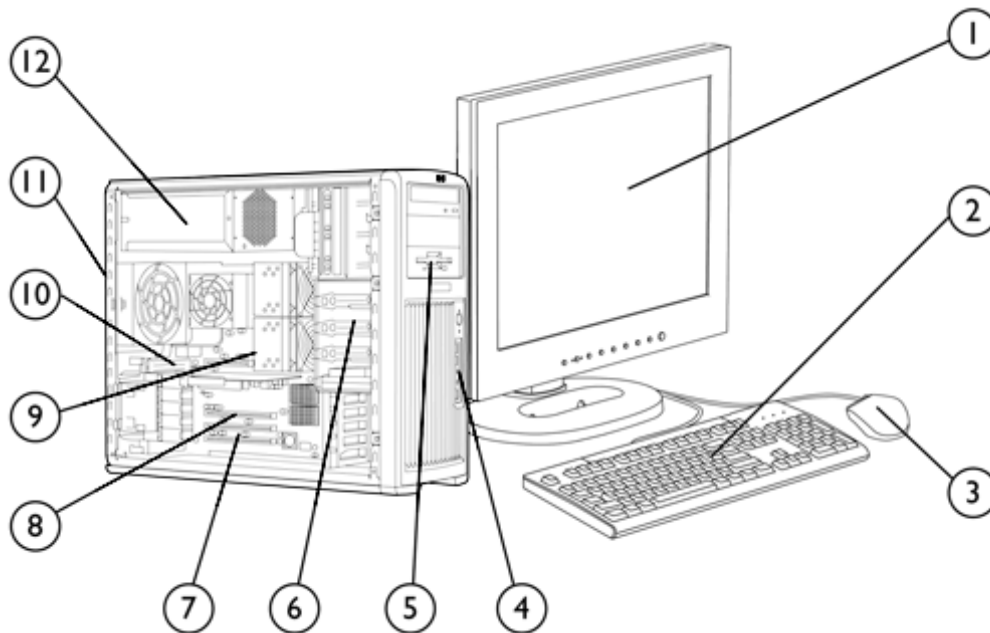


## Overview

HP recommends Windows Vista® Business



1. Monitor (sold separately)
2. Standard Keyboard (USB or PS/2)
3. Mouse (USB or PS/2)
4. Front IO: 2 USB 2.0, IEEE-1394a (standard), headphone and microphone
5. 5.25" external bay for optional diskette drive, optical drive or other 5.25"/3.5" device
6. 5 internal 3.5" bays, 3 external 5.25" bays
7. 1 PCI slot, 1 PCI-X slot, 1 PCIe x1 or x8 (selectable), 2 PCIe x8 (x4 electrically)
8. 2 PCI Express x16 Gen2 Graphics Bus
9. Dual-Core or Quad-Core Intel® Xeon® Processors
10. 8 DIMM slots (16 with riser) for DDR2 FB-DIMM memory
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
12. Choice of 800 or 1050 watt, 80 PLUS power supplies

## Overview

### At A Glance

- Choice of Operating Systems:
  - Genuine Windows Vista® Business 32-bit
  - Genuine Windows Vista® Business 64-bit
  - 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
  - Red Hat Enterprise Linux® WS 4 64-bit
  - Red Hat Enterprise Linux® WS 4 32-bit
  - HP Linux Installer Kit for Linux (includes drivers for both 32-bit & 64-bit OS versions of Red Hat Enterprise Linux WS4 and WS5 - see: <http://www.hp.com/workstations/software/linux>)
- 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)
- Up to 1600 MHz Front Side Bus support
- 4-channel 667/800 MHz FB-DIMM memory subsystem
- Up to 128 GB memory capacity
- PCI Express I/O and PCIe x16 Gen2 graphics
- Dual integrated Broadcom 5755 Gigabit LAN on Motherboard (LoM)
- 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\*
- SATA optical drives
- High Definition integrated audio with internal speaker
- Choice of 800 or 1050 watt 80 PLUS power supply
- ENERGY STAR 4.0 compliance with energy-saving features available on selected configurations (Not supported by Linux)
- Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

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

## Standard Features - Custom Components

### Processor\* and Speed – Up to 2 of the following

#### Quad-Core Intel Xeon Processor with Intel® 64 Architecture

Quad-Core Intel® Xeon® Processor E5405/ 2.00 GHz, 1333 MHz FSB, 80 watt  
Quad-Core Intel® Xeon® Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt  
Quad-Core Intel® Xeon® Processor E5420/ 2.50 GHz, 1333 MHz FSB, 80 watt  
Quad-Core Intel® Xeon® Processor E5430/ 2.66 GHz, 1333 MHz FSB, 80 watt  
Quad-Core Intel® Xeon® Processor E5440/ 2.83 GHz, 1333 MHz FSB, 80 watt  
Quad-Core Intel® Xeon® Processor X5450/ 3.00 GHz, 1333 MHz FSB, 120 watt  
Quad-Core Intel® Xeon® Processor X5460/ 3.16 GHz, 1333 MHz FSB 120W  
Quad-Core Intel® Xeon® Processor X5472/ 3.00 GHz, 1600 MHz FSB 120W\*\*  
Quad-Core Intel® Xeon® Processor X5482/ 3.20 GHz, 1600 MHz FSB 150W\*\*

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

One or two Dual-Core Intel Xeon Processor 5200 Sequence\*  
Intel Xeon E5205/ 1.86 GHz, 6 MB L2, 1066 MHz FSB, 65 watt  
Intel Xeon E5240/ 3.00 GHz, 6 MB L2, 1066 MHz FSB, 65 watt  
Intel Xeon X5260/ 3.33 GHz, 6 MB L2, 1333 MHz FSB, 80 watt  
Intel Xeon X5272/ 3.40 GHz, 6 MB L2, 1600 MHz FSB 80W\*\*\*

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

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

### Operating System – One of the following

Genuine Windows Vista® Business 64-bit\*

Genuine Windows Vista® Business 32-bit

Genuine Windows Vista® 64-bit downgrade to Genuine Microsoft® Windows® XP Professional 64-bit (includes recovery media)

Genuine Windows Vista® 32-bit downgrade to Genuine Microsoft® Windows® XP Professional 32-bit (includes recovery media)

HP Linux Installer Kit (see: <http://www.hp.com/workstations/software/linux>):

- Red Hat Enterprise Linux Workstation 4 (Update 6 or later) (32- or 64-bit version)
- For detailed OS/hardware support information for Linux, see: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

Preloaded: Red Hat Enterprise Linux WS 4 (32- or 64-bit version)

\* The following components are not yet supported on Microsoft Vista Business and HP Workstations; ATI graphics, 1394b cards, dual graphics configurations, Creative SoundBlaster X-fi, RAID 5 10 or data array, memory riser.

## Standard Features - Custom Components

1-5 Hard Disk Drives – Up to 5 SATA drives, 5 SAS* drives, or 6 SAS Small Form Factor (SFF)* drives	SATA Hard Drive (if 1st drive is SATA, 2nd drive can be EITHER SATA or SAS)	Windows Vista	Windows XP	Red Hat Enterprise Linux
	80 GB 7200 rpm SATA 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	160 GB 7200 rpm SATA 3.0 Gb/s NCQ* drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	250 GB 7200 rpm SATA 3.0 Gb/s NCQ* drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	500 GB 7200 rpm SATA 3.0 Gb/s NCQ* drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	1 TB 7200 rpm SATA 3.0 Gb/s NCQ* drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	80 GB 10K rpm SATA NCQ* drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	160 GB 10K rpm SATA NCQ* drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	160 GB 10K rpm SATA NCQ** drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	<b>SAS Hard Drive</b> (8 port SAS Controller included on the system board)	<b>Windows Vista<sup>i</sup></b>	<b>Windows XP</b>	<b>Red Hat Enterprise Linux</b>
	146 GB 10K rpm Small Form Factor SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	73 GB 10K rpm Small Form Factor SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	73 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	146 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	300 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

\* NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux

Factory Integrated RAID* on motherboard for SATA and SAS drives All RAID arrays must be less than 2 TB in size		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	RAID 0 Configuration - Striped Array 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.	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	RAID 0 Configuration - Data Array 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).	Not factory integrated	32-Bit, 64-Bit	Not supported
	RAID 1 Configuration - Mirrored Array 2 SATA or 2 SAS hard drives required. All hard drives must be identical (size/speed/type/bus/functional capabilities).	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	RAID 10 Configuration - Striped/Mirrored Array 4 hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities). Must have 4 HD Drives.	Not factory integrated	32-Bit, 64-Bit	Not supported

### Standard Features - Custom Components

RAID 5 Configuration - Parity Array 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.	Not factory integrated	32-Bit, 64-Bit	Not supported
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\*RAID not available with Xeon 5472 or 5482 processors.

Controllers	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
Integrated SATA 3.0 Gb/s controller With RAID 0 (IS*), RAID 1(IM**), RAID 10(IME***) capability	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5 – no hardware RAID
Integrated SAS controller With RAID 0 (IS*), RAID 1(IM**), RAID 10(IME***) capability	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5 – no hardware RAID
LSI MegaRAID SAS 8888ELP 8-port, PCIe SAS RAID Controller	32-Bit, 64-Bit (RAID 5, 10 not supported)	32-Bit, 64-Bit	WS 4 & 5
HP SAS Back Panel Connector kit (Must have 4 or fewer SAS hard drives to configure this option)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5 - no hardware RAID

#### LSI RAID Definitions:

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

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

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

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

HP Memory - One of the following	DDR2-667 ECC Fully Buffered DIMMs	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	HP 512 MB (1x512 MB) PC2-5300F	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 1 GB (2 x 512 MB) PC2-5300F	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 2 GB (2 x 1 GB) PC2-5300F	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 4 GB (2 x 2 GB) PC2-5300F	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 8 GB (4 x 2 GB) PC2-5300F	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 16 GB (8 x 2 GB) PC2-5300F (utilizes riser - converts 8 DIMM slots into 16)*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 32 GB (16 x 2 GB) PC2-5300F (utilizes riser - converts 8 DIMM slots into 16)*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 64 GB (16 x 4 GB) PC2-5300F (utilizes riser - converts 8 DIMM slots into 16)*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	HP 128 GB (16 x 8 GB) PC2-5300F (utilizes riser - converts 8 DIMM slots into 16)**	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	<b>DDR2-800 ECC Fully Buffered DIMMs</b>			

### Standard Features - Custom Components

HP 4 GB (4x1 GB) DDR2-800 ECC Fully Buffered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
HP 8GB (4x2GB) DDR2-800 ECC Fully Buffered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
HP 16GB (8x2GB) DDR2-800 ECC Fully Buffered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
HP 32GB (16x2GB) DDR2-800 ECC Fully Buffered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
HP 64GB (16x4GB) DDR2-800 ECC Fully Buffered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

\* supported ONLY w/dual processors.

\*\* supported ONLY w/dual processors. Expected availability in 1H 2008.

Removable storage 0 or 1 floppy drive Up to 2 optical drives	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
<b>FDD Floppy drive</b>			
1.44-MB Diskette Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
<b>Optical drives</b>			
HP 16X/48X DVD-ROM SATA Drive**	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
HP 48X CD-RW/DVD Combo SATA Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
HP 16X DVD+-RW SuperMulti SATA Drive with LightScribe***	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

\* May only order one.

\*\* Cannot be 2nd drive.

\*\*\* 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.

Input Devices	Keyboard – One of the following	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	PS/2 Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	USB Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	<b>Mouse – One of the following</b>			
	HP USB Laser Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	PS/2 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	USB 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	USB 3-Button Mouse (optical)	N/A	32-Bit, 64-Bit	WS 4 & 5

### Standard Features - Custom Components

Audio	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
HP Thin USB Powered Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
High Definition Integrated Realtek ALC262 Audio with internal speaker	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
SoundBlaster® X-Fi™ XtremeGamer PCI Audio Card	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported
NIC (Network Interface Controller)	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
Integrated dual Broadcom 5755 Gigabit Ethernet LoM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
Optional PCI Express Broadcom BCM5751 Gigabit Ethernet NIC	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
PCI Express Graphics	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
NVIDIA Quadro NVS 290 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card can be NVS 440 (After Market Option only) or NVS 290)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 370 PCIe (256 MB)– 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 570 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 1700 PCIe (512 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 3500 (256 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 3700 PCIe (512 MB) – 1 or 2 of these cards are supported – 2nd card must match first	TBD	TBD	TBD
NVIDIA Quadro FX 4600 PCIe (768 MB) – 1 or 2 of these cards are supported – 2nd card must match first*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 5600 (1.5 GB) – 1 or 2 of these cards are supported – 2nd card must match first*	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported

\* Requires 1050 watt power supply

### Standard Features - Custom Components

Miscellaneous	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
HP 3-Port IEEE 1394b FireWire PCI Card	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported
HP 3-Port IEEE 1394a FireWire PCI Card	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported
Chassis Intrusion Switch	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP Energy Star 4.0 Enabled Configuration	TBD	32-Bit, 64-Bit	Not Supported
HP Workstation Mouse Pad	N/A	N/A	N/A

Software	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
<b>Standard</b>			
Alert Standard Format specification	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP Performance Tuning Framework	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
Roxio Easy Media Creator (CD or DVD burner)	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
Intervideo WinDVD with DVD player	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP Backup and Recovery	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
PDF Complete	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP ProtectTools Software	TBD	TBD	TBD
<b>Optional</b>			
Microsoft Office 2007 Small Business Edition	32-Bit	32-Bit, 64-Bit	N/A
Microsoft Office 2007 Trial Edition	32-Bit	32-Bit, 64-Bit	N/A
HP Client Manager Software v6.2 (optional download)	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP ProtectTools Security	32-Bit, 64-Bit	32-Bit	N/A



## Standard Features - Specs

<b>Form Factor</b>	Minitower	
<b>Color</b>	Carbonite/Alloy metallic	
<b>PCI Slots</b> (see system board section for more details)	<ul style="list-style-type: none"> <li>• 1 half-length PCI slot</li> <li>• 6 full-length slots with a mechanical card guide support for a PCI card with extender bracket.</li> <li>• 2 PCI Express Gen2 x16 slots</li> <li>• 2 PCI Express x4 slots – with x8 connectors</li> <li>• 1 PCI Express x8/x1 switchable. When in x8 mode, 8 PCIe lanes are routed from the 2nd SECOND PCIe Gen2 x16 slot leaving that slot a PCI Express x8.</li> <li>• Our x8 connectors are open ended, allowing a PCIe x16 card to be seated in the slot.</li> <li>• 1 PCI-X 133MHz slot</li> </ul>	
<b>Bays</b> (see storage section for more details)	Total Bays = 8	
<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, 1 IEEE-1394b, 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>	<ul style="list-style-type: none"> <li>• 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)</li> <li>• 8-channel SAS interface (8 SAS connectors on the motherboard), 2 SAS connectors are capable of External SATA operation</li> <li>• 1 EIDE interface (1 EIDE connector), IEEE 1394, USB 2.0</li> </ul>	
<b>Hard Drive Controller Supported</b>	SATA and SAS controllers	

### Standard Features - Preconfigured Regional Models

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<b>xw8600</b> RB442UA#ABA	<b>OS</b>	Microsoft Vista32B Downgrade to XP32 US
	<b>Base unit</b>	HP xw8600 Workstation
	<b>Chassis</b>	HP xw8600 800W 80+ Efficient Chassis
	<b>Country kit</b>	HP xw8600 Localization Kit US
	<b>Processor</b>	Intel Xeon 5405 2.00 12M/1333 QC (1st)
	<b>Memory</b>	2GB (2x1GB) DDR2-667 ECC FBD
	<b>Hard Drive</b>	160GB SATA 3G/s NCQ 7200 (1st)
	<b>Optical Drive</b>	16X DVD +/- RW SuperMulti SATA (1st)
	<b>Graphics</b>	No Integrated Graphics
	<b>Floppy disk drive</b>	No Floppy Disk Option
	<b>Keyboard</b>	HP PS/2 Standard Keyboard US
	<b>Mouse</b>	HP PS/2 Scroll Mouse
	<b>Other</b>	Microsoft Office 2007 Trial Software US

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<b>xw8600</b> RB443UA#ABA	<b>OS</b>	Microsoft Vista32B Downgrade to XP32 US
	<b>Base unit</b>	HP xw8600 Workstation
	<b>Chassis</b>	HP xw8600 800W 80+ Efficient Chassis
	<b>Country kit</b>	HP xw8600 Localization Kit US
	<b>Processor</b>	Intel Xeon 5440 2.83 12M/1333 QC (1st)
	<b>Memory</b>	4GB (2x2GB) DDR2-667 ECC FBD
	<b>Hard Drive</b>	160GB SATA 3Gb/s NCQ 7200 (1st)
	<b>Optical Drive</b>	16X DVD +/- RW SuperMulti SATA (1st)
	<b>Graphics</b>	No Integrated Graphics
	<b>Floppy disk drive</b>	No Floppy Disk Option
	<b>Keyboard</b>	HP PS/2 Standard Keyboard US
	<b>Mouse</b>	HP PS/2 Scroll Mouse
	<b>Other</b>	Microsoft Office 2007 Trial Software US

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### Standard Features - Preconfigured Regional Models

<b>xw8600</b> RB444UA#ABA	<b>OS</b>	Microsoft Vista32B Downgrade to XP32 US
	<b>Base unit</b>	HP xw8600 Workstation
	<b>Chassis</b>	HP xw8600 800W 80+ Efficient Chassis
	<b>Country kit</b>	HP xw8600 Localization Kit US
	<b>Primary Processor</b>	Intel Xeon 5440 2.83 12M/1333 QC (1st)
	<b>Secondary Processor</b>	Intel Xeon 5440 2.83 12M/1333 QC (2nd)
	<b>Memory</b>	4GB (2x2GB) DDR2-667 ECC FBD
	<b>Hard Drive</b>	160GB SATA 3Gb/s NCQ 7200 (1st)
	<b>Optical Drive</b>	16X DVD +/- RW SuperMulti SATA (1st)
	<b>Graphics</b>	NVIDIA Quadro FX1700 512MB PCIe
	<b>Floppy disk drive</b>	No Floppy Disk Option
	<b>Keyboard</b>	HP PS/2 Standard Keyboard US
	<b>Mouse</b>	HP PS/2 Scroll Mouse
	<b>Other</b>	Microsoft Office 2007 Trial Software US

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<b>xw8600</b> RB445UA#ABA	<b>OS</b>	Microsoft Vista32B Downgrade to XP32 US
	<b>Base unit</b>	HP xw8600 Workstation
	<b>Chassis</b>	HP xw8600 800W 80+ Efficient Chassis
	<b>Country kit</b>	HP xw8600 Localization Kit US
	<b>Primary Processor</b>	Intel Xeon 5460 3.16 12M/1333 QC (1st)
	<b>Memory</b>	4GB (2x2GB) DDR2-667 ECC FBD
	<b>Hard Drive</b>	160GB SATA 3G/s NCQ 7200 (1st)
	<b>Optical Drive</b>	16X DVD +/- RW SuperMulti SATA (1st)
	<b>Graphics</b>	No Integrated Graphics
	<b>Floppy disk drive</b>	No Floppy Disk Option
	<b>Keyboard</b>	HP PS/2 Standard Keyboard US
	<b>Mouse</b>	HP PS/2 Scroll Mouse
	<b>Other</b>	Microsoft Office 2007 Trial Software US

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## Standard Features - Preconfigured Regional Models

<b>xw8600</b> RB446UA#ABA	<b>OS</b>	Microsoft Vista32B Downgrade to XP32 US
	<b>Base unit</b>	HP xw8600 Workstation
	<b>Chassis</b>	HP xw8600 1050W 80+ Efficient Chassis
	<b>Country kit</b>	HP xw8600 Localization Kit US
	<b>Primary Processor</b>	Intel Xeon 5460 3.16 12M/1333 QC (1st)
	<b>Secondary Processor</b>	Intel Xeon 5460 3.16 12M/1333 QC (2nd)
	<b>Memory</b>	4GB (2x2GB) DDR2-667 ECC FBD
	<b>Hard Drive</b>	160GB WD Raptor SATA NCQ 10K (1st)
	<b>Optical Drive</b>	16X DVD +/- RW SuperMulti SATA (1st)
	<b>Graphics</b>	No Integrated Graphics
	<b>Floppy disk drive</b>	No Floppy Disk Option
	<b>Keyboard</b>	HP USB Standard Keyboard US
	<b>Mouse</b>	HP USB Optical Scroll Mouse
	<b>Other</b>	Microsoft Office 2007 Trial Software US

## After-Market Options

Processors		Part Number
	<b>2nd Quad-Core Intel Xeon processor 5400 Series with Intel® 64 Architecture, and 12 MB of L2 cache (2x6 MB shared), (E models are 80 watt)</b>	
	Quad-Core Intel® Xeon® Processor X5472/ 3.0 GHz, 1600 MHz FSB	KY115AA
	Quad-Core Intel® Xeon® Processor X5482/ 3.2 GHz, 1600 MHz FSB	KY114AA
	Quad-Core Intel® Xeon® Processor E5405/ 2.00 GHz, 1333 MHz FSB	GX569AA
	Quad-Core Intel® Xeon® Processor E5410/ 2.33 GHz, 1333 MHz FSB	GX570AA
	Quad-Core Intel® Xeon® Processor E5420/ 2.50 GHz, 1333 MHz FSB	GX571AA
	Quad-Core Intel® Xeon® Processor E5430/ 2.66 GHz, 1333 MHz FSB	GX572AA
	Quad-Core Intel® Xeon® Processor E5440/ 2.83 GHz, 1333 MHz FSB	GX573AA
	Quad-Core Intel® Xeon® Processor X5450/ 3.00 GHz, 1333 MHz FSB	KD215AA
	Quad-Core Intel® Xeon® Processor X5460/ 3.16 GHz, 1333 MHz FSB	GX575AA
	<b>2nd Dual-Core Intel Xeon processor 5200 Series with Intel® 64 Architecture, and 6 MB of Shared L2 cache</b>	<b>Part Number</b>
	Intel Xeon E5205/ 1.86 GHz, 6MB L2, 1066 MHz FSB	GX566AA
	Intel Xeon E5240/ 3.00 GHz, 6MB L2, 1333 MHz FSB	KY198AA
	Intel Xeon X5260/ 3.33 GHz, 6MB L2, 1600 MHz FSB	GX568AA

\* Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: [http://www.intel.com/products/processor\\_number/](http://www.intel.com/products/processor_number/) for details. Intel® 64 Architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 Architecture. Processor will not operate (including 32-bit operation) without an Intel® 64 Architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. See: <http://www.intel.com/technology/64bitextensions> for more information.

Quad-Core and Dual-Core are new technologies 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.

PCI Express Graphics	Multi display solutions	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
	<b>Professional 2D</b>				
	NVIDIA Quadro NVS 290 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card can be NVS 440 (After Market Option only) or NVS 290	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GN502AA
	NVIDIA Quadro NVS 440 PCIe (256 MB) – 2nd card can be NVS 440 (After Market Option only) or NVS 290	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PT453A
	HP 'DMS-59 to Dual VGA' Cable Kit	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GS567AA
	<b>Entry 3D</b>				

## After-Market Options

NVIDIA Quadro FX 370 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GP528AA
NVIDIA Quadro FX 570 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GR521AA
<b>Mid-range 3D)</b>				
NVIDIA Quadro FX 1700 PCIe (512 MB) – 1 or 2 of these cards are supported- 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GP529AA
<b>High-end 3D</b>				
NVIDIA Quadro FX 3500 PCIe (256 MB) – 1 or 2 of these cards are supported- 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	ES357AA
NVIDIA Quadro FX 3700 PCIe (512 MB) – 1 or 2 of these cards are supported- 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	TBD	KD506AA
NVIDIA Quadro FX 4600 PCIe (768 MB) – 1 or 2 of these cards are supported- 2nd card must match first*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	RV706AA
NVIDIA Quadro FX 5600 (1.5 GB) – 1 or 2 of these cards are supported – 2nd card must match first *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GU095AA
* Requires 1050 watt power supply				

## After-Market Options

Hard Drives		Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
<b>SATA Hard Drive</b> (if 1st drive is SATA, 2nd drive can be EITHER SATA or SAS)					
80 GB 7200 rpm SATA 3.0 Gb/s drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PY276AA
160 GB 7200 rpm SATA 3.0 Gb/s NCQ** drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PV944A
250 GB 7200 rpm SATA 3.0 Gb/s NCQ** drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA788AA
500 GB 7200 rpm SATA 3.0 Gb/s NCQ** drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PV943A
80 GB 10K rpm SATA NCQ** drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM172AA
160 GB 10K rpm SATA NCQ** drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW222AA
1 TB 7200 rpm SATA 3.0 Gb/s NCQ** drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE262AA
<b>SAS Hard Drive</b> (8 port SAS Controller included on the system board)					
<b>3.5" SAS Hard Drives</b>					
		Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
73 GB 15K rpm SAS 3.0 Gb/s drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA329AA
146 GB 15K rpm SAS 3.0 Gb/s drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA330AA
300 GB 15K rpm SAS 3.0 Gb/s drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM174AA
<b>2.5" SAS SFF Hard Drives</b>					
73 GB 10K rpm SAS 3.0 Gb/s drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE259AA
146 GB 10K rpm SAS 3.0 Gb/s drive		32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE261AA

1394 PCI Cards		Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
HP IEEE 1394a FireWire 3-Port PCI Card		Not supported	32-Bit, 64-Bit	Not supported	PA997A
HP IEEE 1394b FireWire 3-Port PCI Card		Not supported	32-Bit, 64-Bit	Not supported	EA327AA

### After-Market Options

Input/Output Devices	Keyboards	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
	HP PS/2 Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DT527A
	HP USB Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DT528A
	HP USB Smartcard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	ED707AA
	<b>Pointing Devices</b>				
	HP USB Laser Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GW405AA
	HP PS/2 2-Button Scroll Mouse (Carbonite)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DD440B
	HP USB Optical Scroll Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DC172B
	HP USB Optical 3-Button Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DY651A
	HP USB Optical 3-Button 2.9M OEM Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	ET424AA
	HP Space Explorer USB 3d Input Device	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	RY429AA
	HP SpacePilot USB Intelligent Controller	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported	EF390AA

Networking	NICs	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
	Intel Pro/1000 PT Gigabit PCIe NIC	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EH352AA
	Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA833AA

Controllers		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	LSI MegaRAID SAS 8888ELP 8-port, PCIe SAS RAID Controller	32-Bit, 64-Bit (RAID 5, 10 not supported)	32-Bit, 64-Bit	WS 4 & 5	GE258AA

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

Memory modules	PC2-5300F (DDR2-667) ECC Fully Buffered DIMMs	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
	HP 512 MB	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM159AA
	HP 1 GB	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM160AA
	HP 2 GB	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM161AA
	HP 4 GB	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM162AA
	HP 8 GB (requires riser board)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GM112AA



### After-Market Options

Monitors	TFT display	Part Number
(Supported by all Operating Systems available from HP)	HP LP3065 30-inch Widescreen LCD Monitor	EZ320A4
	HP LP2465 24-inch Widescreen LCD Monitor	EF224A4
	HP LP2065 20-inch LCD Monitor	EF227A4
	HP L1965 19-inch LCD Monitor	RA373AA

Removable Storage	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
<b>FDD floppy drive</b>				
1.44 MB Internal Floppy Drive (1 only)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DY670A
<b>Optical drives</b>				
SATA 16X DVD-ROM Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW268AA
HP 48X CD-RW/DVD Combo SATA Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW267AA
HP 16X DVD+-RW SuperMulti SATA Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW269AA
<b>Other options</b>				
HP 16-In-1 Media Card Reader with PCI Card – available Q3	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	EM718AA
* Cannot be 2nd drive				
** LightScribe software supported with Windows XP/Vista only. LightScribe 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.				

Audio	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
HP USB Powered Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	RD628AA
SoundBlaster X-Fi XtremeGamer Audio Card	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported	GE257AA

Other devices/kits	Part Number
HP Internal USB Port Kit	EM165AA
PCI Front and Rear Fan Kit	EM163AA
HP SAS Back Panel Connector	EM164AA

Brackets/Rack Kits	Part Number
HP xw8/9 Bulk 10 Pack PCI Hold Down Kit	EN764AA
xw8400 Slide Rack Kit IT/Broadcast	DY664A

## After-Market Options

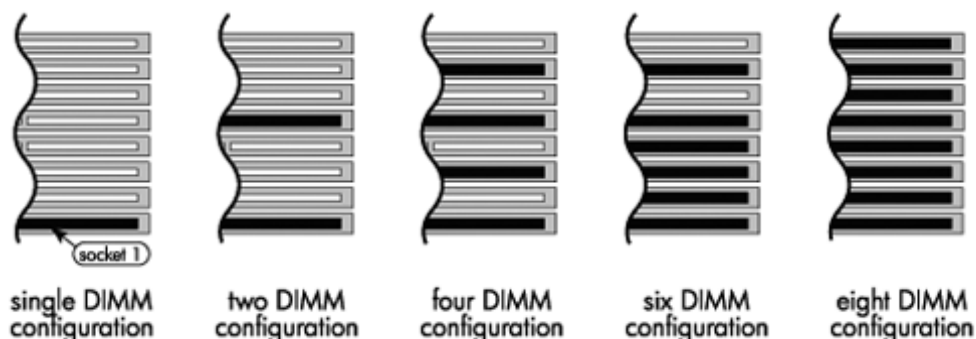
Security features	Part Number
HP Business PC Security Lock Kit	PV606AA
Kensington Security Cable & Lock	PC766A

Software	Windows Vista	Windows XP	Red Hat Enterprise Linux	Part Number
HP RGS PC 3-year Software Assurance	No	Yes	No	GN039AA
HP RGS V5 PC Edition	No	Yes	No	GN038AA
HP RGS V5 Receiver Site License	No	Yes (Free Download)	Yes (Free Download)	GN034AA
HP RGS V5 Workstation Edition	No	Yes	Yes	GN035AA
HP RGS Workstation 3-year Software Assurance	No	Yes	Yes	GN036AA

## Memory

### DDR2 ECC REGISTERED FB-DIMM MEMORY

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.



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 & 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.

### MAXIMUM MEMORY

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.

### POSSIBLE MEMORY CONFIGURATIONS

Not all memory configurations possible are represented below. Also, 512 MB configurations are not supported for 64-Bit operating systems.

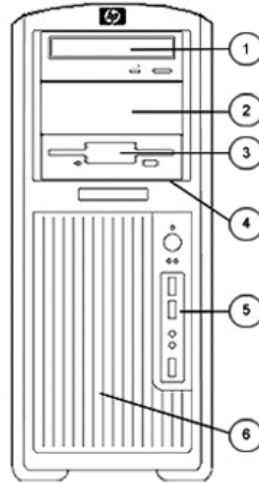
DIMM Size	Slot							
	1	2	3	4	5	6	7	8
512 MB	512 MB							
1 GB	1 GB							
1 GB	512 MB				512 MB			
2 GB	1 GB				1 GB			
2 GB	512 MB		512 MB		512 MB		512 MB	
4 GB	1 GB		1 GB		1 GB		1 GB	
4 GB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
6 GB	1 GB	1 GB	1 GB	1 GB	1 GB		1 GB	
8 GB	2 GB		2 GB		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
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

## Memory

<b>64 GB</b> (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
<b>128 GB</b> (requires riser cards, expected availability in 1H 2008)	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

## Storage

Tower configuration



### Minitower

- Optional Diskette Drive
- 5.25" Storage Drive Bays  
Third external 5.25" bay is not full-depth, bottom bay is limited to 200mm device depth.
- 3.5" Storage Drive Bays with acoustic dampening rail assemblies  
SFF SATA drives have 2:3 bay adapter, so they can convert 2 bays to 3 or 4 bays to 6, enabling up to 6 hard drives.
- 3.5" Storage Drive Bay

	Quantity Supported	Position Supported	Controller
Optional Diskette Drive	1	3	IDE
5.25" Storage Drive Bays Third external 5.25" bay is not full-depth, bottom bay is limited to 200mm device depth.	3	1, 2, 3	IDE
3.5" Storage Drive Bays with acoustic dampening rail assemblies SFF SATA drives have 2:3 bay adapter, so they can convert 2 bays to 3 or 4 bays to 6, enabling up to 6 hard drives.	4	5 (4 standard drive bays native)	SATA or SAS
3.5" Storage Drive Bay	1	6 (5 <sup>th</sup> drive is supported here, tools required for attach, no acoustic dampening)	SATA or SAS

SATA and SAS may be only mixed in a Windows configuration. Here are the rules for mixing hard drives:

1. The boot/data drive must be SATA to load before any SAS drive.
2. Any size or speeds may be chosen for drives 1-3.
3. However, hard drive 4 must be the same size/speed as hard drive

## Storage

3

4. Hard drive 5 must be the same as hard drive 4.

In non-mixed Microsoft Windows and Linux systems, rules 2 & 3 apply.

Configure-to-order RAID configs must all have the same size/speed hard drives.

Using external enclosures, an additional 8 channels of SAS can be supported if there are no other

\* Factory Integrated RAID 0 Configuration (Striped Array) and RAID 1 Configuration (Mirrored Array) requires 2 hard drives with identical speeds, capacity and interface. Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix) for details. If your first HD is a SATA drive, the 2nd must be also. Mixing of SATA and SAS is not supported under Linux.

## Technical Specifications

System Board	
Chipset	Intel® 5400
Super I/O Controller	SMSC SCH5327
System Board Form Factor	SSI-EEB (E-ATX 12" x 13")
Processor Socket	Dual LGA 771
DIMM Connectors (FBD DDR2)	8 (16 with Risers)
PCI Connectors (5.0V)	1 full length 33 MHz 32-Bit
PCI-X Connectors	1 full length 133 MHz 64-Bit
PCI Express 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)
PCI Card Guide	Optional, tool-free support for all full-length cards with PCI extender
Flash ROM	Yes
Integrated Audio	High Definition Integrated Realtek ALC262 Audio with Line in, Line Out, Microphone, Headphone
CD-ROM IN (audio)	No
AUX IN (audio)	Yes
Clear CMOS Button	Yes
CPU Fan Headers	2
Chassis Fan Headers	2
Chassis Speaker Header	Yes
CMOS Battery Holder - Lithium	Yes
Hood Lock Header	Yes
Hood Sensor Header	Yes, as part of the front control panel header, connected by cable-to-switch. Cable/Switch assembly is a configure-to-order option.
Multibay Header	No
Integrated Gigabit Ethernet	2 Broadcom BCM5755 A2
Wake on LAN	Yes
Integrated Trusted Platform Module	TPM 1.2
ASF 1.0 & 2.0 (Alert Standard Format)	Yes
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> <li>● RAID 5 configuration - parity striping</li> </ul> <p><b>NOTE:</b> 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.</p>

## Technical Specifications

	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.
Integrated SAS RAID (LSI 1068X)*	<ul style="list-style-type: none"> <li>■ RAID 0, 1, 10</li> <li>■ Support one RAID array with 2-5(6) 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>NOTE:</b> 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>
SAS/SATA Connectors	6 SATA only connectors 4 SAS connectors, 2 of these SAS connectors (color coded red) can be used for External SATA (eSATA) with the appropriate eSATA After Market Option kit
IEEE 1394 Connectors	1 IEEE 1394b rear connector, 1 IEEE 1394a header for front connector (Not supported in Linux)
USB 2.0 Connectors	8 total: 5 rear, 2 on header for front connectors, 1 internal
Power Supply Headers	2x12 connector, 2x4 CPU connector, 2x3 memory connector
Power Switch, Power LED & Hard Drive LED Header	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.
Password Clear Header	Yes

<b>Cooling</b>	
Power Supply Fan	92 mm x 32 mm
Memory Fan	92 mm x 25 mm (for systems without memory risers)
Processor Fan-Heatsink	80 mm x 15 mm (single or dual)
Chassis Fan (rear)	One 120 mm x 25 mm
Optional Front PCI fan	80 mm x 25 mm - not required for most workstation compute environments

<b>Power Supply</b>				
Power Supply	800W Custom PSU (Wide Ranging, Active PFC)		1050W Custom PSU – (Wide Ranging, Active PFC)	
Operating Voltage Range	90 – 269 VAC		90 – 269 VAC	
Rated Voltage Range	100 – 240 VAC	118 VAC	100 – 240 VAC	118 VAC
Rated Line Frequency	50/60Hz	400Hz	50/60 Hz	400Hz
Operating Line Frequency Range	47 – 66 Hz	393 – 407 Hz	47 – 66 Hz	393 – 407 Hz
Rated Input Current	10.0A @ 100-127 VAC 6A @ 200-240 VAC	9.5A @ 118 VACC	13.2A @ 100-127 VAC 6.6A @ 200-240 VAC	12.0A @ 118 VAC
Heat Dissipation (Configuration and software dependent)	Typical 1530 btu/hr (386 kg-cal/hr) Maximum 2027 btu/hr (511 kg-cal/hr)		Typical 3136 btu/hr (791 kg-cal/hr) Maximum 4480 btu/hr (1129kg-cal/hr)	
Power Supply Fan	92x32 mm variable speed		92x32 mm variable speed	
Energy Star 4.0 Compliant	Yes		Yes	
80 PLUS® Compliant	Yes		Yes	





## Technical Specifications

FEMP Standby Power Compliant @115V (<2W in S5 – Power Off, with Wake on LAN disabled)	Yes	No
Power Consumption in ES Mode – Suspend to RAM (S3) (Instantly Available PC)	<20W	<25W

BIOS Features	Description
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ASF 2.0 Compliant	Allows workstation status to be monitored on a remote console.
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01 +	Provides more control over how and from what devices the workstation will boot.
Instantly Available PC	Allows for very low power consumption with quick resume time
ROM Based F10 Setup and Power-on Self Test	Review and customize BIOS settings
Remote System Installation via F12 (PXE) (remote boot from server)	Allows a new or existing system to boot over the network and download software, including the operating system
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS
ROM Revision Levels	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
System Board Revision Level	Allows management SW to read the revision level of the system board Revision level is digitally encoded into the hardware and cannot be modified
Auto Setup when new hardware installed	System automatically detects addition of new hardware
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, parallel, USB, audio, SAS and network ports
Removable Media Write/Boot Control	Prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-on Password	Prevents an unauthorized person from booting up the workstation
Setup Password	Prevents an unauthorized person from changing the workstation configuration
Replicated Setup	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
Memory Change Alert (requires HP Client Manager Software)	Alerts management console if memory is removed or changed
Thermal Alert (requires HP Client Manager Software)	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li>● <b>NORMAL</b> - normal temperature ranges</li> </ul>

## Technical Specifications

	<ul style="list-style-type: none"> <li>● <b>ALERTED</b> - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown</li> <li>● <b>SHUTDOWN</b> - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs</li> </ul>
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup/Shutdown	<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>
ACPI (Advanced Configuration and Power Interface)	<ul style="list-style-type: none"> <li>● Allows the system to enter and wake from a low power mode</li> <li>● Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system</li> </ul> Supports ACPI 2.0 for full compatibility with 64-Bit operating system
Keyboard-less Operation	The system can be operated without a keyboard
SMBIOS	System Management BIOS 2.5, previously known as DMI BIOS, for system management information
Localized ROM Setup	Common BIOS image supports configuration (Setup) in 12 languages, with local keyboard mappings
Asset Tag	Allows user or MIS to set unique tag string in ROM
Ownership Tag	Allows user or MIS to set unique tag string in ROM
Memory Scrubbing	Allows memory controller to transparently correct transient ECC errors in the background
Memory Remapping	Allows system memory lost to PCI devices to be reclaimed above 4 GB, for use with operating systems that support more than 4 GB (Microsoft Windows XP 64-Bit edition, Linux)
Per-slot Control	Allows individual slot configuration (option ROM., latency)
Adaptive Cooling	Fan control parameters are set according to detected hardware configuration for optimal acoustics
Pre-boot Diagnostics	Early (pre-video) critical errors are reported via beeps and blinks on the power LED

Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0c
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	ATA Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
BIOS 32-Bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	<ul style="list-style-type: none"> <li>● Enhanced Disk Drive Specification Version 1.1</li> <li>● BIOS Enhanced Disk Drive Specification Version 3.0</li> </ul>
PCI	<ul style="list-style-type: none"> <li>● PCI Local Bus Specification, Revision 2.3</li> <li>● PCI Power Management Specification, Revision 1.1</li> </ul>
PCI Express	PCI Express Base Specification, Revision 1.1
PMM	POST Memory Manager Specification, Version 1.01
SATA	<ul style="list-style-type: none"> <li>● Serial ATA Specification, Revision 1.0a</li> <li>● Serial ATA 3.0Gb/s: Extensions to Serial ATA 1.5Gb/s, Revision 1.0</li> </ul>
SAS	SAS specification 1.1
SMBIOS	System Management BIOS Reference Specification, Version 2.5
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification

## Technical Specifications

Serviceability Features of System	
Access panel	Tool-less, one-handed
Optical drives	Tool-less
Floppy drive	Drive requires screws to attach to bracket, once attached to mounting bracket, it latches tool-lessly to chassis
Hard drives	Tool-less
Expansion cards	Tool-less
Green user touch points	Yes, on tool-free internal chassis mechanisms
Color-coordinated cables and connectors	Yes
Memory	Tool-less, can be upgraded without removing any internal components
CPUs	A torx driver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Chassis fan removal	Tool-less
OS CD (Restore OS CD)	Restores computer to its original factory shipping Operating System - No recovery CDs will ship with Windows XP, Vista or Linux - an ISO image will be available on an HD partition.
Restore CD	Restores the computer to its original factory shipping image - Can be obtained via HP Support
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Dual function front power switch	Causes a fail-safe power off when held for 4 seconds
Insight Diagnostics	<b>HP Insight Diagnostics Offline Edition</b>
	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:
	<ul style="list-style-type: none"> <li>• Run diagnostics</li> <li>• View the hardware configuration of the system</li> </ul>
	<b>Key features and benefits</b>
	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:
	<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>

Other Deployment & Management Features	
HP Client Management Solutions	Visit: <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a>

## Technical Specifications

Security Features	
<b>Access Panel Key Lock</b> (standard)	Prevents removal of the access panel and all internal components including optical and floppy drives
<b>Padlock</b> (optional)	Prevents entire system theft and discourages access panel removal. 7mm diameter padlock loop at rear of system.
<b>Kensington Cable Lock</b> (optional)	Prevents entire system theft only. 3mm x 7mm slot at rear of system
<b>Universal chassis clamp lock</b> (optional)	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.
<b>Service and Support</b>	<p>On-site Warranty and Service (<a href="#">Note 1</a>): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (<a href="#">Note 2</a>) service for parts and labor and includes free telephone support (<a href="#">Note 3</a>) 8am - 5pm. Global coverage (<a href="#">Note 2</a>) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.</p> <p><a href="#">NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.</a></p> <p><a href="#">NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.</a></p> <p><a href="#">NOTE 3: 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.</a></p>

## Technical Specifications - Environmental

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: <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>
	*This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'

Energy Consumption							
Example Configuration #1	Processor Info	1x Xeon 5130 2.00GHz					
	Memory Info	4x1 GB DR 667MHz					
	Graphics Info	1xFX1700					
	Disks/Optical/Floppy	1x160GB SATA/1 Optical/1 Floppy					
	PSU	800W 80 PLUS®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	140.2W		137.9W		141.3W	
	Windows Busy Typ(S0)	190.3W		182.7W		192.3W	
	Windows Busy Max (S0)	203.1W		201.8W		200.8W	
	Sleep (S3)	6.26W	4.59W	6.53W	4.92W	6.25W	4.61W
	Off (S5)	3.00W	1.39W	3.29W	1.68W	2.97W	1.36W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	478.5 btu/hr		470.6 btu/hr		482.3 btu/hr	
	Windows Busy Typ(S0)	649.5 btu/hr		623.6 btu/hr		656.3 btu/hr	
	Windows Busy Max (S0)	693.2 btu/hr		688.7 btu/hr		685.3 btu/hr	
	Sleep (S3)	21.4 btu/hr	15.7 btu/hr	22.3 btu/hr	21.4 btu/hr	15.7 btu/hr	22.3 btu/hr
	Off (S5)	10.2 btu/hr	4.71 btu/hr	11.2 btu/hr	10.2 btu/hr	4.71 btu/hr	11.2 btu/hr

## Technical Specifications - Environmental

Example Configuration #2	Processor Info	2x Intel Xeon 2.33GHz (80w)					
	Memory Info	8x2GB DR 667MHz					
	Graphics Info	1xFX4600					
	Disks/Optical/Floppy	2x73GB 15k SAS / 2 Optical / 1 Floppy					
	PSU	800W 80 PLUS®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	280.2W		279.8W		281.7W	
	Windows Busy Typ(S0)	478.8W		474.5W		476.3W	
	Windows Busy Max (S0)	565.8W		557.3W		584.1W	
	Sleep (S3)	16.17W	14.34W	15.85W	16.17W	14.34W	15.85W
	Off (S5)	3.03W	1.38W	3.40W	3.03W	1.38W	3.40W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	956.3 btu/hr		954.9 btu/hr		961.4 btu/hr	
	Windows Busy Typ(S0)	1634.1 btu/hr		1619.5 btu/hr		1625.6 btu/hr	
	Windows Busy Max (S0)	1931.1 btu/hr		1901.9 btu/hr		1993.5 btu/hr	
	Sleep (S3)	55.2 btu/hr	48.9 btu/hr	54.1 btu/hr	55.2 btu/hr	48.9 btu/hr	54.1 btu/hr
	Off (S5)	10. btu/hr	4.71 btu/hr	11.6 btu/hr	10. btu/hr	4.71 btu/hr	11.6 btu/hr

Example Configuration #3	Processor Info	2x Intel Xeon E5460 (3.16GHz)					
	Memory Info	16x4GB DR 667MHz					
	Graphics Info	2xFX5600					
	Disks/Optical/Floppy	2x73GB 15k SAS / 2 Optical / 1 Floppy					
	PSU	1050W 80 PLUS®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	470.1W		460.6W		473.0W	
	Windows Busy Typ(S0)	722.8W		708.2W		730.0W	
	Windows Busy Max (S0)	985.5W		969.6W		990.0W	
	Sleep (S3)	20.41W	18.75W	22.09W	20.56W	20.32W	18.78W
	Off (S5)	4.09W	2.58W	6.25W	4.01W	4.02W	2.40W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	1604.5 btu/hr		1572.1 btu/hr		1614.4 btu/hr	
	Windows Busy Typ(S0)	2466.9 btu/hr		2417.1 btu/hr		2491.5 btu/hr	
	Windows Busy Max (S0)	3363.5 btu/hr		3309.3 btu/hr		3378.9 btu/hr	
	Sleep (S3)	69.7 btu/hr	63.9 btu/hr	75.4 btu/hr	70.2 btu/hr	69.4 btu/hr	64.1 btu/hr
	Off (S5)	13.9 btu/hr	8.81 btu/hr	21.3 btu/hr	13.7 btu/hr	13.7 btu/hr	8.19 btu/hr

## Technical Specifications - Environmental

Example Configuration #4  (Energy Star Compliant)	Processor Info	2x Intel Xeon 5430 2.66GHz					
	Memory Info	4x 1GB DR 667MHz					
	Graphics Info	FX1700					
	Disks/Optical/Floppy	1x250GB SATA/ 1xDVD-ROM					
	PSU	800W 80 PLUS®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	ENERGY STAR® Idle (S0)	143.9W		142.0W		145W	
	ENERGY STAR® PTEC (Total Energy Consumption) Windows running Linpack and Viewperf	311.1W		306.8W		312.8W	
	ENERGY STAR® "Sleep" (S3)	4.6W	–	4.6W	–	4.9W	–
	ENERGY STAR® "Standby" (Off) (S5)	3.00W	1.39W	3.29W	1.68W	2.97W	1.36W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	ENERGY STAR® Idle (S0)	491.2 btu/hr		484.7 btu/hr		494.9 btu/hr	
	ENERGY STAR® PTEC (Total Energy Consumption) Windows running Linpack and Viewperf	1061.8 btu/hr		1047.1 btu/hr		1067.6 btu/hr	
	ENERGY STAR® "Sleep" (S3)	15.7 btu/hr	–	15.7 btu/hr	–	16.7 btu/hr	–
	ENERGY STAR® "Standby" (Off) (S5)	10.2 btu/hr	4.74 btu/hr	11.2 btu/hr	5.73 btu/hr	10.2 btu/hr	4.64 btu/hr

## Technical Specifications - Environmental

Example Configuration #5 (Energy Star Compliant)	Processor Info	2x Intel Xeon 5430 2.66GHz					
	Memory Info	4x2GB 667MHz					
	Graphics Info	FFX4600					
	Disks/Optical/Floppy	1x250GB SATA/ 1x DVD-ROM					
	PSU	800W 80 PLUS®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	ENERGY STAR® Idle (S0)	205W		199.4W		206.2W	
	ENERGY STAR® PTEC (Total Energy Consumption) Windows running Linpack and Viewperf	417W		410.2W		419.7W	
	ENERGY STAR® "Sleep" (S3)	5.4W	–	5.5W	–	5.4W	–
	ENERGY STAR® "Standby" (Off) (S5)	3.00W	1.39W	3.29W	1.68W	2.97W	1.36W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	ENERGY STAR® Idle (S0)	699.7 btu/hr		680.6 btu/hr		888.1 btu/hr	
	ENERGY STAR® PTEC (Total Energy Consumption) Windows running Linpack and Viewperf	1423.2 btu/hr		1400.0 btu/hr		1432.5 btu/hr	
	ENERGY STAR® "Sleep" (S3)	18.4 btu/hr	–	18.8 btu/hr	–	18.4 btu/hr	–
	ENERGY STAR® "Standby" (Off) (S5)	10.2 btu/hr	4.74 btu/hr	11.2 btu/hr	5.73 btu/hr	10.2 btu/hr	4.64 btu/hr

### NOTES:

\* Energy Star low energy mode

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

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



## Technical Specifications - Environmental

Declared Noise Emissions (High and entry level configurations)			
<b>System Configuration</b> (Entry-level)	<b>Processor Info</b> <b>Disks/Optical/Floppy</b>	Dual Intel Xeon E5440 2.83GHz CPUs, 4 x 1GB FBD memory, one 250 GB 7200RPM SATA, Floppy, and DVD ROM optical, NVIDIA NVS 290 graphics, 800 W PSU	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWad, bels)	<b>Deskside</b> <b>Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	4.2	24
	<b>SATA Hard drive Operating</b> (random reads – 30.3 reads/sec)	4.2	24
	<b>Floppy Drive Operating</b> (continuous copy)	4.5	28
	<b>DVD-ROM Operating</b> (sequential reads)	5.1	36
<b>System Configuration</b> (High-end)	<b>Processor Info</b> <b>Graphics Info</b> <b>Disks/Optical/Floppy</b>	Dual Intel Xeon E5460 3.16 GHz CPUs, 4 x 1GB FBD memory, two 146 GB 15K RPM SAS, Floppy, and DVD ROM optical, nVidia FX4600 Graphics, 1050 W PSU.	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWad, bels)	<b>Deskside</b> <b>Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	4.7	29
	<b>SAS Hard drive Operating</b> (random reads)	4.9	31
	<b>Floppy Drive Operating</b> (continuous copy)	4.9	31
	<b>DVD-ROM Operating</b> (sequential reads)	5.2	36
<b>Longevity and Upgrading</b>	<p>This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:</p> <ul style="list-style-type: none"> <li>● Intel LGA775 processor sockets</li> <li>● 8 USB ports</li> <li>● 1 PCI slot, 1 PCI-X slots and 5 PCI Express slots</li> <li>● 8 expansion bays</li> <li>● 8 – 16 memory slots, depending on configuration</li> </ul>		

## Technical Specifications - Environmental

<b>Batteries</b>	<p>This product complies with ISO standards:</p> <ul style="list-style-type: none"> <li>● EU Directive 91/ 157/ EEC</li> <li>● EU Directive 93/ 86/ EEC</li> <li>● EU Directive 98/ 101/ EEC</li> </ul> <p>Batteries used in the product do not contain:</p> <ul style="list-style-type: none"> <li>● Mercury greater than 5ppm by weight</li> <li>● Cadmium greater than 10ppm by weight</li> <li>● Lead greater than 4000ppm by weight.</li> </ul> <p>Battery size: CR2032 (coin cell) Battery type: Lithium</p>
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<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>	
<b>Packaging Materials</b>		
External	Cardboard carton and insert	2.70 kg
Internal	LDPE Foam	0.35 kg

<b>Material Usage</b>	<p>This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at: <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html</a>):</p> <ul style="list-style-type: none"> <li>● Asbestos</li> <li>● 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> </ul>
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## Technical Specifications - Environmental

- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

### Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

### End-Of-Life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

### Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:

[link to new HP white paper now in progress]

Global Citizenship Report:

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications:

<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

ISO 14001 certificates:

<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

## Technical Specifications - Audio

High Definition Integrated Type	Integrated
Realtek ALC262 Audio	
High Definition Codec	Yes
SPDIF	No
External audio jacks	One front stereo analog microphone-in One front stereo headphone-out One rear line-in One rear line-out One rear stereo analog microphone-in
Internal audio connectors	AUX-IN line-level analog input
Retasking	<b>NOTE:</b> All external audio ports are retaskable as Line-In, Line-Out, Microphone-In, or Headphone-Out
Sampling	44.1kHz/48 kHz/96kHz/192kHz (output only)
Wavetable syntheses (software)	Yes - Uses OS soft wavetable
Digital audio	Yes
Analog audio	Yes
Number of channels on Line-Out (mono/stereo)	Two independent stereo outputs (Left & Right channels)
Internal audio speaker power rating	1.5 W
Internal speaker	Yes
Microphone features	Stereo Microphone supporting: Acoustic echo cancellation Noise suppression Beam forming

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HP Thin USB Powered Speakers (KK912AA)	On/Off/Volume Controls	Right side of right speaker
	Power LED	Front of right speaker (green)
	Frequency response	FO to 20kHz
	Watts	2/3 watt (normal/maximum)
	Dimensions (H x W x D)	Speakers: 5.72 x 3.74 x 0.96 in (14.52 x 9.50 x 2.45 cm) per speaker
	Net weight	0.68 lbs (0.31kg)
	Environmental (all conditions non-condensing)	<b>Temperature</b> (operating) 14° to 104° F (-10° to 40° C) <b>Relative Humidity</b> (operating) 40% to 90%
	Speaker cable length	Input cord: 5.91 ft (1800mm±35mm) L-channel cord: 3.28 ft (1000mm±35mm) USB cord: 5.91 ft (1800mm±35mm)
	Color	HP Carbonite
	Option kit contents	<ul style="list-style-type: none"> <li>One pair of HP Thin USB Powered Speakers with attached audio signal and USB power cables for connecting to your PC</li> <li>HP Warranty documentation</li> </ul>

## Technical Specifications - Controllers

Opt. Sound Blaster X-Fi XtremeMusic (PCI)	<b>Audio Quality</b>	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter) = 0.004%										
	<b>Signal to Noise Ratio (SNR)</b>	Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted) <ul style="list-style-type: none"> <li>● Stereo Output: 109dB</li> <li>● Front and Rear Channels: 109dB</li> <li>● Center, Subwoofer and Side Channels: 109dB</li> </ul>										
	<b>Sound Conversion</b>	24-bit Analog-to-Digital conversion of analog inputs at 96kHz sample rate 24-bit Digital-to-Analog conversion of digital sources at 96kHz to analog 7.1 speaker output 24-bit Digital-to-Analog conversion of stereo digital sources at 192kHz to stereo output										
	<b>Recording/Sampling Rate</b>	44.1, 48 and 96kHz										
	<b>ASIO 2.0 support</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 24-bit/96kHz										
	<b>DACs</b>	24-bit/192kHz										
	<b>Voice Support</b>	128 voices										
	<b>Max. Channels in 3D Positional Audio</b>	7.1										
	<b>EAX® ADVANCED HD™ 5.0 support</b>	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™										
	<b>Connectors</b>	FlexiJack (Performing a 3-in-1 function, Digital In / Line In / Microphone) via 3.50 mm minijack Line level out (Front / Rear / Center / Subwoofer / Rear Center) via 3.50 mm minijacks AUX_IN line-level analog input via 4-pin Molex connector on card One AD_Link (26 pin) connector for linking to the X-Fi I/O Console (upgrade option)										
	<b>Dimensions</b>	7.25 x 5 x 0.9 inches; 18.42 x 12.7 x 2.29 cm										
	<b>Additional product features</b>	<table border="0"> <tr> <td><b>Movies</b></td> <td>THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback</td> </tr> <tr> <td><b>Music</b></td> <td>X-Fi 24-bit Crystalizer CMSS-3D SuperRip</td> </tr> <tr> <td><b>Audio Creation</b></td> <td>Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI</td> </tr> <tr> <td><b>Gaming</b></td> <td>EAX ADVANCED HD 5.0</td> </tr> <tr> <td><b>Software Bundle</b></td> <td>Doom 3 Sound Blaster EAX patch</td> </tr> </table>	<b>Movies</b>	THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback	<b>Music</b>	X-Fi 24-bit Crystalizer CMSS-3D SuperRip	<b>Audio Creation</b>	Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI	<b>Gaming</b>	EAX ADVANCED HD 5.0	<b>Software Bundle</b>	Doom 3 Sound Blaster EAX patch
<b>Movies</b>	THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback											
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<b>Gaming</b>	EAX ADVANCED HD 5.0											
<b>Software Bundle</b>	Doom 3 Sound Blaster EAX patch											

## Technical Specifications - Controllers

			<ul style="list-style-type: none"> <li>Entertainment Mode</li> <li>Audio Creation Mode</li> <li>Game Mode</li> <li>Mode Switcher</li> <li>Audio Console</li> <li>Creative MediaSource</li> <li>Creative MediaSource DVD-Audio Player</li> <li>DTS Neo:6 Settings</li> <li>Karaoke Player</li> <li>Entertainment Center</li> <li>Smart Recorder</li> <li>SoundFont Bank Manager</li> <li>Speaker Connection Wizard</li> <li>THX Setup Console</li> <li>Vienna SoundFont Studio</li> <li>Volume Panel</li> <li>WaveStudio</li> <li>Console Launcher</li> <li>Creative Media Toolbox</li> <li>Creative Diagnostics</li> </ul>
	<b>Minimum System Requirements</b>	<b>System RAM</b>	256 MB
		<b>Hard Disk</b>	600MB free space Available PCI 2.1 slot for the audio card CD-ROM/CD-RW or CD/DVD-ROM required for software installation
		<b>Operating System</b>	Microsoft Windows XP Professional Service Pack 2 (SP2), Microsoft Windows XP Professional x64, Microsoft Windows Vista Business 32 and 64
<b>Two Integrated PCI Express Broadcom BCM5755 NetXtreme Gigabit Ethernet Network Controller LoMs</b>	<b>Connector</b>	RJ-45	
	<b>Controller</b>	Broadcom 5755 PCI-E LAN Controller	
	<b>Memory</b>	Integrated 48KB receive buffer and 8KB transmit buffer	
	<b>Data rates supported</b>	10/100/1000 Mbps	
	<b>Compliance</b>	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control	
	<b>Bus architecture</b>	PCIe 1.0a	
	<b>Data path width</b>	X1	
	<b>Data path speed</b>	2.5Gbit per sec per direction transfer rate	
	<b>Data transfer mode</b>	Bus-master DMA	
	<b>Hardware certifications</b>		
	<b>Power requirement</b>	1.5 watts @ +3.3V AUX supply	
	<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	

## Technical Specifications - Controllers

<b>Operating system driver support</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop
<b>Management capabilities</b>	WOL, PXE
<b>Alerting</b>	ASF 2.0 (One LOM only - LAN port furthest away from the PCI slots does not support ASF 2.0)

<b>Intel Pro/1000 GT Gigabit NIC (PCIe)</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Intel 82541PI Gigabit Controller
	<b>Memory</b>	Integrated 64 KB
	<b>Data rates supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	<b>Bus architecture</b>	PCI 2.3
	<b>Data path width</b>	32-Bit PCI
	<b>Data path speed</b>	32 bit 33/66 MHz - 266 Mb/s full duplex
	<b>Data transfer mode</b>	Bus-master DMA
	<b>Hardware certifications</b>	FCC class , BSMI B for Taiwan, VCCI B for Japan
	<b>Power requirement</b>	800 mA @ +5 VDC
	<b>IEEE support</b>	802.2 and 802.3ab
	<b>Network transfer rate</b>	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
100BASE-TX (half-duplex) 100 Mbps		
1000BASE-T, 1000 Mbps		
<b>Environmental</b>	<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 inches; 11.2 x 5.5 x .2 cm	
<b>Operating system driver support</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4	
<b>Management capabilities</b>	ACPI, Wake on LAN, Preboot Execution Environment, WfM Baseline v2.0, DMI 2.0 support, Windows Management Instrumentation, SNMP-manageable Offline Diagnostics, Intel Boot Agent	
<b>Kit contents</b>	IEEE 802.1Q Virtual Local Area Network (VLANs), IEEE 802.3x Flow Control, Transmission Control Protocol (TCP), Checksum Offload, IEEE 802.1p, Intel Priority Packet II.	

## Technical Specifications - Controllers

Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)	Connector	RJ-45	
	Controller	Broadcom 5751 PCI-E 1.0a LAN Controller	
	Memory	Integrated 96Kb frame buffer memory	
	Data rates supported	10/100/1000 Mbps	
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control	
	Bus architecture	PCI-E 1.0a	
	Data path width	X1	
	Data path speed	2.5Gbit per sec per direction transfer rate	
	Data transfer mode	Bus-master DMA	
	Hardware certifications	FCC class B, NRTL Mark Canada and United States, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia	
	Power requirement	3.1 watts @ +3.3V AUX supply	
	Boot ROM support	Yes	
	Network transfer rate	10BASE-T (half-duplex)	10 Mbps
		10BASE-T (full-duplex)	20 Mbps
		100BASE-TX (half-duplex)	100 Mbps
		100BASE-TX (full-duplex)	200 Mbps
		1000BASE-T	1000 Mbps
	Environmental	<b>Operating temperature</b>	32° to 131° F (0° to 55° C)
		<b>Operating humidity</b>	85% at 131° F (55° C)
Dimensions	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x 0.2 cm		
Operating system driver support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows 2000 and XP, Red Hat Linux 7.2, 7.3 and Red Hat Enterprise Linux 3		
Management capabilities	WOL, PXE , Remote cable management		
Alerting	ASF 2.0		
Kit contents	Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement		
LSI MegaRAID® SAS 8888ELP Host Bus Adapter (HBA)	PCI Bus	PCI-Express x8 lanes	
	PCI Modes	Bus Master DMA	
	PCI data burst transfer rate	Up to 3Gb/s per port	
	SAS Bandwidths	Up to 1.5 GB/s	
	PCI Voltage/Card Type	+3.3V Add-in Card	
	PCI Form Factor	7.71 x 2.54 in (19.59 x 6.44cm) (Low-profile, extended half-length)	
	PCI Power	7.5 Watts	
	Bracket	Low-profile, extended half-length	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Eight 3Gb/s SAS/SATA ports	
	SAS Processor	LSI SAS1078	
	Internal Connectors	Two SAS SFF8088 x4	
External Connectors	Two SAS SFF8087 x4		



## Technical Specifications - Controllers

Max. Number of Physical Devices	32		
LED Indicators	Connector LEDs indicate whether the internal or external connector is active for ports 0-3 and 4-7		
RAID Levels	RAID 0, 1, and 5 RAID spans 10 and 50		
Environments	<b>Operating</b>	<b>Storage</b>	
Temperature	32° to 122° F (0° to 50° C)	-49° to +221° F (-45° to +105° C)	
Relative Humidity	5% to 90% non-condensing	5% to 90% non-condensing	
Compliances	EN55022, EN50082, EN60950; FCC Class A, Class B; U11950; UL; CSA C22.2; VCCI; AS3548; BSMI; MIC		
Operating system support	Microsoft® Windows® XP Professional, XP Professional 64-bit Genuine Windows Vista® Business 32-bit Genuine Windows Vista® Business 64-bit Red Hat Linux 7.2, 7.3, WS3 and WS4		

## Technical Specifications - Storage

Serial ATA Hard Drives	1 TB (7,200 rpm)	<b>Capacity</b>	1,000,204,886,016 bytes		
		<b>Height</b>	1 inches; 2.54 cm		
		<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm		
		<b>Interface</b>	Up to 300 MB/s		
		<b>Synchronous Transfer Rate (Maximum)</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled		
		<b>Cache</b>	32 MB		
		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	2.0 ms	
			<b>Average</b>	14.5 ms	
			<b>Full-Stroke</b>	33 ms	
		<b>Rotational Speed</b>	7,200 rpm		
		<b>Logical Blocks</b>	1,953,525,168		
		<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)		
		500 GB (7,200 rpm)	500 GB (7,200 rpm)	<b>Capacity</b>	500,107,862,016 bytes
<b>Height</b>	1 inches; 2.54 cm				
<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm				
<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled				
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 3.0 Gb/s				
<b>Cache</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)				

## Technical Specifications - Storage

250 GB (7,200 rpm)	<b>Capacity</b>	250,059,350,016 bytes	
	<b>Height</b>	1 inches; 2.54 cm	
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 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</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)	

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160 GB (7,200 rpm)	<b>Capacity</b>	160,041,885,696 bytes	
	<b>Height</b>	1 inches; 2.54 cm	
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 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>	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)	

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### Technical Specifications - Storage

<b>80 GB</b> (7,200 rpm)	<b>Capacity</b>	80,026,361,856 bytes	
	<b>Height</b>	1 inches; 2.54 cm or less	
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 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>	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>	156,301,488	
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)	

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<b>160 GB</b> (10k rpm)	<b>Capacity</b>	160,041,885,696 bytes	
	<b>Height</b>	1 inches; 2.54 cm	
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	<b>Interface</b>	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 150 MB/s	
	<b>Cache</b>	16 MB	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.3 ms
		<b>Average</b>	4.6 ms
		<b>Full-Stroke</b>	10.2 ms
	<b>Rotational Speed</b>	10,000 rpm	
	<b>Logical Blocks</b>	312,581,808	
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)	

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## Technical Specifications - Storage

80 GB (10k rpm)	<b>Capacity</b>	80,026,361,856 bytes		
	<b>Height</b>	1 inches; 2.54 cm		
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm		
	<b>Interface</b>	Serial ATA (1.5 Gb/s), Native Command Queuing enabled		
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 150 MB/s		
	<b>Cache</b>	16 MB		
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.3 ms	
		<b>Average</b>	4.6 ms	
		<b>Full-Stroke</b>	10.2 ms	
	<b>Rotational Speed</b>	10,000 rpm		
	<b>Logical Blocks</b>	156,301,488		
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)		

Serial Attached SCSI (SAS) 300 GB Hard Drives (15K rpm)	<b>Capacity</b>	300,000,000,000 bytes		
	<b>Height</b>	1.0 in (25.4mm)		
	<b>Width</b>	4.0 in (101.6mm)		
	<b>Interface</b>	SAS		
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 300 MB		
	<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>	585,937,500 - 512 byte blocks		
	<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)		
	146 GB (15K rpm)	<b>Capacity</b>	146,815,737,856 bytes	
<b>Height</b>		1.0 in (25.4mm)		
<b>Width</b>		4.0 in (101.6mm)		
<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>	0.27 ms	
		<b>Average</b>	3.5 ms	
		<b>Full-Stroke</b>	7.4 ms	
<b>Rotational Speed</b>		15,000 rpm		
<b>Logical Blocks</b>		286,749,488 - 512 byte blocks		
<b>Operating Temperature</b>		50° to 95° F (10° to 35° C)		

## Technical Specifications - Storage

73 GB (15K rpm)	<b>Capacity</b>	73,407,865,856 bytes		
	<b>Height</b>	1.0 in (25.4mm)		
	<b>Width</b>	4.0 in (101.6mm)		
	<b>Interface</b>	SAS		
	<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>	0.27 ms	
		<b>Average</b>	3.5 ms	
		<b>Full-Stroke</b>	7.4 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)		

Serial Attached SCSI (SAS) 146 GB 2.5" SFF Hard Drives (10K rpm)	<b>Capacity</b>	146,815,737,856 bytes		
	<b>Height</b>	0.583 in (14.8mm)		
	<b>Width</b>	2.76 in (70mm)		
	<b>Interface</b>	SAS		
	<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>	0.4 ms	
		<b>Average</b>	4.5 ms	
		<b>Full-Stroke</b>	8.5 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>Mean time between failures (MTBF)</b>	1,600,000 hours		

73 GB (10K rpm)	<b>Capacity</b>	73,407,865,856 bytes		
	<b>Height</b>	0.583 in (14.8mm)		
	<b>Width</b>	2.76 in (70mm)		
	<b>Interface</b>	SAS		
	<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>	0.4 ms	
		<b>Average</b>	4.5 ms	
		<b>Full-Stroke</b>	8.5 ms	

## Technical Specifications - Storage

Rotational Speed	10,000 rpm
Logical Blocks	143,374,738 - 512 byte blocks
Operating Temperature	50° to 95° F (10° to 35° C)
Mean time between failures (MTBF)	1,600,000 hours

## Technical Specifications - Input/Output Devices

<b>HP IEEE 1394a FireWire 400 4-Port PCI Card</b> (Windows XP and Vista Only)	<b>Device Interface Protocol</b>	IEEE-1394a	
	<b>Data Rate</b>	400 Mbps	
	<b>Devices Supported</b>	IEEE-1394 compliant devices	
	<b>Bus Interface</b>	PCI	
	<b>Physical</b>	PCI card with brackets for low profile and full height PCI slots.	
	<b>Environmental</b>	<b>Operating temperature</b>	50° to 131° F (10° to 55° C)
		<b>Non-operating temperature</b>	-22° to 140° F (-30° to 60° C)
		<b>Relative humidity</b>	20% to 80%
	<b>Ports</b>	Two IEEE1394 6-Pin Connector (Rear)	
	<b>Minimum System Requirements</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Windows XP Home, not supported on Linux Pentium II 266 or faster 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot	
	<b>Regulatory Agency Approval</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC	

<b>HP IEEE 1394b FireWire 800 3-Port PCI Card</b> (Windows XP Only)	<b>Device Interface Protocol</b>	IEEE-1394	
	<b>Data Rate</b>	800 Mbps	
	<b>Devices Supported</b>	IEEE-1394 compliant devices	
	<b>Bus Interface</b>	PCI	
	<b>Physical</b>	PCI card with brackets for low profile and full height PCI slots.	
	<b>Environmental</b>	<b>Operating temperature</b>	50° to 131° F (10° to 55° C)
		<b>Non-operating temperature</b>	-22° to 140° F (-30° to 60° C)
		<b>Relative humidity</b>	20% to 80%
	<b>Ports</b>	Two IEEE-1394b bilingual 9-Pin Connector (Rear)	
	<b>Connectors</b>	One 10-Pin header Custom Connector (Internal)	
	<b>Minimum System Requirements</b>	Microsoft Windows XP Professional, Windows XP Home, not supported on Linux Pentium III 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot	
	<b>Regulatory Agency Approval</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC	



## Technical Specifications - Input/Output Devices

PS/2 OR USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 inches; 45.8 x 16.3 x 2.5 cm
Electrical	Electrical	Weight	2 lb (0.9 kg) minimum
		Operating voltage	+ 5VDC $\pm$ 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC 99 - 2001	Functionally compliant
		Microsoft PC 99 - 2001	Mechanically compliant
Mechanical	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 feet; 1.8 m
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
		Environmental	Environmental
Non-operating temperature	-22° to 140° F (-30° to 60° C)		
Operating humidity	10% to 90% (non-condensing at ambient)		
Non-operating humidity	20% to 80% (non-condensing at ambient)		
Operating shock	40 g, six surfaces		
Non-operating shock	80 g, six surfaces		
Operating vibration	2-g peak acceleration		
Non-operating vibration	4-g peak acceleration		
Drop (out of box)	26 inches; 66 cm on carpet, six-drop sequence		
Drop (in box)	42 inches; 107 cm on concrete, 16-drop sequence		
Operating system support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and 4		
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC		
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS		
Kit contents	Keyboard, keyboard software media, installation guide, warranty card, safety and comfort		

### Technical Specifications - Input/Output Devices

HP USB Laser Mouse (GW405AA)	Dimensions (HxLxW)	1.53 x 4.6 x 2.44 in (39 x 117 x 62 mm)			
	Weight	3.33 oz (94g)			
	Cable length	6 feet (185 cm)			
	Tracking	Laser optics resolution	Typical	800 dpi	
			Max	10 inches/sec (25 cm/sec)	
		Accuracy	± 15%		
		Orthogonality	± 10%		
		Hysteresis	± 10%		
	Environmental	Backlash	± 2%		
		Operating temperature	32° to 104° F (0° to 40° C)		
		Non-operating temperature	-40° to 158° F (-40° to 70° C)		
		Operating humidity	10% to 90% (non condensing at ambient)		
	Power Rating	Supply Voltage	Min-4.25v, Typ-5.0v, Max-5.25v		
		Supply Current	Max-100mA		
Suspend Current		Max-0.5mA			
System requirements	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.), xpe, ce.net, Linux, XP-64.				

\* 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>.

HP PS/2 Optical Scroll Mouse	Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)			
	Weight	4.44 oz (126 g)			
	Environmental	Operating temperature	-32° to 104°F (0° to 40° C)		
		Non-operating temperature	-4° to 140°F (-20° to 60° C)		
		Operating humidity	10% to 90% (non-condensing at ambient)		
		Non-operating humidity	10% to 90% non-condensing		
		Operating shock	40 g, 6 surfaces		
		Non-operating shock	80 g, 6 surfaces		
		Operating vibration	2 g peak acceleration		
		Non-operating vibration	4 g peak acceleration		
		Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face		
	Electrical	Operating voltage	5 VDC ± 10%		
		Power consumption	100mA		

## Technical Specifications - Input/Output Devices

	<b>System consumption</b>	PS/2 mini-din connector
	<b>ESD</b>	CE level 4, 15 kV air discharge
	<b>EMI-RFI</b>	Conforms to FCC rules for a Class B computing device
<b>Mechanical</b>	<b>Microsoft® PC99 - 2001</b>	Functionally compliant
	<b>Resolution</b>	400 ± 20% DPI
	<b>Tracking speed</b>	10 in/s (25.4 cm/s) maximum
	<b>Acceleration</b>	100 in/s/s (2.54 m/s/s)
	<b>Switch actuation</b>	61 g nominal peak force
	<b>Switch life</b>	3,000,000 operations (using Hasco modified tester)
	<b>Switch type</b>	Low force micro-switches
	<b>Tracking mechanism life</b>	155 mi (250 km) at average speed of 10 in/s
<b>Scroll wheel</b>	<b>Cable length</b>	6 ft (1.8 m)
	<b>Microsoft PC99 - 2001</b>	Mechanically compliant
	<b>Width</b>	8 mm
	<b>Diameter</b>	1.01 in (25.6 mm)
	<b>Maximum rotation speed</b>	48 rats/sec
	<b>Switch type</b>	Light force micro-switch
	<b>Switch life</b>	1 million operations
	<b>Mechanical life</b>	Minimum 200,000 revolutions
<b>Regulatory approvals</b>	<b>Compliant</b>	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
<b>Compatibility</b>	<b>Operating system support</b>	Windows Vista Business 32 and 64*, Windows XP Professional, Windows XP Professional x64, Linux

\*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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<b>HP 2-button Optical Scroll Mouse (USB)</b>	<b>Dimensions (H x L x W)</b>	1.5 x 4.5 x 2.5 inches; 3.8 x 11.6 x 6.3 cm
	<b>Weight</b>	0.27 lb (0.12 kg)
	<b>Cable length</b>	72.8 inches; 185 cm
	<b>System requirements</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5

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## Technical Specifications - Input/Output Devices

HP Optical 3-Button Mouse (USB)	Dimensions/Weight	Height	1.5 inches; 3.76 cm
		Length	4.5 inches; 11.56 cm
		Width	2.4 inches; 6.19 cm
		Weight	3.80 oz (108 g)
	Environmental	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating temperature	-4° to 140° F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
	Mechanical	Tracking speed	6 in/s Maximum
		Switch life	3,000,000 operations
		Switch type	Micro-switches
		Tracking mechanism life	155 miles (250 km) at average speed of 10 in/s
		Cable length	9.5 feet; 2.9 m

HP SpaceMouse Plus USB	Physical characteristics	Dimensions (H x W x D)	7.4 x 4.72 x 1.73 inches; 18.8 x 12.0 x 4.4 cm
		Cap Diameter	2 x 6.5 x 6.6 mm
		Weight	1.5 lb (0.68 kg)
		Features	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw) Certified for leading CAD and DCC applications
	Environmental	Operating temperature	41° to 140° F (5° to 60° C)
		Non-operating temperature	-13° to 158° F (-25° to 70° C)
		Operating humidity	10 to 98 % RH (non-condensing)
		Non-operating humidity	10 to 98 % RH (non-condensing)
	Mechanical	Buttons	11 programmable (unshifted)
		Cap Force Range	0.2 N – 4.5 N
		Cap Torque Range	4 Nmm to 100 Nmm
		Resolution	8 bit
		USB Specifications	Connector
		Cable Length	6.56 ft (2 m)
		Data Rate	16 msec
	Software Drivers Available	Microsoft Windows XP Professional	
	System Requirements	Disk Space	10 MB free disk space
	Regulatory Approvals	UL, cUL, EN 950, EN 60950, CSA, FCC, CE Mark, TUV, CISPR 22, EN 50082, IEC 1000 4-2, IEC 1000-4-3, AS/NZS, VCCI, BSMI, C-Tick	

## Technical Specifications - Input/Output Devices

HP SpaceExplorer USB	Physical characteristics	<b>Dimensions (L x W x H)</b>	7.6 x 5.4 x 2.3 in (194 x 139 x 58mm)
		<b>Weight</b>	1.36 lbs (0.62 kg)
		<b>Palmrest</b>	Sculpted
	Mechanical	<b>Buttons</b>	15 reprogrammable speed keys
		<b>Motion Controller</b>	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		<b>Device Sensitivity</b>	Adjustable to preference
	<b>System Requirements</b>	USB 1.1 or 2.0	
	<b>Operating System Supported</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, not supported in Linux	
	<b>Regulatory Approvals</b>	FCC, CE	

## Technical Specifications - Optical Devices

HP 16X Max SATA DVD-ROM Drive	Form Factor	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical		
	Interface type	SATA/ATAPI		
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)		
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
	Weight (max)	2.6 lb (1.2 kg)		
	Read speeds	DVD+R/-R/+RW/-RW/+R DL /-R DL	Up to 8X	
		DVD-ROM	Up to 16X	
		DVD-RAM	Up to 4X	
		CD-ROM, CD-R	Up to 48X	
CD-RW		Up to 32X		

### Removable Storage - Media Compatibility - DVD-ROM

Media	Read	Write
CD-ROM	Yes	No
CD-R	Yes	No
CD-RW	Yes	No
DVD-ROM	Yes	No
DVD-ROM DL	Yes	No
DVD-RAM	Yes	No
DVD+R	Yes	No
DVD+R DL	Yes	No
DVD+RW	Yes	No
DVD-R	Yes	No
DVD-RW	Yes	No
DVD-R DL	Yes	No
Access times (typical reads, including setting)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
Power	Source	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum

## Technical Specifications - Optical Devices

<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating) 41° to 122° F (5° to 50° C) <b>Relative Humidity</b> (operating) 10% to 90% <b>Maximum Wet Bulb Temperature</b> (operating) 86° F (30° C)
<b>Operating Systems Supported</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 No driver is required for this device. Native support is provided by the operating system.
<b>Option kit contents</b>	HP 16X Max SATA DVD-ROM Drive, Intermec WinDVD and installation guide.

<b>HP 48X Max SATA CD-RW/DVD-ROM Combo Drive</b>	<b>Form Factor</b>	5.25-inch, half-height, tray-load
	<b>Orientation</b>	Either horizontal or vertical
	<b>Interface type</b>	SATA/ATAPI
	<b>Disc capacity</b>	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)
	<b>Dimensions (W x H x D)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
	<b>Weight (max)</b>	2.6 lb (1.2 kg)
	<b>Write speed</b>	<b>CD-R</b> Up to 48X <b>CD-RW</b> Up to 32X
	<b>Read speeds</b>	<b>DVD+R/-R/+RW/-RW/+R DL /-R DL</b> Up to 8X <b>DVD-ROM</b> Up to 16X <b>CD-ROM, CD-R</b> Up to 48X <b>CD-RW</b> Up to 32X
	<b>Buffer Size</b>	1.5MB (Min)
	<b>Access times</b> (typical reads, including setting)	<b>Random</b> DVD: < 140 ms (typical), CD: < 125 ms (typical) <b>Full Stroke</b> DVD: < 250 ms (seek), CD: < 210 ms (seek)
	<b>Power</b>	<b>Source</b> SATA DC power receptacle <b>DC Power Requirement</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>Total Drive Power</b> (standby mode) < 2.5 Watt
	<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating) 41° to 122° F (5° to 50° C) <b>Relative Humidity</b> (operating) 10% to 90% <b>Maximum Wet Bulb Temperature</b> (operating) 86° F (30° C)

## Technical Specifications - Optical Devices

<b>Operating Systems Supported</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 No driver is required for this device. Native support is provided by the operating system.
<b>Option kit contents</b>	HP 48X Max SATA CD-RW/DVD-ROM Combo Drive, Roxio Easy Media Creator version 9, Intervideo WinDVD, CD-R media, high-speed CD-RW media, and installation guide.

### HP 16X Max SATA DVD+/-RW LightScribe Drive

<b>Form Factor</b>	5.25-inch, half-height, tray-load																		
<b>Orientation</b>	Either horizontal or vertical																		
<b>Interface type</b>	SATA/ATAPI																		
<b>Disc capacity</b>	8.5 GB DL or 4.7 GB standard																		
<b>Dimensions (W x H x D)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)																		
<b>Weight (max)</b>	2.6 lb (1.2 kg)																		
<b>Write speed</b>	<table> <tr> <td>DVD+R</td> <td>Up to 16X</td> </tr> <tr> <td>DVD+RW</td> <td>Up to 8X</td> </tr> <tr> <td>DVD+R DL</td> <td>Up to 8X</td> </tr> <tr> <td>DVD-R DL</td> <td>Up to 4X</td> </tr> <tr> <td>DVD-R</td> <td>Up to 16X</td> </tr> <tr> <td>DVD-RW</td> <td>Up to 6X</td> </tr> <tr> <td>DVD-RAM</td> <td>Up to 12X</td> </tr> <tr> <td>CD-R</td> <td>Up to 48X</td> </tr> <tr> <td>CD-RW</td> <td>Up to 32X</td> </tr> </table>	DVD+R	Up to 16X	DVD+RW	Up to 8X	DVD+R DL	Up to 8X	DVD-R DL	Up to 4X	DVD-R	Up to 16X	DVD-RW	Up to 6X	DVD-RAM	Up to 12X	CD-R	Up to 48X	CD-RW	Up to 32X
DVD+R	Up to 16X																		
DVD+RW	Up to 8X																		
DVD+R DL	Up to 8X																		
DVD-R DL	Up to 4X																		
DVD-R	Up to 16X																		
DVD-RW	Up to 6X																		
DVD-RAM	Up to 12X																		
CD-R	Up to 48X																		
CD-RW	Up to 32X																		
<b>Read speeds</b>	<table> <tr> <td>DVD-RAM</td> <td>Up to 12X</td> </tr> <tr> <td>DVD+RW, DVD-RW, DVD+R DL, DVD-R DL</td> <td>Up to 8X</td> </tr> <tr> <td>DVD-ROM, DVD+R, DVD-R</td> <td>Up to 16X</td> </tr> <tr> <td>CD-ROM, CD-R</td> <td>Up to 48X</td> </tr> <tr> <td>CD-RW</td> <td>Up to 32X</td> </tr> </table>	DVD-RAM	Up to 12X	DVD+RW, DVD-RW, DVD+R DL, DVD-R DL	Up to 8X	DVD-ROM, DVD+R, DVD-R	Up to 16X	CD-ROM, CD-R	Up to 48X	CD-RW	Up to 32X								
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CD-ROM, CD-R	Up to 48X																		
CD-RW	Up to 32X																		
<b>Access times</b> (typical reads, including setting)	<table> <tr> <td><b>Random</b></td> <td>DVD: &lt; 130 ms (typical), CD: &lt; 120 ms (typical)</td> </tr> <tr> <td><b>Full Stroke</b></td> <td>DVD: &lt; 240 ms (seek), CD: &lt; 200 ms (seek)</td> </tr> </table>	<b>Random</b>	DVD: < 130 ms (typical), CD: < 120 ms (typical)	<b>Full Stroke</b>	DVD: < 240 ms (seek), CD: < 200 ms (seek)														
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<b>Power</b>	<table> <tr> <td><b>Source</b></td> <td>SATA DC power receptacle</td> </tr> <tr> <td><b>DC Power Requirement</b></td> <td>5 VDC <math>\pm</math> 5%-100 mV ripple p-p 12 VDC <math>\pm</math> 5%-200 mV ripple p-p</td> </tr> <tr> <td><b>DC Current</b></td> <td>5 VDC - &lt; 1000 mA typical, &lt; 1600 mA maximum 12 VDC - &lt; 600 mA typical, &lt; 1400 mA maximum</td> </tr> <tr> <td><b>Total Drive Power</b> (standby mode)</td> <td>&lt; 2.5 Watt</td> </tr> </table>	<b>Source</b>	SATA DC power receptacle	<b>DC Power Requirement</b>	5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 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>Total Drive Power</b> (standby mode)	< 2.5 Watt										
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<b>Total Drive Power</b> (standby mode)	< 2.5 Watt																		



## Technical Specifications - Optical Devices

<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating) 41° to 122° F (5° to 50° C) <b>Relative Humidity</b> (operating) 10% to 90% <b>Maximum Wet Bulb Temperature</b> (operating) 86° F (30° C)
<b>Operating Systems Supported</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 No driver is required for this device. Native support is provided by the operating system.  <i>* 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>.</i>
<b>Option kit contents</b>	HP 16X DVD+-RW SuperMulti LightScribe drive, LightScribe software, Roxio Easy Media Creator version 9, Intervideo WinDVD Software, installation guide, and DVD+R media. Software is Microsoft Windows only.

## Technical Specifications - Graphics

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

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NVIDIA Quadro NVS 290, 256 MB Dual Head	Form Factor	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connector	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
	Display resolution support	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®
	RAMDAC	Integrated dual 400MHz
	Color planes	32-bit color buffer
	Overlay planes	Hardware supported
	nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.

### Technical Specifications - Graphics

<b>Multi-Monitor Support</b>	Dual monitor support
<b>DVI Support</b>	DMS-59 (to dual DVI-SL)
<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>Supported Graphics APIs</b>	OpenGL 2.1 & DirectX Support; Shader Model 4.0
<b>Available graphics drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode), 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> .

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<b>NVIDIA Quadro FX 370 PCI-Express graphics controller</b>	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (single-link)
	<b>Display resolution support</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>Architecture Features</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>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>	OpenGL 2.1 & SM4.0 and DirectX10 Support

### Technical Specifications - Graphics

**Available graphics drivers** Microsoft Windows Vista 32 and 64, Microsoft Windows XP, 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:  
[http://welcome.hp.com/country/us/eng/software\\_drivers.html](http://welcome.hp.com/country/us/eng/software_drivers.html).

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<b>NVIDIA Quadro FX 570 PCI-Express graphics controller</b>	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (single-link)
	<b>Display resolution support</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>Architecture Features</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>	<60 W
	<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>	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, 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> .	

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## Technical Specifications - Graphics

<b>NVIDIA Quadro FX 1700 PCI-Express graphics controller</b>	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	512 MB 4000MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (single-link)
	<b>Display resolution support</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>Architecture Features</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>	<75 W
	<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>	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, 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> .

## Technical Specifications - Graphics

ATI FireGL V5600 PCI-Express graphics controller	Form factor	ATX
	Graphics controller	R520
	Bus Type	PCI-Express x16
	Memory	512 MB of unified frame buffer, Z-buffer and Texture storage and a 128-bit Ring-Bus memory controller
	Connectors	Two dual-link DVI connectors with analog/digital outputs
	Maximum resolution	Dual Link digital support for 3840 x 2400 @ 60Hz. Ideal for 30-inch widescreen displays.
	RAMDAC	Dual 10-bit per channel 400MHz
	Ring Bus memory controller	<ul style="list-style-type: none"> <li>• 512-bit internal ring bus for highly efficient memory reads</li> <li>• Programmable intelligent arbitration logic</li> </ul>
	Display output	<ul style="list-style-type: none"> <li>• Up to 16-bit per RGB color component High Dynamic Range output (HDR)</li> <li>• Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color)</li> </ul>
	Shading architecture	<ul style="list-style-type: none"> <li>• Supports Full Shader Model 4.0</li> <li>• 120 shader processing unit</li> </ul>
	Supported graphics APIs	DirectX 10 and OpenGL 2.1 advanced
	Available graphics drivers	<p>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 Linux</p> <p>Microsoft Windows Vista 32 and 64, Microsoft Windows XP, 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>.</p>
	Option kit contents	PCA with ATX bracket, DVI to VGA converters, CD and manual.

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NVIDIA Quadro FX 3500 PCI-Express graphics controller	Form Factor	ATX
	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI-Express x16
	Memory	256MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	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®
	Maximum Resolution	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each
	RAMDAC	Dual 400MHz integrated

## Technical Specifications - Graphics

<b>Architecture Features</b>	<ul style="list-style-type: none"> <li>256-bit memory interface</li> <li>128-bit IEEE floating-point precision graphics pipeline</li> <li>128-bit color precision</li> <li>12-bit sub-pixel precision</li> <li>8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm</li> <li>Hardware accelerated anti-aliased points and lines</li> <li>Hardware OpenGL overlay planes</li> <li>Hardware accelerated two-sided lighting</li> <li>Hardware accelerated clipping planes</li> <li>3rd generation occlusion culling</li> <li>3D volumetric texture support</li> <li>Quad-buffered stereo</li> <li>Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz)</li> <li>SLI Link</li> </ul>
<b>Shading Architecture</b>	<ul style="list-style-type: none"> <li>Fully programmable GPU (OpenGL 2.0/DirectX 9.0c 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>	<ul style="list-style-type: none"> <li>OpenGL 2.0 ICD with immediate mode support for all OGL primitive types</li> <li>DirectX 9.0c</li> </ul>
<b>Available Graphics Drivers</b>	<ul style="list-style-type: none"> <li>Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions.</li> <li>HP qualified drivers may be preloaded or available from the HP support web site:</li> <li><a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>.</li> </ul>

<b>NVIDIA Quadro FX 3700</b>	<b>Form Factor</b>	ATX
<b>PCI-Express 2.0 (x16)</b>	<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>Display resolution support</b>	<ul style="list-style-type: none"> <li>Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 2560x1600 @ 60Hz.</li> <li>NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®</li> </ul>
	<b>RAMDAC</b>	Dual 400MHz integrated
	<b>Architecture Features</b>	<ul style="list-style-type: none"> <li>256-bit memory interface</li> <li>128-bit IEEE floating-point precision graphics pipeline</li> <li>128-bit color precision</li> <li>32x FSAA dramatically reduces visual aliasing artifacts at resolution up to 1920x1200</li> <li>Hardware accelerated anti-aliased points and lines</li> <li>Hardware OpenGL overlay planes</li> <li>Hardware accelerated two-sided lighting</li> </ul>

### Technical Specifications - Graphics

	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>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) 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>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

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<b>NVIDIA Quadro FX 4600 (768 MB)</b>	<b>Graphics Controller</b>	NVIDIA Quadro FX 4600 Workstation GPU
	<b>Bus Type</b>	PCI Express x16
	<b>RAMDAC</b>	Dual 400 MHz integrated
	<b>Memory</b>	768 MB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	<b>Multi-monitor Support</b>	Dual integrated display controllers supporting up to 2560x1600 @ 60Hz (both analog and digital) on both displays
	<b>NVIDIA Quadro FX 4600 Architecture</b>	384-bit memory interface 67.2 GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision 65,536 fragment instruction 65,536 vertex instruction 3D volumetric textures Single-system powerwall Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes Hardware two-sided lighting 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Pixel Read-Back



## Technical Specifications - Graphics

<b>Shading Architecture</b>	16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>High Level Shader Languages</b>	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
<b>High-Resolution Antialiasing</b>	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
<b>Display Resolution Support</b>	Dual dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz Internal 400 MHz DACs – Two analog displays up to 2560x1600 @ 60 Hz
<b>nView Architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
<b>Supported Graphics APIs</b>	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
<b>Available Graphics drivers</b>	Microsoft Windows XP Professional, Microsoft Windows Vista Professional, 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>

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<b>NVIDIA Quadro FX 5600 PCIe Graphics</b>	<b>Graphics Controller</b>	NVIDIA Quadro FX 5600 graphics board
	<b>Bus Type</b>	PCI Express x16
	<b>RAMDAC</b>	Dual 400 MHz integrated
	<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>Multi-monitor Support</b>	Dual integrated display controllers supporting up to 2560x1600 @ 60Hz (both analog and digital) on both displays
	<b>NVIDIA Quadro FX 5600 Architecture</b>	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

## Technical Specifications - Graphics

	3rd-generation occlusion culling 16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling
<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>High-level Shader Languages</b>	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.1 and DirectX 10 support Open source compiler
<b>High-resolution Antialiasing</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>Display Resolution Support</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>nView Architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
<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>	Microsoft Windows XP Professional, Microsoft Windows Vista Professional, 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>

### Technical Specifications - Monitors

HP L1965 19-inch LCD Panel  
Monitor

Type	Active matrix, thin film transistor (TFT)
Viewable Image Area (diagonal)	19 inches; 48.25 cm maximum viewable
Screen Opening (WxH)	14.9 x 12.0 inches; 38.0 x 30.5 cm
Viewing Angle (typical)	178 degrees horizontal/178 degrees vertical (10:1 minimum contrast ratio)
Brightness (typical)	300 nits (cd/m <sup>2</sup> )
Contrast Ratio (typical)	1000:1 (typical)
Response Rate (typical)	6 ms (typical gray to gray)**
Pixel Pitch	0.294 mm
Color Depth Support	16.7 million colors
Backlight Lamp Life (to half brightness)	50K hours

\*All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.

\*\*20 ms rise and fall

#### Video/Other Inputs

Plug and Play	Yes (supports VESA DDC2B and DDC/CI; PC2001 compliant)
Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)
Input Signal	Two DVI-I connectors (VGA analog or digital)
Input Impedance	75 ohms $\pm$ 2%
Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green (activated through on-screen display)

#### Signal Interface/Performance

Video Cable	One DVI-D to DVI-D, and 1 DVI-I to VGA cables
Video Cable Length	71 in (1.8 m)
Horizontal Frequency	24 to 83 kHz
Vertical Frequency	48 to 76 Hz
Native Resolution	1280 x 1024 @ 75 Hz analog 1280 x 1024 @ 60 Hz digital
Maximum Resolution (Analog)	1280 x 1024 @ 75 Hz analog
Maximum Resolution (Digital)	1280 x 1024 @ 75 Hz digital
Preset VESA Graphic Modes (non-interlaced)	640 x 480 @ 60 Hz, 72 Hz, 75 Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz, 72 Hz, 75 Hz 1024 x 768 @ 60 Hz, 70 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz
Preset MAC Mode	832 x 624 @ 75 Hz 1152 x 870 @ 75 Hz
Preset VGA Mode	640 x 480 @ 60 Hz, 72 Hz

## Technical Specifications - Monitors

	Preset SUN Mode	1152 x 900 @ 76 Hz
	Fail Safe Mode	Yes (limits out of range signal messages)
	Maximum Pixel Clock Speed	140 MHz
	User Programmable Modes	Yes, 15
	Anti-Glare	Yes
	Anti-Static	Yes
	AssetControl	Yes (accessible on HP Compaq Business Desktops featuring Intelligent Manageability)
	Default Color Temperature	Yes (6500k, 9300k, sRGB, Custom User)
On Screen Display (OSD) Controls	Buttons or Switches	Power on/off; 3-button OSD; second level OSD buttons include dual-input switch, dedicated auto adjust switch
	Languages	English, Spanish, French, German, Netherlands, Italian, Japanese, Simplified Chinese
	User Controls	Size and Positioning Contrast Brightness Clock, Clock Phase Selectable Color Temperature Serial Number Mode Displayed Sleep Timer Input Selection Factory Reset
Power	Power Supply	Auto-ranging, 90 to 265 VAC; internal power supply
	Input Power	100 ~ 240 VAC
	Nominal Current	1.5 A maximum
	Frequency	50 ~ 60 Hz
	Typical Power Consumption	< 35 watts
	Maximum	< 55 watts
	Power Saving	< 2 watts
	Off Mode	0 watts (when master power switch is in the off position)
	Power Cable Length	74.8 in (1.9 m); non-captive
Mechanical	Dimensions (H x W x D)	<b>Unpacked with stand</b> 14.85 min to 18.79 max x 15.9 x 8.78 inches (37.72 min to 47.72 max x 40.39 x 22.29 cm)
		<b>Base Area</b> (Footprint D x W) 8.78 x 11.88 inches (22.29 x 30.18 cm)

Technical Specifications - Monitors

		<b>Panel only</b> (without stand) (H x W x D)	12.96 x 15.9 x 2.4 inches (32.91 x 40.39 x 6.1 cm)
<b>Weight</b>		<b>Unpacked with stand</b>	15.6 lbs (7.06 kg)
		<b>Unpacked without stand</b>	9.26 lbs (4.19 kg)
		<b>Packaged</b>	20.5 lbs (9.27 kg)
<b>Bezel Width</b>			12.5 mm left and right, 12.75 mm top and bottom
<b>Tilt Range</b>			-4 degrees to +30 degrees
<b>Swivel Range</b>			± 45 degrees horizontal swivel
<b>Height Adjustable</b>			Yes (4 in/100mm adjustment range)
<b>Pivot Rotation</b>			Yes, 90 degrees
<b>Base</b>			Ships attached and is removable
<b>Environmental</b>	<b>Temperature – Operating</b>		41° to 95° F (5° to 35° C)
	<b>Temperature – Non-operating</b>		-4° to 140° F (-20° to 60° C)
	<b>Humidity – Operating</b>		20% to 80%
	<b>Humidity – Non-operating</b>		5% to 95%
<b>Environmental Data</b>	<b>Altitude – Operating</b>		0 to 12,000 ft (0 to 3,658 m)
	<b>Altitude – Non-operating</b>		0 to 40,000 feet; 0 to 12,192 m
	<b>Eco-Label Certifications and Declarations</b>		This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:
			<ul style="list-style-type: none"> <li>● US Energy Star</li> <li>● CEC</li> </ul>

Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
<b>Normal Operation</b>	35.7 watts	35.6 watts	35.1 watts
<b>Sleep</b>	1.08 watts	1.14watts	1.23 watts
<b>Off</b>	0.93 watts	0.94 watts	0.92 watts
<b>Heat Dissipation*</b>	100 VAC, 50 Hz	115 VAC, 60 Hz	230 VAC, 50 Hz
<b>Normal Operation</b>	121.7 BTU/hr	121.4 BTU/hr	119.7 BTU/hr
<b>Sleep</b>	3.68 BTU/hr	3.89 BTU/hr	4.19 BTU/hr
<b>Off</b>	3.17 BTU/hr	3.21 BTU/hr	3.14 BTU/hr

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

**Longevity and Upgrading** Upgradeability features contained in the product include:  
One upstream and four downstream USB ports

**Ergonomics** The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.

### Technical Specifications - Monitors

#### Additional Information

This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.

This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 100% recycled materials (by wt.)

This product is 100% recyclable when properly disposed of at end of life.

#### Packaging Materials

- Corrugated - 0.955 kg
- Plastic (other) - 0.055 kg
- Polystyrene - 0.24 kg

#### Material Usage

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

[http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html)):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)

- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

#### Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

#### End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

#### Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report  
<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

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

ISO 14001 certificates:  
<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

Options

HP Silver Flat Panel  
Speaker Bar

HP Silver Flat Panel Speaker Bar

### Technical Specifications - Monitors

<b>Other</b>	<b>Accessories Included</b>	One DVI-D to DVI-D cable, one DVI-I to VGA cable, one USB cable, and CD-ROM with Pivot Pro software, HP Display Assistant software, and HP Display LiteSaver software.
	<b>Software</b>	<p>Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.</p> <p>HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC.</p> <p>HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.</p>
	<b>User Guide Languages</b>	English, Bahasa, B. Portuguese, French, LA Spanish, Korean, Simplified Chinese, Traditional Chinese, Japanese, Danish, Dutch, Finnish, German, Italian, Norwegian, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	<b>Warranty Languages</b>	English
	<b>Color</b>	Carbonite, two-tone carbonite and silver (EMEA only)
	<b>VESA Mounting</b>	Yes (swing arm/wall mount not included); base must be removed for mounting options)
	<b>VESA External Mounting</b>	Yes (standard 4 hole pattern, 100 mm)
	<b>Kensington Lock-ready</b>	Yes
<b>Certification and Compliance</b>		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 13406-2 Compliant (Pixel Defect Guidelines), Mexican NOM Approval, MPR-II Compliant, PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 or 03 depending on region (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft® Windows® Certification
<b>Compatibility</b>		VESA Video Signal Standard (VSIS) Compliant video cards have been tested and proven compatible for use with the HP LP1965 Flat Panel Monitor. Recommended for use with HP products.
<b>Service and Warranty</b>		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display



### Technical Specifications - Monitors

product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

#### HP LP2065 20-inch LCD Panel Monitor

<b>Type</b>	20-inch Active Matrix TFT (thin film transistor)
<b>Viewable Image Area</b> (diagonal)	20.1 inches; 51 cm
<b>Screen Opening</b> (W x H)	16.2 x 12.17 inches; 41.1 x 30.9 cm
<b>Viewing Angle</b> (typical)*	Up to 178° horizontal/178° vertical (10:1 minimum contrast ratio)
<b>Brightness</b> (typical)*	Up to 300 nits (cd/m <sup>2</sup> )
<b>Contrast Ratio</b> (typical)*	Up to 800:1
<b>Response Rate</b> (typical)*	8 ms (gray to gray), 16 ms (rise + fall)
<b>Pixel Pitch</b>	0.255 mm
<b>Color Depth Support</b>	16.7 million colors
<b>Backlight Lamp Life</b> (to half brightness)	45K hours
<b>Buttons or Switches</b>	Input select, auto adjust/OSD up, OSD down, OSD menu select, power
<b>Languages</b>	English, French, German, Spanish, Italian, Dutch, and Japanese
<b>User Controls</b>	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection, image control (including scaling), and factory reset
<b>On Screen Display (OSD) Controls</b>	
<b>Signal Interface/ Performance</b>	
<b>Horizontal Frequency</b>	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
<b>Vertical Frequency</b>	48 to 85 Hz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
<b>Native Resolution</b>	1600 x 1200 @ 60 Hz (recommended)
<b>Preset VESA Graphic Modes</b> (non-interlaced)	1600 x 1200 @ 60 Hz, 75 Hz (VGA input) 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 85 Hz 640 x 480 @ 60 Hz, 75 Hz, 85 Hz
<b>Text Mode</b>	720 x 400 @ 70 Hz
<b>Mac Mode</b>	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
<b>Sun Mode</b>	1152 x 900 @ 66 Hz

### Technical Specifications - Monitors

	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)	
	User Programmable Modes	Yes, 10	
	Anti-Glare	Yes	
	Anti-Static	Yes	
	Default Color Temperature	6500 K	
Video Input	Plug and Play	Yes	
	Input Signal	Four connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, and one s-video	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)	
	Input Signal	Two DVI-I connectors (dual VGA analog or dual digital input possible)	
	Input Impedance	75 ohms $\pm$ 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	Two VGA to DVI-I; two DVI-D to DVI-I	
	Video Cable Length	5.9 feet; 1.8 m	
Power	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	55 watts (without USB ports); 70 watts (USB ports fully loaded)	
	Maximum	< 75 W	
	Power Saving	< 2 watts	
	Power Cable Length	5.9 feet; 1.8 m	
Mechanical	Dimensions (H x W x D)	<b>Unpacked with stand</b>	16.7 to 21.8 x 17.4 x 8.67 in 42.5 to 55.5 x 44.3 x 22.0 cm
		<b>Unpacked w/o stand (head only)</b>	13.58 x 17.4 x 3.42 in 34.5 x 44.3 x 8.7 cm
		<b>Packaged</b>	11.77 x 22.2 x 16.77 in 29.9 x 56.4 x 42.6 cm
	Weight	<b>Unpacked</b>	With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)
		<b>Packaged</b>	26.3 lb (11.95 kg)
	Tilt Range	-5° to + 25° vertical tilt	
	Swivel Range	-45° to + 45°	

### Technical Specifications - Monitors

	<b>Height Adjustable</b>	Yes, range 5.1 inches; 13.0 cm
	<b>Pivot Rotation</b>	Yes
	<b>Base</b>	Detachable, ships attached
<b>Environmental</b>	<b>Temperature – Operating</b>	46° to 95° F (10° to 35° C)
	<b>Temperature – Non-operating</b>	6° to 140° F (-10° to 60° C)
	<b>Humidity – Operating</b>	20% to 80% non-condensing
	<b>Humidity – Non-operating</b>	5% to 85%
	<b>Altitude – Operating</b>	+12,000 feet; +3,657.6 m
	<b>Altitude – Non-operating</b>	+40,000 feet; +12,192 m
<b>Options</b>	<b>HP Silver Flat Panel Speaker Bar - Part number: EE418AA</b>	Powered directly by the monitor or the PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately. For more information, refer to the HP Silver Flat Panel Speaker Bar QuickSpec.
<b>Other</b>	<b>Accessories Included</b>	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #1 or 2 (DVI-I analog) connector. DVI-D to DVI-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #1 or #2 (DVI-I digital) connector.
	<b>User Guide Languages</b>	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	<b>Software</b>	HP Display Assistant Utility makes it possible to adjust displays settings through the PC using two-way communication via DDCI. HP Display Lite Saver allows ability to power up and down display at predetermined hours of the day to save power and backlight life. Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
	<b>User Guide Languages</b>	English
	<b>Warranty Languages</b>	English
	<b>Color</b>	Carbonite/Silver

### Technical Specifications - Monitors

<b>VESA External Mounting</b>	Yes (Standard 4 hole pattern, 100 mm)
<b>Kensington Lock-Ready</b>	Yes
<b>Certification and Compliance</b>	Canadian Requirements/CSA, CE Marking, CISPR Requirements, Energy Star 3.0 Compliant, FCC Approval, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MPR-II Compliant, PC2001 Compliant, PC99 Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
<b>Compatibility</b>	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
<b>Service and Warranty</b>	Three years parts, labor, and on-site service. 24-hour 365-day 1-800 technical support. Replacement options include 2nd business day on-site service or next business day direct replacement. With direct replacement, HP will ship a replacement display product directly to you. Using the shipping labels provided, return your failed display to HP. Certain restrictions and exclusions apply. For details, contact HP Customer Support.

#### HP LP2465 24-inch Widescreen LCD Monitor Panel

<b>Type</b>	24-inch Active Matrix TFT (thin film transistor)
<b>Viewable Image Area (diagonal)</b>	24 inches; 60.96 cm
<b>Screen Opening (W x H)</b>	20.47 x 12.83 inches; 52.0 x 32.6 cm
<b>Viewing Angle (typical)*</b>	178° H/ 178° V (10:1 minimum contrast ratio)
<b>Brightness (typical)*</b>	500 nits (cd/m <sup>2</sup> )
<b>Contrast Ratio (typical)*</b>	1000:1
<b>Response Rate (typical)*</b>	8 ms (typical gray to gray)
<b>Pixel Pitch</b>	0.270 mm
<b>Color Depth Support</b>	16.7 million colors
<b>Backlight Lamp Life (to half brightness)</b>	50K hours
<i>*Response time 13 ms rise and fall, 6 ms gray to gray.</i>	
<b>On Screen Display (OSD) Controls</b>	Buttons or Switches: Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
	Languages: English, French, German, Spanish, Italian, Japanese, Dutch
	User Controls: Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset
<b>Signal Interface/ Performance</b>	<b>Horizontal Frequency</b> : 30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
	<b>Vertical Frequency</b> : 48 to 85 Hz (VGA and DVI input)

## Technical Specifications - Monitors

	<b>Native Resolution</b>	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
	<b>Preset VESA Graphic Modes (non-interlaced)</b>	1920 x 1200 @ 60 Hz 1600 x 1200 @ 60 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 75 Hz 640 x 480 @ 60 Hz, 75 Hz
	<b>Text Mode</b>	720 x 400 @ 70 Hz
	<b>Mac Mode</b>	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	<b>Sun Mode</b>	1152 x 900 @ 66 Hz
	<b>Maximum Pixel Clock Speed</b>	202 MHz (VGA input); 162 MHz (DVI input)
	<b>User Programmable Modes</b>	Yes, 20
	<b>Anti-Glare</b>	Yes
	<b>Anti-Static</b>	Yes
	<b>Default Color Temperature</b>	6500 K
<b>Video/Other Inputs</b>	<b>Plug and Play</b>	Yes
	<b>Self Powered USB 2.0 Hub</b>	One upstream, four downstream ports (located on side of monitor, cable included)
	<b>Input Signal</b>	Two DVI-I (VGA analog and digital) inputs
	<b>Input Impedance</b>	75 ohms $\pm$ 10%
	<b>Sync Input</b>	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	<b>Video Cable</b>	VGA to DVI-I; DVI-D to DVI-D
	<b>Video Cable Length</b>	5.9 ft (1.8 m)
<b>Power</b>	<b>Input Power</b>	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	<b>Frequency</b>	47.5 to 63 Hz
	<b>Typical Power Consumption</b>	75 watts
	<b>Maximum</b>	< 110 watts
	<b>Power Saving</b>	< 2 watts
	<b>Power Cable Length</b>	6.2 ft (1.9 m)
<b>Mechanical</b>	<b>Dimensions (H x W x D)</b>	<b>Unpacked w/ stand</b> 14.6 (min) to 19.7 (max) x 22 x 9.1 in (37.1 (min) to 50.1 (max) x 55.4 x 23.2 cm
		<b>Unpacked w/o stand (head only)</b> 14.4 x 22 x 3.7 in 36.6 x 55.84 x 9.2 cm
		<b>Packaged</b> 11.7 x 22.1 x 25.6 in 29.8 x 56.0 x 65.1 cm

### Technical Specifications - Monitors

	<b>Weight</b>	<b>Unpacked</b>	23.6 lbs (10.7 kg )
		<b>Packaged</b>	23.6 lbs (10.7 kg )
	<b>Tilt Range</b>	-5° to + 25° vertical	
	<b>Swivel Range</b>	-45° to + 45°	
	<b>Height Adjustable</b>	Yes, range 5.1 inches; 130 mm	
	<b>Pivot Rotation</b>	Yes	
	<b>Base</b>	Detachable, ships detached	
<b>Environmental</b>	<b>Temperature – Operating</b>	46° to 95° F (10° to 35° C)	
	<b>Temperature – Non-operating</b>	6° to 140° F (-10° to 60° C)	
	<b>Humidity – Operating</b>	20% to 80% non-condensing	
	<b>Humidity – Non-operating</b>	5% to 85%	
	<b>Altitude – Operating</b>	+12,000 ft (+3,657.6 m)	
	<b>Altitude – Non-operating</b>	+40,000 ft (+12,192 m)	
<b>Other</b>	<b>Accessories Included</b>	<p>VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #2 (DVI-I analog) connector</p> <p>DVI-D to DVI-D cable – connects the graphic card's DVI-D digital connector to the monitor's input #2 (DVI-I digital) connector</p>	
	<b>Software</b>	<p>Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.</p> <p>HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC.</p> <p>HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.</p>	
	<b>User Guide Languages</b>	<p>English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish</p>	

### Technical Specifications - Monitors

	<b>Warranty Languages</b>	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	<b>Color</b>	Carbonite/silver
	<b>VESA External Mounting</b>	Yes (Standard 4 hole pattern, 100 mm)
	<b>Kensington Lock-Ready</b>	Yes
<b>Options</b>	<b>HP Silver Flat Panel Speaker Bar - Part number: EE418AA</b>	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
<b>Certification and Compliance</b>		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCCE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
<b>Compatibility</b>		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
<b>Service and Warranty</b>		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

HP LP3065 30-inch Panel  
Widescreen LCD Monitor

<b>Type</b>	30.0-inch Wide Format Active Matrix TFT (thin film transistor)
<b>Viewable Image Area (diagonal)</b>	29.77 in (75.623 cm)
<b>Screen Opening (W x H)</b>	25.3 x 15.8 in (64.3 x 40.3 cm)
<b>Viewing Angle (typical)*</b>	Up to 178° H/ 178° V (10:1 minimum contrast ratio)
<b>Brightness (typical)*</b>	300 nits (cd/m <sup>2</sup> )
<b>Contrast Ratio (typical)*</b>	1000:1
<b>Response Rate (typical)*</b>	12 ms (8 ms average gray to gray)

## Technical Specifications - Monitors

	Pixel Pitch	0.250 mm	
	Color Depth Support	16.7 million colors	
	Backlight Lamp Life (to half brightness)	40K hours	
	Color Gamut	92% of NTSC	
On Screen Display (OSD) Controls	Buttons or Switches	Input select, brightness up, brightness down, power	
	User Controls	Brightness, input selection	
Signal Interface/ Performance	Horizontal Frequency	100 KHz	
	Vertical Frequency	60 Hz	
	Native Resolution	2560 x 1600 @ 60 Hz (native aspect ratio of 16:10)	
	Pixel Clock Speed	275 MHz	
	Anti-Glare	Yes	
	Anti-Static	Yes	
	Default Color Temperature	6500 K	
Video/Other Inputs	Plug and Play	Yes	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)	
	Input Signal	Three dual-link DVI-D inputs (Windows PC and graphics card that supports DVI ports with dual-link digital bandwidth and VESA DDC standard for plug-and-play setup requires a DVI-D dual-link graphic card that supports WQXGA (2560 x 1600) resolution.)	
	Video Cable	Two dual-link DVI cables	
	Video Cable Length	5.9 ft (1.8 m)	
Power	Input Power	Auto-Ranging, 100 to 240 VAC; internal power supply, 50 Hz/60 Hz	
	Typical Power Consumption	118 watts	
	Maximum	< 176 watts	
	Power Saving	< 2 watts	
	Power Cable Length	5.9 ft (1.8 m)	
Mechanical	Dimensions (H x W x D)	<b>Unpacked w/ stand</b>	19.3 to 23.2 x 27.2 x 9.5in (49.0 to 59.0 x 69.2 x 24.0 cm)
		<b>Unpacked w/o stand (head only)</b>	17.9 x 27.2 x 3.3 in (45.5 x 69.2 x 8.4 cm)
		<b>Packaged</b>	22.4 x 31.1 x 14.9 in (56.8 x 79.0 x 37.8 cm)
	Weight	<b>Unpacked</b>	30.6 lbs (13.9 kg)
	Tilt Range		-5° to + 30° vertical



## Technical Specifications - Monitors

Environmental	Swivel Range	-45° to + 45°		
	Height Adjustable	Yes, range 5.1 in (100 mm)		
	Pivot Rotation	No		
	Base	Detachable, ships detached		
	Temperature – Operating	46° to 95° F (10° to 35° C)		
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)		
	Humidity – Operating	20% to 80% non-condensing		
	Humidity – Non-operating	5% to 85%		
	Altitude – Operating	+12,000 ft		
	Altitude – Non-operating	+40,000 ft		
Environmental Data	Eco-Label Certifications and Declarations	<p>This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:</p> <ul style="list-style-type: none"> <li>● US Energy Star</li> <li>● US Federal Energy Management Program (FEMP)</li> <li>● IT Eco Declaration</li> <li>● TCO 03</li> <li>● Taiwan Green Mark</li> <li>● CECP</li> <li>● Korea Eco-label</li> <li>● EPEAT - Silver</li> </ul>		
	Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
	Normal Operation	102.8 watts	101.7 watts	100.4watts
	Sleep <sup>1</sup>	2 watts	2 watts	2 watts
	Off	0.05 watts	0.06 watts	0.25 watts
	Heat Dissipation <sup>2</sup>	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
	Normal Operation	350.8 BTU/hr	347.0 BTU/hr	342.6 BTU/hr
	Sleep	6.8 BTU/hr	6.8 BTU/hr	6.8 BTU/hr
	Off	0.2 BTU/hr	0.2 BTU/hr	0.9 BTU/hr

## NOTES

<sup>1</sup>This sleep status ignore the input sync signal check cycle when metering the model in sleep mode.

<sup>2</sup>Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

**Longevity and Upgrading** Upgradeability features contained in the product include:

One upstream and four downstream USB ports

**Ergonomics** The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.

**Additional Information** This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.

This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.

This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).

This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see [www.epeat.net](http://www.epeat.net).

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 0% recycled materials (by wt.)

This product is 97.6% recycleable when properly disposed of at end of life.

## Packaging Materials

- Corrugated Paper 2.19 kg
- PE-LD Bags 0.09 kg
- EPS Molded Foam 1.07 kg

## RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS

#### Material Usage

substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

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

[http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html)):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

#### Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.

		<ul style="list-style-type: none"> <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>
	<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: 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>Other</b>	<b>Accessories Included</b>	Two dual link DVI-D to DVI-D cables - connects the graphic card's DVI-D digital connector to the monitor's input (DVI-D digital) connectors; power cord
	<b>Software</b>	HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	<b>User Guide Languages</b>	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	<b>Warranty Languages</b>	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	<b>Color</b>	Carbonite
	<b>VESA External Mounting</b>	Yes (Standard 4 hole pattern, 100 mm)
	<b>Kensington Lock-Ready</b>	Yes

### Technical Specifications - Monitors

<b>Options</b>	<b>HP Flat Panel Speaker Bar - Part number: EE418AA</b>	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
<b>Certification and Compliance</b>	Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals.	
<b>Compatibility</b>	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.	
<b>Service and Warranty</b>	Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.	

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Warranty - year(s) 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.