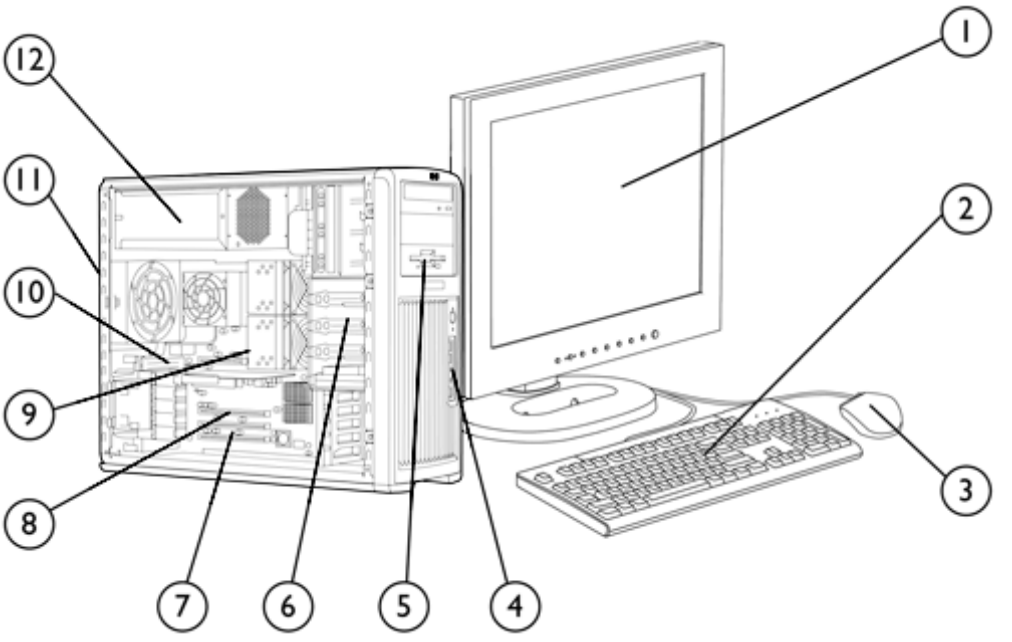
HP recommends Windows Vista® Business



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

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*

Overview

- 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 for details.

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 FSB150W**

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 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/ 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.
**Chassis must be 1050PSU. Memory must be 4G FBD 800-1. Only 1 Graphic Card (must be NVIDIA Quadro FX3700). HDD1 must be 250D1. HDD2 must be 500D2. HDD3 must be 500D3. HDD4 must be 500D4. HDD5 not allowed. Requires one HP 16X DVD+-RW SuperMulti LS SATA Drive. OS must be Windows XP64. Mouse must be PS2 Scroll. Keyboard must be PS2. No Floppy, ADDON, AUDIO, Controller, EnergySTAR, LAN1 or RAID.
***Chassis must be 1050PSU. Memory must be 32GB-800. Graphic card 1 & 2 must be NVIDIA Quadro FX5600. HDD1 must be 73S15D1. HDD2 must be 73S15D2. HDD3 not allowed. Requires one HP 16X DVD+-RW SuperMulti LS SATA Drive. OS must be Linux.

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

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
	SAS Hard Drive (8 port SAS Controller included on the system board)	**Windows Vista[i]**	**Windows XP**	**Red Hat Enterprise Linux**
	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[i]**	**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

	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

*RAID not available with Xeon 5472 or 5482 processors.

Controllers		**Windows Vista[i]**	**Windows XP**	**Red Hat Enterprise Linux**
	Integrated SATA 3.0 Gb/s controller (RAID levels 0, 1, 10, 5)	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
	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 for details.			

HP Memory - One of the following	**DDR2-667 ECC Fully Buffered DIMMs**	**Windows Vista[i]**	**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
	DDR2-800 ECC Fully Buffered DIMMs			

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 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[i]**	**Windows XP**	**Red Hat Enterprise Linux**
	FDD Floppy drive			
	1.44-MB Diskette Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	Optical drives			
	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[i]**	**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
	Mouse – One of the following			
	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

Audio		**Windows Vista[i]**	**Windows XP**	**Red Hat Enterprise Linux**
	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	WS 4 & 5 (configure-to-order expected availability in March 2008)

Standard Features - Custom Components

NIC (Network Interface Controller)		**Windows Vista[i]**	**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[i]**	**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			

Miscellaneous		**Windows Vista[i]**	**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

Standard Features - Custom Components

Software	Windows Vista[i]	Windows XP	Red Hat Enterprise Linux
Standard			
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
Optional			
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
Symantec AntiVirus for Vista	32-Bit, 64-Bit	N/A	N/A
Symantec AntiVirus for XP	N/A	32-Bit, 64-Bit	N/A

Form Factor	Minitower	
Color	Carbonite/Alloy metallic	
PCI Slots (see system board section for more details)	• 1 half-length PCI slot • 6 full-length slots with a mechanical card guide support for a PCI card with extender bracket. • 2 PCI Express Gen2 x16 slots • 2 PCI Express x4 slots – with x8 connectors • 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. • Our x8 connectors are open ended, allowing a PCIe x16 card to be seated in the slot. • 1 PCI-X 133MHz slot	
Bays (see storage section for more details)	Total Bays = 8	
Internal Bays	5 internal 3.5" bays (4 with acoustic dampening rail assemblies)	
External Bays	3 external 5.25" bays* *Third external 5.25" bay is not full-depth, bottom bay is limited to 200mm device depth.	
Front I/O	2 USB 2.0, 1 headphone out, Microphone, and 1 IEEE 1394a	
Rear I/O	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.	
Integrated USB	1 USB 2.0 header (internal)	
Chassis Dimensions (H x W x D)	17.9 x 8.3 x 20.7 inches; 45.4 x 21.0 x 52.5 cm	
System Weight	Exact weights depend upon configuration Minimum config – 40 lb (19.5 kg) Standard config – 46 lb (21 kg) Maximum config – 62 lb (28 kg)	
Temperature	Operating	40° to 95° F (5° to 35° C)
	Non-operating	-40° to 140° F (-40° to 60° C)
Humidity	Operating	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (non-pressurized)	Operating	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
Power Supply	Choice of: • 800W 80+ Efficient wide-ranging, active Power Factor Correction • 1050W 80+ Efficient wide-ranging, active Power Factor Correction	
Interfaces Supported	• 6-channel SATA 3.0 Gb/s Interface (6 Serial-ATA connectors on the motherboard, , 2 channels are eSATA configurable for use with eSATA AMO Kit) • 8-channel SAS interface (8 SAS connectors on the motherboard), 2 SAS connectors are capable of External SATA operation • 1 EIDE interface (1 EIDE connector), IEEE 1394, USB 2.0	
Hard Drive Controller Supported	SATA and SAS controllers	

Processors	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)	Part Number
	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
	2nd Dual-Core Intel Xeon processor 5200 Series with Intel® 64 Architecture, and 6 MB of Shared L2 cache	**Part Number**
	Intel Xeon E5205/ 1.86 GHz, 6MB L2, 1066 MHz FSB	GX566AA
	Intel Xeon 5250/ 3.16 GHz, 6MB L2, 1333 MHz FSB	GX567AA
	Intel Xeon X5260/ 3.33 GHz, 6MB L2, 1333 MHz FSB, 120	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/ 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
	Professional 2D				
	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
	Entry 3D				
	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
	Mid-range 3D)				
	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
	High-end 3D				
	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				

Hard 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**	**Part Number**
	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
	SAS Hard Drive (8 port SAS Controller included on the system board)				
	3.5" SAS Hard Drives	**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

After-Market Options

	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
	2.5" SAS SFF Hard Drives				
	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

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
	Pointing Devices				
	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

After-Market Options

Controllers		Windows Vista[i]	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 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

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
	FDD floppy drive				
	1.44 MB Internal Floppy Drive (1 only)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DY670A
	Optical drives				
	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
	Other options				
	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.

After-Market Options

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	WS 4 & 5 (AMO expected availability in December 2007)	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

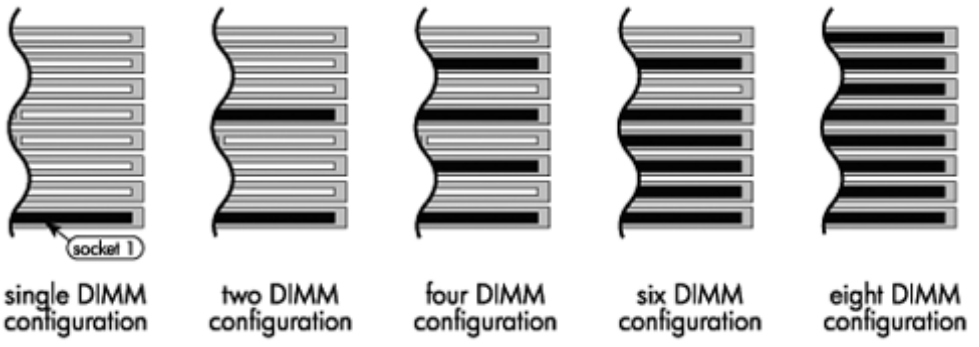
Brackets/Rack Kits		Part Number
	HP xw8/9 Bulk 10 Pack PCI Hold Down Kit	EN764AA
	xw8400 Slide Rack Kit IT/Broadcast	DY664A

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

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

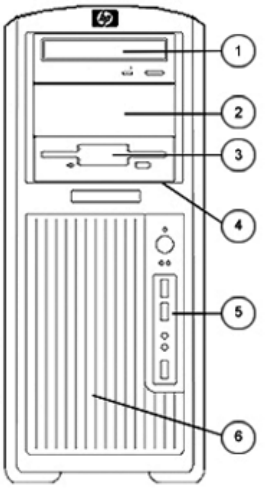
Not all memory configurations possible are represented below. Also, 512 MB configurations are not supported for 64-Bit operating systems.

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	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
64 GB (requires riser cards)	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB

Memory

128 GB (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

Tower configuration



	Quantity Supported	Position Supported	Controller
Minitower			
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 (5th 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 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 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.

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*	• RAID 0, 1, 10, 5 • Supports one RAID array with 2-6 drives • RAID 0 configuration - striped array • RAID 0 configuration - data array • RAID 1 configuration - mirrored array • RAID 10 configuration - stripe of mirrors • RAID 5 configuration - parity striping **NOTE:** Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit: http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.

Technical Specifications

Integrated SAS RAID (LSI 1068X)*	RAID 0, 1, 10 Support one RAID array with 2-5(6) drives Supports two RAID arrays with 2 drives each RAID 0 Configuration - Striped Array RAID 1 Configuration - Mirrored Array RAID 10 Configuration - Stripe of Mirrors External RAID arrays possible **NOTE:** Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details.
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

Cooling	
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

Power Supply				
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	
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: • **NORMAL** - normal temperature ranges • **ALERTED** - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown • **SHUTDOWN** - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console

Technical Specifications

Remote Wakeup/Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM
ACPI (Advanced Configuration and Power Interface)	• Allows the system to enter and wake from a low power mode • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system 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)	AT 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	• Enhanced Disk Drive Specification Version 1.1 • BIOS Enhanced Disk Drive Specification Version 3.0
PCI	• PCI Local Bus Specification, Revision 2.3 • PCI Power Management Specification, Revision 1.1
PCI Express	PCI Express Base Specification, Revision 1.1
PMM	POST Memory Manager Specification, Version 1.01
SATA	• Serial ATA Specification, Revision 1.0a • Serial ATA 3.0Gb/s: Extensions to Serial ATA 1.5Gb/s, Revision 1.0
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	**HP Insight Diagnostics Offline Edition**
	The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to:
	• Run diagnostics • View the hardware configuration of the system
	Key features and benefits
	HP 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:
	• Testing and diagnosing apparent hardware failures • Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance • Sending configuration information to another location for more in-depth analysis

Other Deployment & Management Features	
HP Client Management Solutions	Visit: http://www.hp.com/go/easydeploy

Technical Specifications

Security Features	
Access Panel Key Lock (standard)	Prevents removal of the access panel and all internal components including optical and floppy drives
Padlock (optional)	Prevents entire system theft and discourages access panel removal. 7mm diameter padlock loop at rear of system.
Kensington Cable Lock (optional)	Prevents entire system theft only. 3mm x 7mm slot at rear of system
Universal chassis clamp lock (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.
Service and Support	On-site Warranty and Service (Note 1): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.
	NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.
	NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
	NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

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: • US Energy Star 4.0 (Not in Linux) • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration • Japan PC Green label*
	*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	4x1GB 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

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

Technical Specifications - Environmental

		115 VAC		230 VAC		100 VAC	
		LAN Enabled	**LAN Disabled**	**LAN Enabled**	**LAN Disabled**	**LAN Enabled**	**LAN Disabled**
Heat Dissipation**	**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.

Declared Noise Emissions (High and entry level configurations)			
System Configuration (Entry-level)	**Processor Info Disks/Optical/Floppy**	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	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWad, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	4.2	24
	SATA Hard drive Operating (random reads – 30.3 reads/sec)	4.2	24
	Floppy Drive Operating (continuous copy)	4.5	28
	DVD-ROM Operating (sequential reads)	5.1	36
System Configuration (High-end)	**Processor Info Graphics Info Disks/Optical/Floppy**	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	

Longevity and Upgrading	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: • Intel LGA775 processor sockets • 8 USB ports • 1 PCI slot, 1 PCI-X slots and 5 PCI Express slots • 8 expansion bays • 8 – 16 memory slots, depending on configuration

Technical Specifications - Environmental

Batteries	This product complies with ISO standards: • EU Directive 91/ 157/ EEC • EU Directive 93/ 86/ EEC • EU Directive 98/ 101/ EEC Batteries used in the product do not contain: • Mercury greater than 5ppm by weight • Cadmium greater than 10ppm by weight • Lead greater than 4000ppm by weight. Battery size: CR2032 (coin cell) Battery type: Lithium

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. • This product contains 0% recycled materials (by wt.) • This product is >90% recycle-able when properly disposed of at end of life.		
	Packaging Materials		
	External	Cardboard carton and insert	2.70 kg
	Internal	LDPE Foam	0.35 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): • 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 Diphenyl 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)

Technical Specifications - Environmental

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 Realtek ALC262 Audio	**Type**	Integrated
	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	**NOTE:** 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

Opt. Sound Blaster X-Fi XtremeMusic (PCI)	**Audio Quality**	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter) = 0.004%	
	Signal to Noise Ratio (SNR)	Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted) ● Stereo Output: 109dB ● Front and Rear Channels: 109dB ● Center, Subwoofer and Side Channels: 109dB	
	Sound Conversion	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	
	Recording/Sampling Rate	44.1, 48 and 96kHz	
	ASIO 2.0 support	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz 24-bit/48kHz and 24-bit/96kHz with direct monitoring	
	Enhanced SoundFont support	up to 24-bit resolution 24-bit/96kHz	
	DACs	24-bit/192kHz	
	Voice Support	128 voices	
	Max. Channels in 3D Positional Audio	7.1	
	EAX® ADVANCED HD™ 5.0 support	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™	
	Connectors	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)	
	Dimensions	7.25 x 5 x 0.9 inches; 18.42 x 12.7 x 2.29 cm	
	Additional product features	**Movies**	THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback
		Music	X-Fi 24-bit Crystalizer CMSS-3D SuperRip
		Audio Creation	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
		Gaming	EAX ADVANCED HD 5.0
		Software Bundle	Doom 3 Sound Blaster EAX patch Entertainment Mode Audio Creation Mode Game Mode

			Mode Switcher Audio Console Creative MediaSource Creative MediaSource DVD-Audio Player DTS Neo:6 Settings Karaoke Player Entertainment Center Smart Recorder SoundFont Bank Manager Speaker Connection Wizard THX Setup Console Vienna SoundFont Studio Volume Panel WaveStudio Console Launcher Creative Media Toolbox Creative Diagnostics
	Minimum System Requirements	**System RAM**	256 MB
		Hard Disk	600MB free space Available PCI 2.1 slot for the audio card CD-ROM/CD-RW or CD/DVD-ROM required for software installation
		Operating System	Microsoft Windows XP Professional Service Pack 2 (SP2), Microsoft Windows XP Professional x64, Microsoft Windows Vista Business 32 and 64
Two Integrated PCI Express Broadcom BCM5755 NetXtreme Gigabit Ethernet Network Controller LoMs	**Connector**	RJ-45	
	Controller	Broadcom 5755 PCI-E LAN Controller	
	Memory	Integrated 48KB receive buffer and 8KB transmit buffer	
	Data rates supported	10/100/1000 Mbps	
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control	
	Bus architecture	PCIe 1.0a	
	Data path width	X1	
	Data path speed	2.5Gbit per sec per direction transfer rate	
	Data transfer mode	Bus-master DMA	
	Hardware certifications		
	Power requirement	1.5 watts @ +3.3V AUX supply	
	Boot ROM support	Yes	
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps	
	Operating system driver support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop	
	Management capabilities	WOL, PXE	
	Alerting	ASF 2.0 (One LOM only - LAN port furthest away from the PCI slots does not support ASF 2.0)	

Intel Pro/1000 GT Gigagit NIC (PCIe)	**Connector**	RJ-45
	Controller	Intel 82541PI Gigabit Controller
	Memory	Integrated 64 KB
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI 2.3
	Data path width	32-Bit PCI
	Data path speed	32 bit 33/66 MHz - 266 Mb/s full duplex
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC class , BSMI B for Taiwan, VCCI B for Japan
	Power requirement	800 mA @ +5 VDC
	IEEE support	802.2 and 802.3ab
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 1000BASE-T, 1000 Mbps
	Environmental	**Operating temperature** 32° to 131° F (0° to 55° C) **Operating humidity** 85% at 131° F (55° C)
	Dimensions	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x .2 cm
	Operating system driver support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4
	Management capabilities	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
	Kit contents	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.

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

Technical Specifications - Controllers

	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	**Operating temperature**	32° to 131° F (0° to 55° C)
		Operating humidity	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	
	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	**Operating**	**Storage**
	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; UI1950; 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	

Serial ATA Hard Drives	**1 TB** (7,200 rpm)	**Capacity**	1,000,204,886,016 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Up to 300 MB/s	
		Synchronous Transfer Rate (Maximum)	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Cache	32 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	14.5 ms
			Full-Stroke	33 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	1,953,525,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	
	500 GB (7,200 rpm)	**Capacity**	500,107,862,016 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Storage

250 GB (7,200 rpm)	**Capacity**	250,059,350,016 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s) Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
	Operating Temperature	41° to 131°F (5° to 55°C)	

160 GB (7,200 rpm)	**Capacity**	160,041,885,696 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Storage

80 GB (7,200 rpm)	**Capacity**	80,026,361,856 bytes	
	Height	1 inches; 2.54 cm or less	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s) Native Command Queuing enabled.	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131°F (5° to 55°C)	

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

	80 GB (10k rpm)	**Capacity**	80,026,361,856 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 150 MB/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
			Average	4.6 ms
			Full-Stroke	10.2 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	156,301,488	
		Operating Temperature	41° to 131°F (5° to 55°C)	
Serial Attached SCSI (SAS) Hard Drives	**300 GB** (15K rpm)	**Capacity**	300,000,000,000 bytes	
		Height	1.0 in (25.4mm)	
		Width	4.0 in (101.6mm)	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.5 ms
			Full-Stroke	6.7 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	585,937,500 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	146 GB (15K rpm)	**Capacity**	146,815,737,856 bytes	
		Height	1.0 in (25.4mm)	
		Width	4.0 in (101.6mm)	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.27 ms
			Average	3.5 ms
			Full-Stroke	7.4 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	286,749,488 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	

Technical Specifications - Storage

	73 GB (15K rpm)	**Capacity**	73,407,865,856 bytes	
		Height	1.0 in (25.4mm)	
		Width	4.0 in (101.6mm)	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.27 ms
			Average	3.5 ms
			Full-Stroke	7.4 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	143,374,738 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
Serial Attached SCSI (SAS) 2.5" SFF Hard Drives	**146 GB** (10K rpm)	**Capacity**	146,815,737,856 bytes	
		Height	0.583 in (14.8mm)	
		Width	2.76 in (70mm)	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.4 ms
			Average	4.5 ms
			Full-Stroke	8.5 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	286,749,488 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
		Mean time between failures (MTBF)	1,600,000 hours	
	73 GB (10K rpm)	**Capacity**	73,407,865,856 bytes	
		Height	0.583 in (14.8mm)	
		Width	2.76 in (70mm)	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.4 ms
			Average	4.5 ms
			Full-Stroke	8.5 ms
		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

HP IEEE 1394a FireWire 400 4-Port PCI Card (Windows XP and Vista Only)	**Device Interface Protocol**	IEEE-1394a
	Data Rate	400 Mbps
	Devices Supported	IEEE-1394 compliant devices
	Bus Interface	PCI
	Physical	PCI card with brackets for low profile and full height PCI slots.
	Environmental	**Operating temperature** 50° to 131° F (10° to 55° C)
		Non-operating temperature -22° to 140° F (-30° to 60° C)
		Relative humidity 20% to 80%
	Ports	Two IEEE1394 6-Pin Connector (Rear)
	Minimum System Requirements	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
	Regulatory Agency Approval	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC

HP IEEE 1394b FireWire 800 3-Port PCI Card (Windows XP Only)	**Device Interface Protocol**	IEEE-1394
	Data Rate	800 Mbps
	Devices Supported	IEEE-1394 compliant devices
	Bus Interface	PCI
	Physical	PCI card with brackets for low profile and full height PCI slots.
	Environmental	**Operating temperature** 50° to 131° F (10° to 55° C)
		Non-operating temperature -22° to 140° F (-30° to 60° C)
		Relative humidity 20% to 80%
	Ports	Two IEEE-1394b bilingual 9-Pin Connector (Rear)
	Connectors	One 10-Pin header Custom Connector (Internal)
	Minimum System Requirements	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
	Regulatory Agency Approval	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
		Weight	2 lb (0.9 kg) minimum
	Electrical	**Operating voltage**	+ 5VDC ± 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
		MicrosoftPC 99 - 2001	Functionally compliant
	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	**Operating temperature**	50° to 122° F (10° to 50° C)
		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%	
		Backlash	± 2%	
	Environmental	**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
		System consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge

Technical Specifications - Input/Output Devices

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

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

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**	6.56 feet; 2 m
		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**	**Dimensions** (L x W x H)	7.6 x 5.4 x 2.3 in (194 x 139 x 58mm)
		Weight	1.36 lbs (0.62 kg)
		Palmrest	Sculpted
	Mechanical	**Buttons**	15 reprogrammable speed keys
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	System Requirements	USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, not supported in Linux	
	Regulatory Approvals	FCC, CE	

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
	Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)

	Operating Systems Supported	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.	
	Option kit contents	HP 16X Max SATA DVD-ROM Drive, Intervideo WinDVD and installation guide.	
HP 48X Max SATA CD-RW/DVD-ROM Combo 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)	
	Write speed	**CD-R**	Up to 48X
		CD-RW	Up to 32X
	Read speeds	**DVD+R/-R/+RW/ -RW/+R DL /-R DL**	Up to 8X
		DVD-ROM	Up to 16X
		CD-ROM, CD-R	Up to 48X
		CD-RW	Up to 32X
	Buffer Size	1.5MB (Min)	
	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)
	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
		Total Drive Power (standby mode)	< 2.5 Watt
	Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Operating Systems Supported	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.	
	Option kit contents	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	**Form Factor**	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Disc capacity	8.5 GB DL or 4.7 GB standard	
	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)	
	Write speed	**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
	Read speeds	**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
	Access times (typical reads, including setting)	**Random**	DVD: < 130 ms (typical), CD: < 120 ms (typical)
		Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
	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
		Total Drive Power (standby mode)	< 2.5 Watt
	Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Operating Systems Supported	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.	

* 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.
Option kit contents	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.

NVIDIA Quadro NVS 440 256 MB Graphics Controller	**Form Factor**	ATX
	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: http://welcome.hp.com/country/us/eng/software_drivers.html.

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®.
	Multi-Monitor Support	Dual monitor support
	DVI Support	DMS-59 (to dual DVI-SL)
	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
	Supported Graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0
	Available graphics drivers	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: http://welcome.hp.com/country/us/eng/software_drivers.html.
NVIDIA Quadro FX 370 PCI-Express graphics controller	**Form Factor**	ATX
	Bus Type	PCI-Express x16
	Memory	256MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (single-link)
	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®
	RAMDAC	Integrated dual 400MHz
	Architecture Features	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 accelerrated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<50 W
	Shading Architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported Graphics APIs	OGL 2.1 & SM4.0 and DirectX10 Support
	Available graphics drivers	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux – Ful 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.

Technical Specifications - Graphics

NVIDIA Quadro FX 570 PCI-Express graphics controller	**Form Factor**	ATX
	Bus Type	PCI-Express x16
	Memory	256MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (single-link)
	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®
	RAMDAC	Integrated dual 400MHz
	Architecture Features	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 accelerrated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<60 W
	Shading Architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported Graphics APIs	OGL 2.1 & SM4.0 and DirectX10 Support
	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.

NVIDIA Quadro FX 1700 PCI-Express graphics controller	**Form Factor**	ATX
	Bus Type	PCI-Express x16
	Memory	512 MB 4000MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (single-link)
	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®
	RAMDAC	Integrated dual 400MHz
	Architecture Features	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 accelerrated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<75 W
	Shading Architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported Graphics APIs	OGL 2.1 & SM4.0 and DirectX10 Support
	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.
ATI FireGL V5600 PCI-Express graphics controller	**Form factor**	ATX
	Graphics controller	R520
	Bus Type	PCI-Express x16
	Memory	512 MB f 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	• 512-bit internal ring bus for highly efficient memory reads • Programmable intelligent arbitration logic
	Display output	• Up to 16-bit per RGB color component High Dynamic Range output (HDR) • Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color)
	Shading architecture	• SupportsFull Shader Model 4.0 • 120 shader processing unit
	Supported graphics APIs	DirectX 10 and OpenGL 2.1 advanced
	Available graphics drivers	Microsoft Windows XP Professional qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html. HP-tested Windows XP and Linux 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.
	Option kit contents	PCA with ATX bracket, DVI to VGA converters, CD and manual.

Technical Specifications - Graphics

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
	Architecture Features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz) SLI Link
	Shading Architecture	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
	Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
	Available Graphics Drivers	Microsoft Windows Vista Business 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.

Technical Specifications - Graphics

NVIDIA Quadro FX 3700 PCI-Express 2.0 (x16)	**Form Factor**	ATX
	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI Express x16
	Memory	512MB 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 2560x1600 @ 60Hz. NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Dual 400MHz integrated
	Architecture Features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 32x FSAA dramatically reduces visual aliasing artifacts at resolution up to 1920x1200 Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 2560x1600 @ 60Hz SLI Link
	Shading Architecture	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
	Supported Graphics APIs	OpenGL 2.1 DirectX 10.0
	Available Graphics Drivers	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: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	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

NVIDIA Quadro FX 4600 (768 MB)	**Graphics Controller**	NVIDIA Quadro FX 4600 Workstation GPU
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	768 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	Multi-monitor Support	Dual integrated display controllers supporting up to 2560x1600 @ 60Hz (both analog and digital) on both displays

Technical Specifications - Graphics

NVIDIA Quadro FX 4600 Architecture	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
Shading Architecture	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
High Level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
High-Resolution Antialiasing	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
Display Resolution Support	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
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
Available Graphics drivers	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: http://welcome.hp.com/country/us/eng/software_drivers.html

Technical Specifications - Graphics

NVIDIA Quadro FX 5600 PCIe Graphics	**Graphics Controller**	NVIDIA Quadro FX 5600 graphics board
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	1.5 GB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output
	Multi-monitor Support	Dual integrated display controllers supporting up to 2560x1600 @ 60Hz (both analog and digital) on both displays
	NVIDIA Quadro FX 5600 Architecture	128-bit color precision Unlimited fragment instruction Unlimited vertex instruction 3D volumetric texture support Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd-generation occlusion culling 16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling
	Shading Architecture	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
	High-level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.1 and DirectX 10 support Open source compiler
	High-resolution Antialiasing	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
	Display Resolution Support	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
	nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
	Supported Graphics APIs	OpenGL 2.1 ICD with immediate mode support for all OGL primitive types DirectX 10
	Available Graphics Drivers	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: http://welcome.hp.com/country/us/eng/software_drivers.html

HP L1965 19-inch LCD Monitor	**Panel**	**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^2)
		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 ± 2%
		Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green (activated through on-screen display)
		Video Cable	One DVI-D to DVI-D, and 1 DVI-I to VGA cables
		Video Cable Length	71 in (1.8 m)
	Signal Interface/ Performance	**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
		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)	**Unpacked with stand**	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)
			Base Area (Footprint D x W)	8.78 x 11.88 inches (22.29 x 30.18 cm)
			Panel only (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)
		Weight	**Unpacked with stand**	15.6 lbs (7.06 kg)
			Unpacked without stand	9.26 lbs (4.19 kg)
			Packaged	20.5 lbs (9.27 kg)
		Bezel Width	12.5 mm left and right, 12.75 mm top and bottom	

	Tilt Range	-4 degrees to +30 degrees
	Swivel Range	± 45 degrees horizontal swivel
	Height Adjustable	Yes (4 in/100mm adjustment range)
	Pivot Rotation	Yes, 90 degrees
	Base	Ships attached and is removable
Environmental	**Temperature – Operating**	41° to 95° F (5° to 35° C)
	Temperature – Non-operating	-4° to 140° F (-20° to 60° C)
	Humidity – Operating	20% to 80%
	Humidity – Non-operating	5% to 95%
	Altitude – Operating	0 to 12,000 ft (0 to 3,658 m)
	Altitude – Non-operating	0 to 40,000 feet; 0 to 12,192 m
Environmental Data	**Eco-Label Certifications and 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: • US Energy Star • CECP

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	35.7 watts	35.6 watts	35.1 watts
Sleep	1.08 watts	1.14watts	1.23 watts
Off	0.93 watts	0.94 watts	0.92 watts
Heat Dissipation*	100 VAC, 50 Hz	115 VAC, 60 Hz	230 VAC, 50 Hz
Normal Operation	121.7 BTU/hr	121.4 BTU/hr	119.7 BTU/hr
Sleep	3.68 BTU/hr	3.89 BTU/hr	4.19 BTU/hr
Off	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.
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% recycleable 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):

- 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**	Powered directly by the monitor or PC, seamlessly attaches to the monitor's bezel to bring full multimedia support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately, part number EE418AA. For more information, refer to the HP Flat Panel Speaker Bar QuickSpecs.
Other	**Accessories Included**	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.
	Software	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. 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.

		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.
	User Guide Languages	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
	Warranty Languages	English
	Color	Carbonite, two-tone carbonite and silver (EMEA only)
	VESA Mounting	Yes (swing arm/wall mount not included); base must be removed for mounting options)
	VESA External Mounting	Yes (standard 4 hole pattern, 100 mm)
	Kensington Lock-ready	Yes
Certification and Compliance		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
Compatibility		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.
Service and Warranty		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 LP2065 20-inch LCD Monitor	**Panel**	**Type**	20-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	20.1 inches; 51 cm
		Screen Opening (W x H)	16.2 x 12.17 inches; 41.1 x 30.9 cm
		Viewing Angle (typical)*	Up to 178° horizontal/178° vertical (10:1 minimum contrast ratio)
		Brightness (typical*	Up to 300 nits (cd/m^2)
		Contrast Ratio (typical)*	Up to 800:1
		Response Rate (typical)*	8 ms (gray to gray), 16 ms (rise + fall)
		Pixel Pitch	0.255 mm
		Color Depth Support	16.7 million colors

	Backlight Lamp Life (to half brightness)	45K hours
On Screen Display (OSD) **Controls**	**Buttons or Switches**	Input select, auto adjust/OSD up, OSD down, OSD menu select, power
	Languages	English, French, German, Spanish, Italian, Dutch, and Japanese
	User Controls	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
Signal Interface/ Performance	**Horizontal Frequency**	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Native Resolution	1600 x 1200 @ 60 Hz (recommended)
	Preset VESA Graphic Modes (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
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	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 ± 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)	**Unpacked with stand**	16.7 to 21.8 x 17.4 x 8.67 in 42.5 to 55.5 x 44.3 x 22.0 cm
		Unpacked w/o stand (head only)	13.58 x 17.4 x 3.42 in 34.5 x 44.3 x 8.7 cm
		Packaged	11.77 x 22.2 x 16.77 in 29.9 x 56.4 x 42.6 cm
	Weight	**Unpacked**	With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)
		Packaged	26.3 lb (11.95 kg)
	Tilt Range	-5° to + 25° vertical tilt	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 inches; 13.0 cm	
	Pivot Rotation	Yes	
	Base	Detachable, ships attached	
Environmental	**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 feet; +3,657.6 m	
	Altitude – Non-operating	+40,000 feet; +12,192 m	
Options	**HP Silver Flat Panel Speaker Bar - Part number: EE418AA**	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.	
Other	**Accessories Included**	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.	

		User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
		Software	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 safe 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.
		User Guide Languages	English
		Warranty Languages	English
		Color	Carbonite/Silver
		VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
		Kensington Lock-Ready	Yes
	Certification and Compliance	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)	
	Compatibility	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.	
	Service and Warranty	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**	**Type**	24-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	24 inches; 60.96 cm
		Screen Opening (W x H)	20.47 x 12.83 inches; 52.0 x 32.6 cm
		Viewing Angle (typical)*	178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	500 nits (cd/m^2)
		Contrast Ratio (typical)*	1000:1

	Response Rate (typical)*	8 ms (typical gray to gray)
	Pixel Pitch	0.270 mm
	Color Depth Support	16.7 million colors
	Backlight Lamp Life (to half brightness)	50K hours
	*Response time 13 ms rise and fall, 6 ms gray to gray.	
On Screen Display (OSD) **Controls**	**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
Signal Interface/ Performance	**Horizontal Frequency**	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA and DVI input)
	Native Resolution	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
	Preset VESA Graphic Modes (non-interlaced)	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
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 20
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K

Technical Specifications - Monitors

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	Two DVI-I (VGA analog and digital) inputs	
	Input Impedance	75 ohms ± 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	VGA to DVI-I; DVI-D to DVI-D	
	Video Cable Length	5.9 ft (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	75 watts	
	Maximum	< 110 watts	
	Power Saving	< 2 watts	
	Power Cable Length	6.2 ft (1.9 m)	
Mechanical	**Dimensions** (H x W x D)	**Unpacked w/ stand**	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
		Unpacked w/o stand (head only)	14.4 x 22 x 3.7 in 36.6 x 55.84 x 9.2 cm
		Packaged	11.7 x 22.1 x 25.6 in 29.8 x 56.0 x 65.1 cm
	Weight	**Unpacked**	23.6 lbs (10.7 kg)
		Packaged	23.6 lbs (10.7 kg)
	Tilt Range	-5° to + 25° vertical	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 inches; 130 mm	
	Pivot Rotation	Yes	
	Base	Detachable, ships detached	
Environmental	**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 (+3,657.6 m)	
	Altitude – Non-operating	+40,000 ft (+12,192 m)	
Other	**Accessories Included**	VGA to DVI-I cable **–** connects the graphic card's VGA connector to the monitor's input #2 (DVI-I analog) connector 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	

	Software	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. 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. 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.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite/silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Options	**HP Silver Flat Panel Speaker Bar - Part number: EE418AA**	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.
Certification and Compliance	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 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)
	Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
	Service and Warranty		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 Widescreen LCD Monitor	**Panel**	**Type**	30.0-inch Wide Format Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	29.77 in (75.623 cm)
		Screen Opening (W x H)	25.3 x 15.8 in (64.3 x 40.3 cm)
		Viewing Angle (typical)*	Up to 178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	300 nits (cd/m^2)
		Contrast Ratio (typical)*	1000:1
		Response Rate (typical)*	12 ms (8 ms average gray to gray)
		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

Technical Specifications - Monitors

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)	**Unpacked w/ stand**	19.3 to 23.2 x 27.2 x 9.5in (49.0 to 59.0 x 69.2 x 24.0 cm)
		Unpacked w/o stand (head only)	17.9 x 27.2 x 3.3 in (45.5 x 69.2 x 8.4 cm)
		Packaged	22.4 x 31.1 x 14.9 in (56.8 x 79.0 x 37.8 cm)
	Weight	**Unpacked**	30.6 lbs (13.9 kg)
	Tilt Range	-5° to + 30° vertical	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 in (100 mm)	
	Pivot Rotation	No	
	Base	Detachable, ships detached	
Environmental	**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**	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: • US Energy Star • US Federal Energy Management Program (FEMP) • IT Eco Declaration • •	

- TCO 03
- Taiwan Green Mark
- CECP
- Korea Eco-label
- EPEAT - Silver

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[1]	2 watts	2 watts	2 watts
Off	0.05 watts	0.06 watts	0.25 watts
Heat Dissipation[2]	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

[1]This sleep status ignore the input sync signal check cycle when metering the model in sleep mode.

[2]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. 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 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).

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):

- 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
Other	**Accessories Included**	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
	Software	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.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish

	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Options	**HP Flat Panel Speaker Bar - Part number: EE418AA**	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.
Certification and Compliance	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.	
Compatibility	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.	
Service and Warranty	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.	

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.