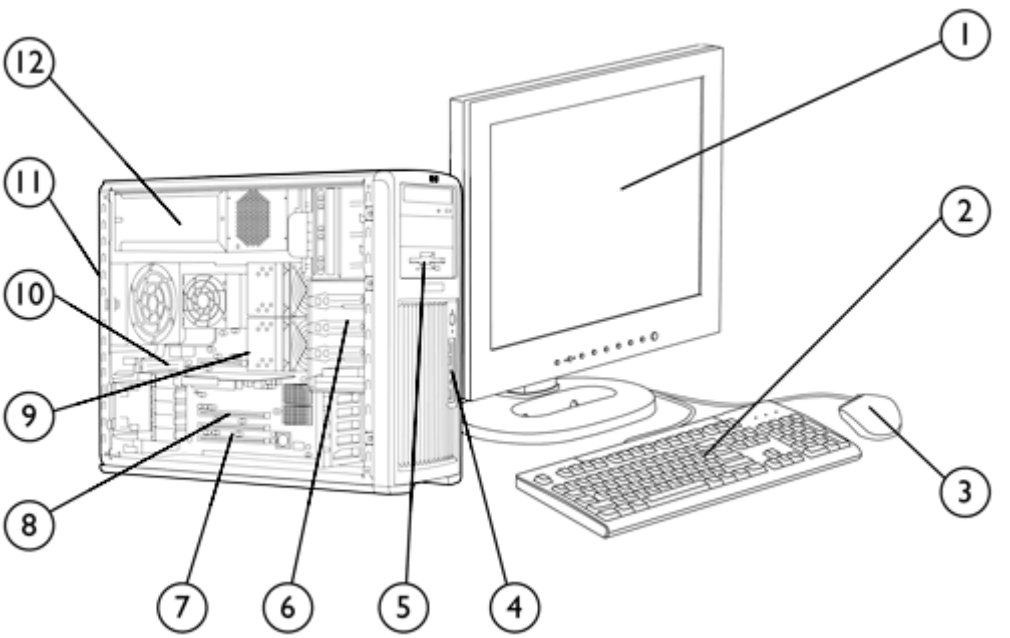
Overview



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
8. 1 PCI Express x16 Graphics Bus
9. Dual-Core Intel® Xeon® Processors
10. 8 DIMM slots for DDR2 FB-DIMM memory
11. 5 USB 2.0, 1 standard serial port, 1 parallel port, 2 PS/2, 1 RJ-45, audio in/out, microphone, 2 IEEE-1394b
12. 800 watt power supply

At A Glance

- 64-Bit Quad-Core Intel® Xeon® Processor 5300 Sequence or Dual-Core Intel® Xeon® Processor 5100 Sequence
- 1066 & 1333 MHz Front Side Bus support
- 4-channel 667 MHz FB-DIMM memory subsystem
- Up to 32 GB memory capacity
- Choice of Operating Systems:
  Genuine Windows® XP Professional
  Genuine Windows XP Professional x64 Edition (see http://www.hp.com/workstations/pws/windowsxp64/ for details)
  Red Hat Enterprise Linux® WS 3 (32- or 64-Bit version)
  Preloaded: Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-Bit version)
- HP Linux Installer Kit (see http://www.hp.com/workstations/software/linux):
  - Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version)
  - Red Hat Enterprise Linux WS 3 (Update 8) (32 or 64 bit version)
  - For detailed OS/hardware support information for linux, see: http://www.hp.com/support/linux_hardware_matrix
- PCI Express I/O and graphics
- Integrated Broadcom 5752 LoM
- 6 channels of Serial ATA (SATA) and 4 channels of Serial Attached SCSI (SAS) 3.0Gb/s natively supported internally; SATA RAID level 0, 1, 5 and 10 and SAS RAID level 0, 1 available on motherboard (Factory integrated RAID is Microsoft Windows only)
- High Definition integrated audio with internal speaker

Overview

- Pre-loaded Manageability Tools (Microsoft Windows only)
- Energy Star Compliance with energy-saving features (Microsoft Windows only)
- 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.

Processor and Speed – Up to 2 of the following

Quad-Core Intel Xeon Processor with Intel® 64 Architecture

One or two Quad-Core Intel Xeon Processor 5100 Sequence, 8 MB total L2 cache (2 x 4 MB shared):*
Quad -Core Intel® Xeon® Processor 5310/ 1.60 GHz,1066 MHz FSB
Quad -Core Intel® Xeon® Processor 5320/ 1.86 GHz,1066 MHz FSB
Quad -Core Intel® Xeon® Processor 5335/ 2.00 GHz,1333 MHz FSB **
Quad -Core Intel® Xeon® Processor 5345/ 2.33 GHz,1333 MHz FSB
Quad -Core Intel® Xeon® Processor 5355/ 2.66 GHz,1333 MHz FSB**

NOTE*: 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 including details on which processors support Intel 64 Architecture or consult with your system vendor for more information.
** Expected availability in January 2006

Dual-Core Intel Xeon Processors with Intel® 64 Architecture

One or two Dual-Core Intel Xeon Processor 5000 Sequence*
3.00 GHz/667
3.20 GHz/1066
3.73 GHz/1066

One or two Dual-Core Intel Xeon Processor 5100 Sequence**
Intel Xeon 5110/ 1.60 GHz, 4MB L2, 1066 MHz FSB
Intel Xeon 5120/ 1.86 GHz, 4MB L2, 1066 MHz FSB Intel Xeon 5130/ 2.00 GHz, 4MB L2, 1333 MHz FSB
Intel Xeon 5140/ 2.33 GHz, 4MB L2, 1333 MHz FSB Intel Xeon 5150/ 2.66 GHz, 4MB L2, 1333 MHz FSB
Intel Xeon 5160/ 3.00 GHz, 4MB L2, 1333 MHz FSB

* Upgrade to Intel Xeon Processor Sequence 5100 not supported.
**Dual-Core Intel Xeon Processor 5100 Sequence expected availability in 3Q 2006. 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 including details on which processors support Intel® 64 Architecture or consult with your system vendor for more information.

Standard Features - Custom Components

Operating System – One of the following

Genuine Windows XP Professional SP2

Genuine Windows XP Professional x64 (expected availability with Intel Xeon processor 5100 sequence only in 2H 2006)

Red Hat Enterprise Linux WS 3 (32 & 64-Bit available an After Market Option only)
Red Hat Enterprise Linux WS 4 (32 & 64-Bit)

HP Linux Installer Kit (see http://www.hp.com/workstations/software/linux):
Red Hat Enterprise Linux Workstation 4 (Update 4 or later) (32- or 64-bit version)
Red Hat Enterprise Linux Workstation 3 (Update 8) (32 or 64 bit version)
For detailed OS/hardware support information for linux, see:
http://www.hp.com/support/linux_hardware_matrix

1-5 Hard Disk Drives - Up to 5 SATA drives , or 4 SAS drives

SATA Hard Drive	Windows XP	Red Hat Linux
80 GB 7200 rpm SATA 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4
160 GB 7200 rpm SATA 3.0Gb/s NCQ** drive	32-Bit, 64-Bit	WS 3, WS 4
250 GB 7200 rpm SATA 3.0Gb/s NCQ** drive	32-Bit, 64-Bit	WS 3, WS 4
500 GB 7200 rpm SATA 3.0Gb/s NCQ** drive	32-Bit, 64-Bit	WS 3, WS 4
750 GB 7200 rpm SATA 3.0Gb/s NCQ** drive	32-Bit, 64-Bit	WS 3, WS 4
80 GB 10K rpm SATA NCQ** drive	32-Bit, 64-Bit	WS 3, WS 4
160 GB 10K rpm SATA NCQ** drive	32-Bit, 64-Bit	WS 3, WS 4
SAS Hard Drive (SAS Controller included on the system board)		
146 GB 10K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4
300 GB 10K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4
73 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4
146 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4
300 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4

NOTE: *Mixing SATA and SAS hard drives is ok with Windows XP (32- or 64-Bit) only. **NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux

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Factory Integrated RAID on motherboard for SATA and SAS drives

	Windows XP	Red Hat Linux
RAID 0 Configuration - Striped Array Minimum of 2 hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities).	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).	32-Bit, 64-Bit	Not supported
RAID 1 Configuration - Mirrored Array Minimum of 2 SATA or 2 SAS hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities).	32-Bit, 64-Bit	Not supported
RAID 10 Configuration - Striped/Mirrored Array Minimum of 4 hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities).	32-Bit, 64-Bit	Not supported
RAID 5 Configuration - Parity Array (available August 2006) Minimum of 3 SATA hard drives needed. All SATA hard drives must be identical (size/speed/type/bus/functional capabilities).	32-Bit, 64-Bit	Not supported

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Standard Features - Custom Components

Controllers		Windows XP	Red Hat Linux
	Integrated SATA 3.0Gb/s controller (RAID levels 0, 1, 10, 5)	32-Bit, 64-Bit	WS 3 & WS 4- no hardware RAID
	Integrated SAS controller (RAID levels 0, 1, 10)	32-Bit, 64-Bit	WS3 & WS4- no hardware RAID
	HP SAS Back Panel Connector kit (No internal SAS hard drives can be ordered with this option)	32-Bit, 64-Bit	WS 3, W S4

Memory - One of the following		Windows XP	Red Hat Linux
	HP 512 MB (1x512 MB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 1 GB (2 x 512 MB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 2 GB (2 x 1 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 3 GB (2 x 1GB + 2 x 512 MB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (2 x 2 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (4 x 1 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 6 GB (6 x 1 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 8 GB (4 x 2 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 8 GB (8 x 1 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 16 GB (8 x 2 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4
	HP 32 GB (8 x 4 GB) PC2-5300F DDR2-667 ECC Fully Buffered DIMM	32-Bit, 64-Bit	WS 3, WS 4

Standard Features - Custom Components

		Windows XP	Red Hat Linux
1 -2 Removable storage (Up to 2 of the following drives)	No Floppy Drive option	N/A	N/A
	1.44-MB Diskette Drive	32-Bit, 64-Bit	WS 3, WS 4
	No Optical Drive option	N/A	N/A
	48X CD-ROM *	32-Bit, 64-Bit	WS 3, WS 4
	16X DVD-ROM	32-Bit, 64-Bit	WS 3, WS 4
	48X CD-RW/DVD-ROM Combo	32-Bit, 64-Bit	WS 3, WS 4
	16X DVD+/-RW, DL, LightScribe** (Windows only)	32-Bit, 64-Bit	WS 3, WS 4
	NOTES:*May only order one. ** 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		

		Windows XP	Red Hat Linux
Input Devices	Keyboard - One of the following*		
	No Keyboard option	N/A	N/A
	PS/2 Standard Keyboard	32-Bit, 64-Bit	WS 3, WS 4
	USB Standard Keyboard	32-Bit, 64-Bit	WS 3, WS 4
	Mouse - One of the following*		
	No Mouse option	N/A	N/A
	PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	WS 3, WS 4
	USB 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	WS 3, WS 4
	USB 3-Button Mouse (optical)	32-Bit, 64-Bit	WS 3, WS 4
	NOTE:* Mixing PS/2 and USB Keyboards and Mice are not supported with Linux OS.		

		Windows XP	Red Hat Linux
Audio	Integrated Intel/Realtek HD Audio with internal speaker	32-Bit, 64-Bit	WS 3, WS 4
	HP Optical Drive Internal Audio Cable (Must order an optical drive. Not supported with SoundBlaster audio cards.)	32-Bit, 64-Bit	WS 3, WS 4
	SoundBlaster® X-Fi XtremeMusic™ PCI audio card	32-Bit	Not Supported

		Windows XP	Red Hat Linux
NIC (Network Interface Controller)	Integrated Broadcom 5752 Ethernet LoM	32-Bit, 64-Bit	WS 3, WS 4
	Optional PCI Express Broadcom BCM5751 Gigabit Ethernet NIC	32-Bit, 64-Bit	WS 3, WS 4

Standard Features - Custom Components

PCI Express Graphics	Windows XP	Red Hat Linux
No Graphics Option	N/A	N/A
NVIDIA Quadro NVS 285 (128MB)	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 560 (128MB)	32-Bit, 64-Bit	WS 3, WS 4
ATI FireGL V3300 (128MB)	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 1500 (256MB)	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 3500 (256MB)	32-Bit, 64-Bit	WS 3, WS 4
ATI FireGL V7200 (256MB)	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 4500 (512MB)	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 5500 (1GB)	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro G-Sync Card (can only be ordered with the FX4500 graphics card.)	32-Bit, 64-Bit	WS 3, WS 4

Miscellaneous	Windows XP	Red Hat Linux
IEEE 1394b FireWire 800 3-Port PCI Card (1-port 1394a & 2-ports 1394b)	32-Bit, 64-Bit	Not Supported
Chassis Intrusion Switch	N/A	N/A
HP Energy Star Enabled Configuration	32-Bit	Not Supported
HP Workstation Mouse Pad	N/A	N/A

Software	Windows XP	Red Hat Linux
Optional Symantec Norton AntiVirus 2004 (optional)	32-Bit	Not supported
CA eTrust 64-Bit Anti-Virus Software (available in the U.S. only)	32-Bit	Not supported
Optional Microsoft Office Basic Edition 2003	32-Bit	Not supported
Optional Microsoft Office Personal Edition 2003	32-Bit	Not supported
Optional Microsoft Office Professional Edition 2003	32-Bit, 64-Bit*	Not supported
Microsoft Office Small Business Edition 2003	32-Bit	Not supported
HP Performance Tuning Framework	32-Bit, 64-Bit	Not supported
HP Client Manager Software v6.0	32-Bit, 64-Bit	Not supported
Optional HP Protect Tools Security Solutions (available January 2007)	32-Bit, 64-Bit	Not supported

NOTE: *Region specific, model DS700AV#ABA only.

Standard Features - Specs

Operating System (choice)	Genuine Windows XP Professional SP2
	Genuine Windows XP Professional x64 Edition
	Red Hat Enterprise Linux WS 4 (64-Bit version). 32-Bit version included with recovery media or as an after market option.
	Preloaded: Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version) HP Linux Installer Kit (see http://www.hp.com/workstations/software/linux): Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version) Red Hat Enterprise Linux WS 3 (Update 8) (32 or 64 bit version) For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix
Form Factor	Minitower
Color	Carbonite/Alloy metallic
System Board Form Factor	E- ATX (12" x 13")
Processor	1 or 2 Dual-Core Intel® Xeon® Processor 5100 Sequence or Quad-Core Intel Xeon Processor 5300 Sequence with Intel® 64 Architecture
CPU FSB	1066/1333 MHz
Standard L2 Cache	4 MB L2 shared cache (non ECC) for Dual-Core / 8 MB (2 X 4 MB shared) total L2 cache (non ECC) for Quad-Core)
Chipset	Intel 5000X
Memory Expansion Slots	8 DIMMs
Memory Type Supported	DDR2 registered ECC FB-DIMMs
Memory Speed Supported	667 MHz
Maximum Memory	32 GB (8 FB-DIMM slots with 4 GB DIMMS)
Network Controller	Broadcom 5752 Gigabit Ethernet LAN on Motherboard
Audio	Integrated Intel/Realtek HD digital audio with S/PDIF 6-channel pass-through, stereo microphone, and Yamaha XG Lite Softsynth support
PCI Slots	• 1 half-length PCI slot • 6 full-length slots with a mechanical card guide support for a PCI card with extender bracket. • 3 PCI-X slots (one 133 MHz, two 100 MHz slots) • 1 PCI Express x16 graphics • 1 PCI Express x16 mechanical (x4 electrical) • 1 PCI Express x8 mechanical (x4 electrical)
Bays	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, Headphone, Microphone, and 1 IEEE 1394a
Rear I/O	2 IEEE-1394b, 5 USB 2.0, 1 standard serial port, 1 parallel port, PS/2 keyboard and mouse, 1 RJ-45 to integrated Gigabit LAN, Audio In, Audio Out, Microphone In
Integrated USB	1 USB 2.0 header (internal)
Choice of PS/2 or USB Keyboard	1
Choice of PS/2 or USB Mouse	1
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	Minimum config - 40 lb (19.5 kg) Standard config - 46 lb (21 kg) Maximum config - 62 lb (28 kg)

Standard Features - Specs

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 (nonpressurized)	Operating	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
Power Supply	800W wide-ranging, active Power Factor Correction	
Interfaces Supported	6-channel SATA 3.0Gb/s Interface (6 Serial-ATA connectors on the motherboard, 4-channel SAS interface (4 SAS connectors each), 1 EIDE interface (1 EIDE connector) supported for optical drives, IEEE 1394, USB 2.0	
Hard Drive Controller Supported	SATA or SAS controllers	

Standard Features - Pre-Configured Regional Models

HP xw8400 Workstation EY759AW#ABA	Form Factor	Rackable Minitower
	Operating System	Genuine Windows XP Professional SP2
	Processor	Two Intel® Xeon® 5050 3.00 GHz 4MB L2 Cache (2MB per Core) 667 Mhz FSB Dual Core
	Chipset	Intel 5000X
	Memory	1GB (2x512MB) DDR2-667 ECC FBD
	Graphics Card	NVIDIA Quadro FX1500 256MB PCIe
	Hard Drive	80GB SATA 3Gb/s (7200 RPM)
	Hard Drive Controller	Integrated 6-channel SATA 3 Gb/s controller with RAID levels 0, 1, 10, 5 capability. Integrated 4-channel SAS controller with RAID 0, 1 capability
	Optical Drive	48X CD-ROM
	Sound Card	Integrated High Definition audio with Jack Retasking technology
	Network Card	Integrated Braodcom 5752 Netxtreme Gigabit PCIe LAN on Motherboard
	Floppy Disk Drive	No Floppy Drive
	Keyboard	HP PS/2 Standard Keyboard
	Mouse	HP PS/2 Scroll Mouse
	Warranty	3 Years - parts/labor/onsite

HP xw8400 Workstation EY760AW#ABA	Form Factor	Rackable Minitower
	Operating System	Genuine Windows XP Professional SP2
	Processor	Two Intel® Xeon® 5060 3.20 GHz 4MB L2 Cache (2MB per Core) 1066 Mhz FSB Dual Core
	Chipset	Intel 5000X
	Memory	2GB (2x1GB) DDR2-667 ECC FBD
	Graphics Card	No Integrated Graphics
	Hard Drive	Two 80GB SATA 3Gb/s (7200 RPM)
	Hard Drive Controller	Integrated 6-channel SATA 3 Gb/s controller with RAID levels 0, 1, 10, 5 capability. Integrated 4-channel SAS controller with RAID 0, 1 capability
	Optical Drive	48X DVD-ROM/CD-RW Combo
	Sound Card	Integrated High Definition audio with Jack Retasking technology
	Network Card	Integrated Braodcom 5752 Netxtreme Gigabit PCIe LAN on Motherboard
	Floppy Disk Drive	No Floppy Drive
	Keyboard	HP PS/2 Standard Keyboard
	Mouse	HP PS/2 Scroll Mouse
	Warranty	3 Years - parts/labor/onsite

Standard Features - Pre-Configured Regional Models

HP xw8400 Workstation EY761AW#ABA	Form Factor	Rackable Minitower
	Operating System	Genuine Windows XP Professional SP2
	Processor	Two Intel® Xeon® 5080 3.73 GHz 4MB L2 Cache (2MB per Core) 1066 Mhz FSB Dual Core
	Chipset	Intel 5000X
	Memory	4GB (4x1GB) DDR2-667 ECC FBD
	Graphics Card	NVIDIA Quadro FX3500 256MB PCIe
	Hard Drive	160GB SATA 3Gb/s NCQ (7200 RPM)
	Hard Drive Controller	Integrated 6-channel SATA 3 Gb/s controller with RAID levels 0, 1, 10, 5 capability. Integrated 4-channel SAS controller with RAID 0, 1 capability
	Optical Drive	48X DVD-ROM/CDRW Combo
	Sound Card	Integrated High Definition audio with Jack Retasking technology
	Network Card	Integrated Braodcom 5752 Netxtreme Gigabit PCIe LAN on Motherboard
	Floppy Disk Drive	No Floppy Drive
	Keyboard	HP PS/2 Standard Keyboard
	Mouse	HP PS/2 Scroll Mouse
	Warranty	3 Years - parts/labor/onsite

HP xw8400 Workstation EY762AW#ABA	Form Factor	Rackable Minitower
	Operating System	Genuine Windows XP Professional SP2
	Processor	Two Intel® Xeon® 5080 3.73 GHz 4MB L2 Cache (2MB per Core) 1066 Mhz FSB Dual Core
	Chipset	Intel 5000X
	Memory	2GB (2x1GB) DDR2-667 ECC FBD
	Graphics Card	No integrated graphics
	Hard Drive	73GB SAS 3Gb/s (15K RPM)
	Hard Drive Controller	Integrated 6-channel SATA 3 Gb/s controller with RAID levels 0, 1, 10, 5 capability. Integrated 4-channel SAS controller with RAID 0, 1 capability
	Optical Drive	16X DVD+/-RW DL LightScribe
	Sound Card	Integrated High Definition audio with Jack Retasking technology
	Network Card	Integrated Braodcom 5752 Netxtreme Gigabit PCIe LAN on Motherboard
	Floppy Disk Drive	Floppy Drive
	Keyboard	HP PS/2 Standard Keyboard
	Mouse	HP PS/2 Scroll Mouse
	Warranty	3 Years - parts/labor/onsite

Processors	2nd Quad-Core Intel Xeon processor 5300 Series with Intel® 64 Architecture, and 8 MB of L2 cache (2x4 MB shared)	
	Quad-Core Intel® Xeon® Processor 5310/ 1.60 GHz,1066 MHz FSB	RQ538AA
	Quad -Core Intel® Xeon® Processor 5320/ 1.86 GHz,1066 MHz FSB	RM054AA
	Quad -Core Intel® Xeon® Processor 5335/ 2.00 GHz,1333 MHz FSB *	RQ539AA
	Quad -Core Intel® Xeon® Processor 5345/ 2.33 GHz,1333 MHz FSB	RQ540AA
	Quad -Core Intel® Xeon® Processor 5355/ 2.66 GHz,1333 MHz FSB *	RQ541AA
	*NOTE: Quad-Core Intel Xeon Processor 5335 and 5355 expected available January 2006	
	2nd Dual-Core Intel Xeon processor 5100 Series with Intel® 64 Architecture, and 4 MB of Shared L2 cache	Part Number
	Intel Xeon 5110/ 1.60 GHz, 4MB L2, 1066 MHz FSB*	EY012AA
	Intel Xeon 5120/ 1.86 GHz, 4MB L2, 1066 MHz FSB *	EY013AA
	Intel Xeon 5130/ 2.00 GHz, 4MB L2, 1333 MHz FSB *	EY014AA
	Intel Xeon 5140/ 2.33 GHz, 4MB L2, 1333 MHz FSB *	EY015AA
	Intel Xeon 5150/ 2.66 GHz, 4MB L2, 1333 MHz FSB *	EY016AA
	Intel Xeon 5160/ 3 GHz, 4MB L2, 1333 MHz FSB *	EY017AA
	NOTE:* Upgrade from Intel Xeon processor 5000 series not supported. Quad-Core Intel Xeon Processor 5335 and 5355 expected available January 2006, 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 including details on which processors support Intel® 64 Architecture or consult with your system vendor 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.	

After-Market Options

PCI Express Graphics	Multi display solutions	Windows XP	Red Hat Linux	Part Number
	NVIDIA Quadro NVS 285 (128 MB)	32-Bit, 64-Bit	WS 3, WS 4	RD069AA
	NVIDIA Quadro FX 560 (128 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES354AA
	ATI FireGL V3300 (128 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES353AA
	NVIDIA Quadro NVS 440 (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	PT453A
	NVIDIA Quadro FX 1500 (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES355AA
	NVIDIA Quadro FX 3500 (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES357AA
	ATI FireGL V7200 (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES356AA
	NVIDIA Quadro FX 4500 (512 MB)	32-Bit, 64-Bit	WS 3, WS 4	EA762AA
	G-Sync card (available when ordering the FX 4500 only)	32-Bit, 64-Bit	WS 3, WS 4	ED087AA

Hard Drives	SATA Hard Drives	Windows XP	Red Hat Linux	Part Number
	80 GB 7200 rpm SATA 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4	PY276AA
	160 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	WS 3, WS 4	PV944A
	250 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	WS 3, WS 4	EA788AA
	500 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	WS 3, WS 4	PV943A
	750 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	WS 3, WS 4	RH201AA
	80 GB 10k rpm SATA NCQ drive	32-Bit, 64-Bit	WS 3, WS 4	EM172AA
	160 GB 10k rpm SATA NCQ drive	32-Bit, 64-Bit	WS 3, WS 4	EW222AA
	SAS Hard Drives			
	146 GB 10K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4	EM173AA
	300 GB 10K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4	RH937AA
	73 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4	EA329AA
	146 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4	EA330AA

1394 PCI Cards		PCI	PCI-X	Windows XP	Red Hat Linux	Part Number
	IEEE 1394b FireWire 800 3-Port PCI Card (2 Ports 1394b & 1 Port 1394a)	X		32-Bit, 64-Bit	Not supported	EA327AA

After-Market Options

Input/Output Devices	Keyboards	Windows XP	Red Hat Linux	Part Number
	HP PS/2 Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	WS 3, WS 4	DT527A
	HP USB Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	WS 3, WS 4	DT528A
	HP USB Smartcard Keyboard - available Q3	32-Bit, 64-Bit	Not supported	ED707AA
	Pointing Devices			
	HP PS/2 2-Button Scroll Mouse (Carbonite)	32-Bit, 64-Bit	WS 3, WS 4	DD440B
	HP USB 2-Button Optical Scroll Mouse (Carbonite/Silver)	32-Bit, 64-Bit	WS 3, WS 4	DC172B
	HP USB Optical 3-Button Mouse	32-Bit, 64-Bit	WS 3, WS 4	DY651A
	HP USB Optical 3-Button 2.9M OEM Mouse	32-Bit, 64-Bit	WS 3, WS 4	ET424AA
	USB Spaceball 5000	32-Bit, 64-Bit	Not supported	DV675A
	USB SpaceMouse	32-Bit, 64-Bit	Not supported	DZ203A
	USB SpacePilot	32-Bit, 64-Bit	Not supported	EF390AA

Networking	NICs	PCI	PCI-X	Windows XP	Red Hat Linux	Part Number
	Intel Pro/1000 GT Gigabit Ethernet Controller (PCI)	X		32-Bit, 64-Bit	WS 3, WS 4	AG393AA
	Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)		X	32-Bit, 64-Bit	WS 3, WS 4	EA833AA

Memory modules	667 MHz	Windows XP	Red Hat Linux	Part Number
	512 MB PC2-5300F ECC Registered DDR2 667 MHz FB-DIMM	32-Bit, 64-Bit	WS 3, WS 4	EM159AA
	1 GB PC2-5300F ECC Registered DDR2 667 MHz FB-DIMM	32-Bit, 64-Bit	WS 3, WS 4	EM160AA
	2 GB PC2-5300F ECC Registered DDR2 667 MHz FB-DIMM	32-Bit, 64-Bit	WS 3, WS 4	EM161AA

Monitors (Supported by all Operating Systems available from HP)	TFT display	Part Number
	HP LP2465 (24 -inch) Flat Panel Monitor TFT	EF224A4
	HP L2065 (20.1-inch) Flat Panel Monitor TFT	EF227A4
	HP L1955 (19.1-inch) Flat Panel Monitor TFT	PD974A5

After-Market Options

Optical drives	DVD-ROM Drive	Windows XP	Red Hat Linux	Part Number
	HP 16X DVD-ROM Drive	32-Bit, 64-Bit	WS 3, WS 4	AA620B
	CD-ROM Drive			
	HP 48X Max CD-ROM Drive (only available as first optical drive)	32-Bit, 64-Bit	WS 3, WS 4	DC143B
	Combo Drive			
	HP 48X CD-RW/DVD-ROM Combo Drive	32-Bit, 64-Bit	WS 3, WS 4	DE206B
	DVD+/-RW Drive			
	HP 16X DVD+/-RW DL LightScribe* (Windows XP only)	32-Bit	WS 3, WS 4	DZ555B

NOTE:* LightScribe software supported with Windows XP 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

Removable Storage		Windows XP	Red Hat Linux	Part Number
	HP 512 MB USB 2.0 Drive Key	32-Bit, 64-Bit	WS 3, WS 4	ED516AA
	HP 1 GB USB 2.0 Drive Key	32-Bit, 64-Bit	WS 3, WS 4	AG382AA
	1.44 MB Internal Floppy Drive	32-Bit		DY670A
	HP 16-In-1 Media Card Reader with PCI Card - available Q3	32-Bit, 64-Bit	Not supported	EM718AA
	StorCase DX115 SATA Removable Enclosure (1 additional HD in a 5.25 inch bay)	N/A	N/A	EA332AA
	StorCase DX115 SAS Removable Enclosure	N/A	N/A	EA333AA
	StorCase DX115 SATA/SAS HDD Carrier Tray	N/A	N/A	RA697AA

Audio		Windows XP	Red Hat Linux	Part Number
	HP Satellite Stereo Speakers			ZD929AA
	HP USB Powered Speakers			RD628AA
	SoundBlaster X-Fi XtremeMusic Audio Card	32-Bit	Not supported	EA326AA

Brackets/Rack Kits		Part Number
	HP xw8/9 Bulk 10 Pack PCI Hold Down Kit	EN764AA
	xw8400 Slide Rack Kit IT/Broadcast	DY664A
	HP Internal USB Port Kit	EM165AA
	PCI Front and Rear Fan Kit	EM163AA
	HP SAS Back Panel Connector	EM164AA

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

After-Market Options

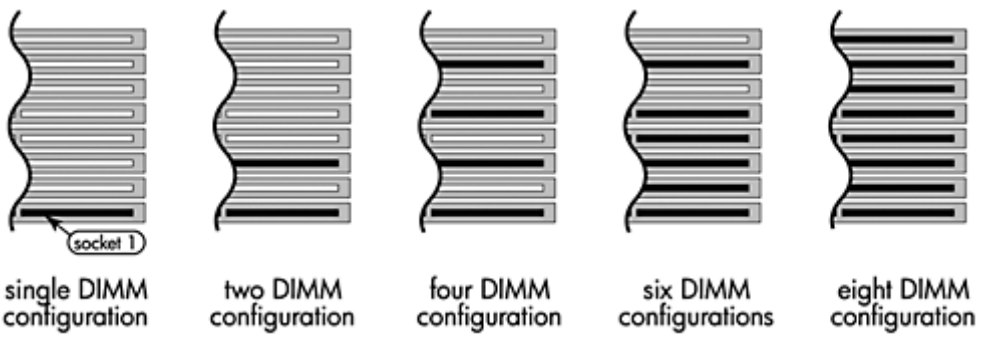
Operating Systems	Part Number
Red Hat Enterprise Linux Workstation 4 (64-Bit preload)	EA700AA
Red Hat Linux WS 4, Update 4, (32- & 64-bit preload)	RL296AA
Red Hat Linux WS 3, Update 8, 64-bit	RL294AA
Red Hat Linux WS 3, Update 8, 32-bit	RL295AA

Software	Windows XP	Red Hat Linux	Part Number
HP Remote SW for HP 1yr Update Subscription	32-Bit	Not supported	PN680A
HP Remote SW Receiver 1y Update Subscription	32-Bit	Not supported	PN682A
HP Remote Graphics SW V3 for HP Systems LTU	32-Bit	Not supported	PY682AA
HP Remote Graphics SW V3 Receiver LTU	32-Bit	Not supported	PY684AA
HP Remote Graphics SW V3 CD-ROM Media	32-Bit	Not supported	PY685AA
HP ProtectTools Quantity 1 Software (available beginning January 2007)	32-Bit	Not supported	EM530AA
HP ProtectTools Quantity 25 Software (available beginning January 2007)	32-Bit	Not supported	EM531AA
HP ProtectTools Quantity 500 Software (available beginning January 2007)	32-Bit	Not supported	EM532AA

Intel 5000X Chipset

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. Best memory performance may be attained with 4 DIMM configurations.



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 & 3. If using 4 DIMMs, install them in 1, 3, 5 and 7. If using 6 DIMMs, install in sockets 1 through 5 and 7. If using 8 DIMMs, install in all sockets.

MAXIMUM MEMORY

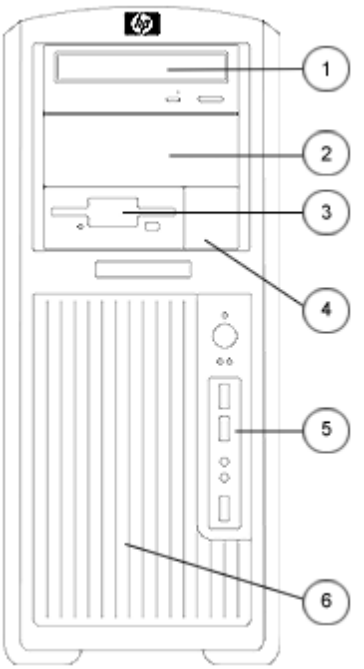
Supports up to 32 GB of DDR2 Fully Buffered DIMMs (a maximum of 16 GB available at launch).

POSSIBLE MEMORY CONFIGURATIONS

Not all memory configurations possible are represented below.

DIMM Size	Slot							
	1	2	3	4	5	6	7	8
256 MB	256 MB							
512 MB	512 MB							
512 MB	256 MB		256 MB					
1 GB	1 GB							
1 GB	512 MB		512 MB					
1 GB	256 MB		256 MB		256 MB		256 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	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB

Tower configuration



	Quantity Supported	Position Supported	Controller
Convertible Minitower			
Optional Diskette Drive	1	3	IDE
5.25" Storage Drive Bays	3	1, 2, 3	IDE - 5.25" bays can be converted for optional SATA/SAS drives with StorCase conversion kit
3.5" Storage Drive Bays with acoustic dampening rail assemblies	4	5 (4 standard drive bays native) 1, 2, 3 (with StorCase conversion)	SATA or SAS
3.5" Storage Drive Bay	1	6 (5^{th} 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.

Up to 4 channels of SAS/SATA can be supported natively.

Using external enclosures, an additional 6 channels of SATA 3.0Gb/s can be supported.

NOTE:* Factory Integrated RAID 0 Configuration (Striped Array) and RAID 1 Configuration (Mirrored Array) requires 2 hard drives with identical speeds, capacity and interface. 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.

System Board	
Processor Architecture	Quad-Core Intel® Xeon® Processor 5300 sequence or Dual-Core Intel® Xeon® Processor 5100 sequence
Chipset	Intel® 5000X
Super I/O Controller	SMSC SCH5307
System Board Form Factor	SSI-EEB (E-ATX 12" x 13")
Processor Socket	Dual LGA 771
DIMM Connectors (FBD DDR2)	8
PCI Connectors (5.0V)	1 full length 33 MHz 32-Bit
PCI-X Connectors	2 full length 100 MHz 64-Bit 1 full length 133 MHz 64-Bit
PCI Express Connectors	1 PCI Express x16 graphics slot 1 PCI Express x16 mechanical (x4 electrical) 1 PCI Express x8 mechanical (x4 electrical)
PCI Card Guide	Optional, tool-free support for all full-length cards with PCI extender
Flash ROM	Yes
Integrated Audio	Realtek ALC262 High-Definition
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-cable.
Multibay Header	No
Integrated Gigabit Ethernet	Broadcom BCM5752
Wake on LAN	Yes
Integrated Trusted Platform Module	TPM 1.2 expected availability for systems sold at end of 2006/ early 2007
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.
Integrated SAS RAID	• RAID 0, 1, 10 • Support one RAID array with 2-4 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: 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.
SAS/SATA Connectors	6 SATA only connectors 4 SAS connectors
IEEE 1394 Connectors	2 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	Yes
Power Switch, Power LED & Hard Drive LED Header	Yes (2x12 connector, 2x2 aux connector, 2x4 CPU connector)
Password Clear Header	Yes

Cooling	
Cooling Solutions Supported	Yes
Power Supply Fan	92 mm x 32 mm
Memory Fan	80 mm x 25 mm
Processor Fan-Heatsink	80 mm x 15 mm
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
Optional Rear PCI fan	70 mm x 15 mm - not required for most workstation compute environments

Technical Specifications

Power Supply		
Power Supply	800 watt custom power supply - (Wide Ranging, Active PFC)	
Operating Voltage Range	90 - 269 VAC	
Rated Voltage Range	100 - 240 VAC	118 VAC
Rated Line Frequency	50/60Hz	400Hz
Operating Line Frequency Range	47-66Hz	393-407Hz
Rated Input Current	13.2 A @ 100-120 VAC 6.6 A @ 200-240 VAC	11.2A @ 118 VAC
Heat Dissipation (Configuration and software dependent)	Typical 1710 btu/hr (430 kg-cal/hr) Maximum 3793 btu/hr (956 kg-cal/hr)	
Power Supply Fan	92x32 mm variable speed	
Energy Star Compliant	YES	
Blue Angel Compliant (<5W in S5 - Power Off)	N/A	
FEMP Standby Power Compliant @115V (<2W in S5 - Power Off, with Wake on LAN disabled)	YES	
Power Consumption in ES Mode - Suspend to RAM (S3) (Instantly Available PC)	< 7 W	

ROM Features	Description
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, 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
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

Technical Specifications

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 1.0a
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

Other Deployment & Management Features	
HP Client Management Solutions (Windows XP only)	HP Client Management Solutions help simplify management of Workstations and significantly reduce total ownership costs. These solutions share a common design and are highly integrated. HP Client Manager Software is included free with all HP business PCs and Workstations. It enables central tracking, monitoring, and management of the hardware aspects of HP client systems: • Get valuable hardware information such as CPU, memory, video, and security settings • Monitor system health to fix problems before they occur • Install drivers and BIOS updates without visiting each PC • Remotely configure BIOS and security settings • Automate processes to quickly resolve hardware problems Additional solutions (fee-based) are available to address Workstation management challenges through the entire IT lifecycle including: • Inventory assessment • Software license compliance • Personality migration • Software image deployment • Software distribution • Asset management • Client backup and recovery • Problem resolution Visit http://www.hp.com/go/clientmanager for more information, to download HP Client Manager Software.

HP ProtectTools (Windows XP only) available beginning January 2007	HP ProtectTools Security Manager can be configured to prevent unauthorized access using Smart Cards, TPM Embedded security chips, USB tokens and other security technologies. HP ProtectTools Security Manager is completely customizable, which gives customers the flexibility to choose the level of security that best meets their needs.
	
	• Smart Card security for HP ProtectTools
	  ○ Initialization and configuration of the Smart Card
	  ○ Manage Smart Card accounts and security settings
	• Embedded Security for HP ProtectTools
	  ○ TPM Embedded Security Chip configuration and management
	• Credential Manager for HP ProtectTools
	  ○ Multifactor Windows Authentication
	  ○ Single sign-on
	• BIOS configuration for HP ProtectTools
	  ○ BIOS configuration and security settings from within the HP ProtectTools Security Manager console
	
	Visit http://h18004.www1.hp.com/products/security/ for more information on HP ProtectTools.

System Software Manager (free - Windows XP only)	A free utility that detects and updates BIOS, device drivers, and management agent versions on your networked PCs and workstations
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
Software Restore CD	Restores computer to its original factory shipping image; No recovery CDs will ship with Linux - an ISO image will be available on an HD partition.
Asset Tag	• Repository for storing company-specific property asset numbers for easy tracking • Initially set equal to the system serial number • Stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Setup program
DIMM Serial Presence Detect	Detects whether or not memory DIMMs are present and their type
Hard Drive Serial Number, Model, and Manufacturer	Hard drive manufacturer, model, and serial number is stored in the hard drive firmware and reported in ROM-based F10 setup
Memory Change Alert (Requires HP Client Manager Software - Windows XP only)	Alerts management console if memory is removed or changed
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
Protocol-level Integrity Monitoring (CRC checking)	A feature of SATA and SAS, Cyclic Redundancy Checking provides command, data and message transfer verification and proactive notification of problems with recommendations for enhancing system performance. It detects all the following errors types: • single bit errors • double bit errors • an odd number of errors • error bursts up to 32-Bits long

Drive Self Tests (DPS)	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures. DPS Access through F10 Setup during Boot (F10 diagnostic access not available with SCSI drives)
SMART Technology (Self-monitoring, analysis and reporting technology - Windows XP only)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count. By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure. SMART I - Drive Failure Prediction SMART II - Off-Line Data Collection SMART III - Off-Line Read Scanning with Defect Reallocation

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.

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 toollessly 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	Tool-less, can be upgraded without removing any internal components
Chassis fan removal	Tool-less
Power supply diagnostic LED	Yes, dual function: AC OK & power OK
Power Button	Yes, ACPI multi-function
Power LED	Yes, dual color LED indicates normal operation and faults.
Hard drive activity LED	Yes
Internal speaker	Yes, used for pre-boot diagnostic beep codes

Technical Specifications

Dual Color Power and HD LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	green – normal red – fault
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS.
Configuration Record SW	Yes
Over-Temp Warning on Screen (Requires IM Agents)	Yes
OS CD (Restore OS CD)	Restores computer to its original factory shipping Operating System
Restore CD	Restores the computer to its original factory shipping image
Flash ROM	Yes
3.3V Aux Power LED on System PCA	Yes
Dual Function 5V Aux Power LED (ON)/PS_ON LED (OFF) on System PCA	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder for easy Replacement	Yes
Processor ZIF Socket for easy Upgrade	Yes
DIMM Connectors for easy Upgrade	Yes
NIC LEDs (integrated) (Green & Amber)	Used to determine NIC status
ASF 1.0 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

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

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 (Not in Linux) • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration • Japan PC Green label*
	*NOTE: This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'

Energy Consumption and Noise Emissions		
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Convertible Mini tower Desktop model is based on a "Typically Configured Desktop"	
	Processor Info	2x 3.46 GHz
	Memory Info	8x 1 GB 667 MHz
	Graphics Info	Quadro FX 3500
	Disks/Optical/Floppy	2x 160 GB SATA / 2 Optical / 1 Floppy

Energy Consumption		115 VAC		230 VAC		100 VAC	
	LAN	Enabled	Disabled	Enabled	Disabled	Enabled	Disabled
	Windows Idle (S0)	293 W		286 W		292 W	
	Windows Busy (S0)	413 W		399 W		415 W	
	Sleep (S3)	4.1W	3.2 W	4.8 W	3.9 W	4.1W	3.2 W
	Off (S5)	2.0 W	1.2 W	2.6 W	1.8 W	1.9 W	1.2 W

Heat Dissipation**		115 VAC		230 VAC		100 VAC	
	LAN	Enabled	Disabled	Enabled	Disabled	Enabled	Disabled
	Windows Idle (S0)	1000 BTU/hr		977 BTU/hr		997 BTU/hr	
	Windows Busy (S0)	1410 BTU/hr		1362 BTU/hr		1417 BTU/hr	
	Sleep (S3)	14 BTU/hr	11 BTU/hr	17 BTU/hr	14 BTU/hr	14 BTU/hr	11 BTU/hr
	Off (S5)	6.8 BTU/hr	4.1 BTU/hr	8.9 BTU/hr	6.2 BTU/hr	6.5 BTU/hr	4.1 BTU/hr

Declared Noise Emissions (High and entry level configurations)			
System Configuration (Entry-level)	The entry-level configuration used for the Declared Noise Emissions for the Convertible Mini tower Desktop model is based on a "Typically Configured Desktop"		
	Processor Info Disks/Optical/Floppy	2x 3.00 GHz Woodcrest Intel Xeon 5130 Sequence 1x 80 GB SATA / 1 DVD-ROM/ 1 Floppy	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.3 Bels	26 dB
	SATA Hard drive Operating (random reads - 30.3 reads/sec)	4.4 Bels	26 dB
	Floppy Drive Operating (continuous copy)	5.1 Bels	35 dB
	DVD-ROM Operating (sequential reads)	5.1 Bels	35 dB

Technical Specifications

System Configuration (High-end)	The high-end configuration used for the Declared Noise Emissions for the Convertible Mini tower Desktop model is based on a "Typically Configured Desktop"		
	Processor Info Graphics Info Disks/Optical/Floppy	2x 3.00 GHz Woodcrest Intel Xeon 5160 Sequence Quadro FX 3500 with active heatsink 1x 73 GB 15K rpm SAS / 1 DVD-ROM / 1 Floppy	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.6 Bels	27 dB
	SAS Hard drive Operating (random reads - 80 reads/sec)	5.0 Bels	32 dB
	Floppy Drive Operating (continuous copy)	5.2 Bels	35 dB
	DVD-ROM Operating (sequential reads)	5.2 Bels	35 dB

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, 3 PCI-X slots and 3 PCI Express slots • 8 expansion bays • 8 memory slots

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 the 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)

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

Integrated Intel/Realtek HDALC262 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) (Windows XP Only)	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

Technical Specifications - Audio

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

Technical Specifications - Audio

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 Service Pack 2 (SP2)

Technical Specifications - Communications

Broadcom BCM5752 NetXtreme Gigabit Ethernet LOM (PCIe)	**Connector**	RJ-45
	Controller	Broadcom 5752 PCI-E LAN Controller
	Memory	Integrated 64KB 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	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	
	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, 1000 Mbps
	Operating system driver support	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 3
	Management capabilities	WOL, PXE
	Alerting	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 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
	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 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 SAS3041E Serial Attach SCSI (SAS) **Host Bus Adapter** (HBA)	**PCI Bus**	PCI-Express x4 lanes	
	PCI Modes	Bus Master DMA	
	PCI data burst transfer rate	1.0 GBps (half duplex) 2.0 GBps (full duplex)	
	SAS Bandwidths	**Half Duplex** Single lane – 300 MBps Wide Port (2 lanes) – 600 MBps Wide Port (4 lanes) – 1200 MBps	**Full Duplex** Single SAS Lane – 600 MBps Wide Port (2 lanes) – 1200 MBps Wide Port (4 lanes) – 2400 MBps
	PCI Card Type	3.3 volt add-in card	
	PCI Voltage	12 V ± 10%	
	PCI Form Factor	6.6" x 2.731" (Low-profile)	
	PCI Power	7.5 Watts	
	Bracket	Full height and Low-profile	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Four 3Gbps SAS / 1.5Gps SATA ports	
	SAS Processor	LSISAS1064E	
	Internal Connectors	Four- SATA x1 connectors	
	External Connectors	None	
	Max. Number of SCSI Devices	128	
	LED Indicators	On-board activity and fault LEDs	
	Integrated Mirroring	Integrated Mirroring option available	
	Environments	Operating	Storage
	Temperature	32° to 140° F (0° to 60° C)	-49° to +221° F (-45° to +105° C)
	Relative Humidity	5% to 90% non-condensing	5% to 90% non-condensing
	MTBF	>200,000 hours	
	Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04);Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950	
	Operating system support	Microsoft Windows XP Professional, XP Professional x64 Red Hat Linux 7.2, 7.3, WS3 and WS4	
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.	

Technical Specifications - Controllers

Adaptec SCSI RAID 2120S Card	Dimensions (H x D)	2.5 x 6.6 inches; 6.4 x 16.8 cm Low profile card
	RAID level	0, 1, 10, 5, 50, JBOD
	Data Transfer Rate	Up to 320 MB/s
	Cache Memory	64 MB (onboard)
	Device Support	Up to 15 SCSI devices
	Bus Type	64-bit/66 MHz PCI
		(Also support 32-bit/33 MHz PCI)
	Internal Connectors	One 68-pin high-density
	External Connectors	One 68-pin VHDCI
	System Requirements	Intel PC or equivalent with available PCI slot
	Operating Temperature	32° to 131° F (0° to 55° C)
	Power Requirements	4 amps @ +5V
	Operating System Support	Windows 2000 Professional, Windows XP Professional, Windows XP Professional x64 Edition
	Other	Optimized disk utilization
		Online RAID Level Migration
		Online capacity expansion
		Immediate RAID availability (background initialization)
		S.M.A.R.T. support
	Kit Contents	Controller card, driver CD, LED cables, user documentation and warranty card.

Serial ATA Hard Drives	750 GB (7,200 rpm)	Capacity	750,156,374,016 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	0.8 ms
			Average	14.0 ms
			Full-Stroke	20 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	1,465,149,168	
		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	1.3 ms
			Average	20.0 ms
			Full-Stroke	30 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Hard Drives

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 (Model EA788AA only)	
	Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
	Cache	With NCQ (Model EA788AA):16 MB Without NCQ (Model PY278AA): 8MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
		Average	18.5 ms
		Full-Stroke	18 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)	
	Synchronous Transfer Rate (Maximum)	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
		Average	9.3 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Hard Drives

80 GB (7,200 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 (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	9.3 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 1.5 Gb/s	
	Cache	16 Mbytes	
	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)	

Technical Specifications - Hard Drives

	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 1.5 Gb/s
		Cache	16 Mbytes
		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	146 GB (15K rpm)	Capacity	146,815,737,856 bytes
		Height	1.0 inches; 25.4 mm
		Width	4.0 inches; 101.6 mm
		Interface	SAS
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s
		Buffer	8 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)

73 GB (15K rpm)	**Capacity**	73,407,865,856 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	8 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)	
300 GB (10K rpm)	**Capacity**	300,000,000,000 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	.3 ms
		Average	<4.5 ms
		Full-Stroke	<11.0 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	585,937,500 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	
146 GB (10K rpm)	**Capacity**	146,815,737,856 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 msec
		Average	<4.5 msec
		Full-Stroke	<11.0 msec
	Rotational Speed	10,000 rpm	
	Logical Blocks	286,749,488 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	

HP USB 2.0 Drive Key	Dimensions (HxWxD)		0.9 x 0.7 x 3.9 inches; 2.3 x 1.8 x 9.8 cm
	Weight		0.05 lb (0.02 kg)
	USB Specification		2.0
	Transfer Rate		Read-1023 KB/Sec; Write-850 KB/Sec
	Storage Media		Solid state flash memory, no moving parts
	Power Supply		USB Bus-powered, no external power required
	Capacity		512 MB or 1 GB
HP StorCase DX115 SATA and SAS Removable Enclosures (Part EA332AA for SATA drives, Part EA333AA for SAS drives)	Physical characteristics	Dimensions of carrier (H x W x D)	1.07 x 4.34 x 7.54 inches; 27.2 x 110.2 x 191.5 mm
		Weight of carrier	1 lbs (0.45 kg)
		Dimensions of receiving frame (H x W x D)	1.62 x 5.75 x 7.88 inches; 41.1 x 146.1 x 200.2 mm
		Weight of receiving frame	N/A
		Dimensions of receiving frame – including front bezel (H x W x D)	1.62 x 5.81 x 8.08 inches; 41.1 x 147.6 x 205.2 mm
		Weight of receiving frame – including front bezel	2 lbs (0.91 kg) [1]
		Features	Allows you to mount a low-profile (up to 1 inch high) 3.5 inch form factor drive into any half-height, 5.25 inch peripheral bay Supports Serial Attached SCSI (SAS) or Serial ATA 3 Gb/s drives • Drive carrier key lock • Drive spin/power up/down button • Power, spin, and fan failure indicator • Drive activity indicator • Soft Start circuitry & anti-static device protection • Cable-less drive connector • 50K mating connector • Cooling fan
	Electrical	Input	+5V 9mA / +12V 20 μA
	Chassis reliability/ maintainability	MTBF (at 30° F)	600,000 hours
		MTTR	5 minutes

Environmental	Operating ambient temperature	32° to 122° F (0° to 50° C)
	Storage ambient temperature	-40° to 158° F (-40° to 70° C)
	Operating relative humidity [2]	5% to 95% 1000 to 10,000 feet; 305 to 3048 m
	Storage relative humidity [2]	50% to 95% -1000 to 40,000 feet; -305 to 12,192 ft)
	Operating altitude	-1000 to 10,000 feet; -305 to 3048 m
	Storage altitude	-1000 to 40,000 feet; -305 to 12,195 m
	Operating shock [3]	60g
	Storage shock [3]	30

NOTES:
[1] With carrier removed
[2] Non-condensing with maximum gradient of 10% per hour
[3] Half-sine wave shock pulses at 2ms

HP IEEE 1394a FireWire 400 4-Port PCI Card (Windows XP 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 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

HP SpacePilot USB (Windows XP only)	Physical Characteristics	Dimensions (L x W x H)	9.3 x 5.6 x 2.0 inches; 236 x 143 x 53 mm
		Weight	1.875 lb (0.85 kg)
		Palmrest	Sculpted
	Mechanical	Buttons	21+ programmable speed keys 15 reprogrammable
		LCD Viewing Area	(W x H) 4.0" x 1.0" (102.4 x 30.2mm)
		Active Area	(W x H) 3.7" x 1.0" (93.4 x 26.2mm)
		Display Format	240 x 64
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	Connector	USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows XP	
	Regulatory Approvals	FCC, CE	
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 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	
HP PS/2 Scroll Mouse	Scroll Wheel	8 mm	
	Maximum Rotation Speed	30 mm/s	
	Switch Type	Light force micro-switch	
	Switch Life	1 million operations	
	Mechanical Life	Minimum 200,000 revolutions	
	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, 6 surfaces
		Non-operating shock	80 g, 6 surfaces
		Operating vibration	2 g peak acceleration
		Non-operating vibration	4 g peak acceleration
	Electrical	Operating voltage	5 VDC ± 10%
		Power consumption	15 mA
		System consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC99 - 2001	Functionally compliant

Technical Specifications - Input/Output Devices

	Mechanical	Resolution	400 ± 20% DPI
		Tracking Speed	10 in/s maximum
		Acceleration	100 in/s
		Switch Actuation	85 g nominal peak force
		Switch Life	1,000,000 operations (using Hasco modified tester)
		Cable Length	2 m
		PC98-99	Mechanically compliant
	Regulatory Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BCIQ, C-Tick	
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 XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and 4	
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

Technical Specifications - Input/Output Devices

Spaceball 5000 USB (Windows XP only)	Physical characteristics	Dimensions (H x W x D)	3.0 x 6.0 x 8.4 inches; 7.6 x 15.2 x 21.3 cm
		Ball Diameter	2.2 inches; 5.6 cm
		Weight	2.1 lb (9.94 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	50° to 104° F (10° to 40° C)
		Non-operating temperature	43° to 140° F (6° to 60° C)
		Operating humidity	8% to 80% (non-condensing at ambient)
		Non-operating humidity	5% to 80% (non-condensing at ambient)
	Mechanical	Buttons	12 programmable (unshifted)
		Ball Force Range	0.5 - 8.2N/1.8 - 29.5 oz
		Ball Torque Range	0.085 – 0.33 oz-in. (6.91 Nmm)
		Resolution	10 bits
	Serial Specifications	Connector	USB 1.1 or greater
		Cable Length	12.8 feet; 3.9 m
		Data Rate	USB model – 16 msec
		Flow Control	Xon/Xoff (on PS/2 model only)
	Software Drivers Available	USB model	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	

HP SpaceMouse Plus USB (Windows XP only)	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 - Optical Devices

HP 48X CD-ROM Drive	**Capacity**	700 MB CD disc	
	Dimensions (HxWxD)	1.63 x 5.83 x 7.27 inches; 4.13 x 14.6 x 18.5 cm	
	Weight	1.76 lb (0.8 kg)	
	Interface	ATAPI/EIDE	
	Mounting Orientation	Horizontal or vertical	
	Data Transfer Rates - Read	Digital audio extraction (minimum) - 1,200 KB/s (8X) CD read - up to 7,200 KB/s (48X)	
	Media and Formats - Read	Formats: CD-DA, CD-ROM (Mode 1 and 2), CD-XA Ready, Photo CD (Single and Multi-session), Mixed Mode (Audio and Data combined), CD-I (FMV), CD Plus, CD-Extra; Media: stamped, CD-R, CD-RW	
	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 0 (16.7 MB/s); UltraDMA Mode 2 (33.3 MB/s)	
	Access Times (typical)	**Random**	< 75 ms @ 48x
		Full-Stroke	< 150 ms
	Start-up Time (typical)	< 7 s (single session)	< 30 s (multisession)
	Stop Time (typical)	< 4 s	
	Read Buffer size	128 KB (minimum)	
	Audio Output	**Line-Out**	0.7 VRMS
		Signal-to-Noise Ratio	80 dB
		Channel Separation	65 dB
	Configuration Jumper Block	Master, slave, and cable select modes	
	Operating Conditions	**Temperature**	41° to 122° F (5° to 50° C)
		Humidity	10% to 80%
	Approvals / Environmental	UL 1950 (US and Canada), CSA, SEMKO, TUV; CE, FDA, FCC, IC, C-TICK	
	Operating Systems Supported	Windows XP Professional, and XP Professional x64 Edition, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4	
	Supplied Software	None	
HP 16X/48X DVD-ROM Drive	**Height**	5.25-in, half-height, tray load	
	Interface Type	ATAPI/EIDE	
	Dimensions (W x H x D)	5.88 x 1.71 x 7.87 [max] inches; 149.5 x 43.25 x 200.0 [max] mm (external, excluding bezel)	
	Disc Formats	DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border; DVD+RW; DVD+R ; CD-ROM Mode 1 and 2; CD-DA; CD-ROM XA Mode 2, Form 1 and 2; CD-extra; CD-text; CD-I Mode 2, Form 1 and 2; CD-I ready; video CD, CD-bridge; PhotoCD (single and multi-session); CD-R; CD-RW	

Technical Specifications - Optical Devices

Disc Capacity	DVD-ROM	4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7G (DVD+R)
	CD-ROM	540 MB (Mode 1, 12 cm), 640 MB (Mode 2, 12 cm), 700 MB (80 minimum CD-R and CD-RW), 180 MB (8 cm)
Access Times (typical reads, including settling)	DVD-ROM Single Layer	120 ms
	CD-ROM Mode 1	90 ms
	Full Stroke DVD	240 ms (seek)
	Full Stroke CD	160 ms (seek)
	Startup Time	< 10 seconds (typical)
	Stop Time	< 4 seconds
	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 3 (44.4 MB/s)
Maximum Data Transfer Rates	CD-ROM Read	6000 KB/s (40X) Max
	DVD-ROM Read	21,600 KB/s (16X) Max
	Digital Audio Extraction	6000 KB/s (40X) Max
Power	Source	Four-pin, 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 – <800 mA typical, < 1000 mA maximum
		12 VDC – < 870 mA typical, <1800 mA maximum
Audio Output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	85 dB
	Channel Separation	65 dB
Configuration Jumper Block	Master, slave, and cable select modes	
Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
Operating Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 85%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)
Certifications, Approvals	MMC II support, multi-read certification, Microsoft WHQL certification, ACA AS/NZS 3548 class B, CNS 13438, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, EMKO EN60950, EN 60825-1, UL 60950, CSA C22.2 60950-2000, CFR 21 part 1040 class 1, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, ANSI C63.4-1992	
Operating Systems Supported	Microsoft Windows 2000, Windows XP Professional	
Kit Contents	16X/48X DVD-ROM Drive, InterVideo WinDVD MPEG Movie Playback software, audio cable, and installation guide.	

HP 48X CD-RW/DVD-ROM Combo Drive	Form Factor	5.25-inch, half-height, tray-load	
	Mounting Orientation	Horizontal or vertical	
	Interface	ATAPI/EIDE	
	Dimensions (HxWxD)	5.77 x 1.71 x 7.87 [max] inches; 14.66 x 4.34 x 20.0 [max] cm (external, excluding bezel)	
	Weight (max)	2.6 lb (1.2 kg)	
	Read Only Disc Parameters	Data Transfer Rates - Read	CD read - 7200 KB/s (48X) Max
			Digital audio extraction (minimum) - 1,800 KB/s (12X)
			DVD ROM read - 21,632 KB/s (16X) Max
		Media and Formats - Read	CD Media: stamped; CD-R; CD-RW (LS, HS, US)
			CD Capacities: 180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (Mode 2, 12 cm, 80-minute)
			CD Formats: CD-DA, CD-ROM (Mode 1 and 2), CD-XA (Mode 2, Form 1 and 2), Photo CD (Single and Multi-session), Mixed Mode (Audio and Data combined), CD-I (Mode 2, Form 1 and 2, and CD-I Ready), CD-Extra, CD-Bridge, Video CD
			DVD Media: stamped (single and double layer); DVD+R; DVD+RW; DVD+R DL; DVD-R; DVD-RW
			DVD Capacities: 4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7G (DVD+R)
			DVD Formats: DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border ; DVD+R version 1.2 (including multi-session); DVD+R DL version 1.0; DVD+RW version 1.2

Writeable Disc Parameters	Data Transfer Rates - Write	**CD-R write** - 2100 KB/s (14X) to 7200 KB/s (48X)
		CD-RW write - 600 KB/s (4X)
		CD-RW write (high speed) - 1500 KB/s (10X) to 1800 KB/s (12X)
		CD-RW write (ultra high speed) - 2400 KB/s (16X) to 4800 KB/s (32X)
	Media and Formats - Write	**CD Media:** CD-R; CD-RW (LS, HS, US)
		CD Capacities: 180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (Mode 2, 12 cm, 80-minute)
		CD Formats: CD-DA, CD-ROM (Mode 1 and 2), CD-XA (Mode 2, Form 1 and 2), Photo CD (Single and Multi-session), Mixed Mode (Audio and Data combined), CD-I (Mode 2, Form 1 and 2, and CD-I Ready), CD-Extra, CD-Bridge, Video CD
	Write Methods	Disc-at-once, session-at-once, track-at-once, incremental fixed and variable packet, multi-session
Access Times (typical reads, including settling)	Random DVD	< 140 ms
	Random CD	< 125 ms, (typical)
	Full Stroke DVD	< 250 ms
	Full Stroke CD	< 210 ms
	Startup Time (single)	< 7 seconds (typical)
	Startup Time (multi-session)	< 30 seconds (typical)
	Stop Time (typical)	< 4 s
	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 Mbytes/s)
Power	Source	Four-pin, 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
Audio Output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Configuration Jumper Block	Master, slave, and cable select modes	
Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	

	Operating Conditions (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative humidity	10% to 90%
		Maximum wet bulb temperature	86° F (30° C)
	Certifications, Approvals		MMC-3 support, multi-read compliant, Microsoft WHQL certification, ACA AS/NZS 3548 class B, BSMI CNS 13438, CE Mark, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, EMKO EN60950, EN 60825-1, UL 60950, CSA C22.2 60950-2000, CFR 21 part 1040 class 1, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, ANSI C63.4-1992 (FCC Class B)
	Operating Systems Supported		Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat WS3 and WS4 Versions
	Supplied Software (for Windows XP)		Roxio Cineplayer Movie Playback Roxio Digital Media Plus: Create or copy CDs and DVDs, including music and data CDs, and data DVDs
HP 16X/48X DVD-ROM Drive	**Height**		5.25-in, half-height, tray load
	Interface Type		ATAPI/EIDE
	Dimensions (W x H x D)		5.88 x 1.71 x 7.87 [max] inches; 149.5 x 43.25 x 200.0 [max] mm (external, excluding bezel)
	Disc Formats		DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border; DVD+RW; DVD+R ; CD-ROM Mode 1 and 2; CD-DA; CD-ROM XA Mode 2, Form 1 and 2; CD-extra; CD-text; CD-I Mode 2, Form 1 and 2; CD-I ready; video CD, CD-bridge; PhotoCD (single and multi-session); CD-R; CD-RW
	Disc Capacity	**DVD-ROM**	4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7G (DVD+R)
		CD-ROM	540 MB (Mode 1, 12 cm), 640 MB (Mode 2, 12 cm), 700 MB (80 minimum CD-R and CD-RW), 180 MB (8 cm)
	Access Times (typical reads, including settling)	**DVD-ROM Single Layer**	120 ms
		CD-ROM Mode 1	90 ms
		Full Stroke DVD	240 ms (seek)
		Full Stroke CD	160 ms (seek)
		Startup Time	< 10 seconds (typical)
		Stop Time	< 4 seconds
		Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 3 (44.4 MB/s)
	Maximum Data Transfer Rates	**CD-ROM Read**	6000 KB/s (40X) Max
		DVD-ROM Read	21,600 KB/s (16X) Max
		Digital Audio Extraction	6000 KB/s (40X) Max

Power	Source	Four-pin, 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 – <800 mA typical, < 1000 mA maximum
		12 VDC – < 870 mA typical, <1800 mA maximum
Audio Output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	85 dB
	Channel Separation	65 dB
Configuration Jumper Block	Master, slave, and cable select modes	
Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
Operating Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 85%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)
Certifications, Approvals	MMC II support, multi-read certification, Microsoft WHQL certification, ACA AS/NZS 3548 class B, CNS 13438, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, EMKO EN60950, EN 60825-1, UL 60950, CSA C22.2 60950-2000, CFR 21 part 1040 class 1, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, ANSI C63.4-1992	
Operating Systems Supported	Microsoft Windows 2000, Windows XP Professional	
Kit Contents	16X/48X DVD-ROM Drive, InterVideo WinDVD MPEG Movie Playback software, audio cable, and installation guide.	

NVIDIA Quadro NVS 285 128MB PCIe Dual Display	Form Factor	Nvidia Quadro NVS 285 128MB PCIe Dual Display Low profile, both ATX and low profile brackets included
	Graphics Controller	Integrated Quadro 285 2D graphics processor unit (GPU)
	Bus Type	PCI-Express
	Memory	128 MB DDR2
	Connectors	Single high-density DMS-59 Flex Connector
	Dimensions	Low-profile, 2.586 x 6.6 inches; 6.57 x 16.76 cm
	Multi-monitor support	Dual analog or digital monitors
	RAMDAC	Dual 350 MHz (integrated)
	Maximum pixel clock	350 MHz
	Overlay planes	One 16-bit Video overlay plane
	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 2000 and Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode) HP qualified drivers may be preloaded or available from the HP support Web site: http://www.hp.com/country/us/en/support.html?pageDisplay=drivers
	Option kit Contents	NVIDIA Quadro NVS 285 128MB PCIe Graphics Card with full height bracket attached, DMS 59 to dual DVI Y cable, DMS 59 to dual VGA Y cable, low profile bracket, Workstation Software Driver CD, Desktop Software Driver CD, documentation.

NVIDIA Quadro FX 560 PCI-Express graphics controller	Form Factor	ATX
	Graphics Controller	NVIDIA NV73GL
	Bus Type	PCI Express x16
	Memory	128MB 600MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 DVI-I (one dual-link) + 9-pin HDTV 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). HD-Out component Mode: YPrPB - SMPTE 1080i, 720p, 480p, 576p or composite Mode: NTSC/PAL 480i, 576i NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Dual 400MHz integrated

	Architecture features	128-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
	Shading architecture	Fully programmable GPU 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 DirectX 9.0
	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.
ATI FireGL V3300 graphics card	Form factor	ATX
	Graphics controller	RV515
	Bus type	PCI-Express x16
	Memory	128MB DDR unified frame buffer, Z-buffer and Texture storage
	Connectors	Dual DVI-I analog/digital, dual VGA analog support with DVI-to-VGA adapters.
	Display resolution support	Analog support for 2048x1536 @ 85Hz on each output connector. Digital support for 1920x1200 @ 60Hz on each output connector.
	RAMDAC	Dual 10-bit per channel 400MHz
	Architecture features	• 2x/4x/6x Anti-aliasing modes; multi-sample algorithm with gamma correction, programmable sparse sample patterns, and centroid sampling • 2x/4x/8x/16x Anisotropic Filtering modes; up to 128-tap texture filtering • High resolution texture support (up to 4K x 4K) • Hardware supported overlays, anti-aliased points and lines, 2 sided lighting, occlusion culling
	Avivo video and display platform	• 64-bit per pixel floating point HDR supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing • 32-bit integer HDR (10:10:10:2) format supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing
	Programmable video processor	• Accelerated MPEG-2, MPEG-4, DiVX, WMV9, VC-1 and H.264 decoding and transcoding • Seamless pixel shader integration with video in real-time

	Display output	• 16-bit per channel floating point HDR and 10 bit per channel DVI output • Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color) • Complete independent color controls and video overlays for each display • High quality pre- and post-scaling engineers with underscan support for all outputs • Content-adaptive de-flicker filtering for interlaced displays • Spatial/temporal dithering enables 10-bit color quality on 8 and 6-bit displays • VGA mode support on all outputs
	Shading architecture	• Supports Microsoft DirectX 9.0 Shader Model 3.0 programmable vertex and pixel shaders in hardware • Full speed 128-bit floating point processing for all shader operations • Dedicated branch-execution units for high performance dynamic branching and flow control • Dedicated texture address units for improved efficiency • Up to 128 simultaneous pixel threads • Multiple Render Target (MRT) support • Render to vertex buffer support
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	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
NVIDIA Quadro FX 1500 PCI-Express graphics controller	Form Factor	ATX
	Graphics Controller	NVIDIA NV71GL
	Bus Type	PCI Express x16
	Memory	256MB GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 9-pin HDTV 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). HD-Out component Mode: YPrPB - SMPTE 1080i, 720p, 480p, 576p or composite Mode: NTSC/PAL 480i, 576i NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Dual 400MHz integrated

Technical Specifications - Graphics

	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)
	Shading architecture	Fully programmable GPU 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 DirectX 9.0
	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.
NVIDIA Quadro FX 3500 PCI-Express graphics controller	Form Factor	ATX
	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI-Express x16
	Memory	256MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	Maximum Resolution	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each
	RAMDAC	Dual 400MHz integrated

Technical Specifications - Graphics

	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 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 4500, 512 MB with optional G-Sync	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	512 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	Display resolution support	Dual integrated display controllers supporting up to 2048x1536 @ 75Hz (analog) or 3840x2400 @ 41Hz (digital) on both displays

NVIDIA Quadro FX 4500 architecture	256-bit memory interface 35.2GB/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 12 pixels per clock rendering engine 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 output-drives digital displays at resolutions up to 3840 x 2400 @ 41Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
Optional G-Sync	Delivers Frame lock/Genlock functionality to unprecedented levels of industrial realism, visualization and collaborative capabilities. Frame lock allows the display channels from multiple workstations to be synchronized, thus creating one large "virtual display" that can be driven by a multisystem cluster for performance scalability, while Genlock allows the graphics output to be synchronized to an external source, typically for film and broadcast video applications. The NVIDIA Quadro G-Sync requires an NVIDIA Quadro FX 4500 graphics controller and an available expansion slot.
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, 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 V7200 graphics card	Form factor	ATX
	Graphics controller	R520
	Bus type	PCI-Express x16
	Memory	256MB GDDR3 graphics memory with unified frame buffer, Z-buffer and Texture storage and a 512-bit Ring-Bus memory controller
	Connectors	Dual DVI-I analog/digital, dual VGA analog support with DVI-to-VGA adapters. The DVI-I digital connectors are Dual Link capable. Stereoscopic 3D output connector with quad buffer support, HD Component Video (YPrPb) output with optional adapter.
	Maximum Resolution	Analog support for 2048x1536 @ 85Hz on each output connector. Digital support for 1920x1200 @ 60Hz on each output connector. Dual Link digital support for 2560x1600 @ 60Hz. Ideal for 30-inch widescreen displays. NOTE: Stereo supported on single display only.
	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
	Image quality features	• 2x/4x/6x Anti-aliasing modes; multi-sample algorithm with gamma correction, programmable sparse sample patterns, and centroid sampling • 2x/4x/8x/16x Anisotropic Filtering modes; up to 128-tap texture filtering • High resolution texture support (up to 4K x 4K) • Hardware supported overlays, anti-aliased points and lines, 2 sided lighting, occlusion culling
	Avivo video and display platform	• 64-bit per pixel floating point HDR supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing • 32-bit integer HDR (10:10:10:2) format supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing
	Programmable video processor	• Accelerated MPEG-2, MPEG-4, DiVX, WMV9, VC-1 and H.264 decoding and transcoding • Seamless pixel shader integration with video in real-tim
	Display output	• 16-bit per channel floating point HDR and 10 bit per channel DVI output • Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color) • Complete independent color controls and video overlays for each display • High quality pre- and post-scaling engineers with underscan support for all outputs • Content-adaptive de-flicker filtering for interlaced displays • Xilleon TV encoder for high quality analog support • Spatial/temporal dithering enables 10-bit color quality on 8 and 6-bit displays • VGA mode support on all outputs

	Shading architecture	• Supports Microsoft DirectX 9.0 Shader Model 3.0 programmable vertex and pixel shaders in hardware • Full speed 128-bit floating point processing for all shader operations • Dedicated branch-execution units for high performance dynamic branching and flow control • Dedicated texture address units for improved efficiency • Up to 512 simultaneous pixel threads • Multiple Render Target (MRT) support • Render to vertex buffer support
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	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
NVIDIA Quadro FX 5500 PCIe Graphics Board	Graphics Controller	NVIDIA Quadro FX 5500 Workstation GPU
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	1 GB GDDR2 SDRAM unified graphics memory
	Connectors	2 Dual-link DVI-I, 1 Stereo
	Multi-monitor Support	Yes
	NVIDIA Quadro FX 4500 architecture	256-bit memory interface 33.6 GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision Unlimited fragment instruction Unlimited vertex instruction 3D volumetric textures 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 OpenGL quad-buffered stereo Hardware-Accelerated Line Strippling 16 textures per pixel in fragment programs Window ID clipping functionality
	Shading Architecture	Fully programmable GPU (OpenGL2.0/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
	High Level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler

Technical Specifications - Graphics

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	2 Dual-Link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 24Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft® Windows®.
Supported Graphics APIs	OpenGL 2.0 DirectX 9.0c
3D Primitive Perf	Geometry (Triangles per Second) 225 Million Fill Rate (Texels per Second) 15.6 Billion
Available Graphics drivers	Microsoft Windows XP Professional, 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

HP L1955 Flat Panel 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)	176 degrees horizontal/176 degrees vertical (10:1 minimum contrast ratio)
		Brightness (typical)	Up to 250 nits (cd/m^2)
		Contrast Ratio (typical)	Up to 1000:1 (typical)
		Response Rate (typical)	<16 ms (typical rise + fall)
		Pixel Pitch	0.294 mm
		Color Depth Support	16.7 million colors
	Video/Other Inputs	Plug and Play	Yes (supports VESA DDC2B; PC2001 compliant)
		Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)
		Input Signal	Two connectors: one 15-pin mini D-sub analog VGA; and one DVI-I (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	VGA to VGA, DVI-D to DVI-D, and DVI-I to VGA
		Video Cable Length	78 inches; 2.0 m
	Signal Interface/ Performance	Horizontal Frequency	30 to 82 kHz
		Vertical Frequency	56 to 75 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, 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
		Individual Color Contrast
		Full-screen Resolution
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
	Average	33 watts when displaying standard office software
	Typical Power Consumption	< 40 watts
	Maximum	< 60 watts
	Power Saving	< 2 watts
	Off Mode	0 watts (when master power switch is in the off position)
	Power Cable Length	70 inches; 1.8 m; non-captive

Technical Specifications - Monitors

Mechanical	Dimensions (H x W x D)	Unpacked with stand	16.8 (minimum) to 22.3 (maximum) x 15.9 x 8.3 inches; 42.7 (minimum) to 56.6 (maximum) x 40.4 x 21.1 cm
		Base Area (Footprint D x W)	8.3 x 12.2 in 21.1 x 30.9 cm
		Panel only (without stand) (H x W x D)	13.2 x 15.9 x 3.1 in 33.5 x 40.4 x 7.9 cm
	Weight	Unpacked with stand	16.5 lb (7.5 kg)
		Unpacked without stand	10.5 lb (4.75 kg)
		Packaged	23.5 lb (10.7 kg)
	Bezel Width	13 mm left and right, 14 mm top, and 15 mm bottom	
	Tilt Range	-5° to +35°	
	Swivel Range	± 50° horizontal swivel	
	Height Adjustable	Yes (5.1 in/13 cm adjustment range)	
	Pivot Rotation	Yes, 90 °	
	Base	Ships detached and is removable after installation	
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 13,000 feet; 0 to 4,000 m	
	Altitude – Non-operating	0 to 40,000 feet; 0 to 12,192 m	
Options	Desktop Access Center	Features integrated microphone/headset jacks, dual function headset for phone/PC support, a MultiBay slot for adding an optical drive (sold separately), and four USB ports for easy integration of third-party digital solutions. Sold separately; part number DK985A. For more information, refer to the HP Desktop Access Center QuickSpecs.	
	HP Flat Panel Speaker Bar	Powered directly by the monitor, seamlessly attaches to the monitor's bezel to bring full multimedia support to select HP flat panel monitors. Features dual speakers with full sound range and external jack for headphones. Sold separately, part number PF804AA. For more information, refer to the HP Flat Panel Speaker Bar QuickSpecs.	

	Other	Accessories Included	VGA to VGA cable, DVI-D to DVI-D cable, DVI-I to VGA cable, USB cable, user CD-ROM with Pivot Pro 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.
		Software	HP Display LiteSaver feature lets you schedule Sleep mode at preset times to help protect the display against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
		User Guide Languages	English
		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 L1955 Flat Panel Monitor. Recommended for use with HP products.	
	Service and Warranty	Limited three-year parts and repair labor, service provider labor, and on-site service. Next Business Day advanced exchange direct replacement service available during warranty period. Certain restrictions and exclusions apply. For details, contact HP Customer Support.	
HP Flat Panel Monitor LP2065	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/m2)
		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

Technical Specifications - Monitors

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 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 Flat Panel Monitor LP2465	**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
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 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	75 watts
	Maximum	< 110 watts
	Power Saving	< 2 watts
	Power Cable Length	6.2 feet; 1.9 m

Technical Specifications - Monitors

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 feet; +3,657.6 m	
	Altitude – Non-operating	+40,000 feet; +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.

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.