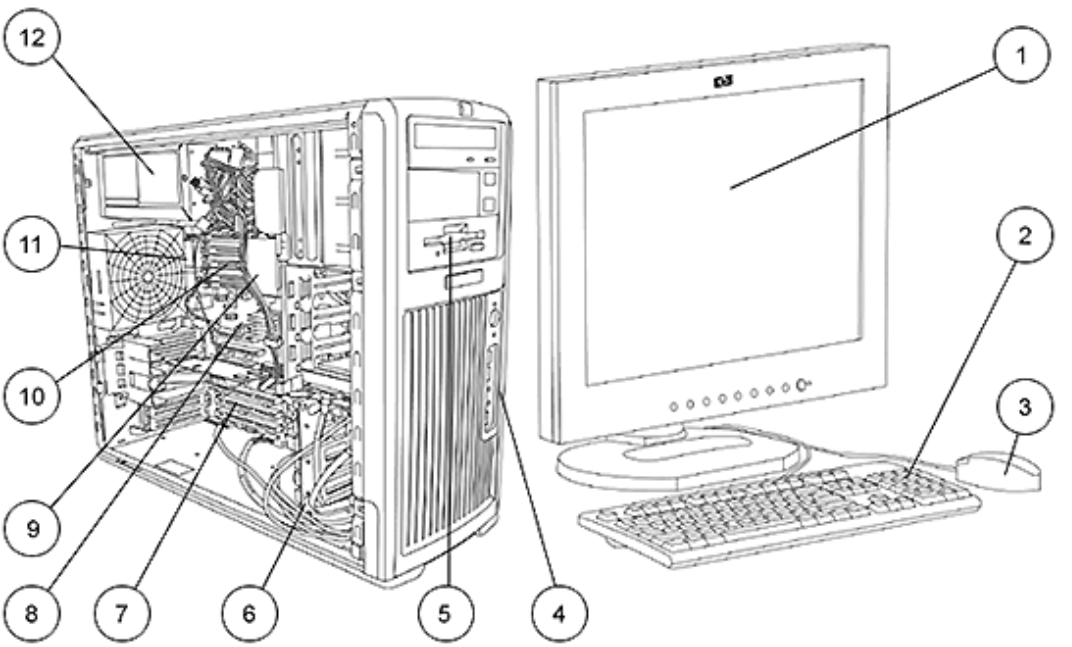
Overview

HP recommends Windows Vista™ Business



1. Monitor (sold separately)
2. 2004 Standard Keyboard
3. 2-Button Scroll Mouse
4. Front IO: 2 USB 2.0, IEEE-1394 (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. 2 PCI, 3 PCI-X slots
8. 2 PCI Express x16 Graphics Bus
9. Dual AMD Opteron™ processors
10. 8 DIMM slots for DDR memory
11. 6 USB 2.0, 1 standard serial port, 1 IEEE 1394, 2 PS/2, 1 RJ-45, audio in/out, microphone
12. 700 watt power supply

At A Glance

- AMD Opteron processors
- Operating Systems:
  - Microsoft Windows XP Professional
  - Microsoft Windows XP Professional x64 Edition
  - Red Hat Enterprise Linux Workstation 4.0
  - HP Linux Installer Kit (see http://www.hp.com/workstations/software/linux/ for details)
- Up to 32 GB of DDR memory using integrated CPU memory controllers
- Up to two AMD Opteron 200 series processors with 1GHz HyperTransport™ bus interconnects
- Dual PCI-Express x16 graphics buses
- Support for NVIDIA Scalable Link Interface to link dual graphics cards
- Integrated NVIDIA Gigabit ethernet
- SATA and Ultra 320 SCSI drives
- SATA 3Gb/s capability is included in the NVIDIA nForce Professional chipset
- AC'97 integrated audio with internal speaker
- Pre-loaded Manageability tools
- Energy Star compliance with energy-saving features
- Protected by HP Services, including a 3-3-3 standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

Standard Features - Custom Components

Processor and Speed – One of the following

AMD Opteron Processor with 1 GHz HyperTransport bus, 1 MB L2 cache
246 (2.00 GHz)
248 (2.20 GHz)
250 (2.40 GHz)
252 (2.60 GHz)
254 (2.80 GHz)
256 (3.00 GHz)

Dual-Core AMD Opteron Processor with 1 GHz HyperTransport bus, 1 MB L2 cache per core for a combined total of 2MB.
270 (2.00 GHz)
275 (2.20 GHz)
280 (2.40 GHz)
285 (2.60 GHz)

Operating System – One of the following

Microsoft Windows XP Professional with service pack 2
Microsoft Windows XP Professional x64 Edition (See http://www.hp.com/workstations/pws/windowsxp64/)

Transition Tool Kit

HP AMD 64 64-bit Transition Tool Kit

Power Supply Cord*

Specially rated cord supplied

***NOTE:** Use only Power Supply Cord supplied with the HP xw9300 workstation. This is a specially rated power cord.

1st Hard Disk Drive – One of the following

	Windows XP	Red Hat Linux
Serial ATA 3Gb/s Hard Drive		
80 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
250 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
500 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
Serial ATA 1.5Gb/s Hard Drives		
74 GB SATA 1.5Gb/s Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
Ultra320 SCSI Hard Drives		
73 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
146 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
300 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
36 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4
73 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4
146 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4

NOTE: All hard drives are supported with Red Hat Linux WS3 Update 5 and WS4 Update 1 (both x86 and EM64T) only when using the same type of drive. Drive mixing is not supported.

Standard Features - Custom Components

2nd Hard Disk Drive** One of the following		Windows XP	Red Hat Linux
	Serial ATA 3Gb/s Hard Drive* **		
	2nd hard drive, 80 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 250 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 500 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	Serial ATA 1.5Gb/s Hard Drives* **		
	2nd hard drive, 74 GB SATA 1.5Gb/s Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	Ultra320 SCSI Hard Drives		
	2nd hard drive, 73 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 146 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 300 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 36 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 73 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4
	2nd hard drive, 146 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4

NOTES:
**Mixing Serial ATA and SCSI hard drives is supported only with Microsoft OS or HP Installer Kit for Linux is supported. Not supported with Hat Linux OS.
***Primary drive must be Serial ATA.

3rd Hard Disk Drive – One of the following		Windows XP	Red Hat Linux
	Serial ATA 3Gb/s Hard Drive		
	3rd hard drive, 80 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 250 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 500 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	Serial ATA 1.5Gb/s Hard Drives		
	3rd hard drive, 74 GB SATA 1.5Gb/s Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	Ultra320 SCSI Hard Drives		
	3rd hard drive, 73 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 146 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 300 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 36 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 73 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4
	3rd hard drive, 146 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4

Standard Features - Custom Components

		Windows XP	Red Hat Linux
4th Hard Disk Drive – One of the following	**Serial ATA 3Gb/s Hard Drive**		
	4th hard drive, 80 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	4th hard drive, 250 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	4th hard drive, 500 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4
	Ultra320 SCSI Hard Drives		
	4th hard drive, 74 GB Serial ATA Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	4th hard drive, 146 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	4th hard drive, 300 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	4th hard drive, 146 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4

		Windows XP	Red Hat Linux*
5th Hard Disk Drive – One of the following	**Ultra320 SCSI Hard Drives**		
	5th hard drive, 146 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	5th hard drive, 300 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4
	5th hard drive, 146 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4

		Windows XP	Red Hat Linux*
Drive controllers	Integrated Serial ATA-II controller (4 channels). With RAID 0, RAID 1, RAID 0+1 capability	32-Bit, 64-Bit	WS3, WS4*
	Integrated dual channel Ultra320 SCSI controller	32-Bit, 64-Bit	WS3, WS4*
	Optional Ultra 320 SCSI controller – basic	32-Bit, 64-Bit	WS3, WS4*
	Optional U320 SCSI Controller – LSI 20320AR RAID 0,1support and external connector	32-Bit, 64-Bit	WS3, WS4*
	NOTE: Hardware Controller supported by Linux except for any of the RAID features. For customers requiring RAID functionality, consider using Software RAID functionality that is controller independent and provided within Red Hat Enterprise Linux.		

		Windows XP	Red Hat Linux*
Factory Integrated RAID	RAID 0 Configuration - Striped Array	32-Bit, 64-Bit	WS3, WS4*
	RAID 0 Configuration - Data Array	32-Bit, 64-Bit	WS3, WS4*
	RAID 1 Configuration - Mirrored Array	32-Bit, 64-Bit	WS3, WS4*
	NOTE: Requires 2 identical hard drives (speeds, capacity, interface)		
	NOTE: Hardware Controller supported by Linux except for any of the RAID features. For customers requiring RAID functionality, consider using Software RAID functionality that is controller independent and provided within Red Hat Enterprise Linux.		

Standard Features - Custom Components

Memory – One of the following	**PC3200 (DDR400) Memory DIMMs**	**Windows XP**	**Red Hat Linux**
	1 GB PC3200 (DDR 400 MHz) ECC Registered (2 x 512 MB)	32-Bit, 64-Bit	WS3, WS4
	2 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 512 MB)	32-Bit, 64-Bit	WS3, WS4
	2 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 512 MB) **	32-Bit, 64-Bit	WS3, WS4
	2 GB PC3200 (DDR 400 MHz) ECC Registered (2 x 1 GB)	32-Bit, 64-Bit	WS3, WS4
	4 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 1 GB)	32-Bit, 64-Bit	WS3, WS4
	4 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 1 GB) **	32-Bit, 64-Bit	WS3, WS4
	4 GB PC3200 (DDR 400 MHz) ECC Registered (8 x 512 MB)**	32-Bit, 64-Bit	WS3, WS4
	6 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 1 GB + 4 x 512 MB)*	32-Bit, 64-Bit	WS3, WS4
	8 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 2 GB)	32-Bit, 64-Bit	WS3, WS4
	8 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 2 GB)**	32-Bit, 64-Bit	WS3, WS4
	8 GB PC3200 (DDR 400 MHz) ECC Registered (8 x 1 GB)**	32-Bit, 64-Bit	WS3, WS4
	12 GB PC3200 (DDR 400 MHz) ECC Registered (4 x 2 GB+4 x 1 GB)**	32-Bit, 64-Bit	WS3, WS4
	16 GB PC3200 (DDR 400 MHz) ECC Registered (8 x 2 GB)**	32-Bit, 64-Bit	WS3, WS4
	PC2700 (DDR333) Memory DIMMs		
	16 GB PC2700 (DDR 333 MHz) ECC Registered (4 x 4 GB)**	32-Bit, 64-Bit	WS3, WS4
	32 GB PC2700 (DDR 333 MHz) ECC Registered (8 x 4 GB)**	32-Bit, 64-Bit	WS3, WS4
	NOTE:** Requires Dual Processor configuration.		

Removable Storage		**Windows XP**	**Red Hat Linux**
	HP No Floppy Drive Option		
	1.44 MB Diskette Drive	32-Bit, 64-Bit	WS3, WS4
	HP No Optical Drive Option		
	48X CD-ROM Drive	32-Bit, 64-Bit	WS3, WS4
	48X CD-RW Drive	32-Bit, 64-Bit	WS3, WS4
	16X DVD-ROM drive	32-Bit, 64-Bit	WS3, WS4
	48X Combo CD-RW/DVD-ROM Drive	32-Bit, 64-Bit	WS3, WS4
	16X DVD+/-RW, DL (Dual-Layer) with LightScribe (Lightscribe Software works with Windows only)	32-Bit	WS3, WS4

NOTE: The RHEL3 U4 (x86) OS will operate correctly after some manual configuration steps. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual.

Standard Features - Custom Components

2nd Removable Storage		Windows XP	Red Hat Linux
	48X CD-RW Drive	32-Bit, 64-Bit	WS3, WS4
	16X DVD-ROM drive	32-Bit, 64-Bit	WS3, WS4
	48X Combo CD-RW/DVD-ROM Drive	32-Bit, 64-Bit	WS3, WS4
	16X DVD+/-RW, DL (Dual-Layer) with LightScribe (Lightscribe Software works with Windows only)	32-Bit	WS3, WS4

NOTE: The RHEL3 U4 (x86) OS will operate correctly after some manual configuration steps. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual.

Keyboard – One of the following		Windows XP	Red Hat Linux
	PS/2 Standard Keyboard*	32-Bit, 64-Bit	WS3, WS4
	USB Standard Keyboard*	32-Bit, 64-Bit	WS3, WS4

NOTE: The RHEL3 U4 (x86) OS will operate correctly after some manual configuration steps. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual. *When using Linux, use either both PS/2 or both USB for keyboard and mouse. Mixing PS/2 and USB is not supported with Linux OS.

Mouse – One of the following		Windows XP	Red Hat Linux
	PS/2 2-Button Scroll Mouse	32-Bit, 64-Bit	WS3, WS4
	USB 2-Button Optical Scroll Mouse	32-Bit, 64-Bit	WS3, WS4
	USB 3-Button Optical Scroll Mouse	32-Bit, 64-Bit	WS3, WS4
	HP Workstations Mouse Pad		

Audio		Windows XP	Red Hat Linux
	Integrated AC'97 sound with internal speaker	32-Bit	WS3 & WS4
	Sound Blaster X-Fi XtremeMusic Audio Card (Not supported with NVIDIA Quadro FX 4500 Graphics)	32-Bit	Not supported
	HP Optical Drive Internal Audio Cable (Not supported with Sound Blaster card)	32-Bit, 64-bit	WS3 & WS4

NIC		Windows XP	Red Hat Linux
	Integrated NVIDIA 10/100/1000 LAN		
	Broadcom 5751 Netxtreme Gigabit PCIe NIC	32-Bit, 64-Bit	WS3 & WS4
	Intel Pro/1000 GT Gigabit PCI NIC	32-Bit	WS3 & WS4

Standard Features - Custom Components

Graphics*		Windows XP	Red Hat Linux**
	NVIDIA Quadro NVS 285* with TurboCache Technology PCIe (128 MB, VGA & DVI)	32-Bit, 64-Bit	WS3, WS4
	NVIDIA Quadro FX 540 PCIe (128 MB)	32-Bit, 64-Bit	WS3, WS4
	NVIDIA Quadro FX 1400 PCIe (128 MB) – NVIDIA SLI capable	32-Bit, 64-Bit	WS3, WS4
	NVIDIA Quadro FX 3450* PCIe (256 MB) – NVIDIA SLI capable	32-Bit, 64-Bit	WS3, WS4
	NVIDIA Quadro FX 4500* PCIe (512 MB)	32-Bit, 64-Bit	WS3, WS4
Graphics Connectors	NVIDIA Quadro G-Sync Card***	32-Bit, 64-Bit	WS3, WS4
	NVIDIA SLI Graphics Connector ****	32-Bit, 64-Bit	

NOTE: *May use two graphics cards. Must use matching graphics cards and order a second processor.
** Supported with Red Hat Linux WS3 U5 and WS4 U1 (both x86 and EM64T)
*** Only supported on NVIDIA Quadro FX 45xx and newer series graphics cards.
**** Only supported on NVIDIA Quadro FX 14xx, 34xx and newer series graphics cards.

Miscellaneous	Windows XP	Red Hat Linux
Hood intrusion sensor	32-Bit, 64-Bit	WS3, WS4
Trusted Platform Module	32-Bit	
SCSI U320 Back Panel Connect		
2nd SCSI U320 Back Panel Connect*		

* **NOTE:** Can only be ordered if PP573AV Back Panel Connect is ordered. Cannot order any SCSI drives if both SCSI Back Panel Connects are ordered.

Software	Windows XP	Red Hat Linux
Symantec Norton AntiVirus Software (optional)	32-Bit	
HP Performance Tuning Framework	32-Bit	
Altiris Recovery	32-Bit	
HP Client Manager Software v6.0	32-Bit	
Computer Associates® eTrust™ 64-bit Antivirus Software	64-Bit	

Standard Features - Specs

Form factor	Minitower	
Operating System (choice)	Microsoft Windows XP Professional SP2	
	Microsoft Windows XP Professional SP2 x64 Edition	
	OR Red Hat Enterprise Linux Workstation 3 Update 5 (support for x86 or EM64T)	
	OR HP Installer Kit for Linux (includes drivers for 64-bit OS versions on xw9300, xw8200, xw6200, xw4200)	
Color	Carbonite/Alloy metallic	
System Board Form Factor	E- ATX (12" x 13")	
Processor	Single or dual AMD Opteron 200 series processors with AMD64 Technology & HyperTransport	
CPU Bus Speed Supported	1 GHz HyperTransport	
Standard L2 Cache	1 MB L2 cache per core.	
Chipset	NVIDIA nForce Professional with AMD-8131 HyperTransport PCI-X tunnel	
Memory Expansion Slots	8 DIMMs, 4 slots active for each CPU in the system)	
Memory Type Supported	DDR (ECC registered)	
Memory Speed Supported	DDR Synch DRAM PC3200 (400 MHz) and PC2700 (333 MHz) Registered ECC	
Maximum Memory	32 GB (8 DIMMs slots with 4 GB DIMMS, 8 GB per CPU socket)	
Network controller	Integrated NVIDIA nForce Professional 10/100/1000 LAN	
Audio	AC'97	
PCI slots	2 PCI-Express (PCIe) x16 graphics 3 full-height PCI-X slots (one 133 MHz, two 100 MHz slots) 1 full-length PCI slot	
Scalable Link Interface	Yes	
Bays	Total Bays = 8	
Internal Bays	• Five 3.5 inch bays (4 with acoustic dampening rail assemblies)	
External Bays	• Three 5.25 inch bays. Top two support full depth (210 mm maximum) devices. Bottom bay is depth restricted to 169mm (including cables). Bays can be converted to internal 3.5" drive bays using optional bracket. • Floppy drive bay using optional bracket. Consumes 1 - 5.25 bay.	
Parallel Port	0	
Serial Port	1	
Front I/O	2 USB 2.0, Headphone, Microphone, IEEE 1394	
Rear I/O	4 USB 2.0, 1 standard serial port, 1 IEEE 1394, PS/2 keyboard and mouse, 1 RJ-45 to integrated Gigabit LAN, Audio In, Audio Out, Mic In	
USB Keyboard	Optional	
USB Mouse	Optional	
PS/2 Keyboard	1	
PS/2 Mouse	1	
Chassis Dimensions (H x W x D)	17.9 x 8.3 x 20.7 in (45.4 x 21.0 x 52.5 cm)	
System weight	Minimum config – 42 lb (19 kg) Standard config – 45 lb (20 kg) Maximum config – 54 lb (24 kg)	
Shipping weight	Standard config – 54 lb (24 kg)	
Temperature	Operating	40° to 95° F (5° to 35° C)
	Non-operating	-40° to 140° F (-40° to 60° C)

Standard Features - Specs

Humidity	Operating	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (nonpressurized)	Operating	10,000 ft (3,000 m)
	Non-operating	30,000 ft (9,100 m)
Power Supply	700W wide-ranging, active Power Factor Correction	
Interfaces Supported	4 SATA interface (4 serial-ATA connectors), Ultra320 SCSI interface, 2 EIDE interface (1 EIDE connectors) supported for optical drives. SATA 3 capability is included in the NVIDIA nForce Professional chipset	
Hard Drive Controller (PCI) Supported	Ultra160 or Ultra320, or SATA RAID, or Ultra320 RAID	
Preinstalled Software		
HP Performance Tuning Framework *		
HP Client Manager Software v6.0*		
Altiris Local Recovery*		
Alert Standard Format specification*		
CD/DVD software dependent on optical drive choices		
* Windows Operating Systems only.		

After-Market Options

Processors		Part Number
	2nd AMD Opteron processor with AMD64 Technology & HyperTransport	
	AMD Opteron 246 processor at 2.00 GHz with 1GHz HT bus & 1 MB of L2 cache	PU942A
	AMD Opteron 248 processor at 2.20 GHz with 1GHz HT bus & 1 MB of L2 cache	PU943A
	AMD Opteron 250 processor at 2.40 GHz with 1GHz HT bus & 1 MB of L2 cache	PU944A
	AMD Opteron 252 processor at 2.60 GHz with 1GHz HT bus & 1 MB of L2 cache	PP661A
	AMD Opteron 254 processor at 2.80 GHz with 1GHz HT bus & 1 MB of L2 cache	ED532AA
	AMD Opteron 256 processor at 3.00 GHz with 1GHz HT bus & 1 MB of L2 cache	ER219AA
	AMD Opteron 270 processor at 2.00 GHz (2 Core) with 1GHz HT bus & 1 MB of L2 cache per core for a combined total of 2 MB.	PY605AA
	AMD Opteron 275 processor at 2.20 GHz (2 Core) with 1GHz HT bus & 1 MB of L2 cache per core for a combined total of 2 MB.	PY606AA
	AMD Opteron 280 processor at 2.40 GHz (2 Core) with 1GHz HT bus & 1 MB of L2 cache per core for a combined total of 2 MB.	EH416AA
	AMD Opteron 285 processor at 2.60 GHz (2 Core) with 1GHz HT bus & 1 MB of L2 cache per core for a combined total of 2 MB.	ER220AA

Graphics*		Windows XP	Red Hat Linux	Part Number
	Multi display solutions			
	SLI Dual Graphics Connector	X	X	PP654A
	NVIDIA Quadro NVS 285 with TurboCache Technology	X		EE0661AA
	NVIDIA Quadro FX 540 (128 MB)	X	X	PH791A
	NVIDIA Quadro FX 1400 - SLI capable (128 MB)	X	X	PM979A
	NVIDIA Quadro FX 3450 - SLI capable (256 MB)	X	X	PY640AA
	NVIDIA Quadro FX 4500	X	X	EA762AA

NOTE: Support for both RHEL WS3 U5 and WS4 U1 (x86 and EM64T). To run the accelerated graphics driver on RHEL3 U4, download the latest driver. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual.
*May use two graphics cards. Must use matching graphics cards and order a second processor.

After-Market Options

Hard Drives	Windows XP	Red Hat Linux	Part Number
Serial ATA Hard Drives			
80 GB SATA 3.0Gb/s Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4	PY276AA
250 GB SATA NCQ Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4	EA788AA
500 GB SATA 3.0Gb/s NCQ Hard Drive (7,200 rpm)	32-Bit, 64-Bit	WS3, WS4	PV943A
160 GB SATA 3.0Gb/s NCQ Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4	EW222AA
74 GB SATA 1.5Gb/s Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4	DX760A
SATA power cable kit (2 per kit)	32-Bit, 64-Bit	WS3, WS4	DN733A
SCSI Hard Drives			
73 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4	AA613A
146 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4	AA614A
300 GB Ultra320 SCSI Hard Drive (10K rpm)	32-Bit, 64-Bit	WS3, WS4	DY672A
36 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4	AA616A
73 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4	AA617A
146 GB Ultra320 SCSI Hard Drive (15K rpm)	32-Bit, 64-Bit	WS3, WS4	DY671A
Hard Drive Accessories			
Cable, 5 port SCSI	32-Bit, 64-Bit	WS3, WS4	AA818A
U320 SCSI Back Panel connector (Uses HDCI, HD68, or mini DB68 connectors)	32-Bit, 64-Bit	WS3, WS4	AA658A
Removable Drive Enclosures			
StorCase DX115 SATA Removable Enclosure	ALL	ALL	EA332AA
StorCase DX115 SATA Removable Enclosure	N/A	N/A	EA332AA

NOTE: All hard drives are supported with Red Hat Linux WS3 Update 5 and WS4 Update 1 (both x86 and EM64T) only when using the same type of drive. Drive mixing is not supported.

Controllers	Windows XP	Red Hat Linux	Part Number
SATA Controllers			
Adaptec Serial ATA 3Gb/s RAID 1420SA PCI-X card	32-Bit, 64-Bit	WS3*	ED090AA
SCSI Controllers			
U320 SCSI Controller – LSI 20320AR RAID 0,1	32-Bit, 64-Bit		DZ554A
Ultra320 SCSI RAID Adaptec 2120S - PCI (Windows & Linux)	32-Bit	WS3, WS4*	AA850A

NOTE: * Hardware RAID is not supported on Linux Systems and this includes the Promise SATA Raid Card, Onboard SATA Chipset Raid, Adaptec 2120S SCSI Raid Card, LSI 20320 A-R SCSI Card, Onboard SCSI Chipset Raid. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID.

After-Market Options

Storage Devices	Windows XP	Red Hat Linux	Part Number
HP 512 MB Drive Key II Flash Drive (USB 2.0)	32-Bit, 64-Bit	WS3, WS4	ED516AA
1GB HP DriveKey II (USB 2.0 Flash Drive)	32-Bit, 64-Bit	WS3, WS4	AG382AA
1.44 MB Internal Floppy Drive	32-Bit, 64-Bit	WS3, WS4	DY670A

Input/Output Devices	Windows XP	Red Hat Linux	Part Number
Keyboards			
HP PS/2 Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	WS3, WS4	DT527A
HP USB Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	WS3, WS4	DT528A
HP USB Smart Card Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	WS3, WS4	ED707AA
Pointing Devices			
HP PS/2 2-Button Scroll Mouse (Carbonite)	32-Bit, 64-Bit	WS3, WS4	DD440B
HP USB 2-Button Optical Scroll Mouse (Carbonite/Silver)	32-Bit, 64-Bit	WS3, WS4	DC172B
HP USB 3-button Optical Mouse	32-Bit, 64-Bit	WS3, WS4	DY651A
HP USB 3-Button Optical 2.9M OEM Mouse	32-Bit, 64-Bit	WS3, WS4	ET424AA
HP SpaceBall 5000 (USB)	32-Bit, 64-Bit	Not Supported	DV675A
HP SpaceMouse (USB)	32-Bit, 64-Bit	Not Supported	DZ203A
HP SpacePilot 3D USB Intelligent Controller	32-Bit, 64-Bit	Not Supported	EF390AA

NOTE: Keyboard and mouse interfaces must be both USB or both PS2 when using Linux.

Networking	Windows XP	Red Hat Linux	Part Number
NICs			
Broadcom 5751 Netxtreme Gigabit PCIe NIC	32-Bit	WS3, WS4	EA833AA
Intel Pro/1000 PT Gigabite PCI Express NIC	32-Bit	WS3	EH352AA
Intel Pro/1000 GT Gigabit PCI NIC	32-Bit	WS3, WS4	AG393AA

After-Market Options

Memory (DIMMs)	Windows XP	Red Hat Linux	Part Number
PC3200 (DDR 400 MHz) ECC Registered DIMMs			
512 MB PC3200 (DDR 400 MHz) ECC Registered (1 x 512 MB)	32-Bit, 64-Bit	WS3, WS4	PP657A
1 GB PC3200 (DDR 400 MHz) ECC Registered (1 x 1 GB)	32-Bit, 64-Bit	WS3, WS4	PP655A
4 GB (2x2GB) DDR400 ECC Registered (Duct)	32-Bit, 64-Bit	WS3, WS4	EA836AA
8 GB DDR PC2700 (333 MHz) ECC Registered (2 x 4 GB)	32-Bit, 64-Bit	WS3, WS4	EK739AA
HP xw9300 2-GB DIMM Cooling Duct Kit	32-Bit, 64-Bit	WS3, WS4	EA789AA

Monitors (Supported by all Operating Systems supplied by HP)	Part Number
TFTs	
HP TFT LP2465 (24-inch)	EF224A5#
HP TFT L2335 (23-inch)	P9615W#
HP TFT LP2065 (20.1-inch) TCO03 Two Tone (Carbonate/Silver)	EF227A5#
HP TFT L2035 (20.1-inch)	P9614W#
HP TFT L1955 (19-inch)	PD974A4
HP TFT L1755 (17-inch)	PL777AA

Optical Drives	Windows XP	Red Hat Linux	Part Number
DVD-ROM Drive			
16X DVD-ROM w/ +R read	32-Bit, 64-Bit	WS3, WS4	AA620B
CD-ROM Drive			
48X Max CD-ROM Drive	32-Bit, 64-Bit	WS3, WS4	DC143B
CD-RW Drive			
48X CD-RW Drive	32-Bit, 64-Bit	WS3, WS4	DE205B
Combo Drive			
48X/32X Combo DVD-ROM/CD-RW Drive	32-Bit, 64-Bit	WS3, WS4	DE206B
DVD+/-RW Drive			
16X DVD+/-RW, DL (Dual-Layer) with LightScribe (LightScribe labeling functionality not supported on Linux)	32-Bit	WS3, WS4*	DZ555B

NOTES: All optical drives are supported with Red Hat Linux WS3 U5 and WS4 U1 (both x86 and EM64T). *LightScribe functionality not supported.

After-Market Options

Removable Storage	Windows XP	Red Hat Linux	Part Number
1.44 MB Internal Floppy Drive	32-Bit, 64-Bit		DY670A
HP StorageWorks DAT 24 USB external tape drive	32-Bit, 64-Bit	WS3, WS4	DW070A
HP StorageWorks DAT 24 USB internal tape drive	32-Bit, 64-Bit	WS3, WS4	DW069A
HP StorageWorks DAT 40 USB external tape drive	32-Bit, 64-Bit	WS3, WS4	DW023A
HP StorageWorks DAT 40 USB internal tape drive	32-Bit, 64-Bit	WS3, WS4	DW022A
HP StorageWorks DAT 72 USB external tape drive	32-Bit, 64-Bit	WS3, WS4	DW027A
HP StorageWorks DAT 72 USB internal tape drive	32-Bit, 64-Bit	WS3, WS4	DW026A
HP StorageWorks DAT 72 SCSI external tape drive	32-Bit, 64-Bit	WS3, WS4, 7.2, 7.3	Q1523B
HP StorageWorks DAT 72 SCSI internal tape drive	32-Bit, 64-Bit	WS3, WS4, 7.2, 7.3	Q1522B

The following Removable Drive Enclosure products are available from and supported by 3rd party:
StorCase Rhino Jr. SCSI Removable Disk Enclosure
(For NA, use: HP P/N A466719, for WW, use: vendor P/N S21A107)
StorCase Rhino Jr. SATA 1.5Gb/s Removable Disk Enclosure (For NA, use: HP P/N A466720, for WW, use: vendor P/N S21J111)

Audio Card	Part Number
Sound Blaster X-Fi XtremeMusic Audio Card	EA326AA
HP Satellite Speakers	ZD929AA

Security	Part Number
Chassis clamp lock, universal, no cable	DE817A
Chassis clamp lock, universal, with cable	DE818A

Brackets/Stands	Part Number
Fixed Rack Kit (IT/Broadcast)	AA640A
HP xw8200 and xw9300 workstation IT/Broadcast Slide Rack Kit	DY664A

Other Devices	Part Number
Front Card Guide and Fan Kit	DY648A
StorCase SATA Removable Drive Enclosure*	EA332AA

***NOTE:** Accommodated in the top two optical bays only.

Operating Systems	Part Number
Red Hat Enterprise Linux Workstation 3 Update 7 (64-bit)	RA355AA
Red Hat Enterprise Linux Workstation 4, Update 3, (32/64-bit)	RA356AA

After-Market Options

Software		Windows XP	Red Hat Linux	Part Number
	HP Remote Graphics V3 LTU for HP WS	32-Bit	7.2, 7.3, WS3	PY682AA
	HP Remote Graphics V4 LTU for HP WS	32-Bit, 64-Bit	WS3	RG088AA
	HP Remote Graphics V3 Receiver LTU	32-Bit	7.2, 7.3, WS3	PY684AA
	HP Remote Graphics V4 Receiver LTU (available 8/1/06)	32-Bit, 64-Bit	WS3	RG090AA
	HP Remote Graphics V3 software media	32-Bit	7.2, 7.3, WS3	PY685AA
	HP Remote Graphics V4 software media	32-Bit, 64-Bit	WS3	RG091AA

Memory

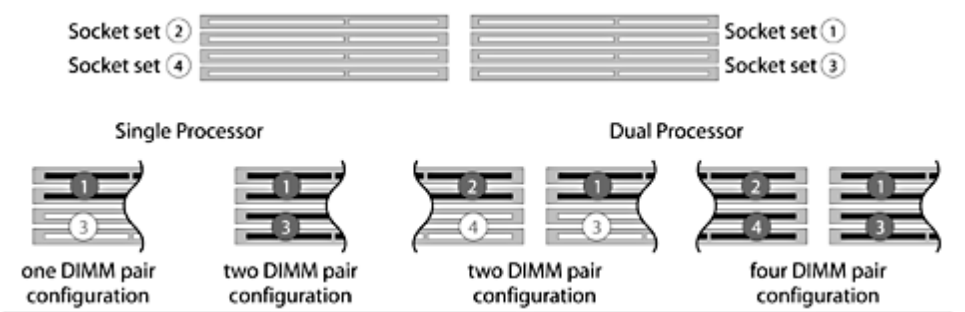
AMD Opteron processor with Direct Connect Architecture

DDR SDRAM ECC REGISTERED MEMORY
This chart does not represent all possible memory configurations. Each AMD Opteron processor has an integrated memory controller that supports ECC Registered 400 MHz (PC3200) or 333 MHz (PC2700) DDR memory only. Main memory is directly connected to the processor through the Direct Connect Architecture. There are 8 DIMM slots which provide 6.4 GB/s bandwidth per processor. It can support a maximum of 8 GB of RAM with one processor installed, 32 GB of RAM when both processors are present.

Memory must be added in pairs. Match DIMM pairs by size and type.

In a single processor configuration, install the first DIMM pair in socket set 1 (blue sockets), and the 2nd DIMM pair in socket set 3 (black socket).

In a dual processor configuration, install the first DIMM pair in socket set 1 (blue sockets), the 2nd DIMM pair in socket set 2 (blue sockets) and, if required, the 3rd pair in socket set 3 (black sockets) and the 4th pair in socket set 4 (black sockets).



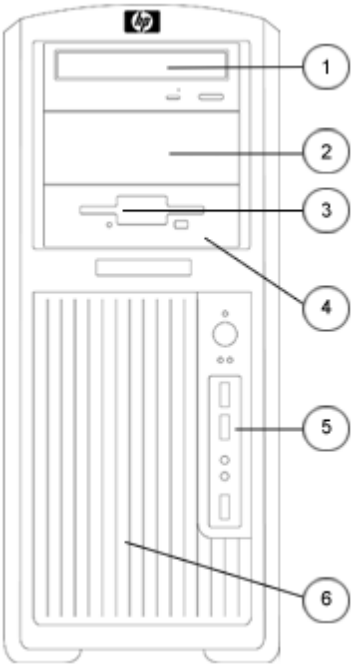
MAXIMUM MEMORY
Supports up to 32GB of DDR SDRAM, in a configuration of 8 GB per processor (over 12 GB requires dual CPUs).

POSSIBLE MEMORY CONFIGURATIONS
Not all memory configurations possible are represented below.

Memory

DIMM Size	Slot							
	CPU 1				CPU2			
	Socket set 1		Socket set 3		Socket set 2		Socket set 4	
1 GB	512 MB	512 MB						
2 GB	1 GB	1 GB						
2 GB	512 MB	512 MB	512 MB	512 MB				
2 GB	512 MB	512 MB	512 MB	512 MB				
4 GB	1 GB	1 GB	1 GB	1 GB				
8 GB	2 GB	2 GB	2 GB	2 GB				
2 GB (dual)	512 MB	512 MB			512 MB	512 MB		
4 GB (dual)	1 GB	1 GB			1 GB	1 GB		
4 GB (dual)	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
6 GB (dual)	1 GB	1 GB	512 MB	512 MB	1 GB	1 GB	512 MB	512 MB
8 GB (dual	2 GB	2 GB			2 GB	2 GB		
8 GB (dual)	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB
12 GB (dual)	2 GB	2 GB	1 GB	1 GB	2 GB	2 GB	1 GB	1 GB
16 GB (dual)	4 GB	4 GB			4 GB	4 GB		
16 GB (dual)	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
32 GB (dual)	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB

Tower configuration



	Quantity Supported	Position Supported	Controller
Convertible Minitower			
Optional Diskette Drive	1	3	Diskette
5.25” Storage Drive Bays	3	1, 2, 3	IDE
3.5” Storage Drive Bays with acoustic dampening rail assemblies	5	4, 5, 6, 7, 8	SATA or SCSI

SCSI and SATA may be mixed in a Windows configuration, only the primary drive may be SATA.

Linux does not support SATA controller or mixing SATA and SCSI drives.

Additional Technical Specifications

System Board	
Architecture	AMD Opteron
Chipset	NVIDIA nForce Professional 2000 with Professional 2200 and 2050
Super I/O Controller	SMSC LPC47B397
System Board Form Factor	E-ATX (12” x 13”)
Processor Socket	Dual 940 Pin ZIF Sockets
DIMM Connectors (DDR1, 2.5V)	8 DDR Memory Slots
PCIe Connectors	Dual x16 PCIe Slots
Integrated Graphics	None
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 card guide	Optional, tool-free support for all full-length cards with PCI extender
USB Ports	2 front, 4 rear
1394 Ports	1 front, 1 rear
Floppy	Yes
PS/2 Keyboard & Mouse	Yes
Serial Port	Yes
Parallel Port	None
Flash ROM	Yes
TPCM Support	Yes
AC97 integrated audio	Yes
CD ROM IN (Audio)	Yes
AUX IN (Audio)	Yes
Clear CMOS Button	Yes
CPU Fan Header	2 (One for each CPU)
Chassis Fan Header	Yes
PCI Cage Fan Header	Yes
Chassis Speaker Header	Yes
CMOS Battery Holder – Lithium	Yes
Hood Lock Header	None
Hood Sensor Header	None
Multibay Header	None
Hard drive acoustic dampening rails	Standard in 4 internal 3.5” bays, tool-free
Integrated SATA RAID	• RAID 0, RAID 1, RAID 0+1 • Supports one RAID array on 4 ports • Creation of 4 drive HDD array • RAID 0 Configuration – Striped Array • RAID 1 Configuration – Mirrored Array
Integrated SCSI	LSI 53C1030 SCSI Controller with optional external connector

Additional Technical Specifications

SCSI Connectors	2 (One Internal, One External Optional)
Integrated LAN	NVIDIA 10/100/1000 LAN Controller (PCIe)
Wake-On-Lan®	Yes
ASF 1.0 (Alert Standard Format)	No
Power Supply Connectors	Yes, 24-pin Main Power, 8-pin CPU, 6-pin Auxiliary
Power Switch, Power LED & Hard Drive LED Header	Yes
S3 Support	Yes
Password Clear Header	Yes
Riser Connector	None
HDD activity LED Header	Yes

Cooling	
Cooling Solutions Supported	Yes
Power Supply Fan	3.62 x 0.98 in (92 x 25 mm)
Processor Fan-Heatsink	2.76 x 0.59 in (70 x 15 mm)
Chassis Fan (front)	One 3.62 x 0.98 in (92 x 25 mm) (optional)
Chassis Fan (rear)	One 4.72 x 1.1 in (120 mm x 28 mm) (standard)
Internal Speaker	Standard

Power Supply	
9 outputs	• +3.3V–used with PCI, PCI-X, PCIe, CK8-04, IO4, AMD8131, LS1030, IEEE 1394, Audio, Super I/O, on-board logic • +5V–used with storage (disk, optical, diskette), PCI, PCI-X, PCIe, IEEE 1394, CK8-04, IO4, USB, input to on-board regulators (1.2V, 1.5V, 1.8V, and 2.5V), SCSI hard drives, and on-board logic • +12V-A–used with PCI, PCI-X, PCIe, IEEE 1394, system fans • +12V-B–used with storage (disk, optical, floppy) • +12V-C–used with PCI Express x16 auxiliary connectors • +12VCPU0–input to onboard regulator that supplies power for CPU0, Mem0 and respective fan • +12VCPU1–input to onboard regulator that supplies power for CPU1, Mem1 and respective fan • -12V–used by PCI, PCI-X • 5VSB–used for sleep circuitry
Full Ranging Input	Yes
Active Power Factor Correction (APFC) (Input Current is nearly ½ a non-APFC PS)	Yes
Passive Power Factor Correction (PFC)	No
Operating Voltage Range	90 – 264 VAC/118 VAC
Rated Voltage Range	100 – 240 VAC
Rated Line Frequency	50-60 Hz/400Hz
Operating Line Frequency Range	47 – 66 Hz/393 – 407Hz
Rated Input Current	11.9A/9.98A
Maximum Rated Power	700 W
Heat Dissipation	Typical 1206.2 btu/hr Maximum 3656.78 btu/hr
PS Size (wide x high x deep)	3.86 x 6.3 x 7.87 in (98 x 160 x 200 mm)
Energy Star Compliant	Yes
Surge Tolerant Full Ranging Power Supply	Withstands power surges up to 2000V

ROM Features	**Description**
Instantly Available PC	Allows for very low power consumption with quick resume time

ROM Based F10 Setup and diagnostics	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 ROM revision levels 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, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, 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 computer
Setup Password	Prevents an unauthorized person from changing the system 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
Master Boot Record Security	Detects changes to MBR and optional restoration, useful in protecting from viruses
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 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 systems
Keyboard-less Operation	The system can be operated without a keyboard
SMBIOS	System Management BIOS 2.3.5, previously known as DMI BIOS, for system management information
Localized ROM Setup	Common BIOS image supports configuration (Setup) in 11 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 (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

Other Deployment & Management Features	
HP Client Management Solutions	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 due to the extensive work between HP and its partner Altiris. 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 Altiris 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/easydeploy for more information, to download HP Client Manager Software, and to evaluate the Altiris solutions.
System Software Manager (free)	A free utility that detects and updates BIOS, device drivers, and management agent versions on your networked PCs and workstations
Altiris Local Recovery	Provides data and system file protection for HP business PCs to enable fast recovery of information that is accidentally deleted or if the system becomes corrupted. Designed for disconnected or seldom-connected users, Local Recovery protects your HP computer's data and system state by taking scheduled snapshots, which are then stored in a protected area on the local hard disk. System backup and disaster recovery is now simple and fast for all users, regardless of connectivity
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
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)	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
Ultra ATA Integrity Monitoring (CRC Checking)	A feature of SATA and SCSI, Cyclic Redundancy Checking provides data transfer verification and proactive notification of hard drive data transmission 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 (Adaptec and LSI SCSI controllers do not offer DPS) • 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)	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	Tool-less

Technical Specifications

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
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 image
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
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) 24 x 7. 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.

AC97 Integrated ADI 1981B Audio	**Type**	Integrated
	AC '97 Stereo Codec	Yes
	FM Synthesis Support	Yes – Yamaha XG Lite
	OPL3 FM Synthesis Support	Yes
	Sound Blaster Compatibility	Yes
	Audio Jacks	Microphone-In (20-K ohm Input Impedance); rear stereo and front analog microphone ports Line-In (12-K ohm Input Impedance) Line-Out * (less than 800 ohms Output Impedance, expects at least a 10-K ohm load) Headphone-Out (2.5 Ohms Output Impedance, expects at least a 32 ohm load)
	NOTE: *Internal Speaker Amplifier is for Internal Speaker only. External Speakers need to be powered externally.	
	Sampling	7 kHz – 48 kHz
	Wavetable Syntheses (software)	Yes – GM and FM Midi Support, Direct Music and Down Loadable Soundset (4 Meg DLS Level 1 and 2 Support)
	3D Positional Sound	No
	Digital Audio	Yes
	Analog Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	3W
	Internal Speaker	Yes
	Hardware Equalizer for Internal Speaker	Fixed 7 Band ParametricEQ
	External Speaker Jack (Line-Out)	Yes
Sound Blaster X-Fi XtremeMusic Audio Card (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

Technical Specifications - Audio

ASIO 2.0 support	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz 24-bit/48kHz and 24-bit/96kHz with direct monitoring	
Enhanced SoundFont support	up to 24-bit resolution 24-bit/96kHz	
DACs	24-bit/192kHz	
Voice Support	128 voices	
Max. Channels in 3D Positional Audio	7.1	
EAX® ADVANCED HD™ 5.0 support	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™	
Connectors	FlexiJack (Performing a 3-in-1 function, Digital In / Line In / Microphone) via 3.50 mm minijack Line level out (Front / Rear / Center / Subwoofer / Rear Center) via 3.50 mm minijacks AUX_IN line-level analog input via 4-pin Molex connector on card One AD_Link (26 pin) connector for linking to the X-Fi I/O Console (upgrade option)	
Dimensions	7.25" x5" x .9" (x x)	
Additional product features	**Movies**	THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback
	Music	X-Fi 24-bit Crystalizer CMSS-3D SuperRip
	Audio Creation	Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI
	Gaming	EAX ADVANCED HD 5.0
	Software Bundle	Doom 3 Sound Blaster EAX patch Entertainment Mode Audio Creation Mode Game Mode Mode Switcher Audio Console Creative MediaSource Creative MediaSource DVD-Audio Player DTS Neo:6 Settings Karaoke Player Entertainment Center Smart Recorder SoundFont Bank Manager Speaker Connection Wizard THX Setup Console Vienna SoundFont Studio Volume Panel WaveStudio

		Console Launcher Creative Media Toolbox Creative Diagnostics
Minimum system requirements	**System RAM**	256 MB
	Hard disk	600MB free space Available PCI 2.1 slot for the audio card CD-ROM/CD-RW or CD/DVD-ROM required for software installation
	Operating System	Microsoft Windows XP Service Pack 2 (SP2)

Technical Specifications - Communications

Integrated NVIDIA LAN-on-Motherboard	**Connector**	RJ-45
	Controller	NVIDIA Gigabit Controller with Marvell PHY
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3-2000
	Bus architecture	Integrated plus RGMII interface
	Data transfer mode	DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	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 NT® 4.0, Microsoft Windows 98, Microsoft Windows 2000, Microsoft Windows XP, Linux 2.2, Linux 2.4
	Management capabilities	WOL, PXE and NVIDA control console

Broadcom 5751 Netxtreme Gigabit PCIe NIC (model EA833AA)	**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 802.1P, 802.1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E
	Data path width	Single channel, PCI-E
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	3.1 watts @ +3.3V AUX supply with 5V tolerance
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
		100BASE-TX (half-duplex) 100 Mbps
		100BASE-TX (full-duplex) 200 Mbps
		1000BASE-T (full-duplex) 2000 Mbps
	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 in (11.2 x 5.5 x .2 cm)
	Operating system driver support	Microsoft Windows XP, Linux 2.2, Linux 2.4, and Red Hat Linux 7.2

Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility
Alerting	N/A
Kit contents	Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement

Technical Specifications - Controllers

LSI Logic LSI53C1030 Ultra320 SCSI Onboard Controller	**Bus architecture**	PCI-X
	Number of supported devices	5 internal SCSI devices
	Interface protocol	64 bit, 100 MHz PCI-X
	Host bus transfer rate	Up to 800 MB/s
	SCSI data transfer rate	Up to 640 MB/s
	SCSI Bus	Wide Ultra320, Low Voltage Differential, and Ultra Wide Single-Ended
	Internal connector	68-pin HD
	External connector	68 pin VHDCI
	Total connectors	2
	Plug and Play Support	No
	Dimensions (H x L)	NA
	Operating system support	Microsoft Windows XP
	Kit contents	NA

U320 SCSI Controller - LSI 20320AR RAID 0,1 including external connector (required with SCSI HDDs)	**Bus architecture**	PCI-X (backward compatible with PCI)
	Number of supported devices	Up to 15 SCSI devices
	Interface protocol	64 bit, 133MHz PCI-X
	Host bus transfer rate	Up to 1MB/s
	SCSI data transfer rate	Up to 320 MB/s per channel
	SCSI Bus	Wide Ultra320, Low Voltage Differential, and Ultra Wide Single-Ended
	Internal connector	68-pin HD
	External connector	68 pin
	Total connectors	2
	Plug and Play Support	No
	Dimensions (H x L)	6.6 x 2.5 in (16.9 x 6.4 cm)
	Approvals	CE, VCCI, Canada, C-Tick, FCC class B, UL 94VO
	Operating system support	Microsoft Windows XP Professional Windows XP Professional x64 Edition
	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 in (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.

Technical Specifications - Hard Drives

Serial ATA 3.0-Gb/s Hard Drives	**500 GB**	**Capacity**	500,107,862,016 bytes	
		Height	1.0 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	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)	
	250 GB	**Capacity**	250,059,350,016 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	8 Mbytes	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
			Average	8.5 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)	

Technical Specifications - Hard Drives

160 GB	**Capacity**	163,928,604,672 bytes	
	Height	1.0 in (2.54 cm)	
	Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Buffer	8 Mbytes	
	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	320,173,056	
	Operating Temperature	41° to 131° F (5° to 55° C)	
80 GB	**Capacity**	80,026,361,856 bytes	
	Height	1.0 in (2.54 cm)	
	Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Buffer	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)	

Technical Specifications - Hard Drives

Serial ATA 1.5-Gb/s Hard Drives (10,000 rpm)	**74 GB**	**Capacity**	74,355,769,344 bytes	
		Height	1.0 in (2.54 mm)	
		Width	Media diameter: 3.3 in (84mm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA	
		Synchronous Transfer Rate (Maximum)	150 MB/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
			Average	4.5 ms
			Full-Stroke	10.2 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	145,226,112	
		Operating Temperature	41° to 140° F (5 to 60° C)	
Ultra320 SCSI Hard Drives (10,000 rpm)	**73 GB**	**Capacity**	73,407,865,856 bytes	
		Height	1.0 in (2.54 cm)	
		Width	3.5 in (8.9 cm)	
		Interface	68 pin LVD SCSI	
		Synchronous Transfer Rate (Maximum)	320 MB/s	
		Buffer	8 Mbytes	
		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	143,374,738	
		Operating Temperature	40° to 130° F (5° to 55° C)	

Technical Specifications - Hard Drives

146 GB	**Capacity**	146,815,737,856 bytes	
	Height	1.0 in (2.54 cm)	
	Width	3.5 in (8.9 cm)	
	Interface	68 pin LVD SCSI	
	Synchronous Transfer Rate (Maximum)	320 MB/s	
	Buffer	8 Mbytes	
	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	
	Operating Temperature	40° to 130° F (5° to 55° C)	
300 GB	**Capacity**	300,000,000,000 bytes	
	Height	1.0 in (2.54 cm)	
	Width	3.5 in (8.9 cm)	
	Interface	68 pin LVD SCSI	
	Synchronous Transfer Rate (Maximum)	320 MB/s	
	Buffer	8 Mbytes	
	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	585,937,500	
	Operating Temperature	40° to 130° F (5° to 55° C)	

Technical Specifications - Hard Drives

Ultra320 SCSI Hard Drives (15,000 rpm)	**36 GB**	**Capacity**	36,420,075,520 bytes	
		Height	1.0 in (2.54 cm)	
		Width	3.5 in (8.9 cm)	
		Interface	68 pin LVD SCSI	
		Synchronous Transfer Rate (Maximum)	320 MB/s	
		Buffer	8 Mbytes	
		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	15,000 rpm	
		Logical Blocks	71,132,960	
		Operating Temperature	40° to 130°F (5° to 55°C)	
	73 GB	**Capacity**	73,407,865,856 bytes	
		Height	1.0 in (2.54 cm)	
		Width	3.5 in (8.9 cm)	
		Interface	68 pin LVD SCSI	
		Synchronous Transfer Rate (Maximum)	320 MB/s	
		Buffer	8 Mbytes	
		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	15,000 rpm	
		Logical Blocks	143,374,738	
		Operating Temperature	40° to 130°F (5° to 55° C)	
	146 GB	**Capacity**	146,815,737,856 bytes	
		Height	1.0 in (2.5 cm)	
		Width	3.5 in (8.9 cm)	
		Interface	68 pin LVD SCSI	
		Synchronous Transfer Rate (Maximum)	320 MB/s	
		Buffer	8 Mbytes	
		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	15,000 rpm	
		Logical Blocks	143,374,738	
		Operating Temperature	40° to 130°F (5° to 55°C)	

Technical Specifications - Removable Storage

USB Disk on Key	**Dimensions** (HxWxD)	0.9 x 0.7 x 3.9 in (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	256 MB

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 in (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 ft (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 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Operating system support	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux Workstation 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 USB Smart Card Keyboard (ED707AA)	**Physical characteristics**	**Keys**	104, 105, 106, 107, 109 layout (depending upon country
		Form factor	USB basic Smart Card keyboard

Technical Specifications - Input/Output Devices

	Colors	Carbonite/Silver
	Dimensions (L x W x H)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	**Operating voltage**	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	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**	30+ 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 ft (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 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence

SMARTCARD function	**Support**	All ISO 7816 smart cards	
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)	
	Chipset	SCM STCII	
	Standard APIs supported	PC/SC, EMV2000, SET	
	Power	USB Port	
		Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
		Supports 3-V and 5-V cards	
	Power consumption	250-mA maximum draw (50 mA for the keyboard with three LEDs ON and 200-mA maximum startup current using a high-current, 60-mA smart card)	
	Communication	**From card**	Programmable from 9,600 baud to 115,200 baud
		From computer	Up to 38,400 baud
	Landing mechanism	**Contact device**	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	USB communications through USB port	
		SCM protocol	
		Automatic card insertion/removal detection	
	Reader performance interface	USB connection	
	Electro-magnetic standards	**Europe**	89/336/CEE guideline
		USA	USAFCC part 15
Operating system support	Microsoft® Windows® 2000, Windows XP Home, Windows XP Professional, xpe, ce.net, Linux, XP-64		
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, JITC, EMV2000, USB-IF		
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, TUVGS		
Kit contents	Keyboard, I/O Security and Documentation CD, , warranty card		
Smart card compatibility	**HP**	HP ProtectTools Smart Card	
	American Express	Amex Blue	

Axalto (Schlumberger)	Cryptoflex 8K Cryptoflex 16K Cryptoflex 32K Cryptoflex 32K e-gate Cyberflex Access 64K Cyberflex Access 32K Cyberflex 32K e-gate Cyberflex 64K Cyberflex Palmera Payflex-S Payflex 1K Payflex 2K Payflex 4K Payflex 8K Prismera US DoD CAC
Cardlogix	CLXSU004KK4 CLXSU008KK5
Datakey	Model 300 Model 330
De La Rue	VisaCash
Gemplus	Gem Expresso GKK32K Gemclub Memo GemClub Micro GemXplore GemSafe
Infineon	SLE66C322P
SafLink (Litronic)	Forte
Sharp	Java Card
Oberthur	CosmopollIC v4 CosmopollIC v4.1 Cosmo ID-One GalatIIC v2.1 US DoD CAC
Memory Cards	
Atmel	AT24C01ASC AT24C02SC AT24C04SC AT24C08SC AT24C16SC AT24C32SC AT24C64SC AT24C128SC AT24C256SC AT24C512SC AT88SC153 AT88SC1608
Axalto (Schlumberger)	PrimeFlex Store 8K PrimeFlex Store 2K

	nfineon	SLE4406 SLE4406E SLE4406E SE SLE4418 SLE4428 SLE4432 SLE4436E SLE4442 SLE5536
	ISSI	IS23SC4418 IS23SC4428
	ST	14C02
	Telefonkarte	SLE4406 SLE4436 SLE5536
	XICOR	X24026

HP PS/2 Scroll Mouse	**Dimensions**	3.8 x 6.3 x 11.6 cm (1.5 x 2.5 x 4.6 in)	
	Weight	4.44 oz (126 g)	
	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
		Drop (out-of-box)	26 in (66 cm) on carpet, 6-drop sequence
		Drop (out-of-box)	1 m on asphalt tile over concrete, 6-drop sequence
	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	65 g nominal peak force
		Switch life	1,000,000 operations (using Hasco modified tester)
		Switch type	Low force micro-switches
		Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
		Cable length	6 ft (1.8 m)
		Microsoft PC99 - 2001	Mechanically compliant
	Scroll wheel	**Width**	8 mm
		Diameter	0.99 in (25.2 mm)
		Maximum rotation speed	30 mm/s
		Switch type	Light force micro-switch
		Switch life	1 million operations
		Mechanical life	Minimum 200,000 revolutions
	Regulatory approvals	**Compliant**	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
	Compatibility	**Operating system support**	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux Workstation 3 and 4

HP 2-button Optical Scroll Mouse (USB)	**Dimensions** (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
	Weight	0.27 lb (0.12 kg)
	Cable length	72.8 in (185 cm)
	System requirements	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux Workstation 3 and 4

Technical Specifications - Input/Output Devices

HP Optical 3-Button Mouse (USB)	**Dimensions/Weight**	**Height**	1.5 in (3.76 cm)
		Length	4.5 in (11.56 cm)
		Width	2.4 in (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 ft (2.9 m)

HP SpacePilot 3D USB Intelligent Controller (model EF390AA)	**Physical Characteristics**	**Dimensions** (L x W x H)	9.3 x 5.6 x 2.0 in (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) 4.1 x 1.2 in (102 x 30 mm)
		Active Area	(W x H) 3.9 x 1.0 in (98 x 26 mm)
		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
	System Requirements	Intel Pentium 4 or AMD Athlon processor based system	
		20 megabytes free disk space for driver and plug-in installation (CD-ROM device required)	
		USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows 2000 and XP	
	Regulatory Approvals	FCC, CE	

Technical Specifications - Input/Output Devices

HP SpaceMouse Plus USB (Windows XP only)	**Physical characteristics**	**Dimensions** (H x W x D)	7.4 x 4.72 x 1.73 in (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**	USB 1.1 or greater
		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	
Spaceball 5000 USB (Windows XP only)	**Physical characteristics**	**Dimensions** (H x W x D)	3.0 x 6.0 x 8.4 in (7.6 x 15.2 x 21.3 cm)
		Ball Diameter	2.2 in (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 ft. (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	

48X CD-ROM Drive	**Form Factor**	5.25-in, half-height, tray load	
	Mounting Orientation	Horizontal or vertical	
	Interface	ATAPI/EIDE	
	Dimensions (HxWxD)	1.63 x 5.83 x 7.27 in (4.13 x 14.6 x 18.5 cm)	
	Weight	1.76 lb (0.8 kg)	
	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	**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
	Access Times (typical reads, including settling)	**CD-ROM Mode 1**	< 125 ms
		Full Stroke CD	< 210 ms
		Start-up Time (typical)	< 7 s (single session), < 30 s (multi-session)
		Stop Time (typical)	< 4 s
		Write Buffer Size	128 KB (minimum)
		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)
	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	
	Operating Conditions (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Humidity	10% to 80%

	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 Enterprise Linux Workstation 3
	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] in (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

Technical Specifications - Optical Devices

	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	**Form Factor**	5.25-inch, half-height, tray-load	
	Mounting Orientation	Horizontal or vertical	
	Interface	ATAPI/EIDE	
	Dimensions (HxWxD)	1.63 x 5.75 x 7.27 [max] in (4.13 x 14.6 x 18.5 [max] cm) (external, excluding bezel)	
	Weight (max)	2.0 lb (0.9 kg)	

Technical Specifications - Optical Devices

Read Only Disc Parameters	**Data Transfer Rates - Read**	**Digital audio extraction** (minimum) - 1,800 KB/s (12X)
		CD read - up to 7,200 KB/s (48X)
	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
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)	**CD-ROM Mode 1**	< 125 ms
	Full Stroke CD	< 210 ms
	Start-up Time (typical)	< 7 s (single session), < 30 s (multi-session)
	Stop Time (typical)	< 4 s
	Write Buffer Size	2 MB
	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 2 (33.3 MB/s)

Technical Specifications - Optical Devices

	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	
	Operating Conditions	**Temperature**	41° to 122° F (5° to 50° C)
		Humidity	10% to 90%10% to 90%
	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 Enterprise Linux Workstation 3	
	Supplied Software (for Windows XP)	Roxio Digital Media Plus: Create or copy CDs and DVDs, including music and data CDs, and data DVDs	
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] in (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

Technical Specifications - Optical Devices

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	

16X DVD+/-RW, Dual-Layer, with LightScribe	**Form Factor**	5.25-inch, half-height, tray-load
	Orientation	Horizontal or vertical

Technical Specifications - Optical Devices

Direct Disc Labeling			
	Interface	ATAPI/EIDE	
	Dimensions (HxWxD)	5.9 x 1.7 x 7.9 in (15.0 x 4.4 x 20.0 cm)	
	Weight (maximum)	2.6 lb (1.2 kg)	
	Read Only Disc Parameters	**Data Transfer Rates - Read**	**DVD-ROM, DVD-video read -** 5-16X (6750 - 21,600 KB/s CAV)
			DVD-video playback, DVD+R, DVD+RW, DVD-R, DVD-RW - 4-8X (5400 - 10,800 KB/s CAV)
			CD-audio playback - 8x (1200 KB/s CLV)
			Digital audio extraction (minimum) **-** 12X (1,800 KB/s CAV)
			CD-ROM, CD-R, CD-RW, CD-Audio read - 16-40X (2400 to 6000 KB/s CAV)
		Media and Formats - Read	**CD Media:** stamped; CD-R; CD-RW (supports AM2) (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, UDF (1.02 and 1.50)
			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), 14.1 GB (DVD-14), 17.0 GB (DVD-18), 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), 1.46 GB (DVD+R, 8cm), 1.46 GB (DVD+RW, 8cm)
			DVD Formats: DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0 (including multi-border); DVD-RW version 1.0 and 1.1; DVD+R version 1.3 (including multi-session); DVD+R DL version 1.0; DVD+RW version 1.2

Writeable Disc Parameters	**Data Transfer Rates - Write**	**CD-R write** - 16-40X (2400-6000 KB/s CAV)
		CD-RW write - 4X (600 KB/s CLV)
		CD-RW write (high speed) **-** 10X (1500 KB/s CLV)
		CD-RW write (ultra high speed) **-** 16-24X (2400-3600 KB/s ZCLV)
		DVD+R - 6-16X (8100-21,600 KB/s CAV), 8x (10,800 KB/s ZCLV), 2.4-4x (3250-5400 KB/s CLV)
		DVD+R DL - 2.4 (3250 KB/s CLV)
		DVD+RW - 2.4-4X (3250-5400 KB/s CLV)
		DVD-R - 2-4X (2700-5400 KB/s CLV), 8X (10,800 KB/s ZCLV)
		DVD-RW - 2-4X (2700-5400 KB/s CLV)
	Media and Formats - Write	**CD Media:** CD-R (OBII Vol2.0 Rev 1.2), CD-RW (LS, HS, US)
		CD Capacities: 180 MB (mode 1, 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, UDF (1.02 and 1.50)
		DVD Media: DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-RW
		DVD Capacities: 4.7 GB (DVD-5), 8.54 GB (DVD-9), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.1), 4.7 GB (DVD+RW version 1.3), 4.7G (DVD+R version 1.2)), 1.46 GB (DVD+R, 8cm), 1.46 GB (DVD+RW, 8cm)
		DVD Formats: DVD-R version 1.0 and 2.0 (including multi-border); DVD-RW version 1.0 and 1.1; DVD+R version 1.3 (including multi-session); DVD+R DL version 1.0; DVD+RW version 1.2
	Write Methods	Disc-at-once, session-at-once, track-at-once, incremental fixed and variable packet, multi-session

Technical Specifications - Optical Devices

LightScribe Direct Disc Labeling Parameters	**Media Supported**	**CD-R:** LightScribe Version 1.0
		DVD+R: LightScribe Version 1.0
	Resolution	**Dots per inch:** 600
		Tracks per inch: 500-1600 (mode dependent)
	Labeling Times	**Draft quality:** < 20 min
		Normal quality: < 28 min
		Best quality: < 36 min
Access Times (typical reads, including settling)	**Random DVD**	< 130 ms (typical)
	Random CD	< 120 ms (typical)
	Full Stroke DVD	< 240 ms
	Full Stroke CD	< 200 ms
	Startup Time (single)	< 7 seconds (typical)
	Startup Time (multi-session)	< 30 seconds (typical)
	Stop Time (typical)	< 4 s
	Cache Buffer	2 MB
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s) (default on most HP xw series workstations)
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
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-4 compliant, 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), relevant parts of IEC 61000-4.	
Operating Systems Supported	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition Red Hat Linux 7.3 WS3 and WS4 Versions (LightScribe labeling functionality not supported on Linux)	

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 Roxio MyDVD for DVD authoring **NOTE:** LightScribe Direct Disc Labeling is supported only on 32-bit Windows XP in the launch timeframe for the xw4300. Support for Windows XP Professional x64 Edition is anticipated to be available some time after the launch, and will require software updates. There is no support for LightScribe labeling under Linux. The drive will operate as a DVD writer under these other operating systems, but will not be available in software applications as a LightScribe "printer".

NOTE: This DVD writer kit does not include any software for burning DVDs on Linux. DVD burning is supported with the 'growisofs' command. CD burning is supported with the 'cdrecord' command. Red Hat Enterprise Linux WS 3 distribution includes both 'cdrecord' and 'growisofs'. Red Hat Linux 8, 9.0 distributions only include 'cdrecord'. Therefore DVD burning is only supported on WS 3.

NVIDIA Quadro NVS 285 with TurboCache Technology PCIe Graphics	**Form Factor**	NVIDIA Quadro NVS 285 with TurboCache Technology 128MB PCIe Dual Head 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 DDR (64 MB local frame buffer plus 64 MB of shared system memory via TurboCache technology) **NOTE:** The graphics card uses part of the total system memory (RAM) for graphics performance. System memory dedicated to graphics performance is not available for other use by other programs.
	Connectors	DMS-59 to dual-DVI Y-cable or dual-VGA Y-cable
	Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
	Overlay planes	One 16-bit Video overlay plane
	Multi-monitor support	Dual analog or digital monitors
	Maximum pixel clock	350 MHz
	RAMDAC	Dual 350 MHz (integrated)
	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

NVIDIA Quadro FX 540 PCI-Express Graphics Card	**Form Factor**	ATX, 4.376" x 7.0" Single slot
	Graphics Controller	NVIDIA NV43GL
	Bus Type	PCI-Express x16, <75W power consumption
	RAMDAC	Dual 400 MHz integrated
	Memory	128 MB 275 MHz DDR SDRAM unified frame buffer, Z-buffer and Texture storage 8.8 GB/sec graphics memory bandwidth
	Connectors	DVI-I + VGA + 10-pin HDTV Out (HD cable purchased separately)
	Multi-monitor support	Integrated analog display controller supporting a single analog display at 2048x1536 @ 75Hz, one digital display at 1600x1200 @ 60Hz.

Technical Specifications - Graphics

	Additional product features	128 KB BIOS 3.3V Flash ROM reprogrammable by SW Hardware accelerated Overlay Planes Hardware accelerated two-sided lighting Hardware accelerated antialiased points and lines 3D Volumetric Texture support Hardware accelerated Occlusion Culling Compliant with Microsoft/Intel PC2001 Workstation requirements Video Timings compliant with VESA DMT 1.0 and VESA GTF 1.0 specifications DDC2B+ Monitor support on all OS platforms ACPI Version 1.0b Power Management support (all modes)
	Shading architecture	Fully programmable GPU (OpenGL1.5/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 Optimized compilers for Cg, OpenGL shading language, and Microsoft HLSL
	Supported graphics APIs	OpenGL 1.5 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
	Available graphics drivers	HP-tested: Microsoft Windows XP, Windows 2000, and Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	DVI-I output - drives digital display at resolutions up to 1600x1200 @ 60Hz Internal 400MHz RAMDACs – drives dual analog display up to 2048x1536 @ 75Hz each
NVIDIA Quadro FX 1400 PCI-Express Graphics Controller	**Form Factor**	ATX, 4.376" x 8.5" Single slot
	Graphics Controller	NVIDIA NV41GL
	Bus Type	PCI-Express x16, <75W power consumption
	RAMDAC	Dual 400 MHz integrated
	Memory	128 MB 300 MHz DDR SDRAM unified frame buffer, Z-buffer and Texture storage 19.2 GB/s graphics memory bandwidth
	Connectors	2 DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output
	Multi-monitor support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays.

Technical Specifications - Graphics

	Additional product features	128 KB BIOS 3.3V Flash ROM reprogrammable by SW Hardware accelerated Overlay Planes Hardware accelerated two-sided lighting Hardware accelerated antialiased points and lines Quad-buffered Stereo 3D Volumetric Texture support Hardware accelerated Occlusion Culling Scalable Link Interface (SLI) technology Compliant with Microsoft/Intel PC2001 Workstation requirements Video Timings compliant with VESA DMT 1.0 and VESA GTF 1.0 specifications DDC2B+ Monitor support on all OS platforms ACPI Version 1.0b Power Management support (all modes)
	Shading architecture	Fully programmable GPU (OpenGL1.5/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 Optimized compilers for Cg, OpenGL shading language, and Microsoft HLSL
	Supported graphics APIs	OpenGL 1.5 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
	Available graphics drivers	HP-tested: Microsoft Windows XP, Windows 2000 and Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	Dual DVI-I output – drives dual digital displays at resolutions up to 1900x1200 @ 60Hz Internal 400MHz RAMDACs – drives dual analog displays up to 2048x1536 @ 85Hz each
NVIDIA Quadro FX 3450 Graphics Controller	**Form Factor**	ATX
	Graphics Controller	NVIDIA Quadro FX 3450 Workstation GPU
	Bus Type	PCI-Express x16
	Memory	256 MB 450 MHz GDDR3 SDRAM unified graphics memory
	Connectors	2 DVI-I (one dual-link/one single-link) analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	Multi-Monitor Support	Dual integrated display controllers supporting up to two analog displays at 2048 x 1536 @ 75 Hz on both displays or dual digital displays at 1920 x 1200 (single-link) and 3840 x 2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows

Technical Specifications - Graphics

	Architecture Features	256-bit memory interface 128-bit IEEE floating-point color precision 12-bit sub-pixel 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 and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling OpenGL Quad-buffered stereo
	Shading Architecture	Fully programmable GPU (OpenGL 2.0/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) 8x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
	Display Resolution Support	Dual Link DVI- I output-drives digital displays at resolutions up to 3840 x 2400 @ 24 Hz Single Link DVI-I output drives digital displays at resolutions up to 1920 x 1200 @ 75 Hz Internal 400 MHz DACs - Two analog displays up to 2048 x 1536 @ 75 Hz each
	nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
	Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
	Available Graphics Drivers	Microsoft Windows XP, 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 Graphics Controller	**Graphics Controller**	NVIDIA Quadro FX 4500 Workstation GPU
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated

Technical Specifications - Graphics

Memory	512 MB GDDR3 SDRAM unified graphics memory
Form Factor	ATX
Connectors	2 DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
Multi-Monitor Support	Dual integrated display controllers supporting up to 2048 x 1536 @ 75 Hz (analog) or 3840 x 2400 @ 41 Hz (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 1920 x 1200
Display Resolution Support	Dual Dual Link DVI- I output-drives digital displays at resolutions up to 3840 x 2400 @ 41 Hz Internal 400 MHz DACs - Two analog displays up to 2048 x 1536 @ 75 Hz each
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c

Available Graphics drivers	Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html

Technical Specifications - Monitors

HP L1755 Flat Panel Monitor	**Panel**	**Type**	Active matrix, thin film transistor (TFT)
		Viewable Image Area (diagonal)	17 in (43.2 cm) maximum viewable
		Screen Opening (WxH)	13.4 x 10.7 in (33.9 x 27.2 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)	25 ms (typical rise + fall)
		Pixel Pitch	0.264 mm
	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 in (2.0 m)
	Signal Interface/ Performance	**Horizontal Frequency**	30 to 82 kHz
		Vertical Frequency	56 to 75 Hz
		Native Resolution	1280 x 1024 @ 60 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 W
	Off Mode	0 watts (when master power switch is in the off position)
	Power Cable Length	70 in (1.8 m); non-captive

Technical Specifications - Monitors

Mechanical	**Dimensions** (H x W x D)	**Unpacked with stand**	16.1 (minimum) to 21.2 (maximum) x 14.4 x 8.3 in (40.9 (minimum) to 42.2 (maximum) x 36.5 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)	11.8 x 14.4 x 2.9 in (30.1 x 40.9 x 7.3 cm)
	Weight	**Unpacked with stand**	14.7 lb (6.7 kg)
		Unpacked without stand	8.1 lb (3.7 kg)
		Packaged	20.2 lb (9.2 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 ft (0 to 4,000 m)	
	Altitude – Non-operating	0 to 40,000 ft (0 to 12,192 m)	
Options	**HP Desktop Access Center – Part number: DK985A**	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. For more information, refer to the HP Desktop Access Center QuickSpec document.	
	HP Flat Panel Speaker Bar – Part number: PF804AA	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. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec document.	

	HP Compaq 7000 Series Ultra-slim Desktop Integrated Work Center Stand – Part number: DL641B	Allows mounting of a 15-, 17- or 19-inch HP flat panel monitor and an HP Compaq dc7100 Ultra-slim Desktop PC on a single stand for the convenience of an "all-in-one" form factor. Sold separately. For more information, refer to this product's QuickSpec document
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, Latin America Spanish, Brazilian Portuguese, Danish, Dutch, Finnish, French, German, Italian, Norwegian, Swedish, Greek, Polish, Russian, Slovenian, Turkish, Simplified Chinese, Traditional Chinese, Korean, and Japanese
	Warranty Languages	English, Canadian French, Latin America Spanish, Brazilian Portuguese, Danish, Dutch, Finnish, French, German, Italian, Norwegian, Spanish, Swedish, Bahasa Indonesian, Simplified Chinese, Traditional Chinese, and Korean
	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 CCC 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 L1755 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 L1955 Flat Panel Monitor	**Panel**	**Type**	Active matrix, thin film transistor (TFT)
		Viewable Image Area (diagonal)	19 in (48.25 cm) maximum viewable
		Screen Opening (WxH)	14.9 x 12.0 in (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
	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 in (2.0 m)

Technical Specifications - Monitors

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

Technical Specifications - Monitors

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 in (1.8 m); non-captive	
Mechanical	**Dimensions** (H x W x D)	**Unpacked with stand**	16.8 (minimum) to 22.3 (maximum) x 15.9 x 8.3 in (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 ft (0 to 4,000 m)	
	Altitude – Non-operating	0 to 40,000 ft (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	

Technical Specifications - Monitors

	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 L2035	**Panel**	**Type**	20-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	20.1 in (51 cm)
		Screen Opening (W x H)	16.2 x 12.17 in (41.1 x 30.9 cm)
		Viewing Angle (typical)*	Up to 170° H/170° V (10:1 minimum contrast ratio)
		Brightness (typical*	Up to 250 nits (cd/m^2)
		Contrast Ratio (typical)*	Up to 400:1
		Response Rate (typical)*	16 ms (typical, rise + fall)
		Pixel Pitch	0.255 mm
		*All specifications are provided by the component manufacturers. Performance specifications represent the highest specification of all HP's component manufacturers' typical level specifications for performance. Actual performance may vary either higher or lower.	
	On Screen Display (OSD) **Controls**	**Buttons or Switches**	PiP (Picture in Picture), Input select, auto adjust, OSD up, OSD down, OSD menu select, power
		Languages	English, French, German, Spanish, Italian
		User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, video picture-in-picture (size and position), input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset

Technical Specifications - Monitors

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)
	Graphics Controller	Pixelworks PW171
	Native Resolution	1600 x 1200 @ 60 Hz (recommended)
	Preset VESA Graphic Modes (non-interlaced)	1600 x 1200 @ 60 Hz, 75 Hz (VGA input)
		1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz
		1280 x 960 @ 60 Hz
		1152 x 900 @ 66 Hz
		1024 x 768 @ 60 Hz, 75 Hz, 85 Hz
		800 x 600 @ 60 Hz, 85 Hz
		640 x 480 @ 60 Hz, 75 Hz, 85 Hz
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 10
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
Video Input	**Plug and Play**	Yes
	Input Signal	Four connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, and one s-video
	Input Impedance	75 ohms ± 10%
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	Video Cable	VGA to VGA; VGA to DVI-I; DVI-D to DVI-I
	Video Cable Length	5.9 ft (1.8 m)
Power	**Input Power**	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	Frequency	47.5 to 63 Hz
	Maximum	< 75 W
	Power Saving	< 5 W
	Power Cable Length	5.9 ft (1.8 m)

Technical Specifications - Monitors

Mechanical	**Dimensions** (H x W x D)	**Unpacked with stand**	17.36 to 20.9 x 17.8 x 8.27 in (44.1 to 53.1 x 45.2 x 21.0 cm)
		Unpacked without stand (head only)	14.29 x 17.8 x 3.19 in (36.3 x 45.2 x 8.1 cm)
		Packaged	11.5 x 21.9 x 23.9 in (29.2 x 55.6 x 60.6 cm)
	Weight	**Unpacked**	With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)
		Packaged	26.9 lb (12.2 kg)
	Tilt Range	-5° to + 25° vertical	
	Swivel Range	-35° to + 35°	
	Height Adjustable	Yes, range 3.54 in (9.0 cm)	
	Pivot Rotation	Yes	
	Base	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 ft (+3,657.6 m)	
	Altitude – Non-operating	+40,000 ft (+12,192 m)	
Options	**HP Desktop Access Center**	Sold separately, the HP 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; part number DK985A. For more information, refer to the HP Desktop Access Center QuickSpecs.	

Technical Specifications - Monitors

	Other	**Accessories Included**	VGA to VGA cable – connects the graphic card's VGA analog connector to the monitor's input #1 (VGA analog) connector 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-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #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
		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
	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, Windows Certification (Microsoft® Windows® 98, Microsoft Windows 2000, and Microsoft Windows XP) * Energy Star Compliant available summer 2004.	
	Compatibility	Compatible with platforms using the VESA standard video modes and HP Compaq Business Desktops d500, d300, and d200 Series, Compaq Evo Desktops, and HP Workstations	
	Service and Warranty	Limited three years parts, labor, and on-site service, including backlight. Availability varies by region. Certain restrictions and exclusions apply. Consult HP Customer Service for details.	
HP Flat Panel Monitor LP2065	**Panel**	**Type**	20-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	20.1 in (51 cm)
		Screen Opening (W x H)	16.2 x 12.17 in (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
	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 ft (1.8 m)	
Power	**Input Power**	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	55 watts (without USB ports); 70 watts (USB ports fully loaded)	
	Maximum	< 75 W	
	Power Saving	< 2 watts	
	Power Cable Length	5.9 ft (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 in (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 ft (+3,657.6 m)
	Altitude – Non-operating	+40,000 ft (+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 L2335	**Panel**	**Type**	23-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	23 in (58.4 cm)
		Screen Opening (W x H)	19.53 x 12.24 in (49.6 x 31.1 cm)
		Viewing Angle (typical)*	Up to 170° H/170° V (10:1 minimum contrast ratio)
		Brightness (typical)*	Up to 250 nits (cd/m^2)
		Contrast Ratio (typical)*	Up to 500:1
		Response Rate (typical)*	16 ms (typical, rise + fall)
		Pixel Pitch	0.258 mm
		* All specifications are provided by the component manufacturers. Performance specifications represent the highest specification of all HP's component manufacturers' typical level specifications for performance. Actual performance may vary either higher or lower.	
	On Screen Display (OSD) **Controls**	**Buttons or Switches**	PiP (Picture in Picture), Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
		Languages	English, French, German, Spanish, Italian
		User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, video picture-in-picture (size and position), input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset

Technical Specifications - Monitors

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)
	Graphics Controller	Pixelworks PW172
	Native Resolution	1920 x 1200 @ 60 Hz (recommended)
	Preset VESA Graphic Modes (non-interlaced)	1920 x 1200 @ 60Hz
		1600 x 1200 @ 60 Hz, 75 Hz
		1280 x 1024 @ 60 Hz, 75Hz, 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, 75Hz
		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, 10
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
Video Input	**Plug and Play**	Yes
	Input Signal	Five connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, one s-video, component video
	Input Impedance	75 ohms ± 10%
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	Video Cable	VGA to VGA; VGA to DVI-I; DVI-D to DVI-I
	Video Cable Length	5.9 ft (1.8 m)
Power	**Input Power**	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	Frequency	47.5 to 63 Hz
	Maximum	< 100 W
	Power Saving	< 5 W
	Power Cable Length	5.9 ft (1.8 m)

Technical Specifications - Monitors

Mechanical	**Dimensions** (H x W x D)	**Unpacked**	17.36 (min) to 20.9 (max) x 21.46 x 8.27 in (44.1 (min) to 53.1 (max) x 54.5 x 21.0 cm)
		Unpacked withou stand (head only)	14.57 x 21.46 x 3.35 in (37.0 x 54.5 x 8.5 cm)
		Packaged	11.5 x 25.75 x 23.86 in (29. 2 x 65.4 x 60.6 cm)
	Weight	**Unpacked**	22.27 lb (10.1 kg)
		Packaged	30.87 lb (14.0 kg)
	Tilt Range	-5° to + 25° vertical	
	Swivel Range	-35° to + 35°	
	Height Adjustable	Yes, range 3.54 in (9.0 cm)	
	Pivot Rotation	Yes	
	Base	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 ft (+3,657.6 m)	
	Altitude – Non-operating	+40,000 ft (+12,192 m)	
Options	**HP Desktop Access Center**	Sold separately, the HP 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; part number DK985A. For more information, refer to the HP Desktop Access Center QuickSpecs.	

Technical Specifications - Monitors

	Other	**Accessories Included**	VGA to VGA cable – connects the graphic card's VGA analog connector to the monitor's input #1 (VGA analog) connector 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-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #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
		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
	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, Windows Certification (Microsoft® Windows® 98, Microsoft Windows 2000, and Microsoft Windows XP). * Energy Star Compliant available summer 2004.	
	Compatibility	Compatible with platforms using the VESA standard video modes and HP Compaq Business Desktops d500, d300, and d200 Series, Compaq Evo Desktops, and HP Business Desktops d300 series.	
	Service and Warranty	Limited three years parts, labor, and on-site service, including backlight. Availability varies by region. Certain restrictions and exclusions apply. Consult HP Customer Service for details.	
HP Flat Panel Monitor LP2465	**Panel**	**Type**	24-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	24 in (60.96 cm)
		Screen Opening (W x H)	20.47 x 12.83 in (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
	Backlight Lamp Life (to half brightness)	50K hours
	*Response time 13 ms rise and fall, 6 ms gray to gray.	
On Screen Display (OSD) **Controls**	**Buttons or Switches**	Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
	Languages	English, French, German, Spanish, Italian, Japanese, Dutch
	User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset
Signal Interface/ Performance	**Horizontal Frequency**	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA and DVI input)
	Native Resolution	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
	Preset VESA Graphic Modes (non-interlaced)	1920 x 1200 @ 60 Hz 1600 x 1200 @ 60 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 75 Hz 640 x 480 @ 60 Hz, 75 Hz
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 20
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K

Technical Specifications - Monitors

Video/Other Inputs	**Plug and Play**	Yes	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)	
	Input Signal	Two DVI-I (VGA analog and digital) inputs	
	Input Impedance	75 ohms ± 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	VGA to DVI-I; DVI-D to DVI-D	
	Video Cable Length	5.9 ft (1.8 m)	
Power	**Input Power**	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	75 watts	
	Maximum	< 110 watts	
	Power Saving	< 2 watts	
	Power Cable Length	6.2 ft (1.9 m)	
Mechanical	**Dimensions** (H x W x D)	**Unpacked w/ stand**	14.6 (min) to 19.7 (max) x 22 x 9.1 in (37.1 (min) to 50.1 (max) x 55.4 x 23.2 cm)
		Unpacked w/o stand (head only)	14.4 x 22 x 3.7 in (36.6 x 55.84 x 9.2 cm)
		Packaged	11.7 x 22.1 x 25.6 in (29.8 x 56.0 x 65.1 cm)
	Weight	**Unpacked**	23.6 lbs (10.7 kg)
		Packaged	23.6 lbs (10.7 kg)
	Tilt Range	-5° to + 25° vertical	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 in (130 mm)	
	Pivot Rotation	Yes	
	Base	Detachable, ships detached	
Environmental	**Temperature – Operating**	46° to 95° F (10° to 35° C)	
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)	
	Humidity – Operating	20% to 80% non-condensing	
	Humidity – Non-operating	5% to 85%	
	Altitude – Operating	+12,000 ft (+3,657.6 m)	
	Altitude – Non-operating	+40,000 ft (+12,192 m)	
Other	**Accessories Included**	VGA to DVI-I cable **–** connects the graphic	

		card's VGA connector to the monitor's input #2 (DVI-I analog) connector DVI-D to DVI-D cable – connects the graphic card's DVI-D digital connector to the monitor's input #2 (DVI-I digital) connector
	Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese. HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite/silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Options	**HP Silver Flat Panel Speaker Bar - Part number: EE418AA**	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.

Technical Specifications - Monitors

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.