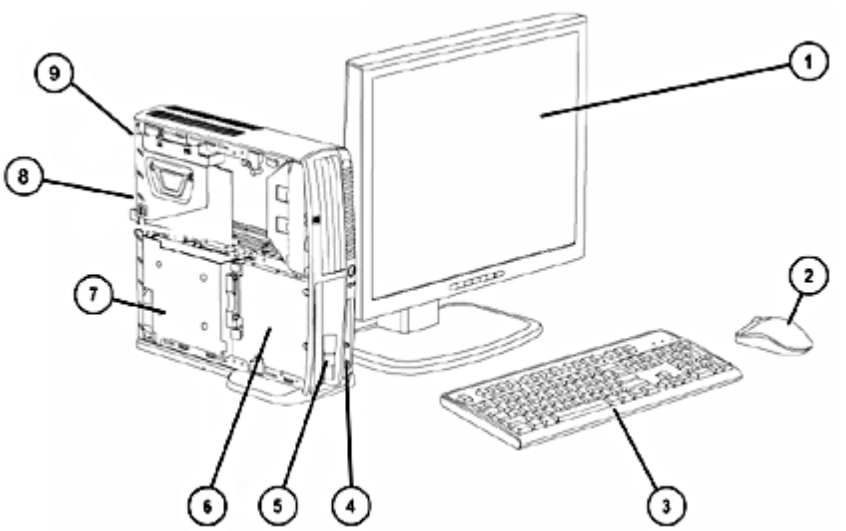
HP recommends
Windows Vista™ Business

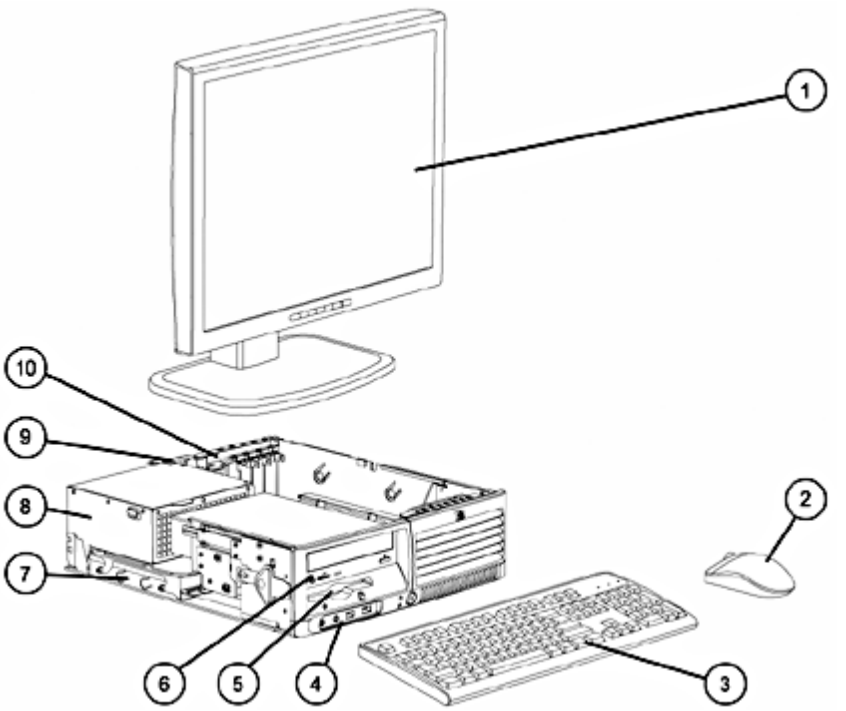
Ultra-slim Desktop



1. Monitor (sold separately)
2. 2-Button Scroll Mouse (PS/2 or USB)
3. HP Standard Keyboard (PS/2 or USB)
4. Front I/O: 2 USB 2.0, headphone and microphone
5. 1 MultiBay Drive Bay
6. 1 3.5" internal bay
7. 200-watt power supply with power harness cable incorporating 1 SATA device power connector
8. 1 full-height PCI slot (optional)
9. Rear I/O: 6 USB 2.0, 1 optional serial port (available via adapter), 1 optional parallel port (available via adapter), 1 optional DVI graphics port (available via DVI ADD2 adapter), 2 PS/2, 1 RJ-45, 1 VGA, audio in/out

Overview

Small Form Factor

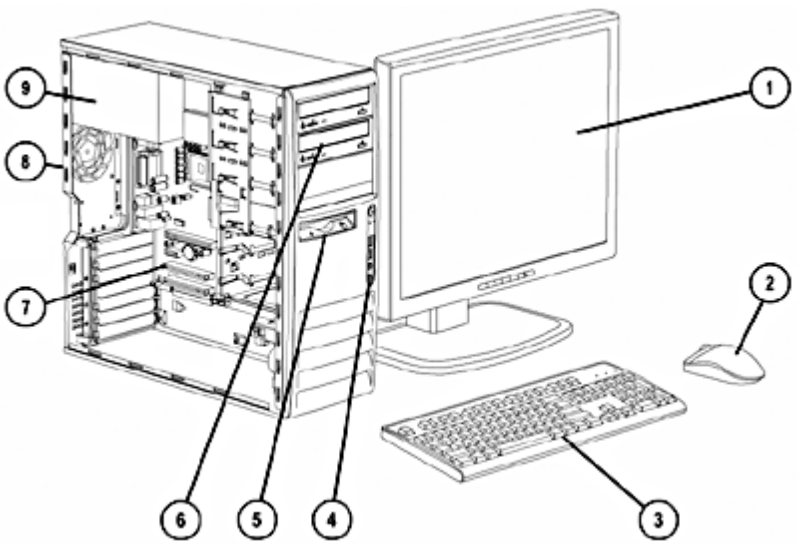


1. Monitor (sold separately)
2. 2-Button Scroll Mouse (PS/2 or USB)
3. HP Standard Keyboard (PS/2 or USB)
4. Front I/O: 2 USB 2.0, headphone and microphone
5. 1 3.5" external bay for optional diskette drive, HP 16-in-1 Media Card Reader, or other 3.5" device
6. 1 5.25" external bay for optional optical drive, or other 5.25" device (bay tilts up for device removal and insertion)
7. 1 3.5" internal bay
8. 240-watt power supply with power harness cable incorporating 2 SATA, 1 PATA and 1 FDD device power connectors
9. Rear I/O: 6 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, audio in/out
10. 2 low profile PCI slots, 1 low profile PCI Express x1 slot, 1 low profile PCI Express x16 slot standard*; 2 full-height PCI slots optional

*__NOTE:__ With riser card option, express x1 and x16 slots are inaccessible.

Overview

Convertible Minitower



1. Monitor (sold separately)
2. 2-Button Scroll Mouse (PS/2 or USB)
3. HP Standard Keyboard (PS/2 or USB)
4. Front I/O: 2 USB 2.0, headphone and microphone
5. 1 3.5" external bay for optional diskette drive, HP 16-in-1 Media Card Reader, or other 3.5" device
6. 3 5.25" external bays and 2 3.5" internal bays
7. 2 full-height PCI slots, 1 full-height PCI Express x1 slot, 1 full-height PCI Express x16 slot, 2 additional full-height PCI slots optional
8. Rear I/O: 6 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, audio in/out, mic in
9. 365-watt power supply with power harness cable incorporating 4 SATA, 3 PATA and 1 FDD device power connectors

*** NOTE**: HP supplied configuration with 5.25" PATA optical device provides 1 additional spare PATA device data-connector on ribbon cable.

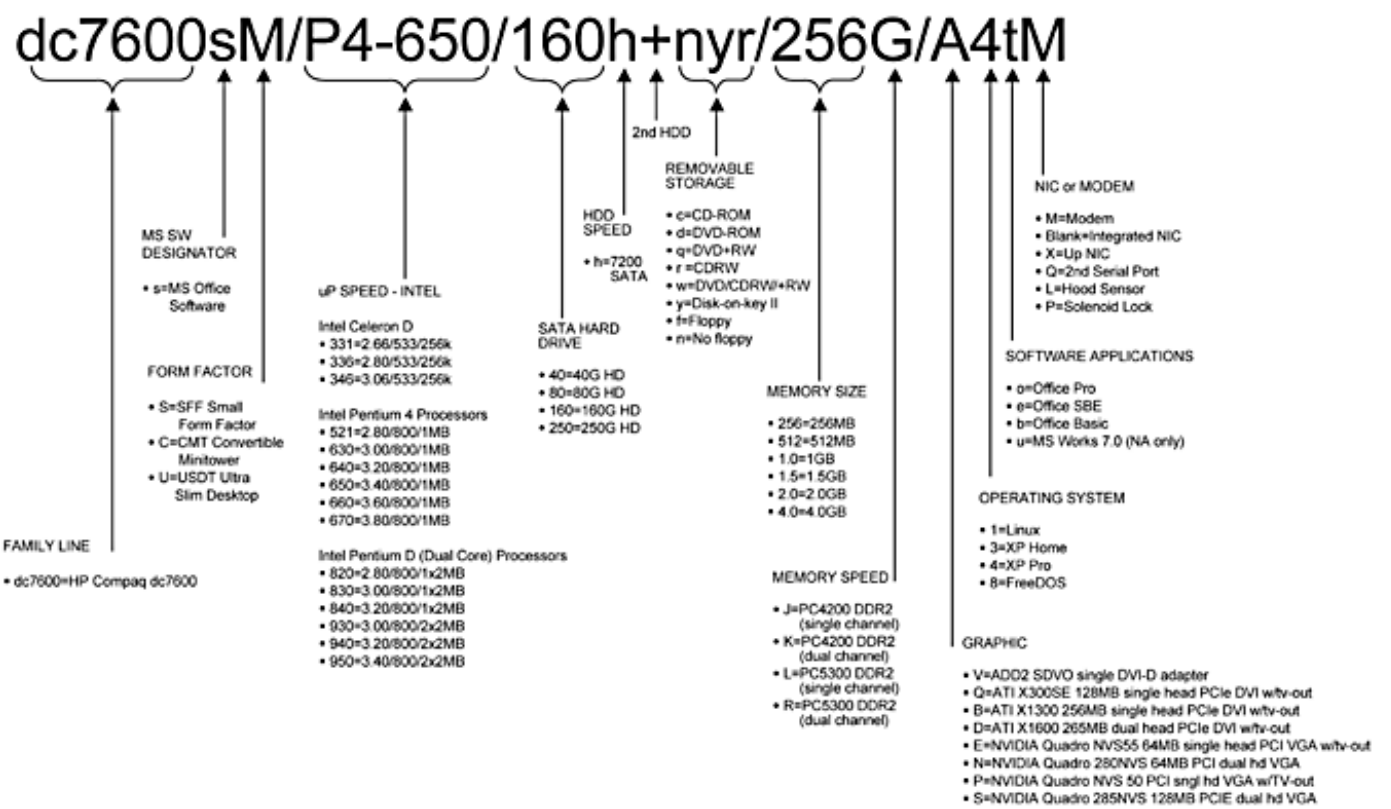
At A Glance

- Designed for long-term, networked deployment within medium and large organizations in commercial business, finance and public sector industries
- Choice of operating systems
- Value-added software available pre-installed:
  - HP ProtectTools Embedded Security (purchased separately)
  - HP Client Manager (http://h18000.www1.hp.com/im/index.html)
  - Altiris Local Recovery
  - Norton AntiVirus with 60 day Live Update Subscription
- Fully compatible software OS image across all three models (Ultra-slim Desktop, Small Form Factor, and Convertible Minitower)
- HP BIOS for security, manageability and software image stability
- Standard 3-years parts, 3-years labor and 3-years on-site warranty services (terms and conditions vary by country; certain restrictions and exclusions apply)
- Tool-less serviceability, HP Insight Diagnostics software, and HP Restore Plus ! CD for fast repair
- Selected configurations with global availability easily set up and ordered through HP.com Business to Business portals (http://h10019.www1.hp.com/business-site/index.html)
- Tailored HP Factory Express deployment and lifecycle services available (http://h71028.www7.hp.com/enterprise/cache/97688-0-0-225-121.aspx)
- Intel technologies introduced in 2005: 945G Express chipset, Pentium 4, Pentium D and Celeron processors
- Embedded TPM1.2 compliant security module (requires HP ProtectTools Embedded Security software)
- Support for SMART III 1.5Gb/s and 3.0Gb/s Serial ATA hard drives
- In compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see http://www.epeat.net

Configurable Components - Select Models (localized by Regions)

Model Key and Example

NOTE: This diagram is an example that illustrates how to read the model number.
It is not intended to give every available configuration choice specified in the body of this document and may include references to modules that are out of date and no longer available.



Configurable Components

Operating System - One of the following	Genuine Windows XP Professional SP2 Genuine Windows XP Home SP2 SuSE Linux Personal 9.3 OEM (delivered on CDs with system, not pre-installed)- WW except Asia FreeDOS **NOTE:** Microsoft Windows NT 4.0 and Microsoft Windows 2000 are not available on these systems. Some drivers for Windows 2000 are available for download from hp.com.

Value-added Software (not included with FreeDOS)	HP ProtectTools Embedded Security software HP Client Management Solutions (visit http://www.hp.com/go/easydeploy) HP Restore CD HP Insight Diagnostics Computer Setup Utility Altiris Local Recovery Norton AntiVirus 2005 with 60 day Live Update Subscription Microsoft Office 2003 Basic Microsoft Office 2003 Personal	Microsoft Office 2003 Professional Microsoft Office 2003 Small Business Microsoft Works 7.0 Microsoft Internet Explorer with Google Toolbar PDF Complete Dantz Retrospect and Roxio DigitalMedia Plus (supplied with CD-RW drive, Combo drive or DVD+/-RW drive) Roxio Cineplayer (supplied with DVD-ROM drive) QuickBooks Simple Start

Value-added Services and Features	HP Stable Platform Program Business-to-Business Portals HP Global Series Services	Factory Express Deployment and Lifecycle Services TPM 1.2 Security Tool-less Serviceability

Service and Support	On-site Warranty and Service Note 1: This three-year (3-3-3), limited warranty and service offering delivers three years of parts, labor and on-site repair. Response time is next business-day Note 2 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. Some countries/regions do not offer one year onsite and labor. **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.

	Ultra-slim Desktop	Small Form Factor	Convertible Minitower

Configurable Components

Dimensions			
Chassis Dimensions (H x W x D)	2.95 x 12.4 x 13.18 in (7.49 x 31.50 x 33.48 cm)	3.95 x 13.3 x 14.9 in (10.03 x 33.78 x 37.85 cm)	17.65 x 6.6 x 17.8 in (44.83 x 16.76 x 45.21 cm)
System weight	13.2 lb (5.99 kg)	19.5 lb (8.85 kg)	32.5 lb (14.74 kg)
System volume	7.9 liters	12.8 liters	33.8 liters
Shipping weight	19 lb (8.62 kg)	30 lb (13.61 kg)	43 lb (19.50 kg)
Maximum supported weight (desktop orientation)	77.1 lb (35 kg)	77.1 lb (35 kg)	77.1 lb (35 kg)
Shipping box dimensions (H x W x D)	12.63 x 18.75 x 20 in (32.08 x 47.63 x 50.8 cm)	12.63 x 18.75 x 20 in (32.08 x 47.63 x 50.8 cm)	23.38 x 13.06 x 22.88 in (59.39 x 33.17 x 58.12 cm)
Power Supply	190W power supply – Active PFC	240W power supply – Active PFC	365W power supply - Active PFC
Ports			
USB 2.0	8 (2 front, 6 rear)	8 (2 front, 6 rear)	8 (2 front, 6 rear)
Serial	1 optional via Serial & parallel I/O adapter	1 standard with 2nd optional	1 standard with 2nd optional
Parallel	1 optional via Serial & parallel I/O adapter	1	1
PS/2	1 keyboard, 1 mouse	1 keyboard, 1 mouse	1 keyboard, 1 mouse
Video	analog for integrated graphics	analog for integrated graphics	analog for integrated graphics
DVI output	available via ADD2 card or PCI card	available via ADD2 card, PCI-E x16 card, or PCI card	available via ADD2 card, PCI-E x16 card, and PCI card
Support for Multi-Monitor	available via ADD2 card or PCI card	available via ADD2 card, PCI-E x16 card, or PCI card	available via ADD2 card, PCI-E x16 card, and PCI card
Audio	Front - mic and headphone Rear - line in, line out	Front - mic and headphone Rear - line in, line out	Front - mic and headphone Rear - line in, line out, mic in
NIC (RJ-45)	Integrated Broadcom NetXtreme Gigabit Ethernet for HP	Integrated Broadcom NetXtreme Gigabit Ethernet for HP	Integrated Broadcom NetXtreme Gigabit Ethernet for HP

		USDT	SFF	CMT
Processor and Speed* One of the following	**Intel Celeron D Processors:**			
	Intel Celeron D 331 Processor (2.66-GHz, 256K L2 cache, 533-MHz FSB)	X	X	X
	Intel Celeron D 336 Processor (2.80-GHz, 256K L2 cache, 533-MHz FSB)	X	X	X
	Intel Celeron D 346 Processor (3.06-GHz, 256K L2 cache, 533-MHz FSB)	X	X	X
	Intel Pentium 4 Processors with HT Technology:			
	Intel Pentium 4 521 Processor (2.8-GHz, 1-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 524 Processor (3.06-GHz, 1-MB L2 cache, 533-MHz FSB)	X	X	X
	Intel Pentium 4 541 Processor (3.2-GHz, 1-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 620 Processor (2.8-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 630 Processor (3.0-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 631 Processor (3.0-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 640 Processor (3.2-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 641 Processor (3.2-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 650 Processor (3.4-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
	Intel Pentium 4 651 Processor (3.4-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X

Configurable Components

Intel Pentium 4 660 Processor (3.6-GHz, 2-MB L2 cache, 800-MHz FSB)			X
Intel Pentium 4 661 Processor (3.6-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium 4 670 Processor (3.8-GHz, 2-MB L2 cache, 800-MHz FSB)			X
Intel Pentium D Dual Core Processors:			
Intel Pentium D 805 Dual Core Processor (2.66-GHz, 2x1MB L2 cache, 533-MHz FSB)	X	X	X
Intel Pentium D 820 Dual Core Processor (2.8-GHz, 2x1MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium D 830 Dual Core Processor (3.0-GHz, 2x1MB L2 cache, 800-MHz FSB)			X
Intel Pentium D 840 Dual Core Processor (3.2-GHz, 2x1MB L2 cache, 800-MHz FSB)			X
Intel Pentium D 915 Dual Core Processor (2.8-GHz, 2x2MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium D 925 Dual Core Processor (3.0-GHz, 2x2MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium D 930 Dual Core Processor (3.0-GHz, 2x2MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium D 940 Dual Core Processor (3.2-GHz, 2x2MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium D 945 Dual Core Processor (3.4-GHz, 2x2MB L2 cache, 800-MHz FSB)	X	X	X
Intel Pentium D 950 Dual Core Processor (3.4-GHz, 2x2MB L2 cache, 800 MHz FSB)	X	X	X

*__NOTE:__ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families.

Memory

945G Express chipset

DDR2 SYNCH DRAM NON-ECC MEMORY

Memory upgrades are accomplished by adding single or multiple DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations. The Intel 945G Express chipsets support non-ECC DDR2 PC2-4200 (533-MHz) and PC2-5300 (667-MHz) memory.

HP recommends dual-channel symmetric configurations for maximum performance. For best performance, add the same amount of total memory to each channel and do not mix speeds. For dual-channel symmetric performance, the total amount of memory in each channel must be equal. If speeds are mixed, speed will default to the slowest DIMM.

Ultra-Slim Desktop

Maximum Memory Supports up to 3-GB of DDR2 SYNCH DRAM. *Not all memory configurations possible are represented below.*

Configurable Components

DIMM Size	Slot		
	Channel A	Channel B	
	1	2	3
256-MB	256-MB		
512-MB	512-MB		
512-MB (dual-channel symmetric)	256-MB		256-MB
1-GB	1-GB		
1-GB (dual channel symmetric)	512-MB		512-MB
1-GB (dual channel symmetric)	512-MB	256-MB	256-MB
2-GB (dual channel symmetric)	1-GB	512-MB	512-MB
3-GB maximum	1-GB	1-GB	1-GB

Small Form Factor and Convertible Minitower

Maximum Memory

Supports up to 4-GB of DDR2 SYNCH DRAM. *Not all memory configurations possible are represented below.*
NOTE: Above 3-GB, all memory may not be available due to system resource requirements.

DIMM Size	Slot			
	Channel A		Channel B	
	1	2	3	4
256-MB	256-MB			
512-MB	512-MB			
512-MB (dual-channel symmetric)	256-MB		256-MB	
1-GB	1-GB			
1-GB (dual-channel symmetric)	512-MB		512-MB	
1-GB (dual-channel symmetric)	256-MB	256-MB	512-MB	
2-GB (dual-channel symmetric)	1-GB		512-MB	512-MB
2-GB (dual-channel symmetric)	512-MB	512-MB	512-MB	512-MB
4-GB maximum (dual-channel symmetric)	1-GB	1-GB	1-GB	1-GB

Configurable Components

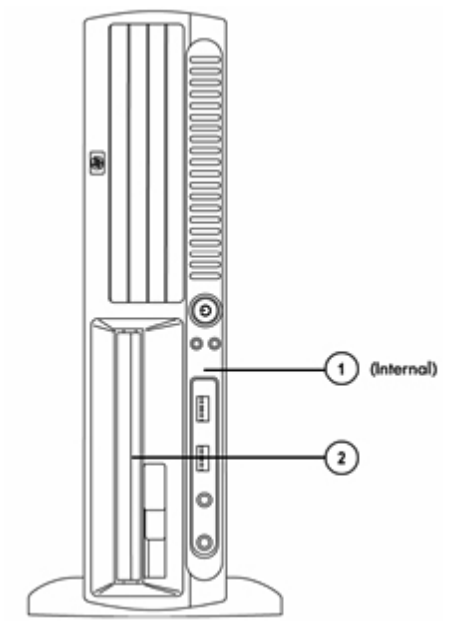
Memory Configurations – One of the following		**USDT**	**SFF**	**CMT**
	256-MB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (1 x 256)	X	X	X
	512-MB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (1 x 512)	X	X	X
	512-MB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (2 x 256)	X	X	X
	1-GB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (1 x 1GB)	X	X	X
	1-GB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (2 x 512)	X	X	X
	2-GB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (4 x 512)		X	X
	3-GB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (3 x 1GB)	X		
	4-GB DDR2 Synch Dram PC2-4200 (533-MHz) Non ECC (4 x 1GB)		X	X
	256-MB DDR2 Synch Dram PC2-5300 (667-MHz) Non ECC (1 x 256)	X	X	X
	512-MB DDR2 Synch Dram PC2-5300 (667-MHz) Non ECC (1 x 512)	X	X	X
	512-MB DDR2 Synch Dram PC2-5300 (667-MHz) Non ECC (2 x 256)	X	X	X
	1-GB DDR2 Synch Dram PC2-5300 (667-MHz) Non ECC (2 x 512)	X	X	X
	2-GB DDR2 Synch Dram PC2-5300 (667-MHz) Non ECC (4 x 512)		X	X

Expandability	**USDT**	**SFF**	**CMT**
PCI slots	Optional with riser card: 1 full-height (4.2"), length (6.6")	2 low-profile (2.5"), length (6.6") standard; 2 full-height (4.2"), length (6.875") via optional riser card. **NOTE:** With riser card option, express x1 and x16 slots are not accessible.	2 full-height (4.2"), length (13.4") standard; (2 additional full-height slots available via optional extender card)
Max power per slot	25W	25W	75W
PCI Express x16 slot	--	1 low-profile (2.5"), length (6.6")	1 full-height (4.2"), length (10.5")
Max power per slot	N/A	25W	75W
PCI Express x1 slot	--	1 low profile (2.5"), length (6.6")	1 full-height (4.2"), length (13.4")
Max power per slot	N/A	10W	10W
External Bays	0 (use MultiBay)	2	4
3.5"	N/A	1	1
5.25"	N/A	1 (length 8.189")	3 (2 - length 8.189", 1 - length 5.71")
MultiBay	1 standard	none	none
IDE	1 IDE for Multibay I (12 mm)	1 IDE connector for opticals	1 IDE connectors for opticals
Internal 3.5" HDD Bays	1	1	2
Hard Drive Controller (PCI) Supported	Serial ATA (support for SATA 1.5-Gb/s and 3.0-Gb/s hard drives)		
Hard Drive Interfaces Supported	1 Serial ATA interface	2 Serial ATA interfaces	2 Serial ATA interfaces

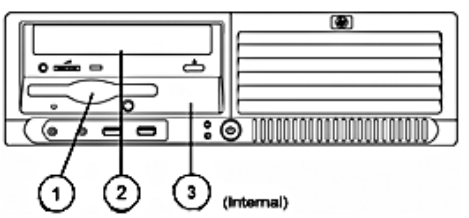
Configurable Components

Storage Diagrams

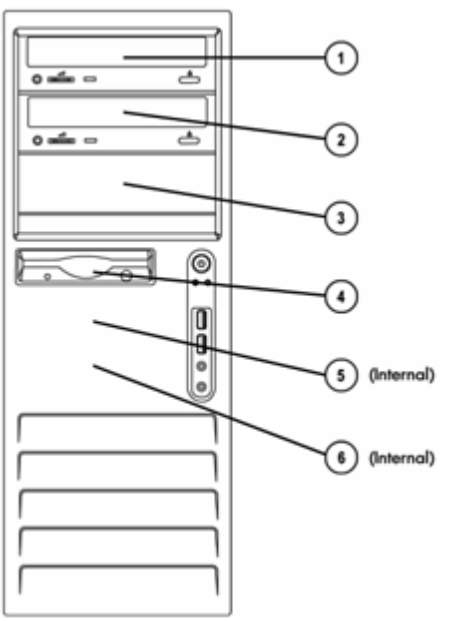
Ultra-slim Desktop



Small Form Factor



Convertible Minitower



Storage – Drive Support

	USDT			SFF			CMT	
	MultiBay Drive Bay	3.5" Serial ATA Hard Drive	Diskette Drive or Media Card Reader (optional)	Storage Drive Bay	3.5" Serial ATA Hard Drives	Diskette Drive or Media Card Reader	Storage Drive Bay	3.5" Serial ATA Hard Drives
Quantity Supported	1	1	1	1	2	1	2	2
Position Supported	2	1	1	2	1, 3	4	1, 2, 3	4, 5, 6
Controller	IDE	SATA	Diskette	IDE	SATA	Diskette	IDE	SATA

		USDT	SFF	CMT
Hard Drive One or two of the following	40-GB SATA 1.5-Gb/s Hard Drive (7200 rpm)	X	X	X
	80-GB SATA 3.0-Gb/s Hard Drive (7200 rpm)	X	X	X
	160-GB SATA 3.0-Gb/s Hard Drive (7200 rpm)	X	X	X
	250-GB SATA 3.0-Gb/s Hard Drive (7200 rpm)	X	X	X
	2nd hard drive, 80-GB SATA 3.0-Gb/s Hard Drive (7200 rpm)		X	X
	2nd hard drive, 160-GB SATA 3.0-Gb/s Hard Drive (7200 rpm)		X	X
	2nd hard drive, 250-GB SATA 3.0-Gb/s Hard Drive (7200 rpm)		X	X

Configurable Components

Removable Storage – One or more of the following depending on form factor (see Storage section below)	**Diskette Drives**			
	1.44-MB Diskette Drive		X	X
	Media Reader			
	HP 16-in-1 Media Reader (PCI card supplies internal USB connection)		X	X
	Optical Drives			
	48X CD-ROM Drive		X	X
	48X/32X/48X CD-RW Drive		X	X
	48X/32X Combo CD-RW/DVD-ROM Drive		X	X
	16X/48X DVD-ROM Drive		X	X
	16X DVD+/-RW LightScribe Drive (Double Layer/Dual Format)		X	X
	MultiBay			
	MultiBay 24X CD-ROM Drive	X		
	MultiBay 24X/24X/24X/8X DVD-CDRW Combo Drive	X		
	MultiBay 8X/24X DVD-ROM Drive	X		
Security	1.2 TPM Embedded Security Chip integrated with Broadcom NIC	X	X	X
	HP ProtectTools Embedded Security Software	X	X	X
	Serial, Parallel, USB Enable/Disable (via BIOS)	X	X	X
	Removable Media Write/Boot Control	X	X	X
	Power-On Password (via BIOS)	X	X	X
	Setup Password (via BIOS)	X	X	X
	Solenoid Lock (electronic hood lock)		X	X
	Hood Removal Sensor	X	X	X
	HP Desktop Security lock kit (lock and cable)	X	X	X
	Security cable with Kensington lock	X	X	X
	Rear port control cover	X	X	X
NIC	Broadcom NetXtreme Gigabit Ethernet integrated on system board	X	X	X
	Intel PRO/1000 GT Gigabit PCI Adapter (full height bracket)			X
	Intel PRO/1000 GT Gigabit PCI Adapter (low profile bracket)	X	X	
Wireless	Wireless A+G PCI Card (full height bracket)	X*		X
	Wireless A+G PCI Card (low profile bracket)		X	
	NOTE: *Requires optional PCI riser card.			
Modem	2006 Agere PCI 56K International SoftModem (full height)	X*	X*	X
	2006 Agere PCI 56K International SoftModem (low profile)		X	
	NOTE: *Requires optional PCI riser card.			

Configurable Components

Graphics	Integrated Intel Graphics Media Accelerator 950	X	X	X
	DVI ADD2 SDVO single head Graphics Adapter for USDT	X		
	DVI ADD2 SDVO single head Graphics Adapter (PCI-E x16)		X	X
	ATI RADEON X300 SE PCI Express 128-MB DDR single head DVI with TV out		X	X
	ATI RADEON X1300 256MB PCIe DVI w/TV		X	X
	ATI RADEON X1600XT 256MB, full-height PCIe, dual DVI w/TV-out			X
	NVIDIA Quadro NVS 280 64-MB PCI dual head VGA	X*	X	X
	NVIDIA Quadro NVS 285 128-MB PCIe x16 dual head VGA		X	X
	NVIDIA Quadro 55 NVS 64MB PCI low profile DVI w/TV-out	X*		
	NOTE: * Requires optional PCI riser card. ** NVS 280 PCI can be selected as a second graphics card when the NVIDIA Quadro NVS 285 is also installed, to provide support for four monitors.			
Audio	Integrated High Definition audio with Realtek 2 channel ALC260 codec (all ports are stereo)	X	X	X
	Microphone and Headphone front ports	X	X	X
	Microphone rear port*	X	X	X
	Line-out and Line-In rear ports*	X	X	X
	Aux Input connection on system board	X	X	X
	Analog CD IN Support	X**		
	Internal Speaker	X	X	X
	NOTE: *Rear audio ports are re-taskable as Line-in, Line-out, or Microphone-in, with optional driver, available only through download from HP support website. External speakers must be powered externally. ** Available on USDT through MultiBay			
Keyboard – One of the following	HP PS/2 Standard Keyboard	X	X	X
	HP USB BG1650 Keyboard	X	X	X
	HP USB Standard Keyboard	X	X	X
	HP USB Smartcard Keyboard	X	X	X
Mouse – One of the following	PS/2 2-Button Scroll Mouse	X	X	X
	PS/2 2-Button Optical Scroll Mouse	X	X	X
	USB 2-Button Optical Scroll Mouse	X	X	X
	USB 2-Button Scroll Mouse	X	X	X

Configurable Components

Miscellaneous	HP FireWire / IEEE 1394 PCI Card (full height)	X*	X	X
	HP FireWire / IEEE 1394 PCI Card (low profile)		X	
	PCI riser card – adds 1 full-height PCI slot	X		
	PCI riser card – adds 2 full-height PCI slots **NOTE:** Low profile slots are unusable with riser card installed.		X	
	PCI extender card for CMT (adds 2 PCI)			X
	PCI Serial & parallel I/O adapter	X*		
	2nd serial port adapter (full height)			X
	2nd serial port adapter (low profile)		X	
	Tower stand	X	X	
	Blue Angel Compliant Bezel – Europe Only	X	X	X
	Configure dc7600 CMT in desktop orientation			X

NOTE: *Requires optional PCI riser card.

After-Market Options (availability may vary by region)

		USDT	SFF	CMT	Part Number
Communications	**Wireless LAN**				
	HP Wireless A+G PCI Card (North America only)	X*	X	X	EA118AA
	HP Wireless A+G PCI Card (WW except North America)	X*	X	X	PZ928AA
	HP BT450 USB Bluetooth Wireless Printer and PC Adapter	X	X	X	IPQ639A
	NICs				
	Broadcom NetXtreme Gigabit Ethernet PCI Express x1 Card		X	X	EA833AA
	Intel PRO/1000 GT Gigabit PCI (full height only)		X	X	AG393AA
	Modem				
	2006 Agere PCI 56K International Modem	X*	X	X	EK694AA
	NOTE: *Requires optional PCI riser card.				
Graphics	**Single head solutions**				
	DVI ADD2 Graphics Card (PCI-E x16)		X	X	DY674A
	ATI RADEON X300 SE PCI Express 128-MB DDR DVI with TV out		X	X	DY596A
	ATI RADEON X1300 256MB DDR PCIE DVI w/TV		X	X	AG392AA
	NVIDIA Quadro 55 NVS 64MB PCI DVI w/TV Out	X*	X	X	EK561AA
	Multi head solutions				
	NVIDIA Quadro NVS 280 64-MB PCI dual head (DMS59 connector with dual VGA Y-cable)	X*	X	X	DY599A
	NVIDIA Quadro NVS 280 64-MB PCIE dual head (DMS59 connector with dual VGA Y-cable)		X	X	DY650A
	NVIDIA Quadro NVS 285 128-MB PCIE x 16 dual head VGA		X	X	EE061AA
	Dual DVI Y-cable for DY599A or DY650A		X	X	DL139A
	NOTE: *Requires optional PCI riser card.				
Hard Drives	**Serial ATA Hard Drives**				
	40-GB SATA 1.5-Gb/s Hard Drive	X	X	X	PB371A
	80-GB SATA 3.0-Gb/s Hard Drive	X	X	X	PY276AA
	160-GB SATA 3.0-Gb/s Hard Drive	X	X	X	PY277AA
	250-GB SATA 3.0-Gb/s Hard Drive	X	X	X	PY278AA

After-Market Options (availability may vary by region)

Input/Output Devices	**Keyboards**				
	HP PS/2 Standard Keyboard	X	X	X	DT527A
	HP USB Standard Keyboard	X	X	X	DT528A
	HP USB BG1650 Standard Keyboard	X	X	X	DT529A
	HP USB Smartcard Keyboard	X	X	X	ED707AA
	Pointing Devices				
	HP PS/2 2-Button Scroll Mouse (Carbonite)	X	X	X	DD440B
	HP PS/2 2-Button Optical Scroll Mouse	X	X	X	EY703AA
	HP USB 2-Button Scroll Mouse (Carbonite)	X	X	X	DD441B
	HP USB 2-Button Optical Scroll Mouse (Carbonite/Silver)	X	X	X	DC172B
Memory (DIMMs)	**PC2-5300 (DDR2, 667 MHz) DIMMs Non-ECC**				
	1 GB PC2-5300 (DDR2-667) DIMM	X	X	X	PX976AA
	512 MB PC2-5300 (DDR2-667) DIMM	X	X	X	PX975AA
	256 MB PC2-5300 (DDR2-667) DIMM	X	X	X	PX974AA
	PC2-4200 (DDR2, 533 MHz) DIMMs Non-ECC				
	1 GB PC2-4200 (DDR2-533) DIMM	X	X	X	PV557AA
	512 MB PC2-4200 (DDR2-533) DIMM	X	X	X	PV560AA
	256 MB PC2-4200 (DDR2-533) DIMM	X	X	X	PV558AA
Monitors	**CRTs**				
	HP s7540 17" (16.0" vis) CRT Monitor				PF997AA#XXX
	HP v7650 17" (16.0" vis) Flat-face CRT Monitor				PF996AA#XXX
	TFTs				
	HP L1506 15" TFT Flat Panel Monitor – Analog only				PX848AA#XXX
	HP L1706 17" TFT Flat Panel Monitor – Analog only				PX849AA#XXX
	HP L1740 17" TFT Flat Panel Display – Analog/Digital				PL766AA#XXX
	HP L1755 17" TFT Flat Panel Display – Analog/Digital				PL777AA#XXX
	HP L1906 19" TFT Flat Panel Display – Analog only				PX850AA#XXX
	HP L1940T 19" TFT Flat Panel Display – Analog/Digital				EM869AA#XXX
	HP L1955 19" TFT Flat Panel Display – Analog/Digital				PD974AA#XXX
	HP L2065 20" TFT Flat Panel Display – Analog/Digital				EF227A4#XXX
	HP LP2465 24" TFT Widescreen Flat Panel Display – Analog/Digital				EF224A4#XXX
	GSA Monitors				
	HP L717g 17" GSA Flat Panel Monitor				EE191AA#XXX
	HP L919g 19" GSA Flat Panel Monitor				EE192AA#XXX
	Options				
	HP Flat Panel Speaker Bar				EE418AA
	HP CRT Monitor Multimedia Base				PM552AA
	USDT Integrated Work Center stand (no display)				DL641B

After-Market Options (availability may vary by region)

Multimedia	HP Satellite Speakers – Silver	X	X	X	ZD929AA
Optical Drives	**DVD-ROM Drive**				
	16X/48X DVD-ROM Drive		X	X	PR596A
	CD-ROM Drive				
	48X Max CD-ROM Drive		X	X	DC143B
	CD-RW Drive				
	48X/32X/48X CD-RW Drive		X	X	DL975B
	Combo Drive				
	48X/32X Combo CD-RW/DVD-ROM Drive		X	X	DL976B
	DVD+/-RW Drive				
	16X DVD+/-RW LightScribe Drive (Double Layer/Dual Format)		X	X	PR595A
Removable Storage	**Drive Key Options**				
	256-MB HP Drive Key II (USB 2.0)	X	X	X	PH657A
	512-MB HP Drive Key II (USB 2.0)	X	X	X	ED516AA
	1-GB HP Drive Key II (USB 2.0)	X	X	X	AG382AA
	Diskette and Digital Drives				
	1.44-MB USB Diskette Drive – External (Carbonite)	X	X	X	DC141B
	1.44-MB Internal Diskette Drive		X	X	DS710G
	Multimedia				
	HP 16-in-1 Media Card Reader with PCI Card		X	X	EM718AA
MultiBay Drive Storage	Multibay 1.44-MB Diskette Drive	X			DE612B
	MultiBay 24X CD-ROM Drive	X			DC513B
	MultiBay 24X/24X/24X/8X Combo DVD-ROM/CD-RW Drive	X			DL974B
	MultiBay 8X DVD-ROM Drive	X			DC515B
	HP MultiBay 8X DVD+/-RW (DL/DF) Drive	X			AG284AA
Security	Kensington lock	X	X	X	PC766A
	HP Business PC Security Lock	X	X	X	EV265AA
	Wall mount/security sleeve (USDT)	X			PA719A
	Wall mount/security sleeve (SFF)		X		PA717A
	HP USB Smartcard Keyboard	X	X	X	ED707AA

After-Market Options (availability may vary by region)

Software	HP Credential Manager for ProtectTools (includes Embedded Security for ProtectTools TPM enabling software)	X	X	X	EM530AA (use EM531AA for 25-user license, EM532AA for 50-user license)
	HP Client Foundation Suite Includes: HP Client Manager HP Systems Insight Manager Connector Altiris Local Recovery Pro Altiris Migration Suite	X	X	X	EF117AA (use EF118AA for 1000+ licenses)
	HP Client Premium Suite Includes: HP Client Manager HP Systems Insight Manager Connector Altiris Local Recovery Pro Altiris Migration Suite Altiris Connector Solution Altiris Client Management Suite Level 1 HP OpenView Connector	X	X	X	EF119AA (use EF120AA for 1000+ licenses)
Brackets/Stands	HP Compaq 7000 Series Ultra-slim Desktop Integrated Work Center Stand (no display)	X			DL641B
Miscellaneous Accessories	Serial and parallel I/O adapter (USDT)	X			PD825A
	2nd serial port adapter		X	X	PA716A
	USB to serial adapter cable	X	X	X	EM449AA
	PCI riser card (USDT)	X			ED247AA
	PCI riser card (SFF)		X		PD824A
	PCI extender card (CMT)			X	DC179B
	HP FireWire / IEEE 1394 PCI Card	X	X	X	PA997A

Unit Environment and Operating Conditions	Ultra-Slim Desktop	Small Form Factor	Convertible Minitower
General Unit Operating Guidelines • Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range. • Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. • Never restrict airflow into the computer by blocking any vents or air intakes. • Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air. • Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow. • If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.			
Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: -22° to 140° F(-30° to 60° C)		
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)		
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)		
***NOTE:** Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.			

Power Supply	Ultra-Slim Desktop	Small Form Factor	Convertible Minitower
Power Supply	200 watt custom power supply – Active PFC)	240 watt custom power supply – Active PFC	365 watt custom power supply – Active PFC)
Operating Voltage Range	90 – 264 VAC	90 – 264 VAC	90 – 264 VAC
Rated Voltage Range	100 – 240 VAC	100 – 240 VAC	100 – 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
Rated Input Current	4A	5A	6A
Heat Dissipation	Typical 340 btu/hr (86 kg-cal/hr) Maximum 1050 btu/hr (265 kg-cal/hr)	Typical 340 btu/hr (86 kg-cal/hr) Maximum 1260 btu/hr (318 kg-cal/hr	Typical 375 btu/hr (95 kg-cal/hr) Maximum 1916 btu/hr (483 kg-cal/hr)
Power Supply Fan	70mm variable speed	80mm variable speed	92mm variable speed
Energy Star Compliant	X	X	X
Blue Angel Compliant (<5w in S5 – Power Off)	X	X	X
FEMP Standby Power Compliant (<2W in S5 – Power Off)**	X	X	X
Power Consumption in ES Mode – Suspend to RAM (S3) (Instantly Available PC)	< 3W	< 3W	< 3W

Environmental and Mechanical Engineering Support Center (EMESC) – Intranet Web Site only	http://env-webserver.ccm.cpqcorp.net/EMESC/default.htm

****NOTE:** Power consumption in the Off/Apparent Off mode is measured and reported with the network interface controller "Wake on LAN" feature disabled in F10 Setup (default is "enabled").

ROM BIOS Information

Key features of the HP BIOS in the dc7600 include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Business desktop computer into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Security – HP BIOS offers a robust and flexible set of security features to help the system administrator secure their systems from removal of sensitive data, and help prevent access by unauthorized users, subversion of OS security policies, removal of hardware, flash of rogue BIOS images, master boot record viruses, and attacks on BIOS settings.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies to assist in operating the HP Business Desktop computer in any enterprise environment.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (ROMPAQ, Flashlite), BIOS updates from within Windows (CPQFlash, SSM), and fail-safe recovery.

Additional HP BIOS Features

- Power-On password – Helps prevent an unauthorized user from powering on the system. After a power-on password is established, the user is required to type the password during the power-on process.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Compaq dc7600 models use ACPI to provide power conservation features under Windows XP.

Other Features	Description
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • 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.
SMBIOS Ver. 2.4	System Management BIOS, previously known as DMI BIOS, for system management information
Wired for Management Support	Intel-driven, industry-wide initiative to make Intel architecture-based PCs, servers and mobile computers more inherently manageable right out of the box and over the network
Dual-State Power Button	Power button acts as both an on/off button and suspend-to-sleep button

Technical Specifications

Serviceability Features of System		
Dual Color Power LED on Front of Computer (Indicates Normal Operations and Fault Conditions)		
Diagnostic LED Explanation Table	Number of 1-second red LED blinks followed by 2-second pause, then repeats: 2-processor thermal protection activated 3-processor not installed 4-power supply failure 5-memory error 6-video error 7-PCA failure (ROM detected failure prior to video) 8-invalid ROM, bootblock recover mode	
• System/Emergency ROM	• Flash ROM	• CMOS Battery Holder for easy Replacement
• Flash Recovery with Video Configuration Record SW	• 5 Aux Power LED on System PCA	• Processor ZIP Socket for easy Upgrade
• Over-Temp Warning on Screen (Requires IM Agents)	• Clear Password Jumper	• DIMM Connectors for easy Upgrade
• OS CD (Restore OS CD)	• Clear CMOS Button	• NIC LEDs (integrated) (Green & Amber)
• Restore CD		

Serviceability Features of Chassis		
• Dual Color Power and HD LED – To Indicate Normal Operations and Fault Conditions	• Color coordinated cables and connectors	• Tool-less Hood Removal
• Front power switch	• System memory can be upgraded without removing the system board or any internal components	• Tool-less Hard Drive, CD & Diskette Removal
• Green Pull Tabs, and Quick Release Latches for easy Identification		• Tool-less System Board Removal
NOTE: Thumb screw release mechanism is used with the Ultra-slim Desktop chassis cover.		
Feature	**Description**	
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments	
Towerable	Product can be oriented as a tower (in addition to desktop orientation)	
Drive Self Tests (DPS)	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or 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		

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	

High Definition Audio	**Type**	Integrated
	High Definition Stereo Codec	Yes – Realtek ALC 260
	Audio Jacks	Microphone-In (64-K ohm Input Impedance); front and rear stereo analog microphone ports available except for USDT, which has front stereo microphone only Line-In (64-K ohm Input Impedance) Line-Out * (200 ohms Output Impedance, expects at least a 10-K ohm load) Headphone-Out (1 Ohm 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	8 kHz – 192 kHz
	Wavetable Syntheses (software)	Yes – Uses OS soft wavetable
	Analog Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	1.5 W
	Internal Speaker	Yes
	External Speaker Jack (Line-Out)	Yes

Integrated Broadcom NetXtreme Gigabit Ethernet	**Connector**	RJ-45
	Controller	Broadcom 5752 PCI-Express 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 mode	Full-duplex
		Half-duplex (not available for the 1000BASE-T transceiver)
	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)
	Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility
	Alerting	N/A

Intel PRO/1000 GT Gigabit PCI NIC	**Connector**	RJ-45
	Controller	Intel 82541PI Gigabit Controller
	Memory	Integrated 64KB configurable transmit receive 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 2.3
	Data path width	32-bit, 33/66 MHz bus interface
	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	(800mA) 4watts @ +5VDC
	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 (actual rate limited by PCI Bus)	
	Environmental	**Operating temperature**	32° to 131°F (0° to 55° C)
		Operating humidity	85% at 131° F (55° C)
	Dimensions	6.4 x 4.8 x 0.8 in (16.3 x 12.1 x 1.9 cm)	
	Management capabilities	ACPIWOL and DMI 2.0, S5 WOL, WMI, PXE 2.0, RPL	
HP Wireless A+G PCI	**Dimensions**	4.99 x 2.54 x 0.71 in (126.8 x 64.4 x 18.0 mm)	
	Weight	0.268 lb (65 g)	
	Controller system interface	Atheros AR5414X chipset PCI Spec 2.2	
	Network standard	IEEE 802.11a/b/g	
	Frequency band	5.1500 to 5.8500 GHz	
		2.4000 to 2.4835 GHz	
		2.4465 to 2.4835 GHz (Europe, Middle East, Asia and Asia Pacific - excluding Japan)	
		2.4000 to 2.4697 GHz (Japan)	
	Operating temperature	32° to 140° F (0° to 60° C), operating	
	Storage temperature	-4° to 176° F (-20° to 80° C), non-operating	
	Humidity	10% to 85% non-condensing	
	Operating voltage	5V ± 5%	
	Power consumption	Tx/Rx peak 560/250mA @ 3.3V (max.)	
	Output power (approximately)	15 dBM ±2dB	
	Receive sensitivity	-90dBm at 11 Mbps (typical)	
	Data transfer rate	Standard rates of 1, 2, 5.5, 11, 6, 9, 12, 18, 24, 48, 54 and Super AG Mode108-Mbps	
	Spreading	DSSS (Direct Sequence Spread Spectrum)	
	Security	64(40h) bit, 128(104h) bit, WPA, IEEE802.1X, AES-OCB, AES-CCM, Microsoft PEAP,TKIP, WEP.	
	Antenna	External 5dBi antenna	
	Throughput	108 Mbps (only with Belkin 54G or above router that supports 108 Mbps speed)	200 ft (60.96 m) – Indoor
		54 Mbps	200 ft (60.96 m) – Indoor
		11 Mbps	200 ft (60.96 m) – Indoor
	Certifications	Wi-Fi certified	

	Certifications for use by country	North America: United States, Canada Europe: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom Australia New Zealand
2006 Agere PCI 56K International SoftModem	**Data Transmission**	Technology speeds: 56,000 Kbps maximum downstream data, controllerless
		NOTE: 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.
	Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/16,800/14,400/12,000/9,600/7,200/4,800/2,400/1,200/300
	Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
	Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/s
	Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
	Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5
	Power Management	ACPI; PPMI 1.1 and wake support with PME and Vaux; meets PCI 2.3 requirements and PC 2001 requirements
	Upgradeability	Driver upgradeable for future enhancements
	Video	ITU-T V.80 video ready interface
	Other	TIA/EIA 602 standard AT command set Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface Optional ring wakeup signal
	Operating Temperature	32° to 158° F (0° to 70° C)
	Operating Humidity	20% to 90%, non-condensing
	Power	Requires a 3.3-V auxiliary power rail on PCI bus Uses only one PCI load (i.e., one grant/request pair), one shared IRQ, one electrical load
	Chipset	Agere Systems SV92PL – Integrated PCI interface with 5-V tolerant buffers and CardBus support
	Dimensions (L X H)	Complies with PCI low profile specifications-6.7 x 2.3 in (17.0 x 5.8 cm) and supports high- and low-profile brackets
	Connection	Single RJ-11 connector
	Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
	Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark
	EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8

Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
Health	Bare PCB material compliant to 94V-0 or better (marked as such)
Other	PC 2001 compliant, PCI version 2.3, WHQL approved; ACPI compliant

Integrated Graphics Media Accelerator 950	**3D/2D Controller**	Microsoft DirectX® 9 based with support for Pixel Shader 2.0, 4:1 anisotropic filtering, Gaussian texture filtering, shadow maps, volumetric textures, double-sided stencil buffers, and 4 pixel pipes.
	VGA Controller	Integrated
	Bus Type	PCI Express™ x16 (Internal graphics is automatically disabled if an external PCIE or PCI graphics card is installed. If the external graphics card is installed in a PCI slot, the internal graphics can be re-enabled using the system's BIOS setup utility. If the external graphics card is installed in the PCI Express™ slot, the internal graphics cannot be enabled).
	RAMDAC	Integrated, 400 MHz
	Memory	Graphics memory is shared with system memory. Graphics memory usage can vary from 8-128 MB depending on the amount of system memory installed and system load. 8 MB is pre-allocated for graphics use at system boot time. Additional memory is allocated for graphics using Intel's Dynamic Video Memory Technology (DVMT) to balance the optimum amount of memory between graphics and other system use. Memory < 256 MB: 8 MB pre-allocated (for DOS) + 24 MB DVMT : max frame buffer of 32 MB 256 MB <= Memory: 8 MB pre-allocated + 120 MB DVMT : max frame buffer of 128 MB
	Controller Clock Speed	400 MHz
	Overlay Planes	Single overlay support with 5x3 filtering
	Maximum Color Depth	32 bits/pixel
	Maximum Vertical Refresh Rate	85 Hz at up to 1920x1440, 85Hz at 2048x1536. Varies with mode and configuration. See table below.
	Multi-display Support	Support for one CRT via the motherboard's VGA connector. Support for an additional DVI-D display via the optional DVI ADD2 card. Dual independent displays and dual synchronous (Twin or Clone mode) displays are supported.
	Graphics/Video API Support	Microsoft DirectX®9, DirectXVA®, VMR9, GDI/GDI+; OpenGL® 1.4.

Resolutions Supported[1]

Resolution	**Maximum Refresh Rate** (Hz)	
	Analog Monitor	**Digital Monitor**
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 1024	85	60
1600 x 1200	85	60
1920 x 1080	85	60
1920 x 1200	85	60
1920 x 1440	85	60
2048 x 1536	85	60

1 Modes listed are supported with a single active display. The supported mode list for multiple active displays is a subset of this list. Not all modes will support video playback and some supported modes may use software MC (motion compensation) rather than hardware MC. Not all modes will support 3D acceleration depending on the system configuration (e.g., resolution selected, size of frame buffer, number of installed memory modules, etc.).

NOTE: Other resolutions and refresh rates may be selectable but are not recommended.

DVI ADD2 Graphics

Models	DY674A Intel DVI ADD2 adapter for Convertible Minitower and Small Form Factor
Form Factor	Low-profile card
DVI-D Connector	Compliant with DDWG (Digital Display Working Group) and VESA specifications for a single-link digital DVI (DVI-D) connector.
Dual Head Support	Yes, when used with the integrated VGA connector
Display Devices Supported	HP L1530 HP L1740 HP L1755 HP L1940 HP L1955 HP L2035 HP L2335

NOTE: The DVI ADD2 card offers optimal performance with any display that meets applicable VESA standards.

Color Depth	All modes support 8-bpp, 16-bpp, and 24-bpp color depths
Host Interface Connector	Mechanically compliant with PCI-E standard Complies with the Intel ADD2 and Intel Serial Digital Video Output (SDVO) specifications
Dot Clock	165 MHz maximum
Display Modes	Supports display modes that require up to 165-MHz bandwidth on the link, as shown in the following table.

Resolution		**60-Hz LCD**	**60-Hz**	**75-Hz**	**85-Hz**
Blanking		5% reduced	GTF	GTF	GTF
640 x 480	VGA	Yes	Yes	Yes	Yes
800 x 600	SVGA	Yes	Yes	Yes	Yes
1024 x 768	XGA	Yes	Yes	Yes	Yes
1280 x 1024	SXGA	Yes	Yes	No	No
1600 x 1200	UXGA	Yes	Yes	No	No

ATI RADEON X300 SE PCI Express (PCIe x16) Graphics

Models	ATI RADEON X300 SE PCI Express 128-MB DDR single head DVI with TV out
Bus Type	PCI Express (x16 lanes)
Maximum Vertical Refresh Rate	85 Hz
Display Support	Integrated 400MHz RAMDAC
Display Max Resolution	2048 x 1536
Board Display Options	**128 MB Card Display Option** DVI-I + TV DVI-I supports analog CRT or flat panel or digital flat panel (using DVI-A, DVI-D or DVI-I connector) DVI-I supports analog CRT or flat panel (with VGA connector and DVI-I to VGA dongle) TV Connector is a 7-pin mini-DIN (also allowing 4-pin S-Video without adaptor)

Technical Specifications - Graphics

Board Configuration 128 MB Frame Buffer	**Specification**	**Description**	
	Graphics Chip	RADEON X300 SE PCI Express	
	Core clock	200 MHz	
	Memory clock	200 MHz	
	Frame buffer	128 MB DDR	
	Memory I/O	64 bit	
	Memory Configuration	4 pcs 16M x 16 DDR	
Memory Type	DDR1		
Maximum Memory	128MB		
Core Power	10 W (Max ASIC power) 18 W (Max Board power)		
Option Kit Contents	ATI RADEON X300 SE PCI Express graphics card with full height bracket attached Low profile bracket Software CD with graphics drivers Warranty documentation		

ATI RADEON X1300 PCIe Graphics Card (256 MB)	**Bus Type**	PCI Express (x16 lanes)	
	Maximum Vertical Refresh Rate	85 Hz	
	Display Support	Integrated 400MHz RAMDAC	
	Display Max Resolution	2048 x 1536	
	Board Display Options	DVI-I + TV DVI-I supports analog CRT or flat panel or digital flat panel (using DVI-A, DVI-D or DVI-I connector) DVI-I supports analog CRT or flat panel (with VGA connector and DVI-I to VGA dongle) TV connector is a 4-pin mini-DIN S-video connector	
	Board Configuration 128 MB Frame Buffer	**Specification**	**Description**
		Graphics Chip	RV515
		Core clock	450 MHz
		Memory clock	250 MHz
		Frame buffer	256 MB DDR2
	Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	
	Core Power	25 W (Max board power)	
	Option kit contents	• ATI RADEON X1300 PCIe graphics card with full height bracket attached • Low profile bracket • DVI-to-VGA Adapter • Software CD with graphics drivers • Warranty documentation	

Technical Specifications - Graphics

	Compliance standards	**EMC Emissions:** a) FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing Devices for Home & Office Use b) CISPR22: 1997/EN 55022:1998 – Class B – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment c) Canadian Standard ICES-003 is equivalent to CISPR22 d) Taiwanese Standard BSMI e) Japanese VCCI f) Australian C-Tick **EMC Immunity:** CISPR 24:1997/EN 55024:1998 – Information Technology Equipment - Immunity Characteristics – Limits and Methods of Measurement. **Safety:** UL 60950 (USA) & EN 60950 (EU): Safety of Information Technology Equipment, Including Electrical Business Equipment. All boards meet UL PCB flammability requirements.

ATI RADEON X1600XT (256 MB DH) FH PCIe Graphics Card	**Bus Type**	PCI Express (x16 lanes)	
	Maximum Vertical Refresh Rate	85 Hz	
	Display Support	Integrated 400 MHz RAMDAC	
	Display Max Resolution	2560 x 1600 digital, 2048 x 1536 analog	
	Board Display Options	2 DVI-I ports (one port supports dual link DVI). DVI-I supports an analog CRT or flat panel with a VGA connector via the provided DVI-I to VGA adapter	
		4-pin mini-DIN S-video connector for TV output	
	Board Configuration	**Specification**	**Description**
		Graphics chip	RV530
		Core clock	590 MHz
		Memory clock	690 MHz
		Frame buffer	256 MB GDDR3, 128 bit wide
	Core Power	56 W (Max board power)	

Technical Specifications - Graphics

NVIDIA Quadro NVS 285 128-MB PCIe Dual Head

Form Factor	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 system memory via TurboCache)
Connector	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)
Multi-monitor Support	Dual analog or digital monitors
RAMDAC	Dual 350 MHz (integrated)
Maximum Pixel Clock	350 MHz
Overlay Planes	One 16-bit Video overlay plane
High-definition Video Processor (HDVP)	Full screen, full frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
Available Graphics Drivers	Microsoft Windows 2000 and Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode) HP qualified drivers may be preloaded or available from the HP support Web site: http://www.hp.com/country/us/en/support.html?pageDisplay=drivers

Analog Resolution	Maximum Refresh Rate
640 x 480	240 Hz
800 x 600	240 Hz
1024 x 768	240 Hz
1152 x 864	170 Hz
1280 x 1024	150 Hz
1600 x 1200	100 Hz
1920 x 1080	85 Hz
1920 x 1200	85 Hz
1920 x 1440	75 Hz
2048 x 1536	60 Hz

Digital Resolution	Maximum Refresh Rate
640 x 480	75 Hz
800 x 600	75 Hz
1024 x 768	75 Hz
1152 x 864	60 Hz
1280 x 1024	60 Hz
1600 x 1200	60 Hz
1900 x 1200	60 Hz

Technical Specifications - Graphics

NVIDIA Quadro NVS 280 64MB PCI Dual Head

Form Factor	Low profile (both ATX and low profile brackets included)
Graphic Controller	Integrated Quadro 280 2-D graphics processor unit (GPU)
Bus type	PCI
RAMDAC	Dual 350 MHz integrated
Memory	64 MB DDR with frame buffer and Texture storage
Connector	Single High-density DMS-59 Connector
Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
Controller clock speed	250 MHz
Color depth	32-bits/pixel max
Overlay planes	One 16-bit Video overlay plane
Maximum vertical refresh rate	85 Hz
Multi-monitor support	Dual analog or digital monitors
Dual DVI Support	Yes (with kit DL139A)
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
Available graphics drivers	Microsoft Windows 2000 and Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode)

NOTE: HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.

Analog Resolution	Maximum Refresh Rate
640 x 480	240 Hz
800 x 600	240 Hz
1024 x 768	200 Hz
1600 x 1200	170 Hz
1600 x 1200	150 Hz
1600 x 1200	100 Hz
1920 x 1200	85 Hz
1920 x 1200	85 Hz
1920 x 1440	75 Hz
2048 x 1536	60 Hz

Digital Resolution	Maximum Refresh Rate
640 x 480	75 Hz
800 x 600	75 Hz
1024 x 768	75 Hz
1152 x 864	60 Hz
1280 x 1024	60 Hz
1600 x 1200	60 Hz (primary only)

Technical Specifications - Graphics

NVIDIA Quadro NVS 55 64MB PCI DVI with TV-Out	**Form Factor**	Low profile, both ATX and low profile brackets included
	Graphic Controller	Integrated Quadro NVS 55 Graphics Processor Unit (GPU)
	Bus type	PCI 2.1, 32-bit, 5V
	Memory	64 MB DDR
	Connectors	Single DVI-I connector Single S-Video connector
	Dimensions	Low profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
	Controller clock speed	250 MHz
	Memory speed	200 MHz
	Color depth	32-bits/pixel max
	Overlay planes	One 16 bit video overlay plane
	Maximum vertical refresh rate	85 Hz
	Maximum pixel clock	Analog output: 350 MHz Digital output: 162 MHz
	Single DVI Support	Yes
	TV out support	Yes (S-Video 4 pin mini-Din)
	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 colorspace conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation Up to 5-tap horizontal by 3-tap vertical filtering
	Agency Approvals	ACA C-tick, BSMI, CE Mark, FCC, ICES/C.I.S.P.R, MIC, UL, VCCI
	Available graphics drivers	Microsoft Windows 2000 and Microsoft Windows XP 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

7200 rpm Serial ATA Hard Drives	**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 MB	
		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)	
	160-GB	**Capacity**	163,928,604,672 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 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
			Average	9.3 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	320,173,056	
		Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

80-GB	**Capacity**	80,026,361,856 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 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 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)	
40-GB	**Capacity**	40,020,000,000 bytes	
	Height	1 inch (2.54 mm)	
	Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA	
	Synchronous Transfer Rate (Maximum)	Up to 1.5 Gb/s	
	Buffer	2 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
		Average	8.5 ms
		Full-Stroke	18.0 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	78,165,360	
	Operating Temperature	41° to 131° F (5° to 55° C)	

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)
		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
		Microsoft® PC 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
	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, installation guide, warranty card, safety and comfort guide	

Technical Specifications - Input/Output Devices

PS/2 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)
		System interface	PS/2 6-pin mini din connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC 99 - 2001	Functionally compliant
	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
	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 guide	

HP USB Smartcard Keyboard	**Physical characteristics**	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
		Form factor	USB basic Smart Card keyboard
		Colors	Carbonite/Silver
		Dimensions (H x W x D)	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
	Microsoft PC 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 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	

USB Standard BG1650 Keyboard (gray)	**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)
		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
		Microsoft PC 99 – 2001	Functionally compliant

Technical Specifications - Input/Output Devices

	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
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, BG Prufzert Mark	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
	Kit contents	Keyboard, installation guide, warranty card, safety and comfort guide	
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

Technical Specifications - Input/Output Devices

	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
	Mechanical	**Resolution**	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	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	.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

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

Technical Specifications - Input/Output Devices

	Electrical	**Operating voltage**	5 VDC ± 10%
		Power consumption	100mA
		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
	Mechanical	**Resolution**	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	61 g nominal peak force
		Switch life	3,000,000 operations (using Hasco modified tester)
		Switch type	Low force micro-switches
		Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
		Cable length	6 ft (1.8 m)
		Microsoft PC99 – 2001	Mechanically compliant
	Scroll wheel	**Width**	8 mm
		Diameter	1.01 in (25.6 mm)
		Maximum rotation speed	48 rats/sec
		Switch type	Light force micro-switch
		Switch life	1 million operations
		Mechanical life	Minimum 200,000 revolutions
	Regulatory approvals	**Compliant**	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
HP USB Scroll Mouse	**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

Technical Specifications - Input/Output Devices

	Electrical	**Operating voltage**	5 VDC ± 10%
		Power consumption	15 mA
		System consumption	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
		Microsoft® PC99 - 2001	Functionally compliant
	Mechanical	**Resolution**	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	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
		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

HP USB Optical Scroll Mouse	**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 95, 98, 2000, Me, and XP Available USB port

Technical Specifications - Optical Storage

16X DVD+/-RW LightScribe Drive (Double Layer / Dual Format)	**Height**	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	ATAPI/EIDE	
	Disc recording capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Write speed	DVD+R	Up to 16X
		DVD+RW	Up to 4X
		DVD+R DL	Up to 2.4X
		DVD-R	Up to 8X
		DVD-RW	Up to 4X
		CD-R	Up to 40X
		CD-RW	Up to 24X
	Read speed	DVD+R/-R/+RW/ -RW/+R DL	Up to 8X
		DVD-ROM	Up to 16X
		CD-ROM, CD-R	Up to 40X
		CD-RW	Up to 32X
	Access time (typical reads, including settling)	**Random**	DVD: < 130 ms (typical), CD: < 120 ms (typical)
		Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
		Startup Time	Single-session: < 15 seconds (typical), Multi-session: < 30 seconds (typical)
		Stop Time	< 4 seconds
		Cache Buffer	2 MB (minimum)
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
	Power	**Source**	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

	Environmental conditions (operating - non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative humidity	10% to 90%
		Maximum wet bulb temperature	86° F (30° C)
	System configuration	Intel Pentium III Processor or later with 128 MB of memory (required); 256 MB recommended 2-D or 3-D graphics cards on primary disk drive for operating system and application software; second disk drive for audio and video data	
	Regulatory approvals	MPC-3 compliant, multi-read requirements, ATA Spec X3T9.2, ATAPI Spec T13.1153D, ANSI C63.4-1992, UL 1950, ACA AS/NZS 3548, CB Bulletin No. 96A, CSA C22.2 No. 950-1995, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, EMKO-TSE 07/94, TUV EN60950, EN60825-1, MIC, BSMI-CNS 13438, CE, Microsoft PC2001 certification, Microsoft Logo for Windows XP and 2000.	
16X/48X DVD-ROM Drive	**Height**	5.25-in, half-height	
	Interface Type	ATAPI	
	Dimensions– External, Excluding Bezel (W x H)	5.88 x 1.71 in (149.5 x 43.5 mm)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	1.2 mm	
	Track Pitch	1.6 µm (CD), 0.74 µm (DVD)	
	Disc Center Hole Diameter	15 mm	
	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, DVD+R DL ; 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), 8.5 GB (DVD+R DL)
		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)
	Block Size (bytes)	DVD-ROM - 2048; CD-ROM Mode 0 - 2352; CD-ROM Mode 1 - 2352, 2340, 2336, 2048; CD-ROM Mode 2 - 2352, 2340, 2336, 2048	
	Access Times (typical reads, including settling)	**DVD-ROM Single Layer**	120 ms (typical)
		CD-ROM Mode 1	90 ms (typical)
		Full Stroke DVD	240 ms (seek) (typical)
		Full Stroke CD	160 ms (seek) (typical)
	Maximum Data Transfer Rates	**CD-ROM Read**	7200 KB/s (up to 48X)
		DVD-ROM Read	21,600 KB/s (16X) Max

Technical Specifications - Optical Storage

	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)	
	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
	Audio Output Level	0.7 Vrms (typical)	
	Configuration Jumper Block	Master, slave, and cable select modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	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, SEMKO, NEMKO, DEMKO, FIMKO, EN 60825-1, UL 60950, and CSA C22.2 60950-2000.	
48X/32X Combo CD-RW/DVD-ROM Drive	**Orientation**	Either horizontal or vertical	
	Disc Loading Mechanism	Half-height, tray load	
	Interface Type	ATAPI	
	Dimensions—external (W x H x D)	5.77 x 1.71 x 7.36 in (14.66 x 4.34 x 18.69 cm) (external, excluding bezel)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	0.05 in (1.2 mm)	
	Track Pitch	1.6 µm (CD), 0.74 um (DVD)	
	Disc Center Hole Diameter	0.6 in (15 mm)	
	Reference Scanning Velocity	1.2 m/s (CD); 3.49 m/s (DVD SL); 3.84 m/s (DVD DL)	

Read Only Disc Parameters	**Formats and Modes Supported**	CD-ROM-Mode 1; CD-ROM XA-Mode 2; CD-Bridge; CD digital audio; CD Extra; Photo CD (single and multi-session); video CD; DVD (single- and double-layer); DVD-R; DVD-RW; DVD-RW Multi-Border; DVD+R; DVD+R Multi-Session , and DVD+RW
	Capacity	180 MB (8 cm); 540 MB (12 cm); 650 MB (12 cm); 700 MB (12 cm); 4.7 GB (DVD-5); 8.54 GB (DVD-9); 9.4 GB (DVD-10)
	Block Size	Mode 1-2,048 and 2,352 bytes; mode 2, form 1-2,048; 2,328; 2,336; 2,340 and 2,352 bytes; mode 2, form 2-2,328; 2,336; 2,340 and 2,352 bytes; CD-DA-2,352 bytes; DVD-2,048 bytes
Writeable Disc Parameters	**Disc Type**	CD-R and CD-RW
	Write Methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
	Format and Modes Supported	CD-ROM; CD-ROM XA; CD digital audio, video CD; CD-Bridge
	Capacity	180 MB (8 cm); 540 MB (12 cm); 650 MB (12 cm); 700 MB (12 cm)
	Block Size	CD-DA-2,352 bytes; mode 0- 2,336 and 2,352 bytes; mode 1-2,048 and 2,352 bytes; mode 2-2,336 and 2,352; mode 2, form 1-2,048 and 2,352 bytes; mode 2, form 2-2,324 and 2,352 bytes
Access Times (typical)	**Random DVD**	< 140 ms (typical)
	Random CD	< 125 ms (typical)
	Full Stroke DVD	< 250 ms (seek)
	Full Stroke CD	< 210 ms
Data Transfer Rates	**CD-R write**	7200 KB/s (48X) Max
	CD-RW write	4800 KB/s (32X) Max
	CD-ROM, CD-R, CD-RW read	7200 KB/s (32X) Max
	DVD ROM read	21,632 KB/s (16X) Max
Data Transfer Modes	ATA PIO mode 4); ATA Multi-word DMA mode 2; ATA UltraDMA mode 0; ATA UltraDMA mode 1, mode 2; ATA UltraDMA Mode 3 (default)	
Cache Buffer	2 MB (minimum)	
Start-up Time (single)	< 7 seconds typical	
Start-up Time (multi-session)	< 30 seconds typical	
Stop Time	< 4 seconds	

Technical Specifications - Optical Storage

	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 VCD — < 1A (typical) < 1600 mA (maximum)
			12 VCD — < 600 mA (typical) < 1.4A (maximum)
			Total Drive Power (Standby mode) — < 2.5 watt
	Audio Output Level	0.7 Vrms	
	Configuration Jumper Block	Cable select (default), master and slave modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	Environmental (all conditions, non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Certifications, Requirements	MPC-3 compliant, multi-read requirements, ACA AS/NZS 3548, ANSI C63.4-1992, ATAPI Spec SFF-8020, ATA Spec X3T9.2, CB Bulletin No. 92A, CSA C22.2 No. 950-1995, C.I.S.P.R. Pub 22, EMKO-TSE 207/94, TUV or VDE EN60 950, EN60825-1, Microsoft ®PC2001 certification, Microsoft Logo for Windows XP, 2000	
48X/32X/48X CD-RW Drive	**Orientation**	Either horizontal or vertical	
	Disc loading mechanism	Half-height, tray load	
	Interface type	ATAPI IDE	
	Dimensions-external (W x H x D)	7.99 x 5.88 x 1.71 in (20.3 x 14.93 x 4.34 cm)	
	Weight	2.6 lb (1.2 kg)	
	Disc diameter	12 cm, 8 cm	
	Disc thickness	1.2 mm	
	Track pitch	1.6 µm	
	Disc center hole diameter	15 mm	
	Reference scanning velocity	1.2 m/s	
	Recording/playing time	80 minutes with CD-R media	

Read only disc parameters	**Formats and modes supported**	CD-ROM-Mode 1; CD-ROM XA-Mode 2 (forms 1 and 2); CD digital audio; CD Extra; CD-I-Mode 2 (forms 1 and 2) and CD-I-Ready; Photo CD (single and multi-session); video CD
	Capacity	185 MB (Mode 2, 8cm); 540 MB (Mode 1, 12 cm); 650 MB (Mode 2, 12 cm); 700 MB (Mode 2, 12 cm)
	Block size	Mode 1-2,048 and 2,352 bytes; mode 2, form 1-2,048; 2,328; 2,336; 2,340 and 2,352 bytes; mode 2, form 2-2,328; 2,336; 2,340 and 2,352 bytes; CD-DA-2,352 and 2,368 bytes
Writeable disc parameters	**Disc type**	CD-R and CD-RW
	Write methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
	Format and modes supported	CD-ROM (mode 1); CD-ROM XA (mode 2, forms 1 and 2); CD digital audio, CD-I (mode 2, forms 1 and 2); video CD
	Capacity	185 MB (Mode 2, 8cm); 540 MB (Mode 1, 12 cm); 650 MB (Mode 2, 12 cm); 700 MB (Mode 2, 12 cm)
	Block size	Mode 1-2,048 bytes; mode 2, form 1-2,048 and 2,352 bytes; mode 2, form 2-2,352 bytes; CD-DA ---2,352 bytes
Access times (typical)	**Random**	< 120 ms
	Full stroke	< 200 ms
Data transfer rates	**CD-RW write**	4800 KB/s (up to 32X)
	CD-ROM, CD-R read	7200 KB/s (up to 48X)
	CD-RW read	7200 KB/s (up to 32X)
	CD-R write	7200 KB/s (up to 48X)
Data transfer modes	ATA PIO mode 4 (16.7MB/s); ATA multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA mode 0 (16.7 MB/s) ;ATA UltraDMA mode 1 (24 MB/s) ; ATA UltraDMA mode 2 (33 MB/s) - default.	
Cache buffer	2 MB (minimum)	
Start-up time (single)	< 7 seconds typical	
Start-up time (multi-session)	< 30 seconds typical	
Stop time	< 4 seconds	

	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 VCD < 1A (typical)
			< 1600 mA (maximum)
			12 VCD < 600 mA (typical)
			< 1.4A (maximum)
			Total Drive Power (Standby mode) < 2.5 watt
	Audio output level	0.7 Vrms	
	Configuration jumper block	Master, slave and cable select modes	
	Data interface connector	50-pin IDE interface	
	Environmental (all conditions, non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	84° F (29° C)
	Certifications, requirements	ACA AS/NZS 3548, ANSI C63.4-1992, CB Test Certificate for IEC 950, CE Mark, CFR 47 part 15, CNS 13438, CSA C22.2 No. 60950, DHHS/FDA - 1040, EN60825, EN55022:1998, EN55024, EN60 950:2000, ICES-003 class B, IEC 61000 4-2 - 4-11, Nordic EN60 950, TUV or VDE EN60 950, UL 60950, C.I.S.P.R. Publication 22 Class B, BSMI, Microsoft P2001, Microsoft Logo for Windows98, 2000 and XP	

48X Max CD-ROM Drive	**Interface**	ATAPI	
	Data Transfer Rate	Variable (Audio CD) - 1,800 to 3,600 KB/s (24X) Max	Variable (CD-ROM, CD-R)-2,400 to 7,200 KB/s (48X) Max
	Access Time (ms)	Random: <125 ms	Full-stroke seek: <210 ms
	Data Buffer	2MB	
	Disk Formats Read	CD-ROM Mode 1, CD-ROM XA (Mode 2, Form 1 and 2), CD Digital Audio, CD-EXTRA, CD-I (Mode 2, Form 1 and 2) and CD-I Ready, CD-Text, CD-Bridge, Photo CD (Single and Multi Session), Video CD, CD-R and CD-RW Multi-Session	
	Disk Formats Written	None	
	Disk Capacity (CD)	180MB, 540MB, 650 MB, and 700MB	
	Block Size	Mode 1-2,048, 2,352 bytes Mode 2-1, 2,048, 2,328, 2,336, 2,340, 2,353 bytes Mode 2-2, 2,328, 2,336, 2,340, 2,352 bytes CD-DA-2,352, 2,368 bytes	
	Diameter	12 cm; 8 cm	
	Thickness	1.2 mm	
	Track Pitch	1.6 µm	
	Audio Output Level	Line-out-0.7 V @ 47 Kohm	

Technical Specifications - Optical Storage

Startup Time	<7 seconds (typical); < 30 seconds with multi-session	
Operating Conditions	**Temperature**	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
Dimensions (H x W x D, maximum)	1.7 x 5.9 x 8.0 in (4.3 x 15.0 x 20.3 cm)	
Weight	2.6 lb (1200 g)	

HP 16-in-1 Media Card Reader	**USB Interface**	USB 2.0 High-speed device	
	Advance protocol support	Supports hardware ECC (Error Correction Code) function • Supports hardware CRC (Cyclic Redundancy Check) function • Supports MS 4-bit parallel transfer mode • Supports MS-PRO 4-bit parallel transfer mode • Supports SD 4-bit parallel transfer mode • Supports high-speed 50-MHz SD 4-bit card (version 1.1) • Support high-speed 52-MHz MMC 8-bit card	
	Supported media type with card adapter	• MicroSD (T-Flash) • Memory Stick Micro	
	Mechanical		
	Environmental	**Operational Environmental Extremes**	Test Parameters/Conditions – Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. = 24 hours 10°C 90% R.H. = 24 hours 20°C 90% R.H. = 24 hours 30°C 90% R.H. = 24 hours 40°C 90% R.H. = 24 hours 50°C 90% R.H. = 24 hours 50°C 10% R.H. = 24 hours
		Storage Environmental Extremes	Test Parameters/Conditions 60°C @ 80% R.H. for 96 hours -30°C @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
	Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.2 FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T	

Eco-Label Certifications & declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US Energy Star
- Blue Angel
- US Federal Energy Management Program (FEMP)
- Taiwan Green Mark
- China Energy Conservation Program
- IT ECO declaration
- Japan PC Green label*
- EPEAT (Silver)

***NOTE**: This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'

Ultra-Slim Desktop

System Configuration

The Energy Consumption and Declared Noise Emissions data for the Ultra-Slim Desktop is based on a typically configured model:

Processor	3.2 GHz
Memory	512 MB
Hard drive	40 GB

Energy Consumption

	115 VAC	230 VAC	100 VAC
Normal Operation	72 W	66 W	73 W
Sleep*	3.9 W	4.2 W	2.5 W
Off	1.0 W	1.3 W	2.6 W

Heat Dissipation**

	115 VAC	230 VAC	100 VAC
Normal Operation	246 BTU/hr	226 BTU/hr	250 BTU/hr
Sleep*	13 BTU/hr	14 BTU/hr	9 BTU/hr
Off	3 BTU/hr	4 BTU/hr	9 BTU/hr

NOTES:

* Energy Star low energy mode

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

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

Declared Noise Emissions
(in accordance with ISO 7779 and ISO 9296)

	Sound Power (LWad, bels)	Sound Pressure (LpAm, decibels)
Idle	3.6	25
Fixed Disk (random writes)	3.9	29
Optical Drive (sequential reads)	4.7	36

Technical Specifications - Environmental Data

Longevity and Upgrading

This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:

- Intel LGA775 processor socket
- 8 USB ports
- 1 multi-bay port
- 1 empty PCI slot (w/ optional riser card)
- 1 internal drive slot
- 3 memory slots
- 1 Serial Port (optional)

Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see http://www.epeat.net.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is 90% recyclable when properly disposed of at end of life.

Packaging Materials

External	Corrugated Paper	1600 g
Internal	LDPE Foam	260 g
	LDPE Bag	2 g

Small Form Factor

System Configuration

The Energy Consumption and Declared Noise Emissions data for the Small Form Factor is based on a typically configured model:

Processor	2.8 GHz
Memory	512 MB
Hard drive	80 GB

Technical Specifications - Environmental Data

Energy Consumption

	115 VAC	230 VAC	100 VAC
Normal Operation	88.5 W	84.5 W	89.5 W
Sleep*	4.2 W	4.2 W	4.5 W
Off	1.0 W	1.0 W	1.3 W

Heat Dissipation**

	115 VAC	230 VAC	100 VAC
Normal Operation	302 BTU/hr	299 BTU/hr	307 BTU/hr
Sleep*	14 BTU/hr	14 BTU/hr	15 BTU/hr
Off	3 BTU/hr	3 BTU/hr	14 BTU/hr

NOTES:

* Energy Star low energy mode

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

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

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

	Sound Power (LWad, bels)	Sound Pressure (LpAm, decibels)
Idle	4.0	29
Fixed Disk (random writes)	4.0	30
Optical Drive (sequential reads)	5.4	45

Longevity and Upgrading

This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:

- Intel LGA775 processor socket
- 8 USB ports
- 2 multi-bay ports (optional)
- 4 empty PCI slots (2 standard, 2 low profile))
- 1 internal drive slots
- 4 memory slots
- 1 Serial Port (optional)

Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)
Battery type: Lithium

Technical Specifications - Environmental Data

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see http://www.epeat.net.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is 74% recyclable when properly disposed of at end of life.

Packaging Materials

External	Corrugated Paper	1600 g
Internal	LDPE Foam	260 g
	LDPE Bag	2 g

Convertible Minitower

System Configuration

The Energy Consumption and Declared Noise Emissions data for the Convertible Minitower is based on a typically configured model:

Processor	2.8 GHz
Memory	256 MB
Hard drive	80 GB

Energy Consumption

	115 VAC	230 VAC	100 VAC
Normal Operation	80 W	76 W	80 W
Sleep	3.6 W	4.1 W	3.5 W
Off	1.4 W	1.9 W	1.4 W

Heat Dissipation**

	115 VAC	230 VAC	100 VAC
Normal Operation	274 BTU/hr	260 BTU/hr	274 BTU/hr
Sleep	12 BTU/hr	14 BTU/hr	12 BTU/hr
Off	5 BTU/hr	6 BTU/hr	5 BTU/hr

NOTES:

* Energy Star low energy mode

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

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

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

	Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
Idle	4.2	25
Fixed Disk (random writes)	4.4	27
Optical Drive (sequential reads)	4.8	31

Technical Specifications - Environmental Data

Longevity and Upgrading

This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:

- Intel LGA775 processor socket
- 8 USB ports
- 4 multi-bay ports (optional)
- 4 empty PCI slots (2 standard, 2 low profile))
- 2 internal drive slots
- 4 memory slots
- 1 Serial Port (optional)

Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see http://www.epeat.net.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is 90% recyclable when properly disposed of at end of life.

Packaging Materials

External	Corrugated Paper	1612 g
Internal	LDPE Foam	296 g

Ultra-Slim Desktop, Small Form Factor, Convertible Minitower

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. From July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).
Prior to this date, customers interested in purchasing RoHS compliant product should contact their local HP sales or distribution office to determine specific configuration status.

Technical Specifications - Environmental Data

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

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

Packaging

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

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

End-of-life Management and Recycling

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

Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:
[link to new HP white paper now in progress]
Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html
ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

Technical Specifications - Environmental Data