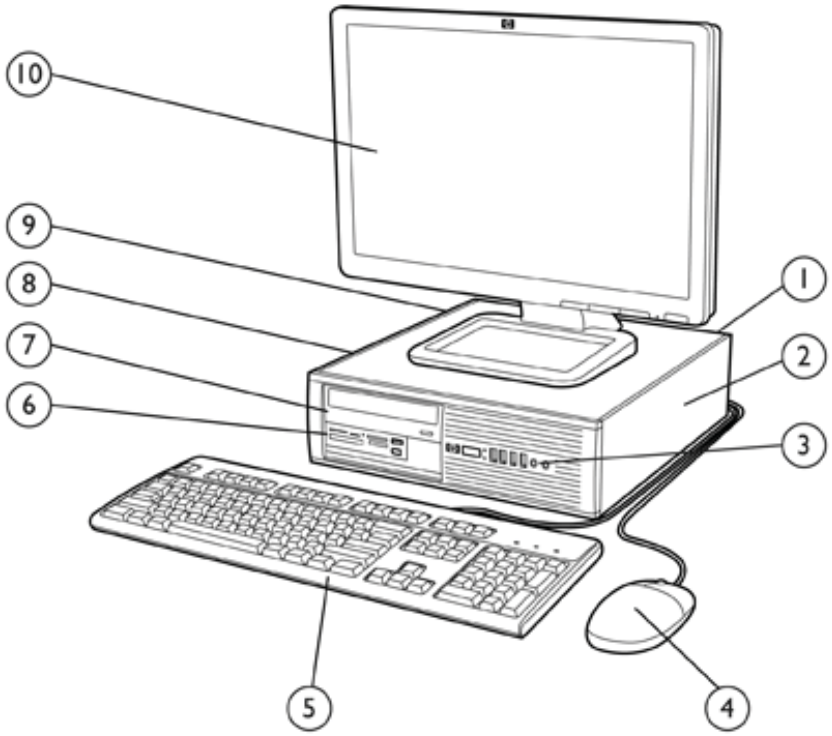
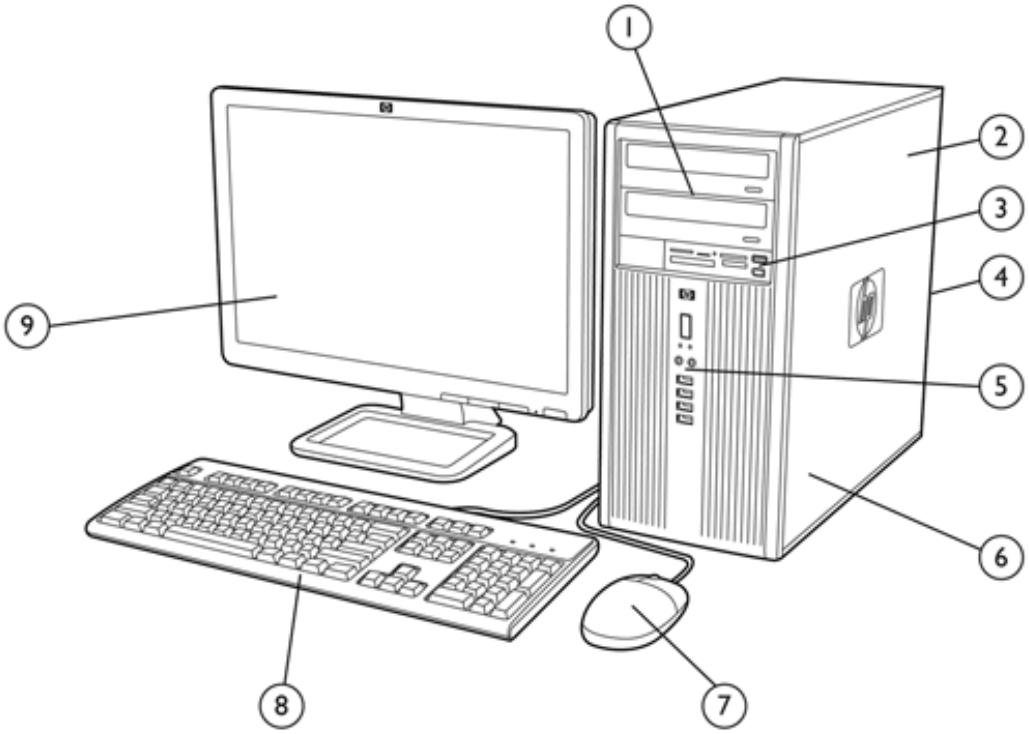
HP Compaq 6005 Pro Small Form Factor Business PC



1 Rear I/O includes (6) USB 2.0 ports, serial port, PS/2 mouse and keyboard ports, RJ-45 network interface, DisplayPort and VGA video interfaces, and audio in/out jacks
2 Low profile expansion slots include (1) PCI, (2) PCI Express x1 and (1) PCI Express x16 graphics
3 Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack
4 HP Optical Mouse
5 HP Keyboard
6 3.5" external drive bay supporting a media card reader or a secondary hard disk drive
7 5.25" external drive bay supporting an optical disk drive
8 3.5" internal drive bay supporting primary hard disk drive
9 240W standard or 89% high efficiency Power Supply
10 HP Monitor (sold separately)

HP Compaq 6005 Pro Microtower Business PC

Overview



1 (2) 5.25" external drive bays
(2) 3.5" internal hard disk drive bays

2 320W standard or 89% high efficiency Power Supply

3 (1) 3.5" external bay

4 Rear I/O includes (6) USB 2.0 ports, serial port, PS/2 mouse and keyboard ports, RJ-45 network interface, DisplayPort and VGA video interfaces, and audio in/out jacks

5 Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack

6 Full height expansion slots include (1) PCI, (2) PCI Express x1 and (1) PCI Express x16 graphics

7 HP Mouse

8 HP Keyboard

9 HP Monitor (sold separately)

Overview

At A Glance

- Designed for long-term deployment within corporate, enterprise, public sector and mid-market commercial organizations
- Choice of two professional chassis form factors to accommodate any desired mix between expandability and size
- BIOS developed and engineered by HP for better security, manageability and software image stability
- AMD 785G chipset with integrated ATI Radeon HD 4200 graphics supporting DirectX 10.1
- Side Port Memory for increased power savings and increased graphics performance
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Supports industry standard management protocols including DASH 1.1
- Integrated dual independent monitor support via both a VGA and DisplayPort video interface
- Standard efficiency or 89% high efficiency energy saving power supplies available on SFF and MT models
- 87% efficient energy saving external power adapter standard with USDT models
- ENERGY STAR qualified models available (dependent upon the desired configuration)
- Guaranteed lengthy purchase lifecycles and image stability
- Software image fully compatible across all models and form factors
- Created using industry leading Design for Environment standards
- 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)
- Protected by HP Services, including standard warranties up to 5-5-5 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Tool-less serviceability features for easier upgrades and repairs

Standard Features and Configurable Components (availability may vary by country)

Operating Systems

Preinstalled	Genuine Windows 7 Home Basic Edition (32-bit)[2] Genuine Windows 7 Home Premium Edition (32-bit or 64-bit)[2] Genuine Windows 7 Professional Edition (32-bit or 64-bit)[2] Novell SUSE Linux Enterprise Desktop 11[3] FreeDOS
Supported	Genuine Windows 7 Enterprise Edition (32-bit)[2] Genuine Windows 7 Enterprise Edition (64-bit)[2] Genuine Windows Vista Business (32-bit)[1] Genuine Windows Vista Home Basic[1] Genuine Windows Vista Business 64[1] Genuine Windows Vista Enterprise 32[1] Genuine Windows Vista Enterprise 64[1]
Certified	Novell SUSE Linux Enterprise Desktop 11[3]

[1] Certain Windows Vista product features require advanced or additional hardware. See www.microsoft.com/windowsvista/getready/hardwarereqs.mspx and www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: www.windowsvista.com/upgradeadvisor

[2] System may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.

[3] The following modules or devices are not supported on Linux certified systems:

- HP 22-in-1 media card reader
- Trusted Platform Module (TPM) 1.2 Security Chip
- Intel Pro 1000 CT GbE NIC
- Broadcom NetXtreme GbE Ethernet Plus NIC
- HP 802.11b/g/n wireless NIC (SFF and MT)
- Intel WiFi Link 5100 a/b/g/n wireless NIC (USDT)
- LSI 56K Int'l SoftModem
- HP USB Smartcard keyboard
- HP Serial port adapter
- HP Parallel port adapter
- HP eSATA port adapter
- HP FireWire/IEEE 1394 I/O card

Value Added Software (included with all models; not included when configured with FreeDOS)

HP Software Management Agent
Computrace for Desktops agent (optional)

HP Insight Diagnostics

PDF Complete Corporate Edition

Standard Features and Configurable Components (availability may vary by country)

Microsoft Office 2010 preloaded (purchase of a Product Key required to activate a full Office 2010 suite)*

* Microsoft Office 2010 Preloaded includes reduced functionality versions of Word and Excel. Purchase of Product Key required to activate full Office 2010 suite available at participating resellers/retailers and http://www.office.com.

Value Added Software (included with select models; not included when configured with FreeDOS)

- Computer Setup Utility
- McAfee Total Protection Anti-Virus*
- Roxio Creator Business
- HP Power Manager
- HP Total Care Advisor
- Corel WinDVD
- Firefox HP Virtual Browser

* 60 day trial period for McAfee Total Protection for Small Business software. Internet access required to receive updates. First update included. Subscription required for updates thereafter.

HP Client Management Solutions (available for free download from the Internet)

http://www.hp.com/go/easydeploy

- HP Client Automation Starter*
- HP SoftPaq Download Manager
- HP Client Catalog for Microsoft SMS
- HP Systems Software Manager

* Available from your HP Sales Representative or HP Channel Partner

Value Added Services and Features

- HP Stable Platform Program
- HP Global Series Services
- Business-to-Business Portals
- Factory Express Deployment and Lifecycle Services
- Trusted Platform Module (TPM) v1.2*

* TPM module disabled where restricted by law, i.e. Russia.

Service and Support

On-site warranty and service[1]: 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[2] and includes free telephone support[3] 24 x 7. Global coverage[2] ensures 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.

[1] Terms and conditions may vary by country. Certain restrictions and exclusions apply

[2] On-site services 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

[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.

Standard Features and Configurable Components (availability may vary by country)

Chipset

AMD 785G chipset

Processor

	SFF/MT
AMD Athlon II X2 Processors	
AMD Athlon II X2 220 Processor 2.8 GHz, 1-MB L2 cache	X
AMD Athlon II X2 B28 Processor 3.4 GHz, 2 MB L2 cache	
AMD Athlon II X2 B30 Processor 3.6 GHz, 2 MB L2 cache	
AMD Phenom II X2 Processors	
AMD Phenom II X2 B57 Processor 3.2 GHz, 1-MB L2 cache, 6-MB shared cache	X
AMD Phenom II X2 B59 Processor 3.4 GHz, 1 MB L2 cache, 6 MB shared cache	X
AMD Phenom II X2 B60 Processor 3.5 GHz, 1 MB L2 cache, 6 MB shared cache	X
AMD Phenom II X3 Processors	
AMD Phenom II X3 B75 Processor 3.0-GHz, 1.5-MB L2 cache, 6-MB shared cache	X
AMD Phenom II X3 B77 Processor 3.2-GHz, 1.5-MB L2 cache, 6-MB shared cache	X
AMD Phenom II X4 Processors	
AMD Phenom II X4 B95 Processor 3.0-GHz, 2-MB L2 cache, 6-MB shared cache	X
AMD Phenom II X4 B97 Processor 3.2-GHz, 2-MB L2 cache, 6-MB shared cache	X
AMD Phenome II X4 B99 Processor 3.3-GHz, 2-MB L2 cache, 6-MB shared cache	X

Standard Features and Configurable Components (availability may vary by country)

Redundant Array of Independent Drives (RAID)

Flexible implementation:

- DriveLock is supported while in RAID mode. Users can manage the DriveLock password from within F10 Setup. Locked drives will be displayed as such in the RAID option ROM interface.
- Hard drive information can be viewed within F10 Setup while in RAID mode. Previously, the hard drives will not appear in Drive Configuration when switching to RAID mode.
- DPS Self Test can be executed on physical hard drives while in RAID mode.
- The RAID Setup Utility (accessed through CTRL-I) can be protected by the F10 Setup password.

NOTE:
RAID 1 is the only RAID configuration offered via factory configurations. The pre-configured systems:

- are only available on the CMT and SFF form factors. are complete RAID systems and have both drives installed. If the CMT is configured with three hard disk drives, the third drive is would be unpartitioned and not part of the RAID array
- have the necessary Option ROM configuration.
- are pre-loaded and pre-installed with all required Intel software.
- include a preinstalled operating system that is mirrored mode out of the box.

Please refer to the HP White Paper titled "Advanced Host Controller Interface (AHCI) and Redundant Array of Independent Disks (RAID) on HP Compaq PCs" at: http://www.hp.com for more information and instructions.

DDR3 Synchronous DRAM NON-ECC System 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 HP Compaq 6005 Pro Series PC supports non-ECC DDR3 PC3-10600 (1333 MHz) and PC3-8500 (1066 MHz) memory.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

Standard Features and Configurable Components (availability may vary by country)

Memory Configurations: **Ultra Slim Desktop**

Maximum Memory Supports up to 8 GB of DDR3 SDRAM using SO-DIMM modules. Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE:
For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Total Memory	**Slot**	
	Channel A (black)	**Channel B** (white)
2 GB (dual channel)	1 GB	1 GB
4 GB (dual channel)	2 GB	2 GB
8 GB (dual channel)	4 GB	4 GB

Memory Configurations: **Small Form Factor Microtower**

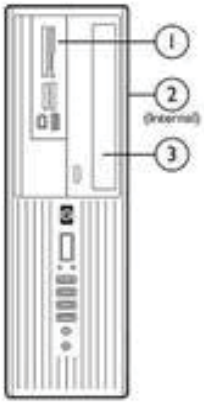
Maximum Memory Supports up to 16 GB of DDR3 SDRAM using DIMM modules. Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE:
For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

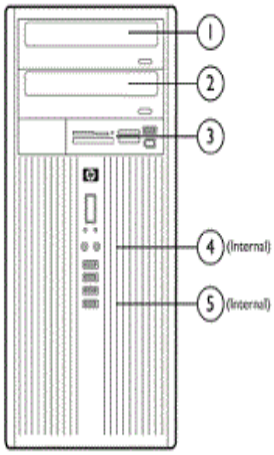
Total Memory	**Slot**			
	Channel A		**Channel B**	
	1 (black)	2 (white)	3 (white)	4 (white)
2 GB (dual channel symmetric)	1 GB		1 GB	
4 GB (dual channel symmetric)	1 GB	1 GB	1 GB	1 GB
8 GB (dual channel symmetric)	2 GB	2 GB	2 GB	2 GB
16 GB (dual channel symmetric)	4 GB	4 GB	4 GB	4 GB

Standard Features and Configurable Components (availability may vary by country)

SFF



MT



Storage Drive Support						
	SFF			MT		
	MCR	ODD	HDD	MCR	ODD	HDD
Quantity Supported	1	1	2	1	2	3
Position	1	3	1,2	3	1,2	4,5

Data Storage Drives

SFF/MT

80-GB Hard Disk Drives

HP 80-GB 2.5" Hard Disk Drive — X
10,000 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart III

160-GB Hard Disk Drives

HP 160-GB 2.5" Hard Disk Drive — X
10,000 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart III

250-GB Hard Disk Drives

HP 250-GB 3.5" Hard Disk Drive — X
7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV

HP 250-GB Removable Hard Disk Drive — X
7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV

320-GB Hard Disk Drive

HP 320-GB 3.5" Self Encrypting Hard Disk Drive — X
7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV

500-GB Hard Disk Drives

Standard Features and Configurable Components (availability may vary by country)

500-GB 3.5" Hard Disk Drive 7,200 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart IV	X
500-GB Removable Hard Disk Drive 7,200 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart IV	X

1-TB Hard Disk Drives

1 TB 3.5" Hard Disk Drive 7,200 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart IV	X

Self-Encrypting Solid State Drive

256 GB SATA 3.5" SED Solid State Drive	X

Self-Encrypting Drive

320 GB SATA 3.5" Self-Encrypting Drive 7,200 rpm	X

Solid State Drives

80 GB 3.5" Solid State Drive	X
120 GB 3.5" Solid State Drive	X
128 GB 3.5" Solid State Drive	X
160-GB 3.5" Solid State Drive	X
256 GB 3.5" Solid State Drive	X
RapidDrive	X

NOTE:

RapidDrive is an optional productivity solution available only on the HP Compaq 6005 Pro SFF & MT models. It links the Solid State Drive (SSD) and Hard Drive together to form one virtual drive that combines the advantages of both technologies. Pre-installed applications reside on the SSD for reduced access time, yet the usual limitations of SSD storage are eliminated by linking it with a large hard drive.

Optical Disc Drives

DVD-ROM Drive[1]	X
SuperMulti LightScribe DVD Writer Drive[1] [2] [3]	X
Blu-Ray Writer Drive	X

[1]For playing DVDs, Corel WinDVD 8
[2] For writing CDs, choice of Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10
[3] For writing CDs and DVDs, video editing and authoring DVDs, choice of Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10

Media Card Readers

Media Card Reader (22-in-1)	X

Standard Features and Configurable Components (availability may vary by country)

Security Solutions and Capabilities

Trusted Platform Module (TPM) 1.2[1]
Stringent Security (via BIOS) [2]
SATA Port Disablement (via BIOS)
Drive Lock
Serial, Parallel, USB enable/disable (via BIOS)
Optional USB Port Disable at factory (user configurable via BIOS)
Removable Media Write/Boot Control
Power-On Password (via BIOS)
Setup Password (via BIOS)
HP Solenoid Hood Lock / Sensor (SFF & MT models only)
Support for chassis padlocks and cable lock devices

[1]TPM module disabled where use is restricted by law; for example, Russia.
[2]This setting is defaulted to disable, but when enabled, the PW jumper will not clear the BIOS pre-boot authentication passwords.

Communication Devices

	SFF/MT
Broadcom NetXtreme BCM-5761 GbE network interface (integrated)	X
Broadcom NetXtreme GbE Ethernet Plus NIC PCIe x1 Card	X
HP 802.11 b/g/n Wireless NIC PCIe x1 Card	X
LSI Hi-Speed 56K International Soft Modem (PCIe x1 Card)	X

Graphics

	SFF/MT
Integrated ATI Radeon HD 4200 Graphics; featuring a Side Port memory interface for 128-MB of dedicated frame buffer DDR3 memory with a device width of x16 for the integrated graphics engine	X
Nvidia NVS 300 Graphics Card	X
Nvidia GeForce 310 DP Graphics Card	X
Nvidia Quadro NVS 290 Graphics Card	X
ATI Radeon HD 4550 Graphics Card	X
ATI Radeon HD 4650 Graphics Card	MT models only
AMD Radeon HD 6350 (512 MB)	X
AMD Radeon HD 6450 (1 GB)	MT models only
AMD Radeon HD 7450 (1 GB)	X
HP DisplayPort to DVI-D Adapter	X
HP DisplayPort to VGA Adapter	X
HP DisplayPort Cable	X

Standard Features and Configurable Components (availability may vary by country)

Multi-Media

High Definition Audio with Realtek ALC261 codec (all ports are stereo)

Microphone/Headphone* and dedicated headphone front ports

Line-out and Line-In rear Ports*

Multi-streaming capable*

Internal Speaker (standard)

HP Thin USB Powered Speakers

HP TV Tuner PCIe x1 Card X

*The front microphone port is re-taskable as a Line-in, Microphone-in or Headphone-in port. Rear audio input ports are re-taskable as a Line-in or Microphone-in port. External speakers must be powered externally. Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks. This allows for different audio applications to use separate audio ports on the system. For example, the front jacks could be used with a headset for a communications application while the rear jacks are being used with external speakers and a multimedia application.

Input/Output Devices

PS/2 Standard Keyboard
USB Standard Keyboard
USB CCID SmartCard Keyboard
USB Mini Keyboard
USB and PS/2 Washable Keyboard

PS/2 Optical Mouse
USB Optical Mouse
USB Laser Mouse
USB and PS/2 Washable Mouse

Miscellaneous Devices

	SFF/MT
HP FireWire (IEEE 1394) Card	X
HP Serial Port Adapter (RS-232 compatible)	X
HP Parallel Port Adapter	X
HP eSATA Port Adapter	X
HP SFF Tower Stand	SFF only

After-Market Options (availability may vary by region)

Communication Devices	SFF/MT	Part Number
HP Wireless 802.11 b/g/n NIC Card	X	FH971AA
Broadcom NetXtreme GbE Ethernet Plus NIC Card	X	FS215AA
LSI Hi-Speed 56K Int'l Soft Modem Card	X	FH970AA
RJ11 Modem Adapter Kit	X	DC131C

Graphics Solutions	SFF/MT	Part Number
ATI Radeon HD 4550 Graphics Card	X	SG764AT
ATI Radeon HD 4650 Graphics Card	MT models only	VN566AT
Nvidia Quadro NVS 290 Graphics Card (PCIe x16)	X	KG748AA
Nvidia GeForce 310 DP Graphics Card	X	VG885AA
DMS59 DVI Dual-head Connector Cable	X	DL139A
HP DVI to DVI Cable	X	DC198A
HP DisplayPort To DVI-D Adapter	X	FH973AT
HP DisplayPort To DL DVI-D Adapter	X	NR078AA
HP DisplayPort to VGA Adapter	X	AS615AA
HP DisplayPort to HDMI Adapter	X	BP937AA
HP DisplayPort Cable	X	VN567AA
HP USB Graphics Adapter	X	NL571AT

Storage Drives	SFF/MT	Part Number
HP 250GB Hard Disk Drive	X	PY278AA
HP 320GB Hard Disk Drive	X	FH963AA
HP 500GB Hard Disk Drive	X	KW347AA
HP eSATA Adapter	X	FH966AA
HP Removable SATA Hard Drive Enclosure (frame & carrier)	X	RY102AA
HP Removable SATA Hard Drive Enclosure (carrier only)	X	RY103AA

After-Market Options (availability may vary by region)

Input Devices	SFF/MT	Part Number
HP PS/2 Standard Keyboard	X	DT527A
HP USB Standard Keyboard	X	DT528A
HP USB SmartCard Keyboard	X	ED707AA
HP USB Keyboard and Mouse Kit	X	RC465AA
HP USB Washable Keyboard	X	VF097AA
HP USB and PS/2 Washable Mouse	X	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	X	BU207AA
HP PS/2 Optical Mouse	X	EY703AA
HP USB Optical Mouse	X	DC172AT
HP USB Laser Mouse	X	GW405AT
HP USB Travel Mouse	X	RH304AA
HP 2.4GHz Wireless Keyboard and Mouse	X	NB896AA

System Memory	SFF/MT	Part Number
HP 2 GB DIMM	X	AT024AA
HP 4 GB DIMM	X	VH638AA

Multimedia Devices	SFF/MT	Part Number
HP Thin USB Powered Speakers	X	KK912AA
HP DVD-ROM Drive	X	AR629AA
HP SuperMulti LightScribe DVD Writer Drive	X	AR630AA
HP Blu-ray Writer Drive	X	AR482AA

Removable Media Storage	SFF/MT	Part Number
HP USB External Diskette Drive	X	DC141B
HP Media Card Reader (22-in-1)	X	AR941AA

After-Market Options (availability may vary by region)

Security Devices	SFF/MT	Part Number
HP/Kensington MicroSaver Cable Lock	X	PC766A
HP Business PC Security Lock	X	PV606AA
HP SFF Wall Mount/Security Sleeve	SFF models only	VN570AA

Security Devices	SFF/MT	Part Number
HP Client Automation - Standard Edition (single seat)	X	T3488AA
HP Client Automation - Standard Edition (10 seats)	X	TA599AA
HP Client Automation - Standard Edition (100 seats)	X	TA600AA
HP Client Automation - Standard Edition (500 seats)	X	TA601AA
HP Client Automation - Standard Edition (1,000 seats)	X	T3489AA

Stands and Accessories	SFF/MT	Part Number
HP SFF Tower Stand	SFF models only	VN569AA
HP Serial Port Adapter (RS-232 compatible)	X	PA716A
HP Parallel Port Adapter	X	KD061AA
HP FireWire IEEE 1394 Card	X	PA997A

Monitors	Part Number
HP Compaq LE1711 17-inch LCD Monitor	EM886AA
HP Compaq LE1911 19-inch LCD Monitor	EM887AA
HP Compaq LE2002x 20-inch LED Backlit LCD Monitor	LL763AA
HP Compaq LE2002xi 20-inch LCD Monitor with IWC Stand	QC841AA
HP Compaq LE2002xm 20-inch LED Backlit LCD Monitor	A2U63AA
HP Compaq LE2202x 21.5-inch LED Backlit LCD Monitor	LL649AA
HP Compaq L2206tm 21.5-inch LED Backlit Touch Monitor	B0L55AA
HP L2401x 24-inch LED Backlit Monitor	B6R21AA

Technical Specifications

Weights & Dimensions

(configured with 1 HDD and 1 ODD)	SFF	MT
Chassis (H x W x D)	4.0 x 13.3 x 14.9 in 100 x 338 x 379 mm	14.9 x 7.0 x 17.0 in 377 x 177 x 431 mm
System Volume	782.77 cu in 12.8 L	1739 cu in 28.5 liter
Tower Stand (H x W x D)	1.1 x 7.0 x 7.9 in 29 x 178 x 200 mm	N/A
Packaging (H x W x D)	9.0 x 19.7 x 23.4 in 229 x 500 x 594 mm	19.7 x 12.2 x 23.6 in 500 x 310 x 600 mm
System Weight*	16.7 lb 7.6 kg	20.5 lb 9.3 kg
Shipping Weight*	17.9 lb 8.1 kg	28.8 lb 13.1 kg
Max Supported Weight (desktop orientation)	77.0 lb 35.0 kg	N/A

I/O Ports

	SFF/MT
USB 2.0	Front - four (4) ports Rear - six (6) ports
Serial	one RS-232 compatible port standard second port available as an option
Parallel	one port available as an option
eSATA	one port available as an option
PS/2	color coded support for keyboard (purple) and mouse (green)
Video	VGA and DisplayPort provide integrated dual independent monitor support
DVI output	available via optional DisplayPort to DVI Adapter
Audio	Front - microphone & headphone Rear - line input (supports microphone or line input), line out **NOTE:** See Audio/Visual section for information on re-taskable audio ports.
NIC	Industry standard RJ-45 port accesses the integrated network interface controller

Technical Specifications

Slots	SFF	MT
Mini PCI Express	N/A	N/A
MXM	N/A	N/A
5-volt PCI	1 each 2.5" low profile 6.6" length 25W max. power	1 each 4.2" full height 6.6" length 25W max. power
PCI Express x1	2 each 2.5" low profile 6.6" length 25W max. power	2 each 4.2" full height 6.6" length 25W max. power
PCI Express x16	1 each 2.5" low profile 6.6" length 25W max. power	1 each 4.2" full height 6.6" length 75W max. power

Bays	SFF	MT
3.5" external	1 bay available for Media Card Reader unless used for a secondary hard drive	
5.25" external	1 each 8.19" depth	2 each 8.19" depth
Slim	N/A	N/A
Secure Digital (SD) Reader	N/A	N/A
Internal HDD Bays	1 each 3.5" drives	2 each 3.5" drives

Controller	SFF	MT
Hard Drive Controller	Serial ATA Supports SATA 1.5-GB/s and 3.0-GB/s	
Host SATA Controller	Advanced Host Controller Interface (AHCI) Revision 1.2. The specification includes a description of the hardware/software interface between system software and the host controller hardware.	
SATA Interfaces	(3) SATA (1) eSATA	

Technical Specifications

Unit Environment and Operating Conditions

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)

* 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	SFF	MT
Standard Efficiency	240W active PFC	320W active PFC
High Efficiency*	240W active PFC 87/89/85% efficient at 20/50/100% load	320W active PFC 87/89/85% efficient at 20/50/100% load
Operating Voltage Range	90 - 264 VAC	90 - 264 VAC
Rated Voltage Range	100 - 240 VAC	100 - 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 - 63 Hz	47 - 63 Hz
Rated Input Current	4A	5.5A
Rated Input Current with Energy Efficient* Power Supply	4A	5.5A
Current Leakage (NFPA 99)	< 275 µA	< 450 µA
Power Supply Fan	92mm variable speed	92mm variable speed
External Power Adapter		
Dimensions	N/A	N/A
Total Cord Length	N/A	N/A

* High efficiency power supply is a requirement for ENERGY STAR qualification in conjunction with a select range of processors and modules

ROM BIOS Information

Key features of the HP BIOS include:

- Deployment and manageability - HP BIOS provides several technologies that help integrate the HP Compaq 6005 Pro Series PC 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.
- Computrace agent - For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management - The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP business PC in any enterprise environment.
- Acoustic performance - Industry leading acoustic emissions across the range of operating conditions.
- 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 (Flashbin), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.

Additional HP BIOS Features

- Power-On password - Helps prevent an unauthorized user from powering on the system.
- 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 Elite models use ACPI to provide power conservation features.

S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

Other Features

- 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.
- System Management BIOS v2.6
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:

# of 1 second blinks followed by a 2 second pause; then repeats	Event Description500
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 recovery mode
9	System not fetching code
10	System hand while loading an option ROM

- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- 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

Technical Specifications

Additional Features	Description
DASH 1.1 support (Desktop and Mobile Architecture for System Hardware)	A standards initiative for representing out-of-band management capability for computer systems. It is a secure, web-services based successor to ASF.
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
TXT (Trusted Execution Technology) and VT-d (Virtualized devices)	TXT allows for secure management (via TPM) and measured launch of VMM, as well as teardown of secrets in unexpected reset case. TXT support provided in select Intel processors
	VT-d is a chipset technology that virtualizes directed I/O
	Together, TXT and VT-d may be used to support verified launch of a known trusted VMM that also may protect VMs from accessing each other's memory.
Computrace	Computrace agent support standard
Towerable Orientation	Small Form Factor models can be oriented as either a desktop or a tower
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
Drive Protection System	DPS Access through F10 Setup during Boot
	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
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
SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	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 III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry
	Detects errors in Read/Write buffers on HDD cache RAM
SMART IV - End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

Technical Specifications - Audio

High Definition Audio	
Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC261 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal. All ports are 3.5mm in diameter
Internal Speaker Amplifier	For the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses (software)	Yes - Uses OS soft wavetable
Analog Audio	Yes
# 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

Technical Specifications - Audio

HP Thin USB Powered Speakers

On/Off/Volume Controls	Right side of right speaker	
Power LED	Front of right speaker (green)	
Frequency Response	FO to 20kHz	
Watts	2/3 watt (normal/maximum)	
Dimensions/Speaker (H x W x D)	5.72 x 3.74 x 0.96 in 14.52 x 9.50 x 2.45 cm	
Net Weight	0.68 lbs 0.31kg	
Color	Black	
Environmental (all conditions non-condensing)	**Operating Temperature:**	14° to 104° F -10° to 40° C
	Relative Humidity	40% to 90%
Speaker Cable Length	**Input Cord:**	5.91 ft 1800mm
	L-channel Cord:	3.28 ft 1000mm
	USB Cord:	5.91 ft 1800mm

Broadcom NetXtreme BCM 5761 GbE integrated network interface

Connector	RJ-45
Controller	Broadcom 5761 PCI-Express LAN Controller
Memory	8 MB NVRAM serial Flash
Data rates supported	10/100/1000 Mbps
Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, and 802.3x
Bus architecture	PCI-Express
Data path width	Single Channel PCI-Express
Data transfer mode	Bus-master DMA
Hardware certifications	FCC class B, Canada and US NRTL Mark, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia, UL listed (E212044), European Union Notice (CE 0682)
Power requirement	1.8W @ 3.3V
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 (actual rate limited by PCI Bus)
Environmental	Operating temperature 32° to 131°F (0° to 55° C) Operating humidity 131° F (55° C) with 5% to 95% non-condensing humidity
Dimensions	2.75 in x 4.13 in (7 cm x 10.5 cm), low profile compatible
OS driver support	Windows Vista 32-bit SP1, Windows Vista x64 SP1, Windows XP 32 bit professional
Management	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles

Broadcom NetXtreme GbE Ethernet Plus Network Interface Controller

Connector	RJ-45
Controller	Broadcom 5761 PCI-Express LAN Controller
Memory	8 MB NVRAM serial Flash
Data rates supported	10/100/1000 Mbps
Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, and 802.3x
Bus architecture	PCI-Express
Data path width	Single Channel PCI-Express
Data transfer mode	Bus-master DMA
Hardware certifications	FCC class B, Canada and US NRTL Mark, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia, UL listed (E212044), European Union Notice (CE 0682)
Power requirement	1.8W @ 3.3V
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 131° F (55° C) with 5% to 95% non-condensing humidity
Dimensions	2.75 in x 4.13 in (7 cm x 10.5 cm), low profile compatible
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Management	ACPI, WOL and DMI 2.0, PXE 2.1, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles

HP Wireless Network Connection 802.11 b/g/n

Dimensions (L x H)	3.3 x 4.7 in 8.5 x 12 cm
Weight	0.08 lbs (40 g)
Controller	Ralink RT2790
System interface	PCIe x1
Network standard	802.11 b/g/n
Frequency band	2.400 - 2.497 GHz
Operating temperature	14° to 149°F, operating (-10° to 65°C, operating)
Storage temperature	-40° to 176°F, non-operating (-40° to 80°C, non-operating)
Humidity	10-90% operating 5-95% non-operating

Technical Specifications - Communications

Operating voltage	3.3V +/- 9% 12V +/- 8%	
Power Consumption	**Platform/WLAN Mode**	**Power Consumption**
	Maximum Power Consumption:	10 Watts
	Transmit Only	4 Watts maximum averaged power over 1 second
	Transmit Packet or Active Scanning	1000 mA peak current for 100 microseconds or longer
	Receive Only Mode or Idle without IEEE PSP mode enabled	3 Watts maximum averaged over 1 second
	Idle, with IEEE PSP mode enabled	1.0 Watts maximum averaged over 1 second
	Transmit Disabled (turned off in software)	50 mW maximum, averaged over 1 second
	Platform in S3 or S4 (power removed from Low Profile PCI Express Card)	5 mW maximum, averaged over 1 second
Output Power (approximate)	802.11b mode	+19 dBm +/- 1.0 dB maximum
	802.11g mode	+17 dBm +/- 1.0 dB maximum
	EWC mode	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)

Receive Sensitivity	**Mode**	**Data Rate**	**Sensitivity**
	802.11b	1 Mbps	-94 dBm
	802.11b	11 Mbps	-85 dBm
	802.11g	6 Mbps	-91 dBm
	802.11g	18 Mbps	-85 dBm
	802.11g	48 Mbps	-75 dBm
	802.11g	54 Mbps	-72 dBm
	EWC (2.4 GHz)	6.5 Mbps	-87 dBm
	EWC (2.4 GHz)	54 Mbps	-82 dBm
	EWC (2.4 GHz)	81 Mbps	-78 dBm
	EWC (2.4 GHz)	162 Mbps	-74 dBm
	EWC (2.4 GHz)	270 Mbps	-68 dBm
	EWC (2.4 GHz)	300 Mbps	-64 dBm

Data Transfer Rate	**Data Rate (MCS)**	**Minimum Throughput**
	1 Mbps (802.11 b)	700 kbps
	2 Mbps (802.11 b)	1.4 Mbps
	5.5 Mbps (802.11 b)	3.5 Mbps
	11 Mbps (802.11 b)	5.9 Mbps
	12 Mbps (802.11 g)	6 Mbps
	18 Mbps (802.11 g)	9 Mbps
	24 Mbps (802.11 g)	12 Mbps
	36 Mbps (802.11 g)	18 Mbps
	48 Mbps (802.11 g)	21 Mbps

	54 Mbps (802.11 g)	22.5 Mbps
	6.5 Mbps (20 MHz EWC)	4.5 Mbps
	13 Mbps (20 MHz EWC)	9 Mbps
	19.5 Mbps (20 MHz EWC)	13.5 Mbps
	26 Mbps (20 MHz EWC)	18 Mbps
	39 Mbps (20 MHz EWC)	27 Mbps
	52 Mbps (20 MHz EWC)	36 Mbps
	58.5 Mbps (20 MHz EWC)	40 Mbps
	65 Mbps (20 MHz EWC)	45 Mbps
	78 Mbps (20 MHz EWC)	54 Mbps
	104 Mbps (20 MHz EWC)	72 Mbps
	117 Mbps (20 MHz EWC)	81 Mbps
	130 Mbps (20 MHz EWC)	91 Mbps
	13.5 Mbps (40 MHz EWC)	8 Mbps
	27 Mbps (40 MHz EWC)	16 Mbps
	40.5 Mbps (40 MHz EWC)	24 Mbps
	54 Mbps (40 MHz EWC)	32 Mbps
	81 Mbps (40 MHz EWC)	48 Mbps
	108 Mbps (40 MHz EWC)	64 Mbps
	121.5 Mbps (40 MHz EWC)	72 Mbps
	135 Mbps (40 MHz EWC)	81 Mbps
Security	IEEE and WiFi compliant 64 / 128 bit WEP encryption AES: CCM 802.1x authentication WPA: 802.1x. WPA-PSK and TKIP WPA2 certification IEEE 802.11i Cisco Certified Extensions, all versions through V5	
Antenna	HP part number 497792-001	
Certifications	Wi-Fi certified	
Certifications for use by country	United States, Canada, Peru, Taiwan	

LSI 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	PCI Bus Power Management Interface Specification (PCI-PM) Revision 1.2, Appendix A. D0, D3hot, and D3cold. Wake on Ring state when in D3cold. If the power management event (PME) feature is enabled in D3cold, a modem can wake the system via WAKE# (WAKEN) or beacon. Meets PCI Express 1.1 standard.
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 express bus Uses only one PCI express load (i.e., one grant/request pair), one shared IRQ, one electrical load
Chipset	LSI SV92EX - Integrated PCI interface with 3.3-V tolerant buffers and CardBus support
Dimensions (L **X H)**	Complies with PCI express 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.
Other	The SV92EX device is packaged in a 32-pin micro leadless chip carrier (MLCC). The SV92EX is fully compliant with the PCI Express revision 1.1 specification. WHQL approved; ASPM compliant.

Technical Specifications - Graphics

ATI HD 4200 Integrated Graphics

Memory	Variable and user selectable in BIOS
Controller Clock Speed	500-MHz
Maximum Color Depth	32-bpp
Multi-display Support	Yes
Graphics/Video API Support	DX10, OpenGL 2.0
Output Connectors	(1) VGA; (1) DisplayPort
VGA DAC Frequency	400-MHz

Resolutions Supported

	Maximum Refresh Rate	
Resolution	**Analog Connection**	**Digital Connection**
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60
1920x1200	85	60
1920x1440	85	60
2048x1536	75	60
2560x1600	N/A	60

NOTE:
Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

NOTE:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

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NVIDIA Quadro NVS 290 Graphics Card

Bus Type	PCI Express x16; low profile	PCI Express x1, low profile
Graphics Controller	Integrated Quadro 290 2D GPU	
Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage	
Connector	Single high-density DMS-59 Flex Connector	
Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)	
Multi-Monitor support	Dual monitor support	
RAMDAC	Integrated dual 400MHz	
Maximum Pixel Clock	350-MHz	

Technical Specifications - Graphics

Overlay planes	One 16-bit video overlay plane	One 1-bit video overlay plan
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	

Specification	**Description**
Description	G86-825
Core Clock	460-MHz
Memory Clock	400-MHz
Frame Buffer	256-MB DDR2, 64-bit wide

Board Configuration	
Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
Color planes	32-bit color buffer
DVI support	DMS-59 (to dual DVI-SL)
Supported graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0

Resolutions Supported

	Maximum Refresh Rate	
Resolution	**Analog Connection**	**Digital Connection**
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	N/A

NOTE:
Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

NOTE:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

NVIDIA NVS 310 Graphics Card

Introduction

The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets.

The NVIDIA® NVS 310 graphics card is an ideal solution for customers requiring a small form factor graphics add-in card for either standard or small form factor PC designs.

Performance and Features

The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays.

- DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA.
- For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.

Form Factor (H x L)	Low Profile: 2.713 × 6.15 in
Bus Type	PCI Express x16, 2.0 compliant
Graphics Controller	NVIDIA® NVS 310
Memory Size	512 MB DDR3
Memory Clock	875MHz
Memory Bandwidth	14 GB/s
Connectors	2 x DisplayPort 1.2
Maximum Resolution	Up to 2560 x 1600 (digital display) per display.
Display Output	Up to 2 displays in the following configurations DisplayPort output: • Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card • Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology. DVI-D output: • Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors HDMI output: • NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors VGA display output: • Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Technical Specifications - Graphics

Max. Power	19.5 W

Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rates (Hz) by Connection			
	DisplayPort to VGA	DisplayPort to DVI-D	DisplayPort to HDMI	DisplayPort
640 x 480	85	60	60	60
800 x 600	85	60	60	60
1024 x 768	85	60	60	60
1280 x 720	85	60	60	60
1280 x 1024	85	60	60	60
1440 x 900	75	60	60	60
1600 x 1200	60	60	60	60
1680 x 1050	60	60	60	60
1920 x 1080	60-R	60-R	60	60
1920 x 1200	60-R	60-R		60
1920 x 1440				60
2048 x 1536				60
2560 x 1600				60

Note: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

ATI Radeon HD 4550 Graphics Card

Bus type	PCI Express (x16 lanes)
Maximum vertical refresh rate	85 Hz
Display support	Integrated 400 MHz RAMDAC
Display max resolution	1900 x 1200 digital, 2048 x 1536 analog
Board display options	Supports two displays via included DMS-59 to dual VGA cable or 2 DVI monitors via optional DMS-59 to dual DVI cable kit part number: DL139A. 4-pin mini-DIN S-video connector for TV output

Board Configuration	Specification	Description
	Graphics Chip:	RV710
	Core clock:	600MHz
	Memory clock:	800 MHz
	Frame buffer:	512 MB DDR3, 64 bit wide

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

Compliance StandardsSupported Resolutions	EMC Emissions	EMC Immunity
	FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use	

CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment

Canadian Standard ICES-003 is equivalent to CISPR22

Taiwanese Standard BSMI

Japanese VCCI

Australian C-Tick

Korean (MIC)

CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement

	Maximum Refresh Rate	
Resolution	**Analog Connection**	**Digital Connection**
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	N/A

NOTE:
Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

NOTE:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

ATI Radeon HD 4650 Graphics Card

Bus type	PCI Express x16
Maximum vertical refresh rate	85 Hz
Display support	Integrated 400 MHz RAMDAC
Display max resolution	2560 x 1600 digital, 2048 x 1536 analog

Resolutions Supported

	Maximum Refresh Rate (Hz)	
Resolution	**Analog Connection**	**Digital Connection**
640x480	85	60
800x600	85	60

1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60*

* Only supported when using a dual-link DVI or DP connection

NOTE:
Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

NOTE:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

Board display options Supports two displays via included two DisplayPort and one Dual Link DVI-I connectors.

Board Configuration	**Specification**	**Description**
	Graphics Chip:	RV635
	Core clock:	725 MHz
	Memory clock:	500 MHz
	Frame buffer:	1 GB DDR3, 128 bit wide

Core power 56 W

Compliance Standards	**EMC Emissions**	**EMC Immunity**
	FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use	CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and
	CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment	
	Canadian Standard ICES-003 is equivalent to CISPR22	Methods of Measurement
	Taiwanese Standard BSMI	
	Japanese VCCI	
	Australian C-Tick	
	Korean (MIC)	

HP DisplayPort to DVI-D Adapter

Connectors	DisplayPort and DVI-D single link connector
Adapter length	7.5 in (19.0 cm)
Adapter weight	.10 lbs (.05 kg)

HP DisplayPort to VGA Adapter

Connectors	DisplayPort and VGA connector
Adapter length	8 in (20 cm)
Adapter weight	.1 lbs (.06 kg)
Maximum vertical refresh rate	85 Hz
Display support	162 MHz RAMDAC
Display max resolution	1600x1200

Resolutions Supported

Resolution	Max refresh rate
640x480	85
800x600	85
1024x768	85
1280x720	85
1280x1024	85
1440x900	75
1600x1200	60
1680x1050	60
1920x1080	60-R
1920x1200	60-R

Note:
Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP. Using the HP DisplayPort to VGA Adapter may require an update to the graphics driver installed on your system. To install the most up-to-date graphics driver go to: www.hp.com.

Note:
60-R denotes reduced blanking timings are used. Not all monitors support reduced blanking timing.

250-GB 3.5" Hard Disk Drive

Capacity	250,059,350,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA (SATA)	
	Up to 3 GB/s	
Buffer Size	8 MB	
Logical Blocks	488,397,168	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
	Average	8.5 ms
	Full-Stroke	18 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

500-GB 3.5" Hard Disk Drive

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA (SATA)	
Synchronous Transfer Rate (maximum)	Up to 3 GB/s	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
	Average	11 ms
	Full-Stroke	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications – Hard Disk Data Storage

160-GB 10,000 rpm Hard Disk Drive

Capacity	160,041,885,696 bytes	
Rotational Speed	10,000 rpm	
Interface	Serial ATA (SATA)	
Synchronous Transfer Rate (maximum)	Up to 3 GB/s	
Buffer Size	16 MB	
Logical Blocks	312,581,808	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
	Average	4.6 ms
	Full-Stroke	10.2 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F 5° to 55° C	

80-GB 2.5" Solid State Drive

Unformatted Capacity	80-GB	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
Interface	Serial ATA (SATA)	
Dimensions (W x H x D)	2.74 x 0.37 x 4 in/6.98 x 0.95 x 10.2 cm	
Weight	0.18 lb/80 g	
Bandwidth Performance	**Sustained Sequential Read**	Up to 250 MB/s
	Sustained Sequential Write	Up to 70 MB/s
	Random Read	Up to 35K IOPs
	Random Write	Up to 6.6K IOPs
Latency	**Read**	65-ms
	Write	85-ms
Power	**DC power requirement**	5 VDC 5%-100 mV ripple p-p
	Total power consumption	0.15W (active); 0.075W (idle)
Useful Drive Life	35TB written, up to 20GB/day for 5 years	
Environmental (all conditions, non-condensing)	**Operating Temperature**	32° to 158° F (0° to 70° C)
	Relative Humidity	5% to 95%
	Maximum Wet Bulb Temperature (operating)	84° F (29° C)
	Shock	1,500 G/0.5-ms

Technical Specifications – Hard Disk Data Storage

NOTE:
For solid state disk drives, GB means 1 billion bytes. 16GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity varies by content and will be less than 15.8GB.

HP 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
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
	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)
Environmental	**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

Technical Specifications - Input/Output Devices

	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

HP 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	

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	Standard 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
Environmental	**Acoustics**	43-dBA maximum sound pressure level
	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)

Technical Specifications - Input/Output Devices

	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 STCIII	
	Standard APIs supported	PC/SC, EMV2000, CT-API	
	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

HP PS/2 Optical Mouse

Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in 3.95 x 6.21 x 11.7 cm	
Weight	4.44 oz 126 g	
Environmental	**Operating temperature**	-32° to 104°F 0° to 40° C

Technical Specifications - Input/Output Devices

	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 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)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	**Operating voltage**	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	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	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	

HP USB Optical 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, XP and Vista Available USB port

HP USB Laser Mouse

Scroll Wheel	24	
Maximum Rotation Speed	48 rats/sec	
Switch Type	Wheel	
Switch Life	Button – 3,000,000	
	Wheel – 1,000,000 times	
	Tilt switch – 500,000 times	
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	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
Electrical	**Operating Voltage**	+ 5VDC ± 5%

Technical Specifications - Input/Output Devices

	Power Consumption	
	MTBF	> 150,000 hrs
	ESD	IEC-61000-4-2 criteria B, Contact discharge: +/- 4kV, Air discharge: +/- 8kV
	EMI-RFI	FCC Class B
	PC98	PC 99 Compliant
Mechanical	**Resolution**	800dpi
	Tracking Speed	25 cm/sec
	Acceleration	0.5mm
	Switch Actuation	0.6N (60gf)
	Switch Life	Button - 3,000,000
		Wheel - 1,000,000 times
		Tilt switch - 500,000 times
	Cable Length	1850mm
	PC98-99	PC99 compliant
Regulatory Approvals	Regulatory Approvals UL60950-1, UL 94, UL 746 (A-E), UL 796 TUV/GS: EN 60950-1, EN 60825-1 FCC Class B, UL 1950, cUL, TUV GS, CE, C-tick, VCCI, BSMI, RRL	

HP Blu-ray Writer Drive

AMO Part Number	AR482AA		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA/ATAPI		
Disc capacity	50 GB DL or 25 GB standard		
Dimensions (W x H x D)	5.9 x 1.7 x 7.5 in 15.0 x 4.4 x 19.0 cm		
Weight (max)	2.0 lb 907g		
Write Speeds		**Single-layer**	**Double-layer**
	BD-R	2x, 4x CLV, 6x CAV	2x, 4x CLV
	BD-RE	2.3x	2x CLV
	DVD-R	2x, 4x CLV, 8x ZCLV, 8x, 12x PCAV, 16x CAV	2x, 4x CLV
	DVD-RW	1x, 2x, 4x, 6x CLV	Not supported
	DVD+R	2.4x, 4x CLV, 8x ZCLV, 8x, 12x PCAV, 16x CAV	2.4x, 4x CLV
	DVD+RW	2.4x, 4x, 6x CLV, 8x ZCLV	Not supported
	DVD-RAM	2x, 3x CLV, 3-5x PCAV	
	CD-R	8x,16x CLV, 24x, 32x PCAV, 40x CAV	
	CD-RW	4x, 10x, 16x CLV, 24x ZCLV	
Read Speeds		**Single-layer**	**Double-layer**
	BD-ROM	6x CAV	4.8x CAV
	BD-R	6x CAV	4.8x CAV
	BD-RE (SL/DL)	4.8x CAV	4.8x CAV
	DVD-ROM	16x CAV	8x CAV
	DVD-R	12x CAV	8x CAV
	DVD-RW	10x CAV	Not support
	DVD+R	12x CAV	8x CAV
	DVD+RW	10x CAV	Not support
	BDMV (AACS Compliant Disc)	4.8x CAV	
	DVD-RAM	2x, 3x CLV, 3x-5x PCAV	
	DVD-Video (CSS Compliant Disc)	8x CAV	
	CD-R/RW/ROM	40x / 40x / 40x CAV	
	CD-DA (DAE)	32x CAV	
	80 mm CD	16x CAV	
Sustained Transfer rate	**BD-ROM**	26.97 MB/s (6x) max.	
	DVD-ROM	16.62 MB/s (16x) max.	
	CD-ROM	6,000 KB/s (40x) max.	
Buffer Transfer Rates	1.5Gbps bits/s (10b side) 1.2Gbps bits/s (8b side)		
Multimedia MPC-3 compliant	Yes		

Technical Specifications - Optical Storage

Access times (typical reads, including setting)	**Random**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
Power	**Source**	SATA DC power receptacle
	DC Power Requirement	5 VDC -1000 mA typical, 1600 mA maximum 12 VDC -600 mA typical, 1400 mA maximum
	DC Current	5 VDC -1000 mA typical, 1600 mA maximum 12 VDC -600 mA typical, 1400 mA maximum
Environmental (all conditions non-condensing)	**Temperature (operating)**	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 90%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)

HP SuperMulti Drive

AMO Part Number	AR630AT		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	Serial ATA		
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	2.6 lb (1.2 kg)		
Performance	CD Media Read Access	Random	< 120 ms typical
		Full Stroke	< 200 ms typical
	DVD Media Read Access	Random	< 130 ms typical
		Full Stroke	< 240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD-R	Up to 21600 KB/s (16X)
		DVD+R	Up to 21600 KB/s (16X)

		DVD-RW	Up to 10800 KB/s (8X)
		DVD-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)
	CD Media Write Transfer	CD-R Write	UP to 6000 KB/s (40X)
		CD-RW	600 KB/s (4X)
		CD-RW (High speed)	1500 KB/s (10X)
		CD-RW (Ultra speed)	Up to 3600 KB/s (24X)
		CD-RW (Ultra speed+)	Up to 4800 KB/s (32X)
	DVD Media Write Transfer	DVD+R	Up to 21600 KB/s (16X)
		DVD+R DL (v1.2)	Up to 16200 KB/s (12X)
		DVD+R DL (v1.1)	Up to 10800 KB/s (8X)
		DVD+RW (Volume 2 v1.0)	Up to 10800 KB/s (8X)
		DVD+RW (Volume 1 v1.3)	Up to 5400 KB/s (4X)
		DVD-R (v2.1 rev. 6.0)	Up to 21600 KB/s (16X)
		DVD-R (v2.1 rev. 4.0)	Up to 10800 KB/s (8X)
		DVD-R DL (v3.0 rev. 5.0)	Up to 16200 KB/s (12X)
		DVD-R DL (v3.0 rev. 3.0)	Up to 10800 KB/s (8X)
		DVD-RW (v1.2 rev. 3.0)	8100 KB/s (6X)
		DVD-RW (v1.2 rev. 2.0)	Up to 5400 KB/s (4X)
		DVD-RAM (v2.2 rev. 5.0)	Up to 16200 KB/s (12X)
		DVD-RAM (v2.2 rev. 2.0)	Up to 6750 KB/s (5X)
Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+R	Yes	No
	DVD+R DL	Yes	No
	DVD+RW	Yes	No
	DVD-R	Yes	No
	DVD-RW	Yes	No
	DVD-R DL	Yes	No
Power Supply	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	<1000 mA (typical)
			1600 mA (max.)

		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)	
	Temperature (storage)	-22° F to 140° F (-30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	
	Altitude	0 to 10,171 ft. (0 to 3,100 meters)	

HP DVD-ROM Drive

AMO Part Number	AR629AA		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	Serial ATA		
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	2.6 lb (1.2 kg)		
Performance	CD Media Read Access	Random	< 120 ms typical
		Full Stroke	< 200 ms typical
	DVD Media Read Access	Random	< 130 ms typical
		Full Stroke	< 240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)

		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD-R	Up to 21600 KB/s (16X)
		DVD+R	Up to 21600 KB/s (16X)
		DVD-RW	Up to 10800 KB/s (8X)
		DVD-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)
Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+R	Yes	No
	DVD+R DL	Yes	No
	DVD+RW	Yes	No
	DVD-R	Yes	No
	DVD-RW	Yes	No
	DVD-R DL	Yes	No
Power Supply	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental conditions (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)	
	Temperature (storage)	–22° F to 140° F (–30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	
	Altitude	0 to 10,171 ft. (0 to 3,100 meters)	

HP 22-n-1 plus 1394 Media Card Reader

USB Interface	USB 2.0 High-speed interface
	NOTE: Requires the USB cable to be connected to the internal USB 2.0 port or a USB 2.0 PCI card.
1394 Interface	Two IEEE-1394a external ports; 1 IEEE-1394a internal port (connects to the pass through cable on the media card reader)
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 MS PRO-HG Duo 4-bit parallel transfer mode Supports SD 4-bit parallel transfer mode Supports high-speed 50Mhz SD 4-bit card (version 2.0) Supports high-speed 52Mhz MMC 8-bit card (version 4.2) Supports CF v4.0 with PIO mode 6 and Ultra DMA mode
Supported media type	CompactFlash Type I CompactFlash Type II Microdrive MultiMediaCard (MMC) Reduced Size MultiMediaCard (RS MMC) MultiMediaCard 4.2 (MMC Plus, including MMC Plus HC) Reduced Size MultiMediaCard 4.2 (MMC Mobile, including MMC Mobile HC) Secure Digital Card (SD) Secure Digital High Capacity (SDHC) miniSD miniSD High Capacity Micro SD (T-Flash) Micro SD HC Memory Stick Memory Stick Select Memory Stick Duo (MS Duo) Memory Stick PRO (MS PRO) Memory Stick PRO Duo (MS PRO Duo) Memory Stick PRO-HG Duo MagicGate Memory Stick (MG) MagicGate Memory Stick Duo xD-Picture Card
Supported media type with card adapter	Memory Stick Micro (M2) MMC Micro

Technical Specifications - Removable Storage

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 140°F (60°C) @ 80% R.H. for 96 hours -22°F (-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. 1.3 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 ®
- IT ECO declaration
- EPEAT Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country

Small Form Factor

Energy Consumption (typically configured)	115 VAC	230 VAC	100 VAC
Normal Operation	27.4159W	27.1680W	27.7080W
Sleep State (Energy Star low power mode)	2.5527W	2.7644W	2.5316W
Off	0.7149W	0.8667W	0.7003W

Heat Dissipation (typically configured)*	115 VAC	230 VAC	100 VAC
Normal Operation	94 BTU/hr	93 BTU/hr	95 BTU/hr
Sleep	9 BTU/hr	9 BTU/hr	9 BTU/hr
Off	2 BTU/hr	3 BTU/hr	2 BTU/hr

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

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

	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	27
Fixed Disk (random writes)	3.9	28

Battery

The battery(s) in this product complies with EU Directive 2006/66/EC, and does not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight:

Battery Size

CR2032 (coin cell)

Battery type

Li-Ion

Additional Information

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

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

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

This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see: www.epeat.net

Technical Specifications - Eco Data

	Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.	
	This product contains 0% post consumer recycled plastic (by wt.)	
	This product is 91.5% recyclable when properly disposed of at end of life.	
Packaging Materials	External	Corrugated 1835g
		Contains at least 30% recycled content
	Internal	EPE low density solid: 150g
		EPE low density foam: 20g
		Contains 100% recycled content

Microtower

Energy Consumption (typically configured)	115 VAC	230 VAC	100 VAC
Normal Operation	31.3720W	32.1179W	31.8169W
Sleep State (Energy Star low power mode)	2.4746W	2.6361W	2.4347W
Off	0.7153W	0.8560W	0.6980W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	107 BTU/hr	110 BTU/hr	109 BTU/hr
Sleep	8 BTU/hr	9 BTU/hr	8 BTU/hr
Off	2 BTU/hr	3 BTU/hr	2 BTU/hr

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

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

	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	28
Fixed Disk (random writes)	3.8	29

Battery	The battery(s) in this product complies with EU Directive 2006/66/EC, and does not contain: • Mercury greater the 5ppm by weight • Cadmium greater than 10ppm by weight:
Battery Size	CR2032 (coin cell)
Battery type	Li-Ion
Additional Information	This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC. This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.

	This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).	
	This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see: www.epeat.net	
	Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.	
	This product contains 0% post consumer recycled plastic (by wt.)	
	This product is 91.4% recyclable when properly disposed of at end of life.	
Packaging Materials	External	Corrugated 1835g
		Contains at least 30% recycled content
	Internal	EPE low density solid: 150g
		EPE low density foam: 20g
		Contains 100% recycled content

All Models

Reduction in Hazardous Substances (RoHS) Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

Material Usage

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

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- 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)

	Nickel finishes that release greater than 0.5 micro-grams/cm^2/week, measured according to EN 1811:1998, are not used on any product surface designed to be frequently handled or touched by users.
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/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html