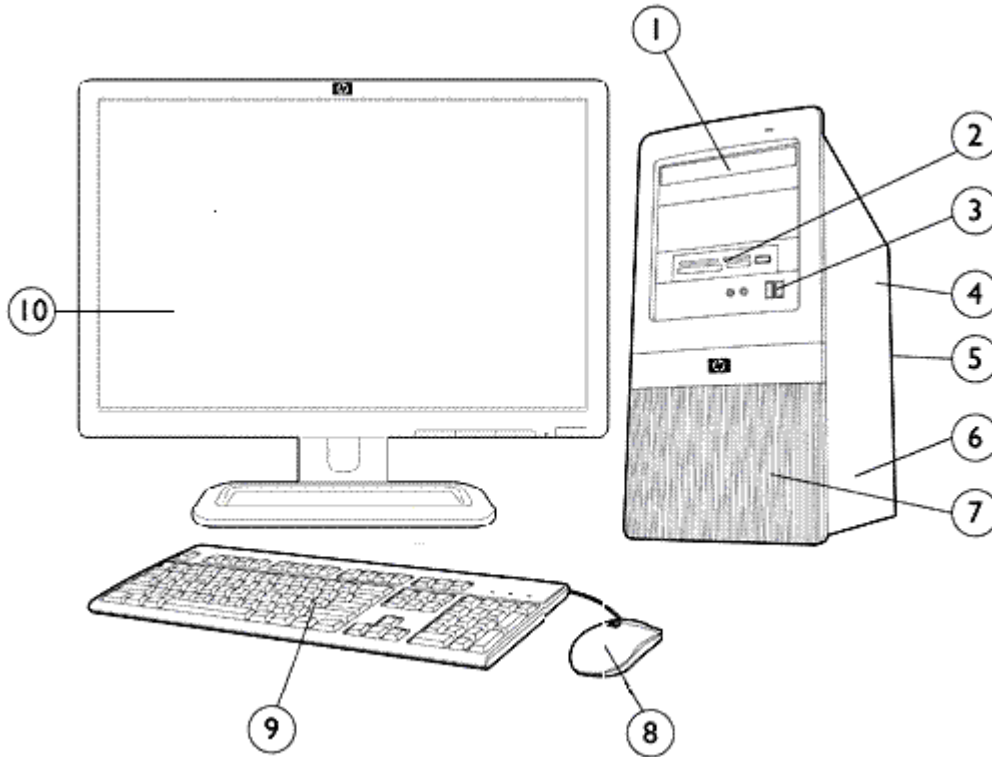


Overview

HP recommends
Windows Vista® Business

Microtower

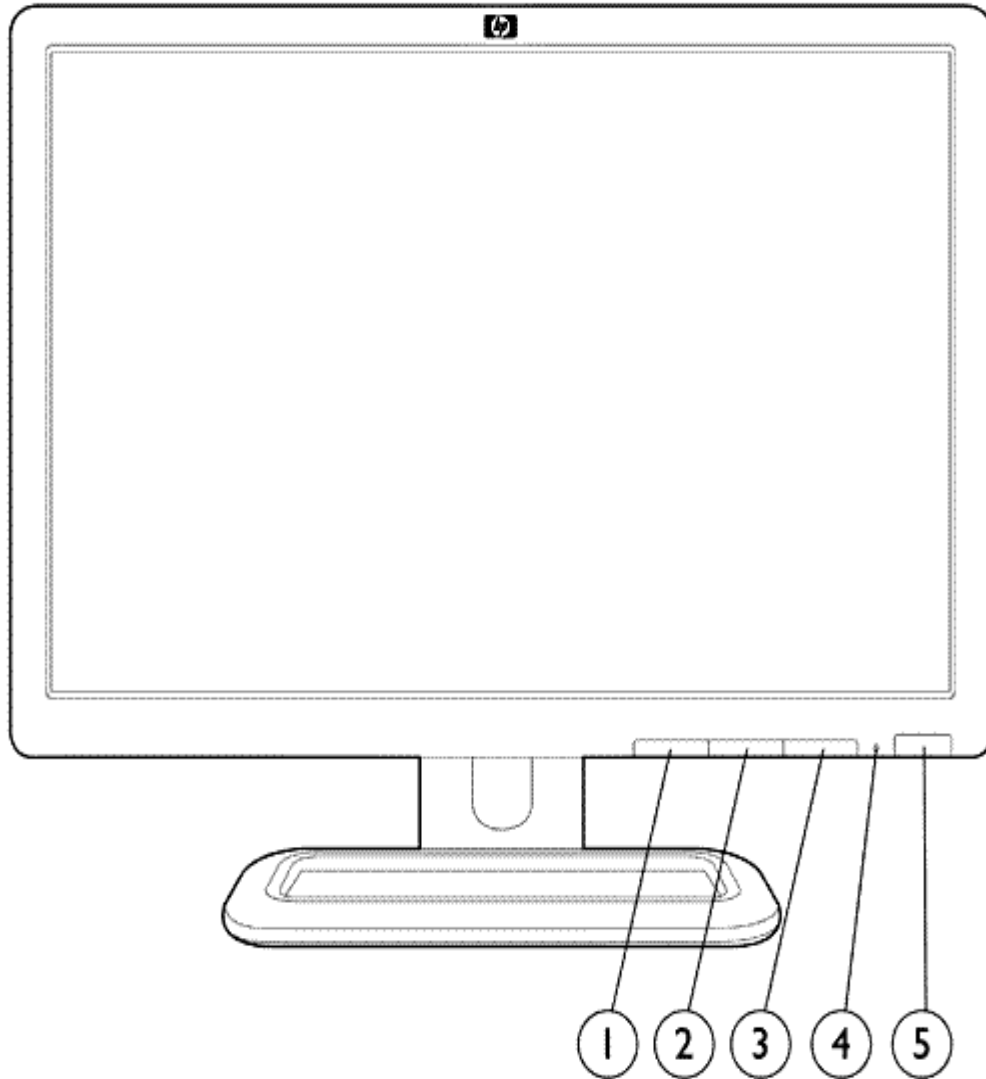


1. (2) external 5.25" drive bays for optional optical drives
2. (1) external 3.5" drive bay for optional media reader or diskette drive
3. (2) USB 2.0 ports, audio ports
4. 250-watt max power supply
5. (4) USB 2.0 ports, (2) PS/2, (1) RJ-45, (1) VGA, (1) audio in – (1) audio out – (1) MIC
6. (1) full-height PCI 2.3 slot, (2) PCIe x1 slots, (1) PCIe x16 slot
7. (2) internal 3.5" drive bays
8. PS/2 Scroll Mouse
9. HP Standard Keyboard
10. HP L1908wv 19-inch Widescreen LCD Monitor*

* Combine offer Desktop and Monitor offered only in select countries.

Overview

HP L1908ww 19-inch Widescreen LCD Monitor*



1. **Menu/select:** Opens, selects or exits the OSD menu.
2. **"-"/Auto:** Navigates backward through the OSD menu and decreases adjustment levels; when the OSD menu is inactive, activates the auto adjustment feature to optimize the screen image.
3. **"+":** Navigates forward through the OSD menu and increases adjustment levels.
4. **Power LED:** fully powered = green; sleep mode = amber; sleep timer mode = flashing amber.
5. **Power:** Turns the monitor on or off.

* Combine offer Desktop and Monitor offered only in select countries.

Overview

At A Glance

- Intel® Core™ 2 processors, Intel Pentium® processors, or Intel Celeron® processors
- Choice of operating systems:
 - Genuine Windows Vista Business 32
 - Genuine Windows Vista Home Basic 32
 - Red Flag Linux (China Only)
 - FreeDOS
- Intel G31 Express Chipset
- Intel I/O Controller Hub 7 (ICH7)
- Intel Graphics Media Accelerator
- 19-inch diagonal widescreen monitor*
- PCI and PCI Express I/O buses
- Serial ATA controller
- USB 2.0 support
- Realtek RTL8101E 10/100 Fast Ethernet controller
- Choice of hard drives and optical drives
- DDR2 SDRAM system memory
- Protected by HP Services. Terms and conditions vary by country. Certain restrictions and exclusions apply.

* Combine offer Desktop and Monitor offered only in select countries.

Standard Features and Configurable Components

Processor and Speed

One of the following

Intel Celeron Processors

Intel Celeron 420 Processor (1.60-GHz, 512-KB L2 cache, 800-MHz FSB)

Intel Celeron 430 Processor (1.80-GHz, 512-KB L2 cache, 800-MHz FSB)

Intel Celeron 440 Processor (2.00-GHz, 512-KB L2 cache, 800-MHz FSB)

Intel Celeron 450 Processor (2.2-GHz, 512K L2 cache, 800-MHz FSB)

Intel Celeron Dual-Core Processors

Intel Celeron Dual Core E1200 Processor (1.60-GHz, 512-KB L2 cache, 800-MHz FSB)

Intel Celeron Dual Core E1500 Processor (2.2-GHz, 512K L2 cache, 800-MHz FSB)

Intel Pentium Dual-Core Processors

Intel Pentium Dual Core E2140 Processor (1.60-GHz, 1-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual Core E2160 Processor (1.80-GHz, 1-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual Core E2200 Processor (2.40-GHz, 1-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual Core E5200 processor (2.50 GHz, 2 MB L2 cache, 800 MHz FSB)

Intel Pentium Dual Core E5300 Processor (2.6-GHz, 2MB L2 cache, 800-MHz FSB)

Intel Core 2 Duo Processors

Intel Core 2 Duo E4500 Processor (2.20-GHz, 2-MB L2 cache, 800-MHz FSB)

Intel Core 2 Duo E4600 Processor (2.40-GHz, 2-MB L2 cache, 800-MHz FSB)

Intel Core 2 Duo E4700 Processor (2.60-GHz, 2-MB L2 cache, 800-MHz FSB)

Intel Core 2 Duo E7300 Processor (2.66-GHz, 3-MB L2 cache, 1066-MHz FSB)

Intel Core 2 Duo E7400 Processor (2.80-GHz, 3 MB L2 cache, 1066-MHz FSB)

Intel Core 2 Duo E8200 Processor (2.66-GHz, 6-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E8300 Processor (2.83-GHz, 6 MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E8400 Processor (3.00-GHz, 6-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E8500 Processor (3.16-GHz, 6-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E8600 processor (3.33 GHz, 6 MB L2 cache, 1333 MHz FSB)

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

Standard Features and Configurable Components

Operating Systems and Application Software (availability varies by region)

Genuine Windows Vista Business 32*
Genuine Windows Vista Home Basic 32*
RedFlag Linux (China Only)
Free DOS

* Certain Windows Vista product features require advanced or additional hardware. See: <http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx> and <http://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: <http://www.windowsvista.com/upgradeadvisor>

Microsoft Office 2007 Basic
Microsoft Office 2007 Small Business
Microsoft Office 2007 Professional
Microsoft Works 8.5
HP Power Manager 2.0
Roxio Easy Media Creator 9.x**
Intervideo WinDVD Player 5.x**
Sun Java Runtime Environment
Firefox-HP Virtual Browser

** Supporting software available with certain optical drive configurations

Hard Drives

80-GB Serial ATA 3.0-Gb/s NCQ, Smart IV (7200 rpm)
160-GB Serial ATA 3.0-Gb/s NCQ, Smart IV (7200 rpm)
250-GB Serial ATA 3.0-Gb/s NCQ, Smart IV (7200 rpm)
320-GB Serial ATA 3.0-Gb/s Hard Drive (7200 rpm)
500-GB Serial ATA 3.0-Gb/s NCQ, Smart IV (7200 rpm)

System Memory

512-MB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (1 x 512MB)
1-GB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (1 x 1GB)
2-GB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (2 x 1GB)
2-GB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (1 x 2GB)
4-GB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (2 x 2GB)

Standard Features and Configurable Components

Storage –

One or more of the following (see Storage section below)

Diskette Drive

1.44-MB Diskette Drive

Media Reader

HP 16-in-1 Media Reader and additional USB 2.0 port

HP 22-in-1 Media Card Reader

HP 22-in-1 Media Card Reader with 1394 port

Optical Drives (Serial ATA)

SATA DVD-ROM Drive

SATA CD-RW/DVD-ROM Combo Drive

SATA SuperMulti LightScribe DVD Writer Drive

Input Devices

Keyboard – One of the following

HP PS/2 Standard Keyboard

HP USB Standard Keyboard

Mouse – One of the following

PS/2 2-Button Optical Scroll Mouse

USB 2-Button Optical Scroll Mouse

USB 2-Button Laser Mouse

Audio

Realtek ALC662 High Definition audio codec

3D audio compliant and HD Audio compatible

Communication

Integrated Realtek 8101E 10/100 Ethernet Controller

Intel PRO/1000 PT Gigabit PCIe Controller (full height) – optional

Agere 56K PCI Modem – optional

LSI PCIe x1 Hi-Speed 56K International SoftModem – optional

HP Wireless A+G PCI Card (full height)

HP Wireless 802.11 b/g/n PCIe Card

Graphics

Intel Graphics Media Accelerator – integrated

NVIDIA GeForce 8400 GS (256MB) Single Head PCIe x16 – optional*

HP ADD2 SDVO PCIe x16 DVI-D Adapter – optional

ATI Radeon HD 2400XT (256MB DH) PCIe x16 – optional

ATI Radeon 3470 256MB Single Head graphics adapter (PCIe x16)

HP DisplayPort To DVI-D Adapter

* 1 GB of system memory required. Graphics cards use part of the total system memory to enhance graphics performance.

Standard Features and Configurable Components

Monitor HP L1908wv 19-inch Widescreen LCD Monitor*
* Combine offer Desktop and Monitor offered only in select countries.

Miscellaneous HP FireWire / IEEE 1394 PCI Card (full height)
HP Serial/Parallel PCI Card (full height)

System Details

- Base Unit**
- Micro ATX microtower chassis, including power supply and front bezel
 - Five (5) drive bays and four expansion slots
 - Microsoft operating system CD – optional
 - Active type heatsink
 - 92 x 92 x 25 mm chassis fan
 - System board with Intel G31 Express chipset, Intel I/O Controller Hub 7 (ICH7), Realtek RTL8101E 10/100 Ethernet controller, Intel GMA graphics, and Realtek audio, (1) full-height PCI 2.3 slot, (2) PCI Express x1 slots, (1) PCI Express x16 slot, (2) DDR2 DIMM memory slots, (4) Serial ATA data connectors
 - Product documentation on CD
 - HP system restore CD – optional
 - Power cord

Slots

PCI One (1) full-height PCI 2.3 slot on PCA
Two (2) full-height PCI Express x1 slots on PCA
One (1) full-height PCI Express x16 slot on PCA (for graphic cards)

Memory Expansion Two (2) DDR2 SDRAM DIMM slots (4 GB maximum memory support)

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.

Bays

Internal Two (2) 3.5"

External Two (2) 5.25"
One (1) 3.5"

USB Support EHCI high-speed USB 2.0 controller
Two (2) front ports; Four (4) rear ports, Two (2) internal ports on motherboard

Interfaces (Legacy) One (1) PS/2 keyboard port
One (1) PS/2 mouse port
One (1) analog VGA video port
One (1) line in; one (1) line out; one (1) mic in
One (1) RJ45 network port

System Details

Weight & Dimensions	Desktop	Chassis Dimensions (H x W x D)	14.38 x 6.50 (7.09 w/bezel) x 14.69 in 365 x 165 (180 w/bezel) x 373 mm
	Monitor	System Weight	22.4 lb (10.2 kg)
		Dimensions (H x W x D)	Unpacked w/stand 14.6 x 17.6 x 7.3 in (37.0 x 44.6 x 18.7 cm)
			Unpacked w/o stand 11.9 x 17.6 x 2.3 in (head only) (30.1 x 44.6 x 5.9 cm)
		Weight	Unpacked 11.2 lb (5.1 kg)
			Head only 9.3 lb (4.2 kg)

Technology and Features	Memory Type	PC2-6400 DDR2 SDRAM (800MHz) non-ECC Up to 4-GB maximum system memory supported
		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.
	Hard Drive Interfaces Supported	Serial ATA

Chassis	Front Panel	Power button Power On LED HDD Activity LED
	Cooling Solutions Supported	Power Supply Fan (variable speed) Active heatsink (variable speed) Chassis fan
	Slots Supported	Four (4) full-height expansion slots
	Front I/O	Two (2) USB 2.0 ports
	Rear I/O	Standard Micro ATX I/O connectors, including four (4) USB 2.0 ports
	Drive Bays	Two (2) 5-1/4" external One (1) 3-1/2" external Two (2) 3-1/2" internal
	Internal Speaker	N/A
	Security	Padlock loop Kensington Lock Support Optional USB Port Disable at factory (user configurable via BIOS)
	Power Supply	250-watt ATX Power Supply – PFC/non-PFC with a 115v/230v line switch (varies by country/region)

System Details

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 4 in (10.2 cm) 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 (9000 m)

NOTE: Operating temperature is de-rated 1.0 deg C per 1000 ft (300 m) to 10,000 ft (3000 m) 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.

System Board

Processor	Socket T; LGA775 industry standard Micro ATX form factor Support single Intel Core 2 Duo, Celeron 4xx or Dual Core
PWM	ISL6312 – 3 Phase
Chipset	Intel G31 Express Intel I/O Controller Hub 7 (ICH7)
Super I/O	Fintek F71882FG
Front Side Bus Frequency	800/1066/1333 MHz
Memory	DDR2 SDRAM 2 x DIMM slots
Clock Generator	RTM 876-665
Integrated Graphics	Intel Graphics Media Accelerator (GMA)
Audio	Realtek ALC662 HD Audio compatible codec with two channel audio 3D audio
LOM	Realtek RTL8101E 10/100 Fast Ethernet controller
Storage	Four Serial ATA interfaces
Expansion Slots	1 x PCI 2.3 slot 2 x PCI Express x1 slots 1 x PCI Express x16 slot
BIOS	SPI EEPROM
Industrial Standard	PCI 2.3 compliant USB 2.0

System Details

Rear Side I/O Ports	<ul style="list-style-type: none"> 1 x PS/2 keyboard port 1 x PS/2 mouse port 4 x USB 2.0 ports 1 x RJ-45 10/100 port 1 x D-sub 15 pin analog VGA port 3 x audio ports
On Board I/O Interfaces	<ul style="list-style-type: none"> 1 x ATX power connector 1 x +12V power connector 1 x Floppy connector 1 x Front panel connector, Switch, LED (ON/Flash/OFF) 2 x Fan headers for CPU, chassis, with voltage/fan speed control 1 x header to support 2 USB 2.0 ports at front side 1 x header to support 2 front (Headphone/Mic) audio ports 1 x header to support USB media reader
Board Size	Micro-ATX, PCB Size: 9.6 x 8.5 in (24.38 x 21.86 cm) 4-layer PCB with green color
Additional Features	<ul style="list-style-type: none"> ● Bootable without keyboard, mouse or monitor ● Keyboard/mouse/USB wake up ● Support S1, S3, S4 and S5 ● ACPI status ● Hardware monitor capability ● CPU fan speed control

Network Interface	Integrated Realtek 8101E 10/100 Fast Ethernet Controller	Hardware Highlights Features	<ul style="list-style-type: none"> PCIe x1 interface 10-Mbps and 100-Mbps operation Crossover detection and auto-correction Wake-on-Lan and remote Wake-up (Wake-on-LAN supported from S1, S3, S4 only. Not supported from S5)
	Intel PRO/1000 PT Gigabit PCIe Adapter	Hardware Highlights Features	<ul style="list-style-type: none"> PCI Express interface 10-Mbps, 100-Mbps and 1000-Mbps operation (Wake-on-LAN supported from S1, S3, S4 only. Not supported from S5)

Wireless Wireless A+G PCI Card (full height bracket)

Power Supply	<ul style="list-style-type: none"> ● ATX Power Supply – Passive PFC/non-PFC with a 115v/230v line switch ● Passive Power Factor Correction (PFC) – with line switch set to 230V – No PFC in 115V line switch position ● 90 to 140VAC, or 180 to 264VAC operating voltage range ● 100 to 127VAC, or 200 to 240VAC rated voltage range ● 50-60 Hz rated line frequency ● 47-63 Hz operating line frequency range ● 250 watt maximum rated power ● 80-mm power supply fan – variable speed for optimum acoustics
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System Details

Power Conservation 'Energy Saver'

- APM 1.2 support
- Screen blanking
- Hard drive 'Idle' mode
- System Idle mode
- ~2 watt power consumption in ES mode – suspend to RAM (S3) (instantly available PC)
- Processor/Cache memory power-down (S3)

System Environmental Specs

- Values are subject to change without notification and are for reference only.
- Performance of system, options, and ancillary equipment will vary depending on the system configuration.
- Levels presented do not account for non-HP/Compaq installed hardware.

Ambient Air Temperature	Operating	50° to 95°F (10° to 35°C) at sea level with an altitude de-rating of 1.0°C per every 1000 ft (300 m) above sea level to a maximum of 8000 ft (2500 m), no direct sustained sunlight. Maximum rate of change is 77°F/Hr (25°C/Hr). The upper limit may be limited by the type and number of options installed.
	Storage	-22° to 140°F (-30° to 60°C) – Maximum rate of change: 410°F/Hr (210°C/Hr).
Humidity	Operating	10% to 90% relative humidity (Rh), 86°F (30°C) maximum wet bulb temperature, non-condensing
	Storage	10% to 95% relative humidity (Rh), 101.66°F (38.7°C) maximum wet bulb temperature, non-condensing
Altitude	Operating	0 to 10,000 feet (0 to 3048 meters) – This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 1,000 ft/min (304.8 m/min).
	Non-Operating	0 to 30,000 feet (0 to 9,144 meters) – Maximum allowable altitude change rate is 1200 ft/min (365.76 m/min).
Shock		Listed are the levels of shock the product can withstand with NO damage being incurred. The values represent peak input acceleration during a 2 to 3 ms half-sine shock pulse, 11 ms trapezoidal shock pulse.
	Non-Operating	35G's (Half-sine Shock) 35G's (Trapezoidal Shock)
Vibration		Listed are the levels of vibration the product can withstand with NO damage being incurred. The values represent a flat random vibration input acceleration profile across the given frequency range.
	Operating	Random vibration at 5Hz@0.00025G ² /Hz, 10Hz@0.01G ² /Hz, 100Hz@0.01G ² /Hz, 300Hz@0.00001G ² /Hz 5Hz to 300Hz, (0.25G's nominal).
	Non-Operating	Random vibration at 0.008G ² /Hz, 10Hz to 500Hz, (2 Grms nominal).
Acoustic Noise		Listed are the declared A-WEIGHTED SOUND POWER LEVELS (LWAd) and declared average desktop seated operator position A-WEIGHTED SOUND

System Details

PRESSURE LEVELS (LpAm) when the product is operating in a 73.4°F (23°C) ambient environment. Noise emissions were measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109).

IDLE (Fixed disk drive spinning)	LWAd = 4.3 Bels, Desktop Average LpAm = 32dBA
FIXED DISK (Random write)	LWAd = 4.8 Bels, Desktop Average LpAm = 37dBA
CD-ROM (Sequential Reads)	LWAd = 5.0 Bels, Deskside Average LpAm = 39dBA

Service and Support

On-site Warranty ^{Note 1}: One-year (1-1-0) limited warranty delivers one year of on-site, next business-day ^{Note 2} service for parts and labor and includes free telephone support ^{Note 3} 24 x 7. Global coverage ^{Note 2} ensures that any product purchased in one country and transferred to another non-restricted country will remain fully covered under the original warranty and service offering. One-year onsite and labor are not available in all countries.

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region

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 Compaq and third-party HP-qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

After-Market Options

Communications	NICs		
		Intel PRO/1000 PT Gigabit PCIe Controller (full height)	EH352AA
	Wireless LAN		
		HP Wireless A+G PCI Card (North America only)	EA118AA
		HP Wireless A+G PCI Card (WW except North America)	PZ928AA
		HP Wireless 802.11 b/g/n PCIe Card	FH971AA
	Modems		
	Agere 2006 PCI High-Speed 56K International SoftModem	EK694AA	
	LSI PCIe x1 Hi-Speed 56K International SoftModem	FH970AA	
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Hard Disk Drives		HP 500-GB SATA 3.0-Gb/s Hard Drive	PV943A
		HP 320-GB SATA 3.0-Gb/s Hard Drive	FH963AA
		HP 250-GB SATA 3.0-Gb/s Hard Drive	PY278AA
		HP 160-GB SATA 3.0-Gb/s Hard Drive	PY277AA
		HP 80-GB SATA 3.0-Gb/s Hard Drive	PY276AA
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Removable Storage Devices	Diskette Drive		
		HP 1.44-MB Internal Diskette Drive	AH053AA
		HP 1.44-MB USB Diskette Drive – External	DC141B
		HP 16-in-1 Media Reader	EM718AA
		HP 22-in-1 Media Card Reader	FX273AA
	HP 22-in-1 Media Card Reader with 1394 port	KN518AA	
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Input Devices		HP PS/2 Standard Keyboard	DT527A
		HP USB Standard Keyboard	DT528A
		HP 2.4 GHz Wireless Keyboard and Mouse	NB896AA#xxx
		HP USB 2-Button Laser Mouse	GW405AA
		HP PS/2 2-Button Optical Scroll Mouse	EY703AA
		HP USB 2-Button Optical Scroll Mouse	DC172B
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Memory		HP 2-GB PC2-6400 (DDR2-800 MHz) DIMM	AH060AA
		HP 1-GB PC2-6400 (DDR2-800 MHz) DIMM	AH058AA
		HP 512-MB PC2-6400 (DDR2-800 MHz) DIMM	AH056AA
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Audio		HP Satellite Speakers	ZD929AA
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After-Market Options

Graphics	NVIDIA GeForce 8400 GS 256MB SH PCIe x16 Graphics Card*	GJ119AA
	ATI Radeon HD 2400XT 256MB DH PCIe x16 Graphics Card	KD060AA
	ATI Radeon 3470 256MB SH PCIe x16	FH972AA
	HP DisplayPort To DVI-D Adapter	FH973AA
	HP ADD2 SDVO DVI-D Adapter	DY674A
* 1 GB of system memory required. Graphics cards use part of the total system memory to enhance graphics performance.		

Optical Drives	HP SATA CD-RW/DVD-ROM Combo Drive	AH046AA
	HP SATA DVD-ROM Drive	AH047AA
	HP SATA SuperMulti LightScribe DVD Writer Drive	GF343AA

Security	HP Business PC Security Lock Kit	PV606AA
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Miscellaneous Accessories	HP FireWire / IEEE 1394 PCI Card	PA997A
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Monitor Options	HP Silver Flat LCD Panel Speaker Bar	EE418AA
	HP LCD Monitor Quick Release*	EM870AA
	HP Monitor Security Lock	PC766A
* The HP Quick Release has been designed to support a maximum of up to 24 lbs (10.9 kg) depending upon the mounting configuration used. Please note this is a total weight limit for all devices mounted, i.e. the combined weight of the monitor and a second device such as an HP Thin Client cannot exceed 24 pounds. Because mounting surfaces vary widely and the final mounting method and configuration may vary, mounting fasteners are not supplied (other than the VESA-compliant screws). HP recommends that you consult with a qualified engineering, architectural or construction professional to determine the appropriate type and quantity of mounting fasteners required for your application and to ensure that your mounting solution is properly installed to support applied loads.		

Memory

DDR SYNCH DRAM NON-ECC MEMORY

The Intel G31 Express chipset supports non-ECC DDR2 memory up to PC2-6400 (800-MHz). Memory upgrades are accomplished by adding single or dual DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations.

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.

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.

STANDARD MEMORY

512-MB, 1-GB, 2-GB, or 4-GB DDR2 SYNCH DRAM

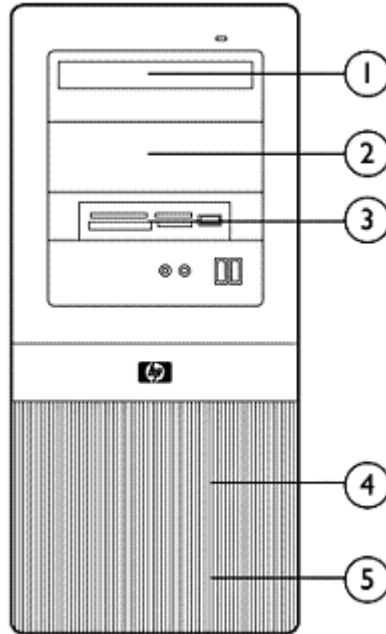
OPTIONAL MEMORY UPGRADES

Supports up to 4 GB of DDR2 SYNCH DRAM. 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.

DIMM Size	Slot 1	Slot 2
512-MB	512-MB	
1-GB	1-GB	
2-GB (dual-channel symmetric)	1-GB	1-GB
4-GB (dual-channel symmetric)	2-GB	2-GB

Storage



HP Compaq dx2390 Microtower Business PC

Drive Support	Maximum Quantity Supported	Position Supported	Controller
Diskette Drives	1	3	SIO
Media Reader	1	3	Internal USB 2.0 port
DVD-ROM Drives	2	1, 2	SATA
CD-RW/Combo Drives	2	1, 2	SATA
SuperMulti LightScribe DVD Writer Drives	2	1, 2	SATA
3.5" Serial ATA Hard Drives	2	4,5	SATA

Technical Specifications – Monitor and Audio

HP L1908wv 19-inch Widescreen LCD Monitor	Type	19-in (48.25-cm) diagonal Wide-Aspect Active Matrix TFT (thin film transistor)	
	Viewable Image Area (diagonal)	19 in (48.25 cm) wide (WXGA+); diagonally measured	
	Screen Opening (W x H)	16.1 x 10.1 in (40.98 x 25.67 cm)	
	Panel Type	TN	
	Aspect Ratio	16:10	
	Viewing Angle (typical)	Up to 160° horizontal/160° vertical (10:1 minimum contrast ratio)	
	Brightness (typical)*	250 nits (cd/m ²)	
	Contrast Ratio (typical)*	1000:1	
	Response Time (typical)*	=5 ms (on/off)	
	Pixel Pitch	.285 mm	
	Backlight Lamp Life (to half brightness)	50 K hours	
	*All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.		
	On Screen Display (OSD) Controls	Buttons or Switches	Auto adjust/OSD down, OSD UP, OSD menu select, power
Languages		English, French, German, Spanish, Italian, Dutch, and Japanese, S. Chinese	
User Controls		Brightness, contrast, positioning, color temperature (6500k, 9300k, custom), individual color control, serial number, display, clock, clock phase, monitor management, factory reset, zoom	
Signal Interface/ Performance	Horizontal Frequency	24 to 83 kHz	
	Vertical Frequency	50 to 76 Hz	
	Native Resolution	1440 x 900 @ 60 Hz	
	Preset VESA Graphic Modes (non-interlaced)		1280 x 1024 @ 60 Hz and 75 Hz
			1024 x 768 @ 60 Hz and 75 Hz
			800 x 600 @ 60 Hz and 75 Hz
			640 x 480 @ 60 Hz and 75 Hz
	Text Mode	720 x 400 @ 70 Hz	
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz	
	Sun Mode	1152 x 900 @ 66 Hz	
	Maximum Pixel Clock Speed	140 MHz (analog input)	
	User Programmable Modes	Yes, 10	
	Anti-Glare	Yes	
	Anti-Static	Yes	
	Default Color Temperature	6500 K	
Video/Other Inputs	Plug and Play	Yes	
	Self Powered USB 2.0 Hub	No	

Technical Specifications – Monitor and Audio

	Input Signal	VGA			
	Input Impedance	75 ohms \pm 10%			
	Sync Input	TTL separate synch or Composite Sync			
	VGA Cable	15 pin D-sub VGA			
	VGA Cable Length	5.9 ft (1.8 m)			
Power	Input Power	Auto-Sensing, 100 to 240 VAC, 50 \pm 3 Hz to 60 \pm 3 Hz			
	Frequency	45 to 63 Hz			
	Typical Power Consumption	37 watts			
	Maximum	50 watts			
	Power Saving	2 watts standby; 1 watt off			
	Power Cable Length	6.2 ft (1.9 m)			
	Mechanical	Dimensions (H x W x D)	Unpacked w/stand	14.6 x 17.6 x 7.3 in (37.0 x 44.6 x 18.7 cm)	
			Unpacked w/o stand (head only)	11.9 x 17.6 x 2.3 in (30.1 x 44.6 x 5.9 cm)	
Packaged			16.7 x 21.2 x 6.9 in (42.3 x 53.6 x 17.4 cm)		
Weight		Unpacked	11.2 lb (5.1 kg)		
		Head only	9.3 lb (4.2 kg)		
		Packaged	14.2 lb (6.45 kg)		
Tilt Range		-5° to + 30° vertical			
Swivel Range		No			
Height Adjustable		No			
Pivot Rotation		No			
Base	Detachable, ships attached				
Environmental	Temperature - Operating	41° to 104° F (5° to 40° C)			
	Temperature - Non-operating	-29° to 140° F (-34° to 60° C)			
	Humidity - Operating	20% to 80% non-condensing			
	Humidity - Non-operating	5% to 95%, 38.7° C max wet-bulb			
Environmental Data	Altitude - Operating	+12,000 ft (3,658 m)			
	Altitude - Non-operating	+40,000 ft (12,192 m)			
	Eco-Label Certifications and Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:			
		<ul style="list-style-type: none"> ● ENERGY STAR® ● IT ECO declaration ● TCO 03 ● Taiwan Green Mark ● CECP ● EPEAT™ Silver 			
	Energy Consumption (in accordance with ENERGY STAR® test method)	AC Input Voltage at 100 VAC \pm 5 VAC, 50 Hz \pm 3 Hz	AC Input Voltage at 115 VAC \pm 5 VAC, 60 Hz \pm 3 Hz	AC Input Voltage at 230 VAC \pm 5 VAC, 50 Hz \pm 3 Hz	

Technical Specifications – Monitor and Audio

Normal Operation	36 watts	37 watts	37 watts
Sleep	2 watts	2 watts	2 watts
Off	1 watt	1 watt	1 watt
Heat Dissipation*	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	123 BTU/hr	123 BTU/hr	123 BTU/hr
Sleep	6.82 BTU/hr	6.82 BTU/hr	6.82 BTU/hr
Off	3.41 BTU/hr	3.41 BTU/hr	3.41 BTU/hr

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

Ergonomics The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.

Additional Information This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.

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

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

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

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per TCO and prEN50279 A/B/C.

This product contains 0% recycled materials (by wt.)

This product is 95% recyclable when properly disposed of at end of life.

Packaging Materials

- Corrugated Carton 0.96 kg
- HDPE Bag 0.09 kg
- Polystyrene 0.55 kg

Material Usage This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at:

http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html

- Asbestos
- Certain Azo Colorants

Technical Specifications – Monitor and Audio

- 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.

Other

Accessories Included

VGA cable - connects the graphic card's VGA connector to the monitor's VGA input

Software

HP Display Assistant is a software utility that allows monitor adjustment and color calibration using the Display Data Channel Command Interface (DDC/CI) protocol of the connected PC.

HP Display LiteSaver allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.

Technical Specifications – Monitor and Audio

	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	All carbonite
	VESA External Mounting	Yes
	Kensington Lock-Ready	Yes
Certification and Compliance		TCO'03, ISO 13406-2 VDT Guidelines Approval, CISPR Requirements, VCCI Approvals, MIC (Korean) Requirements, CSA, Australian ACA Approval, "GS" Mark, TUV Approvals, CE Marking, FCC Approval, ENERGY STAR® Qualified, PC-2001 Certified, Microsoft® Windows® Certification (Microsoft® Windows® 98, Microsoft Windows 2000, Microsoft Windows XP, and Windows Vista®), EPEAT™ Silver
Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
Service and Warranty		Limited one-year warranty (1-1-0). Availability varies by region. Certain restrictions and exclusions apply.
Integrated Realtek ALC662 Audio	Type	Integrated
	HD Audio compatible codec	Yes 5:1 channel
	Sampling	Supports 48/96 KHz
	Audio Jacks	Mic-In Line-In Line-Out / Headphone Out
	Power Support	Digital: 3.3V Analog: 5V
	Other	Meets performance requirements for audio on PC99/2001 systems High-performance DACs with 97dB SNR(A-Weighting) ADCs with 90dB NR(A-Weighting)

Technical Specifications - Communications

Integrated Realtek 8101E-GR 10/100 Fast Ethernet Controller	Controller	8101E-GR	
	Memory	N/A	
	Data rates supported	2.5GHz data rate with X1 link width	
	Compliance	IEEE802.3, IEEE 802.3u, IEEE 802.3ab	
	Bus architecture	PClexpress 1.1	
	Data transfer mode	Half/Full Duplex Operation	
	Hardware certifications	MS NDIS5, IPv4, IPv6, TCP, UDP	
	Power requirement	100mbps (heavy traffic)	TBD mW max.
		10mbps (heavy traffic)	TBD mW max.
		S3 with Link	TBD mW
		Link Down @S0	TBD mW
		Link Down @S3/S5	TBD mW
	Boot ROM support	EEPROM, 1Kb, 2Kb	
	Network transfer rate	10/100Mbps over CAT.5	
10Mbps over CAT.3			
Dimensions	9mm x 9mm		
Management capabilities	ACPI rev 2.0, PM rev 1.1, ASPM v1.0a		

Intel PRO/1000 PT Gigabit PCIe Controller	Connector	RJ-45	
	Controller	Intel 82572EI Gigabit Ethernet Controller	
	Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers	
	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 Express 1.0a	
	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	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T	
	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 2.6 x 0.8 in (16.3 x 6.6 x 1.9 cm)		

Technical Specifications - Communications

Management capabilities ASF, WOL, PXE, DMI, WFM 2.0. (Wake-on-LAN supported from S1, S3, S4 only. Not supported from S5)

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	Atheros AR5414X chipset
	system interface	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 200 ft (60.96 m) – Indoor above router that supports 108 Mbps speed) 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

HP Wireless 802.11b/g/n PCIe	Dimensions (L x H)	3.3 x 4.7 inches (8.5 x 12 cm)
	Weight	0.08 pounds (40 g)
	Controller	Ralink RT2790
	System interface	PCIExpress x1



Technical Specifications - Communications

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			
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 (approximately)	802.11 b modes	802.11 g modes	EWC modes
		+19 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum	+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		

Technical Specifications - Communications

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

Technical Specifications - Communications

	<ul style="list-style-type: none"> • 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

Agere 56K PCI Modem	Data Transmission	56,000 Kbps maximum downstream data 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	14,400/12,000/9,600/7,200/4,800/2,400/300 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)

Technical Specifications - Communications

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

LSI PCIe x1 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	

Technical Specifications - Communications

Safety	UL recognized to UL 1950, 3 rd 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, 3 rd 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

<p>Integrated Graphics Media Accelerator</p>	<p>3D/2D Controller</p>	<p>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.</p>
	<p>VGA Controller</p>	<p>Integrated</p>
	<p>Bus Type</p>	<p>PCI Express™ x16 (If an external graphics card is installed in a PCI slot, the internal graphics can be enabled or disabled using the system's BIOS setup utility. If an external graphics card is installed in the PCI Express™ slot, the internal graphics cannot be enabled).</p>
	<p>RAMDAC</p>	<p>Integrated, 350 MHz</p>
	<p>Memory</p>	<p>Graphics memory is shared with system memory. Graphics memory usage varies 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 as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.</p>
		<p>System memory equal or greater than 512 MB 8 MB pre-allocated + 248 MB DVMT = max frame buffer of 256 MB</p>
	<p>Controller Clock Speed</p>	<p>250 MHz</p>
	<p>Overlay Planes</p>	<p>Single overlay support with 5x3 filtering</p>
	<p>Maximum Color Depth</p>	<p>32 bits/pixel</p>
	<p>Maximum Vertical Refresh Rate</p>	<p>75 Hz at up to 2048 x 1536 analog, 60 Hz at up to 1920 x 1200 for flat panel, 85 Hz at up to 1400 x 1050 for digital CRT/HDTV. Varies with mode and configuration. See table below.</p>
	<p>Multi-display Support</p>	<p>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.</p>
	<p>Graphics/Video API Support</p>	<p>Microsoft DirectX®9, DirectXA®, VMR9, GDI/GDI+; OpenGL® 1.4.</p>

Resolutions Supported ¹	Resolution	Maximum Refresh Rate (Hz)		
		Analog Monitor	Digital Monitor	
			Flat Panel	CRT / HDTV
	640 x 480	75	60	85
	800 x 600	75	60	85
	1024 x 768	75	60	85
	1280 x 1024	75	60	85
	1400 x 1050	75	60	85
	1600 x 1200	75	60	N/A
	1920 x 1080	75	60	N/A
	1920 x 1200	75	60	N/A
	1920 x 1440	75	N/A	N/A
	2048 x 1536	75	N/A	N/A

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.

Technical Specifications - Graphics

NVIDIA GeForce 8400 GS Bus type	PCI Express (x16 lanes)											
(256 MB SH) PCIe x16 Graphics Controller	Maximum vertical refresh rate	85 Hz										
	Display support	Integrated 400 MHz RAMDAC										
	Display max resolution	2048 x 1536 (analog), 2560 x 1600 (digital)										
	Input/Output connectors	DVI-I (DVI port supports dual-link and HDCP) TV-out (4 pin S-video)										
	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	<table border="0"> <thead> <tr> <th>Specification</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Graphics Chip</td> <td>NVIDIA GeForce 8400 GS</td> </tr> <tr> <td>Core clock</td> <td>460 MHz</td> </tr> <tr> <td>Memory clock</td> <td>200 MHz</td> </tr> <tr> <td>Frame buffer</td> <td>256 MB DDR2</td> </tr> </tbody> </table>	Specification	Description	Graphics Chip	NVIDIA GeForce 8400 GS	Core clock	460 MHz	Memory clock	200 MHz	Frame buffer	256 MB DDR2
Specification	Description											
Graphics Chip	NVIDIA GeForce 8400 GS											
Core clock	460 MHz											
Memory clock	200 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)										

NVIDIA GeForce 8400 GS (256 MB SH) PCIe x16 Graphics Controller 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 Rate (Hz)	
	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: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

Technical Specifications - Graphics

HP ADD2 SDVO PCIe x16 DVI-D Adapter	Models	HP ADD2 SDVO DVI-D Out Adapter
	Form Factor	Low-profile card
	DVI-D Connector	Digital connection only
	Dual Head Support	Yes, when used with the integrated VGA connector
	Display Devices Supported	HP L1740 HP L1940T HP L2045W HP LP1965

NOTE: These graphics adapters offer 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 HD 2400XT (256MB DH) 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	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	RV610	
		Core clock	650 MHz	
		Memory clock	500 MHz	
		Frame buffer	256 MB DDR2, 128 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			
Core power	21 W			
Compliance standards	EMC Emissions: a) FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing			

Technical Specifications - Graphics

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

g) Korean (MIC)

EMC Immunity:

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

ATI Radeon HD 2400XT (256MB DH) PCIe Graphics Card 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 Rate (Hz)	
	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: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card	Bus type	ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card		
	Maximum vertical refresh rate	85 Hz		
	Display support	Integrated 400 MHz RAMDAC		
	Display max resolution	2560x1600 digital, 2048 x 1536 analog		
	Board display options	Supports two displays via the DisplayPort and DVI connectors		
	Board configuration	Specification	Description	
		Graphics Chip	RV620	
		Core clock	750 MHz	
		Memory clock	500 MHz	
		Frame buffer	256 MB DDR2, 64 bit wide	

Technical Specifications - Graphics

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
Operating systems support	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows XP Professional or Windows XP Home 32*.

* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

Linux x86 and x86_64 distributions using XFree86 or X.Org**.

** Linux drivers are available from ATI's website and may be available in a Linux distribution. Refer to the Open Source and Linux from HP website: <http://www.hp.com/wwsolutions/linux/products/clients/> for support information.

Core power	22 W (max)
Dimensions (H x D)	2.71 in x 6.60 in (68.90 mm x 167.65 mm)
Weight	0.30 lb (134.3 g)
Option kit contents	<ul style="list-style-type: none">• ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card with full height bracket attached• DVI to VGA adapter• Software CD with graphics drivers• Low profile bracket to convert the card for using in a low profile chassis• Warranty documentation

Compliance standards	<p>EMC Emissions:</p> <ul style="list-style-type: none">a) FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Useb) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipmentc) Canadian Standard ICES-003 is equivalent to CISPR22d) Taiwanese Standard BSMIe) Japanese VCCIf) Australian C-Tickg) Korean (MIC) <p>EMC Immunity:</p> <p>CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.</p>
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ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card 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

Technical Specifications - Graphics

Resolution	Maximum Refresh Rate (Hz)	
	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 DisplayPort connection

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

Technical Specifications - Input Devices

HP PS/2 or USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
	Electrical	Weight	2 lb (0.9 kg) minimum
		Operating voltage	+ 5VDC \pm 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		ESD	CE level 4, 15-kV air discharge
		EMI – RFI	Conforms to FCC rules for a Class B computing device
	Mechanical	Microsoft PC 99 – 2001	Functionally compliant
		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)
	Environmental	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)
		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	

Technical Specifications - Input Devices

HP USB 2-Button Laser	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%
		Power Consumption	
MTBF		> 150,000 hrs	
ESD		IEC-61000-4-2 criteria B, Contact discharge: +/- 4kV, Air discharge: +/- 8kV	
EMI-RFI		FCC Class B	
Mechanical	PC98	PC 99 Compliant	
	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	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		

Technical Specifications - Input Devices

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		
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	
Mechanical	Microsoft PC99 – 2001	Functionally compliant	
	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	

Technical Specifications - Input Devices

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)

Technical Specifications - Hard Drives

Serial ATA Hard Drives 80 GB
(7200 rpm)

Capacity	80,026,361,856 bytes	
Height	1 in (2.54 cm)	
Width	Media diameter: 3.5 in (8.9 cm) Physical size: 4 in (10.2 cm)	
Interface	Serial ATA (3.0 Gb/s)	
Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
Buffer	8 MB	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2.0 ms
	Average	11 ms
	Full-Stroke	21 ms
Rotational Speed	7,200 rpm	
Logical Blocks	156,301,488	
Operating Temperature	32° to 140° F (0° to 60° C)	

160 GB

Capacity	160,041,885,696 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)	3.0 Gb/s	
Buffer	8 MB	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2.0 ms
	Average	11 ms
	Full-Stroke	21 ms
Rotational Speed	7,200 rpm	
Logical Blocks	312,581,808	
Operating Temperature	32° to 140° F (0° to 60° C)	

250 GB

Capacity	250,059,350,016 bytes	
Height	1 in (2.54 cm)	
Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
Interface	Serial ATA (3.0 Gb/s)	
Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
Buffer	8 MB	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2.0 ms
	Average	11 ms
	Full-Stroke	21 ms

Technical Specifications - Hard Drives

	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
320 GB	Capacity	320,072,933,376 bytes	
	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.5 in (8.9 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	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	625,142,448	
	Operating Temperature	41° to 131° F (5° to 55° C)	
500 GB	Capacity	500,107,862,016 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)	3.0 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2.0 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Optical Storage

SATA DVD-ROM Drive	Height	5.25-inch, half-height, tray-load			
	Orientation	Either horizontal or vertical			
	Interface type	SATA/ATAPI			
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)			
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)			
	Weight (max)	2.6 lb (1.2 kg)			
	Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X		
		DVD-ROM	Up to 16X		
		DVD-RAM	Up to 4X		
		CD-ROM, CD-R	Up to 48X		
		CD-RW	Up to 32X		
		Removable Storage - Media Compatibility - DVD-ROM	Media	Read	Write
			CD-ROM	Yes	No
CD-R	Yes		No		
CD-RW	Yes		No		
DVD-ROM	Yes		No		
DVD-ROM DL	Yes		No		
DVD-RAM	Yes		No		
DVD+R	Yes		No		
DVD+R DL	Yes		No		
DVD+RW	Yes		No		
Access times (typical reads, including setting)	DVD-R	Yes	No		
	DVD-RW	Yes	No		
	DVD-R DL	Yes	No		
	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)			
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)			
Cache Buffer	2 MB (minimum)				
Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)				
Power	Source	SATA DC power receptacle			
	DC Power Requirement	5 VDC \pm 5%-100 mV ripple p-p 12 VDC \pm 5%-200 mV ripple p-p			
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum			

Technical Specifications - Optical Storage

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

SATA CD-RW/DVD-ROM Combo Drive	Height	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical		
	Interface type	SATA/ATAPI		
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)		
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
	Weight (max)	2.6 lb (1.2 kg)		
	Write speeds	CD-R	Up to 48X	
		CD-RW	Up to 32X	
		Read speeds	Up to 8X	
	Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X	
		DVD-ROM	Up to 16X	
		CD-ROM, CD-R	Up to 48X	
		CD-RW	Up to 32X	
	Access times (typical reads, including setting)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)	
		Full Stroke	DVD: < 250 ms (typical), CD: < 210 ms (typical)	
	Power	Source	SATA DC power receptacle	
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p	
			12 VDC ± 5%-200 mV ripple p-p	
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum		
		12 VDC - < 600 mA typical, < 1400 mA maximum		
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)		
	Relative Humidity	10% to 90%		
	Maximum Wet Bulb Temperature	86° F (30° C)		

Technical Specifications - Optical Storage

HP SATA SuperMulti LightScribe DVD Writer Drive	Height	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical		
	Interface type	SATA/ATAPI		
	Disc capacity	8.5 GB DL or 4.7 GB standard		
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
	Weight (max)	2.6 lb (1.2 kg)		
	Write speeds	DVD-RAM	Up to 12X	
		DVD+R	Up to 16X	
		DVD+RW	Up to 8X	
		DVD+R DL	Up to 8X	
		DVD-R DL	Up to 8X	
		DVD-R	Up to 16X	
		DVD-RW	Up to 6X	
		CD-R	Up to 48X	
		CD-RW	Up to 32X	
		Read speeds	DVD-RAM	Up to 12X
			DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X
			DVD-ROM DL	Up to 8X
			DVD-ROM, DVD+R, DVD-R	Up to 16X
	CD-ROM, CD-R		Up to 48X	
	CD-RW		Up to 32X	
	Access times (typical reads, including setting)		Random	DVD: < 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 \pm 5%-100 mV ripple p-p 12 VDC \pm 5%-200 mV ripple p-p		
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum		
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)		
	Relative Humidity	10% to 90%		
	Maximum Wet Bulb Temperature	86° F (30° C)		

Technical Specifications - Removable Storage

1.44-MB Diskette Drive	Size	3.5 in (8.89 cm)	
	LED Indicators (front panel)	Green	
	Read/Write Capacity per Diskette (high/low)	1.44 MB/720 KB	
	Drive Height	One-third	
	Drive Rotation	300 rpm	
	Transfer Rate (high/low)	500/250 KB/s	
	Bytes/Sector	512	
	Sectors/Track (high/low)	18/9	
	Tracks/Side (high/low)	80/80	
	Access Times	Track-to-Track (high/low)	3/6 ms
		Average (high/low)	94/173 ms
		Settling Time	15 ms
		Latency Average	100 ms
	Cylinders (high/low)	80/80	
Read/Write Heads	Two		

HP 16-in-1 Media Card Reader	USB interface	USB 2.0 High-speed device via PCI card or pass-through via internal USB port of system board	
	Advance protocol support	<ul style="list-style-type: none"> • 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 (version 4.x) 	
	Supported media types	<ul style="list-style-type: none"> • Supports CompactFlash Card Type I (CF I), CompactFlash Card Type II (CF II), MicroDrive (MD) • Supports 3.3V SmartMedia Card (SM), SmartMedia ROM (SM ROM), xD-Picture Card (xD) • Supports Secure Digital Card (SD), Secure Digital ROM Card (SD ROM), miniSD, MultiMediaCard (MMC), Secure MultiMediaCard (Secure MMC), ROM Type MultiMediaCard (MMC ROM), Reduced Size MultiMediaCard (RS MMC), MultiMediaCard 4.0 (MMC Plus), Reduced Size MultiMediaCard 4.0 (MMC Mobile) • Support Memory Stick (MS), Memory Stick ROM (MS ROM), MagicGate Memory Stick (MG), Memory Stick Select, Memory Stick Duo (MS Duo), Memory Stick PRO (MS-PRO), Memory Stick PRO Duo (MS PRO Duo) 	
Mechanical	Length (3.5")	124.7 cm	
	Width (3.5")	101.6 cm	
	Height (3.5")	25.4 cm	
	Length (5.25")	171.6 cm	
	Width (5.25")	148.9 cm	

Technical Specifications - Removable Storage

Environmental	<p>Height (5.25") 42.7 cm</p> <p>Operational environmental extremes Test Parameters/Conditions – Power applied, unit operating on system $\pm 5\%$ 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</p> <p>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</p>
Approvals	<p>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</p>

HP 22-in-1 Media Card Reader (with 1394 port)	<p>USB Interface USB 2.0 High-speed interface</p> <p>1394 Interface Two IEEE-1394a external ports; 1 IEEE-1394a internal port (connects to the pass through cable on the media card reader)</p> <p>Advance protocol support <ul style="list-style-type: none"> ● 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 </p> <p>Supported media type <ul style="list-style-type: none"> ● 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 </p>
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Technical Specifications - Removable Storage

	<ul style="list-style-type: none">● 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	<ul style="list-style-type: none">● Memory Stick Micro (M2)● MMC Micro
Environmental	Operational Environmental Extremes Test Parameters/Conditions - Power applied, unit operating on system $\pm 5\%$ 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

Technical Specifications - Environmental Data

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>

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