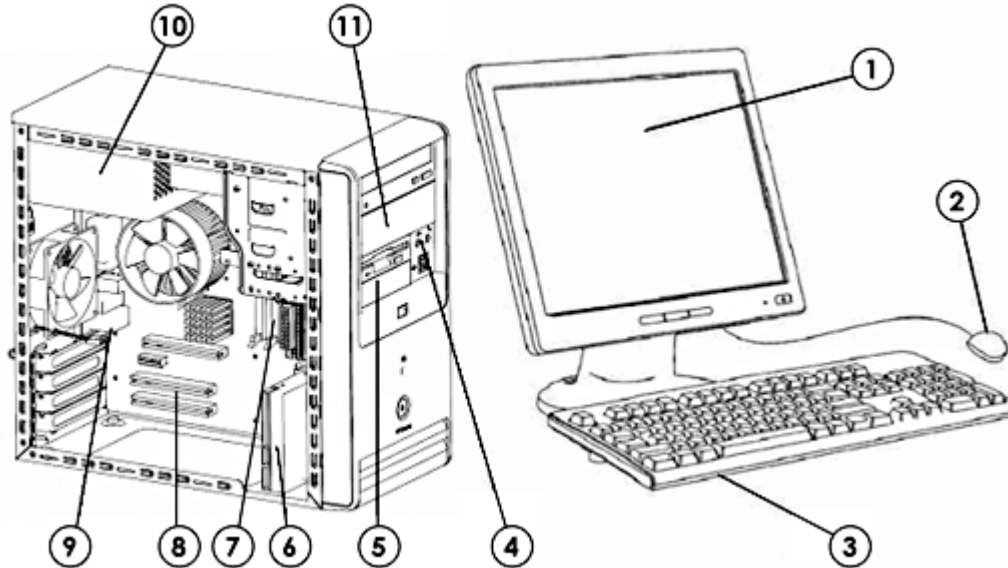


Overview

**HP recommends
Windows Vista® Business**



- | | |
|---|--|
| 1. Monitor (sold separately) | 7. 4 DDR2 DIMM Slots |
| 2. 2-Button Scroll Mouse | 8. 2 PCI 2.3 slots, 1 PCI-e x1 slot, 1 PCI-e x16 Slot |
| 3. HP Standard Keyboard | 9. 6 USB 2.0 ports, 1 serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, 1 audio in, 1 audio out, 1 MIC |
| 4. Front I/O – 2 USB 2.0 ports & MIC, Headset | 10. 300-watt max power supply |
| 5. 2 external 3.5" drive bays for optional diskette drive | 11. 2 external 5.25" drive bays for optional optical drives |
| 6. 2 internal 3.5" drive bays | |

At A Glance

- Intel Quad Core™, Intel® Core™ 2 Duo, Intel Pentium Dual Core, Intel Celeron® -L and Intel Celeron Dual Core Processors
- Choice of operating systems:
 - Genuine Windows Vista Business 32 bit
 - Genuine Windows Vista Business 64 bit
 - Genuine Windows Vista Home Basic 32 bit
 - Genuine Windows Vista downgrade to XP Professional 32 bit
 - Genuine Windows Vista Starter 32 bit
 - Novell Suse Linux
 - Free DOS
- Intel G33 Express Chipset
- Intel I/O Controller Hub 9 (ICH9)
- Intel Graphics Media Accelerator 3100
- DDR2 SDRAM system memory
- 8 channel High Definition Audio
- PCI and PCI Express I/O buses
- Serial ATA controller
- USB 2.0 support
- Realtek 8111C Gigabit Ethernet controller

Overview

- Choice of hard drives and optical drives
- Protected by HP Services. Terms and conditions applicable for India only.

Standard Features and Configurable Components

Processor and Speed Intel Celeron Processors*

One of the following

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 (2.20-GHz, 512-KB L2 cache, 800-MHz FSB)

Intel Celeron Dual-Core Processor E1200 (1.6GHz/ 800MHz, 512KB)

Intel Celeron Dual-Core Processor E1400 (2.0GHz/ 800MHz, 512KB)

Intel Celeron Dual-Core Processor E1500 (2.2GHz/ 800MHz, 512KB)

Intel Pentium Dual-Core Processors*

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

Intel Pentium Dual-Core E2180 Processor (2.0-GHz, 1-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual-Core E2200 Processor (2.20-GHz, 1-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual-Core E2220 Processor (2.40-GHz, 1-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual-Core E5200Processor (2.50-GHz, 2-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual-Core E5300Processor (2.60-GHz, 2-MB L2 cache, 800-MHz FSB)

Intel Pentium Dual core E6300 Processor (2.80-GHz, 2-MB L2 cache, 1066-MHz FSB)

Intel Core 2 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 E6550 Processor (2.33-GHz, 4-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E6750 Processor (2.66-GHz, 4-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E6850 Processor (3.00-GHz, 4-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Duo E7200 Processor (2.53-GHz, 3-MB L2 cache, 1066-MHz FSB)

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

Intel Core 2 Duo E7400 Processor (2.8-GHz, 3-MB L2 cache, 1066-MHz FSB)

Intel Core 2 Duo E7500 Processor (2.93-GHz, 3-MB L2 cache, 1066-MHz FSB)

Intel Core 2 Duo E7600 Processor (3.06-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 Quad Processors

Intel Core 2 Quad Q6600 Processor (2.4-GHz, 8-MB L2 cache, 1066-MHz FSB)

Intel Core 2 Quad Q8200 Processor (2.33-GHz, 4-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Quad Q8300 Processor (2.50-GHz, 4-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Quad Q8400 Processor (2.66-GHz, 4-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Quad Q9300 Processor (2.50-GHz, 6-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Quad Q9400 Processor (2.66-GHz, 6-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Quad Q9450 Processor (2.66-GHz, 12-MB L2 cache, 1333-MHz FSB)

Intel Core 2 Quad Q9550 Processor (2.83-GHz, 12-MB L2 cache, 1333-MHz FSB)

Standard Features and Configurable Components

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

Operating Systems and Application Software (availability varies by region)

- Genuine Windows Vista Business 32 bit*
- Genuine Windows Vista Business 64 bit*
- Genuine Windows Vista Home Basic 32 bit*
- Genuine Windows Vista Business downgrade to Genuine Windows XP Professional installed*†
- Genuine Windows Vista Starter 32 bit*
- Novell Suse Linux
- 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>.

† Windows Vista Business disk also included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order annually at least 25 customer systems with the same custom image.

- Microsoft Office 2007 Basic
- Microsoft Office 2007 Small Business
- Microsoft Office 2007 Professional

- Roxio Easy Media Creator 9.x**
- Intervideo WinDVD Player 5.x**
- AntiVirus

**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 Hard Drive (7200 rpm)

System Memory

- 512MB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (1 x 512MB)
- 1-GB DDR2 Synch DRAM PC2-6400 (800-MHz) Non-ECC (2 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)
- 3-GB DDR2 Sync DRAM PC2-6400 (800-MHz) (3 x 1GB)
- 4-GB DDR2 Sync DRAM PC2-6400 (800-MHz) (2 x 2GB)
- 4-GB DDR2 Sync DRAM PC2-6400 (800-MHz) (4 x 1GB)
- 8-GB DDR2 Sync DRAM PC2-6400 (800-MHz) (4x2GB)

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.



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

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 ALC883 High Definition audio codec

3D audio compliant with AC'97 and HD Audio compatible

Internal PC speaker (optional)

Communication

Integrated Realtek 8111C GbE Ethernet Controller

Intel PRO Gigabit PCI-e x1 NIC Card (full height) – optional

Broadcom NetXtreme 5751 Gigabit PCIe Controller – optional

Agere 56K PCI Modem – optional

Graphics

Intel Graphics Media Accelerator 3100 – integrated

NVIDIA GeForce 8400 GS (256MB) Single Head PCI-e x16 – optional*

ATI Radeon HD 2400XT (256MB DH) PCI-e x16 – optional*

ATI Radeon HD 3650 (512MB) PCIe x16 Card – (optional)*

ATI Radeon 3470 256MB SH PCIe Card – 1st – (Optional)**

* Not available with Novell Suse Linux.

**Not available with Vista Business 64 Bit & Vista Starter OS

System Details

Base Unit

- Micro ATX microtower chassis, including power supply and front bezel
- Six (6) drive bays and four expansion slots
- Active type heat sink
- 92 x 92 x 25 mm chassis fan
- System board with Intel G33 Express chipset, Intel I/O Controller Hub 9 (ICH9), Realtek RTL8111C GbE Ethernet controller, Intel GMA 3100 graphics, and Realtek High Definition audio, (2) full-height PCI 2.3 slot, (1) PCI Express x1 slots, (1) PCI Express x16 slot, (4) DDR2 DIMM memory slots, (4) Serial ATA data connectors
- Product documentation on CD
- HP system restore DVD
- Power cord

Slots

PCI	Two (2) full-height PCI 2.3 slots on PCA One (1) full-height PCI Express x1 slot on PCA One (1) full-height PCI Express x16 slot on PCA (for graphic cards)
Memory Expansion	Four (4) DDR2 SDRAM DIMM slots (8 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" Two (2) 3.5"

USB Support

EHCI high-speed USB 2.0 controller
Two (2) front ports; Six (6) rear ports, 4 Optional USB ports

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

Weight & Dimensions

Chassis Dimensions (H x W x D)	14.37 x 7.09 (7.09 w/bezel) x 15.75 in 365 x 180 (180 w/bezel) x 400 mm
Packaged Dimensions (L x W x H)	23.2 x 19.6 x 10.9 in 589 x 499 x 278 mm
System Weight	26.45 lb (12 kg)
Shipping Weight	30.8 lb (14.0 kg)

System Details

Technology and Features	Memory Type	PC2-6400 DDR2 SDRAM (800MHz) non-ECC Up to 8-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 (variable speed)
	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 Six (6) USB 2.0 ports
	Drive Bays	Two (2) 5-1/4" external Two (2) 3-1/2" external Two (2) 3-1/2" internal
	Internal Speaker	Optional
	Security	Chassis Intrusion switch Kensington Lock Support
	Power Supply	300-watt ATX Power Supply – non-PFC with a 230v

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	32° to 113° F (0° to 45° 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)

System Details

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 Intel single, Core 2 Duo or Quad core, Celeron 4xx or Dual Core
	PWM	ON NCP5387 – 3 Phase
	Chipset	Intel G33 Express Intel I/O Controller Hub 9 (ICH9)
	Super I/O	ITE 8718F
	Front Side Bus Frequency	800/1066/1333 MHz
	Memory	DDR2 SDRAM 4 DIMM slots
	Clock Generator	RMT875T-605
	Integrated Graphics	Intel Graphics Media Accelerator (GMA) 3100
	Audio	Realtek ALC883 HD Audio compatible codec with eight channel audio
	LOM	Realtek RTL8111C GbE Ethernet controller
	Storage	Four Serial ATA interfaces
	Expansion Slots	2 x PCI 2.3 slot 1 x PCI Express x1 slots 1 x PCI Express x16 slot
	BIOS	Award Core 6
	Industrial Standard	PCI 2.3 compliant USB 2.0
	Rear Side I/O Ports	1 x PS/2 Keyboard port 1 x PS/2 mouse port 6 x USB 2.0 ports 1 x RJ-45 10/100/1000 port 1 x D-sub 15 pin analog VGA port 3 x audio ports
	On Board I/O Interfaces	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 3 x Internal USB header 1 x header to support 2 front (Headphone/Mic) audio ports
	Board Size	Micro-ATX, PCB Size: 9.6" x 9.6" in (24.38 x 24.38 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 S3, S4 and S5 ● ACPI status ● Hardware monitor capability ● CPU fan speed control

System Details

Network Interface	Integrated Realtek 8111C- GbE Ethernet Controller	Hardware Highlights Features	
	Intel PRO/1000 PT Gigabit PCIe Adapter	Hardware Highlights Features	PCI Express interface 10-Mbps, 100-Mbps and 1000-Mbps operation

Power Supply	<ul style="list-style-type: none"> • ATX Power Supply – Non-PFC with 230v • 50–60 Hz rated line frequency • 300 watt maximum rated power • 80-mm power supply fan – variable speed for optimum acoustics
---------------------	--

Power Conservation ‘Energy Saver’	<ul style="list-style-type: none"> • APM 1.2 support • Screen blanking • System Idle mode
--	--

System Environmental Specs	<ul style="list-style-type: none"> • 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	32° to 113°F (0° to 45°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	5% 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).

System Details

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 40G's (Half-sine Shock) 40G'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 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 = 35 dBA FIXED DISK (Random write) LWAd = 4.8 Bels, Desktop Average LpAm = 40dBA CD-ROM (Sequential Reads) LWAd = 5.0 Bels, Deskside Average LpAm = 42dBA

After-Market Options

Communications	NICs	
	Broadcom NetXtreme Gigabit Ethernet PCIe NIC Card	EA833AA
	Intel Pro 1000 GT PCI Gigabit NIC (FH) Card	EH352AA
	Modems	
	Agere 2006 PCI High-Speed 56K International SoftModem	EK694AA
Hard Disk Drives	HP 80GB SATA 3.0Gb/s Hard Drive	PY276AA
	HP 160GB SATA 3.0Gb/s Hard Drive	PY277AA
	HP 250GB SATA 3.0Gb/s Hard Drive	PY278AA
	HP 320GB SATA 3.0Gb/s Hard Drive	FH963AA
	HP 500GB SATA 3.0Gb/s Hard Drive	KW347AA
Removable Storage Devices	Diskette Drive	
	HP CDC 1.44MB 3.5 Internal Floppy	AH053AA
Input Devices	Keyboards	
	HP PS/2 Standard Keyboard	DT527A#ABB
	HP USB Standard Keyboard	DT528A#ABB
	Mice	
	HP PS/2 2-Button Optical Scroll Mouse	EY703AA
	HP USB 2-Button Optical Scroll Mouse	DC172B
	HP USB 2-Button Laser Mouse	GW405AA
Memory	HP 512-MB PC2-6400 DIMM Memory	AH056AA
	HP 1-GB PC2-6400 DIMM Memory	AH058AA
	HP 2-GB PC2-6400 (DDR2 800 MHz) DIMM	AH060AA
Audio	HP USB Powered Speakers	RD628AA
Graphics	ATI Radeon HD 2400 XT (256MB DH) PCIe x16 Graphics Card	KD060AA
	NVIDIA GeForce 8400 GS 256MB SH PCIe x16 Card	GJ119AA
	ATI Radeon HD 3650 (512MB DH) PCIe x16 Graphics Card	KS505AA
	ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card*	FH972AA
	NOTE: 1GB of system memory required. Graphics cards use part of the total system memory to enhance graphics performance & Graphics cards are not available with SUSE Linux	
* Not available with Vista Business 64 Bit & Vista Starter OS		

After-Market Options

Optical Drives	HP 48X/32X SATA Combo Drive (CDRW/DVD)	AH046AA
	HP 16X/48X SATA DVD-ROM Drive	AH047AA
	HP 16X SATA SuperMulti LightScribe Drive	GF343AA

Security

Monitors

CRTs

HP v7650 CRT Monitor ALL	PF996AA#ACJ
HP s7540 CRT Monitor ALL	PF997AA#ACJ
HP s5502 CRT Monitor ALL	PQ560AA#ACJ

LCDs

v185W	FS932AA#ACJ
HP L1750 17" LCD Monitor	GF904AA#ACJ
HP w15v LCD Monitor INDIA	FM745AA#ACJ
HP w15e 15-Inch LCD Monitor	KQ759AA#ACJ
HP L1908w Wide LCD Monitor	GP536AA#ACJ
HP L1908wi Wide LCD Monitor	GP537AA#ACJ
HP L1710 17-inch LCD Monitor ALL	GS917AA#ACJ
HP L1910 19-inch LCD Monitor	GS918AA#ACJ
HP w17e 17 Inch LCD Monitor	GV537AA#ACJ
L1506 LCD Monitor ALL	PX848AA#ACJ
HP L1908wm LCD Monitor	KA214AA#ACJ
HP L1950 19 inch LCD Monitor	PX850AA#ACJ
HP LP1965 LCD Monitor ALL	RA373AA#ACJ
HP L2208w LCD Monitor	GX007AA#ACJ
HP L2245w LCD Monitor	GX008AA#ACJ
HP LP1965 LCD Monitor	RA374AA#ACJ
HP L2045w LCD Monitor ALL	RB145AA#ACJ

Technical Specifications - Memory

DDR SYNCH DRAM NON-ECC MEMORY

The Intel G33 Express chipset supports non-ECC DDR2 memory up to PC2-6400 (800-MHz). 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.

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

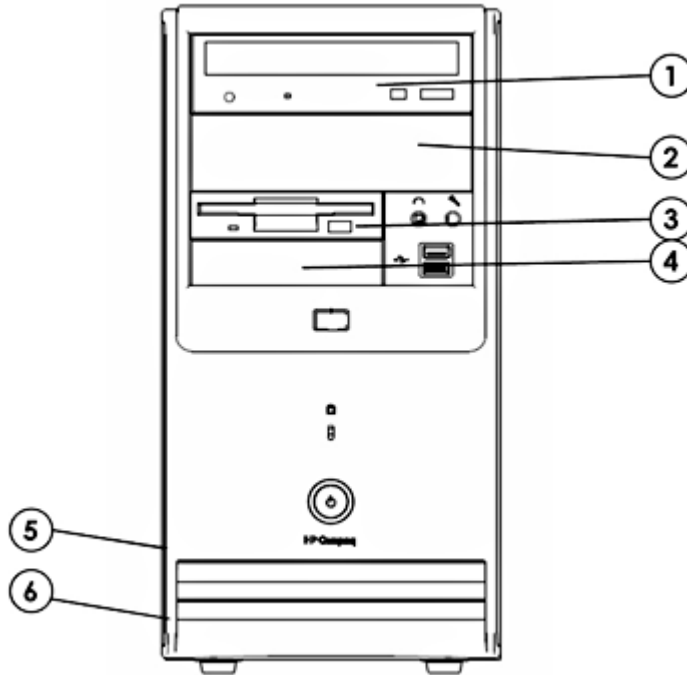
OPTIONAL MEMORY UPGRADES

Supports up to 8-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	Channel A		Channel B	
	Slot 1	Slot 2	Slot 3	Slot 4
512-MB	512-MB			
1-GB	1-GB			
2GB	2-GB			
1-GB (dual-channel symmetric)	512-MB		512-MB	
2-GB (dual-channel symmetric)	1-GB		1-GB	
4-GB (dual-channel symmetric)	1-GB	1-GB	1-GB	1-GB
4-GB (dual-channel symmetric)	2-GB		2-GB	
8-GB (dual-channel symmetric)	2-GB	2-GB	2-GB	2-GB

Technical Specifications - Storage



Drive Support	Maximum Quantity Supported	Position Supported	Controller
Diskette Drives	1	3	SIO
Media Reader	1	4	Internal USB 2.0 port
DVD / DVD +/- RW / Combo Drives	2	1, 2	SATA
3.5" Serial ATA Hard Drives	2	5, 6	SATA

Technical Specifications - Audio

Integrated Realtek ALC883 Audio	Type	Integrated
	High Definition Stereo Codec	Yes
	Sampling	Supports 44.1KHz to 96 KHz Support 16/20/24 bit PCM format, 3D audio
	Audio Jacks	Mic-In Line-In Line-Out
	Power Support	Digital: 3.3V Analog: 3.0 to ~5.0 V
	Other	Meets performance requirements for audio on PC99/2001 systems High quality differential CD input

Technical Specifications - Communications

Integrated Realtek 8111C-GR GbE Ethernet Controller	Controller	Realtek 8111C PCI LAN Controller
	Memory	
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3ab compliant, IEEE 802.3, 802.1Q, 802.3ab and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI 2.2
	Data transfer mode	Bus-master DMA
	Hardware certifications	
	Power requirement(LOM)	+3.3 Volt signaling.
	Boot ROM support	Yes

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	Driver upgradeable for future enhancements
	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

Technical Specifications - Communications

Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark)
EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
Health	Bare PCB material compliant to 94V-0 or better (marked as such)
Other	PC 2001 compliant, PCI version 2.3, WHQL approved; ACPI compliant

Technical Specifications - Graphics

Integrated Graphics Media Accelerator 3100	3D/2D Controller	Microsoft DirectX® 9 based with support for Pixel Shader 2.0, 4:1 anisotropic filtering, Gaussian texture filtering, shadow maps, volumetric textures, double-sided stencil buffers, and 4 pixel pipes.
	VGA Controller	Integrated
	Bus Type	PCI Express™ x16 (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).
	RAMDAC	Integrated, 400 MHz
	Memory	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. System memory equal or greater than 512 MB 8 MB pre-allocated + 248 MB DVMT = max frame buffer of 256 MB
	Controller Clock Speed	400 MHz
	Overlay Planes	Single overlay support with 5x3 filtering
	Maximum Color Depth	32 bits/pixel
	Maximum Vertical Refresh Rate	85 Hz at up to 1920x1440, 85 Hz at 2048x1536. Varies with mode and configuration. See table below.
	Multi-display Support	Support for one CRT via the motherboard's VGA connector. Support for an additional DVI-D display via the optional DVI ADD2 card. Dual independent displays and dual synchronous (Twin or Clone mode) displays are supported.
	Graphics/Video API Support	Microsoft DirectX®9, DirectXVA®, VMR9, GDI/GDI+; OpenGL® 1.4.

Technical Specifications - Input Devices

HP PS/2 or USB Standard Keyboard	Physical characteristics	Keys	104 layout
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		ESD	CE level 4, 15-kV air discharge
		EMI – RFI	Conforms to FCC rules for a Class B computing device
	Mechanical	MicrosoftPC 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)
		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)
		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 - 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 (8.89 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	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)

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)	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 ± 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		

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 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	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	<table border="0"> <tr> <td>DVD-RAM</td> <td>Up to 12X</td> </tr> <tr> <td>DVD+R</td> <td>Up to 16X</td> </tr> <tr> <td>DVD+RW</td> <td>Up to 8X</td> </tr> <tr> <td>DVD+R DL</td> <td>Up to 8X</td> </tr> <tr> <td>DVD-R DL</td> <td>Up to 8X</td> </tr> <tr> <td>DVD-R</td> <td>Up to 16X</td> </tr> <tr> <td>DVD-RW</td> <td>Up to 6X</td> </tr> <tr> <td>CD-R</td> <td>Up to 48X</td> </tr> <tr> <td>CD-RW</td> <td>Up to 32X</td> </tr> </table>	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
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	<table border="0"> <tr> <td>DVD-RAM</td> <td>Up to 12X</td> </tr> <tr> <td>DVD+RW, DVD-RW, DVD+R DL, DVD-R DL</td> <td>Up to 8X</td> </tr> <tr> <td>DVD-ROM DL</td> <td>Up to 8X</td> </tr> <tr> <td>DVD-ROM, DVD+R, DVD-R</td> <td>Up to 16X</td> </tr> <tr> <td>CD-ROM, CD-R</td> <td>Up to 48X</td> </tr> <tr> <td>CD-RW</td> <td>Up to 32X</td> </tr> </table>	DVD-RAM	Up to 12X	DVD+RW, DVD-RW, DVD+R DL, DVD-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						
DVD-RAM	Up to 12X																			
DVD+RW, DVD-RW, DVD+R DL, DVD-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)	<table border="0"> <tr> <td>Random</td> <td>DVD: < 140 ms (typical), CD: < 125 ms (typical)</td> </tr> <tr> <td>Full Stroke</td> <td>DVD: < 250 ms (seek), CD: < 210 ms (seek)</td> </tr> </table>	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)														
Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)																			
Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)																			
	Power	<table border="0"> <tr> <td>Source</td> <td>SATA DC power receptacle</td> </tr> <tr> <td>DC Power Requirement</td> <td>5 VDC \pm 5%-100 mV ripple p-p 12 VDC \pm 5%-200 mV ripple p-p</td> </tr> <tr> <td>DC Current</td> <td>5 VDC (< 1000 mA typical, 1600 mA maximum) 12 VDC (< 600 mA typical, 1400 mA maximum)</td> </tr> </table>	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)												
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)	<table border="0"> <tr> <td>Temperature</td> <td>41° to 122° F (5° to 50° C)</td> </tr> <tr> <td>Relative Humidity</td> <td>10% to 90%</td> </tr> <tr> <td>Maximum Wet Bulb Temperature</td> <td>86° F (30° C)</td> </tr> </table>	Temperature	41° to 122° F (5° to 50° C)	Relative Humidity	10% to 90%	Maximum Wet Bulb Temperature	86° F (30° C)												
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

HP 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	



Technical Specifications - Removable Storage

Environmental	Length (5.25")	171.6 cm
	Width (5.25")	148.9 cm
	Height (5.25")	42.7 cm
	Operational environmental extremes	Test Parameters/Conditions - Power applied, unit operating on system $\pm 5\%$ nominal supply voltage. 10°C 10% R.H. \geq 24 hours 10°C 90% R.H. \geq 24 hours 20°C 90% R.H. \geq 24 hours 30°C 90% R.H. \geq 24 hours 40°C 90% R.H. \geq 24 hours 50°C 90% R.H. \geq 24 hours 50°C 10% R.H. \geq 24 hours
Approvals	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
		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, cJUL, TUV-T

© Copyright 2009 Hewlett-Packard Development Company, L.P.
All rights reserved.

The information contained herein is subject to change without notice.

Intel and Pentium are U.S. registered trademarks of Intel Corporation. Microsoft and Windows are U.S. registered trademarks of Microsoft Corporation. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.