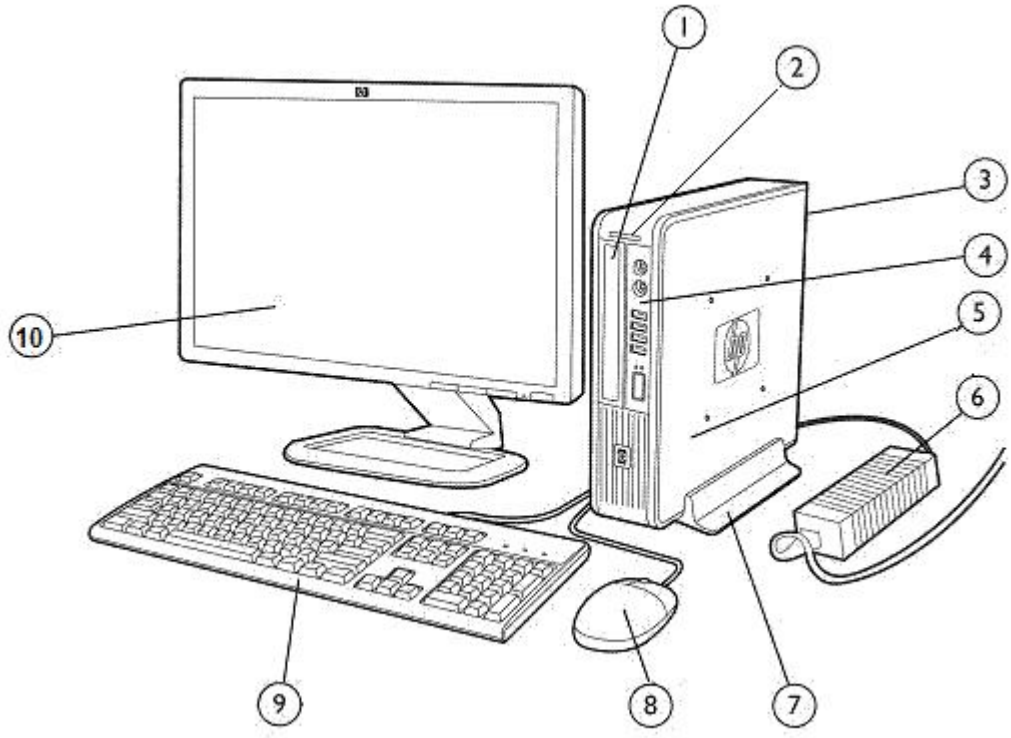
Overview

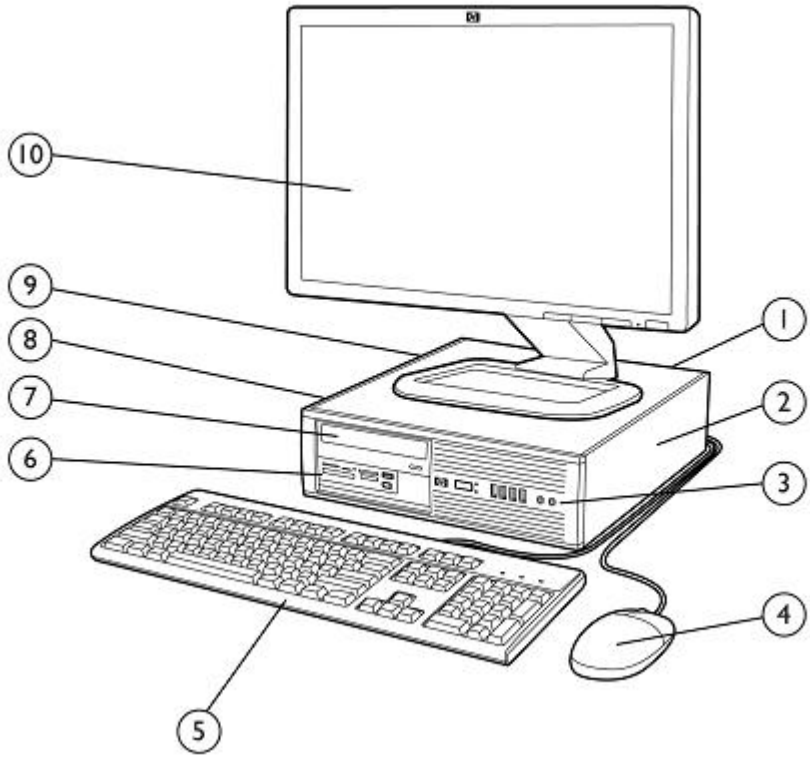
Ultra-slim Desktop



1. Optical Disc Drive (slimline)
2. Secure Digital (SD) Card Reader
3. Rear I/O includes (6) USB 2.0 ports, DisplayPort and VGA video interfaces, PS/2 mouse and keyboard ports, RJ-45 network interface, audio in/out jacks
4. Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack
5. 2.5" internal hard disk drive bay
6. 135W 87% efficient external Power Adapter
7. HP USDT Tower Stand (sold separately)
8. HP Optical Mouse
9. HP Keyboard
10. HP Monitor (sold separately)

Overview

Small Form Factor



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

2. Low profile expansion slots include (1) PCI slot, (2) PCI Express x1 slots and (1) PCI Express x16 graphics slot

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

4. HP Optical Mouse

5. HP Keyboard

6. 3.5" external drive bay supporting a media card reader or a secondary hard disk drive

7. 5.25" external drive bay supporting an optical disk drive

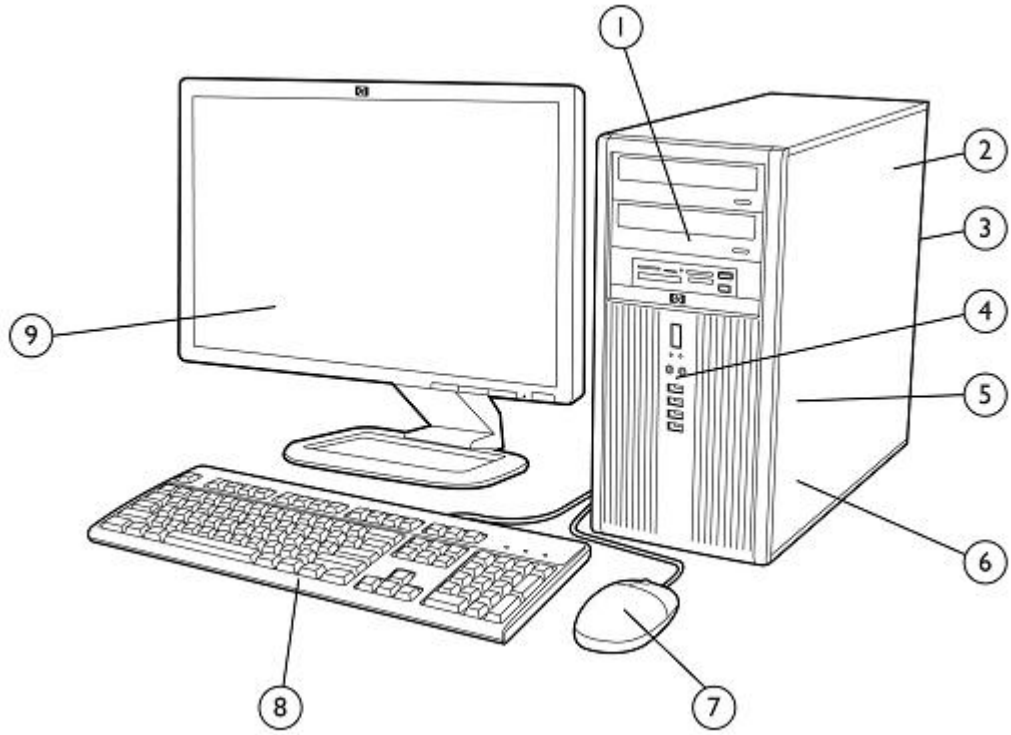
8. 3.5" internal drive bay supporting primary hard disk drive

9. 240W standard or 89% high efficiency Power Supply

10. HP Monitor (sold separately)

Overview

Convertible Minitower



1. (3) 5.25" external drive bays supporting optical disk drives, removable hard disk drives, or the HP Media Card Reader

2. 320W standard or 89% high efficiency Power Supply

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

4. Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and an auto detecting microphone/headphone jack

5. (3) 3.5" internal drive bays supporting multiple hard disk drives

6. Full height expansion slots include (3) full-length PCI slots, (1) PCI Express x1 slot, and (2) full-length PCI Express x16 graphics slots
NOTE: 2nd PCIe x16 slot has x4 connectivity.

7. HP Optical Mouse

8. HP Keyboard

9. HP Monitor (sold separately)

Overview

At A Glance

- Designed for long-term deployment within corporate, enterprise, public sector and mid-market commercial organizations
- Choice of three professional chassis form factors to accommodate any desired mix between expandability and size
- BIOS developed and engineered by HP for better security, manageability and software image stability
- Intel® Q45 Express chipset featuring integrated GMA 4500 integrated graphics
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Intel® Core 2 Processor with vPro Technology (requires select processors)
- Supports industry standard management protocols including Intel Standard Manageability and DASH 1.1 (via optional Broadcom NIC card)
- Integrated dual independent monitor support via both a VGA and DisplayPort video interface
- Standard efficiency or 89% high efficiency energy saving power supplies available on the CMT and SFF models
- 87% efficient energy saving external power adapter standard with USDT models
- ENERGY STAR qualified models available (dependent upon the desired configuration)
- CMT and SFF models can be configured with multiple hard disk drives in a RAID array
- Guaranteed lengthy purchase lifecycles and image stability
- Software image fully compatible across all models and form factors
- Created using industry leading Design for Environment standards
- Selected configurations with global availability easily set up and ordered through HP.com Business to Business portals (http://h10019.www1.hp.com/business-site/index.html)
- Tailored HP Factory Express deployment and lifecycle services available (http://h71028.www7.hp.com/enterprise/cache/97688-0-0-225-121.aspx)
- Protected by HP Services, including standard warranties up to 5-5-5 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Tool-less serviceability features for easier upgrades and repairs

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

Operating Systems

Preinstalled

- Genuine Windows Vista Business (32-bit)[1]
- Genuine Windows Vista Home Basic1
- Genuine Windows 7 Home Basic Edition (32-bit)[2]
- Genuine Windows 7 Home Premium Edition (32-bit or 64-bit)[2]
- Genuine Windows 7 Professional Edition (32-bit or 64-bit)[2]
- Genuine Windows 7 Professional Edition with a custom downgrade to Genuine Windows XP Professional[2,3]
- FreeDOS

Supported

- Genuine Windows Vista Enterprise Edition[1]
- Genuine Windows 7 Enterprise Edition[2]
- Genuine Windows 7 Ultimate Edition[2]
- Novell SUSE Linux Enterprise Desktop 114

Certified

- Red Hat Desktop RHEL[4]

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

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

[3] Windows 7 Professional disk may be 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 at least 25 customer systems with the same custom image.

[4] The following features are not supported on Linux certified systems:

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

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

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

- HP ProtectTools Security Suite
- HP Software Management Agent
- Computrace for Desktops agent (optional)
- HP Insight Diagnostics
- PDF Complete

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

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

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

HP Client Management Solutions (available for free download from the Internet) http://www.hp.com/go/easydeploy)

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

* Available from your HP Sales Representative or HP Channel Partner

Value Added Services and Features

- HP Stable Platform Program
- Intel Stable Platform Program
- Business-to-Business Portals
- HP Global Series Services
- Factory Express Deployment and Lifecycle Services
- Intel Standard Manageability
- Intel Core 2 Processor with vPro Technology
- Trusted Platform Module (TPM) v1.2*

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

Service and Support

On-site warranty and service[1]: three year (3/3/3) limited warranty and service offering delivers three years of parts, labor and on-site repair. Response time is next business day[2] and includes free telephone support[3] 24 x 7. Global coverage[2] ensures any product purchased in one country and transferred to another non-restricted country will remain fully covered under the original warranty and service offering. Some countries/regions do not offer one year onsite and labor.

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

[2] On-site services may be provided pursuant to a service contract between HP and an authorized HP third party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

[3] Technical telephone support applies only to HP configured, HP and HP qualified third party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Chipset	USDT	SFF	CMT
Intel Q45 Express	X	X	X

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

Processor	USDT	SFF	CMT
Intel Celeron Processors (dual core):			
Intel Celeron E3200 Processor 2.40 GHz, 1M L2 cache, 800 MHz FSB	X	X	X
Intel Celeron E3300 Processor 2.50 GHz, 1M L2 cache, 800 MHz FSB	X	X	X
Intel Pentium Processors:			
Intel Pentium E5300 Processor 2.60 GHz, 2M L2 cache, 800 MHz FSB	X	X	X
Intel Pentium E5400 Processor 2.70 GHz, 2M L2 cache, 800 MHz FSB	X	X	X
Intel Pentium E6300 Processor 2.80 GHz, 2M L2 cache, 1066 MHz FSB	X	X	X
Intel Pentium E6500 Processor 2.93 GHz, 2M L2 cache, 1066 MHz FSB	X	X	X
Intel Core 2 Duo Processors:			
Intel Core 2 Duo E7500 Processor 2.93 GHz, 3M L2 cache, 1066 MHz FSB	X	X	X
Intel Core 2 Duo E7600 Processor 3.06 GHz, 3M L2 cache, 1066 MHz FSB	X	X	X
Intel Core 2 Duo E8400 Processor 3.0 GHz, 6M L2 cache, 1333 MHz FSB with vPro Technology	X	X	X
Intel Core 2 Duo E8500 Processor 3.16 GHz, 6M L2 cache, 1333 MHz FSB with vPro Technology	X	X	X
Intel Core 2 Duo E8600 Processor 3.33 GHz, 6M L2 cache, 1333 MHz FSB with vPro Technology	X	X	X
Intel Core 2 Quad Processors:			
Intel Core 2 Quad Q8400 Processor 2.66 GHz, 4M L2 cache, 1333 MHz FSB		X	X
Intel Core 2 Quad Q8400s Processor (low power) 2.66 GHz, 4M L2 cache, 1333 MHz FSB	X		
Intel Core 2 Quad Q9505 Processor 2.83 GHz, 6M L2 cache, 1333 MHz FSB with vPro Technology		X	X
Intel Core 2 Quad Q9505s Processor (low power) 2.83 GHz, 6M L2 cache, 1333 MHz FSB with vPro Technology	X		
Intel Core 2 Quad Q9550 Processor 2.83 GHz, 12M L2 cache, 1333 MHz FSB with vPro Technology		X	X
Intel Core 2 Quad Q9550s Processor (low power) 2.83 GHz, 12M L2 cache, 1333 MHz FSB with vPro Technology	X		
Intel Core 2 Quad Q9650 Processor 3.0 GHz, 12M L2 cache, 1333 MHz FSB with vPro Technology		X	X

Intel Core 2 Processor with vPro Technology

All HP Compaq 8000 Elite Series models featuring this technology include processors which are part of the Intel 2010 Stable Image

Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the HP Compaq 8000 Elite Series Business PC, thus making these models the most stable, secure, and manageable platforms available to enterprises today.

The 2010 SIPP processors are:

- Core 2 Duo E8400, E8500, E8600
- Core 2 Quad Q9505, Q9505s, Q9550, Q9550s, Q9650

Intel's Core 2 Processor with vPro Technology suite of features includes:

Intel Advanced Management Technology (AMT) v5.0 – An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 5.0 includes all features described as part of Intel Standard Manageability plus the following advanced management functions:

- Fast Call for Help – a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance – pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc by connecting to their IT console or Service Provider when it's convenient
- Remote Alerts – automatically alert IT or service provider if issues arise
- Access Monitor – Provides oversight into Intel® AMT actions to support security requirements

Microsoft NAP Support – Allows AMT 5.0 to gain access to a Microsoft NAP enabled 802.1x network OOB to enable OOB SW updates, inventories, remote diagnostics, etc. NAP is a new platform and solution that controls access to network resources based on a client computer's identity and compliance with corporate governance policy. NAP allows network administrators to define granular levels of network access based on who a client is, the groups to which the client belongs, and the degree to which that client is compliant with corporate governance policy. If a client is not compliant, NAP provides a mechanism to automatically bring the client back into compliance and then dynamically increase its level of network access.

When a client attempts to access the network or communicate on the network, it must present its system health state or proof of health compliance. If a client cannot prove it is compliant with system health requirements (for example, that it has the latest operating system and antivirus updates installed), its access to the network or communication on the network can be limited to a restricted network containing server resources so that health compliance issues can be remedied. After the updates are installed, the client requests access to the network or attempts the communication again. If compliant, the client is granted unlimited access to the network or the communication is allowed.

Redundant Array of Independent Drives (RAID)

Flexible implementation:

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

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

- Are only available on the CMT and SFF form factors. The USDT does not support RAID as it does not allow for more than one hard disk drive.

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

Please refer to the HP White Paper titled "Advanced Host Controller Interface (AHCI) and Redundant Array of Independent Disks (RAID) on HP Compaq 8000 Elite Series PCs" at: http://www.hp.com for more information and instructions.

DDR3 Synchronous DRAM NON-ECC System Memory

Memory upgrades are accomplished by adding single or multiple DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations. The HP Compaq 8000 Elite Series PC supports non-ECC DDR3 PC3-10600 (1333 MHz) and PC3-8500 (1066 MHz) memory.

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

Ultra-slim Desktop

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

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

SO-DIMM Size	Slot	
	Channel A (black)	Channel B (white)
1 GB	1 GB	
2 GB (dual channel symmetric)	1 GB	1 GB
4 GB (dual channel symmetric)	2 GB	2 GB
8 GB (dual channel symmetric)	4 GB	4 GB

* The Intel Q45 Express chipset includes a built-in Management Engine (ME), which allocates memory for manageability functions. Management Engine memory is shared with system memory. If the PC contains a single SO-DIMM, 16 MB of memory is pre-allocated for it at system startup. If the PC contains two SO-DIMMs, 32 MB of memory is pre-allocated. This memory is not made available to the operating system, just as pre-allocated video memory is not available.

Small Form Factor and Convertible Minitower

Maximum Memory*

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

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

DIMM Size	Slot			
	Channel A		Channel B	
	1 (black)	2 (white)	3 (white)	4 (white)
1 GB	1 GB			
2 GB (dual channel symmetric)	1 GB		1 GB	
4 GB (dual channel symmetric)	1 GB	1 GB	1 GB	1 GB
8 GB (dual channel symmetric)	2 GB	2 GB	2 GB	2 GB
16 GB (dual channel symmetric)	4 GB	4 GB	4 GB	4 GB

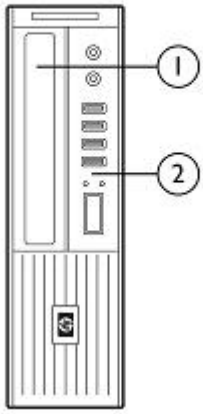
* The Intel Q45 Express chipset includes a built-in Management Engine (ME), which allocates memory for manageability functions. Management Engine memory is shared with system memory. If the PC contains a single DIMM, 16 MB of memory is pre-allocated for it at system startup. If the PC contains two DIMMs, 32 MB of memory is pre-allocated. This memory is not made available to the operating system, just as pre-allocated video memory is not available.

Memory Configurations

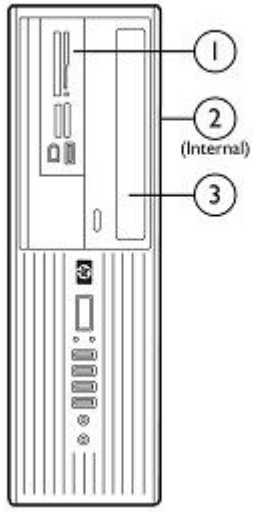
	USDT	SFF	CMT
1-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (1 x 1GB)	X	X	X
2-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (1 x 2GB)	X	X	X
2-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (2 x 1GB)	X	X	X
3-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (1GB + 2GB)	X	X	X
4-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (4 x 1GB)		X	X
4-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (1 x 4GB)	X	X	X
4-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (2 x 2GB)	X	X	X
8-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (2 x 4GB)	X	X	X
8-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (4 x 2GB)		X	X
16-GB DDR3 SDRAM PC3-10600 (1,333MHz) Non ECC (4 x 4GB)		X	X

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

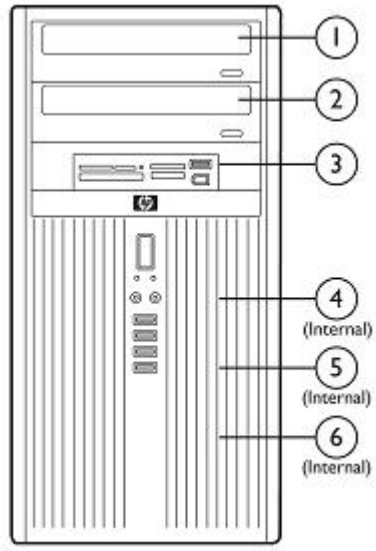
Ultra-slim Desktop



Small Form Factor



Convertible Minitower



Storage - Drive Support									
	USDT			SFF			CMT		
	SDR	ODD	HDD SSD	MCR	ODD	HDD SSD	MCR	ODD	HDD SSD
Quantity Supported	1	1	1	1	1	2	1	2	3
Position	1	2	3	1	3	2,1	3	1,2	4,5,6

Hard Disk Drives	USDT	SFF	CMT
160GB 2.5" Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV	X		
160GB 3.5" Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV		X	X
160GB 2.5" Hard Disk Drive 10,000 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart III		X	X
160GB Removable Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV		X	X
250GB 2.5" Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV	X		
250GB 3.5" Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV		X	X
250GB Removable Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV		X	X
320GB 3.5" Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV		X	X

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

320GB Removable Hard Disk Drive 7,200 rpm, 8MB cache, 3.0 GB/s, NCQ, Smart IV	X	X
500GB 3.5" Hard Disk Drive 7,200 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart IV	X	X
500GB Removable Hard Disk Drive 7,200 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart IV	X	X
1 TB 3.5" Hard Disk Drive 7,200 rpm, 16MB cache, 3.0 GB/s, NCQ, Smart IV	X	X

Solid State Drives

	USDT	SFF	CMT
64GB 2.5" Solid State Drive	X		

5.25-inch Optical Drives

	USDT	SFF	CMT
DVD-ROM Drive[1]		X	X
SuperMulti LightScribe DVD Writer Drive[1,2,3]		X	X
Blu-Ray Writer Drive		X	X

Slimline Optical Drives

	USDT	SFF	CMT
DVD-ROM Drive[1]	X		
SuperMulti LightScribe DVD Writer Drive[1,2,3]	X		

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

Media Card Readers

	USDT	SFF	CMT
Media Card Reader (22-in-1)		X	X
Media Card Reader (22-in-1) with 1394 port		X	X
Secure Digital (SD) HC Reader	X		

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

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

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

Network Interface Connection	USDT	SFF	CMT
Intel 82567LM GbE Network Connection (integrated)	X	X	X
Intel Gigabit CT Desktop NIC Card		X	X
Broadcom NetXtreme GbE Ethernet Plus NIC (PCIe x1)		X	X

NOTE: The integrated network connection is required to support the vPro Technology features.

HP 802.11 b/g/n Wireless NIC (PCIe x1)		X	X
Intel Wi-Fi Link 5100 a/b/g/n Wireless NIC (mini PCI)	X		

NOTE: These wireless network interface solutions will disable the vPro Technology features.

Modem	USDT	SFF	CMT
LSI Hi-Speed 56K International Soft Modem (PCIe x1)		X	X

Graphics	USDT	SFF	CMT
Intel Graphics Media Accelerator 4500 (integrated)	X	X	X
Nvidia GeForce 310 DP PCIe x16 Graphics Card		X	X
Nvidia Quadro NVS 290 Graphics Card		X	X
Nvidia Quadro NVS 295 Graphics Card		X	X
ATI Radeon HD 4550 Graphics Card*		X	X
ATI Radeon HD 4650 DP Graphics Card		X	X
HP ADD2 SDVO + DVI-D Video Adapter		X	X

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

* Not available until January 2010.

HP DisplayPort to DVI-D Adapter	X	X	X
HP DisplayPort to VGA Adapter	X	X	X

Audio/Visual

	USDT	SFF	CMT
High Definition Audio with Realtek ALC261 codec (all ports are stereo)	X	X	X
Microphone/Headphone* and dedicated headphone front ports	X	X	X
Line-out and Line-In rear Ports*	X	X	X
Multi-streaming capable*	X	X	X
Internal Speaker (standard)	X	X	X
HP Thin USB Powered Speakers	X	X	X
HP TV Tuner Mini PCIe Card	X		
HP TV Tuner PCIe x1 Card		X	X

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

Input Devices

	USDT	SFF	CMT
PS/2 Standard Keyboard	X	X	X
USB Standard Keyboard	X	X	X
USB SmartCard Keyboard	X	X	X
USB Mini Keyboard	X	X	X
USB & PS/2 Washable Keyboard	X	X	X

PS/2 Optical Scroll Mouse	X	X	X
USB Optical Scroll Mouse	X	X	X
USB Laser Scroll Mouse	X	X	X

Miscellaneous

	USDT	SFF	CMT
FireWire (IEEE 1394) Card		X	X
Serial Port Adapter		X	X
Parallel Port Adapter		X	X
eSATA Port Adapter		X	X
PC Tower Stand	X	X	
Configure CMT in desktop orientation			X
Rear Port/Cable Control Cover	X		

After-Market Options (availability may vary by region)

Communications	USDT	SFF	CMT	Part Number
HP Wireless 802.11 b/g/n NIC Card		X	X	FH971AA
Broadcom NetXtreme GbE Ethernet Plus NIC Card		X	X	FS215AA
Intel Gigabit CT Desktop NIC Card		X	X	FH969AA
LSI Hi-Speed 56K Int'l Soft Modem Card		X	X	FH970AA
RJ11 Modem Adapter Kit		X	X	DC131C

NOTE: The use of a NIC Card (wired or wireless) will disable the vPro Technology features.

Graphics	USDT	SFF	CMT	Part Number
ATI Radeon HD 4550 Graphics Card*		X	X	AT042AA
ATI Radeon HD 4650 DP Graphics Card			X	AR566AA
Nvidia Quadro NVS 290 Graphics Card		X	X	KG748AA
Nvidia Quadro NVS 295 Graphics Card		X	X	FY943AA
Nvidia GeForce 310 DP PCIe x16 Graphics Card		X	X	VG885AA
HP ADD2 SDVO + DVI-D Video Adapter		X	X	DY674A

* Not available until January 2010.

DMS59 DVI Dual-head Connector Cable		X	X	DL139A
HP DVI to DVI cable		X	X	DC198A
HP DisplayPort To DVI-D adapter	X	X	X	FH973AA
HP DisplayPort To DL DVI-D adapter	X	X	X	NR078AA
HP DisplayPort to VGA Adapter	X	X	X	AS615AA
HP DisplayPort Cable Kit	X	X	X	VN567AA

Hard Disk Drives	USDT	SFF	CMT	Part Number
HP 160GB SATA NCQ SMART IV Hard Disk Drive		X	X	PY277AT
HP 250GB SATA NCQ SMART IV Hard Disk Drive		X	X	PY278AA
HP 500GB SATA NCQ SMART IV Hard Disk Drive		X	X	KW347AA
HP eSATA Adapter		X	X	FH966AA
HP Removable SATA Hard Drive Enclosure (frame & carrier)		X	X	RY102AA
HP Removable SATA Hard Drive Enclosure (Carrier Only)		X	X	RY103AA

After-Market Options (availability may vary by region)

Input/Output Devices	USDT	SFF	CMT	Part Number
HP PS/2 Standard Keyboard	X	X	X	DT527A
HP USB Standard Keyboard	X	X	X	DT528A
HP USB Gray Keyboard	X	X	X	DT529A
HP 2.4GHz Wireless Keyboard & Mouse	X	X	X	NB896AA
HP USB Mini Keyboard	X	X	X	AS601AA
HP USB Washable Keyboard	X	X	X	VF097AA
HP PS/2 Optical Scroll Mouse	X	X	X	EY703AA
HP USB Optical Scroll Mouse	X	X	X	DC172B
HP USB Laser Mouse	X	X	X	GW405AA

DDR3 SDRAM System Memory	USDT	SFF	CMT	Part Number
1 GB DIMM		X	X	AT023AA
1 GB SO-DIMM	X			TBD
2 GB DIMM		X	X	AT024AA
2 GB SO-DIMM	X			TBD
4 GB DIMM		X	X	TBD
4 GB SO-DIMM	X			TBD

HP Monitors	USDT	SFF	CMT	Part Number
HP L1506 15 TFT Flat Panel Monitor – Analog only	X	X	X	PX848AA
HP L1706 17 TFT Flat Panel Monitor – Analog only	X	X	X	PX849AA
HP L1740 17 LCD Flat Panel Display – Analog/Digital	X	X	X	PL766AA
HP L1745 17 TFT Flat Panel Display – Analog/Digital	X	X	X	GE178AA
HP L1906 19 TFT Flat Panel Display – Analog only	X	X	X	PX850AA
HP L1940T 19 TFT Flat Panel Display – Analog/Digital	X	X	X	EM869AA
HP LP1965 19 TFT Flat Panel Display – Analog/Digital	X	X	X	RA373AA
HP L2045w TFT Flat Panel Display – Analog/Digital	X	X	X	RD125AA
HP L2065 20 TFT Flat Panel Display – Analog/Digital	X	X	X	EF227A4
HP LP2465 24 TFT Widescreen Flat Panel Display – Analog/Digital	X	X	X	EF224A4
HP LP3045 30 TFT Flat Panel Display – Digital	X	X	X	EZ320A8
HP w19 Wide LCD Display – Analog/Digital	X	X	X	EM885AA
HP s7540 17 (16.0 vis) CRT Monitor	X	X	X	PF997AA

This is only representative, not an exhaustive list. All HP Monitors are supported except the 30-inch model. The 30-inch model can be added, but it requires a special graphics card.

After-Market Options (availability may vary by region)

Multimedia Devices	USDT	SFF	CMT	Part Number
HP Thin USB Powered Speakers	X	X	X	KK912AA
DVD-ROM Drive		X	X	AH047AA
DVD-ROM Drive (Slimline)	X			FH967AA
SuperMulti LightScribe Drive		X	X	GF343AA
SuperMulti LightScribe Drive (Slimline)	X			KV843AA
Blu-Ray Writer Drive		X	X	AR482AA

Removable Media Storage	USDT	SFF	CMT	Part Number
HP USB External Diskette Drive	X	X	X	DC141B
HP Media Card Reader (22-in-1)		X	X	AR941AA
HP Media Card Reader (22-in-1) with FireWire (IEEE 1394)		X	X	AR942AA

Security Devices	USDT	SFF	CMT	Part Number
HP/Kensington MicroSaver Cable Lock	X	X	X	PC766A
HP Business PC Security Lock	X	X	X	PV606AA
HP (2009) USDT Rear Port Controller Cover	X			NV571AA
HP Wall Mount/Security Sleeve		X		TBD
HP ProtectTools version 5.0 (1 User)	X	X	X	TBD
HP USB SmartCard Keyboard	X	X	X	ED707AA

Software Solutions	USDT	SFF	CMT	Part Number
HP Client Automation Standard	X	X	X	T3488AA (qty 1) TA599AA (qty 10) TA600AA (qty 100) TA601AA (qty 500) T3489AA (qty 1000)

After-Market Options (availability may vary by region)

Stands and Accessories	USDT	SFF	CMT	Part Number
HP Integrated Work Center Stand	X			GN783AA
HP (2009) USDT Tower Stand	X			VN568AA
HP (2009) SFF Tower Stand		X		VN568AA
HP Serial Port Adapter		X	X	PA716A
HP Parallel Port Adapter		X	X	KD061AA
HP 5.25" Blank Bezel Kit (50 pack)		X	X	DC177B
HP FireWire (IEEE 1394) Card		X	X	PA997A

	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
Dimensions			
Chassis (H x W x D)	2.6 x 9.9 x 10 in 66 x 251.5 x 254 mm	3.95 x 13.30 x 14.9 in 100 x 338 x 378.5 mm	17.63 x 7.00 x 17.5 in 447.8 x 177.8 x 444.5 mm
System Volume	257.5 cu in 4.22 L	790.26 cu in 12.95 L	2160 cu in 35.4 L
Tower Stand (H x W x D)	1.07 x 4.92 x 6.69 in 27.2 x 124.9 x 169.9 mm	1.12 x 7.01 x 7.87 in 28.5 x 178 x 200 mm	N/A
Packaging (H x W x D)	8.60 x 15.68 x 19.68 in 218.4 x 398.3 x 499.9 mm	9.00 x 19.68 x 23.38 in 228.6 x 499.9 x 593.85 mm	22.64 x 12.72 x 24.41 in 575.0 x 323 x 620 mm
System Weight*	6.75 lb 3.07 kg	16.72 lb 7.6 kg	24.54 lb 11.15 kg
Shipping Weight*	14.42 lb 6.54 kg	17.86 lb 8.1 kg	34.0 lb 15.42 kg
Max Supported Weight (desktop orientation)	77 lb 35 kg	77 lb 35 kg	77 lb 35 kg
*Configured with 1 hard drive, 1 optical drive, no diskette drive, and no PCI card.			

I/O Ports	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
USB 2.0	Front – four (4) ports Rear – six (6) ports		
Serial	N/A	one port standard; second port available optionally	
Parallel	N/A	one port available as an option	
eSATA	N/A	one port available as an option	
PS/2	color coded support for keyboard (purple) and mouse (green)		
Video	VGA and DisplayPort provide integrated dual independent monitor support		
DVI output	available via optional DisplayPort to DVI Adapter		
Audio	Front – microphone & headphone Rear – line input (supports microphone or line input), line out NOTE: See Audio/Visual section for information on re-taskable audio ports.		
NIC	Industry standard RJ-45 port accesses the integrated network interface controller		

Slots	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
Type and quantity	(1) mini PCI Express	(1) PCI (2) PCI Express x1 (1) PCI Express x16	(3) PCI (1) PCI Express x1 (half-length) (2) PCI Express x16
Slot specifications		Low profile cards 25W cards	Full height Primary x16 slot supports 75W or 35W card Secondary x16 slot supports 35W card Secondary slot functions electrically as a x4 slot

Technical Specifications

PCI Slots	N/A	1 slot low profile – 2.5" length – 6.6" max. power – 25W	3 slots full height – 4.2" full length max. power – 25W
PCI Express x16 Slot (Supports discrete graphics cards)	N/A	1 slot low profile – 2.5" length – 6.6" max. power –25W	2 slots full height – 4.2" full length max. power – 75W (primary) max. power – 35W (secondary)
PCI Express x1 Slot	N/A	2 slots low profile – 2.5" length – 6.6" max. power – 10W	1 slot half height – 2.5" half length max. power – 10W
Bays	**Ultra-slim Desktop**	**Small Form Factor**	**Convertible Minitower**
3.5" external	N/A	1 bay available for Media Card Reader unless used for a secondary hard drive	N/A
5.25" external	N/A	1 bay – 8.19" depth	3 bays Top two bays accept drives up to 8.19" depth Bottom bay accepts drives up to 5.7" depth
Slimline	1 bay for ODD	N/A	N/A
Secure Digital (SD) Reader	SD Reader or blank	N/A	N/A
Internal Drive Bays	1 bay for 2.5" drive	1 bay for 3.5" drive	3 bays for 3.5" drives
Controller	**Ultra-slim Desktop**	**Small Form Factor**	**Convertible Minitower**
Hard Drive Controller	Serial ATA Supports SATA 1.5-GB/s and 3.0-GB/s		
SATA Interfaces	(1) Total	(4) Total: (3) common SATA (1) eSATA	(5) Total: (4) common SATA (1) eSATA
Host SATA Controller	Advanced Host Controller Interface (AHCI) Revision 1.2. The specification includes a description of the hardware/software interface between system software and the host controller hardware.		

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply	Ultra Slim Desktop	Small Form Factor	Convertible Minitower
Standard Efficiency	N/A	240W active PFC	320W active PFC
High Efficiency*	135W active PFC 87% efficient	240W active PFC 87/89/85% efficient at 20/50/100% load	320W active PFC 87/89/85% efficient at 20/50/100% load
Operating Voltage Range	90 – 264 VAC	90 – 264 VAC	90 – 264 VAC
Rated Voltage Range	100 – 240 VAC	100 – 240 VAC	100 – 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
Rated Input Current	N/A	4A	5.5A
Rated Input Current with Energy Efficient* Power Supply	2.4A	4A	5.5A
Current Leakage (NFPA 99)	< 250 µA	< 275 µA	< 450 µA
System Heat Dissipation	N/A	Typical 198 btu/hr (50 kg-cal/hr) Maximum 1063 btu/hr (268 kg-cal/hr	Typical 222 btu/hr (56 kg-cal/hr) Maximum 1410 btu/hr (356 kg-cal/hr)
System Heat Dissipation with Energy Efficient* Power Supply	Typical 133 btu/hr (33.5 kg-cal/hr) Maximum 549 btu/hr (132 kg-cal/hr)	Typical 150 btu/hr (38 kg-cal/hr) Maximum 941 btu/hr (237 kg-cal/hr)	Typical 171 btu/hr (43 kg-cal/hr) Maximum 1255 btu/hr (316 kg-cal/hr)
Power Supply Fan	N/A	92mm variable speed	92mm variable speed
External Power Adapter			
Dimensions	6.7 x 2.6 x 1.5 in	N/A	N/A

Total Cord Length	12 ft 8 in	N/A	N/A

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

ROM BIOS Information

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Elite PC into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Select models feature either Intel Standard Manageability or Core 2 processor with vPro Technology.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Computrace agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (Flashbin), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.

Additional HP BIOS Features

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Elite models use ACPI to provide power conservation features.
- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

Other Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- System Management BIOS v2.6
- Intel Wired for Management support; industry wide initiative to make Intel architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
    - 2 – processor thermal protection activated
    - 3 – processor not installed
    - 4 – power supply failure
    - 5 – memory error
    - 6 – video error
    - 7 – PCA failure (ROM detected failure prior to video)
    - 8 – invalid ROM, bootblock recovery mode
    - 9 – system not fetching code
    - 10 – system hang while loading an option ROM
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED – To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Green Pull Tabs, and Quick Release Latches for easy Identification

NOTE: thumb screw release mechanism is used with the Ultra-slim Desktop chassis cover.

Additional Features	Description
Intel Standard Manageability NOTES: • Requires the utilization of the integrated network connection • Available with selected processors, those not part of Intel's Stable Intel Platform Program (SIPP)	Includes the following: Basic PC management capabilities such as asset inventory, HW alerting, SOL/IDE-R, remote configuration, agent presence, and system defense DASH 1.1 compliance for support of industry standards. Support for profile updates. Host VPN* support for local management VPN tunneling
Intel Core 2 Processor with vPro Technology NOTES: • Requires the utilization of the	Includes the following: Intel Advanced Management Technology (AMT) v5.0 • Intel Standard Manageability technologies (see above for a list of features) • Fast Call for Help – client outside the firewall may initiate a call for help via BIOS

integrated network connection • Available with selected processors, those part of Intel's Stable Intel Platform Program (SIPP)	screen, periodic connections, or alert triggered connection • Audit Logs – policy based log of AMT actions to deter rogue administrator actions Microsoft NAP Support – allows AMT to gain access to a Microsoft NAP enabled 802.1x network OOB to enable OOB SW updates, inventories, remote diagnostics, etc. Remote Scheduled Maintenance – Pre-schedule when the PC connects to the IT or service provider console for maintenance Remote Alerts – automatically alert IT or service provider if issues arise Access Monitor – Provides oversight to support security requirements
DASH 1.1 support (Desktop and Mobile Architecture for System Hardware)	A standards initiative for representing out-of-band management capability for computer systems. It is a secure, web-services based successor to ASF.
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
TXT (Trusted Execution Technology) and VT-d (Virtualized devices)	• TXT allows for secure management (via TPM) and measured launch of VMM, as well as teardown of secrets in unexpected reset case. TXT support provided in select Intel processors. • VT-d is a chipset technology that virtualizes directed I/O Together, TXT and VT-d may be used to support verified launch of a known trusted VMM that also may protect VMs from accessing each other's memory.
Computrace	Computrace agent support standard
Tower	Product can be oriented as a tower (in addition to desktop orientation)
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
Drive Protection System	DPS Access through F10 Setup during Boot • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures.
SMART Technology (Self-Monitoring, Analysis and Reporting Technology) SMART I – Drive Failure Prediction SMART II – Off-Line Data Collection SMART III – Off-Line Read Scanning with Defect Reallocation SMART IV – End-to-End CRC for hard	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure • IOEDC: I/O Error Detection Circuitry • Detects errors in Read/Write buffers on HDD cache RAM

drives	Intertace in F10 setup provides contirmation ot SMART IV support.

Technical Specifications - Audio

High Definition Audio	Type	Integrated
	High Definition Stereo Codec	Yes - Realtek 4-channel ALC261 codec
	Audio Jacks	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal.
	Internal Speaker Amplifier is for the internal speaker only. External speakers need to be powered externally. Rear Line-In audio port is re-task able as Line-In or Microphone-In.	
	Multistreaming Capable	Multistreaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
	Sampling	8 kHz - 192 kHz
	Wavetable Syntheses (software)	Yes - Uses OS soft wavetable
	Analog Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	1.5 W
	Internal Speaker	Yes
	External Speaker Jack (Line-Out)	Yes

Technical Specifications - Audio

HP Thin USB Powered Speakers	On/Off/Volume Controls	Right side of right speaker	
	Power LED	Front of right speaker (green)	
	Frequency response	FO to 20kHz	
	Watts	2/3 watt (normal/maximum)	
	Dimensions (H x W x D)	Speakers: 5.72 x 3.74 x 0.96 in (14.52 x 9.50 x 2.45 cm) per speaker	
	Net weight	0.68 lbs (0.31kg)	
	Environmental (all conditions non-condensing)	Temperature (operating)	14° to 104° F (-10° to 40° C)
		Relative Humidity (operating)	40% to 90%
	Speaker cable length	Input cord: 5.91 ft (1800mm±35mm)	
		L-channel cord: 3.28 ft (1000mm±35mm)	
		USB cord: 5.91 ft (1800mm±35mm)	
	Color	black	

Intel 82567LM Gigabit Network Connection (integrated)	Connector	RJ-45	
	Controller	Intel 82567LM Gigabit platform LAN Connect Networking Controller	
	Memory	24 KB FIFO packet buffer memory	
	Data rates supported	10/100/1000 Mbps	
	Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3 ab and 802.3u compliant	
	Bus architecture	GLCI, LCI interface. Intel specific MAC to PHY interface	
	Data transfer mode	At gigabit GLCI (Intel proprietary 802.3 series-based interface) is for Data, LCI (parallel bus) for MDIO, at 10/100 LCI for both data and MDIO, GLCI is idle.	
	Hardware certifications	FCC B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union	
	Power requirement	Requires 3.3V,1.9/1.8V and 1.0V or just 3.3V with integrated regulators Power consumption 1.3 Watts for 82567 whole LOM	
	ACBS	Intel Auto Connect Battery Saving feature	
	Boot ROM support	Yes	
	Network transfer mode	Full-duplex	
		Half-duplex (not supported for the 1000BASE-T transceiver)	
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
		10BASE-T (full-duplex) 20 Mbps	
		100BASE-TX (half-duplex) 100 Mbps	
		100BASE-TX (full-duplex) 200 Mbps	
		1000BASE-T (full-duplex) 2000 Mbps	
	Environmental	Operating temperature	32° to 131°F (0° to 55° C) To 70° C for external regulator
		Operating humidity	85% at 131° F (55° C)
	Management capabilities	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic.	
	Alerting	ASF 2.0 support, AMT 3.0 support	

Technical Specifications - Communications

Broadcom NetXtreme GbE Ethernet Plus NIC	Connector	RJ-45	
	Controller	Broadcom 5761 PCI-Express LAN Controller	
	Memory	8 MB NVRAM serial Flash	
	Data rates supported	10/100/1000 Mbps	
	Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, and 802.3x	
	Bus architecture	PCI-Express	
	Data path width	Single Channel PCI-Express	
	Data transfer mode	Bus Master DMA	
	Hardware certifications	FCC class B, Canada and US NRTL Mark, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia, UL listed (E212044), European Union Notice (CE 0682)	
	Power requirement	1.8W @ 3.3V	
	Boot ROM support	Yes	
	Network transfer mode	Full-duplex	
		Half-duplex (not available for the 1000BASE-T transceiver)	
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
		10BASE-T (full-duplex) 20 Mbps	
		100BASE-TX (half-duplex) 100 Mbps	
		100BASE-TX (full-duplex) 200 Mbps	
		1000BASE-T (full-duplex) 2000 Mbps	
	Environmental	Operating temperature	32° to 131°F (0° to 55° C)
		Operating humidity	131° F (55° C) with 5% to 95% non-condensing humidity
	Dimensions	2.75 in x 4.13 in (7 cm x 10.5 cm), low profile compatible	
	Operating system driver support	Windows Vista 32-bit SP1, Windows Vista x64 SP1, Windows XP 32 bit professional	
	Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles	

Technical Specifications - Communications

Intel Gigabit CT Desktop NIC	Connector	RJ-45
	Controller	Intel 82574L Gigabit Ethernet Controller
	Memory	40KB 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, 802.1as Time synch offload
	Bus architecture	PCIe Base 1.1 (2.5 GT/s) x1
	Data path width	X1, 250 MB/s, Bi-directional interface
	Data transfer mode	Bus-master DMA
	Hardware certifications	(see EPS for more certification details) EMI: FCC Class B Intel 25-GS3000 Environmental Specification. EN-55024: 1998 specification (see EPS for details) EN-55022: Class A 1998 specification. EN-60950-1 first Edition specification. C-Tick specification, Class A VCCI Class 1 specification. CE specification and CE Mark. UL 60950-1 first Edition specification. CSA 60950-1 first Edition specification. BSMI CNS13438 Class A specification Korean MIC Class A specification. European RoHS directive China RoHS directive
	Power requirement	3.3V and 3.3V Aux, 2.1 Watts max in 1000Base-T (D0)
	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: 0 °C to 55 °C (operating) -40 to 70 °C (non-operating) Operating humidity: 85% at 131° F (55° C)
	Dimensions	Low-profile, half-length form factor conforming to PCIe* CEM v1.1 (55 mm x 119 mm)
	Management capabilities	SMBus, WOL, PXE

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
	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)	802.11b modes	802.11g 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	
	2 Mbps (802.11 b)	1.4 Mbps	
	5.5 Mbps (802.11 b)	3.5 Mbps	

	11 Mbps (802.11 b)	5.9 Mbps
	12 Mbps (802.11 g)	6 Mbps
	18 Mbps (802.11 g)	9 Mbps
	24 Mbps (802.11 g)	12 Mbps
	36 Mbps (802.11 g)	18 Mbps
	48 Mbps (802.11 g)	21 Mbps
	54 Mbps (802.11 g)	22.5 Mbps
	6.5 Mbps (20 MHz EWC)	4.5 Mbps
	13 Mbps (20 MHz EWC)	9 Mbps
	19.5 Mbps (20 MHz EWC)	13.5 Mbps
	26 Mbps (20 MHz EWC)	18 Mbps
	39 Mbps (20 MHz EWC)	27 Mbps
	52 Mbps (20 MHz EWC)	36 Mbps
	58.5 Mbps (20 MHz EWC)	40 Mbps
	65 Mbps (20 MHz EWC)	45 Mbps
	78 Mbps (20 MHz EWC)	54 Mbps
	104 Mbps (20 MHz EWC)	72 Mbps
	117 Mbps (20 MHz EWC)	81 Mbps
	130 Mbps (20 MHz EWC)	91 Mbps
	13.5 Mbps (40 MHz EWC)	8 Mbps
	27 Mbps (40 MHz EWC)	16 Mbps
	40.5 Mbps (40 MHz EWC)	24 Mbps
	54 Mbps (40 MHz EWC)	32 Mbps
	81 Mbps (40 MHz EWC)	48 Mbps
	108 Mbps (40 MHz EWC)	64 Mbps
	121.5 Mbps (40 MHz EWC)	72 Mbps
	135 Mbps (40 MHz EWC)	81 Mbps

Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption • AES: CCM • 802.1x authentication • WPA: 802.1x. WPA-PSK and TKIP • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5
Antenna	HP part number 497792-001
Certifications	Wi-Fi certified
Certifications for use by country	United States, Canada, Peru, Taiwan

Intel WiFi Link 5100 a/b/g/n (USDT) Wireless NIC	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n (draft 2.0)* * The specifications for 802.11n draft 2.0 are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11n WLAN devices. In countries where n draft 2.0 is not allowed, this capability is not enabled.
	Interoperability	Wi-Fi certified (802.11abg only) Cisco Compatible Extensions Program compliant (802.11abg only) with Microsoft Windows Vista and XP Tested with wireless access points from several major manufacturers
	Frequency Band	2.4 GHz and 5 GHz
	Antenna Structure	1 transmit; 2 receive (1x2)
	Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n (draft): 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n (draft) specification
	Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
	Security[1]	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128, 192, and 256 bits), 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows Vista and XP only.
	Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
	Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power (for CCK)[2]	15 dBm
	Output Power (for OFDM; power varies by data rate)[2]	15 dBm
	Power Consumption	Transmit: 2.3 Watts (average, with one spatial streams) Receive: 1.9 Watts (average with two receive chains) Idle mode[3]: 30 mW (average) Radio off: 20 mW (max)
	Power Management	ACPI compliant power management 802.11 compliant power saving mode
	Receiver Sensitivity[4]	300 Mbps: -68 dBm, 54 Mbps: -74 dBm, 6 Mbps: -90 dBm

Technical Specifications - Communications

Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance	
Range	802.11 a - Typical (@6 Mbps)	600 feet - Outdoor Open Area 150 feet - Indoor, Office environment
	802.11 b - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
	802.11 g - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
Form Factor	PCI-Express MiniCard	
Weight	0.013 lb (6 g)	
Dimensions	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%	
Temperature	Operating Non-operating	32° to 176° F (0° to 80° C) -40° to 176° F (-40° to 80° C)
Humidity	Operating Non-operating	10% to 90% (non-condensing) 5% to 90% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
Configuration Utility[5]	Microsoft Windows XP Choice of Configuration Utility: • Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows XP (required for Cisco Compatible Extensions support) Microsoft Windows Vista • Microsoft Windows Vista Wireless Network Connection Manager. • Intel IHV extensions for Windows Vista available to support Cisco Compatible Extensions.	

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. In Power Save Polling mode and on battery power.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.

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

Technical Specifications - Communications

Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/s
Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5
Power Management	PCI Bus Power Management Interface Specification (PCI-PM) Revision 1.2, Appendix A. D0, D3hot, and D3cold. Wake on Ring state when in D3cold. If the power management event (PME) feature is enabled in D3cold, a modem can wake the system via WAKE# (WAKEN) or beacon. Meets PCI Express 1.1 standard.
Upgradeability	Driver upgradeable for future enhancements
Video	ITU-T V.80 video ready interface
Other	TIA/EIA 602 standard AT command set
	Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface
	Optional ring wakeup signal
Operating Temperature	32° to 158° F (0° to 70° C)
Operating Humidity	20% to 90%, non-condensing
Power	Requires a 3.3-V auxiliary power rail on PCI express bus
	Uses only one PCI express load (i.e., one grant/request pair), one shared IRQ, one electrical load
Chipset	LSI SV92EX - Integrated PCI interface with 3.3-V tolerant buffers and CardBus support
Dimensions (L X H)	Complies with PCI express low profile specifications-6.7 x 2.3 in (17.0 x 5.8 cm) and supports high- and low-profile brackets
Connection	Single RJ-11 connector
Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark
EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
Other	The SV92EX device is packaged in a 32-pin micro leadless chip carrier (MLCC). The SV92EX is fully compliant with the PCI Express revision 1.1 specification. WHQL approved; ASPM compliant.

Integrated Intel Graphics Media Accelerator (GMA) 4500	3D/2D Controller	Microsoft DirectX® 10 based with support for Pixel Shader 3.0
	VGA Controller	Integrated
	DisplayPort	Integrated, Multimode capable; supports HDCP
	Bus Type	PCI Express™ x16
	RAMDAC	Integrated, 350 MHz
	Memory	Graphics memory is shared with system memory. Graphics memory usage varies depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content. For Vista, use of PAVP heavy mode preallocates an additional 96MB. 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.

Windows XP Memory Usage:

Total System Memory	Pre-Allocated (MB)	DVMT (MB)
.5GB	32	128
1.0GB	32	512
1.5GB	32	768
2GB & more	32	1024

Windows Vista Memory Usage:
(Assumes Management Engine , VT-d enabled and other memory allocated for other BIOS usage)

System Memory	PVAP	Avail System Memory (MB)	Total Avail GFX Memory (MB)	Dedicated Video Memory (MB)	System Video Memory (MB	Shared System Memory (MB)
1 GB	Lite	952	252	32	96	124
	Heavy	856	294	122	6	166
2 GB	Lite	1976	764	32	96	636
	Heavy	1880	806	122	6	678
4 GB	Lite	4024	1759	32	96	1631
	Heavy	3928	1759	122	6	1631
6 GB	Lite	6072	1759	32	96	1631
	Heavy	5976	1759	122	6	1631
8 GB	Lite	8120	1759	32	96	1631
	Heavy	8024	1759	122	6	1631

Total Available GFX Memory: Total graphics memory available to the system as reported by the OS.

Dedicated Video Memory: Memory owned and locked for graphics use as reported by the OS. (Preallocated)

System Video Memory: System memory locked and dedicated for graphics use.

	Shared System Memory: Memory dynamically allocated for Graphics use
HW Video Decode	Hardware Accelerated decode for MPEG2 encrypted video; support for PAVP Lite (default) and Heavy (or Paranoid) modes
Maximum Color Depth	32 bits/pixel
Maximum Vertical Refresh Rate	85 Hz at up to 1920x1440, 75 Hz at 2048x1536. Varies with mode and configuration. See table below.
Multi-display Support	Integrated dual independent monitor support facilitated via one VGA port and one DisplayPort integrated on the back plane of the system board and presented as part of the rear I/O set of interfaces. DVI supported via optional HP DisplayPort to DVI-D adapter.
Graphics/Video API Support	Microsoft DirectX® 10, OpenGL® 1.5 (OpenGL® 2.0 available in a driver update)

Resolutions Supported

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

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

* Only supported when using a 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 - Graphics

NVIDIA Quadro NVS 290 256MB PCIe Dual Head	Form Factor	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connector	DMS-59; includes one DMS-59 to Dual VGA cable. A DMS-59 to Dual DVI-I cable is available as an option.
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Integrated dual 400MHz
	Color planes	32-bit color buffer
	Overlay planes	Hardware supported
	nView architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
	Multi-Monitor support	Dual monitor support
	DVI support	DMS-59 (to dual DVI-SL)
	High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Supported graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0

NVIDIA Quadro NVS 295 Graphics Card	Form Factor	2.731 inches (H) × 6.600 inches (L), Half-Height
	Graphics Controller	NVIDIA Quadro NVS 295 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort Comes with 2 DisplayPort to DVI-D Adapters ('DisplayPort to VGA' and 'DisplayPort to DL DVI' adapters available as an accessory)
	Maximum Resolution	Two DisplayPort outputs drive two digital displays up to 2560 x 1600
	Display Output	• Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking • Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking (through DisplayPort to DVI-D (single link) cable)
	Supported Graphics APIs	OpenGL 3.0 DirectX 10.0

Technical Specifications - Graphics

NVIDIA GeForce 310 DP PCIe x16 Graphics Card	Bus type	PCI Express (x16 lanes)
	Maximum vertical refresh rate	85 Hz
	Display support	Integrated 400 MHz RAMDAC
	Display max resolution	2560x1600 digital, 2048 x 1536 analog

NVIDIA GeForce 310 DP PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the 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.

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	512 MB DDR3, 64 bit wide
Audio Support (through HDMI only)	Integrated HD Audio codec supports linear PCM and Dolby® Digital (7.1) audio formats for HDMI output	
Operating systems support	Windows 7 Home Basic*, Windows 7 Home Premium*, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows 7 Ultimate Edition 32*, Windows 7 Ultimate Edition 64*, Windows Vista Business 32†, Windows Vista Business 64†, Windows Vista Home Basic 32†, Windows Vista Home Basic 64†, Windows XP Professional or Windows XP Home 32†.	

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

Windows 7 Business disk may be 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 at least 25 customer systems with the

same custom image

† 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	• NVIDIA GeForce 310 DP PCIe x16 Graphics Cardwith 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	EMC Emissions: a) FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use b) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment c) Canadian Standard ICES-003 is equivalent to CISPR22 d) Taiwanese Standard BSMI e) Japanese VCCI f) Australian C-Tick g) Korean (MIC) EMC Immunity: CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.

ATI Radeon HD 4550 Dual Head PCIe x16 Graphics Card

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

Technical Specifications - Graphics

Board configuration	Specification	Description
	Graphics Chip	RV710
	Core clock	600MHz
	Memory clock	800 MHz
	Frame buffer	256 MB DDR2, 64 bit wide
Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	
Compliance standards	EMC Emissions: a) FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use b) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment c) Canadian Standard ICES-003 is equivalent to CISPR22 d) Taiwanese Standard BSMI e) Japanese VCCI f) Australian C-Tick g) Korean (KCC) EMC Immunity: CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.	

ATI Radeon HD 4550 DH PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the 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 4650	Bus type	PCI Express (x16 lanes)

Technical Specifications - Graphics

(1GB) PCIe x16 Graphics Card	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 through any combination of two of the three output ports.	
	Board configuration	Specification	Description
		Graphics Chip	RV730Pro
		Core clock	600MHz
		Memory clock	500 MHz
		Frame buffer	1 GB DDR3, 128 bit wide
	Maximum power	55 W	
	Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	
	Compliance standards	EMC Emissions: a) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment EMC Immunity: CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.	

ATI Radeon HD 4650 (512MB) PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the 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**

* Max HDMI resolution is 1080p

** Only supported when using a dual-link DVI 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 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

HP DisplayPort to DVI-D Adapter

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

Technical Specifications - Graphics

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

HP DisplayPort to VGA adapter 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. Using the HP DisplayPort to VGA Adapter may require an update to the graphics driver installed on your system. To install the most up-to-date graphics driver go to: www.hp.com.

Resolution	Max refresh rate
640x480	85
800x600	85
1024x768	85
1280x720	85
1280x1024	85
1440x900	75
1600x1200	60
1680x1050	60
1920x1080	60-R
1920x1200	60-R
NOTE: 60-R denotes reduced blanking timings are used. Not all monitors support reduced blanking timing.	

2.5″ 7200 RPM Serial ATA Hard Drives	250 GB	**Capacity**	250,059,350,016 bytes	
		Height (Nominal)	0.374 in (9.5 mm)	
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm)	
			Physical size: 2.75 in (70 mm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Cache	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	12 ms
			Full-Stroke	22 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	488,397,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160 GB	**Capacity**	160,041,885,696 bytes	
		Height (Nominal)	0.374 in (9.5 mm)	
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm)	
			Physical size: 2.75 in (70 mm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Cache	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	12 ms
			Full-Stroke	22 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
3.5″ 7200 RPM Serial ATA Hard Drives	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)	Up to 3 Gb/s	
		Buffer	16 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)	
320 GB	**Capacity**	320,069,031,690 bytes	
	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.5 in (8.89 cm)	
		Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
		Average	8.5 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	625,142,448	
	Operating Temperature	41° to 131° F (5° to 55° C)	
250 GB	**Capacity**	250,059,350,016 bytes	
	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.5 in (8.89 cm)	
		Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
		Average	8.5 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
160 GB	**Capacity**	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)	Up to 3 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
		Average	9.3 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131° F (5° to 55° C)	
10,000 RPM Serial ATA Hard Drives	**160 GB**		
	Capacity	160,041,885,696 bytes	
	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.0 in (7.62 cm)	
		Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
	Cache	16 Mbytes	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
		Average	4.6 ms
		Full-Stroke	10.2 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

Solid State Drive	64 GB	Capacity	64 GB	
		NAND Flash Memory	Multi Level Cell (MLC) with wear leveling controller	
		Interface type	SATA 3Gb/sec	
		Dimensions-external (W x H x D)	2.74 x 0.37 x 4 in (6.98 x 0.95 x 10.2 cm)	
		Weight	0.14 lb (65 g)	
		Internal transfer rate	Write speed	Up to 220 MB/s
			Read speed	Up to 120 MB/s
		Host transfer rate	Ultra DMA mode	Up to 150 MB/s
		Power	DC power requirement	5 VDC 5%-100 mV ripple p-p
			Total power consumption	<1.12Watt
		Environmental (all conditions, non-condensing)	Temperature (operating)	32° to 158° F (0° to 70° C)
			Relative Humidity (operating)	5% to 95%
			Maximum Wet Bulb Temperature (operating)	84° F (29° C)
		Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, R1113 and C1172 Class B	

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

Technical Specifications - Input/Output Devices

USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	USB Type A plug connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft® PC 99 - 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
	Kit contents	Keyboard, installation guide, warranty card, safety and comfort guide	

Technical Specifications - Input/Output Devices

PS/2 Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	PS/2 6-pin mini din connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC 99 - 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
HP USB Smartcard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Form factor	USB basic Smart Card keyboard
		Colors	Carbonite/Silver
		Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%

	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Languages	30+ available
	Keycaps	Low-profile design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
SMARTCARD function	Support	All ISO 7816 smart cards
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)
	Chipset	SCM STCII
	Standard APIs supported	PC/SC, EMV2000, SET
	Power	USB Port Short circuit detection (protects smart card and reader) Power supply compliant with ISO7816 and EMV (5V, 60 mA) Supports 3-V and 5-V cards
	Power consumption	250-mA maximum draw (50 mA for the keyboard with three LEDs ON and 200-mA maximum startup current using a high-current, 60-mA smart card)

	Communication	From card	Programmable from 9,600 baud to 115,200 baud
		From computer	Up to 38,400 baud
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	USB communications through USB port SCM protocol Automatic card insertion/removal detection	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	89/336/CEE guideline
		USA	USAFCC part 15

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
		Microsoft PC99 - 2001	Functionally compliant
	Mechanical	Resolution	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	61 g nominal peak force
		Switch life	3,000,000 operations (using Hasco modified tester)
		Switch type	Low force micro-switches

		Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
		Cable length	6 ft (1.8 m)
		Microsoft PC99 - 2001	Mechanically compliant
	Scroll wheel	Width	8 mm
		Diameter	1.01 in (25.6 mm)
		Maximum rotation speed	48 rats/sec
		Switch type	Light force micro-switch
		Switch life	1 million operations
		Mechanical life	Minimum 200,000 revolutions
	Regulatory approvals	Compliant	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
HP USB Optical Scroll Mouse	Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)	
	Weight	0.27 lb (0.12 kg)	
	Cable length	72.8 in (185 cm)	
	System requirements	Microsoft Windows 95, 98, 2000, Me, XP and Vista Available USB port	
HP USB 2-Button Laser Mouse	Scroll Wheel	24	
	Maximum Rotation Speed	48 rats/sec	
	Switch Type	wheel	
	Switch Life	Button - 3,000,000 Wheel - 1,000,000 times Tilt switch - 500,000 times	
	Environmental	Operating Temperature	32° to 104° F (0° to 40° C)
		Non-operating Temperature	-4° to 140° F (-20° to 60° C)
		Operating Humidity	10% to 90% (non-condensing at ambient)
		Non-operating Humidity	20% to 80% (non-condensing at ambient)
		Operating Shock	40 g, six surfaces
		Non-operating Shock	80 g, six surfaces
		Operating Vibration	2-g peak acceleration
		Non-operating Vibration	4-g peak acceleration
	Electrical	Operating Voltage	+ 5VDC ± 5%
		Power Consumption	
		MTBF	> 150,000 hrs
		ESD	IEC-61000-4-2 criteria B, Contact discharge: +/- 4kV, Air discharge: +/- 8kV
		EMI-RFI	FCC Class B
		PC98	PC 99 Compliant
	Mechanical	Resolution	800dpi
		Tracking Speed	25 cm/sec

	Acceleration	0.5mm
	Switch Actuation	0.6N (60gf)
	Switch Life	Button - 3,000,000 Wheel - 1,000,000 times Tilt switch - 500,000 times
	Cable Length	1850mm
	PC98-99	PC99 compliant
Regulatory Approvals		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 - Optical Storage

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

Technical Specifications - Optical Storage

	Multimedia MPC-3 compliant		Yes
	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 ± 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 (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
HP SuperMulti 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+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 time (typical reads, including settling)	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 ± 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 conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	86° F (30° C)

HP 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
		DVD-R	Yes	No
		DVD-RW	Yes	No
		DVD-R DL	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)	

Technical Specifications - Optical Storage

		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
	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)
HP Slim SuperMulti LightScribe DVD Writer Drive	Height		12.7mm height
	Orientation		Either horizontal or vertical
	Interface type		SATA/ATAPI
	Disc recording capacity		Up to 8.5 GB DL or 4.7 GB standard
	Dimensions (W x H x D)		5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)
	Weight (max)		0.42 lb (190 g)
	Write speeds	DVD-RAM	Up to 5X
		DVD-R DL	Up to 4X
		DVD+R	Up to 8X
		DVD+RW	Up to 4X
		DVD+R DL	Up to 4X
		DVD-R	Up to 8X
		DVD-RW	Up to 6X
		CD-R	Up to 24X
		CD-RW	Up to 16X
	Read speeds	DVD-RAM	Up to 5X
		DVD-RW, DVD+RW	Up to 8X
		DVD-R DL, DVD+R DL	Up to 6X
		DVD+R, DVD-R	Up to 8X
		DVD-ROM DL, DVD-ROM	Up to 8X
		CD-ROM, CD-R	Up to 24X
		CD-RW	Up to 24X
	Access time (typical reads, including settling)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
		Stop Time	< 4 seconds
		Cache Buffer	2 MB (minimum)

		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s - default)
	Power	Source	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
			12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
			12 VDC (< 600 mA typical, 1400 mA maximum)
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio output	Line-Out	0.7 VRMS
		Signal-to-Noise Ratio	74 dB
		Channel Separation	65 dB
	Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	86° F (30° C)
HP Slim DVD-ROM Drive	Height	12.7mm	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
	Weight (max)	0.42 lb (190 g)	
	Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 4X
		DVD-ROM	Up to 8X
		CD-ROM, CD-R	Up to 24X
		CD-RW	Up to 24X
	Access time (typical reads, including settling)	Random DVD	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Random CD	DVD: < 250 ms (seek), CD: < 210 ms (seek)
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s)
	Power	Source	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum
		Total Drive Power (standby mode)	< 2.5 Watt

Technical Specifications - Optical Storage

Audio output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	5% to 85%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)

HP 22-in-1 Media Card Reader (with 1394)	USB Interface	USB 2.0 High-speed interface NOTE: Requires the USB cable to be connected to the internal USB 2.0 port or a USB 2.0 PCI card.
	1394 Interface	Two IEEE-1394a external ports; 1 IEEE-1394a internal port (connects to the pass through cable on the media card reader)
	Advance protocol support	• Supports hardware ECC (Error Correction Code) function • Supports hardware CRC (Cyclic Redundancy Check) function • Supports MS 4-bit parallel transfer mode • Supports MS-PRO 4-bit parallel transfer mode • Supports MS PRO-HG Duo 4-bit parallel transfer mode • Supports SD 4-bit parallel transfer mode • Supports high-speed 50Mhz SD 4-bit card (version 2.0) • Supports high-speed 52Mhz MMC 8-bit card (version 4.2) • Supports CF v4.0 with PIO mode 6 and Ultra DMA mode
	Supported media type	• CompactFlash Type I • CompactFlash Type II • Microdrive • MultiMediaCard (MMC) • Reduced Size MultiMediaCard (RS MMC) • MultiMediaCard 4.2 (MMC Plus, including MMC Plus HC) • Reduced Size MultiMediaCard 4.2 (MMC Mobile, including MMC Mobile HC) • Secure Digital Card (SD) • Secure Digital High Capacity (SDHC) • miniSD • miniSD High Capacity • Micro SD (T-Flash) • Micro SD HC • Memory Stick • Memory Stick Select • Memory Stick Duo (MS Duo) • Memory Stick PRO (MS PRO) • Memory Stick PRO Duo (MS PRO Duo) • Memory Stick PRO-HG Duo • MagicGate Memory Stick (MG) • MagicGate Memory Stick Duo • xD-Picture Card
	Supported media type with card adapter	• Memory Stick Micro (M2) • MMC Micro
	Environmental	Operational Environmental Extremes: Test Parameters/Conditions - Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. = 24 hours 10°C 90% R.H. = 24 hours 20°C 90% R.H. = 24 hours 30°C 90% R.H. = 24 hours 40°C 90% R.H. = 24 hours 50°C 90% R.H. = 24 hours

		50°C 10% R.H. = 24 hours
	Storage Environmental Extremes	Test Parameters/Conditions 140°F (60°C) @ 80% R.H. for 96 hours -22°F (-30°C) @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
Approvals		USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3 FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T

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