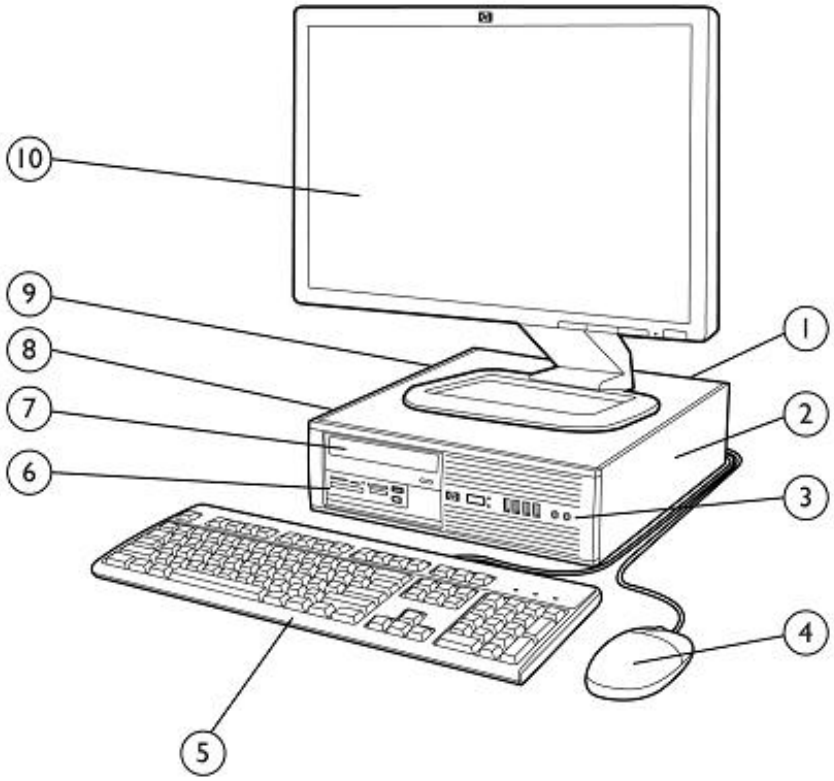
HP Compaq 8100 Elite Small Form Factor Business PC



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

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

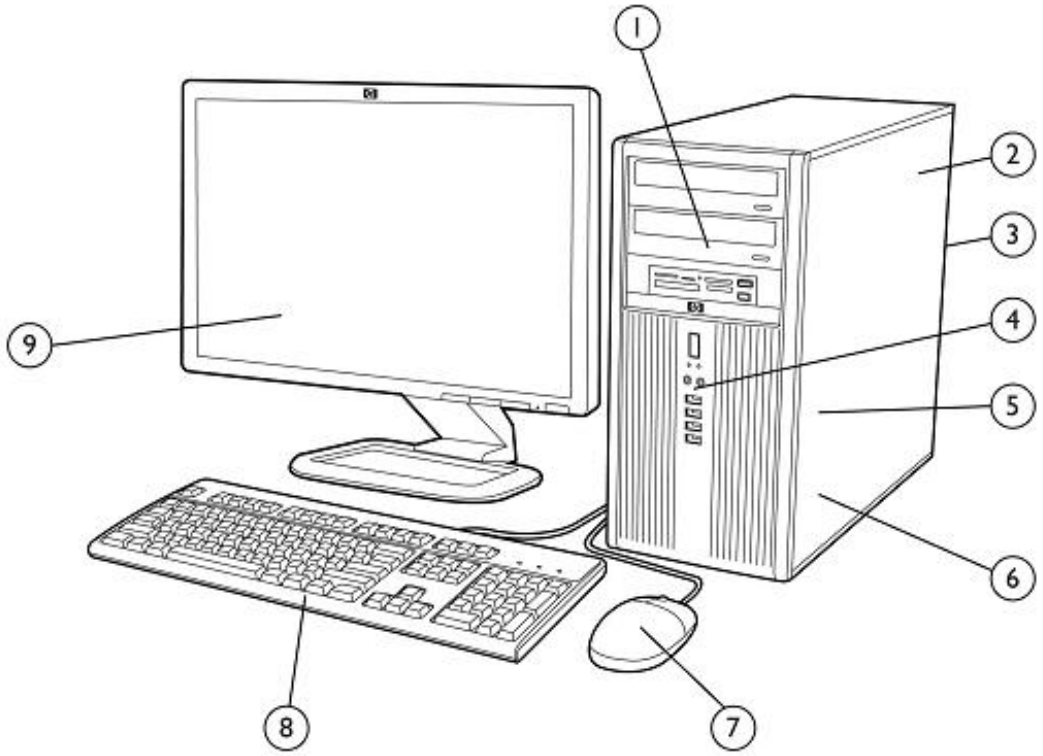
7 5.25″ external drive bay supporting an optical disk drive

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)

HP Compaq 8100 Elite Convertible Minitower Business PC



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 a 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: Second 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 two professional chassis form factors to accommodate any desired mix between expandability and size
- BIOS developed and engineered by HP for better security, manageability and software image stability
- Intel® Q57 Express chipset
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Intel® Core Processors 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
- ENERGY STAR qualified models available (dependent upon the desired configuration)
- 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 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]
	FreeDOS
Supported	Genuine Windows Vista Enterprise Edition[1]
	Genuine Windows Vista Business (32-bit)[1]
	Genuine Windows Vista Home Basic[1]
	Genuine Windows 7 Enterprise Edition[2]
	Genuine Windows 7 Ultimate Edition[2]
Certified	Novell SUSE Linux Enterprise Desktop 11[3]
	Red Hat Enterprise Linux 64[3]

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

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

[3] The following 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
- Antivirus software*
- Roxio Creator Business
- HP Power Manager
- HP Total Care Advisor
- Microsoft Office 2010 preloaded (purchase of a Product Key required to activate a full Office 2010 suite)**
- Firefox HP Virtual Browser
- Corel WinDVD

* May be Norton or McAfee antivirus software. First 60 days included. Subscription required for live updates thereafter. Internet access required.

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

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

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

* Available from your HP Sales Representative or HP Channel Partner

Value Added Services and Features

- HP Stable Platform Program
- 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*

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

Intel Q57 Express

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

Processors

NOTE: all models configured with Intel® Core™ processors with 4 cores require a discrete graphics solution

Intel Pentium Processors:

Intel Pentium G6950 Processor
2.80 GHz, 3M total cache
2 cores/2 threads
Integrated Intel® HD Graphics

Intel Core i3 Processors:

Intel Core i3-530 Processor
2.93 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics

Intel Core i3-540 Processor
3.06 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics

Intel Core i3-550 Processor
3.20 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics

Intel Core i3-560 Processor
3.33 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics

Intel Core i5 Processors:

Intel Core i5-650 Processor
3.2 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics
Intel® Core™ processor with vPro™ technology
Intel® Stable Image Platform Program (SIPP)

Intel Core i5-660 Processor
3.33 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics
Intel® Core™ processor with vPro™ technology
Intel® Stable Image Platform Program (SIPP)

Intel Core i5-670 Processor
3.46 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics
Intel® Core™ processor with vPro™ technology
Intel® Stable Image Platform Program (SIPP)

Intel Core i5-680 Processor
3.60 GHz, 4M total cache
2 cores/4 threads
Integrated Intel® HD Graphics
Intel® Core™ processor with vPro™ technology
Intel® Stable Image Platform Program (SIPP)

Intel Core i5-750 Processor
2.66 GHz, 8M total cache
4 cores/4 threads
Requires a discrete graphics solution

Intel Core i5-760 Processor
2.80 GHz, 8M total cache
4 cores/4 threads
Requires a discrete graphics solution

Intel Core i7 Processors:

Intel Core i7-860 Processor
2.80 GHz, 8M total cache
4 cores/8 threads
Requires a discrete graphics solution
Intel® Core™ processor with vPro™ technology
Intel® Stable Image Platform Program (SIPP)

Intel Core i7-870 Processor
2.93 GHz, 8M total cache
4 cores/8 threads
Requires a discrete graphics solution
Intel® Core™ processor with vPro™ technology
Intel® Stable Image Platform Program (SIPP)

Intel Core i7-880 Processor
3.06 GHz, 8M total cache
4 cores/8 threads
Requires a discrete graphics solution
Intel® Core™ processor with vPro™ technology

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 8100 Elite Series PCsupports 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.

Memory Configurations

Maximum Memory

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

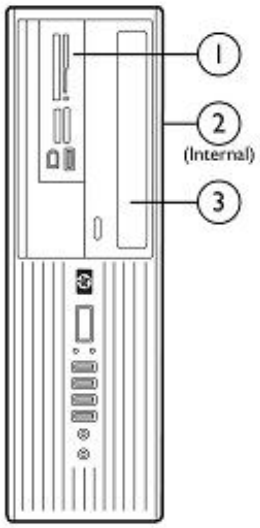
NOTE:
For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system

Total Memory	Slot			
	Channel A		Channel B	
	1 (black)	2 (white)	3 (white)	4 (white)
1GB	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

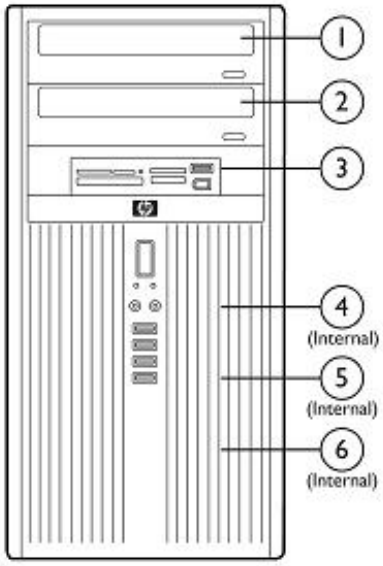
* The Intel Q57 Express chipset includes a built-in Management Engine (ME), which allocates memory for manageability functions. Management Engine memory is shared with system memory. If the PC contains a single SO-DIMM, 16 MB of memory is pre-allocated for it at system startup. If the PC contains two 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.

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

Small Form Factor



Convertible Minitower



Storage Drive Support						
	Small Form Factor			Convertible Minitower		
	MCR	ODD	HDD SSD	MCR	ODD	HDD SSD
Quantity Supported	1	1	2	1	2	3
Position	1	3	2,1	3	1,2	4,5,6

Data Storage Drives

250-GB Hard Disk Drives

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

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

500-GB Hard Disk Drives

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

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

1-TB Hard Disk Drives

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

Solid State Drives

64-GB 2.5" Solid State Drive

80-GB 2.5" Solid State Drive

Optical Disc Drives

DVD-ROM Drive[1]

SuperMulti DVD Writer Drive[1,2,3]

Blu-Ray Writer Drive

[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

Media Card Reader (22-in-1)

Media Card Reader (22-in-1) with 1394 port

Security Solutions and Capabilities

Trusted Platform Module (TPM) 1.2[1]

Stringent Security (via BIOS)[2]

SATA Port Disablement (via BIOS)

Drive Lock

RAID Configurations

HP ProtectTools Embedded Security Software

Serial, Parallel, USB enable/disable (via BIOS)

Optional USB Port Disable at factory (user configurable via BIOS)

Removable Media Write/Boot Control

Power-On Password (via BIOS)

Setup Password (via BIOS)

Solenoid Hood Lock / Sensor

Support for chassis padlocks and cable lock devices

[1]TPM module disabled where use is restricted by law; for example, Russia.

[2]This setting is defaulted to disable, but when enabled, the PW jumper will not clear the BIOS pre-boot authentication passwords.

Network Interface Connections

Intel 82578 GbE Network Connection (integrated)

Intel Gigabit CT Desktop NIC Card

Broadcom NetXtreme GbE Ethernet Plus NIC (PCIe x1)

HP 802.11 b/g/n Wireless PCIe x1 Card

Note:

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

Modem

LSI Hi-Speed 56K International Soft Modem (PCIe x1)

Graphics

Intel Graphics Media Accelerator 4500 (integrated)
Nvidia GeForce 310 Card
Nvidia Quadro NVS 290 Card
Nvidia Quadro NVS 295 Card*
ATI Radeon HD 4550 Card
ATI Radeon HD 4650 Graphics Card

HP DisplayPort to DVI-D Adapter
HP DisplayPort to VGA Adapter
HP DisplayPort to HDMI Adapter
HP DisplayPort Cable

* When ordered with an Nvidia Quadro NVS 295 card, the PC is shipped with two DisplayPort to VGA Adapters. When an Nvidia Quadro NVS 295 card is purchased as an after-market option, it comes with two DisplayPort to DVI-D Adapters.

Audio/Visual

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

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

Note: The audio ports/jacks provided by all of our systems are 3.5mm in diameter. This would include both the front jacks and rear jacks, for audio in/out, mic in and headphone out.

Input/Output Devices

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

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

Miscellaneous Devices and Configurations

FireWire (IEEE 1394) Card
Serial Port Adapter (RS-232 compatible)
Parallel Port Adapter
eSATA Port Adapter
PC Tower Stand
Configure CMT in desktop orientation

After-Market Options (availability may vary by region)

Communications	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	SFF	CMT	Part Number
ATI Radeon HD 4550 Graphics Card	X	X	AT042AA
ATI Radeon HD 4650 DP (1GB) PCIe x16 Graphics Card		X	VN566AA
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

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	FH973AA
HP DisplayPort To DL DVI-D adapter	X	X	NR078AA
HP DisplayPort to VGA Adapter	X	X	AS615AA
HP DisplayPort Cable Kit	X	X	VN567AA

Hard Disk Storage Drives	SFF	CMT	Part Number
HP 250GB Hard Disk Drive	X	X	PY278AA
HP 500GB Hard Disk Drive	X	X	KW347AA

HP 64-GB Solid State Drive	X	X	VG679AA
HP 80-GB Solid State Drive	X	X	BM848AA

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 Devices	SFF	CMT	Part Number
HP PS/2 Standard Keyboard	X	X	DT527A
HP USB Standard Keyboard	X	X	DT528A
HP USB Mini Keyboard	X	X	AS601AA
HP USB Gray Keyboard	X	X	DT529A
HP USB SmartCard Keyboard	X	X	ED707AA
HP USB Keyboard and Mouse Kit	X	X	RC465AA
HP USB Washable Keyboard	X	X	VF097AA
HP USB and PS/2 Washable Mouse	X	X	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	X	X	BU207AA
HP PS/2 Optical Scroll Mouse	X	X	EY703AA
HP USB Optical Scroll Mouse	X	X	DC172B
HP USB Laser Mouse	X	X	GW405AA
HP USB Travel Mouse	X	X	GW405AT
HP 2.4GHz Wireless Keyboard and Mouse	X	X	NB896AA

System Memory	SFF	CMT	Part Number
1 GB DIMM	X	X	AT023AA
2 GB DIMM	X	X	AT024AA
4 GB DIMM	X	X	VH638AA

Multimedia Devices	SFF	CMT	Part Number
HP Thin USB Powered Speakers	X	X	KK912AA
DVD-ROM Drive	X	X	AR629AA
SuperMulti Drive	X	X	AR630AA
Blu-Ray Writer Drive	X	X	AR482AA

Removable Media Storage	SFF	CMT	Part Number
HP USB External Diskette Drive	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

After-Market Options (availability may vary by region)

Security Devices	SFF	CMT	Part Number
HP/Kensington MicroSaver Cable Lock	X	X	PC766A
HP Business PC Security Lock	X	X	PV606AA
HP SFF Solenoid Lock and Hood Sensor	X		BP428AA
HP CMT Solenoid Lock and Hood Sensor		X	DE618A
HP SFF Wall Mount/Security Sleeve	X		VN570AA

HP Client Automation Software	SFF	CMT	Part Number
HP Client Automation – Standard Edition (single seat)	X	X	T3488AA
HP Client Automation – Standard Edition (10 seats)	X	X	TA599AA
HP Client Automation – Standard Edition (100 seats)	X	X	TA600AA
HP Client Automation – Standard Edition (500 seats)	X	X	TA601AA
HP Client Automation – Standard Edition (1,000 seats)	X	X	T3489AA

Stands and Accessories	SFF	CMT	Part Number
HP SFF Tower Stand	X		VN569AA
HP Integrated Work Center - Small Form Factor	X		QK549AA
HP Serial Port Adapter (RS-232 compatible)	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

Weights and Dimensions (configured with 1 HDD and 1 ODD)	Small Form Factor	Convertible Minitower
Chassis (H x W x D)	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	782.77 cu in 12.8 L	2160 cu in 35.4 L
Tower Stand (H x W x D)	1.12 x 7.01 x 7.87 in 28.5 x 178 x 200 mm	N/A
Packaging (H x W x D)	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*	16.72 lbs 7.6 kg	24.54 lbs 11.15 kg
Shipping Weight*	17.86 lbs 8.1 kg	34.0 lbs 15.42 kg
Max Supported Weight (desktop orientation)	77 lb 35 kg	77 lbs 35 kg

I/O Ports

USB 2.0	Front – four (4) ports Rear – six (6) ports
Serial	one RS-232 compatible port standard second port available optionally
Parallel	one port available as an option
eSATA	one port available as an option
PS/2	color coded support for keyboard (purple) and mouse (green)
Video	VGA and DisplayPort provide integrated dual independent monitor support
DVI output	available via optional DisplayPort to DVI Adapter
Audio	Front – microphone & headphone Rear – line input (supports microphone or line input), line out Note: See Audio/Visual section for information on re-taskable audio ports. Note: The audio ports/jacks provided by all of our systems are 3.5mm in diameter. This would include both the front jacks and rear jacks, for audio in/out, mic in and headphone out.
NIC	Industry standard RJ-45 port accesses the integrated network interface controller

Slots	Small Form Factor	Convertible Minitower
PCI Slot	(1) low profile PCI slot 25W max power	(3) full height PCI slot 25W max. power
PCI Express x16	(2) low profile PCIe x16 graphics slot 35W max power	(2) full height PCIe x16 graphics slots 75W max. power - primary slot 35W max. power - secondary slot Note: Secondary slot functions as a x4 slot
PCI Express x1	(1) low profile PCIe x1 slot	(1) full height PCIe x1 slot

Bays		Small Form Factor	Convertible Minitower
External	3.5″	(1) bay available for Media Card Reader unless used for a secondary hard drive	N/A
	5.25″	(1) bay available for Optical Disc Drive 8.19″ deep	3 bays Top two bays accept drives up to 8.19″ depth Bottom bay accepts drives up to 5.7″depth

Controller	Small Form Factor	Convertible Minitower
Hard Drive Controller	Serial ATA Supports SATA 1.5-GB/s and 3.0-GB/	
SATA Interfaces	(3) common SATA (1) eSATA	(4) common SATA (1) eSATA
Host SATA Controller	(1) low profile PCIe x1 slot	(1) full height PCIe x1 slot

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	Small Form Factor	Convertible Minitower
Standard Efficiency	240W active PFC	320W active PFC
High Efficiency*	240W active PFC 87/89/85% efficient at 20/50/100% load	320W active PFC 87/89/85% efficient at 20/50/100% load
Operating Voltage Range	90 – 264 VAC	90 – 264 VAC
Rated Voltage Range	100 – 240 VAC	100 – 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz
Rated Input Current	4A	5.5A
Rated Input Current with Energy Efficient* Power Supply	4A	5.5A
Current Leakage (NFPA 99)	< 275 μA	< 450 μA
Power Supply Fan	92mm variable speed	92mm variable speed
Power Cord Length	6 ft (1.83 m)	6 ft (1.83 m)

*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

Additional Features	Description
Intel Standard Manageability	• Requires the utilization of the integrated network connection • Available with selected processors not part of the Intel Stable Intel Platform Program (SIPP) • Intel Advanced Management Technology (AMT) v3.2 • Basic PC management capabilities such as asset inventory, HW alerting, SOL/IDE-R, remote configuration, agent presence and system defense. • DASH 1.1 compliance. Support for profile updates. • Host VPN support for local management VPN tunneling
Intel Core vPro Processor Technology	• Requires the utilization of the integrated network connection • Available with selected processors which are part of the Intel Stable Intel Platform Program (SIPP) • Intel Advanced Management Technology (AMT) v6.0 • 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 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
Towerable Orientation	Product can be oriented as either a desktop or a tower
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
Drive Protection System	DPS Access through F10 Setup during Boot A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced

	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I – Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II – Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III – Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry
	Detects errors in Read/Write buffers on HDD cache RAM
SMART IV – End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

High Definition Audio

Type	Integrated
Realtek 4-channel ALC261 HD Stereo Codec	• DAC supports 16/20/24-bit PCM format for 4 channel audio solution • Two stereo ADCs support 16/20-bit PCM format • All DACs support independent 44.1k/48k/96kHz sample rate • All ADCs support independent 44.1k/48k/96kHz sample rate
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal.
Speakers	System includes an internal PC speaker rated 1.5W powered by an internal amplifier. External speakers must be powered externally.
Multistreaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Analog Audio	Yes

HP Thin USB Powered Speakers

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

Intel 82578 GbE Network Connection (integrated)

Connector	RJ-45
Controller	Intel 82578 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	PCIe-like interface for 1000 speed, SMBus interface for lower 10/100 speeds.
Data rates supported	10/100/1000 Mbps
Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3 ab and 802.3u compliant
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 & 1.2V. Power consumption 761 Milliwatts
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
Operating temperature	0° to 85° C
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic.
Alerting	ASF 2.0 support, AMT 3.0 support

Broadcom NetXtreme GbE Ethernet Plus Network Interface Controller

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

Intel GbE CT Desktop Network Interface Connection

Connector	RJ-45
Controller	Intel 82574L Gigabit Ethernet Controller
Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
Data rates supported	10/100/1000 Mbps
Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
Bus architecture	PCI-E 1.0a
Data path width	X1, 250 MB/s, Bi-directional interface
Data transfer mode	Bus-master DMA
Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
Power requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
Boot ROM support	Yes
Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI Bus)
Environmental	Operating temperature 32° to 131°F (0° to 55° C) Operating humidity 85% at 131° F (55° C)
Dimensions	4.75 x 2.25 x 0.8 in (12.1 x 5.7 x 2.0 cm)
Management	WOL, PXE, DMI, WFM 2.0

HP Wireless Network Connection 802.11 b/g/n

Dimensions (L x H)	3.3 x 4.7 in 8.5 x 12 cm
Weight	0.08 lbs 40 g
Controller	Ralink RT2790
System interface	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%

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

Technical Specifications - Communications

Power consumption	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 mode	+19 dBm +/- 1.0 dB maximum
	802.11g mode	+17 dBm +/- 1.0 dB maximum
	EWC mode	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)

	Mode	Data rate	Sensitivity
Receive 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 Rate (MCS)	Minimum Throughput
Data transfer rate	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
	IEEE and WiFi compliant 64 / 128 bit WEP encryption	
	AES: CCM	
	802.1x authentication	
Security	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 Wireless Network Interface Connection (USDT)

	IEEE 802.11a
	IEEE 802.11b
	IEEE 802.11g
	IEEE 802.11n
Wireless LAN Standards	Note: 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.
	Wi-Fi certified (802.11a/b/g only)
Interoperability	Cisco Compatible Extensions Program compliant (802.11a/b/g 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)

Technical Specifications - Communications

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	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)	15 dBm
Output Power (for OFDM; power varies by data rate)	15 dBm
Power Consumption	Transmit: 2.3 Watts (average, with one spatial streams) Receive: 1.9 Watts (average with two receive chains Idle mode: 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
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: 32° to 176° F (0° to 80° C) Non-operating: -40° to 176° F (-40° to 80° C)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 90% (non-condensing)

Altitude	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)	
Configuration Utility[5]	Microsoft Windows XP • 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 56K International SoftModem PCI Express x1 Card

Data Transmission	Technology speeds: 56,000 Kbps maximum downstream data, controllerless Note: 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.
Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/ 16,800/14,400/12,000/9,600/7,200/4,800/2,400/1,200/300
Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/
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

Technical Specifications - Communications

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.

Intel HD Graphics

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
2.0GB & more	32	1024

Assumes Management Engine, VT-d enabled and other memory allocated for other BIOS usage

Windows XP Memory 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

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)

Maximum Refresh Rate (Hz)

Technical Specifications - Graphics

Resolutions Supported

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

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

NVIDIA Quadro NVS 290 Graphics Card

Bus Type	PCI Express x16; low profile	PCI Express x1, low profile
Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage	
Connector	Single high-density DMS-59 Flex Connector	
Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)	
Multi-Monitor support	Dual monitor support	
RAMDAC	Integrated dual 400MHz	
Maximum Pixel Clock	350-MHz	
Overlay planes	One 16-bit video overlay plane	One 1-bit video overlay plan
High Definition Video Processor (HDVP)	Full screen, full frame video playback of HDTV and DVD content DVD ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling	

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

Technical Specifications - Graphics

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

Resolutions Supported

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

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

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

Technical Specifications - Graphics

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 VGA Adapters Note: When purchased as an after-market option, this comes instead with 2 DisplayPort to DVI-D adapters.
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

NVIDIA GeForce 310 Graphics Card

Bus type	PCI Express (x16 lanes)	
Board display options	Supports two displays via the DisplayPort and DVI connectors	
	Specification	**Description**
Board configuration	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	
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)	
Maximum vertical refresh rate	85 Hz	
Display support	Integrated 400 MHz RAMDAC	
Display max resolution	2560 x 1600 digital, 2048 x 1536 analog	

Technical Specifications - Graphics

Supported Resolutions

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

* Only supported when using a dual-link DVI or DP connection.
Note:
Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP
Note:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

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 use in a low profile chassis
Warranty documentation

Compliance Standards

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

ATI Radeon HD 4550 Graphics Card

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

Board configuration

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

Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish

Compliance standards

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

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

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

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

ATI Radeon HD 4650 Graphics Card

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

Technical Specifications - Graphics

Resolutions Supported

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

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

Board display options

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

Board configuration

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

Core power

56 W

Board display options	Supports two displays via included two DisplayPort and one Dual Link DVI-I connectors.	
Board configuration	EMC Emissions	EMC Immunity
	FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment Canadian Standard ICES-003 is equivalent to CISPR22 Taiwanese Standard BSMI Japanese VCCI Australian C-Tick Korean (MIC)	CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement

HP DisplayPort to DVI-D Adapter

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

HP DisplayPort to VGA Adapter

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

Technical Specifications - Graphics

Resolutions Supported

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

Note:
Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP. Usin DisplayPort to VGA Adapter may require an update to the graphics driver installed on your system. To install the most up-t graphics driver go to: www.hp.com.
Note:
60-R denotes reduced blanking timings are used. Not all monitors support reduced blanking timing.

250-GB 3.5″ Hard Disk Drive

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

500-GB 3.5″ Hard Disk Drive

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

64-GB 2.5″ Solid State Drive

Capacity	64 GB	
Interface	Serial ATA (SATA)	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
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
Dimensions (W x H x D)	2.74 x 0.37 x 4 in/6.98 x 0.95 x 10.2 cm	
Weight	0.14 lb/65 g	
Environmental (all conditions, non-condensing)	**Operating Temperature:**	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Maximum Wet Bulb Temperature (operating)	84° F (29° C)

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.

80-GB 2.5″ Solid State Drive

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

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

HP USB Standard Keyboard

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

Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Standard Keyboard

Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in 45.8 x 16.3 x 2.5 cm
	Weight	2 lb 0.9 kg minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 – 2001	Functionally compliant
Mechanical	Languages	38 available
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft 1.8 m
	Microsoft PC 99 –2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	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)

Technical Specifications - Input/Output Devices

Environmental	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP 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
	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)

Technical Specifications - Input/Output Devices

Environmental	Operating shock	40 g, six surfaces	
	Non-operating shock	80 g, six surfaces	
	Operating vibration	2-g peak acceleration	
	Non-operating vibration	4-g peak acceleration	
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence	
	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 Mouse

Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in 3.95 x 6.21 x 11.7 cm	
Weight	4.44 oz 126 g	
	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)

Technical Specifications - Input/Output Devices

Environmental	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Microsoft PC99 - 2001	Functionally compliant
	Resolution	400 ± 20% DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	100 in/s/s (2.54 m/s/s)
	Switch actuation	61 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
	Cable length	6 ft (1.8 m)
Scroll wheel	Microsoft PC99 - 2001	Mechanically compliant
	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 Mouse

Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in 3.8 x 11.6 x 6.3 cm
Weight	0.27 lb 0.12 kg
Cable length	72.8 in 185 cm
System requirements	Microsoft Windows 95, 98, 2000, Me, XP and Vista Available USB port

HP USB Laser Mouse

Scroll Wheel	24	
Maximum Rotation Speed	48 rats/sec	
Switch Type	wheel	
Switch Life	Button – 3,000,000 Wheel – 1,000,000 times Tilt switch – 500,000 times	
Environmental	Operating Temperature	32° to 104° F 0° to 40° C
	Non-operating Temperature	-4° to 140° F -20° to 60° C
	Operating Humidity	10% to 90% (non-condensing at ambient)
	Non-operating Humidity	20% to 80% (non-condensing at ambient)
	Operating Shock	40 g, six surfaces
	Non-operating Shock	80 g, six surfaces
	Operating Vibration	2-g peak acceleration
	Non-operating Vibration	4-g peak acceleration
Electrical	Operating Voltage	+ 5VDC ± 5%
	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	

HP Blu-ray Writer Drive

AMO Part Number	AR482AA		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
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		
Disc Capacity	DVD-ROM	8.5GB DL or 4.7GB standard	
	Blu-ray	50GB DL or 25GB standard	
Startup Time	Full Stroke DVD	< 250 ms (seek)	
	Full Stroke CD	< 210 ms (seek)	
	Blu-ray	< 275 ms (seek)	
		(Time to drive ready from tray loading)	
		BD-ROM (SL/DL)	25S / 28S
		BD-R (SL/DL)	25S / 28S
		BD-RE (SL/DL)	25S / 28S
		DVD-ROM (SL/DL)	18S / 18S
		DVD-R (SL/DL)	25S / 25S
		DVD-RW	25S
		DVD+R (SL/DL)	25S / 25S
		DVD+RW	25S
		DVD-RAM	45S
		CD-ROM	15S
Maximum Data Transfer Rates	CD-ROM Read	CD-ROM up to 40X CD-RW up to 40X 8x CAV	
	DVD-ROM Read	DVD-RAM up to 5X DVD+RW up to 10X DVD-RW up to 10X DVD+R DL up to 8X DVD-R DL up to 8X DVD-ROM up to 16X DVD-ROM DL up to 8X DVD+R up to 12X DVD-R up to 12X BD-ROM up to 6X BD-ROM DL up to 4.8X	

Power	Blu-ray	BD-R up to 6X BD-R DL up to 4.8X BD-R up to 6X BD-RE SL/DL up to 4.8X
	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 Drive

AMO Part Number	AR630AT
Height	5.25-inch, half-height, tray-load
Orientation	Either horizontal or vertical
Interface type	Serial ATA
Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
Weight (max)	2.6 lb (1.2 kg)

CD Media Read Access	Random	< 120 ms typical
	Full Stroke	< 200 ms typical
DVD Media Read Access	Random	< 130 ms typical
	Full Stroke	< 240 ms typical
CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
	CD-RW Read	Up to 4800 KB/s (32X)
	Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
	Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
	Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
	Video CD Playback	Up to 2400 KB/s (16X)
DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
	DVD-ROM DL Read	Up to 10800 KB/s (8X)
	DVD Video Playback	Up to 10800 KB/s (8X)
	DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
	DVD Video DL (other than playback)	Up to 10800 KB/s (8X)

Performance		DVD-R	Up to 21600 KB/s (16X)
		DVD+R	Up to 21600 KB/s (16X)
		DVD-RW	Up to 10800 KB/s (8X)
		DVD-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)
		CD-R Write	Up to 6000 KB/s (40X)
		CD-RW	600 KB/s (4X)
	CD Media Write Transfer	CD-RW (High speed)	1500 KB/s (10X)
		CD-RW (Ultra speed)	Up to 3600 KB/s (24X)
		CD-RW (Ultra speed+)	Up to 4800 KB/s (32X)
		DVD+R	Up to 21600 KB/s (16X)
		DVD+R DL (v1.2)	Up to 16200 KB/s (12X)
		DVD+R DL (v1.1)	Up to 10800 KB/s (8X)
		DVD+RW (Volume 2 v1.0)	Up to 10800 KB/s (8X)
		DVD+RW (Volume 1 v1.3)	Up to 5400 KB/s (4X)
		DVD-R (v2.1 rev. 6.0)	Up to 16200 KB/s (12X)
	DVD Media Write Transfer	DVD-R (v2.1 rev. 4.0)	Up to 21600 KB/s (16X)
		DVD-R DL (v3.0 rev. 5.0)	Up to 10800 KB/s (8X)
		DVD-R DL (v3.0 rev. 3.0)	Up to 10800 KB/s (8X)
		DVD-RW (v1.2 rev. 3.0)	8100 KB/s (6X)
		DVD-RW (v1.2 rev. 2.0)	Up to 5400 KB/s (4X)
		DVD-RAM (v2.2 rev. 5.0)	Up to 16200 KB/s (12X)
		DVD-RAM (v2.2 rev. 2.0)	Up to 6750 KB/s (5X)

Media Compatibility	Media	Read	Write
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+R	Yes	No
	DVD+R DL	Yes	No
	DVD+RW	Yes	No
	DVD-R	Yes	No
	DVD-RW	Yes	No
	DVD-R DL	Yes	No

Power Supply			
	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
		5 VDC	<1000 mA (typical) 1600 mA (max.)

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

HP DVD-ROM Drive

AMO Part Number	AR629AA		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	Serial ATA		
Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
Weight (max)	2.6 lb (1.2 kg)		
Performance	CD Media Read Access	Random	< 120 ms typical
		Full Stroke	< 200 ms typical
	DVD Media Read Access	Random	< 130 ms typical
		Full Stroke	< 240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
		DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)

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

HP 22-n-1 Media Card Reader plus 1394 Media Card Reader

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

Supported media type with card adapter	Memory Stick PRO Duo (MS PRO Duo) Memory Stick PRO-HG Duo MagicGate Memory Stick (MG) MagicGate Memory Stick Duo xD-Picture Card 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	

Eco-Label Certifications & declarations

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

- US ENERGY STAR ®
- IT ECO declaration
- EPEAT Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.

Small Form Factor

Energy Consumption (typically configured)	115 VAC	230 VAC	100 VAC
Normal Operation	39.787 W	39.547 W	39.865 W
Sleep (Energy Star low power mode)	3.2283 W	3.4659 W	3.2186 W
Off	1.0477 W	1.2128 W	1.0345 W

Heat Dissipation (typically configured)*	115 VAC	230 VAC	100 VAC
Normal Operation	136 BTU/hr	135 BTU/hr	136 BTU/hr
Sleep	11 BTU/hr	12 BTU/hr	11 BTU/hr
Off	4 BTU/hr	4 BTU/hr	4 BTU/hr

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

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

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.7	27
Fixed Disk (random writes)	3.7	27

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

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

Battery Size CR2032 (coin cell)

Battery Type Lithium

Additional Information

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

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

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

Technical Specifications - Environmental Data

This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.

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

This product contains 0% post consumer recycled plastic (by wt.)

This product is 95.1% recyclable when properly disposed of at end of life.

Packaging Materials		
	External	Corrugated Carton – 1700 g
	Internal	EPE – Expanded Polyethylene – 198 g Polyethylene low density foam – 160 g

The Corrugated Carton packaging material is made from 100% recycled content.
The EPE – Expanded Polyethylene packaging material is made from 100% recycled content
The Polyethylene low density foam packaging material is made from 100% recycled content

Convertible Minitower

Energy Consumption (typically configured)	115 VAC	230 VAC	100 VAC
Normal Operation	46.9450 W	47.0125 W	46.5123 W
Sleep (Energy Star low power mode)	3.7745 W	3.7250 W	3.6882 W
Off	0.7562 W	0.8895 W	0.7751 W

Heat Dissipation (typically configured)*	115 VAC	230 VAC	100 VAC
Normal Operation	161 BTU/hr	161 BTU/hr	159 BTU/hr
Sleep	13 BTU/hr	13 BTU/hr	13 BTU/hr
Off	3 BTU/hr	3 BTU/hr	3 BTU/hr

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

Technical Specifications - Environmental Data

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

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	21
Fixed Disk (random writes)	3.8	21

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

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

Battery Size CR2032 (coin cell)

Battery type Li-Ion

Additional Information

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

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

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

This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.

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

This product contains 0% post consumer recycled plastic (by wt.)

This product is 90% recyclable when properly disposed of at end of life.

Packaging Materials

External	Corrugated 2550 g
Internal	Polyethylene high density 160 g

The corrugated packaging material is made from 37% recycled content.The Polyethylene high density packaging material is made from 100% recycled content.

All Models

Reduction in Hazardous **Substances (RoHS) Compliance**

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

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

Material Usage	http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • Asbestos • Certain Azo Colorants • Certain Brominated Flame Retardants – may not be used as flame retardants in plastics • Cadmium • Chlorinated Hydrocarbons • Chlorinated Paraffins • Formaldehyde • Halogenated Diphenyl Methanes • Lead carbonates and sulfates • Lead and Lead compounds • Mercuric Oxide Batteries • Ozone Depleting Substances • Polybrominated Biphenyls (PBBs) • Polybrominated Biphenyl Ethers (PBBEs) • Polybrominated Biphenyl Oxides (PBBOs) • Polychlorinated Biphenyl (PCB) • Polychlorinated Terphenyls (PCT) • Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications. • Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO) • Nickel finishes that release greater than 0.5 micro-grams/cm^2/week, measured according to EN 1811:1998, are not used on any product surface designed to be frequently handled or touched by users.
Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment. For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html

Hewlett-Packard Corporate Environmental Information	Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html