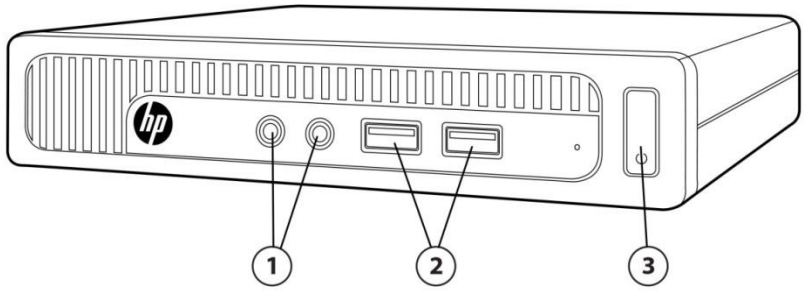
Overview

HP EliteDesk 705 G1 Desktop Mini Business PC



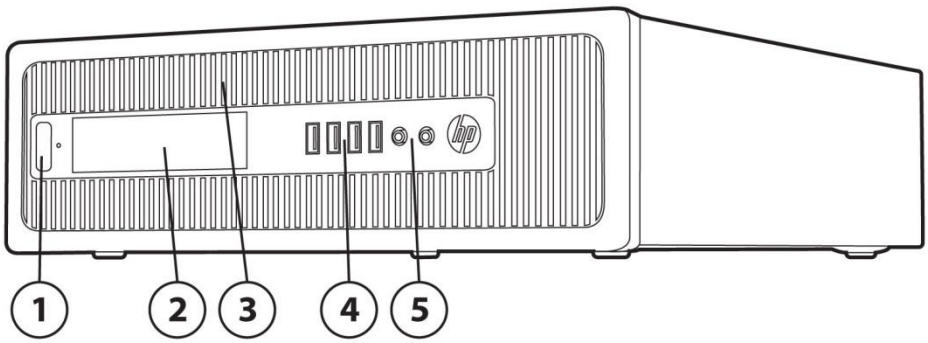
1. 3.5mm headphone output and microphone jacks
2. (2) Front USB 3.0 ports
3. Power button and PC status LED

Not Shown

Slots	(1) internal M.2 PCIe x4 connector for optional wireless NIC (1) internal M.2 PCIe x4 connector for optional SSD drive
Bays	(1) 2.5” internal storage drive bay
Rear I/O	USB2.0 (2) USB3.0 (1) VGA video port; (2) DisplayPort with multi-stream video ports (1) RJ-45 network connector 3.5mm audio out jack
VESA	Support for VESA 100 mounting system on bottom of PC chassis

Overview

HP EliteDesk 705 G1 Small Form Factor Business PC



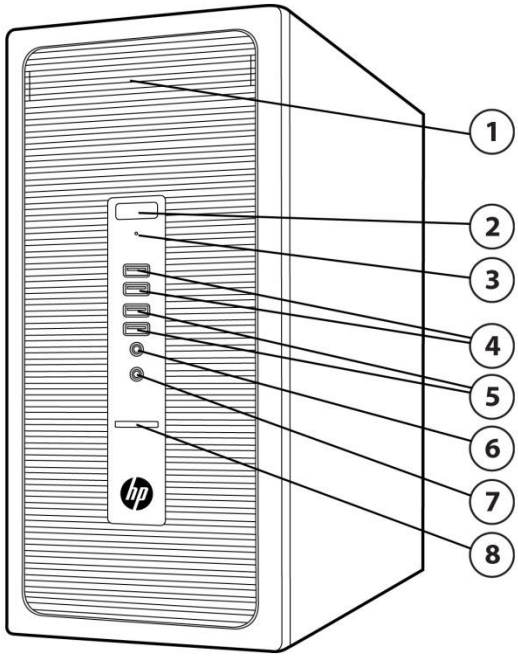
1. Power button and PC status LED
2. 3.5” external drive bay; used for installing a Media Card Reader or 2nd data storage drive
3. 5.25” Slim drive bay supporting an optical disk drive (located behind removable bezel)
4. (2) USB 3.0 ports, (2) USB 2.0 ports
5. 3.5mm headphone output and microphone jack

Not Shown

Slots	(2) PCI Express x16 graphics connectors; one wired as a x4 (2) PCI Express x1 accessory connectors
Bays	(1) 2.5” internal storage drive bay (1) 3.5” internal storage drive bay
Rear I/O	(2) USB 3.0 ports; (4) USB 2.0 ports (1) VGA video port; (2) DisplayPort with multi-stream video ports (1) RJ-45 network connector (1) RS-232 serial port 3.5mm audio in/out jacks PS/2 keyboard and mouse ports

Overview

HP EliteDesk 705 G1 Microtower Business PC



1. Slim drive bay supporting an optical disk drive (located behind removable bezel)
2. Power button
3. PC status LED
4. (2) USB 2.0 ports
5. (2) USB 3.0 ports (charging port)
6. 3.5mm headphone output
7. Microphone jack
8. SD Card Reader bay

Not Shown

Slots	(2) PCI Express x16 graphics connectors; one wired as a x4 (2) PCI Express x1 accessory connectors
Bays	(1) Slim optical drive bay (2) 3.5” internal storage drive bays
Rear I/O	(2) USB 3.0 ports; (4) USB 2.0 ports (1) VGA video port; (2) DisplayPort with multi-stream video ports (1) RJ-45 network connector (1) RS-232 serial port

Overview

3.5mm audio in/out jacks
PS/2 keyboard and mouse ports

AT A GLANCE

- Choice of three chassis form factors: Desktop Mini, Small Form Factor and Microtower
- PC chassis and all internal components and modules are manufactured with low halogen content
- HP developed and engineered UEFI BIOS supporting security, manageability and software image stability
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Processor support up to 95W (MT/SFF), 35W (DM)
- Multi-independent monitor support via VGA and dual digital DisplayPort video interfaces with multi-stream
- DTS Studio Sound audio management software
- Standard and high efficiency energy saving power supply options
- SFF and MT models can be configured with dual data drives in a RAID
- ENERGY STAR® qualified and certified EPEAT® Gold models
- Guaranteed lengthy purchase lifecycles and image stability

NOTE: See important legal disclosures for all listed specs in their respective features sections.

STANDARD FEATURES AND CONFIGURABLE COMPONENTS

OPERATING SYSTEMS

Preinstalled (Windows)

Windows 10 Pro 64*
Windows 10 Home 64*
Windows 8.1 Pro 64*
Windows 8.1 64*
Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro)**
Windows 7 Professional 32 (available through downgrade rights from Windows 10 Pro)**
Windows 7 Professional 64 (available through downgrade rights form Windows 8.1 Pro)***
Windows 7 Professional 32 (available through downgrade rights form Windows 8.1 Pro)***
Windows 7 Professional 64*
Windows 7 Professional 32*

Pre-installed (Other)

FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

Web Support Only

Windows 10 Pro 64
Windows 10 Home 64
Windows 8.1 Pro 64
Windows 8.1 64
Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro)
Windows 7 Professional 32 (available through downgrade rights from Windows 10 Pro)
Windows 7 Professional 64 (available through downgrade rights form Windows 8.1 Pro)
Windows 7 Professional 32 (available through downgrade rights form Windows 8.1 Pro)
Windows 7 Professional 64
Windows 7 Professional 32
Windows 10 Enterprise 64
Windows 8.1 Enterprise 64
Windows 7 Enterprise 64
Windows 7 Enterprise 32

*__NOTE__: Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.microsoft.com.

**This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 10 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

***This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

Standard Features and Configurable Components

CHIPSET

AMD® A88X FCH

PROCESSORS

AMD Quad-Core A10 APU with AMD Radeon™ HD Graphics*	DM	SFF	MT
AMD Quad-Core A10 PRO-7850B Accelerated Processor with AMD Radeon™ R7 Series Up to 4 GHz Max. Boost Frequency (3.7 GHz base frequency) 4 MB L2 cache, 4 cores, 8 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 2133 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X
AMD Quad-Core A10 PRO-7800B Accelerated Processor with AMD Radeon™ R7 Series Up to 3.9 GHz Max. Boost Frequency (3.5 GHz base frequency) 4 MB L2 cache, 4 cores, 8 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 2133 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X
AMD Quad-Core A10 PRO-6800B Accelerated Processor with AMD Radeon™ HD 8670D Up to 4.4 GHz Max. Boost Frequency (4.1 GHz base frequency) 4 MB L2 cache, 4 cores, 384 Radeon™ Cores 2.0 Discrete-Class Graphics Supports DDR3 memory up to 2133 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X

AMD Quad-Core A8 APU with AMD Radeon™ HD Graphics*	DM	SFF	MT
AMD Quad-Core A8 PRO-7600B Accelerated Processor with AMD Radeon™ R7 Series Up to 3.8 GHz Max. Boost Frequency (3.1 GHz base frequency) 4 MB L2 cache, 4 cores, 6 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 2133 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X
MD Quad-Core A8 PRO-7600B Accelerated Processor with AMD Radeon™ R7 Series Up to 3.3 GHz Max. Boost Frequency (2.2 GHz base frequency) 4 MB L2 cache, 4 cores, 6 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 2133 MT/s data rate Supports AMD® DASH 1.1 Technologies	X		
AMD Quad-Core A8-6500B Accelerated Processor with AMD Radeon™ HD 8570D Up to 4.1 GHz Max. Boost Frequency (3.5 GHz base frequency) 4 MB L2 cache, 4 cores, 256 Radeon™ Cores 2.0		X	X

Standard Features and Configurable Components

Discrete-Class Graphics
Supports DDR3 memory up to 1866 MT/s data rate
Supports AMD® DASH 1.1 Technologies

AMD Dual-Core A6 APU with AMD Radeon™ HD Graphics*	**DM**	**SFF**	**MT**
AMD Dual-Core A6 PRO – 7400B Accelerated Processor with AMD Radeon™ R5 Series Up to 3.9 GHz Max. Boost Frequency (3.5 GHz base frequency) 1 MB L2 cache, 2 cores, 4 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 1866 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X
AMD Dual-Core A6 – 6400B Accelerated Processor with AMD Radeon™ HD 8470D Up to 4.1 GHz Max. Boost Frequency (3.9 GHz base frequency) 1 MB L2 cache, 2 cores, 192 Radeon™ Cores 2.0 Discrete-Class Graphics Supports DDR3 memory up to 1866 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X

AMD Dual-Core A4 APU with AMD Radeon™ HD Graphics*	**DM**	**SFF**	**MT**
AMD Dual-Core A4 PRO – 7350B Accelerated Processor with AMD Radeon™ R5 Series Up to 3.8 GHz Max. Boost Frequency (2.9 GHz base frequency) 1 MB L2 cache, 2 cores, 3 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 1866 MT/s data rate Supports AMD® DASH 1.1 Technologies	X		
AMD Dual-Core A4 PRO – 7300B Accelerated Processor with AMD Radeon™ HD 8470D Up to 4.2 GHz Max. Boost Frequency (3.8 GHz base frequency) 1 MB L2 cache, 2 cores, 3 Graphics Core Next Cores Discrete-Class Graphics Supports DDR3 memory up to 1866 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X
AMD Dual-Core A4 – 6300B Accelerated Processor with AMD Radeon™ HD 8370D Up to 3.9 GHz Max. Boost Frequency (3.7 GHz base frequency) 1 MB L2 cache, 2 cores, 128 Radeon™ Cores 2.0 Discrete-Class Graphics Supports DDR3 memory up to 1600 MT/s data rate Supports AMD® DASH 1.1 Technologies		X	X

**Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing system required. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. AMD's numbering is not a measurement of clock speed.

Standard Features and Configurable Components

GRAPHICS*

***NOTE**: AMD and NVIDIA graphics cards are not available on configurations with the preinstalled Windows 10 operating system. Configurations with the Windows 10 downgrade to Windows 7 operating system will allow for upgrading to Windows 10 with AMD and NVIDIA graphics cards through graphics driver installation from hp.com.

System Integrated Graphics	**DM**	**SFF**	**MT**
AMD Radeon HD Graphics (integrated on processor)	X	X	X

Optional Discrete Graphics Solutions	**DM**	**SFF**	**MT**
AMD RADEON R9 255 2GB PCIe x16*			X
AMD RADEON R7 240 2GB PCIe x16		X	X
AMD Radeon HD 8350 (1GB) PCIe x16		X	X
AMD Radeon HD 8490 (1GB) PCIe x 16*		X	X
NVIDIA NVS 310 (512 MB) PCIe x16		X	X
NVIDIA NVS 315 (1GB) PCIe x 16*		X	X
NVIDIA GeForce GT 630 DP PCIe FHx16*			X

*Available October, 2014.

Dual Graphics Support Information[1]

AMD A-Series Accelerated Processor (APU) based PC with an AMD Radeon™ DirectX® 11 capable discrete graphics card. Only AMD Radeon™ Dual Graphics combines two powerful Radeon™ DirectX 11-enabled graphics processors to provide a stellar performance boost when you need it. Experience higher resolutions with greater image quality and boost visual performance when you combine a Quad-Core AMD APU for desktops with the AMD Radeon™ HD graphics card.[1]

By default, dual graphics is not enabled. The customer must open the AMD Catalyst Control Center app and enable this function.

Dual Graphics Compatibility Chart

Processor	**Discrete Graphics Card** (optional)			
	HD 8350 1GB FH PCIe x16	HD 8350 1GB PCIe x16 DH	HD 8490 1GB PCIe x16	R7 240 2GB FH PCIe x16
A10 PRO-7850B				X
A10 PRO-7800B				X
A10-6800B	X	X	X	
A8-6500B	X	X	X	
A8 PRO-7600B				X

X denotes which processor and discrete graphics card combinations have been tested as compatible for dual graphics.

[1] AMD Radeon™ Dual Graphics requires an AMD "A" series APU plus an AMD Radeon™ discrete graphics configuration and is available on Windows® 7 Professional, Windows 7 Ultimate, Windows® 7 Home Premium, and/or Windows® 7 Home Basic OS. Linux OS supports manual switching which requires restart of X-Server to engage and/or disengage the discrete graphics processor for dual graphics capabilities. Additional hardware (e.g. Blu-ray drive, HD or 10-bit monitor, TV tuner, wirelessly enabled HDTV) and/or

Standard Features and Configurable Components

ADAPTERS AND CABLES

	DM	SFF	MT
DVI Cable	X	X	X
DisplayPort Cable	X	X	X
DMS-59 to Dual DisplayPort Cable			X
DMS-59 to Dual DVI Cable			X
DMS-59 to Dual VGA Cable			X
DisplayPort to DisplayPort Cable	X	X	X
DisplayPort to DVI-D Adapter	X	X	X
DisplayPort to HDMI Adapter	X	X	X
HP DisplayPort To HDMI 1.4 Adapter	X	X	X
DisplayPort to VGA Adapter	X	X	X
Serial Port Adapter		X	X
Parallel Port Adapter		X	X

STORAGE*

Hard Disk Drives (HDD)	DM	SFF	MT
500 GB 7200 rpm HDD	X	X	X
500 GB 7200 rpm SED HDD	X	X	X
500 GB 10K rpm HDD		X	X
1 TB 7200 rpm HDD		X	X
1 TB 10K rpm HDD		X	X
2 TB 7200 rpm HDD		X	X

Solid State Hybrid Drives (SSHD)	DM	SFF	MT
500 GB SSHD (8 GB cache)	X	X	X
1 TB SSHD (8 GB cache)	X	X	X
1TB 7200 RPM SATA 6G 3.5 8GB SSHD		X	X

Solid State Drives (SSD) & Self-encrypting Solid State Drives (SED)	DM	SFF	MT
128 GB SSD		X	X
256 GB SSD		X	X
128 GB Turbo Drive SSD (M.2 PCIe card) **	X		
128 GB Turbo Drive SSD (PCIe card)		X	X
128 GB Opal 2 SED	X	X	X
256 GB Opal 2 SED	X	X	X
Intel Pro 1500 120 GB Opal 1 SED	X	X	X
Intel Pro 1500 180 GB Opal 1 SED	X	X	X

Standard Features and Configurable Components

120GB SATA 2.5 Non-SED SSD (with 3.5" adapter when needed)	X	X	X
120GB SATA Opal 1	X		
120GB SATA Opal 2	X		
180GB SATA 2.5 Non-SED SSD (with 3.5" adapter when needed)	X	X	X
128GB SATA 2.5 SSD TLC Non-SED (with 3.5" adapter when needed)	X		X
256GB SATA 2.5 SSD TLC Non-SED (with 3.5" adapter when needed)	X		X
512GB SATA 2.5 SSD Non-SED (with 3.5" adapter when needed)	X	X	X

*__NOTE:__ For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1/10) of system disk is reserved for the system recovery software.

**Available at TBD later date

Optical Disc Drives	DM	SFF	MT
Slim DVD-ROM		X	X
Slim BDXL Blu-ray Writer		X	X
Slim SuperMulti DVD Writer		X	X

Removable	DM	SFF	MT
HP Slim Removable SATA HDD Frame/Carrier		X	X

Media Card Reader (optional)			
15-in-1 USB2/3.5 Media Card Reader		X	
SD Carder Reader 5-in-1			X
Supports Secure Digital (SD, SDXC, SDHC, UHS-I, UHS-II)			

MEMORY*

Form Factor	Type	Maximum	# of Slots
Desktop Mini	DDR3 non-ECC Up to 1600 MT/s	16 GB	2 SODIMM
Small Form Factor	DDR3 non-ECC Up to 1600 MT/s	32 GB	4 DIMM
Microtower	DDR3 non-ECC Up to 1600 MT/s	32 GB	4 DIMM

* Full availability of 4 GB or more of memory requires a 64-bit operating system. With Windows 32-bit operating systems, the amount of usable memory is dependent upon your configuration, so that above 3 GB all memory may not be available due to system resource requirements.

Memory modules support data transfer rates up to 1600 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)	**DM**	**SFF**	**MT**
Broadcom NetXtreme Gigabit Ethernet Plus – DASH compliant NIC (integrated)	X	X	X
Intel Ethernet I210-T1 PCIe x1 Gb Network Interface Card (optional)		X	X

Wireless LAN (optional)*	**DM**	**SFF**	**MT**
Intel Wireless-N 7260 802.11 M.2 a/b/g/n NIC Card Wireless Network Connection	X		
Intel Wireless-N 7260 802.11 a/b/g/n PCIe- Clink Card (SFF/MT Only) Wireless Network Connection		X	X
HP Wireless 802.11 a/b/g/n 2x2 Dual Band Mini Card		X	X

* Wireless access point and Internet service required and not included. Availability of public wireless access points limited

AUDIO/MULTIMEDIA

	DM	**SFF**	**MT**
HD audio with Realtek ALC221 codec (all ports are stereo)	X	X	X
DTS Studio Sound audio management technology	X	X	X
Microphone* and headphone front ports (3.5mm)	X	X	X
Line-out and Line-In rear Ports* (3.5mm)	**Line out only**	X	X
Multi-streaming capable*	X	X	X
Internal speaker (standard)	X	X	X

* The front microphone port is re-taskable as a Line-in, Microphone-in or Headphone-out 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.

KEYBOARDS AND POINTING DEVICES

Keyboard	**DM**	**SFF**	**MT**
HP PS/2 Keyboard	X	X	X
HP USB Keyboard	X	X	X
USB Smart Card (CCID) Keyboard	X	X	X
HP USB PS/2 Washable Keyboard**	X	X	X
HP Wireless Keyboard and Mouse Combo*, **	X	X	X
HP USB Antimicrobial Keyboard	X	X	X

Standard Features and Configurable Components

*Keyboard contains 25% post-consumer recycled plastic material.
** Low Halogen - External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

Mice	DM	SFF	MT
HP PS/2 Mouse	X	X	X
HP USB Mouse	X	X	X
HP USB 1000dpi Laser Mouse	X	X	X
HP USB PS/2 Washable Mouse**	X	X	X
HP USB Antimicrobial Mouse	X	X	X

HP BIOS

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP EliteDesk 705 G1 Business PC into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- UEFI specification 2.1
- Absolute Persistence Module – 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 (DOSFlash), 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.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

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.

Standard Features and Configurable Components

SECURITY

	DM	SFF/MT
Trusted Platform Module,SLB9660TT1.2FW4.40 (TPM) 1.2 (Common Criteria EAL4+ certified)	X	X
SATA port disablement (via BIOS)	X	X
Drive lock	X	X
RAID configurations		X
Serial, parallel, USB enable/disable (via BIOS)	X	X
Optional USB Port Disable at factory (user configurable via BIOS)	X	X
Removable media write/boot control	X	X
Power-On password (via BIOS)	X	X
Setup password (via BIOS)	X	X
Solenoid Hood Lock / Sensor		X
Support for chassis padlocks and cable lock devices	X	X

ENVIRONMENTAL & REGULATORY

ENERGY STAR® qualified models available

EPEAT® registered where applicable/supported. See http://www.epeat.net for registration status by country.

Low halogen (chassis, all internal components and modules)*

TAA compliant

* External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

PORTS

I/O Ports – Standard

	DM	SFF/MT
USB 2.0	N/A	2 (front); 4 (rear)
USB 3.0	2 (front); 4 (rear)	2 (front); 2 (rear)
Serial (RS-232)	N/A	1
PS/2	N/A	1 keyboard (purple) 1 mouse (green)
Video	1 ea. VGA 2 ea. DisplayPort	1 ea. VGA 2 ea. DisplayPort
Audio	Front: headphone/mic Rear: line in/out 3.5mm diameter	Front: headphone/mic Rear: line in/out 3.5mm diameter
Network Interface	RJ-45	RJ-45

I/O Ports – Optional

	DM	SFF/MT
2nd Serial (RS-232)	N/A	1

Standard Features and Configurable Components

Parallel	N/A	1

SLOTS

	DM	SFF	MT
M.2	1 ea. M.2 PCIe x4-2230 (for WLAN) 1 ea. M.2 PCIe x4-2280 (for storage)	N/A	N/A
PCI Express x1 (v2.0)	N/A	2 ea. 2.5” low profile 6.6” length 10W max. power	2 ea. 4.376” full height 6.6” length 10W max. power
PCI Express x16 (v2.0) (wired as a x4)	N/A	1 ea. 2.5” low profile 6.6” length 10W max. power	1 ea. 4.376” full height 6.6” length 10W max. power
PCI Express x16 (v3.0)	N/A	1 ea. 2.5” low profile 6.6” length 75W max. power	1 ea. 4.376” full height 6.6” length 75W max. power

BAYS

	DM	SFF	MT
5.25" Half Height ODD	N/A	N/A	N/A
Slim ODD	N/A	1 ea.	1 ea.
Secure Digital (SD) Reader	N/A	N/A	1 ea.
2.5” internal storage drive	1 ea.	1 ea.	N/A
3.5” internal storage drive	N/A	2 ea.	2 ea.

SERVICE AND SUPPORT

On-site Limited Warranty 1: Three-year (3-3-3) limited warranty delivers three years of on-site, next business day 2 service for parts and labor and includes free telephone support 3 24 x 7. Three-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing a Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: www.hp.com/go/cpc

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

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

Standard Features and Configurable Components

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

Included	
Security	
MultiMedia	
Communication	
HP Value Add	
3rd Party	
Microsoft Products	

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS			
Included	**Windows 7**	**Windows 8.1**	**Windows 10**
BIOS	HP BIOSphere[1] HP DriveLock HP BIOS Protection[2] BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase[3] Absolute Persistence Module[4]	HP BIOSphere[1] HP DriveLock HP BIOS Protection[2] BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase[3] Hybrid Boot Measured Boot Secure Boot Absolute Persistence Module[4]	HP BIOSphere[1] HP DriveLock HP BIOS Protection[2] BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase[3] Hybrid Boot Measured Boot Secure Boot Absolute Persistence Module[4]
Multimedia	CyberLink Power DVD, BD CyberLink Power2Go (Secure Burn)	CyberLink Power DVD, BD CyberLink Power2Go (Secure Burn)	CyberLink Power DVD, BD CyberLink Power2Go (Secure Burn)

	Windows 7	Windows 8.1	Windows 10
Communication	Native Miracast Support[6]	Native Miracast Support[6]	Native Miracast Support[6]
HP Value Add	HP ePrint Driver[7] HP Recovery Manager HP Support Assistant	HP ePrint Driver[7] HP Recovery Manager HP Support Assistant	HP ePrint Driver[7] HP Recovery Manager HP Support Assistant

Standard Features and Configurable Components

	HP Recovery Disk Creator	HP Recovery Disk Creator	Windows 10 Welcome App HP Recovery Disk Creator
3rd Party	Foxit PhantomPDF Express for HP	Foxit PhantomPDF Express for HP	Foxit PhantomPDF Express for HP
Microsoft Products	Buy Office Bing Search Skype	Buy Office Bing Search Skype	Buy Office Bing Search Skype
Manageability	HP Drive Packs[8] HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) [8] HP Client Catalog [8] HP CIK for Microsoft SCCM [8] LANDESK Management [9] HP BIOS Config Utility (BCU) [8]	HP Drive Packs[8] HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) [8] HP Client Catalog [8] HP CIK for Microsoft SCCM [8] LANDESK Management [9] HP BIOS Config Utility (BCU) [8]	HP Drive Packs[8] HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) [8] HP Client Catalog [8] HP CIK for Microsoft SCCM [8] LANDESK Management [9] HP BIOS Config Utility (BCU) [8]
For more information on HP Client Management Solutions refer to: http://www.hp.com/go/clientmanagement.			
	Windows 7	Windows 8.1	Windows 10
Security	HP Device Access Manager HP Drive Encryption[10] HP Disk Sanitizer External Edition HP Security Manager Microsoft Security Essentials[11]	HP Device Access Manager HP Drive Encryption[10] HP Disk Sanitizer External Edition HP Security Manager Microsoft Defender	HP Drive Encryption[10] HP Disk Sanitizer External Edition HP Security Manager Microsoft Defender
Standard	Smart Card Reader Security lock slot Preboot Authentication	Smart Card Reader Security lock slot Preboot Authentication	Smart Card Reader Security lock slot Preboot Authentication

NOTE: The Absolute Persistence agent is shipped turned off, and must be activated by customers when they purchase a subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S.

For more information on HP Client Security Software Suite, refer to http://www.hp.com/go/clientsecurity.

Footnotes:
1 Available only on business PCs with HP BIOS.

Standard Features and Configurable Components

2 May require a manual recovery step if all copies of BIOS are compromised or deleted
3 For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.
4 Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: http://www.absolute.com/company/legal/agreements/ computrace-agreement. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.
6 Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming media players that also support Miracast. You can use Miracast to share what you're doing on your PC and present a slide show. For more information: http://windows.microsoft.com/en-us/windows-8/project-wireless-screen-miracast
7 Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see http://www.hp.com/go/eprintcenter). Requires optional broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary.
8 Not preinstalled, however available on manageability website.
9 Subscription required.
10 Requires Windows. Data is protected prior to Drive Encryption login. Turning the PC off or into hibernate logs out of Drive Encryption and prevents data access.
11 Opt in and internet connection required for updates.

AMD® DASH TECHNOLOGY CAPABLE

The DASH standards are designed to assist in the remote management of common desktop infrastructure tasks, such as deploying new operating systems, monitoring of computer system health, power control and power state monitoring, and asset inventory collection. As new hardware technologies are introduced or additional requirements are placed on the IT infrastructure, DASH will continue to evolve to include new functionality.

DASH has been designed to solve many of the pitfalls and constraints of previous management standards by leveraging well-proven technologies from the Service Oriented Architecture domain, advancements in security standards, and extensive modeling of management components, configuration data and relationships first introduced in the server management domain.

DASH is a web services-based management protocol and relies on security and network routing concepts familiar to web site and web services administrators.

Key Features

- Service availability without the requirement of an installed operating system and/or system power states
- Interoperability between various DASH-capable device implementations and management consoles
- Descriptive data model allowing for the discovery of iterative specification updates (new profiles) or vendor-specific extensions (custom profiles)
- Well understood transport level security (HTTPS basic and digest authentication models with optional TLS client/server certificate support)
- Secured setup with support for multiple DASH users and multiple access roles (administrator, operator, auditor)
- DASH ecosystem can coexist with legacy Alert Standard Format (ASF) infrastructure
- Control boot sources, redirect boot to a redirected USB sessions
- Forward POST logs to specified destination
- Monitor and inventory the HW of the managed clients

Management Profiles

A management profile is a specification that defines a normative set of behaviors and characteristics for addressing a particular management domain.

A profile consists of the following information:

- A data model representing the problem domain that consists of objects, properties and methods exposed by the profile
- Use cases to be addressed by the profile
- Steps required to traverse the data model and derive results

When a substantive block of new profiles become available, or fundamental changes are introduced to the DASH ecosystem, the DASH Implementation Requirements document is updated to reflect a new version of the standard. Profiles are continually being developed by the DMTF and DASH is designed to support them as they become available.

AMD® STANDARD MANAGEABILITY

Includes DASH 1.0/1.1 compliance plus:

- System Defense

Standard Features and Configurable Components

- Agent Presence
- SOL/IDE Redirection
- CISCO NAC/SDN support
- ME Wake on LAN
- Host Based Configuration
- ME Firmware Rollback
- IPv6 Support

DASH 1.0/1.1 compliance:

- Boot Control
- HW Inventory
- SW Inventory
- Power State Management
- HW Alerting

Feature	DMTF Specification(s)
Alert Standard Format (ASF 2.0)	DSP0136
DASH Implementation Requirements	DSP0232
System inventory and control	DSP1058, DSP1033, DSP1029, DSP1027, DSP1026, DSP1023, DSP1022, DSP1015, DSP1013, DSP1012, DSP1011
Boot control	DSP1012
User account management	DSP1034, DSP1039
BIOS management	DSP1061
Offline mailboxes/Opaque management data	DSP1070
Indications	DSP1054
In-band NIC management	DSP1014
Sensors	DSP1009
Text console redirection (+Telnet and SSHv2)	DSP1024
Broadcom defined SMBIOS Extensions for Sensors	DSP0134
MCTP / SMBus	DSP0236, DSP0237, DSP0239
PLDM	DSP0240, DSP0241, DSP0245
PLDM for SMBIOS Data Transfer	DSP0246
PLDM for BIOS Control and Configuration	DSP0247
PLDM Numeric Sensors	DSP0248
WMI provider for Ethernet port & SW inventory	DSP1014, DSP1023
WMI provider for User account Mgmt	DSP1034, DSP1039
WMI provider for firmware update	DSP1025
USB redirection (storage media; read only)	DSP1077
Power State management or Power Control (including graceful shutdown	DSP1027
Event logging	DSP1010, DSP8007

Standard Features and Configurable Components

Record log audit or security log	DSP1010
WMI provider for Opaque Mgmt data	DSP1070
PLDM Platform Event Messages	DSP0248
Service Processor	DSP1018
Physical Computer System View	in progress

GRAPHICS

Integrated AMD HD Graphics		
VGA Controller	Integrated	

DisplayPort	• DP++
	• DisplayPort audio:
	  ○ Linear PCM, Dolby Digital (AC-3), Dolby TrueHD, DTS, and DTS-HD Master Audio
	  ○ LPCM at sample rates: 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, and 192 kHz, Bits per sample: 16, 20, and 24
	  ○ Supports up to 8 channels
	• 4, 2, or 1-lane transmission
	• 5.4 Gbps (HBR2), 2.7 Gbps, and 1.62 Gbps link bit rates
	• DisplayPort Multi-Stream Transport (MST) for up to four independent video and audio streams on one connector
	• Maximum resolution of 4096 x 2160 at 30 Hz and 24 bpp (single stream)
	  ○ Supports 2560 x 1600 at 60 Hz (single stream)
	  ○ Support for tiled displays with resolution of up to 4096 x 2160 at 60 Hz DisplayPort 1.2 MST
	Supports stereoscopic 3D gaming, Blu-ray 3D, and stereoscopic 3D video for 120-Hz frame sequential monitors	

Memory	Allocated at system startup and configurable using F10 setup with values of 128MB, 256MB, 512MB and 1024MB. Additional memory that is not in use by the host will be dynamically allocated and will vary depending on the total installed system memory.	
Maximum Graphics Memory	Microsoft Windows 7	Windows 8.1
	Variable*	Variable*
	* Actual amount of maximum graphics memory can vary depending on the amount of installed system memory	
Maximum Color Depth	32 bits/pixel, 8-bits per color component	
Graphics/Video API Support	• Discrete-level graphics processor embedded alongside the x86 CPU complex • Dedicated graphics memory controller **AMD Eyefinity** AMD Eyefinity support for up to four displays when at least two displays are operating with DisplayPort 1.2 multi-streaming. **AMD Dual Graphics support** Available with select combinations of A8 and A10 processors with select AMD graphics cards • AMD Asynchronous CrossFire™ Technology **Power Management** • AMD PowerPlay™ power management technology	

- Dynamic power gating for GPU, UVD, VCE, GFX, DCE, and Graphics Memory Controller (GMC)

- Dynamic refresh rate supported with digital panels that support this feature
- Dynamic refresh rate
- Frame Buffer Compression
- Panel Self-Refresh

3D Acceleration Features

DirectX® 11.1 compliant, including full speed 32-bit floating point per component operations:

Shader Model 5 geometry and pixel support in a unified shader architecture

- Graphics Core Next (GCN) architecture
- Advanced shader instructions, including flexible flow control with CPU-level flexibility on branching
- Read/Write caching system, replacing texture cache with a unified read-write two-level cache
- Vertex, pixel, geometry, compute, domain, and hull shaders
- 32-bit and 64-bit floating point processing per component
- High performance dynamic branching and flow control
- Shader instruction store, using an advanced caching system
- Advanced shader design, with ultra-threading sequencer for high efficiency operations
- Advanced, high performance branching support, including static and dynamic branching
- High dynamic range rendering with floating point blending, texture filtering, and anti-aliasing support
- 16-bit and 32-bit floating point components for high dynamic range computations
- Full anti-aliasing on render surfaces up to and including 128-bit floating point formats

- Support for OpenCL™ 1.2, DirectCompute 11 and Microsoft C++ AMP
- Support for OpenGL 4.1/4.1+

Motion Video Acceleration Features

- Supports DVD, Blu-ray, and SDTV/HDTV content playback with low CPU usage
- Supports stereoscopic 3D Blu-ray
- Video compression engine:
  - Dedicated hardware (VCE 2.0) assisted encoding of HD video streams to H.264 (main profile)
  - Support H.264 SVC temporal scalability
  - Real-time transcoding by encoding the output from UVD with reduction of CPU utilization and power consumption
- Motion video decode acceleration technology:
  - Dedicated hardware (UVD) for H.264, MPEG4, VC-1, MVC, and MPEG2 decode:
    - H.264 implementation based on the ISO/IEC 14496-10 specification

	• MPEG**6** implementation based on the ISO/IEC 14496-2 specification • VC-1 implementation based on the SMPTE 421M specification • MPEG2 implementation based on the ISO 13818-2 specification • Multi View Coding (MVC) for Blu-ray 3D content • WMV-9 implementation ○ Real time high-definition and standard definition stream decode ○ Real time dual high-definition stream decode

• **Supported Display Resolutions and Refresh Rates**
NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

SUPPORTED DVI-D (DIGITAL) AND DISPLAYPORT DISPLAY MODES Resolution	Depth (BPP)	Refresh Rate (Hz)
320x200	8, 16, 32	60
320x240	8, 16, 32	60
400x300	8, 16, 32	60
480x360	8, 16, 32	60
512x384	8, 16, 32	60
640x350	8, 16, 32	60
640x400	8, 16, 32	60
640x480	8, 16, 32	60
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	8, 16, 32	60
1024x768	8, 16, 32	60
1152x864	8, 16, 32	60
1280x720	8, 16, 32	60
0.98M9 (1280x768)	8, 16, 32	60
1280x960	8, 16, 32	60
1280x1024	8, 16, 32	60
1.30MA (1440x900)	8, 16, 32	60, 75
1600x900	8, 16, 32	60
1.64MA (1600x1024)	8, 16, 32	60
1600x1200	8,16, 32	60
1.76MA (1680x1050)	8, 16, 32	60
1.76MA-R (1680x1050)	8, 16, 32	75-R
2.07M9-R (1920x1080)	8, 16, 32	60-R
2.30MA-R (1920x1200)	8, 16, 32	60-R
2560x1440	8, 16, 32	60
2560x1600	8, 16, 32	60
VGA AND DVI-A (ANALOG) DISPLAY MODES		
Resolution	Depth (bpp)	CRT Refresh Rate (Hz)
320x200	8, 16, 32	60, 75, 85
320x240	8, 16, 32	60, 75, 85

Technical Specifications – Graphics

400x300	8, 16, 32	60, 75, 85
480x360	8, 16, 32	60, 75, 85
512x384	8, 16, 32	60, 75, 85
640x350	8, 16, 32	60, 75, 85
640x400	8, 16, 32	60, 75, 85
640x480	8, 16, 32	60, 75, 85
720x480	8, 16, 32	60, 75, 85
720x576	8, 16, 32	50, 60, 75, 85
800x600	8, 16, 32	60, 75, 85
1024x768	8, 16, 32	60, 75, 85
1152x864	8, 16, 32	60, 75, 85
1280x720	8, 16, 32	60, 75, 85
0.98M9 (1280x768)	8, 16, 32	60, 75, 85
1280x960	8, 16, 32	60, 75, 85
1280x1024	8, 16, 32	60, 75, 85
1.30MA (1440x900)	8, 16, 32	60, 75
1600x900	8, 16, 32	60, 75, 85
1.64MA (1600x1024)	8, 16, 32	60, 75, 85
1600x1200	8, 16, 32	60, 75, 85
1.76MA (1680x1050)	8, 16, 32	60, 75
1920x1080	8, 16, 32	60, 75, 85
2.30MA (1920x1200)	8, 16, 32	60, 75, 85
1920x1440	8, 16, 32	60, 75, 85
2048x1536	8, 16, 32	60, 75

AMD Radeon R9 255 2GB PCIe x16		
Memory	2GB 128-bit wide frame buffer operating at 1150MHz.	
Controller Clock Speed	AMD Cape Verde GPU engine operating at 900 MHz.	
Multidisplay Support	Yes (2)	
Graphics /API support	Supports Microsoft DirectX 11.1, OpenGL 4.3 and OpenCL 1.2 APIs. DX 11.1, Shader Model 5, UVD 4.2, VCE 2.0, OpenGL 4.2 (4.1+), OpenCL 1.2, and DirectCompute 11	
Output Connectors	1 x of each Dual-Link DVI-I, DisplayPort 1.2 and HDMI 1.4 output connectors. DisplayPort and HDMI outputs support audio 1 VGA and 1 DisplayPort1.2	
Supported Display Resolutions and Refresh Rates **NOTE**: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP		
SUPPORTED DVI-D (DIGITAL) AND DISPLAYPORT DISPLAY MODES Resolution	Depth (BPP)	Refresh Rate (Hz)
320x200	8, 16, 32	60
320x240	8, 16, 32	60
400x300	8, 16, 32	60

Technical Specifications – Graphics

480x360	8, 16, 32	60
512x384	8, 16, 32	60
640x350	8, 16, 32	60
640x400	8, 16, 32	60
640x480	8, 16, 32	60
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	8, 16, 32	60
1024x768	8, 16, 32	60
1152x864	8, 16, 32	60
1280x720	8, 16, 32	60
0.98M9 (1280x768)	8, 16, 32	60
1280x960	8, 16, 32	60
1280x1024	8, 16, 32	60
1.30MA (1440x900)	8, 16, 32	60, 75
1600x900	8, 16, 32	60
1.64MA (1600x1024)	8, 16, 32	60
1600x1200	8,16, 32	60
1.76MA (1680x1050)	8, 16, 32	60
1.76MA-R (1680x1050)	8, 16, 32	75-R
2.07M9-R (1920x1080)	8, 16, 32	60-R
2.30MA-R (1920x1200)	8, 16, 32	60-R
2560x1440	8, 16, 32	60
2560x1600	8, 16, 32	60
VGA AND DVI-A (ANALOG) DISPLAY MODES		
Resolution	Depth (bpp)	CRT Refresh Rate (Hz)
320x200	8, 16, 32	60, 75, 85
320x240	8, 16, 32	60, 75, 85
400x300	8, 16, 32	60, 75, 85
480x360	8, 16, 32	60, 75, 85
512x384	8, 16, 32	60, 75, 85
640x350	8, 16, 32	60, 75, 85
640x400	8, 16, 32	60, 75, 85
640x480	8, 16, 32	60, 75, 85
720x480	8, 16, 32	60, 75, 85
720x576	8, 16, 32	50, 60, 75, 85
800x600	8, 16, 32	60, 75, 85
1024x768	8, 16, 32	60, 75, 85
1152x864	8, 16, 32	60, 75, 85
1280x720	8, 16, 32	60, 75, 85
0.98M9 (1280x768)	8, 16, 32	60, 75, 85
1280x960	8, 16, 32	60, 75, 85
1280x1024	8, 16, 32	60, 75, 85
1.30MA (1440x900)	8, 16, 32	60, 75
1600x900	8, 16, 32	60, 75, 85

Technical Specifications – Graphics

1.64MA (1600x1024)	8, 16, 32	60, 75, 85
1600x1200	8, 16, 32	60, 75, 85
1.76MA (1680x1050)	8, 16, 32	60, 75
1920x1080	8, 16, 32	60, 75, 85
2.30MA (1920x1200)	8, 16, 32	60, 75, 85
1920x1440	8, 16, 32	60, 75, 85
2048x1536	8, 16, 32	60, 75

AMD Radeon R7 240 2GB PCIe x16	
Memory	2048MB DDR3 128-bit wide frame buffer running at 1800MHz.
Controller Clock Speed	AMD R14D-M2-70 GPU engine running at 730 MHz.
Multidisplay Support	Yes (2)
Graphics /API support	Supports Microsoft DirectX 11.1, OpenGL 4.3 and OpenCL 1.2 APIs. DX 11.1, Shader Model 5, UVD 4.2, VCE 2.0, OpenGL 4.2 (4.1+), OpenCL 1.2, and DirectCompute 11
Output Connectors	1 x of each DVI-I (VGA via dongle output), and HDMI connectors.

Supported Display Resolutions and Refresh Rates

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

Resolution	VGA	DVI-D	HDMI
640x480	85	60	60
720x480	85	60	60
720x576	85	60	60
800x600	85	60	60
1024x768	85	60	60
1280x720	85	60	60
1280x768	85	60	60
1280x1024	85	60	60
1440x900	85	60	60
1600x1024	85	60	60
1600x1200	85	60	60
1680x1050	75	60	60
1920x1080	85	60*	60
1920x1200	85	60*	NA
1920x1440	85	NA	NA
2048x1536	75	NA	NA
2560x1440	NA	NA	NA
2560x1600	NA	NA	NA
* Requires display with support for reduced blanking timing			

NVIDIA NVS 310 Graphics Card

Technical Specifications – Graphics

Introduction	The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets. The NVIDIA® NVS 310 graphics card is an ideal solution for customers requiring a small form factor graphics add-in card for either standard or small form factor PC designs.	
Performance and Features	The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.	
Form Factor	Low Profile: 2.713 × 6.15 in	
Graphics Controller	NVIDIA® NVS 310	
Memory Clock	875MHz	
Memory Size	512 MB DDR3	
Memory Bandwidth	14 GB/s	
Max. Power	19.5W	
Display Max. Resolution	Up to 2560 x 1600 (digital display) per display	
Display Output	Up to 2 displays in the following configurations	
	DisplayPort output:	• Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card • Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort Multi-Stream topology technology.
	DVI-D output:	• Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors

Technical Specifications – Graphics

	HDMI output:	• NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors
	VGA display output:	• Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Supported Display Resolutions and Refresh Rates

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

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

NVIDIA NVS 315 1GB PCIe x 16 Graphics Card	
Introduction	Get efficient dual-display graphics performance in a PCI Express low-profile graphics card with the NVIDIA NVS 315 PCIe x16 1 GB Graphics Card, an ideal desktop graphics solution for professional business and commercial applications.
Performance and Features	The NVIDIA® NVS 315 Graphics Card offers 1 GB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.
Form Factor	Low Profile: 2.713 × 6.15 in
Graphics Controller	NVIDIA® NVS 315
Memory Clock	875MHz
Memory Size	512 MB DDR3
Memory Bandwidth	14 GB/s
Connectors	DMS-59 , with support for dual VGA, dual DVI or dual Display Port with the appropriate adapter cable
Display Max. Resolution	Up to 2048 x 1536 VGA; 1920 x 1200 DVI; 2560 x 1600 DisplayPort
Display Output	Up to 2 displays in the following configurations

	• Dual DVI :
	  ○ Drives two DVI displays using optional HP DMS59 DVI Dual-head Connector Cable DL139A
	• Dual DisplayPort :
	  ○ Drives two DisplayPort using optional HP DMS-59 to Dual DisplayPort kit XP688AA
	• Dual VGA :
	  ○ Drives two analog using the included HP DMS-59 to Dual VGA Cable

Supported Display Resolutions and Refresh Rates **NOTE**: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP	
Resolution	**Maximum Refresh Rates (Hz) by Connection**

Technical Specifications – Graphics

	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60*
2560 x 1600	N/A	60*
		* Display Port Only

AMD Radeon HD 8350 1GB PCIe x16 DH Graphics Card	
Introduction	Get stable 2D and advanced 3D graphics performance from the AMD Radeon HD 8350 1 GB PCIe x16 DH Graphics Card, a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8350 GPU, great for Web conferencing or video and photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8350
Core Clock	GPU engine operates at 523 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	875 MHz
HDCP Support	Yes

Technical Specifications – Graphics

Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x 1536

Supported Display Resolutions and Refresh Rates

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

	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A

AMD Radeon HD 8490 1GB PCIe x16 Graphics Card

Introduction	Get impressive graphics and high resolution dual-display performance in a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8490 Graphics Processor. Improve your everyday PC, Web conferencing, and video or photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8490
Core Clock	GPU engine operates at 875 MHz
Memory	1GB, DDR3, SDRAM

Technical Specifications – Graphics

Memory Clock	900 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600, Analog 2048 x 1536

Supported Display Resolutions and Refresh Rates

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

	Analog Connection	Digital Connection
300 x 200	85	60
320 x 240	85	60
400 x 300	85	60
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 900	85	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60
2560 x 1600	N/A	60

Technical Specifications – Graphics

NVIDIA GeForce GT630 Graphics Card	
Introduction	The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Card Graphics Card provides a full height, PCI Express x16 graphics add-in card solution based on the NVIDIA Kepler Architecture GPU. The card is designed to support three display connections through its DVII, and two DisplayPort connectors. An ideal solution for desktop PC customers seeking enhanced 2D and advanced 3D graphics performance, the NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards are an excellent choice for business users who want run multiple displays from a single graphics board. Engage in Web conferencing or video or photo editing, while improving your everyday business PC experience with better graphics and excellent visual display quality.
Performance and Features	The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards deliver superior PCI Express (PCIe) Gen 3 features including: • Unprecedented flexibility for new applications and enhanced performance • Support for NVIDIA surround technology • Run multiple displays from a single graphics card • Full 16 lane PCIe Generation 3 bus support with peak bandwidth support • Wireless Display ready for future support
Form Factor	PCIe x16 Card
Graphics Controller	NVIDIA Kepler Architecture GPU
Core Clock	875 MHz
Memory Clock	891 MHz
Memory Size	2 GB DDR3 128 bit
Memory Bandwidth	28.5 GB/s
Display Max. Resolution	2560 x 1600 digital, 2048 x 1536 analog
Display Support	Integrated 400 MHz RAMDAC

Supported Display Resolutions and Refresh Rates

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

Resolution	Maximum Refresh Rates (Hz)	
	Analog Connection	Digital Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60

Technical Specifications – Graphics

1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1600	N/A	60

HARD DISK AND SOLID STATE STORAGE

Introduction:

HP Serial Advanced Technology Attachment (SATA) Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

SATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, the SATA interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability. The HP EliteDesk 705 G1 Series Business PC supports the latest SATA 6.0Gb/s specification.

HP Drive Lock

HP Serial ATA Hard Drives offer enhanced security via a new Drive Lock. When enabled, this ATA security feature set prevents software access to user data on the drive until one or two user-defined passwords are provided.

SMART IV Technology

Self-Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), which allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver. AHCI support is typically implemented in RAID configurations.

***NOTE:** For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1) of system disk is reserved for the system recovery software.GB = 1 billion bytes. Actual available capacity is less.

Technical Specifications – Hard Disk and Solid State Storage

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 SFF and TWR form factors. The DM form factors do not support RAID as they do not allow for multiple common storage drives.
- Are complete RAID systems and have both drives installed. If the TWR is configured with three hard disk drives, the third drive is would be un-partitioned and not part of the RAID array
- Have the necessary Option ROM configuration.
-
- Include a preinstalled operating system that is mirrored mode out of the box.

HP 1TB* 10K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive		
Unformatted Capacity	1 TB	
Rotational Speed	10,000 rpm	
Interface	Serial ATA (6.0 Gb/s)	
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s	
Buffer Size	64 MB	
Cache	Adaptive	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	1.2 ms
	Average:	3.6 ms
	Full-Stroke:	9.0 ms
Height (nominal)	0.6 in/1.53 mm	

Technical Specifications – Hard Disk and Solid State Storage

Width (nominal)	Media diameter: 2.5 in/63.6 mm
	Physical size: 2.75 in/69.9 mm
Operating Temperature	41° to 131° F (5° to 55° C)

HP 500 GB* 10K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Unformatted Capacity	500 GB	
Rotational Speed	10,000 rpm	
Interface	Serial ATA (6.0 Gb/s)	
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s	
Buffer Size	64 MB	
Cache	Adaptive	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	1.2 ms
	Average:	3.6 ms
	Full-Stroke:	9.0 ms
Height (nominal)	0.6 in/1.53 mm	
Width (nominal)	Media diameter: 2.5 in/63.6 mm	
	Physical size: 2.75 in/69.9 mm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 320 GB* 7.2K SATA 6.0Gb/s 2.5" Hard Disk Drive	
Capacity	320,072,933,376 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 2.0 (6.0 Gb/s)

Technical Specifications – Hard Disk and Solid State Storage

Buffer Size	16 MB	
Logical Blocks	488,397,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	12 ms
	Full-Stroke:	22 ms
Height (nominal)	0.374 in/9.5 mm	
Width (nominal)	Media diameter: 2.5 in/63.5 mm	
	Physical size: 2.75 in/70 mm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 500 GB* 7200 RPM SATA 2.5" Self-Encrypting (SED) Hard Disk Drive		
Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Drive Type	Self-Encrypting Drive (SED) with SATA interface	
Interface	SATA 6 Gb/s	
Segmented Buffer with write cache	32768 KB - A portion of buffer capacity used for firmware	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	1.0 ms
	Average:	13 ms
	Full-Stroke:	25 ms
Media Diameter	2.5 in/63.5 mm	
Height	0.267 in/6.8 mm, ±0.2mm	
Width	2.75 in/69.85 mm, ±0.25mm	
Length	3.945 in/100.2 mm, ±0.25mm	

Technical Specifications – Hard Disk and Solid State Storage

Weight	3.35 oz/95 g (max)
Operating Temperature	32° to 140° F (0° to 60° C)

HP 500 GB* 7.2K SATA 6.0Gb/s 2.5" Hard Disk Drive		
Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 2.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	12 ms
	Full-Stroke:	25 ms
Height (nominal)	0.374 in/9.5 mm	
Width (nominal)	Media diameter: 2.5 in/63.5 mm	
	Physical size: 2.75 in/70 mm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 1 TB* SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)	
Formatted Capacity	1 TB
Spindle Speed	5,400 rpm +/- 0.2%
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash
Interface	Serial ATA (SATA)
Cache Buffer	64 MB
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB

Technical Specifications – Hard Disk and Solid State Storage

Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.374 +/-.008 in (9.5 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.254 lb/115 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

HP 500 GB* SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)		
Formatted Capacity	500 GB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.268 +/-.008 in (6.8 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.209 lb/95 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

HP 500 GB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:**	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 120 GB* Solid State Drive		
Unformatted Capacity	120 GB	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
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

Technical Specifications – Hard Disk and Solid State Storage

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

* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 36GB (for Windows 8.1) is reserved for system recovery software. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features.

** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 128 GB* Solid State Drive		
Unformatted Capacity	128 GB*	
Architecture	Multi Level Cell (MLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.16 lb (73 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 450 MB/ss
	Sustained Sequential Write:	Up to 260 MB/s
	Random Read (4KB):	up to 46K IOPs
	Random Write (4KB):	up to 56K IOPs

Technical Specifications – Hard Disk and Solid State Storage

Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.5 V; Max 5.5 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 36GB (for Windows 8.1) is reserved for system recovery software. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features.
** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 256 GB* (non-SED) TLC Solid State Drive		
Unformatted Capacity	256 GB*	
Architecture	Triple Level Cell (TLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.1 lb (45 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 510 MB/s
	Sustained Sequential Write:	Up to 280 MB/s
	Random Read (4KB):	up to 90K IOPs
	Random Write (4KB):	up to 70K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.75 V; Max 5.25 V

Technical Specifications – Hard Disk and Solid State Storage

	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	
* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 16GB for Windows 7 and up to 36GB for Windows 8.1 is reserved for system recovery software.** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.		

HP 128 GB* (non-SED) TLC Solid State Drive		
Unformatted Capacity	128 GB*	
Architecture	Triple Level Cell (TLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.1 lb (45 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 510 MB/ss
	Sustained Sequential Write:	Up to 140 MB/s
	Random Read (4KB):	up to 90K IOPs
	Random Write (4KB):	up to 36K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.75 V; Max 5.25 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)

Technical Specifications – Hard Disk and Solid State Storage

Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	
* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 16GB for Windows 7 and up to 36GB for Windows 8.1 is reserved for system recovery software.** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.		

HP 512 GB* (non-SED) TLC Solid State Drive		
Unformatted Capacity	512 GB*	
Architecture	Triple Level Cell (TLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	54 g	
Bandwidth Performance	Sustained Sequential Read:	Up to 510 MB/ss
	Sustained Sequential Write:	Up to 455 MB/s
	Random Read (4KB):	up to 90K IOPs
	Random Write (4KB):	up to 60K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.75 V; Max 5.25 V
	Total power consumption:	250 mW (Active) ; <50 mW; (Idle)

Technical Specifications – Hard Disk and Solid State Storage

Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

HP 128 GB* Turbo Drive SSD (M.2 PCIe card)		
Unformatted Capacity	128 GB*	
Architecture	NAND Flash Memory which has a high reliability and a high technology in a small form factor for using a SSD and supporting PCIe interface up to 4 lanes.	
Form Factor	PCIe SATAe Ultrathin	
Dimensions (Width x Length x Thickness)	.899 x 3.149 x .146 in (22 x 80 x 3.73 mm)	
Weight	0.017 lb (8 g) Max	
Bandwidth Performance - Performance measured using IOMeter 2008 on Windows 8 64bit. Actual performance may vary depending on use conditions and environment.	Sustained Sequential Read (128KB):	Up to 920 MB/ss
	Sustained Sequential Write (128KB):	Up to 430 MB/s
	Random Read (4KB):	up to 8500 IOPs
	Random Write (4KB):	up to 32000 IOPs
Power	Allowable voltage	3.3V ± 5%
	Total power consumption:	5.8 W (Active) ; 80 mW; (Idle)
MTBF	1.5 M hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G

Technical Specifications – Hard Disk and Solid State Storage

Regulations	Safety TUV UL CB c-UL-us	TUV
		UL CB
		c-UL-us
		TUV
	EMC/EMI	CE (EU)
		BSMI (Taiwan)
		KCC (South Korea)
		VCCI (Japan)
		C-Tick (Austrailia)
		FCC (USA)
* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 16GB for Windows 7 and up to 36GB for Windows 8.1 is reserved for system recovery software. ** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.		

HP 128 GB* SATA 2.5" Self-Encrypting (SED) Solid State Drive		
Unformatted Capacity	128 GB	
Architecture	Self-Encrypting (SED) Solid State Drive using NAND Flash and SATA interface	
Interface	SATA 6 Gb/s	
Height	.267 in/6.80 mm	
Width	2.75 in/69.85 mm	
Length	3.94 in/100.2 mm	
Weight	0.121 lb (55 g) max	
Performance	Host Transfer Rate:	600 MB/s
	Sequential Read:	Up to 520 MB/s
	Sequential Write:	Up to 340 MB/s
	* For hard drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 16GB for Windows 7 and up to 36GB for Windows 8.1 is reserved for system recovery software. ** **NOTE**s : 1. Measured at HP 8570p@Win7 x64 2. Performance measured using CrystaldiskMark 3.01c 3. Drive was connected as primary	
Power	System power consumption:	Active* - 0.78A / 3.891W (typical)
		Idle** - 0.005A / 0.026W (typical)
	* Active power is measured during execution of IOMeter 2006 in Windows 7 ** Idle power is measured on DOS Idle status with DIPM on	
System Reliability	MTBF - 1,500,000 Hours	
	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%

Environmental (all conditions, non-condensing)	Shock:	1500G, duration 0.5ms, Half Sine Wave

HP 256 GB* SATA 2.5" Self-Encrypting (SED) Solid State Drive		
Unformatted Capacity	256,186,209,271 bytes	
Architecture	Self-Encrypting (SED) Solid State Drive with 25nm MLC NAND Flash and SATA interface	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
NAND Flash	25nm MLC NAND Flash	
Height	.275 in/7mm	
Width	2.75 in/69.85 mm	
Length	3.95 in/100.5 mm	
Weight	0.161 lb (73 g)	
Bandwidth Performance	Sustained Sequential 128k Read:	Up to 450 MB/s
	Sustained Sequential 128k Write:	Up to 260 MB/s
	Random 4k Read:	Up to 46K IOPs
	Random 4k Write:	Up to 56K IOPs
Latency	Read:	55 µs
	Write:	55 µs
Power	SATA power consumption:	160 mW (active average); <85 mW (idle average)
Useful Drive Life	72TB written, up to 40GB/day for 5 years	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/1 ms

HP 500 GB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Technical Specifications – Hard Disk and Solid State Storage

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 1 TB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Capacity	1,000,204,886,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	1,953,525,168	
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	

Technical Specifications – Hard Disk and Solid State Storage

Operating Temperature	41° to 131° F (5° to 55° C)

HP 2 TB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Unformatted Capacity	2 TB	
Rotational Speed	7,200 rpm	
Interface	SATA 6Gb/s NCQ	
Cache, Multisegmented (MB)	64 MB	
Seek Time (average)	Read	<8.5 ms
	Write	<9.5 ms
Height	1.028 in/26.11 mm	
Width	4.0 in/101.6 mm	
Depth	5.787 in/146.99 mm	
Weight	1.38 lb/626 g	
Operating Temperature	32° to 140° F (0° to 60° C)	

Technical Specifications - Removable Storage

REMOVABLE STORAGE

HP Slim SuperMulti DVD Writer Drive*		
Height	12.7mm height	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard	
Dimensions (W x H x D)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel	
Weight (max)	0.42 lb (190 g)	
Write speeds	DVD-RAM	Up to 5X
	DVD-R DL	Up to 6X
	DVD+R	Up to 8X
	DVD+RW	Up to 8X
	DVD+R DL	Up to 6X
	DVD-R	Up to 8X
	DVD-RW	Up to 6X
	CD-R	Up to 24X
	CD-RW	Up to 24X
Read speeds	DVD-RAM	Up to 5X
	DVD-RW, DVD+RW	Up to 8X
	DVD-R DL, DVD+R DL	Up to 8X
	DVD+R, DVD-R	Up to 8X
	DVD-ROM DL, DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	Random	DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)
	Full Stroke	DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
	Stop Time	6 seconds (typical)
Power	Source	Slimline SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
	Temperature	41° to 122° F (5° to 50° C)

Technical Specifications - Removable Storage

Environmental conditions (operating - non-condensing)	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)

Technical Specifications - Removable Storage

HP Slim Blu-ray BDXL Drive*			
Height	12.7mm height		
Orientation	Either horizontal or vertical		
Interface type	SATA/ATAPI		
Disc recording capacity	Up to 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard SL		
Dimensions (W x H x D)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel		
Weight (max)	Up to 0.37 lb (170 g) without bezel		
		Triple-layer	**Quadruple-layer**
Write speeds	BD-R	Up to 4X	Up to 4X
	BD-RE	Up to 2X	Not supported
		Single-layer	**Double-layer**
	BD-R	Up to 6X	Up to 6X
	BD-RE	Up to 2X	Up to 2X
	DVD-R	Up to 8X	Up to 6X
	DVD-RW	Up to 6X	Not supported
	DVD+R	Up to 8X	Up to 6X
	DVD+RW	Up to 8X	Not supported
	DVD-RAM	Up to 5X	
	CD-R	Up to 24X	
	CD-RW	Up to 24X	
		Triple-layer	**Quadruple-layer**
	BD-R	Up to 4X	Up to 4X
	BD-RE	Up to 4X	Not supported
		Single-layer	**Double-layer**
	BD-ROM	Up to 6X	Up to 6X
	BD-R	Up to 6X	Up to 6X
Read speeds	BD-RE	Up to 6X	Up to 6X
	DVD-ROM	Up to 8X	Up to 8X
	DVD-R	Up to 8X	Up to 8X
	DVD-RW	Up to 8X	
	DVD+R	Up to 8X	Up to 8X
	DVD+RW	Up to 8X	

Technical Specifications - Removable Storage

	BDMV (AACS Compliant Disc)	Up to 6X/2X (Read/Play)	
	DVD-RAM	Up to 5X	
	DVD-Video (CSS Compliant Disc)	Up to 8X/4X (Read/Play)	
	CD-R/RW/ROM	Up to24X	
	CD-DA(DAE)	Up to 20X/10X (Read/Play)	
Access time (typical reads, including settling)	Random	BD-ROM: 205 ms (typical), DVD-ROM: 185 ms (typical), CD-ROM: 165 ms (typical)	
	Full Stroke	BD-ROM: 350 ms (typical), DVD-ROM: 345 ms (typical), CD-ROM: 340 ms (typical)	
Power	Source	Slimline SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p	
	DC Current	5 VDC -1200 mA typical, 2000 mA maximum	
Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)	
	Relative Humidity	10% to 80%	
	Maximum Wet Bulb Temperature	84° F (29° C)	

HP Slim DVD-ROM Drive*		
Height	12.7mm	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Dimensions (W x H x D)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel	
Weight (max)	Up to 0.37 lb (170 g) without bezel	
Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X
	DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	Random	DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)
	Full Stroke	DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
Power	Source	Slimline SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p

Technical Specifications - Removable Storage

	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature (operating)	84° F (29° C)
* Duplication of copyrighted material is strictly prohibited. Actual speeds may vary. Double Layer media compatibility will widely vary with some home DVD players and DVD-ROM drives. Note that DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 Double Sided-Version 1.0 Media.		

MEMORY

System Memory Support

The HP EliteDesk 705 G1 Business PC supports DDR3/DDR3L protocols with two independent, 64-bit wide channels each accessing one or two DIMMs.

- Two channels of non-ECC DDR3/DDR3L unbuffered dual in-line memory modules (UDIMM) or DDR3/DDR3L unbuffered small outline dual in-line memory modules (SO-DIMM) with a maximum of two DIMMs per channel
- Single-channel and dual-channel memory organization modes
- Data burst length of eight for all memory organization modes
- Memory data transfer rates of up to 1600 MT/s; actual supported data transfer rate determined by the configured processor.
- 64-bit wide channels
- DDR3/DDR3L system memory I/O voltage of 1.5V
- Theoretical maximum memory bandwidth of:
  - 21.3 GB/s in dual-channel mode assuming 1333 MT/s
  - 25.6 GB/s in dual-channel mode assuming 1600 MT/s
  - 25.6 GB/s in dual-channel mode assuming 1600 MT/s

Platform Memory Support

- The Small Form Factor (SFF) and Microtower (MT) platforms support up to four (4) industry-standard DDR3-SDRAM DIMMs.
- The Desktop Mini (DM) supports up to two (2) industry-standard DDR3-SDRAM SO-DIMMs.

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.

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.

NETWORKING AND COMMUNICATIONS

Broadcom NetXtreme Gigabit Ethernet Plus (integrated)	
Connector	RJ-45
System Interface	Integrated on PCA
Controller	Broadcom BCM5762 GbE
Memory	24 KB FIFO packet buffer memory Two Queues (Tx & Rx)
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.1as/1588 802.3 802.3ab 802.3az 802.3u
Bus architecture	PCI Express and SMBus
Data transfer mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
Power requirement	Requires 3.3Vdc with integrated regulators Thermal Design Power (TDP) 0.535 Watts
Boot ROM support	Yes
Network transfer mode	Full-duplex
	Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	10BASE-T (half-duplex) 10 Mbps
	10BASE-T (full-duplex) 20 Mbps
	100BASE-TX (half-duplex) 100 Mbps
	100BASE-TX (full-duplex) 200 Mbps
	1000BASE-T (full-duplex) 2000 Mbps

Environmental	Operating Temperature:	0° to 85° C
	Operating Humidity:	60**%** RH
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic, Smart speed operation	
Alerting	ASF 2.0 support; AMT 7.0 support	

Intel® Ethernet I210-T1 Gigabit Network Adapter	
Connector	RJ-45
System Interface	PCI Express x1
Controller	Intel® I210 Gigabit Ethernet Controller
Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3AB 802.3u 802.3x flow control
Bus architecture	PCI-E 2.1
Data path width	X1, 250 MB/s, Bi-directional interface
Data transfer mode	Bus-master DMA
Hardware certifications	FCC, B, CE, TUV-c, TUVus Mark Canada and United States, TUV-GS Mark for European Union
Power requirement	Aux 3.3 V, 3.0 Watts in 1000 base-T and 1.0 Watts in 100 Base-T
Boot ROM support	Yes 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps
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 132° F (0° to 55° C)
	Operating Humidity:	85% at 131° F (55° C)
Management	WOL, PXE, DMI, WFM 2.0	

Intel Dual Band Wireless-N 7260 802.11 a/b/g/n (2x2) Wireless Network Interface Connection

Wireless LAN Standards	IEEE 802.11a/b/g/n	
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS)	
	Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP.	
	NOTE: 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.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Antenna Structure	2 transmit; 2 receive (2x2)	
Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)	
Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM	

Technical Specifications – Networking and Communications

Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
	NOTE: Check latest software/driver release for updates on supported security features.
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between band Access Points
Output Power	• 2.4G: +13.5dBm minimum • 5G: +12dBm minimum
	NOTE: Maximum output power may vary by country according to local regulations.
Power Consumption	Transmit: 2.0 Watts
	Receive: 1.6 Watts
	Idle mode: 250 mW (WLAN associated) In Power Save Polling mode and on battery power.
	Idle mode: 100 mW (WLAN unassociated)
	Radio off: 100 mW (WLAN unassociated)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity **NOTE**: 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).	802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) 802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps)
Antenna Connections	2 U.FL type connectors (output impedance of 50 ± 2 ohms)
Form Factors	PCI-Express Half-MiniCard
Weight	0.0068 lb (3.1 g)

Technical Specifications – Networking and Communications

Dimensions	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)	
Operating Voltage	3.3V +/- 9%	
Temperature	**Operating:** **Non-operating:**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**	10% to 90% (non-condensing) 5% to 90% (non-condensing)
Altitude	**Operating:** **Non-operating:**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON	

HP WLAN 802.11 a/b/g/n 2x2 Dual Band PCIe x1 WLAN/Bluetooth Card		
Wireless LAN Standards	IEEE 802.11a/b/g/n	
Interoperability	Wi-Fi certification	
	BQE certification of the Bluetooth component	
	CCXv1, v2, v3, v4, v5 CCX certified (Cisco Client Extensions)	
	NOTE: 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.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Antenna Structure	2 transmit; 2 receive (2x2) Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications.	
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported.	
Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5 • WAPI	
	NOTE: Check latest software/driver release for updates on supported security features.	
Roaming	IEEE 802.11 compliant roaming between band Access Points	
Output Power	• +13.5 dBm minimum • Maximum output power must be able to achieve modular regulatory certification peak gain of +3dBi at 2.4GHz and +5dBi at 5GHz	

Technical Specifications – Networking and Communications

<table>
<tr><td></td><td>NOTE: Maximum output power may vary by country according to local regulations.</td></tr>
<tr><td rowspan="5">Power Consumption</td><td>Transmit: 2.0 Watts</td></tr>
<tr><td>Receive: 1.6 Watts</td></tr>
<tr><td>Idle mode: 250 mW (WLAN associated)</td></tr>
<tr><td>Idle mode: 100 mW (WLAN unassociated)</td></tr>
<tr><td>Radio off: 75 mW (WLAN unassociated)</td></tr>
<tr><td rowspan="3">Bluetooth Power Consumption</td><td>Peak operating: 330 mW</td></tr>
<tr><td>Receive: 230 mW</td></tr>
<tr><td>USB selective suspend: 17 mW</td></tr>
<tr><td>Power Management</td><td>ACPI and PCI Express bus compliant power management
802.11 compliant power saving mode
Supports USB selective suspend and resume of the Bluetooth component through the USB control signals.</td></tr>
<tr><td>Receiver Sensitivity</td><td>802.11b
<table><tr><th>Sensitivity (dBm)</th><th>Rate (Mbps)</th><th>Modulation and Coding Rate</th></tr><tr><td>-95</td><td>1</td><td>BPSK</td></tr><tr><td>-93</td><td>2</td><td>QPSK</td></tr><tr><td>-91</td><td>5.5</td><td>CCK</td></tr><tr><td>-88</td><td>11</td><td>CCK</td></tr></table></td></tr>
<tr><td></td><td>802.11a/g
<table><tr><th>Sensitivity (dBm)</th><th>Rate (Mbps)</th><th>Modulation and Coding Rate</th></tr><tr><td>-90</td><td>6</td><td>BPSK - ½</td></tr><tr><td>-89</td><td>9</td><td>BPSK – ¾</td></tr><tr><td>-87</td><td>12</td><td>QPSK – ½</td></tr><tr><td>-85</td><td>18</td><td>QPSK – ¾</td></tr><tr><td>-82</td><td>24</td><td>16 QAM – ½</td></tr><tr><td>-79</td><td>36</td><td>16 QAM – ¾</td></tr><tr><td>-76</td><td>48</td><td>64 QAM – 2/3</td></tr><tr><td>-74</td><td>54</td><td>64 QAM – ¾</td></tr></table></td></tr>
<tr><td></td><td>802.11n
<table><tr><th>Sensitivity (dBm)</th><th>Rate (Mbps)</th><th>Modulation and Coding Rate</th></tr><tr><td>-69</td><td>150</td><td>64 QAM – 5/6</td></tr><tr><td>-66</td><td>300</td><td>64 QAM – 5/6</td></tr></table></td></tr>
<tr><td>Form Factors</td><td>PCI-Express Half-MiniCard</td></tr>
<tr><td>Weight</td><td>0.1133 oz (3.212 g)</td></tr>
</table>

Technical Specifications – Networking and Communications

Dimensions	1.04 x 1.17 x 0.042 in (26.65 x 29.85 x 1.067 mm)	
Operating Voltage	3.3V +/- 9%	
Temperature	**Operating:** **Non-operating:**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	**Operating:** **Non-operating:**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)

Technical Specifications - Audio

AUDIO

High Definition Audio	
Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance)
	Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver)
	Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load)
	Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal.
	All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes

Technical Specifications - Input/Output Devices

INPUT/OUTPUT DEVICES

HP USB Keyboard		
Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.12 x 6.47 x 0.96 in (46.03 x 16.43 x 2.44 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	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)

Technical Specifications - Input/Output Devices

	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)	30 in (76.2 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Keyboard		
Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.22 x 6.47 x 1.1 in (46.28 x 16.43 x 2.79 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 10%
	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
	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

Technical Specifications - Input/Output Devices

	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	50-dBA maximum sound pressure level
	Operating temperature	32° to 104° F (0° to 40° C)
	Non-operating temperature	-22° to 149° F (-30° to 65° C)
	Operating humidity	15% to 80% (non-condensing at ambient)
	Non-operating humidity	15% to 90% (non-condensing at ambient)
	Operating shock	N/A
	Non-operating shock	65 inch 2.9 ms, six surface; 30g 266 inch/second; 50g 266 inch/second six surface
	Operating vibration	2-g peak acceleration
	Non-operating vibration	Starting at 5 Hz, vary the frequency of vibration from 5 to 500 Hz and back to 5 Hz at a Logarithmic sweep rate of 1 octave per minute.
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	29.93 in (76 cm) on concrete, 16-drop sequence
Approvals	CUL, ICES-003 Class B, FCC, CE Mark,TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Smart Card (CCID) Keyboard

Technical Specifications - Input/Output Devices

Key Benefits:	• Protects against unauthorized access with smart card technology • Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software • Combination of username and password or pin with a smart card or security token • Secures online transactions using digital signatures and certificates • Conforms to industry standards for ease of setup and use • Delivers long product life and quiet operation with high-impact materials and lubricated keys • Spill drain feature	
Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country
	Form factor	USB basic smart card keyboard
	Colors	Carbonite/Silver
	Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Languages	30+ available
	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys

Technical Specifications - Input/Output Devices

	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	
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	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps

Technical Specifications - Input/Output Devices

		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC
		USA	USAFCC part 15
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF		
Ergonomic Compliance	ISO 9241-4, TUVGS		
Kit Contents	Keyboard, I/O Security and Documentation CD, warranty card		

HP USB PS/2 Washable Keyboard

Physical Characteristics	Keys	104 (US) Layout, 105 (EU) layout – depending upon country
	Dimensions (L x W x H)	17.67x 6.62 x 1.38 in (449 x 168 x 35 mm)
	Weight	1.7 lb (0.77 kg) minimum
Electrical	Operating voltage	+ 5VDC ±5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys

Technical Specifications - Input/Output Devices

	Cable length	7 ft (2.2 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	4° to 149° F (-20° to 65° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (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, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP Wireless Keyboard and Mouse		
Keyboard	Dimensions (H x L x W)	1.09 x 18.1 x 6.47 in (27.87 x 460.3 x 164.3 mm)
	Weight – Without Two AA Alkaline Batteries	1.94 lb (880 g)
Mouse	Dimensions (H x L x W)	1.46 x 4.53 x 2.47 in (37 x 115 x 62.9 mm)
	Weight – Without Two AA Alkaline Batteries	0.15 lb (67 g)
Receiver	Dimensions (H x L x W)	0.33x 1.79 x 0.72 in (8.4 x 45.5 x 18.4 mm)
	Weight	0.21 oz (5.9 g)
	Range	32.8 ft (10 m)
System Requirements	Available USB port for the receiver CD-ROM Drive	
Approvals	Product Safety	UL; CSA /TUV (Europe only); CE Mark; CB Report
	Ergonomics	ANSI; ISO (Europe only); GS Mark (Germany only)
	EMC	FCC; CE; ACA (-tick); BSMI; KC ; VCCI
	CE Mark	EN 55022:2010; EN 55024; EN 301489-1; EN 61000
	Design Guidelines for PCs	PC 99 – connector overmold colors; PC 2001 – full functionality
	Telecom	All local telecom requirements and approvals for intended markets
	USA	FCC Title 47 CFR, Par 15, Subpart C; other local requirements
	Country Support	US, Belgium, Switzerland, Spain, Denmark, Netherlands, France, Germany, Italy, Portugal, Sweden, Norway, Finland, UK, Poland, Czech Republic, Turkey, Greece, Austria, Bulgaria, Cyprus, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, Romania, Slovakia, Slovenia, Vietnam, HK, Australia, NZ, Malaysia, Singapore, Indonesia, Philippines, Thailand, Canada, China, Japan, Korea, Taiwan, India, Venezuela, Ecuador, Russia, Ukraine, Israel, Croatia, United Arab Emirates, Peru, Brazil, Chile, Argentina, Mexico, South Africa, and up to 193 countries worldwide.
Environmental	Keyboard contains 25% post-consumer recycled plastic material.	
Encryption	128bit AES Encryption	

Technical Specifications - Input/Output Devices

HP PS/2 Mouse		
Dimensions (H x L x W)	1.46 x 2.48 x 4.53 in (3.70 x 6.29 x 11.50 cm)	
Weight	3.53 oz (100g; +10g/- 5 g)	
Environmental	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	800 DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	±15%

Technical Specifications - Input/Output Devices

	Switch actuation	65±20 gf
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	80 km
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
Scroll wheel	Width	6 mm
	Diameter	22.5 ± 0.2 mm
	Maximum rotation force	50 gf-cm
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	UL/cUL, FCC, CE Mark, TUV/GS, VCCI, KCC, BSMI, C-Tick	

HP USB Mouse	
Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.7 x 11.5 x 6.3 cm)
Weight	0.22 lb (0.10 kg)
Cable length	70.9 in (180 cm)
System requirements	Available USB port

HP USB 1000dpi Laser Mouse	
Dimensions (H x L x W)	1.47 x 4.53 x 2.47 in (37.3 x 114.97 x 62.86 mm)
Weight	3.360 oz (102g)

Technical Specifications - Input/Output Devices

Cable length	70.9 in (180 cm)	
System requirements	Available USB port	
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)
Mechanical	Resolution	1000dpi
	Tracking Speed	45 cm/sec
	Cable Length	70.9 in (180 cm)

HP USB PS/2 Washable Mouse

Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)	
Weight	4.44 oz (126 g)	
Environmental	Operating temperature	–32° to 104°F (0° to 40° C)
	Non-operating temperature	–4° to 140°F (–20° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	10% to 90% non-condensing
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration

Technical Specifications - Input/Output Devices

	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 or USB
	ESD	CE level 2 8 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	1000 ± 20% DPI
	Tracking speed	14 in/s (35.56 cm/s) maximum
	Acceleration	2 g
	Switch actuation	70 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	8.8 ft total 70 cm+ 2m extension
	Cable length	Mechanically compliant
	Microsoft PC99 - 2001	1000 ± 20% DPI
Scroll wheel	Width	6 mm
	Diameter	1 in (25.4 mm)
	Maximum rotation force	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	3 million operations

Technical Specifications - Input/Output Devices

	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	FCC, CE Mark, ICES-003-B, IP66/NEMA4X	

POWER

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	DM	SFF	MT
Standard Efficiency	90W active PFC 87% efficient	240W active PFC 70% efficient	280W active PFC 70% efficient
80 PLUS Bronze	N/A	N/A	280W active PFC 82/85/82% efficient at 20/50/100% load (115V) 82/85/82% efficient at 20/50/100% load (230V)
80 PLUS Gold	N/A	240W active PFC 87/90/87% efficient at 20/50/100% load (115V) 89/91/90% efficient at 20/50/100% load (230V)	280W active PFC 87/90/87% efficient at 20/50/100% load (115V) 88/91/88% efficient at 20/50/100% load (230V)

Technical Specifications – Power

		240W active PFC	280W active PFC
80 PLUS Platinum	N/A	90/92/89% efficient at 20/50/100% load (115V) 90/93/91% efficient at 20/50/100% load (230V)	90/92/89% efficient at 20/50/100% load (115V) 91/93/90% efficient at 20/50/100% load (230V)
Operating Voltage Range	90 - 264 VAC	90 - 264 VAC	90 - 264 VAC
Rated Voltage Range	100 - 240 VAC	100 - 240 VAC	100 - 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Operating Line Frequency	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
Rated Input Current	N/A	4A	3.6A
Rated Input Current with Energy Efficient* Power Supply	N/A	4A	3.6A
DC Output	+19.5V	N/A	N/A
Current Leakage (NFPA 99: 2102)		Less than 500 microamps of leakage current at 120 Vac with the ground wire disconnected, as required for Non-patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1. Less than 100 microamps of leakage current at 120 Vac with the ground wire intact with normal polarity, as required for Non-patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1.	
Power Supply Fan	N/A	92=>70mm variable speed	80mm variable speed
Power cord length	N/A	6.0 ft. (1.83 m)	6.0 ft. (1.83 m)
External Power Adapter			
Total Cord Length	12 ft 8 in	N/A	N/A

Technical Specifications – Weights & Dimensions

Weights & Dimensions

Weights & Dimensions

(configured with 1 HDD & 1 ODD; DM configured with 1 HDD only)

	DM	SFF	MT
Chassis (W x H x D)	6.9 x 1.3 x 7.0 in 175 x 34 x 177 mm	13.3 x 3.95 x 14.9 in 338 x 100 x 380 mm	14.0 x 6.7 x 13.4 in 355 x 170 x 340 mm
System Volume	62.79 cu in 1.05 L	782.7 cu in 12.8 L	1252 cu in 20.5 L
System Weight*	2.9 lb 1.3 kg	16.7 lb 7.6 kg	14.0 lb 6.35 kg
Max Supported Weight (desktop orientation)	N/A	77.0 lb 35.0 kg	N/A
Tower Stand (H x W x D)	77x 4.6 x 6.3 in 19.5 x 117 x 160 mm Weight: 47g/ .1 lbs.	1.1 x 7.0 x 7.9 in 29 x 178 x 200 mm	N/A
Packaging (H x W x D)	7.8 x 11.4 x 19.7 in 198 x 290 x 500 mm	9.0 x 19.7 x 23.4 in 229 x 500 x 594 mm	11.7 x 20.3 x 18.8 in 299 x 517 x 478 mm
Shipping Weight	9.0 lb. 4.1 kg	17.9 lb 8.1 kg	20.6 lb 9.3 kg
Palletization Profile	8-units per layer 10/12 layer max 80/96 per pallet	4-units per layer 10-layer max. 40-units per pallet	8-units per layer 4-layer max. 32-units per pallet

Technical Specifications – Miscellaneous Features

MANAGEMENT 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.
- 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, boot block recovery mode
    - 9 - system not fetching code
    - 10 - system hang while loading an option ROM
- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- 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 (SFF), and Quick Release Latches for easy Identification

ADDITIONAL FEATURES

	Description
Towerable Orientation	Product can be oriented as either a desktop (horizontal) or a tower (vertical)

Technical Specifications – Miscellaneous Features

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.
	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
Drive Protection System	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.

After-Market Options (availability may vary by region)

Business Monitors	DM	SFF/MT	Part Number
HP ProDisplay P191	X	X	C9E54AA
HP ProDisplay P201	X	X	C9F26AA
HP ProDisplay P221	X	X	C9E49AA
HP ProDisplay P17A	X	X	F4M97AA
HP ProDisplay P19A	X	X	D2W67AA
HP ProDisplay P231	X	X	E4S07AA
HP EliteDisplay E201	X	X	C9V73AA
HP EliteDisplay E221	X	X	C9V76AA
HP EliteDisplay E231	X	X	C9V75AA
HP EliteDisplay E190i	X	X	E4U30AA
HP EliteDisplay E241i	X	X	FOW81AA
HP EliteDisplay E271i	X	X	D7Z72AA
HP EliteDisplay E221c	X	X	D9E49AA
HP EliteDisplay S230tm	X	X	E4S03AA
HP L2206tm	X	X	B0L55AA

Communication Devices	DM	SFF/MT	Part Number
Intel Ethernet I210 – T1 Gbe NIC		X	E0X95AA
Intel 7260 802.11 a/b/g/n PCIe x1 WLAN Card		X	F2P07AA
HP WLAN 802.11 a/g/n 2x2 DualBand PCIe x1 Card		X	J5C51AA

Graphics Solutions	DM	SFF/MT	Part Number
AMD Radeon HD 8350 Graphics (PCIe x16)		X	E1C63AA
AMD Radeon HD 8490 Graphics Card*		X	E1C64AA
Nvidia GeForce GT 630 Graphics Card*			B4J92AA
Nvidia NVS 310 Graphics (PCIe x16)		X	A7U59AA
Nvidia NVS 315 Graphics (PCIe x16)*		X	E1C65AA
HP Dual Output USB Graphics Adapter	X	X	C5U89AA
HP USB Graphics Adapter	X	X	NL571AA
HP DisplayPort Cable Kit	X	X	VN567AA
HP DisplayPort To DVI-D Adapter	X	X	FH973AA
HP DisplayPort to HDMI Adapter	X	X	BP937AA
HP DisplayPort To HDMI 1.4 Adapter	X	X	K2K92AA
HP DisplayPort to VGA Adapter	X	X	AS615AA
HP DMS-59 to Dual DVI Cable		X	DL139A
HP DMS-59 to Dual DisplayPort Adapter		X	XP688AA
HP DVI to DVI Cable		X	DC198A

*Available in October, 2014.

After-Market Options (availability may vary by region)

HP (Bulk) 700mm DisplayPort Cable Kit	X		V8Y77A6

Data Storage Drives and Accessories	**DM**	**SFF/MT**	**Part Number**
HP Desktop Mini 500GB HDD/ I/O	X		K9Q82AA
HP Desktop Mini DVD-Writer ODD	X		K9Q83AA
HP Desktop Mini I/O Module	X		K9Q84AA
HP 500GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X	QK554AA
HP 1TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X	QK555AA
HP 1TB 10K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X	C2T91AA
HP 128GB SATA 3.0Gb/s Solid State Drive	X	X	QV063AA
Intel Pro 1500 180GB SATA SED Opal1 Solid State Drive	X	X	G4M04AA
HP 500GB SATA 3.0Gb/s Solid State Hybrid Drive	X	X	E1C62AA
HP 500GB 10K rpm SATA 3.5" Hard Disk Drive		X	C2T90AA
HP 128GB SED Opal 2 Solid State Drive	X		G1K24AA
HP Slim Removable SATA Hard Drive Enclosure (frame & carrier)		X	C1N41AA
HP Slim Removable SATA Hard Drive Enclosure (carrier only)		X	E3F39AA
128 GB Turbo Drive SSD (PCIe card)		X	J5V07AA

Input Devices	**DM**	**SFF/MT**	**Part Number**
HP USB Keyboard	X	X	QY776AA
HP USB Gray Keyboard	X	X	B6B64AA
HP USB Smart Card (CCID) Keyboard	X	X	BV813AA
HP USB Keyboard and Mouse Kit	X	X	B1T09AA
HP USB Washable Keyboard**	X	X	VF097AA
HP USB PS/2 Washable Mouse**		X	BM866AA
HP USB PS/2 Washable Keyboard and Mouse Kit**		X	BU207AA
HP USB Grey Mouse	X	X	K7W54AA
HP PS/2 Mouse		X	QY775AA
HP PS/2 Keyboard		X	
HP USB Mouse	X	X	QY777AA
HP USB 1000dpi Laser Mouse	X	X	QY778AA
HP Wireless Keyboard and Mouse Combination*, **	X	X	QY449AA
HP USB Antimicrobiall Keyboard and Mouse (China Only)	X	X	K7X25AA

*Keyboard contains 25% post-consumer recycled plastic material

** Low Halogen - External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

System Memory	**DM**	**SFF/MT**	**Part Number**

After-Market Options (availability may vary by region)

HP 4GB DDR3-1600 (PC3-12800) DIMM		X	B4U36AA
HP 8GB DDR3-1600 (PC3-12800) DIMM		X	B4U37AA
HP 4GB DDR3-1600 (PC3-12800) SODIMM	X		B4U39AA
HP 8GB DDR3-1600 (PC3-12800) SODIMM	X		B4U40AA

Multimedia Devices	**DM**	**SFF/MT**	**Part Number**
HP Slim DVD-ROM Drive		X	VP033AA
HP Slim SuperMulti DVD Writer Drive		X	QS209AA
HP Slim BDXL Blu-Ray Writer Drive		X	E0X94AA
HP USB HD 720P v2 Business Webcam	X	X	D8Z08AA
HP Business Headset	X	X	QK550AA
HP USB Business Speakers	X	X	D9J19AA

Removable Media Storage	**DM**	**SFF/MT**	**Part Number**
HP 15-in-1 USB2/3 3.5 Media Card Reader		X	F4N90AA

Security Devices	**DM**	**SFF/MT**	**Part Number**
HP 2014 Solenoid Lock and Hood Sensor (SFF only)		SFF only	J6L43AA
HP 2014 Solenoid Lock and Hood Sensor (MT only)		MT only	J6L42AA
HP SFF Wall Mount/Security Sleeve		SFF only	VN570AA
HP Desktop Mini Security/Dual Vesa Sleeve	X		G1K22AA
HP UltraSlim Cable Lock	X	X	H4D73AA
HP Business PC Security Lock Kit		X	PV606AA

Stands and Accessories	**DM**	**SFF/TWR**	**Part Number**
HP Integrated Work Center – Desktop Mini(IWCdm)	X		G1V61AA
HP Integrated Work Center Stand v3 (SFF)		SFF only	F2P06AA
HP SFF Tower Stand		SFF only	VN569AA
HP DM Chassis Tower Stand	X		G1K23AA
HP 800/600 SFF Bezel Kit		SFF only	E3F27AA
HP Serial Port Adapter (RS-232 compatible)		X	PA716A
HP Parallel Port Kit		X	KD061AA
HP Desktop Mini Rack Mount	X		G1K21AA
HP Desktop 90w Mini Power Supply Kit	X		TBD

LANDesk Software (E-Delivery)

After-Market Options (availability may vary by region)

Contact your HP representative for available options

Summary of changes

Date of change:	Version History:		Description of change:
	From v1 to v2		
May 27, 2014	From v1.9 to v2.0		Multiple edits
June 13, 2014	From v2.0 to v2.1		Multiple edits (Processor, Graphics and Storage)
June 23, 2014	From v2.0 to v2.1		Adding TBD availability to multiple graphics cards and one SSD.
July 10, 2014	From v2.1 to v2.2		Updating the power supply for the desktop Mini to 120w
July 14,2014	From v2.2 to v3	Change	Information on Rear I/O
		Addition	Per Jeff Request added the headings
July 15, 2014	From 3 to 4		Added note to Graphics Solutions in After-Market Options section.
July 29, 2014	From 4 to 5	Upgrade	Change the version so it would match concentra
August 12,2014	From v5 to v6	Change	Change the value for chipset AMD from D4 to AMD A88X FCH.
September 30, 2014	From v6 to v8	Remove	From security "Trusted Platform Module"
		Addition	Added a note for "Graphics/Video API Support" mentioning SUPPORTED DVI-D (DIGITAL) AND DISPLAYPORT DISPLAY MODES Resolution Added under security " Trusted Platform Module,SLB9660TT1.2FW4.40 (TPM) 1.2 (Common Criteria EAL4+ certified)"
October 23, 2014	From v8 to v9	Remove	Remove from processor the mark X from DM on the processors “AMD Quad-Core A10 APU with AMD Radeon™ HD Graphics*” and “AMD Dual-Core A6 APU with AMD Radeon™ HD Graphics*”
November 12, 2014	From v9 to v10	Remove	Several removal of values done by Javier Lazaro in the document
		Addition	Added new sections of hard drives and solid state
December 1, 2014	From v10 to v12	Upgrade	Upgrade top sync with Concentra
January 22, 2015	From v12 to v13	Addition	Added a note about Current Leakage, under POWER
January 28, 2015	From v13 to v14	Addition	HP DisplayPort To HDMI 1.4 Adapter to Storage 1TB 7200 RPM SATA 6G 3.5 8GB SSHD 120GB SATA 2.5 Non-SED SSD (with 3.5” adapter when needed) 180GB SATA 2.5 Non-SED SSD (with 3.5” adapter when needed) HP USB Antimicrobial Keyboard to KEYBOARDS AND POINTING DEVICES HP DisplayPort To HDMI 1.4 Adapter to Graphics Solutions HP USB Antimicrobiall Keyboard and Mouse (China Only) to Input Devices
		Removed	128 GB Turbo Drive SSD (PCIe card) from SFF and MT from Solid State Drives (SSD) & Self-encrypting Solid State Drives (SED)
February 9, 2015	From v14 to v15	Change	Change the based frequency from “AMD Dual-Core A4 PRO”
February 23, 2015	From v15 to v16	Addition	Processor support up to 95W (MT/SFF), 35W (DM) to “At a glance”
		Removed	HP 160 GB Solid State Drive removed
March 24, 2015	From v16 to v17	Changed	Changed the value for interface in the chart “HP 500 GB* 7200 RPM SATA 2.5” Self-Encrypting (SED) Hard Disk Drive”
March 31, 2015	From v17 to v18	Added	Added 5.25” at the beginning of the sentence in #3. Under Small Form Factor.

Summary of changes

April 28, 2015	From v18 to v20	Added	under Solid State Drives (SSD) & Self-encrypting Solid State Drives (SED) added 120GB SATA Opal 1 120GB SATA Opal 2 128GB SATA 2.5 SSD TLC Non-SED (with 3.5" adapter when needed) 256GB SATA 2.5 SSD TLC Non-SED (with 3.5" adapter when needed) 512GB SATA 2.5 SSD Non-SED (with 3.5" adapter when needed) Added chart of HP 256 GB* (non-SED) TLC Solid State Drive, HP 128 GB* (non-SED) TLC Solid State Drive and HP 512 GB* (non-SED) TLC Solid State Drive
May 22, 2015	From v20 to v21	Changed	Change the marks under " **Media Card Reader (optional)"** now 15-in-1 USB2/3.5 Media Card Reader should be for SFF and SD Carder Reader 5-in-1 for MT
July 7, 2015	From v21 to v22	Changed	Changed OS
		Addition	Added new note under Storage
August 10, 2015	From v22 to v23	Changed	Change processor frequency for **AMD Quad-Core A8 APU with AMD Radeon™ HD Graphics***
August 12,2015	From v23 to v24	Added	Added value of 3.8 to " **AMD Quad-Core A8 APU with AMD Radeon™ HD Graphics"**
		Remove	Remove X from DM under **AMD Quad-Core A8 APU with AMD Radeon™ HD Graphics**
October 8, 2015	From v25 to v26	Added	Added note about AMD and NVIDIA graphics cards are not available for Windows 10
December 10, 2015	From v26 to v27	Updated	Power section update
March 28, 2016	From v27 to v28	Added	HP (Bulk) 700mm DisplayPort Cable Kit
May 02, 2016	From v28 to v29	Update	Removed communication device compatibility from DM