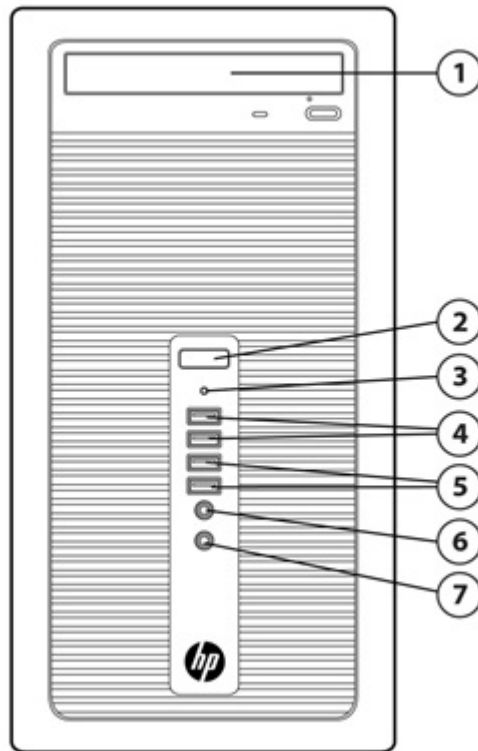


### Overview



1. Drive bay supporting an optical disk drive (optional)
2. Power button
3. PC status LED
4. (2) USB 2.0 ports (black)
5. (2) USB 3.0 ports (blue)
6. 3.5mm microphone jack
7. 3.5mm headphone output

#### Not Shown

5.25" External Drive Half-Height Drive Bay (located behind removable bezel)

3.5" external drive bay; used for installing a Media Card Reader

Slots (1) PCI Express x16 graphics connectors;  
(3) PCI Express x1 accessory connectors  
(1) USB 2.0 header for media card reader  
(1) Parallel port (optional)

Bays (2) 3.5" internal storage drive bays

Rear I/O (4) USB 2.0 ports

### Overview

- (1) VGA video port; (1) DVI-D video port
- (1) RJ-45 network connector
- (1) RS-232 serial port
- (1) RS-232 serial (optional)
- 3.5mm audio in/out jacks
- PS/2 keyboard and mouse ports

### Overview

#### At A Glance

- Expandable, upgradable chassis and system board
- HP developed and engineered UEFI BIOS supporting security, manageability and software image stability
- AMD Radeon HD 8240 Integrated Graphics (w/ AMD E1-2500 APU)
- AMD Radeon HD 8330 Integrated Graphics (w/ AMD A4-5000 APU)
- AMD Radeon HD 8400 Integrated Graphics (w/ AMD A6-5200 APU)
- Realtek RTL8151GH-CG GbE LOM integrated network connection
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Multi-independent monitor support via VGA and DVI-D video interfaces
- Discrete graphics options available for all platforms
- DTS Sound + audio management software
- Standard and high efficiency energy saving power supply options
- ENERGY STAR® qualified models certified EPEAT® Gold

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

### OPERATING SYSTEM

#### Preinstalled When Purchased

Windows 8.1 Pro (64-bit)

Windows 8.1 (64-bit)

Windows 7 Ultimate (32-bit)\*\*

Windows 7 Ultimate (64-bit)\*\*

Windows 7 Professional (32-bit)\*\*

Windows 7 Professional (64-bit)\*\*

Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8.1 Pro)\*\*\*

Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8.1 Pro)\*\*\*

Windows 7 Home Premium (32-bit)\*\*

Windows 7 Home Premium (64-bit)\*\*

Windows 7 Home Basic (32-bit)\*\*

FreeDOS 2.0

Novell SUSE Linux Enterprise Desktop 11

\*Not all features are available in all editions of Windows 8.1. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8.1 functionality. See <http://www.microsoft.com>.

\*\*Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See <http://www.microsoft.com/windows/windows-7/> for details.

\*\*\*This system is preinstalled with Windows 7 Professional 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.

### PROCESSORS

#### AMD Quad-Core A6 APU with AMD Radeon™ HD Graphics

AMD Quad-Core A6-5200 Accelerated Processor with AMD Radeon™ HD 8400 Discrete-Class Graphics (2.0GHz 2MB L2 cache, 25W)

#### AMD Quad-Core A4 APU with AMD Radeon™ HD Graphics

AMD Quad-Core A4-5000 Accelerated Processor with AMD Radeon™ HD 8330 Discrete-Class Graphics (1.5GHz 2MB L2 cache, 15W)

#### AMD Dual-Core E1 APU with AMD Radeon™ HD Graphics

AMD Dual-Core E1-2500 Accelerated Processor with AMD Radeon™ HD 8240 Discrete-Class Graphics (1.4GHz 1MB L2 cache, 15W)

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

### GRAPHICS

#### AMD Radeon HD Graphics (integrated on processor)

- Integrated AMD Radeon HD 8240, 8330 or 8400 Graphics depending on processor

AMD Radeon HD 8350 (1GB) FH PCIe x16

AMD Radeon HD 8350 (1GB) PCIe x16

AMD Radeon HD 8470 (2GB) FH

AMD Radeon HD 8490 (1GB) PCIe x16

NVIDIA GeForce GT630 (2GB) FH PCIe x16

NVIDIA NVS 310 x16 1st (no cbl)

NVIDIA NVS 315 (1GB) PCIe x1

### ADAPTERS AND CABLES

HP DMS-59 to Dual DisplayPort Cable

HP DMS-59 to Dual DVI Cable

HP DMS-59 to Dual VGA Cable

HP DisplayPort to DisplayPort Cable

HP DisplayPort to DVI-D Adapter

HP DisplayPort to HDMI Adapter

HP DisplayPort to VGA Adapter

HP Serial Port Adapter

HP Parallel Port Adapter

HP DisplayPort Cable

### STORAGE

#### SATA Drives

1 TB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5"

2 TB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5"

#### Hybrid Drives

500 GB SATA 6G 2.5 (8GB cache) SSHD Drive

500 GB SATA 6G 2.5 2nd Drive (8 GB cache)  
(with 3.5" adapter)

1 TB SATA 6G 2.5 (8 GB cache) SSHD Drive

1 TB SATA 6G 2.5 2nd Drive (8 GB cache) SSHD Drive  
(with 3.5" adapter)

#### Solid State Drives

128 GB SATA 6G 2.5 SSD  
(with 3.5" adapter)

128 GB SATA 6G 2.5 2nd SSD  
(with 3.5" adapter)

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

#### Self-encrypting Solid State Drive

- 120 GB SATA 2.5" Opal1 (SED) Solid State Drive with caddy
- 180 GB SATA 2.5" Opal1 (SED) Solid State Drive with caddy
- 256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive (with 3.5" adapter)
- 256GB SATA 2.5" 2nd Self-Encrypting (SED) Solid State Drive installed w/caddy

#### Optical Disc Drives

- Blu-ray BDXL Writer
- SuperMulti DVD Writer
- DVD-ROM

#### Media Card Reader

- 15-in-1 USB2/3 Media Card Reader

## MEMORY

Form Factor	Type	Maximum	# of Slots
Microtower	DDR3 non-ECC Up to 1600 MT/s	16 GB	2 UDIMM

**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.

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)

- Realtek RTL8151GH-CG GbE LOM (standard)
- Intel Ethernet I210-T1 PCIe x1 Gb Network Interface Card (optional)

#### Wireless

- Intel® Dual Band Wireless-N 7260 802.11 a/b/g/n PCI Express (optional)<sup>1</sup>
- <sup>1</sup> Intel® Dual Band Wireless-N 7260 planned to be available December, 2013.

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

### AUDIO/MULTIMEDIA

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

### KEYBOARDS AND POINTING DEVICES

#### Keyboard

- HP PS/2 Keyboard
- HP USB Keyboard
- USB Smart Card (CCID) Keyboard
- HP USB and PS/2 Washable Keyboard
- HP Wireless Keyboard and Mouse Combo\*
- \*Keyboard contains 25% post-consumer recycled plastic material

#### Mice

- HP PS/2 Mouse
- HP USB Mouse
- HP USB 1000dpi Laser Mouse
- HP USB and PS/2 Washable Mouse

### HP BIOS

Key features of the HP BIOS include:

- 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, BIOS updates from within Windows, HP Client Manager, and fail-safe recovery if updates are interrupted.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features:

- 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.

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

- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W in S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

### MANAGEABILITY

Fully manageable and supported by industry-standard HP Client Management Solutions. Optional LANDesk management tools simplify mobile device management and security. Simplify everything from deployment or migration to daily management, security, licensing, and more-and stop downtime before it starts.

- Hardware Management: Inventory, Device config and BIOS updates, HW alerting, Driver updates
- Software Management: Deployment, App Management, Patch Management; Deployment and Migration; Proactive HW and SW Management; Mobile Users and Device Management; Remote Assistance / Help Desk
- LANDesk Management Suite 9.5 (LDMS) - optional - contact HP representative for part numbers
- Hardware integration with Microsoft System Center Configuration Manager: Client Integration Kit (CIK), Client Catalog, Client Driver Packs
- HP SoftPaq Download Manager (SDM)
- HP System Software Manager (SSM)
- HP BIOS Configuration Utility (BCU)
- HP Driver Packs
- HP Client Management Interface (HP CMI)

### SECURITY

Trusted Platform Module (TPM) 1.2 (Common Criteria EAL4+ certified)	N/A
SATA port disablement (via BIOS)	X
Drivelock	N/A
RAID configurations	N/A
Serial, parallel, USB enable/disable (via BIOS)	X
Optional USB Port Disable at factory (user configurable via BIOS)	N/A
Removable media write/boot control	X
Power-On password (via BIOS)	N/A
Setup password (via BIOS)	X
HP Chassis (1 bay) Security Kit	X
Solenoid Hood Lock / Sensor	N/A
Support for chassis padlocks and cable lock devices	N/A

### ENVIRONMENTAL & REGULATORY

- ENERGY STAR® qualified models available
- EPEAT® registered where applicable/supported. See [www.epeat.net](http://www.epeat.net) for registration status by country.
- Low halogen (chassis, all internal components and modules)
- TAA compliant



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

### PORTS

#### I/O Ports - Standard

USB 2.0	2 (front); 4 (rear);
USB 3.0	2 (front); 1 (internal)
Serial (RS-232)	1
PS/2	1 keyboard (purple) 1 mouse (green)
Video	1 VGA 1 DVI-D
Audio	Front: headphone/mic Rear: line in/out 3.5mm diameter
RJ-45 Network Interface	

#### I/O Ports - Optional

2nd Serial (RS-232)	1
Parallel	1
PCI Express Mini Card	N/A
MXM Graphics	N/A
mSATA	N/A
PCI Express x1 (v2.0)	3 4.2" full height 6.6" length 10W max. power
PCI Express x16 (v2.0) (wired as a x4)	1 4.2" full height 6.6" length 75W max. power
PCI Express x16 (v3.0)	N/A
Optional PCI (v2.3)	N/A

### BAYS

3.5" external storage drive	1
5.25" ODD	2
Slim ODD	N/A
2.5" internal storage drive	N/A
3.5" internal storage drive	2

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

### SERVICE AND SUPPORT

On-site Warranty <sup>1</sup>: One-year (1-1-1) limited warranty delivers one year of on-site, next business day <sup>2</sup> service for parts and labor and includes free telephone support <sup>3</sup> 24 x 7. One-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](http://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.

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

### Technical Specifications – Operating Systems, Software and eDocumentation

#### OPERATING SYSTEMS

##### Preinstalled

Windows 8.1 Pro (64-bit)\*  
Windows 8.1 (64-bit)\*  
Windows 7 Ultimate (32-bit)\*\*  
Windows 7 Ultimate (64-bit)\*\*  
Windows 7 Professional (32-bit)\*\*  
Windows 7 Professional (64-bit)\*\*  
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8.1 Pro)\*\*\*  
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8.1 Pro)\*\*\*  
Windows 7 Home Premium (32-bit)\*\*  
Windows 7 Home Premium (64-bit)\*\*  
Windows 7 Home Basic (32-bit)\*\*  
FreeDOS 2.0  
Novell SUSE Linux Enterprise Desktop 11

For all Preinstalled operating systems HP provides Microsoft WHQL certified (where applicable) drivers on [www.hp.com](http://www.hp.com) at the time of product announcement.

##### Web Support

Windows 7 Enterprise (32-bit or 64-bit)

For all Supported operating systems HP performs testing of the OS, and makes available all HP value add software (OS dependent). Certified drivers are made available on [www.hp.com](http://www.hp.com) within 30 days of product announcement.

##### Certified

Novell SUSE Linux Enterprise Desktop 111  
Red Hat Enterprise Linux 641

For all Certified operating systems HP will submit hardware to the operating system vendor for testing and certification. All drivers would be obtained from the operating system vendor, not supplied by HP. Certification will be posted by the operating system vendor.

\*Not all features are available in all editions of Windows 8.1. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8.1 functionality. See <http://www.microsoft.com>.

\*\*Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See <http://www.microsoft.com/windows/windows-7/> for details.

\*\*\*This system is preinstalled with Windows® 7 Professional 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.

<sup>1</sup>The following features are not supported by Novell SUSE Linux Enterprise Desktop:

- Intel Gigabit CT Desktop NIC
- Broadcom NetXtreme Gigabit Ethernet Plus
- HP Media Card Reader
- HP Client Security
- HP Blu-ray Writer playback of commercial movies
- HP 2nd serial port adapter
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®

The following features are not supported by Red Hat Enterprise Linux 64:

### Technical Specifications – Operating Systems, Software and eDocumentation

- TPM v1.2 embedded Security Chip
- Intel Gigabit CT Desktop NIC
- HP Wireless 802.11b/g/n NIC
- HP Media Card Reader
- HP Blu-ray Writer
- HP 2nd serial port Adapter
- HP USB Smart Card (CCID) Keyboard
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®

### SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Included	Windows 7	Windows 8.1
<b>Security</b>	HP Client Security: HP Drive Encryption (FIPS 140-2) HP Device Access Manager with Just In Time Authentication HP Password Manager HP File Sanitizer (SSDs and Hybrid Drives not supported) HP Disk Sanitizer External Edition <sup>1</sup> Microsoft Security Essentials	Disk Sanitizer External Edition <sup>1</sup> Microsoft Defender
<b>MultiMedia</b>	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)
<b>Communication</b>		HP Wireless Hotspot
<b>HP Value Add</b>	HP ePrint Driver <sup>2</sup> HP PageLift HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver <sup>2</sup> HP PageLift HP Recovery Manager HP Support Assistant
<b>3rd Party</b>	Adobe Flash Player Box PDF Complete, Corporate Edition Skype	PDF Complete, Corporate Edition Skype
<b>Microsoft Products</b>	Buy Office	Buy Office

<sup>1</sup> Available via download

<sup>2</sup> 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 [www.hp.com/go/eprintcenter](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

### Technical Specifications - Graphics

#### Integrated AMD Radeon HD 8240, 8330 & 8400 Graphics

<b>Memory</b>	Variable and user selectable in BIOS settings
<b>Controller Clock Speed</b>	Variable depending on the installed APU model
<b>Maximum Color Depth</b>	32 bpp (8-8-8-8)
<b>Multidisplay Support</b>	Yes (2)
<b>Graphics /API support</b>	DX 11.1, Shader Model 5, UVD 4.2, VCE 2.0, OpenGL 4.2 (4.1+), OpenCL 1.2, and DirectCompute 11
<b>Output Connectors</b>	1 VGA and 1 DVI-D (with HDCP support)

#### 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 Resolution	VGA Connection	DVI-D Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
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	N/A
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

\* Only supported on displays connected to the external DisplayPort connector.

#### AMD Radeon HD 8470 Graphics Card

<b>Form Factor</b>	Full Height
<b>Graphics Controller</b>	AMD Radeon HD 8470
<b>Core Clock</b>	775MHz
<b>Memory Clock</b>	900MHz
<b>Memory</b>	2GB, DDR3, 64-bit wide
<b>Bus Type</b>	PCIe Gen2
<b>Max. Power</b>	< 30W
<b>Power Source Support</b>	12V and 3.3V
<b>3D API Support</b>	DX11
<b>HDCP Support</b>	Yes
<b>Display Max. Resolution</b>	Digital 2560 x 1600 Analog 2048 x 1536
<b>Supported Graphics APIs</b>	DX11, OpenGL, full 1080p BD (H264) playback in hardware, HDMI 1.4 support

### Technical Specifications - Graphics

#### 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	Refresh Rates
800 x 600	60 Hz
1024 x 768	60 Hz
1280 x 720	60 Hz
1280 x 768	60 Hz
1280 x 1024	60 Hz
1360 x 768	60 Hz
1440 x 900	60 Hz
1600 x 900	60 Hz
1680 x 1050	60 Hz
1920 x 1080	60 Hz

### NVIDIA NVS 310 Graphics Card

#### 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.

### Technical Specifications - Graphics

- 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
- 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	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

### Technical Specifications - Graphics

#### 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	
	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



### Technical Specifications - Graphics

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

### 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 Output

Integrated 400 MHz RAMDAC

### Technical Specifications - Graphics

#### 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
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

### AMD Radeon HD 8350 1GB PCIe x16 DH Graphics Card

<b>Introduction</b>	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.
<b>Form Factor</b>	PCIe x16
<b>Graphics Controller</b>	AMD Radeon HD 8350
<b>Core Clock</b>	GPU engine operates at 523 MHz
<b>Memory</b>	1GB, DDR3, SDRAM
<b>Memory Clock</b>	875 MHz
<b>HDCP Support</b>	Yes
<b>Display Max. Resolution</b>	Digital 1920 x 1200 Analog 2048 x 1536

### Technical Specifications - Graphics

#### 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

<b>Introduction</b>	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.
<b>Form Factor</b>	PCIe x16
<b>Graphics Controller</b>	AMD Radeon HD 8490
<b>Core Clock</b>	GPU engine operates at 875 MHz
<b>Memory</b>	1GB, DDR3, SDRAM
<b>Memory Clock</b>	900 MHz
<b>HDCP Support</b>	Yes
<b>Display Max. Resolution</b>	Digital 2560 x 1600 Analog 2048 x 1536

### Technical Specifications - Graphics

#### 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 - 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 ProDesk 405 G1 Series Business PC supports the latest SATA 6.0Gb/s specification.

#### 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:** GB = 1 billion bytes. Actual available capacity is less.

### Technical Specifications - Hard Disk and Solid State Storage

#### HP 1-TB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)

<b>Formatted Capacity</b>	1 TB
<b>Spindle Speed</b>	5,400 rpm +/- 0.2%
<b>Drive Type</b>	Solid State Hybrid Drive (SSHD) technology with NAND Flash
<b>Interface</b>	Serial ATA (SATA)
<b>Cache Buffer</b>	64 MB
<b>NAND Flash Commercial Multilevel Cell (cMLC)</b>	8 GB
<b>Number of Sectors</b>	976,773,168
<b>Seek Time (typical reads)</b>	Single Track: 2.0 ms Average: 12 ms
<b>Height</b>	0.374 +/- .008 in (9.5 +/- 0.2 mm)
<b>Width</b>	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)
<b>Length</b>	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)
<b>Weight</b>	0.254 lb/115 g (max)
<b>Operating Temperature</b>	32° to 140° F (0° to 60° C)

#### HP 500 GB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)

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

### Technical Specifications - Hard Disk and Solid State Storage

#### HP 128 GB Solid State Drive

<b>Unformatted Capacity</b>	128 GB*
<b>Architecture</b>	Multi Level Cell (MLC) NAND
<b>Interface</b>	SATA 6 GB/sec
<b>Dimensions (W x H x D)</b>	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)
<b>Weight</b>	0.16 lb (73 g)
<b>Bandwidth Performance</b>	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
<b>Latency</b>	Read: 55ms (TYP) Write: 55ms (TYP)
<b>Power</b>	DC power requirement: Min 4.5 V; Max 5.5 V Total power consumption: 160 mW (Active) ; <85 mW; (Idle)
<b>Useful Drive Life</b>	1.2 million device hours**
<b>Environmental</b> (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
<b>Regulations</b>	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. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content

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

#### HP 256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive

<b>Unformatted Capacity</b>	256,186,209,271 bytes
<b>Architecture</b>	Self-Encrypting (SED) Solid State Drive with 25nm MLC NAND Flash and SATA interface
<b>Interface</b>	Serial ATA 2.0 (3.0 Gb/s)
<b>NAND Flash</b>	25nm MLC NAND Flash
<b>Height</b>	.275 in/7mm
<b>Width</b>	2.75 in/69.85 mm
<b>Length</b>	3.95 in/100.5 mm
<b>Weight</b>	0.161 lb (73 g)
<b>Bandwidth Performance</b>	Sustained Sequential 128k Read: Up to 450 MB/ss Sustained Sequential 128k Write: Up to 260 MB/s Random 4k Read: up to 46K IOPs Random 4k Write: up to 56K IOPs
<b>Latency</b>	Read: 55 µs Write: 55 µs
<b>Power</b>	SATA power consumption: 160 mW (active average); <85 mW (idle average)

### Technical Specifications - Hard Disk and Solid State Storage

<b>Useful Drive Life</b>	72TB written, up to 40GB/day for 5 years	
<b>Environmental</b> (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 1-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

<b>Capacity</b>	1,000,204,886,016 bytes	
<b>Rotational Speed</b>	7,200 rpm	
<b>Interface</b>	Serial ATA 3.0 (6.0 Gb/s)	
<b>Buffer Size</b>	32 MB	
<b>Logical Blocks</b>	1,953,525,168	
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
<b>Height</b> (nominal)	1 in/2.54 cm	
<b>Width</b> (nominal)	Media diameter:	3.5 in/8.89 cm
	Physical size:	4 in/10.2 cm
<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	

### HP 2-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

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



### Technical Specifications - Removable Storage

#### HP Blu-ray BDXL Writer Drive

<b>Height</b>	5.25-inch, half-height, tray-load	
<b>Orientation</b>	Either horizontal or vertical	
<b>Interface type</b>	SATA	
<b>Disc capacity</b>	Blu-ray: 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard DVD: 8.5GB DL or 4.7GB standard	
<b>Dimensions</b> W x H x D (max)	5.8 x 1.7 x 7.1 in (14.8 x 4.2 x 18.0 cm) max	
<b>Weight</b> (max)	2.1 lb (950g)	
<b>Performance</b>	<b>CD-ROM Read Access time</b>	Random 140 ms (typical) Full Stroke 230 ms (typical)
	<b>DVD-ROM Read Access time</b>	Random 150 ms (typical) Full Stroke 240 ms (typical)
	<b>BD-ROM Read Access time</b>	Random 250 ms (typical) Full Stroke 350 ms (typical)
	<b>Startup Time</b>	(Time to drive ready from tray loading) BD-ROM (SL/DL) 28S / 28S BD-R (SL/DL/TL/QL) 28S / 28S / 40S / 40S BD-RE (SL/DL/TL) 28S / 28S / 40S DVD-ROM (SL/DL) 18S / 18S DVD-R (SL/DL) 25S / 25S DVD-RW 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S DVD-RAM 35S CD-ROM 15S
	<b>CD Read speeds</b>	CD-ROM up to 40X CD-R up to 40X CD-RW up to 40X
	<b>DVD Read speeds</b>	DVD-RAM up to 5X DVD+/-RW up to 10X DVD+/-R up to 16X DVD+/-R DL up to 8X DVD-ROM up to 16X DVD-ROM DL up to 8X
	<b>Blu-ray Read speeds</b>	BD-ROM (SL/DL) up to 8X BD-R (SL/DL) up to 8X BD-R (TL/QL) up to 6X BD-RE (SL/DL) up to 6X BD-RE TL up to 4X
	<b>CD Write speeds</b>	CD-R up to 40X CD-RW up to 24X

### Technical Specifications - Removable Storage

	<b>DVD Write speeds</b>	DVD+/-R up to 16X DVD+/-R DL up to 8X DVD+RW up to 8X DVD-RW up to 6X DVD-RAM up to 5X
	<b>Blu-ray Write speeds</b>	BD-R (SL/DL) up to 6X BD-R (TL/QL) up to 4X BD-RE (SL/DL/TL) up to 2X
<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirement</b>	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	<b>DC Current</b>	5 VDC -1200 mA typical, 1500 mA maximum 12 VDC -1000 mA typical, 1500 mA maximum
<b>Environmental</b> (all conditions non-condensing)	<b>Temperature (operating)</b>	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b>	10% to 90%
	<b>Maximum Wet Bulb Temperature</b>	86° F (30° C)

### HP SuperMulti DVD Writer Drive

<b>Height</b>	5.25-inch, half-height, tray-load		
<b>Orientation</b>	Either horizontal or vertical		
<b>Interface type</b>	SATA		
<b>Dimensions</b> W x H x D (max)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm) max		
<b>Weight (max)</b>	2.1 lb (950g)		
<b>Performance</b>	CD-ROM Read Access	Random	120 ms typical
		Full Stroke	200 ms typical
	DVD-ROM Read Access	Random	130 ms typical
		Full Stroke	240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
		DVD Media Read Transfer	DVD-ROM SL Read
	DVD-ROM DL Read		Up to 10800 KB/s (8X)
	DVD Video Playback		Up to 10800 KB/s (8X)
DVD Video SL (other than playback)	Up to 21600 KB/s (16X)		

### Technical Specifications - Removable Storage

	DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
	DVD+/-R	Up to 21600 KB/s (16X)
	DVD+/-R DL	Up to 10800 KB/s (8X)
	DVD+/-RW	Up to 10800 KB/s (8X)
	DVD-RAM	Up to 6750 KB/s (5X)
CD Media Write Transfer	CD-R	Up to 6000 KB/s (40X)
	CD-RW	Up to 600 KB/s (4X)
	CD-RW (High speed)	Up to 1500 KB/s (10X)
	CD-RW (Ultra speed)	Up to 3600 KB/s (24X)
DVD Media Write Transfer	DVD+/-R	Up to 21600 KB/s (16X)
	DVD+/-R DL	Up to 10800 KB/s (8X)
	DVD+RW	Up to 10800 KB/s (8X)
	DVD-RW	Up to 8100 KB/s (6X)
	DVD-RAM	Up to 6750 KB/s (5X)

#### Media Compatibility

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

#### Power

<b>Source</b>	SATA DC power receptacle	
<b>DC Power Requirement</b>	5 VDC $\pm$ 5%	100 mV ripple p-p
	12 VDC $\pm$ 5%	200 mV ripple p-p
<b>DC Current</b>	5 VDC	1000 mA (typical) 1600 mA (max.)
	12 VDC	1200 mA (typical) 2000 mA (max.)
	Total Drive Power (Standby Mode)	< 2.5W

#### Rear Panel

SATA Power Connector, 15-pin  
SATA Data Connector, 7-pin  
Markings to identify each connector

#### Environmental (all conditions non-condensing)

<b>Operating Temperature</b>	41° to 122° F (5° to 50° C)
<b>Storage Temperature</b>	-22° F to 140° F (-30° C to 60° C)
<b>Relative Humidity</b>	10% to 90%
<b>Maximum Wet Bulb Temperature</b>	86° F (30° C)

### Technical Specifications - Removable Storage

#### HP DVD-ROM Drive

<b>Height</b>	5.25-inch, half-height, tray-load		
<b>Orientation</b>	Either horizontal or vertical		
<b>Interface type</b>	SATA		
<b>Dimensions</b> W x H x D (max)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm) max		
<b>Weight (max)</b>	2.1 lb (950g)		
<b>Performance</b>	CD-ROM Read Access	Random	120 ms typical
		Full Stroke	200 ms typical
	DVD-ROM Read Access	Random	130 ms typical
		Full Stroke	240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
		DVD Media Read Transfer	DVD-ROM SL Read
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+/-RW	Up to 10800 KB/s (8X)
		DVD-RAM	Up to 6750 KB/s (5X)
<b>Media Compatibility</b>	<b>Media</b>	<b>Read</b>	<b>Write</b>
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+/-R	Yes	No
DVD+/-R DL	Yes	No	

### Technical Specifications - Removable Storage

<b>Power</b>	DVD+/-RW	Yes	No
	<b>Source</b>	SATA DC power receptacle	
	<b>DC Power Requirement</b>	5 VDC $\pm$ 5%	100 mV ripple p-p
		12 VDC $\pm$ 5%	200 mV ripple p-p
	<b>DC Current</b>	5 VDC	1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
Total Drive Power (Standby Mode)		< 2.5W	
<b>Rear Panel</b>	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
<b>Environmental</b> (all conditions non-condensing)	<b>Operating Temperature</b>	41° to 122° F (5° to 50° C)	
	<b>Storage Temperature</b>	-22° F to 140° F (-30° C to 60° C)	
	<b>Relative Humidity</b>	10% to 90%	
	<b>Maximum Wet Bulb Temperature</b>	86° F (30° C)	

### Technical Specifications – Memory

#### Platform Memory Support

- The Microtower platform supports up to two (2) industry-standard DDR3-SDRAM 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.

### Technical Specifications - Networking and Communications

#### Realtek RTL8151GH-CG GbE LOM Network Adapter

<b>Connector</b>	RJ-45
<b>System Interface</b>	Integrated on PCA
<b>Controller</b>	Realtek RTL8151GH-CG Gigabit Ethernet Controller
<b>Memory</b>	16 KB FIFO packet buffer memory
<b>Data rates supported</b>	10/100/1000 Mbps
<b>IEEE Compliance</b>	802.1P 802.1Q 802.3 802.3ab 802.3az 802.3u
<b>Bus architecture</b>	PCI Express
<b>Data transfer mode</b>	PCIe-based interface for active state operation (S0 state)
<b>Power requirement</b>	Requires 3.3V and 1V or just 3.3V with integrated regulators Power consumption 0.425 W
<b>Network transfer mode</b>	Full-duplex Half-duplex (not supported for the 1000BASE-T transceiver)
<b>Network transfer rate</b>	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
<b>Environmental</b>	Operating Temperature: 32° to 158° F (0° to 70° C) Operating Humidity: 60% RH
<b>Management</b>	WOL, auto MDI crossover, PXE, Multi-port teaming, Advanced cable diagnostic

#### Intel® Ethernet I210-T1 Gigabit Network Adapter

<b>Connector</b>	RJ-45
<b>System Interface</b>	PCI Express x1
<b>Controller</b>	Intel® I210 Gigabit Ethernet Controller
<b>Memory</b>	Integrated Dual 48K configurable transmit receive FIFO Buffers
<b>Data rates supported</b>	10/100/1000 Mbps
<b>IEEE Compliance</b>	802.1P 802.1Q 802.2 802.3 802.3AB 802.3u 802.3x flow control
<b>Bus architecture</b>	PCI-E 2.1

### Technical Specifications - Networking and Communications

<b>Data path width</b>	X1, 250 MB/s, Bi-directional interface
<b>Data transfer mode</b>	Bus-master DMA
<b>Hardware certifications</b>	FCC, B, CE, TUV-c, TUVus Mark Canada and United States, TUV-GS Mark for European Union
<b>Power requirement</b>	Aux 3.3 V, 3.0 Watts in 1000 base-T and 1.0 Watts in 100 Base-T
<b>Boot ROM support</b>	Yes
<b>Network Transfer Rate</b>	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)
<b>Environmental</b>	Operating Temperature: 32° to 131°F (0° to 55° C) Operating Humidity: 85% at 131° F (55° C)
<b>Management</b>	WOL, PXE, DMI, WFM 2.0

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

<b>Wireless LAN Standards</b>	IEEE 802.11a/b/g/n
<b>Interoperability</b>	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.
<b>Frequency Band</b>	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
<b>Antenna Structure</b>	2 transmit; 2 receive (2x2)
<b>Data Rates</b>	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)
<b>Modulation</b>	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM
<b>Security</b>	<ul style="list-style-type: none"><li>• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li><li>• AES-CCMP: 128 bit in hardware</li><li>• 802.1x authentication</li><li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li><li>• WPA2 certification</li><li>• IEEE 802.11i</li><li>• Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li><li>• WAPI</li></ul>



### Technical Specifications - Networking and Communications

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**

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)

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).

802.11b:-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)

**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:** 14° to 158° F (-10° to 70° C)  
**Non-operating:** -40° to 176° F (-40° to 80° C)

**Humidity**

**Operating:** 10% to 90% (non-condensing)  
**Non-operating:** 5% to 90% (non-condensing)

**LED Activity**

LED Amber - Radio OFF; LED White - Radio ON

### Technical Specifications - Audio

#### High Definition Audio

<b>Type</b>	Integrated
<b>HD Stereo Codec</b>	Realtek 2-channel ALC221 codec
<b>Audio I/O Ports</b>	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
<b>Internal Speaker Amplifier</b>	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.
<b>Multi-streaming Capable</b>	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.
<b>Sampling</b>	8 kHz - 192 kHz
<b>Wavetable Syntheses</b>	Yes – Uses OS soft wavetable
<b>Analog Audio</b>	Yes
<b># of Channels on Line-Out</b>	Stereo (Left & Right channels)
<b>Internal Speaker</b>	Yes
<b>External Speaker Jack</b>	Yes
<b>Full Duplex</b>	Yes

### Technical Specifications – Keyboards and Pointing Devices

#### HP USB Keyboard

	Keys	104, 105, 106, 107, 109 layout (depending upon country)
<b>Physical characteristics</b>	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)
	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
<b>Electrical</b>	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
<b>Mechanical</b>	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
<b>Environmental</b>	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)	30 in (76.2 cm) on concrete, 16-drop sequence
<b>Approvals</b>	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
<b>Ergonomic compliance</b>	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, KC	

### Technical Specifications – Keyboards and Pointing Devices

<b>Kit contents</b>	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

### HP PS/2 Keyboard

<b>Physical Characteristics</b>	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
	Operating voltage	+ 5VDC $\pm$ 5%
<b>Electrical</b>	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
<b>Mechanical</b>	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	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)
<b>Environmental</b>	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

### Technical Specifications – Keyboards and Pointing Devices

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
<b>Approvals</b>	CUL, ICES-003 Class B, FCC, CE Mark, TUV GS, VCCI, BSMI, C-Tick, KC
<b>Ergonomic compliance</b>	ANSI HFS 100, ISO 9241-4, and TUVGS

### HP USB Smart Card (CCID) Keyboard

- 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

<b>Physical Characteristics</b>	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
	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
<b>Electrical</b>	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
	Languages	30+ available
	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
<b>Mechanical</b>	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)

### Technical Specifications – Keyboards and Pointing Devices

<b>Environmental</b>	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		
	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 STCIII		
	Standard APIs supported	PC/SC, EMV2000, CT-API		
<b>SmartCard Function</b>	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	
		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	
<b>Approvals</b>	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF			
<b>Ergonomic Compliance</b>	ISO 9241-4, TUVGS			
<b>Kit Contents</b>	Keyboard, I/O Security and Documentation CD, warranty card			

### HP USB PS/2 Washable Keyboard

<b>Physical Characteristics</b>	Keys	104 (US) layout or 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	
	Operating voltage	+ 5VDC ±5%	

### Technical Specifications – Keyboards and Pointing Devices

<b>Electrical</b>	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
	Keycaps	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
<b>Mechanical</b>	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft (2.2 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
<b>Environmental</b>	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
<b>Operating system support</b>	Windows® 7, Windows Vista, Windows XP Professional	
<b>Approvals</b>	UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
<b>Ergonomic compliance</b>	ANSI HFS 100, ISO 9241-4, and TUVGS	

### HP Wireless Keyboard and Mouse

<b>Keyboard</b>	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)

### Technical Specifications – Keyboards and Pointing Devices

<b>Mouse</b>	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)
<b>Receiver</b>	Dimensions (H x L x W)	0.33 x 1.79 x 0.72 in (8.4 x 45.5 x 18.4 mm)
	Weight	0.21 oz (5.9 g)
	Cable Length – Minimum	6 ft (1.8 m)
	Range	32.8 ft (10 m)
<b>System Requirements</b>	Windows 7 Home Basic*, Windows 7 Home Premium*, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows 7 Ultimate Edition 32*, Windows 7 Ultimate Edition 64* Windows Vista or Windows XP	
	Available USB port for the receiver CD-ROM Drive	
<p><i>*This system may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See <a href="http://www.microsoft.com/windows/windows-7/">http://www.microsoft.com/windows/windows-7/</a> for details.</i></p>		
<b>Approvals</b>	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
<b>Environmental</b>	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.
	Keyboard contains 25% post-consumer recycled plastic material	

### 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)



### Technical Specifications – Keyboards and Pointing Devices

<b>Weight</b>	3.53 oz (100g; +10g/- 5 g)	
	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
<b>Environmental</b>	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
	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
<b>Electrical</b>	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
	Resolution	800 DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	±15%
	Switch actuation	65±20 gf
<b>Mechanical</b>	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
	Width	6 mm
	Diameter	22.5 ± 0.2 mm
<b>Scroll wheel</b>	Maximum rotation force	50 gf-cm
	Switch type	Light force micro-switch

### Technical Specifications – Keyboards and Pointing Devices

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

<b>Dimensions</b> (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
<b>Weight</b>	0.22 lb (0.10 kg)
<b>Cable length</b>	70.9 in (180 cm)
<b>System requirements</b>	Available USB port

### HP USB 1000dpi Laser Mouse

<b>Dimensions</b> (H x L x W)	1.47 x 4.53 x 2.47 in (37.3 x 114.97 x 62.86 mm)	
<b>Weight</b>	3.360 oz (102g)	
<b>Cable length</b>	70.9 in (180 cm)	
<b>System requirements</b>	Available USB port	
<b>Environmental</b>	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)
<b>Mechanical</b>	Resolution	1000dpi
	Tracking Speed	45 cm/sec
	Cable Length	70.9 in (180 cm)

### Technical Specifications – Keyboards and Pointing Devices

#### HP USB PS/2 Washable Mouse

<b>Dimensions</b> (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)		
<b>Weight</b>	4.44 oz (126 g)		
<b>Environmental</b>	Operating temperature	–32° to 104°F (0° to 40° C)	
	Non-operating temperature	–4° to 140°F (–20° to 60° C)	
	Operating humidity	10% to 90% (non-condensing at ambient)	
	Non-operating humidity	10% to 90% non-condensing	
	Operating shock	40 g, 6 surfaces	
	Non-operating shock	80 g, 6 surfaces	
	Operating vibration	2 g peak acceleration	
	Non-operating vibration	4 g peak acceleration	
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face	
	<b>Electrical</b>	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	
Resolution		1000 ± 20% DPI	
Tracking speed		14 in/s ( 35.56 cm/s) maximum	
Acceleration		2 g	
<b>Mechanical</b>		Switch actuation	70 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)	
	Switch type	Low force micro-switches	
	Cable length	8.8 ft total 70 cm+ 2m extension	
	Microsoft PC99 – 2001	Mechanically compliant	
	Width	6 mm	
	Diameter	1 in (25.4 mm)	
	<b>Scroll wheel</b>	Maximum rotation speed	48 rats/sec
		Switch type	Light force micro-switch
		Switch life	3 million operations
Mechanical life		Minimum 200,000 revolutions	
<b>Regulatory approvals</b>	Compliant	FCC, CE Mark, ICES-003-B, IP66/NEMA4X	

### Technical Specifications – 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

Standard Efficiency	300W active PFC (230 VAC input only)
High Efficiency* 80 PLUS Bronze	300W active PFC  82/85/82% efficient at 20/50/100% load (115V)  82/85/82% efficient at 20/50/100% load (230V)
Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	200 - 240 VAC (300W active PFC) 90 - 240 VAC
Rated Line Frequency	50/60 Hz
Operating Line Frequency Range	47 - 63 Hz
Rated Input Current	4A
Rated Input Current with Energy Efficient* Power Supply	4A
Current Leakage (NFPA 99)	<900uA / 230Vac (300W PSU)
Power Supply Fan	80mm Fan (300W PSU)
Power cord length	6.0 ft. (1.83 m)
External Power Adapter Dimensions	N/A

### Technical Specifications – Power

Total Cord Length

N/A

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

### Technical Specifications – Weights & Dimensions

#### Weights & Dimensions

(configured with 1 HDD & 1 ODD)

<b>Chassis (W x H x D)</b>	182.88 x 357 x 402 mm 7.2 x 14.05 x 15.82 in
<b>System Volume</b>	24.66 L
<b>System Weight*</b>	7.148 kg 15.75 lb
<b>Max Supported Weight (desktop orientation)</b>	N/A
<b>Tower Stand (H x W x D)</b>	N/A
<b>Packaged (H x W x D)</b>	535 x 289 x 500 mm 21.06 x 11.37 x 19.68 in
<b>Shipping Weight*</b>	Est. = ~10.7 kg (packaged) ~23.58 lb
<b>Palletization Profile</b>	4-units per layer 8-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, bootblock 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, and Quick Release Latches for easy Identification

### Technical Specifications – Miscellaneous Features

#### Additional Features

##### Towerable Orientation

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

##### 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.



### Options and Accessories (sold separately)

#### Communication Devices

	Part Number
Intel Ethernet I210 - T1 Gbe NIC	E0X95AA
Intel 6205 802.11 a/b/g/n PCIe x1 NIC	E0X93AA

#### Graphics Solutions

	Part Number
AMD Radeon HD 8350 Graphics (PCIe x16)	E1C63AA
AMD Radeon HD 8490 Graphics Card	E1C64AA
Nvidia NVS 310 Graphics (PCIe x16)	A7U59AA
Nvidia NVS 315 Graphics (PCIe x16)	E1C65AA
HP DisplayPort Cable Kit	VN567AA
HP DisplayPort To Dual Link DVI-D Adapter	NR078AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to HDMI Adapter	BP937AA
HP DisplayPort to VGA Adapter	AS615AA
HP DMS-59 to Dual DVI Cable	DL139A
HP DMS-59 to Dual DisplayPort Adapter	XP688AA

#### Data Storage Drives and Accessories

	Part Number
HP 2TB 7200rpm SATA 6.0Gb/s Hard Disk Drive	
HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive	QK555AA
HP 1-TB 10K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive	C2T91AA
HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive	QK554AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	QV063AA
HP 160-GB SATA 3.0Gb/s Solid State Drive	QV064AA*
HP 500-GB SATA 3.0Gb/s Solid State Hybrid Drive	E1C62AA
HP Slim Removable SATA Hard Drive Enclosure (frame & carrier)	C1N41AA
HP Slim Removable SATA Hard Drive Enclosure (carrier only)	E3F39AA
HP Chassis (1bay) Security Kit	AR639AA

\*Not available in all regions.

### Options and Accessories (sold separately)

#### Input Devices

	<b>Part Number</b>
HP USB Keyboard	QY776AA
HP USB Gray Keyboard	B6B64AA
HP USB Smart Card (CCID) Keyboard	BV813AA
HP USB Keyboard and Mouse Kit	B1T09AA
HP USB Washable Keyboard	VF097AA
HP USB and PS/2 Washable Mouse	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	BU207AA
HP PS/2 Mouse	QY775AA
HP USB Mouse	QY777AA
HP USB 1000dpi Laser Mouse	QY778AA
HP Wireless Keyboard and Mouse Combination	QY449AA

#### System Memory

	<b>Part Number</b>
HP 4GB DDR3-1600 (PC3-12800) DIMM	B4U36AA
HP 8GB DDR3-1600 (PC3-12800) DIMM	B4U37AA

#### Multimedia Devices

	<b>Part Number</b>
HP Slim DVD-ROM Drive	VP033AA
HP Slim SuperMulti DVD Writer Drive	QS209AA
HP USB HD 720P v2 Business Webcam	D8Z08AA
HP Business Headset	QK550AA

#### Removable Media Storage

	<b>Part Number</b>
HP 14-in-1 Media Card Reader (available Dec. 2013)	TBD

#### Security Devices

	<b>Part Number</b>
HP SFF Wall Mount/Security Sleeve	VN570AA
HP UltraSlim Cable Lock	H4D73AA

#### Stands and Accessories

	<b>Part Number</b>
HP Integrated Work Center Stand (SFF)	QP897AA
HP 405 Tower Bezel Kit	E1C66AA
HP Serial Port Adapter (RS-232 compatible)	PA716A
HP Parallel Port Kit	KD061AA
HP PCI Expansion Kit	E1V16AA

### Options and Accessories (sold separately)

#### Business Monitors

	Part Number
HP ProDisplay P191	C9E54AA
HP ProDisplay P201	C9F26AA
HP ProDisplay P221	C9E49AA
HP EliteDisplay E201	C9V73AA
HP EliteDisplay E221	C9V76AA
HP EliteDisplay E231	C9V75AA
HP LA2405x	D0P36AA
HP EliteDisplay E271i	D7Z72AA
HP EliteDisplay E221c	D9E49AA
HP L2206tm	B0L55AA

#### LANDesk Software (E-Delivery)

Contact your HP representative for available options.

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