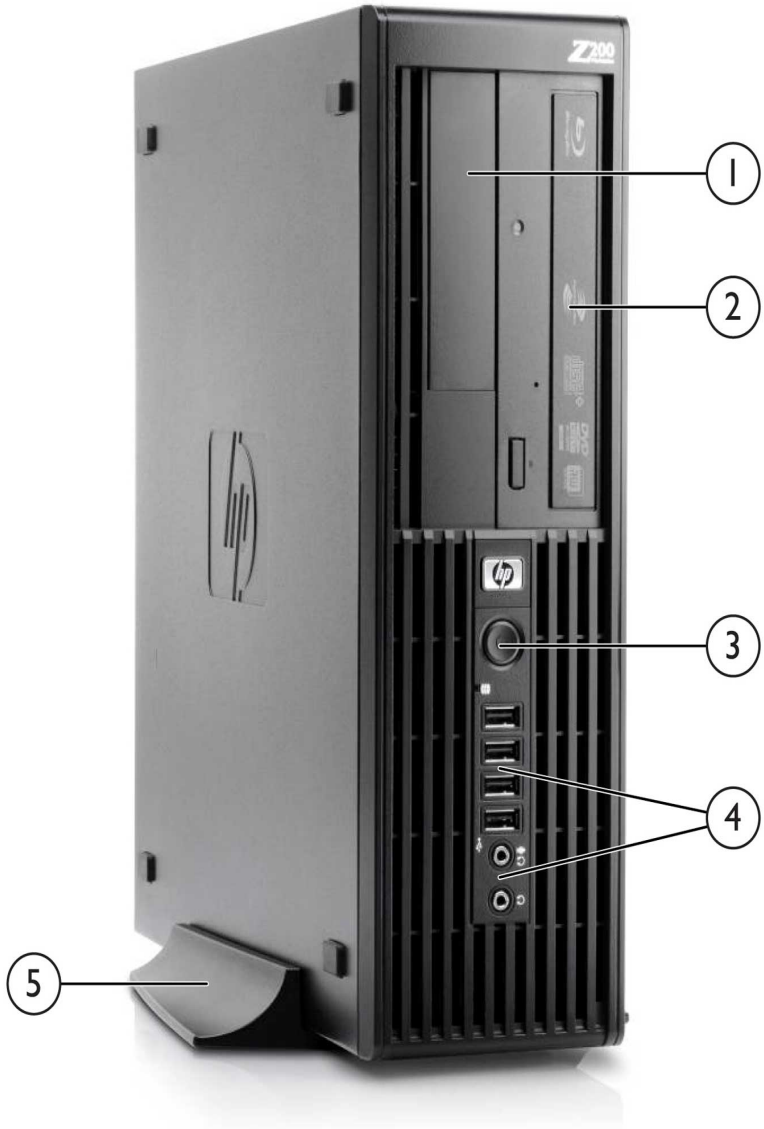
Overview



1. External 3.5" Bay
2. External 5.25" Bay
3. Power button
4. Standard Front I/O: 4 USB 2.0, headphone, microphone
5. Tower stand (optional)

Form Factor	Small Form Factor

Overview

Operating Systems	Genuine Windows® 7 Ultimate 64-bit Genuine Windows® 7 Professional 32-Bit Genuine Windows® 7 Professional 64-Bit **NOTES:** Systems may require upgraded and/or separately purchased hardware and/or DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details. HP Linux Installer Kit for Linux [includes drivers for 32-bit & 64-bit OS versions of Red Hat Enterprise Linux (RHEL) 5 Workstation, Red Hat Enterprise Linux (RHEL) 6 Workstation, 64-bit Novell SUSE Linux Enterprise Desktop (SLED) 11] See http://www.hp.com/workstations/software/linux for details. Novell SLED 11 Linux Preloaded Red Hat Enterprise Linux WS5 (Paper Licence drop-in-the-box only) For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix
Available Processors	Intel® Pentium® processor G6950, 2.80 GHz, 73W, 3 MB cache, 1066 MHz memory, Dual-Core Intel Core processor i3-540, 3.06 GHz, 73W, 4 MB cache, 1333 MHz memory, Dual-Core, HT Intel Core processor i3-550, 3.20 GHz, 73W, 4 MB cache, 1333 MHz memory, Dual-Core, HT Intel Core processor i3-560, 3.33 GHz, 73W, 4 MB cache, 1333 MHz memory, Dual-Core, HT Intel Core processor i5-650, 3.20 GHz, 73W, 4 MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core processor i5-660, 3.33 GHz, 4 MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core processor i5-670, 3.46 GHz, 73W, 4 MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core processor i5-680, 3.60 GHz, 73W, 4 MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core processor i5-760, 2.80 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, Turbo Intel Core processor i7-870, 2.93 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Core processor i7-880, 3.06 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel® Xeon® processor X3430, 2.40 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, Turbo Intel Xeon processor X3440, 2.53 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon processor X3450, 2.66 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon processor X3470, 2.93 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon processor X3480, 3.06 GHz, 95W, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo
Available Processor Disclaimers	Integrated Intel HD graphics is not supported on the Quad-Core Intel Core i5-700 Desktop Processor Series, Intel Core i7-800 Desktop Processor Series or Intel Xeon Processor 3400 Series. Intel's numbering is not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details. 64-bit computing on Intel® 64 architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel 64 architecture. Processor will not operate (including 32-bit operation) without an Intel 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. See: http://www.intel.com/info/em64t for more information. Dual-Core and Quad-Core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; Not all customers or software applications will necessarily benefit from use of these technologies.

Overview

Color	Jack Black	
Convertibility	The Z200 SFF can either be placed flat on the desktop or made to stand on the desk with the optional tower stand.	
Expansion Slots (see system board section for more details)	• 1 PCI Express Gen1 slot x1 mechanical/x1 electrical (Low Profile) • 1 PCI Express Gen2 slot x16 mechanical/ x16 electrical (Low Profile, dedicated for graphics) • 1 PCI Express Gen1 slot x16 mechanical/x4 electrical (Low Profile) • 1 PCI slot (Low Profile)	
Expansion Bays (see storage section for more details)	• 1 internal 3.5" bay, and 1 shared with external 3.5" bay. • 1 external 5.25" bay.	
Front I/O	4 USB 2.0, optional IEEE 1394: 1 Front, 1 Rear (rear via optional card, front port via 22-in-1 MCR with 1394 card), 1 audio out, and 1 microphone/ 2nd headphone.	
Internal I/O	4 USB 2.0 ports available by two separate 9-pin headers	
Rear I/O	1 VGA and 1 DisplayPort output from Intel HD graphics (available on dual-core processors only); 6 USB 2.0, 1 standard and 1 optional serial port, 1 optional parallel port, 2 PS/2, RJ-45 (NIC), 1 audio line in, 1 audio line out; audio ports can be retasked to function as line in, line out, microphone, or headphone	
Interfaces Supported	22-in-1 Media Card Reader (optional)	
Chassis Dimensions (W x D x H)	Standard desktop orientation: 100mm x 338mm x 381mm (HxWxD) (3.95" x13.3" x15.0"); Optional SFF Tower orientation (excluding stand dimension): 338mm x 100mm x 381mm (HxWxD) (13.3" x3.95" x15.0")	
Weight	Exact weights depend upon configuration; System Weight* 7.6 kg (16.72 lbs) Shipping Weight* 8.1 kg (17.86 lbs) Max Supported Weight (desktop orientation) 35 kg (77 lb) *Configured with 1 hard drive, 1 optical drive and one NVIDIA Quadro NVS 295 low profile graphics card.	
Temperature	Operating:	40° to 95°F (5° to 35°C)
	Non-operating	-40° to 140°F (-40° to 60°C)
Humidity	Operating:	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (non-pressurized)	Operating:	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
Power Supply	240 watts wide-ranging, active Power Factor Correction, 89% Efficient The Power Supply Efficiency Report for this product may be found at these links: http://www.80plus.org/manu/psu/psu_reports/HEWLETT%20PACKARD_PC80190_ECOS%201587_240W_Report.pdf; http://www.80plus.org/manu/psu/psu_reports/HEWLETT%20PACKARD_HP-2402E0_ECOS%201586_240W_Report.pdf; http://www.80plus.org/manu/psu/psu_reports/HEWLETT%20PACKARD_PS-4241-9HA_ECOS%201588_240W_Report.pdf	
Backup Devices	For a complete listing of compatible DAT tape drives, LTO tape drives and RDX Removable Disk Backup System offerings, please visit http://www.hp.com/go/connect	

Supported Components

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Dual-Core Intel® "Clarkdale" Processors for Z200				
Intel® Pentium® Processor G6950 2.8 GHz, 3MB cache, 1066 MHz memory, Dual-Core	Y	N		
Intel Core Processor i3-540 3.06 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT	Y	N		
Intel Core Processor i3-550 3.20 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT	Y	N		
Intel Core Processor i3-560 3.33 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT	Y	N		
Intel Core Processor i5-650 3.20 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo	Y	N		
Intel Core Processor i5-660 3.33 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo	Y	N		
Intel Core Processor i5-670 3.46 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo	Y	N		
Intel Core Processor i5-680 3.60 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo	Y	N		
Quad-Core Intel® Core™ i5-700 and Core i7-800 Desktop Processor Series				
Intel Core Processor i5-760 2.80 GHz, 8 MB cache, 1333 MHz memory, Quad-Core, Turbo	Y	N		
Intel Core Processor i7-870 2.93 GHz, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo	Y	N		
Intel Core Processor i7-880 3.06 GHz, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo	Y	N		
Quad-Core Intel® Xeon® Processor 3400 Series with Intel® Nehalem Architecture				
Intel Xeon Processor X3430 2.40 GHz, 8MB cache, 1333 MHz memory, Quad-Core, Turbo	Y	N		
Intel Xeon Processor X3440 2.53 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo	Y	N		
Intel Xeon Processor X3450 2.66 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo	Y	N		
Intel Xeon Processor X3470 2.93 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo	Y	N		
Intel Xeon Processor X3480 3.06 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo	Y	N		

Integrated Intel® HD graphics is supported only on Dual-Core Intel® "Clarkdale" Processors; it is not supported on the Quad-Core Intel Core i5-700 Desktop Processor Series, Intel Core i7-800 Desktop Processor Series or Intel Xeon Processor 3400 Series

Supported Components

Hard Drives

SATA Hard Drives

		Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	SATA (Serial ATA) Hard Drives for HP Workstations				
	160GB SATA 7200 rpm 3Gb/s 3.5" HDD	Y	Y	PV944A	
	250GB SATA 7200 rpm 3Gb/s 3.5" HDD (for HP Z-Workstations)	Y	Y	PY278AA	
	320GB SATA 7200 rpm 3Gb/s 3.5" HDD	Y	Y	FH963AA	
	500GB SATA 7200 rpm 3Gb/s 3.5" HDD	Y	Y	PV943A	
	1000GB (1TB) SATA 7200 rpm 3.0Gb/s 3.5" HDD	Y	Y	GE262AA	
	160GB SATA 10K rpm SFF in 3.5" Frame HDD	Y	Y	EW222AA	
	300GB SATA 10K rpm SFF in 3.5" Frame HDD	Y	Y	FM802AA	
SATA Solid State Drives	**HP Solid State Drives for Workstations**				
	HP 160GB SATA X25-M SSD	Y	Y	WV915AA	

Hard Drive Controllers

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated SATA 3.0 Gb/s Controller				
Integrated SATA 3.0 Gb/s Controller	Y	N		
Factory integrated RAID on motherboard for SATA drives				
RAID 0 Configuration – Striped Array	Y	N		Available May 2010
RAID 1 Configuration – Mirrored Array	Y	N		

RAID 0 availability May 2010.
SATA hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.
All drives must be identical in type and capacity
All RAID arrays must be less than 2 TB
NOTE 1: Requires identical hard drives (speeds, capacity, interface).

Supported Components

Graphics

Integrated Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported Multi Mixed
Integrated Intel HD Graphics Media Accelerator (Z200)					
Intel® HD Graphics (integrated)	Y	Y			1
Professional 2D					
NVIDIA Quadro NVS 295 256MB PCIe Graphics Card	Y	Y	FY943AA		2
NVIDIA NVS 300 512MB PCIe Graphics Card	Y	Y	XP612AA		2
Entry 3D					
NVIDIA Quadro FX 380 LP 512MB PCIe Graphics Card	Y	Y	WL055AA		1
ATI FirePro V3800 512MB PCIe Graphics Card	Y	Y	WL048AA		1
NVIDIA Quadro 600 1GB Graphics Card	Y	Y	WS093AA		1

Memory

CTO	Option Kit Part Number	Support Notes
PC3-10600 DDR3-1333 ECC Unbuffered DIMMs CTO		
2GB (2x1GB) DDR3-1333 ECC Unbuffered RAM 1-CPU		
3GB (3x1GB) DDR3-1333 ECC Unbuffered RAM 1-CPU		
4GB (2x2GB) DDR3-1333 ECC Unbuffered RAM 1-CPU		
8GB (4x2GB) DDR3-1333 ECC Unbuffered RAM 1-CPU		
8GB (2x4GB) DDR3-1333 ECC Unbuffered RAM 1-CPU		
16GB (4x4GB) DDR3-1333 ECC Unbuffered RAM 1-CPU		
PC3-10600 DDR3-1333 nECC Unbuffered DIMMs CTO		
1 GB (1x1GB) DDR3-1333 nECC Unbuffered RAM 1-CPU		
2 GB (2x1GB) DDR3-1333 nECC Unbuffered RAM 1-CPU		
4 GB (2x2GB) DDR3-1333 nECC Unbuffered RAM 1-CPU		
8 GB (4x2GB) DDR3-1333 nECC Unbuffered RAM 1-CPU		

Sub-Section Description/Notes

Two channels of DDR3 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.

The CPUs determine the speed at which the memory is clocked. If a 1066 MHz capable CPU is used in the system, the maximum speed the memory will run at is 1066 MHz regardless of the specified speed of the memory.

AMO		
PC3-10600 DDR3-1333 nECC Unbuffered DIMMs AMO		
HP 1GB DDR3-1333 non-ECC UDIMM	XC497AA	
HP 2GB DDR3-1333 non-ECC UDIMM	XC440AA	

Supported Components

PC3-10600 DDR3-1333 ECC Unbuffered DIMMs AMO	
1GB (1x1GB) DDR3-1333 ECC Unbuffered RAM	FX698AA
2GB (1x2GB) DDR3-1333 ECC Unbuffered RAM	FX699AA
4GB (1x4GB) DDR3-1333 ECC Unbuffered RAM	NL797AA

NOTE: Only unbuffered DDR3 DIMMs are supported.

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Thin USB Powered Speakers	Y	Y	KK912AA	
Integrated Intel/Realtek HD ALC261 Audio	Y	Y		

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 16X DVD-ROM SATA Drive	Y	Y	EW268AA	See note 1
HP 16X DVD+/-RW SuperMulti SATA Drive	Y	Y	EW269AA	
HP 22-in-1 Media Card Reader Kit (Workstations)	Y	Y	NK361AA	
HP Blu-ray Writer	Y	Y	AR482AA	
HP 22-in-1 3.5 JackBlack Media Card Reader with 1394a	Y	Y		

Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.
As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

NOTE 1: Not supported as a 2nd drive option.

Controller Cards

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP FireWire/IEEE 1394a PCI Card	Y	Y		

Supported Components

Monitors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP LP2065 20-inch LCD Monitor	Y	Y	EF227A4	
HP LP2475w 24-inch Widescreen LCD Monitor	Y	Y	KD911A4	
HP DreamColor LP2480zx Professional Display	Y	Y	GV546A4	
HP LP3065 30-inch Widescreen LCD Monitor	Y	Y	EZ320A4	
HP ZR22w 21.5-inch S-IPS LCD Monitor	Y	Y	VM626A4	
HP ZR24w 24-inch S-IPS LCD Monitor	Y	Y	VM633A4	
HP ZR30w 30-inch S-IPS LCD Monitor	Y	Y	VM617A4	

Supported by all Operating Systems available from HP

Screen Size Diagonally Measured

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Broadcom (5761) NetXtreme Gigabit Ethernet Plus NIC	N	Y		This is a PCI Express card based on the Broadcom 5761 chip.
Intel Gigabit CT Desktop NIC	Y	Y		
Integrated Intel 82578DM PCIe LoM Controller	Y	N		

NOTE 1: "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

The Broadcom (5761) NetXtreme Gigabit Ethernet Plus NIC and the Intel Gigabit CT NIC are supported on the following operating systems:
Microsoft Windows XP Pro 32-bit and 64-bit and Microsoft Windows 7 32-bit and 64-bit versions.
Red Hat Enterprise Linux(RHEL), 5 Desktop/Workstation
Novell SLED 10 & 11

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Security Cable with Kensington Lock	N	Y	PC766A	
HP Solenoid Hood Lock & Hood Sensor	Y	Y	GJ116AA	SFF version

Supported Components

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP USB Standard Keyboard	Y	Y	DT528A	
HP PS/2 Standard Keyboard	Y	Y	DT527A	
HP USB Smart Card Keyboard	N	Y	ED707AA	
HP USB CCID SmartCard Keyboard	Y	Y	BV813AA	
HP 2.4GHz Wireless Keyboard & Mouse	N	Y	NB896AA	
HP USB Laser Mouse	Y	Y	GW405AA	
HP USB 2-Button Optical Scroll Mouse	Y	Y	DC172B	
HP PS/2 Optical Scroll Mouse	Y	Y	EY703AA	
HP USB Optical 3-Button Mouse	Y	Y	DY651A	
HP SpaceExplorer 3D USB Controller	N	Y	RY429AA	

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Power Cord Kit	N	Y	DM293A	
HP Workstation Mouse Pad	Y	N		Japan only
HP Serial Port Adapter	N	Y	PA716A	
HP ENERGY STAR 5.0 Enabled Configuration	Y	N		
HP Parallel Port Adapter Kit	N	Y	KD061AA	

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Performance Advisor	Y	N		Supports Windows 7 only. Available as a web download or standard preload with the Windows 7 preinstall.
Roxio Easy Media Creator (DVD/Blu-ray Disc burner software)	Y	N		
Intervideo WinDVD (DVD player/burner software)	Y	N		

Supported Components

HP ProtectTools Security	Y	N	Must select as a Configure to Order option. Delivered as a "drop in the box" CD.
PDF Complete - Trial Edition	Y	N	
HP Client Manager Software v6.2 (optional download)	Y	N	
MS Office Home & Business 2010	Y	N	
HP Support Assistant	Y	N	

Operating Systems	Support Notes
Genuine Windows® 7 Ultimate 64-bit	
Genuine Windows® 7 Professional 32-bit	See: http://www.microsoft.com/windows/windows-7/ for support details.
Genuine Windows® 7 Professional 64-bit	See: http://www.microsoft.com/windows/windows-7/ for support details.
HP Linux Installer Kit	See: http://www.hp.com/workstations/software/linux
Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)	
Novell SLED 11 Linux	Preload

System Technical Specifications

System Board	
System Board Form Factor	BTX 21.2mm x 26.7mm
Processor Socket	Single LGA 1156
CPU Bus Speed	DMI
Chipset	Intel® PCH 3450
Super I/O Controller	SMSC SCH5327, Rev B
Memory Expansion Slots	4 DDR3 memory slots
Memory Type Supported	DDR3, UDIMM (Unbuffered), ECC & nECC
Memory Modes	Channel non-Interleaved
Memory Speed Supported	1333MHz DDR3
Memory Protection	ECC available on data, parity on address and command
Memory	
Maximum Memory	16GB

MEMORY LOADING CONFIGURATIONS

Memory Size (GB)	DIMM1	DIMM2	DIMM3	DIMM4
1	1 GB			
2	1 GB		1 GB	
3	1 GB	1 GB	1 GB	
4	2 GB		2 GB	
8	2 GB	2 GB	2 GB	2 GB
8	4 GB		4 GB	
16	4 GB	4 GB	4 GB	4 GB

Memory Configuration (Supported)	ECC DIMMs are supported, as well as non-ECC 1GBx1 configuration on Z200 SFF.	
PCI Express Connectors	1 PCI Express x16 Gen2 slot (x16 electrical/ mechanical) 1 PCI Express Gen1 slot x16 mechanical/x4 electrical 1 PCI Express Gen1 slot x1 mechanical/x1 electrical **NOTES**: Note: In the PCIe x16 Gen 2 slot, if it is not being used for a graphics card, only cards certified as After Market Options for this platform are supported.	
PCI Connectors (5.0V)	1 PCI	
Supported Drive Interfaces	**SATA**	Integrated (4) Serial ATA interfaces (Three common SATA ports and one that can optionally be used for eSATA). RAID 0 and 1 supported. (Factory integrated RAID is Microsoft Windows only).
Serial Attached SCSI	None	
Integrated RAID	**NOTE:** Requires identical hard drives (speeds, capacity, interface)	

System Technical Specifications

Integrated Graphics	Integrated Intel HD Graphics Media Accelerator UMA (graphics frame buffer). Integrated graphics can support dual display across DP & VGA outputs for relevant processors only. **NOTES**: Unified Memory Architecture (UMA)- A region of system memory is reserved and dedicated to the graphics display. DirectX 9.0 compliant 2D/3D graphics core 1 VGA + 1 DP graphics ports integrated in motherboard.	
Network Controller	Integrated Gbit LAN MAC by Intel PHY Hanksville 82578DM. Management capabilities WOL, PXE 2.1 and AMT 6.0	
External SATA (eSATA)	1 port eSATA capable with optional eSATA After-Market Option cable kit.	
IDE connector	No	
Floppy connector	No	
Network Controller	Management capabilities WOL, PXE 2.1 and ASF 2.0	
Serial	1 rear port	
2nd Serial	Yes- requires optional Serial Port Adaptor	
Parallel	1 internal header (optional parallel port adaptor required)	
HD Integrated Audio	High Definition Integrated Realtek ALC261 Audio with Line in, Line Out, Microphone, Headphone	
CD-ROM input/Audio	No	
AUX INPUT; Audio	No	
IEEE 1394 Connector(s)	**Front**	1 IEEE 1394a (requires optional PCI card to function)
	Rear	No
	Internal	No
USB Connector(s)	**Front**	4 USB 2.0
	Rear	6 USB 2.0
	Internal	4 USB 2.0
Flash ROM	Yes	
CPU Fan Header	Not applicable - passive CPU heatsink	
Chassis Fan Header	No	
Front PCI Fan Header	Yes	
Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium	Yes	
Integrated Trusted Platform Module	Integrated TPM 1.2	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	Yes	
Keyboard/Mouse	USB or PS/2	
Power Supply	240W, 89% efficiency	

System Technical Specifications

Operating Voltage Range	90-264 VAC
Rated Voltage Range	100-240 VAC
Rated Line Frequency	50/60 Hz
Operating Line Frequency Range	47-63 Hz
Rated Input Current	4A
Heat Dissipation	Typical 580 btu/hr (146 kg-cal/hr) Maximum 941 btu/hr (237 kg-cal/ hr)
Power Supply Fan	92x25 mm variable speed
ENERGY STAR® qualified (Config Dependent)	Yes
80 PLUS Compliant	Yes
FEMP Standby Power Compliant	Yes
Power consumption in sleep mode (as defined by ENERGY STAR) - **Suspend to RAM** (S3)	<5W
Built-in Self Test (BIST) LED	No
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes
Hood Lock Header	Yes

Declared Noise Emissions (Entry-level and High-end configurations)		
System Configuration (Entry level)	**Processor Info**	Intel i5-670, 3.46 GHz
	Memory Info	2 x 2GB DDR3 1333 MHz
	Graphics Info	Integrated Graphics
	Disks/Optical/Floppy	1 x 160 GB 7200 RPM SATA / DVD-ROM / No Floppy

System Technical Specifications

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure**
	Idle	3.3 Bels	18.9 dB
	SATA Hard drive Operating (random reads)	3.3 Bels	19.2 dB
	Floppy Drive Operating (continuous copy)	N/A	N/A
	DVD-ROM Operating (sequential reads)	4.8 Bels	35.3 dB

System Configuration (High-end)	**Processor Info**	Intel Xeon Processor X3470 Lynnfield 2.93 GHz
	Memory Info	4 x 2GB DDR3 1333 MHz
	Graphics Info	NVIDIA Quadro FX 380LP
	Disks/Optical/Floppy	2 x 500 GB 7200 SATA / DVD-ROM / No Floppy

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure**
	Idle	3.5 Bels	20.4 dB
	Hard drive Operating (random reads)	3.6 Bels	21.7 dB
	Floppy Drive Operating (continuous copy)	N/A	N/A
	DVD-ROM Operating (sequential reads)	5.0 Bels	36.9 dB

System Configuration		
Example Configuration #1	**Processor Info**	Intel Core i3-530 Processor 2.93GHz
	Memory Info	2x 2GB DDR3 1333 (UDIMM)
	Graphics Info	NVIDIA Quadro NVS295
	Disks/Optical/Floppy	1x160GB SATA / 1 Optical
	PSU	240W 89% Efficient

Energy Consumption	**115 VAC**		**230 VAC**		**100 VAC**	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	41.02 W		42.63 W		41.63 W	
Windows Busy Typ (S0)	92.25 W		91.20 W		92.18 W	
Windows Busy Max (S0)	111.34 W		110.49 W		112.17 W	
Sleep (S3)	2.89 W	2.82 W	3.22 W	3.14 W	2.86 W	2.79W
Off (S5)	0.84 W	0.76 W	1.12 W	1.04 W	0.82 W	0.73 W
Zero Power Mode (EuP)	0.66 W		0.85 W		0.65W	

System Technical Specifications

Heat Dissipation**	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	139.96 btu/hr		145.46 btu/hr		142.05 btu/hr	
Windows Busy Typ (S0)	314.77 btu/hr		311.18 btu/hr		314.53 btu/hr	
Windows Busy Max (S0)	379.90 btu/hr		377.00 btu/hr		382.73 btu/hr	
Sleep (S3)	9.86 btu/hr	9.62 btu/hr	10.99 btu/hr	10.71btu/hr	9.76 btu/hr	9.52 btu/hr
Off (S5)	2.87 btu/hr	2.59 btu/hr	3.82 btu/hr	3.55 btu/hr	2.80 btu/hr	2.49 btu/hr
Zero Power Mode (EuP)	2.25 btu/hr		2.90 btu/hr		2.22 btu/hr	

System Configuration		
Example Configuration #2	**Processor Info**	1x Intel Xeon X3460 2.8GHz
	Memory Info	4x 2GB DDR3 1333MHz (UDIMM)
	Graphics Info	1x FX380 LP
	Disks/Optical/Floppy	1x 160GB SATA / 1 Optical
	PSU	240W 89% Efficient

Energy Consumption	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	39.03 W		40.19 W		39.60 W	
Windows Busy Typ (S0)	172.32 W		170.05 W		174.66 W	
Windows Busy Max (S0)	217.59 W		212.36 W		220.49 W	
Sleep (S3)	3.35 W	3.26 W	3.96 W	3.62 W	3.32 W	3.25 W
Off (S5)	0.84 W	0.75 W	1.12 W	1.04 W	0.82 W	0.73 W
Zero Power Mode (EuP)	0.66 W		0.85 W		0.65W	

Heat Dissipation**	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	133.17 btu/hr		137.13 btu/hr		135.12 btu/hr	
Windows Busy Typ (S0)	587.97 btu/hr		580.23 btu/hr		595.96 btu/hr	
Windows Busy Max (S0)	742.44 btu/hr		724.59 btu/hr		752.33 btu/hr	
Sleep (S3)	11.4 btu/hr	11.1 btu/hr	13.5 btu/hr	12.3 btu/hr	11.3 btu/hr	11.1 btu/hr
Off (S5)	2.87 btu/hr	2.56 btu/hr	3.82 btu/hr	3.55 btu/hr	2.80 btu/hr	2.49 btu/hr
Zero Power Mode (EuP)	2.25 btu/hr		2.90 btu/hr		2.22 btu/hr	

System Technical Specifications

System Configuration		
Example Configuration #3 (ENERGY STAR Qualified)	**Processor Info**	1x Intel Xeon X3470 2.93GHz
	Memory Info	4x 4GB DDR3 1333MHz (UDIMM)
	Graphics Info	2x NVS295
	Disks/Optical/Floppy	2x1000GB SATA / 1 Optical
	PSU	240W 89% Efficient

Energy Consumption	**115 VAC**		**230 VAC**		**100 VAC**	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
On-Idle (ENERGY STAR® Idle (S0))	62.40 W		62.05 W		62.42 W	
ENERGY STAR® "Sleep" (S3)	3.84 W	-	4.05 W	-	3.84 W	-
ENERGY STAR® "Standby" (Off) (S5)	0.87 W	-	1.03 W	-	0.86 W	-

Heat Dissipation**	**115 VAC**		**230 VAC**		**100 VAC**	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
On-Idle (ENERGY STAR® Idle (S0))	212.92 btu/hr		211.72 btu/hr		212.98 btu/hr	
ENERGY STAR® "Sleep" (S3)	13.1 btu/hr	-	13.8 btu/hr	-	13.1 btu/hr	-
ENERGY STAR® "Standby" (Off) (S5)	2.97 btu/hr	-	3.51 btu/hr	-	2.93 btu/hr	-

NOTES:

* Energy Star low energy mode

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

This product is in compliance with US executive order 13221.

System Technical Specifications

Environmental Requirements	**Temperature**	Operating: 40° to 95° F (5° to 35° C) Non-operating: -40° to 140° F (-40° to 60° C)
	Humidity	Operating: 8% to 85% RH, non-condensing Non-operating: 8% to 90% RH, non-condensing
	Maximum Altitude	Operating: 10,000 feet (3,000 m) Non-operating: 30,000 feet (9,100 m)
	Dynamic (new)	Shock Operating: ½-sine: 40g, 2-3ms Non-operating: ½-sine: 160 cm/s, 2-3ms (~100g) square: 422 cm/s, 20g Vibration Operating random: 0.5g (rms), 5-300 Hz Non-operating random: 2.0g (rms), 10-500 Hz **NOTES:** Values represent individual shock events and do not indicate repetitive shock events.Values do not indicate continuous vibration.
	Cooling	Above 5,000 ft (1524 m) altitude, maximum operating temperature is de-rated by 1.8° F (1° C) per 1,000 ft (305 m) elevation increase

Physical Security and Serviceability	
Access Panel	Tool-less Includes system board and memory information
Expansion Cards	Tool-less
Processor Socket	Tool-less, except for the processor heatsink.
Green User Touch Points	Yes, on tool-free internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Screw-In
Dual Color Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Restore CD/DVD Set	Restores the computer to its original factory shipping image - Can be obtained via HP Support
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	Yes (optional): Locks side cover and secures chassis from theft 0.22-in diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system

System Technical Specifications

Universal Chassis Clamp Lock Support	Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable Threaded feature at rear of system
Solenoid Lock and Hood Sensor	Yes (optional) The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed
Rear Port Control Cover	Yes, locks rear IO cables to prevent cable theft
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
Setup Password	Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	Yes
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power supply diagnostic LED	No
Power Button	Yes, ACPI multi-function
Power LED	Yes, blue (normal), red (fault)
Hard drive activity LED	Yes, green
Internal speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection
Power Supply Fans	92 mm x 92 mm x 25 mm 4-wire PWM (non-serviceable)
CPU Heatsink Fan(s)	Not applicable- CPU heatsink is passive.
Chassis Fans	92 mm x 92mm x 25 mm 4-wire PWM
Memory Fans	No
HP Vision Diagnostics Offline Edition	**HP Vision Diagnostics Offline Edition** The diagnostics utility must be booted from USB or CD, and enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to: • Run diagnostics • View the hardware configuration of the system Key features and benefits: HP Vision Diagnostics simplifies the process of effectively identifying,

	diagnosing, and isolating the hardware issues. In addition to robust management tools, service tools can be invaluable in quickly resolving system problems. To streamline the service process and resolve problems quickly, it is necessary to have the right information available at the time that a service call is placed. The primary information requirement, which is also the one that provides the greatest insight into potential system issues, is the configuration of the system. Vision Diagnostics helps provide higher system availability. Typical uses of the Insight Diagnostics are: • Testing and diagnosing apparent hardware failures • Documenting system configurations for upgrade planning, standardization, inventory tracking,disaster recovery, and maintenance • Sending configuration information to another location for more in-depth analysis
Access Panel Key Lock	No
ACPI-Ready Hardware	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
Trusted Platform Module Chip with optional ProtectTools Software	Yes
Integrated Chassis Handles	No
Power Supply	Tool-less
PCI Card Retention	Yes, rear (all), middle (none), front (none)
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder for easy Replacement	Yes
DIMM Connectors for easy Upgrade	Yes
HP ProtectTools Security Manager	Yes - Not supported on Microsoft XP x64 or Linux

BIOS	
BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal v0.4
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.

System Technical Specifications

WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	Saves BIOS settings to USB flash device in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 2.6, for system management information.
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: • NORMAL - normal temperature ranges. • ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
ASF 2.0 Compliant	Allows workstation status to be monitored on a remote console.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS) so that management SW applications can use and report this information.
System board revision level	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.

System Technical Specifications

Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
Intel® Active Management Technology (AMT)	Allows workstation status to be monitored on a remote console
Industry Standard Specification Support	
Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 1.0
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	• Enhanced Disk Drive Specification Version 1.1 • BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0
PMM	POST Memory Manager Specification, Version 1.01
SATA	• Serial ATA Specification, Revision 1.0a • Serial ATA 3 Gb/s: Extensions to Serial ATA 1.5 Gb/s, Revision 1.0
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Computing Group TPM Specification Version 1.2
USB	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.6

Social and Environmental Responsibility

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • ENERGY STAR® (energy-saving features available on selected configurations -Windows only) • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration

	• Japan PC Green label* • EPEAT Gold® for all ENERGY STAR® configurations. For more details and a list of countries in which this product is registered, please visit the following link: http://www.epeat.net/ProductDisplay.aspx?return=search&action=view&search=true&productid=4611&ProductType=5&epeatcountryid=1 *This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'
Recycled Content and Design for Recycling	The Corrugated Carton packaging material is made from 100% recycled content. The EPE - Expanded Polyethylene packaging material is made from 100% recycled content The Polyethylene low density foam packaging material is made from 100% recycled content. Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
Batteries	Battery size: CR2032 (coin cell) Battery type: Lithium Metal. This product complies with ISO standards: • EU Directive 91/ 157/ EEC • EU Directive 93/ 86/ EEC • EU Directive 98/ 101/ EEC Batteries used in the product do not contain: • Mercury greater than 5ppm by weight • Cadmium greater than 10ppm by weight • Lead greater than 4000ppm by weight.
Restricted Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at: http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • Asbestos • Batteries – Mercury • Batteries – Cadmium • Batteries – Lead (non-rechargeable) • Batteries – Non-rechargeable Alkaline and Carbon-Zinc Batteries • Batteries – Classification as "Not Restricted" for Transport • Brominated Flame Retardants (PBBs, PBDEs, including DecaBDE) • Brominated Flame Retardants (all BFRs in external case plastic parts) • Cadmium and its compounds • Certain Azo Colorants • Chlorinated Hydrocarbons • Chlorinated Paraffins • Formaldehyde • Formaldehyde – emissions • Hexavalent Chromium and its compounds in metallic applications • Hexavalent Chromium and its compounds in non-metallic applications • Lead and its compounds • Lead in paint

	• Lead in Polyvinyl Chloride (PVC) coating of external cables, wires and cords • Mercury and its compounds • Nickel on external surfaces • Ozone Depleting Substances (ODS) • Polycyclic Aromatic Hydrocarbons (PAH) • Perfluorooctane sulfonates (PFOS) in parts • Perfluorooctane sulfonates (PFOS) in preparations • Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs) • Polychlorinated Naphthalenes • Polyvinyl Chloride (PVC) in external case plastic parts • Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)
Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
Packaging Materials	
External	Corrugated 2550 g The corrugated packaging material is made from 37% recycled content.
Internal	Polyethylene high density 160 g. The Polyethylene high density packaging material is made from 100% recycled content.
End-of-Life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. [link to new HP white paper now in progress] Global Citizenship Report: http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications: http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report: http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications: http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html
Service, Support and Warranty	On-site Warranty and Service (Note 1): One and three-years, limited warranty and service offering delivers on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering **NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply. **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, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries. HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/lookuptool. Additional HP Care Pack Services information by product is available at: http://www.hp.com/hps/carepack. Service levels and response times for HP Care Packs may vary depending on your geographic location.
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC. • Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043. • This product contains 0% recycled materials (by weight) • This product is >90% recycle-able when properly disposed of at end of life.

Manageability	
HP Client Management Solutions	Visit: http://www.hp.com/go/easydeploy
Product Change Notification	• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition. • Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.
Support Software CD & WWW	Yes
HP Client Manager	Visit: http://www.hp.com/go/easydeploy
System Software Manager	Visit: http://www.hp.com/go/ssm

Stable & Consistent Offerings

As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section. HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers-no special programs, no additional cost-no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.

Processors	**Product #**	**Offering**
	WG013AV	Intel Core i5-650 3.2 4MB/1333 DC CPU
	WG015AV	Intel Core i5-670 3.46 4MB/1333 DC CPU
	WG019AV	Intel Xeon X3450 2.66 8MB/1333 QC CPU
Hard Drives	**Product #**	**Offering**
	WF996AV	HP 250GB SATA 7200 1st HDD
	WG002AV	HP 250GB SATA 7200 2nd HDD
	WF998AV	HP 500GB SATA 7200 1st HDD
	WG004AV	HP 500GB SATA 7200 2nd HDD
Graphics	**Product #**	**Offering**
	WF977AV	NVIDIA Quadro NVS 295 256MB Graphics
	WF978AV	NVIDIA Quadro NVS 295 256MB Graphics (2nd)
Memory	**Product #**	**Offering**
	WG029AV	HP 2GB (2x1GB) DDR3-1333 ECC RAM
	WG033AV	HP 4GB (2x2GB) DDR3-1333 ECC RAM
	WG037AV	HP 8GB (4x2GB) DDR3-1333 ECC RAM
Optical and Removable Storage	**Product #**	**Offering**
	WG007AV	HP 16X DVD+-RW SuperMulti SATA Drive
Input Devices	**Product #**	**Offering**
	VG956AV	HP USB Standard Keyboard
	VB274AV	HP USB Optical Scroll Mouse
Operating Systems	**Product #**	**Offering**
	WF962AV	MS Windows 7 Professional 64-bit OS

Technical Specifications - Processors

Processors	Intel® Pentium® Processor G6950 2.8 GHz, 3MB cache, 1066 MHz memory, Dual-Core Intel Core Processor i3-540 3.06 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT Intel Core Processor i3-550 3.20 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT Intel Core Processor i3-560 3.33 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT Intel Core Processor i5-650 3.20 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core Processor i5-660 3.33 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core Processor i5-670 3.46 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core Processor i5-680 3.60 GHz, 4MB cache, 1333 MHz memory, Dual-Core, HT, Turbo Intel Core Processor i5-760 2.80 GHz, 8 MB cache, 1333 MHz memory, Quad-Core, Turbo Intel Core Processor i7-870 2.93 GHz, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Core Processor i7-880 3.06 GHz, 8 MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon Processor X3430 2.40 GHz, 8MB cache, 1333 MHz memory, Quad-Core, Turbo Intel Xeon Processor X3440 2.53 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon Processor X3450 2.66 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon Processor X3470 2.93 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo Intel Xeon Processor X3480 3.06 GHz, 8MB cache, 1333 MHz memory, Quad-Core, HT, Turbo

Technical Specifications - Hard Drives

SATA (Serial ATA) Hard Drives for HP Workstations	**300GB SATA 10K rpm SFF in 3.5" Frame HDD**	**Capacity**	300,069,052,416 bytes	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	4.0 in; 10.17 cm
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300MB/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7 ms (maximum)
			Average	4.4 ms
			Full Stroke	9.5 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	586,072,368	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160GB SATA 10K rpm SFF in 3.5" Frame HDD	**Capacity**	160,041,885,696 bytes	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7 ms (maximum)
			Average	4.4 ms
			Full Stroke	9.5 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	1000GB (1TB) SATA 7200 rpm 3.0Gb/s 3.5" HDD	**Capacity**	1,000,204,886,016 bytes	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	

Technical Specifications - Hard Drives

	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Buffer	32 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	1,953,525,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
500GB SATA 7200 rpm 3Gb/s 3.5" HDD	**Capacity**	500,107,862,016 bytes	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
320GB SATA 7200 rpm 3Gb/s 3.5" HDD	**Capacity**	320,072,933,376 bytes	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4.0 in; 10.17 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	12 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	

Technical Specifications - Hard Drives

	Logical Blocks	625,142,448	
	Operating Temperature	41° to 131° F (5° to 55° C)	
250GB SATA 7200 rpm 3Gb/s 3.5" HDD	**Capacity**	250,059,350,016 bytes	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4.0 in; 10.17 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
160GB SATA 7200 rpm 3Gb/s 3.5" HDD	**Capacity**	160,041,885,696 bytes	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.2 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

HP Solid State Drives for Workstations	**HP 160GB SATA X25-M SSD**	**Capacity**	160,041,885,696 bytes	
		Height	0.28 in; 0.7 cm	
		Width	**Media Diameter**	NaN in; N/A cm
			Physical Size	2.5 in; 6.36 cm
		Interface	SATA	
		Synchronous Transfer Rate (Maximum)	3Gb/s	
		Seek Time (typical reads, includes controller overhead, including settling)	**Average**	Read: 75 microseconds; Write: 85 microseconds
		Logical Blocks	312,581,808	
		Operating Temperature	32° to 158° F (0° to 70° C)	

Technical Specifications - Graphics

Integrated Intel HD Graphics Media Accelerator (Z200)	**Form Factor**	Integrated
	Graphics Controller	Intel Integrated Graphics Media Accelerator HD
	Bus Type	PCI Express x16
	Memory	Graphics memory is shared with system memory. Graphics memory usage varies depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content. For Vista, use of PAVP heavy mode preallocates an additional 96MB. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.
	Connectors	Z200; 1 Single Link DVI-I, 1 DP Z200 SFF; 1 VGA, 1 DP Graphics adapters are orderable as an accessory as necessary.
	Maximum Resolution	DVI-I: 1920 x 1200 Display Port: 2560 x 1600
	RAMDAC	Integrated, 350 MHz
	Display Output	Z200: Integrated dual independent monitor support facilitated via one DVI port and one DisplayPort integrated on the back plane of the system board and presented as part of the rear I/O set of interfaces. Second DVI supported via optional DisplayPort to DVI-D adapter. VGA support via optional DVI to VGA adapter or DisplyPort to VGA adapter. Z200 SFF: Integrated dual independent monitor support facilitated via one VGA port and one DisplayPort integrated on the back plane of the system board and presented as part of the rear I/O set of interfaces. Second VGA supported via optional DisplayPort to VGA adapter. DVI support via optional DisplayPort to DVI adapter. Intel HD graphics can provide audio to displays supporting audio over DisplayPort or HDMI (via DisplayPort to HDMI adapter)
	Supported Graphics APIs	Microsoft DirectX 10, OpenGL 2.1

Technical Specifications - Graphics

NVIDIA Quadro NVS 295 256MB Graphics Card	**Form Factor**	2.731 inches (H) × 6.600 inches (L), Half-Height
	Graphics Controller	NVIDIA Quadro NVS 295 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort Comes with 2 DisplayPort to DVI-D Adapters ('DisplayPort to VGA' and 'DisplayPort to DL DVI' adapters available as an accessory)
	Maximum Resolution	Two DisplayPort outputs drive two digital displays up to 2560 x 1600 **NOTE:** This card supports up to two displays
	Display Output	• Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking • Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking (through DisplayPort to DVI-D (single link) cable)
	Supported Graphics APIs	OpenGL 3.0 DirectX 10.0
	Available Graphics Drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 (64-bit and 32-bit) * WS4 not supported on Z200 & Z200 SFF Red Hat Enterprise Linux(RHEL) 5 Desktop/Workstation (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation (64-bit and 32-bit) SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com

Technical Specifications - Graphics

NVIDIA NVS 300 512MB Graphics Card	**Form Factor**	2.7 inches (H) x 5.7 inches (L), Half-Height
	Graphics Controller	NVIDIA NVS 300 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	512 MB GDDR3 SDRAM unified graphics memory
	Connectors	DMS-59 Includes DMS-59 to Dual DVI-I adapter DMS-59 to Dual DisplayPort adapter and DMS-59 to Dual VGA adapter available as an option DMS-59 to Dual DisplayPort adapter required for HP ZR30w Display
	Maximum Resolution	DVI: two digital displays up to 1920 x 1200 DisplayPort: two digital displays up to 2560 x 1600 VGA: two analog displays up to 1920 x 1080
	Image Quality Features	
	Display Output	This card support up to two displays: • Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking • Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking (through optional DMS-59 to DisplayPort adapter) • Drives VGA enabled analog displays at resolutions up to 1920 x 1080 (through optional DMS-59 to VGA adapter)
	Supported Graphics APIs	OGL 3.3 DirectX 10.1
	Available Graphics Drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) 5 Desktop/Workstation Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com

Technical Specifications - Graphics

NVIDIA Quadro FX 380 256MB Graphics Card	**Form Factor**	4.376 inches (H) × 6.60 inches (L)
	Graphics Controller	NVIDIA Quadro FX 380 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual-Link DVI-I Two DVI to VGA adapters included
	Maximum Resolution	Two dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz or two analog displays at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	RAMDAC	Dual Internal 400 MHz DAC
	Shading architecture	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) • Long fragment programs (unlimited instructions) • Long vertex programs (unlimited instructions) • Looping and subroutines (up to 256 loops per vertex program) • Dynamic flow control • Conditional execution
	Supported graphics APIs	OpenGL 3.0 DirectX 10.0
	Available graphics drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 (64-bit and 32-bit) * WS4 not supported on Z200 & Z200 SFF Red Hat Enterprise Linux(RHEL) 5 Desktop/Workstation Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Power Consumption	34 Watts

Technical Specifications - Graphics

ATI FirePro V3800 512MB Graphics Card	**Form Factor**	2.71 in (H) x 6.61 in (L) "Single-Wide"
	Graphics Controller	ATI FirePro V3800 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	512 MB DDR3 SDRAM
	Connectors	1 DL DVI, 1 DP output One DP to DVI adapter included
	Maximum Resolution	Up to two digital displays at resolutions up to 2560 x 1600 @ 60Hz or two analog displays, one at resolutions up to 2048 x 1536 @ 85Hz, the other at up to 1920 x 1200 @ 60Hz (165 MHz dot clock) **NOTES:** This card supports up to two displays Use of more than two displays on Linux requires support for xrandr 1.2 or greater in the X server
	RAMDAC	400 MHz DAC, 10-bits per channel
	Image Quality Features	• Full 30-bit display pipeline for more accurate color reproduction superior image quality (30-bit monitor required for full 30-bit display) • Advanced video capabilities, including high fidelity gamma, color correction and scaling • Dedicated hardware (UVD2) for H.264, VC-1, and MPEG2 decode
	Shading architecture	• Support for Full Shader Model 5.0 • 400 Stream Processing Units • Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders • Common instruction set and texture unit access supported for all types of shaders • Dedicated branch execution units and texture address processors • Anti-aliases Shaders and Textures as well as Polygon Edges
	Supported graphics APIs	DirectX 11, OpenGL 3.2, OpenCL 1.0 and full implementation of DirectCompute 11 (OpenCL™ compliant driver and SDK release scheduled in 2010)
	Available graphics drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) WS4 * WS4 not supported on Z200 & Z200 SFF Red Hat Enterprise Linux(RHEL) 5 Desktop/Workstation Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Power Consumption	43 Watts

Technical Specifications - Graphics

NVIDIA Quadro 600 1GB Graphics Card	**Form Factor**	2.731" H x 6.6" L Single Slot Small Form Factor
	Graphics Controller	NVIDIA Quadro 600 Graphics Card
	Bus Type	PCI Express 2.0 x16
	Memory	1 GB GDDR3 128-bit
	Connectors	1 DVI-I output, 1DisplayPort output One DP to DVI adapter included with card DVI to VGA, DisplayPort to VGA and DisplayPort to DVI adapters available as accessories
	Maximum Resolution	DisplayPort (up to 2560 x 1600 @ 60Hz and 1920x1200 @ 120Hz) Dual-link DVI-I output (up to 2560 x 1600 @ 60Hz and 1920x1200 @ 120Hz)
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.0 DirectX 11 CUDA API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
	Available Graphics Drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) WS4 (64-bit and 32-bit) * WS4 not supported on Z200 and Z200 SFF Red Hat Enterprise Linux (RHEL) 5 Desktop/Workstation (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Power Consumption	40 Watts

Technical Specifications - Multimedia and Audio Devices

HP Thin USB Powered Speakers	**Frequency Response** (-3dB, 24-bit/96kHz input)	FO to 20kHz
	Dimensions (H x W x D)	Speakers: 14.52 x 9.50 x 2.45 cm (5.72 x 3.74 x 0.96 in) per speaker

Integrated Intel/Realtek HD ALC261 Audio	**Minimum System Requirements**	Integrated

Technical Specifications - Optical and Removable Storage

HP DVD-ROM Drive	**Description**		5.25-inch, half-height, tray-load
	Mounting Orientation		Either horizontal or vertical
	Interface Type		SATA/ATAPI
	Dimensions (WxHxD)		15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	**DVD-ROM Single Layer**	< 140 ms (typical)
		CD-ROM Mode 1	< 125 ms (typical)
		Full Stroke DVD	< 250 ms (seek)
		Full Stroke CD	< 210 ms (seek)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	5° to 50° C (41° to 122° F)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	30° C (86° F)
		Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux (RHEL) WS4**, 5, 6 Desktop/Workstation Removed reference to "Novell" because of acquisition and changed product reference to "SUSE Linux Enterprise Desktop 10 & 11", No driver is required for this device. Native support is provided by the operating system. * Certain Windows Vista product features require advanced or additional hardware. See http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx and http://www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. Windows Vista Business disk also included for future upgrade if desired. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

Technical Specifications - Optical and Removable Storage

** RHEL WS4 not supported on Z200/Z200SFF

HP DVD+/-RW Drive	**Description**	5.25-inch, half-height, tray-load		
	Mounting Orientation	Either horizontal or vertical		
	Interface Type	SATA/ATAPI		
	Dimensions (WxHxD)	15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)		
	Disc Formats	DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW		
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard	
		Full Stroke DVD	< 250 ms (seek)	
		Full Stroke CD	< 210 ms (seek)	
	Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 40X CD-RW Up to 32X	
		DVD ROM Read	DVD-RAM	Up to 12X
			DVD+RW	Up to 8X
			DVD-RW	Up to 8X
			DVD+R DL	Up to 8X
			DVD-R DL	Up to 8X
			DVD-ROM	Up to 16X
			DVD-ROM DL	Up to 8X
			DVD+R	Up to 16X
			DVD-R	Up to 16X
	Power	**Source**	SATA DC power receptacle	
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p	
		DC Current	5 VDC -<1000 mA typical, <1600 mA maximum 12 VDC -<600 mA typical, <1400 mA maximum	
	Operating Environmental (all conditions non-condensing)	**Temperature**	5° to 50° C (41° to 122° F)	
		Relative Humidity	10% to 90%	
		Maximum Wet Bulb Temperature	30° C (86° F)	
		Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux (RHEL) WS4**, 5, 6	

		Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11 No driver is required for this device. Native support is provided by the operating system. *Certain Windows Vista product features require advanced or additional hardware. See http://microsoft.com/windowsvista/getready/hardwarereqs.mspx and http://www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. Windows Vista Business disk also included for future upgrade if desired. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements ** RHEL WS4 not supported on Z200/Z200SFF
	Kit Contents	HP SATA SuperMulti DVD Writer Drive, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide, and DVD+R media.

HP 22-in-1 Media Card Reader	**Description**	The Media Card Reader device uses the same physical form factor and mounting as a Floppy Disk Drive. The device connects to a 2x5 two-channel USB header on the motherboard of the system. There is no USB controller card provided. Please see the Disc Formats section below for a list of flash memory card formats that are supported.
	Mounting Orientation	The Media Card Reader can be mounted in a dedicated Floppy Drive bay (if the chassis provides one) or in an appropriate Optical Bay adapter. It will operate in any orientation.
	Interface Type	USB 2.0 (one channel dedicated to the separate USB port; one channel dedicated to the flash memory card slots)
	Dimensions (WxHxD)	124.5 x 101.6 x 25.4 mm (4.9 x 4.0 x 1.0 in)
	Disc Formats	Picture Micro SD Micro SDHC SD SDHC SDXC Mini SD Mini SDHC MultiMediaCard Reduced Size MultiMediaCard (RS MultiMediaCard) MultiMedia Card 4.2 (MultiMediaCard Plus, including MultiMediaCard Plus HC) Reduced Size MultiMedia Card 4.2 (MultiMediaCard Mobile, including

Technical Specifications - Optical and Removable Storage

		MultiMediaCard Mobile HC) CompactFlash Card Type I CompactFlash Card Type II MicroDrive Memory Stick (MS) MagicGate Memory Stick (MG) MagicGate Memory Stick Duo Memory Stick Select Memory Stick Duo (MS Duo) Memory Stick PRO (MS PRO) Memory Stick PRO Duo (MS PRO Duo) Memory Stick PRO-HG Duo Two additional formats are usable with adapters (not supplied): MultiMediaCard Micro Memory Stick Micro (M2)	
HP Blu-Ray Writer	**Description**	5.25-inch, half-height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA	
	Dimensions (WxHxD)	15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)	
	Disc Formats	BD-ROM BD-R BD-RE DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard
		Blu-ray	50 GB DL or 25 GB standard
		Full Stroke DVD	< 250 ms (seek)
		Full Stroke CD	< 210 ms (seek)
		Blu-ray	< 275 ms (seek)
		Startup Time	BD-ROM (SL/DL) 25S / 28S
			BD-R (SL/DL) 25S / 28S
			BD-RE (SL/DL) 25S / 28S
			DVD-ROM (SL/DL) 18S / 18S
			DVD-R (SL/DL) 25S / 25S
			DVD-RW 25S
			DVD+R (SL/DL) 25S / 25S

Technical Specifications - Optical and Removable Storage

		DVD+RW	25S
		DVD-RAM	45S
		CD-ROM	15S
Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM	Up to 40X
		CD-R	Up to 40X
		CD-RW	Up to 40X
	DVD ROM Read	DVD-RAM	Up to 5X
		DVD+RW	Up to 10X
		DVD-RW	Up to 10X
		DVD+R DL	Up to 8X
		DVD-R DL	Up to 8X
		DVD-ROM	Up to 16X
		DVD-ROM DL	Up to 8X
		DVD+R	Up to 12X
		DVD-R	Up to 12X
	Blu-Ray	BD-ROM	Up to 6X
		BD-ROM DL	Up to 4.8X
		BD-R	Up to 6X
		BD-R DL	Up to 4.8X
		BD-R	Up to 6X
		BD-RE SL/DL	Up to 4.8X
Power	**Source**	SATA DC power receptacle	
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 10%-100 mV ripple p-p	
	DC Current	5 VDC -900 mA typical, 1200 mA maximum 12 VDC -1000 mA typical, 1600 mA maximum	
Operating Environmental (all conditions non-condensing)	**Temperature**	5° to 50° C (41° to 122° F)	
	Relative Humidity	15% to 80%	
	Maximum Wet Bulb Temperature	30° C (86° F)	
	Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux (RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11 * No driver is required for this device. Native support is provided by the operating system. ** RHEL WS4 not supported on Z200/Z200SFF	

	Kit Contents	HP Blue Laser RW Drive, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide.
Disclaimer	As Blu-Ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-Ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.	

Technical Specifications - Controller Cards

HP FireWire/IEEE 1394a PCI Card	**Data Transfer Rate**	Burst Data Rate up to 400 Mbps
	Device Interface Protocol	IEEE-1394a
	Devices Supported	IEEE-1394 compliant devices
	Bus Type	PCI card with brackets for low profile and full height PCI slots.
	Certification Level	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Ports	Two IEEE 1394 6-Pin Connector (Rear)
	Internal Connectors	One 10-Pin (9 Contacts) Custom Connector
	System Requirements	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system. *Certain Windows Vista product features require advanced or additional hardware. See http://microsoft.com/windowsvista/getready/hardwarereqs.mspx and http://www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements. Pentium II 266 or above 128-MB RAM 1-GB Hard Drive CD-ROM drive Built-in sound system Available PCI slot
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Operating Systems Supported	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32* *Certain Windows Vista product features require advanced or additional hardware. See http://microsoft.com/windowsvista/getready/hardwarereqs.mspx and http://www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

Technical Specifications - Networking and Communications

Broadcom (5761) NetXtreme Gigabit Ethernet Plus NIC	**Connector**	RJ-45
	Controller	Broadcom 5761 PCI-Express LAN Controller
	Memory	8 MB NVRAM serial Flash
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, and 802.3x
	Bus Architecture	PCI-Express
	Data Path Width	Single Channel PCI-Express
	Data Transfer Mode	Bus Master DMA
	Hardware Certifications	FCC class B, Canada and US NRTL Mark, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia, UL listed (E212044), European Union Notice (CE 0682)
	Power Requirement	1.8W @ 3.3V
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex Half-duplex (not available for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Operating Temperature	32° to 131°F (0° to 55° C)
	Operating Humidity	131° F (55° C) with 5% to 95% non-condensing humidity
	Dimensions	7 cm x 10.5 cm (2.75 in x 4.13 in), low profile compatible
	Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit, Windows Vista 32-bit SP1, Windows Vista x64 SP1, Windows XP 32 bit professional, Windows XP x64 Red Hat Enterprise Linux (RHEL) WS4**, 5, 6 Desktop/Workstation Novell SLED 10 & 11 *RHEL WS4 not supported on Z200/Z200SFF
	Management Capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles
	Kit Contents	Broadcom NetXtreme Gigabit Ethernet Plus NIC, Broadcom NetXtreme Gigabit Ethernet Plus NIC USB Cable Assembly, CD, drivers, quick install guide, product warranty statement

Technical Specifications - Networking and Communications

Intel Gigabit CT Desktop NIC	**Connector**	RJ-45
	Controller	Intel WG82574L Gigabit Ethernet Controller
	Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus Architecture	PCI-E 1.0a
	Data Path Width	X1, 250 MB/s, Bi-directional interface
	Data Transfer Mode	Bus-master DMA
	Hardware Certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power Requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
	Boot ROM Support	Yes
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Operating Temperature	32° to 131°F (0° to 55° C)
	Operating Humidity	85% at 131° F (55° C)
	Dimensions (H x W x D)	12.1 x 5.7 x 2.0 cm (4.75 x 2.25 x 0.8 in)
	Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64, Windows Vista Business 32, Windows XP Professional, Windows XP x64. Red Hat Enterprise Linux 4 (RHEL4.8 or newer)*, Red Hat Enterprise Linux 5 (RHEL5.3 or newer), Red Hat Enterprise Linux 6 * RHEL WS4 not supported on Z200/Z200SFF
	Management Capabilities	WOL , PXE, DMI, WFM 2.0
	Kit Contents	Intel Gigabit CT Desktop NIC, low profile bracket, CD containing Intel PROset II NIC drivers, quick install guide, product warranty statement