Overview

HP Z1 G2

1. Power Button
2. System Activity LED
3. Thunderbolt™ 2* (2 ports)
4. SD 4.0 Media Card Reader
5. USB 3.0 (2 ports, upper charging, lower standard)
6. Headphone port
7. Microphone port

*Thunderbolt is new technology. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see https://thunderbolttechnology.net/products. Thunderbolt™ 2.0 is planned to be available via an optional add-in card in early 2014.

Form Factor	All in One
Operating Systems	Preinstalled: • Windows 8.1 Pro 64-bit • Windows 8.1 Pro Downgrade to Windows 7 Professional 64-bit • Windows 8.1 64-bit • Windows 8.1 Simplified Chinese Edition 64-bit • Windows 8.1 Emerging Markets 64-bit • Windows 7 Professional 64-bit • HP Linux Installer Kit (includes drivers for 64-bit OS versions of RHEL 6, SUSE Linux Enterprise Desktop 11, Ubuntu 14.04)

Overview

	• SUSE Linux Enterprise Desktop 11 (90 day license) • Red Hat Enterprise Linux Desktop/Workstation (Paper license with 1 year support; no reinstalled OS) Supported: • Windows 8/8.1 Enterprise 64-bit • Windows 7 Enterprise 64-bit **NOTE:** For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix.

Available Processors

Name	Cores	Clock Speed (GHz)	Intel® Turbo Boost Technology[1]	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel® HD Graphics	TDP (W)
Intel® Xeon® processor E3-1281v3	4	3.7	4.1	8	1600	Y	Y	N/A	80W
Intel® Xeon® processor E3-1246v3	4	3.5	3.9	8	1600	Y	Y	Intel HD Graphics P4600	84W
Intel® Xeon® processor E3-1226v3	4	3.3	3.7	8	1600	N	Y	Intel HD Graphics P4600	84W
Intel® Core™ i3-4160 processor	2	3.6	N/A	3	1600	Y	N	Intel HD Graphics 4400	54W
Intel® Core™ i3-4170 processor	2	3.7	N/A	3	1600	Y	N	Intel HD Graphics 4400	54W
Intel® Core™ i5-4590 processor	4	3.3	3.7	6	1600	N	Y	Intel HD Graphics 4600	84W
Intel® Core™ i7-4790 processor	4	3.6	4.0	8	1600	Y	Y	Intel HD Graphics 4600	84W

[1]The specifications shown in this column represent the maximum frequency (GHz) of one processor core when accelerated with Intel Turbo Boost Technology. Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A.

Available Processor Disclaimers	Intel Xeon E3 and Intel Core i3 processors can support either ECC or non-ECC memory. 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.
Integrated Display	See below for detailed information

Overview

	Panel
	
	• Type: IPS (in-plane switching) LED Backlit LCD
	• Viewable Image Area: 68.5 cm, (27 in.) widescreen; diagonally measured
	• Screen Opening (W x H): 59.8 x 33.6 cm, (23.5 x 13.3 in.)
	• Optimal Resolution: 2560 x 1440 @ 60 Hz; 3.7MP
	• Aspect Ratio: 16:9 Widescreen
	• Viewing Angle (typical): Up to 178° horizontal / 178° vertical
	• Maximum Brightness (typical)*: 380 nits cd/m^2
	• Minimum Brightness (typical)*: 50 nits cd/m^2
	• Contrast Ratio (typical)*: 1000:1
	• Dynamic Contrast Ratio (typical)*: N/A
	• Response Time (typical)*: 14 ms (gray to gray)
	• Pixel Pitch: 0.2331 mm x 0.2331 mm
	• Backlight LED Life Time: 30,000 hours minimum
	• Color Gamut Area vs. NTSC: 77% (CIE 1931)
	• Color Gamut Coverage of sRGB: 100% (CIE 1931)
	• Color Support **: Up to 16.7 Million colors
	
	Notes: *All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.
	
	Notes: Color Support **: Up to 16.7 Million colors
	
	Signal Interface/Performance
	
	• Horizontal Frequency: 90 kHz
	• Vertical Frequency: 60 H
	• Native Resolution: 2560 x 1440 @ 60 Hz; 3.7MP
	• Preset VESA Graphic Modes (non-interlaced): 2560 x 1440 @ 60 Hz
	• Maximum Pixel Clock Speed: 250 MHz
	• User Programmable Modes: None
	• Default Color Temperature: 6500 K
	• Touch: 10 finger touch as CTO option (no pen ability)
	• Z1 G2 Touch Technology:
	  ○ Sensor Panel: 27"Glass on Glass
	  ○ Multi-Touch: 10 points
	  ○ Technology: Projected Capacitive Touch
	  ○ Input: Finger or Capacitive Stylus
	  ○ Resolution: 25 pixels-per-inch minimum (Win8)
	  ○ Accuracy: 1 mm to each target & 10% jitter limit on moving (Win 8)
	• Anti-glare: No glass, anti-glare as CTO option

Convertibility	The Z1 can either be placed on the desktop in the traditional display method or mounted on a wall with the industry standard VESA mount. The VESA mount on the Z1 uses a 100x100 VESA mount pattern.
Expansion Slots (see system board section for more details)	• 1 MXM 3.1 (dedicated for graphics) • 2 miniPCIe/mSATA full-length
Expansion Bays (see storage section for more details)	• 1 internal 3.5" bay, or • 2 internal 2.5" bays

Overview

Side I/O	1 USB 3.0, 1 USB 3.0 Charging Data Port, 2 ThunderboltTM 2 ports (Optional**),1 SD 4.0 Media Card Reader, 1 Headphone, 1 Microphone ** An Optical drive cannot be configured if the Thunderbolt option is selected.	
Internal I/O	1 USB 2.0 Type A on Rear IO board, 2 internal on 9-pin header (not available on touch capable option)	
Rear I/O	1 DisplayPort v1.1, 4 USB 2.0, 1 RJ45 LAN, 1 Subwoofer Output, 1 optical S/PDIF Output, 1 Audio Line-in, and 1 Audio Line-out	
Chassis Dimensions (HxWxD)	Vertical display orientation WITH stand: 530.0mm x 660.4mm x 419.1mm (20.8in. x 26in. x 16.5in.); Standard display orientation WITHOUT stand: 457.2mm x 660.4mm x 81.28mm (18in. x 26in. x 3.2in.) Service/Shipping orientation: 116mm x 660mm x 510mm	
Weight	Exact weights depend upon configuration; Max system weight WITH stand: 21.32 kg (47 lbs); Stand weight 5.9 kg (13 lbs)	
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:	3,000 m (10,000 ft)
	Non-operating	9,100 m (30,000 ft).
Power Supply	400 watts wide-ranging, active Power Factor Correction, 90% Efficient The Power Supply Efficiency Report for this product may be found at these links: http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_650503-001_ECOS%202720.1_400W_Report.pdf	
Chipset	Intel® C226 chipset	
Memory	4 DIMM slots, supporting up to 32GB ECC or 16GB non-ECC Unbuffered DDR3 1866 MT/s Components. Actual Memory speed is determined by the processor.	
Memory Disclaimers	The CPU determines the speed at which the memory is clocked. If a 1600MT/s capable CPU is used in the system, the maximum speed the memory will run at is 1600MT/s regardless of the specified speed of the memory.	
Workstation ISV Certifications	See the latest list of certifications at: http://www.hp.com/united-states/campaigns/workstations/partnerships.html	

Supported Components

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® Xeon® processor E3-1200 v3 family (Z230/Z1G2)				
Intel® Xeon® processor E3-1281v3, Quad-Core, 8 MB cache, 3.7 GHz, up to 4.1 GHz with Intel Turbo Boost Technology	Y	Y		Note 1
Intel® Xeon® processor E3-1246v3, Quad-Core, 8 MB cache, 3.5 GHz, up to 3.9 GHz with Intel Turbo Boost Technology	Y	Y		Note 1, 2
Intel® Xeon® processor E3-1226v3, Quad-Core, 8 MB cache, 3.3 GHz, up to 3.7 GHz with Intel Turbo Boost Technology	Y	Y		Note 1, 2
4th generation Intel® Core™ processor family				
Intel® Core™ i3-4160 processor, Dual-Core, 3 MB cache, 3.6 GHz	Y	Y		Note 1
Intel® Core™ i3-4170 processor, Dual-Core, 3 MB cache, 3.7 GHz	Y	N		Note 1
Intel® Core™ i5-4590 processor, Quad-Core, 6 MB cache, 3.3 GHz, up to 3.7 GHz with Intel Turbo Boost Technology	Y	N		Note 3
Intel® Core™ i7-4790 processor, Quad-Core, 8 MB cache, 3.6 GHz, up to 4.0 GHz with Intel Turbo Boost Technology	Y	N		Note 3

NOTE 1: These processors support either ECC or non-ECC memory
NOTE 2: Intel HD Graphics P4600 provides improved desktop performance and supports workstation-specific graphics drivers for improved compatibility and performance on select professional applications compared to Intel HD Graphics 4600 or Intel HD Graphics 4400.
NOTE 3: These processors support only non-ECC memory

Monitors / Displays

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP DreamColor LP2480zx Professional Display				
HP Z Display Z30i 30-inch IPS LED Backlit Monitor				
HP Z Display Z27i 27-inch IPS LED Backlit Monitor				
HP Z Display Z24i 24-inch IPS LED Backlit Monitor				
HP Z Display Z23i 23-inch IPS LED Backlit Monitor				
HP Z Display Z22i 21.5-inch IPS LED Backlit Monitor				

NOTES:
Supported by all Operating Systems available from HP

Screen Size Diagonally Measured

Storage / Hard Drives

SATA Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SATA Hard Drives for HP Workstations				

Supported Components

	500GB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA	
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA	
	2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA	
	3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QF298AA	
SATA SSDs	**HP Solid State Drive for Workstations**				
	HP 256GB SATA 6Gb/s SSD	Y	Y	A3D26AA	
	HP 512GB SATA 6Gb/s SSD	Y	Y	D8F30AA	
	HP 256GB mSATA 6Gb/s SSD	Y	Y	E5Z78AA	
	Intel Pro 1500 180GB SATA SSD	Y	Y	F5Z70AA	
	HP 1TB SATA 6Gb/s SSD	Y	Y	F3C96AA	
	HP 256GB SATA 6Gb/s SED SSD	Y	Y	D8N28AA	Note 1
	Samsung Enterprise 240GB SATA SSD	Y	Y	F0W94AA	
	Samsung Enterprise 480GB SATA SSD	Y	Y	TBD	

Sub-Section Description/Notes

Note 1:
The 256GB Self-Encrypting Drive (SED) version has similar performance to the standard 256GB SSD. It is also available in Opal 1.0 and Opal 2.0 versions

Hard Drive Controllers

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Factory integrated RAID on motherboard for SATA drives				
RAID 0 Configuration - Striped Array	Y	N		
RAID 1 Configuration - Mirrored Array	Y	N		

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).

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported Multi Mixed
Integrated Intel HD Graphics (Z230/Z1G2)					
Intel HD Graphics P4600	Y	N		**See note 1**	1
Intel HD Graphics 4600	Y	N		**See note 2**	1
Intel HD Graphics 4400	Y	N		**See note 3**	1
Entry 3D					
NVIDIA Quadro K610M 1GB Graphics	Y	Y	E5Z74AA		1
Mid-range 3D					
NVIDIA Quadro K2100M 2GB Graphics	Y	Y	E5Z75AA		1

NOTE 1: Supported on Intel Xeon E3-12x5v3 processors only.
NOTE 2: Supported on Intel Core i5-4xxx and Core i7-4xxx processors only.
NOTE 3: Supported on Intel Core i3-4xxx processors only

Supported Components

High End 3D				
NVIDIA Quadro K3100M 4GB Graphics	Y	Y	E5Z76AA	1
NVIDIA Quadro K4100M 4GB Graphics	Y	Y	E5Z77AA	1

NOTE 1:
If a discrete graphics card is installed, Intel integrated graphics is disabled.

Memory	**CTO**	**Option Kit Part Number**	**Support Notes**
	DDR3-1866 ECC Unbuffered DIMMs - CTO		
	HP 32GB (4x8GB) DDR3-1866 ECC RAM		
	HP 16GB (2x8GB) DDR3-1866 ECC RAM		
	HP 16GB (4x4GB) DDR3-1866 ECC RAM		
	HP 8GB (2x4GB) DDR3-1866 ECC RAM		
	HP 8GB (4x2GB) DDR3-1866 ECC RAM		
	HP 4GB (2x2GB) DDR3-1866 ECC RAM		
	HP 4GB (1x4GB) DDR3 1866 ECC RAM		
	Sub-Section Description/Notes		
	Intel® Xeon E3 and Intel Core i3 processors can support either ECC or non-ECC memory; Intel® Core i5/i7 processors only support non-ECC memory.		
	Two channels of DDR3 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.		
	The CPU determines the speed at which the memory is clocked. If a 1333MT/s capable CPU is used in the system, the maximum speed the memory will run at is 1333MT/s regardless of the specified speed of the memory.		
	Only unbuffered DDR3 DIMMs are supported.		
	AMO		
	DDR3-1866 ECC Unbuffered DIMMs - AMO		
	HP 8GB (1x8GB) DDR3-1866 ECC RAM	E2Q93AA	
	HP 4GB (1x4GB) DDR3-1866 ECC RAM	E2Q91AA	
	HP 2GB (1x2GB) DDR3-1866 ECC RAM	E2Q90AA	
	DDR3-1866 nECC Unbuffered DIMMs AMO		
	HP 4GB (1x4GB) DDR3-1866 nECC RAM	E5Z83AA	
	Sub-Section Description/Notes		
	The CPU determines the speed at which the memory is clocked. If a 1600MT/s capable CPU is used in the system, the maximum speed the memory will run at is 1600MHz regardless of the specified speed of the memory.		

Multimedia and Audio Devices	**Factory Configured**	**Option Kit**	**Option Kit Part Number**	**Support Notes**
HP HD 2MP 1080p Webcam	Y	N		
Integrated HP Digital Mic Array	Y	N		

Optical and Removable Storage	**Factory Configured**	**Option Kit**	**Option Kit Part Number**	**Support Notes**

Supported Components

HP Slim DVD-ROM Drive	Y	Y	E5Z82AA
HP Slim SuperMulti DVDRW SATA Drive	Y	Y	E5Z80AA
HP Slim Blu-ray Writer	Y	Y	E5Z81AA

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.

Controller Cards	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Thunderbolt 2-port AiO Module	Y	Y	E5Z73AA	

Networking and Communications	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Intel I217LM PCIe GbE Controller (Intel vPro with Intel AMT 9.0)	Y	N		
Integrated Intel Dual Band Wireless-AC 7260, Dual Band with dual antenna TX/RX streams at 867Mbps 802.11ac Wireless LAN & Bluetooth®4 Combo Card	Y	N		

NOTE 1: Card is factory installed into miniPCIe slot 1.

Racking and Physical Security	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Chassis Intrusion Sensor	Y	N		
HP Keyed Cable Lock Kit	N	Y	BV411AA	

Input Devices	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP USB CCID SmartCard Keyboard	Y	Y	E6D77AA	
HP USB Keyboard	Y	Y	QY776AA	
HP Wireless Keyboard and Mouse	Y	Y	QY449AA	
HP USB Laser Mouse	Y	Y	GW405AA	

Other Hardware	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Power Cord Kit	Y	N		
HP ENERGY STAR Qualified Configuration	Y	N		

Software	Factory Configured	Option Kit	Option Kit Part	Support Notes

Supported Components

			Number
HP Performance Advisor	Y	N	See note 1
HP Remote Graphics Software (RGS) 6.0	Y	N	See note 2
PDF Complete - Corporate Edition	Y	N	
MS Office Home & Business 2013	Y	N	See note 3

NOTE 1: Available as a free download here: www.hp.com/go/performanceadvisor
NOTE 2: Supports both 32 and 64 bit versions of Windows 7 Professional and Enterprise, Windows XP Professional and Enterprise, and RHEL V6
NOTE 3: Available CTO as a "Drop in the Box" addition.

Operating Systems	**Support Notes**
HP Linux Installer Kit	See note 2
SUSE Linux Enterprise Desktop 11	See note 2
Genuine Windows® 7 Professional 64-bit	See note 1
Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)	See note 3
Windows 8.1 Pro Downgrade to Windows 7 Professional 64-bit	
Windows 8.1 Pro 64-bit	
Windows 8.1 64-bit	
Windows 8.1 Pro Downgrade to Windows 7 Professional 64-bit (National Academic)	
Windows 8.1 Simplified Chinese Edition 64-bit	
Windows 8.1 Emerging Markets Single-Language 64-bit OS	
Microsoft Windows 7 Professional 64-bit (National Academic)	

NOTE 1: See http://www.microsoft.com/windows/windows-7/ for support details.
NOTE 2: For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix.
NOTE 3: This second OS must be ordered with the HP Linux Installer Kit as the first OS.

System Technical Specifications

System Board		
System Board Form Factor	Custom Motherboard, Custom Rear IO board, Custom Side IO board	
Processor Socket	Single LGA 1150	
CPU Bus Speed	DMI Gen2	
Chipset	Intel® PCH C226	
Super I/O Controller	Nuvoton NPCD379H	
Memory Expansion Slots	4 DDR3 memory slots	
Memory Type Supported	DDR3, UDIMM (Unbuffered), ECC & non-ECC	
Memory Modes	Non-interleaved for single channel. Interleaved when both channels are populated.	
Memory Speed Supported	Up to 1600MT/s DDR3	
Maximum Memory	32GB ECC or 16GB non-ECC	
Memory Configuration (Supported)	4GB non-ECC/ 2GB, 4GB and 8GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed on the same system. **NOTES:** * Maximum memory capacities assume 64-bit operating systems, such as genuine Genuine Windows® 7 Professional 64-Bit or Red Hat Linux 64-bit. 32-bit Windows Operating Systems support up to 4 GB.	
PCI Express Connectors	1 MXM 3.1 slot (PCIe Gen2 x16, DP x 2) for graphics 2 miniPCIe/mSATA slots (PCIe Gen2 x1 or SATA 6Gbps x1, USB 2.0), full length **NOTE:** the Z1 G2 ships with an Intel WLAN/BT card installed in slot 1.	
Supported Drive Interfaces	**SATA**	Integrated Serial ATA interfaces: 2 x 6Gb/s SATA, 1 x 6Gb/s SATA for ODD 2 x mSATA/miniPCIe slots **NOTE:** the Z1 supports a maximum of two SATA SFF/SSD drives only. RAID 0 and 1 supported. (Factory integrated RAID is Microsoft Windows only). **NOTE:** the Z1 G2 ships with an Intel WLAN/BT card installed in slot 1.
	Integrated RAID	**NOTE:** Requires identical hard drives (speeds, capacity, interface)
	Integrated Graphics	Intel HD Graphics P4600 (on Intel Xeon E3-12x5v3 processors) Intel HD Graphics 4600 (on Core i5-4570 processor) Intel HD Graphics 4400 (on Core i3-4130 processor) Unified Memory Architecture (UMA)- A region of system memory is reserved and dedicated to the graphics display. DirectX 11.1 compliant and OpenGL 4.0. Integrated Graphics can support up to 3 displays: embedded display, external display via Rear IO and external display via optional add-in TBT module.
	Network Controller	Integrated Ethernet PHY Connection I217LM. Management capabilities: WOL, PXE 2.1 and AMT 9

System Technical Specifications

USB Connector(s)	**Front**	Side (not Front): 1 USB 3.0, 1 USB 3.0 Charging Data Port
	Rear	4 USB 2.0
	Internal	1 USB 2.0 Type A, 2 USB 2.0 across one 9-pin header (9-pin header is not available when the touch display option is selected)
HD Integrated Audio	Intel HD / IDT 92HD68 codec	
Flash ROM	Yes	
CPU Fan Header	Yes	
Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium	Yes	
Integrated Trusted Platform Module	Integrated TPM 1.2. TPM module disabled where restricted by law.	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	Yes	
Keyboard/Mouse	USB or Wireless	

Power Supply

Power Supply	400W 90% Efficient, Custom PSU (Wide Ranging, Active PFC)	
Operating Voltage Range	90-264 VAC	
Rated Voltage Range	100-240 VAC	118 VAC
Rated Line Frequency	50-60 Hz	400 Hz
Operating Line Frequency Range	47-63 Hz	393-407 Hz
Rated Input Current	5A @ 100-240 VAC	4.5A @ 118 VAC
Heat Dissipation (Configuration and software dependent)	Typical: 570 btu/hr (144 kg-cal/hr) Maximum: 1365 btu/hr (344 kg-cal/hr)	
Power Supply Fan	(2) 40x20 mm variable speed	
ENERGY STAR Qualified (Configuration dependent)	Yes	
80 PLUS® Compliant	Yes, 90% Efficient The Z1 400W power supply efficiency report can be found at this link: http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_650503-001_ECOS%202720.1_400W_Report.pdf	
FEMP Standby Power Compliant @115V	Yes	
ErP LOT6 Compliant @ 230V (<0.5 W in S5 - Power Off)	Yes	
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	NA	
Power Consumption in sleep mode	<4W	

System Technical Specifications

(as defined by ENERGY STAR) - Suspend to RAM (S3) (Instantly Available PC)	
Built-in Self Test LED	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes

System Configuration

Example Configuration #1	Processor Info	1xIntel Core i3-4130					
	Memory Info	HP 8GB (2x4GB) DDR3 1866 ECC RAM					
	Graphics Info	1xNVIDIA K610M Graphics					
	Disks/Optical/Floppy	1x500GB SATA/1xDVD-ROM SATA					
	Power Supply	400W 90% Custom PSU					
	Other	-					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	70 W		70 W		71 W	
	Windows Busy Typ (S0)	108 W		110 W		110 W	
	Windows Busy Max (S0)	142 W		139 W		143 W	
	Sleep (S3)	0.82 W	0.82 W	0.97 W	0.82 W	0.82 W	0.97 W
	Off (S5)	0.74 W	0.74 W	0.89 W	0.74 W	0.74 W	0.89 W
	Zero Power Mode (EuP)	0.20 W		0.35 W		0.19 W	
Heat Dissipation (Btu/hr)**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	239 Btu/hr		239 Btu/hr		242 Btu/hr	
	Windows Busy Typ (S0)	369 Btu/hr		375 Btu/hr		375 Btu/hr	
	Windows Busy Max (S0)	485 Btu/hr		474 Btu/hr		488 Btu/hr	
	Sleep (S3)	2.80 Btu/hr	2.80 Btu/hr	3.31 Btu/hr	2.80 Btu/hr	2.80 Btu/hr	3.31 Btu/hr
	Off (S5)	2.52 Btu/hr	2.52 Btu/hr	3.04 Btu/hr	2.52 Btu/hr	2.52 Btu/hr	3.04 Btu/hr
	Zero Power Mode (EuP)	0.68 Btu/hr		1.19 Btu/hr		0.65 Btu/hr	

Example Configuration #2	Processor Info	1xIntel Xeon E3-1280v3					
	Memory Info	HP 8GB (2x4GB) DDR3 1866 ECC RAM					
	Graphics Info	1xNVIDIA K3100M Graphics					
	Disks/Optical/Floppy	1x1TB SATA/1xDVD+-RW SATA					
	Power Supply	400W 90% Custom PSU					
	Other	-					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	74 W		73 W		75 W	
	Windows Busy Typ (S0)	167 W		171 W		174 W	
	Windows Busy Max (S0)	244 W		237 W		242 W	
	Sleep (S3)	0.83 W	0.83 W	0.98 W	0.83 W	0.83 W	0.98 W
	Off (S5)	0.74 W	0.74 W	0.89 W	0.74 W	0.74 W	0.89 W
	Zero Power Mode (EuP)	0.20 W		0.35 W		0.19 W	
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled

System Technical Specifications

(Btu/hr)	Windows Idle (S0)	253 Btu/hr		249 Btu/hr		256 Btu/hr	
	Windows Busy Typ (S0)	570 Btu/hr		584 Btu/hr		594 Btu/hr	
	Windows Busy Max (S0)	833 Btu/hr		809 Btu/hr		826 Btu/hr	
	Sleep (S3)	2.83 Btu/hr	2.83Btu/hr	3.34 Btu/hr	2.83 Btu/hr	2.83Btu/hr	3.34 Btu/hr
	Off (S5)	2.52 Btu/hr	2.52 Btu/hr	3.04 Btu/hr	2.52 Btu/hr	2.52 Btu/hr	3.04 Btu/hr
	Zero Power Mode (EuP)	0.68 Btu/hr		1.19 Btu/hr		0.65 Btu/hr	

Example Configuration #3	Processor Info	1xIntel Xeon E5-1280v3					
	Memory Info	HP 16GB (4x4GB) DDR3 1866 ECC RAM					
	Graphics Info	1xNVIDIA K4100M					
	Disks/Optical/Floppy	2x1TB SATA 10K SFF/1xDVD+-RW SATA					
	Power Supply	400W 90% Custom PSU					
	Other	-					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	80 W		78 W		81 W	
	Windows Busy Typ (S0)	189 W		191 W		195 W	
	Windows Busy Max (S0)	275 W		263 W		274 W	
	Sleep (S3)	0.90 W	0.90 W	1.06 W	0.90 W	0.90 W	1.06 W
	Off (S5)	0.73 W	0.73 W	0.89 W	0.73 W	0.73 W	0.89 W
	Zero Power Mode (EuP)	0.20 W		0.34 W		0.19 W	
Heat Dissipation (Btu/hr)**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	273 Btu/hr		266 Btu/hr		276 Btu/hr	
	Windows Busy Typ (S0)	645 Btu/hr		652 Btu/hr		665 Btu/hr	
	938 Btu/hr	938 Btu/hr		897 Btu/hr		935 Btu/hr	
	Sleep (S3)	3.07 Btu/hr	3.07 Btu/hr	3.62 Btu/hr	3.07 Btu/hr	3.07 Btu/hr	3.62 Btu/hr
	Off (S5)	2.49 Btu/hr	2.49 Btu/hr	3.04 Btu/hr	2.49 Btu/hr	2.49 Btu/hr	3.04 Btu/hr
	Zero Power Mode (EuP)	0.68 Btu/hr		1.16 Btu/hr		2.22 Btu/hr	

Declared Noise Emissions (Entry-level and High-end configurations)		
System Configuration (Entry level)	**Processor Info**	Intel Core i3-4130 2-core 3.4 GHz
	Memory Info	2 x 2 GB DDR3 1333 MT/s
	Graphics Info	NVIDIA Quadro K610M
	Disks/Optical	1 x 2TB 7200 RPM SATA / Slim SuperMulti DVDRW SATA

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Desktop Sound Pressure** (LpAm, decibels)
	Idle	3.0 Bels	20 dB
	Hard drive Operating (random reads)	3.2 Bels	23dB
	DVD-ROM Operating (sequential reads)	4.3 Bels	32 dB

System Configuration (Entry level)	**Processor Info**	Intel i3-4130 2-core 3.4 GHz
	Memory Info	2 x 2 GB DDR3 1333 MT/s

System Technical Specifications

	Graphics Info	Intel HD Graphics 4400
	Disks/Optical	2 x 480 GB SSD SATA / Slim SuperMulti DVDRW SATA

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Desktop Sound Pressure** (LpAm, decibels)
	Idle	2.7 Bels	20 dB
	Hard drive Operating (random reads)	2.7 Bels	20 dB
	DVD-ROM Operating (sequential reads)	4.3 Bels	33 dB

System Configuration (High-end)		
	Processor Info	Intel Xeon E3-1280 V3 4-core 3.6 GHz
	Memory Info	4 x 8 GB DDR3 1333 MT/s
	Graphics Info	NVIDIA Q4100M MXM
	Disks/Optical	2 x 500 GB 10K RPM SATA / Slim SuperMulti DVDRW SATA

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Desktop Sound Pressure** (LpAm, decibels)
	Idle	3.0 Bels	21 dB
	Hard drive Operating (random reads)	3.8 Bels	28 dB
	DVD-ROM Operating (sequential reads)	4.3 Bels	32 dB

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 (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g Vibration Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025 g^2/Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g^2/Hz 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

System Technical Specifications

	Includes system board and memory information
Tool-less	Tool-less
Hard Drives	Tool-less
Expansion Cards	MXM graphics assembly is tool-less. MiniPCIe cards are screw-in.
Processor Socket	Tool-less, except for the processor heatsink.
Green User Touch Points	On tool-free internal chassis mechanisms
Color-coordinated Cables and Connectors	When appropriate
Memory	Tool-less
System Board	Screw-In for motherboard, Rear IO and Side IO boards.
Over-Temp Warning on Screen	Yes
Restore CD/DVD Set	Restores the computer to its original factory shipping operating system. Orderable with the workstation, or available from Support.
Dual Function Side Power Switch	Power on/off Causes a fail-safe power off when held for 4 seconds
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3mm x 7mm slot at rear of system
Solenoid Lock and Hood Sensor	No Solenoid Lock Hood Sensor - The Sensor Kit detects when the access panel has been opened.
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enables or disables USB, audio, and network ports
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	No
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	Yes
Side Power Button	ACPI multi-function
Side Power LED	Blue (normal), red (fault)
Side Hard Drive Activity LED	Green
Side ODD Activity LED	Present on an Optical Device
Internal Stereo Speakers	Two 4W speakers
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection
Power Supply Fans	Two 40 mm x 40 mm x 20 mm 4-wire PWM (not serviceable separately from the power supply)
CPU Heatsink Fan	Two 80 mm blowers

System Technical Specifications

MXM Heatsink Fan	One 110 mm blower with MXM graphics assembly
System Blower	110 mm blower
HP Advanced System Diagnostics Offline Edition	HP Vision 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.
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	Yes
Integrated Chassis Handles	One on top-rear of system
Power Supply	Tool-less
miniPCIe Card Retention	2 × M2 screws
Flash ROM	Present
Diagnostic Power Switch LED on board	No
Clear Password Jumper	Present
Clear CMOS Button	Present
CMOS Battery Holder	Present
DIMM Connectors	Present - tool-less

BIOS	
BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal v0.4
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.
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 2.7.1, 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.

System Technical Specifications

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. Supports ACPI 4.0 for full compatibility with 64-bit operating systems.
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.
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.
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	Enables the user or IT administrator 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)	AMT 7.0; Allows workstation status to be monitored on a remote console
Digitally and Cryptographically Signed BIOS	Helps to prevent the installation of unauthorized versions of a BIOS (a rogue BIOS) from a virus, malware, or other code that could lead to compromised system security, data access, physical service, or even system board replacement.
Master Boot Record Protection	A feature in the HP BIOS that prevents changes and/or infections to the Master Boot Record. Useful in protecting from viruses
Boot Block Emergency Recovery Mode (BIOS	The HP BIOS offers a write-protected boot block ROM that provides recovery from a failed flashing of the computer BIOS. This special recovery mode prevents the system from becoming unusable or

System Technical Specifications

Recovery)	"bricked" when a BIOS update is interrupted.
Industry Standard Specification Support	
Industry Standard	Revision Supported by the BIOS
UEFI Specification Revision	2.3.1
ACPI	Advanced Configuration and Power Management Interface, Version 4.0
ASF	No
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 Express	- PCI Express Mini Card Electromechanical Specification Revision 1.2 - PCI Express Base Specification, Revision 2.0 - PCI Express Base Specification, Revision 3.0 - MXM Graphics Module Mobile PCI Express Module Electromechanical Specification Version 3.0, Revision 3.1
PMM	POST Memory Manager Specification, Version 1.01
SATA	- Serial ATA Specification, Revision 1.0a - Serial ATA II: Extensions to Serial ATA 1.0, Revision 2.6 - Serial ATA II Cables and Connectors Volume 2 Gold - SATA-IO SATA Revision 3.0 Specification
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 Specifiation - Universal Serial Bus Revision 2.0 Specification - Universal Serial Bus Revision 3.0 Specification

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) • IT ECO declaration
Batteries	The battery in this product complies with EU Directive 2006/66/EC Battery size: CR2032 (coin cell) Battery type: Lithium Metal The battery in this product does not contain: • Mercury greater than 5ppm by weight • Cadmium greater than 10ppm by weight • Lead greater than 40ppm by weight
Restricted Material Usage	This product meets the material restrictions specified in HP's General Specification for the Environment. http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf

System Technical Specifications

	Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.
Low Halogen Statement	This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen.
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. This product is greater than 90% recyclable by weight when properly disposed of at end of life.
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
Additional Information	• 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 is >90% recycle-able when properly disposed of at end of life. EPEAT Gold - ENERGY STAR qualified configurations of this product are in compliance with the IEEE 1680 (EPEAT) standard at the Gold level where HP registers workstation products. See http://ww2.epeat.net/CompanyDetail.aspx?CompanyID=24 for registration status in your country.
Packaging	HP Workstation product packaging meets the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html • Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment • Does not contain ozone-depleting substances (ODS) • Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed • Maximizes the use of post-consumer recycled content materials in packaging materials • All packaging material is recyclable • All packaging material is designed for ease of disassembly • Reduced size and weight of packages to improve transportation fuel efficiency • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formattin
Packaging Materials	
Internal	Cushions and plastic bags made of low density polyethylene (LDPE).
External	Outer carton, accessories carton, and insert made of corrugated paper board.

Manageability	
Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality: • DASH 1.1 required functionalities via integrated Intel LAN

System Technical Specifications

Intel Active Management Technology (AMT)	Intel Active Management Technology (Intel® AMT) 9.0 An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 9.0 includes the following advanced management functions: • Power Management (on, off, reset, graceful shutdown, sleep and hibernate) • Hardware Inventory (includes BIOS and firmware revisions) • Hardware Alerting • Agent Presence • System Defense Filters • Serial Over LAN (SOL) • IDE Redirect • Remote Configuration • TLS-PSK Setup and Configuration • TLS-PKI Setup and Configuration • Cisco NAC/SDN Support • ME Wake-on-LAN • DASH 1.1 compliance • IPv6 Support • Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection • Remote Scheduled Maintenance - pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc by connecting to their IT console or Service Provider when it's convenient • Remote Alerts - automatically alert IT or service provider if issues arise • Access Monitor - Provides oversight into Intel® AMT actions to support security requirements • PC Alarm Clock • Microsoft NAP Support • Host Base set-up and configuration • Management Engine (ME) firmware roll back • Enhanced KVM resolution • KVM Remote Control • Local Time Sync to UTC • Remote Memory Dump Command - Creates memory dump for debug • Wireless Management in Sleep States • Desktop Wireless Manageability
Intel® vPro™ Technology	The HP Z1 G2 Workstation supports Intel vPro technology when configured with a processor branded "featuring Intel vPro Technology"
Remote Manageability Software Solutions	The HP Z1 Workstation is supported on the following remote manageability software consoles: • LANDesk Management Suite (PSG recommended solution) • Microsoft System Center Configuration Manager • HP Client Automation Enterprise For questions or support for manageability needs, please visit http://www.hp.com/go/easydeploy
System Software Manager	For questions or support for SSM, please visit: http://www.hp.com/go/ssm
Service, Support, and Warranty	On-site Warranty and Service (Note 1): One, Three, Four & Five -years (options available), limited warranty and service offering delivers on-site, next business-day (Note 2) service for parts and labor

System Technical Specifications

	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 24x7 support service 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.
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.

Technical Specifications - Processors

Processors

Intel® Xeon® processor E3-1281v3, Quad-Core, 8 MB cache, 3.7 GHz, up to 4.1 GHz with Intel Turbo Boost Technology

Intel® Xeon® processor E3-1246v3, Quad-Core, 8 MB cache, 3.5 GHz, up to 3.9 GHz with Intel Turbo Boost Technology

Intel® Xeon® processor E3-1226v3, Quad-Core, 8 MB cache, 3.3 GHz, up to 3.7 GHz with Intel Turbo Boost Technology

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Intel® Core™ i7-4790 processor, Quad-Core, 8 MB cache, 3.6 GHz, up to 4.0 GHz with Intel Turbo Boost Technology

Intel® Core™ i5-4590 processor, Quad-Core, 6 MB cache, 3.3 GHz, up to 3.7 GHz with Intel Turbo Boost Technology

Intel® Core™ i3-4160 processor, Dual-Core, 3 MB cache, 3.6 GHz

Intel® Core™ i3-4170 processor, Dual-Core, 3 MB cache, 3.7 GHz

Technical Specifications - Hard Drives

SATA Hard Drives for HP Workstations	**500GB SATA 7200 rpm 6Gb/s 3.5" HDD**	**Capacity**	500GB	
		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 (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	16MB	
		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)	
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	1 Terabyte (1000 GB)	
		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 (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	64MB	
		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)	
	2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	2TB	
		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 (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	64MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
			Average	11 ms
			Full Stroke	18 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	3,907,029,168	

Technical Specifications - Hard Drives

		Operating Temperature	41° to 131° F (5° to 55° C)	
	3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	3.0TB	
		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 (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	64MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.6 ms
			Average	11 ms
			Full Stroke	Not specified
		Rotational Speed	7,200 rpm	
		Operating Temperature	41° to 131° F (5° to 55° C)	
SATA SSDs for HP Workstations	**HP 256GB SATA 6Gb/s SSD**	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 256GB SATA 6Gb/s SED SSD	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 256GB mSATA 6Gb/s SSD	**Capacity**	256GB	
		Interface	6Gb/s SATA	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 512GB SATA 6Gb/s SSD	**Capacity**	512GB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 1TB SATA 6Gb/s SSD	**Capacity**	1TB	
		Height	0.28 in; 0.7 cm	

Technical Specifications - Hard Drives

	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
Samsung Enterprise 240GB SATA SSD	**Capacity**	240GB	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	600 Mb/s	
Samsung Enterprise 480GB SATA SSD	**Capacity**	480GB	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	600 Mb/s	
Intel Pro 1500 180GB SATA SSD	**Capacity**	180GB	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	600 Mb/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	

Technical Specifications - Graphics

Integrated Intel HD Graphics (Z230/Z1G2)	**Form Factor**	Integrated in select Intel Xeon E3, Intel Core i7, and Intel Core i5 processors. Check specific platform specifications for selections.
	Graphics Controller	Intel HD Graphics
	Memory	Unified Memory Architecture (UMA) frame buffer. Graphics memory is shared with system memory. Size selectable between 64 MB to 512 MB via BIOS setting. Default size is 64 MB. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (Intel DVMT 5.0), to provide an optimal balance between graphics and system memory use.
	Connectors	Check system platform specifications where Intel HD Graphics are available.
	Maximum Resolution	Display Port: 2560 x 1600 DVI: 1920x1200 VGA: 2048x1536 **NOTE:** For DVI and VGA outputs, separate adapters may be required.
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.0 DirectX 11.1
	Available Graphics Drivers	Windows 7 Windows 8.1
NVIDIA Quadro K610M 1GB Graphics	**Form Factor**	MXM v3.1 Type A (82mm x 70mm)
	Graphics Controller	N15M-Q3, 954MHz core clock 192 CUDA cores
	Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
	Memory	1GB GDDR5 64 bit wide interface 2600MHz, 20.8 GB/s
	Connectors	One MXM v3.1 connector (285-pin)
	Maximum Resolution	2 x 3840x2160 @ 60Hz digital displays In Z1 G2 application: - Internal Display: 2560x1440 - External Display via DP connector: 2560x1600 - External Display via optional Thunderbolt module: Two 3840x2160
	RAMDAC	Not Applicable
	Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. Nvidia Scalable Geometry Engine.
	Shading Architecture	Shader Model 5.0 support
	Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 11.1 Shader Model 5.0 OpenGL 4.3

Technical Specifications - Graphics

		Compute API support for NVIDIA CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
	Available Graphics Drivers	Windows 7 64-bit Windows 8.1 64-bit SUSE Linux Enterprise Desktop 11 64-bit Red Hat Enterprise Linux 6 Workstation 64-bit See www.hp.com/go/support for HP supported NVIDIA graphics drivers
NVIDIA Quadro K2100M 2GB Graphics	**Form Factor**	MXM v3.1 Type A (82mm x 70mm)
	Graphics Controller	N15P-Q3, 665MHz core clock 576 CUDA cores
	Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
	Memory	2GB GDDR5 128 bit wide interface 3000MHz, 48 GB/s
	Connectors	One MXM v3.1 connector (285-pin)
	Maximum Resolution	2 x 3840x2160 @ 60Hz digital displays In Z1 G2 application: - Internal Display: 2560x1440 - External Display via DP connector: 2560x1600 - External Display via optional Thunderbolt module: Two 3840x2160
	RAMDAC	Not Applicable
	Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. Nvidia Scalable Geometry Engine. AES-128 CTR/CBC/ECB decryption modes supported. Nvidia 3D Vision Pro
	Shading Architecture	Shader Model 5.0 support
	Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 11.1 Shader Model 5.0 OpenGL 4.3 Compute API support for NVIDIA CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
	Available Graphics Drivers	Windows 7 64-bit Windows 8.1 64-bit SUSE Linux Enterprise Desktop 11 64-bit Red Hat Enterprise Linux 6 Workstation 64-bit See www.hp.com/go/support for HP supported NVIDIA graphics drivers
NVIDIA Quadro K3100M 4GB Graphics	**Form Factor**	MXM v3.1 Type B (82mm x 105mm)
	Graphics Controller	N15E-Q1, 705MHz core clock 768 CUDA cores
	Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
	Memory	4GB GDDR5 256 bit wide interface

Technical Specifications - Graphics

		3200MHz, 102.4 GB/s
	Connectors	One MXM v3.1 connector (285-pin)
	Maximum Resolution	2 x 3840x2160 @ 60Hz digital displays In Z1 G2 application: - Internal Display: 2560x1440 - External Display via DP connector: 2560x1600 - External Display via optional Thunderbolt module: Two 3840x2160
	RAMDAC	Not Applicable
	Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. Nvidia Scalable Geometry Engine. AES-128 CTR/CBC/ECB decryption modes supported. Nvidia 3D Vision Pro
	Shading Architecture	Shader Model 5.0 support
	Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 11.1 Shader Model 5.0 OpenGL 4.3 Compute API support for NVIDIA CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
	Available Graphics Drivers	Windows 7 64-bit Windows 8.1 64-bit SUSE Linux Enterprise Desktop 11 64-bit Red Hat Enterprise Linux 6 Workstation 64-bit See www.hp.com/go/support for HP supported NVIDIA graphics drivers
NVIDIA Quadro K4100M 4GB Graphics	**Form Factor**	MXM v3.1 Type B (82mm x 105mm)
	Graphics Controller	N15E-Q3, 705MHz core clock 1152 CUDA cores
	Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
	Memory	4GB GDDR5 256 bit wide interface 3200MHz, 102.4 GB/s
	Connectors	One MXM v3.1 connector (285-pin)
	Maximum Resolution	Maximum number of active displays: 4 In Z1 G2 application: - Internal Display: 2560x1440 - External Display via DP connector: 2560x1600 - External Display via optional Thunderbolt module: Two 3840x2160
	RAMDAC	Not Applicable
	Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration.

Technical Specifications - Graphics

	Nvidia Scalable Geometry Engine. AES-128 CTR/CBC/ECB decryption modes supported. Nvidia 3D Vision Pro
Shading Architecture	Shader Model 5.0 support
Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 11.1 Shader Model 5.0 OpenGL 4.3 Compute API support for NVIDIA CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
Available Graphics Drivers	Windows 7 64-bit Windows 8.1 64-bit SUSE Linux Enterprise Desktop 11 64-bit Red Hat Enterprise Linux 6 Workstation 64-bit See www.hp.com/go/support for HP supported NVIDIA graphics drivers

Technical Specifications - Optical and Removable Storage

HP Slim DVD-ROM Drive	**Description**	12.7mm high, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	
	Dimensions (WxHxD)	128 x 14 x 128mm	
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	**DVD-ROM Single Layer**	<110 ms (typical)
		CD-ROM Mode 1	<110 ms (typical)
		Full Stroke DVD	<230 ms (seek)
		Full Stroke CD	<220 ms (seek)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC - <800mA typical, < 1600 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Operating Systems Supported	Windows 8 32-bit and 64-bit, 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.	
HP Slim SuperMulti DVDRW SATA Drive	**Description**	12.7mm high, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 14 x 128mm	
	Supported Media Types	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
	Access Times	**Full Stroke DVD**	< 230 ms (seek)
		Full Stroke CD	< 220ms (seek)
	Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD-RAM Up to 8X DVD+RW Up to 8X DVD-RW Up to 8X

Technical Specifications - Optical and Removable Storage

			DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Operating Systems Supported		Windows 8 32-bit and 64-bit, 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.
	Kit Contents		HP SATA SuperMulti DVD Writer drive, Cyberlink Power2Go Software, Cyberlink PowerDVD Software, installation guide, and DVD+R media.
	Approvals		© Copyright 2013 Hewlett-Packard Development Company, L.P. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein. The information contained herein is subject to change without notice.
HP Slim Blu-ray Writer	**Description**		12.7mm high, tray-load
	Mounting Orientation		Horizontal
	Interface Type		SATA
	Dimensions (WxHxD)		128 x 14 x 128mm
	Supported Media Types		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
		CD-ROM	650MB CD-ROM (Read Only) 800/700/650MB CD-Recordable (Read & Write)

Technical Specifications - Optical and Removable Storage

		700/650MB CD-Rewritable (Read & Write) 700/650MB High Speed CD-Rewritable (Read & Write) 700/650MB Ultra & Ultra+ Speed CD-Rewritable (Read & Write)
	Blu-ray	50 GB DL or 25 GB standard
Access Times	**Full Stroke DVD**	< 200ms (seek)
	Full Stroke CD	< 200ms (seek)
	Blu-ray	< 230ms (seek)
	Startup Time	(Time to drive ready from tray loading) BD-ROM (SL/DL) 25S / 28S BD-R (SL/DL) 25S / 28S BD-RE (SL/DL) 25S / 28S DVD-ROM (SL/DL) 18S / 18S DVD-R (SL/DL) 25S / 25S DVD-RW 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S DVD-RAM 45S CD-ROM 15S
Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
	DVD ROM Read	DVD-RAM Up to 8X 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 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Blu-ray	BD-ROM Up to 6X BD-ROM DL Up to 6X BD-R Up to 6X BD-R DL Up to 6X BD-R Up to 6X BD-RE SL/DL Up to 6X BD-RE TL 4.8x
Power	**Source**	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -900 mA typical, 2000mA maximum
Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
	Relative Humidity	15% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 8 32-bit and 64-bit, 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.
Kit Contents	HP Blue Laser RW Drive, Cyberlink Power2Go Software, Cyberlink PowerDVD Software, installation guide. 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 Thunderbolt 2-port AiO Module	**Data Transfer Rate**	Supports up to 20 Gb/s (20,000 Mb/s)
	Devices Supported	Thunderbolt™ certified devices
	Ports	Two (2) Thunderbolt™ 2 external 20-Pin output connectors (Side)
	Internal Connectors	TBD
	System Requirements	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit, Intel i5 series or higher processor, 128-MB RAM, 1-GB Hard Drive, available PCIe 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%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit.
	Kit Contents	HP Thunderbolt™ 2 Module, user documentation and warranty card.
	Warranty	The HP Thunderbolt™ 2 Module has a one-year Limited Warranty or the remainder of the warranty of the HP supported product in which it is installed. Technical support is available seven days a week, 24 hours a day, by phone, as well as online support forums. Certain restrictions and exclusions apply.

Technical Specifications - Networking and Communications

Integrated Intel I217LM PCIe GbE Controller	**Connector**	RJ-45
	Controller	Intel I217LM GbE platform LAN connect networking controller
	Memory	3 KB Tx and 3KB Rx FIFO packet buffer memory
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1as/1588, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3z
	Bus Architecture	PCI Express and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	vPro, WOL, auto MDI crossover, PXE, iSCSI Boot, Muti-port teaming, RSS, ACPI, Advanced cable diagnostic, loopback modes, AMT 9.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD)

Summary of Changes

Date of change:	Version History:		Description of change:
July 1	V4 to v5	Changed	
		Added	IDNumber, June updates
		Removed	
November 1, 2014	From v5 to v6	Added	1 USB 3.0, 1 USB 3.0 Charging Data Port, and note from Side I/O's Overview
February 1, 2015	From v6 to v7	Changed	Operative Systems support from Overview and Supported Components sections
April 1, 2015	From v7 to v8	Changed	Memory nomenclature in Overview, Supported components, and System technical Specifications.
May 1, 2015	From v8 to v9	Removed	Core i3-4150 and DDR3-1866 nECC DIMMs
June 1, 2015	From v9 to v10	Added	Intel® Core™ i3-4170 processor
		Changed	Processor sections in Overview, Supported Components and Technical Specifications