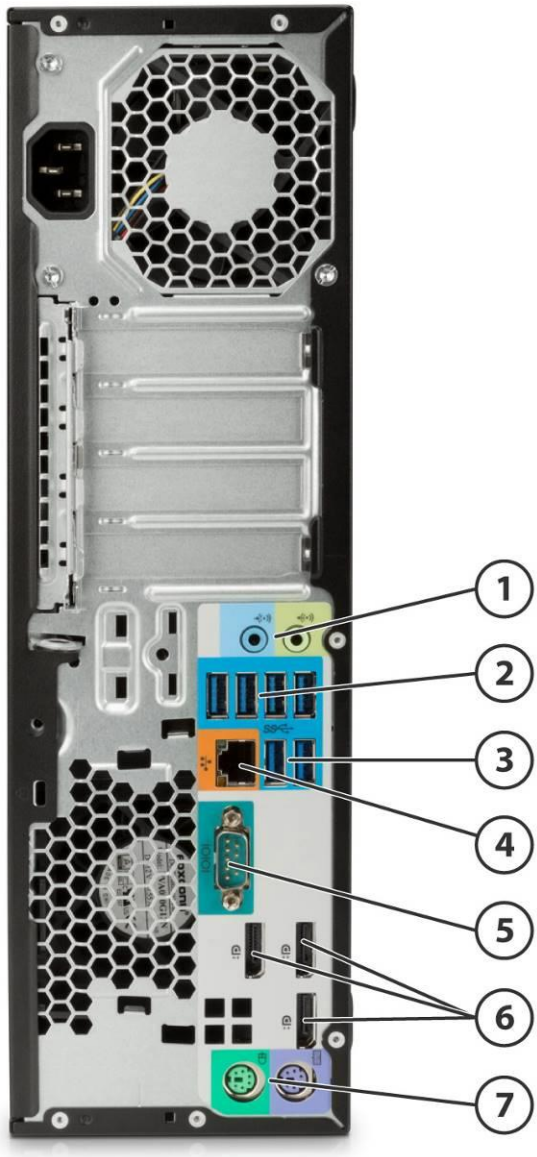
Overview

HP Z240 SFF Workstation



1. Power button
2. Slim ODD bay
3. External/internal shared 3.5" bay
4. Optional SD Card Reader
5. 1 USB 2.0 battery charging port
6. 1 USB 2.0 port
7. 2 USB 3.0 (blue) ports
8. Microphone/Headphone
9. Headphone

Overview



1. 1 Audio Line In, 1 Audio Line Out
2. 4 USB 3.0
3. 2 USB 3.0
4. RJ-45 to integrated GBE
5. 1 serial port
6. 3 DisplayPort (DP 1.2) outputs from Intel® HD graphics (available on specific processors only)
7. PS/2 ports (keyboard, mouse)

Supported Components

Form Factor

Small Form Factor

Operating Systems

Preinstalled:

- Windows 10 Pro 64*
- Windows 7 Professional (available through downgrade rights from Windows 10 Pro 64)**
- Windows 10 Home 64
- Windows 7 Professional 64
- HP Linux®-ready
- Red Hat® Enterprise Linux® Workstation (1 year paper license available; Preinstall not available)

Supported:

- Windows 10 Enterprise 64
- Windows 8.1 Enterprise 64
- Windows 8.1 Pro 64
- Windows 7 Enterprise 32/64
- Windows 7 Professional 32[1]
- Red Hat® Enterprise Linux® Desktop 6, 7
- SUSE Linux® Enterprise Desktop 11 SP4, 12 SP1

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

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

NOTE: For detailed OS/hardware support information for Linux®, see: http://www.hp.com/support/linux_hardware_matrix

NOTE 1: Windows 7 Professional 32 bit has limited configuration support on the Z240

Processors

Name	Cores	Clock Speed (GHz)	Intel® Turbo Boost Technology[1]	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Integrated Graphics	Featuring Intel® vPro™ Technology	TDP (W)
Intel® Xeon® processor E3-1280v5	4	3.7	4.0	8	2133	Y	N/A	Y	80W
Intel® Xeon® processor E3-1270v5	4	3.6	4.0	8	2133	Y	N/A	Y	80W
Intel® Xeon® processor E3-1245v5	4	3.5	3.9	8	2133	Y	Intel HD Graphics P530	Y	80W
Intel® Xeon® processor E3-1240v5	4	3.5	3.9	8	2133	Y	N/A	Y	80W
Intel® Xeon® processor E3-1230v5	4	3.4	3.8	8	2133	Y	N/A	Y	80W

Supported Components

Intel® Xeon® processor E3-1225v5	4	3.3	3.7	8	2133	N	Intel HD Graphics P530	Y	80W
Intel® Core™ i7-6700 processor	4	3.4	4.0	8	2133	Y	Intel HD Graphics 530	Y	65W
Intel® Core™ i5-6600 processor	4	3.3	3.9	6	2133	N	Intel HD Graphics 530	Y	65W
Intel® Core™ i5-6500 processor	4	3.2	3.6	6	2133	N	Intel HD Graphics 530	Y	65W
Intel® Core™ i3-6300 processor	2	3.8	N/A	4	2133	Y	Intel HD Graphics 530	N	51W
Intel® Core™ i3-6100 processor	2	3.7	N/A	3	2133	N	Intel HD Graphics 530	N	51W
Intel® Pentium™ G4400 processor	2	3.3	N/A	3	2133	N	Intel HD Graphics 510	N	54W

[1]The specifications shown in this column represent the maximum turbo frequency with one core active. Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A.

NOTES: Integrated Intel® HD graphics P530 is not supported on all Intel® Xeon E3 processors

Intel® Xeon E3, Intel® Core™ i3 and Intel® Pentium® processors can support either ECC or non-ECC memory; Intel® Core™ i5/i7 processors only support non-ECC memory.

Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details.

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

Color Black

Convertibility The Z240 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 PCIe Gen3 x16 slot
1 PCIe Gen3 x1 slot /x1 connector
1 PCIe Gen3 x1 slot /x1 connector
1 PCIe Gen3 x4 slot /x16 connector
1 M.2 slot (PCIe Gen3 x4)*

(all slots are Low Profile)

NOTE: The PCIe Gen 3 x16 slot is meant for HP qualified cards, configured or after market. HP does not provide warranty support for 3rd party cards.

* M.2 slot supports compatible devices up to 80mm

Expansion Bays
1 shared internal/external 3.5" bay.
1 internal 3.5" bay
1 internal 2.5" bay (for SSD only)

Supported Components

Front I/O	2 USB 3.0, 1 USB 2.0, 1 USB 2.0 Charging Data Port, 1 Headphone, and 1 Microphone/Headphone;
Internal I/O	1 USB 3.0 and 2 USB 2.0 ports available as 2 separate 2x6(3.0 x1, 2.0 x1) and 1x6(2.0 x1) header: supports one HP Internal USB 2.0 Port Kit and one USB 3.0 Media Card Reader.
Rear I/O	3 DisplayPort (DP 1.2) outputs from Intel® HD graphics (available on specific processors only); 6 USB 3.0 ports, 1 serial port (standard), 2 PS/2, RJ-45 (LoM), 1 Audio Line-in, and 1 Audio Line-out.
Interfaces Supported	SD Media Card Reader (optional)
Chassis Dimensions (H x W x D)	Standard desktop orientation: 100 x 338 x 381 mm (3.95 x 13.3 x 15.0 in); Optional SFF Tower orientation (excluding stand dimension): 338 x 100 x 381 mm (13.3 x 3.95 x 15.0 in)
Weight	Exact weights depend upon configuration Minimum Weight: 5.7 kg (12.66 lb) Typical Weight*: 6.7 kg (14.86 lb) Maximum Weight: 7.7 kg (16.93 lb) Max Supported Weight (desktop orientation): 35 kg (77 lb) * Configured with 2 3.5" hard drives, 1 optical drive, 2 DIMMs and 1 NVIDIA Quadro K620 graphics card
Temperature	Operating: 40° to 95°F (5° to 35°C) Non-operating: -40° to 140°F (-40° to 60°C) **NOTES:** Derate the maximum operating temperature by one degree C (1.8 degrees F) for every 305m (1,000 ft) altitude over 1,524m (5,000 ft).
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	240W 92% Efficiency wide-ranging, active Power Factor Correction (PFC) 200W 85% Efficiency wide-ranging, active PFC Power Supply option available in some countries. **NOTE:** The Power Supply Efficiency Report for the 240W, 92% efficiency power supply may be found at this link: TBD
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
Chipset	Intel® C236 chipset
Memory	4 DIMM slots, supporting up to 64GB ECC/non-ECC, DDR4 2133 MT/s

The CPUs determine the speed at which the memory is clocked. If a 2133 MT/s capable CPU is used in the system, the maximum speed the memory will run at is 2133 MT/s regardless of the specified speed of the memory.
Note: Transfer rates up to 2133 MT/s

Workstation ISV Certifications	See the latest list of certifications at http://www.hp.com/united-states/campaigns/workstations/partnerships.html

Supported Components

Supported Components

Processors	Factory Configured	Option Kit
Intel® Xeon® processor E3-1200 v5 family		N
Intel Xeon E3-1225 v5 3.3 2133 4C CPU	Y	N
Intel Xeon E3-1245 v5 3.5 2133 4C CPU	Y	N
Intel Xeon E3-1270 v5 3.6 2133 4C CPU	Y	N
Intel Xeon E3-1230 v5 3.4 2133 4C CPU	Y	N
Intel Xeon E3-1240 v5 3.5 2133 4C CPU	Y	N
Intel Xeon E3-1280 v5 3.7 2133 4C CPU	Y	N
6th generation Intel® Core™ processor family		
Intel® Core™ i7-6700 3.4 2133 4C CPU	Y	N
Intel® Core™ i7-6600 3.3 2133 4C CPU	Y	N
Intel® Core™ i7-6500 3.2 2133 4C CPU	Y	N
6th generation Intel® Core™ i3/Pentium processor family		
Intel Core i3-6100 3.7 2133 2C CPU	Y	N
Intel Core i3-6300 3.8 2133 2C CPU	Y	N
Intel Pentium G4400 3.3 2133 2C CPU	Y	N

NOTE 1: Intel Integrated Graphics P530 for Xeon processors supports workstation-specific graphics drivers for improved compatibility and performance on select professional applications, compared to Intel HD Graphics 530.
NOTE 2: These processors support either ECC or non-ECC memory
NOTE 3: These processors support only non-ECC memory

Monitors / Displays	Factory Configured	Option Kit	Option Kit Part Number
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			
HP DreamColor Z24x Professional Display			
HP DreamColor Z27x Professional Display			

SATA Hard Drives	Factory Configured	Option Kit	Option Kit Part Number
500GB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA
1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA
2TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA
3TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QF298AA
500GB SATA 7.2K SED SFF HDD	Y	N	(N/A as AMO)
1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)	Y	Y	M7S54AA

SATA Solid State Drives

Supported Components

	HP 128GB SATA 6Gb/s SSD	Y	Y	A3D25AA
	HP 256GB SATA 6Gb/s SSD	Y	Y	A3D26AA
	HP 512GB SATA 6Gb/s SSD	Y	Y	D8F30AA
	HP 1TB SATA 6Gb/s SSD	Y	Y	F3C96AA
	HP 256GB SATA 6Gb/s SED Opal 2 SSD	Y	Y	G7U67AA
	HP Enterprise Class 240GB SATA SSD	Y	Y	T3U07AA
	HP Enterprise Class 480GB SATA SSD	Y	Y	T3U08AA

PCIe SSDs	PCIe SSDs for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number
	HP Z Turbo Drive G2 128GB SSD*	Y	Y	(N/A as AMO)
	HP Z Turbo Drive G2 256GB SSD*	Y	Y	M1F73AA
	HP Z Turbo Drive G2 512GB SSD*	Y	Y	M1F74AA
	HP Z Turbo Drive G2 1TB SSD*	Y	Y	T9H98AA
	HP Z Turbo Drv G2 256GB PCIe SSD (Z240 MB) **	N	Y	T6U42AA
	HP Z Turbo Drv G2 512GB PCIe SSD (Z240 MB) **	N	Y	T6U43AA
	HP Z Turbo Drv G2 1TB PCIe SSD (Z240 MB) **	N	Y	W6C19AA

* PCIe card installed in standard PCIe x4 slot
** Installed in native M.2 slot on Z240 motherboard

NOTE: The HP Z240 SFF is capable of configuring up to 2 Z Turbo Drives. By default, the 1st Z Turbo Drive configured will be installed in the M.2 slot on the system's motherboard. The 2nd Z Turbo drive will be installed via PCIe card into the PCIe Gen 3 x4 slot.
The HP Z Turbo Drive G2 (NVMe) is not supported with Windows 7 32-bit.

NOTE 1: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB (for Windows 10) of system disk is reserved for system recovery software.

Supported Components

Hard Drive Controllers		Factory Configured	Option Kit
	Integrated SATA Controller (Z240)		
	Integrated SATA Controller, RAID 0,1 supported: 4x 6 Gb/s ports	Y	N
	RAID 0 Configuration – Striped Array[1]	Y	N
	RAID 1 Configuration – Mirrored Array[1]	Y	N

NOTE 1: Windows OS only; Supported only with two drives of identical type and capacity.

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.

Graphics		Factory Configured	Option Kit	Option Kit Part Number	Supported # of cards
Integrated Graphics	**Integrated Intel HD Graphics (Z240)**				
	Intel® HD Graphics P530	Y	N		1
	Intel® HD Graphics 530	Y	N		1
Professional 2D	NVIDIA® NVS™ 310 1GB Graphics[1]	Y	Y	M6V51AA	1
	NVIDIA® NVS™ 315 1GB Graphics	Y	Y	E1U66AA	2
	NVIDIA® NVS™ 510 2GB Graphics[2]	Y	Y	C2J98AA	1
Graphics DisplayPort Cable Adapters	HP DisplayPort To DVI-D Adapter	Y	Y	FH973AA	1
	HP DisplayPort To DVI-D Adapter (2-Pack)	Y	N		1
	HP DisplayPort To DVI-D Adapter (4-Pack)	Y	N		1
	HP DisplayPort To VGA Adapter	Y	Y	AS615AA	1
	HP DisplayPort to Dual Link DVI Adapter	Y	Y	NR078AA	1
Entry 3D	AMD FirePro™ W2100 2GB Graphics	Y	Y	J3G91AA	1
	NVIDIA® Quadro® K420 2GB Graphics	Y	Y	N1T07AA	1
	NVIDIA® Quadro® K620 2GB Graphics	Y	Y	J3G87AA	1
Mid-range 3D	AMD FirePro™ W4300 4GB Graphics	Y	Y	T7T58AA	1
	NVIDIA® Quadro® K1200 4GB Graphics	Y	Y	L4D16AA	1

NOTE 1: Intermixing integrated Intel HD graphics and discrete graphics cards in order to drive more than three displays can be enabled using the Computer (F10) Setup Utility. However, HP recommends using only discrete graphics when four or more displays are required to be supported. Utility.

Supported Components

Memory

DDR4-2133 ECC Unbuffered DIMMs - CTO

HP 64GB (4x16GB) DDR4-2133 ECC RAM
HP 32GB (2x16GB) DDR4-2133 ECC RAM
HP 32GB (4x8GB) DDR4-2133 ECC RAM
HP 16GB (2x8GB) DDR4-2133 ECC RAM
HP 8GB (1x8GB) DDR4-2133 ECC RAM
HP 8GB (2x4GB) DDR4-2133 ECC RAM
HP 4GB (1x4GB) DDR4-2133 ECC RAM

DDR4-2133 non-ECC Unbuffered DIMMs - CTO

HP 64GB (4x16GB) DDR4-2133 non-ECC RAM
HP 32GB (2x16GB) DDR4-2133 non-ECC RAM
HP 32GB (4x8GB) DDR4-2133 non-ECC RAM
HP 16GB (2x8GB) DDR4-2133 non-ECC RAM
HP 8GB (1x8GB) DDR4-2133 non-ECC RAM
HP 8GB (2x4GB) DDR4-2133 non-ECC RAM
HP 4GB (1x4GB) DDR4-2133 non-ECC RAM

NOTES: Intel® Xeon E3, Intel® Core™ i3 and Intel® Pentium® processors can support either ECC or non-ECC memory; Intel® Core™ i5/i7 processors only support non-ECC memory.

Two channels of DDR4 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 2133 MHz capable CPU is used in the system, the maximum speed the memory will run at is 2133 MHz regardless of the specified speed of the memory.

Transfer rates up to 2133 MT/s

AMO	Option Kit Part Number
DDR4-2133 ECC Unbuffered DIMMs - AMO	
HP 4GB (1x4GB) DDR4-2133 ECC RAM	N0H86AA
HP 8GB (1x8GB) DDR4-2133 ECC RAM	N0H87AA
HP 16GB (1x16GB) DDR4-2133 ECC RAM	N0H88AA
DDR4-2133 non-ECC Unbuffered DIMMs - AMO	
HP 4GB (1x4GB) DDR4-2133 non-ECC RAM	T0E50AA
HP 8GB (1x8GB) DDR4-2133 non-ECC RAM	T0E51AA
HP 16GB (1x16GB) DDR4-2133 non-ECC RAM	T0E52AA

NOTE: Only unbuffered DDR4 DIMMs are supported.

Multimedia and Audio Devices	Factory Configured	Option Kit	Option Kit Part Number

Supported Components

	Integrated Realtek HD ALC221-VB Audio	Y	N

Optical and Removable Storage		Factory Configured	Option Kit	Option Kit Part Number
	HP SlimTray Optical Drives			
	HP 9.5mm Slim SuperMulti DVD Writer	Y	Y	K3R64AA
	HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA
	HP 9.5mm Slim BDXL Blu-Ray Writer	Y	Y	K3R65AA
	HP SD Media Card Reader			
	HP SD Media Card Reader	Y	N	
	HDD Frame/Carriers			
	HP DP25 Removable 2.5" HDD Frame/Carrier	N	Y	W3J84AA
	HP DP25 Removable 2.5" HDD Spare Carrier	Y	Y	W3J85AA

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. With Blu-ray, 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
	HP Thunderbolt™ 2 PCIe 1-port I/O Card	Y	Y	F3F43AA

Note 1: Four USB 3.0 ports are available integrated on the motherboard (2 front, 2 rear). Integrated USB 3.0 ports are supported under Microsoft Windows 10, Microsoft Windows 7 or Microsoft Windows 10 operating systems only.

Networking and Communications		Factory Configured	Option Kit	Option Kit Part Number
	Integrated Intel I219LM PCIe GbE Controller (Intel® vPro™ with Intel AMT 11.0)	Y	N	
	Intel® Ethernet I210-T1 PCIe NIC[3,4]	Y	Y	E0X95AA
	Intel 8260 802.11 a/b/g/n/ac with Bluetooth® 4.2 PCIe NIC	N	Y	N0S95AA
	Intel Ethernet I350-T2 2-Port 1Gb NIC	Y	Y	V4A91AA

NOTE 1: The integrated network connection is required to support Intel vPro™ Technology.
NOTE 2: If AMT is provisioned, then network teaming with the integrated LAN port is not possible.
NOTE 3: "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.
NOTE 4: The Intel Ethernet I210-T1 PCIe NIC is supported on the following operating systems:
- Microsoft Windows 7 and Windows 10 64-bit versions
- Red Hat Enterprise Linux(RHEL)

Supported Components

Racking and Physical Security		Factory Configured	Option Kit	Option Kit Part Number
	HP Solenoid Lock and Hood (SFF) Sensor	Y	Y	E0X97AA
	HP Business PC Security Lock Kit*	N	Y	PV606AA
	HP UltraSlim Cable Lock Kit	N	Y	H4D73AA

* The HP Business PC Security Lock Kit does not work with the Integrated Work Center stand.

Input Devices		Factory Configured	Option Kit	Option Kit Part Number
	HP USB 1000dpi Laser Mouse	Y	Y	QY778AA
	HP USB Optical 3-Button Mouse	Y	Y	DY651A
	HP USB Optical Mouse	Y	Y	QY777AA
	HP PS/2 Mouse	Y	Y	QY775AA
	HP USB Hardened Mouse	Y	Y	P1N77AA
	3Dconnexion CADMouse	Y	Y	M5C35AA
	HP USB CCID SmartCard Keyboard	Y	Y	BV813AA
	HP USB Business Slim Keyboard	Y	Y	N3R87AA
	HP PS/2 Business Slim Keyboard	Y	Y	N3R86AA
	HP Wireless Business Slim Keyboard	Y	Y	

Other Hardware		Factory Configured	Option Kit	Option Kit Part Number
	HP Power Cord Kit	N	Y	DM293A
	HP Workstation Mouse Pad (Japan only)	Y	N	
	HP Serial Port Adapter	Y	Y	PA716A
	HP ENERGY STAR® Qualified Configuration	Y	N	
	HP PCIe x1 Parallel Port Card	N	Y	N1M40AA
	HP Internal USB Port Kit	N	Y	EM165AA
	HP (SFF) Tower Stand	Y	Y	VN569AA
	Z240 SFF Dust Filter	Y	Y	M6W76AA

Software		Factory Configured	Option Kit	Support Notes
	HP Performance Advisor	Y	N	See Note 1
	HP Remote Graphics Software (RGS) 7.1	Y	N	
	PDF Complete - Corporate Edition	Y	N	
	Cyberlink PowerDVD and Power2Go	Y	N	
	HP PC Hardware Diagnostics UEFI (Windows OS only)	Y	N	
	HP Client Security Software	Y	Y	

NOTE 1: Supports, and preinstalled with, Windows 7 and Windows 10 only. Also available as a free download from http://www.hp.com/go/performanceadvisor
NOTE 2: Supported Operating Systems:

Supported Components

- Windows 7 Professional
- Windows 10 Pro

Operating Systems

Windows® 7 Professional 64-bit
Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)
Windows 10 Pro 64
Windows 7 Professional (available through downgrade rights from Windows 10 Professional)
Windows 10 Home 64
Windows 7 Professional 64-bit (National Academic)

See http://www.microsoft.com/windows/windows-7/for support details.
See http://www.redhat.com/rhel/desktop/

HP BIOS

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Z240 Workstation into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Update your BIOS via the cloud or standardize on a BIOS version hosted on Enterprise network.
- Z240 Workstations feature Intel® Standard Manageability or Intel® vPro™ Processor Technology (support varies depending on processor selected)
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- UEFI specification 2.4
- Absolute Persistence agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Z240 Workstation in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Z240 Workstations, including BIOS updates from within DOS (DOSFlash), BIOS updates from within Windows, and fail-safe recovery. In addition, the HP Workstation BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features:

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.

- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Workstation models use ACPI to provide power conservation features.

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

Sure Start

- BIOS Integrity checking – Sure Start protection ensures that only trusted BIOS code is executed and not rootkits, viruses and malware. Verification is done upon boot up, shutdown and while on.
- Sure Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability.
- Protecting beyond BIOS – Integrity checking and repair is extended to other data that should be protected such as network configuration parameters (network name), platform specific information (i.e. system IDs) and other code the system needs to boot.
- Audit enabled – System Audit via Sure Start Event Logs capture data such as incident, repair date and time for troubleshooting and investigating.

Supported Components

SECURITY

Description	Supported
Trusted Platform Module, SLB9670TT1.2FW4.40 (TPM) 1.2 (Common Criteria EAL4+ certified), Field upgradeable to 2.0	X
SATA port disablement (via BIOS)	X
Drive lock	X
RAID configurations	X
Intel® Identify Protection Technology (IPT)1	X
Serial, parallel, USB enable/disable (via BIOS)	X
Optional USB Port Disable at factory (user configurable via BIOS)	X
Removable media write/boot control	X
Power-On password (via BIOS)	X
Setup password (via BIOS)	X
Solenoid Hood Lock	X
Hood Sensor	X
Support for chassis padlocks devices	X
Support for chassis cable lock devices	X

1. Models configured with Intel® Core™ processors have the ability to utilize advanced security protection for online transactions. IPT, used in conjunction with participating web sites, provides double identity authentication by adding a hardware component in addition to the usual user name and password. IPT is initialized through an HP Client Security module.

System Board

System Board Form Factor	ATX 24.38 x 24.38 mm (9.6 x 9.6 inches)
Processor Socket	Single LGA 1151
CPU Bus Speed	DMI
Chipset	Intel® PCH C236
Memory Expansion Slots	4 DDR4 memory slots
Memory Type Supported	DDR4, UDIMM (Unbuffered), ECC& non-ECC
Memory Modes	Non-Interleaved for single channel. Interleaved when both channels are populated.
Memory Speed Supported	2133MT/s DDR4
Memory Protection	ECC available on data
Maximum Memory	64GB
Memory Configuration (Supported)	4GB, 8GB and 16GB non-ECC/ 4GB, 8GB and 16GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed on the same system. **NOTE:** * Maximum memory capacities assume 64-bit operating systems, such as 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 PCI Express Gen3 slot x16 mechanical/ x16 electrical (LP, half length) • 1 PCI Express Gen3 slot x1 mechanical/ x1 electrical (LP, half length) • 1 PCI Express Gen3 slot x1 mechanical/ x1 electrical (LP, half length) • 1 PCI Express Gen3 slot x16 mechanical/ x4 electrical (LP, half length) • 1 M.2 slot (PCIe Gen3 x4)[1] **NOTE:** LP = Low Profile **NOTE:** In the PCIe Gen3 slot (x16 electrical/x16 mechanical) slot, if it is not being used for a graphics card, only cards certified as After Market Options for this platform are supported. **NOTE 1:** M.2 slot supports compatible devices up to 80mm

Supported Drive Interfaces	**SATA**	Integrated (4) Serial ATA interfaces (6Gb/s SATA). RAID 0 and 1 supported. Factory integrated RAID for Microsoft Windows only.
	Serial Attached SCSI	None
	Integrated RAID	**NOTE:** Requires identical hard drives (speeds, capacity, interface)
	Integrated Graphics	Intel HD Graphics 530 (on Core i3/i5/i7-6xxx processors); Intel Integrated Graphics for Xeon E3 processors Based on Unified Memory Architecture (UMA) - A region of system memory is reserved and dedicated to the graphics display. Support for Microsoft® DirectX 11, OpenGL 4.0 and OpenCL 1.2 on Intel® HD Graphics P530; 3 DP 1.2 graphics ports integrated on motherboard; Supports up to three simultaneous displays across DP outputs. Max. resolution supported: 3840x2160 @60Hz
	Network Controller	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 11.0
	IDE connector	No
	Floppy connector	No

System Technical Specifications

	Serial	1 rear port
	2nd Serial	Yes- requires optional Serial Port Adapter Kit
IEEE 1394 Connector(s)		
USB Connector(s)	**Front**	2 USB 3.0, 2 USB 2.0
	Rear	6 USB 3.0
	Internal	1 USB 3.0, 2 USB 2.0
HD Integrated Audio	Yes	
Flash ROM	Yes	
Chassis Fan Header	Not applicable	
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	

System Configurations							
Z240 SFF Configuration #1	**Processor Info**	1x Intel Core i3-6100 3.7 3MB 51W CPU					
	Memory Info	4GB (1x 4GB) 2133 MHz DDR4 non-ECC					
	Graphics Info	Intel HD Integrated Graphics 530					
	Disks/Optical/Floppy	1x SATA 500 GB 7.2k rpm/ 1x 9.5mm Slim ODD					
	PSU	200W 85%					
	Other						
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	15.42 W		16.63 W		15.48 W	
	Windows short Idle (S0)	16.31 W		17.137 W		16.39 W	
	Windows Busy Typ (S0)	68.36 W		61.32 W		68.24 W	
	Windows Busy Max (S0)	90.559 W		89.05 W		90.882 W	
	Sleep (S3)	2.46 W	2.41 W	2.624 W	2.598 W	2.47 W	2.46 W
	Off (S5)	*1.11 W*	*1.09 W*	*1.26 W*	1.258 W	1.09 W	1.06 W
	Zero Power Mode (EuP)	0.289 W		0.406 W		0.289 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)	52.615 btu/hr		56.744 btu/hr		52.82 btu/hr	
	Windows short Idle (S0)	55.652 btu/hr		58.474 btu/hr		55.925 btu/hr	
	Windows Busy Typ (S0)	233.254 btu/hr		209.232 btu/hr		232.844 btu/hr	
	Windows Busy Max (S0)	309 btu/hr		303.851 btu/hr		310.102 btu/hr	
	Sleep (S3)	8.39 btu/hr	8.22 btu/hr	8.95 btu/hr	8.86 btu/hr	8.43 btu/hr	8.39 btu/hr
	Off (S5)	3.79 btu/hr	3.72 btu/hr	4.3 btu/hr	4.29 btu/hr	3.72 btu/hr	3.62 btu/hr

System Technical Specifications

	Zero Power Mode (EuP)	0.986 btu/hr		1.385 btu/hr		0.986 btu/hr	
Z240 SFF Configuration #2 ENERGY STAR® QUALIFIED	**Processor Info**	1x Intel Core i5-6500 3.2 6MB 65W CPU					
	Memory Info	8GB (2x 4GB) 2133 MHz DDR4 ECC					
	Graphics Info	1x NVIDIA Quadro K620 1GB Graphics					
	Disks/Optical/Floppy	1x SATA 1 TB 7.2k rpm/ 1x9.5mm Slim ODD					
	PSU	240W 92%					
	Other						
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	24.212 W		23.392 W		22.88 W	
	Windows short Idle (S0)	25.092 W		25.463 W		25.24 W	
	Windows Busy Typ (S0)	82.3 W		81.8 W		82.6 W	
	Windows Busy Max (S0)	146.9 W		145.2 W		149.11 W	
	Sleep (S3)	2.892 W	2.652 W	2.907 W	2.884 W	2.69 W	2.652 W
	Off (S5)	1.248 W	1.1 W	*1.278 W*	1.25 W	1.08 W	1.07 W
	Zero Power Mode (EuP)	0.289 W		0.406 W		0.289 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)	82.615 btu/hr		79.817 btu/hr		78.07 btu/hr	
	Windows short Idle (S0)	85.617 btu/hr		79.48 btu/hr		86.122 btu/hr	
	Windows Busy Typ (S0)	280.819 btu/hr		279.113 btu/hr		281.843 btu/hr	
	Windows Busy Max (S0)	501.243 btu/hr		495.443 btu/hr		508.784 btu/hr	
	Sleep (S3)	9.87 btu/hr	9.05 btu/hr	9.92 btu/hr	9.84 btu/hr	9.18 btu/hr	9.05 btu/hr
	Off (S5)	4.26 btu/hr	3.75 btu/hr	4.36 btu/hr	4.27 btu/hr	3.69 btu/hr	3.65 btu/hr
	Zero Power Mode (EuP)	0.996 btu/hr		1.399 btu/hr		0.962 btu/hr	
Z240 SFF Configuration #3	**Processor Info**	1x Intel Xeon E3-1280v5 3.7 8MB 80W CPU					
	Memory Info	64GB (4x16GB) 2133 MHz DDR4 ECC					
	Graphics Info	1x NVIDIA Quadro K1200 4GB Graphics					
	Disks/Optical/Floppy	2x 512GB Z Turbo Drive G2 PCIe SSDs / 1x9.5mm Slim ODD					
	PSU	240W 92%					
	Other						
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	28.374 W		26.488 W		27.438 W	
	Windows short Idle (S0)	28.735 W		28.836 W		28.972 W	
	Windows Busy Typ (S0)	116.51 W		114.42 W		116.92 W	
	Windows Busy Max (S0)	172.488 W		170.592 W		173.808 W	
	Sleep (S3)	3.986 W	3.966 W	4.092 W	4.072 W	4.004 W	3.969 W
	Off (S5)	1.062 W	1.059 W	1.154 W	1.129W	1.042 W	1.038 W
	Zero Power Mode (EuP)	0.211 W		0.286 W		0.206 W	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled

System Technical Specifications

	Windows Idle (S0)	96.816 btu/hr		90.381 btu/hr		93.622 btu/hr	
	Windows short Idle (S0)	98.048 btu/hr		98.392 btu/hr		98.857 btu/hr	
	Windows Busy Typ (S0)	397.548 btu/hr		390.417 btu/hr		398.947 btu/hr	
	Windows Busy Max (S0)	588.553 btu/hr		582.084 btu/hr		593.057 btu/hr	
	Sleep (S3)	13.6btu/hr	13.53btu/hr	13.96btu/hr	13.89btu/hr	13.66btu/hr	13.54btu/hr
	Off (S5)	3.62 btu/hr	3.61 btu/hr	3.94 btu/hr	3.85 btu/hr	3.56btu/hr	3.54btu/hr
	Zero Power Mode (EuP)	0.72 btu/hr		0.976 btu/hr		0.703 btu/hr	

Power Supply	240W, 92% efficiency, wide-ranging, active PFC Power Supply; (**Note:** 200W 85% Efficiency wide-ranging, active PFC Power Supply option available in some countries). The Z240 SFF 92% PSU Efficiency Report can be found at this link: TBD

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 @ 100-240V
Heat Dissipation	Typical: 444 btu/hr (112 kcal/hr) Maximum: 890 btu/hr (224 kcal/hr)
Power Supply Fan	70mm x 70mm x 25 mm 4-wire PWM
ENERGY STAR® qualified (Config Dependent)	Yes
FEMP Standby Power Compliant	Yes, with Wake-on-LAN disabled: <2W in S5- Power Off
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes

Declared Noise Emissions (Entry-level and High-end configurations)

System Configuration (Entry level)	**Processor Info**	Intel Core i5-6500 3.2GHz
	Memory Info	1 - 4 GB DDR4 2133 MHz ECC RAM
	Graphics Info	iGfx
	Disks/Optical	Single 1 TB 7200 RPM SATA Blu-ray DVD-RW

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.2	21
	Hard drive Operating (random reads)	3.3	22
System Configuration (High-end)	**Processor Info**	Intel Xeon E3-1280 V5 3.70 GHz	
	Memory Info	4 - 8GB DDR4 2133 MHz ECC RAM	

System Technical Specifications

	Graphics Info	AMD W2100	
	Disks/Optical	Dual 2 TB 7200 RPM SATA Blu-ray DVD-RW	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.4	25
	Hard drive Operating (random reads)	3.4	25
	DVD-ROM Operating (sequential reads)		

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
Hard Drives	Tool-less (Internal bays)
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	Consists of an operating system DVD (OSDVD) and a driver DVD (DRDVD). OSDVD restores the original operating system. DRDVD will provide all drivers for the system. The DRDVD may also contain applications that originally shipped with the system for optional installation. Applications can also be obtained from HP.com. OSDVD and DRDVD are orderable with the system and available from 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
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

System Technical Specifications

	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, parallel, 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
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
Front Power Button	Yes, ACPI multi-function
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection
Power Supply Fans	70mm x 70mm x 25mm 4-wire PWM (non-serviceable)
CPU Heatsink Fan	Mainstream (<=65W): 93mm x 86mm 75.8mm Performance (<=95W): 93mm x 102.7mm x 75.8mm
Chassis Fan	Not applicable. CPU heatsink fan also operates as the chassis fan.
Memory Heatsink Fan	No
HP PC Hardware Diagnostics UEFI	HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support.
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	No
Power Supply	Requires T15 Torx or flat blade screwdriver
PCI Card Retention	Yes, rear (all), middle (none), front (none)
Flash ROM	Yes

System Technical Specifications

Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes

System Technical Specifications

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. Provides more control over how and from what devices the workstation will boot.
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 Power On	Users can define a specific day-of-week 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.
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. Updates can be performed before starting the OS. Updates can be periodically scheduled.
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.
ASF 2.0 Compliant	No.
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.

System Technical Specifications

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	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) 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 11.0; 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 Recovery)	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 "bricked" when a BIOS update is interrupted.
Industry Standard Specification Support	
Industry Standard	Revision Supported by the BIOS
UEFI Specification Revision	UEFI 2.4.0
ACPI	Advanced Configuration and Power Management Interface, Version 4.0
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
PCI Express	PCI Express Base Specification, Revision 2.0; PCI Express Base Specification, Revision 3.0.
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 1.0a - 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 (TPM 2.0 via Firmware Update)
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.0 Specification

Social and Environmental Responsibility

Eco-Label Certifications & Declarations This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen.

- ENERGY STAR® (energy-saving features available on selected configurations -Windows only)

System Technical Specifications

- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program (CECP)
- 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
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, as well as the following customer-configurable internal components: Creative Recon3D PCIe Audio Card is not Low Halogen. 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:
Living Progress 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 registered in the U.S. EPEAT registration varies by country. See http://www.epeat.net for registration status by 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 formatting

Packaging Materials	
Internal	Cushions made from fabricated recycled expanded-polyethylene (EPE) or recycled expanded-polypropylene (EPP). May also be made from recycled molded paper-pulp (MPP).
External	Carton made from corrugated fiberboard with at least 25% recycled content.

System Technical Specifications

Manageability

Intel® Active Management Technology (AMT)

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 11.0 includes the following advanced management functions:

- Power Management (on, off, standby, reset)
- Hardware/Software Inventory (includes BIOS and firmware revisions
- Hardware Alerting
- Agent Presence
- System Defense Filters
- SOL (Serial Over LAN)
- 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
- Protected Audio Video Path (PAVP)
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Enhanced KVM resolution (Up to 4K)

Intel® vPro™™ Technology

The HP Z240 workstations support Intel® vPro™ technology when purchased with a vPro™ technology capable CPU: Intel® Xeon® processor family or 6th Generation Intel® Core i5/i7 processors with Intel® VT-d/VT-x and Intel® TXT technology

Remote Manageability Software Solutions

Visit: http://www.hp.com/go/easydeploy

System Software Manager

Visit: http://www.hp.com/go/ssm

Service, Support, and Warranty

- 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.

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**
	N2K97AV	Intel Xeon E3-1225v5 3.3 8M GT2 4C SFF
	N2L00AV	Intel Xeon E3-1240v5 3.5 8M GT0 4C SFF
	N2K98AV	Intel Xeon E3-1245v5 3.5 8M GT2 4C SFF

Hard Drives	**Product #**	**Offering**
	M6U81AV	500GB 7200 RPM SATA 1st HDD
	M6U90AV	500GB 7200 RPM SATA 2nd HDD
	M6U82AV	1TB 7200 RPM SATA 1st HDD
	M6U91AV	1TB 7200 RPM SATA 2nd HDD

Graphics	**Product #**	**Offering**
	M6Q36AV	NVIDIA NVS 510 2GB 1st GFX
	M6Q40AV	NVIDIA Quadro K620 2GB 1st GFX
	M6Q32AV	AMD FirePro W2100 2GB 1st GFX

Memory	**Product #**	**Offering**
	M6Q57AV	4GB DDR4-2133 ECC (1x4GB) RAM
	M6Q58AV	8GB DDR4-2133 ECC (2x4GB) RAM
	M6Q59AV	8GB DDR4-2133 ECC (1x8GB) RAM
	M6Q60AV	16GB DDR4-2133 ECC (2x8GB) RAM
	M6Q61AV	32GB DDR4-2133 ECC (4x8GB) RAM

Optical and Removable Storage	**Product #**	**Offering**
	L8S24AV	16X SuperMulti DVDRW SATA 1st ODD

Technical Specifications - Processors

Intel® Xeon® processor E3-1200 v5 family

Intel Xeon E3-1280 v5 3.7 2133 4C CPU
Intel Xeon E3-1270 v5 3.6 2133 4C CPU
Intel Xeon E3-1245 v5 3.5 2133 4C CPU
Intel Xeon E3-1240 v5 3.5 2133 4C CPU
Intel Xeon E3-1230 v5 3.4 2133 4C CPU
Intel Xeon E3-1225 v5 3.3 2133 4C CPU

Intel® Core™ i7-6700 3.4 2133 4C CPU
Intel® Core™ i7-6600 3.3 2133 4C CPU
Intel® Core™ i7-6500 3.2 2133 4C CPU

Intel Core i3-6300 3.8 2133 2C CPU
Intel Core i3-6100 3.7 2133 2C CPU
Intel Pentium G4400 3.3 2133 2C CPU

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 600 MB/s	
		Buffer	32MB	
		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 (6.0 Gb/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	

Technical Specifications - Hard Drives

	Logical Blocks	3,907,029,168	
	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	4.0 in; 10.17 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 6.0 Gb/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	7200 rpm	
	Operating Temperature	41° to 140° F (5° to 60° C)	
500GB SATA 7.2K SED SFF HDD	**Capacity**	500GB	
	Height	0.275 in; 0.7 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	Serial ATA (6Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	32MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.6 ms
		Average	4.2 ms
		Full Stroke	25ms (typical)
	Rotational Speed	7200 rpm	
	Operating Temperature	32° to 140° F (0° to 60° C)	
1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)	**Capacity**	1TB	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB standard HDD cache buffer	
	Cache	8GB NAND flash	
	Rotational Speed	7,200 rpm	
	Operating Temperature	32° to 140° F (0° to 60° C)	

Technical Specifications - Hard Drives

HP SATA Solid State Drives (SSDs) for Workstations	**HP 128GB SATA 6Gb/s SSD**	**Capacity**	128GB	
		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 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 Opal 2 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 550MB/s (Sequential Read)	
		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	6Gb/s SATA	
		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	
		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)	
		Capacity	240GB	

Technical Specifications - Hard Drives

	HP Enterprise Class 240GB SATA SSD	**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 600MB/s	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP Enterprise Class 480GB SATA SSD	**Capacity**	480GB	
		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 600MB/s	
		Operating Temperature	32° to 158° F (0° to 70° C)	
PCIe SSDs for HP Workstations	**HP Z Turbo Drive G2 128GB SSD**	**Capacity**	128GB	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP Z Turbo Drive G2 256GB SSD	**Capacity**	256GB	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	

Technical Specifications - Hard Drives

HP Z Turbo Drive 512GB SSD	**Capacity**	512GB
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
HP Z Turbo Drive G2 1TB SSD	**Capacity**	1TB
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
HP Z Turbo Drv G2 256GB PCIe SSD (Z240 MB)	**Capacity**	256GB (one M.2 PCIe NVMe module)
HP Z Turbo Drv G2 512GB PCIe SSD (Z240 MB)	**Capacity**	512GB (one M.2 PCIe NVMe module)
HP Z Turbo Drv G2 1TB PCIe SSD (Z240 MB)	**Capacity**	1TB
	Interface	PCI Express 3.0 x4 electrical x4 physical

Technical Specifications - Graphics

Integrated Intel® HD* Graphics (Z240)	**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 10 Windows 7

*Integrated graphics will depend on processor. HD content required to view HD images

NVIDIA® NVS™310 1GB Graphics	**Form Factor**	Low Profile: 2.713 inches in height × 6.150 inches in length Weight: ~142 grams
	Graphics Controller	NVIDIA® NVS™310 GPU: GF119-825
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 1GBB DDR3 Clock: 875Mhz Memory Bandwidth: 14GB/s
	Connectors	2 x DisplayPort 1.2
	Maximum Resolution	Up to 2560 x 1600 (digital display) per display.
	Image Quality Features	See Display Output section. The following video formats are supported: • MPEG2 • MPEG4 Part 2 Advanced Simple Profile • H.264 SVC codec support • Support for 3D Blu Ray • VC1 • DivX version 3.11 and later • MVC A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS™ 310 GPU provides hardware acceleration

	for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.
Display Output	Up to 2 displays in the following configurations: DisplayPort output: • Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS™ 310 graphics card • Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology. DVI-D output: • Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors HDMI output: • NVS™ 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors VGA display output: • Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	DX11, OpenGL 4.1
Available Graphics Drivers	Windows 8.1 Windows 8 Windows 7 Professional (64-bit and 32-bit) Windows XP Professional (64-bit and 32-bit) Red Hat® Enterprise Linux® (RHEL) SUSE Linux® Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or the latest HP qualified drivers are 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	19.5 Watts
Note	1. The thermal solution used on this card is an active fan heatsink.

2. Factory configured NVS 310 graphics card have no cable adpaters included. Adapters must be ordered separately.
3. Option kit NVS 310 includes 2 DP to DVI-D cable adapters.
4. Configurations of three NVS 310 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications - Graphics

NVIDIA® NVS™ 315 1GB Graphics (for HP Workstations)	**Form Factor**	Low Profile: 2.713 inches in height × 5.7 inches in length
	Graphics Controller	NVIDIA® NVS™ 315 (using GF119-825 GPU) Number of Cores: 48 CUDA® cores Max. Power: 19.3W Cooling Solution: Active fan heatsink
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 1GB DDR3 Clock: 875Mhz Memory Bandwidth: 14GB/s
	Connectors	DMS-59 output Cables included: - For CTO: DMS-59 to DVI cable - For AMO: DMS-59 to DVI cable and DMS-59 to VGA cable
	Maximum Resolution	Maximum number of displays supported: 2 Maximum Resolution Support: - DMS-59 to VGA: 2048 x 1536 @ 85Hz - DMS-59 to DVI: 1980 x 1200 @ 60Hz - DMS-59 to DP: 2560 x 1600 @ 60Hz
	Image Quality Features	See Display Output section. The following video formats are supported: - MPEG2 - MPEG4 Part 2 Advanced Simple Profile - H.264 SVC codec support - Support for 3D Blu Ray - VC1 - DivX version 3.11 or later A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS™NVS™™ 315 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.
	Display Output	Up to 2 displays in the following configurations: DisplayPort output: • Drives two DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected via the DMS-59 to DP adapter. DVI-D output:

- Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DMS-59 to DVI-D single-link cable adaptor

VGA display output:

- Drives two analog display at resolutions up to 2048 × 1536 at 85 Hz using DMS-59 to VGA cable adaptor.

Shading Architecture	Shader Model 5.0
Supported Graphics APIs	DX11, OpenGL 4.3
Available Graphics Drivers	Windows® 8 Windows 7 Professional (64-bit and 32-bit) Windows XP Professional (64-bit and 32-bit) Red Hat® Enterprise Linux® (RHEL) SUSE Linux® Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or the latest HP qualified drivers are 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
Notes	The thermal solution used on this card is an active fan heatsink.

Technical Specifications - Graphics

NVIDIA® NVS™ 510 2GB Graphics	**Form Factor**	Low Profile, 2.713 inches × 6.3 inches, single slot
	Graphics Controller	NVS™NVS™™™ 510 GPU Core Clock: 797 Mhz Memory Clock: 891 Mhz CUDA® Cores: 192
	Bus Type	PCI Express x16, Generation 2.0
	Memory	2GB DDR3
	Connectors	Four mini-DisplayPort. Four mini-DisplayPort to DisplayPort adapters included. (DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)
	Maximum Resolution	Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz) **NOTE:** This card supports up to four displays. For Windows XP, only 2 active displays are supported.
	Image Quality Features	10-bit internal display processing, including hardware support for 10-bit scan-out
	Display Output	DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support. Digital Display Support 1. DisplayPort Output - Drives four DisplayPort enabled digital display at resolutions up to 3840 × 2160 at 60 Hz with reduced blanking, when connected natively using the 4 DisplayPort connectors on the NVS™NVS™™ 510 graphics card. - DisplayPort Multi-Stream Topology (MST) Technology: Supports various combinations of display resolutions and number of displays when using DisplayPort multi stream topology technology - up to a maximum of 4 monitors at a resolution of 1920 × 1200 at 60 Hz with reduced blanking. 2. DVI-D Output - Drives four digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors. - Drives four digital displays at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors. 3. HDMI Output - The NVS™NVS™™ 510 graphics board is capable of driving four high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors. Analog Display Support 1. VGA display output - Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.
	Supported Graphics APIs	Full Microsoft® DirectX 11, Shader Model 5.0 support Full OpenGL 4.3 support
	Available Graphics Drivers	Windows 7 Professional (64-bit and 32-bit) Windows® XP Professional (64-bit and 32-bit)

Technical Specifications - Graphics

		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	33.4 Watts
	Note	The thermal solution used on this card is an active fan heatsink.

AMD FirePro™ W2100 2GB Graphics	**Form Factor**	Low Profile, half length (full-height bracket included)
	Graphics Controller	AMD FirePro™ W2100 professional graphics based on Oland GPU. GPU: 320 Stream Processors organized into 5 Compute Units GPU Frequency: 630Mhz Power: 26W Cooling: Active
	Bus Type	PCI Express® x8, Generation 3.0
	Memory	2GB DDR3 memory Memory Bandwidth: up to 28.8 GB/s Memory Width: 128 bit
	Connectors	2x Display Port 1.2 connectors Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort 1.2: - up to 4096x2160 x 24 bpp @ 60Hz Dual Link DVI(I) (requires adapter cable): - up to 2560 x 1600 x 32 bpp @ 60Hz Single Link-DVI(I)(requires adapter cable): - up to 1920 x 1200 x 32 bpp @ 60Hz VGA (requires adapter cable): - up to 1920 x 1200 x 32 bpp @ 60Hz
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.
	Display Output	2 x DisplayPort® 1.2a Maximum number of displays: 2
	Shading Architecture	Shader Model 5.0

Technical Specifications - Graphics

	Supported Graphics APIs	OpenCL™ 1.2, DirectX® 11.2/12, OpenGL 4.4 OpenGL 4.4 support with driver release 14.301.xxx OpenCL 1.2 conformance expected with drive release 14.301.xxx
	Available Graphics Drivers	Windows 8.1 (64-bit and 32-bit) Windows 7 (64-bit and 32-bit) Linux® HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	Depending on the card model, native DisplayPort™ connectors and/or certified DisplayPort™ active or passive adapters to convert your monitor's native input to your card's DisplayPort™ or Mini-DisplayPort™ connector(s) may be required. See www.amd.com/firepro for details.
NVIDIA® Quadro® K420 2GB Graphics	**Form Factor**	Low Profile, single slot Dimensions: 2.713 inches × 6.3 inches Cooling: Active
	Graphics Controller	NVIDIA® Quadro® K420 GPU: GK107 with 192 CUDA® cores Power: 41W
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 2GB DDR3 Clock: 891MHz Memory Bandwidth: 29GB/s Memory Width: 128 bit
	Connectors	One dual-link DVI-I connector One DisplayPort connector Factory Configured: No video cable adapter included After market option kit: One DP-to-DVI adapter included with card Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	VGA (via adapter cable): - 2048 × 1536 × 32 bpp at 85 Hz Dual-link DVI - 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) Single-link DVI - 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)

Technical Specifications - Graphics

		DisplayPort 1.2 - 3840 × 2160 × 30 bpp at 60 Hz
	Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection) Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
	Display Output	Maximum number of displays: - 2 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors Maximum number of DisplayPort displays possible (may require MST and/or HBR2): - 4 1920x1200 - 2 2560x1600 - 1 3840x2160 Maximum number of monitors across all available Quadro® K420 outputs is 4.
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	DX11, OpenGL 4.4 Programming support for CUDA® C, CUDA® C++, DirectCompute 5.0, OpenCL, Python, and Fortran
	Available Graphics Drivers	Windows 8.1 Windows 8 Windows 7 Linux® - Full OpenGL implementation, complete with NVIDIA® and ARB extensions
	Notes	1. Factory configured Quadro® K420 does not include any video adapters. Adapters must be ordered separately. 2. Option kit Quadro® K420 includes one DP to DVI-D adapter. 3. Full Height Profile bracket installed. Low Profile bracket included in after-market kit.
NVIDIA® Quadro® K620 2GB Graphics	**Form Factor**	Dimensions: 2.713” H x 6.3” L Single Slot, Low Profile Cooling: Active Weight: 133 grams
	Graphics Controller	NVIDIA® Quadro® K620 GPU: GM107 GPU with 384 CUDA® cores Power: 45 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	Size: 2GB GDDR3

Technical Specifications - Graphics

	Memory Bandwidth: 29 GB/s Memory Width: 128-bit
Connectors	1 DL-DVI(I) 1 DisplayPort Factory Configured: No video cable adapter included After market option kit: One DP-to-DVI adapter included with card Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
Maximum Resolution	DisplayPort 1.2: - up to 4096x2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) Dual Link DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz VGA (via adapter cable): - 2048 × 1536 × 32 bpp at 85 Hz
Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection) Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
Display Output	Maximum number of displays: - 2 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors Maximum number of DisplayPort displays possible (may require MST and/or HBR2): - 4 1920x1200 - 2 2560x1600 - 1 4096x2160 Maximum number of monitors across all available Quadro® K620 outputs is 4.
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.4 DirectX 11 API support includes: CUDA® C, CUDA® C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Technical Specifications - Graphics

	Available Graphics Drivers	Windows 8.1 Windows 8 Windows 7 Linux® - Full OpenGL implementation, complete with NVIDIA® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. Factory configured Quadro K620 does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K620 offered as an Option Kit (AMO) includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately. 3. Full Height Profile bracket installed. Low Profile bracket included in after-market kit.
AMD FirePro W4300 4GB Graphics	**Form Factor**	Low Profile, single slot (6.6” x 3.118”) Full Height, single slot (6.6" x 4.725")
	Graphics Controller	AMD FirePro W4300 graphics GPU Frequency: 930Mhz Memory Clock Speed: 1500Mhz GPU: 768 Stream Processors organized into 12 Compute Units Power: <50 Watts Cooling: Active
	Bus Type	PCI Express® x16, Generation 3.0
	Memory	4GB GDDR5 memory Memory Bandwidth: up to 96 GB/s Memory Width: 128 bit
	Connectors	4x Mini Display Port 1.2 connectors with HBR2 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort: - 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling Incorporated Adaptive-Sync enables FreeSync™ technology from AMD that allows GPU control of display refresh rates for tear-free and jitter-free image quality

Technical Specifications - Graphics

		when rotating models or viewing video content.(Requires FreeSync compliant displays)
	Display Output	Max number of monitors supported using DisplayPort 1.2a: - 4 direct attached monitors - 6 using DP 1.2a with MST and HBR2 enabled monitors Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2): - one 4096x2160 display - two 2560x1600 displays - four 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4 OpenCL 2.0 DirectX 12.0
	Available Graphics Drivers	Windows 10 (64-bit and 32-bit) Windows® 7 (64-bit and 32-bit) Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details. 2. Configurations of two FirePro W4300 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).
NVIDIA® Quadro® K1200 4GB Graphics	**Form Factor**	Dimensions: 2.71" H x 6.875" L Single Slot, Low Profile Cooling: Active Weight: ~175 grams
	Graphics Controller	NVIDIA® Quadro® K1200 Graphics Card GPU: GM107 with 512 CUDA® cores Power: 46 Watts
	Bus Type	PCI Express 2.0 x16

Technical Specifications - Graphics

Memory	Size: 4GB GDDR5 Memory Bandwidth: 80 GB/s Memory Width: 128-bit
Connectors	4 mini-DisplayPort 1.2a Factory Configured Option: 4 mini-DP-to-DP adapters included with card Option Kit: 4 mini-DP-to-DP adapters included with card Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories
Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz VGA (via adapter cable): - 2048 × 1536 × 32 bpp at 85 Hz
Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)
Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of DisplayPort displays possible: - 4 1920x1200 - 4 2560x1600 - 4 4096x2160 Maximum number of monitors across all available Quadro® K1200 outputs is 4.
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.4 DirectX 11.1 API support includes: CUDA® C, CUDA® C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows 8.1 Windows 8 Windows 7 Linux® - Full OpenGL implementation, complete with NVIDIA® and ARB extensions

HP qualified drivers may be preloaded or available from the HP support Web site:
http://welcome.hp.com/country/us/en/support.html

Notes

1. Quadro® K1200 offered as Factory Configured Option includes 4 miniDP to DP video cable adapters. Other video cable adapters must be ordered separately.
2. Quadro® K1200 offered as an Option Kit includes 4 mini-DP to DP adapters. Additional cables must be ordered separately.
3. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim SuperMulti DVD Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	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**	< 200 ms (seek)
		Full Stroke CD	< 200 ms (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 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 8.1, 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	9.5mm Slim SuperMulti DVD Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	
	Description	9.5mm height, tray-load	

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim DVD-ROM Drive	**Mounting Orientation**	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	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 (typical)
		Full Stroke CD	< 220 ms (typical)
	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 8.1, 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	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	
HP 9.5mm Slim BDXL Blu-Ray Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	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
		Blu-ray	25 GB (single-layer)

Technical Specifications - Optical and Removable Storage

		50 GB (dual-layer) 100/128 GB (BDXL)
Access Times	**Full Stroke DVD**	< 230 ms (seek)
	Full Stroke CD	< 220 ms (seek)
	Blu-ray	< 230 ms (seek) (Full Stroke Blu-ray)
	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
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	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 8.1, 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.	

Technical Specifications - Optical and Removable Storage

	Kit Contents	9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide
	NOTES	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.
HP SD Media Card Reader	**Description**	Supports hardware ECC (Error Correction Code) function Supports hardware CRC (Cyclic Redundancy Check) function Supports MS 4-bit parallel transfer mode Supports MS-PRO 4-bit parallel transfer mode Supports MS PRO-HG Duo 4-bit parallel transfer mode Supports SD 4-bit parallel transfer mode Supports UHS-104 SD 4-bit card (version 3.0) Supports CF v6.0 with PIO mode 6 and Ultra DMA 7 mode
	Interface Type	USB 3.0 High-speed interface Note: If there is a USB2 connection, USB2 transfer speeds are supported.
	Dimensions (WxHxD)	Dedicated slot in front bezel (orderable option)
	Supported Media Types	Secure Digital Card (SD) Secure Digital High Capacity (SDHC) SD Extended Capacity Memory Card (SDXC) SD Ultra High Speed II(SD UHSII) These additional media types are supported with a card adapter. Memory Stick Micro (M2) miniSD miniSD High Capacity Micro SD Memory Card (MicroSD) Micro SD High Capacity Memory Card (MicroSDHC) Test Parameters/Conditions - Power applied, unit operating on system ±5%
	Operating Systems Supported	Windows 8 Pro (64-bit)* Windows 8.1 (64-bit)* Windows 8 (64-bit)* Windows 7 Ultimate (32-bit)** Windows 7 Ultimate (64-bit)** Windows 7 Professional (32-bit)** Windows 7 Professional (64-bit)** Windows 7 Home Basic** Windows 7 Home Premium (32-bit)** Windows 7 Home Premium (64-bit)** Windows Vista Business 64 Windows Vista Business 32 Windows Vista Home Basic 32 Windows XP Professional Windows XP Home 32 No driver is required for this device. Native support is provided by the operating system.

Technical Specifications - Optical and Removable Storage

	Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.microsoft.com
Kit Contents	SD card reader, Install Guide, IO & Security Software and Documentation CD
	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT
	0.35 lbs (0.16 kg)

Technical Specifications - Controller Cards

HP Thunderbolt™ 2 PCIe 1-port I/O Card	**Data Transfer Rate**	Supports up to 20 Gb/s (20,000 Mb/s)
	Devices Supported	Thunderbolt™ certified devices
	Bus Type	PCIe card, full or half height PCIe slots
	Ports	One Thunderbolt™ 2 external 20-Pin output connectors (Rear)
	Internal Connectors	One 5-Pin header connector
	System Requirements	Windows 7 Professional 64-bit, 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	Windows 7 Professional 64-bit, Windows 8.1 64-bit.
	Kit Contents	HP Thunderbolt™ 2 PCIe 1-port I/O Card, full height and half height bracket, DisplayPort to DisplayPort cable, internal header cables (2), user documentation and warranty card.
	Warranty	The HP Thunderbolt™ 2 PCIe 1-port I/O Card 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® I219LM PCIe GbE Controller (Intel® vPro™ with Intel AMT 11.0)	**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)
Intel 8260 802.11 a/b/g/n/ac with Bluetooth 4.2 PCIe NIC	**Operating Temperature**	0 to 80 C
	Operating Humidity	Non-operating 50% to 90% RH non-condensing (at temperatures of 25C to 35C)
	Kit Contents	WLAN module with PCIe x1 card, Dual band antenna, USB cable for internal Bluetooth connection, installation guide, warranty card
Intel Ethernet I350-T2 2-Port 1Gb NIC	**Connector**	Two RJ-45
	Controller	Intel® Ethernet I350 Controller
	Data Rates Supported	10/100/1000 Mbps, Half- and full-duplex
	Compliance	802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588 PCIe v2.1 standard RoHS (6 of 6) FCC (U.S. only) Class B DOC (Canada) Class B CE EN 55024, EN55022 Class B VCCI Class II UL 1950 CSA 950 EN 60950 CE ACPI 1.1a Microsoft WHQL (Windows Hardware Quality Labs)

Technical Specifications - Networking and Communications

Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
Power Requirement	4.4W (typical)
Network Transfer Rate	10BASE-T (half-duplex) 10 Mb/s 10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s 100BASE-TX (full-duplex) 200 Mb/s 1000BASE-T (full-duplex) 2000 Mb/s
Operating Temperature	32° to 131° F (0° to 55° C)
Operating Humidity	10% to 95% non-condensing
Dimensions (H x W x D)	5.3 x 2.5 in (13.50cm x 6.4 cm) (without brackets)
Operating System Driver Support	Windows 7 32-bit and 64-bit; Windows 10 32-bit and 64-bit; Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation Novell SLED 10 & SLED 11
Kit Contents	Intel I350-T2 PCIe Dual Port Gigabit NIC PCA with a standard height bracket attached to it (the low profile bracket is included in the clamshell that the PCA ships in) Product Warranty statement and the Installation Guide.

Summary of Changes

Date of change:	Version History:		Description of change:
October 8, 2015	From v1 to v2	Changed	Expansions slots under Overview; Memory nomenclature, Z Turbo Drive 512 PCI Express version. Nvidia NVS 310 memory size, Quadro K420 memory size, SD Media card reader dimensions, kit contents and media type
November 11, 2015	From v2 to v3	Added	Intel® Xeon® processor E3-v5 family, M.2 slot (PCIe Gen3 x4), Intel HD Graphics P530, NVIDIA NVS 310 1GB Graphics, HP 9.5mm Slim SuperMulti DVD Writer, HP 9.5mm Slim DVD-ROM Drive, HP 9.5mm Slim BDXL Blu-Ray Writer, Z240 SFF Dust Filter
		Changed	Processors Note Intel Integrated Graphics P530 for Xeon processors, Processors Note Intel Integrated Graphics P530 for Xeon processors, M.2 support note,
		Removed	NVIDIA NVS 310 512MB Graphics, HP DVD ROM Slim-Tray Drive, HP DVD RW SuperMulti Slim-Tray Drive, HP Blu-ray Writer Slim-Tray Drive
January 1, 2016	From v3 to v4	Added	Update Available Processors table in "Overview" section. Update Processors with Core i3/Pentium specs in "Supported Components" section, Updated Stable & Consistent Offerings Section
		Changed	nECC RAM to non-ECC RAM in Supported components
March 1, 2016	From v4 to v5	Added	HP PCIe x1 Parallel Port Card to “Other hardware” section; Note for Z Turbo Drives under "Storage/Hard Drives" under supported components 2; AMD W4300 GFX card Under “Graphics Mid-range 3D”; Noise/acoustics declaration table under "System”; Power supply configuration table under "System Board"
		Changed	SLED 11 SP 4 in Overview section under Supported OS
		Removed	Removed eSATA option kit number and changed option from Y to N under "Supported Components"
March 31, 2016	From v5 to v6	Added	Windows 7 Professional 32 note in OS Overview; HP Z Turbo Drive G2 1TB SSD, HP Z Turbo Drv G2 256GB, 512, and 1TB M.2; The HP Z Turbo Drive G2 (NVMe) Win 7 32bit support note; BIOS and Security features in Supported Components
		Changed	HP eSATA PCI Cable Kit options in Other Hardware
May 1, 2016	From v6 to v7	Added	Intel I350-T2 card under Supported Components and Networking and Communications sections
		Changed	Intel 8260 Wireless LAN card to "Y" under Factory Configured, Z240 SFF Dust Filter to "Y" under Factory Configured in the Other Hardware section
June 1, 2016	From v7 to v8	Added	"HP DP25 Removable 2.5" HDD Frame/Carrier" to Optical and Removable Storage section
		Changed	Multi from "2" to "1" for W2100 GFX card under Graphics Cards
		Removed	eSATA cable from "Other Hardware" in supported components
July 1, 2016	From v8 to v9	Added	HP USB Hardened Mouse, 3Dconnexion CADMouse to Input Devices.
August 1, 2016	From v9 to v10	Removed	Internal header (parallel port adapter required) from System Board
September 1, 2016	From v10 to v11	Changed	Graphics note under Supported Components section

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