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# HP Z440 Workstation Specifications

- Product image
- Product features
- Power specifications
- Graphics specifications
- High performance GPU computing
- Multimedia and audio devices
- Storage and hard drives
- Optical and removable storage specifications
- Networking and communications
- Physical specifications
- Software/OS
- Environmental specifications

## Product image



HP Z440 Workstation



## Product features

Feature	Description
Chipset	Intel® C612 Chipset
Graphics	<ul style="list-style-type: none"> <li>• NVIDIA NVS 310 512MB Graphics</li> <li>• NVIDIA NVS 315 1GB Graphics</li> <li>• NVIDIA NVS 510 2GB Graphics</li> </ul>
Graphics Cable Adapters	<ul style="list-style-type: none"> <li>• HP DisplayPort to Dual Link DVI Adapter</li> <li>• HP DisplayPort To DVI-D Adapter</li> <li>• HP DisplayPort To DVI-D Adapter (2-Pack)</li> <li>• HP DisplayPort To DVI-D Adapter (4-Pack)</li> <li>• HP DisplayPort To DVI-D Adapter (6-Pack)</li> <li>• HP DisplayPort To VGA Adapter</li> <li>• HP DisplayPort To VGA Adapter 2<sup>nd</sup></li> </ul>
Storage/Hard drives	<p><b>SAS Hard Drives for HP Workstations:</b></p> <ul style="list-style-type: none"> <li>• 600GB SAS 15K rpm 6Gb/s 3.5" HDD</li> <li>• 300GB SAS 15K rpm 6Gb/s 3.5" HDD</li> <li>• HP 1.2TB SAS 10K SFF HDD</li> <li>• HP 600GB SAS 10K SFF HDD</li> <li>• HP 300GB SAS 10K SFF HDD</li> </ul> <p><b>NOTE:</b> *For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software. Up to (4) 3.5-inch 15K rpm SAS drives: 300, 600 GB; 2.4 TB max Up to (4) 2.5-inch 10K rpm SAS drives: 300, 600 GB, 1.2 TB; 4.8 TB max SAS controller add-in card required 3rd and 4th SFF SAS HDDs will be automatically installed into a single 2:1 5.25" external bay adapter Removable Boot Drive option</p> <p><b>SATA Hard Drives:</b></p> <ul style="list-style-type: none"> <li>• 500GB SATA 7200 rpm 6Gb/s 3.5" HDD</li> <li>• 1TB SATA 7200 rpm 6Gb/s 3.5" HDD</li> <li>• 2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD</li> </ul>

Feature	Description
	<ul style="list-style-type: none"> <li>• 3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD</li> <li>• 500GB SATA 7.2K SED SFF HDD</li> </ul> <p><b>NOTE:</b> *For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software. Up to (4) 3.5-inch 7200 rpm SATA drives: 500 GB, 1.0, 2.0, 3.0, 4.0* TB; 16.0 TB max Up to (1) 2.5-inch SATA Self-Encrypting Drive (SED): 500 GB Opal 1 Removable Boot Drive option *4TB drive planned to be available late 2014</p> <p><b>SATA Solid State Drives:</b></p> <ul style="list-style-type: none"> <li>• HP 128GB SATA 6Gb/s SSD</li> <li>• HP 256GB SATA 6Gb/s SSD</li> <li>• HP 512GB SATA 6Gb/s SSD</li> <li>• HP 1TB SATA 6Gb/s SSD</li> <li>• HP 256GB SATA 6Gb/s SED SSD</li> <li>• Intel Pro 1500 180GB SATA SSD</li> <li>• Samsung Enterprise 240GB SATA SSD</li> <li>• Samsung Enterprise 480GB SATA SSD</li> </ul> <p><b>NOTE:</b> *For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software. Up to (4) 2.5-inch 6Gb/s SATA Solid State Drives: 128, 256, 512 GB, 1 TB; 4.0 TB max Up to (1) 2.5-inch 6Gb/s SATA Self-Encrypting Solid State Drive (SED SSD): 256 GB Opal 2 Up to (4) 2.5-inch Intel Pro 1500 6Gb/s SATA Solid State Drive: 180 GB; 720 GB max Up to (4) 2.5-inch Samsung Enterprise 6Gb/s SATA Solid State Drives: 240, 480 GB; 1.9 TB max 3rd and 4th SSDs will be automatically installed into a single 2:1 5.25" external bay adapter</p> <p><b>PCIe Solid State Drives:</b></p> <ul style="list-style-type: none"> <li>• HP Z Turbo Drive 512GB SSD</li> <li>• HP Z Turbo Drive 256GB SSD</li> </ul> <p><b>NOTE:</b> *For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software. Up to (2) PCI Express Solid State Drives: 256, 512 GB; 1.0 TB max PCIe SSDs are not available with SAS controller and/or HDDs</p> <p><b>Hard Drive Controllers</b></p> <ul style="list-style-type: none"> <li>• Integrated SATA 6.0 Gb/s Controller</li> <li>• RAID 0 Configuration – Striped Array</li> </ul>

Feature	Description
	<ul style="list-style-type: none"> <li>• RAID 0 Data Configuration -- Boot/OS Drive + 2 Drive Striped Array</li> <li>• RAID 1 Configuration – Mirrored Array</li> <li>• RAID 10 Configuration - Striped/Mirrored Array</li> <li>• LSI 9217-4i4e 8-port SAS 6Gb/s RAID Card</li> </ul> <p><b>NOTE:</b> SATA hardware RAID is supported on Linux systems that have support for the Intel RSTe technology. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit <a href="#">Hardware Support Matrix for Linux</a> for RAID capabilities with Linux. All drives must be identical in type and capacity. RAID arrays greater than 2 TB are fully supported. <b>1</b> Requires hard drives with identical speed, capacity, and interface. Specific user-configured hardware SAS RAID configurations are supported on this Linux system. For details, please visit <a href="#">Hardware Support Matrix for Linux</a>. <b>2</b> Specific user-configured hardware SAS RAID configurations are supported on this Linux system. IS: Striping of 2 or more HDDs into a single logical volume IM: Mirroring of 2 HDDs into a single logical volume IME: Mirroring of 3 or more HDDs into a single logical volume. For details, please visit <a href="#">Hardware Support Matrix for Linux</a>.</p>
Memory	<p>4GB DDR4-2133 ECC Registered RAM</p> <p>8GB DDR4-2133 ECC Registered RAM</p> <p>16GB DDR4-2133 ECC Registered RAM</p> <p><b>NOTE:</b> For details on the supported memory configurations on the HP Z440 Workstation, please refer to the System Technical Specifications - System Board section of this document. Each processor supports up to 4 channels of DDR4 memory. To realize full performance at least 1 DIMM must be inserted into each channel. The CPUs determine the speed at which the memory is clocked. If an 1866MHz capable CPU is used in the system, the maximum speed the memory will run at is 1866MHz, regardless of the specified speed of the memory. <b>1</b> ONLY registered DDR4 DIMMs are supported. DDR3 DIMMs ARE NOT SUPPORTED. <b>2</b> Configurations of greater than 4x memory DIMMs require the HP Z440 Memory Cooling Solution, which is available both CTO (J2R51AV) and AMO (J2R52AA).</p>
Networking/Communications	<p>Integrated Intel I218LM PCIe GbE Controller</p> <p>Intel Ethernet I210-T1 PCIe NIC</p> <p>HP X520 10GbE Dual Port Adapter</p>



Feature	Description
	<p>HP 10GbE SFP+ SR Transceiver</p> <p>HP 361T PCIe Dual Port Gigabit NIC</p> <p>Intel 7260 802.11 a/b/g/n PCIe WLAN NIC</p> <p><b>NOTE:</b> "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. *Wireless access point and internet service required. Availability of public wireless access points limited.</p>
Audio/Multimedia	Integrated Realtek HD ALC221 Audio
Input Devices	<p><b>Keyboard:</b></p> <ul style="list-style-type: none"> <li>• HP PS/2 Keyboard</li> <li>• HP USB Keyboard</li> <li>• HP USB Smart Card Keyboard</li> <li>• HP Wireless Keyboard and Mouse</li> </ul> <p><b>Mice:</b></p> <ul style="list-style-type: none"> <li>• HP PS/2 Mouse</li> <li>• HP USB Optical Mouse</li> <li>• HP USB 1000dpi Laser Mouse</li> <li>• HP USB Optical 3-Button 2.9M OEM Mouse</li> <li>• HP SpaceMouse Pro USB 3D Input Device</li> <li>• HP SpacePilot Pro 3D USB Intelligent Controller</li> </ul>

## Power specifications

Specification	Description
Power Supply	<ul style="list-style-type: none"> <li>• 700W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)</li> <li>• 525W 85% Efficient, Custom PSU (Wide-Ranging, Active PFC)</li> </ul>

Specification	Description
Operating Voltage Range	90–269 VAC
Rated voltage range	<ul style="list-style-type: none"> <li>• 100 - 240 VAC</li> <li>• 118 VAC</li> </ul>
Rated line frequency	<ul style="list-style-type: none"> <li>• 50–60 Hz</li> <li>• 400 Hz</li> </ul>
Operating line frequency range	<ul style="list-style-type: none"> <li>• 47–66 Hz</li> <li>• 393–407 Hz</li> </ul>
Rated input current	<ul style="list-style-type: none"> <li>• 100-240V @ 9.5A</li> <li>• 100-240V @ 9.5A</li> </ul>
Heat Dissipation (Configuration and software dependent)	<p>700W</p> <ul style="list-style-type: none"> <li>• <b>Typical:</b> 1648 btu/hr (415 kg-cal/hr)</li> <li>• <b>Maximum:</b> 2746 btu/hr (692 kg-cal/hr)</li> </ul> <p>525W</p> <ul style="list-style-type: none"> <li>• <b>Typical:</b> 1311 btu/hr (330 kg-cal/hr)</li> <li>• <b>Maximum:</b> 2185 btu/hr (551 kg-cal/hr)</li> </ul>
Power Supply Fan	92x25 mm variable speed
ENERGY STAR Qualified (Configuration dependent)	Yes
Power supply fan	92x25 mm variable speed

Specification	Description
80 PLUS® Compliant	<p>925W</p> <ul style="list-style-type: none"> <li>• Yes, 90% Efficient</li> <li>• The Z640 925W power supply efficiency report can be found at this link: TBD</li> </ul> <p>525W</p> <ul style="list-style-type: none"> <li>• Yes, 85% Efficient</li> <li>• The Z440 525W power supply efficiency report can be found at this link: TBD</li> </ul>
FEMP Standby Power Compliant @115V (<2W in S5 – Power Off)	Yes
EuP Compliant @ 230V (<0.5W in S5 - Power Off)	Yes
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	Yes; Configuration dependent
Power Consumption in sleep mode (as defined by ENERGY STAR) – Suspend to RAM (S3) (Instantly Available PC)	<15w
Built-in Self-Test LED	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes

# Graphics specifications

## NVIDIA NVS 310 512MB Graphics

Specification	Description
Form factor	<p>Low Profile:</p> <ul style="list-style-type: none"> <li>2.7 inches (H) x 5.7 inches (L), Half-Height</li> </ul>
Weight	142 grams
Graphics controller	<p>NVIDIA NVS 310</p> <p>GPU: GF119-825</p>
Connectors	2x DisplayPort
Bus type	PCI Express x16, 2.0 compliant
Memory	<ul style="list-style-type: none"> <li><b>Size:</b> 512MB DDR3</li> <li><b>Clock:</b> 875Mhz</li> </ul>
Connectors	2 x DisplayPort
Maximum Resolution	Up to 2560 x 1600 (digital display) per display
Image Quality Features	<p>The following video formats are supported:</p> <ul style="list-style-type: none"> <li>MPEG2</li> <li>MPEG4 Part 2 Advanced Simple Profile</li> <li>H.264 SVC codec support</li> </ul>





Specification	Description
	<ul style="list-style-type: none"> <li>• Support for 3D Blu Ray</li> <li>• VC1</li> <li>• DivX version 3.11 and later</li> <li>• MVC</li> </ul> <p>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.</p>
Display Output	<p>Up to 2 displays in the following configurations:</p> <p>DisplayPort output:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology.</li> </ul> <p>DVI-D output:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> </ul> <p>HDMI output:</p> <ul style="list-style-type: none"> <li>• 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</li> </ul> <p>VGA display output:</p> <ul style="list-style-type: none"> <li>• Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptor</li> </ul>
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	DX11, OpenGL 4.1

Specification	Description
Available Graphics Drivers	<p>Windows 8</p> <p>Genuine Windows 7 Professional (64-bit and 32-bit)</p> <p>Microsoft Windows XP Professional (64-bit and 32-bit)</p> <p>Red Hat Enterprise Linux(RHEL)</p> <p>SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)</p> <p>HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the <a href="#">HP Software and Drivers</a>.</p> <p>SUSE Linux Enterprise drivers may also be obtained from NVIDIA website.</p>

**NOTE:** **1** The thermal solution used on this card is an active fan heatsink. **2** Factory configured NVS 310 graphics card have no cable adapters included. Adapters must be ordered separately. **3** Option kit NVS 310 includes 2 DP to DVI-D cable adapters.

#### NVIDIA NVS 315 1GB Graphics (for HP Workstations)

Specification	Description
Form factor	<p>Low Profile:</p> <ul style="list-style-type: none"> <li>• 2.713 inches in height × 5.7 inches in length</li> <li>• Weight: ~ 142 grams</li> </ul>
Graphics controller	<p>NVIDIA NVS 315 (using GF119-825 GPU)</p> <p>Number of Cores: 48 CUDA cores</p> <p>Max. Power: 19.3W</p> <p>Cooling Solution: Active fan heatsink</p>
Bus Type	PCI Express x16, 2.0 compliant



Specification	Description
Memory	<ul style="list-style-type: none"> <li>• <b>Size:</b> 1GB DDR3</li> <li>• <b>Clock:</b> 875Mhz</li> <li>• <b>Memory Bandwidth:</b> 14GB/s</li> </ul>
Connectors	<p>DMS-59 output</p> <p>Cables included:</p> <ul style="list-style-type: none"> <li>• For CTO: DMS-59 to DVI cable</li> <li>• For AMO: DMS-59 to DVI cable and DMS-59 to VGA cable</li> </ul>
Maximum Resolution	<p>Maximum number of displays supported: 2</p> <p>Maximum Resolution Support:</p> <ul style="list-style-type: none"> <li>• DMS-59 to VGA: 2048 x 1536 @ 85Hz</li> <li>• DMS-59 to DVI: 1980 x 1200 @ 60Hz</li> <li>• DMS-59 to DP: 2560 x 1600 @ 60Hz</li> </ul>
Image Quality Features	<p>See Display Output section.</p> <p>The following video formats are supported:</p> <ul style="list-style-type: none"> <li>• MPEG2</li> <li>• MPEG4 Part 2 Advanced Simple Profile</li> <li>• H.264 SVC codec support</li> <li>• Support for 3D Blu Ray</li> <li>• VC1</li> <li>• DivX version 3.11 and later</li> </ul> <p>A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The 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.</p>
Display Output	<p>Up to 2 displays using one of the following DMS-59 cables:</p> <ul style="list-style-type: none"> <li>• DMS-59 to DVI</li> </ul>



Specification	Description
	<ul style="list-style-type: none"> <li>• DMS-59 to VGA</li> <li>• DMS-59 to DP</li> </ul> <p>DisplayPort output:</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul> <p>DVI-D output:</p> <ul style="list-style-type: none"> <li>• Drives two digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DMS-59 to DVI-D single-link cable adaptor</li> </ul> <p>VGA display output:</p> <ul style="list-style-type: none"> <li>• Drives two analog displays at resolutions up to 2048 × 1536 at 85 Hz using DMS-59 to VGA cable adaptor.</li> </ul>
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	DX11, OpenGL 4.3
Available Graphics Drivers	<p>Windows 8</p> <p>Genuine Windows 7 Professional (64-bit and 32-bit)</p> <p>Microsoft Windows XP Professional (64-bit and 32-bit)</p> <p>Red Hat Enterprise Linux (RHEL)</p> <p>SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)</p> <p>HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the <a href="#">HP Software and Drivers</a>.</p> <p>SUSE Linux Enterprise drivers may also be obtained from NVIDIA website.</p>

**NOTE:** 1 The thermal solution used on this card is an active fan heatsink. 2 Factory configured NVS 310 graphics card have no cable adapters included. Adapters must be ordered separately. 3 Option kit graphics card

Specification	Description
	includes DMS-59 to DVI and DMS-59 to VGA cables (one each).

## NVIDIA NVS 510 2GB Graphics

Specification	Description
Form factor	Low Profile, 2.713 inches × 6.3 inches, single slot
Graphics controller	<ul style="list-style-type: none"> <li>NVS 510 GPU</li> <li><b>Core Clock:</b> 797 MHz</li> <li><b>Memory Clock:</b> 891 MHz</li> <li><b>CUDA Cores:</b> 192</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>Four mini-DisplayPort</li> <li>Four mini-DisplayPort-to-DisplayPort adapters included</li> <li>(DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)</li> </ul>
Memory	2GB DDR3
Bus type	PCI Express x16, Generation 2.0
Maximum Resolution	<p>Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz)</p> <p><b>NOTE:</b> This card supports up to four displays. For Windows XP, only 2 active displays are supported.</p>
Image Quality Features	10-bit internal display processing, including hardware support for 10-bit scan-out



Specification	Description
Display Output	<p>DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support.</p> <p>Digital Display Support</p> <ul style="list-style-type: none"> <li>• DisplayPort Output <ul style="list-style-type: none"> <li>• 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 510 graphics card.</li> <li>• 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.</li> </ul> </li> <li>• DVI-D Output <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> </li> <li>• HDMI Output <p>The 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.</p> </li> </ul> <p>Analog Display Support</p> <p>VGA display output:</p> <ul style="list-style-type: none"> <li>• Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.</li> </ul>
Supported Graphics APIs	<p>Full Microsoft DirectX 11, Shader Model 5.0 support</p> <p>Full OpenGL 4.3 support</p>
Available Graphics Drivers	<p>Genuine Windows 7 Professional (64-bit and 32-bit)</p> <p>Microsoft Windows XP Professional (64-bit and 32-bit)</p> <p>Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation</p> <p>SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)</p> <p>HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the <a href="#">HP Software and Drivers</a>.</p>

Specification	Description
<p><b>NOTE:</b> Heatsink cooler design is active.</p>	

## NVIDIA NVS 510 2GB Graphics

Specification	Description
Form factor	Low Profile, 2.713 inches × 6.3 inches, single slot
Graphics controller	<ul style="list-style-type: none"> <li>NVS 510 GPU</li> <li><b>Core Clock:</b> 797 MHz</li> <li><b>Memory Clock:</b> 891 MHz</li> <li><b>CUDA Cores:</b> 192</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>Four mini-DisplayPort</li> <li>Four mini-DisplayPort-to-DisplayPort adapters included</li> <li>(DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)</li> </ul>
Memory	2GB DDR3
Bus type	PCI Express x16, Generation 2.0
Maximum Resolution	<p>Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 × 2160 @ 60Hz)</p> <p><b>NOTE:</b> This card supports up to four displays. For Windows XP, only 2 active displays are supported.</p>
Image Quality	10-bit internal display processing, including hardware support for 10-bit scan-out



Specification	Description
Features	
Display Output	<p>DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support.</p> <p><b>Digital Display Support</b></p> <p><b>DisplayPort Output</b></p> <ul style="list-style-type: none"> <li>• 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 510 graphics card.</li> <li>• 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.</li> </ul> <p><b>DVI-D Output</b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> <p><b>HDMI Output</b></p> <ul style="list-style-type: none"> <li>• The 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.</li> </ul> <p><b>Analog Display Support</b></p> <p><b>VGA display output</b></p> <ul style="list-style-type: none"> <li>• Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.</li> </ul>
Supported Graphics APIs	<ul style="list-style-type: none"> <li>• Full Microsoft DirectX 11, Shader Model 5.0 support</li> <li>• Full OpenGL 4.3 support</li> </ul>
Available Graphics Drivers	<ul style="list-style-type: none"> <li>• Genuine Windows 7 Professional (64-bit and 32-bit)</li> <li>• Microsoft Windows XP Professional (64-bit and 32-bit)</li> <li>• Red Hat Enterprise Linux (RHEL) 6 Desktop/Workstation</li> <li>• SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)</li> </ul>





Specification	Description
	HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a> .
<p><b>NOTE:</b> Heatsink cooler design is active.</p>	

## NVIDIA Quadro K620 2GB Graphics

Specification	Description
Form factor	<ul style="list-style-type: none"> <li>• 2.713" H x 6.3" L</li> <li>• Single Slot, Low Profile</li> <li>• Full Height Profile bracket installed</li> <li>• Low Profile bracket included</li> <li>• Weight: 133 grams</li> </ul>
Graphics controller	<ul style="list-style-type: none"> <li>• NVIDIA Quadro K620 Graphics Card</li> <li>• GM107 GPU</li> <li>• 384 CUDA cores</li> <li>• Max Power: 45 Watts</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>• 1 DL-DVI(I) output, 1 DisplayPort output</li> <li>• Factory Configured: No video cable adapter included</li> <li>• Option Kit: One DP-to-DVI adapter included with card</li> </ul> <p>Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p>
Memory	<ul style="list-style-type: none"> <li>• 2 GB GDDR3, 900 MHz</li> <li>• 128-bit memory I/O path</li> <li>• 29 GB/s memory bandwidth</li> </ul>
Bus type	PCI Express 2.0 x16



Specification	Description
Maximum Resolution	<p>DisplayPort 1.2:</p> <ul style="list-style-type: none"> <li>• up to 4096x2160 x 30 bpp @ 60Hz</li> <li>• supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)</li> </ul> <p>Dual Link DVI(I) output:</p> <ul style="list-style-type: none"> <li>• up to 2560 x 1600 x 32 bpp @ 60Hz</li> </ul> <p>Single Link-DVI(I) output:</p> <ul style="list-style-type: none"> <li>• up to 1920 x 1200 x 32 bpp @ 60Hz</li> </ul>
Image Quality Features	<ul style="list-style-type: none"> <li>• 10-bit internal display processing pipeline</li> <li>• 10-bit scan-out support</li> </ul>
Display Output	<ul style="list-style-type: none"> <li>• 1 Dual-link DVI-I connector</li> <li>• 1 Display Port connector</li> </ul>
Shading Architecture	Full Microsoft DirectX 11.1 Shader Model 5.0
Supported Graphics APIs	<ul style="list-style-type: none"> <li>• OpenGL 4.4</li> <li>• DirectX 11.1</li> <li>• API support includes: <ul style="list-style-type: none"> <li>• CUDA C</li> <li>• CUDA C++</li> <li>• DirectCompute 5.0</li> <li>• OpenCL</li> <li>• Java</li> <li>• Python</li> <li>• Fortran</li> </ul> </li> </ul>
Available Graphics Drivers	<ul style="list-style-type: none"> <li>• Microsoft Windows 8.1</li> <li>• Microsoft Windows 8</li> <li>• Microsoft Windows 7</li> <li>• Linux</li> </ul>



Specification	Description
	HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a> .
<p><b>NOTE:</b> 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.</p>	

## NVIDIA Quadro K420 1GB Graphics

Specification	Description
Form factor	<p>Low Profile:</p> <ul style="list-style-type: none"> <li>2.713 inches × 6.3 inches, single slot</li> </ul>
Graphics controller	<ul style="list-style-type: none"> <li>NVIDIA Quadro K420</li> <li>GPU: GK107</li> </ul>
Bus Type	PCI Express x16, 2.0 compliant
Memory	<ul style="list-style-type: none"> <li>Size: 1GB DDR3</li> <li>Clock: 891MHz</li> <li>Memory Bandwidth: 29GB/s</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>One dual-link DVI-I connector</li> <li>One DisplayPort connector</li> </ul>
Maximum Resolution	<p>VGA (via adapter cable):</p> <ul style="list-style-type: none"> <li>2048 × 1536 × 32 bpp at 85 Hz</li> </ul> <p>Dual-link DVI</p>



Specification	Description
	<ul style="list-style-type: none"> <li>• 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> Single-link DVI <ul style="list-style-type: none"> <li>• 920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> DisplayPort 1.2 <ul style="list-style-type: none"> <li>• 3840 × 2160 × 30 bpp at 60 Hz</li> </ul>
RAMDAC	400 MHz integrated RAMDAC
Display Output	Maximum number of displays supported: 2
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	<ul style="list-style-type: none"> <li>• Microsoft Windows 8.1</li> <li>• Microsoft Windows 8</li> <li>• Microsoft Windows 7</li> </ul>
Notes	<p><b>NOTE:</b> 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.</p>

## NVIDIA Quadro K2200 4 GB Graphics

Specification	Description
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Specification	Description
Form factor	4.38" H x 7.97" L Single Slot, Full Height
Weight:	240 grams
Graphics controller	<ul style="list-style-type: none"> <li>• NVIDIA Quadro K2200 Graphics Card</li> <li>• GM107 GPU</li> <li>• 640 CUDA cores</li> <li>• Max Power: 67.7 Watts</li> </ul>
Bus Type	PCI Express 2.0 x16
Memory	<ul style="list-style-type: none"> <li>• 4 GB GDDR5, 2500 Mhz</li> <li>• 128-bit memory I/O path</li> <li>• 80 GB/s memory bandwidth</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>• 1 DL-DVI(I) output, 2 DisplayPort outputs</li> <li>• Factory Configured Option: No video cable adapter included</li> <li>• Option Kit: One DP-to-DVI adapter included with card</li> </ul> <p>Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories</p>
Maximum Resolution	<p>DisplayPort:</p> <ul style="list-style-type: none"> <li>• up to 4096 x 2160 x 30 bpp @ 60Hz</li> <li>• supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)</li> </ul> <p>DL-DVI(I) output:</p> <ul style="list-style-type: none"> <li>• up to 2560 x 1600 x 32 bpp @ 60Hz</li> </ul>

Specification	Description
Image Quality Features	<ul style="list-style-type: none"> <li>• 10-bit internal display processing pipeline</li> <li>• 10-bit scan-out support</li> </ul>
Display Output	<p>VGA:</p> <ul style="list-style-type: none"> <li>• requires use of DVI-to-VGA and/or DP-to-VGA video cable adapters</li> <li>• 400 MHz integrated RAMDAC</li> <li>• Max resolution: 2048 x 1536 x 32 bpp @ 85 Hz</li> </ul> <p>DL-DVI(I):</p> <ul style="list-style-type: none"> <li>• Max resolution: 2560 x 1600 x 32 bpp @ 60 Hz</li> </ul> <p>SL-DVI(I):</p> <ul style="list-style-type: none"> <li>• Max resolution: 1920 x 1200 x 32 bpp @ 60 Hz</li> </ul> <p>DisplayPort:</p> <ul style="list-style-type: none"> <li>• Supports HBR2 and MST</li> <li>• Max resolution: 4096 x 2160 x 30 bpp @ 60 Hz (only one monitor can be connected to a Quadro K2200 DisplayPort connector at this resolution)</li> <li>• Max number of DisplayPort daisy-chained monitors or hub connected monitors from a single Quadro K2200 DisplayPort connector: 4 with maximum resolution of 1920 x 1200</li> </ul> <p>Maximum number of monitors across all available Quadro K2200 outputs is 4.</p>
Shading Architecture	Full Microsoft DirectX 11.1 Shader Model 5.0
Supported Graphics APIs	<ul style="list-style-type: none"> <li>• OpenGL 4.4</li> <li>• DirectX 11.1</li> <li>• API support includes: <ul style="list-style-type: none"> <li>• CUDA C</li> <li>• CUDA C++</li> <li>• DirectCompute 5.0</li> <li>• OpenCL</li> <li>• Java</li> <li>• Python</li> <li>• Fortran</li> </ul> </li> </ul>

Specification	Description
Available Graphics Drivers	<ul style="list-style-type: none"> <li>• Microsoft Windows 8.1</li> <li>• Microsoft Windows 8</li> <li>• Microsoft Windows 7</li> <li>• Linux</li> </ul> <p>HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a>.</p>

**NOTE:** **1** Quadro K2200 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. **2** Quadro K2200 offered as an Option Kit includes one DP-to-DVI video cable adapter. 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 or a DisplayPort 1.2 hub device. **4** A DisplayPort hub device may be used to connect multiple DisplayPort monitors to a single Quadro K2200 DisplayPort output.

#### AMD FirePro W2100 2GB Graphics

Specification	Description
Form factor	Low Profile, half length (full-height bracket included)
Graphics controller	<p>AMD FirePro™ W2100 professional graphics</p> <p>Power: &lt;50W</p> <p>Cooling: Active</p>
Bus Type	PCI Express® x8, Generation 3.0
Memory	<p>2GB DDR3 memory</p> <p>Memory Bandwidth: 14.4 GB/s</p>
Connectors	2x Display Port 1.2 connectors



Specification	Description
	<p>Pre-configured: No video cable adapter included</p> <p>Option Kit: One DP-to-DVI adapter included with card</p> <p>Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p>
Maximum Resolution	<p>DisplayPort 1.2:</p> <ul style="list-style-type: none"> <li>• up to 4096x2160 x 30 bpp @ 60Hz</li> </ul> <p>Dual Link DVI(I) (requires adapter cable):</p> <ul style="list-style-type: none"> <li>• up to 2560 x 1600 x 32 bpp @ 60Hz</li> </ul> <p>Single Link-DVI(I)(requires adapter):</p> <ul style="list-style-type: none"> <li>• up to 1920 x 1200 x 32 bpp @ 60Hz</li> </ul> <p>VGA(requires adapter):</p> <ul style="list-style-type: none"> <li>• up to 1920 x 1200 x 32 bpp @ 60Hz</li> </ul>
Display Output	2 x DisplayPort® 1.2
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenCL™ 1.2, DirectX® 11 and OpenGL 4.4
Available Graphics Drivers	<p>Windows 8.1 (64-bit and 32-bit)</p> <p>Windows 7 (64-bit and 32-bit)</p> <p>Red Hat Enterprise Linux (RHEL)</p> <p>SUSE Linux Enterprise Desktop 11(64-bit and 32-bit)</p> <p>Ubuntu</p> <p>HP qualified drivers may be preloaded or available from the the <a href="#">HP Software and Drivers</a>.</p>



Specification	Description
Notes	<p><b>NOTE:</b> 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 <a href="http://www.amd.com/firepro">www.amd.com/firepro</a> for details</p>

## NVIDIA Quadro K4200 4GB Graphics

Specification	Description
Form factor	<p>4.376" H x 9.5" L</p> <p>Single Slot, Full Height</p>
Weight	~458 grams (without extender)
Graphics controller	<p>NVIDIA Quadro K4200 Graphics Card</p> <p>Kepler GK104 GPU</p> <p>1344 CUDA cores</p> <p>Max Power: 108 Watts</p>
Bus Type	PCI Express 2.0 x16
Memory	<p>4 GB GDDR5, 2700 MHz</p> <p>256-bit memory I/O path</p> <p>173 GB/s memory bandwidth</p>
Connectors	<p>1 DL-DVI(I) output, 2 DisplayPort outputs</p> <p>CTO: No video cable adapter included</p> <p>AMO: One DP-to-DVI adapter included with card</p>

Specification	Description
	Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories
Maximum Resolution	DisplayPort: <ul style="list-style-type: none"> <li>• up to 3840 x 2160 x 30 bpp @ 60Hz</li> <li>• supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)</li> </ul> DL-DVI(I) output: <ul style="list-style-type: none"> <li>• up to 2560 x 1600 x 32 bpp @ 60Hz</li> </ul>
Image Quality Features	<ul style="list-style-type: none"> <li>• 10-bit internal display processing pipeline</li> <li>• 10-bit scan-out support</li> </ul>
Display Output	VGA: <ul style="list-style-type: none"> <li>• requires use of DVI-to-VGA and/or DP-to-VGA video cable adapters</li> <li>• 400 MHz integrated RAMDAC</li> <li>• Max resolution: 2048 x 1536 x 32 bpp @ 85 Hz</li> </ul> DL-DVI(I): <ul style="list-style-type: none"> <li>• Max resolution: 2560 x 1600 x 32 bpp @ 60 Hz</li> </ul> SL-DVI(I): <ul style="list-style-type: none"> <li>• Max resolution: 1920 x 1200 x 32 bpp @ 60 Hz</li> </ul> DisplayPort: <ul style="list-style-type: none"> <li>• Supports HBR2 and MST</li> <li>• Max resolution: 3840 x 2160 x 30 bpp @ 60 Hz (only one monitor can be connected to a Quadro K4200 DisplayPort connector at this resolution)Max resolution: 3840 x 2160 x 30 bpp @ 60 Hz (only one monitor can be connected to a Quadro K4200 DisplayPort connector at this resolution)</li> <li>• Max number of DisplayPort daisy-chained monitors or hub connected monitors from a single Quadro K4200 DisplayPort connector: 4 with maximum resolution of 1920 x 1200</li> <li>• Requires use of DP-to-HDMI cable</li> <li>• Max Resolution: 1920 x 1080 x 32 bpp @ 60Hz</li> </ul> HDMI:

Specification	Description
	<ul style="list-style-type: none"> <li>Requires use of DP-to-HDMI cable</li> <li>Max Resolution: 1920 x 1080 x 32 bpp @ 60Hz</li> </ul> <p>Maximum number of monitors across all available Quadro K4200 outputs is 4.</p>
Shading Architecture	Full Microsoft DirectX 11 Shader Model 5.0
Supported Graphics APIs	<ul style="list-style-type: none"> <li>OpenGL 4.4</li> <li>DirectX 11.1</li> <li>API support includes: <ul style="list-style-type: none"> <li>CUDA C,</li> <li>CUDA C++</li> <li>DirectCompute 5.0</li> <li>OpenCL</li> <li>Java</li> <li>Python</li> <li>Fortran</li> </ul> </li> </ul>
Available Graphics Drivers	<ul style="list-style-type: none"> <li>Microsoft Windows 8.1</li> <li>Microsoft Windows 8</li> <li>Microsoft Windows 7</li> <li>Linux</li> </ul> <p>HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a>.</p>
Notes	<p><b>NOTE:</b> <b>1</b> Quadro K4200 offered as CTO does not include a video cable adapter. Video cable adapters must be ordered separately. <b>2</b> Quadro K4200 offered as AMO includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately. <b>3</b> 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 or a DisplayPort 1.2 hub device. <b>4</b> A DisplayPort hub device may be used to connect multiple DisplayPort monitors to a single Quadro K4200 DisplayPort output.</p>

NVIDIA Quadro K5200 8GB Graphics



Specification	Description
Form factor	4.376" H x 10.5" L Dual Slot
Weight	~880 grams
Graphics controller	NVIDIA Quadro K5200 GK 110 GPU 2304 CUDA cores Max Power: 150 Watts
Bus Type	PCI Express 3.0 x16
Memory	8GB GDDR5 256-bit memory I/O path 192 GB/s memory bandwidth
Connectors	DVI-I (1), DVI-D (1), DP (2) Factory configured option: No adapter included with card. Option Kit: No adaptor included with card. DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.
Image Quality Features	<ul style="list-style-type: none"> <li>• DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP support</li> <li>• NVIDIA 3D Vision™ technology</li> </ul>



Specification	Description
Display Output	<p>400 MHz integrated RAMDAC</p> <ul style="list-style-type: none"> <li>Maximum resolution over VGA (through DVI to VGA cable): 2048 × 1536 × 32 bpp at 85 Hz</li> </ul> <p>Dual-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none"> <li>Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> <p>Single-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none"> <li>Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> <p>DisplayPort with MST and HBR2</p> <ul style="list-style-type: none"> <li>Maximum resolution: 4096 × 2160 × 30 bpp at 60Hz</li> <li>Maximum resolution: 2560 × 1600 × 30bpp at 120Hz</li> </ul> <p>HDMI:</p> <ul style="list-style-type: none"> <li>Maximum resolution: 1920 × 1080 × 32 bpp at 60Hz</li> </ul>
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	<p>OpenGL 4.4</p> <p>DirectX 11</p> <p>API support for NVIDIA's CUDA™ C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran</p>
Available Graphics Drivers	<p>Windows 8</p> <p>Windows 7 Professional (64-bit and 32-bit)</p> <p>Red Hat Enterprise Linux (RHEL) 6 Desktop/Workstation (64-bit)</p> <p>SUSE Linux Enterprise Desktop 11 SP3(64-bit and 32-bit)</p>



Specification	Description
	HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a> .
Notes	<p><b>NOTE: 1</b> NVIDIA GRID VGX Pass Through feature supported on NVIDIA Quadro K5200 to enable direct mapping of GPU to Virtual Machine. <b>2</b> No display output adapter included.</p>

## NVIDIA Quadro K6000 12GB Graphics

Specification	Description
Form factor	4.376" H x 10.5" L Dual Slot Power: 234 Watts
Weight	~880 grams
Graphics controller	NVIDIA Quadro K6000 Graphics Card based on the GK180 GPU Core Count: 2880 Base Clock: 797 MHz Boost Clock: 902 MHz
Bus Type	PCI Express 3.0 x16
Memory	12GB GDDR5 384-bit memory I/O path 288 GB/s memory bandwidth ECC Memory



Specification	Description
Connectors	<p>DVI-I (1), DVI-D (1), DP (2), Optional 3D Stereo bracket with 3-pin mini-DIN connector.</p> <p>Factory configured option: No adapter included with card.</p> <p>Option Kit: No adaptor included with card.</p> <p>DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.</p>
Image Quality Features	<ul style="list-style-type: none"> <li>• DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP support</li> <li>• NVIDIA 3D Vision™ technology</li> <li>• NVIDIA Premium Mosaic and nView</li> </ul>
Display Output	<p>400 MHz integrated RAMDAC</p> <ul style="list-style-type: none"> <li>• Maximum resolution over VGA (through DVI to VGA cable): 2048 × 1536 × 32 bpp at 85 Hz</li> </ul> <p>Dual-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none"> <li>• Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> <p>Single-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none"> <li>• Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> <p>DisplayPort with MST and HBR2</p> <ul style="list-style-type: none"> <li>• Maximum resolution: 3840 × 2160 × 36 bpp at 60Hz</li> </ul> <p>HDMI:</p> <ul style="list-style-type: none"> <li>• Maximum resolution: 1920 × 1080 × 32 bpp at 60Hz</li> </ul>
Shading Architecture	<ul style="list-style-type: none"> <li>• Shader Model 5.0</li> <li>• Full IEEE 754-2008 32-bit and 64-bit precision</li> </ul>

Specification	Description
Supported Graphics APIs	<p>Full OpenGL 4.3</p> <p>Full DirectX 11</p> <p>CUDA API support includes:</p> <ul style="list-style-type: none"> <li>• CUDA C</li> <li>• CUDA C++</li> <li>• DirectCompute 5.0</li> <li>• OpenCL</li> <li>• Java</li> <li>• Python</li> <li>• Fortran</li> </ul>
Available Graphics Drivers	<p>Windows 8</p> <p>Windows 7 Professional (64-bit and 32-bit)</p> <p>Red Hat Enterprise Linux (RHEL) 6 Desktop/Workstation</p> <p>SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)</p> <p>HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a>.</p> <p>Novell SUSE Linux Enterprise drivers may also be obtained from NVIDIA website.</p>
Notes	<p><b>NOTE: 1</b> NVIDIA GRID VGX Pass Through feature supported on NVIDIA Quadro K6000 to enable direct mapping of GPU to Virtual Machine. <b>2</b> No display output adapter included.</p>

## High performance GPU computing

### NVIDIA Tesla K40 Workstation Compute Processor

Factory Configured	Option Kit
Form Factor	<ul style="list-style-type: none"> <li>• Size: 4.376 inches by 10.5 inches</li> <li>• Slots: Dual Slot</li> <li>• Power Connectors: One 6-pin and one 8-pin</li> </ul>





Factory Configured	Option Kit
Weight	~826 grams
System Interface	PCI Express Gen3 ×16
Video Outputs	None
Memory	<ul style="list-style-type: none"> <li>• 12GB GDDR5</li> <li>• memory path: 384-bit</li> <li>• memory clock: 3Ghz</li> </ul>
Peak Memory Bandwidth	288 GB/s
Supported APIs	<p>CUDA, OpenACC, OpenCL 1.2 API support includes:</p> <ul style="list-style-type: none"> <li>• C</li> <li>• C++</li> <li>• Java</li> <li>• Python</li> <li>• Fortran</li> </ul>
Supported Operating Systems	<ul style="list-style-type: none"> <li>• Windows 8 (64-bit)</li> <li>• Genuine Windows 7 Professional (64-bit)</li> <li>• Red Hat Enterprise Linux (RHEL) 5, 6 Desktop/Workstation (64-bit)</li> <li>• SUSE Linux Enterprise Desktop 11 (64-bit)</li> </ul> <p>HP qualified drivers may be preloaded or available from the <a href="#">HP Software and Drivers</a>.</p> <p>Novell SUSE Linux Enterprise drivers may also be obtained from NVIDIA website.</p>

Factory Configured	Option Kit
Processor Cores	<ul style="list-style-type: none"> <li>• GK110B GPU</li> <li>• Base Clock: 745 MHz</li> <li>• Boost Clock: up to 875 MHz</li> <li>• 2888 CUDA cores</li> </ul>
Power Consumption	~235 Watts
<p><b>NOTE:</b> A 700W PSU is required for any K40 configuration on the Z440.</p>	

## Multimedia and audio devices

	Factory Configured	Option Kit
Integrated Realtek HD ALC221 Audio	Yes	No

## Storage and hard drives

### HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations

600GB SAS 15K rpm 6Gb/s 3.5" HDD

Specification	Description
Capacity	600GB
Height	2.54 cm (1 in) <ul style="list-style-type: none"> <li>• Media Diameter 8.9 cm (3.5 in)</li> <li>• Physical Size 10.17 cm (4 in)</li> </ul>



Specification	Description
Interface	SAS
Synchronous Transfer Rate (Maximum)	6.0 Gb/s
Buffer	16 MB
Seek time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track</b> 0.2 ms</li> <li>• <b>Average</b> 3.4 ms</li> <li>• <b>Full Stroke</b> 6.6 ms</li> </ul>
Rotational Speed	15,000 rpm
Logical Blocks	1,172,123,568 - 512 byte blocks
Operating temperature	10° to 35° C (50° to 95° F)

## 300GB SAS 15K rpm 6Gb/s 3.5" HDD

Specification	Description
Capacity	300GB
Height	2.54 cm (1 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter</b> 8.9 cm (3.5 in)</li> <li>• <b>Physical Size</b> 0.17 cm (4 in)</li> </ul>



Specification	Description
Interface	SAS
Synchronous Transfer Rate (Maximum)	6Gb/s
Buffer	16MB
Seek Time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track</b> 0.2 ms</li> <li>• <b>Average</b> 3.4 ms</li> <li>• <b>Full Stroke</b> 6.6 ms</li> </ul>
Rotational Speed	15,000 rpm
Operating temperature	10° to 35° C (50° to 95° F)

## HP 300GB SAS 10K SFF HDD

Specification	Description
Capacity	300GB
Height	1.53 cm (0.6 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter</b> 6.36 cm (2.5 in)</li> <li>• <b>Physical Size</b> 6.99 cm (2.75 in)</li> </ul>
Interface	SAS 6Gb/s



Specification	Description
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	64MB
Cache	multi-segmentable cache buffer
Seek Time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track</b> 0.4 ms (max)</li> <li>• <b>Average</b> 3.6 ms</li> <li>• <b>Full Stroke</b> 7.3 ms</li> </ul>
Rotational Speed	10,000 rpm
Logical Blocks	585,937,500
Operating temperature	5° to 55° C (41° to 131° F)

## HP 600GB SAS 10K SFF HDD

Specification	Description
Capacity	600GB
Height	1.53 cm (0.6 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter:</b> 6.36 cm (2.5 in)</li> <li>• <b>Physical Size:</b> 6.99 cm (2.75 in)</li> </ul>



Specification	Description
Interface	SAS 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	64MB
Cache	multi-segmentable cache buffer
Seek Time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track:</b> 0.4 ms (max)</li> <li>• <b>Average:</b> 3.6 ms</li> <li>• <b>Full Stroke:</b> 7.3 ms</li> </ul>
Rotational Speed	10,000 rpm
Logical Blocks	1,172,123,568
Operating temperature	5° to 55° C (41° to 131° F)

## HP 1.2TB SAS 10K SFF HDD

Specification	Description
Capacity	1.2TB
Height	1.53 cm (0.6 in)

Specification	Description
Drive Type	<ul style="list-style-type: none"> <li>• <b>Media Diameter:</b> 6.36 cm (2.5 in)</li> <li>• <b>Physical Size:</b> 6.99 cm (2.75 in)</li> </ul>
Interface	SAS 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	64MB
Cache	multi-segmentable cache buffer
Number of Sectors	976,773,168
Seek Time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track:</b> 0.18ms (max)</li> <li>• <b>Average:</b> 3.5ms</li> <li>• <b>Full Stroke:</b> 7.17ms</li> </ul>
Rotational Speed	10,000 rpm
Logical Blocks	2,344,225,968
Operating Temperature	5° to 55° C (41° to 131° F)

## SATA (Serial ATA) Hard Drives for HP Workstations

500GB SATA 7200 rpm 6Gb/s 3.5" HDD

<https://support.hp.com/us-en/document/c04506309>



Specification	Description
Capacity	500GB
Height	2.54 cm (1 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter:</b> 8.9 cm (3.5 in)</li> <li>• <b>Physical Size:</b> 10.17 cm (4 in)</li> </ul>
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)	<ul style="list-style-type: none"> <li>• <b>Single Track:</b> 2 ms</li> <li>• <b>Average:</b> 11 ms</li> <li>• <b>Full Stroke:</b> 21 ms</li> </ul>
Rotational Speed	7,200 rpm
Logical Blocks	976,773,168
Operating Temperature	5° to 55° C (41° to 131° F)

1TB SATA 7200 rpm 6Gb/s 3.5" HDD

Specification	Description
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Specification	Description
Capacity	1TB
Height	2.54 cm (1 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter:</b> 8.9 cm (3.5 in)</li> <li>• <b>Physical Size:</b> 10.17 cm (4 in)</li> </ul>
Interface	<ul style="list-style-type: none"> <li>• Serial ATA (6.0Gb/s)</li> <li>• NCQ enabled</li> </ul>
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
Buffer	64MB
Cache	Adaptive
Seek Time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track:</b> 2 ms</li> <li>• <b>Average:</b> 11 ms</li> <li>• <b>Full Stroke:</b> 21 ms</li> </ul>
Rotational Speed	7,200 rpm
Operating Temperature	5° to 55° C (41° to 131° F)

2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD



Specification	Description
Capacity	2 TB
Height	2.54 cm (1 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter:</b> 8.9 cm (3.5 in)</li> <li>• <b>Physical Size:</b> 10.17 cm (4 in)</li> </ul>
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)	<ul style="list-style-type: none"> <li>• <b>Single Track:</b> 1.0 ms</li> <li>• <b>Average:</b> 11 ms</li> <li>• <b>Full Stroke:</b> 18 ms</li> </ul>
Rotational Speed	7,200 rpm
Logical Blocks	3,907,029,168
Operating Temperature	5° to 55° C (41° to 131° F)

## 3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD

Specification	Description
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Specification	Description
Capacity	3.0 TB
Height	2.54 cm (1 in)
Width	<ul style="list-style-type: none"> <li>• <b>Media Diameter:</b> 8.9 cm (3.5 in)</li> <li>• <b>Physical Size:</b> 10.17 cm (4.0 in)</li> </ul>
Interface	Serial ATA (6.0Gb/s), NCQ enabled
Synchronous Transfer Rate (Maximum)	Up to 6.0 Gb/s
Buffer	64 MB
Seek Time (typical reads, includes controller overhead, including settling)	<ul style="list-style-type: none"> <li>• <b>Single Track:</b> 6 ms</li> <li>• <b>Average:</b> 11 ms</li> <li>• <b>Full Stroke:</b> Not specified</li> </ul>
Rotational Speed	7200 rpm
Operating Temperature	5° to 60° C (41° to 140° F)

## HP Solid State Drives (SSDs) for Workstations

### HP 128GB SATA 6Gb/s SSD

Specification	Description
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Specification	Description
Capacity	128 GB
Height	0.7 cm (0.28 in)
Width	<b>Physical Size:</b> 6.36 cm (2.5 in)
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)
Operating Temperature	0° to 70° C (32° to 158° F)

## HP 256GB SATA 6Gb/s SSD

Specification	Description
Capacity	256 GB
Height	0.7 cm (0.28 in)
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)
Operating Temperature	0° to 70° C (32° to 158° F)

## HP 256GB SATA 6Gb/s SED SSD

Specification	Description
Capacity	256 GB
Height	0.7 cm (0.28 in)
Width	<b>Physical Size:</b> 6.36 cm (2.5 in)
Interface	6Gb/s SATA
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)
Operating Temperature	0° to 70° C (32° to 158° F)

## HP 512GB SATA 6Gb/s SSD

Specification	Description
Capacity	512GB
Height	0.7 cm (0.28 in)
Width	<ul style="list-style-type: none"> <li>• <b>Physical Size:</b> 6.36 cm (2.5 in)</li> </ul>
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)

Specification	Description
Operating Temperature	0° to 70° C (32° to 158° F)

## HP 1TB SATA 6Gb/s SSD

Specification	Description
Capacity	1TB
Height	0.7 cm (0.28 in)
Width	<ul style="list-style-type: none"> <li>Physical Size: 6.36 cm (2.5 in)</li> </ul>
Interface	6Gb/s SATA
Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)
Operating Temperature	0° to 70° C (32° to 158° F)

## Samsung Enterprise 240GB SATA SSD

Specification	Description
Capacity	240GB
Width	<ul style="list-style-type: none"> <li>Physical Size: 6.36 cm (2.5 in)</li> </ul>
Interface	SATA 6Gb/s



Specification	Description
Synchronous Transfer Rate (Maximum)	600 Mb/s

## Samsung Enterprise 480GB SATA SSD

Specification	Description
Capacity	480 GB
Width	<ul style="list-style-type: none"> <li>Physical Size: 6.36 cm (2.5 in)</li> </ul>
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	600 Mb/s

## Intel Pro 1500 180GB SATA SSD

Specification	Description
Capacity	180 GB
Width	<ul style="list-style-type: none"> <li>Physical Size: 6.36 cm (2.5 in)</li> </ul>
Interface	6Gb/s SATA
Operating Temperature	0° to 70° C (32° to 158° F)

## PCIe SSDs for HP Workstations



## HP Z Turbo Drive 256GB SSD

Specification	Description
Capacity	256GB
Interface	PCI Express 2.0 x4 electrical x4 physical
Operating Temperature	0° to 70° C (32° to 158° F)

## HP Z Turbo Drive 512GB SSD

Specification	Description
Capacity	512GB
Interface	PCI Express 2.0 x4 electrical x4 physical
Operating Temperature	0° to 70° C (32° to 158° F)

## Optical and removable storage specifications

## HP 9.5mm Slim SuperMulti DVD Writer

Specification	Description
Description	9.5 mm height, tray-load
Mounting Orientation	Either horizontal or vertical
Interface Type	SATA/ATAPI



Specification	Description
Dimensions (W x H x D)	128 x 9.5 x 127 mm
Supported Media Types	<ul style="list-style-type: none"> <li>• DVD-RAM</li> <li>• DVD+R</li> <li>• DVD+RW</li> <li>• DVD+R DL</li> <li>• DVD-R DL</li> <li>• DVD-R</li> <li>• DVD-RW</li> <li>• CD-R</li> <li>• CD-RW</li> </ul>
Disc Capacity	<ul style="list-style-type: none"> <li>• <b>DVD-ROM:</b> 8.5 GB DL or 4.7 GB standard</li> <li>• <b>Full Stroke DVD:</b> &lt; 200 ms (seek)</li> <li>• <b>Full Stroke CD:</b> &lt; 200 ms (seek)</li> </ul>
Maximum Data Transfer Rates	<p><b>CD ROM Read</b></p> <ul style="list-style-type: none"> <li>• CD-ROM, CD-R Up to 24X</li> <li>• CD-RW Up to 24X</li> </ul> <p><b>DVD ROM Read</b></p> <ul style="list-style-type: none"> <li>• DVD-RAM Up to 8X</li> <li>• DVD+RW Up to 8X</li> <li>• DVD-RW Up to 8X</li> <li>• DVD+R DL Up to 8X</li> <li>• DVD-R DL Up to 8X</li> <li>• DVD-ROM Up to 8X</li> <li>• DVD-ROM DL Up to 8X</li> <li>• DVD+R Up to 8X</li> <li>• DVD-R Up to 8X</li> </ul>
Power	<ul style="list-style-type: none"> <li>• <b>Source:</b> SATA DC power receptacle</li> <li>• <b>DC Power Requirements:</b> 5 VDC ± 5%-100 mV ripple p-p</li> </ul>

Specification	Description
	<ul style="list-style-type: none"> <li>• <b>DC Current:</b> 5 VDC -&lt; 800 mA typical, &lt;1600 mA maximum</li> </ul>
Operating Environmental (all conditions non-condensing)	<ul style="list-style-type: none"> <li>• <b>Temperature:</b> 5° to 50° C (41° to 122° F)</li> <li>• <b>Relative Humidity:</b> 10% to 80%</li> <li>• <b>Maximum Wet Bulb Temperature:</b> 29° C (84° F)</li> </ul>
Operating Systems Supported	<ul style="list-style-type: none"> <li>• Windows 8.1</li> <li>• Windows 8 32-bit and 64-bit</li> <li>• Windows 7 Professional 32-bit and 64-bit</li> <li>• Windows Vista Business 64*</li> <li>• Windows Vista Business 32*</li> <li>• Windows Vista Home Basic 32*</li> <li>• Windows 2000</li> <li>• Windows XP Professional</li> <li>• Windows XP Home 32*</li> <li>• Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 &amp; 11</li> </ul> <p>No driver is required for this device. Native support is provided by the operating system.</p>
Kit Contents	9.5mm Slim SuperMulti DVD Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide

## HP 9.5mm Slim DVD-ROM Drive

Specification	Description
Description	9.5mm height, tray-load
Mounting Orientation	Either horizontal or vertical
Interface Type	SATA / ATAPI



Specification	Description
Dimensions (W x H x D)	128 x 9.5 x 127mm
Disc Capacity	DVD-ROM <ul style="list-style-type: none"> <li>• <b>Single layer:</b> Up to 4.7 GB</li> <li>• <b>Double layer:</b> Up to 8.5 GB</li> </ul>
Access Times	<ul style="list-style-type: none"> <li>• <b>DVD-ROM Single Layer:</b> &lt; 110 ms (typical)</li> <li>• <b>CD-ROM Mode 1:</b> &lt; 110 ms (typical)</li> <li>• <b>Full Stroke DVD:</b> &lt; 230 ms (typical)</li> <li>• <b>Full Stroke CD:</b> &lt; 220 ms (typical)</li> </ul>
Power	<ul style="list-style-type: none"> <li>• <b>Source:</b> SATA DC power receptacle</li> <li>• <b>DC Power Requirements:</b> 5 VDC ± 5%-100 mV ripple p-p</li> <li>• <b>DC Current:</b> VDC – &lt; 800mA typical, &lt; 1600 mA maximum</li> </ul>
Operating Environmental (all conditions non-condensing)	<ul style="list-style-type: none"> <li>• <b>Temperature:</b> 5° to 50° C (41° to 122° F)</li> <li>• <b>Relative Humidity:</b> 10% to 80%</li> <li>• <b>Maximum Wet Bulb Temperature:</b> 29° C (84° F)</li> </ul>
Operating Systems Supported	<ul style="list-style-type: none"> <li>• 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*.</li> <li>• Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 &amp; 11</li> <li>• No driver is required for this device. Native support is provided by the operating system.</li> </ul>
Kit Contents	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide



Specification	Description
Description	9.5mm height, tray-load
Mounting Orientation	Either horizontal or vertical
Interface Type	SATA/ATAPI
Dimensions (W x H x D)	128 x 9.5 x 127 mm
Supported Media Types	<ul style="list-style-type: none"> <li>• BD-ROM</li> <li>• BD-R</li> <li>• BD-RE</li> <li>• DVD-RAM</li> <li>• DVD+R</li> <li>• DVD+RW</li> <li>• DVD+R DL</li> <li>• DVD-R DL</li> <li>• DVD-R</li> <li>• DVD-RW</li> <li>• CD-R</li> <li>• CD-RW</li> </ul>
Disc Capacity	<ul style="list-style-type: none"> <li>• DVD-ROM <ul style="list-style-type: none"> <li>• 8.5 GB DL or 4.7 GB standard</li> </ul> </li> <li>• Blu-ray <ul style="list-style-type: none"> <li>• 25 GB (single-layer)</li> <li>• 50 GB (dual-layer)</li> <li>• 100/128 GB (BDXL)</li> </ul> </li> <li>• Full Stroke DVD <ul style="list-style-type: none"> <li>• &lt; 230 ms (seek)</li> </ul> </li> <li>• Full Stroke CD <ul style="list-style-type: none"> <li>• &lt; 220 ms (seek)</li> </ul> </li> <li>• Blu-ray <ul style="list-style-type: none"> <li>• &lt; 230 ms (seek) (Full Stroke Blu-ray)</li> </ul> </li> </ul>



Specification	Description
	<ul style="list-style-type: none"> <li>• Startup Time (Time to drive ready from tray loading)               <ul style="list-style-type: none"> <li>• <b>BD-ROM (SL/DL):</b> 25S / 28S</li> <li>• <b>BD-R (SL/DL):</b> 25S / 28S</li> <li>• <b>BD-RE (SL/DL):</b> 25S / 28S</li> <li>• <b>DVD-ROM (SL/DL):</b> 18S / 18S</li> <li>• <b>DVD-R (SL/DL):</b> 25S / 25S</li> <li>• <b>DVD-RW:</b> 25S</li> <li>• <b>DVD+R (SL/DL):</b> 25S / 25S</li> <li>• <b>DVD+RW:</b> 25S</li> <li>• <b>DVD-RAM:</b> 45S</li> <li>• <b>CD-ROM:</b> 15S</li> </ul> </li> </ul>
Maximum Data Transfer Rates	<ul style="list-style-type: none"> <li>• CD ROM Read               <ul style="list-style-type: none"> <li>• CD-ROM, CD-R Up to 24X</li> <li>• CD-RW Up to 24X</li> </ul> </li> <li>• DVD ROM Read               <ul style="list-style-type: none"> <li>• DVD-RAM Up to 8X</li> <li>• DVD+RW Up to 8X</li> <li>• DVD-RW Up to 8X</li> <li>• DVD+R DL Up to 8X</li> <li>• DVD-R DL Up to 8X</li> <li>• DVD-ROM Up to 8X</li> <li>• DVD-ROM DL Up to 8X</li> <li>• DVD+R Up to 8X</li> <li>• DVD-R Up to 8X</li> </ul> </li> <li>• Blu-ray               <ul style="list-style-type: none"> <li>• BD-ROM Up to 6X</li> <li>• BD-ROM DL Up to 6X</li> <li>• BD-R Up to 6X</li> <li>• BD-R DL Up to 6X</li> <li>• BD-R Up to 6X</li> <li>• BD-RE SL/DL Up to 6X</li> </ul> </li> </ul>
Power	<ul style="list-style-type: none"> <li>• <b>Source:</b> SATA DC power receptacle</li> <li>• <b>DC Power Requirements:</b> 5 VDC <math>\pm</math> 5%-100 mV ripple p-p</li> <li>• <b>DC Current:</b> 5 VDC -900 mA typical, 2000mA maximum</li> </ul>
Operating Environmental (all conditions non-condensing)	<ul style="list-style-type: none"> <li>• <b>Temperature:</b> 5° to 50° C (41° to 122° F)</li> <li>• <b>Relative Humidity:</b> 10% to 80%</li> <li>• <b>Maximum Wet Bulb Temperature:</b> 29° C (84° F)</li> </ul>

Specification	Description
Operating Systems Supported	<ul style="list-style-type: none"> <li>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*.</li> <li>Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 &amp; 11</li> <li>No driver is required for this device. Native support is provided by the operating system.</li> </ul>
Kit Contents	<p>9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide</p> <p>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.</p>

## HP DX115 Removable Drive Enclosure

Specification	Description
Interface Type	Compatible with SAS or SATA controllers. Offers 6Gb/s performance when used with 6Gb/s HDDs.
Dimensions (WxHxD)	147.6 x 41.1 x 205 (5.81 x 1.62 x 8.08 in)
Approvals	<ul style="list-style-type: none"> <li><b>Frame and Carrier:</b> 1.73 kg (3.8 lbs.)</li> <li><b>Carrier:</b> 0.45 kg (1 lbs.)</li> </ul>

## HP 15-in-1 Media Card Reader

Specification	Description
Description	<ul style="list-style-type: none"> <li>Supports hardware ECC (Error Correction Code) function</li> <li>Supports hardware CRC (Cyclic Redundancy Check) function</li> <li>Supports MS 4-bit parallel transfer mode</li> <li>Supports MS-PRO 4-bit parallel transfer mode</li> <li>Supports MS PRO-HG Duo 4-bit parallel transfer mode</li> </ul>



Specification	Description
	<ul style="list-style-type: none"> <li>• Supports SD 4-bit parallel transfer mode</li> <li>• Supports UHS-104 SD 4-bit card (version 3.0)</li> <li>• Supports CF v6.0 with PIO mode 6 and Ultra DMA 7 mode</li> </ul>
Interface Type	USB 3.0 High-speed interface  <div style="background-color: #f0f0f0; padding: 5px;"><b>NOTE:</b> If there is a USB2 connection, USB2 transfer speeds are supported.</div>
Dimensions (WxHxD)	124.5 x 101.6 x 25.4 mm (4.9 x 4 x 1 in)  Fits conveniently in the 5.25" drive bay.
Supported Media Types	<ul style="list-style-type: none"> <li>• CompactFlash Type I</li> <li>• CompactFlash Type II</li> <li>• Microdrive</li> <li>• Secure Digital Card (SD)</li> <li>• Secure Digital High Capacity (SDHC)</li> <li>• SD Extended Capacity Memory Card (SDXC)</li> <li>• SD Ultra High Speed II(SD UHSII)</li> <li>• Memory Stick</li> <li>• Memory Stick Select</li> <li>• Memory Stick Duo (MS Duo)</li> <li>• Memory Stick PRO (MS PRO)</li> <li>• Memory Stick PRO Duo (MS PRO Duo)</li> <li>• Memory Stick PRO-HG Duo</li> <li>• MagicGate Memory Stick (MG)</li> <li>• MagicGate Memory Stick Duo</li> </ul> <p>These additional media types are supported with a card adapter.</p> <ul style="list-style-type: none"> <li>• Memory Stick Micro (M2)</li> <li>• miniSD</li> <li>• miniSD High Capacity</li> <li>• Micro SD Memory Card (MicroSD)</li> <li>• Micro SD High Capacity Memory Card (MicroSDHC)</li> </ul>

Specification	Description
	Test Parameters/Conditions - Power applied, unit operating on system $\pm 5\%$
Operating Systems Supported	<ul style="list-style-type: none"> <li>• Windows 8 Pro (64-bit)*</li> <li>• Windows 8.1 (64-bit)*</li> <li>• Windows 8 (64-bit)*</li> <li>• Windows 7 Ultimate (32-bit)**</li> <li>• Windows 7 Ultimate (64-bit)**</li> <li>• Windows 7 Professional (32-bit)**</li> <li>• Windows 7 Professional (64-bit)**</li> <li>• Windows 7 Home Basic**</li> <li>• Windows 7 Home Premium (32-bit)**</li> <li>• Windows 7 Home Premium (64-bit)**</li> <li>• Windows Vista Business 64</li> <li>• Windows Vista Business 32</li> <li>• Windows Vista Home Basic 32</li> <li>• Windows XP Professional</li> <li>• Windows XP Home 32</li> </ul> <p>No driver is required for this device. Native support is provided by the operating system.</p> <p>Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality.</p> <p>Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality.</p>
Kit Contents	<ul style="list-style-type: none"> <li>• Windows 8 Pro (64-bit)*</li> <li>• Windows 8.1 (64-bit)*</li> <li>• Windows 8 (64-bit)*</li> <li>• Windows 7 Ultimate (32-bit)**</li> <li>• Windows 7 Ultimate (64-bit)**</li> <li>• Windows 7 Professional (32-bit)**</li> <li>• Windows 7 Professional (64-bit)**</li> <li>• Windows 7 Home Basic**</li> <li>• Windows 7 Home Premium (32-bit)**</li> <li>• Windows 7 Home Premium (64-bit)**</li> <li>• Windows Vista Business 64</li> <li>• Windows Vista Business 32</li> </ul>



Specification	Description
	<ul style="list-style-type: none"> <li>Windows Vista Home Basic 32</li> <li>Windows XP Professional</li> <li>Windows XP Home 32</li> </ul> <p>No driver is required for this device. Native support is provided by the operating system.</p> <p>Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality.</p> <p>Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality.</p>
Kit Contents	Media card reader, 5.25" bracket/rails/bezel, Install Guide, IO & Security Software and Documentation CD
Approvals	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
Weight	0.16 kg (0.35 lbs)

## Networking and communications

### Integrated Intel I218LM PCIe GbE Controller

Specification	Description
Connector	RJ-45 (motherboard integration)
Controller	Intel I218LM GbE platform LAN connect networking controller
Memory	3 KB FIFO packet buffer memory (both Tx and Rx)

Specification	Description
Data Rates Supported	10/100/1000 Mbps
Compliance	<ul style="list-style-type: none"> <li>• 802.1as</li> <li>• 802.1p</li> <li>• 802.1Q</li> <li>• 802.3</li> <li>• 802.3ab</li> <li>• 802.3az</li> <li>• 802.3i</li> <li>• 802.3u</li> <li>• 802.3x</li> <li>• 802.3z</li> </ul>
Bus architecture	PCI Express 1.1 (x1) 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 only (integrated regulators)
Boot ROM Support	Yes
Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
Network Transfer Rate	<ul style="list-style-type: none"> <li>• 10BASE-T (half-duplex) 10 Mbps</li> <li>• 10BASE-T (full-duplex) 20 Mbps</li> <li>• 100BASE-TX (half-duplex) 100 Mbps</li> <li>• 100BASE-TX (full-duplex) 200 Mbps</li> <li>• 1000BASE-T (full-duplex) 2000 Mbps</li> </ul>



Specification	Description
Management Capabilities	<ul style="list-style-type: none"> <li>• WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics</li> <li>• AMT 9.1 support, vPro compliant</li> </ul>

## HP X520 10GbE Dual Port Adapter

Specifications	Description
Hardware Certifications	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC

## HP 10GbE SFP+ SR Transceiver

Specifications	Description
Operating Temperature	32°F to 113°F (0°C to 45°C)
Operating Humidity	0% to 85%, noncondensing
Dimensions (H x W x D)	1.19 x 1.38 x 5.57 cm (0.47 x 0.54 x 2.19 in)

## HP 361T PCIe Dual Port Gigabit NIC

Specification	Description
Connector	Two RJ-45
Controller	Intel® Ethernet I350 Controller
Data rates supported	10/100/1000 Mbps, Half- and full-duplex
Compliance	<ul style="list-style-type: none"> <li>• 802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588</li> <li>• PCIe v2.0 standard</li> </ul>

Specification	Description
	<ul style="list-style-type: none"> <li>• RoHS (6 of 6)</li> <li>• FCC (U.S. only) Class B</li> </ul> <ul style="list-style-type: none"> <li>• DOC (Canada) Class B</li> <li>• CE EN 55024, EN55022 Class B</li> <li>• VCCI Class II</li> <li>• UL 1950</li> <li>• CSA 950</li> <li>• EN 60950</li> <li>• CE</li> <li>• ACPI 1.1a</li> </ul> <p>Microsoft WHQL (Windows Hardware Quality Labs)</p>
Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
Power requirement	<ul style="list-style-type: none"> <li>• 4.1W idle without EEE link partner</li> <li>• 10BASE-T (full-duplex) 20 Mb/s</li> <li>• 100BASE-TX (half-duplex) 100 Mb/s</li> <li>• 100BASE-TX (full-duplex) 200 Mb/s</li> <li>• 1000BASE-T (full-duplex) 2000 Mb/s</li> </ul>
Network Transfer Rate	<ul style="list-style-type: none"> <li>• 10BASE-T (half-duplex) 10 Mb/s</li> <li>• 3.2W idle with EEE link partner</li> <li>• 4.2W maximum</li> </ul>
Operating Temperature	0° to 55° C (32° to 131° F)
Operating Humidity	10% to 95% non-condensing
Dimensions (H x W x D)	13.50 x 6.4 cm (5.3 x 2.5 in) (without brackets)
Operating System Driver Support	<ul style="list-style-type: none"> <li>• Windows 7 Professional 32-bit and 64-bit</li> <li>• Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation</li> </ul>

Specification	Description
	HP 361T 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)
Kit Contents	Product Warranty statement and the Quick Install Card (QIC)

## Intel 7260 802.11 a/b/g/n PCIe WLAN NIC

Specifications	Description
Operating Temperature	<ul style="list-style-type: none"> <li>• <b>Operating:</b> 10% to 90% (non-condensing)</li> <li>• <b>Non-operating:</b> 5% to 95% (non-condensing)</li> </ul>
Dimensions (H x W x D)	<ul style="list-style-type: none"> <li>• <b>Native HMC:</b> 26.8 x 30.0 x 2.4 mm</li> <li>• <b>Carrier Card Assembly:</b> 84 x 119 mm (3.3 x 4.7 in)</li> </ul>
Kit Contents	PCIe x1 card with full height bracket, rf antenna, antenna cable, separate low profile bracket, software CD and warranty.

**NOTE:** 1. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista. 2. Check latest software/driver release for updates on supported security features. 3. Maximum output power may vary by country according to local regulations. 4. In Power Save Polling mode and on battery power. 5. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

## Physical specifications

Specification	Description
Chassis (W x D x H)	43.2 x 16.9 x 44.5 cm (17.0 x 6.65 x 17.5 in)



Specification	Description
System weight	<p>Actual weight depends upon configuration</p> <ul style="list-style-type: none"> <li>• <b>Minimum:</b> 11.0 kg (24.3 lbs)</li> <li>• <b>Standard:</b> 13.5 kg (29.8 lbs)</li> <li>• <b>Maximum:</b> 17.5 kg (38.5 lbs)</li> </ul>

## Software/OS

Feature	Description
Operating systems (Preinstalled)	<ul style="list-style-type: none"> <li>• Windows 8.1 Pro 64-bit*</li> <li>• Windows 7 Professional 64-bit (available through downgrade rights from Windows 8.1 64-bit)**</li> <li>• Windows 7 Professional (MSNA) 64-Bit*</li> <li>• HP Linux Installer Kit</li> <li>• Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)</li> </ul> <p><b>NOTE:</b> * Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See <a href="http://www.microsoft.com">http://www.microsoft.com</a>. ** This system is preinstalled with Windows® 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data. <b>1</b> This second OS must be ordered with the HP Linux Installer Kit as the first OS.</p>
Software	<ul style="list-style-type: none"> <li>• HP Performance Advisor</li> <li>• HP Remote Graphics Software (RGS) 6.0</li> <li>• MS Office Home &amp; Business 2013</li> <li>• Cyberlink PowerDVD and Power2Go</li> <li>• Foxit PhantomPDF Express</li> </ul> <p><b>NOTE:</b> Available as a free download from <a href="#">HP Performance Advisor</a>. NOTE 2: Supported operating systems:</p>

Feature	Description
	<ul style="list-style-type: none"> <li>• Windows 7 Professional 32/64</li> <li>• Windows 8 Professional 32/64</li> <li>• RHEL v6.5</li> <li>• SLED 11 SP3</li> </ul> <p>For more information, go to <a href="#">HP Remote Graphics Software</a>.</p> <p>Must select as a Configure to Order option.</p>

**NOTE:** HP Cloud Recovery download tool (Cloud Recovery Client) is available under Software and Drivers section on the support page.

## Environmental specifications

Specifications	Description
Temperature range	<ul style="list-style-type: none"> <li>• <b>Operating:</b> 5°C to 35°C (40°F to 95°F)</li> <li>• <b>Non-operating:</b> -40°C to 60°C (-40°F to 140°F)</li> </ul>
Relative humidity	<ul style="list-style-type: none"> <li>• <b>Operating:</b> 8% to 85% RH, non-condensing</li> <li>• <b>Non-operating:</b> 8% to 90% RH, non-condensing</li> </ul>
Maximum altitude	<ul style="list-style-type: none"> <li>• <b>Operating:</b> 3,000 m (10,000 ft)</li> <li>• <b>Non-operating:</b> 9,100 m (30,000 ft)</li> </ul>
Dynamic (new)	<p><b>Shock</b></p> <ul style="list-style-type: none"> <li>• <b>Operating:</b> ½-sine: 40g, 2-3ms (~62 cm/sec)</li> <li>• <b>Non-operating:</b> <ul style="list-style-type: none"> <li>• ½-sine: 160 cm/s, 2-3ms (~105g)</li> <li>• square: 422 cm/s, 20g</li> </ul> </li> </ul> <p><b>NOTE:</b> Values represent individual shock events and do not indicate repetitive shock</p>

Specifications	Description
	<p>events.</p> <p><b>Vibration</b></p> <ul style="list-style-type: none"> <li>• <b>Operating random:</b> 0.5g (rms), 5-300 Hz, up to 0.0025g<sup>2</sup>/Hz</li> <li>• <b>Non-operating random:</b> 2.0g (rms), 5-500 Hz, up to 0.0150 g<sup>2</sup>/Hz</li> </ul> <p><b>NOTE:</b> Values do not indicate continuous vibration.</p>
Cooling	Above 1524 m (5,000 ft.) altitude, maximum operating temperature is de-rated by 1° C (1.8° F) per 305 m (1,000 ft.) elevation increase

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