

Overview

NVIDIA Graphics



SUPPORTED SOLUTIONS

Category

Part number

QUADRO

NVIDIA® Quadro® K420	N1T07AA
NVIDIA® Quadro® K620	J3G87AA
NVIDIA® Quadro® K1200	L4D16AA
NVIDIA® Quadro® K2200	J3G88AA
NVIDIA® Quadro® M2000	T7T60AA
NVIDIA® Quadro® M4000	M6V52AA
NVIDIA® Quadro® M5000	M6V53AA
NVIDIA® Quadro® M6000 (12GB)	L2K02AA
NVIDIA® Quadro® M6000 (24GB)	T7T61AA
NVIDIA® Quadro® M1000M	T8W13AA
NVIDIA® Quadro® M2000M	Available factory integrated only.
NVIDIA® Quadro® P400 (2GB)	1ME43AA

Overview

NVIDIA® Quadro® P600 1 st GFX (2GB)	1ME42AA
NVIDIA® Quadro® P1000 1 st GFX (4GB)	1ME01AA
NVIDIA® Quadro® P2000 1 st GFX (5GB)	1ME41AA
NVIDIA® Quadro® P4000 1 st GFX (8GB)	1ME40AA
NVIDIA® Quadro® P5000 1 st GFX (16GB)	Z0B13AA
NVIDIA® Quadro® P6000 1 st GFX (24GB)	Z0B12AA
NVIDIA® Quadro® GP100 (16GB)	1ZE81AA
NVIDIA® Quadro® Sync II	1WT20AA

NVIDIA NVS

NVIDIA® NVS™ 310	M6V51AA
NVIDIA® NVS™ 315	E1U66AA
NVIDIA® NVS™ 510	C2J98AA

Overview

COMPATIBILITY MATRIX

	Category	HP Z1 G3	HP Z240 SFF	HP Z240 Tower	HP Z440	HP Z640	HP Z840	HP Z4 G4	HP Z6 G4	HP Z8 G4
NVIDIA® Quadro® K420	Sub Entry 3D		X	X	X	X	X			
NVIDIA® Quadro® K620	Entry 3D		X	X	X	X	X			
NVIDIA® Quadro® K1200	Mid-range 3D		X	X	X	X	X			
NVIDIA® Quadro® K2200	Mid-range 3D			X	X	X	X			
NVIDIA® Quadro® M2000	Mid-range 3D			X	X	X	X			
NVIDIA® Quadro® M4000	High End 3D			X	X	X	X			
NVIDIA® Quadro® M5000	High End 3D			X	X	X	X			
NVIDIA® Quadro® M6000 (12GB)	Ultra 3D					X	X			
NVIDIA® Quadro® M6000 (24GB)	Ultra 3D					X	X			
NVIDIA® Quadro® M1000M	Entry 3D	X								
NVIDIA® Quadro® M2000M*	Mid-range 3D	X								
NVIDIA® Quadro® P400 (2GB)	Entry 3D		X	X	X			X	X	X
NVIDIA® Quadro® P600 1st GFX (2GB)	Entry 3D		X	X	X	X	X	X	X	X
NVIDIA® Quadro® P1000 1st GFX (4GB)	Mid-range 3D		X	X	X			X	X	X
NVIDIA® Quadro® P2000 1st GFX (5GB)	Mid-range 3D			X	X	X	X	X	X	X
NVIDIA® Quadro® P4000 1st GFX (8GB)	High End 3D			X	X	X	X	X	X	X
NVIDIA® Quadro® P5000 1st GFX (16GB)	High End 3D				X	X	X	X	X	X
NVIDIA® Quadro® P6000 1st GFX (24GB)	Ultra 3D					X	X	X	X	X
NVIDIA® Quadro® GP100 (16GB)	Ultra 3D						X	X	X	X
NVIDIA® Quadro® Sync II	GPU Sync				X	X	X			
NVIDIA® NVS™ 310	Pro 2D		X	X	X	X	X			
NVIDIA® NVS™ 315	Pro 2D		X	X	X	X	X			

Overview

NVIDIA® NVS™ 510	Pro 2D	X	X	X	X	X
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* Available factory integrated only

Desktop Workstation Graphics

NVIDIA® Quadro® K420 2GB Graphics

Part number	N1T07AA
Compatibility	Z440, Z640, Z840
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) 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):

Desktop Workstation Graphics

- 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

Microsoft Windows 8.1

Microsoft Windows 8

Microsoft 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 aftermarket kit.

Desktop Workstation Graphics

NVIDIA® Quadro® K620 2GB Graphics

Part number	J3G87AA
Compatibility	Z240 SFF/CMT, Z440, Z640, Z840
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 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 x 1536 x 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

Desktop Workstation Graphics

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

Available Graphics Drivers

Microsoft Windows 8.1
Microsoft Windows 8
Microsoft 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 aftermarket kit.

Desktop Workstation Graphics

NVIDIA® Quadro® K1200 4GB Graphics

Part number	L4D16AA
Compatibility	HP Z240 SFF/Tower, Z440, Z640, Z840
Form Factor	Dimensions: 2.71" H x 6.875" L Single Slot, Low Profile Cooling: Active Weight: ~175 grams Includes Full Height and Low Profile chassis brackets
Graphics Controller	NVIDIA® Quadro® K1200 Graphics Card GPU: GM107 with 512 CUDA cores Power: 46 Watts
Bus Type	PCI Express 2.0 x16
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 x 1536 x 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

Desktop Workstation Graphics

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 10
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).

Desktop Workstation Graphics

NVIDIA® Quadro® K2200 Graphics Card

Part number	J3G88AA
Compatibility	Z240 CMT, Z440, Z640, Z840
Form Factor	Dimensions: 4.376" H x 7.97" L Single Slot, Full Height Cooling: Active Weight: 240 grams
Graphics Controller	NVIDIA Quadro K2200 Graphics Card GPU: GM107 with 640 CUDA cores Power: 68 Watts
Bus Type	PCI Express 2.0 x16
Memory	Size: 4GB GDDR5 Memory Bandwidth: 80 GB/s Memory Width: 128-bit
Connectors	1 DL-DVI(I) 2 DisplayPort 1.2a Factory Configured Option: No video cable adapter included 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 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 x 1536 x 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 - 3 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors

Desktop Workstation Graphics

Maximum number of DisplayPort displays possible (may require MST and/or HBR2):

- 4 1920x1200
- 4 2560x1600
- 2 4096x2160

Maximum number of monitors across all available Quadro K2200 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

Microsoft Windows 8.1
Microsoft Windows 8
Microsoft 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 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 (displays must support MST and HBR2).

Desktop Workstation Graphics

NVIDIA® Quadro® M2000 4GB Graphics

Part number	T7T60AA
Compatibility	HP Z240 Tower, Z440, Z640, Z840
Form Factor	Dimensions: 4.376" H x 6.6" L Single Slot, Full Height Cooling: Active Weight: 239 grams
Graphics Controller	NVIDIA Quadro M2000 Graphics Card GPU: GM206 with 768 CUDA cores Power: 75 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 4GB GDDR5 Memory Bandwidth: 105.7 GB/s Memory Width: 128-bit
Connectors	4x DisplayPort 1.2a Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as accessories
Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) Using two DP outputs, the M2000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.
RAMDAC	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
Image Quality Features	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro M2000 outputs is 4.
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.5 DirectX 12

Desktop Workstation Graphics

API support includes:

CUDA C, CUDA C++, DirectCompute 5.0, and OpenCL software

Available Graphics Drivers

Microsoft Windows 10

Microsoft 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 M2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately.
 2. Quadro M2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.
 3. See www.hp.com/go/support for HP supported NVIDIA graphics drivers
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Desktop Workstation Graphics

NVIDIA® Quadro® M4000 8GB Graphics

Part number	M6V52AA
Compatibility	HP Z240 Tower, Z440, Z640, Z840
Form Factor	Dimensions: 4.4" H x 9.5" L Single Slot, Full Height Cooling: Active Weight: 475 grams (without extender)
Graphics Controller	NVIDIA® Quadro® M4000 GPU: GM204 with 1664 CUDA cores Power: 120 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 8GB GDDR5 Memory Bandwidth: 192 GB/s Memory Width: 256-bit
Connectors	4 DisplayPort™ 1.2a Factory configured Option: 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 accessories
Maximum Resolution	DisplayPort™: - single 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 x 1536 x 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) NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support Full OpenGL quad buffered stereo support Support for large-scale, ultra-high resolution visualization using the NVIDIA® SVS platform which includes NVIDIA® Mosaic, NVIDIA® Sync and NVIDIA® Warp/Blend technologies
Display Output	Maximum number of displays - 4 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors

Desktop Workstation Graphics

Maximum number of DisplayPort™ displays possible:

- 4 1920x1200
- 4 2560x1600
- 4 4096x2160
- 2 5120x2880 (requires dual DP input capable 5k displays)

Maximum number of monitors across all available QUADRO® M4000 outputs is 4.

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

OpenGL 4.5
DirectX 12

API support includes:

CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Windows 10
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. Configurations using the QUADRO® M4000 graphics card 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).

Desktop Workstation Graphics

NVIDIA® Quadro® M5000 8GB Graphics

Part number	M6V53AA
Compatibility	HP Z240, Z440, Z640, Z840
Form Factor	Dimensions: 4.4" H x 10.5" L Dual Slot, Full Height Cooling: Active Weight: 525 grams (without extender)
Graphics Controller	NVIDIA® Quadro® M5000 GPU: GM204 with 2048 CUDA cores Power: 150 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 8GB GDDR5 ECC capable Memory bandwidth: 211GB/s Memory Width: 256-bit
Connectors	1 Dual Link DVI-I 4 DisplayPort™ 1.2a Factory configured option: No adapter included with card. After market option kit: No adaptor included with card. Additional DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories
Maximum Resolution	DisplayPort™: - up to four 4096 x 2160 x 30 bpp @ 60Hz displays - up to two 5120 x 2880 @ 60Hz displays - 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 x 1536 x 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) NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support. Full OpenGL quad buffered stereo support. Support for large-scale, ultra-high resolution visualization using the NVIDIA® SVS platform which includes NVIDIA® Mosaic, NVIDIA® Sync and NVIDIA® Warp/Blend technologies.

Desktop Workstation Graphics

Display Output

Maximum number of displays
- 4 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
- 4 2560x1600
- 4 4096x2160
- 2 5120x2880 (requires dual DP input 5k displays)

Maximum number of monitors across all available QUADRO® M5000 outputs is 4.

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

OpenGL 4.5
DirectX 12

API support for NVIDIA®'s CUDA™ C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, Fortran

Available Graphics Drivers

Windows 10
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® M5000 does not include a video cable adapter. Video cable adapters must be ordered separately.
2. 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).
3. Configurations of a single QUADRO® M5000 graphics card 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).

Desktop Workstation Graphics

NVIDIA® Quadro® M6000 12GB Graphics

Part number	L2K02AA
Compatibility	HP Z840, Z640
Form Factor	4.42" H x 10.5" L Dual Slot Power: 250 Watts Weight: 1030 grams
Graphics Controller	NVIDIA® Quadro® M6000 Graphics Card based on the GM200 GPU Core Count: 3072 Base Clock: 1026 MHz Boost Clock: 1152 MHz Idle Clock: 324 MHz
Bus Type	PCI Express 3.0 x16
Memory	12GB GDDR5 384-bit memory I/O path 317 GB/s memory bandwidth ECC Memory (disabled by default)
Connectors	DP (x4) Dual-Link DVI-I 3-pin mini-DIN connector SLI connector QUADRO® Sync connector One 8-pin auxiliary power connector 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">● DisplayPort™ with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP 1.3 support● NVIDIA® 3D Vision™ technology● NVIDIA® Premium Mosaic and nView
Display Output	400 MHz integrated RAMDAC <ul style="list-style-type: none">● Maximum resolution over VGA (requires DVI to VGA cable or DP to VGA adapter): 2048 × 1536 × 32 bpp at 85 Hz Dual-link internal TMDS (DVI 1.0) <ul style="list-style-type: none">● Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) Single-link internal TMDS (DVI 1.0) <ul style="list-style-type: none">● Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)

Desktop Workstation Graphics

DisplayPort™ 1.2a with MST and HBR2. Each DisplayPort™ connector has the following capabilities:

- Maximum pixel clock: 592 MPixel/s
- Maximum bandwidth: 17.2 Gbps
- Example maximum resolution: 4096 × 2160 × 30 bpp at 60Hz

HDMI

- Maximum resolution (requires DP to HDMI adapter): 4096 × 2160 × 8 bpp at 60Hz

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

Full OpenGL 4.4
Full DirectX 12
API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Windows 10
Windows 8.1
Windows 8
Windows 7 Professional
Linux®

HP qualified drivers may be preloaded or available from the HP support Web site:
<http://www8.hp.com/us/en/drivers.html>

- Notes**
1. NVIDIA® GRID VGX Pass Through feature supported on NVIDIA® Quadro® M6000 to enable direct mapping of GPU to Virtual Machine.
 2. No display output adapter included.
 3. For HP Z840 Workstation configurations, the 1125W power supply option must be used.

Desktop Workstation Graphics

NVIDIA® Quadro® M6000 24GB Graphics

Part number	T7T61AA
Compatibility	HP Z840, Z640
Form Factor	4.4" H x 10.5" L Dual Slot Power: 250 Watts Weight: 1023 grams
Graphics Controller	NVIDIA® Quadro® M6000 Graphics Card based on the GM200 GPU Core Count: 3072 Base Clock: 1026 MHz Boost Clock: 1152 MHz Idle Clock: 324 MHz
Bus Type	PCI Express 3.0 x16
Memory	24GB GDDR5 384-bit memory I/O path 317 GB/s memory bandwidth ECC Memory (disabled by default)
Connectors	DP (x4) Dual-Link DVI-I Optional Stereo SLI connector QUADRO® Sync connector One 8-pin auxiliary power connector Factory configured option: No adapter included with card. Option Kit: No adaptor included with card. Dual-Link 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">• DisplayPort™ with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP 1.3 support• NVIDIA® 3D Vision™ technology• NVIDIA® Premium Mosaic and nView
Display Output	400 MHz integrated RAMDAC <ul style="list-style-type: none">• Maximum resolution over VGA (requires DVI to VGA cable or DP to VGA adapter): 2048 × 1536 × 32 bpp at 85 Hz Dual-link internal TMDS (DVI 1.0) <ul style="list-style-type: none">• Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) Single-link internal TMDS (DVI 1.0) <ul style="list-style-type: none">• Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)

Desktop Workstation Graphics

DisplayPort™ 1.2a with MST and HBR2. Each DisplayPort™ connector has the following capabilities:

- Maximum pixel clock: 592 MPixel/s
- Maximum bandwidth: 17.2 Gbps
- Example maximum resolution: 4096 × 2160 × 30 bpp at 60Hz

HDMI

- Maximum resolution (requires DP to HDMI adapter): 4096 × 2160 × 8 bpp at 60Hz

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

Full OpenGL 4.4
Full DirectX 12
API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Windows 10
Windows 8.1
Windows 8
Windows 7 Professional
Linux®

HP qualified drivers may be preloaded or available from the HP support Web site:
<http://www8.hp.com/us/en/drivers.html>

Notes

1. NVIDIA® GRID VGX Pass Through feature supported on NVIDIA® Quadro® M6000 to enable direct mapping of GPU to Virtual Machine.
2. No display output adapter included.
3. For HP Z840 Workstation configurations, the 1125W power supply option must be used.

Desktop Workstation Graphics

NVIDIA® Quadro® M1000M 2GB Graphics

Part number	T8W13AA
Compatibility	HP Z1 G3
Form Factor	MXM v3.1 Type A (82mm x 70mm)
Graphics Controller	N16P-Q1, 993MHz core clock 512 CUDA cores
Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
Memory	2GB GDDR5 128bit wide interface 2500MHz, 80 GB/s
Connectors	One MXM v3.1 connector (285-pin)
Maximum Resolution	2 x 4096x2160 @ 60Hz digital displays + 1 x 3840x2160 @ 60Hz internal digital display In Z1 G3 application: - Internal Display: 3840x2160 - External Display via DP 1.2 connector: 4096x2160 - External Display via TBT 3 connector: 4096x2160
RAMDAC	Not Applicable
Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. NVIDIA® Scalable Geometry Engine.
Shading Architecture	Shader Model 5.0 support
Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 12 OpenGL 4.5 Compute API support for NVIDIA® CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
Available Graphics Drivers	Windows 7 64-bit Windows 10 64-bit SUSE Linux® Enterprise Desktop 11 64-bit Red Hat Enterprise Linux® 6 Workstation 64-bit

Notes See www.hp.com/go/support for HP supported NVIDIA® graphics drivers

Desktop Workstation Graphics

NVIDIA® Quadro® M2000M 4GB Graphics

Part number	Factory integrated offering only
Compatibility	HP Z1G3
Form Factor	MXM v3.1 Type A (82mm x 70mm)
Graphics Controller	N16P-Q3, 1084MHz core clock 640 CUDA cores
Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
Memory	4GB GDDR5 128 bit wide interface 2500MHz, 80 GB/s
Connectors	One MXM v3.1 connector (285-pin)
Maximum Resolution	2 x 4096x2160 @ 60Hz digital displays + 1 x 3840x2160 @ 60Hz internal digital display In Z1 G3 application: - Internal Display: 3840x2160 - External Display via DP 1.2 connector: 4096x2160 - External Display via TBT 3 connector: 4096x2160
RAMDAC	Not Applicable
Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. NVIDIA® Scalable Geometry Engine. AES-128 CTR/CBC/ECB decryption modes supported. NVIDIA® 3D Vision Pro
Shading Architecture	Shader Model 5.0 support
Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 12 OpenGL 4.5 Compute API support for NVIDIA® CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
Available Graphics Drivers	Windows 7 64-bit Windows 10 64-bit SUSE Linux® Enterprise Desktop 11 64-bit Red Hat® Enterprise Linux® 6 Workstation 64-bit

Notes See www.hp.com/go/support for HP supported NVIDIA® graphics drivers

Desktop Workstation Graphics

NVIDIA® Quadro® P400 2GB Graphics

Part number	1ME43AA
Compatibility	Z240 TWR, Z240 SFF, Z440, Z4 G4, Z6 G4, Z8 G4
Form Factor	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Cooling: Active Weight: 129 grams
Graphics Controller	NVIDIA® Quadro® P400 Graphics Card GP107-825 GPU 256 CUDA cores Max Power: 30 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s
Connectors	3mDP Outputs*
Maximum Resolution	DisplayPort™ 1.4: - up to 3x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
Display Output	3 mDP Connectors
Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 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 *P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports.

Factory Configured (Z240/ Z440 Workstations): Two mDP-to-DP adapters included
 Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included
 After market option kit:Two mDP-to-DP Adapters included

Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:

- 2MY05AA - HP miniDP-to-DP Adapter Cables
- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Desktop Workstation Graphics

NVIDIA® Quadro® P600 1st GFX 2GB Graphics

Part number	1ME42AA
Compatibility	Z440, Z640, Z840, Z240 TWR, Z240 SFF, Z4 G4, Z6 G4, Z8 G4
Form Factor	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Cooling: Active Weight: 129 grams
Graphics Controller	NVIDIA® Quadro® P600 Graphics Card GP107-850 GPU 384 CUDA cores Max Power: 40 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 128-bit Memory Bandwidth: 64 GB/s
Connectors	4mDP Outputs *
Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
Display Output	4 mDP Connectors
Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 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

*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports.

Factory Configured (Z240/ Z440/ Z640/ Z840 Workstations): Two mDP-to-DP adapters included

Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included

After market option kit: Two mDP-to-DP Adapters included

Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:

- 2MY05AA - HP miniDP-to-DP Adapter Cables
- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Desktop Workstation Graphics

NVIDIA® Quadro® P1000 1st GFX 4GB Graphics

Part number	1ME01AA
Compatibility	Z240 TWR, Z240 SFF, Z440, Z4 G4, Z6 G4, Z8 G4
Form Factor	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Cooling: Active Weight: 129 grams
Graphics Controller	NVIDIA® Quadro® P1000 Graphics Card GP107-860 GPU 640 CUDA cores Max Power: 47 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 4 GB GDDR5, 2500 MHz Memory Interface: 128-bit memory interface Memory Bandwidth: 80 GB/s memory bandwidth
Connectors	4mDP Outputs*
Maximum Resolution	DisplayPort 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
Display Output	4 mDP Connectors
Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 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	*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports. Factory Configured (Z240/ Z440 Workstations): Two mDP-to-DP adapters included Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit: Two mDP-to-DP Adapters included Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories: <ul style="list-style-type: none"> - 2MY05AA - HP miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

NVIDIA Quadro P2000 1st GFX 5GB Graphics

Desktop Workstation Graphics

Part number	1ME41AA
Compatibility	HP Z240 Tower, Z440, Z640, Z840, Z4 G4, Z6 G4, Z8 G4
Form Factor	Dimensions: 4.4”Hx7.9”L Single Slot Cooling: Active Weight: 260 grams
Graphics Controller	NVIDIA Quadro P2000 Graphics Card Power: 75 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 5GB GDDR5 Memory Bandwidth: 140 GB/s Memory Width: 160-bit
Connectors	4x DisplayPort 1.4 Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included Additional DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
Maximum Resolution	DisplayPort: - up to 5120 x 2880 x 24 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 & 1.4 ready. DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60 Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz HDMI 2.0 (requires DP to HDMI adapter): 5120 x 2880 x 24 bpp @ 60Hz
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, NVIDIA® Mosaic and nView.
Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro P2000 outputs is 4.
Shading Architecture	Shader Model 5.1
Supported Graphics APIs	OpenGL® 4.5 DirectX® 12

Desktop Workstation Graphics

API support includes:
 CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran software

Available Graphics Drivers

Microsoft Windows 10
 Microsoft Windows 7 Professional 64bit
 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 P2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately.
 2. Quadro P2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

NVIDIA® Quadro® P4000 1st GFX 8GB Graphics

Part number	1ME40AA
Compatibility	HP Z240 Tower, Z440, Z640, Z840, Z4 G4, Z6 G4, Z8 G4
Form Factor	Dimensions: 4.4”H x 9.5”L Single-slot, full-height Weight: 475 grams (without extender)
Graphics Controller	NVIDIA® Quadro® P4000 Graphics Card GPU: GP104 with 1792 CUDA cores Power: 120 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 8GB GDDR5 Memory Bandwidth: 243 GB/s Memory Width: 256-bit
Connectors	4 x DisplayPort 1.4 3-pin mini-DIN connector via optional bracket 1 x 6-pin auxiliary power connector 4-pin header for stereo signal SYNC connector for Quadro® Sync II 2 x SLI connectors
	Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included
	Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to- DVI adapters are available as accessories
Maximum Resolution	Dual-link internal TMDS (DVI 1.0): - up to 2560 x 1600 x 32 bpp @ 60 Hz Single-link internal TMDS (DVI 1.0): - up to 1920 x 1200 x 32 bpp @ 60 Hz HDMI™ 2.0b (requires DP to HDMI adapter):

Desktop Workstation Graphics

- up to 5120 x 2880 x 24 bpp @ 60Hz

DisplayPort:

- up to 4096 x 2160 x 30 bpp @ 60Hz
- up to 2560 x 1600 x 30 bpp @ 120 Hz
- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

Using two DP outputs, the P4000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.

Image Quality Features

Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors. NVIDIA 3D Vision™ and other 3D stereo technologies. NVIDIA Mosaic and nView.

Display Output

Maximum number of displays
- 4 direct attached monitors

Maximum number of monitors across all available Quadro P4000 outputs is 4.

Shading Architecture

Shader Model 5.1

Supported Graphics APIs

OpenGL 4.5
DirectX 12
Vulkan 1.0

API support includes:

CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Microsoft Windows 10
Microsoft 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 P4000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately.
 2. Quadro P4000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

NVIDIA® Quadro® P5000 1st GFX 16GB Graphics

Part number	Z0B13AA
Compatibility	HP Z240 Tower, Z440, Z640, Z840, Z4 G4, Z6 G4, Z8 G4
Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 815 grams / 1.80 lbs

Desktop Workstation Graphics

Graphics Controller	Quadro™ P5000 graphics GPU: 2560 NVIDIA CUDA® Parallel Processing Cores Power: 180 Watts Cooling: Active
Memory	16GB GDDR5X memory Memory Bandwidth: Up to 288 GB/s Memory Width: 256 bit ECC Memory (disabled by default)
Connectors	DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.
Maximum Resolution	5K support @ 60Hz - 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView Desktop Management
Display Outputs¹	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
GPU Architecture	NVIDIA Pascal™
Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit Linux 64-bit

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- Supports up to a total of 4 displays
 - 2- For HP Z440 Workstations, the 700W power supply option must be used.
 - 3- For HP Z840 Workstation configurations, the 1125W power supply option must be used for multiple P5000 configurations.

Desktop Workstation Graphics

NVIDIA® Quadro® P6000 1st GFX 24GB Graphics

Part number	Z0B12AA
Compatibility	HP Z440, Z640, Z840, Z4 G4, Z6 G4, Z8 G4
Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 967 grams / 2.14 lbs
Graphics Controller	Quadro™ P6000 graphics GPU: 3840 NVIDIA CUDA® Parallel Processing Cores Power: 250 Watts Cooling: Active
Memory	24GB GDDR5X memory Memory Bandwidth: Up to 432 GB/s Memory Width: 384 bit ECC Memory (disabled by default)
Connectors	DP (x4) with HDR support DL-DVI(I) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.
Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
Display Outputs¹	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
GPU Architecture	NVIDIA Pascal™

Desktop Workstation Graphics

Supported Graphics APIs	DirectX® 12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit Linux 64-bit

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

Notes	<ol style="list-style-type: none">1- Supports up to a total of 4 displays2- For HP Z440 Workstations, the 700W power supply option must be used.3- For HP Z840 Workstation configurations, the 1125W power supply option must be used for P6000.
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NVIDIA® Quadro® GP100 16GB Graphics

Part number	1ZE81AA
Compatibility	HP Z840, Z4 G4, Z6 G4, Z8 G4
Form Factor	Dual Slot (4.4" Height x 10.5" Length) Weight: 989 grams +72 grams extender
Graphics Controller	NVIDIA® QUADRO® GP100 GPU: 3584 NVIDIA CUDA® Parallel Processing Cores Power: 235 Watts Cooling: Active
Memory	16GB HBM2 Memory Bandwidth: Up to 717 GB/s Memory Width: 4096-bit ECC Memory (disabled by default)
Connectors	DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector SYNC for Quadro® Sync II One 8-pin auxiliary power connector (2x) NVLink connectors

Factory configured option: 8-pin power adapter included with card.
After market option Kit: 8-pin power adapter included with card.

DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.

Desktop Workstation Graphics

Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
Display Outputs	4x DP1.4 MST & HDR2 outputs (up to 5120 x 2880 @ 60Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz) 1x Single-link DVI-D output (up to 1920 x 1200 @ 60 Hz) HDMI™ 2.0b (up to 5120 x 2880 @ 60Hz)* *requires DP to HDMI adapter
GPU Architecture	NVIDIA GP
Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 Windows® 7 Professional 64-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 Factory Configured (Z840 Workstations): No adapters included Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit: No adapters included

NVIDIA® Quadro® Sync II

Part number	1WT20AA
Dimensions (HxD)	6.0 inches × 4.2 inches
Devices Supported	NVIDIA® Quadro® P4000 NVIDIA® Quadro® P5000 NVIDIA® Quadro® P6000
Bus Type	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector
PCI Form Factor	Full Height, half length, single slot
Ports	2 RJ45 connectors for carrying frame lock signals over CAT5 cables. BNC Connector for external house synchronization.
Internal Connectors	6 NVIDIA SLI® style edge fingers for connection to compatible GPUs <ul style="list-style-type: none"> • Included with the board are 4 12-Inch Short Sync Cables to connect to GPU's • Included with the board are 2 24-Inch Long Sync Cables to connect to GPU's
System Requirements	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector

Desktop Workstation Graphics

	Must be used with NVIDIA Quadro P4000, P5000 or P6000 graphics cards. Requires Quadro driver version R375 or later.
Temperature - Operating	0° to 55° C
Temperature - Storage	-40° to 60° C
Relative Humidity - Operating	10% to 80%
Power Requirements	Board power dissipation: <15W
Operating Systems Supported	Windows 10 64-bit Windows 7 64-bit Linux 64-bit
Kit Contents	Contains: <ul style="list-style-type: none">• Quadro Sync II Card• 4 x 12-Inch Short Sync Cables• 2 x 24-Inch Long Sync Cables (Two)• Quick Start Guide

NVIDIA® NVS 310 1GB Graphics

Part number	M6V51AA
Compatibility	HP Z240 SFF/Tower, Z440, Z640, Z840
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	2x DisplayPort™ 1.2
Maximum Resolution	Up to 2560 x 1600 (digital display) per display.
Image Quality Features	The following video formats are supported: <ul style="list-style-type: none">- 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

Desktop Workstation Graphics

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 10
Windows 8.1
Windows 8
Genuine Windows 7 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

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured NVS 310 graphics card have no cable adaptors 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).

Desktop Workstation Graphics

NVIDIA® NVS 315 1GB Graphics

Part number	E1U66AA
Compatibility	- Z220 (CMT & SFF), Z230 (CMT & SFF), Z420, Z620, Z820 - Z440, Z640, Z840
Form Factor	Low Profile: 2.713 inches in height × 5.7 inches in length Weight: ~142 grams
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 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 using one of the following DMS-59 cables: DMS-59 to DVI DMS-59 to VGA DMS-59 to DP

Desktop Workstation Graphics

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 adaptor.

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 10
Windows 8.1
Windows 8
Microsoft Windows 7 Professional (64-bit and 32-bit)
Microsoft 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

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured graphics card includes DMS-59 to DVI cable.
3. Option kit graphics card includes DMS-59 to DVI and DMS-59 to VGA cables (one each).
4. Configurations of three NVS 315 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).

Desktop Workstation Graphics

NVIDIA® NVS 510 2GB Graphics

Part number	C2J98AA
Compatibility	HP Z240 SFF/Tower, Z440, Z640, Z840
Form Factor	Low Profile, 2.713 inches × 6.3 inches, single slot
Graphics Controller	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 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 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.

Desktop Workstation Graphics

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 10
Windows 8.1
Genuine Windows 7 Professional (64-bit and 32-bit)
Microsoft Windows XP Professional (64-bit and 32-bit)
Red Hat Enterprise Linux® (RHEL) 6 Desktop/Workstation
SUSE Linux® Enterprise Desktop 11 (64-bit and 32-bit)

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

Notes

Heatsink cooler design is active.

Summary of Changes

Date of change:	Version History:		Description of change:
June 1, 2016	v1		Created new
October 1, 2016	From v1 to v2	Changed	Compatibility for NVS 315
March 1, 2017	From v2 to v3	Added	NVIDIA Quadro P5000 and P6000
May 1, 2017	From v3 to v4	Added	NVIDIA Quadro P2000
June 5, 2017	From v4 to v5	Added	NVIDIA Quadro P400, P600, P1000, P4000 & NVIDIA Quadro Sync II
July 6, 2017	From v5 to v6	Added	NVIDIA Quadro GP100 16GB Graphics
		Changed	The Note 2 for NVIDIA Quadro P400, P600, P1000 & the Operating Systems supported section for the NVIDIA Quadro Sync II
		Removed	The Tesla K40 as High Performance GPU Computing
September 6, 2017	From v6 to v7	Changed	the info for the NVIDIA Quadro P4000 8GB Graphics
December 13, 2017	From v7 to v8	Changed	Updated NVIDIA Quadro P Series with the 1 st GFX
January 31, 2018	From v8 to v9	Changed	Format, COMPATIBILITY MATRIX section

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