

HP Z Workstations graphics card options



Quick reference guide

Table of contents

Desktop Workstations compatibility	3
Mobile and All-in-One Workstations compatibility	4
Compare features: Integrated Graphics	4
Compare features: MXM	5
Compare features: Professional 2D	6
Compare features: Entry 3D	6
Compare features: Midrange 3D	8
Compare features: High-end 3D	9
Compare features: Ultra 3D	11
Compare features: High performance computing	11
Compare features: Virtual Workstation	12



Professional graphics solutions for HP Z Workstations

HP is proud to exclusively offer professional graphics choices on all of our HP Workstations—from the ZBook 14 to the Z840.

HP's professional graphics line-up is perfect for users who are running business critical applications based on OpenGL and DirectX® who require stability, reliability, great performance, additional support, and application-specific features and optimization for things like complex design modeling, dataset manipulation, visual effects and visualization.

Desktop Workstations compatibility

	HP Z1 G2	HP Z230 SFF	HP Z230 Tower	HP Z440	HP Z640	HP Z840	HP DL380z Gen9
Integrated graphics							
Intel® HD 4400	•	•	•				
Intel® HD 4600	•	•	•				
Intel® HD P4600	•	•	•				
MXM							
NVIDIA® Quadro® K610M	•						
NVIDIA® Quadro® K2100M	•						
NVIDIA® Quadro® K3100M	•						
NVIDIA® Quadro® K4100M	•						
Professional 2D							
NVIDIA® NVS 310		• •	• •				
NVIDIA® NVS 315		• •	• •				
NVIDIA® NVS 510		•	•				
Entry 3D							
NVIDIA® Quadro® K420		•	• •	• •	• •	• •	
NVIDIA® Quadro® K620		•	•	• •	• •	• •	
AMD FirePro™ W2100		•	• •	• •	• •	• •	
Midrange 3D							
NVIDIA® Quadro® K2200			•	• •	• •	• • •	• • • •
AMD FirePro™ W5100		•	•	• •	• •	• • •	
High-end 3D							
NVIDIA® Quadro® K4000			•				
NVIDIA® Quadro® K4200			•	•	• •	• •	• • • •
NVIDIA® Quadro® K5200				•	• •	• • •	• •
NVIDIA® Quadro® K5000							
AMD FirePro™ W7100		• (AMO only)	• (AMO only)	•	• •	• •	
Ultra 3D							
NVIDIA® Quadro® K6000				• (AMO only)	•	• •	• •
High performance computing							
NVIDIA® Tesla K40						• •	
Virtual Workstation							
NVIDIA® GRID K1							• •
NVIDIA® GRID K2							• •

Mobile and All-in-One Workstations compatibility

	HP Z1 G2	HP ZBook 14 G2	HP ZBook 15u G2	HP ZBook 15 G2	HP ZBook 17 G2
Entry 3D					
AMD FirePro™ M4150		•			
AMD FirePro™ M4170			•		
Intel® HD Graphics 4600				•	•
Intel® HD Graphics 5500		•	•		
NVIDIA® Quadro® K610M	•			•	
Midrange 3D					
AMD FirePro™ M5100				•	
NVIDIA® Quadro® K1100M				•	•
NVIDIA® Quadro® K2100M	•			•	
NVIDIA® Quadro® K2200M					•
High-end 3D					
AMD FirePro™ M6100					•
NVIDIA® Quadro® K3100M	•				•
NVIDIA® Quadro® K4100M	•				•
Ultra 3D					
NVIDIA® Quadro® K5100M					•

Compare features: Integrated graphics†

		Intel® HD 4400	Intel® HD 4600	Intel® HD P4600	Intel® HD 5500
Processor support		Intel® Core™ i3-41xx	Future 5th Gen Intel® Core™ Processor	Intel® Xeon® E3-12x5 v3	Intel® Core™ i5-5xxx Intel® Core™ i7-5xxx
Graphics memory		Shared with system ¹	Shared with system ¹	Shared with system ¹	Shared with system ¹
Outputs	HP Z230 Tower	1 DVI-I; 2 DP	1 DVI-I; 2 DP	1 DVI-I; 2 DP	N/A
	HP Z230 SFF	3 DP	3 DP	3 DP	N/A
Orderable cables/adapters		DP to DVI-D DP to DLDVI-D DP to VGA DVI to VGA	DP to DVI-D DP to DLDVI-D DP to VGA DVI to VGA	DP to DVI-D DP to DLDVI-D DP to VGA DVI to VGA	N/A
Max display resolution (may require appropriate adapters)	VGA	2048 x 1536	2048 x 1536	2048 x 1536	1920 x 1200
	DVI	1920 x 1200	1920 x 1200	1920 x 1200	2560 x 1600
	DP	2560 x 1600	2560 x 1600	2560 x 1600	3840 x 2160

Compare features: Integrated graphics† (continued)

	Intel® HD 4400	Intel® HD 4600	Intel® HD P4600
Number of active displays supported	3	3	3
Host interface	Integrated with CPU	Integrated with CPU	Integrated with CPU
Number of PCIe slots required	0	0	0
ISV certifications	No	No	Yes
OpenGL Version	4	4	4
Vertex and pixel shaders	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version	DX 11.1	DX 11.1	DX 11.1
Max power consumption	Shared with system	Shared with system	Shared with system

Compare features: MXM (For HP Z1 G2)

	NVIDIA® Quadro® K610M	NVIDIA® Quadro® K2100M	NVIDIA® Quadro® K3100M	NVIDIA® Quadro® K4100M
Graphics memory	1 GB DDR3	2 GB DDR5	4 GB GDDR5	4 GB GDDR5
Memory bandwidth	20.8 GB/s	48 GB/s	102.4 GB/s	102.4 GB/s
Outputs	1 DP 2 TB (Optional)	1 DP 2 TB (Optional)	1 DP 2 TB (Optional)	1 DP 2 TB (Optional)
Orderable cables/adapters	DP to DVI-D DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D DP to DLDVI-D DP to VGA DP to HDMI
Max display resolution (may require appropriate adapters)	VGA	2048 x 1536	2048 x 1536	2048 x 1536
	DVI	1920 x 1200	1920 x 1200	1920 x 1200
	DP	Internal Panel: 2560 x 1440 External Panel: 3840 x 2160	Internal Panel: 2560 x 1440 External Panel: 3840 x 2160	Internal Panel: 2560 x 1440 External Panel: 3840 x 2160
Number of active displays supported	4 (with TB Option)	4 (with TB Option)	4 (with TB Option)	4 (with TB Option)
Host interface	MXM 3.0	MXM 3.0	MXM 3.0	MXM 3.0
ISV certifications	yes	yes	yes	yes
OpenGL Version	4.3	4.3	4.3	4.3
Vertex and pixel shaders	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version	DX 11.1	DX 11.1	DX 11.1	DX 11.1
Max power consumption	<35 Watts	50 Watts	75 Watts	100 Watts
Other notes	Z1 G2 Internal Panel can be driven from external source via Z1 G2 DP connector	Z1 G2 Internal Panel can be driven from external source via Z1 G2 DP connector	Z1 G2 Internal Panel can be driven from external source via Z1 G2 DP connector	Z1 G2 Internal Panel can be driven from external source via Z1 G2 DP connector

Compare features: Professional 2D

		NVIDIA® NVS 310	NVIDIA® NVS 315	NVIDIA® NVS 510
Graphics memory¹		512 MB DDR3	1 GB DDR3	2 GB DDR3
Memory bandwidth		14 GB/s	14 GB/s	28.5 GB/s
Outputs		2 DP	1 DMS-59	4 mini-DP
Orderable cables/adapters		DP to DVI-D ² DP to DLDVI-D DP to VGA DP to HDMI	DMS-59 to dual DVI ³ DMS-59 to dual VGA DMS-59 to dual DP	4 mini-DP to DP ³
Max display resolution (may require appropriate adapters)	VGA	2048 x 1536	2048 x 1536	2048 x 1536
	DVI	1920 x 1200	1920 x 1200	1920 x 1200
	DP	2560 x 1600	2560 x 1600	3840 x 2160
Number of active displays supported		2	2	4
Host interface		PCI Express Gen2 x16	PCI Express Gen2 x16	PCI Express Gen2 x16
Number of PCIe slots required		1	1	1
ISV certifications		No	No	No
OpenGL Version		4.1	4.1	4.3
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version		DX 11	DX 11	DX 11
Max power consumption		19.5 Watts	20 Watts	35 Watts
Other notes		Low Profile, Active Cooling, Mosaic and nView	Low Profile, Active Cooling, Mosaic and nView	Low Profile, Active Cooling, Mosaic and nView

Compare features: Entry 3D

		AMD FirePro™ M4150	AMD FirePro™ M4170	NVIDIA® Quadro® K610M
Graphics memory¹		1 GB GDDR5	1 GB DDR5	1 GB DDR3
Memory bandwidth				20.8 GB/s
Outputs		1 DP 1 VGA	1 DP 1 VGA	1 DP 1 TBT Version 2 1 VGA
Orderable cables/adapters		DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI
Max display resolution (may require appropriate adapters)	VGA	1920 x 1200	1920 x 1200	1920 x 1200
	DVI	2560 x 1600	2560 x 1600	2560 x 1600
	DP	3840 x 2160	3840 x 2160	3840 x 2160
	TBT	N/A	N/A	3840 x 2160
Number of active displays supported		3	3	4/5
Host interface		System board integrated	System board integrated	MXM 3.1 Type A
Number of PCIe slots required				
ISV certifications		Yes	Yes	Yes
OpenGL Version		4.2	4.2	4.3
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version		DX 11.1	DX 11.1	DX 11.1
Max power consumption		~25 Watts	~28 Watts	~30 Watts
Other notes		AMD Enduro™ Technology	AMD Enduro™ Technology	NVIDIA® Optimus™

Compare features: Entry 3D

		NVIDIA® Quadro® K420	AMD FirePro™ W2100	NVIDIA® Quadro® K620
Graphics memory¹		1 GB DDR3	2 GB DDR3	2 GB DDR3
Memory bandwidth		29 GB/s	28.8 GB/s	29 GB/s
Outputs		1 DL DVI-I 1 DP	2 DP	1 DL DVI-I 1 DP
Orderable cables/adapters		DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI
Max display resolution (may require appropriate adapters)	VGA	2048 x 1536	2048 x 1536	2048 x 1536
	DVI	1920 x 1200	1920 x 1200	1920 x 1200
	DP	3840 x 2160	4096 x 2160	4096 x 2160
Number of active displays supported		2 Direct, 4 using DP MST	2 Direct	2 Direct, 4 using DP MST
Host interface		PCI Express Gen2 x16	PCI Express Gen3 x8	PCI Express Gen2 x16
Number of PCIe slots required		1	1	1
ISV certifications		Yes	Yes	Yes
OpenGL Version		4.4	4.4	4.4
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version		DX 11	DX 11.2/12	DX 11
Max power consumption		41 Watts	35 Watts	45 Watts
Other notes		Low Profile, Active Cooling, DisplayPort HBR2 and MST, Mosaic and nView	Low Profile, Active Cooling, DisplayPort HBR2	Low Profile, Active Cooling, DisplayPort HBR2 and MST, Mosaic and nView

Compare features: Midrange 3D

	NVIDIA® Quadro® K1100M	NVIDIA® Quadro® K2100M	NVIDIA® Quadro® K2200M	NVIDIA® Quadro® K2200	AMD FirePro™ M5100	AMD FirePro™ W5100	
Graphics memory¹	2 GB GDDR5	2 GB GDDR5	2 GB GDDR5	4 GB GDDR5	2 GB GDDR5	4 GB GDDR5	
Memory bandwidth	44.8 GB/s	48 GB/s	N/A	80 GB/s	72 GB/s	96 GB/s	
Outputs	1 DP 1 TBT Version 2 1 VGA	1 DP 1 TBT Version 2 1 VGA	1 DP 1 TBT Version 2 1 VGA	1 DL DVI-I 2 DP	1 DP 1 TBT Version 2 1 VGA	4 DP	
Orderable cables/adapters	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	N/A	N/A	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	N/A	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	
Max display resolution (may require appropriate adapters)	VGA	1920 x 1200	1920 x 1200	1920 x 1200	2048 x 1536	1920 x 1200	1920 x 1200
	DVI	2560 x 1600	2560 x 1600	2560 x 1600	1920 x 1200	2560 x 1600	1920 x 1200
	DP	3840 x 2160	3840 x 2160	3840 x 2160	4096 x 2160	3840 x 2160	4096 x 2160
	TBT	3840 x 2160	3840 x 2160	3840 x 2160	N/A	3840 x 2160	N/A
Number of active displays supported	4/5	4/5	4/5	3 Direct, 4 using DP MST	4/5	4 Direct, 6 using DP MST	
Host interface	MXM 3.1 Type A	MXM 3.1 Type A	MXM 3.1 Type B	PCI Express Gen2 x16	MXM 3.1 Type A	PCI Express Gen3 x16	
Number of PCIe slots required	N/A	N/A	N/A	1	N/A	1	
ISV certifications	Yes	Yes	Yes	Yes	Yes	Yes	
OpenGL Version	4.3	4.3	4.3	4.4	4.3	4.4	
Vertex and pixel shaders	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	
DirectX version	DX 11.1	DX 11.1	DX 11.1	DX 11	DX 11.1	DX 11.2/12	
Max power consumption	~45 Watts	~55 Watts	~65 Watts	68 Watts	~50 Watts	<75 Watts	
Other notes	NVIDIA® Optimus™	NVIDIA® Optimus™	AMD Enduro™	Active Cooling, DisplayPort HBR2 and MST, Mosaic and nView	AMD Enduro™	Active Cooling, AMD Eyefinity Technology, DisplayPort HBR2 and MST	

Compare features: High-end

		NVIDIA® Quadro® K3100M	NVIDIA® Quadro® K4000	NVIDIA® Quadro® K4100M	NVIDIA® Quadro® K5000
Graphics memory¹		4 GB GDDR5	3 GB GDDR5	4 GB GDDR5	4 GB GDDR5
Memory bandwidth		102.4 GB/s	134 GB/s	102.4 GB/s	173 GB/s
Outputs		1 DP 1 TBT Version 2 1 VGA	1 DL DVI-I 2 DP	1 DP 1 TBT Version 2 1 VG	2 DP 1 Dual-Link DVI-I 1 Dual-Link DVI-D 1 Stereo (optional)
Orderable cables/adapters		N/A	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI
Max display resolution (may require appropriate adapters)	VGA	1920 x 1200	2048 x 1536	1920 x 1200	2048 x 1536
	DVI	2560 x 1600	1920 x 1200	2560 x 1600	1920 x 1200
	DP	3840 x 2160	3840 x 2160	3840 x 2160	3840 x 2160
	TBT	3840 x 2160	N/A	3840 x 2160	N/A
Number of active displays supported		4/5	3 Direct, 4 using DP MST	4/5	4
Host interface		MXM 3.1 Type B	PCI Express Gen2 x16	MXM 3.1 Type B	PCI Express Gen2 x16
Number of PCIe slots required		N/A	N/A	N/A	2
ISV certifications		Yes	Yes	Yes	Yes
OpenGL Version		4.3	4.3	4.3	4.3
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version		DX 11.1	DX 11	DX 11.1	DX11
Max power consumption		~75 Watts	80 Watts	~100 Watts	122 Watts
Other notes		NVIDIA® Optimus™	DisplayPort HBR2 and MST, Mosaic and nView, 3D Stereo Adapter available	NVIDIA® Optimus™	NVIDIA® SLI Connector, 3D Stereo Adapter available, ECC memory support, DisplayPort MST and HBR2, Mosaic and nView

Compare features: High-end

		NVIDIA® Quadro® K4200	AMD FirePro™ M6100	AMD FirePro™ W7100	NVIDIA® Quadro® K5200
Graphics memory¹		4 GB GDDR5	2GB GDDR5	8 GB GDDR5	8 GB GDDR5
Memory bandwidth		173 GB/s	96 GB/s	176 GB/s	192 GB/s
Outputs		1 DL DVI-I 2 DP 1 Stereo (optional)	1 DP 1 TBT Version 2 1 VGA	4 DP	2 DP 1 Dual-Link DVI-I 1 Dual-Link DVI-D 1 Stereo (optional)
Orderable cables/adapters		DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	N/A	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI
Max display resolution (may require appropriate adapters)	VGA	2048 x 1536	1920 x 1200	2048 x 1536	2048 x 1536
	DVI	1920 x 1200	2560 x 1600	1920 x 1200	1920 x 1200
	DP	3840 x 2160	3840 x 2160	4096 x 2160	4096 x 2160
	TBT	N/A	3840 x 2160	N/A	
Number of active displays supported		3 Direct, 4 using DP MST	4/5	4 Direct, 6 using DP MST	4
Host interface		PCI Express Gen2 x16	MXM 3.1 Type B	PCI Express Gen3 x16	PCI Express Gen3 x16
Number of PCIe slots required		1	N/A	1	2
ISV certifications		Yes	Yes	Yes	Yes
OpenGL Version		4.4	4.3	4.4	4.4
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0	Shader Model 5.0	Shader Model 5.0
DirectX version		DX 11	DX 11.1	DX 11.2/12	DX 11
Max power consumption		108 Watts	~75 Watts	<150 Watts	150 Watts
Other notes		Active Cooling, DisplayPort HBR2 and MST, Quadro® Sync, Mosaic and nView, 3D Stereo Adapter connector available	AMD Enduro™	Active Cooling, AMD Eyefinity Technology, DisplayPort HBR2 and MST	Active Cooling, Quadro® Boost, SLI Connector, Quadro® Sync, DisplayPort MST and HBR2, 3D Stereo Adapter available, ECC memory support, Mosaic and nView

Compare features:		Ultra 3D		High performance computing
		NVIDIA® Quadro® K6000	NVIDIA® Quadro® K5100M	NVIDIA® Tesla K40
Graphics memory¹		12 GB GDDR5	8 GB GDDR5	12 GB GDDR5
Memory bandwidth		288 GB/s	115.2 GB/s	288 GB/s
Outputs		2 DP 1 Dual-Link DVI-I 1 Dual-Link DVI-D; 1 Stereo (optional)	1 DP 1 TBT Version 2 1 VGA	None
Orderable cables/adapters		DP to DVI-D ⁴ DP to DLDVI-D DP to VGA DP to HDMI	N/A	None
Max display resolution (may require appropriate adapters)	VGA	2048 x 1536	1920x1200	N/A
	DVI	1920 x 1200	2560x1600	N/A
	DP	3840 x 2160	3840x2160	N/A
	TBT	N/A	3840x2160	N/A
Number of active displays supported		4	4/5	N/A
Host interface		PCI Express Gen3 x16	MXM 3.1 Type B	PCI Express Gen3 x16
Number of PCIe slots required		2	N/A	2
ISV certifications		Yes	Yes	Yes
OpenGL Version		4.3	4.3	N/A
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0	N/A
DirectX version		DX 11	DX 11.1	N/A
Max power consumption		234 Watts	100 Watts	~235 Watts
Other notes		Active Cooling, Quadro® Boost, SLI Connector, Quadro® Sync, DisplayPort MST and HBR2, 3D Stereo Adapter available, ECC memory support, Mosaic and nView	NVIDIA® Optimus™	Must be configured with supported Quadro® Kepler series graphics card. Requires CUDA, or OpenACC enabled applications. OpenCL enabled.

Compare features: **Virtual Workstation**

		NVIDIA® GRID K1	NVIDIA® GRID K2
Graphics memory¹		4x 4GB DDR3	2x 4 GB GDDR5
Memory bandwidth		4x 30 GB/s	2x 160 GB/s
Outputs		None	None
Orderable cables/adapters		None	None
Max display resolution (may require appropriate adapters)	VGA	N/A	N/A
	DVI	N/A	N/A
	DP	2560 x 1600	2560 x 1600
Number of active displays supported		Up to 2 depending on number of users	Up to 4 depending on number of users
Host interface		PCI Express Gen3 x16	PCI Express Gen3 x16
Number of PCIe slots required		2	2
ISV certifications		No	Yes
OpenGL Version		4.3	4.3
Vertex and pixel shaders		Shader Model 5.0	Shader Model 5.0
DirectX version		DX 11	DX 11
Max power consumption		~130 Watts	225 Watts
Other notes		Four entry GPU's, no video connectors on card, passive cooling	Two high end GPU's, no video connectors on card, passive cooling, ECC memory support

Resources, contacts, or additional links

AMD® FirePro™ Professional Graphics
amd.com/en-us/solutions/workstations

NVIDIA® Quadro® Graphics
nvidia.com/object/hp_workstations.html

High Performance Computing
www8.hp.com/us/en/campaigns/workstations/gpu-computing.html

Learn more at
hp.com/go/leadershipgraphics

† Available on select processor configurations. Please see product QuickSpecs for details.

1. Shared graphics memory uses part of the total system memory for video performance. System memory dedicated to video performance is not available for other use by other programs.
2. Two DP to DVI-D adapters included in AMO kit offering.
3. Adapter(s) included in CTO and AMO kit offerings.
4. Adapter included in AMO kit offering.

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