ADLINK
Leading EDGE COMPUTING

GPU-Accelerated Solution

Embedded Graphics

Secure your six figure investment by improving system responsiveness with 80% data throughput increase and 60% latency decrease



www.adlinktech.com

2020

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Graphics processing units (GPUs) are used in industrial imaging, computing acceleration, and—more and more—artificial intelligence (AI). In embedded applications GPUs can drive high-resolution multi-display systems, accelerate image construction, and perform complex computation in neural networks for manufacturing, transportation, gaming, healthcare, aerospace and defense, and telecom applications at the edge.

Targeting such applications, ADLINK, an NVIDIA® Quadro® Embedded Partner, has allied with NVIDIA to offer a comprehensive lineup of Embedded Graphics solutions based on NVIDIA Quadro Embedded GPUs, tapping the growth potential of GPUs in embedded markets and creating unlimited opportunities for ADLINK's partners.

ADLINK Embedded Graphics are provided by Mobile Express modules (MXMs) and PCI Express Graphics (PEG) cards. The MXMs feature high performance per watt and extended operating temperature options, ideally suited to size, weight, and power (SWaP)-constrained applications in demanding environments. PEG cards maximize computing power and plug-and-play convenience to significantly boost performance of computing-intensive performance-critical applications. Long-term product availability and technical support address the needs of graphics processing and GPU-accelerated computing for embedded and AI applications.

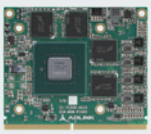
With years of market-proven experience in embedded applications, ADLINK is bringing embedded applications to the next level with heterogeneous computing platforms integrating CPU and NVIDIA GPU. The CPU/GPU combination enables complex data analysis and AI at the edge, unlocking massive potential for embedded applications, especially in network-constrained environments.

Embedded Graphics

5-Year Longevity Support, NVIDIA GPUDirect™ RDMA NVEncode and NVDecode

NVIDIA® QUADRO® CERTIFIED
▪ EMBEDDED

EGX-MXM-P1000
Mobile PCI Express Module with NVIDIA® Quadro® Embedded P1000 GPU



EGX-MXM-P3000
Mobile PCI Express Module with NVIDIA® Quadro® Embedded P3000 GPU



Quadro-E PEG P620
PCI Express Graphic Card with NVIDIA® Quadro® Embedded P620



Quadro-E PEG P2200
PCI Express Graphic Card with NVIDIA® Quadro® P2200



EGX-MXM-P2000
Mobile PCI Express Module with NVIDIA® Quadro® Embedded P2000 GPU



EGX-MXM-P5000
Mobile PCI Express Module with NVIDIA® Quadro® Embedded P5000 GPU



Quadro-E PEG P1000
PCI Express Graphic Card with NVIDIA® Quadro® Embedded P1000



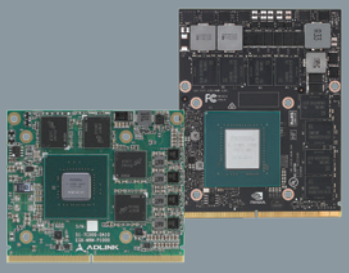
Quadro-E PEG P4000
PCI Express Graphic Card with NVIDIA® Quadro® P4000



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MXM-Compatible Systems and Boards

MXM graphics feature high performance per watt and extended operating temperature options, ideally suited to SWaP-constrained applications in demanding environments.





MVP-5100-MXM Integrated Fanless Embedded Computer

Powerful compact fanless system with MXM graphics and rich I/O

Coming Soon | Fanless



MVP-6100-MXM Expandable Fanless Embedded Computer

Function expansion options with MXM graphics, AI frame grabber, and data acquisition/motion control card

Coming Soon | Expansion



DLAP-3000-CFL Compact Embedded Computer

Compact system with MXM graphics, socket-type CPU, and fan

Coming Soon | Fan



ADi-SC1X Intelligent Platform

Modular flexibility with COM Express, MXM, and backplane for easy upgrade, targeted at gaming, intelligent vending machines and infotainment applications

Coming Soon | Fan



PIS-5500 Embedded AIoT Platform

EN50155-compliant, rugged, fanless platform supporting wide DC input range for real-time video analysis and image processing in rail applications



HPERC VITA-75 Computer

VITA-75 compliant, extreme rugged, SWaP-optimized compact computing platform with MXM graphics for aerospace and defense applications



cPCI-R6500D Rear Transition Module

6U CompactPCI RTM with MXM graphics for 6U processor blades in industrial and defense applications



VPX3-P5000 GPGPU Blade

Rugged, high performance, 3U VPX blade with NVIDIA Pascal™ P5000 GPU for data analysis and image processing in aerospace and defense applications

Coming Soon



PCIE-GIENVQ AI Frame Grabber

4CH GigE frame grabber with MXM graphics for multiple GigE Vision connections, machine vision, and AI-enabled applications

Coming Soon

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PEG-Compatible Systems and Boards

PEG cards maximize computing power and plug-and-play convenience to significantly boost performance of computing-intensive performance-critical applications.





New MVP-6100 Series Fanless Embedded Computer

Function expansion options with PEG/ data acquisition/motion control card and AI frame grabber

Coming Soon | Expansion



MVP-6010/6020 Series Expandable Fanless Computer

Function expansion options with PEG/ data acquisition/motion control card and AI frame grabber

Fanless | Expansion



MXC-6600 Series Expandable Fanless Computer

Function expansion options with PEG/ data acquisition/motion control card and AI frame grabber. Ruggedness with extended temperature range support

Fanless | Expansion



ADi-SA1X Intelligent Platform

Support up to 11 displays for gaming, intelligent vending machines, and infotainment applications

Fan



ADi-SA2X Intelligent Platform

Support up to 7 displays for gaming, intelligent vending machines, and infotainment applications

Fan



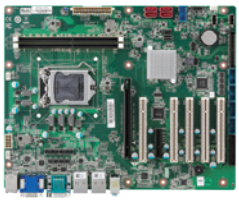
ALPS-4800 Carrier-grade AI Training Platform

Flexible performance configuration with up to 8 NVIDIA® Tesla® accelerators for machine/deep learning training



IPC Series Rackmount Computer

High-mix PCI and PCIe slots to consolidate highly-parallel graphics computing, motion control, and data acquisition through add-on cards



ATX Motherboard

Highly configurable motherboards to consolidate highly-parallel graphics computing, motion control, and data acquisition through add-on cards



Mini-ITX Embedded Board

Form-fit-function design supports PEG card, AI frame grabber, data acquisition, and motion control cards

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FAQ

Q1 Where are the business opportunities for embedded graphics?

A

GPUs are used in embedded applications demanding high-resolution, multi-display capability, parallel computing, and AI enablement. ADLINK sees applications such as clinical diagnostic imaging devices, rugged military laptops and imaging radar for aerospace and defense, and gaming slot machines as presenting considerable potential to benefit from embedded graphics.

Top-down applications that can benefit from embedded graphics further include

- High-resolution, multi-display setup: Applications include air traffic control, electronic chart displays and information systems (ECDIS), video walls, digital signage, gaming, and healthcare environments
- Parallel computing: High-performance application processing including radar/ sonar systems in aerospace and defense, ultrasound imaging in healthcare, and accelerated multi-access edge computing (AMEC) in telecoms
- AI engines: System training and inferencing in smart manufacturing, smart city, telecom, aerospace and defense, and transportation

Q2 Why should customers choose ADLINK Embedded Graphics over other graphics with longevity support?

A

High-resolution, multi-display setup, parallel computing, and AI engines are three common use of graphics. Other graphics products supporting long life availability and more than four display outputs have an advantage over ADLINK Embedded Graphics in the first use case scenario. As for highly-parallel computing and AI applications, ADLINK Embedded Graphics can reduce CPU overhead, boost data throughput by approximately 80%, lower latency by 60%, and increase system responsiveness.

Q3 How do customers benefit from ADLINK being an NVIDIA Quadro Embedded Partner?

A

ADLINK, as an NVIDIA Quadro Embedded Partner, can provide technical support for GPU firmware customization, an important consideration for embedded customers.

Q4 Why should customers choose ADLINK Embedded Graphics powered by NVIDIA Quadro Embedded GPUs?

A

- **Longevity support:** Product availability is 18 months for consumer-grade NVIDIA® GeForce® GPUs and 3 years for NVIDIA Quadro GPUs while NVIDIA Quadro Embedded GPUs support 5+ year availability in line with embedded application requirements. ADLINK MXMs support 5-year availability. PEG cards support 3-year availability which can be extended to additional 5 years under an extended life program.

Model	Longevity Support
MXMs	5 years
PEG Cards	3 (+5)* years

* Special conditions apply

- **Lower development costs:** Longevity support translates into reduced development time, effort, and costs associated with graphics entering EOL. Development costs can reach six figures[i] for safety-critical applications that undergo time-consuming verification and testing processes. As consumer-grade graphics could reach EOL three times through the lifecycle of an embedded graphics, it is obvious that developing with embedded graphics would yield a superior return on investment (ROI).
- **Increased system responsiveness:** NVIDIA GPUDirect™ RDMA in NVIDIA Quadro Embedded GPUs can boost data throughput by approximately 80% and lower latency by 60%[ii]. A direct path for data exchange is established between the GPU and third-party devices[iii] , eliminating the need to copy data to CPU memory before reaching the GPU, such that data throughput and system responsiveness are significantly increased for GPU-accelerated applications.

Q5 How do I choose ADLINK Embedded Graphics for embedded applications?

A

ADLINK's MXMs, with high performance per watt and extended operating temperature options, are an ideal fit for mobile, SWaP-constrained, passive-cooling applications such as portable ultrasound, airborne radar, and aerial infrared imaging.

PEG cards connect via a common interface and are easy to integrate and use in many embedded market segments, such as healthcare (magnetic resonance imaging (MRI) and computed tomography (CT)), industrial automation (AOI inspection), and telecom multi-access edge computing.

Q6 How are NVIDIA Quadro Embedded GPUs benchmarked with other GPUs or CPUs?

A

For graphics-intensive applications involved with high-resolution, multi-display setup, please refer to performance benchmark testing results in Figure 1. For compute-intensive applications involved with highly-parallel workloads or AI training and inferencing, please refer to performance benchmark testing results in Figure 2.

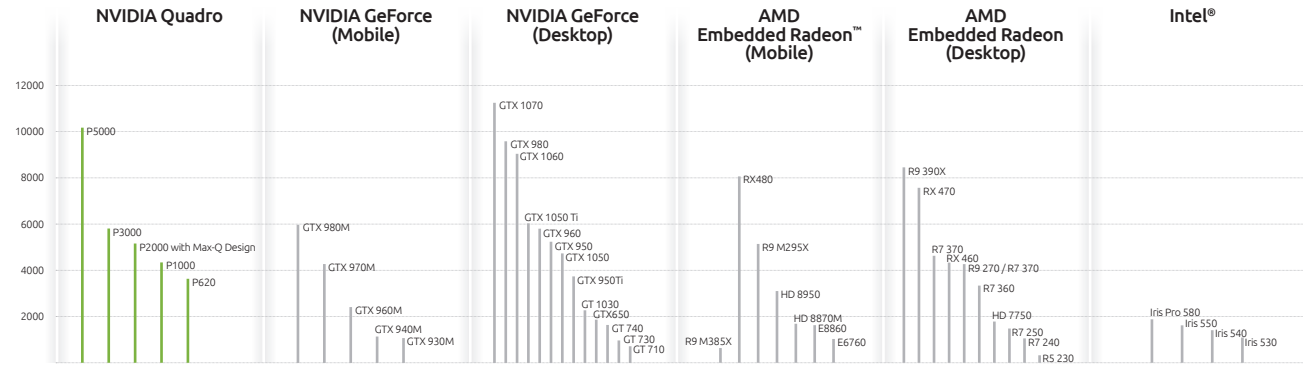


Figure 1: Passmark G3D Benchmark[iv]

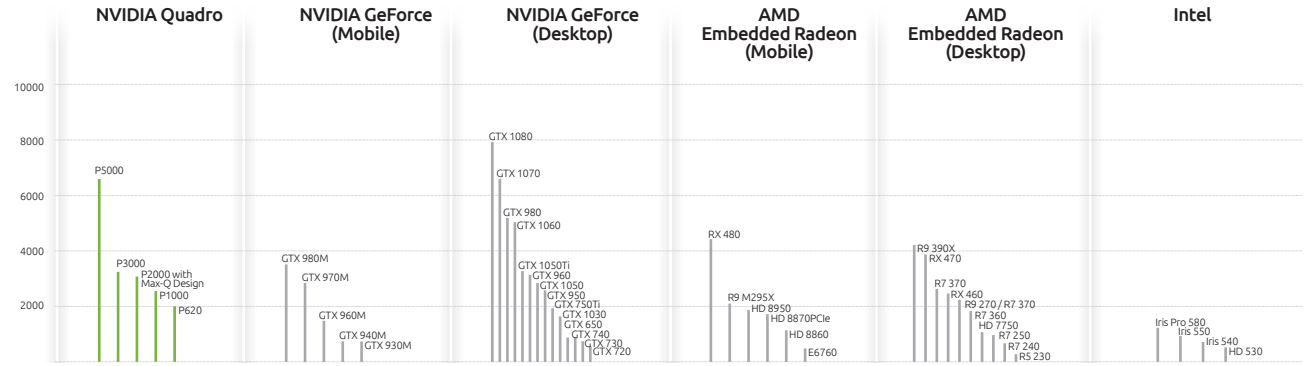


Figure 2: DirectCompute Benchmark[v]

Q7 Why buy embedded graphics powered by NVIDIA Quadro Embedded GPUs from ADLINK or ADLINK's distributors?

A

ADLINK is the top choice for embedded customers. Among only four NVIDIA Quadro Embedded Partners in the world, ADLINK is the only one with market-proven experience offering diverse product portfolios that address embedded application needs. ADLINK's offerings include embedded graphics in MXM and PEG form factors and MXM- and PEG-compatible platforms and modules to accelerate and facilitate GPU adoption in embedded applications.

Q8 Other NVIDIA GPU-powered Mobile Express modules are available online. Why should I buy from ADLINK or ADLINK's distributors?

A

ADLINK and our distributors offer MXM graphics powered by NVIDIA Quadro Embedded GPUs with 5-year availability and technical support that cannot be offered by online vendors. Online NVIDIA GPU-powered MXMs are highly likely gray market goods without warranty or longevity support. Additionally, Quadro-powered MXMs are for embedded usage, requiring VBIOS, system BIOS and cookie support.

[i] Product Development Cost and Timelines, https://www.acornpd.com/blog/product-development-cost-and-timelines

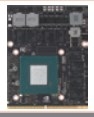
[ii] The Software and workloads used in performance tests may have been optimized for performance only on ADLINK platforms. Performance tests are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. Contact ADLINK for more complete information about performance and benchmark results.

[iii] NVIDIA GPUDirect™ Technology, http://developer.download.nvidia.com/devzone/devcenter/cuda/docs/GPUDirect_Technology_Overview.pdf.

[iv] PassMark Software - Video Card (GPU) Benchmark Charts - Video Card Model List, https://www.videocardbenchmark.net/gpu_list.php

[v] PassMark Software - Video Card Benchmarks - GPU Compute Video Cards, https://www.videocardbenchmark.net/directCompute.html

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Model Name	EGX-MXM-P1000	EGX-MXM-P2000	EGX-MXM-P3000	EGX-MXM-P5000
				
Graphic Core				
Graphic Architecture	NVIDIA® Pascal™ GP107		NVIDIA® Pascal™ GP104	
GPU	Quadro® P1000	Quadro® P2000	Quadro® P3000	Quadro® P5000
Display Output	4x DisplayPort 1.4 digital video outputs Support for High Dynamic Range (HDR) video 4K at 120Hz or 5K at 60Hz with 10-bit color depth		Up to 1 internal display plus 5 external display outputs 5x DisplayPort 1.4 digital video outputs (DP++) 1x HDMI, 2x DVI, 1x eDP	
Signal Interface	MXM 3.1, PCI Express Gen3 x16 support			
GPGPU Computing				
CUDA Support	512 CUDA® cores, 1.8 TFLOPS SP Peak	768 CUDA® cores, 2.3 TFLOPS SP Peak	1280 CUDA cores, 3.9 TFLOPS peak FP32 Performance	2048 CUDA cores, 6.4 TFLOPS peak FP32 performance
Memory	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 96 GB/s	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 96 GB/s	GDDR5 6GB memory, memory width: 192-bit, bandwidth: 168.2 GB/s	GDDR5 16GB memory, memory width: 256-bit, bandwidth: 192.2 GB/s
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1, OpenCL™ 1.2		CUDA Toolkit 8.0, CUDA Compute version 6.1, OpenCL™ 1.2, Direct Compute	
Graphic API	DirectX® 12, OpenGL 4.5, Vulcan 1.0		DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1	
NVIDIA Technology	-	-	NVIDIA® Mosaic Technology, NVIDIA® nView® Display Management Technology	NVIDIA® VR Ready, NVIDIA® Mosaic Technology, NVIDIA® nView® Display Management Technology
Mechanicals				
Dimensions	82 (W) x 70 (D) x 4.8 (H) mm		87 (W) x 105 (D) x 4.8 (H) mm	
Locking Mechanism	Standard MXM 3.1 Type A		Standard MXM 3.1 Type B	
Environmental				
Operating Temp.	Standard: 0˚C to 55˚C, ETT: -40˚C to 85˚C		0 to 55˚C	
Storage Temp.	-40˚C to 85˚C		-40˚C to 125˚C	
Module Power Consumption	48W	58W	75W	100W
SW Support				
OS Support	Windows 7/10 & Linux drivers, 64-bit			

Model	Quadro-E PEG P620	Quadro-E PEG P1000	Quadro-E PEG P2200	Quadro-E PEG P4000
				
Graphic Core				
Graphic Architecture	NVIDIA® Pascal™ GP107		NVIDIA® Pascal™ GP106	NVIDIA® Pascal™ GP104
GPU	Quadro® P620	Quadro® P1000	Quadro® P2200	Quadro® P4000
Display Output	4x mDP 1.4, 4096x2160 @ 60Hz/5120x2880 @ 60Hz HDCP 2.2 support * VGA/DVI/HDMI support via adapter/connector/bracket		4x DP 1.4, 4096x2160 @ 60Hz/ 5120x2880 @ 60Hz * VGA/DVI/ HDMI support via adapter/ connector/bracket	4x DP 1.4, 7680×4320 @120 Hz/ 7680×4320 @ 60 Hz/ 5120×2880 @ 60 Hz HDCP 2.2 support * VGA/DVI/ HDMI support via adapter/ connector/bracket
Signal Interface	PCI Express Gen3 x16 support			
GPGPU Computing				
CUDA Support	512 CUDA cores, 1.38 TFLOPS peak FP32 performance	640 CUDA cores, 1.89 TFLOPS peak FP32 performance	1280 CUDA cores, 3.8 TFLOPS peak FP32 performance	1792 CUDA cores, 5.3 TFLOPS peak FP32 performance
Memory	GDDR5 2GB memory, memory width: 128-bit, bandwidth: 80 GB/s	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 80 GB/s	GDDR5 5GB memory, memory width: 160-bit, bandwidth: 200 GB/s	GDDR5 8GB memory, memory width: 256-bit, bandwidth: 243 GB/s
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1, OpenCL™ 1.2, Direct Compute			
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1			
NVIDIA Technology	NVIDIA® Mosaic Technology, NVIDIA® nView® Display Management Technology			
Mechanicals				
Dimensions	2.713" × 5.7", single slot	2.713" × 5.7", single slot	4.4" H x 7.9" L, single slot	4.4" H x 9.5" L, single slot
Weight	129g	129g	256g	475g
Environmental				
Operating Temp.	0 to 55˚C			
Storage Temp.	-40˚C to 75˚C			
Module Power Consumption	40W	47W	75W	105W
SW Support				
OS Support	Windows 7/10 & Linux drivers, 64-bit			

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