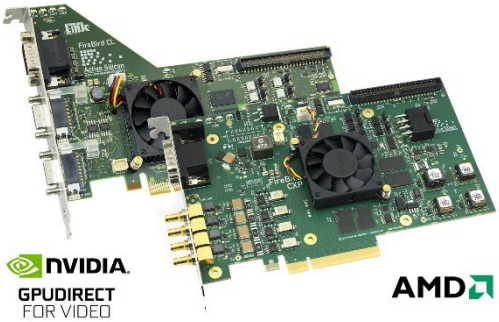
GPU Solutions

Real-Time Accelerated Processing

- Support for NVIDIA's GPUDirect for Video
- Support for AMD's DirectGMA
- SDK sample code available
- Easy integration of modern GPU processing

FEATURES

- All FireBird frame grabbers compatible with GPUDirect for Video and DirectGMA.
- GPU memory directly accessible to frame grabber.
- CPU is bypassed.
- Immediate image transfer – no need to wait for full image.
- All devices are synchronized.
- Reduced system memory bandwidth usage.



OVERVIEW

Modern Graphic Processing Units (GPUs) are extremely efficient at processing images and graphics, and their parallel structure makes them particularly well suited to applications where large blocks of data need to be processed in parallel. Whether you use it for de-Bayering, image manipulation, 3D vision, neural networks, deep learning, or any other application, the GPU approach can provide many benefits.

Active Silicon's **FireBird frame grabbers** can be used in combination with GPUs. In addition, specific APIs enable many filter, convolution and matrix-vector operations to be performed by the GPU directly on data from a frame grabber without the need to be processed by system buffers or by the CPU. This makes data acquisition fast with lowest latency possible as the GPU memory is made directly accessible to the frame grabber.

The two major GPU manufacturers, NVIDIA and AMD, provide specific APIs that accelerate processing and aid integration with third-party devices such as **FireBird frame grabbers**. Our well-documented API and SDK example code complement these APIs and guarantee smooth integration with **NVIDIA's GPUDirect for Video** and **AMD's DirectGMA** when using **FireBird frame grabbers**.

GPUDIRECT FOR VIDEO - NVIDIA

Under Windows, the **GPUDirect for Video** API allows data to be transferred from the acquisition card directly into GPU buffers via DMA (Direct Memory Access) without the overhead of any CPU interaction. These GPU buffers may be in the PC's system memory as shown in Figure 1, but are managed by the GPU, which has the ability to process and/or transfer these buffers using its own lightning-fast DMA engine directly to and from the GPU.

By using **GPUDirect for Video** the CPU overhead is eliminated since it has removed a memory copy of the image data into a GPU buffer, thus reducing latency and system memory bandwidth usage, resulting in significant performance improvements in data transfer times for applications running on NVIDIA cards. Another great benefit is that the GPU can start processing data as soon as it arrives in the GPU buffer rather than the alternative via a non-GPU buffer of having to wait until the whole image frame has arrived. This provides optimum system latency.

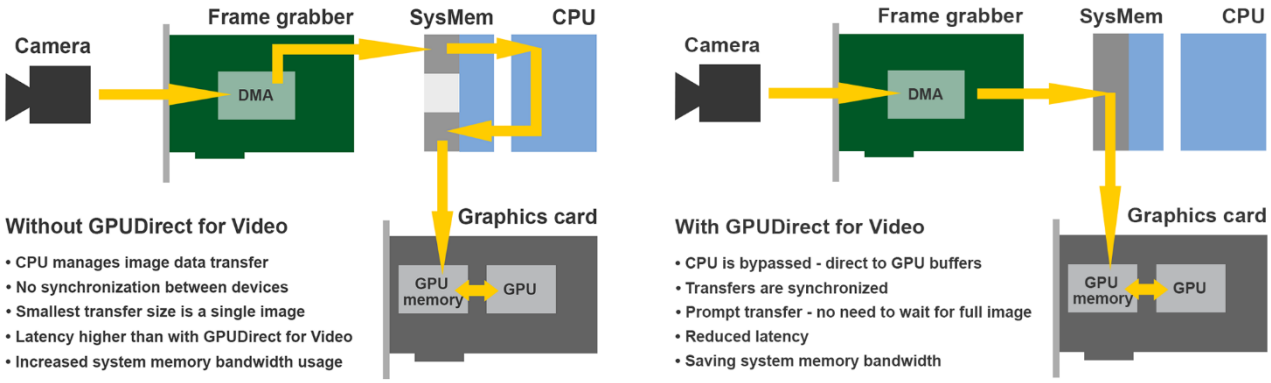


Figure 1: GPU Access – traditional versus using NVIDIA's GPUDirect for Video

NVIDIA's **GPUDirect RDMA** is the technology equivalent under Linux and this API allows the frame grabber to DMA image data directly into the GPU's memory, physically located on the graphics card memory, bypassing system memory altogether. This is similar to AMD's **DirectGMA** outlined below, also supported by **FireBird frame grabbers** and software libraries.

DIRECTGMA - AMD

DirectGMA (Direct Graphics Memory Access) is AMD's proprietary method and API for low latency peer-to-peer data transfers between PCI Express devices. The API exposes part of the GPU memory and makes it accessible to other devices on the bus, such as **FireBird frame grabbers**. This allows the frame grabber to DMA image data directly into GPU memory, with no CPU involvement at all and bypassing system memory completely, resulting in minimal latency data transfer with the added benefit of saving memory bandwidth.

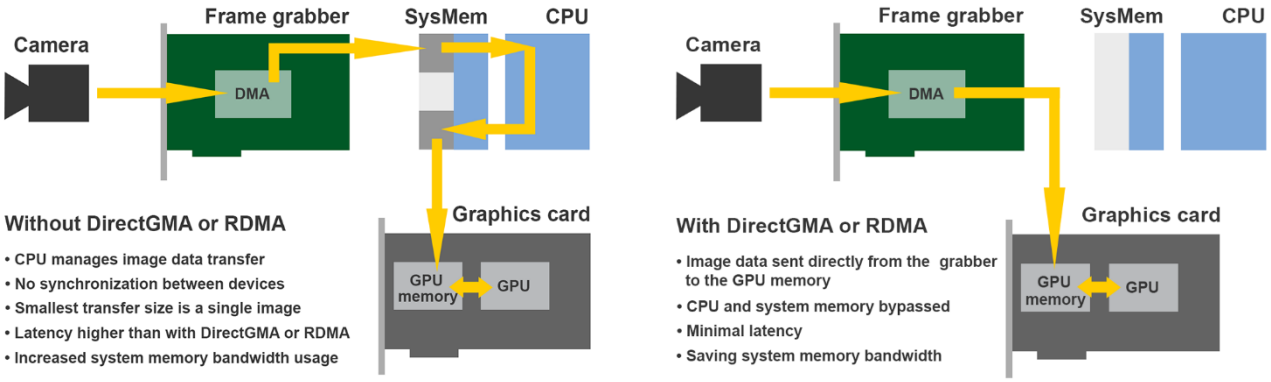


Figure 2: GPU Access – traditional versus using AMD's DirectGMA or NVIDIA's GPUDirect RDMA

GPU API COMPARISON

NVIDIA GPUDirect for Video / RMDA	***AMD DirectGMA***
• Supported GPUs: RTX, Quadro; GRID; Tesla; also see NVIDIA's GPUDirect for Video page. • Operating system – Windows 7/8/10 64-bit or Linux 64-bit • Supporting API – CUDA, OpenCL™, OpenGL®, DirectX® • NVIDIA cards offer from 8 to over 5000 CUDA Cores, offering a range of processing power	• Supported GPUs: certain FirePro and Radeon models; see AMD's graphics specs [*enter directgma into search field*] • Operating system – Windows 7/8/10 64-bit or Linux 64-bit • Supporting API – OpenCL™, OpenGL®, DirectX® • AMD graphic cards support STREAM technology, which uses OpenCL cross-platform programming standard
Setup requirements: • NVIDIA GPU supporting **GPUDirect for Video** • Active Silicon's SDK and NVIDIA SDK • FireBird frame grabber	***Setup requirements:*** • AMD GPU supporting **DirectGMA** • Active Silicon's SDK and AMD SDK • **FireBird frame grabber**

INTEGRATION WITH ACTIVE SILICON PRODUCTS

All Active Silicon **FireBird frame grabbers** are compatible with **GPUDirect for Video** and **DirectGMA**. We provide a well-documented API and SDK sample code that allows for easy integration of parallel computing techniques on standard PC hardware.

- Active Silicon's SDK includes a comprehensive suite of C++ examples for **GPUDirect for Video** and **DirectGMA** with full source code. This can be easily found in the SDK manual index:
- SDK Setup – GPU Hardware and Software
- Examples list – NVIDIA **GPUDirect for Video** Examples
- Our technology supports **GPUDirect for Video** on Windows 10 / 11 and Linux, and **DirectGMA** on Windows 10 / 11 and Linux.
- Our API supports CUDA, OpenCL, OpenGL and DirectX and is consistent across operating systems and hardware platforms allowing easy migration.
- With ActiveDMA technology, our **FireBird frame grabbers** work latency free.

Active Silicon

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