



## Alpha Data Camera Link Products

### An Introduction to Alpha Data Camera Link Products

Camera Link is a widely-used communications interface standards for vision applications, maintained by the Automated Imaging Association (AIA).

Given the large range of available cameras and special purpose instruments, an FPGA is the ideal platform for implementing a Camera Link processor.

- Support for the entire range from low resolution and low frame rate, to extremely high resolution and/or high frame rate.
- Support for a variety of pixel depths, pixel formats (luminance, color, temperature etc.), and pixel encoding (Bayer)

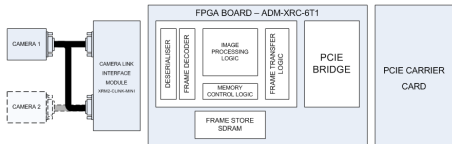
Cameras and Frame Grabbers implementing the standard range from low resolution and low frame rate, to extremely high resolution and/or high frame rate. Pixel depths and formats (luminance, colour, temperature etc), and encoding (Bayer) can vary with the type of camera.

Given the large range of available cameras and special purpose instruments, an FPGA is the ideal platform the implementing a Camera Link processor.

The FPGA fabric provides the resources needed to implement filters, comparisons, frame stamping, and statistical analysis of captured image or video data. The FPGA can be re-programmed as many time as desired, making it suitable for applications where the image processing pipeline might need to be modified either statically (changing the hardware setup for a new application), or dynamically (used in an application where the function of the image processing pipeline might need to be modified when the mode of operation changes).

Alpha Data offers a range of FPGA cards, Camera Link IO module, and example reference designs (included with FPGA cards); to provide customizable frame grabbing solutions.

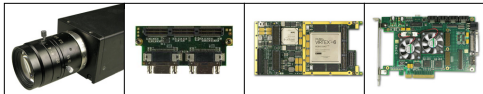
### A Camera Link System



## Camera Link System Building Blocks

The system the camera link design is being built for defines the modules used to create the Camera Link Interface. A Desktop PC system requires a PCI Express Card whereas a ruggedized environment may require an XMC or VPX standard card.

With Alpha Data products this isn't a problem as the system is built up from a number of submodules, most being interchangeable depending on the final system requirements.



## The Alpha Data Camera Link SDK

To complement our Camera Link Hardware products, Alpha Data provides an extensive Camera Link frame grabber design kit.

This kit includes an application-programming interface (API) and reference FPGA designs intended to assist the user in creating a Camera Link based application using one of Alpha Data's ADM-XRC range of reconfigurable co-processors with one of Alpha Data's Camera Link XRM's. The provided API takes care of low-level tasks such as:

- Opening the card
- Configuring the FPGA as a frame grabber
- Serial communication with the attached camera(s)
- Configuring the acquisition of individual images or a stream of consecutive images
- Enabling the transfer of frames of data to the local host via DMA

The reference FPGA designs provide simple frame grabbers compatible with acquiring data from Base, Medium, or Full Camera Link camera(s). These designs are a starting point to perform DSP tasks on the images such as filtering, format conversion, or compression. The designs are also extendable to perform analysis of the input image stream(s) on the FPGA card where the FPGA logic may be used to implement a control system reacting to the input image stream(s).

Bespoke examples, including camera emulation designs, can be requested with hardware purchases or quotations (this may add an NRE cost that will vary with the specification of the example design). Contact [Alpha Data Sales](#) for further details, outlining your specific Camera Link requirements.

Information on the Camera Link SDK can be found here:

[For Virtex-6 and newer FPGA family Products](#)

[Contact Support at Alpha Data for Virtex-4 and Virtex-5 IP Information](#)

## Alpha Data Camera Link Products

Alpha Data provides a range of Camera Link products. There are a range of IO modules for FMC Standard boards and XRM/XRM2 for most Alpha Data FPGA products.

Alpha Data is also rolling out a collection of "Frame Grabber" systems. These are complete Camera Link Systems for installation in standard PC motherboards. They come with the complete Camera Link SDK and an example frame grabber design.

The Camera Link SDK allows the development of application-specific frame grabbers, image processors or real-time video processors.

## Pre-Assembled Alpha Data Camera Link Frame Grabber System

Putting all the blocks together you get this:








This system has been used to create the **ADA-PCIE-CLINK6V** frame grabber system.



A similar system can be constructed with the Alpha Data **FMC-CAMERALINK** and the **ADPE-XRC-6T**. Alternatively, the **FMC-CAMERALINK** and the **ADM-VPX3-7V2**.

## Alpha Data Camera Link IO Modules

Alpha Data provides a range of Camera Link IO Modules for the FMC Standard and the XRM/XRM2 standard.

Product	Modes of Operation
	<b>FMC-CAMERALINK</b> Base Mode (x2) - Operates as a single Base Camera Link interface or a dual Base Camera Link interface (1 Camera Link interface per connector) Medium Mode - Operates as a Medium Camera Link interface - uses both connectors Full Mode - Operates as a Full Camera Link interface - uses both connectors
	<b>XRM-CAMERALINK</b> Base Mode - Operates as a single Base Camera Link interface. Uses standard MDR26 connector
	<b>XRM-CLINK-MINI</b> Base Mode (x2) - Operates as a single Base Camera Link interface or a dual Base Camera Link interface (1 Camera Link interface per connector) Medium Mode - Operates as a Medium Camera Link interface - uses both connectors Full Mode - Operates as a Full Camera Link interface - uses both connectors
	<b>XRM-CLINK-ADV</b> Base Mode (x2) - Operates as a single Base Camera Link interface or a dual Base Camera Link interface (1 Camera Link interface per connector). Medium Mode - Operates as a Medium Camera Link interface - uses both connectors. Full Mode - Operates as a Full Camera Link interface - uses both connectors  Also has Dual JPEG200 Codecs
	<b>XRM-CLINK-GIGE</b> Base Mode - Operates as a single Base Camera Link interface. Also has a Gigabit Ethernet interface

Power over Camera Link (PoCL) is not available as standard. It can be provided as a build option on selected products. Contact [Alpha Data Information](#) for further details and availability.

## Industry Link(s)

Alpha Data is a member of the AIA. Our profile is viewable here [Vision Online Organization Website](#).



## Revision History

Date	Revision	Nature of Change
11/12/13	Draft	Initial document

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