Matrox **Rapixo CL Pro** »

Featured-packed high-performance Camera Link frame grabbers with FPGA-based image processing offload

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Overview

Comprehensive Camera Link frame grabber series

Matrox® Rapixo CL Pro is a series of Camera Link® frame grabbers with the most comprehensive features currently available in the industry. Built upon the field-proven design of the Matrox Radient eV series of Camera Link frame grabbers, the Matrox Rapixo CL Pro offers reliable image acquisition, extended cable length support, high frame-rate image capture, and onboard image processing offload that will extend the effectiveness of the Camera Link standard for years to come.

FPGA-based image processing offload

The Matrox Rapixo CL Pro makes use of an FPGA device from the Xilinx Kintex™-7 family that integrates the controlling, formatting, and streaming logic of the various interfaces, and also allows developers to incorporate Matrox Imaging- or user-developed custom image pre-processing operations to offload from the host computer. Operations performed onboard are controlled through Matrox Imaging Library (MIL) X application-development software. Within MIL X, an existing FPGA configuration can be rearranged to perform a required sequence of operations without necessarily having to generate a new FPGA configuration. Using the Matrox FDK, developers generate their own FPGA configurations with custom operations written in C/C++.

Versatile high-performance image acquisition

The Matrox Rapixo CL Pro is capable of handling image capture from a single lowest data-rate Camera Link device to multiple maximum-bandwidth Camera Link cameras. With the possibility of interfacing up to four Base or two Full/80-bit mode Camera Link cameras at up to 85 MHz on a single board with PoCL support, the Matrox Rapixo CL Pro provides users with the flexibility to configure systems to best match imaging needs while simplifying overall setup.

A PCIe 2.0 x8 host interface provides the throughput necessary to ensure the continuous flow of pixels from the Matrox Rapixo CL Pro to host memory. With a peak bandwidth of up to 4 GB/s, the Matrox Rapixo CL Pro's host interface prevents pixels from inadvertently being discarded. Furthermore—thanks to a programmable option—the Matrox Rapixo CL Pro is capable of handling applications where image-capture rates exceed the tens of thousands of frames per seconds, all without host intervention. The Matrox Rapixo CL Pro is also designed to work at extended cable lengths, allowing cameras to be placed at distances previously not possible from the computer while maintaining the same maximum throughput.

Matrox Rapixo CL Pro at a glance

Support the most high-performance Camera Link cameras with available support for Full and 80-bit mode at up to 85 MHz

Perform deterministic image acquisition by way of the jitter-free Camera Link 2.1 interface

Offload host computer of custom image processing using a field-programmable gate array (FPGA) device

Eliminate missed frames through a PCIe® 2.0 x8 host interface and ample onboard buffering

Optimize multi-camera applications via support for up to four Base or two Full/80-bit Camera Link cameras per board

Minimize space requirements and maximize PC compatibility through a half-length design with mini Camera Link connectivity for true single-slot operation

Improve and simplify system connectivity with Power-over-Camera-Link (PoCL) support at extended cable lengths

Lifecycle managed for consistent long-term supply

Each component on the Matrox Rapixo CL Pro has been carefully selected to ensure product availability in excess of five years. The Matrox Rapixo CL Pro is also subject to strict change control to provide consistent supply. Longevity of stable supply lets OEMs achieve maximum return on the original investment by minimizing the costs associated with repeated validation of constantly changing products.
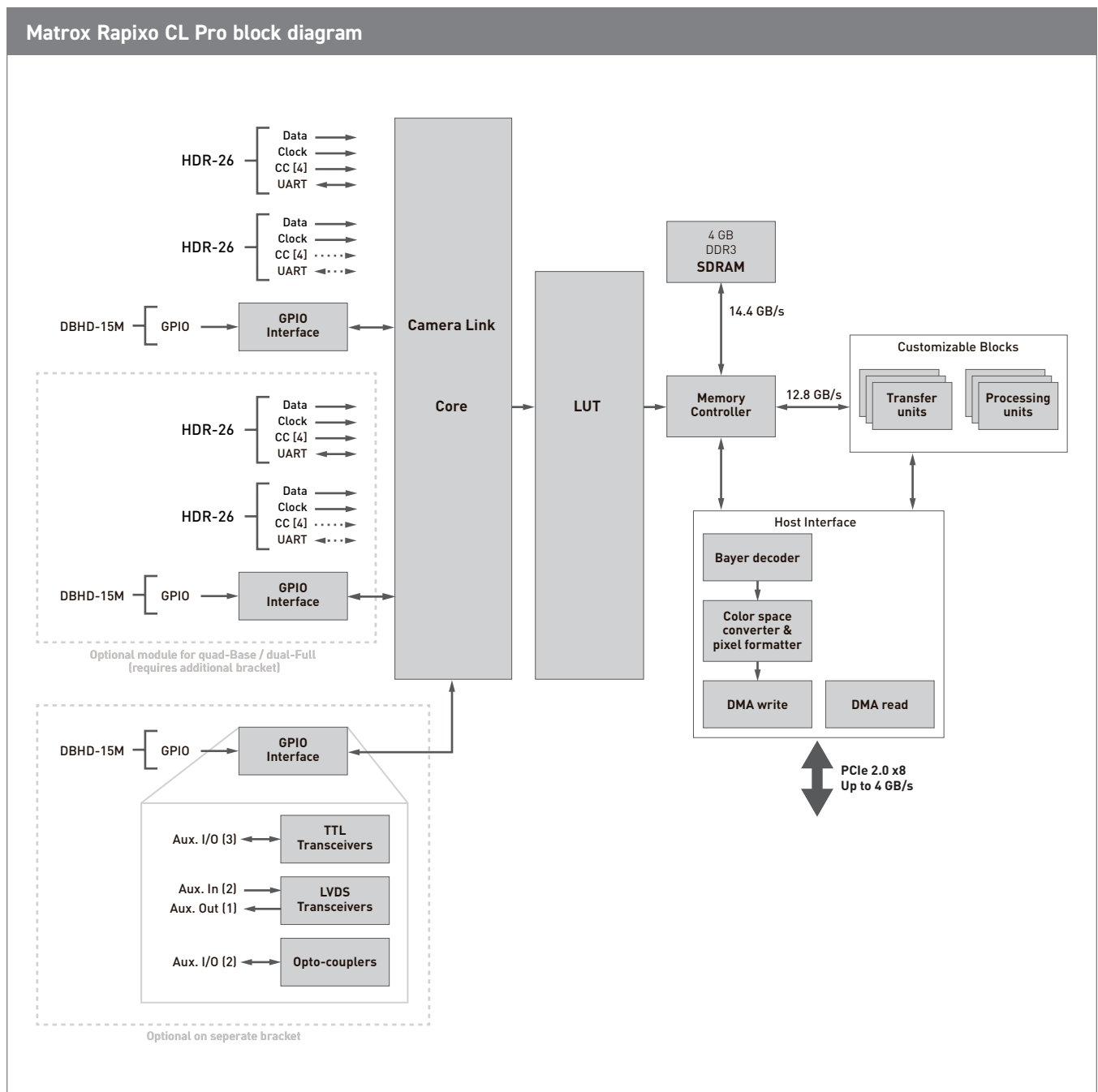
Software Environment

Field-proven application development software

Matrox Rapixo CL Pro is supported by MIL X, a comprehensive collection of software tools for developing industrial imaging applications. MIL X features interactive software and programming functions for image capture, processing, analysis, annotation, display,

and archiving. These tools are designed to enhance productivity, thereby reducing the time and effort required to bring solutions to market. Refer to the MIL X datasheet for more information.

Connectivity

Matrox Rapixo CL Pro block diagram

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Specifications

Matrox Rapixo CL Pro	
Hardware	
Host interface	
Interconnect	PCIe 2.0 x8
Camera/video interface	
Standard	Camera Link 2.1
Configuration	Two (2) independent Base Camera Link ports (dual-Base)
	One (1) Medium/Full Camera Link port (single-Full)
	Up to 80-bit mode
	Four (4) independent Base Camera Link ports (quad-Base)
	Two (2) independent Medium/Full Camera Link ports (dual-Full)
	Up to 80-bit mode
Speeds	20 MHz to 85 MHz Camera Link clock
Connectors	HDR26 (mini Camera Link)
Power output	PoCL with SafePower
Miscellaneous	Extended Camera Link cable length support
	Supports frame and line scan sources
Memory	
Type	DDR3 SDRAM
Quantity	4 GB
Purpose	Image buffering and processing
Image processing capabilities	
Onboard look-up tables	8-/10-/12-bit support
Onboard Bayer interpolation	GB, BG, GR, and RG pattern support
Onboard color space conversion	Input formats: 8-/16-bit mono/Bayer, 24-/48-bit packed BGR
	Output formats: 8-/16-bit mono, 24-/48-bit packed/planar BGR, 16-bit YUV, 32-bit BGRa
Custom processing	Matrox Imaging- or user-developed using Xilinx Vivado® Design Suite and Matrox FDK
I/Os	
Types	Three (3) TTL configurable auxiliary I/Os per Camera Link port
	Two (2) LVDS auxiliary inputs per Camera Link port
	One (1) LVDS auxiliary output per Camera Link port
	Two (2) opto-isolated auxiliary inputs per Camera Link port
Connectors	One (1) / two (2) DBHD-15 male GPIO connector(s) (dual-Base and single-Full / quad-Base and dual-Full)
	One (1) / two (2) optional additional DBHD-15 male GPIO connector(s) (dual-Base / quad-Base)
I/Os synchronization	One (1) quadrature rotary encoder per Camera Link port
	Four (4) 16-bits timer
Physical	
Form factor	Half-length, full-height, PCIe add-in card
Dimensions (L x W x H)	167.6 x 111.1 x 18.7 mm (6.6 x 4.38 x 0.74 in)
	Additional Camera Link module for quad-Base / dual-Full: 45.0 x 106.65 x 18.7 mm (1.77 x 4.20 x 0.74 in)

Specifications (cont.)

Matrox Rapixo CL Pro	
Environmental	
Operating temperature	0°C to 55°C (32°F to 131°F)
Certifications	
Electromagnetic compatibility	FCC Class A
	CE Class A
Substance control	RoHS-compliant
Software	
Compatible software	MIL X
Operating system support	Windows 7 (64-bit)
	Windows 10 (64-bit)
	Linux (64-bit)
Camera communication	GenICam CLProtocol 1.2
	GenICam GenCP 1.3
Licensing provisions	MIL X license fingerprint and storage

Ordering Information

Part number	Description
Hardware	
RAP 4G CL DB P325	Matrox Rapixo CL Pro dual-Base Camera Link PCIe 2.0 x8 frame grabber with 4 GB DDR3 SDRAM, Xilinx Kintex 7 325T FPGA, and HDR26 (mini Camera Link) connectors. Includes cable adaptor for third and fourth GPIOs.
RAP 4G CL SF P325	Matrox Rapixo CL Pro single-Medium/Full Camera Link PCIe 2.0 x8 frame grabber with 4 GB DDR3 SDRAM, Xilinx Kintex 7 325T FPGA, and HDR26 (mini Camera Link) connectors. Includes cable adaptor for third and fourth GPIOs.
RAP 4G CL QB P325	Matrox Rapixo CL Pro quad-Base Camera Link PCIe 2.0 x8 frame grabber with 4 GB DDR3 SDRAM, Xilinx Kintex 7 325T FPGA, and HDR26 (mini Camera Link) connectors. Includes cable adaptor for third and fourth GPIOs.
RAP 4G CL DF P325	Matrox Rapixo CL Pro dual-Medium/Full Camera Link PCIe 2.0 x8 frame grabber with 4 GB DDR3 SDRAM, Xilinx Kintex 7 325T FPGA, and HDR26 (mini Camera Link) connectors. Includes cable adaptor for third and fourth GPIOs.

The Matrox Imaging advantagé

Assured quality & longevity
Adhering to industry best practices in all hardware manufacturing and software development, product designs pay careful attention to component selection to secure consistent long-term availability. Matrox Imaging is able to meet Copy Exact and Revision Change Control procurement requirements in particular circumstances, backed by a dedicated team of QA specialists.

Trusted industry standards
Matrox Imaging champions industry standards in its design and production. Leveraging these standards to deliver quality compatible products, Matrox Imaging protects its customers' best interests by ensuring hardware and software components work with as many third-party products as possible.

Comprehensive customer support
Devoted front-line support and applications teams are on call to offer timely product installation, usage, and integration assistance. Matrox Professional Services delivers deep technical assistance to help customers develop their particular applications in a timely fashion. Services include personalized training and device interfacing as well as application feasibility, prototyping, troubleshooting, and debugging.

Tailored customer training
Matrox Vision Academy comprises online and on-premises training for Matrox Imaging vision software tools. On-premises intensive training courses are regularly held at Matrox headquarters, and can also be customized for onsite delivery. The Matrox Vision Academy online training platform hosts a comprehensive set of on-demand videos available when and where needed.

Long-standing global network
Matrox Imaging customers benefit from a global network of distributors who offer complementary products and support, and integrators who build customized vision systems. These relationships are built on years of mutual trust and span the globe, ensuring customer access to only the best assistance in the industry.

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ABOUT MATROX IMAGING
Matrox Imaging, now a part of Zebra Technologies, is an established and trusted supplier to top OEMs and integrators involved in machine vision, image analysis, and medical imaging industries. The components consist of smart cameras, 3D sensors, vision controllers, I/O cards, and frame grabbers, all designed to provide optimum price-performance within a common software environment. For more information, visit www.matrox. com/imaging

The use of the terms "industrial" or "factory-floor" do not indicate compliance to any specific industrial standards.