Matrox **Rapixo CXP** »

Single- to quad-input CoaXPress® 2.0 frame grabbers
with optional FPGA-based image processing offload

Matrox Rapixo CXP at a glance

CXP-12 **Support for the highest speeds** available in CXP 2.0

Connect to and capture from up to four cameras or combine connections for even higher data rates

PoCXP support simplifies cabling between cameras and vision computer

Offload host computer of custom image processing using a FPGA device

Auxiliary I/Os per CXP connection to synchronize with sensors, encoders, and controllers

License fingerprint for MIL software avoids the need for a separate hardware key

Interface cards for high-speed imaging

Matrox® Rapixo CXP is a new generation of frame grabbers, supporting version 2.0 of the CoaXPress® (CXP) digital interface standard for machine vision applications. The Matrox Rapixo CXP family supports data rates of either up to 6.25 Gbps (CXP-6) or up to 12.5 Gbps (CXP-12) per connection. The PCIe® host interface comfortably matches the maximum input bandwidth from the CXP links. The CXP links are accessed through high-density BNC connectors allowing for a homogenous interconnection with new cameras. Power-over-CoaXPress (PoCXP) support on each connection simplifies system configurations, combining the camera's power interface with its command- and data-interface onto the same coaxial cable.

The Matrox Rapixo CXP family of frame grabbers feature one, two, or four connections for interfacing to independent cameras. Matrox Rapixo CXP Dual and Quad can also handle higher data rates through connection aggregation. The Matrox Rapixo CXP family possess sufficient onboard memory to buffer incoming image data in situations where the host computer is temporarily unable to accept data. The fanless design for select models ensures extended use without maintenance.

Offload host computer of custom image processing using a FPGA

The Matrox Rapixo CXP Pro makes use of a field-programmable gate array (FPGA) device from the Xilinx Kintex® UltraScale™ family for not only integrating the controlling, formatting, and streaming logic of the various interfaces, but also allowing developers to incorporate Matrox Imaging- or user-developed custom image pre-processing operations to offload from the host computer. A variety of FPGA sizes are available for the Matrox Rapixo CXP Pro, providing a range of solutions tailored to a given application. Operations performed on-board are controlled through Matrox Imaging Library (MIL) application-development software. Within MIL, 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 FPGA Development Kit (FDK), developers generate their own FPGA configurations with custom operations written in C/C++.
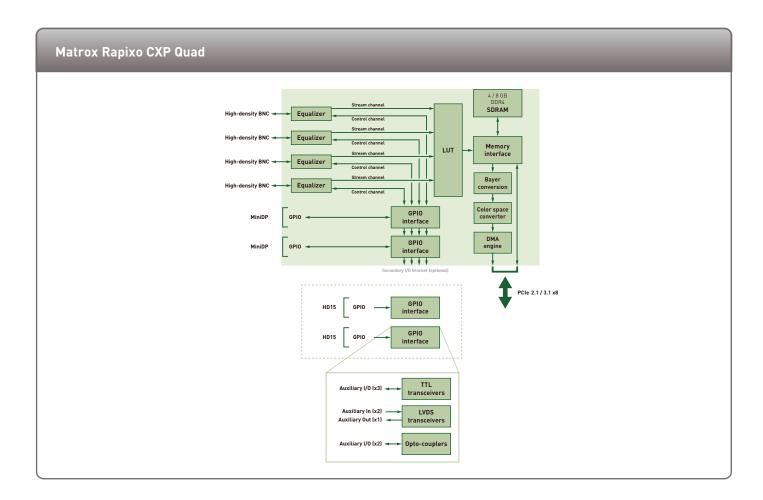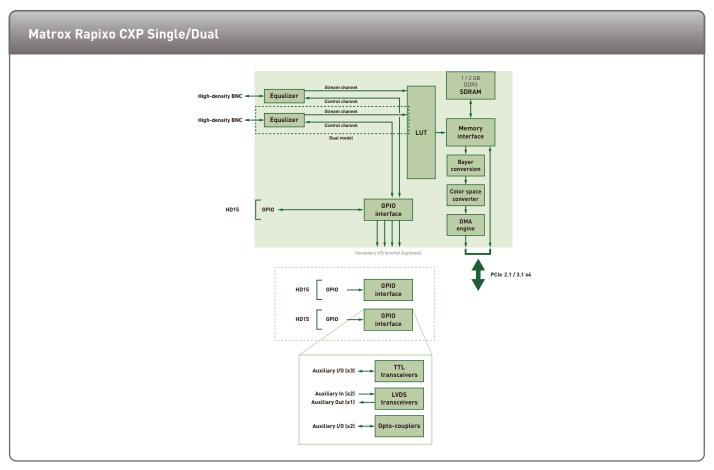
Pairs with MIL[1] software

Matrox Rapixo CXP boards supports 64-bit Windows® and Linux® through the latest MIL software. The card also acts as a license fingerprint and can store a supplemental license for MIL software, avoiding the need for a separate hardware key.

Field-proven development software

The Matrox Rapixo CXP family is supported by MIL[1] software—a comprehensive software development kit (SDK) with a 25-year history of reliable performance. This toolkit features interactive software and programming functions for image capture, processing, analysis, annotation, display, and archiving operations, with the accuracy and robustness needed to tackle the most demanding applications. Refer to the MIL datasheet for more information.

MATROX IMAGING

Matrox Rapixo CXP Quad

High-density BNC — Equalizer
Stream channel
Control channel

High-density BNC — Equalizer
Stream channel
Control channel

High-density BNC — Equalizer
Stream channel
Control channel

High-density BNC — Equalizer
Stream channel
Control channel

LUT

4 / 8 GB DDR4 SDRAM

Memory interface

Bayer conversion

Color space converter

DMA engine

MiniDP — GPIO — GPIO interface

MiniDP — GPIO — GPIO interface

Secondary I/O bracket (optional)

HD15 — GPIO — GPIO interface

HD15 — GPIO — GPIO interface

PCIe 2.1 / 3.1 x8

Auxiliary I/O (x3) — TTL transceivers

Auxiliary In (x2) — LVDS transceivers
Auxiliary Out (x1)

Auxiliary I/O (x2) — Opto-couplers

Matrox Rapixo CXP Single/Dual

High-density BNC — Equalizer
Stream channel
Control channel

High-density BNC — Equalizer
Stream channel
Control channel

Dual model

LUT

1 / 2 GB DDR3 SDRAM

Memory interface

Bayer conversion

Color space converter

DMA engine

HD15 — GPIO — GPIO interface

Secondary I/O bracket (optional)

HD15 — GPIO — GPIO interface

HD15 — GPIO — GPIO interface

PCIe 2.1 / 3.1 x4

Auxiliary I/O (x3) — TTL transceivers

Auxiliary In (x2) — LVDS transceivers
Auxiliary Out (x1)

Auxiliary I/O (x2) — Opto-couplers

Specifications

Hardware

Model	Matrox Rapixo CXP Quad	Matrox Rapixo CXP Single/Dual

Host interface

Interconnect	PCIe 2.1 / 3.1 x8[2]	PCIe 2.1 / 3.1 x4[2]

Camera/video interface

Standard	CXP version 2.0	
Configuration	Four (4) connections	One (1) or two (2) connection(s)[3]
Speeds (Per connection)	1.25 / 2.5 / 3.125 / 5 / 6.25 / 10 / 12.5 Gbps (CXP-1, 2, 3, 5, 6, 10, and 12 respectively)	
Streams	Up to eight (8) total	
Connectors	High-density BNC	
Power output	PoCXP	
Miscellaneous	Connection-status indicator LEDs	

Memory

Type	DDR4 SDRAM	DDR3 SDRAM
Quantity	4 or 8 GB	1 or 2 GB
Purpose	Image buffering and processing	

Image processing capabilities

On-board look-up tables	8- / 10- / 12-bit support	
On-board Bayer interpolation	GB, BG, GR, and RG pattern support	
On-board 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, 16-bit YCbCr, 32-bit BGRa	
Custom processing	Matrox Imaging- or user-developed using Xilinx Vivado® Design Suite and Matrox FPGA Development Kit (FDK)	N/A

General purpose I/Os

Types	Three (3) TTL I/Os per connector Two (2) LVDS inputs per connector One (1) LVDS output per connector Two (2) opto-isolated inputs per connector	
Connectors	Two (2) mDP connectors on main I/O bracket accessed through a mDP-to-HD15 adaptor	One (1) HD15 connector on main I/O bracket
	Two (2) HD15 connectors on secondary I/O bracket	

Physical

Form factor	Half-length, full-height, PCIe add-in card	
Product dimensions (L x W x H)	16.76 x 1.871 x 11.12 cm (6.6 x 0.737 x 4.376 in)[3]	
Power consumption	17.33 W (typical)[4]	TBD

Environmental

Operating temperature	0°C to 55°C (32°F to 131°F)[5]	
Operating relative humidity	Up to 95% (non-condensing)	

Certifications

	FCC Class A CE Class A (EN55032, EN55024) ICES-003 / NMB-003 Class A RCM Class A KC Class A	

Software

Compatible software	Matrox Imaging Library (MIL) 10[6]	
Operating system support	Windows 7 (64-bit) Windows 10 (64-bit) Linux (64-bit)	
Licensing provisions	MIL license fingerprint and storage	

Ordering Information

Hardware

Part number	Description
RAP 1G 1C12	Matrox Rapixo CXP Single CXP-12 PCIe 2.1 x4 frame grabber with 1 GB DDR3 SDRAM and passive heatsink.
	Note: Cable adaptors for second and third GPIO sets sold separately.
RAP 2G 2C12	Matrox Rapixo CXP Dual CXP-12 PCIe 3.1 x4 frame grabber with 2 GB DDR3 SDRAM and passive heatsink.
	Note: Cable adaptors for second and third GPIO sets sold separately.
RAP 4G 4C6	Matrox Rapixo CXP Quad CXP-6 PCIe 2.1 x8 frame grabber with 4 GB DDR4 SDRAM and passive heatsink. Includes one (1) mDP-to-HD15 GPIO cable adaptor.
	Note: Cable adaptors for second, third, and fourth GPIO sets sold separately.
RAP 4G 4C12	Matrox Rapixo CXP Quad CXP-12 PCIe 3.1 x8 frame grabber with 4 GB DDR4 SDRAM and passive heatsink. Includes one (1) mDP-to-HD15 GPIO cable adaptor.
	Note: Cable adaptors for second, third, and fourth GPIO sets sold separately.
RAP 8G 4C12 P352	Matrox Rapixo CXP Pro Quad CXP-12 PCIe 3.1 x8 frame grabber with 8 GB DDR4 SDRAM, Xilinx Kintex Ultrascale KU035 FPGA, and active heatsink (fansink). Includes one (1) mDP-to-HD15 GPIO cable adaptor.
	Note: Cable adaptors for second, third, and fourth GPIO sets sold separately.

Contact Matrox Imaging for other part numbers.

Accessories

Part number	Description
RAPACCKIT01	Accessory kit for Matrox Rapixo CXP Quad. One (1) additional mDP-to-HD15 GPIO cable adaptor and one (1) secondary dual HD15 I/O bracket with ribbon cable.
RAPACCKIT02	Accessory kit for Matrox Rapixo CXP Single/Dual. Include one (1) secondary dual HD15 I/O bracket with ribbon cable.
HDBNC2BNC	One (1) 12 in or 30 cm HDBNC-male-to-BNC-female adaptor cable.

Software

Refer to MIL datasheet and Matrox FDK datasheet .

Endnotes:
1. The software may be protected by one or more patents; see www.matrox.com/patents for more information.
2. Model dependent.
3. Dimensions (length x width x height) are taken from bottom edge of goldfinger to top edge of board. These measurements do not include mounting bracket.
4. Matrox Rapixo CXP Pro model power consumption is dependent on FPGA device and onboard processing workload.
5. Models with passive heatsink require a minimum ventilation of 150 LFM (linear feet per minute) in a single board configuration. Contact a sales representative for ventilation requirement for multiple board configurations.
6. Through an update.

The Matrox Imaging Advantage

Assured Quality & Longevity
We adhere 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 our dedicated team of QA specialists.

Trusted Industry Standards
Matrox Imaging champions industry standards in our design and production. We leverage these standards to deliver quality compatible products, protecting our customers' best interests by ensuring our hardware and software components work with as many third-party products as possible.

Comprehensive Customer Support
Our 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 our vision software tools. On-premises intensive training courses are regularly held at Matrox headquarters, and can also be customized for onsite delivery. 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.

About Matrox Imaging

Founded in 1976, Matrox is a privately held company based in Montreal, Canada. Imaging, Graphics, and Video divisions provide leading component-level solutions, leveraging the others' expertise and industry relations to provide innovative, timely products.

Matrox Imaging 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, vision controllers, I/O cards, and frame grabbers, all designed to provide optimum price-performance within a common software environment.

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