



# Matrox **RadientPro CL** >>>

Full-featured Camera Link frame grabber  
with FPGA-based processing offload

# Overview

## Full-featured Camera Link vision processor

Matrox® RadientPro CL is a vision processor board capable of handling the highest image acquisition rates supported by the Camera Link® interface standard, specifically the Full and 80-bit modes (single-Full model). The Matrox RadientPro CL also makes available a FPGA device capable of offloading the host system from having to deal with repetitive, computationally intensive image-processing algorithms that consume substantial host system bandwidth. This FPGA device can be tailored for specific algorithms either by Matrox Imaging or by using the optional [Matrox FPGA Development Kit \(FDK\)](#).

## Offload and accelerate repetitive tasks from the host CPU

As image size continues to grow, frame rate steadily increase, and applications are expected to do more, the demands on the host system keep rising. The Matrox RadientPro CL can lessen the pressure by offloading repetitive compute-intensive image-processing operations using the on-board Altera Stratix V FPGA, freeing valuable processing resources for the rest of the application—and even accelerating the application. Candidate operations include spatial and temporal filtering, gain and offset correction, dead pixel correction, optical and perspective distortion correction, Bayer color interpolation, color space conversions, and frequency domain transformations. The on-board operations are controlled through [MIL X](#) software, within which a FPGA configuration can be rearranged to perform a required sequence of operations without having to necessarily generate a new FPGA configuration. When the need arises, Matrox Imaging's FPGA design services can be employed to generate an application-specific FPGA configuration. Users can also use the [Matrox FDK](#) to create custom FPGA configurations.

## Matrox RadientPro CL at a glance

**Capture images at the highest Camera Link rates** with support for the Full and 80-bit modes at up to 85 MHz (single-Full model)

**Eliminate lost pixels** through a PCIe® 2.0 x8 host interface and ample on-board buffering

**Reduce cabling and eliminate power supplies** by way of Power-over-Camera-Link (PoCL) support

**Offload and accelerate image processing** to free and assist the host CPU using an Altera® Stratix® V FPGA

**Simplify the development of custom on-board image processing** using the optional [Matrox FDK](#)

**Reduce development and validation costs** through a managed lifecycle offering consistent long-term availability

**Implement image capture with ease and confidence** using the [Matrox Imaging Library \(MIL\) X](#) application development toolkit

**Maintain flexibility and choice** by way of support for 64-bit Windows® 7/10 and 64-bit Linux®

# Overview (cont.)

## Versatile Camera Link interface

For low-latency and deterministic acquisition, Camera Link provides a scalable and proven solution for vision applications. From cost-sensitive, low data-rate applications to mainstream applications including color and right up to maximum-bandwidth applications, Camera Link is an excellent fit.

The use of the mini Camera Link connector (HDR) on the Matrox RadientPro CL facilitates higher-density multi-camera system designs by enabling two Base or one Full mode Camera Link interface with triggering and general purpose I/O in a single slot.

The single-Full Matrox RadientPro CL model supports the latest area- and line-scan cameras up to the Camera Link Full and 80-bit modes at 85 MHz. When interfaced to PoCL-enabled cameras, overall cabling complexity is reduced, eliminating the need for bulky and costly external camera power supplies.

## High-performance host interface

A PCIe 2.0 x8 host interface provides the throughput necessary to ensure the continuous flow of pixels from the Matrox RadientPro CL to host memory. With a peak bandwidth of up to 4 GB/s, the Matrox RadientPro CL's host interface prevents pixels from inadvertently being discarded while the point-to-point connectivity of PCIe stops other add-in devices from taking away valuable bandwidth between the frame grabber and the host PC.

## Lifecycle managed for consistent long-term supply

Each component on the Matrox RadientPro CL has been carefully selected to ensure product availability in excess of five years. The Matrox RadientPro CL 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 the repeated validation of constantly changing products.

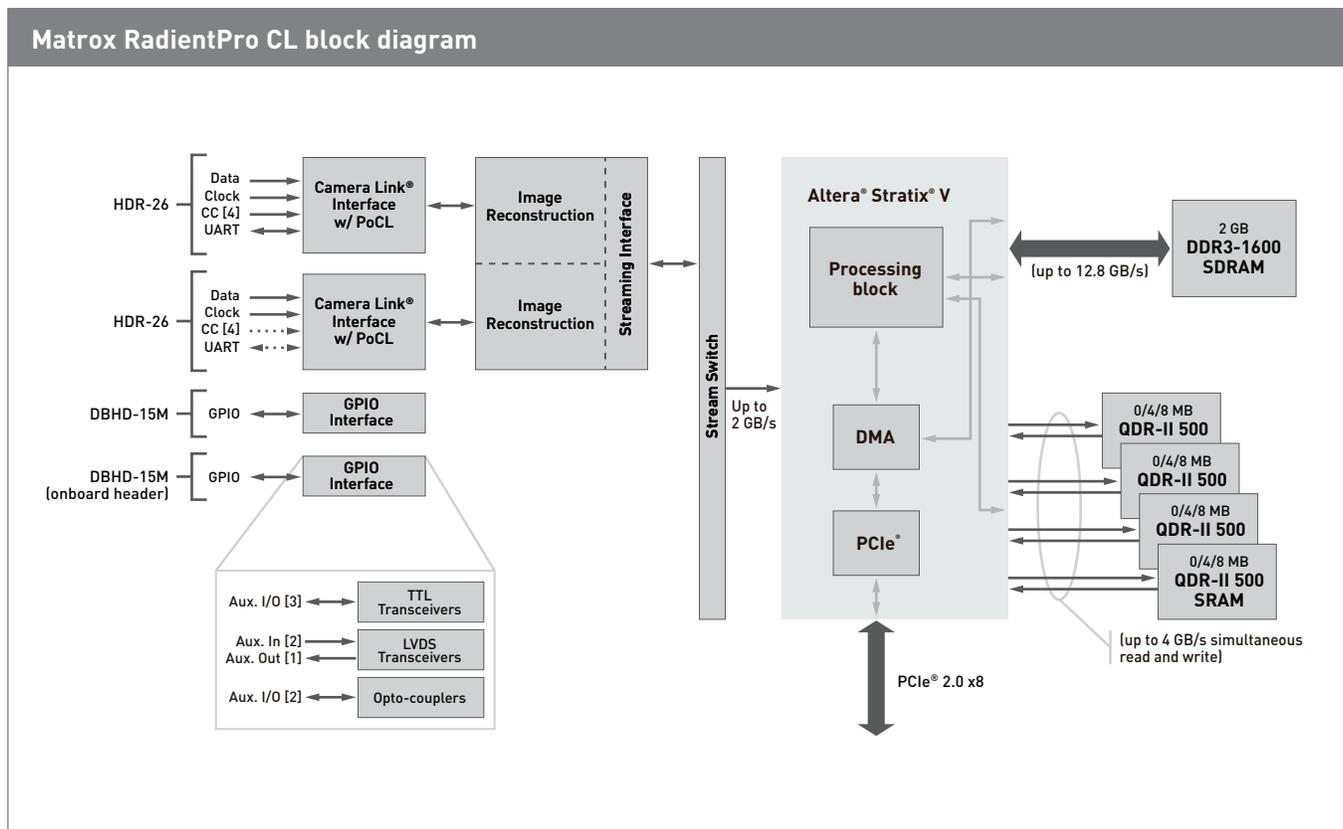
# Software Environment

## Field-proven application development software

The Matrox RadientPro CL 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.

Included with MIL X are ready-made configurations for the FPGA-based processing core that implement a variety of image-processing functions. Custom configurations can also be created by Matrox Imaging experts upon request and evaluation. For developers seeking to create their own image-processing functions, the Matrox FDK is also available. It provides a component library and tools to enable creation of custom FPGA configurations for the Matrox RadientPro CL. Refer to the [Matrox FDK datasheet](#) for more information.

# Connectivity



# Specifications

Matrox RadientPro CL	
<b>Hardware</b>	
PCIe 2.0 x8 host bus interface	
Altera Stratix V 340K LE FPGA device	
For Matrox Imaging or custom image-processing algorithms designed with Matrox FDK	
2 GB of DDR3-1600 SDRAM	
0, 16, 32 MB of QDR2 SRAM	
Camera Link 2.0 acquisition	
Mini Camera Link connectors (HDR-26)	
PoCL with SafePower	
20 to 85 MHz Camera Link clock	
One (1) Medium/Full Camera Link port (single-Full model)	
Support for 8-tap x 10-bit and 10-tap x 8-bit (80-bit) modes	
Two (2) Base Camera Link ports (dual-Base model)	
Supports frame and line scan sources	
On-board image reconstruction	
On-board color space conversion	
Input formats	
8-/16-bit mono/Bayer	
24-/48-bit packed BGR	
Output formats	
8-/16-bit mono	
24-bit packed BGR/RGB	
32-/48-bit BGRa/RGBa	
16-bit YUV	
YCrCb	
One (1) DBHD-15 male GPIO connector	
Three (3) TTL configurable auxiliary I/Os	
Two (2) LVDS auxiliary inputs	
One (1) LVDS auxiliary output	
Two (2) opto-isolated auxiliary inputs	
Optional add-on DBHD-15 male GPIO connector	
Three (3) TTL configurable auxiliary I/Os	
Two (2) LVDS auxiliary inputs	
One (1) LVDS auxiliary output	
Two (2) opto-isolated auxiliary inputs	
Support for one (1) quadrature rotary encoder per Camera Link port	
<b>Physical</b>	
Dimensions (L x W x H): 167.6 x 111.1 x 18.7 mm (6.6 x 4.38 x 0.74 in)	

# Specifications (cont.)

Matrox RadientPro CL	
<b>Certifications</b>	
FCC class A	
CE class A	
RoHS-compliant	
<b>Environmental</b>	
Operating temperature: 0°C to 40°C (32°F to 104°F)	
Relative humidity: Up to 95% (non-condensing)	
<b>Software</b>	
MIL X license fingerprint and storage	
Software drivers: MIL drivers for 64-bit Windows 7	
Software drivers: MIL drivers for 64-bit Windows 10	
Software drivers: MIL drivers for 64-bit Linux	
Implements GenICam™ 2.3.1 (CLProtocol 1.1) and GenICam GenCP 1.0 under Windows/Linux	
Optional Matrox FDK for use with Impulse CoDeveloper and Altera Quartus® II	

# Ordering Information

Part number	Description
<b>Hardware</b>	
RP2GDB340300*	Matrox RadientPro dual-Base Camera Link PCIe 2.0 x8 frame grabber with 2 GB DDR3 SDRAM, Altera Stratix V 5SGXA3 FPGA, and no SRAM.
RP2GSF340300*	Matrox RadientPro single-Medium/Full Camera Link PCIe 2.0 x8 frame grabber with 2 GB DDR3 SDRAM, Altera Stratix V 5SGXA3 FPGA, and no SRAM.
Matrox RadientPro CL variations with SRAM available upon request.	

## The Matrox Imaging advantage



### 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.



## 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.

## Contact Matrox

[imaging.info@matrox.com](mailto:imaging.info@matrox.com)

**North America Corporate Headquarters:** 1 800-804-6243 or 514-822-6020

Serving: Canada, United States, Latin America, Europe, Asia, Asia-Pacific, and Oceania

[www.matrox.com/imaging](http://www.matrox.com/imaging)

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

© 2020 Matrox Electronic Systems, Ltd. All rights reserved. Matrox reserves the right to change specifications without notice. Matrox and Matrox product names are either trademarks and/or registered trademarks in Canada or other countries and/or trademarks of Matrox Electronic Systems, Ltd and/or Matrox Graphics Inc. All other company and product names are registered trademarks and/or trademarks of their respective owners. The information furnished herein is believed to be accurate and reliable at time of printing; however, no responsibility license is granted under any patents or patent rights of Matrox Electronic Systems, Ltd. 02/2020

**matrox**<sup>®</sup>