



# Matrox Radiant eCL >>

High-performance Camera Link® frame grabber with FPGA-based processing offload.



## Benefits

- › **Offload and accelerate image processing** to free and assist the host CPU using an Altera® Stratix® III FPGA
- › **Optimize multi-camera applications** via support for up to four independent Base (eCL-QB) or up to two Full (eCL-DF) Camera Link® cameras per board
- › **Perform deterministic image acquisition** by way of the jitter-free Camera Link® interface
- › **Eiminate lost pixels** through a x8 PCIe® host interface and ample on-board buffering
- › **Use the highest-rate cameras** with available support for 10-taps (eCL-F) at 85 MHz
- › **Reduce cabling and eliminate power supplies** by way of Power over Camera Link® (PoCL) support
- › **Reduce development and validation costs** through a managed lifecycle offering consistent long term availability
- › **Implement image capture with ease and confidence** using Matrox Imaging Library (MIL) application development toolkit
- › **Maintain flexibility and choice** by way of 32-bit and 64-bit Windows® XP Windows® Vista® and Linux¹ support

## Utmost performance for a Camera Link® frame grabber

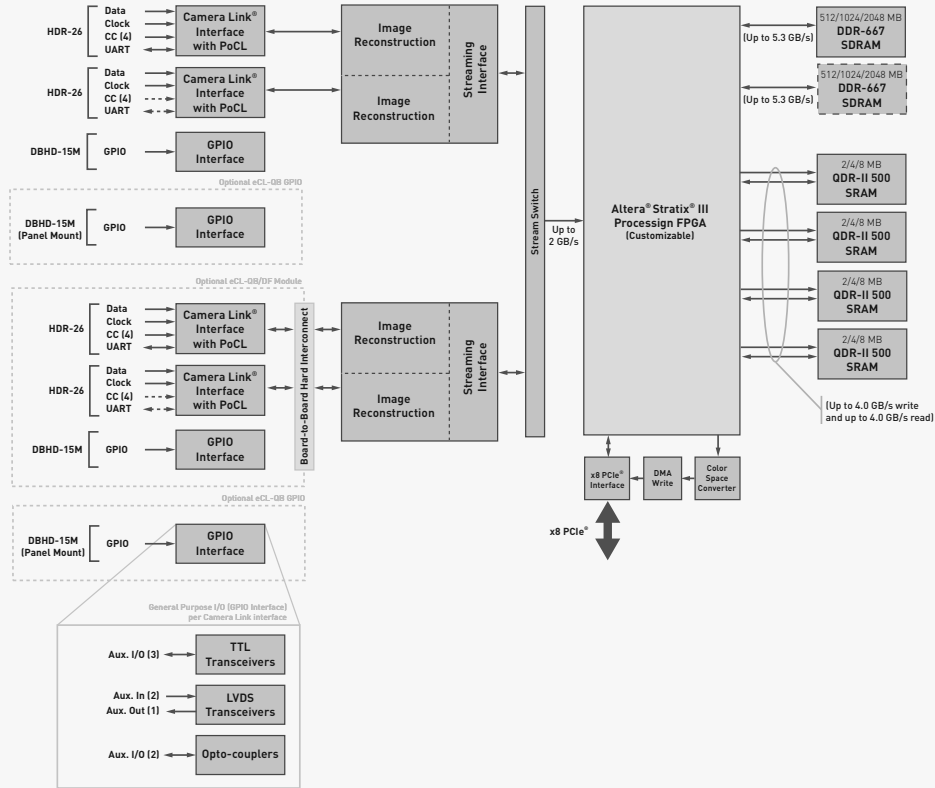
The Matrox Radiant eCL frame grabber matches the highest level of performance offered by the Camera Link® interface standard with support for the maximum transmission rate beyond the maximum number of ports. The acquisition of such massive amounts of data is usually accompanied by image processing operations that can overwhelm the most capable computer. The Matrox Radiant eCL also features an on-board real-time processing FPGA device that can be configured to offload and even accelerate the most compute intensive part of typical image processing applications without generating additional data traffic within the host computer.

### Offload and accelerate repetitive tasks from the host CPU

As image size continues to grow, frame rate steadily increases and applications are expected to do more, the demands for processing on the host system are escalating. Alleviating this pressure, the Matrox Radiant eCL can offload repetitive CPU intensive tasks on the Altera® Stratix® III FPGA such as 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, freeing valuable processing resources for the rest of the application and accelerating the application. The operations performed on-board are controlled through the Matrox Imaging Library (MIL) application development software. Through MIL, 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's FPGA design services can be employed to generate an application-specific FPGA configuration.



## Matrox Radiant eCL



### Versatile Camera Link® Interface

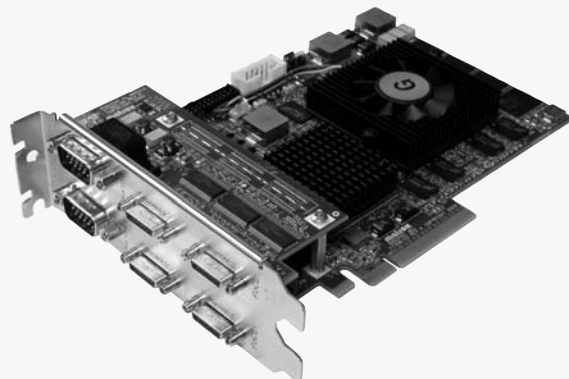
For field-proven, low-latency and deterministic acquisition, Camera Link® provides a scalable solution conceived specifically for machine vision applications. From cost-sensitive low data rate applications, to mainstream applications including color and right up to maximum bandwidth applications, Camera Link® is an excellent fit. The introduction of the mini Camera Link® connector (HDR) has lead to higher density multi-camera systems by enabling two Base or one Full mode Camera Link® interface with triggering and general purpose I/O in a single slot.

The Matrox Radiant eCL-QB is capable of simultaneously capturing from up to four completely independent Base Camera Link® cameras at up to 85 MHz. Fully supporting Power over Camera Link® (PoCL), the Matrox Radiant eCL-(QB) can reduce cabling complexity and eliminate the need for bulky and costly external camera power supplies. Alternatively the Matrox Radiant eCL-DF, supporting up to two Medium/Full cameras with up to 10-taps at up to 85 MHz, can acquire and reconstruct images from the most advanced multi-tap high-performance area and line scan cameras.

### High-performance host interface

A x8 PCIe® host interface provides the throughput necessary to ensure the continuous flow of pixels from the Matrox Radiant eCL to host memory. With a peak bandwidth of up to 2 GB/s, the Matrox Radiant eCL'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.

## Matrox Radiant eCL-QB or eCL-DF



Preliminary

### Lifecycle managed for consistent long term supply

Matrox Imaging not only carefully selected each component in the Matrox Radiant eCL to ensure product availability in excess of five years, but also exercises strict change control to provide consistent supply. Longevity of stable supply lets OEMs achieve maximum return on the original investment without incurring the additional costs associated with the repeated validation due to constantly-changing products.

### Application development with Matrox Imaging Library (MIL)

Complementing the Matrox Radiant eCL is the Matrox Imaging Library (MIL) providing a comprehensive collection of software tools for developing industrial imaging applications. MIL 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 your solution to market. The MIL API is not only intuitive and straightforward to use but it is also portable. It allows applications to be easily moved from one supported video interface or operating system to another, which provides platform flexibility and protects the original development investment.

### Software maintenance, support and training

The purchase price of MIL gives registered users automatic enrollment in a maintenance program for one year. This program entitles registered users to support from Matrox Imaging's highly qualified technical staff as well as free updates and upgrades. Matrox Imaging's team of vision specialists is committed to providing customers with the assistance needed to take applications from concept to completion. A front-line support group is available to answer installation questions and provide immediate troubleshooting assistance, while our developers are ready to guide customers through the design, development and deployment phases of their projects. Matrox Imaging offers our development community a variety of training programs ranging from instructor-led classroom session to live and pre-recorded webcasts. Refer to the support section at [www.matrox.com/imaging/training/](http://www.matrox.com/imaging/training/) for more information.

## Specifications

### Hardware

- x8 PCIe® host bus interface
  - half-length, full-height
- Altera® Stratix® III processing FPGA
  - up to 133 MHz Core Clock

Logic Rich Devices	Equivalent Logic Elements	Max. 18-bit x 18-bit Multipliers
EP3SL110	107,500	288
EP3SL150	142,500	384
EP3SL200	198,900	576
EP3SL340	338,000	576
DSP Rich Devices		
EP3SE110	107,500	896
EP3SE260	254,400	768

- 1/2/4 GB of DDR2-667 SDRAM
  - up to 10.6 GB/s read and write
- 8/16/32 MB of QDR-II 250 SRAM
  - up to 4 GB/s read and 4 GB/s write
- Camera Link® Acquisition
  - mini-Camera Link® connectors (HDR-26)
  - 20 MHz to 85 MHz Camera Link® clock
  - one (1) serial port per Camera Link® channel
  - two (2) Base Camera Link® ports (eCL-B) or four (4) Camera Link® Base ports (eCL-QB)
    - Power over Camera Link® (PoCL) with SafePower
  - one (1) Medium/Full Camera Link® port (eCL-F) or two (2) Camera Link® Full ports (eCL-DF)
    - up to 10-tap support
- supports frame and line scan sources
- on-board image reconstruction
- on-board color space conversion
  - input formats
    - mono/Bayer 8-bit and 16-bit
    - BGR packed 24-bit and 48-bit
  - output formats
    - mono 8-bit and 16-bit
    - 24-bit BGR/RGB packed
    - 32/48-bit BGR $\alpha$ /RGB $\alpha$
    - YUV 16-bit
    - YCrCb
- one (1) DBHD-15 male GPIO connector
  - three (3) TTL configurable auxiliary I/O's
  - two (2) LVDS auxiliary inputs
  - one (1) LVDS auxiliary output
  - two (2) opto-isolated auxiliary inputs
- optional add-on DBDHD-15 male GPIO connector (up to 2 for eCL-QB)
  - three (3) TTL configurable auxiliary I/O's
  - two (2) LVDS auxiliary inputs
  - one (1) LVDS auxiliary output
  - two (2) opto-isolated auxiliary inputs
- support for one (1) quadrature rotary encoder per port
- MIL license fingerprint and storage

## Dimensions and environmental information

- Matrox Radient eCL
  - 167.6 mm L x 111.1 mm H x 18.7 mm W (6.6" x 4.38" x 0.74")
  - 1.0 A @ 3.3V, 3.05 mA @ 12V or 30.3 W typical power draw<sup>2</sup> with PoCL
- additional Camera Link® module (eCL-QB/DF)
  - 45.0 mm L x 106.65 mm H x 18.7 mm W (1.77" x 4.20" x 0.74")
  - 1.0 A @ 3.3V, 0.8 mA @ 12V or 13 W additional power draw with PoCL
- operating temperature: 0°C to 55° C (32° F to 131° F)
- relative humidity: up to 95% (non-condensing)
- FCC class A (pending)
- CE class A (pending)
- RoHS-compliant

## Software Environment

- host drivers for 32/64-bit Microsoft® Windows® XP and Vista®
- host driver for 32/64-bit Linux<sup>1</sup>

## Ordering Information

### Hardware

Part number	Description
RAD 2G DB 150400*	Matrox Radient eCL-DB dual-Base Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL150-C4 processing FPGA and no SRAM.
RAD 2G SF 150400*	Matrox Radient eCL-SF single-Medium/Full Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL150-C4 processing FPGA and no SRAM.
RAD 2G QB 150400*	Matrox Radient eCL-QB quad-Base Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL150-C4 processing FPGA and no SRAM.
RAD 2G DF 150400*	Matrox Radient eCL-DF dual-Medium/Full Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL150-C4 processing FPGA and no SRAM.
RAD 2G DB 200416*	Matrox Radient eCL-DB dual-Base Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL200-C4 processing FPGA and 16 MB SRAM. Ask for availability. Subject to minimum order quantity.
RAD 2G SF 200416*	Matrox Radient eCL-SF single-Medium/Full Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL200-C4 processing FPGA and 16 MB SRAM. Ask for availability. Subject to minimum order quantity.
RAD 2G QB 200432*	Matrox Radient eCL-B quad-Base Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL200-C4 processing FPGA and 32 MB SRAM. Ask for availability. Subject to minimum order quantity.
RAD 2G DF 200432*	Matrox Radient eCL-F dual-Medium/Full Camera Link® frame grabber with 2 GB DDR2-667 SDRAM, Altera® Stratix® III EP3SL200-C4 processing FPGA and 32 MB SRAM. Ask for availability. Subject to minimum order quantity.

### Software

Call Matrox Imaging or your local sales representative for more information.

#### Notes:

1. Contact local representative or Matrox Imaging Sales for availability.
2. Typical power consumption for RAD2GSF150416\*.
3. Only available with initial board purchase.

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or e-mail: [imaging.info@matrox.com](mailto:imaging.info@matrox.com) or <http://www.matrox.com/imaging>

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Preliminary