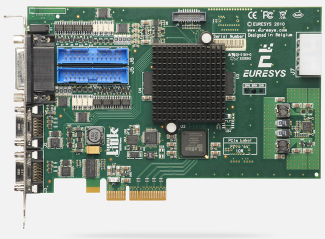
EURESYS™ Excellence in vision

B2S BETTER SOLUTION & SUPPORT

# Grablink DualBase

Frame grabber for two base-configuration Camera Link cameras



## At a Glance

- For two Camera Link Base or Lite configuration cameras
- Directly compatible with hundreds of Camera Link cameras available on the market
- Supports PoCL, Power over Camera Link
- ECCO: Extended Camera Link cable length
- PCIe x4 bus: 850 MB/s sustained delivery bandwidth
- Feature-rich set of 20 digital IO lines

## Benefits

### ECCO: Extended Camera Link Cable Operation

- Use longer, up to 15 meters long, Camera Link cables!
- Download this document for more information

### Directly compatible with hundreds of Camera Link cameras available on the market

Check out our camera compatibility page (in the Support menu) to download the relevant CamFiles

### General purpose I/O lines

- Compatible with a wide range of sensors and motion encoders.
- High-speed differential inputs: Quadrature motion encoder support up to 5 MHz.
- Isolated current-sense inputs: 5V, 12V, 24V signaling voltages accepted, up to 50 kHz, individual galvanic isolation up to 500VAC RMS.
- Isolated contact outputs.

### High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory
- Hardware scatter-gather support
- 64-bit addressing capability

### Area-scan triggering capabilities

- A trigger is used to start the acquisition when the part is in position. Hardware triggers come from the Grablink's I/O lines. Software triggers come from the application.
- An optional trigger delay is available to postpone the acquisition for a programmable time.
- A trigger decimation function allows to skip some of the triggers.
- Camera exposure control allows the application to control the exposure time of the camera.
- When the acquisition starts, at the appropriate timing, the Grablink board generates a signal to control an illumination device connected to one of its output lines.

### Line-scan triggering capabilities

Grablink supports continuous web scanning (to inspect infinite, continuously moving surfaces without losing a single line) and discrete object scanning (to acquire the image of objects moving in front of the camera).

- A trigger is used to start the acquisition when the part is in position. Hardware triggers come from the board's I/O lines. Software triggers come from the application.
- After it is started, the acquisition either:
  - Continues indefinitely (for web inspection applications)
  - Continues for a programmable number of lines (to acquire the image of objects of a known length)
  - Continues until an end trigger is received (to acquire the image of objects of a variable length)
- An optional trigger delay is available to postpone the beginning of the acquisition for a programmable number of lines.

### Line-scan triggering capabilities

- The Grablink frame grabber controls the camera scanning rate based on the signals received from a motion encoder. When the parts move faster, the acquisition line rate of the camera increases. When the parts move slower, the acquisition line rate of the camera decreases.
- The Grablink boards interpret A/B signals from quadrature motion encoders to know in which direction (forward or backward) the part is moving.
- Optionally, the Grablink can be instructed to acquire lines only when the object is moving forward or only when the object is moving backward.
- A feature called Backward Motion Cancellation stops the acquisition when a backward motion is detected. The line acquisition automatically resumes when the motion is again in the forward direction, at the exact place where the acquisition was interrupted.
- A Rate Converter allows the camera to acquire lines at any programmable resolution lower or higher than the resolution of the motion encoder. This gives the designer incredible freedom and flexibility during the development of the application.
- A Rate Divider allows the camera to acquire lines at a resolution lower than the resolution of the motion encoder. It divides the frequency of the incoming encoder signal by a programmable integer.

### Flexible line-scan camera operation with the rate converter.

- The rate converter is a smart, programmable frequency multiplier/divider.
- Used with motion encoders and line-scan cameras, it allows the user to choose the aspect ratio of the pixels in the image.
- It provides a way to calibrate the acquisition chain to easily reach square (1:1 aspect ratio) pixels.

### Windows and Linux drivers available

## Applications

### MACHINE VISION FOR THE ELECTRONIC MANUFACTURING INDUSTRY

**High speed image acquisition for inspection machines.**

The Coaxlink and Grablink cards are dependable industrial frame grabbers that provide robust and stable image acquisition from the fastest digital cameras available. They feature precise camera control and synchronization functions.

- AOI (Automated Optical Inspection) machines
- 3D SPI (Solder Paste Inspection) machines
- 3D lead/ball inspection machines

**Very high resolution line-scan image acquisition for inspection machines**

The Coaxlink and Grablink cards are dependable industrial frame grabbers that provide robust and stable image acquisition from the fastest digital cameras available. They feature precise line-scan camera control and synchronization functions.

- Flat Panel Display inspection
- Solar cell inspection

### MACHINE VISION FOR THE GENERAL MANUFACTURING INDUSTRIES

**High frame rate image acquisition for inspection machines**

Glass inspection: bottles, vials

**Line-scan image acquisition for surface inspection machines**

The Coaxlink and Grablink cards are dependable industrial frame grabbers that provide robust and stable image acquisition from the fastest digital cameras available. They feature precise line-scan camera control and synchronization functions.

**Line-scan image acquisition for textile inspection**

### MACHINE VISION FOR THE PRINTING INDUSTRY

**High speed line-scan image acquisition for printing inspection machines**

- Printing inspection for packages
- Printing inspection for labels

### VIDEO ACQUISITION AND RECORDING

**High-frame-rate video acquisition for motion analysis and recording**

## Specifications

### Mechanical

| | |
|---|---|
| Form Factor | PCI Express card |
| Format | Standard profile, half length, 4-lane PCI Express card |
| Cooling method | Air-cooling, passive heatsink |
| Mounting | For insertion in a standard height, 4-lane or higher, PCI Express card slot |
| Connectors | • 'A' on bracket:<br>– 26-position Shrunk Delta Ribbon (SDR) socket<br>– Camera Link Camera A<br>• 'B' on bracket:<br>– 26-position Shrunk Delta Ribbon (SDR) socket<br>– Camera Link Camera B<br>• 'EXTERNAL I/O' on bracket:<br>– 26-pin 3-row high-density female sub-D connector<br>– I/O lines and power output<br>• 'INTERNAL I/O A on PCB:<br>– 26-pin 2-row 0.1" pitch pin header with shrouding<br>– I/O lines of camera A and power output<br>• 'INTERNAL I/O B on PCB:<br>– 26-pin 2-row 0.1" pitch pin header with shrouding<br>– I/O lines of camera B and power output<br>• 'POWER INPUT' on module:<br>– 4-pin MOLEX power socket<br>– 12 VDC power input for PoCL cameras and I/O power |
| Dimensions | L 167.65 mm x H 111.15 mm<br>L 6.6 in x H 4.38 in |
| Weight | 137 g, 4.83 oz |

### Host bus

| | |
|---|---|
| Standard | PCI Express 1.0 |
| Link width | 4 lanes |
| Link speed | 2.5 GT/s (PCIe 1.0) |
| Maximum payload size | 1024 bytes |
| DMA | 32- and 64-bit |
| Peak delivery bandwidth | 1,024 MB/s |
| Effective (sustained) delivery bandwidth | • Up to 833 MB/s for a PCI Express payload size of 256 bytes and 64-bit addressing<br>• Up to 844 MB/s for a PCI Express payload size of 256 bytes and 32-bit addressing<br>• Up to 754 MB/s for a PCI Express payload size of 128 bytes |
| Power consumption | Max.7.2 W; Typ. 6.0 W (0.47 A @ 3.3V;0.37 A @+12V) |

## Camera / video inputs

| | |
|---|---|
| Interface standard(s) | Camera Link 2.0 |
| Connectors | 2 Shrunk Delta Ribbon (SDR) Miniature Camera Link (MiniCL) |
| ECCO - Extended Camera Link Cable Operation | ECCO |
| Number of cameras | Two Base or Lite cameras |
| Line-scan cameras supported | Yes |
| Maximum aggregated camera data transfer rate | 4.08 Gbit/s (510 MB/s) |
| Camera Link configuration | Base or Lite |
| Camera Link clock frequency range | From 20 MHz up to 85 MHz |
| PoCL (Power over Camera Link) | One PoCL SafePower compliant controller with overload, over-voltage and short-circuit protections |
| Camera types | • Gray-scale and color (RGB and Bayer) cameras<br>• Area-scan and line-scan cameras |
| Camera pixel formats supported | Monochrome, Bayer, and RGB (PFNC names):<br>• Mono8, Mono10, Mono12, Mono14, Mono16<br>• BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG<br>• RGB8 |

## Area-scan camera control

| | |
|---|---|
| Trigger | • Precise control of asynchronous reset cameras, with exposure control.<br>• Support of camera exposure/readout overlap.<br>• Support of external hardware trigger, with optional delay and trigger decimation. |
| Strobe | • Accurate control of the strobe position for strobed light sources.<br>• Support of early and late strobe pulses. |

## Line-scan camera control

| | |
|---|---|
| Scan/page trigger | • Precise control of start-of-scan and end-of-scan triggers.<br>• Support of external hardware trigger, with optional delay.<br>• Support of infinite acquisition, without missing line, for web inspection applications. |
| Line trigger | • Support for quadrature motion encoders, with programmable noise filters, selection of acquisition direction and backward motion compensation.<br>• Rate Converter tool for fine control of the pixel aspect ratio.<br>• Rate Divider tool |
| Line strobe | • Accurate control of the strobe position for strobed light sources. |

## On-board processing

| | |
|---|---|
| On-board memory | 128 MB (64 MB for image data) |
| Image data stream processing | • Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb |
| Input LUT (Lookup Table) | • Monochrome: 8-bit, 10-bit or 12-bit per pixel, up to 500 MPixel/s per camera<br>• RGB: 3x8-bit per pixel, up to 125 MPixel/s per camera |
| Geometrical operators | • Cropping (not available for 2YE cameras)<br>• Left/right and up/down mirroring |
| Bayer CFA to RGB decoder | • Advanced interpolation method using average and median functions on a 3x3 kernel<br>• Up to 125 MPixel/s per camera |

## General Purpose Inputs and Outputs

| | |
|---|---|
| Number of lines | 2 sets of 10 I/O lines, each set including:<br>• 2 differential inputs (DIN)<br>• 4 isolated inputs (IIN)<br>• 4 isolated outputs (IOUT) |
| Usage | • Each acquisition channel has a dedicated set of 10 I/O's<br>– The I/O set of INTERNAL IO CONNECTOR A is dedicated to the acquisition channel of CAMERA A<br>– The I/O set of INTERNAL IO CONNECTOR B is dedicated to the acquisition channel of CAMERA B<br>• The input lines of an I/O set can be used by the corresponding acquisition channel as:<br>– Camera frame trigger source (area-scan only)<br>– Acquisition sequence trigger source (area-scan only)<br>– Camera line trigger source (line-scan only)<br>– Page acquisition trigger source (line-scan only)<br>– Page acquisition end trigger source (line-scan only)<br>– (Quadrature) motion encoder input (line-scan only)<br>• The IOUT 1 output line of an I/O set can be used by the corresponding acquisition channel, as:<br>– Illumination strobe output<br>• All the input lines can be used as general purpose inputs<br>• All the output lines can be used as general purpose outputs |
| Electrical specifications | • DIN: High-speed differential inputs compatible with ANSI/EIA/TIA-422/485 differential line drivers and complementary TTL drivers<br>• IIN: Isolated current-sense inputs with wide voltage input range up to 30V, compatible with totem-pole LVTTL, TTL, 5V CMOS drivers, RS-422 differential line drivers, potential free contacts, solid-state relays and opto-couplers<br>• IOUT: Isolated contact outputs compatible with 30V / 100mA loads |
| Filter control | • Glitch removal filter available only on input lines used as trigger sources<br>• Configurable with five time constants:<br>– 100 ns, 500 ns, and 2.5 µs for trigger / page trigger / page end trigger sources<br>– 40 ns, 100 ns, 200 ns, 500 ns, 1 µs, 5 µs, 10 µs for line trigger sources |
| Power output | Non-isolated, +5V, 1A and +12V, 1A, with electronic fuse protection |

## Software

| | |
|---|---|
| Host PC Operating System | • Microsoft Windows 10, 8.1, 8, 7<br>• Microsoft Windows Server 2012 R2, 2012, 2008 R2<br>• Linux, from kernel version 2.6 to 4.10, compatible with a wide range of distributions<br>• 32- and 64-bit versions |
| APIs | • MultiCam 32- and 64-bit binary libraries (Windows and Linux), for ISO-compliant C/C++ compilers |
| Memento | Compatible with Memento Event Logging tool |

## Environmental conditions

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|---|---|
| Operating ambient air temperature | 0 to +50 °C / +32 to +122 °F |
| Operating ambient air humidity | 10 to 90% RH non-condensing |
| Storage ambient air temperature | -20 to +70 °C / -4 to +158 °F |
| Storage ambient air humidity | 10 to 90% RH non-condensing |

## Certifications

| | |
|---|---|
| Electromagnetic - EMC standards | • European Council EMC Directive 2004/108/EC<br>• United States FCC rule 47 CFR 15 |
| EMC - Emission | • EN 55022:2010 Class B<br>• FCC 47 Part 15 Class B |
| EMC - Immunity | • EN 55024:2010 Class B<br>• EN 61000-4-2<br>• EN 61000-4-3<br>• EN 61000-4-4<br>• EN 61000-4-5<br>• EN 61000-4-6 |
| Flammability | PCB compliant with UL 94 V-0 |
| RoHS | European Union Directive 2011/65/EU (ROHS2) |
| REACH | European Union Regulation 1907/2006 |
| WEEE | Must be disposed of separately from normal household waste and must be recycled according to local regulations |

## Ordering Information

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|---|---|
| Product code - Description | • 1623 - Grablink DualBase |
| Optional accessories | 1625 - I/O Cable for Grablink DualBase and Coaxlink |

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