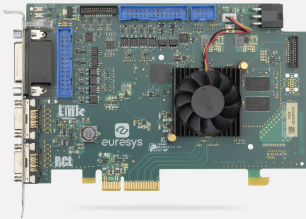




Grablink Duo

Frame grabber for one full- or two base-configuration Camera Link cameras



At a Glance

- For two independent Camera Link Base configuration cameras or one Camera Link Base, Medium, Full, 72-bit or 80-bit camera
- Directly compatible with hundreds of Camera Link cameras available on the market
- PoCL, Power over Camera Link
- ECCO: Extended Camera Link cable length
- PCIe Gen 2 x4 bus
- Feature-rich set of 20 digital IO lines
- Compatible with eGrabber driver and Memento Event Logging Tool

Benefits

Compatible with eGrabber

- eGrabber Studio: eGrabber's new interactive evaluation and demonstration application
- GenlCam Browser: An application giving access to the GenlCam features exposed by the GenTL Producer(s)
- GenTL Console: A command-line tool giving access to the functions and commands exposed by the Euresys GenTL Producer

ECCO: Extended Camera Link Cable Operation

- Use longer, up to 15 meters long, Camera Link cables!

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

Check out our supported cameras page (in the Support menu)

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory and hardware boards that expose PCI addresses
- 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 1/2

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 2/2

- 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.

Line-scan Metadata insertion

When activated, this feature records metadata beside image data. Line metadata are captured every acquired image line. Buffer metadata are only captured when the first image line of a buffer is acquired.

The metadata are composed with a configurable set of general purpose event counters, quadrature encoder position counters and/or I/O line status.

This feature allows line-scan applications to correlate image data with system events including motion encoder positions.

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.

General purpose I/O lines

- Compatible with a wide range of sensors and motion encoders
- Eight Isolated current-sense inputs (up to 30V, signaling up to 200 kHz, individual galvanic isolation up to 250VDC and 170 VAC RMS)
- Four high-speed differential inputs (quadrature motion encoder support up to 5 MHz)
- Four isolated contact outputs (up to 30V, 100 mA, signaling up to 100 KHz)
- Four high-speed 5V-compliant TTL inputs/ LVTTTL outputs (signaling up to 5 MHz)

Memento Event Logging Tool

- Memento is an advanced development and debugging tool available for Coaxlink and Grablink cards.

- Memento records an accurate log of all the events related to the camera, the frame grabber and its driver as well as the application.
- It provides the developer with a precise timeline of time-stamped events, along with context information and logic analyzer view.
- It provides valuable assistance during application development and debugging, as well as during machine operation.

C2C-Link camera synchronization

Allows to accurately synchronize multiple area-scan or line-scan cameras connected

- to the same card
- to different cards in the same PC
- to different cards in different PCs

Compliant with GenICam

Including support for

- GenApi
- The Standard Feature Naming Convention (SFNC)
- GenTL

Windows, Linux and macOS drivers available

- Including support for Intel 64-bit platforms as well as ARM 64-bit platforms

Applications

Machine Vision for the Electronic Manufacturing Industry

- High speed image acquisition for AOI, 3D SPI, 3D lead/ball inspection machines.
- Very high resolution line-scan image acquisition for Flat Panel Display inspection and solar cell inspection

Machine Vision for the General Manufacturing Industries

- High frame rate image acquisition for inspection machines
- Line-scan image acquisition for surface inspection machines
- Line-scan image acquisition for textile inspection

Machine Vision for the Printing Industry

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

Video Acquisition and Recording

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

Specifications

Mechanical

Format	Standard profile, half length, 4-lane PCI Express card
Cooling method	Air cooling, fan-cooled heatsink
Mounting	For insertion in a standard height, 4-lane or higher, PCI Express card slot

Connectors

- 'A' on bracket:
 - 26-position Shrunken Delta Ribbon (SDR) socket
 - Camera Link camera #1 Base connector
- 'B' on bracket:
 - 26-position Shrunken Delta Ribbon (SDR) socket
 - Camera Link camera #1 Medium/Full/72-bit/80-bit connector
 - Camera Link camera #2 Base connector
- 'EXTERNAL I/O' on bracket:
 - 26-pin 3-row high-density female sub-D connector
 - I/O lines and power output
- 'INTERNAL I/O 1' on PCB:
 - 26-pin 2-row 0.1" pitch pin header with shrouding
 - I/O lines and power output
- 'INTERNAL I/O 2' on PCB:
 - 26-pin 2-row 0.1" pitch pin header with shrouding
 - I/O lines and power output
- 'I/O EXTENSION' on PCB:
 - 26-pin 2-row 0.05" pitch pin header with shrouding
 - I/O extension lines and power output
- 'AUXILIARY POWER INPUT' on PCB:
 - 6-pin PEG power socket
 - 12 VDC power input for PoCL camera(s) and I/O power output
- 'C2C-LINK' on PCB:
 - 6-pin 2-row 0.1-in header
 - Card to card link

LED indicators

- 'A', 'B' on bracket:
 - Bi-color red/green LEDs
 - Camera Link status indicator

Switches

- 'RECOVERY' on PCB:
- 3-pin 1-row 0.1" header or 2-way DIP switch
 - Firmware emergency recovery

Dimensions

PCB L X H: 167.65 mm x 111.15 mm, 6.6 in x 4.38 in

Weight

150 g, 5.29 oz

Host bus

Standard

PCI Express 2.0

Link width

- 4 lanes
- 1 lane or 2 lanes with reduced performance

Link speed

- 5.0 GT/s (PCIe 2.0)
- 2.5 GT/s (PCIe 1.0) with reduced performance

Maximum payload size

512 bytes

Peak delivery bandwidth

2,000 MB/s

Effective (sustained) delivery bandwidth

1,700 MB/s (Host PC motherboard dependent)

Power consumption

Typ. 7.1 W (2.7 W @ +3.3V, 4.4 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Interface standard(s)

Camera Link 2.0

Connectors	Two Shrunk Delta Ribbon (SDR) Miniature Camera Link (MiniCL)
ECCO - Extended Camera Link Cable Operation	ECCO
Number of cameras	<ul style="list-style-type: none"> • One 80-bit / 72-bit / Full / Medium / Base configuration camera • Or two Base configuration cameras
Maximum aggregated camera data transfer rate	6.8 Gbit/s (850 MB/s)
Camera Link configuration	Base, Medium, Full, 72-bit, 80-bit
Camera Link clock frequency	From 20 MHz up to 85 MHz
PoCL (Power over Camera Link)	<ul style="list-style-type: none"> • PoCL Safe Power: <ul style="list-style-type: none"> – Two independent controllers – PoCL Device detection and automatic power-on – Overload and short-circuit protection • A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable
Camera types	<ul style="list-style-type: none"> • Area-scan cameras: <ul style="list-style-type: none"> – Grayscale and color (RGB and Bayer CFA) • Line-scan cameras: <ul style="list-style-type: none"> – Grayscale and color RGB
Camera pixel formats supported	<ul style="list-style-type: none"> • Mono8, Mono10, Mono12, Mono14, Mono16 • BayerXX8, BayerXX10, BayerXX12, BayerXX16 where XX = GR, RG, GB, or BG • RGB8 <p>NOTE: Refer to release notes for availability of BayerXX14, RGB10, RGB12, RGB14 and RGB16 formats</p>

Area-scan camera control

Trigger	<ul style="list-style-type: none"> • Precise control of asynchronous reset cameras, with exposure control. • Support of camera exposure/readout overlap. • Support of external hardware trigger, with optional delay and trigger decimation.
Strobe	<ul style="list-style-type: none"> • Accurate control of the strobe position for strobed light sources. • Support of early and late strobe pulses.

Line-scan camera control

Scan/page trigger	<ul style="list-style-type: none"> • Precise control of start-of-scan and end-of-scan triggers. • Support of external hardware trigger, with optional delay. • Support of infinite acquisition, without missing line, for web inspection applications.
Line trigger	<ul style="list-style-type: none"> • Support for quadrature motion encoders, with programmable noise filters, selection of acquisition direction and backward motion compensation. • Rate Converter tool for fine control of the pixel aspect ratio: Rate Conversion Ratio in the range 0.001 to 1000 with an accuracy better than 0.1%. • Rate Divider tool
Line strobe	<ul style="list-style-type: none"> • Accurate control of the strobe position for strobed light sources.

On-board processing

On-board memory	512 MB
Image data stream processing	<ul style="list-style-type: none"> • Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb
Input LUT (Lookup Table)	<ul style="list-style-type: none"> • Monochrome 8-bit to 8-bit transformation • Monochrome 10-bit to 8-, 10- or 16-bit transformations • Monochrome 12-bit to 8-, 12- or 16-bit transformations

Bayer CFA to RGB decoder	Advanced interpolation method using average and median functions on a 3x3 kernel
Data stream statistics	<ul style="list-style-type: none"> • Measurement of: <ul style="list-style-type: none"> – Frame rate (Area-scan only) – Line rate – Data rate • Configurable averaging interval
Event signaling and counting	<ul style="list-style-type: none"> • The application software can be notified of the occurrence of various events: <ul style="list-style-type: none"> – Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers – A large set of custom events • Custom events sources: <ul style="list-style-type: none"> – I/O Toolbox events – Camera and Illumination control events • Each custom event is associated with a 32-bit counter that counts the number of occurrences • The last three 32-bit context data words of the event context data can be configured with event-specific context data: <ul style="list-style-type: none"> – Event-specific data – State of all System I/O lines sampled at the event occurrence time – Value of any event counter
Metadata Insertion	<p>Recording of metadata beside image data.</p> <ul style="list-style-type: none"> • The metadata are composed with a configurable set of general purpose event counters, quadrature encoder position counters and/or I/O line status. • Line metadata are captured every acquired image line. • Buffer metadata are only captured when the first image line of a buffer is acquired. • Allows line-scan applications to correlate image data with system events including motion encoder positions. <p>NOTE: Only available on selected line-scan firmware variants. Refer to release notes.</p>
General Purpose Inputs and Outputs	
Number of lines	<p>20 I/O lines:</p> <ul style="list-style-type: none"> • 4 differential inputs (DIN) • 4 singled-ended TTL inputs/outputs (TTLIO) • 8 isolated inputs (IIN) • 4 isolated outputs (IOUT) <p>NOTE: The number of I/O lines can be extended using I/O modules attached to the I/O EXTENSION connector.</p>
Usage	<ul style="list-style-type: none"> • Any I/O input lines can be used by any LIN tool of the I/O Toolbox • Selected pairs of I/O input lines can be used by any QDC tool of the I/O toolbox to decode A/B signals of a motion encoder

Electrical specifications	<ul style="list-style-type: none"> • DIN: High-speed differential inputs, up to 5 MHz, compatible with ANSI/EIA/TIA-422/485 differential line drivers and complementary TTL drivers • TTLIO: High-speed 5V-compliant TTL inputs or LVTTTL outputs, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers or LVTTTL, TTL, 3V CMOS receivers • IIN: Isolated current-sense inputs with wide voltage input range up to 30V, signaling up to 200 kHz, individual galvanic isolation up to 250VDC and 170 VAC, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers, RS-422 differential line drivers, potential free contacts, solid-state relays and opto-couplers • IOUT: Isolated contact outputs compatible with 30V / 100mA loads <p>NOTE: IIN and IOUT lines provide a functional isolation grade for the circuit technical protection. It does not provide an isolation that can protect a human being from electrical shock!</p>
Filter control	<ul style="list-style-type: none"> • Glitch removal filter available on all System I/O input lines • Configurable filter time constants: <ul style="list-style-type: none"> – for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 μs – for IIN lines: 500 ns, 1 μs, 2 μs, 5 μs, 10 μs
Polarity control	Yes
Power output	Non-isolated, +12V, 1A, with electronic fuse protection
I/O Toolbox tools	<p>The I/O Toolbox is a configurable interconnection of tools that generates events (usually triggers):</p> <ul style="list-style-type: none"> • Line Input tool (LIN): edge detector delivering events on rising or falling edges of any selected input line. • Quadrature Decoder tool (QDC): a composite tool including: <ul style="list-style-type: none"> – A quadrature edge detector delivering events on selected transitions of selected pairs of input lines. – An optional backward motion compensator for clean line-scan image acquisition when the motion is unstable. – A 32-bit up/down counter for delivering a position value. • User Actions Scheduler tool (UAS): to delegate the execution of 'User Actions' at a scheduled time or encoder position. Possible user actions include setting low/high/toggle any bit of the User Output Register or generation of any User Events. • Delay tool (DEL): to delay up to 16 events from one or two I/O toolbox event sources, by a programmable time or number of motion encoder ticks (any QDC events). • Divider tool (DIV): to generate an event every nth input events from any I/O toolbox event source. • Multiplier/divider tool (MDV): to generate m events every d input events from any I/O toolbox event source. • The 'Input Tools' (LIN, QDC and UAS) can be further processed by the 'Event Tools' (DEL, DIV and MDV) to generate any of the following "trigger" events: <ul style="list-style-type: none"> – The "cycle trigger" of the Camera and Illumination controller – The "cycle sequence trigger" of the Camera and Illumination controller – The "start-of-scan trigger" of the Acquisition Controller (line-scan only) – The "end-of-scan trigger" of the Acquisition Controller (line-scan only)
I/O Toolbox composition	<p>Determined by the selected firmware variant:</p> <ul style="list-style-type: none"> • '1-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C • '2-camera': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 2 C2C • '1-camera, line-scan': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C • '2-camera, line-scan': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 3 C2C

C2C-Link

Description	<ul style="list-style-type: none">• Accurate synchronization of the trigger and the start-of-exposure of multiple grabber-controlled area-scan cameras.• Accurate synchronization of the start-of-cycle, start-of-scan and end-of-scan of multiple grabber-controlled line-scan cameras.
Specification	<ul style="list-style-type: none">• C2C-Link synchronizes cameras connected to:<ul style="list-style-type: none">– the same card– to different cards in the same PC (requires an accessory cable such as the "3303 C2C-Link Ribbon Cable" or a custom-made C2C-Link cable)– to different cards in different PCs (requires one "1636 InterPC C2C-Link Adapter" for each PC and one RJ 45 CAT 5 STP straight LAN cable for each adapter but the last one)• Maximum distance:<ul style="list-style-type: none">– 60 cm inside a PC– 1200 m cumulated adapter to adapter cable length• Maximum trigger rate:<ul style="list-style-type: none">– 2.5 MHz for configurations using a single PC, or up to 10 PCs and 100 m total C2C-Link cable length– 200 kHz for configurations up to 32 PCs and 1200m total C2C-Link cable length• Trigger propagation delay from master to slave devices:<ul style="list-style-type: none">– Less than 10 ns for cameras on the same card or on different cards in the same PC– Less than 265 ns for cameras on different cards in different PCs (3 PCs and 40m total C2C-Link cable length)

Software

Host PC Operating System	<ul style="list-style-type: none">• Microsoft Windows 11, 10, 8.1, 7 for x86-64 (64-bit) processor architecture• Linux for x86-64 (64-bit) and AArch64 (64-bit) processor architectures• macOS for x86-64 (64-bit) and AArch64 (64-bit) processor architectures
APIs	<ul style="list-style-type: none">• EGrabber class, with C++ and .NET APIs: .NET assembly designed to be used with development environments compatible with .NET frameworks version 4.0 or higher• GenICam GenTL producer libraries compatible with C/C++ compilers:<ul style="list-style-type: none">– 'x86_64' dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86-64 (64-bit) applications– 'aarch64' dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of AArch64 (64-bit) applications

Environmental conditions

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

Certifications

Electromagnetic - EMC standards	<ul style="list-style-type: none">• European Council EMC Directive 2014/30/EU• United States FCC rule 47 CFR 15
EMC - Emission	<ul style="list-style-type: none">• EN 55032:2015 / CISPR 32:2012 Class B• FCC 47 Part 15 Class B

EMC - Immunity	<ul style="list-style-type: none"> • EN 55035:2017 / CISPR 35:2016 • EN 61000-6-2:2005 / IEC 61000-6-2:2016 • EN 61000-4-2:2009 • EN 61000-4-3:2006 • EN 61000-4-4:2004 • EN 61000-4-6:2014
KC Certification	Korean Radio Waves Act, Article 58-2, Clause 3
Flammability	PCB compliant with UL 94 V-0
RoHS	European Union Directive 2015/863 (ROHS3)
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

Product code - Description	<ul style="list-style-type: none"> • 1628 - Grablink Duo
Optional accessories	<ul style="list-style-type: none"> • 1625 - DB25F I/O Adapter Cable • 1636 - InterPC C2C-Link Adapter • 3303 - C2C-Link Ribbon Cable • 3304 - HD26F I/O Adapter Cable • 3610 - HD26F I/O Extension Module - TTL-RS422 • 3612 - HD26F I/O Extension Module - TTL-CMOS5V-RS422



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