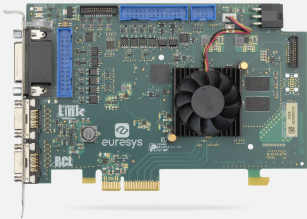




# Grablink Duo

用于一个Full配置或两个Base配置的Camera Link相机的采集卡



## 特性一览

- 适用于两台独立的Camera Link Base配置相机或一台Camera Link Base、Medium、Full、72位或80位相机
- 直接兼容市场上数以百计的 Camera Link 相机
- PoCL，Power over Camera Link
- ECCO：延长的 Camera Link 线缆长度
- PCIe Gen 2 x4 总线
- 特征丰富的 20 条数字 I/O 线
- 兼容eGrabber驱动程序和Memento事件记录工具

## 优势

### 兼容eGrabber

- eGrabber Studio：eGrabber新型交互式评估和演示应用程序
- GenICam 浏览器：该应用程序提供对 GenTL Producer 中 GenICam 功能的访问渠道。
- GenTL 控制台：该命令行工具提供对 Euresys GenTL Producer 功能和命令的访问渠道。

### ECCO：Camera Link 电缆延长

- 支持最长可达20米Camera link 线缆！

### 直接兼容市场上数以百计的 Camera Link 相机

查看我们支持的相机页面（在“支持”菜单中）

### 高性能 DMA（直接存储器存取）

- 直接传输到用户分配的内存和显示 PCI 地址的硬件板
- 硬件分散 - 聚集支持
- 64 位寻址能力

### 区域扫描触发功能

- 触发器用于在零件就位时启动采集。硬件触发器来自 Grablink 的 I/O 线。软件触发器来自于应用程序。
- 可控的延时触发器，用来控制推迟图像采集的时间点。
- 触发抽取功能允许跳过某些触发器。
- 相机曝光控制允许应用来控制相机的曝光时间。
- 当系统开始采集图像时，Grablink采集卡会在一个适当的时间点生成信号来控制连接在输出端的照明设备。

## 线扫描触发能力 1/2

**Grablink** 支持连续滚网扫描（以检查无限、连续移动的表面而不丢失行）和离散的目标扫描（以采集在相机前方移动的目标图像）。

- 触发器用于在零件就位时启动采集。硬件触发器来自主板 I/O 线。软件触发器来自于应用程序。
- 启动以后，采集将：
  - 无限进行下去 (用于滚网式监测应用)
  - 继续进行可编程的行数（以采集已知长度的目标图像）
  - 继续进行直至收到结束触发信号（以采集可变长度的目标图像）
- 可控的延时触发器，用来以可编程的行数推迟开始采集。

## 线扫描触发能力 2/2

- **Grablink** 图像采集卡根据从运动编码器接收到的信号来控制相机扫描率。如果零件移动速度变快，相机的采集线率将增大。如果零件移动速度变慢，相机的采集线率将减小。
- **Grablink** 板解读来自正交运动编码器的 A/B 信号，了解零件向哪个方向（向前或向后）移动。
- 可以选择仅当采集对象向前或者向后移动的时候命令**Grablink**卡进行图像采集。
- 监测到向后运动时，名为“向后动作取消”的功能即停止采集。当在采集中断位置再次向前运动时，自动恢复行采集。
- 速率转换器能够让相机以任何低于或高于运动编码器分辨率的可编程分辨率来采集行。这就为设计师在应用程序开发过程中提供了惊人的自由度和灵活度。
- 速率分割器允许相机采集的图像分辨率高于或低于运动编码器的分辨率，它实现于利用一个可编程的整数倍来对编码器输入信号进行分割。

## 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.

## 通过速率转换器实现灵活的线扫相机操作

- 速率转换器是一个智能的、可编程的倍频器/分频器。
- 用于运动编码器和线扫描相机，允许用户选择该图像中的像素纵横比。
- 它提供了一种方法来校准采集链以轻松达到正方形（1:1 纵横比）像素。

## 通用 I/O 线

- 兼容多种传感器和运动编码器
- 八个隔离的电流感应输入（最高30V，信令最高200kHz，单独电气隔离高达250VDC和170VAC RMS）
- 四个高速差分输入（正交运动编码器支持高达5 MHz）
- 四个隔离触式输出（高达30V，100 mA，信令高达100 KHz）
- 四个高速5V兼容TTL输入/LVTTL输出（信令最高为5 MHz）

## Memento 事件日志工具

- **Memento**是供Coaxlink和Grablink卡使用的高级开发和调试工具。
- **Memento** 记录与相机、图像采集卡及其驱动程序以及应用程序相关的所有事件的准确日志。
- 对于包含时间戳的时间，它为开发人员提供精确的时间表，也提供上下文信息和逻辑分析器视图。
- 它可以在应用程序开发和调试，以及机器操作期间提供宝贵的协作。

## C2C-Link相机同步

可精确同步相连的多个面扫或线扫相机

- 同一张卡
- 同一台PC中的不同卡
- 不同PC中的不同卡

## 符合 Genicam 标准

包括支持

- GenApi
- 标准功能命名约定 (SFNC)
- GenTL

## Windows、Linux和macOS驱动程序可用

- 支持英特尔64位平台以及ARM 64位平台

## 应用

### 电子制造业的机器视觉

- 用于AOI、3D SPI、3D铅/球检测机的高速图像采集。
- 极高分辨率线扫描图像采集，用于平板显示器检测和太阳能电池检测

### 一般制造业的机器视觉

- 用于检查机的高帧率图像采集
- 表面检测机的线扫描图像采集
- 用于纺织品检测的线扫描图像采集

### 印刷业的机器视觉

- 用于印刷检查机的高速线扫描图像采集

### 视频采集和录制

- 用于运动分析和记录的高帧速率视频采集

## 规格

### 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

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## LED indicators

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

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## Switches

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

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## Dimensions

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

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## Weight

150 g, 5.29 oz

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## Host bus

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### Standard

PCI Express 2.0

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### Link width

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

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### Link speed

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

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### Maximum payload size

512 bytes

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### Peak delivery bandwidth

2,000 MB/s

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### Effective (sustained) delivery bandwidth

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

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### Power consumption

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

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## Camera / video inputs

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### 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"> <li>• One 80-bit / 72-bit / Full / Medium / Base configuration camera</li> <li>• Or two Base configuration cameras</li> </ul>
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"> <li>• PoCL Safe Power: <ul style="list-style-type: none"> <li>– Two independent controllers</li> <li>– PoCL Device detection and automatic power-on</li> <li>– Overload and short-circuit protection</li> </ul> </li> <li>• A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable</li> </ul>
Camera types	<ul style="list-style-type: none"> <li>• Area-scan cameras: <ul style="list-style-type: none"> <li>– Grayscale and color (RGB and Bayer CFA)</li> </ul> </li> <li>• Line-scan cameras: <ul style="list-style-type: none"> <li>– Grayscale and color RGB</li> </ul> </li> </ul>
Camera pixel formats supported	<ul style="list-style-type: none"> <li>• Mono8, Mono10, Mono12, Mono14, Mono16</li> <li>• BayerXX8, BayerXX10, BayerXX12, BayerXX16 where XX = GR, RG, GB, or BG</li> <li>• RGB8</li> </ul> <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"> <li>• Precise control of asynchronous reset cameras, with exposure control.</li> <li>• Support of camera exposure/readout overlap.</li> <li>• Support of external hardware trigger, with optional delay and trigger decimation.</li> </ul>
Strobe	<ul style="list-style-type: none"> <li>• Accurate control of the strobe position for strobed light sources.</li> <li>• Support of early and late strobe pulses.</li> </ul>

## Line-scan camera control

Scan/page trigger	<ul style="list-style-type: none"> <li>• Precise control of start-of-scan and end-of-scan triggers.</li> <li>• Support of external hardware trigger, with optional delay.</li> <li>• Support of infinite acquisition, without missing line, for web inspection applications.</li> </ul>
Line trigger	<ul style="list-style-type: none"> <li>• Support for quadrature motion encoders, with programmable noise filters, selection of acquisition direction and backward motion compensation.</li> <li>• 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%.</li> <li>• Rate Divider tool</li> </ul>
Line strobe	<ul style="list-style-type: none"> <li>• Accurate control of the strobe position for strobed light sources.</li> </ul>

## On-board processing

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

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"> <li>• Measurement of: <ul style="list-style-type: none"> <li>– Frame rate (Area-scan only)</li> <li>– Line rate</li> <li>– Data rate</li> </ul> </li> <li>• Configurable averaging interval</li> </ul>
Event signaling and counting	<ul style="list-style-type: none"> <li>• The application software can be notified of the occurrence of various events: <ul style="list-style-type: none"> <li>– Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers</li> <li>– A large set of custom events</li> </ul> </li> <li>• Custom events sources: <ul style="list-style-type: none"> <li>– I/O Toolbox events</li> <li>– Camera and Illumination control events</li> </ul> </li> <li>• Each custom event is associated with a 32-bit counter that counts the number of occurrences</li> <li>• 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"> <li>– Event-specific data</li> <li>– State of all System I/O lines sampled at the event occurrence time</li> <li>– Value of any event counter</li> </ul> </li> </ul>
Metadata Insertion	<p>Recording of metadata beside image data.</p> <ul style="list-style-type: none"> <li>• The metadata are composed with a configurable set of general purpose event counters, quadrature encoder position counters and/or I/O line status.</li> <li>• Line metadata are captured every acquired image line.</li> <li>• Buffer metadata are only captured when the first image line of a buffer is acquired.</li> <li>• Allows line-scan applications to correlate image data with system events including motion encoder positions.</li> </ul> <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"> <li>• 4 differential inputs (DIN)</li> <li>• 4 singled-ended TTL inputs/outputs (TTLIO)</li> <li>• 8 isolated inputs (IIN)</li> <li>• 4 isolated outputs (IOUT)</li> </ul> <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"> <li>• Any I/O input lines can be used by any LIN tool of the I/O Toolbox</li> <li>• 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</li> </ul>

## Electrical specifications

- 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

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!

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### Filter control

- Glitch removal filter available on all System I/O input lines
- Configurable filter time constants:
  - for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1  $\mu$ s
  - for IIN lines: 500 ns, 1  $\mu$ s, 2  $\mu$ s, 5  $\mu$ s, 10  $\mu$ s

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### Polarity control

Yes

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### Power output

Non-isolated, +12V, 1A, with electronic fuse protection

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### I/O Toolbox tools

The I/O Toolbox is a configurable interconnection of tools that generates events (usually triggers):

- 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:
  - 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:
  - 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)

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### I/O Toolbox composition

Determined by the selected firmware variant:

- '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"><li>• Accurate synchronization of the trigger and the start-of-exposure of multiple grabber-controlled area-scan cameras.</li><li>• Accurate synchronization of the start-of-cycle, start-of-scan and end-of-scan of multiple grabber-controlled line-scan cameras.</li></ul>
Specification	<ul style="list-style-type: none"><li>• C2C-Link synchronizes cameras connected to:<ul style="list-style-type: none"><li>– the same card</li><li>– 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)</li><li>– 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)</li></ul></li><li>• Maximum distance:<ul style="list-style-type: none"><li>– 60 cm inside a PC</li><li>– 1200 m cumulated adapter to adapter cable length</li></ul></li><li>• Maximum trigger rate:<ul style="list-style-type: none"><li>– 2.5 MHz for configurations using a single PC, or up to 10 PCs and 100 m total C2C-Link cable length</li><li>– 200 kHz for configurations up to 32 PCs and 1200m total C2C-Link cable length</li></ul></li><li>• Trigger propagation delay from master to slave devices:<ul style="list-style-type: none"><li>– Less than 10 ns for cameras on the same card or on different cards in the same PC</li><li>– Less than 265 ns for cameras on different cards in different PCs (3 PCs and 40m total C2C-Link cable length)</li></ul></li></ul>

## Software

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

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



EMC - Immunity	<ul style="list-style-type: none"> <li>• EN 55035:2017 / CISPR 35:2016</li> <li>• EN 61000-6-2:2005 / IEC 61000-6-2:2016</li> <li>• EN 61000-4-2:2009</li> <li>• EN 61000-4-3:2006</li> <li>• EN 61000-4-4:2004</li> <li>• EN 61000-4-6:2014</li> </ul>
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"> <li>• 1628 - Grablink Duo</li> </ul>
Optional accessories	<ul style="list-style-type: none"> <li>• 1625 - DB25F I/O Adapter Cable</li> <li>• 1636 - InterPC C2C-Link Adapter</li> <li>• 3303 - C2C-Link Ribbon Cable</li> <li>• 3304 - HD26F I/O Adapter Cable</li> <li>• 3610 - HD26F I/O Extension Module - TTL-RS422</li> <li>• 3612 - HD26F I/O Extension Module - TTL-CMOS5V-RS422</li> </ul>



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