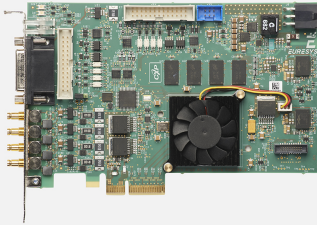


# Coaxlink Quad

四路连接 CoaXPress 图像采集卡



## 一览

- 4 个 CoaXPress CXP-6 连接：2,500 MB/s 摄像机带宽
- PCIe 2.0 (Gen 2) x4 总线：传输带宽 1,700 MB/s
- 特征丰富的 20 条数字 I/O 线
- 丰富的摄像机控制功能
- Memento 事件日志工具

## 优势

### 从速度最快、分辨率最高的摄像机采集图像

- 在同行业中最高的数据采集速率
- 25 Gbit/s (2,500 MB/s) 带宽（从摄像机到主机 PC 内存）

### 长线缆支持

- CXP-6 速度时 40 米 (6.25 Gbps)
- CXP-3 速度时 100 米 (3 Gbps)

### 使用标准同轴电缆

- 只需一条并不昂贵的电缆，就可完成数据传输、摄像机控制、触发器和电源供应
- 顶级的可靠性和灵活性，可在恶劣环境执行

### 坚固的接头

Coaxlink 使用 DIN 1.0/2.3 连接器，带有推/拉门锁系统以实现可靠连接

### Memento 事件日志工具

- Memento 是供 Coaxlink 卡使用的高级开发和调试工具。
- Memento 记录与摄像机、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。
- 它为开发者提供时间标记的精确时间表以及上下文信息。
- 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。

### AMD 的 DirectGMA 支持

- 图像数据直接传送到 GPU 内存。
- 消除了不必要的系统内存拷贝，显著降低 CPU 开销，并减少延迟，从而为使用了 AMD FirePro W5x00 及以上以及所有的 AMD FirePro S 系列产品的应用程序带来数据传输时间方面的显著性能改进。

### PCIe 2.0 (Gen 2) x4 总线

- 1,700 MB/s 持续总线带宽

## 通用 I/O 线

- 兼容多种传感器和运动编码器。
- 高速差分输入：正交运动编码器，支持高达 5 MHz。
- 隔离电流检测输入：接受 5V、12V、24V 信号电压，最高 50 kHz，各个电隔离高达 500 VAC RMS。
- 隔离触式输出。
- 高速 5V 兼容 TTL 输入/LVTTL 输出。

## 高性能 DMA（直接存储器存取）

- 直接传送到用户分配的内存
- 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 Coaxlink 的 I/O 线。软件触发器来自于应用程序。
- 可选的触发器延时，用于按可编程的时间来推迟采集。
- 触发抽取功能允许跳过某些触发器。
- 摄像机曝光控制允许应用来控制摄像机的曝光时间。
- 在适当的时间启动采集时，Coaxlink 卡生成一个信号来控制连接到一条输出线的照明设备。

## 线扫描触发功能

Coaxlink 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（以采集在摄像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：
  - 无穷继续下去（对于大幅物体检查应用程序）
  - 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）
- 可选的触发器延时，用于按可编程的行数来推迟开始采集。

## 线扫描触发功能

- Coaxlink 图像采集卡根据从运动编码器接收到的信号来控制摄像机扫描率。如果零件移动速度变快，摄像机的采集线率将增大。如果零件移动速度变慢，摄像机的采集线率将减小。
- Coaxlink 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。
- 可以选择是否指示 Coaxlink 仅当对象向前移动或向后移动时获取路径。
- 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。
- 速率转换器能够让摄像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性。
- 速率除法器能够让摄像机以任何低于或高于运动编码器分辨率的分辨率来采集行。它将进入的编码器信号的频率除以一个可编程的整数。

## 带有速率转换器的柔性线扫描摄像机操作。

- 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摄像机，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。

## Coaxlink 驱动程序包括如下工具：

- Genicam 浏览器：该应用程序提供访问系统中 GenTL Producer 披露的 GenICam 功能。
- GenTL 控制台：该命令行工具提供访问 Euresys GenTL Producer 披露的功能和命令。

## 符合 Genicam 标准

包括支持

- GenApi
- 标准功能命名约定 (SFNC)
- GenTL

## 提供 Windows 和 Linux 驱动程序

## 应用

### 电子制造业的机器视觉

#### 用于检查机器的高速图像采集。

Coaxlink 和 Grablink 卡是可靠的工业图像采集卡，从最快的数码摄像机提供强大和稳定的图像采集。它们的特点是精确的摄像机控制和同步功能。

- AOI（自动光学检测）机
- 3D SPI（锡膏检测）机
- 3D 引线/球型检查机

#### 用于检查机的极高分辨率的线扫描图像采集

Coaxlink 和 Grablink 卡是可靠的工业图像采集卡，从最快的数码摄像机提供强大和稳定的图像采集。它们的特点是精确的线扫描摄像机控制和同步功能。

- 平板显示检测
- 太阳能电池检查

### 一般制造业的机器视觉

#### 用于检查机的高帧率图像采集

玻璃检测：瓶、小瓶

#### 表面检测机的线扫描图像采集

Coaxlink 和 Grablink 卡是可靠的工业图像采集卡，从最快的数码摄像机提供强大和稳定的图像采集。它们的特点是精确的线扫描摄像机控制和同步功能。

#### 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

- 包装打印检查
- 标签打印检查

### 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

### 军事与国防

#### 无人操作应用，车载视频采集

CoaxPress 标准可在几毫秒内将视频传输到 PC。该系统的超低延迟将允许控制陆地车辆或远程控制无人机。

### 视频监视、监控和安全

#### 通过长距离同轴电缆传输和采集高清视频，进行交通监控、监视和控制

CoaxPress 是最近出现的强大标准，提供了摄像机和 PC 图像采集卡之间的高速接口。在高速公路上，高速摄像机可以高速连拍图像。更清晰的图像将提高车牌识别的准确率。

可容纳高频实时触发和曝光时间调整到低照度的情况。

## Mechanical

Form Factor	PCI Express card
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	<ul style="list-style-type: none"> <li>• 'A', 'B', 'C', 'D' on bracket: <ul style="list-style-type: none"> <li>– 4x DIN 1.0/2.3 female connectors</li> <li>– CoaXpress host interface</li> </ul> </li> <li>• EXTERNAL I/O' on bracket: <ul style="list-style-type: none"> <li>– 26-pin 3-row high-density female sub-D connector</li> <li>– I/O lines and power output</li> </ul> </li> <li>• INTERNAL I/O 1' and 'INTERNAL I/O 2' on PCB: <ul style="list-style-type: none"> <li>– 2x 26-pin 2-row 0.1" pitch pin header with shrouding</li> <li>– I/O lines and power output</li> </ul> </li> <li>• 'AUXILIARY POWER INPUT' on module: <ul style="list-style-type: none"> <li>– 6-pin PEG power socket</li> <li>– 12 VDC power input for PoCXP camera(s) and I/O power</li> </ul> </li> <li>• 'C2C LINK' on module: <ul style="list-style-type: none"> <li>– 6-pin 2-row 0.1-in header</li> <li>– Card to card link</li> </ul> </li> </ul>
Lamp indicators	<ul style="list-style-type: none"> <li>• 'A', 'B', 'C', 'D' on bracket: <ul style="list-style-type: none"> <li>– 4x bi-color red/green LEDs</li> <li>– CoaXPress Host connector indicator lamps</li> </ul> </li> <li>• 'FPGA STATUS LAMP' on PCB: <ul style="list-style-type: none"> <li>– Bi-color red/green LED</li> <li>– FPGA status lamp</li> </ul> </li> <li>• 'BOARD STATUS LAMP' on PCB: <ul style="list-style-type: none"> <li>– Bi-color red/green LED</li> </ul> </li> </ul>
Switches	'RECOVERY' on card PCB: <ul style="list-style-type: none"> <li>• 3-pin 1-row 0.1" header</li> <li>• Firmware emergency recovery</li> </ul>
Dimensions	L 167.65 mm x H 111.15 mm L 6.6 in x H 4.38 in
Weight	170 g, 6.00 oz

## Host bus

Standard	PCI Express 2.0
Link width	<ul style="list-style-type: none"><li>• 4 lanes</li><li>• 1 lane or 2 lanes with reduced performance</li></ul>
Link speed	<ul style="list-style-type: none"><li>• 5.0 GT/s (PCIe 2.0)</li><li>• 2.5 GT/s (PCIe 1.0) with reduced performance</li></ul>
Maximum payload size	512 bytes
DMA	32- and 64-bit
Peak delivery bandwidth	2,000 MB/s
Effective (sustained) delivery bandwidth	1,700 MB/s (Host PC motherboard dependent)
Power consumption	Typ. 12.1W ( 2.5 W @ +3.3V, 9.6 W @ +12V), excluding camera and I/O power output

## Camera / video inputs

Interface standard(s)	CoaXPress 1.0 and 1.1
Connectors	4x DIN1.0/2.3 CXP-6
Status LEDs	1 CoaXPress Host connection status per connector
Number of cameras	<ul style="list-style-type: none"><li>• One 1- or 2- or 4-connection area-scan camera</li><li>• Two 1- or 2-connection area-scan cameras</li><li>• One 1- or 2- or 4-connection line-scan camera</li></ul>
Line-scan cameras supported	Yes
Maximum aggregated camera data transfer rate	25 Gbit/s (2,500 MB/s)
Supported CXP down-connection speeds	1.25 GT/s (CXP-1), 2.5 GT/s (CXP-2), 3.125 GT/s (CXP-3), 5 GT/s (CXP-5), and 6.25 GT/s (CXP-6)
Number of CXP data streams (per camera)	1 data stream per camera
Maximum CXP stream packet size	16,384 bytes
PoCXP (Power over CoaXPress)	<ul style="list-style-type: none"><li>• PoCXP Safe Power:<ul style="list-style-type: none"><li>– 17 W of 24V DC regulated power per CoaXPress connector</li><li>– PoCXP Device detection and automatic power-on</li><li>– Overload and short-circuit protections</li></ul></li><li>• On-board 12V to 24V DC/DC converter</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>– Gray-scale and color (RGB and Bayer CFA)</li><li>– Single-tap (1X-1Y) progressive-scan</li></ul></li><li>• Line-scan cameras:<ul style="list-style-type: none"><li>– Gray-scale and color RGB</li></ul></li></ul>
Camera pixel formats supported	Raw, Monochrome, Bayer, RGB, and RGBA (PFNC names): <ul style="list-style-type: none"><li>• Raw</li><li>• Mono8, Mono10, Mono12, Mono14, Mono16</li><li>• BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG</li><li>• RGB8, RGB10, RGB12, RGB14, RGB16</li><li>• RGBA8, RGBA10, RGBA12, RGBA14, RGBA16</li></ul>

## 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	1 GB
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><li>• Optional swap of R and B components</li><li>• Little endian conversion</li></ul>
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 on 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><li>– CoaXPress data stream events</li><li>– CoaXPress host interface 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 3 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>– Count value of any event counter</li></ul></li></ul>

## 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>
Usage	<ul style="list-style-type: none"> <li>• Any System I/O input lines can be used by any LIN tool of the I/O Toolbox</li> <li>• Selected pairs of System 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> <li>• The LIN and QDC tools outputs can be further processed by the other tools (DIV, MDV, DEL) of the I/O toolbox to generate any of the following "trigger" events: <ul style="list-style-type: none"> <li>– The "cycle trigger" of the Camera and Illumination controller</li> <li>– The "cycle sequence trigger" of the Camera and Illumination controller</li> <li>– The "start-of-scan trigger" of the Acquisition Controller (line-scan only)</li> <li>– The "end-of-scan trigger" of the Acquisition Controller (line-scan only)</li> </ul> </li> </ul>
Electrical specifications	<ul style="list-style-type: none"> <li>• DIN: High-speed differential inputs compatible with ANSI/EIA/TIA-422/485 differential line drivers and complementary TTL drivers</li> <li>• 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</li> <li>• IIN: Isolated current-sense inputs with wide voltage input range up to 30V, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers, RS-422 differential line drivers, potential free contacts, solid-state relays and opto-couplers</li> <li>• IOUT: Isolated contact outputs compatible with 30V / 100mA loads</li> </ul>
Filter control	<ul style="list-style-type: none"> <li>• Glitch removal filter available on all System I/O input lines</li> <li>• Configurable filter time constants: <ul style="list-style-type: none"> <li>– for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 <math>\mu</math>s</li> <li>– for IIN lines: 500 ns, 1 <math>\mu</math>s, 2 <math>\mu</math>s, 5 <math>\mu</math>s, 10 <math>\mu</math>s</li> </ul> </li> </ul>
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) from input lines. The composition of the toolset is product- and firmware-dependent.</p> <ul style="list-style-type: none"> <li>• Line Input tool (LIN): Edge detector delivering events on rising or falling edges of any selected input line.</li> <li>• Quadrature Decoder tool (QDC): A composite tool including: <ul style="list-style-type: none"> <li>– A quadrature edge detector delivering events on selected transitions of selected pairs of input lines.</li> <li>– An optional backward motion compensator for clean line-scan image acquisition when the motion is unstable.</li> <li>– A 32-bit up/down counter for delivering a position value.</li> </ul> </li> <li>• Divider tool (DIV): to generate an event every nth input events from any I/O toolbox event source.</li> <li>• Multiplier/divider tool (MDV): to generate m events every d input events from any I/O toolbox event source.</li> <li>• 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).</li> </ul>



## I/O Toolbox composition

### Firmware-dependent I/O toolbox composition:

- 1-camera: 8 LIN, 1 QDC, 1 DIV, 1 MDV, 2 DEL
- 2-camera: 8 LIN, 1 QDC, 1 DIV
- 1-line-scan: 8 LIN, 1 QDC, 1 DIV, 1 MDV, 2 DEL

## C2C-Link

### Description

- Allows to accurately synchronize the trigger and start-of-exposure of multiple grabber-controlled area-scan and line-scan cameras.
- C2C-Link is able to synchronize cameras connected
  - to the same Coaxlink 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)

### Specification

- Maximum distance
  - 60 cm inside a PC
  - 1200 m cumulated adapter to adapter cable length
- Maximum trigger rate
  - 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
  - Less than 10 ns for cameras on the same Coaxlink card or on different Coaxlink cards in the same PC
  - Less than 265 ns for cameras on different Coaxlink cards in different PCs (3 PCs and 40m total C2C-Link cable length)

## Software

### Host PC Operating System

- Microsoft Windows 10, 8.1, 8, 7
- Linux Kernel version 3.13, compatible with a wide range of distributions, tested with Ubuntu 14.04
- 32- and 64-bit versions

### APIs

EGrabber class, with C++ and .NET APIs:

- .NET assembly designed to be used with development environments compatible with .NET frameworks version 2.0 or higher

GenICam GenTL producer libraries compatible with C/C++ compilers:

- x86 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86 applications
- x86\_64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86\_64 applications

### Memento

Compatible with Memento Event Logging tool, version 4.0 and later

## Environmental conditions

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	<ul style="list-style-type: none"><li>• The European Council EMC Directive 2004/108/EC</li><li>• The United States FCC rule 47 CFR 15</li></ul>
EMC - Emission	<ul style="list-style-type: none"><li>• EN 55022:2010 Class B</li><li>• FCC 47 Part 15 Class B</li></ul>
EMC - Immunity	<ul style="list-style-type: none"><li>• EN 55024:2010 Class B</li><li>• EN 61000-4-3</li><li>• EN 61000-4-4</li><li>• EN 61000-4-5</li><li>• EN 61000-4-6</li></ul>
Flammability	PCB compliant with UL 94 V-0
RoHS	Compliant with the European Union Directive 2011/65/EU (RoHS2)
REACH	Compliant with the European Union Regulation No 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>• 1632 - Coaxlink Quad</li></ul>
Optional accessories	<ul style="list-style-type: none"><li>• 1625 - I/O Cable for Grablink DualBase and Coaxlink</li><li>• 1636 - InterPC C2C-Link Adapter</li><li>• 3303 - C2C-Link Ribbon Cable</li><li>• 3304 - HD26F I/O Adapter Cable</li></ul>



## AMERICA

### **Euresys Inc.**

27126-B Paseo Espada - Suite 704  
San Juan Capistrano, CA 92675 - United States  
Phone: +1 949 743 0612  
Email: sales.americas@euresys.com

## EMEA

### **Euresys SA**

Liège Science Park - Avenue du Pré-Aily, 14  
4031 Angleur - Belgium  
Phone: +32 4 367 72 88  
Email: sales.europe@euresys.com

## ASIA

### **Euresys Pte. Ltd.**

750A Chai Chee Road - #07-15 Viva Business Park  
Singapore 469001 - Singapore  
Phone: +65 6445 4800  
Email: sales.asia@euresys.com

## CHINA

### **Euresys Shanghai Liaison Office**

17F, Unit AB, N. 588 Yan An Dong Road - Huangpu District  
CN-200001 Shanghai - China  
Euresys上海联络处  
上海黄浦区 延安东路588号17楼AB座  
200001  
Phone: +86 13817814488  
Email: sales.china@euresys.com

## JAPAN

### **Euresys Japan K.K.**

Expert Office Shinyokohama - Dai 2 Ueno Building, Shinyokohama 3-7-18  
Kouhoku-Ku, Yokohama-Shi 222-0033 - Japan  
〒222-0033  
神奈川県横浜市港北区新横浜3-7-18 第2上野ビル エキスパートオフィス新横浜  
Phone: +81 45 594 7259  
Email: sales.japan@euresys.com

More at [www.euresys.com](http://www.euresys.com)

