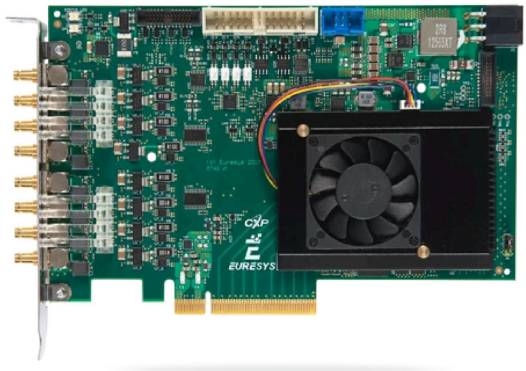
5/22/2024

Datasheet

Coaxlink Octo

PCIe 3.0 eight-connection CoaXPress frame grabber



- Eight CoaXPress CXP-6 connections: 5,000 MB/s camera bandwidth
- Connect up to eight CoaXPress cameras to one card
- PCIe 3.0 (Gen 3) x8 bus: 6,700 MB/s bus bandwidth
- Feature-rich set of 10 digital I/O lines
- Extensive camera control functions
- Memento Event Logging Tool
- Compatible with CustomLogic: Your own FPGA logic

Main benefits

Acquire images from the fastest and highest resolution cameras

- Highest data acquisition rate in the industry
- Up to 5,000 MB/s bandwidth from camera to host PC memory

PCIe 3.0 (Gen 3) x8 bus

- 7,800 MB/s peak bus bandwidth
- 6,700 MB/s sustained bus bandwidth

Long cable support

- 40 meters at CXP-6 speed (6.25 Gbps)
- 100 meters at CXP-3 speed (3 Gbps)

Power over CoaXPress

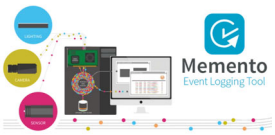
- Power over CoaXPress : Feed your camera up to 17 W per channel under 24 VDC with automatic device detection, measurement and overload protection.
- Total and per-channel voltage and current measurement is possible, allowing validation and performance deviation monitoring.

Use standard coaxial cables

- A single inexpensive cable for data transfer, camera control, trigger and power supply
- Top reliability and flexibility, performs in the harshest environments

Robust connectors for reliable connections

Coaxlink CXP-6 uses DIN 1.0/2.3 connectors with push/pull latching system.



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.

Compatible with eGrabber

- eGrabber Studio: eGrabber's new interactive evaluation and demonstration application
- GenICam Browser: An application giving access to the GenICam 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

C2C-Link camera synchronization

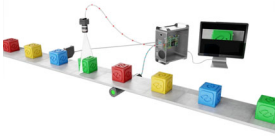
Allows to accurately synchronize multiple area-scan or line-scan cameras connected

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

Compliant with GenICam

Including support for:

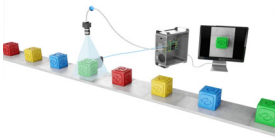
- GenApi
- The Standard Feature Naming Convention (SFNC)
- GenTL



Line-scan triggering capabilities

Euresys' frame grabbers offer many capabilities to synchronize line-scan or 1D cameras, sensors and lighting controllers. Frame grabbers can control the camera scanning rate based on the signals received from a motion encoder.

They support 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).



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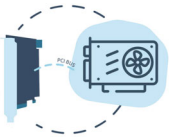


Direct GPU transfer

- Sample programs for AMD DirectGMA and NVIDIA (CUDA) available.
- Direct GPU transfer eliminates unnecessary system memory copies, lowers CPU overhead, and reduces latency, resulting in significant performance improvements in data transfer times for applications.
- Direct capture of image data to GPU memory is available using AMD's DirectGMA. Compatible with AMD FirePro W5x00 and above and all AMD FirePro S series products.

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory
- Hardware scatter-gather support

ARM macOS LINUX Windows

Windows, Linux and macOS drivers available

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

Other benefits

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.

CustomLogic: Your own FPGA logic

- CustomLogic is an FPGA design kit enabling the design and upload of FPGA code to a Coaxlink board
- It is compatible with the Coaxlink Octo, Coaxlink Quad CXP-12 and Coaxlink QSFP+ for which up to 70% of their AMD Kintex Ultrascale XCKU035 FPGA resources are available.
- The design phase uses the Xilinx Vivado development tools (not provided)
- Using CustomLogic does not require any additional hardware

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 250VDC and 170VAC RMS.
- Isolated contact outputs.
- High-speed 5V-compliant TTL inputs/ LVTTL outputs.

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.

Specifications

Mechanical

Form factor

PCI Express card

Format

Standard profile, half length, 8-lane PCI Express card

Cooling method

Air cooling, fan-cooled heatsink

Mounting

For insertion in a standard height, 8-lane or higher, PCI Express card slot

Connectors

'A B C D E F G H' on card bracket:

8 x DIN 1.0/2.3 75 Ohms coaxial receptacles

CoaXPress Host Interface

'INTERNAL I/O 1' on printed circuit board:

26-pin 2-row 0.1" pitch pin header with shrouding

I/O lines and I/O power output

'I/O EXTENSION' on printed circuit board:

26-pin 2-row 0.05" pitch pin header with shrouding

I/O extension cable socket

'C2C-LINK' on printed circuit board:

6-pin 2-row 0.1" pitch pin header with shrouding

Card-to-card link

'AUXILIARY POWER INPUT' on printed circuit board:

6-pin PEG power socket

12 V DC power input for PoCXP and I/O power output

LED indicators

'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H' on bracket:

Bi-color red/green LEDs

CoaXPress Host connector indicator

'FPGA STATUS LAMP' on PCB:

Bi-color red/green LED

FPGA status indicator

'BOARD STATUS LAMP' on PCB:

Bi-color red/green LED

Board 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

Net weight: 185 g [6.5 oz]

Gross weight: 330 g [11.6 oz]

Host bus

Standard

PCI Express 3.0

Link width

8 lanes

1 lane, 2 lanes or 4 lanes with reduced performance

Link speed

8.0 GT/s (PCIe 3.0)

5.0 GT/s (PCIe 2.0) with reduced performance

Maximum payload size

512 bytes

DMA

32- and 64-bit

Peak delivery bandwidth

7,800 MB/s

Effective (sustained) delivery bandwidth

6,700 MB/s (Host PC motherboard dependent)

Power consumption

Typ. 16 W (4.2 W @ +3.3V, 11.8 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Camera interface standard

CoaXPress

Interface standard(s)

CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1

Maximum link speed

CXP-6

Maximum link width

8 connections

Camera powering

PoCXP

Connectors

Eight DIN1.0/2.3 75 Ohms CXP-6

Status LEDs

One CoaXPress Host connection status LED per connection

Number of cameras

Area-scan cameras:

- One 1- or 2- or 4- or 8-connection camera
- One or two 1- or 2- or 4-connection cameras
- Up to four 1- or 2-connection cameras
- One 1- or 2- or 4-connection camera and up to four 1-connection cameras
- Up to eight 1-connection cameras

Line-scan cameras:

- One 1- or 2- or 4- or 8-connection camera
- One or two 1- or 2- or 4-connection cameras
- Up to four 1- or 2-connection cameras

Maximum number of cameras

8

Line-scan cameras supported

Yes

Maximum aggregated camera data transfer rate

50 Gbps (5,000 MB/s)

Supported CXP down-connection speeds

1.25 Gbps (CXP-1), 2.5 Gbps (CXP-2), 3.125 Gbps (CXP-3), 5 Gbps (CXP-5), and 6.25 Gbps (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)

PoCXP Safe Power:

- 17 W of 24V DC regulated power per CoaXPress connector
- PoCXP Device detection and automatic power-on
- Overload and short-circuit protections

On-board 12V to 24V DC/DC converter

A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable

Camera types

Area-scan cameras:

- Grayscale and color (YCbCr, YUV, RGB and Bayer CFA)
- Single-tap (1X-1Y) progressive-scan

Line-scan cameras and contact imaging sensors:

- Grayscale and color RGB

Camera pixel formats supported

Mono8, Mono10, Mono12, Mono14, Mono16

BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG

RGB8, RGB10, RGB12, RGB14, RGB16

RGBA8, RGBA10, RGBA12, RGBA14, RGBA16

YCbCr601_422_8, YCbCr601_422_10

YCbCr709_422_8, YCbCr709_422_10

YUV422_8, YUV422_10

Raw

Area-scan camera control

Trigger

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

Accurate control of the strobe position for strobed light sources.

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.

Support of external hardware trigger, with optional delay.

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.

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

Accurate control of the strobe position for strobed light sources.

On-board processing

On-board memory

2 GB

Image data stream processing

Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb

Optional swap of R and B components

Little endian conversion

Flat-field correction

Only available with the '2-camera' firmware variant

Input LUT (Lookup Table)

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

Geometrical operators

Horizontal image flipping ('2-camera, line-scan' firmware variant only)

Bayer CFA to RGB decoder

'1-camera' firmware variant:

- 3x3 linear interpolation method
- 3x3 median-based interpolation method
- 5x5 gradient-based interpolation method

'2-camera' firmware variant:

- 3x3 linear interpolation method
- 3x3 median-based interpolation method

CustomLogic

Yes

CustomLogic firmware variants

'1-camera, customlogic' firmware variant for one 1- or 2- or 4-connection area-scan camera

'2-camera, customlogic' firmware variant for two 1- or 2-connection line-scan cameras

Data stream statistics

Measurement of:

- Frame rate (Area-scan only)
- Line rate
- Data rate

Configurable averaging interval

Event signaling and counting

The application software can be notified of the occurrence of various events:

- Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers
- A large set of custom events

Custom events sources:

- I/O Toolbox events
- Camera and Illumination control events
- CoaXPress data stream events
- CoaXPress host interface 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:

- Event-specific data

State of all System I/O lines sampled at the event occurrence time

Value of any event counter

General Purpose Inputs and Outputs

Number of lines

10 I/O lines on INTERNAL I/O connector:

2 differential inputs (DIN)

2 singled-ended TTL inputs/outputs (TTLIO)

4 isolated inputs (IIN)

2 isolated outputs (IOUT)

NOTE: The number of I/O lines can be extended using I/O modules attached to the I/O EXTENSION connector.

Usage

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

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 LVTTL outputs, compatible with totem-pole LVTTL, TTL, 5V CMOS drivers or LVTTL, TTL, 3V CMOS receivers

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

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!

Filter control

Glitch removal filter available on all System I/O input lines

Configurable filter delay:

Custom value

Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs

Fixed values for IIN lines: 500 ns, 1 µs, 2 µs, 5 µs, 10 µs

Polarity control

Yes

Power output

From AUXILIARY POWER connector to INTERNAL I/O and I/O EXTENSION connectors:

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

From PCI Express connector io I/O EXTENSION connector:

Non-isolated, +3.3V, unprotected

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.

Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet message from the remote device.

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, DLT 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)

I/O Toolbox composition

Determined by the selected firmware variant:

'1-camera': 8 LIN, 1 QDC, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'2-camera': 8 LIN, 1 QDC, 4 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'3-camera': 8 LIN, 1 QDC, 6 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'4-camera': 8 LIN, 1 QDC, 8 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'5-camera': 8 LIN, 1 QDC, 10 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'5-camera, 5D22211': 8 LIN, 1 QDC, 10 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'8-camera': 8 LIN, 1 QDC, 16 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'1-camera, line-scan': 8 LIN, 1 QDC, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

'2-camera, line-scan': 8 LIN, 1 QDC, 4 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

'4-camera, line-scan': 8 LIN, 1 QDC, 8 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

C2C-Link

Description

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

C2C-Link synchronizes cameras connected to:

- 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:

- 120 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 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

Microsoft Windows 11, 10 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

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:

- '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

Memento supported

Yes

Environmental conditions

Operating ambient air temperature

0 °C to +55 °C / +32 °F to +131 °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

EMC standards

European Council EMC Directive 2014/30/EU

United States FCC rule 47 CFR 15

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class A

FCC 47 Part 15 Class A

EMC - Immunity

EN 55024:2010 / CISPR 24:2010

EN 55035:2017 / CISPR 35:2016

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

PC3602 Coaxlink Octo

Included accessories

PC3304 HD26F I/O Adapter Cable

Related products

PC1625 DB25F I/O Adapter Cable

PC1636 InterPC C2C-Link Adapter

PC3303 C2C-Link Ribbon Cable

PC3610 HD26F I/O Extension Module - TTL-RS422

PC3611 Dual HD26F I/O Extension Module - TTL-CMOS5V-RS422

PC3612 HD26F I/O Extension Module - TTL-CMOS5V-RS422

PC3613 JTAG Adapter Xilinx for Coaxlink

PC3614 HD26F I/O Extension Module - Standard I/O Set

PC3618 HD26F I/O Extension Module - Fast I/O

Offices

- Europe, Middle East & Africa
  Euresys SA
  Contact support : support.europe@euresys.com

  Sensor to Image GmbH
  Contact support : support.europe@euresys.com

- China
  Euresys Shanghai Liaison Office
  Contact support : support.china@euresys.com

  Euresys Shenzhen Liaison Office
  Contact support : support.china@euresys.com

- Japan
  Euresys Japan K.K.
  Contact support : support.japan@euresys.com

- South Korea
  Euresys South Korea Liaison Office
  Contact support : support.korea@euresys.com

- Asia (other countries)
  Euresys Pte. Ltd.
  Contact support : support.asia@euresys.com

- North, Central & South America
  Euresys Inc.
  Contact support : support.usa@euresys.com

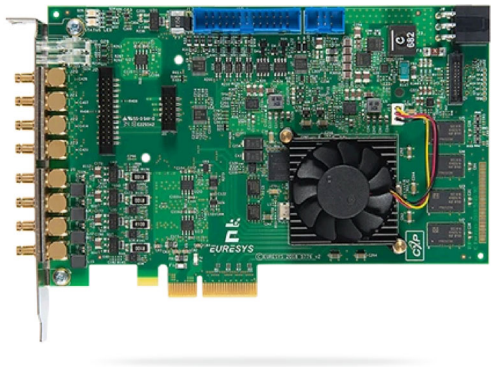
  TKH Vision Experience Center
  Contact support : support.usa@euresys.com

6/3/2024

Datasheet

Coaxlink Quad G3 DF

PCIe 3.0 four-connection CoaXPress frame grabber with data forwarding



- Four CoaXPress CXP-6 connections and four Data Forwarding outputs: 2,500 MB/s camera bandwidth
- PCIe 3.0 (Gen 3) x4 bus: 3,300 MB/s bus bandwidth
- Feature-rich set of 10 digital I/O lines
- Extensive camera control functions
- Memento Event Logging Tool

Main benefits

Acquire images from the fastest and highest resolution cameras

- Highest data acquisition rate in the industry
- 25 Gbit/s (2,500 MB/s) bandwidth from camera to host PC memory

PCIe 3.0 (Gen 3) x4 bus

- 3,300 MB/s sustained bus bandwidth

Long cable support

- 40 meters at CXP-6 speed (6.25 Gbps)
- 100 meters at CXP-3 speed (3 Gbps)

Power over CoaXPress

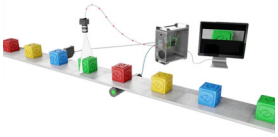
- Power over CoaXPress : Feed your camera up to 17 W per channel under 24 VDC with automatic device detection, measurement and overload protection.
- Total and per-channel voltage and current measurement is possible, allowing validation and performance deviation monitoring.

Robust connectors for reliable connections

Coaxlink CXP-6 uses DIN 1.0/2.3 connectors with push/pull latching system.

Use standard coaxial cables

- A single inexpensive cable for data transfer, camera control, trigger and power supply
- Top reliability and flexibility, performs in the harshest environments



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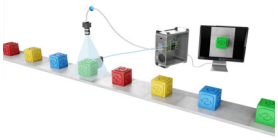

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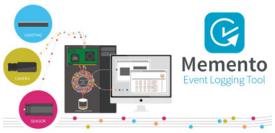

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eGrabber
Powerful Image Acquisition

Compatible with eGrabber

- eGrabber Studio: eGrabber's new interactive evaluation and demonstration application
- GenICam Browser: An application giving access to the GenICam 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

C2C-Link camera synchronization

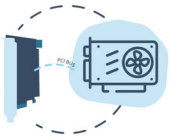
Allows to accurately synchronize multiple area-scan or line-scan cameras connected

- 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



Direct GPU transfer

- Sample programs for AMD DirectGMA and NVIDIA (CUDA) available.
- Direct GPU transfer eliminates unnecessary system memory copies, lowers CPU overhead, and reduces latency, resulting in significant performance improvements in data transfer times for applications.
- Direct capture of image data to GPU memory is available using AMD's DirectGMA. Compatible with AMD FirePro W5x00 and above and all AMD FirePro S series products.

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory
- Hardware scatter-gather support

Windows, Linux and macOS drivers available

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

Other benefits

CoaXPress Data Forwarding

- The data forwarding capability allows image data from one camera to be transferred to multiple frame grabbers on different Host PCs to distribute the image processing load.
- Data can be distributed between up to 10 synchronized daisy chained PCs.
- PCs can be close to each other or up to 40 meters away.

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 250VDC and 170VAC RMS.
- Isolated contact outputs.
- High-speed 5V-compliant TTL inputs/ LVTTL outputs.

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.

Specifications

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

'A B C D' on card bracket:

- 4 x DIN 1.0/2.3 75 Ohms coaxial receptacles
- CoaXPress Host Interface

'FA FB FC FD' on card bracket:

- 4 x DIN 1.0/2.3 75 Ohms coaxial receptacles
- CoaXPress Data Forwarding Interface

'INTERNAL I/O 1' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'C2C-LINK' on printed circuit board:

- 6-pin 2-row 0.1" pitch pin header with shrouding
- Card-to-card link

'AUXILIARY POWER INPUT' on printed circuit board:

- 6-pin PEG power socket
- 12 V DC power input for PoCXP and I/O power output

LED indicators

'A', 'B', 'C', 'D' on bracket:

- Bi-color red/green LEDs
- CoaXPress Host connector indicator

'FPGA STATUS LAMP' on PCB:

- Bi-color red/green LED

FPGA status indicator

'BOARD STATUS LAMP' on PCB:

Bi-color red/green LED

Board 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

Net weight: 168 g [5.9 oz]

Gross weight: 269 g [9.5 oz]

Host bus

Standard

PCI Express 3.0

Link width

4 lanes

1 lane or 2 lanes with reduced performance

Link speed

8.0 GT/s (PCIe 3.0)

5.0 GT/s (PCIe 2.0) with reduced performance

Maximum payload size

512 bytes

DMA

32- and 64-bit

Peak delivery bandwidth

3,900 MB/s

Effective (sustained) delivery bandwidth

3,350 MB/s (Host PC motherboard dependent)

Power consumption

Typ. 16.8 W (3.8 W @ +3.3V, 13 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Camera interface standard

CoaXPress

Interface standard(s)

CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1

Maximum link speed

CXP-6

Maximum link width

4 connections

Camera powering

PoCXP

Connectors

Four DIN1.0/2.3 75 Ohms CXP-6

Status LEDs

One CoaXPress Host connection status LED per connection

Number of cameras

Area-scan cameras:

One 1- or 2- or 4-connection camera

Line-scan cameras:

One 1- or 2- or 4-connection camera

Maximum number of cameras

1

Line-scan cameras supported

Yes

Maximum aggregated camera data transfer rate

25 Gbps (2,500 MB/s)

Supported CXP down-connection speeds

1.25 Gbps (CXP-1), 2.5 Gbps (CXP-2), 3.125 Gbps (CXP-3), 5 Gbps (CXP-5), and 6.25 Gbps (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)

PoCXP Safe Power:

- 17 W of 24V DC regulated power per CoaXPress connector
- PoCXP Device detection and automatic power-on
- Overload and short-circuit protections

On-board 12V to 24V DC/DC converter

A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable

Camera types

Area-scan cameras:

- Grayscale and color (YCbCr, YUV, RGB and Bayer CFA)
- Single-tap (1X-1Y) progressive-scan

Line-scan cameras and contact imaging sensors:

- Grayscale and color RGB

Camera pixel formats supported

Mono8, Mono10, Mono12, Mono14, Mono16

BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG

RGB8, RGB10, RGB12, RGB14, RGB16

RGBA8, RGBA10, RGBA12, RGBA14, RGBA16

YCbCr601_422_8, YCbCr601_422_10

YCbCr709_422_8, YCbCr709_422_10

YUV422_8, YUV422_10

Raw

Area-scan camera control

Trigger

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

Accurate control of the strobe position for strobed light sources.

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.

Support of external hardware trigger, with optional delay.

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.

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

Accurate control of the strobe position for strobed light sources.

On-board processing

On-board memory

1 GB

Image data stream processing

Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb

Optional swap of R and B components

Little endian conversion

Flat-field correction

Only available with the '1-camera,line-scan' and '1-df-camera, line-scan' firmware variants

Input LUT (Lookup Table)

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

Only on '1-camera' and '1-df-camera' firmware variants:

3x3 linear interpolation method (Method 1)

3x3 median-based interpolation method (Method 2)

Data stream statistics

Measurement of:

- Frame rate (Area-scan only)
- Line rate
- Data rate

Configurable averaging interval

Event signaling and counting

The application software can be notified of the occurrence of various events:

- Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers
- A large set of custom events

Custom events sources:

- I/O Toolbox events
- Camera and Illumination control events
- CoaXPress data stream events
- CoaXPress host interface 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:

- Event-specific data
- State of all System I/O lines sampled at the event occurrence time
- Value of any event counter

General Purpose Inputs and Outputs

Number of lines

10 I/O lines:

2 differential inputs (DIN)

2 singled-ended TTL inputs/outputs (TTLIO)

4 isolated inputs (IIN)

2 isolated outputs (IOUT)

Usage

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

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 LVTTL outputs, compatible with totem-pole LVTTL, TTL, 5V CMOS drivers or LVTTL, TTL, 3V CMOS receivers

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

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!

Filter control

Glitch removal filter available on all System I/O input lines

Configurable filter delay:

- Custom value
- Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs
- Fixed values 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

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.

Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet message from the remote device.

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, DLT 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)

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

'1-df-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'1-line-scan': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

'1-df-camera,line-scan': 8 LIN, 1 QDC, 2 EIN, 1 UAS, 2 DEL, 1 DIV, 1 MDV,3 C2C

C2C-Link

Description

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

C2C-Link synchronizes cameras connected to:

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:

120 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 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

Microsoft Windows 11, 10 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

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:

'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

Memento supported

Yes

Environmental conditions

Operating ambient air temperature

0 °C to +55 °C / +32 °F to +131 °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

EMC standards

European Council EMC Directive 2014/30/EU

United States FCC rule 47 CFR 15

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class A

FCC 47 Part 15 Class A

EMC - Immunity

EN 55024:2010 / CISPR 24:2010

EN 55035:2017 / CISPR 35:2016

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

PC1635 Coaxlink Quad G3 DF

Related products

PC1625 DB25F I/O Adapter Cable

PC1636 InterPC C2C-Link Adapter

PC3303 C2C-Link Ribbon Cable

PC3304 HD26F I/O Adapter Cable

Offices

- Europe, Middle East & Africa
  Euresys SA
  Contact support : support.europe@euresys.com

  Sensor to Image GmbH
  Contact support : support.europe@euresys.com

- China
  Euresys Shanghai Liaison Office
  Contact support : support.china@euresys.com

  Euresys Shenzhen Liaison Office
  Contact support : support.china@euresys.com

- Japan
  Euresys Japan K.K.
  Contact support : support.japan@euresys.com

- South Korea
  Euresys South Korea Liaison Office
  Contact support : support.korea@euresys.com

- Asia (other countries)
  Euresys Pte. Ltd.
  Contact support : support.asia@euresys.com

- North, Central & South America
  Euresys Inc.
  Contact support : support.usa@euresys.com

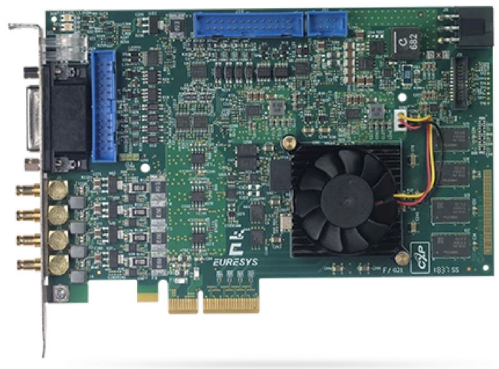
  TKH Vision Experience Center
  Contact support : support.usa@euresys.com

6/3/2024

Datasheet

Coaxlink Quad G3

PCIe 3.0 four-connection CoaXPress frame grabber (fan-cooled heatsink)



- Four CoaXPress CXP-6 connections: 2,500 MB/s camera bandwidth
- PCIe 3.0 (Gen 3) x4 bus: 3,300 MB/s bus bandwidth
- Feature-rich set of 20 digital I/O lines
- Fan-cooled heatsink
- Extensive camera control functions
- Memento Event Logging Tool

Main benefits

PCIe 3.0 (Gen 3) x4 bus

- 3,300 MB/s sustained bus bandwidth

Power over CoaXPress

- Power over CoaXPress : Feed your camera up to 17 W per channel under 24 VDC with automatic device detection, measurement and overload protection.
- Total and per-channel voltage and current measurement is possible, allowing validation and performance deviation monitoring.

Long cable support

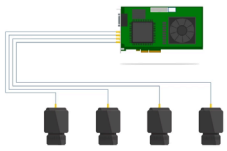
- 40 meters at CXP-6 speed (6.25 Gbps)
- 100 meters at CXP-3 speed (3 Gbps)

Use standard coaxial cables

- A single inexpensive cable for data transfer, camera control, trigger and power supply
- Top reliability and flexibility, performs in the harshest environments

Robust connectors for reliable connections

Coaxlink CXP-6 uses DIN 1.0/2.3 connectors with push/pull latching system.

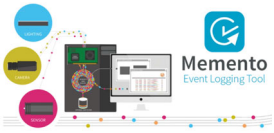


Connect up to 4 cameras to a single Coaxlink card

Connect up to 4 cameras to a single Coaxlink card

Compatible with eGrabber

- eGrabber Studio: eGrabber's new interactive evaluation and demonstration application
- GenICam Browser: An application giving access to the GenICam 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



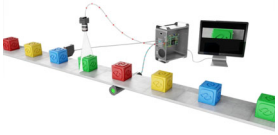
Memento Event Logging Tool

- 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

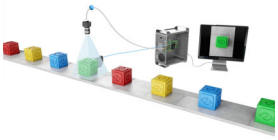
- to the same card
- to different cards in the same PC
- to different cards in different PCs



Line-scan triggering capabilities

Euresys' frame grabbers offer many capabilities to synchronize line-scan or 1D cameras, sensors and lighting controllers. Frame grabbers can control the camera scanning rate based on the signals received from a motion encoder.

They support 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).



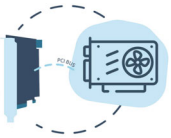
Area-scan triggering capabilities

Euresys' frame grabbers offer many capabilities to synchronize area-scan or 2D cameras, sensors and lighting controllers, for stationery or moving objects in the field of view, or moving cameras.

Compliant with GenICam

Including support for:

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



Direct GPU transfer

- Sample programs for AMD DirectGMA and NVIDIA (CUDA) available.
- Direct GPU transfer eliminates unnecessary system memory copies, lowers CPU overhead, and reduces latency, resulting in significant performance improvements in data transfer times for applications.
- Direct capture of image data to GPU memory is available using AMD's DirectGMA. Compatible with AMD FirePro W5x00 and above and all AMD FirePro S series products.

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory
- Hardware scatter-gather support

Cooling method

- Fan-cooled heatsink
- Also available with a passive (fanless) heatsink.

Windows, Linux and macOS drivers available

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

Other benefits

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 250VDC and 170VAC RMS.
- Isolated contact outputs.
- High-speed 5V-compliant TTL inputs/ LVTTL outputs.

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.

Specifications

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

'A B C D' on card bracket:

- 4 x DIN 1.0/2.3 75 Ohms coaxial receptacles
- CoaXPress Host Interface

'EXTERNAL I/O' on card bracket:

- 26-pin 3-row high-density D-Sub female socket with UNC4-40 jack socket screws
- I/O lines and I/O power output

'INTERNAL I/O 1' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'INTERNAL I/O 2' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'C2C-LINK' on printed circuit board:

- 6-pin 2-row 0.1" pitch pin header with shrouding
- Card-to-card link

'AUXILIARY POWER INPUT' on printed circuit board:

- 6-pin PEG power socket
- 12 V DC power input for PoCXP and I/O power output

LED indicators

'A', 'B', 'C', 'D' on bracket:

- Bi-color red/green LEDs

CoaXPress Host connector indicator

'FPGA STATUS LAMP' on PCB:

Bi-color red/green LED

FPGA status indicator

'BOARD STATUS LAMP' on PCB:

Bi-color red/green LED

Board 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

Net weight: 173 g [6.1 oz]

Gross weight: 274 g [9.7 oz]

Host bus

Standard

PCI Express 3.0

Link width

4 lanes

1 lane or 2 lanes with reduced performance

Link speed

8.0 GT/s (PCIe 3.0)

5.0 GT/s (PCIe 2.0) with reduced performance

Maximum payload size

512 bytes

DMA

32- and 64-bit

Peak delivery bandwidth

3,900 MB/s

Effective (sustained) delivery bandwidth

3,350 MB/s (Host PC motherboard dependent)

Power consumption

Typ. 16.8 W (3.8 W @ +3.3V, 13 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Camera interface standard

CoaXPress

Interface standard(s)

CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1

Maximum link speed

CXP-6

Maximum link width

4 connections

Camera powering

PoCXP

Connectors

Four DIN1.0/2.3 75 Ohms CXP-6

Status LEDs

One CoaXPress Host connection status LED per connection

Number of cameras

Area-scan cameras:

- One 1- or 2- or 4-connection camera
- One 1- or 2- or 4-connection multi-stream camera (up to 4 data streams)
- One or two 1- or 2-connection cameras
- One 1- or 2-connection and one or two 1-connection cameras
- Up to four 1-connection cameras
- One 4-connection sub-link of an 8-connection camera

Line-scan cameras:

- One 1- or 2- or 4-connection camera
- One or two 1- or 2-connection cameras
- Up to four 1-connection cameras

Maximum number of cameras

4

Line-scan cameras supported

Yes

Maximum aggregated camera data transfer rate

25 Gbps (2,500 MB/s)

Supported CXP down-connection speeds

1.25 Gbps (CXP-1), 2.5 Gbps (CXP-2), 3.125 Gbps (CXP-3), 5 Gbps (CXP-5), and 6.25 Gbps (CXP-6)

Number of CXP data streams (per camera)

4 on '1-camera, 4 data-stream' firmware variant

1 per camera on other firmware variants

Maximum CXP stream packet size

16,384 bytes

PoCXP (Power over CoaXPress)

PoCXP Safe Power:

- 17 W of 24V DC regulated power per CoaXPress connector
- PoCXP Device detection and automatic power-on
- Overload and short-circuit protections

On-board 12V to 24V DC/DC converter

A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable

Camera types

Area-scan cameras:

- Grayscale and color (YCbCr, YUV, RGB and Bayer CFA)
- Single-tap (1X-1Y) progressive-scan

Line-scan cameras and contact imaging sensors:

- Grayscale and color RGB

Camera pixel formats supported

Mono8, Mono10, Mono12, Mono14, Mono16

BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG

RGB8, RGB10, RGB12, RGB14, RGB16

RGBA8, RGBA10, RGBA12, RGBA14, RGBA16

YCbCr601_422_8, YCbCr601_422_10

YCbCr709_422_8, YCbCr709_422_10

YUV422_8, YUV422_10

Raw

Area-scan camera control

Trigger

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

Accurate control of the strobe position for strobed light sources.

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.

Support of external hardware trigger, with optional delay.

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.

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

Accurate control of the strobe position for strobed light sources.

On-board processing

On-board memory

1 GB

Image data stream processing

Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb

Optional swap of R and B components

Little endian conversion

Flat-field correction

Only available with the '1-camera' and '1-camera, line-scan' firmware variants

Input LUT (Lookup Table)

Available on all the firmware variants but '1-camera, 4-data-stream':

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

'1-camera' firmware variant:

- 3x3 linear interpolation method
- 3x3 median-based interpolation method

'2-camera' firmware variant:

- 5x5 gradient-based interpolation method (for one camera only)

Data stream statistics

Measurement of:

- Frame rate (Area-scan only)
- Line rate
- Data rate

Configurable averaging interval

Event signaling and counting

The application software can be notified of the occurrence of various events:

- Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers
- A large set of custom events

Custom events sources:

- I/O Toolbox events
- Camera and Illumination control events
- CoaXPress data stream events
- CoaXPress host interface 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:

- Event-specific data
- State of all System I/O lines sampled at the event occurrence time
- Value of any event counter

General Purpose Inputs and Outputs

Number of lines

20 I/O lines:

4 differential inputs (DIN)

4 singled-ended TTL inputs/outputs (TTLIO)

8 isolated inputs (IIN)

4 isolated outputs (IOUT)

Usage

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

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 LVTTL outputs, compatible with totem-pole LVTTL, TTL, 5V CMOS drivers or LVTTL, TTL, 3V CMOS receivers

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

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!

Filter control

Glitch removal filter available on all System I/O input lines

Configurable filter delay:

- Custom value
- Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs
- Fixed values 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

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.

Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet message from the remote device.

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, DLT 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)

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

'3-camera': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 2 C2C

'4-camera': 8 LIN, 4 QDC, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 2 C2C

'1-camera, 4-data-stream': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 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

'4-camera, line-scan': 8 LIN, 4 QDC, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 3 C2C

'1-slm-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

'1-sls-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

C2C-Link

Description

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

C2C-Link synchronizes cameras connected to:

- 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:

120 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 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

Microsoft Windows 11, 10 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

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:

'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

Memento supported

Yes

Environmental conditions

Operating ambient air temperature

0 °C to +55 °C / +32 °F to +131 °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

EMC standards

European Council EMC Directive 2014/30/EU

United States FCC rule 47 CFR 15

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class B

FCC 47 Part 15 Class B

EMC - Immunity

EN 55024:2010 / CISPR 24:2010

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

PC1633 Coaxlink Quad G3

Related products

PC1625 DB25F I/O Adapter Cable

PC1633-LH Coaxlink Quad G3 LH

PC1636 InterPC C2C-Link Adapter

PC3303 C2C-Link Ribbon Cable

PC3304 HD26F I/O Adapter Cable

Offices

- Europe, Middle East & Africa
  Euresys SA
  Contact support : support.europe@euresys.com

  Sensor to Image GmbH
  Contact support : support.europe@euresys.com

- China
  Euresys Shanghai Liaison Office
  Contact support : support.china@euresys.com

  Euresys Shenzhen Liaison Office
  Contact support : support.china@euresys.com

- Japan
  Euresys Japan K.K.
  Contact support : support.japan@euresys.com

- South Korea
  Euresys South Korea Liaison Office
  Contact support : support.korea@euresys.com

- Asia (other countries)
  Euresys Pte. Ltd.
  Contact support : support.asia@euresys.com

- North, Central & South America
  Euresys Inc.
  Contact support : support.usa@euresys.com

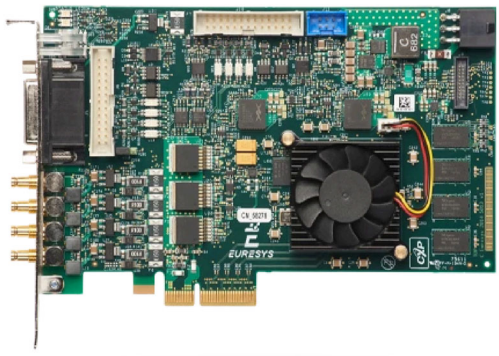
  TKH Vision Experience Center
  Contact support : support.usa@euresys.com

6/3/2024

Datasheet

Coaxlink Quad 3D-LLE

Quad CXP-6 frame grabber with on-board laser line extraction for 3D profiling

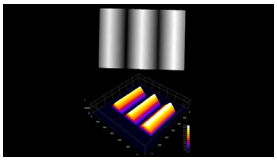


- Laser line extraction with zero host CPU usage
- Single and Dual Laser Line Extraction into a depth map
- Real-time generation of 16-bit 3D height maps
- Choice of algorithms: Maximum, Peak, Center of Gravity (COG)
- Precision: up to 1/256 pixel (with Peak and COG algorithms)
- Performance: 38,000 profiles/s from 1024 x 128 images. 76,000 profiles/s from 1024 x 64 images
- Memento Event Logging Tool

Main benefits

Laser line extraction with zero host CPU usage

The Coaxlink's on-board FPGA measures the position of the laser line during the image acquisition without loading the host CPU.



Real-time generation of 16-bit 3D height maps

The Coaxlink directly transfers the computed 3D height map to the host PC memory without delay, in real-time.

Power over CoaXPress

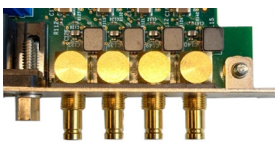
- Power over CoaXPress : Feed your camera up to 17 W per channel under 24 VDC with automatic device detection, measurement and overload protection.
- Total and per-channel voltage and current measurement is possible, allowing validation and performance deviation monitoring.

Long cable support

- 40 meters at CXP-6 speed (6.25 Gbps)
- 100 meters at CXP-3 speed (3 Gbps)

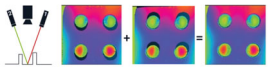
Use standard coaxial cables

- A single inexpensive cable for data transfer, camera control, trigger and power supply
- Top reliability and flexibility, performs in the harshest environments



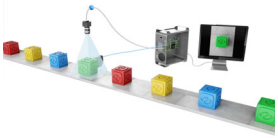
Robust connectors for reliable connections

Coaxlink CXP-6 uses DIN 1.0/2.3 connectors with push/pull latching system.



Dual laser line extraction

Supported by software and hardware implementations, the dual laser line extraction process reduces the effect of occlusions. Occlusions occur when some parts of the objects are not lit by any laser. Using two lasers with different angles reduces these undefined areas. The object-based calibration included in Easy3DLaserLine allows combining the acquired data into a single calibrated point cloud.

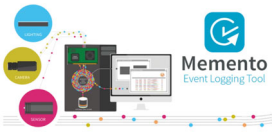


Area-scan triggering capabilities

Euresys' frame grabbers offer many capabilities to synchronize area-scan or 2D cameras, sensors and lighting controllers, for stationery or moving objects in the field of view, or moving cameras.

Compatible with eGrabber

- eGrabber Studio: eGrabber's new interactive evaluation and demonstration application
- GenICam Browser: An application giving access to the GenICam 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



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

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory
- Hardware scatter-gather support

Windows, Linux and macOS drivers available

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

Other benefits

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 250VDC and 170VAC RMS.
- Isolated contact outputs.
- High-speed 5V-compliant TTL inputs/ LVTTL outputs.

Specifications

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

'A B C D' on card bracket:

- 4 x DIN 1.0/2.3 75 Ohms coaxial receptacles
- CoaXPress Host Interface

'EXTERNAL I/O' on card bracket:

- 26-pin 3-row high-density D-Sub female socket with UNC4-40 jack socket screws
- I/O lines and I/O power output

'INTERNAL I/O 1' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'INTERNAL I/O 2' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'C2C-LINK' on printed circuit board:

- 6-pin 2-row 0.1" pitch pin header with shrouding
- Card-to-card link

'AUXILIARY POWER INPUT' on printed circuit board:

- 6-pin PEG power socket
- 12 V DC power input for PoCXP and I/O power output

LED indicators

'A', 'B', 'C', 'D' on bracket:

- Bi-color red/green LEDs

CoaXPress Host connector indicator

'FPGA STATUS LAMP' on PCB:

Bi-color red/green LED

FPGA status indicator

'BOARD STATUS LAMP' on PCB:

Bi-color red/green LED

Board 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

Net weight: 173 g [6.1 oz]

Gross weight: 275 g [9.7 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

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. 16.8 W (3.8 W @ +3.3V, 13 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Camera interface standard

CoaXPress

Interface standard(s)

CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1

Maximum link speed

CXP-6

Maximum link width

4 connections

Camera powering

PoCXP

Connectors

Four DIN1.0/2.3 75 Ohms CXP-6

Status LEDs

One CoaXPress Host connection status LED per connection

Number of cameras

One 1- or 2- or 4-connection camera

Maximum number of cameras

1

Maximum aggregated camera data transfer rate

25 Gbps (2,500 MB/s)

Supported CXP down-connection speeds

1.25 Gbps (CXP-1), 2.5 Gbps (CXP-2), 3.125 Gbps (CXP-3), 5 Gbps (CXP-5), and 6.25 Gbps (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)

PoCXP Safe Power:

- 17 W of 24V DC regulated power per CoaXPress connector
- PoCXP Device detection and automatic power-on
- Overload and short-circuit protections

On-board 12V to 24V DC/DC converter

A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable

Camera types

Grayscale area-scan cameras

Camera pixel formats supported

Mono8

Area-scan camera control

Trigger

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

Accurate control of the strobe position for strobed light sources.

Support of early and late strobe pulses.

On-board processing

On-board memory

1 GB

Image data stream processing

Laser Line Extraction (LLE) processing core to compute the vertical position of one detected laser line along a ROI using one of the following algorithms:

Maximum Detection algorithm

- Maximum ROI width: 8192 pixels

Maximum ROI height: 65536 pixels

Depth map format: 16-bit unsigned integer number

Accuracy: 1 pixel

8-bit Maximum Detection algorithm

Maximum ROI width: 8192 pixels

Maximum ROI height: 256 pixels

Depth map format: 8-bit unsigned integer number

Accuracy: 1 pixel

Peak Detection algorithm

Maximum ROI width: 8192 pixels

Maximum ROI height: 2048 pixels

Depth map format: UQ11.5 fixed-point unsigned number

Accuracy: 1/32 pixel

High accuracy Peak Detection algorithm

Maximum ROI width: 8192 pixels

Maximum ROI height: 256 pixels

Depth map format: UQ8.8 fixed-point unsigned number

Accuracy: 1/256 pixel

Center Of Gravity algorithm

Maximum ROI width: 8192 pixels

Maximum ROI height: 2048 pixels

Depth map format: UQ11.5 fixed-point unsigned number

Accuracy: 1/32 pixel

High accuracy Center Of Gravity algorithm

Maximum ROI width: 8192 pixels

Maximum ROI height: 256 pixels

Depth map format: UQ8.8 fixed-point unsigned number

Accuracy: 1/256 pixel

Data stream statistics

Measurement of:

Frame rate (Area-scan only)

Line rate

Data rate

Configurable averaging interval

Event signaling and counting

The application software can be notified of the occurrence of various events:

Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers

A large set of custom events

Custom events sources:

- I/O Toolbox events
- Camera and Illumination control events
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- CoaXPress host interface 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:

- Event-specific data
- State of all System I/O lines sampled at the event occurrence time
- Value of any event counter

General Purpose Inputs and Outputs

Number of lines

20 I/O lines:

4 differential inputs (DIN)

4 singled-ended TTL inputs/outputs (TTLIO)

8 isolated inputs (IIN)

4 isolated outputs (IOUT)

Usage

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

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 LVTTL outputs, compatible with totem-pole LVTTL, TTL, 5V CMOS drivers or LVTTL, TTL, 3V CMOS receivers

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

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!

Filter control

Glitch removal filter available on all System I/O input lines

Configurable filter delay:

- Custom value
- Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs
- Fixed values 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

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.

Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet message from the remote device.

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, DLT 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)

I/O Toolbox composition

8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

C2C-Link

Description

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

C2C-Link synchronizes cameras connected to:

- 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:

- 120 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 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

Microsoft Windows 11, 10 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

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:

- '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

Memento supported

Yes

Environmental conditions

Operating ambient air temperature

0 °C to +55 °C / +32 °F to +131 °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

EMC standards

European Council EMC Directive 2014/30/EU

United States FCC rule 47 CFR 15

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class B

FCC 47 Part 15 Class B

EMC - Immunity

EN 55024:2010 / CISPR 24:2010

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

PC1637 Coaxlink Quad 3D-LLE

Related products

PC1625 DB25F I/O Adapter Cable

PC1636 InterPC C2C-Link Adapter

PC3303 C2C-Link Ribbon Cable

PC3304 HD26F I/O Adapter Cable

Offices

- Europe, Middle East & Africa
  Euresys SA
  Contact support : support.europe@euresys.com

  Sensor to Image GmbH
  Contact support : support.europe@euresys.com

- China
  Euresys Shanghai Liaison Office
  Contact support : support.china@euresys.com

  Euresys Shenzhen Liaison Office
  Contact support : support.china@euresys.com

- Japan
  Euresys Japan K.K.
  Contact support : support.japan@euresys.com

- South Korea
  Euresys South Korea Liaison Office
  Contact support : support.korea@euresys.com

- Asia (other countries)
  Euresys Pte. Ltd.
  Contact support : support.asia@euresys.com

- North, Central & South America
  Euresys Inc.
  Contact support : support.usa@euresys.com

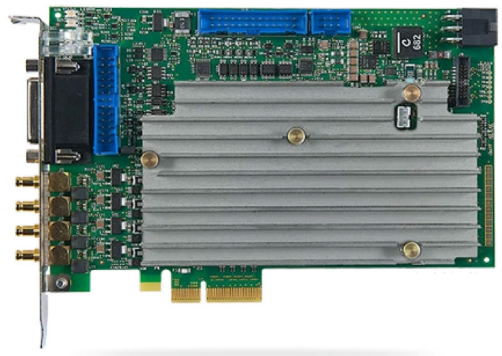
  TKH Vision Experience Center
  Contact support : support.usa@euresys.com

6/3/2024

Datasheet

Coaxlink Quad G3 LH

PCIe 3.0 four-connection CoaXPress frame grabber (passive heatsink)



- Four CoaXPress CXP-6 connections: 2,500 MB/s camera bandwidth
- PCIe 3.0 (Gen 3) x4 bus: 3,300 MB/s bus bandwidth
- Passive (fanless) heatsink
- Feature-rich set of 20 digital I/O lines
- Extensive camera control functions
- Memento Event Logging Tool

Main benefits

PCIe 3.0 (Gen 3) x4 bus

- 3,300 MB/s sustained bus bandwidth

Power over CoaXPress

- Power over CoaXPress : Feed your camera up to 17 W per channel under 24 VDC with automatic device detection, measurement and overload protection.
- Total and per-channel voltage and current measurement is possible, allowing validation and performance deviation monitoring.

Long cable support

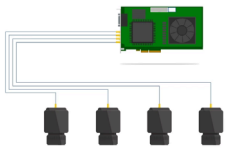
- 40 meters at CXP-6 speed (6.25 Gbps)
- 100 meters at CXP-3 speed (3 Gbps)

Use standard coaxial cables

- A single inexpensive cable for data transfer, camera control, trigger and power supply
- Top reliability and flexibility, performs in the harshest environments

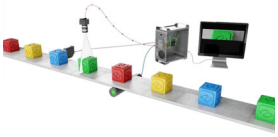
Robust connectors for reliable connections

Coaxlink CXP-6 uses DIN 1.0/2.3 connectors with push/pull latching system.



Connect up to 4 cameras to a single Coaxlink card

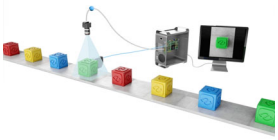
Connect up to 4 cameras to a single Coaxlink card



Line-scan triggering capabilities

Euresys' frame grabbers offer many capabilities to synchronize line-scan or 1D cameras, sensors and lighting controllers. Frame grabbers can control the camera scanning rate based on the signals received from a motion encoder.

They support 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).

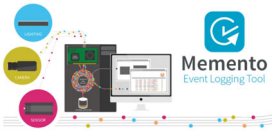


Area-scan triggering capabilities

Euresys' frame grabbers offer many capabilities to synchronize area-scan or 2D cameras, sensors and lighting controllers, for stationery or moving objects in the field of view, or moving cameras.

Compatible with eGrabber

- eGrabber Studio: eGrabber's new interactive evaluation and demonstration application
- GenICam Browser: An application giving access to the GenICam 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



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

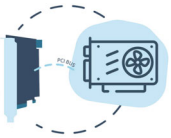
Allows to accurately synchronize multiple area-scan or line-scan cameras connected

- 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



Direct GPU transfer

- Sample programs for AMD DirectGMA and NVIDIA (CUDA) available.
- Direct GPU transfer eliminates unnecessary system memory copies, lowers CPU overhead, and reduces latency, resulting in significant performance improvements in data transfer times for applications.
- Direct capture of image data to GPU memory is available using AMD's DirectGMA. Compatible with AMD FirePro W5x00 and above and all AMD FirePro S series products.

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory
- Hardware scatter-gather support

Cooling method

- Passive (fanless) heatsink
- Also available with a fan-cooled heatsink.

Windows, Linux and macOS drivers available

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

Other benefits

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 250VDC and 170VAC RMS.
- Isolated contact outputs.
- High-speed 5V-compliant TTL inputs/ LVTTL outputs.

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.

Specifications

Mechanical

Form factor

PCI Express card

Format

Standard profile, half length, 4-lane PCI Express card

Cooling method

Air-cooling, fanless

Mounting

For insertion in a standard height, 4-lane or higher, PCI Express card slot

Connectors

'A B C D' on card bracket:

- 4 x DIN 1.0/2.3 75 Ohms coaxial receptacles
- CoaXPress Host Interface

'EXTERNAL I/O' on card bracket:

- 26-pin 3-row high-density D-Sub female socket with UNC4-40 jack socket screws
- I/O lines and I/O power output

'INTERNAL I/O 1' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'INTERNAL I/O 2' on printed circuit board:

- 26-pin 2-row 0.1" pitch pin header with shrouding
- I/O lines and I/O power output

'C2C-LINK' on printed circuit board:

- 6-pin 2-row 0.1" pitch pin header with shrouding
- Card-to-card link

'AUXILIARY POWER INPUT' on printed circuit board:

- 6-pin PEG power socket
- 12 V DC power input for PoCXP and I/O power output

LED indicators

'A', 'B', 'C', 'D' on bracket:

- Bi-color red/green LEDs

CoaXPress Host connector indicator

'FPGA STATUS LAMP' on PCB:

Bi-color red/green LED

FPGA status indicator

'BOARD STATUS LAMP' on PCB:

Bi-color red/green LED

Board 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

Net weight: 260 g [9.2 oz]

Gross weight: 361 g [12.7 oz]

Host bus

Standard

PCI Express 3.0

Link width

4 lanes

1 lane or 2 lanes with reduced performance

Link speed

8.0 GT/s (PCIe 3.0)

5.0 GT/s (PCIe 2.0) with reduced performance

Maximum payload size

512 bytes

DMA

32- and 64-bit

Peak delivery bandwidth

3,900 MB/s

Effective (sustained) delivery bandwidth

3,350 MB/s (Host PC motherboard dependent)

Power consumption

Typ. 16.8 W (3.8 W @ +3.3V, 13 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Camera interface standard

CoaXPress

Interface standard(s)

CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1

Maximum link speed

CXP-6

Maximum link width

4 connections

Camera powering

PoCXP

Connectors

Four DIN1.0/2.3 75 Ohms CXP-6

Status LEDs

One CoaXPress Host connection status LED per connection

Number of cameras

Area-scan cameras:

- One 1- or 2- or 4-connection camera
- One 1- or 2- or 4-connection multi-stream camera (up to 4 data streams)
- One or two 1- or 2-connection cameras
- One 1- or 2-connection and one or two 1-connection cameras
- Up to four 1-connection cameras
- One 4-connection sub-link of an 8-connection camera

Line-scan cameras:

- One 1- or 2- or 4-connection camera
- One or two 1- or 2-connection cameras
- Up to four 1-connection cameras

Maximum number of cameras

4

Line-scan cameras supported

Yes

Maximum aggregated camera data transfer rate

25 Gbps (2,500 MB/s)

Supported CXP down-connection speeds

1.25 Gbps (CXP-1), 2.5 Gbps (CXP-2), 3.125 Gbps (CXP-3), 5 Gbps (CXP-5), and 6.25 Gbps (CXP-6)

Number of CXP data streams (per camera)

4 on '1-camera, 4 data-stream' firmware variant

1 per camera on other firmware variants

Maximum CXP stream packet size

16,384 bytes

PoCXP (Power over CoaXPress)

PoCXP Safe Power:

- 17 W of 24V DC regulated power per CoaXPress connector
- PoCXP Device detection and automatic power-on
- Overload and short-circuit protections

On-board 12V to 24V DC/DC converter

A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable

Camera types

Area-scan cameras:

- Grayscale and color (YCbCr, YUV, RGB and Bayer CFA)
- Single-tap (1X-1Y) progressive-scan

Line-scan cameras and contact imaging sensors:

- Grayscale and color RGB

Camera pixel formats supported

Mono8, Mono10, Mono12, Mono14, Mono16

BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG

RGB8, RGB10, RGB12, RGB14, RGB16

RGBA8, RGBA10, RGBA12, RGBA14, RGBA16

YCbCr601_422_8, YCbCr601_422_10

YCbCr709_422_8, YCbCr709_422_10

YUV422_8, YUV422_10

Raw

Area-scan camera control

Trigger

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

Accurate control of the strobe position for strobed light sources.

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.

Support of external hardware trigger, with optional delay.

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.

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

Accurate control of the strobe position for strobed light sources.

On-board processing

On-board memory

1 GB

Image data stream processing

Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb

Optional swap of R and B components

Little endian conversion

Flat-field correction

Only available with the '1-camera' and '1-camera, line-scan' firmware variants

Input LUT (Lookup Table)

Available on all the firmware variants but '1-camera, 4-data-stream':

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

'1-camera' firmware variant:

- 3x3 linear interpolation method
- 3x3 median-based interpolation method

'2-camera' firmware variant:

- 5x5 gradient-based interpolation method (for one camera only)

Data stream statistics

Measurement of:

- Frame rate (Area-scan only)
- Line rate
- Data rate

Configurable averaging interval

Event signaling and counting

The application software can be notified of the occurrence of various events:

- Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers
- A large set of custom events

Custom events sources:

- I/O Toolbox events
- Camera and Illumination control events
- CoaXPress data stream events
- CoaXPress host interface 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:

- Event-specific data
- State of all System I/O lines sampled at the event occurrence time
- Value of any event counter

General Purpose Inputs and Outputs

Number of lines

20 I/O lines:

4 differential inputs (DIN)

4 singled-ended TTL inputs/outputs (TTLIO)

8 isolated inputs (IIN)

4 isolated outputs (IOUT)

Usage

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

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 LVTTL outputs, compatible with totem-pole LVTTL, TTL, 5V CMOS drivers or LVTTL, TTL, 3V CMOS receivers

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

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!

Filter control

Glitch removal filter available on all System I/O input lines

Configurable filter delay:

- Custom value
- Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs
- Fixed values 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

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.

Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet message from the remote device.

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, DLT 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)

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

'3-camera': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 2 C2C

'4-camera': 8 LIN, 4 QDC, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 2 C2C

'1-camera, 4-data-stream': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 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

'4-camera, line-scan': 8 LIN, 4 QDC, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 3 C2C

'1-slm-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

'1-sls-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

C2C-Link

Description

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

C2C-Link synchronizes cameras connected to:

- 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:

120 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 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

Microsoft Windows 11, 10 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

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:

'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

Memento supported

Yes

Environmental conditions

Operating ambient air temperature

0 °C to +55 °C / +32 °F to +131 °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

EMC standards

European Council EMC Directive 2014/30/EU

United States FCC rule 47 CFR 15

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class B

FCC 47 Part 15 Class B

EMC - Immunity

EN 55024:2010 / CISPR 24:2010

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

PC1633-LH Coaxlink Quad G3 LH

Related products

PC1625 DB25F I/O Adapter Cable

PC1636 InterPC C2C-Link Adapter

PC3303 C2C-Link Ribbon Cable

PC3304 HD26F I/O Adapter Cable

Offices

- Europe, Middle East & Africa
  Euresys SA
  Contact support : support.europe@euresys.com

  Sensor to Image GmbH
  Contact support : support.europe@euresys.com

- China
  Euresys Shanghai Liaison Office
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