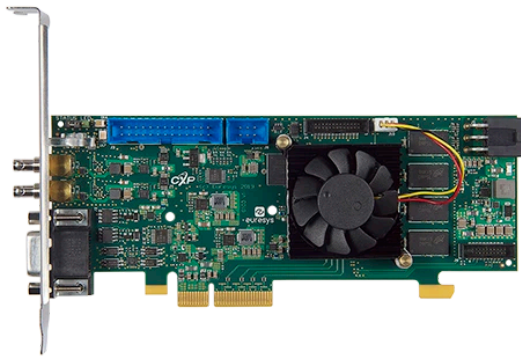


5/21/2024

Datasheet

Coaxlink Duo CXP-12

Two-connection CoaXPress CXP-12 frame grabber



- Two CoaXPress CXP-12 connections: 2,500 MB/s camera bandwidth
- PCIe 3.0 (Gen 3) x4 bus: 3,300 MB/s bus bandwidth
- Low-profile card. Delivered with standard and low-profile brackets
- Fan-cooled heatsink
- Feature-rich set of 10 digital I/O lines
- Extensive camera control functions
- Memento Event Logging Tool

Main benefits



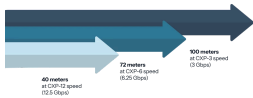
Low-profile PCIe card

Delivered with standard and low-profile brackets



PCIe 3.0 (Gen 3) x4 bus

- 3,300 MB/s sustained bus bandwidth



Long cable support

- 40 meters at CXP-12 speed (12.5 Gbps)
- 72 meters at CXP-6 speed (6.25 Gbps)
- 100 meters at CXP-3 speed (3 Gbps)



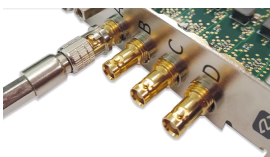
Power over CoaXPress

- 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.



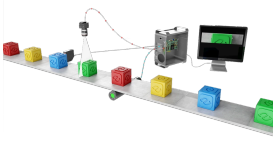
Use standard coaxial cables

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



Micro-BNC (HD-BNC™) connectors for reliable connection

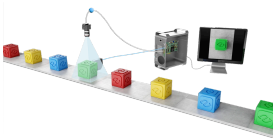
- Trusted push and turn, bayonet-style positive lock
- Allows for quick and easy connects and disconnects



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.



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 interactive evaluation and demonstration application, giving access to GenICam features exposed by GenTL Producers
- GenTL Console: A command-line tool giving access to the functions and commands exposed by the Euresys GenTL Producers



C2C-Link camera synchronization

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

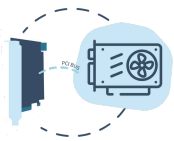
- to the same card
- to different cards in the same PC
- to different cards in different PCs



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

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

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/ LVTTTL 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

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

Cooling method

Air cooling, fan-cooled heatsink

Mounting

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

Delivered with standard- and low-profile brackets for insertion in a standard- or a low-profile chassis.

Connectors

'A B' on card bracket:

2 x Micro-BNC 75 Ohms coaxial receptacles

CoaXPress Host Interface

'EXTERNAL I/O' on card bracket:

15-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

'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' 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 68.9 mm [6.6 in x 2.71 in]

Weight

Net weight: 122 g [4.3 oz]

Gross weight: 232 g [8.2 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)

PCI Express slot power rating

25 W

Power consumption

Typ. 14.8 W (4.3W @ 3.3V, 10.5 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-12

Maximum link width

2 connections

Camera powering

PoCXP

Connectors

Two micro-BNC 75 Ohms (also known as HD-BNC™) CXP-12

Status LEDs

One CoaXPress Host connection status LED per connection

Number of cameras

Area-scan cameras:

- One 1- or 2-connection camera
- One or two 1-connection cameras

Line-scan cameras:

- One 1- or 2-connection camera
- One or two 1-connection cameras

Maximum number of cameras

2

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), 6.25 Gbps (CXP-6), 10.0 Gbps (CXP-10)*, and 12.5 Gbps (CXP-12)*

NOTE: mixing CXP-10 and CXP-12 is not allowed!

Supported CXP up-connection speeds

Low-speed 20.83... Mbps (CXP-1 to CXP-6)

Low-speed 41.66... Mbps (CXP-10, CXP-12)

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 (RGB and Bayer CFA)

- Single-tap (1X-1Y) progressive-scan

Line-scan cameras:

- 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

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

5x5 gradient-based interpolation method on '1-camera' firmware variant

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)

NOTES:

Only 2 IIN and 1 IOUT lines are available on the EXTERNAL I/O connector.

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

IIN: Isolated current-sense inputs with wide voltage input range up to 30V, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers, RS-422 differential line drivers, potential free contacts, solid-state relays and optocouplers

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 μ s

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

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, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

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

Driver name

eGrabber

First release

Coaxlink 12.4

Current release

eGrabber 26.08

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 4.6 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 CFR Title 47 Part 15B

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class B

FCC CFR Title 47 Part 15B Class B

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 status

Released

Product code - Description

[PC3622] Coaxlink Duo CXP-12

Related products

[PC1625] DB25F I/O Adapter Cable

[PC1636] InterPC C2C-Link Adapter

[PC3303] C2C-Link Ribbon Cable

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

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