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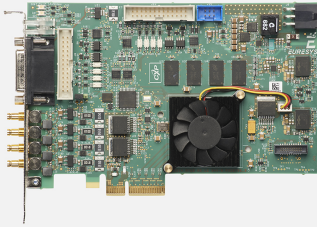
Do not use for new design

Coaxlink Quad CXP-3

Four-connection CXP-3 CoaXPress frame grabber

At a Glance

- Four CoaXPress CXP-3 connections: 1,250 MB/s camera bandwidth
- Connect four cameras to one card
- Works with extra-long camera cables (100+ meters)
- PCIe 2.0 (Gen 2) x4 bus: 1,700 MB/s delivery bandwidth
- Extensive camera control functions
- Memento Event Logging Tool

Benefits

Long cable support: 100+ meters

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-3 uses DIN 1.0/2.3 connectors with push/pull latching system

Connect up to 4 cameras to a single Coaxlink card

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.

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.

PCIe 2.0 (Gen 2) x4 bus

- 1,700 MB/s sustained bus bandwidth

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.

High-performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory and hardware boards that expose PCI addresses
- Hardware scatter-gather support
- 64-bit addressing capability

Area-scan triggering capabilities

- A trigger is used to start the acquisition when the part is in position. Hardware triggers come from the Coaxlink's I/O lines. Software triggers come from the application.
- An optional trigger delay is available to postpone the acquisition for a programmable time.
- A trigger decimation function allows to skip some of the triggers.
- Camera exposure control allows the application to control the exposure time of the camera.
- When the acquisition starts, at the appropriate timing, the Coaxlink board generates a signal to control an illumination device connected to one of its output lines.

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

Compliant with GenICam

Including support for

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

Windows, Linux and macOS drivers available

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

Specifications

Mechanical

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

Connectors	• 'A', 'B', 'C', 'D' on bracket:
	− 4x DIN 1.0/2.3 female connectors
	− CoaXPress host interface
	• 'EXTERNAL I/O' on bracket:
	− 26-pin 3-row high-density female sub-D connector
	− I/O lines and power output
	• 'INTERNAL I/O 1' and 'INTERNAL I/O 2' on PCB:
	− 2x 26-pin 2-row 0.1" pitch pin header with shrouding
	− I/O lines and power output
	• 'AUXILIARY POWER INPUT' on module:
	− 6-pin PEG power socket
	− 12 VDC power input for PoCXP camera(s) and I/O power
	• 'C2C-LINK' on module:
	− 6-pin 2-row 0.1-in header
	− Card to card link
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	170 g, 6.00 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. 12.1W (2.5 W @ +3.3V, 9.6 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Interface standard(s)	CoaXPress 1.0, 1.1 and 1.1.1
Connectors	Four DIN1.0/2.3 75 Ohms CXP-3
Status LEDs	One CoaXPress Host connection status LED per connection
Number of cameras	Up to four 1-connection cameras

Maximum aggregated camera data transfer rate	12.5 Gbit/s (1,250 MB/s)
Supported CXP down-connection speeds	1.25 GT/s (CXP-1), 2.5 GT/s (CXP-2), 3.125 GT/s (CXP-3)
Number of CXP data streams (per camera)	1 data stream per camera
Maximum CXP stream packet size	8,192 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 • Color (RGB and Bayer CFA)
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.

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

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 time constants:
	− for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs
	− for IIN lines: 500 ns, 1 µs, 2 µs, 5 µs, 10 µs
Polarity control	Yes
Power output	Non-isolated, +12V, 1A, with electronic fuse protection

I/O Toolbox tools	The I/O Toolbox is a configurable interconnection of tools that generates events (usually triggers) from input lines. The composition of the toolset is product- and firmware-dependent.

- 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.
- Divider tool (DIV): to generate an event every nth input events from any I/O toolbox event source.
- 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).

I/O Toolbox composition	8 LIN, 1 QDC, 1 DIV, 1 DEL

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:
  - 60 cm inside a PC
  - 1200 m cumulated adapter to adapter cable length
- Maximum trigger rate:
  - 2.5 MHz for configurations using a single PC, or up to 10 PCs and 100 m total C2C-Link cable length
  - 200 kHz for configurations up to 32 PCs and 1200m total C2C-Link cable length
- Trigger propagation delay from master to slave devices:
  - Less than 10 ns for cameras on the same 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, 8.1, 7 for x86-64 (64-bit) processor architecture
- Linux for x86-64 (64-bit) and AArch64 (64-bit) processor architectures
- macOS for x86-64 (64-bit) and AArch64 (64-bit) processor architectures

APIs	

- 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

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

Electromagnetic - 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 55035:2017 / CISPR 35:2016 • EN 61000-6-2:2005 / IEC 61000-6-2:2016 • EN 61000-4-2:2009 • EN 61000-4-3:2006 • EN 61000-4-4:2004 • EN 61000-4-6:2014
KC Certification	Korean Radio Waves Act, Article 58-2, Clause 3
Flammability	PCB compliant with UL 94 V-0
RoHS	European Union Directive 2015/863 (ROHS3)
REACH	European Union Regulation 1907/2006
WEEE	Must be disposed of separately from normal household waste and must be recycled according to local regulations

Ordering Information

Product code - Description	• 1638 - Coaxlink Quad CXP-3
Optional accessories	• 1625 - DB25F I/O Adapter Cable • 1636 - InterPC C2C-Link Adapter • 3303 - C2C-Link Ribbon Cable • 3304 - HD26F I/O Adapter Cable