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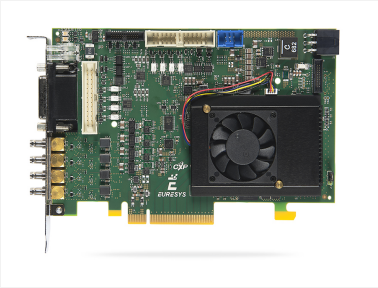
Empowering Computer Vision

Coaxlink Quad CXP-12 JPEG

四路 CoaXPress CXP-12 图像采集卡，带 JPEG 压缩



特性一览

- 四个 250 MPixels/s JPEG 编码器
- 兼容 8 位/像素 Bayer CFA 相机
- 每个相机有两个视频流：JPEG 流和 RGB 预览流
- 四路 CoaXPress CXP-12 连接：5,000 MB/s 相机带宽
- PCIe 3.0 (Gen 3) x8 总线：6,700 MB/s 总线带宽

优势

应用

Coaxlink Quad CXP-12 JPEG 支持紧凑地实现多通道超高分辨率图像采集和录制系统。嵌入式像素处理极大减少了监控和压缩图像流的 CPU 工作负载。

描述

- Coaxlink Quad CXP-12 JPEG 的 4 相机固件形式实现了四个独立的图像采集通道，每个通道都有一个 Bayer CFA 解码器和一个基准 JPEG 编码器，它们可以高达 250 兆像素/秒的速度进行处理，每秒的彩色像素总计高达 10 亿。
- 每个通道都提供两个并发流：用于记录的“JPEG”编码流，和用于监控的“预览”流。
- JPEG 流的典型延迟只有 20 行，可提供与标准 JPEG 解码器兼容且符合 JFIF 标准的 4:2:2 全分辨率编码图像。JPEG 编码质量的配置范围为 1 到 100。
- “预览”流提供 8 位 Bayer 全分辨率图像、24 位 RGB 全分辨率图像或 24 位 RGB 低分辨率图像。

支持 JFIF 图像格式

GenICam 浏览器和 GenTL 查看器应用程序现在支持 JFIF 图像。

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.

PCIe 3.0 (Gen 3) x8 总线

- 7,800 MB/s 峰值总线带宽
- 6,700 MB/s 持续总线带宽

连接最快速最高分辨率的相机来采集图像

- 在同行业中最高的数据采集速率
- 50 Gbit/s (5,000 MB/s) 带宽（从相机到主机 PC 内存）

长线缆支持

- 在 CXP-12 速度 (12.5 Gbps) 下，长度为 40 米
- CXP-6 速度时 72 米（6.25 Gbps）
- CXP-3 速度时 100 米（3 Gbps）

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

Micro-BNC (HD-BNC™) 连接器提供可靠连接
- 值得信赖的推转卡环式正锁
- 便于快速简单地连接和断开

最多可连接4个相机到一张Coaxlink卡

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

直接GPU传输
- 可提供用于AMD DirectGMA和NVIDIA (CUDA)的样例程序。
- GPU 直接传输消除了不必要的系统内存副本，降低了 CPU 开销，减少了延迟，从而显著改善了应用程序的数据传输时间。
- 使用AMD的DirectGMA，可直接将图像数据采集到GPU内存。兼容AMD FirePro W5x00和更高版本以及所有AMD FirePro S系列产品。

通用 I/O 线
- 兼容多种传感器和运动编码器。
- 高速差分输入：正交运动编码器，支持高达 5 MHz。
- 隔离式电流感应输入：接受 5V、12V、24V 信号电压，最高 50 kHZ，个别电气隔离高达 250VDC 和 170VAC RMS。
- 隔离触式输出。
- 高速 5V 兼容 TTL 输入/LVTTL 输出。

高性能 DMA（直接存储器存取）
- 直接传输到用户分配的内存和显示 PCI 地址的硬件板
- 硬件分散 – 聚集支持
- 64 位寻址能力

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

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

符合 Genicam 标准

包括支持

- GenApi
- 标准功能命名约定（SFNC）
- GenTL

Windows、Linux和macOS驱动程序可用

- 包含对英特尔 32 位和 64 位平台以及 ARM 64 位平台的支持

应用

视频采集和录制

- 用于运动分析和记录的高帧速率视频采集

视频监视、监控和安全

- 通过长距离同轴线缆传输和采集高清视频，进行交通监控、监视和控制

规格

Mechanical

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' on bracket: – 4x Micro-BNC 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 • 'I/O EXTENSION' on PCB: – 26-pin 2-row 0.05" pitch pin header with shrouding – I/O extension lines and power output • 'AUXILIARY POWER INPUT' on 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 card PCB: • 3-pin 1-row 0.1" header • Firmware emergency recovery
Dimensions	L 167.65 mm x H 111.15 mm L 6.6 in x H 4.38 in
Weight	196 g, 6.91 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. 18.1 W (6.3 W @ +3.3V, 11.8 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Interface standard(s)	CoaXPress 1.0, 1.1, 1.1.1 and 2.0
Connectors	Four micro-BNC 75 Ohms (also known as HD-BNC™) CXP-12
Status LEDs	One CoaXPress Host connection status LED per connection
Number of cameras	Four 1-connection area-scan cameras
Maximum aggregated camera data transfer rate	50 Gbit/s (5,000 MB/s)
Supported CXP down-connection speeds	1.25 GT/s (CXP-1), 2.5 GT/s (CXP-2), 3.125 GT/s (CXP-3), 5 GT/s (CXP-5), 6.25 GT/s (CXP-6), 10.0 GT/s (CXP-10), and 12.5 GT/s (CXP-12)
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: • 8-bit Bayer CFA single-tap (1X-1Y) progressive-scan • Image resolution (H x V): from 128 x 16 up to 5120 x 3840; width and height must be multiples of 8
Camera pixel formats supported	Bayer (PFNC names): • BayerGR8, BayerRG8, BayerGB8, BayerBG8

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	4 GB
Image data stream processing	• Optional swap of R and B components • 1:8 image downscaling available on RGB8 output (Stream0, a.k.a. "preview stream")
Bayer CFA to RGB decoder	• '4-camera' firmware variant: – 3x3 median-based interpolation method
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

On-board video codec

Video encoders	JPEG • Baseline profile • 4 encoders • Up to 250 Mpixels/second per encoder • JFIF compliant output

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) 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 • The LIN and QDC tools outputs can be further processed by the other tools (DIV, MDV, DEL) of the I/O toolbox to generate any of the following "trigger" events: – The "cycle trigger" of the Camera and Illumination controller – The "cycle sequence trigger" of the Camera and Illumination controller
Electrical specifications	• DIN: High-speed differential inputs 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
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. • Multiplier/divider tool (MDV): to generate m events every d 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). • 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.
I/O Toolbox composition	8 LIN, 4 QDC, 4 DIV, 4 MDV, 4 DEL, 1 UAS

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 10, 8.1, 7 for x86 (32-bit) and x86-64 (64-bit) processor architectures • Linux for x86 (32-bit), x86-64 (64-bit) and aarch64 (64-bit) processor architectures • macOS for x86-64 (64-bit) processor architecture Refer to release notes for details

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 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86 applications • x86_64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86_64 applications • aarch64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of aarch64 applications

Environmental conditions

Operating ambient air temperature	0 to +55 °C / +32 to +131 °F
Operating ambient air humidity	10 to 90% RH non-condensing
Storage ambient air temperature	-20 to +70 °C/ -4 to +158 °F
Storage ambient air humidity	10% to 90% RH non-condensing

Certifications

Electromagnetic - EMC standards	• European Council EMC Directive 2004/108/EC • United States FCC rule 47 CFR 15
EMC - Emission	• EN 55022:2010 Class B • FCC 47 Part 15 Class B
EMC - Immunity	• EN 55024:2010 Class B • EN 61000-4-3 • EN 61000-4-4 • EN 61000-4-6
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	• 3620-4 - Coaxlink Quad CXP-12 JPEG
Optional accessories	• 1625 - DB25F I/O Adapter Cable • 1636 - InterPC C2C-Link Adapter • 3303 - C2C-Link Ribbon Cable • 3304 - HD26F I/O Adapter Cable • 3610 - HD26F I/O Extension Module TTL-RS422 • 3612 - HD26F I/O Extension Module TTL-CMOS5V-RS422 • 3613 - JTAG Adapter Xilinx for Coaxlink

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