KAYA INSTRUMENTS

Rugged interconnect™ TECHNOLOGIES

Technologies evolve, our commitment remains

Chameleon II CoaXPress

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Camera Simulator with Four Channels

Innovative Approach

The **Chameleon II** is the industry's first CoaXPress 2.1 standard Camera Simulator. Capable of generating video streams and test patterns of up to 4 CoaXPress links in single, dual or quad modes with each link supporting standard CoaXPress bitrates of up to 12.5 Gbps. With a grand total PCI Express transfer rate of up to 55 Gbps, the Chameleon II is ideally suited for development of industrial, defense and aerospace Machine Vision systems and applications.

Intelligent Design

The **Chameleon II** Camera Simulator can easily transmit generic test patterns, customers' specific pre-processed data or custom video streams on the CoaXPress 2.1 links. The Chameleon II Simulator enables PoCXP simulation by connecting an external load.
A GPIO connector enables machine control signals such as triggers, timers, shaft-encoders, exposure-control and general I/O along with video stream acquisition. Standard Micro-BNC and headers connector are used as the CoaXPress 2.1 interface and the general purpose I/O, respectively.

Key Features:

- Static and dynamic test patterns
- BMP/RAW/TIFF/JPEG etc. image files
- RAW video files
- Streaming video (up to 55 Gbps)
- Data rates up to 12.5 Gbps per link
- Up to 32Gbyte image buffer
- Multiple pre-recorded video in sequential/loop modes
- Fully programmable image timing and
- Fully programmable configuration parameters
- Emulation of Camera controls and triggers
- GUI Interface
- Up to 4 CoaXPress device links
- Frame and line scan formats support
- Flexible GPIO interface on front bracket panel:
  - 4 TTL configurable I/Os
  - 4 LVTTL configurable I/Os
  - 4 LVDS inputs and outputs
  - 4 opto-isolated inputs and outputs
  - 4 quadrature rotary encoders
  - 4 timers
  - Integrated strobe controller
- CoaXPress V2.1 compliant
- Gen<i>Cam compliant
- Power over CoaXPress Simulation
- Supporting both Windows and Linux OS
- API for custom application development
- Plug-in modules for Matlab HALCON Cognex and Labview
- 4 Micro-BNC connectors for CoaXPress links
- PCIe Gen3 x8 Half-length card
- Per-Link LED indication on card bracket
- 0 °C to 55 °C operating environment temperatures

Technical Data

Feature	
Form Factor	PCI Express card
Format	Standard profile, half length, 8-lane PCI Express card
Cooling method	Air cooling, fan-cooled heatsink (optional passive heatsink)
Mounting	For insertion in a standard height, 8-lane or higher, PCI Express card slot
Connectors	▪ Ports 0 through 3 on bracket for 4x Micro-BNC female connectors CoaXPress host interface ▪ 1x standard header I/O connector ▪ Auxiliary power load (PoCXP) on bracket panel
Dimensions	167.65 mm x 111.15 mm | 6.6 in. x 4.38 in. (Length x Height)
Weight	225 g

Host bus	
Standard	PCI Express 3.0
Link width	8 lanes, 1, 2 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 ▪ Scatter gather support ▪ Physical address support (GPU transfers)
Peak delivery bandwidth	7,880 MB/s
Effective (sustained), delivery bandwidth	6,710 MB/s (Host PC motherboard dependent)
Power consumption	Typ. 16.8 W (3.8 W @ +3.3 V, 13 W @ +12 V), excluding camera and I/O power output

Camera / video inputs	
Interface standard(s)	CoaXPress 2.1 (CoaXPress 1.1 backward compatible)
Status LEDs	1 bicolor status LED per connector 4 System status LEDs
Number of links, per single host	Up to 4
MAX aggregated data transfer rate	50 Gbit/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 GT/s (CXP-10) ▪ 12.5 GT/s (CXP-12)
Number of video streams	1 data stream
Number of simulated cameras	1
Maximum stream packet size	8.192 bytes
PoCXP (Power over CoaXPress)	▪ PoCXP Safe Power ▪ Power over CoaXPress Simulation ▪ Power source must be connected to an external load
Video types	▪ Area-scan cameras: - Gray-scale and color (RGB and Bayer CFA) - Single-tap (1X-1Y) progressive-scan - Mlti tap images can be simulated with API and user image segmentation ▪ Line-scan cameras: - Gray-scale and color RGB
Bandwidth limitations	- 8bpp,12bpp,14bpp , 16bpp - 40Gpbs protocol limited - 10bpp – 34Gbps

Image width	16pixel to 16mega pixels
Image height	1pixel to 16mega pixels
Arbitrary image simulation	Not supported
Link Sharing	Images must be striped prior to loading to API or APP
Pixel formats supported	Raw, Monochrome, Bayer, RGB, YUV, YCbCr and RGBA (PFNC names): - Raw - 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 - YUV422_8, YUV422_16 - YCbCr709_422_8, YCbCr709_422_16

Area-scan camera control	
Trigger	▪ Precise control of asynchronous reset cameras, with exposure control. ▪ Support of camera exposure/readout overlap. ▪ Support of triggering from encoder or timer. ▪ Support of external hardware trigger, with optional delay, filtering and trigger decimation.
Downlink trigger	Not supported

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 and filtering. ▪ Support of triggering from encoder. ▪ Support of infinite acquisition, without missing lines.
Line trigger	Support for quadrature motion encoders, with programmable filters, selection of acquisition direction and backward motion compensation.
Line strobe	Accurate control of the strobe position for strobe light sources.
Downlink trigger	Not supported

On-board processing	
On-board memory	Up to 4GByte DDR4 SODIMM
Data stream statistics	Measurement of: - Frame/Line rate - Transmit packets - Test packets
Event signaling and counting	The application software can be notified of the occurrence of various events: - Newly generated buffers - Camera and Illumination control events - I/O events - Timer events - Encoder events

General Purpose Inputs and Outputs	
Number of lines	▪ 20 I/O lines: ▪ 4 differential inputs ▪ 4 differential outputs ▪ 8 singled-ended TTL inputs/outputs ▪ 4 singled-ended LVTTL inputs/outputs ▪ 4 opto-isolated inputs ▪ 4 opto-isolated outputs
Usage	▪ Any System I/O input lines can be connected to any I/O line ▪ Any I/O line can be used to decode A/B and Z signals of a motion encoder

	▪ Any I/O line can generate any trigger event ▪ Any I/O line can trigger a timer
Electrical specifications	▪ Differential lines - LVDS compatible ▪ TTL lines - 5V TTL compliant ▪ LVTTL lines - 3.3V LVTTL compliant ▪ Isolated lines - opto isolated lines with voltage range up to 30V
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
Encoders	▪ 4 quadrature encoders with A/B and Z inputs ▪ 32bit position counter ▪ Forward and backward counting ▪ Position trigger support ▪ Noise filtering
Timers	▪ 4 general purpose timers ▪ Configurable delay and duration ▪ 32bit accumulator
Event reporting	▪ 64-bit system timestamp event reporting ▪ Each I/O line can generate event on configurable edge ▪ Each Timer can generate event ▪ Each encoder can generate event

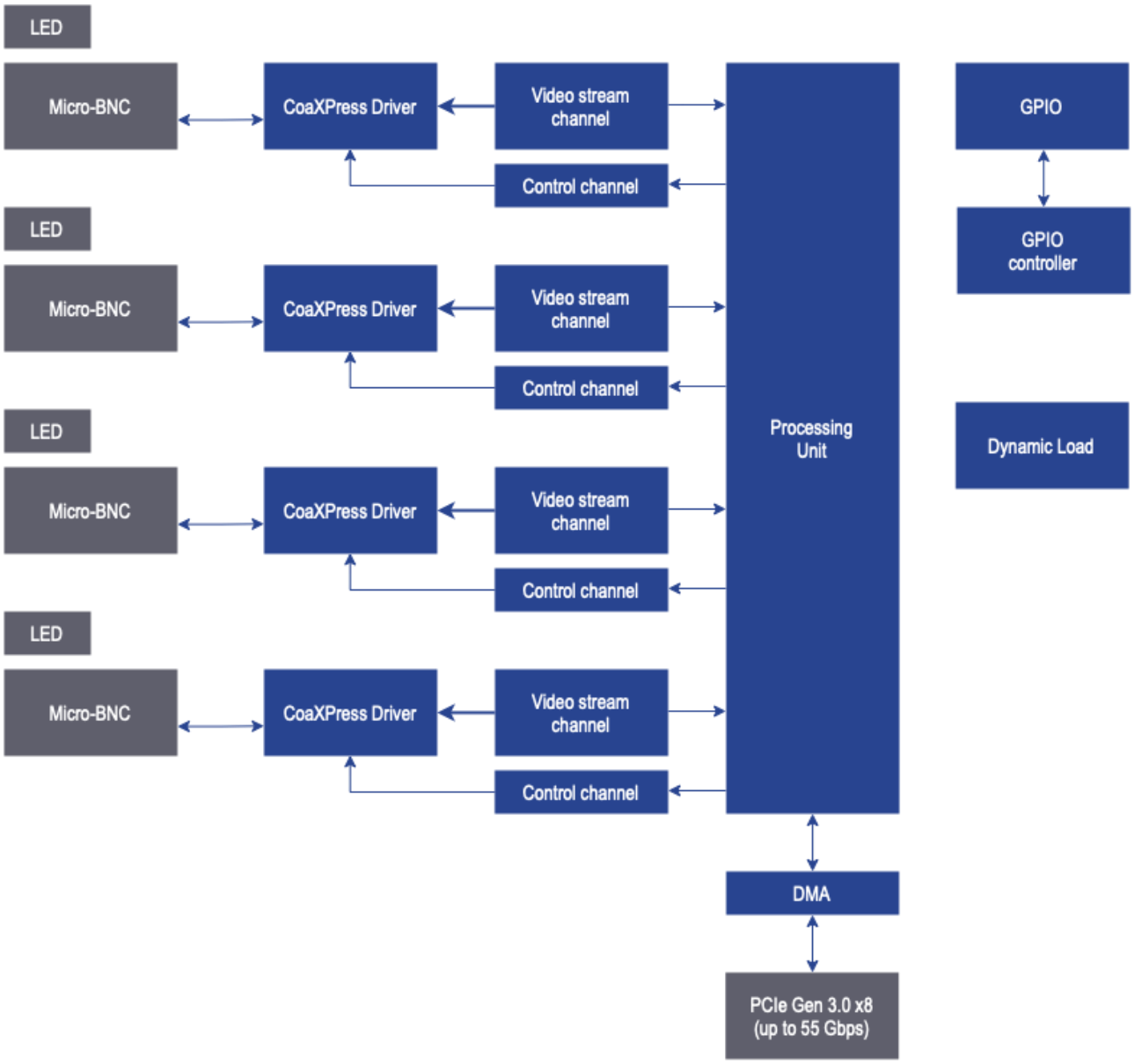
Software	
Host PC Operating System	▪ Microsoft Windows 11 32-bit and 64-bit versions ▪ Microsoft Windows 10 64-bit version ▪ Open source Linux kernel driver ▪ Tested and precompiled for Ubuntu 18.04 and 20.04 versions ▪ Nvidia Xavier AGX
Gen<i>Cam	▪ Support of Gen<i>Cam 3.2 ▪ Full camera parameters configuration
Buffer management	▪ Circular buffer support ▪ Accumulation of several frames/lines to single buffer to reduce CPU load ▪ DMA Buffer filling directly to system memory ▪ Buffer must be 32byte aligned
GUI	▪ Supported for Windows and Linux OS ▪ Camera display and configuration ▪ Flexible buffer queuing ▪ Image/video recording and playback
Debugging capabilities	▪ Event logging ▪ Statistics counters
APIs	▪ GenICam GenTL producer libraries C, Python and .NET bindings ▪ Compilers: x86_64 dynamic library designed to be used with ISO-compliant C runtime Allows for development of x86_64 applications ▪ Plug-in modules for Matlab, HALCON, Cognex and Labview

Environmental conditions	
Operating ambient air temperature	0 °C to +50 °C / +32 °F to +122 °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	▪ The European Council EMC Directive 2004/108/EC ▪ The Unites 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
Flammability	PCB compliant with UL 94 V-0
RoHS	Compliant with the European Union Directive 2011/65/EU (ROHS2)
REACH	Compliant with the European Union Regulation No 1907/2006
WEEE	Must be disposed of separately from normal household waste and must be recycled according to local regulations

Ordering Information	**KY-Chameleon-II**
Optional accessories	CoaXPress cables

Chameleon II CoaXPress Camera Simulator HW Block Diagram



Compatibility

KAYA Instruments creates and maintains compatibility and interfaces for the most common and advanced vision image processing libraries and applications. Major support is available for **MVTec Halcon, National Instruments' LabVIEW** and **MathWorks' MATLAB**.

- Supported vision standards:

CoaXPress® GEN<i>CAM TRANSPORT LAYER 10GigE VISION GEN CAMERA Link HS

- Supported vision libraries:

HALCON a product of MVTec OpenCV NATIONAL INSTRUMENTS LabVIEW COGNEX

- Supported operating systems:

Windows Linux

Please check our website for an up-to-date list of other supported libraries and software package

Contact Us

Please feel free to contact our team with any question or further inquiry at **info@kayainstruments.com** – we will be happy to provide assistance and consultation.

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