



Komodo II CoaXPress 12G PCIe/104

Komodo II CoaXPress 12G PCIe/104 Frame Grabber

Innovative Approach

Komodo II CoaXPress 12G PCIe/104 is the best in class Frame Grabber, supporting the CoaXPress 2.0 standard. It can receive video streams from up to 4 CoaXPress links in single, dual or quad modes. It can also be used for simultaneous capture from multiple cameras. Each link supports standard CoaXPress bitrates of up to 12.5 Gbps. The frame grabber utilizes PCIe/104 compact standard. It is rugged, reliable and the four-corner mounting holes make it particularly resistant to shock and vibrations. These features make the Komodo II CoaXPress 104 ideally suited for industrial, defense and aerospace Machine Vision Systems and applications.

Intelligent Design

The Komodo II CoaXPress 12G PCIe/104 can easily receive video streams on the CoaXPress links and transmit them to computer memory through the PCIe interface. This product also provides an external GPIO for machine control signals, such as triggers, timers, shaft encoders, exposure control and general I/O which can be controlled aside video stream acquisition. Our frame grabber uses standard Micro-BNC connectors as a CoaXPress interface to the camera. It utilizes PCIe Gen3 x8 links for communication with Host PC for video uploading and configuration.

Key Features:

- 1 to 4 CoaXPress links support
- Small stackable PCIe/104 form factor
- PCIe 3.0 (Gen 3) x8 bus
- Rugged design
- 2GB DDR4 frame buffer
- Camera controls and triggers
- Per-Link LED indication on front card bracket panel
- Flexible GPIO interface:
 - 4 TTL configurable I/Os
 - 4 LVTTTL configurable I/Os
 - 4 LVDS inputs and outputs
 - 4 opto-isolated outputs and inputs
 - 4 quadrature rotary encoders
 - Integrated strobe controller
 - 4 timers
- CoaXPress 2.0 compliant
- Power over CoaXPress with 13W per link
- Multiple camera synchronization
- Multiple Frame Grabbers synchronization
- Micro-BNC connectors for CoaXPress links
- GUI Interface
- Supporting Windows and Linux OS
- API for custom application development
- Plug-in modules for Matlab, HALCON, Cognex and Labview
- Gen<i>i</i>Cam compliant
- GenTL support
- Data rates up to 12.5 Gbps per link
- Transfer rates of up to 55 Gbps
- -40°C to 85°C operating environment temperatures

Technical Data

Feature	
Form factor	PCIe/104 Type 1
Cooling method	Conduction cooling
Mounting	PCIe/104 4 mounting holes
Connectors	<ul style="list-style-type: none"> Ports 0 through 3 via x4 extended Micro-BNC female connectors cables x1 External I/O connector on separate PCB: HD-DB26 D-sub panel mount (26-pin 3-row, through hole, right angle) Auxiliary power input (PoCXP) on PCB 6-pin PEG power socket 12 VDC power input for PoCXP camera(s)
Dimensions	L 106.6 mm x H 98.9 mm L 4.2 in x H 3.89 in
Weight	225gr
Host Bus	
Standard	PCI Express 3.0
Link width	8 lanes, 1, 2 or 4 lanes with reduced performance
Link speed	<ul style="list-style-type: none"> 8.0 GT/s (PCIe 3.0) 5.0 GT/s (PCIe 2.0) with reduced performance
Maximum payload size	512 bytes
DMA	<ul style="list-style-type: none"> 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	TBD
Camera / Video Inputs	
Interface standard(s)	CoaXPress 2.0 (CoaXPress 1.1 backward compatible)
Status LEDs	1 bicolor status LED per connector 4 System status LEDs
Number of cameras	Up to 4
Number of links per Single camera	Up to 4
Synchronization between cameras	Yes
Line-scan cameras supported	Yes
MAX aggregated camera data transfer rate	50 Gbit/s
Supported CXP down-connection speeds	<ul style="list-style-type: none"> 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 data streams (per camera)	1 data stream per camera
Maximum stream packet size	8.192 bytes
PoCXP (power over CoaXPress)	<ul style="list-style-type: none"> PoCXP Safe Power 13 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

Camera types

- Area-scan cameras:
 - Gray-scale and color (RGB and Bayer CFA)
 - Single-tap (1X-1Y) progressive-scan
- Line-scan cameras:
 - Gray-scale and color RGB

Camera 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
- YUV411_8, YUV411_10, YUV411_12, YUV411_14, YUV411_16
- YUV422_8, YUV422_10, YUV422_12, YUV422_14, YUV422_16
- YUV444_8, YUV444_10, YUV444_12, YUV444_14, YUV444_16
- YCbCr601_411_8, YCbCr601_411_10, YCbCr601_411_12, YCbCr601_411_14, YCbCr601_411_16
- YCbCr601_422_8, YCbCr601_422_10, YCbCr601_422_12, YCbCr601_422_14, YCbCr601_422_16
- YCbCr601_444_8, YCbCr601_444_10, YCbCr601_444_12, YCbCr601_444_14, YCbCr601_444_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.

Strobe

Accurate control of the strobe position for strobe 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 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.

On-Board Processing

On-board memory

2GByte DDR4

Bayer De-Mosaic

- Full 16bit resolution
- Bilinear 3x3
- Bilinear 3x2 for linescan with gradient correction

Color transformation

Full 16bit resolution 18bit coefficients table:

- Color space conversion
- Gain and Offset

Decimation

Line skip

Additional features

Unpacking of 10-/12-/14-bit to 16-bit with justification to LSB

Frame timestamp

64bit with 8ns precision

Data stream statistics

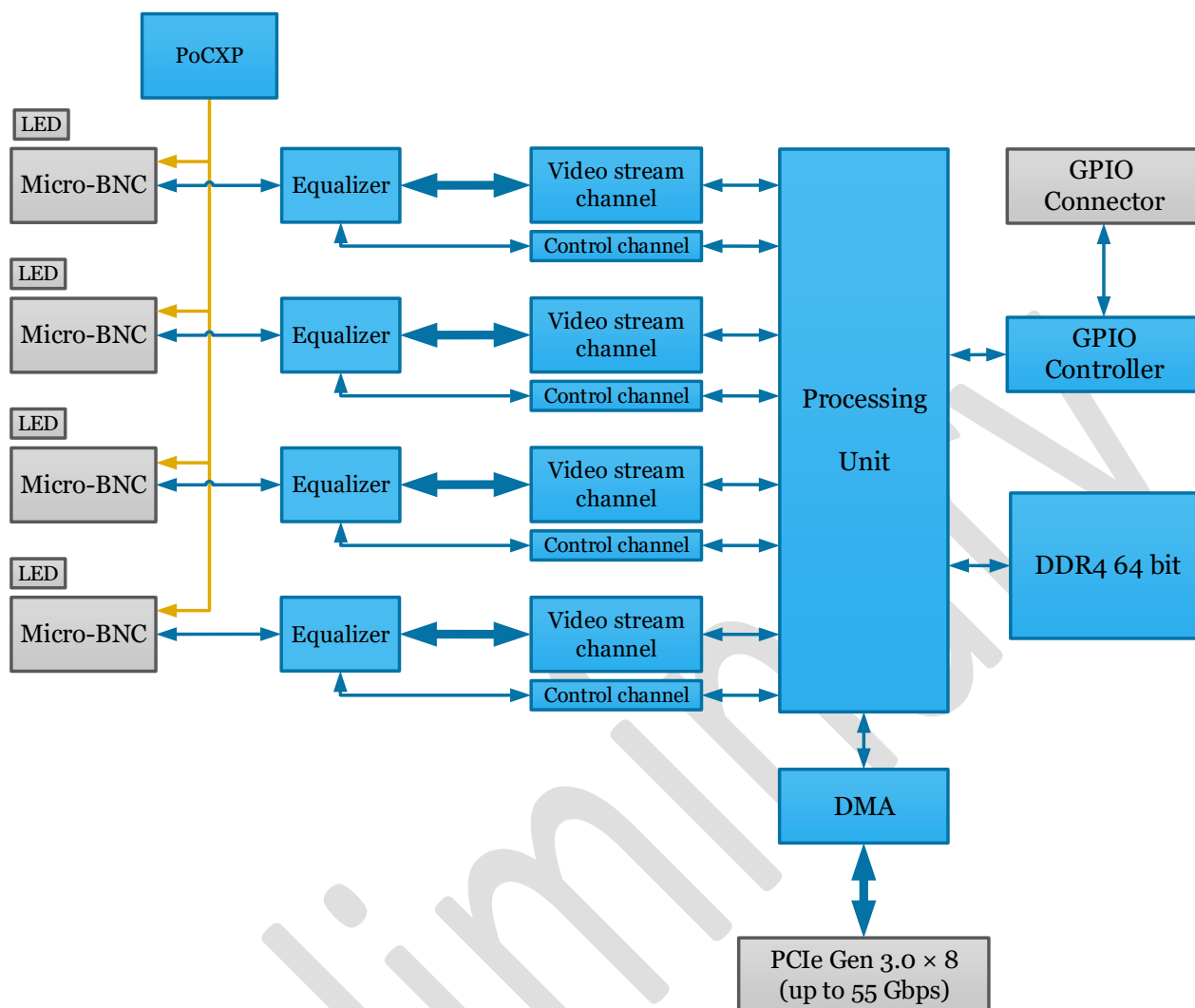
Measurement of:

- Frame/Line rate
- CRC Errors

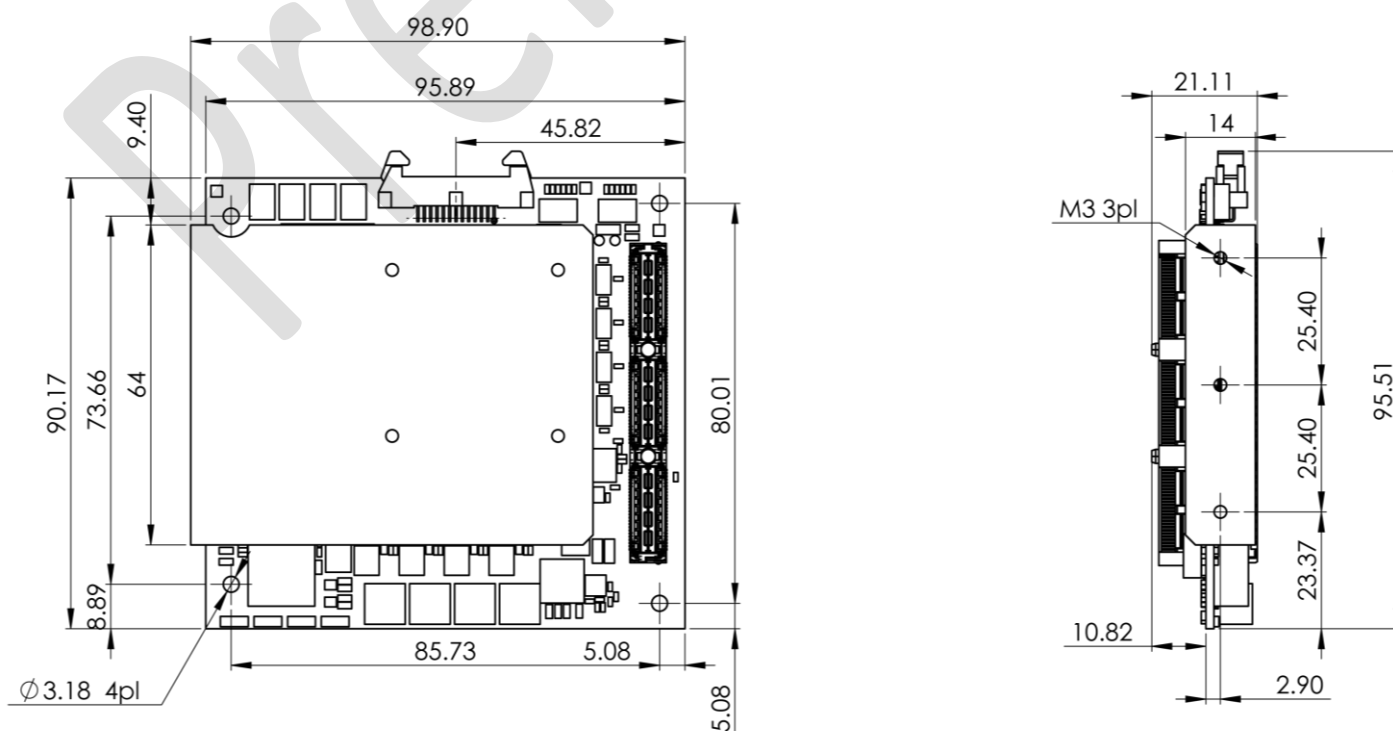
	<ul style="list-style-type: none"> - Dropped frames - Received packets - Test packets
Event signaling and counting	<p>The application software can be notified of the occurrence of various events:</p> <ul style="list-style-type: none"> - Newly acquired buffers - Camera and Illumination control events - I/O events - Timer events - Encoder events
General Purpose Inputs and Outputs	
Number of lines	<ul style="list-style-type: none"> ▪ 20 I/O lines: <ul style="list-style-type: none"> - 2 differential inputs - 2 differential outputs - 4 singled-ended TTL inputs/outputs - 4 singled-ended LVTTTL inputs/outputs - 4 opto-isolated inputs - 4 opto-isolated outputs
Usage	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Differential lines - LVDS compatible ▪ TTL lines: 5V TTL compliant ▪ LVTTTL lines: 3.3V LVTTTL compliant ▪ Isolated lines: opto-isolated lines with voltage range up to 30V
Filter control	<ul style="list-style-type: none"> ▪ Glitch removal filter available on all System I/O input lines ▪ Configurable filter time constants: <ul style="list-style-type: none"> - for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 μs - for IN lines: 500 ns, 1 μs, 2 μs, 5 μs, 10 μs
Polarity control	Yes
Encoders	<ul style="list-style-type: none"> ▪ 4 quadrature encoders with A/B and Z inputs ▪ 32bit position counter ▪ Forward and backward counting ▪ Position trigger support ▪ Noise filtering
Timers	<ul style="list-style-type: none"> ▪ 4 general purpose timers ▪ Configurable delay and duration ▪ 32bit accumulator
Event reporting	<ul style="list-style-type: none"> ▪ 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
Frame Grabber Synchronization	
Synchronization	Precise area and line-scan cameras synchronization across different frame grabbers

Software	
Host PC operating system	<ul style="list-style-type: none"> ▪ Microsoft Windows 10 32-bit and 64-bit versions ▪ Open source kernel driver ▪ Tested and precompiled for Ubuntu 18.04, RedHat 7.x, CentOS 7.x 64-bit versions ▪ Nvidia Xavier AGX (with an optional adapter card)
Gen<i>Cam	<ul style="list-style-type: none"> ▪ Support of Gen<i>Cam 2.4 and 3.0 ▪ Full camera and Frame Grabber parameters configuration
Buffer management	<ul style="list-style-type: none"> ▪ Circular buffer support ▪ Accumulation of several frames/lines to single buffer to reduce CPU load ▪ CPU load ▪ DMA Buffer filling directly to system memory
GUI	<ul style="list-style-type: none"> ▪ Supported for Windows and Linux OS ▪ Multi camera display and configuration ▪ Flexible buffer queuing ▪ Image/video recording and playback
Debugging capabilities	<ul style="list-style-type: none"> ▪ Event logging ▪ Statistics counters
APIs	<ul style="list-style-type: none"> ▪ Gen<i>Cam, GenTL producer libraries, C/C++, Python and NET bindings ▪ Compilers: <ul style="list-style-type: none"> - x86 and x86_64 dynamic library designed to be used with ISO-compliant C runtime Allows for development of x86 and x86_64 applications ▪ Plug-in modules for Matlab, HALCON, Cognex and Labview
Environmental Conditions	
Operating ambient air temperature	-40°C to +85°C / -40°F to +185 °F
Operating ambient air humidity	10% to 90% RH non-condensing
Storage ambient air temperature	-60°C to +90°C / -76°F to +194°F
Storage ambient air humidity	10% to 90% RH non-condensing
Shock/Vibration	MIL-STD-810G
Certifications	
Electromagnetic - EMC standards	<ul style="list-style-type: none"> ▪ The European Council EMC Directive 2004/108/EC ▪ The United States FCC rule 47 CFR 15
EMC - Emission	<ul style="list-style-type: none"> ▪ EN 55022:2010 Class B ▪ FCC 47 Part 15 Class B
EMC - Immunity	<ul style="list-style-type: none"> ▪ 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	
Optional accessories	CoaXPress cables

Komodo II CoaXPress 12G PCI/e104 Frame Grabber HW Block Diagram



Mechanical Drawings



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:



❖ Supported vision libraries:



❖ Supported operating systems:



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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