Predator II Single CoaXPress Thunderbolt
Single CXP-6 Frame Grabber

Innovative Approach

Predator II Single CoaXPress Thunderbolt is the best-in-class Frame Grabber, supporting the CoaXPress v2.1 standard. It can receive video streams from Single CoaXPress v2.1 link in single mode. It can also be used for simultaneous capture from multiple cameras. Each link supports standard CoaXPress v2.1 bitrates of up to 6.25 Gbps. These features make the **Predator II Single CoaXPress Thunderbolt** ideally suited for industrial, defense and aerospace Machine Vision Systems and applications.

Intelligent Design

The **Predator II Single CoaXPress Thunderbolt** can easily receive video streams on the CoaXPress link 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 v2.1 interface to the camera. It utilizes Thunderbolt 3 for communication with Host PC for video uploading and configuration.

Key Features:

- Single CoaXPress link support
- Thunderbolt 3
- PCIe 2.0 x2 bus
- 512 MB DDR3 frame buffer
- Camera controls and triggers
- Link Status LED indication
- CoaXPress v2.1 compliant
- Power over CoaXPress with 13 W per link
- Multiple camera synchronization
- Multiple Frame Grabbers synchronization
- Micro-BNC connectors for CoaXPress links
- GUI Interface
- Supporting Windows, Linux OS and Nvidia Jetpack
- API for custom application development
- Plug-in modules for Matlab, HALCON, Cognex and Labview
- Gen$<$i$>$Cam compliant
- GenTL support
- Data rates up to 6.25 Gbps per link
- Transfer rates of up to 850 MB/s
- 0 ℃ to +50 ℃ operating environment temperatures

TECHNICAL DATA

Mechanical	
Form factor	Thunderbolt 3
Format	External Thunderbolt 3 enclosure
Cooling method	Passive
Mounting	Stand Alone
Connectors	• Ports 1 through 1 via x1 Micro-BNC connectors for CoaXPress v2.1 interface
Dimensions	133 mm x 45 mm x 25 mm (5.2" x 1.8" x 1.0")
Weight	240 g (8.5 oz)

Host Bus	
Standard	PCI Express 2.0
Link width	• 2 lanes • 1 lane with reduced performance
Link speed	• 5.0 GT/s (PCIe 2.0)
Maximum payload size	256 bytes
DMA	• 64-bit addressing support • Scatter gather support • Physical address support (GPU transfers)
Peak delivery bandwidth	1,000 MB/s
Effective (sustained) delivery bandwidth	850 MB/s (Host PC dependent)
Power consumption	10 W, excluding camera and I/O power output

Camera / Video Inputs	
Interface standard(s)	CoaXPress v2.1 (CoaXPress 1.0, 1.1, 1.1.1 and 2.0 backward compatible)
Status LEDs	• 1 bicolor status LED per camera connector • 2 System status LEDs
Number of cameras	Up to 1
Number of links per single camera	Up to 1
Number of streams per single camera	Up to 1
Total number of streams per frame grabber	Up to 1
Synchronization between cameras	Yes
Line-scan cameras supported	Yes
Maximum aggregated camera data transfer rate	6.3 Gbit/s

Supported down-connection speeds	• 1.25 Gbit/s (CXP-1) • 2.5 Gbit/s (CXP-2) • 3.125 Gbit/s (CXP-3) • 5 Gbit/s (CXP-5) • 6.25 Gbit/s (CXP-6))
Supported up-connection speeds	• Low-speed 20.83... Mbps (CXP-1 to CXP-6)
Maximum stream packet size	8,192 bytes
Power over protocol	• PoCXP Safe Power • 13 W of 24 V DC regulated power per CoaXPress connector • PoCXP Device detection and automatic power-on • Overload and short-circuit protections • On-board 12 V to 24 V DC/DC converter
Camera types	Area-scan cameras: • Gray-scale and color (RGB and Bayer CFA) • Single-tap (1X-1Y) progressive-scan • Single-tap (1X-1Y) interlaced 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	512 MB DDR3
Bayer De-Mosaic	• Full 16-bit resolution • Bilinear 3x3 • Bilinear 3x2 for linescan with gradient correction
Color transformation	• Full 16-bit resolution 18-bit coefficients table • Color space conversion • Gain and Offset
Decimation	Line skip
Additional features	Unpacking of 10/12/14-bit to 16-bit LSB aligned
Frame timestamp	64-bit with 8 ns precision
Data stream statistics	Measurement of: • Frame rate • CRC Errors • Received/Dropped frames • Received/Dropped packets • Test packets
Event signaling and counting	The application software can be notified of the occurrence of various events: • Newly acquired buffers • I/O events • Timer events • Encoder events

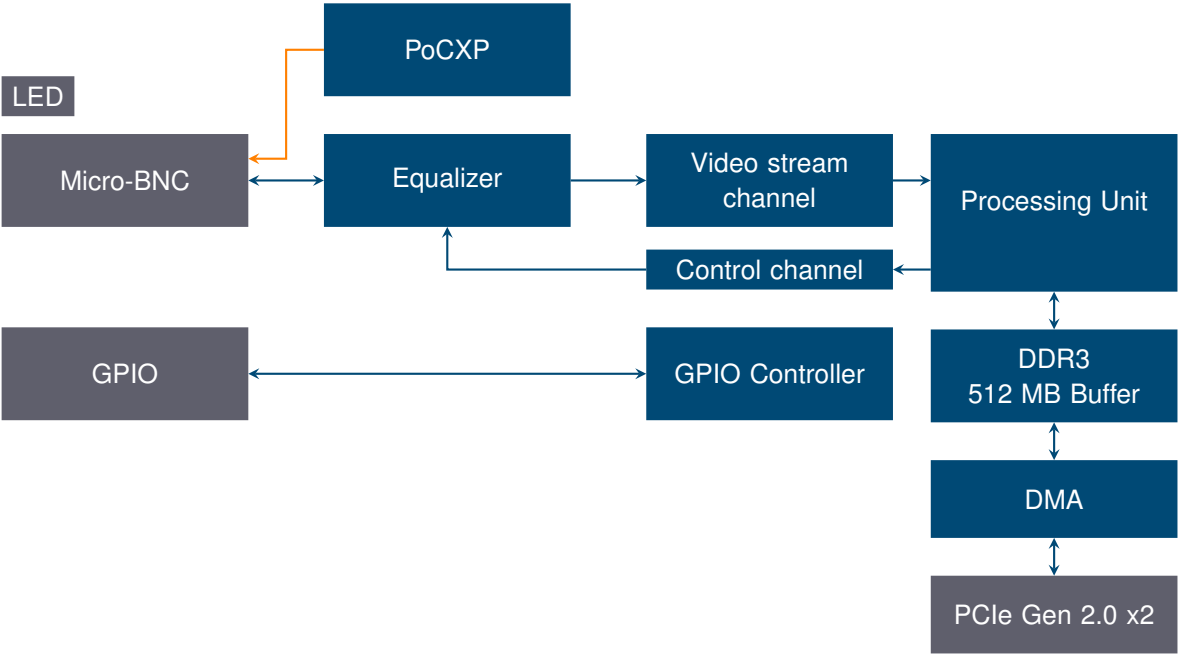| Software	
Host PC operating system	• Microsoft Windows 10 64-bit version • Microsoft Windows 11 64-bit version • Signed and certified kernel driver supporting Windows 10 and 11 • Source code Linux kernel driver (Automaticlly compiled during installation) • Tested for Ubuntu 18.04, 20.04 and 22.04 versions • Nvidia Xavier AGX (Jetpack 5.1.1 and 4.6.1) • Nvidia Orin AGX (Jetpack 5.1.1)
Gen<i>Cam	• Support of Gen<i>Cam 3.2 • Full camera and Frame Grabber parameters configuration
Buffer management	• Circular buffer support • Accumulation of several frames/lines to single buffer to reduce CPU load • Flexible buffer queuing • DMA Buffer filling directly to system memory
GUI	• Supported for Windows and Linux OS • Multi camera display and configuration • Image/video recording and playback
Debugging capabilities	• Event logging • Statistics counters

APIs	
	• Gen<i>Cam, GenTL producer libraries, ANSI C, Python and NET bindings
	• 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
	• Export straightforward, unified and easy-to-use API across all Grabber types
	• Include practical examples based on API functions, for supported language wrappers
	• Documentation include sample snippets for API usage

Environmental Conditions	
Operating ambient air temperature	0 ℃ to +50 ℃ (32 ℉ to +122 ℉)
Operating ambient air humidity	10% to 90% RH non-condensing
Storage ambient air temperature	0 ℃ to +55 ℃ (32 ℉ to +131 ℉)
Storage ambient air humidity	10% to 90% RH non-condensing
Shock/Vibration	-

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	
Part Number	KY-FGP-II-TB
Optional accessories	• CoaXPress cables • KY-PWR12 - 12V power supply to use PoCXP
Accessories Included	• Thunderbolt cable

HARDWARE BLOCK DIAGRAM

PoCXP

LED

Micro-BNC

Equalizer

Video stream channel

Processing Unit

Control channel

GPIO

GPIO Controller

DDR3
512 MB Buffer

DMA

PCIe Gen 2.0 x2

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.

KAYA Instruments

Please feel free to contact our sales team for pricing, availability, documentation or customization at our e-mails – we will be happy to provide assistance and consultation.
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