PC1633 Coaxlink Quad G3

General

Product name	PC1633 Coaxlink Quad G3
Product code	1633
Product status	Released

Mechanical

Form factor	PCI Express card
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 card bracket: 4 x DIN 1.0/2.3 75 Ohms coaxial receptacles CoaXPress Host Interface 'EXTERNAL I/O' on card bracket: 26-pin 3-row high-density D-Sub female socket with UNC4-40 jack socket screws I/O lines and I/O power output 'INTERNAL I/O 1' on printed circuit board: 26-pin 2-row 0.1" pitch pin header with shrouding I/O lines and I/O power output 'INTERNAL I/O 2' on printed circuit board: 26-pin 2-row 0.1" pitch pin header with shrouding I/O lines and I/O power output 'C2C-LINK' on printed circuit board: 6-pin 2-row 0.1" pitch pin header with shrouding Card-to-card link 'AUXILIARY POWER INPUT' on printed circuit board: 6-pin PEG power socket 12 V DC power input for PoCXP and I/O power output
LED indicators	'A', 'B', 'C', 'D' on bracket:

Mechanical

	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	Net weight: 173 g [6.1 oz]
	Gross weight: 274 g [9.7 oz]

Host Bus

Standard	PCI Express 3.0
Link width	4 lanes
	1 lane or 2 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	3,900 MB/s
Effective (sustained) delivery bandwidth	3,350 MB/s (Host PC motherboard dependent)
Power consumption	Typ. 16.8 W (3.8 W @ +3.3V, 13 W @ +12V), excluding camera and I/O power output

Camera Inputs

Camera interface standard	CoaXPress
Interface standard(s)	CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1
Maximum link speed	CXP-6
Maximum link width	4 connections
Camera powering	PoCXP

Camera Inputs

Connectors	Four DIN1.0/2.3 75 Ohms CXP-6
Status LEDs	One CoaXPress Host connection status LED per connection
Number of cameras	Area-scan cameras: One 1- or 2- or 4-connection camera One 1- or 2- or 4-connection multi-stream camera (up to 4 data streams) One or two 1- or 2-connection cameras One 1- or 2-connection and one or two 1-connection cameras Up to four 1-connection cameras One 4-connection sub-link of an 8-connection camera Line-scan cameras: One 1- or 2- or 4-connection camera One or two 1- or 2-connection cameras Up to four 1-connection cameras
Maximum number of cameras	4
Line-scan cameras supported	Yes
Maximum aggregated camera data transfer rate	25 Gbps (2,500 MB/s)
Supported CXP down-connection speeds	1.25 Gbps (CXP-1), 2.5 Gbps (CXP-2), 3.125 Gbps (CXP-3), 5 Gbps (CXP-5), and 6.25 Gbps (CXP-6)
Number of CXP data streams (per camera)	4 on '1-camera, 4 data-stream' firmware variant 1 per camera on other firmware variants
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: Grayscale and color (YCbCr, YUV, RGB and Bayer CFA) Single-tap (1X-1Y) progressive-scan Line-scan cameras and contact imaging sensors: Grayscale and color RGB

Camera Inputs

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.

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. Support of infinite acquisition, without missing line, for web inspection applications.
Line trigger	Support for quadrature motion encoders, with programmable noise filters, selection of acquisition direction and backward motion compensation. Rate Converter tool for fine control of the pixel aspect ratio: Rate Conversion Ratio in the range 0.001 to 1000 with an accuracy better than 0.1%. Rate Divider tool
Line strobe	Accurate control of the strobe position for strobed light sources.

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

On-Board Processing

	Optional swap of R and B components Little endian conversion
Flat-field correction	Only available with the '1-camera' and '1-camera, line-scan' firmware variants
Input LUT (Lookup Table)	Available on all the firmware variants but '1-camera, 4-data-stream': Monochrome 8-bit to 8-bit transformation Monochrome 10-bit to 8-, 10- or 16-bit transformations Monochrome 12-bit to 8-, 12- or 16-bit transformations
Bayer CFA to RGB decoder	'1-camera' firmware variant: 3x3 linear interpolation method 3x3 median-based interpolation method '2-camera' firmware variant: 5x5 gradient-based interpolation method (for one camera only)
Data stream statistics	Measurement of: Frame rate (Area-scan only) Line rate Data rate Configurable averaging interval

On-Board Processing

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 I/O

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

General Purpose I/O

	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 delay: Custom value Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs Fixed values 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): 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. Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet message from the remote device. 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. 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). 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. The 'Input Tools' (LIN, QDC, DLT and UAS) can be further processed by the 'Event Tools' (DEL, DIV and MDV) 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

General Purpose I/O

	The "start-of-scan trigger" of the Acquisition Controller (line-scan only) The "end-of-scan trigger" of the Acquisition Controller (line-scan only)
I/O Toolbox composition	Determined by the selected firmware variant: '1-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C '2-camera': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 2 C2C '3-camera': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 2 C2C '4-camera': 8 LIN, 4 QDC, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 2 C2C '1-camera, 4-data-stream': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C '1-camera, line-scan': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C '2-camera, line-scan': 8 LIN, 2 QDC, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 3 C2C '4-camera, line-scan': 8 LIN, 4 QDC, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 3 C2C '1-slm-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C '1-sls-camera': 8 LIN, 1 QDC, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

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: 120 cm inside a PC 1200 m cumulated adapter to adapter cable length Maximum trigger rate:

C2C Link

	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

Driver name	eGrabber
First release	Coaxlink 4.0
Current release	eGrabber 25.12
Host PC Operating System	Microsoft Windows 11, 10 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 4.6 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
Memento supported	Yes

Environmental

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

EMC standards

European Council EMC Directive 2014/30/EU

United States FCC CFR Title 47 Part 15B

EMC - Emission

EN 55032:2015 / CISPR 32:2012 Class B

FCC CFR Title 47 Part 15B Class B

EMC - Immunity

EN 55024:2010 / CISPR 24:2010

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