# PC3623 Coaxlink Quad CXP-12 Value

## General

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| Product name | PC3623 Coaxlink Quad CXP-12 Value |
| Product code | 3623 |
| Product status | Released |

## Mechanical

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| Form factor | PCI Express card |
| 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 card bracket:<br>4 x Micro-BNC 75 Ohms coaxial receptacles<br>CoaXPress Host Interface<br>'EXTERNAL I/O' on card bracket:<br>26-pin 3-row high-density D-Sub female socket with UNC4-40 jack socket screws<br>I/O lines and I/O power output<br>'INTERNAL I/O 1' on printed circuit board:<br>26-pin 2-row 0.1" pitch pin header with shrouding<br>I/O lines and I/O power output<br>'INTERNAL I/O 2' on printed circuit board:<br>26-pin 2-row 0.1" pitch pin header with shrouding<br>I/O lines and I/O power output<br>'I/O EXTENSION' on printed circuit board:<br>26-pin 2-row 0.05" pitch pin header with shrouding<br>I/O extension cable socket<br>'C2C-LINK' on printed circuit board:<br>6-pin 2-row 0.1" pitch pin header with shrouding<br>Card-to-card link<br>'AUXILIARY POWER INPUT' on printed circuit board: |

## Mechanical

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| | 6-pin PEG power socket<br>12 V DC power input for PoCXP and I/O power output |
| LED indicators | 'A', 'B', 'C', 'D' on bracket:<br>Bi-color red/green LEDs<br>CoaXPress Host connector indicator<br>'FPGA STATUS LAMP' on PCB:<br>Bi-color red/green LED<br>FPGA status indicator<br>'BOARD STATUS LAMP' on PCB:<br>Bi-color red/green LED<br>Board status indicator |
| Switches | 'RECOVERY' on PCB:<br>3-pin 1-row 0.1" header or 2-way DIP switch<br>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: 187 g [6.6 oz]<br>Gross weight: 287 g [10.1 oz] |

## Host Bus

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| Standard | PCI Express 3.0 |
| Link width | 8 lanes<br>1 lane, 2 lanes or 4 lanes with reduced performance |
| Link speed | 8.0 GT/s (PCIe 3.0)<br>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. 16.7 W (3.3 W @ +3.3V, 13.4 W @ +12V), excluding camera and I/O power output |

## Camera Inputs

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|---|---|
| Camera interface standard | CoaXPress |
| Interface standard(s) | CoaXPress 1.0, 1.1, 1.1.1, 2.0 and 2.1 |

## Camera Inputs

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|---|---|
| Maximum link speed | CXP-12 |
| Maximum link width | 4 connections |
| Camera powering | PoCXP |
| 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 | Area-scan cameras:<br>One 1- or 2- or 4-connection camera<br>Two 1- or 2-connection cameras<br>Four 1-connection cameras<br>Line-scan cameras:<br>One 1- or 2- or 4-connection camera<br>Two 1- or 2-connection cameras<br>Four 1-connection cameras |
| Maximum number of cameras | 4 |
| Line-scan cameras supported | Yes |
| Maximum aggregated camera data transfer rate | 50 Gbps (5,000 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), 6.25 Gbps (CXP-6), 10.0 Gbps (CXP-10), and 12.5 Gbps (CXP-12) |
| Supported CXP up-connection speeds | Low-speed 20.83... Mbps (CXP-1 to CXP-6)<br>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:<br>17 W of 24V DC regulated power per CoaXPress connector<br>PoCXP Device detection and automatic power-on<br>Overload and short-circuit protections<br>On-board 12V to 24V DC/DC converter<br>A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable |
| Camera types | Area-scan cameras:<br>Grayscale and color (YCbCr, YUV, RGB and Bayer CFA)<br>Single-tap (1X-1Y) progressive-scan<br>Two-tap (1X-2YE) on two distinct data streams ( '1-camera' firmware variant only) |

## Camera Inputs

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|---|---|
| | Line-scan cameras and contact imaging sensors:<br><br>Grayscale and color RGB |
| Camera pixel formats supported | Mono8, Mono10, Mono12, Mono14, Mono16<br><br>BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG<br><br>RGB8, RGB10, RGB12, RGB14, RGB16<br><br>RGBA8, RGBA10, RGBA12, RGBA14, RGBA16<br><br>YCbCr601_422_8, YCbCr601_422_10<br><br>YCbCr709_422_8, YCbCr709_422_10<br><br>YUV422_8, YUV422_10<br><br>Raw |

## Area Scan Camera Control

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| Trigger | Precise control of asynchronous reset cameras, with exposure control.<br><br>Support of camera exposure/readout overlap.<br><br>Support of external hardware trigger, with optional delay and trigger decimation. |
| Strobe | Accurate control of the strobe position for strobed light sources.<br><br>Support of early and late strobe pulses. |

## Line Scan Camera Control

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| Scan/page trigger | Precise control of start-of-scan and end-of-scan triggers.<br><br>Support of external hardware trigger, with optional delay.<br><br>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.<br><br>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%.<br><br>Rate Divider tool |
| Line strobe | Accurate control of the strobe position for strobed light sources. |

## On-Board Processing

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| On-board memory | 4 GB |
| Image data stream processing | Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSb or MSb<br>Optional swap of R and B components<br>Little endian conversion |
| Flat-field correction | Only available with the '1-camera' firmware variant |
| Input LUT (Lookup Table) | Monochrome 8-bit to 8-bit transformation<br>Monochrome 10-bit to 8-, 10- or 16-bit transformations<br>Monochrome 12-bit to 8-, 12- or 16-bit transformations |
| Bayer CFA to RGB decoder | '1-camera' firmware variant:<br>3x3 linear interpolation method<br>3x3 median-based interpolation method |
| Pixel binning | TBD |
| Data stream statistics | Measurement of:<br>Frame rate (Area-scan only)<br>Line rate<br>Data rate<br>Configurable averaging interval |
| Event signaling and counting | The application software can be notified of the occurrence of various events:<br>Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers<br>A large set of custom events<br>Custom events sources:<br>I/O Toolbox events<br>Camera and Illumination control events<br>CoaXPress data stream events<br>CoaXPress host interface events<br>Each custom event is associated with a 32-bit counter that counts the number of occurrences<br>The last three 32-bit context data words of the event context data can be configured with event-specific context data:<br>Event-specific data<br>State of all System I/O lines sampled at the event occurrence time<br>Value of any event counter |

## General Purpose I/O

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| Number of lines | 20 I/O lines:<br><br>4 differential inputs (DIN)<br><br>4 singled-ended TTL inputs/outputs (TTLIO)<br><br>8 isolated inputs (IIN)<br><br>4 isolated outputs (IOUT)<br><br>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<br><br>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<br><br>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<br><br>IIN: 200 kHz isolated current-sense input with wide voltage input range up to 30V, compatible with totem-pole (push-pull) HTL drivers, 5V TTL/RS-422 differential line drivers, 5V CMOS drivers, potential free contacts, solid-state relays and opto-couplers<br><br>IOUT: Isolated contact outputs compatible with 30V / 100mA loads<br><br>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<br><br>Configurable filter delay:<br><br>Custom value<br><br>Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs<br><br>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):<br><br>Line Input tool (LIN): edge detector delivering events on rising or falling edges of any selected input line.<br><br>Quadrature Decoder tool (QDC): a composite tool including:<br><br>A quadrature edge detector delivering events on selected transitions of selected pairs of input lines. |

## General Purpose I/O

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| | An optional backward motion compensator for clean line-scan image acquisition when the motion is unstable.<br><br>A 32-bit up/down counter for delivering a position value.<br><br>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.<br><br>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.<br><br>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).<br><br>Divider tool (DIV): to generate an event every nth input events from any I/O toolbox event source.<br><br>Multiplier/divider tool (MDV): to generate m events every d input events from any I/O toolbox event source.<br><br>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:<br><br>The "cycle trigger" of the Camera and Illumination controller<br><br>The "cycle sequence trigger" of the Camera and Illumination controller<br><br>The "start-of-scan trigger" of the Acquisition Controller (line-scan only)<br><br>The "end-of-scan trigger" of the Acquisition Controller (line-scan only) |
| I/O Toolbox composition | Determined by the selected firmware variant:<br><br>'1-camera': 8 LIN, 1 QDC, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C<br><br>'2-camera': 8 LIN, 1 QDC, 4 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C<br><br>'4-camera': 8 LIN, 4 QDC, 8 DLT, 1 UAS, 2 DEL, 4 DIV, 4 MDV, 2 C2C<br><br>'1-camera, line-scan': 8 LIN, 1 QDC, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C<br><br>'2-camera, line-scan': 8 LIN, 2 QDC, 4 DLT, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 3 C2C<br><br>'4-camera, line-scan': 8 LIN, 4 QDC, 8 DLT, 1 UAS, 4 DEL, 4 DIV, 4 MDV, 3 C2C |

## C2C Link

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| Description | Accurate synchronization of the trigger and the start-of-exposure of multiple grabber-controlled area-scan cameras. |

## C2C Link

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|---|---|
| | 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:<br><br>the same card<br><br>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)<br><br>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)<br><br>Maximum distance:<br><br>120 cm inside a PC<br><br>1200 m cumulated adapter to adapter cable length<br><br>Maximum trigger rate:<br><br>2.5 MHz for configurations using a single PC, or up to 10 PCs and 100 m total C2C-Link cable length<br><br>200 kHz for configurations up to 32 PCs and 1200m total C2C-Link cable length<br><br>Trigger propagation delay from master to slave devices:<br><br>Less than 10 ns for cameras on the same card or on different cards in the same PC<br><br>Less than 265 ns for cameras on different cards in different PCs (3 PCs and 40m total C2C-Link cable length) |

## Software

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| Driver name | eGrabber |
| First release | eGrabber 23.08 |
| Current release | eGrabber 25.12 |
| Host PC Operating System | Microsoft Windows 11, 10 for x86-64 (64-bit) processor architecture<br><br>Linux for x86-64 (64-bit) and AArch64 (64-bit) processor architectures<br><br>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<br><br>GenICam GenTL producer libraries compatible with C/C++ compilers: |

## Software

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| | 'x86_64' dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86-64 (64-bit) applications<br><br>'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

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| 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 |

## Certifications

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| EMC standards | European Council EMC Directive 2014/30/EU<br><br>United States FCC CFR Title 47 Part 15B |
| EMC - Emission | EN 55032:2015 / CISPR 32:2012 Class B<br><br>FCC CFR Title 47 Part 15B Class B |
| EMC - Immunity | EN 55024:2010 / CISPR 24:2010<br><br>EN 55035:2017 / CISPR 35:2016<br><br>EN 61000-4-2:2009<br><br>EN 61000-4-3:2006<br><br>EN 61000-4-4:2004<br><br>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 |