

# PC3622 Coaxlink Duo CXP-12

## General

|                |                            |
|----------------|----------------------------|
| Product name   | PC3622 Coaxlink Duo CXP-12 |
| Product code   | 3622                       |
| Product status | Released                   |

## Mechanical

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Form factor    | PCI Express card                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Format         | Low profile, half length, 4-lane PCI Express card                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Cooling method | Air cooling, fan-cooled heatsink                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Mounting       | For insertion in a 4-lane or higher, PCI Express card slot.<br><br>Delivered with standard- and low-profile brackets for insertion in a standard- or a low-profile chassis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Connectors     | 'A B' on card bracket:<br><br>2 x Micro-BNC 75 Ohms coaxial receptacles<br><br>CoaXPress Host Interface<br><br>'EXTERNAL I/O' on card bracket:<br><br>15-pin 3-row high-density D-Sub female socket with UNC4-40 jack socket screws<br><br>I/O lines and I/O power output<br><br>'INTERNAL I/O 1' on printed circuit board:<br><br>26-pin 2-row 0.1" pitch pin header with shrouding<br><br>I/O lines and I/O power output<br><br>'I/O EXTENSION' on printed circuit board:<br><br>26-pin 2-row 0.05" pitch pin header with shrouding<br><br>I/O extension cable socket<br><br>'C2C-LINK' on printed circuit board:<br><br>6-pin 2-row 0.1" pitch pin header with shrouding<br><br>Card-to-card link<br><br>'AUXILIARY POWER INPUT' on printed circuit board:<br><br>6-pin PEG power socket<br><br>12 V DC power input for PoCXP and I/O power output |

## Mechanical

|                |                                                   |
|----------------|---------------------------------------------------|
| LED indicators | 'A', 'B' on bracket:                              |
|                | 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                            |
| Switches       | Board status indicator                            |
|                | 'RECOVERY' on PCB:                                |
|                | 3-pin 1-row 0.1" header or 2-way DIP switch       |
| Dimensions     | Firmware emergency recovery                       |
|                | PCB L x H: 167.65 mm x 68.9 mm [6.6 in x 2.71 in] |
| Weight         | Net weight: 122 g [4.3 oz]                        |
|                | Gross weight: 232 g [8.2 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. 14.8 W (4.3W @ 3.3V, 10.5 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-12                                 |
| Maximum link width        | 2 connections                          |

## Camera Inputs

|                                              |                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Camera powering                              | PoCXP                                                                                                                                                                                                                                                                                                                                            |
| Connectors                                   | Two micro-BNC 75 Ohms (also known as HD-BNC™) CXP-12                                                                                                                                                                                                                                                                                             |
| Status LEDs                                  | One CoaXPress Host connection status LED per connection                                                                                                                                                                                                                                                                                          |
| Number of cameras                            | <p>Area-scan cameras:</p> <p>One 1- or 2-connection camera</p> <p>One or two 1-connection cameras</p> <p>Line-scan cameras:</p> <p>One 1- or 2-connection camera</p> <p>One or two 1-connection cameras</p>                                                                                                                                      |
| Maximum number of cameras                    | 2                                                                                                                                                                                                                                                                                                                                                |
| Line-scan cameras supported                  | Yes                                                                                                                                                                                                                                                                                                                                              |
| Maximum aggregated camera data transfer rate | 25 Gbps (2,500 MB/s)                                                                                                                                                                                                                                                                                                                             |
| Supported CXP down-connection speeds         | <p>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)*</p> <p>NOTE: mixing CXP-10 and CXP-12 is not allowed!</p>                                                                                                                                            |
| Supported CXP up-connection speeds           | <p>Low-speed 20.83... Mbps (CXP-1 to CXP-6)</p> <p>Low-speed 41.66... Mbps (CXP-10, CXP-12)</p>                                                                                                                                                                                                                                                  |
| Number of CXP data streams (per camera)      | 1 data stream per camera                                                                                                                                                                                                                                                                                                                         |
| Maximum CXP stream packet size               | 16,384 bytes                                                                                                                                                                                                                                                                                                                                     |
| PoCXP (Power over CoaXPress)                 | <p>PoCXP Safe Power:</p> <p>17 W of 24V DC regulated power per CoaXPress connector</p> <p>PoCXP Device detection and automatic power-on</p> <p>Overload and short-circuit protections</p> <p>On-board 12V to 24V DC/DC converter</p> <p>A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable</p> |
| Camera types                                 | <p>Area-scan cameras:</p> <p>Grayscale and color (RGB and Bayer CFA)</p> <p>Single-tap (1X-1Y) progressive-scan</p> <p>Line-scan cameras:</p> <p>Grayscale and color RGB</p>                                                                                                                                                                     |
| Camera pixel formats supported               | <p>Mono8, Mono10, Mono12, Mono14, Mono16</p> <p>BayerXX8, BayerXX10, BayerXX12, BayerXX14, BayerXX16 where XX = GR, RG, GB, or BG</p>                                                                                                                                                                                                            |

## Camera Inputs

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

## Line Scan Camera Control

|                   |                                                                                                                                                                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scan/page trigger | <p>Precise control of start-of-scan and end-of-scan triggers.</p> <p>Support of external hardware trigger, with optional delay.</p> <p>Support of infinite acquisition, without missing line, for web inspection applications.</p>                                                                                                       |
| Line trigger      | <p>Support for quadrature motion encoders, with programmable noise filters, selection of acquisition direction and backward motion compensation.</p> <p>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%.</p> <p>Rate Divider tool</p> |
| Line strobe       | <p>Accurate control of the strobe position for strobed light sources.</p>                                                                                                                                                                                                                                                                |

## On-Board Processing

|                              |                                                                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On-board memory              | 1 GB                                                                                                                                                                |
| Image data stream processing | <p>Unpacking of 10-/12-/14-bit to 16-bit with selectable justification to LSB or MSb</p> <p>Optional swap of R and B components</p> <p>Little endian conversion</p> |

## On-Board Processing

|                              |                                                                                                                        |
|------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Input LUT (Lookup Table)     | 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     | 5x5 gradient-based interpolation method on '1-camera' firmware variant                                                 |
| Data stream statistics       | Measurement of:                                                                                                        |
|                              | Frame rate (Area-scan only)                                                                                            |
|                              | Line rate                                                                                                              |
|                              | Data rate                                                                                                              |
|                              | Configurable averaging interval                                                                                        |
| 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 | 10 I/O lines:                              |
|                 | 2 differential inputs (DIN)                |
|                 | 2 singled-ended TTL inputs/outputs (TTLIO) |
|                 | 4 isolated inputs (IIN)                    |
|                 | 2 isolated outputs (IOUT)                  |
|                 | NOTES:                                     |

## General Purpose I/O

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | <p>Only 2 IIN and 1 IOOUT lines are available on the EXTERNAL I/O connector.</p> <p>The number of I/O lines can be extended using I/O modules attached to the I/O EXTENSION connector.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Usage                     | <p>Any I/O input lines can be used by any LIN tool of the I/O Toolbox</p> <p>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</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Electrical specifications | <p>DIN: High-speed differential inputs, up to 5 MHz, compatible with ANSI/EIA/TIA-422/485 differential line drivers and complementary TTL drivers</p> <p>TTLIO: High-speed 5V-compliant TTL inputs or LVTTTL outputs, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers or LVTTTL, TTL, 3V CMOS receivers</p> <p>IIN: Isolated current-sense inputs with wide voltage input range up to 30V, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers, RS-422 differential line drivers, potential free contacts, solid-state relays and opto-couplers</p> <p>IOOUT: Isolated contact outputs compatible with 30V / 100mA loads</p> <p>NOTE: IIN and IOOUT 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!</p> |
| Filter control            | <p>Glitch removal filter available on all System I/O input lines</p> <p>Configurable filter delay:</p> <p>Custom value</p> <p>Fixed values for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 µs</p> <p>Fixed values for IIN lines: 500 ns, 1 µs, 2 µs, 5 µs, 10 µs</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Polarity control          | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Power output              | Non-isolated, +12V, 1A, with electronic fuse protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| I/O Toolbox tools         | <p>The I/O Toolbox is a configurable interconnection of tools that generates events (usually triggers):</p> <p>Line Input tool (LIN): edge detector delivering events on rising or falling edges of any selected input line.</p> <p>Quadrature Decoder tool (QDC): a composite tool including:</p> <p>A quadrature edge detector delivering events on selected transitions of selected pairs of input lines.</p> <p>An optional backward motion compensator for clean line-scan image acquisition when the motion is unstable.</p> <p>A 32-bit up/down counter for delivering a position value.</p> <p>Device Link Trigger tool (DLT): delivers an event on reception of a valid high-speed CoaXPress 2.0 connection trigger packet</p>                                                                                                     |

## General Purpose I/O

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

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, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 2 C2C

'2-camera': 8 LIN, 2 QDC, 4 DLT, 1 UAS, 2 DEL, 2 DIV, 2 MDV, 2 C2C

'1-camera, line-scan': 8 LIN, 1 QDC, 2 DLT, 1 UAS, 2 DEL, 1 DIV, 1 MDV, 3 C2C

'2-camera, line-scan': 8 LIN, 2 QDC, 4 DLT, 1 UAS, 2 DEL, 2 DIV, 2 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)

## C2C Link

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:

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 12.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Current release          | eGrabber 25.12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Host PC Operating System | <p>Microsoft Windows 11, 10 for x86-64 (64-bit) processor architecture</p> <p>Linux for x86-64 (64-bit) and AArch64 (64-bit) processor architectures</p> <p>macOS for x86-64 (64-bit) and AArch64 (64-bit) processor architectures</p>                                                                                                                                                                                                                                                                                                |
| APIs                     | <p>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</p> <p>GenICam GenTL producer libraries compatible with C/C++ compilers:</p> <p>'x86_64' dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86-64 (64-bit) applications</p> <p>'aarch64' dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of AArch64 (64-bit) applications</p> |
| 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   |

## Certifications

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