# CLT-303R & CLT-303L CAMERA LINK TRANSLATOR

# User's Manual

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# Table of Contents

# 1. Introduction

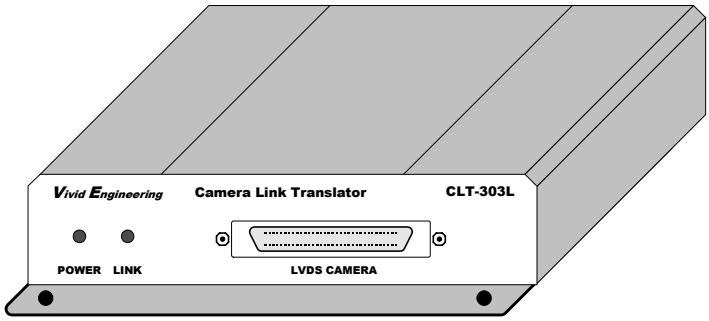
## 1.1. Overview

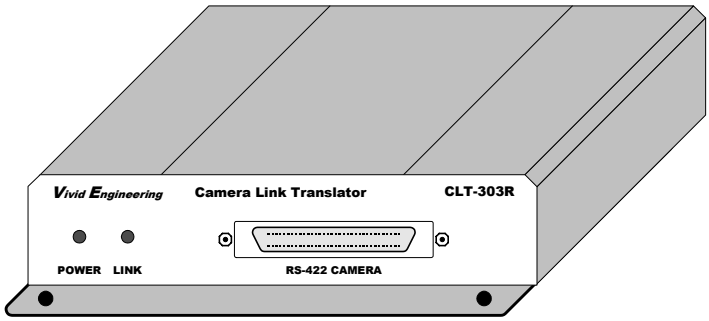
The CLT-303R and CLT-303L Camera Link [1] Translators enable the use of traditional RS-422 and LVDS digital cameras with Camera Link frame grabbers. The "R" and "L" versions support parallel RS-422 and LVDS digital camera data, respectively. The CLT-303's can convert a wide range of cameras from parallel digital output to Camera Link base configuration with up-to 24-bit data.

Cameras with pixel clock rates as low as 2.5 MHz and as high as 85 MHz are supported. Features include RS-232 communication support, a camera signal detect indicator, and isolated DC power input.

The CLT-303's are housed in sturdy, compact aluminum enclosures. A locking-plug power supply is optional.

[1] The Camera Link interface standard enables the interoperability of cameras and frame grabbers, regardless of vendor. The Automated Imaging Association (AIA) sponsors the Camera Link program including the oversight Camera Link Committee, the self-certification program, and the product registry. The Camera Link specification may be downloaded from the AIA website, found at www.machinevisiononline.org


Vivid Engineering
Camera Link Translator
CLT-303L
POWER
LINK
LVDS CAMERA


Vivid Engineering
Camera Link Translator
CLT-303R
POWER
LINK
RS-422 CAMERA

## 1.2. Features

- Enable use of RS-422 and LVDS cameras with Camera Link frame grabbers
- Also useful for converting parallel video from FPGA and imaging development boards
- Camera Link "base" configuration interface, supports up-to 24-bit data
- "R" version supports RS-422 cameras
- "L" version supports LVDS cameras
- 2.5 MHz to 85 MHz camera pixel clock range for "L" version
- 2.5 MHz to 32 MHz camera pixel clock range for "R" version
- RS-232 camera communication support
- Selectable camera clock and timing signal polarities
- Link indicator
- Isolated DC power input
- Minimal data pass-through latency
- Flow-through connector placement
- Sturdy, compact aluminum enclosure with mounting flange
- Multi-nation power supply included, locking-plug power supply optional
- 3-year warrantee

## 1.3. Functional Description

The CLT-303L & CLT-303R Camera Link Translators enable the use of traditional RS-422 and LVDS digital cameras with Camera Link frame grabbers. Block diagrams of the CLT-303R and CLT-303L are provided in Figures 1-1 and 1-2, respectively. The CLT-303R is intended for use with RS-422 digital cameras and the CLT-303L for use with LVDS (EIA-644) digital cameras.

The camera interface receives video data in parallel digital format using RS-422 or LVDS, depending on CLT-303 version. The camera interface incorporates a 68-pin SCSI-style connector.

The CLT-303 frame grabber interfaces incorporates the connector, signals, pinout, and chipset in compliance with the Camera Link specification. The CLT-303 incorporates the "base" configuration signal set, consisting of video data, camera control, and serial communications.

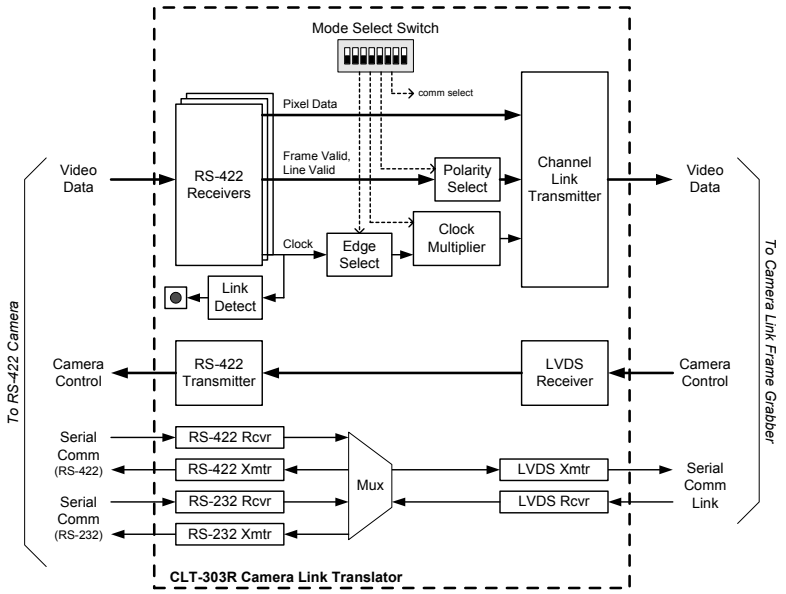



**Figure 1-1: CLT-303R Block Diagram**

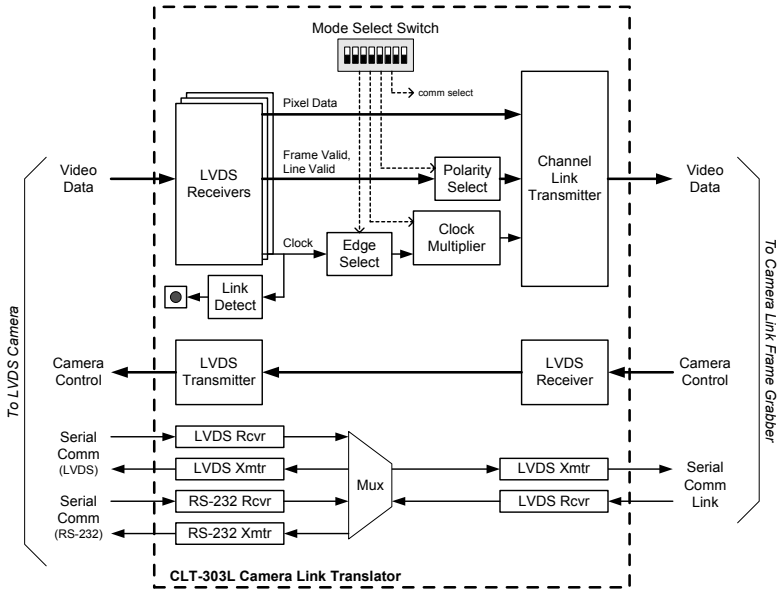



**Figure 1-2: CLT-303L Block Diagram**

The CLT-303 receives parallel digital camera data on the 68-pin camera connector and maps the pixel data into the corresponding Camera Link "base" configuration format. The CLT supports single-channel (monochrome) cameras with 8/10/12/14/16-bit pixels, dual-channel 8/10/12-bit cameras, and 8-bit color cameras.

The latency (i.e. delay) of the video, control, and communication signals passing through the CLT-303 is minimal. This is an important criteria in time-critical applications. See Table 1.1 for CLT-303 latency specifications.

Camera timing signal characteristics are selected using the rear-panel mode switch. One switch position is used to select the polarity of the line valid signal, and a second switch position is used to select the polarity of the frame valid signal. In most cases, a "high" state on the line enable and frame enable signals is used to envelope valid lines and frames of video data, respectively. The settings enable the user to select either active-high or active-low polarities for each timing signal. Note that the frame enable signal is not used in line scan applications. Switch settings are defined in Section 1.3.1.

Camera Link incorporates a data valid signal which is used to qualify the video data. This signal is generated by the CLT-303 and sent to the Camera Link frame grabber. Most LVDS and RS-422 digital cameras do not incorporate a *data valid* type signal. The CLT-303 incorporates a provision for the rare cases in which a data valid *is* provided by the camera. When the data valid pass-through dip switch position is raised, the CLT-303 passes the data valid signal from the camera to the frame grabber. The Camera Link data valid input is active-high, qualifying the incoming video data when the signal is high. A second dipswitch position, data valid polarity, supports either active-high or active-low data valid signals from the camera. When the data valid pass-through dipswitch is in the normal (low) position, the CLT-303 maintains the data valid signal sent to the frame grabber in the high position. The only exception is when the clock multiplier is being used which is discussed next.

Camera pixel clock characteristics are selected using the rear-panel mode switch. One switch position is used to select which pixel clock edge, rising or falling, is used to sample the data and timing signals received from the camera. Two additional switch positions are used to enable the CLT-303 clock multiplier circuit. The clock multiplier supports the use of camera with pixel clock frequency below the Camera Link 20MHz minimum by "multiplying" the camera clock frequency before it is sent to the Camera Link frame grabber.. For cameras with pixel clocks in the 10-19.99 MHz range, the clock multiplier is used to 2x (i.e. double) the clock frequency. For cameras with pixel clocks in the 5-9.99 MHz range, the clock multiplier is used to 4x (i.e. quadruple) the clock frequency. For cameras with pixel clocks in the 2.5-4.99 MHz range, the clock multiplier is used to 8x the clock frequency.

The result of using the clock multiplier is a 2x/4x/8x oversampling of camera data and timing signals sent to the Camera Link frame grabber. When in 2x/4x/8x mode, the CLT-303L & CLT-303R toggles the "data valid" signal defined in the Camera Link Specification accordingly. If the frame grabber supports the data valid signal, the oversampling affect is removed automatically. Otherwise, the oversampling is easily removed in the frame grabber by adjusting the line timing (multiply by 2/4/8) and decimating (divide by 2/4/8) the pixels in the "X" dimension. Two switch positions are used to select camera clock characteristics. Switch settings are defined in Section 1.3.1.

The CLT-303 receives four LVDS camera control signals from the Camera Link frame grabber and retransmits two of the signals (CC1 and CC2) to the camera using LVDS or RS-422 signaling, depending on CLT-303 version. These signals are often used to externally synchronize the camera (i.e. EXSYNC).

The CLT-303 routes the serial communication signals between the LVDS/RS-422 digital camera and the Camera Link frame grabber. This supports host computer access to mode control and status registers in the camera via the serial port included in the Camera Link frame grabber. The camera may or may not incorporate a serial port. The CLT-303 supports differential signaling (LVDS or RS-422, depending on CLT-303 version) for the camera serial port as well as RS-232 single-ended signaling which is used with some LVDS/RS-422 cameras. A rear-panel dipswitch is used to select the camera serial port signaling standard (RS-422/LVDS or RS-232). Note that the LVDS/RS-422 and RS-232 serial ports use different pins on the 68-pin camera connector. The camera cable must be correctly wired for the desired serial port signaling standard.

The CLT-303L & CLT-303R *frame grabber* interface incorporates LVDS devices for the serial communication signals (per Camera Link). The *camera* interface serial signals are implemented using LVDS or RS-422 devices, depending on CLT-303 version.

A front-panel link status indicator illuminates when the camera video signal is detected. The front panel also includes a power indicator.

The CLT-303 is powered by an external wall plug-in power supply. A multi-nation power supply is standard. Optionally, the CLT-303 is available with a locking-plug power supply. The locking plug reduces the risk of accidental disconnection from the rear-panel power jack. The CLT-303 is also available without power supply.

The CLT-303 DC power input is electrically isolated from the internal circuitry. This feature ensures compatibility with user power systems.

**Note: The CLT-303 requires a steady, continuous pixel clock from the camera.**

### 1.3.1. Mode Switch Settings

The CLT-303 incorporates a rear-panel mode select switch. The switch allows the user to identify camera timing signal, serial communication, and clock characteristics. The mode switch has eight positions. The functional assignments are defined in Figure 1-3.

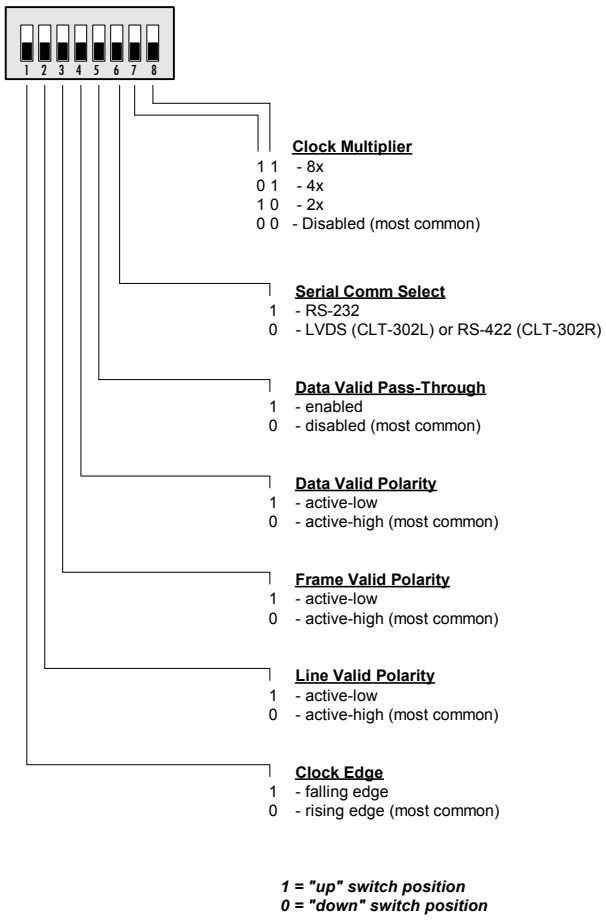



**Figure 1-3: CLT-303 Mode Switch Definition**

**Note: Normal (default) dipswitch settings are "all-low" as shown above**

## 1.4. Typical Application

A typical CLT-303 application is shown in Figure 1-4. An LVDS camera is connected to the CLT-303L using a camera cable that incorporates a 68-pin connector and pin assignments for use with the CLT-303L and RS-232 camera communication . The CLT-303L is connected to the frame grabber using a standard Camera Link cable.

The camera in this example is 8-bit, dual-channel, area-scan with a 20MHz pixel clock and LVDS signaling. The frame enable and line enable timing signals are conventional active-high. The camera does not generate a data valid signal. Data sampling is via the falling edge of the camera pixel clock. The serial control port on the camera is RS-232. The corresponding mode switch settings are shown in Figure 1-5. The clock multiplier feature is not required in this example since the pixel clock is within the 20-85 MHz range required by Camera Link.

The Camera Link frame grabber is programmed for area-scan, base-configuration, dual-channel, 8-bit mode. The pixel clock rate is set at 20MHz and video timing is set to match camera characteristics.

Camera control signal CC1 is routed from the frame grabber, through the CLT-303L, to the camera for use as an EXSYNC pulse, exposure control, etc.

The serial port in the Camera Link frame grabber is used to control and monitor camera functions.

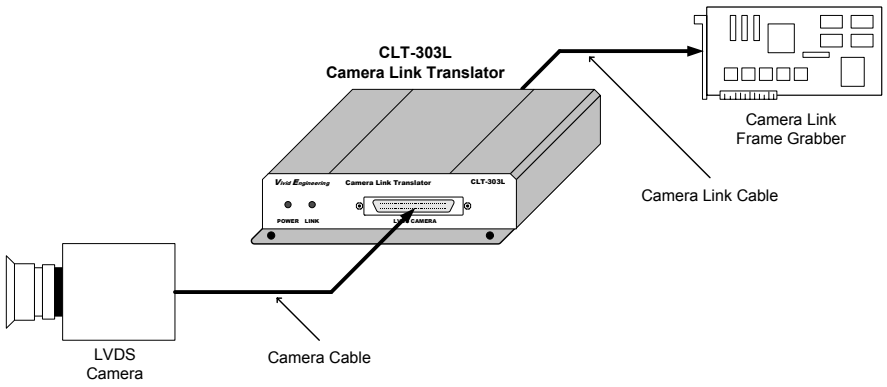



**Figure 1-4: CLT-303 Typical Application**

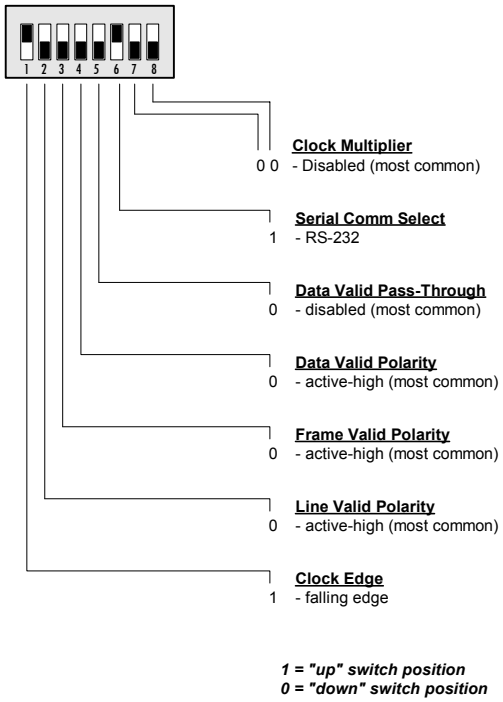



**Figure 1-5: Example Mode Settings**

## 1.5. Specifications

**Table 1-1: CLT-303L & CLT-303R Specifications**

| Feature | Specification |
|---|---|
| Camera Interface | - "R" version = Parallel RS-422<br>- "L" version = Parallel LVDS (EIA-644) |
| Camera Connector | 68-pin SCSI-style (HD68) |
| Frame Grabber Interface | Camera Link "base" configuration |
| Frame Grabber Connector | 26-pin MDR type |
| Camera Frequency | - "R" version: 2.5 - 32 MHz<br>- "L" version: 2.5 - 85 MHz |
| Mode Selection | Rear-panel 8-position DIP switch |
| Latency | Video path: 3 camera pixel clock cycles<br>Control signals: 20 ns max |
| Power Supply | Universal wall style w/ outlet plug set |
| Power Plug | 2.1 x 5.5 mm, center-positive. Locking style optional |
| Power Requirements | 4.5 – 9.0 VDC, internally isolated<br>- 300 mA @ 5 VDC (typical) |
| Cabinet Dimensions | 5.28" (L) x 1.12" (H) x 6.13" (D) |
| Weight | 13 oz |
| Operating Temperature Range | 0 to 50° C |
| Storage Temperature Range | -25 to 75° C |
| Relative Humidity | 0 to 90%, non-condensing |
| Compliance | FCC Class A, ROHS, CE EN55024 pending |

# 2. Interface

## 2.1. Front Panel Connections

A CLT-303L & CLT-303R Camera Link Translator front panel is shown in Figure 2-1 (CLT-303L shown). The front panel contains a 68-pin video connector for connecting to the camera , an LED power indicator, and an LED link indicator. The camera connector is a 68-pin SCSI-3 type (HD68), TE Connectivity p/n 5787170-7. Included are two jackscrew sockets (TE Connectivity p/n 749087-2) that mate with camera cable 2-56 thread jackscrews. Figure 2-2 identifies the pin positions.

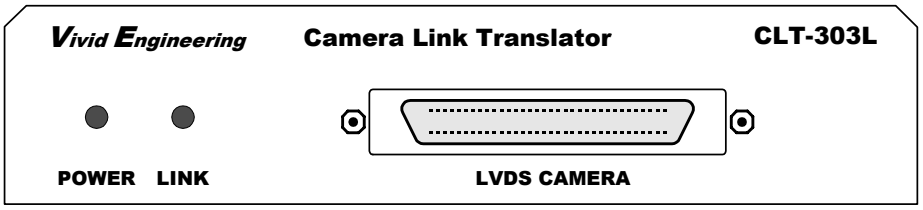



**Figure 2-1: CLT-303L Front Panel**

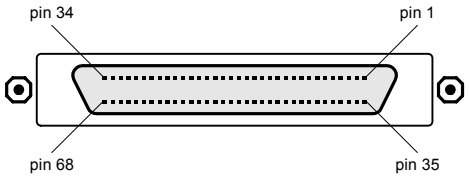



**Figure 2-2: HD68 Connector Pin Positions**

### 2.1.1. Camera Connector Signals

Tables 2-1 through 2-5 identify the 68-pin camera connector signal assignments for single-channel pixel data modes (1x8, 1x10, 1x12, 1x14, and 1x16). Tables 2-6 through 2-8 identify the signal assignment for dual-channel modes (2x8, 2x10, 2x12), and Table 2-9 identifies the signal assignment for color mode (3x8). **The appropriate table must be used when making a camera cable for use with the CLT-303.**

### 2.1.2. Camera Cable Shielding and Grounding

At a minimum, one digital ground pin at the camera connector must be connected to one of the digital ground pins on the CLT-303 connector in order to maintaining signal reference levels between camera and CLT-303. Camera cable "inner" shields (if present) should also be connected to CLT-303 digital ground pins.

Camera cable "outer" shields should be attached to the metallic connector shell, which contacts the CLT-303 aluminum enclosure. CLT-303 enclosure body and endplate contacting surfaces are unpainted, providing a Faraday cage to shield the internal circuitry. The enclosure is isolated from the CLT-303 circuitry, avoiding possible safety concerns.

### 2.1.3. Camera Cable Recommended Connectors

The following is a list of recommended CLT-303 mating connectors (plugs) and housings (backshells) to use when making camera cables:

Plug, TE Connectivity p/n 1-5750913-7
Plug, TE Connectivity p/n 5750913-7
Plug, TE Connectivity p/n 5749111-6
Plug, TE Connectivity p/n 5749621-7
Backshell, TE Connectivity p/n 5786152-3
Backshell, TE Connectivity p/n 5750752-1
Backshell, TE Connectivity p/n 5750752-3

*Other suitable connector manufacturers include NorComp, Acon, and Harting.*

## Table 2-1: Camera Connector, 8-bit Single-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 +[1] | 8 | CAM → CLT-303 | |
| A7 -[1] | 42 | CAM → CLT-303 | |
| *Unused Input* | 9 | CAM → CLT-303 | |
| *Unused Input* | 43 | CAM → CLT-303 | |
| *Unused Input* | 10 | CAM → CLT-303 | |
| *Unused Input* | 44 | CAM → CLT-303 | |
| *Unused Input* | 11 | CAM → CLT-303 | |
| *Unused Input* | 45 | CAM → CLT-303 | |
| *Unused Input* | 12 | CAM → CLT-303 | |
| *Unused Input* | 46 | CAM → CLT-303 | |
| *Unused Input* | 13 | CAM → CLT-303 | |
| *Unused Input* | 47 | CAM → CLT-303 | |
| *Unused Input* | 14 | CAM → CLT-303 | |
| *Unused Input* | 48 | CAM → CLT-303 | |
| *Unused Input* | 15 | CAM → CLT-303 | |
| *Unused Input* | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| *Unused Input* | 16 | CAM → CLT-303 | |
| *Unused Input* | 50 | CAM → CLT-303 | |
| *Unused Input* | 17 | CAM → CLT-303 | |
| *Unused Input* | 51 | CAM → CLT-303 | |
| *Unused Input* | 18 | CAM → CLT-303 | |
| *Unused Input* | 52 | CAM → CLT-303 | |
| *Unused Input* | 19 | CAM → CLT-303 | |
| *Unused Input* | 53 | CAM → CLT-303 | |
| *Unused Input* | 20 | CAM → CLT-303 | |
| *Unused Input* | 54 | CAM → CLT-303 | |
| *Unused Input* | 21 | CAM → CLT-303 | |
| *Unused Input* | 55 | CAM → CLT-303 | |
| *Unused Input* | 22 | CAM → CLT-303 | |
| *Unused Input* | 56 | CAM → CLT-303 | |
| *Unused Input* | 23 | CAM → CLT-303 | |
| *Unused Input* | 57 | CAM → CLT-303 | |
| *Unused Input* | 24 | CAM → CLT-303 | |
| *Unused Input* | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-2: Camera Connector, 10-bit Single-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 + | 8 | CAM → CLT-303 | |
| A7 - | 42 | CAM → CLT-303 | |
| A8 + | 9 | CAM → CLT-303 | |
| A8 - | 43 | CAM → CLT-303 | |
| A9 +[1] | 10 | CAM → CLT-303 | |
| A9 -[1] | 44 | CAM → CLT-303 | |
| *Unused Input* | 11 | CAM → CLT-303 | |
| *Unused Input* | 45 | CAM → CLT-303 | |
| *Unused Input* | 12 | CAM → CLT-303 | |
| *Unused Input* | 46 | CAM → CLT-303 | |
| *Unused Input* | 13 | CAM → CLT-303 | |
| *Unused Input* | 47 | CAM → CLT-303 | |
| *Unused Input* | 14 | CAM → CLT-303 | |
| *Unused Input* | 48 | CAM → CLT-303 | |
| *Unused Input* | 15 | CAM → CLT-303 | |
| *Unused Input* | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| *Unused Input* | 16 | CAM → CLT-303 | |
| *Unused Input* | 50 | CAM → CLT-303 | |
| *Unused Input* | 17 | CAM → CLT-303 | |
| *Unused Input* | 51 | CAM → CLT-303 | |
| *Unused Input* | 18 | CAM → CLT-303 | |
| *Unused Input* | 52 | CAM → CLT-303 | |
| *Unused Input* | 19 | CAM → CLT-303 | |
| *Unused Input* | 53 | CAM → CLT-303 | |
| *Unused Input* | 20 | CAM → CLT-303 | |
| *Unused Input* | 54 | CAM → CLT-303 | |
| *Unused Input* | 21 | CAM → CLT-303 | |
| *Unused Input* | 55 | CAM → CLT-303 | |
| *Unused Input* | 22 | CAM → CLT-303 | |
| *Unused Input* | 56 | CAM → CLT-303 | |
| *Unused Input* | 23 | CAM → CLT-303 | |
| *Unused Input* | 57 | CAM → CLT-303 | |
| *Unused Input* | 24 | CAM → CLT-303 | |
| *Unused Input* | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-3: Camera Connector, 12-bit Single-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 + | 8 | CAM → CLT-303 | |
| A7 - | 42 | CAM → CLT-303 | |
| A8 + | 9 | CAM → CLT-303 | |
| A8 - | 43 | CAM → CLT-303 | |
| A9 + | 10 | CAM → CLT-303 | |
| A9 - | 44 | CAM → CLT-303 | |
| A10 + | 11 | CAM → CLT-303 | |
| A10 - | 45 | CAM → CLT-303 | |
| A11 +[1] | 12 | CAM → CLT-303 | |
| A11 -[1] | 46 | CAM → CLT-303 | |
| *Unused Input* | 13 | CAM → CLT-303 | |
| *Unused Input* | 47 | CAM → CLT-303 | |
| *Unused Input* | 14 | CAM → CLT-303 | |
| *Unused Input* | 48 | CAM → CLT-303 | |
| *Unused Input* | 15 | CAM → CLT-303 | |
| *Unused Input* | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| *Unused Input* | 16 | CAM → CLT-303 | |
| *Unused Input* | 50 | CAM → CLT-303 | |
| *Unused Input* | 17 | CAM → CLT-303 | |
| *Unused Input* | 51 | CAM → CLT-303 | |
| *Unused Input* | 18 | CAM → CLT-303 | |
| *Unused Input* | 52 | CAM → CLT-303 | |
| *Unused Input* | 19 | CAM → CLT-303 | |
| *Unused Input* | 53 | CAM → CLT-303 | |
| *Unused Input* | 20 | CAM → CLT-303 | |
| *Unused Input* | 54 | CAM → CLT-303 | |
| *Unused Input* | 21 | CAM → CLT-303 | |
| *Unused Input* | 55 | CAM → CLT-303 | |
| *Unused Input* | 22 | CAM → CLT-303 | |
| *Unused Input* | 56 | CAM → CLT-303 | |
| *Unused Input* | 23 | CAM → CLT-303 | |
| *Unused Input* | 57 | CAM → CLT-303 | |
| *Unused Input* | 24 | CAM → CLT-303 | |
| *Unused Input* | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-4: Camera Connector, 14-bit Single-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 + | 8 | CAM → CLT-303 | |
| A7 - | 42 | CAM → CLT-303 | |
| A8 + | 9 | CAM → CLT-303 | |
| A8 - | 43 | CAM → CLT-303 | |
| A9 + | 10 | CAM → CLT-303 | |
| A9 - | 44 | CAM → CLT-303 | |
| A10 + | 11 | CAM → CLT-303 | |
| A10 - | 45 | CAM → CLT-303 | |
| A11 + | 12 | CAM → CLT-303 | |
| A11 - | 46 | CAM → CLT-303 | |
| A12 + | 13 | CAM → CLT-303 | |
| A12 - | 47 | CAM → CLT-303 | |
| A13 +[1] | 14 | CAM → CLT-303 | |
| A13 -[1] | 48 | CAM → CLT-303 | |
| *Unused Input* | 15 | CAM → CLT-303 | |
| *Unused Input* | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| *Unused Input* | 16 | CAM → CLT-303 | |
| *Unused Input* | 50 | CAM → CLT-303 | |
| *Unused Input* | 17 | CAM → CLT-303 | |
| *Unused Input* | 51 | CAM → CLT-303 | |
| *Unused Input* | 18 | CAM → CLT-303 | |
| *Unused Input* | 52 | CAM → CLT-303 | |
| *Unused Input* | 19 | CAM → CLT-303 | |
| *Unused Input* | 53 | CAM → CLT-303 | |
| *Unused Input* | 20 | CAM → CLT-303 | |
| *Unused Input* | 54 | CAM → CLT-303 | |
| *Unused Input* | 21 | CAM → CLT-303 | |
| *Unused Input* | 55 | CAM → CLT-303 | |
| *Unused Input* | 22 | CAM → CLT-303 | |
| *Unused Input* | 56 | CAM → CLT-303 | |
| *Unused Input* | 23 | CAM → CLT-303 | |
| *Unused Input* | 57 | CAM → CLT-303 | |
| *Unused Input* | 24 | CAM → CLT-303 | |
| *Unused Input* | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-5: Camera Connector, 16-bit Single-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 + | 8 | CAM → CLT-303 | |
| A7 - | 42 | CAM → CLT-303 | |
| A8 + | 9 | CAM → CLT-303 | |
| A8 - | 43 | CAM → CLT-303 | |
| A9 + | 10 | CAM → CLT-303 | |
| A9 - | 44 | CAM → CLT-303 | |
| A10 + | 11 | CAM → CLT-303 | |
| A10 - | 45 | CAM → CLT-303 | |
| A11 + | 12 | CAM → CLT-303 | |
| A11 - | 46 | CAM → CLT-303 | |
| A12 + | 13 | CAM → CLT-303 | |
| A12 - | 47 | CAM → CLT-303 | |
| A13 + | 14 | CAM → CLT-303 | |
| A13 - | 48 | CAM → CLT-303 | |
| A14 + | 15 | CAM → CLT-303 | |
| A14 - | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| A15 +[1] | 16 | CAM → CLT-303 | |
| A15 -[1] | 50 | CAM → CLT-303 | |
| *Unused Input* | 17 | CAM → CLT-303 | |
| *Unused Input* | 51 | CAM → CLT-303 | |
| *Unused Input* | 18 | CAM → CLT-303 | |
| *Unused Input* | 52 | CAM → CLT-303 | |
| *Unused Input* | 19 | CAM → CLT-303 | |
| *Unused Input* | 53 | CAM → CLT-303 | |
| *Unused Input* | 20 | CAM → CLT-303 | |
| *Unused Input* | 54 | CAM → CLT-303 | |
| *Unused Input* | 21 | CAM → CLT-303 | |
| *Unused Input* | 55 | CAM → CLT-303 | |
| *Unused Input* | 22 | CAM → CLT-303 | |
| *Unused Input* | 56 | CAM → CLT-303 | |
| *Unused Input* | 23 | CAM → CLT-303 | |
| *Unused Input* | 57 | CAM → CLT-303 | |
| *Unused Input* | 24 | CAM → CLT-303 | |
| *Unused Input* | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-6: Camera Connector, 8-bit Dual-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 +[1] | 8 | CAM → CLT-303 | |
| A7 -[1] | 42 | CAM → CLT-303 | |
| B0 + | 9 | CAM → CLT-303 | |
| B0 - | 43 | CAM → CLT-303 | |
| B1 + | 10 | CAM → CLT-303 | |
| B1 - | 44 | CAM → CLT-303 | |
| B2 + | 11 | CAM → CLT-303 | |
| B2 - | 45 | CAM → CLT-303 | |
| B3 + | 12 | CAM → CLT-303 | |
| B3 - | 46 | CAM → CLT-303 | |
| B4 + | 13 | CAM → CLT-303 | |
| B4 - | 47 | CAM → CLT-303 | |
| B5 + | 14 | CAM → CLT-303 | |
| B5 - | 48 | CAM → CLT-303 | |
| B6 + | 15 | CAM → CLT-303 | |
| B6 - | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| B7 +[2] | 16 | CAM → CLT-303 | |
| B7 -[2] | 50 | CAM → CLT-303 | |
| *Unused Input* | 17 | CAM → CLT-303 | |
| *Unused Input* | 51 | CAM → CLT-303 | |
| *Unused Input* | 18 | CAM → CLT-303 | |
| *Unused Input* | 52 | CAM → CLT-303 | |
| *Unused Input* | 19 | CAM → CLT-303 | |
| *Unused Input* | 53 | CAM → CLT-303 | |
| *Unused Input* | 20 | CAM → CLT-303 | |
| *Unused Input* | 54 | CAM → CLT-303 | |
| *Unused Input* | 21 | CAM → CLT-303 | |
| *Unused Input* | 55 | CAM → CLT-303 | |
| *Unused Input* | 22 | CAM → CLT-303 | |
| *Unused Input* | 56 | CAM → CLT-303 | |
| *Unused Input* | 23 | CAM → CLT-303 | |
| *Unused Input* | 57 | CAM → CLT-303 | |
| *Unused Input* | 24 | CAM → CLT-303 | |
| *Unused Input* | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
[2] Pixel “B” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-7: Camera Connector, 10-bit Dual-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 + | 8 | CAM → CLT-303 | |
| A7 - | 42 | CAM → CLT-303 | |
| A8 + | 9 | CAM → CLT-303 | |
| A8 - | 43 | CAM → CLT-303 | |
| A9 +[1] | 10 | CAM → CLT-303 | |
| A9 -[1] | 44 | CAM → CLT-303 | |
| *Unused Input* | 11 | CAM → CLT-303 | |
| *Unused Input* | 45 | CAM → CLT-303 | |
| *Unused Input* | 12 | CAM → CLT-303 | |
| *Unused Input* | 46 | CAM → CLT-303 | |
| B8 + | 13 | CAM → CLT-303 | |
| B8 - | 47 | CAM → CLT-303 | |
| B9 +[2] | 14 | CAM → CLT-303 | |
| B9 -[2] | 48 | CAM → CLT-303 | |
| *Unused Input* | 15 | CAM → CLT-303 | |
| *Unused Input* | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| *Unused Input* | 16 | CAM → CLT-303 | |
| *Unused Input* | 50 | CAM → CLT-303 | |
| B0 + | 17 | CAM → CLT-303 | |
| B0 - | 51 | CAM → CLT-303 | |
| B1 + | 18 | CAM → CLT-303 | |
| B1 - | 52 | CAM → CLT-303 | |
| B2 + | 19 | CAM → CLT-303 | |
| B2 - | 53 | CAM → CLT-303 | |
| B3 + | 20 | CAM → CLT-303 | |
| B3 - | 54 | CAM → CLT-303 | |
| B4 + | 21 | CAM → CLT-303 | |
| B4 - | 55 | CAM → CLT-303 | |
| B5 + | 22 | CAM → CLT-303 | |
| B5 - | 56 | CAM → CLT-303 | |
| B6 + | 23 | CAM → CLT-303 | |
| B6 - | 57 | CAM → CLT-303 | |
| B7 + | 24 | CAM → CLT-303 | |
| B7 - | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
[2] Pixel “B” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-8: Camera Connector, 12-bit Dual-Channel Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| A0 + | 1 | CAM → CLT-303 | |
| A0 - | 35 | CAM → CLT-303 | |
| A1 + | 2 | CAM → CLT-303 | |
| A1 - | 36 | CAM → CLT-303 | |
| A2 + | 3 | CAM → CLT-303 | |
| A2 - | 37 | CAM → CLT-303 | |
| A3 + | 4 | CAM → CLT-303 | |
| A3 - | 38 | CAM → CLT-303 | |
| A4 + | 5 | CAM → CLT-303 | |
| A4 - | 39 | CAM → CLT-303 | |
| A5 + | 6 | CAM → CLT-303 | |
| A5 - | 40 | CAM → CLT-303 | |
| A6 + | 7 | CAM → CLT-303 | |
| A6 - | 41 | CAM → CLT-303 | |
| A7 + | 8 | CAM → CLT-303 | |
| A7 - | 42 | CAM → CLT-303 | |
| A8 + | 9 | CAM → CLT-303 | |
| A8 - | 43 | CAM → CLT-303 | |
| A9 + | 10 | CAM → CLT-303 | |
| A9 - | 44 | CAM → CLT-303 | |
| A10 + | 11 | CAM → CLT-303 | |
| A10 - | 45 | CAM → CLT-303 | |
| A11 +[1] | 12 | CAM → CLT-303 | |
| A11 -[1] | 46 | CAM → CLT-303 | |
| B8 + | 13 | CAM → CLT-303 | |
| B8 - | 47 | CAM → CLT-303 | |
| B9 + | 14 | CAM → CLT-303 | |
| B9 - | 48 | CAM → CLT-303 | |
| B10 + | 15 | CAM → CLT-303 | |
| B10 - | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| B11 +[2] | 16 | CAM → CLT-303 | |
| B11 -[2] | 50 | CAM → CLT-303 | |
| B0 + | 17 | CAM → CLT-303 | |
| B0 - | 51 | CAM → CLT-303 | |
| B1 + | 18 | CAM → CLT-303 | |
| B1 - | 52 | CAM → CLT-303 | |
| B2 + | 19 | CAM → CLT-303 | |
| B2 - | 53 | CAM → CLT-303 | |
| B3 + | 20 | CAM → CLT-303 | |
| B3 - | 54 | CAM → CLT-303 | |
| B4 + | 21 | CAM → CLT-303 | |
| B4 - | 55 | CAM → CLT-303 | |
| B5 + | 22 | CAM → CLT-303 | |
| B5 - | 56 | CAM → CLT-303 | |
| B6 + | 23 | CAM → CLT-303 | |
| B6 - | 57 | CAM → CLT-303 | |
| B7 + | 24 | CAM → CLT-303 | |
| B7 - | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “A” MSB
[2] Pixel “B” MSB
“FG” = Frame Grabber
“cam” = Camera

## Table 2-9: Camera Connector, Color Mode

| Camera Interface Signal Name | Camera Interface Connector Pin | Signal Direction | Notes |
|---|---|---|---|
| R0 + | 1 | CAM → CLT-303 | |
| R0 - | 35 | CAM → CLT-303 | |
| R1 + | 2 | CAM → CLT-303 | |
| R1 - | 36 | CAM → CLT-303 | |
| R2 + | 3 | CAM → CLT-303 | |
| R2 - | 37 | CAM → CLT-303 | |
| R3 + | 4 | CAM → CLT-303 | |
| R3 - | 38 | CAM → CLT-303 | |
| R4 + | 5 | CAM → CLT-303 | |
| R4 - | 39 | CAM → CLT-303 | |
| R5 + | 6 | CAM → CLT-303 | |
| R5 - | 40 | CAM → CLT-303 | |
| R6 + | 7 | CAM → CLT-303 | |
| R6 - | 41 | CAM → CLT-303 | |
| R7 +[1] | 8 | CAM → CLT-303 | |
| R7 -[1] | 42 | CAM → CLT-303 | |
| G0 + | 9 | CAM → CLT-303 | |
| G0 - | 43 | CAM → CLT-303 | |
| G1 + | 10 | CAM → CLT-303 | |
| G1 - | 44 | CAM → CLT-303 | |
| G2 + | 11 | CAM → CLT-303 | |
| G2 - | 45 | CAM → CLT-303 | |
| G3 + | 12 | CAM → CLT-303 | |
| G3 - | 46 | CAM → CLT-303 | |
| G4 + | 13 | CAM → CLT-303 | |
| G4 - | 47 | CAM → CLT-303 | |
| G5 + | 14 | CAM → CLT-303 | |
| G5 - | 48 | CAM → CLT-303 | |
| G6 + | 15 | CAM → CLT-303 | |
| G6 - | 49 | CAM → CLT-303 | |

| | | | |
|---|---|---|---|
| G7 +[2] | 16 | CAM → CLT-303 | |
| G7 -[2] | 50 | CAM → CLT-303 | |
| B0 + | 17 | CAM → CLT-303 | |
| B0 - | 51 | CAM → CLT-303 | |
| B1 + | 18 | CAM → CLT-303 | |
| B1 - | 52 | CAM → CLT-303 | |
| B2 + | 19 | CAM → CLT-303 | |
| B2 - | 53 | CAM → CLT-303 | |
| B3 + | 20 | CAM → CLT-303 | |
| B3 - | 54 | CAM → CLT-303 | |
| B4 + | 21 | CAM → CLT-303 | |
| B4 - | 55 | CAM → CLT-303 | |
| B5 + | 22 | CAM → CLT-303 | |
| B5 - | 56 | CAM → CLT-303 | |
| B6 + | 23 | CAM → CLT-303 | |
| B6 - | 57 | CAM → CLT-303 | |
| B7 +[3] | 24 | CAM → CLT-303 | |
| B7 -[3] | 58 | CAM → CLT-303 | |
| Mode Control 1 + | 25 | CLT-303 → CAM | *CC1 from FG* |
| Mode Control 1 - | 59 | CLT-303 → CAM | *”* |
| Mode Control 2 + | 26 | CLT-303 → CAM | *CC2 from FG* |
| Mode Control 2 - | 60 | CLT-303 → CAM | *”* |
| Serial Control Out + | 27 | CLT-303 → CAM | *serial comm, FG to cam* |
| Serial Control Out - | 61 | CLT-303 → CAM | *“* |
| Serial Control In + | 28 | CAM → CLT-303 | *serial comm, cam to FG* |
| Serial Control In - | 62 | CAM → CLT-303 | *“* |
| RS-232 Comm Out | 29 | CLT-303 → CAM | *RS-232 comm, FG to cam* |
| RS-232 Comm In | 63 | CAM → CLT-303 | *RS-232 comm, cam to FG* |
| Frame Enable + | 30 | CAM → CLT-303 | *“frame valid”* |
| Frame Enable - | 64 | CAM → CLT-303 | “ |
| Line Enable + | 31 | CAM → CLT-303 | *“line valid”* |
| Line Enable - | 65 | CAM → CLT-303 | “ |
| Data Valid + | 32 | CAM → CLT-303 | *“data valid”* |
| Data Valid - | 66 | CAM → CLT-303 | “ |
| Pixel Strobe + | 33 | CAM → CLT-303 | “pixel clock” |
| Pixel Strobe - | 67 | CAM → CLT-303 | “ |

| | | | |
|---|---|---|---|
| Ground | 34 | N/A | *tied to digital ground* |
| Ground | 68 | N/A | *tied to digital ground* |

[1] Pixel “R” MSB (red)
[2] Pixel “G” MSB (green)
[3] Pixel “B” MSB (blue)
“FG” = Frame Grabber
“cam” = Camera

## 2.2. Rear Panel

The CLT-303 Camera Link Translator rear panel is shown in Figure 2-3. The rear panel contains a 26-pin MDR video connectors for connecting to the frame grabber, an 8-position mode select DIP switch, and a DC power jack.

The DC power jack accepts either a standard 2.1 x 5.5 mm barrel-style power plug, or a special locking version plug. The locking plug has bayonet-style "ears" on the barrel. Once inserted, the barrel may be turned ¼ turn clockwise. This locks the connector in place and provides retention. The locking plug is removed by first turning the barrel ¼ turn counterclockwise, and then pulling out the plug from the unit. Plug polarity is center-positive. The locking power plug is Philmore p/n 2150.

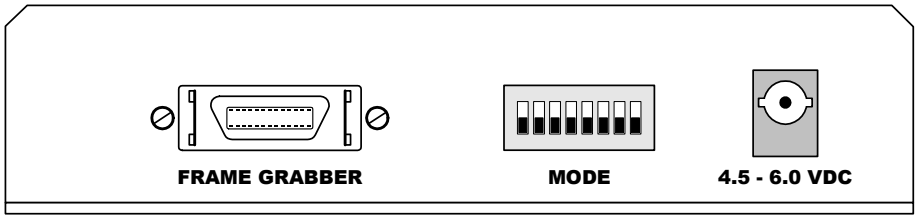



**Figure 2-3: CLT-303 Rear Panel**

### 2.2.1. Video Connector Signals

The MDR-26 video connector signal assignments comply with the Camera Link "base" configuration. The connector signal assignments correspond to the *camera* interface defined in the Camera Link Specification. This provides compatibility with standard Camera Link cables.

# 3. Mechanical

## 3.1. Dimensions

The CLT-303 Camera Link Translator cabinet dimensions are shown in Figure 3-1 (CLT-303L shown).

The CLT-303 is housed in a sturdy aluminum enclosure. The body is extruded aluminum, with detachable front and rear endplates. The enclosure incorporates a mounting flange. The flange contains four predrilled holes (0.15" diameter) for convenient equipment mounting. A mounting footprint drawing is provided in Figure 3-2.

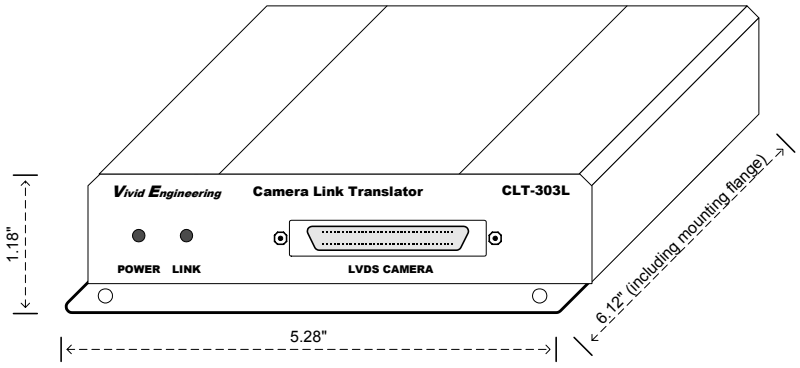



**Figure 3-1: CLT-303L & CLT-303R Cabinet Dimensions**

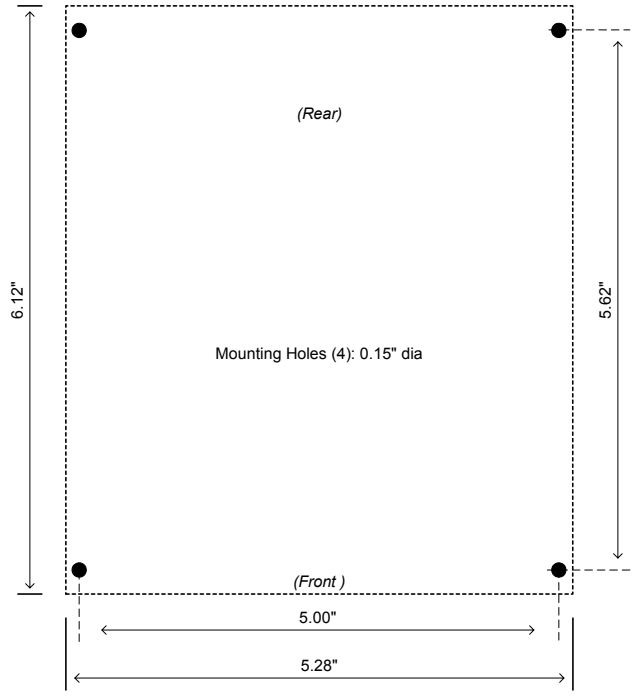



**Figure 3-2: Mounting Footprint Drawing**

## 3.2. External Power Supply

The CLT-303 is powered by 4.5 – 9.0 VDC and incorporates a 2.1 x 5.5 mm DC power jack that accepts either a standard barrel-style power plug, or a special locking version (see Section 2.2). Power plug polarity is center-positive.

The CLT-303 includes a multi-nation wall-mount power supply that handles a wide power range (90-264 VAC, 47-63 Hz) and comes with a set of outlet plugs suitable for most countries (US, Europe, UK, etc). The CLT-303 may also be purchased with a locking-plug power supply, or without power supply.

# 4. Revision History

**Table 5-1: CLT-303L & CLT-303R User's Manual Revision History**

| Document ID # | Date | Changes |
|---|---|---|
| 201087-0.1 | 2/10/12 | Preliminary release of manual |
| | | |