CLV-401A CAMERA LINK VIDEO SPLITTER

User's Manual

Document # 201058, Rev 1.1, 4/2/2018

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1. Introduction

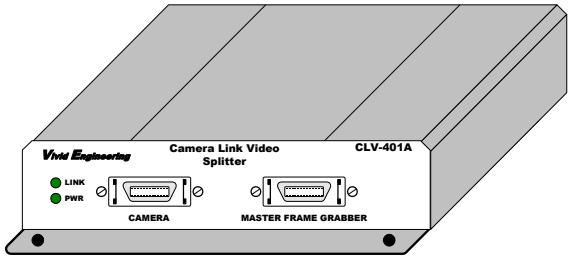
1.1. Overview

The CLV-401A Camera Link Video Splitter interfaces one Camera Link camera to two frame grabbers using standard Camera Link cables. This arrangement enables the addition of a second frame grabber (or other acquisition device) for functions such as camera setup, secondary/parallel processing, monitoring, and recording.

One frame grabber acts as master and provides control and communications to the camera. The second frame grabber receives camera video data only.

The CLV-401A is compatible with Camera Link "base" configuration cameras (i.e. one Camera Link cable from camera). A front-panel link status indicator identifies an active connection.

The CLV-401A is housed in sturdy aluminum enclosure.



1.2. Features

- Interfaces one camera to two frame grabbers
- Second frame grabber (or other acquisition device) can be used for camera setup, processing, monitoring, etc
- Uses standard Camera Link cables (MDR-style, not included)
- Supports Camera Link "base" configuration (i.e. one Camera Link cable from camera)
- Connects to cameras and/or frame grabbers with mini (SDR/HDR) connector via adapting cables
- Connects to Power over Camera Link (PoCL) cameras via Vivid Engineering CLR-102 Repeater/Adapter
- Minimal video data pass-through latency: 3 camera pixel clocks
- Minimal control/communication pass-through latency: under 5 nS
- Link status indicator identifies an active camera connection
- Also acts as a repeater, doubling max distance between camera and frame grabbers
- Multi-nation power supply included, locking-plug power supply optional
- Sturdy aluminum enclosure w/ mounting flange
- 3-year warrantee
- Made in USA

1.3. Cable Length Recommendations

The pixel clock frequency for Camera Link cameras ranges from 20-85 MHz per the Camera Link Specification. Applications using long cables and cameras at the higher end of the frequency range (60-85 MHz) are likely to exhibit pixel data errors, synchronization problems, etc.

To ensure data integrity, Vivid Engineering recommends limiting Camera Link cable lengths when using high pixel clock frequency cameras as follows:

Table 1-1: Cable Length Recommendations

Camera Frequency	Maximum Cable Length
20 – 60 MHz	10 meters *(i.e. no limitation)*
61 – 79 MHz	7 meters
80 – 85 MHz	5 meters

For example, cables used to connect the camera to the CLV-401A and the CLV-401A to the frame grabbers should be no longer than 5m when using a camera with an 85 MHz pixel clock frequency.

1.4. Functional Description

A block diagram of the CLV-401A is provided in Figure 1-1. The CLV-401A interfaces one camera to two frame grabbers. One frame grabber is the master (primary), and one frame grabber is slave (secondary).

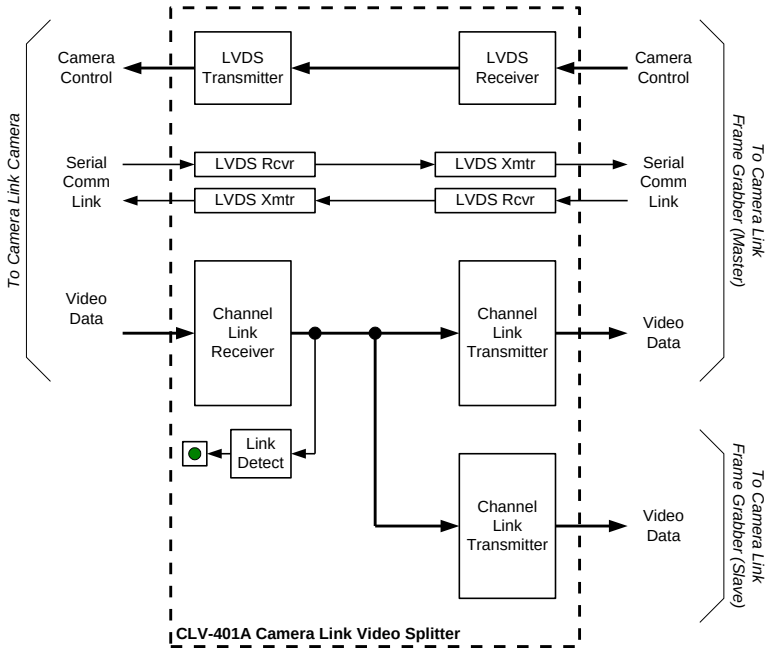


Figure 1-1: CLV-401A Block Diagram

The interface between the camera and the *master* frame grabber contains the entire Camera Link signal set defined in the Camera Link Specification for "base" configurations. This consists of video data, camera control, and serial communications. The master frame grabber receives video data from the camera, and can also control and communicate with the camera.

The interface between the camera and the *slave* frame grabber contains only the video data signals. The slave frame grabber receives video data, but cannot control or communicate with the camera.

The CLV-401A incorporates high-speed (85MHz) interfaces and is compatible with "base" configuration camera. "Medium" configuration applications are supported using

two CLV-401A's in parallel. The CLV-401A does not support the Camera Link "full" configuration.

The latency (i.e. delay) of the video, control, and communication signals passing through the CLV-401A is minimal. This is an important criterion in time-critical applications. See Table 1.2 for the latency specifications.

CLV-401A also acts as a repeater and doubles the maximum separation between the camera and the frame grabbers.

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

The CLV-401A is powered by an external wall plug-in power supply. A multi-nation power supply is standard. Optionally, the CLV-401A is available with a locking-plug power supply. The locking plug reduces the risk of accidental disconnection from the rear-panel power jack. The CLV-401A is also available without power supply.

The CLV-401A DC power input is electrically isolated from the internal circuitry. This feature ensures compatibility with user power systems.

1.5. Typical Applications

1.5.1. Standard Application

A standard CLV-401A base application is shown in Figure 1-2. A Camera Link "base" configuration camera is connected to a single CLV-401A via a standard Camera Link cable. Two additional Camera Link cables are then used to connect the CLV-401A to the master and slave Camera Link frame grabbers.

The master frame grabber provides camera control and communications, and performs the primary processing functions. The slave frame grabber cannot control or communicate with the camera, but may be used for parallel processing, secondary processing, camera setup, monitoring, etc.

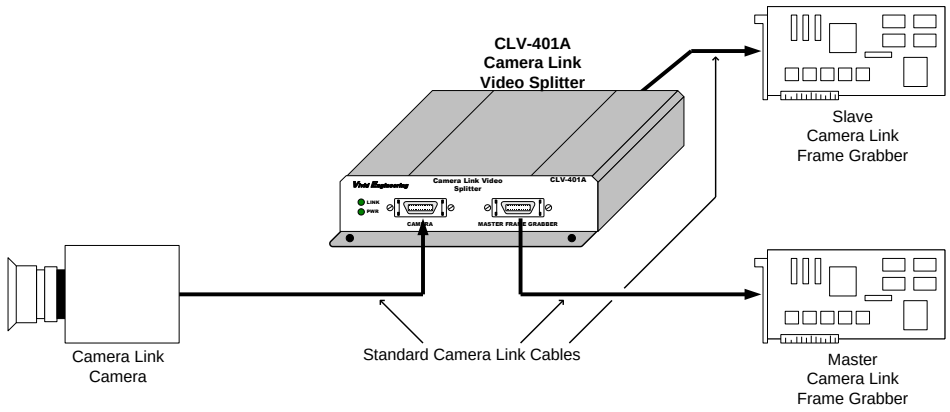


Figure 1-2: CLV-401A Standard Application

1.5.2. Medium Application

A CLV-401A "medium" application is shown in Figure 1-3. Medium configurations, in which two cables connect the camera to the frame grabber, are supported using two CLV-401A's in parallel. A Camera Link "medium" configuration camera is connected to two CLV-401A's via a pair of standard Camera Link cables. Four additional Camera Link cables are then used to connect the CLV-401A's to the master and slave Camera Link frame grabbers.

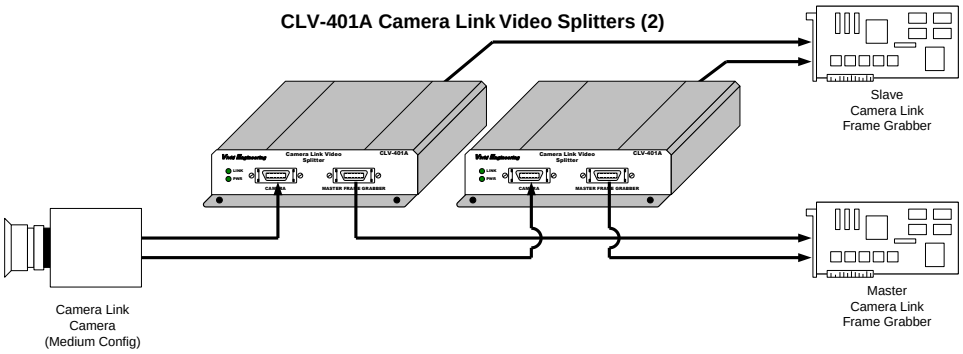


Figure 1-3: CLV-401A Medium Application

1.5.3. PoCL Application

A Power over Camera Link (PoCL) application is shown in Figure 1-4. The CLV-401A does not support PoCL, but PoCL cameras can be accommodated by combining the CLV-401A with the Vivid Engineering CLR-102 Camera Link PoCL Repeater/Adapter.

A Camera Link "base" configuration PoCL camera is connected the CLR-102 via a PoCL-compatible Camera Link cable. The CLR-102 provides the power to the camera. An adapting cable (MDR connector one end and SDR/HDR connector other) is used to connect the CLR-102 to the CLV-401A. Finally, two Camera Link cables are used to connect the CLV-401A to the master and slave Camera Link frame grabbers. These cables may standard (MDR to MDR) or adapting (MDR to HDR/SDR) depending on frame grabber connector type.

The frame grabbers may be either PoCL or non-PoCL types. Note that PoCL frame grabbers must incorporate the *safepower* protocol which is part of the Camera Link specification.

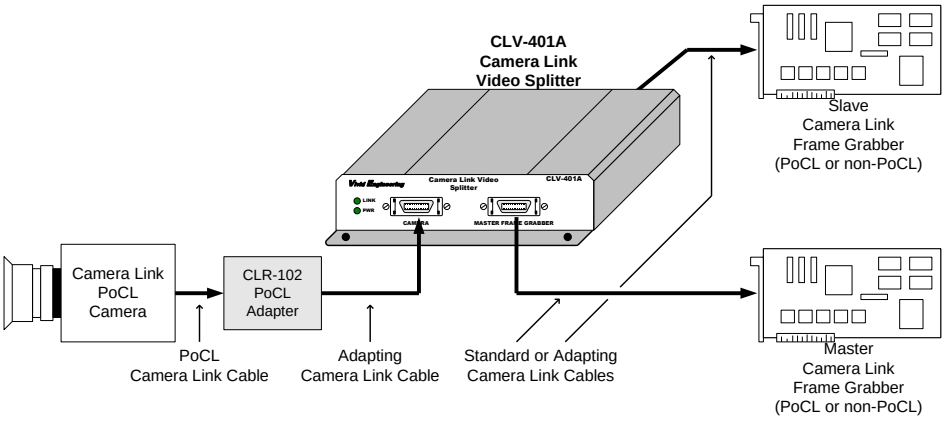


Figure 1-4: CLV-401A PoCL Application

1.6. Specifications

Table 1-1: CLV-401A Specifications

Feature	Specification
Video Interfaces	Camera Link “base” configuration
Video Connectors	26-pin MDR type
Frequency Range	20 - 85 MHz
Latency	Video path: 3 camera pixel clock cycles Control & communication: 5ns 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 VDC, internally isolated 230 mA @ 5 VDC (typical)
Cabinet Dimensions	5.28” (L) x 1.18” (H) 5.12” (D)
Weight	11 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, CE Class A, RoHS

2. Interface

2.1. Front Panel Connections

The CLV-401A Camera Link Video Splitter front panel is shown in Figure 2-1. The front panel contains two 26-pin MDR video connectors; one for connecting to the camera and one for connecting to the master frame grabber. The front panel also incorporates LED power and link status indicators.

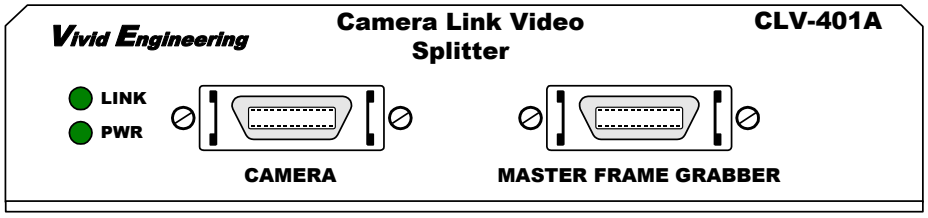


Figure 2-1: CLV-401A Front Panel

2.2. Rear Panel Connections

The CLV-401A Camera Link Video Splitter rear panel is shown in Figure 2-2. The rear panel contains the 26-pin MDR video connector for the slave frame grabber, and the 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 plug. The locking plug has bayonet-style "ears" on the barrel. Once inserted, the plug is turned ¼ turn clockwise. This locks the connection and provides retention. Plug polarity is center-positive. The locking power plug part number is Philmore 2150 or Shogyo MP-121AR.

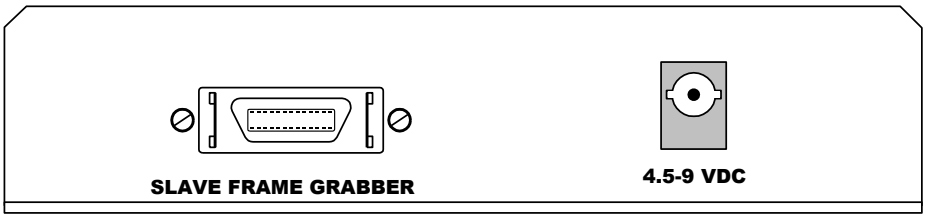


Figure 2-2: CLV-401A Rear Panel

2.3. Video Connectors

The MDR-26 video connectors and signal assignments comply with the Camera Link "base" configuration. The *camera* connector signal assignments correspond to the frame grabber interface defined in the Camera Link Specification. Conversely, the *frame grabber* connector assignments are as defined for the camera interface in the Camera Link Specification. This arrangement provides compatibility with standard Camera Link cables.

2.4. Cable Shield Grounding

Camera and frame grabber cable "outer" shields are connected to the CLV-401A aluminum case. Case and endplate contacting surfaces are unpainted, providing a Faraday cage to shield internal circuitry. The case is isolated from the CLV-401A circuitry and the cable "inner" shields, avoiding possible safety concerns.

The camera and frame grabber cable "inner" shields connects to circuit digital ground, maintaining signal reference levels between the camera and the CLV-401A. and between the CLV-401A and the frame grabbers.

3. Mechanical

3.1. Dimensions

The CLV-401A Camera Link Video splitter cabinet dimensions are shown in Figure 3-1.

The CLV-401A 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.

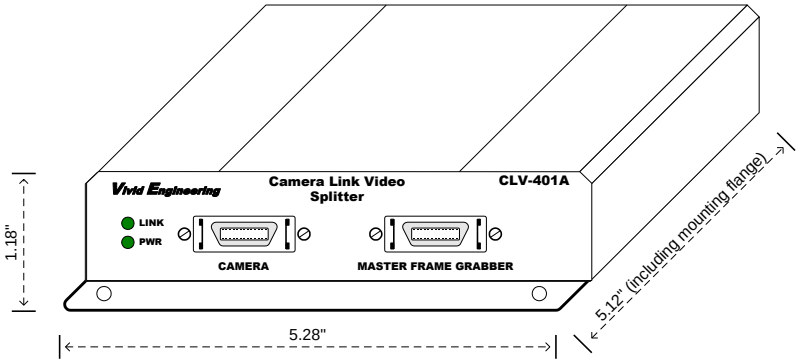


Figure 3-1: CLV-401A Cabinet Dimensions

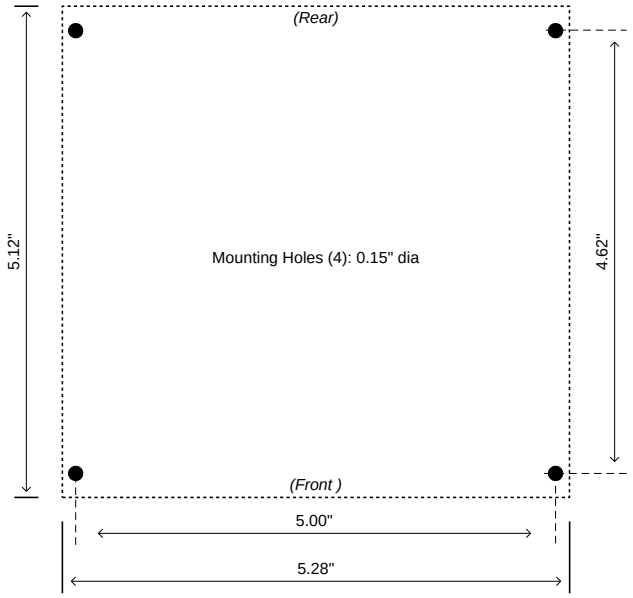


Figure 3-2: CLV-401A Mounting Footprint

3.2. External Power Supply

The CLV-401A 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 CLV-401A 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 CLV-401A may also be purchased with a locking-plug power supply, or without power supply.

4. Regulatory Compliance

4.1. FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

4.2. EU Notice (European Union)

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This device complies with EC Directive 89/336/EEC for a Class A digital device. It has been tested and found to comply with EN55022A and EN55024.

4.3. Certificate of RoHS Compliance

Vivid Engineering certifies that the CLV-401A Camera Link Video Splitter complies with RoHS Directive 2002/95/EC for the control of hazardous substances.

5. Revision History

Table 5-1: CLV-401A User's Manual Revision History

Document ID #	Date	Changes
201058-0.1	1/4/12	Preliminary release of manual
201058-1.1	4/2/18	Application and compliance updates