

CLR-101A CAMERA LINK™ REPEATER

# **User's Manual**

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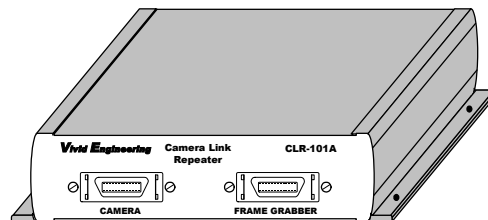
# 1. Introduction

## 1.1. Overview

The CLR-101A Camera Link™<sup>1</sup> Repeater supports applications requiring separation between camera and frame grabber in excess of the maximum Camera Link™ cable length (10 meters).

One Camera Link™ cable connects the camera to the CLR-101A, and a second cable connects the CLR-101A to the frame grabber. This solution provides a 20 meter reach between camera and frame grabber using a pair of standard 10m Camera Link™ cables. Up-to three repeaters may be cascaded to support greater distances. The CLR-101A supports the Camera Link™ “base” configuration. “Medium” configuration applications are supported using two CLR-101As in parallel.

Featuring a sturdy compact enclosure with mounting flange, locking power supply connector, and FCC & CE compliance, the CLR-101A is well suited for OEM and industrial applications.



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<sup>1</sup> 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](http://www.machinevisiononline.org)

Camera Link™ is a trademark of the Automated Imaging Association

## **1.2. Features**

- Doubles max distance between camera and frame grabber
- Uses standard Camera Link™ cables (not included)
- Supports Camera Link™ “base” configurations
- “Medium” configuration support using two CLR-101A’s in parallel
- Up-to three CLR-101A’s may be cascaded, supporting a 40m reach
- Locking power supply connector
- Sturdy, compact aluminum enclosure w/ mounting flange
- FCC, Canadian, and CE Regulatory Compliance
- 3-year warrantee
- Cost-effective solution
- Well suited for industrial and OEM applications

### 1.3. Functional Description

A block diagram of the CLR-101A is provided in Figure 1-1. The CLR-101A regenerates the “base” configuration signal set defined in the Camera Link Specification. The regenerated signals may then be transmitted an additional distance up-to 10 meters over standard Camera Link™ cables.

The CLR-101A incorporates the connectors, signals, pinouts, and chipset in compliance with the Camera Link™ specification. The CLR-101A regenerates all the “base” configuration signals, consisting of video data, camera control, and serial communications.

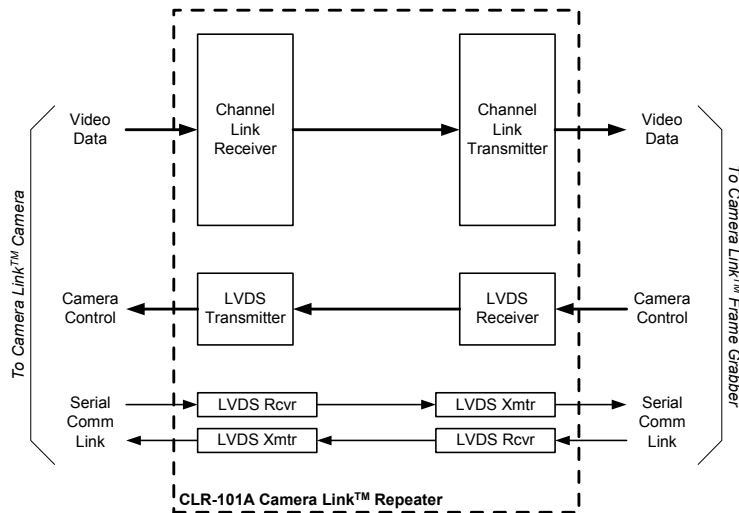


Figure 1-1: CLR-101A Block Diagram

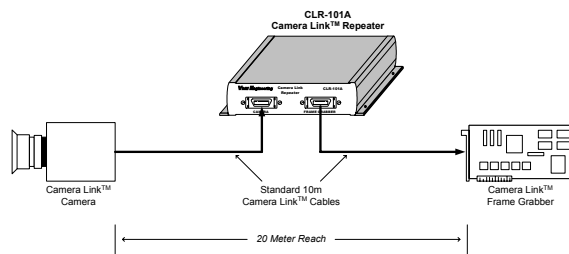
Camera Link “medium” applications are supported using a pair of CLR-101A’s in parallel. The CLR-101A does not support the Camera Link “full” configuration.

The CLR-101A is powered by an external wall plug-in power supply (optional). A locking power supply connector reduces the risk of an accidental disconnect.

## 1.4. Typical Applications

### 1.4.1. Standard Base Application

A typical CLR-101A application is shown in Figure 1-2. A Camera Link™ “base” configuration camera is connected to the CLR-101A via a standard 10m Camera Link™ cable. A second 10m Camera Link™ cable is then connected from the CLR-101A to a Camera Link™ frame grabber. This provides a 20 meter reach between camera and frame grabber



**Figure 1-2: CLR-101A Standard Application**

### 1.4.2. 40 Meter Application

Figure 1-3 shows an application in which multiple CLR-101As and standard cables are cascaded to provide a 40 meter separation between camera and frame grabber. In this example, a 40 meter reach is achieved using three CLR-101As and four standard 10m Camera Link™ cables.

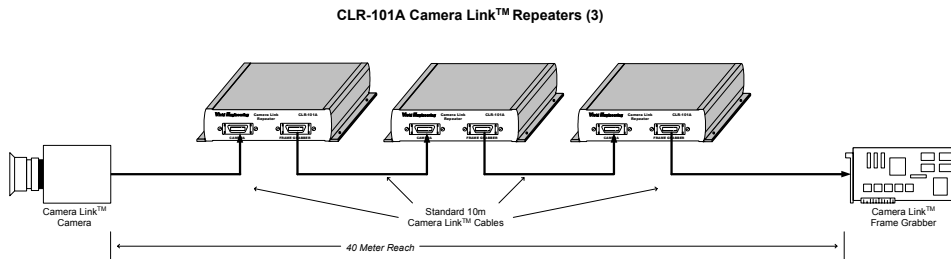


Figure 1-3: CLR-101A 40m Application

### 1.4.3. Medium Application

CLR-101A medium application is shown in Figure 1-4. Medium configurations, in which two cables connect the camera to the frame grabber, are supported using two CLR-101As in parallel. A Camera Link™ medium configuration camera is connected to two CLR-101As via a pair of standard Camera Link™ cables. A second pair of cables is then used to connect the CLR-101As to the Camera Link™ frame grabber

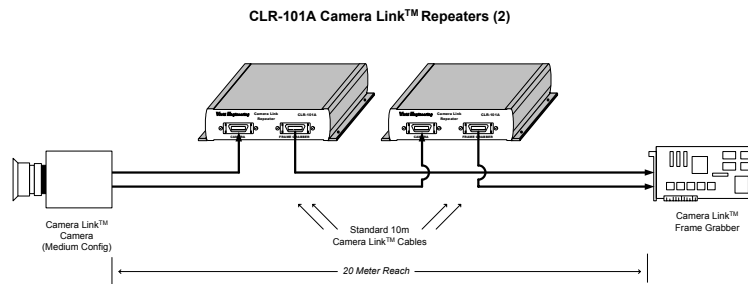


Figure 1-4: CLR-101A “Medium” Application



## 1.5. Specifications

**Table 1-1: CLR-101A Specifications**

Feature	Specification
Video Interfaces	Camera Link Spec "base" configuration
Video Connectors	26-pin MDR type
Frequency Range	20 - 66 MHz
Chipset	National Semi. DS90CR285 / DS90CR286A
Power Supply	Optional US/Europe Transformer w/ Outlet Plug Set
Power Jack	Circular locking, Switchcraft p/n TB3M
Power Requirements	5-7 VDC, 230 mA (typical)
Cabinet Dimensions	5.25" (L) x 1.14" (H) x 4.12" (D)
Weight	14 oz
Operating Temperature Range	0 to 50° C
Storage Temperature Range	-25 to 75° C
Relative Humidity	0 to 90%, non-condensing

## 2. Interface

### 2.1. Front Panel Connections

The CLR-101A Camera Link™ Repeater 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 frame grabber. The MDR-26 connectors are 3M p/n 10226-55G3VC as specified in the Camera Link Spec. Figure 2-2 identifies the MDR-26 pin positions.

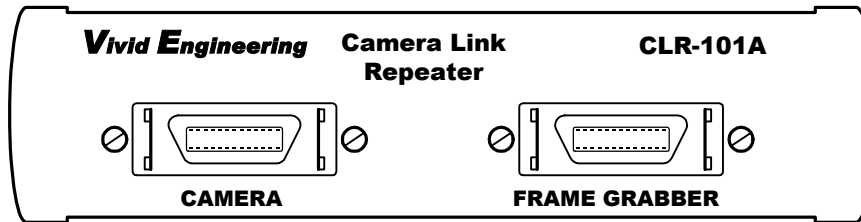


Figure 2-1: CLR-101A Front Panel

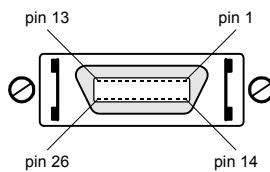


Figure 2-2: MDR-26 Connector Pin Positions

### **2.1.1. Video Connector Signals**

The front panel MDR-26 video connector 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.

Table 2-1 identifies the signal assignments for the MDR-26 video connectors.

### **2.1.2. Cable Shield Grounding**

Camera and frame grabber cable “outer” shields are connected to the CLR-101A aluminum case. Case and endplate contacting surfaces are unpainted, providing a Faraday cage to shield internal circuitry. The case is isolated from the CLR-101A circuitry and the cable “inner” shields, avoiding possible safety concerns.

The frame grabber cable “inner” shield connects to circuit digital ground, maintaining signal reference levels between the CLR-101A and the frame grabber.

The Camera Link™ Specification recommends that a provision be incorporated into frame grabbers that enable the inner shields be tied to digital ground either directly, or through a parallel R/C network. In CLR-101A, the *camera connector* represents the Camera Link™ frame grabber interface. To incorporate this flexibility, the CLR-101A ties the inner shields from the camera connector to digital ground through 0-ohm resistors. If necessary, the 0-ohm resistors may be replaced with a parallel RC network.

**Table 2-1: MDR-26 Connector Assignments**

Camera Link Signal Name	Camera Connector Pin # (frame grabber pinout)	Frame Grabber Connector Pin # (camera pinout)	Signal Direction
Inner shield	1	1	N/A
Inner shield	14	14	N/A
X0-	25	2	CAM → FG
X0+	12	15	CAM → FG
X1-	24	3	CAM → FG
X1+	11	16	CAM → FG
X2-	23	4	CAM → FG
X2+	10	17	CAM → FG
Xclk-	22	5	CAM → FG
Xclk+	9	18	CAM → FG
X3-	21	6	CAM → FG
X3+	8	19	CAM → FG
SerTC+	20	7	FG → CAM
SerTC-	7	20	FG → CAM
SerTFG-	19	8	CAM → FG
SerTFG+	6	21	CAM → FG
CC1-	18	9	FG → CAM
CC1+	5	22	FG → CAM
CC2+	17	10	FG → CAM
CC2-	4	23	FG → CAM
CC3-	16	11	FG → CAM
CC3+	3	24	FG → CAM
CC4+	15	12	FG → CAM
CC4-	2	25	FG → CAM
Inner shield	13	13	N/A
Inner shield	26	26	N/A

"FG" = Frame Grabber

"CAM" = Camera

## 2.2. Rear Panel Connections

The CLR-101A Camera Link™ Repeater rear panel is shown in Figure 2-3. The rear panel contains a power on indicator and a circular locking DC power jack. DC power jack accepts 5 to 7 volts DC. Power jack pin assignments are shown in Figure 2-4. The power jack is Switchcraft p/n TB3M.

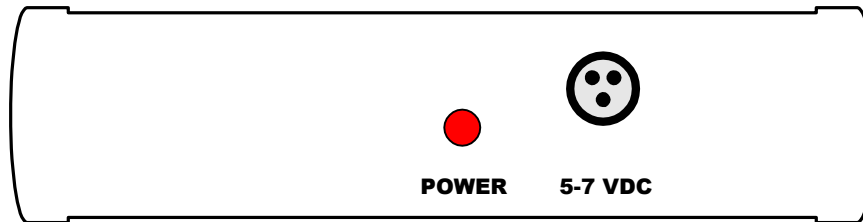


Figure 2-3: CLR-101A Rear Panel

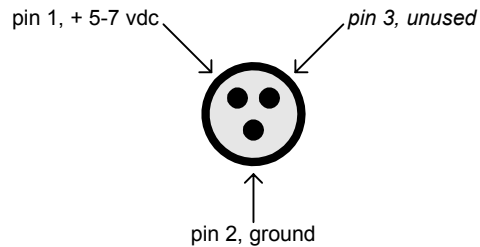


Figure 2-4: Power Jack Pins

## 3. Mechanical

### 3.1. Dimensions

The CLR-101A Camera Link™ Repeater cabinet dimensions are shown in Figure 3-1.

The CLR-101A 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 for convenient equipment mounting. The mounting holes are 11/64" diameter and are suitable for #8 machine screws. A mounting hole template drawing is provided in Figure 3-2.

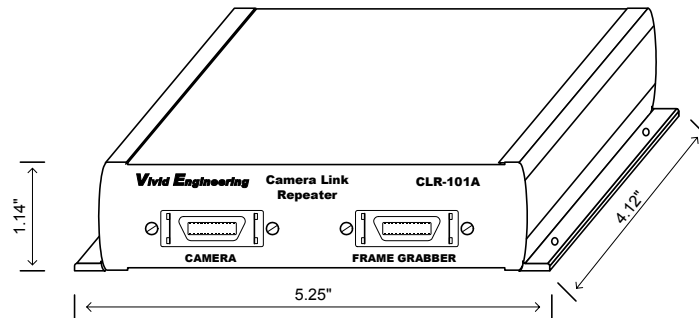
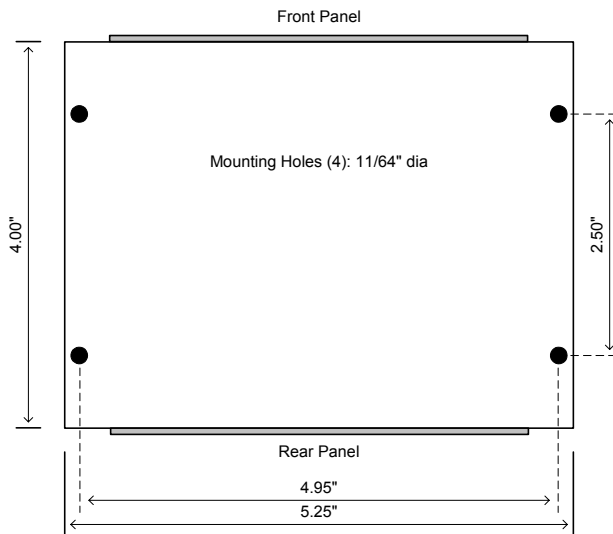


Figure 3-1: CLR-101A Cabinet Dimensions



**Figure 3-2: Mounting Hole Template**

### **3.2. External Power Supply**

The CLR-101A is powered by 5-7 VDC. The circular power jack is a locking type to prevent accidental disconnection. The recommended power plug is Switchcraft p/n TA3FL. Power jack/plug pin assignments are specified in Section 2.2.

The optional multi-nation wall-mount power supply 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 CLR-101A is protected by an internal resettable fuse.

## 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. Canadian Compliance Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

### 4.3. 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 EN55022, EN55024, and EN61326.



## 5. Revision History

**Table 5-1: CLR-101A User's Manual Revision History**

Document ID #	Date	Changes
200253-1.0	11/1/04	Initial release of manual