

# *DVI-D Single Link Re-Clocker*

*Rev A*

Part Number  
10-700-134-A

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## *Document History*

<b>REV</b>	<b>Date</b>	<b>Action</b>
A	March 3, 2016	Initial draft for review
B	March 4, 2016	Modified draft Removed foam feet from mechanical drawing Added input power current specs Corrected part number in footer
C	March 18, 2016	Added labels to mechanical drawing

## 1 Overview

The 10-700-134 is a 1x1 DVI-D re-clocking single-link repeater. The device conforms to DVI v1.0 and HDMI v1.3a standards and is capable of supporting up to 10.2 Gbps (3 x 3.4 Gbps) throughput. A single-link DVI-D interface consists of three Transition Minimized Differential Signaling (TMDS) data channels and a single clock channel. Advanced circuitry incorporates configurable receiver equalization (EQ), clock and data recovery (CDR), and configurable de-emphasis on data channel output drivers.

More often than not, the DVI signals having degraded by use of long cable run need to be corrected along with excess jitter. Table 1 shows the configurable levels and ranges:

EQ Level	De-Emphasis	
	mVp-p	dB
0 dB*	1000*	0*
10 dB	710	-3
16 dB	500	-6
19 dB	355	-9
25 dB		
26 dB		
27 dB		
* Default		

Table 1: EQ and De-Emphasis ranges

Format (data rate)	EQ Level Setting			
	STP		UTP	
	0~10m	>10m	0~10m	>10m
1080p 48bit (3.4 Gbps)	10 dB	26 dB	10 dB	25 dB
1080p 36bit (2.25 Gbps)	10 dB	26 dB	10 dB	25 dB
1080p 48bit (1.65 Gbps)	10 dB	26 dB	10 dB	25 dB
1080i 48bit (750 Mbps)	26 dB	26 dB	25 dB	25 dB

Table 2: Recommended EQ settings for 28 AWG DVI/HDMI/UTP cables

Using the USB maintenance port allows the user to select the desired level of de-emphasis. If de-emphasis is not specified the standard factory default equalization is set at 0dB. Unit also includes an EDID (plug-n-play) signal repeater.

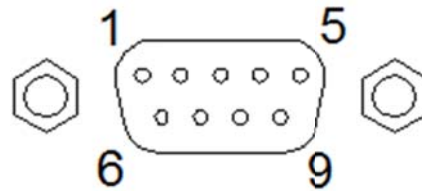
Universal Serial Bus (USB) port/interface (multiple) provides the unit maintenance interface. This permits the user to view and change the default configuration parameters. Internal non-volatile memory is used to hold the power up default settings.

## 2 Status LED

The bi-color LED (green/yellow) provides power and operational status. At power-on the status LED will illuminate with both LEDs active. After initial start-up the LED is momentarily turned OFF, followed by a blink sequence that indicates: EQ setting (green) then de-emphasis setting (yellow). After the settings have been displayed the LED provides an indication of DVI signal presence. It should be noted that the EDID/I2C interface and terminate when the output is disconnected.

### 3 Power Requirements

This unit has an internal switching supply that isolates supply power from the internal power. The units will operate correctly from 12-24 VAC or 10-34 VDC (< 75ma at +28 VDC, <150ma at +12 VDC). Units are equipped with full wave rectification on the power front end, so power may be applied to Pin 1 & 5 using either polarity. The power connector is a 9 pin Sub-D.



Pin 1	Positive Power Input
Pin 2	NC
Pin 3	Internal Circuit Ground
Pin 4	NC
Pin 5	Power Input Return (Gnd)
Pin 6	NC
Pin 7	NC
Pin 8	NC
Pin 9	Chassis Ground

Figure 1

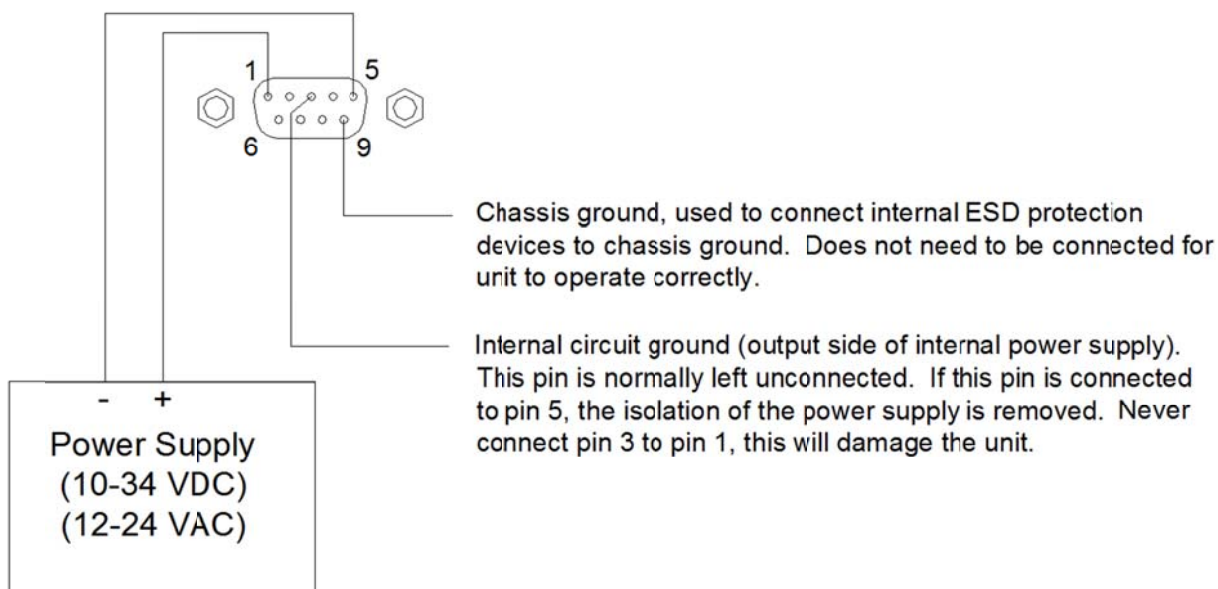


Figure 2

Internal Circuit ground (AGND/Pin-3) is the ground reference for the internal circuits. It is NOT the input voltage return path of pins 1 and 5. The user has the option of floating internal circuits, with respect to any system ground, by not connecting to this pin. The user also has the option to connect the circuit ground to the chassis ground or the input power ground (or both). This power connector pin-out permits the user to define the grounding environment the unit is used in.

Chassis ground (CGND/Pin-9) is connected to internal ESD protection devices. The chassis ground does not need to be connected for proper operation. Secondary ESD protection connections exist between the input and output video signals and internal circuit ground.

The power connector is a 9 pin Sub-D with jack screws to secure the external power plug.

#### 4 Universal Serial Bus (USB) Maintenance Interface

The Universal Serial Bus (USB) maintenance port provides a terminal interface that permits the user to perform several functions: Selection of the control mode, setting configuration parameters, displaying status, and performing debug/maintenance. **Maintenance commands and functions are described at greater detail in Section 5.**

The mini-USB port connects to the unit processor to form via a virtual serial communication channel. A terminal program such as HyperTerminal<sup>1</sup> is used to view, enter, and modify configuration parameters. The configuration is saved in non-volatile memory so the unit initializes with the correct configuration at power-up. Xon/Xoff flow control is used during the download of new code so the data transfer is held while the processor updates internal FLASH memory.

The USB cable may be plugged into the unit at any time. The computer then enumerates the USB-to-UART bridge interface and establishes the Serial communication port number. The “port” should now be visible when configuring the terminal program. USB port configuration parameters should be: 9600bps 8-N-1. (8bit, No parity, 1Stop). Loading of the CP2102 USB-bridge driver (available from Silicon Labs web site) may also be required.

NOTE: USB shield is referenced to Chassis Ground. It is therefore possible for a ground “Sneak Path” to be created through the connected laptop computer. This will typically occur when the laptop or peripherals are connected to an external power source.

#### 5 Maintenance Mode Commands (USB)

This unit has a USB port permitting the user to retrieve information, change parameters, and system debug. The intent of this port is for it to be connected to a laptop computer and use a terminal program to communicate with the internal processor.

At unit power up the user may enter the Maintenance Mode by entering NO when asked if the user wants to download new code. Once the unit is up and running, any key will signal code that the user wants to enter Maintenance Mode. Two carriage return (↵) characters are required to enter Maintenance Mode. If the two carriage return characters, or if no key activity is detected for 30 sec, the code will return to the RUN/Application mode.

Depending on the selected option it may be necessary to change or configure additional parameters. Some parameter value changes may not be available or take effect until the next system reset or power-up is performed. All parameters are retained in non-volatile memory

#### Symbols:

↵ = Carriage Return (0x0D)

● = Space (0x0A)

X1 = One Character X decimal number representing value in dB

X2 = Two Character XX decimal number representing value in dB

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<sup>1</sup> HyperTerminal is no longer a software component of post Windows-XP operating systems. Alternate terminal programs such as Hercules Setup may be considered.

The following shows the different commands available in Maintenance Mode<sup>2</sup>.

**Commands:**

- HELP↵ Responds with the list of valid Maintenance mode commands.
- INFO↵ Displays the unit information such as: Part Number, Serial Number, Revision level, default option number, and CRC values.
- RUN↵ Exits Maintenance mode and returns/jumps to main application.
- CRC↵ Calculates and displays the three checksums/CRC for: Boot, Application, and Configuration code areas.
- REBOOT↵ Forces code to re-start as if power was cycled. (aka “cold start”)
- RELOCK●ON↵ Enables the re-clocking and de-emphasis functions.
- RELOCK●OFF↵ Disables the re-clocking and de-emphasis functions.
- EQ●X2↵ Configures the level of receiver equalization. The following (Table 3) contains the list of valid receiver equalization values and power-up green status LED blink indications.

X2 value	EQ	LED Blinks
00*	0 dB*	1
10	10 dB	2
16	16 dB	3
19	19 dB	4
23	23 dB	5
25	25 dB	6
26	26 dB	7
27	27 dB	8
* Default		

**Table 3: Valid EQ Values**

- DE●X1↵ Configures the level of transmitter de-emphasis. The following (Table 4) contains the list of valid transmit de-emphasis values and power-up yellow status LED blink indications.

X1 value	De-Emphasis	LED Blinks
0*	0 dB*	1
3	-3 dB	2
6	-6 dB	3
9	-9 dB	4
* Default		

**Table 4: Valid De-Emphasis Values**

- LOAD●NEW●CODE↵ Permits the user to load a new revision of processor code.

**NOTE:**

Care must be taken any time a new revision is to be loaded.  
It is the responsibility of the user to contact the factory before attempting to use this function.

<sup>2</sup> Maintenance Mode commands are not case sensitive.

## 6 Specifications:

Video Formats:	single-link DVI-D (Up to 3.4GHz)
Input Connectors:	DVI-I with locking jack-screw standoffs (The only pins that are internally connected are the single-link DVI-D channel)
Input Termination:	50 Ohms, DC coupled
Output Connector:	DVI-I with locking jack-screw standoffs (The only pins that are internally connected are the single-link DVI-D channel)
USB Interface (ASCII data)	8 bit 9600 1 stop No parity XON/XOFF flow control (code loading)
Power LED:	Green (Indicates uP is running) Yellow (Used to display control mode at power-up)
Operating Temperature:	0°C to +70°C
Power:	AC: 12-24VAC DC: 10-34VDC (either polarity on PWR connector)
Supply Current:	<150ma @ 12VDC <75ma @ 28VDC
Power Connector:	9 pin Sub-D (male connector with pin contacts)
Package Dimensions:	4.4" x 2.2" x 0.90" (WxDxH)
Mounting:	Two 6-32 threaded inserts on bottom Two 6-32 threaded inserts on each end
Weight:	8.2 oz



## 7 Mechanical

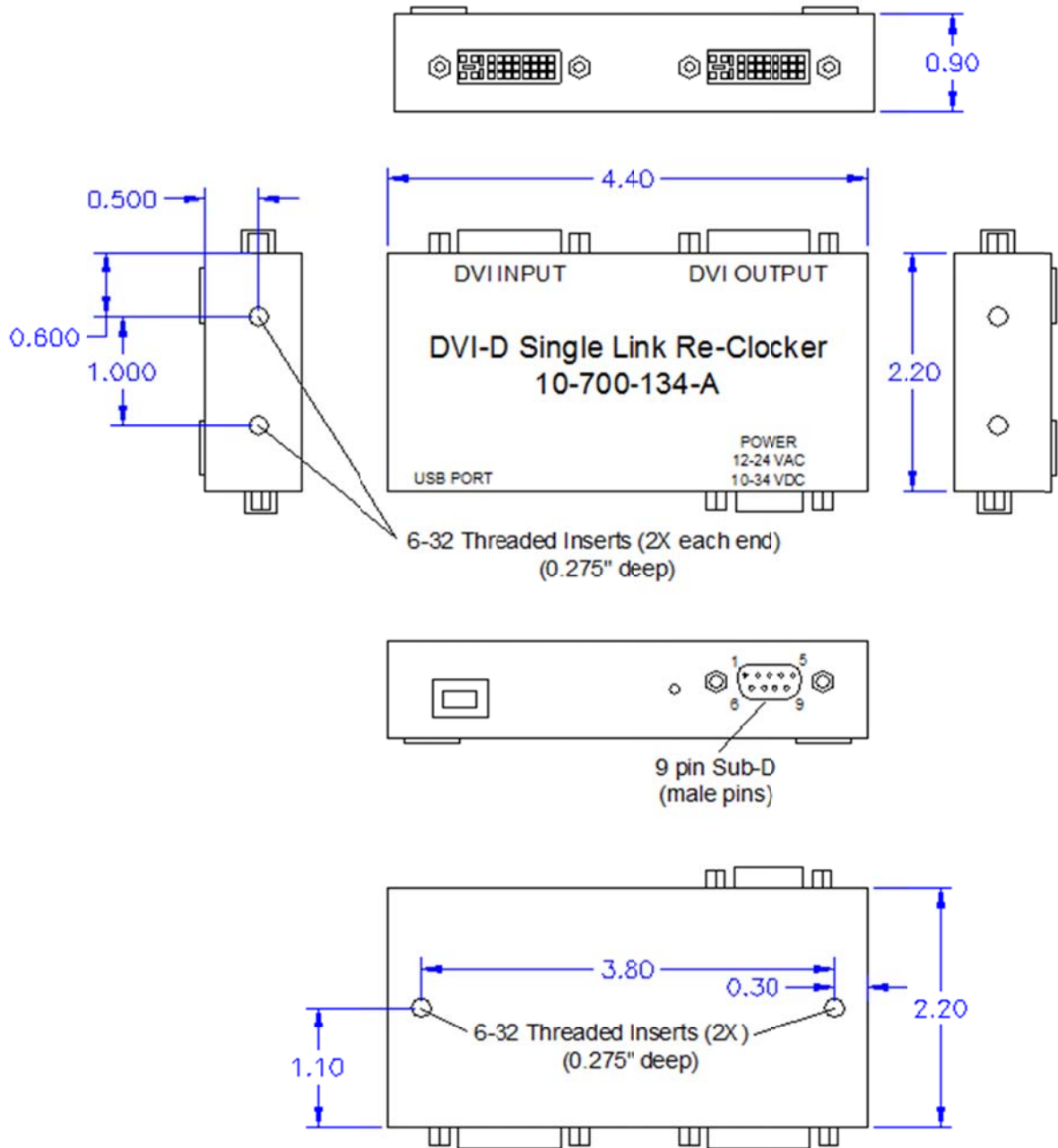


Figure 3: DVI Re-Clocker

# Alternate Terminal Programs

If you've recently upgraded or are working on a computer with Vista/Windows-7, you have no doubt discovered post Windows-XP operating systems no longer include HyperTerminal. The majority of alternative serial terminal emulation programs are sufficient in supporting basic configuration of the option and parameters on VAC product. However in order to support field upgrade of firmware, the terminal emulator must be capable of ASCII file transfer and Xon/Xoff flow control.

Be sure that the appropriate x64/x86/Unix Silicon Lab's CP2102 driver is installed. Windows based operating systems should identify the "COM" port associated with the unit in the "Device Manager" of the Computer Management screen as "Silicon Labs CP210x USB to UART Bridge". Unit communication parameters are set for 9600, 8N1, and Xon/Xoff flow control.

While no warranty or guarantee is implied, NetBurner Inc has a handy terminal program "Multi-threaded TTY" they distribute in support of their product offerings. ([www.netburner.com/support/resources/cb34-ex](http://www.netburner.com/support/resources/cb34-ex))

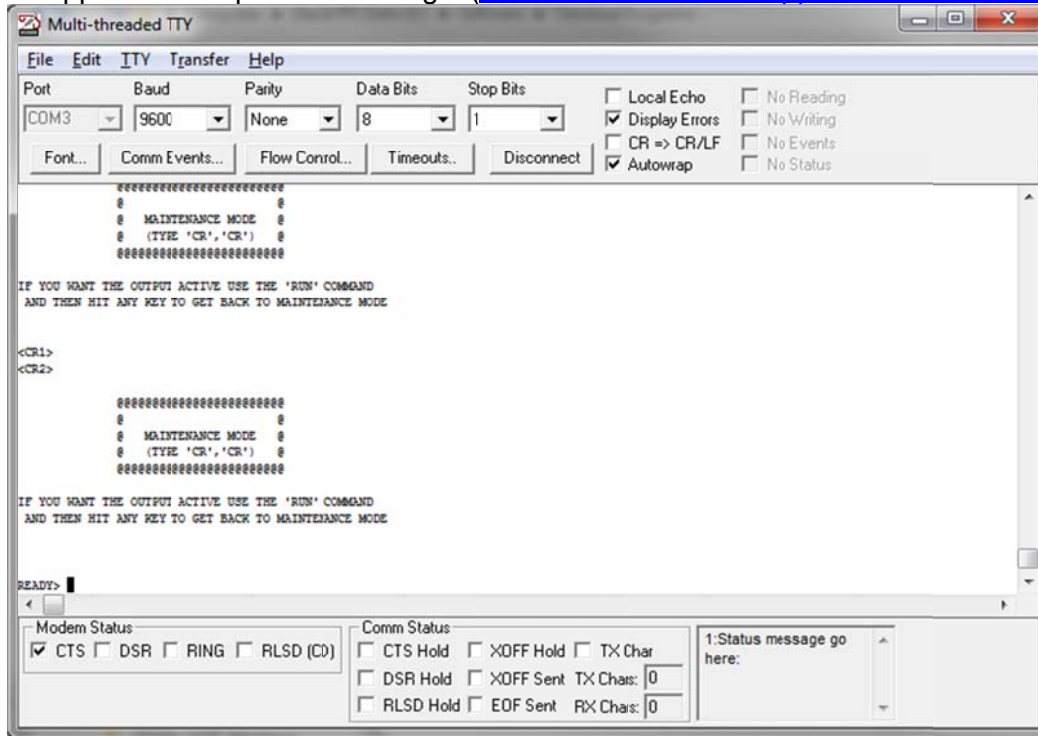
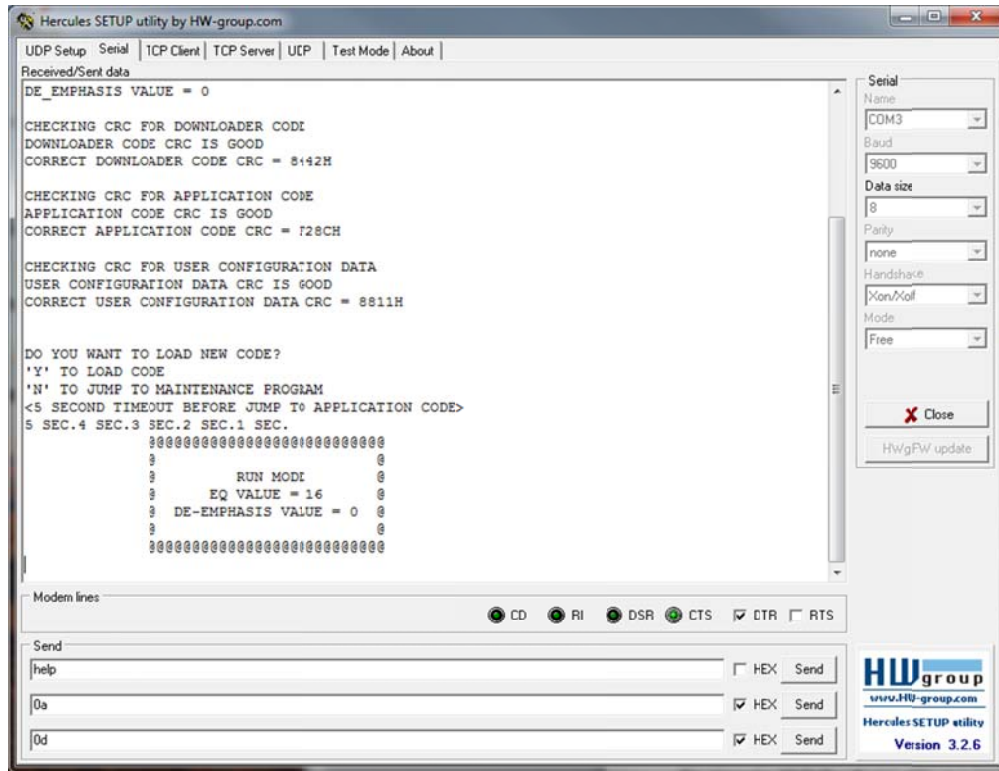


Figure 4: MTTY Serial Terminal Interface

Mtty.exe is a single executable. The example screen above shows the USB Bridge connection as COM3. Configure your "Port" setting to the port your computer has associated with the unit. Set communication parameters for 9600 8N1. Xon/Xoff flow control is configured under the "Flow Control" tab. ASCII file transfer is under the "Transfer" menu pull-down. Don't forget about the "Connect" button.

The Hercules SETUP software utility is a very powerful Serial port terminal, UDP/IP terminal, and TCP/IP Client Server terminal. This software may be downloaded free from [www.hw-group.com](http://www.hw-group.com). HWgroup should be commended for making this excellent software available as Freeware and are indeed worthy of financial support. While functional for unit configuration, serial emulation supports only binary and not ASCII file transfer (required for firmware update).



**Figure 5: Serial Terminal Tab/Window**

Hercules SETUP is a single executable. Some changes from the default configuration settings are required. Click on the “Serial” Tab and the window should appear similar to that of Figure 5. Set “Name” for the units associated “COM” port. For the screen above it just so happened to be COM3. Configure the remaining items for 9600 8N1, Xon/Xoff, and Mode = Free. There is no box for the stop bit ‘1’.

The next step is VERY important. There are additional settings accessed by clicking the right mouse button.

**Un-Check most everything**  
**Change Transmit EOL to “CR (Mac)”**

Use the Open/Close button to connect/disconnect to/from the “COM” port.

