

VAC SDI/DVI DA and Re-Clocker (Rev C)

VAC #10-700-114-A

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Document History

REV	Date	Action
A	April 9, 2013	Original document.
B	April 17, 2013	Corrected DVI 'Out' connector 'J' number
C	April 26, 2013	Added actual power currents Added DVI Maintenance Mode Commands Added DVI LED information

1.0 Basic Operation

The 10-700-114-A is two separate products packaged into a single epoxy brick. Except for the single power connector that provides power to both PCBs, the two boards are totally separate. This product provides two functions, a 1X2 re-clocking SDI DA and a 1X1 re-clocking DVI DA.

The two PCBs both have an isolated power supply so the power input, SDI circuits, and the DVI circuits are all isolated from each other.

The SDI board used standard high frequency BNC connectors for the video and the DVI board has DVI-D connectors. DVI cables with the analog RGB pins will not plug into this unit.

The following sections define the operation of each unit.

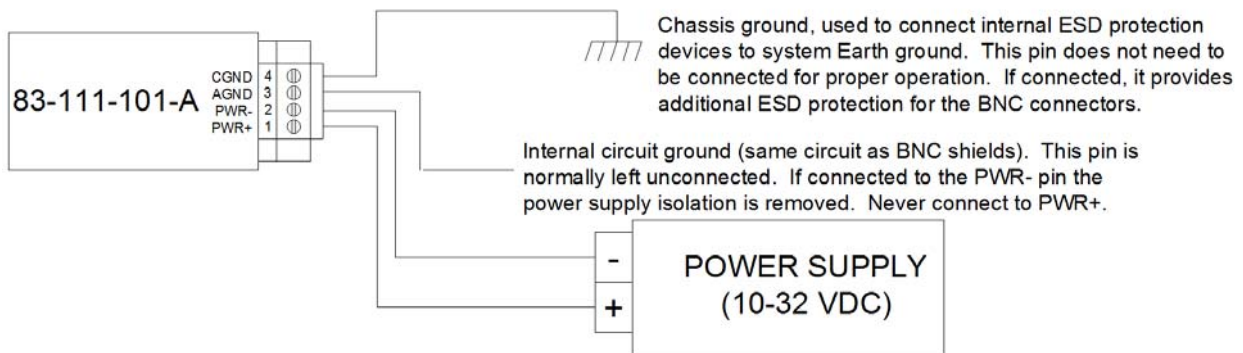
2.0 Power Requirements

This unit has an internal switching supply that isolates supply power from the internal power and I/O. Units will operate correctly when powered by 12-24 VAC or 10-32 VDC. The unit is equipped with full wave rectification, so power may be applied between Pins 1 & 2 using either polarity.



Pin 1	PWR+ (10-34V Supply Connection +V)
Pin 2	PWR- (10-34V Return Connection -V/GND)
Pin 3	AGND/Circuit Ground (Same as BNC Shields)
Pin 4	CGND/Chassis Ground (ESD Protection Ground)

Internal Circuit ground (AGND/Pin-3) is the ground reference for the internal circuits and BNC shields. It is NOT the input voltage return path of pins 1 and 2. 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. The following diagram shows the basic power connector connections.



Chassis ground (CGND/Pin-4) is connected to internal ESD protection devices for the BNC shields and both USB shields. 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 (J3) is a 4 pin 3.5mm center header (Phoenix Contact #1897267) and mating power plug (Phoenix Contact #1847071) with screw flanges for vibration and shock resistance.

The unit has two multi-color LED (green/orange/yellow) to indicate power is connected and the internal uP is running. These LEDs also indicate if video is present on the corresponding video input.

3.0 SDI Board Functions

3.1 Basic Functions

The following SDI formats are supported:

SMPTE 292M	(1.48Gbit/s)
SMPTE 259M	(270/360Mbit/s)
SMPTE 424M	(2.97Gbit/s)

BNC connectors are used for the signal connectors. This unit has one SDI input BNC and two SDI output BNCs.

The units have a single bi-color power-on/signal LED. If the LED is ON the unit has power. If the LED is orange the unit is not detecting a valid input video signal. If the LED is green, a valid input video signal has been detected.

A mini-USB connector is present to connect the units to a laptop computer for configuration or checking internal status registers. One of Five control modes can be selected.

The unit is based on the following major integrated circuits:

- Linear Technology LT3748 flyback controller
- National Semiconductor LMH0387 adaptive cable equalizer/driver
- National Semiconductor LMH0346 re-clocker
- National Semiconductor DS25BR204 1X4 LVDS repeater

3.2 USB Interface and Control

This unit has a USB interface to permit the user to view internal status registers and set operating parameters. The USB port connects to a USB-UART bridge IC. HyperTerminal (or another terminal program) is used to enter configuration parameters. The configuration can be saved in FLASH memory so the unit enters the correct configuration at power-up.

The unit uses a Microchip PIC18F67K22 for internal control, communicating with the USB interface by a Silicon Labs CP2102 USB-UART bridge.

3.3 Maintenance Mode Commands

This unit has a USB port to permit the user to retrieve information, change parameters, and select specific inputs for system debug. The intent of this port is for it to be connected to a laptop computer and use HyperTerminal to communicate with the internal processor. The USB ports use a Silicon Labs CP2102 USB-to-UART (RS232) bridge IC. HyperTerminal must be configured as shown below using the virtual Comm port formed by the CP2102. The drivers for the CP2102 can be downloaded from the Silicon Labs web site.

8 bit data
9600 baud
1 stop
No parity
XON/OFF flow control

The XON/XOFF flow control is used during the download of new code so the data transfer can be stopped while the processor internal FLASH memory is loaded.

The unit should be powered up before the USB cable is plugged in. Once the laptop connects to the CP2102 HyperTerminal can be started and the comm port configured. At unit power up the user can 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 indicate to the code that the user wants to enter Maintenance Mode. Two CR characters are required to enter the Maintenance Mode. If the two characters are not received within 30 sec., the unit will time out and jump back to the RUN mode. While in the Maintenance Mode, if no key activity is detected for 30 sec., the code will jump to the RUN mode.

The following shows the different commands available in Maintenance Mode. The commands are not case sensitive.

3.3.1 HELP Command Format > HELP<CR>

The Help command provides a list of the valid Maintenance Mode Commands.

3.3.2 INFO Command Format > INFO<CR>

The INFO commands provides the user with unit information like part number, serial number, code revision level, default Option number, and code CRC values.

3.3.3 RUN Command Format > RUN<CR>

The RUN command causes the code to jump to the main application and exit the Maintenance Mode.

3.3.4 LOAD NEW CODE Command Format > LOAD NEW CODE<CR>

The LOAD NEW CODE permits the user to load a new revision of the processor code. The user must contact the factory for changes to the code and receive the required TXT file. Care must be taken when loading new code. Once the user answers YES to both questions the application FLASH is erased, new code must be loaded. It is the responsibility of the user to contact the factory before trying to load new code.

3.4 SDI Overall Specifications

Video Formats:	SMPTE 292M (1.48Gbit/s) SMPTE 259M (270/360Mbit/s) SMPTE 424M (2.97Gbit/s)
Input Connectors	BNC
Input Termination	75 Ohms
Output Terminations:	75 Ohms (series), AC coupled
Output Connector:	Two or Four BNC's
USB Interface (ASCII data)	8 bit 9600 baud 1 stop No parity XON/XOFF flow control
Power LED:	Green (Indicates uP is running, active video input) Yellow (Indicates uP is running, no active video on input)

4.0 DVI Board Functions

4.1 Basic Functions

The DVI part of the 10-700-114-A is a re-clocking DVI repeater. The intent of this board is to correct the DVI signals at the end of a long cable run. The TI DS34RT5110 is used to perform the equalization and re-clocking of the three data channels and the clock channel. Using the USB port, the user can change the equalization setting as well as the de-emphasis settings. The re-clocker and de-emphasis functions can also be disabled.

The user can set three different parameters: Equalization level, De-emphasis level, and enable/disable the re-clocking and de-emphasis functions. These operations are defined as commands under the Maintenance Mode section. The standard factory default is the re-clocker is enabled, EQ is set to 0 dB, and the de-emphasis is set to 0 dB. The user can specify a specific set of power up default parameters and the units will ship with those parameter values stored in FLASH as the power up default values.

4.2 USB Interface and Control

This unit has a USB interface to permit the user to view internal status registers and set operating parameters. The USB port connects to a USB-UART bridge IC. HyperTerminal (or another terminal program) is used to enter configuration parameters. The configuration can be saved in FLASH memory so the unit enters the correct configuration at power-up.

The unit uses a Microchip PIC18F67K22 for internal control, communicating with the USB interface by a Silicon Labs CP2102 USB-UART bridge.

4.3 Maintenance Mode Commands

This unit has a USB port to permit the user to retrieve information, change parameters, and select specific inputs for system debug. The intent of this port is for it to be connected to a laptop computer and use HyperTerminal to communicate with the internal processor. The USB port uses a Silicon Labs CP2102 USB-to-UART (RS232) bridge IC. HyperTerminal must be configured as shown below using the virtual Comm port formed by the CP2102. The drivers for the CP2102 can be downloaded from the Silicon Labs web site.

8 bit data
9600 baud
1 stop
No parity
XON/OFF flow control

25	25 dB	6
26	26 dB	7
27	27 dB	8

4.3.6 DE Y Command Format > DE Y<CR>

This command sets the level of de-emphasis. 'Y' is the number of -dB of de-emphasis. The following table shows the valid values for 'Y'

Y VALUE	De-Emphasis dB Level	Power-up Yellow LED Flash Count
0	0 dB	1
3	-3 dB	2
6	-6 dB	3
9	-9 dB	4

4.3.7 RUN Command Format > RUN<CR>

The RUN command causes the code to jump to the main application and exit the Maintenance Mode.

4.3.8 LOAD NEW CODE Command Format > LOAD NEW CODE<CR>

The LOAD NEW CODE permits the user to load a new revision of the processor code. The user must contact the factory for changes to the code and receive the required TXT file. Care must be taken when loading new code. Once the user answers YES to both questions the application FLASH is erased, new code must be loaded. It is the responsibility of the user to contact the factory before trying to load new code.

4.3.9 CRC Command Format > CRC<CR>

The CRC command checks the CRC for the Downloader, Application, and Configuration code areas.

4.3.10 REBOOT Command Format > REBOOT<CR>

The REBOOT command causes the code to jump to the power-up restart memory location and execute code as if the unit was started for a cold start configuration.

4.4 DVI LED

The DVI 1X1 PCB has a single bi-color (green/yellow) LED. At power-on both the Green and Yellow LEDs are turned ON. After the initial start-up code runs the LED is momentarily turned OFF. It then flashes the EQ setting (see section 4.3.5) using the Green LED and then flashes the de-emphasis setting (see section 4.3.6) using the Yellow LED. After the settings are displayed the LED is used to indicate if a valid DVI signal is present at the DVI connector. A Yellow LED indicates no DVI video, a Green LED indicates a valid DVI video signal has been detected. It should be noted that because of the I2C interface used in the DVI interface, the valid DVI input can terminate when the output is disconnected.

4.5 DVI Overall Specifications

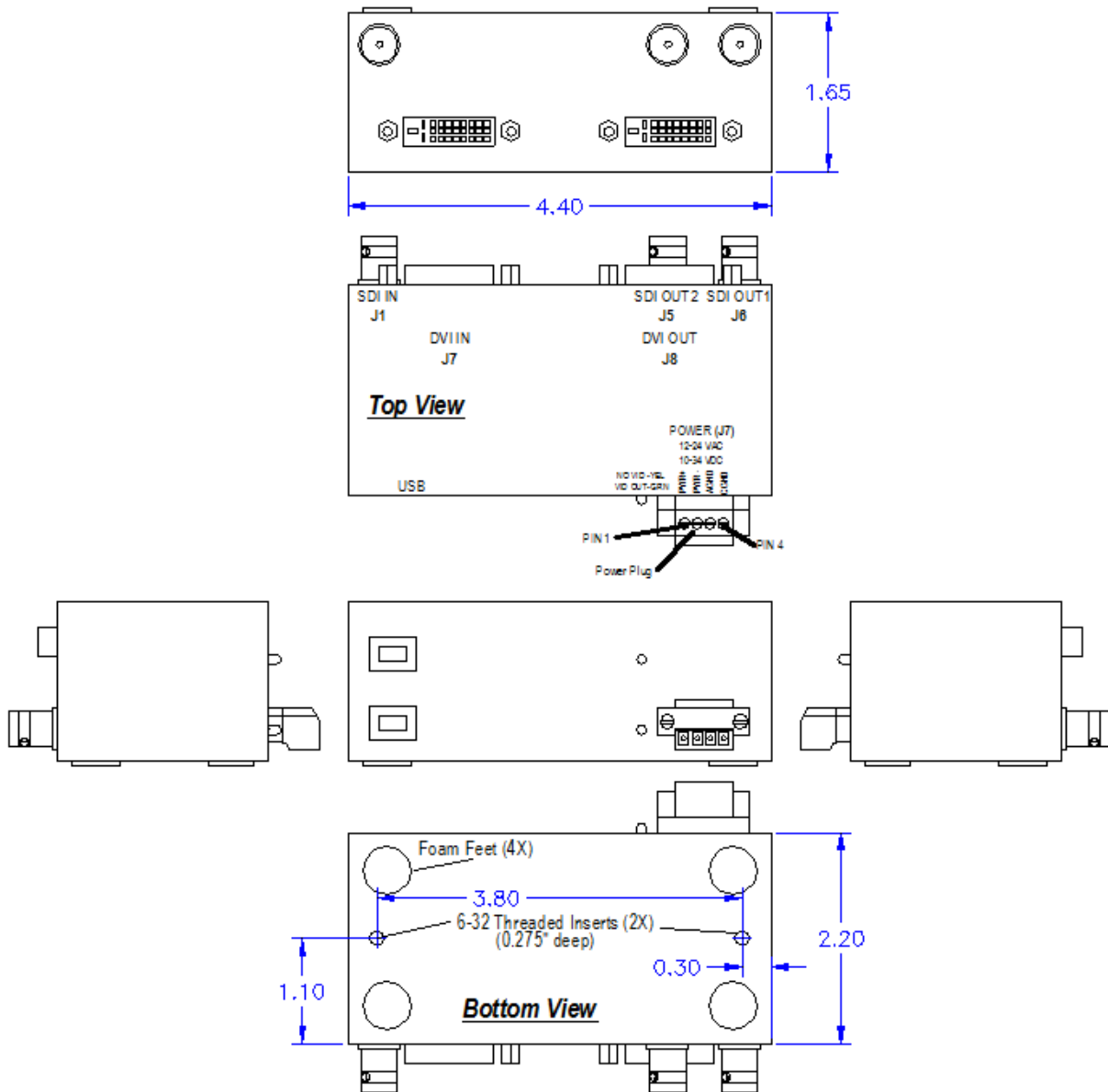
Video Formats:	Single channel DVI (up to 3.4 GHz)
Input Connectors	DVI-D connector with locking jack screws standoffs
Input Termination	50 Ohms per side, DC coupled
Output Connector:	DVI-D connector with locking jack screws standoffs
USB Interface (ASCII data)	8 bit 9600 baud 1 stop No parity XON/XOFF flow control
Power LED:	Green (Indicates uP is running, active video input) Yellow (Indicates uP is running, no active video on input)

5.0 Common Overall Specifications

Operating Temperature Range:	0C to +70C
Power:	12-24V AC, 10-34V DC (either polarity on PWR connector)
Supply Current:	12 VDC < 350 ma 28 VDC < 175 ma

Power Connector:	3.5mm 4 pin terminal block Mating plug	(Phoenix Contact #1843813) (Phoenix Contact #1847071)
Package:	4.4" X 2.2" X 1.65"	
Mounting:	Two 6-32 threaded inserts	
Weight:	15.5 oz.	

6.0 Package



10-700-114-A