

VGA to Composite/YC Converter

(Rev C Manual)

Part Number:

84-141-000-A (800x600@60 Hz VGA to NTSC)
84-141-001-A (1024x768@60 Hz VGA to NTSC)
84-141-002-A (1280x1024@60 Hz VGA to NTSC)

Video Accessory Corporation
1243 Sherman Drive, Suite 8
Longmont, Colorado 80501
303-443-1319

www.vac-brick.com

Two Year Limited Warranty

All Video Accessory Corporation (VAC) products have a full two year limited warranty. Exclusions to the warranty include but are not limited to damage to external components, power LED failure where the product continues to function, and electrical damage due to lightning. The warranty shall be void if any alteration or repair of a VAC product is attempted by anyone not authorized by VAC. This warranty is expressly in lieu of all other warranties express or implied, including warranties of merchantability and fitness for use, and of all other obligations or liabilities on the part of VAC, and it neither assumes nor authorizes any other person to assume for it any liability in connection with the sale of this product. This warranty shall not apply to the product or any part thereof subjected to accident, negligence, alteration, abuse, or misuse. No warranty whatsoever is made with respect to accessories or parts supplied by anyone other than VAC, and this warranty shall extend only to the original purchaser of this product. The warranty provided in this article is exclusive and in lieu of, and buyer hereby waives, all other remedies, express or implied, arising by law or otherwise, including consequential damages, whether or not occasioned by negligence of VAC. This warranty shall not be extended, altered or varied except by written instrument signed by VAC and buyer, and shall only apply within the boundaries of the continental United States. Liability of VAC is limited to repair or replacement at the option of VAC. Warranty work is to be sent to VAC. Freight charges will be the responsibility of the purchaser.

Document History

REV	Date	Action
A	May 1, 2014	Original document
B	Sept. 9, 2014	Added additional maintenance mode commands Updated power requirements Changed virtual RS-232 baud rate Added power-up FPGA configuration time
C	Jan 22, 2015	Added support for multiple VGA input resolutions

1.0 Basic Operation

The 84-141-0xx-A is a video format converter specifically designed to convert analog VGA video into analog Composite/YC video. The unit can convert (1280x1024@60 Hz, 1024X768@60 Hz, or 800x600@60 Hz) VGA into NTSC composite/YC format. This conversion requires down scaling the VGA video to NTSC. The converter uses an FPGA to perform the scaling. An analog to digital decoder is used on the front end and a digital to analog encoder on the back end.

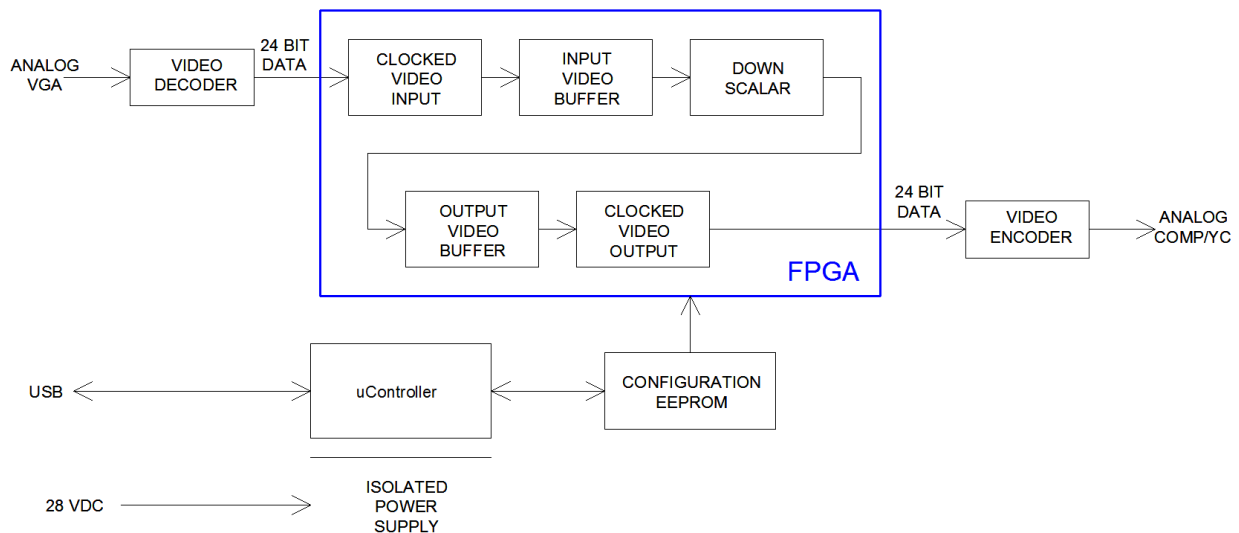
To control ground loops the 83-141-0xx-A uses an isolated power supply.

The unit requires 45-50 seconds to load the FPGA at power-up and become fully functional.

A USB port provides a means to upload new operational code and FPGA configuration files.

2.0 Basic Functions

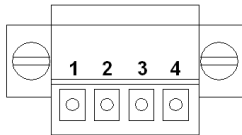
The block diagram below shows the basic structure of the unit.



The front end of the 83-141-0xx-A converts the analog VGA into 24 bit (8 bits per color) digital samples. The clocked video input removes all sync timing information and places the raw pixel color data into an input video data buffer. The down scalar uses the data in the input data buffer as input, runs the down scalar algorithm, and places the NTSC format pixel data into the output buffer. The clocked video output combines the video pixel data in the output buffer and sync timing information and outputs 24 bit pixel color data and sync information. The video encoder converts the digital data and sync data into a composite and Y/C video output.

3.0 Power Requirements

This unit has an internal switching supply that isolates supply power from the internal power and I/O. This unit will operate correctly when powered by 12-24 VAC or 10-34 VDC. The unit is equipped with full wave rectification, so power may be applied between Pins 1 & 2 using either polarity.



Pin 1	PWR+ (Supply Connection +V)
Pin 2	PWR- (Supply 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.

Chassis ground (CGND/Pin-4) 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 (J16) 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 a multi-color LED (green/orange/yellow) to indicate power is connected and the internal uP is running.

4.0 USB Interface and Control

The unit has a USB interface for configuring the unit and running diagnostics commands. The USB port connects to a USB-UART bridge IC. HyperTerminal (or similar 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 USB permits the user to download a new revision of the code as well as new FPGA configuration information.

The user must power the unit externally to use the USB port. The USB cable should then be plugged in and HyperTerminal started. HyperTerminal must be configured per the specification 6.0 section of this document.

5.0 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 MTTY.exe terminal program 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. The USB port does not provide isolation between the USB port ground and the internal circuit ground.

8 bit data
115,200 baud
1 stop
No parity
XON/OFF flow control

The XON/XOFF flow control is used during the download of new code or new FPGA configuration files so the data transfer can be stopped while the processor's 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 MTTY.exe 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. It takes the unit a full second to respond to the first key press. 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.

5.1 HELP Command Format > HELP<CR>

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

5.2 INFO Command Format > INFO<CR>

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

5.3 RUN Command Format > RUN<CR>

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

5.4 VIDEO CONFIG Command Format > VIDEO<SP>CONFIG<CR>

The Video Config command permits the user to set the unit to load any one of four pre-defined Decoder/Encoder register data tables. This provides an ability to fine tune the performance of the converter if needed. The unit ships from the factory with the default settings. Once the Video Config is changed, the value is stored in the internal PIC FLASH memory and that selection is used at power-up.

5.5 FPGA CONFIG Command Format > FPGA<SP>CONFIG<CR>

The FPGA Config command permits the user to set the unit to load one of two pre-defined FPGA configuration files.

The unit ships from the factory with the default set at 1. This FPGA configuration loaded the normal operating configuration data. Configuration 2 loaded a color bar test generator. Once the FPGA Config is changed, the value is stored in the internal PIC FLASH memory and that selection is used at power-up.

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

The LAOD 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.

5.7 LOAD FPGA DATA Command Format > LOAD FPGA<CR>

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

This unit has two FPGA configuration data areas. The FPGA CONFIG command selects the memory area the user is going to over-write.

6.0 Overall Specifications

Video Input Format:	1280 X 1024 @ 60 Hz VGA – 84-141-002 1024 X 768 @ 60 Hz VGA – 84-141-001 800 X 600 @ 60 Hz VGA – 84-141-000
Input Connector	HD 15 pin Sub-D
Input Termination	75 Ohms for video 1K Ohms for sync
Video Output Format:	NTSC Composite and Y/C
Output Connector:	Composite (1 BNC), Y/C (2 BNCs)
Output Video Terminations:	75 Ohms (series), AC coupled
FPGA Load Time	45-50 seconds at power-up or after RUN command
USB Interface (ASCII data)	8 bit 155,200 baud 1 stop No parity XON/XOFF flow control
LEDs:	Bottom LED - Green (Indicates unit has power) Top LED – Orange at power-up during FPGA load Flashes Orange if FPGA load fails Flashes Green if FPGA loads correctly
Operating Temperature Range:	-40C to +70C
Power:	12-24V AC, 10-34V DC (either polarity on PWR connector)
Supply Current Est.:	215ma at 28 VDC
Power Connector:	3.5mm 4 pin terminal block (Phoenix Contact #1843813) Mating plug (Phoenix Contact #1847071)
Package:	4.4" X 2.2" X 1.4"
Mounting:	Two 6-32 threaded inserts
Weight:	14 oz.

7.0 Package

