TEXAS INSTRUMENTS

Contents

Introduction

The Low-Cost Video Interface Platform is a demonstration vehicle designed to demonstrate a cost-effective interface between TVP5145 and TVP5150 decoders (with ITU-R.BT656 outputs) and low-cost C6x DSP's (such as the 'C6204). The video interface shown is appropriate for cost-sensitive markets, such as video interfacing that would be used for a security camera.

The platform consists of a circuit board assembly, FPGA, and DSP software designed to allow data from the decoder to be transferred into external RAM, be read into the DSP for data format conversion, and then be output to a video display device. The electronics board contains a Digital Signal Processor (DSP) and an FPGA to arbitrate the data into and out of the DSP and external memory. It also has provisions to connect an external computer to control the video decoder operation.

This document describes the steps to attach the demonstration platform to a personal computer and verify it has been connected properly by exercising the unit.

Contents of Evaluation Kit

Included in the Low-Cost Video Interface demonstration platform are:

- An electronics board

- An RS232 cable

- A power adapter

- Board stand-offs

- A VGA cable to connect the platform to a computer monitor

- One Stereo RCA cable to connect the audio output to speakers

- An adapter to convert between RCA cables and PC speakers

- A compact disc including documentation and software

Video Platform Overview

A high-level diagram of the demonstration platform is shown in Figure 1. The host PC, running a command program supplied by TI, is attached to the electronics board via an RS232 (serial) cable. Commands from the PC are received by the DSP and allow the settings of the video decoder to be changed.
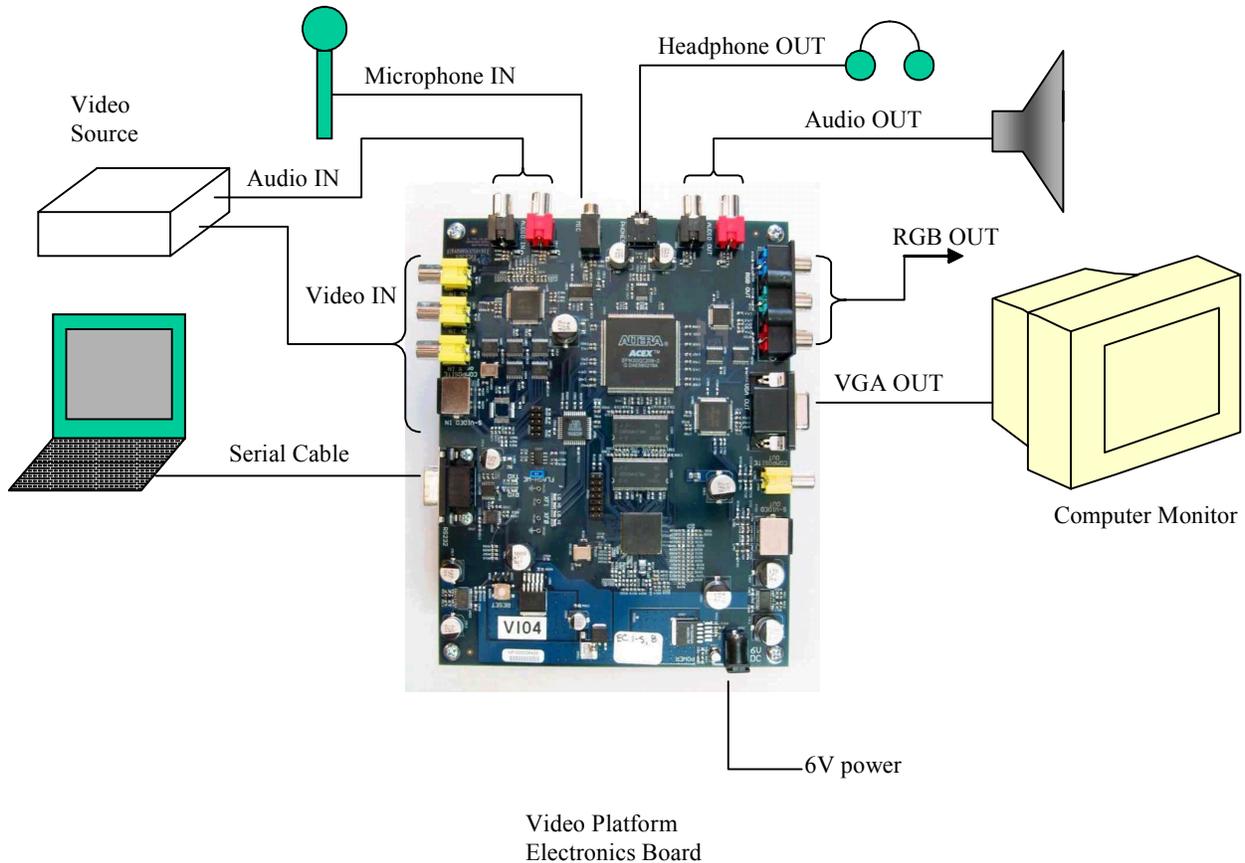

Figure 1. Typical connection of platform.

The platform is attached to a video source, such as a DVD player or video camera, to provide the video data, which is then monitored with a computer monitor.

If desired, a microphone or stereo audio source can be used as an audio input. The audio input is delayed the same amount as the video processing time to allow the video and audio inputs to be synchronized. The platform can also be run without any audio input. The intent of the audio input is to show how a microphone for a security camera system might be implemented.

Detailed connection information is given below.

Installing the Control Software

This section describes how to install the control software that communicates commands to the platform via the RS232 (serial) cable. The control software allows commands to be sent to the platform to change the settings on the video decoder. More details on the installation can be found in the "Low-Cost Video Interface Platform Software Installation Guide."

In this description, the CD is assumed to be the D: drive and your hard drive is assumed to be the C: drive. Substitute the drive letters for your CD and hard drives if they are not the D: and C: drives, respectively. The setup program is found in the CD's D:\GUI directory. The control software has been archived in a self-extracting ZIP format. To install the software, double-click the V1R2.EXE file in the D:\GUI directory. Unzip the files to this directory: **C:\VIDEOIF**. Several files will be copied into the specified directory.

If you do not have Matlab® Version 6.0, you will need to install the Matlab ® libraries by double clicking on the mglArchive.exe file found in the C:\VIDEOIF directory after unzipping. This will install two subdirectory trees call BIN and TOOLBOX and place the necessary Matlab ® library files (DLLs) in them.

Removing the Video Interface Platform from its Protective Packaging

The platform should be used in an ESD-safe environment. Remove the board from its static-safe bag while using an ESD wrist strap or equivalent protection. If not already attached, attach the four stand-offs to the board at the four corners. Place the board on a static-safe work surface.

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Connecting the Platform

The demonstration platform is connected to the PC using the serial cable provided. The serial cable is gray and has a 9-pin D-shell connector (one end male, the other female) on either end. Attach the male end of the cable to the D-shell connector on the platform board. The other female end is connected to the male connector on the PC. Note that you may have to remove the nuts on the end of the cable connected to the PC. Figure 2 shows the location of the RS-232, power, audio, and video connectors on the platform board.
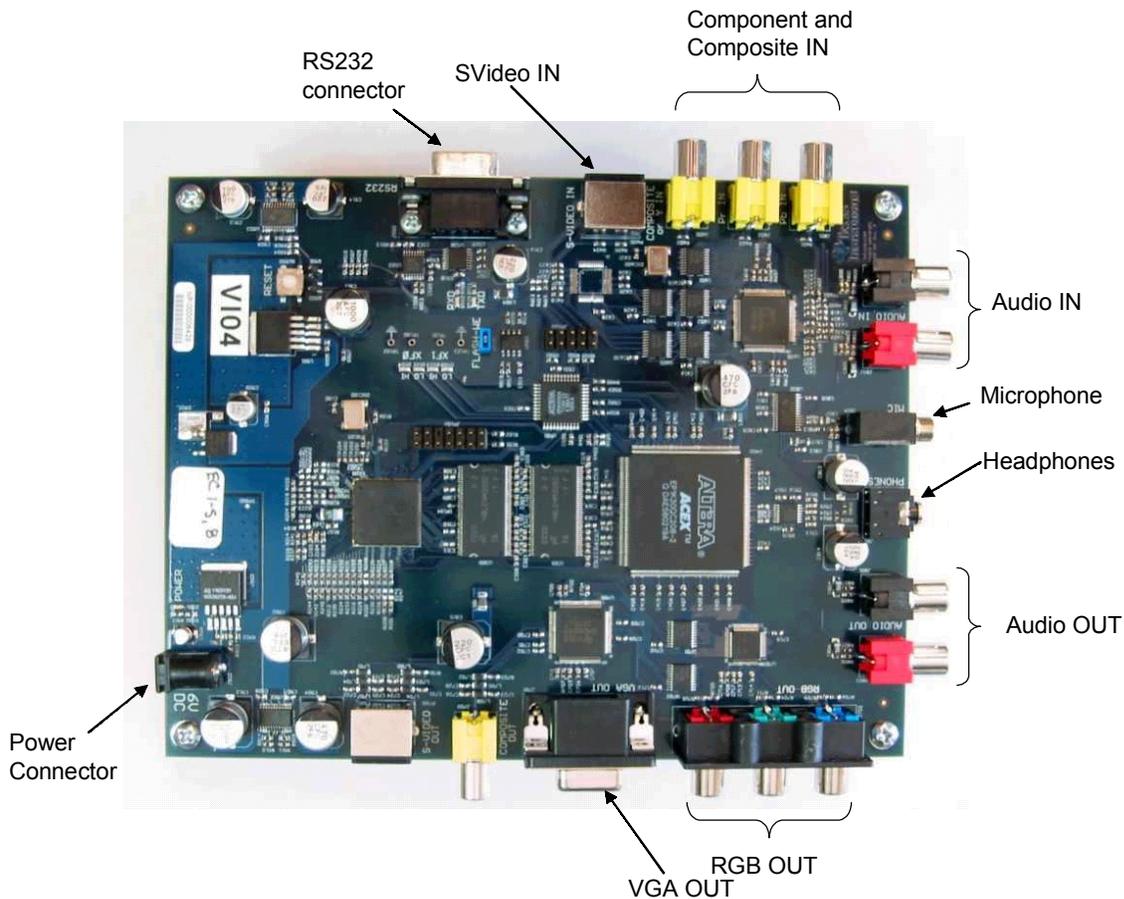

Figure 2. Location of RS232, power, audio, and video connectors.

Next, attach cables from the video source to the proper connectors on the video interface board. The method to attach the cables varies with the type of video input:

- S-Video input. Attach the S-Video cable to the video source and to P600, the S-Video input shown in Figure 2.

- Composite input. Attach the RCA cable to the video source and to J600, the Composite/Yin input shown in Figure 2. J600 is the left-most of the three yellow RCA connectors in Figure 2.

- Analog component input. Attach the three RCA cables to the video source and to the three RCA inputs labeled "Component and Composite IN" shown in Figure 2: Yin to the Composite/Yin input (J600); Pr to the Pr-In input (J602); Pb to the Pb-In input (J601). J600 is the left-most connector in the picture, J602 is in the center, and J601 is to the right.

Next, connect the monitor cable from the VGA output (J701) to a computer monitor. (Alternatively, a TV monitor with separate RGB inputs can be connected using three cables between the RGB out connectors, J702, and the monitor.)

The audio connections may be made next; the platform can be run without the audio being connected. Connect the stereo outputs from the audio/video source to the audio input connectors, J800 and J802. Connect two speakers to the audio output connectors, J801 and J803. If PC speakers are used, it may be necessary to use the RCA-to-3.5 mm jack adapter supplied with the platform.

As an option, a microphone or a headset may be connected to the platform. If desired, the microphone can be plugged in J804, and a headset may be plugged in J805.

Finally, connect the 6V power supply to the board and plug the power supply into a wall outlet. The location of the power supply jack is shown in Figure 2. If the power has been connected properly, then the power LED (D901) will light up. See Figure 8 for the location of the power LED.

Figures 4, 5, and 6 show the platform connected with all the possible options for the three different video input types supported.
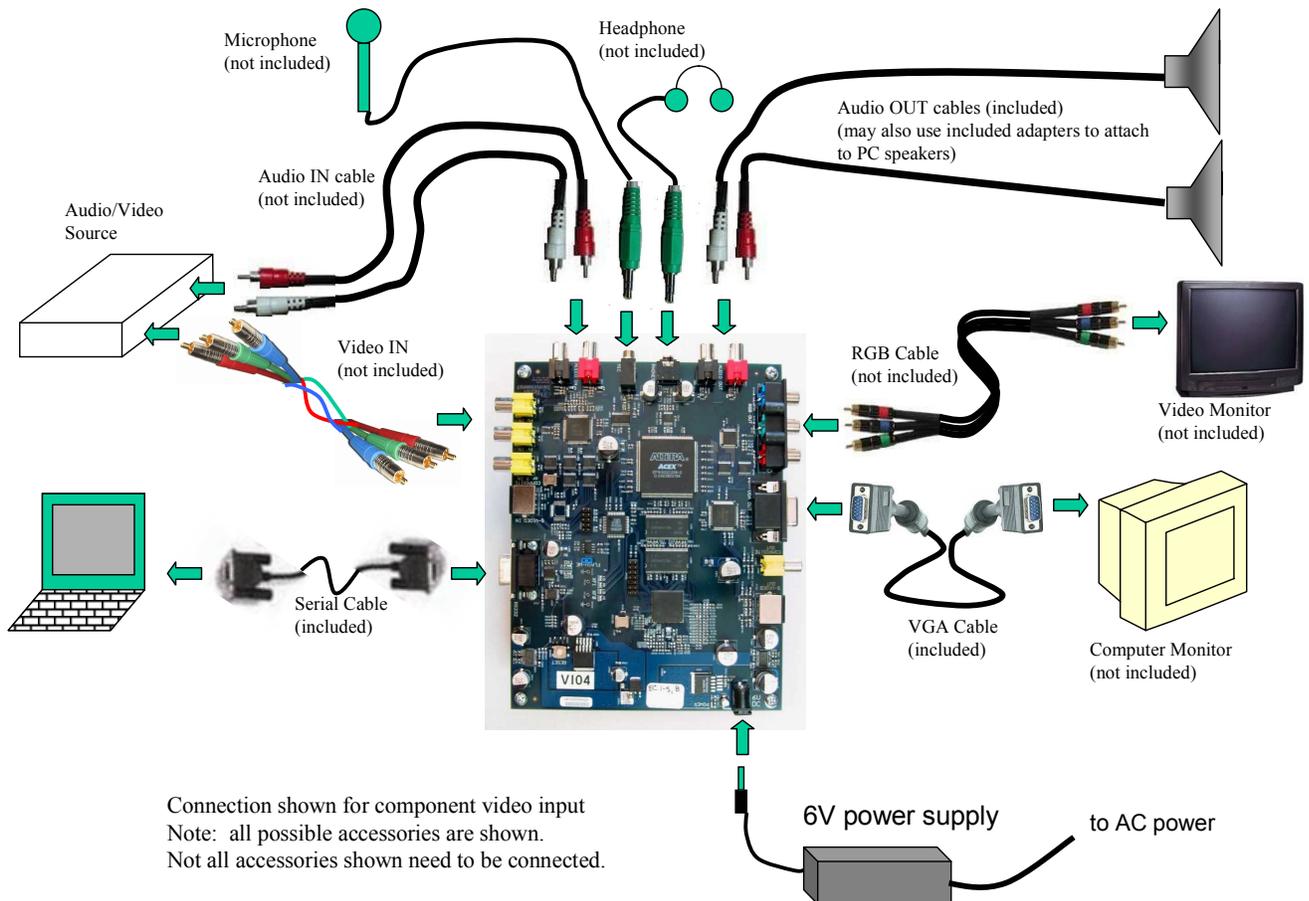

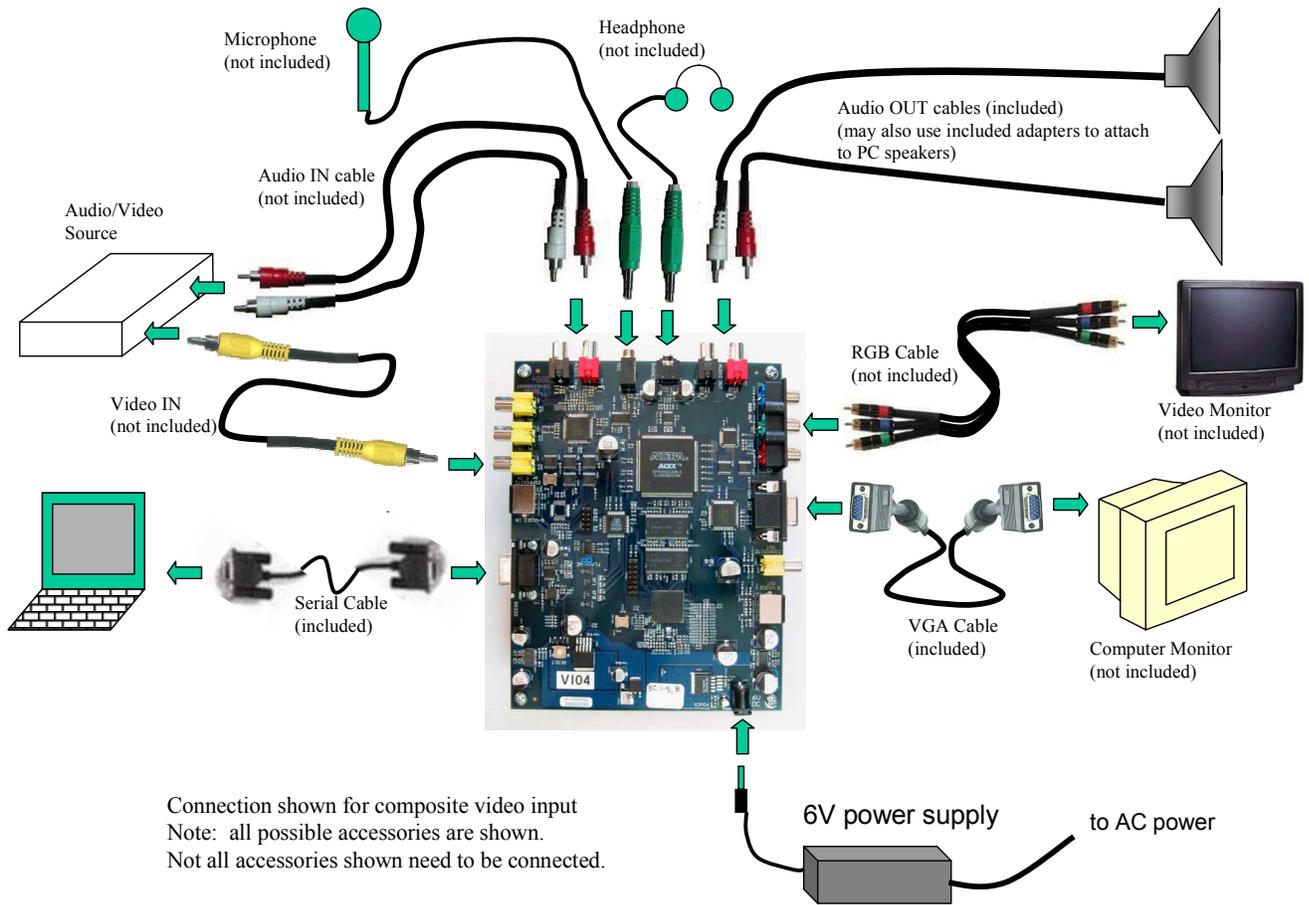Figure 4. Platform Connection with Component Video Input

Microphone (not included)

Headphone (not included)

Audio OUT cables (included) (may also use included adapters to attach to PC speakers)

Audio IN cable (not included)

Audio/Video Source

RGB Cable (not included)

Video Monitor (not included)

Video IN (not included)

Serial Cable (included)

VGA Cable (included)

Computer Monitor (not included)

Connection shown for composite video input
Note: all possible accessories are shown.
Not all accessories shown need to be connected.

6V power supply

to AC power

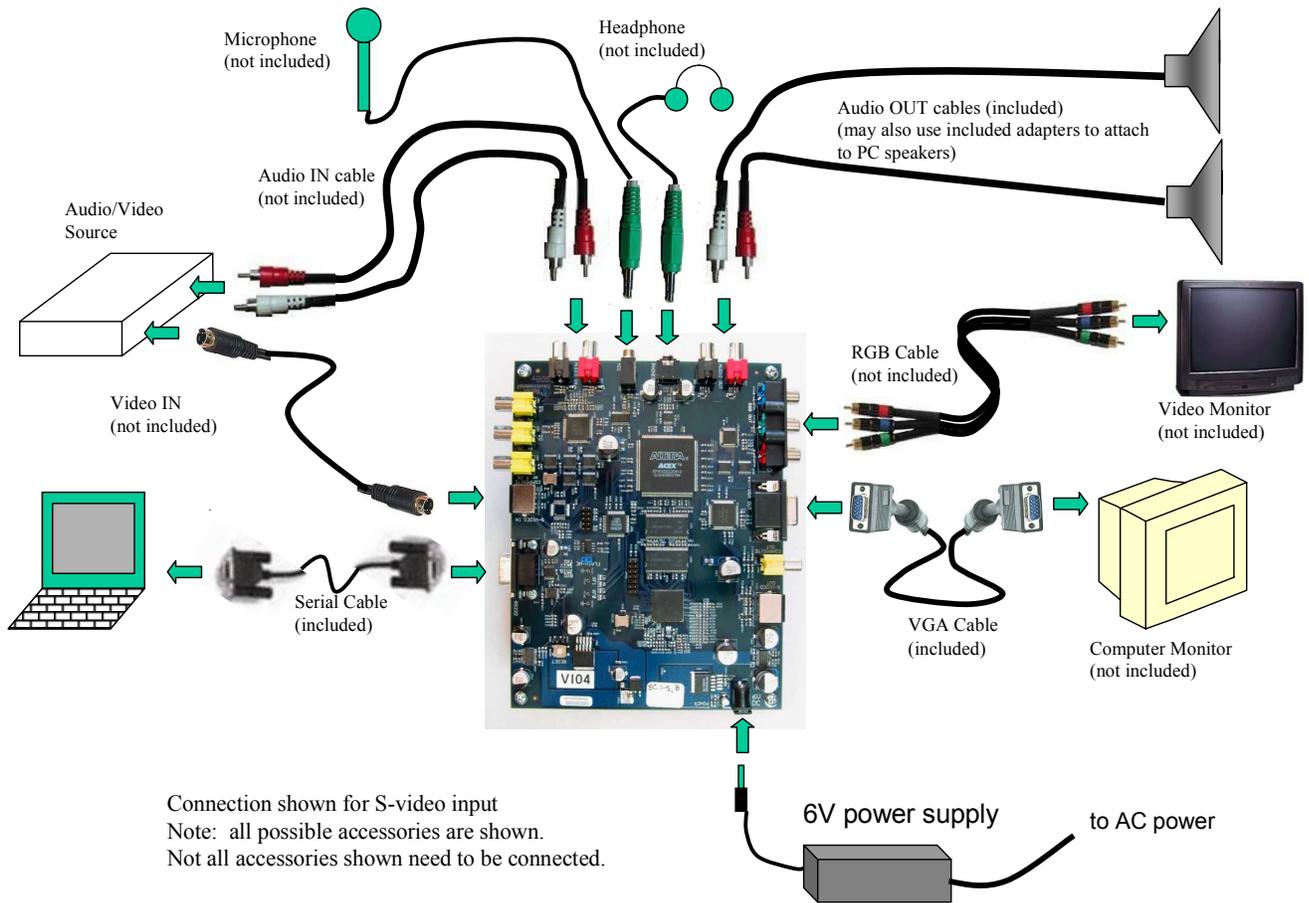Figure 5. Platform Connection with Composite Video Input

Figure 6. Platform Connection with S-Video Input

Establishing Connection between the PC and Demonstration Platform

The next step is to verify that commands can be sent between the PC and the board. After making certain that the evaluation board is powered on, double-click on the Vint.bat file in the C:\VideoIF directory to start.
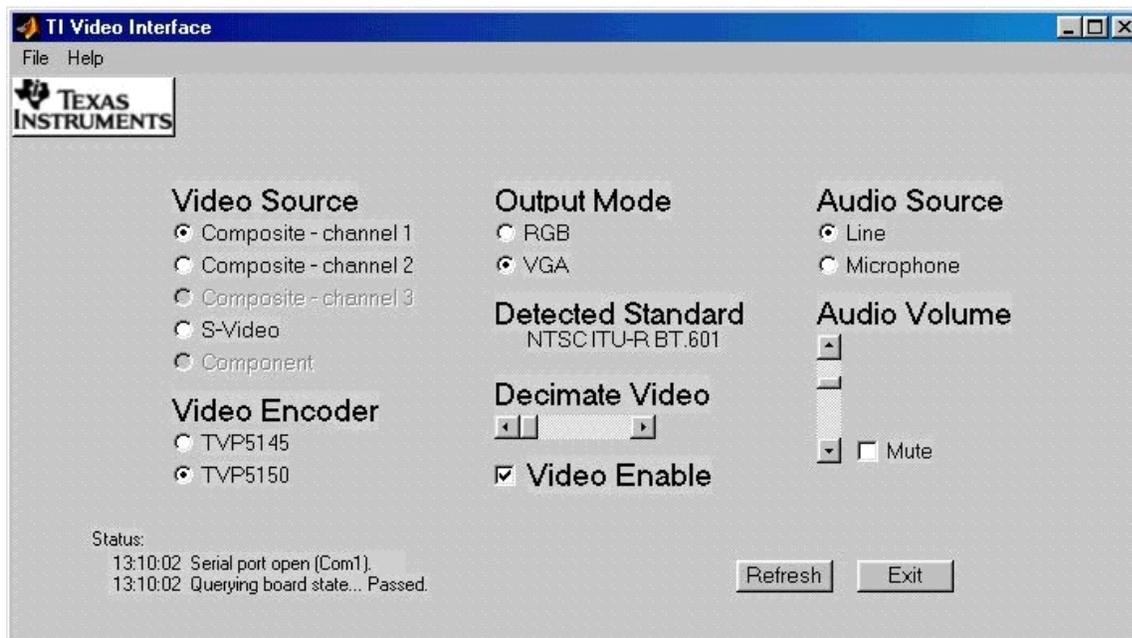
Figure 7. Video Interface Control Program GUI Interface

The first time the Vint program is run, a window will pop-up and request a choice of COM PORT. By pressing the button for the COM PORT where the serial cable is attached, the initial COM PORT is selected. The active COM port can be changed at any time by using the "File" Menu Item at the top of the Vint program window.

If the program gives an error message, check that the RS232 cable is connected and that the power is connected to the platform board. Try to change the COM port to find the correct one for your computer. Please note that COM ports may be used by other applications on your PC (e.g., Palm Pilot synchronization programs) or may be disabled in your BIOS.

If the program indicates that certain files cannot be found, ensure that the program was installed in the proper directory. The batch file expects the program to be installed in the C:\VIDEOIF directory. If the program was installed to a different directory, the batch file must be modified to point to the new directory name. More information on installing the GUI program can be found in the Low-Cost Video Interface Software Installation Guide." More information on using the GUI program can be found in the "Low-Cost Video Interface Software User's Guide."

Status LEDs

Figure 8 shows the status LED's of the demonstration platform.

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Status LED's   RS232 receive LED   RS232 transmit LED
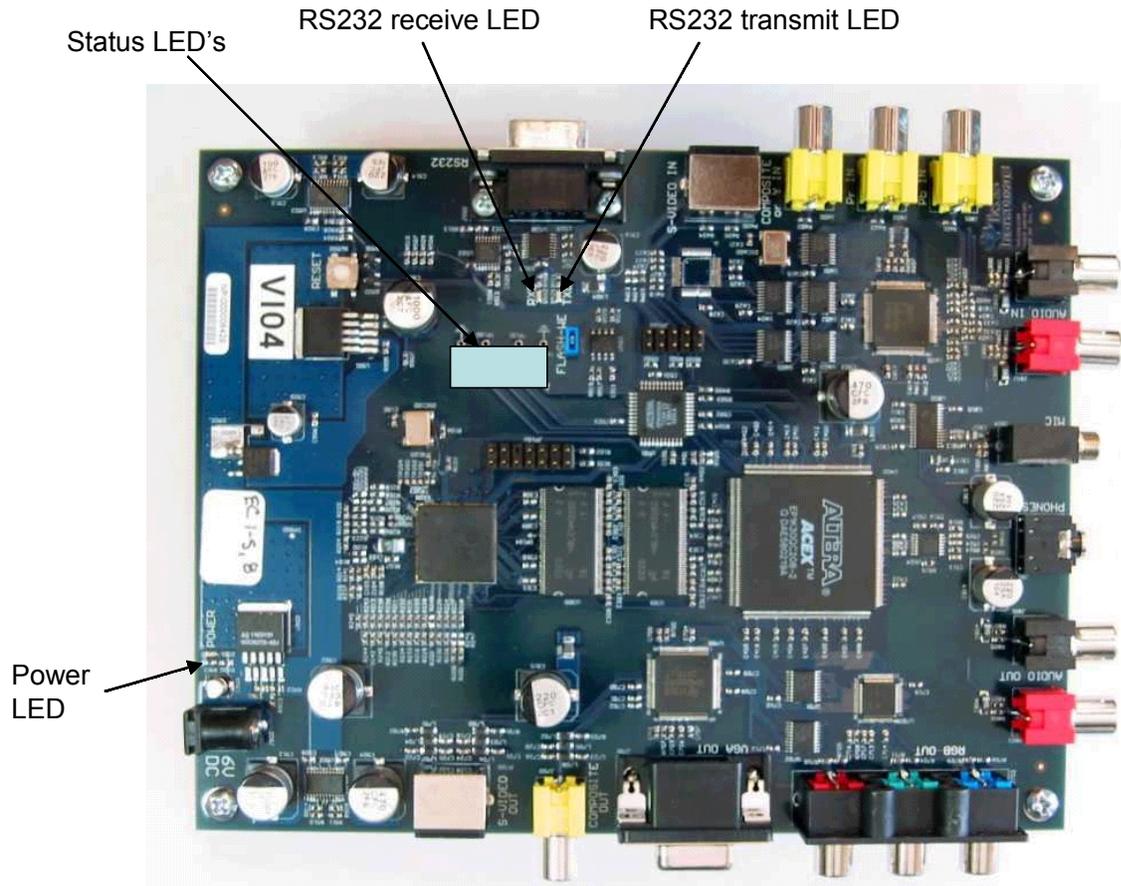

Power
LED

Figure 8. Status LED's.

The Power LED lights when power is connected to the board.

The two communication LED's (D502 and D505) indicate data communication along the RS232 cable to/from the attached PC. The green "TX" LED indicates data being transmitted to the PC, while the red "RX" LED indicates data being received from the PC.

The status LED's are controlled by the DMAC0 and DMAC1 outputs of the DSP. The pair of LED's labeled "XF0" show the status of the DMAC0 line – high (green) or low (red). The pair of LED's labeled "XF1" show the status of the DMAC1 line – high (green) or low (red). The DMAC0 and DMAC1 lines are held low during normal operation, so two red LED's will be illuminated. When the platform is turned on, all the LED's are held off until the DSP and FPGA code is loaded. When the two red LED's turn on, then the platform is ready to process video.

Board Connectors

There are connectors on the board that can be used to connect video signals to and from the board, and to monitor the operation of the board. The connectors are illustrated in Figure 9.
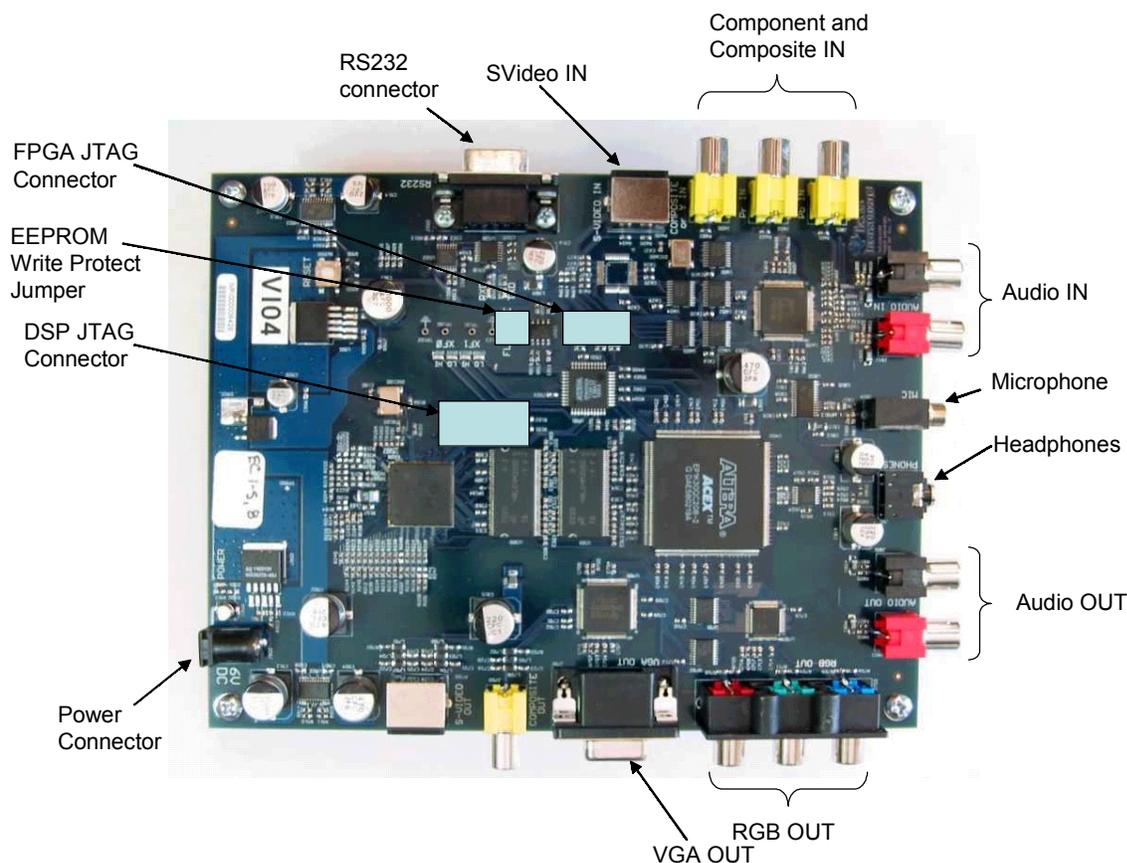
Figure 9. Board Connector Locations.

The RCA connectors bring in either composite or component video signals. J600 inputs the composite signal or the Y component. J601 inputs the Pb component, while J602 inputs the Pr component.

If a composite video input is used, then J600 is used.

J800 and J802 are used to input the audio if a stereo audio source is used. If a microphone is used, then J804 allows the microphone input to be connected. The selection of the audio source is performed on the GUI interface.

The audio output can either go to headphones or a pair of speakers. J801 and J803 are the speaker connections. J805 is for the headphones.

The "JTAG header" (JP100) is the standard 14-pin connector that is used to control the DSP through an emulator.

The "FPGA header" (JP500) is a standardized 10-pin connector that is used to program the FPGA through an Altera programming pod.

JP501 is may be used to enable a write to the EEPROM. In ordinary operation, this jumper should be left open. In the current implementation, this jumper does not protect writes to the EEPROM.
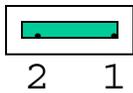
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DSP JTAG
JP100

```
EMU1  14  ..  13  EMU0
 GND  12  ..  11  TCK
 GND  10  ..   9  TCK
 GND   8  ..   7  TDO
 key   6  ..   5  +3.3V
 GND   4  ..   3  TDI
nTRST   2  ..   1  TMS
```

FPGA JTAG
JP500

```
  GND  10  ..   9  TDI
  key   8  ..   7  key
+3.3V   6  ..   5  TMS
+3.3V   4  ..   3  TDO
  GND   2  ..   1  TCK
```

EEPROM Protect
JP501

```
┌──────────┐
│ ▭▬▭▭▬    │     Jumper on:  allow EEPROM write
└──────────┘
  2   1

┌──────────┐
│ .      . │     Jumper off: prevent EEPROM write
└──────────┘
  2   1
```

Figure 10. Connector Pin Assignments. Drawn to match orientation of board in Figure 1. Note that the EEPROM protection function is not implemented in the platform.

Board Switches

The demonstration platform contains one switch which can be used to reset the processor. Pressing the reset switch, SW900, causes the board's RESET signal to be asserted. See Figure 11 for the location of the reset switch.
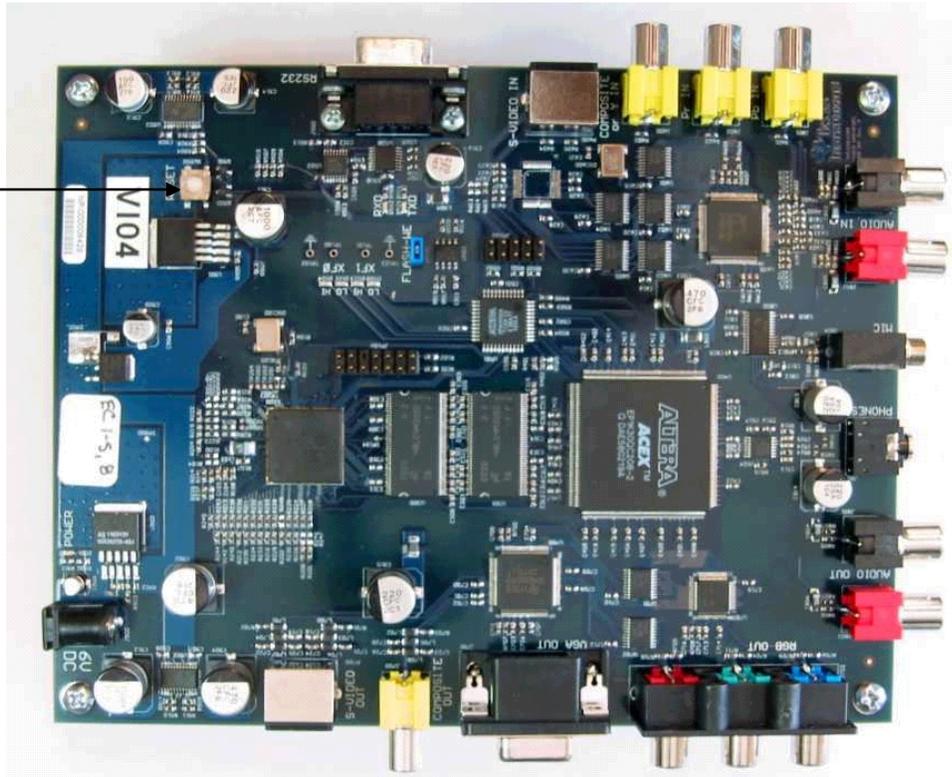
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Figure 11. Reset Switch

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