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Evaluation Board for the ADV7282A 10-Bit, 4× Oversampled SDTV Video Decoder with Differential Inputs and Deinterlacer

FEATURES

- Four video input ports capable of accepting any of the following formats: single-ended CVBS, S-video (Y/C), and component (YPbPr)
- Digital (ITU-R BT.656) and YPbPr outputs

EVALUATION BOARD KIT CONTENTS

- EVAL-ADV7282AEBZ evaluation board
- 7.5 V power supply block
- USB cable

HARDWARE NEEDED

- Source of one or more of the following video inputs: single-ended CVBS, S-Video (Y/C), and/or component (YPbPr)
- PC
- TV or display with YPbPr input
- CVBS input cable(s)
- S-Video cable(s)
- Component cable(s)

SOFTWARE NEEDED

- DVP Evaluation Software
- ADV7282A scripts
- Windows OS

GENERAL DESCRIPTION

The EVAL-ADV7282AEBZ evaluation kit is the platform provided by Analog Devices, Inc., to evaluate the ADV7282A video decoder. The EVAL-ADV7282AEBZ evaluation kit contains an EVAL-ADV7282AEBZ evaluation board and all of its necessary peripherals.

This user guide provides a detailed overview of the EVAL-ADV7282AEBZ evaluation board hardware and the software required to use it.

The ADV7282A data sheet and the ADV7280A/ADV7281A/ADV7282A Device Manual should be consulted in conjunction with this user guide when using the EVAL-ADV7282AEBZ evaluation board.

EngineerZone can be accessed to find additional information about the ADV7282A.

PHOTOGRAPH OF THE EVAL-ADV7282AEBZ

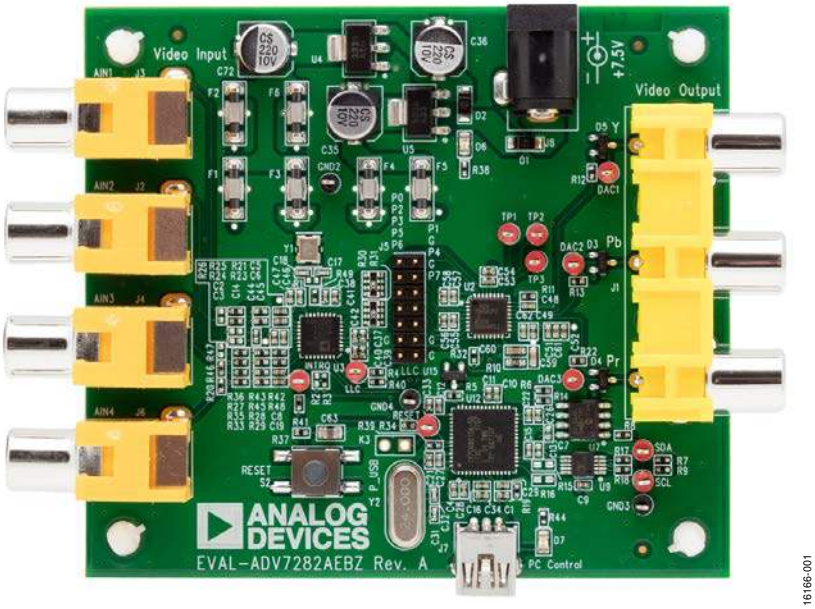

Figure 1

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REVISION HISTORY

8/2017—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

EVALUATION BOARD OVERVIEW

The EVAL-ADV7282AEBZ evaluation board features an ADV7282A video decoder and an ADV7391 video encoder. Four analog video inputs ($A_{IN}1$ to $A_{IN}4$) are connected to the ADV7282A video decoder. The ADV7282A can receive analog video in several different format configurations; hardware configuration changes can be required to support certain formats, for example, single-ended composite video burst sync (CVBS) versus differential CVBS (see Table 1). The ADV7282A converts the analog video received into an ITU-R BT.656-compatible digital stream. The digital stream is connected to the ADV7391 video encoder. The ADV7391 converts the digital stream back into analog video that is output via three analog video outputs.

Analog Video Input Format Configurations

Configuring $A_{IN}3$ and $A_{IN}4$ for Single-Ended CVBS

To configure the $A_{IN}3$ and $A_{IN}4$ inputs to receive single-ended CVBS, make the following resistor changes on the evaluation board:

1. Remove resistors R20, R27, and R46.
2. Replace resistors R33 and R35 with 24 Ω resistors.
3. Replace resistors R28 and R29 with 51 Ω resistors.

Configuring $A_{IN}1$ and $A_{IN}2$ for Differential CVBS

To configure $A_{IN}1$ and $A_{IN}2$ to receive differential CVBS, make the following resistor changes on the evaluation board:

1. Replace resistors R24 and R25 with 1.3 kΩ resistors.
2. Replace resistors R21 and R23 with 430 Ω resistors.
3. Replace R26 with a 75 Ω resistor for pseudo differential CVBS or with a 150 Ω resistor for fully differential CVBS.
4. Connect the positive input to $A_{IN}1$ and the negative input to $A_{IN}2$.
5. Remove R46 and replace R27 with a 0 Ω resistor to enable the diagnostic feature for the $A_{IN}1$ and $A_{IN}2$ inputs. This step is optional.

Configuring $A_{IN}3$ and $A_{IN}4$ for S-Video (Y/C)

To configure $A_{IN}3$ and $A_{IN}4$ to receive S-Video (Y/C), make the following resistor changes on the evaluation board:

1. Remove resistors R20, R27, and R46.
2. Replace resistors R33 and R35 with 24 Ω resistors.
3. Replace resistors R28 and R29 with 51 Ω resistors.
4. Connect the luma channel (Y) to $A_{IN}3$ and the chroma channel (C) to $A_{IN}4$.

Configuring $A_{IN}2$, $A_{IN}3$, and $A_{IN}4$ for YPrPb

To configure $A_{IN}2$, $A_{IN}3$, and $A_{IN}4$ to receive YPrPb, make the following resistor changes on the evaluation board:

1. Remove resistors R20, R27, R46.
2. Replace resistors R33 and R35 with 24 Ω resistors.
3. Replace resistors R28 and R29 with 51 Ω resistors.
4. Connect the luma channel (Y) to $A_{IN}3$, the Pb channel to $A_{IN}4$, and the Pr channel to $A_{IN}2$.

Table 1. Analog Video Input Format Configurations for the EVAL-ADV7282AEBZ Evaluation Board

Configuration	$A_{IN}1$	$A_{IN}2$	$A_{IN}3$	$A_{IN}4$
Default	Single-Ended CVBS Input 1	Single-Ended CVBS Input 2	Differential CVBS Input 1, positive channel	Differential CVBS Input 1, negative channel
Single-ended CVBS	Default	Default	See the Configuring AIN3 and AIN4 for Single-Ended CVBS section	See the Configuring AIN3 and AIN4 for Single-Ended CVBS section
Differential CVBS	See the Configuring AIN1 and AIN2 for Differential CVBS section	See the Configuring AIN1 and AIN2 for Differential CVBS section	Default	Default
S-Video (Y/C)	S-Video Input 1 (Y-channel)	S-Video Input 1 (C-channel)	See the Configuring AIN3 and AIN4 for S-Video (Y/C) section	See the Configuring AIN3 and AIN4 for S-Video (Y/C) section
Component (YPbPr)	Not Applicable	See the Configuring AIN2, AIN3, and AIN4 for YPrPb section	See the Configuring AIN2, AIN3, and AIN4 for YPrPb section	See the Configuring AIN2, AIN3, and AIN4 for YPrPb section

EVALUATION BOARD DESCRIPTION

This section outlines how to power up, communicate with, and use, the evaluation board. For an outline of the evaluation board connections, see Figure 2.

Power Supply

To power up the evaluation board, connect a mains cable to the 7.5 V power supply block included in the EVAL-ADV7282AEBZ evaluation kit. Connect the output jack plug of the 7.5 V power supply block to the input power connector (J8) on the evaluation board. LED D6 illuminates when the power supply is enabled and successfully connects to the evaluation board.

Only use the 7.5 V power supply block provided with the evaluation kit to power the evaluation board.

Communicating with the Evaluation Board

To establish communication with the evaluation board, connect the USB cable included in the EVAL-ADV7282AEBZ evaluation kit to a computer with DVP Eval Software installed. Connect the USB cable to the USB connector (J7) on the evaluation board. LED D7 illuminates when the USB cable successfully connects between an active USB port and the evaluation board.

Connecting Input Video

Connect an analog video input(s) to the desired analog input ($A_{IN}1$ to $A_{IN}4$) of the evaluation board. Refer to Table 1 to determine how different types of input (for example, single-ended CVBS and S-Video) connect to the evaluation board.

Refer to the ADV7282A data sheet and the ADV7280A/ADV7281A/ADV7282A Device Manual for more information on input muxing options.

Connecting Output Video

To observe the output of the evaluation board, connect a YPrPb cable from the analog video output connector (J1) of the evaluation board to a television or other sink device.

Ensure the television or other sink device supports the output format of the evaluation board (480i/576i).

Probing the Digital Video Stream

The digital output stream of the ADV7282A can be probed with an oscilloscope or logic analyzer via a header (J5) on the evaluation board. There is also an individual test point for the LLC signal.

Other Considerations

The 28.63636 MHz crystal (Y1) on the evaluation board does not oscillate until the ADV7282A is configured (see the Configuring the Evaluation Board section). The I2C master works independently of the crystal, using a ring-oscillator in the ADV7282A.

Specific components on the evaluation board are outlined in Table 2 and highlighted in Figure 3. Additional details on components are outlined in Table 3.

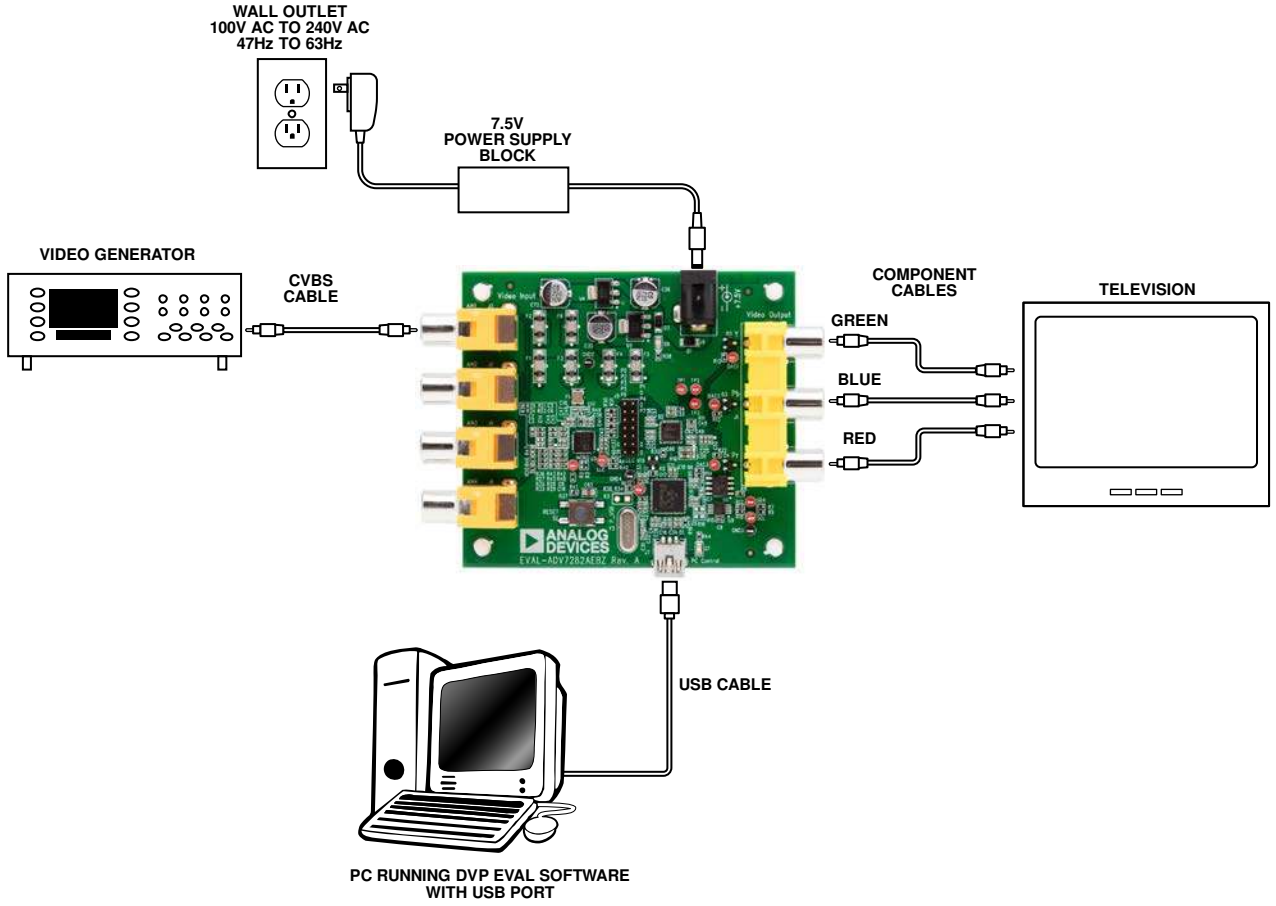

Figure 2. Outline of Evaluation Board Connections

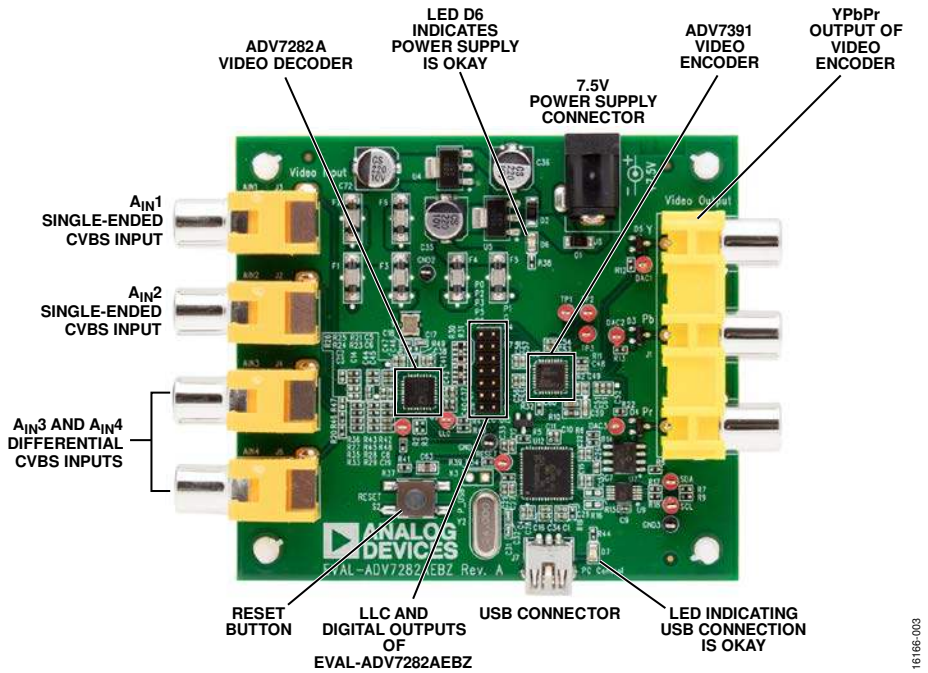

Figure 3. ADV7282A Evaluation Board

Table 2 Essential Evaluation Board Components

Reference Designator	Function	Description
J2 to J4, J6	Analog video inputs	Analog video inputs ($A_{IN}1$ to $A_{IN}4$) connected to the ADV7282A video decoder.
J1	Analog video output	Analog video outputs connected to the ADV7391 encoder.
J8	Power	Connection for 7.5 V power supply. A 7.5 V power supply block is included in the EVAL-ADV7282AEBZ evaluation kit.
D6	Power enabled LED	The LED illuminates when the 7.5 V supply is connected and enabled.
J7	USB	Connecting a USB cable between this connector and a PC with DVP Eval Software and ADV7282A scripts installed allows control of the evaluation board. See the Evaluation Board Software section for more information on DVP Eval Software and ADV7282A scripts.
D7	USB connected LED	The LED illuminates when the USB cable is connected between an active USB port on a PC and the evaluation board.

Table 3 Additional Evaluation Board Components

Reference Designator	Function	Description
J5	P0 to P7 digital outputs	P0 to P7 digital outputs. Digital video output from the ADV7282A.
LLC	LLC output	Line locked clock (LLC) output from the ADV7282A.
$\overline{\text{INTRQ}}$	INTRQ output	Interrupt output from the ADV7282A.
DAC 1 to DAC3	DAC 1 to DAC 3	The YPrPb outputs from the ADV7391 are accessible via the DAC1, DAC2 and DAC3 test points.
Reset and S2	Reset	The evaluation board can be reset by pressing and releasing the push button S2. The evaluation board can also be reset by momentarily connecting the Reset test point to 0 V.
SDA and SCL	I^2C communication bus	Test points. The SDA (I^2C data) and SCL (I^2C clock) test points provide access to the I^2C communication bus on the evaluation board. This allows an external I^2C master to be connected instead of using a PC to configure the evaluation board.
K3	EEPROM Programming	Never short Jumper K3 and only employ K3 during initial programming. This can disable the USB interface on the evaluation board.

EVALUATION BOARD SOFTWARE

SOFTWARE REQUIRED

To complete the initial setup of the evaluation board, download the following:

- ADV7282A script files
- DVP Eval Software

DOWNLOADING THE ADV7282A SCRIPT FILES

To download the ADV7282A script files, complete the following steps:

1. Go to the ADV7282A product page.
2. Download the **ADV7282A_Cust.zip** file.
3. Unzip the **ADV7282A_Cust.zip** file.

DOWNLOADING THE DVP EVAL SOFTWARE

To download the DVP Eval Software, complete the following steps:

1. Open the Install DVP Eval Software thread on EngineerZone.
2. Download the **Install DVP Eval Latest Source 10-14-11.exe.zip** file.
3. Unzip the **Install DVP Eval Latest Source 10-14-11.exe.zip** file.

INSTALLING THE DVP EVAL SOFTWARE

To install the DVP Eval Software, complete the following steps:

1. Run the executable file **Install DVP Eval Latest Source 10-14-11.exe.zip**.
2. Read the **Software License Agreement**. If in agreement, click the **I Agree** button.
3. Select the desired **Desktop** or **Start Menu** shortcuts and click the **Next** button.
4. Select an installation destination folder and click the Install button (see Figure 4). It is recommended to use the default destination folder. Selecting a different destination folder can cause compatibility issues with some versions of Windows® OS.
5. Restart the PC after installing the DVP Eval Software.

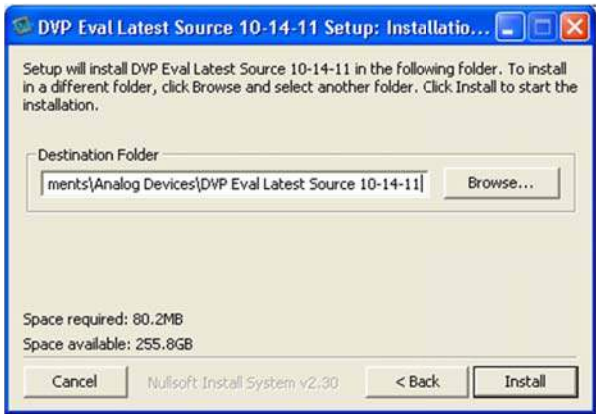

Figure 4. Installation Destination for DVP Eval Software

LOADING THE ADV7282A SCRIPT FILES

This section describes how to combine the ADV7282A script files with the DVP Eval Software.

1. If possible, disconnect the PC from the internet, as some automatic backup agents can interfere with the script file loading process.
2. Copy the unzipped **ADV7282A_Cust** folder to the following directory: C:\Documents and Settings\USER_NAME\My Documents\Analog Devices\DVP Eval Latest Source 10-14-11\xml\New Boards.
3. The location of this folder is influenced by the install location of the DVP Eval Software and USER_NAME must be defined by the user.
4. Open the DVP Eval Software by selecting **Start** > **All Programs** > **Analog Devices** > **DVP Eval Latest Source 10-14-11**..
5. Select **File** > **Update Boards** to combine the ADV7282A script files with the DVP Eval Software (see Figure 5).

Figure 5. Update Board Files on the DVP Eval Software

6. After the **Update Boards** process completes, click **OK** on the **Update Boards Successful** window. The PC can now reconnect to the internet if it is disconnected.

CONFIGURING THE EVALUATION BOARD

After connecting and powering up the hardware and downloading and installing the software, begin using the evaluation board.

To configure the evaluation board, complete the following steps:

1. Select **Start** > **All Programs** > **Analog Devices** > **DVP Eval Latest Source 10-14-11**.
2. Click the **Choose Board** button in the top left corner of the DVP Eval Software window to open the **Board Selector** window (see Figure 6).

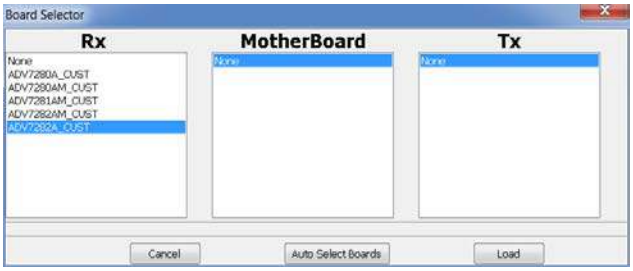

*Figure 6. **Board Selector** Window of DVP Eval Software*

3. Select **ADV7282A_CUST** in the **Rx** list box of the **Board Selector** window, select **None** in the **MotherBoard** list box, and select **None** in the **Tx** list box.
4. Click the **Load** button. A window similar to Figure 7 appears.
5. Select **Script**s > **ADV7282A_CUST** to select and run a script to configure the evaluation board (see Figure 8).
6. To monitor the registers of the ADV7282A or the ADV7391, click on the associated device tab within the DVP Eval Software (see Figure 8).

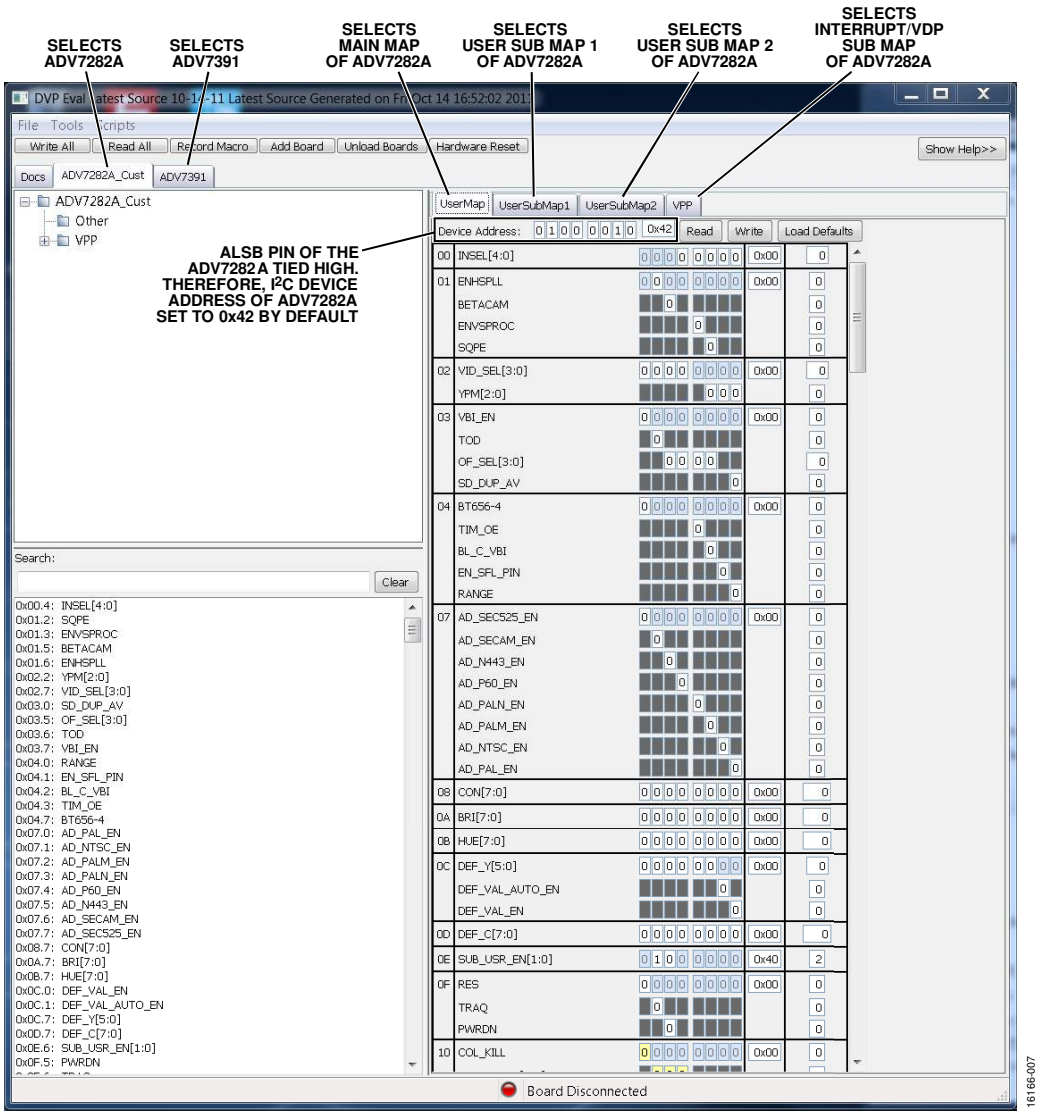

Figure 7. DVP Eval Software after Connecting the ADV7282A Evaluation Board

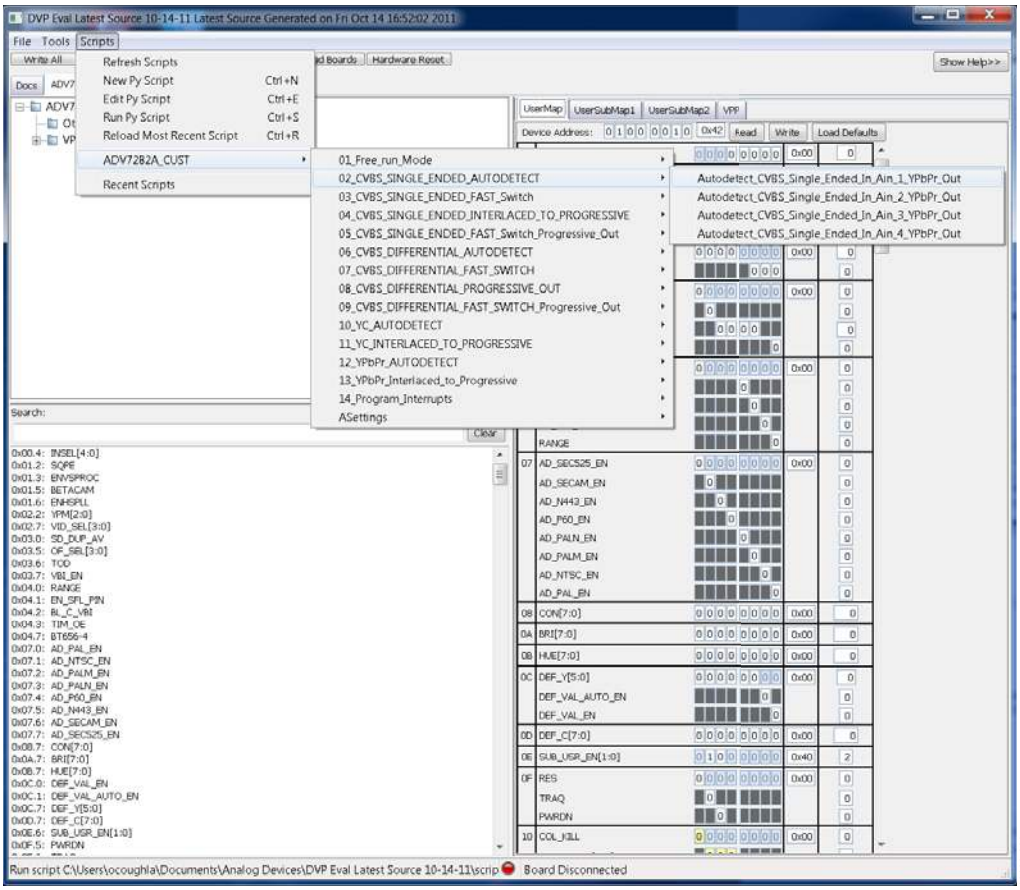

Figure 8. Running ADV7282A Script on DVP Eval Software

NOTES

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

ESD Caution
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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