

## Evaluation Board for the **ADV7182A** 10-Bit, SDTV Video Decoder with Differential Inputs

### FEATURES

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

### EVALUATION BOARD KIT CONTENTS

EVAL-ADV7182AEBZ 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, differential 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](#)

[ADV7182A](#) script

Windows OS

### GENERAL DESCRIPTION

The EVAL-ADV7182AEBZ evaluation kit is the platform provided by Analog Devices, Inc., to evaluate the [ADV7182A](#) video decoder. The EVAL-ADV7182AEBZ evaluation kit contains an EVAL-ADV7182AEBZ evaluation board and all of its necessary peripherals.

This user guide provides a detailed overview of the EVAL-ADV7182AEBZ evaluation board hardware and the software required to use it.

The [ADV7182A](#) data sheet should be consulted in conjunction with this user guide when using the EVAL-ADV7182AEBZ evaluation board.

[EngineerZone](#) can be accessed to find additional information on the [ADV7182A](#).

### PHOTOGRAPH OF THE EVAL-ADV7182AEBZ EVALUATION BOARD

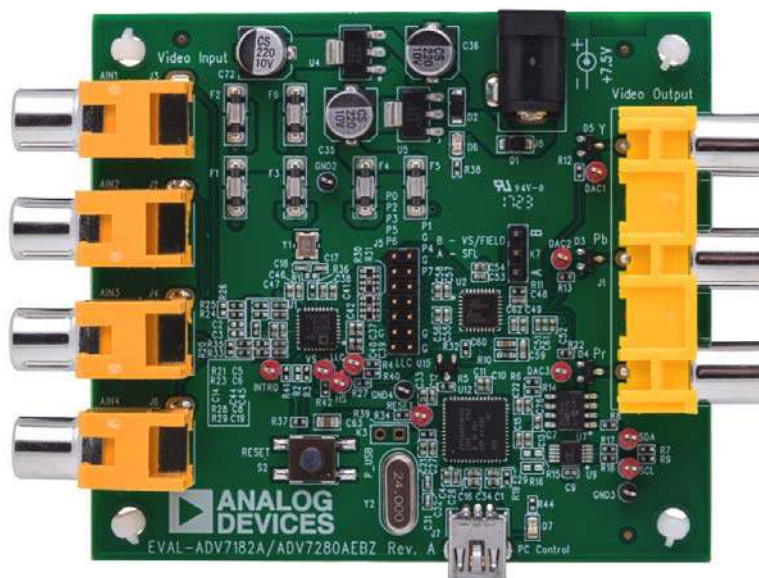


Figure 1.

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**REVISION HISTORY**

8/2017—Revision 0: Initial Version

## EVALUATION BOARD HARDWARE

### EVALUATION BOARD OVERVIEW

The EVAL-ADV7182AEBZ evaluation board features an [ADV7182A](#) video decoder and an [ADV7391](#) video encoder. Four analog video inputs ( $A_{IN1}$  to  $A_{IN4}$ ) are connected to the [ADV7182A](#) video decoder. The [ADV7182A](#) can receive analog video in several different format configurations; hardware configuration changes might be required to support certain formats, for example, single-ended CVBS vs. differential CVBS (see Table 1). The [ADV7182A](#) 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 $A_{IN3}$ and $A_{IN4}$ for Single-Ended CVBS

To configure the  $A_{IN3}$  and  $A_{IN4}$  inputs to receive single-ended CVBS, make the following resistor changes on the evaluation board:

1. Remove Resistor R20.
2. Replace Resistor R33 and Resistor R35 with 24  $\Omega$  resistors.
3. Replace Resistor R28 and Resistor R29 with 51  $\Omega$  resistors.

##### Configuring $A_{IN1}$ and $A_{IN2}$ for Differential CVBS

To configure  $A_{IN1}$  and  $A_{IN2}$  to receive differential CVBS, make the following resistor changes on the evaluation board:

1. Replace Resistor R24 and Resistor R25 with 1.3 k $\Omega$  resistors
2. Replace Resistor R21 and Resistor R23 with 430  $\Omega$  resistors.
3. Replace Resistor R26 with a 75  $\Omega$  resistor for pseudo differential CVBS or with a 150  $\Omega$  resistor for fully differential CVBS.
4. Connect the positive input to  $A_{IN1}$  and the negative input to  $A_{IN2}$ .

##### Configuring $A_{IN3}$ and $A_{IN4}$ for S-Video (Y/C)

To configure  $A_{IN3}$  and  $A_{IN4}$  to receive S-Video (Y/C), make the following resistor changes on the evaluation board:

1. Remove Resistor R20.
2. Replace Resistor R33 and Resistor R35 with 24  $\Omega$  resistors.
3. Replace Resistor R28 and Resistor R29 with 51  $\Omega$  resistors.
4. Connect the luma channel (Y) to  $A_{IN3}$  and the chroma channel (C) to  $A_{IN4}$ .

##### Configuring $A_{IN1}$ , $A_{IN2}$ , and $A_{IN3}$ for YPrPb

To configure  $A_{IN1}$ ,  $A_{IN2}$ , and  $A_{IN3}$  to receive YPrPb, make the following resistor changes on the evaluation board:

1. Remove Resistor R20.
2. Replace Resistor R33 and Resistor R35 with 24  $\Omega$  resistors.
3. Replace Resistor R28 and Resistor R29 with 51  $\Omega$  resistors.
4. Connect the luma channel (Y) to  $A_{IN1}$ , the Pb channel to  $A_{IN2}$ , and the Pr channel to  $A_{IN3}$ .

**Table 1. Analog Video Input Format Configurations for the EVAL-ADV7182AEBZ Evaluation Board**

Configuration	$A_{IN1}$	$A_{IN2}$	$A_{IN3}$	$A_{IN4}$
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 (SE) CVBS	Default	Default	See the Configuring $A_{IN3}$ and $A_{IN4}$ for Single-Ended CVBS section	See the Configuring $A_{IN3}$ and $A_{IN4}$ for Single-Ended CVBS section
Differential CVBS	See the Configuring $A_{IN1}$ and $A_{IN2}$ for Differential CVBS section	See the Configuring $A_{IN1}$ and $A_{IN2}$ 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 $A_{IN3}$ and $A_{IN4}$ for S-Video (Y/C) section	See the Configuring $A_{IN3}$ and $A_{IN4}$ for S-Video (Y/C) section
Component (YPbPr)	See the Configuring $A_{IN1}$ , $A_{IN2}$ , and $A_{IN3}$ for YPrPb section	See the Configuring $A_{IN1}$ , $A_{IN2}$ , and $A_{IN3}$ for YPrPb section	See the Configuring $A_{IN1}$ , $A_{IN2}$ , and $A_{IN3}$ for YPrPb section	Not applicable

## 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-ADV7182AEBZ 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-ADV7182AEBZ 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 ( $A_{IN1}$  to  $A_{IN4}$ ) 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 [ADV7182A](#) data sheet 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).

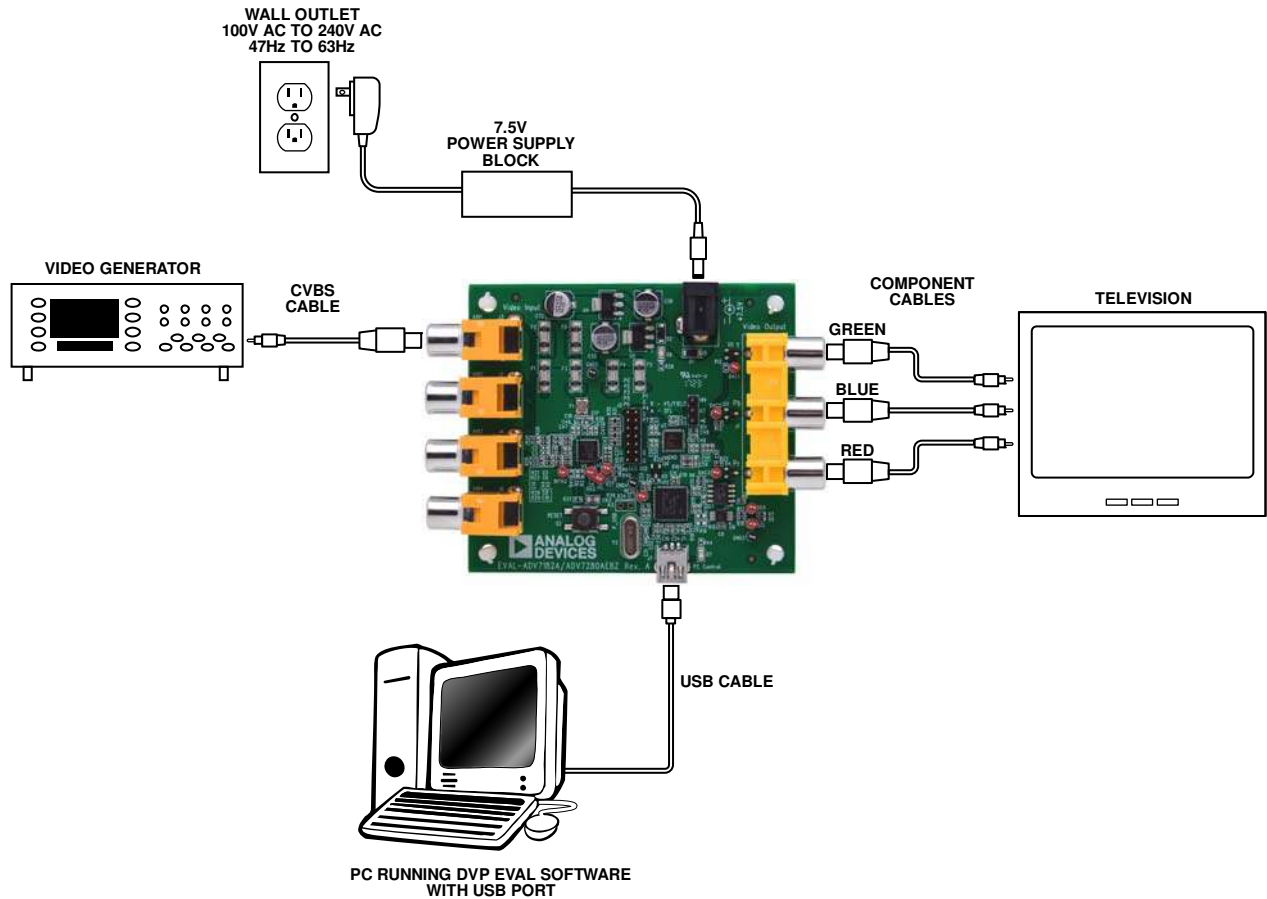
### **Probing the Digital Video Stream**

ADV7182AEBZ output stream of the [ADV7182A](#) can be probed with an oscilloscope or a logic analyzer via a header (J5) on the evaluation board. There are also individual test points for the LLC, HS, and VS/FIELD/SFL signals.

### **Other Considerations**

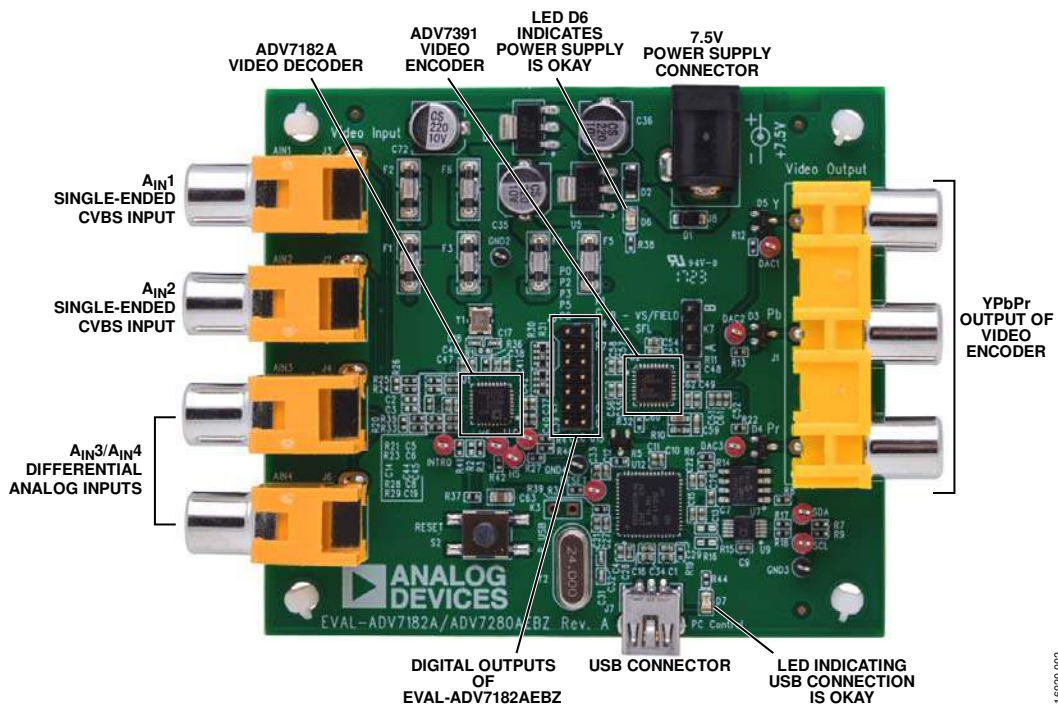
The 28.63636 MHz crystal (Y1) on the evaluation board does not oscillate until the [ADV7182A](#) is configured (see the [Configuring the Evaluation Board](#) section). The I<sup>2</sup>C master works independently of the crystal, using a ring-oscillator in the [ADV7182A](#).

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.



16020-102

Figure 2. Outline of Evaluation Board Connections



16020-002

Figure 3. ADV7182A Evaluation Board

Table 2. Essential Evaluation Board Components

Reference Designator	Function	Description
J2 to J4, J6	Analog video inputs	Analog video inputs (A <sub>IN1</sub> to A <sub>IN4</sub> ) connected to the <a href="#">ADV7182A</a> video decoder.
J1	Analog video output	Analog video outputs connected to the <a href="#">ADV7391</a> encoder.
J8	Power	Connection for 7.5 V power supply. A 7.5 V power supply block is included in the EVAL-ADV7182AEBZ 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 <a href="#">DVP Eval Software</a> and <a href="#">ADV7182A</a> scripts <sup>1</sup> installed allows control of the evaluation board. See the Evaluation Board Software section for more information on <a href="#">DVP Eval Software</a> and <a href="#">ADV7182A</a> 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.

<sup>1</sup> These scripts enable control of the [ADV7182A](#) and the [ADV7391](#) encoder.

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 <a href="#">ADV7182A</a> .
LLC	LLC output	Line locked clock (LLC) output from the <a href="#">ADV7182A</a> .
HS	HS output	Horizontal sync output from the <a href="#">ADV7182A</a> .
VS	VS/FIELD/SFL output	Vertical sync/field/sub-carrier frequency lock output from the <a href="#">ADV7182A</a> .
INTRQ	INTRQ output	Interrupt output from the <a href="#">ADV7182A</a> .
DAC 1 to DAC 3	DAC 1 to DAC 3	The YPrPb outputs from the <a href="#">ADV7391</a> 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 0V.
SDA and SCL	I <sup>2</sup> C communication bus	Test points. The SDA (I <sup>2</sup> C data) and SCL (I <sup>2</sup> C clock) test points provide access to the I <sup>2</sup> C communication bus on the evaluation board. This allows an external I <sup>2</sup> C 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.
K7	Synchronization control	Jumper K7 controls which synchronization signal is sent from the VS/FIELD/SFL pin of the <a href="#">ADV7182A</a> to the <a href="#">ADV7391</a> encoder. If the VS/FIELD/SFL pin is configured for either vertical synchronization or field synchronization, place a jumper in Position A. If the VS/FIELD/SFL pin is configured for the subcarrier frequency lock (SFL) signal, place a jumper in Position B. Jumper K7 can be not inserted if none of the above cases are in use.

## EVALUATION BOARD SOFTWARE

### SOFTWARE REQUIRED

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

- [ADV7182A](#) script files
- [DVP Eval Software](#)

### DOWNLOADING THE [ADV7182A](#) SCRIPT FILES

To download the [ADV7182A](#) script files, complete the following steps:

1. Go to the [ADV7182A](#) product page.
2. Download the [ADV7182A\\_Cust.zip](#) file
3. Unzip the file [ADV7182A\\_Cust.zip](#) file

### DOWNLOADING [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](#).

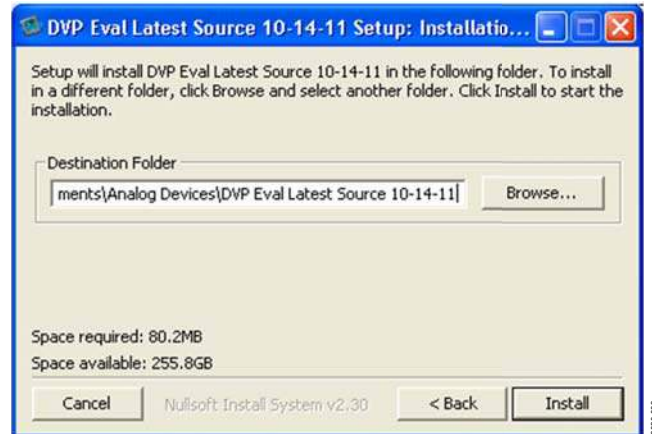


Figure 4. Installation Destination for [DVP Eval Software](#)

### LOADING THE [ADV7182A](#) SCRIPT FILES

This section describes how to combine the [ADV7182A](#) 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 [ADV7182A\\_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 [ADV7182A](#) script files with the [DVP Eval Software](#). (see Figure 5).

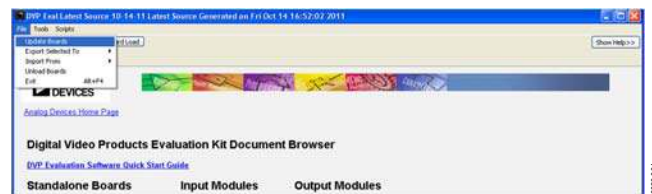


Figure 5. Update Board Files on the [DVP Eval Software](#)

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).

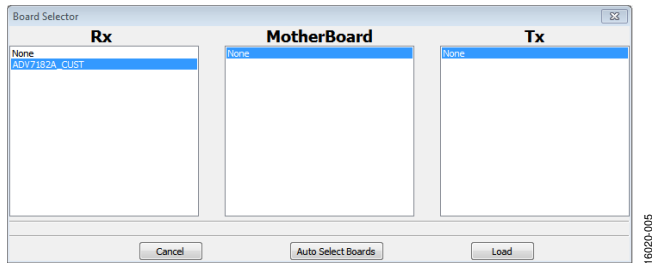


Figure 6. **Board Selector** Window of *DVP Eval Software*

3. Select **ADV7182A\_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 **Scripts > ADV7182A\_CUST** to select and run a script to configure the evaluation board (see Figure 8).
6. To monitor the registers of the **ADV7182A** or the **ADV7391**, click on the associated device tab within the **DVP Eval Software** (see Figure 8).



SELECTS ADV7182A      SELECTS ADV7391

SELECTS MAIN MAP OF ADV7182A      SELECTS INTERRUPT/ VDP SUB MAP OF ADV7182A      SELECTS USER SUB MAP 2 OF ADV7182A

ALSB PIN OF THE ADV7182A TIED HIGH. THEREFORE, DEVICE ADDRESS OF ADV7182A SET TO 0x42 BY DEFAULT

Device Address	0	1	0	0	0	1	0	0x42	Read	Write	Load Defaults
00 INSEL[4:0]	1	0	1	0	0	0	0	0	0x00	0	
01 ENHSPLL	0	0	0	0	0	0	0	0	0x00	0	
02 BETACAM	0	0	0	0	0	0	0	0	0	0	
03 ENNSPROC	0	0	0	0	0	0	0	0	0	0	
04 SQPE	0	0	0	0	0	0	0	0	0	0	
05 VID_SEL[3:0]	1	0	0	0	0	0	0	0	0x00	0	
06 YPM[2:0]	0	0	0	0	0	0	0	0	0	0	
07 VBL_EN	0	0	0	0	0	0	0	0	0x00	0	
08 TOO	0	0	0	0	0	0	0	0	0	0	
09 OF_SRL[3:0]	0	0	0	0	0	0	0	0	0	0	
10 SD_DUP_AV	0	0	0	0	0	0	0	0	0	0	
11 BT656-4	1	0	0	0	0	0	0	0	0x00	0	
12 TIM_DE	0	0	0	0	0	0	0	0	0	0	
13 BL_C_VBI	0	0	0	0	0	0	0	0	0	0	
14 EN_SFL_PFN	0	0	0	0	0	0	0	0	0	0	
15 RANGE	0	0	0	0	0	0	0	0	0	0	
16 AD_SEC525_EN	1	0	0	0	0	0	0	0	0x00	0	
17 AD_SECAM_EN	0	0	0	0	0	0	0	0	0	0	
18 AD_IH43_EN	0	0	0	0	0	0	0	0	0	0	
19 AD_P60_EN	0	0	0	0	0	0	0	0	0	0	
20 AD_PALM_EN	0	0	0	0	0	0	0	0	0	0	
21 AD_PALM_EN	0	0	0	0	0	0	0	0	0	0	
22 AD_NTSC_EN	0	0	0	0	0	0	0	0	0	0	
23 AD_PALM_EN	0	0	0	0	0	0	0	0	0	0	
24 CORN[7:0]	0	0	0	0	0	0	0	0	0x00	0	
25 BR[7:0]	0	0	0	0	0	0	0	0	0x00	0	
26 HURE[7:0]	0	0	0	0	0	0	0	0	0x00	0	
27 DEF_Y[5:0]	0	0	0	0	0	0	0	0	0x00	0	
28 DEF_VAL_AUTO_EN	0	0	0	0	0	0	0	0	0	0	
29 DEF_VAL_EN	0	0	0	0	0	0	0	0	0	0	
30 DEF_C[7:0]	0	0	0	0	0	0	0	0	0x00	0	
31 SUB_LSR_EN[1:0]	1	1	0	0	0	0	0	0	0x40	2	
32 RES	0	0	0	0	0	0	0	0	0x00	0	
33 TRAQ	0	0	0	0	0	0	0	0	0	0	
34 PWARDN	0	0	0	0	0	0	0	0	0	0	
35 COL_KILL	0	0	0	0	0	0	0	0	0x00	0	

Figure 7. DVP Eval Software After Connecting the ADV7182A Evaluation Board

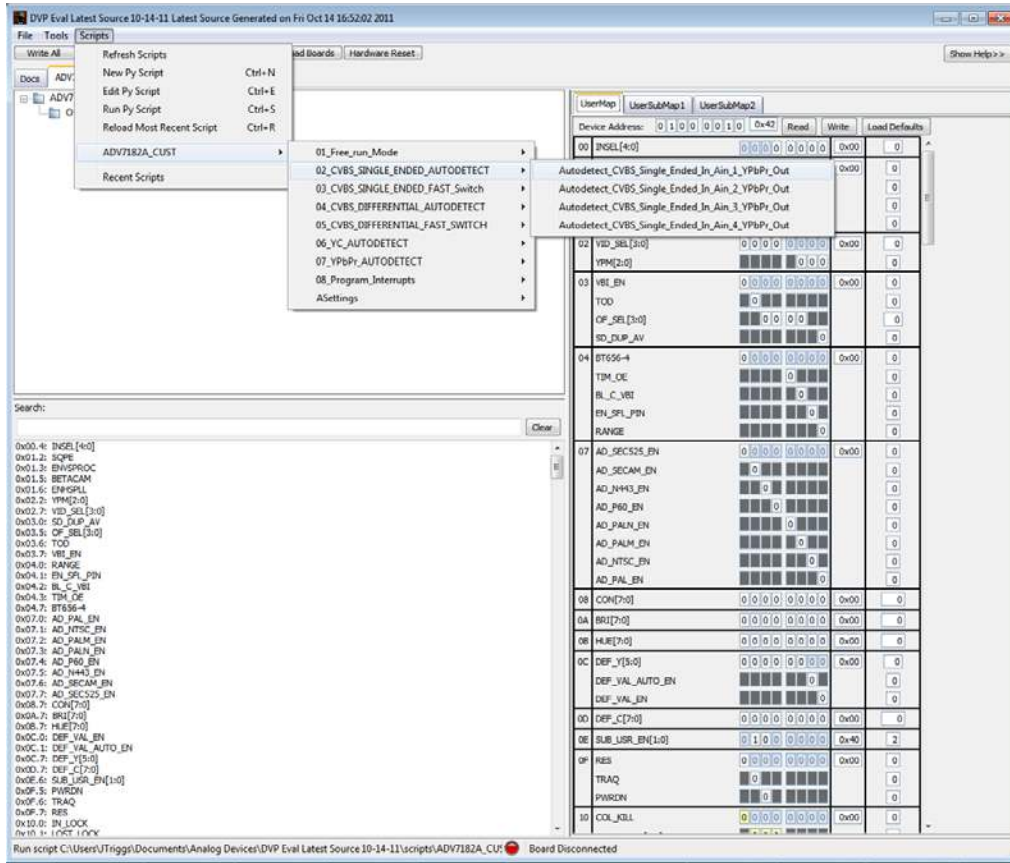


Figure 8. Running EVAL-ADV7182AEBZ Script on DVP Eval Software

I<sup>2</sup>C 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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