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

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.
TABLE OF CONTENTS

Features .............................................................................................. 1
Evaluation Board Kit Contents ....................................................... 1
Hardware Needed ............................................................................. 1
Software Needed ............................................................................... 1
General Description ......................................................................... 1
Photograph of the EVAL-ADV7282AEBZ .................................... 1
Revision History ............................................................................... 2
Evaluation Board Hardware ............................................................ 3
  Evaluation Board Overview ......................................................... 3
  Evaluation Board Description ..................................................... 4
  Evaluation Board Software .......................................................... 7
    Software Required ........................................................................ 7
    Downloading the ADV7282A Script Files ................................. 7
    Downloading the DVP Eval Software ......................................... 7
    Installing the DVP Eval Software .............................................. 7
    Loading the ADV7282A Script Files ......................................... 7
    Configuring the Evaluation Board ............................................ 8

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 (AIN1 to AIN4) 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 AIN3 and AIN4 for Single-Ended CVBS**

To configure the AIN3 and AIN4 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 AIN1 and AIN2 for Differential CVBS**

To configure AIN1 and AIN2 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 AIN1 and the negative input to AIN2.
5. Remove R46 and replace R27 with a 0 Ω resistor to enable the diagnostic feature for the AIN1 and AIN2 inputs. This step is optional.

**Configuring AIN3 and AIN4 for S-Video (Y/C)**

To configure AIN3 and AIN4 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 AIN3 and the chroma channel (C) to AIN4.

**Configuring AIN2, AIN3, and AIN4 for YPrPb**

To configure AIN2, AIN3, and AIN4 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 AIN3, the Pb channel to AIN4, and the Pr channel to AIN2.

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

<table>
<thead>
<tr>
<th>Configuration</th>
<th>AIN1</th>
<th>AIN2</th>
<th>AIN3</th>
<th>AIN4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Single-Ended CVBS Input 1</td>
<td>Single-Ended CVBS Input 2</td>
<td>Differential CVBS Input 1</td>
<td>Differential CVBS Input 1</td>
</tr>
<tr>
<td>Single-ended CVBS</td>
<td>Default</td>
<td>Default</td>
<td>positive channel</td>
<td>negative channel</td>
</tr>
<tr>
<td>Differential CVBS</td>
<td>See the Configuring AIN1 and AIN2 for Differential CVBS section</td>
<td>See the Configuring AIN1 and AIN2 for Differential CVBS section</td>
<td>Default</td>
<td>Default</td>
</tr>
<tr>
<td>S-Video (Y/C)</td>
<td>S-Video Input 1 (Y-channel)</td>
<td>S-Video Input 1 (C-channel)</td>
<td>See the Configuring AIN3 and AIN4 for S-Video (Y/C) section</td>
<td>See the Configuring AIN3 and AIN4 for S-Video (Y/C) section</td>
</tr>
<tr>
<td>Component (YPbPr)</td>
<td>Not Applicable</td>
<td>See the Configuring AIN2, AIN3, and AIN4 for YPbPb section</td>
<td>See the Configuring AIN2, AIN3, and AIN4 for YPbPb section</td>
<td>See the Configuring AIN2, AIN3, and AIN4 for YPbPb section</td>
</tr>
</tbody>
</table>
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 (AIN1 to AIN4) 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

<table>
<thead>
<tr>
<th>Reference Designator</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2 to J4, J6</td>
<td>Analog video inputs</td>
<td>Analog video inputs (AIN1 to AIN4) connected to the ADV7282A video decoder.</td>
</tr>
<tr>
<td>J1</td>
<td>Analog video output</td>
<td>Analog video outputs connected to the ADV7391 encoder.</td>
</tr>
<tr>
<td>J8</td>
<td>Power</td>
<td>Connection for 7.5 V power supply. A 7.5 V power supply block is included in the EVAL-ADV7282AEBZ evaluation kit.</td>
</tr>
<tr>
<td>D6</td>
<td>Power enabled LED</td>
<td>The LED illuminates when the 7.5 V supply is connected and enabled.</td>
</tr>
<tr>
<td>J7</td>
<td>USB</td>
<td>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.</td>
</tr>
<tr>
<td>D7</td>
<td>USB connected LED</td>
<td>The LED illuminates when the USB cable is connected between an active USB port on a PC and the evaluation board.</td>
</tr>
</tbody>
</table>

### Table 3 Additional Evaluation Board Components

<table>
<thead>
<tr>
<th>Reference Designator</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J5</td>
<td>P0 to P7 digital outputs</td>
<td>P0 to P7 digital outputs. Digital video output from the ADV7282A.</td>
</tr>
<tr>
<td>LLC</td>
<td>LLC output</td>
<td>Line locked clock (LLC) output from the ADV7282A.</td>
</tr>
<tr>
<td>INTRQ</td>
<td>INTRQ output</td>
<td>Interrupt output from the ADV7282A.</td>
</tr>
<tr>
<td>DAC 1 to DAC3</td>
<td>DAC 1 to DAC 3</td>
<td>The YPrPb outputs from the ADV7391 are accessible via the DAC1, DAC2 and DAC3 test points.</td>
</tr>
<tr>
<td>Reset and S2</td>
<td>Reset</td>
<td>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.</td>
</tr>
<tr>
<td>SDA and SCL</td>
<td>I²C communication bus</td>
<td>Test points. The SDA (I²C data) and SCL (I²C clock) test points provide access to the I²C communication bus on the evaluation board. This allows an external I²C master to be connected instead of using a PC to configure the evaluation board.</td>
</tr>
<tr>
<td>K3</td>
<td>EEPROM Programming</td>
<td>Never short Jumper K3 and only employ K3 during initial programming. This can disable the USB interface on the evaluation board.</td>
</tr>
</tbody>
</table>
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.

INSTALLING THE DVP EVAL SOFTWARE
To install the DVP Eval Software, complete the following steps:
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.

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).
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).
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 Scripts > 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 6. Board Selector Window of DVP Eval Software
Figure 7. DVP Eval Software after Connecting the ADV7282A Evaluation Board

 ALSB PIN OF THE ADV7282A TIED HIGH. THEREFORE, PC DEVICE ADDRESS OF ADV7282A SET TO 0x42 BY DEFAULT.
Figure 8. Running ADV7282A Script on DVP Eval Software
NOTES

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

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Rev. 0 | Page 11 of 11