Evaluation Board for the ADV7280A 10-Bit, 4x Oversampled SDTV Video Decoder with 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-ADV7280AEBZ 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 YPbPr
PC
TV or display with YPbPr input
CVBS input cable(s)
S-Video cable(s)
Component cable(s)

SOFTWARE NEEDED
DVP Eval Software
ADV7280A scripts
Windows OS

GENERAL DESCRIPTION
The EVAL-ADV7280AEBZ evaluation kit is the platform provided by Analog Devices, Inc., to evaluate the ADV7280A video decoder. The EVAL-ADV7280AEBZ evaluation kit contains an EVAL-ADV7280AEBZ evaluation board and all of its necessary peripherals.

This user guide provides a detailed overview of the EVAL-ADV7280AEBZ evaluation board hardware and the software required to use it.

The ADV7280A data sheet and the ADV7280A/ADV7281A/ADV7282A Device Manual should be consulted in conjunction with this user guide when using the EVAL-ADV7280AEBZ evaluation board.

EngineerZone can be accessed to find additional information about the ADV7280A.
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REVISION HISTORY
8/2017—Revision 0: Initial Version
EVALUATION BOARD HARDWARE

EVALUATION BOARD OVERVIEW

The EVAL-ADV7280AEBZ evaluation board features an ADV7280A video decoder and an ADV7391 video encoder. Four analog video inputs (A\textsubscript{IN}1 to A\textsubscript{IN}4) are connected to the ADV7280A video decoder. The ADV7280A 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 ADV7280A 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.

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-ADV7280AEBZ 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 board 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-ADV7280AEBZ evaluation kit to a computer with the 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\textsubscript{IN}1 to A\textsubscript{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 ADV7280A 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 ADV7280A can be probed with an oscilloscope or 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 ADV7280A is configured (see the Configuring the Evaluation Board section). The I²C master works independently of the crystal, using a ring oscillator in the ADV7280A.

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.

<table>
<thead>
<tr>
<th>Analog Video Format</th>
<th>A\textsubscript{IN}1</th>
<th>A\textsubscript{IN}2</th>
<th>A\textsubscript{IN}3</th>
<th>A\textsubscript{IN}4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential CVBS</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</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>S-Video Input 2 (Y channel)</td>
<td>YPbPr1 Input 1 (Pr channel)</td>
</tr>
<tr>
<td>YPbPr (component)</td>
<td>YPbPr1 Input 1 (Y channel)</td>
<td>Not applicable</td>
<td>YPbPr1 Input 1 (Pr channel)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
Figure 2. Outline of Evaluation Board Connections

Figure 3. ADV7280A Evaluation Board
### Table 2. Important 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 (A IN1 to AIN4) connected to the ADV7280A 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-ADV7280AEBZ evaluation kit.</td>
</tr>
<tr>
<td>D6</td>
<td>Power enabled LED</td>
<td>This 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 ADV7280A scripts installed allows control of the evaluation board. See the Evaluation Board Software section for more information on the DVP Eval Software and ADV7280A 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 ADV7280A.</td>
</tr>
<tr>
<td>LLC</td>
<td>LLC output</td>
<td>LLC output from the ADV7280A.</td>
</tr>
<tr>
<td>HS</td>
<td>HS output</td>
<td>HS output from the ADV7280A.</td>
</tr>
<tr>
<td>VS</td>
<td>VS/FIELD/SFL output</td>
<td>VS/FIELD/SFL output from the ADV7280A.</td>
</tr>
<tr>
<td>INTRQ</td>
<td>INTRQ output</td>
<td>Interrupt output from the ADV7280A.</td>
</tr>
<tr>
<td>DAC 1 to DAC 3</td>
<td>DAC 1 to DAC 3</td>
<td>Test points. 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 S2 push button. 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>I^C communication bus</td>
<td>Test points. The SDA (I^C data) and SCL (I^C clock) test points provide access to the I^C communication bus on the evaluation board. This allows an external I^C 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. The jumper can disable the USB interface on the evaluation board.</td>
</tr>
<tr>
<td>K7</td>
<td>Synchronization control</td>
<td>Jumper K7 controls which synchronization signal sent from the VS/FIELD/SFL pin of the ADV7280A to the ADV7391 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. Do not insert Jumper K7 if none of the mentioned cases are in use.</td>
</tr>
</tbody>
</table>
EVALUATION BOARD SOFTWARE

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

- ADV7280A script files
- DVP Eval Software

DOWNLOADING THE ADV7280A SCRIPT FILES
To download the ADV7280A script files, complete the following steps:

1. Go to the ADV7280A product page.
2. Download the ADV7280A_Cust.zip file.
3. Unzip the ADV7280A_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.

INSTALLING 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.
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 ADV7280A SCRIPT FILES
This section describes how to combine the ADV7280A 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 ADV7280A_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.
   
   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.
3. Open the DVP Eval Software by selecting Start > All Programs > Analog Devices > DVP Eval Latest Source 10-14-11.
4. Select File > Update Boards to combine the ADV7280A script files with the DVP Eval Software (see Figure 5).
5. 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 ADV7280A_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. Click Scripts > ADV7280A_CUST to select and run a script to configure the evaluation board (see Figure 8).
6. To monitor the registers of the ADV7280A or the ADV7391, click the associated device tab within the DVP Eval Software (see Figure 8).

![Figure 6. Board Selector Window of DVP Eval Software](image)

![Figure 7. DVP Eval Software after Connecting the ADV7280A Evaluation Board](image)
Figure 8. Running ADV7280A Script on DVP Eval Software

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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