

Evaluating the AD45335, 32-Channel, 14-Bit, High Voltage Output DAC

FEATURES

- ▶ Full featured evaluation board for the [AD45335](#)
- ▶ On-board reference
- ▶ PC control in conjunction with the [EVAL-SDP-CS1Z](#) or [EVAL-SDP-CB1Z](#) system demonstration platform
- ▶ PC software for voltage output control

EVALUATION KIT CONTENTS

- ▶ EVAL-AD45335SDZ

EQUIPMENT NEEDED

- ▶ [EVAL-SDP-CS1Z](#) or [EVAL-SDP-CB1Z](#) system demonstration platform
- ▶ 5 V power supply
- ▶ 60 V power supply
- ▶ PC running Windows® XP SP2, Windows® Vista, or Windows® 7 with USB 2.0 port

ONLINE RESOURCES

- ▶ [Bill of Materials](#)
- ▶ Documents needed
 - ▶ [AD45335](#) data sheet
- ▶ Software needed

EVALUATION BOARD PHOTOGRAPH

- ▶ [Analysis | Control | Evaluation \(ACE\) Software](#) Version 1.27.3250.1427 or later

GENERAL DESCRIPTION

The EVAL-AD45335SDZ is a full featured evaluation board that can be used to easily evaluate all the features of the EVAL-AD45335SDZ. The EVAL-AD45335SDZ is a 32-channel, 14-bit, high voltage output *denseDAC*® with an on-chip high voltage output amplifier.

The AD45335 output voltage range is programmable using the REF_IN pin. The output range is 0 V to 50 V when REF_IN = 1 V, and 0 V to 200 V when REF_IN = 4 V. Each amplifier can source 150 μ A. REF_IN is buffered internally on the AD45335 and must be driven from a stable reference source.

The selected digital-to-analog converter (DAC) register is written to using the 3-wire interface. The serial peripheral interface (SPI) operates at clock rates of up to 30 MHz and is compatible with digital signal processing (DSP) and microcontroller interface standards.

The [EVAL-SDP-CS1Z](#) or [EVAL-SDP-CB1Z](#) board allows the EVAL-AD45335SDZ to be controlled through the USB port of a PC using the EVAL-AD45335SDZ software.

The EVAL-AD45335SDZ requires 60 V and 5 V external power supplies. On-board components include the [REF198](#), 4.096 V, precision micropower, low dropout, low voltage reference.

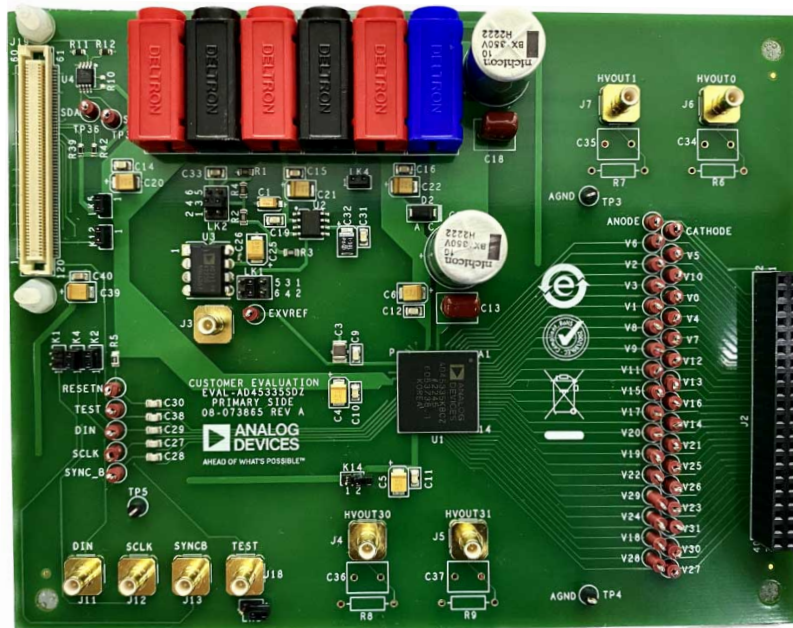


Figure 1. EVAL-AD45335SDZ

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REVISION HISTORY**10/2023—Revision 0: Initial Version**

GETTING STARTED

SOFTWARE INSTALLATION PROCEDURES

The EVAL-AD45335SDZ uses the ACE evaluation software, which allows the evaluation and control of multiple evaluation systems.

The ACE installer comes with the necessary system demonstration platform (SDP) drivers and the Microsoft® .NET Framework 4 by default. Refer to the ACE landing page to get the latest version of ACE. A detailed installation procedure for ACE is also available from the ACE website.

The ACE plugin can be downloaded from the EVAL-AD45335SDZ product page or from the **Plug-in Manager** in the ACE software.

QUICK START STEPS

To begin using the EVAL-AD45335SDZ, follow these steps:

1. Connect the 60 V power supply to V_{PP} and connect the 5 V supply to AV_{CC} , and V_+ . Before turning on the power supplies, check the jumper settings.
2. Connect the EVAL-SDP-CB1Z to the EVAL-AD45335SDZ as shown in Figure 2. Screw the two boards together using the nylon screw/nut set included in the evaluation board kit to ensure that the boards are connected firmly together.
3. Connect the EVAL-SDP-CB1Z to the PC using the appropriate USB cable. Launch the ACE application from the **Analog Devices** subfolder in the **Programs** menu.
4. When ACE is in operation, ACE is able to detect the EVAL-AD45335SDZ (**AD45335 Board**) as connected hardware as shown in Figure 3.
5. Double-click on the **AD45335 Board** to open the EVAL-AD45335SDZ view (as shown in Figure 4).
6. Click on the **AD45335** chip to access the device view window (Figure 5). Figure 5 provides access to the basic controls for configuring the DAC.

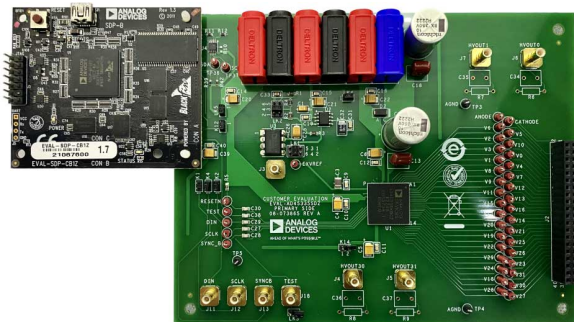


Figure 2. Hardware Configuration

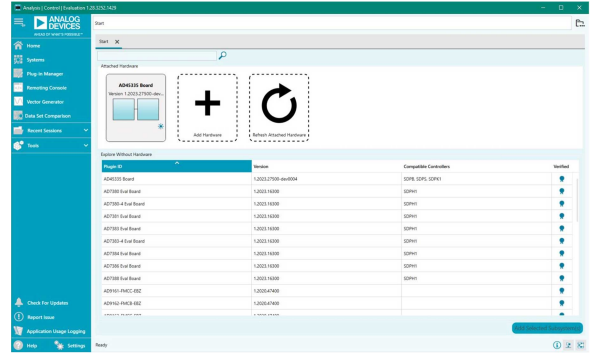


Figure 3. ACE Start Window

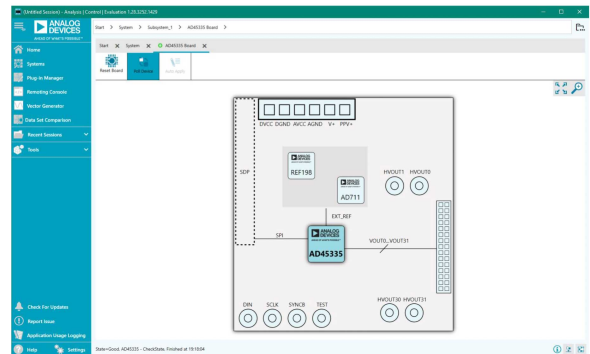


Figure 4. ACE EVAL-AD45335SDZ Board View

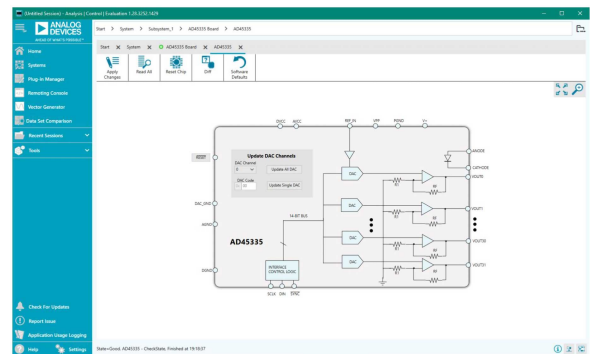


Figure 5. ACE AD45335 Chip View

SOFTWARE FUNCTIONS AND FEATURES

The EVAL-AD45335SDZ ACE plugin was designed to appear similar to the functional block diagram shown in the AD45335 data

sheet. Figure 6 shows the chip block diagram view and the description of each function is discussed in Table 1.

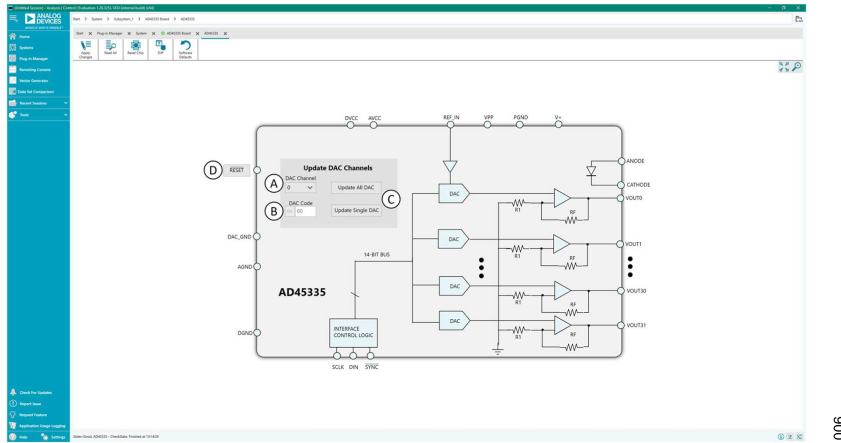


Figure 6. AD45335 Device Block Diagram

Table 1. AD45335 Plugin Functions

Label	Function Name	Description
A	DAC Channel Select	Drop-down menu that sets the DAC channel target for single DAC update.
B	DAC Code	This field sets the 14-bit code to be written to the DAC registers and set the high voltage output. AD45335 uses straight binary coding and the ideal DAC output voltage is given by $V_{OUT} = \frac{50 \times V_{REF_IN} \times D}{2^{14}}$ where: VREF_IN is 4.096 V by default but depends on LK1 and LK2 jumper settings. D is the 14-bit hex code input in this field.
C	DAC Update	The AD45335 plugin offers the following DAC update modes: Update All DAC, which takes the DAC code in B and writes it to all the DAC registers and updates their output. Update Single DAC, which writes the DAC code in B and sends it to the selected DAC channel in A and updates its output.
D	Hardware Reset	Takes the \overline{RESET} pin low, resetting the device to its power-on reset condition.

EVALUATION BOARD HARDWARE

LINK OPTIONS

There are LKx and Kx jumper options that must be set correctly to select the appropriate operating mode before using the EVAL-AD45335SDZ. The functions of these options are shown in [Table 2](#).

Before applying power and signals to the EVAL-AD45335SDZ, ensure that all link positions are in the default or desired positions. To prevent damage to the devices on the EVAL-AD45335SDZ, do not change the link positions while power is being applied to the EVAL-AD45335SDZ.

Table 2. Link Option Descriptions

Link No.	Function
LK1	Reference selection: Position A—External reference (through J3). Position B—4.096 V reference (default). Position C—Scaled reference selection (see LK2 for selection).
LK2	Scaled reference selection: Position A—3.072 V reference. Position B—2.048 V reference (default). Position C—1.024 V reference.
LK3	TEST input pin shorted to GND (not inserted).
LK4	AV _{CC} to V ₊ connection (inserted).
LK5	DV _{CC} to 3.3 V connection (inserted).
K1	SYN _C to the SDP-120 (J19) connector (inserted).
K2	D _{IN} to the SDP-120 (J19) connector (inserted).
K4	SCLK to the SDP-120 (J19) connector (inserted).
K12	3.3 V to VIO from the SDP-120 (J19) connector (inserted).
K14	AV _{CC} to VIN on the SDP-120 (J19) connector (not inserted).

POWER SUPPLIES

Table 3. External Power Supplies

Power Supply	Connector	Voltage Range	Typical	Purpose
DV _{CC}	J15	2.7 V to 5.25 V	5 V	Supplies the DV _{CC} digital supply. Required only if EVAL-AD45335SDZ is used without the EVAL-SDP-CS1Z or EVAL-SDP-CB1Z .
DGND	J16	0 V	0 V	GND connector for the digital supply.
AV _{CC}	J14	4.75 V to 5.25 V	5 V	Supplies the AV _{CC} analog supply. Check the LK4 jumper setting.
V ₊	J9	4.75 V to 5.25 V	5 V	Supplies the V ₊ supply. Check the LK4 jumper setting.
V _{PP}	J8	60 V to 225 V	210 V	Supplies the V _{PP} high voltage supply.
AGND	J17	0 V	0 V	GND connector for the analog and high voltage supplies.

EVALUATION BOARD SCHEMATICS AND ARTWORK

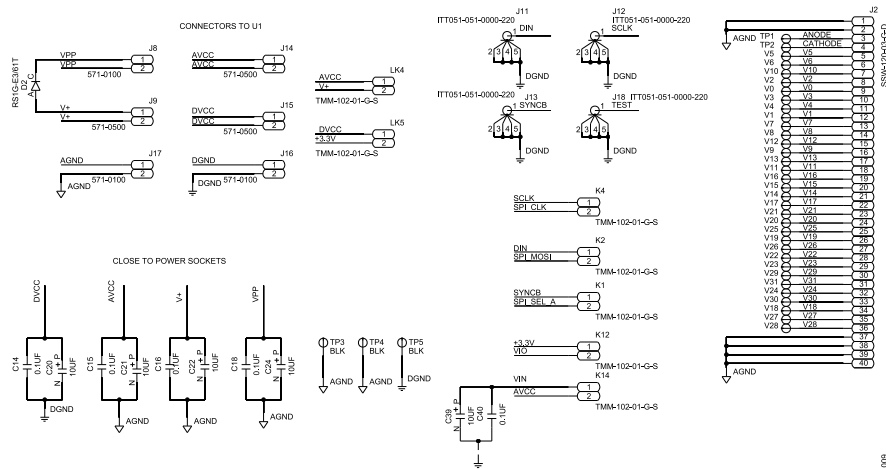


Figure 9. EVAL-AD45335SDZ Connectors

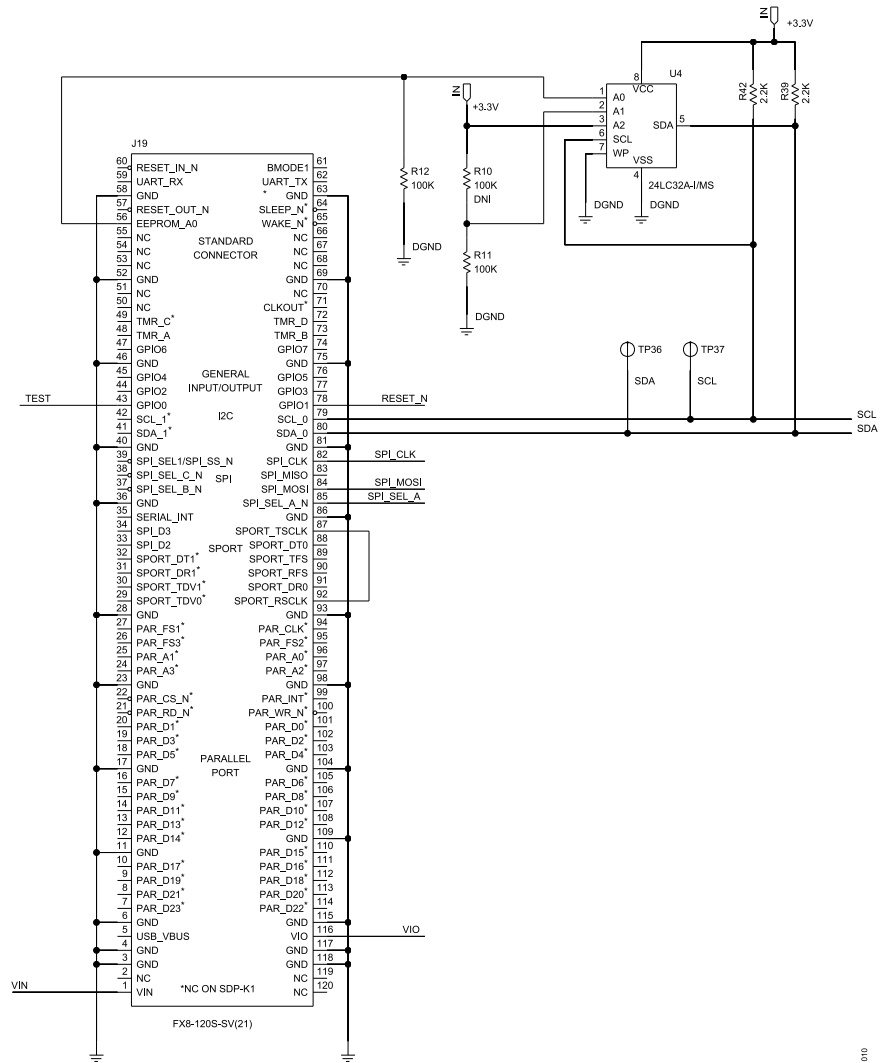


Figure 10. EVAL-AD45335SDZ SDP-120 Connector

NOTES**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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