Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 • www.analog.com

Evaluating the AD5544 Current Output/Serial Input DAC

FEATURES

Full-featured evaluation board for the AD5544
Graphic user interface software for board control and data analysis
Connector to EVAL-SDP-CB1Z system demonstration platform board
Various power supply options

APPLICATIONS

Automatic test equipment
Instrumentation
Digitally controlled calibration

GENERAL DESCRIPTION

The AD5544 quad, 16-bit, current output, digital-to-analog converter (DAC) is designed to operate in a 2.7 V to 5.5 V supply range. But this voltage is limited up to 3.3 V due to EVAL-SDP-CB1Z restrictions.

The applied external reference input voltage ($V_{REF}x$) determines the full-scale output current. Integrated feedback resistors ($R_{FB}x$) provide temperature-tracking, full-scale voltage outputs when combined with an external I-to-V precision amplifier.

A double-buffered serial data interface offers high speed, 3-wire, SPI- and microcontroller-compatible inputs using serial data in (SDI), chip select ($\overline{CS}$), and clock (CLK) signals. In addition, a serial data out pin (SDO) allows for daisy-chaining when multiple packages are used. A common, level-sensitive, load DAC strobe ($\overline{LDAC}$) input allows the simultaneous update of all DAC outputs from previously loaded input registers. Additionally, an internal power-on reset forces the output voltage to 0 at system turn on. An MSB pin allows system reset assertion ($\overline{RS}$) to force all registers to zero code when MSB = 0 or to half-scale code when MSB = 1.

The AD5544 is packaged in a compact 28-lead SSOP.

The EV-AD5544/45SDZ board is used in conjunction with the EVAL-SDP-CB1Z system demonstration platform (SDP) board available from Analog Devices, Inc., which is purchased separately from the evaluation board. The USB-to-SPI communication to the AD5544 is completed using this Blackfin®-based demonstration board. The software offers a waveform generator.

FUNCTIONAL BLOCK DIAGRAM

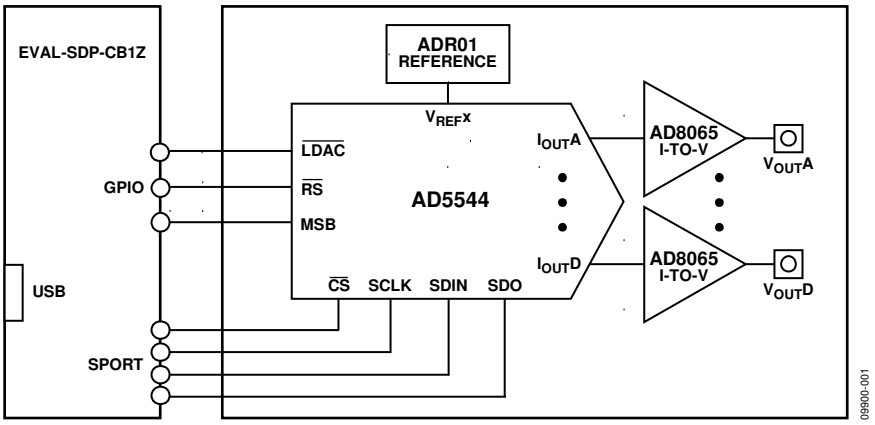

Figure 1.

TABLE OF CONTENTS

REVISION HISTORY

5/13—Rev. A to Rev. B

Changed EVAL-AD5544/45SDZ to EV-AD5544/45SDZ ..... Universal

5/12—Rev. 0 to Rev. A

Changes to General Description Section 1
Changes to Figure 2 3
Changes to Evaluation Board Schematics and Artwork Section 5

5/11—Revision 0: Initial Version

EVALUATION BOARD SOFTWARE

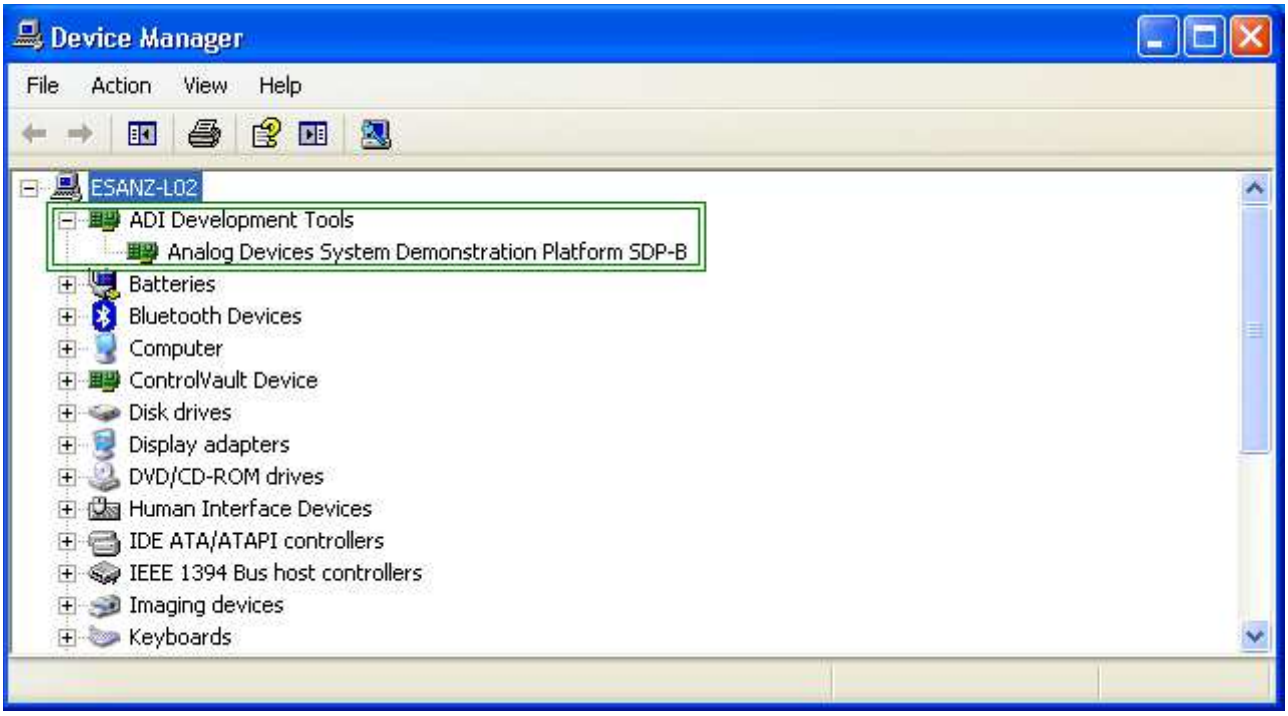

Figure 2. Device Manager Showing the SDP Board Connected

INSTALLING THE SOFTWARE

The EV-AD5544/45SDZ evaluation kit includes the software and drivers on CD. To install the software, do the following:

1. Install the software before connecting the SDP board to the USB port of the PC.
2. Start the Windows® operating system and insert the EV-AD5544/45SDZ evaluation kit CD.
3. Download the EV-AD5544/45SDZ LabVIEW™ software. The correct driver, SDPDriversNET, for the SDP board should download automatically after LabVIEW is downloaded, supporting both 32- and 64-bit systems. However, if the drivers do not download automatically, the driver executable file can also be found in the **Program Files/Analog Devices** folder. Follow the on-screen prompts to install it.
4. After installation of the software and drivers is complete, plug the EV-AD5544/45SDZ into the SDP board and the SDP board into the PC using the USB cable included in the box.
5. When the software detects the evaluation board, proceed through any dialog boxes that appear to finalize the installation (**Found New Hardware Wizard/Install the Software Automatically** and so on).

RUNNING THE SOFTWARE

To run the evaluation board program, do the following:

1. Click **Start/All Programs/Analog Devices/EV-AD5544/45SDZ**.
2. If the SDP board is not connected to the USB port when the software is launched, a connectivity error displays (see Figure 3). Simply connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and follow the instructions.

Figure 3.

USING THE EVALUATION BOARD SOFTWARE

Once the software is launched, the main window pops up (see Figure 4).

Figure 4. Main Window

The first step is to select the device to use that is connected to the SDP board, in this case the AD5544, and click **OK**.

After selecting the device, the AD5544 evaluation software window appears (see Figure 5) to start writing to the device.

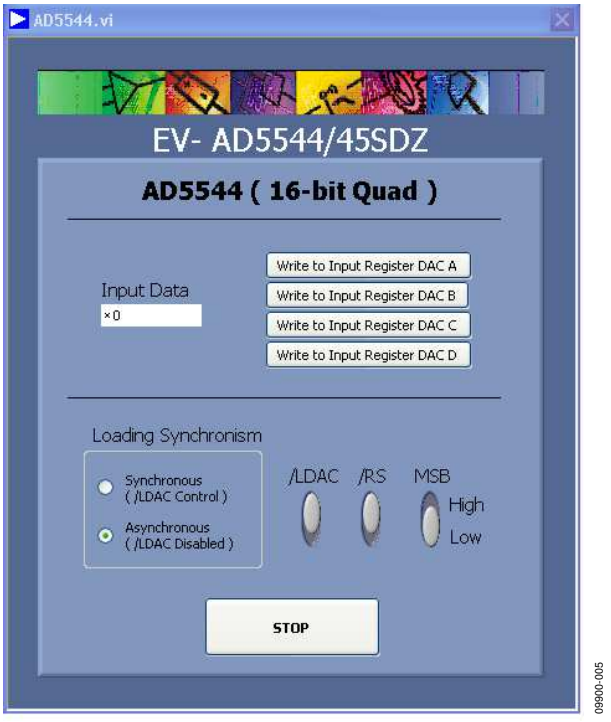

Figure 5. AD5544 Evaluation Software Window

The desired 16-bit data loads and updates one of the four DACs that you selected within the AD5544 part.

There are two modes for loading the data. Synchronous mode enables you to program each channel separately and update them simultaneously. Program $\overline{\text{LDAC}}$ high, load the channels, and finally pull $\overline{\text{LDAC}}$ low. Asynch-ronous mode enables you to load and update each channel separately (the $\overline{\text{LDAC}}$ button is ignored in this case).

The reset button, $\overline{\text{RS}}$, updates all channel outputs to zero scale or midscale when MSB is pulled low or high.

EXAMPLE

With $\overline{\text{LDAC}}$ and $\overline{\text{RS}}$ tied high for asynchronous loading mode, specify quarter scale (0x4000, 16384d) in the **Input Data** box and click **Load and Update DAC A.** The expected output obtained is

$$V_{OUT} = -V_{REF} \times \frac{D}{65{,}536} = -10 \times \frac{16{,}384}{65{,}536} = -2.5\ V$$

When you change the loading synchronism mode to synch-ronous and write the value 0xC000 (49152d), you see no change in the output until $\overline{\text{LDAC}}$ is tied low. The expected output for this case is

$$V_{OUT} = -V_{REF} \times \frac{D}{65{,}536} = -10 \times \frac{49{,}152}{65{,}536} = -7.5\ V$$

EVALUATION BOARD SCHEMATICS AND ARTWORK

SCHEMATICS

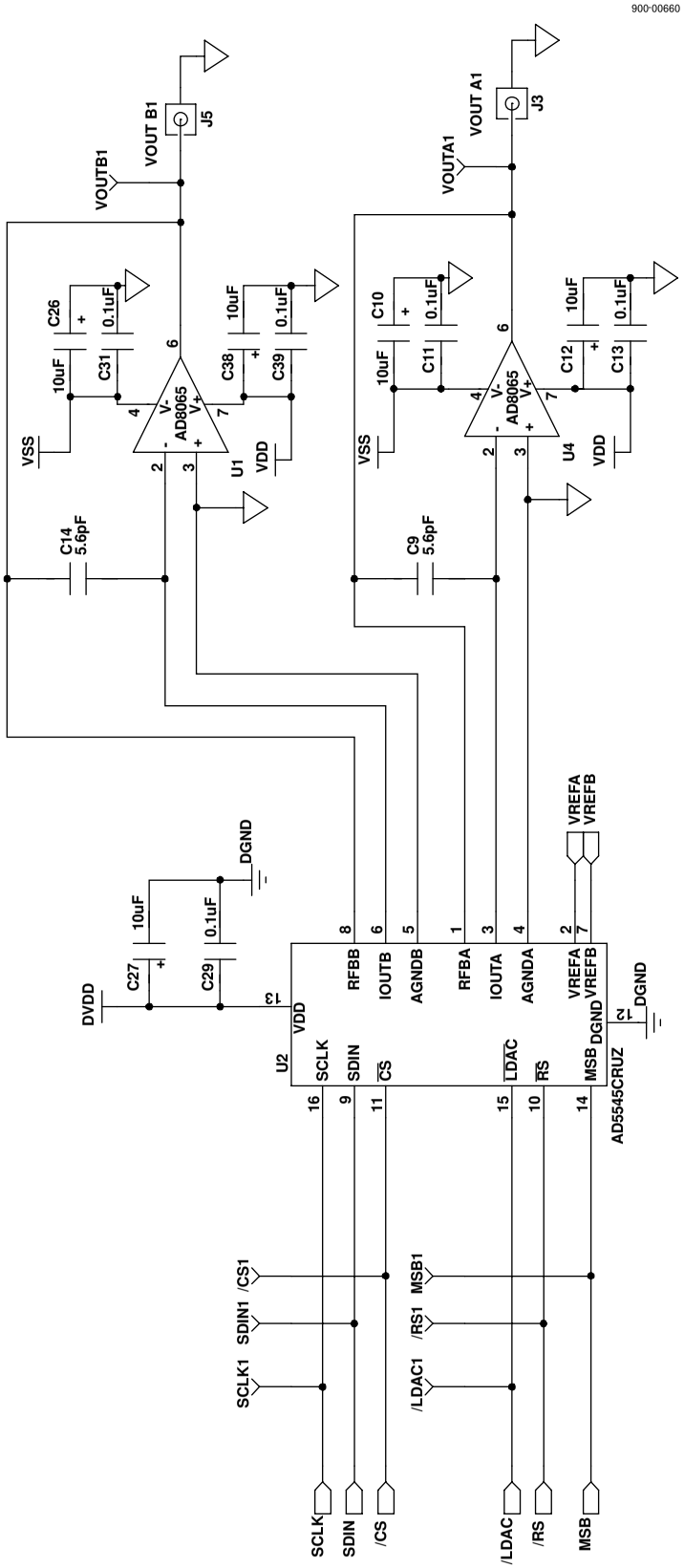

Figure 6. EV-AD5544/45SDZ Schematic Part A

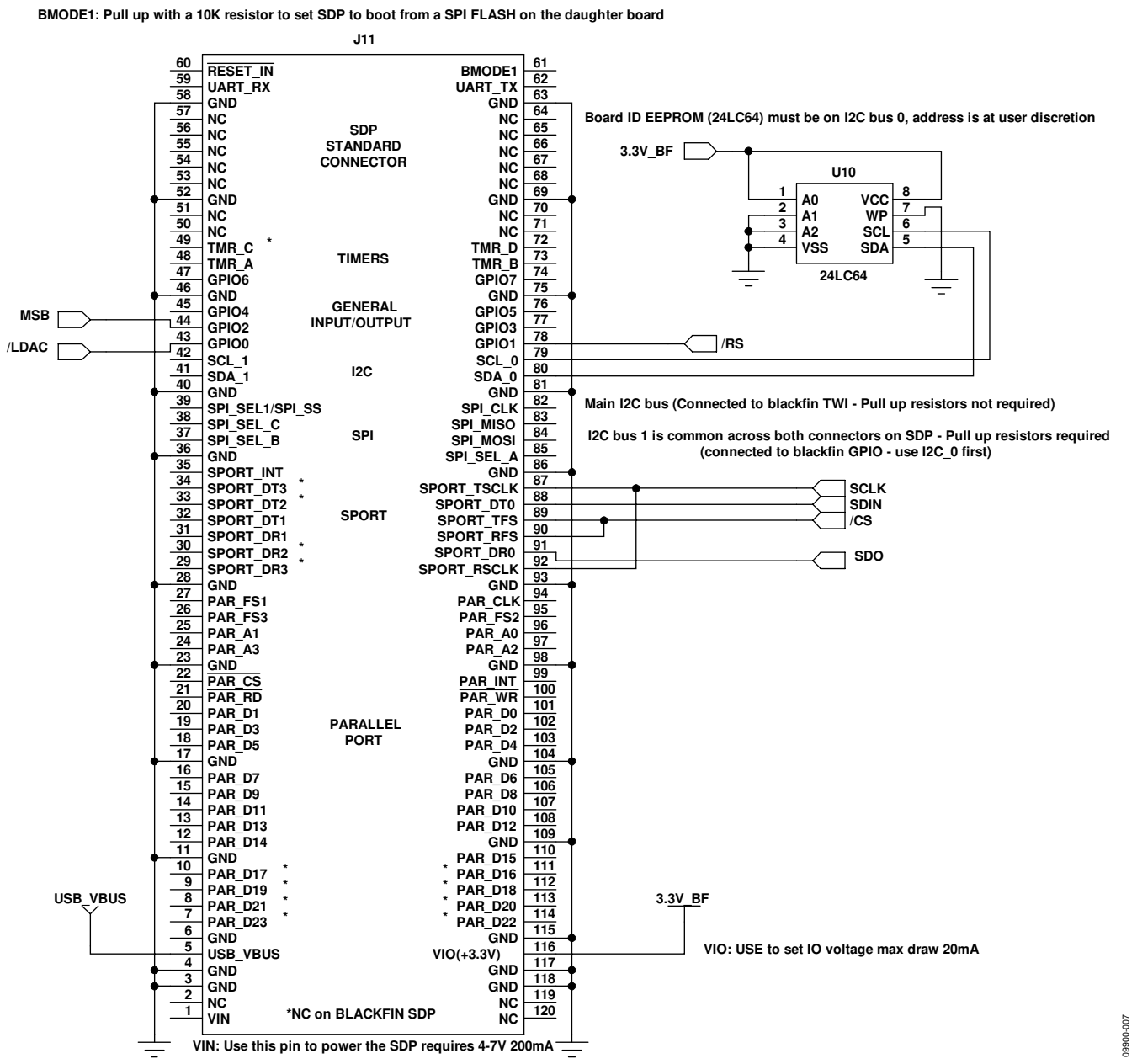

Figure 7. EV-AD5544/45SDZ Schematic Part B

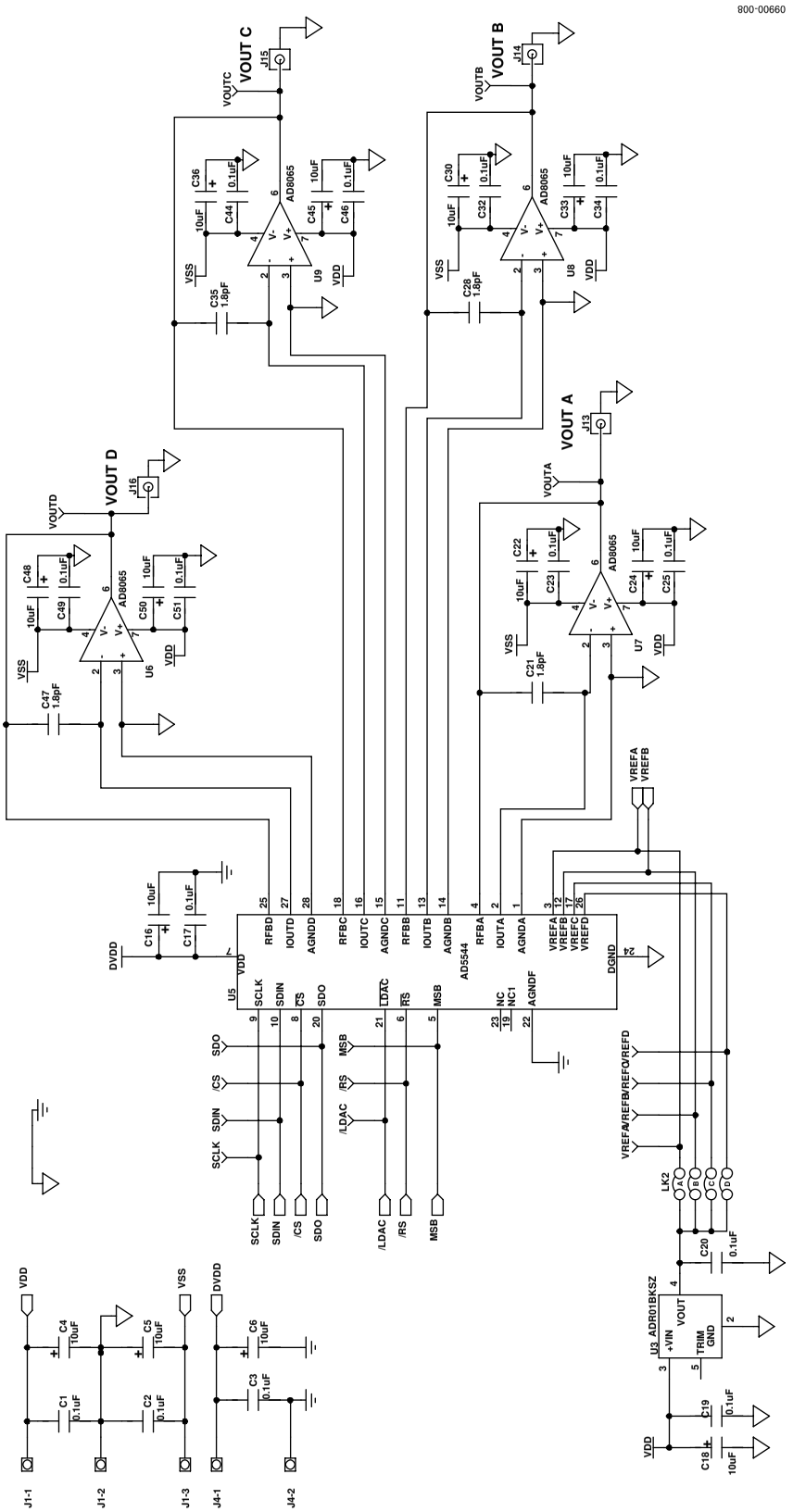

Figure 8. EV-AD5544/45SDZ Schematic Part C

EVALUATION BOARD LAYOUT

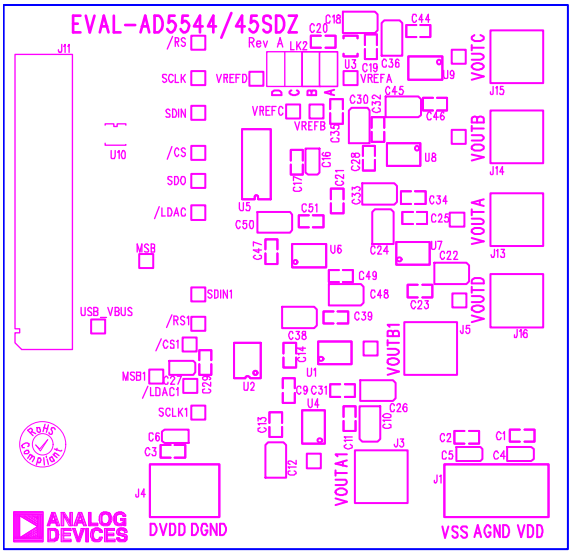

Figure 9. Silkscreen

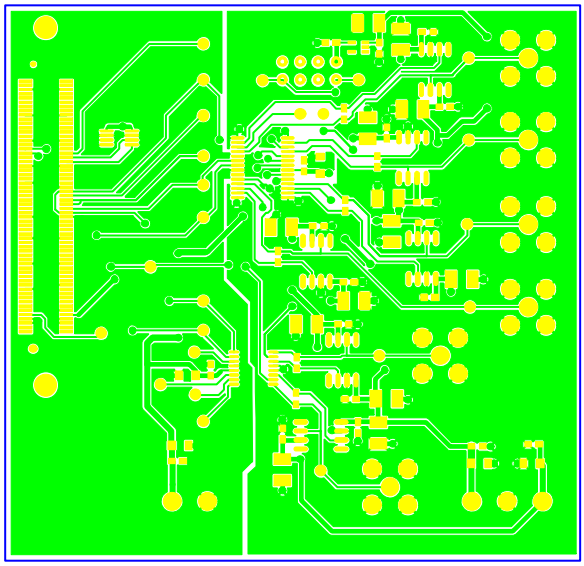

Figure 10. Component Side

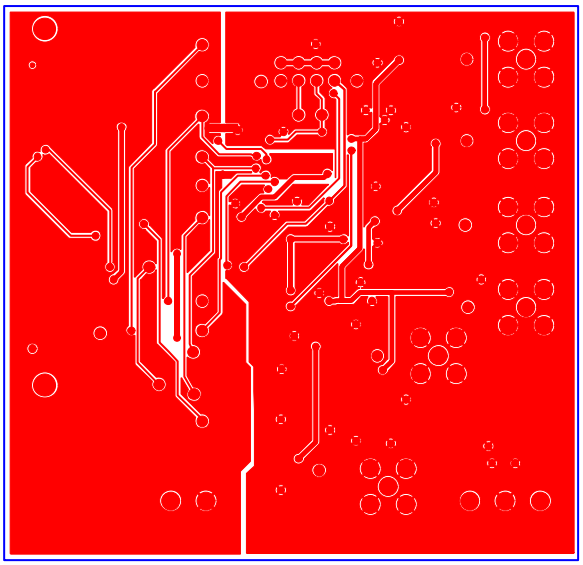

Figure 11. Solder Side

RELATED LINKS

Resource	Description
AD5545	Product Page, AD5545 Precision Dual 16-Bit DAC in Compact TSSOP Packages
AD5544	Product Page, AD5544 Quad, Current-Output, Serial-Input 16-Bit DAC
ADR01	Product Page, ADR01 Ultracompact, Precision 10.0 V Voltage Reference
AD8065	Product Page, AD8065 High Performance, 145 MHz FastFET™ Op Amp
EVAL-SDP-CB1Z	Product Page, System Demonstration Platform

NOTES

NOTES

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.

UG09900-0-5/13(B)

www.analog.com