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Evaluation Board for the AD5570
16-Bit ±12 V/±15 V Serial Input Voltage Output DAC

FEATURES

Full-featured evaluation board for the AD5570
Link options
PC control in conjunction with the Analog Devices, Inc., system demonstration platform
PC software for control

DEVICE DESCRIPTION

The AD5570 is a single 16-bit serial input, voltage output DAC that operates from supply voltages of ±11.4 V up to ±16.5 V. INL and DNL are accurate to 1 LSB (maximum).

Complete specifications for the AD5570 are provided in the AD5570 data sheet, available from Analog Devices, and should be consulted in conjunction with this user guide when using the evaluation board.

EVALUATION BOARD DESCRIPTION

The EVAL-AD5570SDZ is a full-featured evaluation board that is designed to allow the user to easily evaluate all features of the AD5570 voltage output, 16-bit digital-to-analog converter (DAC).

Components on the AD5570 evaluation board include SMB connectors for interfacing to other equipment, a 5 V voltage reference, and a ground force sense. Testpoints are provided on all of the digital interface signal lines for ease of monitoring. The user has the option of inserting both a resistive and capacitive load on the output of the AD5570 at C1 and R1.

The board can be controlled by the system demonstration platform (SDP) connector (J1). The SDP board allows the evaluation board to be controlled through the USB port of a Windows® XP (SP2 or later) or more recent 32-bit or 64-bit (Vista, Windows 7) PC using the AD5570 evaluation software.

FUNCTIONAL BLOCK DIAGRAM

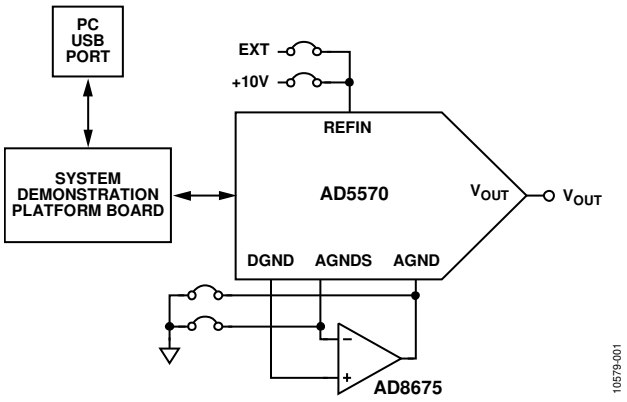

Figure 1.

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REVISION HISTORY

3/12—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The following external supplies must be provided:

- +11.4 V to +16.5 V between the V_{DD} and AGND inputs for the positive analog supply of the AD5570.
- −11.4 V to −16.5 V between the V_{SS} and AGND inputs for the negative analog supply of the AD5570.

The analog and digital planes are connected at one location, close to the AD5570. To avoid ground loop problems, it is recommended AGND and DGND not be connected elsewhere in the system.

Each supply is decoupled to the relevant ground plane with 10 µF and 0.1 µF capacitors. Each device supply pin is also decoupled with a 10 µF and 0.1 µF capacitor pair to the relevant ground plane.

LINK OPTIONS

The link options on the evaluation board should be set for the required operating setup before using the board. The functions of the link options are described in Table 3.

Default Link Option Setup

The default link options are listed in Table 1.

Table 1. Default Link Options

Link Number	Option
LK1	Inserted
LK2	Inserted
LK3	Inserted

ON-BOARD CONNECTORS

There are four connectors on the AD5570 evaluation board PCB as outlined in Table 2.

Table 2. On-Board Connectors

Connector	Function
J1	SDP board connector
J5	Analog power supply connector
VOUT	DAC output connector
VREF	External reference voltage input connector

Table 3. Link Options

Link No.	Description
LK1	LK1 is used in conjunction with LK2 to select whether the on-board ground force sense buffer is used.
LK2	When LK1 and LK2 are inserted, the ground force sense buffer is not used, the ground pins are connected directly to 0 V, and the buffer is removed from the ground loop. When LK1 and LK2 are removed, the ground force sense buffer is used.
LK3	This link is used to select the internal or the external reference. When LK3 is inserted, the on-board reference is selected as the voltage reference source for the AD5570. When LK3 is removed, an external voltage reference can be applied to Connector VREF.

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION

The AD5570 evaluation kit includes self-installing software on a CD. The software is compatible with Windows XP (SP2), Vista, and Windows 7 (32-bit or 64-bit). If the setup file does not run automatically, you can run the **setup.exe** file from the CD.

Install the evaluation software before connecting the evaluation board and SDP board to the USB port of the PC to ensure that the evaluation system is correctly recognized when connected to the PC.

After installation from the CD is complete,

1. Power up the AD5570 evaluation board as described in the Power Supplies section. Connect the SDP board (via either Connector A or Connector B) to the AD5570 evaluation board and then to the USB port of your PC using the supplied cable.
2. When the evaluation system is detected, proceed through any dialog boxes that appear. This completes the installation.

SOFTWARE OPERATION

To launch the software, complete the following steps:

1. From the **Start** menu, select **Analog Devices** > **AD5570** > **AD5570 Evaluation Software**. The main window of the software opens (see Figure 3).
2. If the evaluation system is not connected to the USB port when the software is launched, a connectivity error is displayed (see Figure 2). Connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and follow the instructions.

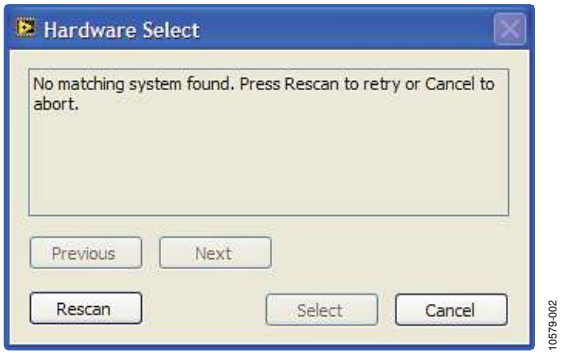

Figure 2. Connectivity Error Alert

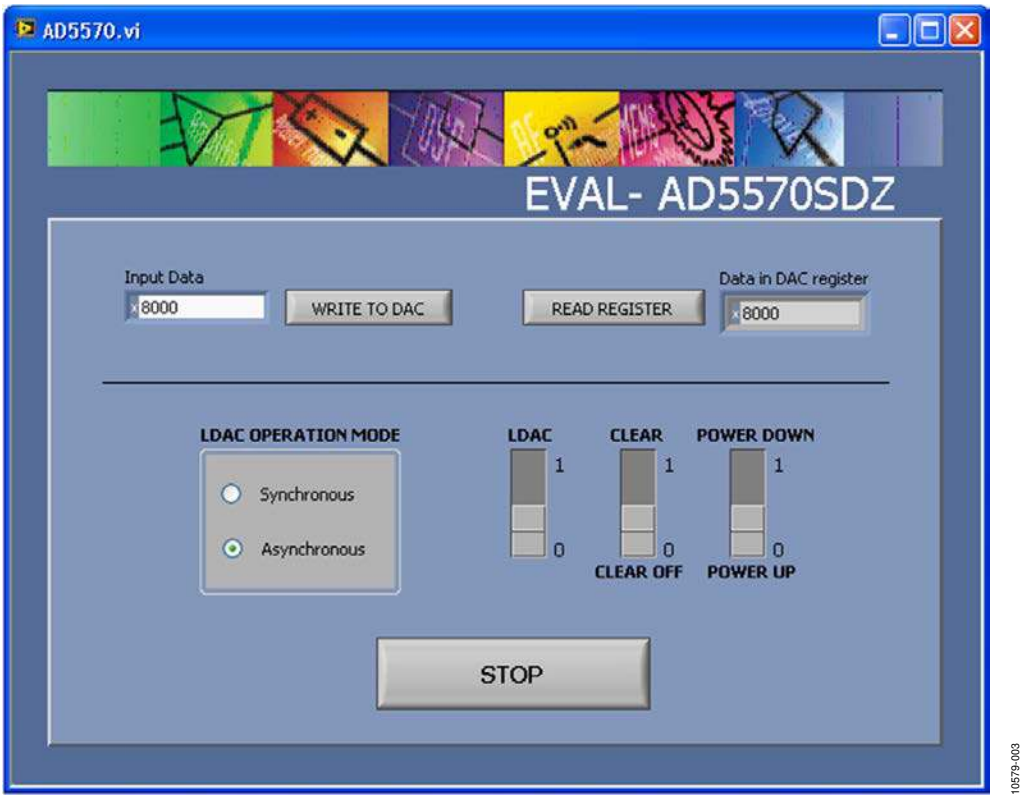

Figure 3. Main Window

FEATURES OF THE AD5570 EVALUATION BOARD SOFTWARE

The software allows the user to control all the functionality of the AD5570. The main features are as follows:

- Load DAC register with a 16-bit word and update the AD5570 output.
- Data readback of the contents of the input shift register.
- Power down/power up the AD5570.
- Clear the AD5570 output to 0 V.

Each of these features is described in the following sections.

Load DAC

In the Input Data field, the user types the 16-bit word to be programmed to the AD5570 and clicks the **WRITE TO DAC** button.

In LDAC synchronous loading mode, the **WRITE TO DAC** button writes the required data to the input shift register and toggles the LDAC signal, which then loads the DAC register and updates the output voltage.

In LDAC asynchronous loading mode, the **WRITE TO DAC** button writes the required data to the input shift register, but the user toggles the LDAC signal by clicking the **LDAC** switch to load the DAC register and update the output voltage.

Data Readback

Clicking the **READ REGISTER** button reads back and displays the current contents of the DAC register.

Power Down/Power Up

This function allows the user to place the AD5570 in power-down mode and to remove the AD5570 from power-down mode. Clicking the **POWER DOWN** switch places the AD5570 in power-down mode, at the same time the text on the button changes to **POWER UP**, indicating that clicking the button again removes the AD5570 from power-down mode.

Clear

Clicking the **CLEAR** switch causes the $\overline{\text{CLR}}$ signal of the AD5570 to be pulsed low, which has the effect of setting the output voltage to 0 V.

EVALUATION BOARD SCHEMATICS AND ARTWORK

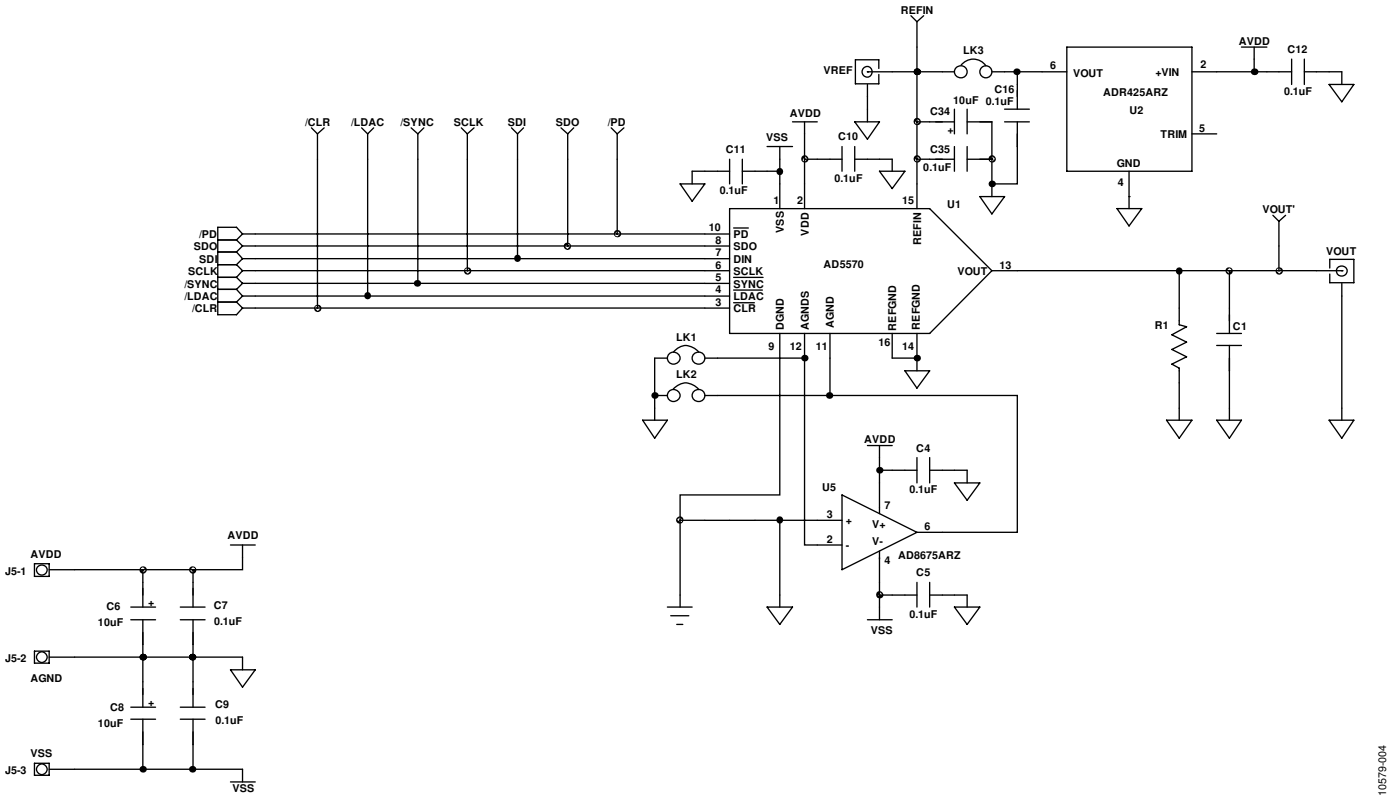

Figure 4. Schematic of the AD5570 Circuitry

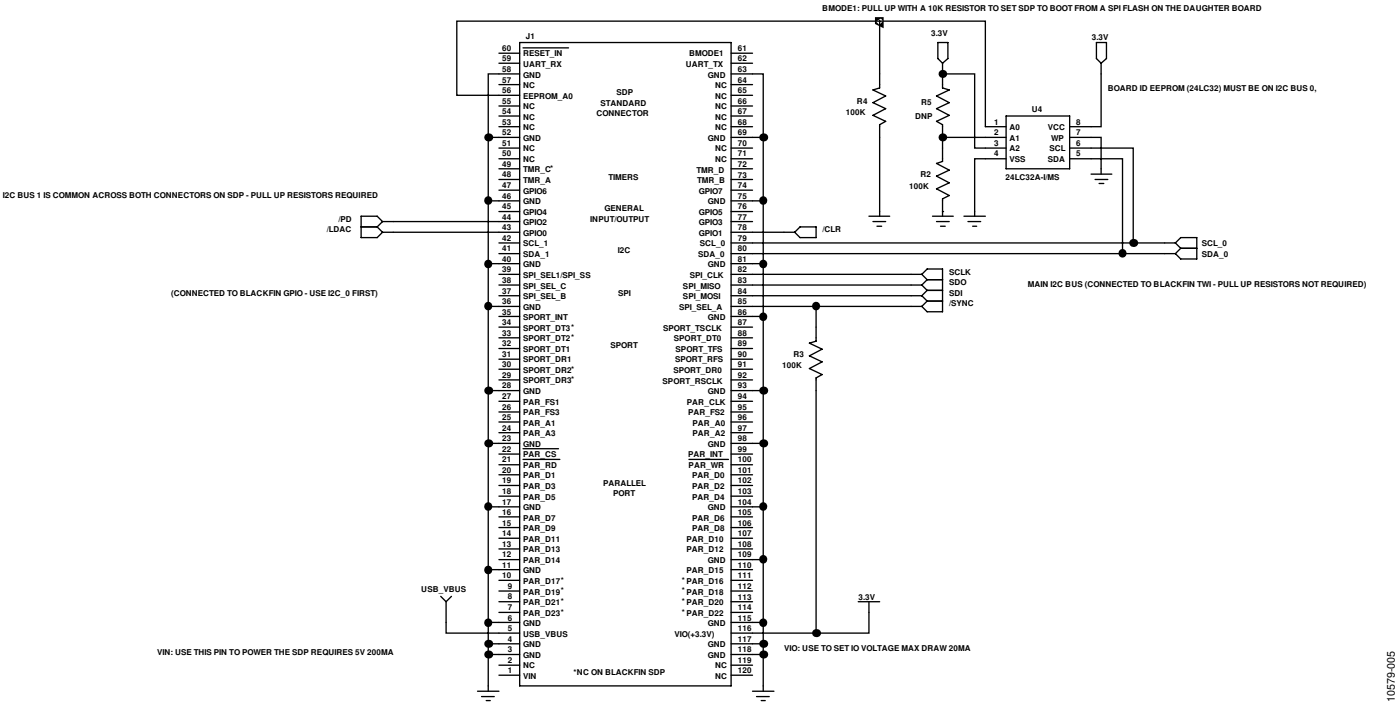

Figure 5. Schematic of the SDP Board Connector

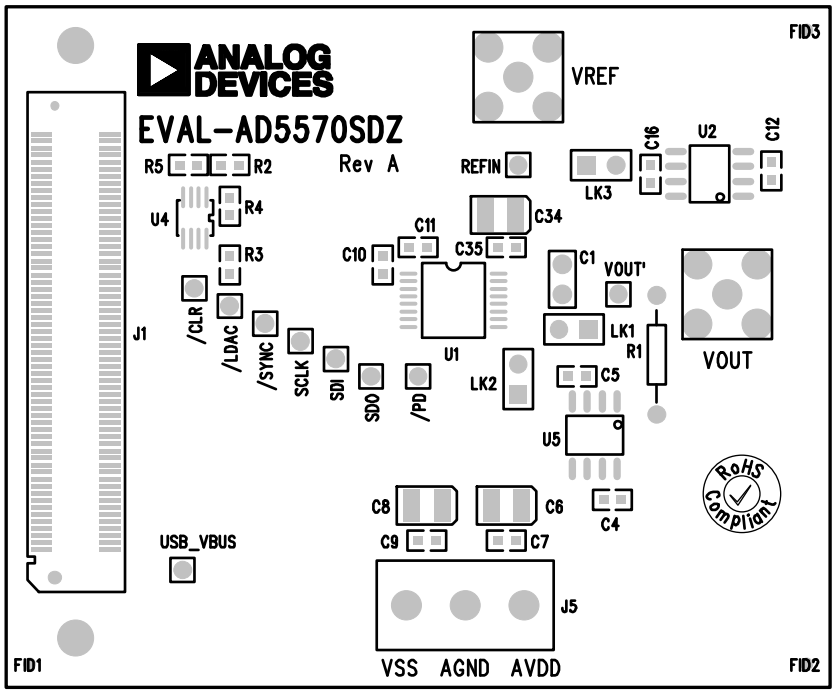

Figure 6. Component Placement Schematic

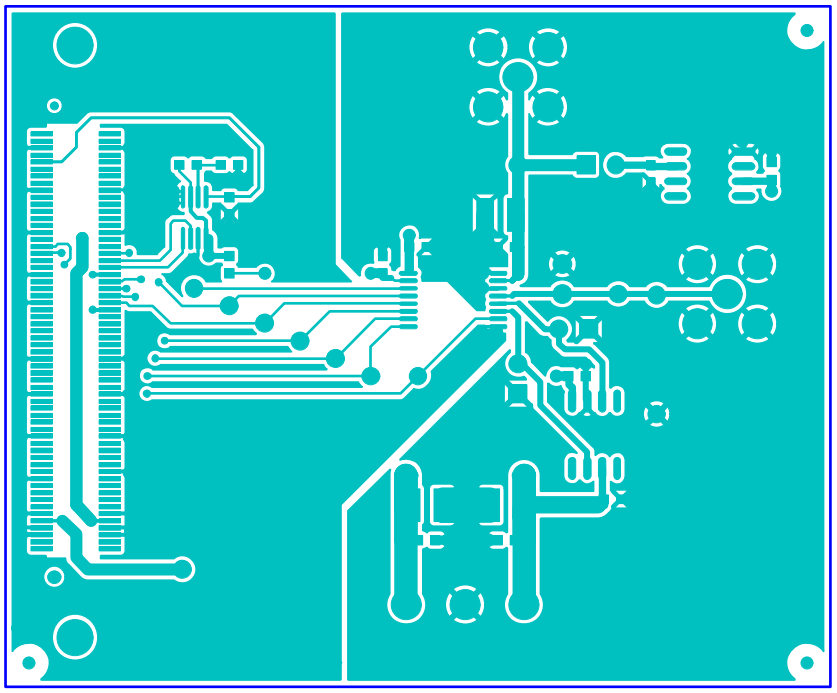

Figure 7. Top Printed Circuit Board (PCB) Layer Schematic

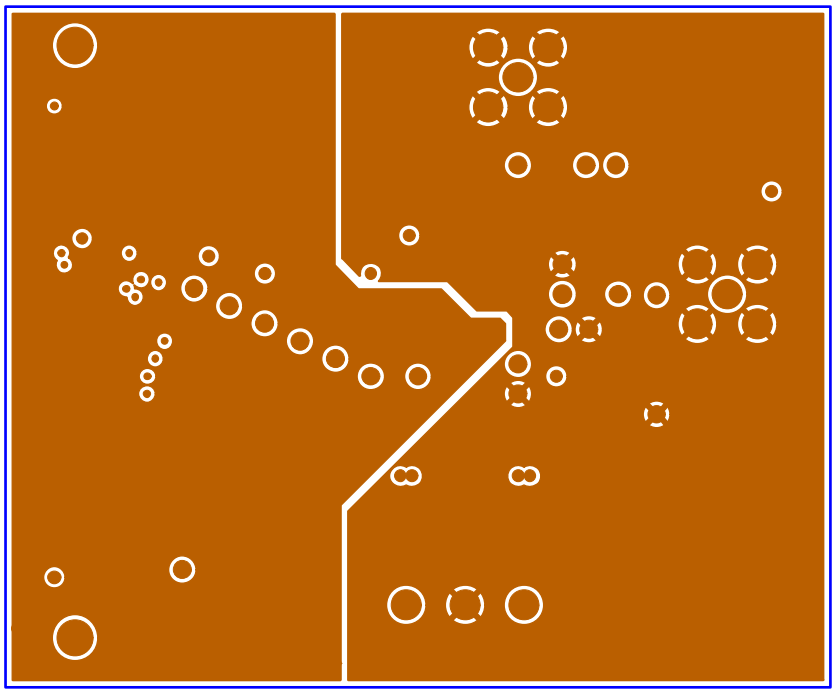

Figure 8. Inner First PCB Layer Schematic

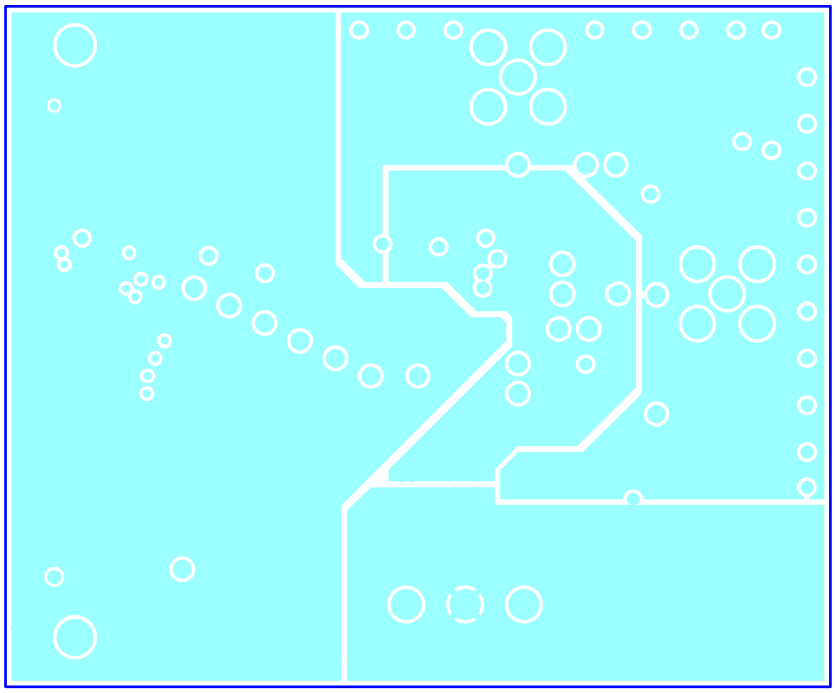

Figure 9. Inner Second PCB Layer Schematic

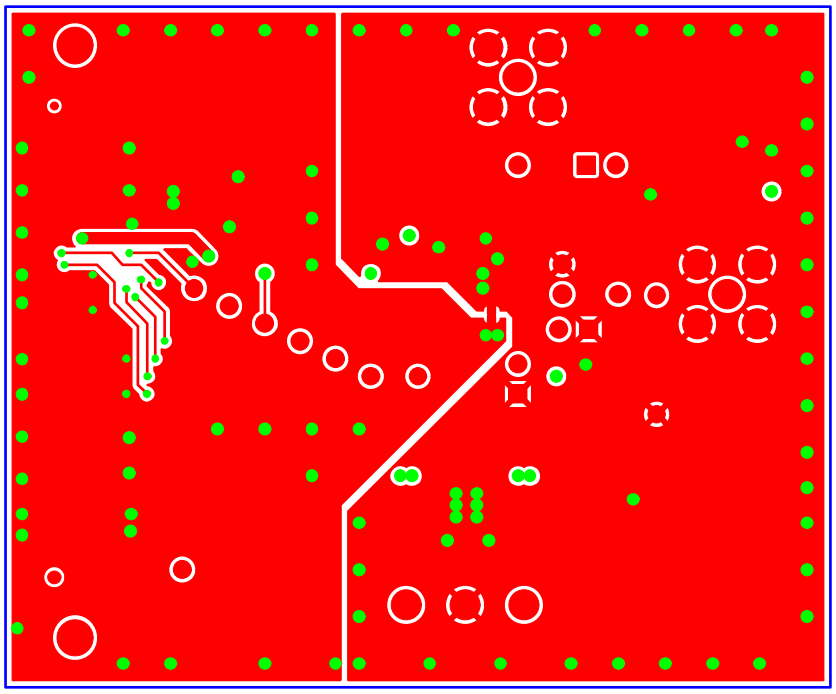

Figure 10. Bottom PCB Layer Schematic

ORDERING INFORMATION

BILL OF MATERIALS

Table 4.

Reference Designator	Part Description	Part Number	Stock Code
/CLR, /LDAC, /PD, /SYNC, REFIN, SCLK, SDI, SDO, USB_VBUS, VOUT'	Testpoint	20-313137	FEC 8731144
C1, C4, C5, C7, C9, C10, C11, C12, C16, C35	Gold plated pin receptacles	73007015	Analog Devices 73007015
C6, C8, C34	Capacitor +, Case B, 10 µF, 20 V	TAJB106K020RNJ	FEC 197427
J1	120-way connector, 0.6 mm pitch	FX8-120S-SV(21)	FEC 1324660
J5	3-pin terminal block, 5 mm pitch	CTB5000/3	FEC 151790
LK1, LK2, LK3	Jumper block, 2 pins, 0.1" spacing	M20-9990246	FEC 1022247 and FEC 150-411
R1	Gold plated pin receptacle, 4.7 kΩ	73007015	Analog Devices 73007015
R2, R3, R4	SMD resistor, 100 kΩ	MC 0.063W 0603 1% 100K	FEC 9330402
R5	SMD resistor	N/A	Not inserted
U1	16-bit ±12 V/±15 V serial input voltage output DAC	AD5570BRSZ	AD5570BRSZ
U2	5 V reference	ADR425ARZ	ADR425ARZ
U4	32 kB I^2C Serial EEPROM, MSOP8	24LC32A-I/MS	FEC 1331330
U5	Single op amp, 8-lead SOIC	AD8675ARZ	AD8675ARZ
VOUT, VREF	Jack SMB, straight	1-1337482-0	FEC 1206013

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.

UG10579-0-3/12(0)

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