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EVAL-AD5693R User Guide
UG-675

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Evaluating the AD5693R, Single, 16-Bit, Serial Voltage-Output DAC

FEATURES

- Full-featured evaluation board for the AD5693R
- On-board reference
- Various link options
- PC control in conjunction with the system demonstration platform (SDP)
- PC software for control of DACs
- On-board ADC for voltage readback

EVALUATION KIT CONTENTS

- AD5693R evaluation board
- AD5693R device
- CD that includes
  - Self-installing software
  - AD5693R data sheet
  - EVAL-AD5693R user guide

ADDITIONAL EQUIPMENT NEEDED

- SDP-B or SDP-S (must order separately) includes a USB cable

GENERAL DESCRIPTION

The EVAL-AD5693RSDZ is designed to help customers quickly prototype new AD5693R circuits and reduce design time. The AD5693R operates from a single 2.7 V to 5.5 V supply. The part incorporates an internal 2.5 V on-board reference to give an output voltage span of 2.5 V or 5 V.

The evaluation board interfaces to the USB port via the SDP board. Software is available with the evaluation board, which allows the user to easily program the AD5693R. This evaluation board requires the EVAL-SDP-CB1Z or EVAL-SDP-CS1Z board.

Full details on the device may be found in the AD5693R data sheet available from Analog Devices and should be consulted in conjunction with this user guide when using the evaluation board.

EVALUATION BOARD PHOTOGRAPH

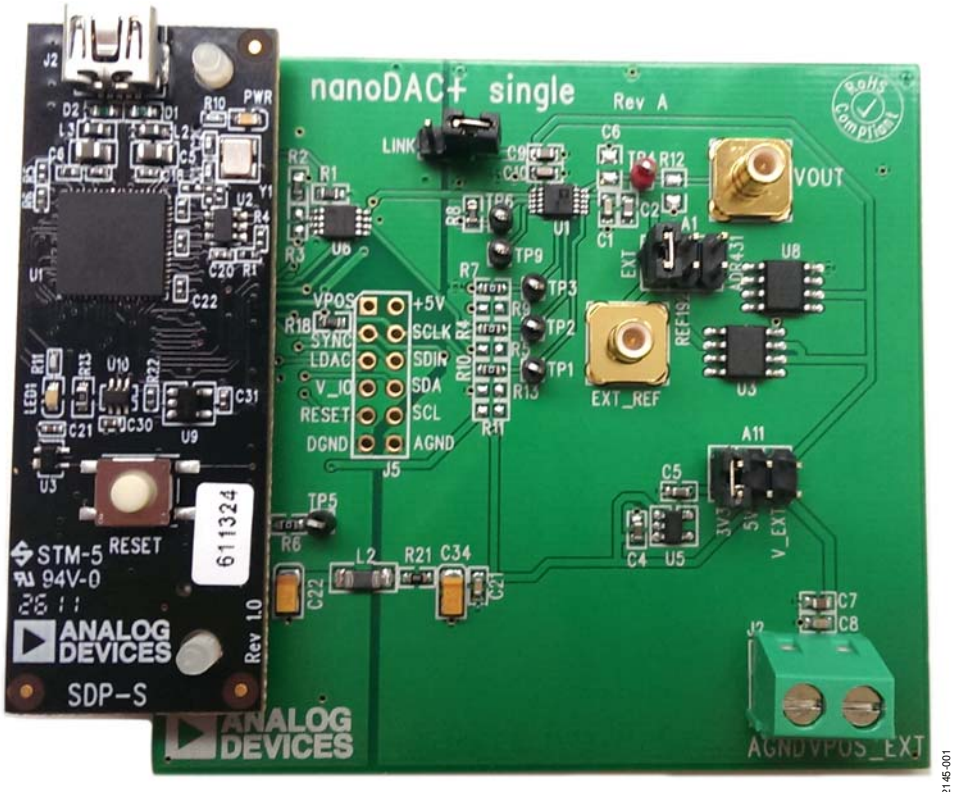

Figure 1. Universal Evaluation Board

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REVISION HISTORY

3/14—Revision 0: Initial Version

GETTING STARTED

INSTALLING THE SOFTWARE

The EVAL-AD5693RSDZ evaluation kit includes self-installing software on CD. The software is compatible with Windows® XP (32-bit), Windows Vista (64-bit/32-bit), and Windows 7 (64-bit/32-bit).

Install the software before connecting the SDP board to the USB port of the PC. This ensures that the SDP board is recognized when it connects to the PC.

1. Start the Windows operating system and insert the CD.
2. The installation software opens automatically. If it does not, run the **setup.exe** file from the CD.
3. After installation is completed, power-up the evaluation board as described in the Power Supplies section.
4. Plug the EVAL-AD5693RSDZ 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.

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The AD5693R evaluation board can be powered either from the SDP or externally by the VPOS_EXT and AGND connector.

Both AGND and DGND inputs are provided on the board. The AGND and DGND planes are connected at one location close to the AD5693R. It is recommended not to connect AGND and DGND elsewhere in the system to avoid ground loop problems.

All supplies are decoupled to ground with 10 μF tantalum and 0.1 μF ceramic capacitors.

Table 1. Power Supply Connectors

Connector No.	Voltage
J2-1	Analog positive power supply, V_EXT
J2-2	AGND

LINK OPTIONS

A number of link and switch options are incorporated in the evaluation board and should be set for the required operating setup before using the board. The functions of these link options are described in detail in Table 3. Table 2 describes the positions of the different links to control the evaluation board by PC via the USB port and SDP board in single-supply mode.

Table 2. Link Options Setup for SDP Control (Default)

Link No.	Options
A11	A
LINK	Disconnected
A1	A

Table 3. Link Functions

Link No.	Option
A1	This link selects the DAC digital voltage source. Position A selects an external reference source via the SMB input EXT_REF. Position B selects the REF192 external reference. Position C selects the ADR431 external reference.
LINK	Connect only if the board of the part is controlled through the PMOD connector and the SDP is not connected.
A11	This link selects the DAC analog voltage source. Position A V_{DD} is powered at 3.3 V. Position B V_{DD} is powered from unregulated USB supply. Position C V_{DD} is powered from an external supply voltage (V_EXT).

HOW TO USE THE SOFTWARE

RUNNING THE SOFTWARE

To run the program, do the following:

1. Click **Start** > **All Programs** > **Analog Devices** > **AD563R** > **AD5693R Evaluation Software**. (To uninstall the program, click **Start** > **Control Panel** > **Add or Remove Programs** > **AD5693R Evaluation Software**.)
2. If the SDP board is not connected to the USB port when the software is launched, a connectivity error is displayed (see Figure 2). Simply connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and follow the instructions.

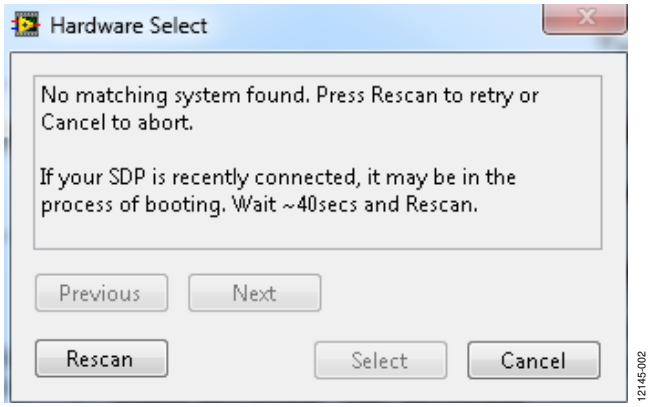

Figure 2. Pop-Up Window Error

3. If the SDP board is not connected to the evaluation boards, a message box appears as shown in Figure 3. Check the connection between the SDP and the EVAL-AD5693RSDZ boards and run the program again. The software will now run in simulation mode enabling you to see how the AD5693R interface functions without the use of an evaluation board.

Figure 3. Error Message

If the SDP board is connected, the system development platform connects for a brief period.

Figure 4. System Develop Platform Wait Window

The main window of the AD5693R evaluation software then opens, as shown in Figure 5.

Note that simulation mode is available and the software can be tested without the use of the evaluation boards.

SOFTWARE OPERATION

To select the AD5693R from the **Analog Devices** menu, click **Start > All Programs > Analog Devices > AD5693R > AD5693R SDP Evaluation Software**.

The AD5693R main window opens as shown in Figure 5. The data programmed into the input register is displayed. You can update the command bits and the data bits by clicking the appropriate button under each area.

To select a command with which to program the part, select the appropriate button. For example, to program DAC output with full scale, write the full-scale value into the **INPUT VALUE (HEX)** text box and click **Write to Input and DAC Register**.

The AD5693R control register options are available by selecting the drop-down menus and clicking **Write to Control Register.** Consult the AD5693R data sheet for details.

Set $\overline{\text{LDAC}}$ and $\overline{\text{RESET}}$ to high or low by clicking the corresponding check boxes. This command is executed immediately.

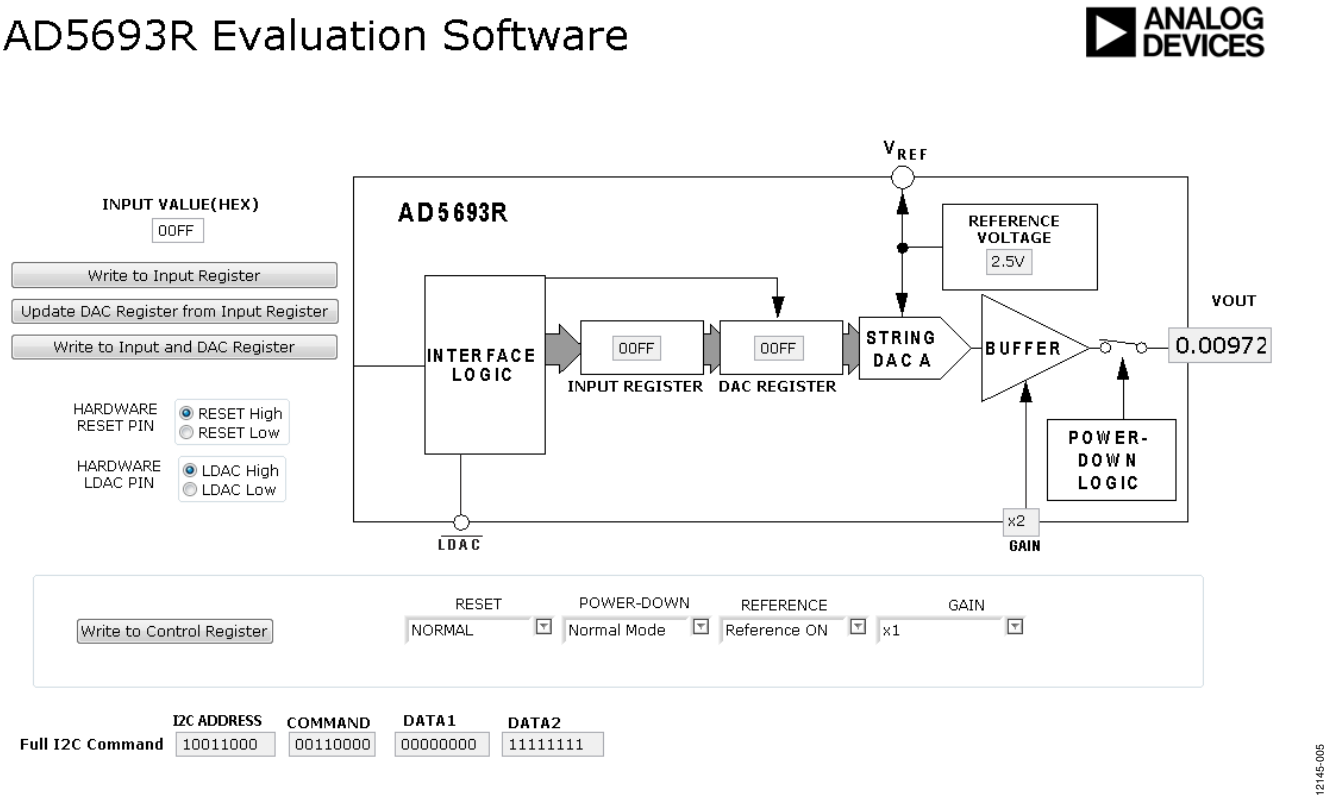

Figure 5. AD5693R Evaluation Board Main Window

EVALUATION BOARD SCHEMATICS AND ARTWORK

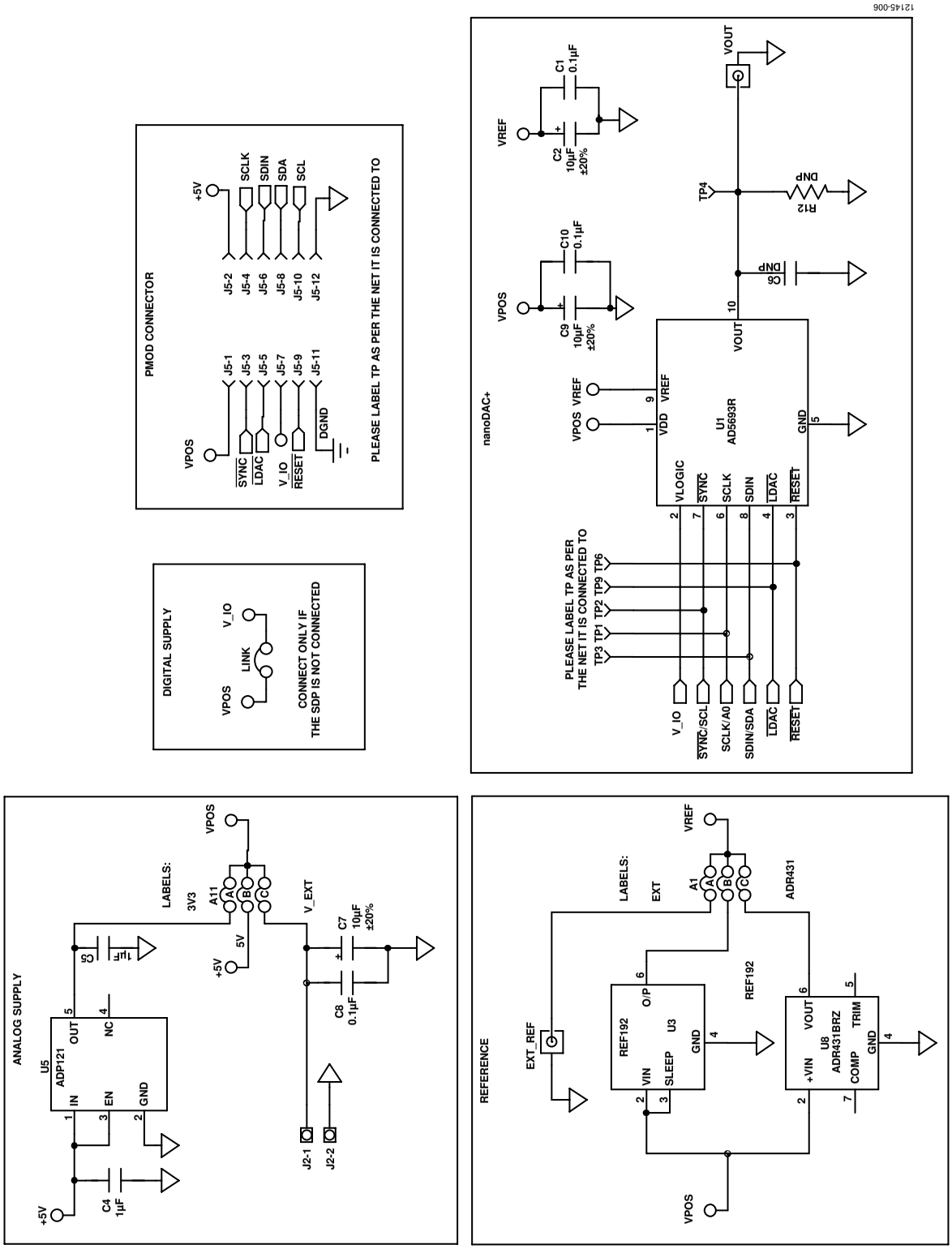

Figure 6. Schematic of AD5693R Evaluation Circuitry

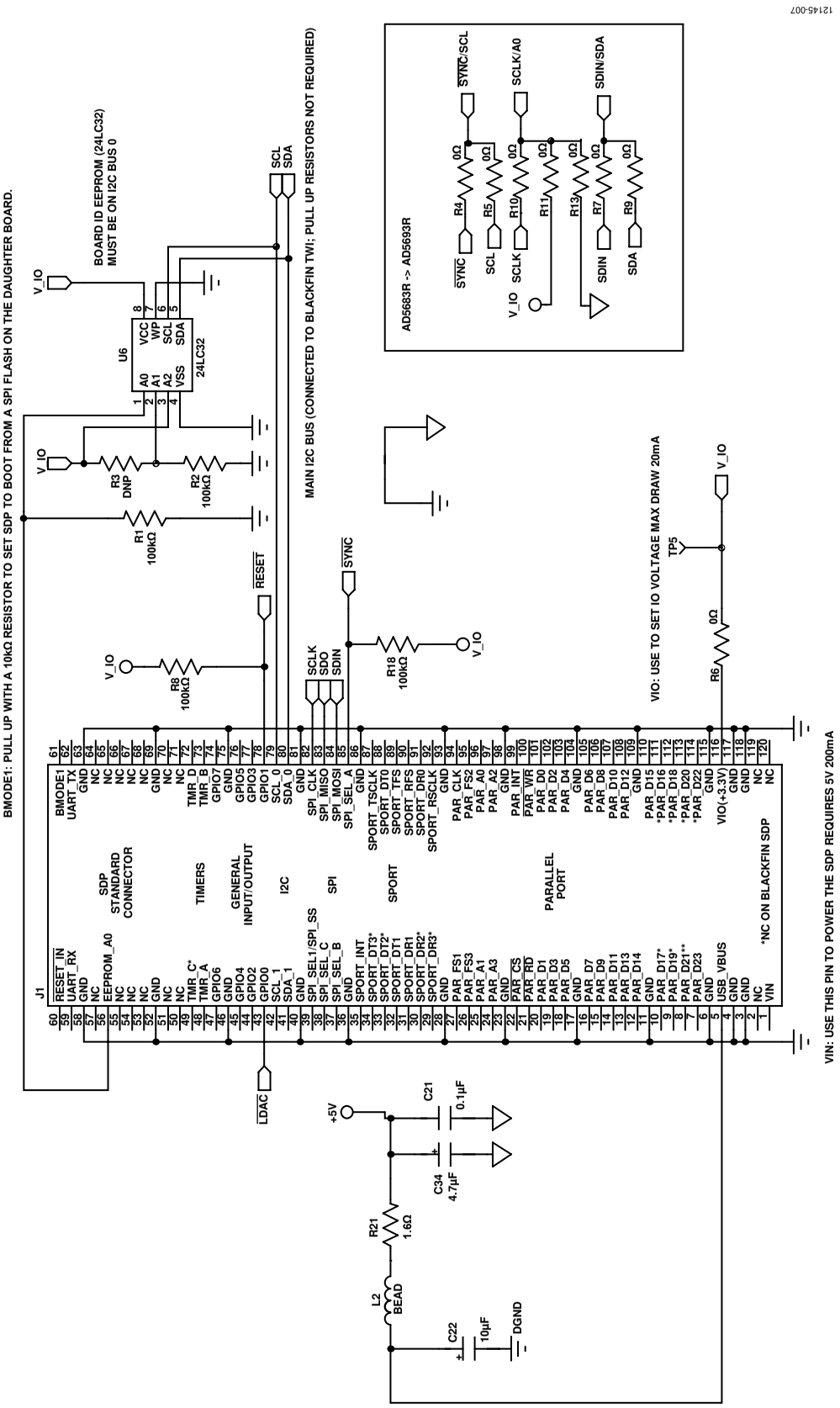

Figure 7. Schematic of SDP Connector

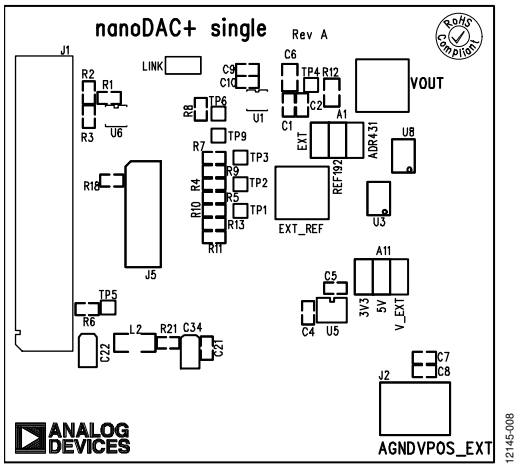

Figure 8. Component Placement Drawing

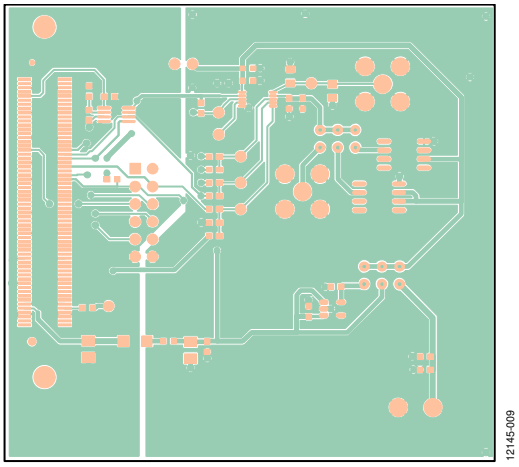

Figure 9. Component Side PCB Drawing

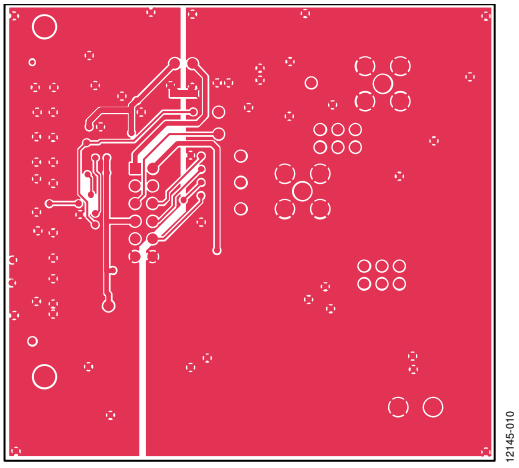

Figure 10. Solder Side PCB Drawing

ORDERING INFORMATION

COMPONENTS LIST

Table 4.

Qty	Reference	Description	Supplier/Part Number
1	U1	AD5693R	AD5693R
1	U3	2.5 V reference	REF192
1	U5	3.3 V regulator	ADP121
1	U6	32K I^2C serial EEPROM	FEC 1331330
1	U8	Ultralow noise XFET voltage references	REF192BRZ
1	LINK	2-pin link	FEC 1022249
2	A1, A11	3-pin link	FEC 148535
2	VOUT, EXT_REF	SMB jack 50 Ω	FEC 1206013
1	J1	120-way female connector	FEC 1324660
1	J2	2-pin terminal block	FEC 151789
3	C1, C8, C10	0.1 µF, 16 V X7R ceramic capacitor	FEC 1216538
1	C21	0.1 µF, 50 V X7R ceramic capacitor	FEC 1759122
2	C4, C5	1 µF, 16 V X7R ceramic capacitor	FEC 1658870
3	C2, C7, C9	10 µF, 10 V, X5R, 0603	FEC 1853538
1	C22	10 µF, 6.3 V, tantalum	FEC 1190107
1	L2	Inductor	FEC 9526862
7	TP1, TP2, TP3, TP4, TP5, TP6, TP9	Test point	FEC 8731128
4	R1, R2, R8, R18	100 kΩ SMD resistor	FEC 9330402
1	R21	1.6 Ω SMD resistor	FEC 1627674
4	R5, R6, R9, R13	0 Ω resistor	FEC 9331662

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.

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