

Evaluation Board for the **ADGS5414** SPI Interface, Octal SPST Switches, 13.5 Ω R_{ON}, ± 20 V/+36V, Mux Configurable

FEATURES

SPI interface with error detection
Includes CRC, invalid read/write address, and SCLK count error detection
Analog supply voltages
Dual supply: ± 9 V to ± 22 V
Single supply: 9 V to 40 V
PC control in conjunction with the evaluation software
Compatible with [EVAL-SDP-CB1Z](#) SDP board

EVALUATION KIT CONTENTS

EVAL-ADGS5414SDZ

DOCUMENTS NEEDED

[ADGS5414](#) data sheet

EQUIPMENT NEEDED

[EVAL-SDP-CB1Z](#) controller board

[ACE](#) software with EVAL-ADGS5414SDZ plug-in

DC voltage source

± 22 V for dual supply

40 V for single supply

Optional digital logic supply: 3.3 V

Analog signal source

Method to measure voltage, such as a digital multimeter (DMM)

GENERAL DESCRIPTION

The EVAL-ADGS5414SDZ is the evaluation board for the [ADGS5414](#). The [ADGS5414](#) is a latch-up proof, octal single-pole, single-throw (SPST) switch controlled by a serial peripheral interface (SPI). The SPI has robust error detection features, including cyclic redundancy check (CRC) error detection, invalid read/write address detection, and serial clock (SCLK) count error detection. It is possible to daisy-chain multiple [ADGS5414](#) devices together, which enables the configuration of multiple devices with a minimal amount of digital lines. The [ADGS5414](#) also supports burst mode, which decreases the time between SPI commands.

Figure 1 shows the EVAL-ADGS5414SDZ in a typical evaluation setup. The EVAL-ADGS5414SDZ is controlled by the [EVAL-SDP-CB1Z](#) system demonstration platform (SDP), which connects to a PC via a USB port. The [ADGS5414](#) is on the center of the evaluation board, and wire screw terminals are provided to connect to each of the source pins and drain pins. Three screw terminals power the device, and a fourth terminal provides users with a defined digital logic supply voltage, if required. Alternatively, the digital logic supply voltage can be supplied from the SDP board.

Full specifications of the [ADGS5414](#) are available in the [ADGS5414](#) data sheet available from Analog Devices, Inc., and must be consulted in conjunction with this user guide when using the evaluation board.

The evaluation board interfaces to the USB port of a PC via the SDP board. The [EVAL-SDP-CB1Z](#) board ([SDP-B](#) controller board) is available to order on the Analog Devices website at www.analog.com.

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REVISION HISTORY

10/2017—Revision 0: Initial Version

ADGS5414 EVALUATION BOARD PHOTOGRAPH

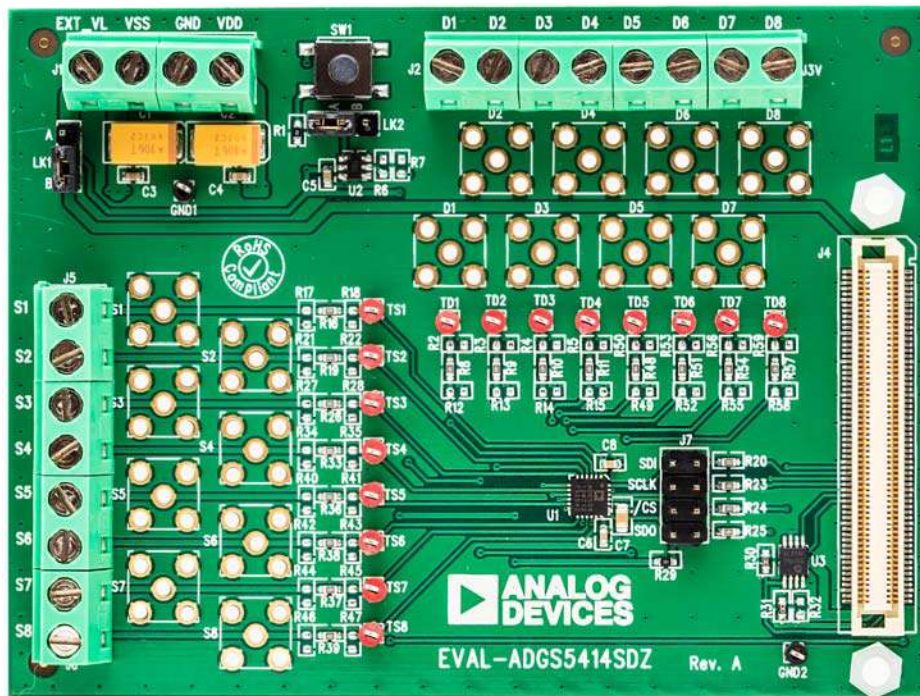


Figure 1.

EVALUATION BOARD HARDWARE

POWER SUPPLIES

Connector J1 provides access to the supply pins of the [ADGS5414](#). VDD, GND, and VSS on the J1 terminal block link to the appropriate pins on the [ADGS5414](#). For dual-supply voltages, the evaluation board can be powered from ± 9 V to ± 22 V. For single-supply voltages, the GND and VSS terminals must connect together and power the evaluation board with 9 V to 40 V. Additionally, 3.3 V is supplied to the V_L pin of the [ADGS5414](#) by the SDP board when Link LK1 is in Position B. When controlling the [ADGS5414](#) by a method other than the SDP board, supply between 2.7 V and 5.5 V to the V_L pin of the [ADGS5414](#) via the EXT_VL screw terminal input on Connector J1. Link LK1 must be in Position A.

INPUT SIGNALS

Four screw connectors, J2, J3, J5, and J6, are provided to connect to both the source and drain pins of the [ADGS5414](#). Additional SubMiniature version B (SMB) connector pads are available if extra connections are required.

Table 2. Link Functions

Link Number	Function
LK1	This link selects the source of the V_L voltage supplied to the ADGS5414 . Position A selects EXT_VL from Connector J1. Position B selects the 3.3 V from the SDP board.
LK2	This link selects how a hardware reset is performed. Position A indicates the SW1 push-button performs a hardware reset. Position B indicates the SDP board can perform a hardware reset.

Each trace on the source and drain side includes two sets of 0603 pads, which can place a load on the signal path to ground. A $0\ \Omega$ resistor is placed in the signal path and can be replaced with a user defined value. The resistor combined with the 0603 pads can create a simple resistor-capacitor (RC) filter.

LINK OPTIONS

A number of link options are provided on the EVAL-ADGS5414SDZ evaluation board that must be set for the required operating conditions before using. Table 1 shows the positions of the links to control the evaluation board via the SDP board using a PC and external power supplies. The functions of these link options are described in detail in Table 2.

When using the SDP board in conjunction with the EVAL-ADGS5414SDZ, Link LK1 must be in Position B to avoid damage to the SDP board.

Table 1. Link Options for SDP Control (Default)

Link Number	Option
LK1	B
LK2	B

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The EVAL-ADGS5414SDZ evaluation board uses the Analog Devices [Analysis Control Evaluation \(ACE\)](#) software. ACE is a desktop software application that allows the evaluation and control of multiple evaluation systems.

ACE installs the necessary SDP drivers and .NET Framework 4 by default. Install ACE before connecting the SDP board. The ACE software and access to full instructions on how to install and use ACE can be found on the Analog Devices website.

After the installation is finished, the EVAL-ADGS5414SDZ evaluation board plug-ins appear when opening ACE.

INITIAL SETUP

To set up the evaluation board, complete the following steps:

1. Connect the evaluation board to the SDP board and connect the SDP board to the computer via a USB cable.
2. Power the evaluation board as described in the Power Supplies section.
3. Run the ACE application. The EVAL-ADGS5414SDZ board plug-ins appear in the attached hardware section of the **Start** tab.
4. Double-click on the evaluation board plug-in to open the evaluation board view shown in Figure 2.
5. The chip block diagram can be accessed by double-clicking the **ADGS5414** icon (see Figure 2). This view provides a basic representation of functionality of the evaluation board. The main function labels are shown in Figure 3.

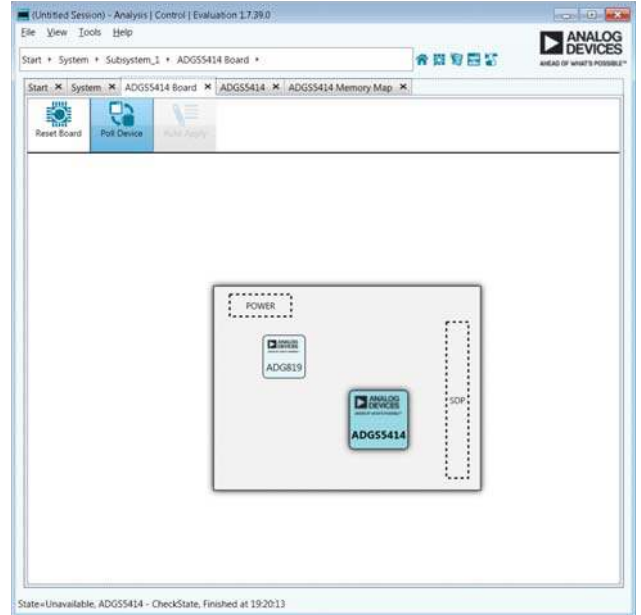


Figure 2. Evaluation Board View of the EVAL-ADGS5414SDZ

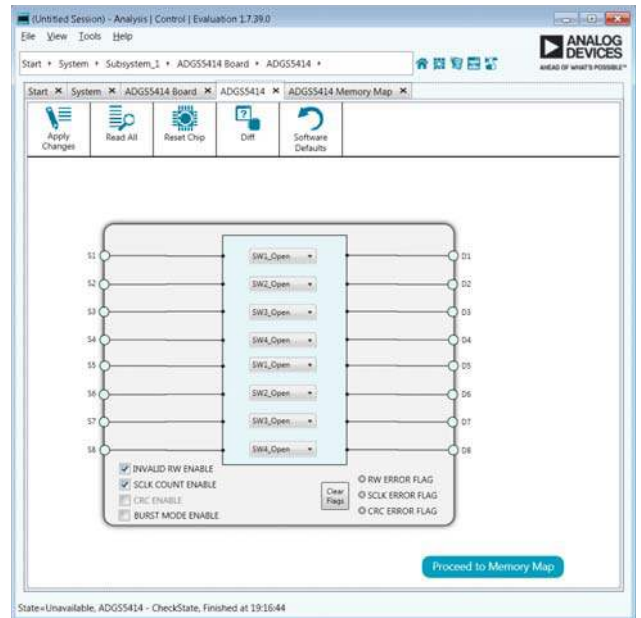


Figure 3. Chip Block Diagram View for the EVAL-ADGS5414SDZ

BLOCK DIAGRAM AND DESCRIPTION

The EVAL-ADGS5414SDZ software is organized so that it appears similar to the functional block diagram shown in the [ADGS5414](#) data sheet. In this way, the user can correlate the functions on the EVAL-ADGS5414SDZ board with the description in the data sheet. A full description of each block, register, and setting is given in the [ADGS5414](#) data sheet.

Figure 4 shows a full screen block diagram with some of the blocks labelled. The functionality of these blocks, which pertain to the evaluation board, are described in Table 3.

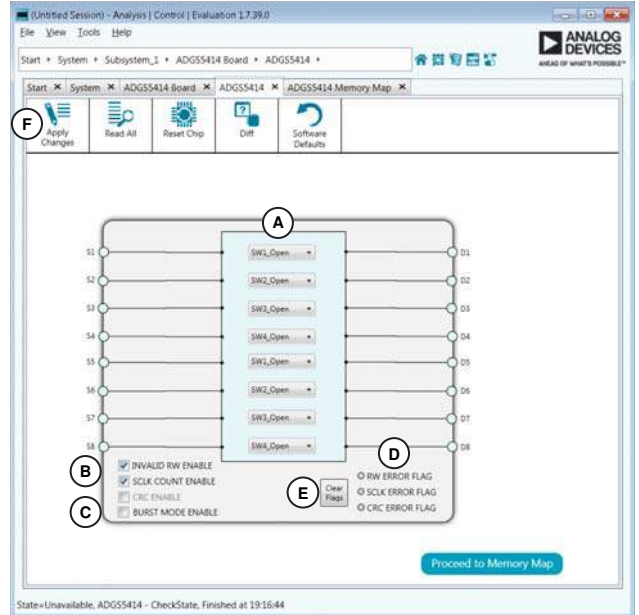


Figure 4. EVAL-ADGS5414SDZ Block Diagram with Labels

Table 3. Block Diagram Functions

Label	Function
A	The dropdown menus configure SW1 to SW8 as open or closed.
B	The INVALID RW ENABLE , SCLK COUNT ENABLE , and CRC ENABLE check boxes enable or disable the error detection features on the SPI interface.
C	The BURST MODE ENABLE check box enables or disables burst mode.
D	The RW ERROR FLAG , SCLK ERROR , and CRC ERROR FLAG indicators illuminate red if the relevant error flags assert in the error flags register.
E	The Clear Flags button clears the error flags register.
F	The Apply Changes button applies all modified values to the devices.

MEMORY MAP

All registers are fully accessible from the **Memory Map** tab, which allows registers to be edited at a bit level (see Figure 5 and Figure 6). The bits shaded in dark gray are read-only bits and cannot be accessed from **ACE**. All other bits are toggled. The **Apply Changes** button transfers data to the device.

All changes in this tab correspond to the block diagram; for example, if the internal register bit is enabled, it displays as enabled on the block diagram. Any bits or registers that are bold are modified values that have not been transferred to the evaluation board. After clicking **Apply Changes**, the data are transferred to the evaluation board.

Registers

+/-	Address (Hex)	Name	Data (Hex)	Data (Binary)
+	0001	* SW_DATA	01	0 0 0 0 0 0 0 1
+	0002	ERR_CONFIG	06	0 0 0 0 0 1 1 0
+	0003	* ERR_FLAGS	00	0 0 0 0 0 0 0 0
+	0005	BURST_EN	00	0 0 0 0 0 0 0 0
+	000B	SOFT_RESETB	00	0 0 0 0 0 0 0 0
+	0025	DAISY_CHAIN_EN	00	0 0 0 0 0 0 0 0

16344-005

Figure 5. ADGS5414 Memory Map

Registers

+/-	Address (Hex)	Name	Data (Hex)	Data (Binary)
+	0001	* SW_DATA	09	0 0 0 0 1 0 0 1
+	0002	ERR_CONFIG	06	0 0 0 0 0 1 1 0
+	0003	* ERR_FLAGS	00	0 0 0 0 0 0 0 0
+	0005	BURST_EN	00	0 0 0 0 0 0 0 0
+	000B	SOFT_RESETB	00	0 0 0 0 0 0 0 0
+	0025	DAISY_CHAIN_EN	00	0 0 0 0 0 0 0 0

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Figure 6. ADGS5414 Memory Map with Unapplied Changes in the SW_DATA Register

EVALUATION BOARD SCHEMATICS AND ARTWORK

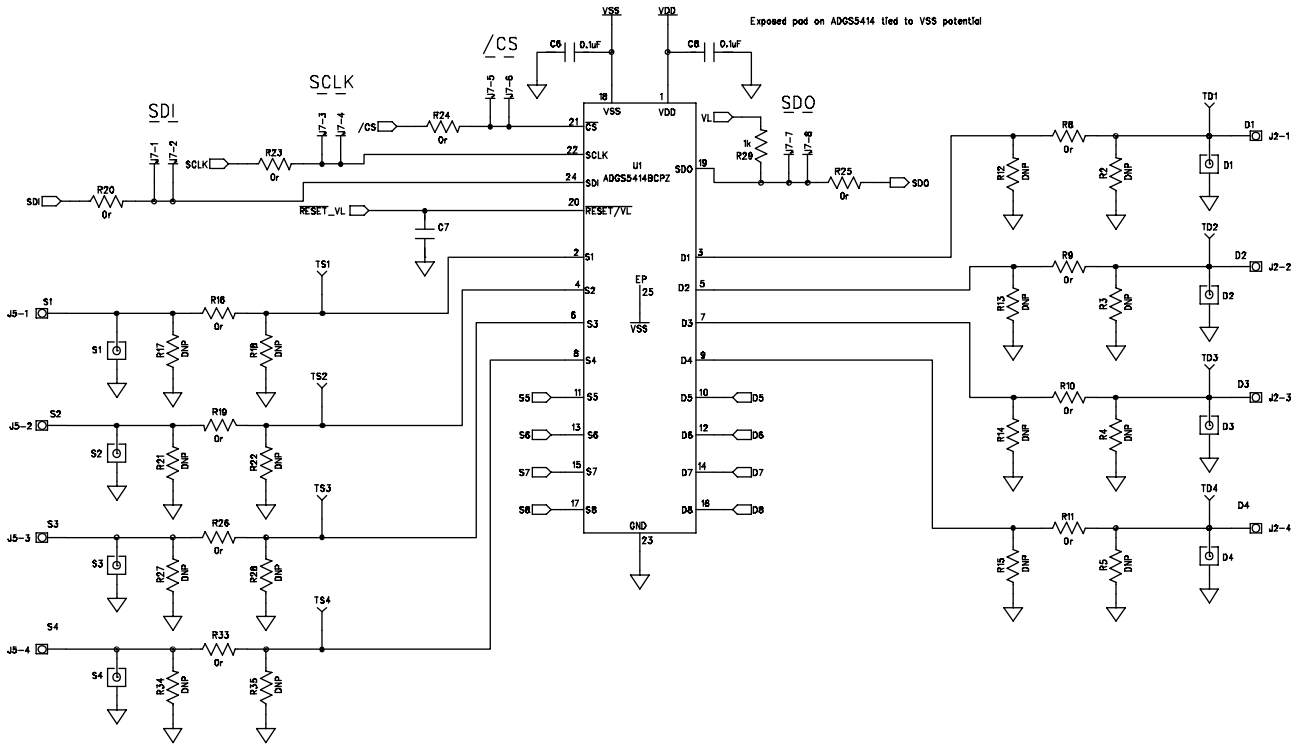


Figure 7. ADGS5414 Device Connections Schematic

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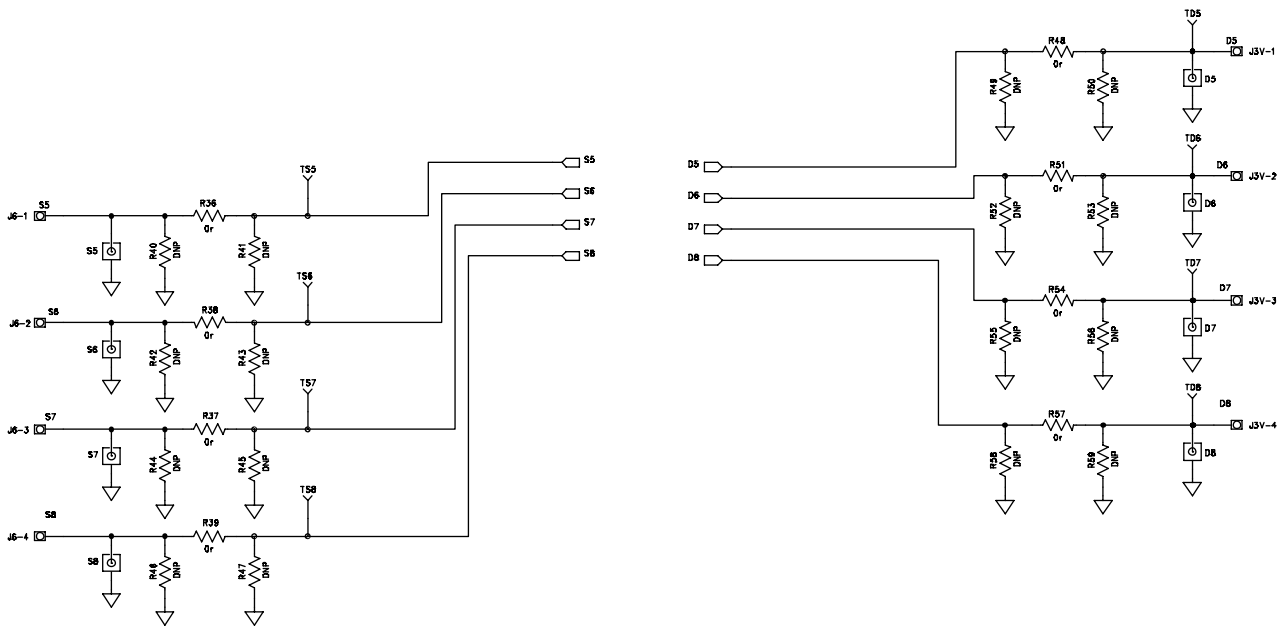


Figure 8. ADGS5414 Device Connections Schematic Continued

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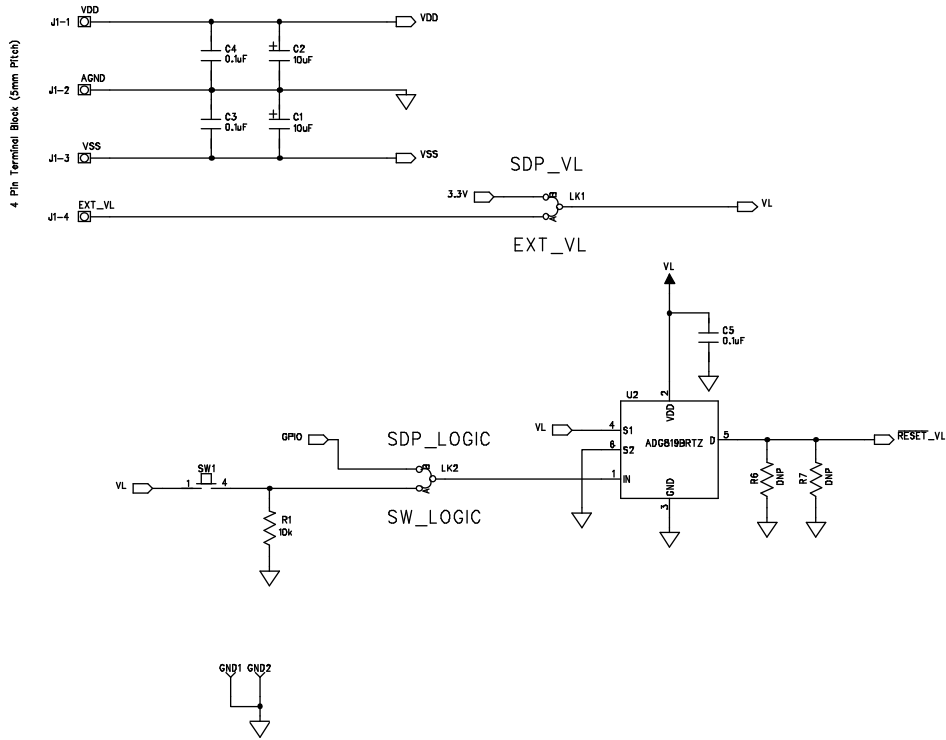


Figure 9. Power Supplies and Reset Schematic

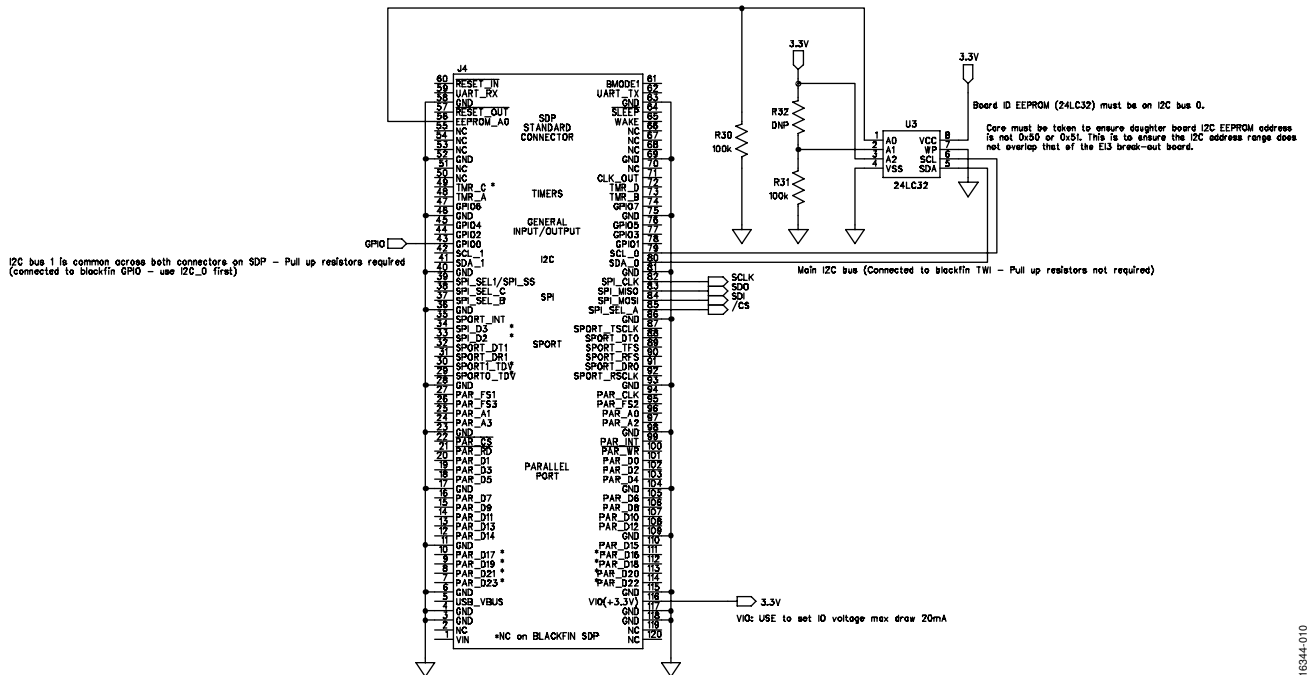
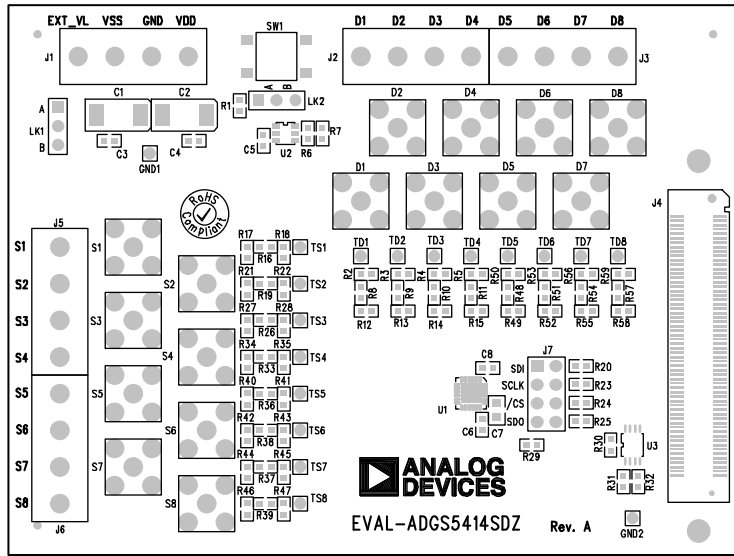
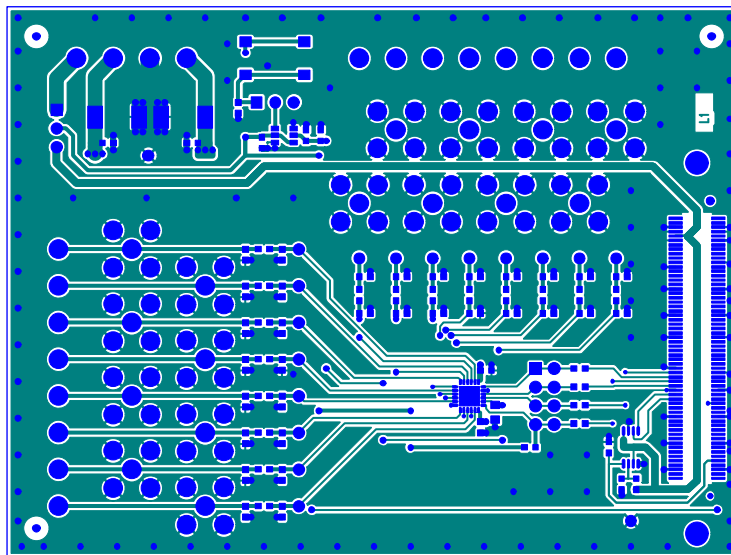


Figure 10. SDP Board Connector Schematic



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Figure 11. EVAL-ADGS5414SDZ Silk Screen



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Figure 12. EVAL-ADGS5414SDZ Top Layer

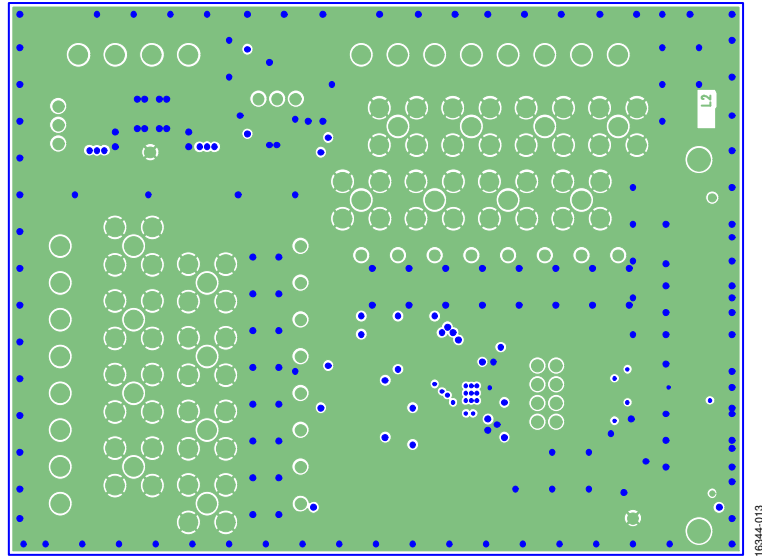


Figure 13. EVAL-ADGS5414SDZ Layer 2

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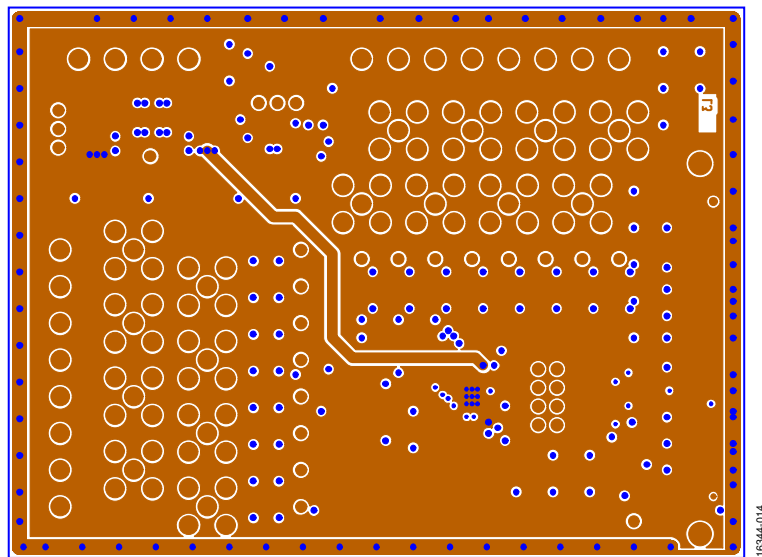
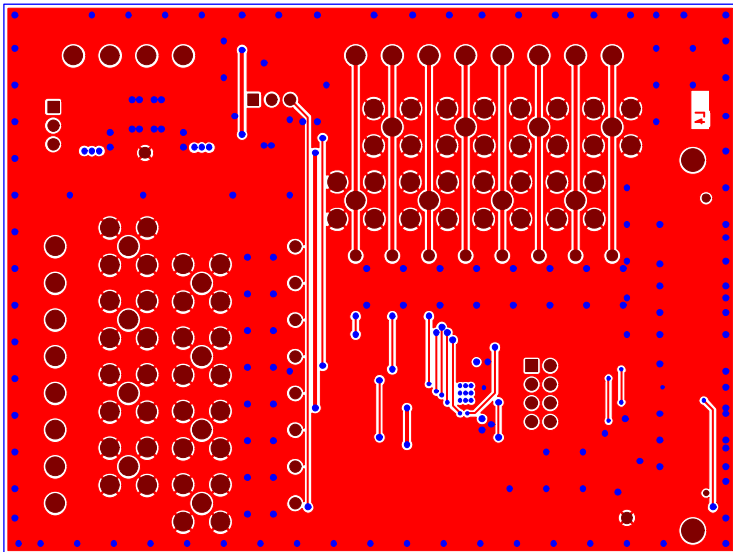


Figure 14. EVAL-ADGS5414SDZ Layer 3

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16344-015

Figure 15. EVAL-ADGS5414SDZ Bottom Layer

ORDERING INFORMATION

BILL OF MATERIALS

Table 4.

Reference Designator	Description
C1 to C2	50 V tantalum capacitors, 10 µF, D size
C3 to C6, C8	50 V, X7R multilayer ceramic capacitors, 0.1 µF, 0603
C7	Capacitor, 10 µF, 0805, 16 V
D1 to D8	Not placed
S1 to S8	Not placed
TD1 to TD8	Red test points
TS1 to TS8	Red test points
GND1, GND2	Black test points
J1 to J3, J5, J6	4-pin terminal blocks, 5 mm pitch
J4	120-way connector, 0.6 mm pitch
J7	Through hole, header, 4 × 2, 2.54 mm
LK1, LK2	3-pin single inline (SIL) headers and shorting links
R2 to R7, R12 to R15, R17, R18, R21, R22, R27, R28, R32, R34, R35, R40 to R47, R49, R50, R52, R53, R55, R56, R58, R59	Not placed
R8 to R11, R16, R19, R20, R23 to R26, R33, R36 to R39, R48, R51, R54, R57	Resistors, 0 Ω, 0603, 1%
R1	Resistor, 10 kΩ, 0.063 W, 1%, 0603
R29	Resistor, 1 kΩ, 0.063 W, 1%, 0603
R30, R31	Resistors, 100 kΩ, 0.063 W, 1%, 0603
SW1	Surface mount device (SMD) push-button switch
U1	ADGS5414, SPI controlled, octal SPST switch
U2	ADG819, 1.8 V to 5.5 V, 2:1 multiplexer/SPDT switch
U3	24LC32A-I/MS, 32 kB, I ² C serial EEPROM

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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