

ANALOG DEVICES UG-1209 Evaluation Board User Guide

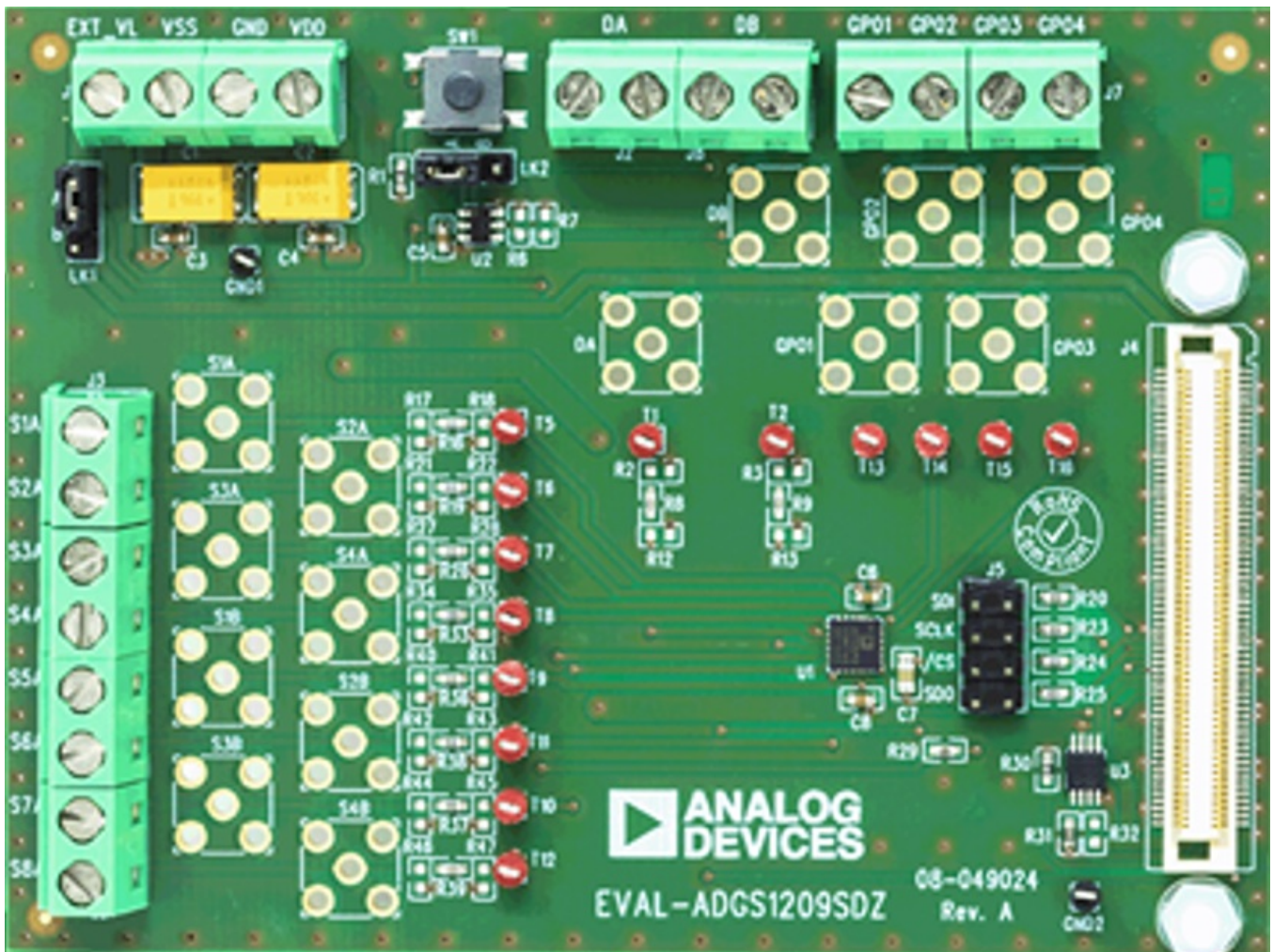
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ANALOG DEVICES UG-1209 Evaluation Board



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

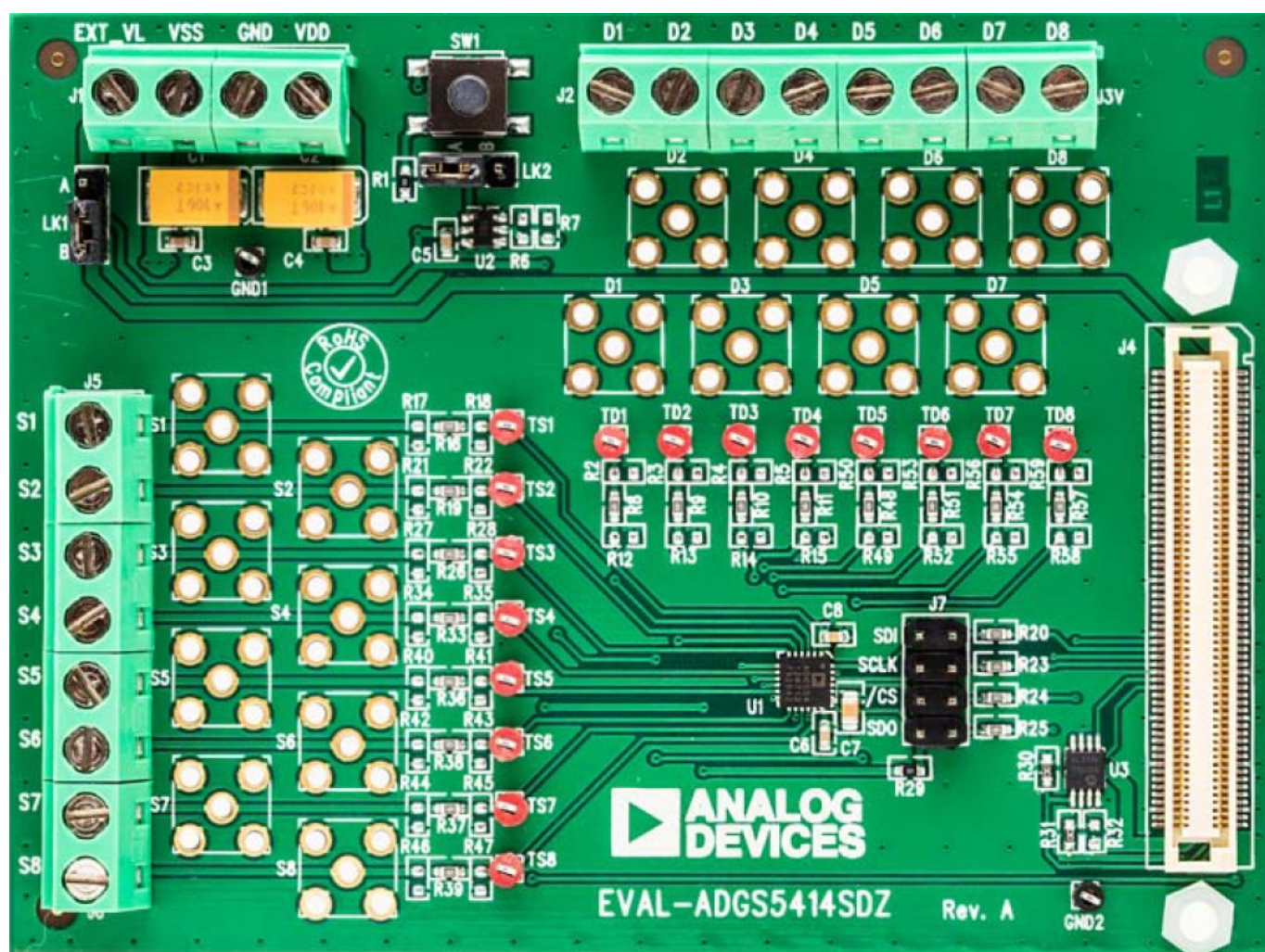
The EVAL-ADGS5414SDZ is the evaluation board for the ADGS5414. The ADGS5414 is a latch-up proof, octal single-pole, single-throw (SPST) switch controlled by a serial peripheral interface (SPI). The SPI has robust error detection features, including cyclic redundancy check (CRC) error detection, invalid 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.

REVISION HISTORY

10/2017—Revision 0: Initial Version

ADGS5414 EVALUATION BOARD PHOTOGRAPH



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 VL 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 VL 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. 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 Ω 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.

Link Options for SDP Control (Default)

| Link Number | Option |
|-------------|--------|
| LK1 | B |
| LK2 | B |

Link Functions

| Link Number | Function |
|-------------|--|
| LK1 | This link selects the source of the VL 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. |

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.

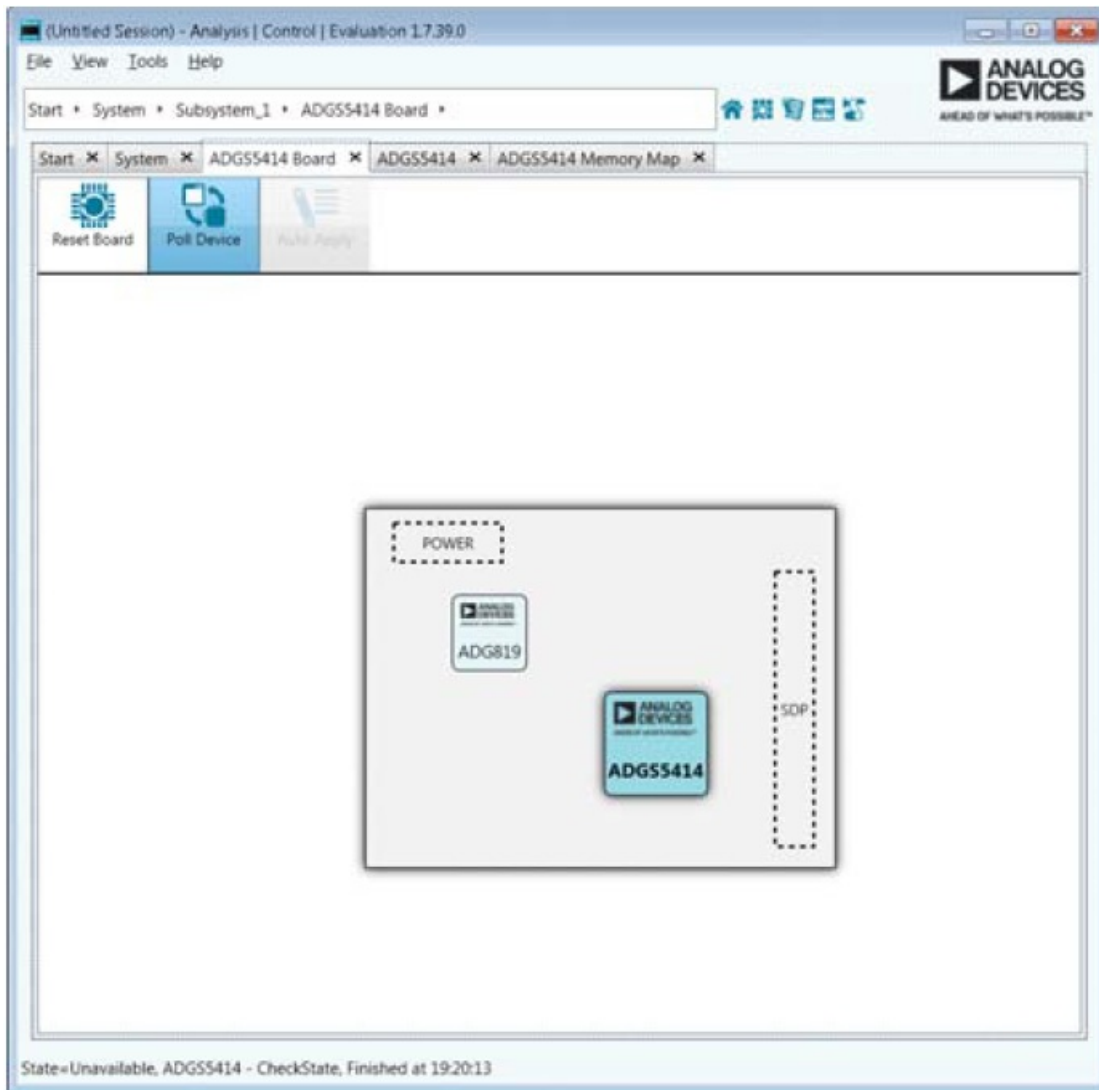
INITIAL SETUP

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

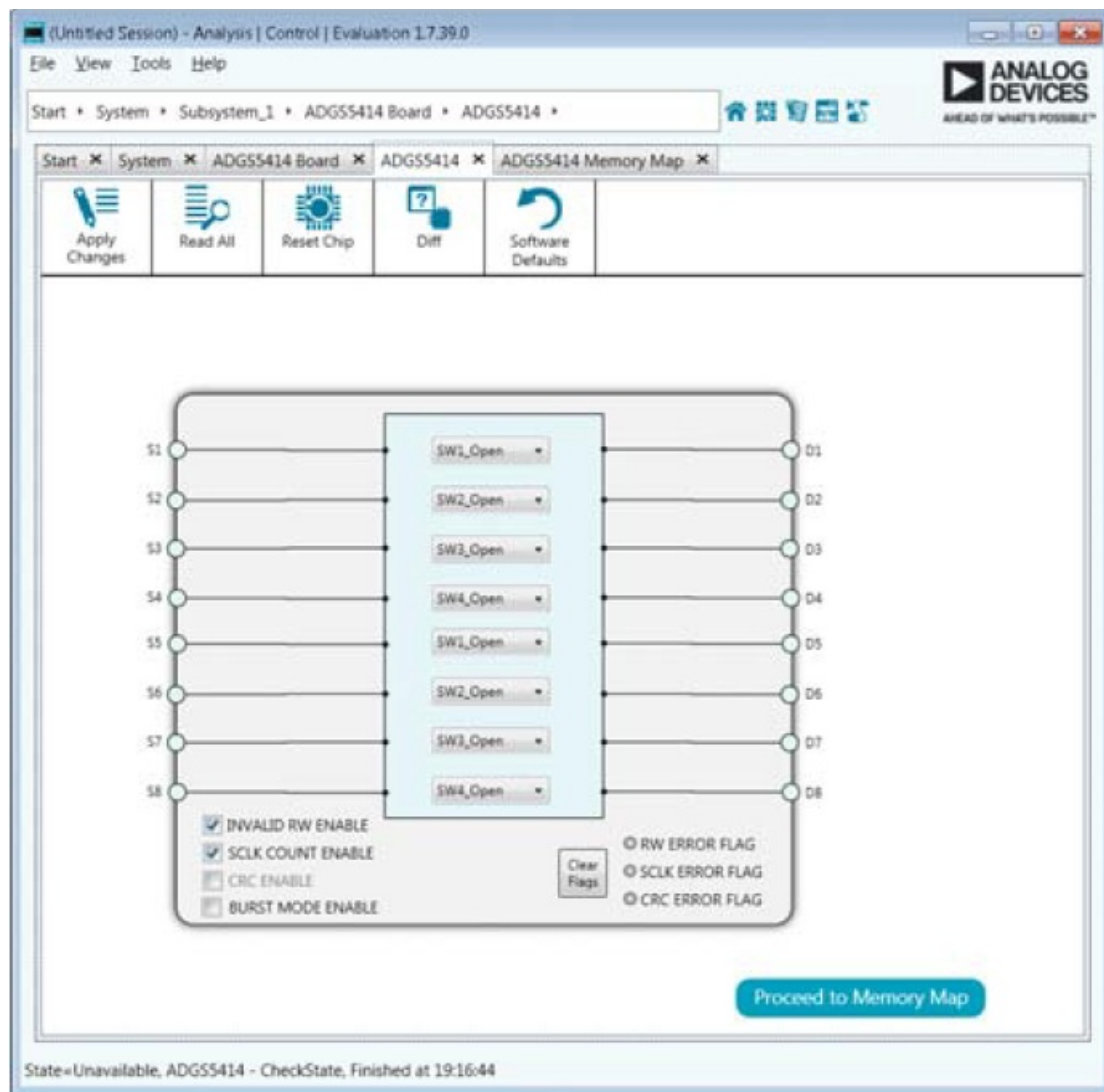
the Start tab.

4. Double-click on the evaluation board plug-in to open the evaluation board view shown in



- Evaluation Board View of the EVAL-ADGS5414SDZ

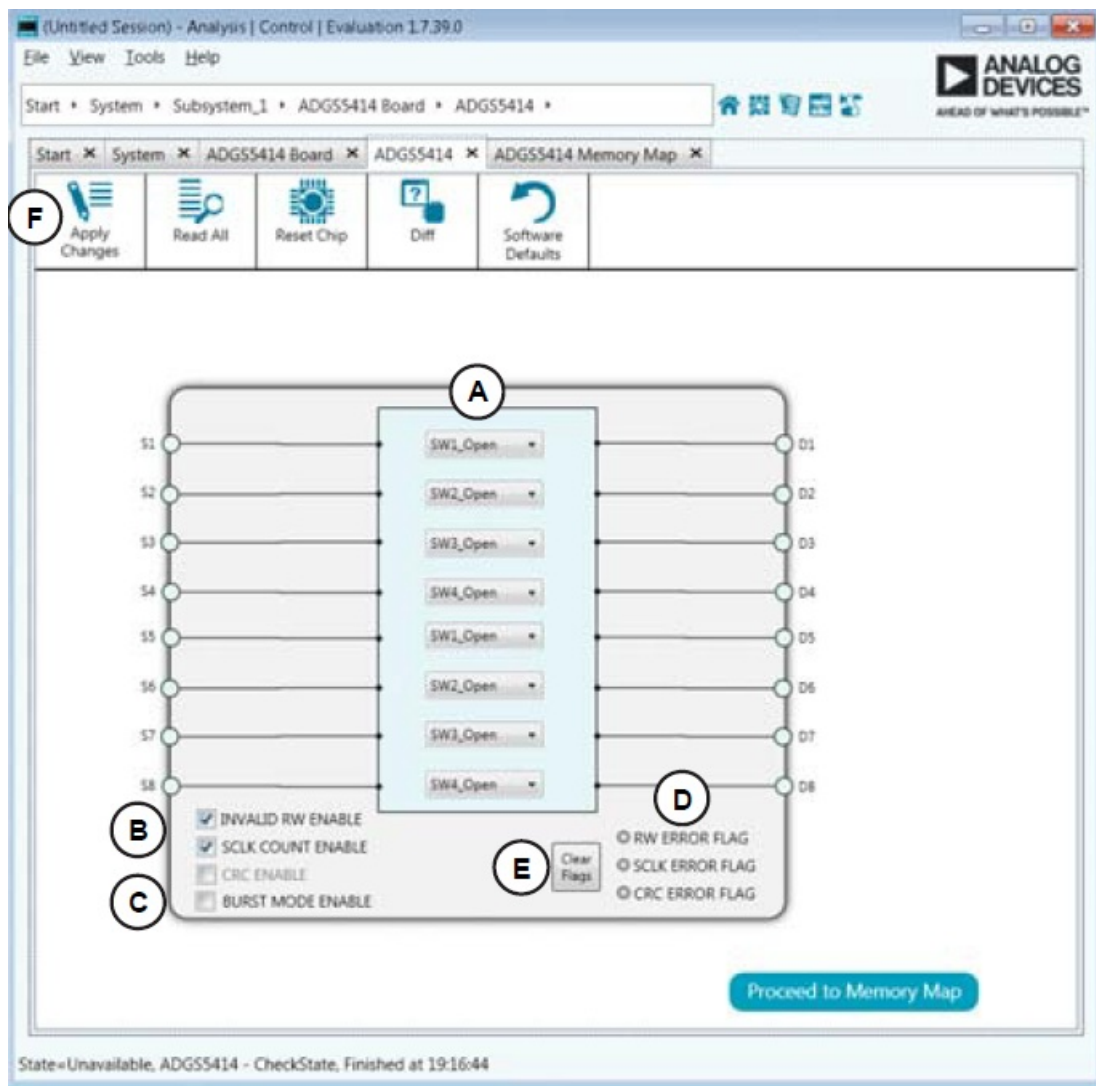
5. The chip block diagram can be accessed by double-clicking the ADGS5414 icon (see Figure 2). This view provides a basic representation of functionality of the evaluation board. The main function labels are shown in



- 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.



- EVAL-ADGS5414SDZ Block Diagram with Labels

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

| <div>+/-</div> | 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 |

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• ADGS5414 Memory Map

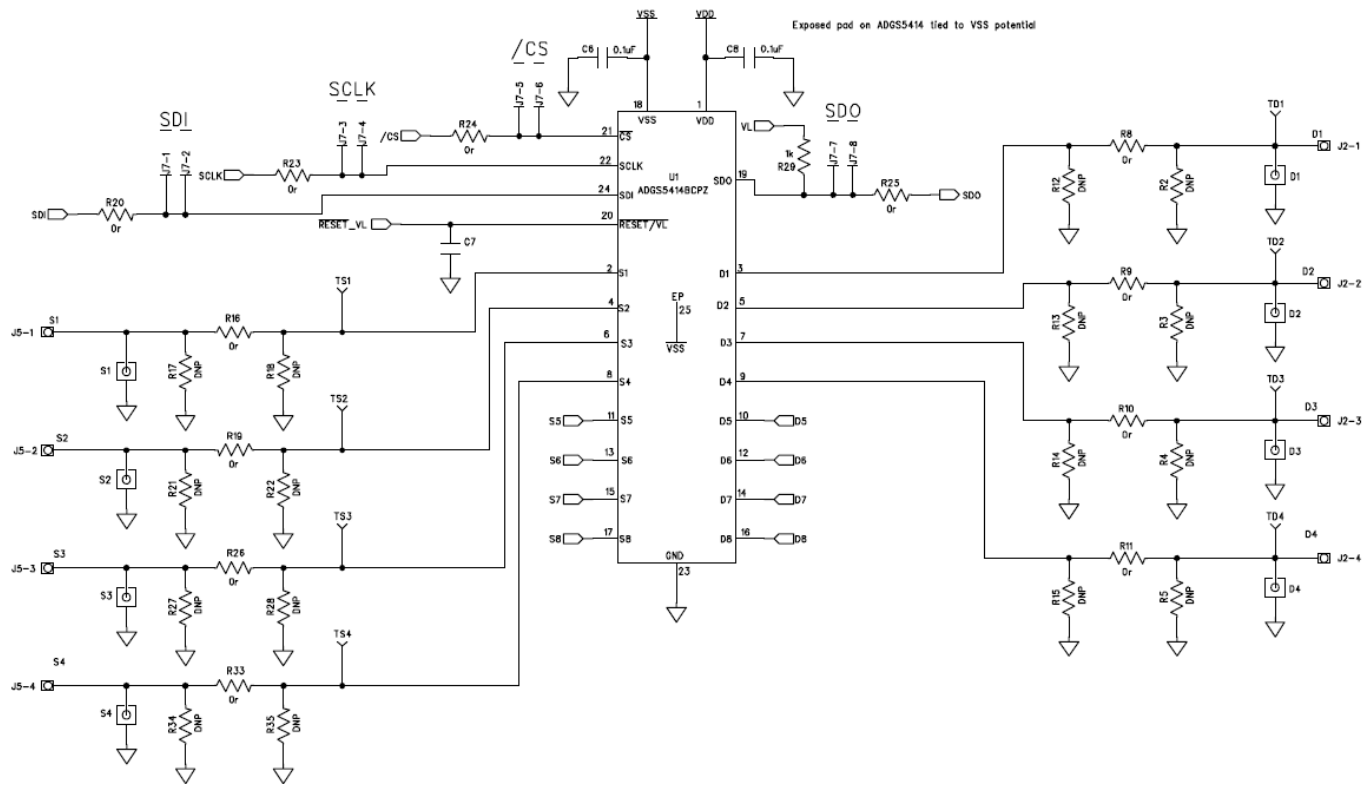
Registers

| <div>+/-</div> | 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 |

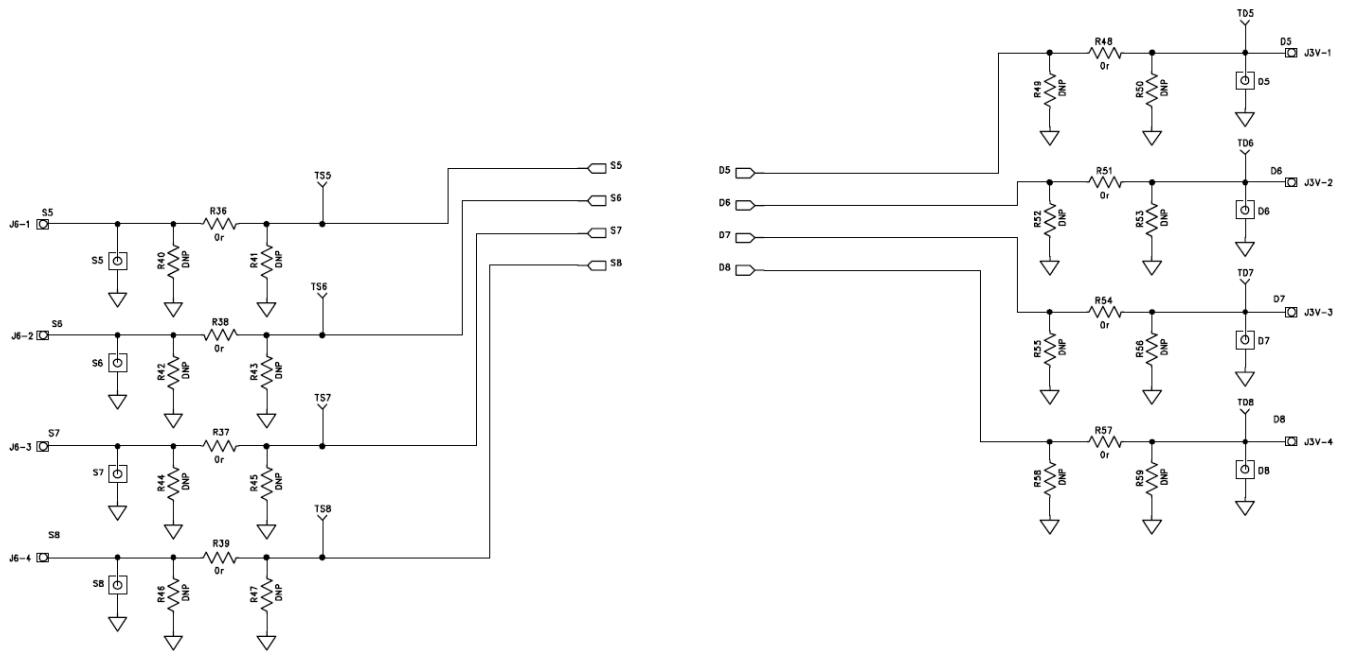
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• ADGS5414 Memory Map with Unapplied Changes in the SW_DATA Register

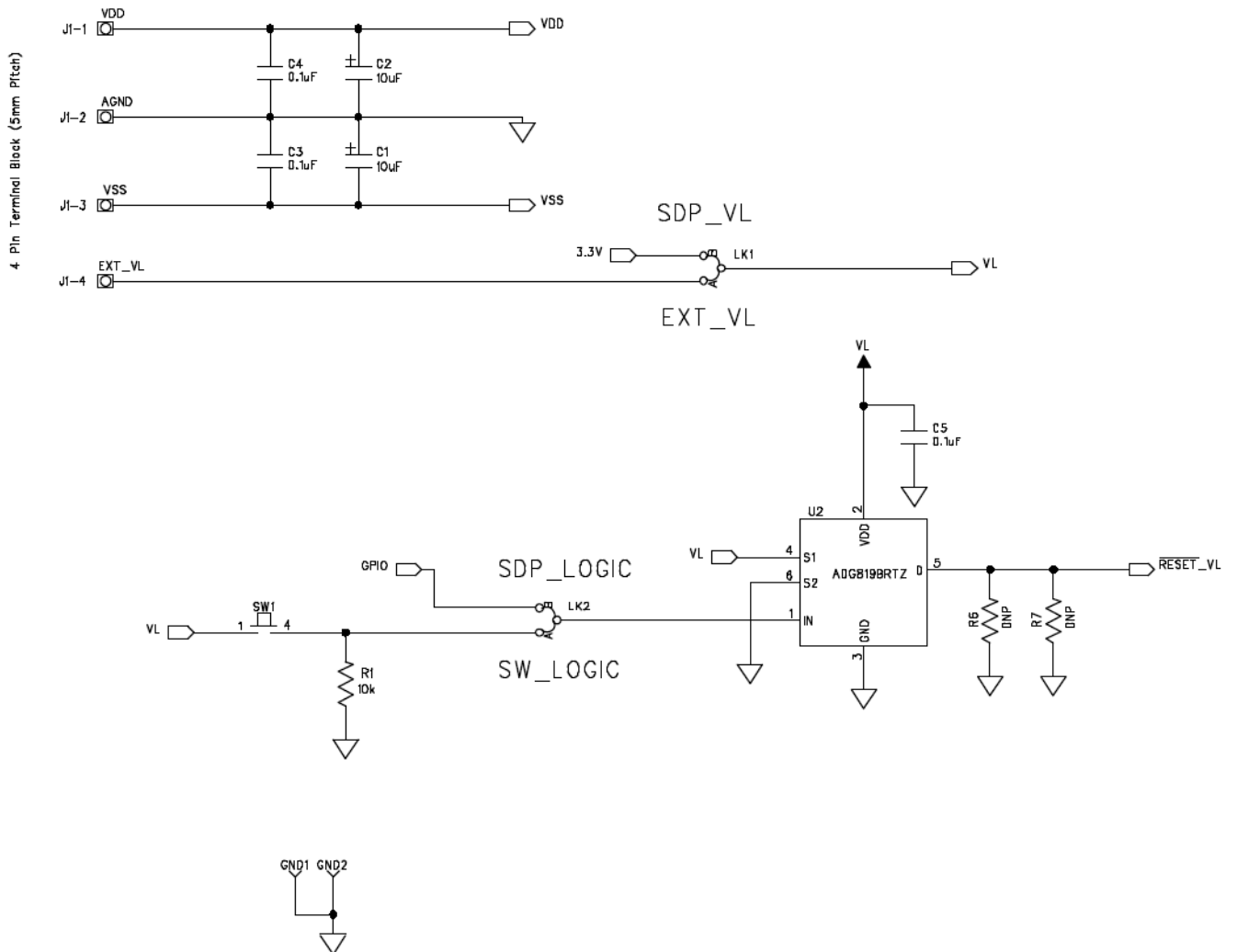
EVALUATION BOARD SCHEMATICS AND ARTWORK



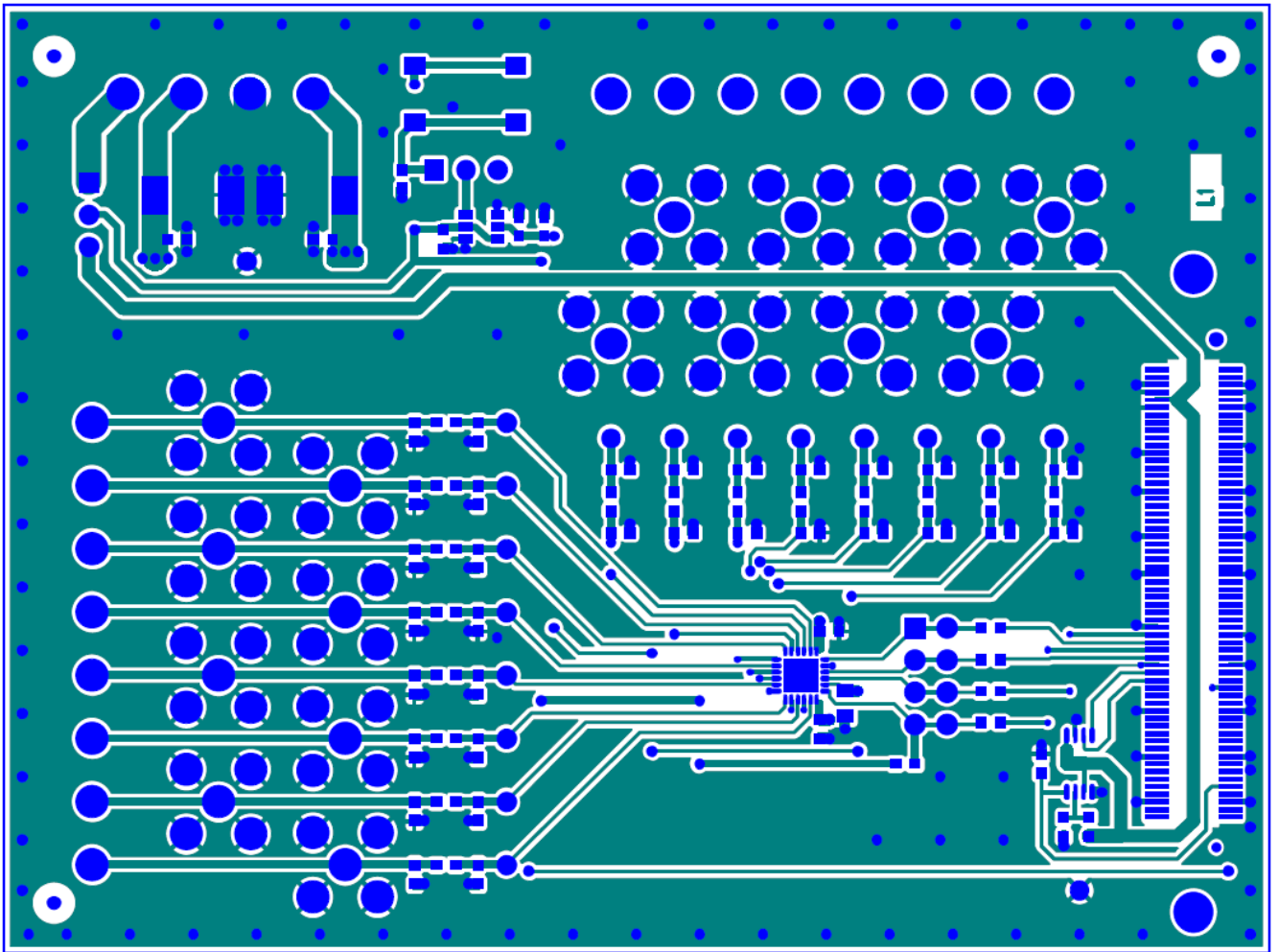
• ADGS5414 Device Connections Schematic



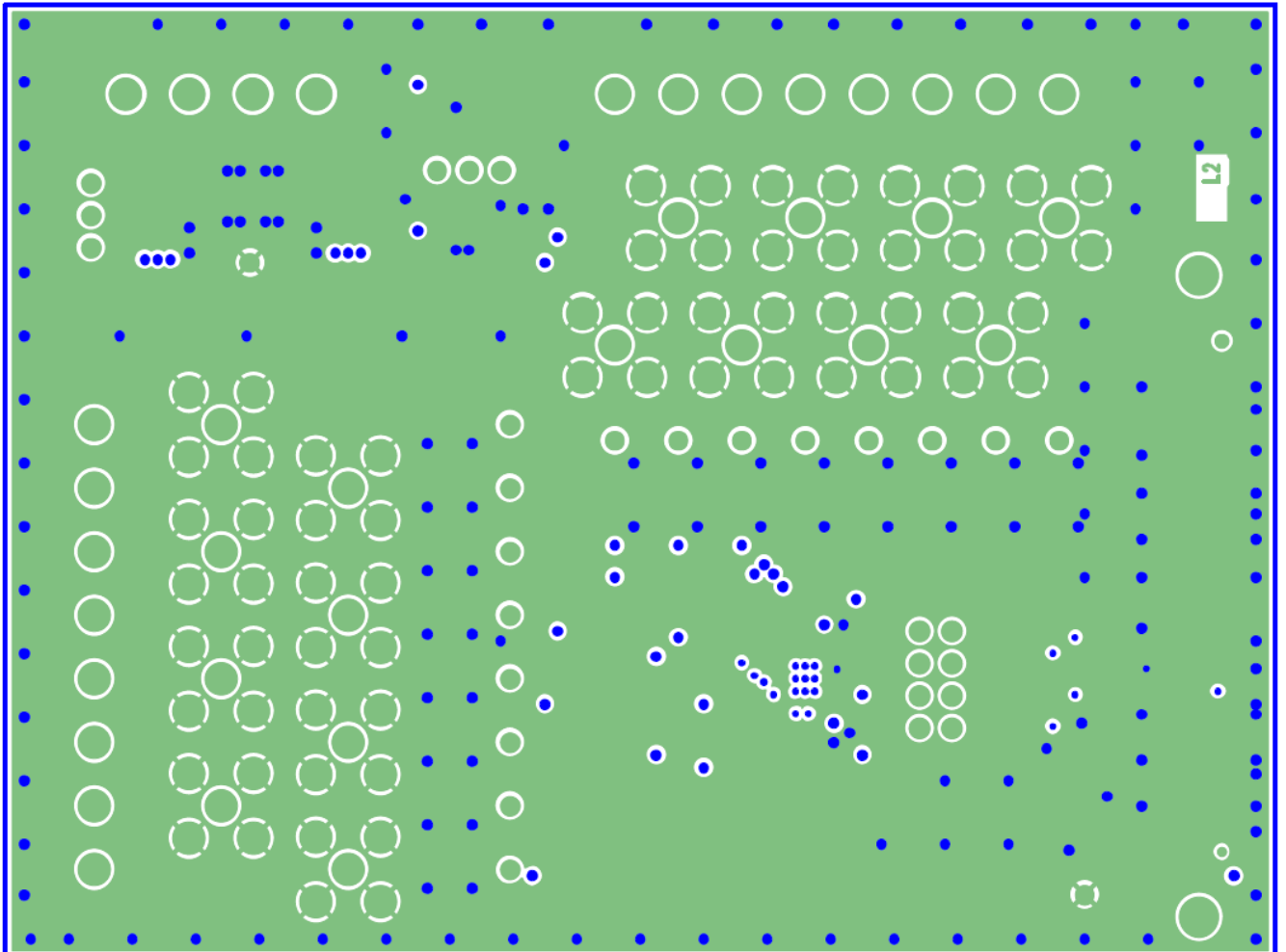
- ADGS5414 Device Connections Schematic Continued|



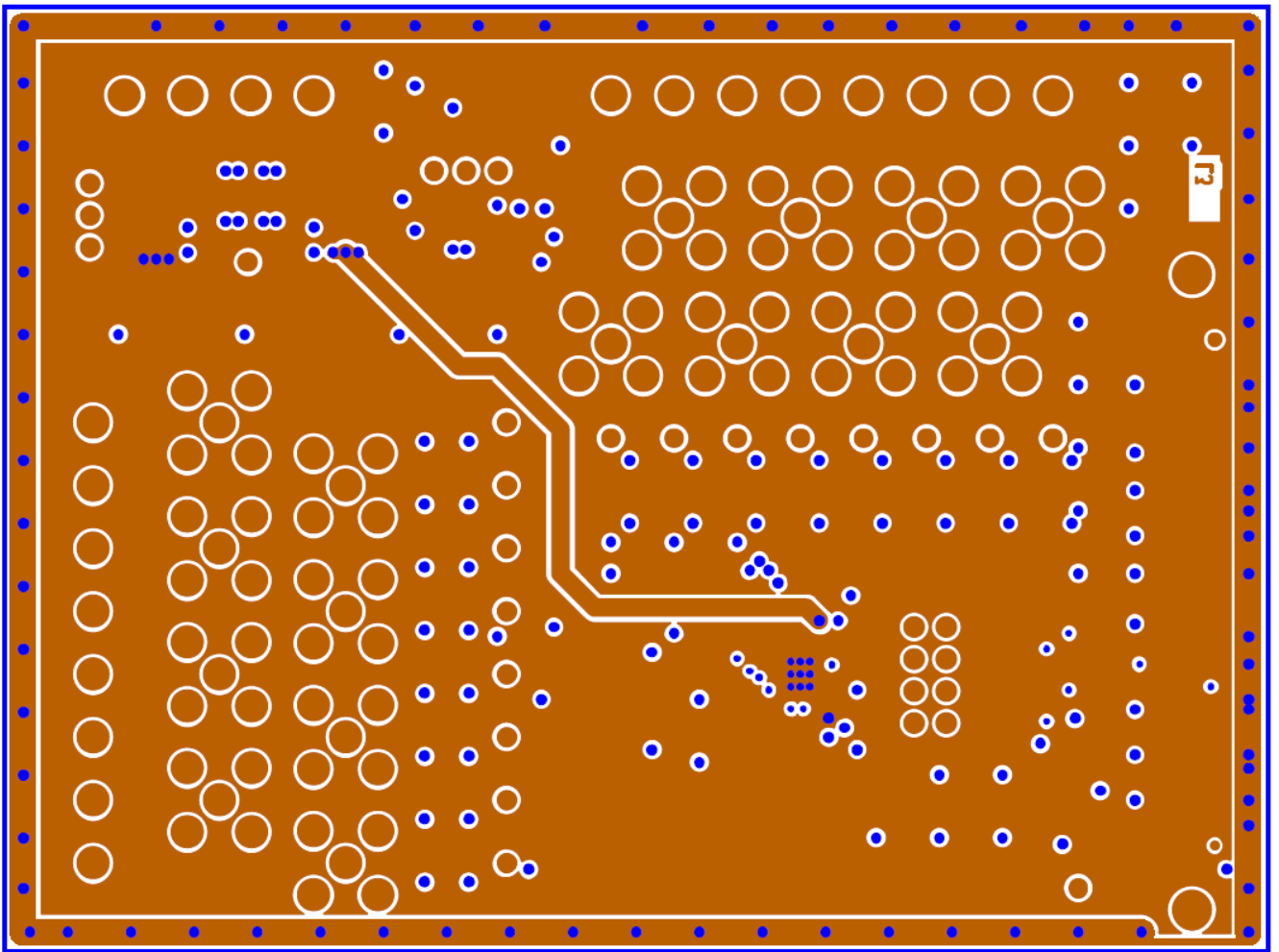
- Power Supplies and Reset Schematic



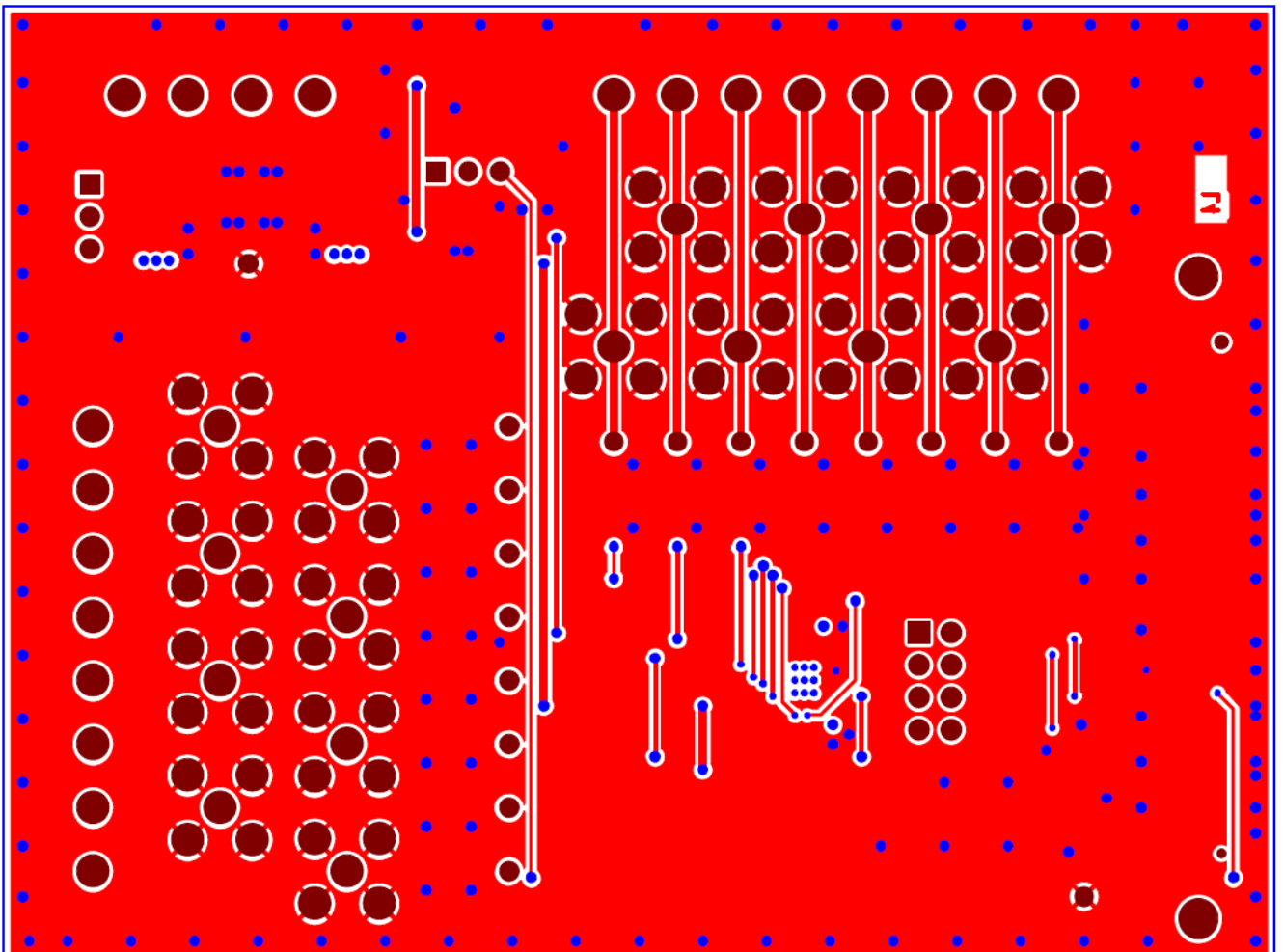
- EVAL-ADGS5414SDZ Top Layer



- EVAL-ADGS5414SDZ Layer 2



- EVAL-ADGS5414SDZ Layer 3



- EVAL-ADGS5414SDZ Bottom Layer

ORDERING INFORMATION

BILL OF MATERIALS

| Reference Designator | Description |
|---|--|
| C1 to C2 | 50 V tantalum capacitors, 10 μ F, D size |
| C3 to C6, C8 | 50 V, X7R multilayer ceramic capacitors, 0.1 μ F, 0603 |
| C7 | Capacitor, 10 μ F, 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 \times 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, | Not placed |
| R50, R52, R53, R55, R56, R58, R59 | |
| R8 to R11, R16, R19, R20, R23 to R26, R33, | Resistors, 0 Ω , 0603, 1% |
| R36 to R39, R48, R51, R54, R5 7 | |
| R1 | Resistor, 10 k Ω , 0.063 W, 1%, 0603 |
| R29 | Resistor, 1 k Ω , 0.063 W, 1%, 0603 |
| R30, R31 | Resistors, 100 k Ω , 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, I2C 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.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.

Documents / Resources

| | |
|---|---|
|  | <p>ANALOG DEVICES UG-1209 Evaluation Board [pdf] User Guide</p> <p>UG-1209 Evaluation Board, UG-1209, Evaluation Board</p> |
|---|---|

References

-  [Mixed-signal and digital signal processing ICs | Analog Devices](#)