

## Evaluating the **ADG5209F**, Overvoltage Protected Dual 4:1 Multiplexer

### FEATURES

#### Supply voltages

Dual supply:  $\pm 5\text{ V}$  to  $\pm 22\text{ V}$

Single supply:  $8\text{ V}$  to  $44\text{ V}$

#### Protected against overvoltage on source pins

Signal voltages up to  $-55\text{ V}$  and  $+55\text{ V}$

#### Parallel interface compatible with $3\text{ V}$ logic

#### On-board low dropout (LDO) regulator for digital supply and control, if required

### EVALUATION KIT CONTENTS

**EVAL-ADG5209FEBZ** evaluation board

### ONLINE RESOURCES

#### Documents Needed

[ADG5209F](#) data sheet

[EVAL-ADG5209FEBZ](#) user guide

### EQUIPMENT NEEDED

#### DC voltage source

$\pm 22\text{ V}$  for dual supply

$44\text{ V}$  for single supply

#### Optional digital logic supply: $3\text{ V}$ to $5\text{ V}$

#### Analog signal source

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

### GENERAL DESCRIPTION

The **EVAL-ADG5209FEBZ** is the evaluation board for the **ADG5209F** and features an overvoltage protected dual 4:1 multiplexer. The **ADG5209F** has overvoltage detection and protection circuitry on the source pins and is protected against signals up to  $-55\text{ V}$  and  $+55\text{ V}$  in both the powered and unpowered states.

Figure 1 shows the **EVAL-ADG5209FEBZ** in a typical evaluation setup. The **ADG5209F** is soldered to the center of the evaluation board, and wire screw terminals are provided to connect to each of the source and drain pins. Three screw terminals power the device, with a fourth terminal used to provide a user defined digital logic supply voltage, if required. Alternatively, a low dropout (LDO) regulator is provided for  $5\text{ V}$  digital logic supply.

Full specifications on the **ADG5209F** are available in the **ADG5209F** data sheet, which must be consulted in conjunction with this user guide when using the evaluation board.

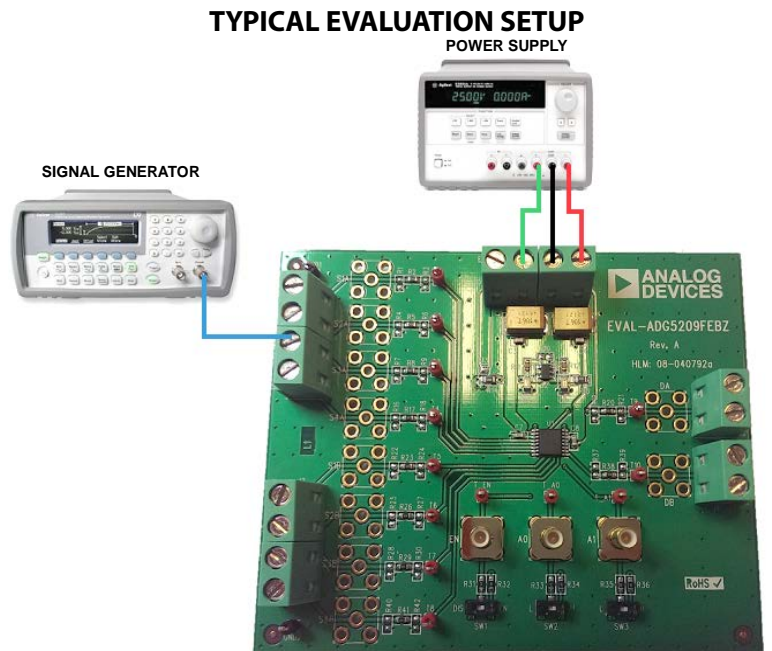


Figure 1. **EVAL-ADG5209FEBZ**, Power Supply, and Signal Generator

**TABLE OF CONTENTS**

Features .....	1	Evaluation Board Hardware.....	4
Evaluation Kit Contents.....	1	Power Supply.....	4
Online Resources.....	1	Input Signals.....	4
Equipment Needed.....	1	Jumper Settings.....	5
General Description .....	1	Switches and 0 Ω Resistors.....	5
Typical Evaluation Setup .....	1	SMB Connectors.....	5
Revision History .....	2	Evaluation Board Schematics and Artwork.....	6
Getting Started .....	3	Ordering Information.....	11
Evaluation Board Setup Procedure .....	3	Bill of Materials.....	11

**REVISION HISTORY**

**5/2016—Rev. 0 to Rev. A**

Changes to Figure 1 .....	1
Changes to Input Signals Section .....	4
Changes to SMB Connectors Section and Table 1 .....	5

**8/2015—Revision 0: Initial Version**

# GETTING STARTED

## EVALUATION BOARD SETUP PROCEDURE

The EVAL-ADG5209FEBZ evaluation board operates independently and does not require any additional evaluation boards or software to operate. An on-board LDO regulator is provided as the digital power supply to manually control the ADG5209F.

Supply the evaluation board with a dual power source of up to ±22 V or a single supply of up to +44 V by connecting VSS and GND together.

A functionality test can be set up as follows:

1. Connect a power supply to J5. Connect VSS and GND together if a single supply is required.
2. Ensure a 0 Ω resistor is inserted in R15 to use the on-board LDO regulator, and that a 0 Ω resistor is inserted in R14.
3. SW1 through SW3 control the digital signals for the ADG5209F.

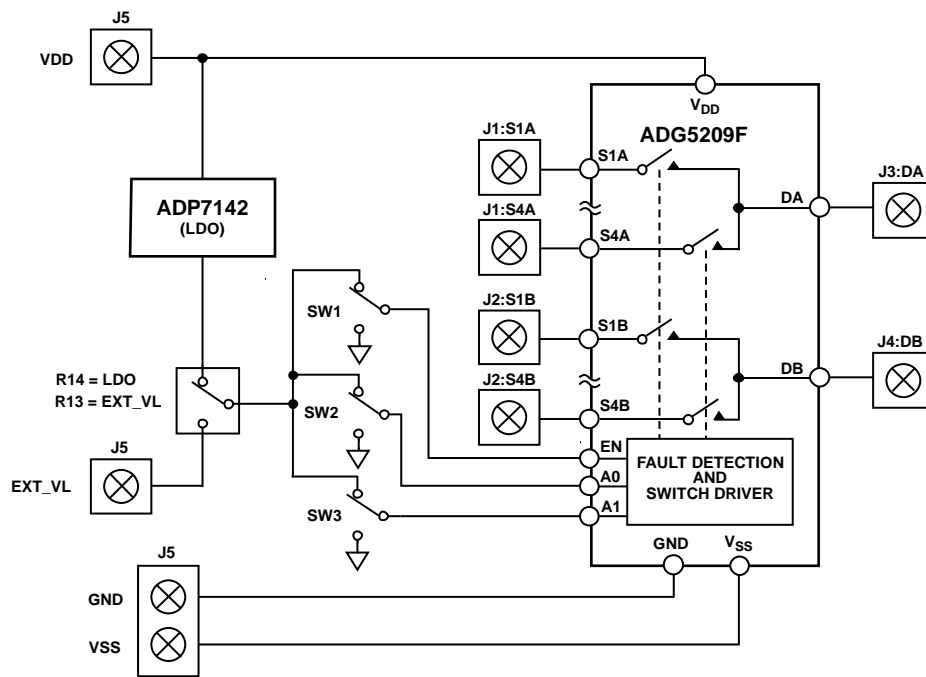


Figure 2. EVAL-ADG5209FEBZ Block Diagram

13457-002

## EVALUATION BOARD HARDWARE

The operation of the [ADG5209F](#) is evaluated using the [EVAL-ADG5209FEBZ](#). Figure 1 shows a typical evaluation setup where only a power supply and signal generator are required. Figure 2 shows the block diagram of the main components of the evaluation board.

Using this evaluation board, the [ADG5209F](#) passes signals from either the source or drain connectors. The source pins have fault detection circuitry that react to an overvoltage event. During an overvoltage event, the channel on which the fault occurs is turned off. See the [ADG5209F](#) data sheet for more details.

### POWER SUPPLY

Connector J5 provides access to the supply pins of the [ADG5209F](#). VDD, GND, and VSS on J5 link to the appropriate pins on the [ADG5209F](#). For dual-supply voltages, the evaluation board can be powered from  $\pm 5$  V to  $\pm 22$  V. For single-supply voltages, the GND and VSS terminals must be connected together, and power the evaluation board with 8 V to 44 V. Additionally, an on-board LDO regulator is provided for a digital control voltage. If necessary, a secondary voltage source can be connected to EXT\_VL and used to control the digital voltages. To use EXT\_VL, move the  $0\ \Omega$  resistor from R14 to R13. Do not expose the on-board LDO regulator to voltages greater than 28 V; remove R15 and supply an alternative digital voltage via EXT\_VL, if required.

### INPUT SIGNALS

Four screw connectors are provided to connect to both the source and drain pins of the [ADG5209F](#). Additional Subminiature Version B (SMB) connector pads are available if extra connections are required. The [ADG5209F](#) is overvoltage protected on the source side, and each source terminal (S1A to S4A and S1B to S4B) can be presented with a voltage of up to +55 V or -55 V. See the [ADG5209F](#) data sheet for more details.

Each trace on the source and drain side includes two sets of 0603 pads that can be used to 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. Use the resistor combined with the 0603 pads to create a simple resistor capacitor (RC) filter.

The [ADG5209F](#) uses a parallel interface to control the operation of the switches. The switch operation can be manually controlled using the SW1 to SW3 switches, or an external controller can be interfaced directly to the control pins by using the SMB connectors (EN, A0, and A1) and removing the  $0\ \Omega$  R31, R33, and R35 resistors.

## JUMPER SETTINGS

### SWITCHES AND 0 Ω RESISTORS

Switches control the [ADG5209F](#) manually and 0 Ω resistors configure the digital control voltage. Table 2 shows a summary of the switches and 0 Ω resistors and how they are used on the evaluation board.

Use SW2 and SW3 to control the switches of the [ADG5209F](#). Position L (low) is tied to GND and sets the logic low, and Position H (high) is tied to VL and sets the logic high.

Use SW1 to enable or disable the device. Position DIS (disable) is tied to GND and disables the device, and Position EN (enable) is tied to VL and enables the device.

R15 connects the on-board LDO regulator to the VDD supply. Remove this resistor to protect the LDO regulator from voltages higher than 28 V. Change the 0 Ω resistor to the R13 position to use an alternative digital voltage connected to DC\_V1.

### SMB CONNECTORS

The parallel interface of the [ADG5209F](#) is controlled manually using the link headers (SW1 to SW3), or it can be accessed using the SMB connectors (EN, A0, and A1). To use the SMB connectors, remove the 0 Ω R31, R33, and R35 resistors.

**Table 1. ADG5209F Truth Table**

SW3 (A1)	SW2 (A0)	SW1 (EN)	Connected Sx
X <sup>1</sup>	X <sup>1</sup>	DIS (disable)	All switches off
L (low)	L (low)	EN (enable)	S1A/S1B
L (low)	H (high)	EN (enable)	S2A/S2B
H (high)	L (low)	EN (enable)	S3A/S3B
H (high)	H (high)	EN (enable)	S4A/S4B

<sup>1</sup> X means don't care.

**Table 2. Switch and 0 Ω Resistor Descriptions**

Label	Position	Description
SW1	DIS (disable)	Logic 0 on the EN pin
	EN (enable)	Logic 1 on the EN pin
SW2	L (low)	Logic 0 on the A0 pin
	H (high)	Logic 1 on the A0 pin
SW3	L (low)	Logic 0 on the A1 pin
	H (high)	Logic 1 on the A1 pin
R13/R14	R14	On-board LDO regulator digital voltage
	R13	EXT_VL digital voltage
R15	Inserted	LDO regulator powered up
	Removed	LDO regulator unpowered
R31, R33, R35	Inserted	SW1 to SW3 are used to control digital logic
	Removed	SMB connectors are used to control digital logic

EVALUATION BOARD SCHEMATICS AND ARTWORK

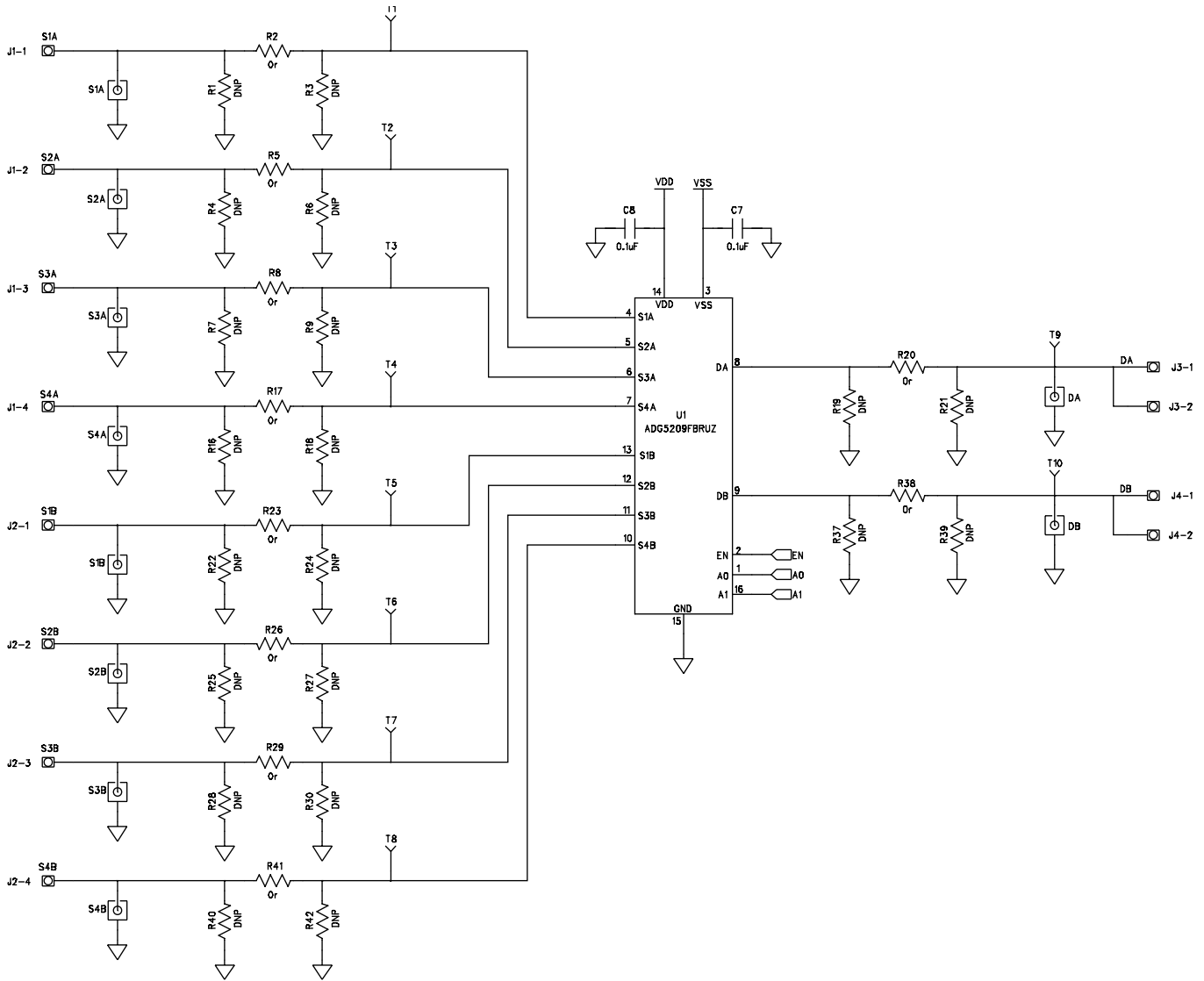


Figure 3. ADG5209F Evaluation Board Schematic (Part 1)

13467-008

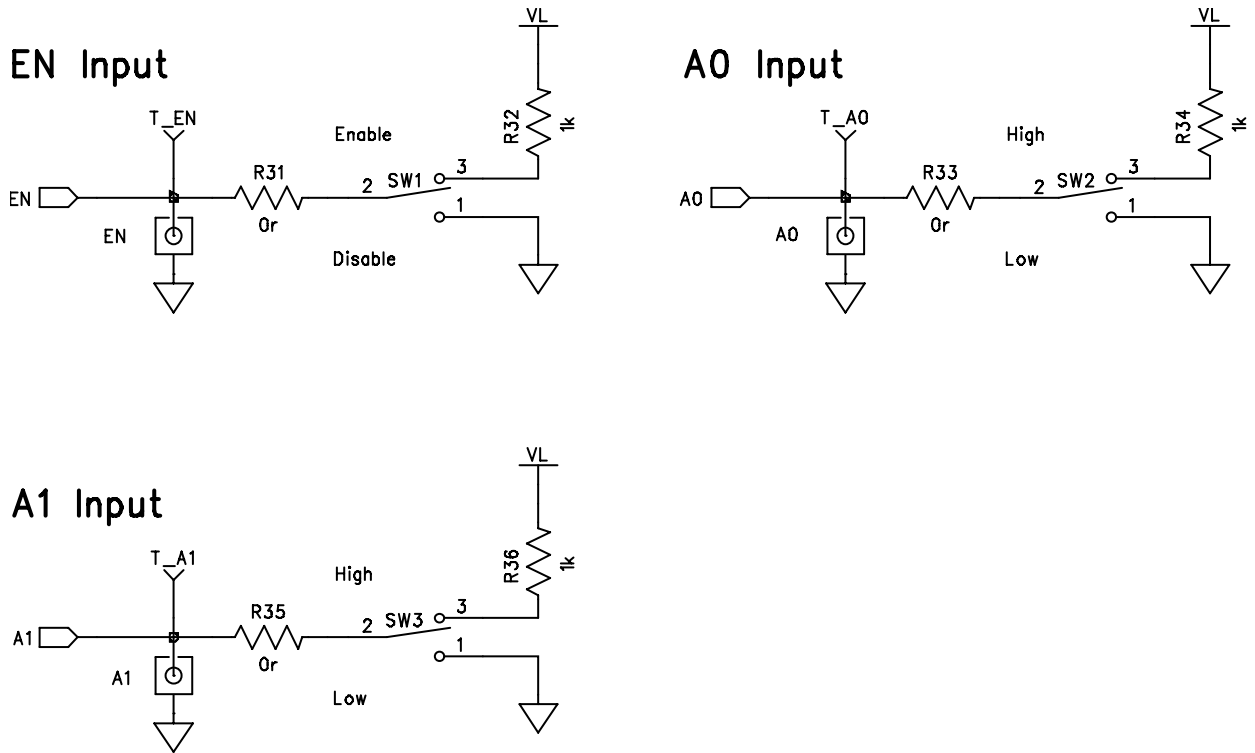


Figure 4. ADG5209F Evaluation Board Schematic (Part 2)

13457-008

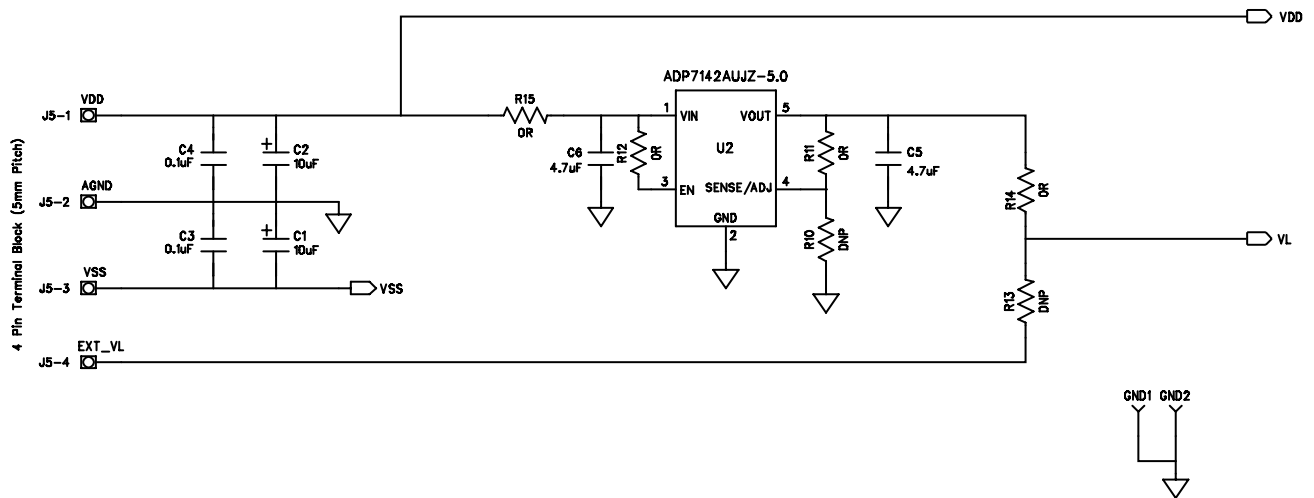


Figure 5. ADG5209F Evaluation Board Schematic (Part 3)

13457-010

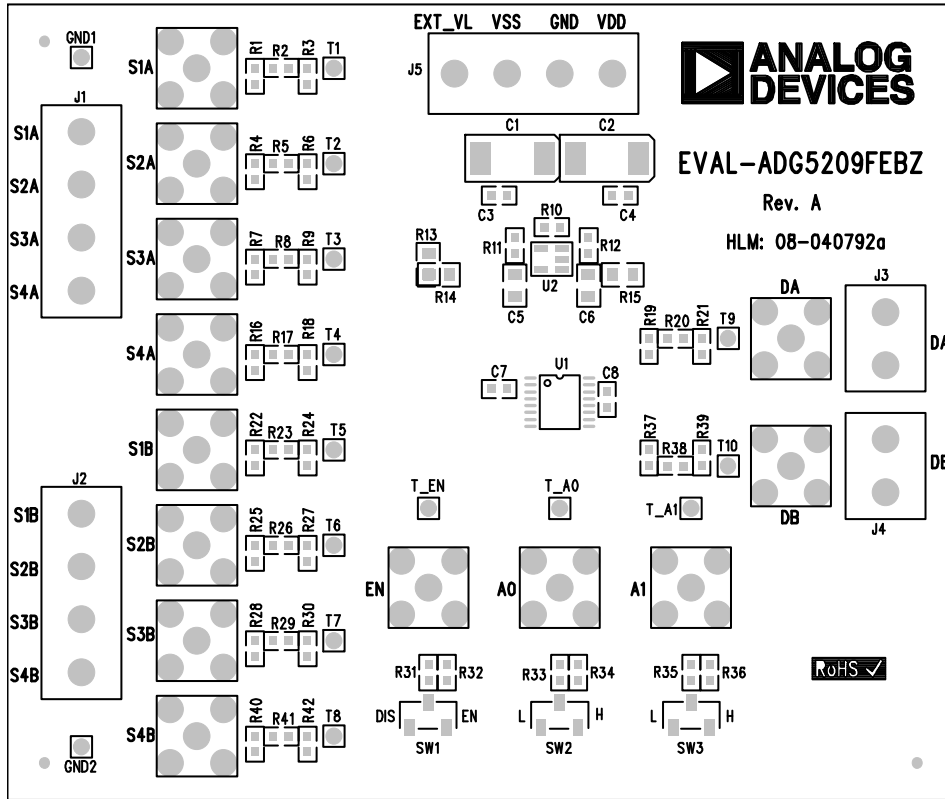


Figure 6. EVAL-ADG5209FEBZ Silkscreen

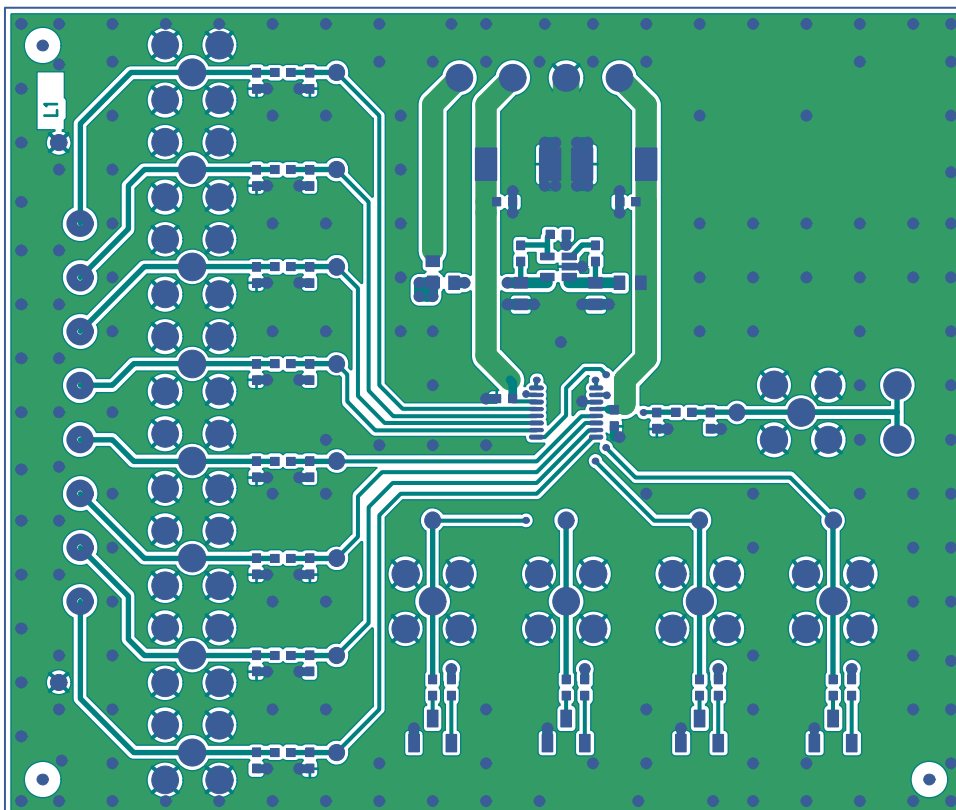
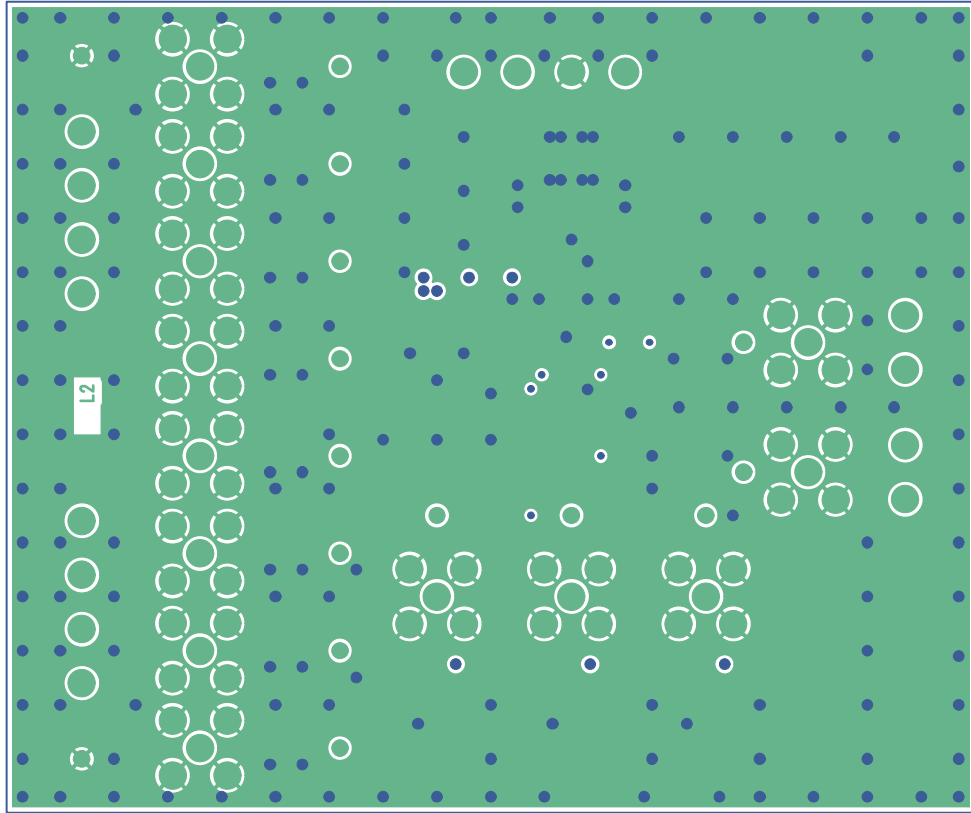


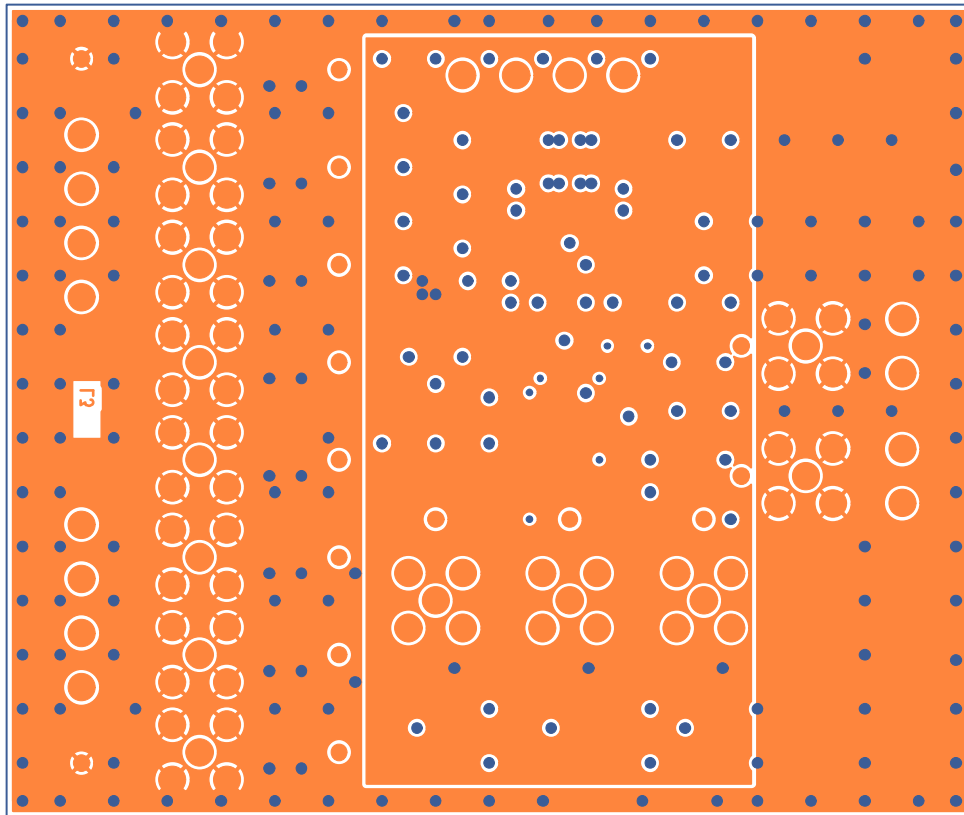
Figure 7. EVAL-ADG5209FEBZ Top Layer





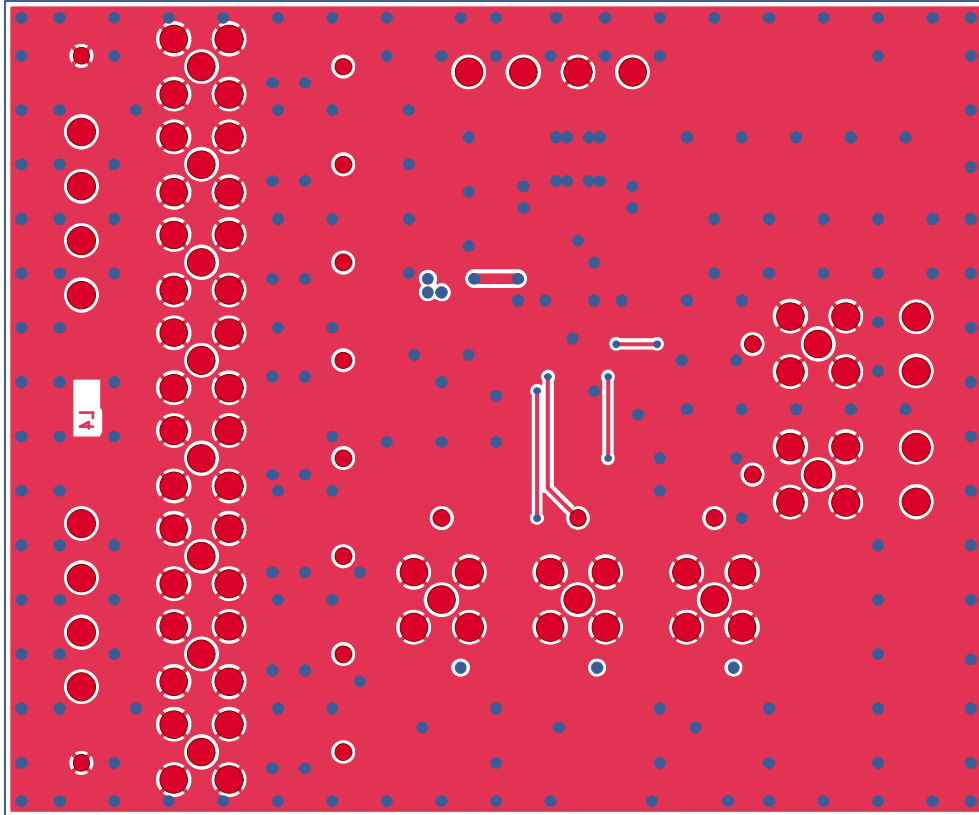
19457-004

Figure 8. EVAL-ADG5209FEBZ Layer 2



19457-005

Figure 9. EVAL-ADG5209FEBZ Layer 3



13457-008

Figure 10. EVAL-ADG5209FEBZ Bottom Layer

## ORDERING INFORMATION

### BILL OF MATERIALS

Table 3.

Reference Designator	Description	Manufacturer Part Number	Stock Code
A0, A1, EN	50 Ω, straight, SMB jacks	SMB1251B1-3GT30G-50	FEC 1111349
C3, C4, C7, C8	50 V, X7R, 0603 size, 0.1 μF, multilayer ceramic capacitors	GRM188R71H104KA93D	FEC 882-0023
C1, C2	50 V, tantalum, D size, 10 μF capacitors	TAJD106K050RNJ	FEC 143-2387
C5, C6	Ceramic, multilayer, 4.7 μF capacitors	C2012X5R1H475K125AB	FEC 2346932
DA, DB	50 Ω, SMB sockets	SMB1251B1-3GT30G-50	Do not insert
GND1, GND2	Black test points	20-2137	FEC 873-1128
J1, J2, J5	4-pin terminal blocks (5 mm pitch)	CTB5000/4	FEC 151791
J3, J4	2-pin terminal blocks (5 mm pitch)	CTB5000/2	FEC 151789
R2, R5, R8, R11, R12, R17, R20, R23, R26, R29, R31, R33, R35, R38, R41	0603, 1%, 0 Ω resistors	MC0063W06030R	FEC 9331662
R1, R3, R4, R6, R7, R9, R10, R16, R18, R19, R21, R22, R24, R25, R27, R28, R30, R37, R39, R40, R42	SMD, 0603 resistors	Not applicable	Do not insert
R32, R34, R36	1 kΩ, 0.063 W, 1%, 0603, resistors	MC0063W060311K	FEC 9330380
R14, R15	0805, 1%, 0 Ω resistors	MC01W08050R	FEC 9333681
R13	SMD, 0805 resistor	Not applicable	Do not insert
S1A, S2A, S3A, S4A, S1B, S2B, S3B, S4B, SW1, SW2, SW3	50 Ω, SMB sockets	SMB1251B1-3GT30G-50	Do not insert
	Single-pole, double throw (SPDT), SMT slide switches	CAS-120TA	Digi-Key CAS120JCT-ND
T1, T2, T3, T4, T5, T6, T7, T8, T9, T10	Red test points	20-313137	FEC 873-1144
T_A0, T_A1, T_EN	Red test points	20-313137	FEC 873-1144
U1	Fault protection, -0.4 pC Q <sub>INJ</sub> , dual 4:1 multiplexer	<a href="#">ADG5209FBRUZ</a>	<a href="#">ADG5209FBRUZ</a>
U2	Linear regulator, 5.0 V, LDO	<a href="#">ADP7142AUJZ-5.0</a>	<a href="#">ADP7142AUJZ-5.0-R7</a>

## 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.

**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 NON-INFRINGEMENT 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.

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9