ANALOG DEVICES

EVAL-ADG5404FEBZ User Guide
UG-790

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Evaluation Board for the ADG5404F Overvoltage Protected 4:1 Mux

FEATURES

- Supply voltages
  - Dual supply: ±5 V to ±22 V
  - Single supply: 8 V to 44 V
- Protected against overvoltage on source pins
  - Signal voltages up to −55 V and +55 V
- LED for visual overvoltage indication
- Parallel interface compatible with 3 V logic
- On-board low dropout (LDO) regulator for digital supply and control if required

ONLINE RESOURCES

- Evaluation Kit Contents
  - EVAL-ADG5404F
- Documents Needed
  - ADG5404F data sheet

EQUIPMENT NEEDED

- DC voltage source
  - ±22 V for dual supply
  - 44 V for single supply
- Optional digital voltage source: 3 V to 5 V
- Analog signal source
- Method to measure voltage, such as digital multimeter (DMM)

GENERAL DESCRIPTION

This user guide describes the evaluation board for the ADG5404F, which is a 4-channel multiplexer. The ADG5404F has overvoltage detection and protection circuitry on the source pins and is protected against signals up to −55 V and +55 V in both the powered and unpowered state.

Figure 1 shows the EVAL-ADG5404FEBZ in a typical setup. The ADG5404F is soldered to the center of the board and wire screw terminals are provided to connect to each of the source and drain pins. Three screw terminals are used to power the device, with a fourth terminal used to provide a user defined digital voltage if required. Alternatively, an LDO regulator is provided for 5 V digital voltage control and to supply the LED, which is mounted to provide visual indication of the fault status of the switch.

TYPICAL SETUP

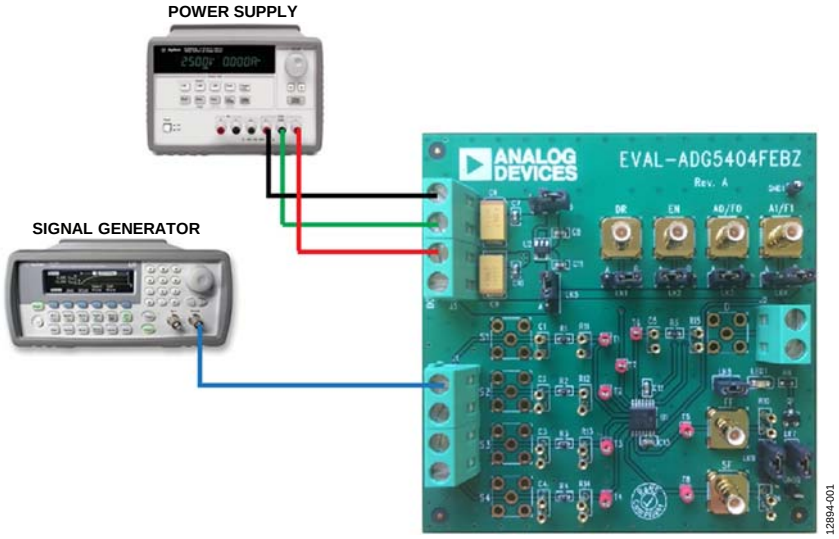

Figure 1. EVAL-ADG5404FEBZ, Power Supply, and Signal Generator

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REVISION HISTORY

2/15—Revision 0: Initial Version

GETTING STARTED

EVALUATION BOARD SETUP PROCEDURE

The EVAL-ADG5404FEBZ board is designed to operate independently and does not require any additional evaluation boards or software. An on-board LDO regulator is provided for digital control and supply voltage.

Supply the evaluation board with a dual power source of up to ±22 V or a single supply of up to 44 V. For single supply operation, connect V_{SS} to GND using J3.

Set up a simple functionality test as follows:

- Connect a power supply to J3. For single supply operation, connect V_{SS} to GND using J3.
- Insert the header for LK6 to use the on-board LDO regulator, and place the header for LK5 to Position B.
- LK2 through to LK4 control the digital signals for each switch on the ADG5404F.
- In Position A, the switch is open (off).
- In Position B, the S4 switch is closed (on) and has a resistance of approximately 10 Ω.
- LED1 lights up to indicate that the switch is operating normally.

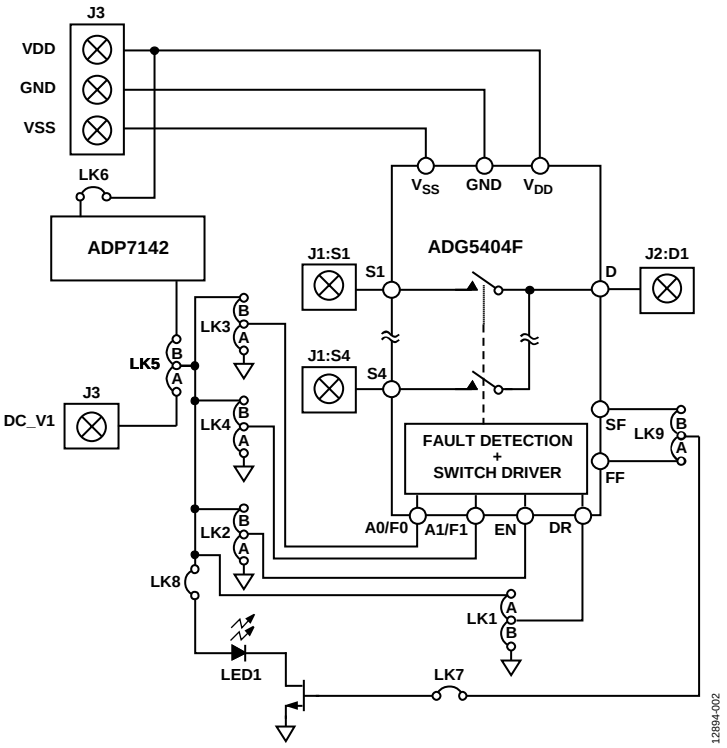

Figure 2. EVAL-ADG5404FEBZ Block Diagram

EVALUATION BOARD HARDWARE

The operation of the ADG5404F is evaluated using the EVAL-ADG5404FEBZ. Figure 1 shows a typical setup where only a power supply and signal generator are required. Figure 2 shows a block diagram of the main components of the evaluation board.

The connectors on the board pass signals through the ADG5404F switch. The source pins have fault detection circuitry that reacts to an overvoltage. During an overvoltage event, the switch is turned off and the FF pin is pulled low. The SF pin is pulled low when the source where the overvoltage occurs is the one selected by the A0/F0 and A1/F1 pins. See the ADG5404F data sheet for further details.

POWER SUPPLIES

Connector J3 provides access to the supply pins of the ADG5404F. VDD, GND, and VSS link to the appropriate pins on the ADG5404F. For dual supply voltages, power the evaluation board from ±5 V to ±22 V. For single supply voltages, connect the GND and V_{SS} terminals and power the evaluation board with 8 V to 44 V. Additionally, an on-board LDO regulator is provided for digital control voltage. If necessary, connect a secondary voltage source to DC_V1 and use it as the digital control voltage. To use DC_V1, place the header of LK5 into Position A.

INPUT SIGNALS

Two screw connectors are provided to connect to both the source and drain pins of the ADG5404F. Additional subminiature Version B (SMB) connector pads have been laid out if extra connections are required.

The ADG5404F is overvoltage protected on the source side, and the maximum voltage that can be applied to S1 to S4 is −55 V or +55 V. See the ADG5404F data sheet for more details.

Each trace on the source and drain side includes two sets of gold pin connectors that are used to 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. Use the resistor combined with the gold pin connectors to create a simple resistor/capacitor (RC) filter.

The ADG5404F uses parallel interface channels (A0/F0, A1/F1) to control the operation of the switches. Use the headers on LK2 to LK4 to manually control the operation of the switches, or connect an external controller directly to the control pins by using the SMB connectors, A0/F0, A1/F1, and EN, and removing the link headers on LK2 to LK4.

OUTPUT SIGNALS

There are two outputs on the ADG5404F. The FF pin indicates when the device is operating normally or whether there is an overvoltage fault on one of the source pins. The SF pin also indicates when an overvoltage occurs on one of the source pins and transitions low only when an overvoltage occurs on the channel selected by the A0/F0 and A1/F1 inputs. For visual indication, an LED is mounted on the evaluation board. Use LK8 to connect the LED circuit. When the device is operating normally, the FF pin remains high and the LED turns on. If an overvoltage occurs at any of the source pins, the FF pin is pulled low and the LED turns off.

The LK9 selector allows the user to choose which output controls the LED. Putting the header on Position A allows the FF pin to control the LED. On Position B, the SF pin controls the LED.

SMB connectors are provided to interface the evaluation board with external controllers, and two gold pin connectors are provided to connect a pull-up resistor between the FF and SF signals and the digital supply.

The DR pin allows the user to choose the state of the drain pin when the device is deactivated during an overvoltage. The LK1 selector allows the user to choose between open circuit and pulling to the rails.

JUMPER SETTINGS

LINK HEADERS

Use the link headers to control the ADG5404F manually, to configure the digital control voltage, and to isolate the LED from the system. Table 2 shows a summary of the link headers and how they are used on the evaluation board.

Use LK3 and LK4 to control the switches of the ADG5404F. Use LK2 to enable or disable the device.

Position A is tied to GND and sets the logic low, whereas Position B is tied to DC_V1 and sets the logic high.

Table 1. ADG5404F Truth Table

LK2 (EN)	LK3 (A0)	LK4 (A1)	Connected Sx
A	X[1]	X[1]	All switches off
B	A	A	S1
B	B	A	S2
B	A	B	S3
B	B	B	S4

[1] X = don't care.

LK1 allows the user to configure the state of the drain during an overvoltage condition.

LK6 connects the on-board LDO regulator to the V_{DD} supply. Remove the header to protect the LDO regulator from voltages higher than 28 V or to use an alternative digital control voltage. Change the header on LK5 to Position B to connect to DC_V1.

LK8 connects the LED to the digital power supply, and LK7 connects the FF or SF pin of the ADG5404F to the LED.

SMB CONNECTORS

Control the parallel interface of the ADG5404F manually using the link headers of LK2 to LK4, or access it using the SMB connectors, A0/F0, A1/F1, and EN. To use the SMB connectors, remove the link headers of LK2 to LK4. Use the FF/SF SMB connectors to access the FF/SF digital outputs from the ADG5404F.

Table 2. Link Header Descriptions

Link Header	Position	Description
LK1	A	V_{DD} or V_{SS} during an overvoltage
	B	Open circuit during an overvoltage
LK2	A	All switches off (disabled)
	B	Device enabled (EN pin), switch function set by A0/F0 and A1/F1 pins
LK3	A	Logic 0 on A0/F0 pin
	B	Logic 1 on A0/F0 pin
LK4	A	Logic 0 on A1/F1 pin
	B	Logic 1 on A1/F1 pin
LK5	A	DC_V1 digital voltage
	B	On-board LDO regulator digital voltage
LK6	Inserted	LDO regulator powered up
	Removed	LDO regulator unpowered
LK7	Inserted	FF/SF pins connected to LED
	Removed	FF/SF pins disconnected from LED
LK8	Inserted	LED powered up
	Removed	LED unpowered
LK9	A	FF pin controls the LED
	B	SF pin controls the LED

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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