Evaluating the ADG1712, 2.4Ω Quad SPST Switch

FEATURES

- ±1.08V to ±2.75V dual supply
- +1.08V to +5.5V single supply
- Low on resistance, 2.4Ω
- 16-lead, 2mm × 2mm LGA package
- 1.8V JEDEC compliant logic
- Fully specified at +5V, +3.3V, +1.8V, and ±2.5V
- Rail-to-rail signal range

EVALUATION KIT CONTENTS

- EVAL-ADG1712ARDZ evaluation board

DOCUMENTS NEEDED

- ADG1712 data sheet

EQUIPMENT NEEDED

- DC voltage source
  - ±2.5V for dual-supply
  - +5V for single-supply
- Optional digital logic supply
- Analog signal source
- Method to measure voltage, such as a digital multimeter (DMM) or oscilloscope

GENERAL DESCRIPTION

The EVAL-ADG1712ARDZ is the evaluation board for the ADG1712. The ADG1712 contains four independent SPST switches. The ADG1712 operates with a low voltage single supply range from +1.08V to + 5.5V, or a low voltage dual supply range from ±1.08V to ±2.75V.

The ADG1712 is designed for small size without compromising on performance. The 2mm × 2mm LGA package is ideal for a broad range of applications where area is a concern.

The ADG1712 has a low on resistance of just 2.4Ω and a rail-to-rail input signal range. Each switch conducts equally well in both directions when on. The switches are turned on with a Logic 1 input on the corresponding digital control line and the digital control inputs are 1.8V JEDEC compliant for ease of use with microcontrollers and field programmable gate arrays (FPGAs).

Figure 1 shows the EVAL-ADG1712ARDZ evaluation board. The ADG1712 is located in the center of the evaluation board. Wire screw terminals are provided to connect to each of the source and drain pins as well as optional Subminiature Version A (SMA) connectors. There are multiple power options on the board for providing power supplies to the evaluation board. A four terminal screw connector can be used to provide V_{DD}, V_{SS}, GND, and V_L connections directly to the ADG1712 from an external power supply. Alternatively on board 3.3V and 1.8V voltage regulators have been supplied to provide options for V_{DD} and V_L. The on-board voltage regulators can be powered from one of three options, the external 5V supply via the screw terminal, from the 5V USB Type-C connector on the evaluation board or using an available 5V supply from a connected SDP-K1 or compatible Arduino board.

Full specifications on the ADG1712 are available in the ADG1712 data sheet available from Analog Devices, Inc., and must be consulted with this user guide when using the EVAL-ADG1712ARDZ evaluation board.

TABLE OF CONTENTS

Features..... 1
Evaluation Kit Contents..... 1
Documents Needed..... 1
Equipment Needed..... 1
General Description..... 1
EVAL-ADG1712ARDZ Evaluation Board Layout..... 3
Evaluation Board Hardware..... 4
Power Supplies..... 4
Input Signals..... 4
Link Options..... 4
Digital Interface Options..... 4
Evaluation Board Schematics and Artwork..... 5
Ordering Information..... 8
Bill of Materials..... 8
Notes..... 9

REVISION HISTORY

7/2025—Revision 0: Initial Version

EVAL-ADG1712ARDZ EVALUATION BOARD LAYOUT

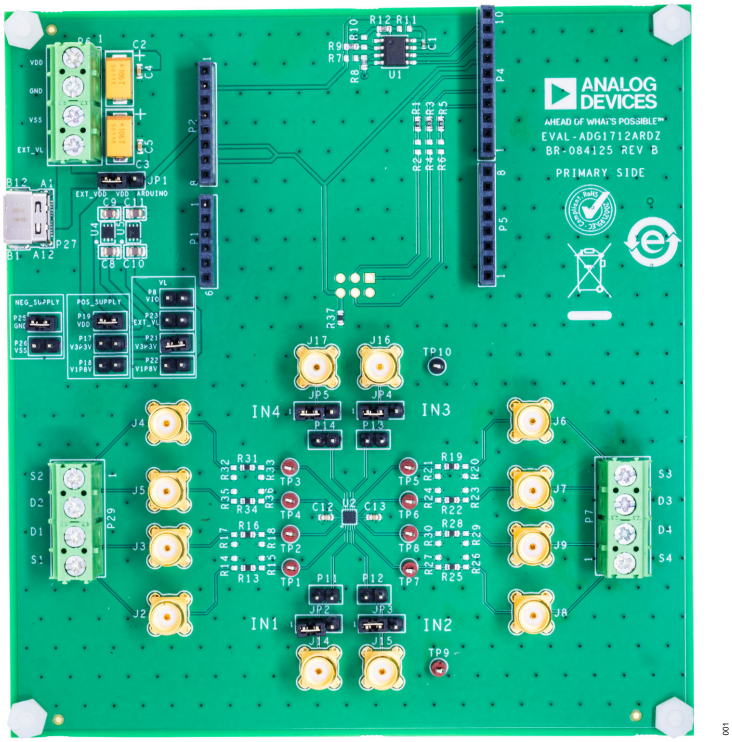

Figure 1. Evaluation Board Layout

EVALUATION BOARD HARDWARE

POWER SUPPLIES

For ease of use, a USB Type-C connector (P27) is supplied on the evaluation board. This connector can be used to supply 5V directly to the ADG1712 for single supply. The 5V USB connection also powers both voltage regulators providing options to power the ADG1712 with single 3.3V supply or single 1.8V supply. The power supply can be configured using the on board jumpers listed in Table 1. To power the ADG1712 with specific power supply voltages or dual supply voltages the screw terminal P6 can be used to provide supply voltages from an external voltage source. For dual-supply voltages, the EVAL-ADG1712ARDZ evaluation board can be powered from ±1.08V to ±2.75V. For single-supply voltages, V_{DD} between 1.08V to 5.5V, the V_{SS} terminal must be connected to GND. Alternatively, the jumper JP1 can be configured to Position B to allow the evaluation board to be powered from a connected compatible SDP-K1 or Arduino board. Similarly, the digital logic voltage supply, V_L, can be powered from either the 3.3V regulator, the 1.8V regulator, an external voltage via the screw terminal, or from the VIO pin of a compatible Arduino board.

INPUT SIGNALS

Screw connectors are provided to connect to both the source pins (S1, S2, S3, and S4) and drain pins (D1, D2, D3, and D4) of the ADG1712. Additional SMA connectors are available to connect cables to the source and drain pins.

Each trace on the source and drain side includes two sets of 0603 pads that can place a load on the signal path to ground. A 0Ω 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 RC filter.

LINK OPTIONS

Several link options are provided on the EVAL-ADG1712ARDZ evaluation board. The functions of these link options are described in Table 1.

Table 1. Link Options

Link Number	Options	
JP1	A = Connect VDD to EXT_VDD and USB connector P27	B = Connect VDD to Arduino 5V
JP2	A = Connect IN1 to VL	B = Connect IN1 to GND
JP3	A = Connect IN2 to VL	B = Connect IN2 to GND
JP4	A = Connect IN3 to VL	B = Connect IN3 to GND
JP5	A = Connect IN4 to VL	B = Connect IN4 to GND
P11	Inserted = Connect IN1 to DIGIO1	Removed = Disconnect IN1 from DIGIO1
P12	Inserted = Connect IN2 to DIGIO2	Removed = Disconnect IN2 from DIGIO2
P13	Inserted = Connect IN3 to DIGIO3	Removed = Disconnect IN3 from DIGIO3
P14	Inserted = Connect IN4 to DIGIO4	Removed = Disconnect IN4 from DIGIO4
P21	Inserted = Connect VL to 3.3V	Removed = Disconnect VL from 3.3V
P22	Inserted = Connect VL to 1.8V	Removed = Disconnect VL from 1.8V
P23	Inserted = Connect VL to EXT_VL	Removed = Disconnect VL from EXT_VL
P8	Inserted = Connect VL to VIO	Removed = Disconnect VL from VIO
P17	Inserted = Connect Pos_Supply to VDD	Removed = Disconnect Pos_Supply from VDD
P18	Inserted = Connect Pos_Supply to 3.3V	Removed = Disconnect Pos_Supply from 3.3V
P19	Inserted = Connect Pos_Supply to 1.8V	Removed = Disconnect Pos_Supply from 1.8V
P25	Inserted = Connect Neg_Supply to GND	Removed = Disconnect Neg_Supply from GND
P26	Inserted = Connect Neg_Supply to VSS	Removed = Disconnect Neg_Supply from VSS

DIGITAL INTERFACE OPTIONS

The digital interface of the ADG1712 can either be controlled manually using the IN1, IN2, IN3, and IN4 link headers or accessed by using the corresponding SMA connectors. To use the Subminiature Version B (SMB) connectors, remove the IN1, IN2, IN3, and IN4 link headers.

The connecters P5 can also be used with a controller board such as the SDP-K1 or Arduino. If a controller board is used to control the ADG1712, remove the IN1, IN2, IN3, and IN4 link header and insert the P11, P12, P13, and P14 link headers.

EVALUATION BOARD SCHEMATICS AND ARTWORK

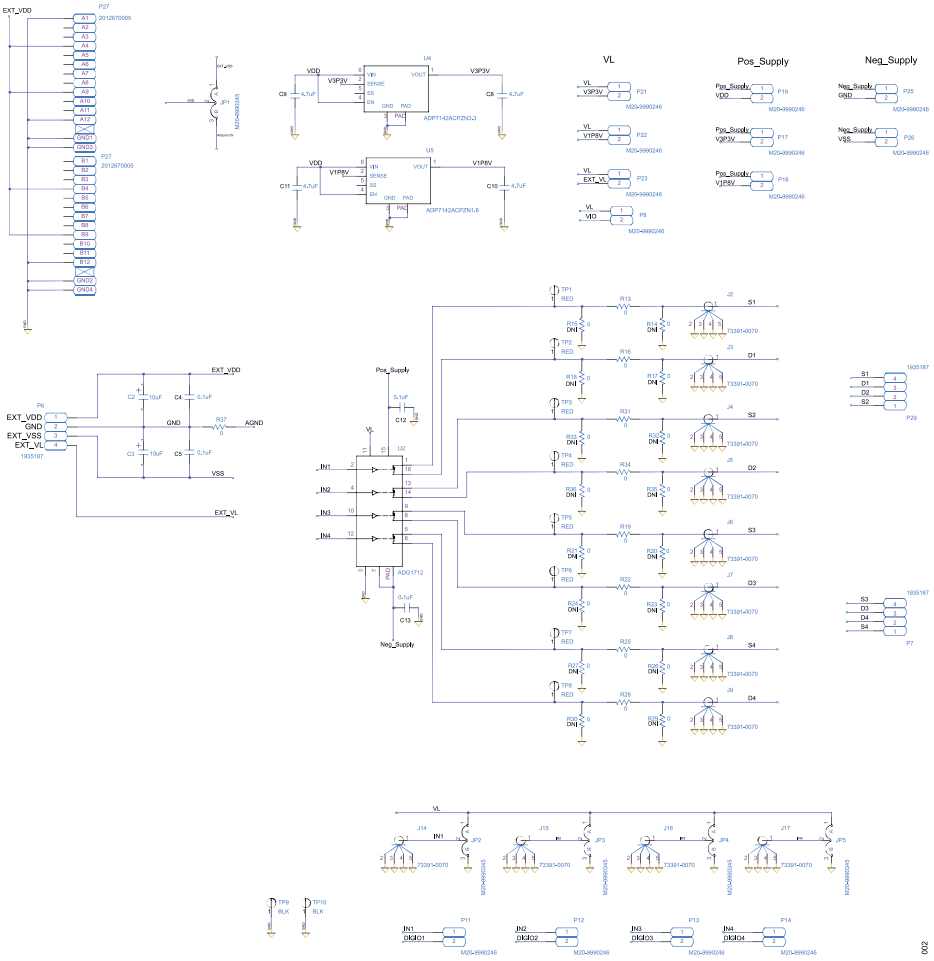

Figure 2. EVAL-ADG1712ARDZ Schematic Part 1

EVALUATION BOARD SCHEMATICS AND ARTWORK

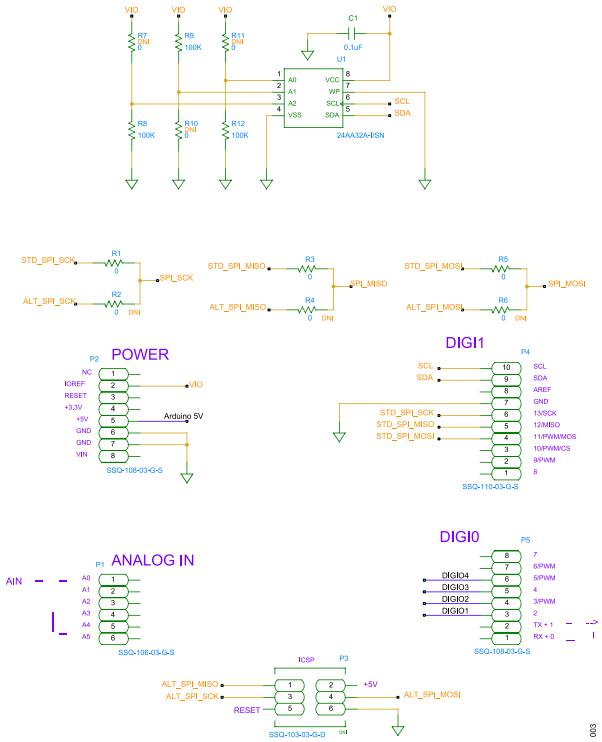

Figure 3. EVAL-ADG1712ARDZ Schematic Part 2

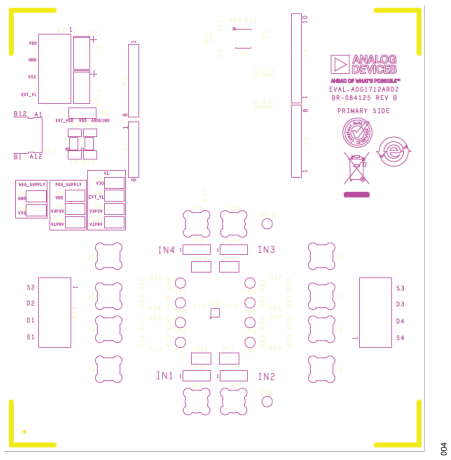

Figure 4. EVAL-ADG1712ARDZ Silkscreen

EVALUATION BOARD SCHEMATICS AND ARTWORK

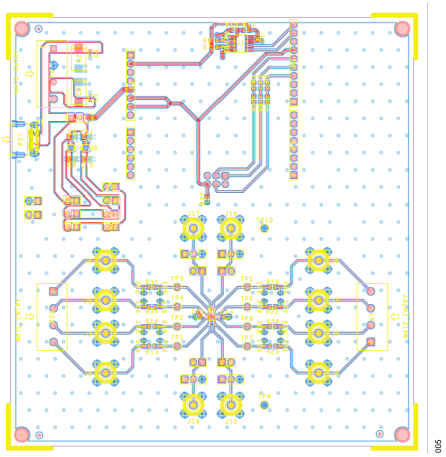

Figure 5. EVAL-ADG1712ARDZ Top Layer

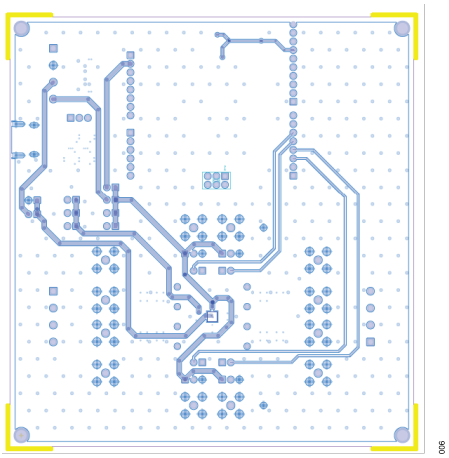

Figure 6. EVAL-ADG1712ARDZ Bottom Layer

ORDERING INFORMATION

BILL OF MATERIALS

Table 2. Bill of Materials

Reference Designator	Description	Manufacturer	Part Number
C1	Ceramic capacitor, 0.1µF, 16V, 10%, X7R, 0402, AEC-Q200	Murata	GCM155R71C104KA55D
C8, C9, C10, C11	Ceramic capacitors, 4.7µF , 50V, 10%, X7R, 0805	Murata	GRM21BZ71H475KE15L
C4, C5, C12, C13	Ceramic capacitors, 0.1µF, 50V, 10%, X7R, 0603	Samsung	CL10B104KB8NNNC
C2, C3	Tantalum capacitors, 10µF, 50V, 20%, 7343-31, 0.8Ω	AVX	TAJD106M050RNJ
J2, J3, J4, J5, J6, J7, J8, J9, J14, J15, J16, J17	Connectors, PCB, SMA, straight jack, 50Ω	Molex	73391-0070
JP1, JP2, JP3, JP4, JP5	Connectors, -PCB, 3-position, male header, unshrouded, single row, 2.54mm pitch, 3mm solder tail	Harwin	M20-9990345
P1	Connector, PCB, receptacle, 25mil, square post, 2.54mm pitch	Samtec	SSQ-106-03-G-S
P8, P11, P12, P13, P14, P17, P18, P19, P21, P22, P23, P25, P26	Connectors, PCB, header, 1-row, 2-way	Harwin	M20-9990246
P2,P5	Connectors, PCB, receptacle, 25mil, square post, 2.54mm P	Samtec	SSQ-108-03-G-S
P27	Connector, PCB, 24-position, USB 3.1-Type C, female 0.25mm/0.5mm, rosin surface mount device (SMD)	Molex	2012670005
P6, P7, P29	Connectors, PCB, 4-position, terminal block, 5mm pitch	Phoenix Contact	1935187
P4	Connector, PCB, receptacle, 25mil square post, 2.54mm pitch	Samtec	SSQ-110-03-G-S
R1, R3,R5	Resistors, SMD, 0Ω, jumper, 1/10W, 0603, AEC-Q200	Panasonic	ERJ-3GEY0R00V
R8, R9, R12	Resistors, SMD, 100KΩ, 1%, 1/16W, 0603	Multicomp (SPC)	MC 0.063W 0603 1% 100K
R13, R16, R19, R22, R25, R28, R31, R34, R37	Resistors, SMD, 0Ω jumper, 1/3W, 0603, AEC-Q200	Vishay	CRCW06030000Z0EAHP
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9	Connectors, PCB, red test point	Keystone Electronics	5000
TP10	Connector, PCB, black test point	Keystone Electronics	5001
U1	IC 32KBIT serial electronically erasable programmable read-only memory (EEPROM)	Microchip Technology	24AA32A-I/SN
U2	IC, low voltage 2.4Ω quad SPST switch	Analog Devices, Inc.	ADG1712
U4	IC, 40V, 200mA, low noise, CMOS LDO linear regulator, 3.3 VOUT	Analog Devices	ADP7142ACPZN3.3-R7
U5	IC 40V, 200mA, low noise, CMOS LDO linear regulator, 1.8 VOUT	Analog Devices	ADP7142ACPZN1.8-R7

ORDERING INFORMATION

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.