Evaluating the ADG6404, 0.62Ω On Resistance, ±20V, +36V, Quad SPST Switch

FEATURES

- Low R_{ON} 0.62Ω
- High continuous current of up to 847mA
- Flat R_{ON} across signal range, 0.003Ω
- Improved balance between on resistance and on capacitance
- 1.8V Logic compatibility
- 16-lead, 4mm × 4mm LFCSP
- Pin to pin compatible with the ADG5404
- Fully specified at ±20V and +36V
- Operational with asymmetric power supplies
- V_{SS} to V_{DD} − 2V analog signal range

EVALUATION KIT CONTENTS

- EVAL-ADG6404 evaluation board

DOCUMENTS NEEDED

- ADG6404 data sheet

EQUIPMENT NEEDED

- DC voltage source
  - ±22 V for dual-supply
  - 39.6 V 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-ADG6404 is the evaluation board for the ADG6404. The ADG6404 is an analog 4:1 multiplexer. The ADG6404 switches one of four inputs to a common output, D, as determined by the 3-bit binary address line, A0, A1, and EN. For use in multiplexer applications, switches exhibit break-before-make switching action.

Each switch conducts equally well in both directions when on, and each switch has an input signal range that extends from V_{SS} to V_{DD} − 2 V. When the switches are disabled, signal levels up to the supplies are blocked. The ADG6404 does not have a V_L pin. The digital inputs are compatible with 1.8V logic inputs over the full-operating supply range. The on-resistance profile is very flat over the full-analog input range, which ensures good linearity and low distortion when switching audio signals.

Figure 1 shows the EVAL-ADG6404 evaluation board. The ADG6404 is located in 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 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 ADP7142 that is on the board. The EVAL-ADG6404 can also be controlled via an Arduino board, if desired.

Full specifications on the ADG6404 are available in the ADG6404 data sheet available from Analog Devices, Inc., and must be consulted with this user guide when using the EVAL-ADG6404 evaluation board.

TABLE OF CONTENTS

REVISION HISTORY

4/2025—Revision 0: Initial Version

EVAL-ADG6404 EVALUATION BOARD LAYOUT

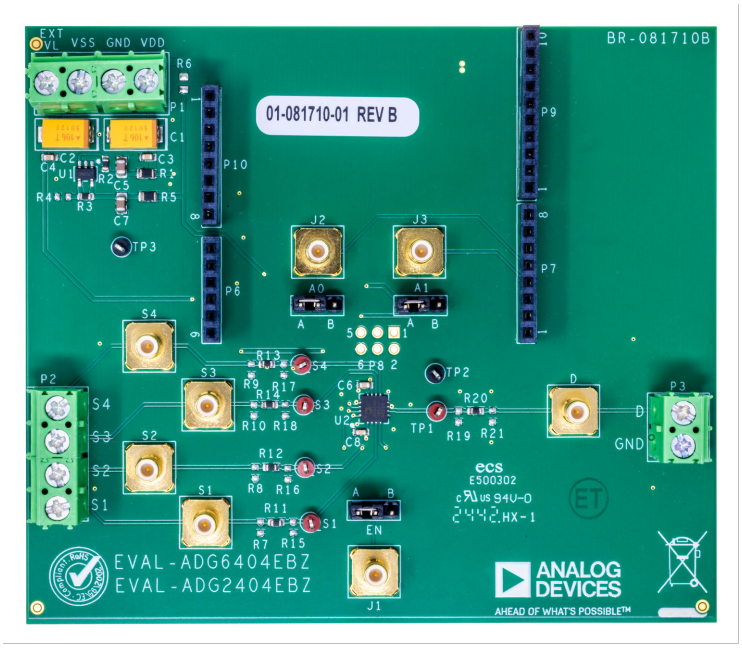

Figure 1. Evaluation Board Layout

EVALUATION BOARD HARDWARE

POWER SUPPLIES

Connector P1 provides access to the supply pins on the ADG6404. V_{DD}, GND, and V_{SS} on P1 link to the appropriate pins on the ADG6404. For dual-supply voltages, the EVAL-ADG6404 evaluation board can be powered from ±18V to ±22V. For single-supply voltages, the GND and V_{SS} terminals must be connected and V_{DD} between 18V to 39.6V. Additionally, 5V from the ADP7142 regulator can be supplied to digital pins of the ADG6404 via links EN, A0, and A1. To use the 5V from ADP7142 for the logic inputs, then use the default setting of R5 populated and R6 not inserted. If there is a wish to supply a custom logic voltage via the EN, A0, and A1 headers, then EXT_VL on P1 can be supplied with a suitable logic voltage. To use EXT_VL on P1, do not insert R5 and populate R6.

INPUT SIGNALS

Screw connector, P2, is provided to connect the source pins, and P3 is provided to connect to the drain pin of the ADG6404. Additional Subminiature Version B (SMB) 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, which 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-ADG6404 evaluation board. The functions of these link options are described in Table 1. Position B ties to GND and sets the logic low, whereas Position A ties sets the logic high, the corresponding truth table is shown in Table 2.

Table 1. ADG6404 Link Options

Link Number	Position	Description
EN	A	Device enabled, switch function set by A0 and A1 pins
	B	All switches off (disabled)
A0	A	Logic 1
	B	Logic 0
A1	A	Logic 1
	B	Logic 0

Table 2. ADG6404 Truth Table

EN	A1	A0	Connected Sx
B	X[1]	X	All switches off
A	B	B	S1
A	B	A	S2
A	A	B	S3
A	A	A	S4

[1] X = Don't care.

DIGITAL INTERFACE OPTIONS

The digital interface of the ADG6404 can either be controlled manually using the EN, A0, and A1 link headers or accessed by using the J1, J2, and J3 SMB connectors. To use the SMB connectors, remove the EN, A0, and A1 link headers.

Connecters P6, P7, P9, and P10 can also be used with a controller board such as the SDP-K1 or Arduino. If a controller board is used to control the ADG6404, remove the EN, A0, and A1 link headers.

EVALUATION BOARD SCHEMATICS AND ARTWORK

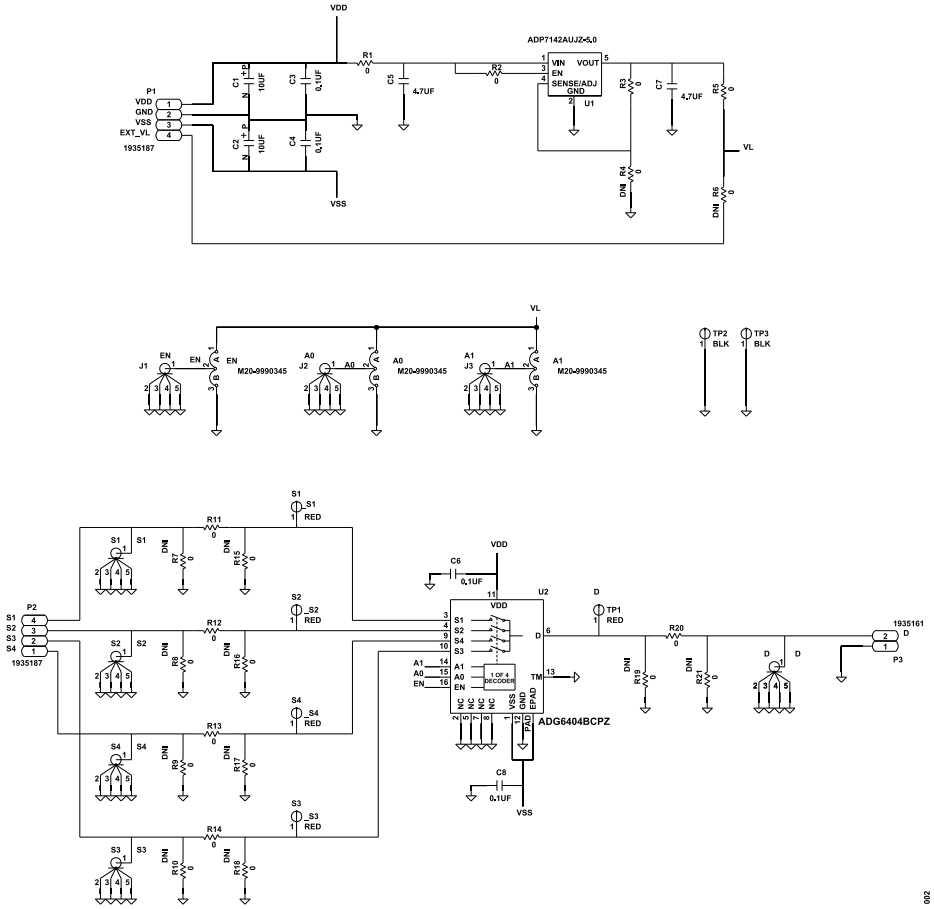

Figure 2. EVAL-ADG6404 Schematic Part 1

EVALUATION BOARD SCHEMATICS AND ARTWORK

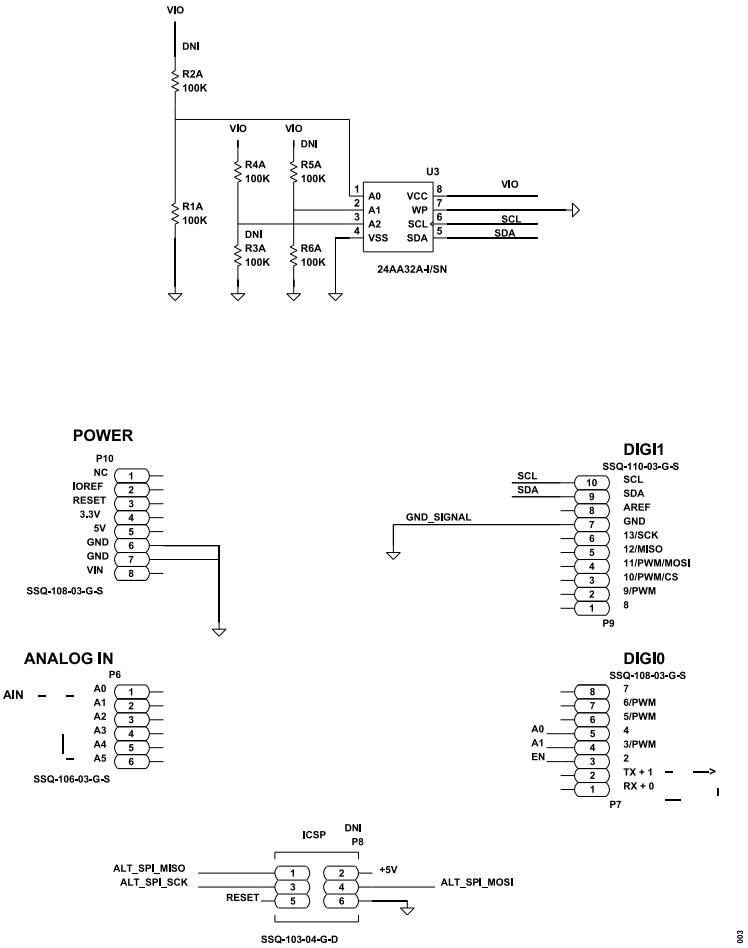

Figure 3. EVAL-ADG6404 Schematic Part 2

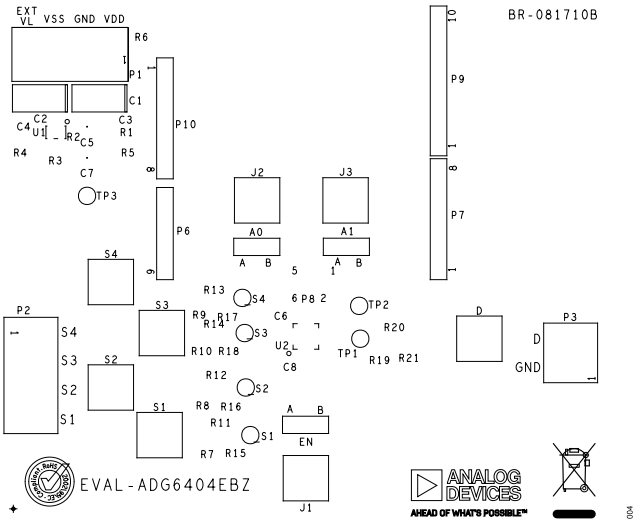

Figure 4. EVAL-ADG6404 Silkscreen

EVALUATION BOARD SCHEMATICS AND ARTWORK

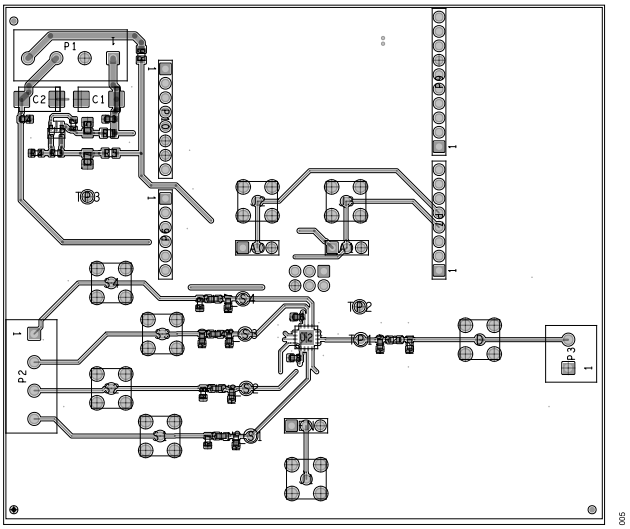

Figure 5. EVAL-ADG6404 Top Layer

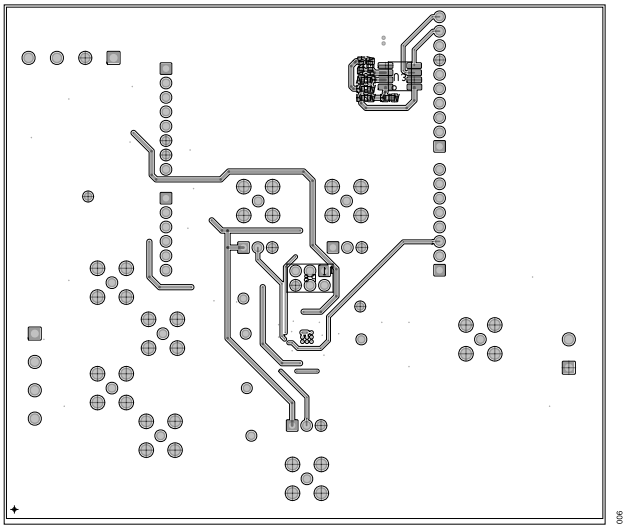

Figure 6. EVAL-ADG6404 Bottom Layer

ORDERING INFORMATION

BILL OF MATERIALS

Table 3. Bill of Materials

Reference Designator	Description	Manufacturer	Part Number
C1, C2	50V, 10µF tantalum capacitors, 7343-31, 0.8Ω	AVX	TAJD106M050RNJ
C3, C4, C6, C8	0.1µF, 50V, ceramic capacitors, X7R, 0603	Samsung	CL10B104KB8NNNC
C5, C7	4.7µF, 50V, ceramic capacitors, X5R, 0805	TDK	C2012X5R1H475K125AB
D, J1 to J3, and S1 to S4	SMB sockets	Amphenol	SMB1251B1-3GT30G-50
A0, A1, and EN	Jumper blocks using 3-pin SIP header	Harwin	M20-9990345
P1, P2	4-pin terminal, 5mm	Phoenix Contact	1935187
P3	2-pin terminal, 5mm	Phoenix Contact	1935161
P7, P10	Socket strips, square tails, 2.54mm pitch	Samtec	SSQ-108-03-G-S
P6	Socket strip, square tails, 2.54mm pitch	Samtec	SSQ-106-03-G-S
P9	Socket strip, square tails, 2.54mm pitch	Samtec	SSQ-110-03-G-S
R1, R5	0Ω resistors, SMD, 1/8 W, 0805	Vishay	RCG08050000Z0EA
R2, R3, R11 to R14, and R20	0Ω jumpers, SMD, 1/4 W, 0603, AEC-Q200	Vishay	CRCW06030000Z0EAHP
R1A to R6A	100kΩ resistors, SMD, 1%, 1/16 W, 0603	Multicomp (SPC)	MC 0.063W 0603 1% 100K
TP1, _S1 to _S4	Red PCB test points	Keystone Electronics	5001
TP2, TP3	Black PCB test points	Keystone Electronics	5001
U1	40V, 200mA, low noise, CMOS LDO linear regulator	Analog Devices	ADP7142AUJZ-5.0-R7
U2	0.62Ω R_{ON}, ±20V, +36V, quad SPST switch	Analog Devices	ADG6404BPCZ
U3	IC, 32kb serial EEPROM	Microchip Technology	24AA32A-I/SN

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.