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Evaluation Board for the AD8174 250 MHz, 10 ns Switching Multiplexer with Amplifier

FEATURES

Full-featured evaluation board for the AD8174
±5 V operation

EVALUATION KIT CONTENTS

AD8174-EB evaluation board

EQUIPMENT NEEDED

Signal source or video pattern generator and signal analyzer
Power supplies (+2 V/1 A and ±5 V/1 A)
SMA to BNC cables for inputs, outputs, and other pins

GENERAL DESCRIPTION

The AD8174 is a high speed buffered multiplexer that offers an internal current feedback output amplifier whose gain is programmed via external resistors and is capable of delivering 50 mA of output current. The AD8174 offers −3 dB signal bandwidth of 250 MHz and a slew rate greater than 1000 V/µs. The AD8174 has excellent video specifications with low differential gain of 0.02%, low differential phase error of 0.05°, and 0.1 dB flatness out to 85 MHz. With a low −78 dB at 5 MHz of crosstalk and better than −88 dB at 5 MHz isolation, the AD8174 is useful in many high speed applications. It is also a low power device consuming only 9.7 mA from a ±5 V supply.

The AD8174 offers a high speed disable feature that allows the user to put the output into a high impedance state for cascading stages so that the off channels do not load the output bus. In addition, the AD8174 can be shut down when not in use to minimize power consumption (I_S = 1.5 mA). The AD8174 is available in 14-lead PDIP and 14-lead SOIC packages.

Full details about the device are available in the AD8174 data sheet, which should be consulted when using the AD8174-EB.

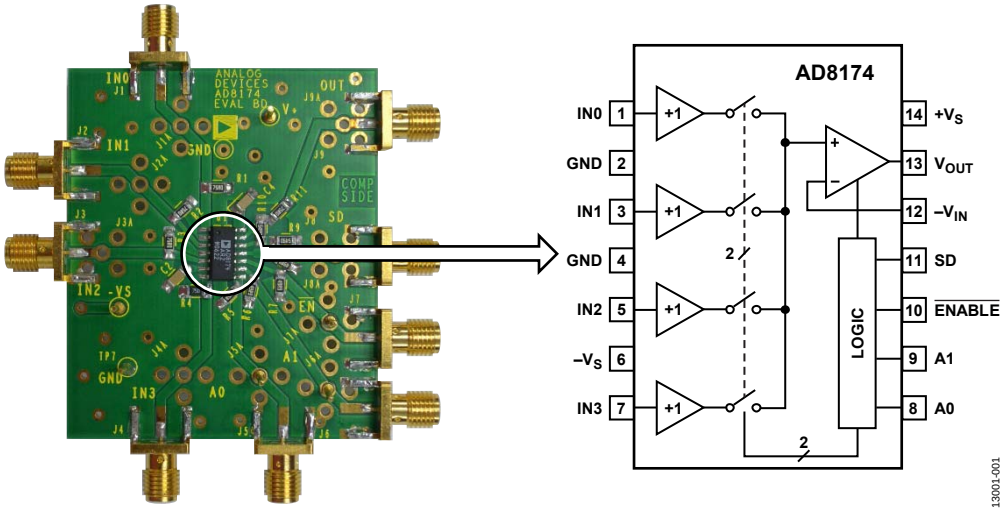

Figure 1. AD8174 4:1 Buffered Multiplexer.

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REVISION HISTORY

3/15—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

INTRODUCTION

The AD8174-EB evaluation board allows the user to easily evaluate the AD8174 in its various gain configurations. Figure 2 shows the typical evaluation board setup used to evaluate the buffered multiplexer.

POWER SUPPLY

The AD8174-EB requires a typical ±5 V power supply to power up the device via the $+V_S$ and $-V_S$ pins.

ANALOG INPUTS

The AD8174-EB has four input channels: IN0, IN1, IN2, and IN3. The input channels are activated by varying the voltage level of the digital control pins, A0 and A1. To make the digital control pins (A0 and A1) logic high, supply a minimum input of 2 V. To make the digital control pins (A0 and A1) logic low, supply a maximum input of 0.8 V. Table 1 shows the truth table for setting the inputs.

By default, all inputs are terminated with 75 Ω resistors in order to receive video signals. To use the evaluation board in nonvideo applications where 50 Ω termination is more popular, replace these resistors with 50 Ω values. Digital control pins, such as A0 and A1, are terminated with 50 Ω resistors to allow easy connection to laboratory equipment. Tie any unused input channels to ground.

ANALOG OUTPUT

The AD8174-EB has only one output (OUT) that can be put into a high impedance state for cascading stages by setting the $\overline{\text{ENABLE}}$ pin (see Table 1). OUT is terminated by default with a 75 Ω resistor.

By default, the gain of the output amplifier is set to +2, but other gain configurations can be set by replacing the two gain resistors. Table 2 shows the recommended resistor values for gain settings.

SHUTDOWN (SD) AND $\overline{\text{ENABLE}}$ PINS

The SD pin, if set to high, shuts off the supply current for all the switches, some of the logic control circuitry, and the amplifier, reducing the quiescent current drain to 1.5 mA.

The $\overline{\text{ENABLE}}$ pin, if set to high, shuts off the supply current of the amplifier, making the output of the amplifier into a high impedance that allows the AD8174-EB to be used in larger arrays.

Both the $\overline{\text{ENABLE}}$ and SD pins are terminated with 50 Ω resistors to allow easy connection to laboratory equipment. If the $\overline{\text{ENABLE}}$ and SD functions are not used, tie these respective pins to ground for proper operation.

Table 1. AD8174-EB Truth Table

A0	A1	$\overline{\text{ENABLE}}$	SD	V_{OUT}
0	0	0	0	IN0
1	0	0	0	IN1
0	1	0	0	IN2
1	1	0	0	IN3
X[1]	X[1]	1	0	High-Z, I_S = 4.1 mA
X[1]	X[1]	X[1]	1	High-Z, I_S = 1.5 mA

[1] X = don't care.

Table 2. Recommended Feedback, Series Resistors, and Bandwidth vs. Capacitive Load and Gain

	G = +1			G = +2			G = +3			G ≥ +4	
C_L (pF)	R_F (kΩ)	R_{SOUT} (Ω)	V_{OUT} = 2 V p-p – 3 dB Bandwidth (MHz)	R_F (kΩ)	R_{SOUT} (Ω)	V_{OUT} = 2 V p-p – 3 dB Bandwidth (MHz)	R_F (Ω)	R_{SOUT} (Ω)	V_{OUT} = 2 V p-p – 3 dB Bandwidth (MHz)	R_F (Ω)	R_{SOUT} (Ω)
20	1	50	149	1	20	174	499	25	170	499	20
50	1	30	104	1	15	117	1 k	15	98	499	20
100	2	20	73	1	15	80	1 k	15	71	499	15
300	2	20	27	1	15	34	1 k	15	33	499	15

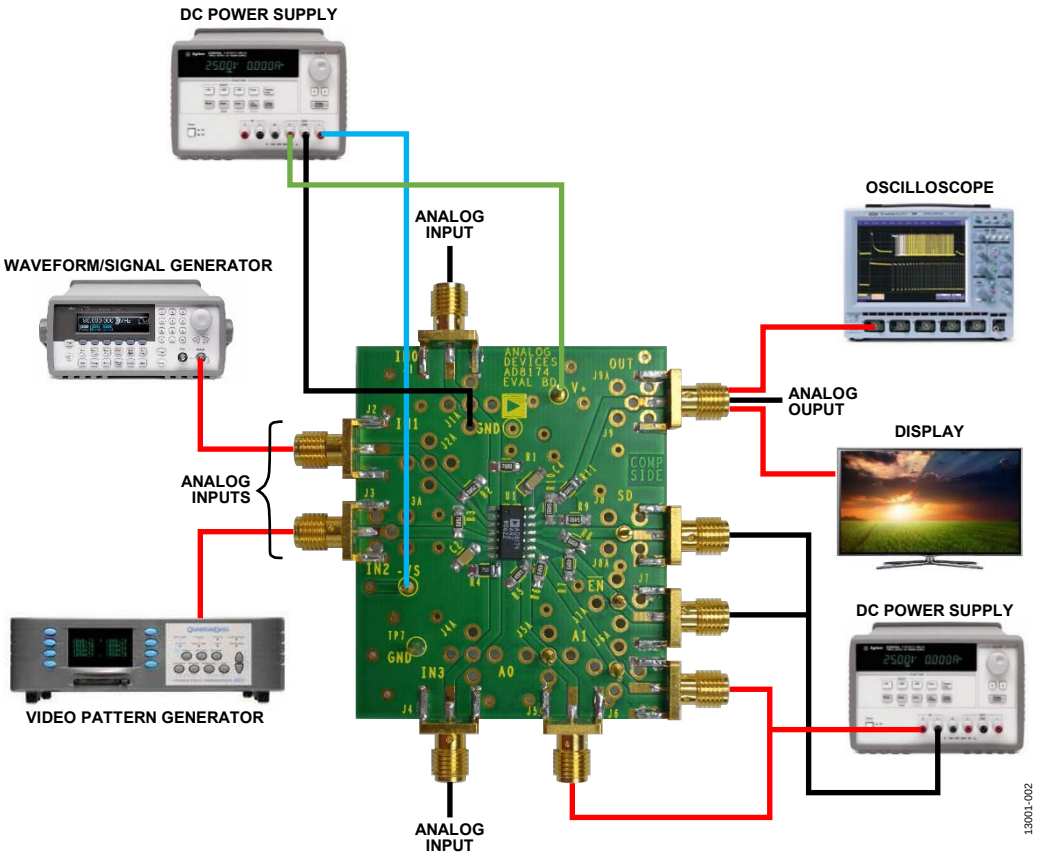

Figure 2. Typical Evaluation Board Setup

EVALUATION BOARD SCHEMATIC AND ARTWORK

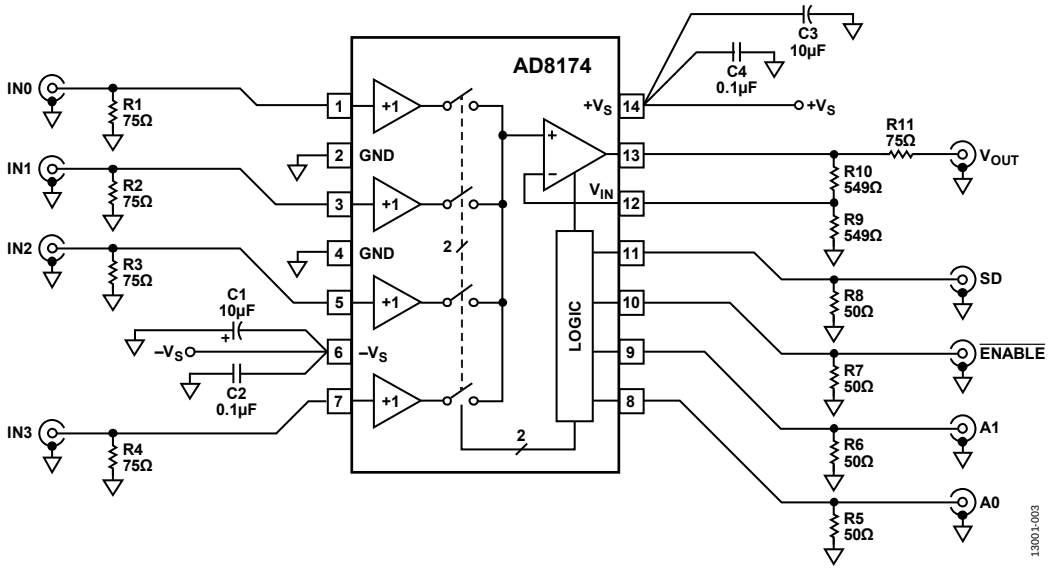

Figure 3. Evaluation Board Schematic

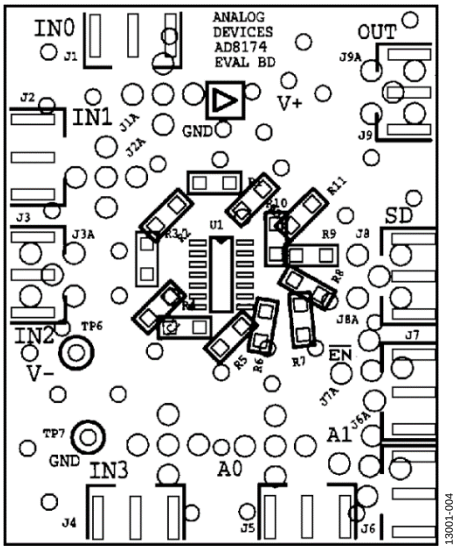

Figure 4. Component Side Silkscreen

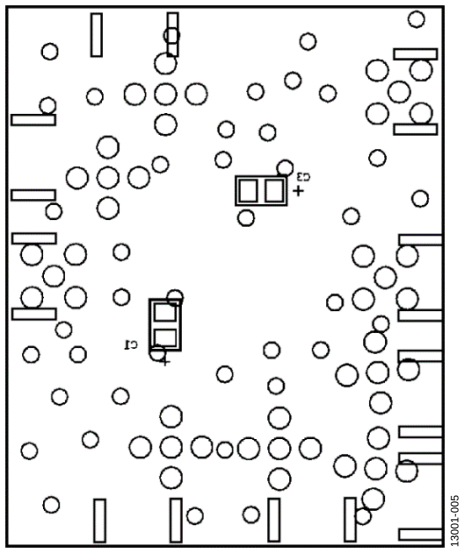

Figure 5. Solder Side Silkscreen

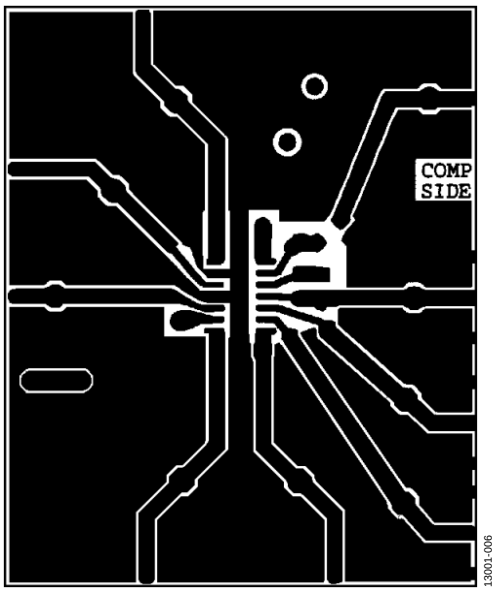

Figure 6. Component Side Layout

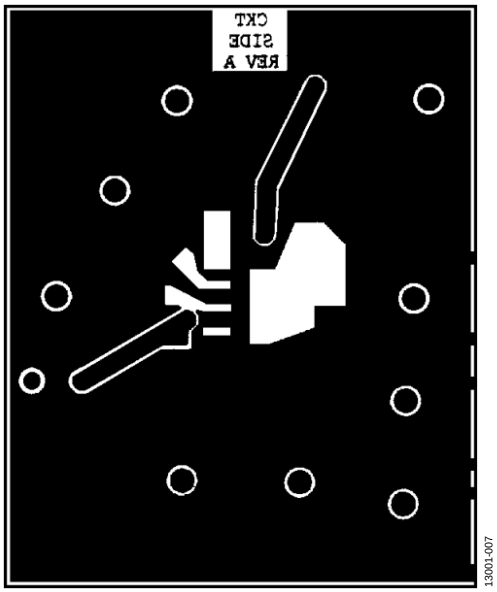

Figure 7. Evaluation Board Top View

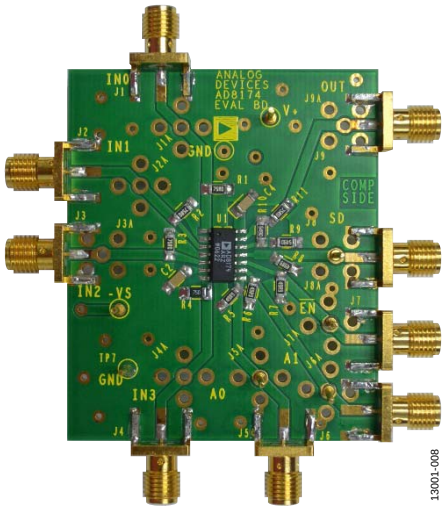

Figure 8. Solder Side Layout

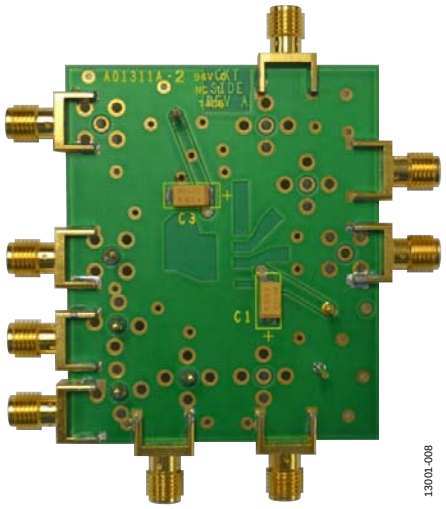

Figure 9. Evaluation Board Bottom View

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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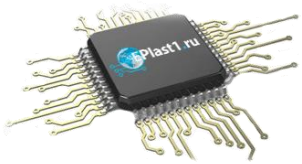

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