



MAX2654/MAX2655/MAX2656 Evaluation Kits

General Description

The MAX2654/MAX2655/MAX2656 evaluation kits (EV kits) simplify evaluation of the MAX2654/MAX2655/MAX2656 low-noise amplifiers (LNAs). These kits enable testing of the devices' performance and require no additional support circuitry. The signal input and output use SMA connectors to facilitate connection of RF test equipment.

The MAX2654/MAX2655/MAX2656 EV kits are fully assembled with the MAX2654/MAX2655/MAX2656 on board, and incorporate input matching components optimized for specific frequency operation.

Features

- ◆ Easy Evaluation of MAX2654/MAX2655/MAX2656
- ◆ +2.7V to +5.5V Single-Supply Operation
- ◆ RF Input and Output Matched to 50Ω
- ◆ Jumper Included for Gain/Shutdown Setting
- ◆ Fully Assembled and Tested

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX2654EVKIT	-40°C to +85°C	6 SC70-6
MAX2655EVKIT	-40°C to +85°C	6 SC70-6
MAX2656EVKIT	-40°C to +85°C	6 SC70-6

Component List MAX2654

DESIGNATION	QTY	DESCRIPTION
C1	1	6pF ± 0.5 pF ceramic capacitor (0402), Murata GRM36COG060D050A
C2	1	1.6pF ± 0.1 pF ceramic capacitor (0402), Murata GRM36COG1R6B050A
C3, C8	2	100pF $\pm 5\%$ ceramic capacitors (0603), Murata GRM36COG101J050
C4	1	22pF $\pm 5\%$ ceramic capacitor (0603), Murata GRM36COG220J050
C5	1	4.7 μ F tantalum capacitor 'C' case AVX TAJC475K020
C6	1	Not installed
R4	1	0 Ω resistor (0603)
R5	1	10k Ω $\pm 1\%$ resistor (0402)
L1	1	5.6nH inductor Murata LQW1608A5N6C00T1
L2	1	0nH inductor (0402)
U1	1	MAX2654EXT 6-pin SC70
RFIN, RFOUT	2	SMA connectors (edge mount) tab contact, EFJohnson 142-0701-851
VCC, GND	2	Test points, Digi-Key 5000K-ND
JU1	1	1 $\times$ 3 header (0.1in centers) Digi-Key S1012-36-ND
JU1	1	Shunt, Digi-Key S9000-ND
—	1	MAX2654 EV kit circuit board, rev A

Component List MAX2655

DESIGNATION	QTY	DESCRIPTION
C1	1	1800pF $\pm 10\%$ ceramic capacitor (0402), Murata GRM36X7R182K050A
C2	1	1.5pF ± 0.1 pF ceramic capacitor (0603), Murata GRM39COG1R5B050A
C3, C8	2	100pF $\pm 5\%$ ceramic capacitors (0402), Murata GRM36COG101J050A
C4	1	12pF $\pm 5\%$ ceramic capacitor (0603) Murata GRM39COG120J050A
C5	1	4.7 μ F tantalum capacitor 'C' case AVX TAJC475K025
C6	1	Not installed
C7	1	27pF $\pm 5\%$ ceramic capacitor (0402) Murata GRM36COG270J050A
R1	1	698 Ω $\pm 1\%$ resistor (0603)
R2	1	511 Ω $\pm 1\%$ resistor (0603)
R3	1	357 Ω $\pm 1\%$ resistor (0603)
R4	1	0 Ω resistor (0603)
R5	1	10k Ω $\pm 1\%$ resistor (0402)
L1	1	5.6nH inductor Murata LQW1608A5N6C00T1

Evaluate: MAX2654/MAX2655/MAX2656



MAX2654/MAX2655/MAX2656 Evaluation Kits

Component List MAX2655 (continued)

DESIGNATION	QTY	DESCRIPTION
L2	1	0nH inductor (0402)
L3	1	3.3nH inductor Toko LL1005-FH3N3J
U1	1	MAX2655EXT, 6-pin SC70
RFIN, RFOUT	2	SMA connectors (edge mount) tab contact, EFJohnson 142-0701-851
VCC, GND	2	Test points, Digi-Key 5000K-ND
JU1	1	1 × 3 header (0.1in centers) Digi-Key S1012-36-ND
JU2, JU3, JU4	3	1 × 2 header (0.1in centers) Digi-Key S1012-36-ND
JU1, JU2, JU3, JU4	4	Shunts Digi-Key S9000-ND
—	1	MAX2655 EV kit circuit board, rev B

Component List MAX2656

DESIGNATION	QTY	DESCRIPTION
C1	1	1800pF ±10% ceramic capacitor (0402), Murata GRM36X7R182K050
C2	1	1.2pF ±0.1pF ceramic capacitor (0402)
C3, C7, C8	3	100pF ±5% ceramic capacitors (0402), Murata GRM36COG101J050
C4	1	680pF ±10% ceramic capacitor (0603), Murata GRM39X7R681K050
C5	1	4.7µF tantalum capacitor 'C' case AVX TAJC475K025
C6	1	Not installed
R1	1	715Ω ±1% resistor (0603)

Component List MAX2656 (continued)

DESIGNATION	QTY	DESCRIPTION
R2	1	511Ω ±1% resistor (0603)
R3	1	392Ω ±1% resistor (0603)
R4	1	0Ω resistor (0603)
R5	1	12kΩ ±1% resistor (0402)
L1	1	4.7nH inductor Murata LQW1608A4N7C00T1
L2	1	0nH inductor (0402)
U1	1	MAX2656EXT, 6-pin SC70
RFIN, RFOUT	2	SMA connectors (edge mount) tab contact, Johnson 142-0701-851
VCC, GND	2	Test points, Digi-Key 5000K-ND
JU1	1	1 × 3 header (0.1in centers) Digi-Key S1012-36-ND
JU2, JU3, JU4	3	1 × 2 headers (0.1in centers) Digi-Key S1012-36-ND
JU1, JU2, JU3, JU4	4	Shunts Digi-Key S9000-ND
—	1	MAX2655/MAX2656 EV kit circuit board, rev A

MAX2654/MAX2655/MAX2656 Evaluation Kits

Quick Start

The MAX2654/MAX2655/MAX2656 EV kits are fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section for proper device evaluation.

Test Equipment Required

- An RF signal generator capable of delivering -30dBm of output power and a frequency range covering the MAX2654/MAX2655/MAX2656 (1400MHz to 2000MHz, for example)
- An RF spectrum analyzer that covers the operating frequency range
- A DC power supply capable of supplying +2.7V to +5.5V
- Two 50 Ω coaxial cables with SMA connectors
- An ammeter to measure supply current (optional)
- A noise figure meter (optional)
- A network analyzer for measuring gain and return loss (optional)

Connections and Setup

Checking Power Gain

- 1) Connect a DC supply (preset to +3.0V) to the V_{CC} and GND terminals (through an ammeter, if desired) on the EV kit.
- 2) Set the RF generator for a desired frequency at a power level of -30dBm. Connect the RF generator's output to the RFIN SMA connector.
- 3) Connect the coaxial cable from the RFOUT SMA connector to the spectrum analyzer.
- 4) Turn on the DC supply. The supply current should read approximately 6mA for MAX2654, 8mA for MAX2655, and 11mA for MAX2656.
- 5) Activate the RF generator's output. A signal on the spectrum analyzer's display should indicate a typical gain as shown on the device data sheet after accounting for cable and board losses.
- 6) Optional: For the MAX2656, set the jumper JU2 to the V_{CC} position. The power gain should now be about 1dB.

- 7) Optional: Another method of determining gain is by using a network analyzer. This has the advantage of displaying gain vs. a swept frequency band, in addition to displaying input and output return loss. Refer to the user manual of the network analyzer for setup details.

Checking Noise Figure

Noise figure measurements on low-noise devices are extremely sensitive to board and lab setup losses and parasitics. There are many techniques and precautions for measuring low noise figure. A detailed explanation of these items would exceed the scope of this document. Take into account PC board and external components loss when performing noise-figure measurements. The typical input losses on these EV kits is 0.2dB at 1575MHz and 0.25dB at 1960MHz. For more information on how to perform this level of noise-figure measurement, refer to the noise-figure meter operating manual and to Hewlett Packard's application note #57-2, Noise Figure Measurement Accuracy.

Layout Considerations

Good PC board layout is an essential part of an RF circuit's design. The EV kit PC board can serve as a guide for laying out a board using the MAX2654/MAX2655/MAX2656. Generally, the V_{CC} node on the PC board should have a decoupling capacitor located close to the device, and additional capacitors may be needed for long V_{CC} lines. This minimizes supply coupling. Proper grounding of the GND pins is essential. Connect the GND pins to the ground plane either directly, through vias, or both. For MAX2654, connect pin 1 to the PC board ground plane through a 0.017in width by 0.035in length line.

Component Suppliers

SUPPLIER	PHONE	FAX	WEB
Coilcraft	847-639-6400	847-639-1469	www.coilcraft.com
Murata Electronics	800-831-9172	814-238-0490	www.murata.com
Taiyo Yuden	800-348-2496	408-434-0375	www.t-yuden.com

Evaluate: MAX2654/MAX2655/MAX2656

MAX2654/MAX2655/MAX2656 Evaluation Kits

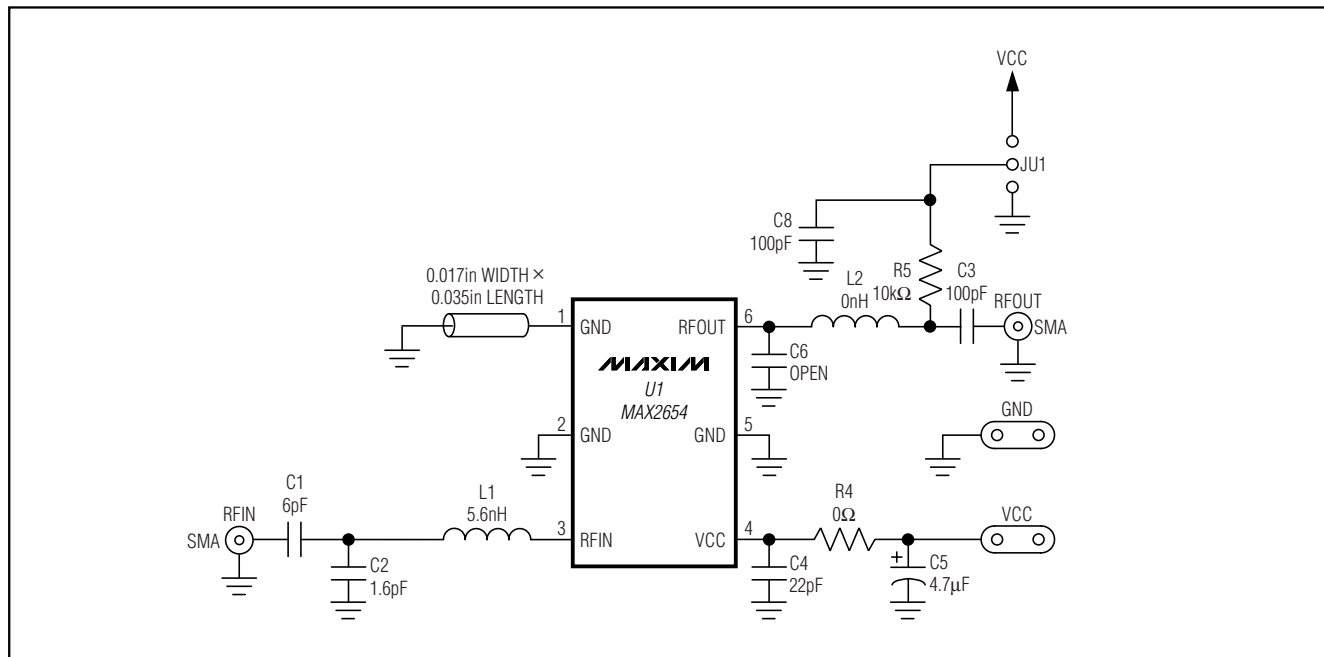


Figure 1. MAX2654 EV Kit Schematic

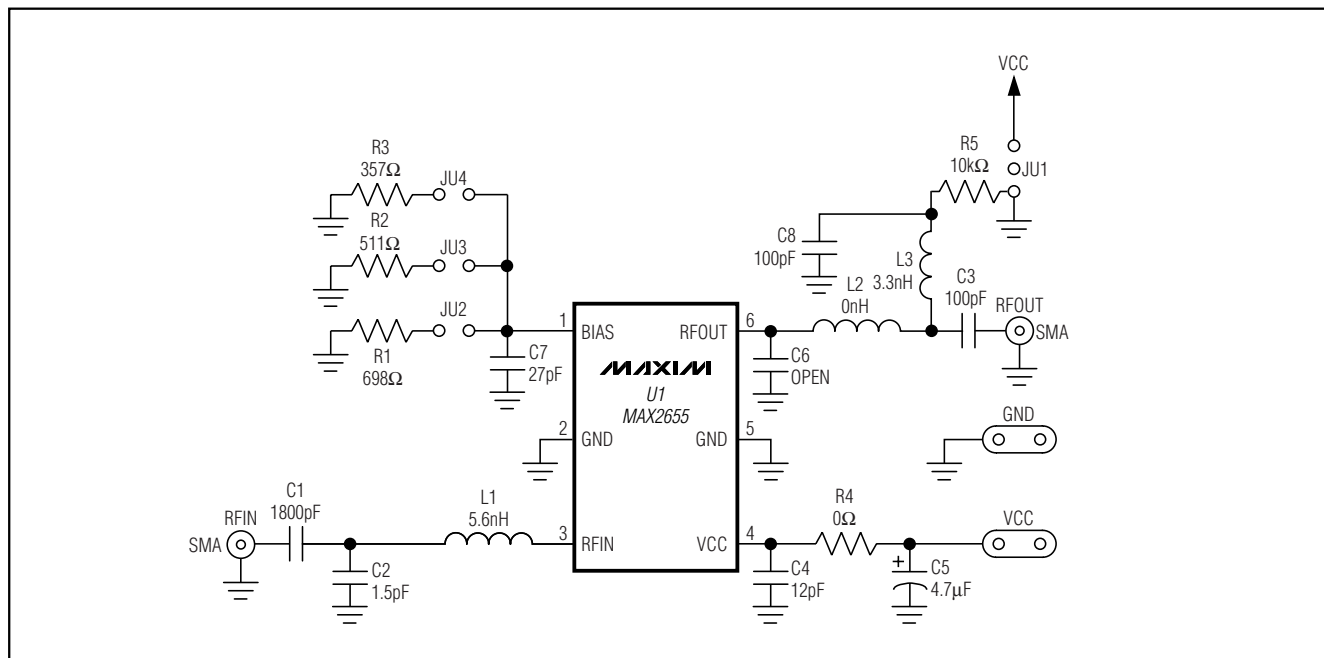


Figure 2. MAX2655 EV Kit Schematic

MAX2654/MAX2655/MAX2656 Evaluation Kits

Evaluate: MAX2654/MAX2655/MAX2656

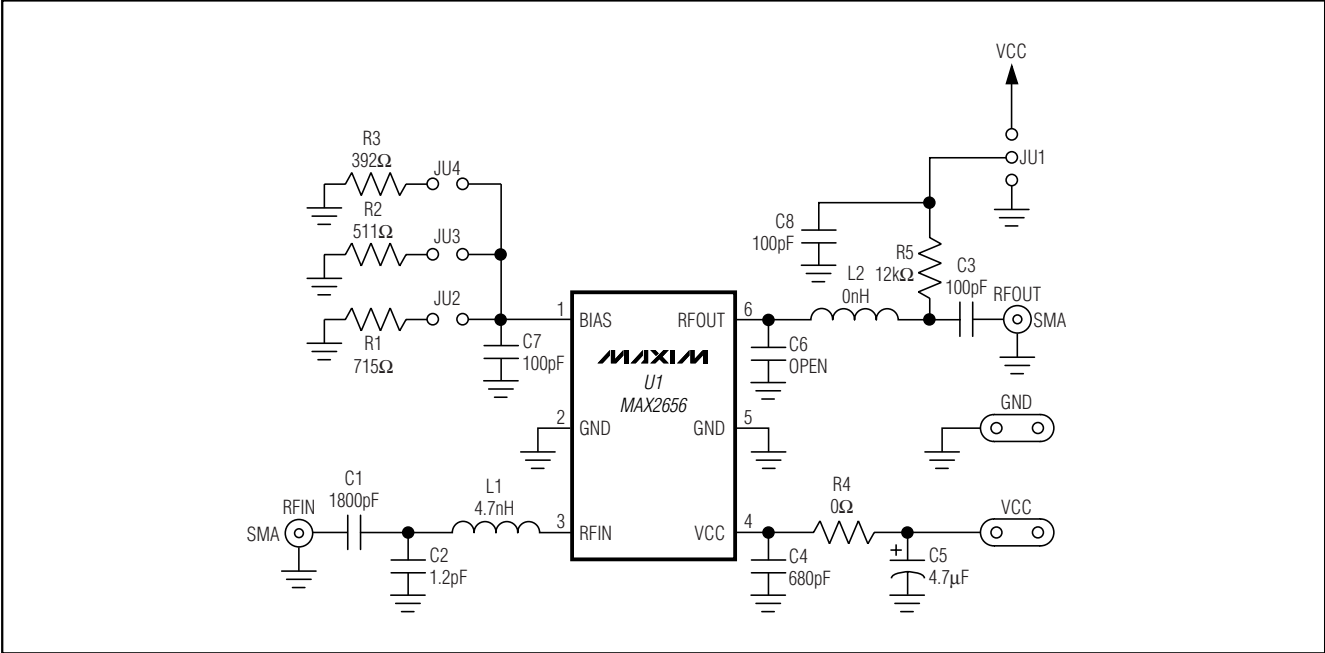


Figure 3. MAX2656 EV Kit Schematic

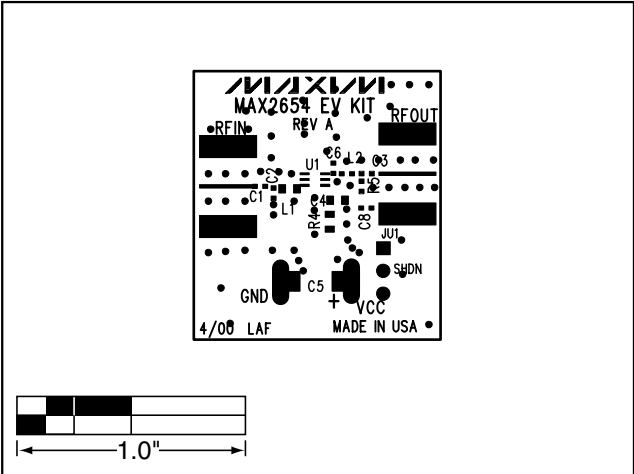


Figure 4. MAX2654 EV Kit Component Placement Guide—Component Side

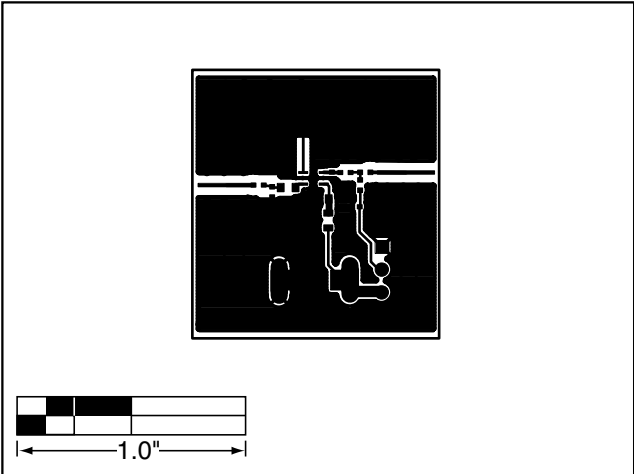


Figure 5. MAX2654 EV Kit PC Board Layout—Component Side

MAX2654/MAX2655/MAX2656 Evaluation Kits

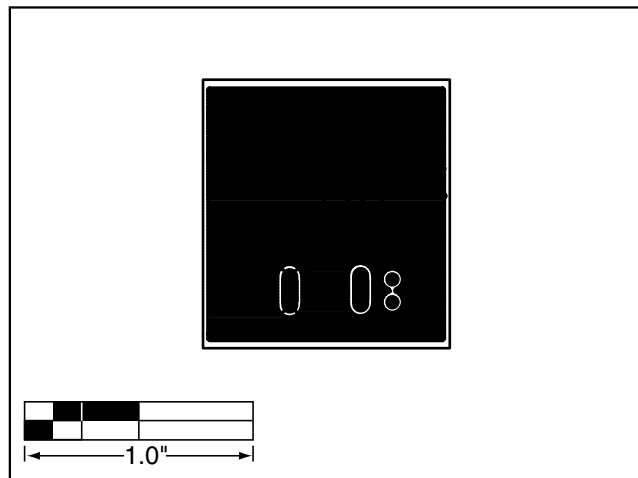


Figure 6. MAX2654 EV Kit PC Board Layout—Ground Layer 2

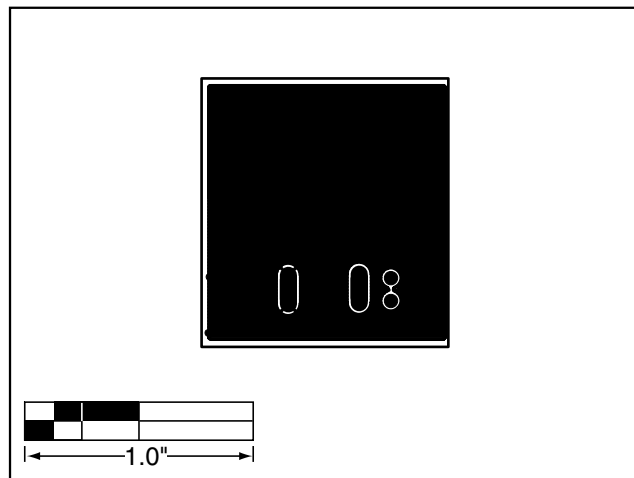


Figure 7. MAX2654 EV Kit PC Board Layout—Ground Layer 3

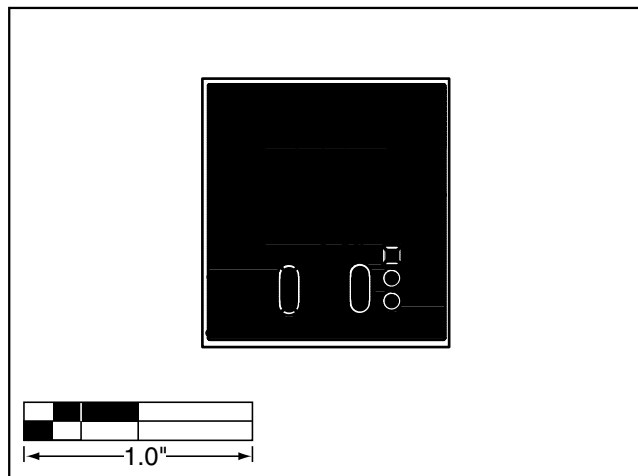


Figure 8. MAX2654 EV Kit PC Board Layout—Solder Side

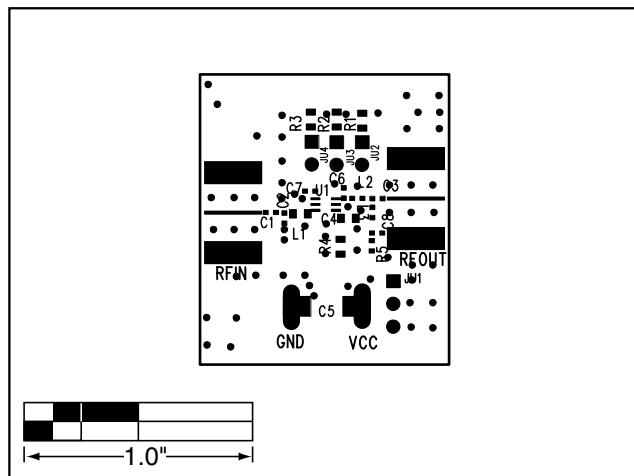


Figure 9. MAX2655 EV Kit Component Placement Guide—Component Side

MAX2654/MAX2655/MAX2656 Evaluation Kits

Evaluate: MAX2654/MAX2655/MAX2656

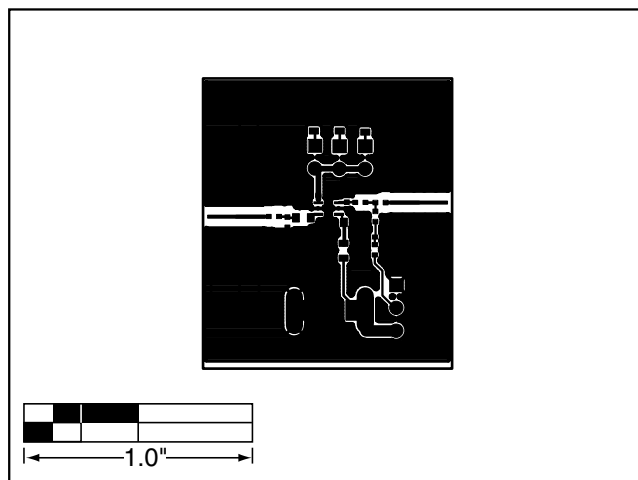


Figure 10. MAX2655 EV Kit PC Board Layout—Component Side

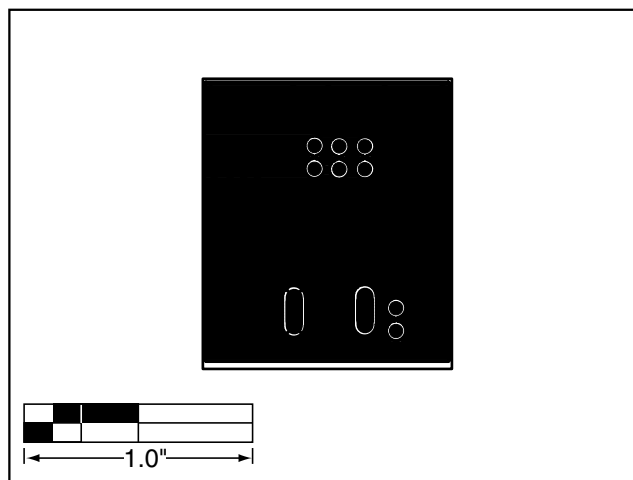


Figure 11. MAX2655 EV Kit PC Board Layout—Ground Layer 2

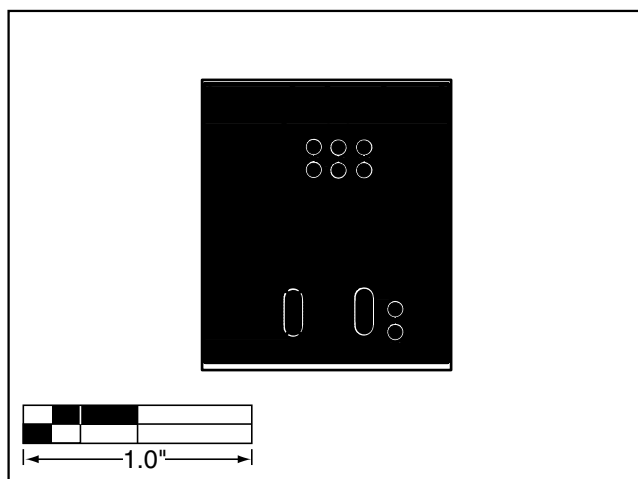


Figure 12. MAX2655 EV Kit PC Board Layout—Ground Layer 3

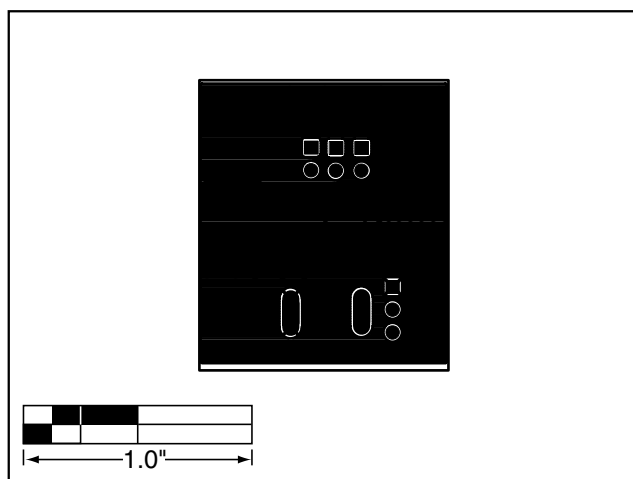


Figure 13. MAX2655 EV Kit PC Board Layout—Solder Side

MAX2654/MAX2655/MAX2656 Evaluation Kits

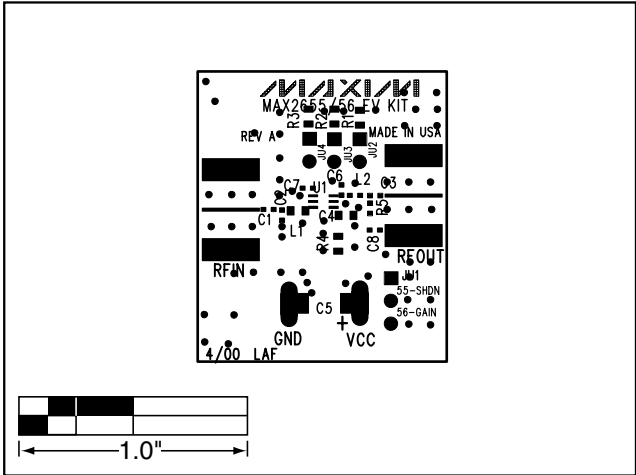


Figure 14. MAX2656 EV Kit Component Placement Guide—Component Side

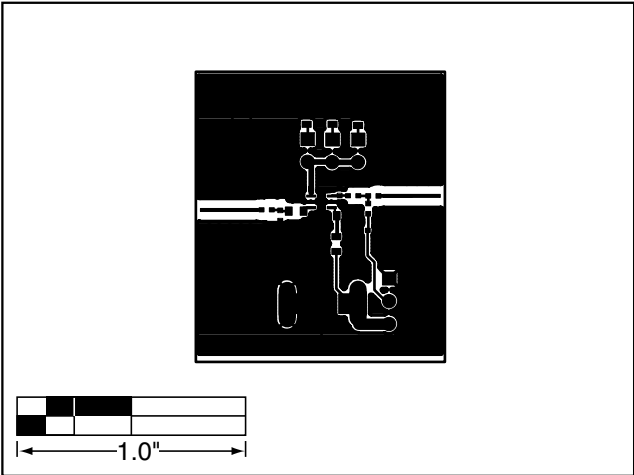


Figure 15. MAX2656 EV Kit PC Board Layout—Component Side

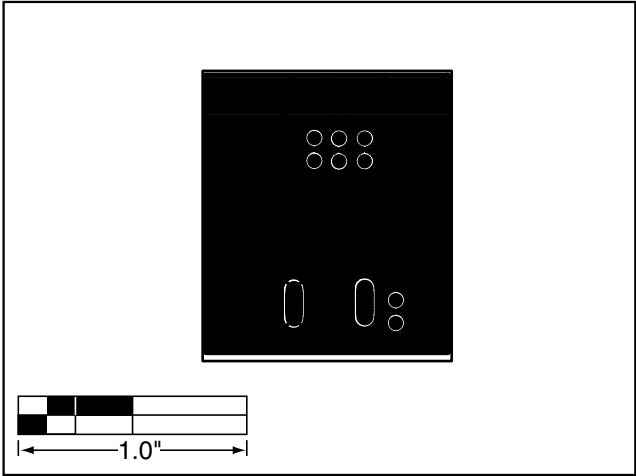


Figure 16. MAX2656 EV Kit PC Board Layout—Ground Layer 2

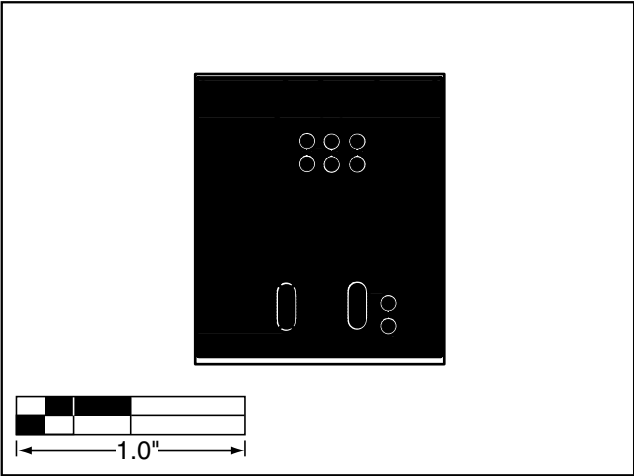


Figure 17. MAX2656 EV Kit PC Board Layout—Ground Layer 3

MAX2654/MAX2655/MAX2656 Evaluation Kits

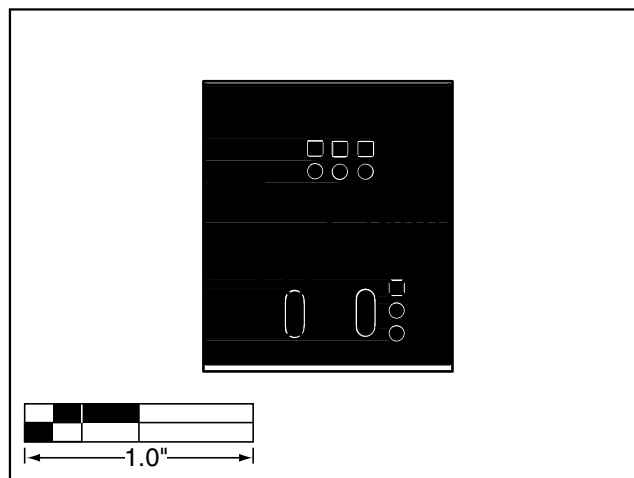


Figure 18. MAX2656 EV Kit PC Board Layout—Solder Side

Evaluate: MAX2654/MAX2655/MAX2656

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

9 _____ **Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600**