

# MAXIM

## MAX2150 Evaluation Kit

### General Description

The MAX2150 evaluation kit (EV kit) simplifies testing of the MAX2150 complete wideband I/Q modulator chip. The kit allows evaluation of the I/Q modulator, synthesizer, 3-wire programming interface, and power-management features. The EV kit provides 50Ω connectors for all signal inputs and outputs.

### Features

- ◆ 3-Wire Control Interface
- ◆ Differential Baseband Inputs
- ◆ 2.7V to 3.6V Single-Supply Operation
- ◆ 50Ω Connectors on All Signal Ports
- ◆ Low-Power Shutdown Modes
- ◆ PC Control Software  
(Available at [www.maxim-ic.com](http://www.maxim-ic.com))

### Ordering Information

| PART         | TEMP RANGE     | IC PACKAGE |
|--------------|----------------|------------|
| MAX2150EVKIT | -40°C to +85°C | 28 QFN     |

### Component Suppliers

| SUPPLIERS   | PHONE        | FAX          | WEBSITE                                                  |
|-------------|--------------|--------------|----------------------------------------------------------|
| AVX         | 843-448-9411 | 843-448-7139 | <a href="http://www.avxcorp.com">www.avxcorp.com</a>     |
| Coilcraft   | 800-322-2645 | 847-639-1469 | <a href="http://www.coilcraft.com">www.coilcraft.com</a> |
| Murata      | 770-436-1300 | 770-436-3030 | <a href="http://www.murata.com">www.murata.com</a>       |
| Taiyo Yuden | 800-368-2496 | 408-573-4159 | <a href="http://www.t-yuden.com">www.t-yuden.com</a>     |
| Toko        | 847-297-0070 | 847-699-7864 | <a href="http://www.tokoam.com">www.tokoam.com</a>       |

### Component List

| DESIGNATION                                                              | QTY | DESCRIPTION                                            |
|--------------------------------------------------------------------------|-----|--------------------------------------------------------|
| BUFEN                                                                    | 1   | 3-pin header, 100mil centers<br>Digi-Key S1012-36-ND   |
| C1, C2, C3,<br>C12, C18, C28,<br>C30, C31, C34,<br>C36, C37, C50,<br>C52 | 13  | 0.1μF ±10% capacitors (0603)<br>Murata GRM188R71C104K  |
| C4, C9, C10,<br>C11, C13, C35                                            | 6   | 100pF ±5% capacitors (0402)<br>Murata GRP1555C1H101J   |
| C5, C6, C7,<br>C15, C16                                                  | 5   | Open                                                   |
| C8                                                                       | 1   | 22pF ±5% capacitor (0402)<br>Murata GRP1555C1H220J     |
| C14, C17                                                                 | 2   | 100pF ±5% capacitors (0603)<br>Murata GRM1885C1H101J   |
| C19, C20, C21,<br>C32, C33                                               | 5   | 0.1μF ±10% capacitors (0402)<br>Murata GRP155R61A104K  |
| C22                                                                      | 1   | 6800pF ±10% capacitor (0402)<br>Murata GRP155R71E682K  |
| C23                                                                      | 1   | 0.068μF ±10% capacitor (0402)<br>Murata GRP155R61A683K |
| C24                                                                      | 1   | 680pF ±10% capacitor (0402)<br>Murata GRP155R71H681K   |

| DESIGNATION                                      | QTY | DESCRIPTION                                                                             |
|--------------------------------------------------|-----|-----------------------------------------------------------------------------------------|
| C25                                              | 1   | 1μF ±10% tantalum capacitor, case A<br>AVX TAJA105K016                                  |
| C26                                              | 1   | 470pF ±10% capacitor (0402)<br>Murata GRP155R71H471K                                    |
| C27                                              | 1   | 1.0μF ±10% capacitor (0603)<br>Murata GRM188R60J105K                                    |
| DCIN, $\overline{EN}$                            | 2   | Test points<br>Digi-Key 5000-ND                                                         |
| J1, J3                                           | 2   | 50Ω BNC connectors, 31 series,<br>Amphenol Allied Electronics<br>31-5329-52RFX 713-9041 |
| J5, J6, J7, J11,<br>J16, J17, J19,<br>J20, VCCSD | 9   | 2-pin headers, 100mil centers<br>Digi-Key S1012-36-ND                                   |
| J8, J13, J14,<br>J15, J18<br>(Note 2)            | 5   | SMA connectors, edge mount<br>EFJohnson 142-0701-801                                    |
| J10                                              | 1   | 10-pin header<br>Digi-Key S2012-36-ND                                                   |
| J19, J20,<br>BUFEN,<br>VCCSD                     | 4   | Shunt-shorting jumpers<br>Digi-Key S9000-ND                                             |



# MAX2150 Evaluation Kit

## Component List (continued)

| DESIGNATION     | QTY | DESCRIPTION                                                                |
|-----------------|-----|----------------------------------------------------------------------------|
| L1              | 1   | Open                                                                       |
| R1–R4, R29, R35 | 6   | Open                                                                       |
| R12             | 1   | 0 $\Omega$ $\pm$ 5% resistor (0402)                                        |
| R13, R18        | 2   | 0 $\Omega$ $\pm$ 5% resistors (0603)                                       |
| R23             | 1   | 245 $\Omega$ $\pm$ 5% resistor (0402)                                      |
| R24, R25        | 2   | 1.1k $\Omega$ $\pm$ 1% resistors (0402)                                    |
| R31–R34         | 4   | 3.3k $\Omega$ $\pm$ 5% resistors (0603)                                    |
| U1 (Note 1)     | 1   | MAX2150EGI I/Q wideband modulator                                          |
| U2              | 1   | VCO<br>Fujitsu VC-3R0A23-0967/1750B                                        |
| VTUNE_OUT       | 1   | SMA connectors, PC mount<br>EFJohnson 142-0701-201                         |
| Y1              | 1   | 20MHz surface-mount crystal<br>CTS Reeves Digi-Key<br>ATS200SM CTX515TR-ND |
| None            | 1   | MAX2150 EV kit circuit board, rev C                                        |
| None            | 1   | MAX2150 data sheet                                                         |
| None            | 1   | MAX2150 EV kit data sheet                                                  |

**Note 1:** This IC has an exposed pad. It must be solder attached to the circuit board to ensure proper function.

**Note 2:** Cut center pin to approximately 1/16in long.

## Quick Start

The MAX2150 EV kit is fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section.

### Test Equipment Required

This section lists the recommended test equipment to verify the operation of the MAX2150. It is intended as a guide only, and substitutions are possible.

- One RF signal generator capable of delivering -7dBm of output power in the 10MHz to 50MHz frequency range (HP 8648A or equivalent) for the PLL reference frequency
- RF spectrum analyzer capable of measuring up to 7GHz RF signal (Rohde & Schwarz FSEA20 or equivalent)
- RF power meter capable of measuring up to +10dBm output power (HP 437B or equivalent) with an RF sensor
- RF network analyzer
- Oscilloscope
- Two power supplies that can provide 250mA at +5.0V (AG E3631A or equivalent)
- Arbitrary waveform generator (HP E4433B or equivalent)

### Connections and Setup

This section provides step-by-step instructions for getting the EV kit up and running in all operation modes.

- 1) Verify that jumpers are in place.
- 2) Verify that the interface board is in place.

## Connector Description

| CONNECTOR | NAME     | DESCRIPTION                              | DC VOLTAGE RANGE |
|-----------|----------|------------------------------------------|------------------|
| J1, J3    | I, Q     | I/Q Baseband Input BNC Connectors        | —                |
| J5, J19   | VCCVCO   | V <sub>CC</sub> to On-Board VCO          | 2.7V ~ 3.6V      |
| J6        | VCC      | Supply Voltage                           | 2.7V ~ 3.6V      |
| J7, J11   | GND      | Ground                                   | —                |
| J8        | RFOUT    | RF Output (SMA)                          | —                |
| J10       | —        | Interface Connection                     | 2.7V ~ 3.6V      |
| J13       | BUFOUT   | Buffer Output (SMA)                      | —                |
| J14, J15  | LO       | External LO Input (SMA)                  | —                |
| J16, J17  | N.C.     | No Connection                            | —                |
| J18       | REFL IN  | Reference Input (SMA)                    | —                |
| J20       | LOCK     | Lock Signal Output                       | —                |
| —         | BUFEN    | Buffer Enable                            | —                |
| —         | DCIN     | Bias Voltage Input                       | 1.6V             |
| —         | EN       | Enable Pin Input                         | —                |
| —         | TUNE_OUT | Tuning Voltage Output                    | —                |
| —         | VCCSD    | V <sub>CC</sub> to Sigma-Delta Modulator | 2.7V ~ 3.6V      |

# MAX2150 Evaluation Kit

- 3) Set the power supply to +3V and turn it off.
- 4) Set the adjustable power supply to +1.6V and turn it off.
- 5) Connect the ground terminal to GND.
- 6) Connect the positive +3V terminal to VCC and the power supply of the interface board.
- 7) Connect the positive terminal of the adjustable power supply to pin DCIN on the board.
- 8) Set the I/Q generator to 330kHz, with an input level of 1V<sub>p-p</sub>. Leave the I/Q generator output off.
- 9) Using 2 BNC cables, connect the output of the I/Q generator to the I/Q input connectors on the MAX2150 EV kit board.
- 10) Use an SMA cable to connect the RFOUT to the input of the spectrum analyzer.
- 11) Set the spectrum analyzer to view the output.
- 12) Turn on all power supplies and enable I/Q signal generator.
- 13) Measure the supply current level.
- 14) Observe the RF output frequency as displayed on the spectrum analyzer. Measure the RF output power.
- 15) The RF output power should be approximately -4dBm after accounting for cable and connector loss.

## Adjustments and Control

### Operation Modes:

- 1) TX mode
- 2) SYNTH mode
- 3) MOD mode
- 4) Software shutdown mode
- 5) Hardware shutdown mode

Refer to the MAX2150 data sheet for details.

### Layout Issues

A good PC board is an essential part of an RF circuit design. The EV kit PC board can serve as a guide for laying out a board using the MAX2150. Keep traces carrying RF signals as short as possible to minimize radiation and insertion loss. Use impedance control on all RF signal traces. The VCC node on the PC board should have decoupling capacitors to the closest ground. Refer to the *Layout* section of the MAX2150 data sheet for more information.

Evaluates: MAX2150

# MAX2150 Evaluation Kit

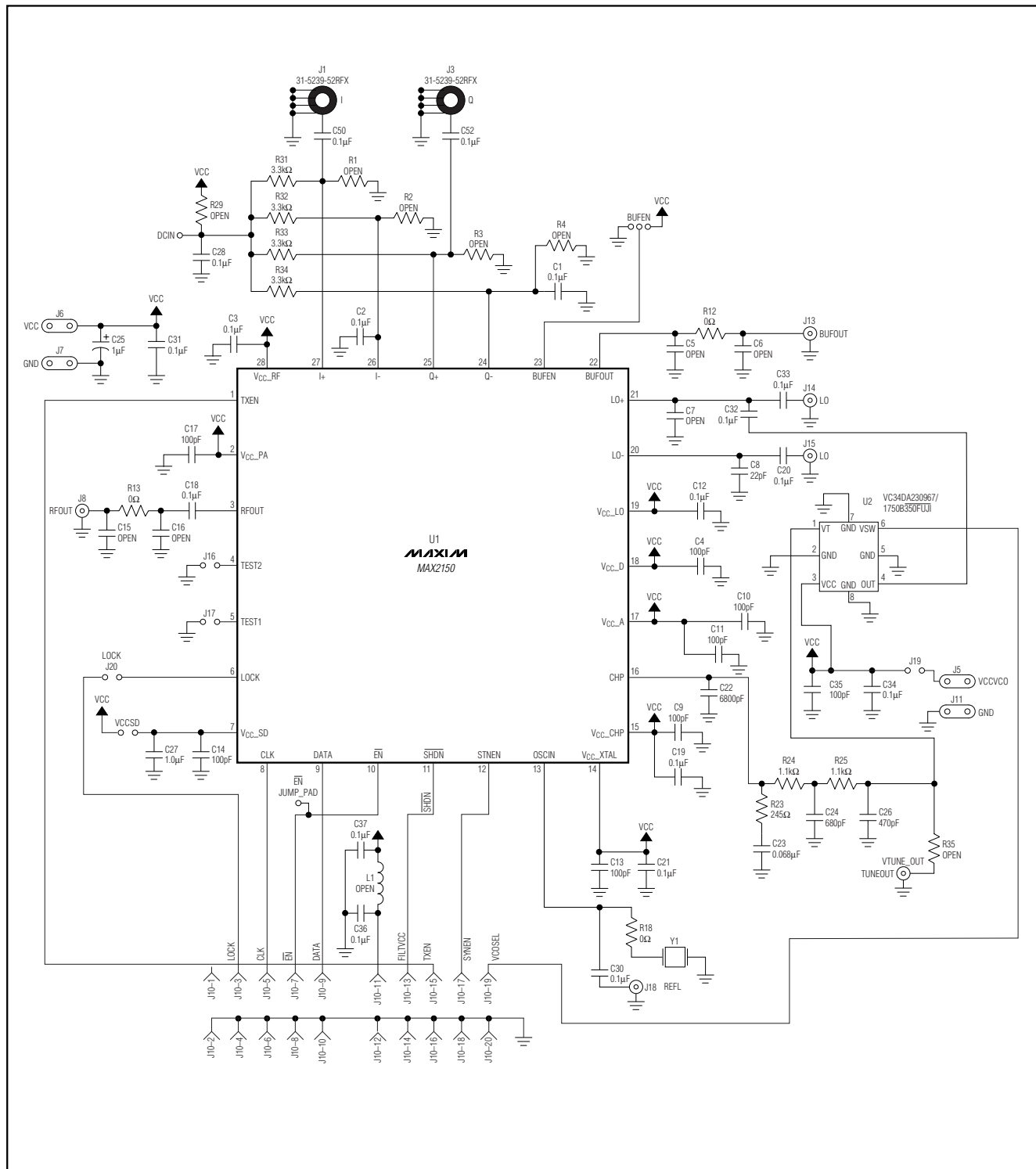


Figure 1. MAX2150 EV Kit Schematic

# MAX2150 Evaluation Kit

Evaluates: MAX2150

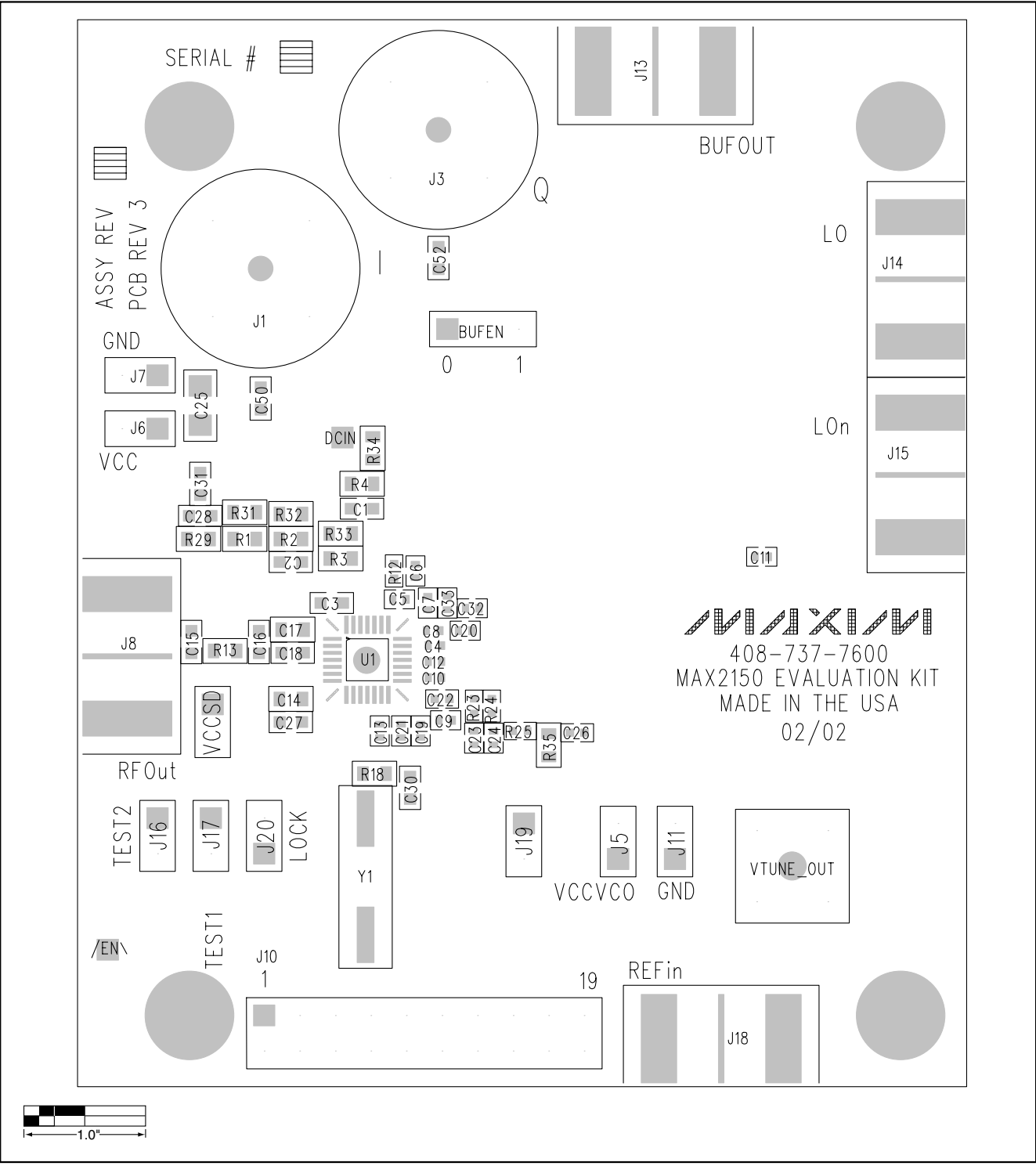


Figure 2. MAX2150 EV Kit Primary-Side Silkscreen

# MAX2150 Evaluation Kit

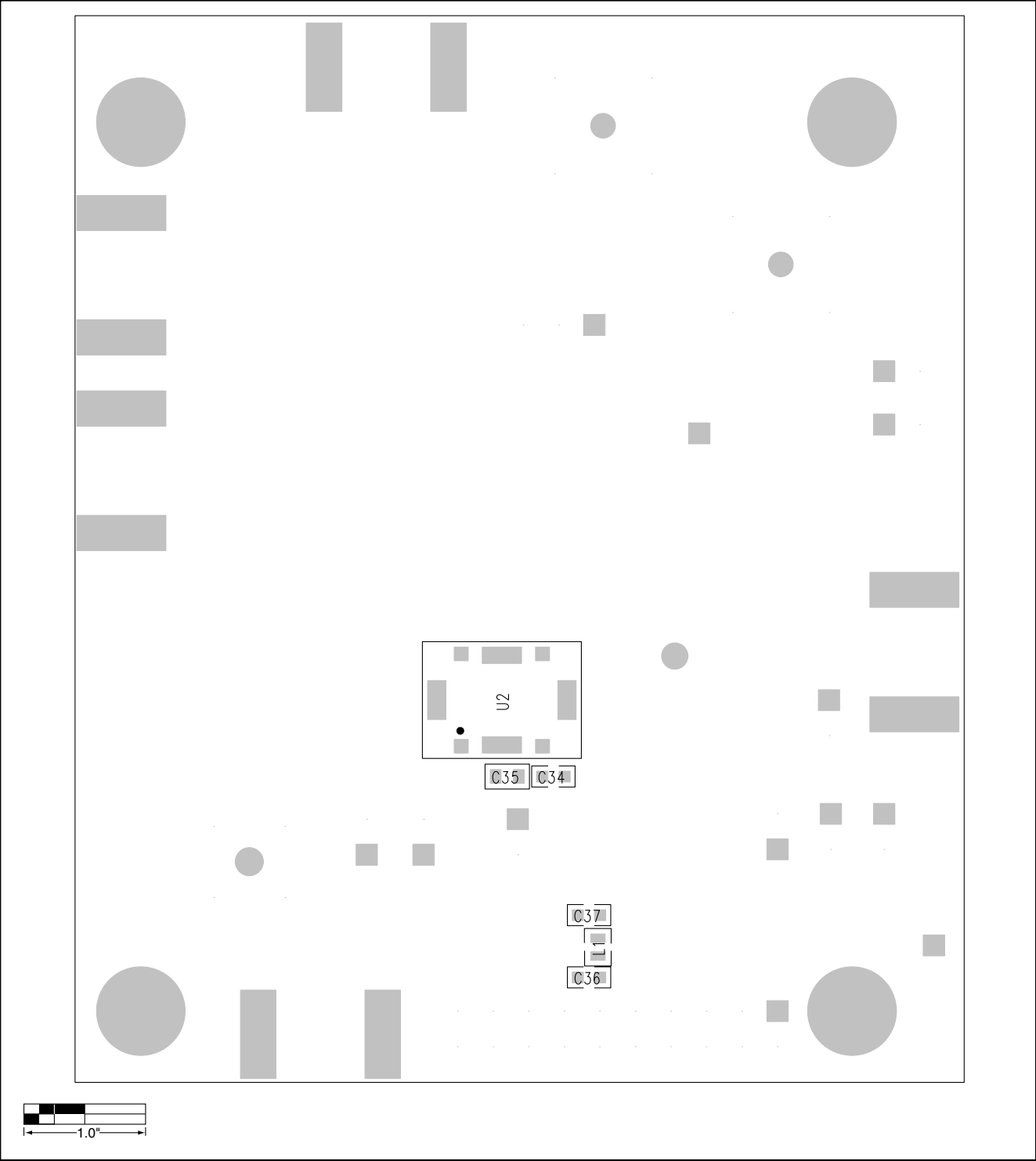


Figure 3. MAX2150 EV Kit Secondary-Side Silkscreen

# MAX2150 Evaluation Kit

Evaluates: MAX2150

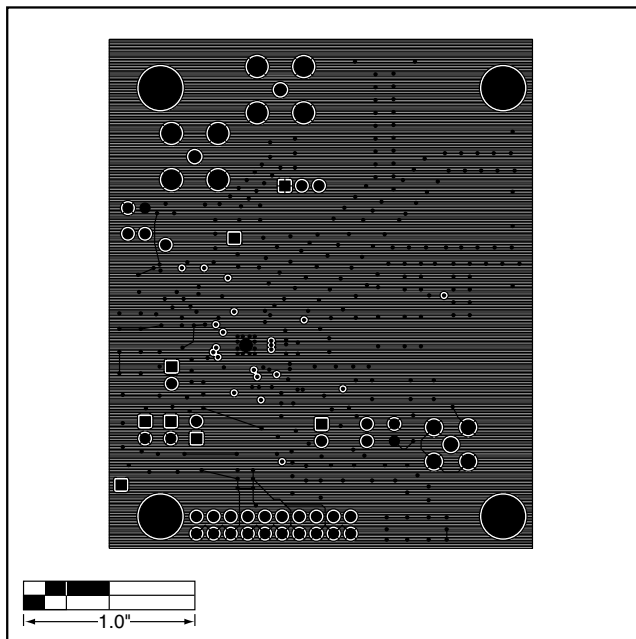


Figure 4. MAX2150 EV Kit PC Board Layout—Layer 2

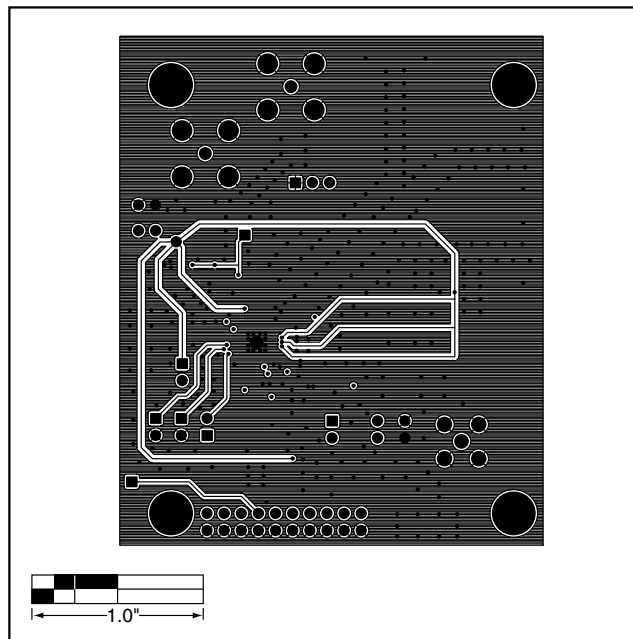


Figure 5. MAX2150 EV Kit PC Board Layout—Layer 3

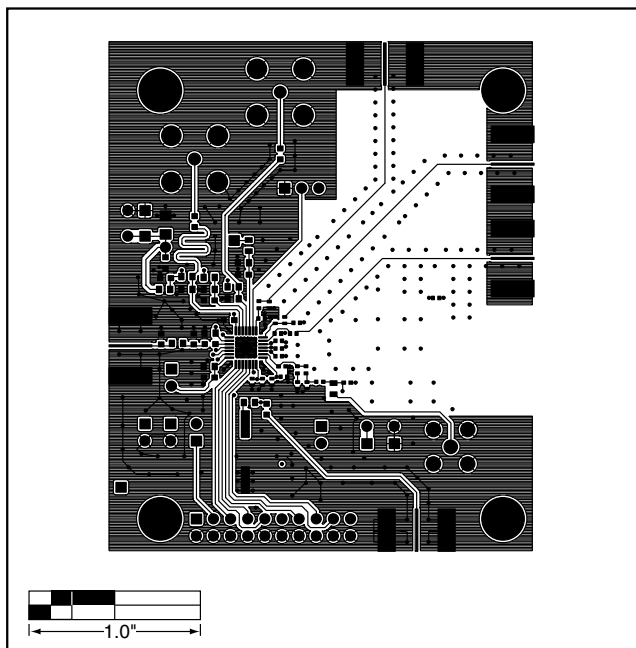


Figure 6. MAX2150 EV Kit Primary Component Side

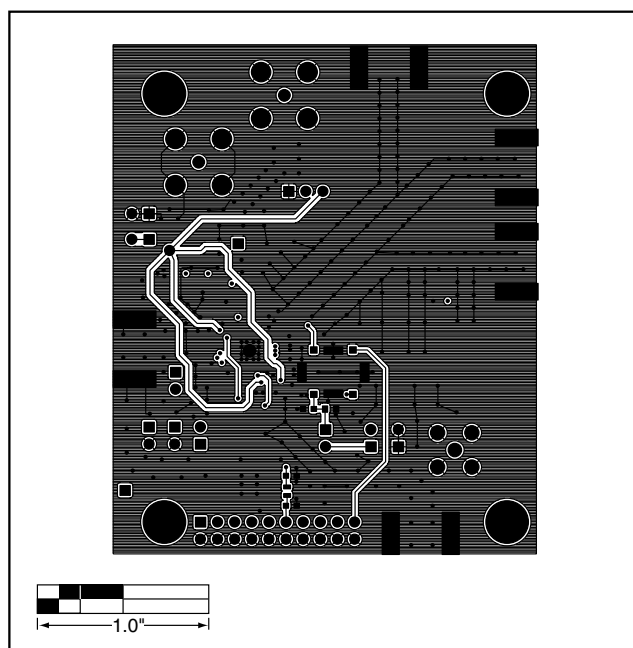


Figure 7. MAX2150 EV Kit Secondary Side

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.

**Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600** \_\_\_\_\_ **7**

# AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit [www.ameya360.com](http://www.ameya360.com)

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd  
Minhang District, Shanghai , China

➤ Sales :

Direct     +86 (21) 6401-6692  
Email       amall@ameya360.com  
QQ         800077892  
Skype       ameyasales1 ameyasales2

➤ Customer Service :

Email       service@ameya360.com

➤ Partnership :

Tel         +86 (21) 64016692-8333  
Email       mkt@ameya360.com