

General Description

The MAX2140 evaluation kit (EV kit) simplifies evaluation of the MAX2140 complete SDARS receiver IC. It enables testing of the device's RF performance and requires no additional support circuitry. The EV kit's signal inputs and outputs use SMA connectors to facilitate the connection of RF test equipment.

Features

- Easy Evaluation of the MAX2140
- +3.1V to +3.6V Single-Supply Operation
- Jumpers for Digital Power Control and Shutdown
- All Critical Peripheral Components Included
- PC Control Software Included

Ordering Information

PART	TYPE
MAX2140EVKIT	EV Kit

#Denotes RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
+5V, -5V, GND	3	2-pin headers Digi-Key 1 x 2 header S1012-36-ND
ADR1, ADR2, JU1, VCC	4	Jumper blocks using 3-pin SIP headers Digi-Key 1 x 3 header S1012-36-ND
C1, C2, C7, C27	4	Open
C3, C4	2	6.8pF $\pm 0.25\text{pF}$ 0402 capacitors Murata GRP1555C1H6R8C
C5, C6	2	47pF $\pm 5\%$ 0603 capacitors Murata GRM1885C1H470J
C8, C10	2	10 μF tantalum capacitors AVX TAJR106K006
C9, C11, C12, C14–C18, C32, C40, C41, C53, C76, C83, C84	15	0.1 μF $\pm 10\%$ 0603 capacitors Murata GRM188R71C104K
C13, C19	2	Open, capacitors
C20, C23, C26, C31, C52	5	100pF $\pm 5\%$ 0603 capacitors Murata GRM1885C1H101J
C21, C22, C42	3	Open, capacitors
C24	1	1000pF $\pm 10\%$ 0603 capacitor Taiyo Yuden UMK107B102KZ-B
C25, C33–C35, C37, C38, C43, C45, C46, C48, C49, C51	12	0.01 μF $\pm 10\%$ 0603 capacitors Taiyo Yuden UMK107B103KZ-B

DESIGNATION	QTY	DESCRIPTION
C28, C29	2	3.9pF $\pm 0.25\text{pF}$ 0603 capacitors Murata GRM1885C1H3R9C
C30	1	0.22 μF $\pm 10\%$ 0603 capacitor Murata
C47, C50	2	2.2 μF $\pm 10\%$ 0603 capacitors Murata
C56, C57	2	3.9pF $\pm 0.25\text{pF}$ 0603 capacitors Murata GRM1885C1H6R8D
C59	1	100pF $\pm 5\%$ 0603 capacitor Murata GRM1885C1H101J
C60, C61	2	47pF $\pm 5\%$ 0402 capacitors Murata GRP1555C1H470J
C62	1	22pF $\pm 1\text{pF}$ 0603 capacitor Murata
C63, C69, C79, C81, C82	5	330pF $\pm 5\%$ 0603 capacitors Murata GRM1885C1H331J
C73	1	0.01 μF $\pm 10\%$ 0805 capacitor Taiyo Yuden UMK212B103KQ-B
C75	1	1.0 μF $\pm 20\%$ 1206 capacitor Murata GRM31MR71C105MA01L
I, Q	2	50 Ω BNC PC board receptacles (jacks) Amphenol 31-5239-52RFX
J1	1	DB25 M PC board CONN HD-20 SERIES 747238-4

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
JRFIN, PWM, REFIN, REF_TEST, SAWIN, SAWOUT	6	SMA end launch jack receptacles 0.062in Johnson 142-0701-801
L1	1	Open
L4, L7, L9, L10	4	56nH $\pm 5\%$ 0603 inductors Murata LQW18AN56NJ00D
L5, L6	2	68nH $\pm 5\%$ 0603 inductors Murata LQG18HN68NJ00
L8	1	33nH $\pm 5\%$ 0603 inductor Murata LQW18AN33NJ00D
L11	1	22nH $\pm 5\%$ inductor 0603CS-22NXJBC
L12	1	33nH, 25 0402 inductor Murata LQP15MN33NG00
L13	1	Open
LOCK, RFAGC, VINANT, VOUTANT	4	Jumper blocks, 2-pin two 0.1in spacing 1 x 2 headers Digi-Key S1012-36-nd
R1	1	0 Ω 0603 resistor
R4, R12, R15, R20	4	51.1 Ω 0603 resistors
R8, R9	2	Open, resistors
R25, R26, R32, R33, R39	5	100 Ω 0603 resistors

DESIGNATION	QTY	DESCRIPTION
R30, R31, R40, R41	4	5.1k Ω 0603 resistors
TCL, TDA, TGND	3	Jumper blocks, 2-pin 0.1in spacing Digi-Key 5000K-ND
U1	1	Maxim MAX2140ETH
U2, U3	2	Differential to single-ended line receivers Maxim MAX4444ESE
U4	1	259.861MHz saw filter RF Monolithics, Inc. SF2025B
U5	1	Low-dropout linear regulator Maxim MAX8877EUK28
U6	1	Buffer/line driver Texas Instruments SN74LVTH244ADBR
U7	1	2338.755MHz multilayer chip bandpass filter TOKO LTF3216BU-F2R3B
U8	1	Closed-loop buffer Maxim MAX4178EUK-T
Y2	1	23.92MHz crystal Epson Q24FA23H0000701
—	1	PCB: MAX2140 EVALUATION KIT

Component Suppliers

SUPPLIER	WEBSITE
Amphenol RF	www.amphenolrf.com
AVX North America	www.avx.com
Digi-Key Corp.	www.digikey.com
Murata Americas	www.murataamericas.com
Taiyo Yuden	www.t-yuden.com

Note: Indicate that you are using the MAX2140 when contacting these component suppliers.

Quick Start

The MAX2140 EV kit is fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section for proper device evaluation.

Test Equipment Required

This section lists the recommended test equipment to verify operation of the MAX2140. It is intended as a guide only, and some substitutions are possible:

- MAX2140 EV kit
- RF signal generator capable of delivering at least +5dBm of output power at the operating frequency (HPE4433B, or equivalent)
- RF power sensor capable of handling at least +20dBm of output power at the operating frequency (HP 8482A, or equivalent)
- RF power meter capable of measuring up to +20dBm of output power at the operating frequency (HP 437B, or equivalent)
- RF spectrum analyzer that covers the MAX2140 operating frequency range, as well as a few harmonics (FSEB20, for example)
- Power supply capable of up to 1A at +2.7V to +6.0V
- Ammeter for measuring the supply current (optional)
- 50Ω SMA cables
- Network analyzer (HP 8753D, for example) to measure small-signal return loss and gain (optional)
- PC laptop or tablet with Microsoft Windows XP®, Windows® 7, 8 OS and a USB port
- USB-A male to USB-B male cable
- US keyboard

Connections and Setup

This section provides a step-by-step guide to operating the EV kit and testing the device's function. **Do not turn on the DC power or RF signal generators until all connections are complete:**

- 1) Connect two DC supplies set to $\pm 5V$ (through an ammeter if desired) to the +5V, -5V, and GND terminals on the EV kit. Do not turn on the supply.
- 2) Connect a DC supply set to 0V to the PWM terminals on the EV kit. Do not turn on the supply.
- 3) Connect one RF signal generator to the JRFIN SMA connector; do not turn on the generator's output. Set the power level to -91dBm.
- 4) Connect the I/Q output on the EV kit to a spectrum analyzer through an SMA cable.
- 5) Connect the PC to the INTF3000 interface board using the USB-A male to USB-B male cable. On INTF3000, remove jumper JU1, and connect a DC supply set to +3V to the VPULL connector. Connect the 25-pin connector of the INTF3000 (J4) directly to the 25-pin connector on the EV kit (J1).
- 6) Run the control software on an IBM-compatible PC.
- 7) Turn on the DC supply. The supply current should read approximately 150mA.
- 8) Activate the RF generator's output.
- 9) Check the I/Q outputs.

Layout Issues

A good PCB is an essential part of an RF circuit design. The EV kit PCB can serve as a guide for laying out a board using the MAX2140. 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 PCB should have decoupling capacitors to the closest ground. Refer to the *Layout* section in the MAX2140 IC data sheet for more information.

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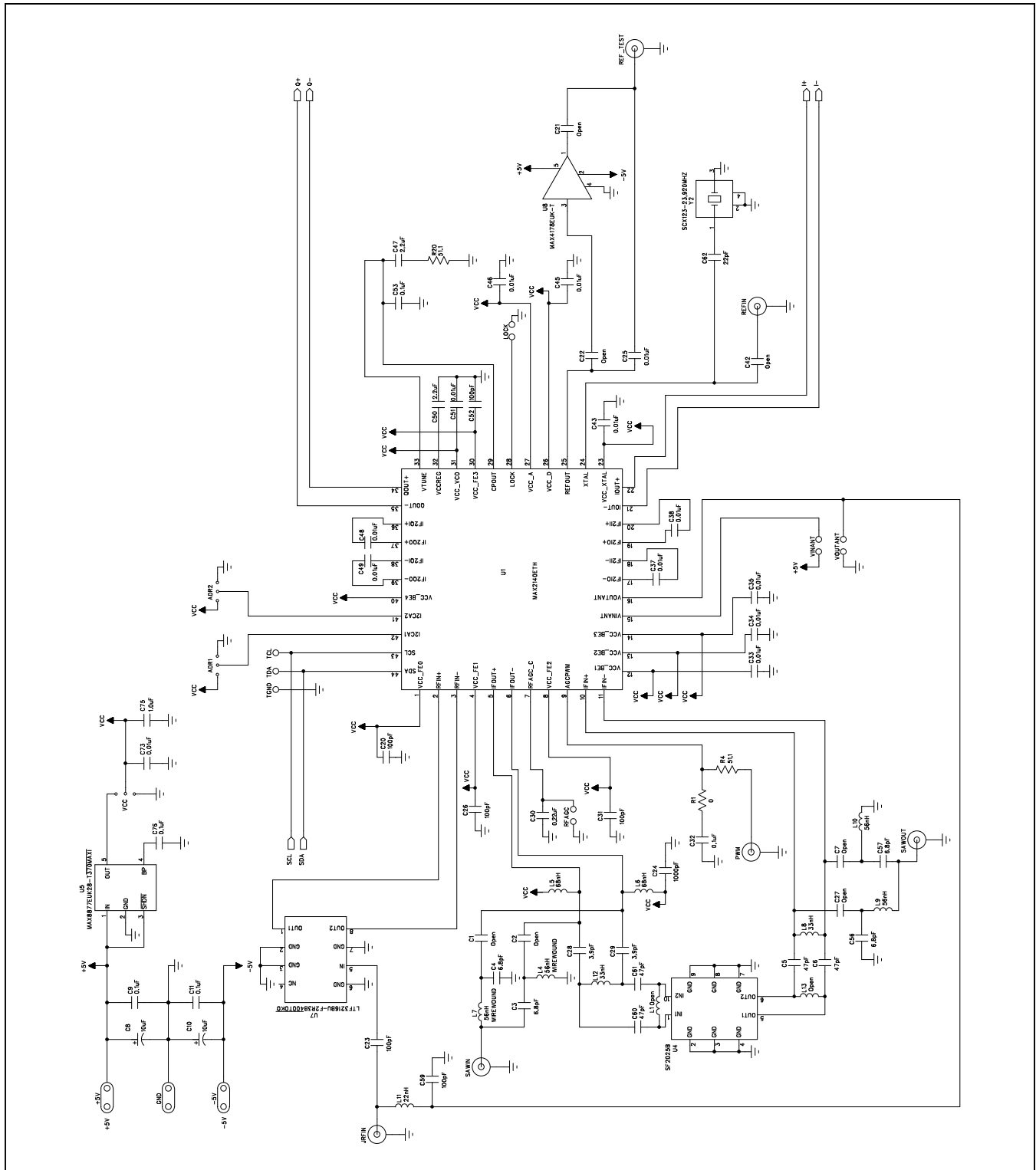


Figure 1a. MAX2140 EV Kit Schematic (Sheet 1 of 2)

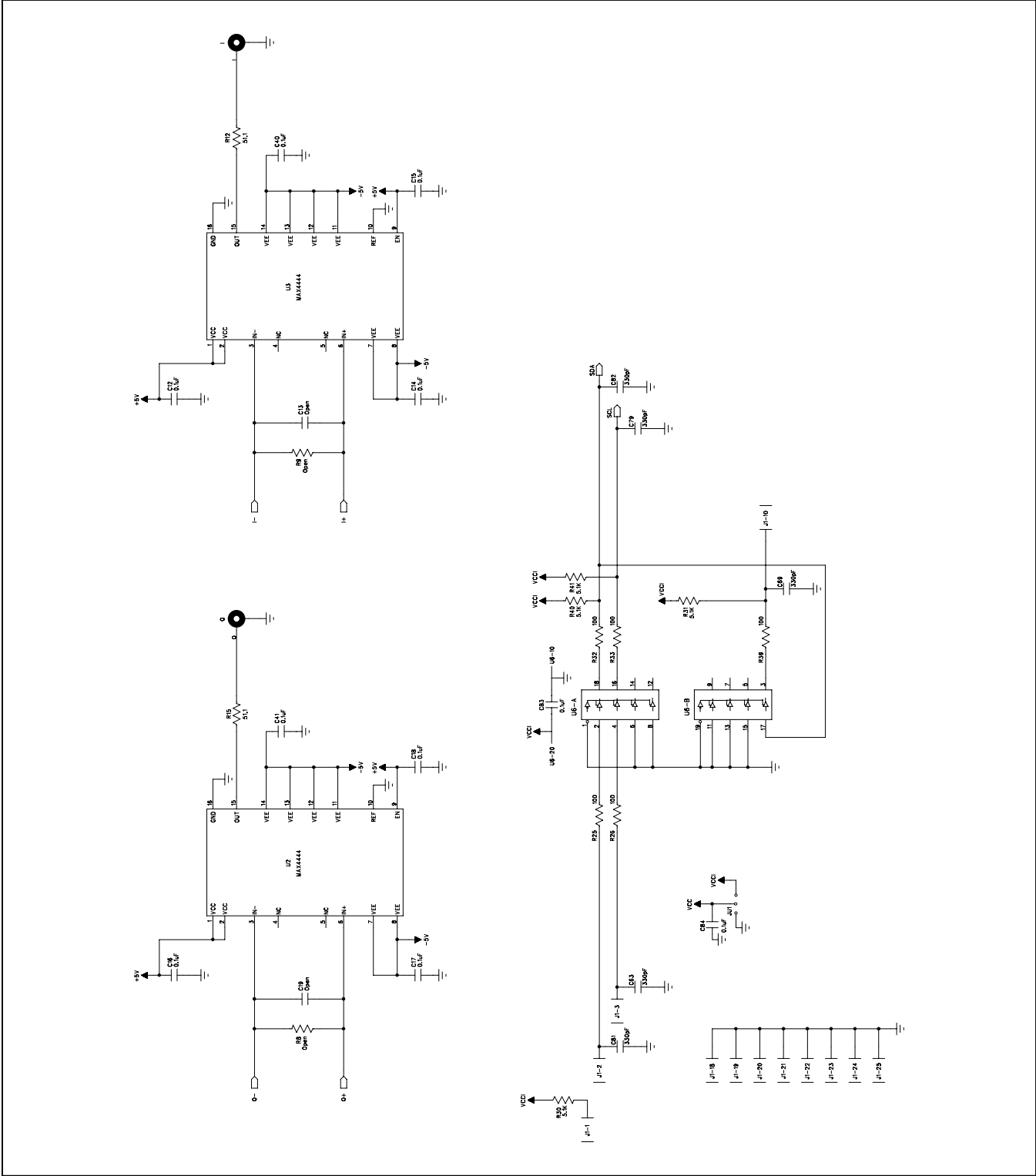


Figure 1b. MAX2140 EV Kit Schematic (Sheet 2 of 2)

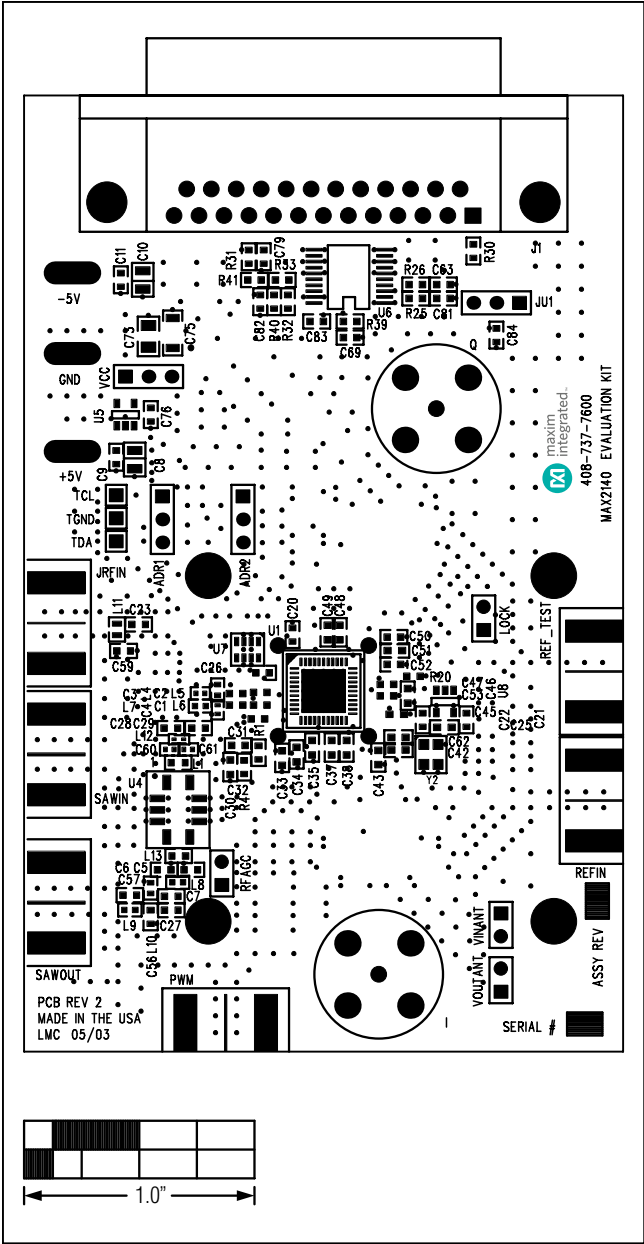


Figure 2. MAX2140 EV Kit Component Placement Guide—Component Side

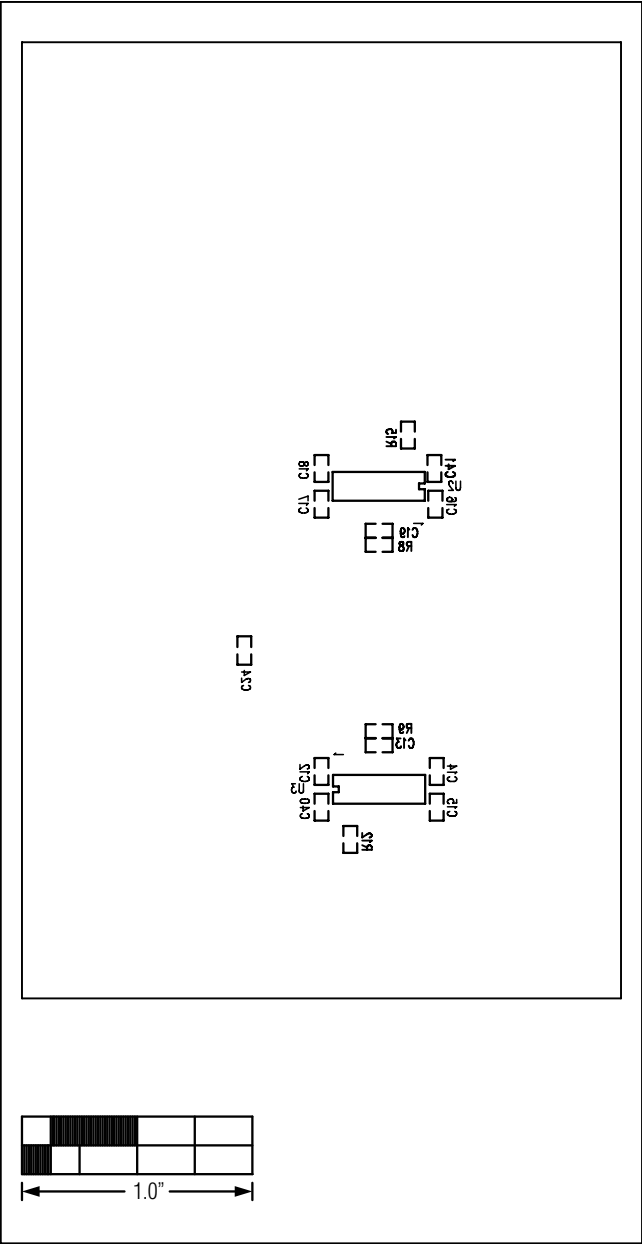


Figure 3. MAX2140 EV Kit Component Placement Guide—Secondary Side

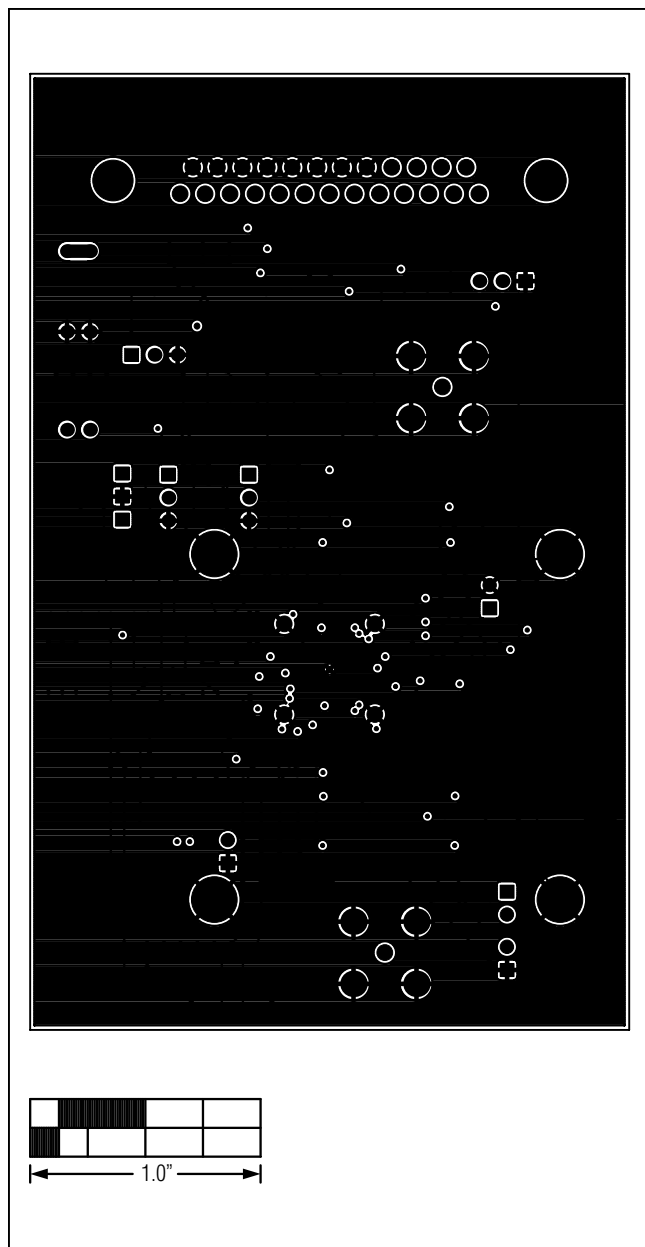


Figure 4. MAX2140 EV Kit PCB Layout—Layer 2

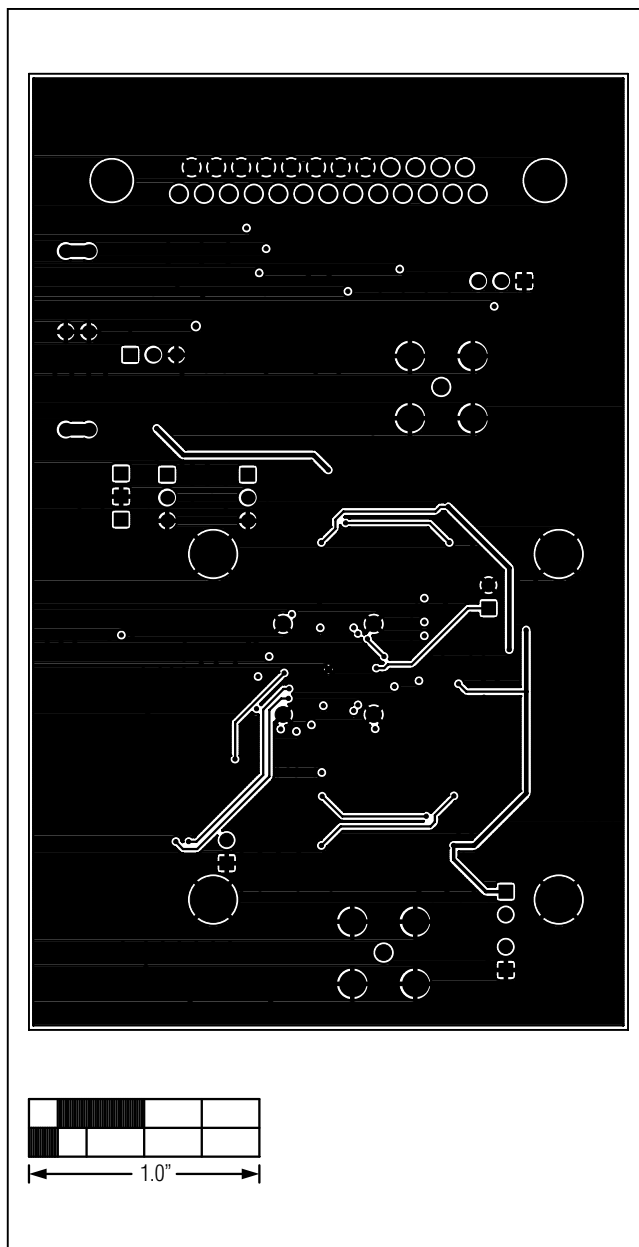


Figure 5. MAX2140 EV Kit PCB Layout—Layer 3

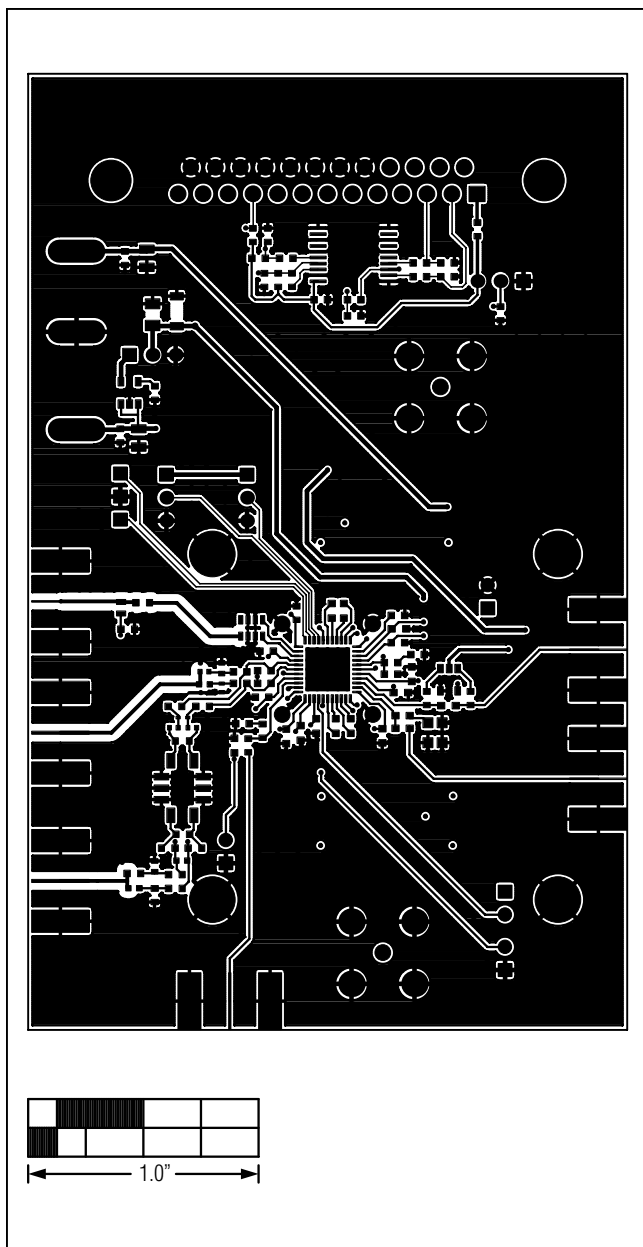


Figure 6. MAX2140 EV Kit PCB Layout—Component Side

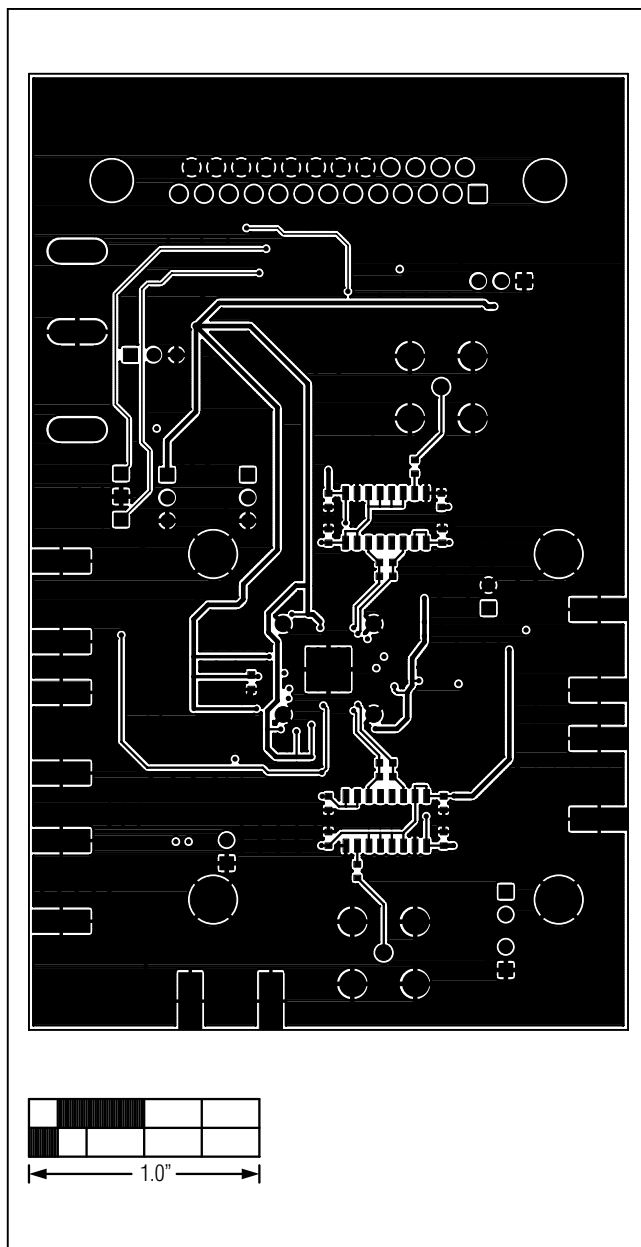


Figure 7. MAX2140 EV Kit PCB Layout—Secondary Side

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/04	Initial release	—
1	11/14	Updated <i>Quick Start</i> section	2, 3

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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JONHON

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