



MAX2837 Evaluation Kit

**Evaluates:
MAX2837**

General Description

The MAX2837 evaluation kit (EV kit) simplifies testing of the MAX2837 receive and transmit performance in WiMAX applications operating in the 2.3GHz to 2.7GHz ISM band. The EV kit provides 50Ω SMA connectors for all RF and baseband inputs and outputs. Differential to single-ended and single-ended to differential line drivers are provided to convert the differential I/Q baseband inputs and outputs to single ended.

Features

- ◆ On-Board Line Driver and Voltage Reference
- ◆ 50Ω SMA Connectors on All RF and Baseband Ports
- ◆ PC Control Software Available at www.maxim-ic.com/evkitsoftware

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX2837EVKIT+	-40°C to +85°C	48 Thin QFN-EP*

+Denotes a lead-free and RoHS-compliant EV kit.

*EP = Exposed paddle.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3, C8, C20, C21, C22, C24, C44, C76, C78	0	Not installed, capacitors
C2, C9, C15, C16, C19, C70, C89	7	22pF ±5% ceramic capacitors (0402) Murata GRM1555C1H220J
C4–C7, C10, C13, C17, C18, C40, C45, C46, C59, C60, C67, C83	15	0.1µF ±10% ceramic capacitors (0402) Murata GRM155R61C104K
C11, C23, C26, C28, C32, C34, C73, C74, C75, C87, C88	11	0.01µF ±10% ceramic capacitors (0402) Murata GRM155R71E103K
C12, C53, C55, C66	4	10µF ±10% ceramic capacitors (0805) Murata GRM21BR61A106K
C14	1	3300pF ±10% ceramic capacitor (0402) Murata GRM155R71H332K
C25, C77	2	1000pF ±10% ceramic capacitors (0402) Murata GRM155R71H102K
C27	1	2.2µF ±10% ceramic capacitor (0805) Murata GRM21BR71A225K
C29, C86	2	1µF ±10% ceramic capacitors (0402) Murata GRM155R61J105K

DESIGNATION	QTY	DESCRIPTION
C36–C39	4	2.2µF ±10% ceramic capacitors (0603) Murata GRM188R61A225K
C68, C69	2	3pF ±5% ceramic capacitors (0402) Murata GRM1555C1H3R0J
C79	1	180pF ±5% ceramic capacitor (0402) Murata GRM1555C1H181J
C81	1	100pF ±5% ceramic capacitor (0402) Murata GRM1555C1H101J
J18	1	DB25 right-angle male connector AMP 5747238-4
L1	1	6.2nH ±0.1nH inductor Murata LQ15AN6N2B00
R1, R7	2	200Ω ±1% resistors (0402)
R2, R5, R6, R38	4	205Ω ±1% resistors (0402)
R3, R10	2	226Ω ±1% resistors (0402)
R4, R26	2	49.9Ω ±1% resistors (0402)
R8, R9, R12–R19, R23, R24, R25, R28, 29, R31, R32, R40, R41, R45, R47, R48	22	0Ω resistors (0402)
R11, R30, R35, R42, R50, R52	0	Not installed, resistors
R20, R51	2	475Ω ±1% resistors (0402)



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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R21, R22	2	61.9Ω ±1% resistors (0402)
R33, R36	2	Trimmer potentiometers Bourns 3296W-1-102LF
R34	1	576Ω ±1% resistor (0402)
R37	1	332Ω ±1% resistor (0402)
T1, T2	2	2.4GHz RF baluns Murata LDB182G5010G-120
U1, U3	2	Low-noise differential ADC drivers ADI AD8139
U2, U6	2	MAX4444ESE+ (16-pin narrow SO)
U4	1	MAX2837ETM+ (48-pin thin QFN-EP, 6mm x 6mm x 0.8mm)
U7	1	Low-dropout linear regulator MAX8887EZK29+ (5-pin SOT23)
U8, U9	2	SN74LVTH244ADB Texas Instruments SN74LVTH244ADBR
U10	1	Low-dropout voltage reference MAX6062AEUR+ (3-pin SOT23)
U11	1	40MHz TCXO Kyocera KT3225N40000ECV28ZAA
U12, U13, U14	3	Ultra-low-noise LDOs MAX8510EXK29+ (5-pin SC70)
+5V, -5V, VBAT, VCCAUX	4	Test points, PCB red Keystone 5010
B1–B7, CLK_OUT, CSB, DIN, DOUT, ENABLE, PABIAS, RXBBI+, RXBBI-, RXBBQ+, RXBBQ-, RXENABLE, RXHP, SCLK, TXBBI+ TXBBI-, TXBBQ+, TXBBI-, TUNEM, TUNEPE, TXENABLE, RSSI, VCM	29	Test points, PCB mini-red Keystone 5000

DESIGNATION	QTY	DESCRIPTION
GND1, GND2	2	Test points, PCB black Keystone 5011
J17, JP2CSB, JPSPICLK, JPSPIDIN, JPSPIDOUT, L3, L4, L7, VCCCP1, VCCINA, VCCPLL, VCCRXXB1, VCCRXXB2, VCCRXXMX, VCCTXXMX, VCCXTAL, VCC_DB, VCC_PAD, VCC_REF, VCC_TCXO, VCC_VCO, Y1	0	Not installed
JPB1–JPB7, JPSHDNB, RXBBBBUF, RXEN, TXEN, VCCVCO, VCCVCO1, VCCVCO2	16	1 x 3-pin headers Sullins PEC36SAAN
RXRF, TXRF, CLKOUT, RXBBI, RXBBQ, TXBBI, TXBBQ, FREF	8	SMA edge-mount connectors, round Johnson 142-0701-801
—	16	Shunts (JPB1–JPB7, JPSHDNB, RXBBBBUF, RXEN, TXEN, VCCVCO, VCCVCO1, VCCVCO2) Sullins SSC02SYAN

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Component Suppliers

SUPPLIER	PHONE	WEBSITE
Digi-Key Corp.	800-344-4539	www.digikey.com
Johnson Components	507-833-8822	www.johnsoncomponents.com
Murata Mfg. Co., Ltd.	770-436-1300	www.murata.com
Texas Instruments Inc.	972-644-5580	www.ti.com

Note: Indicate that you are using the MAX2837 when contacting these component suppliers.

Quick Start

Recommended Test Equipment

This section lists the recommended test equipment to verify the operation of the MAX2837. It is intended as a guide only and substitutions may be possible.

- DC supply capable of delivering +5V and 250mA of continuous current
- DC supply capable of delivering -5V and 250mA of continuous current
- DC supply capable of delivering +3.3V and 250mA of continuous current
- Two HP8648s or equivalent signal sources capable of generating 0dBm up to 3GHz
- Two HP or equivalent arbitrary waveform generators
- One HP8561E or equivalent RF spectrum analyzer with a minimum 100kHz to 3GHz frequency range
- One TDS3012 or equivalent oscilloscope with 200MHz bandwidth
- One HP437B power meter and power head
- A user-supplied Windows® 95/98/2000/XP (or later) PC with an available parallel port
- One female-to-male 25-pin parallel straight-through cable
- One RF coupler

Connections and Setup

The MAX2837 EV kit is fully assembled and factory tested. Follow the instructions below to test the devices. This section provides step-by-step instructions for getting the EV kit up and running in all modes:

- 1) Visit the Maxim website (www.maxim-ic.com/evkit-software) to download the latest version of the EV kit software.
- 2) Install and run the MAX2837 control software.
- 3) To control the EV kit through the 4-wire interface, connect the female-to-male 25-pin parallel straight-through cable between the PC and the EV kit.
- 4) With the power supply turned off, connect the +3.3V power supply to VBAT and VCCAUX. Connect the power-supply ground to the header labeled GND.
- 5) With the power supply turned off, connect the +5V power supply to the +5V pin and the -5V power supply to the -5V pin. Connect the power-supply ground to the header labeled GND. Connect all the power-supply grounds together.
- 6) Set the RXBBUF jumper across pins 1-2 to enable the RX baseband buffers.
- 7) Set the VCCVCO jumper across pins 2-3, VCCVCO1 jumper across pins 1-2, VCCVCO2 jumper across pins 2-3, and VBAT_LDO jumper across pins 2-3 to utilize the three on-board LDOs to regulate the VBAT voltage to +2.85V.
- 8) Turn on the +3.3V power supply, and the +5V and -5V power supplies.

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- 9) In the **Enables** panel of the software, check the EN_SPI box to enable the 3-wire interface.
- 10) Adjust the Tx common-mode potentiometer (R26) until measuring 0.9V common-mode voltage at the VCM test point.
- 11) In the **Synth** panel of the software, set the LO frequency to 2500MHz.
- 12) In the **Register** panel of the software, set ENABLE to 1 and RXENABLE and TXENABLE to 0 to put the IC into standby mode.

Receive Mode

- 1) Use the power meter to calibrate the RF signal generator to deliver -100dBm at 2502MHz. After calibration, turn the RF signal generator off, disconnect it from the power meter, and connect it to the RXRF port of the MAX2837 EV kit.
- 2) Connect either the I or the Q baseband output to a spectrum analyzer. Set the center frequency to 2MHz and the span to 1MHz.
- 3) In the **Register** panel of the software, set ENABLE and RXENABLE to 1 and TXENABLE to 0 to activate the receive path.
- 4) In the **RX** panel of the software, toggle the LNA gain enable and the baseband VGA enable both to be SPI. Set both of the gain controls to max.
- 5) Turn on the RF signal source. The output CW tone at 2MHz should be approximately 0dBm.

Transmit Mode

- 1) Connect the spectrum analyzer to the TXRF port. Set the center frequency to 2500MHz and the span to 5MHz.
- 2) Connect a 2MHz I/Q signal to TXBBI and TXBBQ.

Set the input amplitude of each channel to 90mVRMS.

- 3) In the **Register** panel of the software, set ENABLE and TXENABLE to 1 and RXENABLE to 0 to activate the transmit path.
- 4) Enable the output of the baseband signal sources. The desire tone, LO leakage, and the sideband appear at 2502MHz, 2500MHz, and 2498MHz, respectively. In the **TX** panel of the software, toggle TXVGA to SPI. Set the TX VGA gain to 3dB back from the max gain. Adjust the TX mixer V2I gain to -5.5dB, which is the default. The power level of the desire tone is approximately -1.5dBm in the spectrum analyzer marker reading.

Layout Considerations

The MAX2837 EV kit can serve as a guide for board layout. Keep PCB trace lengths as short as possible to minimize parasitic inductance. Also, keep decoupling capacitors as close to the IC as possible with a direct connection to the ground plane.

Power-Supply Layout

To minimize coupling between different sections of the IC, use a “star” power-supply routing configuration with a large decoupling capacitor at a central V_{CC} node. The V_{CC} traces branch out from this node, each going to a separate V_{CC} node in the circuit. Place a bypass capacitor as close to each supply pin as possible. This arrangement provides local decoupling at each V_{CC} pin. Use at least one via per bypass capacitor for a low-inductance ground connection. Do not share the capacitor ground vias with any other branch.

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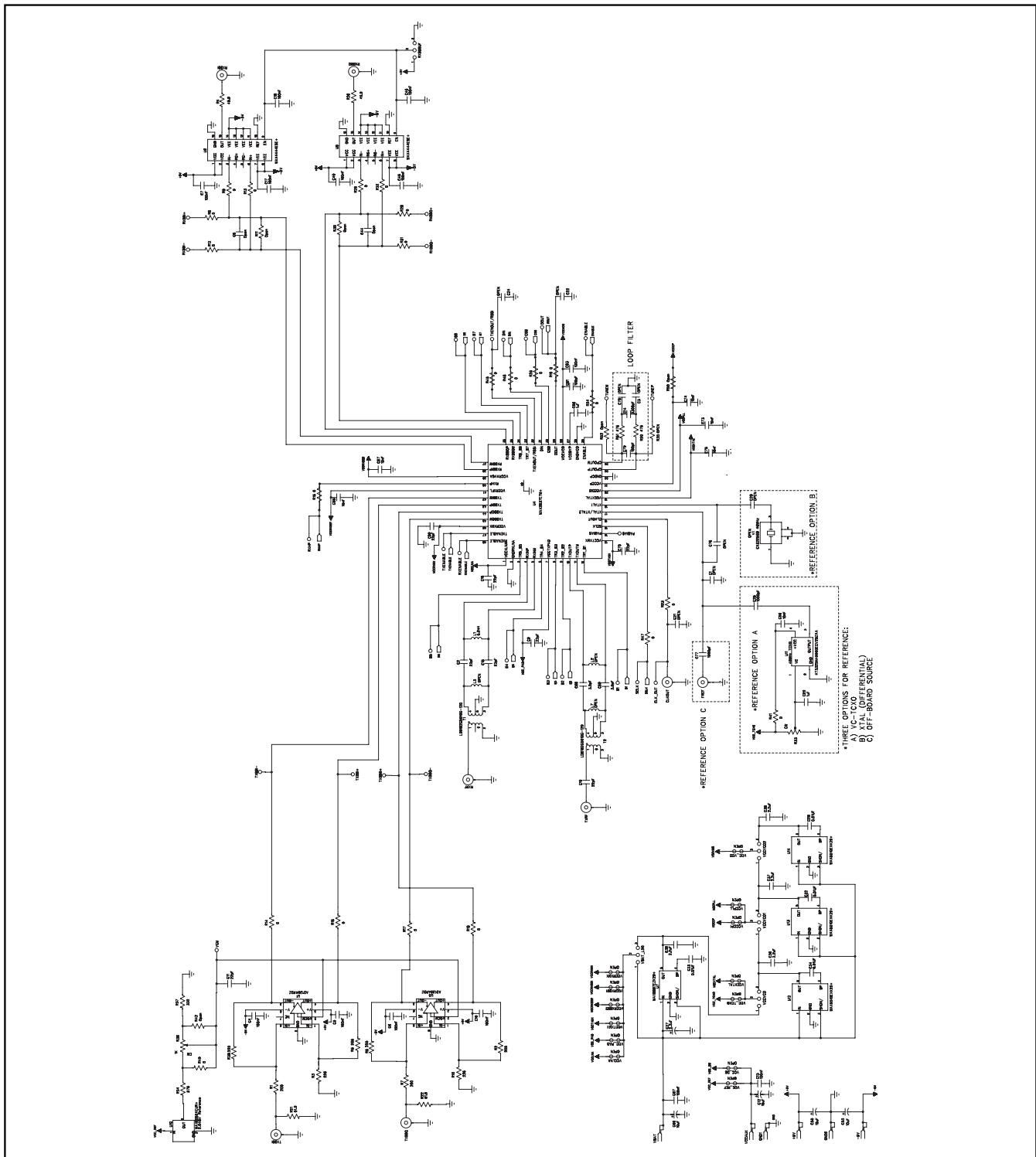


Figure 1a. MAX2837 EV Kit Schematic (Sheet 1 of 2)

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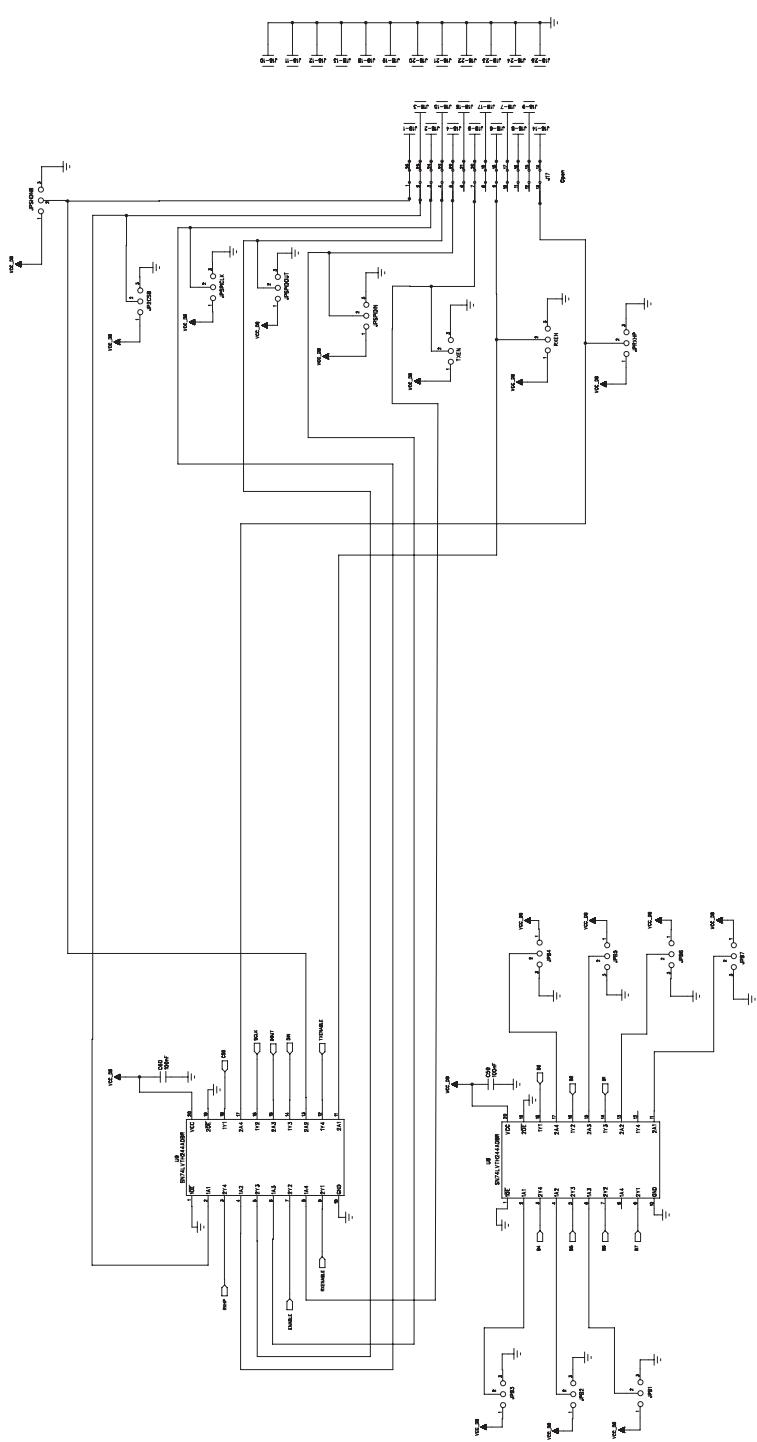


Figure 1b. MAX2837 EV Kit Schematic (Sheet 2 of 2)

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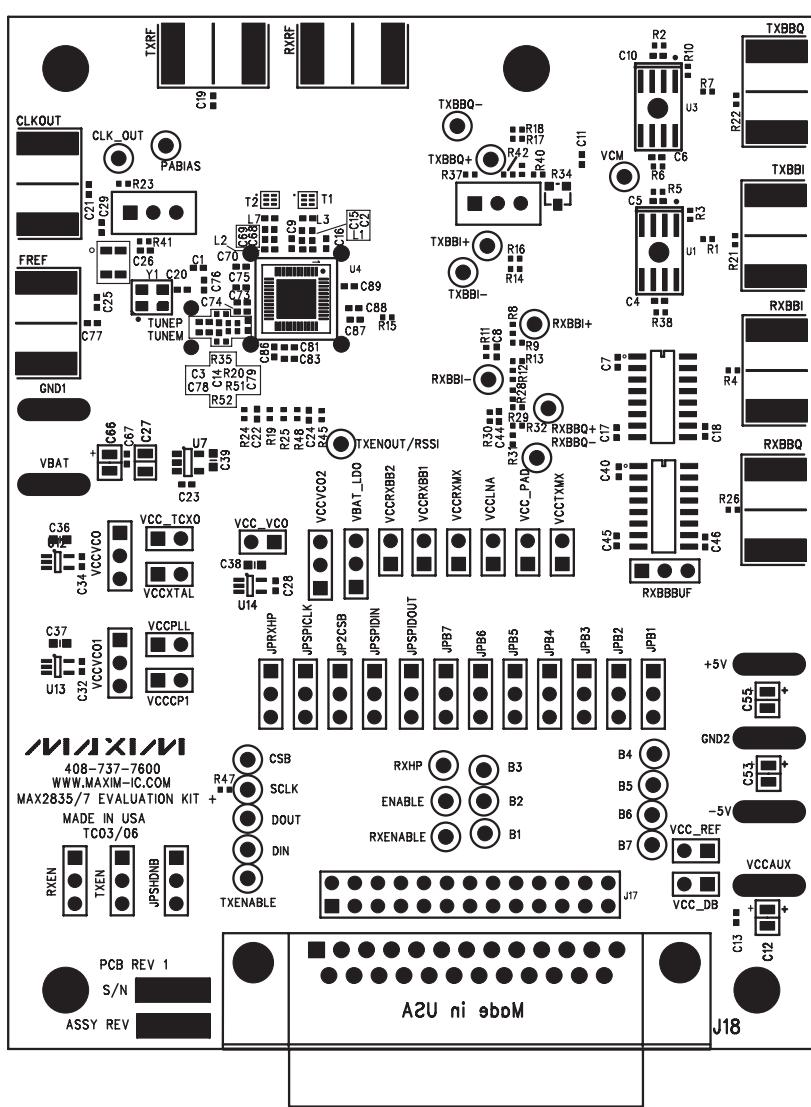


Figure 2. MAX2837 EV Kit PCB Layout—Top Silkscreen

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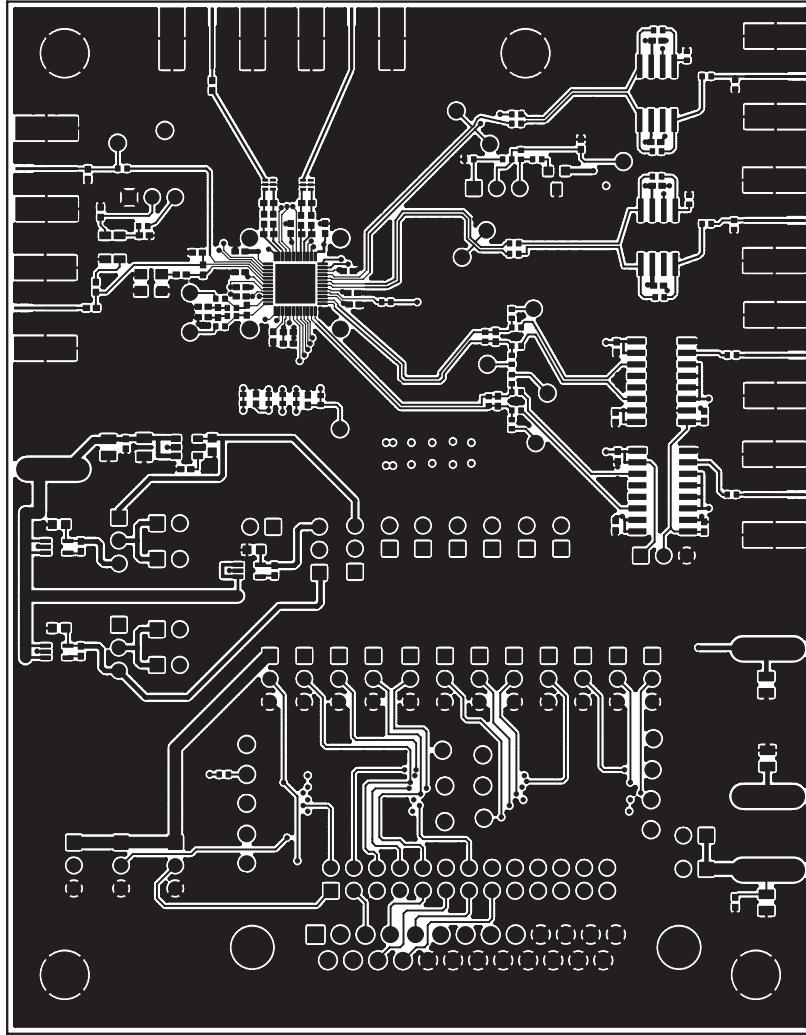


Figure 3. MAX2837 EV Kit PCB Layout—Component Side

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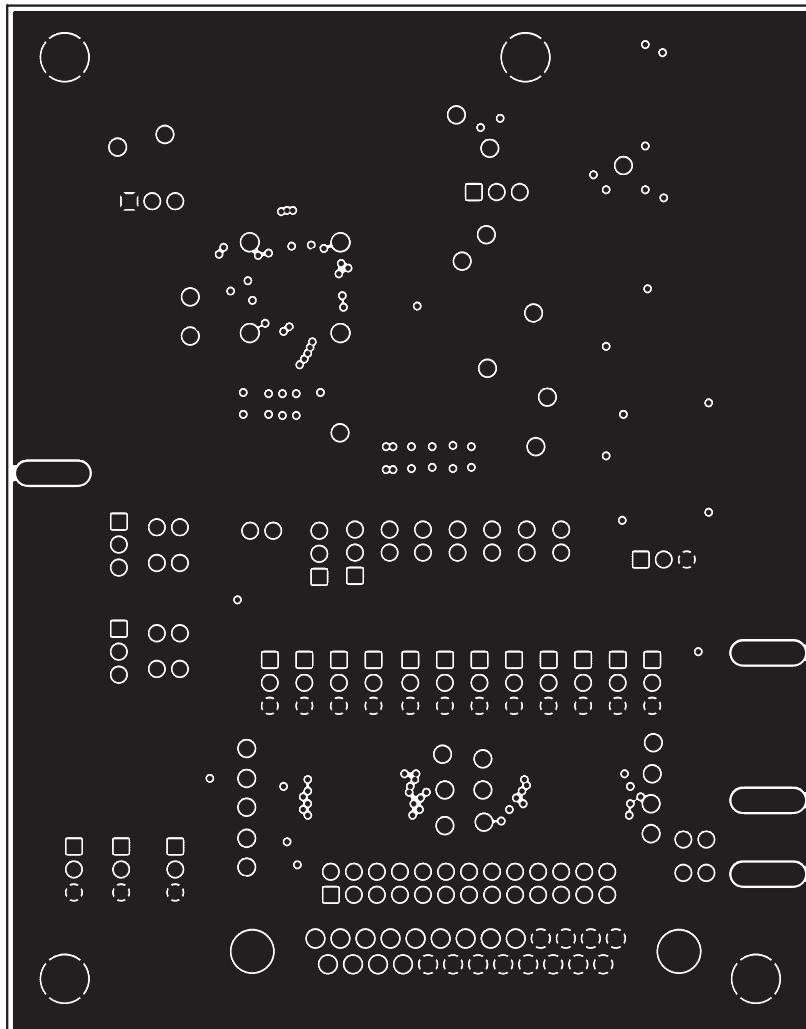


Figure 4. MAX2837 EV Kit PCB Layout—Inner Layer 2, Ground Layer

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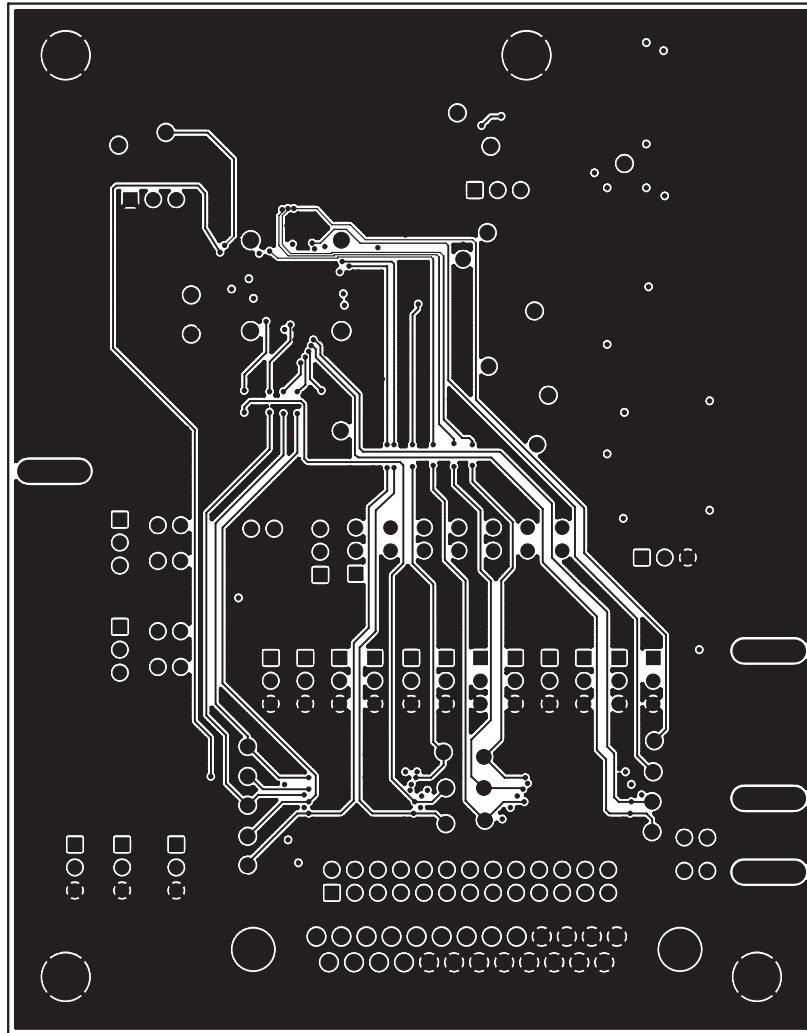


Figure 5. MAX2837 EV Kit PCB Layout—Inner Layer 3, Routes

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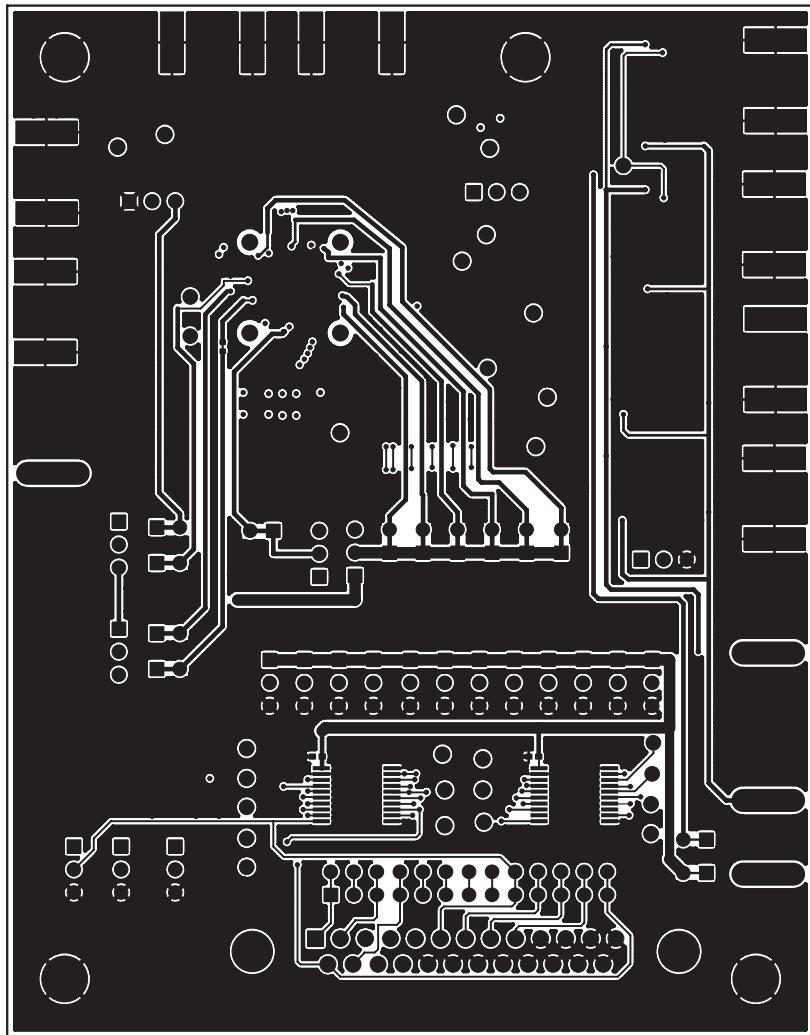


Figure 6. MAX2837 EV Kit PCB Layout—Solder Side

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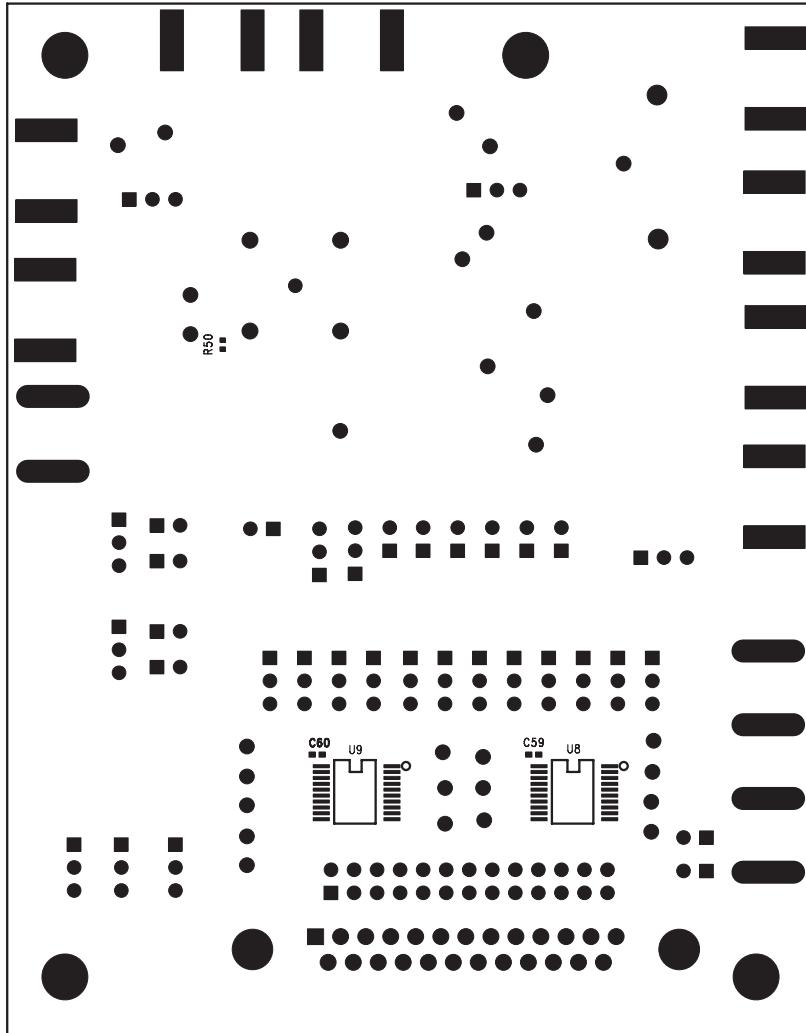


Figure 7. MAX2837 EV Kit PCB Layout—Bottom Silkscreen

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