General Description

The MAX2837 evaluation kit (EV kit) simplifies testing of the device's 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.maximintegrated.com/evkitsoftware)

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.

- MAX2837 EV kit
- INTF3000+ interface board
- 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
- PC laptop or tablet with Microsoft Windows XP®, Windows® 7, 8 OS and a USB port
- USB-A male to USB-B male cable

Connections and Setup

The EV kit is fully assembled and factory tested. Follow the instructions below to test the device. This section provides step-by-step instructions for getting the EV kit up and running in all modes. See Figure 1 for EV kit connections:

1) Connect the PC to the INTF3000 interface board using the USB-A male to USB-B male cable. On the INTF3000, remove jumper JU1 and connect a DC supply set to 3.3V to the VPULL connector. Connect the 25-pin connector of the INTF3000 (J4) directly to the 25-pin connector on the EV kit (J18).
2) 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 GND1.
3) With the power supply turned off, connect the +5V power supply to the +5V test point and the -5V power supply to the -5V test point. Connect the power-supply ground to the header labeled GND2. Connect all the power-supply grounds together.
4) Set the RXBBBUF jumper across pins 1-2 to enable the RX baseband buffers.
5) 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.
6) Turn on the +3.3V power supply, and the +5V and -5V power supplies.
7) Make sure there are no jumpers across headers labeled RXEN, TXEN and JPSHDNB so that these enables can be controlled through the software.
8) Adjust the TX common-mode potentiometer (R36) until measuring 0.9V common-mode voltage at the VCM test point (see Figure 1 for locations).
9) Install and run the MAX2837 control software from HERE.
10) In the **Enables** panel of the software, check the EN_SPI box to enable the 3-wire interface.
11) In the **Synth** panel of the software, set the LO frequency to 2500MHz.
12) In the **Registers** panel of the software, set ENABLE to 1 and RXENABLE and TXENABLE to 0 to put the IC into standby mode. The supply current should be around 35mA.

Receive Mode

1) Set the signal generator to accurately deliver -100dBm at 2502MHz. Connect the output of the signal generator to RXRF port of the EV kit.
2) Connect either the RXBBI or RXBBQ baseband output to a spectrum analyzer. Set the center frequency to 2MHz and the span to 1MHz. Other recommended spectrum analyzer settings are: Res BW of 3kHz, Attenuation of 40dB, and Ref Level of 30dB.
3) In the **Registers** panel of the software, set ENABLE and RXENABLE to 1 and TXENABLE to 0 to activate the receive path. The current should be around 94mA.
4) In the **RX** panel of the software, toggle both the LNA gain enable and the baseband VGA enable 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 -2dBm.

Transmit Mode

1) Connect the spectrum analyzer to the TXRF port. Set the center frequency to 2500MHz and the span to 5MHz. Other recommended spectrum analyzer settings are: Res BW of 10kHz, Attenuation of 10dB and Ref Level of 0dB.
2) Connect a 2MHz sinusoid to TXBBI and a 2MHz sinusoid with a 90° phase shift (or a cosine) to TXBBQ. Set the input amplitude of each channel to 90mV_{RMS}.
3) In the **Registers** panel of the software, set ENABLE and TXENABLE to 1 and RXENABLE to 0 to activate the transmit path. The current should be around 146mA.
4) In the **TX** panel of the software, toggle TX VGA Gain to SPI. Set it to -3dB from the max gain.
5) In the **TX** panel of the software, set the TX Mixer V2I gain to -5.5dB (this is also the default setting).
6) Turn on the baseband signal sources. The output at 2502MHz should be approximately -1dBm. The LO leakage at 2500MHz should be around -27dBm and sideband suppression at 2498MHz should be around -39dBm.

Layout Considerations

The 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.

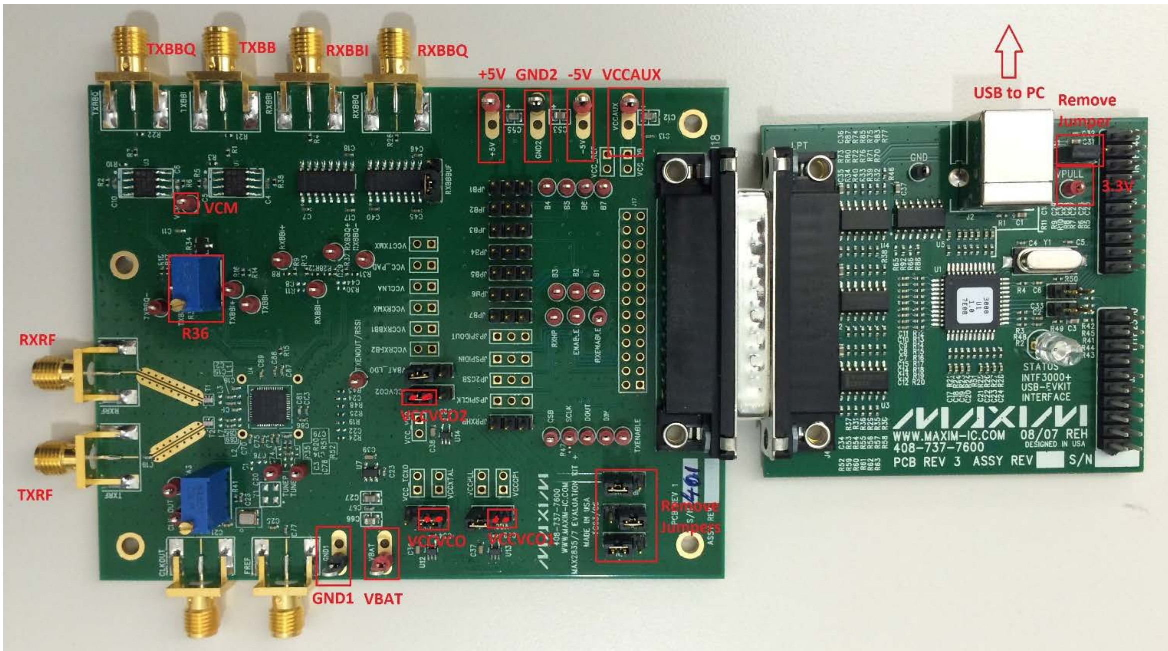


Figure 1. MAX2837 EV Kit Connections

Component Suppliers

SUPPLIER	WEBSITE
Digi-Key Corp.	www.digikey.com
Johnson Components	www.johnsoncomponents.com
Murata Americas	www.murata.com
Texas Instruments Inc.	www.ti.com

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

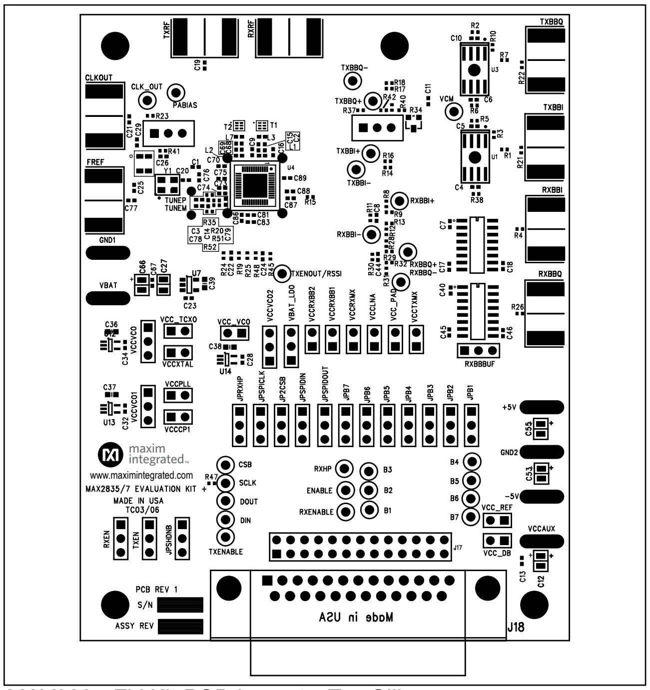
MAX2837 EV Kit Bill of Materials

DESIGNATION	QTY	DESCRIPTION
+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, TUNEP, TXENABLE, RSSI, VCM	29	Test points, PCB mini-red Keystone 5000
GND1, GND2	2	Test points, PCB black Keystone 5011
J17, JP2CSB, JPSPICLK, JPSPIDIN, JPSPIDOUT, L3, L4, L7, VCCCP1, VCCLNA, VCCPLL, VCCRXBB1, VCCRXBB2, VCCRXMX, VCCTXMX, VCCXTAL, VCC_DB, VCC_PAD, VCC_REF, VCC_TCXO, VCC_VCO, Y1	0	Not installed
JPB1–JPB7, JPSHDNB, RXBBBUF, RXEN, TXEN, VCCVCO, VCCVCO1, VCCVCO2	16	1 x 3-pin headers Sullins PEC36SAAN
C1, C3, C8, C20–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
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

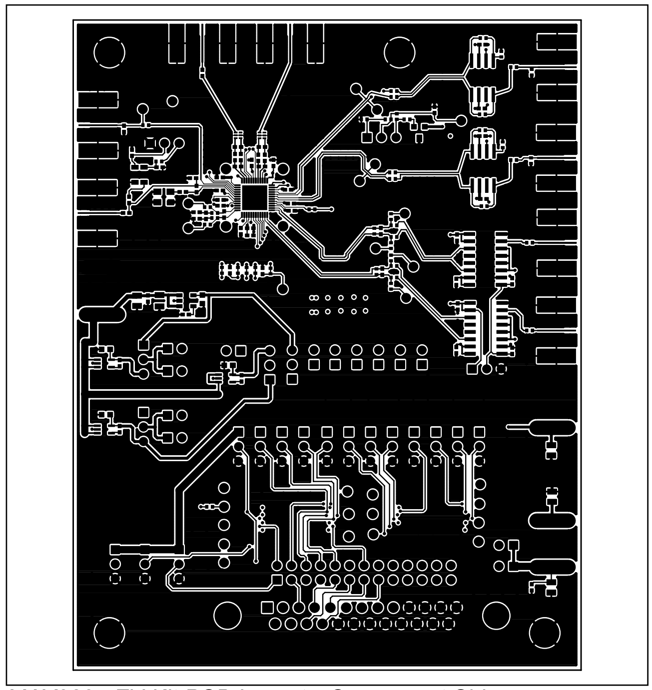
MAX2837 EV Kit Bill of Materials (continued)

DESIGNATION	QTY	DESCRIPTION
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)
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)
RXRF, TXRF, CLKOUT, RXBBI, RXBBQ, TXBBI, TXBBQ, FREF	8	SMA edge-mount connectors, round Johnson 142-0701-801
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–U14	3	Ultra-low-noise LDOs MAX8510EXK29+ (5-pin SC70)
—	16	Shunts (JPB1–JPB7, JPSHDNB, RXBBBUF, RXEN, TXEN, VCCVCO, VCCVCO1, VCCVCO2) Sullins SSC02SYAN
—	1	PCB: MAX9835/7 EVALUATION KIT+

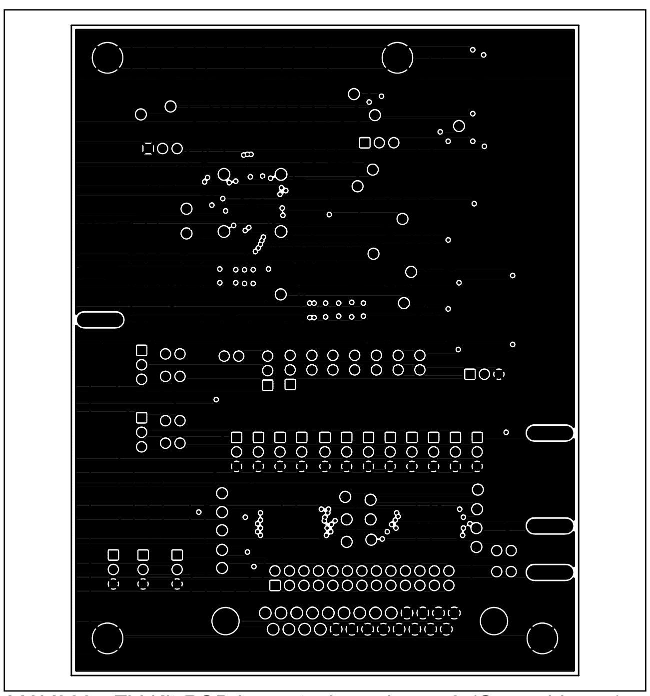
MAX2837 EV Kit PCB Layout Diagrams (continued)



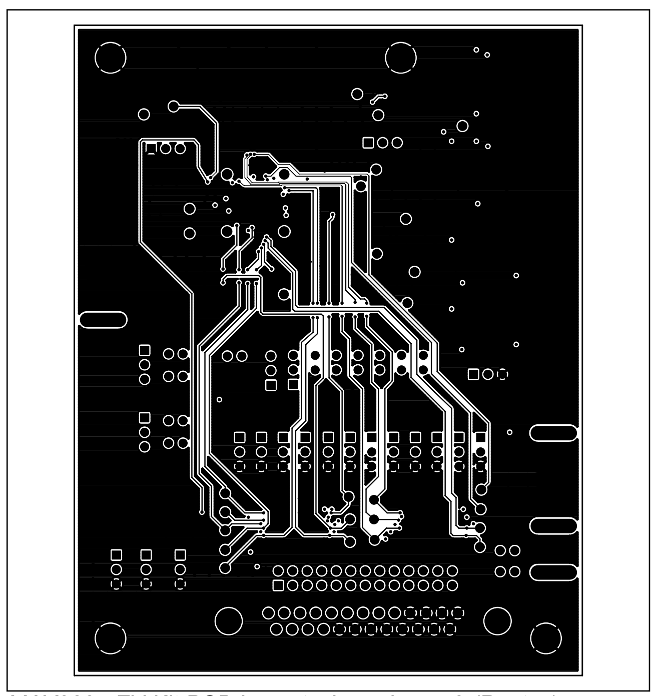
MAX2837 EV Kit PCB Layout—Top Silkscreen



MAX2837 EV Kit PCB Layout—Component Side

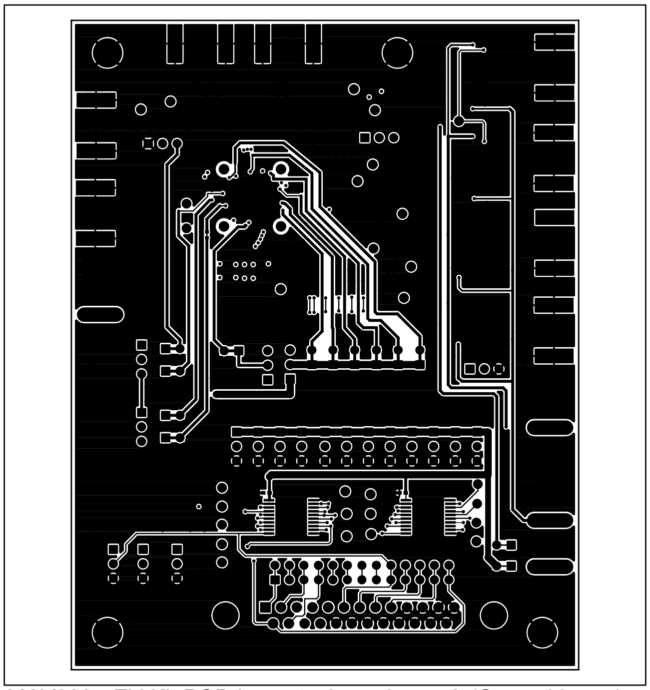


MAX2837 EV Kit PCB Layout—Inner Layer 2 (Ground Layer)

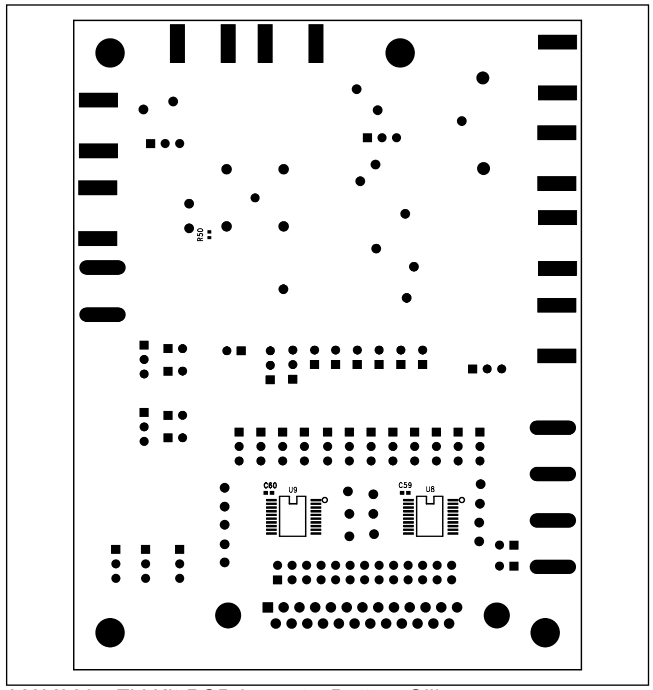


MAX2837 EV Kit PCB Layout—Inner Layer 3 (Routes)

MAX2837 EV Kit PCB Layout Diagrams (continued)

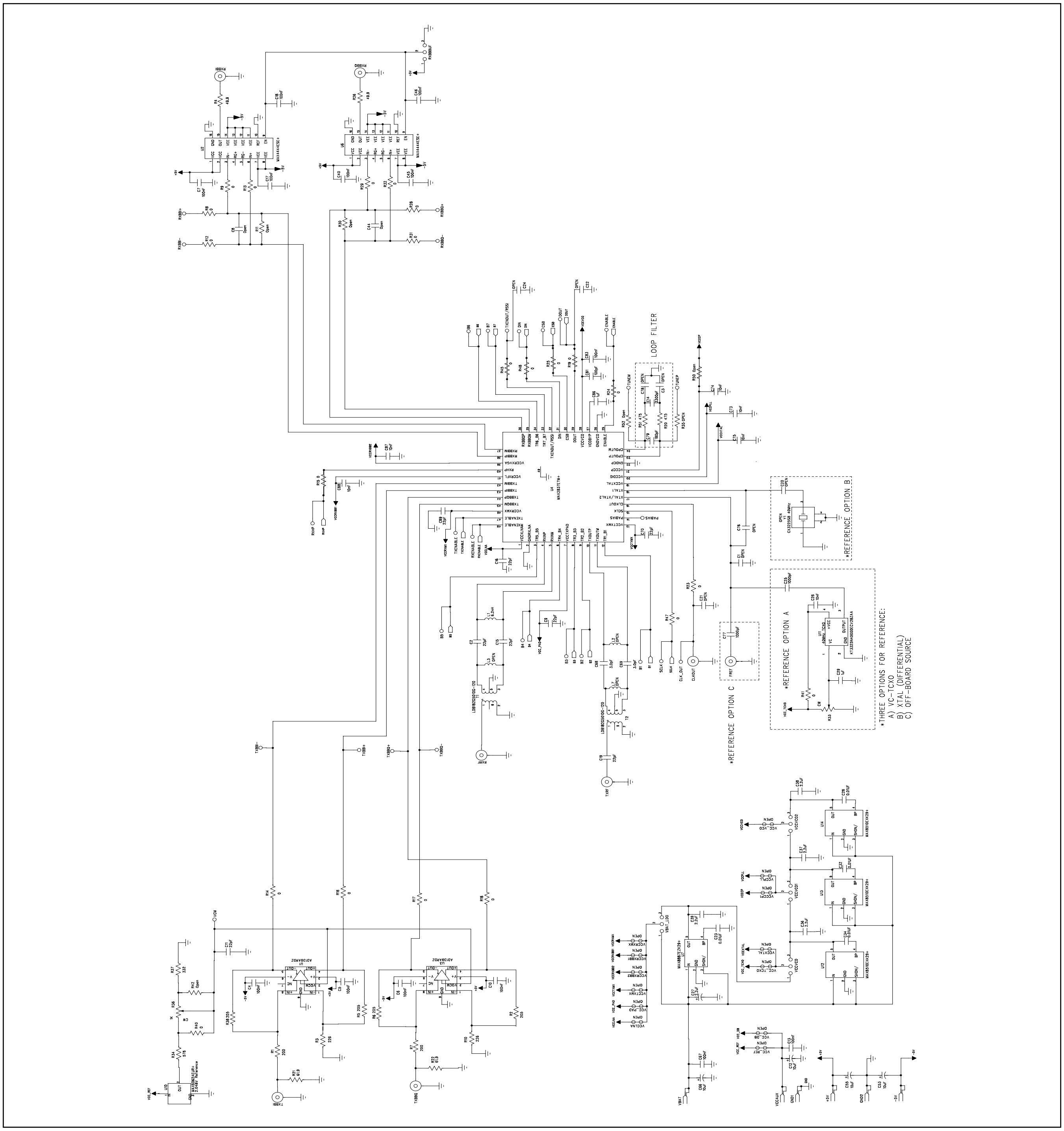


MAX2837 EV Kit PCB Layout—Inner Layer 2 (Ground Layer)



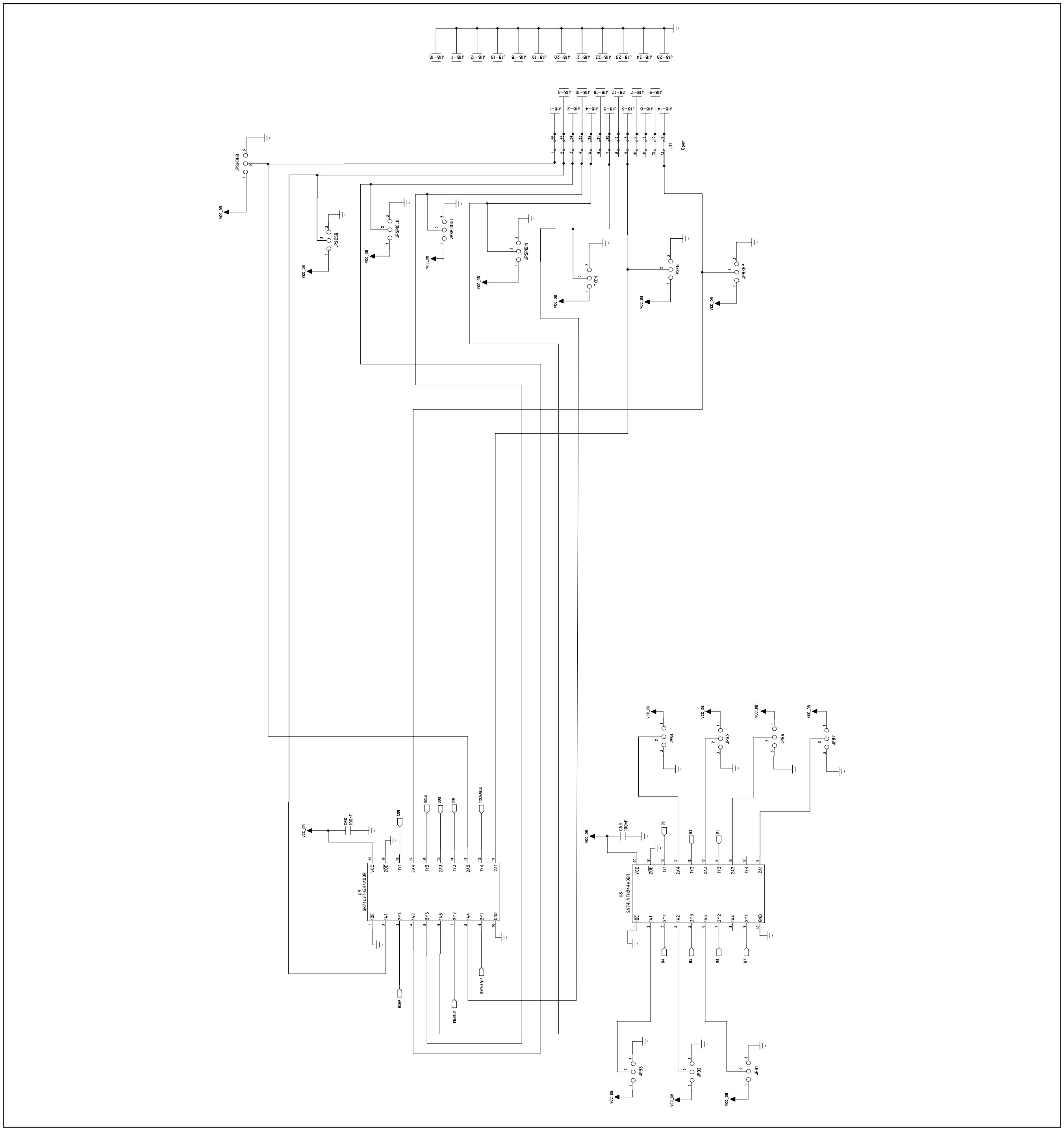
MAX2837 EV Kit PCB Layout—Bottom Silkscreen

MAX2837 EV Kit Schematic



MAX2837 EV Kit Schematic (Sheet 1 of 2)

MAX2837 EV Kit Schematic (continued)



MAX2837 EV Kit Schematic (Sheet 2 of 2)

Ordering Information

PART	TYPE
MAX2837EVKIT+	EV Kit

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

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/07	Initial release	—
1	11/14	Updated *Quick Start* section	3
2	1/16	General improvements to EV kit data sheet	1–4