19-3470; Rev 0; 10/04

MAXIM

MAX2828/MAX2829 Evaluation Kits

Evaluate: MAX2828/MAX2829

General Description

The MAX2828/MAX2829 evaluation kits (EV kits) simplify the testing of the MAX2828/MAX2829. The EV kits provide 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 of the MAX2828/MAX2829 to single-ended ports.

The EV kits simplify evaluation of the receive and transmit performance in the corresponding 802.11x bands.

Features

- **On-Board Line Drivers and Voltage Reference**
- **50Ω SMA and BNC Connectors on All RF and Baseband Ports**
- **PC Control Software Available at www.maxim-ic.com**
- **3-Wire Serial Interface**

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX2828EVKIT	-40°C to +85°C	56 TQFN (T5688-2)
MAX2829EVKIT	-40°C to +85°C	56 TQFN (T5688-2)

MAX2829 Component List

For the MAX2828, components that are connected to N.C. pins can be left open.

DESIGNATION	QTY	DESCRIPTION
C1	1	0.5pF ±0.1pF 0402 capacitor Murata GRM1555C1HR50B
C2	1	8.2pF ±0.1pF 0402 capacitor Murata GRM1555C1H8R2B
C3, C66	2	1.0µF ±10% 0402 capacitors Murata GRM155R60J105K
C4	1	1.0pF ±0.1pF 0402 capacitor Murata GJM1555C1H1R0B
C5, C7, C10, C11, C17, C18, C21, C22, C29, C35, C37, C40, C42, C43, C45, C46, C50, C52, C54, C59, C60	21	0.1µF ±10% 0402 capacitors Murata GRM1555R61A104K
C6, C9, C16, C19, C20, C23–C28, C30, C32, C36, C38, C41, C56, C57, C58	19	0.01µF ±10% 0402 capacitors Murata GRM155R71C103K
C12, C13	2	1.8pF ±0.1pF 0402 capacitors Murata GRM1555C1H1R8B
C14, C15	2	1.2pF ±0.1pF 0402 capacitors Murata GJM1555C1H1R2B

DESIGNATION	QTY	DESCRIPTION
C33	1	560pF ±5% 0402 capacitor Murata GRM1555C1H561J
C34	1	150pF ±5% 0402 capacitor Murata GRM1555C1H151J
C39, C51, C53 C55	4	10µF ±20% tantalum capacitors—R case AVX TAJR106M006R
C47	1	100pF ±5% 0402 capacitor Murata GRM1555C1H101J
C65	1	0.5pF ±0.1pF 0201 capacitor Murata GJM0335C1ER50B
J1–J9	9	Connectors—SMA end-launch jack receptacles 0.062in Johnson 142-0701-801
J12–J16, TP1–TP8, TP10–TP23	27	Test points 5000K-ND
J18	1	Connector DB25—right angle, male AMP 747238-4
JP21, JP22	2	1 x 3 headers, 3-pin in-line headers, 100 mils Sullins S1012-36-ND

MAX2829 Component List (continued)

DESIGNATION	QTY	DESCRIPTION
L1	1	6.8nH ±5% 0402 inductor Murata LQG15HN6N8J00
L2	1	2.0nH ±0.2nH 0201 inductor Murata LQP03TN2N0C00
L6	1	3.6nH ±0.2nH 0402 inductor Murata LQP15MN3N6C00
L7	1	1.8nH ±0.1nH 0402 inductor Murata LQP15MN1N8B02
R1, R2, R6, R10, R16, R17, R22, R27	8	75Ω ±1% 0402 resistors
R3, R7, R18, R23, R25	5	10kΩ ±1% 0402 resistors
R4, R5, R21, R26	4	49.9Ω ±1% 0402 resistors
R8, R9, R12, R13, R19, R28, R29, R31, R32, R36, R42, R44	12	0Ω ±1% 0402 resistors
R14	1	267Ω ±1% 0402 resistor
R15	1	11kΩ ±1% 0402 resistor
R20	1	620Ω ±0.01 0402 resistor
R24	1	300Ω ±0.01 0402 resistor
R34, R37	2	100kΩ ±1% 0402 resistors
R39, R40, R41	3	100Ω ±1% 0402 resistors
R43	1	1kΩ ±1% 0402 resistor
T1	1	HHM1711D1 balun TDK HHM1711D1
T2	1	HHM1732B1 balun TDK HHM1732B1
U1, U5	2	MAX4447ESE
U2, U6	2	MAX4444ESE
U3	1	MAX6061BEUR
U4	1	MAX2828ETN/MAX2829ETN
U8, U9	2	Texas Instruments SN74LVTH244ADBR

Quick Start

Each EV kit is fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section to test the devices.

Test Equipment Required

This section lists the recommended test equipment to verify the operation of the MAX2828/MAX2829. It is intended as a guide only, and substitutions may be possible.

- DC supply capable of delivering +5.0V and 200mA of continuous current
- DC supply capable of delivering -5.0V and 200mA of continuous current
- DC supply capable of delivering +3.6V and 300mA of continuous current
- HP 8663A or equivalent low-noise signal source capable of generating a 20MHz or 40MHz reference oscillator signal
- Two HP 8648s or equivalent signal sources capable of generating 0dBm up to 6GHz
- 802.11x I/Q waveform generator (optional)
- HP 8561E or equivalent RF spectrum analyzer with a minimum 100kHz to 6GHz frequency range
- TDS3012 or equivalent oscilloscope with 200MHz bandwidth
- IBM PC or a PC compatible with Windows® 95/98/2000/NT 4.0, or later operating system and an available parallel port
- Male-to-male 25-pin parallel cable, straight through

Windows is a registered trademark of Microsoft Corp.

Connections and Setup

This section provides step-by-step instructions for getting the EV kits up and running in all modes:

1) Install and run the MAX2828/MAX2829 control software.
2) To control the EV kit through the 3-wire interface, connect the male-to-male 25-pin parallel cable between the PC and EV kit.
3) With the power supply turned off, connect a +2.7V power supply to the header labeled VCC (J13). Connect the power-supply ground to the header labeled GND (J12).
4) With the power supply turned off, connect a +5V power supply to the header labeled +5V (J16), and a -5V power supply to the header labeled -5V (J14). Connect the power-supply ground to the header labeled GND (J15).
5) Connect the low-noise signal source to FREF (J9).

6) Turn on the +5V and -5V power supplies, followed by the +2.7V power supply. Set the low-noise signal source to 20MHz and 2dBm. Enable the signal source. The lock indicator should be green.

Receive Mode

To evaluate the devices in receive mode:

1) Set the RXON jumper (JP22) to the On position and the TXON jumper (JP21) to the Off position.
2) Connect the RF signal source to either RXRFL (802.11g, J4) or RXRFH (802.11a, J3). Set the RF frequency to 2437MHz (802.11g) or 5.25GHz (802.11a). Set the signal power to -100dBm.
3) Set the register setting to the default values listed in the MAX2828/MAX2829 data sheet by clicking on the "Send All" button. Use the software to select between 802.11g and 802.11a modes. In the program, set the frequency to either 2437MHz (802.11g) or 5.25GHz (802.11a). Set the Rx gain to maximum using either the slider bar or the control bits.
4) Connect the spectrum analyzer to either RXBBI or RXBBQ. Set the center frequency to 5MHz with a 10MHz span.
5) Turn on the RF signal source. The output at 5MHz should be approximately -4dBm (802.11g) or -5dBm (802.11a).

Transmit Mode

To evaluate the devices in transmit mode:

1) Set the TXON jumper (JP21) to the On position and the RXON jumper (JP22) to the Off position.
2) Connect a 2MHz I/Q signal to TXBBQ and TXBBI. Set the input amplitude of each channel to $100mV_{RMS}$.
3) Set the register setting to the default values listed in the MAX2828/MAX2829 data sheet by clicking on the "Send All" button. Use the software to select between 802.11g and 802.11a modes. In the program, set the frequency to either 2437MHz (802.11g) or 5.25GHz (802.11a). Set the Tx gain to maximum using either the slider bar or the control bits.
4) Connect the spectrum analyzer to either TXRFL (802.11g, J1) or TXRFH (802.11a, J2).
5) Turn on the baseband signal sources. The output at RF should be approximately -2dBm (802.11g) or -4dBm (802.11a).

Table 1. Jumper Functions

JUMPER	STATE	FUNCTION
JU21	Off	Enables transmit mode. Placing the jumper toward the SPI™ connector puts the device in transmit mode.
JU22	Off	Enables receive mode. Placing the jumper toward the SPI connector puts the device in receive mode.

Table 2. Test Points

TP	DESCRIPTION
TP1	This pin allows for direct injection or monitoring of pin TXBBI+.
TP2	This pin allows for direct injection or monitoring of pin TXBBI-.
TP3	This pin allows for direct injection or monitoring of pin RXBBI+.
TP4	This pin allows for direct injection or monitoring of pin RXBBI-.
TP6	This pin allows for direct injection or monitoring of pin TXBBQ+.
TP7	This pin allows for direct injection or monitoring of pin TXBBQ-.
TP10	This pin allows for monitoring of the VCO tune voltage.
TP11	This pin allows for direct injection or monitoring of pin RXBBQ+.
TP12	This pin allows for direct injection or monitoring of pin RXBBQ-.
TP13	This pin allows for monitoring of pin B3.
TP14	This pin allows for monitoring of pin B4.
TP15	This pin allows for monitoring of pin B2.
TP16	This pin allows for monitoring of pin B5.
TP17	This pin allows for monitoring of pin $\overline{SHDN}$.
TP18	This pin allows for monitoring of pin B1.
TP19	This pin allows for monitoring of pin B6.
TP20	This pin allows for monitoring of pin TXENA.
TP21	This pin allows for monitoring of pin RXENA.
TP22	This pin allows for monitoring of pin RXHP.
TP23	This pin allows for monitoring of pin B7.

SPI is a trademark of Motorola, Inc.

Layout Considerations

The MAX2828/MAX2829 EV kits can be used as a starting point for layout. For best performance, take into consideration grounding and RF, baseband, and power-supply routing. Make connections from vias to the ground plane as short as possible. On the high-impedance ports, keep traces short to minimize shunt capacitance. EV kit Gerber files can be requested at www.maxim-ic.com.

Power-Supply Layout

To minimize coupling between different sections of the IC, a star power-supply routing configuration with a large decoupling capacitor at a central V_{CC} node is recommended. 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.

Matching Network Layout

The layout of a matching network is very sensitive to parasitic circuit elements. To minimize parasitic inductance, keep all traces short and place components as close to the IC as possible.

Table 3. I/O Connectors

SIGNAL	DESCRIPTION
J1	802.11b/g Transmitter Output
J2	802.11a Transmitter Output
J3	802.11a Receiver Input
J4	802.11b/g Receiver Input
J5	Single-Ended Transmitter Baseband I Input
J6	Single-Ended Receiver Baseband I Output
J7	Single-Ended Transmitter Baseband Q Input
J8	Single-Ended Receiver Baseband Q Output
J12	Ground
J13	+2.7V Supply Input
J14	+5V Supply Input
J15	Ground
J16	-5V Supply Input
J18	SPI Interface Connector

Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
AVX	843-448-9411	843-448-1943	www.avx.com
Digi-Key	800-344-4539	218-681-3380	www.digikey.com
Johnson Components	800-247-8256	507-833-6287	www.johnsoncomponents.com
Murata	770-436-1300	770-436-3030	www.murata.com
Texas Instruments	—	—	www.ti.com

Note: *Indicate you are using the MAX2828/MAX2829 when contacting these manufacturers.*

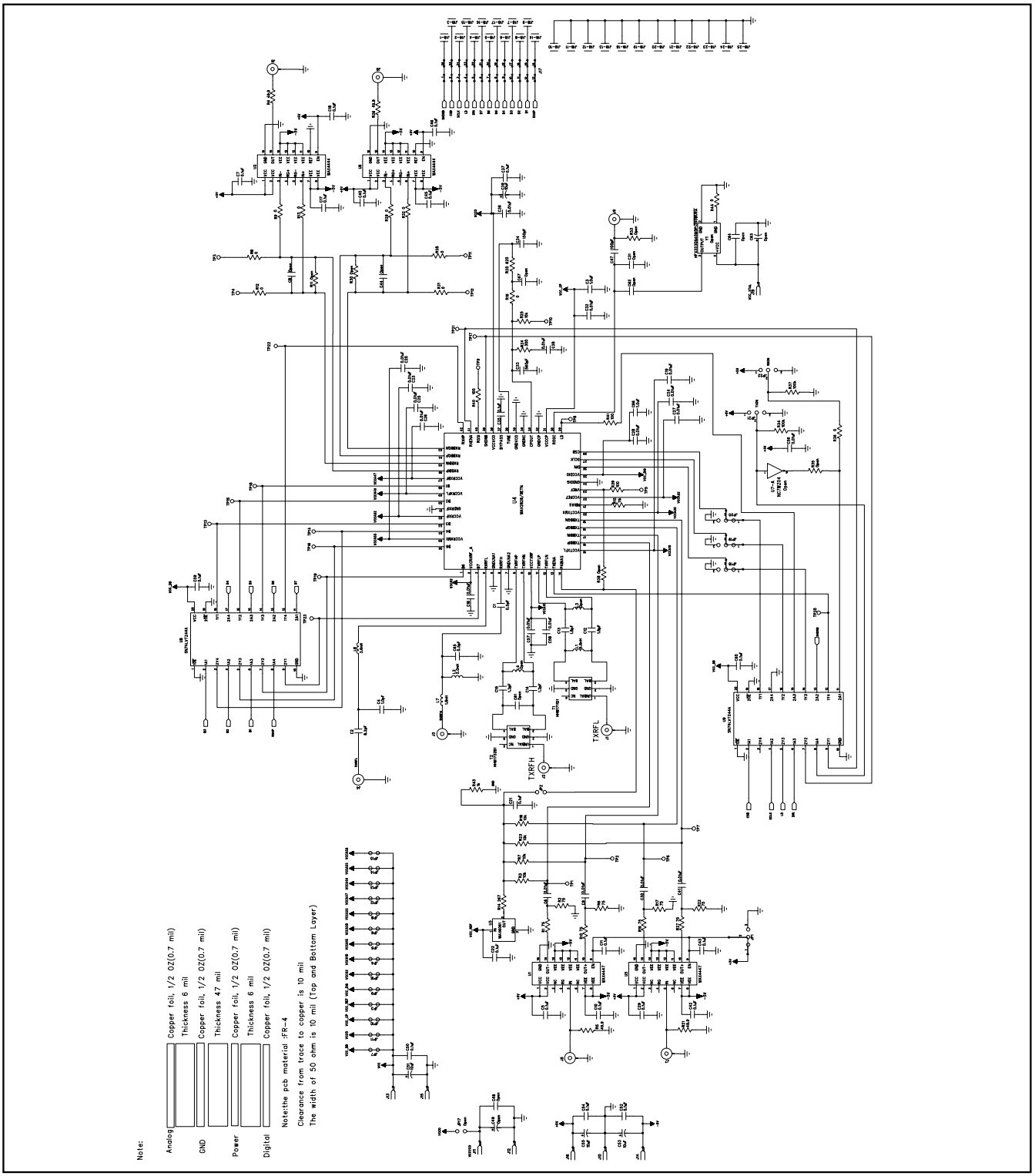

Figure 1. MAX2828/MAX2829 EV Kit Schematic

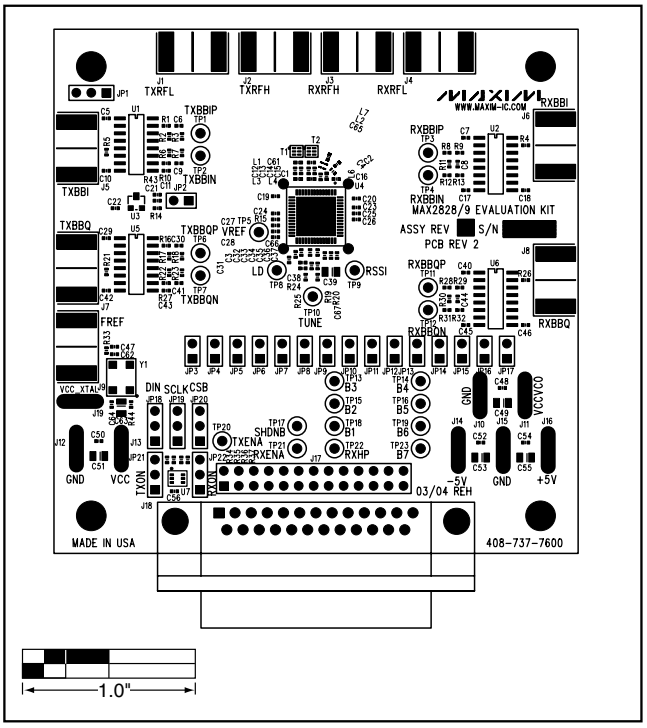

Figure 2. MAX2828/MAX2829 EV Kit PC Board Layout—Top Silkscreen

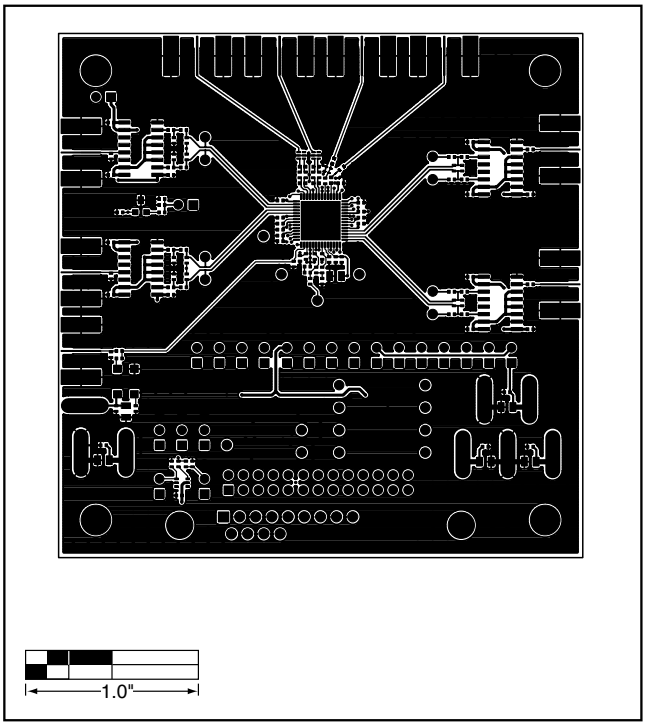

Figure 3. MAX2828/MAX2829 EV Kit PC Board Layout—Component Side

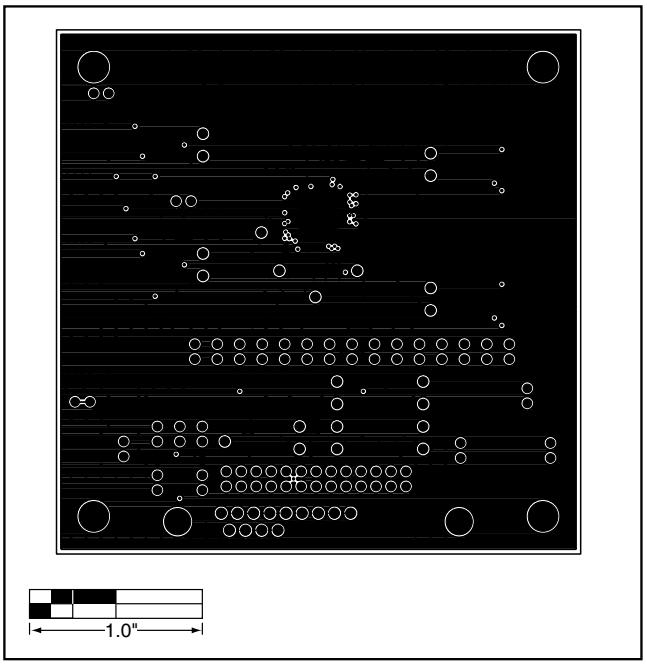

Figure 4. MAX2828/MAX2829 EV Kit PC Board Layout—Inner Layer 2

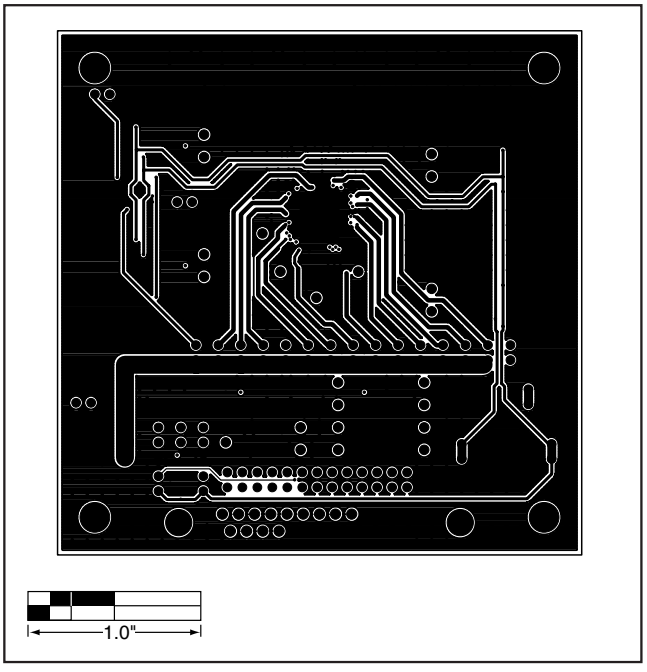

Figure 5. MAX2828/MAX2829 EV Kit PC Board Layout—Inner Layer 3

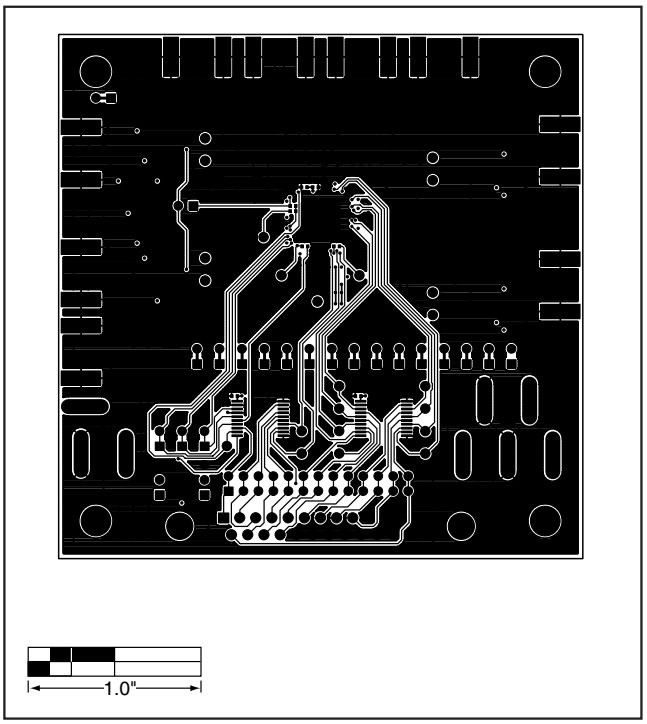

Figure 6. MAX2828/MAX2829 EV Kit PC Board Layout—Solder Side

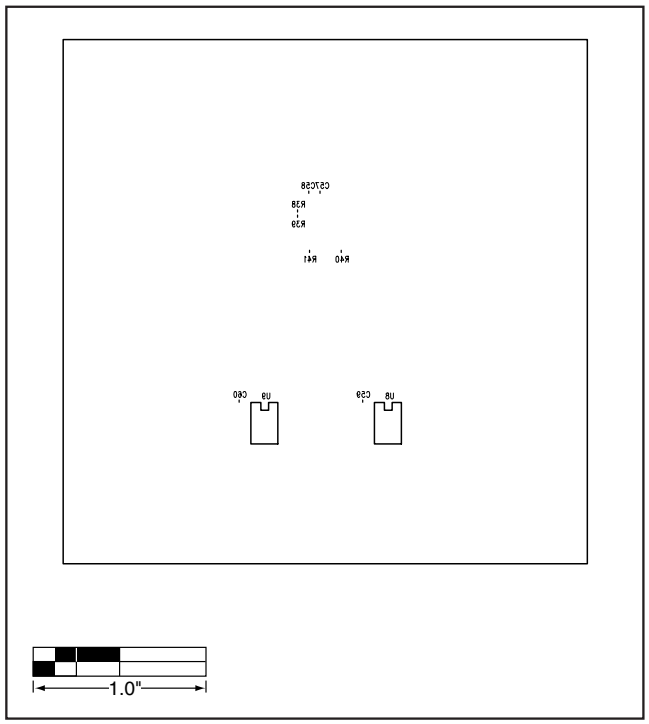

Figure 7. MAX2828/MAX2829 EV Kit PC Board Layout—Bottom Silkscreen

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