MAXIM
MAX8529 Evaluation Kit

Evaluates: MAX8529

_____General Description

The MAX8529 evaluation kit (EV kit) is a fully assembled and tested surface-mount circuit board demonstrating the MAX8529 dual, synchronized, step-down controller. The EV kit comes assembled with a circuit that steps down from an 8V to 13.2V input voltage, to output voltages of 1.8V and 3.3V. Both are capable of sourcing 3A. The switching frequency is set at 1.2MHz, and is adjustable from 600kHz to 1.5MHz with an external resistor. Alternatively, the controller can be synchronized to an external clock generated by another MAX8529 or a system clock. This device also features soft-start and soft-stop. The MAX8529 eliminates the need for current-sense resistors by utilizing the low-side MOSFET's on-resistance as the current-sense element. The adjustable foldback current limit reduces power dissipation during short-circuit conditions. The MAX8529 includes a power-on reset output to signal the system when both outputs reach regulation.

_____Features

♦ **Low Output Noise in DSL Band**

♦ **Ceramic Input/Output Capacitors**

♦ **Foldback Current Limit**

♦ **EV Kit Circuit Optimized for 8V to 13.2V Input**

♦ **>85% Efficiency**

♦ **Fixed-Frequency PWM Operation**

♦ **Adjustable 600kHz to 1.5MHz Switching Frequency**

♦ **External SYNC Input**

♦ **Clock Output for Master/Slave Synchronization**

♦ **Soft-Start and Soft-Stop**

♦ **RESET Output with 140ms Minimum Delay**

♦ **Lossless Current Limit (No Sense Resistor)**

♦ **Surface-Mount Components**

♦ **Fully Assembled and Tested**

_____Component List

DESIGNATION	QTY	DESCRIPTION
C1A, C1B, C12A, C12B	4	22µF, 6.3V X5R ceramic capacitors (1210) Taiyo Yuden JMK325BJ226MM
C2, C11	2	10µF, 25V X5R ceramic capacitors (1812) Taiyo Yuden TMK432BJ106KM
C3, C10	2	0.1µF, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C4	1	330pF, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H331K
C5	1	1000pF, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H102K
C6, C14	2	27pF, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H270J
C7	1	0.22µF, 10V X5R ceramic capacitor (0603) Taiyo Yuden LMK107BJ224MA

_____Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX8529EVKIT	0°C to +70°C	24 QSOP

_____Recommended Equipment

• +8V to +13.2V, 5A, variable-output power supply

• Two dummy loads capable of sinking 3A

• Two digital multimeters (DMM)

_____Quick Start

The MAX8529 EV kit is fully assembled and tested. Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed:**

1) Preset the power supply to +8V and turn off the power supply.

2) Connect the positive lead of the power supply to the VIN pad on the EV kit, and the negative lead of the power supply to the GND pad.

3) Connect the positive input of one DMM to VOUT1, and the negative input of the DMM to GND to measure the output voltage at VOUT1.

4) Connect the positive input of the other DMM to VOUT2, and the negative input of the DMM to GND to measure the output voltage at VOUT2.

5) Turn on the power supply and sweep the input voltage from 8V to 13.2V.

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
C8	1	0.22µF, 35V X5R ceramic capacitor (0805) Taiyo Yuden GMK212BJ224KG
C9	1	4.7µF, 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C13	1	390pF, 50V C0G ceramic capacitor (0603) TDK C1608C0G1H391J
C15	1	1500pF, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H152K
C16, C17	0	Not installed
D1	1	100mA, 30V, dual Schottky diode Central Semiconductor CMPSH-3A
L1	1	1.2µH, 5A inductor Coilcraft D01813P-122HC
L2	1	2.2µH, 7A inductor Coilcraft D03316P-222HC

DESIGNATION	QTY	DESCRIPTION
N1, N2	2	Dual N-channel MOSFETs, 30V, 35mΩ Fairchild FDS6912A
R1, R2, R11, R12	4	6.8Ω ±5% resistors (0603)
R3	1	21.5kΩ ±1% resistor (0603)
R4	1	26.7kΩ ±1% resistor (0603)
R5	1	620Ω ±5% resistor (0603)
R6, R16	2	10kΩ ±5% resistors (0603)
R7	1	22kΩ ±5% resistor (0603)
R8, R18	2	68kΩ ±5% resistors (0603)
R9, R20, R21	3	100kΩ ±5% resistors (0603)
R10	1	10Ω ±5% resistor (0603)
R13	1	24.9kΩ ±1% resistor (0603)
R14	1	10.7kΩ ±1% resistor (0603)
R15	1	560Ω ±5% resistor (0603)
R17	1	130kΩ ±5% resistor (0603)
R19	1	4.99kΩ ±1% resistor (0603)
R22	0	Not installed
U1	1	MAX8529EEG
None	1	MAX8529 EV kit PC board

Component Suppliers

SUPPLIER	COMPONENT	PHONE	WEBSITE
Central Semiconductor	Diodes	631-435-1110	www.centralsemi.com
Coilcraft	Inductors	800-322-2645	www.coilcraft.com
Fairchild Semiconductor	MOSFETs	800-341-0392	www.fairchildsemi.com
Panasonic	Resistors	714-373-7366	www.maco.panasonic.co.jp
Taiyo Yuden	Capacitors	408-573-4150	www.t-yuden.com
TDK	Capacitors	888-835-6646	www.component.tdk.com

Note: *Please indicate that you are using the MAX8529 when contacting these suppliers.*

6) Verify that the VOUT1 output voltage is 1.8V over the entire input range.

7) Verify that the VOUT2 output voltage is 3.3V over the entire input range.

8) Connect one 3A load between VOUT1 and GND.

9) Verify that the VOUT1 output voltage is 1.8V.

10) Connect the second 3A load between VOUT2 and GND.

11) Verify that the VOUT2 output voltage is 3.3V.

Detailed Description

Evaluating Other Output Voltages

The output voltages for the MAX8529 are adjustable from sub-1V to +18V. Change R4 to modify the VOUT1 output voltage. Change R14 to modify the VOUT2 output voltage. Refer to the *Setting the Output Voltage* section in the MAX8529 data sheet for details. Components on the EV kit can require changes to optimize the circuit with the new output voltages. Refer to the *Design Procedure* section in the MAX8529 data sheet for details on calculating the values for these components.

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Frequency and Synchronization

The MAX8529 switching frequency is adjustable from 600kHz to 1.5MHz. Change R19 to adjust the switching frequency. Refer to the *Setting the Switching Frequency* section in the MAX8529 data sheet for more details. Components on the EV kit may require changes to optimize the circuit with the new switching frequency. Refer to the *Design Procedure* section in the MAX8529 data sheet for details on calculating the values for these components.

The MAX8529 EV kit provides a CKO output and SYNC input to evaluate the MAX8529 in 2-phase and 4-phase systems. Refer to the *Clock Synchronization (SYNC, CKO)* section in the MAX8529 data sheet for instructions on synchronizing two MAX8529 controllers.

Current Limit

The MAX8529 EV kit demonstrates the foldback current-limit scheme utilized by the MAX8529. To modify the thresholds for the current limit and foldback current limit, change R7 and R8 for regulator one and R17 and R18 for regulator two. Refer to the *Setting the Valley Current Limit* section of the MAX8529 data sheet for the description of the current-limit schemes and instructions on calculating the resistor values.

### $\overline{RESET}$ Output

The $\overline{RESET}$ output is an open-drain output. $\overline{RESET}$ pulls low when either output falls below 90% of its nominal regulation voltage. Once both outputs exceed 90% of their nominal regulation voltages and both soft-start cycles are completed, $\overline{RESET}$ goes high impedance. To use a logic level other than VL, remove R9 and populate R22 with a 100kΩ resistor. This connects $\overline{RESET}$ to the user's logic level at the VLB input.

Shutdown

Pull EN low or connect to GND to shut down both regulators in the MAX8529. During shutdown, the supply current drops to 1mA and the output enters a high-impedance state. VL and REF remain active in shutdown. Pull EN high or connect to VL to enable both regulators in the MAX8529.

Temperature Range

The MAX8529 EV kit is designed to operate from 0°C to +70°C ambient. Above +50°C, airflow is required to keep the MOSFETs below their maximum junction temperature. The MAX8529 operates from -40°C to +85°C.
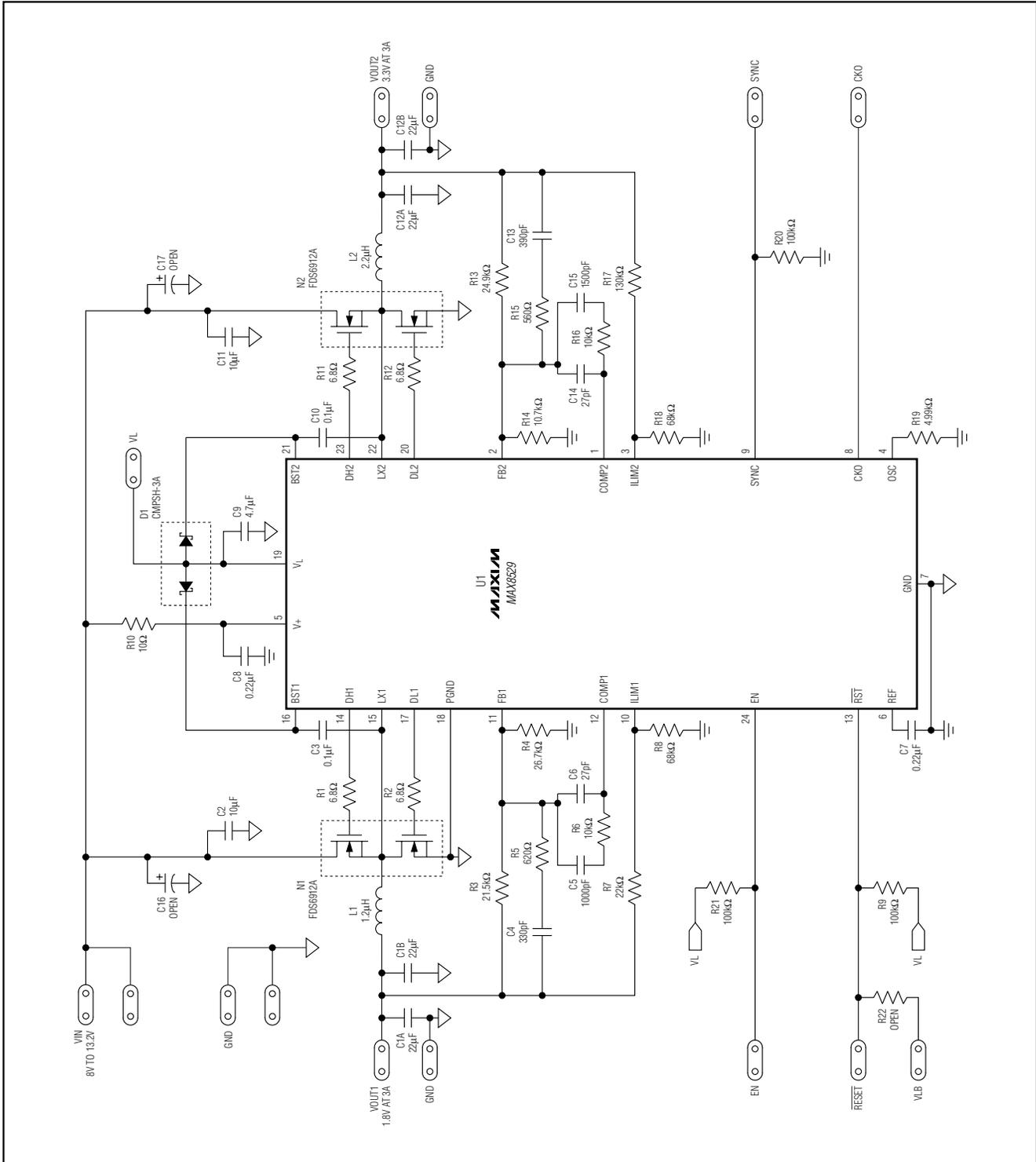
Figure 1. MAX8529 EV Kit Schematic

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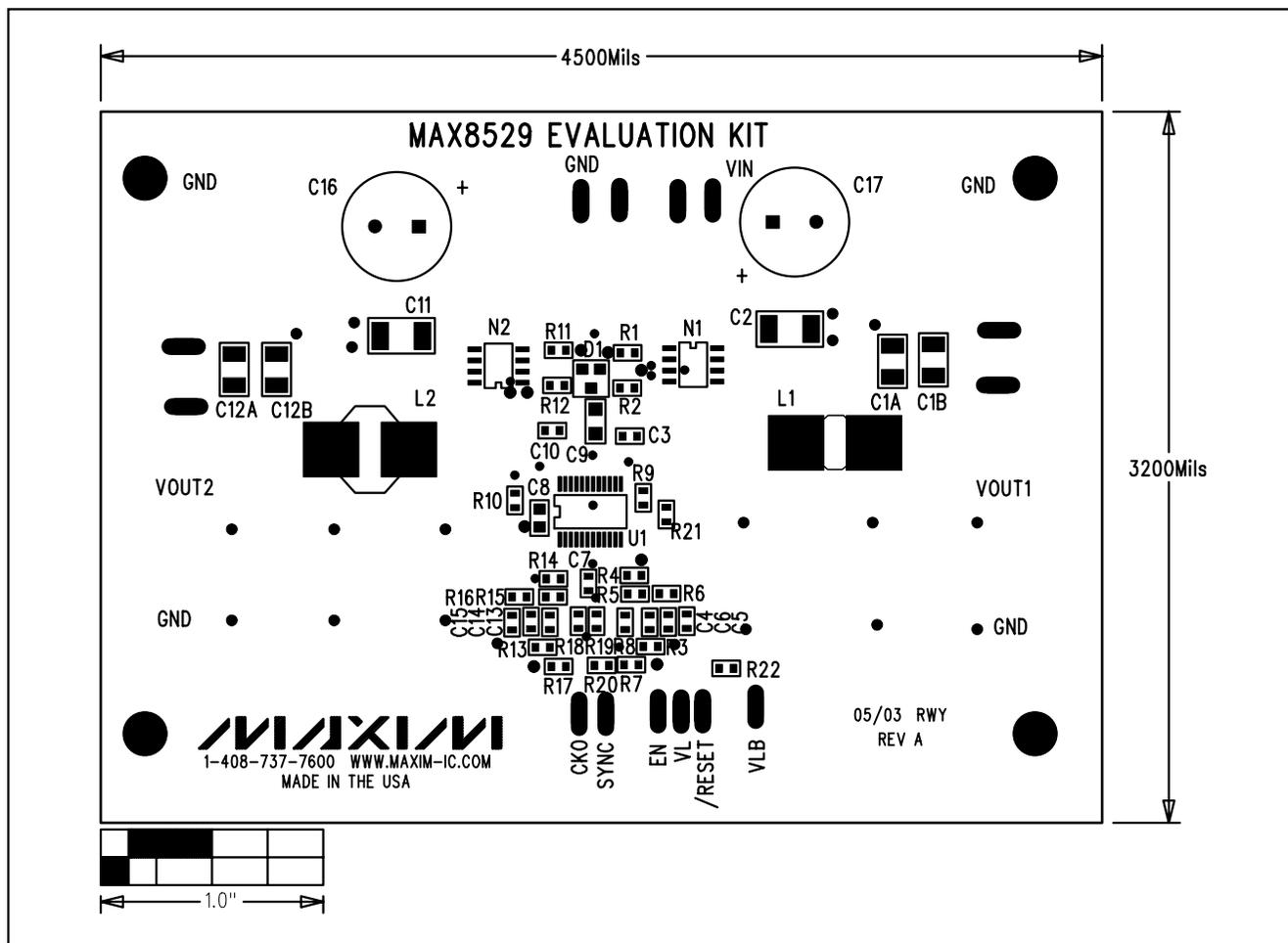
Figure 2. MAX8529 EV Kit Component Placement Guide—Top Silkscreen

MAX8529 Evaluation Kit
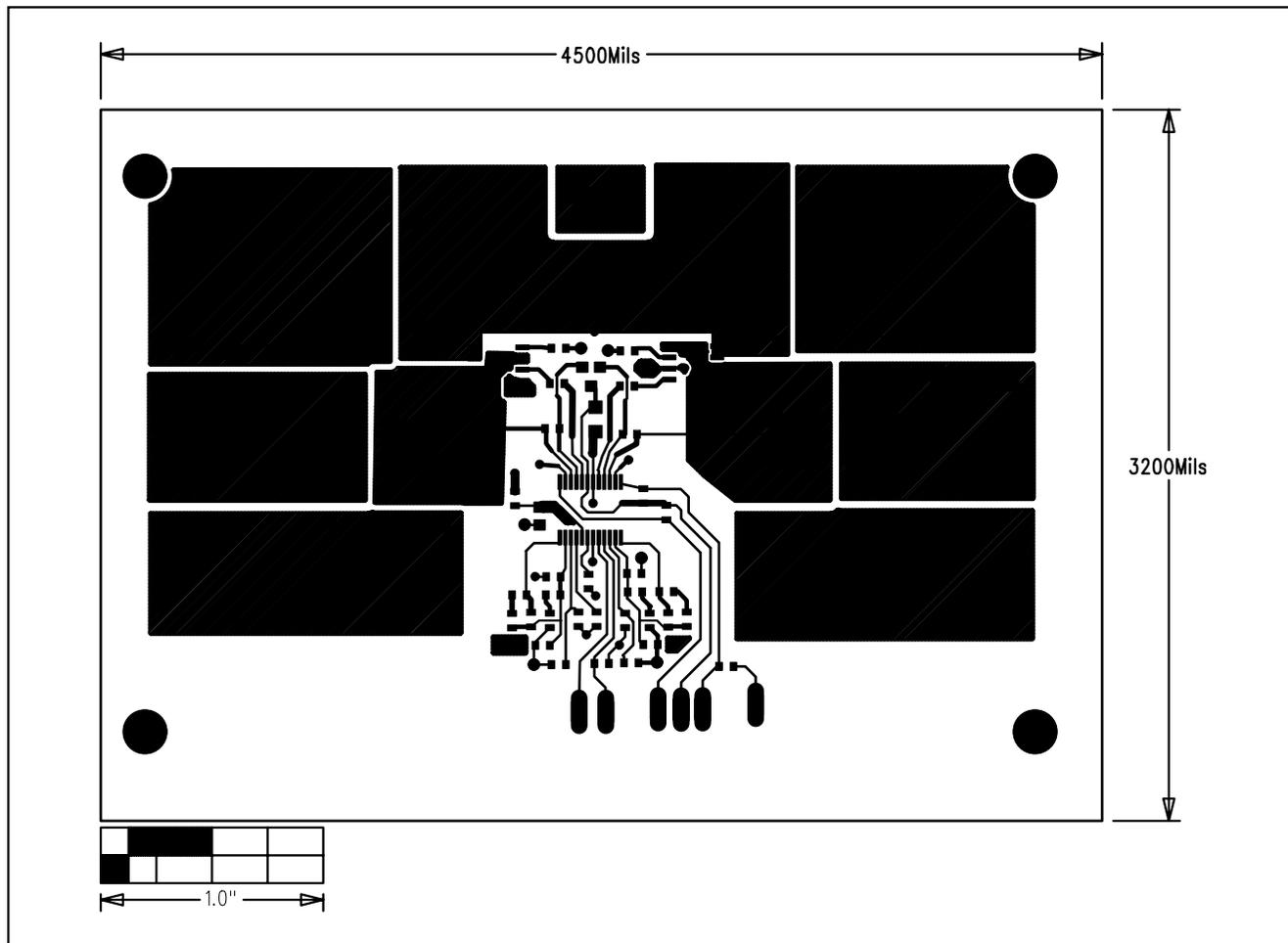
Figure 3. MAX8529 EV Kit PC Board Layout—Component Side

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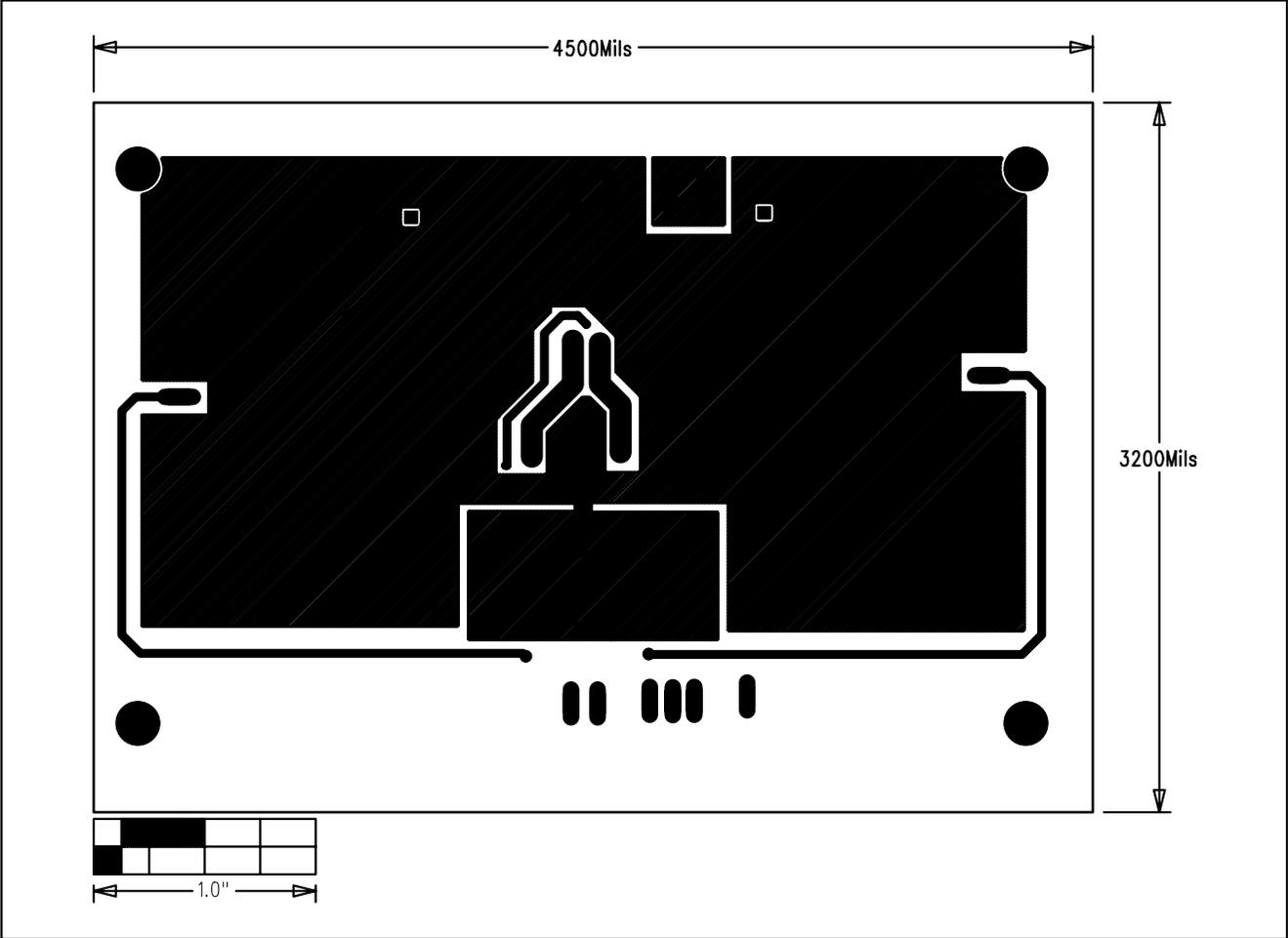
Figure 4. MAX8529 EV Kit PC Board Layout—Solder Side

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