19-3017; Rev 0; 3/04

MAXIM

MAX8554 Evaluation Kit

Evaluates: MAX8553/MAX8554

General Description

The MAX8554 evaluation kit (EV kit) is a fully assembled and tested circuit using the MAX8554 step-down controller. The EV kit comes with the MAX8554 installed and provides a 2.5V output at up to 20A using an input supply between 10.8V and 13.2V and an operating frequency of 200kHz. The same circuit board can also be used to evaluate the MAX8553 tracking step-down controller. To evaluate the MAX8553, order a free sample of the MAX8553EEE along with this EV kit.

Features

- **Up to 20A Output-Current Capability**
- **10.8V to 13.2V Input Voltage Range**
- **Quick-PWM™ Control for Fast Loop Response**
- **Up to 92% Efficiency**
- **No External Bias Supply Required**
- **Foldback Current Limit**
- **Overvoltage Protection**
- **Fully Assembled and Tested**

Quick-PWM is a trademark of Maxim Integrated Products, Inc.

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX8554EVKIT	0°C to +70°C	16 QSOP

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47µF ±10%, 10V X7R ceramic capacitor (0603) TDK C1608X7R1A474K
C2	1	4.7µF ±10%, 6.3V X5R ceramic capacitor (0603) Panasonic ECJ1VB0J475K TDK C1608X5R0J475K
C3	1	4700pF ±10%, 25V X7R ceramic capacitor (0402) TDK C1005X7R1E472K Taiyo Yuden TMK105BJ472KV
C4	1	10µF ±20%, 6.3V X5R ceramic capacitor (0805) TDK C2012X5R0J106M Taiyo Yuden JMK212BJ106MG
C5, C6, C7	3	470µF ±20%, 4V, ESR = 10mΩ POSCAPs Sanyo 4TPD470M
C8	0	Not installed—POSCAP
C9–C12	0	Not installed (E) Sanyo OSCON 4SP560M Through-hole overlay on C5–C8
C13	1	10µF ±20%, 16V X7R ceramic capacitor (1210) TDK C3225X7R1C106M

DESIGNATION	QTY	DESCRIPTION
C14, C15, C16	0	Not installed—POSCAPs surface-mount overlay on C14, C15, C16
C17, C20, C21	3	680µF ±20%, 16V aluminum electrolytic capacitors (F) Sanyo 16MV680WX Rubycon 16MBZ680M10x12.5
C18	1	0.22µF ±10%, 10V X7R/X5R ceramic capacitor (0603) Taiyo Yuden LMK107BJ224KA TDK C1608X5R1A224K
C19	1	1µF ±10%, 16V X5R ceramic capacitor (0603) TDK C1608X5R1C105K
C22, C23	0	Not installed (0603)
C24	0	Not installed (0805)
C25	0	Not installed (0402)
D1	1	Schottky diode (SOT23) Central CMPSH-3
JU1, JU2	2	3-pin headers
JU3	1	4-pin, 3-position header
JU4	0	Not installed Cut here—open
L1	1	1.5µH inductor BI Technologies HM73301R5

For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
N1	1	N-channel MOSFET (8-pin SO) IRF IRF7832
N2, N3	2	N-channel MOSFETs (8-pin SO) IRF IRF7832
Q1	0	Not installed (SOT23)
R1	1	1Ω ±5% resistor (1206)
R2	1	19.1kΩ ±1% resistor (0603)
R3	1	6.04kΩ ±1% resistor (0603)
R4	1	20kΩ ±5% resistor (0603)
R5	1	25.5kΩ ±1% resistor (0603)
R6	1	110kΩ ±1% resistor (0603)
R7, R8, R10–R13	6	0Ω resistors (0603)
R9, R15	0	Not installed (0603)
R14	0	Not installed (2512) (PC board short)
R16	0	Not installed (1206)
U1	1	MAX8554EEE (16-pin QSOP)
None	1	Shunt, 2 position
None	1	MAX8554 EV kit PC board

Quick Start

Recommended Equipment

- Power supply capable of supplying 10.8V to 13.2V at 6A
- Load (up to 20A)
- Voltmeter

Procedure

The MAX8554 evaluation kit is fully assembled and tested. Follow these steps to verify board operation:

1) Preset the power supply to between 10.8V and 13.2V. Turn off the power supply. **Do not turn on the power supply until all connections are completed**.
2) Connect the positive power-supply lead to the EV kit terminal labeled IN.
3) Connect the negative power-supply lead to the EV kit terminal labeled PGND (located next to IN at the top of the EV kit board).
4) Connect the positive voltmeter lead to the EV kit terminal labeled OUT.
5) Connect the voltmeter ground to the EV kit terminal labeled PGND (located next to OUT on the right side of the EV kit board).
6) Connect a load (up to 20A) from OUT to PGND.
7) Verify that jumpers JU1 and JU2 both have pins 2-3 shorted.
8) Verify that jumper JU3 has pins 1-3 shorted.
9) Turn on the power supply.
10) Using the voltmeter, verify that the output voltage is 2.5V.

Detailed Description

V+ Selection

V+ is the input to the VL linear regulator that provides power to supply the IC. Normally V+ is connected to IN (JU1 has pins 2-3 shorted). To use a separate supply between 6V and 28V to power the IC, short pins 1-2 of JU1 and connect the V+ supply to the EV kit pad labeled V+ (see Table 1).

Enable/Shutdown

Shutdown mode turns off the IC, reducing the input current to below 10µA. For the MAX8554, JU2 controls the shutdown feature (see Table 2). Short pins 1-2 of JU2 to shut down the IC, or short pins 2-3 to enable the IC. To control shutdown with an external logic signal, remove

Table 1. JU1—V+ Input Selection

JU1 POSITION	FUNCTION
1-2	Connect a separate supply (6V to 28V) to the V+ pad
2-3*	**V+ is connected to IN**

** Default setting.*

Table 2. JU2—Enable/Shutdown

JU2 POSITION	FUNCTION
1-2	Shutdown (MAX8554 only)
2-3*	**Enable (MAX8554 only)**
Open	With the MAX8554, enable and shutdown are controlled by a digital control signal connected to EN/REFIN. With the MAX8553, JU2 must be left open and the reference input is connected to EN/REFIN.

** Default setting.*

Table 3. JU3—Frequency Selection

JU3 POSITION	SWITCHING FREQUENCY (kHz)
1-2	550
1-3*	**200**
1-4	400
Open	300

** Default setting.*

Table 4. JU4—VL Regulator Bypass

POSITION	FUNCTION
OPEN*	**IC power is provided by the internal VL regulator.**
SHORT	Shorts VL to IN so the IC is powered from IN. In this configuration, the maximum voltage at IN is 5.5V.

** Default setting.*

the shunt from JU2 and connect the logic signal to EN/REFIN. For shutdown with the MAX8553, see the *Evaluating the MAX8553* section.

Changing the Switching Frequency

The switching frequency is selected using JU3 (see Table 3). The EV kit circuit components are optimized for operation at 200kHz. To evaluate other frequencies of operation, refer to the MAX8553/MAX8554 data sheet for information on selecting the optimal components for higher frequency operation.

Bypassing the VL Regulator

When operating the EV kit with an input supply between 4.5V and 5.5V, it may be desirable to power the IC from the same input supply. To do this, short the pads of JU4. If the input voltage is less than 4.5V, a separate supply is needed (see the *V+ Selection* section). If an input voltage greater than 5.5V is used, JU4 must be open; otherwise, the IC can be damaged (see Table 4).

Setting the Output Voltage (MAX8554 Only)

To change the output voltage of the MAX8554 EV kit, replace R2 with a resistor calculated from the following equation:

$$R2 = R3\left(\frac{V_{OUT}}{0.607V} - 1\right)$$

where R3 is 6.04kΩ.

For best performance, it may be necessary to change other components when changing the output voltage. Refer to the MAX8553/MAX8554 data sheet for more information.

Optional Droop Resistor

In some cases a droop resistor is desirable because it adds voltage positioning to the output. Refer to the MAX8553/MAX8554 data sheet for more information on selecting the droop resistor. Before installing the droop resistor (R14), cut the PC board traces that are shorting the resistor pads.

Evaluating the MAX8553

The MAX8554 EV kit can be used to evaluate the MAX8553 tracking step-down controller. Free samples of the MAX8553 can be obtained from Maxim. Using the MAX8553 requires significant changes to other components on the EV kit. Refer to the MAX8553/MAX8554 data sheet for information on component selection.

SHDN Input

To provide a shutdown feature when using the MAX8553, populate Q1 with an N-channel MOSFET and R9 with a pulldown resistor. Refer to the MAX8553/MAX8554 data sheet for part numbers and values. Logic high at SHDN places the circuit in low-power shutdown mode. Leave SHDN open or pull low for normal operation. The SHDN pad is not used in the default EV kit configuration with the MAX8554.

VTTR Output

VTTR connects to the VTTR output of the MAX8553 and is capable of sourcing or sinking up to 25mA of current. The VTTR output voltage is one-half of the voltage applied to EN/REFIN. The VTTR pad is not used (leave unconnected) in the default EV kit configuration with the MAX8554.

Component Suppliers

SUPPLIER	PHONE	WEB
BI Technologies	714-447-2345	www.bitechnologies.com
Central Semiconductor	631-435-1110	www.centralsemi.com
International Rectifier	310-322-3331	www.irf.com
Kamaya	260-489-1533	www.kamaya.com
Murata	814-237-1431	www.murata.com
Panasonic	714-373-7939	www.panasonic.com
Rubycon	0265-72-7111	www.rubycon.co.jp
Sanyo	619-661-6835	www.sanyo.com
Sumida	847-545-6700	www.sumida.com
Taiyo Yuden	408-573-4150	www.t-yuden.com
TDK	847-803-6100	www.component.tdk.com
Vishay	402-564-3131	www.vishay.com

Note: *Please indicate you are using the MAX8553/MAX8554 when contacting these manufacturers.*

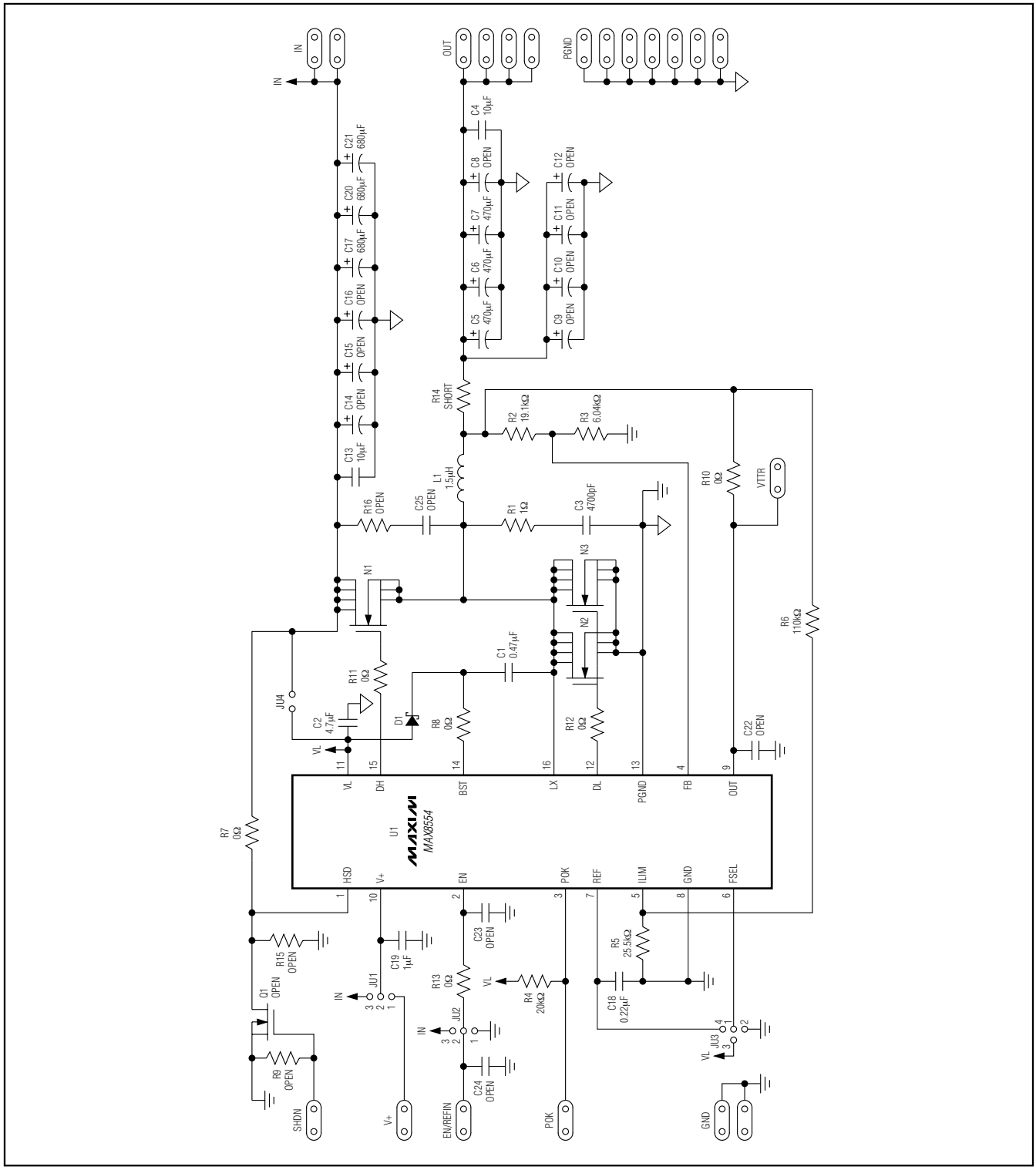

Figure 1. MAX8554 EV Kit Schematic

MAX8554 Evaluation Kit

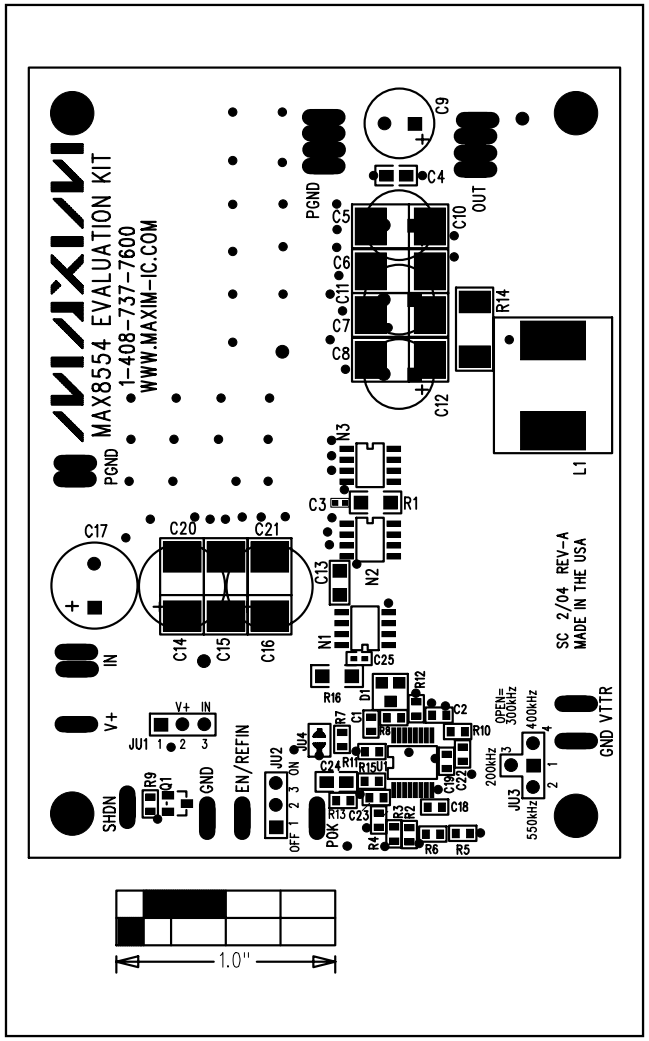

Figure 2. MAX8554 EV Kit Component Placement Guide—Component Side

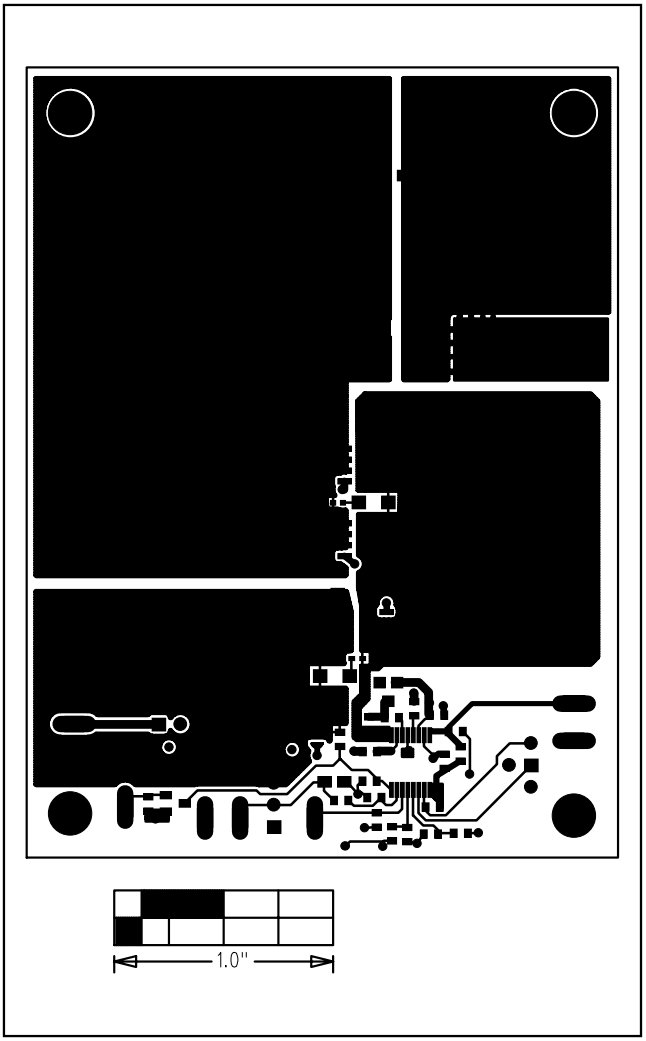

Figure 3. MAX8554 EV Kit PC Board Layout—Component Side

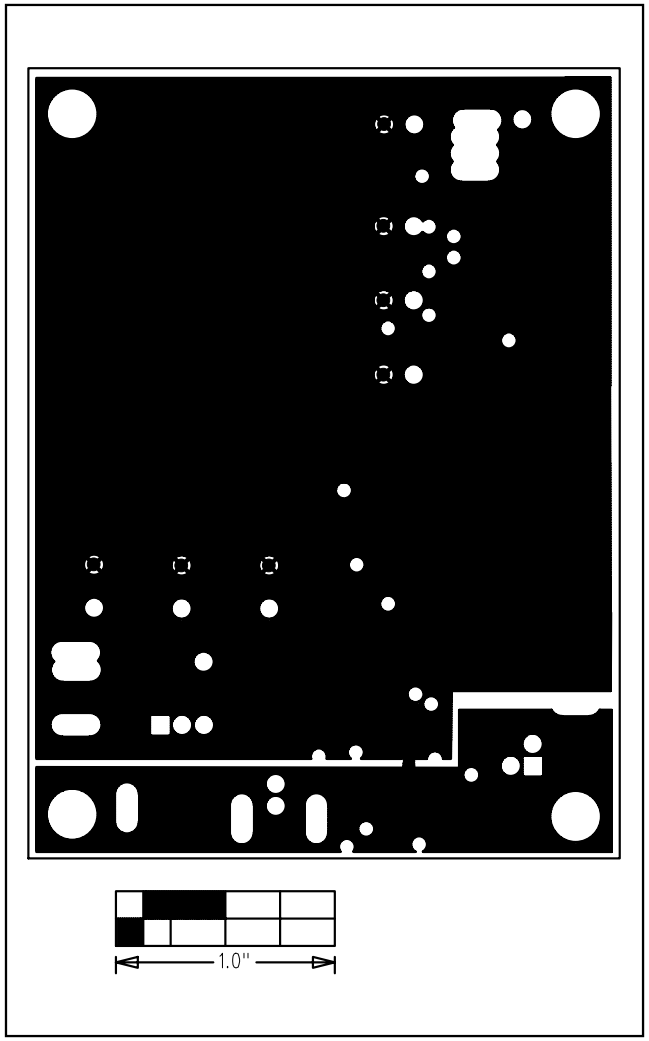

Figure 4. MAX8554 EV Kit PC Board Layout—Layer 2 (Ground)

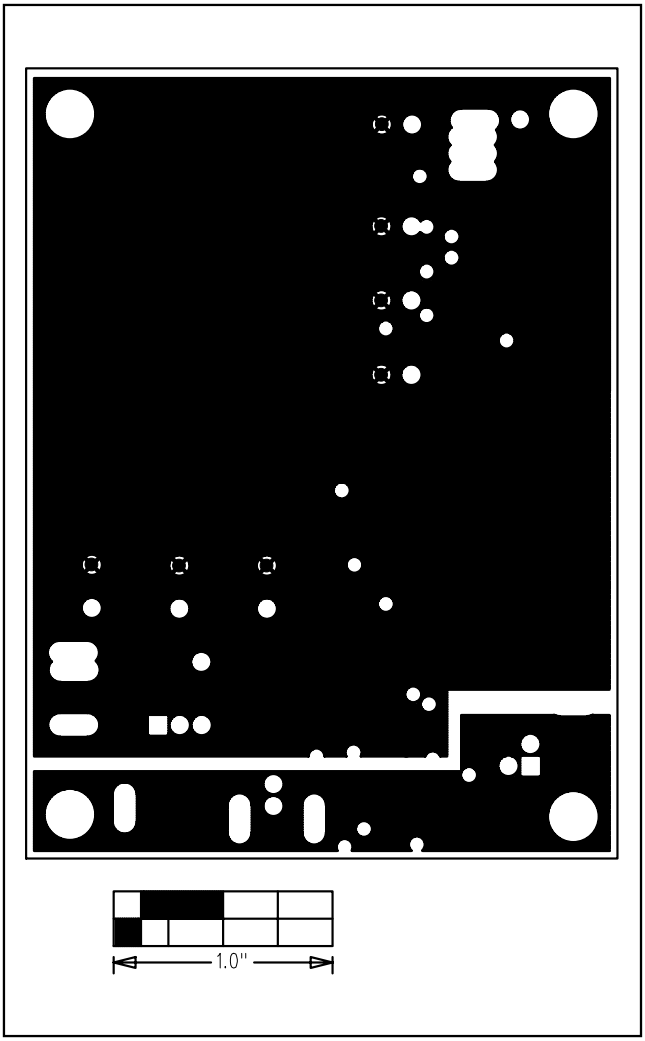

Figure 5. MAX8554 EV Kit PC Board Layout—Layer 3

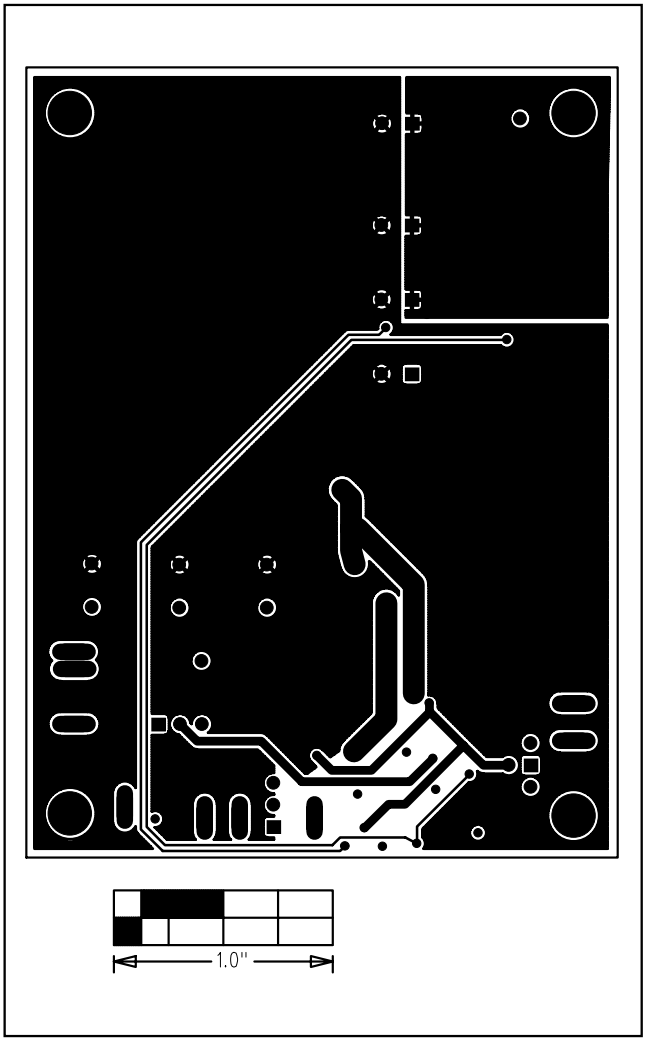

Figure 6. MAX8554 EV Kit PC Board Layout—Solder Side

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