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MAX17515 Evaluation Kit

Evaluates: MAX17515, 5A Integrated Power Module

General Description

The MAX17515 evaluation kit (EV kit) is a fully assembled and tested PCB that demonstrates the typical 5A application circuit of the MAX17515. The MAX17515 is a fixed-frequency, integrated inductor, step-down power module for low-voltage, low-power applications.

The EV kit provides a 1.5V output voltage from a 2.4V to 5.5V input range and delivers up to 5A output current while achieving greater than 91.2% efficiency. The EV kit operates at 1MHz switching frequency and has superior line- and load-transient response. The EV kit also allows the evaluation of other adjustable output voltages from 0.75V to 3.6V by changing resistors R1 and R2.

Ordering Information ***appears at end of data sheet.***

Features

- High Integration Solution/Integrated Shielded Inductor
- 2.4V to 5.5V Input Range
- Configured for 1.5V Output Voltage
- Adjustable Output Voltage Range (0.75V to 3.6V)
- 5A Output Current
- 91.2% Efficiency (V_{IN} = 3.3V, V_{OUT} = 1.5V at 1.5A)
- 1MHz Switching Frequency
- Enable Input
- Power-Good Output Indicator (POK)
- Low-Profile Surface-Mount Components
- Proven PCB Layout
- Fully Assembled and Tested

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	33µF ±20%, 10V X5R electrolytic capacitors (B case) Panasonic EEEFK1A330UR
C2	1	22µF ±20%, 10V X5R ceramic capacitors (1206) TDK C3216X5R1A226M160AC
C3	1	220µF, 2.5V, 13mΩ ESR POS capacitor (B2 case) Panasonic 2R5TPE220MFGB
C4	0	Not installed, 1µF ±20%, 16V X7R ceramic capacitor (0603) Murata GRM188R71C105K TDK C1608X7R1C105K

DESIGNATION	QTY	DESCRIPTION
D1	1	Green LED, clear (0805) Lite-On LTST-C170GKT
JU1	1	2-pin headers
R1, R2	2	47.5kΩ ±1% resistor (0603)
R3	1	1kΩ ±5% resistor (0603)
U1	1	5A, 2.4V to 5.5V input, high-efficiency power module Maxim MAX17515LI+
—	1	Shunt
—	1	PCB: MAX17515 EVKIT

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Keystone Electronics Corp.	800-221-5510	www.keyelco.com
Lite-On, Inc.	408-946-4873	www.liteon.com
Murata Americas	800-241-6574	www.murataamericas.com
Panasonic Corp.	800-344-2112	www.panasonic.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: *Indicate that you are using the MAX17515 when contacting these component suppliers.*

19-6705; Rev 1; 9/13

maxim integrated™

Quick Start

Recommended Equipment

- MAX17515 EV kit
- 2.4V to 5.5V DC power supply (V_{IN})
- 5V DC power supply (V_{CC})
- Dummy load capable of sinking 5A
- Digital multimeter (DMM)
- 100MHz dual-trace oscilloscope

Procedure

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

1) Ensure that the circuit is connected correctly to the supplies and dummy load prior to applying any power.
2) Verify that a shunt is installed across jumper JU1.
3) Enable the power supply (V_{IN} = 5V)
4) Observe the 1.5V output with the DMM and/or oscilloscope. Look at the EP2 switching node while varying the load current.

Detailed Description of Hardware

Input Supply Voltage

The MAX17515 EV kit can operate from a minimum 4.5V single DC power supply at VIN PCB pad with a shunt installed across JU1. The EV kit is also configured to power a lower input voltage at VIN PCB pad, which requires an additional 5V power supply at VCC PCB pad, a capacitor, C4, to be installed, and a connecting trace between V_{IN} and V_{CC} (next to R3's footprint) to be cut. Table 1 lists all operating configurations of the EV kit at different input voltage sources.

Enable Input

The EV kit features a 2-pin jumper (JU1) that selects the enable/disable control input. The shunt is installed across JU1 to enable the device and vice versa.

Switching Frequency (FREQ)

The EV kit features a PWM-mode switching frequency. The switching frequency is fixed at 1MHz.

Programming the Output Voltage

The EV kit includes a default output programmed at 1.5V and also produces an adjustable 0.75V to 3.6V output voltage by connecting FB to a resistive divider. To obtain an output voltage other than the default programmed output, simply modify the R1 and R2 resistors with values according to the following equation:

$$V_{OUT} = V_{FB}\left(1+\frac{R1}{R2}\right)$$

where V_{FB} = 0.75V. Output capacitance value changes are required for an output voltage greater than 2V. Refer to the MAX17515 data sheet for output capacitance selection.

Table 1. Jumper JU1 Functions

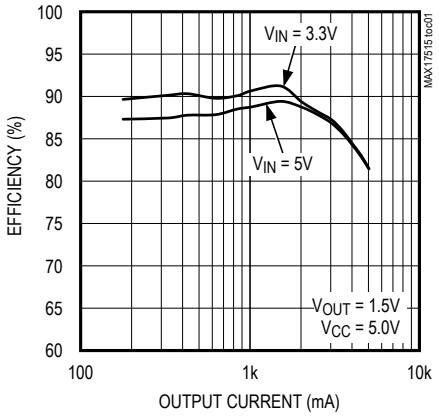
SHUNT (JU1) POSITION	V_{IN}/V_{CC} RANGE	REGULATOR OUTPUT
Installed	V_{IN} = 4.5V to 5.5V V_{CC} = V_{IN}	Enabled
Installed	V_{IN} = 2.4V to 5.5V Require an additional V_{CC} = 4.5V to 5.5V	Enabled
Not installed*	V_{IN} = 2.4V to 5.5V V_{CC} = V_{IN}	Disabled

**The thin trace connecting V_{IN} and V_{CC} (next to R3's footprint) must be cut before applying the additional power supply to the VCC PCB pad.*

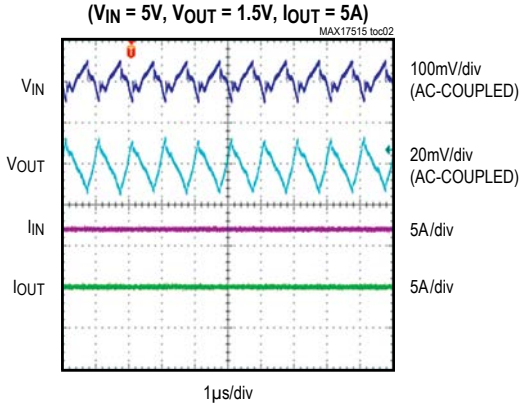
Typical Operating Characteristics

(V_{CC} = 5V, V_{IN} = 3.3V to 5V, V_{OUT} = 0.9V to 3.3V, I_{OUT} = 0–5A, T_A = +25°C, unless otherwise noted.)

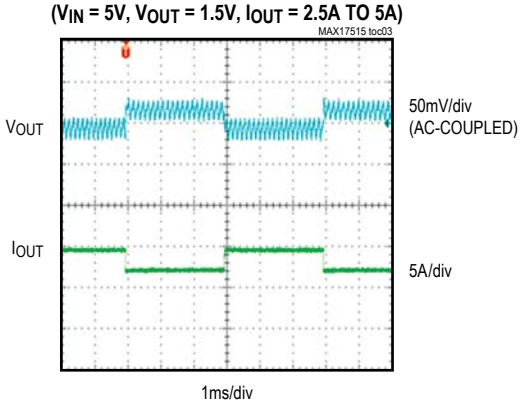
EFFICIENCY vs. OUTPUT CURRENT



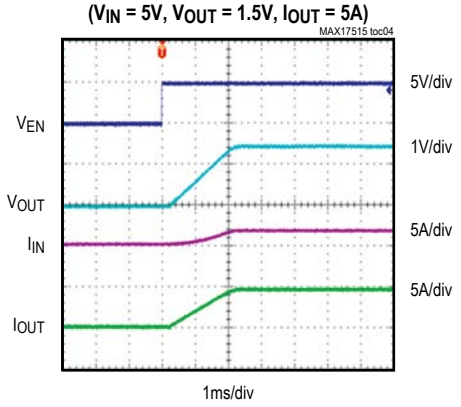
VOLTAGE RIPPLE (V_{IN} = 5V, V_{OUT} = 1.5V, I_{OUT} = 5A)



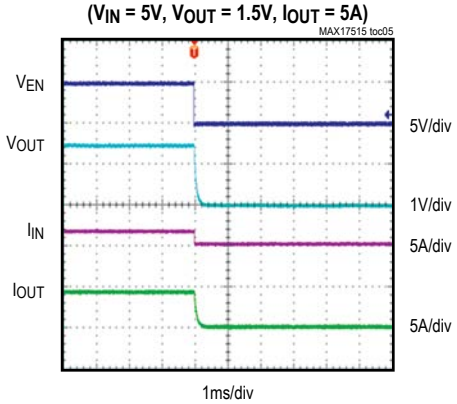
LOAD CURRENT TRANSIENT RESPONSE (V_{IN} = 5V, V_{OUT} = 1.5V, I_{OUT} = 2.5A TO 5A)



STARTUP WAVEFORM (V_{IN} = 5V, V_{OUT} = 1.5V, I_{OUT} = 5A)



SHUTDOWN WAVEFORM (V_{IN} = 5V, V_{OUT} = 1.5V, I_{OUT} = 5A)



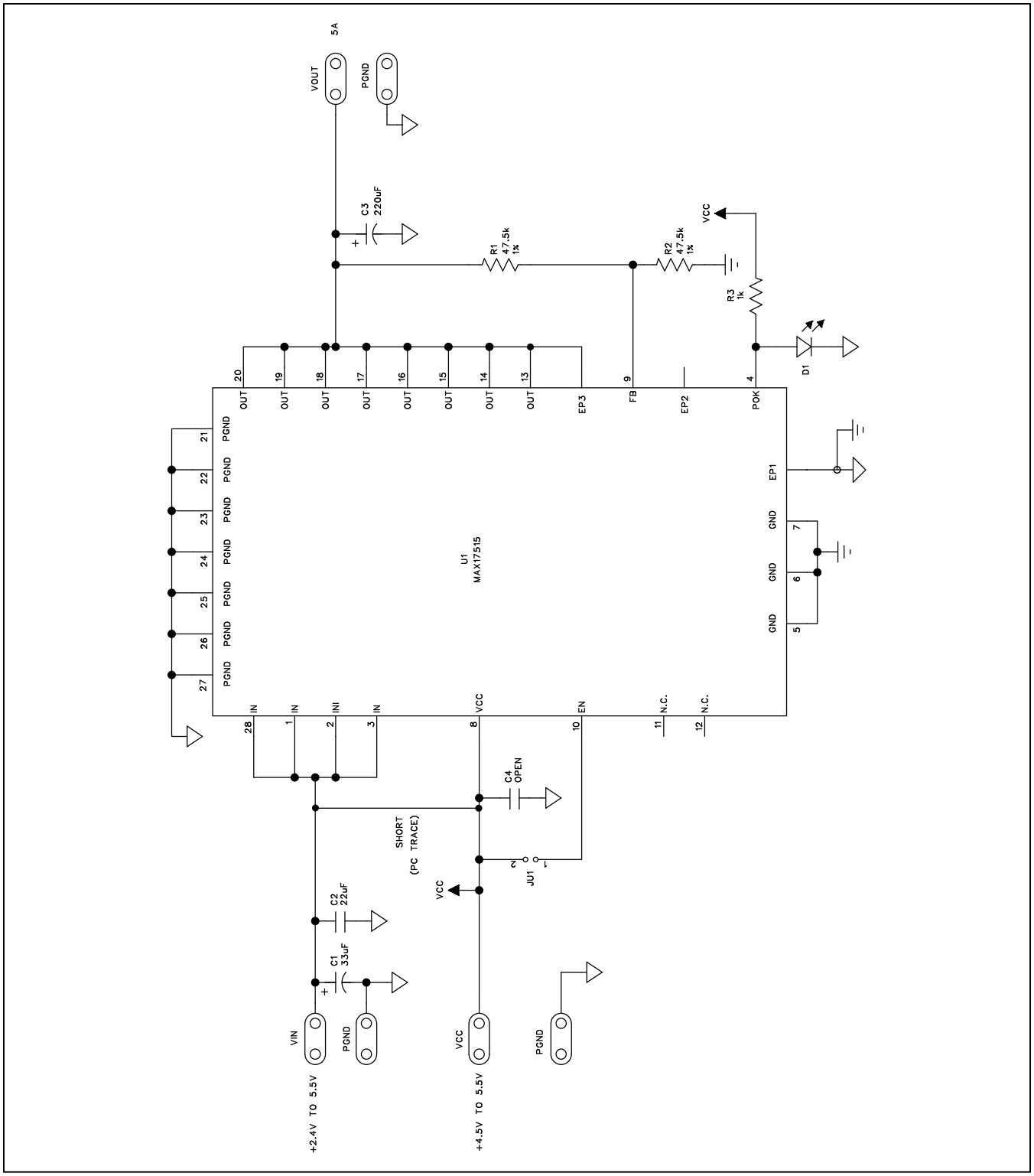


Figure 1. MAX17515 EV Kit Schematic

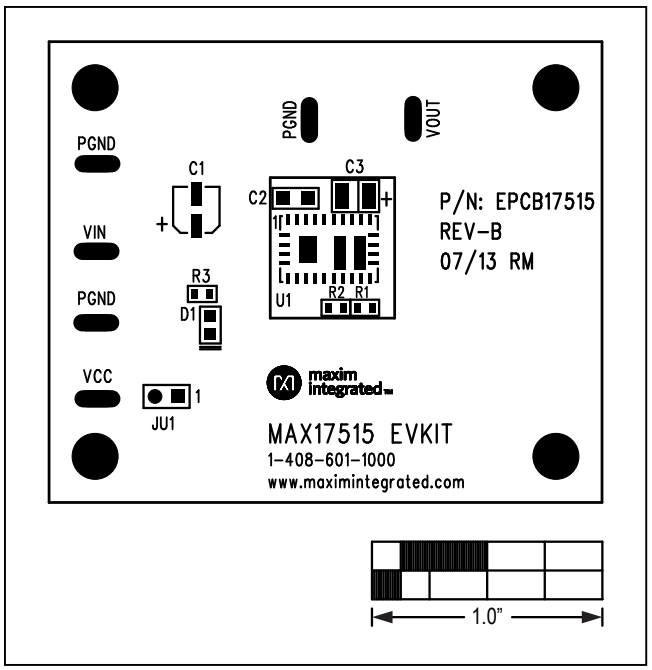


Figure 2. MAX17515 EV Kit Component Placement Guide—Component Side

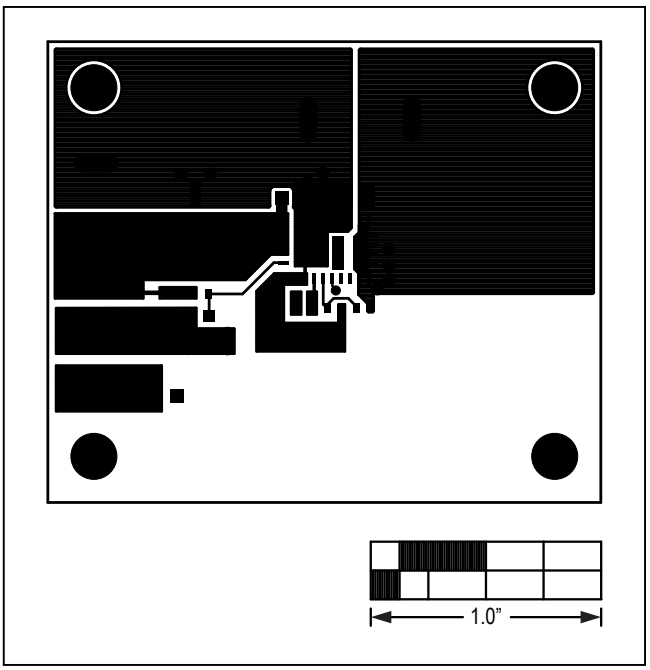


Figure 3. MAX17515 EV Kit PCB Layout—Component Side

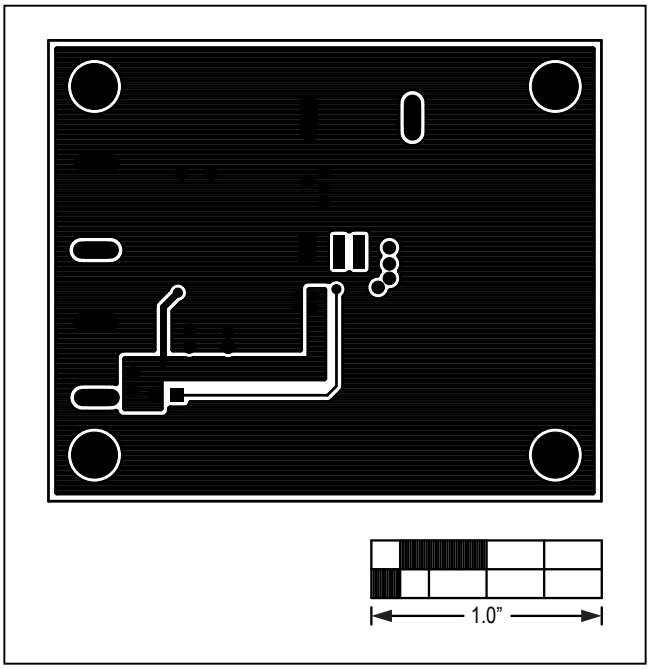


Figure 4. MAX17515 EV Kit PCB Layout—PGND Layer 2

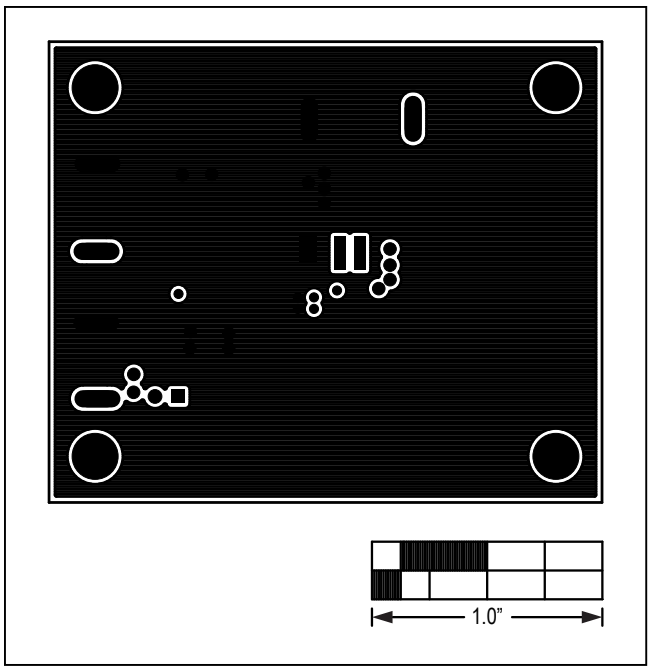


Figure 5. MAX17515 EV Kit PCB Layout—PGND Layer 3

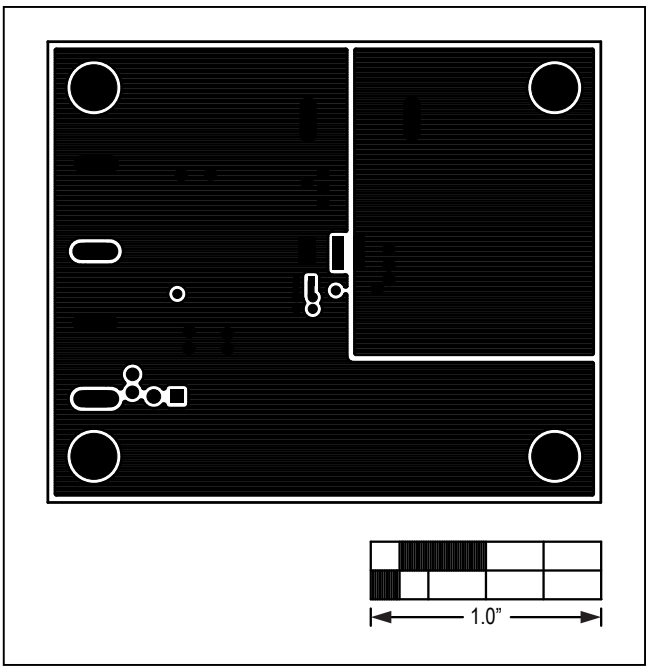


Figure 6. MAX17515 EV Kit PCB Layout—Solder Side

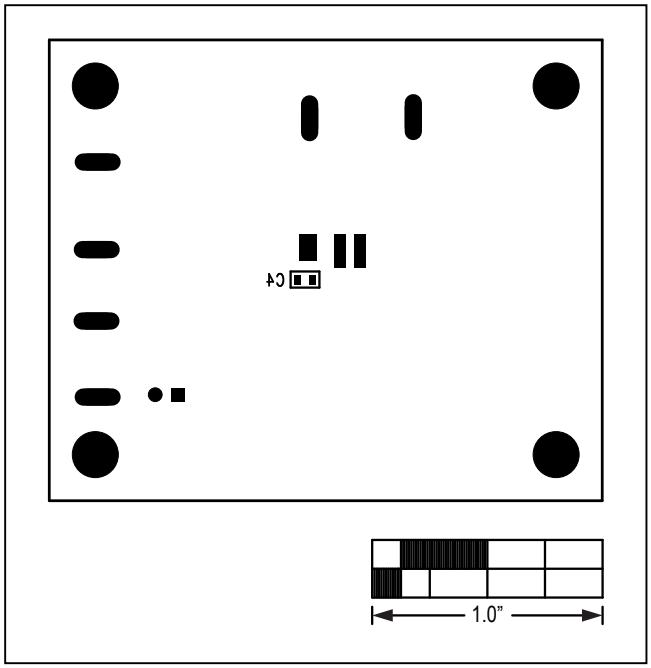


Figure 7. MAX17515 EV Kit PCB Layout—Bottom Silk Screen

Ordering Information

PART	TYPE
MAX17515EVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/13	Initial release	—
1	9/13	Various changes including EV kit layout with multiple outputs to compact layout with a single output	1–6

