

MAX15108 Evaluation Kit

Evaluates: MAX15108

General Description

The MAX15108 evaluation kit (EV kit) provides a proven design to evaluate the MAX15108 high-efficiency, 8A, step-down regulator with integrated switches in a 20-bump wafer-level package (WLP). The EV kit is preset for 1.5V output at load currents up to 8A from a 2.7V to 5.5V input supply. The device features a 1MHz fixed switching frequency, which allows the EV kit to achieve an all-ceramic capacitor design and fast transient responses.

Features

- ◆ Operates from a 2.7V to 5.5V Input Supply
- ◆ All-Ceramic Capacitor Design
- ◆ 1MHz Switching Frequency
- ◆ Output Voltage Range
 - 0.6V Up to $0.94 \times V_{IN}$ (Forced PWM)
 - 0.6V Up to $0.85 \times V_{IN}$ (Skip Mode)
- ◆ Enable Input/Power-Good Output
- ◆ Selectable Skip-Mode Functionality
- ◆ Proven PCB Layout
- ◆ Fully Assembled and Tested

[Ordering Information](#) appears at end of data sheet.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C19	3	10 μ F \pm 10%, 6.3V X5R ceramic capacitors (0603) Murata GRM188R60J106K TDK C1608X5R0J106K
C3, C4, C21	0	Not installed, ceramic capacitors (0603)
C5, C7, C8, C9	4	47 μ F \pm 20%, 6.3V X5R ceramic capacitors (1206) Murata GRM31CR60J476M TDK C3216X5R0J476M
C6	1	2200pF \pm 10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H222K TDK C1608X7R1H222K
C14	1	100pF \pm 5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H101J TDK C1608C0G1H101J
C15	1	4700pF \pm 10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H472K TDK C1608X7R1H472K

DESIGNATION	QTY	DESCRIPTION
C16	1	0.033 μ F \pm 10%, 16V X7R ceramic capacitor (0603) Murata GRM188R71C333K Taiyo Yuden EMK107BJ333KA
C20	1	1 μ F \pm 10%, 6.3V X7R ceramic capacitor (0603) Murata GRM188R70J105K
C22	0	Not installed, 220 μ F \pm 20%, 10V aluminum electrolytic capacitor (6.3mm x 7.7mm)
C23	1	2.2 μ F \pm 10%, 10V X7R ceramic capacitor (0603) Murata GRM188R71A225K
JU1	1	2-pin header
JU2	1	3-pin header
L1	1	0.33 μ H, 18A inductor Vishay IHLP2525BD01R33M01
R1	1	8.06k Ω \pm 1% resistor (0603)
R2	1	5.36k Ω \pm 1% resistor (0603)
R3	1	2.43k Ω \pm 1% resistor (0603)

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R4, R5	2	100k Ω \pm 5% resistors (0603)
R6	1	10 Ω \pm 5% resistor (0603)
R8	1	1 Ω \pm 1% resistor (0805)
R9	1	1k Ω \pm 5% resistor (0603)
R10	1	10k Ω \pm 5% resistor (0603)
R11	0	Not installed, resistor (0603)

DESIGNATION	QTY	DESCRIPTION
U1	1	8A current-mode buck converter (20 WLP) Maxim MAX15108EWP+
—	2	Shunts
—	1	PCB: MAX15108 EVALUATION KIT

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Taiyo Yuden	800-348-2496	www.t-yuden.com
TDK Corp.	847-803-6100	www.component.tdk.com
Vishay	402-563-6866	www.vishay.com

Note: Indicate that you are using the MAX15108 when contacting these component suppliers.

Quick Start

Recommended Equipment

- MAX15108 EV kit
- 5V, 5A DC power supply
- Load capable of sinking 8A
- Digital voltmeter

Procedure

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

- 1) Connect the positive terminal of the 5V supply to the IN PCB pad and the negative terminal to the nearest PGND PCB pad.
- 2) Connect the positive terminal of the 8A load to the OUT PCB pad and the negative terminal to the nearest PGND PCB pad.
- 3) Connect the digital voltmeter across the OUT PCB pad and the nearest PGND PCB pad.
- 4) Verify that a shunt is installed on jumper JU1.
- 5) Verify that a shunt is installed on pins 2-3 on jumper JU2.
- 6) Turn on the DC power supply.
- 7) Enable the load.
- 8) Verify that the voltmeter displays 1.5V.

Detailed Description of Hardware

The MAX15108 EV kit provides a proven design to evaluate the MAX15108 high-efficiency, 8A, step-down regulator with integrated switches. The applications include distributed power systems, portable devices, and preregulators. The EV kit is preset for 1.5V output at load currents up to 8A from a 2.7V to 5.5V input supply. The device features a 1MHz fixed switching frequency, which allows the EV kit to achieve an all-ceramic capacitor design and fast transient responses. A placeholder for an input aluminum electrolytic capacitor (C22) is provided to damp the input if long wires are used; they are not required in a tight system design.

Soft-Start (SS)

The device utilizes an adjustable soft-start function to limit inrush current during startup. The soft-start time is adjusted by the value of C16, the external capacitor from SS to GND. By default, C16 is currently 0.033 μ F, which gives a soft-start time of approximately 2ms. To adjust the soft-start time, determine C16 using the following formula:

$$C16 = (10\mu\text{A} \times t_{SS})/0.6\text{V}$$

where t_{SS} is the required soft-start time in seconds and C16 is in farads.

An external tracking reference with steady-state value between 0 and $V_{IN} - 2\text{V}$ can be applied to SS. Refer to the *Programmable Soft-Start (SS)* section in the MAX15108 IC data sheet for a more detailed description.

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Setting the Output Voltage

The EV kit can be adjusted from 0.6V up to $0.94 \times V_{IN}$ (forced PWM) by changing the values of resistors R1 and R2. To determine the value of the resistor-divider, first select R2 between 1k Ω and 20k Ω . Then use the following equation to calculate R1:

$$R1 = R2 [(V_{OUT}/V_{FB}) - 1]$$

where V_{FB} is the feedback threshold voltage ($V_{FB} = 0.6V$) and V_{OUT} is the desired output. When regulating for an output of 0.6V in skip mode, set R1 to 0 Ω and keep R2 connected from FB to ground.

When R1 is changed, compensation components C14, R3, and C15 must be changed to ensure loop stability. Refer to the *Compensation Design Guidelines* section in the MAX15108 IC data sheet.

Table 1. Regulator Enable (EN) Jumper JU1 Description

SHUNT POSITION	EN PIN	DEVICE OUTPUT
Installed*	Connected to IN	Enabled
Not installed	Pulled to PGND through R4	Disabled

*Default position.

Regulator Enable (EN)

The device features a regulator enable input. For normal operation, a shunt should be installed on jumper JU1. To disable the output, remove the shunt on JU1 and the EN pin will be pulled to PGND through resistor R4. See Table 1 for JU1 settings.

Skip-Mode Input (SKIP)

The device offers selectable skip-mode functionality to reduce current consumption and achieve a higher efficiency at light loads. To operate in skip mode, install a shunt on pins 1-2 on jumper JU2. See Table 2 for JU2 settings.

Caution: Do not change the setting of the skip jumper while the device is operating.

Table 2. Skip-Mode Input (SKIP) Jumper JU2 Description

SHUNT POSITION	SKIP PIN	MODE
1-2	Connected to EN	Skip-mode operation
2-3*	Connected to PGND	Forced-PWM operation

*Default position.

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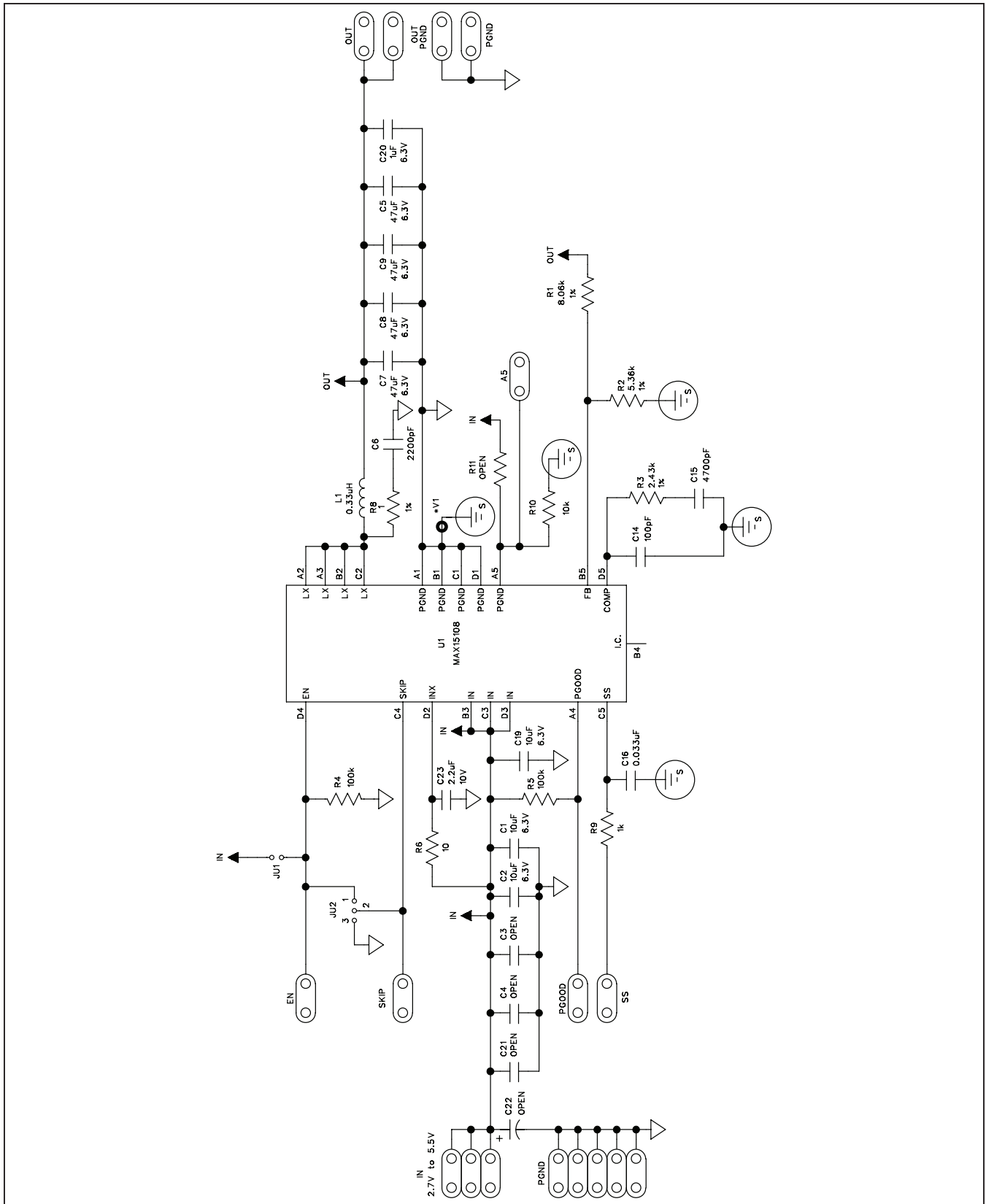


Figure 1. MAX15108 EV Kit Schematic

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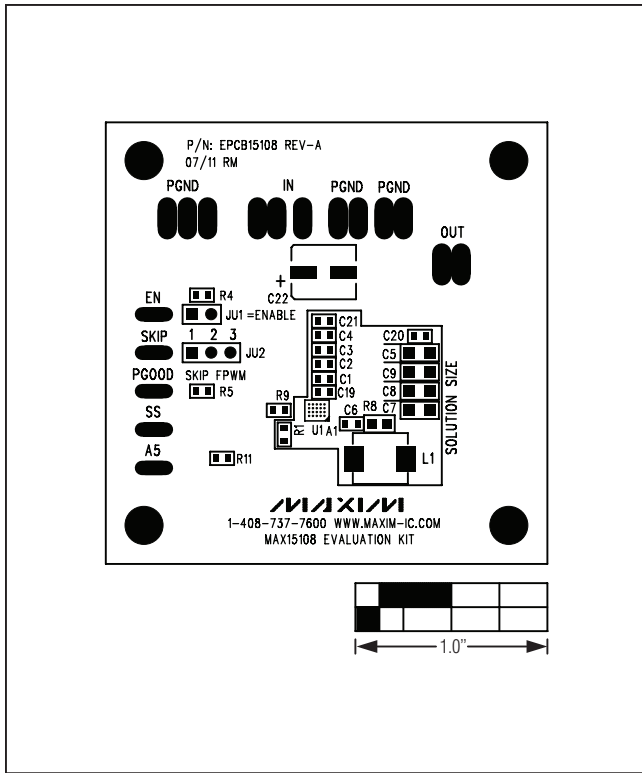


Figure 2. MAX15108 EV Kit Component Placement Guide—Component Side

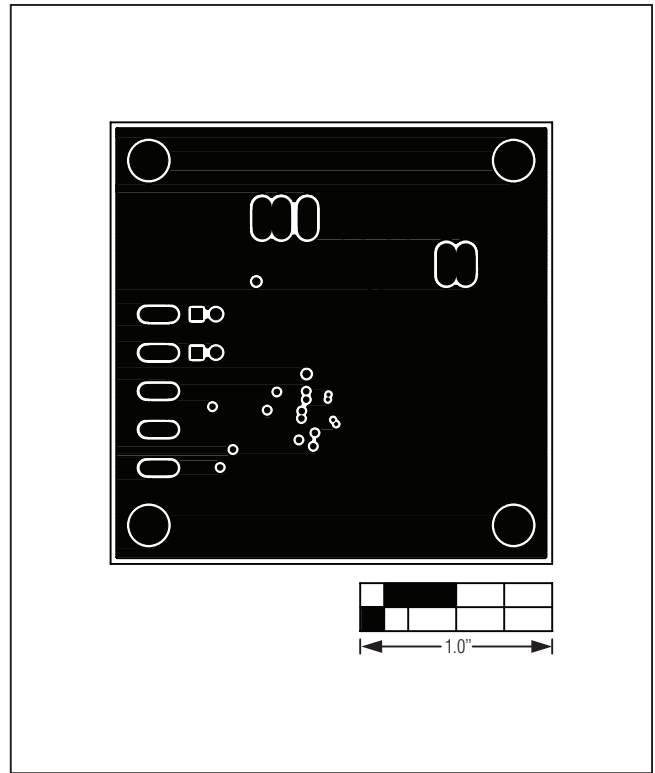


Figure 4. MAX15108 EV Kit PCB Layout—Inner Layer 2

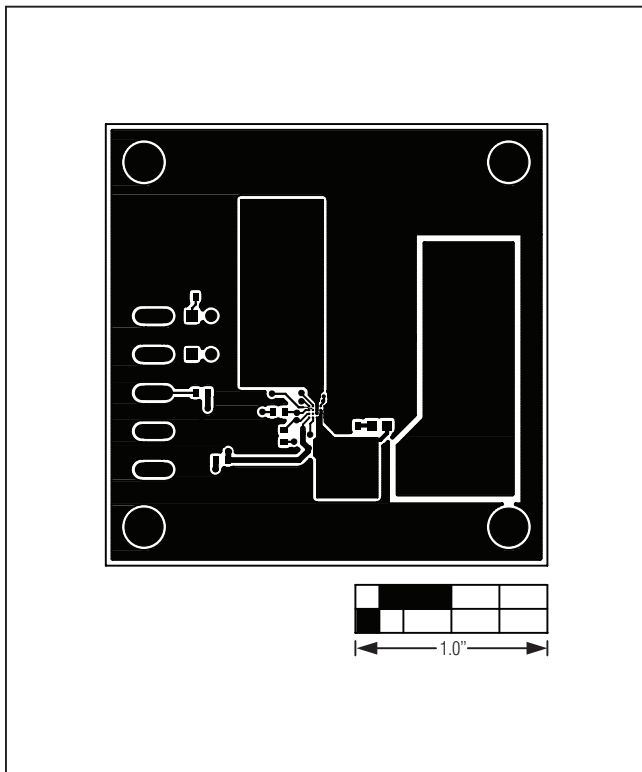


Figure 3. MAX15108 EV Kit PCB Layout—Component Side

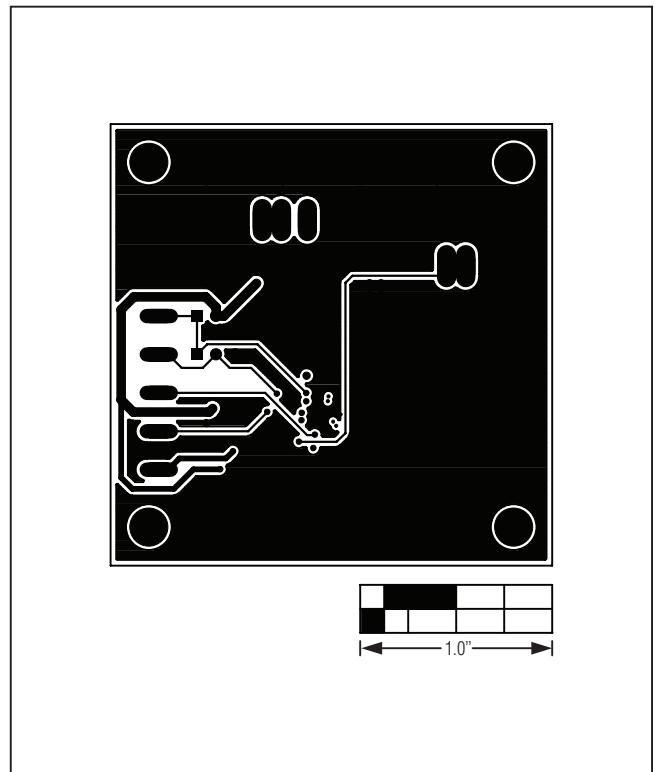


Figure 5. MAX15108 EV Kit PCB Layout—Inner Layer 3

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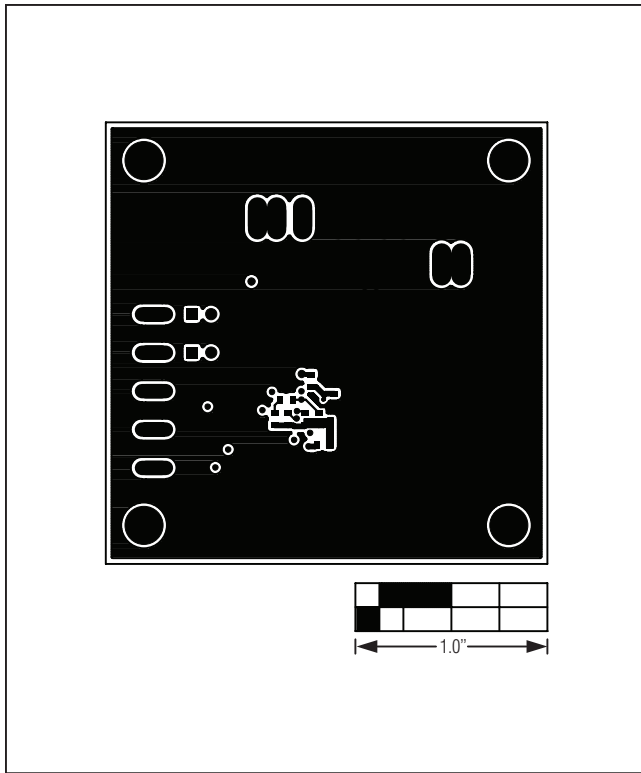


Figure 6. MAX15108 EV Kit PCB Layout—Solder Side

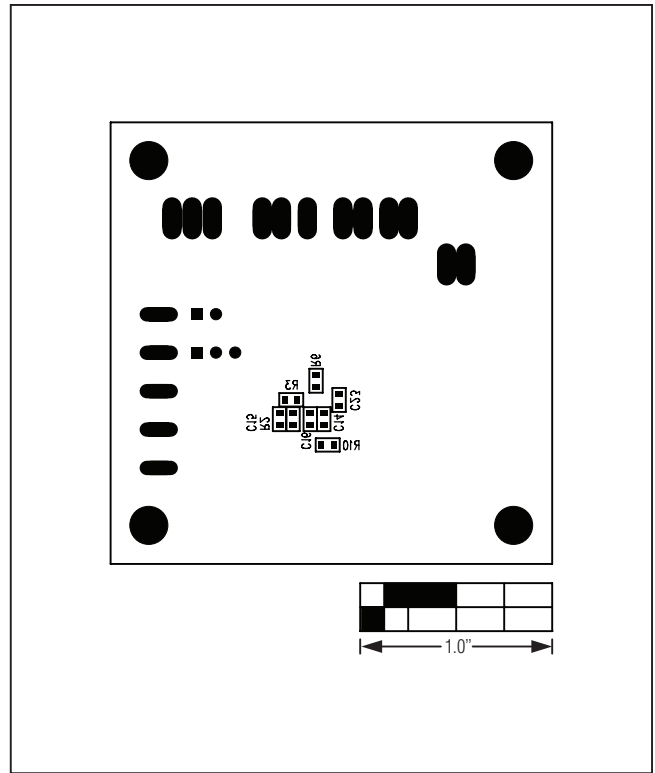


Figure 7. MAX15108 EV Kit Component Placement Guide—Solder Side

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Ordering Information

PART	TYPE
MAX15108EVKIT#	EV Kit

#Denotes RoHS compliant.

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/11	Initial release	—

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