

## Evaluates: MAX15106A/ MAX15106B/MAX15106C

## MAX15106 Evaluation Kit

### General Description

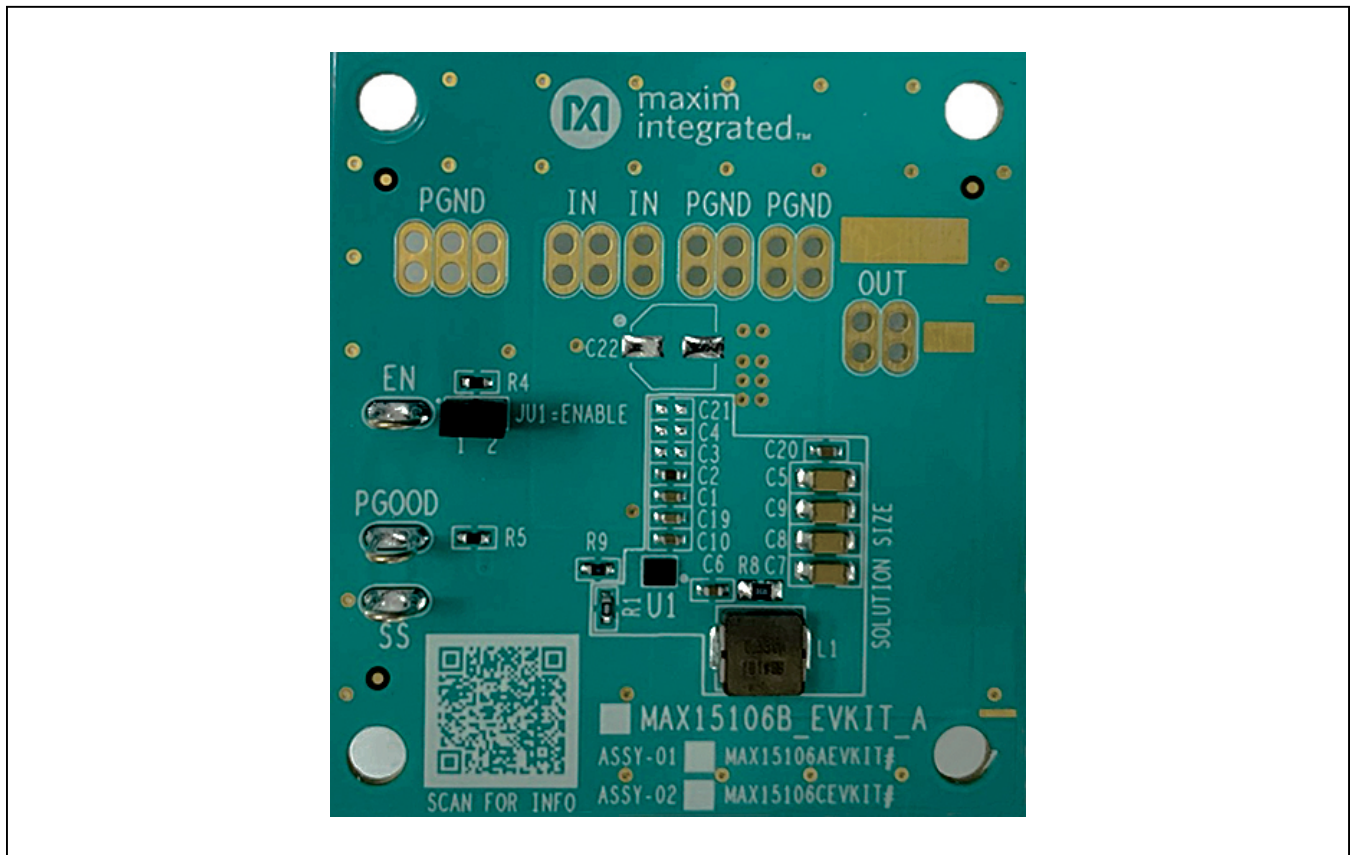
The MAX15106 evaluation kit (EV kit) provides a proven design to evaluate the MAX15106A/MAX15106B/MAX15106C high-efficiency, 6A, step-down regulator with integrated switches in a 20-bump wafer-level package (WLP). The EV kit is preset for 1.5V output at load currents up to 6A from a 2.7V to 5.5V input 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.

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

### Features

- Operates from a 2.7V to 5.5V Input Supply
- All-Ceramic Capacitor Design
- 0.9MHz, 1MHz, 1.1MHz Switching Frequency
- Output Voltage Range
  - 0.6V Up to  $0.94 \times V_{IN}$  (Forced PWM)
- Enable Input/Power-Good Output
- Proven PCB Layout
- Fully Assembled and Tested

### MAX15106 EV Kit Board Photo



## Quick Start

### Recommended Equipment

- MAX15106 EV kit
- 5V, 5A DC power supply
- Load capable of sinking 6A
- 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 the 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 6A 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) Turn on the DC power supply.
- 6) Enable the load.
- 7) Verify that the voltmeter displays 1.5V.

### Detailed Description of Hardware

The MAX15106 EV kit provides a proven design to evaluate the MAX15106 high-efficiency, 6A, 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 6A 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 0.033μF, which gives a soft-start time of approximately 2ms. To adjust the soft-start time, determine C16 using the following formula:

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

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

An external tracking reference with a steady-state value between 0 and  $V_{IN} - 1.5V$  can be applied to SS. Refer to the *Programmable Soft-Start (SS)* section in the MAX15106 IC data sheet for a more detailed description.

### 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 1kΩ and 20kΩ. 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 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 MAX15106 IC data sheet.

### 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.

**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.

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## Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Americas	770-436-1300	www.murataamericas.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 MAX15106 when contacting these component suppliers.

## Ordering Information

PART	TYPE	SWITCHING FREQUENCY
MAX15106AEVKIT#	EV Kit	0.9MHz
MAX15106BEVKIT#	EV Kit	1.0MHz
MAX15106CEVKIT#	EV Kit	1.1MHz

#Denotes RoHS compliant.

## MAX15106 EV Kit Bill of Materials

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	3	C1, C2, C19	Pref	20-0010U-B9A	GRM188R60J106KE47; C1608X5R0J106K080AE	MURATA; TDK	10UF	CAP; SMT (0603); 10UF; 10%; 6.3V; X5R; CERAMIC
2	4	C5, C7-C9	Pref	20-0047U-B57	C1206C476M9PAC; GRM31CR60J476ME19; C3216X5R0J476M160AC	KEMET; MURATA; TDK	47UF	CAP; SMT (1206); 47UF; 20%; 6.3V; X5R; CERAMIC
3	1	C6	Pref	20-2200P-91	C0603C222K5RAC; GCM188R71H222K; CGA3E2X7R1H222K080AD; GRM39X7R222K50V; C1608X7R1H222K	KEMET; MURATA; TDK; MURATA; TDK	2200PF	CAP; SMT (0603); 2200PF; 10%; 50V; X7R; CERAMIC; NOTE: NOT RECOMMENDED FOR NEW DESIGN. USE 20-2200p-E5
4	1	C10	Pref	20-000U1-R1	C0603C104K9RAC; GRM188R70J104KA01	KEMET; MURATA	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 6.3V; X7R; CERAMIC; NOTE: NOT RECOMMENDED FOR NEW DESIGN. USE 20-000u1-01
5	1	C14	Pref	20-0100P-77	C0603C101J5GAC; ECJ-1VC1H101J; C1608C0G1H101J080AA; GRM188SC1H101JA01; CL10C101JB81PN	KEMET; PANASONIC; TDK; MURATA; SAMSUNG	100PF	CAP; SMT (0603); 100PF; 5%; 50V; C0G; CERAMIC
6	1	C15	Pref	20-4700P-91	C0603X7R500-472KNE; GRM188R71H472KA01	VENKEL LTD.; MURATA	4700PF	CAP; SMT (0603); 4700PF; 10%; 50V; X7R; CERAMIC
7	1	C16	Pref	20-0U033-11	GRM188R71C333KA01	MURATA	0.033UF	CAP; SMT (0603); 0.033UF; 10%; 16V; X7R; CERAMIC
8	1	C20	Pref	20-0001U-R1	GRM188R70J105KA01; CL10B105KQ8NNNC	MURATA; SAMSUNG ELECTRONICS	1.0UF	CAP; SMT (0603); 1.0UF; 10%; 6.3V; X7R; CERAMIC; NOTE: NOT RECOMMENDED FOR NEW DESIGN. USE 20-0001u-63
9	1	C23	Pref	20-000U1-11	C0603C104K4RAC; GCM188R71C104KA37; C1608X7R1C104K; GRM188R71C104KA01; C0603X7R160-104KNE; VJ0603Y104KXJCW1BC; 0603YC104KAT4A; 885012206046	KEMET; MURATA; TDK; MURATA; VENKEL LTD; VISHAY DALE; AVX; WURTH ELECTRONICS INC; TDK	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 16V; X7R; CERAMIC; NOTE: NOT RECOMMENDED FOR NEW DESIGN. USE 20-000u1-01
10	3	EN, PGOOD, SS	Pref	01-9020BUSS20AWG-00	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG

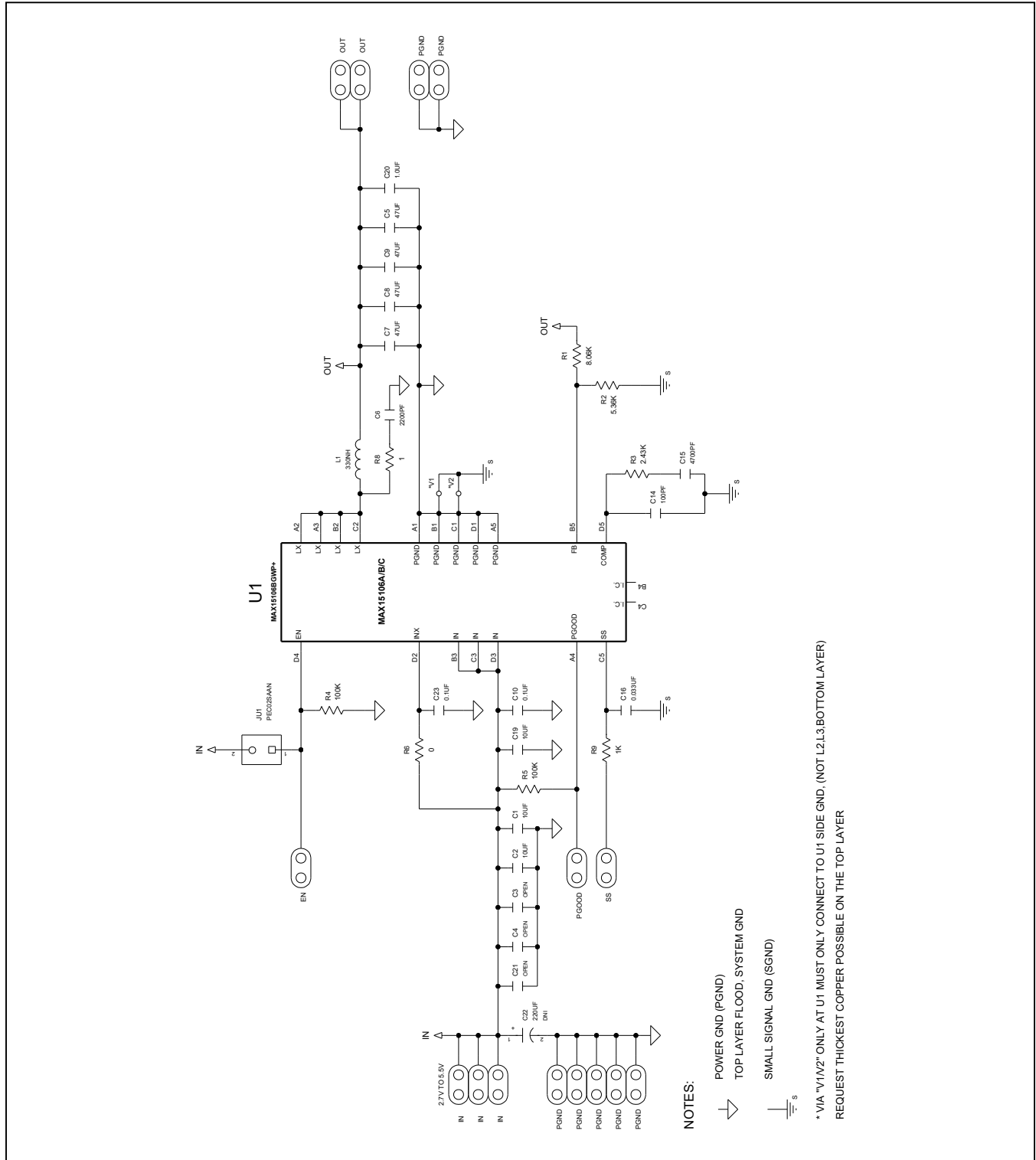
# MAX15106 Evaluation Kit

Evaluates: MAX15106A/  
MAX15106B/MAX15106C

## MAX15106 EV Kit Bill of Materials (continued)

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
11	1	JU1	Pref	01-PEC02SAAN2P-21	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
12	1	L1	Pref	EL1324	IHLP2525BDERR33M01	VISHAY	330NH	INDUCTOR; SMT; SHIELDED; 330NH; 20%; 18A
13	4	MH1-MH4	Pref	02-SOM35016H-00	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
14	1	R1	Pref	80-08K06-24	CRCW06038K06FK; ERJ-3EKF8061	VISHAY DALE; PANASONIC	8.06K	RES; SMT (0603); 8.06K; 1%; +/-100PPM/DEGC; 0.1000W
15	1	R2	Pref	80-05K36-24	CRCW06035K36FK	VISHAY DALE	5.36K	RES; SMT (0603); 5.36K; 1%; +/-100PPM/DEGC; 0.1000W
16	1	R3	Pref	80-02K43-24	CRCW06032K43FK; ERJ-3EKF2431	VISHAY DALE; PANASONIC	2.43K	RES; SMT (0603); 2.43K; 1%; +/-100PPM/DEGC; 0.1000W
17	2	R4, R5	Pref	80-0100K-53	ERJ-3GEYJ104; CRCW0603100KJN	PANASONIC; VISHAY	100K	RES; SMT (0603); 100K; 5%; +/-200PPM/DEGC; 0.1000W
18	1	R6	Pref	80-0000R-27A	RC1608J000CS; CR0603-JI-000ELF; RC0603JR-070RL	SAMSUNG ELECTRONICS; BOURNS; YAGEO PH	0	RES; SMT (0603); 0; 5%; JUMPER; 0.1000W
19	1	R8	Pref	ER0819	LVC-LVC0805LF-1R00-F	TT ELECTRONICS	1	RES; SMT (0805); 1; 1%; +/-200PPM/DEGC; 0.125W
20	1	R9	Pref	80-0001K-53	ERJ-3GEYJ102	PANASONIC	1K	RES; SMT (0603); 1K; 5%; +/-200PPM/DEGC; 0.1000W
21	1	SU1	Pref	02-JMPFS1100B-00	S1100-B; SX1100-B; STC02SYAN	KYCON;KYCON; SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT; PHOSPHOR BRONZE CONTACT=GOLD PLATED
22	1	U1	Pref	10-MAX15106BGWP-W	MAX15106BGWP+	MAXIM	MAX15106BGWP+	IC; SWTCREG; HIGH-EFFICIENCY; 6A; CURRENT-MODE SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR; WLP20
23	1	PCB	-	EPCB15106B	MAX15106B	MAXIM	PCB	PCB:MAX15106B
<b>TOTAL</b>	<b>34</b>							

MAX15106 EV Kit Schematic Diagram



NOTES:

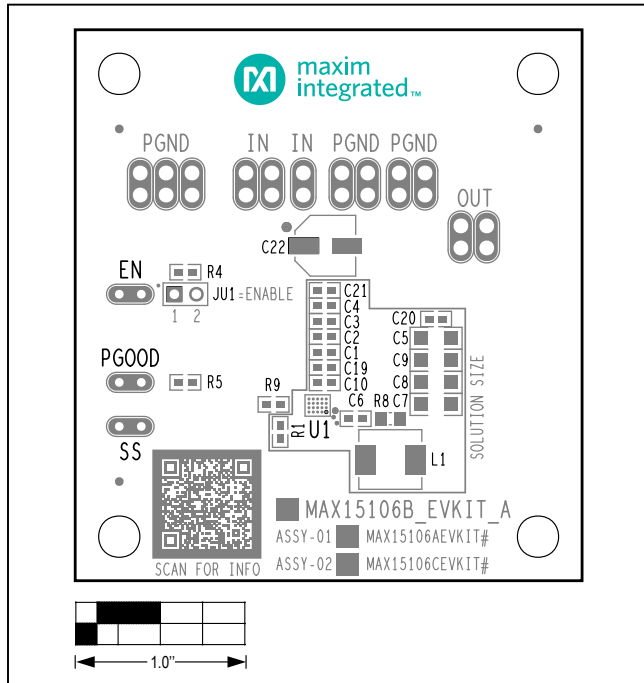
- ▶ POWER GND (PGND)
- ▶ TOP LAYER FLOOD, SYSTEM GND
- ▶ SMALL SIGNAL GND (SGND)

\* VIA "V1/V2" ONLY AT U1 MUST ONLY CONNECT TO U1 SIDE GND. (NOT L2,L3,BOTTOM LAYER)  
REQUEST THICKEST COPPER POSSIBLE ON THE TOP LAYER

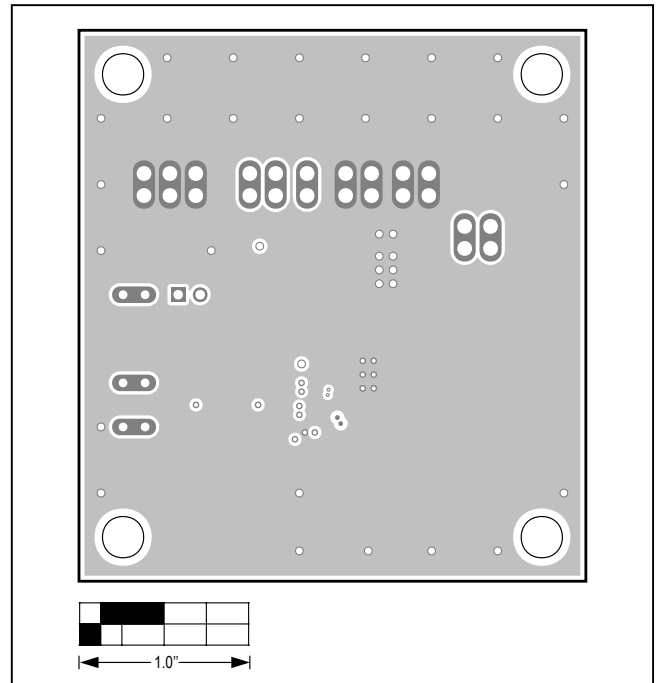
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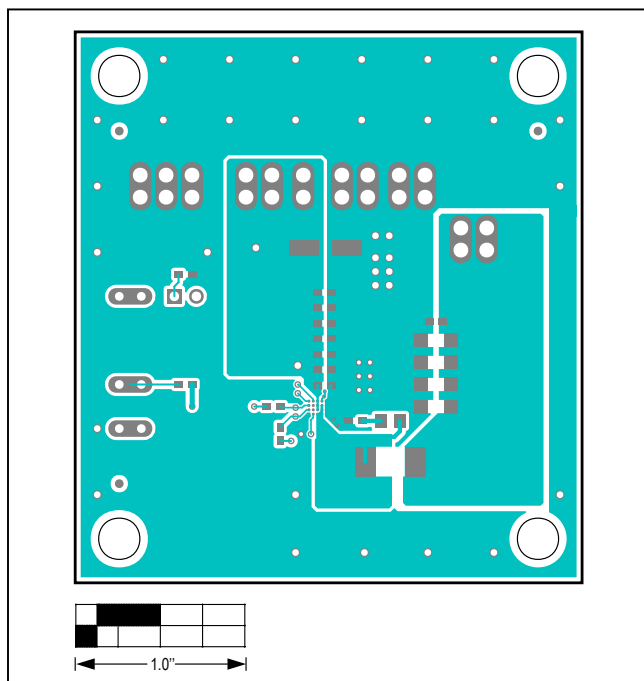
## MAX15106 EV Kit PCB Layout Diagrams



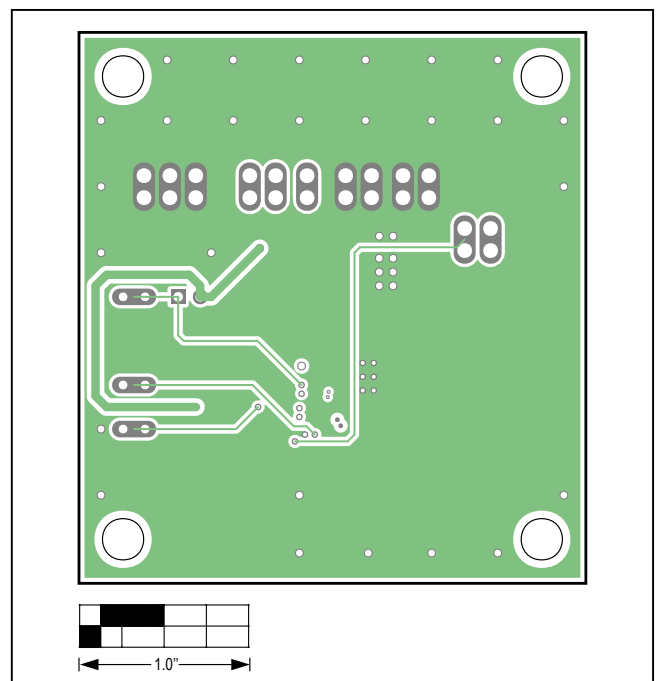
MAX15106 EV Kit Component Placement Guide—  
Top Silkscreen



MAX15106 EV Kit PCB Layout Diagram—Internal 2



MAX15106 EV Kit PCB Layout Diagram—Top View

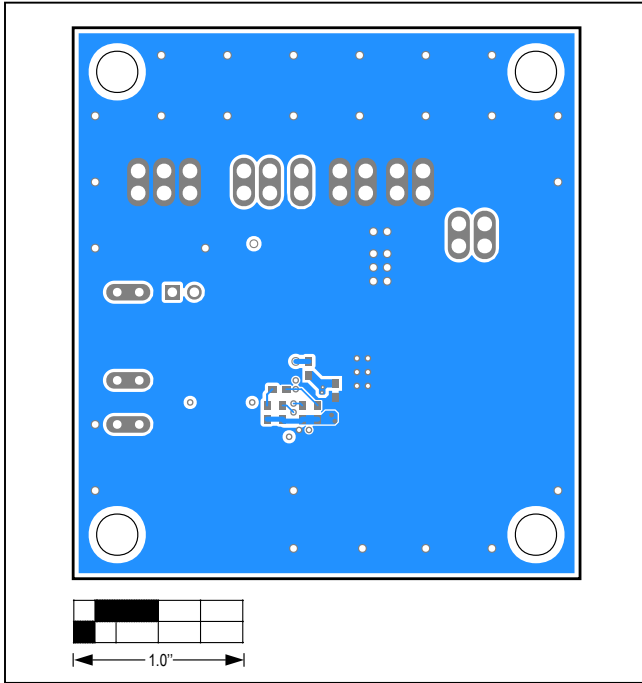


MAX15106 EV Kit PCB Layout Diagram—Internal 3

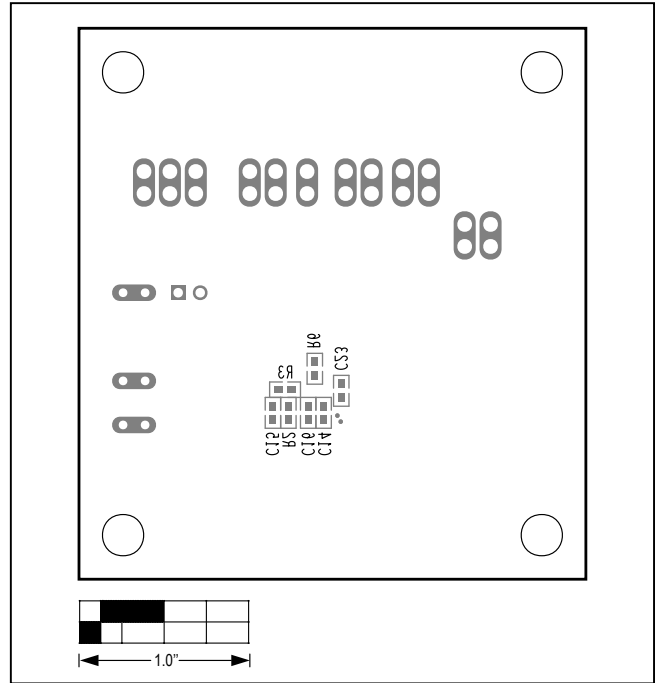
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## MAX15106 EV Kit PCB Layout Diagrams



MAX15106 EV Kit PCB Layout Diagram—Bottom View



MAX15106 EV Kit PCB Layout Diagram—Bottom Silkscreen

## MAX15106 Evaluation Kit

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### Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/21	Release for Market Intro	—
1	3/22	Updated Evaluates parts to MAX15106A/MAX15106B/MAX15106C	All





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