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MAX18066 Evaluation Kit

Evaluates: MAX18066 MAX18166

General Description

The MAX18066 evaluation kit (EV kit) provides a proven design to evaluate the MAX18066 and MAX18166 high-efficiency, 4A, step-down regulators with integrated switches. The EV kit is preset with the MAX18066 for 1.8V output at load currents up to 4A from a 4.5V to 16V input supply. The MAX18166 is pin-compatible with the MAX18066 and can be ordered for evaluation with this EV kit.

Features

- 4.5V to 16V Input Voltage Range
- Fixed 500kHz (MAX18066) and 350kHz (MAX18166) Switching Frequency
- Adjustable Output Voltage Range from 0.606V to (0.9 x V_{IN})
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Recommended Equipment

- MAX18066 EV kit
- 12V, 4A DC power supply
- Load capable of 4A
- Digital voltmeter

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation.

Caution: Do not turn on power supply until all connections are completed.

1) Connect the positive terminal of the 12V supply to the IN connector and the negative terminal to the nearest GND connector.
2) Connect the positive terminal of the 4A load to the VOUT connector and the negative terminal to the nearest GND connector.
3) Connect the digital voltmeter across the VOUT connector and the nearest GND connector
4) Verify that a shunt is not installed on the EN jumper.
5) Turn on the DC power supply.
6) Enable the load.
7) Verify that the voltmeter displays 1.8V.

319-100500; Rev 0; 2/20

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Detailed Description of Hardware

The MAX18066 EV kit evaluates the MAX18066 and MAX18166 current-mode, synchronous, DC-DC buck converters. The EV kit is preset for MAX18066 for 1.8V output and delivers an output current up to 4A with high efficiency. The EV kit operates from an input voltage of 4.5V to 16V. The EV kit provides an adjustable output voltage from 0.606V to 90% of the input voltage through resistor-dividers R5 and R6. The EV kit features independent device-enable control (EN) and power-good (PGOOD) signals that allow for flexible power sequencing.

Soft-Start (SS)

The EV kit utilizes an adjustable soft-start function to limit inrush current during startup. The soft-start time is adjusted by the value of C7, the external capacitor from SS to GND. By default, C7 is currently 0.01µF, which gives a soft-start time of approximately 1.2ms. To adjust the soft-start time, determine C7 using the following formula:

$$C7 = (5\mu A \times t_{SS})/0.606V$$

where t_{SS} is the required soft-start time in seconds and C7 is in farads.

Setting Output Voltage

The EV kit can be adjusted from 0.606V to (0.9 x V_{IN}) by changing the values of R5 and R6. To determine the value of the resistor-divider, first select R6 from 5kΩ to 50kΩ and then use the following equation to calculate R5:

$$R5 = R6 \times (V_{OUT}/V_{FB} - 1)$$

where the feedback threshold voltage V_{FB} = 0.606V (typ). When regulating an output of 0.606V, short FB to OUT and keep R6 connected from FB to GND.

If a different output voltage is desired, revisit the feedback resistor-divider (R5), the inductor, and output capacitor calculations (refer to the *Inductor Selection and Output-Capacitor Selection* sections in the *MAX18066/MAX18166 IC data sheet*). The compensation components (R7, C13, C14, and C15) must be recalculated to ensure loop stability (refer to the *Compensation Design Guidelines* section in the *MAX18066/MAX18166 IC data sheet*).

Regulator Enable (EN)

To shut down the converter, install a shunt on jumper EN. For normal operation, remove the shunt from EN.

Power Good (PGOOD)

PGOOD is an open-drain output that goes high impedance when V_{FB} exceeds 0.56V (typ). PGOOD is internally pulled low when V_{FB} falls below 0.545V (typ). PGOOD also becomes low during shutdown. On the EV kit, the PGOOD test point is pulled up to V_{DD} through resistor R8. Use the GND PCB pad as a ground reference for this signal.

Ordering Information

PART	TYPE
MAX18066EVKIT#	EV Kit

#Denotes RoHS

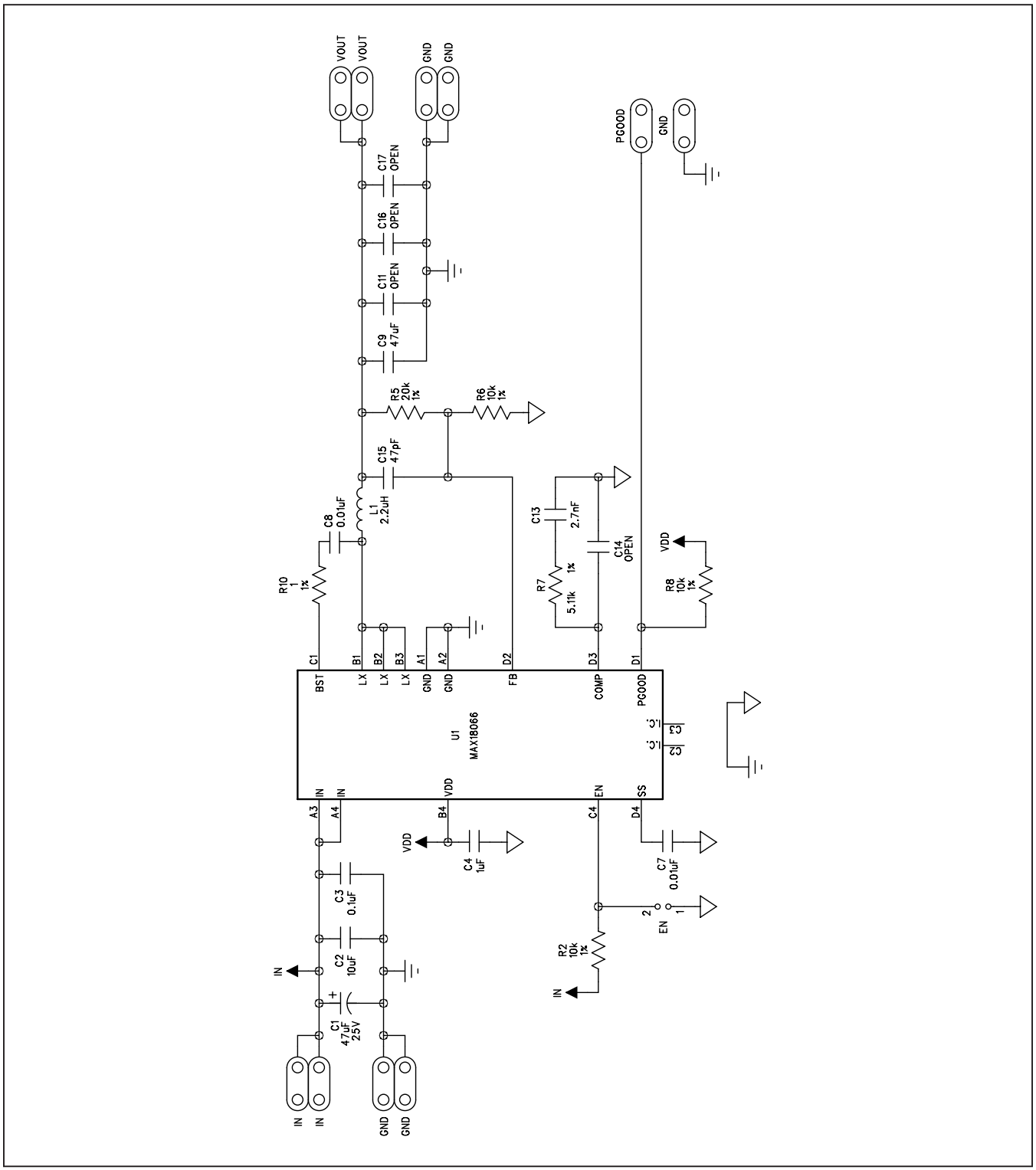
MAX18066 EV Kit Bill of Materials

DESIGNATION	QTY	MFG & PART NUMBER	DESCRIPTION
C1	1	Panasonic EEEFK1E470P	47µF ±20%, 25V aluminum electrolytic capacitor (6.3mm x 5.8mm)
C2	1	Murata GRM31CR61E106K	10uF ±10%, 25V X5R ceramic capacitor (1206)
C3	1	Murata GRM188R71E104K	0.1uF ±10%, 25V X7R ceramic capacitor (0603)
C4	1	Murata GRM188R71C105K	1uF ±10%, 16V X7R ceramic capacitor (0603)
C7, C8	2	Murata GRM188R71E103K	0.01uF ±10%, 25V X7R ceramic capacitor (0603)
C9	1	TDK C2012X5R1A476M125AC	47uF ±20%, 10V X5R ceramic capacitor (0805)
C13	1	Murata GRM188R71H272K	2.7nF ±10%, 50V X7R ceramic capacitor (0603)
C15	1	Murata GRM1885C1H470J	47pF ±5%, 50V C0G ceramic capacitor (0603)
EN	1	SULLINS PEC36SAAN	2-pin Header
GND, GND, IN, VOUT	8	WEICO WIRE 9020 Buss	BUSS, 20G plated solid copper
L1	1	Coilcraft XAL4020-222ME	2.2uH, 5A Inductor , (4mmX4mm)
R2, R6, R8	3	Any	10k ohm ±1%, resistor (0603)
R5	1	Any	20k ohm ±1%, resistor (0603)
R7	1	Any	5.11k ohm ±1%, resistor (0603)
R10	1	Any	1 ohm ±1%, resistor (0402)
U1	1	Maxim MAX18066	MAX18066EWE+ 4A buck converter (16 WLP)
-	1	Any	Shunt
-	1	Maxim MAX18066 PCB	PC Board: MAX18066 EV Kit

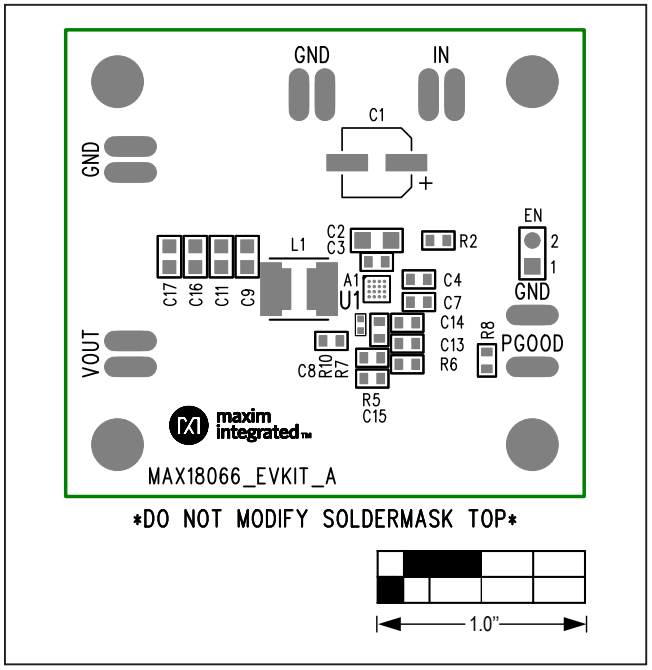
Jumper Table

JUMPER	SHUNT POSITION
EN	One pin

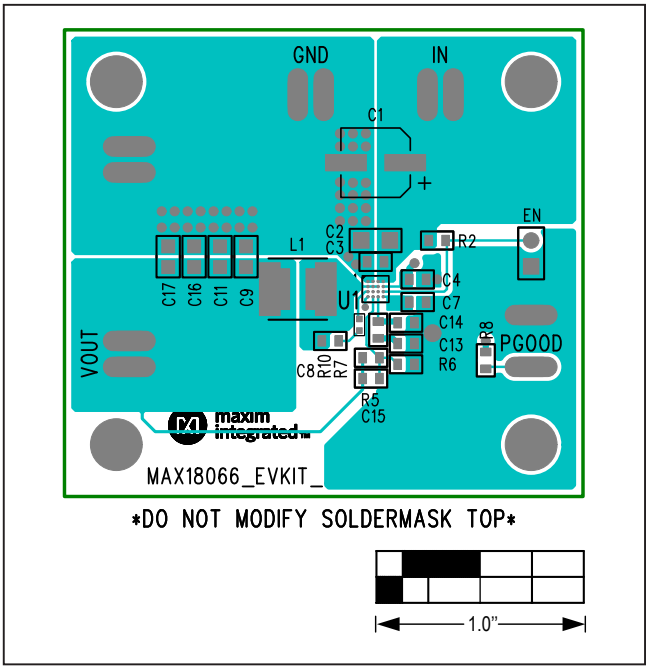
MAX18066 EV Kit Schematic



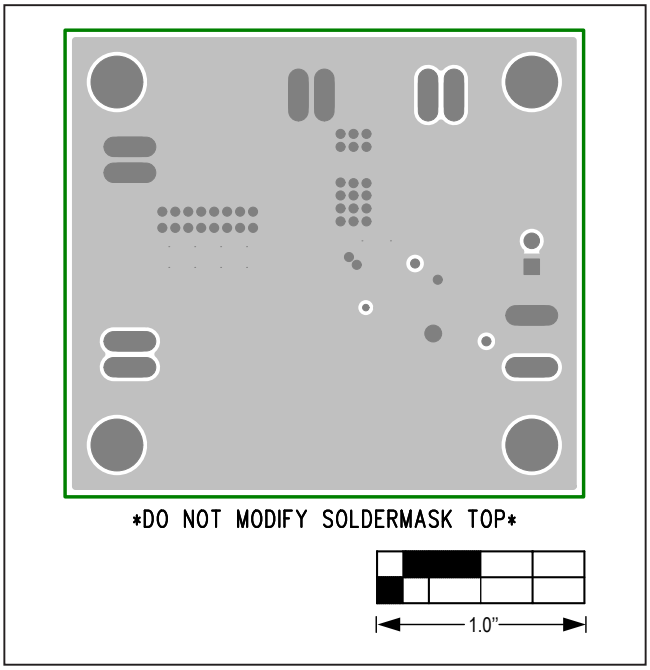
MAX18066 EV Kit PCB Layout Diagrams



MAX18066 EV Component Placement Guide—Top Silkscreen

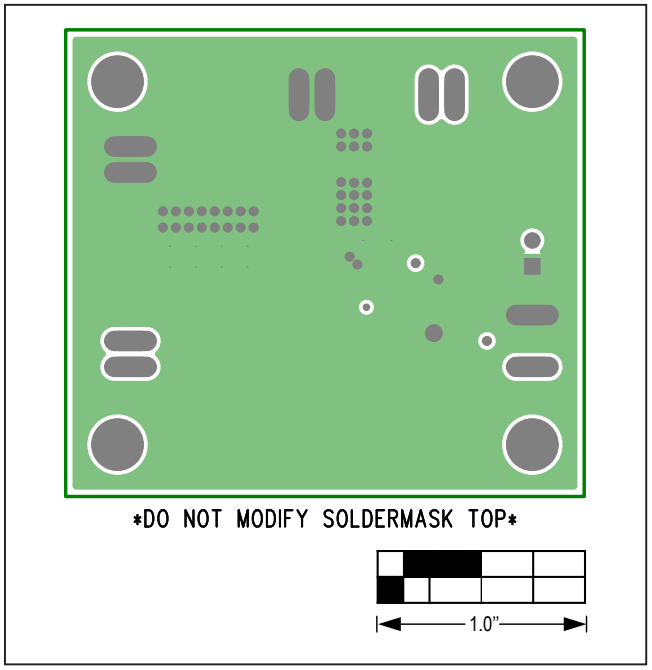


MAX18066 EV Component Placement Guide—Top View

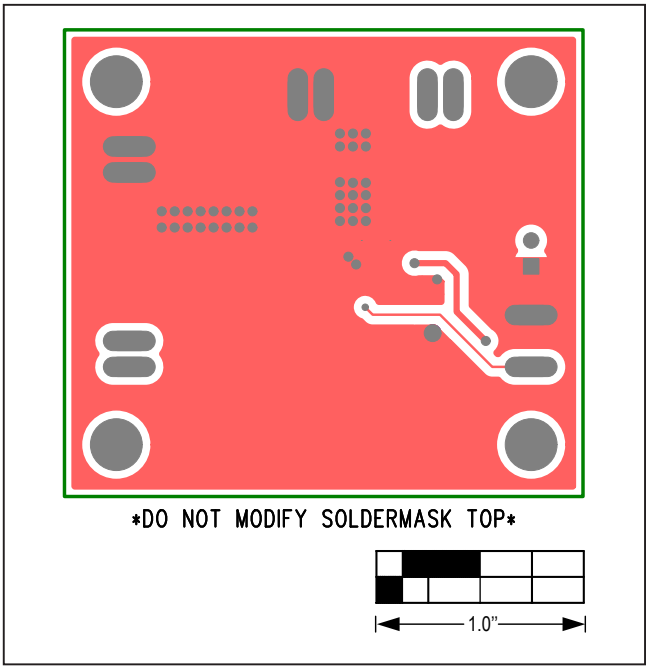


MAX18066 EV Component Placement Guide—Layer 2 GND

MAX18066 EV Kit PCB Layout Diagrams (continued)



MAX18066 EV Component Placement Guide—Layer 3 GND



MAX18066 EV Component Placement Guide—Bottom View

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/20	Initial release	—

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