19-5268; Rev 0; 5/10

MAX15051 Evaluation Kit

Evaluates: MAX15051

General Description

The MAX15051 evaluation kit (EV kit) provides a proven design to evaluate the MAX15051 high-efficiency, 4A, step-down regulator with integrated switches. The EV kit is preset for 1.8V output at load currents up to 4A from a 2.9V to 5.5V input supply. The IC features a 1MHz fixed switching frequency, which allows the EV kit to achieve an all-ceramic capacitor design and fast transient responses.

The EV kit PCB comes with a MAX15051EWE+ installed.

Features

- **Operates from 2.9V to 5.5V Input Supply**
- **All-Ceramic Capacitor Design**
- **1MHz Switching Frequency**
- **Output Voltage Range from 0.6V to (0.9 x V_{IN})**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX15051EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C4	2	22µF ±10%, 10V X7R ceramic capacitors (1206) Murata GRM31CR71A226K
C2, C6	2	0.1µF ±10%, 50V X7R ceramic capacitors (0603) Murata GRM188R71H104K TDK C1608X7R1H104K
C3	0	Not installed, capacitor (0805)
C5	0	Not Installed, capacitor (1206)
C7	1	820pF ±10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H821K
C8	1	33pF ±5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H330J
C9	1	680pF ±10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H681K
C10	1	2.2µF ±10%, 10V X7R ceramic capacitor (0603) Murata GRM188R71A225K
C11	1	0.033µF ±10%, 25V X7R ceramic capacitor (0603) Murata GRM188R71E333K
C12	0	Not installed, capacitor (0603)
JU1	1	2-pin header
L1	1	0.47µH, 16A inductor Würth 744312047
R1	1	8.06kΩ ±1% resistor (0603)
R2	1	4.02kΩ ±1% resistor (0603)
R3	1	6.19kΩ ±1% resistor (0603)
R4	1	20kΩ ±5% resistor (0603)
R5	1	48.7Ω ±1% resistor (0603)
R6	1	100kΩ ±5% resistor (0603)
R8	0	Not installed, resistor (0603)
U1	1	Synchronous buck regulator (16 WLP) Maxim MAX15051EWE+
—	1	Shunt
—	1	PCB: MAX15051 EVALUATION KIT+

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
TDK Corp.	847-803-6100	www.component.tdk.com
Würth Electronik GmbH & Co. KG	201-785-8800	www.we-online.com

Note: *Indicate that you are using the MAX15051 when contacting these component suppliers.*

MAX15051 Evaluation Kit

Quick Start

Recommended Equipment

- MAX15051 EV kit
- 5V, 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 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 pad and the negative terminal to the nearest GND pad.
2) Connect the positive terminal of the 4A load to the OUT pad and the negative terminal to the nearest GND pad.
3) Connect the digital voltmeter across the OUT pad and the nearest GND pad.
4) Verify that a shunt is not installed on jumper JU1.
5) Turn on the DC power supply.
6) Enable the load.
7) Verify that the voltmeter displays 1.8V.

Detailed Description of Hardware

The MAX15051 EV kit provides a proven design to evaluate the MAX15051 high-efficiency, 4A, step-down regulator with integrated switches. The applications include server, point-of-load, ASIC/CPU/DSP, DDR, base stations, telecom and networking, and RAID control power supplies. The EV kit is preset for 1.8V output at load currents up to 4A from a 2.9V to 5.5V input supply. The IC features a 1MHz fixed switching frequency, which allows the EV kit to achieve an all-ceramic capacitor design and fast transient responses.

Reference Input and Soft-Start (REFIN/SS)

The IC utilizes an adjustable soft-start function to limit inrush current during startup. The soft-start time is adjusted by C11, the external capacitor from REFIN/SS to GND. By default, C11 is 0.033µF, which gives a soft-start time of approximately 2.5ms. To adjust the soft-start time, determine C11 using the following equation:

$$C11 = (8\mu A \times t_{SS})/0.6V$$

where t_{SS} is the required soft-start time in seconds and C11 is in farads. C11 should be a 1nF (min) capacitor between REFIN/SS and GND.

When no external reference is applied at REFIN/SS, the device uses the internal 0.6V reference.

Setting Output Voltage

The EV kit can be adjusted from 0.6V to (0.9 x V_{IN}) by changing the values of R1 and R2. To determine the value of the resistor-divider, first select R1 between 2kΩ to 10kΩ, then use the following equation to calculate R2:

$$R2 = (V_{FB} \times R1)/(V_{OUT} - V_{FB})$$

where V_{FB} is equal to the reference voltage at REFIN/SS and V_{OUT} is the output. If no external reference is applied at REFIN/SS, the internal reference is automatically selected and V_{FB} becomes 0.6V. In this case, R2 is not needed for V_{OUT} = 0.6V.

When R2 is changed, compensation components C7, C8, C9, R3, and R5 must be recalculated to ensure loop stability (refer to the *Compensation Design* section in the MAX15050/MAX15051 IC data sheet).

Regulator Enable (EN)

To shut down the converter, install a shunt on jumper JU1. For normal operation, remove the shunt from JU1. See Table 1 to configure JU1.

Power Good (PWRGD)

PWRGD is an open-drain output that goes high impedance when V_{FB} is above 92.5% x $V_{REFIN/SS}$ and $V_{REFIN/SS}$ is above 0.54V. PWRGD becomes low when V_{FB} is below 90% of $V_{REFIN/SS}$ for at least 48 clock cycles or $V_{REFIN/SS}$ is below 0.54V. PWRGD also becomes low during shutdown. On the EV kit, the PWRGD PCB pad is pulled up to VDD through resistor R4. Use the GND PCB pad as a ground reference for this signal.

Table 1. Regulator Enable (EN) Jumper JU1 Description

SHUNT POSITION	DESCRIPTION
Installed	Disables the IC
Not installed*	Normal operation

**Default position.*

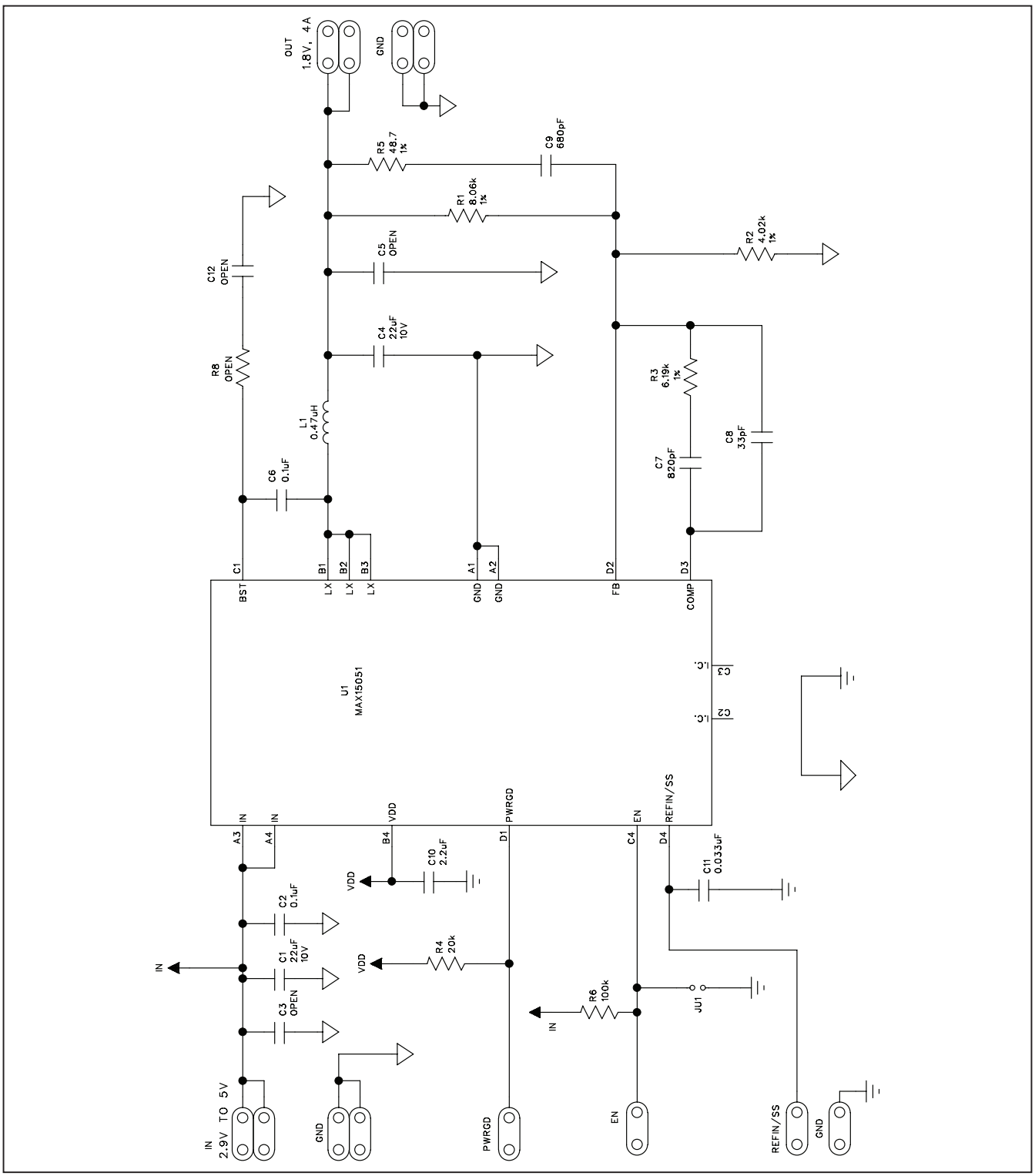

Figure 1. MAX15051 EV Kit Schematic

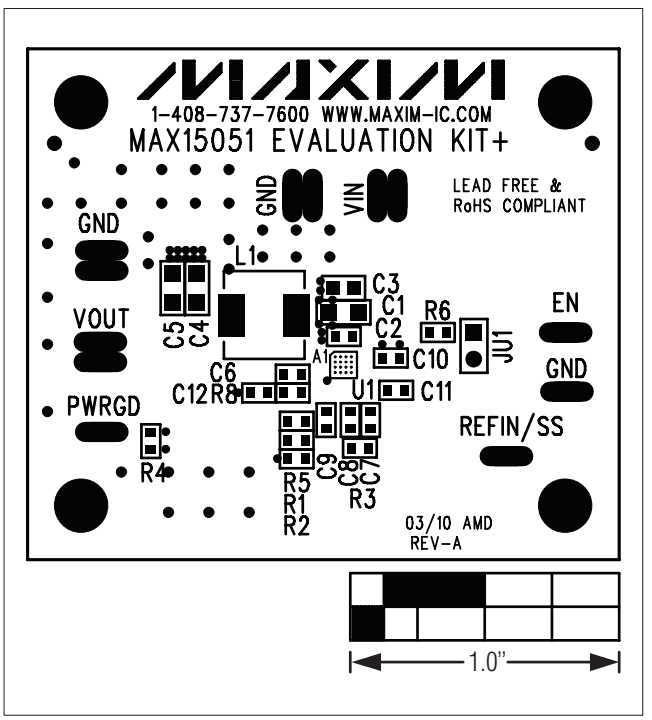

Figure 2. MAX15051 EV Kit Component Placement Guide—Component Side

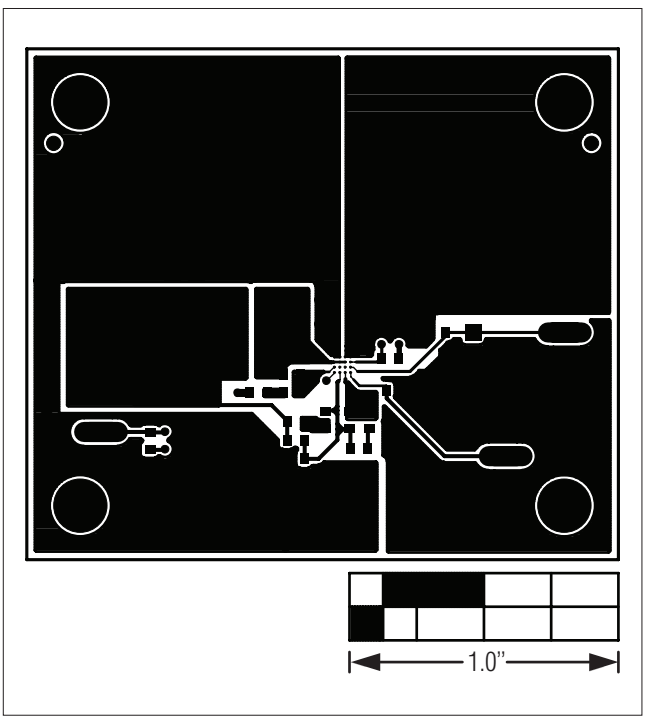

Figure 3. MAX15051 EV Kit Component PCB Layout—Component Side

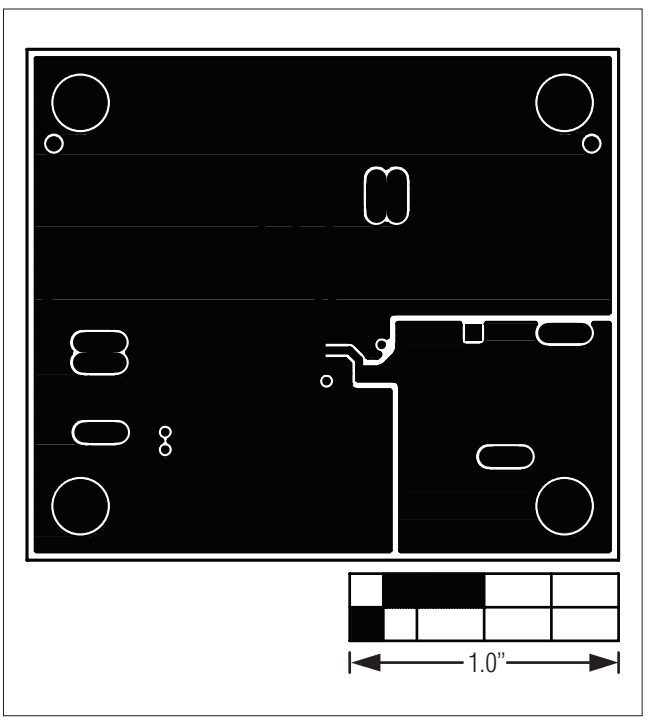

Figure 4. MAX15051 EV Kit PCB Layout—Inner Layer 2

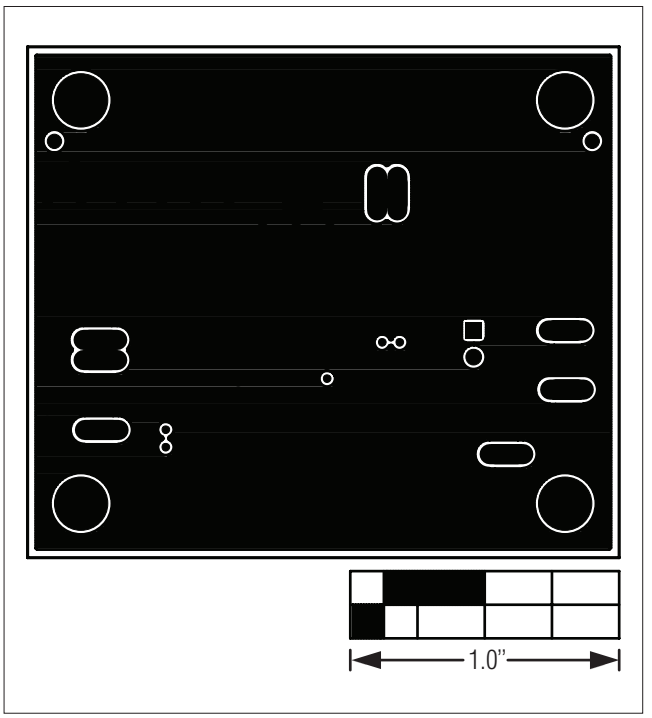

Figure 5. MAX15051 EV Kit PCB Layout—Inner Layer 3

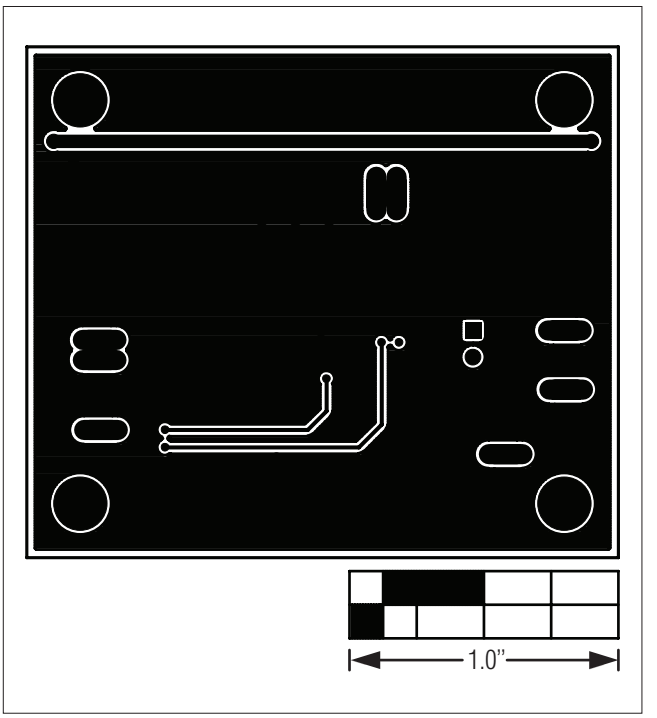

Figure 6. MAX15051 EV Kit PCB Layout—Solder Side

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/10	Initial release	—