19-5275; Rev 0; 5/10

MAX15053 Evaluation Kit

Evaluates: MAX15053

General Description

The MAX15053 evaluation kit (EV kit) provides a proven design to evaluate the MAX15053 high-efficiency, 2A, step-down regulator with integrated switches. The EV kit is preset for 1.8V output at load currents up to 2A from a 2.7V 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.

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 x V_{IN})**
- **Enable Input/Power-Good Output**
- **Selectable Skip-Mode/Forced PWM Functionality**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX15053EVKIT+	EV Kit

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

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C8	0	Not installed, ceramic capacitors (1206)
C2, C7	2	22µF ±20%, 6.3V X5R ceramic capacitors (1206) Murata GRM31CR60J226K TDK C3216X5R0J226M
C3	1	1000pF ±10%, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H102K Murata GRM188R71H102K
C4	1	22000pF ±10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H223K TDK C1608X7R1H223K
C5	0	Not installed, ceramic capacitor (0603)
C6	1	3300pF ±10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H332K TDK C1608X7R1H332K
C9	1	100pF ±10%, 6.3V X7R ceramic capacitor (0603) TDK C1608X7R1H101K
JU1, JU3	2	3-pin headers
JU2	1	2-pin header
L1	1	1µH, 9A, 13.1mΩ inductor (5.2mm x 5.5mm x 3mm) Vishay IHLP2020CZER1R0M11 Vishay IHLP2020CZER1R0M01
R1	1	8.06kΩ ±1% resistor (0603)
R2	1	4.02kΩ ±1% resistor (0603)
R3	1	2.32kΩ ±1% resistor (0603)
R4	1	20kΩ ±5% resistor (0603)
R5	1	1Ω ±1% resistor (0603)
R6	1	1kΩ ±5% resistor (0603)
U1	1	2A step-down regulator (9 WLP) Maxim MAX15053EWL+
—	3	Shunts
—	1	PCB MAX15053 EVALUATION KIT+

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

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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
Vishay	402-563-6866	www.vishay.com

Note: *Indicate that you are using the MAX15053 when contacting these component suppliers.*

Quick Start

Recommended Equipment

- MAX15053 EV kit
- 5V, 2A DC power supply
- Load capable of 2A
- 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 PGND pad.
2) Connect the positive terminal of the 2A load to the OUT pad and the negative terminal to the nearest PGND pad.
3) Connect the digital voltmeter across the OUT pad and the nearest PGND pad.
4) Verify that a shunt is installed on pins 1-2 of jumper JU1.
5) Verify that a shunt is installed on pins 2-3 of jumper JU3.
6) Turn on the DC power supply.
7) Enable the load.
8) Verify that the voltmeter displays 1.8V.

Detailed Description of Hardware

The MAX15053 EV kit provides a proven design to evaluate the MAX15053 high-efficiency, 2A, step-down regulator with integrated switches. The applications include distributed power systems, portable devices, and preregulators. The EV kit is preset for 1.8V output at load currents up to 2A from a 2.7V 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 (SS/REFIN)

The MAX15053 utilizes an adjustable soft-start function to limit inrush current during startup. The soft-start time is adjusted by the value of C4, the external capacitor from SS/REFIN to GND. By default, C4 is currently 22000pF, which gives a soft-start time of approximately 1.3ms. To adjust the soft-start time, determine C4 using the following formula:

$$C4 = (10\mu A \times t_{SS})/0.6V$$

where t_{SS} is the required soft-start time in seconds and C4 is in farads. C4 should be a minimum 1nF capacitor between SS/REFIN and GND.

When no external reference is applied at SS/REFIN, the device uses the internal 0.6V reference. When an external reference is used, soft-start needs to be provided externally.

Setting the Output Voltage

The EV kit can be adjusted from 0.6V up to 0.94 x V_{IN} by changing the values of resistors R1 and R2. To determine the value of the resistor-divider, first select R1 between 2kΩ and 10kΩ and 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 SS/REFIN and V_{OUT} is the output. If no external reference is applied at SS/REFIN, 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 must be recalculated to ensure loop stability (refer to the *Compensation Design Guidelines* section in the MAX15053 IC data sheet).

Regulator Enable (EN)

The IC features an enable input. For normal operation, a shunt should be installed on pins 1-2 of jumper JU1. To disable the output, install a shunt on pins 2-3 of JU1. See Table 1 for JU1 shunt positions.

Table 1. Regulator Enable (EN) Jumper JU1 Description

SHUNT POSITION	MAX15053 OUTPUT
1-2*	Enabled
2-3	Disabled

**Default position.*

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

SHUNT POSITION	SKIP PIN	MODE
Installed	Connected to EN	Skip-mode operation
Not installed*	Unconnected	Forced PWM

**Default position.*

Table 3. R4 Pullup Reference Jumper JU3 Description

SHUNT POSITION	R4 PULLUP REFERENCE
1-2	External user-supplied voltage
2-3*	On-board IN supply

**Default position.*

Skip-Mode Input (SKIP)

The IC 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 jumper JU2. For normal operation, remove the shunt from JU2. See Table 2 for JU2 shunt positions.

Power Good (PGOOD)

PGOOD is an open-drain output that asserts when V_{FB} is above 555mV (typ), and asserts low if V_{FB} is below 530mV (typ). On the EV kit, the PGOOD pad is pulled up through resistor R4. The EV kit gives the option to pull up PGOOD to the IN supply or a user-supplied external voltage through configuration of jumper JU3. See Table 3 for JU3 shunt positions.

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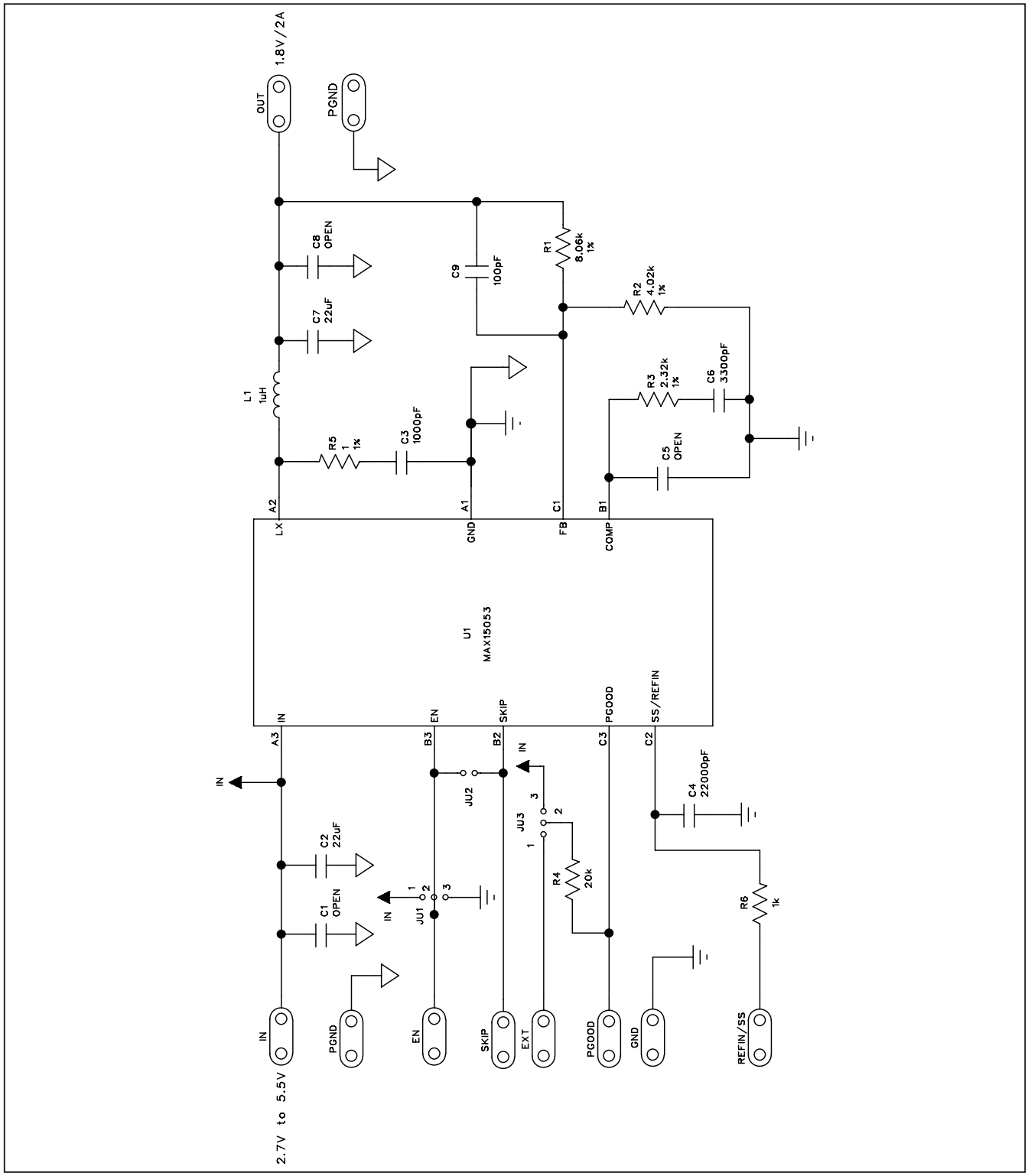


Figure 1. MAX15053 EV Kit Schematic

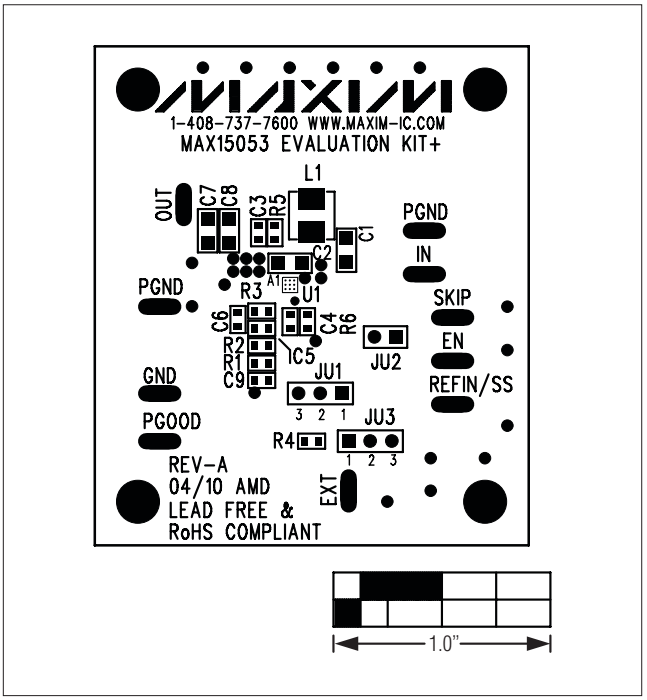


Figure 2. MAX15053 EV Kit Component Placement Guide—Component Side

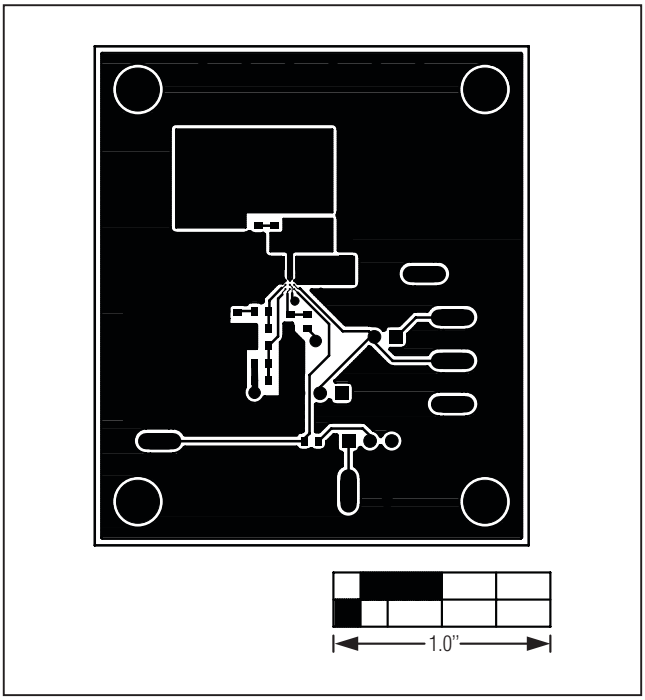


Figure 3. MAX15053 EV Kit Component PCB Layout—Component Side

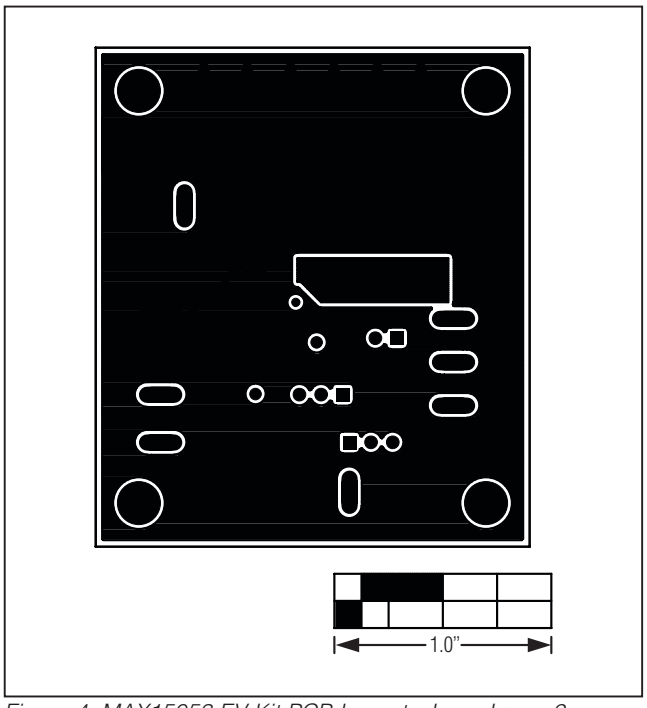


Figure 4. MAX15053 EV Kit PCB Layout—Inner Layer 2

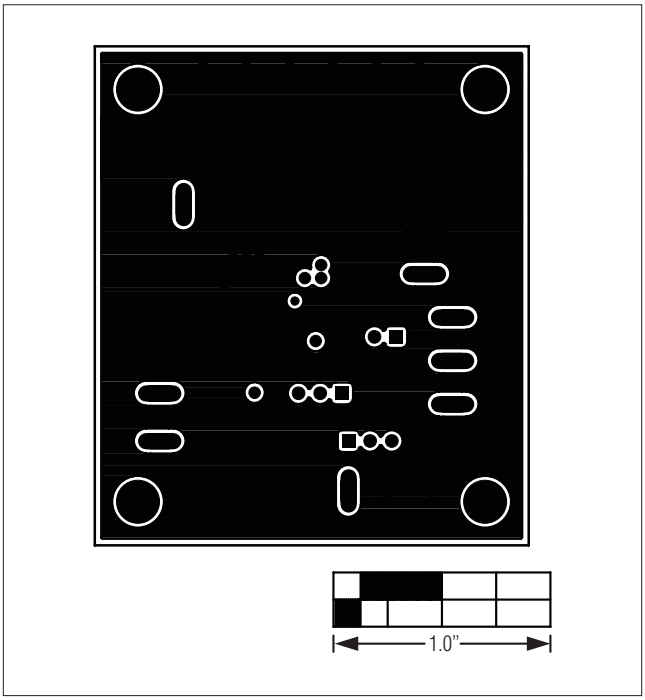


Figure 5. MAX15053 EV Kit PCB Layout—Inner Layer 3

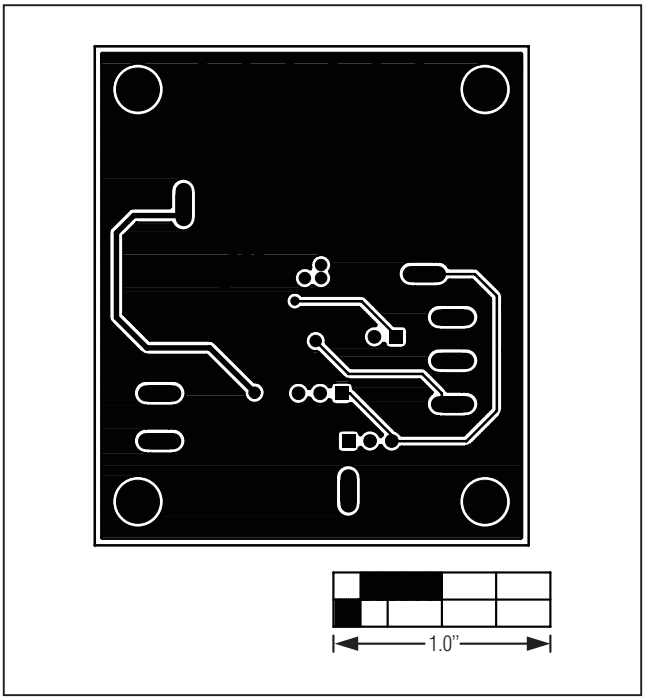


Figure 6. MAX15053 EV Kit PCB Layout—Solder Side

Revision History

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

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