

## General Description

The MAX14691 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the MAX14691 overvoltage-, undervoltage-, and overcurrent-protection device. The EV kit features an external p-channel MOSFET and LED input and output reading. The EV kit comes with the MAX14691ATP+ installed, but can also be used to evaluate the pin-compatible MAX14692 and MAX14693 devices with IC replacement of U1. Request samples from Maxim when ordering the EV kit.

## Benefits and Features

- 5.5V to 58V Operating Voltage Range
- External p-Channel MOSFET Installed
- Proven PCB Layout
- Fully Assembled and Tested

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

## Quick Start

### Required Equipment

- MAX14691 EV kit
- 40V DC power supply
- 5V DC power supply
- Multimeter

### Procedure

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

- 1) Verify that all jumpers are in their default positions.
- 2) Set the 40V DC power supply to 10V and connect to VIN (TP1).
- 3) Connect the 5V DC power supply to VIO (TP21).
- 4) Turn on both power supplies. Verify that LED1 is on, and  $\overline{\text{FLAG}}$  (TP15) is 0V.
- 5) Increase voltage on the DC power supply to TP1 and verify that LED2 turns on when voltage reaches ~12.4V. Also check that voltage on VOUT (TP5) is ~12.4V and  $\overline{\text{FLAG}}$  (TP15) is 5V.
- 6) Increase voltage on the DC power supply to TP1 and verify that LED2 turns off when voltage reaches ~36V. Also check that voltage on VOUT (TP5) goes down and  $\overline{\text{FLAG}}$  (TP15) is 0V.
- 7) Decrease voltage on the DC power supply to TP1 and verify that LED2 turns on when voltage reaches ~35V. Also check that voltage on VOUT (TP5) is ~35V and  $\overline{\text{FLAG}}$  (TP15) is 5V.
- 8) Decrease voltage on the DC power supply to TP1 and verify that LED2 turns on when voltage reaches ~12V. Also check that voltage on VOUT (TP5) goes down and  $\overline{\text{FLAG}}$  (TP15) is 0V.

### Detailed Description of Hardware

The MAX14691 EV kit is a fully assembled and tested circuit board demonstrating the MAX14691 overvoltage-, undervoltage-, and overcurrent-protection device in a 20-pin surface-mount TQFN-EP package.

The EV kit also features LEDs to indicate the power for input and output (see [Table 1](#)).

**Table 1. LED Indicator (LED1, LED2)**

LED	DESCRIPTION
LED1	LED1 is on when IN is powered
LED2	LED2 is on when OUT is powered

**Table 2. Enable Inputs Jumper Settings (JU1, JU12)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	$\overline{\text{HVEN}}$ is connected to VIN
	2-3*	$\overline{\text{HVEN}}$ is connected to GND
JU12	Installed	EN is high
	Not installed*	EN is low

\*Default position.

**Table 3. Enable Inputs Switch Status**

EN	$\overline{\text{HVEN}}$	SWITCH STATUS
0	0	On
1	0	On
0	1	Off
1	1	On

**Table 5. UVLO Threshold Jumper Settings (JU4, JU6)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU4	Installed*	UVLO is connected to ground; internal UVLO threshold is used (do not install JU6)
	Not installed	UVLO is open
JU6	Installed	UVLO is connected to external voltage-divider; use R4/R5 or R7 to set undervoltage threshold (do not install JU4)
	Not installed*	UVLO is open

\*Default position.

### Enable Inputs (EN, $\overline{\text{HVEN}}$ )

Use jumpers JU1 and JU12 to enable the device (see [Table 2](#) for jumper settings).

### Overvoltage-Lockout Threshold (OVLO)

Use jumpers JU3 and JU5 to select internal or external OVLO threshold. Install a shunt on either JU3 or JU5, but not both at the same time (see [Table 4](#) for jumper settings).

### Undervoltage-Lockout Threshold (UVLO)

Use jumpers JU4 and JU6 to select internal or external UVLO threshold. Install a shunt on either JU4 or JU6, but not both at the same time (see [Table 5](#) for jumper settings).

**Table 4. OVLO Threshold Jumper Settings (JU3, JU5)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU3	Installed*	OVLO is connected to ground; internal OVLO threshold is used (do not install JU5)
	Not installed	OVLO is open
JU5	Installed	OVLO is connected to external voltage-divider; use R2/R3 or R6 to set overvoltage threshold (do not install JU3)
	Not installed*	OVLO is open

\*Default position.

**Current-Limit Threshold**

Use jumpers JU7–JU10 to use different resistors to program the current-limit threshold (see [Table 6](#) for jumper settings).

**Reverse-Current Blocking**

Use jumper JU13 to enable or disable reverse-current blocking (see [Table 7](#) for jumper settings).

**Table 6. Current-Limit Threshold Jumper Settings (JU7–JU10)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU7	Installed*	SET1 is connected to ground with a 62kΩ resistor (~0.6A current limit)
	Not installed	SET1 is not connected to ground with a 62kΩ resistor
JU8	Installed	SET1 is connected to ground with a 13kΩ resistor (~2.9A current limit)
	Not installed*	SET1 is not connected to ground with a 13kΩ resistor
JU9	Installed	SET1 is connected to ground with a 6.8kΩ resistor (~5.5A current limit)
	Not installed*	SET1 is not connected to ground with a 6.8kΩ resistor
JU10	Installed	SET1 is connected to ground with a 100kΩ potentiometer (programmable current limit)
	Not installed*	SET1 is not connected to ground with a 100kΩ potentiometer

\*Default position.

**Current-Limit Mode**

Use jumpers JU14 and JU15 to select the current-limit mode (see [Table 8](#) for jumper settings).

**Table 7. Reverse-Current Blocking Jumper Settings (JU13)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU13	1-2	RIPEN is low (disable)
	2-3*	RIPEN is high (enable)

\*Default position.

**Table 8. Reverse-Current Blocking Jumper Settings (JU14, JU15)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU14	Installed*	CLTS2 is low
	Not installed	CLTS2 is high
JU15	Installed	CLTS1 is low
	Not installed*	CLTS1 is high

\*Default position.

**Table 9. Current-Limit Type Select (CLTS1, CLTS2)**

CLTS2	CLTS1	CURRENT-LIMIT TYPE
0	0	Latchoff mode
0	1	Autoretry mode
1	0	Continuous mode
1	1	Continuous mode

## Component List

DESIGNATION	QTY	DESCRIPTION
C1, C5	2	1 $\mu$ F $\pm$ 10%, 100V X7R ceramic capacitors (1206)
C2, C4	2	10 $\mu$ F $\pm$ 20%, 63V radial capacitors
C3	1	1 $\mu$ F $\pm$ 10%, 6.3V X5R ceramic capacitor (0603)
D1	1	50V, 2A diode ON Semi MURA105T3G
D2	1	TVS 36V diode SMCJ36CA
JU1, JU13	2	3-pin single-row headers
JU3–JU10, JU12, JU14, JU15	11	2-pin single-row headers
LED1	1	Green LED Lumex SML-LX1206GW-TR
LED2	1	Yellow LED Lite-On LTST-C150KSKT
Q1	1	60V, 50A p-channel MOSFET Vishay SUD50P06-15
R1	1	220k $\Omega$ $\pm$ 1% resistor (0805)
R2–R5	0	Not installed, resistors (0805)
R6, R7	2	1M $\Omega$ potentiometers Bourns 3296W-1-105LF
R8	1	62k $\Omega$ $\pm$ 1% resistor (0805)
R9	1	13k $\Omega$ $\pm$ 1% resistor (0805)

DESIGNATION	QTY	DESCRIPTION
R10	1	6.8k $\Omega$ $\pm$ 1% resistor (0805)
R11	1	100k $\Omega$ potentiometer Bourns 3296W-1-104LF
R12, R13, R15, R16	4	10k $\Omega$ $\pm$ 1% resistors (0805)
R14	1	100k $\Omega$ $\pm$ 1% resistor (0805)
R17, R18	2	2.7k $\Omega$ $\pm$ 1% resistors (0805)
R19, R20	2	0 $\Omega$ resistors (0805)
TP1, TP2, TP5, TP6, TP17, TP18	6	Red test points
TP3, TP4, TP7, TP8, TP22–TP27	10	Black test points
TP9, TP10, TP14, TP16, TP20	5	Yellow test points
TP11–TP13, TP15, TP19	5	White test points
TP21	1	Orange test point
U1	1	Overvoltage-, undervoltage-, and overcurrent-protection device (20 TQFN-EP*) Maxim MAX14691ATP+
—	10	Shunts
—	1	PCB: MAX14691 EVKIT

\*EP = Exposed pad.

## Component Suppliers

SUPPLIER	PHONE	WEBSITE
Bourns, Inc.	408-496-0706	www.bourns.com
Lite-On, Inc.	408-946-4873	www.us.liteon.com
Lumex North America	800-278-5666	www.lumex.com
ON Semiconductor	602-244-6600	www.onsemi.com
Vishay Americas	402-563-6866	www.vishay.com

**Note:** Indicate that you are using the MAX14691 when contacting these component suppliers.

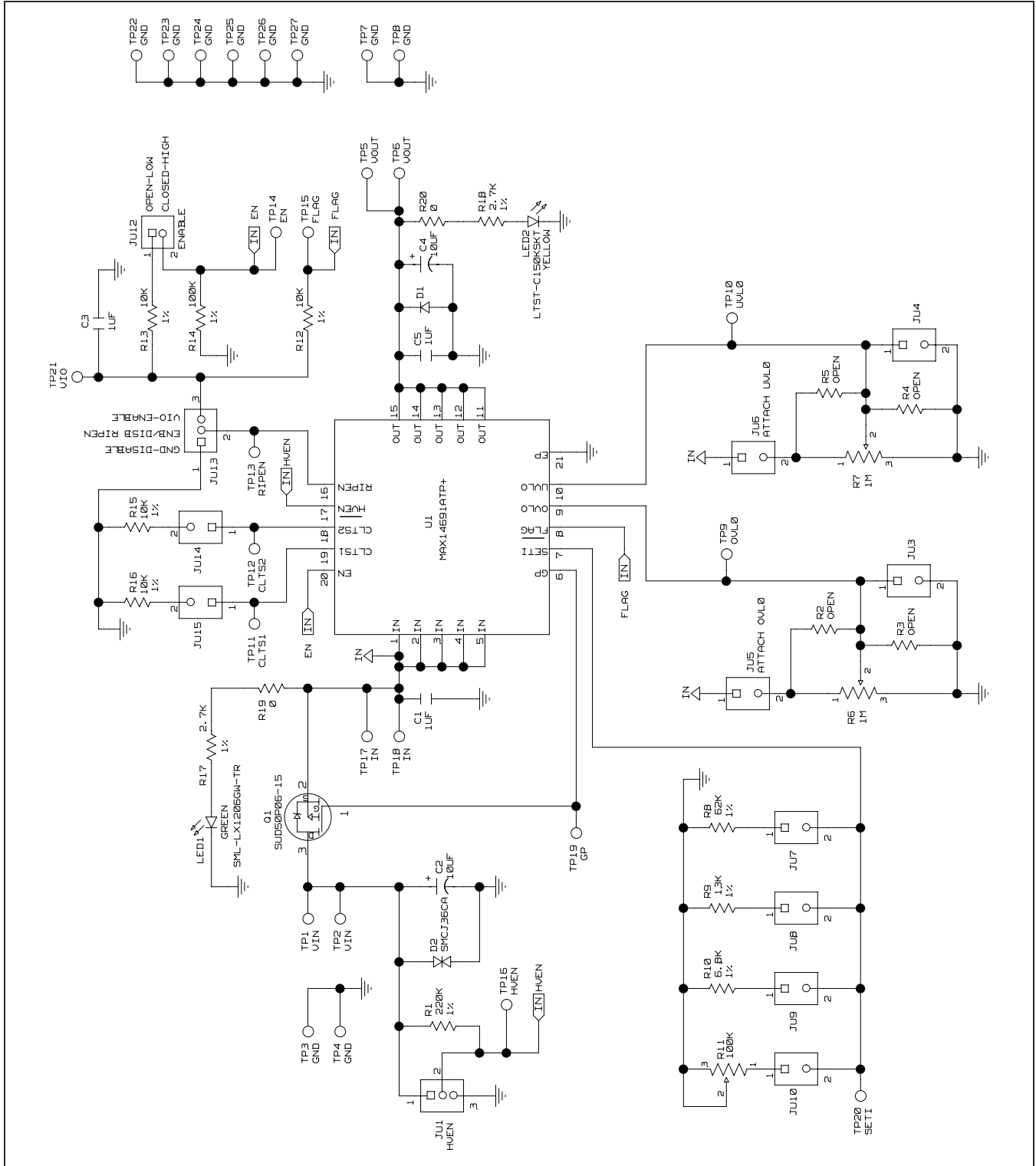


Figure 1. MAX14691 EV Kit Schematic

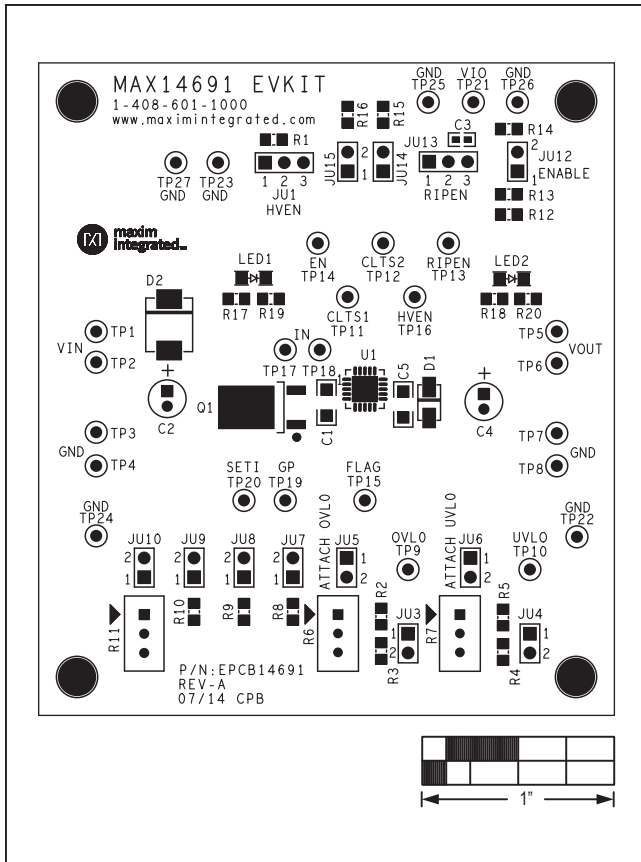


Figure 2. MAX14691 EV Kit Component Placement Guide—Component Side

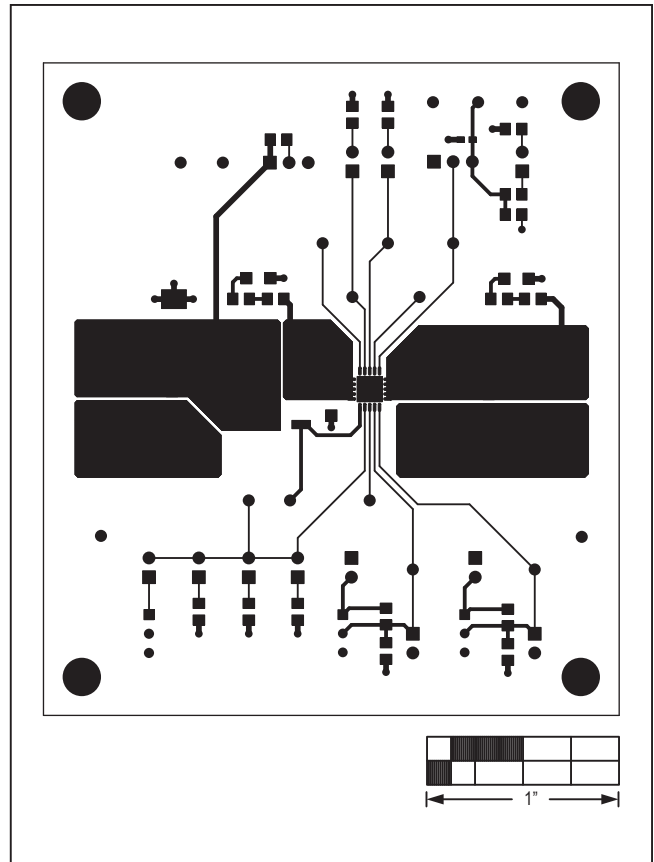


Figure 3. MAX14691 EV Kit PCB Layout—Component Side

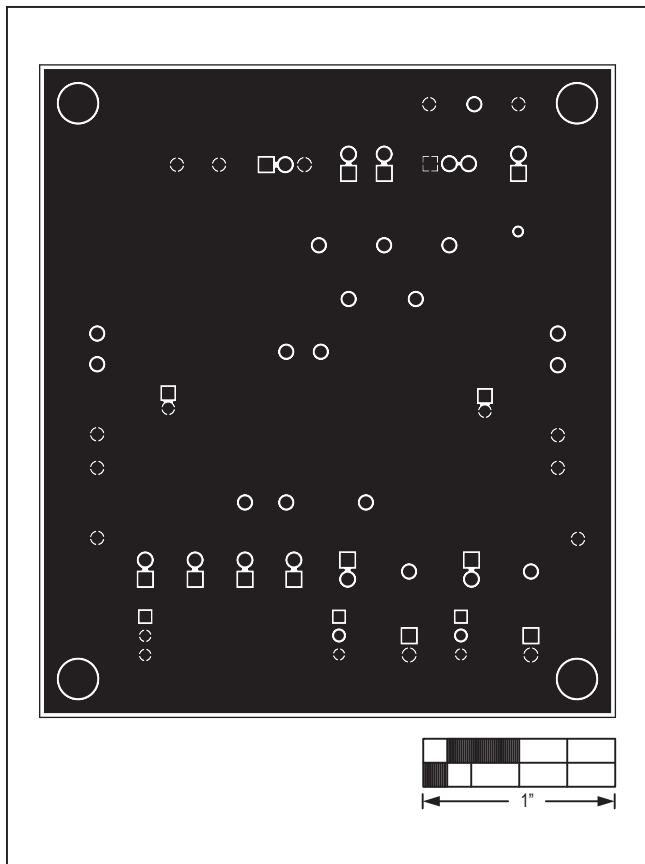


Figure 4. MAX14691 EV Kit PCB Layout—Internal Layer 1

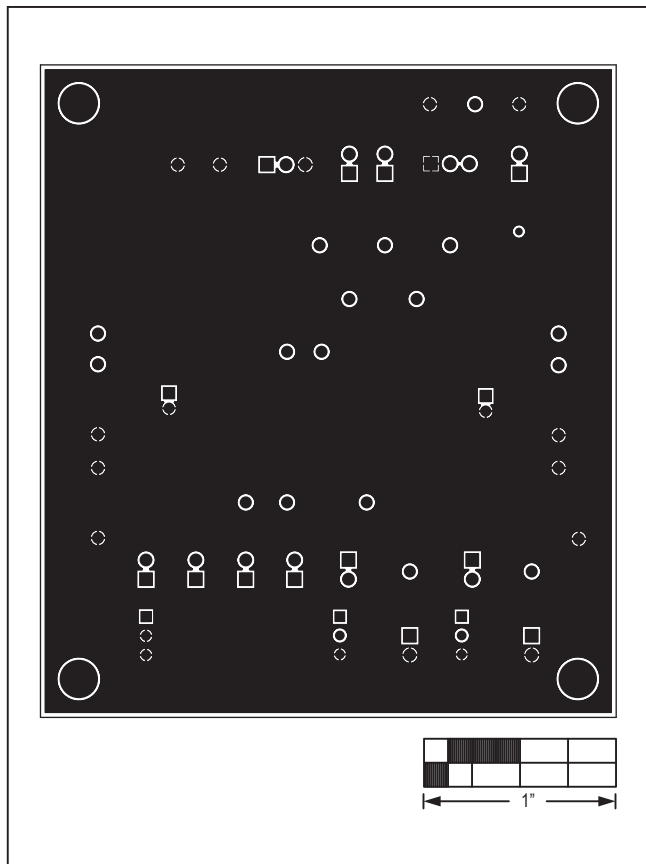


Figure 5. MAX14691 EV Kit PCB Layout—Internal Layer 2

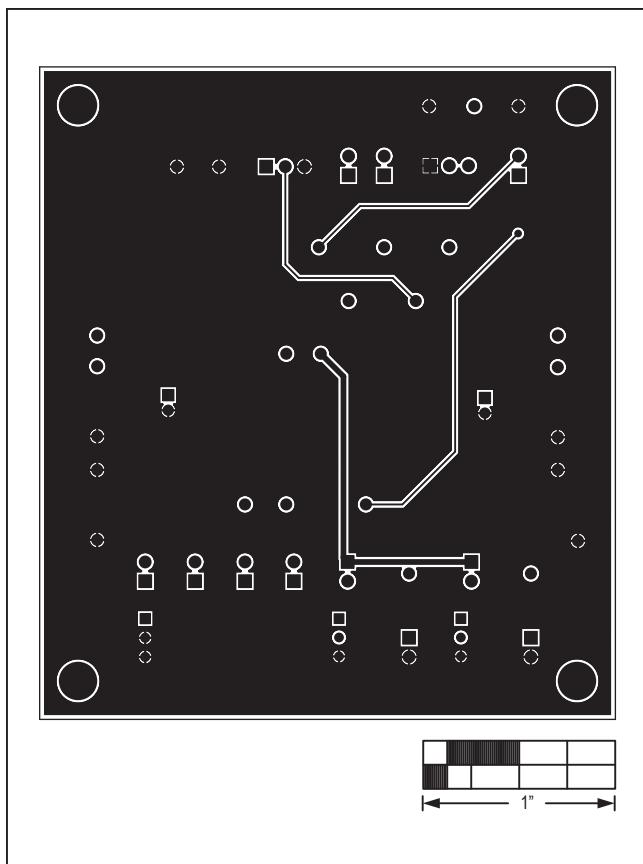


Figure 6. MAX14691 EV Kit PCB Layout—Solder Side

### Ordering Information

PART	TYPE
MAX14691EVKIT#	EV Kit

#Denotes RoHS compliant.



## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/14	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at [www.maximintegrated.com](http://www.maximintegrated.com).

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