

## MAX14670 Evaluation Kit

## Evaluates: MAX14670/MAX14671

### General Description

The MAX14670 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the MAX14670 and MAX14671 bidirectional current-blocking, high-input overvoltage protectors with adjustable OVLO. The EV kit features LED output reading and a USB-powered option for logic pins.

### Component List

| DESIGNATION            | QTY | DESCRIPTION                                                                           |
|------------------------|-----|---------------------------------------------------------------------------------------|
| C1, C2                 | 2   | 1 $\mu$ F $\pm$ 10%, 6.3V X5R ceramic capacitors (0603)<br>Murata GRM188R60J105KA01D  |
| C3                     | 1   | 4.7 $\mu$ F $\pm$ 20%, 6.3V X5R ceramic capacitor (0603)<br>TDK C1608X5R0J475M080AB   |
| C4, C5                 | 2   | 0.1 $\mu$ F $\pm$ 10%, 50V X7R ceramic capacitors (0603)<br>Murata GRM188R71H104KA93D |
| C6, C7                 | 2   | 1 $\mu$ F $\pm$ 10%, 25V X5R ceramic capacitors (0603)<br>Murata GRM188R61E105KA12D   |
| C8                     | 1   | 0.1 $\mu$ F $\pm$ 10%, 25V X7R ceramic capacitor (0603)<br>Murata GRM188R71E104KA01D  |
| J1                     | 1   | USB-B connector<br>FCI 61729-0010BLF                                                  |
| J2–J4                  | 3   | Power terminals<br>Phoenix Contact 1729018                                            |
| JU1–JU3, JU5, JU7, JU8 | 6   | 2-pin single-row headers                                                              |
| JU4, JU6               | 2   | 3-pin single-row headers                                                              |
| LED1                   | 1   | Red LED<br>Lite-On LTST-C150EKT                                                       |
| LED2, LED3             | 2   | Green LEDs<br>OSRAM Opto LG N971-KN-1                                                 |
| R1, R11, R12, R15, R16 | 5   | 1k $\Omega$ $\pm$ 1% resistors (0805)                                                 |
| R2, R18, R20           | 3   | 100k $\Omega$ $\pm$ 1% resistors (0805)                                               |
| R3, R13, R14           | 3   | 10k $\Omega$ $\pm$ 1% resistors (0805)                                                |

### Benefits and Features

- 3V to 28V Operating Voltage Range
- Evaluates Bidirectional OVLO and Adjustable OVLO
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

| DESIGNATION                | QTY | DESCRIPTION                                                        |
|----------------------------|-----|--------------------------------------------------------------------|
| R4                         | 1   | 23.2k $\Omega$ $\pm$ 1% resistor (0805)                            |
| R5                         | 1   | 9.31k $\Omega$ $\pm$ 1% resistor (0805)                            |
| R6                         | 1   | 20k $\Omega$ potentiometer<br>Bourns 3266W-1-203LF                 |
| R7–R10                     | 0   | Not installed, resistors (0805)                                    |
| R17, R19                   | 2   | 22k $\Omega$ $\pm$ 5% resistors (0805)                             |
| TP1, TP8, TP10, TP11, TP18 | 5   | Red test points                                                    |
| TP2, TP3, TP9, TP12, TP13  | 5   | Black test points                                                  |
| TP4, TP14                  | 2   | White test points                                                  |
| TP5, TP15                  | 2   | Yellow test points                                                 |
| TP6, TP16                  | 2   | Orange test points                                                 |
| TP7, TP17                  | 2   | Green test points                                                  |
| U1                         | 1   | Bidirectional overvoltage protector (15 WLP)<br>Maxim MAX14670EWL+ |
| U2                         | 1   | Bidirectional overvoltage protector (15 WLP)<br>Maxim MAX14671EWL+ |
| U3                         | 1   | Dual inverter (6 SC70)<br>Fairchild NC7WZ04P6X                     |
| U4                         | 1   | LDO linear regulator (6 SOT23)<br>Maxim MAX8880EUT+                |
| —                          | 8   | Shunts                                                             |
| —                          | 1   | PCB: MAX14670 EVKIT                                                |

## Component Suppliers

| SUPPLIER                                  | PHONE        | WEBSITE                |
|-------------------------------------------|--------------|------------------------|
| Bourns, Inc.                              | 408-496-0706 | www.bourns.com         |
| FCI Electronics Interconnection Solutions | 800-237-2374 | www.fciconnect.com     |
| Lite-On, Inc.                             | 408-946-4873 | www.us.liteon.com      |
| Murata Americas                           | 800-241-6574 | www.murataamericas.com |
| OSRAM Opto Semiconductors                 | 888-446-7726 | www.osram-os.com       |
| Phoenix Contact, Inc.                     | 800-888-7388 | www.phoenixcontact.com |
| TDK Corp.                                 | 847-803-6100 | www.component.tdk.com  |

**Note:** Indicate that you are using the MAX14670 when contacting these component suppliers.

## Quick Start

### Required Equipment

- MAX14670 EV kit
- 25V DC power supply
- Multimeter
- USB-A male to USB-B male cable or 5V DC power supply

### 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) Connect the USB cable to J1 from a computer (or connect 5V DC power supply to TP8).
- 3) Verify LED1 is on.
- 4) Connect 6V DC power supply to TP1. Verify OUT (TP18) is 6V and LED2 is on.
- 5) Increase voltage on DC power supply to TP1. Verify OUT voltage goes down and LED2 is off when input reaches about 6.8V (OVLO).
- 6) Turn off the power supply and remove it from TP1. Connect it to TP11 and set the voltage to 15V.
- 7) Turn on the power supply and verify OUT (TP18) is 15V and LED3 is on.
- 8) Increase voltage on DC power supply to TP11. Verify OUT voltage goes down and LED3 is off when input reaches about 15.5V (OVLO).

**Table 1. LED Indicator (LED1–LED3)**

| LED  | DESCRIPTION                                                    |
|------|----------------------------------------------------------------|
| LED1 | LED1 is on when VBUS/5V supply for logic pins is powered.      |
| LED2 | LED2 is on when MAX14670 $\overline{\text{ACOK}}$ is asserted. |
| LED3 | LED3 is on when MAX14671 $\overline{\text{ACOK}}$ is asserted. |

**Table 2. Pullup Voltage (JU1–JU3)**

| JUMPER | SHUNT POSITION | DESCRIPTION                            |
|--------|----------------|----------------------------------------|
| JU1    | Installed*     | $V_{CC}$ is set to 1.8V through R4.    |
|        | Not installed  | $V_{CC}$ is not set through R4.        |
| JU2    | Installed      | $V_{CC}$ is set to 2.6V through R5.    |
|        | Not installed* | $V_{CC}$ is not set through R5.        |
| JU3    | Installed      | $V_{CC}$ is set through R6 (variable). |
|        | Not installed* | $V_{CC}$ is not set through R6.        |

\*Default position.

## Detailed Description of Hardware

The MAX14670 EV kit is a fully assembled and tested circuit board demonstrating the MAX14670 and MAX14671 bidirectional current-blocking, high-input overvoltage protector IC in a 15-bump surface-mount wafer-level package (WLP).

The EV kit also features LEDs to indicate the power for logic pins and  $\overline{\text{ACOK}}$  status (see Table 1).

### Pullup Voltage

The EV kit features jumpers to select pullup voltage ( $V_{CC}$ ) for OTG\_EN. Install a jumper in positions shown in Table 2 to change the voltage.

**OVLO Threshold**

Use jumpers JU4 and JU6 to select internal or external OVLO threshold (see Table 3 for jumper settings).

Use these equations to calculate the external OVLO threshold:

$$\text{MAX14670: } V_{\text{IN\_OVLO}} = V_{\text{OVLO\_TH}} \times \left[ 1 + \frac{R7}{R8} \right]$$

$$\text{MAX14671: } V_{\text{IN\_OVLO}} = V_{\text{OVLO\_TH}} \times \left[ 1 + \frac{R9}{R10} \right]$$

**OTG Enable Input**

Use jumpers JU5 and JU7 to select OTG\_EN high or low (see Table 4 for jumper settings).

**Two Inputs**

The EV kit features jumper JU8, which can be set to demonstrate using two devices for two input sources to one output (see Table 5 for jumper settings).

**Table 3. OVLO Threshold (JU4, JU6)**

| JUMPER | SHUNT POSITION | DESCRIPTION                                                                     |
|--------|----------------|---------------------------------------------------------------------------------|
| JU4    | 1-2            | MAX14670 OVLO is connected to R7/R8 voltage divider (external OVLO threshold).  |
|        | 2-3*           | MAX14670 OVLO is connected to ground (internal OVLO threshold).                 |
| JU6    | 1-2            | MAX14671 OVLO is connected to R9/R10 voltage divider (external OVLO threshold). |
|        | 2-3*           | MAX14671 OVLO is connected to ground (internal OVLO threshold).                 |

\*Default position.

**Table 4. OTG Enable Input (JU5, JU7)**

| JUMPER | SHUNT POSITION | DESCRIPTION                                     |
|--------|----------------|-------------------------------------------------|
| JU5    | Installed      | MAX14670 OTG_EN is connected to V <sub>CC</sub> |
|        | Not installed* | MAX14670 OTG_EN is connected to ground          |
| JU7    | Installed      | MAX14671 OTG_EN is connected to V <sub>CC</sub> |
|        | Not Installed* | MAX14671 OTG_EN is connected to ground          |

\*Default position.

**Table 5. Two Inputs (JU8)**

| JUMPER | SHUNT POSITION | DESCRIPTION                                     |
|--------|----------------|-------------------------------------------------|
| JU8    | Installed      | MAX14671 ACOK is connected to device's OVLO     |
|        | Not installed* | MAX14671 ACOK is not connected to device's OVLO |

\*Default position.

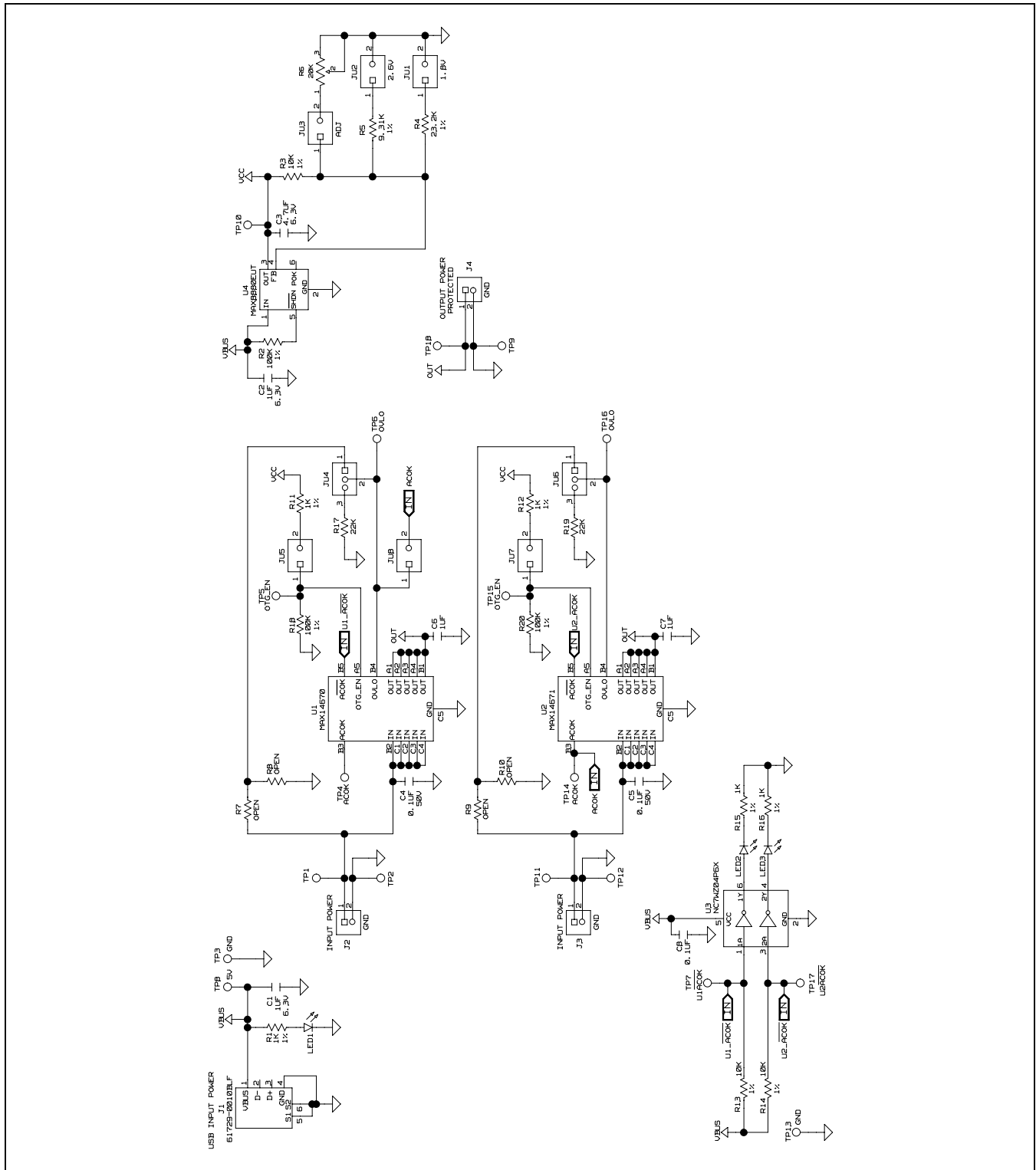


Figure 1. MAX14670 EV Kit Schematic

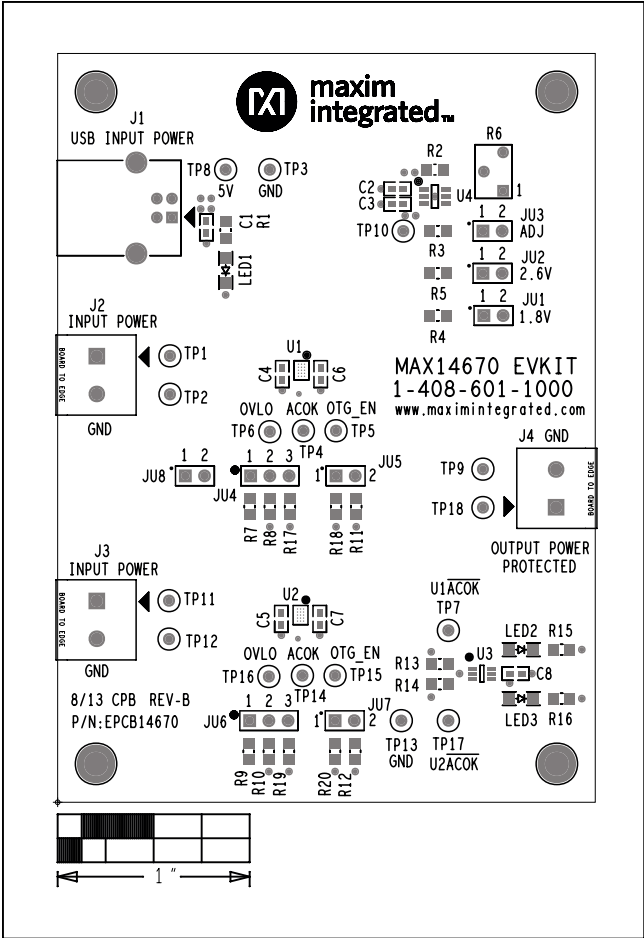


Figure 2. MAX14670 EV Kit Component Placement Guide—Component Side

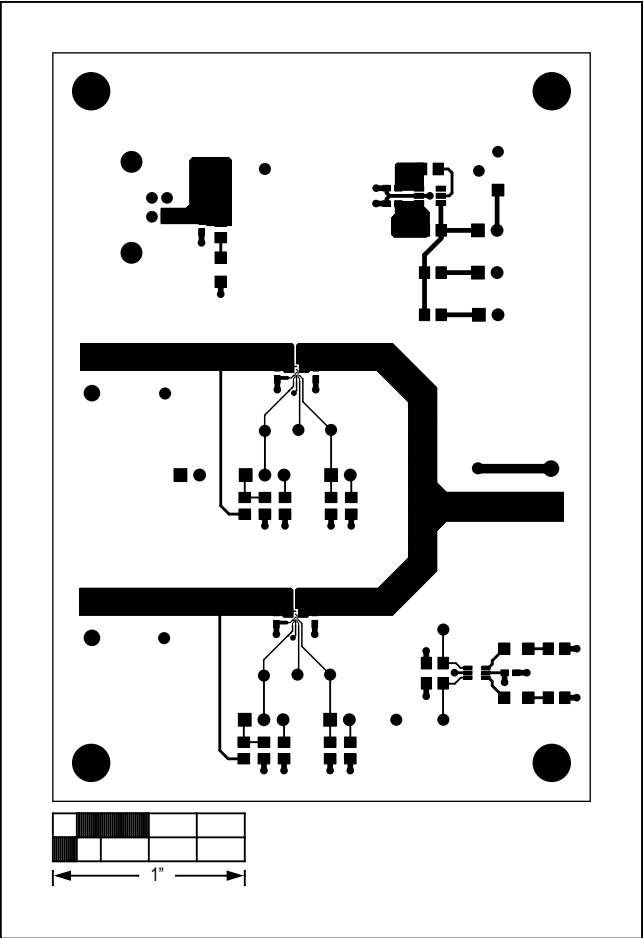


Figure 3. MAX14670 EV Kit PCB Layout—Component Side

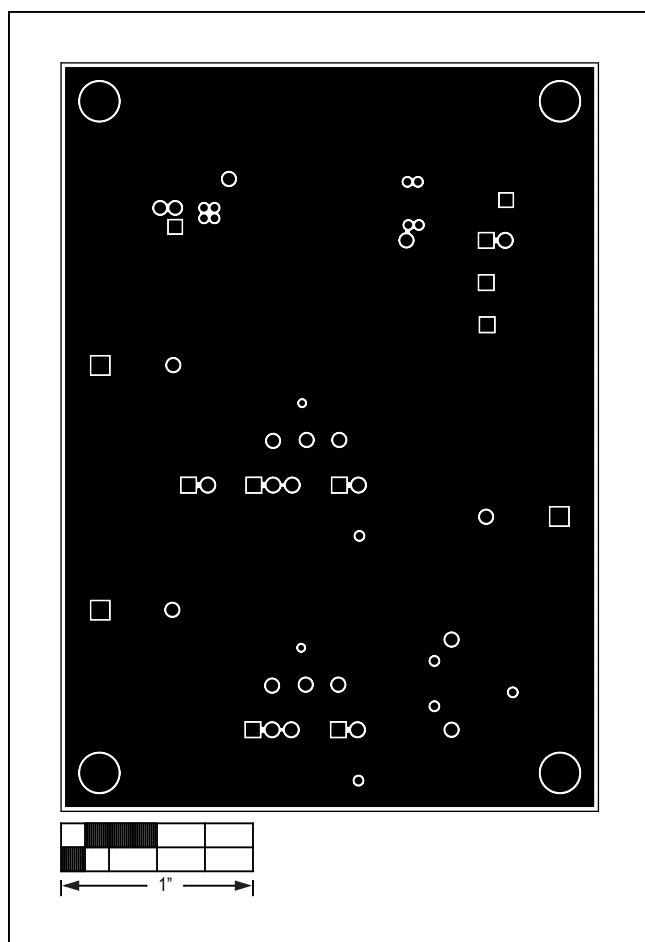


Figure 4. MAX14670 EV Kit PCB Layout—Internal Layer 1

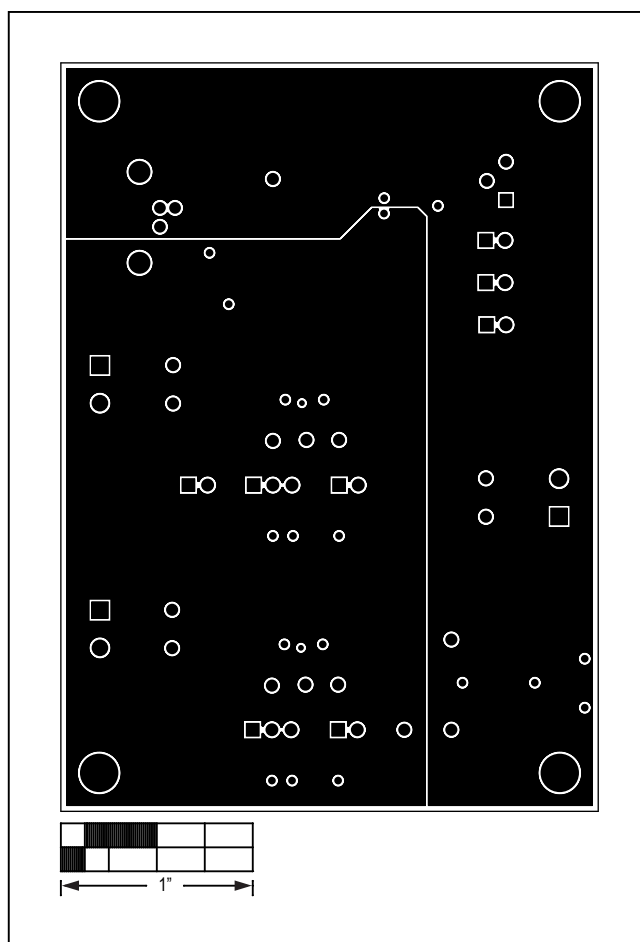


Figure 5. MAX14670 EV Kit PCB Layout—Internal Layer 2

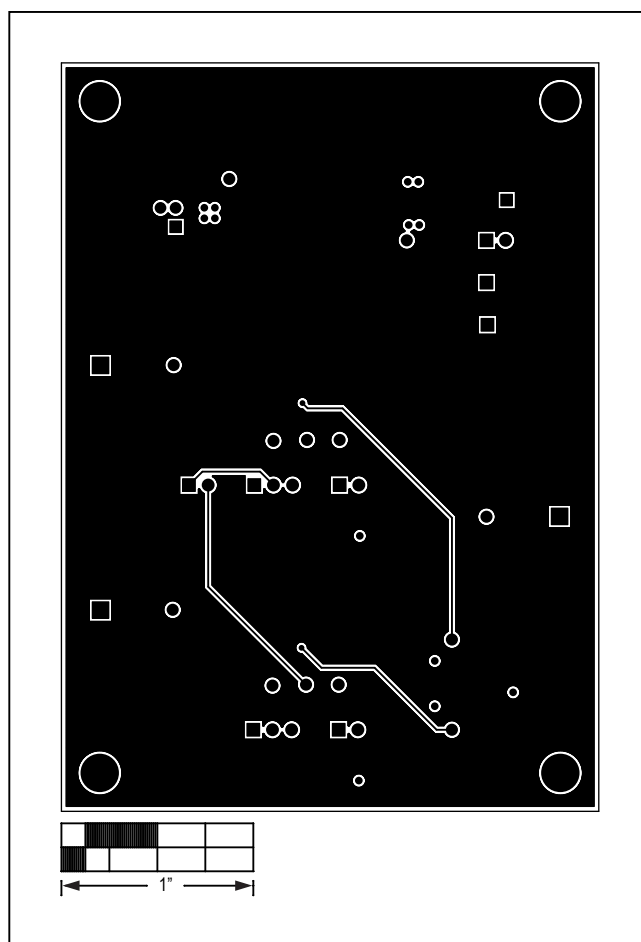


Figure 6. MAX14670 EV Kit PCB Layout—Solder Side

## Ordering Information

| PART           | TYPE   |
|----------------|--------|
| MAX14670EVKIT# | EV Kit |

#Denotes RoHS compliant.

## Revision History

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION     | PAGES<br>CHANGED |
|--------------------|------------------|-----------------|------------------|
| 0                  | 9/13             | 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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