

# MAX17572 5V Output Evaluation Kit

# Evaluates: MAX17572 in 5V Output-Voltage Application

## General Description

The MAX17572 5V output evaluation kit (EV kit) provides a proven design to evaluate the MAX17572 high-voltage, high-efficiency, synchronous step-down DC-DC converter. The EV kit is preset for 5V output at load currents up to 1A and features a 500kHz switching frequency for optimum efficiency and component size. The EV kit features adjustable input undervoltage-lockout, adjustable soft-start, open-drain  $\overline{\text{RESET}}$  signal, and external frequency synchronization.

## Features

- Operates From a 6V to 60V Input Supply
- 5V Output Voltage
- Up to 1A Output Current
- 500kHz Switching Frequency
- Enable/UVLO Input, Resistor-Programmable UVLO Threshold
- Adjustable Soft-Start Time
- Open-Drain  $\overline{\text{RESET}}$  Output
- External Frequency Synchronization
- Overcurrent and Overtemperature Protection
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

## Quick Start

### Recommended Equipment

- MAX17572 5V output EV kit
- 6V to 60V, 2A DC input power supply
- Load capable of sinking 1A
- Digital voltmeter (DVM)

### 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) Set the power supply at a voltage between 6V and 60V. Disable the power supply.
- 2) Connect the positive terminal of the power supply to the  $V_{\text{IN}}$  PCB pad and the negative terminal to the nearest PGND PCB pad. Connect the positive terminal of the 1A load to the  $V_{\text{OUT}}$  PCB pad and the negative terminal to the nearest PGND PCB pad.
- 3) Connect the DVM across the  $V_{\text{OUT}}$  PCB pad and the nearest PGND PCB pad.
- 4) Verify that shunts are installed across pins 1-2 on jumper JU1 (see [Table 1](#) for details).
- 5) Turn on the DC power supply.
- 6) Enable the load.
- 7) Verify that the DVM displays 5V

## Detailed Description of Hardware

The MAX17572 5V output EV kit provides a proven design to evaluate the MAX17572 high-voltage, high efficiency, synchronous step-down DC-DC converter. The EV kit is preset for 5V output from 6V to 60V input at load currents up to 1A and features a 500kHz switching frequency for optimum efficiency and component size. The EV kit includes an EN/UVLO PCB pad and jumper JU1 to enable the output at a desired input voltage. An additional RESET PCB pad is available for monitoring whether the converter output is in regulation.

### Soft-Start Capacitor Selection

The device implements adjustable soft-start operation to reduce inrush current. A capacitor connected from the SS pin to GND programs the soft-start time. The selected output capacitance ( $C_{SEL}$ ) and the output voltage ( $V_{OUT}$ ) determine the minimum required soft-start capacitor as follows:

$$C_{SS} \geq 56 \times 10^{-6} \times C_{SEL} \times V_{OUT}$$

The soft-start time ( $t_{SS}$ ) is related to the capacitor connected at SS ( $C_{SS}$ ) by the following equation:

$$t_{SS} = \frac{C_{SS}}{5.55 \times 10^{-6}}$$

For example, to program a 2ms soft-start time, a 12nF capacitor should be connected from the SS pin to GND.

### Setting the Undervoltage-Lockout Level

The device offers an adjustable input undervoltage-lockout level. Set the voltage at which the device turns on with a resistive voltage-divider connected from  $V_{IN}$  to SGND.

Connect the center node of the divider to EN/UVLO. Choose R1 to be 3.3M $\Omega$  and then calculate R2 as follows:

$$R2 = \frac{1.215 \times R1}{(V_{INU} - 1.215)}$$

where  $V_{INU}$  is the voltage at which the device is required to turn on. Ensure that  $V_{INU}$  is higher than  $0.8 \times V_{OUT}$ .

If the EN/UVLO pin is driven from an external signal source, a series resistance of minimum 1k $\Omega$  is recommended to be placed between the signal source output and the EN/UVLO pin, to reduce voltage ringing on the line.

### Adjusting Output Voltage

Set the output voltage with a resistive voltage-divider connected from the positive terminal of the output capacitor ( $V_{OUT}$ ) to SGND. Connect the center node of the divider to the FB pin. Use the following procedure to choose the resistive voltage-divider values:

Calculate resistor R4 from the output to the FB pin as follows:

$$R3 = \frac{1850}{C_{OUT\_SEL}}$$

Where  $C_{OUT\_SEL}$  (in  $\mu$ F) is the actual derated value of the output capacitance used and R3 is in k $\Omega$ . The minimum allowable value of R3 is  $(5.6 \times V_{OUT})$ , where R3 is in k $\Omega$ . If the value of R3 calculated using the above equation is less than  $(5.6 \times V_{OUT})$ , increase the value of R3 to at least  $(5.6 \times V_{OUT})$ .

$$R4 = \frac{R3 \times 0.9}{(V_{OUT} - 0.9)}$$

R3 is in k $\Omega$ .

**Table 1. TBD**

| SHUNT POSITION | EN/UVLO PIN                                                | MAX17572_OUTPUT                                         |
|----------------|------------------------------------------------------------|---------------------------------------------------------|
| 1-2*           | Connected to VIN                                           | Enabled                                                 |
| Not installed  | Connected to the center node of resistor-divider R1 and R2 | Enabled, UVLO level set through the R1 and R2 resistors |
| 2-3            | Connected to SGND                                          | Disabled                                                |

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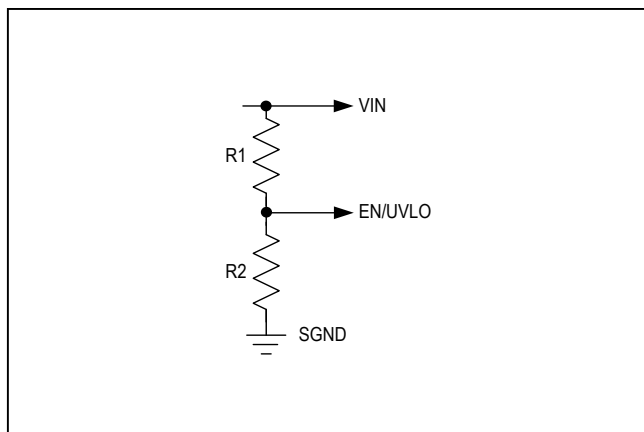


Figure 1. Setting the Input Undervoltage Lockout

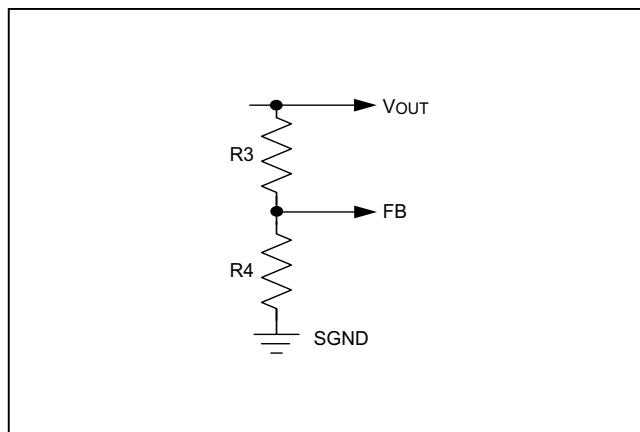
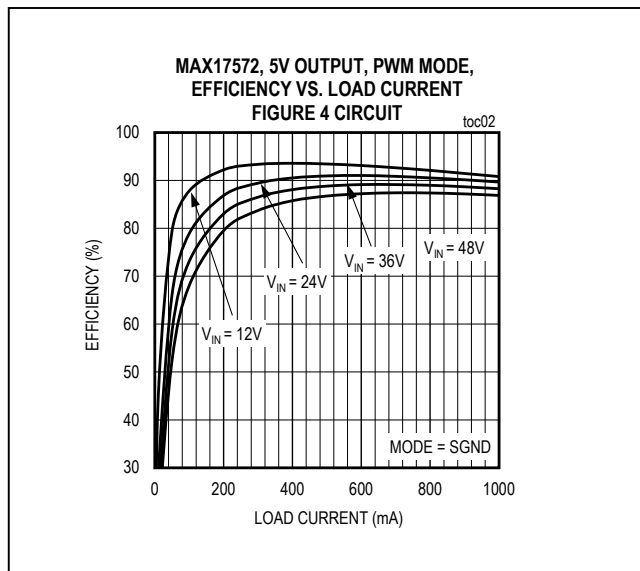
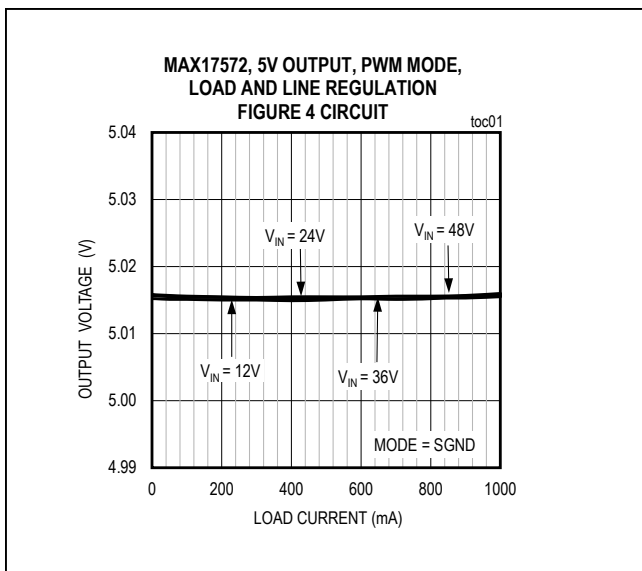


Figure 2. Adjusting Output Voltage

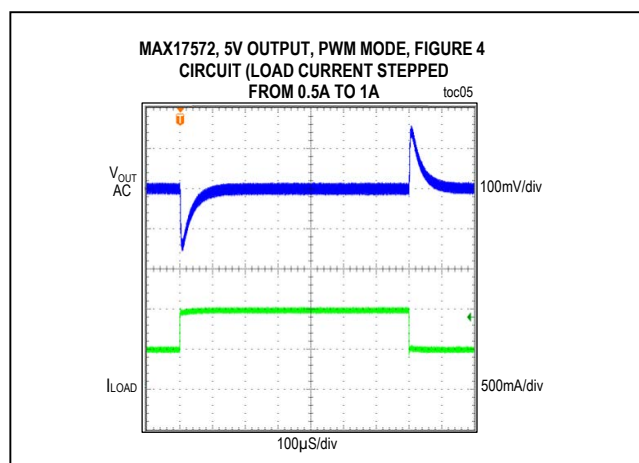
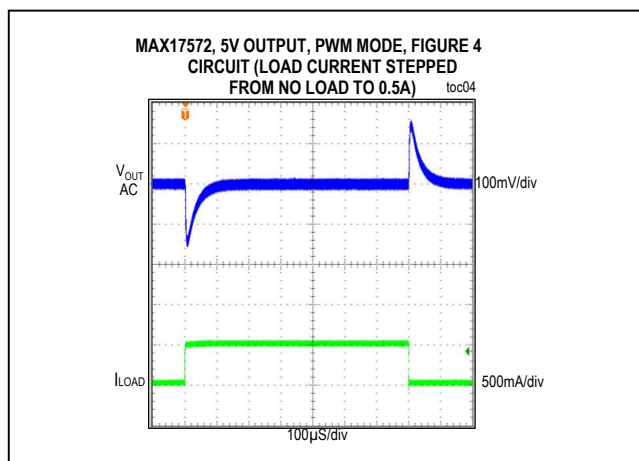
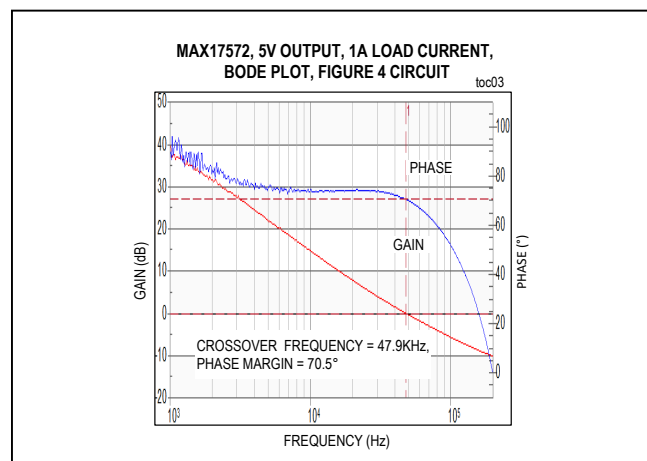
## EV Kit Performance Report



## MAX17572 5V Output Evaluation Kit

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### EV Kit Performance Report (continued)



### Component Suppliers

| SUPPLIER        | WEBSITE                                                  |
|-----------------|----------------------------------------------------------|
| Coilcraft, Inc. | <a href="http://www.coilcraft.com">www.coilcraft.com</a> |
| Murata Americas | <a href="http://www.murata.com">www.murata.com</a>       |
| Panasonic Corp. | <a href="http://www.panasonic.com">www.panasonic.com</a> |
| Vishay          | <a href="http://www.vishay.com">www.vishay.com</a>       |
| Onsemi          | <a href="http://www.onsemi.com">www.onsemi.com</a>       |

**Note:** Indicate that you are using the MAX17572 when contacting these component suppliers.

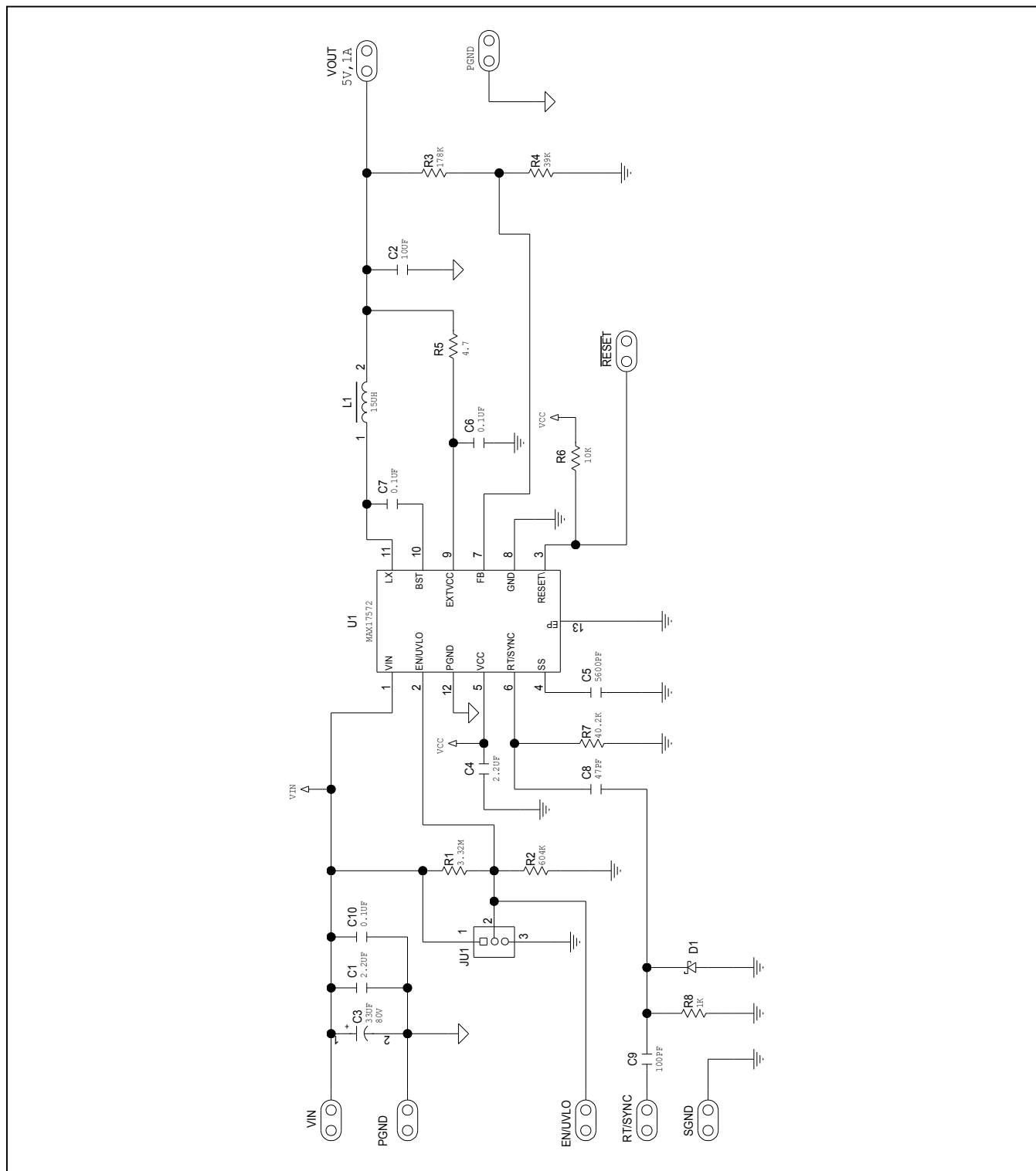
### Ordering Information

| PART            | TYPE   |
|-----------------|--------|
| MAX17572EVKITB# | EV KIT |

## MAX17572 EV System Bill of Materials

| NO. | DESCRIPTION                                         | QUANTITY | DESIGNATOR           | PART NUMBER                                     |
|-----|-----------------------------------------------------|----------|----------------------|-------------------------------------------------|
| 1   | 2.2uF 10%, 100V ,X7R,<br>Ceramic capacitor (1210)   | 1        | C1                   | MURATA GRM32ER72A225KA35                        |
| 2   | 10uF 10%, 10V ,X7R,<br>Ceramic capacitor (1210)     | 1        | C2                   | MURATA GRM32DR71A106KA01                        |
| 3   | 33uF,20%,80V,<br>ELECT,10mm                         | 1        | C3                   | PANASONIC EEE-FK1K330P                          |
| 4   | 1uF 10%, 6.3V ,X7R,<br>Ceramic capacitor (0603)     | 1        | C4                   | MURATA GRM188R70J105KA01                        |
| 5   | 5600pF,10%,50V,X7R,0402,<br>Ceramic capacitor(0402) | 1        | C5                   | KEMET C0402C562K5RAC                            |
| 6   | 0.1uF,10%,50V,X7R,<br>Ceramic capacitor(0402)       | 2        | C6,C7                | MURATA GRM155R71H104KE14                        |
| 7   | 47pF,10%,50V,X7R,0402,<br>Ceramic capacitor(0402)   | 1        | C8                   | MURATA GRM1555C1H470JA01                        |
| 8   | 100pF,10%,50V,X7R,0402,<br>Ceramic capacitor(0402)  | 1        | C9                   | KEMET C0402C101K5GAC,<br>TDKC1005C0G1H101K050BA |
| 9   | 0.1uF,10%,100V,X7R,0603,<br>Ceramic capacitor(0603) | 1        | C10                  | MURATA GRM188R72A104KA35                        |
| 10  | Diode PIV=20V; IF=0.5A                              | 1        | D1                   | ON SEMICONDUCTOR<br>NSR05F20NXT5G               |
| 11  | 3-pin header<br>(36-pin header 0.1" centers )       | 1        | JU1                  | Sullins: PTC36SAAN                              |
| 12  | INDUCTOR, 15uH, 2.8A                                | 1        | L1                   | COILCRAFT XAL4040-153ME                         |
| 13  | RES+,3.32MOHM,1%,0402                               | 1        | R1                   |                                                 |
| 14  | RES+,604K OHM,1%,0402                               | 1        | R2                   |                                                 |
| 15  | RES+,178K OHM,1%,0402                               | 1        | R3                   |                                                 |
| 16  | RES+, 39KOHM,1%,0402                                | 1        | R4                   |                                                 |
| 17  | RES+, 4.7OHM,1%,0402                                | 1        | R5                   |                                                 |
| 18  | RES+,100K OHM,1%,0402                               | 1        | R6                   |                                                 |
| 19  | RES+,40.2K OHM,1%,0402                              | 1        | R7                   |                                                 |
| 20  | RES+,1K OHM,1%,0402                                 | 1        | R8                   |                                                 |
| 21  | Buck Converter<br>MAX17572ATJ+                      | 1        | U1                   | MAX17572ATJ+                                    |
| 22  | 3 pin headers                                       | 1        | See Jumper<br>Table1 | SULLINS STC02SYAN                               |

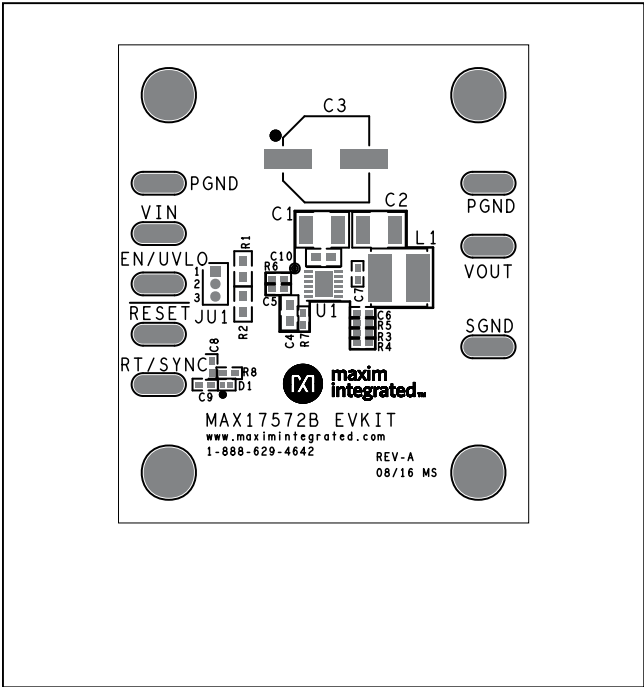
## MAX17572 EV System Schematic



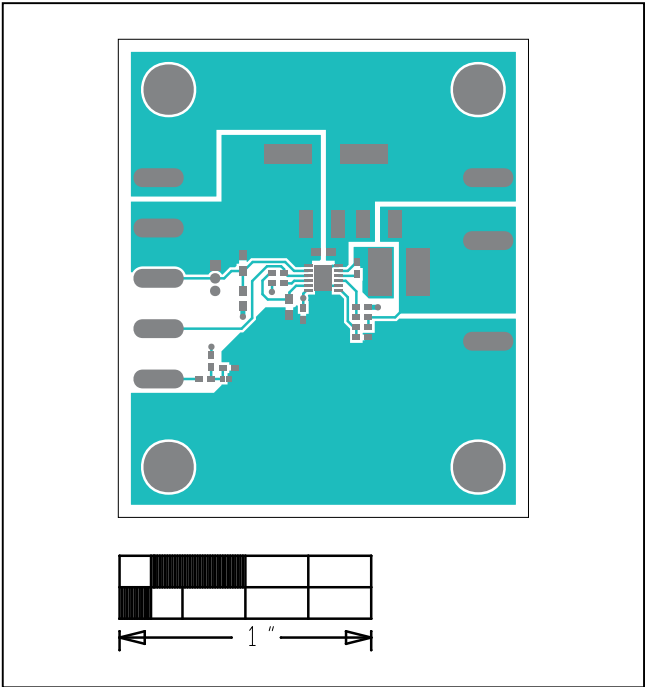
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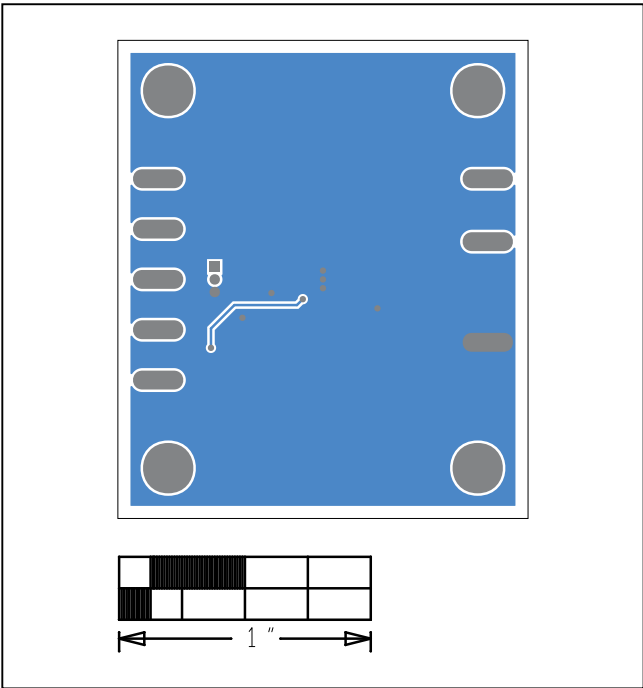
MAX17572 EV System PCB Layout



MAX17572 5V EV Kit—Top Silkscreen



MAX17572 5V EV Kit—Top



MAX17572 5V EV Kit—Bottom

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### Revision History

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION     | PAGES<br>CHANGED |
|--------------------|------------------|-----------------|------------------|
| 0                  | 9/16             | 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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