

## MAX17572 3.3V Output Evaluation Kit

## Evaluates: MAX17572 in 3.3V Output-Voltage Application

### General Description

The MAX17572 3.3V 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 3.3V 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 active-low RESET signal, and external frequency synchronization.

### Features

- Operates from a 4.5V to 60V Input Supply
- 3.3V 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

### Quick Start

#### Recommended Equipment

- MAX17572 3.3V output EV kit
- 4.5V 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 4.5V 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 3.3V

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

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### Detailed Description of Hardware

The MAX17572 3.3V 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 3.3V output from 4.5V 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 (see [Figure 1](#)). 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 (see [Figure 2](#)). Connect the center node of the divider to the FB pin. Use the following procedure to choose the resistive voltage-divider values:

Calculate resistor R3 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  $(5.6 \times V_{OUT})$ .

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

R4 is in k $\Omega$ .

**Table 1. Regulator Enable (EN/UVLO) Description (JU1)**

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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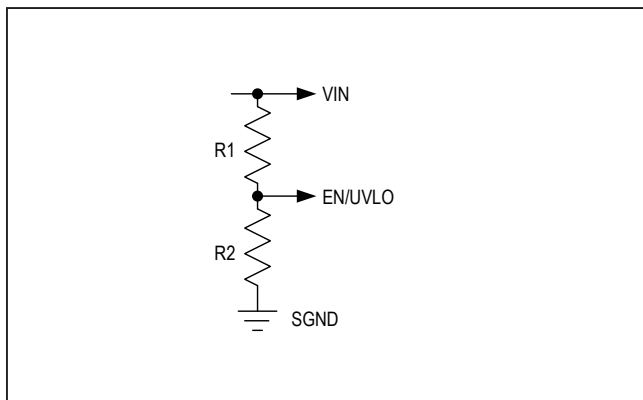


Figure 1. Setting the Input Undervoltage Lockout

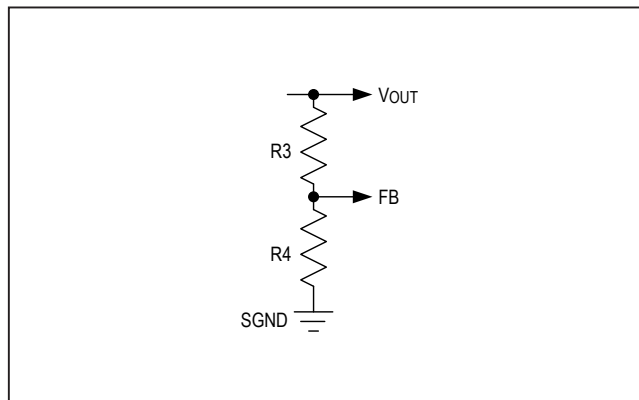
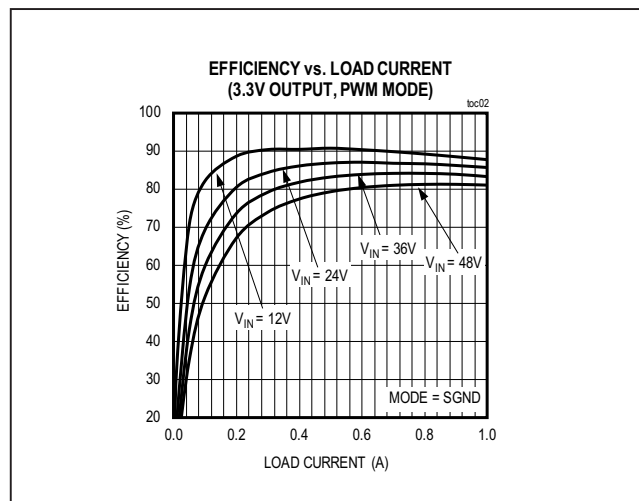
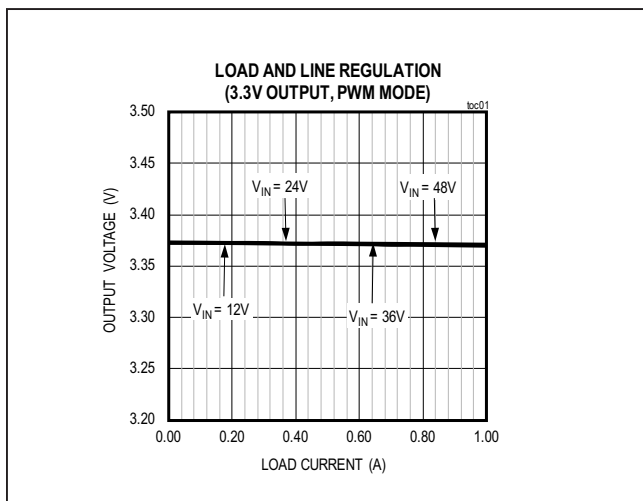


Figure 2: Adjusting Output Voltage

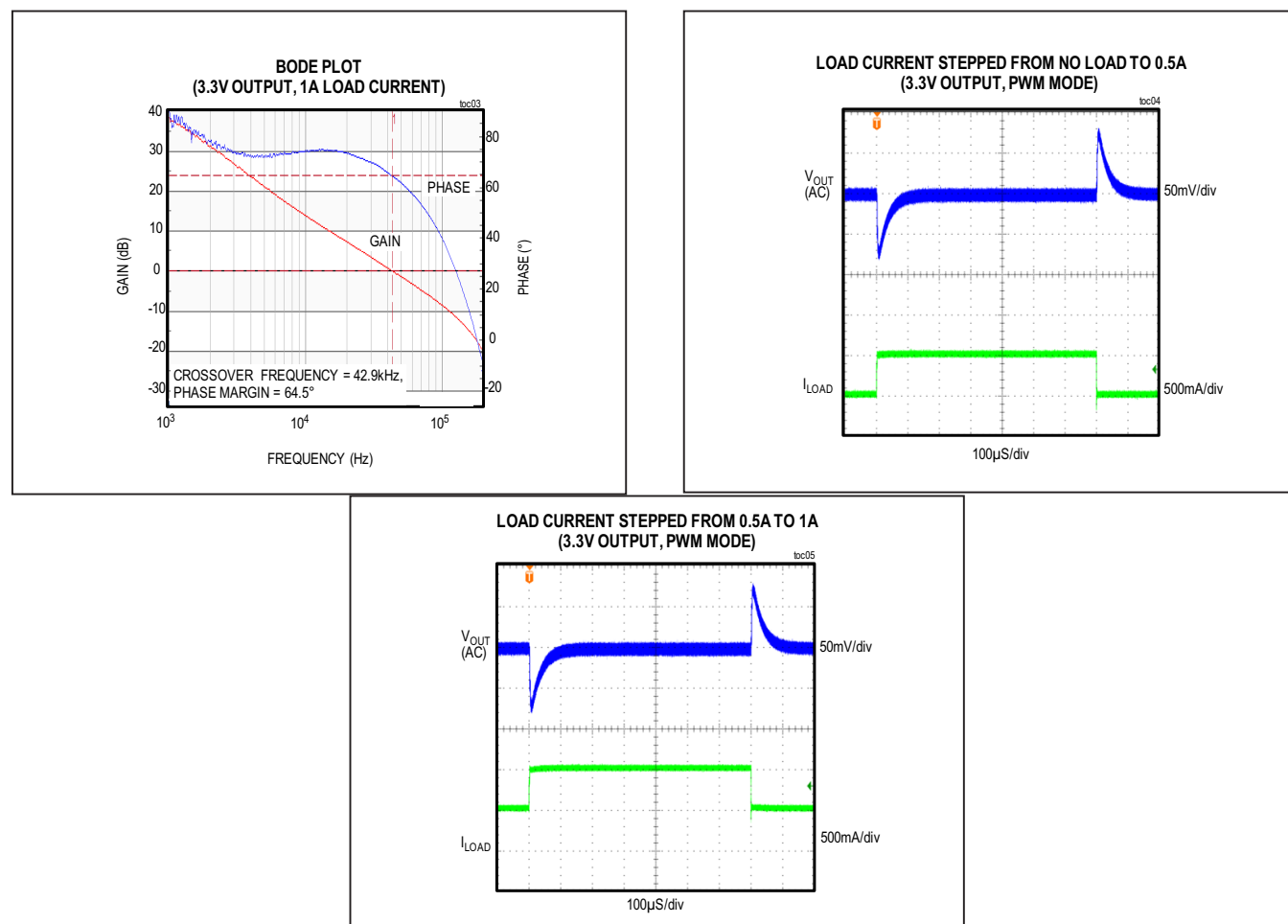
## EV Kit Performance Report



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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>

## Ordering Information

PART	TYPE
MAX17572EVKITA#	EV KIT

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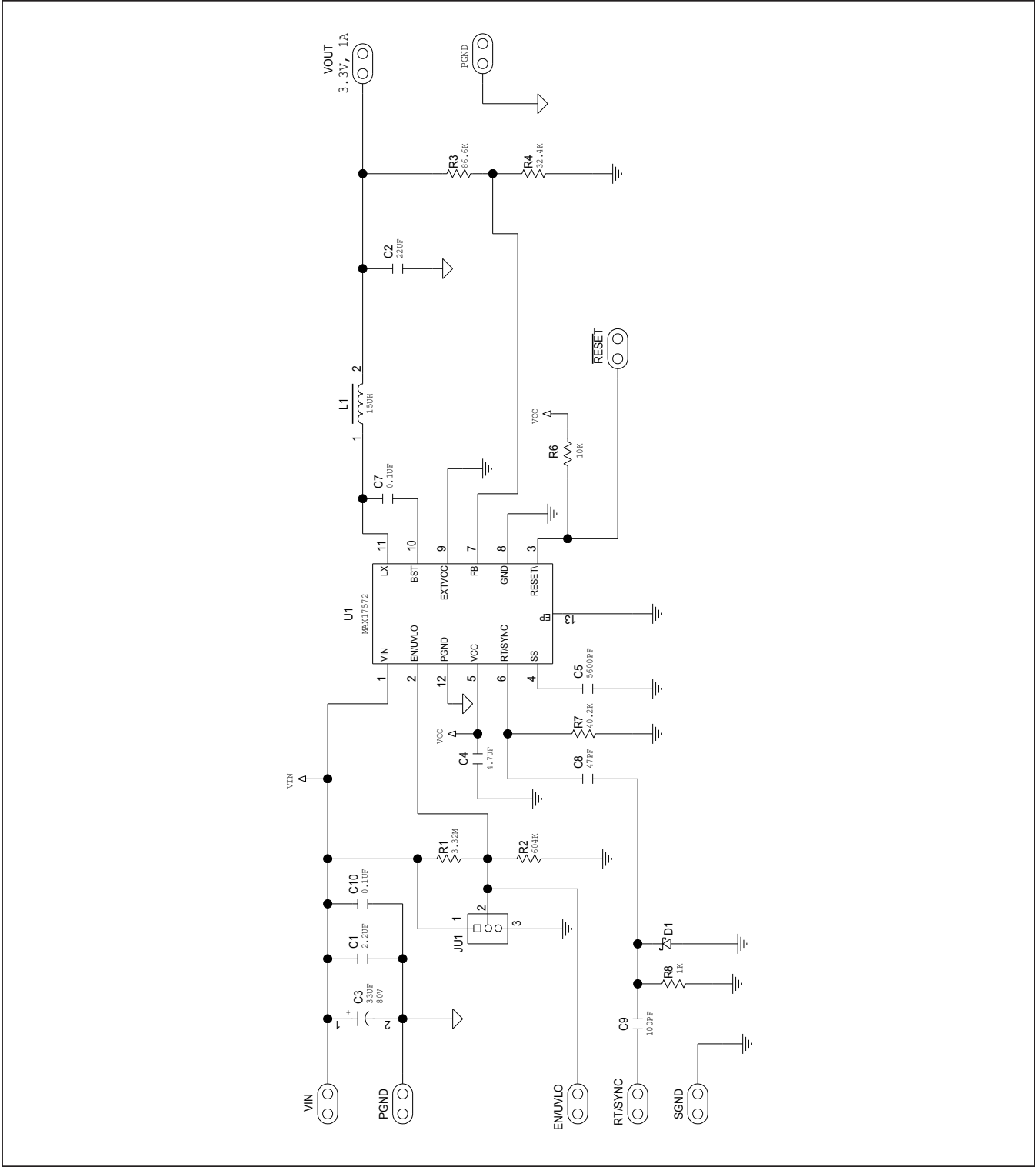
## MAX17572 EV System Bill of Materials

No.	Description	Quantity	Designator	Part Number
1	2.2uF 10%, 100V ,X7R,Ceramic capacitor (1210)	1	C1	MURATA GRM32ER72A225KA35
2	22uF 10%, 10V ,X7R,Ceramic capacitor (1210)	1	C2	MURATA GRM32ER71A226K
3	33uF,20%,80V,ELECT,10mm	1	C3	PANASONIC EEE-FK1K330P
4	4.7uF 10%, 10V ,X7R,Ceramic capacitor (0805)	1	C4	TDK C2012X7R1A475K085AC
5	5600pF,10%,50V,X7R,0402,Ceramic capacitor(0402)	1	C5	Murata GRM155R71E562K
6	0.1uF,10%,50V,X7R, Ceramic capacitor(0402)	2	C6,C7	MURATA GRM155R71H104KE14
7	47pF,10%,50V,X7R,0402,Ceramic capacitor(0402)	1	C8	MURATA GRM1555C1H470JA01
8	100pF,10%,50V,X7R,0402,Ceramic capacitor(0402)	1	C9	MURATA GRM1555C1H101JA01D
9	0.1uF,10%,100V,X7R,0603,Ceramic capacitor(0603)	1	C10	MURATA GRM188R72A104KA35
10	Diode PIV=20V; IF=0.5A	1	D1	ON SEMICONDUCTOR NSR05F20NXT5G
11	3-pin header (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+,86.6K OHM,1%,0402	1	R3	
16	RES+, 32.4KOHM,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 MAX17572ATJ+	1	U1	MAX17572ATJ+
22	3 pin headers	1	See Jumper Table1	SULLINS STC02SYAN

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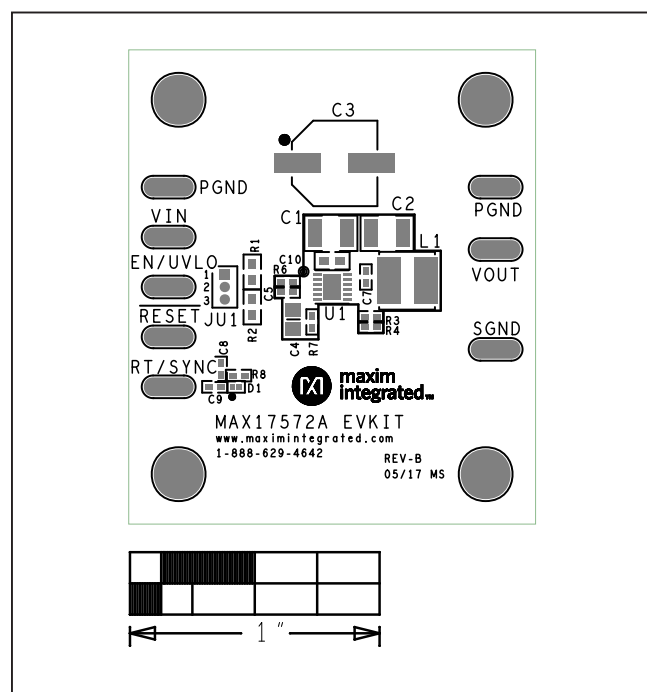
MAX17572 EV System Schematic



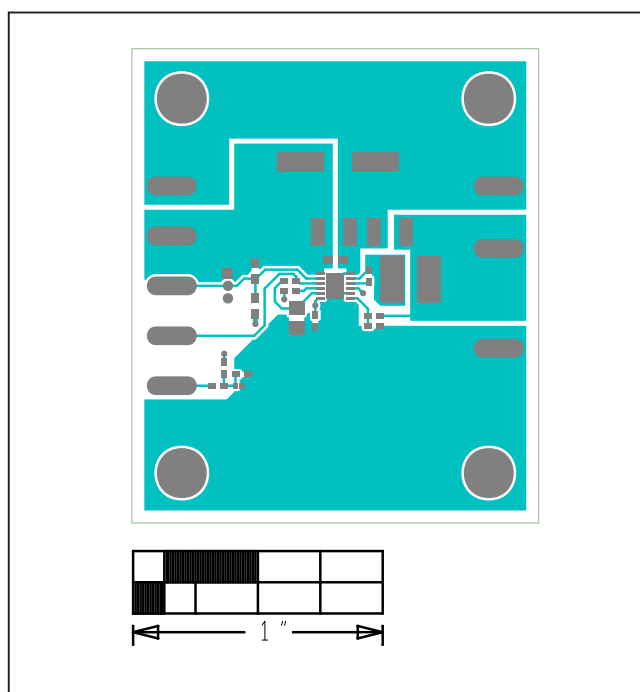
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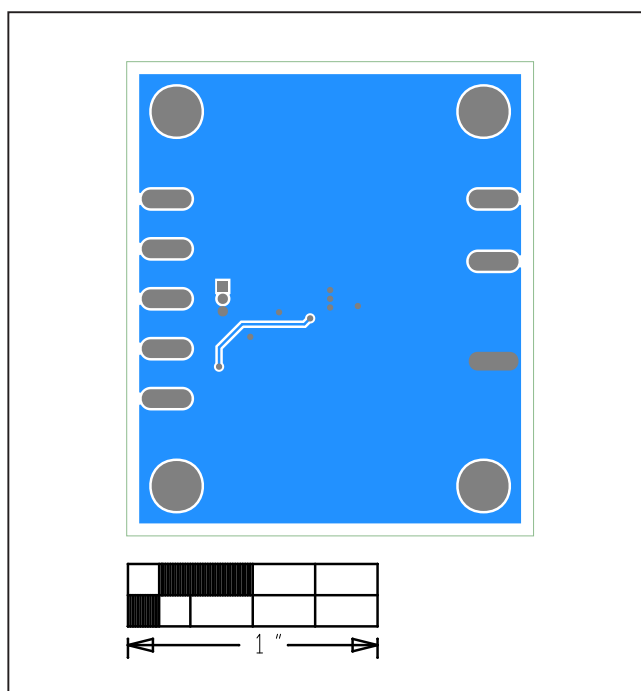
## MAX17572 EV System PCB Layout



MAX17572 3.3V EV Kit—Top Silkscreen



MAX17572 3.3V EV Kit—Top



MAX17572 3.3V EV Kit—Bottom

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### Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/16	Initial release	—
1	6/17	Updated <i>Typical Operating Characteristics</i> , Resistor references in <i>Adjusting Output Voltage</i> section, <i>Bill of Materials</i> , <i>Schematic</i> , and <i>PCB Layout</i> figures.	2–7

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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