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_{IN} PCB pad and the negative terminal to the nearest PGND PCB pad. Connect the positive terminal of the 1A load to the V_{OUT} PCB pad and the negative terminal to the nearest PGND PCB pad.
3) Connect the DVM across the V_{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

19-8650; Rev 0; 9/16

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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 3.3MΩ 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 x V_{OUT}.

If the EN/UVLO pin is driven from an external signal source, a series resistance of minimum 1kΩ 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 µF) is the actual derated value of the output capacitance used and R3 is in kΩ. The minimum allowable value of R3 is (5.6 x V_{OUT}), where R3 is in kΩ. If the value of R3 calculated using the above equation is less than (5.6 x V_{OUT}), increase the value of R3 to at least (5.6 x V_{OUT}).

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

R3 is in kΩ.

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

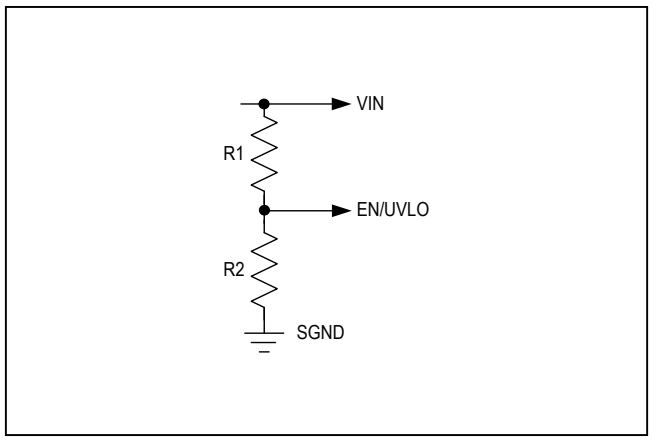


Figure 1. Setting the Input Undervoltage Lockout

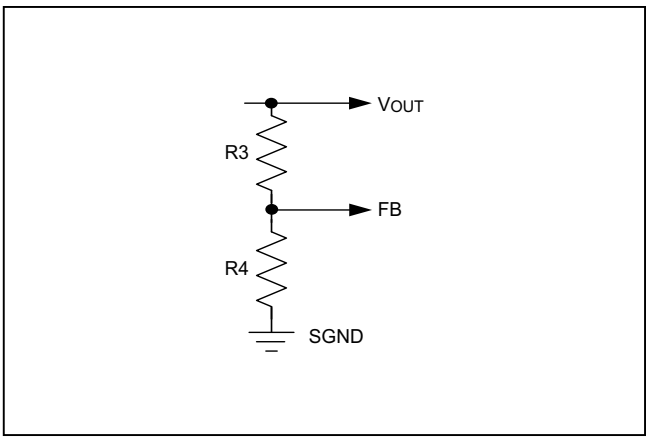
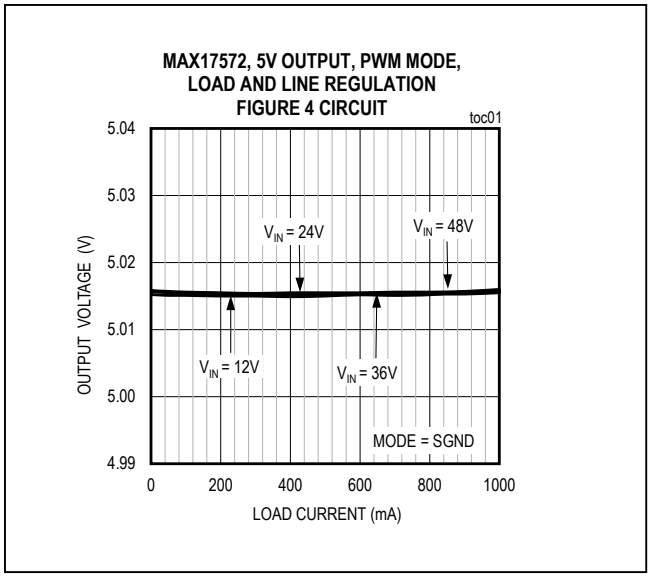
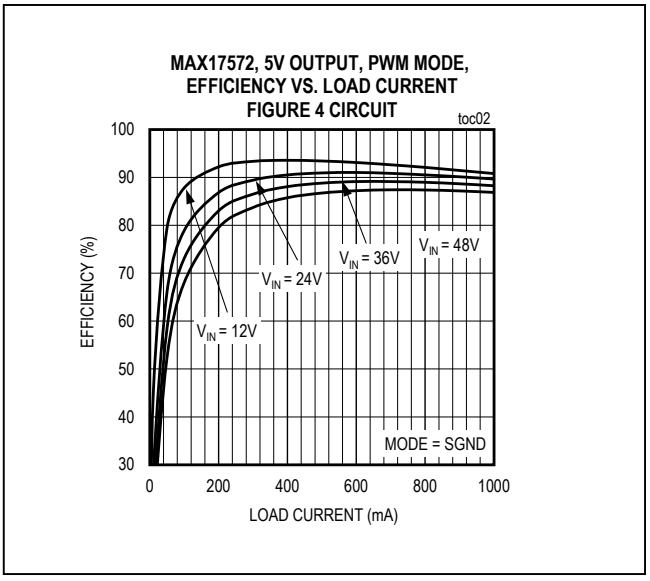


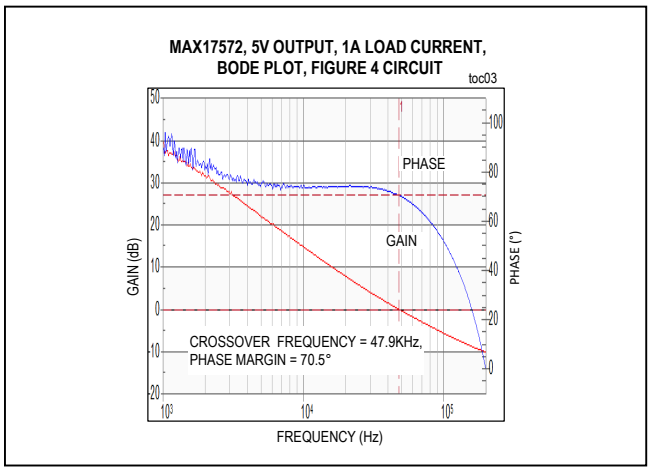
Figure 2: Adjusting Output Voltage

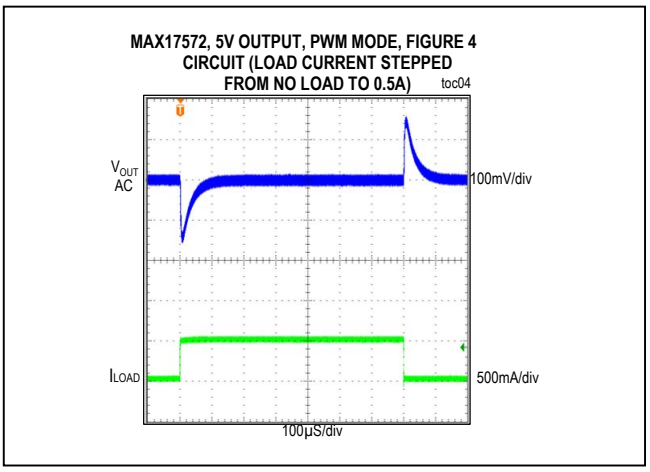
EV Kit Performance Report

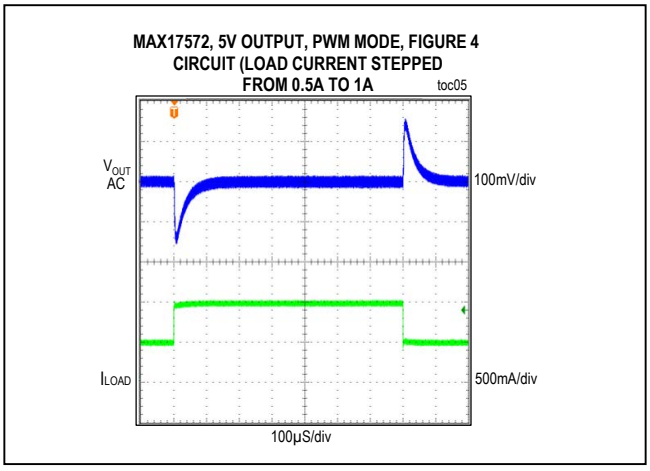




EV Kit Performance Report (continued)







Component Suppliers

SUPPLIER	WEBSITE
Coilcraft, Inc.	www.coilcraft.com
Murata Americas	www.murata.com
Panasonic Corp.	www.panasonic.com
Vishay	www.vishay.com
Onsemi	www.onsemi.com

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

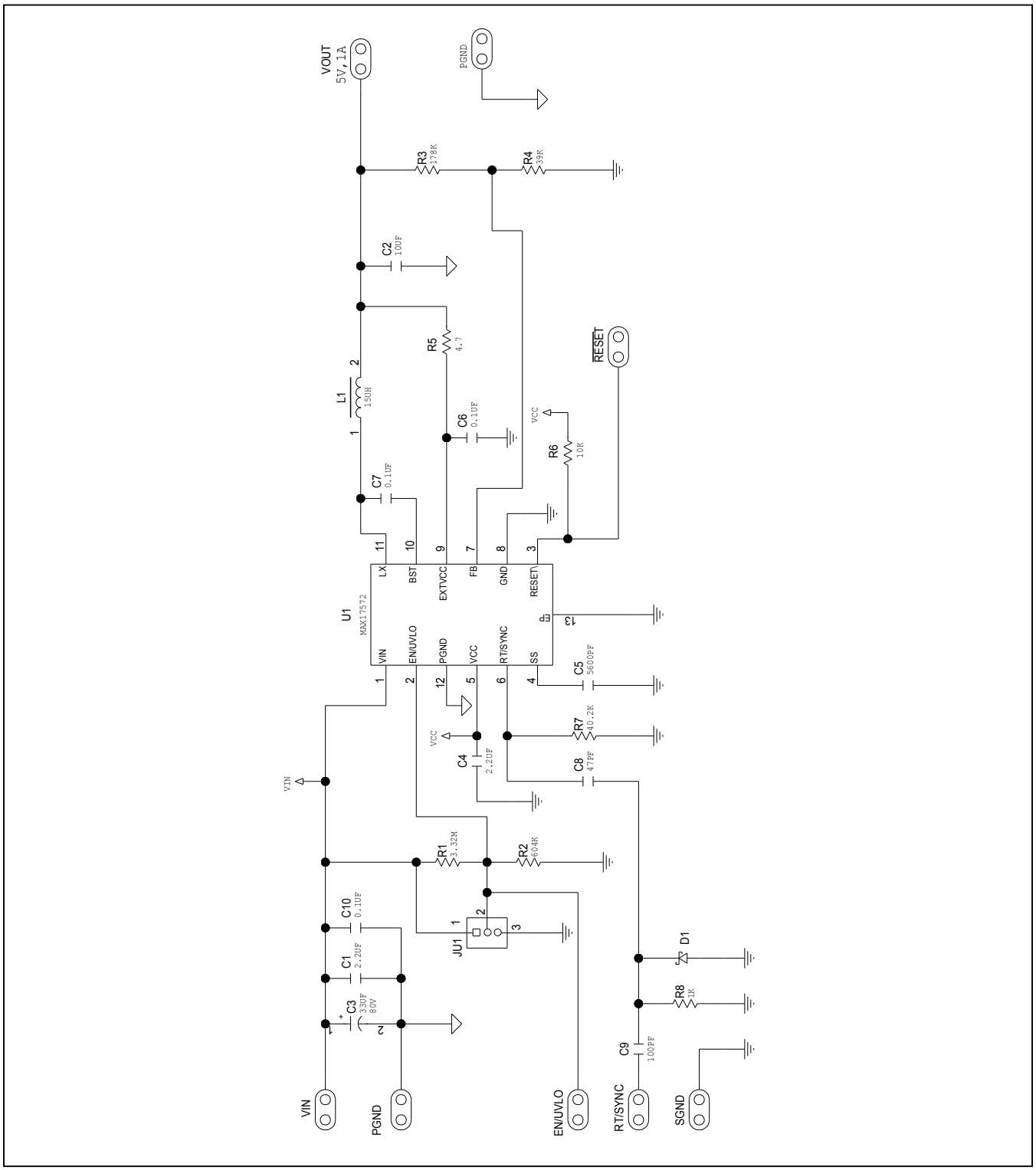
Ordering Information

PART	TYPE
MAX17572EVKITB#	EV KIT

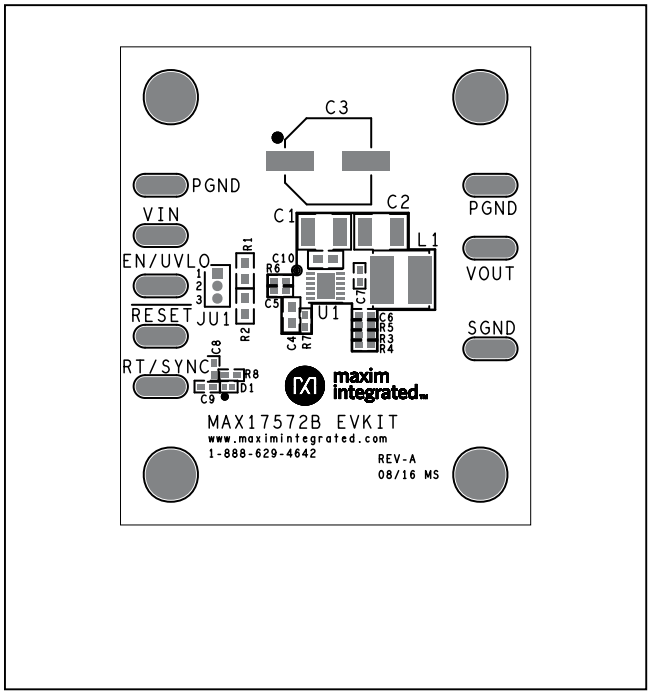
MAX17572 EV System Bill of Materials

NO.	DESCRIPTION	QUANTITY	DESIGNATOR	PART NUMBER
1	2.2uF 10%, 100V ,X7R, Ceramic capacitor (1210)	1	C1	MURATA GRM32ER72A225KA35
2	10uF 10%, 10V ,X7R, Ceramic capacitor (1210)	1	C2	MURATA GRM32DR71A106KA01
3	33uF,20%,80V, ELECT,10mm	1	C3	PANASONIC EEE-FK1K330P
4	1uF 10%, 6.3V ,X7R, Ceramic capacitor (0603)	1	C4	MURATA GRM188R70J105KA01
5	5600pF,10%,50V,X7R,0402, Ceramic capacitor(0402)	1	C5	KEMET C0402C562K5RAC
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	KEMET C0402C101K5GAC, TDKC1005C0G1H101K050BA
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+,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 MAX17572ATJ+	1	U1	MAX17572ATJ+
22	3 pin headers	1	See Jumper Table1	SULLINS STC02SYAN

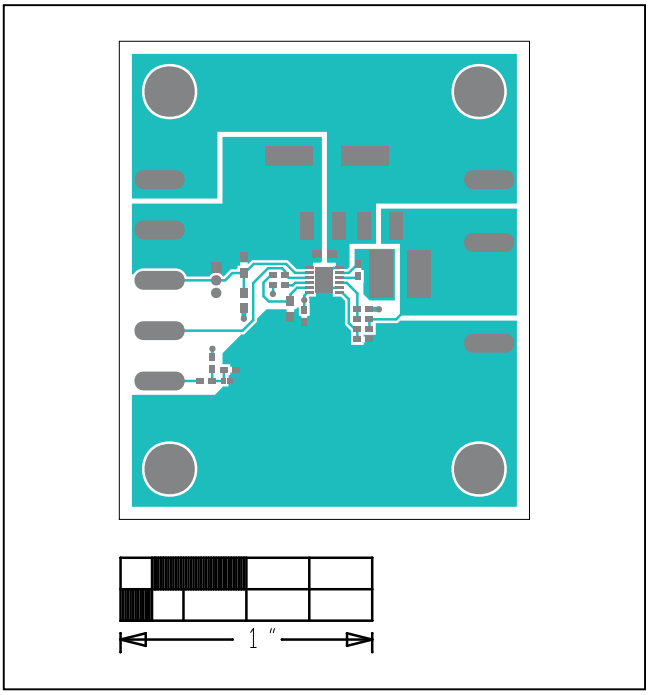
MAX17572 EV System Schematic



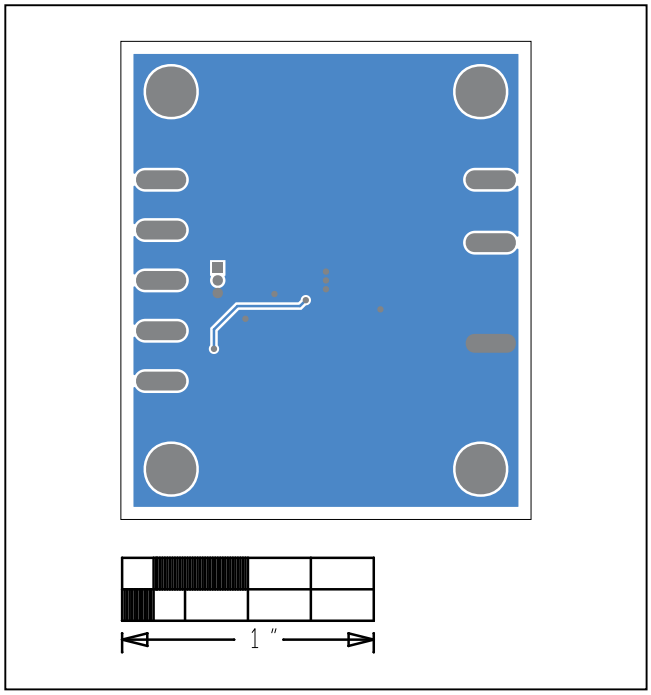
MAX17572 EV System PCB Layout



MAX17572 5V EV Kit—Top Silkscreen



MAX17572 5V EV Kit—Top



MAX17572 5V EV Kit—Bottom