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

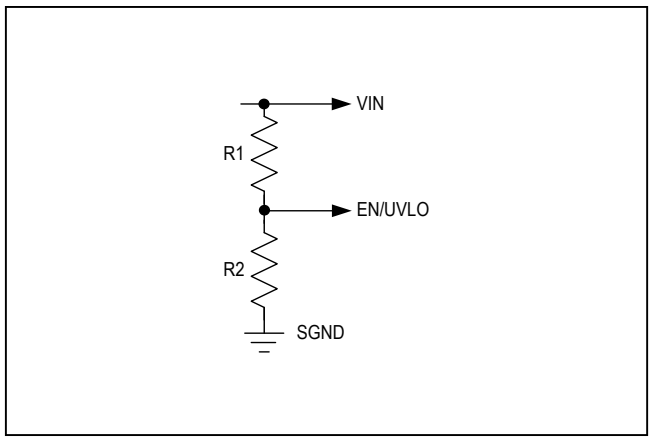


Figure 1. Setting the Input Undervoltage Lockout

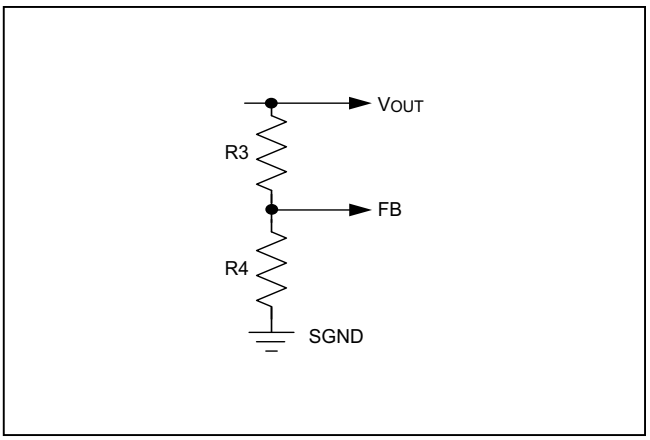
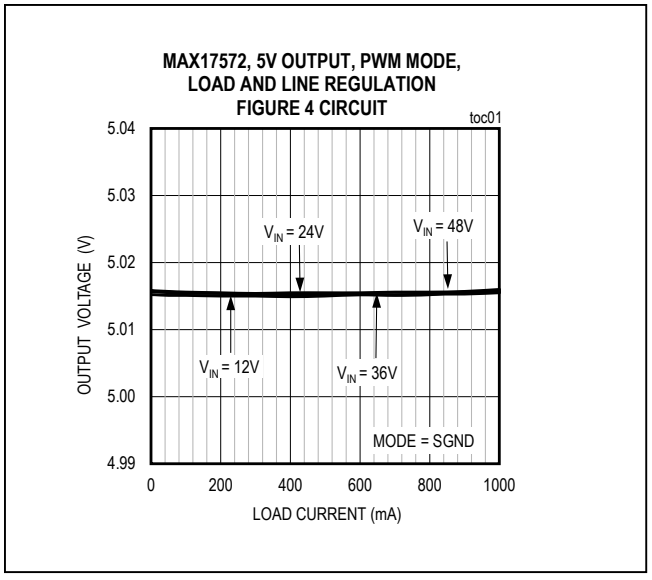
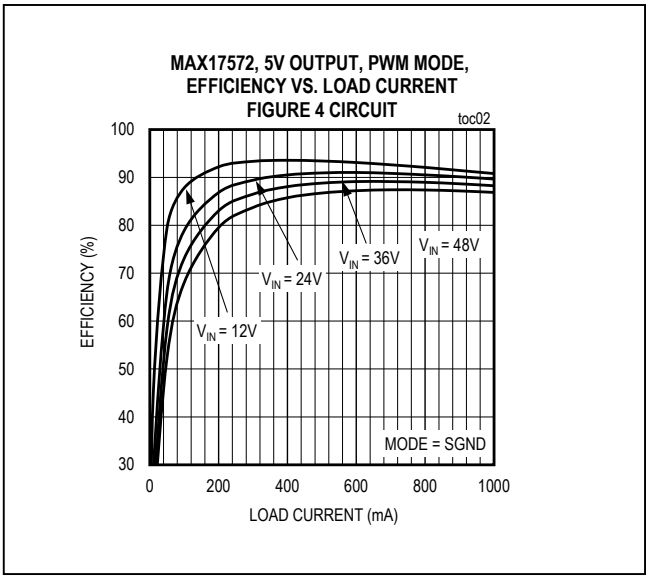


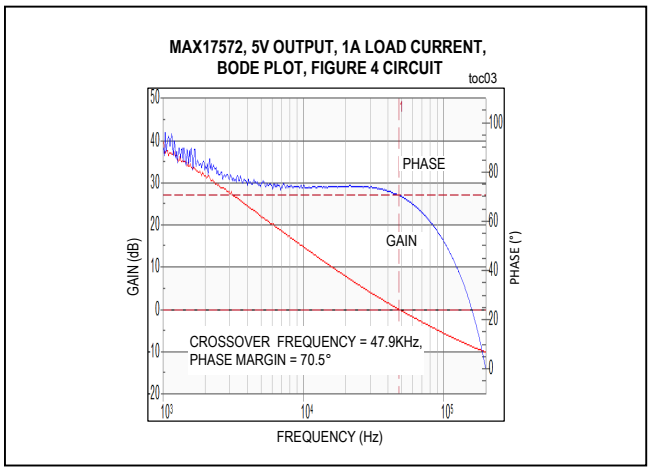
Figure 2: Adjusting Output Voltage

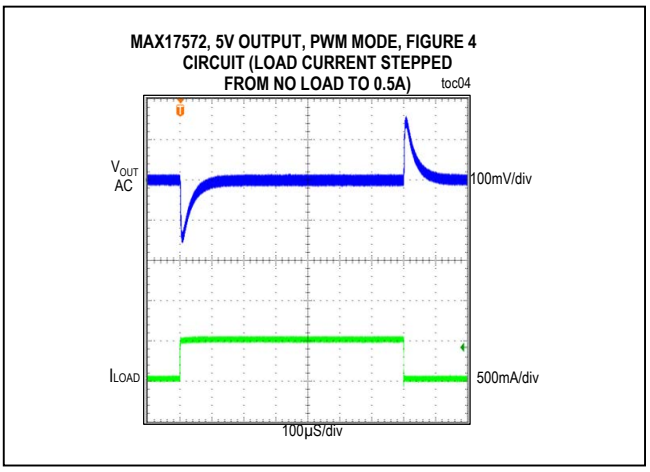
EV Kit Performance Report

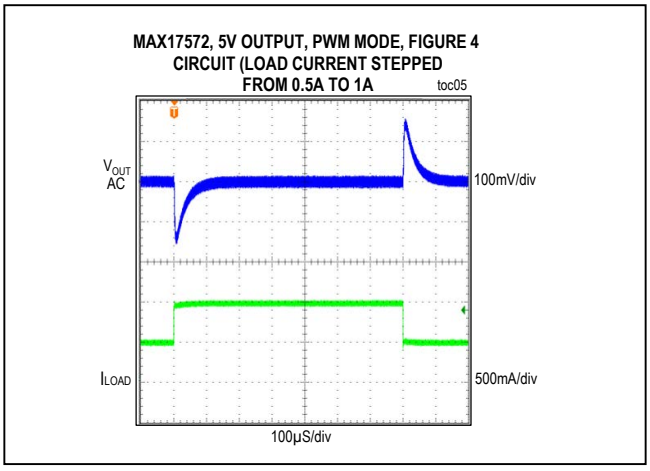




EV Kit Performance Report (continued)







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.*

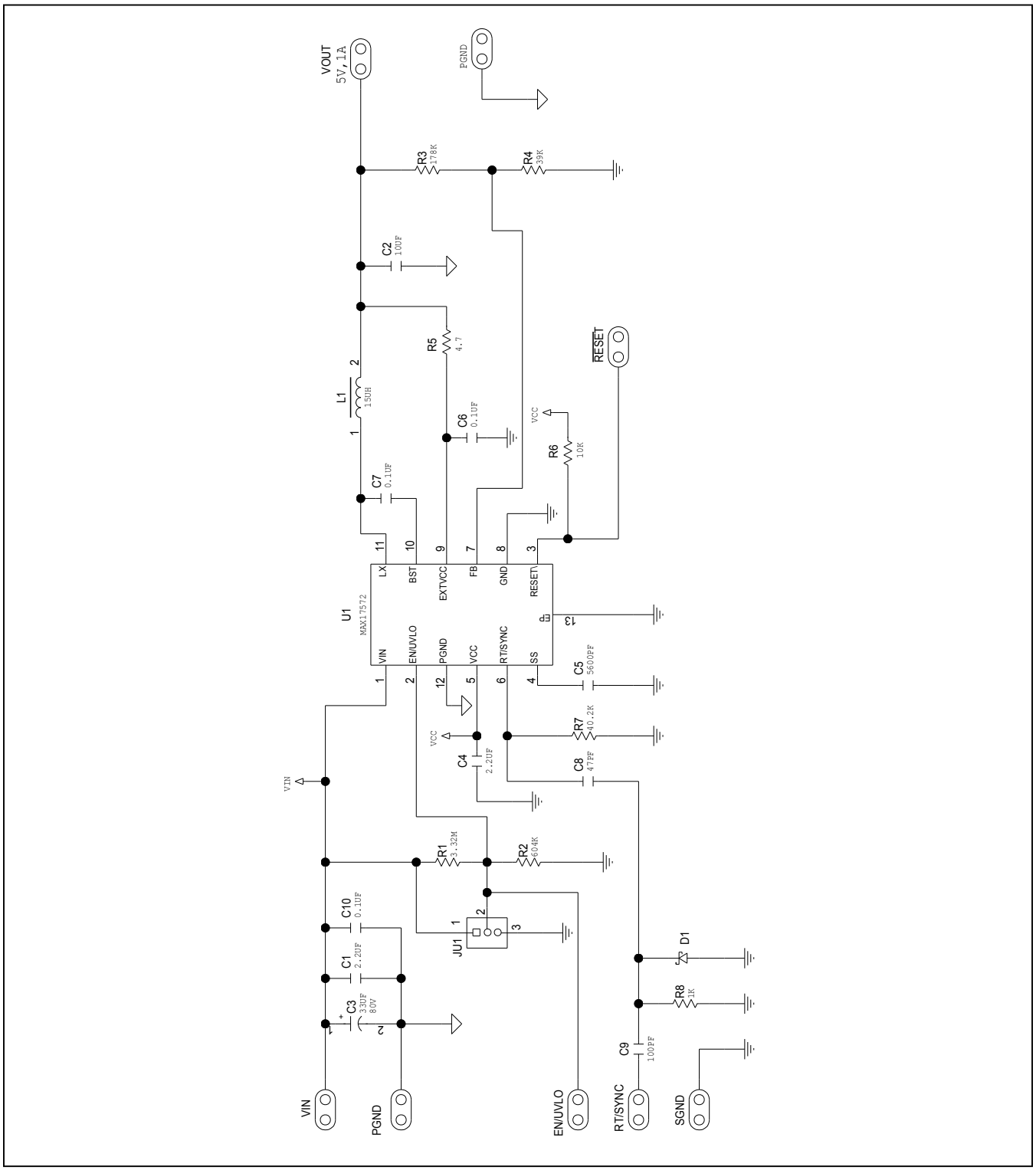
Ordering Information

PART	TYPE
MAX17572EVKITB#	EV KIT

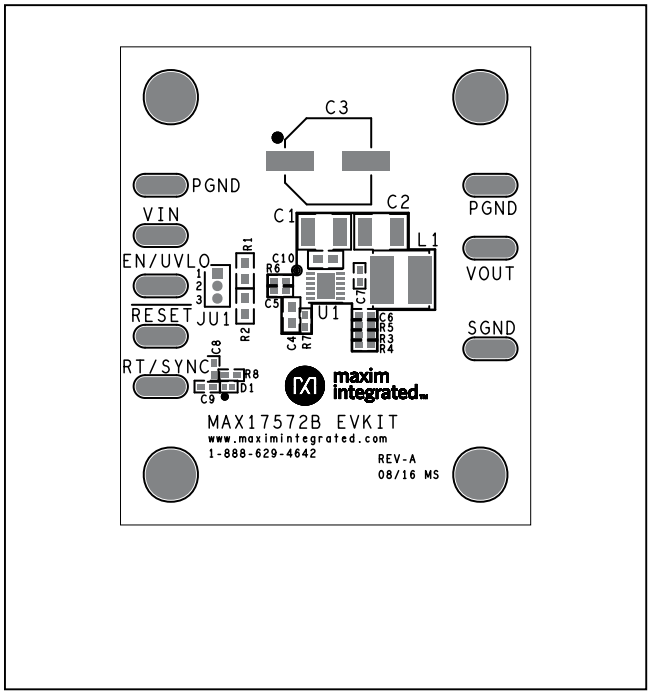
MAX17572 EV System Bill of Materials

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

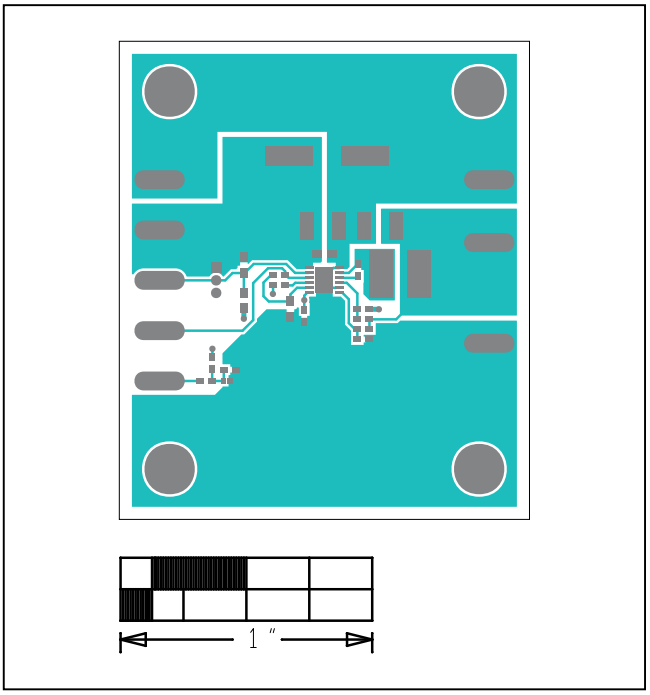
MAX17572 EV System Schematic



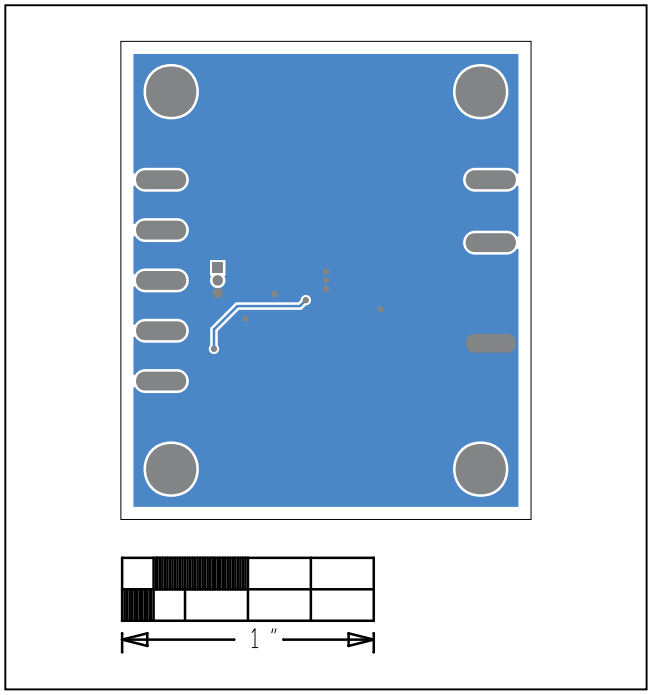
MAX17572 EV System PCB Layout



MAX17572 5V EV Kit—Top Silkscreen



MAX17572 5V EV Kit—Top



MAX17572 5V EV Kit—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/16	Initial release	—

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