



# MAX17127 Evaluation Kit

## General Description

The MAX17127 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB that evaluates the high-efficiency MAX17127 white LED (WLED) driver. The EV kit utilizes a step-up DC-DC converter to generate the voltage required to drive up to six strings of 10 surface-mount WLEDs. The EV kit uses a 5V to 26V input power supply and can be configured to provide an adjustable 10mA to 30mA full-scale LED current.

## Features

- ◆ 5V to 26V Input Range
- ◆ WLED Drives Up to 30mA/String
- ◆ Drives Six Strings of 10 WLEDs
- ◆ Full-Scale LED Current Adjustable from 10mA to 30mA
- ◆ 1MHz PWM Switching Frequency Adjustable from 250kHz to 1MHz (Component Change Required)
- ◆ All Components < 1mm Height
- ◆ Fully Assembled and Tested

## Ordering Information

PART	TYPE
MAX17127EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1 $\mu$ F $\pm$ 10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H104K TDK C1608X7R1H104K
C2–C8, C10–C16, C24	0	Not installed, ceramic capacitors (0603)
C9	1	510pF $\pm$ 5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H511J AVX 06035A511JA12A
C17	1	1 $\mu$ F $\pm$ 10%, 10V X7R ceramic capacitor (0603) Taiyo Yuden LMK107BJ105KA Murata GRM188R71A105K
C18, C22, C23	0	Not installed, ceramic capacitors (1206)
C19, C21	2	2.2 $\mu$ F $\pm$ 20%, 50V X7R ceramic capacitors (1206) Murata GRM31CR71H225K
C20	1	4.7 $\mu$ F $\pm$ 10%, 25V X5R ceramic capacitor (1206) Murata GRM319R61E475K

DESIGNATION	QTY	DESCRIPTION
D1	1	0.7A, 60V Schottky diode (US Flat) Toshiba CUS04
D2–D61	60	White LEDs Nichia NSSW008CT-P1 OPTEK OVSRWACR6
JU1, JU6, JU8–JU12	7	3-pin headers
JU2	0	Not installed, 2-pin header—short PC trace
JU7	0	Not installed, 3-pin header (pins 2-3—short PC trace)
JU4, JU13–JU19, JU20, JU21	10	2-pin headers
L1	1	10 $\mu$ H, 1.2A power inductor Sumida CR6D09HPNP-100MC TDK VLP6810T-100M1R2
R1, R8, R10	3	100k $\Omega$ $\pm$ 5% resistors (0603)
R2	1	1M $\Omega$ $\pm$ 5% resistor (0603)
R3	1	0 $\Omega$ $\pm$ 5% resistor (0603)
R4	1	10k $\Omega$ $\pm$ 5% resistor (0603)

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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R5	1	82.5k $\Omega$ $\pm$ 1% resistor (0603)
R6	1	2.21M $\Omega$ $\pm$ 1% resistor (0603)
R7	1	71.5k $\Omega$ $\pm$ 1% resistor (0603)
R11	0	Not installed, resistor (0603)
R12	0	Not installed, multiterm potentiometer
R14	2	500k $\Omega$ multiterm potentiometer

DESIGNATION	QTY	DESCRIPTION
U1	1	Six-string WLED driver (20 TQFN-EP*) Maxim MAX17127ETP+
—	17	Shunts
—	1	PCB: MAX17127 EVALUATION KIT+

\*EP = Exposed pad.

## Component Suppliers

SUPPLIER	PHONE	WEBSITE
AVX Corporation	843-946-0238	www.avxcorp.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Nichia Corp.	248-352-6575	www.nichia.com
OPTEK Technologies	972-323-2200	www.optekinc.com
Sumida Corp.	847-545-6700	www.sumida.com
Taiyo Yuden	800-348-2496	www.t-yuden.com
TDK Corp.	847-803-6100	www.component.tdk.com
Toshiba America Electronic Components, Inc.	949-623-2900	www.toshiba.com/taec

**Note:** Indicate that you are using the MAX17127 when contacting these component suppliers.

## Quick Start

### Recommended Equipment

- MAX17127 EV kit
- 5V to 26V power supply (VIN)

### Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

- 1) On the EV kit, verify that the shunts are installed, as shown in Table 1.
- 2) Connect the positive terminal of the VIN power supply to the VIN pad. Connect the ground terminal of the VIN power supply to the PGND pad.
- 3) Set the VIN power supply to 12V and enable its output.
- 4) Verify that the six strings of WLEDs are on.

**Table 1. Default Shunt Positions**

JUMPER	SHUNT POSITION
JU1, JU6, JU8–JU12	1-2
JU4, JU14, JU15, JU17–JU20, JU21	Not installed
JU13, JU16	Installed

## Detailed Description of Hardware

The MAX17127 evaluation kit (EV kit) operates on a 5V to 26V wide-input voltage range and provides adjustable 10mA to 30mA full-scale LED current. The EV kit utilizes a step-up DC-DC converter to generate the voltage required to drive up to six strings of 10 surface-mount WLEDs.

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## White LED String Configuration

As configured, the EV kit is assembled with six strings of 10 WLEDs. Each string has an associated 3-pin header (JU1, JU8–JU12) and feedback pin (FB1–FB6). The function of the 3-pin jumpers is summarized in Table 2. To evaluate the EV kit with off-board WLED strings, see the *Off-Board WLED String Configuration* section.

## Off-Board WLED String Configuration

The EV kit can also be used to drive off-board WLED strings. To evaluate external WLED strings, reconfigure shunts from jumpers JU1 and JU8–JU12. See Table 2 for jumpers JU1 and JU8–JU12 configuration and Table 3 for jumper JU13 configuration. Removing these jumpers effectively disconnects the on-board WLED strings between the output and feedback pins, allowing the connection of external WLED strings. For each external WLED string, connect the cathode terminal of the string to the corresponding feedback pad (FB1–FB6) and connect the anode terminal of the string to the VOUT pad. Once the external WLED strings are connected between the VOUT pad and the FB1–FB6 pins, the EV kit can be evaluated in the same manner as the on-board WLED strings. Evaluating more than 10 WLEDs per string may require component changes. Refer to the MAX17127 IC data sheet for component selections.

## Enable (EN)

The EV kit features 2-pin jumper JU16 to control the active-low shutdown input. Drive EN high to place the device in normal operation. If the JU16 shunt is removed, an internal 200kΩ (typ) pulldown resistor places the device in disabled mode. See Table 4 for shunt positions.

**Table 2. Jumper Function (JU1, JU8–JU12)**

SHUNT POSITION	FB_ PIN	STRING_
1-2*	Connected to cathode of WLED string	Enabled
2-3	Connected to AGND	Disabled
Not installed	Connect to an external WLED string	On-board WLED string not used

\*Default position.

**Table 3. Jumper Function (JU13)**

SHUNT POSITION	VOUT
Installed*	Connected to anodes of on-board WLED strings
Not installed	Connect to anodes of off-board WLED strings

\*Default position.

## Brightness Control by PWM Signal Input (PWM)

The EV kit features 2-pin jumper JU20 to implement brightness control through the PWM signal input. See Table 5 for shunt positions.

## LED String Capacitance

In some LCD panel applications, a 0.1μF (typ) capacitor (CLED) is placed in parallel with each LED string to improve ESD immunity. As such, the EV kit provides a footprint across each LED string for optional CLED.

## Full-Scale LED Current Adjustment (ISET)

The EV kit features 3-pin jumper JU6, along with R8 and R14, to set the full-scale LED current. The resistance from ISET to AGND controls the full-scale current in each LED string according to the following equation:

$$I_{LED(MAX)} = \left( 20 \times \frac{180k\Omega}{R8 + R14} \right) mA$$

where R8 is a 100kΩ resistor and R14 is a 500kΩ potentiometer. See Table 6 for jumper JU6 settings.

## Switching-Frequency Selection (FSLCT)

The EV kit is configured to operate at 1MHz, but provides the option to set the switching frequency of the step-up DC-DC converter from 250kHz to 1MHz. The switching frequency is set by adjusting the resistance from FSLCT to AGND according to the following equation:

$$f_{SW} = 1 MHz \times \left( \frac{100k\Omega}{R10} \right)$$

Changing the switching frequency might require different converter components (refer to the MAX17127 IC data sheet for proper component selections).

**Table 4. Jumper Function (JU16)**

SHUNT POSITION	EN PIN	MAX17127
Installed*	Connected to VDDIO	Enabled
Not installed	Internally connected to AGND	Disabled

\*Default position.

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**Table 5. Jumper Function (JU20)**

SHUNT POSITION	PWM PIN	PWM DUTY CYCLE OF LED CURRENT
Installed	Connected to AGND	Zero
Not installed*	Connected to VDDIO through R2	Maximum (100%)
Not installed	Connect to an external PWM signal (0.1kHz to 25kHz)	Follows the signal applied at PWM pad

\*Default position.

**Table 6. Jumper Function (JU6)**

SHUNT POSITION	ISET PIN	I <sub>LED</sub> (MAX)
1-2*	Connected to AGND through R8 and R14	Adjustable from 10mA to 30mA
2-3	Connected to AGND	0.3mA (typ)

\*Default position.

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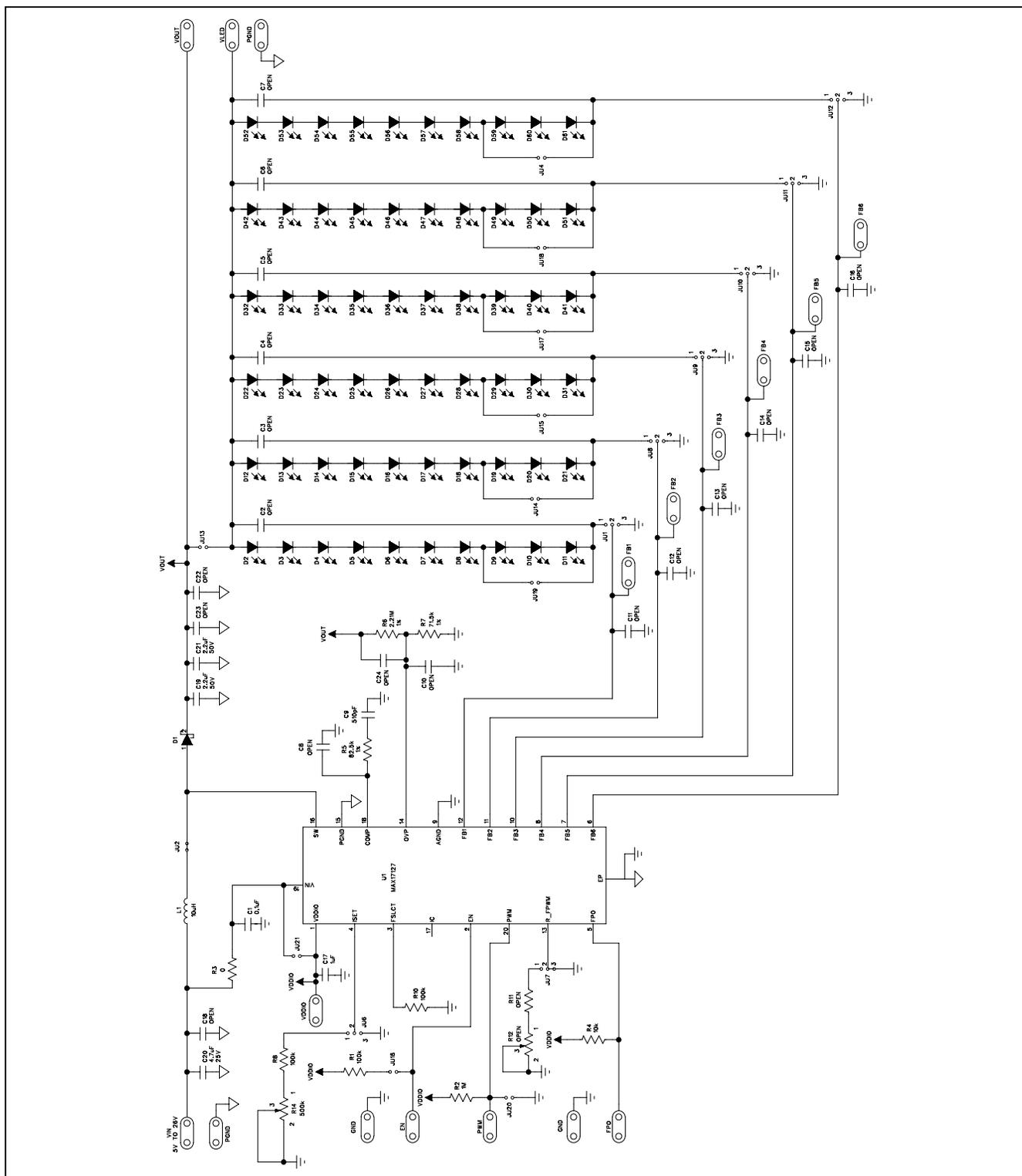


Figure 1. MAX17127 EV Kit Schematic

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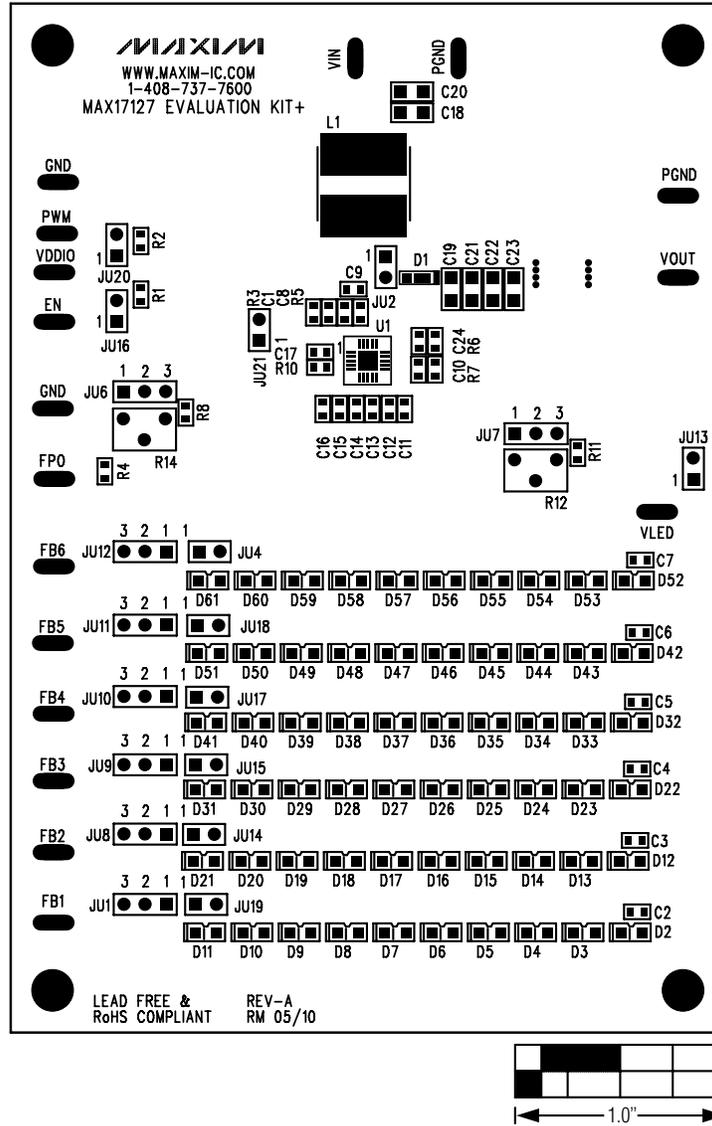


Figure 2. MAX17127 EV Kit Component Placement Guide—Component Side

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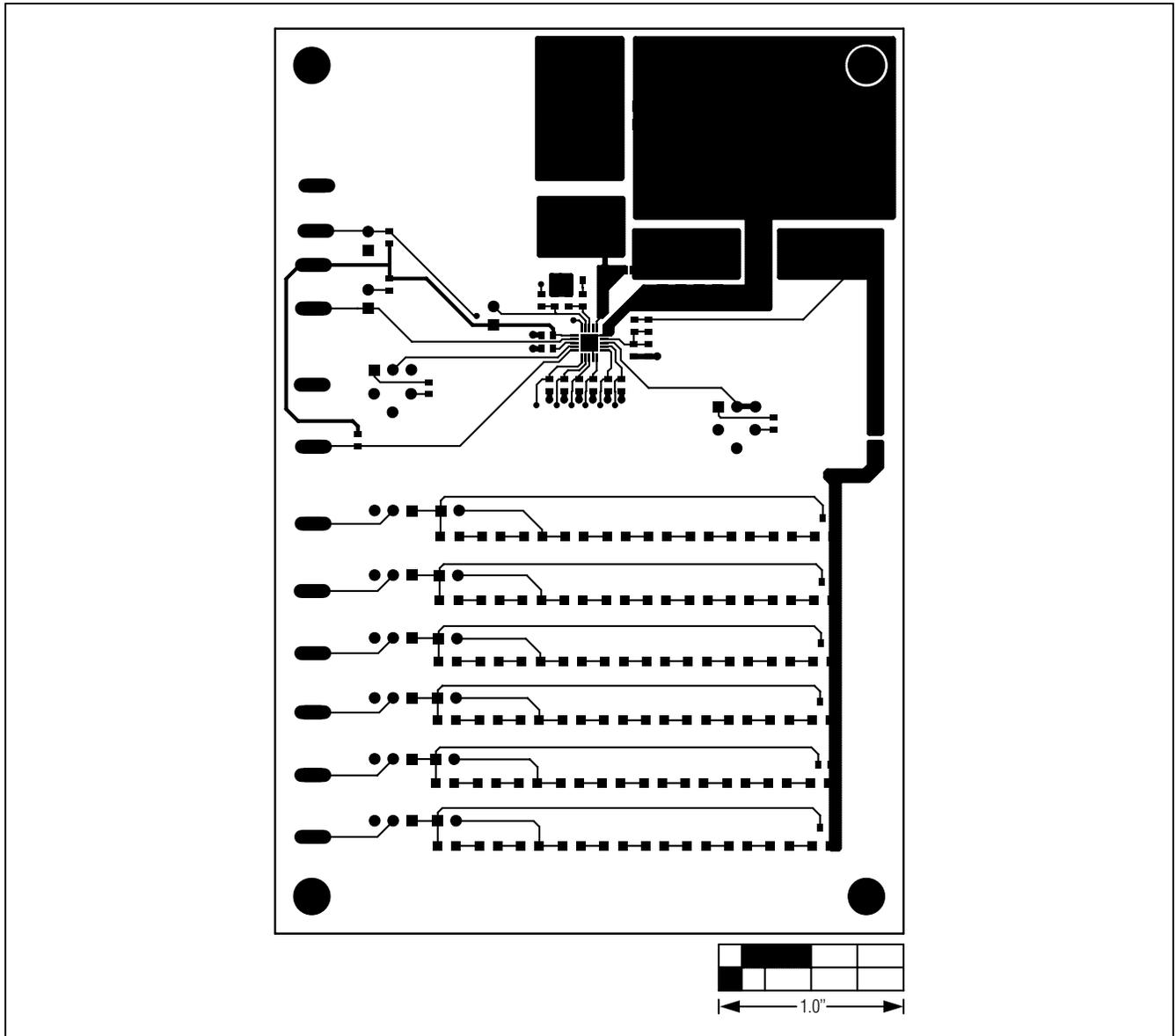


Figure 3. MAX17127 EV Kit PCB Layout—Component Side

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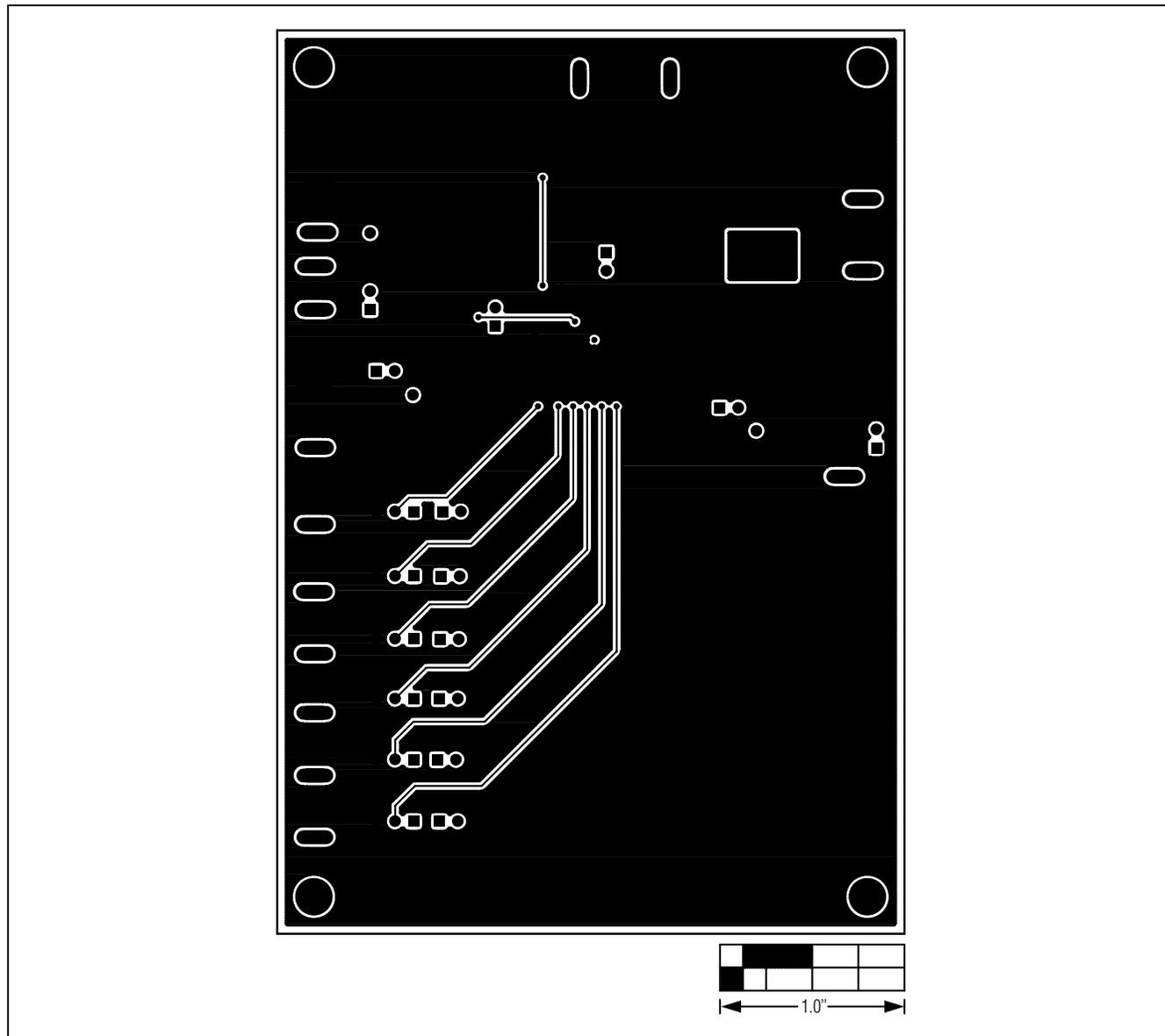


Figure 4. MAX17127 EV Kit PCB Layout—Solder Side

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## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/10	Initial release	—

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