

## General Description

The MAX14727 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the MAX14727 dual-input, bidirectional overvoltage protection with automatic path control device. The EV kit comes with the MAX14727EWV+ installed. To evaluate the MAX14728/MAX14731, request a sample from Maxim and replace the MAX14727 with the MAX14728/MAX14731.

## Features

- 3V to 28V Operating Voltage Range
- LEDs Showing  $\overline{\text{INAOK}}$ ,  $\overline{\text{INBOK}}$
- Proven PCB Layout
- Fully Assembled and Tested

## EV Kit Contents

- EV Kit Board Containing a MAX14727

Ordering Information appears at end of data sheet.

## Quick Start

### Required Equipment

- MAX14727 EV kit
- Two 15V DC power supply
- USB Cable or 5V power supply
- Multimeter

### Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Connect one power supply to INA and one power supply to INB.
- 2) Connect voltmeter to OUT.
- 3) Connect USB cable to J1 or connect 5V power supply on TP1 to source VIO.
- 4) Supply 4.5V to INA. Verify OUT is 4.5V and LED1 is on.
- 5) Increase voltage on INA and verify OUT voltage follows INA voltage. Keep increasing INA voltage, when INA reaches OVLO threshold 13.75V, OUT voltage goes down and LED1 is off.
- 6) Decrease INA voltage, then OUT comes back to be the same as INA voltage and LED1 is on. Turn off INA power supply.
- 7) Supply 4.5V to INB. Verify OUT is 4.5V and LED2 is on.
- 8) Increase voltage on INB and verify OUT voltage follows INB voltage. Keep increasing INB voltage, when INB reaches OVLO threshold 13.75V, OUT voltage goes down and LED2 is off.
- 9) Decrease INB voltage, then OUT comes back to be the same as INB voltage and LED2 is on.
- 10) Set INB voltage to 5V and verify OUT is 5V.
- 11) Set INA voltage to 3V and turn on INA power supply. Verify OUT is still 5V.
- 12) Increase INA voltage. Verify when INA goes to about 4.5V, LED1 is on and OUT voltage is the same as INA voltage.

## Detailed Description

The MAX14727 EV kit is a fully assembled and tested circuit board demonstrating the MAX14727 dual-input, bidirectional overvoltage protection with automatic path control device in a 30-bump WLP package.

### LEDs

LED1/LED2 turns on when  $\overline{\text{INAOK}}/\overline{\text{INBOK}}$  is asserted.

### Digital Inputs

Use USB cable or external power supply to power digital inputs. Use JU1, JU4, JU7, and JU8 to control digital inputs ([Table 1](#)).

### Output Load

Use JU3, and JU5 to add output capacitor or resistor ([Table 2](#)).

### Overvoltage Threshold

Use JU9, and JU10 to choose internal or external overvoltage threshold setting ([Table 3](#)).

**Table 1. JU1, JU4, JU7, JU8 Jumper Setting**

| JUMPER | SHUNT POSITION | DESCRIPTION                                      |
|--------|----------------|--------------------------------------------------|
| JU1    | Installed      | PCON is high (no break before make time)         |
|        | Not installed* | PCON is low (break before make time enabled)     |
| JU4    | Installed      | $\overline{\text{EN}}$ is high (device disabled) |
|        | Not installed* | $\overline{\text{EN}}$ is low (device enabled)   |
| JU7    | Installed      | OTG_ENB high (channel B OTG enabled)             |
|        | Not installed* | OTG_ENB low (channel B OTG disabled)             |
| JU8    | Installed      | OTG_ENA high (channel A OTG enabled)             |
|        | Not installed* | OTG_ENA low (channel A OTG disabled)             |

**Table 2. JU3, JU5 Jumper Setting**

| JUMPER | SHUNT POSITION | DESCRIPTION                             |
|--------|----------------|-----------------------------------------|
| JU3    | Installed      | 100μF capacitor is connected to OUT     |
|        | Not installed* | 100μF capacitor is not connected to OUT |
| JU5    | Installed      | 50Ω resistor is connected to OUT        |
|        | Not installed* | 50Ω resistor is not connected to OUT    |

\*Default position.

**Table 3. JU9, JU10 Jumper Setting**

| JUMPER | SHUNT POSITION | DESCRIPTION                                                                   |
|--------|----------------|-------------------------------------------------------------------------------|
| JU9    | 1-2            | OVLOA is connected to resistor divider. Using external overvoltage threshold. |
|        | 2-3*           | OVLOA is connected to ground. Using internal overvoltage threshold.           |
| JU10   | 1-2            | OVLOB is connected to resistor divider. Using external overvoltage threshold. |
|        | 2-3*           | OVLOB is connected to ground. Using internal overvoltage threshold.           |

\*Default position.

## Ordering Information

| PART           | TYPE  |
|----------------|-------|
| MAX14727EVKIT# | EVKIT |

#Denotes RoHS compliant.

# MAX14727 Evaluation Kit

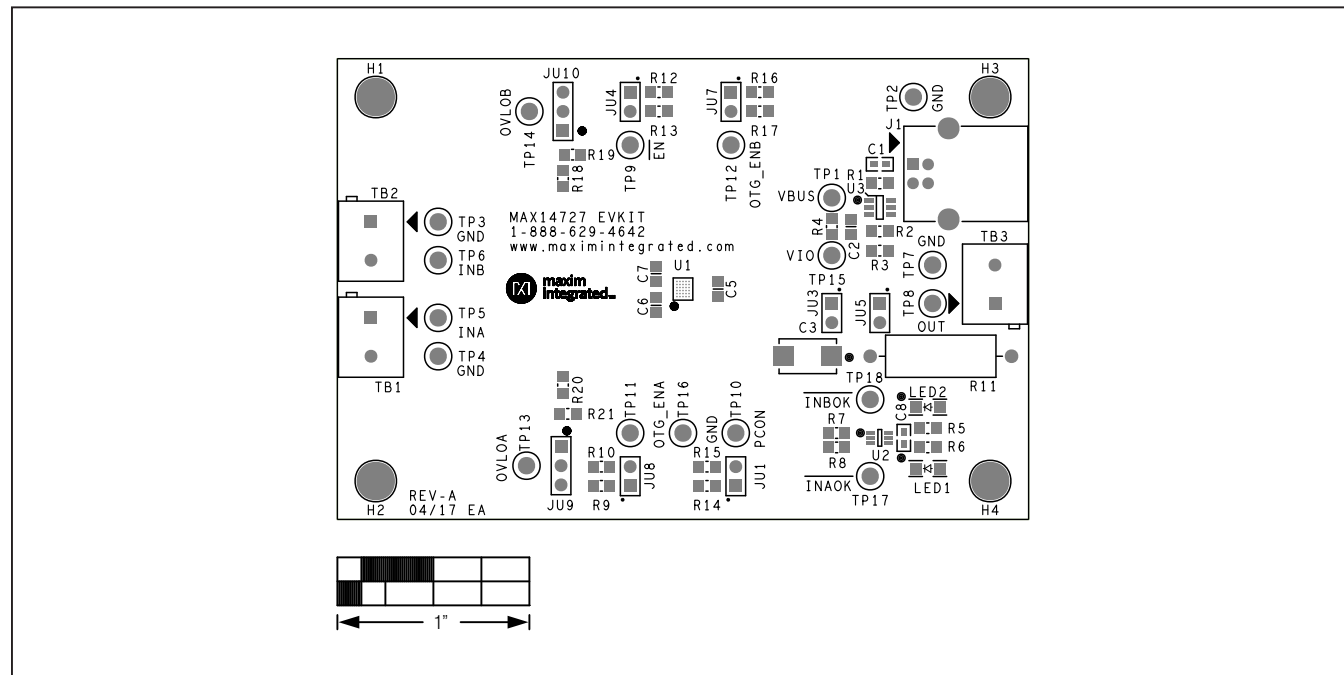
Evaluates: MAX14727/  
MAX14728/MAX14731

## MAX14727 EV Kit Bill of Materials

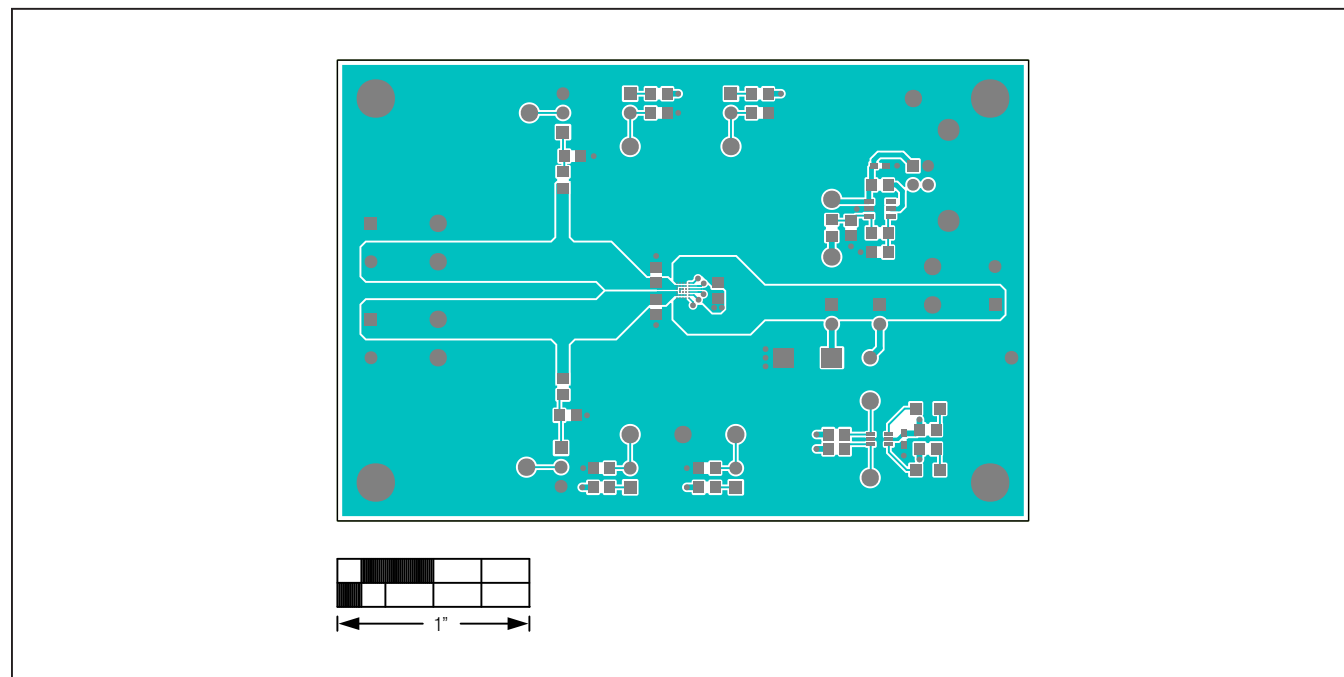
| ITEM  | REF_DES                           | DNI/DNP | QTY | MFG PART #                                                                 | MANUFACTURER                            | VALUE         | DESCRIPTION                                                                                                                       |
|-------|-----------------------------------|---------|-----|----------------------------------------------------------------------------|-----------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 1     | C1, C8                            | -       | 2   | C0603X5R160-105KNP;<br>EMK107BJ105KA;<br>C1608X5R1C105K;<br>GRM188R61C105K | VENKEL LTD./TAIYO YUDEN/<br>TDK/MURATA  | 1UF           | CAPACITOR; SMT; 0603; CERAMIC; 1uF;<br>16V; 10%; X5R; -55degC to + 85degC;<br>0 +/-15% degC MAX.USE 20-0001u-63 FOR<br>NEW DESIGN |
| 2     | C2                                | -       | 1   | C0805C475K4PAC;<br>ECJ-2FB1C475K;<br>CL21A475KOFNNN                        | KEMET/PANASONIC/<br>SAMSUNG ELECTRONICS | 4.7UF         | CAPACITOR; SMT; 0805; CERAMIC;<br>4.7uF; 16V; 10%; X5R; -55degC to + 85degC;<br>0 +/-15% degC MAX.                                |
| 3     | C3                                | -       | 1   | T495X107M020ATE100                                                         | KEMET                                   | 100UF         | CAPACITOR; SMT<br>(7343-43); TANTALUM CHIP;<br>100UF; 20V; TOL=20%; TG=-55 DEGC TO<br>+125 DEGC; AUTO; LOW ESR                    |
| 4     | C5                                | -       | 1   | GRM21BR61H105KA12                                                          | MURATA                                  | 1UF           | CAPACITOR; SMT (0805); CERAMIC CHIP;<br>1UF; 50V; TOL=10%; MODEL=GRM SERIES;<br>TG=-55 DEGC TO +85 DEGC; TC=X5R                   |
| 5     | C6, C7                            | -       | 2   | C0805C104K5RAC;<br>GRM21BR71H104K;<br>C2012X7R1H104K085AA                  | KEMET; MURATA; TDK                      | 0.1UF         | CAPACITOR; SMT (0805); CERAMIC CHIP;<br>0.1UF; 50V; TOL=10%; MODEL=; TG=-55<br>DEGC TO +125 DEGC; TC=X7R;                         |
| 6     | J1                                | -       | 1   | 61729-0010BLF                                                              | FCI CONNECT                             | 61729-0010BLF | CONNECTOR; FEMALE; THROUGH-HOLE;<br>UNIVERSAL SERIES BUS B-TYPE<br>CONNECTOR; RIGHT ANGLE; 4PINS                                  |
| 7     | JU1, JU3-JU5,<br>JU7, JU8         | -       | 6   | PEC02SAAN                                                                  | SULLINS                                 | PEC02SAAN     | CONNECTOR; MALE; THROUGH HOLE;<br>BREAKAWAY; STRAIGHT; 2PINS                                                                      |
| 8     | JU9, JU10                         | -       | 2   | PEC03SAAN                                                                  | SULLINS                                 | PEC03SAAN     | CONNECTOR; MALE; THROUGH HOLE;<br>BREAKAWAY; STRAIGHT; 3PINS                                                                      |
| 9     | LED1, LED2                        | -       | 2   | LG N971-KN-1                                                               | OSRAM                                   | LG N971-KN-1  | DIODE; LED; SMT (1206); PIV=2.6V;<br>IF=0.025A; -30 DEGC TO +85 DEGC; GREEN                                                       |
| 10    | R1, R7, R8, R10,<br>R13, R15, R17 | -       | 7   | CRCW0805100KFK;<br>RK73H2ATTD1003;<br>ERJ-6ENF1003V                        | VISHAY DALE/KOA SPEER/<br>PANASONIC     | 100K          | RESISTOR; 0805; 100K;<br>1%; 100PPM; 0.125W; THICK FILM                                                                           |
| 11    | R2                                | -       | 1   | CRCW080510K0FK;<br>MCR10EZHF1002;<br>ERJ-6ENF1002V;<br>RC0805FR-0710KL     | GENERIC PART                            | 10K           | RESISTOR; 0805; 10K;<br>1%; 100PPM; 0.125W; THICK FILM                                                                            |
| 12    | R3                                | -       | 1   | CRCW08056K04FK;<br>MCR10EZPF6041                                           | VISHAY DALE/ROHM                        | 6.04K         | RESISTOR; 0805; 6.04K;<br>1%; 100PPM; 0.125W; THICK FILM                                                                          |
| 13    | R4                                | -       | 1   | RC0805JR-070RL                                                             | YAGEO PHYCOMP                           | 0             | RESISTOR; 0805; 0 OHM;<br>5%; JUMPER; 0.125W; THICK FILM                                                                          |
| 14    | R5, R6                            | -       | 2   | CRCW0805332RKF;<br>MCR10EZHF3320                                           | VISHAY DALE/ROHM                        | 332           | RESISTOR; 0805; 332 OHM;<br>1%; 100PPM; 0.125W; THICK FILM                                                                        |
| 15    | R9, R12, R14, R16                 | -       | 4   | CRCW08051K00FK;<br>ERJ-6ENF1001V;<br>MCR10EZHF1001;<br>RC0805FR-071KL      | VISHAY DALE; PANASONIC;<br>ROHM; YAGEO  | 1K            | RESISTOR; 0805; 1K;<br>1%; 100PPM; 0.125W; THICK FILM                                                                             |
| 16    | R11                               | -       | 1   | UB5C-50RF1                                                                 | RIEDON INC                              | 50            | RESISTOR; THROUGH HOLE-AXIAL LEAD;<br>50R OHM; 1%; 20PPM; 5W; SILICON<br>COATED WIREWOUND                                         |
| 17    | SU1-SU8                           | -       | 8   | STC02SYAN                                                                  | SULLINS ELECTRONICS CORP                | STC02SYAN     | TEST POINT; JUMPER; STR;<br>TOTAL LENGTH=0.256IN; BLACK;<br>INSULATION=PBT CONTACT=PHOSPHOR<br>BRONZE; COPPER PLATED TIN OVERALL  |
| 18    | TB1-TB3                           | -       | 3   | 398800302                                                                  | MOLEX                                   | 398800302     | CONNECTOR; FEMALE;<br>THROUGH HOLE; 5.08/200 EUROSTYLE<br>LOW; SINGLE ROW FIXED BLOCK; RIGHT<br>ANGLE; 2PINS                      |
| 19    | TP1, TP5, TP6,<br>TP8, TP15       | -       | 5   | 5010                                                                       | Keystone                                | 5010          | TEST POINT WITH 1.80MM<br>HOLE DIA, RED, MULTIPURPOSE                                                                             |
| 20    | TP2-TP4,<br>TP7, TP16             | -       | 5   | 5011                                                                       | Keystone                                | 5011          | TEST POINT; PIN DIA=0.125IN;<br>TOTAL LENGTH=0.445IN; BOARD<br>HOLE=0.063IN; BLACK; PHOSPHOR<br>BRONZE WIRE SILVER PLATE FINISH;  |
| 21    | TP9-TP14,<br>TP17, TP18           | -       | 8   | 5014                                                                       | Keystone                                | 5014          | TEST POINT; PIN DIA=0.125IN;<br>TOTAL LENGTH=0.445IN; BOARD<br>HOLE=0.063IN; YELLOW; PHOSPHOR<br>BRONZE WIRE SILVER PLATE FINISH; |
| 22    | U1                                | -       | 1   | MAX14727EWV+                                                               | MAXIM                                   | MAX14727EWV+  | IC; PROT; 13.75V OVLO; DUAL INPUT;<br>BIIRECTIONAL OVERVOLTAGE<br>PROTECTOR WITH AUTOMATIC PATH<br>CONTROL; WLP30 2.537X2.197     |
| 23    | U2                                | -       | 1   | NC7WZ07P6X                                                                 | FAIRCHILD SEMICONDUCTOR                 | NC7WZ07P6X    | IC; BUF; TINY LOGIC ULTRA-HIGH SPEED<br>DUAL BUFFER; SC70-6                                                                       |
| 24    | U3                                | -       | 1   | MAX8880EUT+                                                                | MAXIM                                   | MAX8880EUT+   | IC; VREG; ULTRA-LOW-IO LOW-DROPOUT<br>LINEAR REGULATOR WITH POK; SOT23-6                                                          |
| 25    | PCB                               | -       | 1   | MAX14727                                                                   | MAXIM                                   | PCB           | PCB:MAX14727                                                                                                                      |
| 26    | R18-R21                           | DNP     | 0   | N/A                                                                        | N/A                                     | OPEN          | PACKAGE OUTLINE 0805 RESISTOR                                                                                                     |
| TOTAL |                                   |         | 68  |                                                                            |                                         |               |                                                                                                                                   |



## MAX14727 EV Kit PCB Layout Diagrams

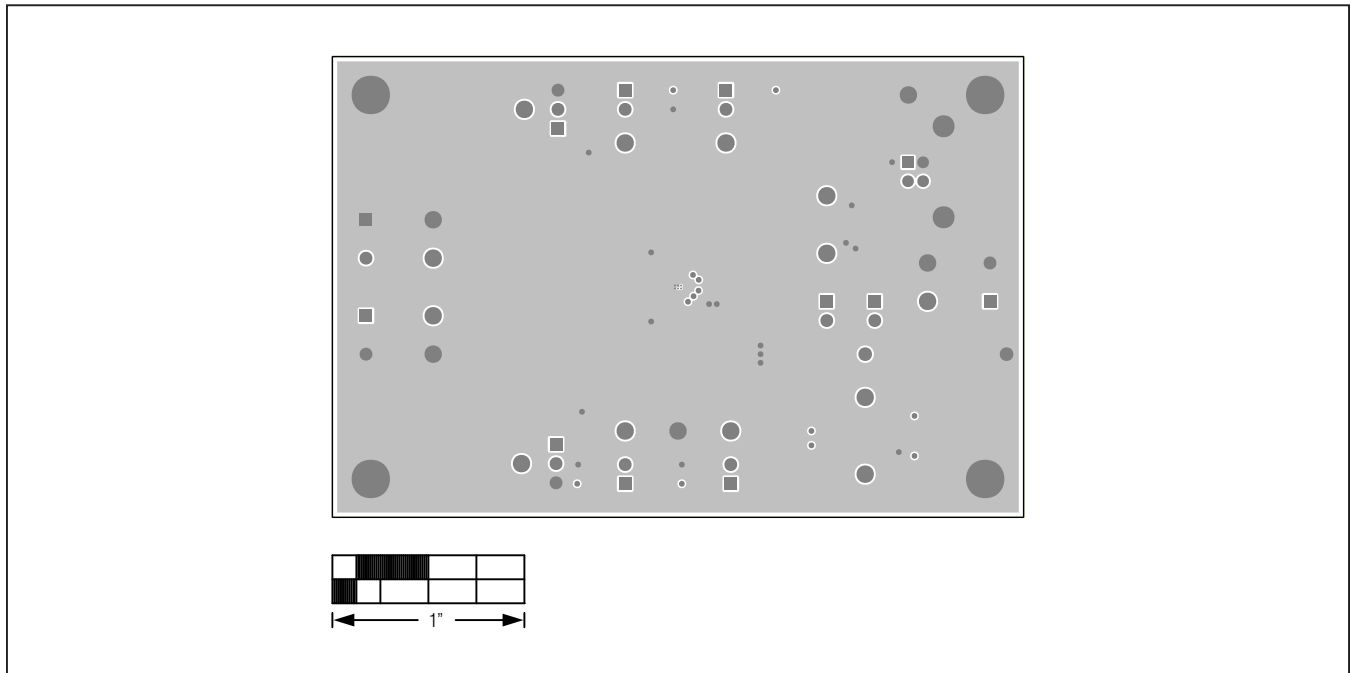


MAX14727 EV Kit—Top Silkscreen

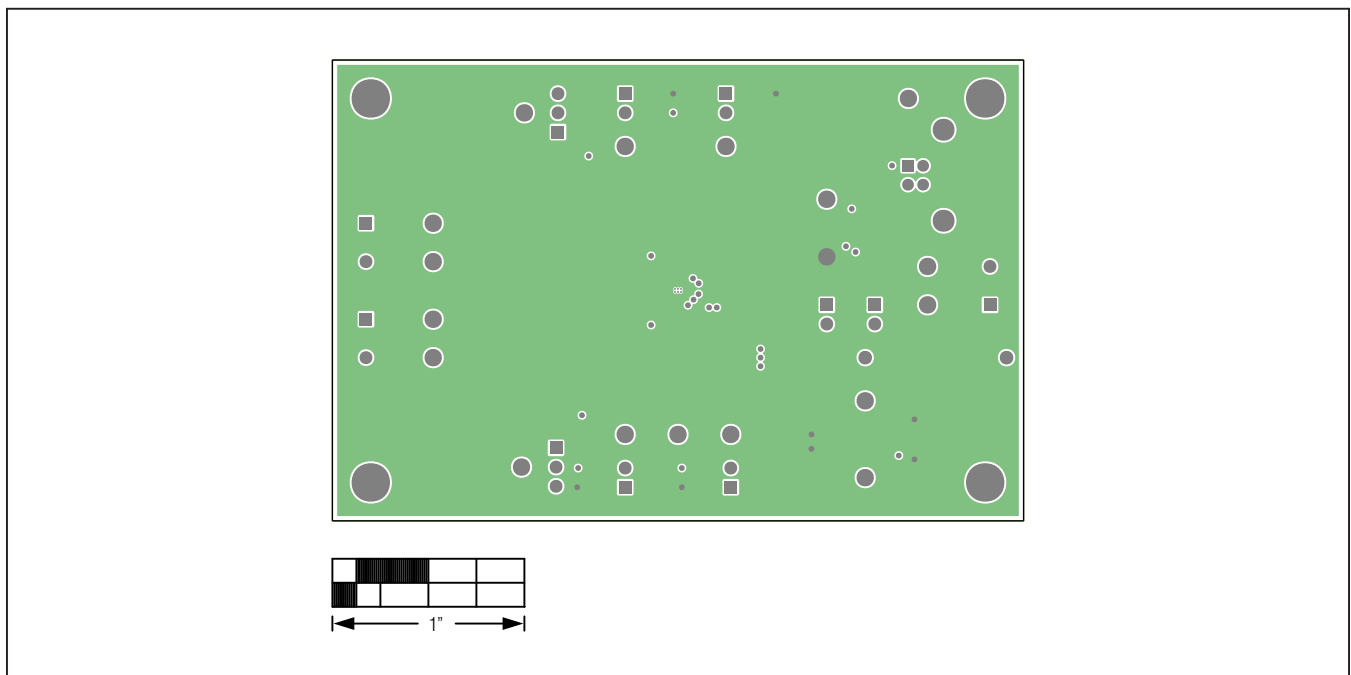


MAX14727 EV Kit—Top

MAX14727 EV Kit PCB Layout Diagrams (continued)

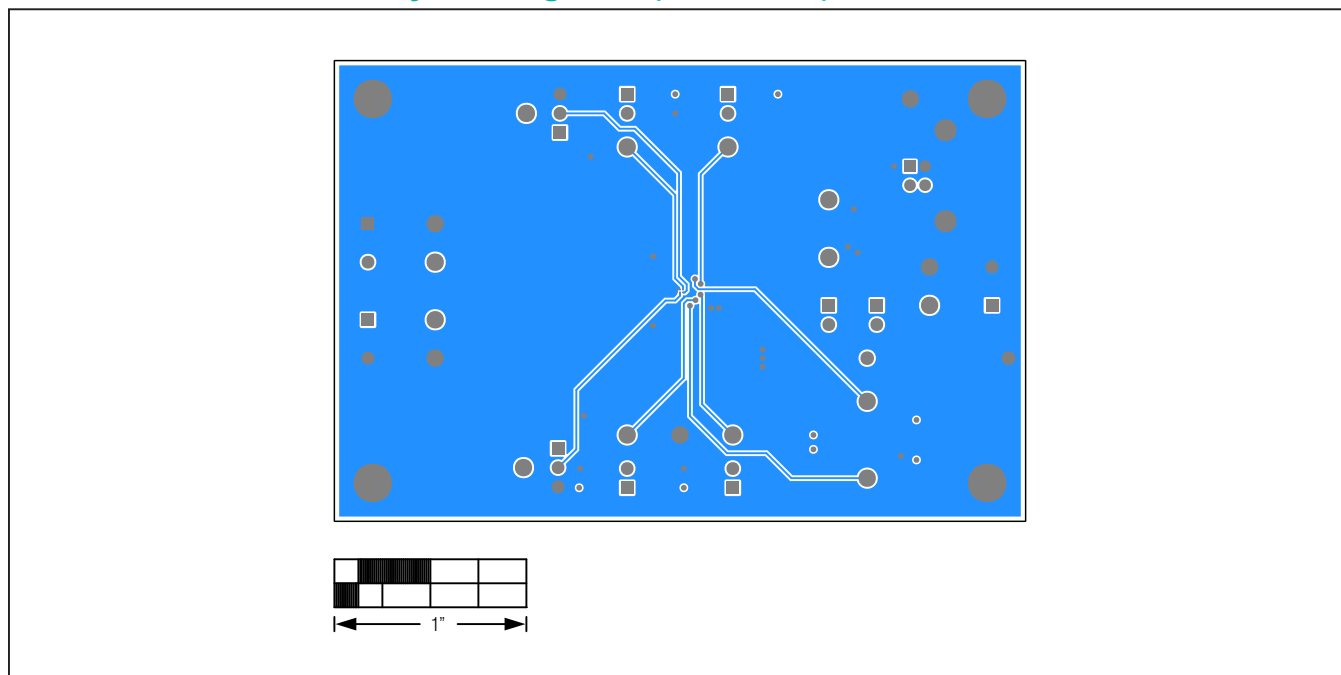


MAX14727 EV Kit—Inner Layer2



MAX14727 EV Kit—Inner Layer3

## MAX14727 EV Kit PCB Layout Diagrams (continued)



MAX14727 EV Kit—Bottom

**Revision History**

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION     | PAGES<br>CHANGED |
|--------------------|------------------|-----------------|------------------|
| 0                  | 7/17             | 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).

*Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time.*