

General Description

The MAX17270 evaluation kit (EV kit) evaluates the MAX17270. The MAX17270 is a 3-output switching regulator that regulates three outputs using a single, small 2.2μH inductor.

The MAX17270 EV kit features two independent circuits to evaluate two different IC packages of the MAX17270. Both circuits on the EV kit operate over an input range of 2.7V to 5.5V. Each circuit provides three jumper-configurable outputs, with voltages from 0.8V to 5V for each output channel. Each circuit output on the EV kit delivers up to 50mA/75mA/80mA of current depending on the input voltage to the output voltage ratio.

The EV kit comes with the MAX17270ETE+ and the MAX17270ENE+ installed.

Features

- Two Independent Circuits on One Board
 - Evaluates the MAX17270 IC in a 16-pin TQFN
 - Evaluates the MAX17270 IC in a 4 x 4 Bump, 0.4mm Pitch WLP
- 2.7V to 5.5V Input Range
- 0.8V to 5V Configurable Output Voltage
- Up to 50mA/75mA/80mA Output Current
- Proven 4-Layer 1oz Copper PCB Layout
- Demonstrates Compact Solution Size
- Fully Assemble and Tested

Ordering Information appears at end of data sheet.

MAX17270 EV Kit Files

| FILE | DESCRIPTION |
|------------------------|--------------------------|
| MAX17270 EV BOM | EV Kit Bill of Materials |
| MAX17270 EV PCB Layout | EV Kit Layout |
| MAX17270 EV Schematic | EV Kit Schematic |

Quick Start

Required Equipment

- MAX17270 EV kit
- 2.7V to 5.5V, 1A DC power supply
- Electronic load capable of 100mA
- Digital voltmeter (DVM)

Procedure

<<Testing the TQFN Circuit>>

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

Caution: Do not turn on power supply until all connections are completed.

- 1) Verify that jumpers JU1 to JU6 are in their default positions, as shown in [Table 1](#) through [Table 4](#).
- 2) Connect the 2.7V to 5.5V power supply between the IN1 and nearest PGND1 terminal posts.
- 3) Turn on the power supply and set the power supply output to 3V.
- 4) Verify that the output voltage at OUT1 and nearest PGND1 terminal posts is 1.0V.
- 5) Verify that the output voltage at OUT2 and nearest PGND1 terminal posts is 1.8V.
- 6) Verify that the output voltage at OUT3 and nearest PGND1 terminal posts is 3.3V.
- 7) Connect the electronic load between OUT1 and PGND1. Set the electronic load to 50mA
- 8) Enable the electronic load and verify that OUT1 is still 1.0V
- 9) Connect the electronic load between OUT2 and PGND1. Set the electronic load to 75mA
- 10) Enable the electronic load and verify that OUT2 is still 1.8V
- 11) Connect the electronic load between OUT3 and PGND1. Set the electronic load to 80mA
- 12) Enable the electronic load and verify that OUT3 is still 3.3V

Procedure

<<Testing the WLP Circuit>>

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

Caution: Do not turn on power supply until all connections are completed.

- 13) Verify that jumpers JU101 to JU106 are in their default positions, as shown in [Table 5](#) through [Table 8](#).
- 14) Connect the 2.7V to 5.5V power supply between the IN and nearest PGND terminal posts.
- 15) Turn on the power supply and set the power supply output to 3V.
- 16) Verify that the output voltage at OUT101 and nearest PGND terminal posts is 1.0V.
- 17) Verify that the output voltage at OUT102 and nearest PGND terminal posts is 1.8V.
- 18) Verify that the output voltage at OUT103 and nearest PGND terminal posts is 3.3V.
- 19) Connect the electronic load between OUT101 and PGND. Set the electronic load to 50mA.
- 20) Enable the electronic load and verify that OUT101 is still 1.0V.

- 21) Connect the electronic load between OUT102 and PGND. Set the electronic load to 75mA.
- 22) Enable the electronic load and verify that OUT102 is still 1.8V.
- 23) Connect the electronic load between OUT103 and PGND. Set the electronic load to 80mA.
- 24) Enable the electronic load and verify that OUT103 is still 3.3V.

Detailed Description of Hardware

The MAX17270 EV kit evaluates the MAX17270. The MAX17270 is a 3-output switching regulator that regulates three outputs using a single, small 2.2µH inductor.

The MAX17270 EV kit features two independent circuits to evaluate two different IC packages of the MAX17270, the 16-pin TQFN and the 4x4 bump, 0.4mm pitch, WLP. Both circuits on the EV kit operates over an input voltage range of 2.7V to 5.5V. Each circuit provides three output channels. Each output channel provides an output with a jumper-configurable voltage from 0.8V to 5V. Each circuit output channel delivers up to 50mA/75mA/80mA of current depending on the input voltage to the output voltage ratio.

The EV kit comes with the MAX17270ETE+ and the MAX17270ENE+ installed.

Table 1. EN1–EN3 (JU1 – JU3) on MAX17270 (TQFN) Circuit

| JU1 - JU3 SHUNT POSITION | DESCRIPTION |
|--------------------------|---|
| 1–2* | Enabled. EN_ = IN1 |
| 2–3 | Disabled. EN_ = PGND1 |
| OPEN | Enabled. EN_ = high (through internal pullup) |

*Default position.

Table 2. RSEL1 (JU4) on MAX17270 (TQFN) Circuit

| JU4 SHUNT POSITION | RSEL1 CONNECTED TO | OUT1 | OUT1 CURRENT LIMIT |
|--------------------|--------------------|------|--------------------|
| 1–2 | R4 = 1M | 0.8V | 0.5A |
| 1–3* | R5 = 768k | 1.0V | 0.5A |
| 1–4 | R6 = 536k | 1.2V | 0.5A |

*Default position.

Table 3. RSEL2 (JU5) on MAX17270 (TQFN) Circuit

| JU5 SHUNT POSITION | RSEL2 CONNECTED TO | OUT2 | OUT2 CURRENT LIMIT |
|--------------------|--------------------|------|--------------------|
| 1–2 | R7 = 20k | 1.5V | 1A |
| 1–3* | R8 = 16.9k | 1.8V | 1A |
| 1–4 | R9 = 14k | 2.2V | 1A |

*Default position.

Table 4. RSEL3 (JU6) on MAX17270 (TQFN) Circuit

| JU6 SHUNT POSITION | RSEL3 CONNECTED TO | OUT3 | OUT3 CURRENT LIMIT |
|--------------------|--------------------|------|--------------------|
| 1–2 | R10 = 11.8k | 2.5V | 1A |
| 1–3* | R11 = 8.45k | 3.3V | 1A |
| 1–4 | R12 = 0 | 5V | 1A |

*Default position.

Table 5. EN101–EN103 (JU101–JU103) on MAX17270 (WLP) Circuit

| JU101–JU103 SHUNT POSITION | DESCRIPTION |
|----------------------------|--|
| 1–2* | Enabled. EN_ = IN |
| 2–3 | Disabled. EN_ = PGND |
| OPEN | Enabled. EN_ = high (via internal pull up) |

*Default position.

Table 6. RSEL101 (JU104) on MAX17270 (WLP) Circuit

| JU104 SHUNT POSITION | RSEL101 CONNECTED TO | OUT101 | OUT101 CURRENT LIMIT |
|----------------------|----------------------|--------|----------------------|
| 1–2 | R104 = 1M | 0.8V | 0.5A |
| 1–3* | R105 = 768k | 1.0V | 0.5A |
| 1–4 | R106 = 536k | 1.2V | 0.5A |

*Default position.

Table 7. RSEL102 (JU105) on MAX17270 (WLP) Circuit

| JU105 SHUNT POSITION | RSEL102 CONNECTED TO | OUT102 | OUT102 CURRENT LIMIT |
|----------------------|----------------------|--------|----------------------|
| 1–2 | R107 = 20k | 1.5V | 1A |
| 1–3* | R108 = 16.9k | 1.8V | 1A |
| 1–4 | R109 = 14k | 2.2V | 1A |

*Default position.

Table 8. RSEL103 (JU106) on MAX17270 (WLP) Circuit

| JU106 SHUNT POSITION | RSEL1032 CONNECTED TO | OUT103 | OUT103 CURRENT LIMIT |
|----------------------|-----------------------|--------|----------------------|
| 1–2 | R110 = 11.8k | 2.5V | 1A |
| 1–3* | R111 = 8.45k | 3.3V | 1A |
| 1–4 | R112 = 0 | 5V | 1A |

*Default position.

Enable Function for the MAX17270ETE+ (TQFN) Circuit

The MAX17270 (TQFN) circuit on the EV kit provides three jumpers JU1, JU2, and JU3 to individually enable or disable each output channel. Refer to [Table 1](#) for jumper setting of jumpers JU1, JU2, and JU3.

Output Voltage Selection for the MAX17270ETE+ (TQFN) Circuit

The MAX17270 (TQFN) circuit on the EV kit provides three jumpers JU4, JU5, and JU6 (RSEL1, RSEL2 and RSEL3) to configure the output voltage for each output channel. Refer to [Table 2](#), [Table 3](#), and [Table 4](#) for jumper setting of jumpers JU4, JU5, and JU6.

Enable Function for the MAX17270ENE+ (WLP) Circuit

The MAX17270 (WLP) circuit on the EV kit provides three jumpers JU101, JU102, and JU103 to individually enable or disable each output channel. Refer to [Table 5](#) for jumper setting of jumpers JU101–JU103.

Ordering Information

| PART | TYPE |
|----------------|--------|
| MAX17270EVKIT# | EV Kit |

#Denotes RoHS compliant.

Output Voltage Selection for the MAX17270ENE+ (WLP) Circuit

The MAX17270 (WLP) circuit on the EV kit provides three jumpers JU104, JU105, and JU106 (RSEL101, RSEL102, and RSEL103) to configure the output voltage for each output channel. Refer to [Table 6](#), [Table 7](#), and [Table 8](#) for jumper setting of jumpers JU104, JU105, and JU106.

Spare Inductors

The MAX17270 EV kit provides spare inductors on the PCB's bottom side. The spare inductors can be used to reconfigure the EV kit output current ratings.

Component Suppliers

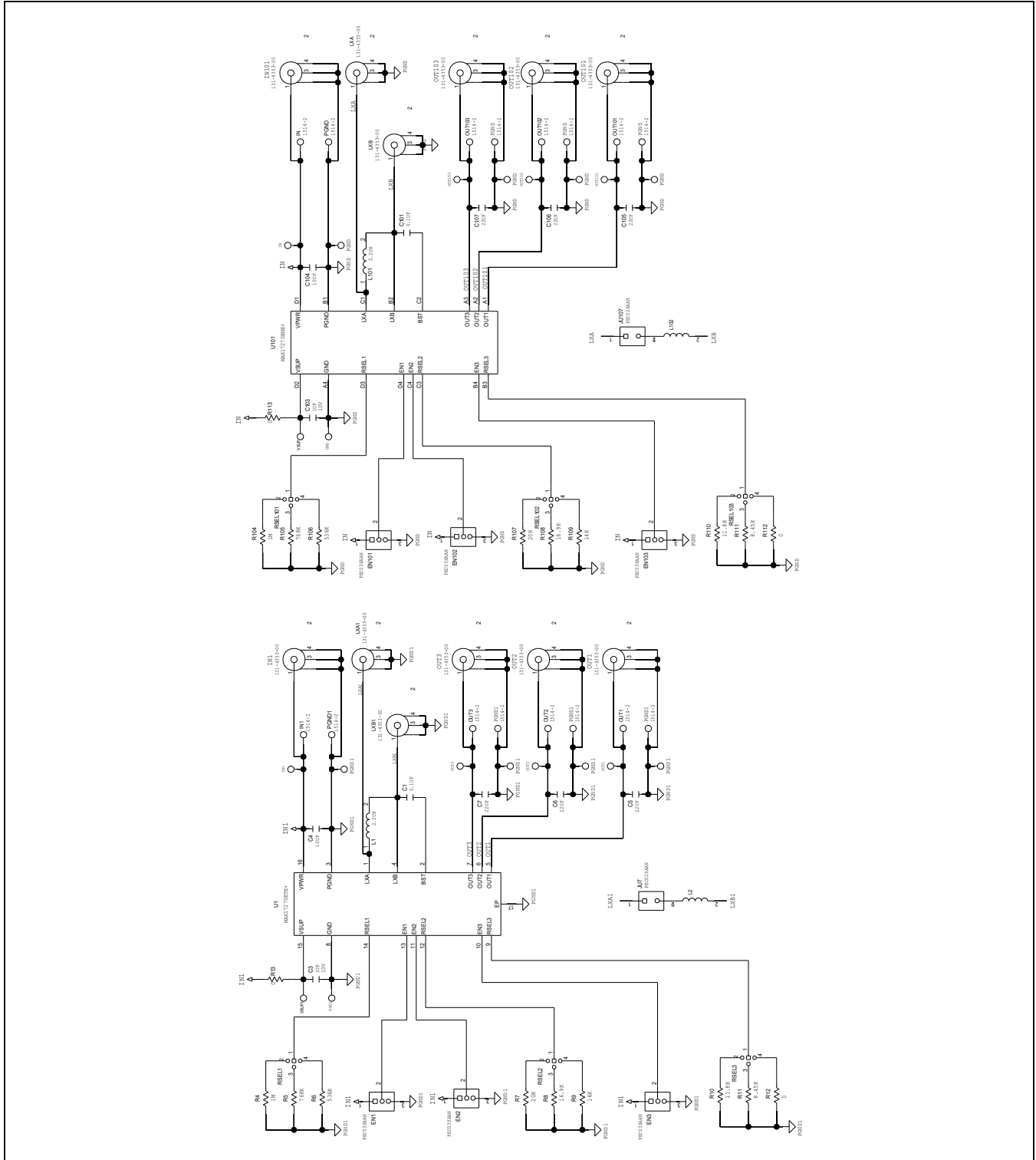
| SUPPLIER | WEBSITE |
|------------------|-------------------|
| Coilcraft | www.coilcraft.com |
| Murata/TOKO | www.murata.com |
| TDK | www.tdk.com |
| Wurth Elektronik | www.we-online.com |

Note: Indicate that you are using the MAX17270 when contacting these component suppliers.

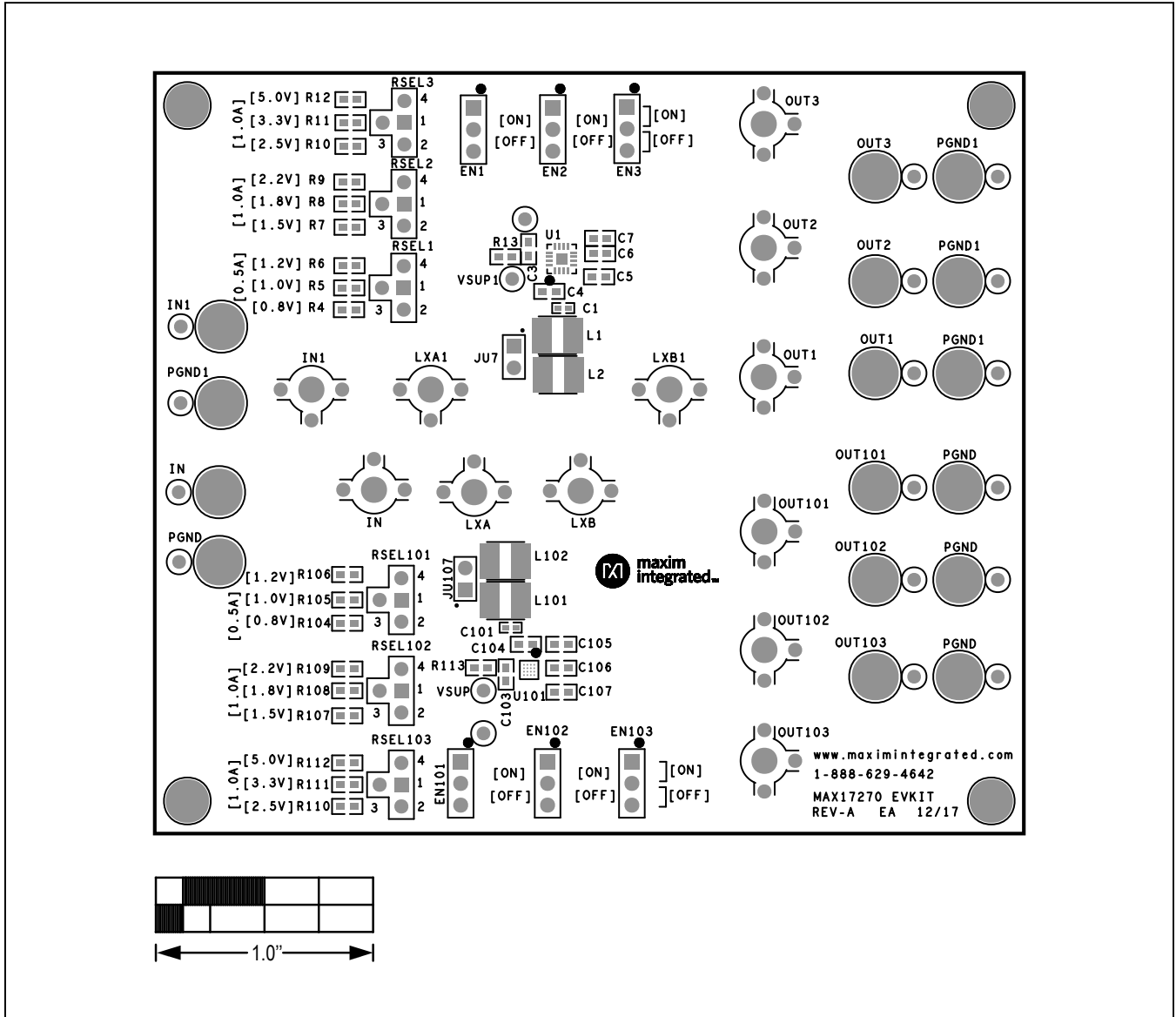
MAX17270 EV Kit Bill of Materials

| ITEM | REF_DES | DW/DNP | QTY | MFG PART # | MANUFACTURER | VALUE | DESCRIPTION |
|-------|---|--------|-----|---|---|--------------|--|
| 1 | C1, C101 | — | 2 | CGA2B3X7R1H104K; C1005X7R1H104K050BB; GRM155R71H104KE14 | TDK,TDK,MURATA | 0.1µF | CAPACITOR: SMT (0402); CERAMIC CHIP; 0.1µF; 50V; TOL = 10%; TG = -55°C TO +125°C; TC = X7R |
| 2 | C3, C103 | — | 2 | GRM188R71A105K; C0603X7R100-105; C1608X7R1A105K080AC; LMK107B7105KA; CL10B105KP8NFN | MURATA,VENKEL LTD,TDK; TAIYO YUDEN; SAMSUNG ELECTRONICS | 1µF | CAPACITOR: SMT (0603); CERAMIC CHIP; 1µF; 10V; TOL = 10%; TG = -55°C TO +125°C; TC = X7R; |
| 3 | C4, C104 | — | 2 | C1608XSR1A109K | TDK | 10µF | CAPACITOR: SMT (0603); CERAMIC CHIP; 10µF; 10V; TOL = 10%; MODEL+; TG = -55°C TO +85°C; TC = X5R |
| 4 | C5-C7, C105-C107 | — | 6 | C1608XSR1A226M080AC; GRM188R61A226ME15 | TDK,MURATA | 22µF | CAPACITOR: SMT (0603); CERAMIC CHIP; 22µF; 10V; TOL = 20%; TG = -55°C TO +85°C; TC = X5R |
| 5 | EN1-EN3, EN101-EN103 | — | 6 | PEC03SAAN | SULLINS | PEC03SAAN | CONNECTOR, MALE, THROUGH HOLE; BREAKAWAY, STRAIGHT, 3PINS |
| 6 | IN, IN1, OUT1-OUT3, PGND, PGND1, OUT101-OUT103, PGND1_OUT1-PGND1_OUT3, PGND_OUT101-PGND_OUT103 | — | 16 | 1514-2 | KEYSTONE | 1514-2 | TERMINAL; TURRET; PIN DIA = 0.090IN; TOTAL LENGTH = 0.105IN; BOARD HOLE = 0.098IN; BRASS; TIN PLATING; |
| 7 | LXA, LXB, LXA1, LXB1, IN1_JACK, OUT1_JACK, OUT3_JACK, IN101_JACK, OUT101_JACK, OUT103_JACK | — | 12 | 131-4353-00 | TEKTRONICS | 131-4353-00 | CONNECTOR, WIREMOUNT; CIRCUIT BOARD TEST POINT MINIATURE PROBE, STRAIGHT, 4PINS |
| 8 | L1, L101 | — | 2 | XFL4020-222ME | COILCRAFT | 2.2µH | INDUCTOR; SMT; METAL COMPOSITE CORE; 2.2µH; TOL = ±20%; 8A; -40°C TO +125°C |
| 9 | L1A | — | 1 | MLP1005M1R0D70T0S1 | TDK | 1µH | INDUCTOR; SMT (0402); FERRITE CHIP; 1µH; TOL = ±20%; 0.5A |
| 10 | L1B | — | 1 | DFE160808S-1ROM=P2 | MURATA | 1µH | INDUCTOR; SMT (0603); MAGNETICALLY SHIELDED; 1µH; TOL = ±20%; 1.9A |
| 11 | L1C | — | 1 | DFM18PAN2R2MG0L | MURATA | 2.2µH | INDUCTOR; SMT (0603); CERAMIC CHIP; 2.2µH; TOL = ±20%; 1.1A; |
| 12 | L1D | — | 1 | DFE201612E-1ROM | MURATA | 1µH | INDUCTOR; SMT (0806); WIREWOUND CHIP; 1µH; TOL = ±20%; 2.9A |
| 13 | L1E | — | 1 | 74479299222 | WURTH ELECTRONICS INC | 2.2µH | INDUCTOR; SMT (1210); MOLDED CHIP; 2.2µH; TOL = ±20%; 2.1A |
| 14 | L1F | — | 1 | 74438357022 | WURTH ELECTRONICS INC | 2.2µH | EVKIT PART-INDUCTOR; SMT; SHIELDED; 2.2µH; TOL = ±20%; 5.2A; |
| 15 | L1G | — | 1 | DFE201612E-2R2M | MURATA | 2.2µH | INDUCTOR; SMT (0806); WIREWOUND CHIP; 2.2µH; TOL = ±20%; 1.8A |
| 16 | R4, R104 | — | 2 | CR0W06031M00FK; MCR03E2PFX1004 | VISHAY DALE;ROHM | 1M | RESISTOR, 0603, 1M OHM, 1%, 100PPM, 0.10W, THICK FILM |
| 17 | R5, R105 | — | 2 | CR0W0603768KFK | VISHAY DALE | 768K | RESISTOR, 0603, 768K OHM, 1%, 100PPM, 0.1W, THICK FILM |
| 18 | R6, R106 | — | 2 | ERJ-3EKF5363 | PANASONIC | 536K | RESISTOR, 0603, 536K OHM, 1%, 100PPM, 0.1W, THICK FILM |
| 19 | R7, R107 | — | 2 | MCR03E2PFX2002; ERJ-3EKF2002; CR0603-FX-200ZELF | ROHM,PANASONIC,BOURNS | 20K | RESISTOR, 0603, 20K OHM, 1%, 100PPM, 0.10W, THICK FILM |
| 20 | R8, R108 | — | 2 | ERJ-3EKF1692V; RC0603FR-0716K9 | PANASONIC,YAGEO PHYCOMP | 16.9K | RESISTOR, 0603, 16.9K OHM, 1%, 100PPM, 0.10W, THICK FILM |
| 21 | R9, R109 | — | 2 | RC1-0603-1402F | INTERNATIONAL MANUFACTURING SERVICE | 14K | RESISTOR, 0603, 14K OHM, 1%, 100PPM, 0.1W |
| 22 | R10, R110 | — | 2 | ERJ-3EKF1182 | PANASONIC | 11.8K | RESISTOR, 0603, 11.8K OHM, 1%, 100PPM, 0.1W, THICK FILM |
| 23 | R11, R111 | — | 2 | RC0603FR-078K45L | YAGEO PHYCOMP | 8.45K | RESISTOR, 0603, 8.45K OHM, 1%, 100PPM, 0.10W, THICK FILM |
| 24 | R12, R13, R112, R113 | — | 4 | CR0W0603000ZS; MCR03E2PJ000,ERJ-3GEY0R00 | VISHAY DALE,ROHM,PANASONIC | 0 | RESISTOR, 0603, 0Ω, 0%; JUMPER, 0.10W, THICK FILM |
| 25 | RSEL1-RSEL3, RSEL101-RSEL103 | — | 6 | 22-28-4043 | MOLEX | 22-28-4043 | CONNECTOR, MALE, THROUGH HOLE; FLAT VERTICAL BREAKAWAY, STRAIGHT, 4PINS |
| 26 | SU1-SU6, SU101-SU106 | — | 12 | S1100-B,SX1100-B | KYCON,KYCON | SX1100-B | TEST POINT; JUMPER; STR; TOTAL LENGTH = 0.24IN; BLACK; INSULATION = PBT; PHOSPHOR BRONZE CONTACT = GOLD PLATED |
| 27 | TP_GND1_U1, TP_GND_U101 | — | 2 | 5001 | KEYSTONE | N/A | TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; |
| 28 | U1 | — | 1 | MAX17270ETE- | MAXIM | MAX17270ETE- | EVKIT PART-IC; NANOPOWER TRIPLE/DUAL-OUTPUT SINGLE INDUCTOR MULTIPLE-OUTPUT (SIMO) BUCK BOOST REGULATOR; TQFN16-EP; PKG. CODE: T1633-5; PKG. OUTLINE DWG. NO.: 21-100136; PKG. LAND PATTERN NUMBER: 90-0032 |
| 29 | U101 | — | 1 | MAX17270ENE- | MAXIM | MAX17270ENE- | EVKIT PART-IC; ULTRA-LOW POWER TRIPLE-OUTPUT SINGLE INDUCTOR MULTIPLE OUTPUT (SIMO) BUCK BOOST REGULATOR; WLP16; 0.40MM PITCH; PACKAGE CODE: N161A1-1; PACKAGE OUTLINE DRAWING: 21-100150 |
| 30 | VSUP, VSUP1 | — | 2 | 5002 | KEYSTONE | N/A | TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER; |
| 31 | PCB | — | 1 | MAX17270 | MAXIM | PCB | PCB MAX17270 |
| 32 | JU7, JU107 | DNP | 0 | PEC02SAAN | SULLINS | PEC02SAAN | CONNECTOR, MALE, THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS |
| 33 | L2, L102 | DNP | 0 | XFL4020-222ME | COILCRAFT | 2.2µH | INDUCTOR; SMT; METAL COMPOSITE CORE; 2.2µH; TOL = ±20%; 8A; -40°C TO +125°C |
| 34 | TP_IN, TP_IN1, TP_OUT1-TP_OUT3, TP_PGND, TP_PGND1, TP_OUT101-TP_OUT103, TP_PGND1_OUT1-TP_PGND1_OUT3, TP_PGND_OUT101-TP_PGND_OUT103 | DNP | 0 | 5000 | KEYSTONE | N/A | TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; |
| TOTAL | | | 100 | | | | |

MAX17270 EV Kit Schematic

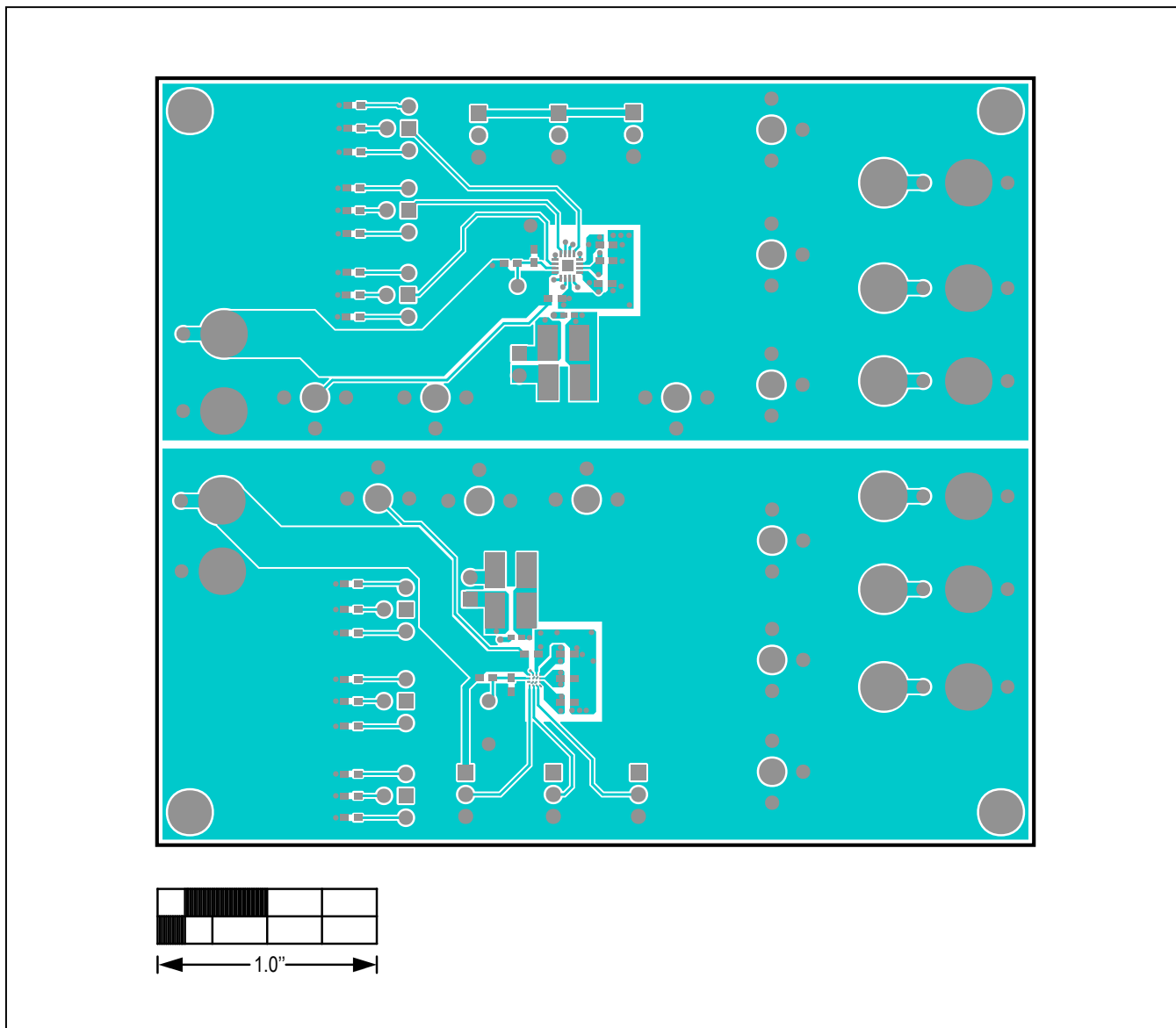


MAX17270 EV Kit PCB Layout Diagrams



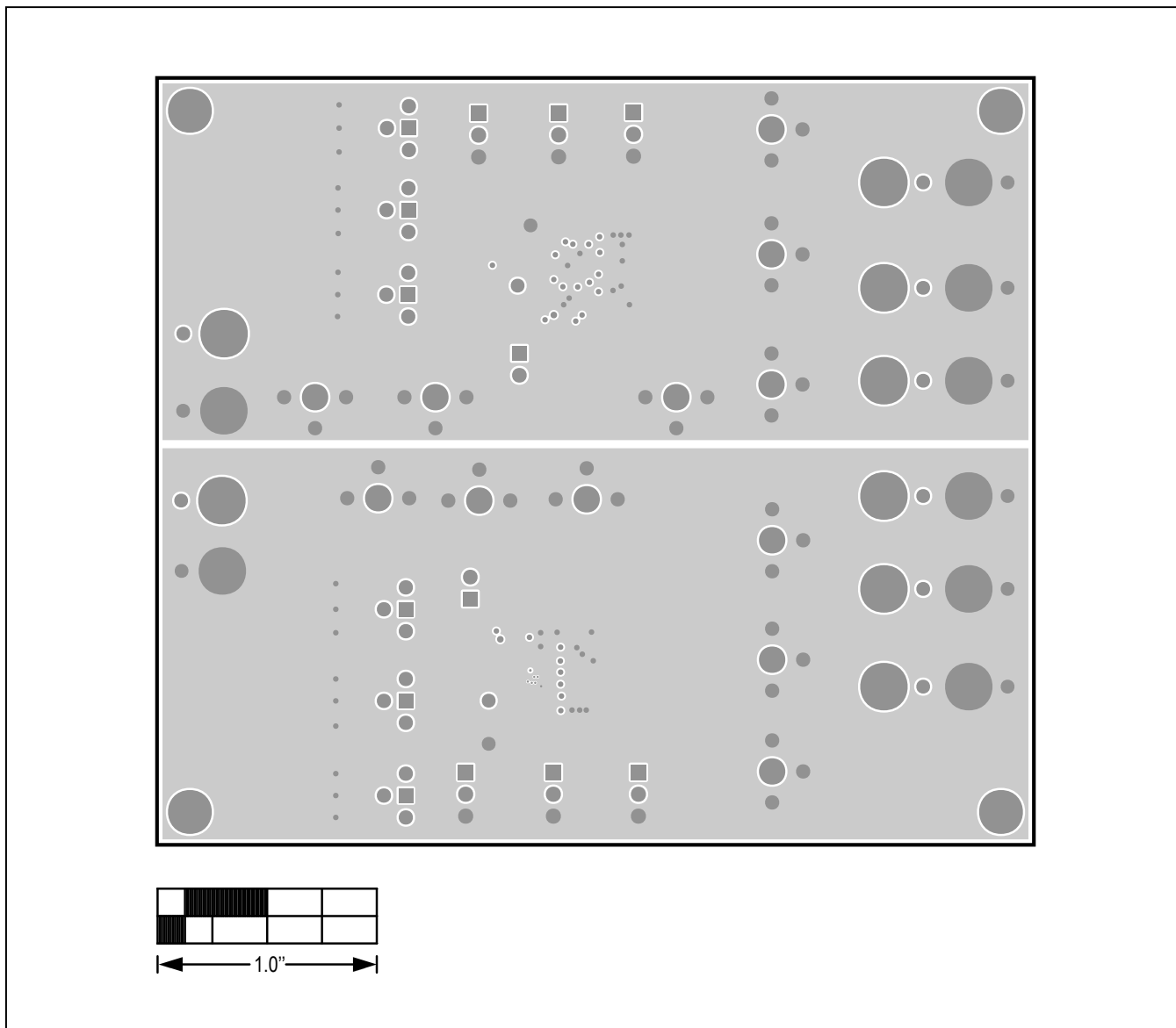
MAX17270 EV PCB—Top Silkscreen

MAX17270 EV Kit PCB Layout Diagrams (continued)



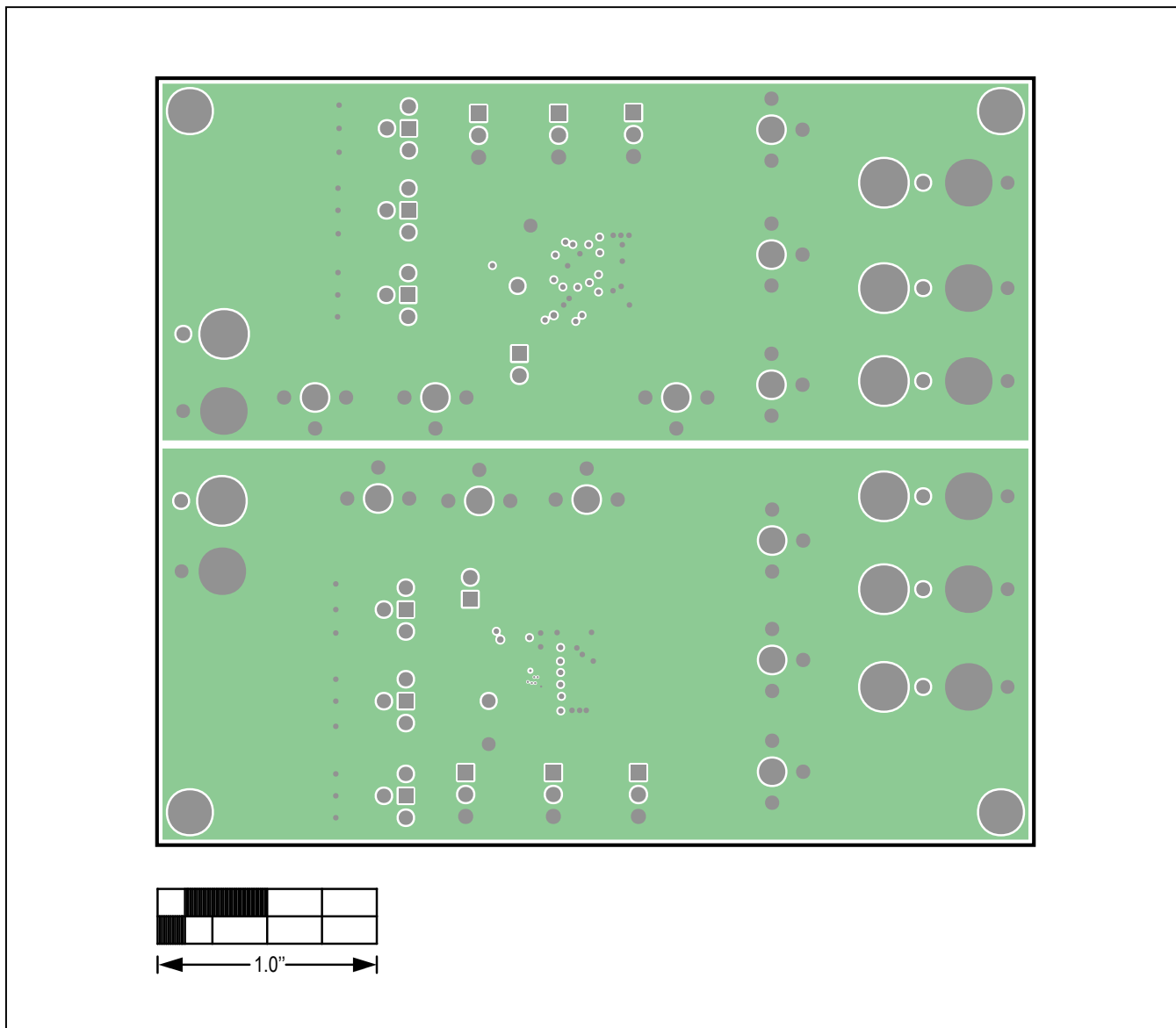
MAX17270 EV PCB—Top Layer

MAX17270 EV Kit PCB Layout Diagrams (continued)



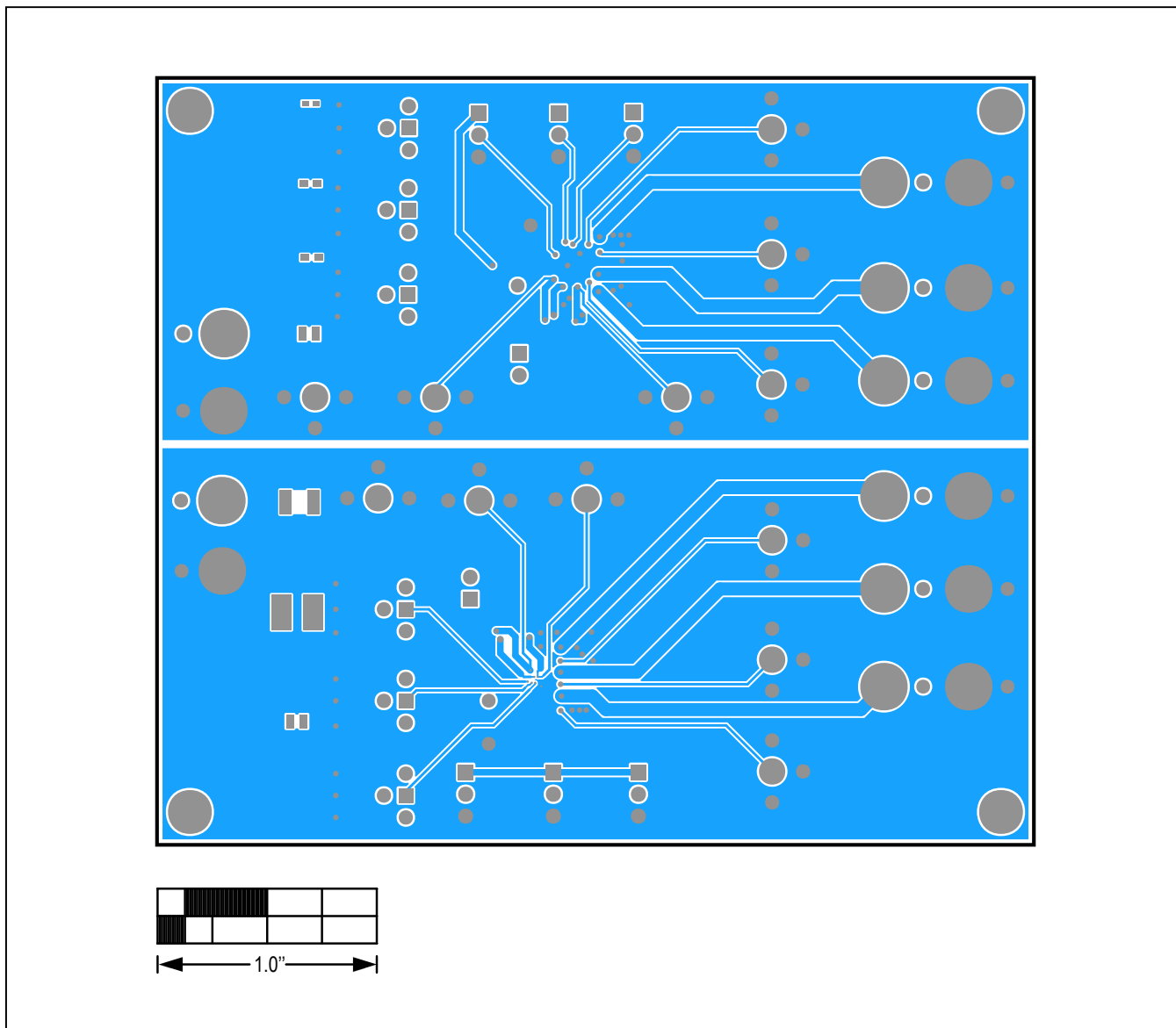
MAX17270 EV PCB—Internal 2

MAX17270 EV Kit PCB Layout Diagrams (continued)



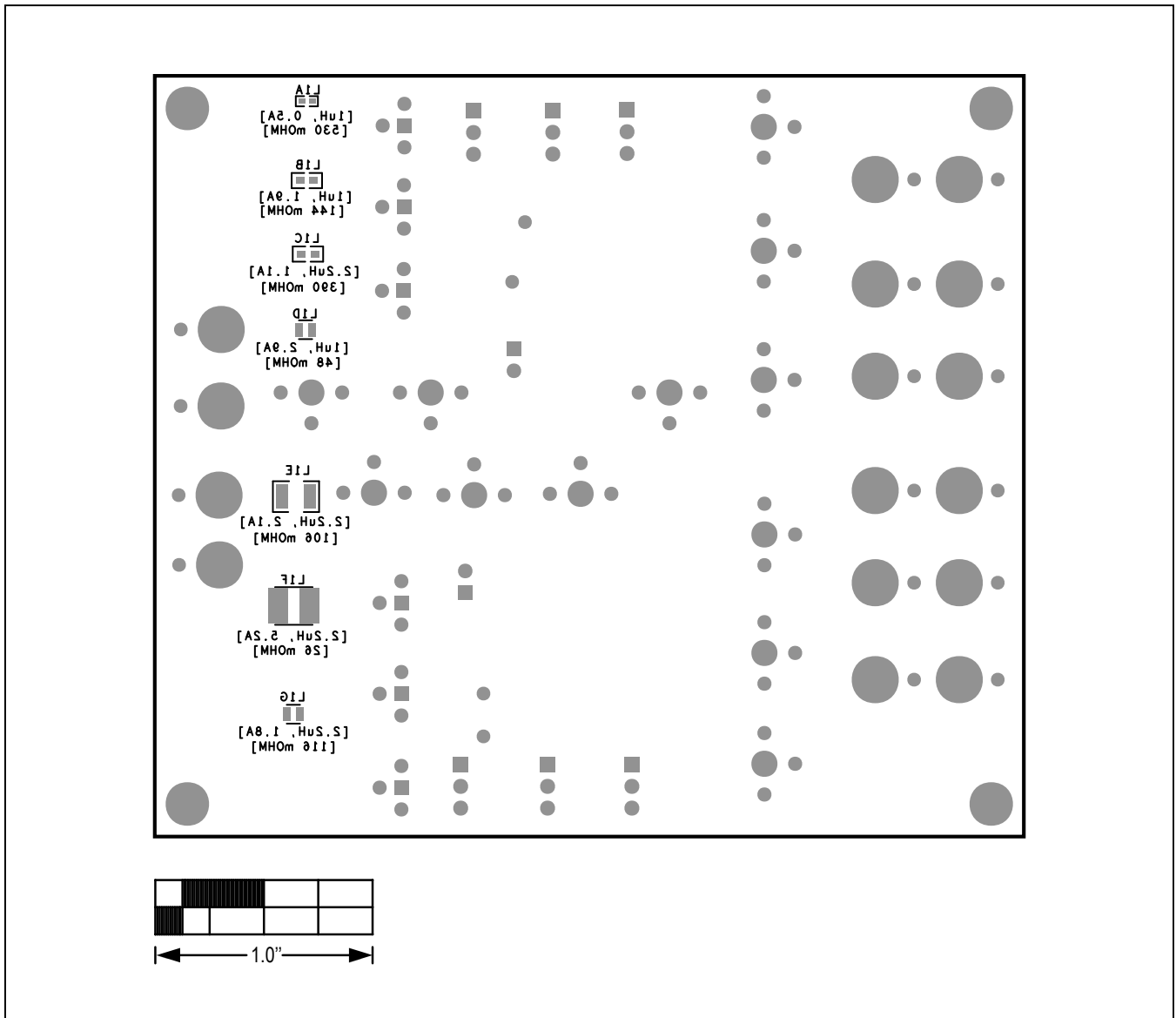
MAX17270 EV PCB—Internal 3

MAX17270 EV Kit PCB Layout Diagrams (continued)



MAX17270 EV PCB—Bottom Layer

MAX17270 EV Kit PCB Layout Diagrams (continued)



MAX17270 EV PCB—Bottom Silkscreen

Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|-----------------|---------------|-----------------|---------------|
| 0 | 2/18 | 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.

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