

MAX20429 Evaluation Kit

Evaluates: MAX20429

General Description

The MAX20429 evaluation kit (EV kit) is a fully assembled and tested application circuit for the MAX20429: a high-efficiency independent phase dual 6A low-voltage buck converter. The EV kit is created with automotive grade components and can test each of the outputs to full load. Various test points and jumpers are included for evaluation. The standard EV kit comes with the MAX20429CAFNA/VY+ installed, which is factory configured for a resistor adjustable output voltage. The default EV kit resistor divider is bypassed with an output voltage of 0.6V on both V_{OUT1} and V_{OUT2} .

Features

- Single Supply Operation with 3.0V to 5.5V Input Supply Range
- Individual Factory Programmable Output Voltages Available from 0.5V to 3.8V
- Resistor Adjustable Output Voltage
- Individual Output Current Up to 6A
- $\pm 1\%$ Output Voltage Accuracy
- Frequency-Synchronization Input
- Individual Enable Inputs
- Individual $\overline{\text{RESET}}$ Outputs
- Jumpers and Test Points on Key Nodes for Simplified Evaluation
- -40°C to 125°C Automotive Temperature Range
- Automotive Grade External Components
- Proven PCB Layout
- Fully Assembled and Tested

Quick Start

Required Equipment

- MAX20429 EV kit
- 5V, 5A DC power supply (PS1)
- 2x Digital Multimeters (DMM)
- Electronic load, 30W capable (EL1)

Procedure

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

- 1) Verify that all jumpers are in their default positions, as shown in [Table 1](#).
- 2) Connect the PS1 positive terminal to V_{SUP} and PS1 negative terminal to PGND1 on the EV kit.
- 3) Set DMM1 to measure Volts, DC and connect probes to V_{OUT1} and PGND on the EV kit.
- 4) Set DMM2 to measure Amps, DC and connect in series between V_{OUT1} and EL1.
- 5) Set PS1 to 5V and enable supply output.
- 6) Verify that the DMM1 measures approximately 0.6V.
- 7) Set EL1 to 6A and enable load.
- 8) Verify that the DMM1 measures approximately 0.6V while DMM2 measures approximately 6A.
- 9) Repeat steps 3 through 8 on V_{OUT2} , verifying DMM1 measures approximately 0.6V at 0A load and 6A load.
- 10) EV kit operation verification is complete.

[Ordering Information](#) appears at end of data sheet.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTION
J1	1-2	Enable buck controller 1 (EN1)
J2	1-2	Enable buck controller 2 (EN2)
J3	Installed	Pull-up to V_{SUP} for $\overline{\text{RESET1}}$
J4	Installed	Pull-up to V_{SUP} for $\overline{\text{RESET2}}$
J5	1-2	SYNC pulled to V_{SUP} enabling forced pulse-width modulation (FPWM) mode

Detailed Description

Synchronization (SYNC)

A logic-high on SYNC enables fixed-frequency, forced PWM mode. In FPWM mode the converter switches at a constant frequency with variable on-time. Apply an external clock on the SYNC input to synchronize the internal oscillator to an external clock. The SYNC input accepts signal frequencies in the range of $1.9\text{MHz} < f_{\text{SYNC}} < 2.3\text{MHz}$ when $f_{\text{SW}} = 2.1\text{MHz}$, and $2.9\text{MHz} < f_{\text{SYNC}} < 3.6\text{MHz}$ when $f_{\text{SW}} = 3.2\text{MHz}$. When the pin is open-circuited or logic-low, the SYNC input enables the device to enter a low-power skip mode under light-load conditions if the IC is configured to allow that behavior.

Enable Input (EN1, EN2)

The enable control input EN1/EN2 activates the device channel from its low-power shutdown state. EN1/EN2 have an input high threshold of 1.5V (typ), an input-low threshold of 0.5V, and a hysteresis of 50mV (typ). When an enable input goes high the output voltage ramps up according to the factory programmed soft-start time. When an enable input goes low the output voltage ramps down with the soft-start time or enters a Hi-Z state depending on the device option selected.

RESET Output

The device features open-drain $\overline{\text{RESET}}$ outputs that assert low when the corresponding output voltage is outside of the OV/UV window. The OV/UV comparators run from a separate reference to provide drift detection on the outputs. $\overline{\text{RESET}}$ remains asserted for a fixed timeout

period after the corresponding output returns to its regulated voltage. The fixed timeout period is selectable between 0.5ms, 3.7ms, 7.4ms, or 14.9ms. Refer to the MAX20429 IC data sheet for specific part details. To obtain a logic signal, place a resistor pull-up between the RESET pins to the system I/O voltage.

Resistor Adjustable Output Option

MAX20429 features an adjustable output option where output voltage can be set by external resistors in addition to the factory programmed V_{OUT} options. Desired output voltage can be calculated using the following method:

$$\text{Output 1: } V_{\text{OUT}} = (R_8 + R_9)/R_9 \times 0.6\text{V}$$

$$\text{Output 2: } V_{\text{OUT}} = (R_{10} + R_{11})/R_{11} \times 0.6\text{V}$$

See [Figure 1](#) and [Figure 2](#) of the MAX20429 EV kit schematics for location of the available resistor footprints.

Evaluating Other Variants

The MAX20429EVKIT# comes installed with the MAX20429CAFNA/VY+ variant.

Maxim Integrated offers factory programming of preset output voltages from 0.5V to 3.8V, and an adjustable output option. If selecting a different device variant, the output inductor and capacitor components may need to be modified for optimal performance. Refer to the MAX20429 IC data sheet for specific part details regarding component selection and contact factory to request any additional variants.

Ordering Information

PART	TYPE
MAX20429EVKIT#	EV Kit

#Denotes RoHS compliance.

MAX20429 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C1, C2	—	2	CGA5L1X7R1V106K160AC; CGA5L1X7R1V106K160AC; GMJ316BB7106K1LH	TDK;TDK; TAIYO YUDEN	10µF	CAPACITOR; SMT (1206); CERAMIC CHIP; 10µF; 35V; TOL = 10%; TG = -55°C TO +125°C; TC = X7R AUTO
2	C3	—	1	CGA3E3X7S1A225K080AE	TDK	2.2µF	CAP; SMT (0603); 2.2µF; 10%; 10V; X7S; CERAMIC CHIP
3	C6	—	1	T530X477M006ATE004; 6THB470M	KEMET; PANASONIC	470µF	CAPACITOR; SMT (7343-43); POLYMER; 470µF; 6.3V; TOL = 20%; TG = -55°C TO +125°C
4	C7, C8	—	2	GRM32ER71A476KE15	MURATA	47µF	CAPACITOR; SMT (1210); CERAMIC; 47µF; 10V; TOL = 10%; MODEL = GRM SERIES; TG = -55°C TO +125°C; TC = X7R
5	C11-C18	—	8	GRM31CR71A226KE15; GCM31CR71A226KE01	MURATA; MURATA	22µF	CAPACITOR; SMT (1206); CERAMIC CHIP; 22µF; 10V; TOL = 10%; MODEL=CHIP MONOLITHIC CERAMIC CAPACITOR FOR GENERAL; TG = -55°C TO +125°C; TC = X7R
6	EN1, EN2, FSYNC, GND, PGND, PGND1-PGND4, RESET1B, RESET2B, VOUT1, VOUT2, VSUP	—	14	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
7	J1, J2, J5	—	3	TSW-103-23-G-S	SAMTEC	TSW-103-23-G-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 3PINS; -55°C TO +125°C
8	J3, J4	—	2	TSW-101-07-L-D	SAMTEC	TSW-101-07-L-D	CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; DOUBLE ROW; STRAIGHT; 2PINS
9	L1, L2	—	2	TFM322512ALMAR22MTAA	TDK	0.22UH	INDUCTOR; SMT (1210); THIN FILM; 0.22µH; 20%; 9.5A ;
10	MH1-MH4	—	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
11	OUT1_BD, OUT1_BD_A, OUT2_BD_A, OUT_B2_BD	—	4	2501-2-00-80-00-00-07-0	MILL-MAX	2501-2-00-80-00-00-07-0	TERMINAL; TURRET; PIN DIA=0.090IN; TOTAL LENGTH = 0.328IN; BOARD HOLE = 0.094IN; TIN OVER NICKEL MATTE FINISH;
12	R1-R4	—	4	CRCW060310K0FK; ERJ-3EKF1002	VISHAY DALE; PANASONIC	10K	RESISTOR; 0603; 10K; 1%; 100PPM; 0.10W; THICK FILM
13	R5, R6	—	2	CRCW060310R0FK; MCR03EZPFX10R0; ERJ-3EKF10R0	VISHAY DALE;ROHM	10	RESISTOR; 0603; 10Ω; 1%; 100PPM; 0.10W; THICK FILM
14	R7	—	1	CRCW06032R00FN	VISHAY DALE	2	RESISTOR; 0603; 2Ω; 1%; 100PPM; 0.10W; THICK FILM
15	R8, R10	—	2	RC1608J000CS; CR0603-JJ-000ELF; RC0603JR-070RL	SAMSUNG ELECTRONICS; BOURNS;YAGEO PH	0	RESISTOR; 0603; 0Ω; 5%; JUMPER; 0.10W; THICK FILM
16	SU1-SU5	—	5	S1100-B;SX1100-B; STC02SYAN	KYCON;KYCON; SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH = 0.24IN; BLACK; INSULATION=PBT; PHOSPHOR BRONZE CONTACT=GOLD PLATED
17	TP1	—	1	7006	KEYSTONE	7006	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; RED
18	TP2	—	1	7007	KEYSTONE	7007	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; BLACK
19	TP5-TP8	—	4	108-0740-001	EMERSON NETWORK POWER	108-0740-001	CONNECTOR; MALE; PANELMOUNT; BANANA JACK; STRAIGHT; 1PIN
20	U1	—	1	MAX20429	MAXIM	MAX20429	EVKIT PART-IC; MAX20429; PACKAGE OUTLINE DRAWING: 21-100428; PACKAGE LAND PATTERN: 90-100155
21	PCB	—	1	MAX20429	MAXIM	PCB	PCB:MAX20429
22	C4, C19	DNP	0	GRM39C0G220J50V; GRM1885C1H220J; C1608C0G1H220J080AA	MURATA; MURATA;TDK	22PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 22PF; 50V; TOL = 5%; MODEL =; TG = -55°C TO +125°C; TC = C0G
23	R9, R11	DNP	0	RC1608J000CS; CR0603-JJ-000ELF; RC0603JR-070RL	SAMSUNG ELECTRONICS; BOURNS; YAGEO PH	0	RESISTOR; 0603; 0Ω; 5%; JUMPER; 0.10W; THICK FILM
TOTAL			65				

MAX20429 EV Kit Schematics

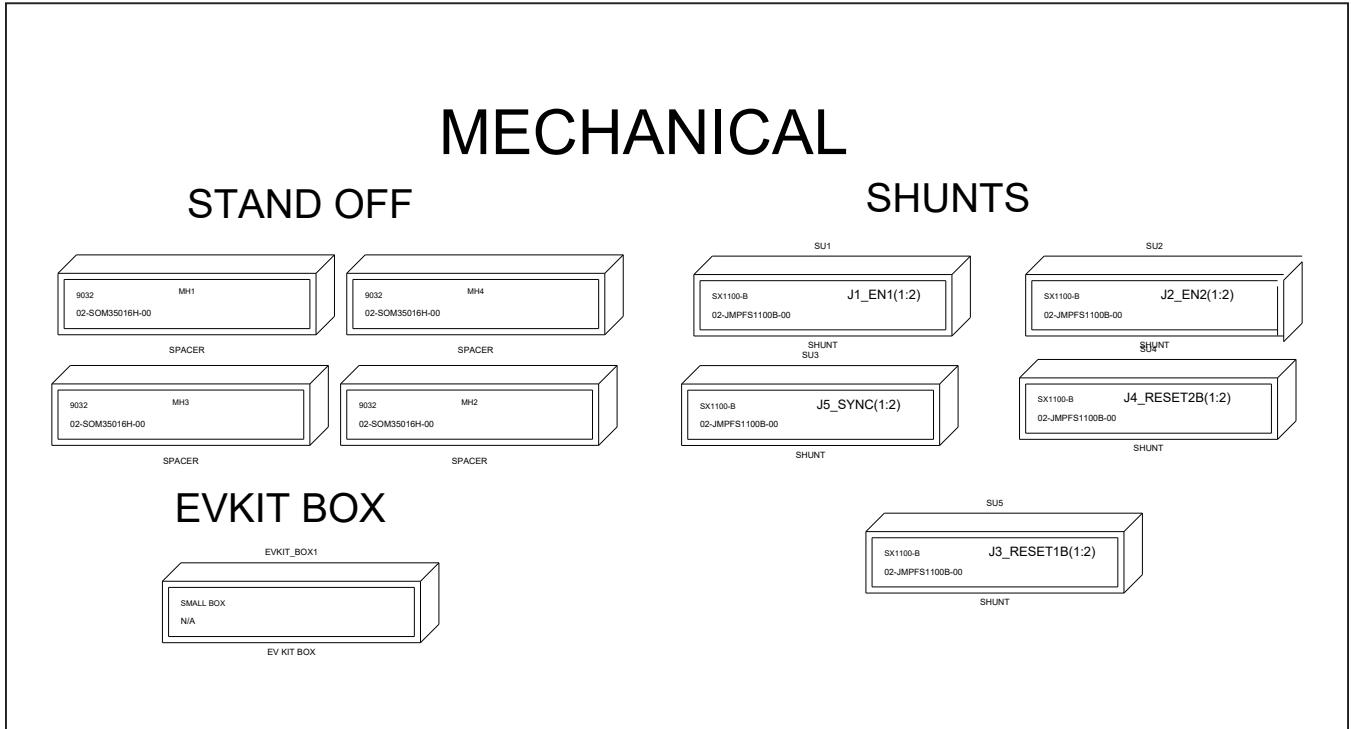


Figure 1. MAX20429 EV Kit Schematic 1-2

MAX20429 EV Kit Schematics (continued)

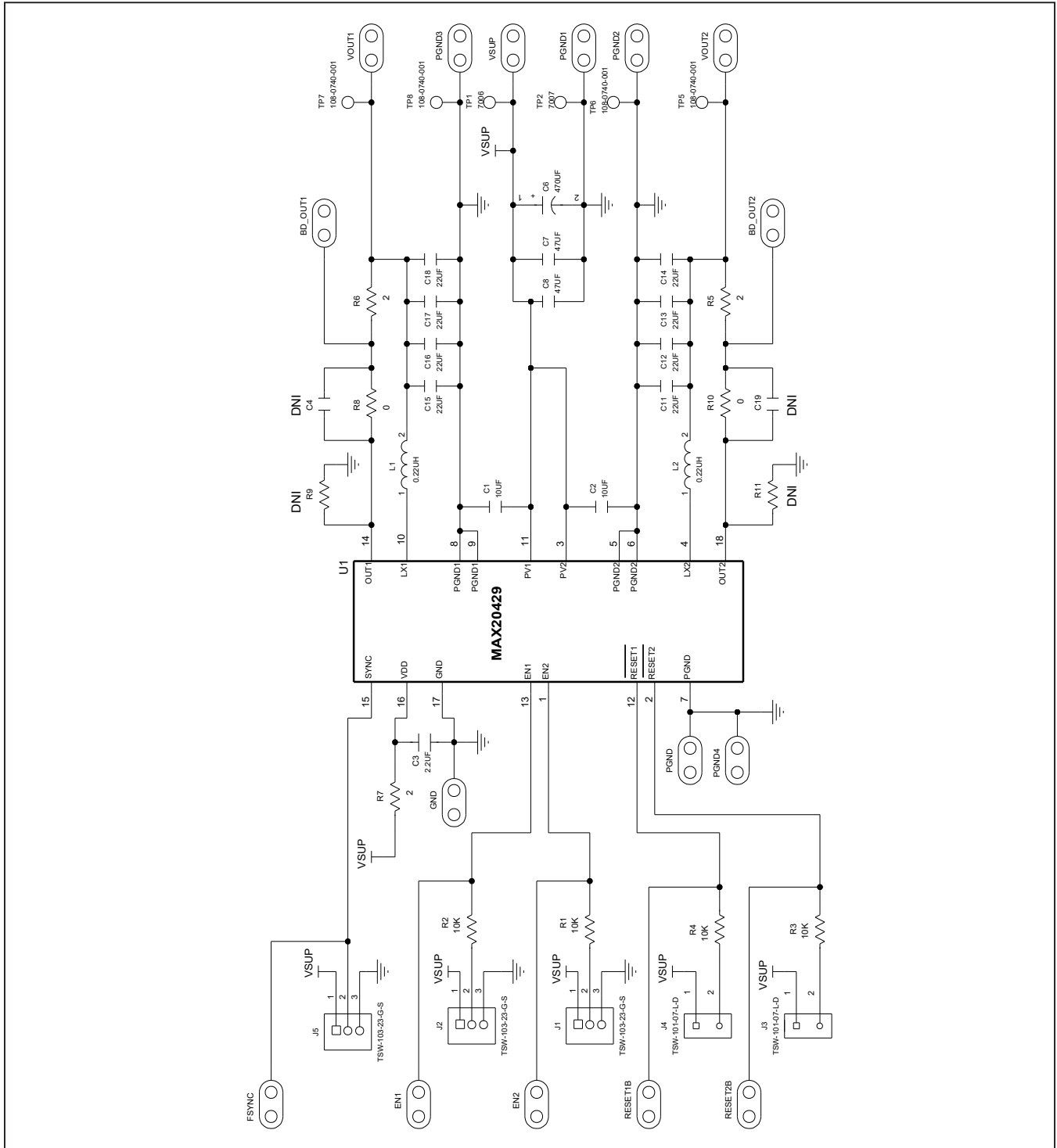
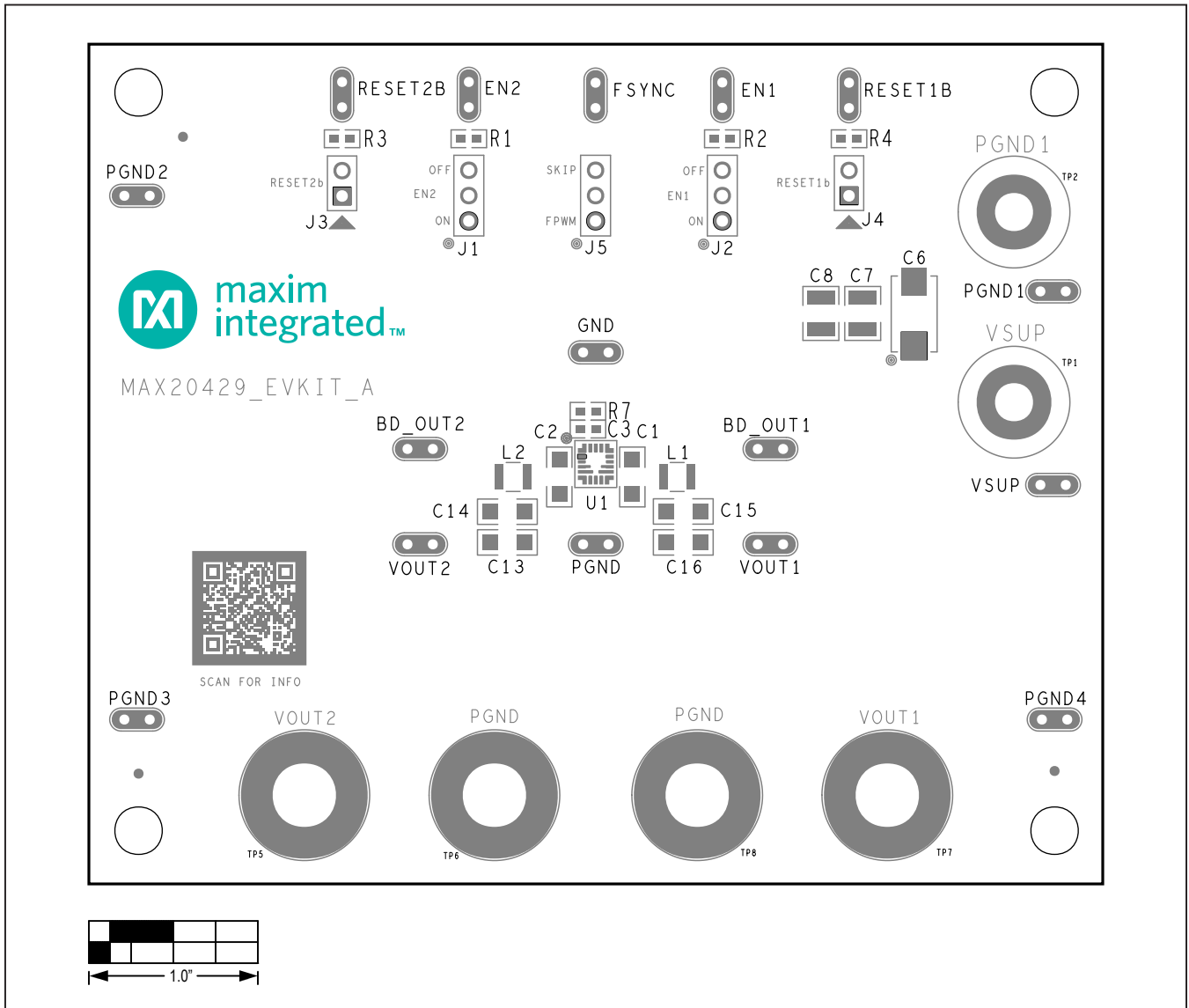


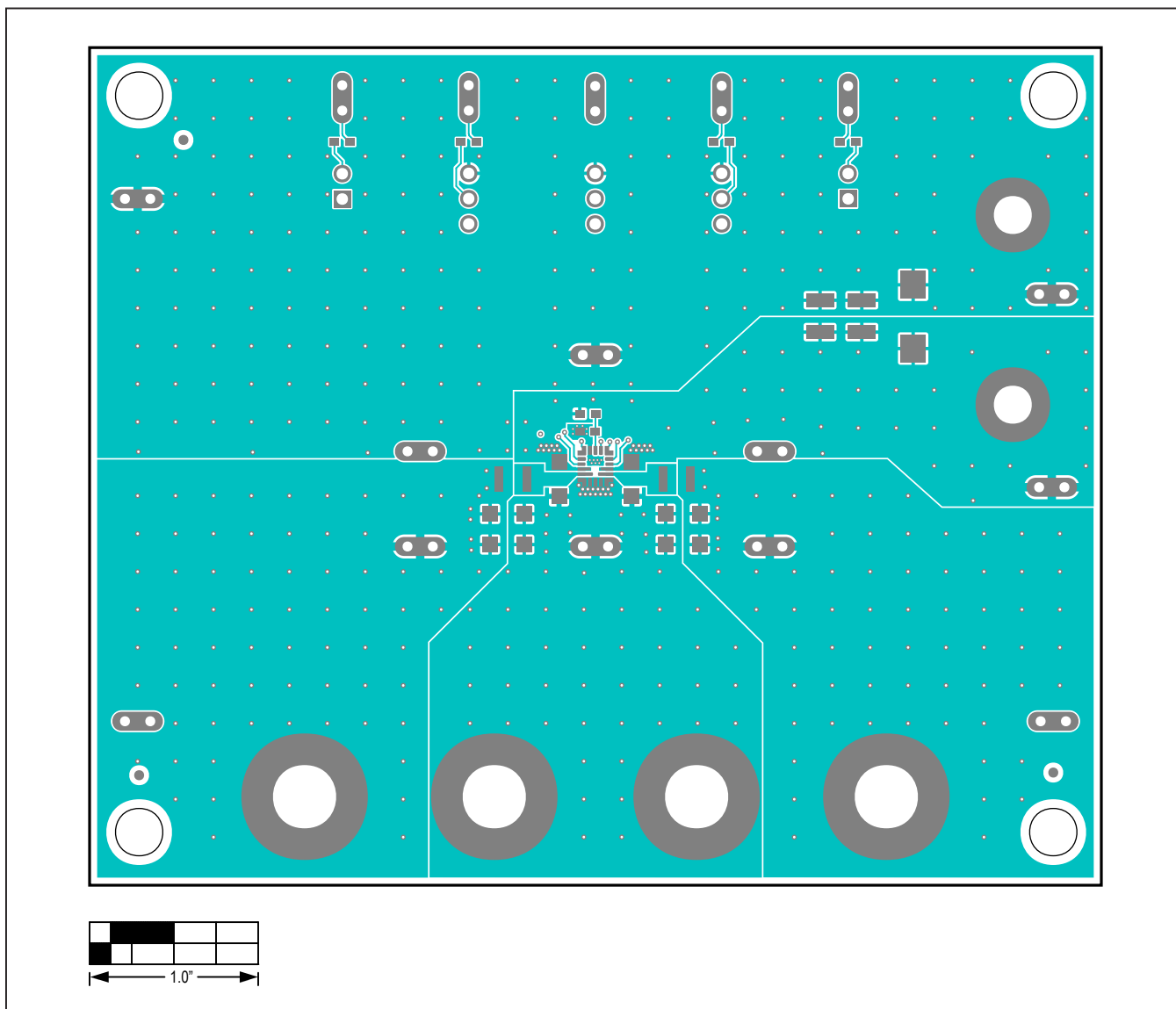
Figure 2. MAX20429 EV Kit Schematic 2-2

MAX20429 EV Kit PCB Layout Diagrams



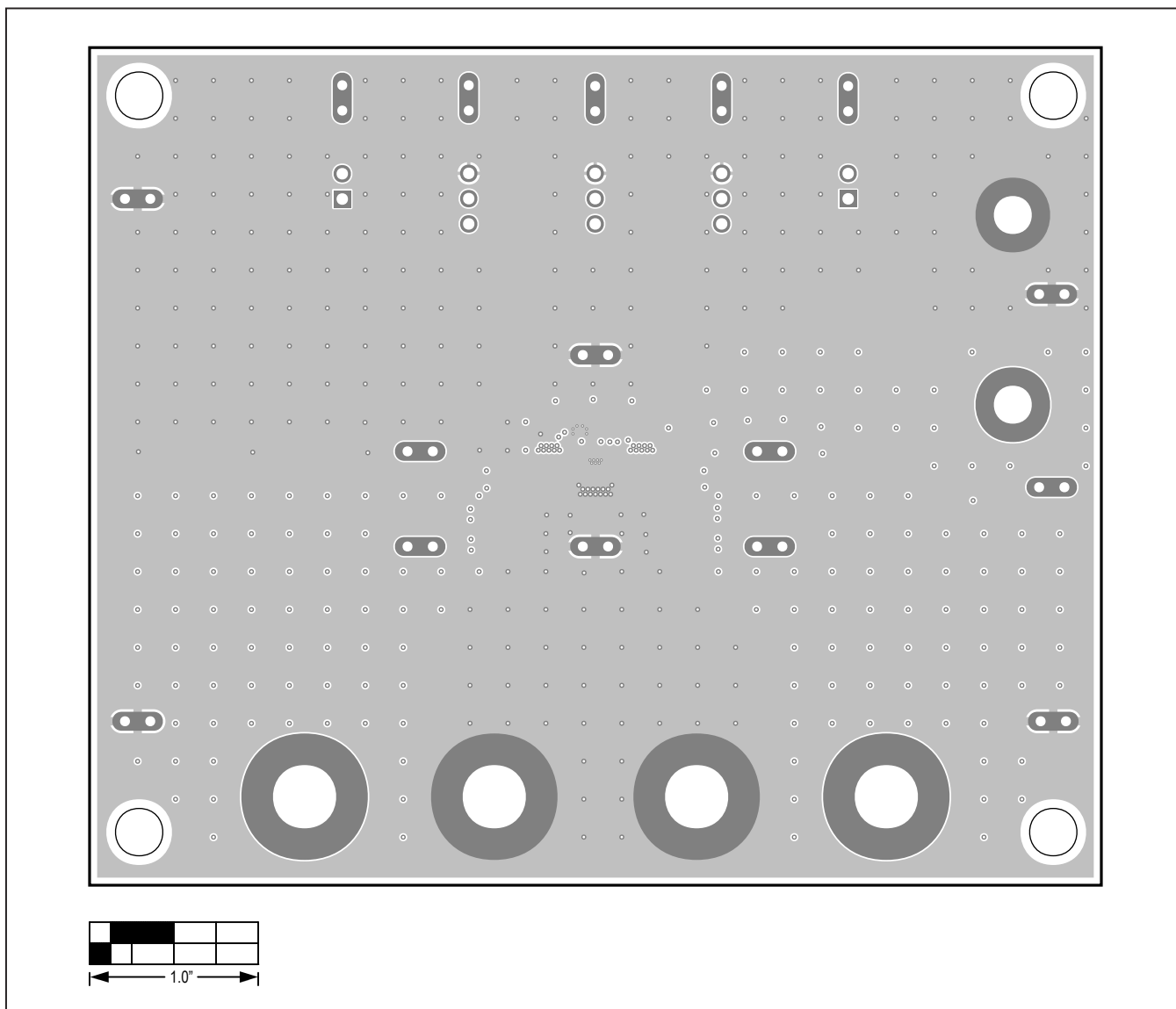
MAX20429 EV Kit PCB Layout—Top Silkscreen

MAX20429 EV Kit PCB Layout Diagrams (continued)



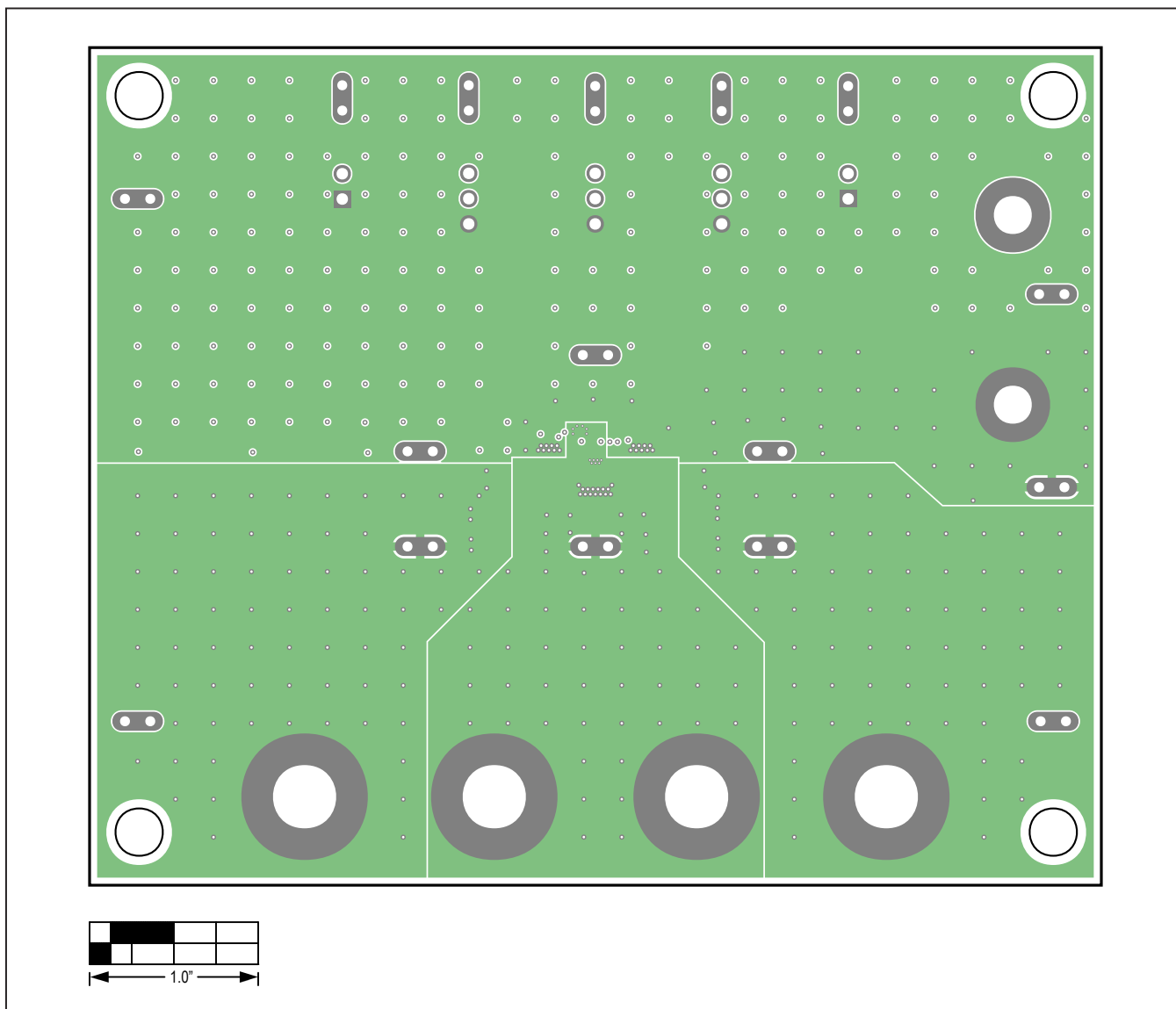
MAX20429 EV Kit Component Placement—Top View

MAX20429 EV Kit PCB Layout Diagrams (continued)



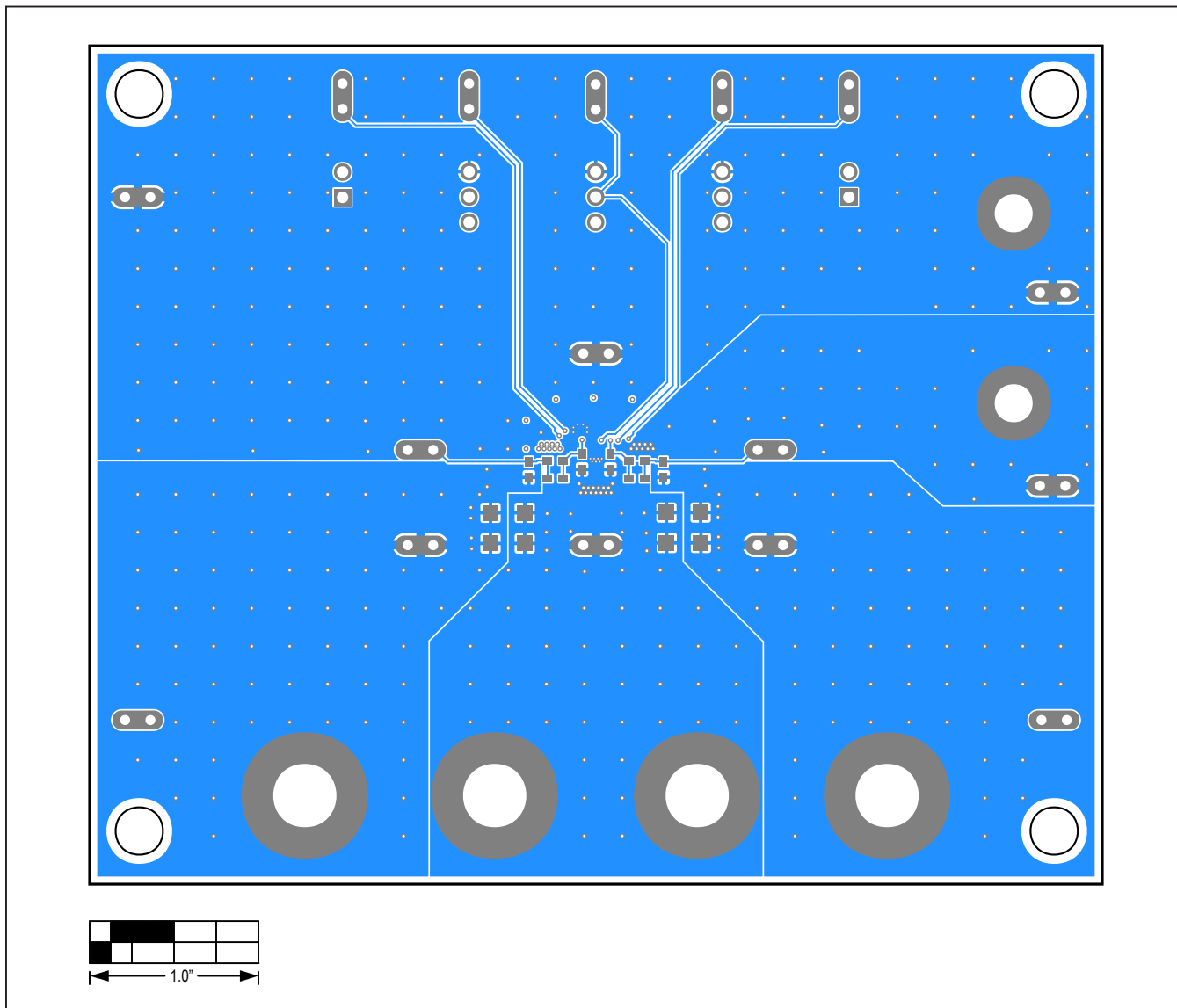
MAX20429 EV Kit PCB Layout—Internal Layer 2

MAX20429 EV Kit PCB Layout Diagrams (continued)



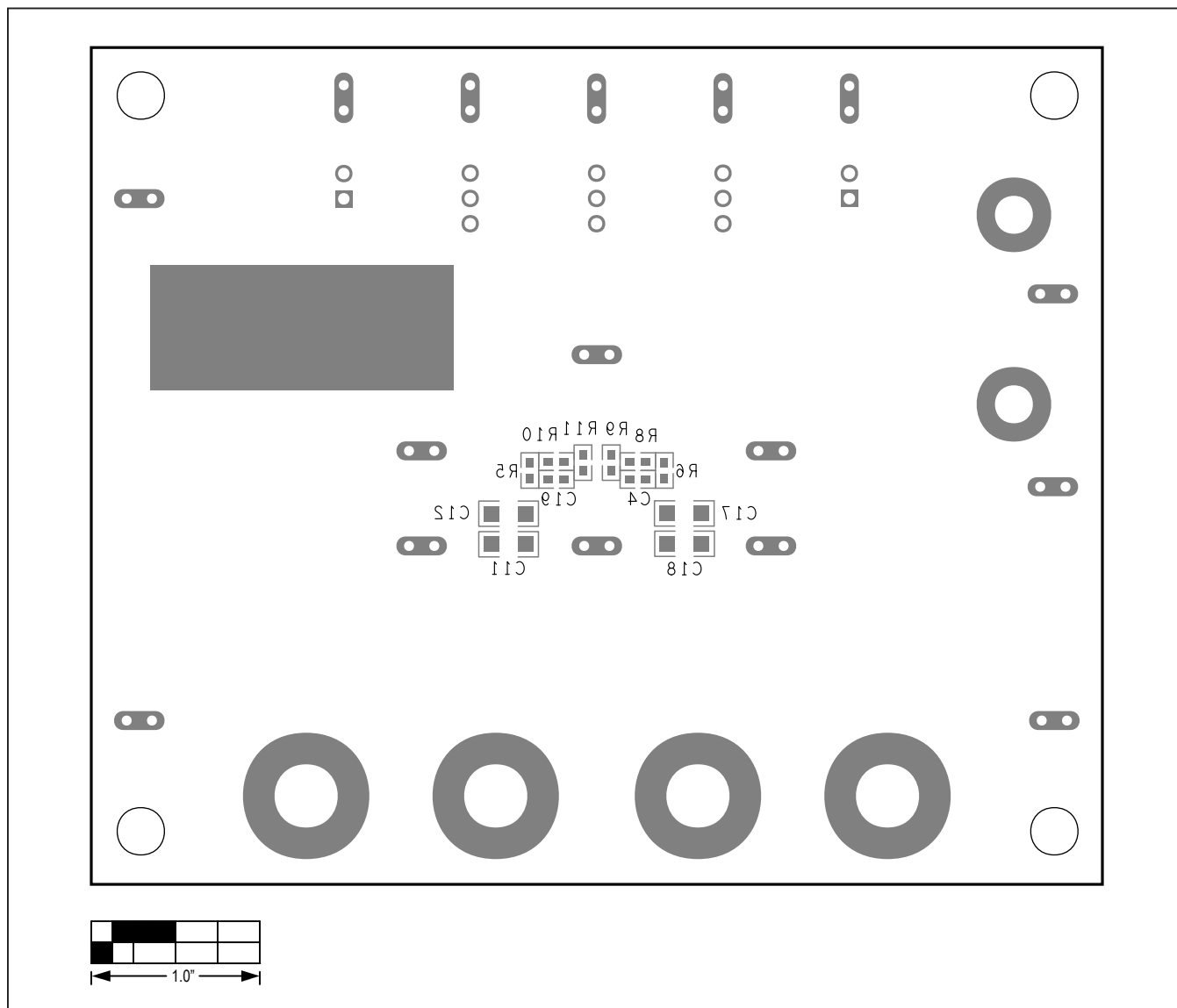
MAX20429 EV Kit PCB Layout—Internal Layer 3

MAX20429 EV Kit PCB Layouts (continued)



MAX20429 EV Kit Component Placement—Bottom View

MAX20429 EV Kit PCB Layouts (continued)



MAX20429 EV Kit PCB Layout—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/20	Initial release	—

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