

Evaluates: MAX20499

MAX20499A Evaluation Kit

General Description

The MAX20499A EV Kit is a fully assembled and tested PCB that allows designers to explore the capabilities of the MAX20499A and the MAX20499B step-down (buck) voltage regulators in an evaluation environment. The MAX20499A has an output current rating of 8A; the MAX20499B has an output current rating of 12A. Both devices operate at 3.0V to 5.5V input supply voltage and can regulate across a voltage range from 0.5V to 1.275V.

The devices feature a 2.2MHz fixed-frequency PWM mode for better noise immunity and load transient response. The 2.2MHz frequency operation accommodates all ceramic capacitors and minimizes the need for external components. The programmable spread-spectrum frequency modulation minimizes radiated electromagnetic emissions. Integrated low $R_{DS(ON)}$ switches improve efficiency at heavy loads and simplify layout.

The I²C interface supports dynamic voltage adjustment with programmable slew rates. Other features include programmable soft-start, over-current protection, and over-temperature protection.

The MAX20499A EV Kit comes pre-tested and ready for immediate use.

Benefits and Features

- Full Silicon Integration Allows for Improved Efficiency and Minimized Space
- Input Voltage Range From 3.0V to 5.5V
- Output Voltages Range From 0.5V to 1.275V
- I²C Controlled Output Voltage (6.25mV Steps)
- Excellent Load Transient Response
- Internally Programmable Compensation
- High Switching Frequency of 2.2MHz
 - Forced PWM Mode
- Enable and Reset Connections Available
- Loop Measurement Ready
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Required Equipment

- MAX20499A EV kit
- 5V, 10A power supply
- Appropriate resistive load, or an electronic load
- Voltmeter

Procedure

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

- 1) Connect a 5V power supply to PV (input red banana jack) and GND (input black banana jack). Activate the supply.
- 2) Verify that RESETB is at logic-low level (J8).
- 3) Populate jumper (J5) between EN and ON (PV) to activate the output.
- 4) Measure the output voltage at the test point (J10).
- 5) Connect appropriate loads to the output.
- 6) Verify that the output voltage at the test point (J10) remains within specification.
- 7) Verify that RESETB is at logic-high level (J8).

Detailed Description of Hardware

EV Kit Interface

The banana jacks TP1 (PV) and TP2 (GND) are the main input power supply points on the board. Connect a 5V power supply across these connectors. Use J19 as a test point for monitoring the input power supply. The banana jacks TP3 (VOUT) and TP4 (GND) serve as outputs to an external load.

The enable signal (EN) for the Device-Under-Test (DUT) is activated (pulled up) by a jumper placed across the EN and ON pins on jumper J5. The enable signal (EN) is monitored at test point J2, and the power-good signal (RESETB) is monitored at test point J8.

Connector J1 provides I²C communication connectivity (see marked pins on the board). The I²C SDA and SCL signals are monitored at test points J6 (SDA) and J7 (SCL).

Use test points J9 for loop measurements and J10 for measuring output voltage at the test point. (Use a differential probe for ripple and transient measurements.) During efficiency measurements, use test point J11 for measuring input voltage.

Input test point (J20), output test points (J24, J12), and GND test points (J21, J13, J25, J22, J23) provide additional flexibility in monitoring the evaluation environment.

For explicit information on how these jumpers and test points interact with the EV Kit circuitry see, the MAX20499A EV Kit schematic ([Figure 1](#)).

Evaluating IC Capabilities

The default DUT on the board is the MAX20499A, an 8A device. Use the input and output connections described in the EV Kit Interface section to apply input supply voltage and draw the appropriate current from the regulator while monitoring the output voltage at test point J10.

Test point J10 provides a voltage readout at a remote sense point located at the output capacitor. This makes J10 suitable for taking output voltage ripple and transient measurements (using a differential probe) and for taking efficiency measurements (using a voltmeter). When measuring efficiency, connect a voltmeter to J11 for input voltage measurements.

J4 allows an external synchronization pulse to be applied to the DUT's SYNC pin. Use 50% duty cycle for the square wave.

Loop measurements are made using the three-pin header (J9). Inject the sinusoidal signal across the Bode+ and Bode- pins when measuring the gain and phase of the closed loop.

For I²C communication specifics, consult the *MAX20499 datasheet*.

MAX20499A EV Kit Jumper/Connector/Switch/Test Point Descriptions

[Table 1](#) below contains detail of all connectors, jumpers, switches, and test point onboard the EV Kit.

Table 1. Serializer Jumper/Connector/Switch/Test Point Descriptions

JUMPER	SIGNAL	DEFAULT POSITION	FUNCTION
J1	NA	NA	I ² C communication connections
J2	EN	NA	Test point for monitoring the device enable (EN) signal
J3	SYNC	NA	Test point for monitoring the device sync (SYNC) signal
J4	SYNC	NA	Connection point for apply an external synchronization signal
J5	EN	OFF	Jumper for activating the device enable (EN) signal
J6	SDA	NA	Test point for monitoring the I ² C SDA signal
J7	SCL	NA	Test point for monitoring the I ² C SCL signal
J8	RESETB	NA	Test point for monitoring the device power-good (RESETB) signal
J9	BODE±	NA	Test point for loop measurements
J10	RS+	NA	Test point for measuring the output voltage at the sense point
J11	PV	NA	Test point for making voltage efficiency measurements
J12	V _{OUT}	NA	Test point for output voltage
J13	GND	NA	Ground test point (see schematic)
J18	V _{DD}	NA	V _{DD} to PV connection (Not required for MINIQUSB)
J19	PV	NA	Test point for monitoring the device input voltage (PV) signal
J20	PV	NA	Test point for measuring input voltage
J21	GND	NA	Ground test point (see schematic)
J22	GND	NA	Ground test point (see schematic)
J23	GND	NA	Ground test point (see schematic)
J24	V _{OUT}	NA	Test point for output voltage
J25	GND	NA	Ground test point (see schematic)
J26	LX	NA	Test point for measuring the LX signal

Ordering Information

PART	TYPE
MAX20499AEKIT#	EV Kit

#Denotes RoHS compliant.

MAX20499A EV Kit Bill of Materials

REFERENCE	QTY	VALUE	MANUFACTURER	MFG PART #	DESCRIPTION
C1, C3, C15, C16	4	10µF	TDK	CGA4J3X7S1A106M125AB	CAPACITOR, 0805, CERAMIC, 10µF, 10V, X7S
C2, C4	2	1µF	TDK	CGA3E1X7R1E105K	CAPACITOR, 0603, CERAMIC, 1µF, 25V, X7R
C5	1	2.2µF	TDK	CGA3E3X7S1A225K080AE	CAPACITOR, 0603, CERAMIC, 2.2µF, 10V, X7S
C6	1	0.1µF	TDK	C1608X7R1E104K080AA	CAPACITOR, 0603, CERAMIC, 0.1µF, 25V, X7R
C7 - C10	4	47µF	TDK	CGA5L1X7T0E476M	CAPACITOR, 1206, CERAMIC, 47µF, 2.5V, X7S
C17	1	470µF	KEMET	T530X477M006ATE004	CAPACITOR, 7343, TANTALUM POLYMER, 470µF, 6.3V
C18 - C21	4	47µF	TDK	CGA6P1X7S1A476M	CAPACITOR, 1210, CERAMIC, 47µF, 10V, X7S
J1	1		SULLINS ELECTRONIC CORP	PPTC102LJBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; BREAKAWAY HEADER; RIGHT ANGLE; 20PINS
J2, J3, J6-J8, J10, J11, J18, J19, J22, J23, J26	12		SAMTEC	TSW-101-07-L-D	CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; DOUBLE ROW; STRAIGHT; 2PINS
J4, J5, J9	3		SAMTEC	TSW-103-23-G-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 3PINS; -55°C TO +125°C
L1	1	100nH	TDK, COILCRAFT	HPL505028FR10MRD3P, XEL4030-101ME	INDUCTOR, SMT, 100nH, 34A/30A
R1, R2, R8	3	1K	PANASONIC	ERJ-3EKF1001V	RESISTOR; 0603; 1K; 1%; 100PPM; 0.10W; THICK FILM
R3	1	2.2	PANASONIC	ERJ-3RQF2R2V	RESISTOR, 0603, 2.2Ω, 1%, 100PPM, 0.10W, THICK FILM
R4, R5	2	10K	PANASONIC	ERJ-3EKF1002V	RESISTOR; 0603; 10K; 1%, 100PPM, 0.10W, THICK FILM
R6	1	10	VISHAY DALE	CRCW040210R0FKEDC	RESISTOR; 0402; 10Ω, 1%; 100PPM; 0.063W, THICK FILM
R7	1	0	PANASONIC	ERJ-2GE0R00X	RESISTOR; 0402; 0Ω; 0%, 0.10W, THICK FILM
TP1	1		KEYSTONE	7006	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; RED
TP2	1		KEYSTONE	7007	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; BLACK
TP3, TP4	2		CINCH CONNECTIVITY SOLUTIONS JOHNSON	108-0740-001	BANANA JACK CONNECTOR STANDARD BANANA THREADED, EXTERNAL (NUT)
U1	1		MAXIM INTEGRATED	MAX20499AFOG	IC; AUTOMOTIVE SINGLE 8A STEP-DOWN CONVERTER FAMILY
C11-C14	NP	47µF	TDK	CGA5L1X7S0E476M	CAP; SMT (1206); 47µF; 20%; 2.5V; CERAMIC CHIP
J12, J13, J20, J21, J24, J25	NP		SAMTEC	TSW-101-07-L-D	CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; DOUBLE ROW; STRAIGHT; 2PINS

MAX20499A EV Kit Schematic Diagram

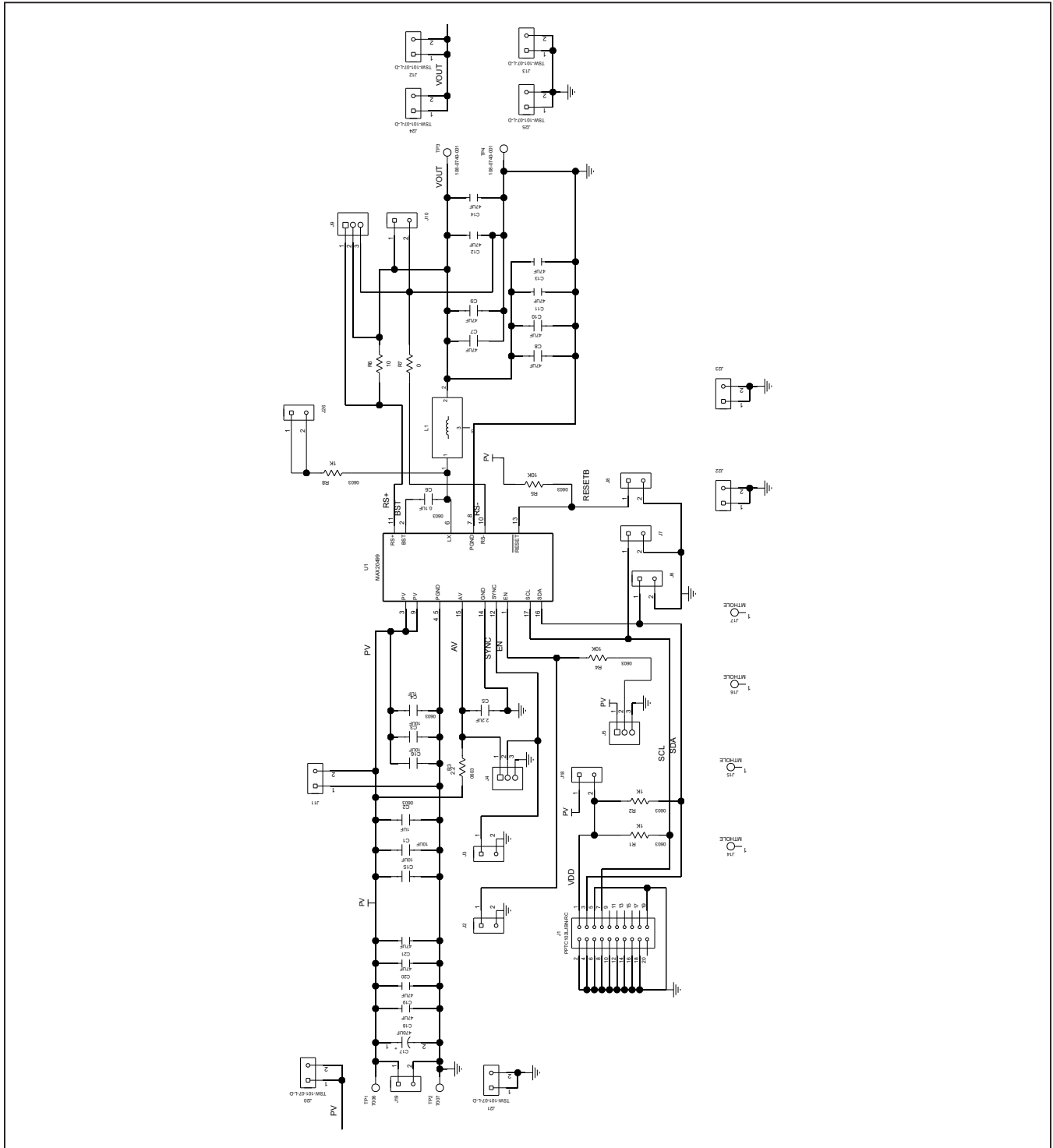


Figure 1. MAX20499A EV Kit Schematic

MAX20499A EV Kit PCB Layout Diagrams

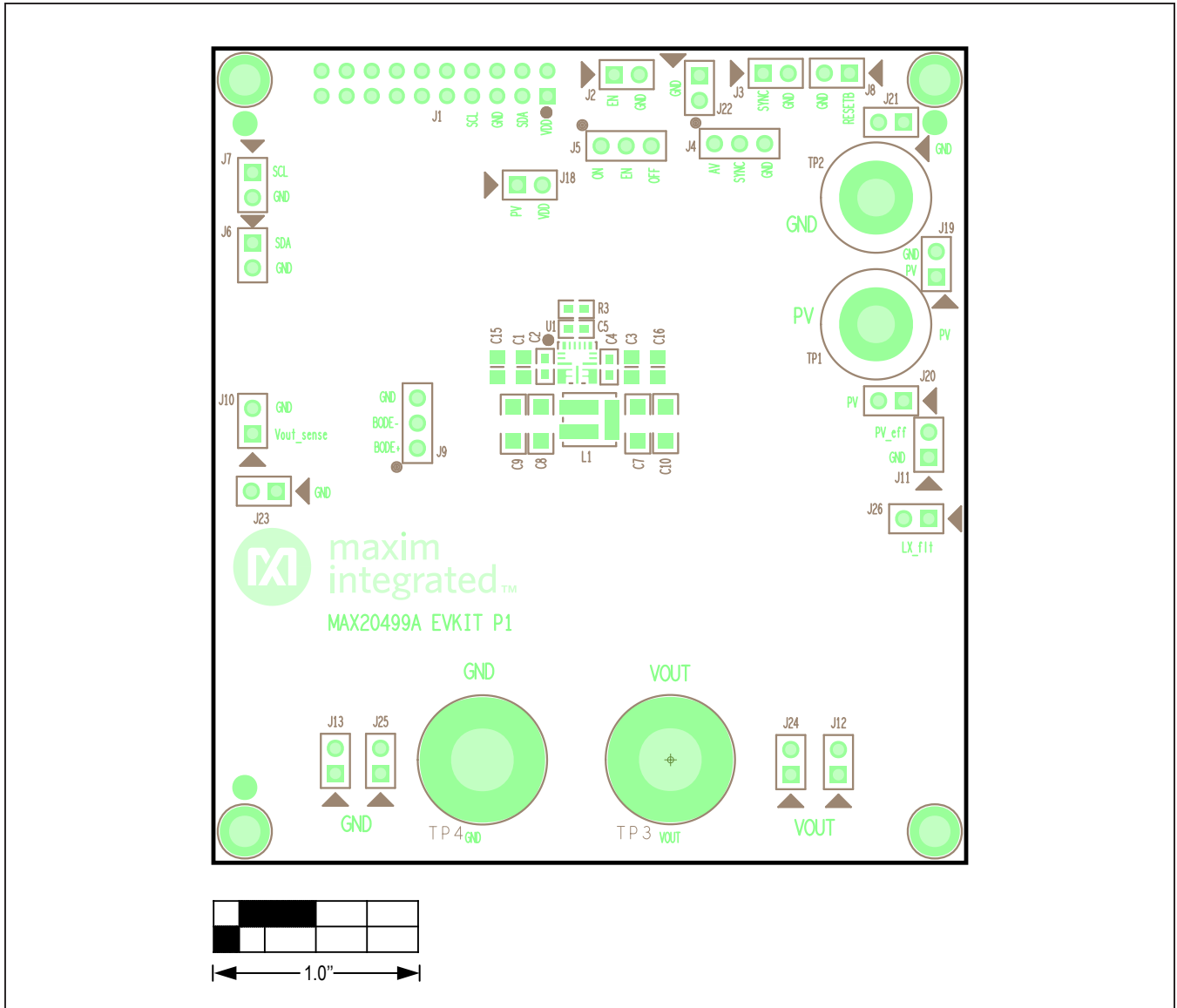


Figure 2. MAX20499A EV Kit Component Placement Guide—Top Assembly Drawing

MAX20499A EV Kit PCB Layout Diagrams (continued)

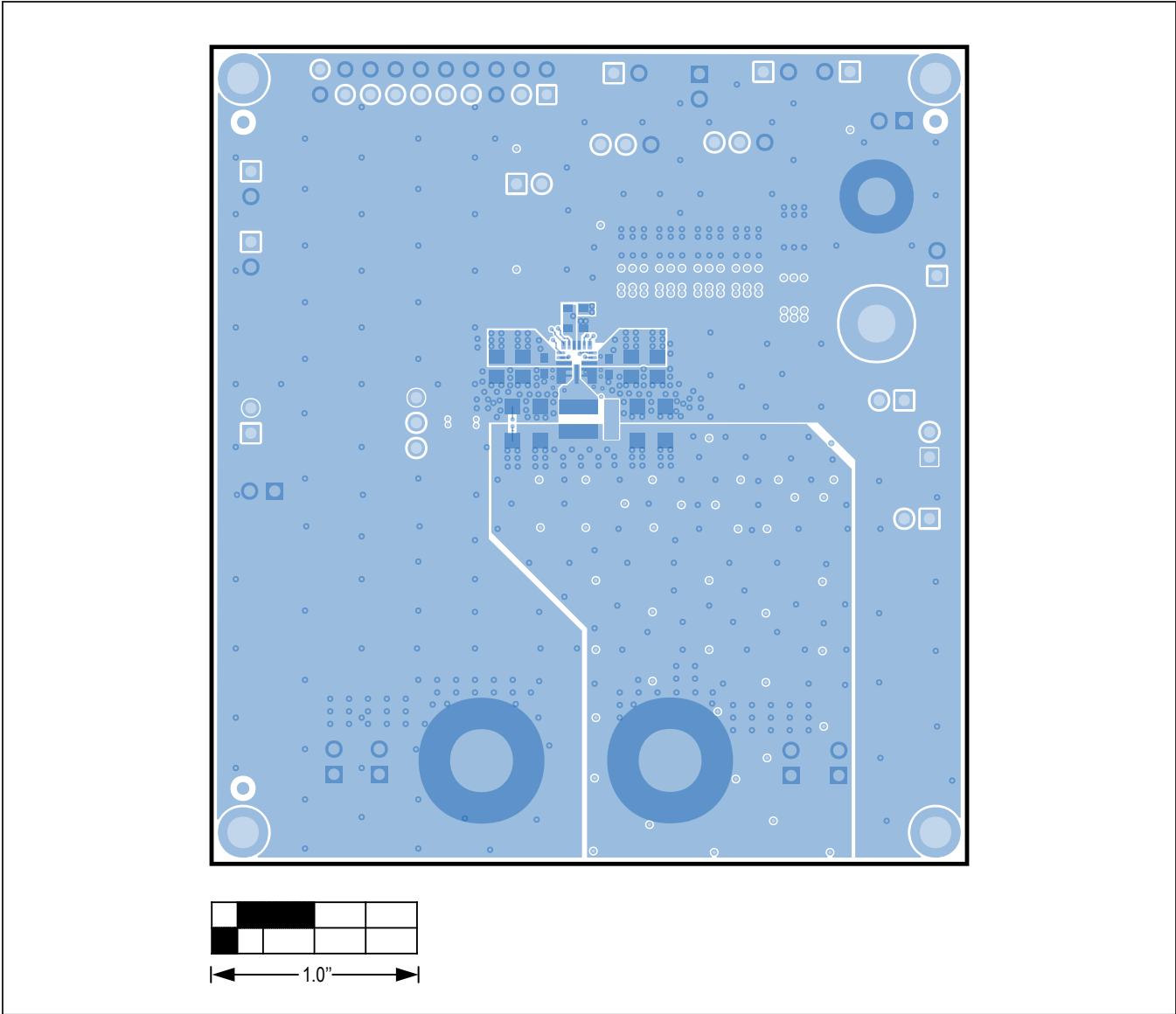


Figure 3. MAX20499A EV Kit Component Placement Guide—Top Layer

MAX20499A EV Kit PCB Layout Diagrams (continued)

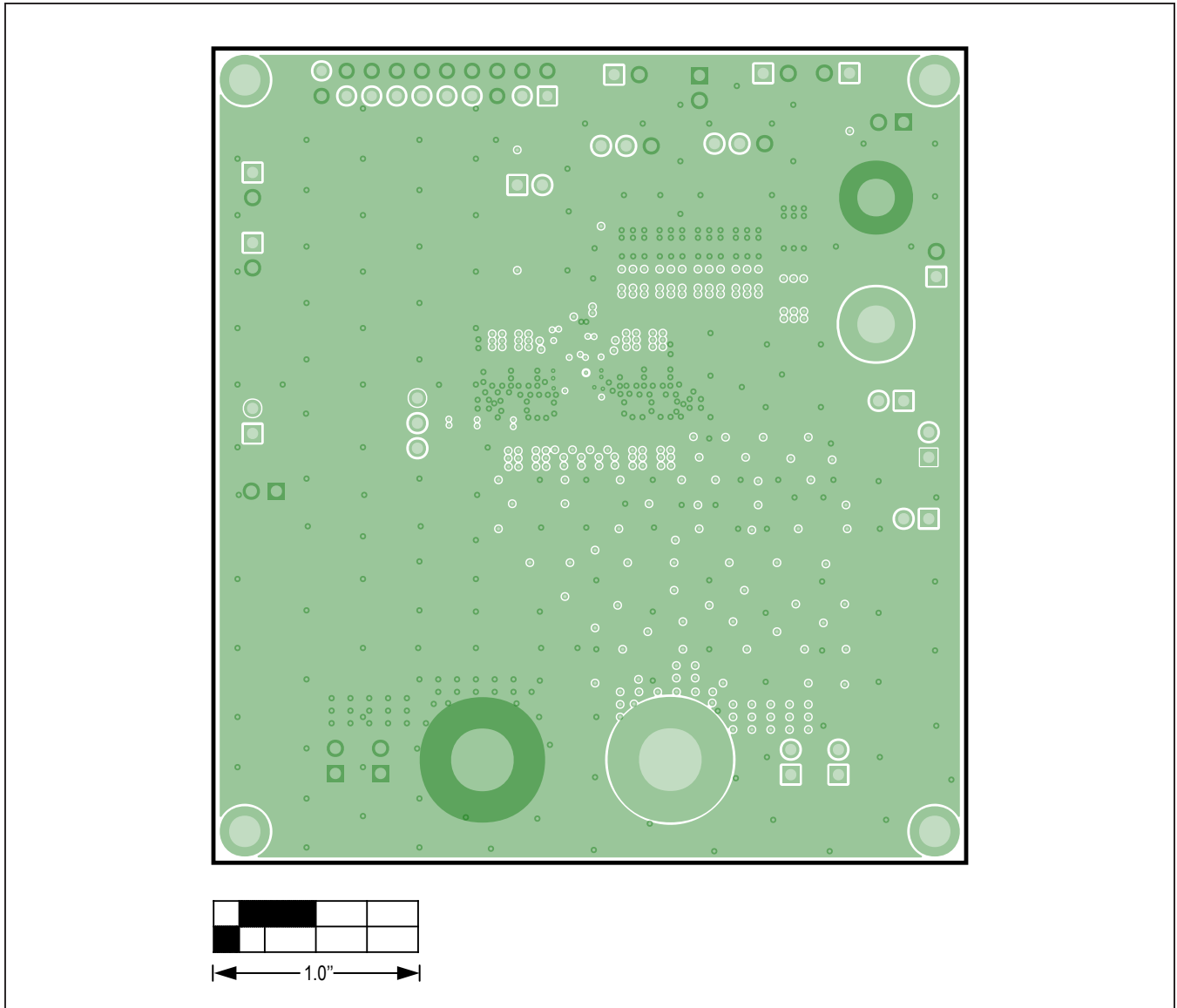


Figure 4. MAX20499A EV Kit Component Placement Guide—Inner Layer 2

MAX20499A EV Kit PCB Layout Diagrams (continued)

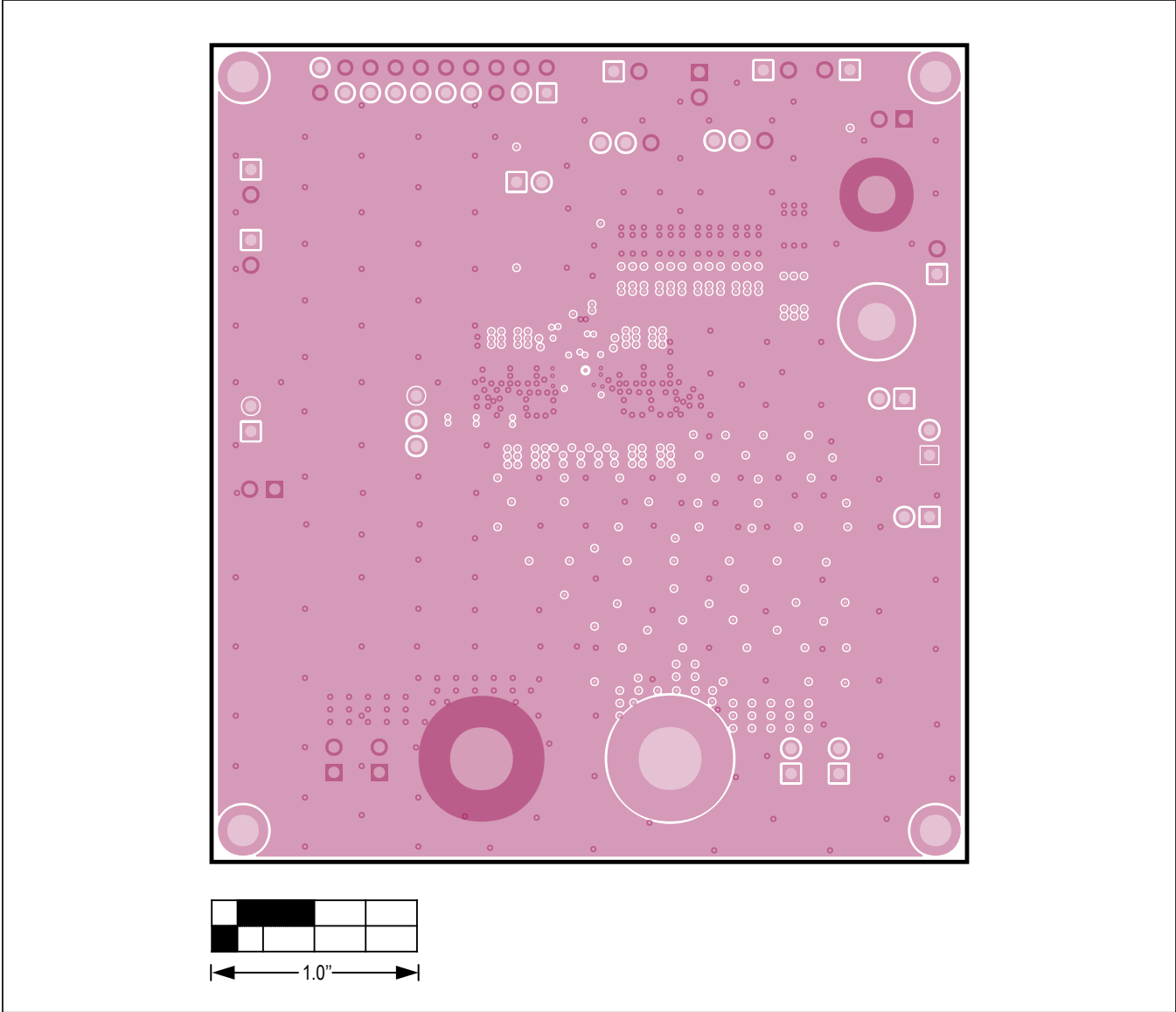


Figure 5. MAX20499A EV Kit Component Placement Guide—Inner Layer 3

MAX20499A EV Kit PCB Layout Diagrams (continued)

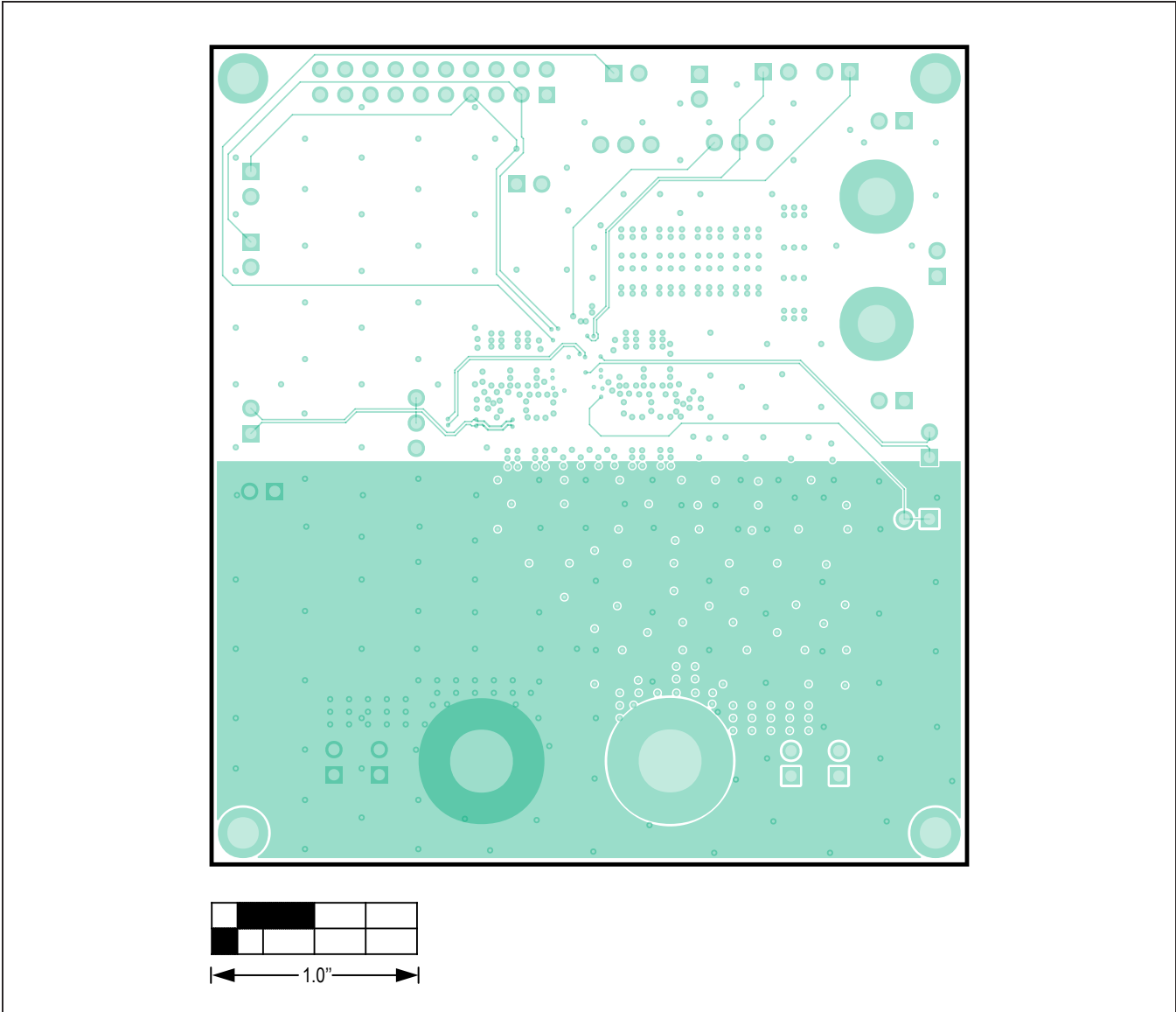


Figure 6. MAX20499A EV Kit Component Placement Guide—Inner Layer 4

MAX20499A EV Kit PCB Layout Diagrams (continued)

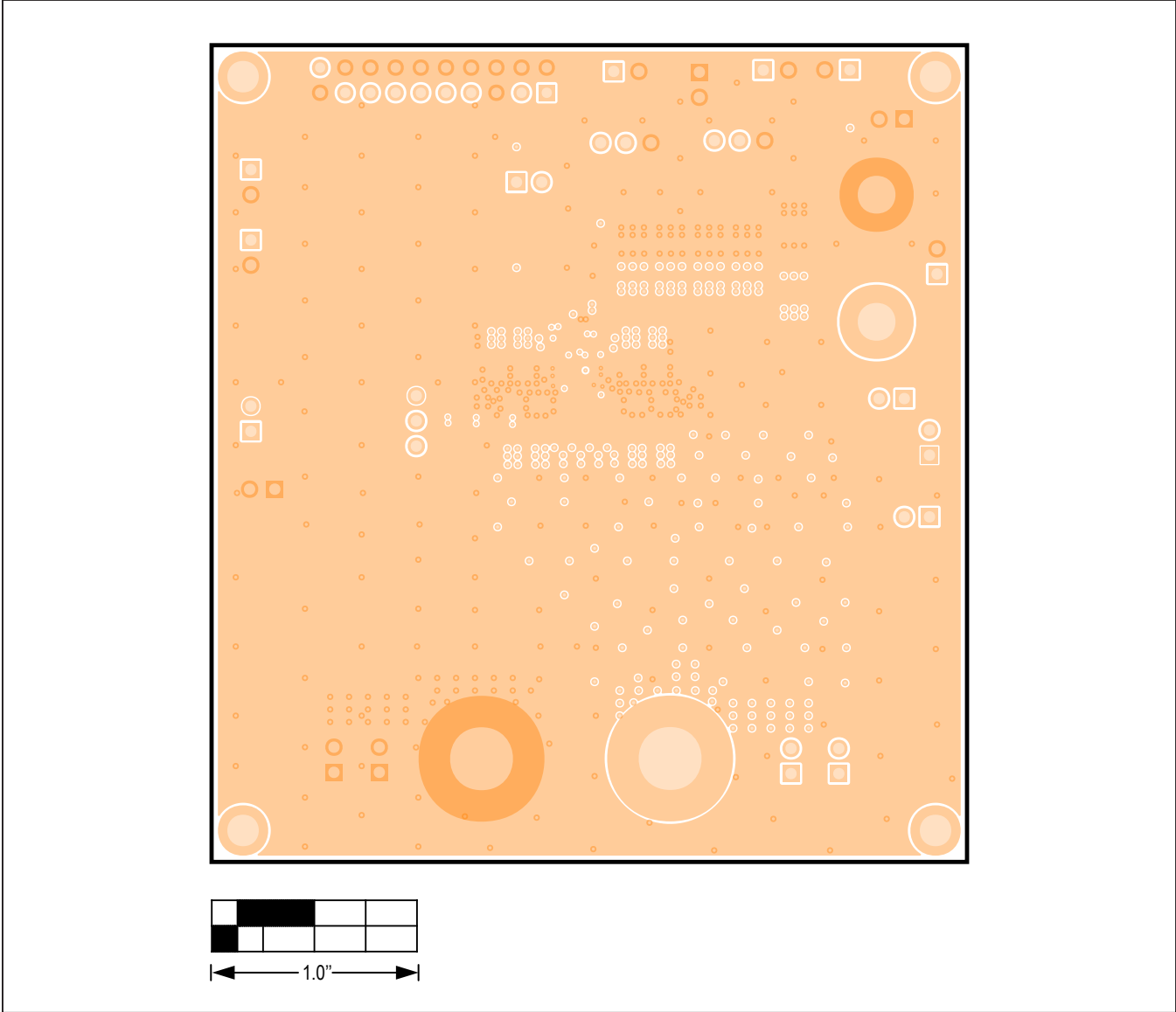


Figure 7. MAX20499A EV Kit Component Placement Guide—Inner Layer 5

MAX20499A EV Kit PCB Layout Diagrams (continued)

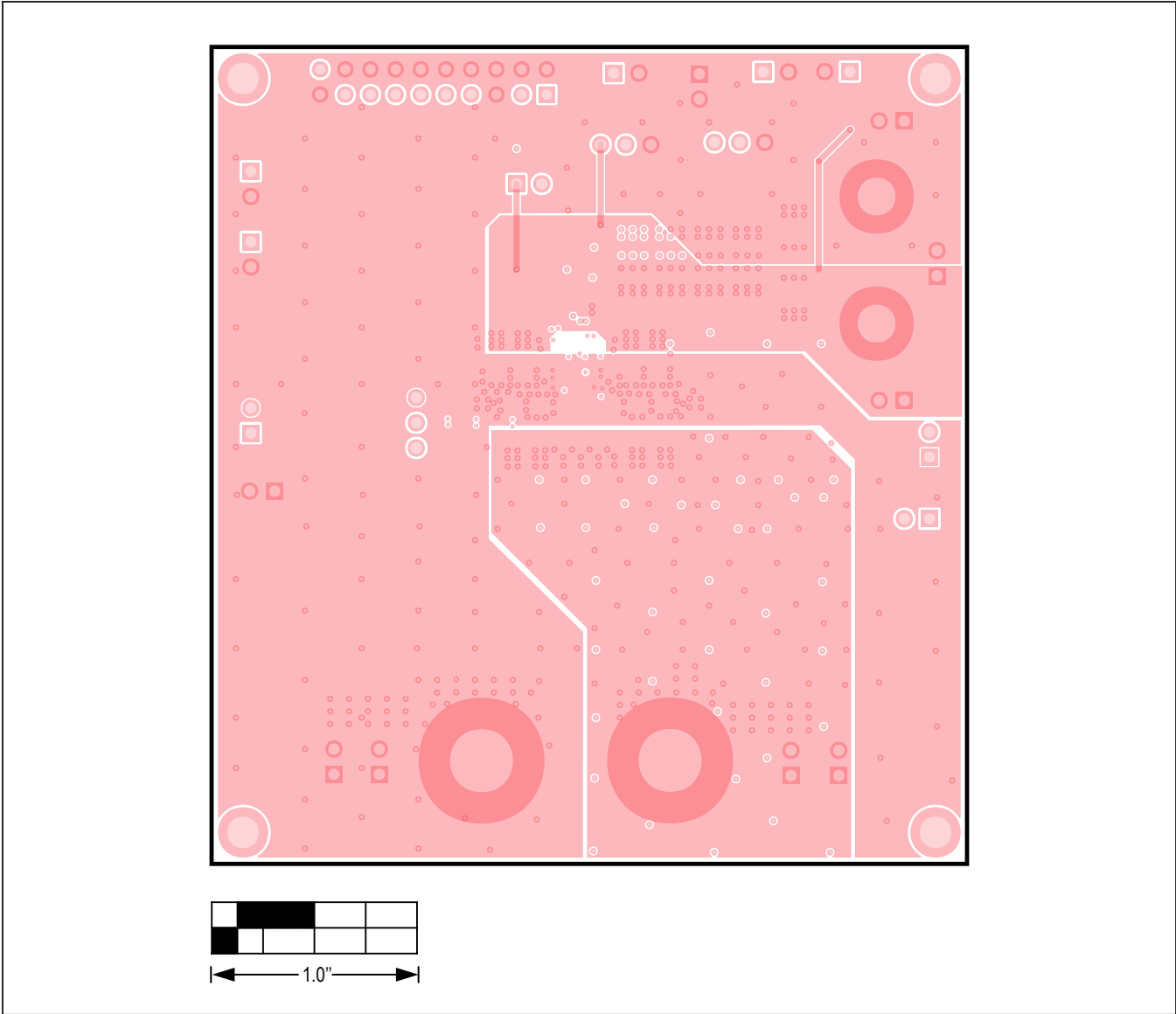


Figure 8. MAX20499A EV Kit Component Placement Guide—Inner Layer 6

MAX20499A EV Kit PCB Layout Diagrams (continued)

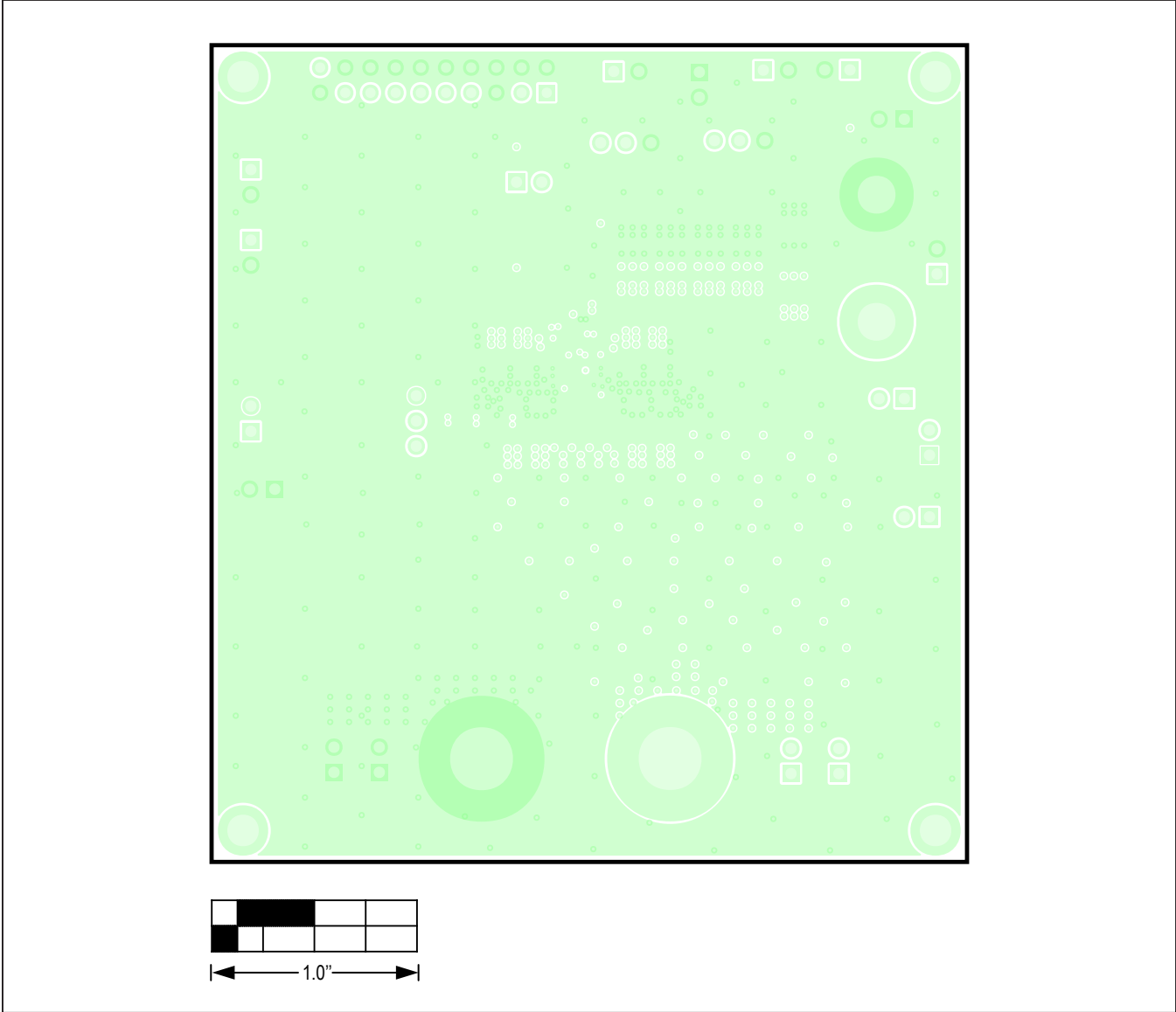


Figure 9. MAX20499A EV Kit Component Placement Guide—Inner Layer 7

MAX20499A EV Kit PCB Layout Diagrams (continued)

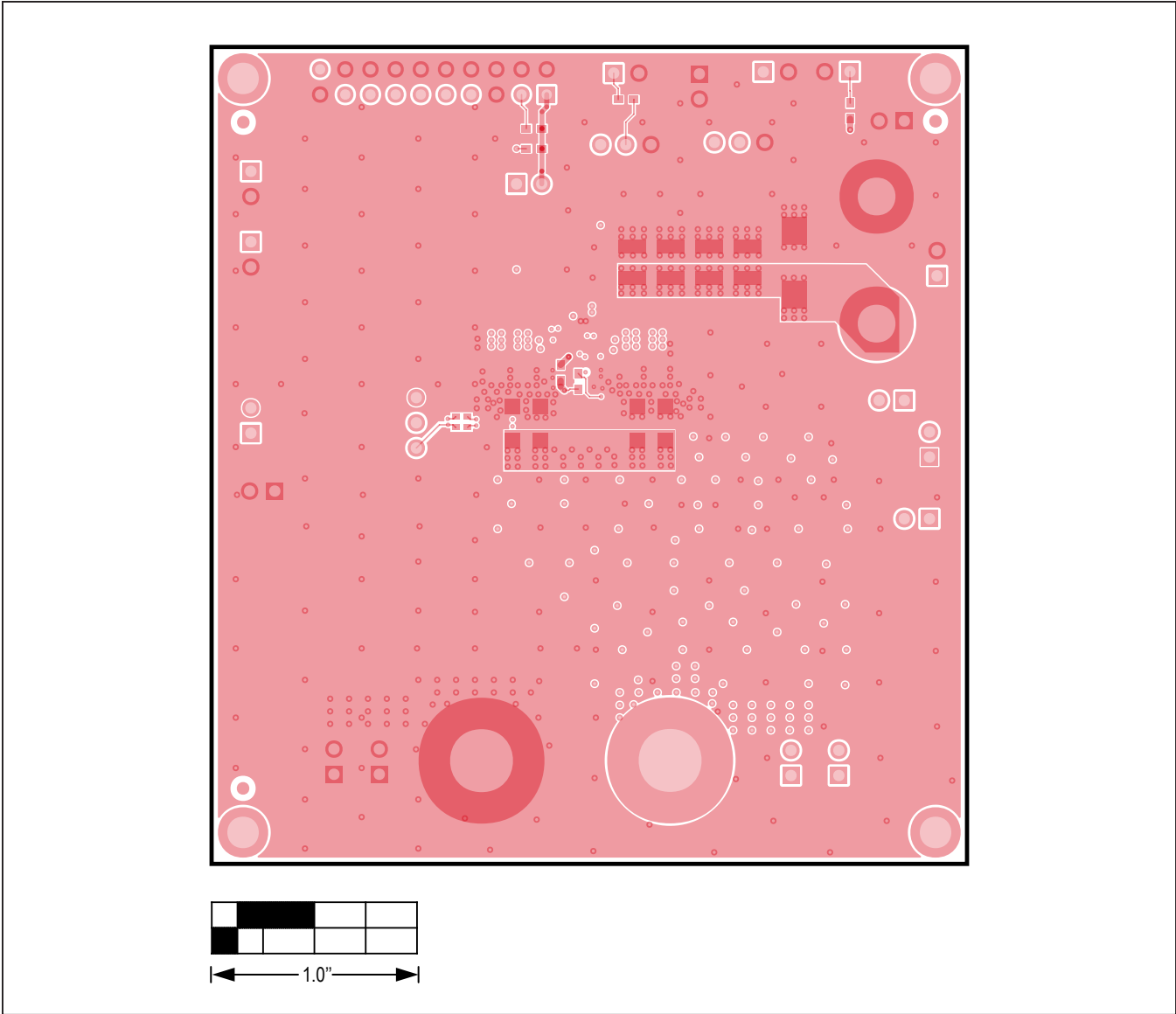


Figure 10. MAX20499A EV Kit Component Placement Guide—Bottom Layer

MAX20499A EV Kit PCB Layout Diagrams (continued)

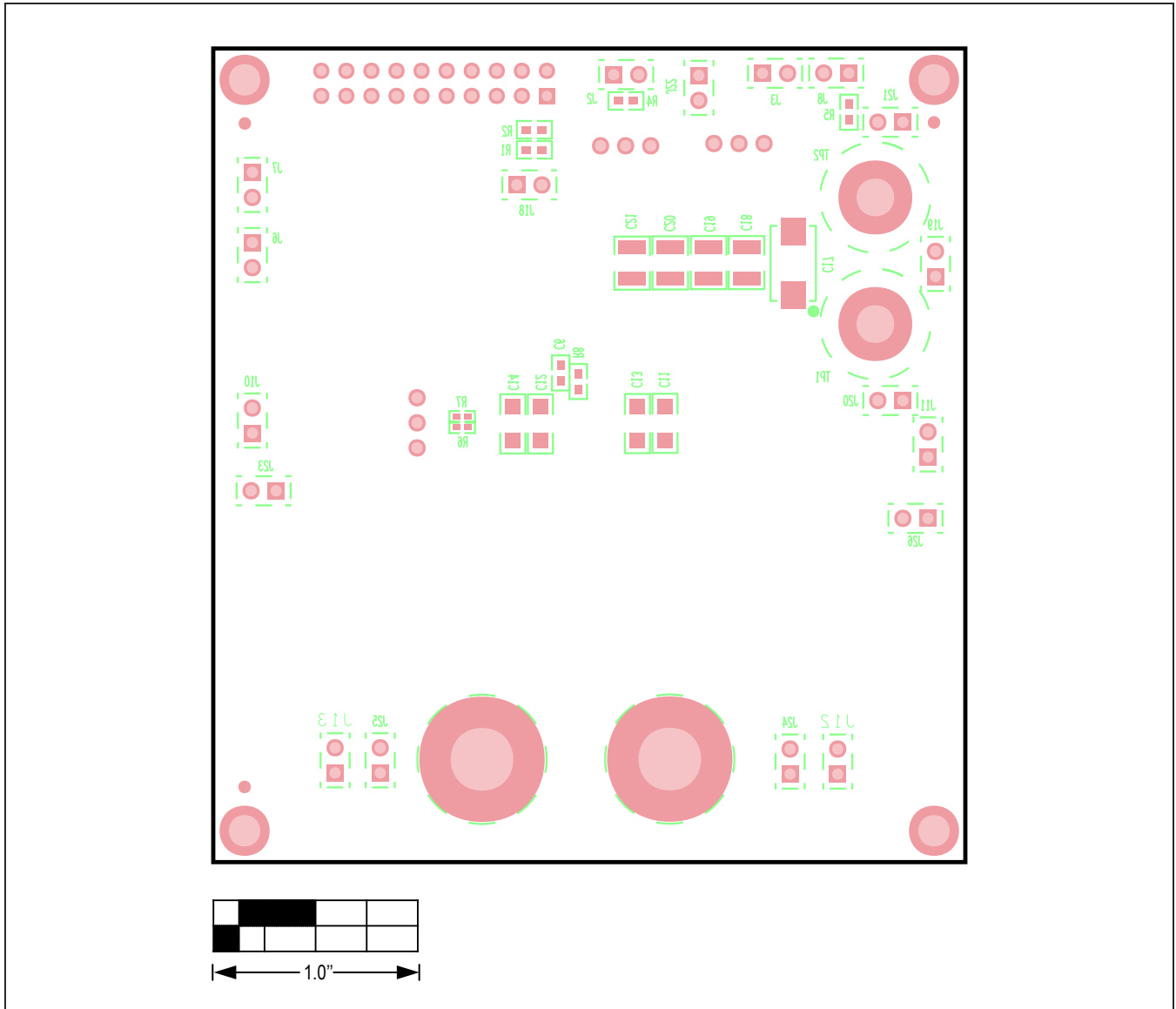


Figure 11. MAX20499A EV Kit Component Placement Guide—Bottom Assembly Drawing

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/20	Initial release	—
1	3/20	Updated <i>Ordering Information</i>	3



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