MAX20499C Evaluation Kit

Evaluates: MAX20499C

General Description

The MAX20499C EV kit is a fully assembled and tested PCB intended to demonstrate the capability of the MAX20499C step-down (buck) voltage regulator. The MAX20499C has an output current rating of 16A. The IC operates at 3V to 5.5V input supply voltage and can regulate to a voltage range of 0.5V to 1.275V.

The MAX20499C features a 2.2MHz fixed-frequency pulse-width modulation (PWM) mode for better noise immunity and load transient response. The 2.2MHz frequency operation allows for the use of all ceramic capacitors and minimizes external components. The spread-spectrum frequency modulation option minimizes electromagnetic emissions. Integrated low $R_{DS(ON)}$ switches improve efficiency at heavy loads and simplifies layout.

The MAX20499C is offered with factory-preset output voltage. The I^2C interface supports dynamic voltage adjustment with programmable slew rates. Other features include programmable soft-start, over-current protection, and over-temperature protection.

Benefits and Features

- High Efficiency DC-DC Converter
- Up to 16A Peak Output Current
- Differential Remote Voltage Sensing
- 3V to 5.5V Input Supply Voltage
- I^2C User Configurable
- Excellent Load Transient Performance
- 2.2MHz or 1.1MHz Operation
- Test Points for Bode Plot Measurement
- Proven PCB Layout
- Fully Assembled and Tested

Quick Start

Required Equipment

- MAX20499C EV kit
- 8V, 20A power supply
- Load resistor or an electronic load
- Voltmeters
- Ammeter

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 (TP1) and GND (TP2). Enable the supply.
2) Place jumper (J5) between EN and PV to enable the IC.
3) Measure the output voltage at the sense point (J10).
4) Connect load between banana sockets TP3 (VOUT) and TP4 (GND).
5) Verify that the output voltage at the sense point (J10) remains within specification.
6) Verify that RESETB (J8) is at logic-high level.

***Ordering Information* appears at end of data sheet.**

maxim integrated™

Detailed Description of Hardware

EV Kit Interface

The banana sockets TP1 (PV) and TP2 (GND) are the main input power supply points on the board. Connect a 5V power supply across these connectors. Use J32 (PV) as a test point for monitoring the input power supply. The banana sockets TP3 (VOUT) and TP4 (GND) serve as outputs to an external load. The MAX20499C is enabled by a jumper placed across the EN and PV pins on jumper J5. The enable signal (EN) can be monitored at test point J2, and the $\overline{\text{RESET}}$ signal (RESETB) is monitored at test point J8. The 20-pin connector J1 is a socket for an optional I²C interface board (not included). The I²C SDA and SCL signals are monitored at test points J6 (SDA) and J7 (SCL). Use test points J27 (Bode+) and J28 (Bode-) for bode plot measurements, and J10 for measuring output voltage at the sense point (a differential probe is recommended for ripple and transient measurements).

I²C Interface

The MAX20499C EV kit is designed to be used with an I²C interface, such as the MINIQUSB or MAXPICO2MINIQ# board, and a PC software that can read and write to the device, for example: SimpleI2C.

Frequency Adjustment with External SYNC

J4 allows an external synchronization pulse to be applied to the device's SYNC pin to set the switching frequency. Use 50% duty cycle for the square wave and follow the SYNC input frequency guideline in the MAX20499C IC data sheet.

MAX20499C EV Kit Jumpers, Test Points, and Connectors

JUMPER	SIGNAL	DEFAULT POSITION	FUNCTION
J1	NA	NA	Connector for optional I²C communication module
J2	EN	NA	Test point for device enable (EN) signal
J3	SYNC	NA	Test point for external synchronization (SYNC) signal
J4	SYNC	NA	Connection point for applying an external synchronization signal
J5	EN	OFF	Jumper for device enable (EN) signal
J6	SDA	NA	Test point for I²C SDA signal
J7	SCL	NA	Test point for I²C SCL signal
J8	RESETB	NA	Test point for $\overline{\text{RESET}}$ (RESETB)
J9	VOUT	NA	Test point for output voltage
J10	RS+	NA	Test point for output sense point
J12	VOUT	NA	Test point for output voltage
J13	GND	NA	Ground
J18	VDD	NA	VDD to PV connector (Not required for MINIQUSB)
J22	GND	NA	Ground
GND	GND	NA	Ground
J26	LX	NA	Test point for LX signal with R-C filter
J27	Bode+	NA	Test point for bode plot measurement
J28	Bode-	NA	Test point for bode plot measurement
J29	GND	NA	Ground
J30	Plugin socket	NA	Socket for optional load transient board (MAXLDBD)
J31	GND	NA	Ground
J32	PV	NA	Test point for input voltage during efficiency measurement

Ordering Information

PART	CONTENTS
MAX20499CEVKIT#	EV Kit

#Denotes RoHS compliant.

MAX20499C EV Kit Bill of Materials

REFERENCE	VALUE	DESCRIPTION	MANUFACTURER	MFG PART #
C1, C3, C15, C16	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 10V; TOL=20%; TG=-55 DEGC TO +125 DEGC; TC=X7S;	TDK	CGA4J3X7S1A106M125AB
C2, C4	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	TDK	CGA3E1X7R1E105K
C5	2.2UF	CAPACITOR, 0603,CERAMIC, 2.2UF, 10V, X7S	TDK	CGA3E3X7S1A225K080AE
C6	0.1UF	CAPACITOR, 0603, CERAMIC, 0.1UF, 25V, X7R	TDK	C1608X7R1E104K080AA
C7 - C14	47UF	CAP; SMT (1206); 47UF; 20%; 4V; CERAMIC CHIP	TDK	CGA5L1X7T0G476M
C17	470UF	CAPACITOR, 7343, TANTALUM POLYMER, 470UF, 6.3V	KEMET	T530X477M006ATE004
C18 - C21	47UF	47µF ±20% 10V Ceramic Capacitor X7S 1210	TDK	CGA6P1X7S1A476M
GND	-	TEST POINT; PIN DIA=0.094IN; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH	KEYSTONE	5020
J1	-	CONNECTOR; FEMALE; THROUGH HOLE; BREAKAWAY HEADER; RIGHT ANGLE; 20PINS	SULLINS ELECTRONIC CORP	PPTC102LJBN-RC
J2, J3, J6-J8, J10, J18, J22, J26	-	CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; DOUBLE ROW; STRAIGHT; 2PINS	SAMTEC	TSW-101-07-L-D
J4, J5	-	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 3PINS; -55 DEGC TO +125 DEGC	SAMTEC	TSW-103-23-G-S
J9	-	MICROMATE FEMALE SURFACE MOUNT MMCX CONNECTOR	AMPHENOL	908-22101
J12, J13, J27-J29, J31, J32	-	TEST POINT; SMT; SILVER; PHOSPHOR BRONZE WITH SILVER PLATE CONTACT	KEYSTONE	5016
J30	-	CONNECTOR; FEMALE; SMT; MINI SLAMMER SOCKET; STRAIGHT; 20PINS	SAMTEC	HSEC8-110-01-S-DV-A
L1	70nH	EVKIT PART - INDUCTOR; SMT; FERRITE; 70NH; 20%; 34A	TDK	HPL505028F070MRD3P
R1, R2, R8	1K	RESISTOR; 0603; 1K; 1%; 100PPM; 0.10W; THICK FILM	PANASONIC	ERJ-3EKF1001
R3	2.2	RESISTOR, 0603, 2.2 OHM, 1%, 100PPM, 0.10W, THICK FILM	PANASONIC	ERJ-3RQF2R2
R4, R5	10K	RESISTOR; 0603; 10K; 1%, 100PPM, 0.10W, THICK FILM	PANASONIC	ERJ-3EKF1002
R6	10	RESISTOR; 0402; 10 OHM, 1%; 100PPM; 0.063W, THICK FILM	VISHAY DALE	CRCW040210R0FK
R7	0	RESISTOR; 0402; 0 OHM; 0%, 0.10W, THICK FILM	PANASONIC	ERJ-2GE0R00
TP1, TP2	-	RECEPTACLE; JACK; BANANA; NICKEL PLATED BRASS	KEYSTONE	575-8
TP3, TP4	-	CONNECTOR; MALE; PANELMOUNT; BANANA JACK; STRAIGHT; 1PIN	EMERSON NETWORK POWER	108-0740-001
U1	MAX20499C	IC; AUTOMOTIVE SINGLE 16A STEP-DOWN CONVERTER FAMILY	MAXIM INTEGRATED	MAX20499CAFOA/VY+

MAX20499C EV Kit Schematic

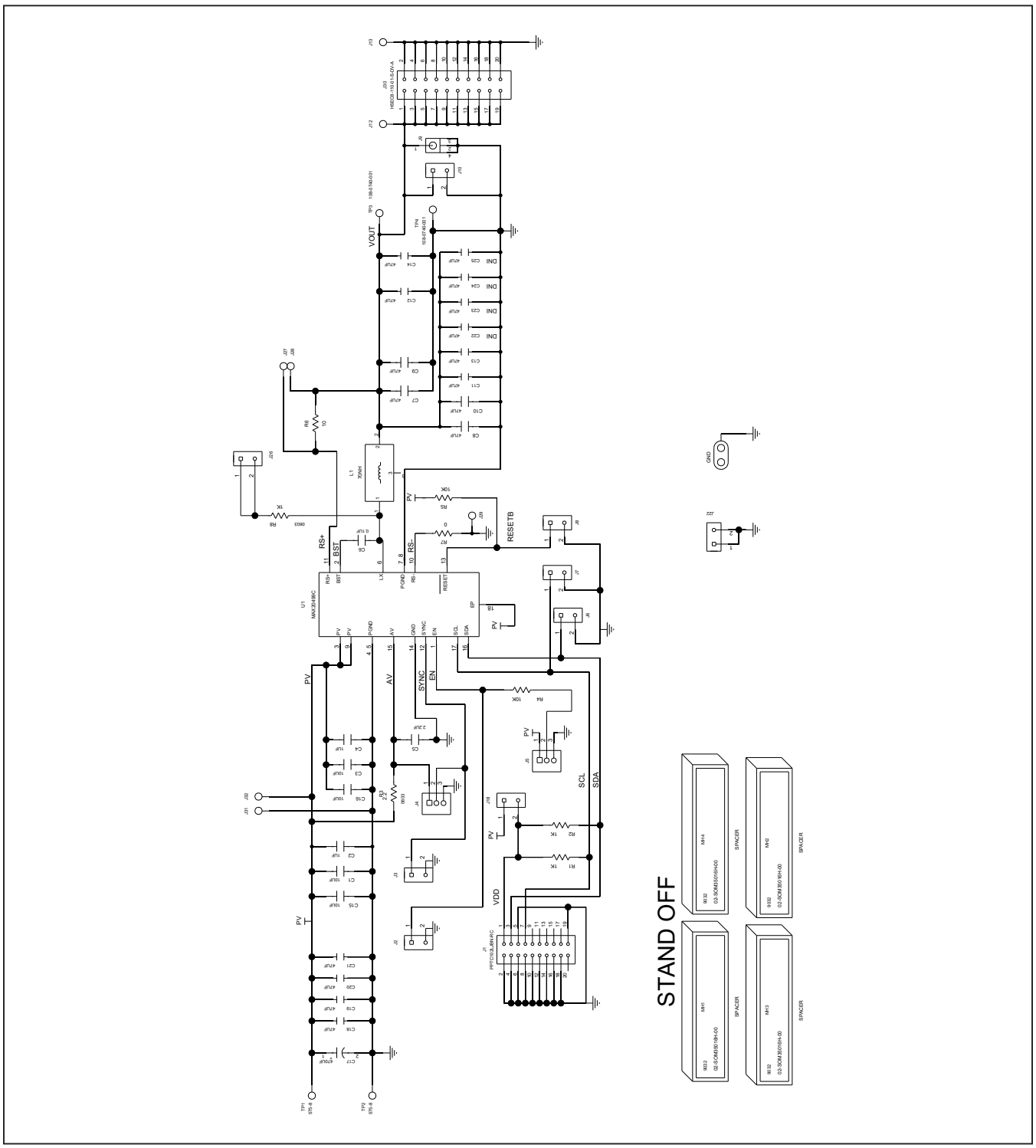

Figure 1. MAX20499C EV Kit Schematic

MAX20499C EV Kit PCB Layouts

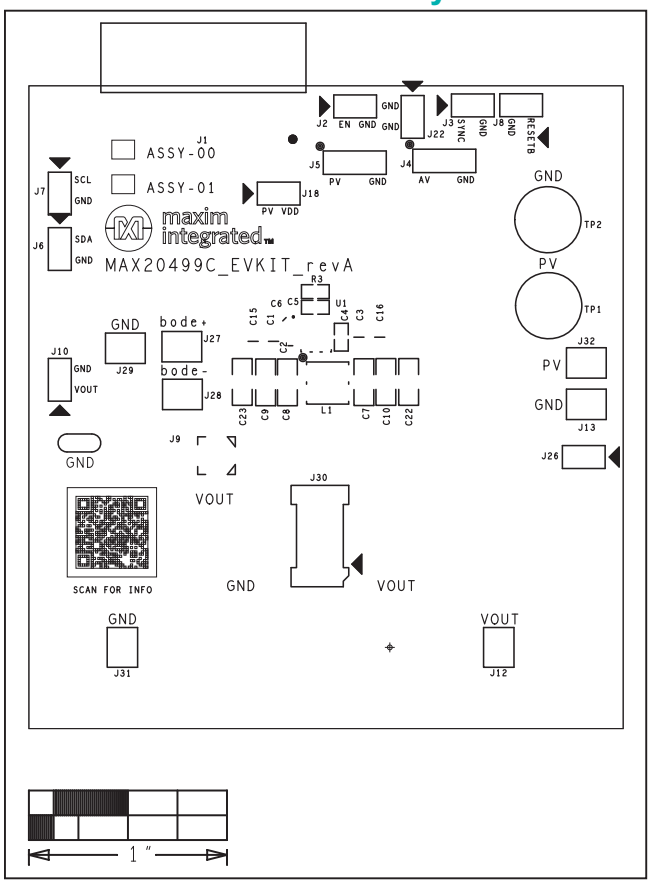

Figure 2. MAX20499C EV Kit PCB Layout—Top Silkscreen

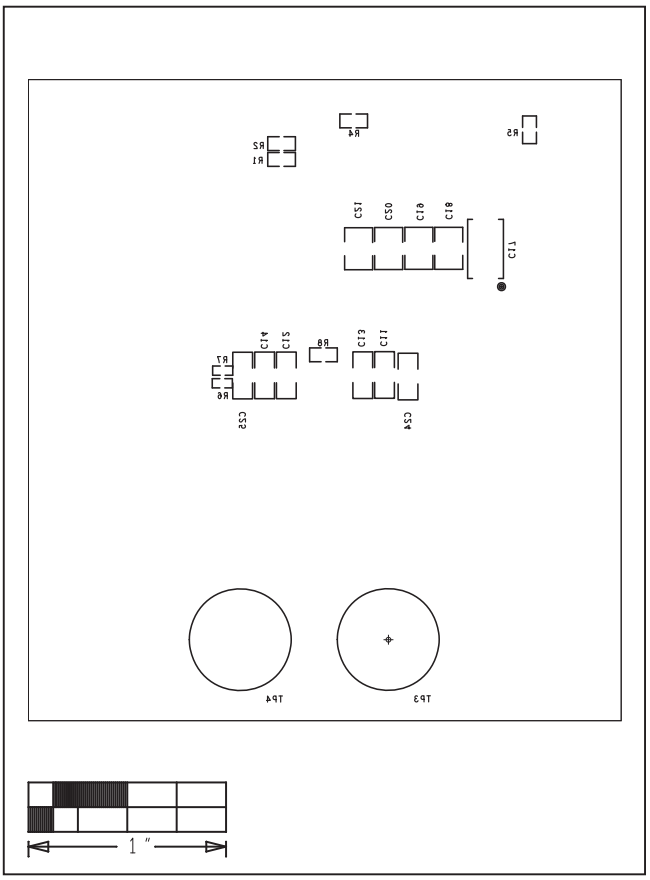

Figure 3. MAX20499C EV Kit PCB Layout—Bottom Silkscreen

MAX20499C EV Kit PCB Layouts (continued)

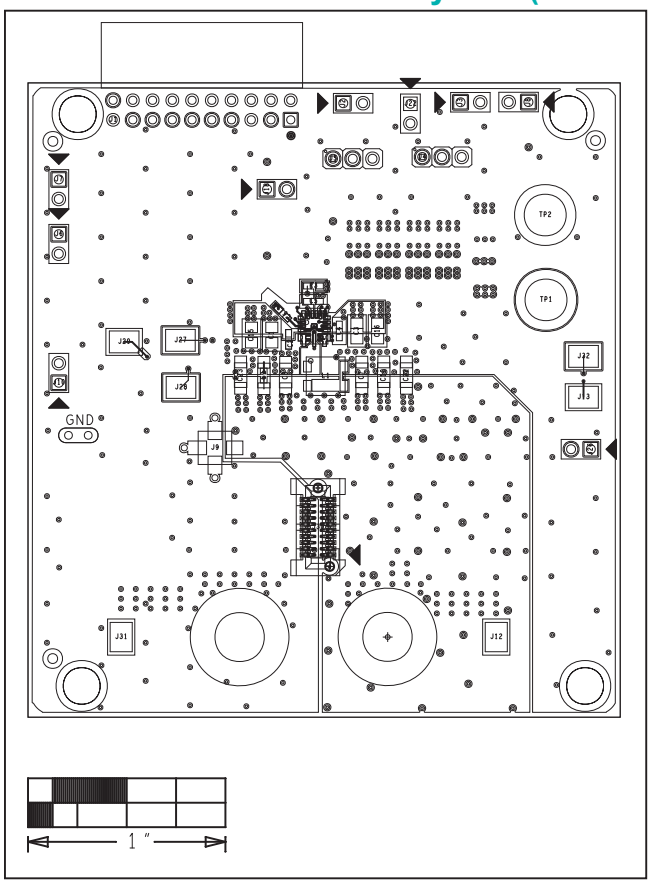

Figure 4. MAX20499C EV Kit PCB Layout—Top Layer

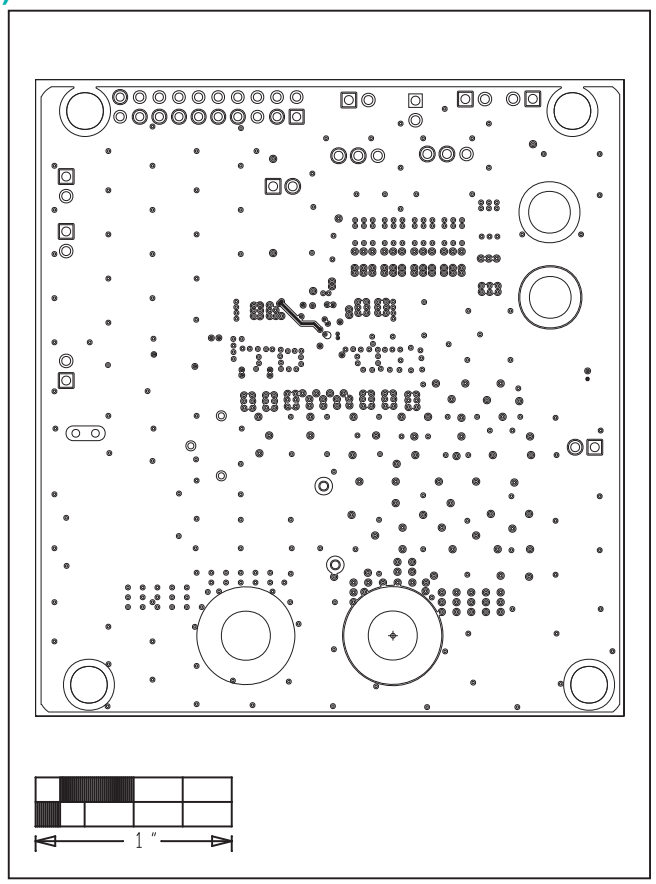

Figure 5. MAX20499C EV Kit PCB Layout—Inner Layer 2

MAX20499C EV Kit PCB Layouts (continued)

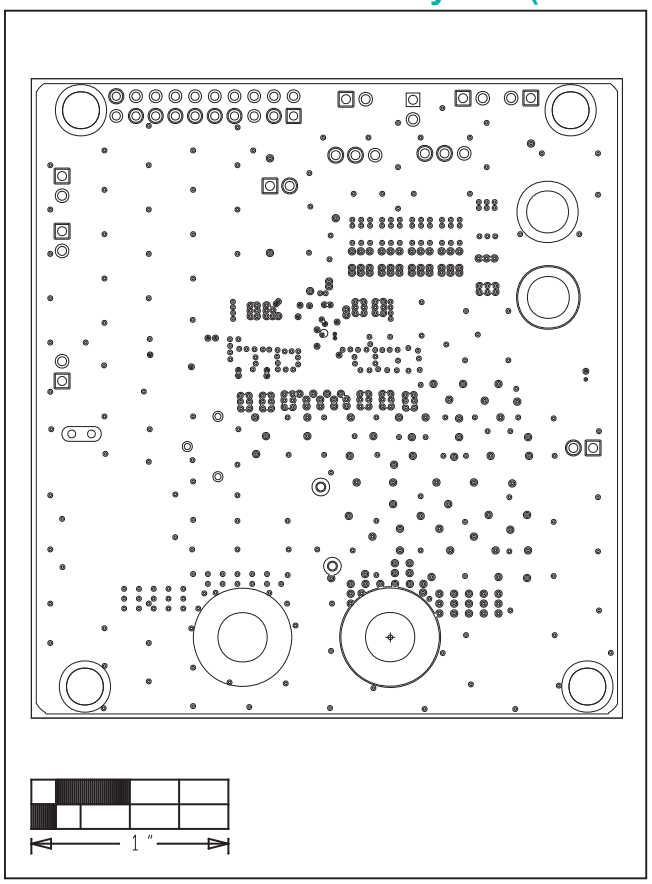

Figure 6. MAX20499C EV Kit PCB Layout—Inner Layer 3

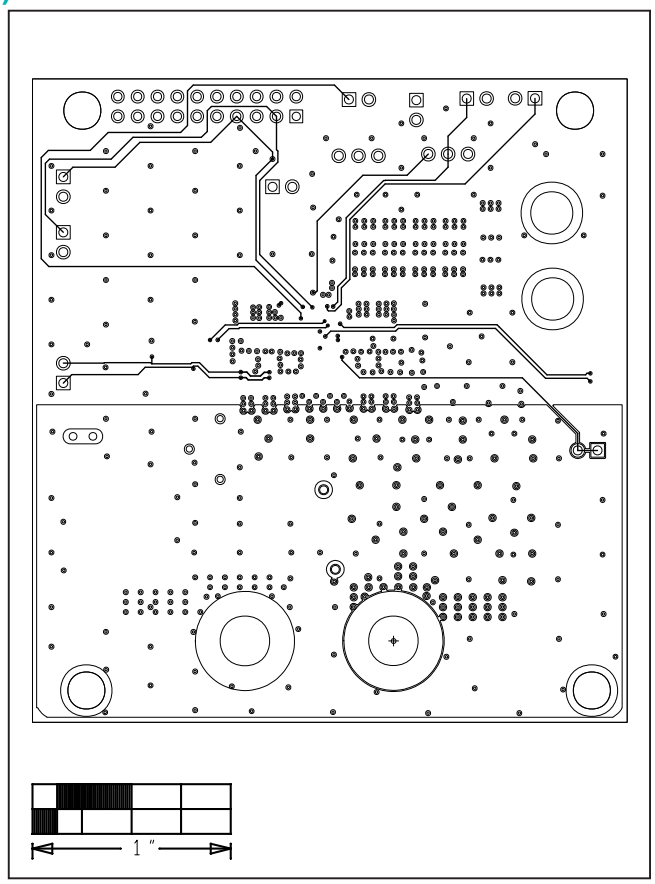

Figure 7. MAX20499C EV Kit PCB Layout—Inner Layer 4

MAX20499C EV Kit PCB Layouts (continued)

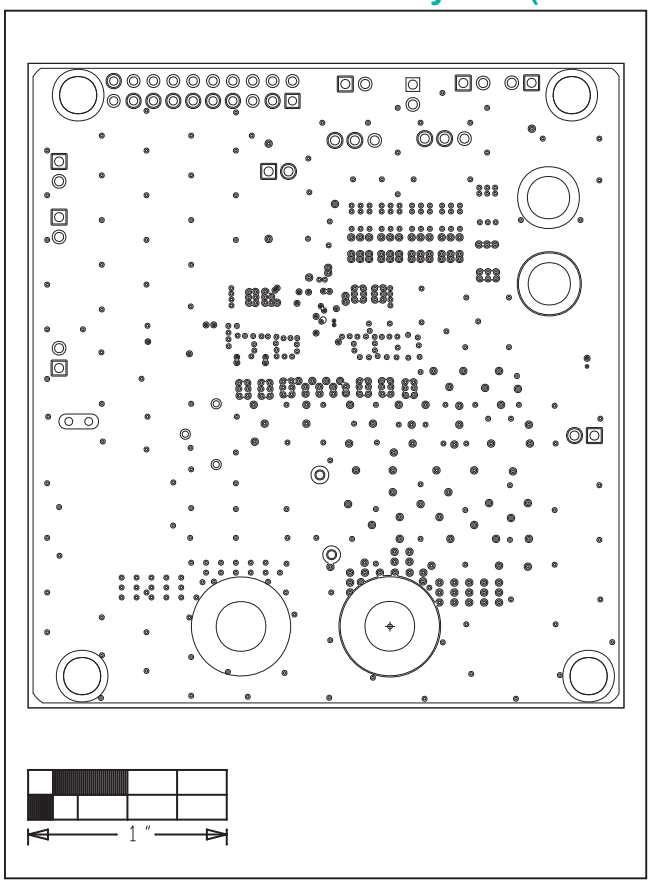

Figure 8. MAX20499C EV Kit PCB Layout—Inner Layer 5

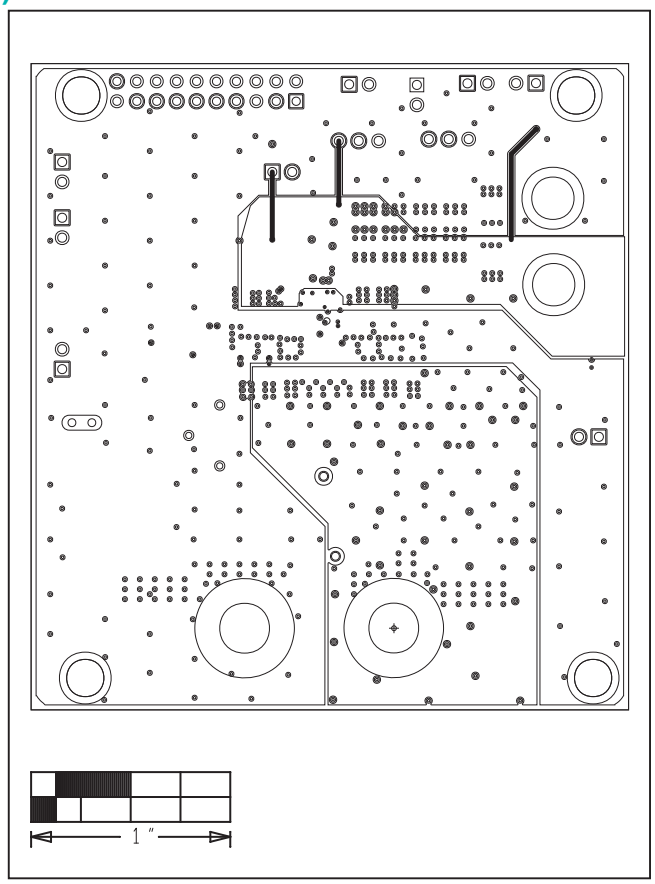

Figure 9. MAX20499C EV Kit PCB Layout—Inner Layer 6

MAX20499C EV Kit PCB Layouts (continued)

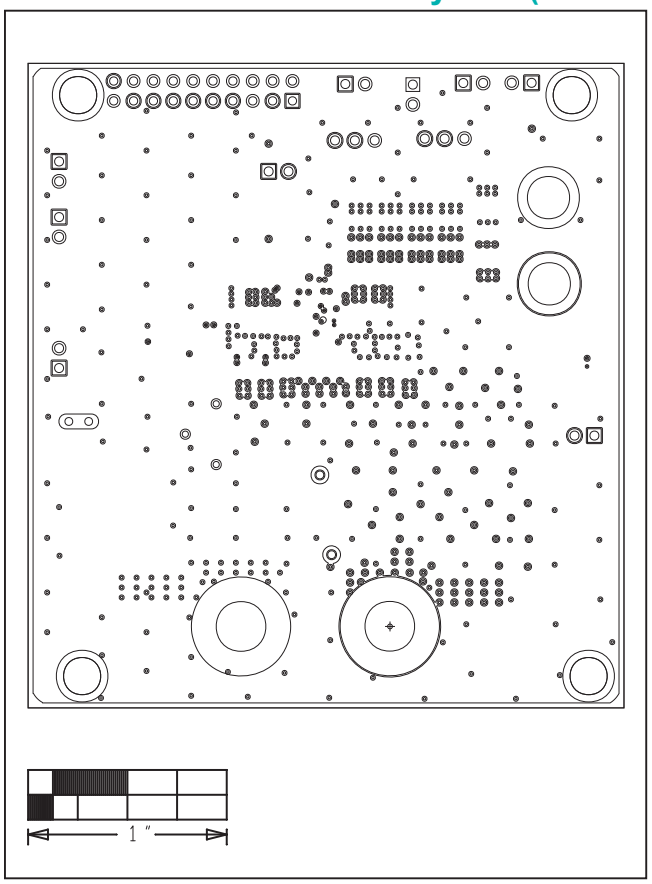

Figure 10. MAX20499C EV Kit PCB Layout—Inner Layer 7

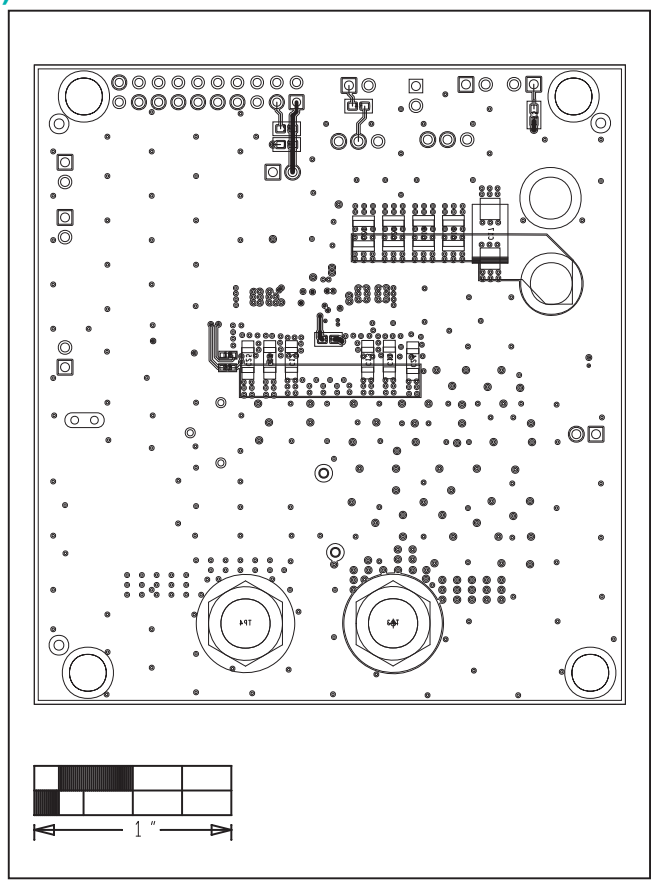

Figure 11. MAX20499C EV Kit PCB Layout—Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/20	Initial release	—
1	6/21	Ordering Information–removed part MAX2499CEVKITSYS#	2

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at https://www.maximintegrated.com/en/storefront/storefront.html.

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.

