

## MAX20006/MAX20008 Evaluation Kits

Evaluates: MAX20004/MAX20006/MAX20008

### General Description

The MAX20006/MAX20008 evaluation kits (EV kits) demonstrate the MAX20004/MAX20006/MAX20008 high-voltage, current-mode, synchronous step-down converters with low operating current. The EV kits operate over a wide 3.5V to 36V input range. The output is set for 5V in the default configuration but can be adjusted between 1V and 10V with appropriate components. The MAX20004/MAX20006/MAX20008 current limit supports a nominal output current of 4A/6A/8A, respectively.

The EV kit switching frequency is set for either 2.2MHz (MAX20006EVKIT) or 400kHz (MAX20008EVKIT) in the default configuration. The switching frequency is resistor programmable between 220kHz and 2.2MHz and can be synchronized to an external signal. The EV kits can be set for fixed-frequency (PWM mode) or pulse-skipping (SKIP mode) for light load efficiency through the provided on-board jumper.

### Features

- Operating VIN Range of 3.5V to 36V
- 25 $\mu$ A No Load Quiescent Current in SKIP Mode
- High-Efficiency Synchronous DC-DC Converter with Integrated FETs
- 220kHz to 2.2MHz Adjustable Frequency
- External Frequency Synchronization (SYNC) Input
- Internal Soft-Start
- Fixed 3.3V/5.0V Output or Resistor Programmable 1V to 10V Output
- Low Dropout (98% Effective Duty Cycle Operation)
- $\pm 2\%$  Output Voltage Accuracy
- $\overline{\text{RESET}}$  Output
- Proven PCB Layout
- Fully Assembled and Tested

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

### Quick Start

#### Required Equipment

- MAX20006/MAX20008 EV kit
- 14V, 4A DC power supply
- Electronic load capable of 8A
- Digital voltmeter (DVM)

#### Procedure

Each EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on supplies until all connections are made.**

- 1) Verify that jumpers JU1–JU2 are in their default positions, as shown in [Table 1](#).
- 2) Connect the 14V power supply between the VIN and nearest GND input terminals on the EV kit.
- 3) Connect the electronic load between the VOUT and nearest GND output terminals on the EV kit and set for 6A (MAX20006EVKIT) or 8A (MAX20008EVKIT).
- 4) Connect the DVM between the VOUT and nearest GND output terminals on the EV kit.
- 5) Turn on the power supply.
- 6) Enable the electronic load.
- 7) Verify that the voltage at VOUT is approximately 5V.

## Detailed Description of Hardware

The MAX20006/MAX20008 EV kits come fully assembled and tested. The MAX20006EVKIT is populated with the MAX20006AFOA/VY+, and the MAX20008EVKIT is populated with the MAX20008AFOA/VY+. Other converters in the family can be tested on the same EV kit; however, changing the IC or the output voltage may also require changing other components. Consult the IC data sheet for guidance on selecting the proper ICs and external components.

### Enable (EN)

Place a shunt in the 2-3 position on jumper JU1 to enable the IC for normal operation. To place the device into shut-down mode, move the shunt on JU1 to the 2-1 position.

### Synchronization and Switching

The IC has the ability to operate in either forced-PWM mode or in SKIP mode. Place a shunt in the 2-1 position on JU2 to select forced-PWM mode at the resistor-programmed frequency. Removing the shunt from JU2 or placing a shunt in the 2-3 position on jumper JU2 causes the IC to enter SKIP mode for maximum light load efficiency. With a shunt in the 2-3 position on jumper JU2,

the switching frequency can be synchronized to an appropriate external signal applied to the SYNC input terminal.

### Setting the Switching Frequency (FOSC)

The IC switching frequency is set by a resistor connected from FOSC to AGND. Refer to the IC data sheet for selecting the resistor value.

### RESET Output

The EV kit provides a  $\overline{\text{RESET}}$  output to monitor the status of the device output. The  $\overline{\text{RESET}}$  output is an open-drain output from the IC with an external pullup resistor to VOUT on the EV kits. Refer to the IC data sheet for details on the  $\overline{\text{RESET}}$  functionality.

### Output Voltage Setting

Populating R9 with a 0Ω jumper connects FB to BIAS for a fixed +5V (EV kit default output) or a fixed +3.3V output voltage depending on the IC version. To set the output to other voltages between 1V and 10V, remove R9, populate R1 with a 0Ω jumper, and populate R7/R8/C14 with the appropriate values. Other component modifications might also be required. Refer to the IC data sheet for details on setting the output voltage.

**Table 1. Enable Control (JU1)**

SHUNT POSITION	EN PIN	VOUT
2-3*	EN tied to VSUP	Enabled
2-1	EN tied to GND	Disabled

\*Default configuration.

**Table 2. Operating Mode Control (JU2)**

SHUNT POSITION	SYNC PIN	MODE
2-1*	SYNC tied to BIAS	Forced PWM
2-3	SYNC pulled to GND with R2	SKIP or external SYNC

\*Default configuration.

## Ordering Information

PART	TYPE
MAX20006EVKIT#	EV Kit
MAX20008EVKIT#	EV Kit

#Denotes RoHS compliant.

MAX20006/MAX20008  
Evaluation Kits

Evaluates: MAX20004/MAX20006/MAX20008

**MAX20006/MAX20008 EV Kit Bill of Materials**

Revision: B  
Date: 02/20/2017

**Parts Common to All Variants**

REFERENCE	QTY	DESCRIPTION	MANUFACTURER	PART#
C1	1	CAP CER 0.1UF 50V X7R 0402	TDK	CGA2B3X7R1H104K050BB
C2	1	CAP CER 10UF 35V X7R 1206	TDK	C3216X7R1V106K160AC
C3	1	CAP ALUM 100UF 20% 35V SMD	PANASONIC	EEFP1V101AP
C4,C5,C7	3	CAP CER 0.1UF 100V X7R 0603	MURATA	GRJ188R72A104KE11D
C8	1	CAP CER 2.2UF 10V X7R 0603	TDK	C1608X7R1A225K080AC
C9	1	CAP CER 1000PF 100V X7R 0603	TDK	C1608C0G2A102J080AA
C10,C11	2	CAP CER 47UF 10V X7R 1210	MURATA	GRM32ER71A476ME15L
C13	0	Not Installed		
C14	0	Not Installed		
FB1	1	FERRITE CHIP 60 OHM 6A 1806	MURATA	BLM41PG6005H1L
J1,J2	2	3 PIN HEADER 0.100" 40POS CUT TO FIT	TE CONNECTIVITY	4-103327-0
R1	0	Not Installed		
R2,R6	2	RES SMD 100K OHM 1% 1/10W 0603	PANASONIC	ERJ-3EKF1003V
R5,R9	2	RES SMD 0 OHM JUMPER 1/10W 0603	PANASONIC	ERJ-3GEY0R00V
R7	0	Not Installed		
R8	0	Not Installed		
GND,VIN,SYNC,RESET,VOU T,GND	6	WIRE LOOP 18AWG SOLID BARE WIRE TINNED		
GND,VIN,VOU,GND	4	BANANA JACK UNINSULATED THREADED EXTERNAL NUT	POMONA	3267
	1	PCB, MAX20004/6/8 EV Kit		
	2	2 POSITION SHUNT CONNECTOR BLACK OPEN TOP 0.100"	KYCON	SX1100-B
	1	LABEL		85-84003-006
	1	WEB instructions for Maxim Data Sheet		EVINSERT
	1	BAG, STATIC SHIELD ZIP 5"x6", W/ ESD LOGO		87-02162-000
	1	FOAM, ANTI-STATIC PE 12"x12"x5MM		85-MAXKIT-PNK
	1	BOX, BROWN 9 3/16" x 7" x 7/8"		

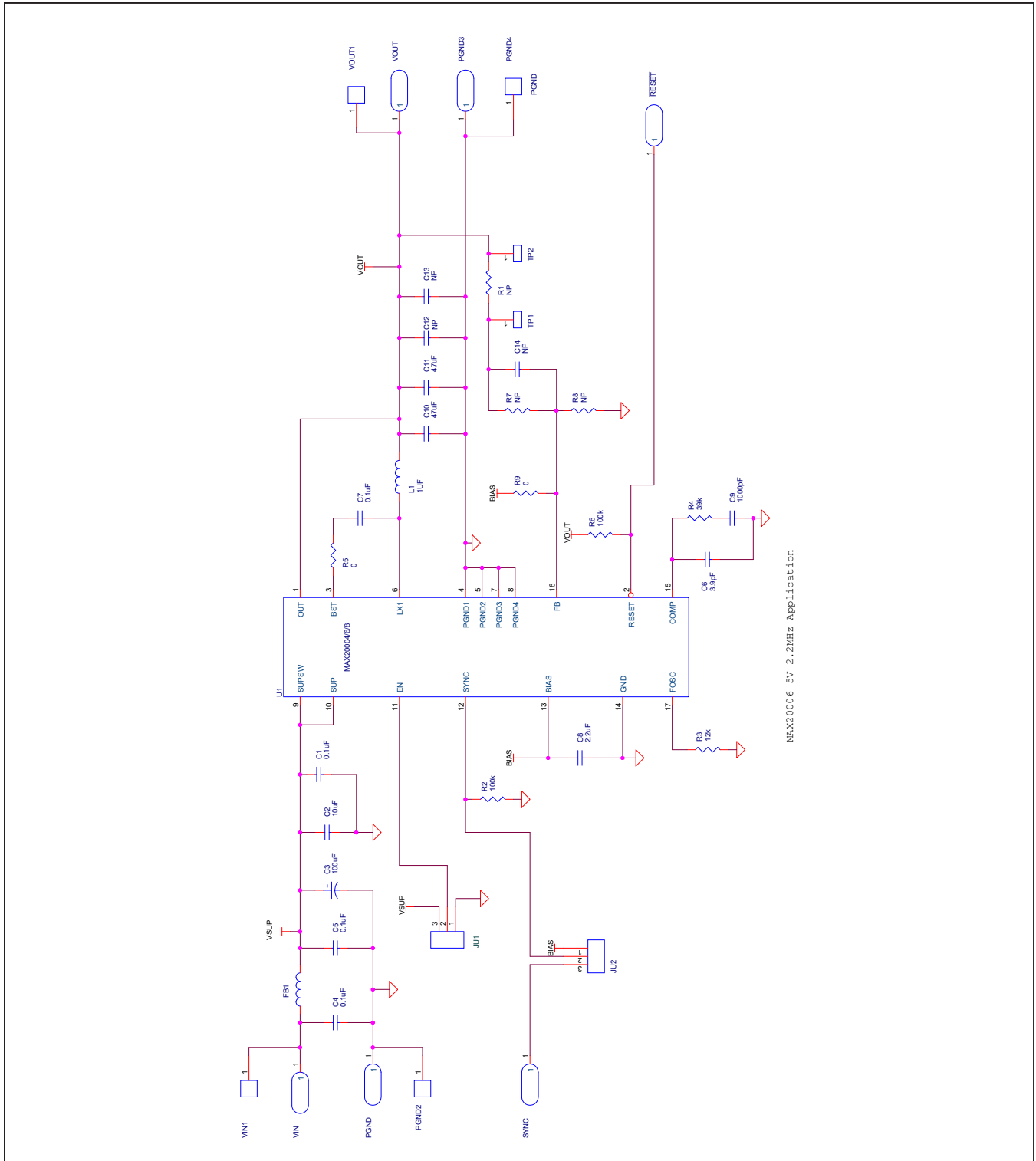
**MAX20006EVKIT# Variant (5V 2.2MHz)**

C6	1	CAP CER 3.9PF 100V C0G 0603	MURATA	GRM1885C2A3R9CZ01D
C12	0	Not Installed		
L1	1	INDUCTOR 1UH	COILCRAFT	XAL6030-102ME
R3	1	RES SMD 12K OHM 1% 1/10W 0603	PANASONIC	ERJ-3EKF1202V
R4	1	RES SMD 39K OHM 1% 1/10W 0603	PANASONIC	ERJ-3EKF3902V
U1	1	IC STEP DOWN CONVERTER 17L-FCQFN	MAXIM	MAX20006AFOA/VY+

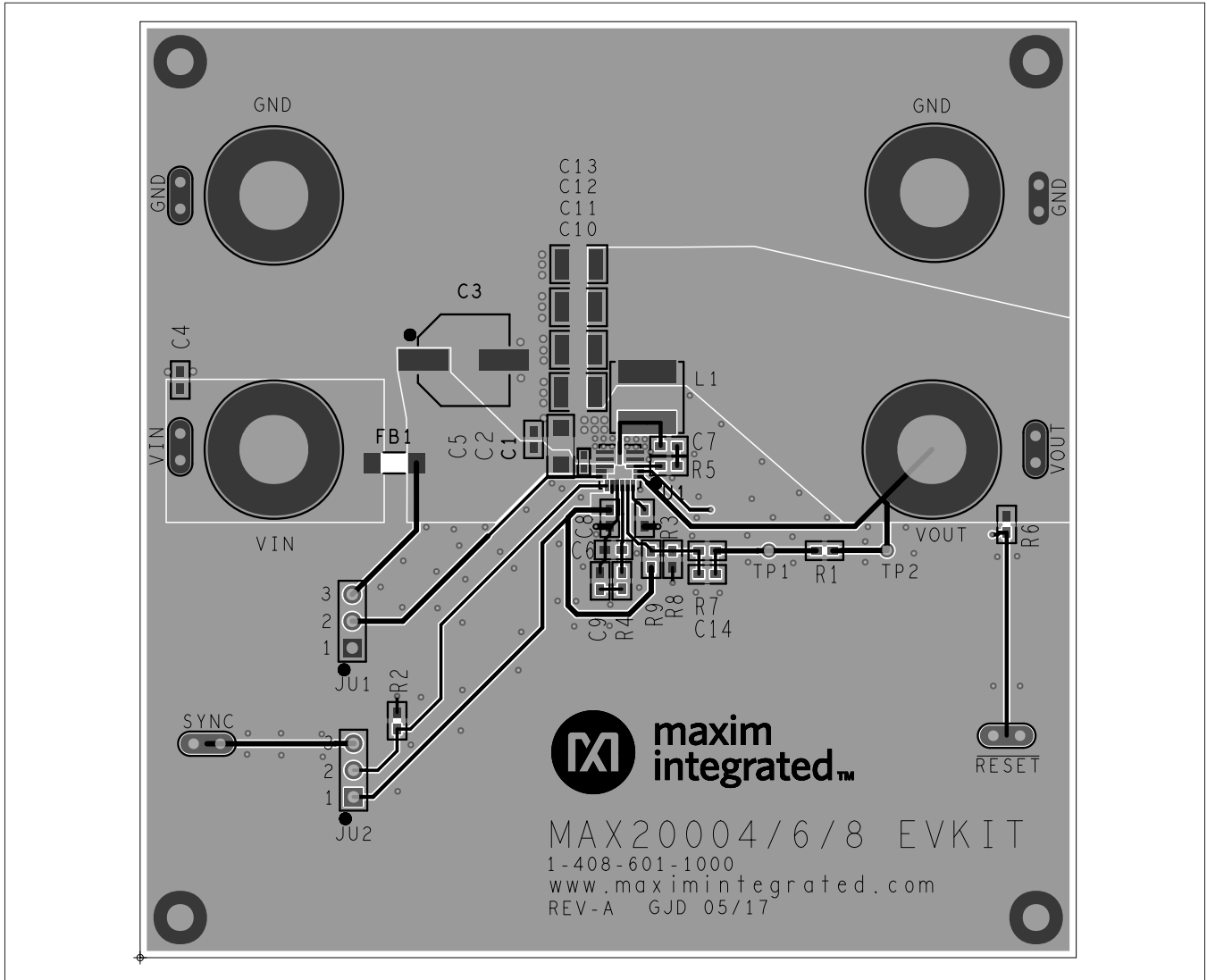
**MAX20008EVKIT# Variant (5V 400kHz)**

C6	1	CAP CER 27PF 100V C0G 0603	MURATA	GRM1885C2A270JA01D
C12	1	CAP CER 47UF 10V X7R 1210	MURATA	GRM32ER71A476ME15L
L1	1	INDUCTOR 4.7UH	COILCRAFT	XAL6060-472ME
R3	1	RES SMD 73.2K OHM 1% 1/10W 0603	PANASONIC	ERJ-3EKF7322V
R4	1	RES SMD 30K OHM 1% 1/10W 0604	PANASONIC	ERJ-3EKF3002V
U1	1	IC STEP DOWN CONVERTER 17L-FCQFN	MAXIM	MAX20008AFOA/VY+

MAX20006/MAX20008 EV Kit Schematic

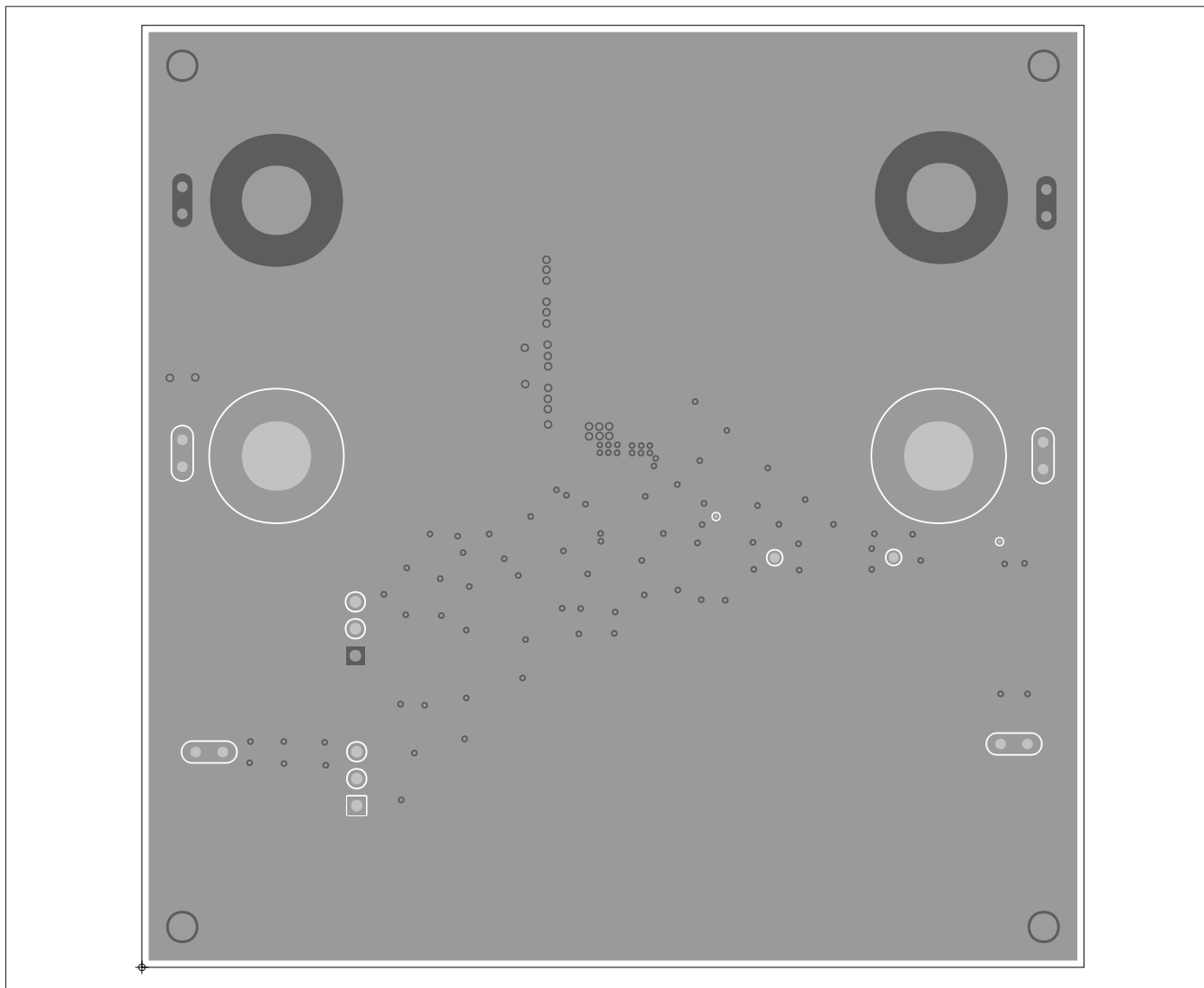


MAX20006/MAX20008 EV Kit PCB Layouts



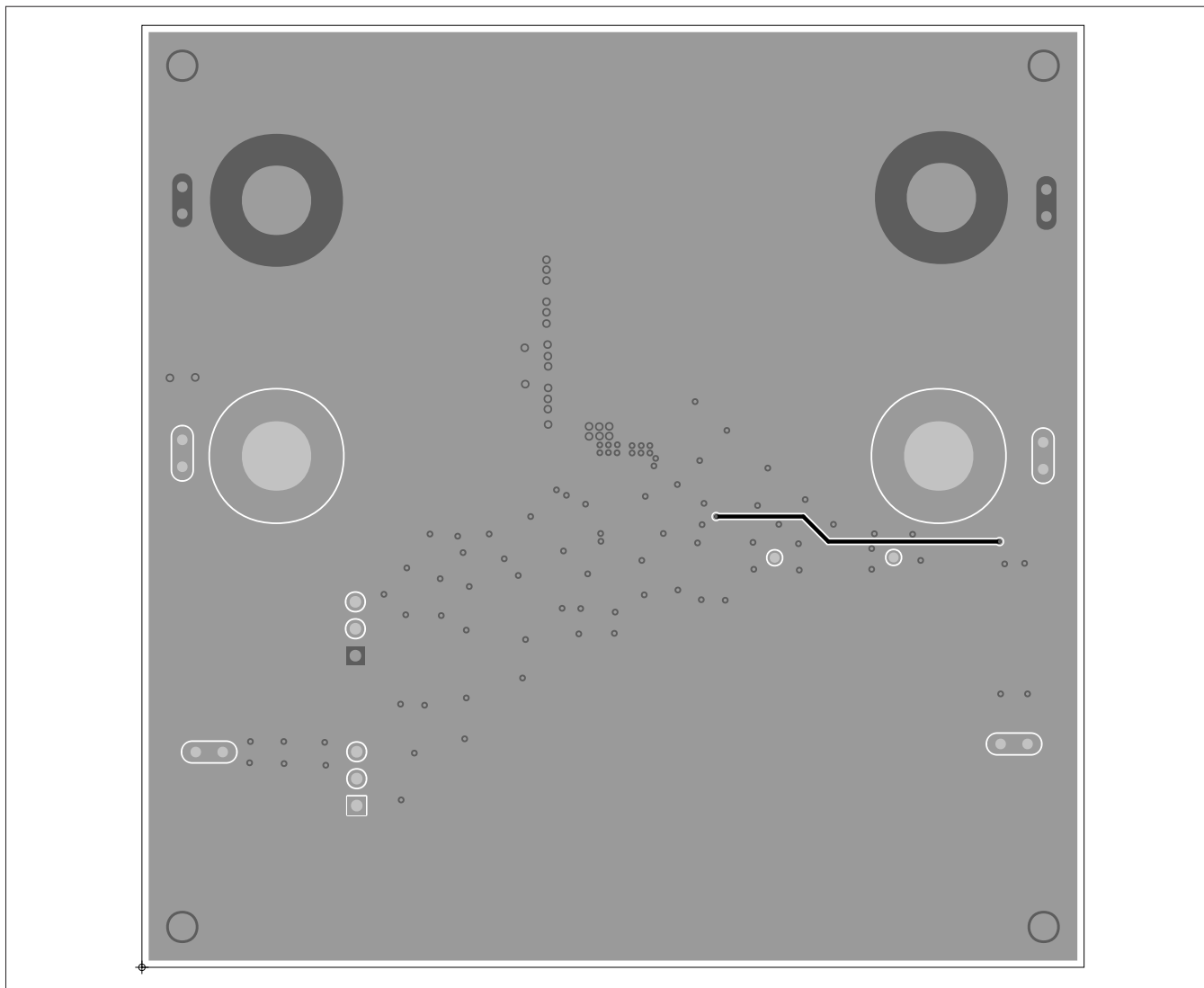
MAX20006/MAX20008 EV Kit PCB Layout—Top Layer

**MAX20006/MAX20008 EV Kit PCB Layouts (continued)**



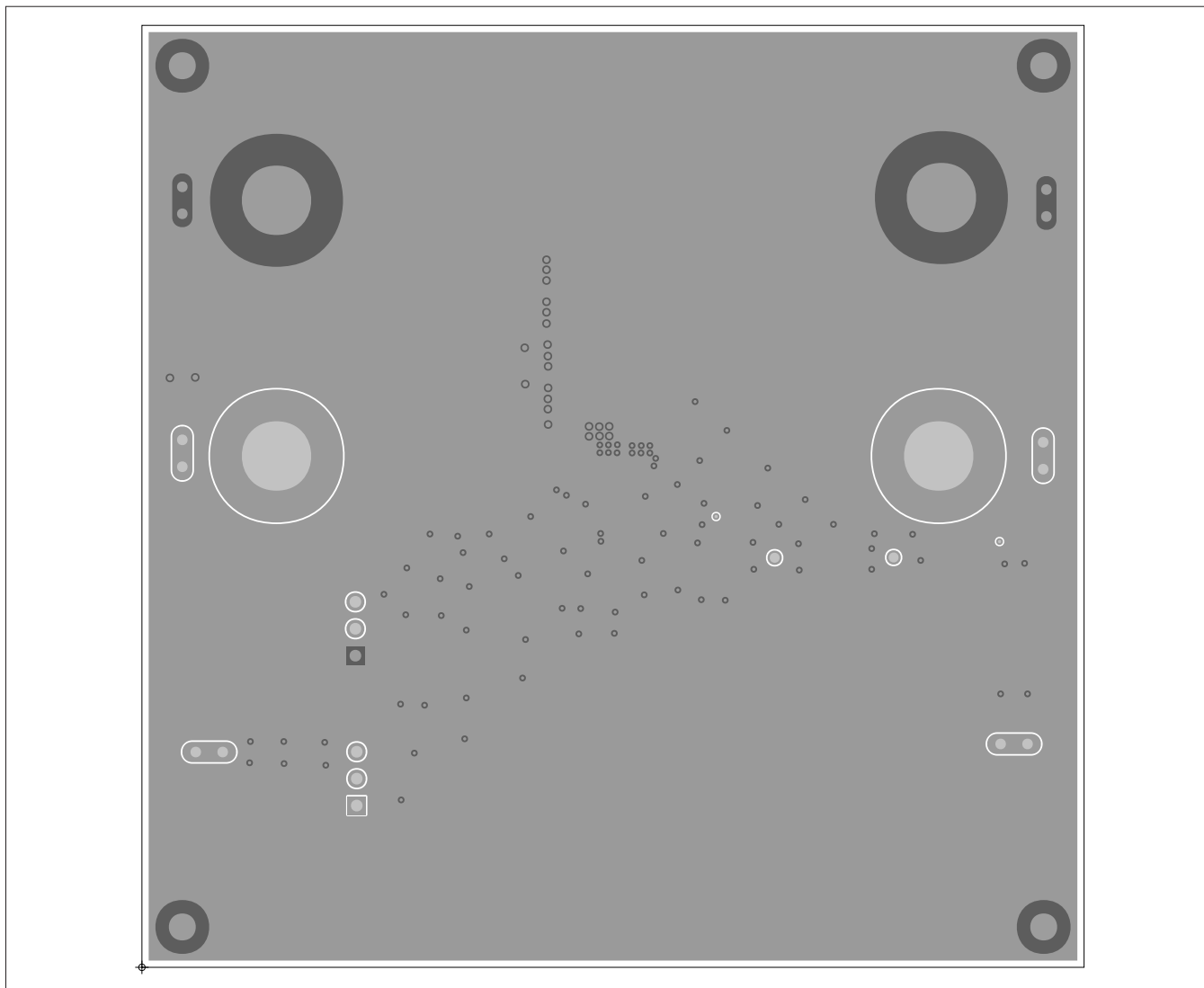
MAX20006/MAX20008 EV Kit PCB Layout—Layer 1

**MAX20006/MAX20008 EV Kit PCB Layouts (continued)**



MAX20006/MAX20008 EV Kit PCB Layout—Layer 2

**MAX20006/MAX20008 EV Kit PCB Layouts (continued)**



*MAX20006/MAX20008 EV Kit PCB Layout—Bottom Layer*