TPS63806EVM

This user's guide describes the operation, and use of the TPS63806EVM evaluation module (EVM). The TPS63806EVM is designed to help the users easily evaluate and test the operation and functionality of the TPS63806 buck-boost converter. The TPS63806EVM has the output voltage set to 3.3 V. The EVM operates from 1.3 V to 5.5 V input voltage. Output current can go up to 2 A in buck mode and boost mode. This document includes setup instructions for the hardware, a schematic diagram, a bill of materials (BOM), and printed-circuit board (PCB) layout drawings for the evaluation module. Throughout this document, the abbreviations EVM, TPS63806EVM, and the term evaluation module are synonymous with the TPS63806, unless otherwise noted.

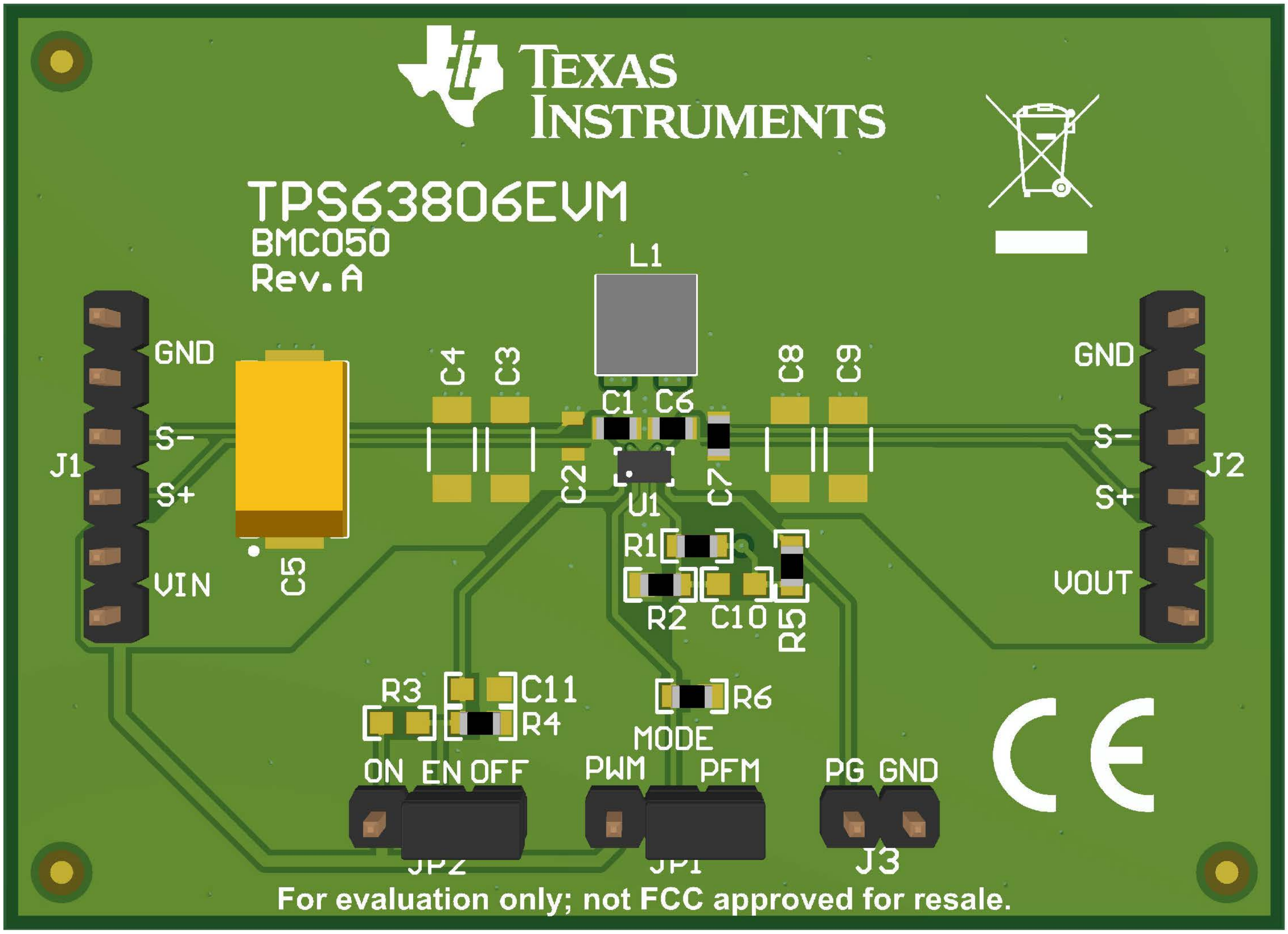

Figure 1. TPS63806 EVM Picture

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1 Introduction

The Texas Instruments TPS63806 is a highly efficient, single-inductor, internally compensated, buck-boost converter in a 15-pin, 2.3-mm × 1.4-mm BGA package.

1.1 Background

The TPS63806EVM uses the TPS63806 integrated circuit (IC) and is set to a 3.3 V output and operates with an input voltage between 1.3 V and 5.5 V.

1.2 Performance Specification

Table 1 provides a summary of the TPS63806EVM performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage		1.3		5.5	V
Start-up input voltage		1.8		5.5	V
Output voltage		1.8		5.2	V
Output current	$V_I \geq 2.2$ V , $V_O = 3.3$ V	0		2	A

1.3 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate the TPS63806. Extra positions are available for additional input and output capacitor and feed forward capacitor.

1.3.1 IC U1 Operation

U1 is configured for evaluation of the adjustable-output version. This EVM is set to 3.3 V. Resistors R1 and R2 can be used to set the output voltage between 1.8 V and 5.0 V. See the datasheet for recommended values.

2 Setup

This section describes how to properly use the TPS63806EVM.

2.1 Input/Output Connector and Header Descriptions

2.1.1 J1, Pin 1 and 2 – VIN

Positive input connection from the input supply for the EVM.

2.1.2 J1, Pin 3 and 4 – S+/S-

Input voltage sense connections. Measure the input voltage at this point.

2.1.3 J1, Pin 5 and 6 – GND

Vin GND return connection from the input supply for the EVM, common with J2, pin 5 and 6.

2.1.4 J2, Pin 1 and 2 – VOUT

Output voltage connection.

2.1.5 J2, Pin 3 and 4 – S+/S-

Vout Sense and GND Sense low-current sense lines for sampling the output voltage at the output capacitor.

2.1.6 J2, Pin 5 and 6 – GND

Vout GND return connection for the output voltage, common with J1 pin 5 and 6.

2.1.7 J3 – PG GND

Power Good (PG) test point and GND connection.

2.1.8 JP1 – MODE

Shorting jumper between the center pin MODE and PFM enables automatic transition to power-saving mode at light-load currents as described in the data sheet; shorting jumper between the center pin MODE and PWM enables forced PWM mode.

2.1.9 JP2 – ENABLE

Shorting jumper between the center pin EN and ON turns on the unit. Shorting jumper between the center pin EN and OFF turns the unit off.

2.2 Setup

To operate the EVM, connect an input supply with the positive lead to J1, pins 1 and 2 and negative lead to J1, pins 5 and 6; connect a load with the positive lead to J2, pins 1 and 2 and the negative lead to J2, pins 5 and 6; short EN and ON (pins 2 and 3) of JP2 with a shorting jumper.

3 Board Layout

This section provides the TPS63806EVM board layout and illustrations.

3.1 Layout

Figure 2 through Figure 6 show the board layout for the TPS63806EVM PCB.

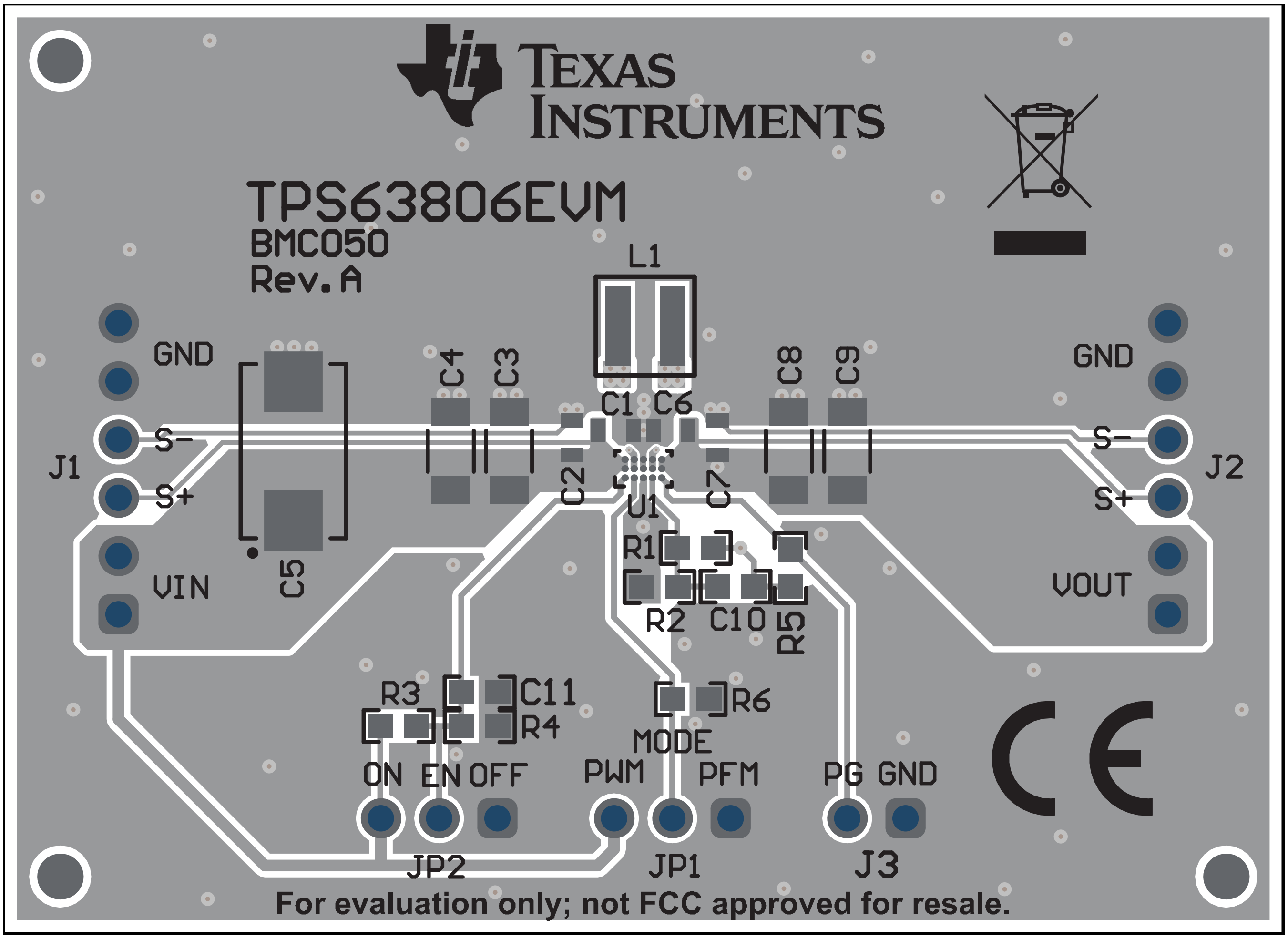

Figure 2. Assembly Layer

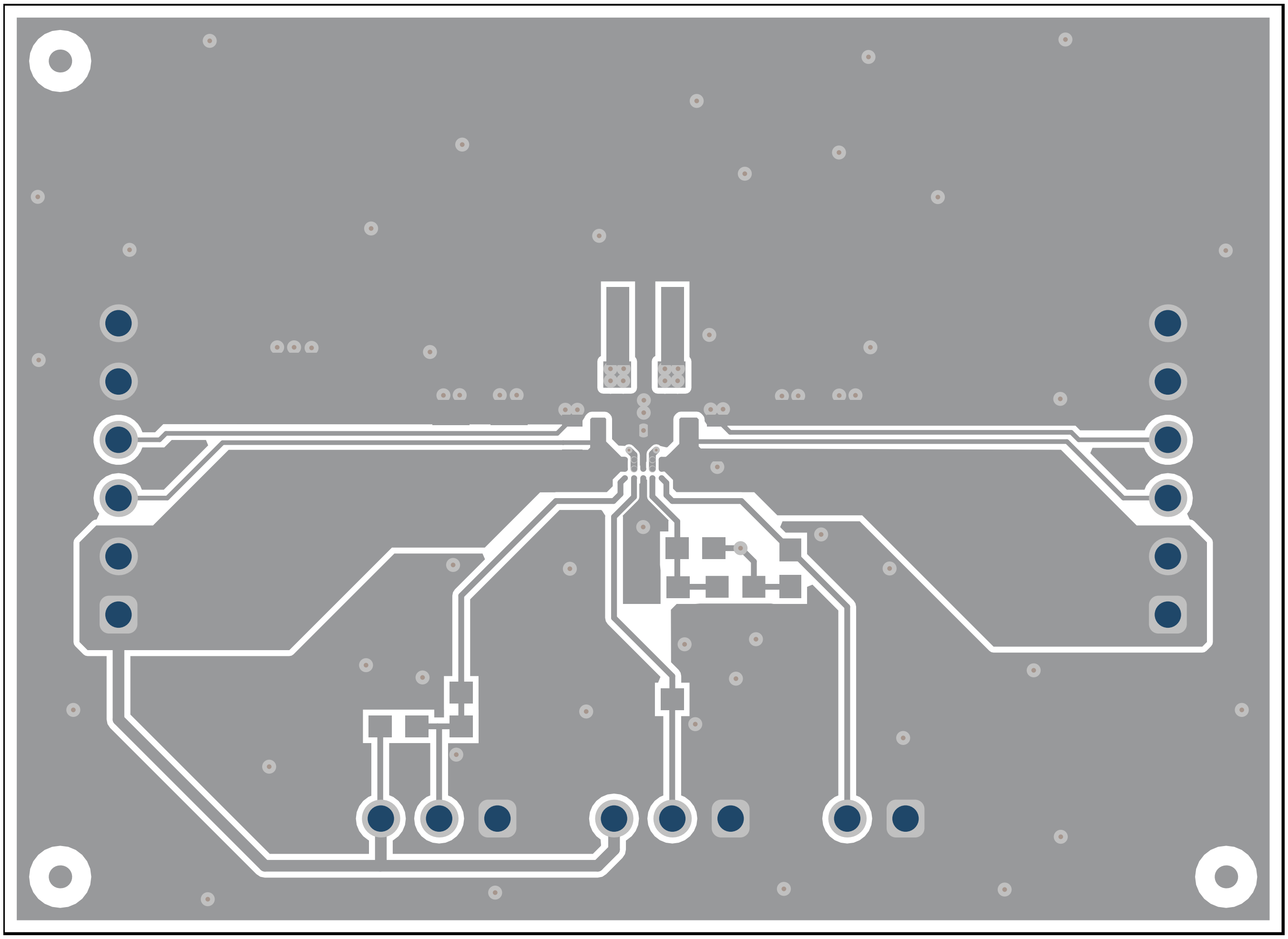

Figure 3. Top Layer Routing

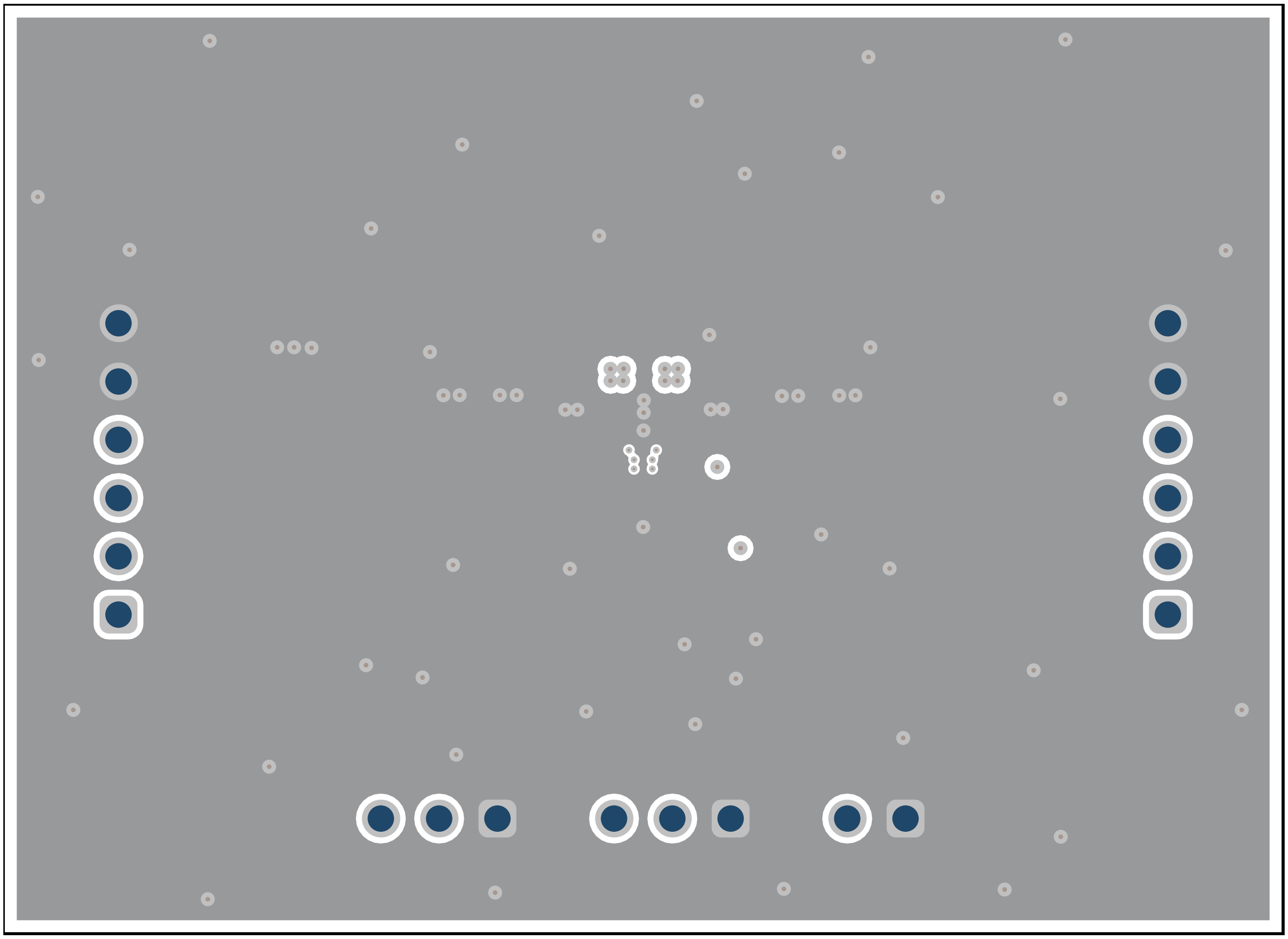

Figure 4. Signal layer 1

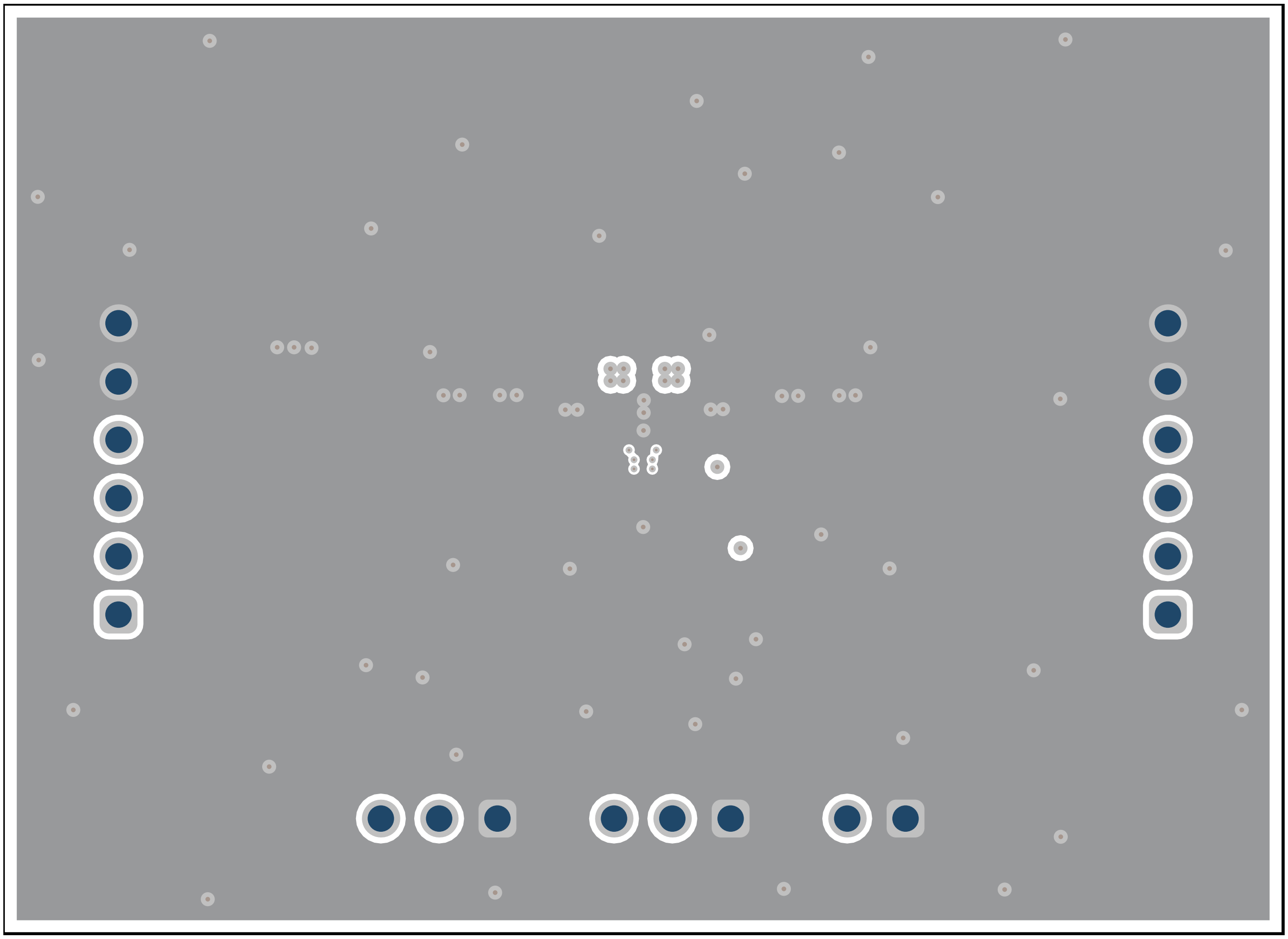

Figure 5. Signal Layer 2

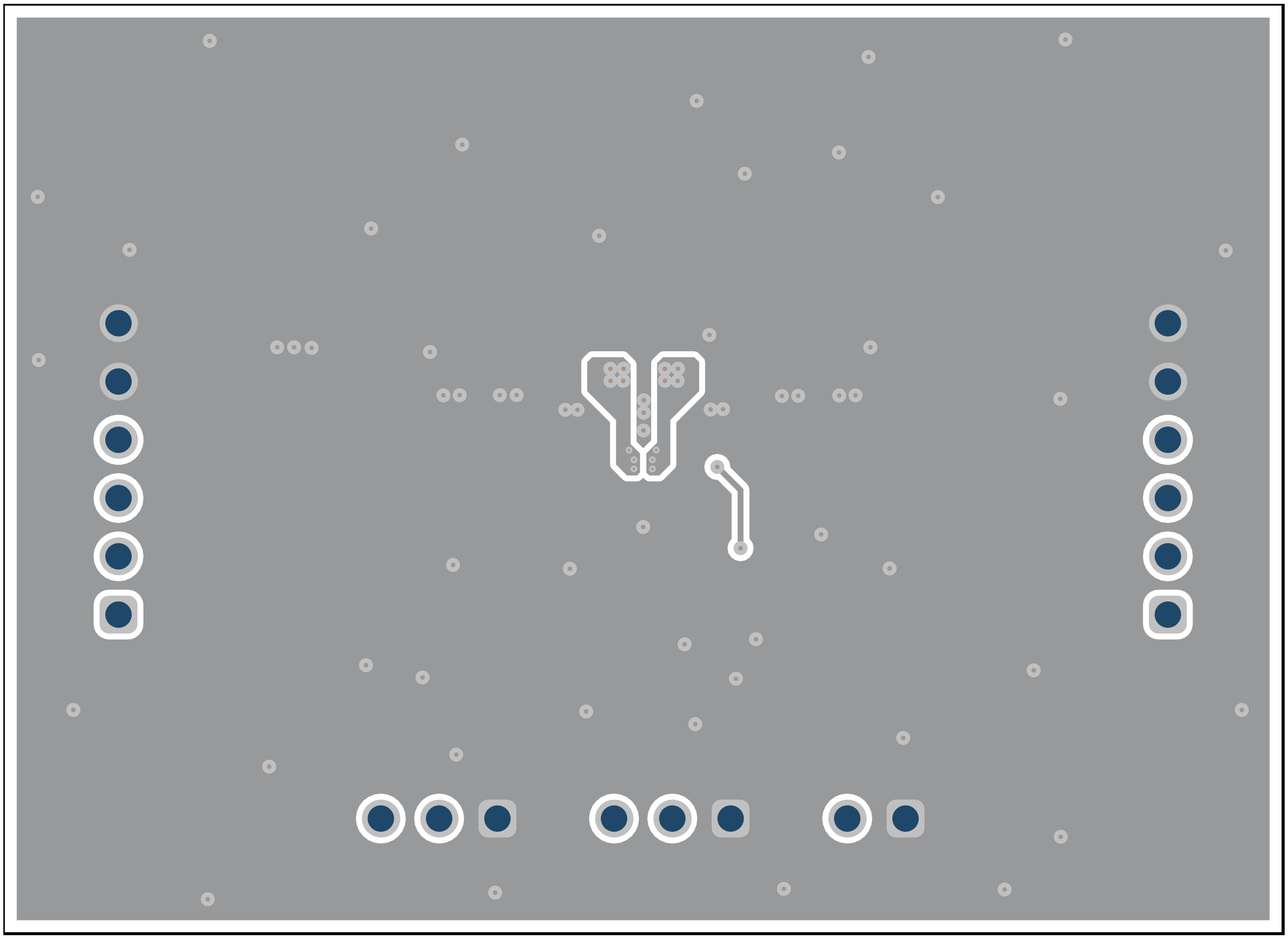

Figure 6. Bottom Layer Routing

4 Schematic and Bill of Materials

This section provides the TPS63806EVM schematic and bill of materials.

4.1 Schematic

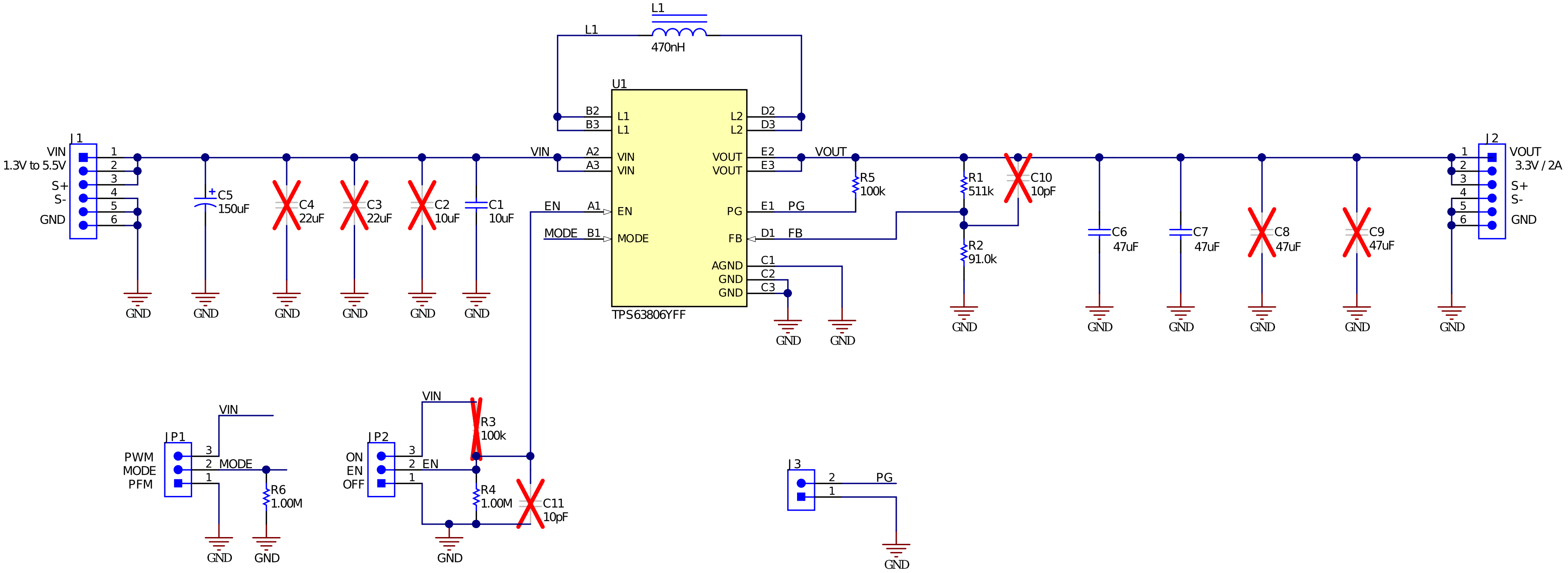

Figure 7. Schematic

4.2 Bill of Materials

Table 2. TPS63806EVM Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	10 µF	CAP, CERM, 10 µF, 6.3 V, +/- 20%, X5R, 0603	603	GRM188R60J106ME84	Murata
1	C5	150 µF	CAP, TA, 150 µF, 10 V, +/- 20%, 0.005ohm	7343-31	T530D157M010ATE005	Kemet
2	C6, C7	47 uF	CAP, CERM, 47 uF, 6.3 V, +/- 20%, X5R, 0603	603	GRM188R60J476ME15D	Murata
1	L1	470 nH	Inductor, Shielded, Composite, 470 nH, 3.5 A, 7.6 mOhm	4x4x1.5mm	XFL4015-471MEC	Coilcraft
1	R1	511 k	RES, 511 k, 1%, 0.1 W, 0603	603	Std	Std
1	R2	91.0 k	RES, 91.0 k, 1%, 0.1 W, 0603	603	Std	Std
1	R5	100 k	RES, 100 k, 1%, 0.1 W, 0603	603	Std	Std
2	R4, R6	1 M	RES, 1.00 M, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	603	Std	Std
1	U1	-	IC, Single Inductor Buck-Boost Converter	2.3x1.4x0.625mm	TPS63806YFF	TI

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