

TPS628502EVM-092 Evaluation Module

This user's guide describes the characteristics, operation, and use of TI's evaluation module (EVM) for the TPS62850x-Q1, TPS628501-Q1, and TPS628502-Q1 devices. The TPS628502EVM-092 is designed to help the user easily evaluate and test the operation and functionality of the TPS62850x buck converters. The EVM converts a 2.7-V to 6.0-V input voltage to a regulated 1.8-V output voltage that delivers up to 2 A. This user's guide includes setup instructions for the hardware, a printed-circuit board (PCB) layout, a schematic diagram, and a bill of materials (BOM).

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1 Introduction

The TPS62850x device is a high-frequency, synchronous, step-down converter optimized for a small solution size and high efficiency. The devices focus on high-efficiency, step-down conversion over a wide output current range. The internal compensation circuit allows a compact solution and small external components. The device is available in a 2.1-mm × 1.6-mm, incl pins in SOT583 package.

1.1 Performance Specification

Table 1 provides a summary of the TPS628502EVM-092 performance specifications.

Table 1. Performance Specification Summary

SPECIFICATION		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage			2.7		6.0	V
Output voltage setpoint				1.8		V
Output current	TPS628502EVM-092		0		2.0	A

1.2 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate the different adjustable output voltage versions of this integrated circuit (IC). On the EVM, additional input and output capacitors can be added and the switching frequency can be modified.

1.2.1 Input and Output Capacitors

Footprints for an additional input capacitor (C11) and output capacitors (C9 and C10) are provided. These capacitors are not required for proper operation but can be used to reduce the input and output voltage ripple and to improve the load transient response. For proper operation, the total output capacitance must remain within the recommended range described in the [TPS62850x-Q1 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package data sheet](#).

1.2.2 Adjustable-Output IC U1 Operation

U1 is configured for evaluation of the adjustable-output version. This unit is set to 1.8 V. Resistors R1 and R2 can be used to set the output voltage between 0.6 V and 5.5 V. For recommended values, see the [TPS62850x-Q1 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package data sheet](#).

1.2.3 Fix-Output IC U1 Operation

U1 can be replaced with the fixed output voltage version of the IC for evaluation. For fixed output voltage version operation, replace R1 with a 0-Ω resistor and remove R2. For recommended values, see the [TPS62850x-Q1 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package data sheet](#).

1.2.4 Feedforward Capacitor

C8 is the feedforward capacitor. For recommended values, see the [TPS62850x-Q1 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package data sheet](#).

1.2.5 Switching Frequency and Control Loop Compensation

R4 controls the switching frequency of the converter. It is also used to select a predefined control loop compensation setting. For recommended values, see the [TPS62850x-Q1 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package data sheet](#).

2 Setup

This section describes how to correctly use the TPS628502EVM-092.

2.1 Connector Descriptions

J1, Pin 1 and 2 – VIN	Positive input voltage connection from the input supply for the EVM
J1, Pin 3 and 4 – S+/S–	Input voltage sense connections. Measure the input voltage at this point.
J1, Pin 5 and 6 – GND	Input return connection from the input supply for the EVM
J2, Pin 1 and 2 – VOUT	Positive output voltage connection
J2, Pin 3 and 4 – S+/S–	Output voltage sense connections. Measure the output voltage at this point.
J2, Pin 5 and 6 – GND	Output return connection
JP1 – EN	EN pin jumper. Place the supplied jumper across ON and EN to turn on the IC. Place the jumper across OFF and EN to turn off the IC.
JP2 – MODE/SYNC	MODE/SYNC pin jumper. Place the supplied jumper across VIN and MODE/SYNC to force the device in fixed frequency PWM operation at all load currents. Place the jumper across MODE/SYNC and GND to enable power save mode. Connect a clock signal to MODE/SYNC referenced to GND to synchronize the switching frequency to the clock signal.
JP3 – PG	The PG output appears on pin 1 of this header with a convenient ground on pin 2.

2.2 Hardware Setup

To operate the EVM, set jumpers JP1 and JP2 to the desired positions per [Section 2.1](#). Connect the input supply to J1 between VIN and GND and connect the load to J2 between VOUT and GND.

3 TPS628502EVM-092 Test Results

The TPS628502EVM-092 was used to take the typical characteristics data in the TPS62850x-Q1 data sheet. See the [TPS62850-Q1 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package data sheet](#) for the performance of this EVM.

4 Board Layout

This section provides the TPS628502EVM-092 board layout. The Gerber files are available on the [TPS628502EVM-092](#) tool page.

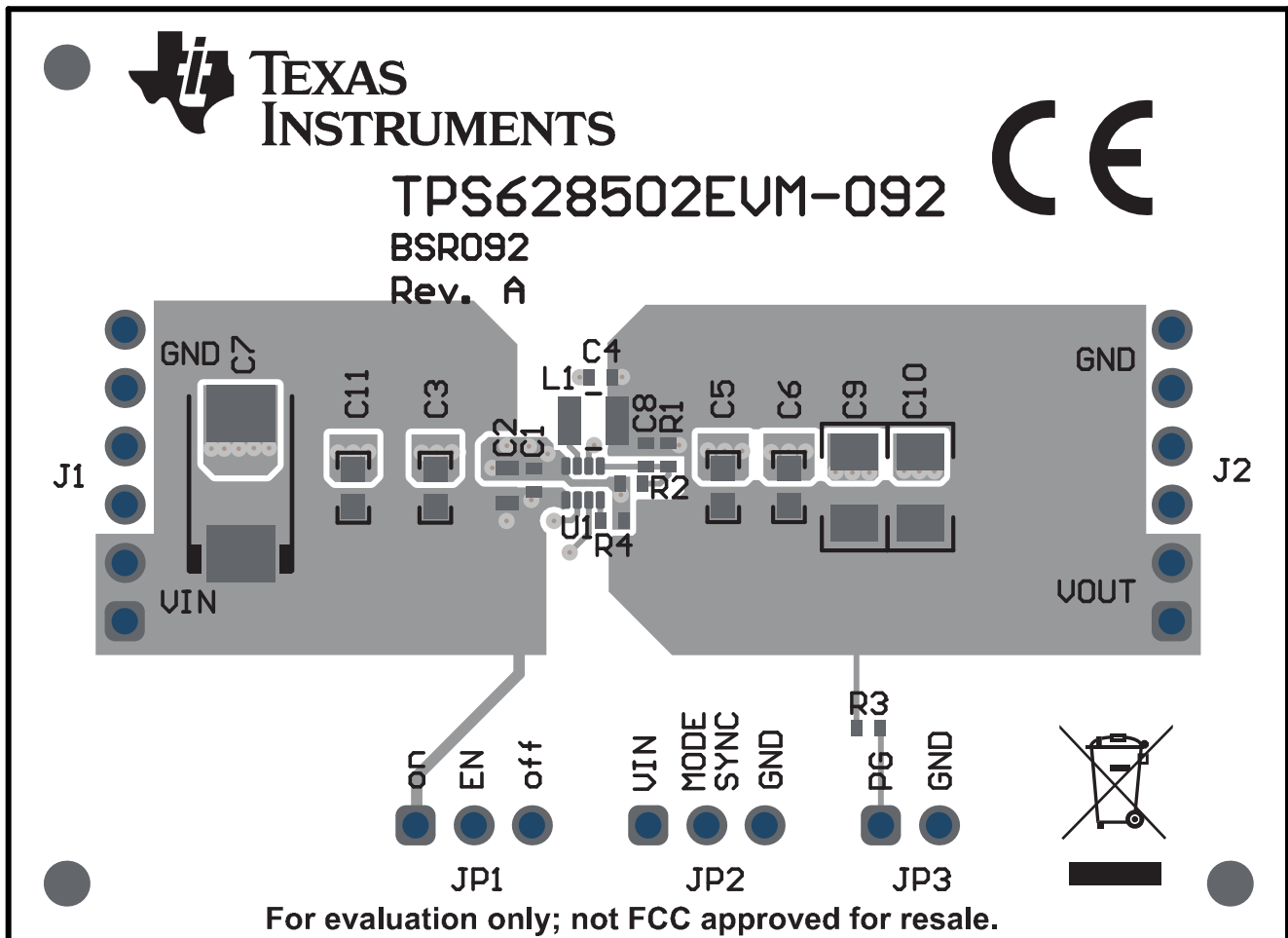


Figure 1. Top Silk

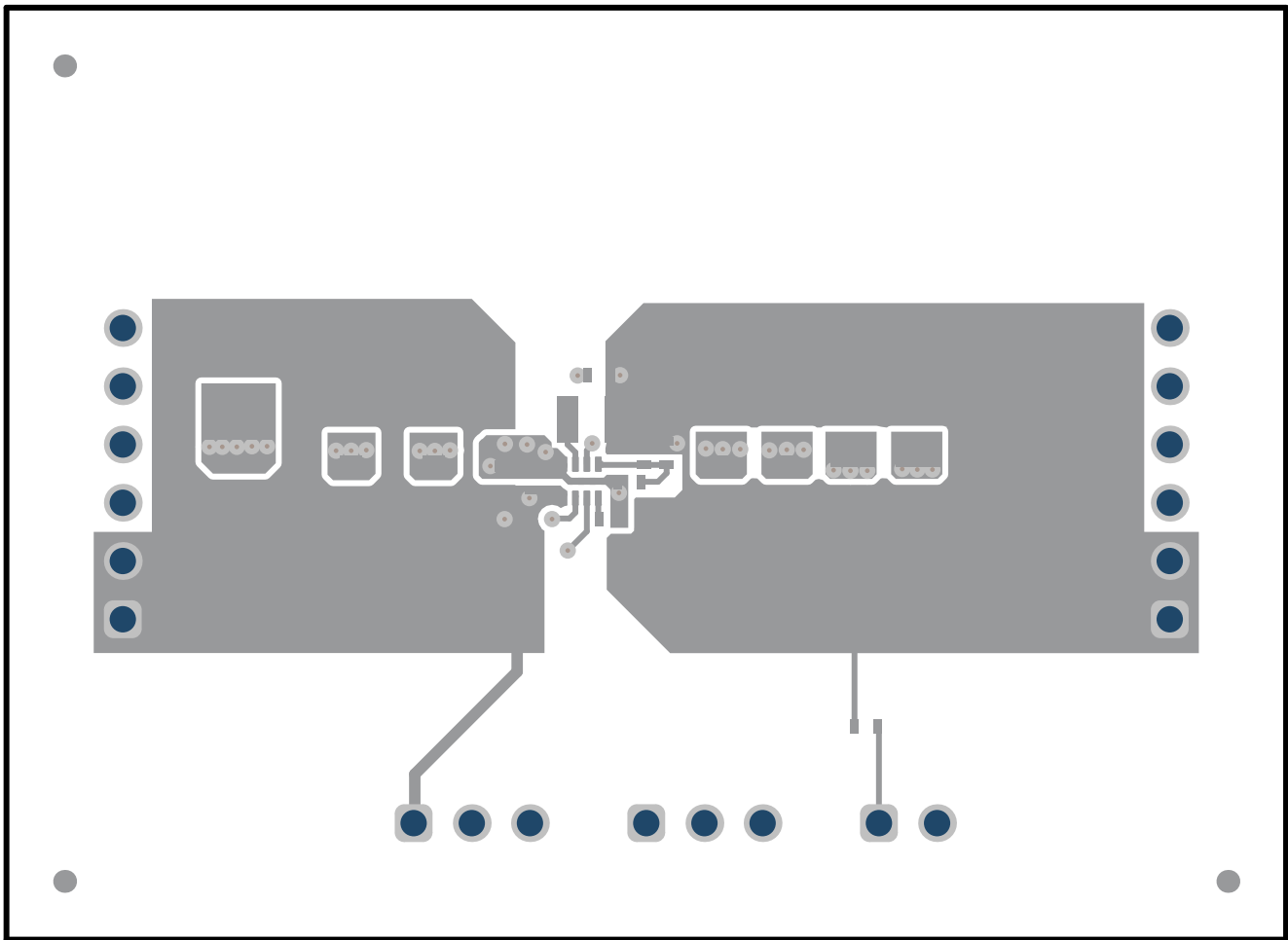


Figure 2. Top Layer

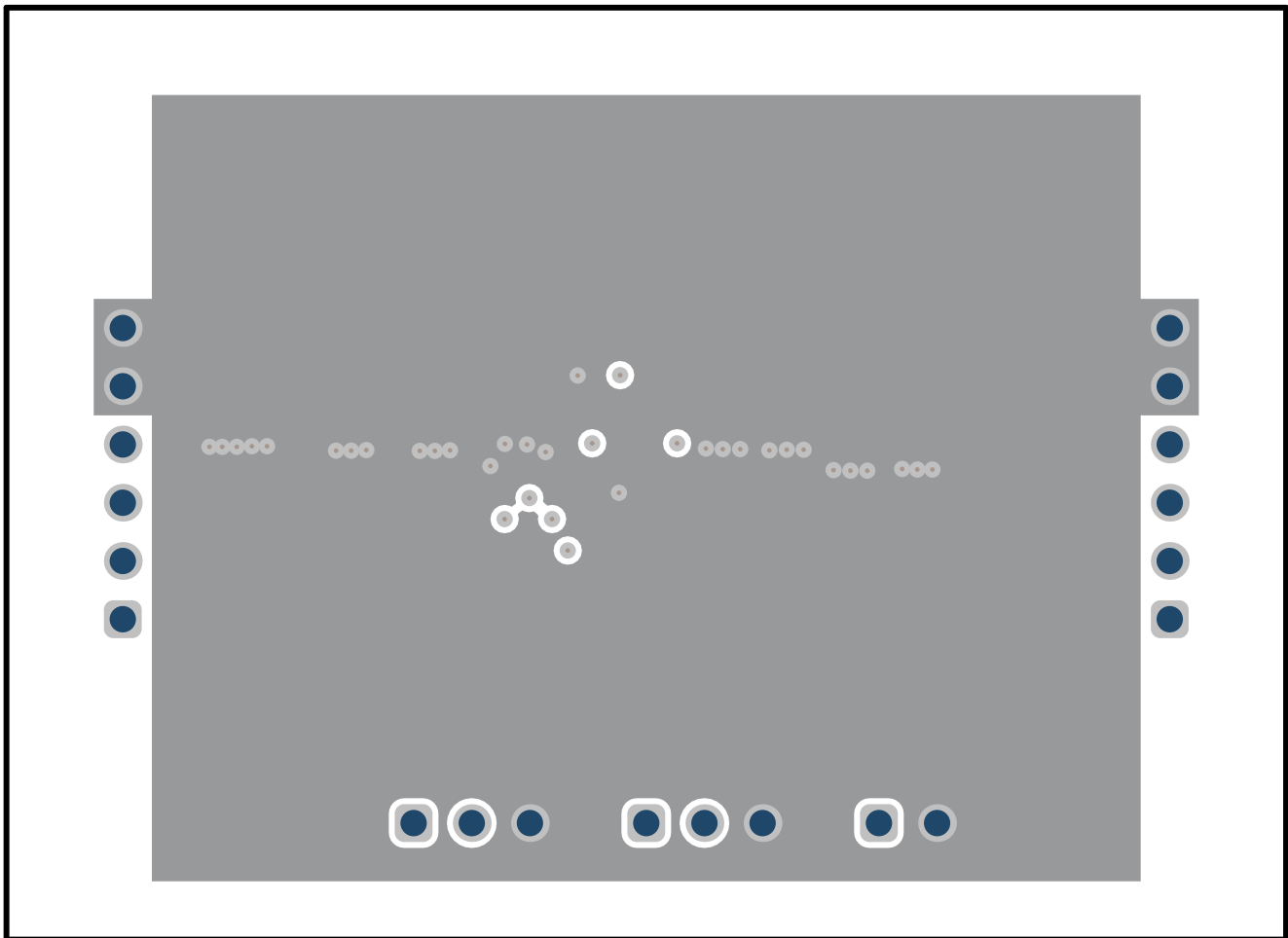


Figure 3. Layer 2

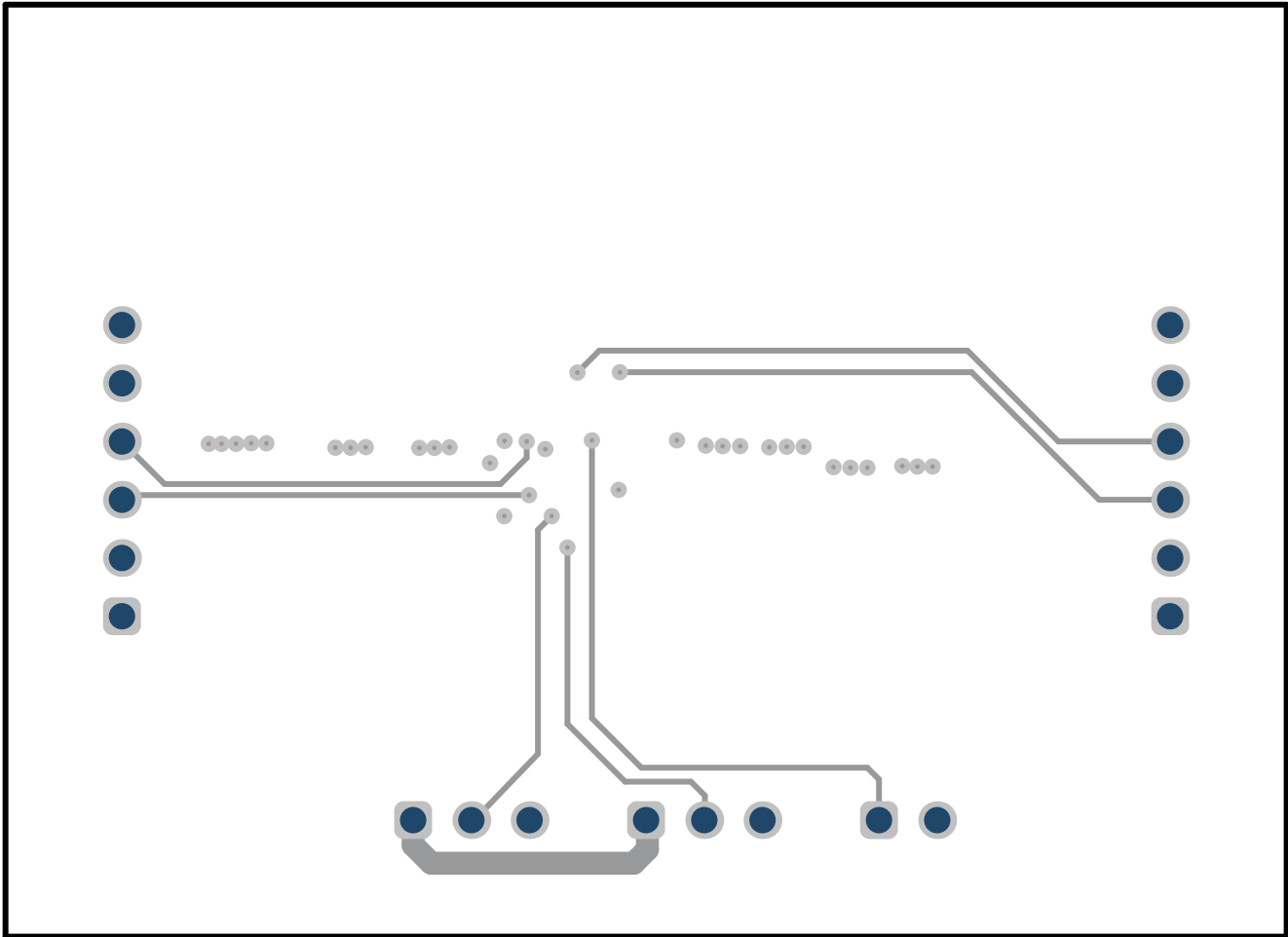


Figure 4. Layer 3

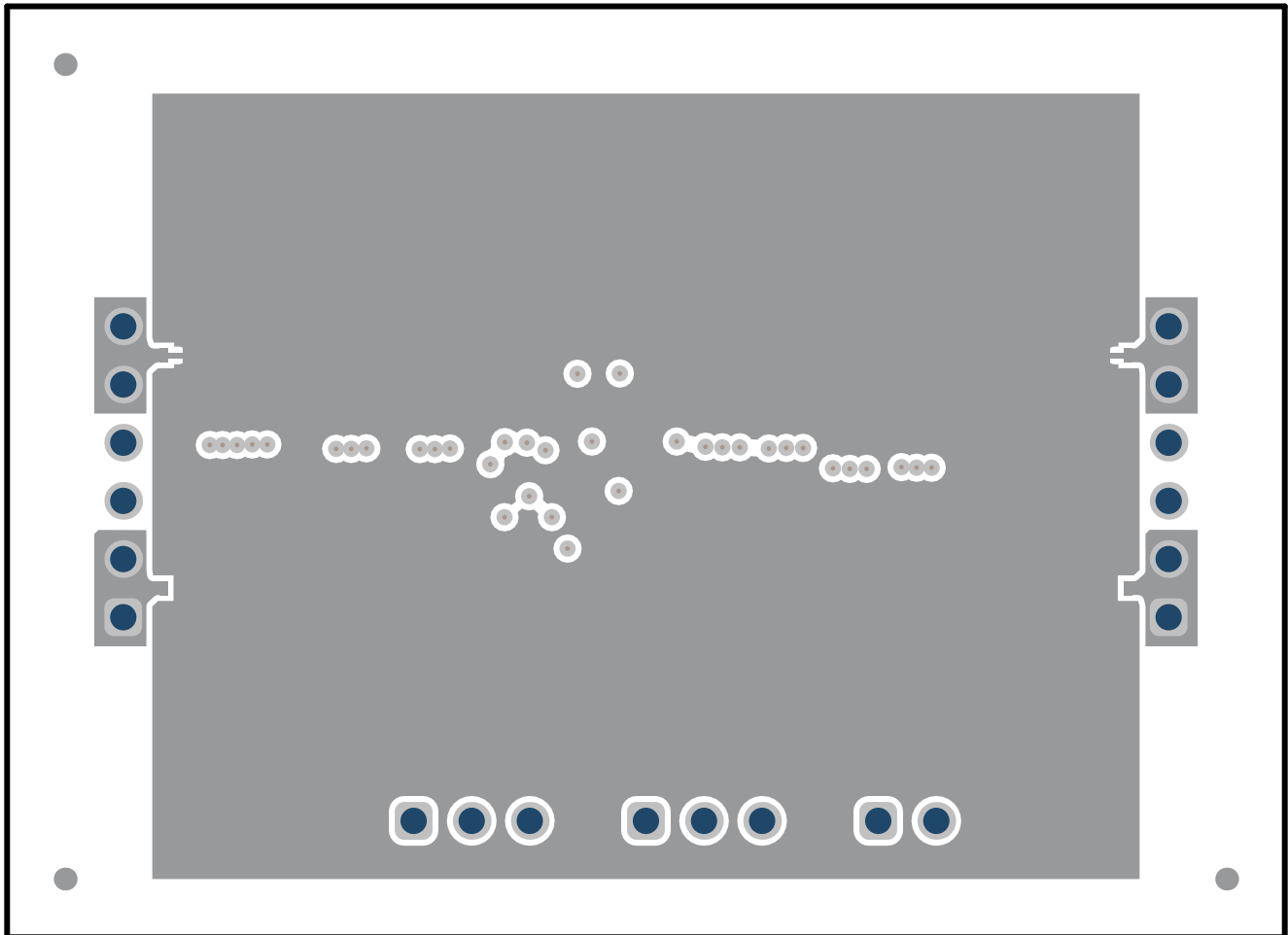


Figure 5. Bottom Layer

5 Schematic and Bill of Materials

This section includes the TPS628502EVM-092 schematic and bill of materials.

5.1 Schematic

Figure 6 shows the EVM schematic.

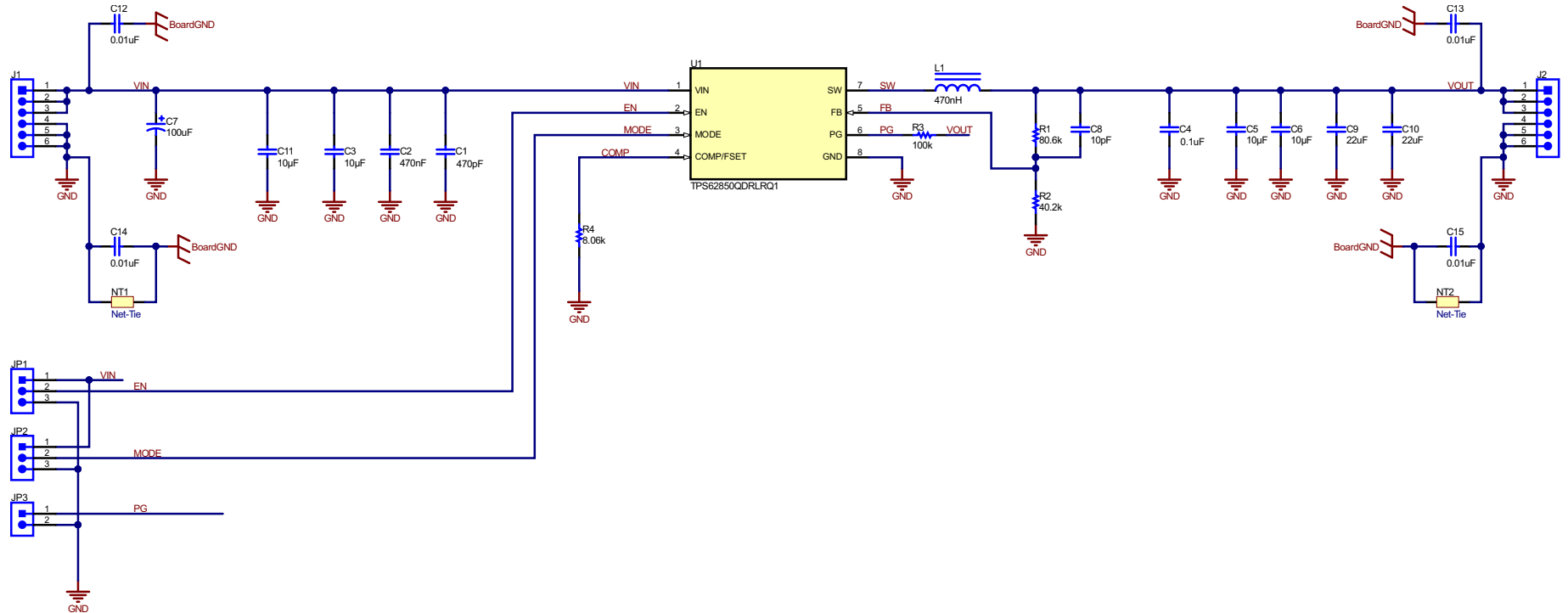


Figure 6. TPS628502EVM-092 Schematic

5.2 Bill of Materials

Table 2 lists the BOM for this EVM.

Table 2. TPS628502EVM-092 BOM

QTY	REF DES	VALUE	DESCRIPTION	SIZE	PART NUMBER	MFR
1	C1	470 pF	Ceramic Capacitor, 50 V, X7R	0402		any
1	C2	0.47 μ F	Ceramic Capacitor, 16 V, X7R	0603	GRM188R71C474KA88D	MuRata
3	C3, C5, C6,C11	10 μ F	Ceramic Capacitor, 10 V, X7R	0603	GRM188Z71A106MA73D	MuRata
1	C4	0.1 μ F	Ceramic Capacitor, 16 V, X7R	0402		any
1	C7	100 μ F	Polymer Capacitor, 20 V	7.3x4.3 mm	20TQC100MYF	Panasonic
1	C8	10 pF	Ceramic Capacitor, 50 V, COG/NPO	0402	GCM1555C1H100JA16D	MuRata
2	C9, C10	22 μ F	Ceramic Capacitor, 10 V, X7R	1206	GCM31CR71A226KE02	MuRata
1	L1	470 nH	Inductor	1008	DFE252012PD-R47M	MuRata Toko
1	R1	80.6 k Ω	Resistor 1%, 0.1 W	0402		any
1	R2	40.2 k Ω	Resistor 1%, 0.1 W	0402		any
1	R3	100 k Ω	Resistor 1%, 0.1 W	0402		any
1	R4	8.06 k Ω	Resistor 1%, 0.1 W	0402		any
1	U1		2.7-V to 6-V Adjustable-Frequency Step-Down Converter	SOT583	TPS628502QDRLRQ1	Texas Instruments

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