



## ABSTRACT

The TPS62851xEVM-139 facilitates the evaluation of the TPS62851x 0.5-A, 1-A and 2-A pin to pin compatible step-down converters in a 2.1-mm × 1.6-mm (including pins) in SOT583 package. BSR139-001 uses the 2-A TPS628512 device, BSR139-002 uses the 1-A TPS628511 device and BSR139-003 uses the 0.5-A TPS628510 device. The EVMs regulate the output voltage to 1.8 V from input voltage from 2.7 V to 6 V. This user's guide describes the characteristics, operation, and use of the TPS62851xEVM-139 Evaluation Module (EVM) with a complete schematic diagram, printed circuit board layouts, and bill of materials are included in this document.

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## 1 Introduction

The TPS62851x device is a synchronous, step-down converter optimized for a small solution size and high efficiency. The devices focus on high-efficiency, step-down conversion over a different 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 (including pins) in SOT583 package.

### 1.1 Performance Specifications

Table 1-1 provides a summary of the TPS62851xEVM-139 performance specifications.

**Table 1-1. Performance Specifications Summary**

SPECIFICATIONS		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage			2.7		6.0	V
Output voltage setpoint				1.8		V
Output current	TPS628510EVM-139		0		0.5	A
	TPS628511EVM-139		0		1.0	A
	TPS628512EVM-139		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 soft-start time 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 [TPS62851x 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 [TPS62851x 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package Data Sheet](#).

#### 1.2.3 Feedforward Capacitor

C8 is the feedforward capacitor. For recommended values, see the [TPS62851x 2.7-V to 6-V Adjustable-Frequency Step-Down Converter in SOT583 Package Data Sheet](#).

#### 1.2.4 Soft-Start Time

C16 controls the soft-start time of the converter. It can be changed for a faster or slower ramp up of output voltage. For recommended values, see the [TPS62851x 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 TPS62851xEVM-139.

### 2.1 Connector Descriptions

<b>J1, Pin 1 and 2 – VIN</b>	Positive input voltage connection from the input supply for the EVM
<b>J1, Pin 3 and 4 – S+/S–</b>	Input voltage sense connections. Measure the input voltage at this point.
<b>J1, Pin 5 and 6 – GND</b>	Input return connection from the input supply for the EVM
<b>J2, Pin 1 and 2 – VOUT</b>	Positive output voltage connection
<b>J2, Pin 3 and 4 – S+/S–</b>	Output voltage sense connections. Measure the output voltage at this point.
<b>J2, Pin 5 and 6 – GND</b>	Output return connection
<b>JP1 – EN</b>	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.
<b>JP2 – MODE/SYNC</b>	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.
<b>JP3 – PG</b>	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 TPS62851xEVM-139 Test Results

The TPS62851xEVM-139 was used to take the typical characteristics data in the TPS62851x data sheet. See the [TPS62851x 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 TPS62851xEVM-139 board layout. See the [TPS62851xEVM-139](#) tool page for more detail.

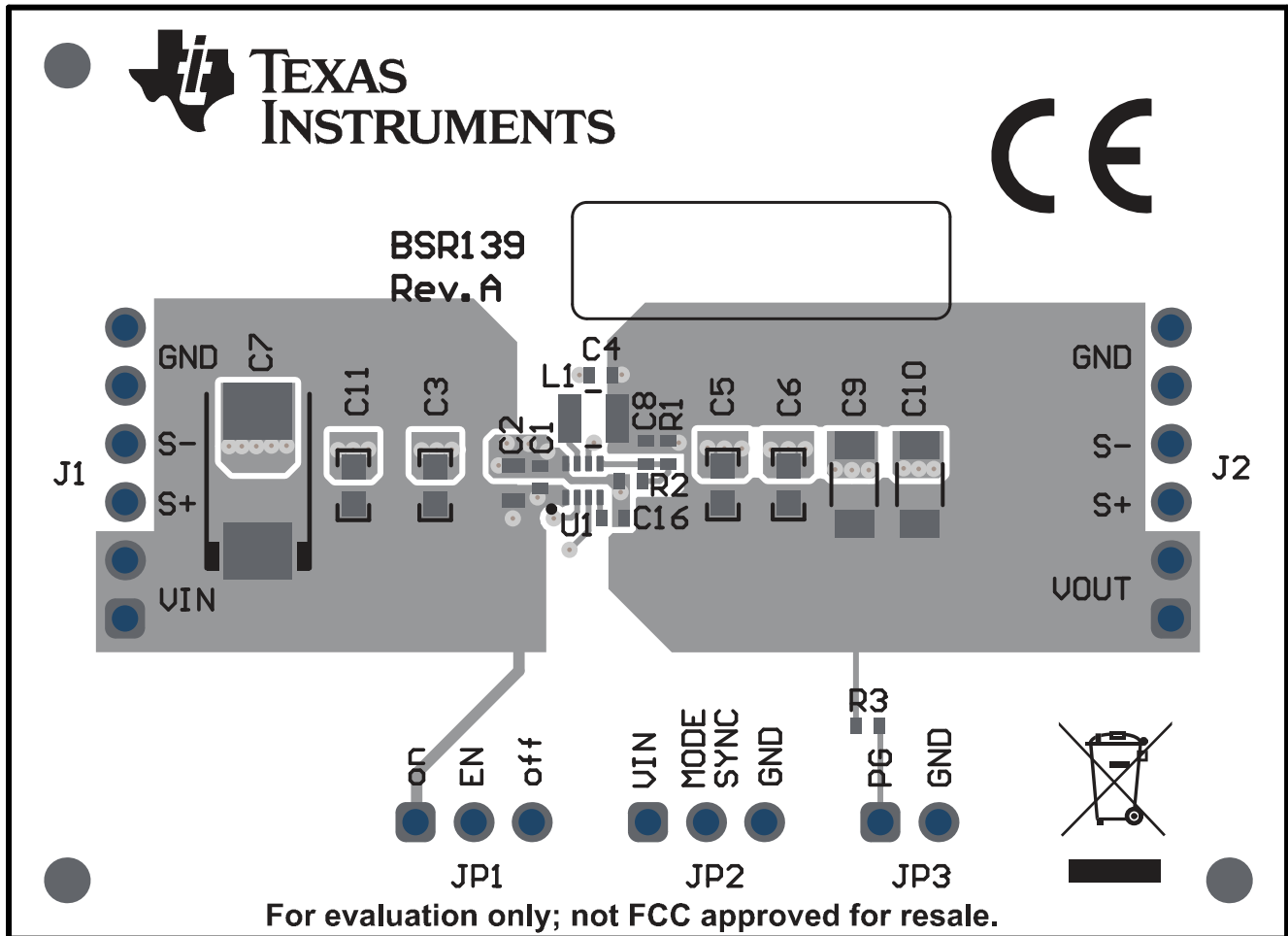
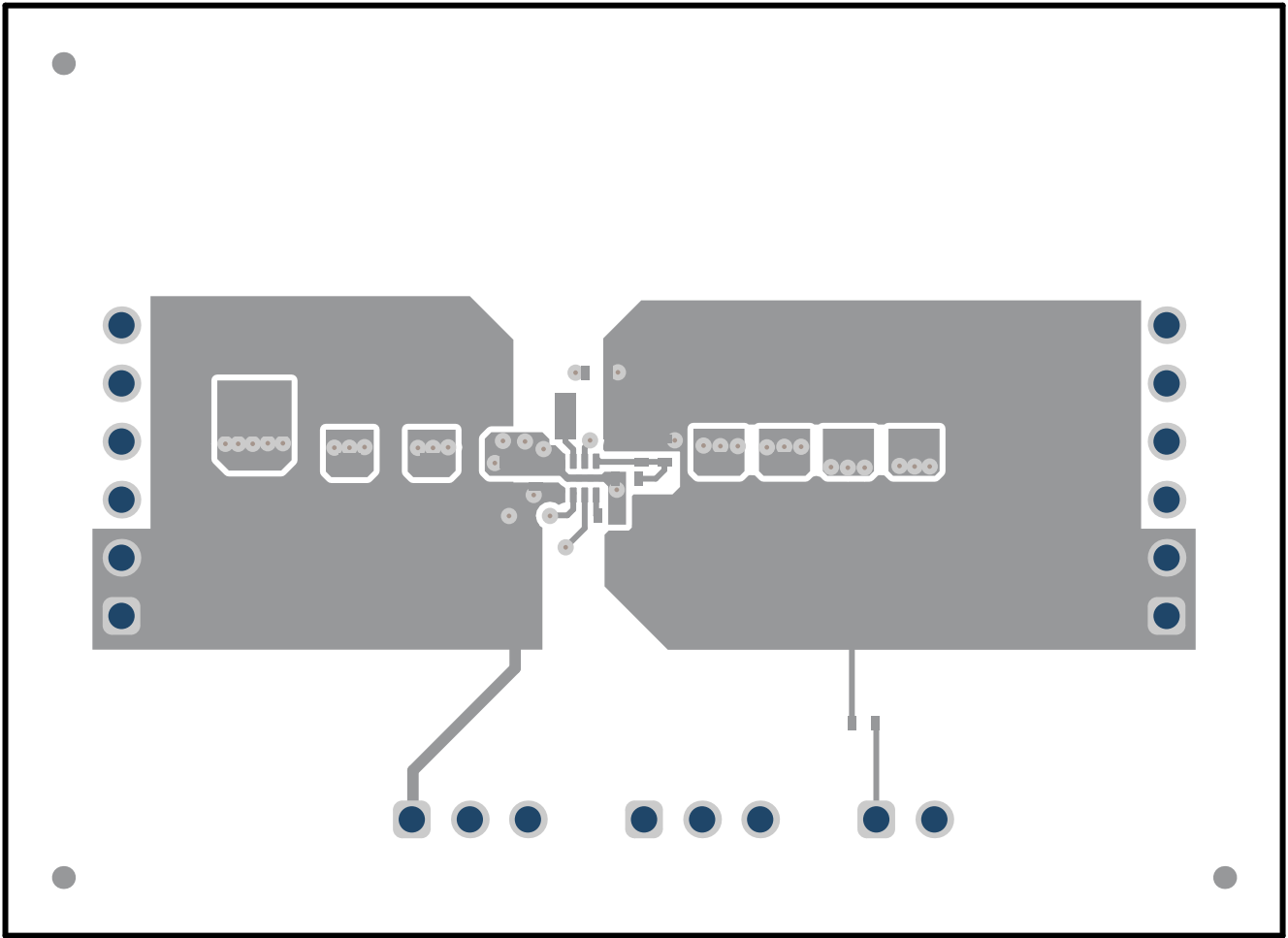
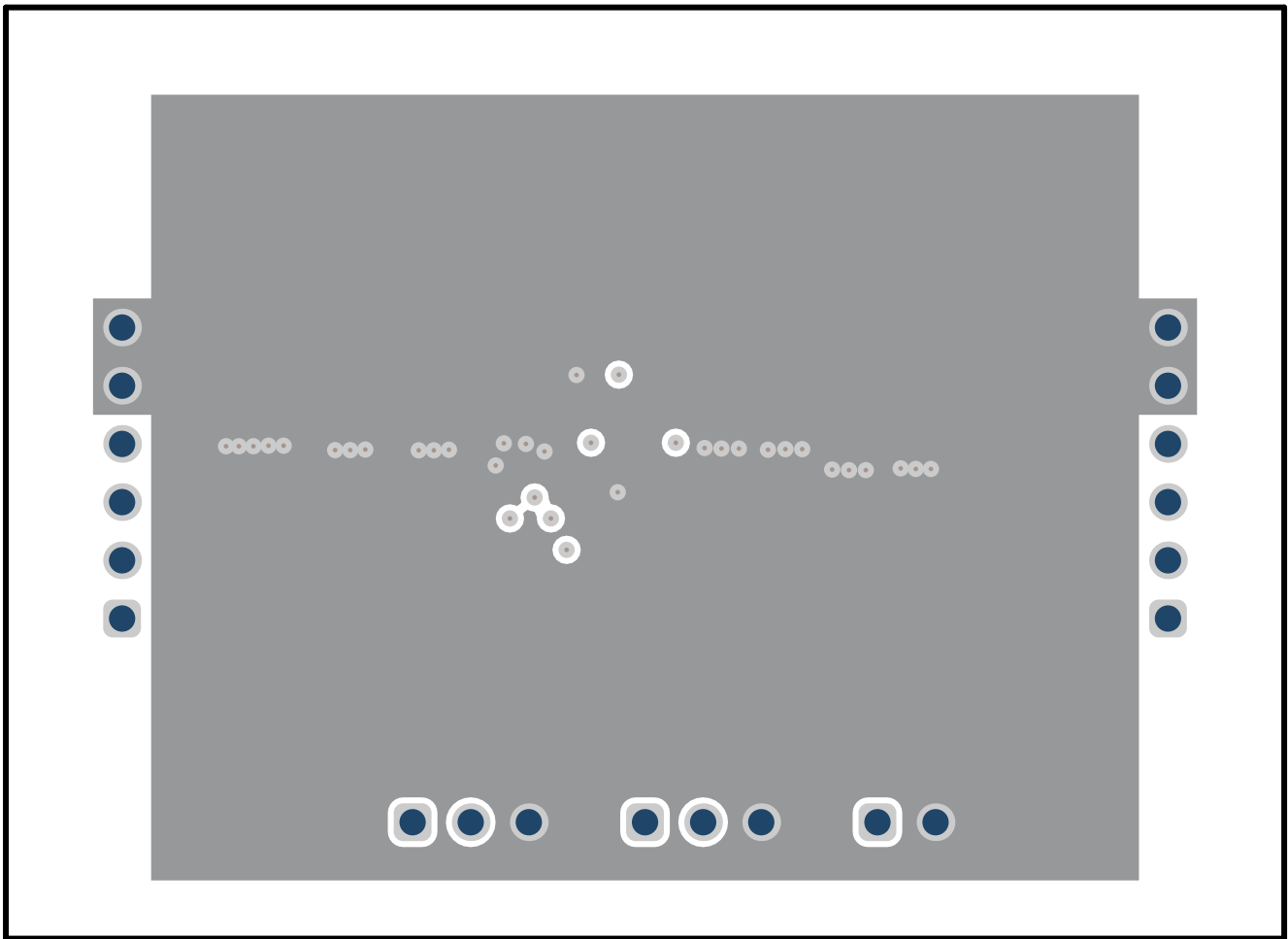


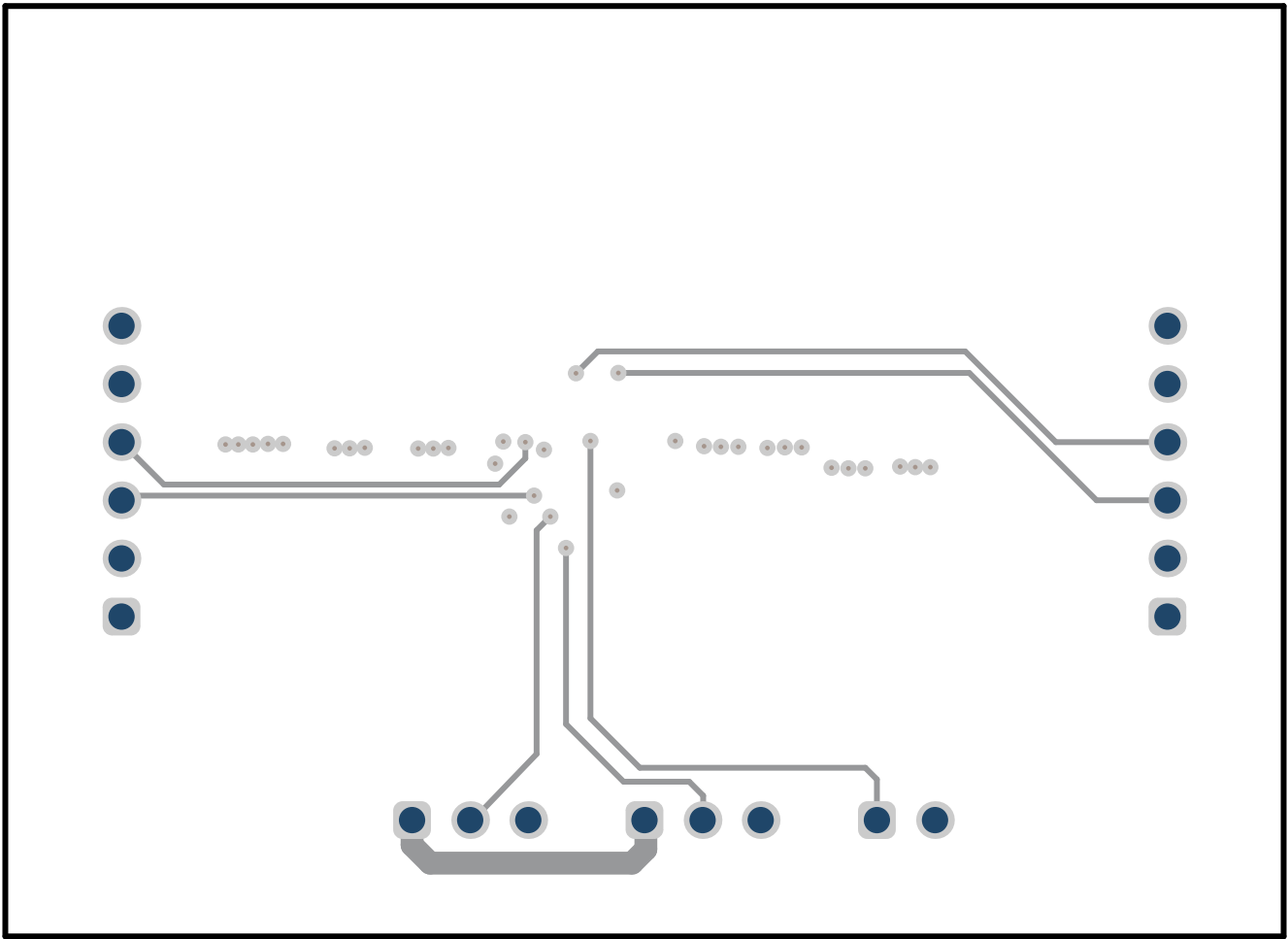
Figure 4-1. Top Silk



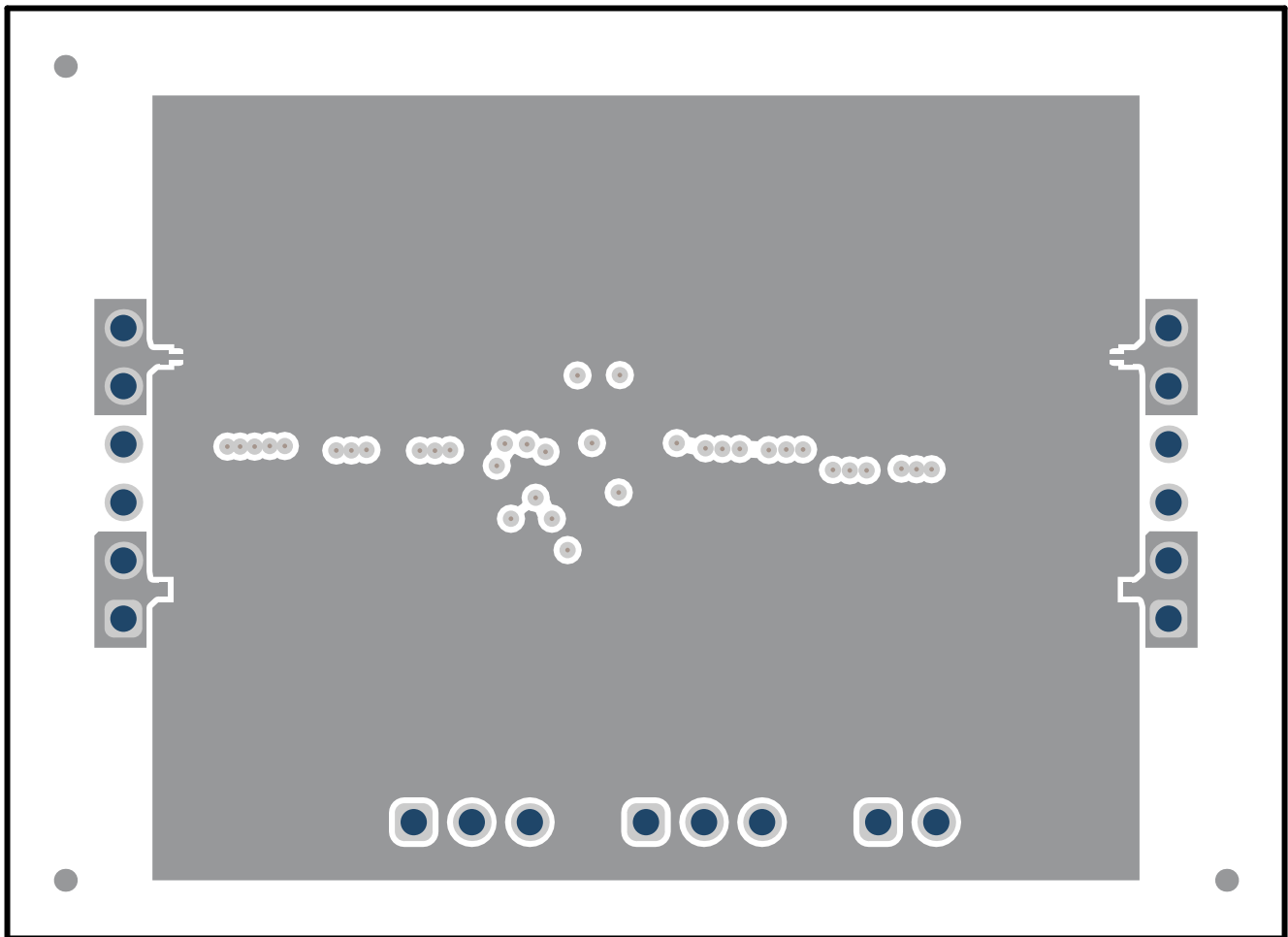
**Figure 4-2. Top Layer**



**Figure 4-3. Layer 2**



**Figure 4-4. Layer 3**



**Figure 4-5. Bottom Layer**



## 5 Schematic and Bill of Materials

This section includes the TPS62851xEVM-139 schematic and bill of materials.

### 5.1 Schematic

Figure 5-1 shows the EVM schematic.

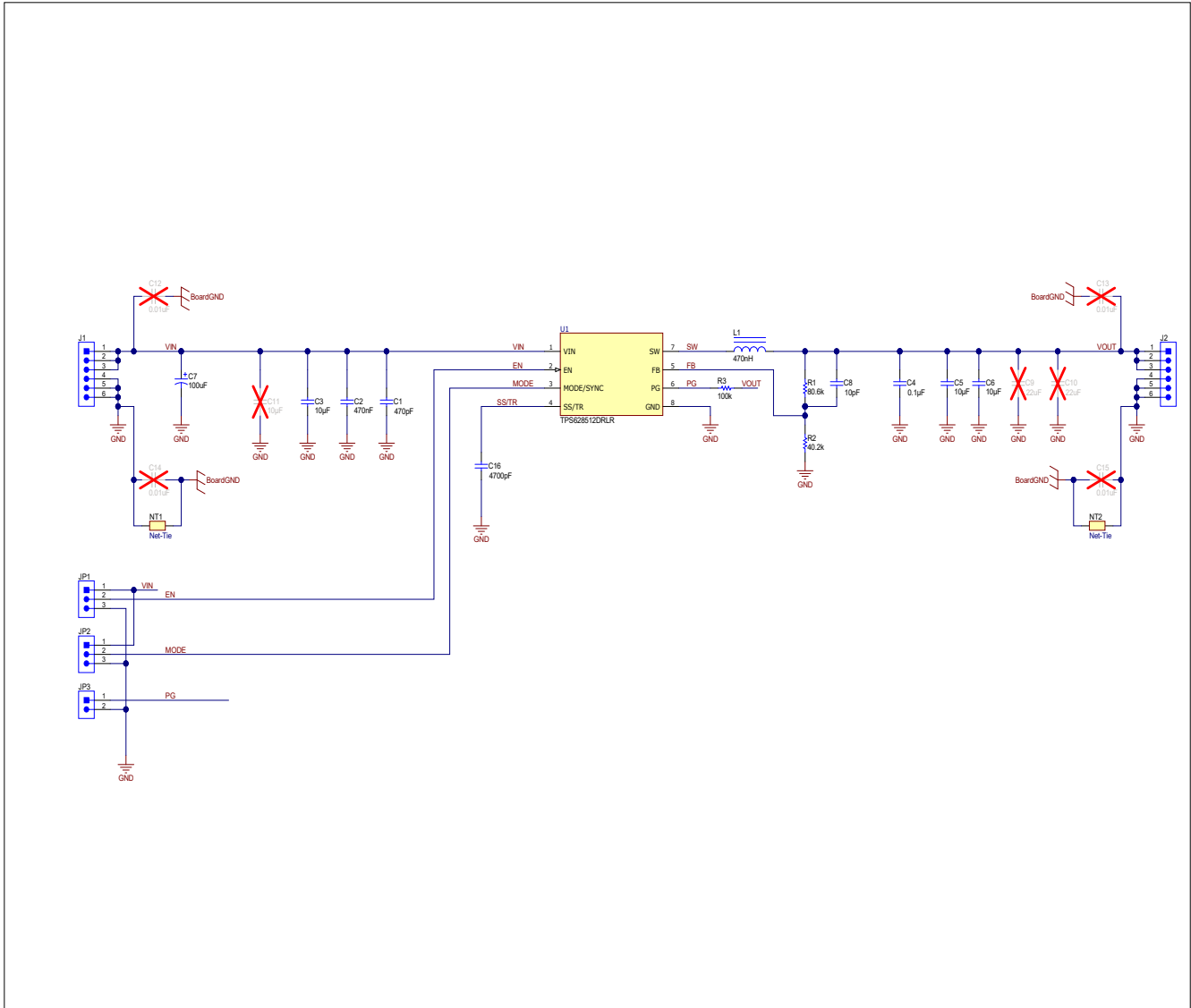


Figure 5-1. TPS62851xEVM Schematic

## 5.2 Bill of Materials

Table 5-1 lists the BOM for this EVM.

**Table 5-1. TPS62851xEVM-139 BOM**

QTY			REF DES	VALUE	DESCRIPTION	SIZE	PART NUMBER	MFR
-001	-002	-003						
1	1	1	C1	470 pF	Ceramic Capacitor, 50 V, X7R	0402		any
1	1	1	C2	0.47 μF	Ceramic Capacitor, 16 V, X7R	0603	GRM188R71C474KA88 D	MuRata
3	3	3	C3, C5, C6,C11	10 μF	Ceramic Capacitor, 10 V, X7R	0603	GRM188Z71A106MA73 D	MuRata
1	1	1	C4	0.1 μF	Ceramic Capacitor, 16 V, X7R	0402		any
1	1	1	C7	100 μF	Polymer Capacitor, 20 V	7.3x4.3 mm	20TQC100MYF	Panasonic
1	1	1	C8	10 pF	Ceramic Capacitor, 50 V, COG/NPO	0402	GCM1555C1H100JA16 D	MuRata
2	2	2	C9, C10	22 μF	Ceramic Capacitor, 10 V, X7R	1206	GCM31CR71A226KE02	MuRata
1	1	1	L1	470 nH	Inductor	1008	DFE201210U-R47M	MuRata Toko
1	1	1	R1	80.6 kΩ	Resistor 1%, 0.1 W	0402		any
1	1	1	R2	40.2 kΩ	Resistor 1%, 0.1 W	0402		any
1	1	1	R3	100 kΩ	Resistor 1%, 0.1 W	0402		any
1	1	1	R4	8.06 kΩ	Resistor 1%, 0.1 W	0402		any
0	0	1	U1		2.7-V to 6-V Adjustable-Frequency Step-Down Converter	SOT583	TPS628510DRLR	Texas Instruments
0	1	0	U1		2.7-V to 6-V Adjustable-Frequency Step-Down Converter	SOT583	TPS628511DRLR	Texas Instruments
1	0	0	U1		2.7-V to 6-V Adjustable-Frequency Step-Down Converter	SOT583	TPS628512DRLR	Texas Instruments

## 6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (August 2020) to Revision A (June 2021)	Page
• Added the TPS628510.....	<a href="#">2</a>

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Last updated 10/2025