



## ABSTRACT

The TPS6285xEVM-139 facilitates the evaluation of the TPS6285x 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 and BSR139-002 uses the 1-A TPS628511 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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## Trademarks

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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	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-Q1 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.

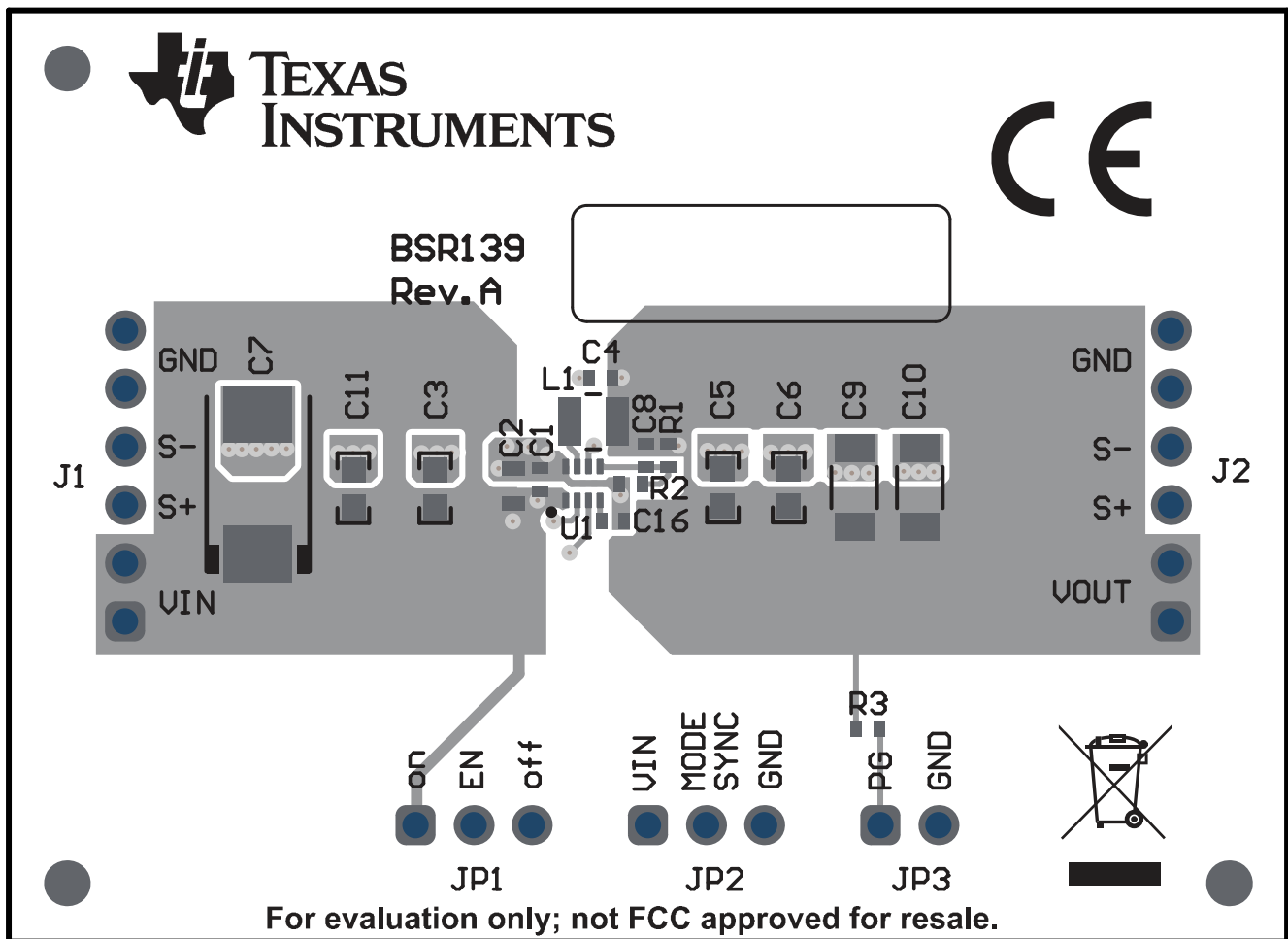


Figure 4-1. Top Silk

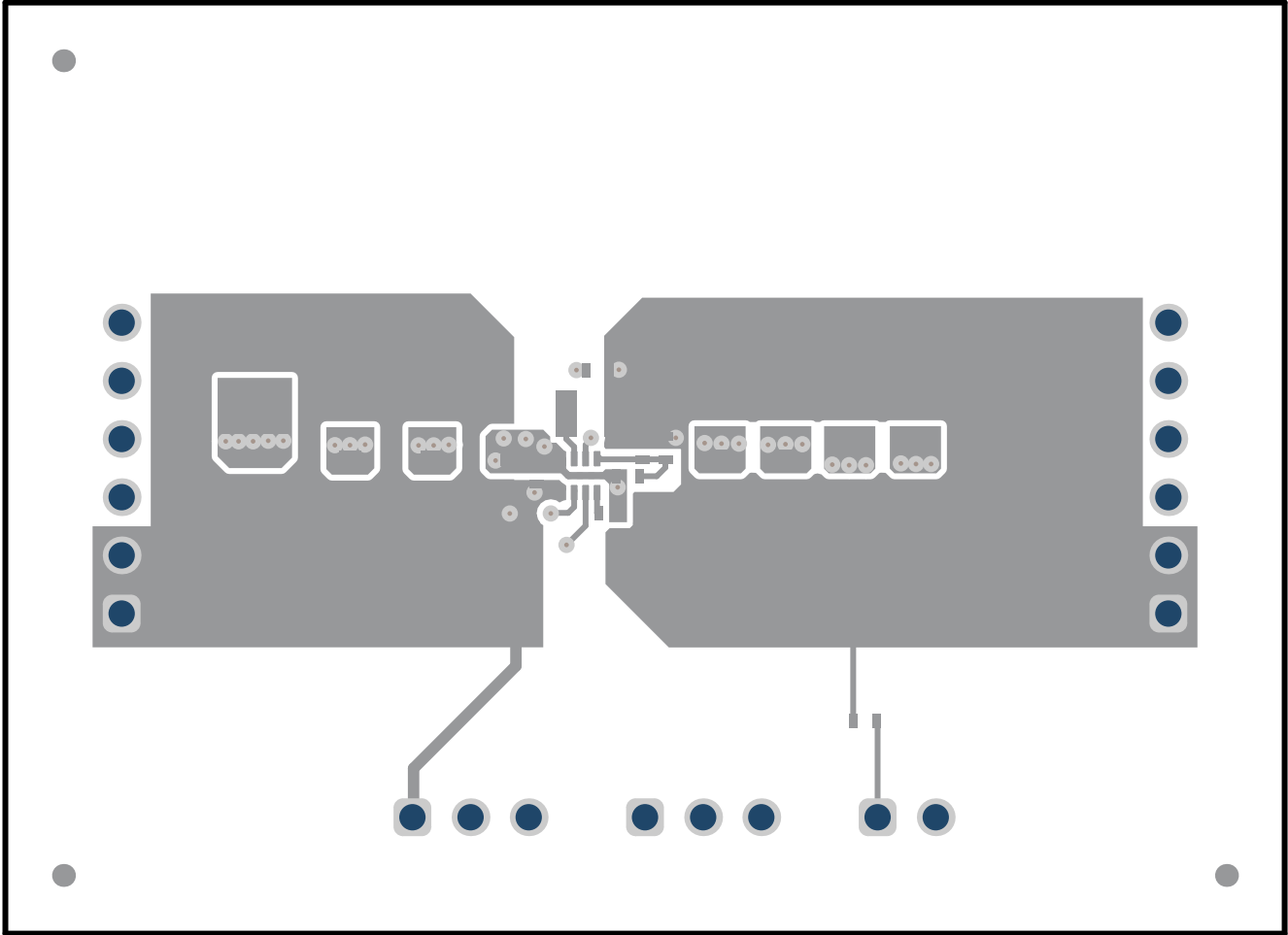


Figure 4-2. Top Layer

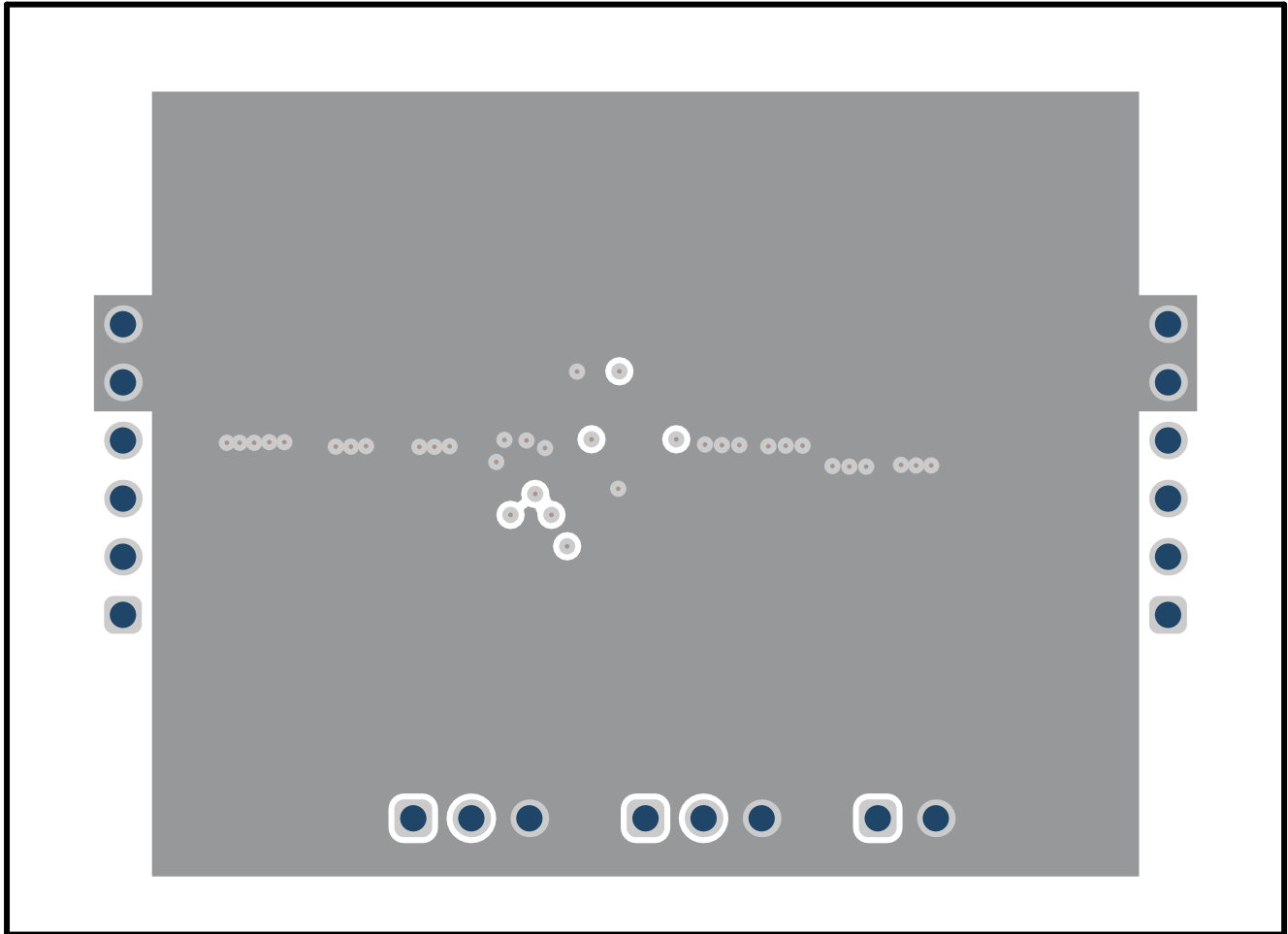


Figure 4-3. Layer 2

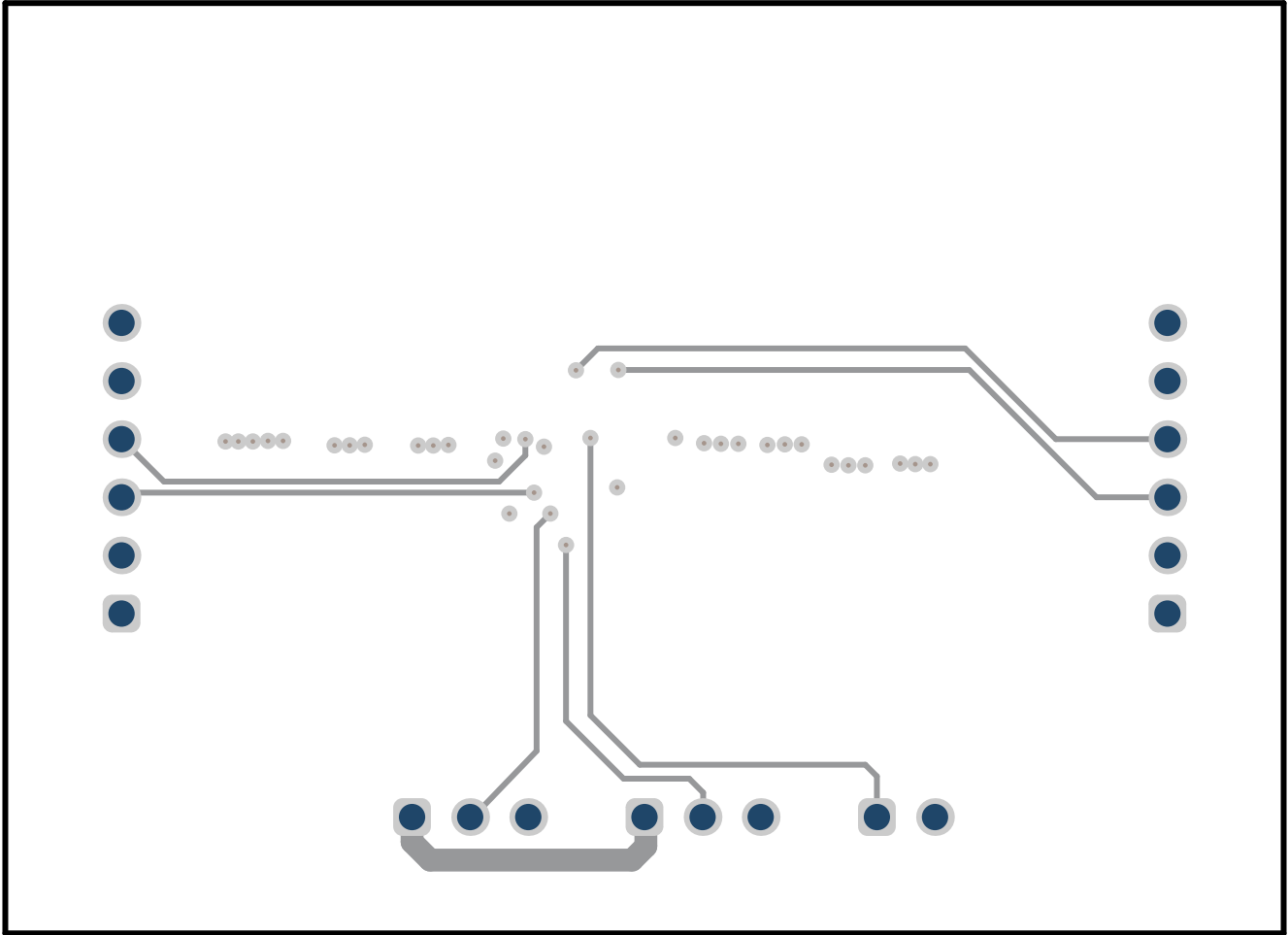


Figure 4-4. Layer 3

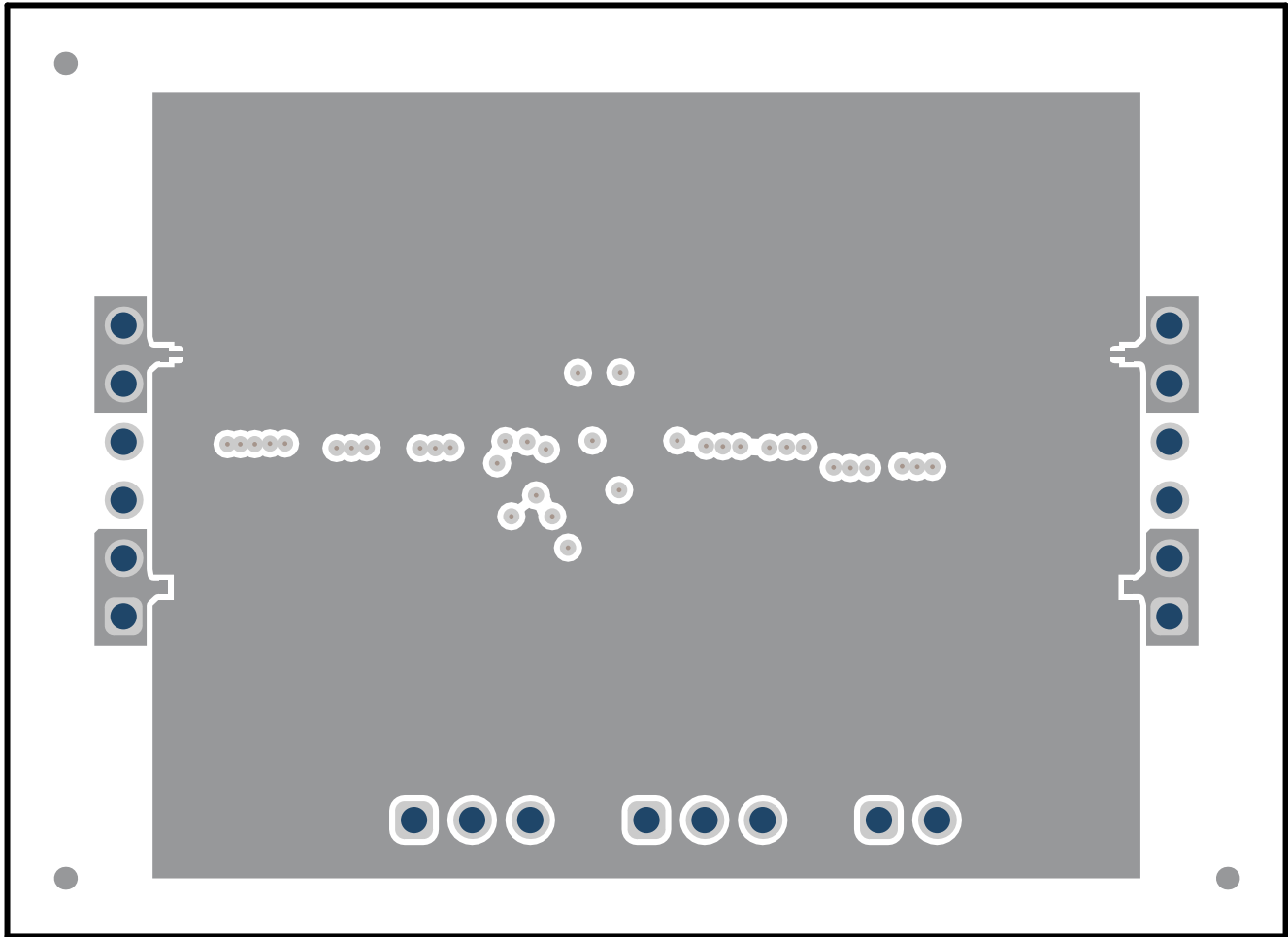


Figure 4-5. Bottom Layer



## 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.

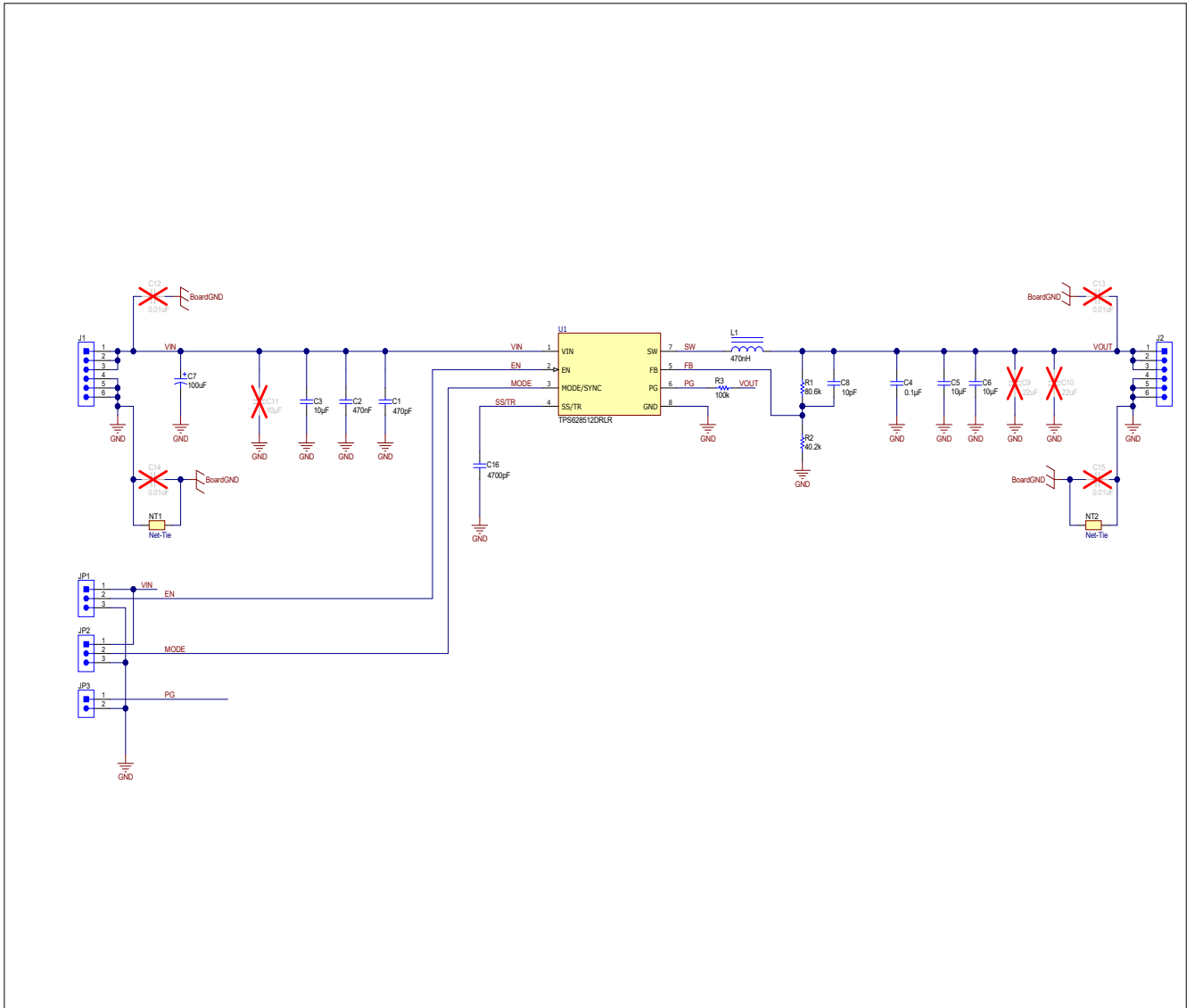


Figure 5-1. TPS62851xEVM Schematic

## 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						
1	1	C1	470 pF	Ceramic Capacitor, 50 V, X7R	0402		any
1	1	C2	0.47 $\mu$ F	Ceramic Capacitor, 16 V, X7R	0603	GRM188R71C474KA88D	MuRata
3	3	C3, C5, C6,C11	10 $\mu$ F	Ceramic Capacitor, 10 V, X7R	0603	GRM188Z71A106MA73D	MuRata
1	1	C4	0.1 $\mu$ F	Ceramic Capacitor, 16 V, X7R	0402		any
1	1	C7	100 $\mu$ F	Polymer Capacitor, 20 V	7.3x4.3 mm	20TQC100MYF	Panasonic
1	1	C8	10 pF	Ceramic Capacitor, 50 V, COG/NPO	0402	GCM1555C1H100JA16D	MuRata
2	2	C9, C10	22 $\mu$ F	Ceramic Capacitor, 10 V, X7R	1206	GCM31CR71A226KE02	MuRata
1	1	L1	470 nH	Inductor	1008	DFE252012PD-R47M	MuRata Toko
1	1	R1	80.6 k $\Omega$	Resistor 1%, 0.1 W	0402		any
1	1	R2	40.2 k $\Omega$	Resistor 1%, 0.1 W	0402		any
1	1	R3	100 k $\Omega$	Resistor 1%, 0.1 W	0402		any
1	1	R4	8.06 k $\Omega$	Resistor 1%, 0.1 W	0402		any
0	1	U1		2.7-V to 6-V Adjustable-Frequency Step-Down Converter	SOT583	TPS628511DRLR	Texas Instruments
1	0	U1		2.7-V to 6-V Adjustable-Frequency Step-Down Converter	SOT583	TPS628512DRLR	Texas Instruments

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This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### **FCC Interference Statement for Class A EVM devices**

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#### **FCC Interference Statement for Class B EVM devices**

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### 3.2 Canada

##### 3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

#### **Concerning EVMs Including Radio Transmitters:**

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

#### **Concernant les EVMs avec appareils radio:**

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

#### **Concerning EVMs Including Detachable Antennas:**

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

### Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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