TPS63027EVM-870

This user's guide describes the characteristics, operation, and use of the TPS63027EVM-870 evaluation module (EVM). This EVM is designed to help the user easily evaluate and test the operation and functionality of the TPS63027. The EVM converts a 2.3-V to 5.5-V input voltage to a regulated 3.3-V output voltage that delivers up to 2 A in boost mode and up to 4A in buck mode. This document includes setup instructions for the hardware, a schematic diagram, a bill of materials (BOM), and printed-circuit board layout drawings for the evaluation module. Throughout this document, the abbreviations *EVM*, *TPS63027EVM-870*, and the term *evaluation module* are synonymous with the TPS63027 evaluation module, unless otherwise noted.

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Trademarks

1 Introduction

The Texas Instruments' TPS63027 is highly efficient, single-inductor, buck-boost converters in a 25 pin, 2.1 mm × 2.1 mm DSBGA package. TPS63027 is an adjustable output voltage converter.

1.1 Background

The TPS63027EVM-870 uses the TPS63027 adjustable version that is programmed with an external feedback divider to an output voltage of 3.3 V.

1.2 Performance Specification

Table 1 provides a summary of the TPS63027EVM-870 performance specifications. All specifications are given for operating in a free-air environment of an ambient temperature of 25°C.

Table 1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage		2.3		5.5	V
Output voltage	PWM Mode		3.3		V
Output current			2		A

1.3 Modification

The output voltage is set to 3.3 V. Resistors R1 and R2 can be used to set the output voltage between 1.0 V and 5.5 V. See the TPS63027 data sheet (SLVSDK8) for recommended values.

2 Setup

This section describes how to properly use the TPS63027EVM-870.

2.1 Input/Output Connector and Header Descriptions

2.1.1 J1 – VIN

Positive input connection from the input supply for the EVM.

2.1.2 J2 – S+/S–

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

2.1.3 J3 – GND

Vin GND return connection from the input supply for the EVM, common with J6.

2.1.4 J4 – VOUT

Positive connection of the output voltage. The load has to be connected between J4 and J6 (GND).

2.1.5 J5 – S+/S–

Header J5 can be used to measure the output voltage directly on the output capacitor.

2.1.6 J6 – GND

Vout GND return connection for the output voltage, common with J3.

2.1.7 JP1 – EN

This jumper enables or disables the TPS63027 on the EVM. Place the jumper across ON and EN to enable the converter. Place the jumper across OFF and EN to disable the converter. A 1-MΩ pullup resistor can be connected between VIN and EN.

2.1.8 JP2 – PFM/PWM (MODE)

This jumper controls the operating mode of the TPS63027 on the EVM. Place the jumper across PWM and MODE to enable forced PWM mode with a constant switching frequency. Place the jumper across PFM and MODE to enable power-save mode with higher efficiency.

2.1.9 J10 - L1 Testpoint Header

This header can be placed to measure the switch pin L1 respective to ground.

2.1.10 J11 - L2 Testpoint Header

This header can be placed to measure the switch pin L2 respective to ground.

2.2 Setup

To operate the EVM, connect an input supply with the positive lead to J1 and negative lead to J3; connect a load with the positive lead to J4 and the negative lead to J6; short EN and ON (pins 2 and 3) of JP1 with a shorting jumper.

3 Board Layout

This section provides the TPS63027EVM-870 board layout and illustrations.

3.1 Layout

Figure 1 through Figure 3 show the TPS63027EVM-870 board layouts.

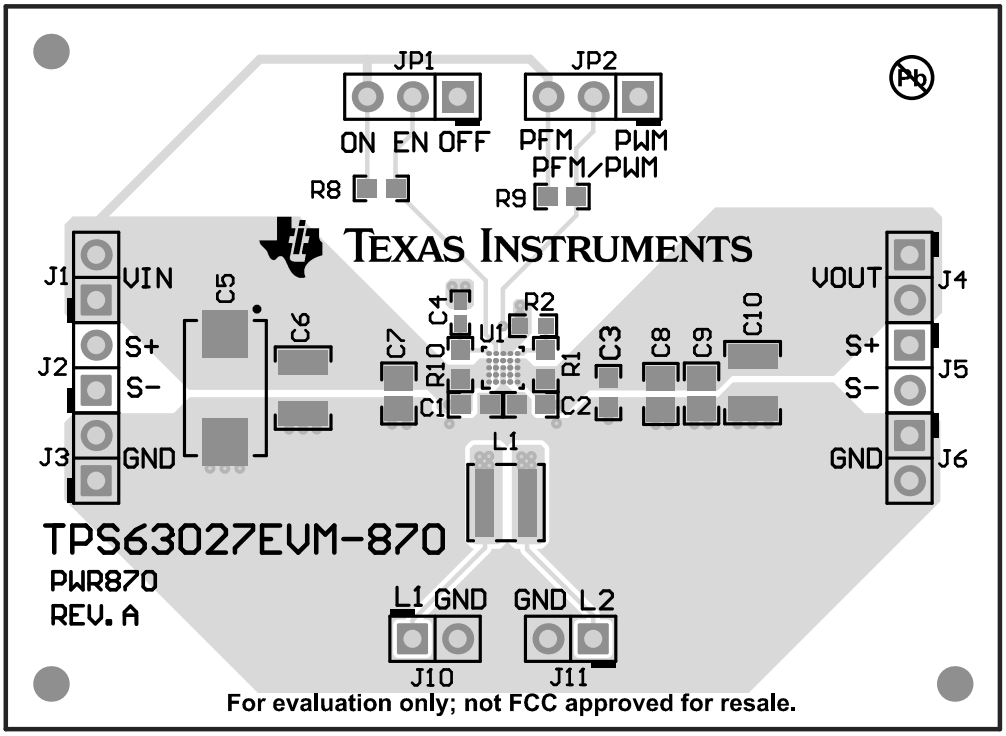

Figure 1. Assembly Layer

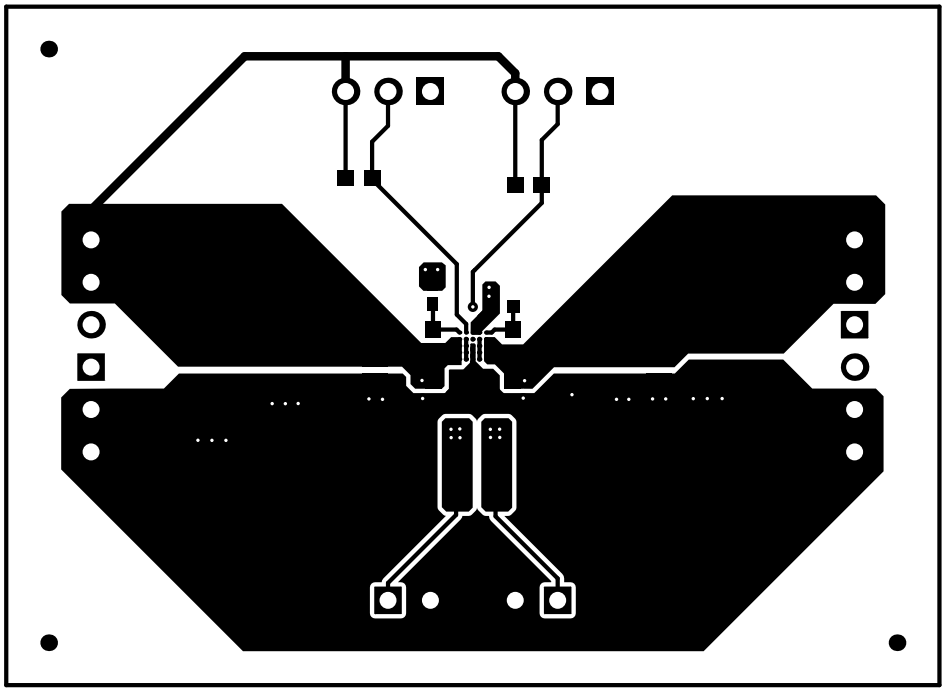

Figure 2. Top Layer Routing

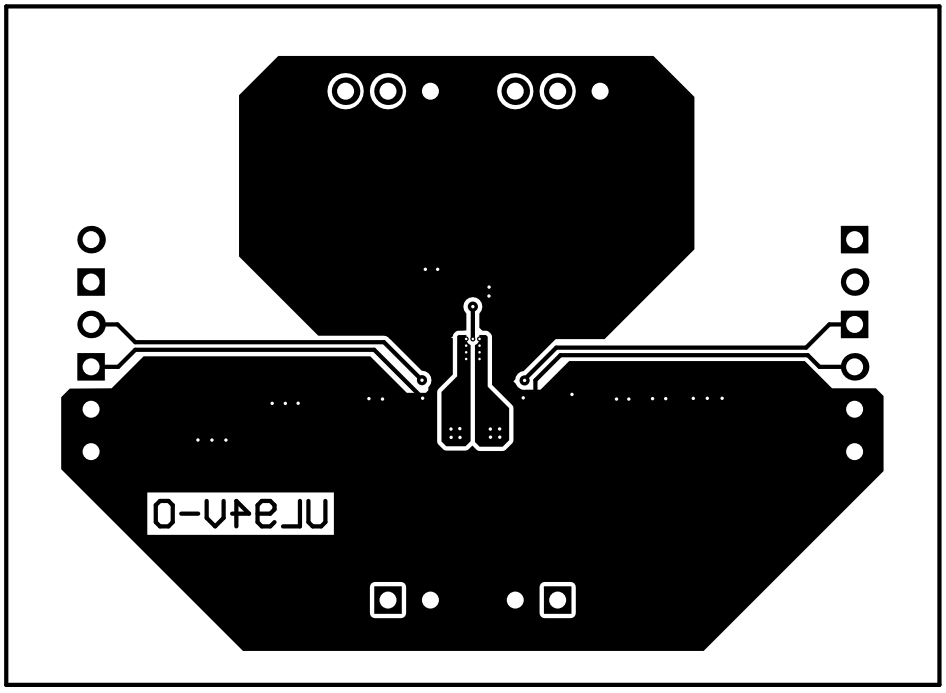

Figure 3. Bottom Layer Routing

4 Schematic and Bill of Materials

This section provides the TPS63027EVM-870 schematic and bill of materials.

4.1 Bill of Materials

Table 2 lists the TPS63027EVM-870 BOM.

Table 2. TPS63027EVM-870 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	10uF	Capacitor, Ceramic Chip, 6.3V, ±20%, X5R	0603	GRM188R60J106ME84	Murata
2	C2, C3	22uF	Capacitor, Ceramic Chip, 10V, ±20%, X5R	0603	GRM188R61A226ME15D	Murata
1	C5	68uF	CAP, TA, 68 µF, 20 V, +/- 10%, 0.15 ohm, SMD	7343-31	T495D686K020ATE150	Kemet
1	L1	1uH	Inductor, Shielded, Composite, 1 µH, 8.75 A, 0.01 ohm, SMD	4x2.1x4mm	XAL4020-102MEB	Coilcraft
1	R1	560k	RES, 560 k, 1%, 0.1 W, 0603	0603	Std	Std
1	R2	180k	RES, 180 k, 1%, 0.1 W, 0603	0603	Std	Std
2	R8.R9	1.00Meg	RES, 1.00 M, 1%, 0.1 W, 0603	0603	Std	Std
1	R10	0k	RES, 0, 5%, 0.1 W, 0603	0603	Std	Std
1	U1	-	TPS63027 High Current, High Efficiency Single Inductor Buck-Boost Converter	DSBGA 25-Pin	TPS63027Yff	TI

4.2 Schematic

Figure 4 illustrates the schematic for this EVM.

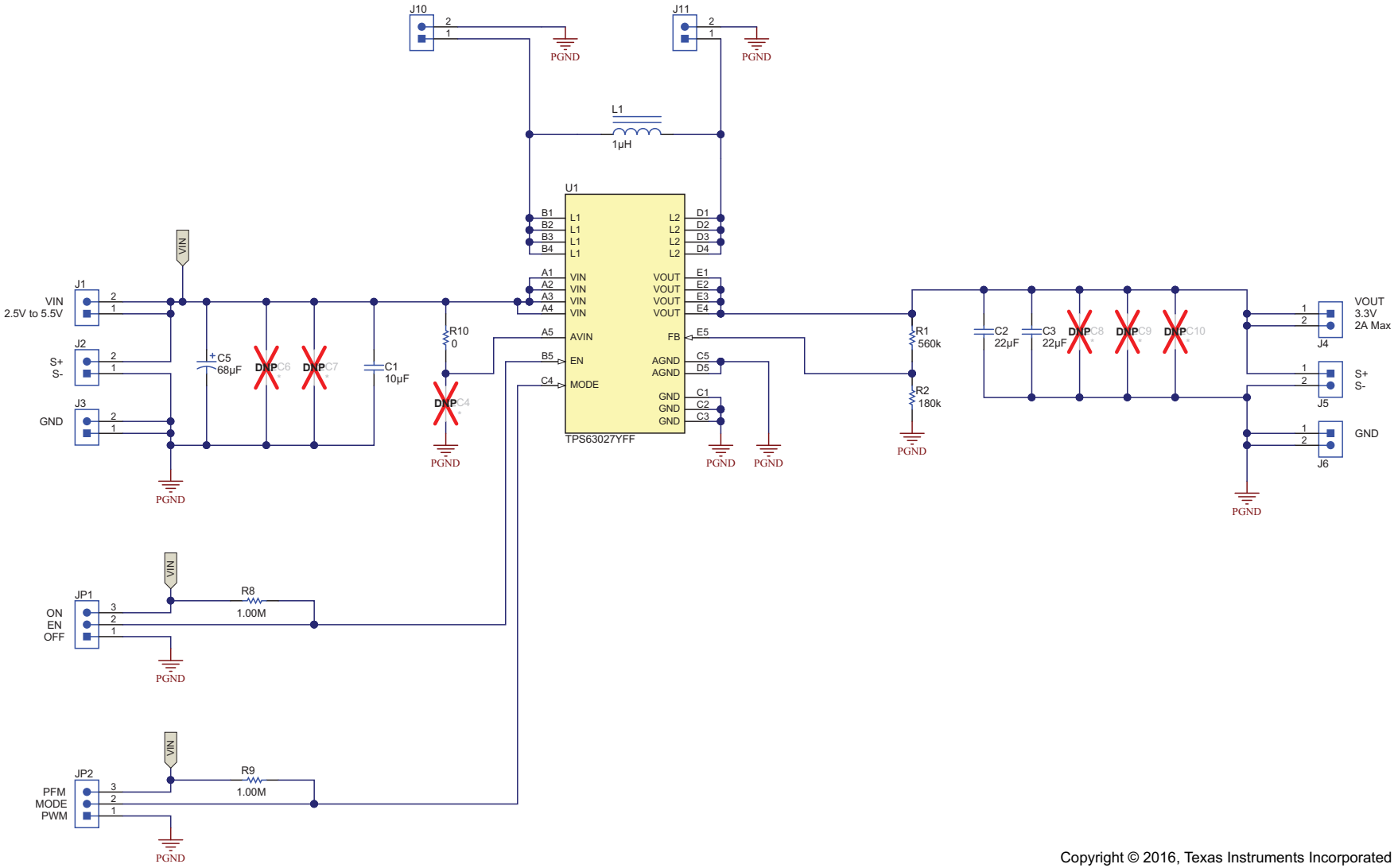

Figure 4. TPS63027EVM-870 Schematic

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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.*

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3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

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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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