User's Guide

TPS62A02 and TPS62A02A Step-Down Converter Evaluation Module User's Guide

ABSTRACT

This user's guide describes the characteristics, operation, and use of TI's TPS62A02 and TPS62A02A evaluation modules (EVM). These EVMs are designed to help the user easily evaluate and test the operation and functionality of the TPS62A02 and TPS62A02A buck converters. The EVMs convert a 2.5-V to 5.5-V input voltage to a regulated 1.8-V output voltage that delivers up to 2-A maximum. This user's guide includes setup instructions for the following:

- Hardware
- A printed-circuit board (PCB) layout
- Schematic diagram
- Bill of materials (BOM)
- Test results of the EVM

Throughout this document, the TPS62A02EVM-197 is used as an abbreviation representing the TPS62A02EVM-197 (001) and TPS62A02AEVM-197 (002).

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Trademarks

1 Introduction

The TPS62A02 and TPS62A02A are synchronous step-down buck DC-DC converters optimized for high efficiency and compact solution size. The TPS62A02 and TPS62A02A delivers an output current up to 2 A. The TPS62A02A variant operates in forced PWM mode (FPWM) across the whole load current range. The TPS62A02EVM-197 and TPS62A02AEVM-197 are available in a 1.6-mm × 1.6-mm SOT563 package.

1.1 Performance Specification

Table 1-1 provides a summary of the TPS62A02 and TPS62A02A performance specifications.

Table 1-1. Performance Specification Summary

Specification		Test Conditions	MIN	TYP	MAX	Unit
Input voltage			2.5		5.5	V
Output voltage setpoint				1.8		V
Output current	TPS62A02EVM-197		0		2	A
	TPS62A02AEVM-197		0		2	A

1.2 Modifications

The PCB for this EVM is designed to accommodate the adjustable voltage version of this IC. On the EVM, additional input and output capacitors can also be added. Finally, a feedforward capacitor can be added as well.

1.2.1 Input and Output Capacitors

C7 is provided for an additional input capacitor. This capacitor is not required for proper operation but can be used to reduce the input voltage ripple.

C5, C6, and C8 are provided for additional output capacitors. These capacitors are not required for proper operation but can be used to reduce the output voltage ripple and to improve the load transient response. The output capacitance must remain within the recommended range in the device data sheet for proper operation.

1.2.2 Feedforward Capacitor

C4 is a feedforward capacitor. This capacitor is not required for proper operation but can be used to improve the load transient performance.

2 Setup

This section describes how to properly use the TPS62A02EVM-197 and TPS62A02AEVM-197.

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
J3 – PG/GND	The PG output appears on pin 1 of this header with a convenient ground on pin 2.
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 – PG Pullup Voltage	PG pin pullup voltage jumper. Place the supplied jumper on JP2 to connect the PG pin pullup resistor to the output voltage. Alternatively, the jumper can be removed and a different voltage can be supplied on pin 1 to pull up the PG pin to a different level. This externally applied voltage must remain below 5.5 V.

2.2 Hardware Setup

To operate the EVM, set jumper JP1 to the desired positions per Section 2.1. Connect the input supply to J1 and connect the load to J2.

3 Board Layout

This section provides the board layout and illustrations of the TPS62A02EVM-197, which is valid for variant TPS62A02AEVM-197 as well.

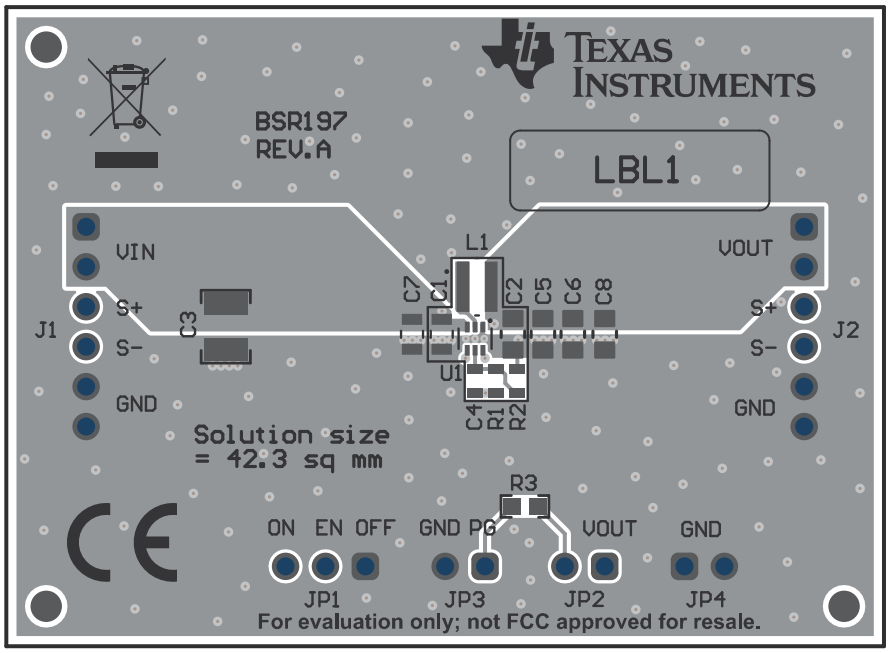

Figure 3-1. Top View Mask

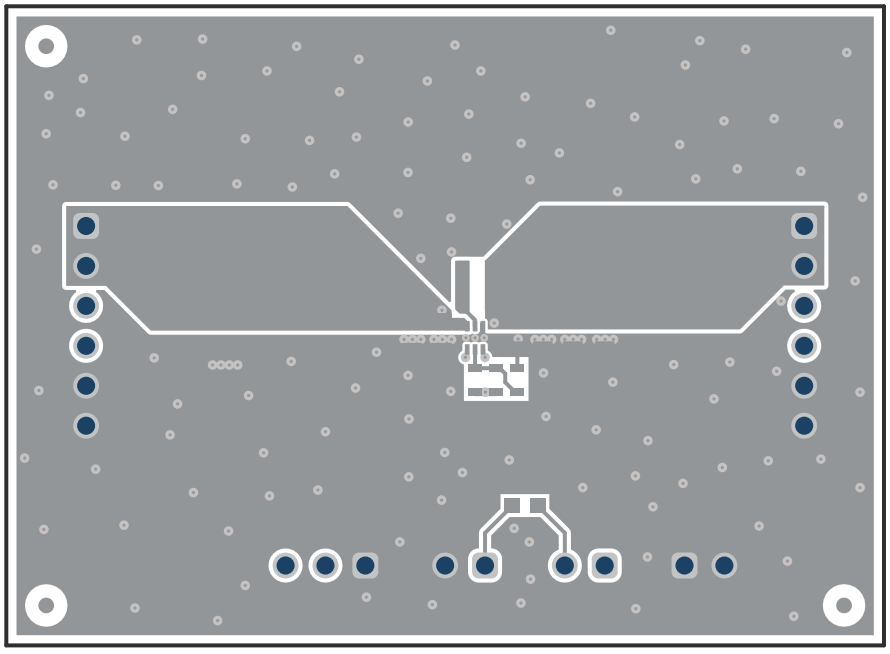

Figure 3-2. Top Layer

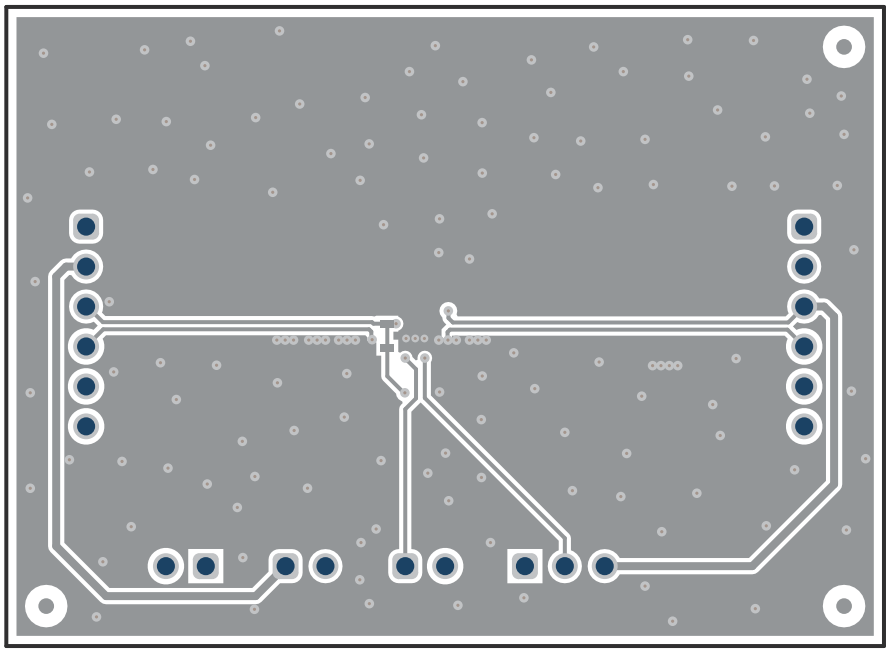

Figure 3-3. Bottom Layer

4 TPS62A02EVM-197 Test Results

Figure 4-1 shows the efficiency results performed with the inductor part number mentioned in the BOM. See the device data sheet for the rest of the performance of this EVM.

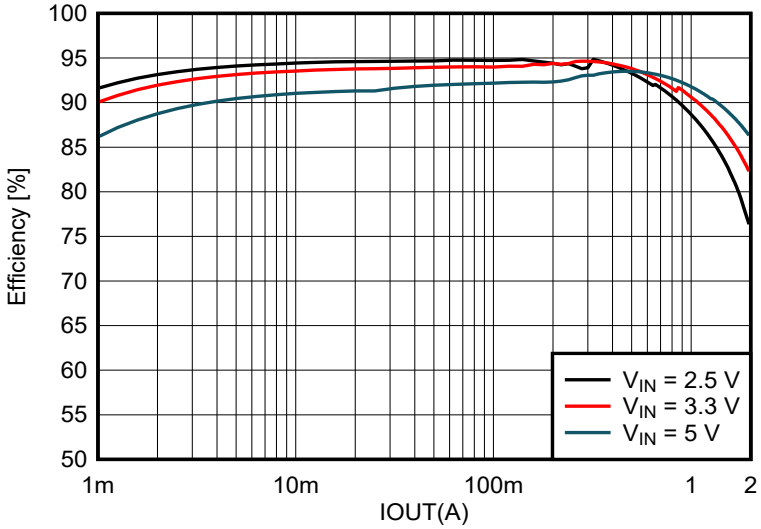

Figure 4-1. Efficiency Results with 1.8-V Output Voltage

5 Schematic and Bill of Materials

This section provides the TPS62A02EVM-197 schematic and bill of materials.

5.1 Schematic

Figure 5-1 illustrates the EVM schematic of TPS62A02EVM-197, which is also valid for the TPS62A02AEVM-197 variant.

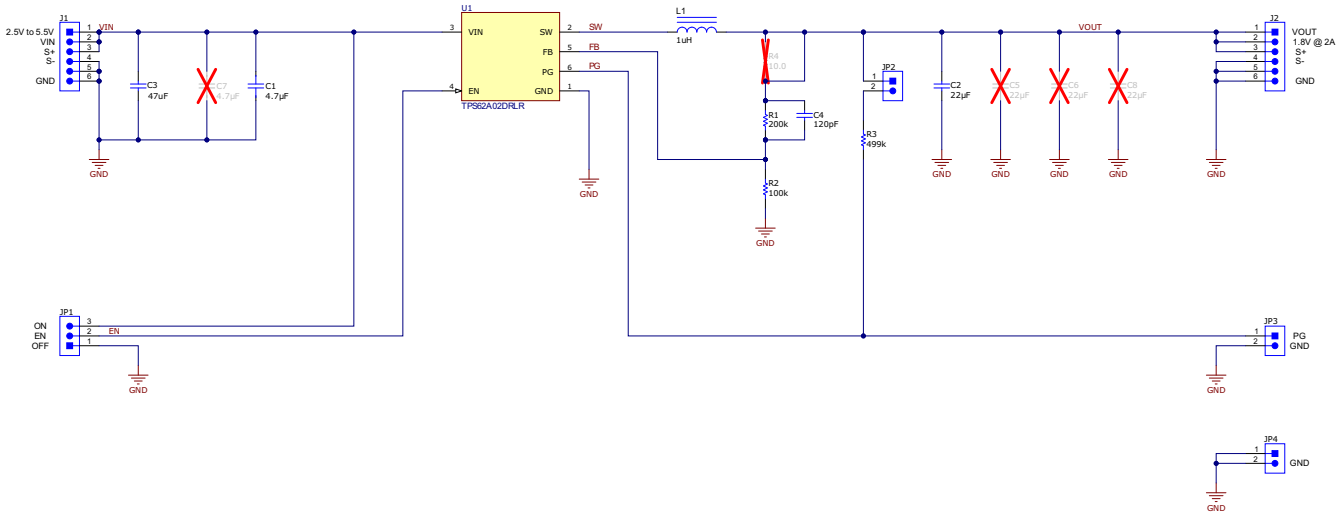

Figure 5-1. TPS62A02EVM-197 Schematic

5.2 Bill of Materials

Table 5-1 lists the BOM for this EVM.

Table 5-1. TPS62A02EVM-197 and TPS62A02AEVM-197 Bill of Materials

Quantity		Ref Des	Value	Description	Size	Part Number	MFR
TPS62A02EVM-197	TPS62A02AEVM-197						
1	1	C1	4.7 µF	Capacitor, Ceramic, 10 V, X7R, ±10%	0805	GRM21BR71A475KE51L	Murata
1	1	C2	22 µF	Capacitor, Ceramic, 10 V, X7R, ±10%	0805	GRM21BZ71A226ME15L	Murata
1	1	C3	47 µF	Capacitor, Ceramic, 10 V, X7R, ±20%	1210	GRM32ER71A476ME15L	Murata
1	1	C4(1)	120 pF	Capacitor, Ceramic, 50 V, C0G/NP0, ±5%	0603	GRM1885C1H121JA01D	Murata
1	1	L1	1 µH	Inductor, Shielded, 4.9 A, 0.0213 Ω	3.65 × 3.35 × 1.5 mm	XGL3515-102MEC	Coilcraft
1	1	R1	200 k	Resistor, Chip, 0.1 W, 1%	0603	Std	Std
1	1	R2	100 k	Resistor, Chip, 0.1 W, 1%	0603	Std	Std
1	1	R3	499 k	Resistor, Chip, 0.1 W, 1%	0603	Std	Std
1	0	U1	TPS62A02	IC, 5.5-V, 2-A Step-Down Converter	1.6 ×1.6 mm	TPS62A02	TI
0	1	U1	TPS62A02A	IC, 5.5-V, 2-A Step-Down Converter with forced PWM operation	1.6 × 1.6 mm	TPS62A02A	TI

(1) C4 is feedforward capacitor, which is optional. The device is fully functional without C4.

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CAUTION

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

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NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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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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(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:

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http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

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