User's Guide

TPS62A06 and TPS62A06A Step-Down Converter Evaluation Module User's Guide

ABSTRACT

This user's guide describes the characteristics, operation, and use of TI's TPS62A06 and TPS62A06A evaluation modules (EVM). These EVMs are designed to help the user easily evaluate and test the operation and functionality of the TPS62A06 and TPS62A06A buck converters. The EVMs convert a 2.5-V to 5.5-V input voltage to a regulated 1.2-V output voltage that delivers up to 6-A maximum output current. 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 TPS62A06EVM-248 is used as an abbreviation representing the TPS62A06EVM-248 (001) and TPS62A06AEVM-248 (002).

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Trademarks

1 Warning and Caution

Caution

Caution Hot surface.
Contact may cause burns.
Do not touch!

2 Introduction

The TPS62A06 and TPS62A06A are synchronous step-down buck DC-DC converters optimized for high efficiency and compact solution size. The TPS62A06 and TPS62A06A delivers an output current up to 6 A. The TPS62A06A variant operates in forced PWM mode (FPWM) across the whole load current range. The TPS62A06 and TPS62A06A are available in a 1.6-mm × 1.6-mm SOT563 package.

2.1 Performance Specification

Table 2-1 provides a summary of the TPS62A06 and TPS62A06A performance specifications.

Table 2-1. Performance Specification Summary

Specification		Test Conditions	MIN	TYP	MAX	Unit
Input voltage			2.5		5.5	V
Output voltage setpoint				1.2		V
Output current	TPS62A06EVM-248		0		6	A
	TPS62A06AEVM-248		0		6	A

2.2 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. A feedforward capacitor can be adjusted as well.

2.2.1 Input and Output Capacitors

C1 is populated on the board to reduce the input impedance of the board and avoid oscillations at high output current conditions, but can not be needed for the final application.

C8 and C9 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.

2.2.2 Feedforward Capacitor

C5 is a feedforward capacitor. This capacitor is not required for proper operation but can be used to improve the load transient performance.

3 Setup

This section describes how to properly use the TPS62A06EVM-248 and TPS62A06AEVM-248.

3.1 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
JP2 – 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.
JP3 – PG Pullup Voltage	PG pin pullup voltage jumper. Place the supplied jumper on JP3 to connect the PG pin pull-up resistor to the output voltage. Alternatively, the jumper can be removed and a different voltage can be supplied on pin 2 to pull up the PG pin to a different level. This externally applied voltage must remain below 5.5 V.

3.2 Hardware Setup

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

4 Board Layout

This section provides the board layout and illustrations of the TPS62A06EVM-248, which is valid for variant TPS62A06AEVM-248 as well.

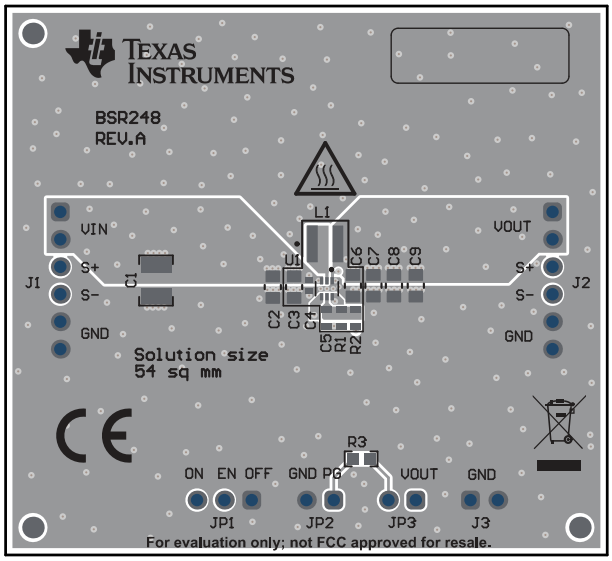

Figure 4-1. Top Silk

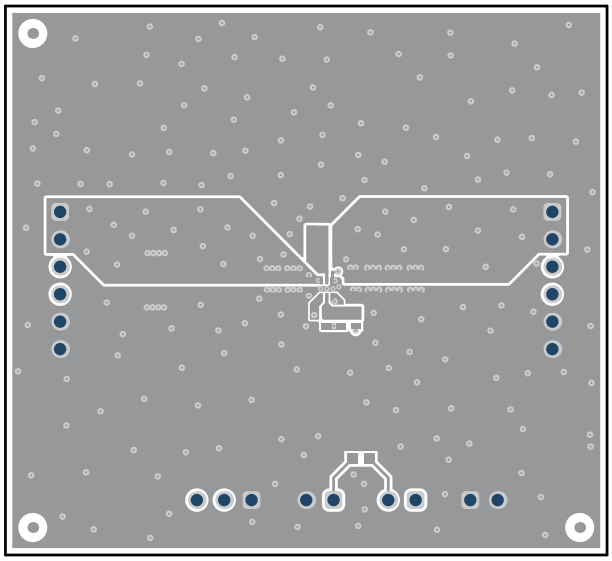

Figure 4-2. Top Layer

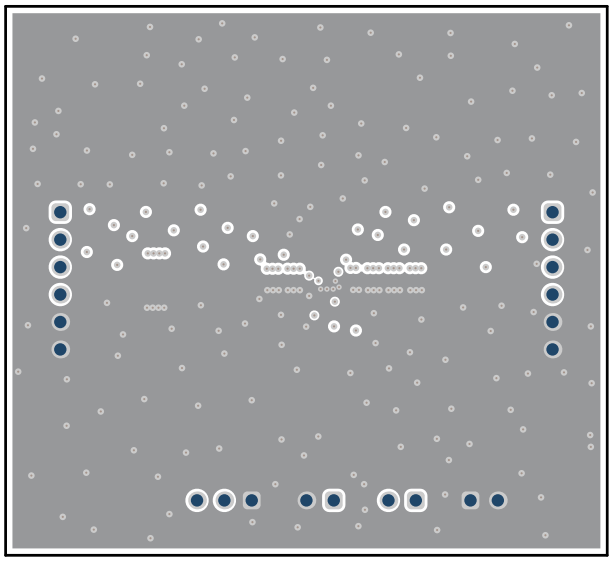

Figure 4-3. Layer 2

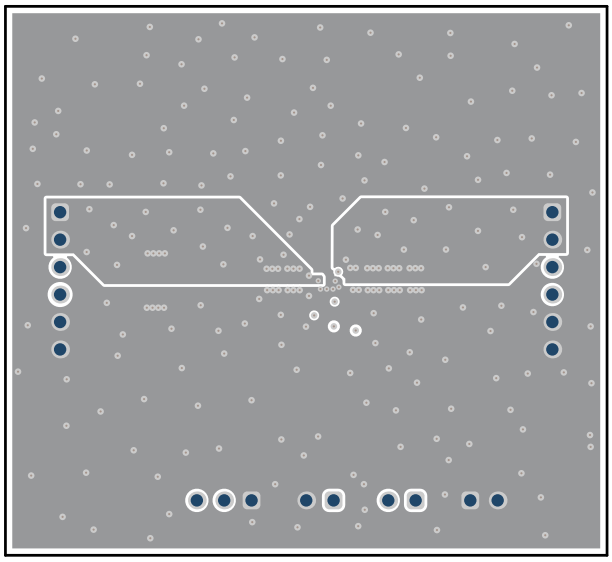

Figure 4-4. Layer 3

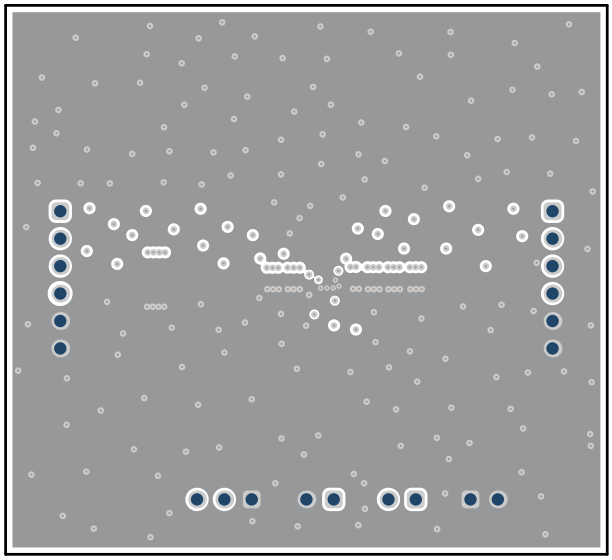

Figure 4-5. Layer 4

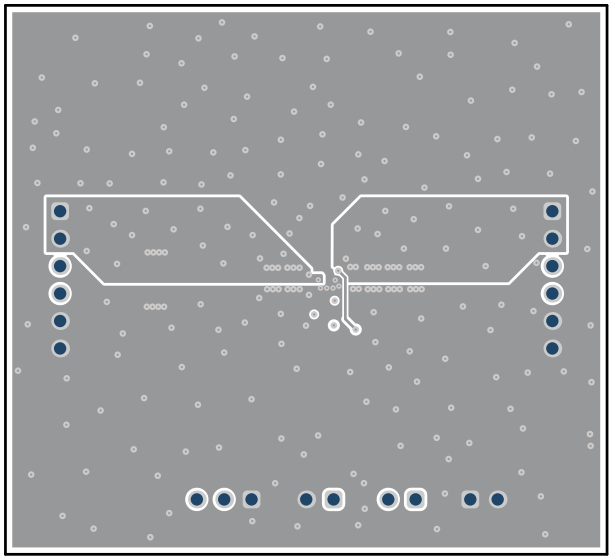

Figure 4-6. Layer 5

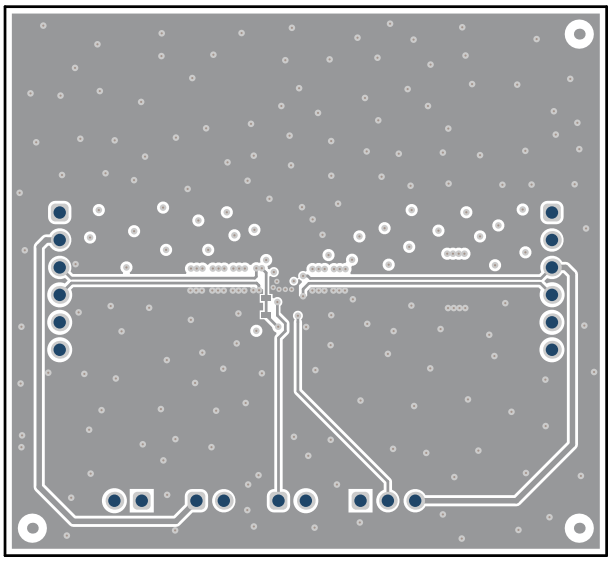

Figure 4-7. Bottom Layer

5 TPS62A06EVM-248 Test Results

Figure 5-1 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.

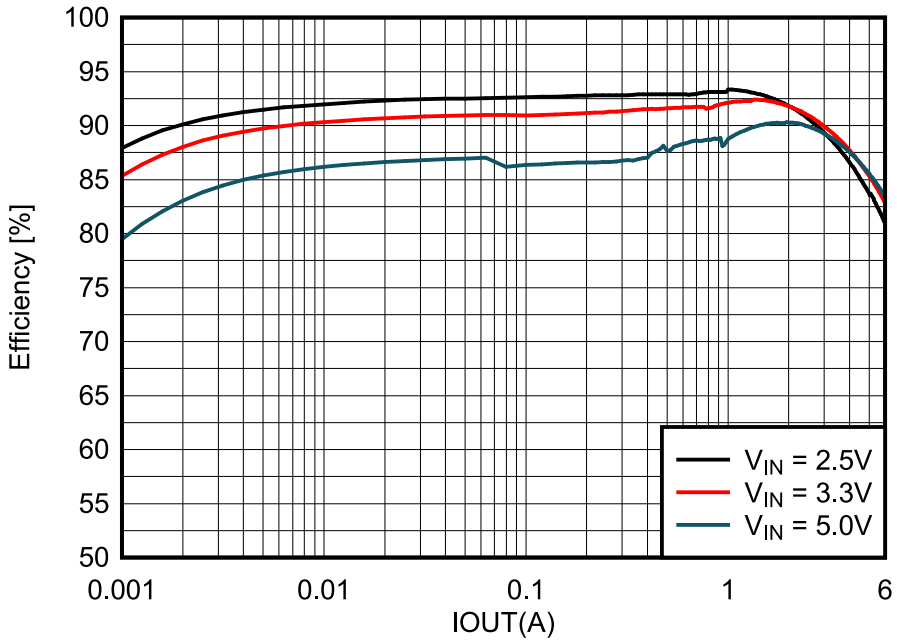

Figure 5-1. Efficiency Results with 1.2-V Output Voltage

6 Schematic and Bill of Materials

This section provides the TPS62A06EVM-248 schematic and bill of materials.

6.1 Schematic

Figure 6-1 illustrates the EVM schematic of TPS62A06EVM-248, which is also valid for the TPS62A06AEVM-248 variant.

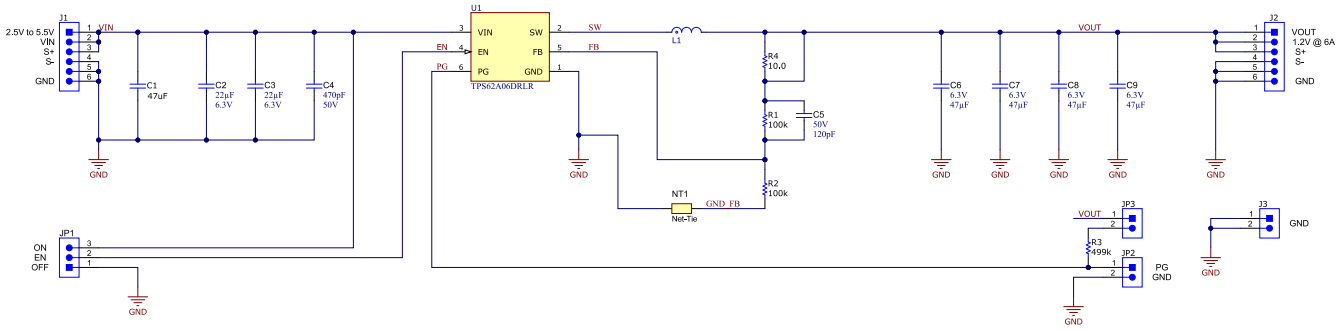

Figure 6-1. TPS62A06EVM-248 Schematic

6.2 Bill of Materials

Table 6-1 lists the BOM for this EVM.

Table 6-1. TPS62A06EVM-248 and TPS62A06AEVM-248 Bill of Materials

Quantity		Ref Des	Value	Description	Size	Part Number	MFR
TPS62A06EVM-248	TPS62A06AEVM-248						
1	1	C1	47 µF	Capacitor, Ceramic, 10 V, X7R, ±20%	1210	GRM32ER71A476ME15L	Murata
1	1	C2, C3	22 µF	Capacitor, Ceramic, 10 V, X7R, ±20%	0805	GRM21BZ70J226ME44L	Murata
1	1	C4	470 pF	Capacitor, Ceramic, 50 V, C0G/NP0, ±5%	0402	GRT1555C1H471JA02D	Murata
1	1	C5(1)	120 pF	Capacitor, Ceramic, 50 V, C0G/NP0, ±5%	0603	GRM1885C1H121JA01D	Murata
1	1	C6, C7	47 µF	Capacitor, Ceramic, 10 V, X6S, ±20%	0805	JMK212BC6476MG-T	Taiyo Yuden
1	1	L1	220 µH	Inductor, Shielded, 18A, 21.3 mΩ	4 × 4 × 1.5 mm	XGL4015-221MEC	Coilcraft
1	1	R1, R2	100 kΩ	Resistor, Chip, 0.1 W, 1%	0603	Std	Std
1	1	R3	500 kΩ	Resistor, Chip, 0.1 W, 1%	0603	Std	Std
1	0	U1	TPS62A06	IC, 5.5-V, 6-A Step-Down Converter	1.6 × 1.6 mm	TPS62A06	TI
0	1	U1	TPS62A06A	IC, 5.5-V, 6-A Step-Down Converter with forced PWM operation	1.6 × 1.6 mm	TPS62A06A	TI

(1) C5 is feedforward capacitor, which is optional. The device is fully functional without C5.

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