

TPS613221AEVM-019 Evaluation Module

This user's guide describes the characteristics, operation, and use of the TPS613221AEVM-019 evaluation module (EVM). The EVM contains the TPS613221A device, which is a high performance, high efficiency, synchronous boost converter with only 6- μ A quiescent current. The user's guide includes the EVM specifications, recommended test setup, test results, schematic diagram, bill of materials, and the board layout.

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1 Introduction

1.1 Performance Specification

[Table 1](#) lists the TPS613221A EVM performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1. Performance Specification Summary

SPECIFICATION	TEST CONDITIONS	MIN	TYP	MAX	UNIT
VIN	–		1.5		V
VOUT	TPS613221A EVM, VIN = 1.5 V, Io ≤ 0.1 A		3.3		V

1.2 Modification

The printed-circuit board (PCB) for this EVM is designed to accommodate some modifications by the user. The external component can be changed according to the real application.

1.3 Input Capacitor

A 150-μF tantalum capacitor, C1, is added as the input capacitor in the EVM. The ESR of the tantalum capacitor is 0.1 Ω, which helps to damp the ringing of the input voltage when the EVM is powered by a power supply with a long cable. The capacitor is not required for proper operation and can be removed in a real application.

1.4 Output Capacitor Selection

A 22-μF ceramic capacitor, C3, is added as the output capacitors. This capacitor can ensure the low output ripple at a heavy load condition.

1.5 Schottky Diode Selection

TI recommends adding a Schottky type diode (D1 in [Figure 1](#)) with low forward voltage (VF) and low capacitance, to improve efficiency in heavy load conditions. If the diode is used, a snubber circuit of a resistor and a capacitor should be used in parallel to the diode, to stabilize the system operation. The recommended capacitance of the capacitor of the snubber circuit is 3x that of the diode capacitance. The typical values are 5 Ω for the resistor and 120 pF for the capacitor.

2 Test Setup

This section describes how to properly connect, set up, and use the TPS613221AEVM-019 device.

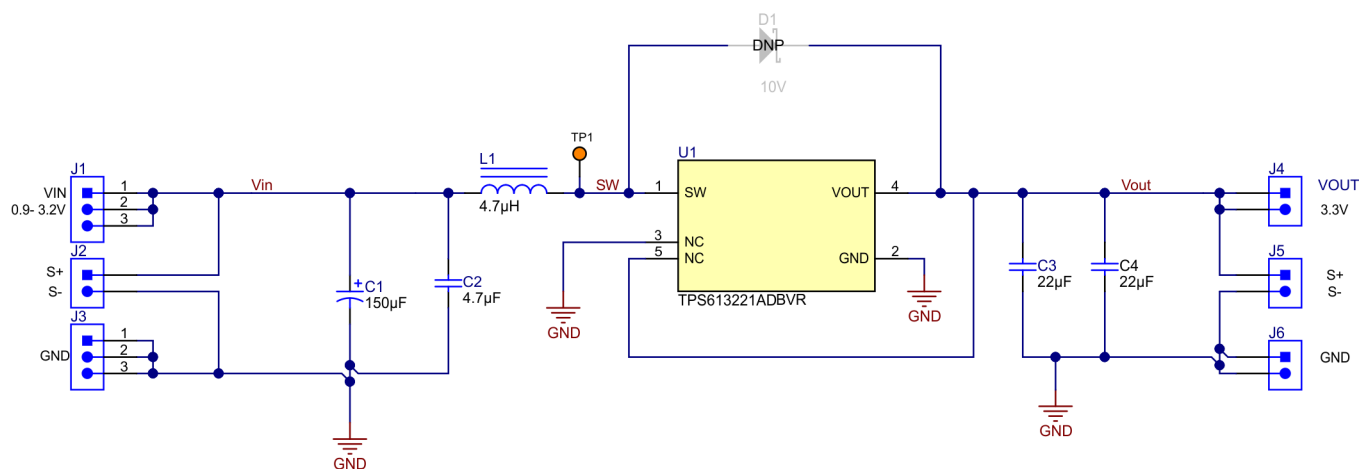
2.1 Input/Output Connector Descriptions

This section describes the input/output connector descriptions.

- J1-VIN: Positive input connection from the input supply for the EVM
- J3-GND: Return connection from the input supply for the EVM
- J4-VOUT: Positive connection for the output voltage
- J6-GND: Return connection for the output voltage

3 Schematic

This section provides the TPS613221AEVM-019 device schematic.



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Figure 1. TPS613221AEVM-019 Schematic

4 Bill of Materials

[Table 2](#) lists the bill of materials (BOM).

Table 2. Bill of Materials

Designator	QTY	Value	Part Number	Manufacturer	Description	Package
C1	1	150 μ F	T520B157M006ATE070	Kemet	Capacitor, TA, 150 μ F, 6.3 V, \pm 20%, 0.07 Ω , SMD	3528-21
C3	1	22 μ F	GRM188R60J226MEA0D	MuRata	Capacitor, ceramic, 22 μ F, 6.3 V, \pm 20%, X5R, 0603	0603
C4	1	22 μ F	GRM21BR61C226ME44L	MuRata	Capacitor, ceramic, 22 μ F, 16 V, \pm 20%, X5R, 0805	0805
J1, J3	2		TSW-103-07-G-S	Samtec	Header, 100 mil, 3 \times 1, gold, TH	3 \times 1 header
J2, J4, J5, J6	4		TSW-102-07-G-S	Samtec	Header, 100 mil, 2 \times 1, gold, TH	2 \times 1 header
L1	1	4.7 μ H	DFE252012F-4R7M=P2	MuRata Toko	Inductor, shielded, powdered iron, 4.7 μ H, 0.15 A, 0.19 Ω , SMD	2.5 \times 1.2 \times 2 mm
TP1	1	Orange	5003	Keystone	Test point, miniature, orange, TH	Orange miniature test point
U1	1		TPS613221ADBVR	Texas Instruments	6.5- μ A quiescent current, 1.8-A switch current boost converter, DBV0005A (SOT-23-5)	DBV0005A
C2	0	4.7 μ F	GRM155R61A475MEAAD	MuRata	Capacitor, ceramic, 4.7 μ F, 10 V, \pm 20%, X5R, 0402	0402
D1	0	10 V	ZLLS410TA	Diodes Inc.	Diode, Schottky, 10 V, 0.75 A, SOD-323	SOD-323

5 Board Layout

Figure 2 and Figure 3 show the board layout.

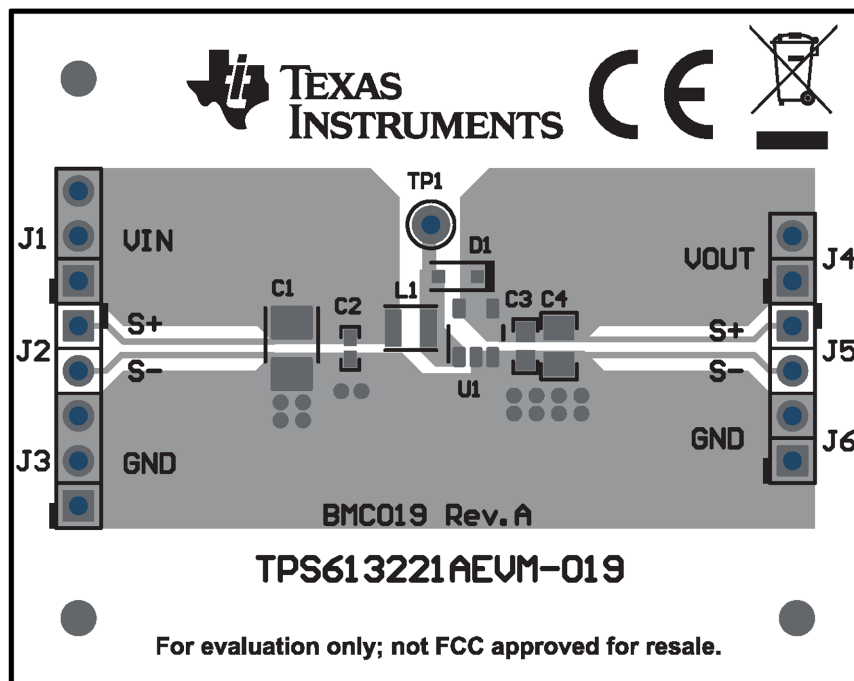


Figure 2. TPS613221AEVM-019 Top-Side Layout

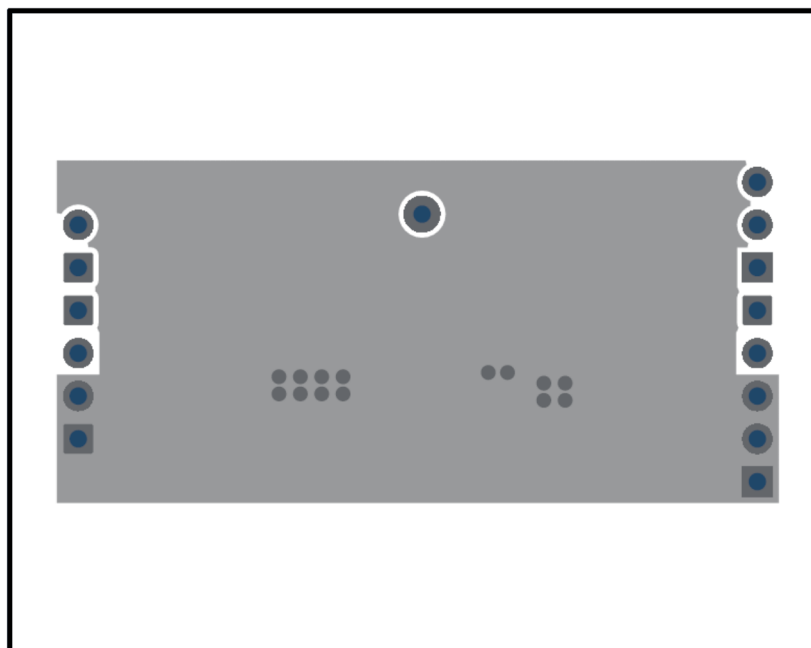


Figure 3. TPS613221AEVM-019 Bottom-Side Layout

Revision History

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

Changes from Original (January 2018) to A Revision	Page
• Added <i>Schottky Diode Selection</i> section.....	2

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
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