

TPS5402 Step-Down Converter Evaluation Module User's Guide



Table of Contents

1 Introduction.....	2
2 Background.....	2
3 Board Layout.....	2
4 Bench Test Setup Conditions.....	4
4.1 Headers Description and Jumper Placement.....	4
4.2 Jumpers and Switches.....	4
5 Power-Up Procedure.....	5
6 Schematic and Bill of Materials.....	6
7 Revision History.....	7

List of Figures

Figure 3-1. Placement (Top Layer).....	2
Figure 3-2. Board Layout (Top Layer).....	3
Figure 3-3. Board Layout (Bottom Layer).....	3
Figure 4-1. Headers Description and Jumper Placement.....	4
Figure 6-1. TPS5402EVM Schematic.....	6

Trademarks

All trademarks are the property of their respective owners.

1 Introduction

This document presents the information required to operate the TPS5402 as well as the support documentation including schematic and bill of materials.

2 Background

The TPS5402 is designed to provide 1.7-A continuous current with an operational range of 4.5 V to 28 V and an external set switching frequency ranging from 50 kHz to 1.1 MHz.

As there are many possible options to set the converters, [Table 2-1](#) presents the performance specification summary for the EVM.

Table 2-1. Summary of Performance

TEST CONDITIONS	PERFORMANCE
$V_{IN} = 3.5\text{ V to }28\text{ V}$ $f_{sw} = 300\text{ kHz}$ (25°C ambient)	Buck: 3.3 V, up to 1.7 A

The evaluation module is designed to provide access to the features of the TPS5402. Some modifications can be made to this module to test performance at different input and output voltages, current and switching frequency. Please contact TI Field Applications Group for advice on these matters.

3 Board Layout

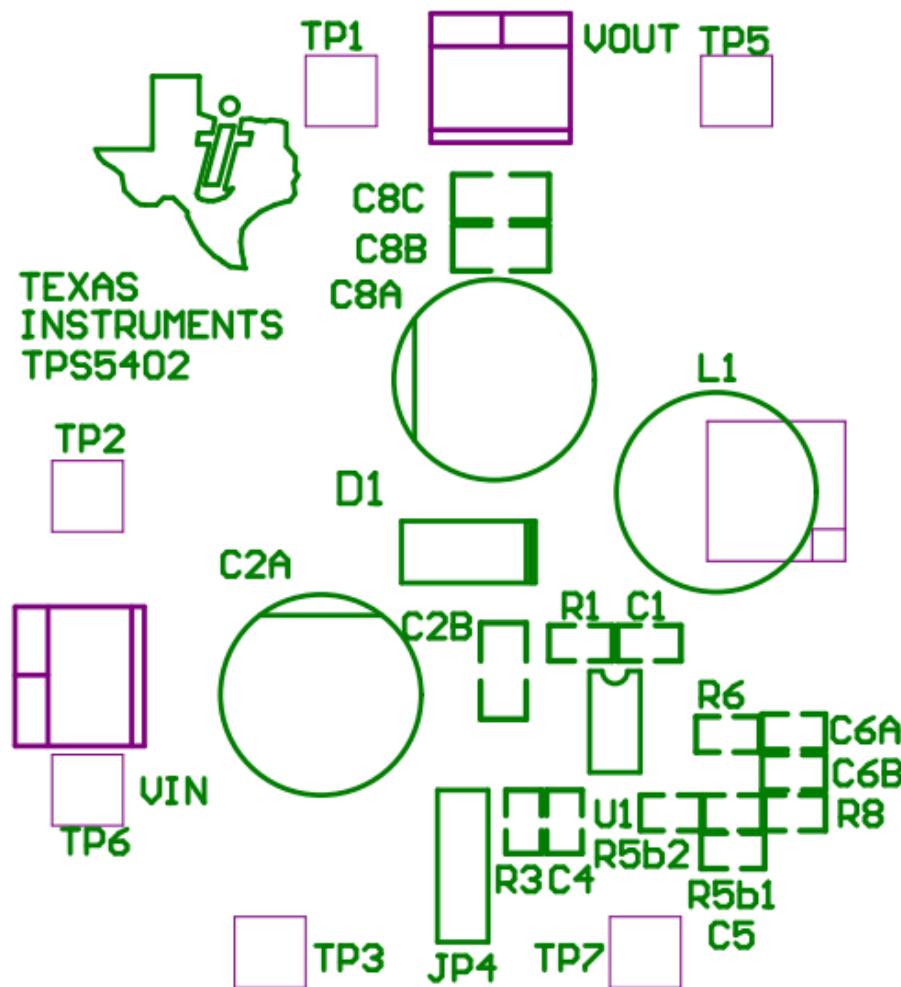


Figure 3-1. Placement (Top Layer)

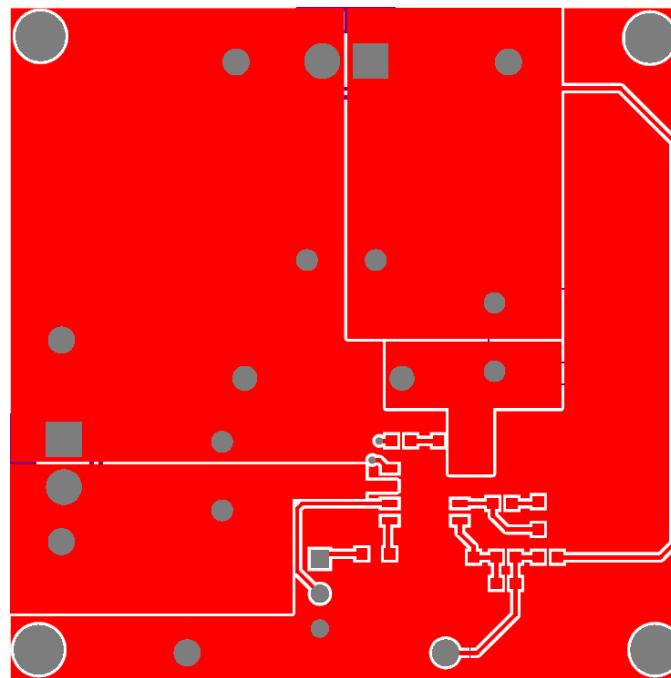


Figure 3-2. Board Layout (Top Layer)

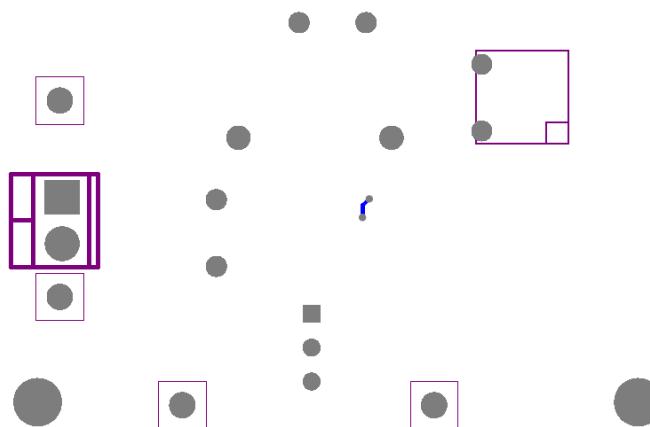


Figure 3-3. Board Layout (Bottom Layer)

4 Bench Test Setup Conditions

4.1 Headers Description and Jumper Placement

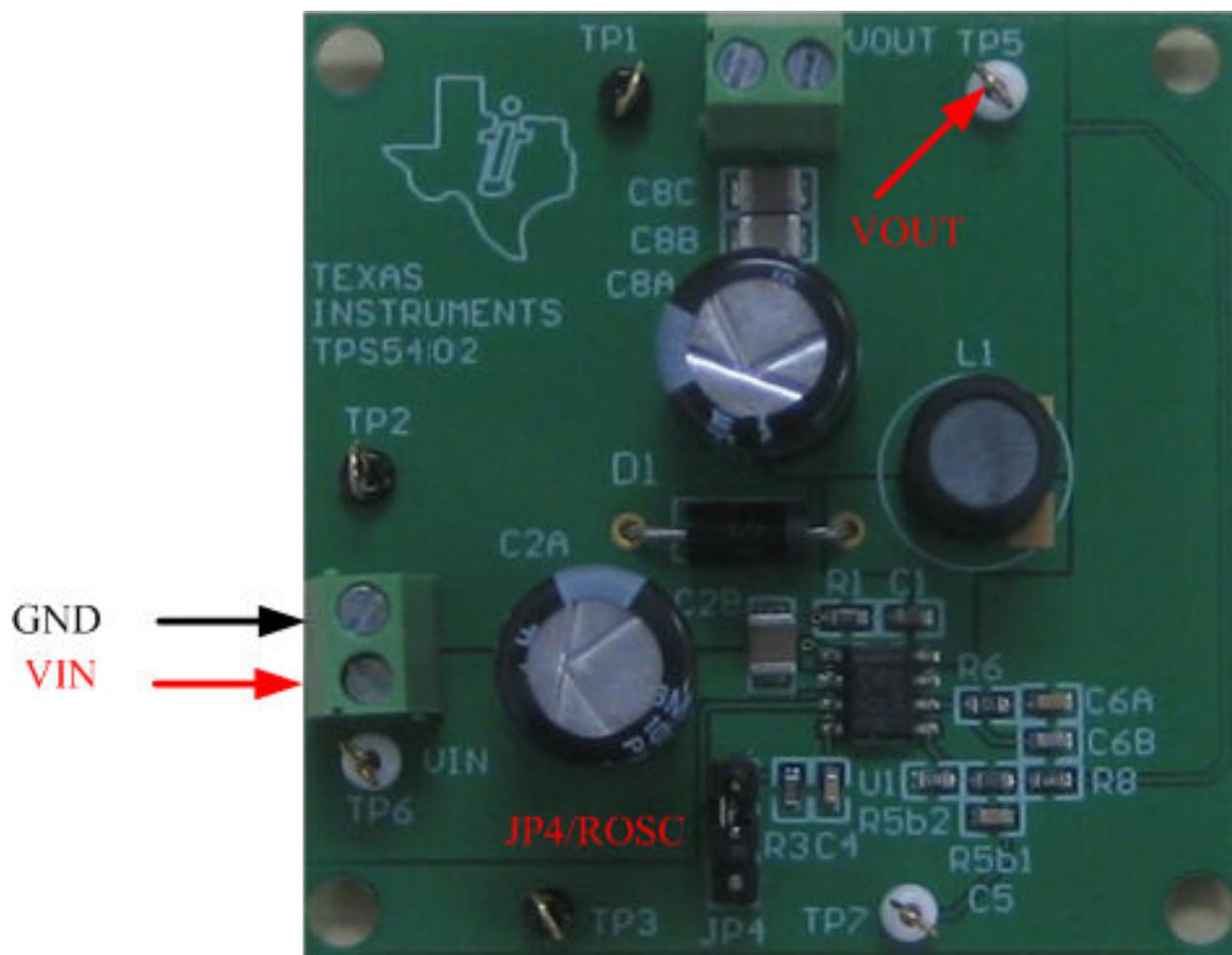


Figure 4-1. Headers Description and Jumper Placement

Test points:

1. LX, VIN, VOUT

4.2 Jumpers and Switches

Table 4-1. Jumpers and Switches

NO.	FUNCTION	PLACEMENT	COMMENT
JP4	Switching Frequency	Connect JP4 to GND and set the switching frequency to 50 kHz; Leave it open and set switching frequency to 120 kHz; Connect a resistor to set the switching frequency	See datasheet (SLVSBF7) for the resistor value corresponding to specific switching frequency.

5 Power-Up Procedure

1. Apply 4.5 V – 28 V to JP1.
2. Apply load to the output connector.

6 Schematic and Bill of Materials

The following pages contain the TPS5402EVM schematic and bill of materials.

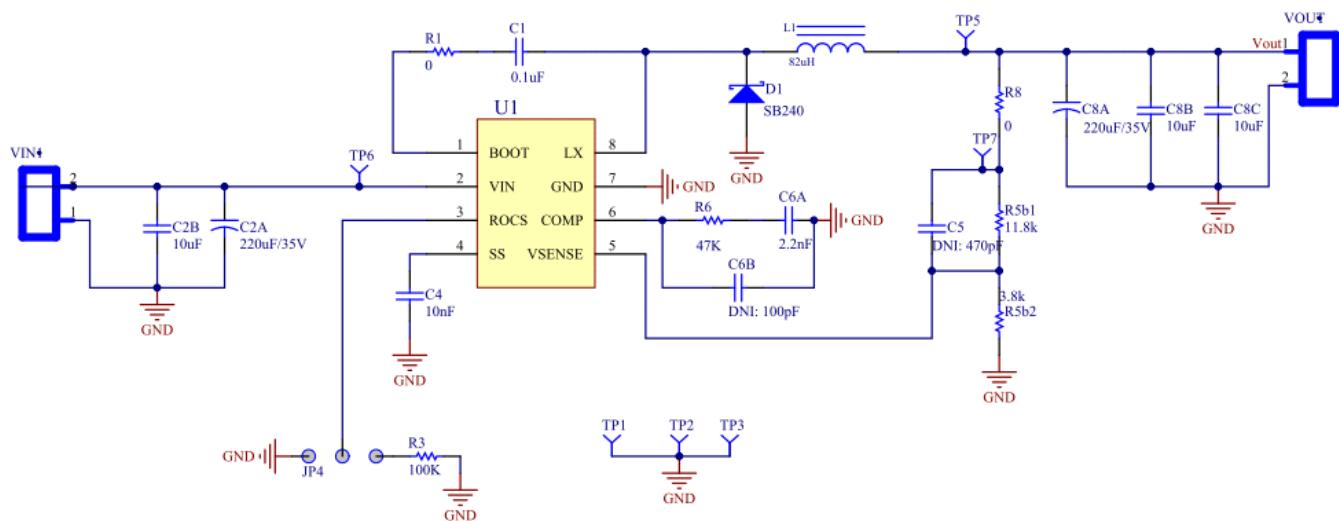


Figure 6-1. TPS5402EVM Schematic

Table 6-1. TPS5402EVM Bill of Materials

ITEM NO.	QTY	DESIGNATOR	VALUE	MANUFACTURER	PART NO.	DESCRIPTION
1	1	C1	0.1 μ F	Generic		Capacitor, 0.1 μ F, 35 V, Ceramic, X7R, 0603
2	3	C2, C8B, C8C	10 μ F	Generic		Capacitor, 10 μ F, 35 V, Ceramic, X5R, 0805
3	2	C2A, C8A	220 μ F	Rubycon	5YXF220MEFC	220 μ F/35 V 10x12.5
4	1	C4	10 nF	Generic		Capacitor, 10 nF, 35 V, Ceramic, X7R, 0603
5		C5	470 pF	Generic		Capacitor, 470 pF, 50 V, Ceramic, X7R, 0603
6	1	C6A	2.2 nF	Generic		Capacitor, 2.2 nF, 50 V, Ceramic, X7R, 0603
7	DNI	C6B	100 pF	Generic		Capacitor, 100 pF, 50 V, Ceramic, X7R, 0603
8	1	D1		Comchip	SB240E	Comchip SB240E 2-A/40-V Schottky Rectifier
9	1	JP4		Mill-Max Manufacturing Corp.	800-10-064-10-001000	Three Pin Jumper, SIP HEADER 64 POS STRAIGHT PCB
10	1	L1	82 μ H	Bourns	RL622-820K-RC	Magnetic-Core Inductor
11	2	R1, R8	0	Generic		Resistor, 1%, 1/10W, 0603, SMD
12	1	R3	100 K	Generic		Resistor, 1%, 1/10W, 0603, SMD
13	1	R6	30 K	Generic		Resistor, 1%, 1/10W, 0603, SMD
14	1	R5b1	11.8 k	Generic		Resistor, 1%, 1/10W, 0603, SMD
15	1	R5b2	3.8 k	Generic		Resistor, 1%, 1/10W, 0603, SMD
16	2	TP1, TP2	5001	Generic	5001	Keystone Electronics, Test Point, Black
17	3	TP5, TP6, TP7	5002	Generic	5002	Keystone Electronics, Test Point, White
18	1	U1		Texas Instruments	TPS5402	SOIC8
19 ⁽¹⁾	1			Sullins Connector Solutions	SPC02SYAN	SPC02SYAN, CONN JUMPER SHORTING GOLD FLASH

(1) Install item 19 on item 8 to the inner side.

7 Revision History

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

Changes from Revision * (September 2012) to Revision A (November 2021)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document.	2
• Updated the user's guide title.....	2

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](#) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2022, Texas Instruments Incorporated