

TPS65270 High Current, Synchronous Step Down Dual Buck DC/DC Converter Evaluation Module

User's Guide



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1	Introduction	5
2	Background	5
3	Schematic	6
4	Board Layout	7
5	Bench Test Setup Conditions	9
	5.1 Headers Description and Jumper Placement	9
	5.2 Jumpers	10
6	Power-Up Procedure	10
7	Bill of Materials	11

List of Figures

1	TPS65270 Schematic	6
2	Placement (Top Layer)	7
3	Board Layout (Top Layer).....	7
4	Board Layout (Bottom Layer).....	8
5	Headers Description and Jumper Placement	9

List of Tables

1	Input Voltage and Output Current Summary	5
2	Jumpers.....	10
3	Bill of Materials	11

1 Introduction

This document presents the information required to power the TPS65270 PMIC as well as the support documentation including schematic and bill of materials.

2 Background

The TPS65270 PMIC is designed to provide 2-A and 3-A continuous currents with an operational range of 4.5 V to 16 V and an externally set switching frequency ranging from 300 kHz to 1.4 MHz. When the PMIC is not fully loaded, Buck1 can be loaded to 2.5 A and Buck2 to 3.5 A.

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

Table 1. Input Voltage and Output Current Summary

EVM	TEST CONDITIONS	OUTPUT CURRENT RANGE
TPS65270EVM	$V_{IN} = 4.5 \text{ V to } 16 \text{ V}$ $f_{sw} = 620 \text{ kHz}$	Buck1, 1.8 V, up to 2 A Buck2, 1.2 V, up to 3 A (25°C ambient)

This evaluation module is designed to provide access to the features of the TPS65270. Some modifications can be made to this module to test performance at different input and output voltages, current and frequency operation. Please contact TI Field Applications Group for advice on these matters.

3 Schematic

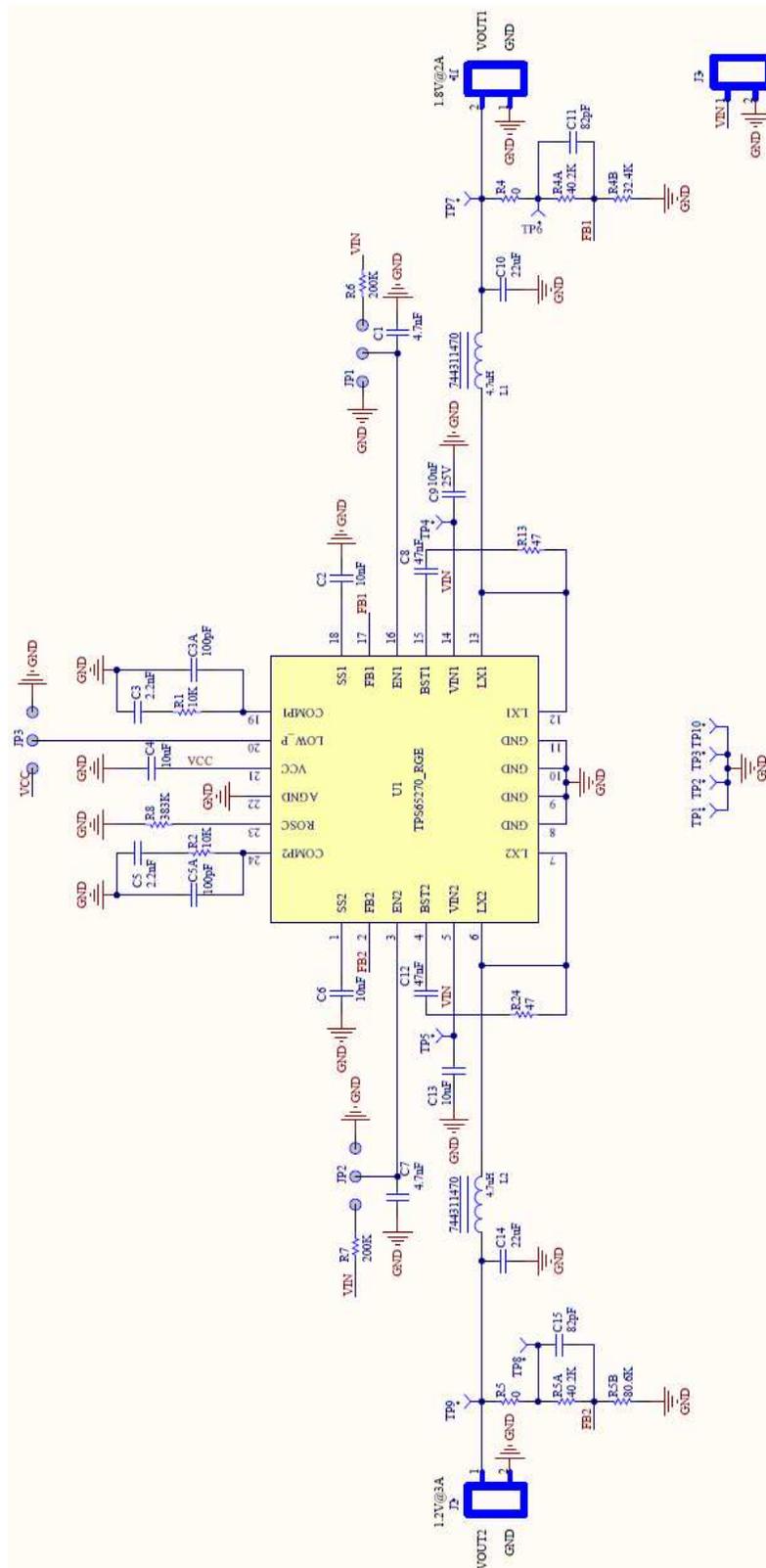


Figure 1. TPS65270 Schematic

4 Board Layout

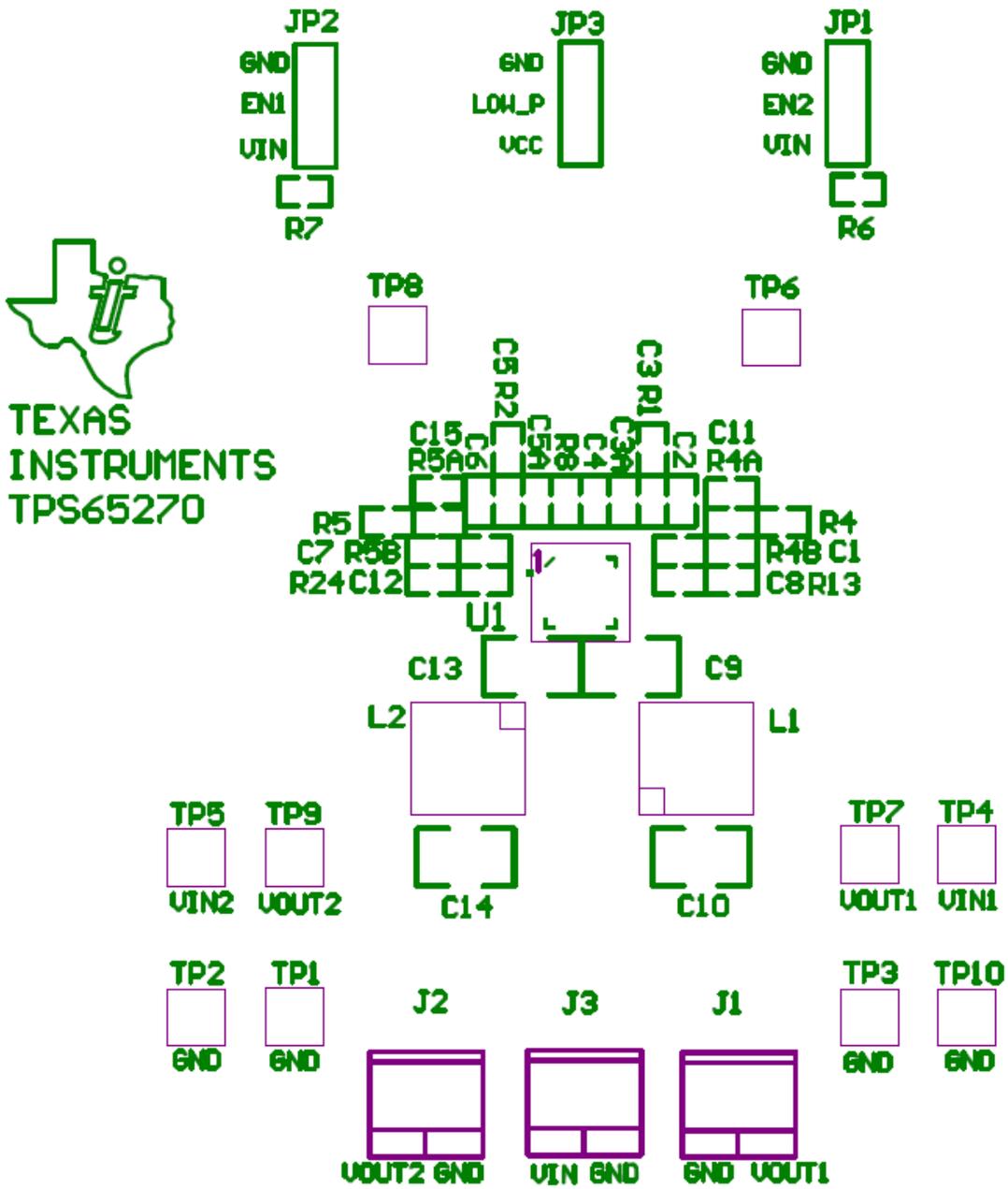


Figure 2. Placement (Top Layer)

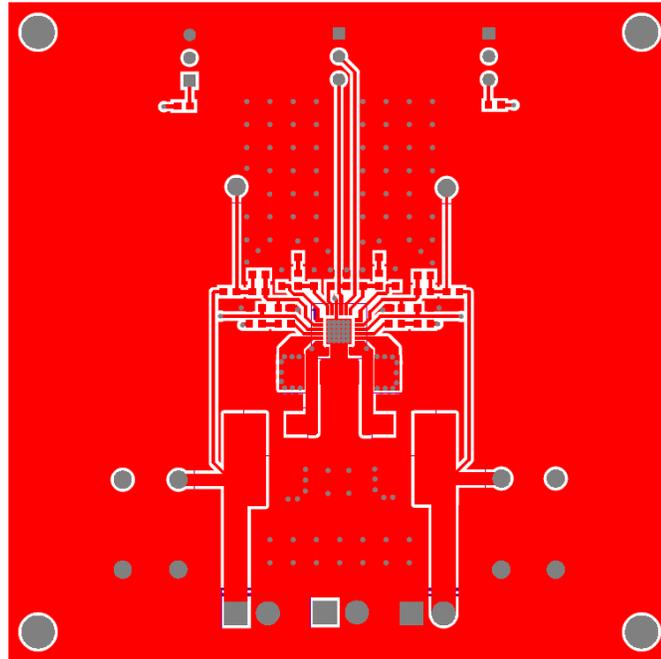


Figure 3. Board Layout (Top Layer)

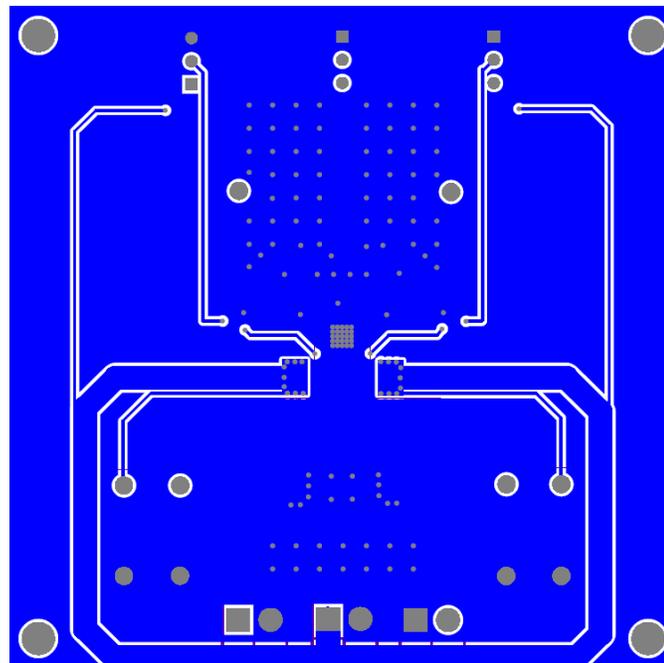


Figure 4. Board Layout (Bottom Layer)

5 Bench Test Setup Conditions

5.1 Headers Description and Jumper Placement

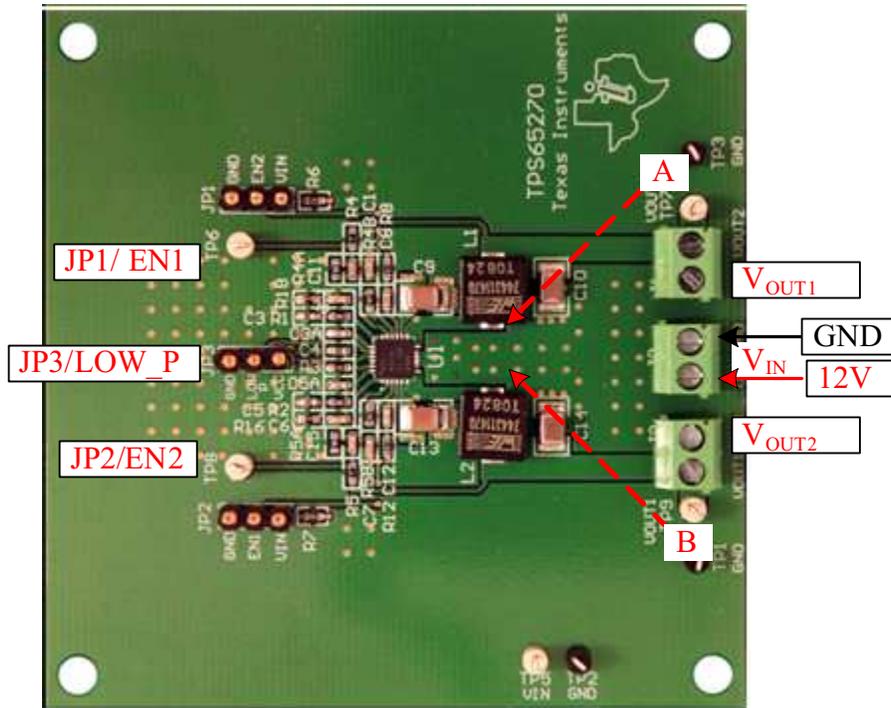


Figure 5. Headers Description and Jumper Placement

Test points:

A: LX of V_{OUT1}

B: LX of V_{OUT2}

V_{OUT1} , V_{OUT2} , V_{CC} , EN1, EN2, LOW_P

5.2 Jumpers

Table 2. Jumpers

JUMPER NO.	FUNCTION	PLACEMENT	COMMENT
JP1	BUCK1 enable (EN1)	Connect EN1 to GND to disable V_{OUT1} , connect EN1 to V_{IN} to enable V_{OUT1} ; Leave open to enable V_{OUT1}	
JP2	BUCK2 enable (EN2)	Connect EN2 to GND to disable V_{OUT2} , connect EN2 to V_{IN} to enable V_{OUT2} ; Leave open to enable V_{OUT2}	
JP3	Low Power Mode (LOW_P)	Connect LOW_P to GND to enter forced PWM mode; Connect LOW_P to V_{CC} to enter automatic PSM/PWM mode	Cannot leave open

6 Power-Up Procedure

1. Apply 4.5 V - 16 V to J3.
2. Toggle JP1 or JP2 to enable V_{OUT1} and V_{OUT2} respectively.
3. Apply loads to the output connectors.

7 Bill of Materials

Table 3. Bill of Materials

ITEM	QUANTITY	DESIGNATOR	VALUE	FOOTPRINT	MANUFACTURER	DESCRIPTION
1	2	C1, C7	4.7nF	603	Generic	CAP 4700PF 50V CERAMIC X7R 0603
2	2	C2, C6	10nF	603	Generic	CAP 10000PF 50V CERM X7R 0603
3	2	C3, C5	2.2nF	603	Generic	CAP 2200PF 50V CERAMIC X7R 0603
4 ⁽¹⁾	2	C3A, C5A	100pF	603	Generic	CAP100PF 50V CERAMIC X7R 0603
5	2	C9, C13	10uF	1210	Generic	CAP 10UF 35V CERAMIC X5R 1210
6	1	C4	10uF	603	Generic	CAP CER 10UF 10V X5R 20% 0603
7	2	C8, C12	47nF	603	Generic	CAP 47000PF 50V CERAMIC X7R 0603
8	2	C10, C14	22uF	1210	Generic	CAP 22UF 16V CERAMIC X5R 1210
9 ⁽¹⁾	2	C11, C15	82pF	603	Generic	CAP 82PF 50V CERAMIC X7R 0603
10	3	J1, J2, J3	ED555/2DS	TB_2X3.5MM	Onshore technology Inc	Terminal Block, 2-pin, 6-A, 3.5mm
11 ⁽²⁾	3	JP1, JP2, JP3	NA	JMP0.3	Mil Max/Generic	SIP HEADER 64 POS STRAIGHT PCB (800-10-064-10-001000)
12	2	L1, L2	4.7uH	IND_744311470	Wurth Electronics Inc	Magnetic-Core Inductor
13	2	R1, R2	10K	603	Generic	RES 10.0K OHM 1/10W 1% 0603 SMD
14	2	R4, R5	0	603	Generic	RES 0 OHM 1/10W 1% 0603 SMD
15	2	R4A, R5A	40.2K	603	Generic	RES 40.2K OHM 1/10W 1% 0603 SMD
16	1	R4B	32.4K	603	Generic	RES 32.4K OHM 1/10W 1% 0603 SMD
17	1	R5B	80.6K	603	Generic	RES 80.6K OHM 1/10W 1% 0603 SMD
18	2	R6, R7	200K	603	Generic	RES 200K OHM 1/10W 1% 0603 SMD
19	1	R8	383K	603	Generic	RES 3830K OHM 1/10W 1% 0603 SMD
20	2	R13, R24	47	603	Generic	RES 47 OHM 1/10W 1% 0603 SMD
21	3	TP1, TP2, TP3	5001	TH-40	Keystone Electronics	Test Point, Black, Thru Hole Color Keyed
22	5	TP5, TP6, TP7, TP8, TP9	5002	TH-40	Keystone Electronics	Test Point, White, Thru Hole Color Keyed
23	1	U1	NA	RGE24	Texas Instruments	'TPS65270RGE24
24 ⁽³⁾	4	NA	NA	NA	3M	SJ-5303 (CLEAR), BUMPON HEMISPHERE .44X.20 CLEAR
25 ⁽⁴⁾	3	NA	NA	NA	Sullins Connector Solutions	SPC02SYAN, CONN JUMPER SHORTING GOLD FLASH

⁽¹⁾ Optional

⁽²⁾ Split into three pins

⁽³⁾ Install item 24 on bottom at corners.

⁽⁴⁾ Install item 25 on item 11 no order - be consistent

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of and the output voltage range of that listed in Table 1.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 85°C. The EVM is designed to operate properly with certain components above 85°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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