

TPS61023EVM-052 Evaluation module

The TPS61023EVM-052 evaluates the performance of the TPS61023, which is a 3-A boost converter with 0.5-V ultra-low input voltage. This user's guide describes the input and output ranges, EVM setup, bill of materials (BOM), schematic, and the PCB layout.

Contents

1	Introduction	2
2	Setup	2
3	Schematic and Bill of Materials	3
4	Board Layout	5

List of Figures

1	TPS61023EVM-052 Schematic.....	3
2	TPS61023EVM-052 Top-Side Layout.....	5
3	TPS61023EVM-052 Bottom-Side Layout.....	6

List of Tables

1	EVM Characteristics.....	2
2	TPS61023EVM-052 Bill of Materials	4

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1 Introduction

1.1 Performance

Table 1 provides a summary of the TPS61023EVM performance characteristics, tested at 25°C ambient temperature.

Table 1. EVM Characteristics

	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage			3.6		V
Output voltage	TPS61023EVM, $V_{IN} = 3.6\text{ V}$, $I_O \leq 2\text{ A}$		5.0		V
Output current	$V_{IN} = 2.7\text{ V}$			1.5	A
	$V_{IN} = 1.8\text{ V}$			1	

1.2 Modification

The EVM is designed to support 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 C2, is added as the input capacitor in the EVM, The ESR of the tantalum capacitor is 0.1 Ω , 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 Feedforward Capacitor

A feed-forward capacitor C9 can help to improve the response performance and the phase margin if the value is properly selected, Refer to this application note to select the feed-forward capacitor if required. [Feedforward Capacitor Makes Boost Converter Fast and Stable](#)

2 Setup

This section describes the setup of the TPS61023EVM-052.

2.1 Input/Output Connector Descriptions

See the following :

TP1-VIN	Positive input connection from the input supply for the EVM
TP2-VOUT	Positive connection for the output voltage
TP3-GND	Return connection from the input supply for the EVM
TP4-GND	Return connection for the output voltage
J1-VIN_S	Input voltage sensing for measuring efficiency. VIN_S+ is for positive input and VIN_S- is for negative input.
J2_VOUT_S	Output voltage sensing for measuring efficiency. VOUT_S+ is for output positive node and VOUT_S- is for output negative node
J3_EN	EN pin input jumper. Place a jumper across EN and VIN to turn on the IC. Place a jumper across EN and GND to turn off the IC

3 Schematic and Bill of Materials

This section provides the TPS61023EVM-052 schematic, bill of materials (BOM), and board layout.

3.1 Schematic

Figure 1 is the EVM schematic.

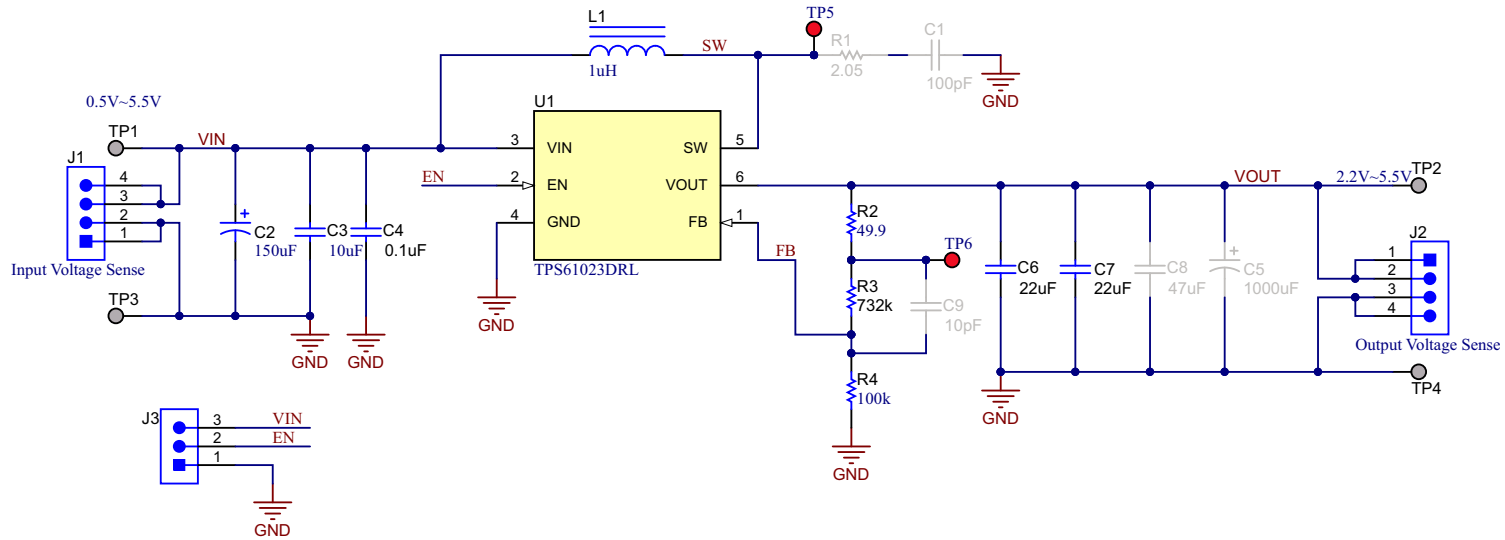


Figure 1. TPS61023EVM-052 Schematic

3.2 Bill of Materials

Table 2 displays the EVM bill of materials.

Table 2. TPS61023EVM-052 Bill of Materials

Designator	Qty	Value	Description	PackageReference	PartNumber	Manufacturer
C2	1	150uF	CAP, TA, 150 uF, 10 V, +/- 10%, 0.1 ohm, SMD	7343-31	T495D157K010ATE100	Kemet
C3	1	10uF	CAP, CERM, 10 uF, 10 V, +/- 20%, X5R, 0603	0603	GRM188R61A106MAA LD	MuRata
C4	1	0.1uF	CAP, CERM, 0.1 uF, 10 V, +/- 10%, X5R, 0402	0402	GRM155R61A104KA01 D	MuRata
C6, C7	2	22uF	CAP, CERM, 22 uF, 10 V, +/- 20%, X5R, 0603	0603	GRM188R61A226ME1 5D	MuRata
J1, J2	2		Header, 100mil, 4x1, Gold, TH	4x1 Header	TSW-104-07-G-S	Samtec
J3	1		Header, 100mil, 3x1, Gold, TH	3x1 Header	TSW-103-07-G-S	Samtec
L1	1	1uH	Inductor, Shielded, Composite, 1 uH, 9 A, 0.0089 ohm, AEC-Q200 Grade 1, SMD	4x4mm	XEL4030-102MEB	Coilcraft
R2	1	49.9	RES, 49.9, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060349R9FKEA	Vishay-Dale
R3	1	732k	RES, 732 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW0603732KFKEA	Vishay-Dale
R4	1	100k	RES, 100 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW0603100KFKEA	Vishay-Dale
TP1, TP2, TP3, TP4	4		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	Keystone
TP5, TP6	2		Test Point, Compact, Red, TH	Red Compact Testpoint	5005	Keystone
U1	1		3-A BOOST CONVERTER WITH 0.5V ULTRA-LOW INPUT VOLTAGE, DRL0006A	DRL0006A	TPS61023	Texas Instruments
C1	0	100pF	CAP, CERM, 100 pF, 50 V, +/- 5%, C0G/NP0, 0603	0603	GRM1885C1H101JA01 D	MuRata
C5	0	1000uF	CAP, AL, 1000 uF, 10 V, +/- 20%, 0.15 ohm, SMD	SMT Radial G	EEE-FC1A102P	Panasonic
C8	0	47uF	CAP, CERM, 47 uF, 10 V, +/- 10%, X5R, 1206	1206	GRM31CR61A476KE1 5L	MuRata
C9	0	10pF	CAP, CERM, 10 pF, 10 V, +/- 10%, X7R, 0603	0603	0603ZC100KAT2A	AVX
R1	0	2.05	RES, 2.05, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW06032R05FKEA	Vishay-Dale

4 Board Layout

The PCB of the TPS61023EVM has four layers. Figure 2 and Figure 3 show the top side and bottom side of the PCB layout, respectively. The two internal layers are ground plane helping to improve the thermal performance.

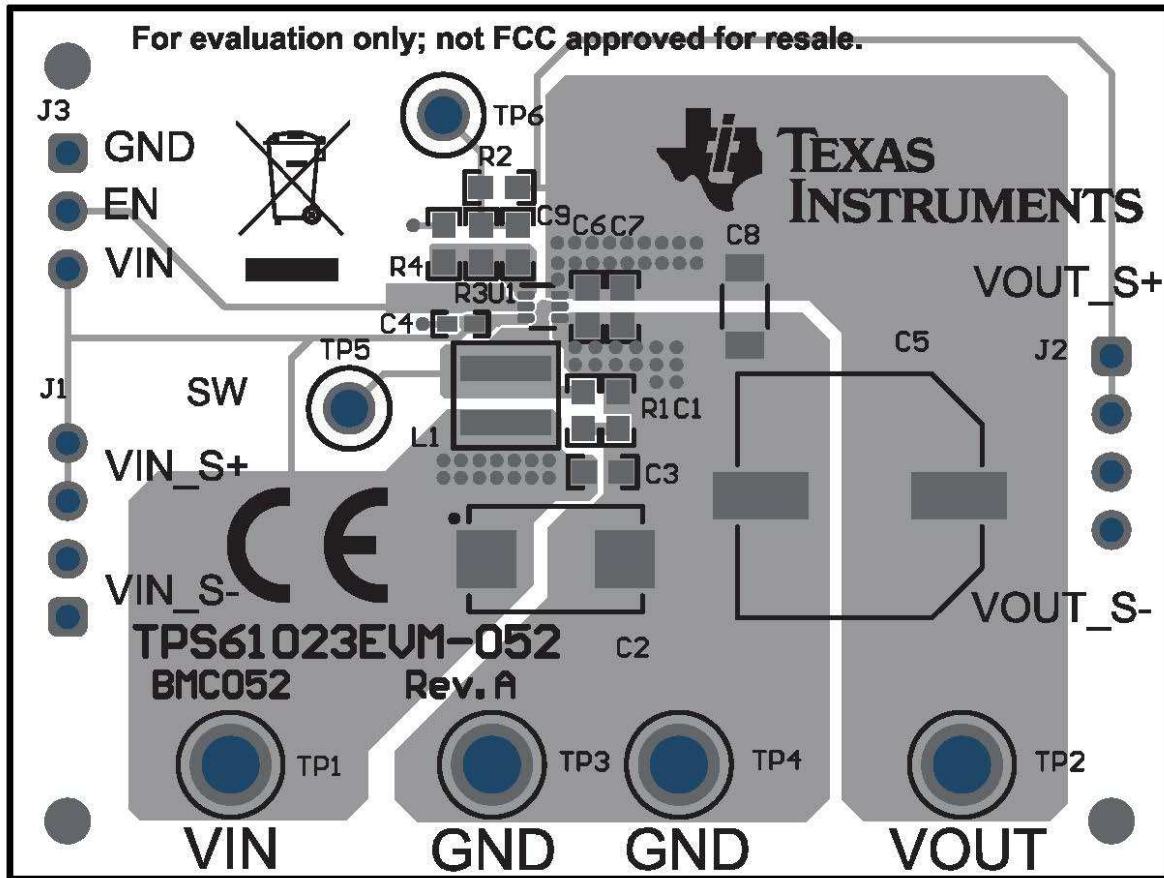


Figure 2. TPS61023EVM-052 Top-Side Layout

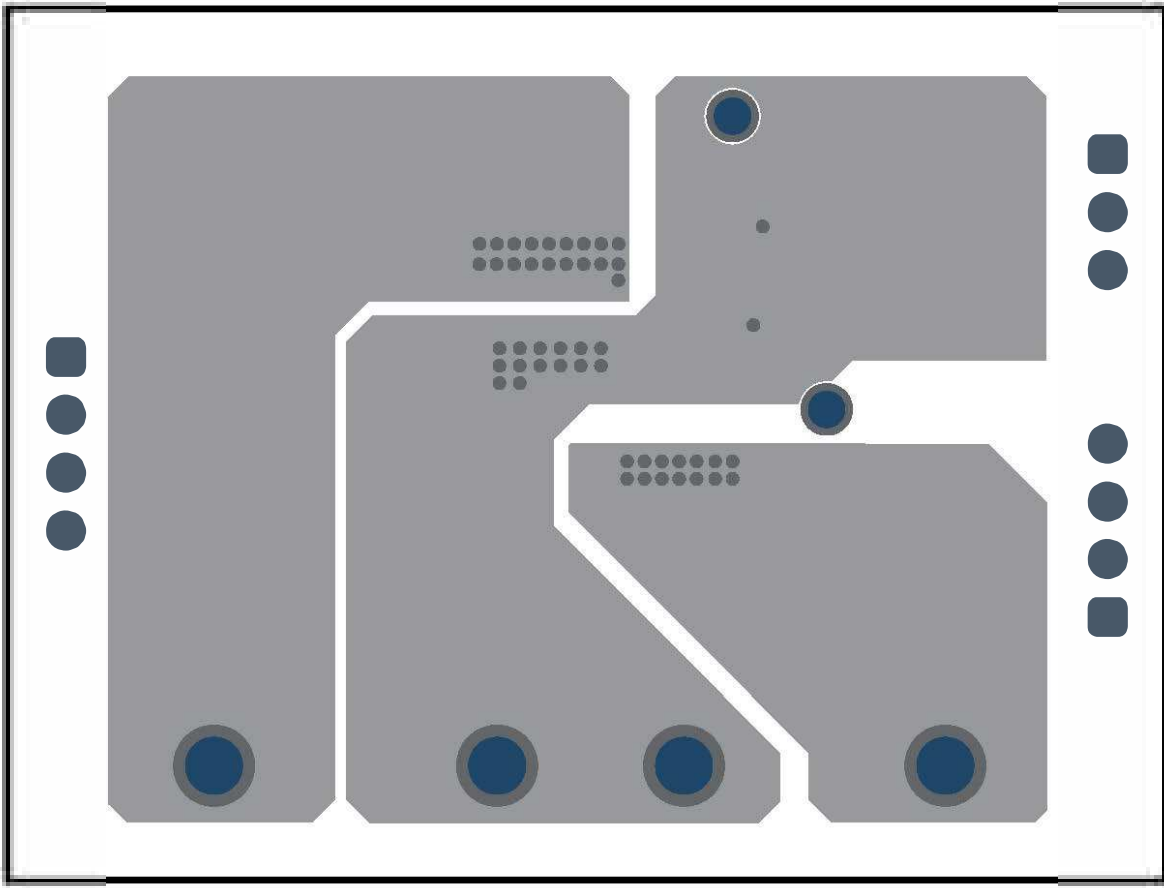


Figure 3. TPS61023EVM-052 Bottom-Side Layout

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