# 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.

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## Trademarks

# 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 V, $I_O$ ≤ 2A | | 5.0 | | V |
| Output current | $V_{IN}$ = 2.7 V | | | 1.5 | A |
| | $V_{IN}$ = 1.8 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 0.1Ω, 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.

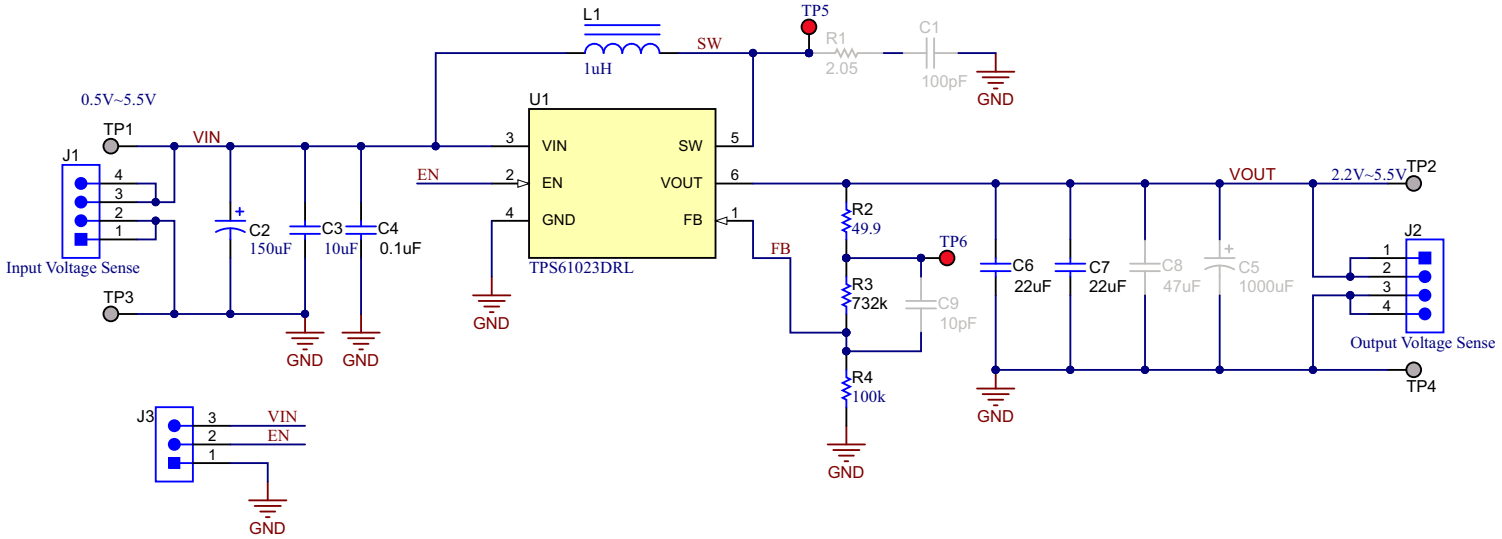


**Figure 1. TPS61023EVM-052 Schematic**

## 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 | GRM188R61A106MAALD | MuRata |
| C4 | 1 | 0.1uF | CAP, CERM, 0.1 uF, 10 V, +/- 10%, X5R, 0402 | 0402 | GRM155R61A104KA01D | MuRata |
| C6, C7 | 2 | 22uF | CAP, CERM, 22 uF, 10 V, +/- 20%, X5R, 0603 | 0603 | GRM188R61A226ME15D | 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 | GRM1885C1H101JA01D | 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 | GRM31CR61A476KE15L | 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 panel helping to improve the thermal performance.

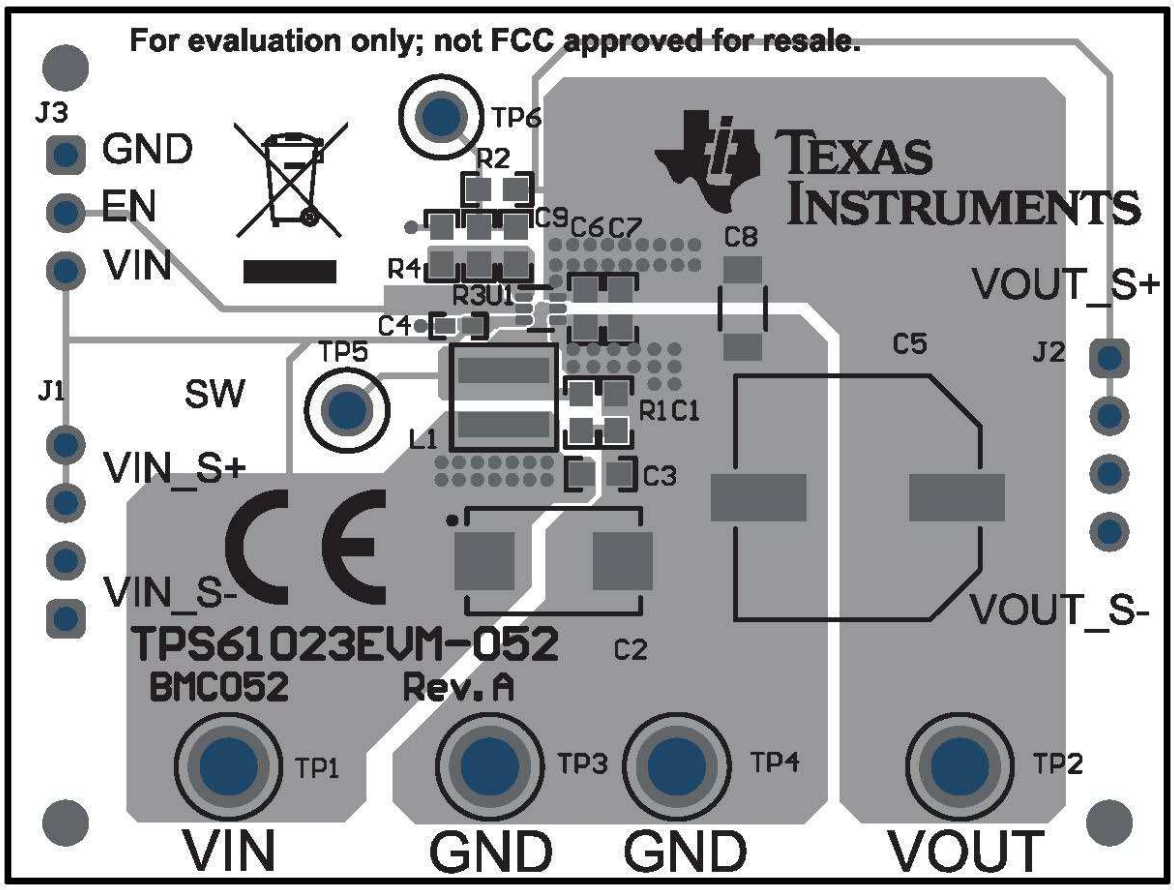


**Figure 2. TPS61023EVM-052 Top-Side Layout**

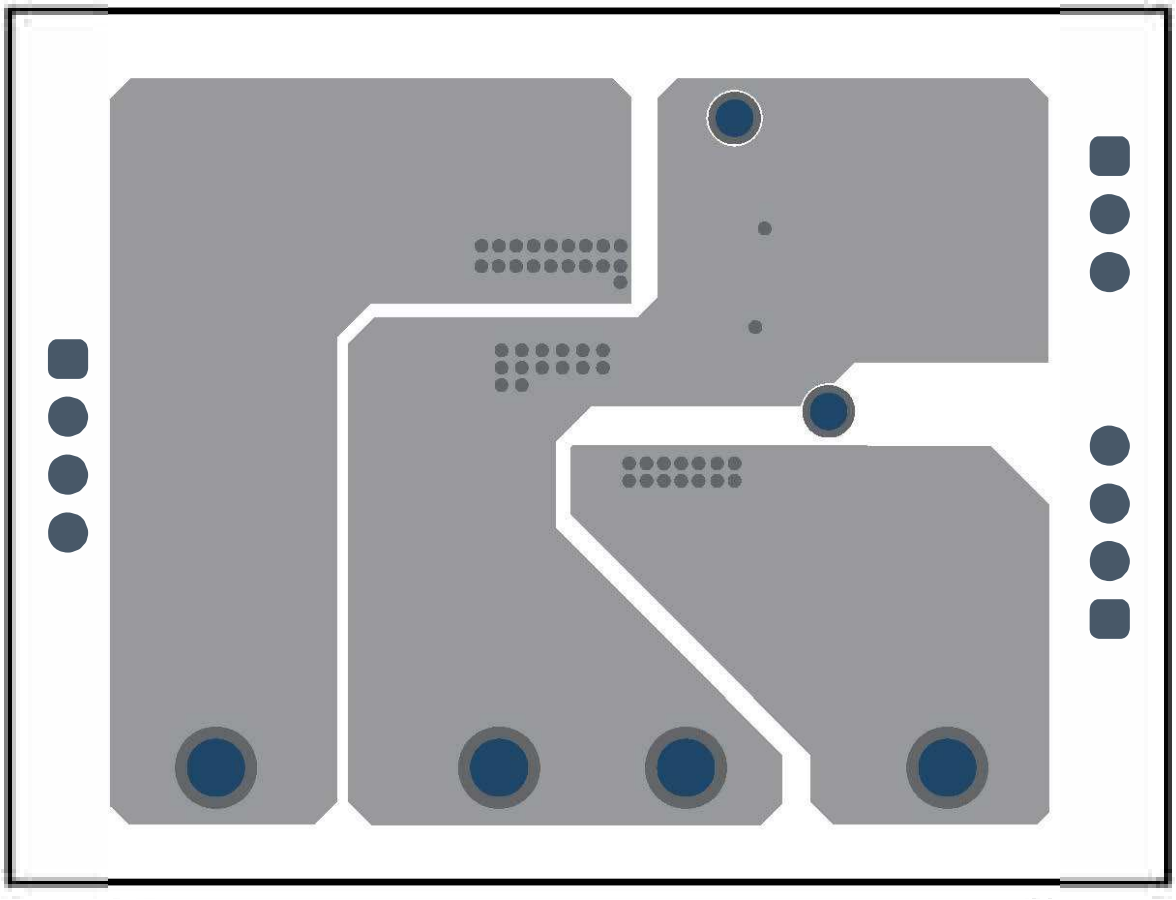

**Figure 3. TPS61023EVM-052 Bottom-Side Layout**

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