TPS61372EVM-033 Evaluation Module User Guide

This user's guide describes the setup, schematic and layout of the evaluation module (EVM) for the TPS61372. The EVM helps to evaluate the behavior and performance of the TPS61372 at different input voltages, output voltages and load conditions. The input voltage is from 2.5 V to 5 V, and the output voltage is set to 12 V. This can be changed through external feedback resistors. Two jumpers are placed to test the EN and MODE pin function.

The TPS61372EVM is manufactured before the TPS61372 is finally released, so the IC in the EVM may be not the final version. The marking on the IC indicates "XTPS" instead of "TPS" for the final IC version. The reference voltage, switching frequency and current limitation may have larger variations. For example, the reference voltage of the IC is approximately 4% higher than specified value. However, the output ripple, efficiency, line and load transient and other behaviors of the IC are the same as the final version IC.

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Trademarks

1 Setup

Table 1 provides the input voltage, output voltage and load condition of TPS61372EVM-033. The output voltage can be modified by changing the high-side feedback resistors, that are connected between the output and the FB pin. The TPS61372 limits the inductor peak current to typical 3.6 A, thus the maximum output current depends on the input and output voltage.

No power sequence is required to start the EVM. The device regulates its output voltage when the input voltage is ready and EN pin is logic high. The output voltage may be approximately 12.5 V for the "XTPS" marked version, as it is not the final version.

Table 1. Performance Specification

Specification	Test Condition	MIN	TYP	MAX	UNIT
Input voltage		2.5	3.6	5	V
Output voltage	V_{IN} = 3.6 V, I_{OUT} = 0.6 A		12		V
Output Current	V_{IN} = 3.6 V	0	0.6		A

2 Schematic

Figure 1 shows the schematic of the TPS61372EVM. Some components are used to evaluate the IC easily but unnecessary in real application, such as the 150-µF input capacitor C2, feedback resistor R4. The J5 and J6 are to detect the input and output voltages close to the IC.

The long cable between the power supply and the EVM introduces large parasitic inductance. This parasitic inductor could "ring" with the ceramic capacitor if not using a 50-mΩ ESR, 150-µF tantalum capacitor. Normally, the parasitic inductor is much smaller in real applications; so, the tantalum capacitor is not required.

The 49.9-Ω R4 is used to measure the Bode plot; this helps to estimate the stability of the boost converter while evaluating the IC. Two resistors, R2 and R3 in series, can help to precisely select the feedback divider. One resistor may be good enough for real applications.

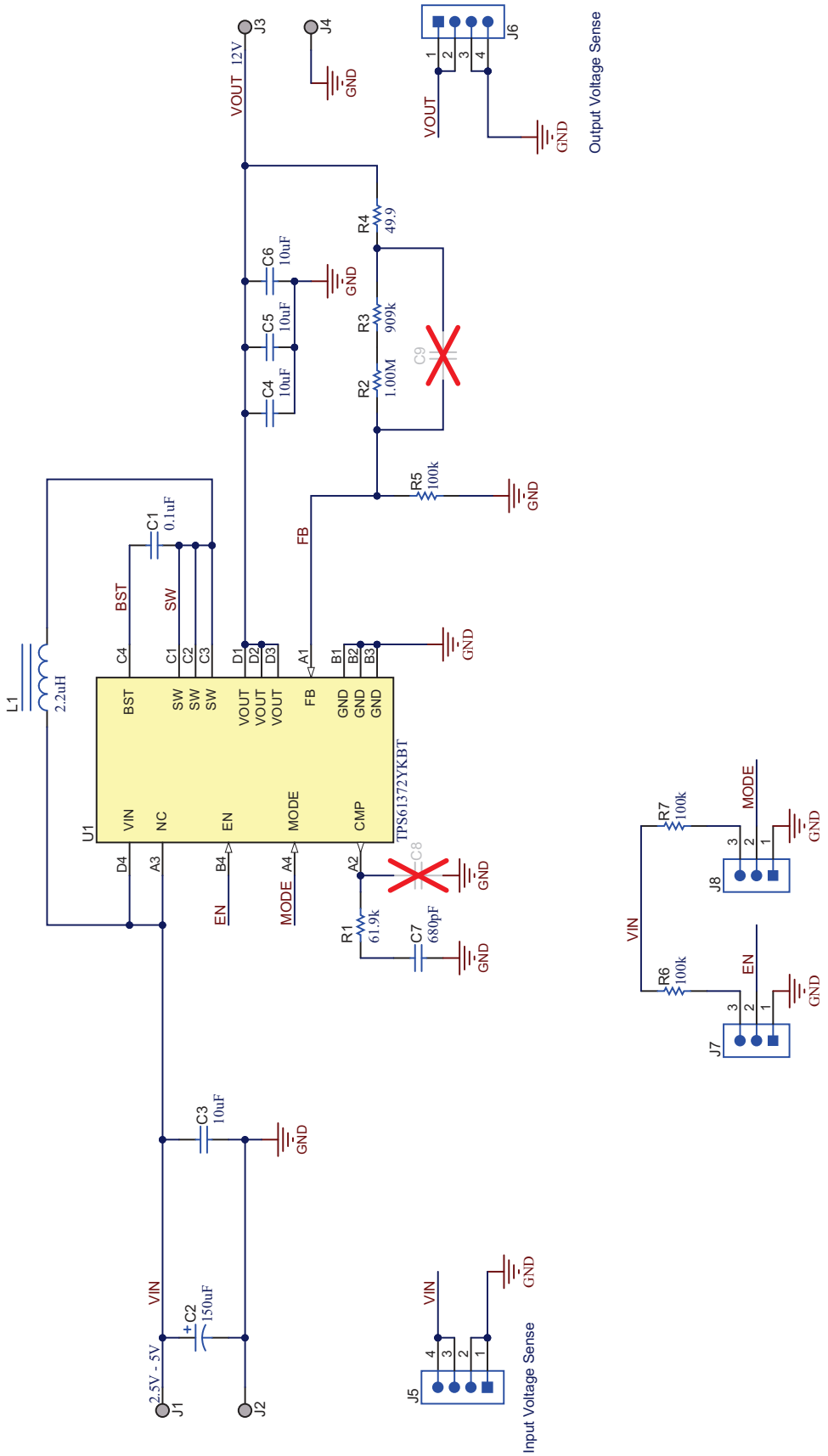

Figure 1. Schematic of the TPS61372EVM

3 PCB

The TPS61372EVM is built on a four-layer PCB. The top layer view and bottom layer view are shown in Figure 2 and Figure 3. The two internal layers are ground panels. All the components are placed on the top layer.

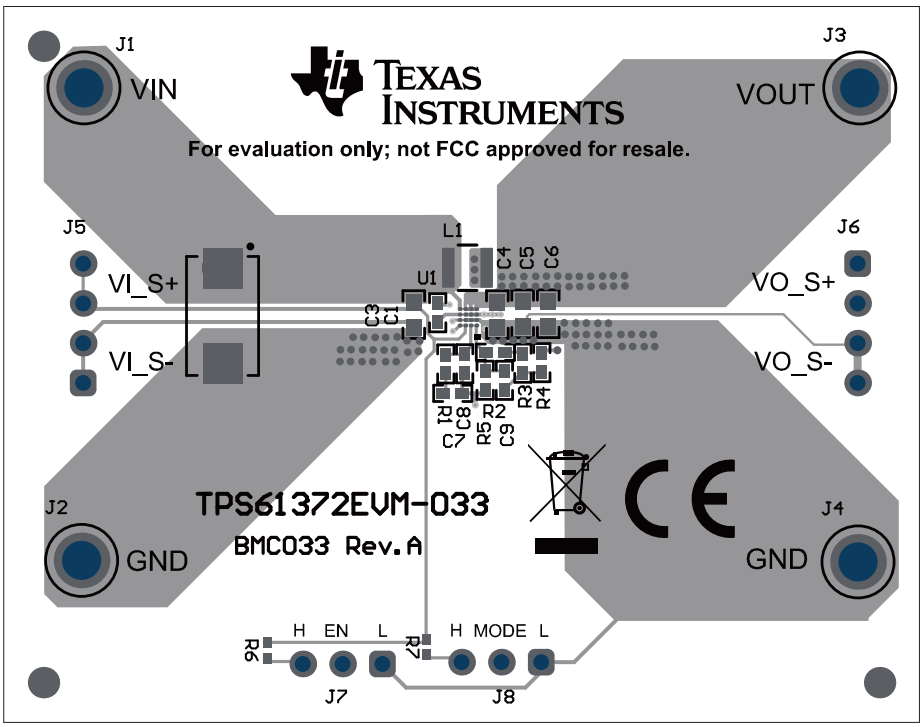

Figure 2. Top View of TPS61372EVM

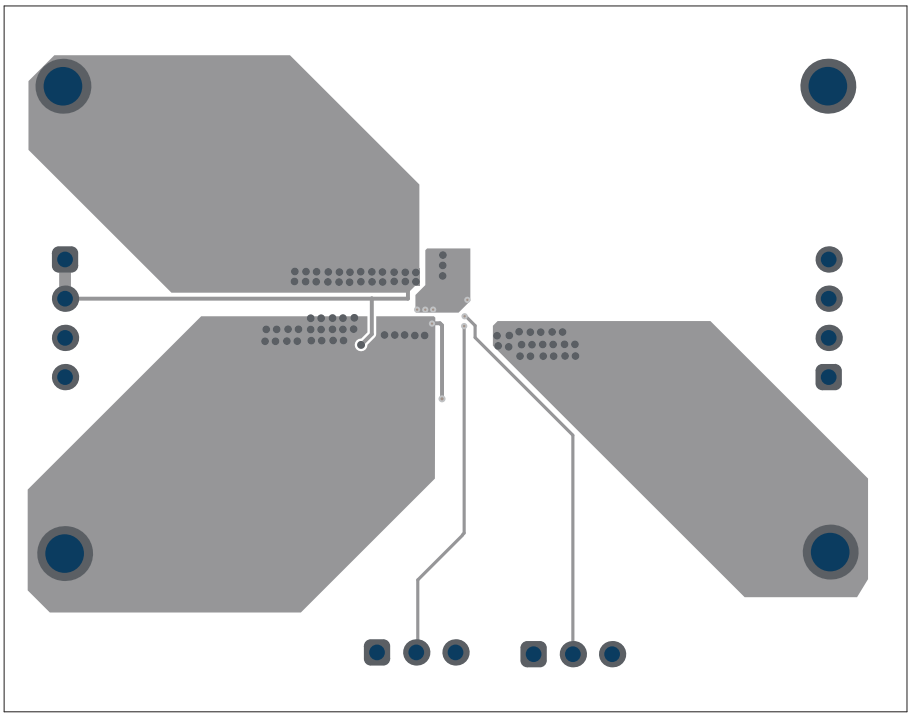

Figure 3. Bottom View of TPS61372EVM

4 Bill of Material

The part number of the components used in the TPS61372EVM can be found in the Table 2.

Table 2. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
PCB1	1		Printed Circuit Board		BMC033	Any
C1	1	0.1µF	CAP, CERM, 0.1 µF, 16 V, ± 10%, X5R, 0402	0402	GRM155R61C104KA88D	MuRata
C2	1	150µF	CAP, Tantalum Polymer, 150 µF, 16 V, ± 20%, 0.05 ohm, 7343-31 SMD	7343-31	16TQC150MYF	Panasonic
C3, C4, C5, C6	4	10µF	CAP, CERM, 10 µF, 25 V, ± 20%, X5R, 0603	0603	GRM188R61E106MA73D	MuRata
C7	1	680pF	CAP, CERM, 680 pF, 25 V, ± 5%, C0G/NP0, 0402	0402	GRM1555C1E681JA01D	MuRata
J1, J2, J3, J4	4		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	Keystone
J5, J6	2		Header, 100mil, 4x1, Gold, TH	4x1 Header	TSW-104-07-G-S	Samtec
J7, J8	2		Header, 100mil, 3x1, Gold, TH	3x1 Header	TSW-103-07-G-S	Samtec
L1	1	2.2µH	Inductor, Shielded, Metal Composite, 2.2 µH, 2.6 A, 0.066 ohm, SMD	Inductor, 3.2x2.5mm, SMT	DFE322512F-2R2M=P2	MuRata
R1	1	61.9kΩ	RES, 61.9 kΩ, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040261K9FKED	Vishay-Dale
R2	1	1.00MΩ	RES, 1.00 M, 1%, 0.063 W, 0402	0402	RC0402FR-071ML	Yageo America
R3	1	909kΩ	RES, 909 kΩ, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402909KFKED	Vishay-Dale
R4	1	49.9	RES, 49.9, 1%, 0.063 W, 0402	0402	RC0402FR-0749R9L	Yageo America
R5	1	100kΩ	RES, 100 kΩ, 1%, 0.0625 W, 0402	0402	RC0402FR-07100KL	Yageo America
R6, R7	2	100kΩ	RES, 100 kΩ, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402100KFKED	Vishay-Dale
SH-JP1, SH-JP2	2		Shunt, 100mil, Gold plated, Black	Shunt 2 pos. 100 mil	881545-2	TE Connectivity
U1	1		16-V, 3.6-A Synchronous Boost with Short Protection and Load Disconnect, YKB0016AEAG (DSBGA-16)	YKB0016AEAG	TPS61372YKBT	Texas Instruments
C8	0	10pF	CAP, CERM, 10 pF, 50 V,± 1%, C0G/NP0, 0402	0402	GRM1555C1H100FA01D	MuRata
C9	0	1pF	CAP, CERM, 1 pF, 50 V, ± 10%, C0G/NP0, 0402	0402	GRM1555C1H1R0BA01D	MuRata
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A

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