# 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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## 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 |


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## 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.



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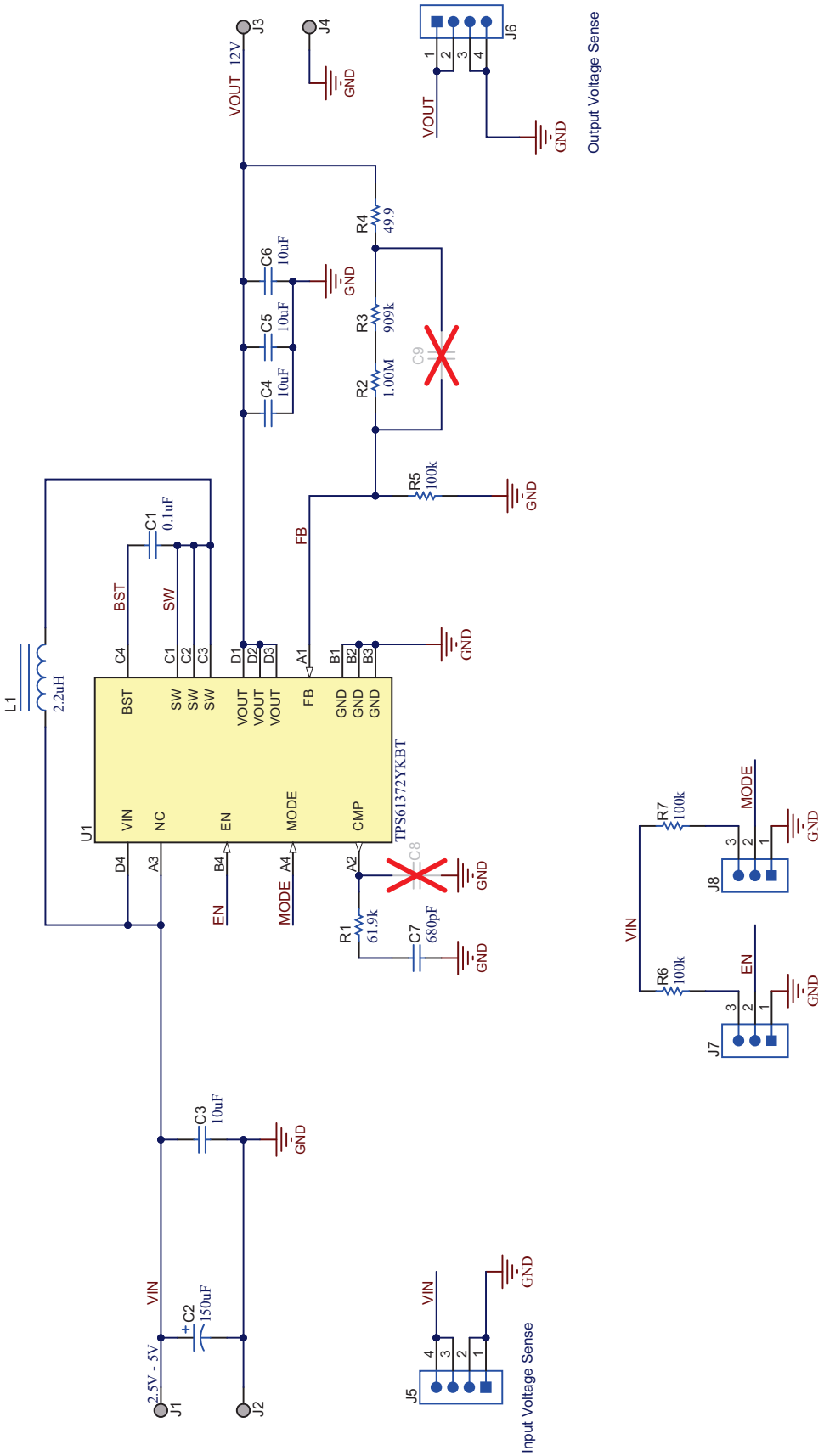



**Figure 1. Schematic of the TPS61372EVM**



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## 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.

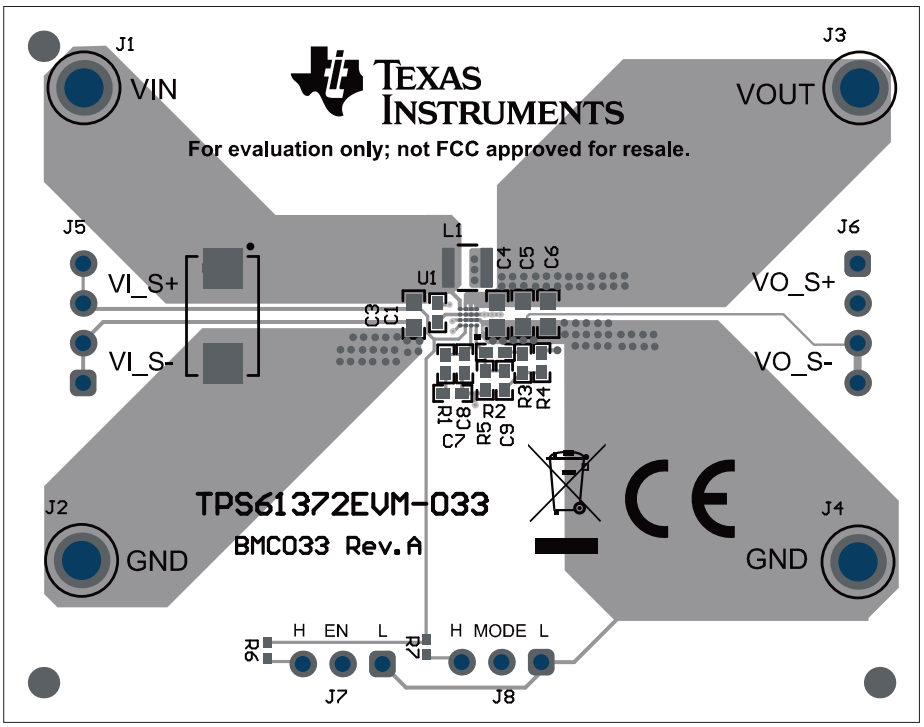



**Figure 2. Top View of TPS61372EVM**

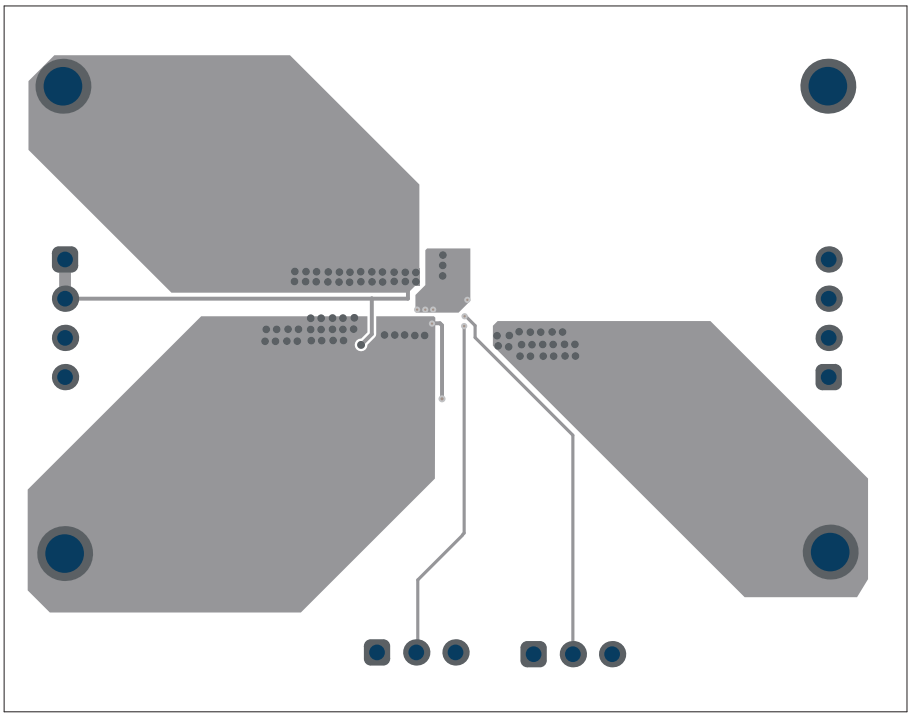


**Figure 3. Bottom View of TPS61372EVM**



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## 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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