TPS62750EVM-413

This user's guide describes the characteristics, operation, and use of the TPS62750EVM-413 evaluation module (EVM). This user's guide includes setup instructions, schematic diagram, bill of materials, and printed-circuit board (PCB) layout drawings for the EVM. The EVM features the 2.5-mm x 2.5-mm, 10-pin SON package (DSK) on a 40-mm X 32-mm (1.6-inch x 1.2-inch) PCB.

1 Introduction

The TPS62750EVM-413 evaluation module (EVM) helps designers evaluate the operation and performance of the TPS62750 step-down converter. This EVM demonstrates the Texas Instruments TPS62750 2.25-MHz, synchronous, step-down converter for power devices from USB or current-limited inputs. The TPS62750 output is adjustable from 0.8 V to 85% of Vin, and the maximum Vin is 6 V. Output current is determined by input, output voltage, and switch current limit of 1500 mA, but at 5 V in and 3.6 V out the output current is up to 750 mA. Unique features of the TPS62750 is an adjustable input current limit set by two onboard resistors. The Current Select jumper allows selection of a high- or low-input current setting. The Enable jumper is provided to turn the device on and off.

1.1 Related Documentation From Texas Instruments

TPS62750, High-Efficiency, Step-Down Converter for USB Applications data sheet (SLVS955)

2 Setup

This section describes the jumpers and connectors on the EVM as well as how to properly connect, set up, and use the TPS62750EVM-413. The capacitor C4 position provides the option for additional input filtering, if desired.

2.1 J1/J3 – Input Connections

This is the connections for the input supply voltage. Connect the positive connection to J1 and the negative connection to GND J3. Twist the leads to the input supply and keep them as short as possible to minimize EMI transmission connection for the leads from the input source.

2.2 J4/J6 – Output Connections

This is the connections for the output. Connect the positive connection of the load to J4 and negative connection to GND J6.

2.3 J2/J5 – Vin Sense and Vout Sense

The two connectors are not installed, but if accurate measurements of the input or output are required, J2 or J5 can be installed for the measurements. Traces on the printed-circuit board (PCB) connect to the input or output capacitor and run independent of the output and ground lines to the two connectors. Note these traces are low current sense lines and must not be used as input or output.

2.4 JP1 – EN (ENABLE)

This jumper enables or disables the converter. Connecting the shorting jumper between EN and ON enables the converter. Connecting the shorting jumper between EN and OFF disables the converter. Do not leave this pin floating.

2.5 JP2 – Current Select

This jumper sets the input current selection from high to low. Resistor R3 sets low-input current and resistor R4 sets high-input current. The EVM is set for 100 mA in low position and 500 mA in high position. Do not leave this pin floating.

3 Operation

Connect the positive input power supply to the pins J1, and connect the input power return (ground) to the GND pins on J3. The TPS62750EVM-413 has a maximum input voltage and operating voltage of 6 V.

Connect the desired load between the Vogt pin, J4 and GND pins J6. The TPS62750 EVM is set for 3.6 V out and maximum current can be up to 2 A at high-input voltage.

Configure jumpers JP1 to turn the device On or Off. Configure jumper JP4 to select high- or low-input current.

4 Test Results

This section provides typical performance waveforms using the TPS62750EVM-413 PCB.

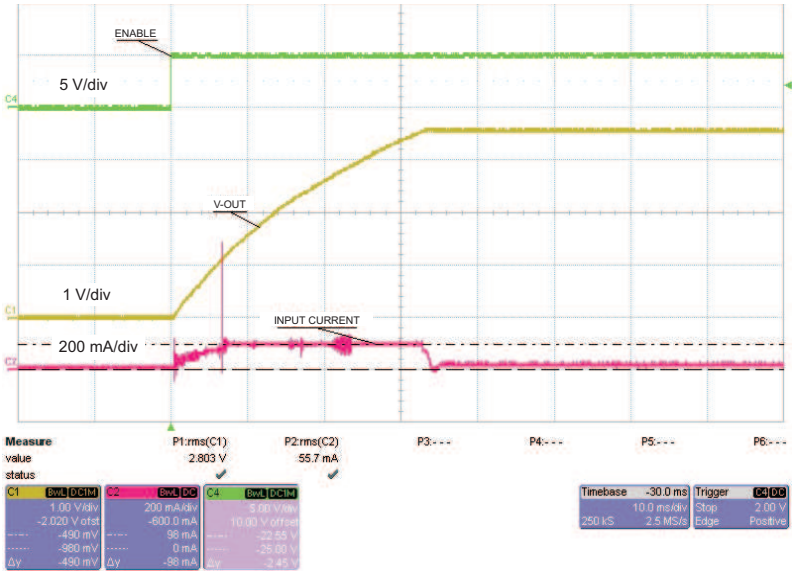


Figure 1. Turnon With Enable and Current Limit Set to Low, Time Base 10 ms

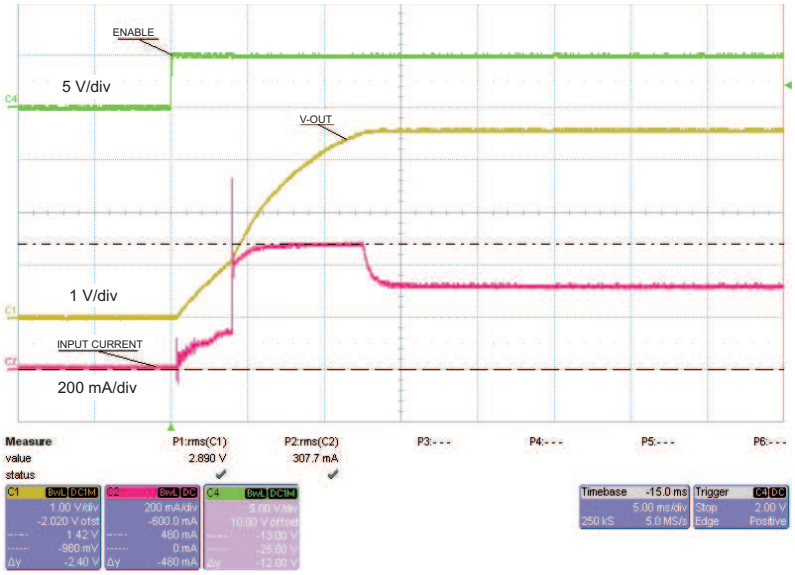


Figure 2. Turnon With Enable and Current Limit Set to High, Time Base 5 ms

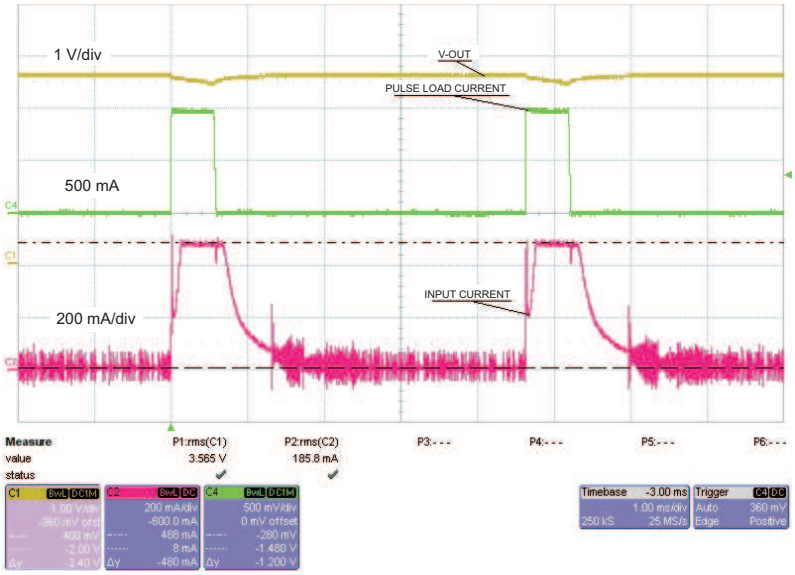


Figure 3. 1-A Pulse Load With Current Limit Set to High, Pulse 577 μs at 216 Hz, Time Base 1 ms

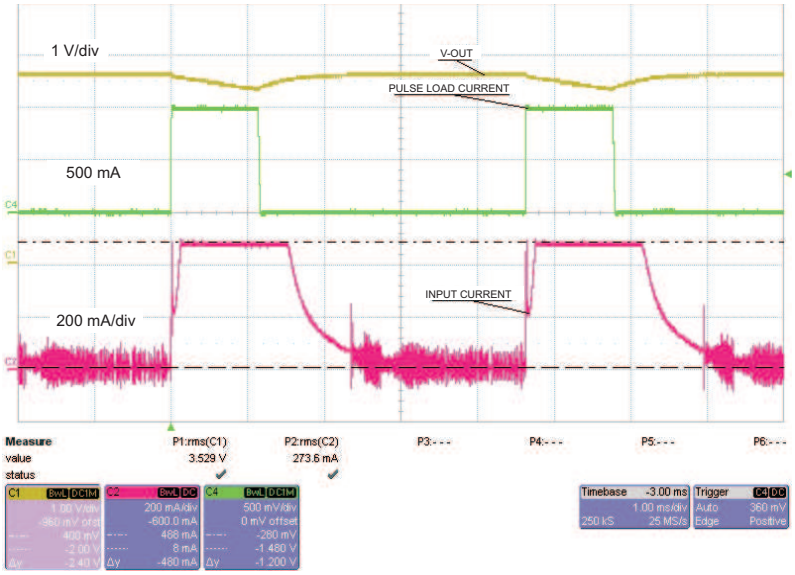


Figure 4. 1-A Pulse Load With Current Limit Set to High, Pulse 1154 μs at 216 Hz, Time Base 1 ms

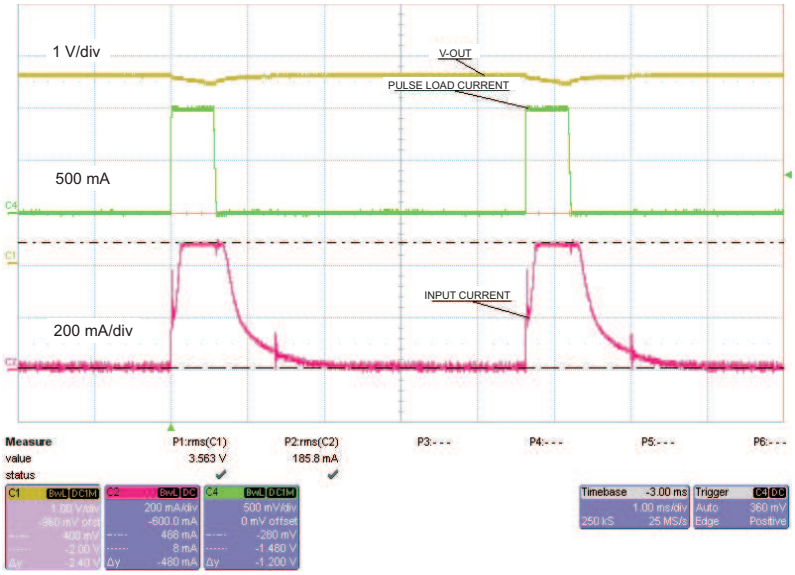


Figure 5. C4 Added 47 μF, 1-A Pulse Load With Current Limit Set to High, Pulse 577 μs at 216 Hz, Time Base 1 ms

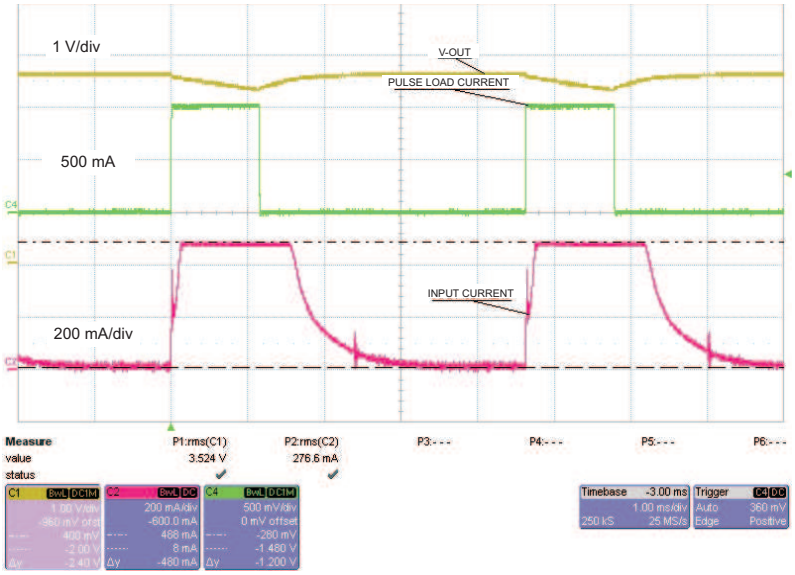


Figure 6. C4 Added 47 μF, 1-A Pulse Load With Current Limit Set to High, Pulse 1154 μs at 216 Hz, Time Base 1 ms

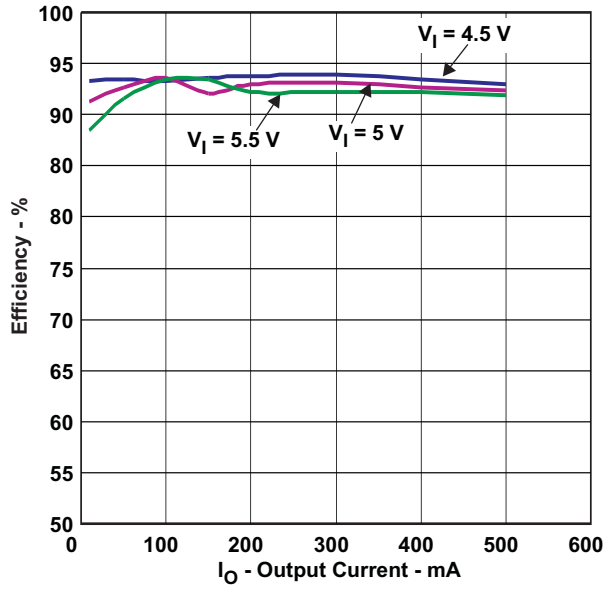


Figure 7. Efficiency With Current Limit Set to High, Vin 5 V, 4.5 V, and 5.5 V

5 Board Layout, Schematic, and Bill of Materials

This section provides the TPS62750EVM-413 board layout, schematic, and bill of materials.

5.1 Board Layout

Board layout is critical for all high-frequency, switch-mode power supplies. If the layout is not carefully done, the regulator can show stability and EMI problems. Therefore, use wide and short traces for the main current path and for the power ground tracks. The input and output capacitor, as well as the inductor, must be placed as close as possible to the integrated circuit. Use a common ground node for power ground to minimize the effects of ground noise. Figure 8 through Figure 10 show the board layout for the TPS62750EVM-413 PCB.

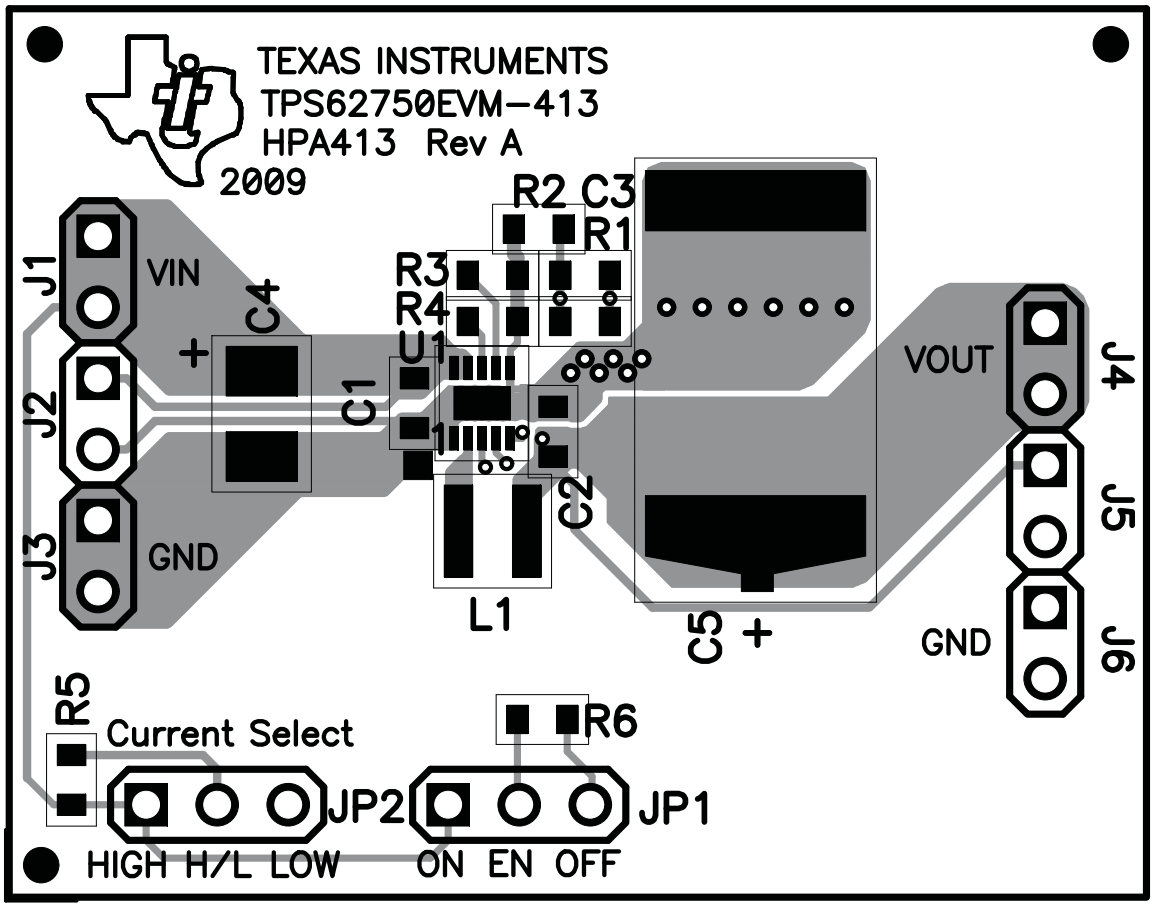


Figure 8. Top Assembly Layer

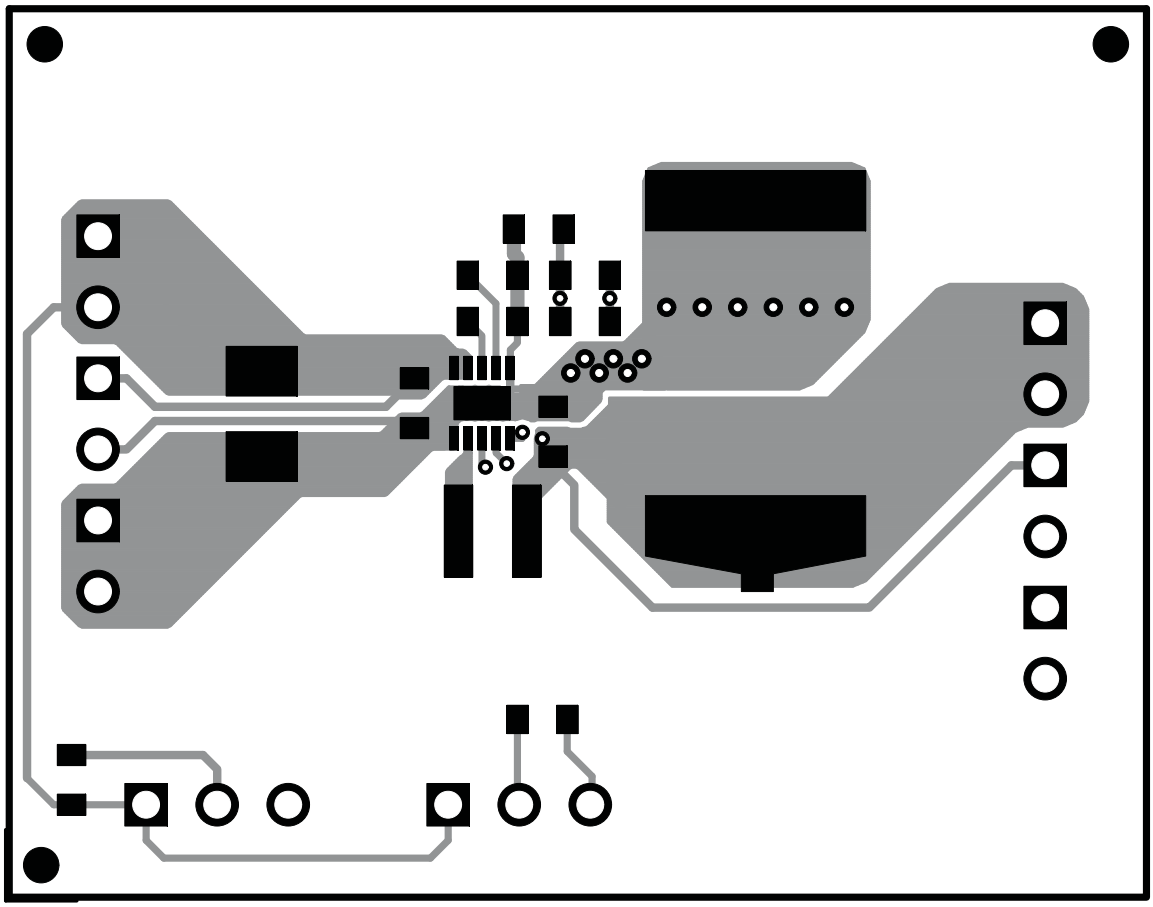


Figure 9. Top Layer

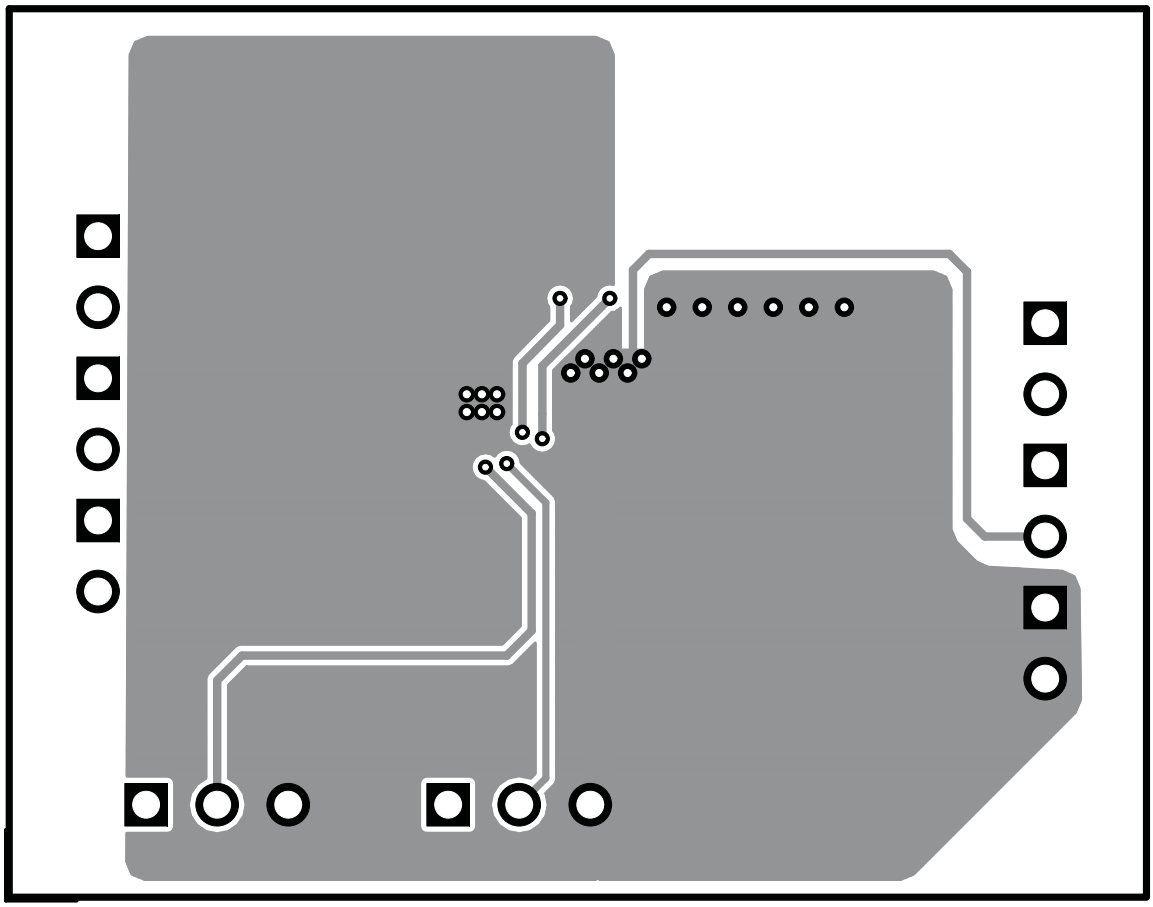


Figure 10. Bottom Layer

5.2 Schematic and Bill of Materials

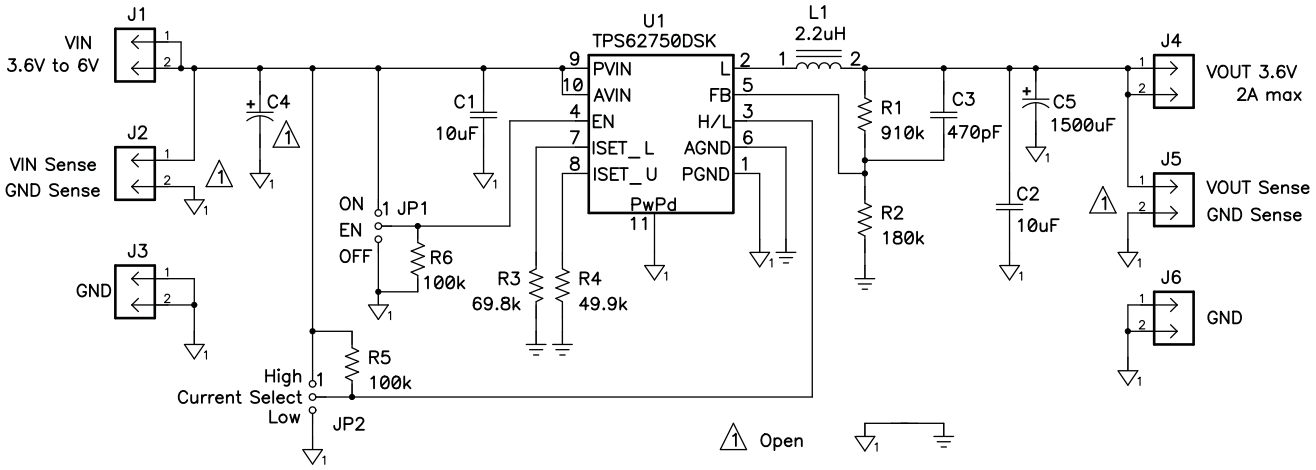


Figure 11. TPS62750EVM-413 Schematic

Table 1. Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
2	C1, C2	10µF	Capacitor, Ceramic, 6.3V, X5R, 20%	0603	GRM188R60J106M	Murata
1	C3	470pF	Capacitor, Ceramic, 50V, C0G, ±0.5pF	0603	C1608C0G1H471J	TDK
0	C4	Open	Capacitor, Bulk	3528(B)	Std	Std
1	C5	1500µF	Capacitor, Tantalum, 6.3V, 20%	X Code	592D158X06R3X2T25H	Vishay
1	L1	2.2µH	Inductor, SMT, 2.0A, 110 milliohm	0.118 x 0.118 inch	LPS3015-222ML	Coilcraft
1	R1	910k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R2	180k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R3	69.8k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R4	49.9k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
2	R5, R6	100k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	U1	TPS62750DSK	IC, High Efficiency Step-Down Converter	DSK	TPS62750DSK	TI

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2.9 V to 6 V and the output voltage range of 0.8 V to 5 V.

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 50°C. The EVM is designed to operate properly with certain components above 60°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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