TPS62590EVM-454

This user's guide describes the characteristics, operation, and use of the TPS62590EVM-454 evaluation module (EVM). This EVM demonstrates the Texas Instruments TPS62590, 2.25-MHz, synchronous, step-down converter capable of providing 1 A of output current. This user's guide includes setup instructions, a schematic diagram, a bill of materials, and printed-circuit board layout drawings for the evaluation module.

1 Introduction

The TPS62590EVM-454 evaluation module (EVM) helps designers evaluate the operation and performance of the TPS62590 dc/dc converter. This converter is a 2.25-MHz, synchronous, step-down converter capable of 1 A of output current.

2 Setup

This section describes the jumpers and connectors on the EVM as well as how to properly connect, set up, and use the TPS62590EVM-454.

2.1 Input/Output Connector Descriptions

2.1.1 J1/J3 – Input Connections

This is the connections for the input supply voltage. Connect the positive connection to the V_{IN} 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.

2.1.2 J4/J6 – Output Connections

This is the connections for the output. Connect the positive connection of the load to V_{OUT}out J4 and negative connection to GND J6.

2.1.3 J2/J5 – V_{IN} Sense and V_{OUT} 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.

2.1.4 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. Never leave this pin floating.

2.1.5 JP2 – MODE

This jumper sets the mode to PWM or PFM/PWM of the TPS62590. Connecting the shorting jumper between MODE PWM forces the TPS62590 into fixed frequency PWM mode. Connecting the shorting jumper between MODE and PFM/PWM enables the Power Save mode with automatic transition from PFM mode to fixed frequency PWM mode. Never leave this pin floating.

3 Operation

Connect the positive input power supply to J1. Connect the input power return (ground) to J2. The TPS62590EVM-454 has an absolute maximum input voltage of 7 V. The recommended maximum operating voltage is 6 V.

Connect the desired load between J3 and J4. The TPS62590EVM-454 can supply up to 1 A of output current.

Configure jumpers JP1 and JP2 as required. The functions of JP1 and JP2 are described in Section 2.

4 Test Results

See the Typical Characteristics section of the TPS62590 data sheet (SLVS764). This EVM uses the same inductors and capacitors as those used for characterization in the data sheet. Performance is consistent with that shown in the data sheet.

5 Board Layout

This section provides the TPS62590EVM-454 board layout and illustrations.

5.1 Layout

Board layout is critical for all high-frequency switch mode power supplies. Figure 1 through Figure 3 show the board layout for the TPS62590EVM-454 PCB. The nodes with high-switching frequencies and currents are kept as short as possible to minimize trace inductance. Careful attention has been given to the routing of high-frequency current loops and a single-point grounding scheme is used. See the data sheet for specific layout guidelines.

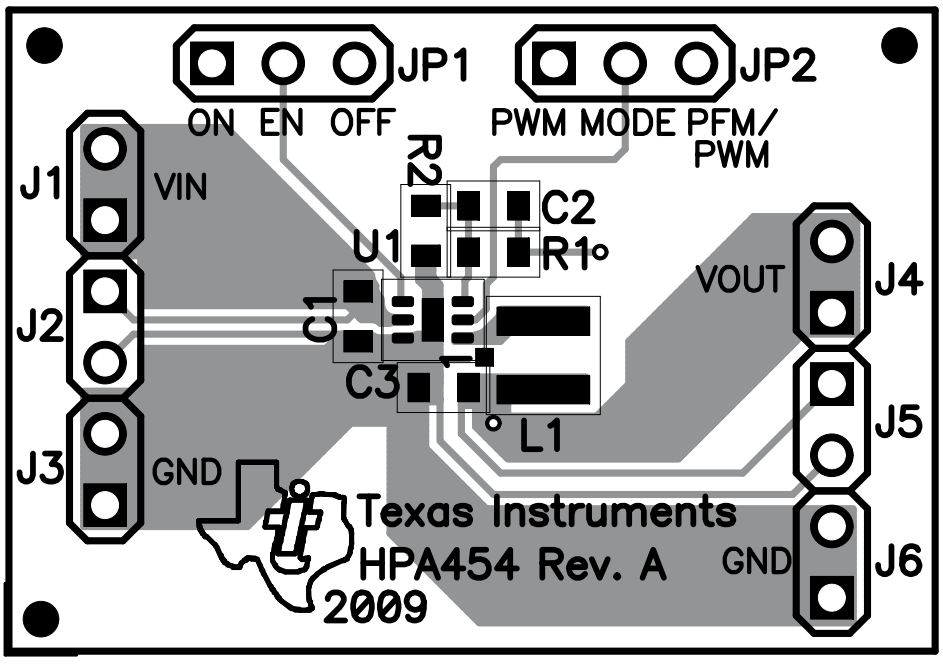

Figure 1. Assembly Layer

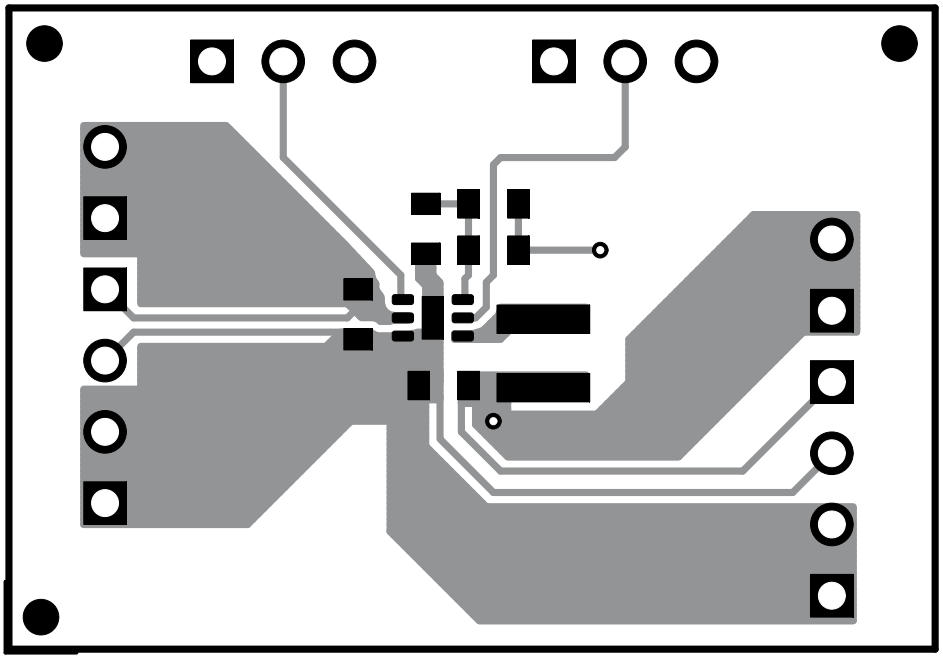

Figure 2. Top Layer Routing

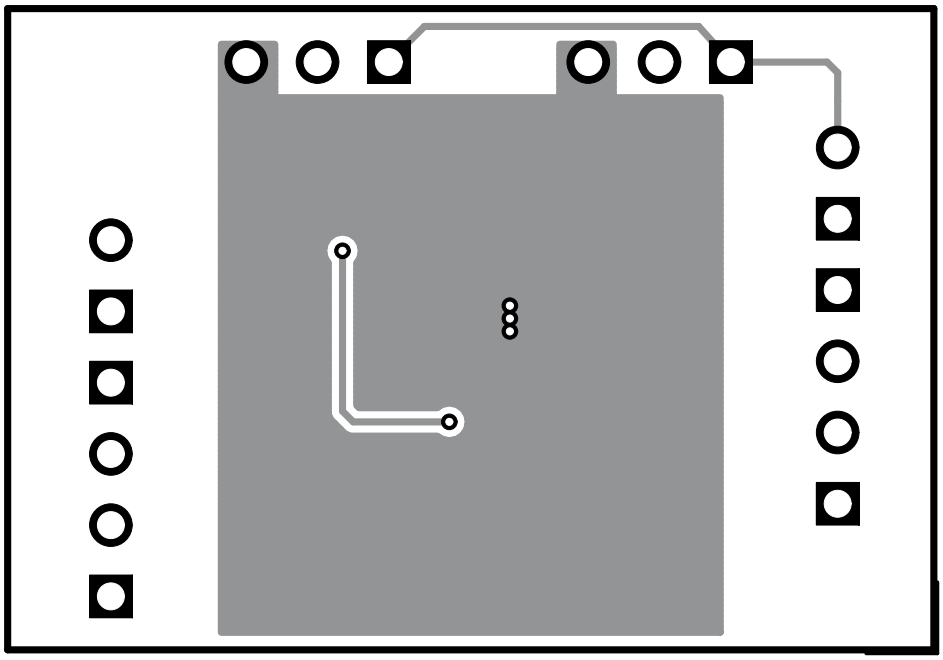

Figure 3. Bottom Layer Routing

6 Schematic and Bill of Materials

This section provides the TPS62590EVM-454 schematic and bill of materials.

6.1 Schematic

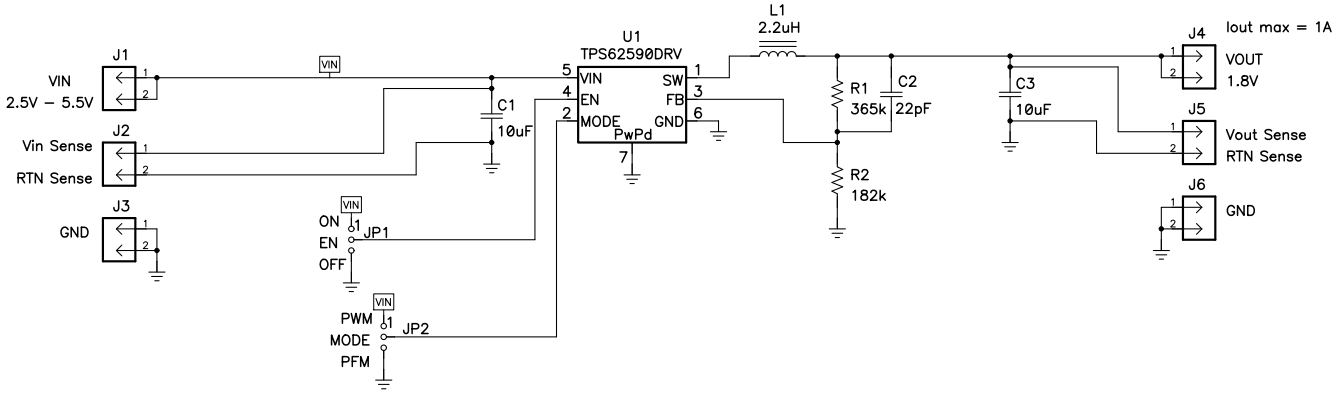

Figure 4. TPS62590EVM-454 Layer Routing Schematic

6.2 Bill of Materials

Table 1. TPS62590EVM-454 Bill of Materials

Count	ReDes	Value	Description	Size	Part Number	MFR
2	C1, C3	10 µF	Capacitor, Ceramic, 6.3V, X5R, 20%	0603	GRM188R60J106ME47D	Murata
1	C2	22 pF	Capacitor, Ceramic, 50V, C0G, 5%	0603	C1608C0G1H220J	TDX
4	J1, J3, J4, J6	PTC02SAAN	Header, 2 pin, 100mil spacing	0.100 × 2	PTC02SAAN	Sullins
0	J2, J5	Open	Header, 2 pin, 100mil spacing	0.100 × 2	PTC02SAAN	Sullins
2	JP1, JP2	PTC03SAAN	Header, 3 pin, 100mil spacing	0.100 × 3	PTC03SAAN	Sullins
1	L1	2.2 µH	Inductor, SMT, 1.5A, 110 mΩ	0.118 × 0.118	LPS3015-222ML	Coilcraft
1	R1	365k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R2	182k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	U1	TPS62590DRV	IC, 1A Step Down Converter	SON-6[DRV]	TPS62590DRV	TI
2	–		Shunt, 100 mil, Black	0.100	929950-00	3M
1	–		PCB, 0.9 In × 1.3 In × 0.062 In		HPA454	Any

Notes: 1. These assemblies are ESD sensitive, ESD precautions shall be observed.
2. These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.
3. These assemblies must comply with workmanship standards IPC-A-610 Class 2.
4. Ref designators marked with an asterisk ('**') cannot be substituted. All other components can be substituted with equivalent MFG's components.

7 Related Documentation From Texas Instruments

- *TPS62590, 1-A Step Down Converter in 2x2 SON Package* data sheet (SLVS764)

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2 V to 6 V and the output voltage range of 0.6 V to 6 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 85°C. The EVM is designed to operate properly with certain components above 85°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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