TPS62560EVM-330

This user's guide describes the characteristics, operation, and use of the TPS62560EVM-330 evaluation module (EVM). This EVM demonstrates the Texas Instruments TPS62560, 2.25-MHz, synchronous, step-down converters capable of providing up to 600 mA of output current. The document includes setup instructions, a schematic diagram, a bill of materials, and printed-circuit board layout drawings for the evaluation module.

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1 Introduction

The TPS62560EVM-330 evaluation module (EVM) helps designers evaluate the operation and performance of the TPS62560 DC/DC converter. This converter is a 2.25-MHz, synchronous, step-down converter capable of 600 mA 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 TPS62560EVM-330.

2.1 Input/Output Connector Descriptions

2.1.1 J1 – VIN

This is the positive input supply voltage. Twist the leads to the input supply, and keep them as short as possible to minimize EMI transmission.

2.1.2 J2 – GND

This is the return connection for the input power supply of the converter.

2.1.3 J3 – VOUT

This is the positive connection from the output . Connect this pin to the positive input of the load.

2.1.4 J4 – GND

This is the return connection for the output.

2.1.5 J5 – ENABLE

This jumper enables or disables the converter. Connecting the shorting jumper between pins 1 and 2 (VIN and EN) enables the converter. Connecting the shorting jumper between pins 2 and 3 (EN and GND) disables the converter. Never leave this pin floating.

2.1.6 J6 – MODE

This jumper sets the mode of the TPS62560. Connecting the shorting jumper between pins 1 and 2 (VIN and MODE) forces the TPS62560 into the fixed frequency PWM mode. Connecting the shorting jumper between pins 2 and 3 (MODE and GND) 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 TPS62560EVM-330 has an absolute maximum input voltage of 7 V. The recommended maximum operating voltage is 5.5 V.

Connect the desired load between J3 and J4. The TPS62560EVM-330 can supply up to 600 mA of output current.

Configure jumpers JP1 and JP2 as required. The functions of JP1 and JP2 are described in the Setup section of this manual.

4 Test Results

This section provides typical performance waveforms for the TPS62560EVM-330 board.

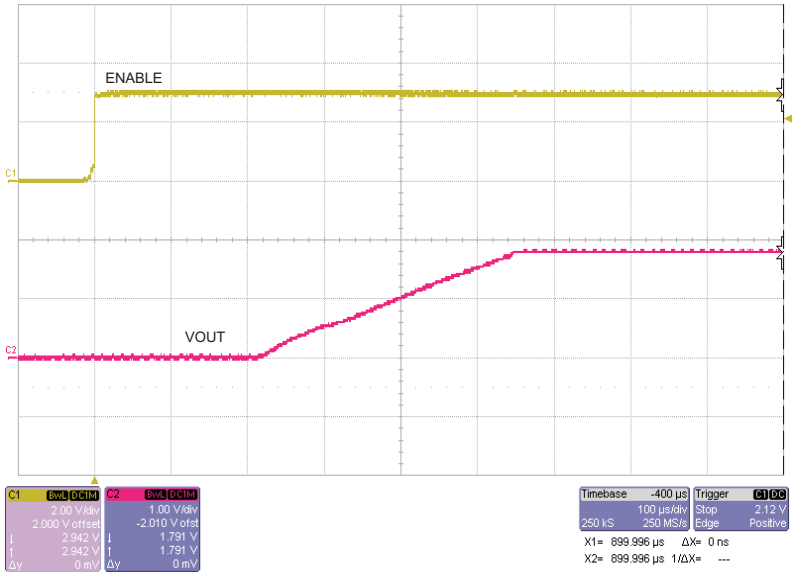


Figure 1. Start-up From Enable, Vin=3 V, Vout=1.8 V, Iload=600 mA

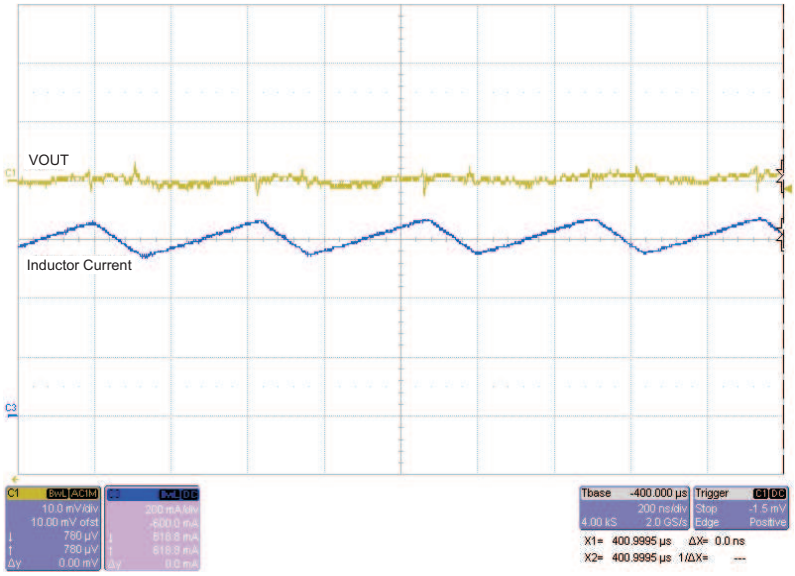


Figure 2. Output Voltage Ripple, Vin=3 V, Vout=1.8 V, Iload=600 mA

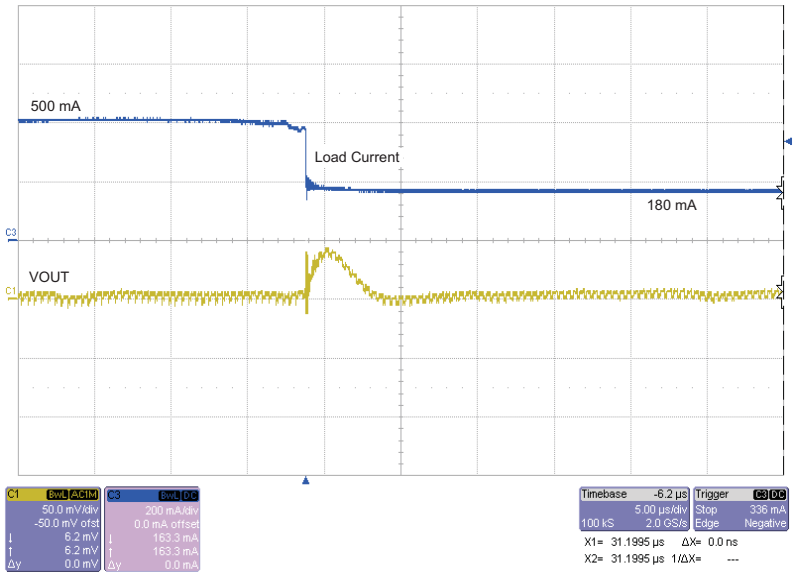


Figure 3. Load Transient, 500-mA to 180-mA Step, Vin=3 V, Vout=1.8 V

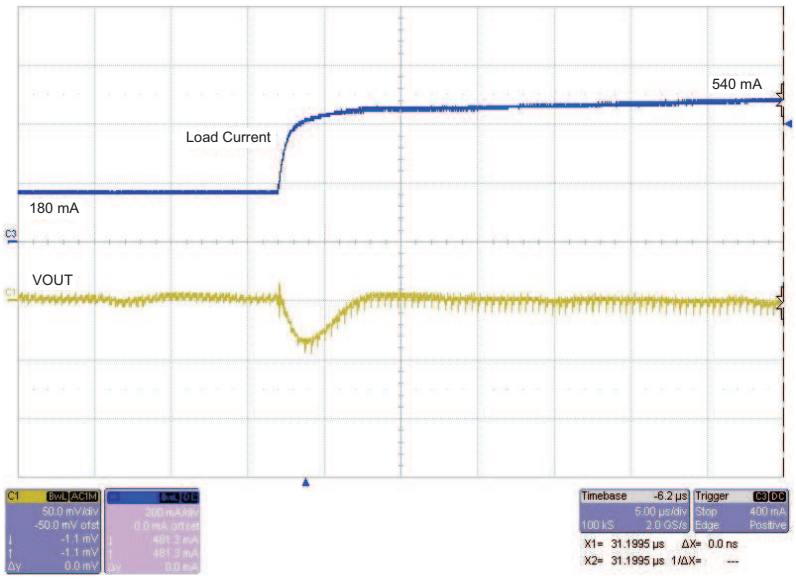


Figure 4. Load Transient, 180-mA to 540-mA Step

5 Board Layout

This section provides the TPS62560EVM-330 board layout and illustrations.

5.1 Layout

Board layout is critical for all high-frequency switch mode power supplies. Figure 5 through Figure 7 show the board layout for the TPS62560EVM-330 printed-circuit board. 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. A single-point grounding scheme is used. See the TPS62560 data sheet for specific layout guidelines.

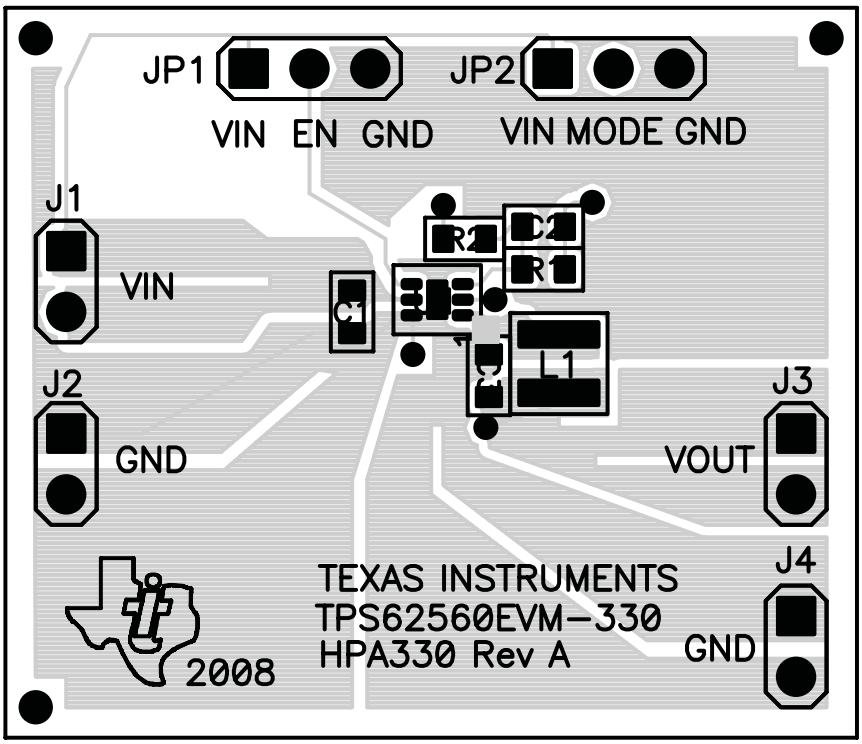


Figure 5. Assembly Layer

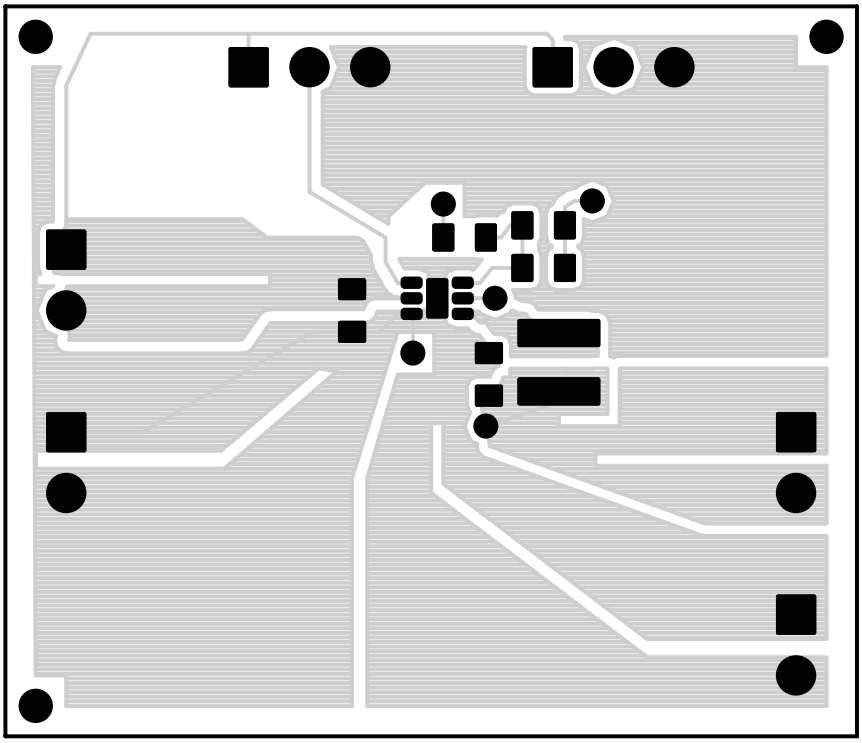


Figure 6. Top Layer Routing

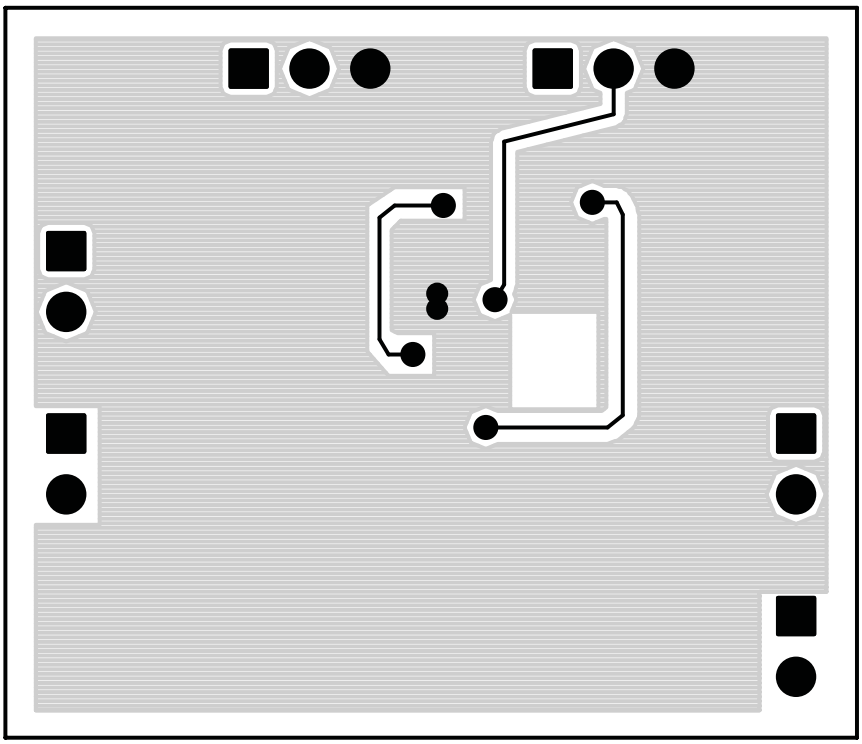


Figure 7. Bottom Layer Routing

6 Schematic and Bill of Materials

This section provides the TPS62560EVM-330 schematic and bill of materials.

6.1 Schematic

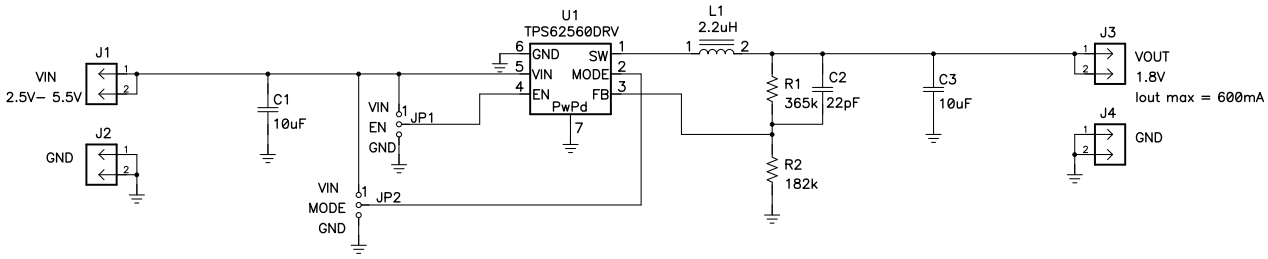


Figure 8. TPS62560EVM-330 Schematic

6.2 Bill of Materials

Table 1. TPS62560EVM-330 Bill of Materials

Count	RefDes	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	TDK
4	J1 - J4		Header, 2 pin, 100mil spacing, (36-pin strip)	0.100 x 2	PTC36SAAN	Sullins
2	JP1, JP2		Header, 3 pin, 100mil spacing, (36-pin strip)	0.100 x 3	PTC36SAAN	Sullins
1	L1	2.2 µH	Inductor, SMT, 1.5A, 110mΩ	0.118 x 0.118	LPS3015-222ML	Coilcraft

Table 1. TPS62560EVM-330 Bill of Materials (continued)

Count	RefDes	Value	Description	Size	Part Number	MFR
1	R1	365k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R2	182k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	U1		IC, 2.25MHz 600mA Step-Down Converter	SON-6[DRV]	TPS62560DRV	TI
1	--		PCB, 1.4 In x 1.2 In x 0.062 In		HPA330	Any
2	--		Shunt, 100mil, Black	0.100	929950-00	3M
Notes: 1.	These assemblies are ESD sensitive, ESD precautions shall be observed.					
2.	These assemblies must be clean and free from flux and all contaminant. 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

TPS62560, 2.25 MHz, 600-mA Step-Down Converter in 2x2 SON Package data sheet (SLVS815)

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2.5 V to 5.5 V and the output voltage range of 0.85 V to 5.5 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 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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