TPS62700EVM-264

This user's guide describes the characteristics, operation, and use of the TPS62700EVM-264 and the TPS62700EVM-264 evaluation module (EVM). This EVM demonstrates the Texas Instruments TPS62700 2-MHz, synchronous, step-down converter for power amplifier (PA) applications. The TPS62700 supplies up to 650 mA of output current at a pin programmable output voltage between 1.3 V and 3.09 V from a 2.5-V to 6-V input source. This user's guide includes setup instructions, schematic diagram, bill of materials (BOM) and PCB layout drawings for the EVM.

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1 Introduction

The TPS62700EVM-264 evaluation module (EVM) helps designers evaluate the operation and performance of the TPS62700 step-down converter. This converter is a 2-MHz, synchronous, step-down converter that provides up to 650 mA of output current at a pin-programmable output for powering PA applications. The board features the tiny 1,6-mm ×1,75-mm 8-ball WCSP package (YZF) for a small solution size.

1.1 Related Documentation From Texas Instruments

TPS62700, 2.0-MHz, 650-mA, Step-Down Converter for RF Power Amplifiers in Tiny 8-Pin WCSP Package data sheet (SLVS784)

2 Setup

This section describes the jumpers and connectors on the EVM as well as how to properly connect, set up, and use the TPS62700EVM-264.

2.1 J1 – Input Connections

This is the connection for the leads from the input source. Connect the positive connection to the Vin pins and the return connection to the GND pins.

2.2 J2 – Output Connections

This is the connection for the output of the TPS62700EVM. Connect the positive connection of the load to the Vout pins and the return connection to the GND pins.

2.3 J3 – EN

This is the enable input for the device. Place a shunt across the ON and EN pins of J3 to enable the integrated circuit (IC). Place a shunt across the OFF and EN pins of J3 to disable the IC. A shunt must be installed on J3 in either ON or OFF positions and EN should not be left unconnected.

2.4 J4 – Vcorl

This jumper allows the user to program the output voltage. Place a shunt across the H and Vctrl pins of J4 to set the output to the high default value of 3.09 V. Place a shunt across the L and Vctrl pins of J4 to the output to the low default value of 1.3 V. Remove the shunt and connect a voltage source to the Vctrl pin of J4 to program a voltage between 1.3 V and 3.09 V. The output tracks the voltage at the Vctrl with a gain of 2.5. See the *Dynamic Output Voltage Control* V_{CON} section of the TPS62700 data sheet for more information on the setting the output voltage.

3 Operation

Connect the positive input power supply to the Vin pins on J1. Connect the input power return (ground) to the GND pins on J1. The TPS62700EVM-264 has a maximum input voltage of 6 V. The recommended maximum operating input voltage is 5.5 V.

Connect the desired load between the Vout and GND pins on J2. The TPS62700 supplies up to 650 mA of output current.

Configure jumpers J3 and J4 as required.

4 Test Results

This section provides typical performance waveforms using the TPS62700EVM-264 printed-circuit board.

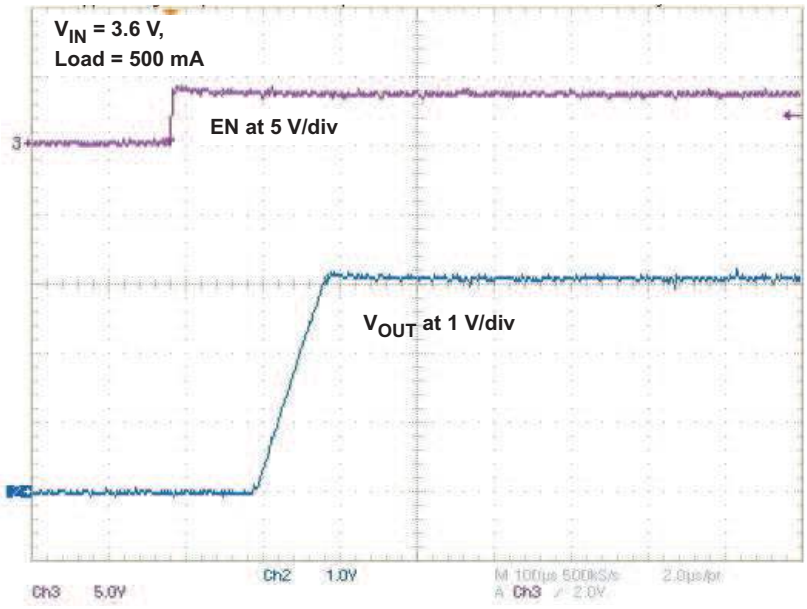

Figure 1. Vout Start-up From Enable

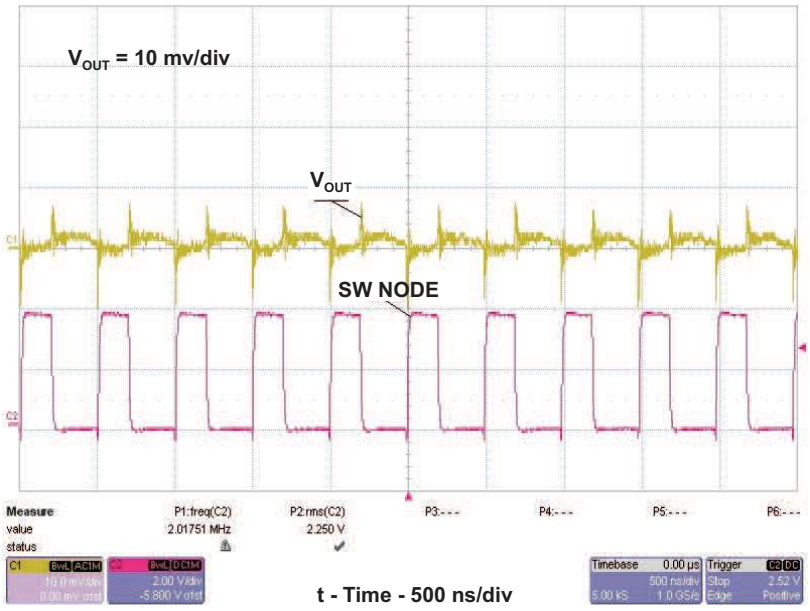

Figure 2. Output Ripple, VIN=3.6 V, VOUT=3.09 V, IOUT=500 mA

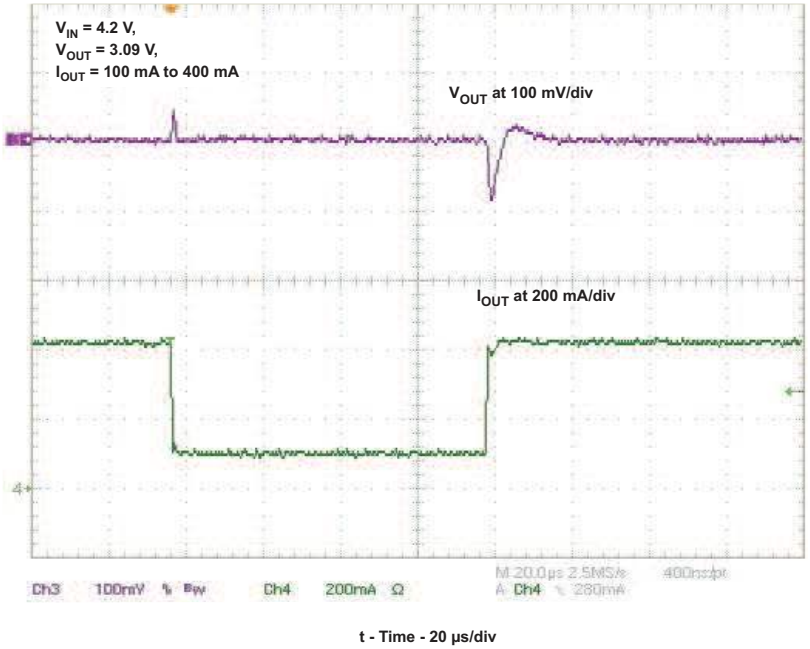

Figure 3. Load Transient, VIN=3.6 V, VOUT=3.09 V, IOUT= 400 mA to 100 mA to 400 mA

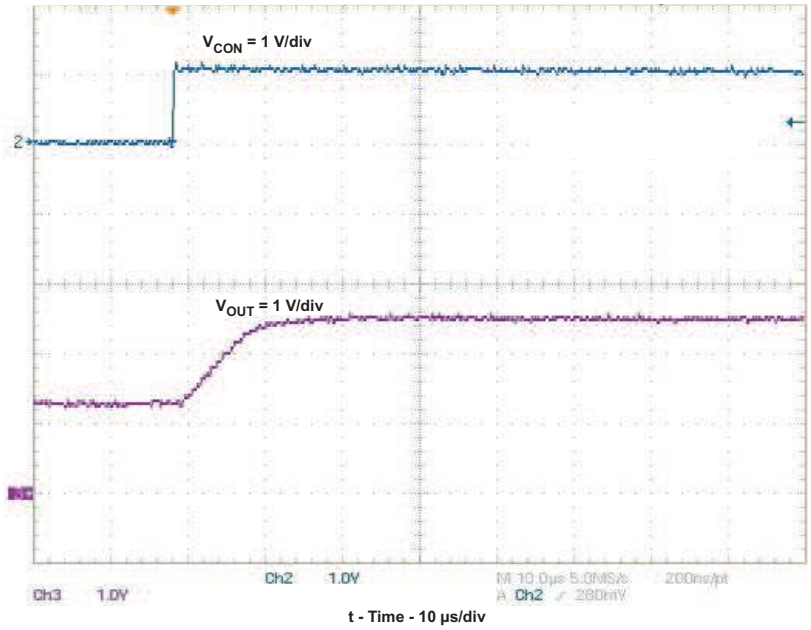

Figure 4. Output Transient, Vcon 0 V to 1 V, Vout 1.3 V to 2.5 V

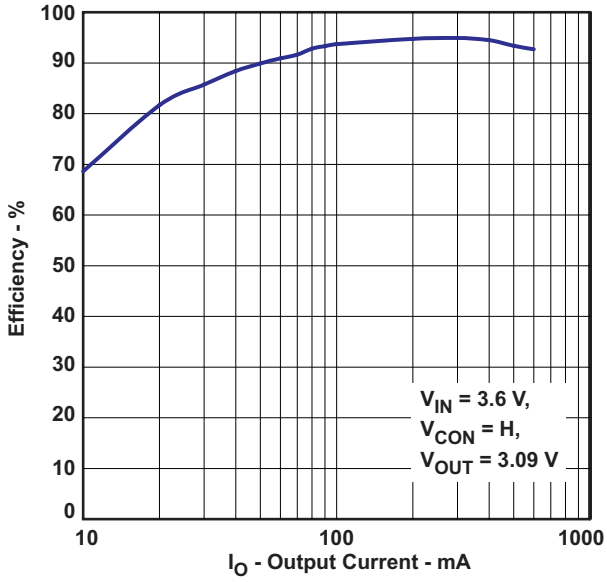

Figure 5. Efficiency vs IOUT, VIN=3.6 V, Vcon H, VOUT=3.09 V

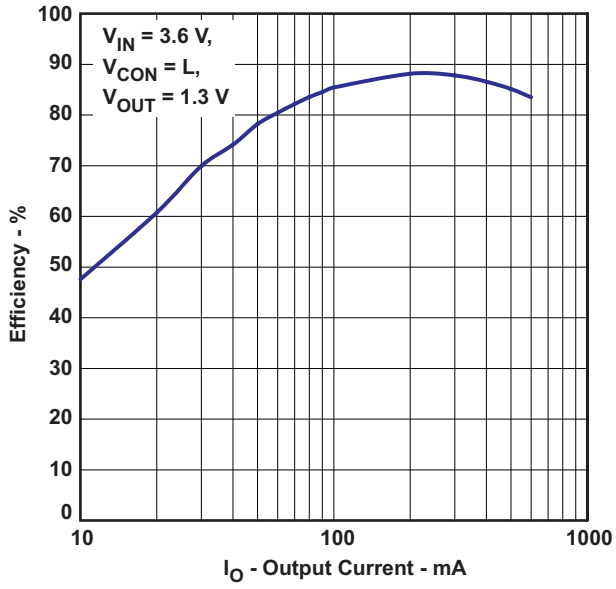

Figure 6. Efficiency vs IOUT, VIN=3.6 V, Vcon L, VOUT=1.3 V

5 Board Layout, Schematic, and Bill of Materials

This section provides the TPS62700EVM-264 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 could show stability problems as well as 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, should be placed as close as possible to the IC. Use a common ground node for power ground to minimize the effects of ground noise. Figure 7 through Figure 9 show the board layout for the TPS62700EVM-264 PCB.

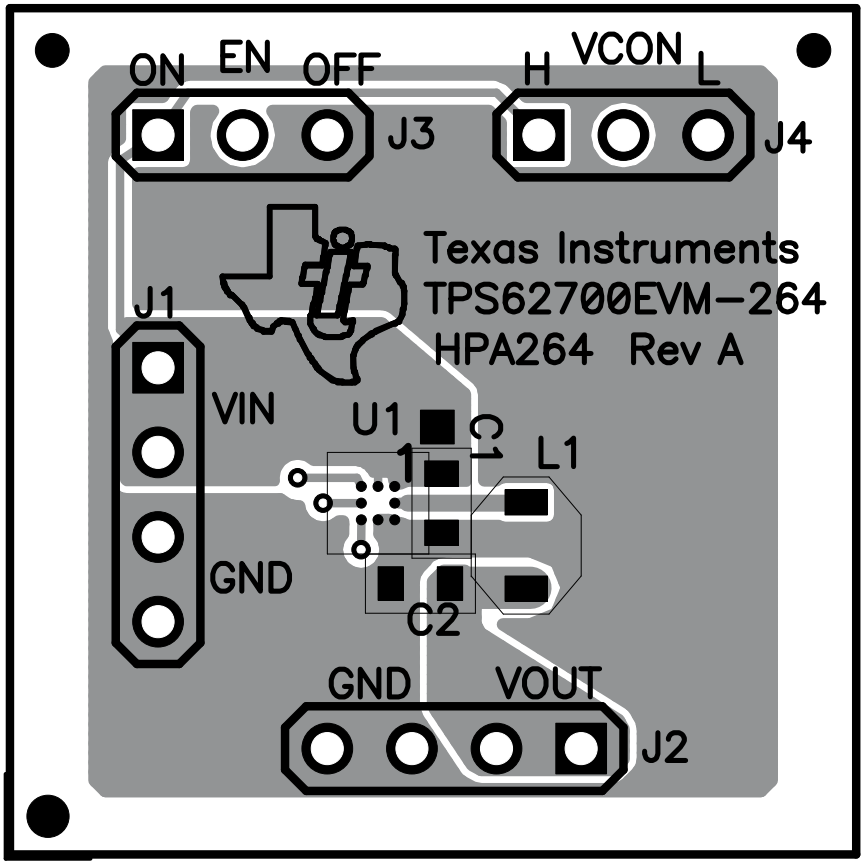

Figure 7. Top Assembly Layer

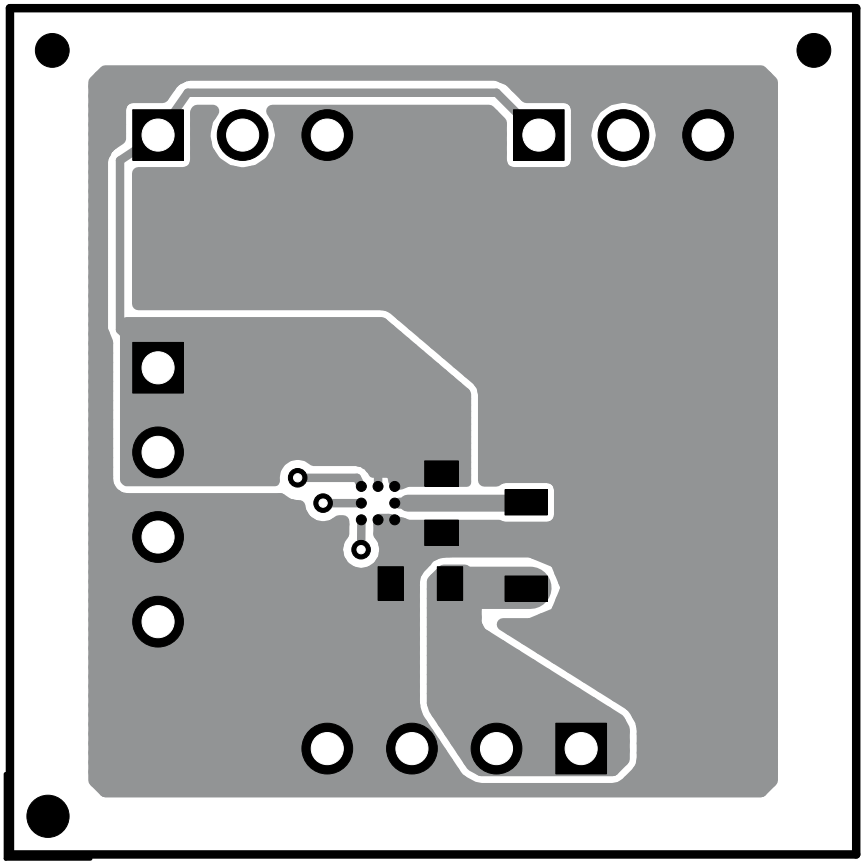

Figure 8. Top Layer

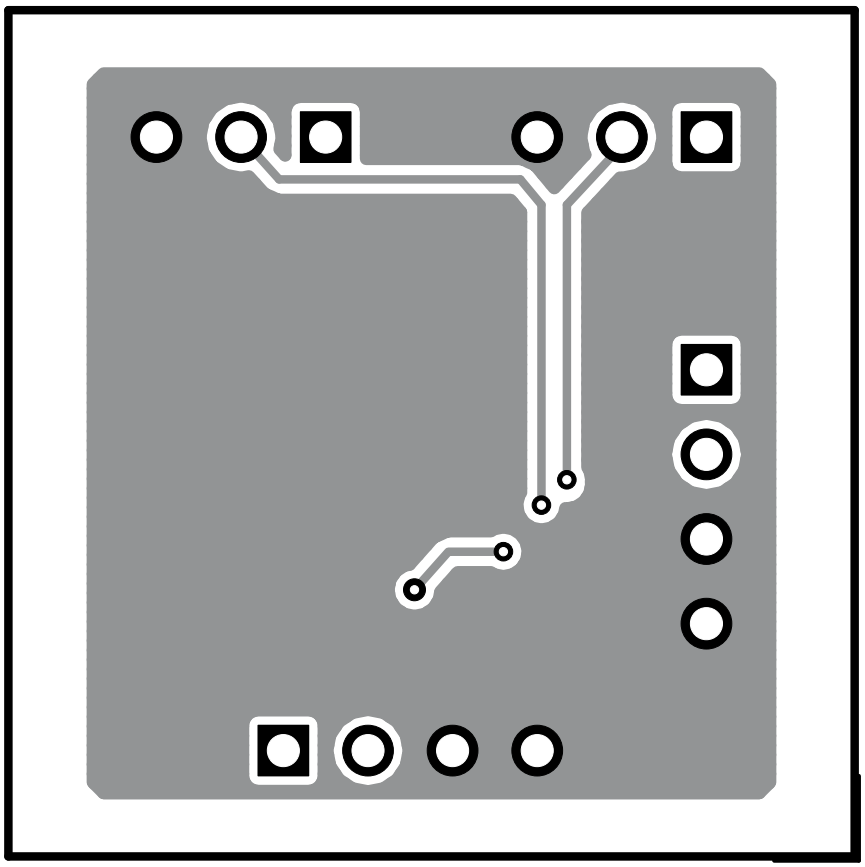

Figure 9. Bottom Layer

5.2 Schematic and Bill of Materials

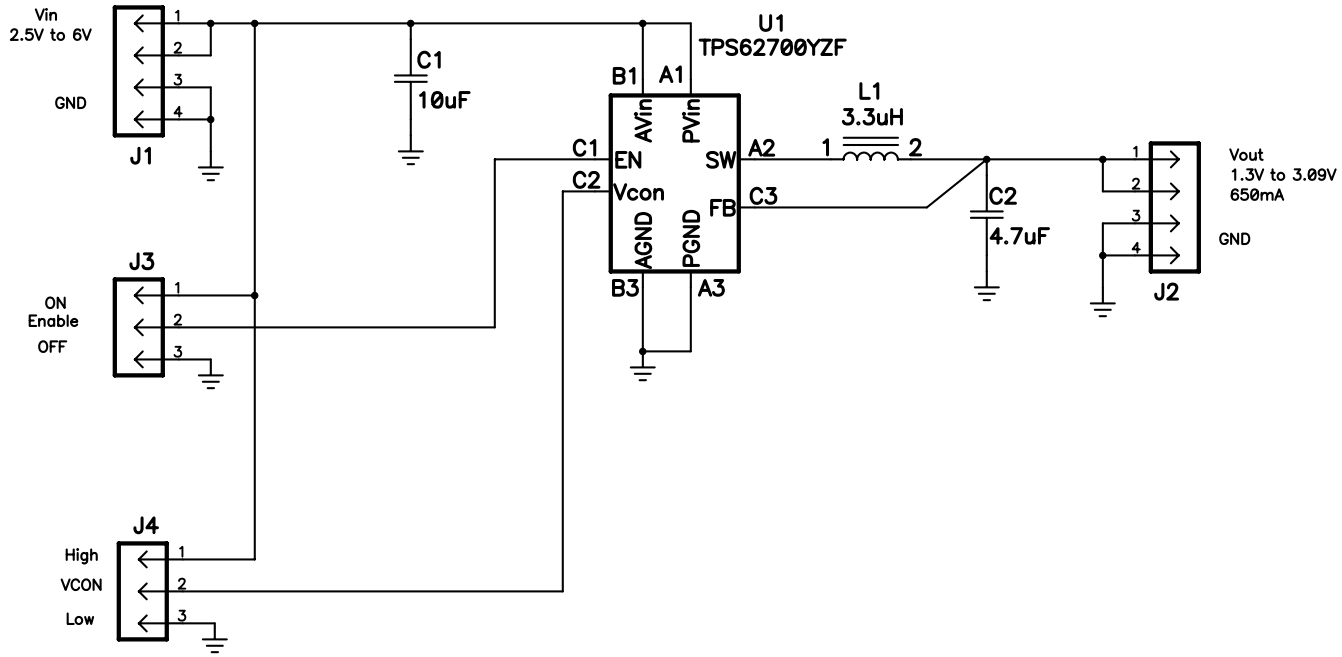

Figure 10. TPS62700EVM-264 Schematic

Table 1. Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	10 µF	Capacitor, Ceramic, 6.3V, X5R, 15%	0603	GRM188R60J106M	Murata
1	C2	4.7 µF	Capacitor, Ceramic, 6.3V, X5R, 15%	0603	GRM188R60J475K	Murata
2	J1, J2	PTC36SAAN	Header, 4-pin, 100mil spacing, (36-pin strip)	0.100 inch × 4	PTC36SAAN	Sullins
2	J3, J4	PTC36SAAN	Header, 3-pin, 100mil spacing, (36-pin strip)	0.100 inch × 3	PTC36SAAN	Sullins
1	L1	3.3 µH	Inductor, SMT, 1.3A, 150-milliohm	0.102 x 0.110 inch	VLF3014AT-3R3M1R0	TDK
1	U1	TPS62700YZF	IC, 225 MHz 650mA Step Down Converter	YZF-8	TPS62700YZF	TI
1	—		PCB	0.062" x 1.0" x 1.0"	HPA264	Any
2			Shunt, 100 mil, 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 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.

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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 1.3 V to 3.09 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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