Four-Channel, Power-Distribution Switch EVM

This user's guide describes the TPS20xxEVM-295 family of evaluation modules (EVM). This guide contains the EVM schematic, bill of materials, assembly drawings, and top and bottom board layouts.

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1 Introduction

The TPS20xxEVM-295 family of evaluation modules (EVM) support the four-channel, current-limited, power-distribution switches in Table 1. These EVMs operate over a 2.7-V to 5.5-V range and provide a continuous output current of up to 0.5 A. Test points provide convenient access to all critical node voltages.

The silkscreen outline on the PCB top-side encloses components found in a typical USB application.

The TPS20xxEVM-295 accepts an S0-16 packaged power-distribution switch. These switches have an enable input, an overcurrent status output, overtemperature shutdown, and identical pinouts.

Table 1 summarizes the available EVM options.

2 EVM Options, Schematic, and Bill of Materials

2.1 EVM Options

Table 1. TPS20xxEVM-295 Options

EVM	Device	Continuous Output Current (A)	ENABLE
TPS2044BEVM-295	TPS2044BD	0.5	Active Low
TPS2048AEVM-295	TPS2048AD	0.25	Active Low
TPS2054BEVM-295	TPS2054BD	0.5	Active High
TPS2058AEVM-295	TPS2058AD	0.25	Active High

2.2 Schematics

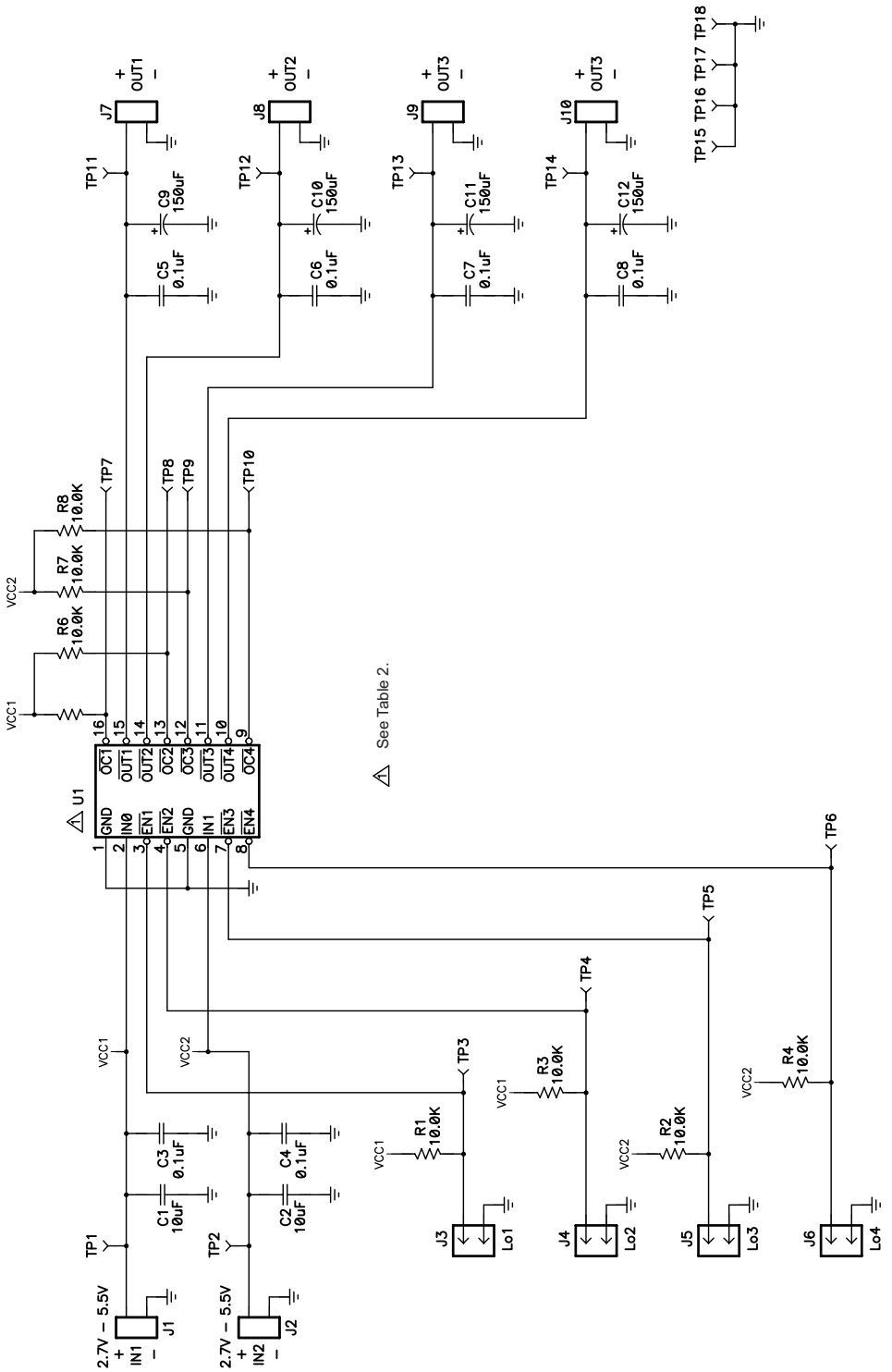


Figure 1. TPS20xxEVM-295 EVM Schematic

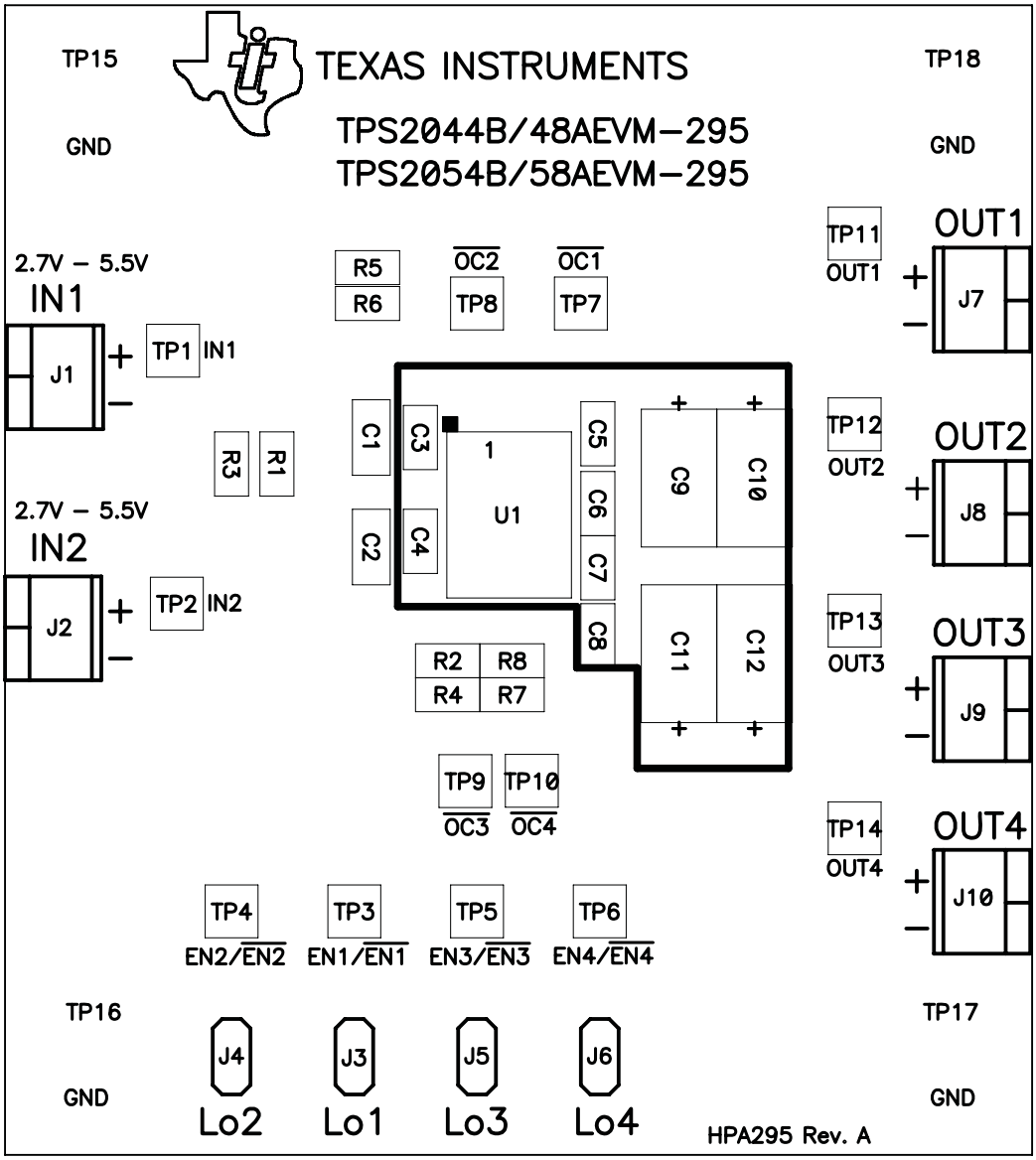
2.3 Bill of Materials

Table 2. TPS20xxEVM-295 Bill of Materials

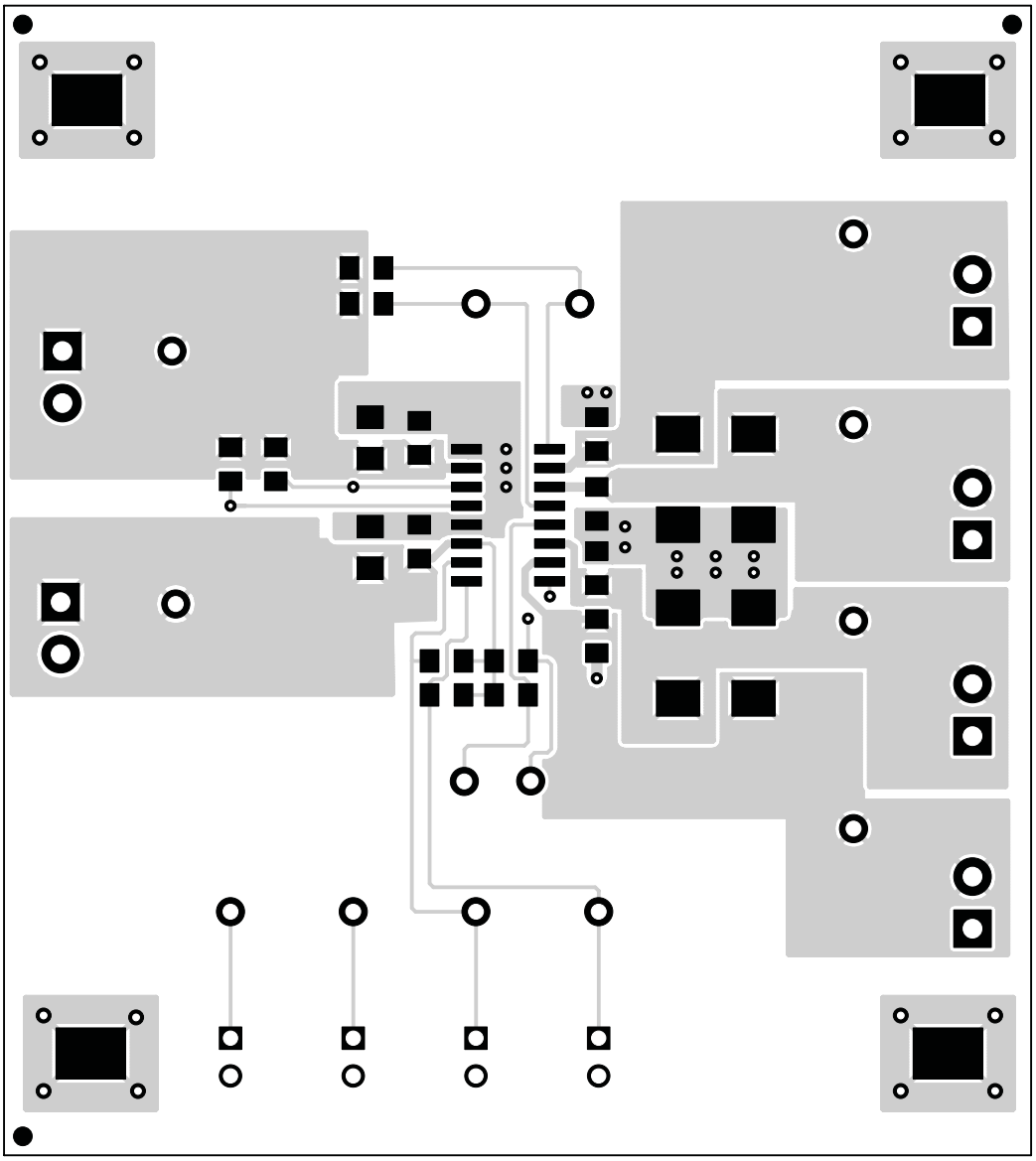
QTY									
-001	**-002**	**-003**	**-004**	**RefDes**	**Value**	**Description**	**Size**	**Part Number**	**MFR**
2	2	2	2	C1, C2	10 µF	Capacitor, Ceramic, 10 µF, X7R, 10V, 10%	1206	STD	STD
6	6	6	6	C3–C8	0.1 µF	Capacitor, Ceramic, 16V, X7R, 10%	0805	STD	STD
4	4	4	4	C9–C12	150 µF	Capacitor, Tantalum, 150 µF, 10V, 100milliohm, 10%	7343 (D)	B45197A2157K409	Kemet
1	0	0	0	U1	TPS2044BD	IC, Quad Power-Distribution Switch, 5.5V, 500mA	SO16	TPS2044BD	TI
0	1	0	0	U1	TPS2048AD	IC, Quad Power-Distribution Switch, 5.5V, 250mA	SO16	TPS2048AD	TI
0	0	1	0	U1	TPS2054BD	IC, Quad Power-Distribution Switch, 5.5V, 500mA	SO16	TPS2054BD	TI
0	0	0	1	U1	TPS2058AD	IC, Quad Power-Distribution Switch, 5.5V, 250mA	SO16	TPS2058AD	TI
1	1	1	1	—	HPA295	PCB, 3.045 In x 2.72 In x 0.062"	3.045" x 2.72"	HPA295	Any
8	8	8	8	R1–R8	10.0K	Resistor, Chip, 1/10W, 1%	0805	CRCW0805-1002F	Vishay

3 Board Layout

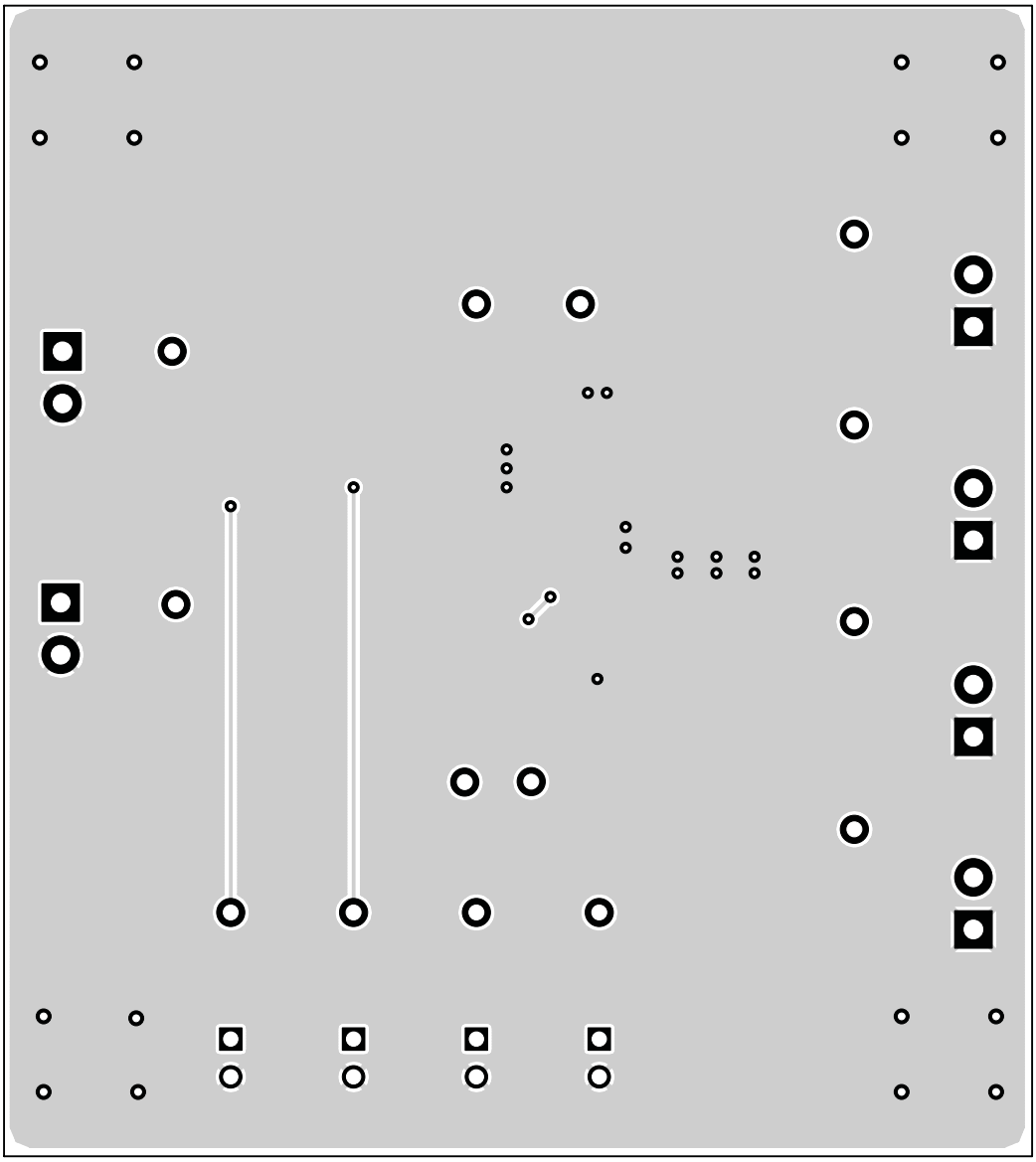
3.1 TPS20xxEVM-295 Component Placement



3.2 TPS20xxEVM-295 Top-Side Layout



3.3 TPS20xxEVM-295 Bottom-Side Layout



4 EVM Setup

4.1 Recommended Test Equipment

The following test equipment is recommended:

- Two-channel storage oscilloscope
- Current probe
- Voltage probe
- An adjustable power supply with a 2.7-V to 5.5-V output and a 5-A current limit
- Volt-ohm meter
- A passive or active load capable of handling 5 A

4.2 Measuring Current-Limit

The user should read the applicable data sheet before using the EVM.

Figure 2 shows the EVM test set up for measuring current limit. A single switch is enabled into a short circuit for this measurement. Figure 3 shows the current waveform for a TPS2044BEVM-295.

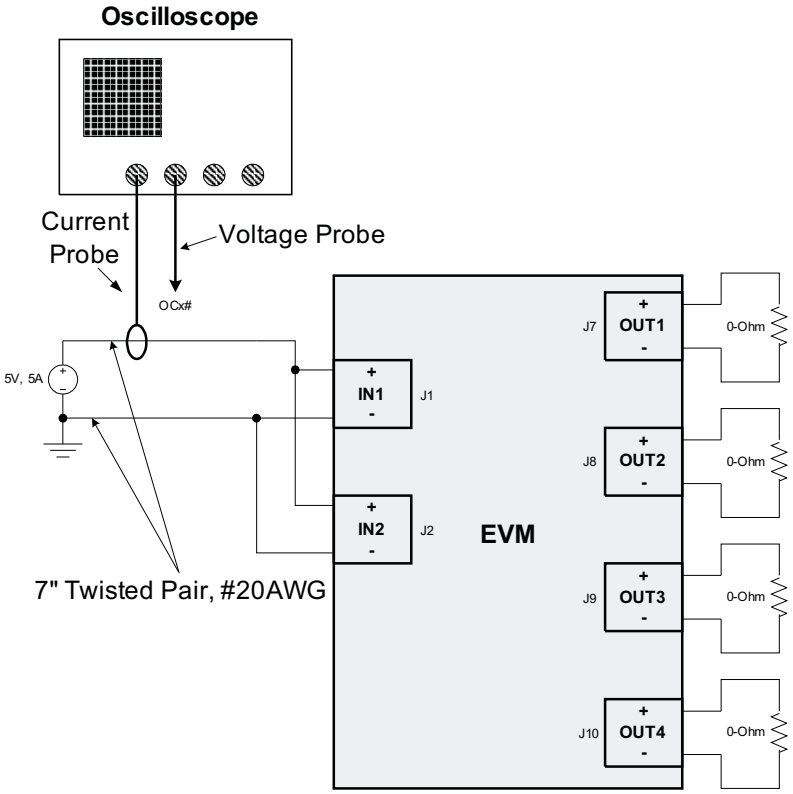


Figure 2. EVM Setup for Measuring Current Limit

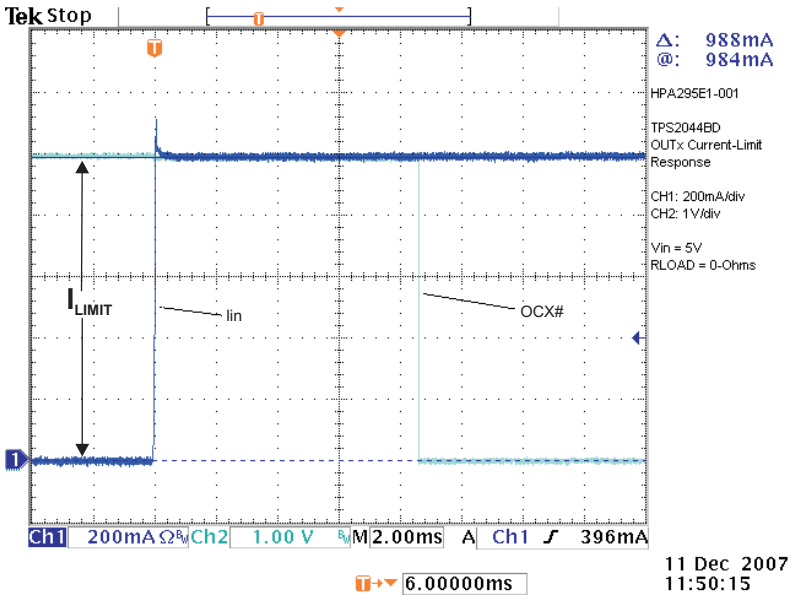


Figure 3. TPS2044BEVM-295 Short-Circuit Output Current and $\overline{OCx}$ Status

4.3 Related Documentation from Texas Instruments

1. *TPS2041B/42B/43B/44B/51B/52B/53B/54B, Current-Limited, Power-Distribution Switches* data sheet, (SLVS514)
2. *TPS2045A/46A/47A/56A/57A/58A, Current-Limited, Power-Distribution Switches* data sheet (SLVS251)

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2.7 V to 5.5 V and the output voltage range of 2.7 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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