

## Three-Channel, Power-Distribution Switch EVM

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This user's guide describes the TPS20xxEVM-294 family of evaluation modules (EVM). This guide contains the EVM schematics, bill of materials, assembly drawings, and top and bottom board layouts.

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## 1 Introduction

The TPS20xxEVM-294 family of evaluation modules (EVM) support the three-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 1 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-294 accepts an SO-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 Schematics and Bill of Materials

### 2.1 EVM Options

**Table 1. TPS20xxEVM-294 Options**

EVM	Device	Continuous Output Current (A)	ENABLE
TPS2043BEVM-294	TPS2043BD	0.5	Active Low
TPS2047BEVM-294	TPS2047BD	0.25	Active Low
TPS2053BEVM-294	TPS2053BD	0.5	Active High
TPS2057AEVM-294	TPS2057AD	0.25	Active High
TPS2063EVM-294	TPS2063D	1	Active Low
TPS2067EVM-294	TPS2067D	1	Active Low

## 2.2 Schematics

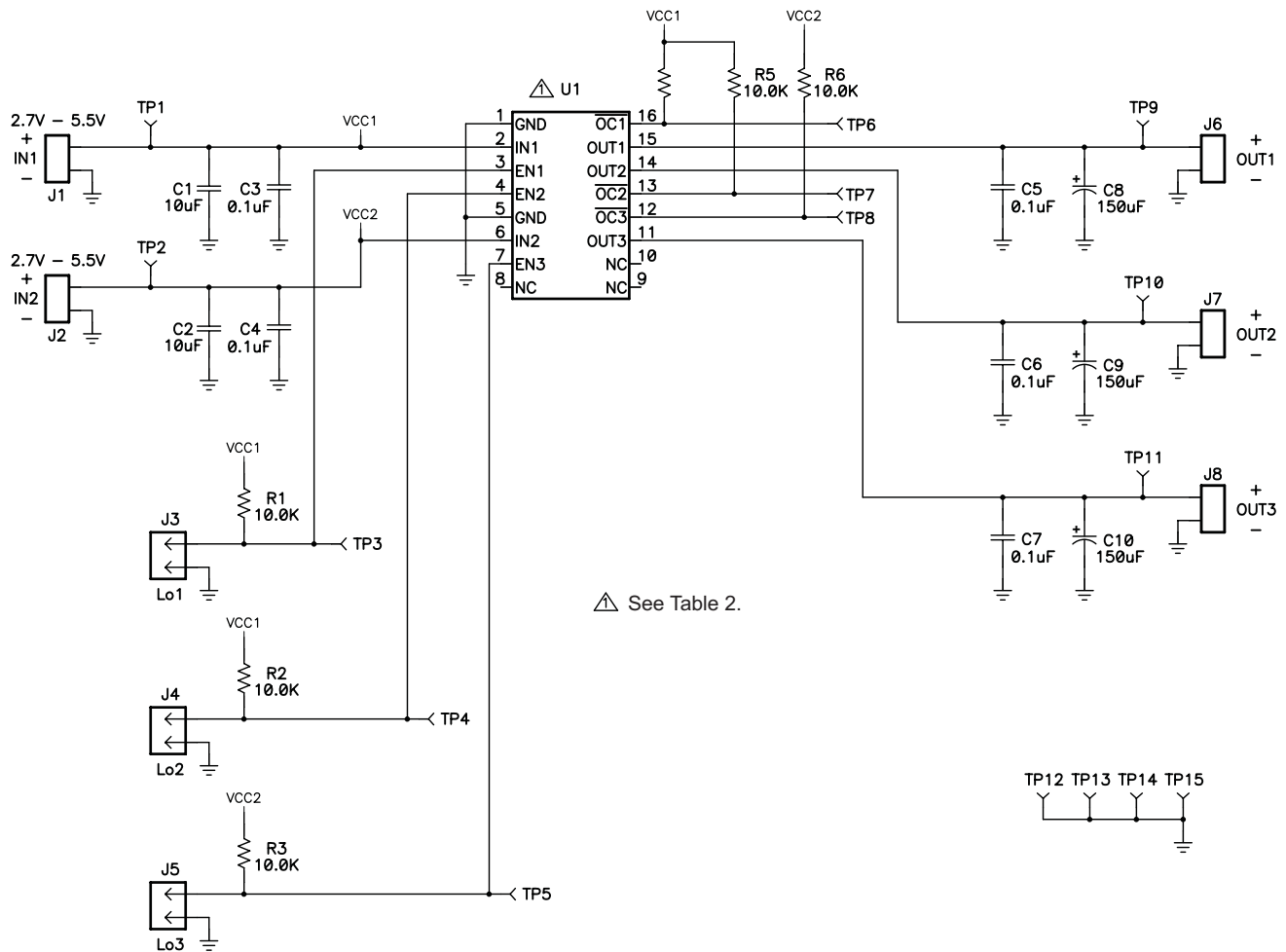


Figure 1. TPS20xxEVM-294 Schematic

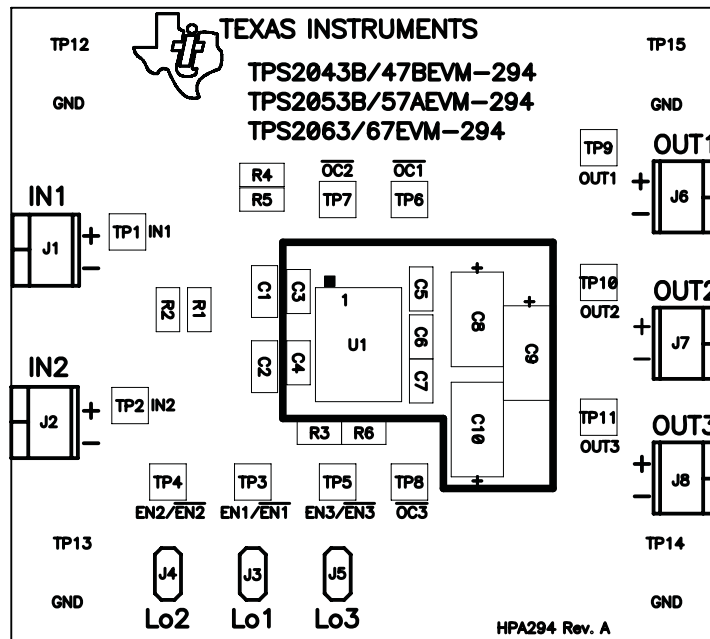
## 2.3 Bill of Material

**Table 2. TPS20xxEVM-294 Bill of Materials**

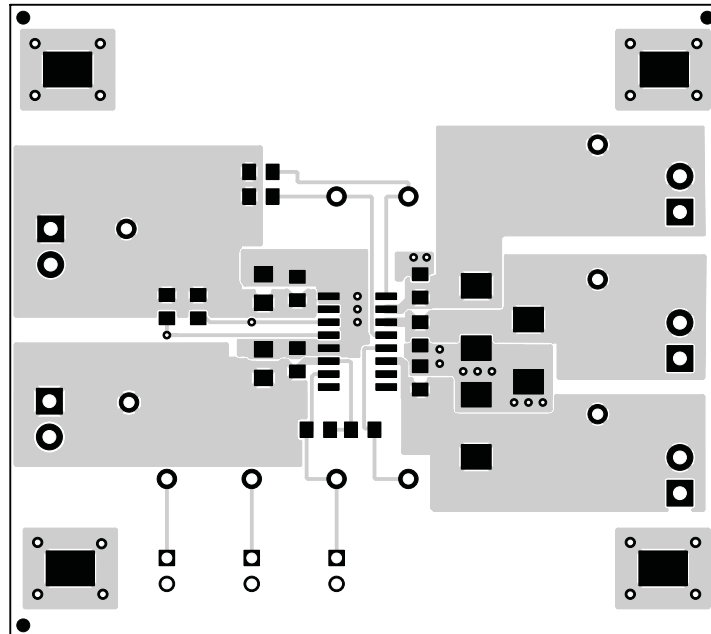
QTY						RefDes	Value	Description	Size	Part Number	MFR
-001	-002	-003	-004	-005	-006						
2	2	2	2	2	2	C1, C2	10 $\mu$ F	Capacitor, Ceramic, 10- $\mu$ F, X7R, 10V, 10%	1206	STD	STD
5	5	5	5	5	5	C3–C7	0.1 $\mu$ F	Capacitor, Ceramic, 16V, X7R, 10%	0805	STD	STD
3	3	3	3	3	3	C8–C10	150 $\mu$ F	Capacitor, Tantalum, 150 $\mu$ F, 10V, 100m $\Omega$ , 10%	7343 (D)	B45197A2157K409	Kemet
1	0	0	0	0	0	U1	TPS2043BD	IC, Triple Power-Distribution Switch, 5.5V, 500mA	SO16	TPS2043BD	TI
0	1	0	0	0	0	U1	TPS2047BD	IC, Triple Power-Distribution Switch, 5.5V, 250mA	SO16	TPS2047BD	TI
0	0	1	0	0	0	U1	TPS2053BD	IC, Triple Power-Distribution Switch, 5.5V, 500mA	SO16	TPS2053BD	TI
0	0	0	1	0	0	U1	TPS2057AD	IC, Triple Power-Distribution Switch, 5.5V, 250mA	SO16	TPS2057AD	TI
0	0	0	0	1	0	U1	TPS2063D	IC, Triple Power-Distribution Switch, 5.5V, 1000mA	SO16	TPS2063D	TI
0	0	0	0	0	1	U1	TPS2067D	IC, Triple Power-Distribution Switch, 5.5V, 1000mA	SO16	TPS2067D	TI
1	1	1	1	1	1	--	HPA294	PCB, 2.72 In x 2.445 In x 0.062 In		HPA294	Any
6	6	6	6	6	6	R1–R6	10.0K	Resistor, Chip, 1/10W, 1%	0805	CRCW0805-1002F	Vishay

### 3 Board Layout

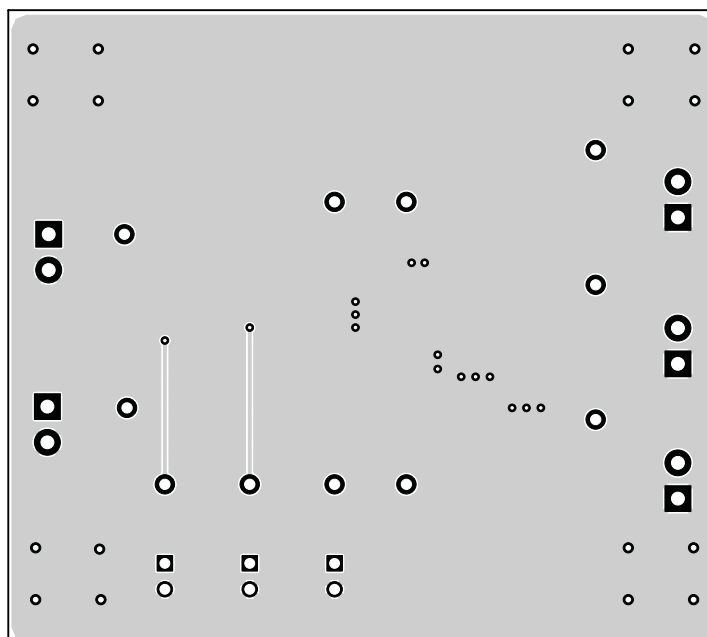
#### 3.1 TPS20xxEVM-294 Board



#### 3.2 TPS20xxEVM-294 Top-Side Layout



### 3.3 TPS20xxEVM-294 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 output 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 setup for measuring current limit. A single switch is enabled into a short circuit for this measurement. [Figure 3](#) shows the current waveform for a TPS2053BEVM-294.

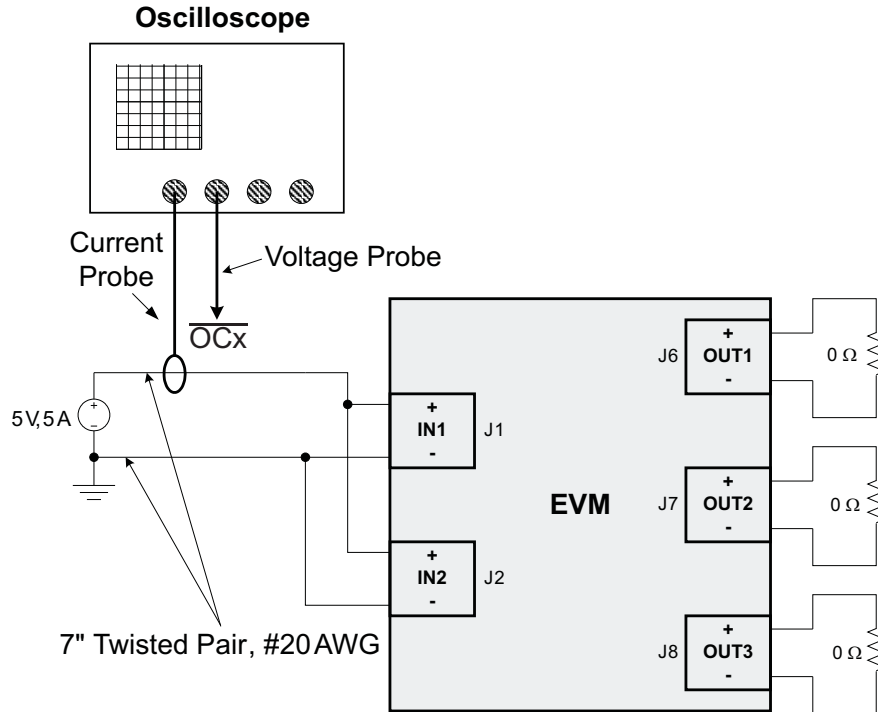


Figure 2. EVM Setup For Measuring Current Limit

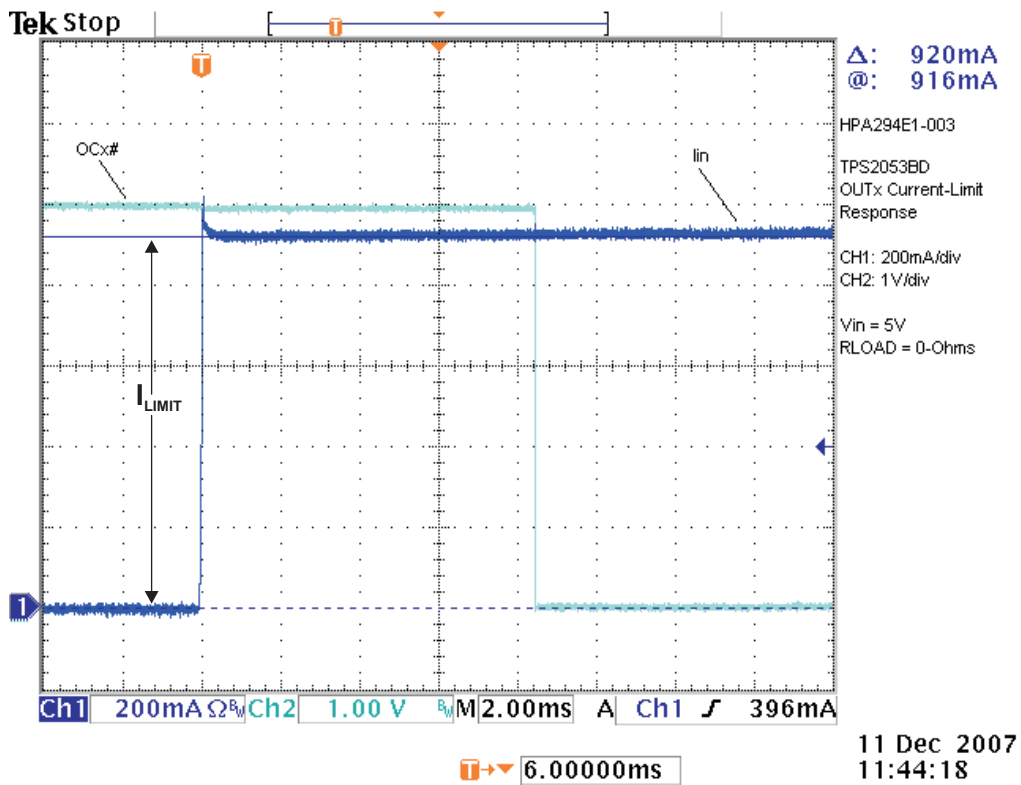


Figure 3. TPS2053BEVM-294 Short-Circuit Output Current and  $\overline{OCx}$  Status

## **5 Related Documentation from Texas Instruments**

1. *TPS2041B/42B/43B/44B/51B/52B/53B/54B, Current-Limited, Power-Distribution Switches* data sheet ([SLVS514](#))
2. *TPS2045B/46B/47B/55B, Current-Limited, Power-Distribution Switches* data sheet ([SLVS532](#))
3. *TPS2045A/46A/47A/56A/57A/58A, Current-Limited, Power-Distribution Switches* data sheet ([SLVS251](#))
4. *TPS2061/62/63/65/66/67, Current-Limited, Power-Distribution Switches* data sheet ([SLVS490](#))



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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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