

Single-Channel, Power-Distribution Switch Evaluation Module

This user's guide describes the TPS20xxCDBVEVM-636 and TPS20xxCDGNEVM-635 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 TPS20xxCDBVEVM-636 and TPS20xxCDGNEVM-635 are evaluation modules (EVM) for the Texas Instruments family of single-channel, current-limited, power distribution switches. These EVMs operate over a 4.5-V to 5.5-V range and provide a continuous output current of up to 2 A (see [Table 1](#)). Test points provide convenient access to all critical node voltages.

The TPS20xxCDBVEVM-636 accepts an SOT23-5 packaged, power-distribution switch whereas the TPS20xxCDGNEVM-635 accepts MSOP-8 packaged switch with a thermal pad. These switches have an enable input, fault status output, and overtemperature shutdown. The shaded EVM options shown in [Table 2](#) are not currently available.

[Table 1](#) and [Table 2](#) summarize the configurable EVM options.

2 Schematics and Bill of Materials

2.1 EVM Options

Table 1. TPS20xxCDBVEVM-636 Options

EVM	Device	Continuous Output Current (A)	ENABLE
TPS2051CDBVEVM-636	TPS2051CDBV	0.5	Active High
TPS2065CDBVEVM-636	TPS2065CDBV	1	Active High

Table 2. TPS20xxCDGNEVM-635 Options

EVM	Device	Continuous Output Current (A)	ENABLE
TPS2065CDGNEVM-635	TPS2065CDGN	1	Active High
TPS2069CDGNEVM-635	TPS2069CDGN	1.5	Active High
TPS2000CDGNEVM-635	TPS2000CDGN	2	Active Low
TPS2001CDGNEVM-635 ⁽¹⁾	TPS2001CDGN	2	Active High

⁽¹⁾ TPS2001CDGK (2A switch with active-high enable) can be installed and evaluated on TPS20xxCDGNEVMN-635.

2.2 Schematics

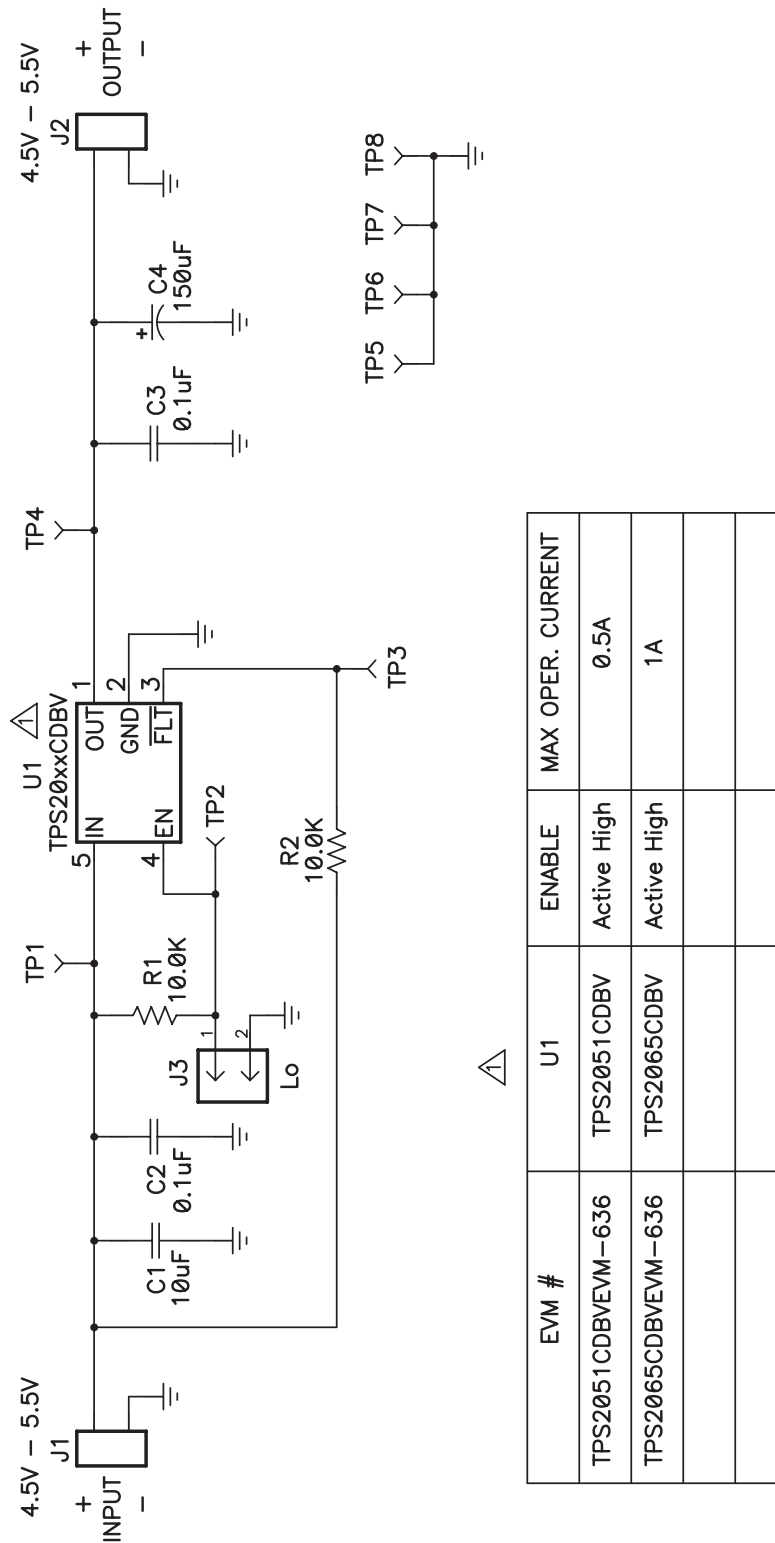


Figure 1. TPS20xxCDBVEVM-636 Schematic

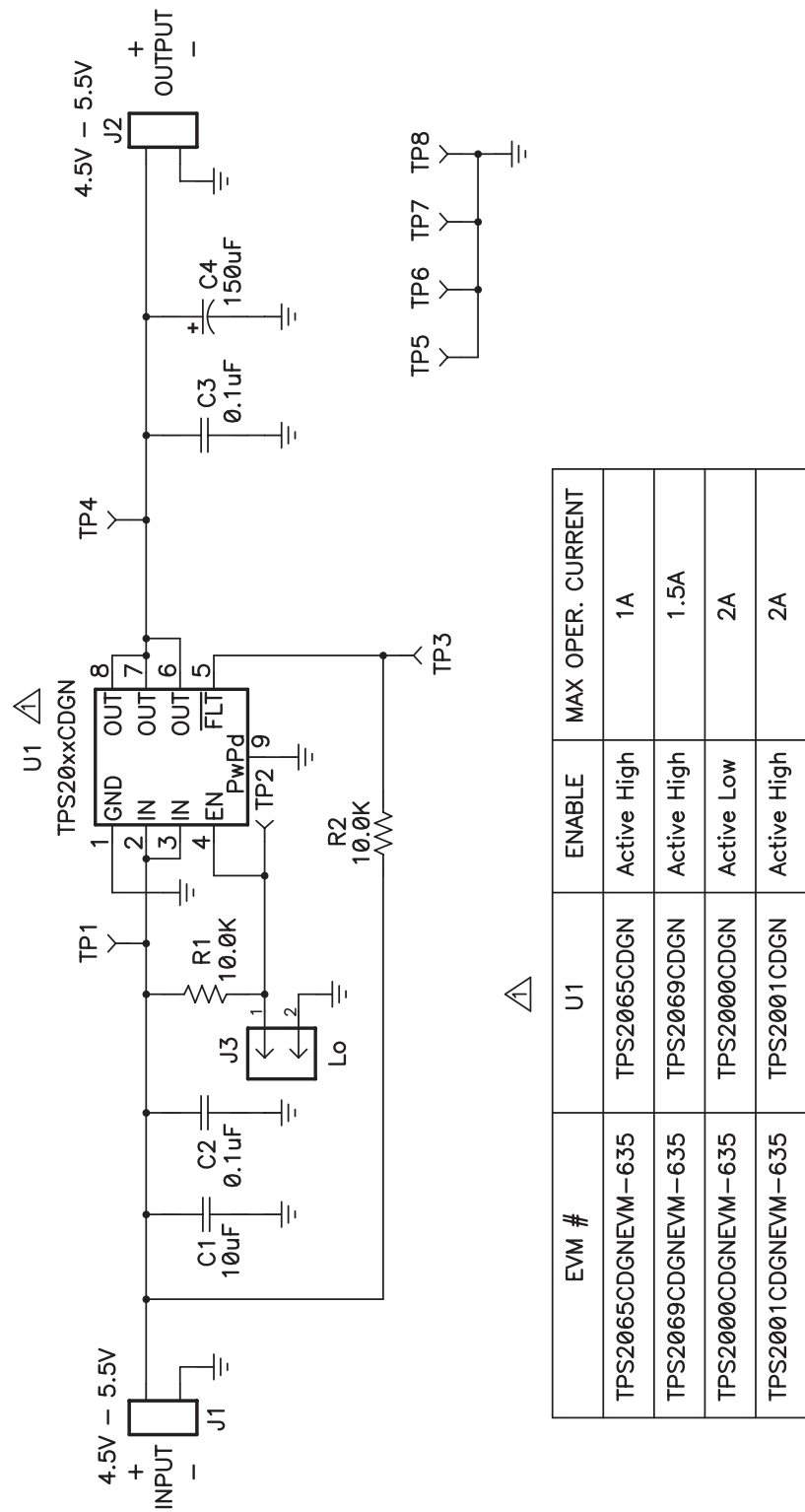


Figure 2. TPS20xxCDGNEVM-635 Schematic

EVM #	U1	ENABLE	MAX OPER. CURRENT
TPS2065CDGNEVM-635	TPS2065CDGN	Active High	1A
TPS2069CDGNEVM-635	TPS2069CDGN	Active High	1.5A
TPS2000CDGNEVM-635	TPS2000CDGN	Active Low	2A
TPS2001CDGNEVM-635	TPS2001CDGN	Active High	2A

2.3 Bill of Material

Table 3. TPS20xxCDBVEVM-636 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	10 μ F	Capacitor, Ceramic, X7R, 10V, 10%	1206	STD	STD
2	C2, C3	0.1 μ F	Capacitor, Ceramic, 16V, X7R, 10%	0805	STD	STD
1	C4	150 μ F	Capacitor, Tantalum, 10V, 100milliohm, 10%	7343 (D)	B45197A2157K409	Kemet
2	J1, J2	ED555/2DS	Terminal Block, 2-pin, 6-A, 3.5mm	0.27 x 0.25 inch	ED555/2DS	OST
1	J3	PEC02SAAN	Header, Male 2-pin, 100mil spacing,	0.100 inch x 2	PEC02SAAN	Sullins
2	R1, R2	10.0K	Resistor, Chip, 1/10W, 1%	0805	STD	STD
4	TP1, TP2, TP3, TP4	5002	Test Point, White, Thru Hole Color Keyed	0.100 x 0.100 inch	5002	Keystone
4	TP5, TP6, TP7, TP8	5016	Test Point, SM, 0.150 x 0.090	0.185 x 0.135 inch	5016	Keystone
1	U1	TPS2051CDBV or TPS2065CDBV	IC, Current-Limited, Power-Distribution Switch	SOT-23-5	TPS2051CDBV or TPS2065CDBV	TI
1	-	HPA636	PCB, 2.25 In x 2.225 In x 0.062 In	2.25 inch x 2.225 inch	HPA636	Any
1	-	929955-06	Shorting Jumper, 10u-inch gold		929955-06	3M
4		2566	Bumper, rubber		2566	SPC Tech
1	-		Label (See note 7)	1.25 x 0.25 inch	THT-13-457-10	Brady

Table 4. TPS20xxCDGNEVM-635 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	10 μ F	Capacitor, Ceramic, X7R, 10V, 10%	1206	STD	STD
2	C2, C3	0.1 μ F	Capacitor, Ceramic, 16V, X7R, 10%	0805	STD	STD
1	C4	150 μ F	Capacitor, Tantalum, 10V, 100milliohm, 10%	7343 (D)	B45197A2157K409	Kemet
2	J1, J2	ED555/2DS	Terminal Block, 2-pin, 6-A, 3.5mm	0.27 x 0.25 inch	ED555/2DS	OST
1	J3	PEC02SAAN	Header, Male 2-pin, 100mil spacing,	0.100 inch x 2	PEC02SAAN	Sullins
2	R1, R2	10.0K	Resistor, Chip, 1/10W, 1%	0805	STD	STD
4	TP1, TP2, TP3, TP4	5002	Test Point, White, Thru Hole Color Keyed	0.100 x 0.100 inch	5002	Keystone
4	TP5, TP6, TP7, TP8	5016	Test Point, SM, 0.150 x 0.090	0.185 x 0.135 inch	5016	Keystone
1	U1	TPS2065CDGN or TPS2069CDGN or TPS2000CDGN or TPS2001CDGN	IC, Current-Limited, Power-Distribution Switch	DGN-8	TPS2065CDGN or TPS2069CDGN or TPS2000CDGN or TPS2001CDGN	TI
1	--	929955-06	Shorting Jumper, 10u-inch gold		929955-06	3M
4	--	2566	Bumper, rubber		2566	SPC Tech
1	--	HPA635	PCB, 2.25 In x 2.225 In x 0.062 In	2.25 inch x 2.225 inch	HPA635	Any
1	--		Label (See note 7)	1.25 x 0.25 inch	THT-13-457-10	Brady

3 Board Layout

This section contains three views of the TPS20xxCDBVEVM-636 and the TPS20xxCDGNEVM-635 evaluation boards as well as some layout considerations.

3.1 TPS20xxCDBVEVM-636 Board

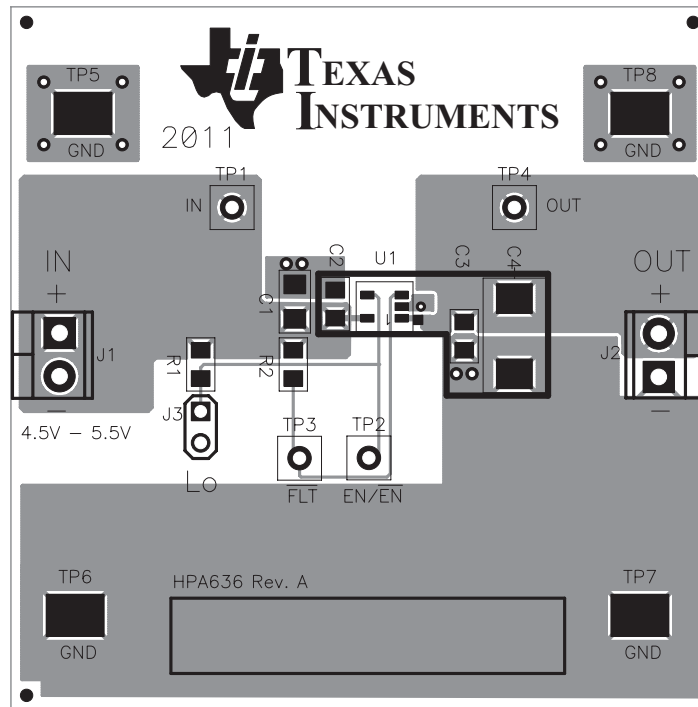


Figure 3. TPS20xxCDBVEVM-636 Component Placement

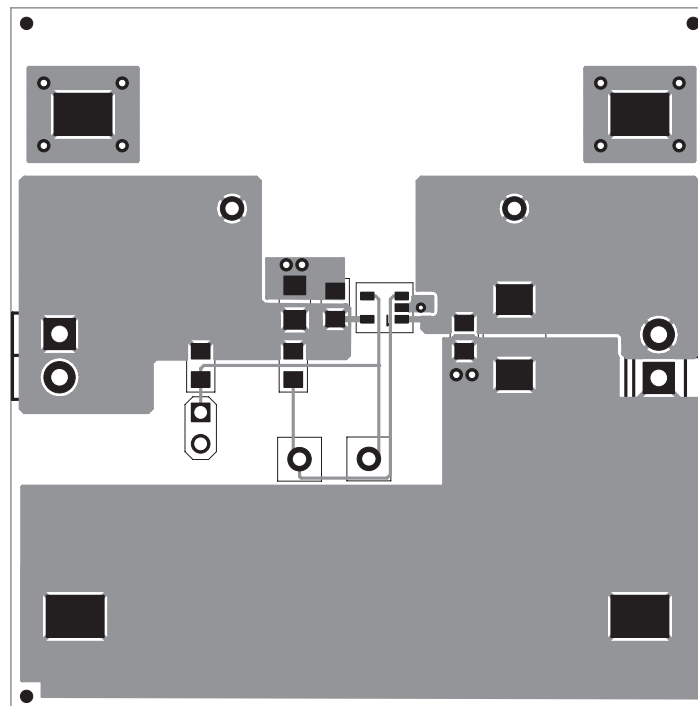


Figure 4. TPS20xxCDBVEVM-636 Top-Side Layout

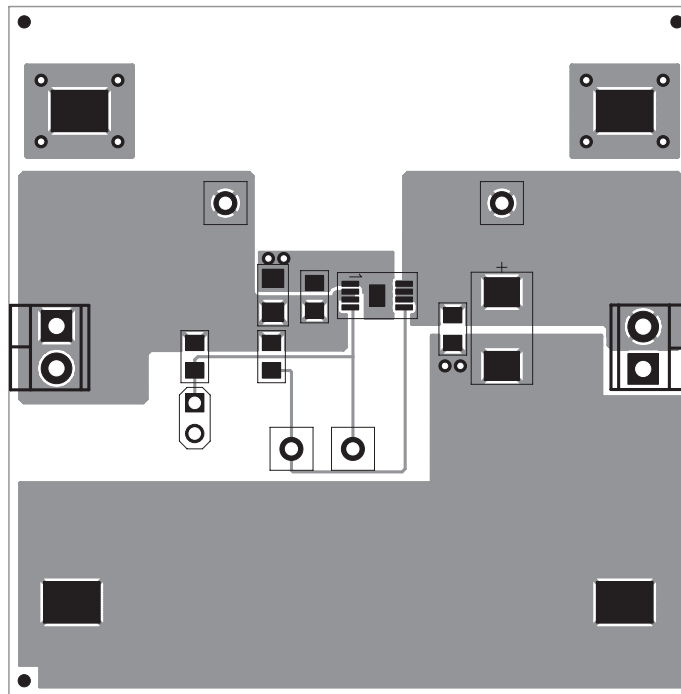


Figure 7. TPS20xxCDGNEVM-635 Top-Side Layout

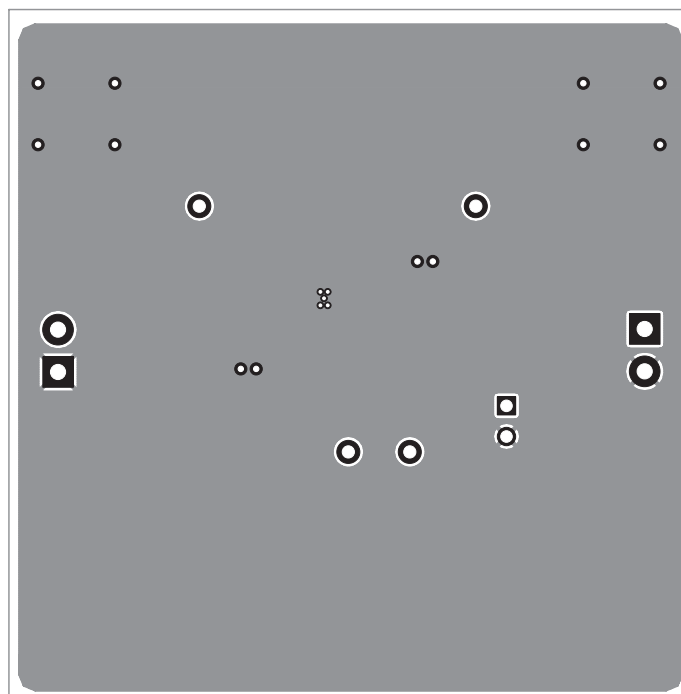


Figure 8. TPS20xxCDGNEVM-635 Bottom-Side Layout

3.3 Layout Considerations

The IN and OUT pins of U1 can carry significant current; so, traces to these pins must be of suitable length and width to minimize the voltage drop to the load. Locate the 0.1- μ F bypass capacitors close to the IN and OUT pins of U1.

4 EVM Setup

4.1 Recommended Test Equipment

The following test equipment is recommended:

- Two-channel storage oscilloscope
- Current probe
- Voltage probe
- 5 V at 5-A power supply
- Volt-ohm meter
- A passive or active load

4.2 Measuring Current Limit

The user is advised to read the applicable data sheet before using the EVM.

Figure 9 shows the EVM test setup for measuring current limit. The power distribution switch is enabled into a short circuit for this measurement. Figure 10 shows the current waveform for TPS2069CDGNEVM-635.

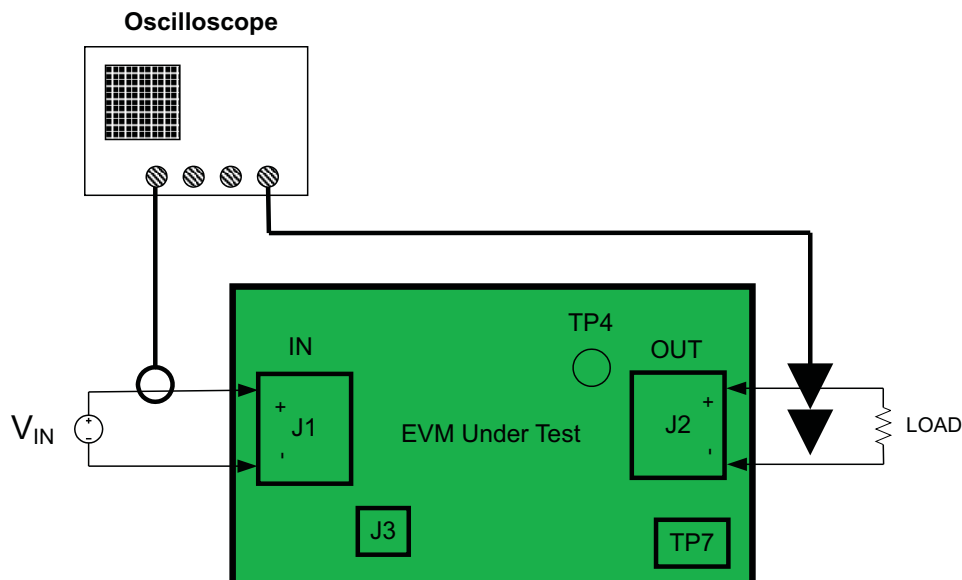


Figure 9. EVM Setup For Measuring Current Limit

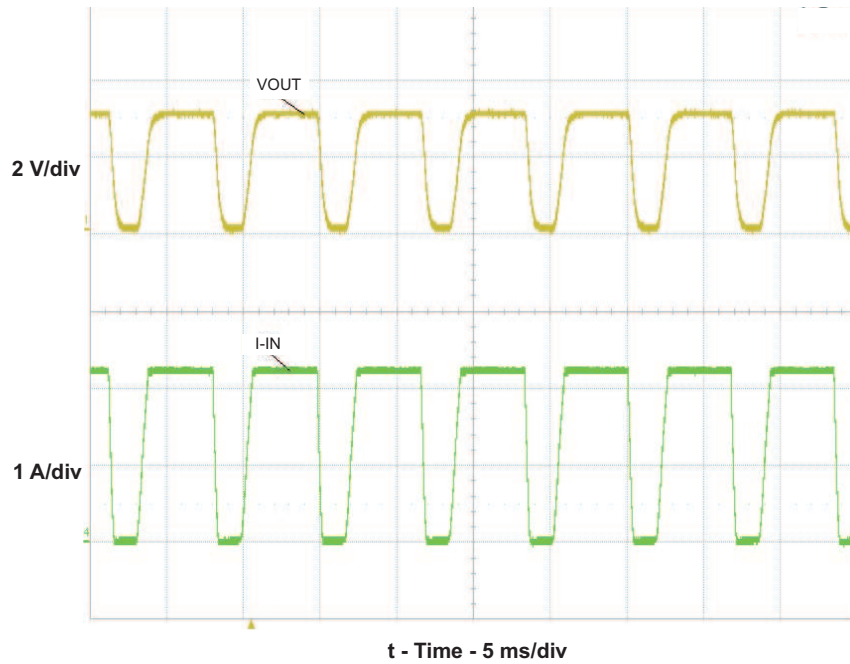


Figure 10. TPS2069CDGNEVM-635 Short-Circuit Input Current and Output Voltage

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 4.5 V to 5.5 V and the output voltage range of 4.5 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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