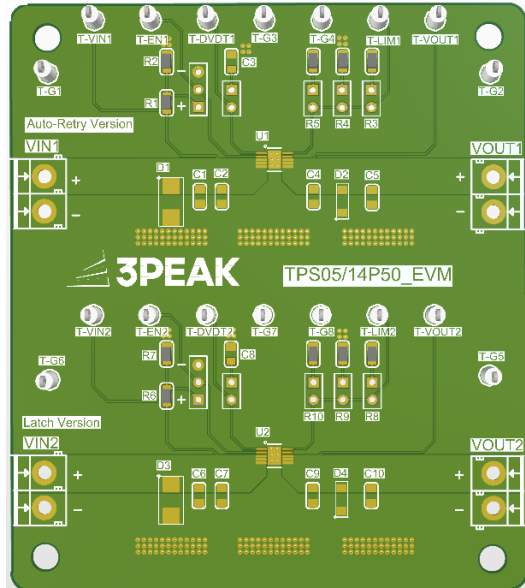


TPS14P50 EFUSE EVM User's Guide



EVM Features

- TPS14P50: 12-V E-fuse
–15-V Over-Voltage Clamp
- TPS05P50: 5-V E-fuse
–6.1-V Over-Voltage Clamp
- 27-mΩ Low Turn-On Resistance
- 5-A Maximum Continuous Current
–2-A to 5-A Adjustable Current Limit
–±15% Adjustable Current Limit Accuracy
- Adjustable Output Voltage Slew Rate
- Adjustable Undervoltage Lock Out
- Integrated Inrush Control
- Protection:
 - Over-Current Protection
 - Short-to-Ground Protection
 - Over-Temperature Protection

EVM DESCRIPTIONS

This user's guide describes the evaluation module (EVM) for the TPS05P50 and TPS14P50.

TPS05P50/TPS14P50 are simple 5-V/12-V eFuse Protection Switches with overcurrent and reverse current blocking features.

APPLICATIONS

- Hotswap Protection
- HDD and SSD Driver Card
- PCIe Cards
- Server Fan Power Supply

Revision History

Revise Date	Version	Reason/Issue
2024-11-18	A0	First Issue

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1. Performance Specification

A summary of the TPS14P50 EVM performance specifications is provided in Table.1. The EVM supports two versions (Latched and Auto- Retry) of the devices on two Channels (VIN1 and VIN2 respectively). Input power is applied at VIN1 and VIN2, while VOUT1 and VOUT2 provide the output connection to the load.

Table.1 TPS14P50 EVM Performance Specification

Channel	Vin Range	OVP	Current Limit			Fault Response
			Lo Setting	Mi Setting	Hi Setting	
CH1	4.5V-14V	15	2.3A	3.75A	5.1A	Auto Retry
CH2	4.5V-5.5V	6.1	2.3A	3.75A	5.1A	Latch

2. EVM Documentation

2.1 Schematic

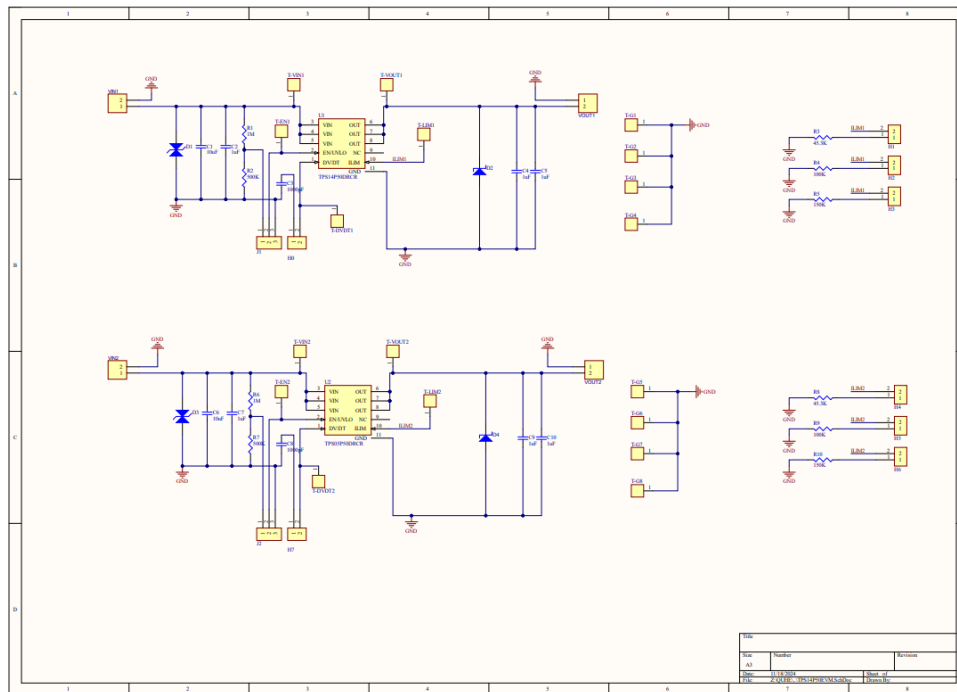


Fig. 1 TPS14P50 EVM Schematic

2.2 Bill of Material

Table.2 TPS14P50 EVM Bill of Materials

Designator	Qty	Value	Description	Package	MFR
C1, C6	2	10uF/25V	CAP CREM, 10uF, 25V X7R	0805	SAMSUNG
C2, C4, C5, C7, C9, C10	6	1uF/50V	CAP CREM, 1uF, 50V X7R	0805	SAMSUNG
C3, C8	2	1000pF/50V	CAP CREM, 1000pF, 50V X7R	0805	SAMSUNG
R3, R8	2	45.3K	Res,1%,0.125W,0805	0805	
R1, R6	2	1M	Res,1%,0.125W,0805	0805	
R2, R7	2	500K	Res,1%,0.125W,0805	0805	
R4, R9	2	100K	Res,1%,0.125W,0805	0805	
R5, R10	2	150K	Res,1%,0.125W,0805	0805	
U1	1		TPS14P50A-DF8R	DFN3X3-10	

2.3 PCB Layout

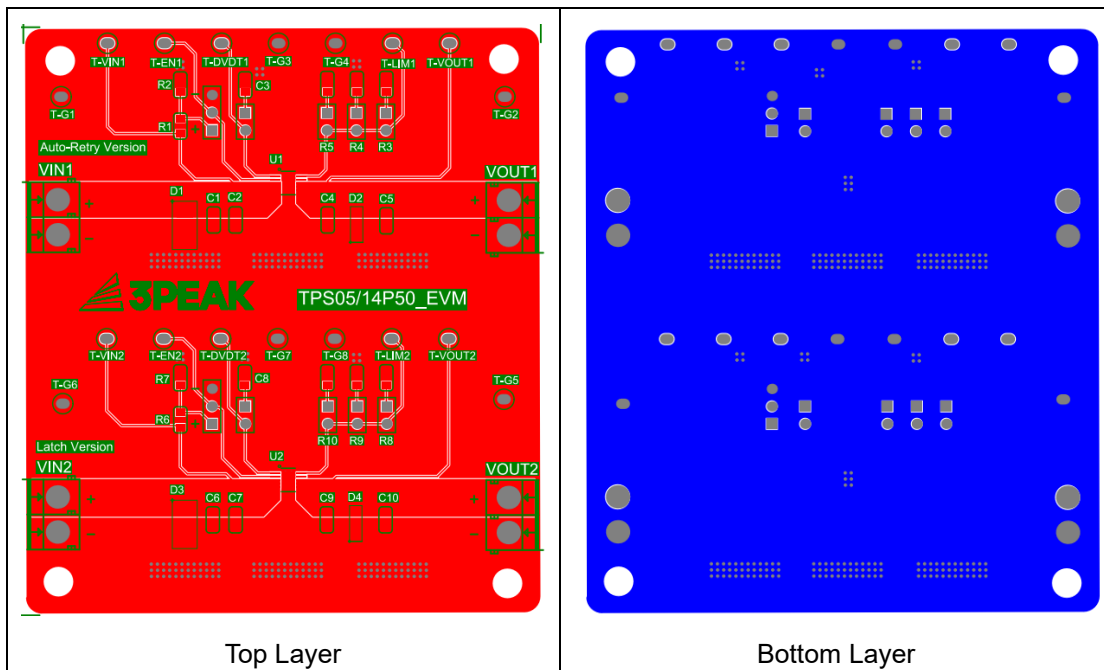


Fig. 2 TPS14P50 EVM PCB Layout

3. Test Setup and Procedure

3.1 Test Setup

The TPS14P50 EVM is provided with input/output connectors and test points as shown in Table.3.

Table.3 TPS14P50 EVM Connections

Channel	Test point	Description
CH1	VIN1	Input voltage
	T-VIN1	Voltage sense pin of VIN
	T-EN1	EN-VIN or EN-GND jumper
	T-VOUT1	Voltage sense pin of VOUT
	VOUT1	Output voltage
	T-G	GND connection
CH2	VIN2	Input voltage
	T-VIN2	Voltage sense pin of VIN
	T-EN2	EN-VIN or EN-GND jumper
	T-VOUT2	Voltage sense pin of VOUT
	VOUT2	Output voltage

Referring to Table.3, the recommended connections to evaluate TPS14P50-EVM is shown in Fig.3.

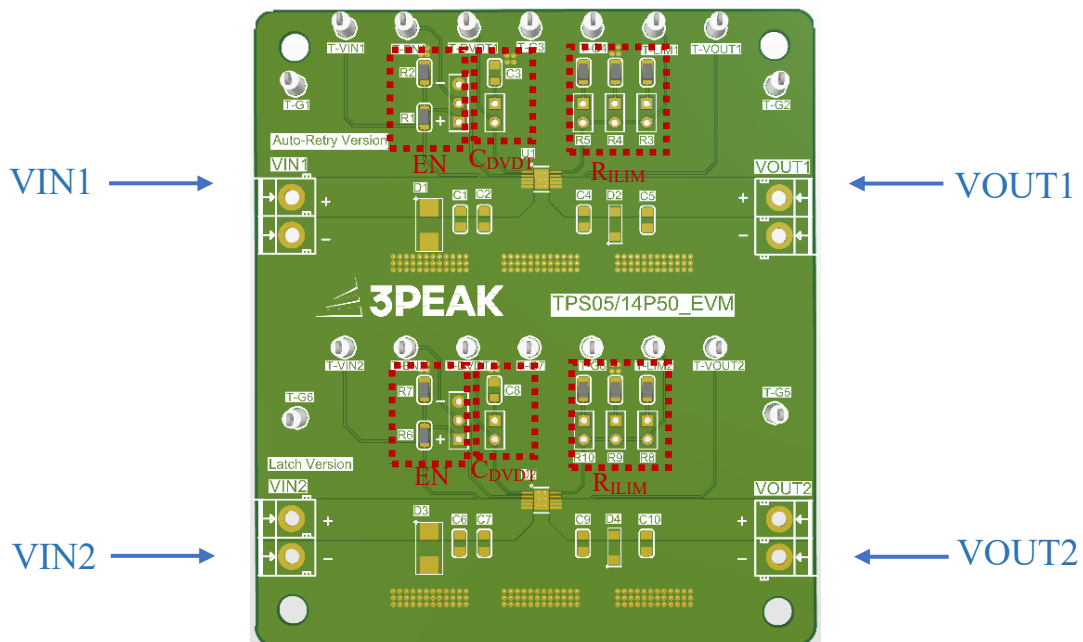


Fig. 3 EVM Test Setup

3.2 Test Equipment

Table.4 is the equipment used by 3PEAK, can also use other model of instruments which can support the voltage, current and power level of this EVM test. Multimeters are used as voltage or current meters which measure the voltage and current of input and output.

Table.4 Test Equipment Used by 3PEAK

Instruments	Model	Vender
DC Source	GPD3303S	GWINSTEK
Electronic Load	63640-150-60	Chroma
Oscilloscope	MSO58	Tektronix
Multimeter	34461A	Keysight

3.3 Test Procedure

- Set up the EVM as described in Fig.3.
- Set the power-supply VIN1 from 5V to 20V, and VOUT1 is output.
- EN is the enable pin, which can be enabled or disabled by using a jumper according to the “+” and “-” indicators.
- Turn on the power supply and set the output voltage and current limit.

Table.5 TPS14P50 EVM Jumper Setting for Current Limits

Jumper Position	Load Current Limit
R5, R10	5.1A
R4, R9	3.75A
R3, R8	2.3A

- Oscilloscope is used to capture waveforms like input voltage and others.

NOTE:

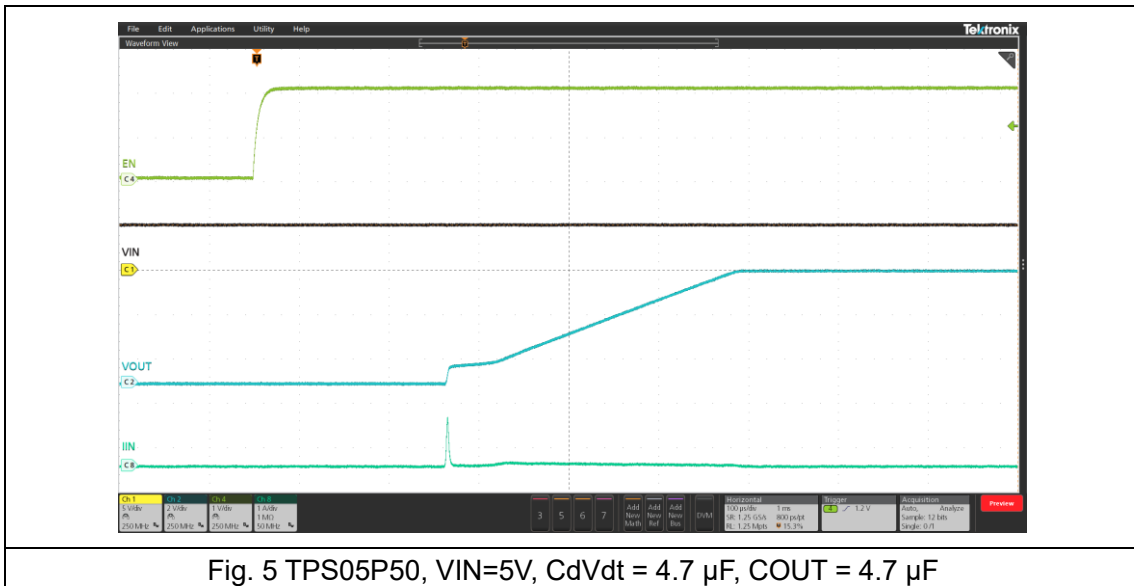
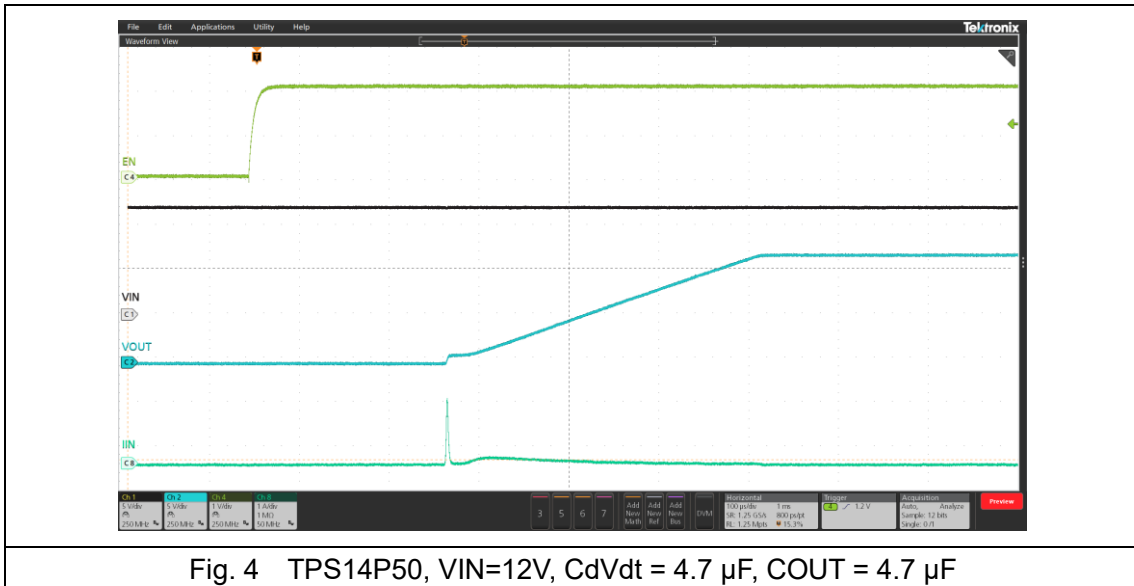
- The two channels on the TPS05/14P50 EVM have the same layout. The U1 in the EVM provided is TPS14P50 Auto Retry Version. If a different version of the IC is required, please purchase it as needed.
- For the TPS05P50 latch version, we recommend using a Schottky diode at the output.

4. Test Results and Performance Evaluation

4.1 Powering Up

Below shows the EN start-up waveforms of the EVM including TPS14P50/05P50, the output voltage ramps up slowly with soft-start function.

4.1.1 EN Start-up



4.2 Over-Voltage Clamp

For both TPS14P50 and TPS05P50, the absolute maximum voltage rating of IN pin is 20 V, and the recommended VIN operating voltage range is 4.5 V to 14 V and 4.5 V to 5.5 V for TPS05P50 respectively. However, when the VIN voltage is greater than the recommended operating voltage range, the device enters the over-voltage clamp (OVC) mode to limit the output voltage at VOVC

4.1.2 Over-Voltage Clamp

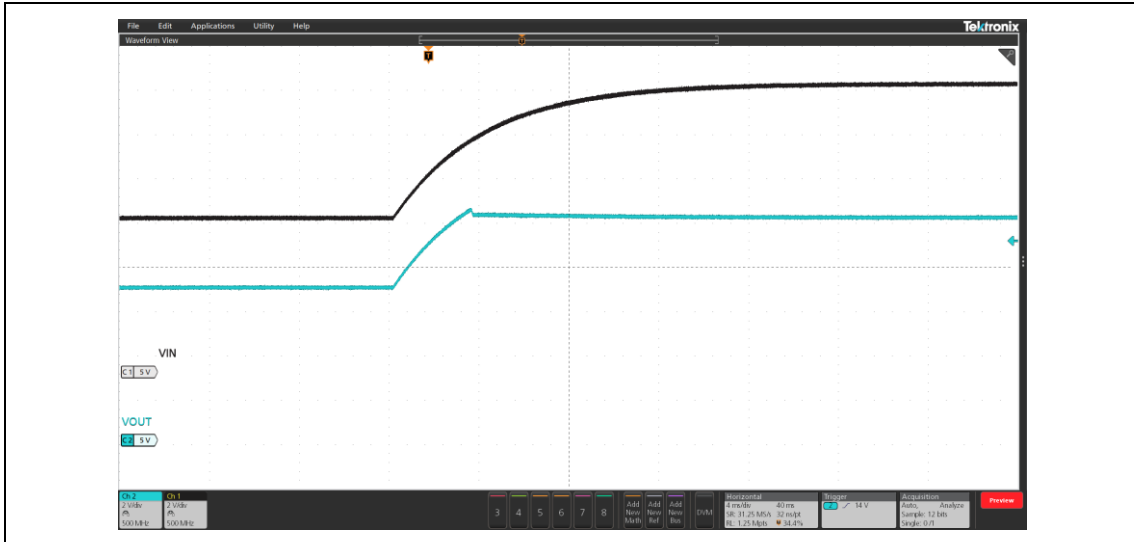


Fig. 6 TPS14P50 VIN=12_18V IO=0.5A

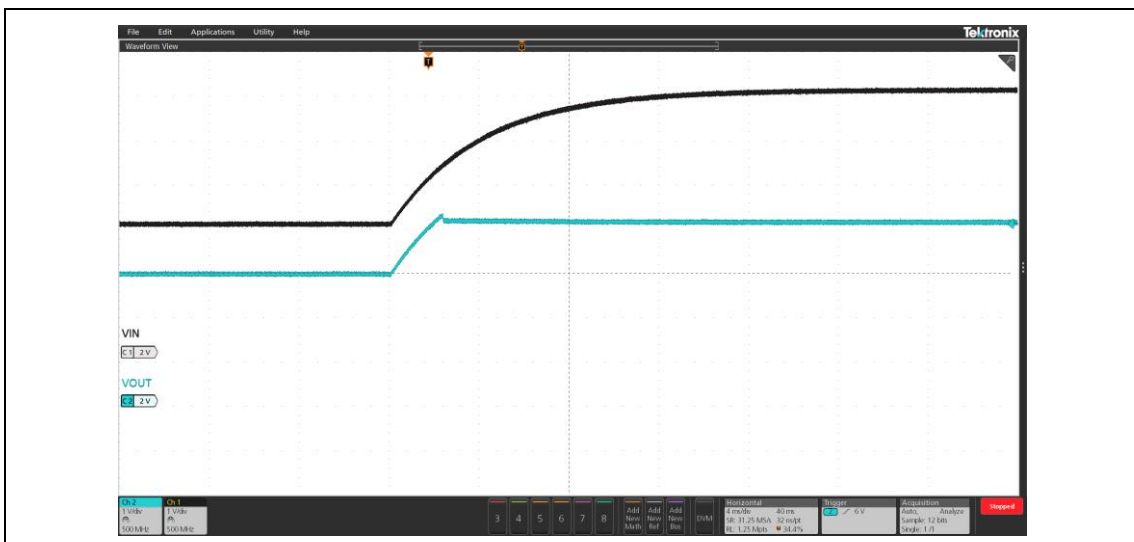


Fig. 7 TPS05P50 VIN=5_8V IO=0.5A

4.3 Thermal Shutdown

Figure 8 and Figure 9 show Auto Retry version and Latch version in thermal shutdown.

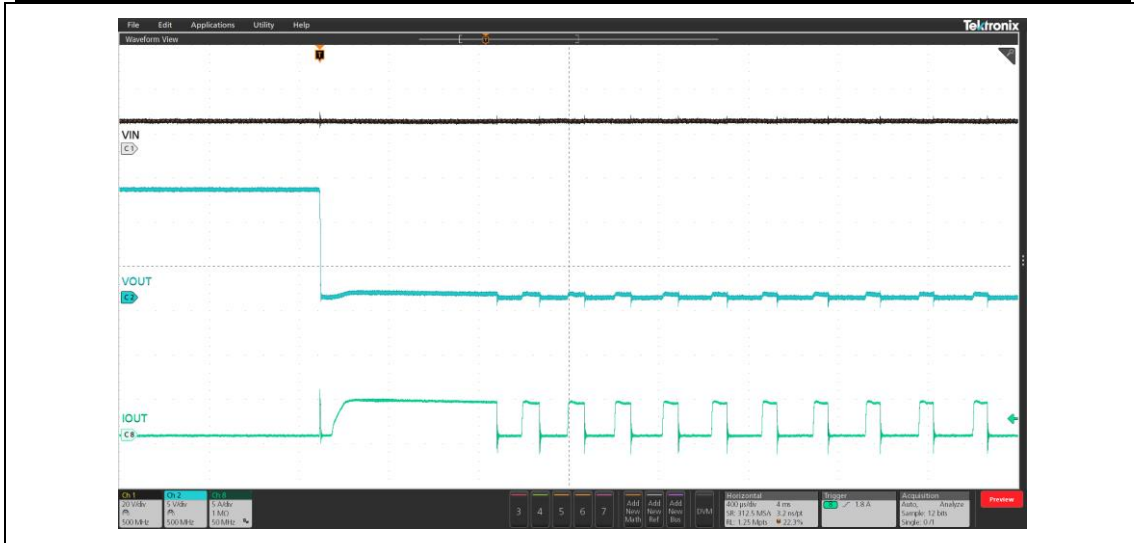


Fig. 8 TPS14P50 Thermal Shutdown Auto Retry Version

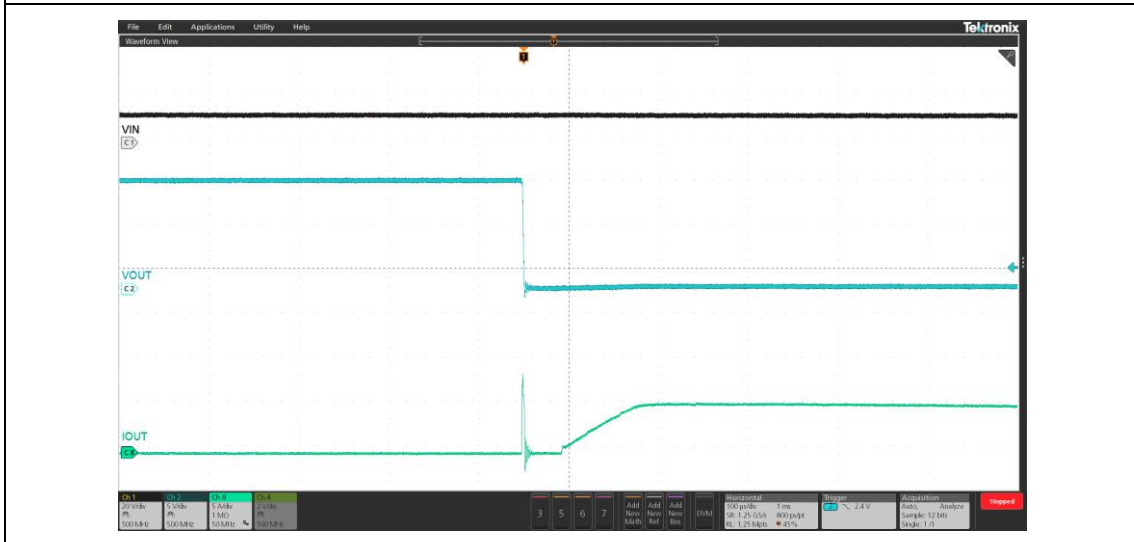


Fig. 9 TPS14P50 Thermal Shutdown Latch Version

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