User's Guide

TPS22992S Evaluation Module

ABSTRACT

This user's guide describes the characteristics, operation, and use of the TPS22992S adjustable current limited load switch Evaluation Module (EVM). This document contains the complete EVM schematic diagram, printed-circuit board layouts, bill of materials, and necessary instructions on how to operate the EVM.

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Trademarks

1 Introduction

The TPS22992S EVM is a two-layer PCB containing the TPS22992S load switch device. The VIN and VOUT connections to the device and the PCB layout routing are capable of handling high continuous currents and provide a low-resistance pathway into and out of the device under test. Test point connections allow the EVM user to control the device with user-defined test conditions and make accurate R_{ON} measurements.

1.1 Description

Table 1 lists a short description of the TPS22992S load switch performance specification. For additional details on load switch performance, application notes, and data sheet, see www.ti.com/loadswitch.

Table 1-1. TPS22992S Characteristics

EVM	Device	Rise Time Typical (µs)	V_{IN} (V)	V_{BIAS} (V)	Enable (ON Pin)	Quick Output Discharge
PSIL152	TPS22992S	Adjustable	0.1 V to 5.5 V	1.5 V to 5.5 V	Active High	Adjustable

1.2 Features

This EVM has the following features:

- V_{IN} input voltage range: 0.1 V to 5.5 V
- Access to the VIN, VOUT, PG, ON, GND and QOD pins of the TPS22992S load switch
- Onboard CIN and COUT capacitors
- Adjustable rise time

2 Electrical Performance

See the *TPS22992x 5-V, 8.7-mΩ, 6-A Load Switch with Adjustable Rise Time Data Sheet* for detailed electrical characteristics of the TPS22992S.

3 Schematic

Figure 1 illustrates the TPS22992SEVM schematic.

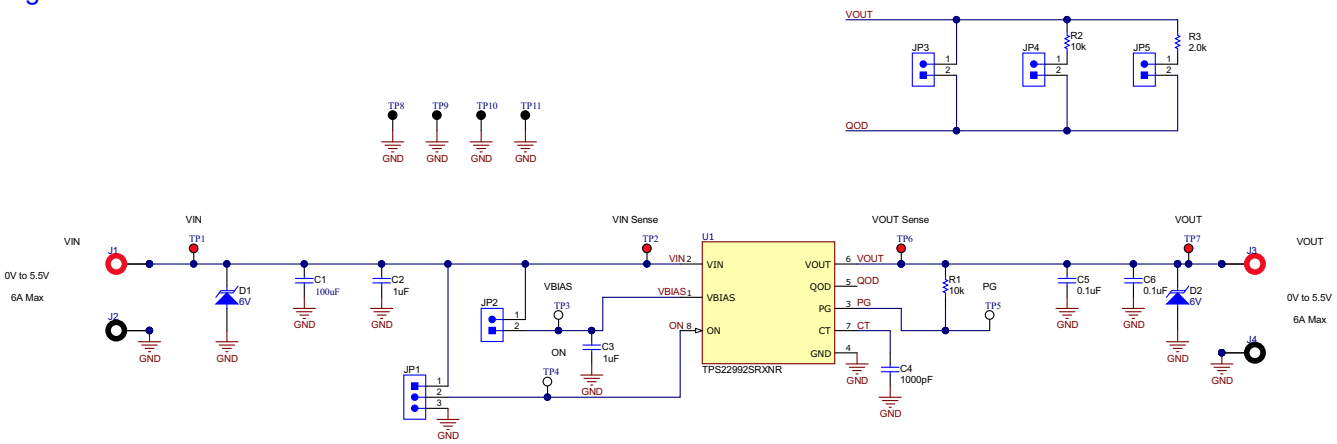

Figure 3-1. TPS22992SEVM Schematic

4 PCB Layout

Figure 2 and Figure 3 show the PCB layout images.

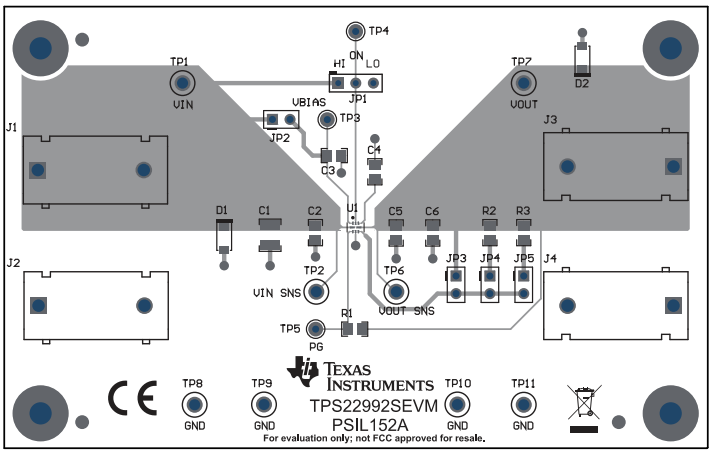

Figure 4-1. TPS22992SEVM Top Layout

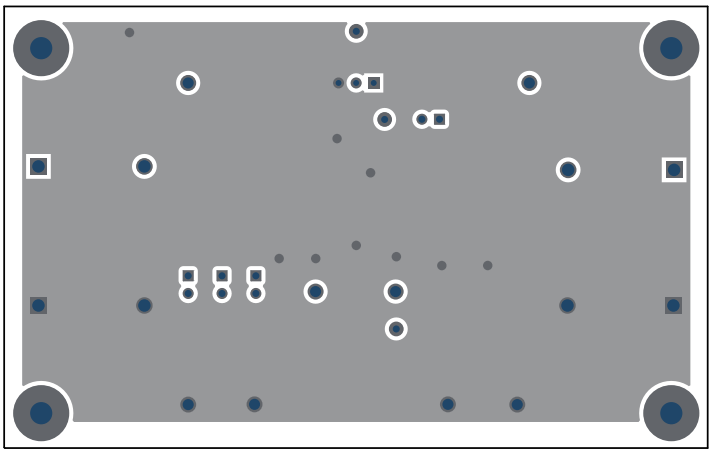

Figure 4-2. TPS22992SEVM Bottom Layout

4.1 Setup

This section describes the jumpers and connectors on the EVM as well as how to properly connect, set up and use the EVM. Table 2 describes the input and output connectors and jumpers. Table 3 describes the different test points and functionality. Table 4 describes the jumper functionality and configurations.

Table 4-1. TPS22992SEVM Input and Output Connector Functionality

Input	Connector and Test Point	Label	Description
VIN	J1	J1	Input banana connector for VIN
	TP1	VIN	Input test point for VIN
	TP2	VIN Sense	Sense test point for VIN
VOUT	J3	J3	Output banana connector for VOUT
	TP7	VOUT	Output test point for VOUT
	TP6	VOUT Sense	Sense test point for VOUT
GND	TP8, TP9, TP10, TP11	GND	Test point for GND
	J2, J4	J2, J4	Banana connector for GND

Table 4-2. TPS22992SEVM Test Point Description

Pin	Test Point	Label	Description
ON	TP4	ON	Enable signal test point
VBIAS	TP3	VBIAS	Bias voltage test point
PG	TP5	PG	Power good signal test point

Table 4-3. TPS22992SEVM Jumper Configuration

Input	Jumper	Label	Description
VIN	JP2	VBIAS	BIAS voltage pull up to VIN
	JP1	ON	ON-pin enable signal • Position 1 and 2 sets ON-pin HI • Position 2 and 3 sets ON-pin LO

Table 4-3. TPS22992SEVM Jumper Configuration (continued)

Input	Jumper	Label	Description
VOUT	JP3, JP4, JP5	JP3, JP4, JP5	Quick output discharge setting • JP3 sets device to use internal QOD • JP4 sets device to use internal QOD + 10 kΩ • JP5 sets device to use internal QOD + 2 kΩ

5 Operation

Connect the VIN power supply to the J1 terminal. The input voltage range of the TPS22992SEVM is 0.1 V to 5.5 V. Connect an acceptable bias voltage to TPS3 or populate JP2 to use VIN as VBIAS. The bias voltage range of TPS22992SEVM is 1.5 V to 5.5 V. Note that VIN cannot be greater than VBIAS for correct operation of the device.

External output loads can be applied to the switch by using the J2 terminal. Adjust the quick output discharge on the TPS22992SEVM if required. When the ON pin is asserted high, the output of the TPS22992S is enabled.

6 Test Configurations

6.1 On-Resistance (R_{on}) Test Setup

Figure 4 shows the typical setup for measuring on-resistance. The voltage drop across the switch is measured using the sense connections, and this can be divided by the load current to calculate the R_{on} resistance.

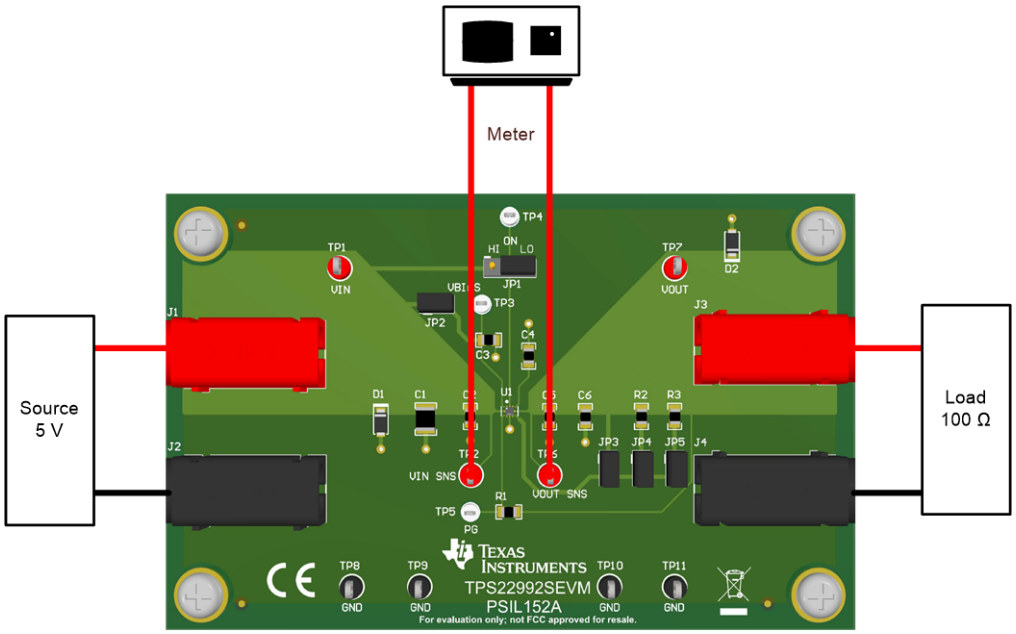

Figure 6-1. R_{on} Test Setup

6.2 Rise Time Test Setup

Figure 5 shows the test setup for measuring the rise time of the TPS22992S. Apply a squarewave to the ON pin of the switch using a function generator and apply a voltage to the VIN terminal using a power supply. Observe the waveform at VOUT Sense with an oscilloscope to measure the slew rate and rise time of the switch with a given input voltage.

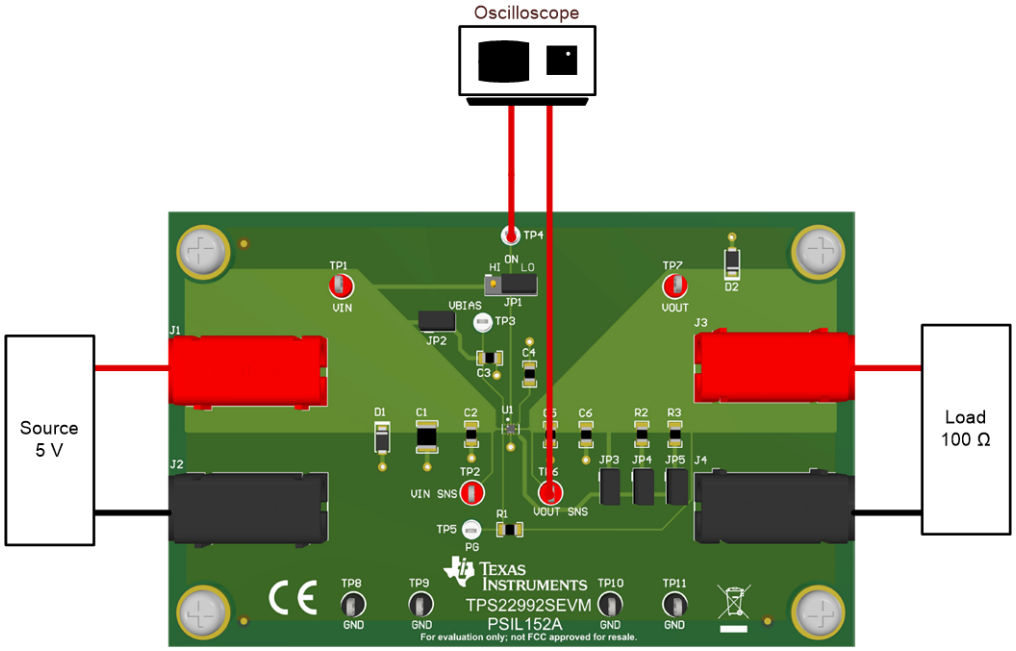

Figure 6-2. Rise Time Test Setup

7 Bill of Materials (BOM)

Table 5 lists the TPS22992SEVM BOM.

Table 7-1. TPS22992SEVM BOM

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
!PCB	1		Printed Circuit Board		PSIL152	Any
C1	1	100uF	CAP, CERM, 100 uF, 16 V, +/- 20%, X5R, 1210	1210	C1210C107M4PAC7800	Kemet
C2, C3	2	1uF	CAP, CERM, 1 uF, 50 V, +/- 10%, X7R, 0805	0805	C0805C105K5RACTU	Kemet
C4	1	1000pF	CAP, CERM, 1000 pF, 50 V, +/- 5%, X7R, 0805	0805	C0805C102J5RACTU	Kemet
C5, C6	2	0.1uF	CAP, CERM, 0.1 uF, 25 V, +/- 5%, X7R, 0805	0805	08053C104JAT2A	AVX
D1, D2	2	6V	Diode, TVS, Uni, 6 V, 10.3 Vc, SOD-123FL	SOD-123FL	SMF6A	Littelfuse
H1, H2, H3, H4	4		Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH	B&F Fastener Supply
H5, H6, H7, H8	4		Standoff, Hex, 0.5"L #4-40 Nylon	Standoff	1902C	Keystone
J1, J3	2		Standard Banana Jack, insulated, 10A, red	571-0500	571-0500	DEM Manufacturing
J2, J4	2		Standard Banana Jack, insulated, 10A, black	571-0100	571-0100	DEM Manufacturing
JP1	1		Header, 100mil, 3x1, TH	Header, 3x1, 100mil, TH	800-10-003-10-001000	Mill-Max
JP2, JP3, JP4, JP5	4		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
R1, R2	2	10k	RES, 10 k, 5%, 0.125 W, 0805	0805	ERJ-6GEYJ103V	Panasonic
R3	1	2.0k	RES, 2.0 k, 5%, 0.125 W, 0805	0805	ERJ-6GEYJ202V	Panasonic
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5	5	1x2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions

Table 7-1. TPS22992SEVM BOM (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
TP1, TP2, TP6, TP7	4		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone
TP3, TP4, TP5	3		Test Point, Miniature, White, TH	White Miniature Testpoint	5002	Keystone
TP8, TP9, TP10, TP11	4		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone
U1	1		5V, 8.7mΩ, 6A Load Switch with Adjustable Rise Time	WQFN-HR8	TPS22992SRXNR	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265