TPS22948 Load Switch Evaluation Module

The TPS22948EVM evaluation module (EVM) allows the user to connect power to and control the 6-pin, SC-70 package load switch. Parameters such as the on-resistance, rise time, and output pull-down resistance can be easily and accurately evaluated.

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1 Introduction

The TPS22948EVM is a two-layer PCB containing the TPS22948 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

The TPS22948 datasheet lists a short description of the TPS22948 load switch performance specifications; for additional details on load switch performance, application notes, and the datasheet, see www.ti.com/loadswitch.

Table 1. TPS22948 Rise Time, Output Current Rating, Enable and Output Discharge Characteristics

EVM	Device	Rise Time Typical (µs)	V_{IN} (V)	Maximum Continuous Current (A)	Enable (ON Pin)	Fault Indication
PSIL051	TPS22948	Fixed	2.5 V to 5.5 V	100 mA	Active High	Adjustable

1.2 Features

This EVM has the following features:

- V_{IN} input voltage range: 2.5 V to 5.5 V
- Access to the VIN, VOUT, FLT, GND and ON pins of the TPS22948 load switch device
- Onboard C_{IN} and C_{OUT} capacitors
- 100 mA maximum continuous current operation

2 Electrical Performance

Refer to the TPS22948 datasheet for detailed electrical characteristics of the TPS22948.

3 Schematic

Figure 1 illustrates the TPS22948EVM schematic.

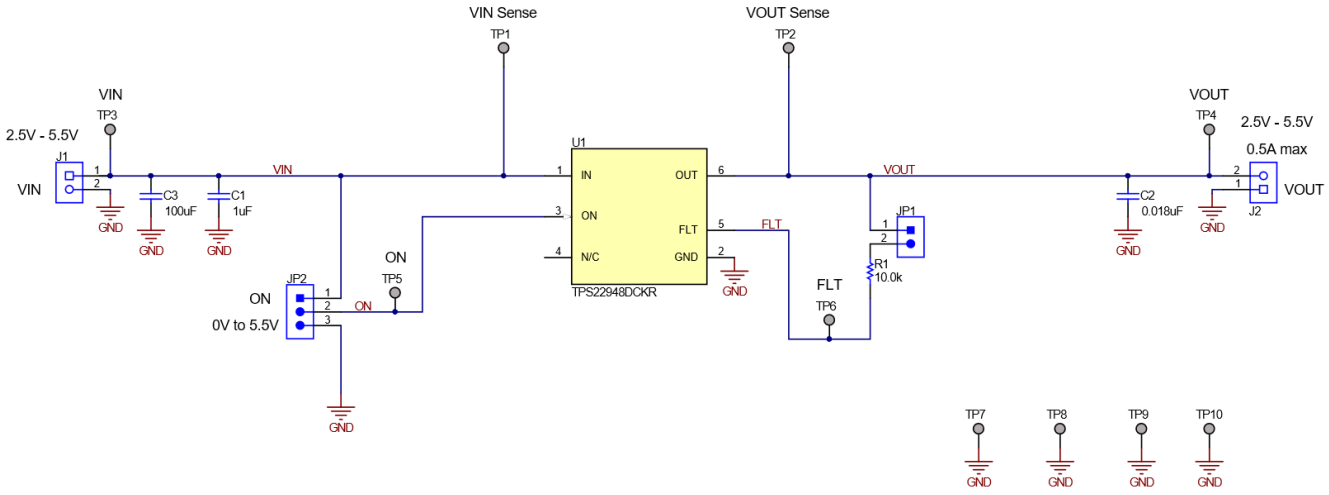

Figure 1. TPS22948EVM Schematic

4 Layout

Figure 2 and Figure 3 show the PCB layout images.

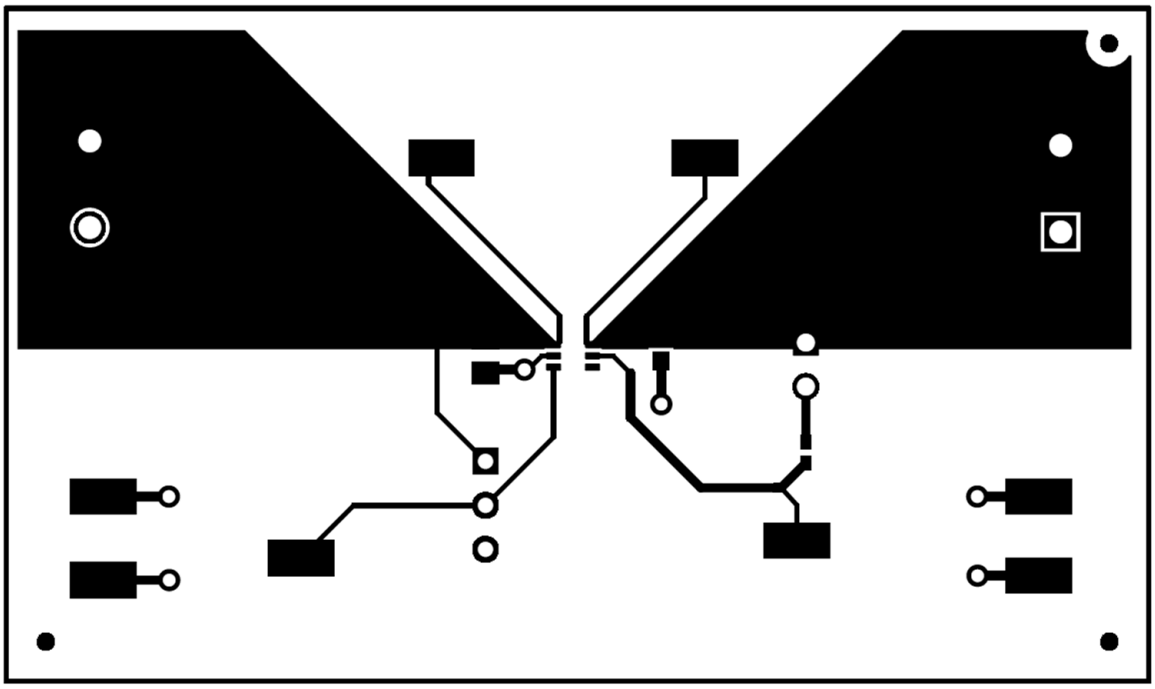

Figure 2. TPS22948EVM Top Layout

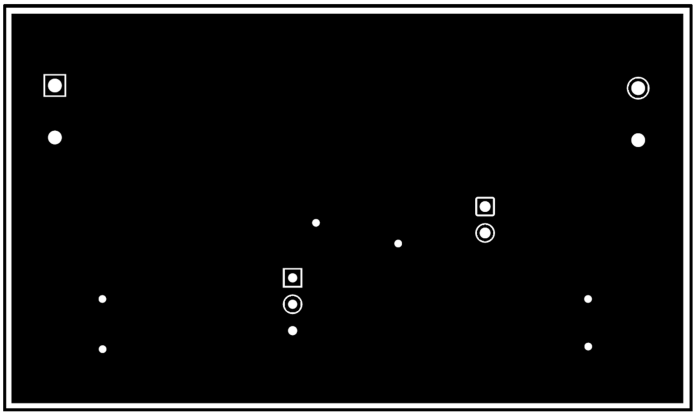

Figure 3. TPS22948EVM Bottom Layout

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.

4.1.1 J1, TP1 – Input Connection

This is the connection for the leads from the input source. Connect the positive lead to the + terminal (VIN) and the negative lead to the – terminal (GND).

4.1.2 J2, TP4 – Output Connection

This is the connection for the output of the EVM. Connect the positive lead to the + terminal (VOUT) and the negative lead to the – terminal (GND).

4.1.3 JP2, TP5 – ON

This is the enable input for the device. A shorting jumper can be installed on JP2 in either the high or low position. An external enable source can be applied to the EVM by removing the shunt and connecting a signal to TP5. Refer to TPS22948 datasheet for proper ON and OFF voltage level settings. A switching signal may also be used and connected at this point.

4.1.4 JP1 - Fault Connection

During normal operation, a shorting jumper is placed on JP1. This the FAULT pin to VOUT, enabling a pull-up from VOUT to FAULT. When the device encounters a fault, either from a reverse current condition or thermal shutdown, the pin will be pulled low. During normal operation, the pin will be pulled high. TP6 can also be used to provide feedback.

4.1.5 TP1 - VIN Sense, TP2 - VOUT Sense

These two connections are used when very accurate measurements of the input or output are required. Make R_{ON} measurements using these sense connections when measuring the voltage drop from VIN to VOUT.

4.1.6 TP7, TP8, TP9, TP10 – GND

These are connections to GND.

5 Operation

Connect the VIN power supply to the J1 terminal (VIN). The input voltage range of the TPS22948EVM is 2.5 V to 5.5 V.

External output loads can be applied to the switch by using the J2 terminal (VOUT). The TPS22948EVM is rated for a maximum continuous current of 100 mA. When the ON pin is asserted high, the output of the TPS22948 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.

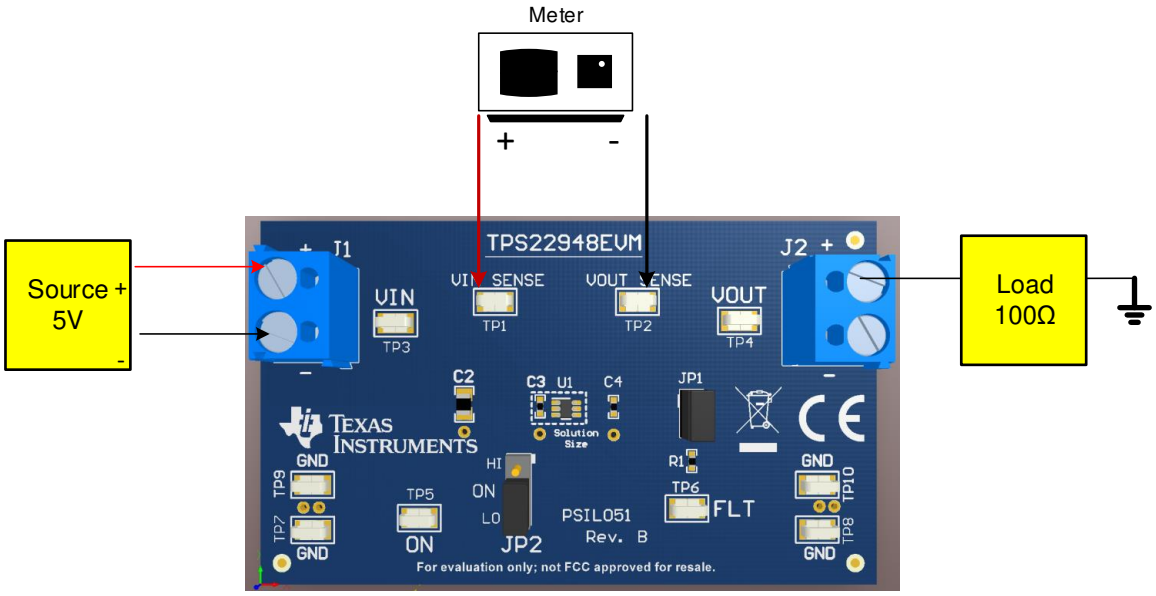

Figure 4. R_{ON} Test Setup

6.2 Rise Time Test Setup

Figure 5 shows the test setup for measuring the rise time of the TPS22948. Apply a square wave 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 (TP6) with an oscilloscope to measure the slew rate and rise time of the switch with a given input voltage.

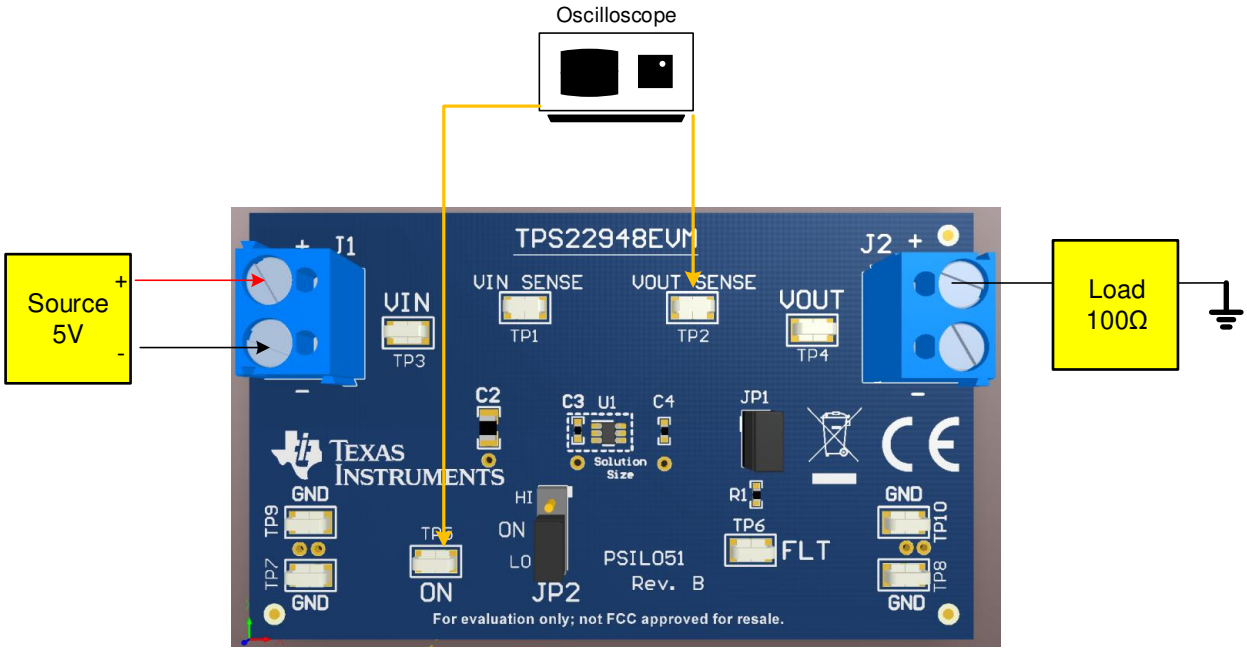

Figure 5. Rise Time Test Setup

7 Bill of Materials (BOM)

Table 2 lists the TPS22948EVM BOM.

Table 2. TPS22948EVM Bill of Materials

Qty	Designator	Value	Description	Package Reference	Part Number	Manufacturer
!PCB1	1		Printed Circuit Board		PSIL051	Any
C1	1	1 uF	CAP, CERM, 1 uF, 16 V, +/- 10%, X8R, 0805	0805	C2012X8R1C105K125AB	TDK
C3	1	100 uF	CAP, CERM, 100 uF, 16 V, +/- 20%, X5R, 1210	1210	C1210C107M4PAC7800	Kemet
C2	1	0.018 uF	CAP, CERM, 0.018 uF, 16 V, +/- 10%, X7R, 0402	0402	GRM155R71C183KA01D	MuRata
J1, J2	2		Terminal Block, 5 mm, 2x1, Tin, TH	Terminal Block, 5 mm, 2x1, TH	691 101 710 002	Wurth Elektronik
JP1	1		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
JP2	1		Header, 100mil, 3x1, TH	Header, 3x1, 100mil, TH	800-10-003-10-001000	Mill-Max
R1	1	10.0 k	RES, 10.0 k, 0.1%, 0.063 W, 0402	0402	MCR01MRTF1002	Rohm
SH-J1, SH-J2	2	1x2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10	10		Test Point, Miniature, SMT	Test Point, Miniature, SMT	5019	Keystone
U1	1		0.3A, Current Limited Load Switch with Reverse Current Blocking, DCK0006A (SOT-SC70-6)	DCK0006A	TPS22948DCKR	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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This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

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(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

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