TPS22970 Load Switch Evaluation Module

The TPS22970 evaluation module (EVM) allows the user to connect power to and control the 8-pin YPH package load switch. Parameters such as the on-resistance, rise time, and output pull-down resistance can be easily evaluated. Table 1 lists a short description of the TPS22970 load switch performance specifications; for additional details on load switch performance, application notes, and the datasheet see www.ti.com/loadswitch.

Table 1. TPS22970 Output Current Rating, Enable and Output Discharge Characteristics

EVM	Device	VIN	Maximum Continuous Current	Enable (ON Pin)	Quick Output Discharge
HVL176-001	TPS22970	0.65 V to 3.6 V	4 A	Active High	Yes

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1 Introduction

1.1 Description

The TPS22970EVM is a two-sided PCB containing the TPS22970 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.

1.2 Features

- VIN input voltage range: 0.65 V to 3.6 V.
- EVM allows access to the VIN, VOUT, GND, and ON pin of the *TPS22970 Load Switch Device*.
- On board C_{IN} and C_{OUT} capacitors.
- 4-A maximum continuous current operation.
- WCSP-8 package: 0.9 mm × 1.9 mm, 0.5-mm pitch.

2 Electrical Performance

Refer to the datasheet (SLVSDF2) for detailed electrical characteristics of the TPS22970.

3 Schematic

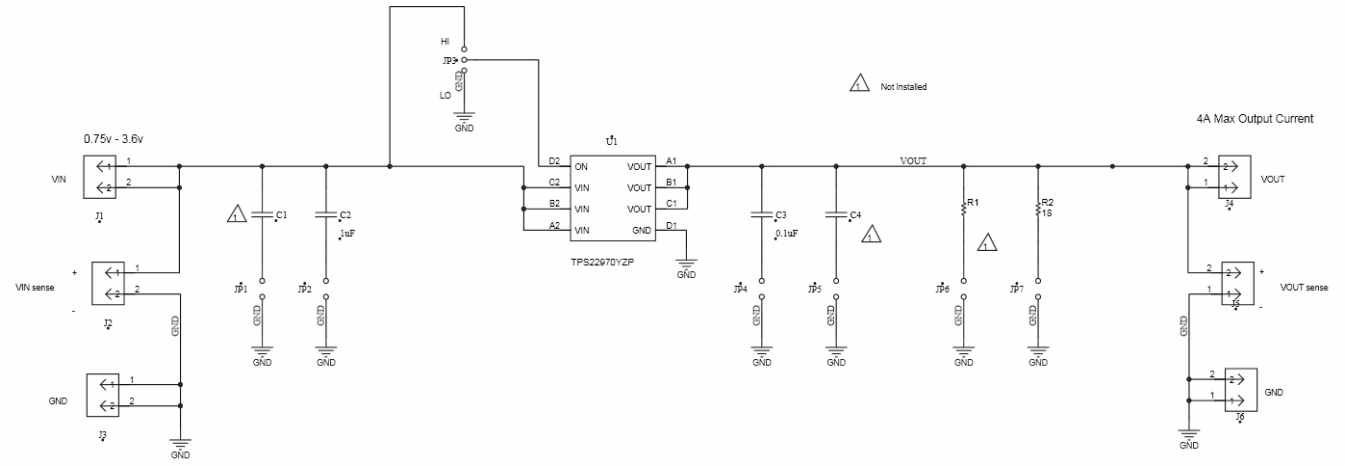


Figure 1. TPS22970EVM Schematic

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4 Layout

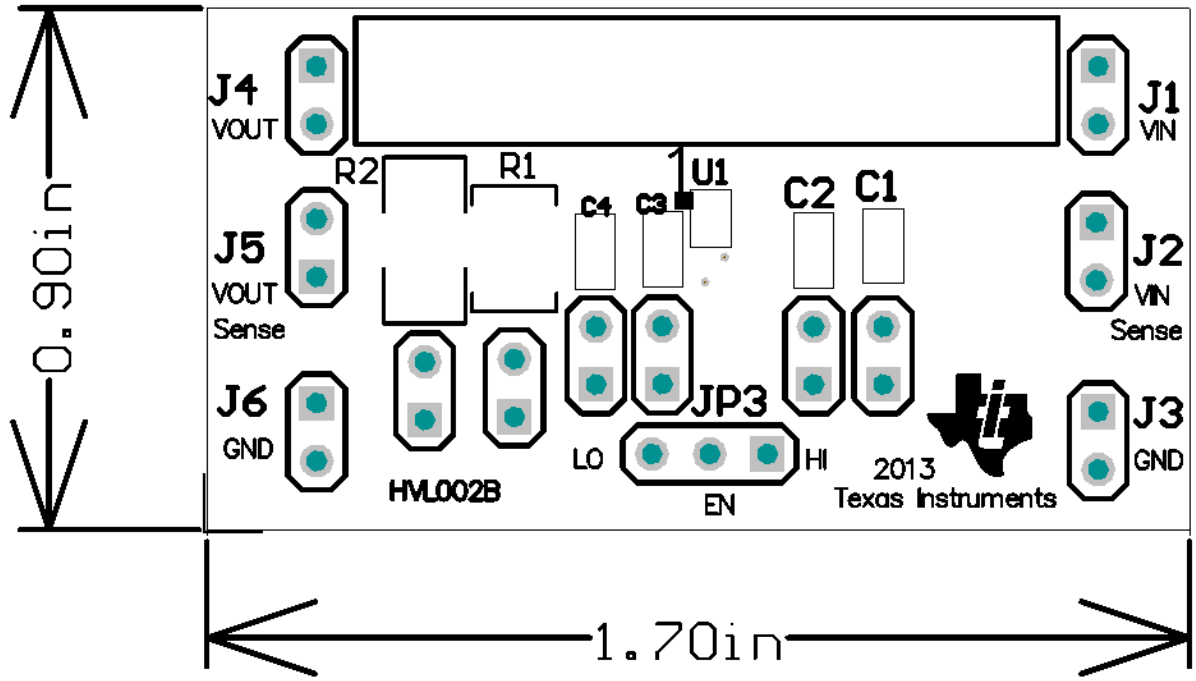


Figure 2. TPS22970EVM Top Assembly

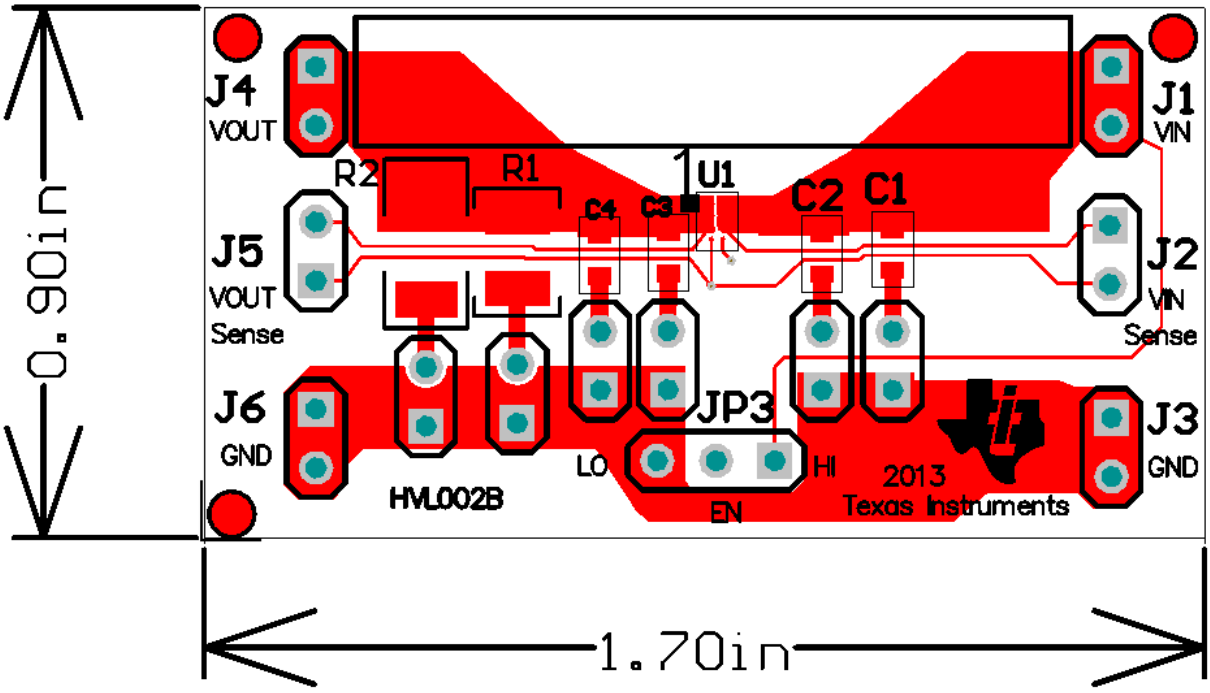


Figure 3. TPS22970EVM Top Layout

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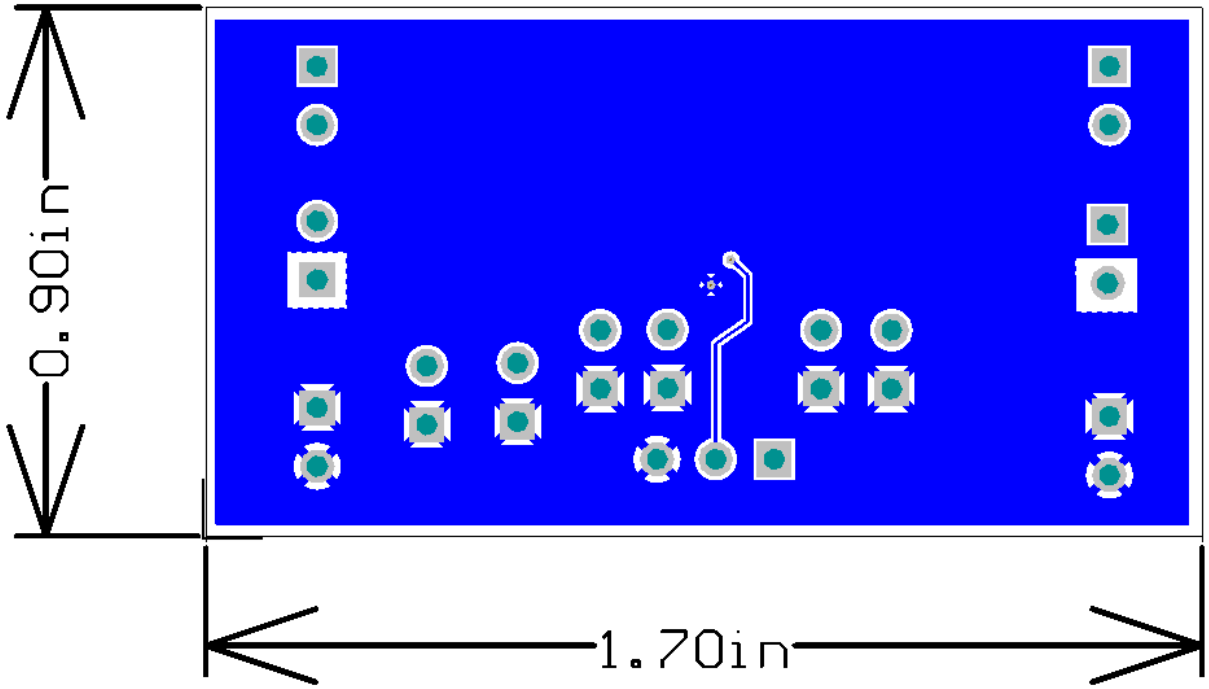


Figure 4. TPS22970EVM Bottom Layout

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 – Input Connection

This is the connection for the leads from the input source. Connect the positive lead to J1 and the negative lead to J3 (GND).

4.1.2 J4 – Output Connection

This is the connection for the output of the EVM. Connect the positive lead to the J4 terminal and the negative lead to the J6 terminal (GND).

4.1.3 JP3 – ON

This is the enable input for the device. A shorting jumper must be installed on JP3 in either the high or low position. The TPS22970 is active high, and ON must not be left floating. An external enable source can be applied to the EVM by removing the shunt and connecting a signal to the middle lead. Refer to the TPS22970 datasheet (SLVSDF2) for proper ON and OFF voltage level settings. A switching signal may also be used and connected.

4.1.4 J2 - VIN Sense, J5 - VOUT Sense

These two connections are used when very accurate measurements of the input or output are required. R_{ON} measurements must be made using these sense connections when measuring the voltage drop from VIN to VOUT to calculate the on-resistance.

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4.1.5 C1/C2 - Input Capacitor

During normal operation, a shorting jumper is placed on JP1/JP2. This connects the C1/C2 capacitors from the input of the device to ground. Refer to the Applications Section of the TPS22970 datasheet (SLVSDF2) for additional information on selecting the input capacitor.

4.1.6 C3/C4 - Output Capacitor

During normal operation a shorting jumper is placed on JP4/JP5. This connects the C3/C4 capacitors from the output of the device to ground. Refer to the Applications Section of the datasheet for additional information on selecting the output capacitor.

4.1.7 R1/R2 - Output Resistor

To apply a resistive load to the output of the load switch, a shorting jumper is applied to JP6/JP7. This connects the R1/R2 resistors from the output of the device to ground.

4.1.8 J3/J6 – GND

These are connections to GND.

5 Operation

Connect the positive input of the VIN power supply to VIN at J1. Connect the negative lead of the power supply to GND at J3. The input voltage range of the TPS22970EVM is 0.65 V to 3.6 V.

External output loads can be applied to the switch by using J4 (VOUT) and J6 (GND). The TPS22970EVM is rated for a maximum continuous current of 4 A. Configure JP3 as required. JP3 must be installed for proper operation. When the ON pin is asserted high, the output of the TPS22970 is enabled.

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6 Bill of Materials (BOM)

Table 2. Bill of Materials TPS22970EVM

Qty	Designator	Value	Description	Package Reference	Manufacturer	Part Number
1	—		PCB, 0.9 in × 1.7 in x 0.062 in		Any	HVL002
1	C3	0.1 uF	Capacitor, Ceramic,16-V, X7R	0603	MuRata	GRM188F51H104ZA01D
1	C2	1 uF	Capacitor, Ceramic, 6.3 V, X5R 10%	0603	MuRata	GRM188F51E105A12D
0	C1, C4	OPEN	Capacitor, Ceramic	0603	Std	Std
0	R1	OPEN	Resistor, 5% 1/8W	1210	Std	Std
1	R2	18 Ω	Resistor, 5% 1/2W	2010	Std	ERJ-12ZYJ180U
12	J1-J6, JP1-2, JP4-8	PEC02SAAN	Header, 2 pin, 100-mil spacing	0.100 inch × 2	Sullins	PEC02SAAN
1	JP3	PEC03SAAN	Header, 3 pin, 100-mil spacing IC	0.100 inch × 3	Sullins	PEC03SAAN
1	U1	TPS22970YZP	Single Channel Load Switch	YZP	Texas Instruments	TPS22970YZP
3	N/A	N/A	Shunt, 100-mil, Black	0.100	3M	929950-00

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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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Concernant les EVMs avec antennes détachables

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
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