

## TPS22925EVM 3.6-V, 3-A, 9-mΩ On-Resistance Load Switch Evaluation Module

The TPS22925 evaluation module (EVM) allows the user to connect power to and control the 6-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 TPS22925 load switch performance specifications; for additional details on load switch performance, application notes, and the datasheet see [www.ti.com/loadswitch](http://www.ti.com/loadswitch).

**Table 1. TPS22925 Rise Time, Output Current Rating, Enable, and Output Discharge Characteristics**

EVM	Device	Rise Time Typical	VIN (V)	Maximum Continuous Current	Enable (ON Pin)	Quick Output Discharge
HVL135-001	TPS22925B	100 μs	3.6	3 A	Active High	Yes
HVL135-002	TPS22925BN	100 μs	3.6	3 A	Active High	No
HVL135-001	TPS22925C	810 μs	3.6	3 A	Active High	Yes
HVL135-002	TPS22925CN	810 μs	3.6	3 A	Active High	No

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## 1 Introduction

### 1.1 Description

The TPS22925EVM is a two-sided PCB containing the TPS22925 load switch devices. 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.

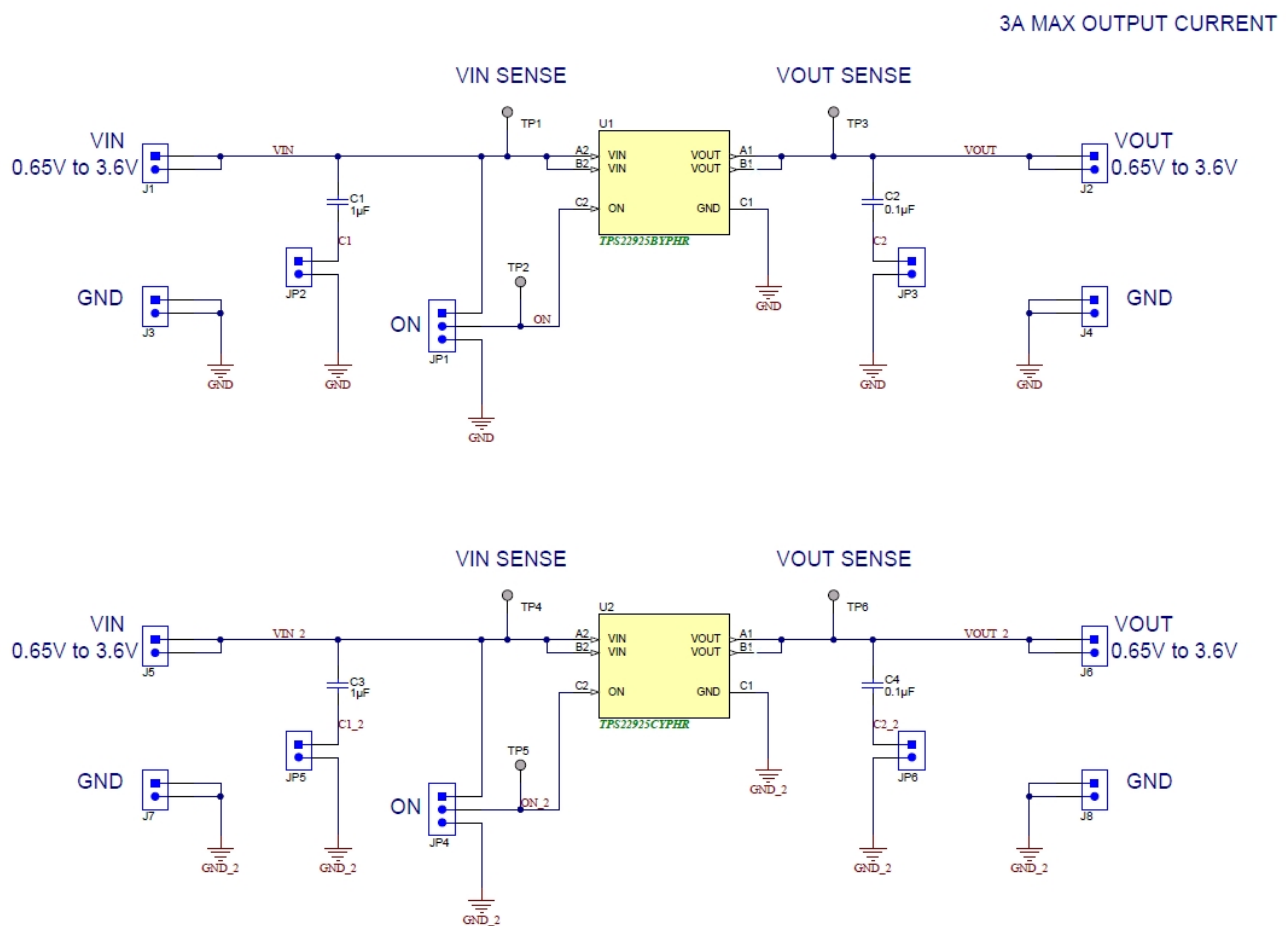
### 1.2 Features

- VIN input voltage range: 0.65 V to 3.6 V.
- EVM allows access to the VIN, VOUT, GND, and ON pin of the *TPS22925 Load Switch Devices*.
- On board  $C_{IN}$  and  $C_{OUT}$  capacitors.
- 3 A max continuous current operation.
- 24-mm<sup>2</sup> Load Switch solution size sampled on this EVM.

## 2 Electrical Performance

Refer to the datasheet ([SLVS840](#)) for detailed electrical characteristics of the TPS22925.

## 3 Schematic



**Figure 1. TPS22925EVM Schematic**

4 Layout

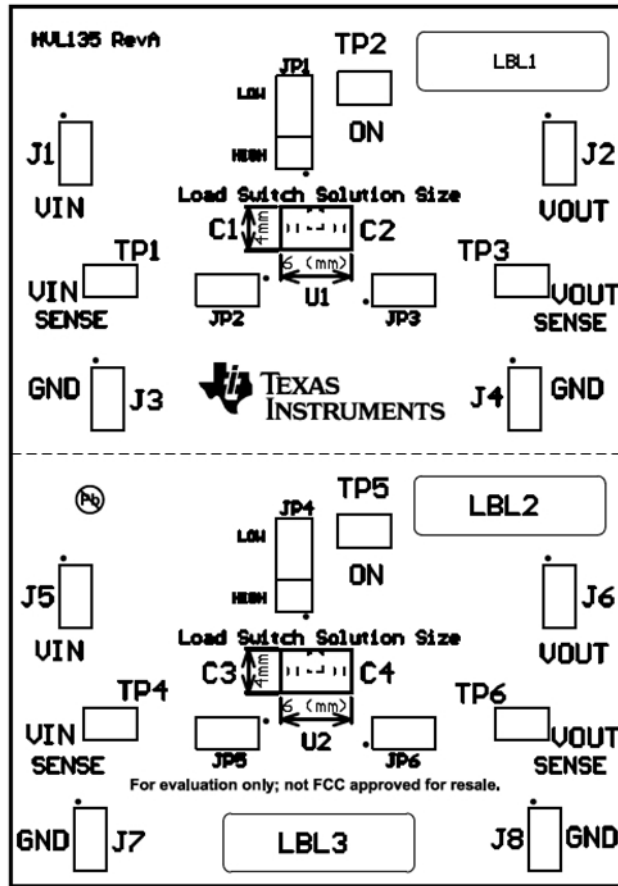


Figure 2. TPS22925EVM Top Assembly

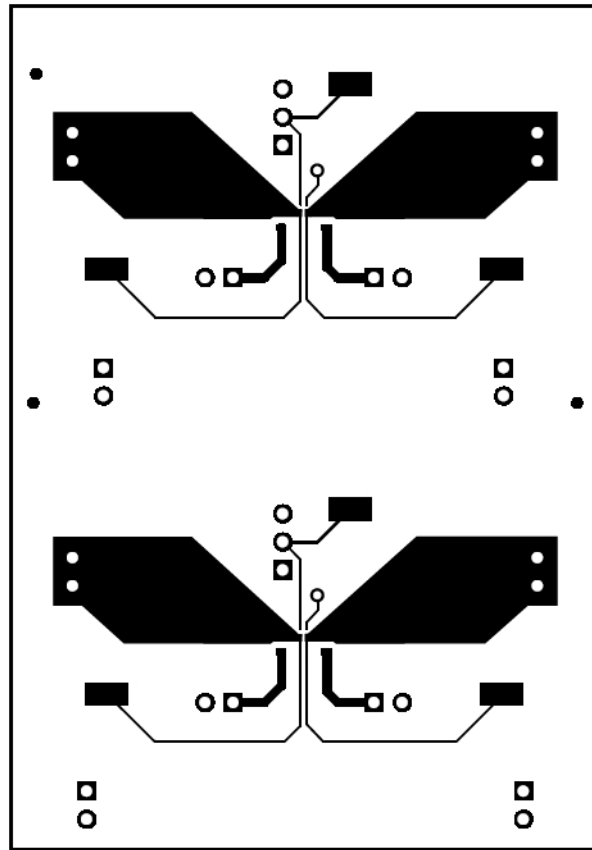
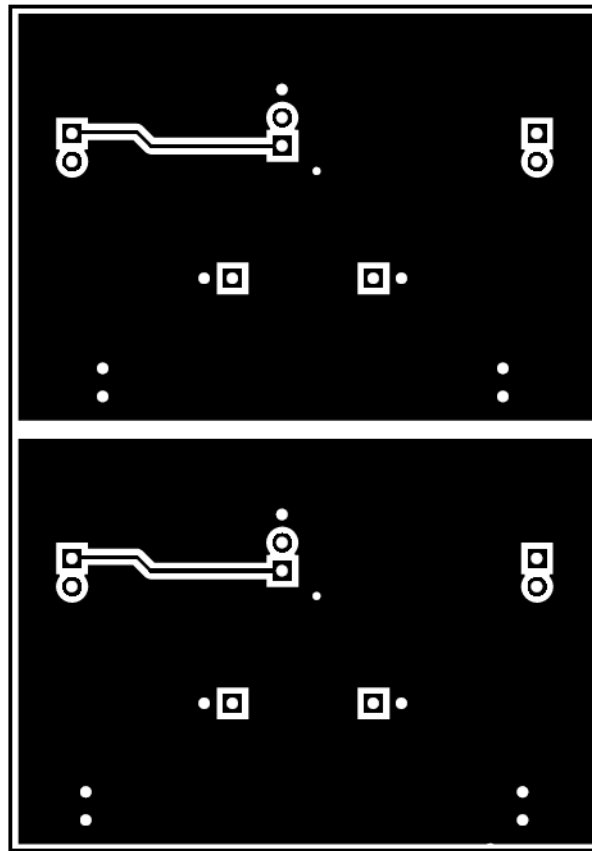


Figure 3. TPS22925EVM Top Layout



**Figure 4. TPS22925EVM 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/J5 – Input Connection

This is the connection for the leads from the input source. Connect the positive lead to J1/J5 and the negative lead to J3/J7 (GND).

### 4.1.2 J2/J6 – Output Connection

This is the connection for the output of the EVM. Connect the positive lead to J2/J6 terminals and the negative lead to J4/J8 terminals (GND).

### 4.1.3 JP1/JP4 – ON

This is the enable input for the device. A shorting jumper must be installed on JP1/JP4 in either the high or low position. The TPS22925 is active high. 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 TP2/TP5. Refer to the datasheet for proper ON and OFF voltage level settings. A switching signal may also be used and connected at this point.

#### 4.1.4 TP1/TP4 - VIN Sense, TP3/TP6 - VOUT Sense

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

#### 4.1.5 JP2/JP5- Input Capacitor

During normal operation a shorting jumper is placed on JP2/JP5 this connects C1/C3 capacitor from the input of the device to ground. Refer to the Applications Section of the Datasheet for additional information on selecting the input capacitor.

#### 4.1.6 JP3/JP6 - Output Capacitor

During normal operation a shorting jumper is placed on JP3/JP6 this connects C2/C4 capacitor 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 J3/J4/J7/J8 – GND

These are connections to GND.

## 5 Operation

Connect the positive input of the VIN power supply to VIN at J1/J5. Connect the negative lead of the power supply to GND at J3/J7. The input voltage range of the TPS22925EVM is 0.65 V to 3.6 V.

External output loads can be applied to the switch by using J2/J6 VOUT and J4/J8 GND. The TPS22925EVM is rated for a maximum continuous current of 3 A. Configure JP1/JP4 as required. JP1/JP4 must be installed for proper operation. When the ON pin is asserted high, the output of the TPS22925 will be enabled.

## 6 Test Configurations

### 6.1 On-Resistance ( $R_{ON}$ ) Test Setup

Figure 5 shows a typical setup for measuring on-resistance. The voltage drop across the switch is measured using the sense connections. This value is then divided by the current into the load, yielding the  $R_{ON}$  resistance.

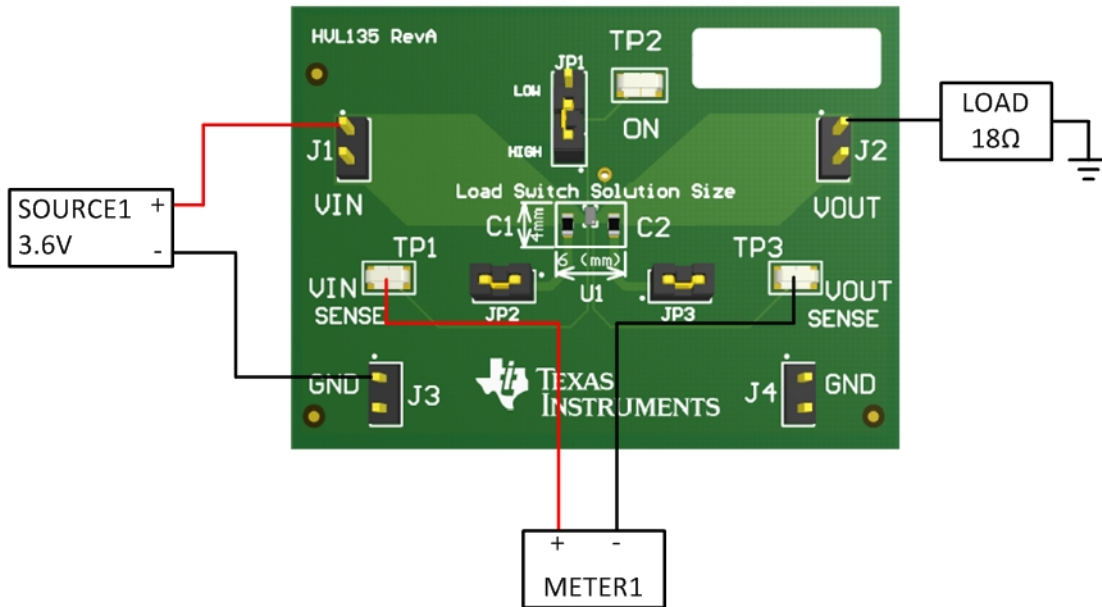


Figure 5.  $R_{ON}$  Setup

## 6.2 Slew Rate Test Setup

Figure 6 shows a test setup for measuring the slew rate of the load switch. 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 waveform at VOUT with a scope to measure the slew rate and rise time of the switch with a given input voltage.

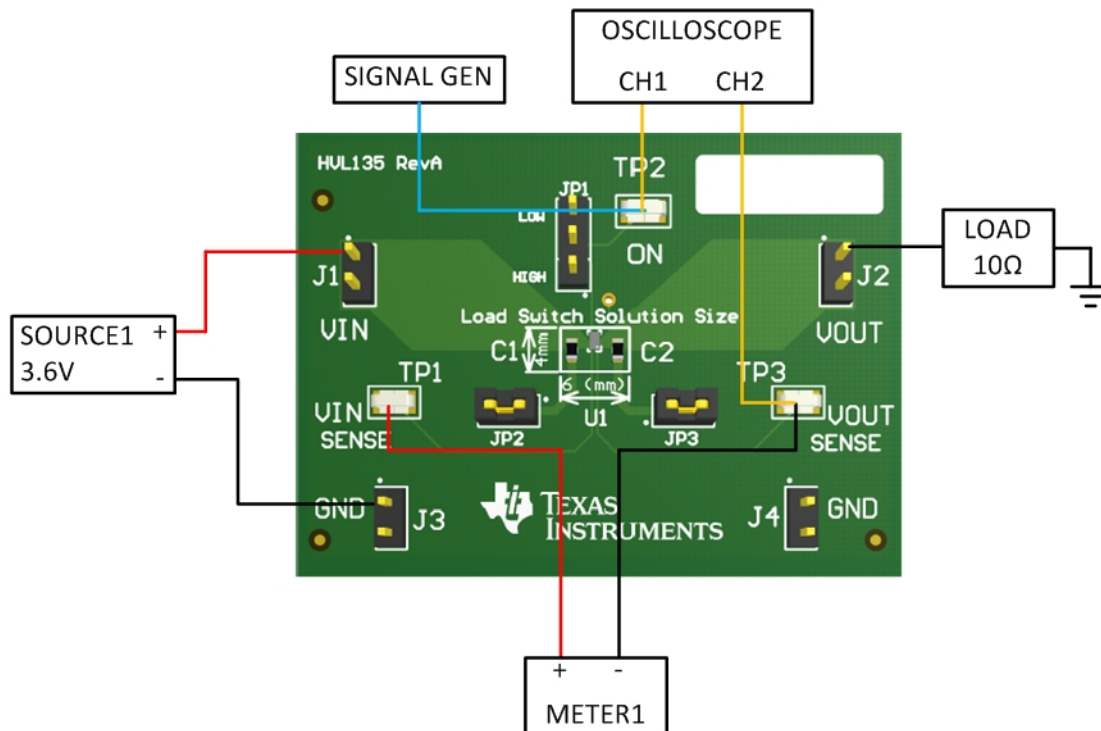


Figure 6. Slew Rate Setup



## 7 Bill of Materials (BOM)

**Table 2. Bill of Materials TPS22925EVM**

Qty	Designator	Value	Description	Package Reference	Manufacturer	Part Number
1	IPCB1		Printed Circuit Board		Any	HVL078
2	C1, C3	1uF	CAP, CERM, 1uF, 25V, +/-10%, X7R, 0603	0603	MuRata	GRM188R71E105KA12D
2	C2, C4	0.1uF	CAP, CERM, 0.1uF, 100V, +/-10%, X7R, 0603	0603	MuRata	GRM188R72A104KA35D
12	J1, J2, J3, J4, J5, J6, J7, J8, JP2, JP3, JP5, JP6	PEC02S AAN	Header, 100mil, 2x1, Gold, TH	0.100 inch x 2	Samtec	TSW-102-07-G-S
2	JP1, JP4		Header, 100mil, 3x1, Gold, TH	Header, 3 PIN, 100mil	Samtec	TSW-103-07-G-S
3	LBL1, LBL2, LBL3		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	Brady	THT-14-423-10
6	SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	3M, alternate: Samtec	969102-0000-DA, alternate: SNT-100-BK-G
6	TP1, TP2, TP3, TP4, TP5, TP6		Test Point, Miniature, SMT	Test Point, Miniature, SMT	Keystone	5019
1	U1		Single Channel Ultra-Low Resistnace Load Switch	YPH0006ACAC	Texas Instruments	TPS22925BYPHR
1	U1		Single Channel Ultra-Low Resistnace Load Switch	YPH0006ACAC	Texas Instruments	TPS22925BNYPHR
1	U1		Single Channel Ultra-Low Resistnace Load Switch	YPH0006ACAC	Texas Instruments	TPS22925CYPHR
1	U1		Single Channel Ultra-Low Resistnace Load Switch	YPH0006ACAC	Texas Instruments	TPS22925CNYPHR
0	FID1, FID2, FID3		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A

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## Revision History

Changes from Original (November 2015) to A Revision	Page
• Changed 10 m $\Omega$ to 9 m $\Omega$ in title of the document.....	1

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NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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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.

### 3.2 Canada

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

#### Concerning EVMs Including Radio Transmitters:

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#### Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

#### Concerning EVMs Including Detachable Antennas:

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#### Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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[http://www.tij.co.jp/lstds/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page)

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If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

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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
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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