TPS22959EVM-079 15A Load Switch IC

The TPS22959EVM-079 evaluation module (EVM) allows the user to connect power to and control the 8-pin SON package load switch. Parameters such as the On-resistance, output rise time and output discharge resistance can be easily evaluated. Table 1 lists a short description of the load switch performance specifications; refer to the datasheet SLVSCN2 for more details

Table 1. TPS22959 Slew Rate, Output Current Rating, Enable, and Output Discharge Options

EVM	Device	Slew Rate Typical V_{BIAS} = 5V	VIN (V)	Max. Continuous Current	Enable (ON Pin)	Quick Output Discharge
HVL079-003	TPS22959	2663 µs	5	15A	Active High	Yes

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1 Description

The TPS22959EVM is a two sided PCB containing the TPS22959 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 RON measurements.

1.1 Features

- VIN input voltage range: 0.8V to 5.5V.
- VBIAS voltage range: 2.5 to 5.5V
- EVM allows access to the VIN, VOUT and ON pin of the TPS22959 Load Switch Device.
- On board CIN and COUT capacitors.
- 15A max continuous current.

2 Electrical Performance

Refer to the datasheet SLVSCN2 for detailed electrical characteristics of the TPS22959.

3 Schematic

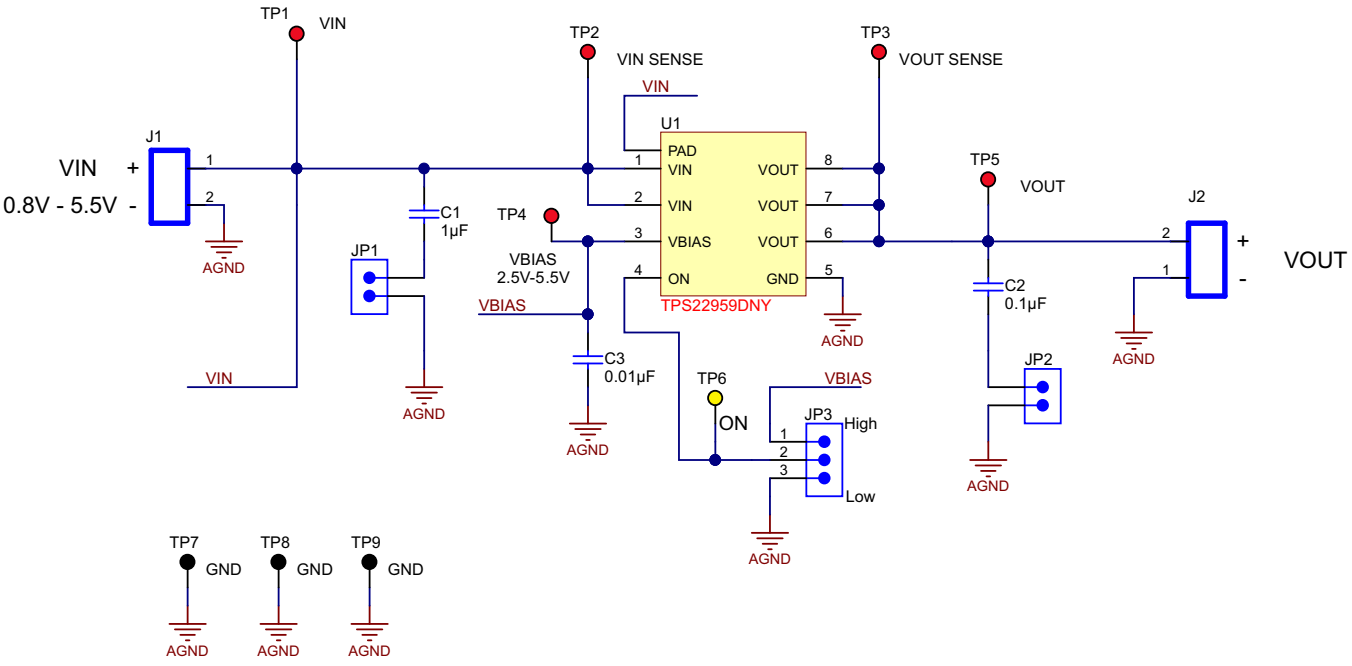


Figure 1. TPS22959EVM-079 Schematic

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4 Layout

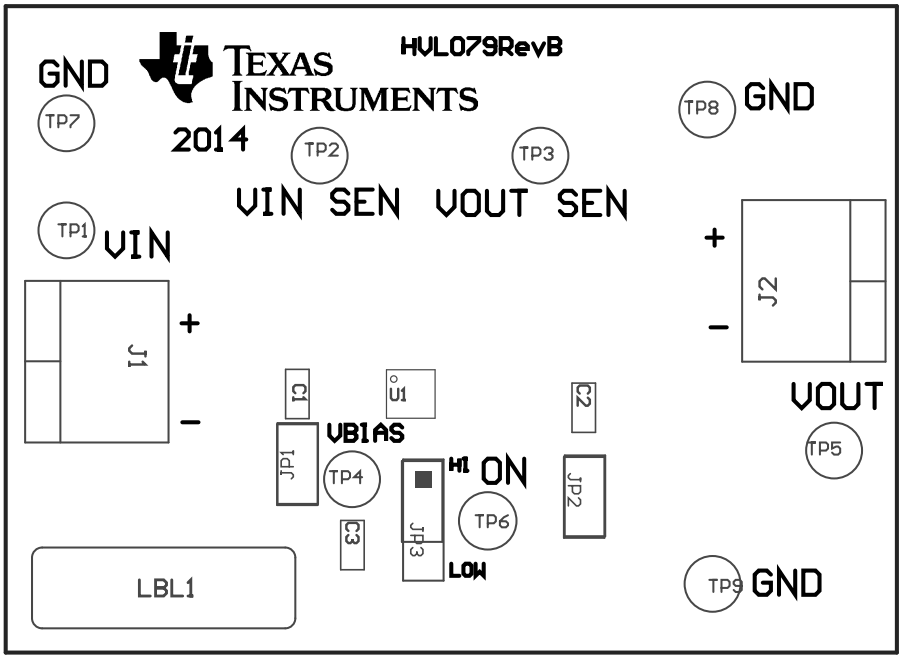


Figure 2. TPS22959EVM-079 Top Assembly

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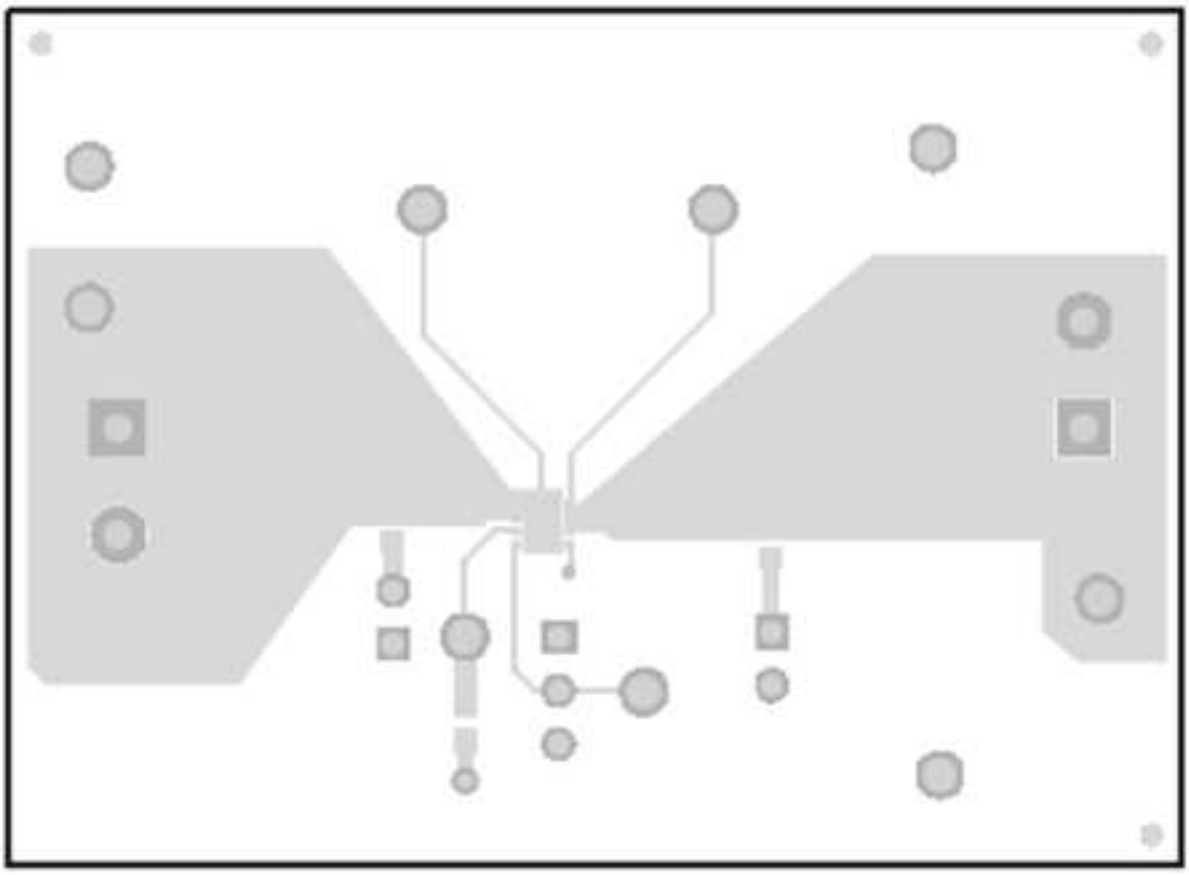


Figure 3. TPS22959EVM-079 Top Layout

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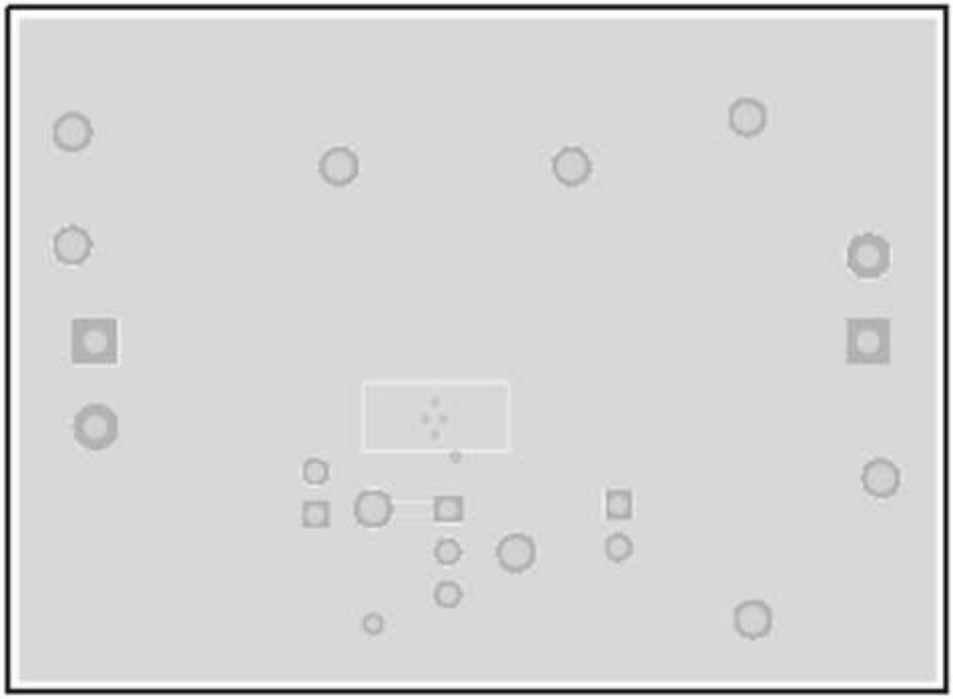


Figure 4. TPS22959EVM-079 Bottom Layout

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 J1-1 (+) terminal and the negative lead to J1-2 (–) terminal (GND). TP1 is also available for connecting to the input.

J1 Connector is rated for currents of 15A, use the J1 input connection point when operating the EVM in the High current mode (IIN > 3A).

4.1.2 J2 – Output Connection

This is the connection for the output of the EVM. Connect the positive lead to J2-2 (+) terminal and the negative lead to J2-1 (–) terminal (GND). TP5 is also available for connecting to the output.

J2 Connector is rated for currents of 15A, use the J2 input connection point when operating the EVM in the High current mode (IOUT > 3A).

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 TPS22959 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 TP6. Refer to the datasheet for proper ON and OFF voltage level settings. A switching signal may also be used and connected at this point.

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4.1.4 TP2 – VIN Sense, TP3 – 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 and then calculating the resistance.

4.1.5 TP4 - VBIAS

This connection to the device is used for applying VBIAS voltage, VBIAS voltage range is from 2.5V to 5.5V, VBIAS voltage must be applied for the device to operate.

4.1.6 JP1 Input Capacitor

During normal operation a shorting jumper is placed on JP1 this connects C1 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.

4.1.7 JP2 – Output Capacitor

During normal operation a shorting jumper is placed on JP2 this connects C2 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.

4.1.8 TP7/TP8/TP9 – GND

These are connections to GND.

5 Operation

Connect the positive input of the VIN power supply to VIN at J1-1 for currents greater than 3A, or connect the positive input of the VIN power supply to VIN at TP1 for currents less than 3A. Connect the negative lead of the power supply to GND at J1-2. The input voltage range of the TPS22959EVM-079 is 0.8V to 5.5V.

The VBIAS voltage range of the TPS22959EVM-079 is 2.5V to 5.5V. Connect the positive input of the VBIAS power supply to VBIAS at TP4. Connect the negative lead of the V_{BIAS} power supply to GND at TP7, TP8 or TP9.

External output loads can be applied to the switch by connecting between J2-2 VOUT and J2-1 GND for currents greater than 3A. For currents less than 3A, connect the output load between TP5 and GND (TP7, TP8 or TP9). The TPS22959EVM-079 is rated for a maximum continuous current of 15A. Configure JP3 as required. JP3 must be installed for proper operation. When the ON pin is asserted high, the output of the TPS22959 will be enabled.

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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 then divided by the current into the load yielding the R_{ON} resistance.

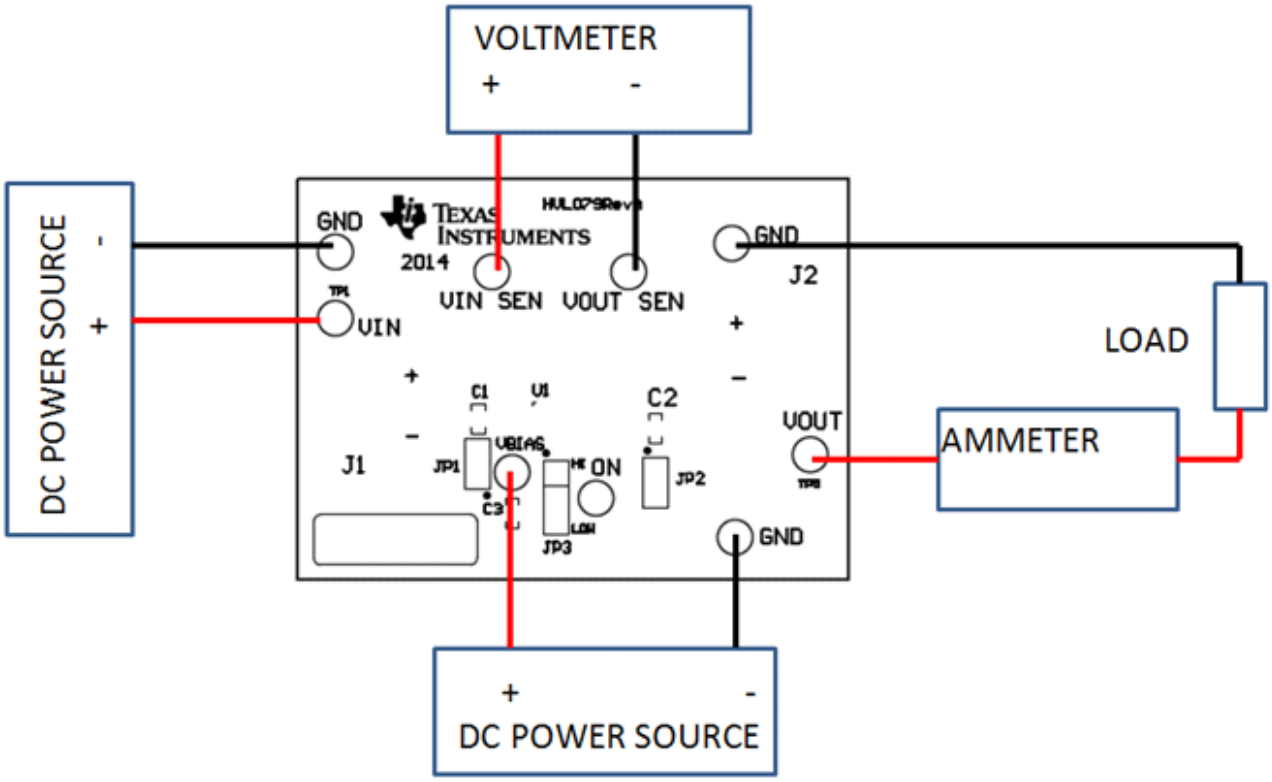


Figure 5. R_{ON} Setup

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6.2 Slew Rate Test Setup

Figure 6 shows a test setup for measuring the Slew Rate of the Load Switch. Controlling the ON pin of the switch with a signal source and then measuring the VOUT with a scope shows the switches ability to have a controlled VOUT ramp.

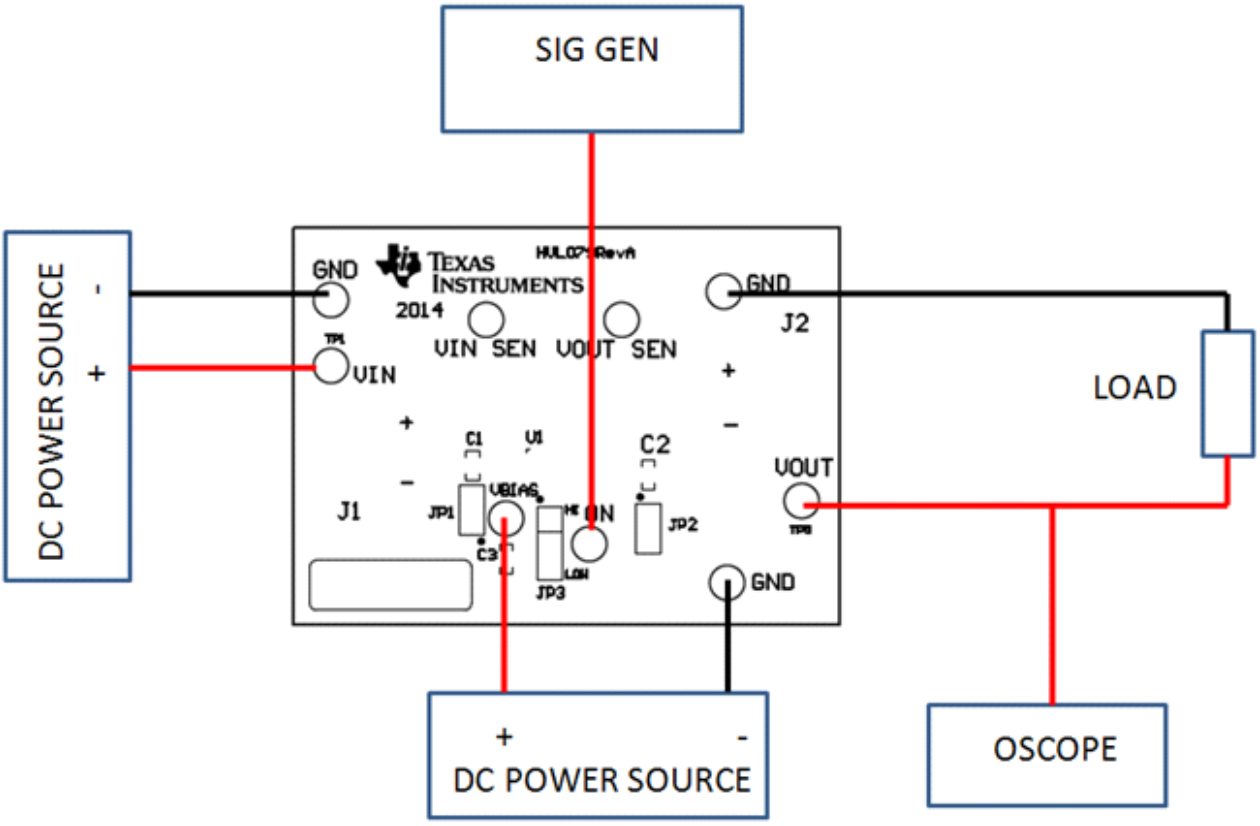


Figure 6. Slew Rate Setup

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6.3 VOUT Slew Rate Examples

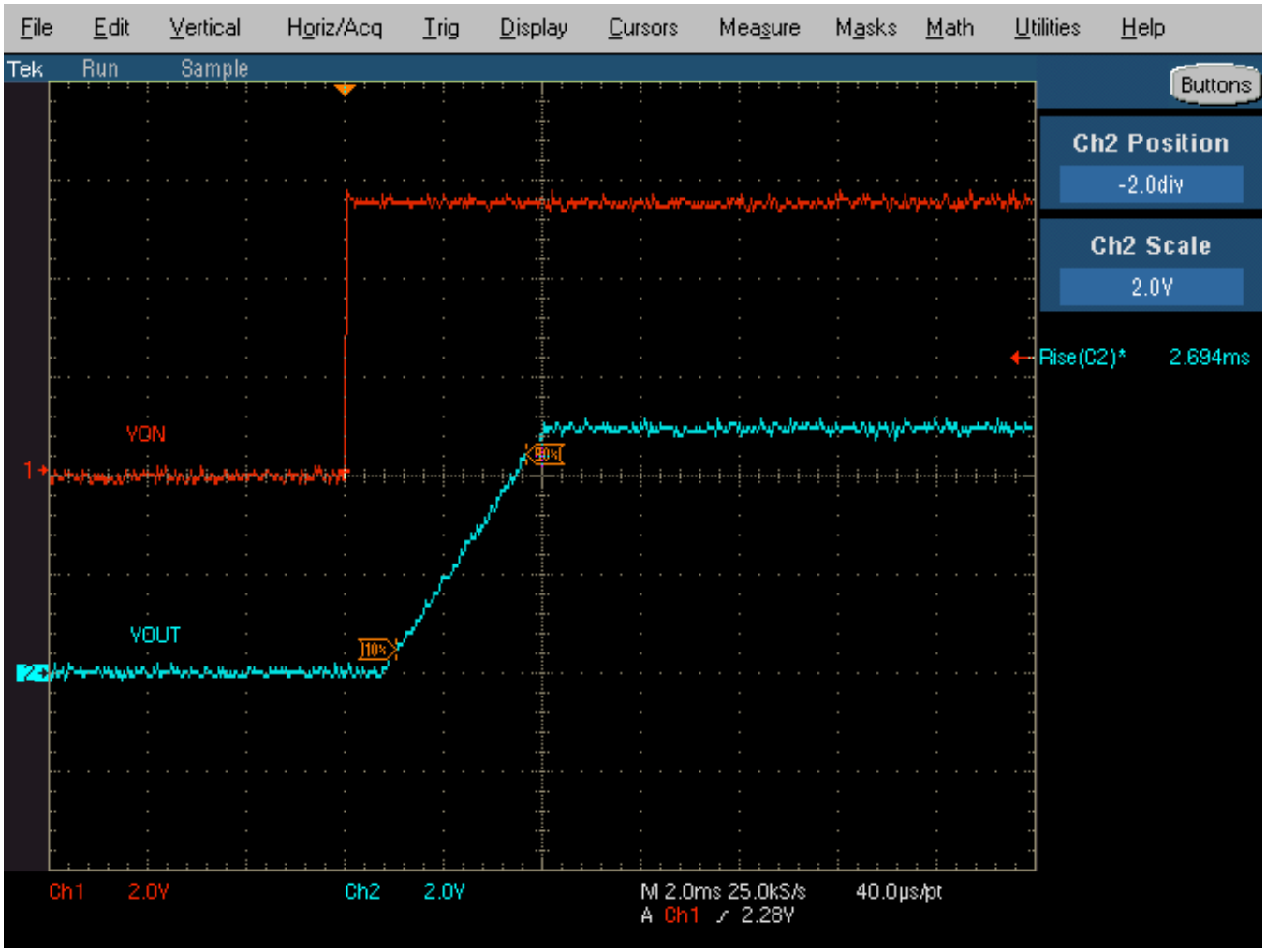


Figure 7. TPS22959 Vout t_R Example (V_{BIAS} = 5V, V_{IN} = 5V, R_L = 10Ω)

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7 Bill of Materials (BOM)

Table 2. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate	
							Part Number	Manufac.
!PCB	1		Printed Circuit Board		HVL079	Any	-	-
C1	1	1uF	CAP, CERM, 1uF, 16V, +/-10%, X5R, 0603	0603	C0603C105K4PACTU	Kemet		
C2	1	0.1uF	CAP, CERM, 0.1uF, 50V, +/-10%, X7R, 0603	0603	GCM188R71H104KA57B	MuRata		
C3	1	0.01uF	CAP, CERM, 0.01uF, 50V, +/-5%, X7R, 0603	0603	C0603C103J5RACTU	Kemet		
FID1, FID2, FID3	3		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A		
J1, J2	2	ED120/2DS	Terminal Block, 2-pin, 15-A, 5.1mm	0.40 x 0.35 inch	ED120/2DS	OST		
JP1, JP2	2		Header, 100mil, 2x1, Tin plated, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions		
JP3	1		Header, 100mil, 3x1, Tin plated, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions		
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	THT-14-423-10	Brady		
SH-JP1, SH-JP2, SH-JP3	3	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M	SNT-100-BK-G	Samtec
TP1, TP2, TP3, TP4, TP5	5	Red	Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone		
TP6	1	Yellow	Test Point, Compact, Yellow, TH	Yellow Compact Testpoint	5009	Keystone		
TP7, TP8, TP9	3	Black	Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone		
U1	1		IC,Ultra- Low On Resistance, 6A Single Chan-Load SW with Controlled Turn-On	DNY0008A	TPS22959DNY	Texas Instruments		None
Notes: Unless otherwise noted in the Alternate PartNumber and/or Alternate Manufacturer columns, all parts may be substituted with equivalents.								

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