TPS3780EVM-154 Evaluation Module

This user's guide describes the operational use of the TPS3780EVM-154 evaluation module (EVM) as a reference design for engineering demonstration and evaluation of the TPS3780EVM, two-channel voltage detectors with low-power and high-accuracy comparators. Included in this user's guide are setup instructions, a schematic diagram, printed circuit board (PCB) layout drawings, and a bill of materials for the evaluation module. This user's guide also discusses how to modify the TPS3780EVM-154 board to evaluate the TPS3779.

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1 Introduction

The Texas Instruments TPS3780EVM-154 helps design engineers evaluate the operation and performance of two TPS3780 ICs with different hysteresis options (TPS3780ADRYR/T and TPS3780BDRYR/T) for possible use in their own circuit application. This particular EVM configuration contains two dual-voltage detectors with low quiescent current and high threshold accuracy in a small µSON (1.45 mm × 1 mm) package. This document describes the configuration and set up of the TPS3780EVM-154 EVM board.

2 Setup

This section describes the jumpers and connectors on the EVM as well as how to properly connect, setup, and use the TPS3780EVM-154.

2.1 Input and Output Connector and Jumper Descriptions

2.1.1 TP1 to TP2: VDD

This connector is the input power-supply connection.

2.1.2 TP3: GND

Return connector for the input power supply. This connector is also connected to TP8 and TP13 in the EVM.

2.1.3 TP4 to TP5: SENSE1

This connector is connected to the voltage that is monitored.

2.1.4 TP8: GND

Return connector for the SENSE1 and SENSE2 voltage signal. This connector is also connected to TP3 and TP13 in the EVM.

2.1.5 TP6 to TP7: SENSE2

This connector is connected to a second voltage that will be monitored.

2.1.6 TP11 to TP12: OUT1

This connector is the open-drain output of comparator 1 that pulls up to VPU through a 50-kΩ resistor in the EVM. Connect a voltage meter or oscilloscope probe from TP11 to GND (TP13).

2.1.7 TP13: GND

Return connector for the OUT1 and OUT2 outputs. This connector is also connected to TP3 and TP8 in the EVM.

2.1.8 TP9 to TP10: OUT2

This connector is the open-drain output of comparator 2 that pulls up to VPU through a 50-kΩ resistor in the EVM. Connect a voltage meter or oscilloscope probe from TP9 to GND (TP13).

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2.1.9 J1: VPU

The TPS3780EVM-154 is designed for OUT1 and OUT2 to pull up to either VDD or an external voltage source. Table 1 shows the connections for choosing between the two. If the shorting jumper is removed, an external voltage can be placed on pin 2.

Table 1. Connector JP1 Selections

Short Pins	Pullup Voltage (VPU)
1 and 2	VDD
OPEN	External voltage on pin 2

2.2 Equipment Setup

This setup is described for evaluating U1 (top IC). This setup can also be used for evaluating U2 (bottom IC).

- Set the first power-supply voltage between 1.5 V to 6.5 V. Turn the power supply off. Connect the positive voltage lead from the power supply to TP1 (VDD). Connect the ground lead from the power supply to TP3 (GND).
- Set the second power-supply voltage to 0 V. Turn the power supply off. Connect the positive voltage lead from the power supply to TP4 (SENSE1). Connect the ground lead from the power supply to TP8 (GND).
- Set the third power-supply voltage to 0 V. Turn the power supply off. Connect the positive voltage lead from the power supply to TP6 (SENSE2). Connect the ground lead from the power supply to TP8 (GND).
- Place the shorting jumper on JP1 (VPU VDD).
- Turn on all power supplies and vary SENSE1 and SENSE2 as needed to evaluate the TPS3780.

3 Operation

This section provides information about the operation of the TPS3780EVM-154.

3.1 General Operation

The TPS3780EVM-154 is a dual-voltage detector. The device monitors a selected voltage signal (SENSE1 or SENSE2). OUT1 triggers HIGH (VPU) when SENSE1 rises above the VIT+ threshold and triggers LOW (GND) when SENSE1 falls beneath VIT–. OUT2 operates the same way. Table 2 lists the design requirements for general operation.

Table 2. Design Parameters

Parameter	Design Requirement	Design Result
VDD	5 V	5 V
Hysteresis	10%	10%
Monitored voltage 1	3.3 V nominal, $V_{MON(PG)}$ = 2.9 V, $V_{MON(UV)}$ = 2.6 V	$V_{MON(PG)}$ = 2.908 V, $V_{MON(UV)}$ = 2.618 V
Monitored voltage 2	3 V nominal, $V_{MON(PG)}$ = 2.6 V, $V_{MON(UV)}$ = 2.4 V	$V_{MON(PG)}$ = 2.606 V, $V_{MON(UV)}$ = 2.371 V
Output logic voltage	3.3-V CMOS	3.3-V CMOS

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4 Board Layout

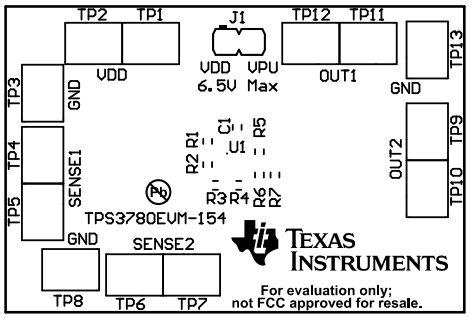


Figure 1. Top Overlay

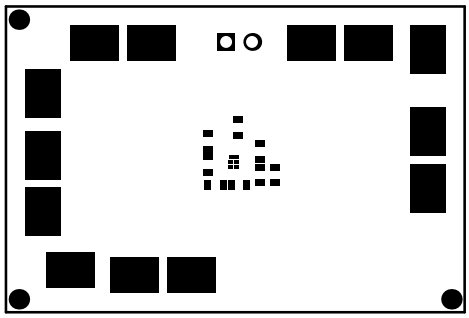


Figure 2. Top Solder Mask

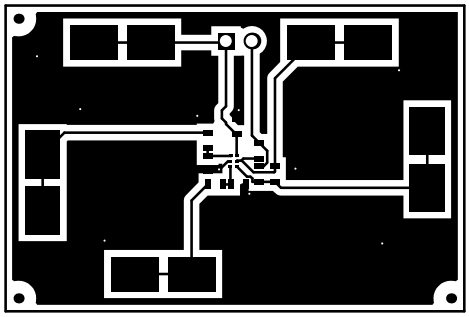


Figure 3. Top Layer

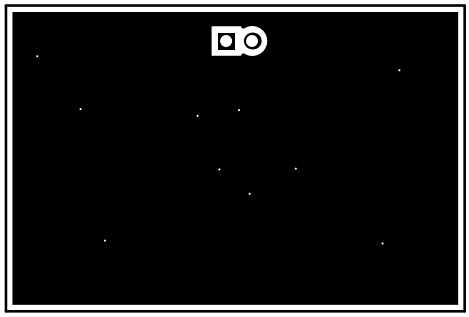


Figure 4. Bottom Layer

5 Schematic

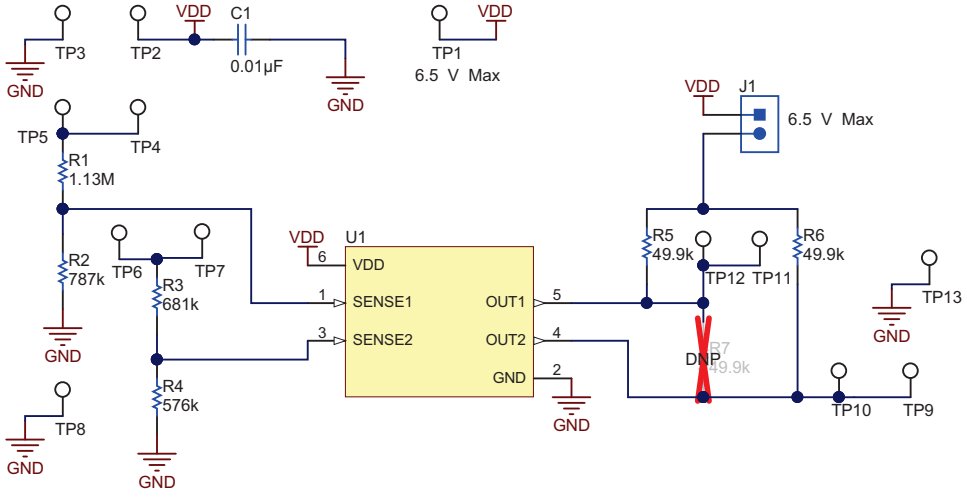


Figure 5. TPS3780EVM-154 Schematic

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6 Bill of Materials

Table 3. TPS3780EVM-154 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	0.01uF	CAP, CERM, 0.01 µF, 16 V, +/- 10%, X7R, 0603	0603	GRM188R71C103KA01D	MuRata
1	J1		Header, 2.54 mm, 2x1, Gold, TH	Header, 2.54mm, 2x1, TH	61300211121	Wurth Elektronik eiSos
1	R1	1.13Meg	RES, 1.13 M, 1%, 0.1 W, 0603	0603	CRCW06031M13FKEA	Vishay-Dale
1	R2	787k	RES, 787 k, 1%, 0.1 W, 0603	0603	CRCW0603787KFKEA	Vishay-Dale
1	R3	681k	RES, 681 k, 1%, 0.1 W, 0603	0603	CRCW0603681KFKEA	Vishay-Dale
1	R4	576k	RES, 576 k, 1%, 0.1 W, 0603	0603	CRCW0603576KFKEA	Vishay-Dale
2	R5, R6	49.9k	RES, 49.9 k, 1%, 0.1 W, 0603	0603	CRCW060349K9FKEA	Vishay-Dale
1	SH-J1	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M
13	TP1-TP13	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone
1	U1		Low-Power, Dual-Voltage Detector, DRY006A	DRY0006A	TPS3780ADRY	Texas Instruments
0	R7	49.9k	RES, 49.9 k, 1%, 0.1 W, 0603	0603	CRCW060349K9FKEA	Vishay-Dale

7 Evaluating the TPS3779 Using the TPS3780EVM-154 Board

The TPS3779 and TPS3780 are a family of two-channel voltage detectors with low-power and high-accuracy comparators. The TPS3779 and TPS3780 perform the same functions; however, they use different output stages. The TPS3780 uses an open-drain output while the TPS3779 uses a push-pull output.

7.1 Modifying the TPS3780EVM-154 Board

The TPS3779 uses a push-pull output stage; therefore, pullup resistors are not needed. The following modifications to the TPS3780EVM-154 board can be made to evaluate the TPS3779:

- Remove resistors R5-R6 or
- Remove J1

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Revision History

Changes from Original (October 2012) to A Revision **Page**

- Updated document to reflect the Rev B board 2
- Changed titles of the *TP1 to TP2: VDD*, *TP3: GND*, *TP4 to TP5: SENSE1*, *TP8: GND*, *TP6 to TP7: SENSE2*, *TP11 to TP12: OUT1*, *TP13: GND*, and *TP9 to TP10: OUT2* sections 2
- Changed jumper connections to test point connections in *TP3: GND*, *TP8: GND*, *TP11 to TP12: OUT1*, *TP13: GND*, and *TP9 to TP10: OUT2* sections 2
- Changed *J1: VPU* section: changed title and changed VCC to VDD in description 3
- Changed VCC to VDD in Table 1 3
- Deleted sections 2.1.10 through 2.1.18 3
- Changed *Equipment Setup* section: changed jumper connections to test point connections and changed VCC to VDD .. 3
- Changed *General Operation* section 3
- Changed *Board Layout* section 4
- Changed Figure 5 4
- Changed Table 3 5
- Changed modification steps in *Modifying the TPS3780EVM-154 Board* section 5

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

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