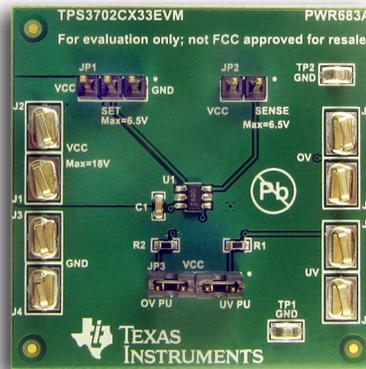


TPS3702CX33EVM-683 High accuracy window voltage detector evaluation module for OV/UV monitoring



This user's guide describes the operational use of the [TPS3702CX33EVM-683 evaluation module](#) (EVM) as a reference design for engineering demonstration and evaluation of the TPS3702CX33, an ultralow-power, wide supply voltage, window voltage detector for over and undervoltage monitoring. 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 EVM.

Throughout this document, the terms EVM, demonstration kit, evaluation board, and evaluation module are synonyms with the TPS3702CX33EVM-683 evaluation module.

Contents

1	Introduction	2
2	Hardware.....	2
	2.1 Input and Output Connectors	2
	2.2 Components	3
3	Setup and Test	4
4	Operation	4
5	PCB Layout	5
6	Schematic.....	6
7	Bill of Materials	6

List of Figures

1	Top Layer Routing	5
2	Bottom Layer Routing	5
3	TPS3702CX33EVM-683 Schematic.....	6

List of Tables

1	TPS3702CX33EVM-683 Bill of Materials	6
---	--	---

Trademarks

All trademarks are the property of their respective owners.

1 Introduction

The Texas Instruments' TPS3702CX33EVM-683 EVM helps design engineers to evaluate the operation and performance of the [TPS3702 family of overvoltage and undervoltage monitors](#) for possible use in their own circuit applications. This particular EVM configuration contains the TPS3702CX33 window voltage detector for overvoltage and undervoltage monitoring with open-drain output, in a 6-pin, DDC (SOT) package. The TPS3702 is a high-accuracy window voltage detector with fixed-voltage threshold options and a wide range of operational supply voltages. The nominal voltage rail that the device monitors is indicated by the last two digits of the part number. In this case, 33 indicates the fixed threshold version intended to monitor a nominal rail of 3.3 V. This document describes the configuration and setup of the TPS3702CX33EVM-683.

2 Hardware

This section describes the connectors on the EVM, as well as how to properly connect, set up, and use the TPS3702CX33EVM-683.

2.1 Input and Output Connectors

2.1.1 J1 and J2: VCC

The power-supply connectors. Two terminals are provided for multiple connections.

NOTE: The [TPS3702 data sheet](#) uses *VDD* to denote the power supply. In this case, VCC and VDD are functionally equivalent.

2.1.2 J3 and J4: GND

Return connectors for the input power supply. Two terminals are provided for multiple connections.

2.1.3 J5 and J6: OV

These terminals connect to the overvoltage output. Connect this output to a multimeter, oscilloscope, or external circuit to verify that OV goes low when SENSE exceeds the overvoltage threshold. Two terminals are provided for multiple connections.

2.1.4 J7 and J8: UV

These terminals connect to the undervoltage output. Connect this output to a multimeter, oscilloscope, or external circuit to verify that UV goes low when SENSE drops below the undervoltage threshold. Two terminals are provided for multiple connections.

2.1.5 JP1: SET

This jumper is used to connect the SET pin to VCC or GND. To connect the SET pin to a voltage other than VCC or GND, connect an external source to the center pin. The SET pin has a maximum operational rating of 6.5 V, but VCC can tolerate 18 V; therefore, a resistor divider is used to help safeguard against electrically overstressing this pin when shorting SET to VCC using the jumper. See [Section 2.2.4](#) for more information on the resistor divider.

NOTE: Force the SET pin high or low. Floating the SET pin may require the device to be reset.

2.1.6 JP2: SENSE

This jumper is used to connect the SENSE pin to VCC if the device monitors the supply voltage. To connect the SENSE pin to a voltage other than VCC, connect an external source to the right-side pin. The SENSE pin has a maximum operational rating of 6.5 V, but VCC can tolerate 18 V. Therefore, be careful not to short SENSE to VCC using this jumper if the voltage on VCC is greater than 6.5 V because shorting SENSE to VCC under this condition may cause electrical overstress and damage the device.

2.1.7 JP3: OV PU and UV PU

The OV PU and UV PU jumpers connect to the pull up voltage, and set the logic level for the overvoltage and undervoltage signals. Use the installed jumpers to connect OV PU and UV PU to VCC, or use the outermost terminals (labeled OV PU and UV PU) to connect to an external source (or sources)

2.1.8 TP1 and TP2: GND

These test points are connected to the ground plane, and allow for easier ground connections on the right-hand side of the board for measuring equipment, such as scope probes.

2.2 Components

2.2.1 C1

This 10-nF input capacitor is connected to VCC and GND. Although not required for proper device operation, this capacitor helps reduce the impedance and noise of the input supply line.

2.2.2 R1 and R2

These 10-k Ω resistors are used to connect the OV and UV pins to the desired pull-up voltage. R1 is connected to UV and R2 is connected to OV.

2.2.3 R3

This 0- Ω resistor connects the OV and UV outputs together to create a wired-OR solution that is low if either output is low. This EVM does not have this component installed; add this component, if required.

2.2.4 R4 and R5

The R4 (3.3-M Ω) and R5 (1.8-M Ω) resistors are used to safeguard the SET pin when JP1 is set to VCC. These resistors form a resistor divider connected between VCC and GND.

3 Setup and Test

1. Set the input power supply voltage to 0 V.
2. Connect the ground lead from the power supply to J3 (GND).
3. Connect the positive voltage lead from the power supply to J1 (VCC).
4. Short SENSE to VCC using a jumper, or connect it to a separate power supply.
5. Short SET to VCC using a jumper, or connect it to a separate power supply.
6. Short OV PU and UV PU to VCC using a jumper, or connect it to a separate power supply.
7. Connect a voltmeter or scope across J5 and J7 (OV and UV) and J4 (GND).
8. Vary the input power-supply voltage as necessary for test purposes.
9. Vary the monitored voltage as necessary for test purposes.
10. Vary the power supplies connected to OV PU and UV PU as necessary for test purposes.

4 Operation

The TPS3702CX33EVM-683 is a fixed-threshold, single-rail monitor, and triggers a reset when the monitored supply rail connected to SENSE exits the accuracy band. Pull-up resistors are used to generate the overvoltage and undervoltage signals.

5 PCB Layout

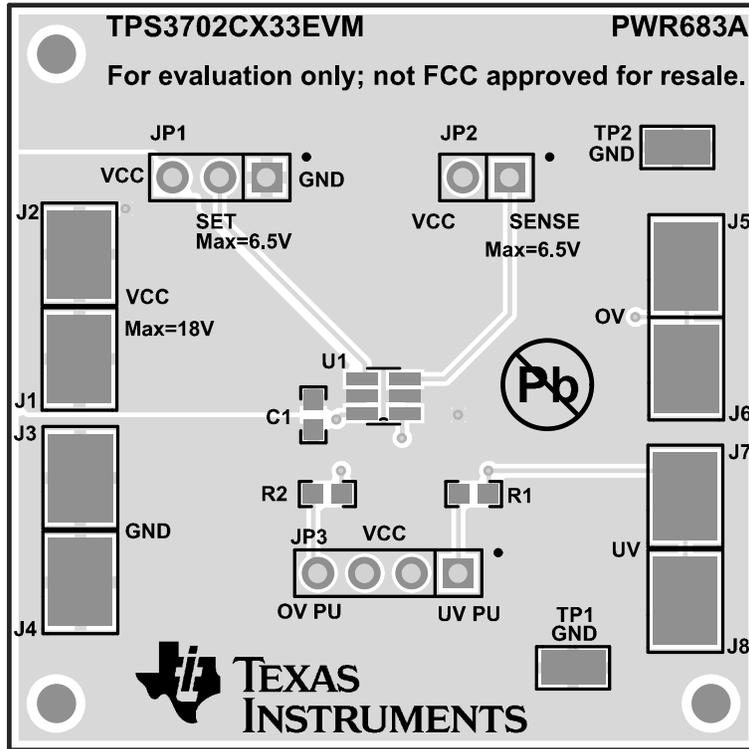


Figure 1. Top Layer Routing

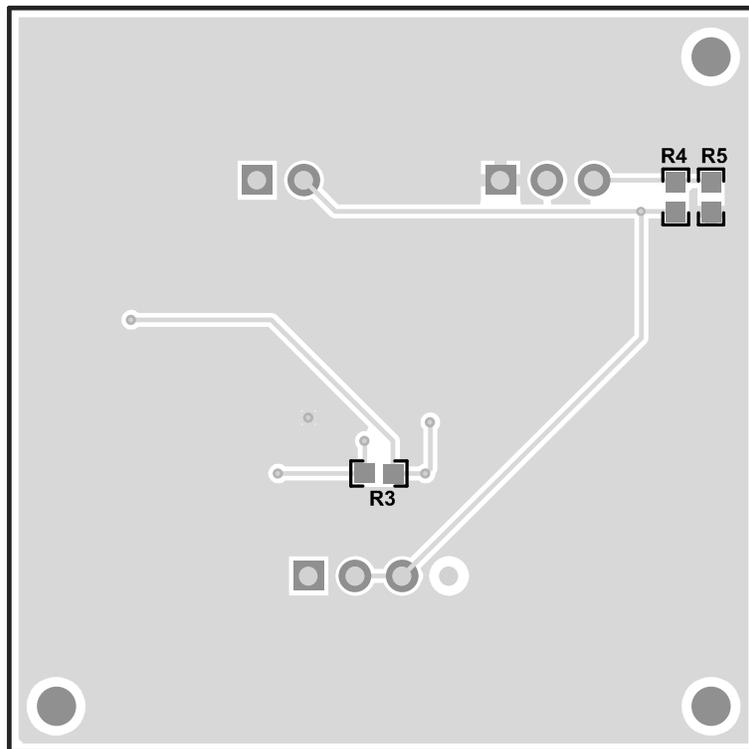


Figure 2. Bottom Layer Routing

6 Schematic

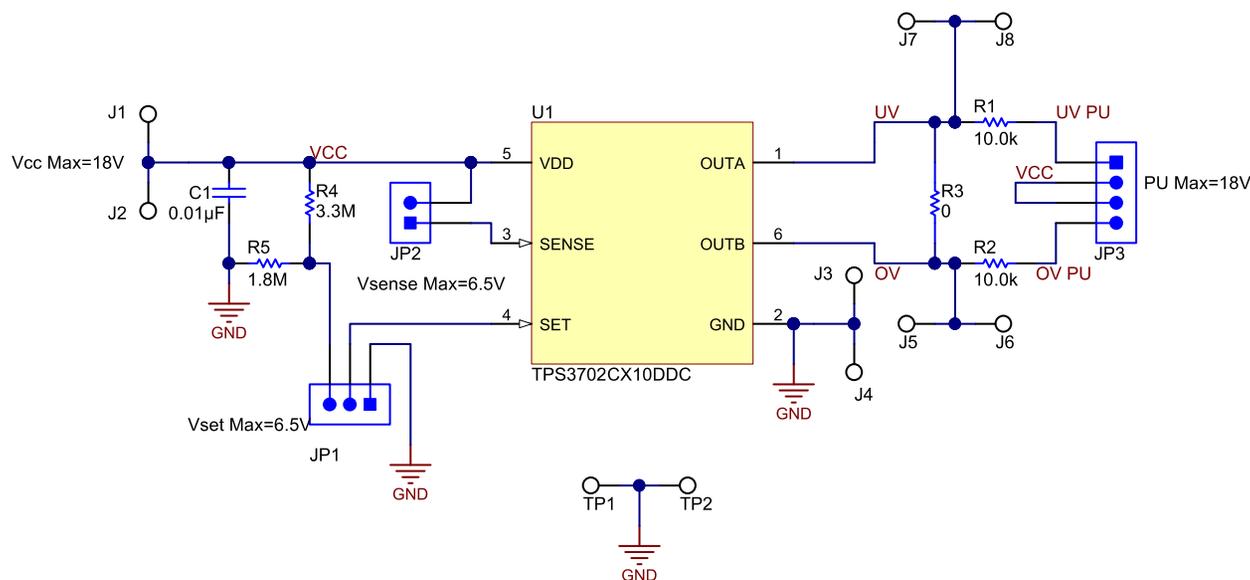


Figure 3. TPS3702CX33EVM-683 Schematic

7 Bill of Materials

Table 1. TPS3702CX33EVM-683 Bill of Materials⁽¹⁾⁽²⁾⁽³⁾

Designator	Qty	Value	Description	Size (Package Reference)	Part Number	Manufacturer
C1	1	0.01 µF	Capacitor, Ceramic, 0.01 µF, 25 V, ±10%, X7R, 0603	603	GRM188R71E103KA01D	MuRata
J1, J2, J3, J4, J5, J6, J7, J8	8	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone
JP1	1	—	Header, TH, 100-mil, 3x1, Gold plated, 230 mil above insulator	3x1 Header	TSW-103-07-G-S	Samtec
JP2	1	—	Header, TH, 100-mil, 2x1, Gold plated, 230 mil above insulator	2x1 Header	TSW-102-07-G-S	Samtec
JP3	1	—	Header, TH, 100-mil, 4x1, Gold plated, 230 mil above insulator	4x1 Header	TSW-104-07-G-S	Samtec

⁽¹⁾ These assemblies are electrostatic-discharge (ESD) sensitive; observe ESD precautions.

⁽²⁾ These assemblies must be clean and free from flux and all contaminants. Do not use no-clean flux.

⁽³⁾ These assemblies must comply with workmanship standards IPC-A-610 Class 2.

Table 1. TPS3702CX33EVM-683 Bill of Materials⁽¹⁾⁽²⁾⁽³⁾ (continued)

Designator	Qty	Value	Description	Size (Package Reference)	Part Number	Manufacturer
R1, R2	2	10.0 kΩ	Resistor, 10.0 kΩ, 1%, 0.1 W, 0603	603	RC0603FR-0710KL	Yageo America
R4	1	3.3 MΩ	Resistor, 3.3 MΩ, 5%, 0.1 W, 0603	603	CRCW06033M30JNEA	Vishay-Dale
R5	1	1.8 MΩ	Resistor, 1.8 MΩ, 5%, 0.1 W, 0603	603	CRCW06031M80JNEA	Vishay-Dale
SH-JP1, SH-JP2, SH-JP31, SH-JP32	4	1 x 2	Shunt, 100-mil, Gold-plated, Black	Shunt	969102-0000-DA	3M
TP1, TP2	2	SMT	Test Point, Miniature, SMT	Testpoint_Keystone_Miniature	5015	Keystone
U1 ⁽⁴⁾	1	—	IC, High-Accuracy Window Voltage Detector, DDC0006A	DDC0006A	TPS3702CX33DDC	Texas Instruments
R3	0	0	Resistor, 0 Ω, 5%, 0.1 W, 0603	603	CRCW06030000Z0EA	Vishay-Dale

⁽⁴⁾ Cannot be substituted. All other components can be substituted with equivalent manufacturer components.

Revision History

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

Changes from Original (January 2015) to A Revision	Page
• Changed "supervisor" to "detector", updated title	1

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2022, Texas Instruments Incorporated