

TPS71533EVM

LDO Regulator Evaluation Module

User's Guide

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265

EVM IMPORTANT NOTICE

Texas Instruments (TI) provides the enclosed product(s) under the following conditions:

This evaluation kit being sold by TI is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not considered by TI to be fit for commercial use. As such, the goods being provided may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety measures typically found in the end product incorporating the goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may not meet the technical requirements of the directive.

Should this evaluation kit not meet the specifications indicated in the EVM User's Guide, the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods. Please be aware that the products received may not be regulatory compliant or agency certified (FCC, UL, CE, etc.). Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

TI currently deals with a variety of customers for products, and therefore our arrangement with the user **is not exclusive**.

TI assumes **no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein**.

Please read the EVM User's Guide and, specifically, the EVM Warnings and Restrictions notice in the EVM User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact the TI application engineer.

Persons handling the product must have electronics training and observe good laboratory practice standards.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used.

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265

DYNAMIC WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2.7–24 V and the output current range of 0 mA to 50 mA.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 85°C. The EVM is designed to operate properly with certain components above 85°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265

Preface

About This Manual

This user's guide describes the TPS71533EVM LDO regulator evaluation module. Each EVM PCB contains a SLVP199 test board with a TPS71533DCK low dropout linear regulator as well as supporting passive components. The EVM provides a convenient method of evaluating the performance of the TPS715xx linear regulator family or other SC-70/SOT-323 packaged devices with similar pin-outs.

How to Use This Manual

- Chapter 1—Introduction
- Chapter 2—EVM Test Setup
- Chapter 3—Test Results

Related Documentation From Texas Instruments

- TPS71533 data sheet (literature number SLVS338)



Contents

1	Introduction	1-1
1.1	TPS715xx Family of LDO Regulators	1-2
1.2	EVM Design Strategy	1-2
1.3	Schematic	1-2
1.4	Bill of Materials	1-3
1.5	Board Layout	1-3
2	EVM Test Setup	2-1
3	Test Results	3-1

Figures

1-1	Schematic Diagram	1-2
1-2	Top Layer	1-3
1-3	Bottom Layer	1-4
1-4	Assembly Drawing (top)	1-4
2-1	Recommended TPS71533EVM Test Setup	2-1
3-1	Input Voltage Ramp vs Output Voltage	3-1

Tables

1-1	TPS71533EVM Bill of Materials	1-3
-----	-------------------------------------	-----



Introduction

This user's guide describes the TPS71533EVM LDO regulator evaluation module. Each EVM contains a TPS71533 low dropout linear regulator as well as supporting passive components.

Topic	Page
1.1 TPS715xx Family of LDO Regulators	1-2
1.2 EVM Design Strategy	1-2
1.3 Schematic	1-2
1.4 Bill of Materials	1-3
1.5 Board Layout	1-3

1.1 TPS715xx Family of LDO Regulators

The TPS715xx family of LDO regulators is comprised of small SOT–223/PICO packaged regulators capable of delivering 50 mA of output current. Features of the part include:

- ❑ 50-mA Low-Dropout Regulator
- ❑ 24-V Maximum Input Voltage
- ❑ Low 4.25- μ A Quiescent Current at 50 mA
- ❑ 5-Pin PICO/SC70 (DCK) Package
- ❑ Stable With Any Ceramic Capacitor ($>0.47 \mu\text{F}$)
- ❑ Dropout Voltage Typically 100 mV at 50 mA
- ❑ Over Current Limitation
- ❑ -40°C to 125°C Operating Junction Temperature Range

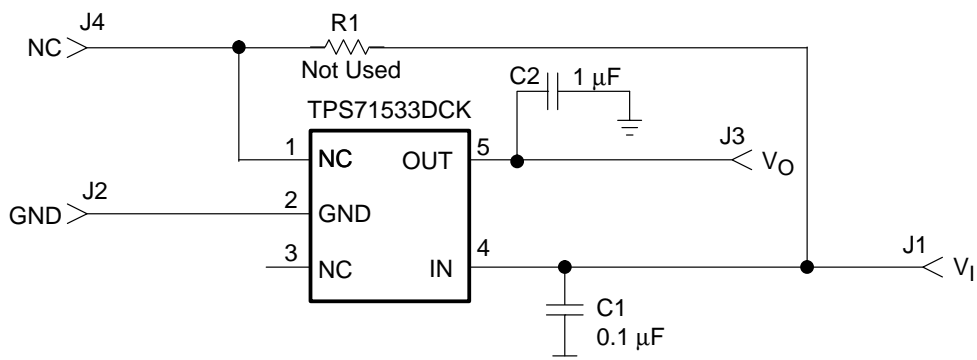
1.2 EVM Design Strategy

The purpose of this EVM is to facilitate evaluation of the TPS715xx family of LDO regulators. Each EVM PCB contains a TPS71533 low dropout linear regulator as well as supporting passive components. Also, the board's small size and side clips facilitate attaching it to other PCBs as a power module.

1.3 Schematic

Figure 1-1 shows the SLVP199 PCB schematic diagram, which is used as the PCB for the TPS71533EVM.

Figure 1–1. Schematic Diagram



1.4 Bill of Materials

Table 1–1 lists materials required for the TPS71533EVM.

Table 1–1. TPS71533EVM Bill of Materials

Qty	Ref Des	Description	Size	MFR	Part Number
1	C1	Capacitor, ceramic, 0.1 μ F, 25 V, X7R, 10%	603	Murata	GRM188R71E104KA01
1	C2	Capacitor, ceramic, 1- μ F, 6.3 V, X5R, 10%	603	Murata	GRM188R60J105KA01
4	J1–J4	Clip, surface-mount, 0.040 board, 0.090 standoff	0.100"	NAS Interplex	CA26DA-D36W-0FC
0	R1	Not used	603		
1	U1	IC, regulator, LDO, micropower	SOP-5 (DCK)	TI	TPS71533DCK

1.5 Board Layout

Figures 1–2 through 1-4 show the board layout for the SLVP199 PCB used for the TPS71533EVM.

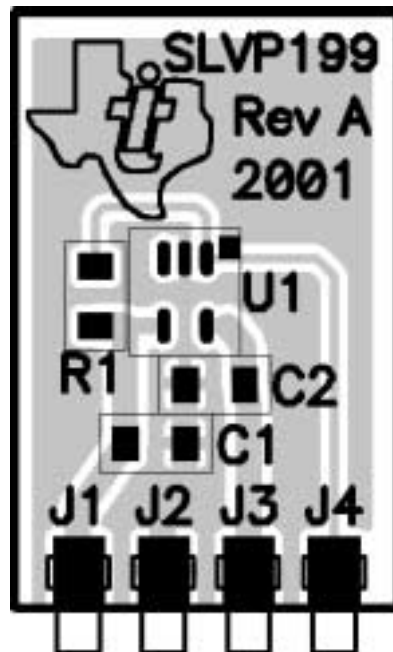
Figure 1–2. Top Layer



Figure 1–3. Bottom Layer



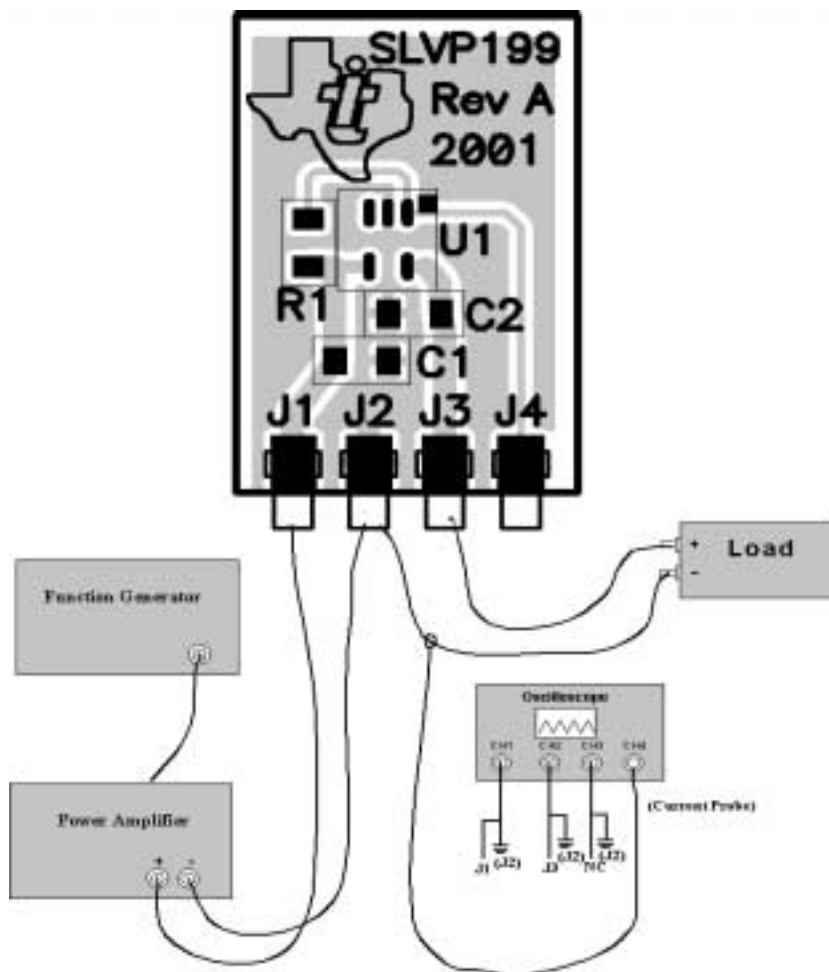
Figure 1–4. Assembly Drawing (top)



EVM Test Setup

This chapter provides recommended test equipment and procedures for performing evaluations using the TPS71533EVM. Figure 2–1 shows the test setup.

Figure 2–1. Recommended TPS71533EVM Test Setup



The settings for the test equipment shown in Figure 2–1 are described below:

- Function generator is set to a triangle wave that ramps from 0 V to 8 V, and a period of 10 ms.
- Power amplifier is set to a gain of 3 dB and a minimum slew rate of 5000 V/ μ s.
- Power supply capable of \pm 30-V swing and a 0.5-A current limit to power the power amplifier.
- A four-channel oscilloscope with channel one's voltage probe connected to J1 (IN) and channel two's voltage probe connected to J3 (OUT). Using a free channel, connect a current probe around the output load resistance. Set the scope to trigger off of channel one so that one full triangle is displayed on the screen.
- A 66- Ω resistance for 50-mA of output current (or 50-mA electronic load) connected between J3 (OUT) and J2 (GND).

After powering on the amplifier, the input voltage, output voltage, and output current is displayed.

Test Results

This chapter provides laboratory test results of the TPS71533EVM.

Figure 3–1 shows the input voltage ramp from 0 to just below 24 V (CH1), the 3.3-V regulated output voltage (CH2), and the 50-mA output current (CH4). The scale on CH4 is 20 mA/div.

Figure 3–1. Input Voltage Ramp vs Output Voltage

