

TPS73633EVM

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.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265

Copyright © 2004, Texas Instruments Incorporated

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

EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 1.8 V and 6.0 V and the output voltage range of 1.8 V and 6.0 V.

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 100°C. The EVM is designed to operate properly with certain components above 100°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

Read This First

About This Manual

This User's Guide describes the characteristics, operation, and use of the TPS73633EVM evaluation module (EVM). This EVM is designed to help the user easily evaluate and test the operation and functionality of the TPS73633. This User's Guide includes setup instructions for the hardware, a schematic diagram, a bill of materials (BOM), and PCB layout drawings for the evaluation module.

How to Use This Manual

This document contains the following chapters:

- ☐ Chapter 1 — Introduction
- ☐ Chapter 2 — Setup
- ☐ Chapter 3 — Board Layout
- ☐ Chapter 4 — Schematic and Bill of Materials

Related Documentation From Texas Instruments

TPS73633 data sheet (SBVS038)

FCC Warning

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

If You Need Assistance. . .

Contact your local TI sales representative.

Contents

1	Introduction	1-1
1.1	Background	1-2
1.2	Performance Specification	1-2
1.3	Modifications	1-2
1.3.1	Fixed Output IC Operation	1-2
1.3.2	Adjustable Output IC Operation	1-2
2	Setup	2-1
2.1	Input/Output Connector Descriptions EVM Connection	2-2
2.2	Setup	2-2
3	Board Layout	3-1
3.1	Layout	3-2
4	Schematic and Bill of Materials	4-1
4.1	Schematic	4-2
4.2	Bill of Materials	4-3

Figures

3-1	Assembly Layer	3-2
3-2	Top Layer Routing	3-2
3-3	Bottom Layer Routing	3-2
4-1	TPS73633EVM Schematic	4-2

Tables

1-1	Performance Specification Summary	1-2
4-1	TPS73633EVM Bill of Materials	4-3

Introduction

The Texas Instruments TPS73633DRB is a low dropout regulator (LDO) in a 3×3-mm QFN package that provides output currents of up to 500 mA. This IC has an NMOS topology with a voltage-follower pass element that allows operation with either low-ESR ceramic output capacitors or no output capacitors at all.

Topic	Page
1.1 Background	1-2
1.2 Performance Specification	1-2
1.3 Modifications	1-2

1.1 Background

The TPS73633EVM uses the TPS73633DRB in a 3×3-mm QFN package to provide 3.3 V at up to 500 mA. The EVM operates at full-rated performance with an input voltage between 3.5 V and 5.5 V. Although the IC does not require input or output capacitors, the EVM comes with these capacitors populated. A 2.2-μF input capacitor ensures that the EVM is stable in laboratory setups where the input supply is not located in close proximity to the EVM. The output capacitor helps stabilize the output voltage for loads that are not physically close to the EVM.

1.2 Performance Specification

Table 1–1 provides a summary of the TPS73633EVM performance specifications. All specifications are given for an ambient temperature of 25°C

Table 1–1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage		3.5		5.5	V
Output voltage	$I_O = 10 \text{ mA to } 500 \text{ mA}$	3.267	3.3	3.333	V
Output current		0		500	mA

1.3 Modifications

The PWB for this EVM is designed to accommodate both the fixed and adjustable versions of this IC. At the time the EVM was released, only the fixed 3.3-V version was available.

1.3.1 Fixed Output IC Operation

For use with a fixed-output IC, R1 must be open. R2 may either be left open or populated with a noise-reduction capacitor. Placing a capacitor in the R2 position reduces noise that is generated by the internal bandgap reference and produces a low-noise output. Typical noise-reduction capacitors range from 1000 pF to 0.01 μF. See the TPS73633 data sheet for more information.

1.3.2 Adjustable Output IC Operation

For use with an adjustable output IC, R1 and R2 must be populated. These two resistors are the feedback resistors that set the output voltage for the regulator. See the TPS73633 data sheet for more information.

Setup

This chapter describes how to properly use the TPS73633EVM.

Topic	Page
2.1 Input/Output Connector Descriptions EVM Connection	2-2
2.2 Setup	2-2

2.1 Input/Output Connector Descriptions EVM Connection

J1-VIN	Positive input connection from the input supply
J2-GND	Return connection from the input supply. Common with J4.
J3-VOUT	Output voltage from the EVM
J4-GND	Return connection from the load. Common with J2.
JP1-EN	Enable jumper for the EVM. Shorting EN to ON turns the EVM on. Shorting EN to OFF turns the EVM off.

2.2 Setup

To operate the EVM, simply connect an input supply to the appropriate pins, connect a load to the appropriate pins, and enable the EVM by shorting the EN to ON on JP1.

Board Layout

This chapter provides the TPS73633EVM board layout and illustrations.

Topic	Page
3.1 Layout	3-2

3.1 Layout

Figure 1–3 shows the board layout for the TPS73633EVM PWB.

Figure 3–1. Assembly Layer

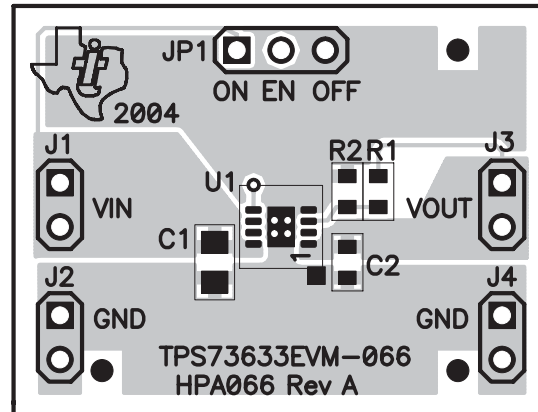


Figure 3–2. Top Layer Routing

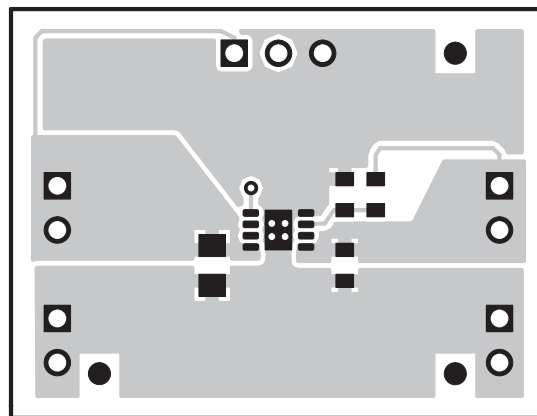
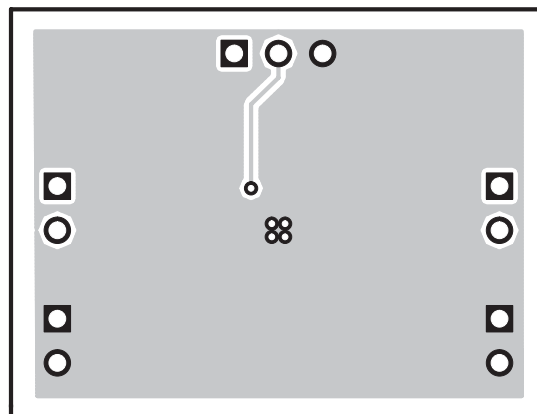


Figure 3–3. Bottom Layer Routing



Schematic and Bill of Materials

This chapter provides the TPS73633EVM schematic and bill of materials.

Topic	Page
4.1 Schematic	4-2
4.2 Bill of Materials	4-3

The schematic diagram illustrates a voltage regulation circuit using the TPS73633DRB. The input voltage (VIN) is connected to the IN pin (pin 8) of the regulator. The enable pin (EN, pin 5) is connected to GND. The output (VOUT) is taken from the OUT pin (pin 1). A feedback network is connected to the NR/FB pin (pin 3), consisting of a 10k resistor (R1) in series with a 10k resistor (R2) connected to GND. The input capacitor (C1, 2.2 uF) is connected between VIN and GND. The output capacitor (C2, 1.0 uF) is connected between VOUT and GND. The circuit is powered by a 5V source and has a 1.0V output voltage.

4.2 Bill of Materials

Table 4–1. TPS73633EVM Bill of Materials

Count	Ref Des	Description	SIZE	MFR	Part Number
1	C1	Capacitor, ceramic, 2.2 μ F, 6.3 V, X5R, 10%	805	TDK	C2012X5R0J225KT
1	C2	Capacitor, ceramic, 1.0 μ F, 6.3 V, X5R, 10%	603	TDK	C3216X5R0J105KT
4	J1–J4	Header, 2 pin, 100 mil spacing, (36-pin strip)	0.100 $\times$ 2	Sullins	PTC36SAAN
1	JP1	Header, 3 pin, 100 mil spacing, (36-pin strip)	0.100 $\times$ 3	Sullins	PTC36SAAN
0	R1, R2	Resistor, chip, xx Ω , 1/16 W	603		
1	U1	IC, Cap free, NMOS, 400 mA LDO regulator with reverse current protection		TI	TPS73633DRB
1	—	PCB, 1.205 In $\times$ 0.925 In $\times$ 0.062 In		Any	HPA066
1	—	Shunt, 100 mil, black	0.100	3M	929950–00
