TEXAS INSTRUMENTS

TPS61007EVM-177

EVM User's Guide for High-Efficiency, Boost Converters

User's Guide

October 2000

Power Management Products

SLVU039

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability.

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

Customers are responsible for their applications using TI components.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.

Preface

About This Manual

This user's guide describes the TPS61007EVM-177 (SLVP177) evaluation module for high-efficiency boost converters.

How to Use This Manual

- ❑ Chapter 1 Introduction
- ❑ Chapter 2 Evaluation With the TPS61007EVM-177
- ❑ Chapter 3 Printed Circuit Board (PCB) Layout

Information About Cautions and Warnings

This book may contain cautions and warnings.

This is an example of a caution statement.

A caution statement describes a situation that could potentially damage your software or equipment.

This is an example of a warning statement.

A warning statement describes a situation that could potentially cause harm to you.

The information in a caution or a warning is provided for your protection. Please read each caution and warning carefully.

Related Documentation From Texas Instruments

- ❑ TPS61007 data sheet (literature number SLVS279)

Contents

Figures

Tables

Chapter 1

Introduction

The Texas Instruments TPS61007 evaluation module (EVM) helps designers evaluate the different operating modes and the performance of high-efficiency boost converters.

The TPS61007EVM-177 is an adjustable boost converter whose output voltage is set to 3.3 V. If any other output voltage needs to be evaluated, the TPS61007EVM-177 can be easily set up to provide an output voltage between 1.5 V and 3.3 V by modifying the external resistor divider.

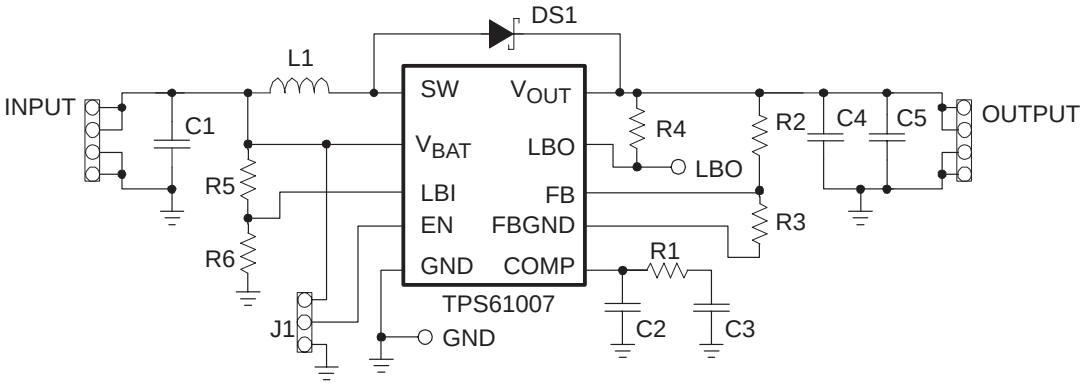
The TPS61007 has an input voltage range between 0.9 V and V_O. The maximum output current is at least 100 mA from 0.9-V input voltage (one battery cell input) and 250 mA from 1.8-V input voltage (two battery cell input).

Topic **Page**

1.1 SLVP177 EVM Schematic

Figure1–1 shows the SLVP177 EVM schematic diagram.

Figure 1–1. SLVP177 EVM Schematic Diagram



1.2 SLVP177 Bill of Materials

Table 1–1 lists materials required for the SLVP177 EVM.

Table 1–1. SLVP177 EVM Bill of Materials

Ref Des	Qty	Part Number	Description	MFG
C1	1	C3216X5R0J106	Capacitor, 10 µF, X5R, 6.3 V, SMD 1206	TDK
C2	1		Capacitor, 10 pF, X7R, SMD 0805	
C3	1		Capacitor, 10 nF, X7R, SMD 0805	
C4	1	C4532X5R1A226M	Capacitor, 22 µF, X5R, 6.3 V, SMD 1812	TDK
C5			Not Used	
DS1	1	MBRM120LT3	Diode, Schottky, DO216AA	ON Semiconductor
GND, LBO	2		Test points	
INPUT, OUTPUT	2		Header 1 x 4, 0.1” pitch	
J1	1		Header 1 x 3, 0.1” pitch, with jumper	
L1	1	CDRH6D38-100	Coil	Sumida
R1	1		Resistor, 100 kΩ, 1%, SMD 0805	
R2, R4	1		Resistor, 1 MΩ, 1%, SMD 0805	
R3	1		Resistor, 180 kΩ, 1%, SMD 0805	
R5	1		Resistor, 390 kΩ, 1%, SMD 0805	
R6	1		Resistor, 470 kΩ, 1%, SMD 0805	
U1	1	TPS61007DGS	IC, high-efficiency boost converter, adjustable version, MSOP10	Texas Instruments

1.3 Setup of the EVM

It is important to establish all connections to the EVM before the power supply connected to the EVM is turned on.

1) Connect a power supply (0.9 V to V_O, depending on the output voltage of the EVM) to the INPUT header.
2) Connect a voltmeter to the OUTPUT header.
3) Verify that the jumper, J1, is set to EN.
4) Turn on the power supply and verify the output voltage.

Chapter 2

Evaluation With the TPS61007EVM-177

This chapter details the evaluation process and features of the EVM. For this evaluation, a load is connected to the output terminal in order to adjust the load current between 0 mA and 250 mA.

For accurate output voltage and input voltage measurements, it is important to measure the voltage on the input and output voltage terminals with kelvin contacts or with a voltmeter connected directly to the input voltage or output voltage terminals. This will eliminate any measurement errors related to voltage drops along the input and output terminal wires connected to the power supply or load.

The EVM has additional pins to allow the user to assemble an additional output capacitor, C5, onto the PCB for further evaluation purposes.

Topic **Page**

2.1 Enable (EN) Jumper

This jumper enables the device. Connecting the EN pin to V_{BAT} (i.e. setting the jumper to EN) will enable the part.

2.2 LBI/LBO Comparator

The LBO terminal is an open drain output and has a pullup resistor, R4, connected to the output. The signal on this pin will go low as soon as the input voltage at LBI falls below the threshold of 500 mV. LBO will stay at high impedance when the input voltage at LBI is above the threshold. A resistor divider (R5, R6) is used on the EVM to monitor the supply voltage. As a default on the EVM, the LBO output will go low when the supply voltage falls below 0.9 V. More details about setting the low battery threshold voltage can be found in the data sheet (SLVS279).

Chapter 3

PCB Layout

Just as for all switch mode power supplies, the PCB layout is a critical step in the power supply design process. The following figures show the layout for the adjustable and fixed output voltage EVMs. Refer to the data sheet (SLVS279) for further layout guidelines. The required board area for the complete dc-dc converter solution is less than 418 mm^2 (19 mm x 21 mm) on a double-sided PCB, as indicated by the rectangle on the component placement figure.

Topic **Page**

3.1 PCB Layout of the TPS61007EVM-177 (SLVP177)

Figure 3–1. Component Placement

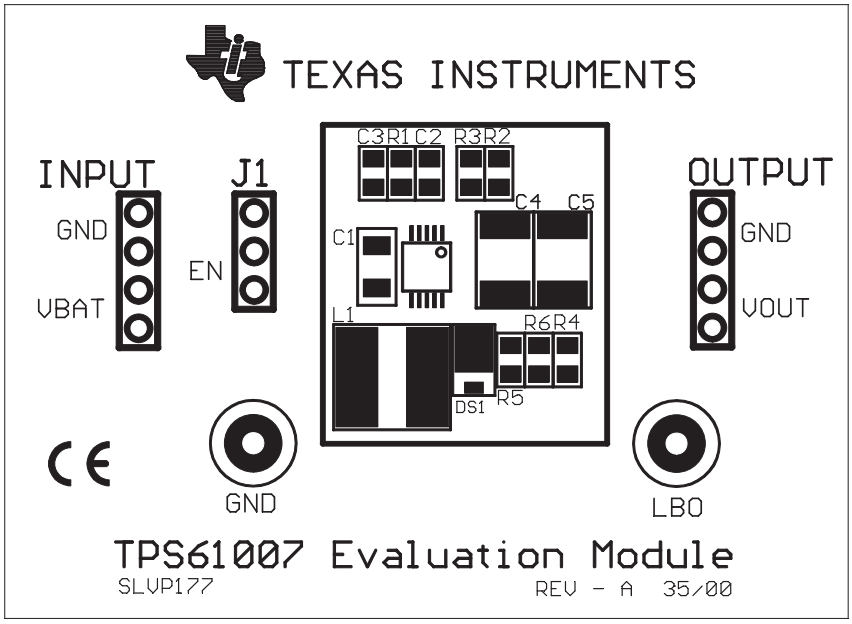


Figure 3–2. Top Layer

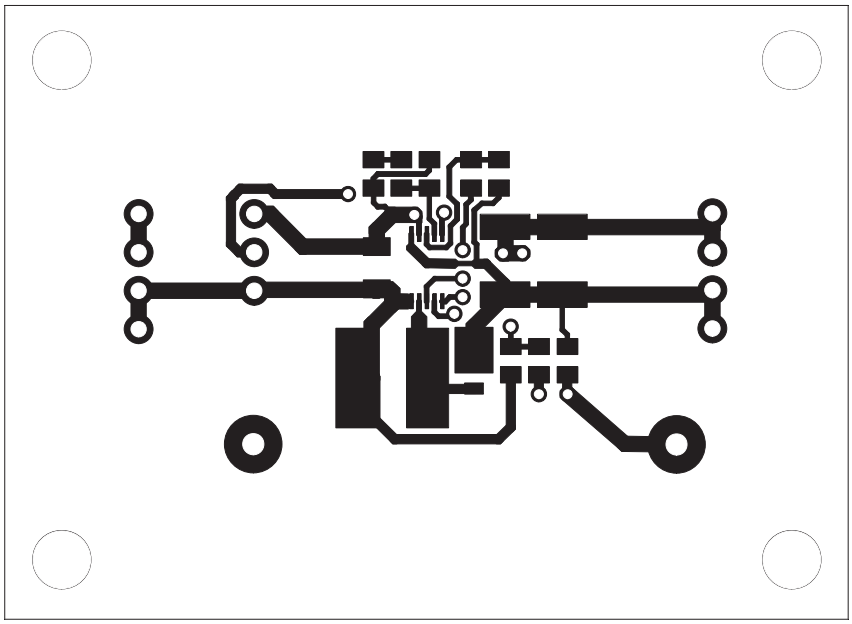


Figure 3–3. Bottom Layer