TEXAS INSTRUMENTS

TPS61070EVM-062

User's Guide

June 2004

PMP Portable Power

SLVU106

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 0.9 V to 5.5 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 125°C. The EVM is designed to operate properly with certain components above 125°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.

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Preface

Read This First

About This Manual

This users guide describes the characteristics, operation, and use of the TPS61070EVM-062 evaluation module (EVM). This EVM contains Texas Instruments high-efficiency boost converter that is configured to provide a regulated 5-V output voltage and up to 300 mA of current from single-cell alkaline batteries. The user's guide includes a schematic diagram, bill of materials (BOM), and test data.

How to Use This Manual

This document contains the following chapters:

- Chapter 1 – Introduction
- Chapter 2 – Setup and Test Results
- Chapter 3 – Board Layout
- Chapter 4 – Bill of Materials and Schematic

Related Documentation From Texas Instruments

SLVS510 − TPS6107x data sheet

If you need Assistance

Contact your local TI sales representative.

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.

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Figures

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Chapter 1

Introduction

This chapter contains background information for the TPS61070EVM-062 evaluation modules.

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1.1 Background

This TPS61070EVM uses a TPS61070 boost converter to step up 0.9-V or higher input voltages to 5 V. The goal of the EVM is to demonstrate the small size of the TPS61070 power supply solution and provide flexibility in interchanging the supporting passive components.

The TPS61070EVM uses a TPS61070 adjustable output boost converter and the appropriate feedback components to provide 5 V.

1.2 Performance Specification Summary

Table 1−1 provides a summary of the TPS61070EVM 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 range	TPS61070EVM	0.9		5.5	V
Output voltage	TPS61070EVM		5		V
Output current		0		300	mA

1.3 Modifications

Because the primary goal of the EVM is to demonstrate the small size of the TPS61070 power supply solution, capacitors and inductors with small footprints were chosen. These capacitors and inductors were carefully selected to maximize efficiency and minimize ripple while minimizing overall solution size. Changing components could improve or degrade EVM performance.

Chapter 2

Setup and Test Results

This chapter describes how to properly connect, set up, and use the TPS61070EVM.

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2.1 Input/Output Connections

The connection points are described in the following paragraphs.

2.1.1 J1−Vin

This is the positive connection to the input power supply. The leads to the input supply should be twisted and kept as short as possible.

2.1.2 J2−GND

This is the return connection to the input power supply.

2.1.3 JP1−Enable

This is the enable pin of the device. Placing a jumper across pins 2−3 of J1 shorts the enable pin to GND, thereby disabling the device. Placing a jumper across pins 1−2 of J1 connects the enable pin to Vin and enables the device.

2.1.4 J3−Vout

This is the positive output for the device.

2.1.5 J4−GND

This is the return connection for the load.

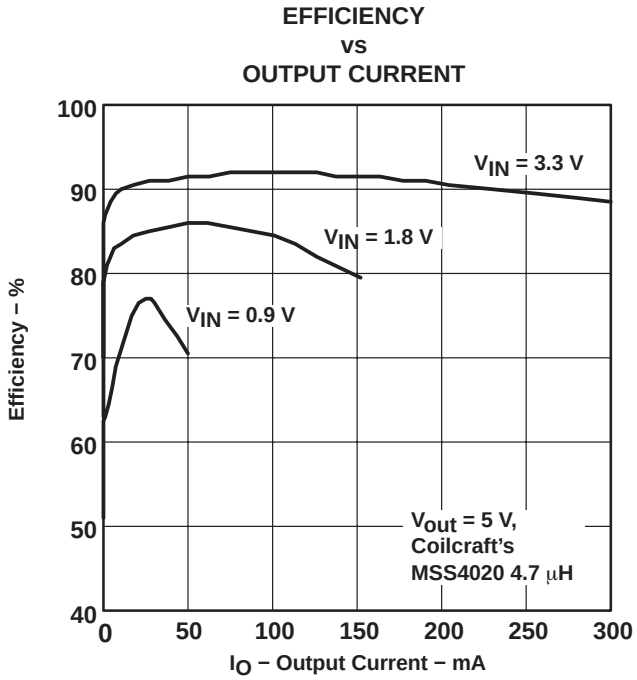
2.2 EVM Operation

An input power supply and a load must be connected to the appropriate EVM connectors in order for the EVM to operate. The absolute maximum input voltage is 6 V. The TPS61070 is designed to operate with a maximum input voltage of 5.5 V. Short the pins 1−2 on jumper J1 (labeled ON) to enable the device.

2.3 Test Results

Figure 2−1 shows are the test results using this EVM.

Figure 2−1. TPS61070 Efficiency vs Output Current



Chapter 3

Board Layout

This chapter provides the TPS61070EVM board layout and illustrations.

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3.1 Layout

Board layout is critical for all switch mode power supplies. Figure 3−1, Figure 3−2, and Figure 3−3 show the board layout for the HPA062 PWB. The switching nodes with high-frequency noise are isolated from the noise sensitive feedback circuitry and careful attention has been given to the routing of high-frequency current loops. See the data sheet for further layout guidelines.

Figure 3−1. Top Assembly Layer

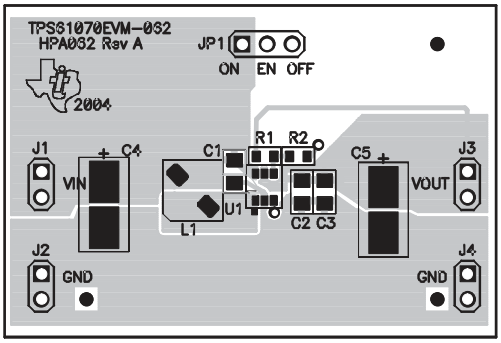


Figure 3−2. Top Layer Routing

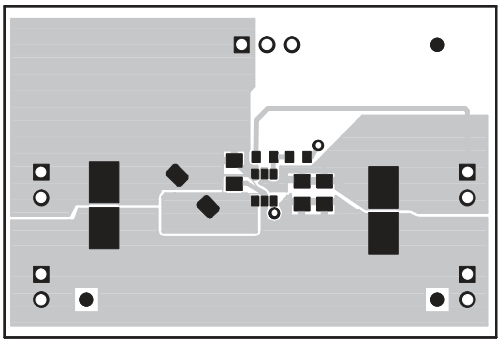
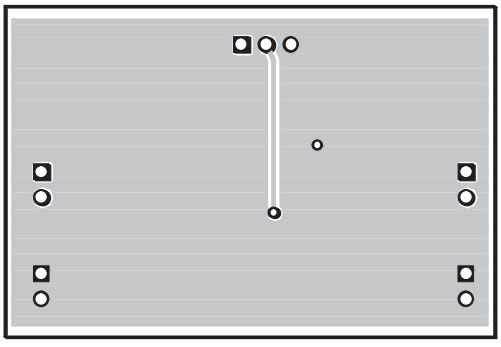


Figure 3−3. Bottom Layer Routing



Chapter 4

Bill of Materials and Schematic

This chapter provides the TPS61070EVM-062 bill of materials and schematics.

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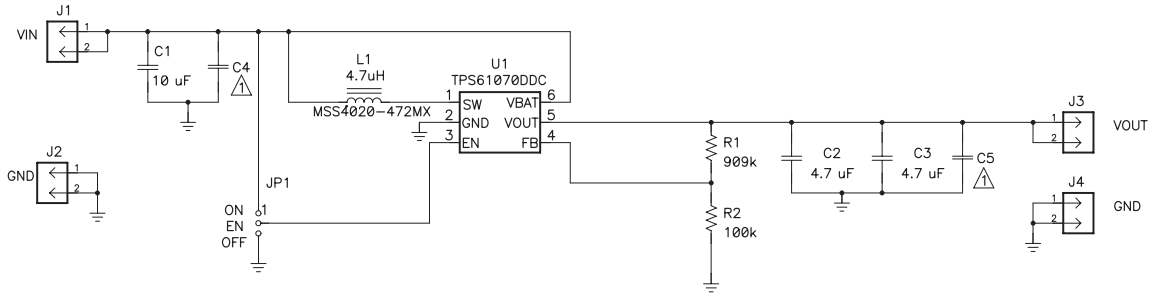
4.1 Bill of Materials

Table 4−1. Bill of Materials

COUNT	Ref Des	DESCRIPTION	SIZE	MFR	PART NUMBER
1	C1	Capacitor, Ceramic, 10−uF, 6.3−V, X5R, 10%	805	TDK	C2012X5R0J106KT
2	C2, C3	Capacitor, Ceramic, 4.7−uF, 10−V, X5R, 10%	805	TDK	C2012X5R1A475KT
0	C4, C5	Capacitor, Multi−pattern, 603−D case, xx−uF, vv−V	7343 (D)		
4	J1 − J4	Header, 2−pin, 100mil spacing, (36−pin strip)	0.100 x 2	Sullins	PTC36SAAN
1	JP1	Header, 3−pin, 100mil spacing, (36−pin strip)	0.100 x 3	Sullins	PTC36SAAN
1	L1	Inductor, SMT, 4.7−uH, 0.8−A, 115−milliohm	0.158 X 0.158	Coilcraft	MSS4020−472MX
1	R1	Resistor, Chip, 909k−Ohms, 1/16−W, 1%	603	Std	Std
1	R2	Resistor, Chip, 100k−Ohms, 1/16−W, 1%	603	Std	Std
1	U1	IC, High Efficient, Tiny 1Cell LiIon or 1−3 Cells Alk/ Nixx Boost Converter	SOT23−6	TI	TPS61070DDC
1	−−	PCB, 1.96 In x 1.3 In x .062 In		Any	HPA062
1	−−	Shunt, 100−mil, Black	0.100	3M	929950−00

4.2 Schematic

Figure 4−1. TPS61070 Schematic



⚠1 User defined