

TPS61030EVM-029

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.

Following are URLs where you can obtain information on other Texas Instruments products & 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

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 specified input and output ranges described in the EVM User's Guide.

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 60°C. The EVM is designed to operate properly with certain components above 60°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 TPS61030EVM-029 synchronous boost converter evaluation module (EVM). This EVM features a Texas Instruments high-efficiency, single-cell Li-Ion, dual-cell battery boost converter that is configured to deliver 5.0V at 1A with an input voltage of 1.8V. This user's guide includes setup instructions, a schematic diagram, a bill of materials (BOM), characterization results, and printed circuit board (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

The following document provides information regarding Texas Instruments integrated circuits used in the assembly of the TPS61030EVM-029. This document is available from the TI web site. The last character of the literature number corresponds to the document revision, which is current at the time of the writing of this User's Guide. To obtain a copy of the following TI document, visit our website at <http://www.ti.com/> or call the Texas Instruments Literature Response Center at (800) 477-8924 or the Product Information Center at (972) 644-5580. When ordering, identify the document by both title and literature number.

Data sheet	Literature number
TPS61030 Data Sheet	SLUS534

If You Need Assistance

If you have questions regarding either the use of this evaluation module or the information contained in the accompanying documentation, please contact the Texas Instruments Product Information Center at (972) 644-5580, visit the TI web site at www.ti.com, or 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.

Contents

Introduction	iii
About This Manual	iii
How to Use This Manual	iii
Related Documentation From Texas Instruments	iii
If You Need Assistance	iv
FCC Warning	iv
Contents	v
Figures	vi
Tables	vi
Introduction	1-1
Setup	2-1
2.1 Input/Output Connector Descriptions	2-2
2.2 Setup	2-2
2.3 Operation	2-3
Board Layout	3-1
3.1 Layout	3-2
Schematic and Bill of Materials	4-1
4.1 Schematic	4-2
4.2 Bill of Materials	4-3

Figures

Figure 1. Efficiency vs I_{OUT} for the TPS61030EVM	2-3
Figure 2. Maximum Output Current vs V_{BAT}	2-3
Figure 3. Assembly Layer	3-2
Figure 4. Top Layer Routing	3-2
Figure 5. Bottom Layer Routing	3-3
Figure 6. TPS61030EVM-029 Schematic	4-2

Tables

Table 1. TPS61030EVM-029 Bill of Materials	4-3
--	-----

Introduction

The Texas Instruments TPS61030EVM evaluation board helps designers evaluate the operation and performance of the TPS61030 family of high-frequency synchronous boost DC/DC converters.

This EVM is specifically designed and optimized to operate with 2-cell NiCad, Ni-MH, or alkaline battery input. The default output voltage of this EVM is 5.0V. If desired, this EVM can easily be modified to supply higher or lower output voltages by adjusting the appropriate feedback resistor dividers. Also, other fixed-output voltage versions of the devices can be easily evaluated using this EVM. Refer to the TPS61030 data sheet (SLVS534) for the various fixed-output voltage options available in the TPS6103x device family as well as for more information on adjusting the output voltage.

Setup

This chapter describes the jumpers and connectors on the EVM as well as how to properly configure, set up, and use the TPS61030EM-029.

Topic	Page
2.1 Input/Output Connector Descriptions	2-2
2.2 Setup	2-2
2.3 Operation	2-3

2.1 Input/Output Connector Descriptions

2.1.1 J1—VBAT

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 to minimize EMI transmission.

2.1.2 J2—GND

This is the return connection for the input power supply.

2.1.3 J3—VOUT

This is the positive connection from the output of the power supply. Connect this pin to the positive input of the load.

2.1.4 J4—GND

This is the negative connection from the output of the power supply. Connect this pin to the negative input of the load.

2.1.5 J5—LBO

The LBO pin is an open-drain output configured with a 1M pull-up resistor.

2.1.6 J6—GND

This is the ground connection for the LBO pin.

2.1.7 JP1—SYNC

This jumper enables or disables the power save mode at light loads. If SYNC is connected to VBAT, the power save mode is disabled. Connecting SYNC to GND enables the power save mode. When the SYNC pin is not connected to VBAT or GND, the switch of the frequency of the device will synchronize to a user-provided signal of 500kHz to 700kHz.

2.1.8 JP2—EN

This jumper enables and disables the TPS61030 on the EVM.

2.2 Setup

Connect an input supply between J1 and J2. The voltage range on this supply should stay between 1.8V and 5.0V. Connect a load between J3 and J4. Enable the output by positioning a jumper to connect the EN and ON pins. Configure the SYNC jumper to the desired setting.

2.3 Operation

The EVM has been optimized to operate from a 2-cell NiCad, NiMH, and alkaline battery with input voltage range down to 1.8V. The output voltage is set to 5.0V and is capable of supplying 1A. After connecting the input and output connections, and setting the SYNC jumper (JP1) to the desired setting, turn on the input supply and then enable the output as desired with JP2.

The resistor divider on the LBI pin is designed to trip the LBO output when the input supply voltage drops below 1.8V.

Efficiency may vary depending on the inductor used in the design. Generally, smaller size inductors decrease the efficiency in the design. Figure 2–1 shows the efficiency versus I_{OUT} curve for the TPS61030EVM.

Figure 2–1. Efficiency vs I_{OUT} for the TPS61030EVM

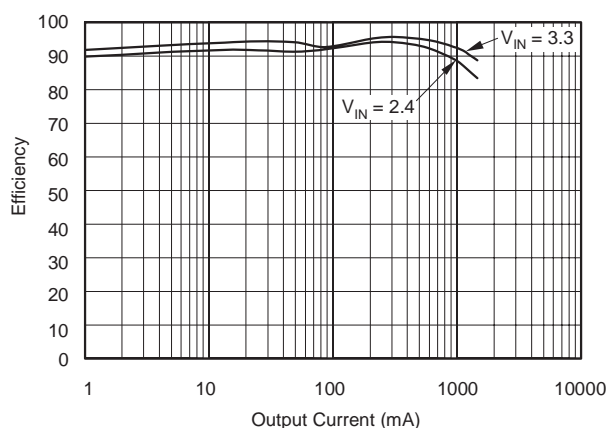
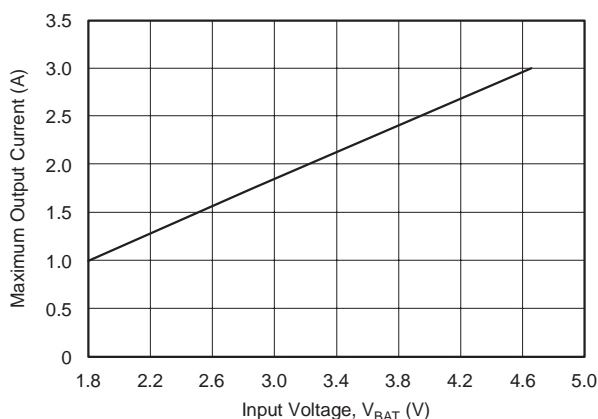


Figure 2–2 shows the typical maximum output current versus input voltage for this EVM.

Figure 2–2. Maximum Output Current vs V_{BAT}



Board Layout

This chapter provides the TPS61030EVM-029 board layout and illustrations.

Topic	Page
3.1 Layout	3-2

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 TPS61030EVM-029 PCB. The nodes with high switching frequencies and currents are short and isolated from the noise sensitive feedback circuitry. Careful attention has been given to the routing of high-frequency current loops. Refer to the data sheet for specific layout guidelines.

Figure 3–1. Assembly Layer

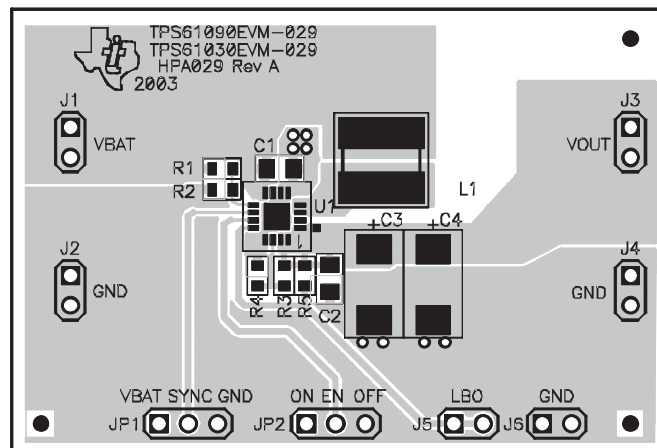


Figure 3–2. Top Layer Routing

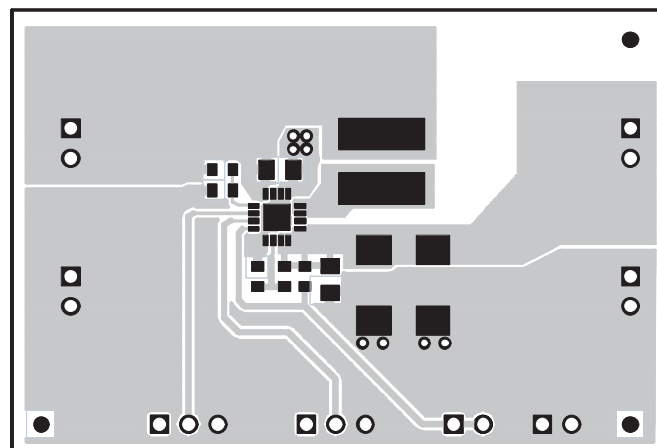
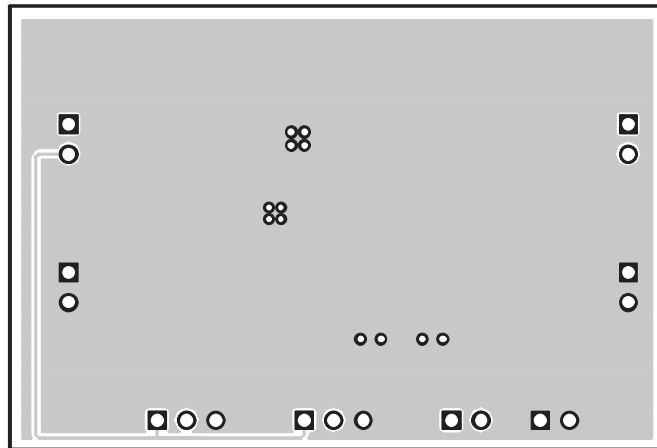


Figure 3–3. Bottom Layer Routing



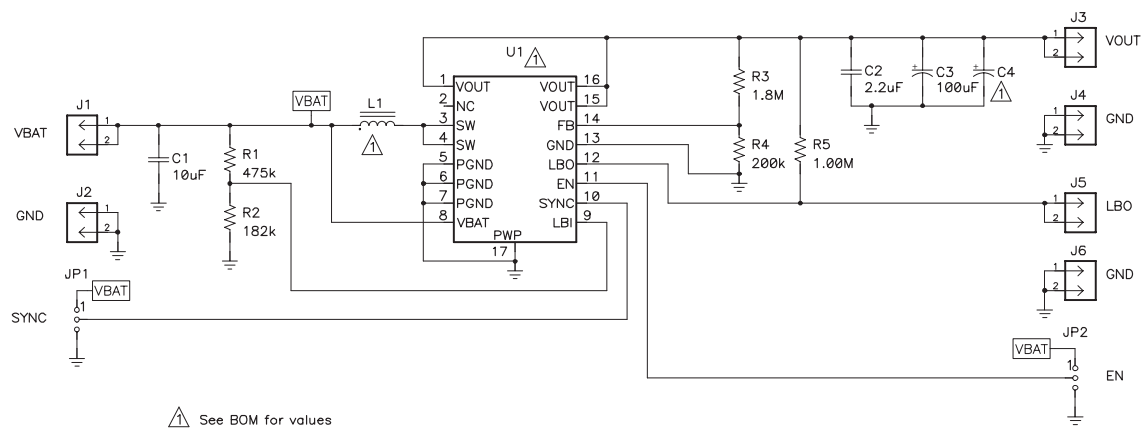
Schematic and Bill of Materials

This chapter provides the TPS61030EVM-029 schematic and bill of materials.

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

4.1 Schematic

Figure 4–1. TPS61030EVM-029 Schematic



4.2 Bill of Materials

Table 4–1. TPS61030EVM-029 Bill of Materials

Count	Reference Designator	Description	Size	Manufacturer	Mfg Part Number
1	C1	Capacitor, Ceramic, 10 μ F, 6.3V, X5R, \pm 10%	805	TDK	C1608X5R1A105KT
1	C2	Capacitor, Ceramic, 2.2 μ F, 10V, X5R, \pm 20%	805	TDK	C1005X7R1H472KT
2	C3, C4	Capacitor, Low ESR Tantalum, 100 μ F, 16V, 270m Ω , 10%	7343 (D)	Vishay	595D107X0016C2T
6	J1–J6	Header, 2-pin, 100 mil spacing (36-pin strip)	0.100 x 2	Sullins	PTC36SAAN
2	JP1, JP2	Header, 3-pin, 100 mil spacing (36-pin strip)	0.100 x 3	Sullins	PTC36SAAN
1	L1	Inductor, SMT, 6.8 μ H, 4.9A, 23m Ω	0.476 x 0.515	Sumida	CDRH124-6R8
1	R1	Resistor, Chip, 475k Ω , 1/16W, 1%	603	Std	Std
1	R2	Resistor, Chip, 182k Ω , 1/16W, 1%	603	Std	Std
1	R3	Resistor, Chip, 1.8M Ω , 1/16W, 1%	603	Std	Std
1	R4	Resistor, Chip, 200k Ω , 1/16W, 1%	603	Std	Std
1	R6	Resistor, Chip, 1.0M Ω , 1/16W, 1%	603	Std	Std
1	U1	IC, Synchronous Boost Converter with 4A Switch	QFN–16	Texas Instruments	TPS61030RSA
1	--	PCB, 2.23in x 1.5in x .062in		Any	HPA029
2	--	Shunt, 100 mil (black)	0.100	3M	929950–00

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692
Email amall@ameya360.com
QQ 800077892
Skype ameyasales1 ameyasales2

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333
Email mkt@ameya360.com