

Using the TPS61169 Evaluation Module

User's Guide



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TPS61169 User's Guide

1 Introduction

The Texas Instruments TPS61169EVM evaluation module, containing a TPS61169 integrated circuit (IC), helps designers evaluate the operation and performance of the TPS61169, which is a WLED driver providing highly integrated solutions for single-cell Li-ion battery powered backlight for small-to-medium form-factor LCD Display. The EVM contains one DC / DC converter (see [Table 1](#)).

Table 1. Device and Package Configurations

CONVERTER	IC	PACKAGE
U1	TPS61169	SC70 5L - DCK

1.1 1.1 Performance Specification Summary

The TPS61169EVM is designed to operate from an input voltage source ranging from 2.7 V to 5.5 V and provides a 20-mA output current for string LEDs. There can be 4 to 10 LEDs in series according to customer application. [Table 2](#) provides a summary of the TPS61169 performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 2. Typical Performance Specification Summary

	CONDITION	MIN	TYP	MAX	UNITS
V _{IN} supply		2.7		5.5	V
I _{OUT}			20		mA
Number of LEDs in series as the load	JP3 shorted		6		
	JP4 shorted		7		
	JP5 shorted		8		
	JP6 shorted		9		

2 Set-Up

This section describes the jumpers and connectors on the EVM as well and how to properly connect, set up, and use the TPS61169EVM.

2.1 Input/Output Connector Description

J1,J2 – Input are the power input terminals for the converter. The terminal blocks provide a power (V_{BAT}) and ground (GND) connection to allow the user to attach the EVM to a cable harness.

JP1 – Output is the regulated output terminal for the converter. The terminal block provides a connection for LED load, and it allows the user to add a current meter between its two pins to measure the output current.

JP2 – CTRL is the jumper used to enable the device. Connecting pin 1 and pin 2 will toggle the CTRL high and enable the device. Connecting pin 2 and pin 3 will toggle the CTRL low and disable the device.

JP3, JP4, JP5, JP6 function has been described in [Table 2](#).

2.2 Hardware Requirements

This EVM requires an external power supply capable of providing 2.7 V to 5.5 V at 0.5 A. To change the default current value (that is, implement dimming), the user can apply a PWM signal to JP2-pin 2.

2.2.1 Normal Operation without Dimming Control

No additional hardware is required.

2.2.2 PWM Dimming

A function generator capable of driving the PWM pin with 1.2 V to V_{IN} amplitude, and a 5-kHz to 100-kHz PWM signal is required for PWM-controlled dimming.

2.3 Set-Up

The input voltage range for the converter is 2.7 V to 5.5 V. A load should be applied to the output terminal for proper operation.

2.4 Operation

2.4.1 Non-Dimming Operation (Default Configuration)

For non-dimming operation of the TPS61169, JP1 and JP2 should be properly configured. The recommended settings using shorting blocks are shown in [Table 3](#). The configurations for JP3 to JP5 is determined by the specific application.

Table 3. Final Jumper Settings

REFERENCE DESIGNATOR	SETTING ON BOARD
JP1	Short pin 1 and pin 2
JP2	Short pin 1 and pin 2

In this default configuration, the device will power up when power is applied

2.4.2 PWM-Dimming Operation

Remove the jumper on JP2 of default configuration, Connect the appropriately configured function generator output between pin 2 and pin 3 (for GND connection) of JP2. The device will power up when power is applied. Duty cycle of the PWM signal is directly proportional to the regulated current.

2.5 Test Results

This section provides typical efficiency for the TPS61169EVM board.

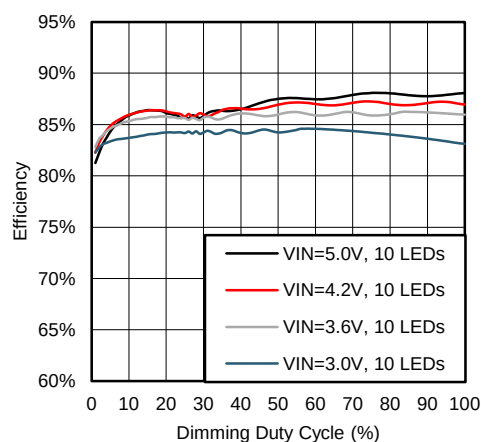


Figure 1. Efficiency of 10s1p

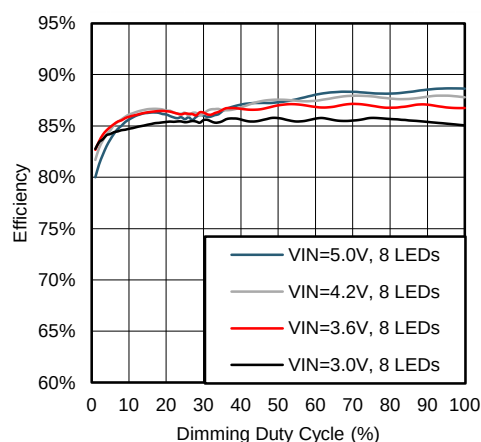


Figure 2. Efficiency of 8s1p

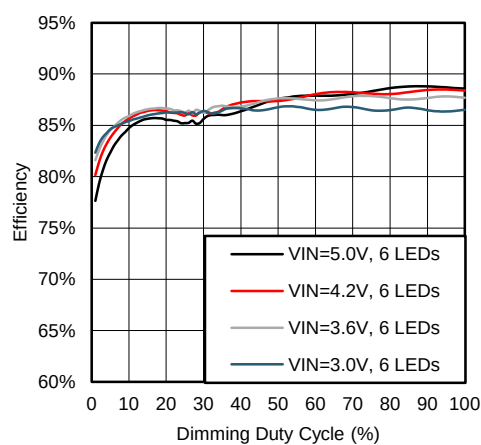


Figure 3. Efficiency of 6s1p

3 Board Layout

Figure 4, Figure 5, and Figure 6 show the board layout for the TPS61169EVM. The EVM offers resistors, capacitors, and jumpers. Jumpers are provided to configure the device. The PCB provides 1-oz. copper planes on the top and bottom to dissipate heat.

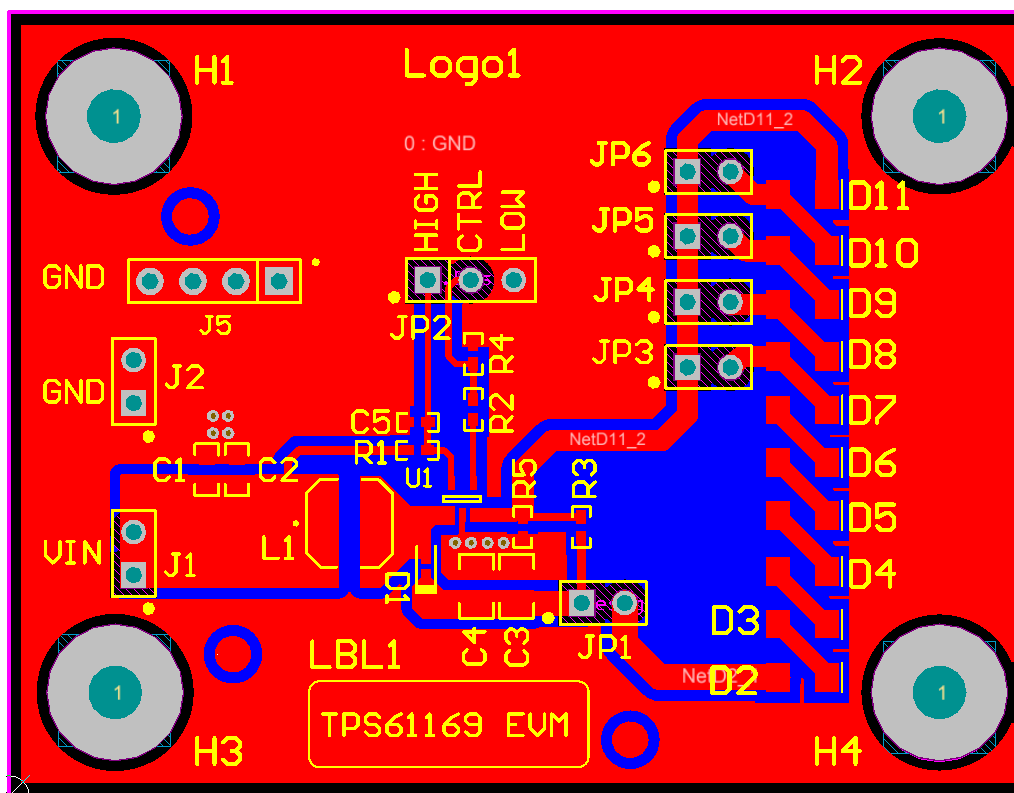


Figure 4. Top Assembly

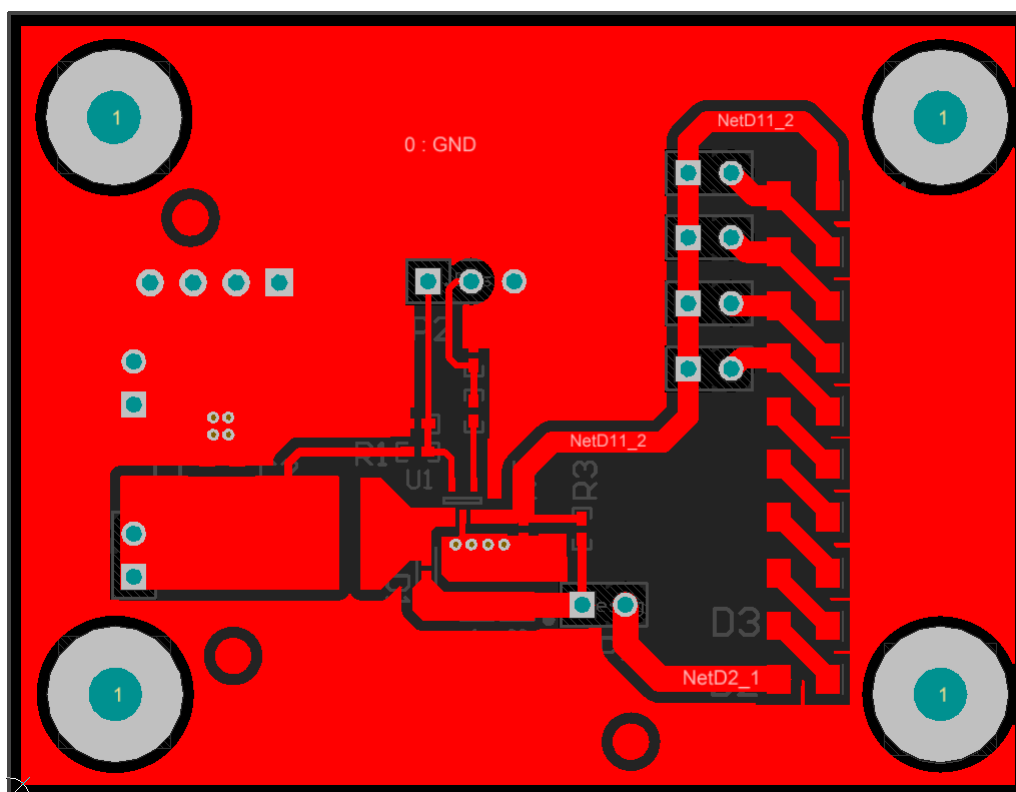


Figure 5. Top Layer Routing

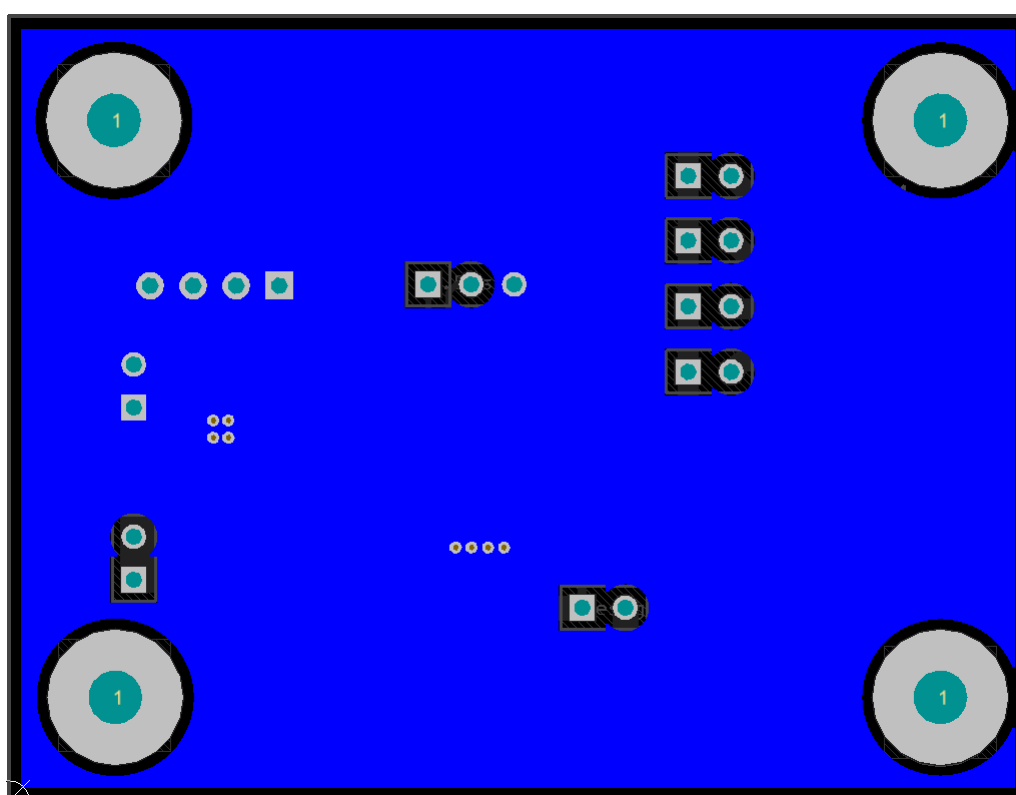
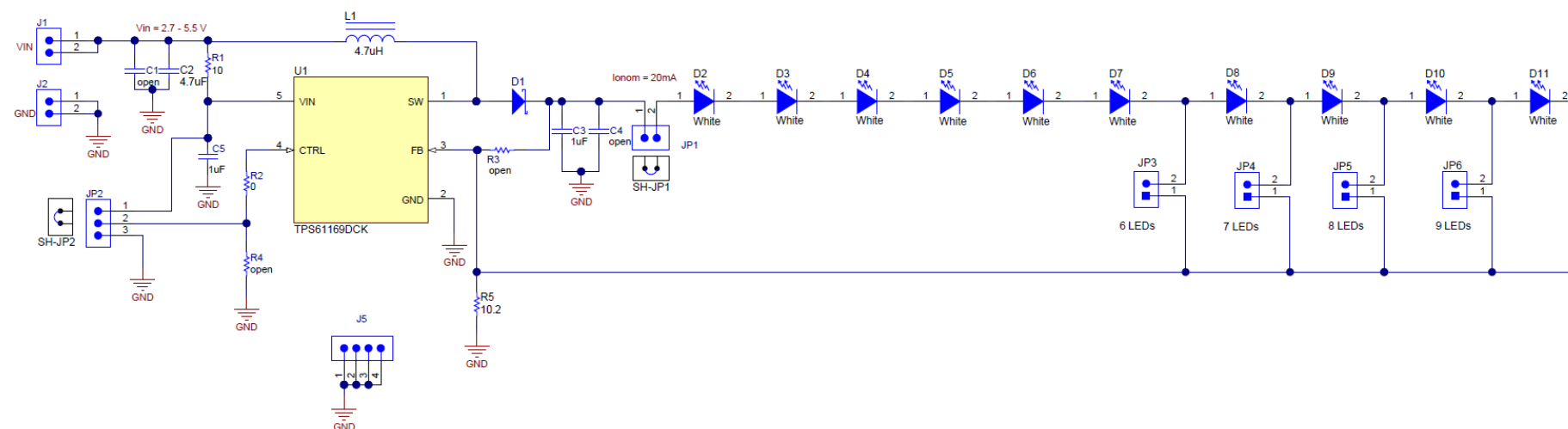


Figure 6. Bottom Layer Routing

4 Schematic



5 Bill of Materials

DESIGNATOR	QTY	VALUE	DESCRIPTION	PACKAGE REFERENCED	PART NUMBER	MANUFACTURER
C1	1	open	CAP, CERM, 1 μ F, 10 V, $\pm$ 10%, X5R, 0603	0603	C1608X5R1A105K	TDK
C2	1	4.7 μ F	CAP, CERM, 4.7 μ F, 16 V, $\pm$ 10%, X5R, 0603	0603	GRM188R61C475KAAJ	MuRata
C3, C4	2	1 μ F, open	CAP, CERM, 1 μ F, 50 V, $\pm$ 10%, X7R, 0805	0805	GRM21BR71H105KA12L	MuRata
C5	1	1 μ F	CAP, CERM, 1 μ F, 10 V, $\pm$ 10%, X5R, 0402	0402	GRM155R61A105KE15D	MuRata
D1	1	40 V	Diode, Schottky, 40 V, 0.25 A, SOD-523	SOD-523	NSR0240V2T1G	ON Semiconductor
D2, D3, D4, D5, D6, D7, D8, D9, D10, D11	10	white	LED, White, SMD	2x1 3x3 mm	ZSM-T3020-W	JKL Components
FID1, FID2, FID3	3		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
H1, H2, H3, H4	4		Machine screw, round #4-40 x 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH	B&F Fastener Supply
H5, H6, H7, H8	4		Standoff, Hex, 0.5"L #40-40 Nylon	Standoff	1902C	Keystone
J1, J2, JP1, JP3, JP4, JP5, JP6	7		Header, 100 mil, 2 x 1, tin-plated, TH	Header, 2-pin, 100 mil, Tin	PEC02SAAN	Sullins Connector Solutions
J5	1		Header, TH, 100 mil, 4x1, gold-plated, 230 mil above insulator	4x1 header	TSW-104-07-G-S	Samtec, Inc.
JP2	1		Header, 100 mil, 2x1, tin-plated, TH	Header, 3-pin, 100 mil, tin	PEC03SAAN	Sullins Connector Solutions
L1	1	4.7 μ H	Inductor, shielded drum core, ferrite, 4.7 μ H, 1.8 A, 0.13 Ω , SMD	LPS4018	LPS4018-472MLB	Coilcraft
LBL1	1		Thermal transfer printable labels, 0.650" W x 0.200" H - 10,000 per roll	PCB label 0.650"H x 0.200"W	THT-14-423-10	Brady
R1, R3, R4	3	10, open, open	RES, 10 Ω , 5%, 0.063W, 0402	0402	CRCW040210R0JNED	Vashay-Dale
R2	1	0	RES, 0 Ω , 5%, 0.063W, 0402	0402	RC0402JR-070RL	Yageo America
R5	1	10.2	RES, 10.2 Ω , 1%, 0.063W, 0402	0402	CRCW040210R2FKED	Vishay-Dale
SH-JP1, SH-JP2	2	1 x 2	Shunt, 2 mm, gold-plated, black	2-mm shunt, closed top	2SN-BK-G	Samtec
U1	1		38-V High-Current Boost WLED driver with PWM control, DCK0005A	DCK0005A	TPS61159DCK	Texas Instruments

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- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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