TPS61197EVM User Guide

User's Guide

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1 Introduction

The Texas Instruments TPS61197EVM evaluation module (EVM) contains a TPS61197 integrated circuit (IC) and helps designers to evaluate the operation and performance of the TPS61197, a single-string 2WLED driver providing a highly integrated solution for LCD-TV backlight.

The EVM contains one DC / DC converter (see Table 1).

Table 1. Device and Package Configurations

CONVERTER	IC	PACKAGE
U1	TPS61197	SOIC

1.1 Performance Specification Summary

The EVM is designed to operate from an input voltage source ranging from 10 V to 30 V and provides a 250-mA continuous output current for a WLED string. The overvoltage protection (OVP) voltage is set to 60 V, which can be adjusted according to customer's application. Table 2 provides a summary of the TPS61197EVM 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		10		30	V
I_{OUT}			250		mA

2 Jumper and Connector Set-Up

This section describes the jumpers and connectors on the EVM, as well as how to properly connect, set up, and use the TPS61197EVM.

2.1 Input/Output Connector Description

J1 - Input: This header is the power input terminals for the converter. The terminal block provides a power (V_{IN}) and ground (GND) connection to allow the user to attach the EVM to a cable harness.

J2 - Output: This header provides connections to the boost converter output (V_{OUT}) and the drain of dimming MOS. This header can be connected to WLEDs string to facilitate evaluation.

J4 - Ground: This header connects to GND.

JP1 - EN: This jumper is used to enable the device. Connecting pin1 and pin2 will toggle the EN high and enable the device. Connecting pin2 and pin3 will toggle the EN low and disable the device.

JP2 - PWM: This jumper is used to set PWM control. Connecting pin1 and pin2 will send high signal to device and set full on. Connecting pin2 and pin3 will send low signal to device and set off.

JP3 - FAULT: This jumper is used to set PWM control. Connecting pin1 and pin2 will send high signal to device and set full on. Connecting pin2 and pin3 will send low signal to device and set off.

2.2 TPS61197EVM Configuration

This EVM requires an external power supply capable of providing 10 V to 30 V at 5 A. To change the default current value (that is, to implement dimming), the user can apply a PWM signal to JP2-pin2.

The hardware connections of TPS61197EVM:

- The DC power supply is connected between J1-pin1 and J1-pin2.
- The LED array is connected to the J2.
- The one single PWM dimming signal can be connected to JP2-pin2.

The range of dimming frequency is 90 Hz to 22 kHz. The output overvoltage protection is set to 60 V, which can be adjusted by R8 in SCH, then can drive different series number of LEDs. To ensure the TPS61197EVM operates properly, the minimum output voltage of the board should be more than the input power voltage. This requires the user to select the LED array carefully to make sure the total forward voltage of the series LEDs is more than the input voltage.

Figure 1 shows the default configuration of jumpers.

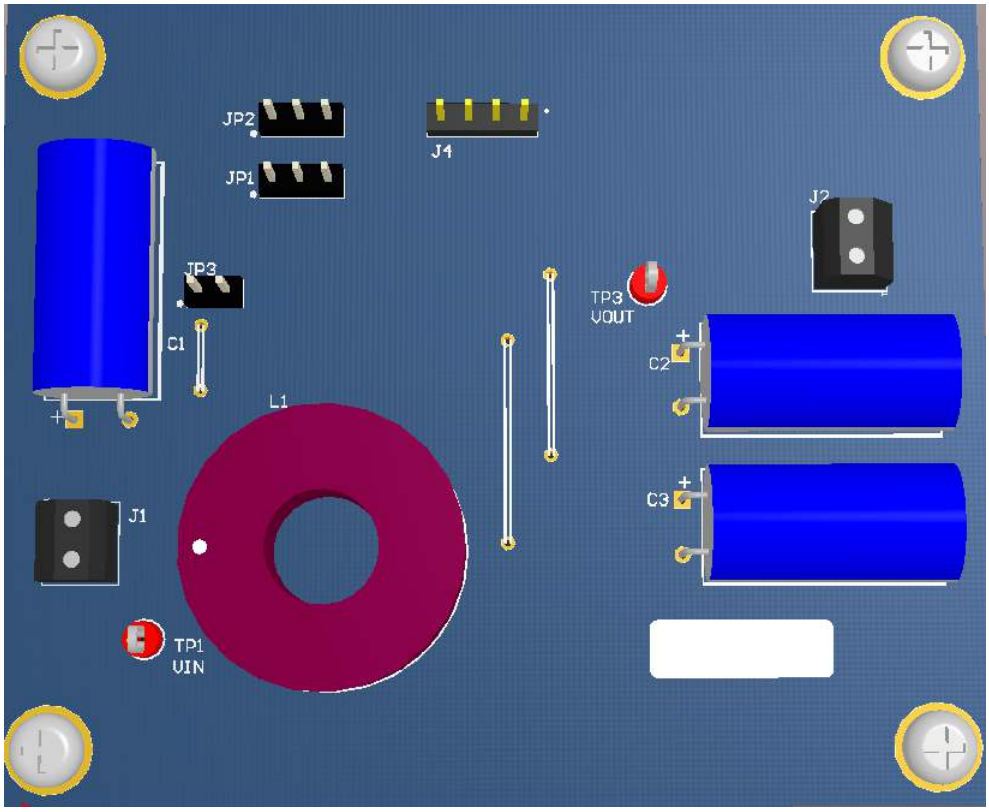

Figure 1. Default Jumper Configuration

3 Operation

3.1 Non-Dimming Operation (Default Configuration)

For non-dimming operation of the TPS61197EVM, connect pin1 and pin2 of JP1, JP2. In this default configuration, the device will power up when power is applied.

3.2 PWM-Dimming Operation

Connect the appropriately configured function generator output between JP2-pin2 and JP2-pin3 (for GND connection) to control PWM1. The PWM signal's duty cycle is directly proportional to the regulated current.

3.3 Test Results

This section provides typical efficiency for the TPS61197EVM board.

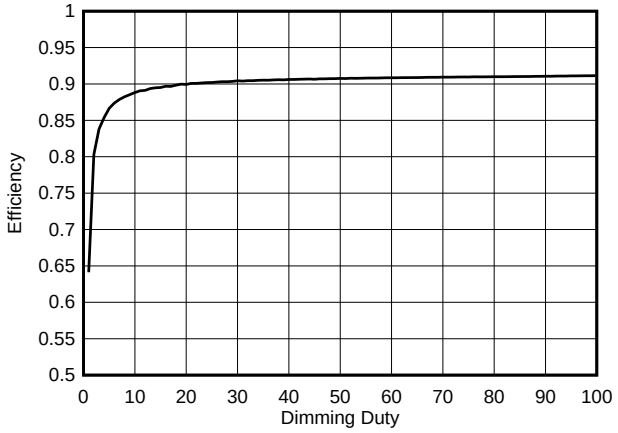

Figure 2. Efficiency v. Dimming Duty
V_{IN} = 24 V, 16 LEDs

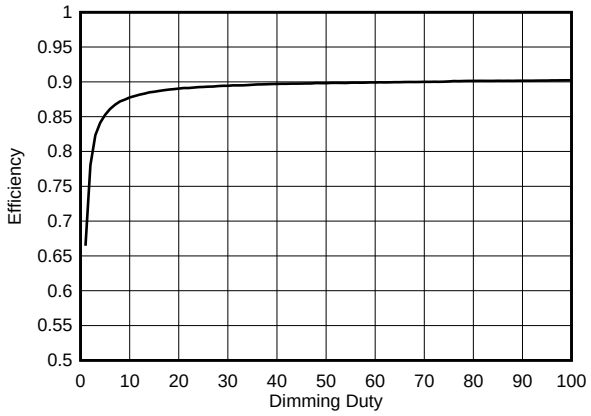

Figure 3. Efficiency v. Dimming Duty
V_{IN} = 24 V, 20 LEDs

4 Board Layout

Figure 4 and Figure 5 show the component placement on the single PCB layer of the TPS61197EVM. The PCB provides 1 oz. copper planes to dissipate heat.

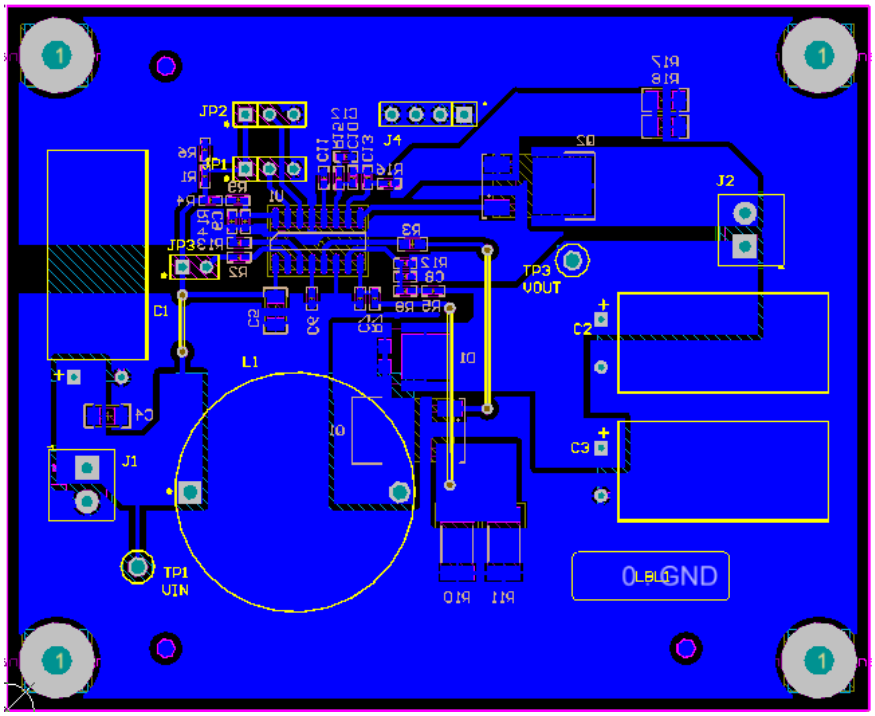

Figure 4. Assembly Layer

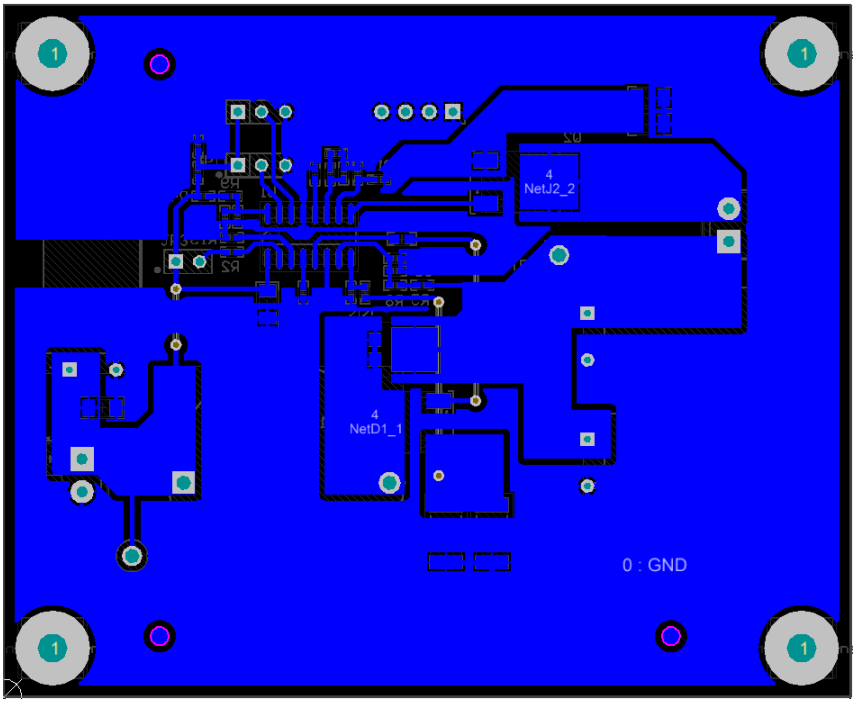

Figure 5. Routing Layer

5 Schematic

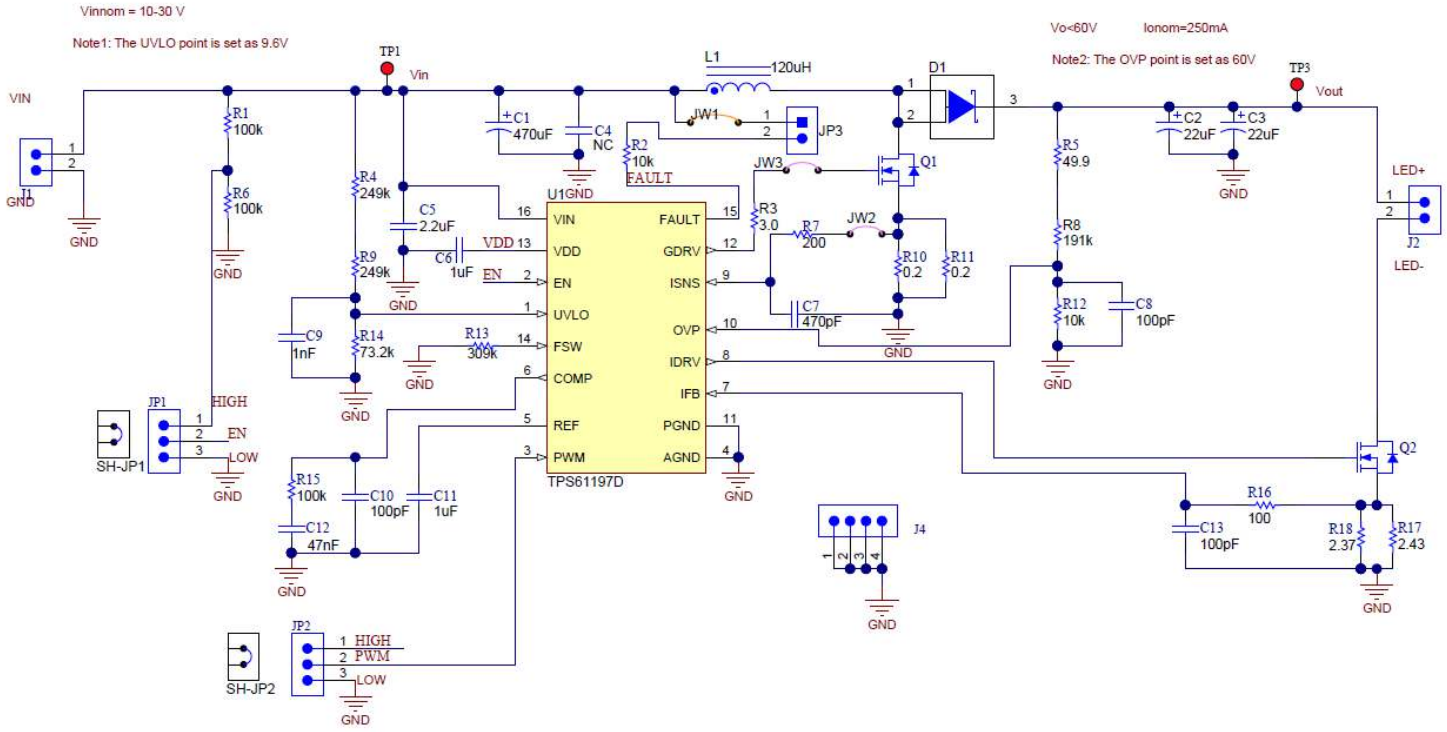

Figure 6. TPS61197EVM Schematic

6 Bill of Materials

REFDES	QUANTITY	VALUE	PACKAGE	PART NUMBER
C1	1	470 µF	CAPPR5-10x20_HorizontalUp	35ZL470MEFC10X20
C2, C3	2	22 µF	CAPPR5-10x20_HorizontalUp	EEUED2E220
C4	1	1 µF	1206	C3216X7R1H105K
C5	1	2.2 µF	1206	GRM31CR61H225KA88L
C6, C11	2	1 µF	402	GRM155R61A105KE15D
C7	1	470 pF	402	C1005C0G1H471J
C8, C10, C13	3	100 pF	402	GRM1555C1H101JA01D
C9	1	1000 pF	402	C1005C0G1E102J
C12	1	0.047 µF	402	GRM155R60J473KA01D
D1	1	SS5P10-M3xx	TO-277[SMPC]	D_SCHOT_SS5P10_
FID1, FID2, FID3	3		Fiducial10-20	Fiducial
H1, H2, H3, H4	4		NY PMS 440 0025 PH	NY PMS 440 0025 PH
H5, H6, H7, H8	4		Keystone_1902C	1902C
J1, J2	2		TERM_BLK_ED555-2DS	ED555/2DS
J4	1		TSW-104-07-G-S	TSW-104-07-G-S
JP1, JP2	2		CONN_PEC03SAAN	PEC03SAAN
JP3	1		CONN_PEC02SAAN	PEC02SAAN
L1	1	120 µH	TRD-PS 0429-TI14	TRD-PS 0429-TI14
LBL1	1		Label_650x200	Size: 0.65" x 0.20 "
Q1, Q2	2	300 V	DPAK	FQD7N30TM
R1, R6, R15	3	100 k	402	CRCW0402100KJNED
R2, R12	2	10 k	402	CRCW040210K0JNED
R3	1	3	603	CRCW06033R00JNEA
R4, R9	2	249 k	402	CRCW0402249KFKED
R5	1	49.9	402	CRCW040249R9FKED
R7	1	200	402	CRCW0402200RFKED
R8	1	191 k	402	CRCW0402191KFKED
R10, R11	2	0.2	2512M	CSRN2512FKR200
R13	1	309 k	402	CRCW0402309KFKED
R14	1	73.2 k	402	CRCW040273K2FKED
R16	1	100	402	CRCW0402100RJNED
R17	1	2.43	1206	CRCW12062R43FKEA
R18	1	2.37	1206	CRCW12062R37FKEA
TP1, TP3	2	Red	Keystone5010	5010
U1	1		D0016A_N	TPS61197D

7 Related Documentation From Texas Instruments

See the TPS61197 datasheet (SLVSC25) for more information.

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      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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- *Reorient or relocate the receiving antenna.*
- *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.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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