TLV62585EVM-824 Evaluation Module

This user's guide describes the characteristics, operation, and use of TI's TLV62585 evaluation module (EVM). This EVM is designed to help the user easily evaluate and test the operation and functionality of the TLV62585 3-A, buck converter. The EVM converts a 2.5-V to 5.5-V input voltage to a regulated 1.8-V output voltage that delivers up to 3 A. This user's guide includes setup instructions for the hardware, a printed-circuit board (PCB) layout, a schematic diagram and a bill of materials (BOM).

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1 Introduction

The TLV62585 device is a high-frequency, synchronous, step-down converter optimized for small solution size and high efficiency. With an input voltage range of 2.5 V to 5.5 V, common battery technologies are supported. The devices focus on high-efficiency, step-down conversion over a wide output current range. At medium to heavy loads, the converter operates in PWM mode and automatically enters *Power Save Mode* operation at light load to maintain high efficiency over the entire load current range. The internal compensation circuit allows a compact solution and small external components. Together with its adaptive off-time control architecture, excellent load transient performance, and output voltage regulation accuracy are achieved. The device is available in a 2-mm × 2-mm, 12-pin QFN package.

1.1 Background

The TLV62585EVM-824 uses the TLV62585 step-down converter and it is set to 1.8-V output. The EVM operates with full-rated performance with an input voltage between 2.5 V and 5.5 V.

1.2 Performance Specification

Table 1 provides a summary of the TLV62585EVM-824 performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1. Performance Specification Summary

Specification	Test Conditions	MIN	TYP	MAX	Unit
Input voltage		2.5		5.5	V
Output voltage			1.8		V
Output current		0		3	A

1.3 Modifications

The PCB for this EVM is designed to accommodate additional output capacitors C5 and C6.

1.3.1 Input and Output Capacitors

C4, C5, and C6 are provided for additional output capacitors. These capacitors are not required for proper operation but can be used to reduce the output voltage ripple and to improve the load transient response. The total output capacitance must remain within the recommended range in the TLV62585 data sheet (SLVSDE5) for proper operation.

1.3.2 Adjustable-Output IC U1 Operation

U1 is configured for evaluation of the adjustable-output version. This unit is set to 1.8 V. Resistors R1 and R2 can be used to set the output voltage between 0.6 V and Vin. See the TLV62585 data sheet (SLVSDE5) for the recommended values.

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2 Setup

This section describes how to properly use the TLV62585EVM-824.

2.1 Connector Descriptions

J1, pin 1 and pin 2 – VIN	Positive input voltage connection from the input supply for the EVM
J1, pin 3 and pin 4 – S+/S–	Input voltage sense connections. Measure the input voltage at this point.
J1, pin 5 and pin 6 – GND	Input return connection from the input supply for the EVM
J2, pin 1 and pin 2 – VOUT	Positive output voltage connection
J2, pin 3 and pin 4 – S+/S–	Output voltage sense connections. Measure the output voltage at this point.
J2, pin 5 and pin 6 – GND	Output return connection
J3 – PG/GND	The PG output appears on pin 1 of this header with a convenient ground on pin 2.
JP1 – EN	EN pin jumper. Place the supplied jumper across ON and EN to turn on the IC. Place the jumper across OFF and EN to turn off the IC.
JP2	Place the supplied jumper across both pins to reference the PG signal to VOUT.

2.2 EVM Setup

To operate the EVM, set jumpers JP1 and JP2 to the desired positions per Section 2.1. Connect the input supply to J1, between VIN and GND and connect the load to J2 between VOUT and GND.

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3 Board Layout

This section provides the TLV62585EVM-824 board layout and illustrations. The Gerbers are available on the EVM product page: TLV62585EVM-824.

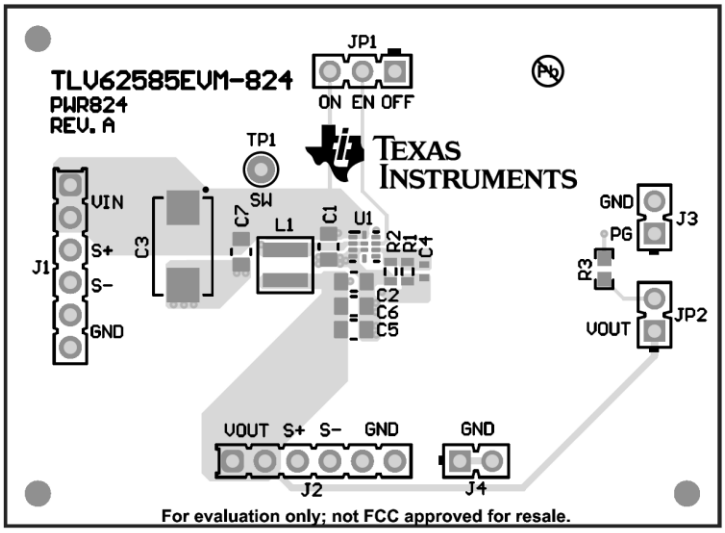


Figure 1. Assembly Layer

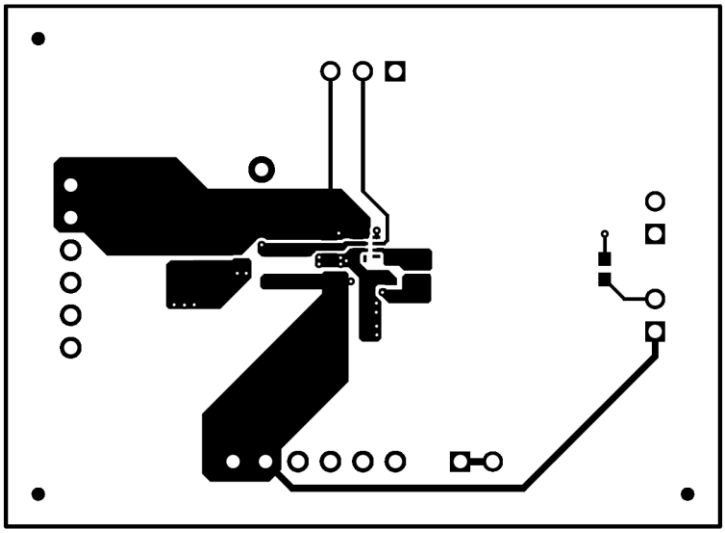


Figure 2. Top Layer

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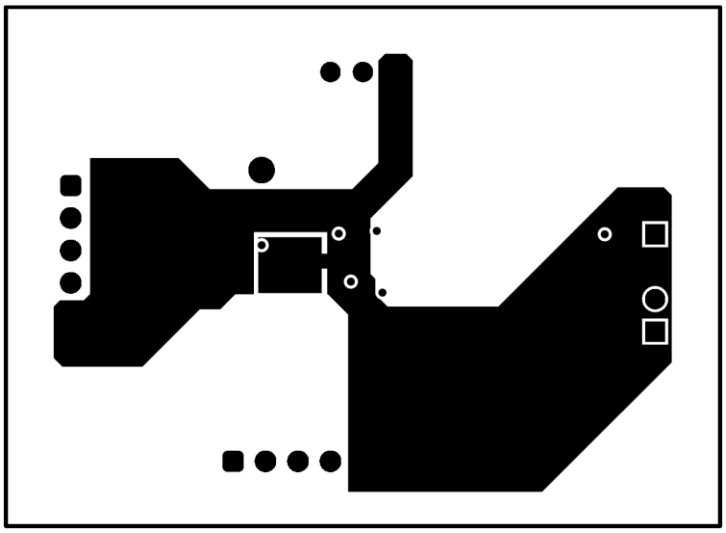


Figure 3. Internal Layer-1 Routing

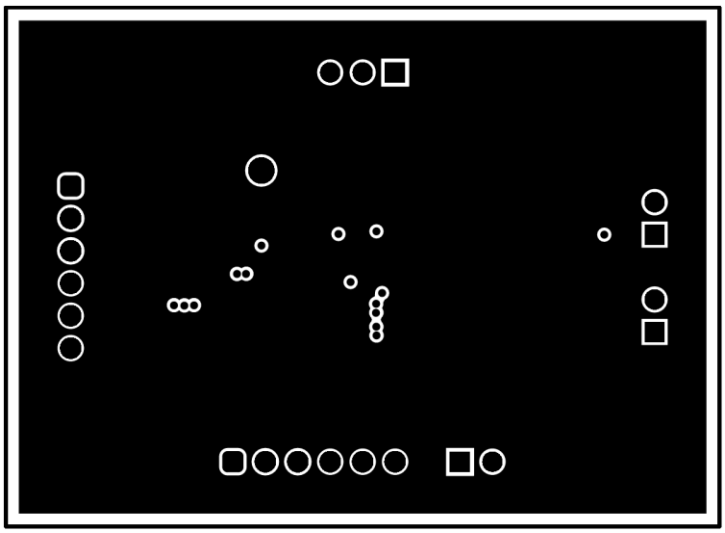


Figure 4. Internal Layer-2 Routing

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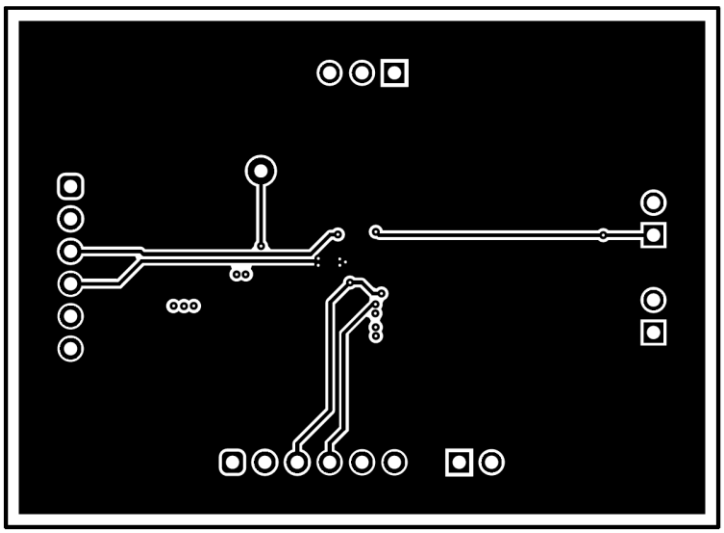


Figure 5. Bottom Layer

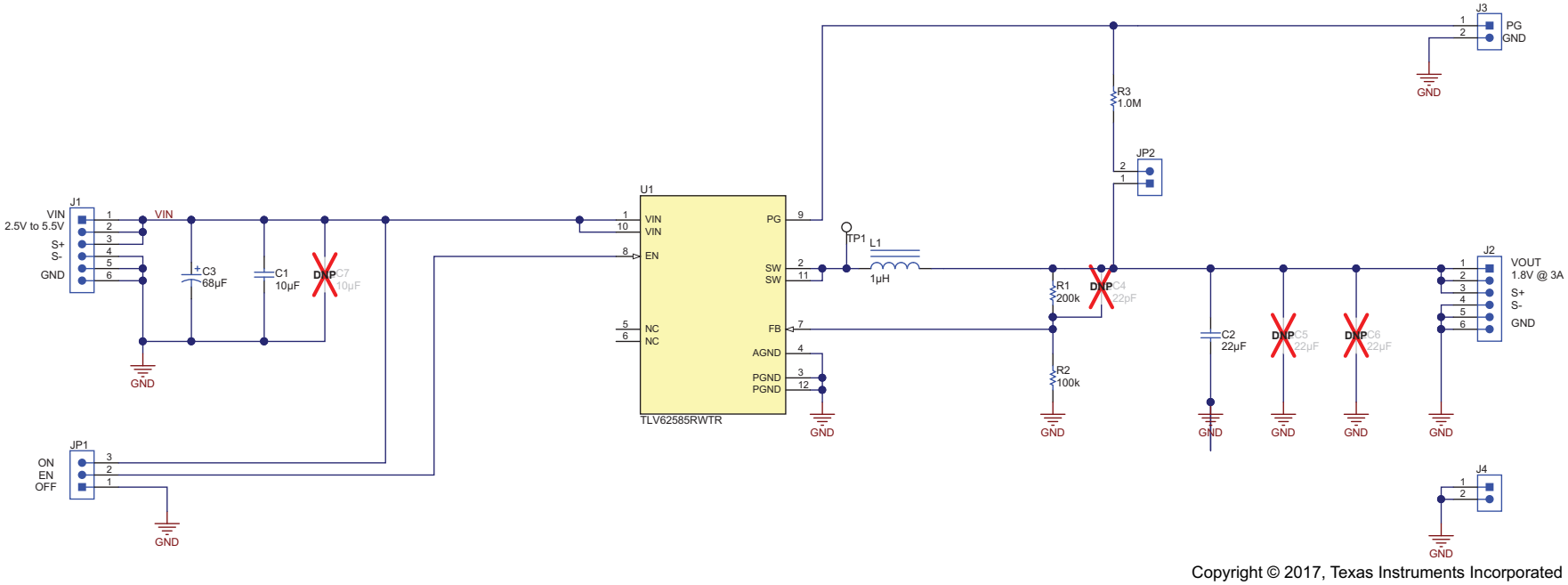
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4 Schematic and Bill of Materials

This section provides the TLV62585EVM-824 schematic and bill of materials.

4.1 Schematic

Figure 6 illustrates the TLV62585EVM-824 schematic.



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Figure 6. TLV62585EVM-824 Schematic

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4.2 Bill of Materials

Table 2 lists the TLV62585EVM-824 BOM.

Table 2. TLV62585EVM-824 Bill of Materials

Count	Ref Des	Value	Description	Size	Part Number	Manufacturer
1	C1	10uF	CAP, CERM, 10 µF, 10 V, +/- 20%, X7R, 0805	0805	GRM21BR71A106ME51L	Murata
1	C2	22uF	CAP, CERM, 22 µF, 6.3 V, +/- 20%, X7T, 0805	0805	GRM21BD70J226ME44L	Murata
1	C3	68uF	CAP, TA, 68 µF, 10 V, +/- 10%, 0.07 ohm, SMD	7343-20	T495V686K010ATE070	Kemet
1	L1	1uH	Inductor, Shielded, Composite, 1 µH, 5.4 A, 0.01 ohm, SMD	4x2x4mm	XFL4020-102MEB	Coilcraft
1	R1	200k	RES, 200 k, 1%, 0.1 W, 0603	0603	CRCW0603200KFKEA	Vishay-Dale
1	R2	100k	RES, 100 k, 1%, 0.1 W, 0603	0603	CRCW0603100KFKEA	Vishay-Dale
1	R3	1.0Meg	RES, 1.0 M, 5%, 0.1 W, 0603	0603	CRCW06031M00JNEA	Vishay-Dale
1	U1	TLV62585	High Efficiency 3-A Step-Down Converter in 2-mm × 2-mm VSON Package, TLV62585	2x2mm	TLV62585	TI

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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.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *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 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. 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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http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

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If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
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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