TPS62684EVM-647 Evaluation Module

This user's guide describes the characteristics, operation, and use of the TPS62684EVM-647 (PWR647-001) evaluation module (EVM). The TPS62684EVM-647 is a fully assembled and tested platform for evaluating the performance of the TPS62684 high-frequency, synchronous, step-down dc-dc converter optimized for battery-powered portable applications. This document includes a schematic diagram, a printed circuit board (PCB) layout, and a bill of materials.

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1 Introduction

The TPS62684 device is a high-frequency, synchronous, step-down dc-dc converter optimized for battery-powered portable applications. Intended for low-power applications, the TPS62684 supports up to 1600-mA of load current and allows the use of low-cost chip inductors and capacitors. The TPS62684 operates at a regulated 5.5-MHz switching frequency with spread spectrum dithering.

1.1 Features

- Input voltage range 3.25 V to 5.5 V
- 1600 mA Output Current
- 2.85V Fixed output voltage
- Best in class load and line transient
- Spread spectrum, PWM frequency dithering
- Total solution size of less than 12 mm^2
- Active Output Discharge

1.2 Applications

- Cell phones, smartphones
- Tablet PC
- Digital TV, WLAN, GPS, and Bluetooth

2 TPS62684EVM-647 Schematic

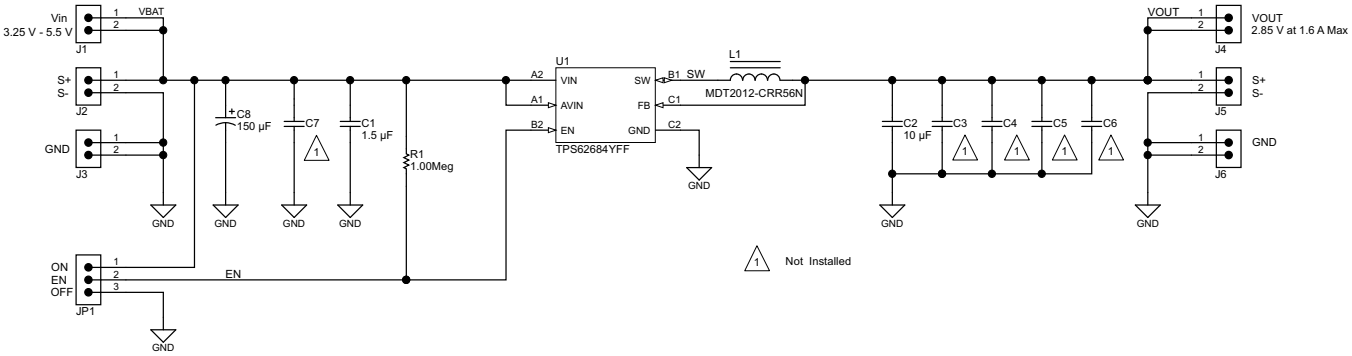

Figure 1. TPS62684EVM-647 Schematic

3 Connector Descriptions

3.1 Input/Output Connectors: TPS62684EVM-647

3.1.1 J1 – VIN

This header is the positive connection to the input power supply. The power supply must be connected between J1 (VIN) and J3 (GND). The leads to the input supply must be twisted and kept as short as possible. The input voltage must be between 3.25 V and 5.5 V.

3.1.2 J2 – S+/S–

J2 S+/S– are the sense connections for the input of the converter. Connect a voltmeter, sense connection of a power supply, or oscilloscope to this header.

3.1.3 J3 – GND

This header is the return connection to the input power supply. Connect the power supply between J3 (GND) and J1 (VIN). The leads to the input supply must be twisted and kept as short as possible.

3.1.4 J4 – VOUT

This header is the positive output of the step-down converter. A load can be connected between J6 (GND) and J4 (VOUT).

3.1.5 J5 – S+/S-

J5 S+/S– are the sense connections for the output of the converter. Connect a voltmeter, sense connection of an electronic load, or oscilloscope to this header.

3.1.6 J6 – GND

J8 is the return connection of the converter. A load can be connected between J4 (VOUT) and J6 (GND).

3.2 Jumpers

3.2.1 JP1 – ENABLE

This jumper enables/disables the converter on the EVM. Placing a shorting jumper between EN and ON turns on the converter. Placing a shorting jumper between EN and OFF disables the converter.

4 TPS62684EVM-647 Test Data

The TPS62684EVM-647 was used to take the data in the TPS62684 data sheet, SLVSAC5. See the device data sheet for the performance of this EVM.

4.1 Thermal Performance

Figure 2 shows the typical thermal performance of the TPS62684EVM-647.

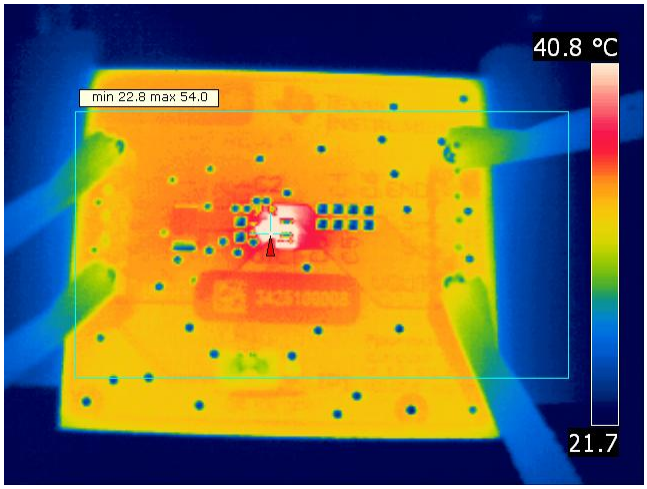

Figure 2. Thermal Performance for the TPS62684 (VIN = 5.5 V, Load = 1600 mA)

4.2 Loop Response

Figure 3 shows the bode plot of the TPS62684EVM-647.

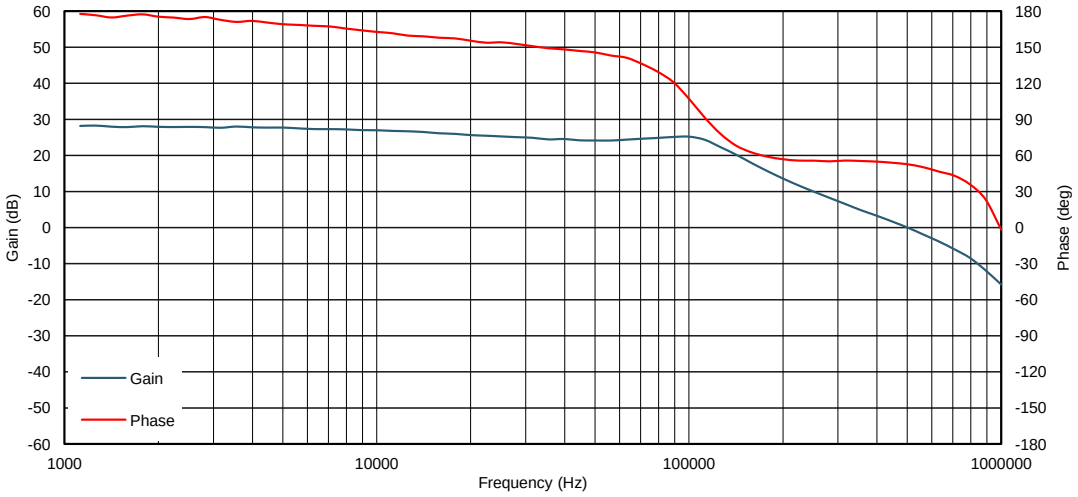

Figure 3. Loop Response for the TPS62684 (VIN = 5 V, Load = 1600 mA)

5 TPS62684EVM-647 Board Layout

Figure 4 through Figure 8 show the design of the TPS62684EVM-647 printed-circuit boards (PCBs). The gerbers are available on the EVM product page: TPS62684EVM-647.

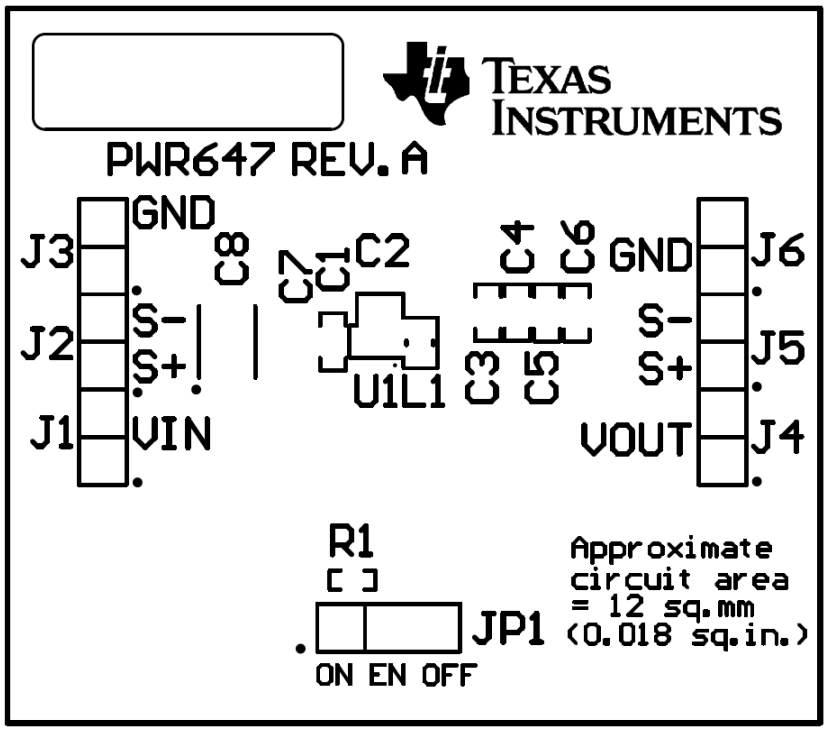

Figure 4. TPS62684EVM-647 Top Silkscreen (Top View)

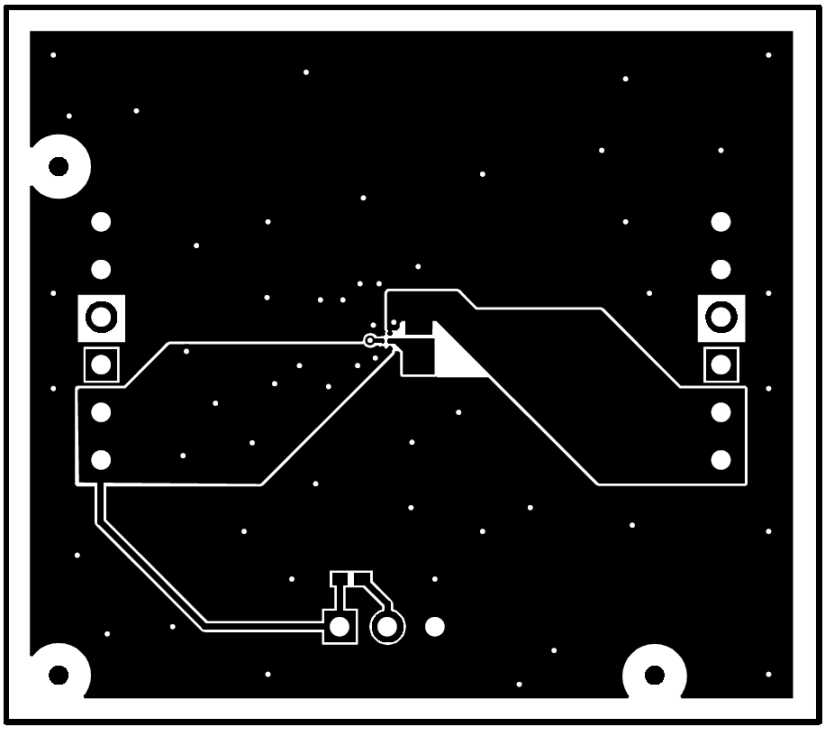

Figure 5. TPS62684EVM-647 Top Copper (Top View)

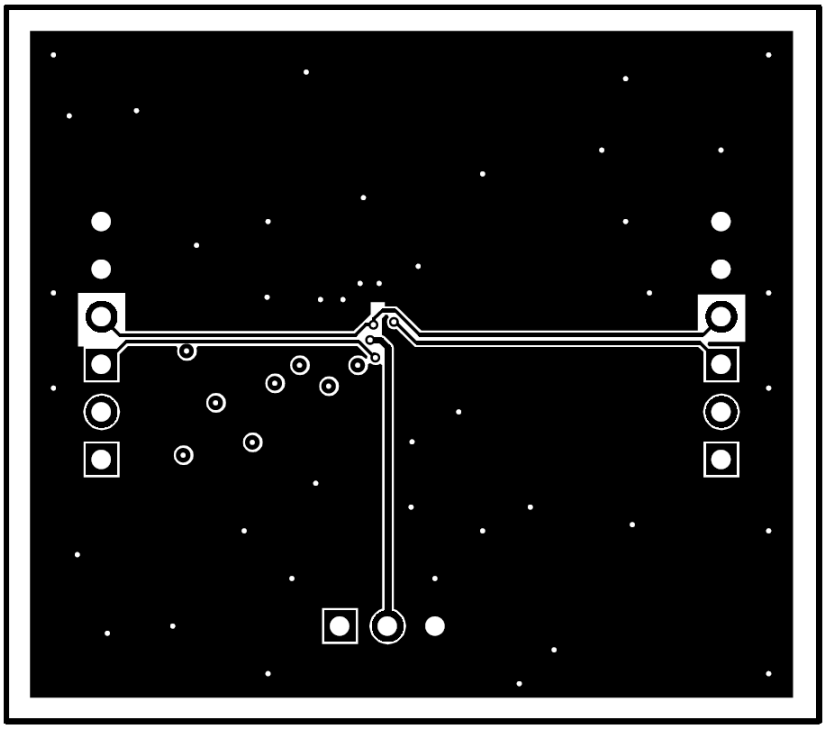

Figure 6. TPS62684EVM-647 Layer 2 Copper

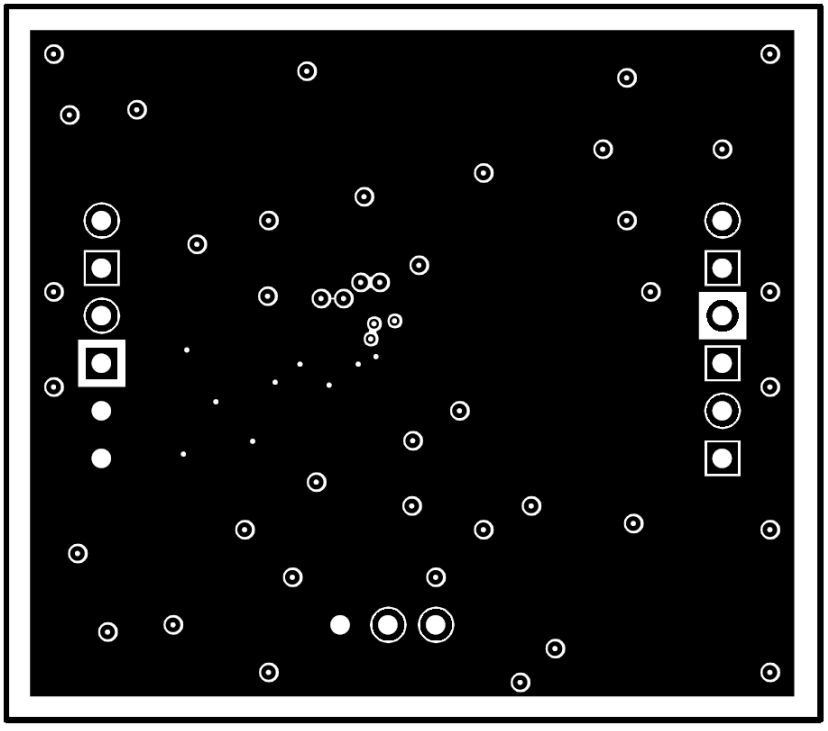

Figure 7. TPS62684EVM-647 Layer Copper

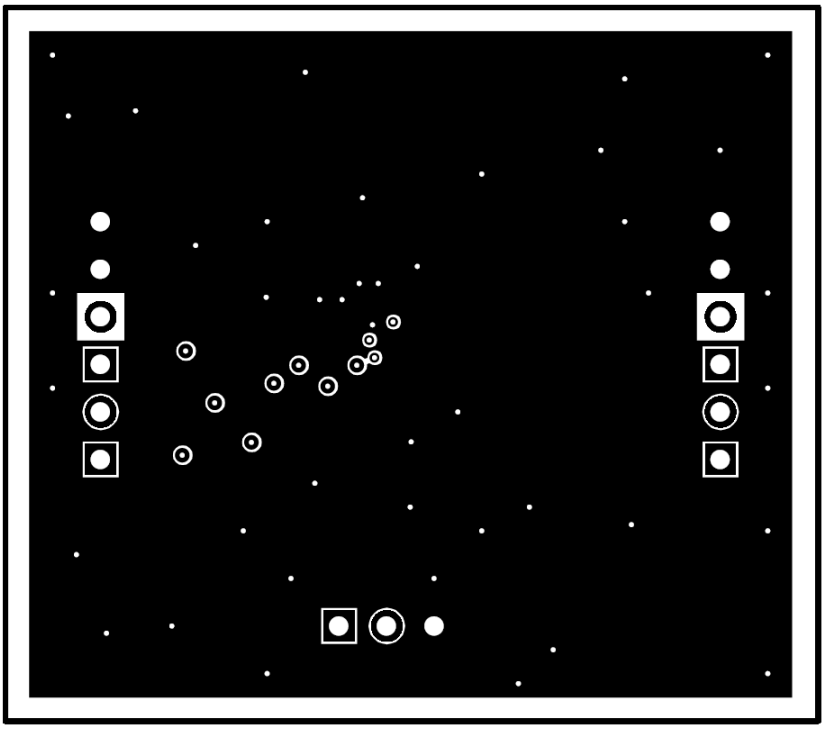

Figure 8. TPS62684EVM-647 Bottom Copper (Bottom View)

6 TPS62684EVM-647 Bill of Material

Table 1 lists the bill of materials for the TPS62684EVM-647.

Table 1. Bill of Material for the TPS62684EVM-647

TPS62684EVM-647 (PWR647-001)						
Qty	RefDes	Value	Size	Description	Part Number	Manufacturer
1	C1	150 µF	3528	Capacitor, Tantalum Poly, 6.3 V, 70 mΩ, 20%	T520B157M006ATE070	Kemet
1	C2	1.5 µF	0402	Capacitor, Ceramic, 6.3 V, X5R, 20%	GRM155R60J155ME80	Murata
1	C3	10 µF	0603	Capacitor, Ceramic, 6.3 V, X5R, 20%	GRM188R60J106ME84	Murata
1	L1	0.56 µH	0805	Inductor, SMT, 2.35 A, 65 mΩ	MDT2012-CRR056N	Toko
1	U1	TPS62684	1.431 mm x 1.135 mm	IC, 2.85-V, 1600-mA, Synchronous Step-Down Converter	TPS62684YFF	TI

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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.

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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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