TPS62842EVM-103 User's Guide

The TPS62842EVM-103 facilitates the evaluation of the TPS62842DGR of 750-mA, step-down converter with 60-nA I_Q in a DGR package. The EVM has output voltages between 1.8 V and 3.6 V from higher input voltages between 1.8 V and 6.5 V. Due to its extremely low I_Q, the TPS6284x provides a long battery lifetime for systems which have very low current consumption states such as building automation, metering, and the Internet of Things (IoT).

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Trademarks

1 Introduction

The TPS6284x is a family of synchronous, step-down converters in different packages. The TPS62842EVM-103 contains the TPS62842DGR device in a DGR package. The DGR package is a bigger package than DLC (SON) and YBG (WCSP) packages but it has better thermal performance.

1.1 Performance Specification

Table 1 provides a summary of the TPS62842EVM-103 performance specifications.

Table 1. Performance Specification Summary

SPECIFICATION	MIN	TYP	MAX	UNIT
Input voltage	1.8	3.6	6.5	V
Output voltage		3.3		V
Output current	0		750	mA

1.2 Modifications

The printed-circuit board (PCB) for this EVM uses the adjustable output voltage version of this integrated circuit (IC). Additional input and output capacitors can also be added. Finally, the loop response of the IC can be measured.

1.2.1 Adjusting the Output Voltage

The output voltage is adjusted though the choice of R11 and R14 resistors. Since R11 and R14 are in parallel, only R11 or R14 should be installed at the same time. R11 and R14 are 0603 sizes to make it easy to change the output voltage by replacing them. However, 0201 size resistors can also be used to reduce the total solution size.

1.2.2 Input and Output Capacitors

C14 is provided for an additional input capacitor. This capacitor is not required for proper operation but can be used to reduce the input voltage ripple.

C15, C16, and C17 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 data sheet for proper operation.

1.2.3 Loop Response Measurement

The loop response of the EVM can be measured with two simple changes to the circuitry. First, cut the trace between the VOS pin and the output capacitor on the top layer. This change is shown in Figure 1. Second, install a 10-Ω resistor across the resistor pads on the back of the PCB at R13. The pads are spaced to allow installation of an 0603-sized resistor. With these changes, an ac signal (10-mV, peak-to-peak amplitude recommended) can be injected into the control loop across the added resistor. Details of measuring the control loop of DCS-Control devices are found in *How to Measure the Control Loop of DCS-Control™ Devices*.

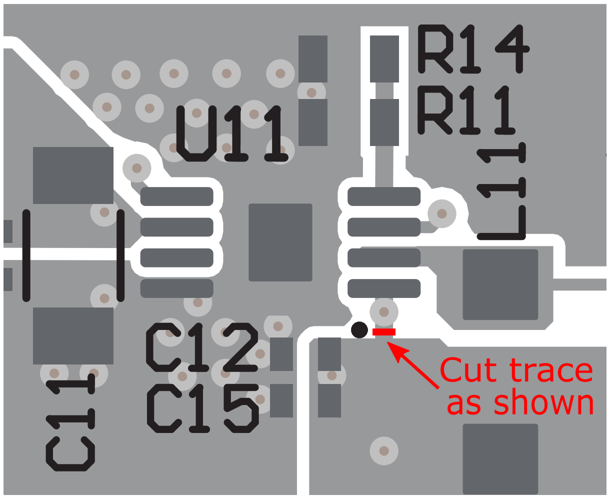

Figure 1. Loop Response Measurement Modification

2 Setup

This section describes how to properly use the TPS62842EVM-103.

2.1 *Input/Output Connector Descriptions*

J11, Pin 1 and 2 – VIN	Positive input connection from the input supply for the EVM.
J11, Pin 3 and 4 – S+/S-	Input voltage sense connections. Measure the input voltage at this point.
J11, Pin 5 and 6 – GND	Input return connection from the input supply for the EVM.
J12, Pin 1 and 2 – VOUT	Output voltage connection.
J12, Pin 3 and 4 – S+/S-	Output voltage sense connections. Measure the output voltage at this point.
J12, Pin 5 and 6 – GND	Output return connection.
JP11 – EN	EN pin input 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.
JP12 – MODE	MODE pin input jumper. Place the supplied jumper across PWM and MODE to operate in forced PWM mode. Place the jumper across PFM and MODE to operate in power save mode with an automatic transition to PWM mode at higher load currents.

2.2 *Setup*

To operate the EVM, set jumpers JP11 through JP13 to the desired position per Section 2.1. Connect the input supply to J11 and connect the load to J12.

3 TPS62842EVM-103 Test Results

The TPS62842EVM-103 was used to take all the data in the *1.8V-6.5V, 750mA, 60nA I_Q Step-Down Converter* data sheet. See the device data sheet for the performance of this EVM.

Figure 2 shows the thermal performance of the EVM.

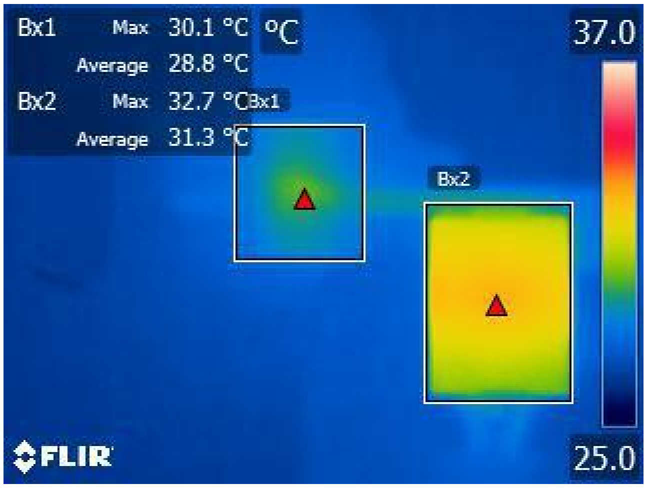

Figure 2. TPS62842 Thermal Performance (V_{IN} = 6.5 V, V_{OUT} = 3.6 V, I_{OUT} = 750 mA)

4 Board Layout

This section provides the TPS62842EVM-103 board layout and illustrations in Figure 3 through Figure 9.

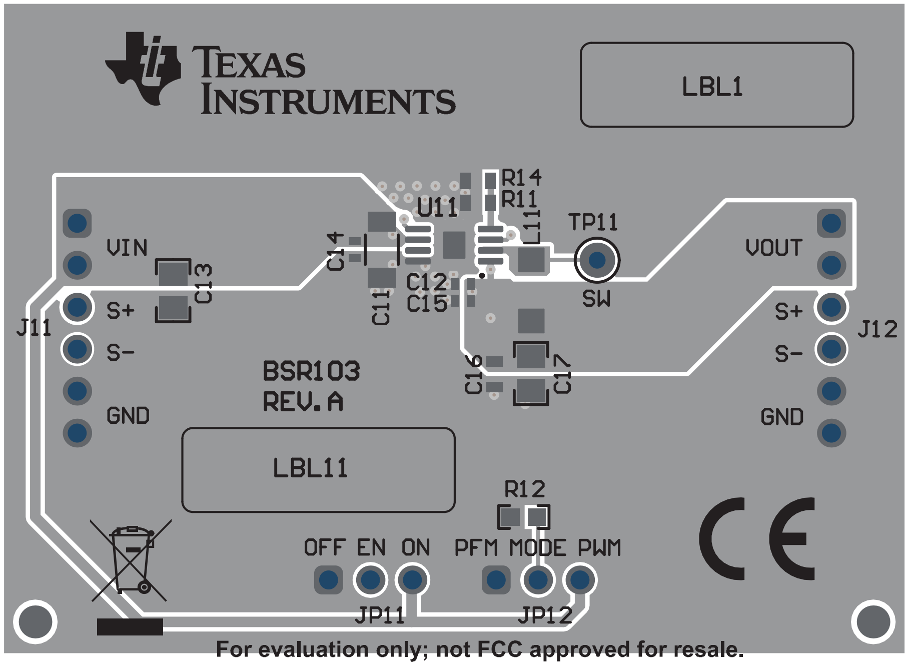

Figure 3. Top Assembly

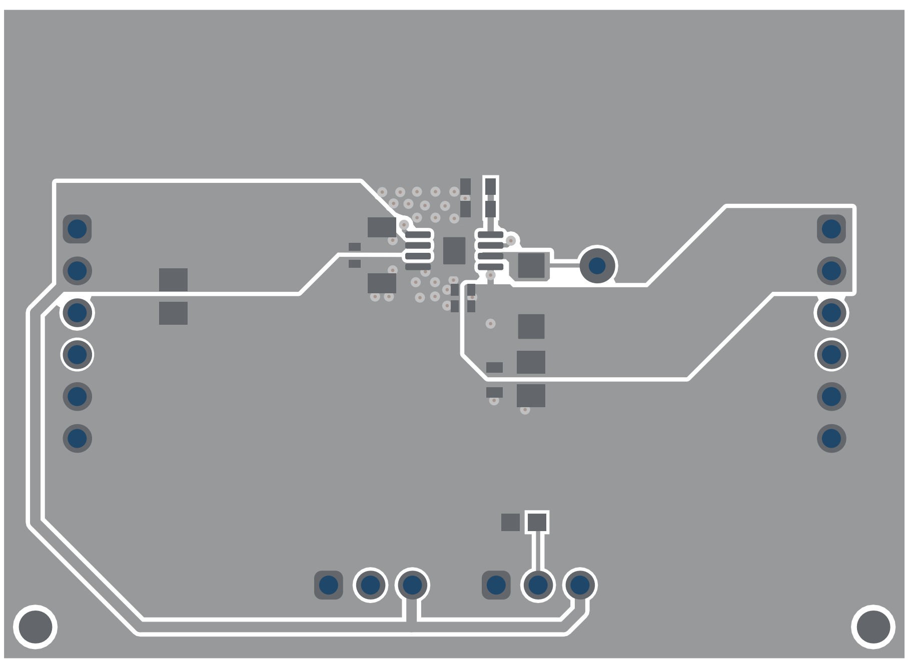

Figure 4. Top Layer

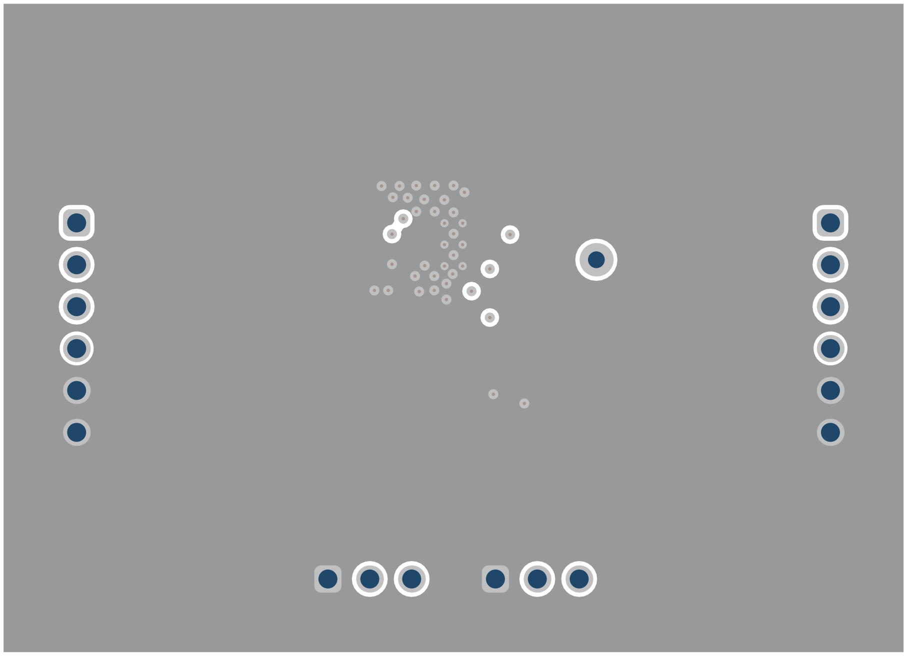

Figure 5. Internal Layer 1

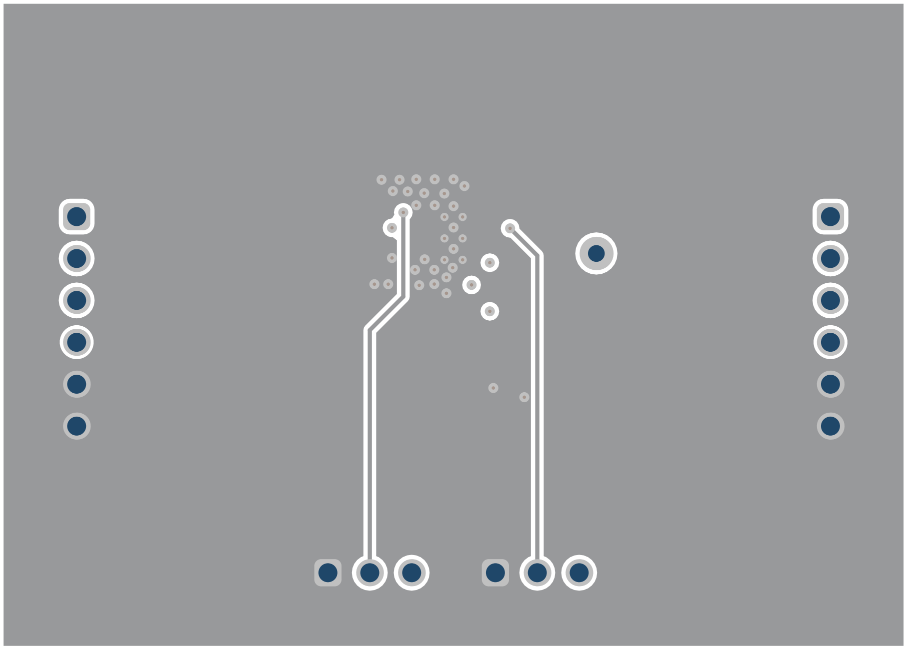

Figure 6. Internal Layer 2

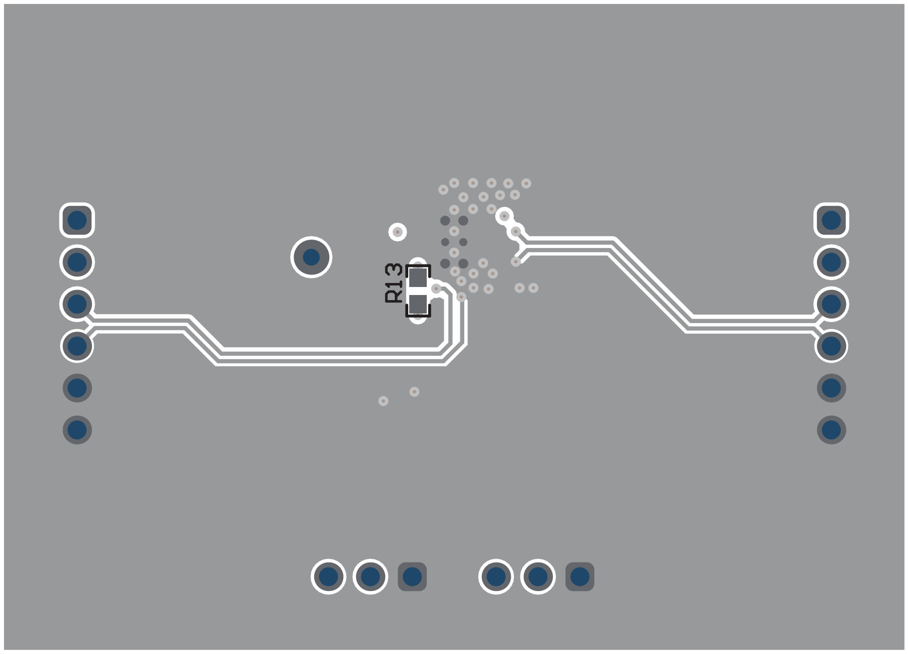

Figure 7. Bottom Layer

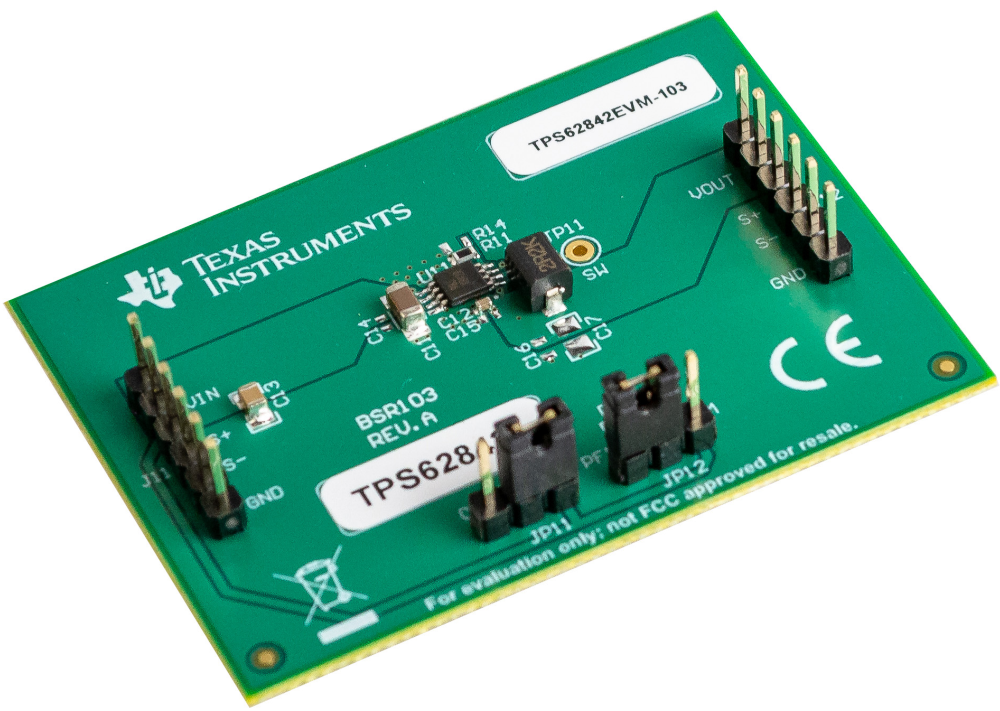

Figure 8. TPS62842EVM-103 Angled View

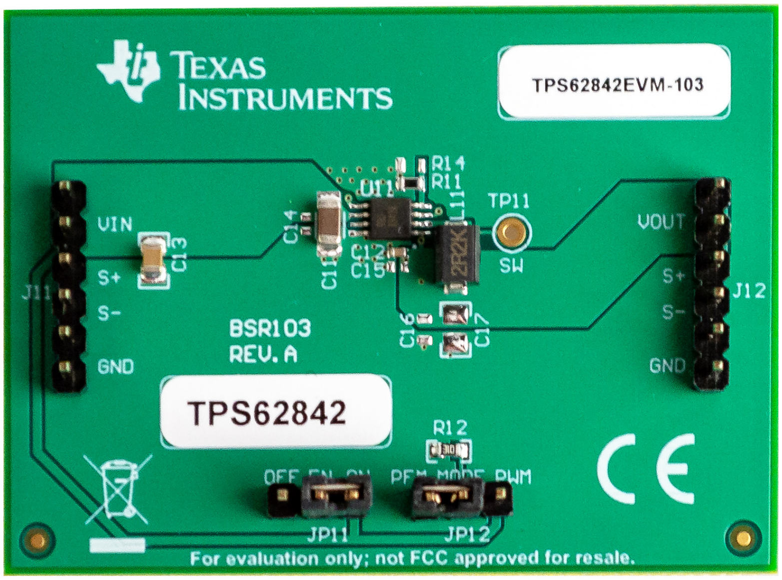

Figure 9. TPS62842EVM-103 Top View

5 Schematic and List of Materials

This section provides the TPS62842EVM-103 schematic and List of Materials.

5.1 Schematic

Figure 10 illustrates the TPS62842EVM-103 schematic.

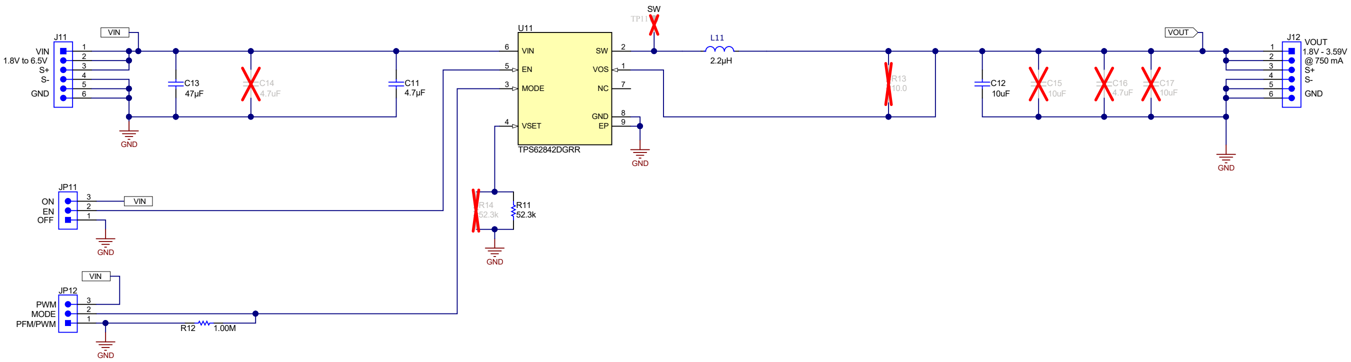

Figure 10. TPS62842EVM-103 Schematic

5.2 List of Materials

Table 2 lists the TPS62842EVM-103 list of materials.

Table 2. TPS62842EVM-103 List of Materials

REF DES	QTY	DESCRIPTION	PART NUMBER	MANUFACTURER
C11	1	Capacitor, ceramic, 4.7 µF, 50 V, ±20%, X7R, 1206	GRM31CR71H475MA12L	Murata
C12	1	Capacitor, ceramic, 10 µF, 6.3 V, ±20%, X5R, 0402	GRM155R60J106ME15D	Murata
C13	1	Capacitor, ceramic, 47 µF, 10 V, ±20%, X5R, 0805	GRM21BR61A476ME15L	Murata
L11	1	Inductor, Unshielded, metal composite, 2.2 µH, 850 mA, 180 mΩ, SMD	CC453232-2R2KL	Bourns
R11	1	Resistor, 52.3 kΩ, 1%, 0.05 W, 0201	Std	Std
R12	1	Resistor, 1.00 MΩ, 1%, 0.1 W, 0603	Std	Std
U11	1	1.8 V to 6.5 V, 750 mA, 60 nA I_Q Step Down Converter in DGR Package	TPS62842DGR	Texas Instruments