User's Guide

TPS62442EVM-122 User's Guide

Table of Contents

List of Figures

List of Tables

Trademarks

1 Introduction

The TPS62442-Q1 device is a high-frequency, synchronous, dual step-down converter optimized for a small solution size and high efficiency. The devices focus on high-efficiency, dual step-down conversion over a wide output current range. The internal compensation circuit allows a compact solution and small external components. The device is available in a 2.7-mm × 2.3-mm, including pins in a VQFN package.

1.1 Performance Specification

Table 1-1 provides a summary of the TPS62442EVM-122 performance specifications.

Table 1-1. Performance Specification Summary

SPECIFICATION		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage			2.7		6.0	V
Output voltage setpoint				1.8 / 1.8		V
Output current	TPS62442EVM-122		0		2.0 / 2.0	A

1.2 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate the different adjustable output voltage versions of this integrated circuit (IC). On the EVM, additional input and output capacitors can be added and the switching frequency can be modified.

1.2.1 Input and Output Capacitors

Footprints for an additional output capacitors (C15 to C20) are provided. These capacitors are not required for proper operation but can be used to reduce output voltage ripple and to improve the load transient response. For proper operation, the total output capacitance must remain within the recommended range described in the *TPS6244x-Q1 2.75-V to 6-V Dual Step-Down Converter with Adjustable Frequency in a QFN Package* data sheet.

1.2.2 Adjustable-Output IC U1 Operation

U1 is configured for evaluation of the adjustable-output version. This unit is set to 1.8 V for both outputs. Resistors R1, R2 and R3, R4 can be used to set the output voltage between 0.6 V and 5.5 V. For recommended values, see the *TPS6244x-Q1 2.75-V to 6-V Dual Step-Down Converter with Adjustable Frequency in a QFN Package* data sheet.

1.2.3 Feedforward Capacitor

C9 and C10 are the feedforward capacitors. For recommended values, see the *TPS6244x-Q1 2.75-V to 6-V Dual Step-Down Converter with Adjustable Frequency in a QFN Package* data sheet.

1.2.4 Switching Frequency and Control Loop Compensation

R7 controls the switching frequency of the converter. It is also used to select a predefined control loop compensation setting. For recommended values, see the *TPS6244x-Q1 2.75-V to 6-V Dual Step-Down Converter with Adjustable Frequency in a QFN Package* data sheet.

2 Setup

This section describes how to correctly use the TPS62442EVM-122.

2.1 Connector Descriptions

J1, Pin 1 and 2 – VIN	Positive input voltage connection from the input supply for the EVM
J1, Pin 3 and 4 – S+/S–	Input voltage sense connections. Measure the input voltage at this point.
J1, Pin 5 and 6 – GND	Input return connection from the input supply for the EVM
J2, Pin 1 and 2 – VOUT	Converter 1 positive output voltage connection
J2, Pin 3 and 4 – S+/S–	Converter 1 output voltage sense connections. Measure the output voltage at this point.
J2, Pin 5 and 6 – GND	Converter 1 output return connection
J3, Pin 1 and 2 – VOUT	Converter 2 positive output voltage connection
J3, Pin 3 and 4 – S+/S–	Converter 2 output voltage sense connections. Measure the output voltage at this point.
J3, Pin 5 and 6 – GND	Converter 2 output return connection
JP1 – EN1	EN1 pin jumper. Place the supplied jumper across ON and EN to turn on the IC converter 1. Place the jumper across OFF and EN to turn off the IC.
JP2 – EN2	EN2 pin jumper. Place the supplied jumper across ON and EN to turn on the IC converter 2. Place the jumper across OFF and EN to turn off the IC.
JP3 – MODE/SYNC	MODE/SYNC pin jumper. Place the supplied jumper across VIN and MODE/SYNC to force the device in fixed frequency PWM operation at all load currents. Place the jumper across MODE/SYNC and GND to enable power save mode. Connect a clock signal to MODE/SYNC referenced to GND to synchronize the switching frequency to the clock signal.
J4 – PG1	The PG1 output appears on pin 1 of this header with a convenient ground on pin 2 for converter 1.
J5 – PG2	The PG2 output appears on pin 1 of this header with a convenient ground on pin 2 for converter 2.

2.2 Hardware Setup

To operate the EVM, set jumpers JP1, JP2, and JP3 to the desired positions per Section 2.1. Connect the input supply to J1 between VIN and GND. Connect the load to J2 between VOUT1 and GND and Connect the load to J3 between VOUT2 and GND.

3 TPS62442EVM-122 Test Results

The TPS62442EVM-122 was used to take the typical characteristics data in the TPS6244x-Q1 data sheet. See the *TPS6244x-Q1 2.75-V to 6-V Dual Step-Down Converter with Adjustable Frequency in a QFN Package* data sheet for the performance of this EVM.

4 Board Layout

This section provides the TPS62442EVM-122 board layout. The Gerber files are available on the TPS628502EVM-092 tool page.

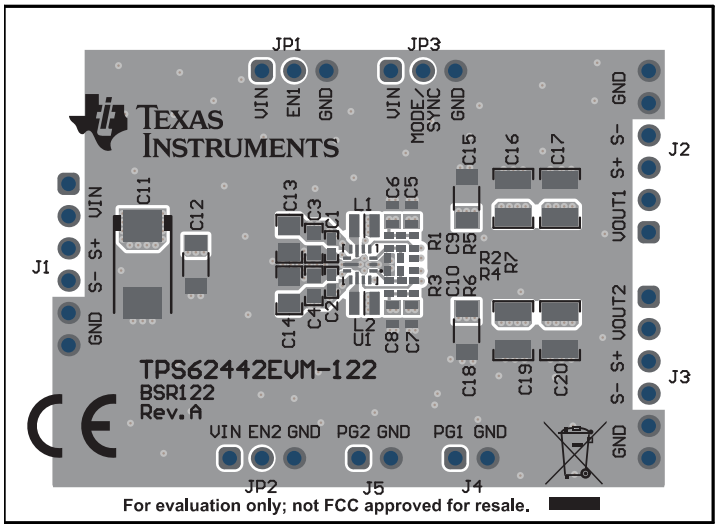

Figure 4-1. Top Silk

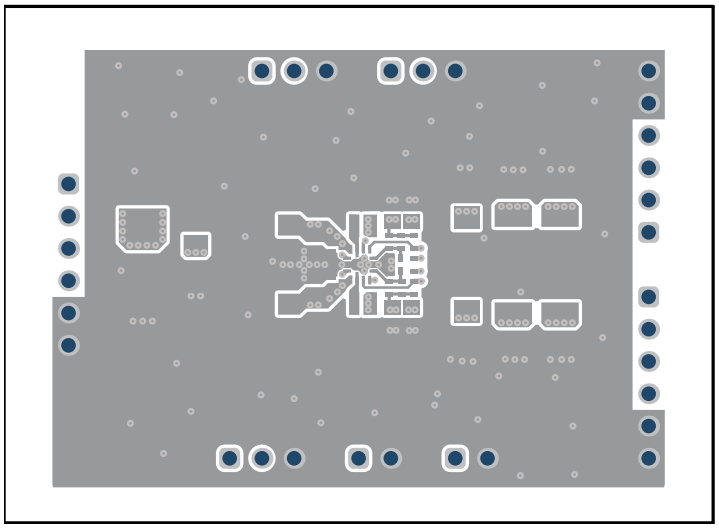

Figure 4-2. Top Layer

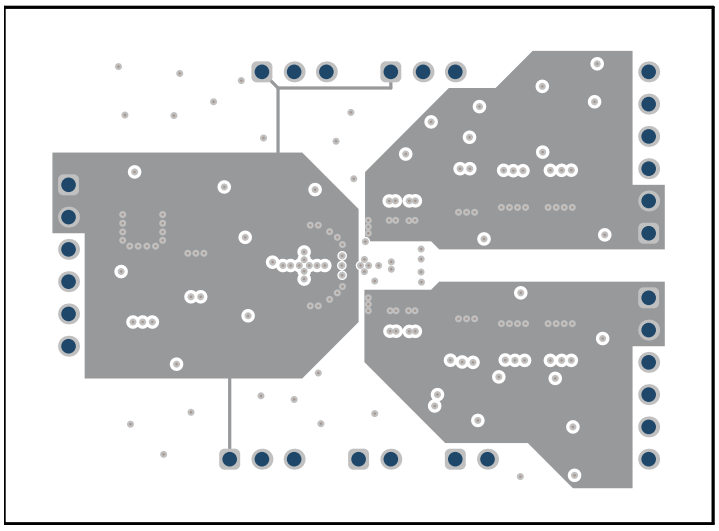

Figure 4-3. Layer 2

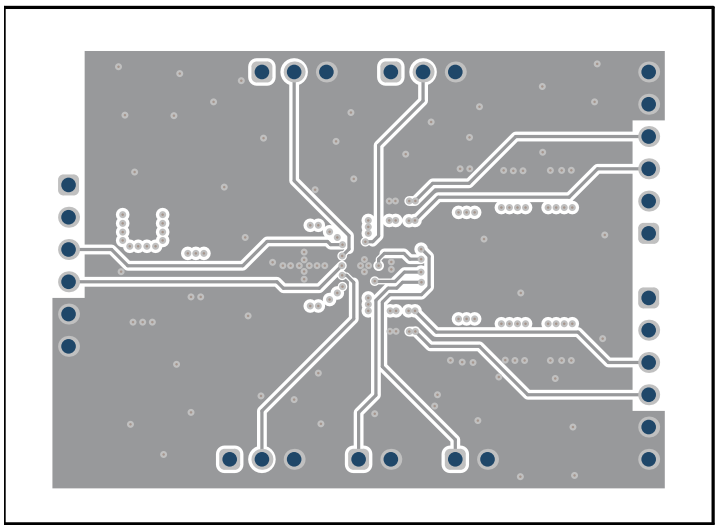

Figure 4-4. Layer 3

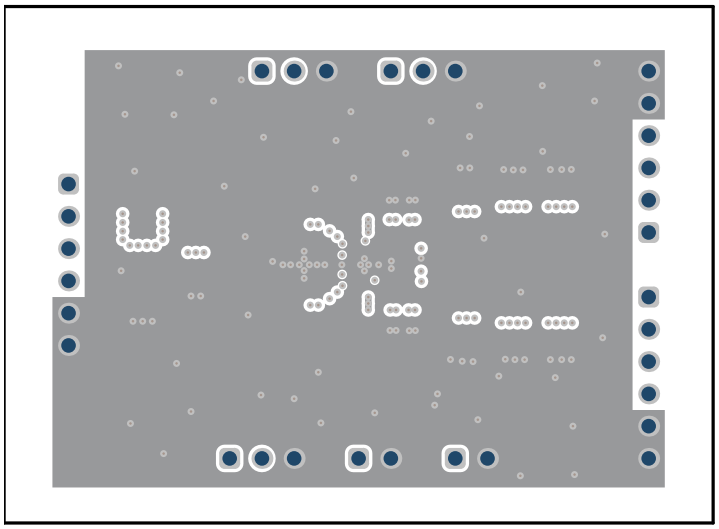

Figure 4-5. Bottom Layer

5 Schematic and Bill of Materials

This section includes the TPS62442EVM-122 schematic and bill of materials.

5.1 Schematic

Figure 5-1 shows the EVM schematic.

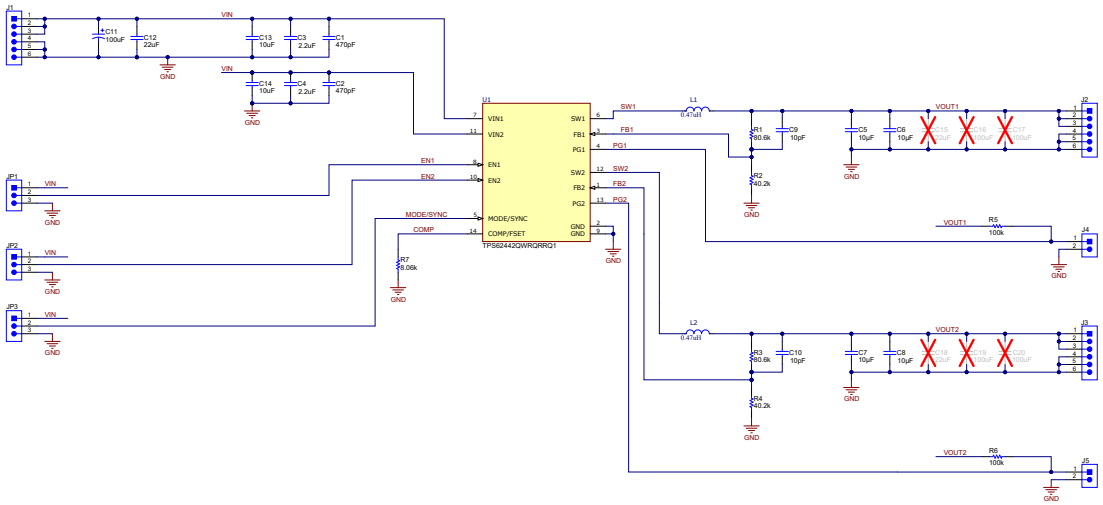

Figure 5-1. TPS62442EVM-122 Schematic

5.2 Bill of Materials

Table 5-1 lists the BOM for this EVM.

Table 5-1. TPS62442EVM-122 BOM

QTY	REF DES	VALUE	DESCRIPTION	SIZE	PART NUMBER	MFR
2	C1, C2	470 pF	Ceramic Capacitor, 50 V, X7R	0402		any
2	C3, C4	2.2 µF	Ceramic Capacitor, 16 V, X7R	0603	GRM188C70J225KE20D	MuRata
6	C5–C8,C13, C14	10 µF	Ceramic Capacitor, 10 V, X7R	0603	GRM188Z71A106MA73D	MuRata
1	C4	0.1 µF	Ceramic Capacitor, 16 V, X7R	0402		any
1	C11	100 µF	Polymer Capacitor, 20 V	7.3 × 4.3 mm	20TQC100MYF	Panasonic
4	C16, C17, C19, C20	100 µF	Ceramic Capacitor, 6.3 V, X5R	1210	GRM32ER60J107ME20L	MuRata
2	C9, C10	10 pF	Ceramic Capacitor, 50 V, COG/NPO	0402	GCM1555C1H100JA16D	MuRata
3	C12, C15, C18	22 µF	Ceramic Capacitor, 10 V, X7R	1206	GCM31CR71A226KE02	MuRata
2	L1, L2	470 nH	Inductor	1008	DFE201612PD-R47M=P2	MuRata Toko
2	R1, R3	80.6 kΩ	Resistor 1%, 0.1 W	0402		any
2	R2, R4	40.2 kΩ	Resistor 1%, 0.1 W	0402		any
2	R5, R6	100 kΩ	Resistor 1%, 0.1 W	0402		any
1	R7	8.06 kΩ	Resistor 1%, 0.1 W	0402		any
1	U1		2.7-V to 6-V Dual Adjustable-Frequency Step-Down Converter	VQFN	TPS62442QDRLRQ1	Texas Instruments

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