EVM User's Guide: TPSM82A824EVM-162 TPSM82A824AEVM-162

TPSM82A824 and TPSM82A824A Evaluation Modules

Description

The TPSM82A824 and TPSM82A824A evaluation modules (EVMs) are designed to help users easily evaluate and test the operation and functionality of the TPSM82A824 and TPSM82A824A buck converter modules. The EVMs convert a 2.5-V to 5.5-V input voltage to a regulated 1.8-V output voltage that delivers up to 4-A maximum output current.

Get Started

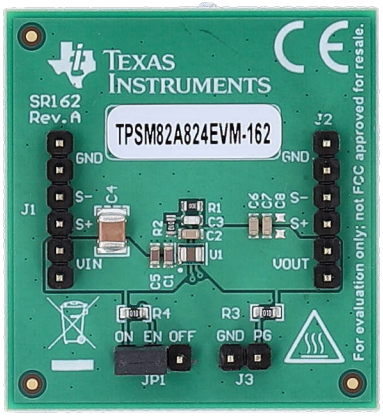
1. Order the EVM on ti.com
2. Download the datasheet
3. Use the data sheet to adjust the BOM with the device for desired output voltage.

Features

- Efficiency greater than 92%
- 2.5V to 5.5V input voltage range
- 0.6V to VIN adjustable output voltage
- 26µA operating quiescent current
- Forced-PWM and PSM versions available
- 100% duty cycle for lowest dropout
- Output discharge
- Power good output
- Integrated soft start-up
- Overtemperature protection
- Hiccup short circuit protection
- Pin- and footprint-compatible with TPSM82821, TPSM82822 and TPSM82823
- 10-pin µSIP with 1.2mm max height

Applications

- Optical modules
- Machine vision
- Industrial PCs
- PLCs
- Wired Networking



1 Evaluation Module Overview

1.1 Introduction

The TPSM82A82x and the TPSM82A82xA are high efficiency synchronous, step-down converter power modules in a small 2-mm × 2.5-mm µSIP package. The device family consists of 3 A or 4 A output current modules and comes in both automatic power save mode and forced PWM mode versions. This user's guide includes the following information:

- Hardware setup instructions
- A printed-circuit board (PCB) layout
- Schematic diagram
- Bill of materials (BOM)

In some cases throughout this document, the TPSM82A824EVM-162 is used as an abbreviation representing both, the TPSM82A824EVM-162 (003) and TPSM82A824AEVM-162 (004).

1.2 Kit Contents

Table 1-1. TPSM82A824EVM-162 Kit Content

Item	Description	Quantity
TPSM82A824EVM-162	PCB	1

Table 1-2. TPSM82A824AEVM-162 Kit Content

Item	Description	Quantity
TPSM82A824AEVM-162	PCB	1

1.3 Specification

Table 1-3 provides a summary of the TPSM82A824EVM-162 and the TPSM82A824AEVM-162 performance specifications.

Table 1-3. Performance Specification Summary

SPECIFICATION	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage		2.5	5	5.5	V
Output voltage setpoint			1.8		V
Output current	TPSM82A82EVM-162	0		4	A
	TPSM82A824AEVM-162	0		4	A

1.4 Device Information

The PCB for this EVM is designed to accommodate the adjustable voltage version of this IC. On the EVM, desired output voltage can be set by adjusting the resistor divider branch with the feedback pin. An additional output capacitors can also be added. The TPSM82A824 is operating in auto-PFM/PWM. The device operates typically at 2.2MHz frequency pulse width modulation (PWM) at moderate to heavy load currents. The switching frequency is reduced at light load condition. The TPSM82A824A operates in FPWM. The switching frequency of the device in FPWM mode is typically at 2.2MHz.

2 Hardware

This section describes how to properly use the TPSM82A824EVM-162 and the TPSM82A824AEVM-162.

2.1 External Power Supply or Power Accessory Requirements

Nom Output Voltage: 2.5 to 5.5 VDC

Max Output Current: 4 A

Efficiency Level V

Note

TI recommends using an external power supply or power accessory which complies with applicable regional safety standards such as (by example) UL, CSA, VDE, CCC, PSE, etc.

2.2 Setup

To operate the EVM, set jumper JP1 between ON and EN to turn on the device as shown in Section 2.3. Connect the power supply to input J1 and connect the load to J2.

2.3 Input/Output Connector Descriptions

J1, Pin 1 and 2 – VIN	Positive input 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	Output voltage connection
J2, Pin 3 and 4 – S+/S–	Output voltage sense connections. Measure the output voltage at this point.
J2, Pin 5 and 6 – GND	Output return connection
J3 – PG/GND	The PG output appears on pin 1 of this header with ground on pin 2.
JP1 – EN	EN pin input jumper. Place the supplied jumper across ON and EN to turn on the module. Place the jumper across OFF and EN to turn off the IC.

2.4 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate the adjustable output voltage versions of this device family. The input capacitor and the feedforward capacitor can be adjusted by replacing components. An additional output capacitors can also be added. The board layout, schematic, bill of materials, and the setup for both the TPSM82A824EVM-162 and the TPSM82A824AEVM-162 remains the same. Therefore, either of the EVMs can be used to evaluate any device variant from this family by replacing the IC.

2.4.1 Input and Output Capacitors

C4, shown in Figure 3-1, is populated on the board to reduce the input impedance of the board and avoid oscillations at high output current conditions, but it might not be required for the final application.

C8 is provided for adding an output capacitor. This capacitor is 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.

2.4.2 Feedforward Capacitor

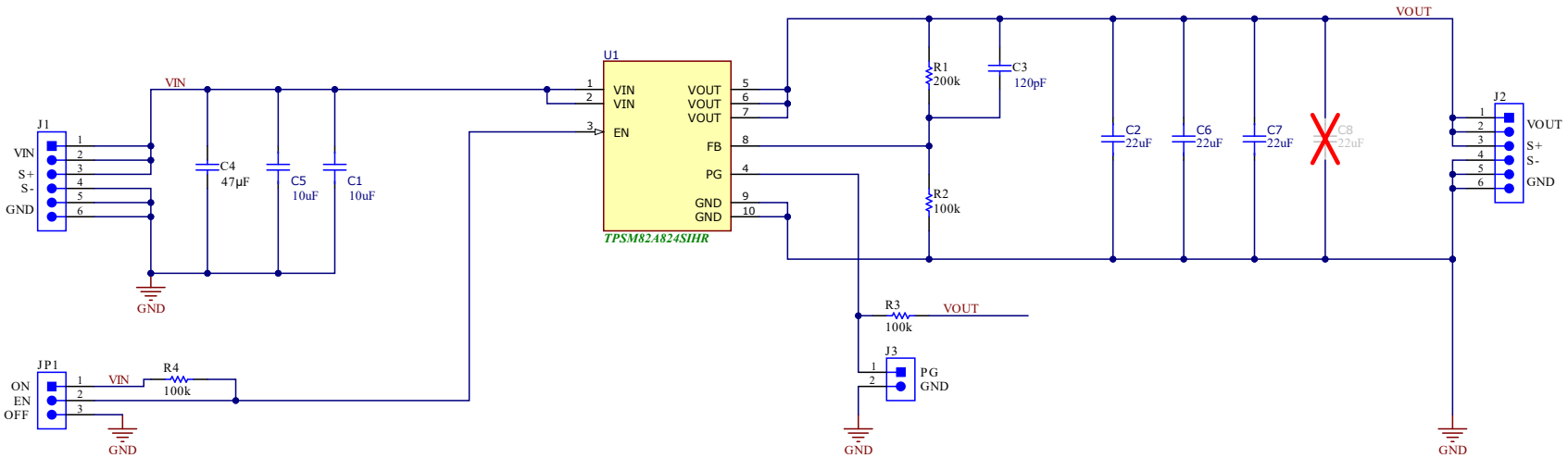
C3 is a feedforward capacitor. This capacitor is not required for proper operation but can be used to improve the load transient performance. This EVM has a feedforward capacitor of 120pF assembled. TI recommends to check the requirements of feedforward capacitor in the data sheet of the device according to adjusted output voltage.

3 Hardware Design Files

3.1 Schematics

Figure 3-1 illustrates the EVM schematic. In this subsection, the TPSM82A824EVM-162 is used as an example.

- The TPSM82A824EVM-162 uses the TPSM82A824 IC.
- The TPSM82A824AEVM-162 uses the TPSM82A824A IC.



3.2 PCB Layouts

This section provides the TPSM82A824EVM-162 and TPSM82A824AEVM-162 board layout and illustrations in Figure 3-2 through Figure 3-6. The Gerbers are available on the TPSM82A824EVM-162 product page. In this section, the TPSM82A824EVM-162 is used as an example. The board layout for the TPSM82A824AEVM-162 remains the same. The Gerbers for the TPSM82A824AEVM-162 are also available on the respective product page.

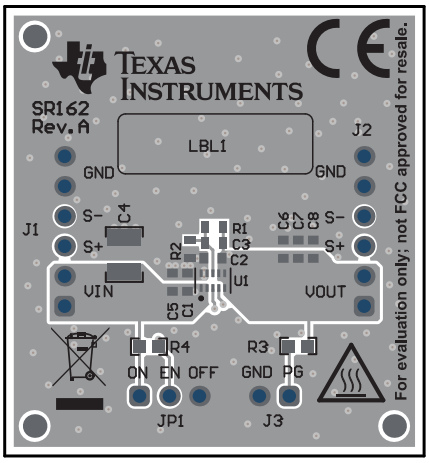


Figure 3-2. Top Assembly

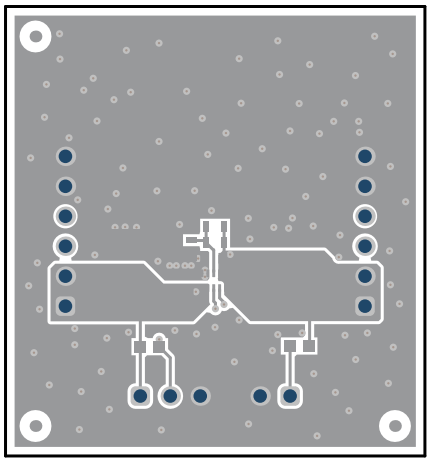


Figure 3-3. Top Layer

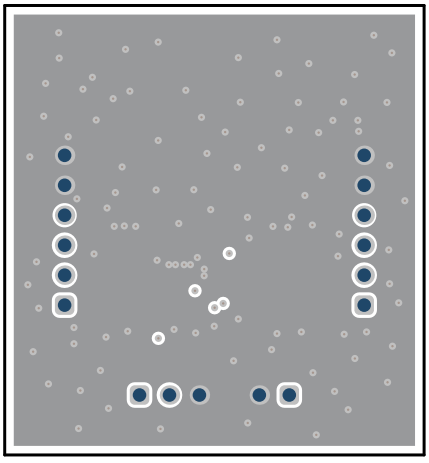


Figure 3-4. Signal Layer 1

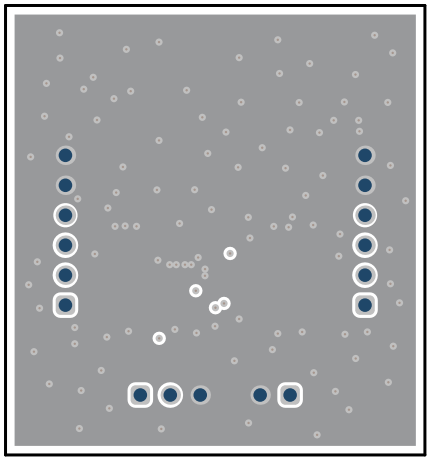


Figure 3-5. Signal Layer 2

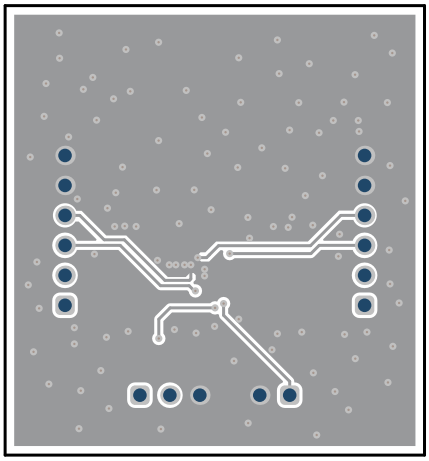


Figure 3-6. Bottom Layer

3.3 Bill of Materials

Section 3.3 lists the BOM for this EVM.

Table 3-1. TPSM82A824EVM-162 and TPSM82A824AEVM-162 Bill of Materials

COUNT		DESIGNATOR	VALUE	DESCRIPTION	SIZE	PART NUMBER	MANUFACTURER
-003	-004						
2	2	C1, C5	10 µF	CAP, CERM, 10 µF, 10V, ±10%, X7R, 0603	0603	GRM188Z71A106KA73D	Murata
3	3	C2, C6, C7	22 µF	CAP, CERM, 22 µF, 6.3V, ±20%, X7T, 0603	0603	GRM188D70J226ME01D	Murata
1	1	C3	120 pF	CAP, CERM, 120 pF, 50 V, ±5%, C0G/NP0, 0603	0603	06035A121JAT2A	AVX
1	1	C4	47 µF	CAP, CERM, 47 µF, 10 V, ±20%, X7R, 1210	1210	LMK325B7476MM-PR	Taiyo Yuden
1	1	R1	200 k	RES, 200 k, 1%, 0.1 W, 0603	0603	RC0603FR-07200KL	Yageo
3	3	R2, R3, R4	100 k	RES, 100 k, 1%, 0.1 W, 0603	0603	RC0603FR-07100KL	Yageo
1	0	U1		4-A high-efficiency step-down module with auto-Power Safe Mode in 2-mm × 2.5-mm µSIP	2 mm × 2.5 mm	TPSM82A824SIHR	Texas Instruments
0	1	U1		4-A high-efficiency step-down module with forced PWM in 2-mm × 2.5-mm µSIP	2 mm × 2.5 mm	TPSM82A824ASIHR	Texas Instruments

4 Safety Instructions

WARNING

Hot surface. Contact may cause burns. Do not touch.

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
May 2026	*	Initial Release

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