

TPSM828303PEVM-058 Evaluation Module



Description

The TPSM828303PEVM-058 facilitates the evaluation of the TPSM828303PVCB, 3A synchronous step-down DC/DC power module with integrated inductor in a 2.5mm × 2.6mm × 2.0mm MagPack™ package. The TPSM828303PEVM evaluation module (EVM) is simple, easy-to-use. The EVM regulates the output voltage to 1.8V with the input voltage from 2.25V to 5.5V. However, the output voltage on the EVM can be adjusted from 0.5V to 4.5V, with 1% accuracy across the full input voltage and junction temperature range.

Get Started

1. Order the EVM on [ti.com](https://www.ti.com).
2. Download the data sheet ([SLVSGM1](#)).
3. Use data sheet or WEBENCH® to modify the output voltage & to change the input &/or output capacitors.

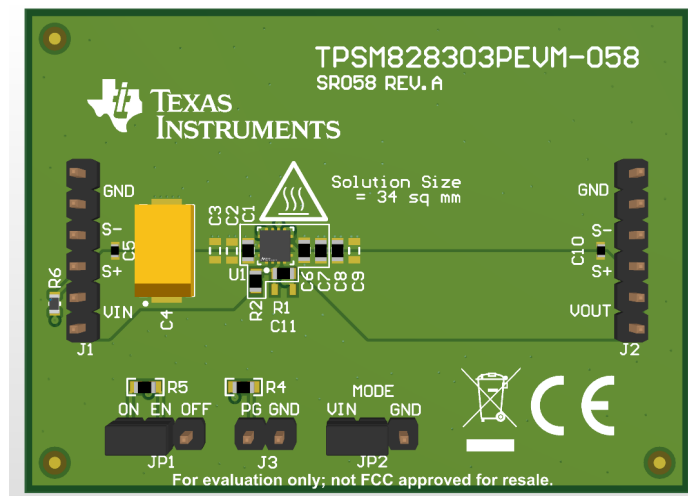
Features

- 2.25V to 5.5V input voltage range
- 0.5V to 4.5V adjustable output voltage

- 3A step-down power module with integrated inductor in a 2.5mm × 2.6mm × 2.0mm MagPack package
- 1% FB voltage accuracy (–40°C to 125°C T_J)
- 2.0MHz switching frequency
- DCS-Control topology
- Optimized EMI performance
- Facilitates CISPR 11/32 compliance
 - Integrated on-chip noise-filtering capacitors
 - Measurements according to CISPR available
- Excellent transient response
- MODE pin, power-good output
- Supports 1.2V GPIO
- 100% duty cycle for lowest dropout
- Active output discharge
- Thermal shutdown protection
- Hiccup or latch-off OCP/OVP

Applications

- [Factory automation and control](#)
- [Industrial PC](#)
- ASIC, SoC, and MCU supply
- Generic point of load



TPSM828303PEVM-058 Hardware Image (Top View)

1 Evaluation Module Overview

1.1 Introduction

The TPSM828303PEVM-058 facilitates the evaluation of the TPSM828303PVCB, 3A synchronous step-down DC/DC power module with integrated inductor in a 2.5mm × 2.6mm × 2.0mm MagPack package. The EVM regulates the output voltage to 1.8V with the input voltage from 2.25V to 5.5V. This user's guide describes the characteristics, operation, and use of the TPSM828303PEVM-058 Evaluation Module (EVM) with a complete schematic diagram, printed circuit board layouts, and bill of materials included in this document.

1.2 Kit Contents

Table 1-1. TPSM828303PEVM-058 Kit Contents

ITEM	DESCRIPTION	QUANTITY
TPSM828303PEVM-058	PCB	1

1.3 Specifications

Table 1-2. Performance Specifications Summary

SPECIFICATIONS		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage			2.25		5.5	V
Output voltage setpoint				1.8		V
Output current	TPSM828303PVCB		0		3.0	A

1.4 Device Information

The TPSM828303PEVM-058 is for the TPSM828303PVCB device. TPSM828303PVCB is a 3A high efficiency and easy to use synchronous step-down DC/DC power module with integrated inductor. Based on the DCS-Control topology, the device provides a fast transient response with small output capacitance. The internal reference allows to regulate the output voltage down to 0.5V with a high feedback voltage accuracy of 1% over the junction temperature range of –40°C to 125°C. The nominal switching frequency is 2MHz with a controlled variation over the input voltage range. The MODE pin allows for an easy selection for the mode of operation. If PSM is selected, the converter operates in DCM at light load conditions with a reduced switching frequency to maintain a high efficiency, and seamlessly transition to CCM as the load current increases to medium or heavy ranges. If forced-PWM is selected, then the converter maintains a CCM operation regardless of the load current to maintain a minimum output voltage ripple. The family offers excellent EMI performance and comes in a 2.5mm × 2.6mm × 2.0mm MagPack package.

2 Hardware

2.1 Setup

This section describes how to correctly use the TPSM828303PEVM.

2.1.1 Connector Descriptions

J1, Pin 1 and 2 – VIN	Input return 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	Positive input voltage connection from the input supply for the EVM.
J2, Pin 1 and 2 – VOUT	Output return 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	Positive output voltage connection.
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 – MODE	MODE pin jumper. Place the supplied jumper across VIN and MODE to force the device in fixed frequency PWM operation at all load currents. Place the jumper across MODE and GND to enable power save mode.
J3 – PG/GND	The PG output appears on pin 1 of this header with a convenient ground on pin 2.

2.1.2 Hardware Setup

To operate the EVM, set jumpers JP1 and JP2 to the desired positions per [Section 2.1.1](#). Connect the input supply to J1 between VIN and GND and connect the load to J2 between VOUT and GND. J3 can be left floating.

2.2 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate some modifications by the user. Additional input and output capacitors or a feedforward capacitor can be added. Also, the MODE setting and output voltage setting can be changed. Finally, the loop response of the TPSM828303PEVM-058 can be measured.

2.2.1 Input and Output Capacitors

Footprints for additional input capacitors (C2, C3) and output capacitor (C9) are provided. These capacitors are not required for proper operation but can be used to reduce the input and 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 [TPSM82830x 5.5V input, 1A / 2A/ 3A Step-down Module with Integrated Inductor in a QFN or MagPack Package](#).

2.2.2 Setting the Output Voltage

This EVM can be configured for evaluation of the adjustable output voltage. Default output voltage setting is 1.8V on TPSM828303PEVM-058. Resistors R1 and R2 can be used to set the output voltage between 0.5V and 4.5V. For calculating R1& R2, see the [TPSM82830x 5.5V input, 1A / 2A/ 3A Step-down Module with Integrated Inductor in a QFN or MagPack Package](#).

2.2.3 Loop Response Measurement

The loop response of the TPSM828303PEVM-058 can be measured by cutting the trace parallel to R3 and assembling a 50Ω resistor as R3 to inject the noise signal.

3 Implementation Results

3.1 TPSM828303PEVM-058 Test Results

The TPSM828303PEVM was used to take the typical characteristics data in the TPSM82830x data sheet (SLVSGM1). See the [TPSM82830x 5.5V input, 1A / 2A/ 3A Step-down Module with Integrated Inductor in a QFN or MagPack Package](#) for the performance of this EVM.

4 Hardware Design Files

4.1 Schematic

Figure 4-1 shows the EVM schematic.

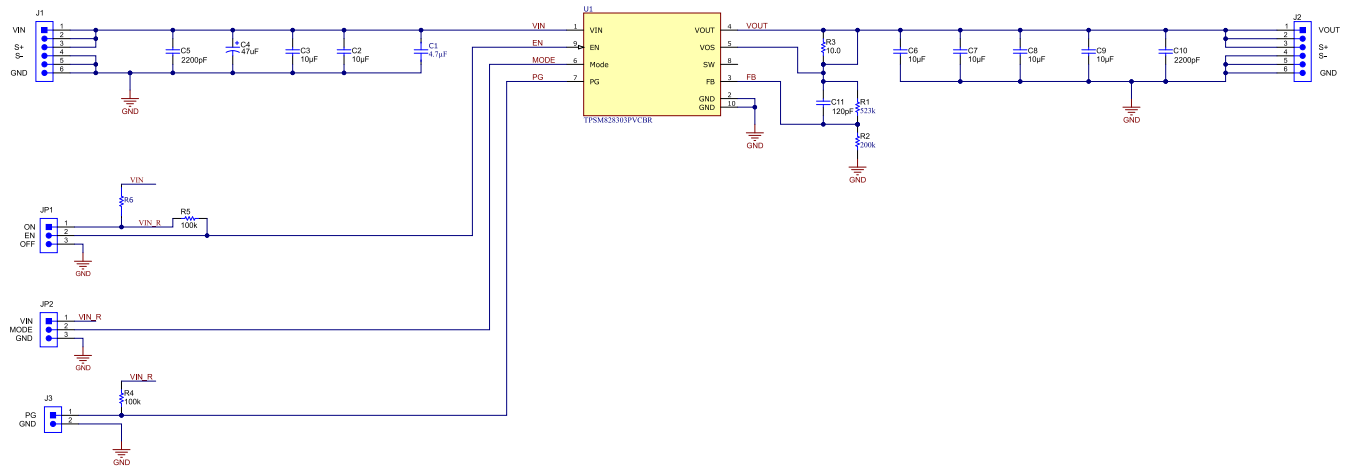


Figure 4-1. TPSM828303PEVM Schematic

4.2 PCB Layouts

This section provides the TPSM828303PEVM board layout. See the [TPSM828303PEVM](#) tool page for more details.

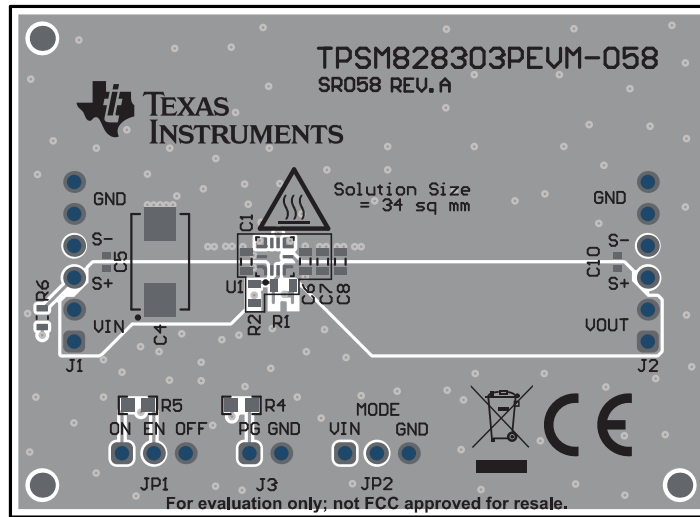


Figure 4-2. Top Silk

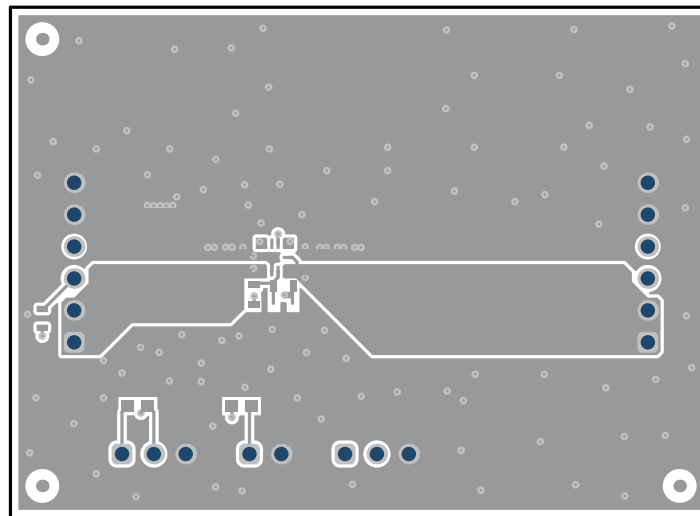


Figure 4-3. Top Layer

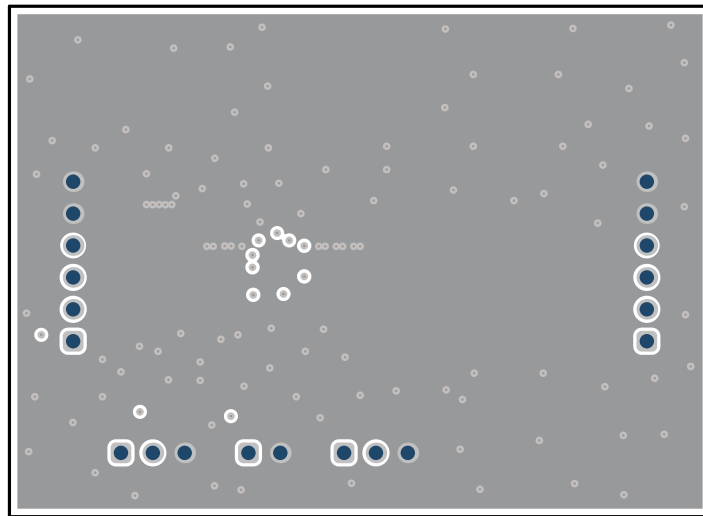


Figure 4-4. Signal Layer 1

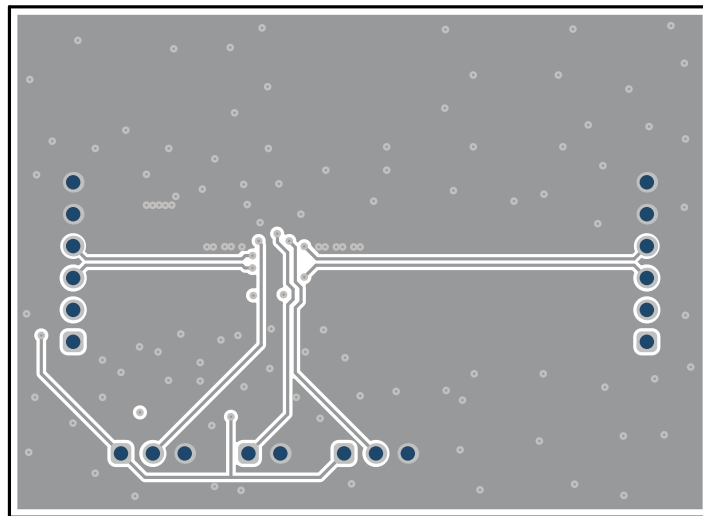


Figure 4-5. Signal Layer 2

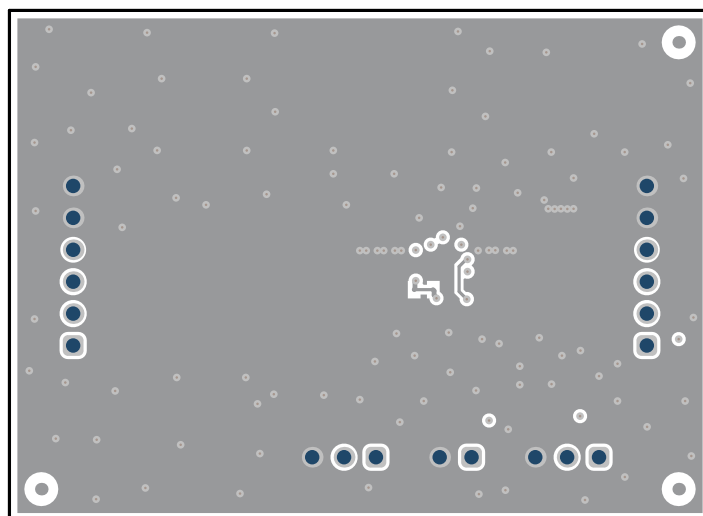


Figure 4-6. Bottom Layer

4.3 Bill of Materials

Table 4-1 lists the bill of materials for this EVM.

Table 4-1. TPSM828303PEVM-058 Bill of Materials

QTY	REF DES	VALUE	DESCRIPTION	SIZE	PART NUMBER	MFR
-001						
1	C1	4.7 μ F	Ceramic Capacitor, 6.3V, X7R	0603	JMK107BB7475KA-T	Taiyo Yuden
1	C4	47 μ F	Tantalum Capacitor, 35V	7343	T495X476K035ATE300	Kemet
2	C5, C10	2200pF	Ceramic Capacitor, 50V, X7R	0402	GRM155R71H222KA01D	MuRata
3	C6, C7, C8	10 μ F	Ceramic Capacitor, 10V, X7R	0603	GRM188Z71A106KA73D	MuRata
1	R1	523k Ω	Resistor 1%, 0.1 W	0603		any
1	R2	200k Ω	Resistor 1%, 0.1 W	0603		any
2	R4, R5	100k Ω	Resistor 1%, 0.1 W	0603		any
1	R6	1k Ω	Resistor 1%, 0.1 W	0603		any
1	U1		3A synchronous step-down DC/DC power module with integrated inductor	MagPack™ package	TPSM828303PVCB	Texas Instruments

5 Additional Information

5.1 Trademarks

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