

**ABSTRACT**

The TPS6282xA family of devices are easy-to-use synchronous stepdown DC/DC converters based on the DCS-Control™ topology; therefore, they provide a fast transient response. The internal reference allows regulation of the output voltage down to 0.6 V with a high-feedback voltage accuracy of 1% over the junction temperature range of –40°C to 125°C. The family devices are pin-to-pin and BOM-to-BOM compatible. The entire solution requires a small 470-nH inductor, a single 4.7-μF input capacitor, and two 10-μF or a single 22-μF output capacitor.

Table of Contents

1 Introduction	2
1.1 Performance Specification.....	2
1.2 Modifications.....	2
2 Setup	3
2.1 Input/Output Connector Descriptions.....	3
2.2 Setup.....	3
3 TPS62826AEVM-126 Test Results	4
4 Board Layout	5
5 Schematic and Bill of Materials	6
5.1 Schematic.....	7
5.2 Bill of Materials.....	7
6 Revision History	8

List of Figures

Figure 3-1. Thermal Performance ($V_{IN} = 2.5\text{ V}$, $V_{OUT} = 1.25\text{ V}$, $I_{OUT} = 3\text{ A}$).....	4
Figure 4-1. Top Assembly.....	5
Figure 4-2. Top Layer.....	5
Figure 4-3. Signal Layer 1.....	5
Figure 4-4. Signal Layer 2.....	6
Figure 4-5. Bottom Layer.....	6
Figure 5-1. TPS62826AEVM-126 Schematic.....	7

List of Tables

Table 1-1. Performance Specification Summary.....	2
Table 5-1. TPS62826AEVM-126 Bill of Materials.....	7

Trademarks

DCS-Control™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

1 Introduction

The TPS6282xA step-down converters family comes in a small 1.5- × 1.5- × 1-mm QFN package and supports a maximum output current of 4 A. The TPS6282xA is pin-to-pin compatible within its family and also with the TPS6282x family. The TPS6282xA is the forced-PWM version of TPS6282x family and these converters maintain a continuous conduction mode operation and keeps the output voltage ripple very low across the whole load range and at a nominal switching frequency of 2.2 MHz.

1.1 Performance Specification

Table 1-1 provides a summary of the TPS6282xAEVM-126 performance specifications.

Table 1-1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage	TPS62824A, TPS62825A and TPS62826A	2.4		5.5	V
	TPS62827A	2.5		5.5	
Output voltage setpoint			1.8		V
Output current	TPS62824A	0		1	A
	TPS62825A			2	
	TPS62826A			3	
	TPS62827A			4	

1.2 Modifications

The printed circuit board (PCB) for this EVM is designed to accommodate both TPS6282x and TPS6282xA families of this integrated circuit (IC). Additional input and output capacitors can also be added if necessary. Finally, the loop response of the IC can be measured.

1.2.1 Input and Output Capacitors

C7 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.

C5 and C8 are provided for additional output capacitors. For TPS62824A/25A/26A 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. For TPS62827A, we recommend to use 3 * 10-μF for proper operation. The total output capacitance must remain within the recommended range in the data sheet for proper operation.

2 Setup

This section describes how to properly use the TPS62826AEVM-126 as an example. All the other versions can be configured in a similar way.

2.1 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 jumper across ON and EN to turn on the IC. Place the jumper across OFF and EN to turn off the IC.
JP2 – PG Pullup Voltage	PG pin pull up voltage jumper. Place the jumper on JP2 to connect the PG pin pull up resistor to V_{IN} . Alternatively, the jumper can be removed and a different voltage can be supplied on pin 2 to pull up the PG pin to a different level. This externally applied voltage must remain below 5.5V.

2.2 Setup

To operate the EVM, set jumpers JP1 through JP2 to the desired position per [Section 2.1](#). Connect the input supply to J1 and connect the load to J2.

3 TPS62826AEVM-126 Test Results

The TPS62826AEVM-126 was used to take all the data in the [TPS62826A, 3-A Step-Down Converter with 1% Output Voltage Accuracy in 1.5-mm × 1.5-mm QFN Package Data Sheet](#). See the device data sheet for the performance of this EVM.

Figure 3-1 shows the thermal performance of the EVM.

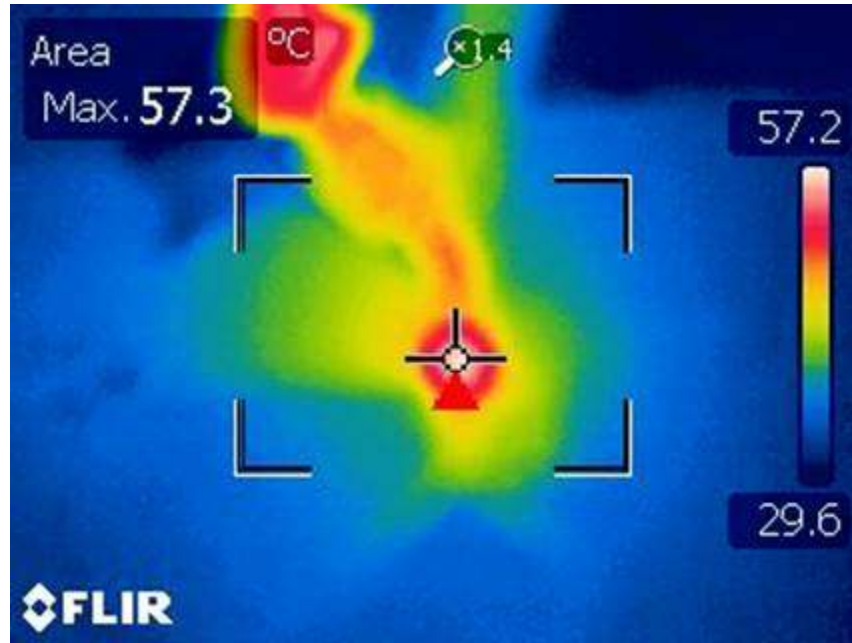


Figure 3-1. Thermal Performance ($V_{IN} = 2.5\text{ V}$, $V_{OUT} = 1.25\text{ V}$, $I_{OUT} = 3\text{ A}$)

4 Board Layout

This section provides the TPS62826AEVM-126 board layout and illustrations in [Figure 4-1](#) through [Figure 4-5](#). The Gerbers are available on the EVM product page: [TPS62826AEVM-126](#).

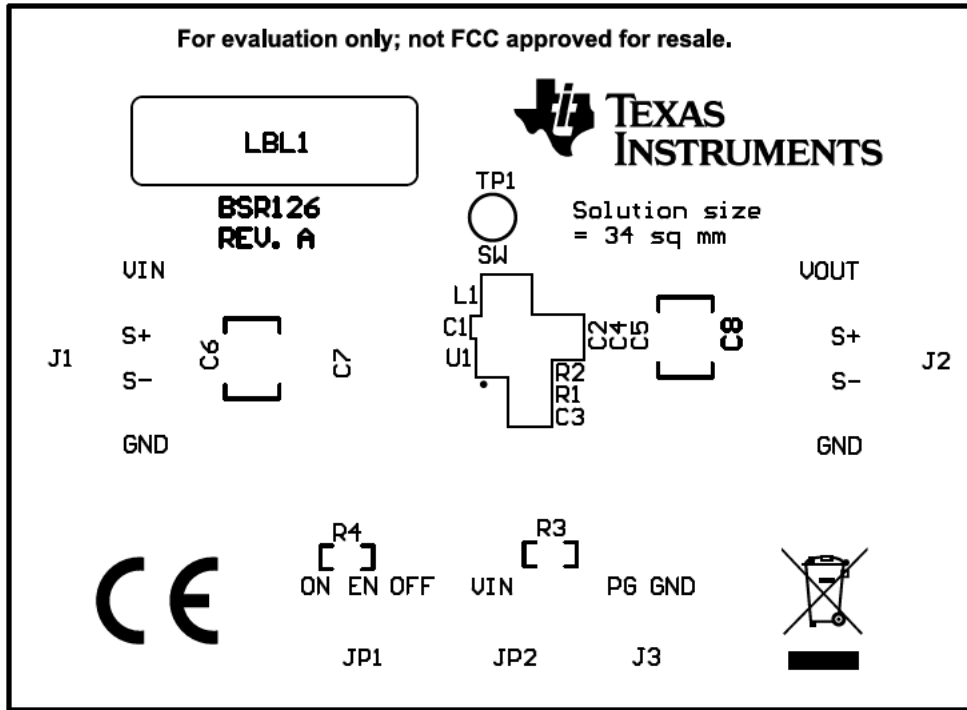


Figure 4-1. Top Assembly

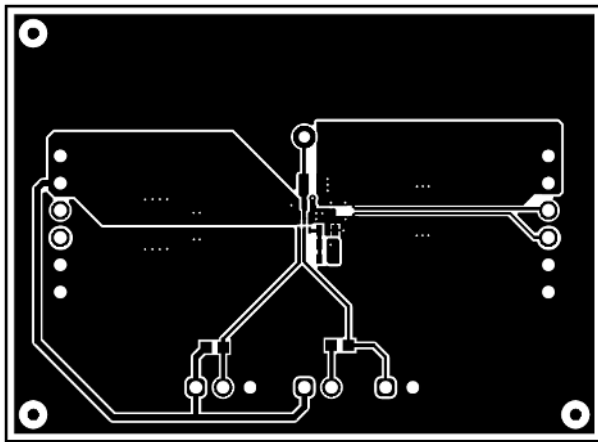


Figure 4-2. Top Layer

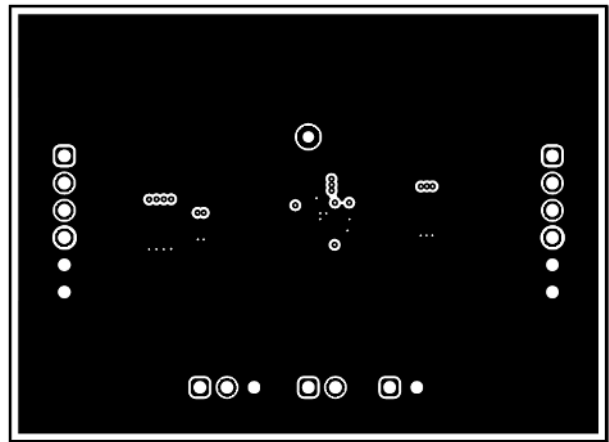


Figure 4-3. Signal Layer 1

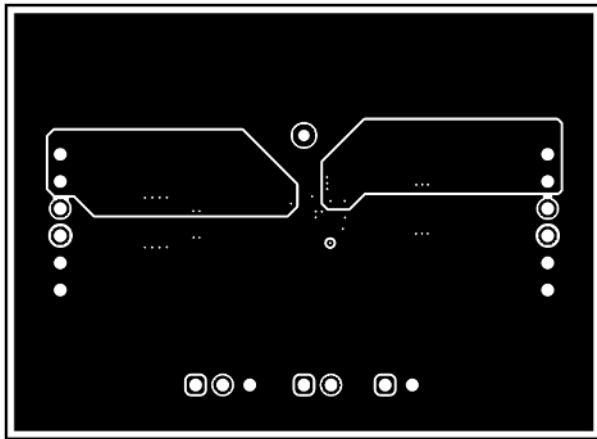


Figure 4-4. Signal Layer 2

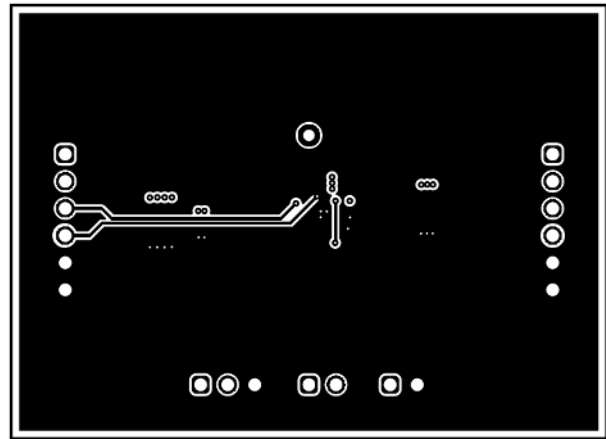


Figure 4-5. Bottom Layer

5 Schematic and Bill of Materials

This section provides the TPS62826AEVM-126 Schematic and Bill of Materials (BOM).

5.1 Schematic

Figure 5-1 illustrates the EVM schematic.

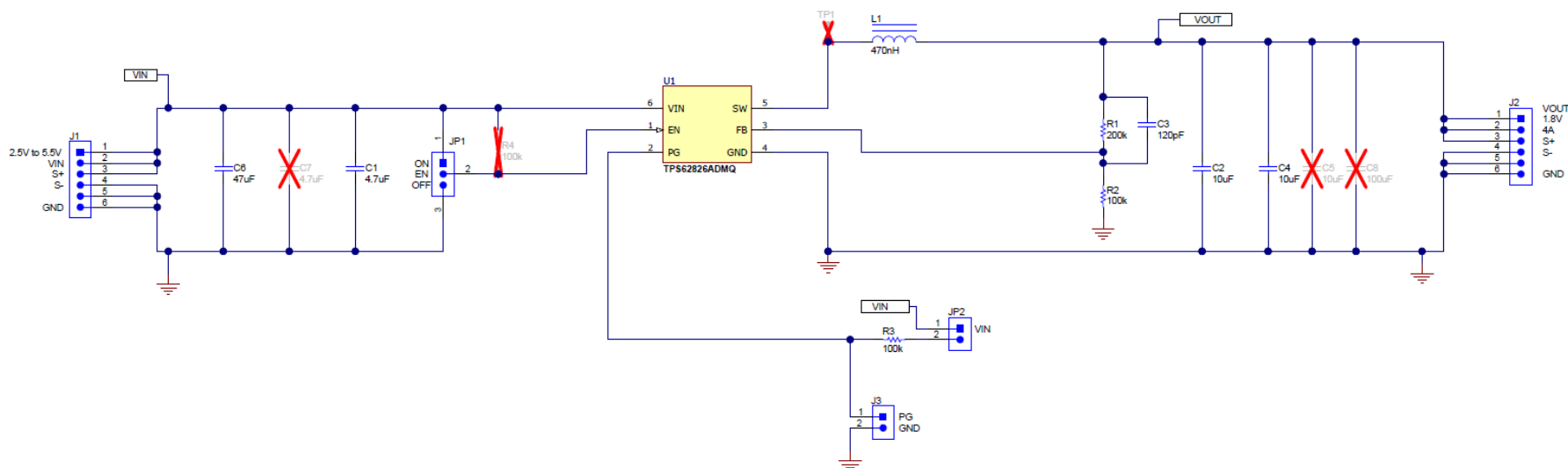


Figure 5-1. TPS62826AEVM-126 Schematic

5.2 Bill of Materials

Table 5-1 lists the BOM for this EVM.

Table 5-1. TPS62826AEVM-126 Bill of Materials

Count	Designator	Value	Description	Package Reference	Part Number	Manufacturer
1	C1	4.7 µF	CAP, CERM, 4.7 µF, 6.3 V, ±10%, X7R, 0603	0603	JMK107BB7475MA-T	Taiyo Yuden
2	C2, C4	10 µF	CAP, CERM, 10 µF, 10 V, ±20%, X7R, 0603	0603	GRM188Z71A106MA73D	Murata
1	C3	120 pF	CAP, CERM, 120 pF, 50 V, ±5%, C0G/NP0, 0603	0603	Std	Std
1	C6	47 µF	CAP, CERM, 47 µF, 10 V, ±20%, X7R, 1210	1210	GRM32ER71A476ME15L	Murata
1	L1	470 nH	Inductor, Shielded, 470 nH, 3.6 A, 0.032 ohm, SMD	2016	DFE201610E-R47M=P2	Murata
1	R1	200 k	RES, 200 k, 1%, 0.1 W, 0603	0603	Std	Std
3	R2, R3, R4	100 k	RES, 100 k, 1%, 0.1 W, 0603	0603	Std	Std
1	U1		3-A Step-Down Converter with 1% Output voltage accuracy in 1.5-mm × 1.5-mm QFN	1.5 x 1.5 mm	TPS62826ADMQ	Texas Instruments

6 Revision History

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

Changes from Revision * (October 2020) to Revision A (March 2021)	Page
• Added TPS62824AEVM-126 and TPS62827AEVM-126 to User Guide.....	1
• Added TPS62824A, TPS62825A, TPS62826A, TPS62827A to the <i>Performance Specification</i> section.....	2
• Updated output capacitor requirements in the <i>Input and Output Capacitors</i> section for the device family.....	2
• Updated description in the <i>Setup</i> section for the device family.....	3

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2022, Texas Instruments Incorporated