TPS62866EVM-051 Evaluation Module

The TPS62866EVM-051 facilitates the evaluation of the TPS62866 6-A, step-down converter with DCS-Control™ in a tiny 1.05-mm by 1.78-mm WCSP package with 0.35-mm pitch. The EVM outputs a 0.9-V output voltage with 1% accuracy from input voltages between 2.4 V and 5.5 V. The TPS62866 is a highly efficient and tiny solution for point-of-load (POL) converters for space-constrained applications, such as artificial intelligence chips, camera modules, solid state drives (SSDs), and optical modules.

Contents

List of Figures

List of Tables

1 Introduction

The TPS62866 is a synchronous, step-down converter in a 1.05- x 1.78- x 0.5-mm wafer chip-scale package (WCSP).

1.1 Performance Specification

Table 1 provides a summary of the TPS62866EVM-051 performance specifications.

Table 1. Performance Specification Summary

SPECIFICATION	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage		2.4	5	5.5	V
Output voltage setpoint			0.9		V
Output current		0		6000	mA

1.2 Modifications

The EVM can support variance of the whole IC family. Additional input and output capacitors can be added.

2 Setup

This section describes how to properly use the TPS62866EVM-051.

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, Pin 5 – VBUS The VBUS pin of this header is used to bias the SCL and SDA nodes of I²C interface via a resistor.

J3, Pin 6 – GND The GND pin of this header is used to connect the grounds of the IC and the I²C interface.

J3, Pin 9 – SCL The pin of this header should be connected to the SCL of the I²C interface.

J3, Pin 10 – SDA The pin of this header should be connected to the SDA of the I²C interface.

JP1 – VID/PG VID/$\overline{PG}$ pin jumper. Always place the jumper across VID/$\overline{PG}$ and LOW pins before start-up. This sets the output voltage and device address. After startup, VOUT reflects the value set on V_{OUT} Register 1 if the jumper is placed across VID/$\overline{PG}$ and LOW pins. VOUT follows the value set on V_{OUT} Register 2 if the jumper is placed across VID/$\overline{PG}$ and HIGH pins.

JP2 – 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.

2.2 Setup

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

3 TPS62866EVM-051 Test Results

The TPS62866EVM-051 was used to take all the data in the TPS62866 data sheet (SLVSEI1). See the device data sheet for the performance of this EVM.

4 Board Layout

This section provides the TPS62866EVM-051 board layout and illustrations in Figure 1 through Figure 7. The Gerbers are available on the EVM product page: TPS62866EVM-051

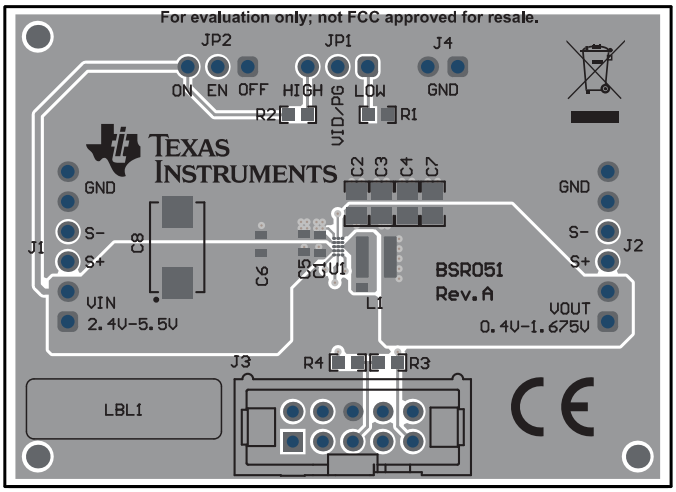

Figure 1. Top Assembly

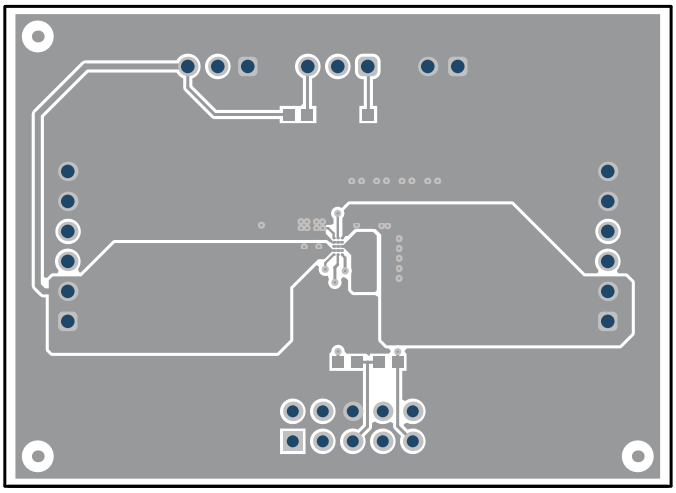

Figure 2. Top Layer

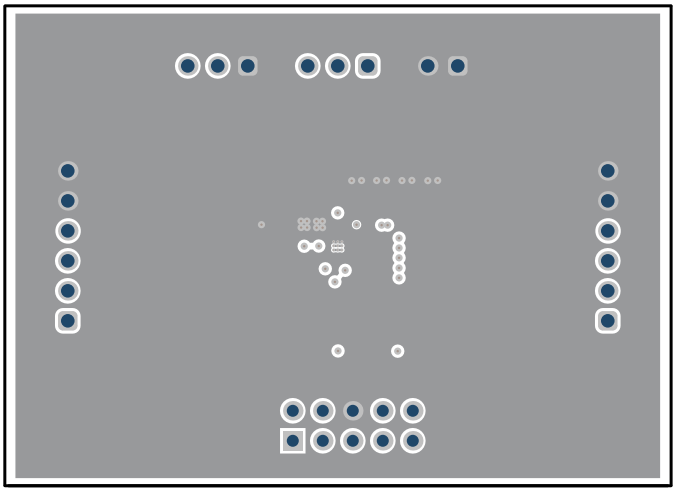

Figure 3. Signal Layer 1

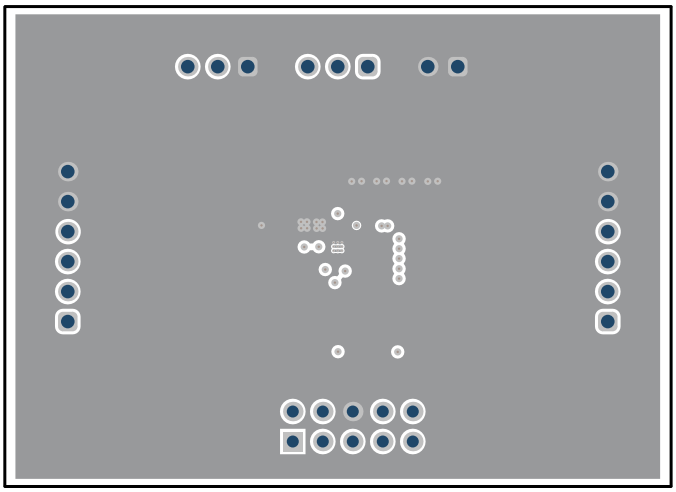

Figure 4. Signal Layer 2

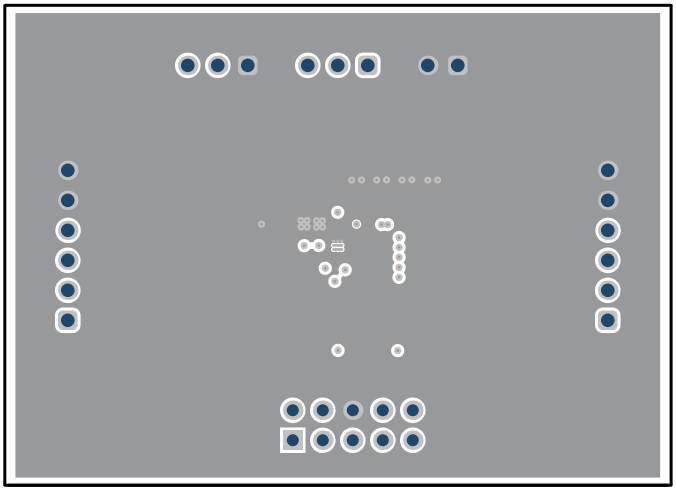

Figure 5. Signal Layer 3

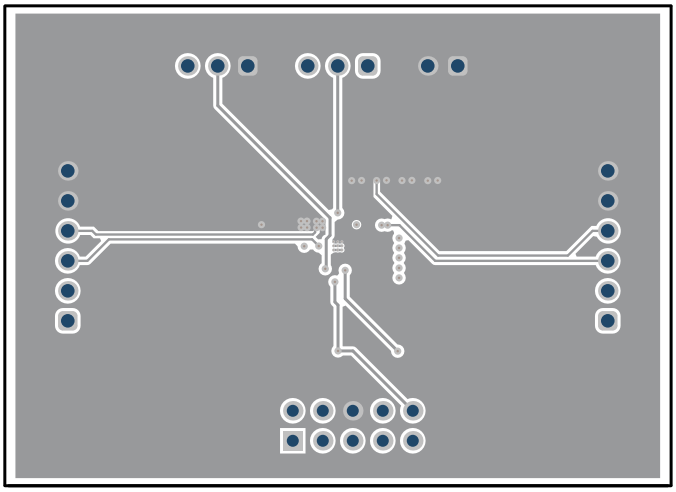

Figure 6. Signal Layer 4

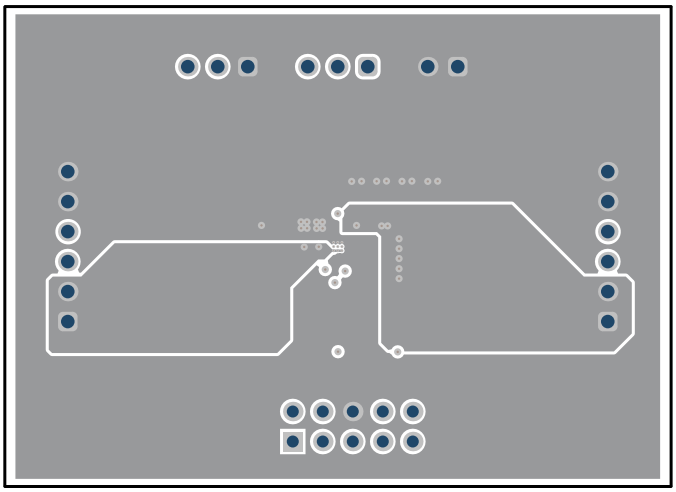

Figure 7. Bottom Layer

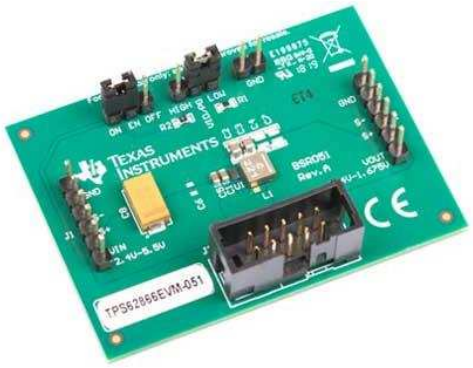

Figure 8. TPS62866EVM-051 Angled View

Figure 9. TPS62866EVM-051 Overhead View

5 Schematic and List of Materials

This section provides the TPS62866EVM-051 schematic and list of materials.

5.1 Schematic

Figure 10 illustrates the EVM schematic.

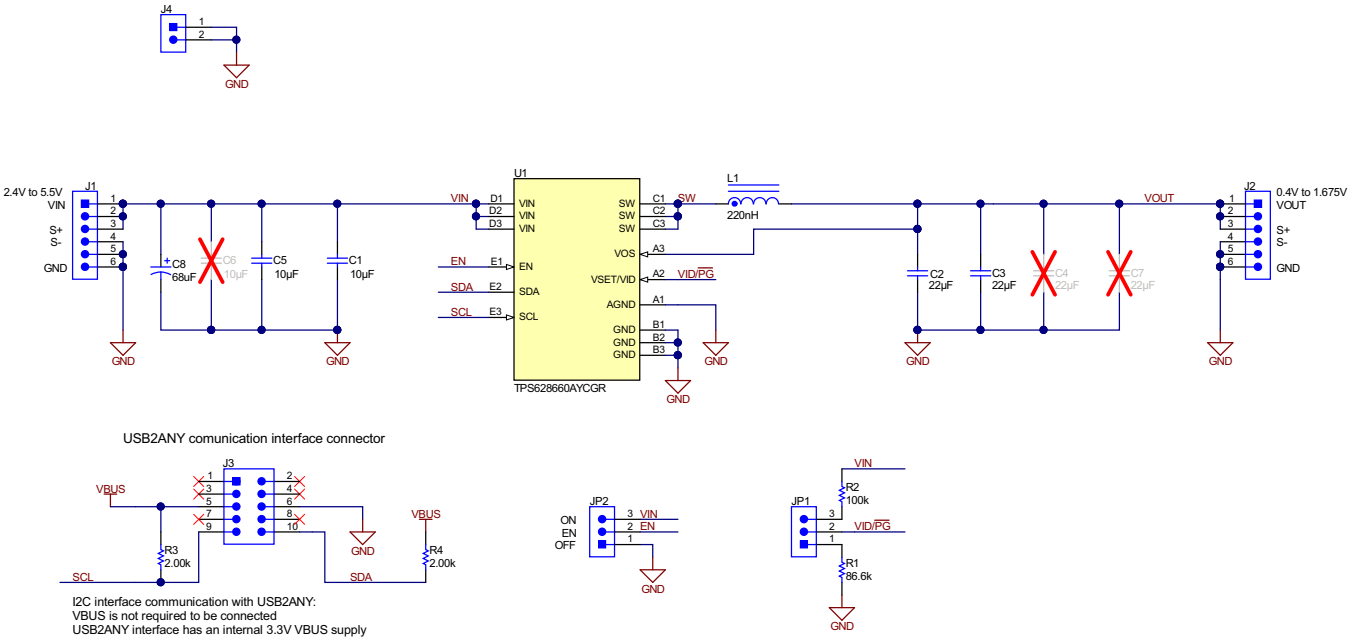

Figure 10. TPS62866EVM-051 Schematic

5.2 List of Materials

Table 2 lists a list of materials for this EVM.

Table 2. TPS62866EVM-051 List of Materials

DESIGNATOR	QTY	DESCRIPTION	PART NUMBER	MANUFACTURER
C1, C5	2	Capacitor, ceramic, 10 µF, 6.3 V, ±20%, X7R, 0603	CL10B106MQ8NRNC	Samsung Electro-Mechanics
C2, C3	2	Capacitor, ceramic, 22 µF, 6.3 V, ±20%, X7R, 0805	GRM21BZ70J226ME44L	Murata
C8	1	Capacitor, tantalum, 68 µF, 20 V, ±10%, 7343	T495D686K020ATE150	Kemet
L1	1	Inductor, 220 nH, 16.8 A, 5.8 mΩ, SMD, 4040	XAL4020-221MEB	Coilcraft
R1	1	Resistor, 86.6 kΩ, 1%, 0.1 W, 0603	Std	Std
R2	1	Resistor, 100 kΩ, 1%, 0.1 W, 0603	Std	Std
R3, R4	2	Resistor, 2.0 kΩ, 1%, 0.1 W, 0603	Std	Std
U1	1	6-A Step-Down Converter with I²C Interface and Wide Output Voltage Range, YCG0015ACAC (DSBGA-15)	TPS628660AYCGT	Texas Instruments

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3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

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1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
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4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

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