TPS62088EVM-814 Evaluation Module

The TPS62088EVM-814 facilitates the evaluation of the TPS62088 3-A, step-down converter with DCS-Control™ in a tiny 1.2-mm by 0.8-mm WCSP package with 0.4-mm pitch. The EVM outputs a 1.8-V output voltage with 1% accuracy from input voltages between 2.4V and 5.5V with a maximum solution height of 1 mm. The TPS62088 is a highly efficient and tiny solution for point-of-load (POL) converters for space-constrained applications, such as solid state drives (SSDs), wearables, and smart phones.

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1 Introduction

The TPS62088 is a synchronous, step-down converter in a 1.2- x 0.8- x 0.5-mm wafer chip-scale package (WCSP).

1.1 Performance Specification

Table 1 provides a summary of the TPS62088EVM-814 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			1.8		V
Output current		0		3000	mA

1.2 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate both the fixed and adjustable output voltage versions of this integrated circuit (IC). Additional input and output capacitors can also be added. Finally, the loop response of the IC can be measured.

1.2.1 Fixed Output Voltage Operation

U1 can be replaced with the fixed output voltage version of the IC for evaluation. For fixed output voltage version operation, replace R1 with a 0-Ω resistor and remove R2 and C4.

1.2.2 Input and Output Capacitors

C9 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.

C6, C7, and C8 are provided for additional output capacitors. 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. The total output capacitance must remain within the recommended range in the data sheet for proper operation.

1.2.3 Loop Response Measurement

The loop response of the TPS62088EVM-814 can be measured by lifting both R1 and C4 and inserting a 50-Ω resistor in series with these two components to inject the measurement signal across. The results of this test are shown in Figure 2.

2 Setup

This section describes how to properly use the TPS62088EVM-814.

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 supplied 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 pullup voltage jumper. Place the supplied jumper on JP2 to connect the PG pin pullup resistor to V_{IN}. Alternatively, the jumper can be removed and a different voltage can be supplied on pin 1 to pull up the PG pin to a different level. This externally applied voltage must remain below 5.5 V.

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 TPS62088EVM-814 Test Results

The TPS62088EVM-814 was used to take all the data in the TPS62088 data sheet (SLVSD94). See the device data sheet for the performance of this EVM.

Figure 1 shows the thermal performance of the EVM.

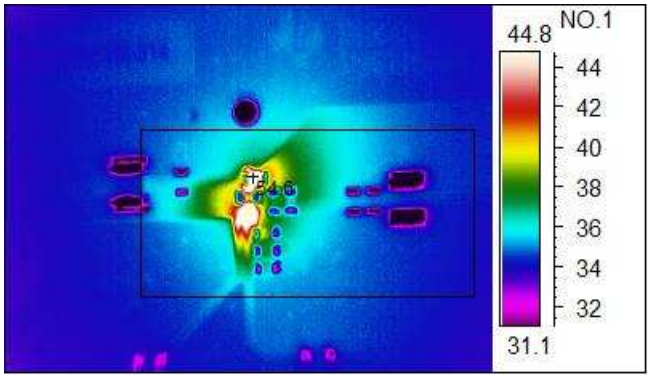

Figure 1. Thermal Performance (V_{IN} = 5 V, I_{OUT} = 3000 mA)

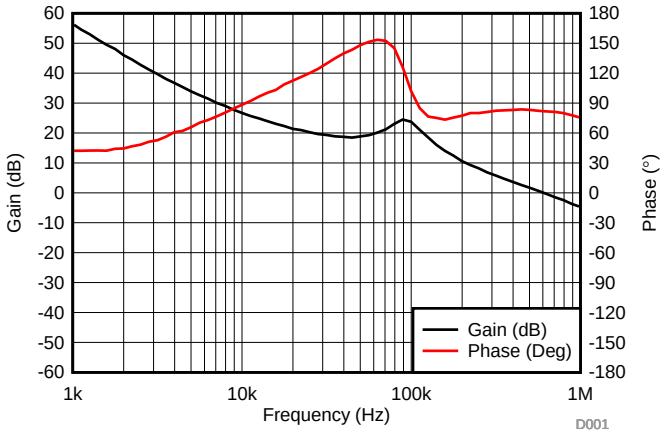

Figure 2. Loop Response Measurement (V_{IN} = 5 V, Load = 3000 mA)

4 Board Layout

This section provides the TPS62088EVM-814 board layout and illustrations in Figure 3 through Figure 7. The Gerbers are available on the EVM product page: TPS62088EVM-814.

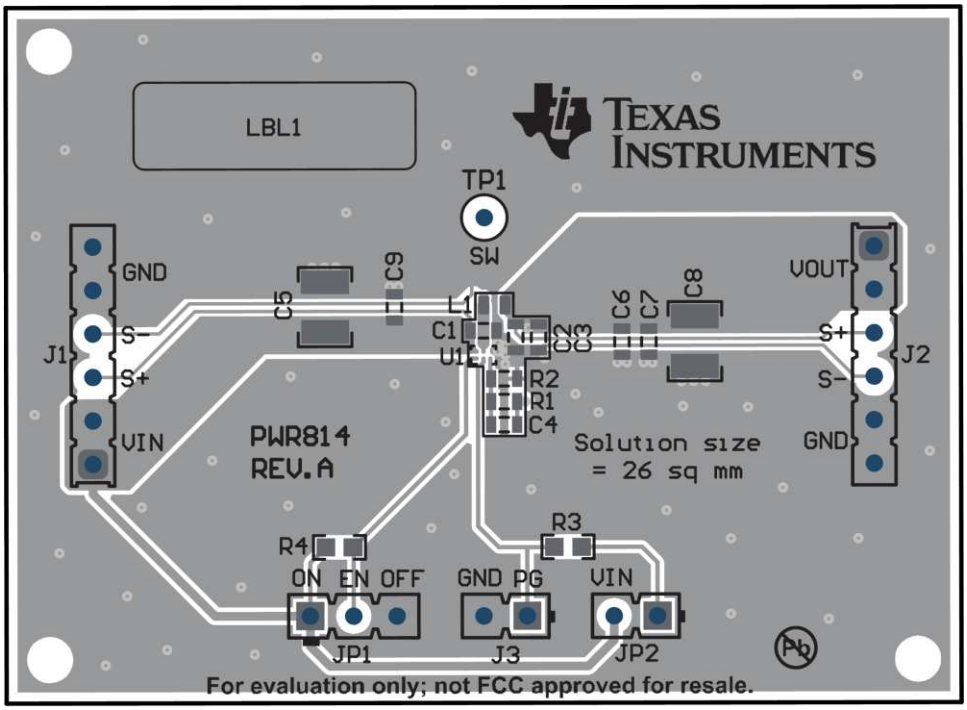

Figure 3. Top Assembly

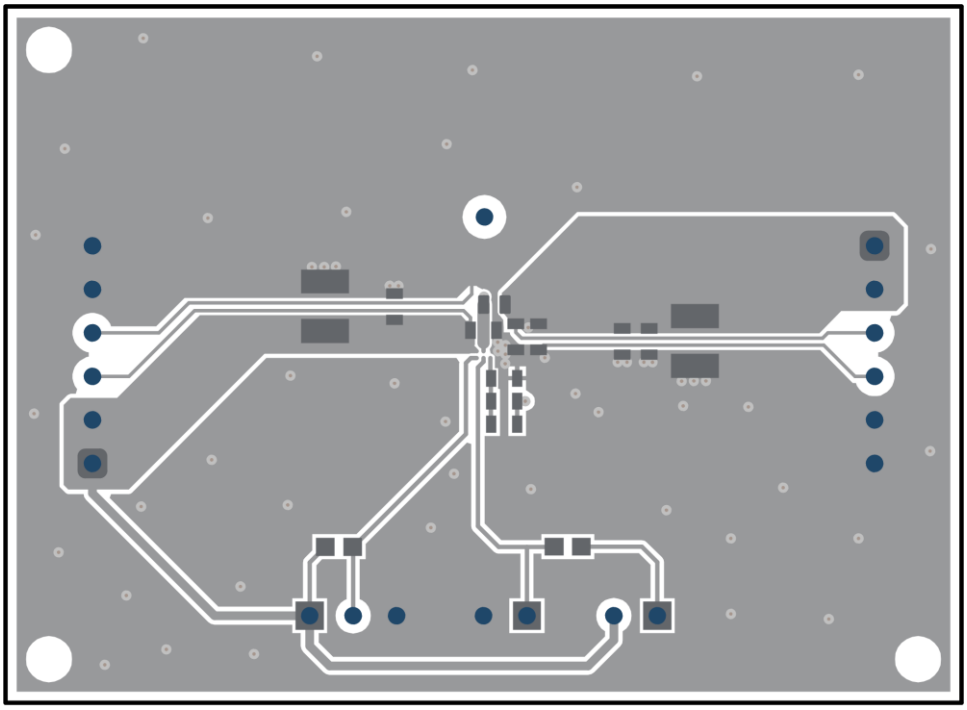

Figure 4. Top Layer

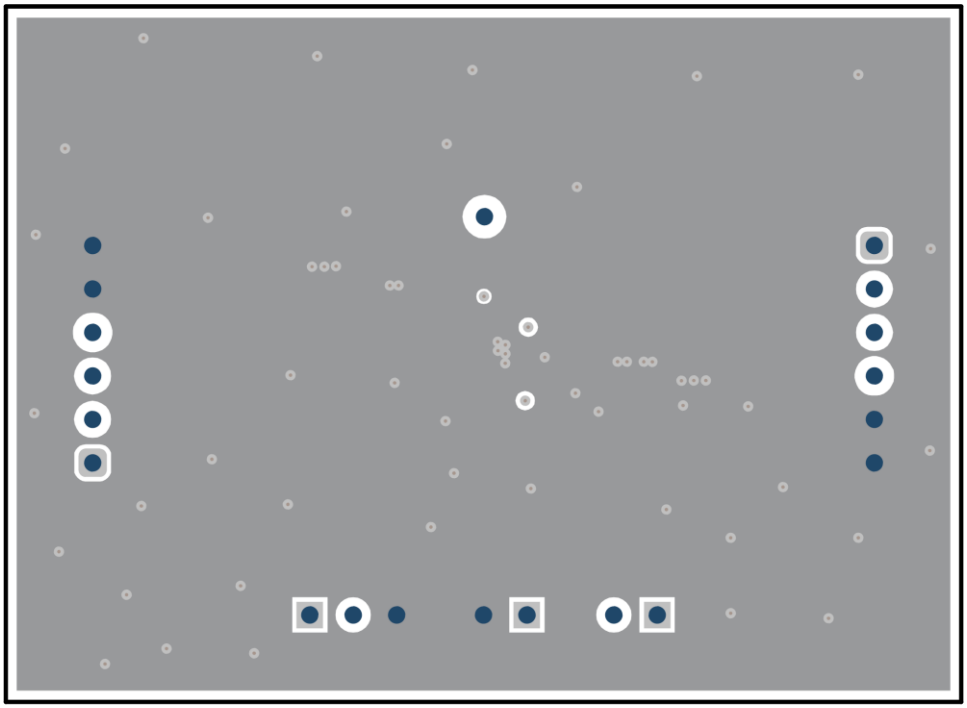

Figure 5. Signal Layer 1

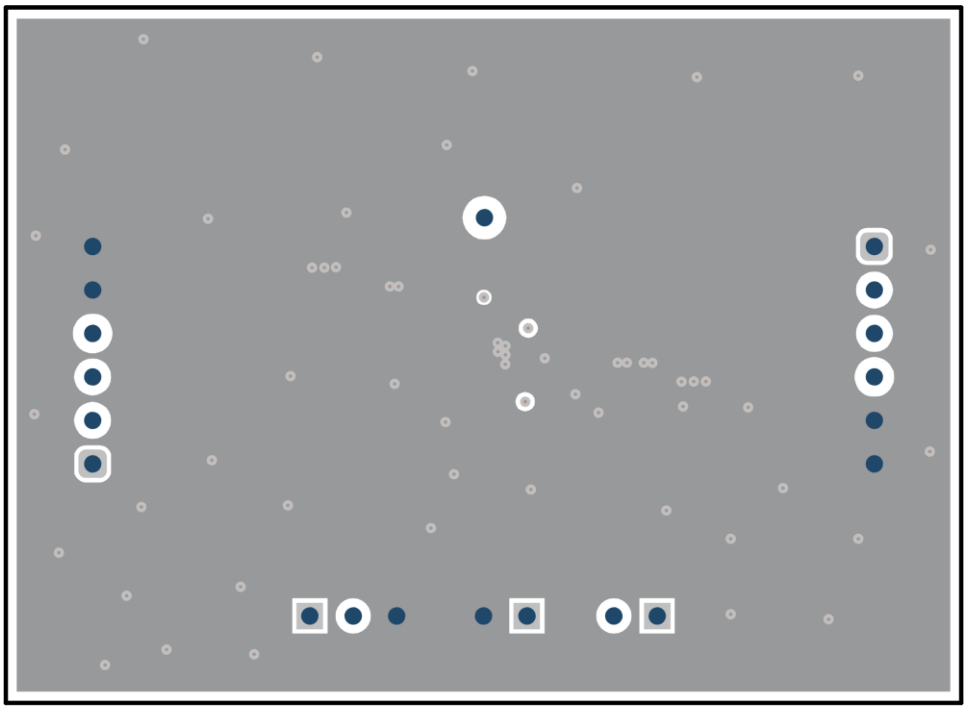

Figure 6. Signal Layer 2

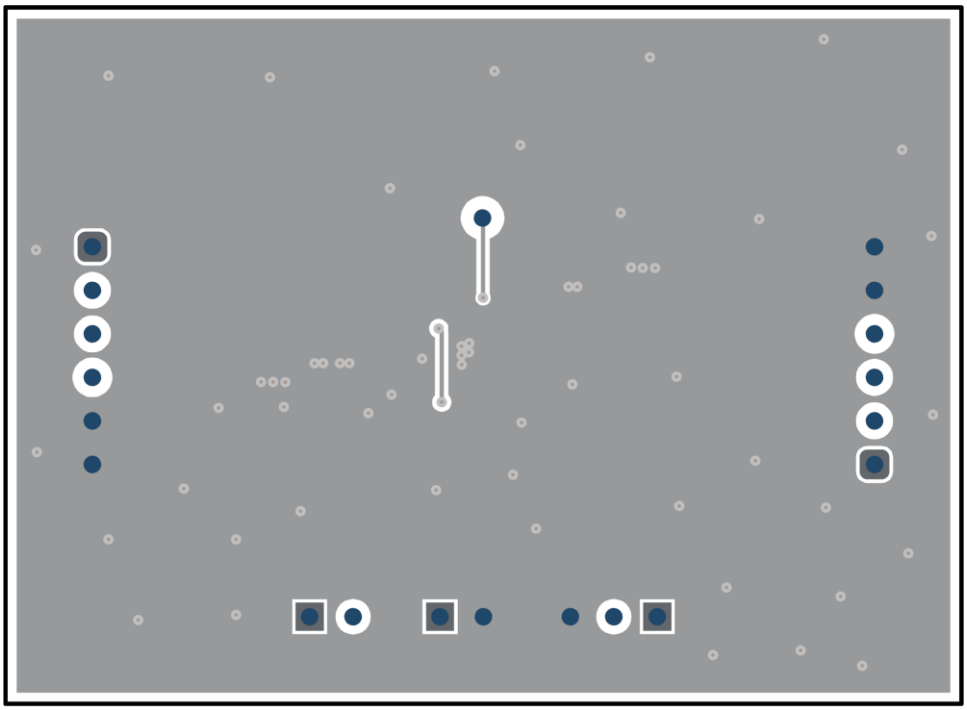

Figure 7. Bottom Layer

5 Schematic and Bill of Materials

This section provides the TPS62088EVM-814 schematic and bill of materials (BOM).

5.1 Schematic

Figure 8 illustrates the EVM schematic.

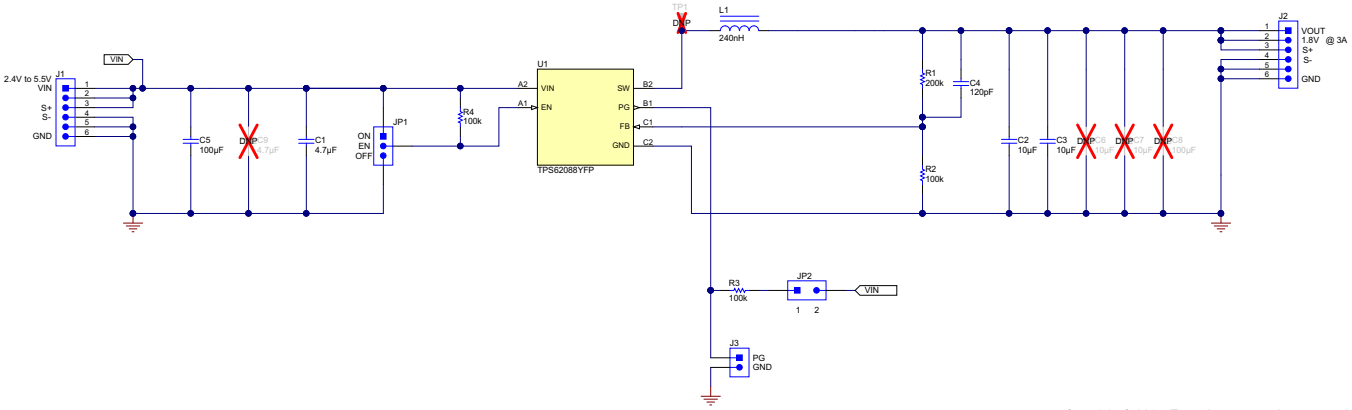

Figure 8. TPS62088EVM-814 Schematic

5.2 Bill of Materials

Table 2 lists the BOM for this EVM.

Table 2. TPS62088EVM-814 Bill of Materials

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer
C1	1	4.7 µF	CAP, CERM, 4.7 µF, 6.3 V, ±10%, X7R, 0603	0603	JMK107BB7475MA-T	Taiyo Yuden
C2, C3	2	10 µF	CAP, CERM, 10 µF, 10 V, ±20%, X7R, 0603	0603	GRM188Z71A106MA73D	Murata
C4	1	120 pF	CAP, CERM, 120 pF, 50 V, ±5%, C0G/NP0, 0603	0603	Std	Std
C5	1	100 µF	CAP, CERM, 100 µF, 6.3 V, ±20%, X5R, 1210	1210	GRM32ER60J107ME20L	Murata
L1	1	240 nH	Inductor, 240 nH, 3.5 A, 0.03 ohm, SMD	1608	DFE18SANR24MG0L	Murata
R1	1	200 kΩ	RES, 200 k, 1%, 0.1 W, 0603	0603	Std	Std
R2, R3, R4	3	100 kΩ	RES, 100 k, 1%, 0.1 W, 0603	0603	Std	Std
U1	1		Tiny 3-A High Efficiency Synchronous Buck Converter in Chip Scale Package	1.2 x 0.8 mm	TPS62088YFP	Texas Instruments

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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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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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