TLV61048EVM User's Guide

The TLV61048EVM-042 evaluates the performance of the TLV61048. The TLV61048 is a non-synchronous boost converter to support up to 14-V output voltage from input ranging from 2.65 V to 5.5 V. The device integrates a 14-V power switch with 3.7-A typical current limit and operates at 600-KHz or, 1-MHz by configuring the FREQ pin. This user's guide describes the setup, schematic, bill of materials (BOM), and the PCB layout of the evaluation board.

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1 Introduction

1.1 Performance

Table 1 provides a summary of the TLV61048EVM performance characteristics, tested at 25°C ambient temperature.

Table 1. EVM Characteristics

	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Input voltage, V_{power}	The voltage in VIN pin is 3.3V	1.2	2		V
Output voltage, V_{OUT}	V_{power} > 2 V, I_{OUT} ≤ 200mA		12		V
Output current, I_{OUT}	V_{power} > 2 V	200			mA

1.2 Modification

The EVM is designed to support some modifications by the user. The external components can be changed according to the real application.

The C6 is reserved for one cell super-capacitor, of which the voltage is normally from 1.2 V to 2.7 V. One typical application of the TLV61048 is to generate 12-V output from one cell super-capacitor. In such application, the VIN pin of TLV61048 should be powered by a typical 3.3-V external power supply.

To reduce the output ripple during stable and load transient condition, the C4 and C5 can be populated to increase the output capacitor.

The feed-forward capacitor C8 can help to improve the response performance and the phase margin if the value is properly selected. Refer to this application note to select the feed-forward capacitor if required. *Feedforward Capacitor Makes Boost Converter Fast and Stable*.

2 Setup

The function of connectors on the TLV61048EVM-042 and their setup is described below:

J1-VPS Positive output of the power supply for the TLV61048EVM.

J2-VOUT Positive connection for the loading.

J3-GND Return connection of the power supply for the TLV61048EVM.

J4-GND Return connection for the loading.

J5-VPS_S power supply sensing for measuring efficiency. VPS_S and GND_S are for positive and negative inputs of the voltage meter.

J6-VOUT_S Output voltage sensing for measuring efficiency. VOUT_S and GND_S are for positive and negative inputs of the voltage meter.

J7-VIN Select the voltage source for the VIN pin of the TLV61048. if short the VIN to VPS, The power supply for the EVM must be higher than 2.6 V. if support the VIN with an additional 3.3-V voltage source, the power supply connected to the VPS can be down to 1.2V.

J8-EN Control the EN pin to enable or disable the TLV61048.

J9-FREQ The device switches with 600-KHz frequency if the FREQ pin is floating, and with 1-MHz if the FREQ is shorted to GND.

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3 Schematic and Bill of Materials and PCB Layout

This section provides the TLV61048EVM-042 schematic, bill of materials (BOM), and PCB board layout.

3.1 Schematic

Figure 1 shows the EVM schematic.

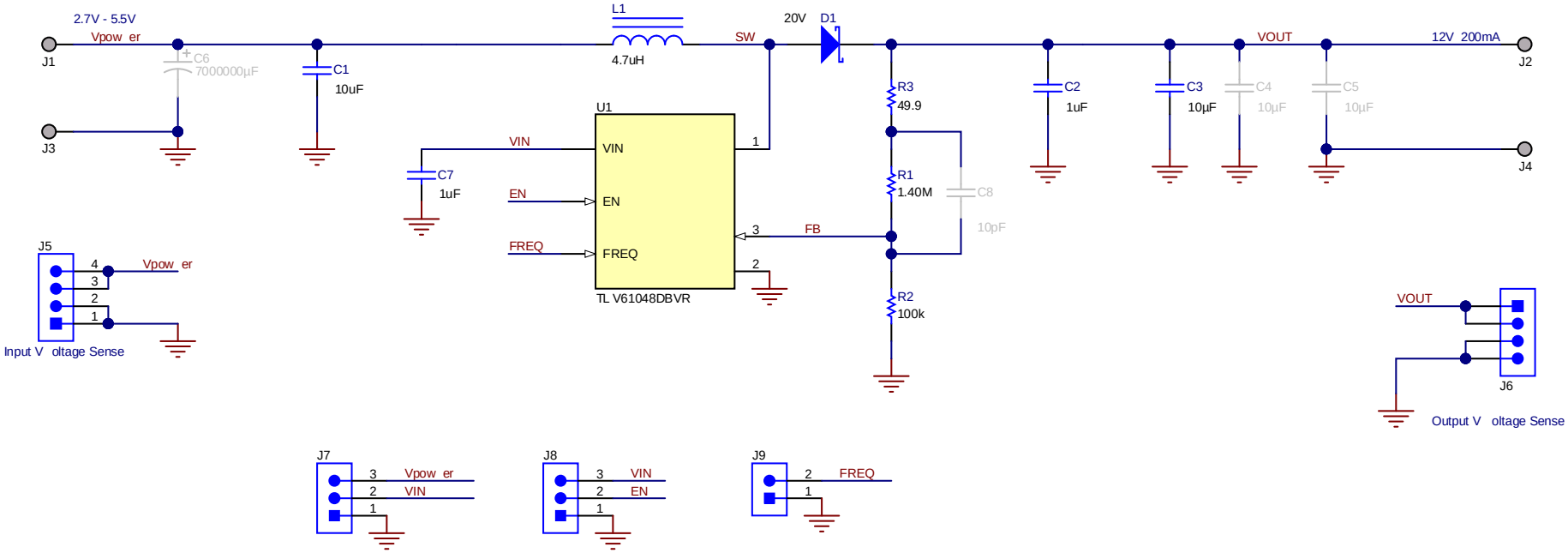


Figure 1. TLV61048EVM-042 Schematic

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3.2 Bill of Materials

Table 2 displays the EVM bill of materials.

Table 2. TLV61048EVM-042 Bill of Materials

Designator	Qty	Value	Description	PackageReference	PartNumber	Manufacturer
C1	1	10uF	CAP, CERM, 10 uF, 25 V, +/- 20%, X5R, 0603	0603	GRM188R61E106MA73D	MuRata
C2	1	1uF	CAP, CERM, 1 uF, 16 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603	0603	GCM188R71C105KA64D	MuRata
C3	1	10uF	CAP, CERM, 10 µF, 25 V,+/- 10%, X5R, 1206	1206	CC1206KKX5R8BB106	Yageo
C7	1	1uF	CAP, CERM, 1 uF, 6.3 V, +/- 10%, X5R, 0603	0603	GRM185R60J105KE26D	MuRata
D1	1	20V	Diode, Schottky, 20 V, 1 A, SMAF	SMAF	B120AF-13	Diodes Inc.
J1, J2, J3, J4	4		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	Keystone
J5, J6	2		Header, 100mil, 4x1, Gold, TH	4x1 Header	TSW-104-07-G-S	Samtec
J7, J8	2		Header, 100mil, 3x1, Gold, TH	3x1 Header	TSW-103-07-G-S	Samtec
J9	1		Header, 100mil, 2x1, Gold, TH	Sullins 100mil, 1x2, 230 mil above insulator	PBC02SAAN	Sullins Connector Solutions
L1	1	4.7uH	Inductor, Shielded, Composite, 4.7 uH, 4.5 A, 0.0401 ohm, SMD	4.0x3.1x4.0mm	XAL4030-472MEB	Coilcraft
R1	1	1.40Meg	RES, 1.40 M, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW06031M40FKEA	Vishay-Dale
R2	1	100k	RES, 100 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW0603100KFKEA	Vishay-Dale
R3	1	49.9	RES, 49.9, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060349R9FKEA	Vishay-Dale
SH-JP1, SH-JP2	2		Shunt, 100mil, Gold plated, Black	Shunt 2 pos. 100 mil	881545-2	TE Connectivity
U1	1		15-V Output Voltage Non-Sync Boost Converter, DBV0006A (SOT-23-6)	DBV0006A	TLV61048DBVR or DBVT	Texas Instruments
C4, C5	0	10uF	CAP, CERM, 10 µF, 25 V,+/- 10%, X5R, 1206	1206	CC1206KKX5R8BB106	Yageo
C6	0	7000000uF	CAP, AL, 7000000 µF, 2.7 V, +50/-20%, 0.06 ohm, SMD	Dia 10mm	ZNP2R7S705RS1025	Chengdu OK New Energy Technology
C8	0	10pF	CAP, CERM, 10 pF, 50 V,+/- 1%, C0G/NP0, 0402	0402	GRM1555C1H100FA01D	MuRata

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3.3 PCB Layout

The PCB of the TLV61048EVM has two layers. All the components are in the top layer. Figure 2 shows the top layout and components location. Figure 3 shows the bottom layer.

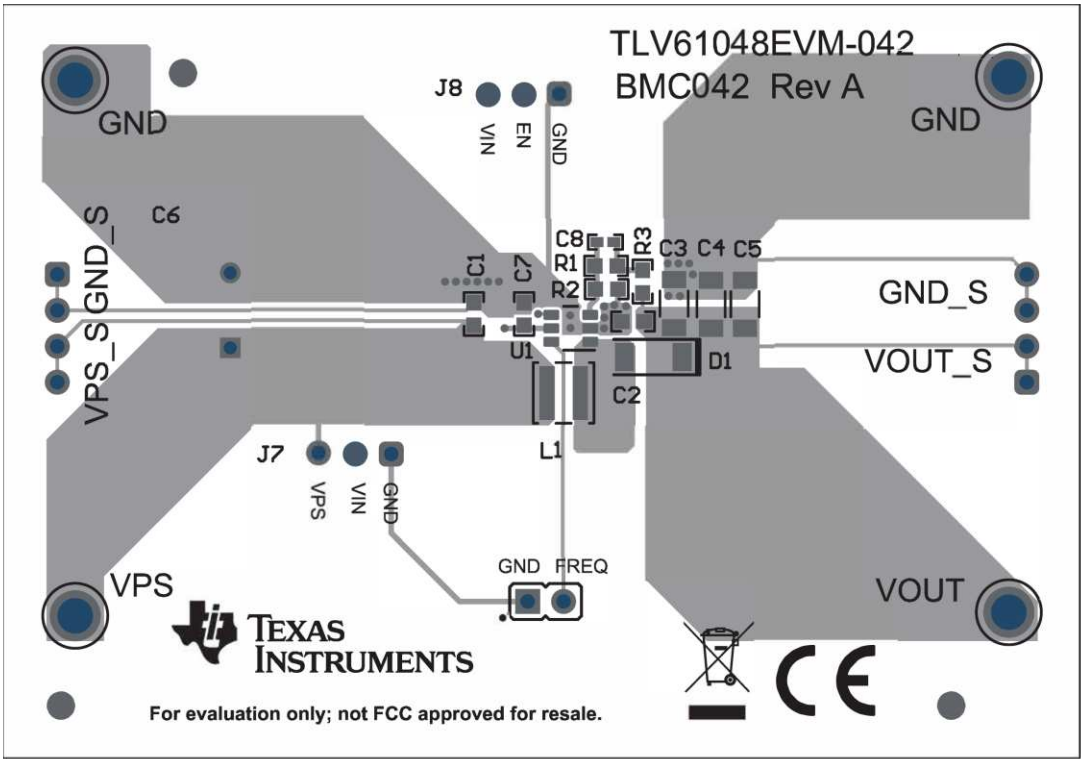


Figure 2. TLV61048EVM Top View

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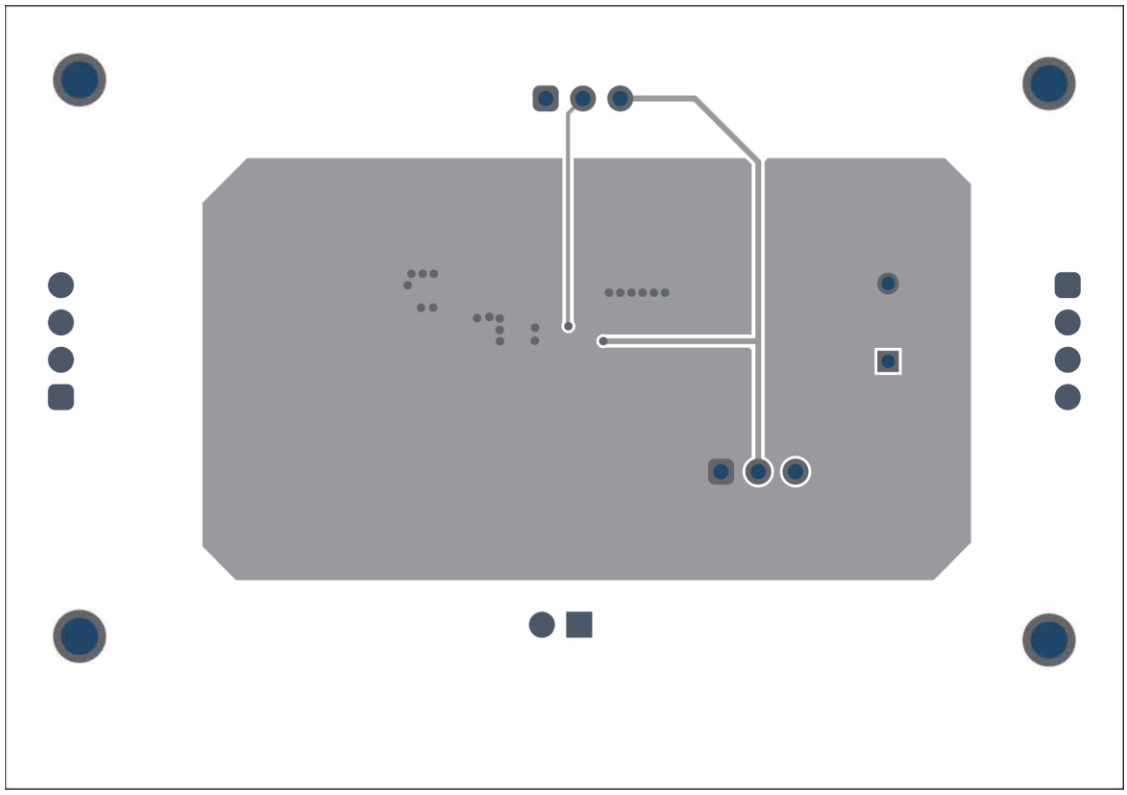


Figure 3. TLV61048EVM Bottom View

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Revision History

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

Changes from Original (March 2019) to A Revision	Page
• Changed descriptive text in the 1st paragraph of the User's Guide.	1
• Changed description for J9-FREQ connectior in Section 2 .	2

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