LMR23625CEVM User's Guide

The Texas Instruments LMR23625CEVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR23625 wide-input Simple Switcher® buck regulator. This document describes the setup and the input / output connections of the EVM. Included are the board layout, schematic, and bill of materials.

Contents

List of Figures

List of Tables

Trademarks

Simple Switcher is a registered trademark of Texas Instruments.

1 Introduction

The LMR23625 is a 36 V, 2.5 A step-down synchronous regulator with 75 µA quiescent current. With a wide input range from 4 V to 36 V, it is suitable for a wide range of applications from automotive to industry for power conditioning from unregulated sources. The LMR23625CEVM evaluation board is designed to provide the design engineer to evaluate the LMR23625 series operation and performance.

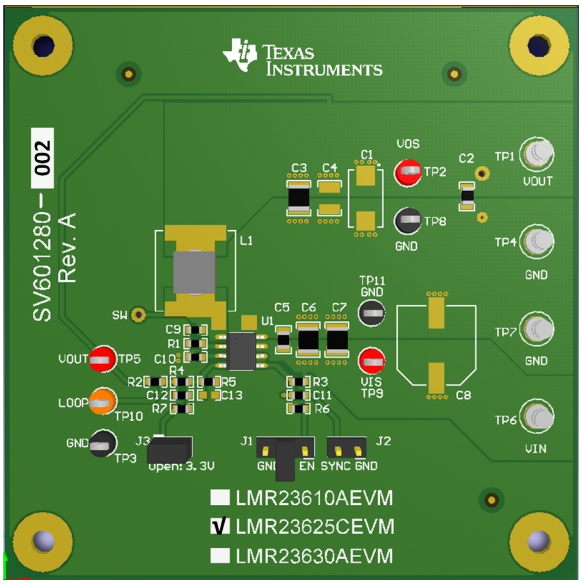

Figure 1. LMR23625CEVM Board

EVM Features

- 4 V to 36 V Input Voltage Range
- Jumper Selectable Output Options (5 V or 3.3 V)
- Up to 2.5 A Output Current
- Switching Frequency 2100 kHz
- Frequency Synchronization to External Clock
- Hiccup Mode Short Current Protection

The EVM contains one DC-DC converter (See Table 1)

Table 1. Device and Package Configurations

CONVERTER	EVM	IC	PACKAGE
U1	LMR23625CEVM	LMR23625	HSOIC-8

2 Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up and use the LMR23625CEVM.

2.1 Input/Output Connector Description

VIN — Terminal TP6 – is the power input terminal for the converter. Adjacent to it is the GND reference ground. Use this terminal to attach the EVM to a cable harness.

VOUT — Terminal TP1 – is the regulated output voltage for the converter. Adjacent to it is the GND reference ground.

GND — Terminal TP4, TP7 – are the ground reference for the converter. Use these terminals to attach the EVM to a cable harness.

EN — Jumper J1 – is used to enable the switch-mode converter. The device will be enabled when the respective jumper is high or floating, and disabled when low. The EVM default system UVLO is 6.2 V (typical), it also can be programmed by changing R3 or R6. Refer to LMR23625-Q1 datasheet for enable and adjustable undervoltage lockout.

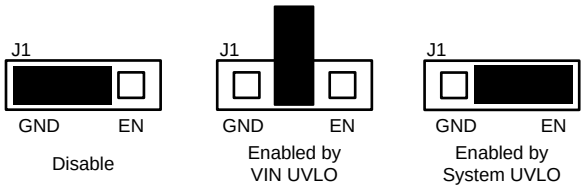

Figure 2. Enable Jumper Setting

SYNC — Jumper J2 – is used to synchronize the switching frequency to external clock. Refer to datasheet for detail application information.

Testpoint — TP2, TP3, TP5, TP8, TP9, TP10, TP11 – these are test points used for input/output voltage measurements and loop response measurements.

2.2 Adjusting the Output Voltage

The default setting output voltage is 5 V. Open J3 will change output voltage from 5 V to 3.3 V.

If other outputs need to be configured, then: open J3 and adjust the feedback resistors using the following equation.

$$V_{OUT} = V_{REF} \times (1 + (R4 / R5)) \quad (1)$$

where

- V_{REF} is 1 V

3 Board Layout

Figure 3 to Figure 6 show the board layout for the LMR23625CEVM. The PCB consists of a 4-layer design. 2-oz copper planes are applied on all four layers to dissipate heat with an array of thermal vias under the thermal pad to connect to all four layers.

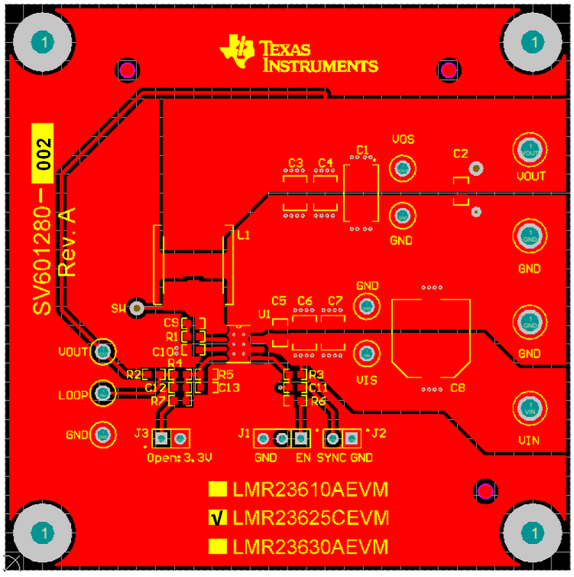

Figure 3. Top Layer

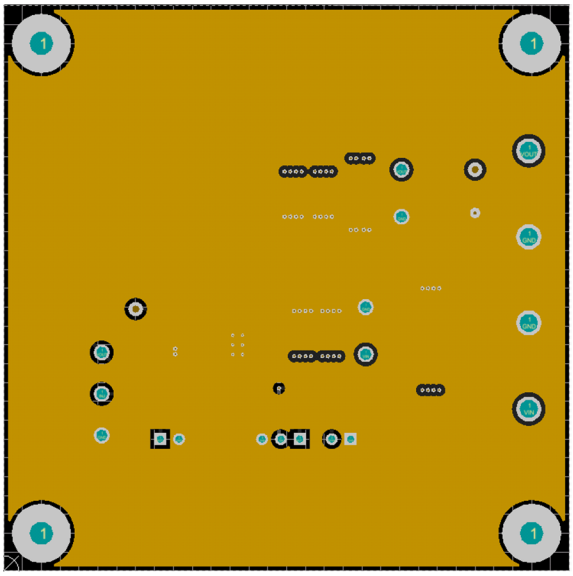

Figure 4. Middle Layer 1

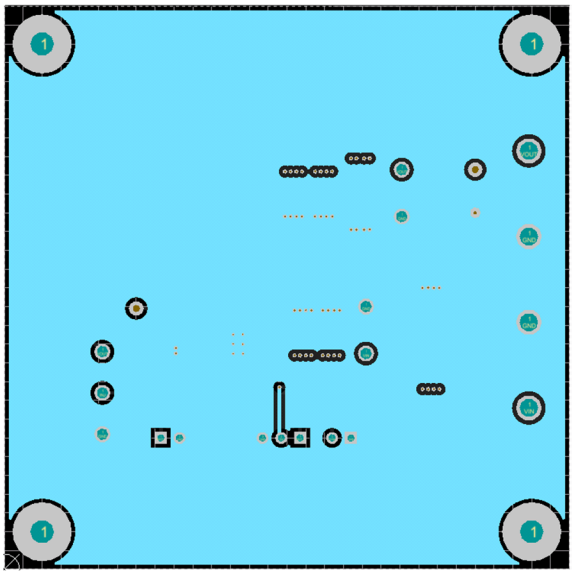

Figure 5. Middle Layer 2

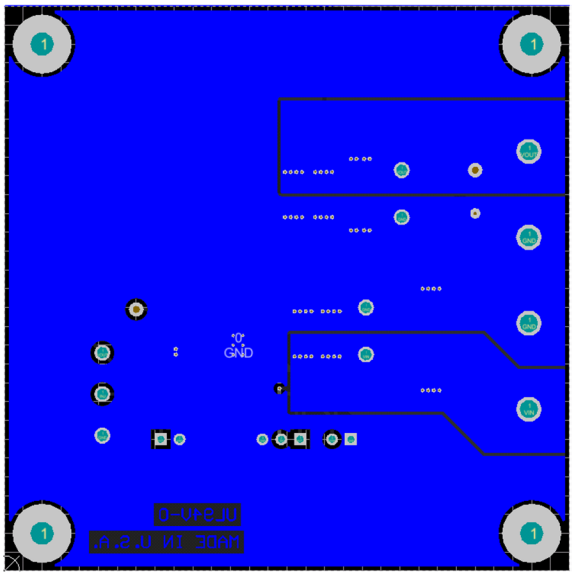

Figure 6. Bottom Layer

4 Schematic and Bill of Materials

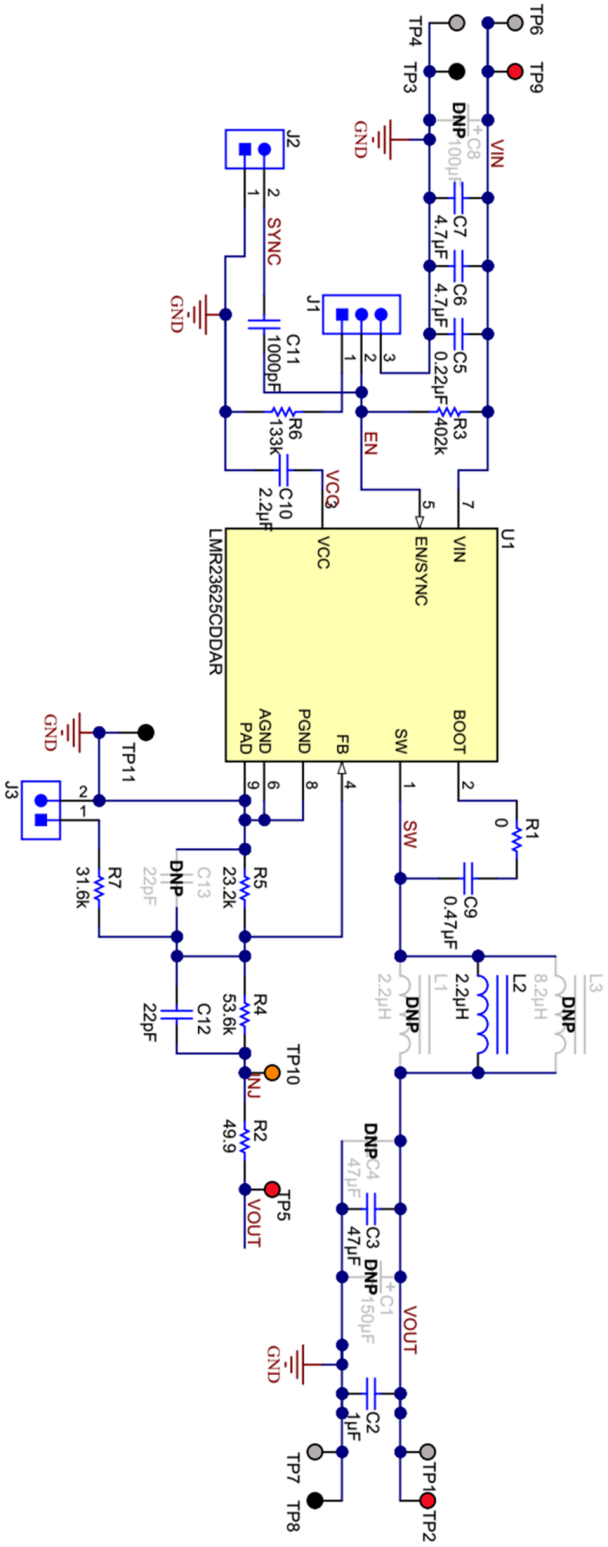

Figure 7. LMR23625CEVM Schematic

Table 2. LMR23625CEVM Bill of Materials (BOM)

Designator	Description	Part Number	Footprint	Quantity
C2	CAP, CERM, 1 µF, 25 V, +/- 10%, X7R, 0805	GRM219R71E105KA88D	0805	1
C3	CAP, CERM, 47 µF, 16 V, +/- 20%, X5R, 1210	GRM32ER61C476ME15L	1210	1
C5	CAP, CERM, 0.22 µF, 50 V, +/- 10%, X7R, 0805	GRM21BR71H224KA01L	0805	1
C6, C7	CAP, CERM, 4.7 µF, 50 V, +/- 10%, X7R, 1210	GRM32ER71H475KA88L	1210	2
C9	CAP, CERM, 0.47 µF, 16 V, +/- 10%, X7R, 0603	GRM188R71C474KA88D	0603	1
C10	CAP, CERM, 2.2 µF, 16 V, +/- 10%, X7R, 0603	GRM188Z71C225KE43	0603	1
C11	CAP, CERM, 1000 pF, 50 V, +/- 10%, X7R, 0603	GRM188R71H102KA01D	0603	1
C12	CAP, CERM, 22 pF, 50 V, +/- 5%, C0G/NP0, 0603	GRM1885C1H220JA01D	0603	1
J1	Header, 100mil, 3x1, Gold, TH	TSW-103-07-G-S	TSW-103-07-G-S	1
J2, J3	Header, 100mil, 2x1, Gold, TH	TSW-102-07-G-S	TSW-102-07-G-S	2
L2	Inductor, Wirewound, Powdered Iron, 2.2 µH, 4.9 A, 0.035 ohm, SMD	74437336022	WE-LHMI_5030	1
R1	RES, 0, 5%, 0.1 W, 0603	CRCW06030000Z0EA	0603	1
R2	RES, 49.9, 1%, 0.1 W, 0603	CRCW060349R9FKEA	0603	1
R3	RES, 402 k, 1%, 0.1 W, 0603	CRCW0603402KFKEA	0603	1
R4	RES, 53.6k, 1%, 0.1W, 0603	CRCW060353K6FKEA	0603	1
R5	RES, 23.2 k, 1%, 0.1 W, 0603	CRCW060323K2FKEA	0603	1
R6	RES, 133 k, 1%, 0.1 W, 0603	CRCW0603133KFKEA	0603	1
R7	RES, 31.6 k, 1%, 0.1 W, 0603	CRCW060331K6FKEA	0603	1
SH-J1, SH-J3	Shunt, 100 mil, Flash Gold, Black	SPC02SYAN	SPC02SYAN	2
TP1, TP4, TP6, TP7	Terminal, Turret, TH, Double	1502-2	Keystone1502-2	4
TP2, TP5, TP9	Test Point, Compact, Red, TH	5005	Keystone5005	3
TP3, TP8, TP11	Test Point, Compact, Black, TH	5006	'Keystone5006	3
TP10	Test Point, Compact, Orange, TH	5008	Keystone5008	1
U1	SIMPLE SWITCHER 36 V, 2.5 A Synchronous Step-Down Converter, DDA0008E	LMR23625CDDAR	HSOIC-8	1
PCB	PCB, FR4, 4 Layers, Size 3000 x 3000 mil, Thickness 62 mil	SV601280		1

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      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.

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      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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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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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
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