LMR23630A EVM User's Guide

The Texas Instruments LMR23630AEVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR23630A 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.

1 Introduction

The LMR23630 is a 36 V, 3 A step-down synchronous regulator with 75 µA quiescent current. With a wide input range from 4.5 V to 36 V, it is suitable for a wide range of applications from automotive to industry for power conditioning from unregulated sources. The LMR23630AEVM evaluation board is designed to provide the design engineer to evaluate the LMR23630 series operation and performance.

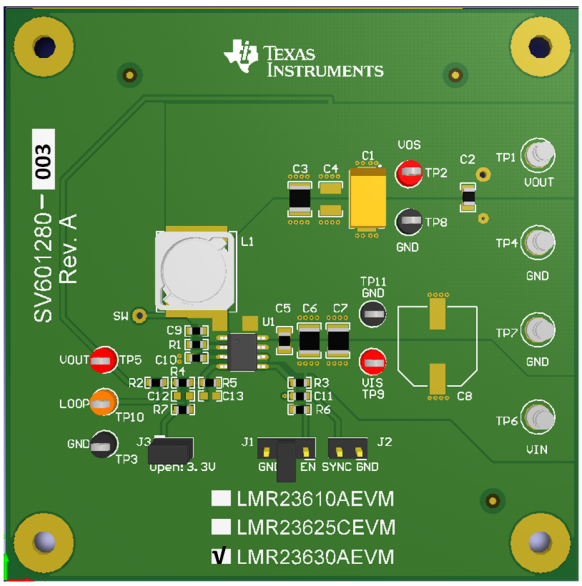

Figure 1. LMR23630AEVM Board

EVM Features

- 4.5 V to 36 V Input Voltage Range
- Jumper Selectable Output Options (5 V or 3.3 V)
- Up to 3 A Output Current
- Switching Frequency 400 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	LMR23630AEVM	LMR23630A	HSOIC-8

2 Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up and use the LMR23630AEVM.

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 LMR23630A datasheet for enable and adjustable undervoltage lockout.

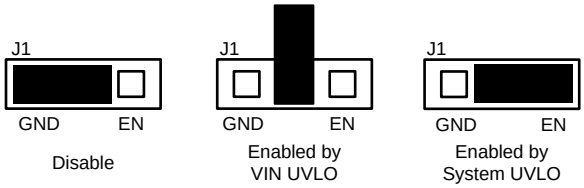

Figure 2. Enable Jumper Setting

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 5.0 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 LMR23630AEVM. 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.

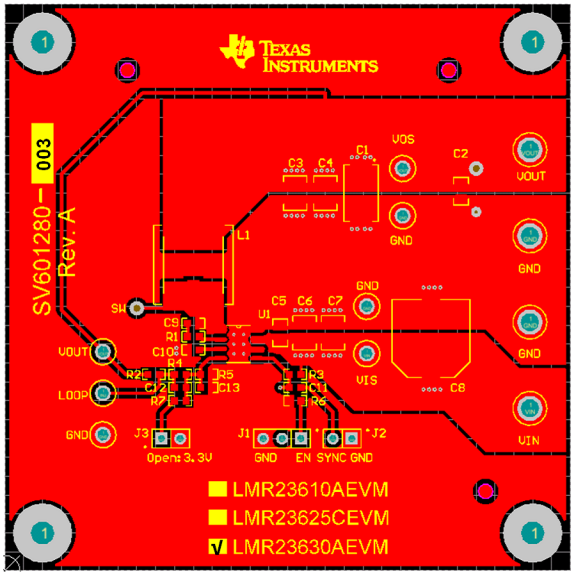

Figure 3. Top Layer

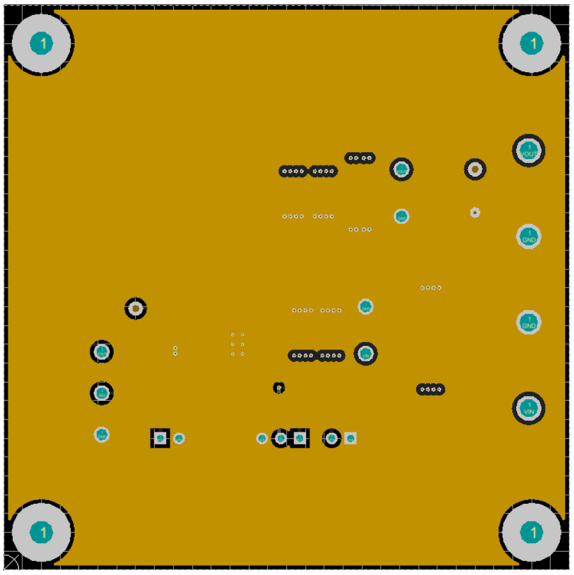

Figure 4. Middle Layer 1

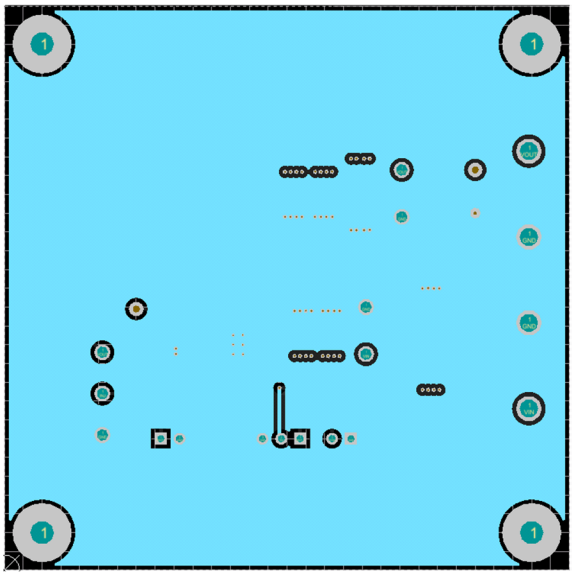

Figure 5. Middle Layer 2

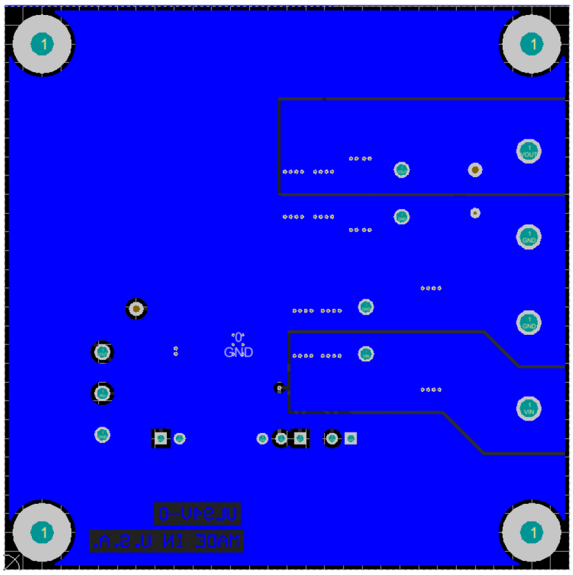

Figure 6. Bottom Layer

4 Schematic and Bill of Materials

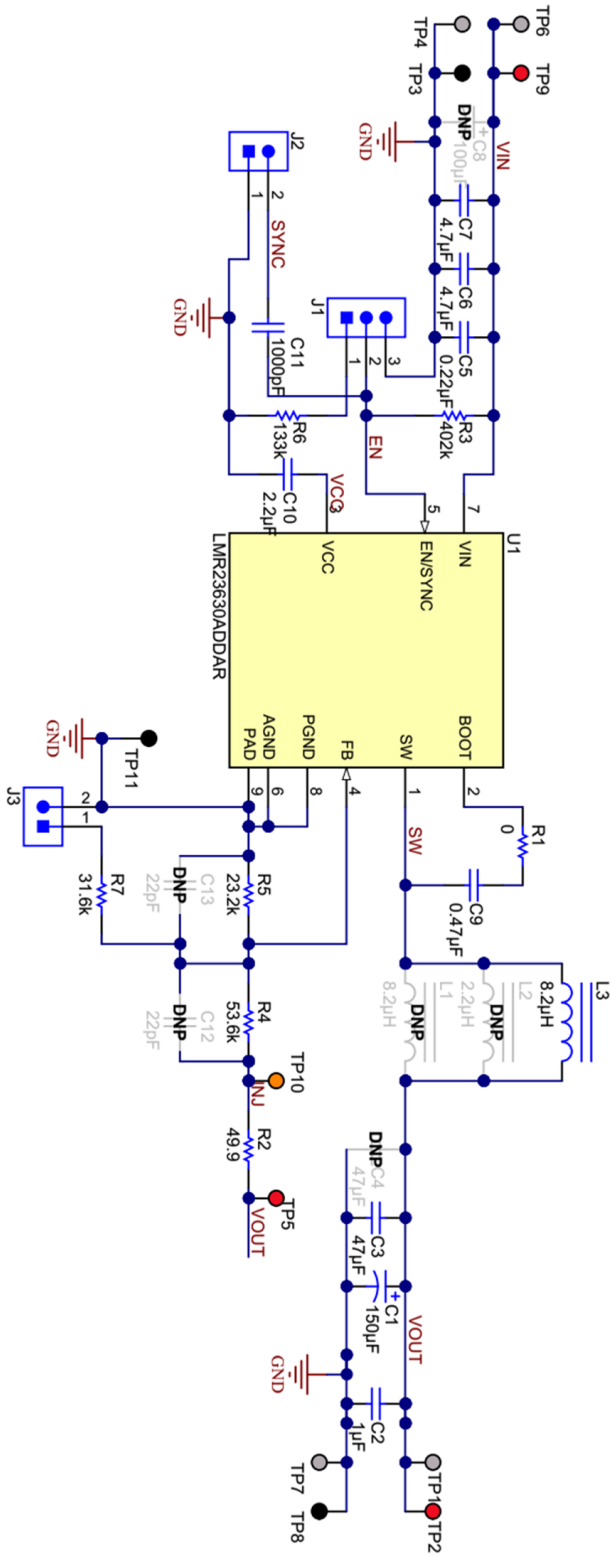

Figure 7. LMR23630AEVM Schematic

Table 2. LMR23630AEVM Bill of Materials (BOM)

Designator	Description	Part Number	Footprint	Quantity
C1	CAP, TA, 150 µF, 16 V, +/- 20%, 0.015 ohm, SMD	T530X157M016ATE015	7343-43	1
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
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
L3	Inductor, Wirewound, Metal Composite, 8.2 µH, 5.05 A, 0.0286 ohm, SMD	7447797820	WE-PDF-1045	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, 3 A Synchronous Step-Down Converter, DDA0008E	LMR23630ADDAR	HSOIC-8	1
PCB	PCB, FR4, 4 Layers, Size 3000 x 3000 mil, Thickness 62 mil	SV601280		1

Revision History

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

Changes from Original (June 2016) to A Revision	Page
• Changed the minimum input voltage spec from 4V to 4.5V as required through the document.	1

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