User's Guide

LMR51430 Buck Regulator Evaluation Module User's Guide

ABSTRACT

The Texas Instruments LMR51430EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51430 wide-input synchronous buck regulator. This document describes the setup, input/output connections of the EVM, board layout, schematic, and bill of materials.

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Trademarks

1 Introduction

The Texas Instruments LMR51430EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51430 wide-input buck regulator.

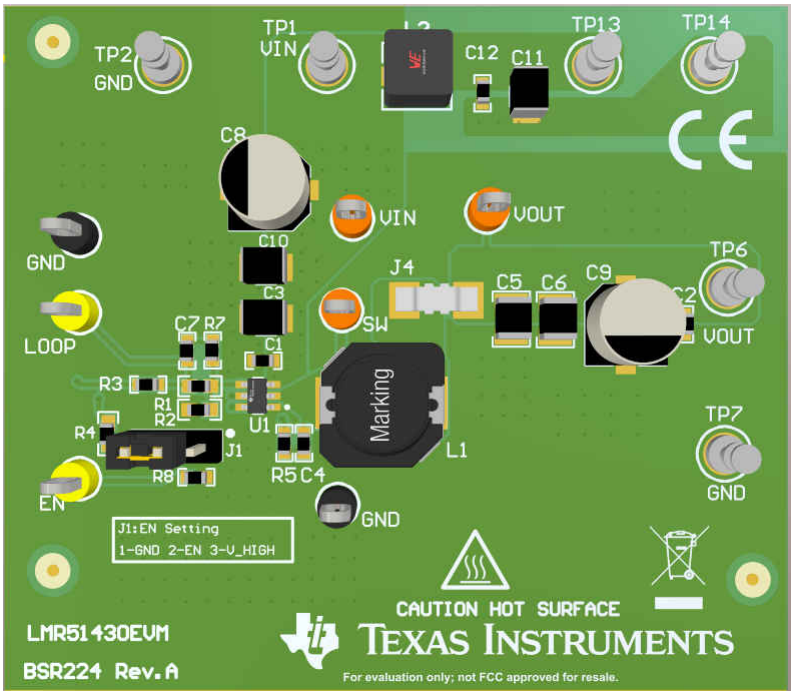

Figure 1-1. LMR51430EVM Board

1.1 Description

The Texas Instruments LMR51430EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51430 wide-input buck regulator.

1.2 Features

- 4.5-V to 36-V input voltage range
- Default 5-V output
- Up to 3-A output current
- 500-kHz switching frequency
- Hiccup mode short current protection
- Internal compensation

The EVM contains one DC/DC converter (see Table 1-1).

Table 1-1. Device and Package Configurations

Converter	EVM	Device	Package
U1	LMR51430EVM	LMR51430	SOT23-6

2 EVM Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up, and use the LMR51430EVM.

VIN – Terminal TP1	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.
EMI IN+ – Terminal TP13	Input terminal for input filter of the converter. If an input filter is desired between the supply voltage and the LMR38020, connect the supply voltage between EMI IN+ and EMI GND (Terminal TP14) on the bottom layer.
VOUT – Terminal TP6	Regulated output voltage for the converter. Adjacent to it is the GND reference ground.
GND – Terminal TP2, TP5, TP7, TP14	Ground reference for the converter. Use these terminals to attach the EVM to a cable harness.
ENABLE SETTING – Jumper J1	Used to enable the switch-mode converter. The device will be enabled when the EN pin is high, and disabled when low.

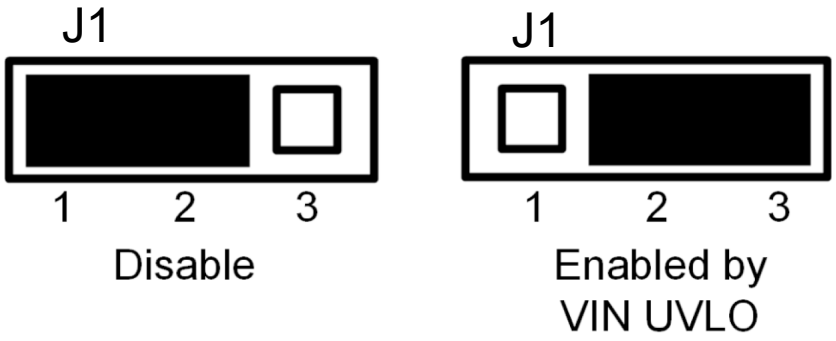

Figure 2-1. Enable Jumper Setting

Jumper J4	Replacing J4 with a wire can use current scope to test the inductor current.

2.1 Adjusting the Output Voltage

If other outputs need to be configured, adjust the feedback resistors using Equation 1.

$$V_{OUT} = V_{REF} \times (1 + (R1 / R2)) \quad (1)$$

where

- V_{REF} is 0.6 V.

3 PCB Layouts

Figure 3-1 to Figure 3-2 show the board layout for the LMR51430EVM. The PCB consists of a 4-layer design. The board size is 57.8-mm × 64mm, 2-oz copper planes are applied on each layers.

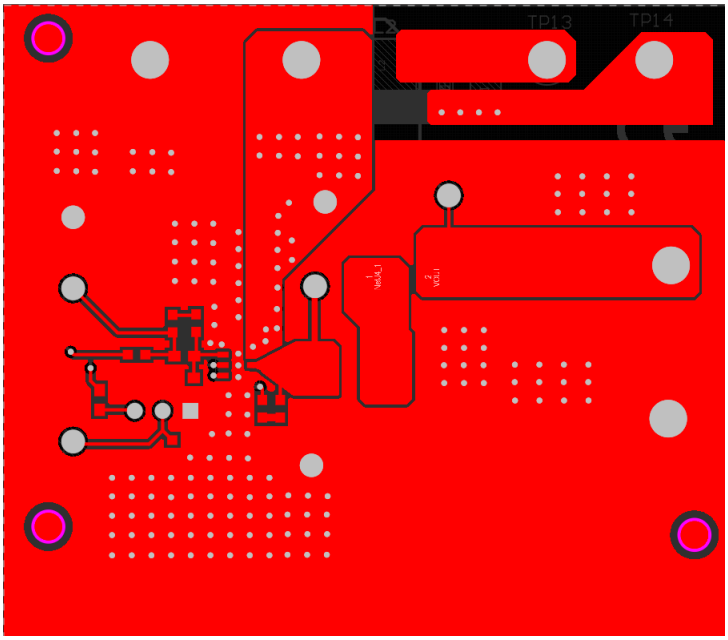

Figure 3-1. PCB Layout (Top View)

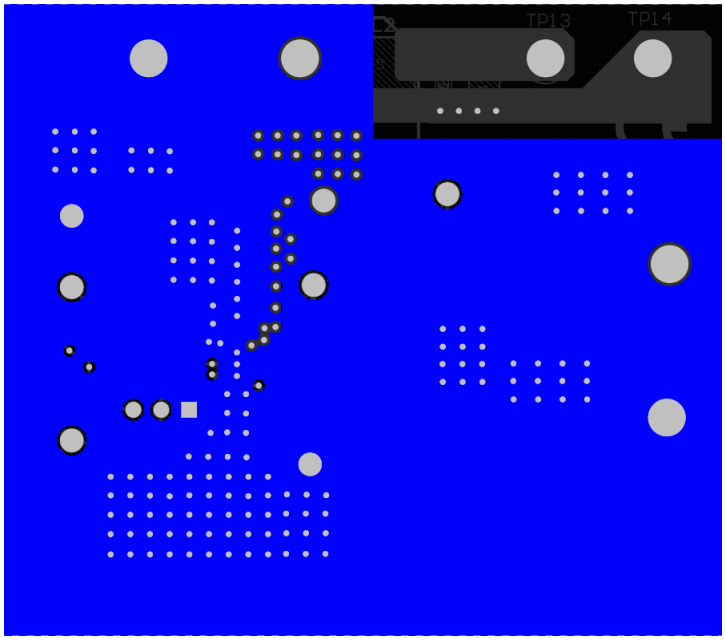

Figure 3-2. PCB Layout (Bottom View)

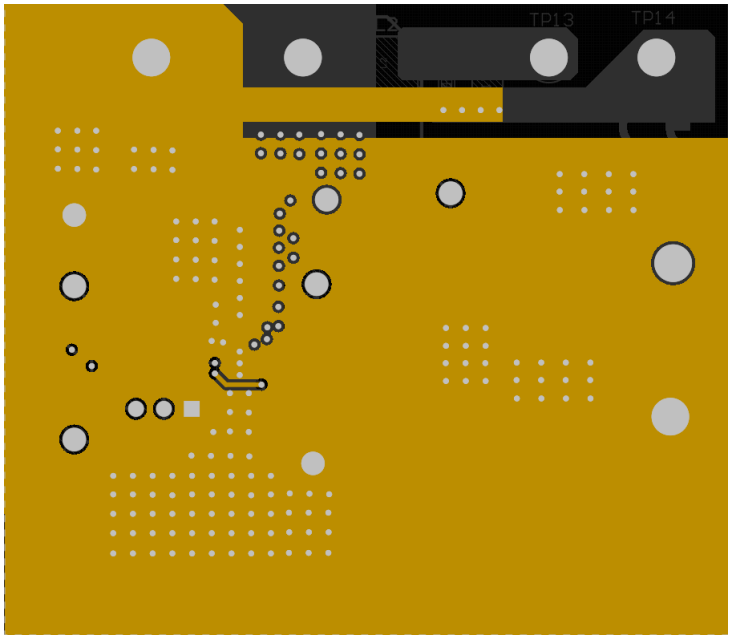

Figure 3-3. Layer 1

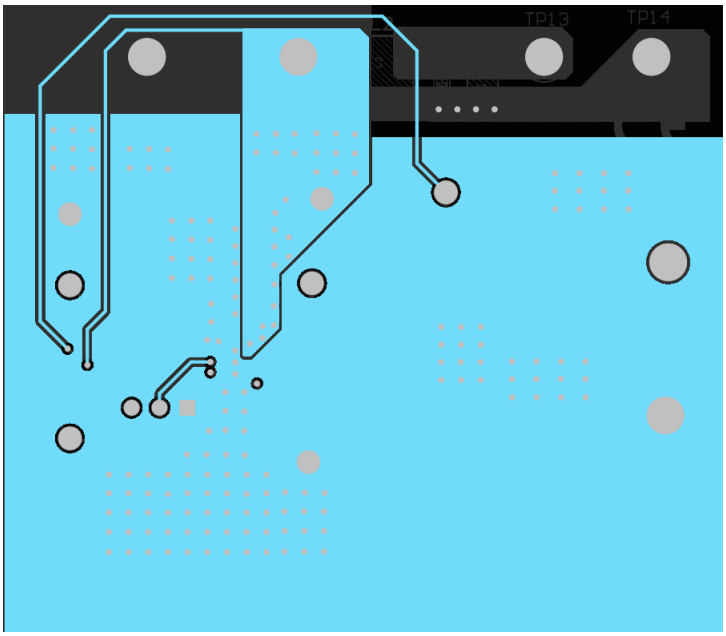

Figure 3-4. Layer 2

4 Schematic

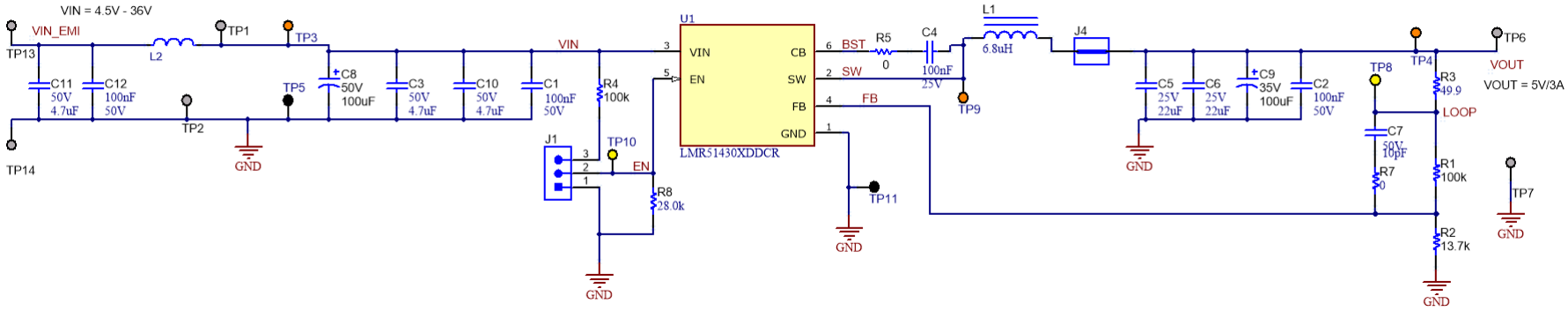

Figure 4-1. LMR51430EVM Schematic

5 LMR51430EVM Bill of Materials

Table 5-1. LMR51430EVM Bill of Materials

Designator	Quantity	Description	Part Number	Manufacturer
C1, C2	2	CAP, CERM, 0.1 µF, 50 V, ±10%, X7R, 0603	C1608X7R1H104K080AA	TDK
C3, C10	2	CAP, CERM, 4.7 µF, 50 V, ±10%, X7R, 1210	C3225X7R1H475K250AB	TDK
C4	1	CAP, CERM, 0.1 µF, 25 V, ±10%, X7R, 0603	C0603X104K3RACTU	Kemet
C5, C6	2	CAP, CERM, 22 µF, 25 V, ±10%, X7R, 1210	GRM32ER71E226KE15L	MuRata
FID1, FID2, FID3	3	Fiducial mark. There is nothing to buy or mount.	N/A	N/A
J1	1	Header, 100 mil, 2 × 1, Tin, TH	PEC02SAAN	Sullins Connector Solutions
J4	1	Shorting Jumper, 5.375 mm, 2 Position, Tin, SMT	5102	Keystone
L1	1	Inductor, Shielded Drum Core, Ferrite, 6.8 µH, 5.2 A, 0.0185 Ω, SMD	7447714068	Wurth Elektronik
R1, R4	2	RES, 100 k, 1%, 0.1 W, 0603	CRCW0603100KFKEA	Vishay-Dale
R2	1	RES, 13.7 k, 1%, 0.1 W, 0603	CRCW060313K7FKEA	Vishay-Dale
R3	1	RES, 49.9, 1%, 0.1 W, 0603	RC0603FR-0749R9L	Yageo
R5	1	RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	ERJ-3GEY0R00V	Panasonic
R8	1	RES, 28.0 k, 1%, 0.1 W, 0603	RC0603FR-0728KL	Yageo America
SH-J1	1	Shunt, 100 mil, Gold plated, Black	SNT-100-BK-G	Samtec
TP1, TP2, TP6, TP7, TP13, TP14	6	Terminal, Turret, TH, Double	1502-2	Keystone
TP3, TP4, TP9	3	Test Point, Multipurpose, Orange, TH	5013	Keystone
TP5, TP11	2	Test Point, Multipurpose, Black, TH	5011	Keystone
TP8, TP10	2	Test Point, Multipurpose, Yellow, TH	5014	Keystone
U1	1	LMR51430XDDCR	LMR51430XDDCR	Texas Instruments
C7	0	CAP, CERM, 10 pF, 50 V, ±1%, C0G/NP0, 0603	0603C100F5GAC7867	Kemet
C8	0	CAP, AL, 100 µF, 50 V, ±20%, 0.34 Ω, AEC-Q200 Grade 2, SMD	EEE-FK1H101P	Panasonic
C9	0	CAP, AL, 100 µF, 35 V, ±20%, 0.26 Ω, AEC-Q200 Grade 2, SMD	EEE-FT1V101AP	Panasonic
C11	0	CAP, CERM, 4.7 µF, 50 V, ±10%, X7R, 1210	C3225X7R1H475K250AB	TDK
C12	0	CAP, CERM, 0.1 µF, 50 V, ±10%, X7R, 0603	1608X7R1H104K080AA	TDK
L2	0	1.2-µH Shielded Molded Inductor, 5.8 A, 18 mΩ Max 2-SMD	744316220	Wurth Electronics
R7	0	RES, 0, 5%, 0.1 W, 0603	CRCW06030000Z0EA	Vishay-Dale

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265