User's Guide

LMR51420EVM User's Guide

ABSTRACT

The Texas Instruments LMR51420EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51420 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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1 Introduction

The Texas Instruments LMR51420EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51420 wide-input buck regulator.

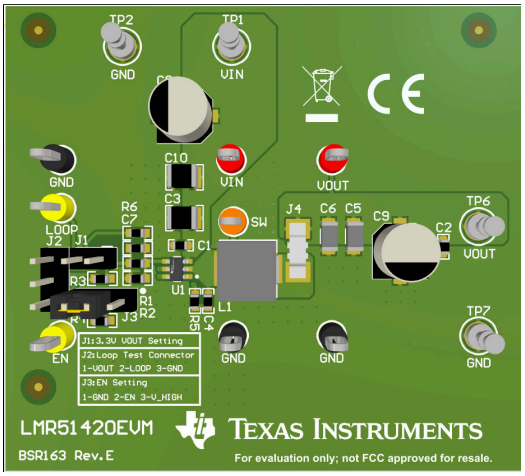

Figure 1-1. LMR51420EVM Board

1.1 Description

The Texas Instruments LMR51420EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51420 wide-input buck regulator.

1.2 Features

- 4.5-V to 36-V input voltage range
- Default 5-V output
- Up to 2-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	LMR51420EVM	PLMR51420	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 LMR51420EVM.

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.
VOUT – Terminal TP3	Regulated output voltage for the converter. Adjacent to it is the GND reference ground.
GND – Terminal TP2, TP4	Ground reference for the converter. Use these terminals to attach the EVM to a cable harness.
VOUT SETTING – Jumper JP1	Used to set output voltage to 5-V or 3.3-V output
ENABLE SETTING – Jumper JP3	Used to enable the switch-mode converter. The device will be enabled when the EN pin is high, and disabled when low.

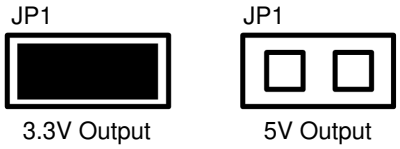

Figure 2-1. Vout Jumper Setting

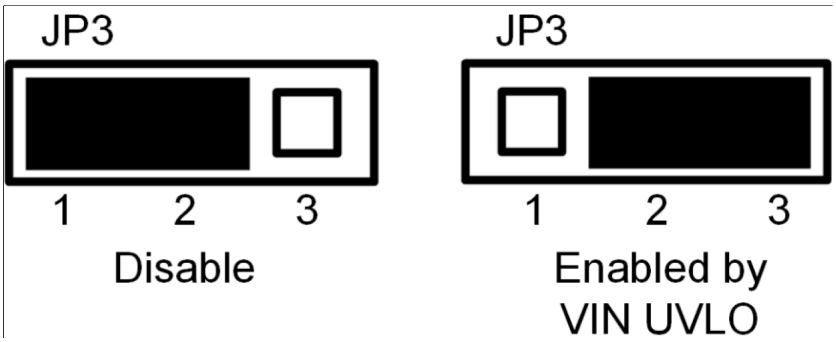

Figure 2-2. Enable Jumper Setting

Jumper J2	Test points used for loop response measurements
Jumper J4	Replacing J4 by wire can use current scope to test the inductor current

2.1 Ajusting the Output Voltage

If other outputs need to be configured, leave jumper J1 unconnected and adjust the feedback resistors using the 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 LMR51420EVM. The PCB consists of a 2-layer design. The board size is 57.8-mm x 64mm, 2-oz copper planes are applied on both layers.

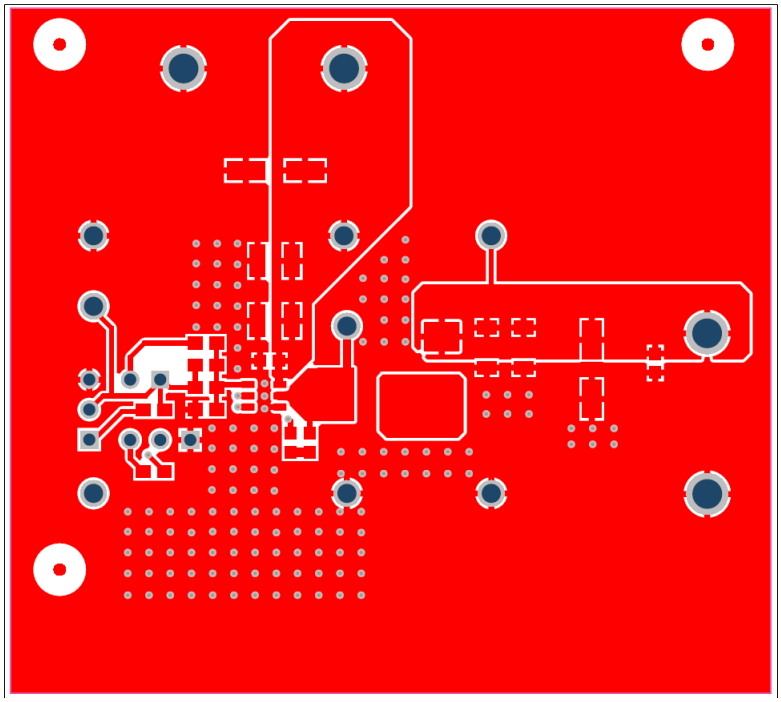

Figure 3-1. PCB Layout Top View

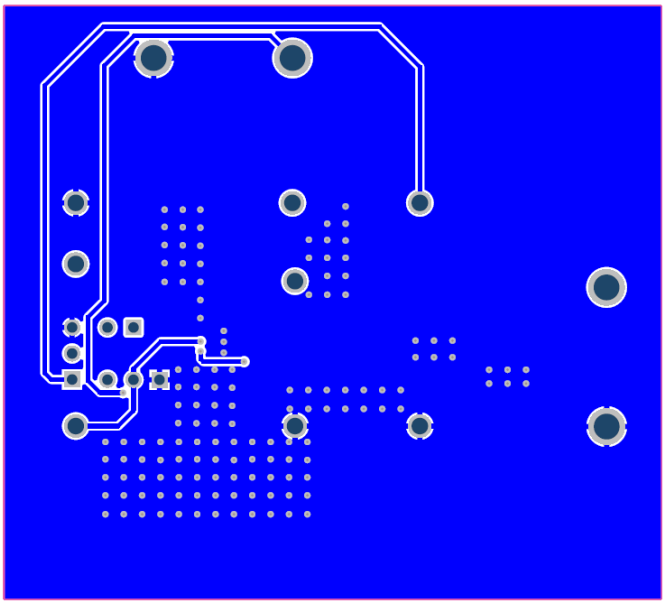

Figure 3-2. PCB Layout Bottom View

4 Schematics

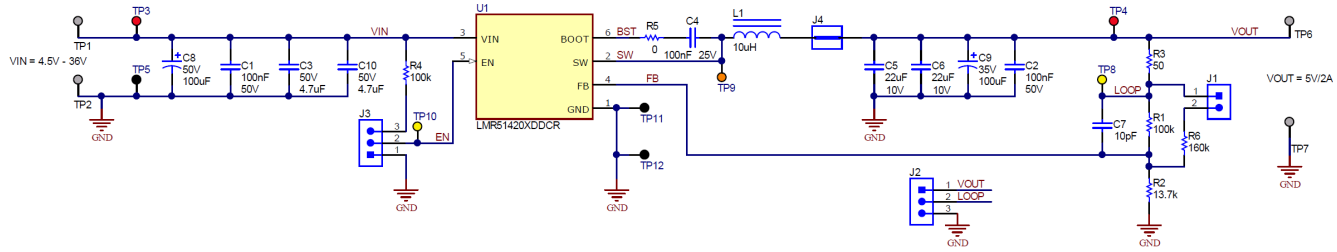

Figure 4-1. LMR51420EVM Schematic

5 LMR51420EVM Bill of Materials

Table 5-1. LMR51420EVM Bill of Materials

Designator	Quantity	Description	PartNumber	Manufacturer
C1, C2	2	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, 0603	GRM188R71H104KA93D	MuRata
C3, C10	2	CAP, CERM, 4.7 uF, 50 V, +/- 10%, X7R, 1210	GRM32ER71H475KA88L	MuRata
C4	1	CAP, CERM, 0.1 uF, 25 V, +/- 10%, X7R, 0603	GRM188R71E104KA01D	MuRata
C5, C6	2	CAP, CERM, 22 uF, 10 V, +/- 10%, X7R, 1206	GRM31CR71A226KE15L	MuRata
FID1, FID2, FID3	3	Fiducial mark. There is nothing to buy or mount.	N/A	N/A
J1	1	Header, 100mil, 2x1, Tin, TH	PEC02SAAN	Sullins Connector Solutions
J2, J3	2	Header, 100mil, 3x1, Tin, TH	PEC03SAAN	Sullins Connector Solutions
J4	1	Shorting Jumper, 5.375mm, 2 Position, Tin, SMT	5102	Keystone
L1	1	Inductor, Shielded Drum Core, Powdered Iron, 10 uH, 3.2 A, 0.065 ohm, SMD	74437349100	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, 50, 1%, 0.1 W, 0603	CRCW060350R0FKEA	Vishay-Dale
R5	1	RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	ERJ-3GEY0R00V	Panasonic
R6	1	RES, 160 k, 1%, 0.1 W, 0603	CRCW0603160KFKEA	Vishay-Dale
SH-J1	1	Shunt, 100mil, Gold plated, Black	SNT-100-BK-G	Samtec
TP1, TP2, TP6, TP7	4	Terminal, Turret, TH, Double	1502-2	Keystone
TP3, TP4	2	Test Point, Multipurpose, Red, TH	5010	Keystone
TP5, TP11, TP12	3	Test Point, Multipurpose, Black, TH	5011	Keystone
TP8, TP10	2	Test Point, Multipurpose, Yellow, TH	5014	Keystone
TP9	1	Test Point, Multipurpose, Orange, TH	5013	Keystone
U1	1	PLMR51420XDDCR	PLMR51420XDDCR	Texas Instruments
C7	0	CAP, CERM, 10 pF, 100 V, +/- 5%, C0G/NP0, 0603	GRM1885C2A100JA01D	MuRata
C8	0	CAP, AL, 100 uF, 50 V, +/- 20%, 0.34 ohm, AEC-Q200 Grade 2, SMD	EEE-FK1H101P	Panasonic
C9	0	CAP, AL, 100 uF, 35 V, +/- 20%, 0.26 ohm, AEC-Q200 Grade 2, SMD	EEE-FT1V101AP	Panasonic

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