User's Guide

LMR51610EVM User's Guide

ABSTRACT

The Texas Instruments LMR51610EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51610 wide-input synchronous buck regulator. This document describes the following:

- Setup
- Input and output connections of the EVM
- Board layout
- Schematic
- Bill of materials

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Trademarks

1 Introduction

The Texas Instruments LMR51610EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR51610 wide-input buck regulator.

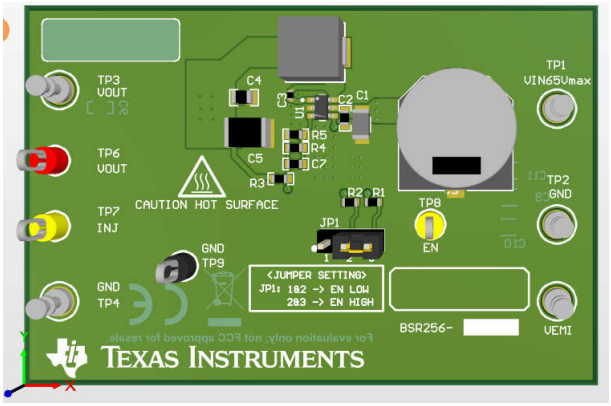

Figure 1-1. LMR51610EVM Board

EVM Features

- 4-V to 65-V input voltage range
- Default 3.3-V output
- Up to 1-A output current
- 400-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	LMR51610EVM	LMR51610	SOT23-6

2 Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up, and use the LMR51610EVM.

2.1 Input and Output Connector Description

VIN — Terminal TP1 – Power input terminal for the converter. Adjacent to this terminal 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 this terminal 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.

ENABLE SETTING — Jumper JP1 – Used to enable the switch-mode converter. The device enables when the EN pin is high, and disabled when low.

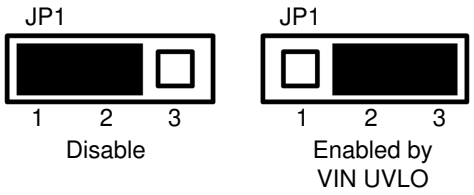

Figure 2-1. Enable Jumper Setting

Testpoint — TP6, TP7, TP9, Test points used for loop response measurements

2.2 Adjusting the Output Voltage

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

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

where

- V_{REF} is 0.8 V.

3 LMR51610EVM Schematic

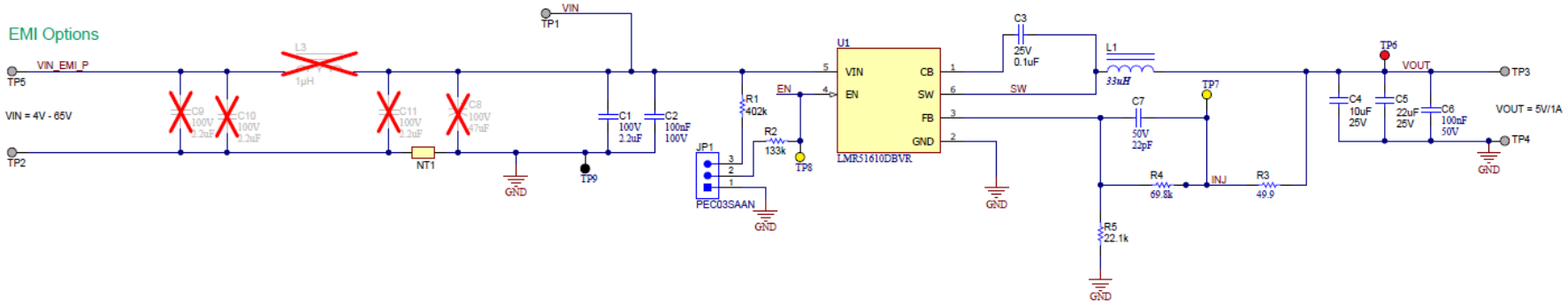

Figure 3-1. LMR51610EVM Schematic

4 Board Layout

Figure 4-1 and Figure 4-4 show the board layout for the LMR51610EVM. The PCB consists of a 4-layer design. The board size is 46 mm × 69 mm. 2-oz copper planes are applied on top and bottom layers, 1-oz copper planes are applied on middle layers.

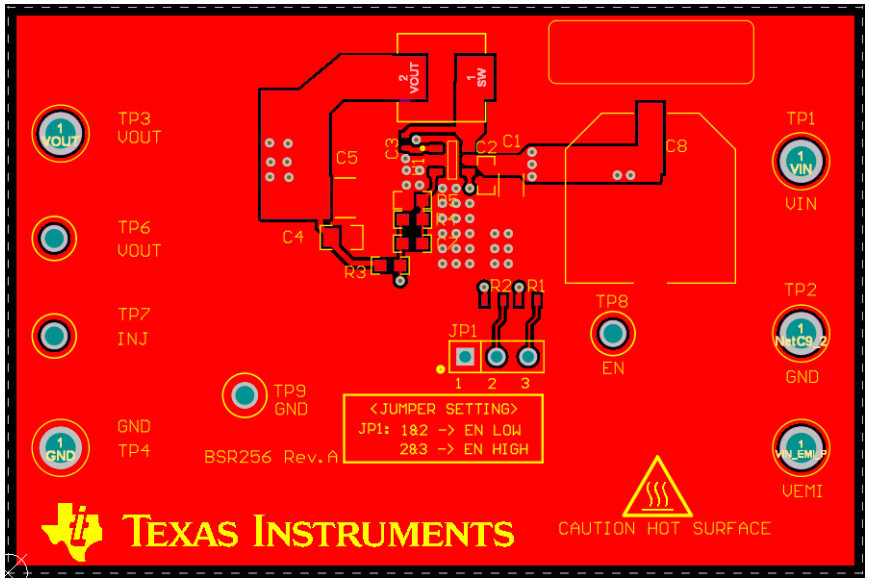

Figure 4-1. Top Layer

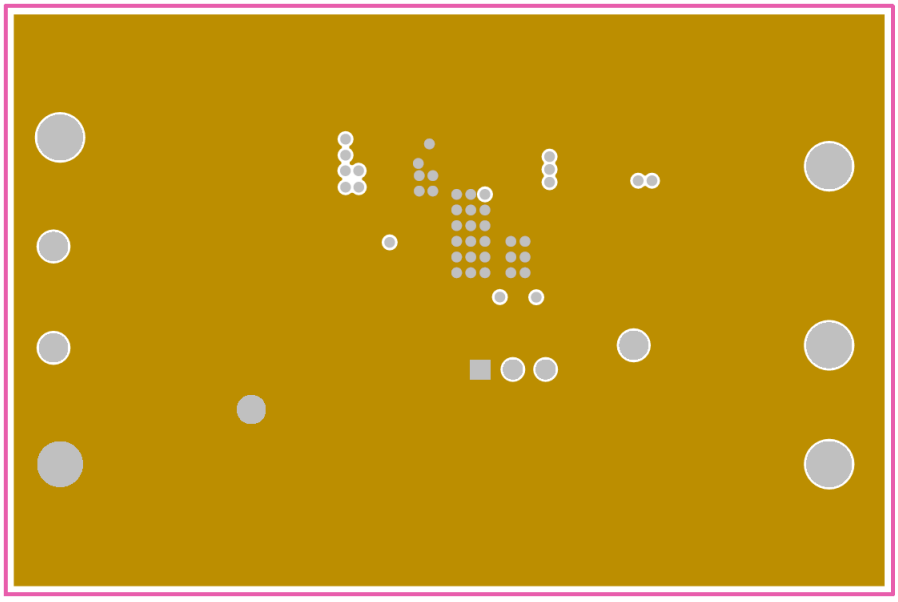

Figure 4-2. Middle Layer One

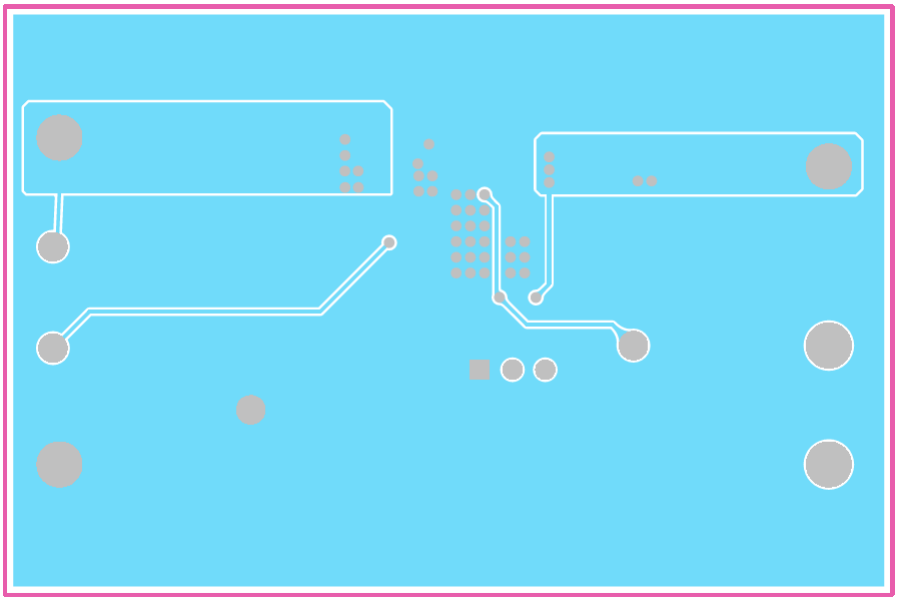

Figure 4-3. Middle Layer Two

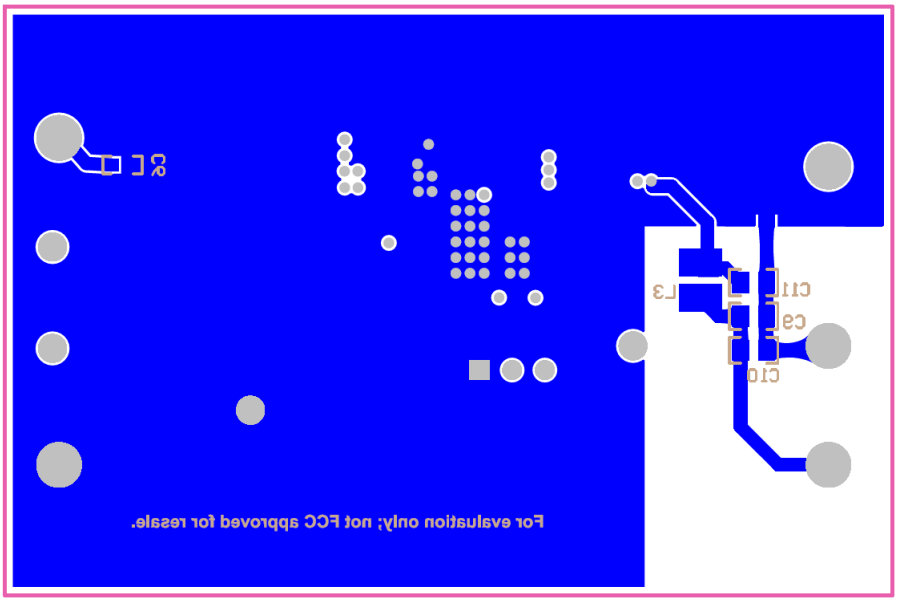

Figure 4-4. Bottom Layer

5 Bill of Materials

Table 5-1. LMR51610EVM Bill of Materials

DESIGNATOR	QUANTITY	VALUE	DESCRIPTION	PACKAGE REFERENCE	PART NUMBER	MANUFACTURER
C1	1	2.2 µF	CAP, CERM, 2.2 uF, 100 V, +/- 10%, X7S, 1206	1206	C3216X7S2A225K160AB	TDK
C2	1	0.1 µF	CAP, CERM, 0.1 µF, 1000 V, ±10%, X7R, 0603	0603	C1608X7R1H104K080AA	TDK
C3	1	0.1 µF	CAP, CERM, 0.1 µF, 25 V, ±10%, X7R, 0402	0402	GRM155R71E104KE14D	MuRata
C4	1	10 µF	CAP, CERM, 10 µF, 25 V, ±10%, X7R, 0805	0805	'GRM21BZ71E106KE15L	MuRata
C6	1	0.1 µF	CAP, CERM, 0.1 µF, 50V, ±10%, X7R, 0603	0603	'C1608X7R1H104K080AA	'TDK
JP1	1		Header, 100 mil, 3 × 1, Tin, TH	Header, 3 PIN, 100 mil, Tin		
L1	1	33uH	33 µH Semi-Shielded Drum Core, Wirewound Inductor 1.45 A 137mOhm Nonstandard	7.30 × 4.80 × 6.60 mm	74404064330	'Wurth Electronics
R1	1	402 k	RES, 402 k, 1%, 0.1 W, 0603	0603	'CRCW0603402KFKEA	'Vishay-Dale
R2	1	133 k	RES, 133 k, 1%, 0.1 W, 0603	0603	'CRCW0603133KFKEA	'Vishay-Dale
R3	1	49.9	RES, 49.9, 1%, 0.1 W, 0603	0603	'CRCW060349R9FKEA	'Vishay-Dale
R4	1	69.8k	RES, 69.8 k, 1%, 0.1 W, 0603	0603	'RT0603DRE0769K8L	'Yageo America
R5	1	22.1 k	RES, 22.1 k, 1%, 0.1 W, 0603	0603	'RC0603FR-0722K1L	'Yageo
SH-J1	1	1x2	Shunt, 100 mil, Gold plated, Black	Shunt	'SNT-100-BK-G Alternate '969102-0000-DA	
TP1, TP2, TP3, TP4	4		Terminal, Turret, TH, Double	Keystone1502-2	'1502-2	'Keystone
TP6	1		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	'5010	'Keystone
TP7, TP8	2		Test Point, Multipurpose, Yellow, TH	Yellow Multipurpose Testpoint	'5014	'Keystone
TP9	1		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	'5011	'Keystone
U1	1		LMR51610 DBV0006A (SOT-23-6)	DBV0006A	LMR51610DBVR	Texas Instruments
C5	0	22 µF	CAP, CERM, 22 uF, 25 V, ± 20%, X7R,		CGA8P1X7R1E226M250KC	TDK
C7	0	22 pF	CAP, CERM, 22 pF, 50 V, ±5%, C0G/NP0, 0603	0603	'CGA3E2C0G1H220J080AA	'TDK
C8	0	47 µF	'CAP, AL, 47 uF, 100 V, +/- 20%, 0.42 ohm, SMD	'12.5x13.5	'EEV-TG2A470Q	'Panasonic
C9, C10, C11	0	2.2 µF	CAP, CERM, 2.2 uF, 100 V, +/- 10%, X7S, 1206	1206	'C3216X7S2A225K160AB	'TDK
L3	0	1 µH	Inductor, Shielded, Metal Composite, 1 µH, 2.9 A, 0.048 Ω, SMD	2 × 1.6 mm	'DFE201612E-1R0M=P2 Alternate 74479276210C	MuRata, 'Wurth Electronics
TP5	0		Terminal, Turret, TH, Double	Keystone1502-2		

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