User's Guide

LMR50410EVM User's Guide

ABSTRACT

The Texas Instruments LMR50410EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR50410 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 LMR50410EVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR50410 wide-input buck regulator.

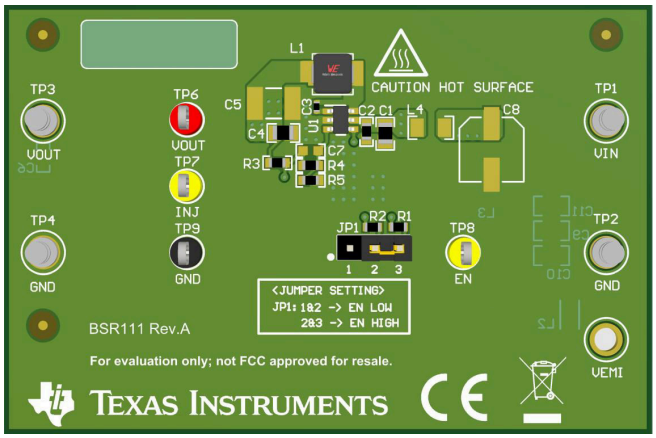

Figure 1-1. LMR50410EVM Board

EVM Features

- 4-V to 36-V input voltage range
- Default 3.3-V output
- Up to 1-A output current
- 700-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	LMR50410EVM	LMR50410	SOT23-6

2 Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up, and use the LMR50410EVM.

2.1 Input/Output Connector Description

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.

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

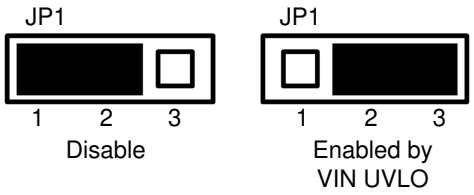

Figure 2-1. Enable Jumper Setting

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

2.2 Adjusting the Output Voltage

If 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 1.0 V

3 LMR50410EVM Schematic

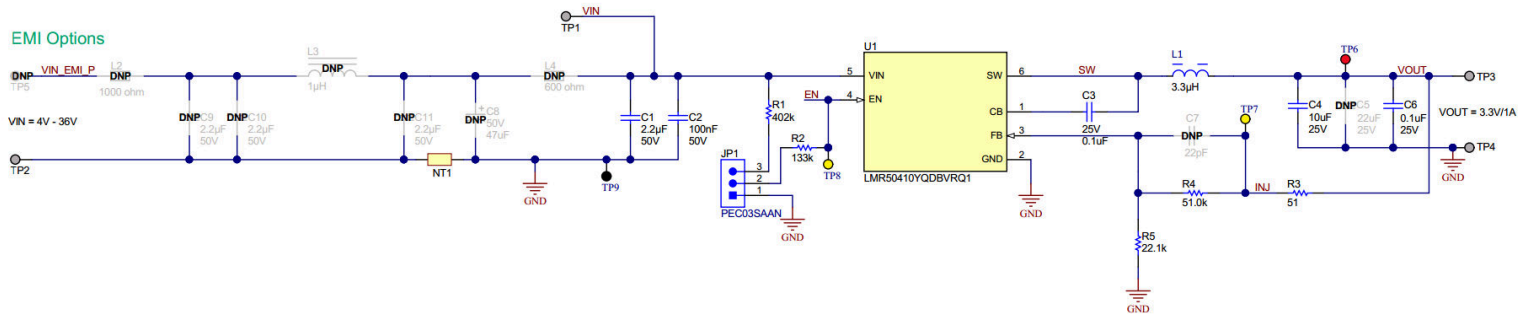

Figure 3-1. LMR50410EVM Schematic

4 Board Layout

Figure 4-1 to Figure 4-4 show the board layout for the LMR50410EVM. The PCB consists of a 4-layer design. The board size is 46-mm x 69-mm, 2-oz copper planes are applied on top and bottom layers, 1-oz copper planes are applied on middle layers.

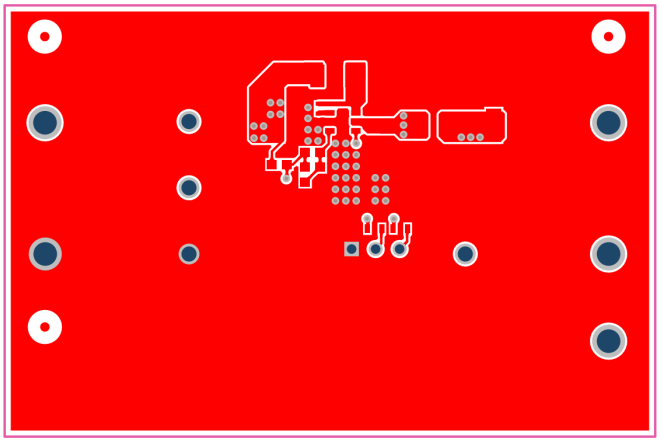

Figure 4-1. Top Layer

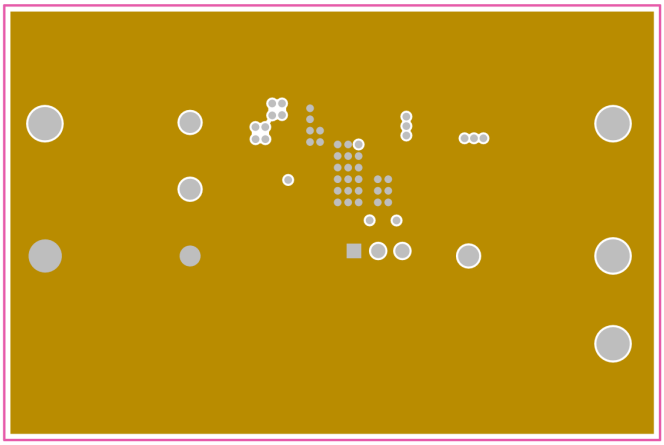

Figure 4-2. Middle Layer One

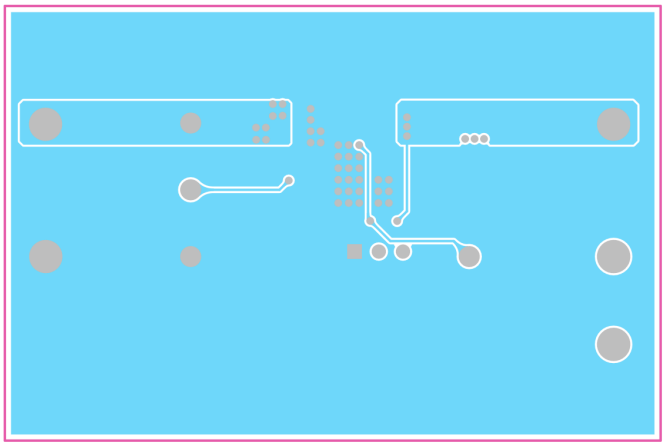

Figure 4-3. Middle Layer Two

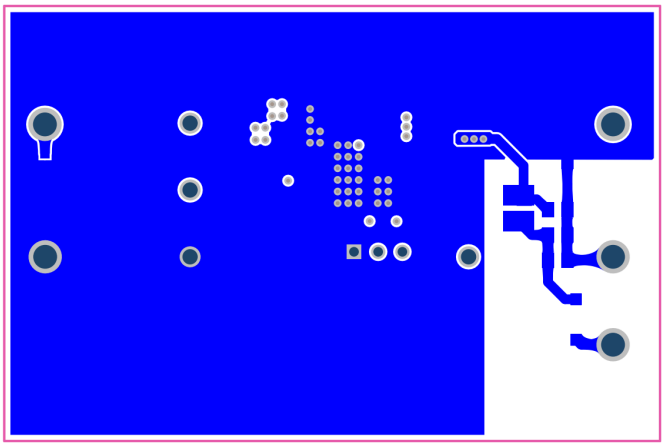

Figure 4-4. Bottom Layer

5 Bill of Materials

Table 5-1. LMR50410EVM Bill of Materials

DESIGNATOR	QUANTITY	VALUE	DESCRIPTION	PACKAGE REFERENCE	PART NUMBER	MANUFACTURER
C1	1	2.2 µF	CAP, CERM, 2.2 µF, 50 V, ±10%, X7R, 0805	0805		
C2	1	0.1 µF	CAP, CERM, 0.1 µF, 50 V, ±10%, X7R, 0603	0603		
C3	1	0.1 µF	CAP, CERM, 0.1 µF, 25 V, ±10%, X7R, 0402	0402		
C4	1	10 µF	CAP, CERM, 10 µF, 25 V, ±10%, X7R, 0805	0805		
C6	1	0.1 µF	CAP, CERM, 0.1 µF, 25 V, ±10%, X7R, 0603	0603		
JP1	1		Header, 100 mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin		
L1	1		3.3-µH Shielded Molded Inductor 2.5-A 76-mΩ Max Nonstandard	SMT_IND_4MM06_4MM06	74437324033	Wurth Electronics
R1	1	402 k	RES, 402 k, 1%, 0.1 W, 0603	0603		
R2	1	133 k	RES, 133 k, 1%, 0.1 W, 0603	0603		
R3	1	51	RES, 51, 5%, 0.1 W, 0603	0603		
R4	1	51.0 k	RES, 51.0 k, 1%, 0.1 W, 0603	0603		
R5	1	22.1 k	RES, 22.1 k, 1%, 0.1 W, 0603	0603		
SH-J1	1	1x2	Shunt, 100 mil, Gold plated, Black	Shunt		
TP1, TP2, TP3, TP4	4		Terminal, Turret, TH, Double	Keystone1502-2		
TP6	1		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint		
TP7, TP8	2		Test Point, Multipurpose, Yellow, TH	Yellow Multipurpose Testpoint		
TP9	1		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint		
U1	1		LMR50410YQDBVRQ1, DBV0006A (SOT-23-6)	DBV0006A	LMR50410YQDBVRQ1	Texas Instruments
C5	0	22 µF	CAP, CERM, 22 µF, 25 V, ±20%, X7R	1812		
C7	0	22 pF	CAP, CERM, 22 pF, 50 V, ±5%, C0G/NP0, 0603	0603		
C8	0	47 µF	CAP, AL, 47 µF, 50 V, ±20%, 0.6 Ω, SMD	F80		
C9, C10, C11	0	2.2 µF	CAP, CERM, 2.2 µF, 50 V, ±10%, X7R, 0805	0805		
L2	0	1000 Ω	Ferrite Bead, 1000 Ω at 100 MHz, 1.5 A, 1806	1806	BLM41PG102SN1L	MuRata
L3	0	1 µH	Inductor, Shielded, Metal Composite, 1 µH, 2.9 A, 0.048 Ω, SMD	2x1.6mm	DFE201612E-1R0M	MuRata
L4	0	600 Ω	Ferrite Bead, 600 Ω at 100 MHz, 1.5 A, 1206	1206	BLM31PG601SH1L	MuRata
TP5	0		Terminal, Turret, TH, Double	Keystone1502-2		

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