TPS560430 Evaluation Module

The Texas Instruments TPS560430XFEVM evaluation module (EVM) helps designers evaluate the operation and performance of the TPS560430 wide-input synchronous 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.

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1 Introduction

The Texas Instruments TPS560430XFEVM evaluation module (EVM) helps designers evaluate the operation and performance of the TPS560430 wide-input buck regulator.

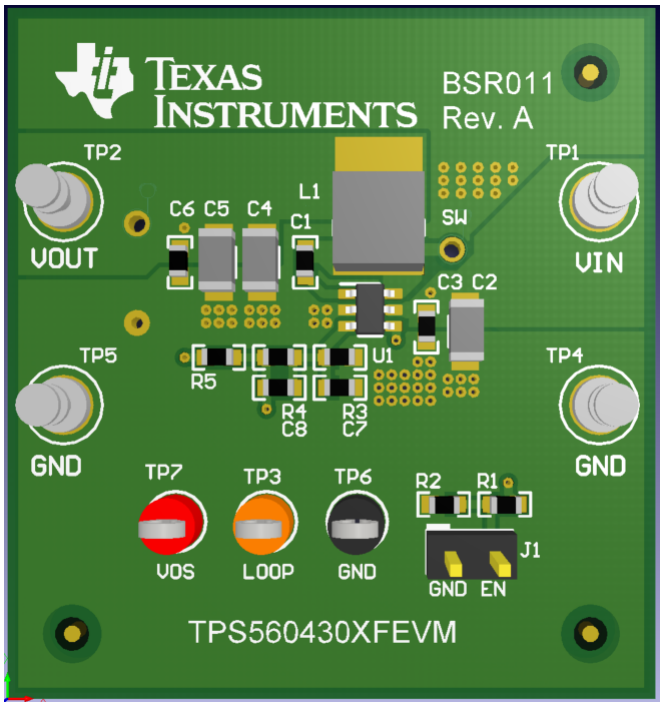

Figure 1. TPS560430XFEVM Board

EVM Features

- 4-V to 36-V input voltage range
- Accurate 5-V output
- Up to 600-mA output current
- Switching frequency 1.1 MHz
- Hiccup mode short current protection
- Internal compensation

The EVM contains one DC/DC converter (See Table 1)

Table 1. Device and Package Configurations

CONVERTER	EVM	DEVICE	PACKAGE
U1	TPS560430XFEVM	TPS560430XF	SOT23-6

2 Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up and use the TPS560430XFEVM.

2.1 Input/Output Connector Description

VIN — Terminal TP1 – 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 TP2 – is the regulated output voltage for the converter. Adjacent to it is the GND reference ground.

GND — Terminal TP4, TP5 – 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 EN pin is high, and disabled when low. EN turn off trip point also can be programmed by changing R1 or R2. Refer to TPS560430 datasheet for enable and adjustable under-voltage lockout.

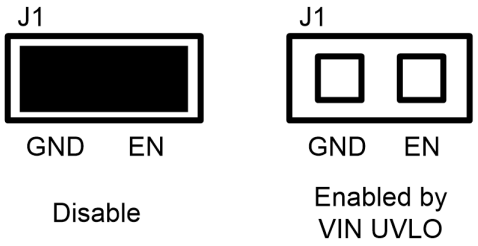

Figure 2. Enable Jumper Setting

Testpoint — TP3, TP6, TP7 – these are 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 following equation.

$$V_{OUT} = V_{REF} \times (1 + (R4 / R3)) \quad (1)$$

Where V_{REF} is 1.0 V

3 TPS560430XFEVM Schematic

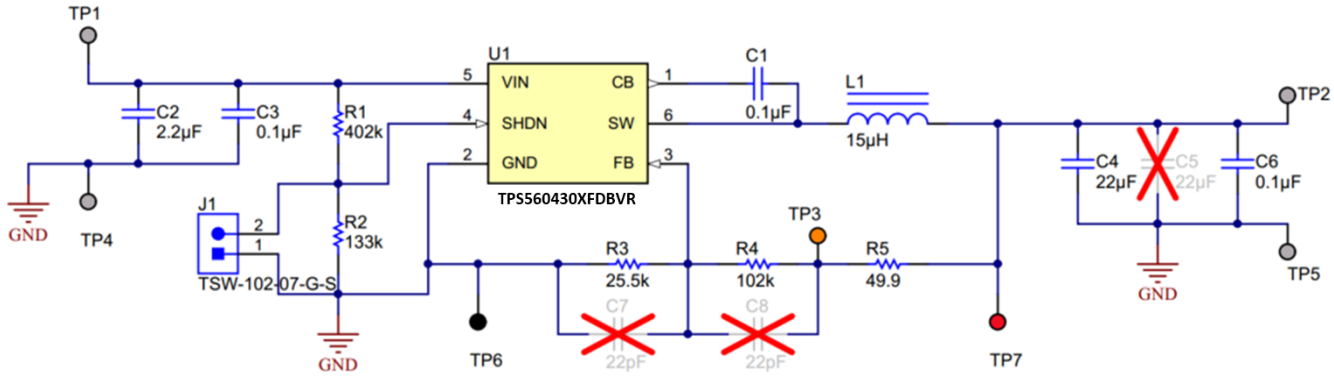

Figure 3. TPS560430XFEVM Schematic

4 Board Layout

Figure 4 and Figure 5 show the board layout for the TPS560430XFEVM. The PCB consists of a 2-layer design. The board size is 38 mm x 41 mm, 1-oz copper planes is applied on both layers.

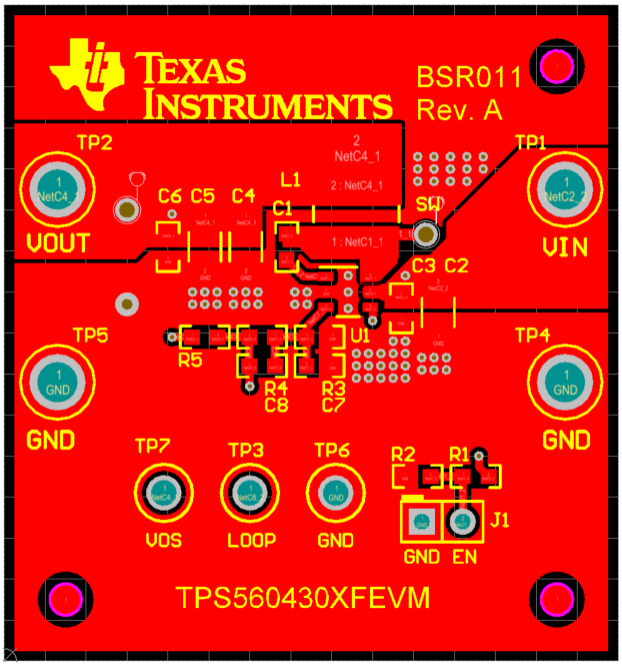

Figure 4. Top Layer

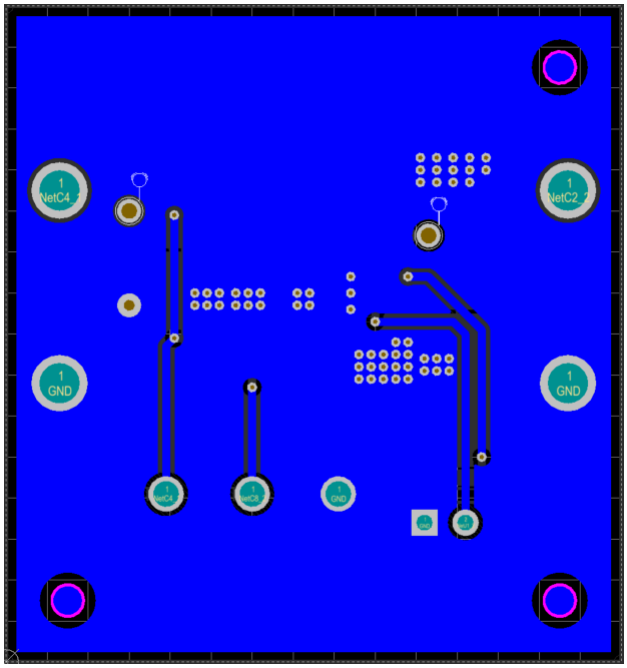

Figure 5. Bottom Layer

5 List of Materials

Table 2. TPS560430XFEVM List of Materials

DES	DESCRIPTION	PART NUMBER	MANUFACTURE	QUANTITY
C1, C3, C6	Capacitor, ceramic, 0.1 µF, 50 V, ±10%, X7R, 0603	GRM188R71H104KA93D		3
C2	Capacitor, ceramic, 2.2 µF, 50 V, ±10%, X7R, 1206	GRM31CR71H225KA88L		1
C4	Capacitor, ceramic, 22 µF, 10 V, ±10%, X7R, 1206	GRM31CR71A226KE15L		1
J1	Header, 100 mil, 2 x 1, gold, TH	TSW-102-07-G-S		1
L1	Inductor, shielded drum core, ferrite, 15 µH, 1.4 A, 0.118 ohm, SMD, 4838	74408943150		1
R1	Resistor, 402 kΩ, 1%, 0.1 W, 0603	CRCW0603402KFKEA		1
R2	Resistor, 133 kΩ, 1%, 0.1 W, 0603	CRCW0603133KFKEA		1
R3	Resistor, 25.5 kΩ, 1%, 0.1 W, 0603	CRCW060325K5FKEA		1
R4	Resistor, 102 kΩ, 1%, 0.1 W, 0603	CRCW0603102KFKEA		1
R5	Resistor, 49.9 Ω, 1%, 0.1 W, 0603	CRCW060349R9FKEA		1
SH-J1	Shunt, 100 mil, flash gold, black	SPC02SYAN		1
TP1, TP2, TP4, TP5	Terminal, turret, TH, double	1502-2		4
TP3	Test point, compact, orange, TH	5008		1
TP6	Test point, compact, black, TH	5006		1
TP7	Test point, compact, red, TH	5005		1
U1	Device, 36-V, 600-mA, Synchronous Buck Regulator	TPS560430XFDBVR	Texas Instruments	1

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      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

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This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

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Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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