

# LMR16006X/YEVM Evaluation Board

## User's Guide



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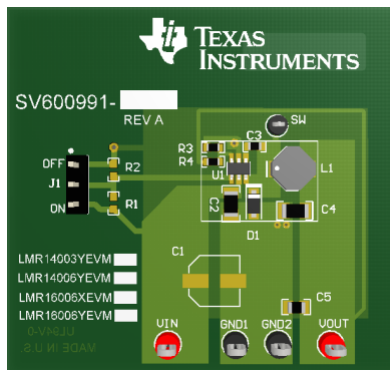
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# LMR16006X/YEVM Evaluation Board

The Texas Instruments LMR16006XEVM and LMR16006YEVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR16006X and LMR16006Y switch-mode power-supply. This document describes the setup and the input/output connections of the EVM. Included are the board layout, schematic, and bill of materials.

## 1 Introduction

The Texas Instruments LMR16006X/6YEVM evaluation module (EVM) helps designers evaluate the operation and performance of the LMR16006X and LMR16006Y Switch Mode Power Supply.



**Figure 1. LMR16006X/6YEVM Board**

The LMR16006X and LMR16006Y is a PWM DC/DC buck (step-down) regulator. With a wide input range from 4V to 60V, it is suitable for a wide range of applications from automotive to industry for power conditioning from unregulated sources. The LMR16006X/6YEVM evaluation board is designed to provide the design engineer with a fully functional power converter based on the buck topology to evaluate the LMR16006X/6Y series of buck regulators.

### EVM Features

- 6V to 60V Input Voltage Range
- 5V Output Voltage
- Up to 600mA Output Current
- Switching Frequency (0.7MHz for X version, 2.1 MHz for Y version)
- Frequency Foldback Current Limit of 1.2A
- Internal Compensation

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

**Table 1. Device and Package Configurations**

CONVERTER	EVM	IC	PACKAGE
U1	LMR16006XEVM	LMR16006XDDCR	SOT23-6
	LMR16006YEVM	LMR16006YDDCR	

## 2 Setup

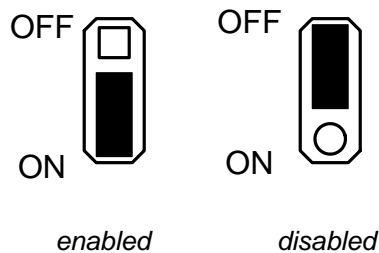
This section describes the jumpers and connectors on the EVM and how to properly connect, set up and use the LMR16006X/6YEVM.

### 2.1 Input/Output Connector Description

**V<sub>in</sub>** – Input is the power input terminal for the device. Adjacent to it is the GND reference ground. Use those terminals to attach the EVM to a cable harness.

**V<sub>out</sub>** – Output is the output terminal for the LMR16006X/6Y switch-mode regulator. Adjacent to it is the GND reference ground.

**EN** – is the jumper used to enable the switch-mode converter. The rail will be enabled when the respective jumper is high or floating, and disabled when low. External resistors can also be used to adjust the EN turn off trip point, and the jumper should not be used in that case.



**Figure 2. Enable Jumper Setting**

### 2.2 Adjusting the Output Voltage

The output voltage can be changed from 5.0V to another voltage by adjusting the feedback resistors using the following equation:

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

Where V is 0.765V

#### Test Points

TP_GND (x2)	Ground
TP_Vin	BUCK input
TP_Vout	BUCK output
TP_SW	BUCK phase Pin

### 3 Board Layout

Figure 3 and Figure 4 show the board layout for the LMR16006YEV. The EVM offers jumper to enable the regulator.

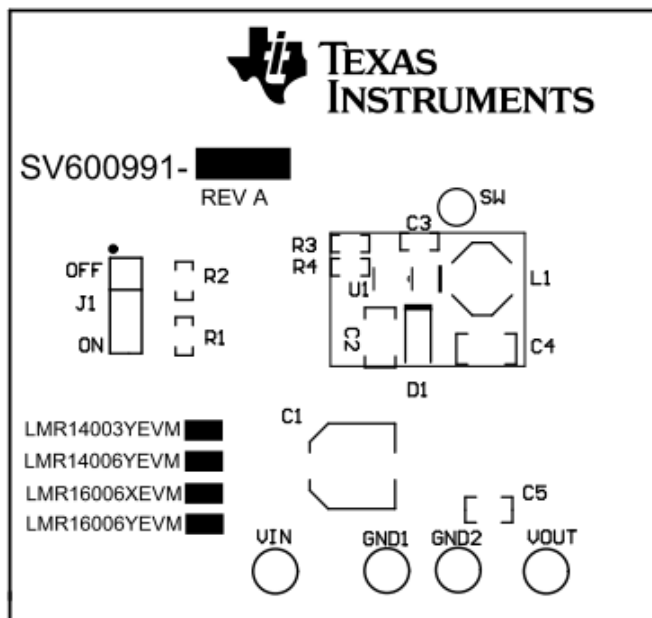


Figure 3. Top Layer

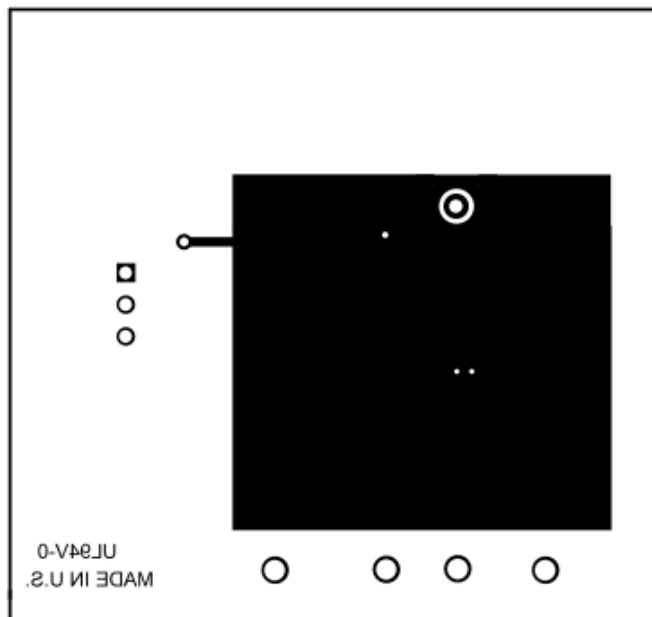


Figure 4. Bottom Layer

4 Schematic and Bill of Materials

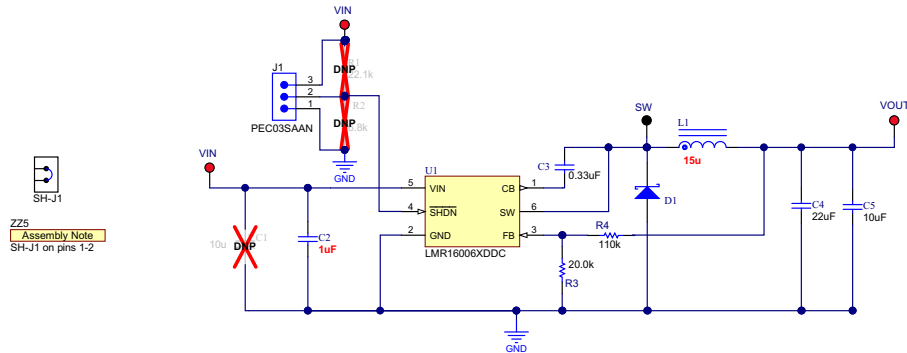


Figure 5. LMR16006XEVM Schematic

Table 2. LMR16006X/6YEVM Bill of Materials (BOM)

Quantity		Desig - nator	P/N	Description	Footprint	Manufacturer
LMR16006 -XEVM	LMR16006- YEVM					
1	1	PCB	PCB	Printed Circuit Board, FR4, 1oz, 2 Layers, size 1922x2054mil	1922x2054mil	Any
0	0	C1	EEE-FK1J100P	CAP, AL, 10uF, 63V, +/-20%, 1.5 ohm, SMD	SM_RADIAL_D	Panasonic
1	1	C2	GRM31CR72A105 KA01L	CAP, CERM, 1uF, 100V, +/-10%, X7R, 1206	1206	MuRata
1	1	C3	C0603C334K4RAC TU	CAP, CERM, 0.33uF, 16V, +/-10%, X7R, 0603	603	Kemet
1	1	C4	GRM31CR61C226 KE15L	CAP, CERM, 22uF, 16V, +/-10%, X5R, 1206	1206	MuRata
1	1	C5	GRM21BR61C106 KE15L	CAP, CERM, 10uF, 16V, +/-10%, X5R, 0805	805	MuRata
1	1	R3	CRCW060320K0F KEA	RES, 20.0k ohm, 1%, 0.1W, 0603	603	Vishay-Dale
1	1	R4	CRCW0603110KF KEA	RES, 110k ohm, 1%, 0.1W, 0603	603	Vishay-Dale
1	1	D1	MBR1H100SFT3G	Diode, Schottky, 100V, 1A, SOD-123FL	SOD-123F	ON Semiconduct
1	0	L1	SD53-150-R	'Inductor, Shielded Drum Core, Ferrite, 15uH, 1.1A, 0.122 ohm, SMD	5.5x5.5mm	Cooper Bussman
0	1	L1	SD53-6R8-R	Inductor, Shielded Drum Core, Ferrite, 6.8uH, 1.65A, 0.059 ohm, SMD	5.5x5.5mm	Cooper Bussman
1	1	J1	PEC03SAAN	Header, 100mil, 3x1, Tin plated, TH	CONN_PEC03S AAN	Sullins
2	2	GND	5011	Test Point, Multipurpose, Black, TH	Keystone5011	Keystone
1	1	SW	5001	Test Point, TH, Miniature, Black	Keystone5001	Keystone
2	2	VIN, VOUT	5010	Test Point, Multipurpose, Red, TH	Keystone5010	Keystone
1	0	U1	LMR16006XDDC	IC, 600 mA 60V Step-Down Converter, SOT23-6	SOT23-6	TI
0	1	U1	LMR16006YDDC	IC, 600 mA 60V Step-Down Converter, SOT23-6	SOT23-6	TI

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- 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.

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

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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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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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