

2 UVLO Threshold and Hysteresis

The UVLO resistors are selected using the following two equations:

$$V_{IN(HYS)} = I_{HYS}R_6 \quad (1)$$

and

$$V_{IN(UVLO, rising)} = 1.225V \times \left(\frac{R_6}{R_7} + 1 \right) \quad (2)$$

On this evaluation board $R_6 = 127 \text{ k}\Omega$ and $R_7 = 11.8 \text{ k}\Omega$, resulting in UVLO rising threshold at $V_{IN} = 14.5 \text{ V}$ and a hysteresis of 2.54 V .

3 Board Connection and Start-Up

The input connections are made using J1 (VIN) and J2 (SGND) terminals. The primary output (VOUT) appears across J5 and J6. The secondary (isolated) output is available across J3 and J4. The input voltage should be gradually increased above the UVLO set point of 14.5 V . Both the primary and the isolated outputs should be close to 5 V at this point. The board is designed to function with input voltage range of 15 V to 48 V . The minimum VIN threshold can be changed by changing the UVLO resistors R_6 and R_7 . VIN should not exceed 48 V .

4 Bill of Materials

Designator	Qty	Value	Description	Pkg Ref	Part Number	Mfr
C1	1	2.2uF	CAP, CERM, 2.2uF, 25V, +/-10%, X7R, 0805	0805	GRM21BR71E225KA73L	MuRata
C2	1	2200pF	CAP, CERM, 2200pF, 630V, +/-10%, X7R, 1206	1206	GRM31BR72J222KW01L	MuRata
C3	1	0.01uF	CAP, CERM, 0.01uF, 50V, +/-10%, X7R, 0603	0603	GRM188R71H103KA01D	MuRata
C4	1	1000pF	CAP, CERM, 1000pF, 50V, +/-10%, X7R, 0603	0603	GRM188R71H102KA01D	MuRata
C5	1	2.2uF	CAP, CERM, 2.2uF, 50V, +/-10%, X7R, 1206	1206	GRM31CR71H225KA88L	MuRata
C6	1	0.47uF	CAP, CERM, 0.47uF, 50V, +/-10%, X7R, 0805	0805	GRM21BR71H474KA88L	MuRata
C7	1	4.7uF	CAP, CERM, 4.7uF, 16V, +/-10%, X7R, 0805	0805	GRM21BR71C475KA73L	MuRata
C8	1	1uF	CAP, CERM, 1uF, 16V, +/-10%, X7R, 0603	0603	GRM188R71C105KA12D	MuRata
C9	1	0.1uF	CAP, CERM, 0.1uF, 50V, +/-10%, X7R, 0603	0603	GRM188R71H104KA93D	MuRata
D1	1	0.57V	Diode, Schottky, 60V, 1A, SOD-123F	SOD-123F	PMEG6010CEH,115	NXP Semiconductor
L1	1	100uH	Coupled inductor, 100uH, 2.2A, 0.322 ohm, +/-20%, SMD	MSD1260	MSD1260-104MLB	Coilcraft
R1	1	2.00k	RES, 2.00k ohm, 1%, 0.125W, 0805	0805	CRCW08052K00FKEA	Vishay-Dale
R2	1	46.4k	RES, 46.4k ohm, 1%, 0.1W, 0603	0603	RC0603FR-0746K4L	Yageo America
R3	1	10.0k	RES, 10.0k ohm, 1%, 0.1W, 0603	0603	RC0603FR-0710KL	Yageo America
R4	1	0	RES, 0 ohm, 5%, 0.125W, 0805	0805	CRCW08050000Z0EA	Vishay-Dale
R5	1	124k	RES, 124k ohm, 1%, 0.1W, 0603	0603	RC0603FR-07124KL	Yageo America
R6	1	127k	RES, 127k ohm, 1%, 0.1W, 0603	0603	RC0603FR-07127KL	Yageo America
R7	1	11.8k	RES, 11.8k ohm, 1%, 0.1W, 0603	0603	RC0603FR-0711K8L	Yageo America
R8	1	3.40k	RES, 3.40k ohm, 1%, 0.1W, 0603	0603	RC0603FR-073K4L	Yageo America
U1	1		48V, 325mA Constant On-Time Synchronous Buck Regulator, DDA0008B	DDA0008B	LM25018MR/NOPB	Texas Instruments
D2	0	0.65V	Diode, Schottky, 40V, 0.35A, SOD-523	SOD-523	ZHCS350TA	Diodes Inc.

5 Performance Curves

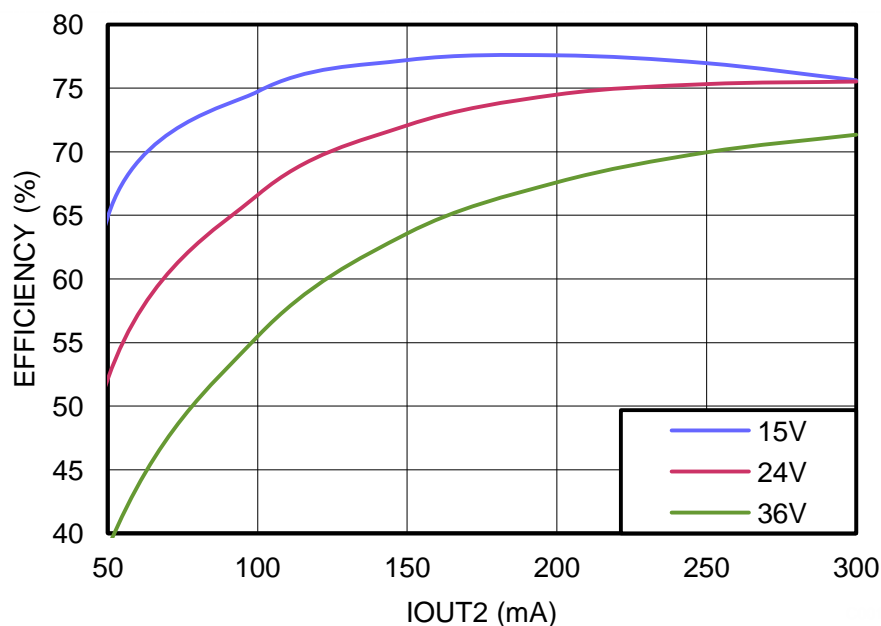


Figure 2. Efficiency at 500 kHz, $V_{OUT1} = 5\text{ V}$

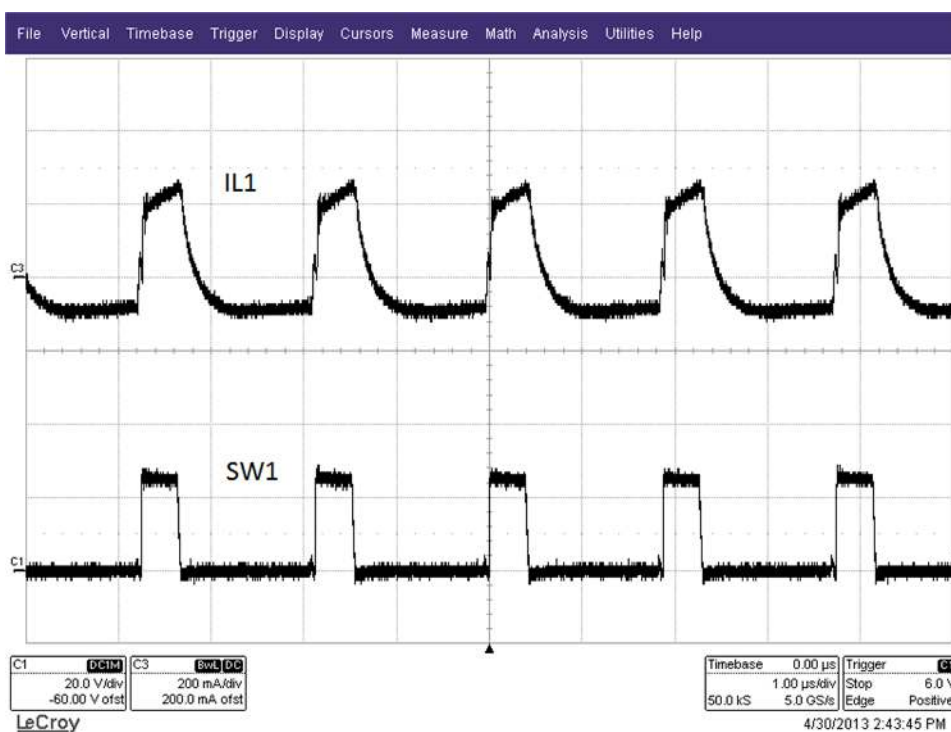


Figure 3. Steady State Waveform
($V_{IN} = 24\text{ V}$, $I_{OUT1} = 0\text{ mA}$, $I_{OUT2} = 200\text{ mA}$)

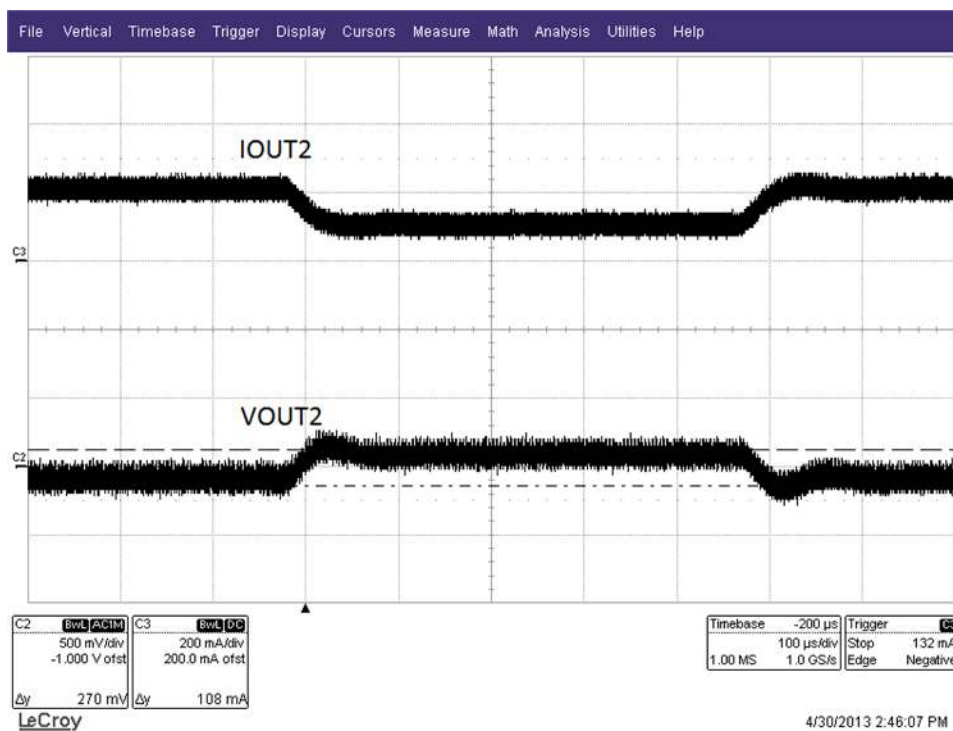


Figure 4. Step Load Response
(VIN = 24 V, I_{OUT1} = 0, Step Load on I_{OUT2} = 100 mA to 200 mA)

6 PC Board Layout

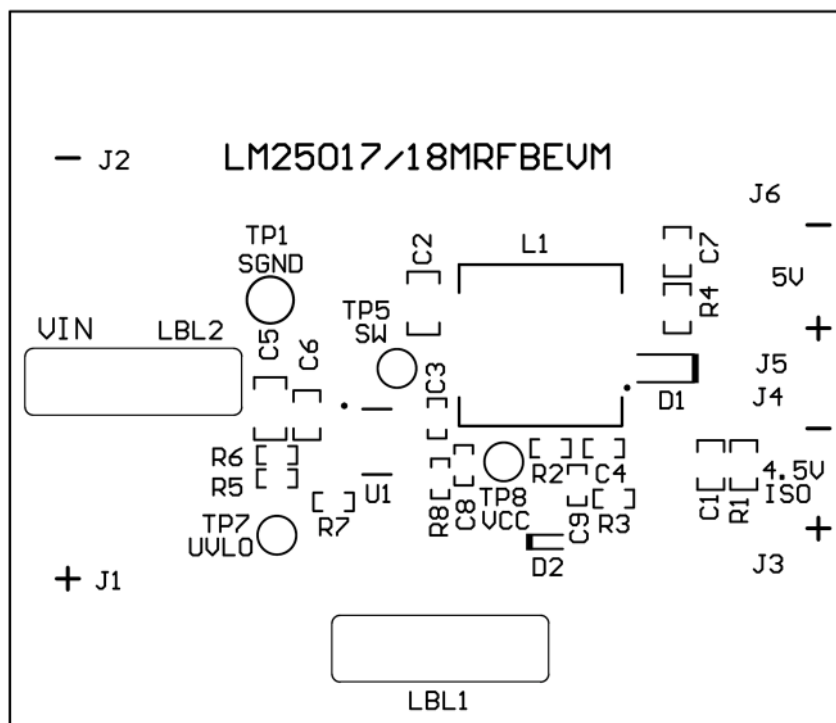


Figure 5. TopSilk

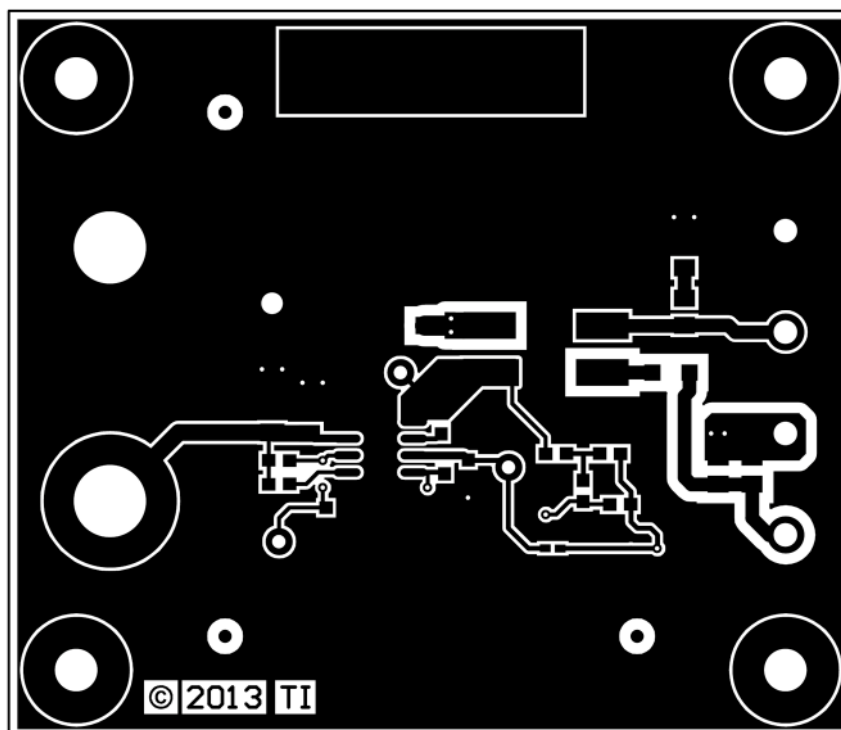


Figure 6. Top Copper

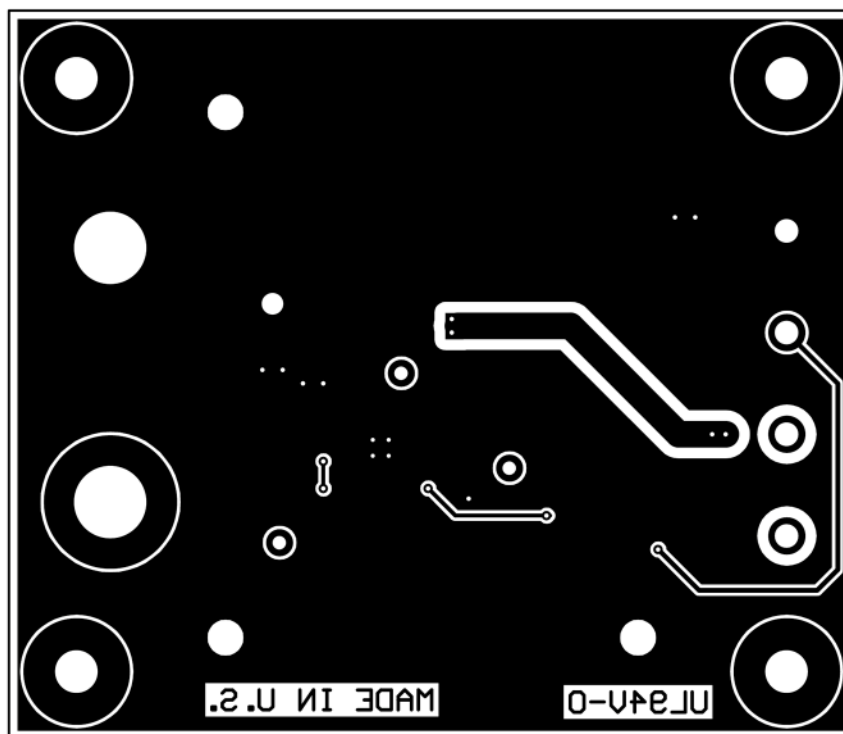


Figure 7. Bottom Copper

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User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

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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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

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

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.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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.

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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This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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(address) 24-1, Nishi-Shinjuku 6 chome, Shinjuku-ku, Tokyo, Japan

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東京都新宿区西新宿 6 丁目 2 4 番 1 号

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