LM3269 Evaluation Board

1 Introduction

The LM3269 evaluation board is a working demonstration of a buck-boost DC-DC converter designed to generate output voltages above or below a given input voltage. It is particularly suitable for cell-phone applications powering 3G/4G Power Amplifiers.

For more details and electrical characteristics about the converter operation, please refer to the LM3269 data sheet. If you are considering using the LM3269 in a system design, please review the "PCB Layout Considerations" section of the data sheet.

2 Operating Conditions

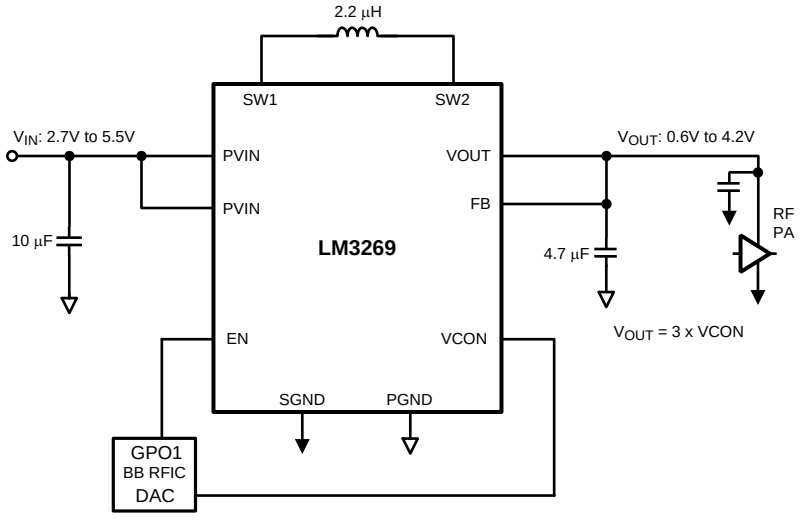
The device will operate under the following conditions:

- V_{IN}: 2.7V ≤ V_{IN} ≤ 5.5V
- Adjustable V_{OUT}: 0.6V to 4.2V
- VCON: 0.2V to 1.4V
- V_{OUT} equation: V_{OUT}= 3 x VCON
- I_{OUT} range: 0mA to 750mA

3 Package

The LM3269 is available in a 12-bump (0.4 mm pitch) lead-free DSBGA (2.0mm X 2.5mm X 0.6mm) package.

4 Typical Application Circuit



5 Startup Sequence

To activate the LM3269EVM Buck-Boost DC-DC converter output, execute the following steps:

1. Place EN pin LOW.
2. Power up PVIN (within the P_{VIN} range of 2.7V to 5.5V).
3. Set VCON pin to 1/3 of desired output voltage (0.2 ≤ VCON ≤ 1.4V).
4. Place EN pin HIGH, then V_{OUT} should present as expected.

6 List of Materials

Designator	Model	Description	Manufacturer
CPVIN(1)	Std	100 µF, optional , 6.3V, 1411 (3528) Low ESR Tantalum	Std
C1(2)	Std	220 pF, optional, 01005 (0402)	Std
C2(2)	Std	0.1 µF, optional, 0201 (0603)	TDK
C3	C1608X5R0J106K	10 µF, 6.3V, 0603 (1608)	
C4	C1608X5R0J475K	4.7 µF, 6.3V, 0603 (1608)	Std
C5(2)	Std	0.1µF, optional, 0201 (0603)	Std
C6(2)	Std	220 pF, optional, 01005 (0402)	Std
C7, C8(3)	Std	0.47 µF, optional, 0201 (0603)	Std
C9	Std	Optional, 0402 (1005)	Std
L	MIPSZ2520D2R2	2.2 µH, 2.5 x 2.0 x 1.0 mm	FDK
R1	Std	Optional, 01005 (0402), Shorted	Std
U1	LM3269TLE	Buck-Boost Converter	Texas Instruments

(1) CPVIN: The long test leads necessary for bench testing add significant parasitic inductances in series with the bench power supply. The 100 µF capacitor at CPVIN reduces the impact that these parasitic inductances have on both static and transient behavior during testing.

(2) C1, C2, C5, C6 help to improve high frequency noise.

(3) C7, C8 resemble PA decoupling capacitor.

7 Input/Output Capacitor Information

The total recommended actual capacitance on the VOUT bus should be at least 7.0 µF (4.7 µF + PA decoupling caps) to take into account the DC bias degradation and other tolerances.

BUS	MIN (µF)	TYP (µF)	MAX (µF)
PVIN	–	10	–
VOUT	7	–	10

8 Evaluation Board Schematic and PCB Layout

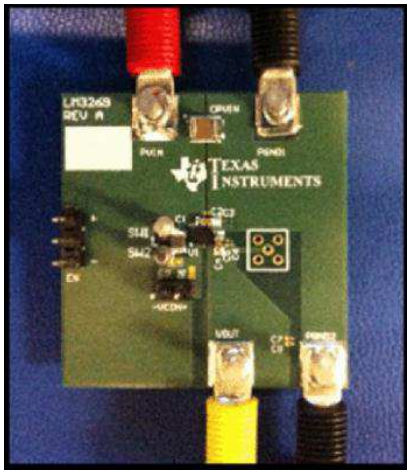


Figure 1. Picture of LM3269 Evaluation Board

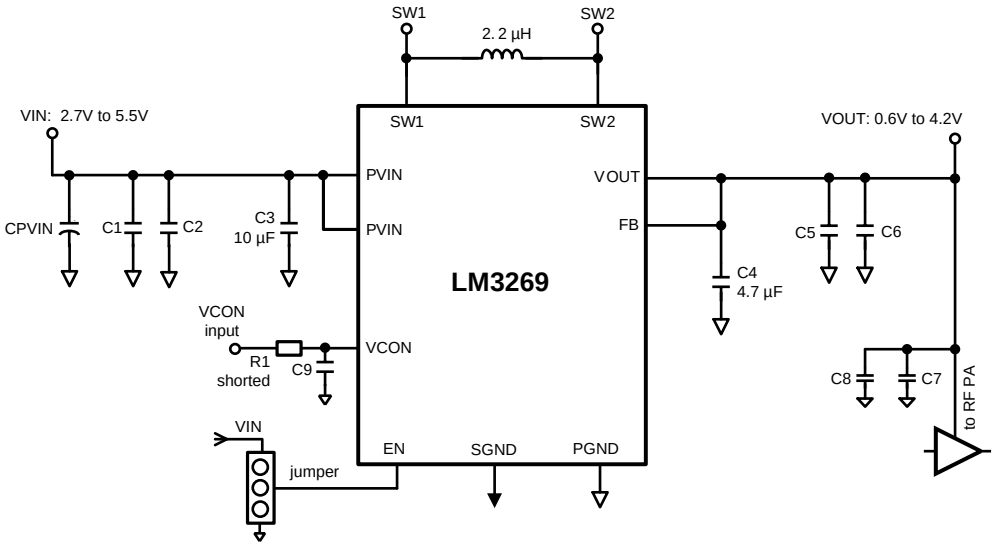


Figure 2. LM3269 Evaluation Board Schematic

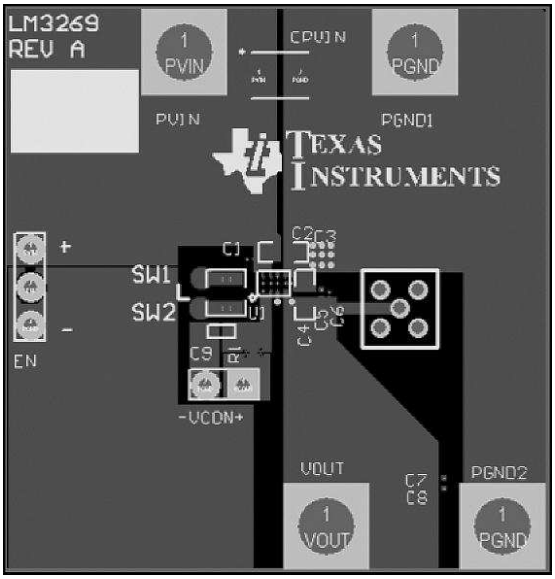


Figure 3. Top Layer

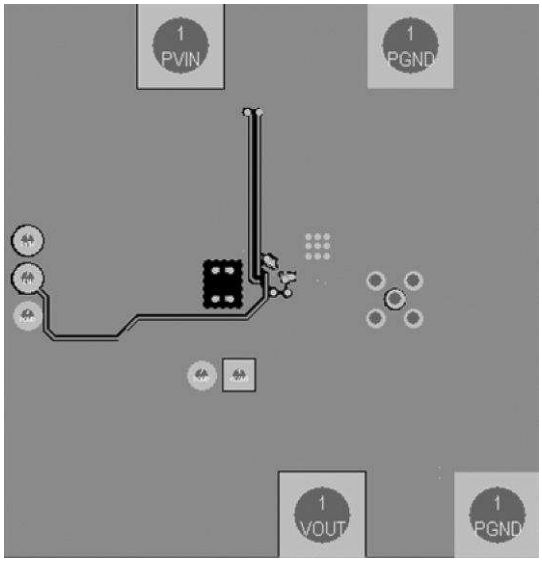


Figure 4. Mid-Layer 1

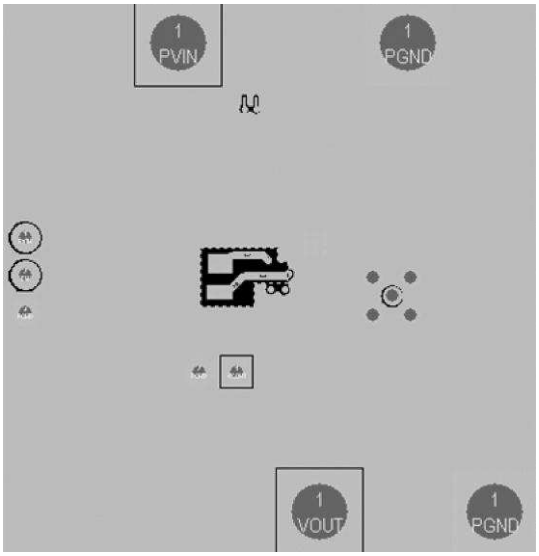


Figure 5. Mid-Layer 2

Figure 6. Bottom Layer

9 Connection Diagram and Package Mark Information

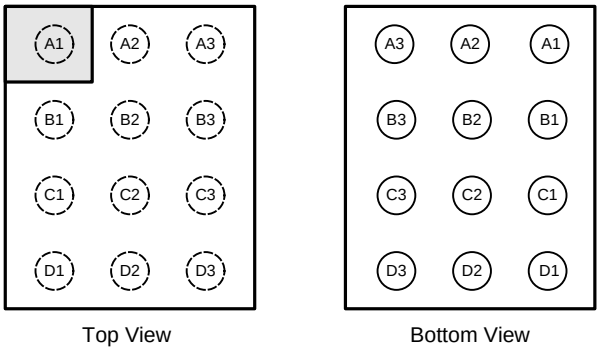


Figure 7. Connection Diagram and Package Marking 12-Bump Thin DSBGA Package

10 Pin Descriptions

Pin #	Name	Description
A1	NC	Non connection. Leave this pin floating; do not connect to PVIN or PGND.
B1	VCON	Voltage Control Analog input. VCON controls the output voltage in PWM and PFM modes.
C1	FB	Feedback input to inverting input of error amplifier. Connect output voltage directly to this node at load point.
D1	VOUT	Regulated output voltage of LM3269. Connect this to a 4.7 µF ceramic output filter capacitor to GND.
A2	NC	Non connection. Leave this pin floating; **do not** connect to PVIN or PGND.
B2	EN	Enable Pin. Pulling this pin higher than 1.2V enables part to function.
C2	SGND	Signal Ground for analog circuits and control circuitry.
D2	SW2	Switch pin for Internal Power Switches. Connect inductor between SW1 and SW2
A3	PVIN	Power MOSFET input and power current input pin. Optional low-pass filtering may help buck and buck-boost modes for radiated EMI and noise reduction.
B3	PVIN	Power MOSFET input and power current input pin. Optional low-pass filtering may help buck and buck-boost modes for radiated EMI and noise reduction.
C3	SW1	Switch pin for Internal Power Switches. Connect inductor between SW1 and SW2.
D3	PGND	Power Ground for Power MOSFETs and gate drive circuitry.

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General Statement for EVMs including a radio

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.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

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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