

Signal Chain Power LT3470A Inverting Regulator

DESCRIPTION

Demonstration circuit SCP-LT3470A-IEVALZ is a 40V micropower DFN inverting buck regulator featuring the LT3470A. The board is optimized for –3.3V output at up to 250mA load current for a steady state input voltage range of 4V to 36V.

Like all boards in the Signal Chain Power series, this board is designed to be easily plugged into other SCP boards to form a complete signal chain power system, enabling fast evaluation of low power signal chains. To evaluate this board, some universal SCP hardware is required, namely:

SCP-INPUT-EVALZ SCP-FILTER-EVALZ
SCP-OUTPUT-EVALZ SCP-1X2BKOUT-EVALZ
SCP-1X5BKOUT-EVALZ SCP-5X1-EVALZ
SCP-THRUBRD-EVALZ

To properly evaluate SCP series demo boards, you will need the SCP Configurator companion software. SCP Configurator can help you choose the right board and topology for your design.

Note that this Demo Manual does not cover details important to the operation and configuration regarding the [LT3470A](#). Please refer to the [LT3470A datasheet](#) for a complete description of the part.

Design files for this circuit board are available.

All registered trademarks and trademarks are property of their respective owners.

Table 1. Performance Summary

SYMBOL	PARAMETER	NOTES	MIN	TYP	MAX	UNITS
$V_{IN(MAX)}$	Max Input Voltage				40	V
$V_{OUT(MAX)}$	Max Output Voltage				–16	V
$I_{OUT(MAX)}$	Max Output Current				250	mA

BOARD IMAGE

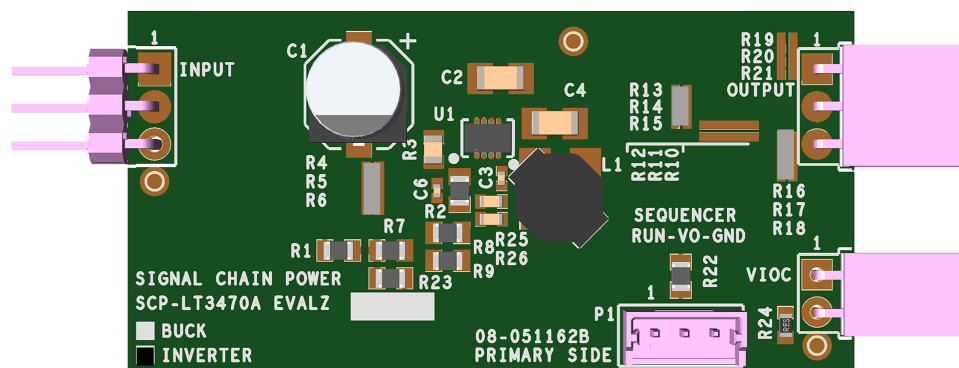


Figure 1. SCP-LT3470A-IEVALZ Board

QUICK START PROCEDURE

Demonstration circuit SCP-LT3470A-IEVALZ is easy to set up to evaluate the performance of any SCP hardware configuration.

1. The SCP-LT3470A-IEVALZ ships with a default output voltage of $-3.3V$. To change the output voltage, see “Configuration Settings” section, and modify the board accordingly. Be sure to check for open connections or solder shorts after making any modifications.
2. Connect the SCP-INPUT-EVALZ and SCP-OUTPUT-EVALZ boards to the SCP-LT3470A-IEVALZ (refer to Figure 2) and connect the input board to a voltage source, V_{SOURCE} . Connect the output board to a voltmeter or dynamic load. Slowly raise the input voltage until the SCP-LT3470A-IEVALZ powers up into regulation and sweep V_{SOURCE} through the desired range of operation.

NOTE: Make sure that the input voltage is always within spec. If using a dynamic load to measure output voltage, make sure the load is initially set to zero.

3. Check for proper output voltage. The output should be regulated at the programmed value ($\pm 5\%$).
4. Once the proper output voltage is established, power off V_{SOURCE} and similarly test other boards in the SCP system until all elements have been individually verified prior to assembling into the final circuit configuration.

NOTE: When measuring the input or output voltage ripple, use the optional SMA connector locations available on the input, output, 1×5 , 1×2 , and 5×1 breakout boards. Avoid using the test point connections with long scope leads.

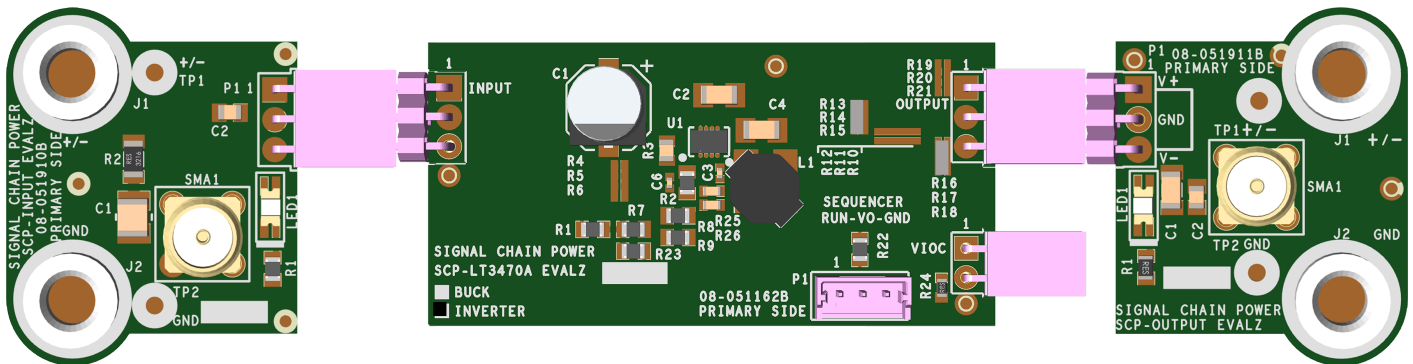


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-LT3470A-IEVALZ is a 40V micropower DFN inverting buck regulator featuring the LT3470A. The board is optimized for –3.3V output at up to 250mA load current for a steady state input voltage range of 4V to 36V.

The output of the SCP-LT3470A-BEVALZ is resistor-programmable from –3V to –16V. The board can be also configured to drive VIOC-capable LDO regulators.

OUTPUT VOLTAGE PROGRAMMING

$$|V_{OUT}| = 1.25V_{FB} \left(1 + \frac{R2}{R3} \right)$$

Table 2. Output Voltage Programming Resistor Selection Table

V _{OUT} (V)	R2 (Ω)	R3 (Ω)
–3.0	140k	100k
–3.3	115k	69.8k
–3.5	107k	59.0k
–4.0	165k	75.0k
–4.5	294k	113k
–5.0	102k	34.0k
–5.5	340k	100k
–6.0	523k	137k
–6.5	150k	35.7k
–7.0	107k	23.2k
–7.5	590k	118k
–8.0	576k	107k
–8.5	162k	28.0k
–9.0	806k	130k
–9.5	107k	16.2k
–10.0	931k	133k
–11.0	107k	13.7k
–12.0	118k	13.7k
–13.0	187k	20.0k
–14.0	102k	10.0k
–15.0	110k	10.0k
–16.0	118k	10.0k

SHDN PIN CONFIGURATION

The SHDN pin is tied to the optional SCP Run/Sequence header P1. To create a harness for this function, use Molex part 0510650300 with crimp pin 50212-8000.

To use an active run signal, use a 1.00M for either pull-up or pull-down resistors R1 and R7, short R23 with 0Ω, and use the drive signal from connector P1.

Important: Do not connect harness to Pin 3.

VOLTAGE INPUT-TO-OUTPUT CONTROL (VIOC) IMPLEMENTATION

VIOC cannot be implemented with the board in the inverting buck configuration. If using a VIOC-capable negative LDO, ensure R9 and R24 are open and independently set fixed output voltages for both the inverting buck and negative LDO boards.

CONFIGURATION FOR V_{OUT} < 3.0V

For V_{OUT} between 1.25V and 3.0V, contact the SCP team via email at SCP@analog.com.

DEMO MANUAL SCP-LT3470A-IEVALZ

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PCB	ANALOG DEVICES 08_051162c
2	1	C1	CAP ALUM 10UF 50V 20% RAD SMD	PANASONIC 50SVPF10M
3	1	C2	CAP CER X7R, GENERAL PURPOSE	YAGEO CC1206KKX7R9BB105
4	1	C3	CAP CER 0.22UF 50V 10% X5R 0402	TAIYO YUDEN UMK105BJ224KV-F
5	1	C4	CAP CER 22UF 10% 25V X5R 1206	SAMSUNG CL31A226KAHNNNE
6	1	C6	CAP CER NPO	YAGEO CC0402JRNPO9BN220
7	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
8	1	L1	IND SHIELDED POWER, 0.5OHM DCR, 0.75A	WURTH ELEKTRONIK74408942330
9	1	OUTPUT	CONN FEMALE 3POS 2.54MM PITCH R/A GOLD	SULLINS PPPC031LGBN-RC
10	1	P1	CONN-PCB 3POS HEADER WIRE TO BRD WAFER ASSY STRAIGHT 2MM PITCH (Note 1)	MOLEX 53253-0370
11	1	R1	RES PRECISION THICK FILM CHIP 100k 1% 1/8W 0805	PANASONIC ERJ-6ENF1003V
12	1	R2	RES STANDARD THICK FILM CHIP, FOR AUTOMOTIVE 324k 1% 1/8W 0805	VISHAY CRCW0805324KFKEA
13	2	R24, R25	RES THICK FILM 0603 (Note 1)	N/A
14	1	R26	RES FILM SMD 0-0hm 5% 0.1W 0603	PANASONIC ERJ-3GEY0R00V
15	1	R3	RES PRECISION THICK FILM CHIP 200k 1% 1/8W 0805	PANASONIC ERJ-6ENF2003V
16	4	R7, R9, R22, R23	RES THICK FILM 0805 (Note 1)	N/A
17	1	R8	RES STANDARD THICK FILM CHIP JUMPER, FOR AUTOMOTIVE	VISHAY CRCW08050000Z0EA
18	1	U1	IC MICROPWR BUCK REGULATOR	LINEAR TECHNOLOGY LT3470AEDDB#PBF
19	1	VIOC	CONN FEMALE 2POS 2.54MM PITCH R/A GOLD	SULLINS PPPC021LGBN-RC

Note 1. These items are not stuffed (DNI).

Note 2. Locations R13–R15, R16–R18 are shorted with 0Ω resistors for the Inverting Buck option; R4–R6, R10–R12, R19–R21 are DNI.



DEMO MANUAL SCP-LT3470A-IEVALZ



ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Analog Devices Inc.:](#)

[SCP-LT3470A-IEVALZ](#)