

Signal Chain Power Series LT8410 Ultralow Power Boost Converter with Power Disconnect

DESCRIPTION

Demonstration circuit SCP-LT8410-EVALZ is an Ultralow Power Boost Converter with Output Disconnect featuring the LT8410. The demo circuit converts a 3V–10V source to 16V/1.6mA at 3Vin.

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-OUTPUT-EVALZ
- SCP-FILTER-EVALZ
- SCP-THRUBRD-EVALZ
- SCP-1X2BKOUT-EVALZ
- SCP-1X5BKOUT-EVALZ
- SCP-5X1-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 [LT8410](#). Please refer to the [LT8410 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				16	V
V _{OUT(MAX)}	Max Output Voltage				40	V
I _{SW(LIM)}	Switch Current Limit				25	mA

BOARD IMAGE

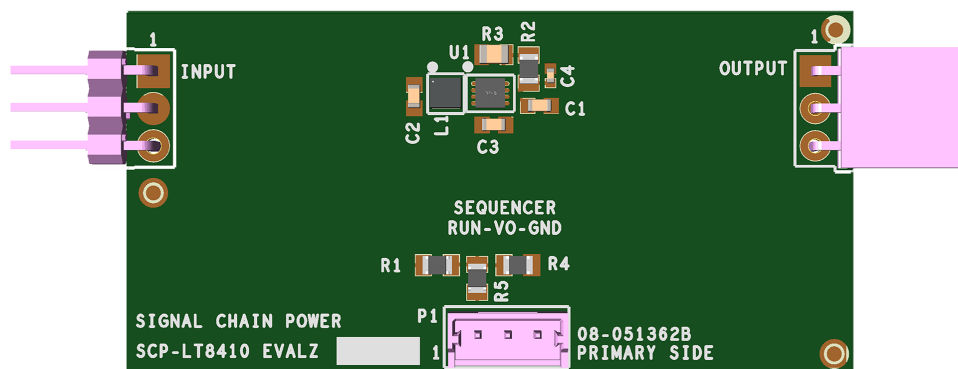


Figure 1. SCP-LT8410-EVALZ Evaluation Board

DEMO MANUAL SCP-LT8410-EVALZ

QUICK START PROCEDURE

Demonstration circuit SCP-LT8410-EVALZ is easy to set up to evaluate the performance of any SCP hardware configuration.

1. The SCP-LT8410-EVALZ ships with a default output voltage of 16V. 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-LT8410-EVALZ (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-LT8410-EVALZ 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.

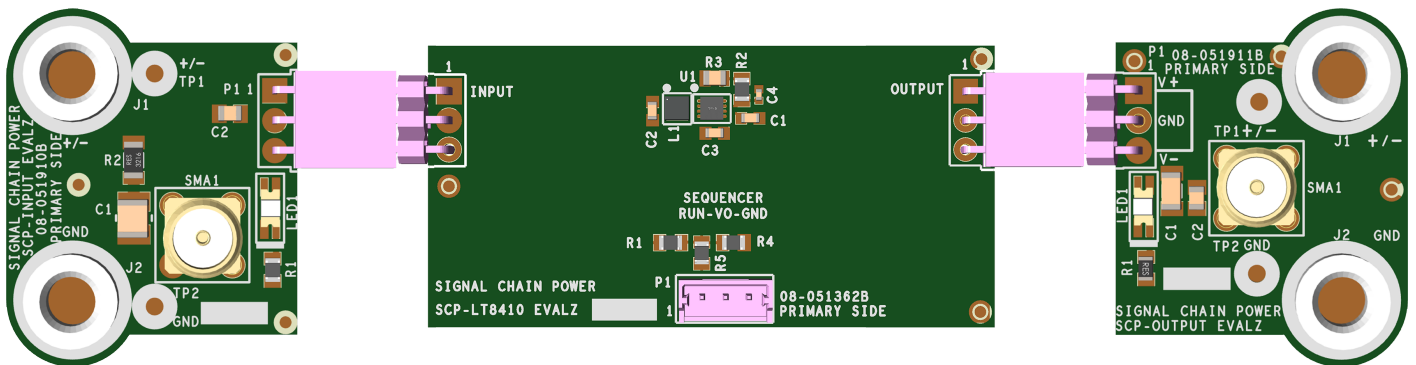


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-LT8410-EVALZ is an Ultralow Power Boost Converter with Output Disconnect featuring the LT8410. The demo circuit converts a 3V-10V source to 16V/1.6mA at 3Vin.

The output of the SCP-LT8410-EVALZ is resistor-programmable from 5V to 40V.

OUTPUT VOLTAGE PROGRAMMING

$$V_{OUT} = \frac{39.335}{\left(1 + \frac{R2}{R3}\right)}; R3 + R2 \geq 200k$$

Table 2. Resistor Selection Guide for Common Output Voltages

V _{OUT} (V)	R2 (Ω)	R3 (Ω)
5.0	698K	102K
6.0	590K	107K
7.0	523K	113K
8.0	301K	76.8K
9.0	464K	137K
10.0	464K	158K
11.0	274K	107K
12.0	232K	102K
13.0	232K	115K
14.0	316K	174K
15.0	232K	143K
16.0	200K	137K
17.0	221K	169K
18.0	243K	205K
19.0	200K	187K
20.0	226K	232K
21.0	158K	182K
22.0	249K	316K
23.0	115K	162K
24.0	137K	215K
25.0	133K	232K
30.0	232K	453K
35.0	137K	301K
40.0	113K	280K

SHDN PIN CONFIGURATION

The $\overline{\text{SHDN}}$ 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 1.00MΩ for either pull-up or pull-down resistors R₁ and R₄, short R₅ with 0Ω, and use the drive signal from connector P₁.

If precision UVLO operation is desired, program enable divider R₁ and R₄ such that:

$$V_{ENABLE} = 1.30V_{TH} \left(1 + \frac{R1}{R4}\right)$$

$$V_{UVLO} = \left(1.24V - R5 \cdot 10^{-7}\right) \left(\frac{R1}{R4}\right) - R1 \cdot 10^{-7}$$

OUTPUT CURRENT LIMITS

The LT8410 is a micropower device, and output current is limited as a function of input voltage and output voltage ratios. Refer to the following table and interpolate to determine the maximum output current possible.

Table 3. LT8410 Maximum Output Current vs Output Voltage

V _{OUT} (V)	I _{OUT(MAX)} (mA)			
	V _{IN} = 2.8V	V _{IN} = 3.6V	V _{IN} = 5.0V	V _{IN} = 12.0V
40.0	0.5	0.7	1.1	3.6
35.0	0.7	0.9	1.4	4.4
30.0	0.8	1.0	1.5	5.5
25.0	1.0	1.4	2.1	7.2
20.0	1.4	1.9	2.9	9.7
15.0	1.6	2.4	4.0	14.0
10.0	3.3	4.6	7.0	—
5.0	8.0	11.0	17.0	—

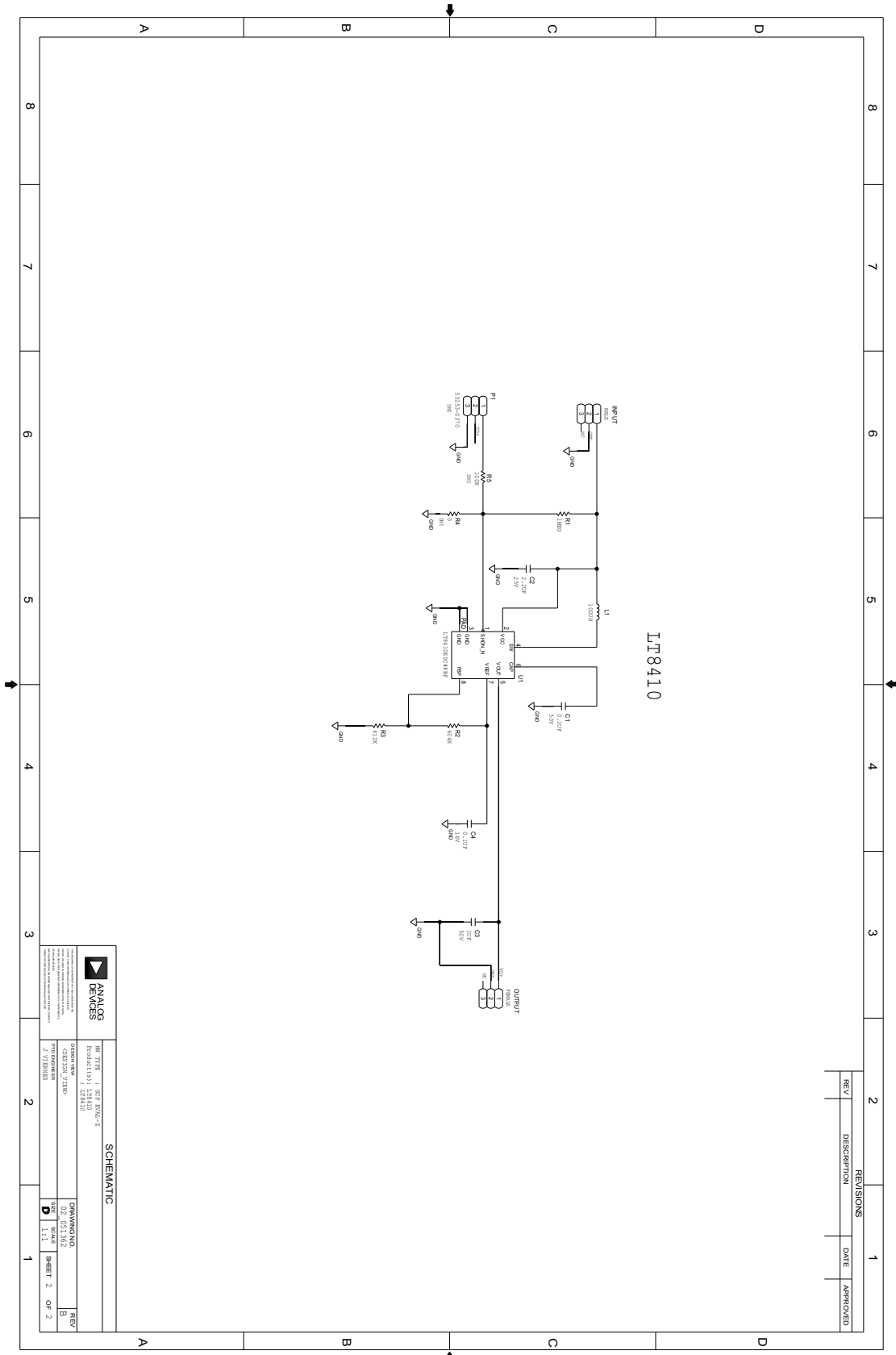
DEMO MANUAL SCP-LT8410-EVALZ

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PCB	ANALOG DEVICES 08_051362b
2	1	C1	CAP CER 0.1UF 50V 10% X7R 0603	SAMSUNG CL10B104KB8NNNC
3	1	C2	CAP CER X5R, GENERAL PURPOSE	MURATA GRM188R61E225KA12D
4	1	C3	CAP CER 1UF 50V 10% X5R 0603	SAMSUNG CL10A105KB8NNNC
5	1	C4	CAP CER X7R	KEMET C0402C104K4RACTU
6	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
7	1	L1	IND SHIELDED POWER, 9.27OHM DCR, 0.17A	COILCRAFT INC. XPL2010-104MLB
8	1	OUTPUT	CONN FEMALE 3POS 2.54MM PITCH R/A GOLD	SULLINS PPPC031LGBN-RC
9	1	P1	CONN-PCB 3POS HEADER WIRE TO BRD WAFER ASSY STRAIGHT 2MM PITCH (Note 1)	MOLEX 53253-0370
10	1	R1	RES THICK FILM CHIP, GENERAL PURPOSE	YAGEO RC0805JR-071ML
11	1	R2	RES SMD 604K OHM 1% 1/8W 0805	YAGEO RC0805FR-07604KL
12	1	R3	RES PRECISION THICK FILM CHIP	PANASONIC ERJ-6ENF4123V
13	1	R4	RES THICK FILM 0805 (Note 1)	VISHAY CRCW08050000Z0EA
14	1	R5	RES THICK FILM 0805 (Note 1)	PANASONIC ERJ-6ENF1003V
15	1	U1	IC-LIN ULTRALOW POWER BOOST CONVERTER WITH OUTPUT DISCONNECT	LINEAR TECHNOLOGY LT8410EDC#PBF

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

SCHEMATIC DIAGRAM



DEMO MANUAL SCP-LT8410-EVALZ



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.