

Signal Chain Power LT8362 Low I_Q SEPIC Converter

DESCRIPTION

Demonstration circuit SCP-LT8362-S-EVALZ features the LT8362 in a SEPIC configuration. It operates with a switching frequency of 2MHz and has an output voltage of 12V.

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 [LT8362](#). Please refer to the [LT8362 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				48	V
V _{OUT(MAX)}	Max Output Voltage				48	V
I _{OUT(MAX)}	Max Output Current				2	A

BOARD IMAGE

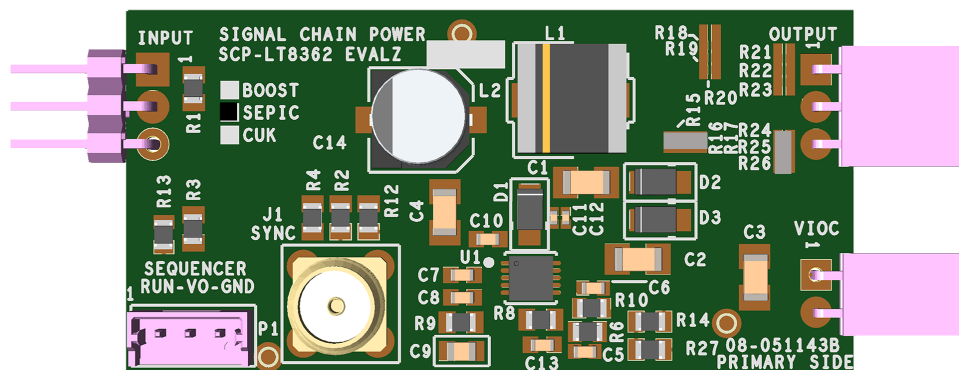


Figure 1. SCP-LT8362-S-EVALZ Board

QUICK START PROCEDURE

Demonstration circuit SCP-LT8362-S-EVALZ is easy to set up to evaluate the performance of any SCP hardware configuration.

1. The SCP-LT8362-S-EVALZ ships with a default output voltage of 12V. 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-LT8362-S-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-LT8362-S-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 \times 5, 1 \times 2, and 5 \times 1 breakout boards. Avoid using the test point connections with long scope leads.

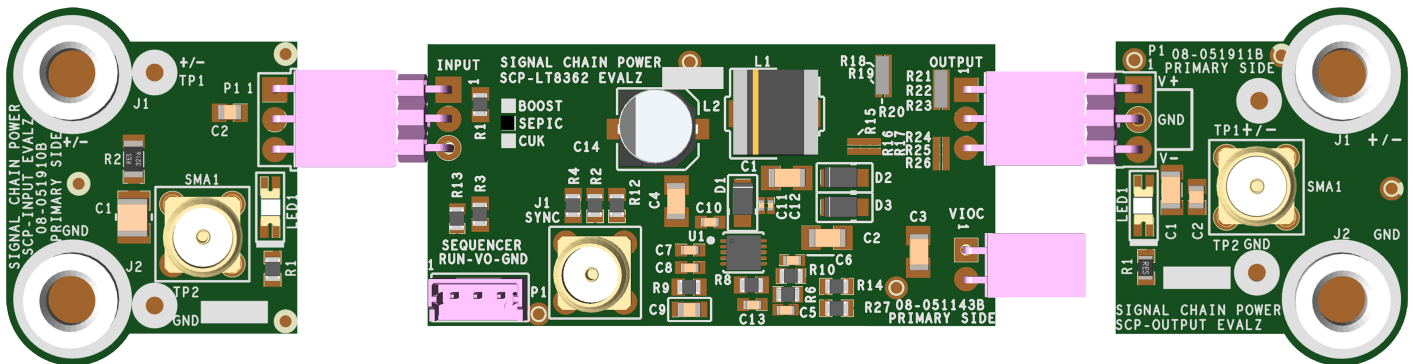


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-LT8362-S-EVALZ features the LT8362 in a SEPIC configuration. It operates with a switching frequency of 2MHz and has an output voltage of 12V.

The output of the SCP-LT8362-B-EVALZ is resistor-programmable from 5V to 48V. The board can be also configured to drive VIOC-capable LDO regulators.

OUTPUT VOLTAGE PROGRAMMING

$$V_{OUT} = 1.6V_{FBX} \left(1 + \frac{R6}{R8} \right)$$

Table 2. Resistor Selection Guide for Common Output Voltages

V _{OUT} (V)	R6 (Ω)	R8 (Ω)
5.0	24.3K	11.5K
6.0	31.6K	11.5K
7.0	115K	34.0K
8.0	102K	25.5K
9.0	118K	25.5K
10.0	105K	20.0K
11.0	107K	18.2K
12.0	71.5K	11.0K
13.0	97.6K	13.7K
14.0	78.7K	10.2K
15.0	115K	13.7K
16.0	102K	11.3K
17.0	162K	16.9K
18.0	205K	20.0K
19.0	150K	13.7K
20.0	115K	10.0K
21.0	243K	20.0K
22.0	255K	20.0K
23.0	226K	16.9K
24.0	140K	10.0K
25.0	215K	14.7K
30.0	442K	24.9K
35.0	287K	13.7K
40.0	255K	10.7K
45.0	374K	13.7K
48.0	309K	10.7K

EN/UVLO PIN CONFIGURATION

The EN/UVLO 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 R3, short R13 with 0Ω, and use the drive signal from connector P1.

If precision UVLO operation is desired, program enable divider R5 and R6 such that:

$$R6 = 10k - 100k, \text{ nominal}$$

$$R5 = R6 \left(\frac{V_{IN} - 1.60V_{TH}}{1.60V_{TH}} \right)$$

The LT8330 has an accurate 1.60V threshold which places the part into under voltage lockout. The hysteresis threshold on the rising edge is typically 80mV and scales by the factor:

$$V_{HYST} = 80mV \left(\frac{R5 + R6}{R6} \right)$$

VOLTAGE INPUT-TO-OUTPUT CONTROL (VIOC) IMPLEMENTATION

To implement the VIOC function for this regulator, set R27 to 0Ω. Refer to the “Configuration Settings” section in the Demo Manual for the LDO board and use the following configuration for this board.

Table 3. VIOC Cross-Reference Designators

VIOC SETTING REFERENCES	R _{BOT}	R _{TOP}	R _{MAX}
V _{OUT} Reference Designators	R8	R6	R14

$$V_{LDOIN} - V_{LDOOUT} = V_{VIOC} = 1.60V_{FB} \left(\frac{R_{BOT} + R_{TOP}}{R_{BOT}} \right)$$

$$V_{(MAX)LDOIN} = 1.60V_{FB} \left(\frac{R_{BOT} + R_{TOP} + R_{MAX}}{R_{BOT}} \right) + I_{SINK} R_{MAX}$$

I_{SINK} is the current through R_{MAX}, typically 15μA, so R_{BOT} should be sized such that the divider current runs a minimum of 100μA to minimize the I_{SINK} error term.

DEMO MANUAL SCP-LT8362-S-EVALZ

MODE PIN CONFIGURATION

The SCP-LT8362-B-EVALZ is configured by default for Burst Mode at light loads for efficiency. The MODE pin can also be configured to burst with spread spectrum, if desired. The table below shows the various configurations possible with the MODE pin.

Table 4. Settings for MODE Pin Configuration

MODE	R2	R4	R12
Burst Mode	0 Ω	Open	Open
Burst/Spread Spectrum	100k	Open	Open
Pulse Skip	Open	Open	Open
Pulse Skip/Spread Spectrum	Open	Open	0 Ω
Clock Sync/Pulse Skip	Open	0 Ω	Open

If the clock synchronization option is desired, the SCP-LT8362-B-EVALZ can be driven from an external source via the optional SMA connector J1.

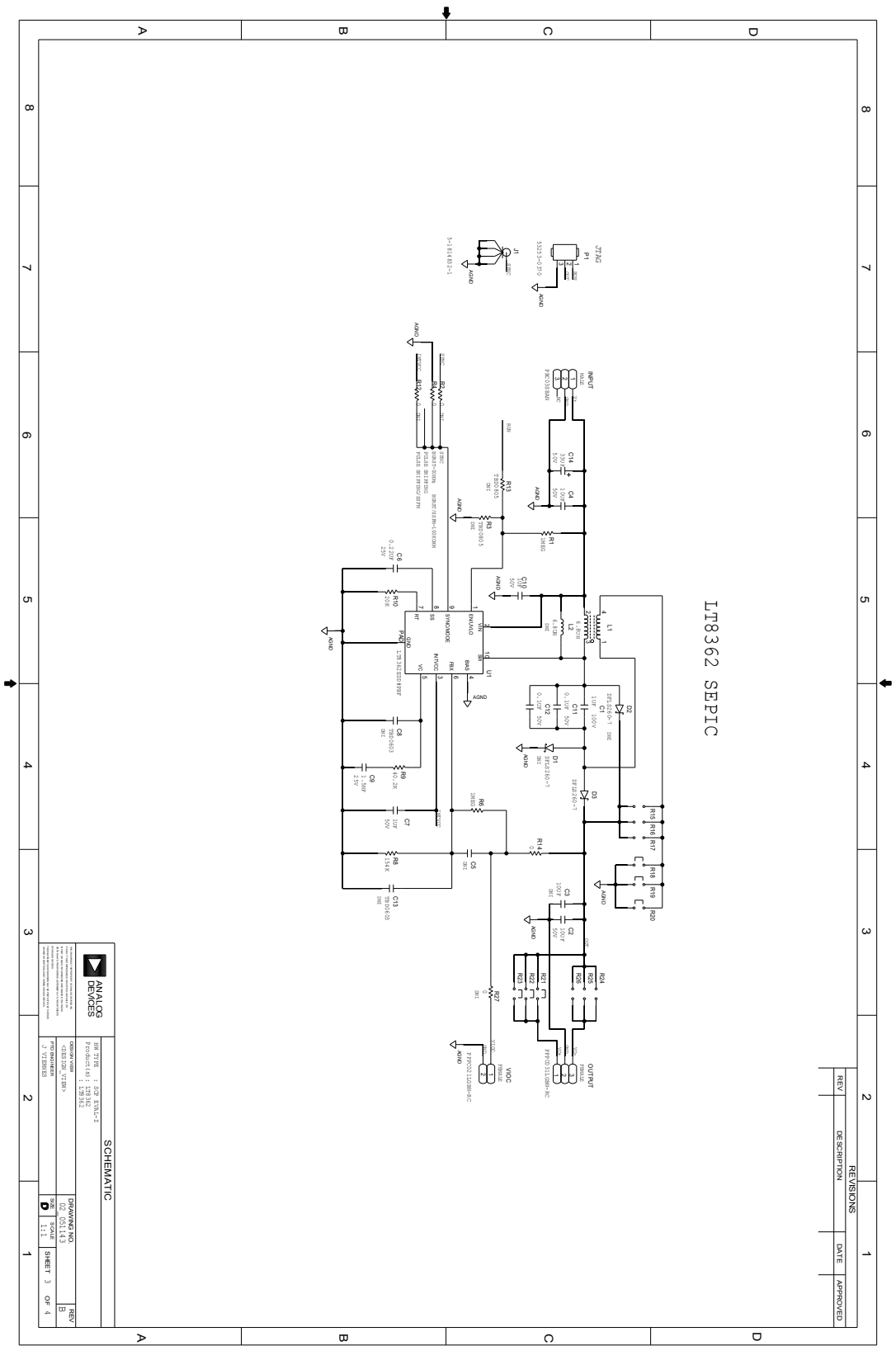
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PCB	ANALOG DEVICES 08_051143b
2	1	C1	CAP MULTILAYER CER, X7R	TAIYO YUDEN HMK316B7105KL-T
3	2	C11, C12	CAP CER 0.1UF 50V 10% X5R 0402	YAGEO CC0402KRX5R9BB104
4	1	C14	CAP ALUM 33UF 50V 20% 6.6X6.6MM	UNITED CHEMI CON EMVH500ADA330MF80G
5	2	C2, C4	CAP CER 10UF 50V X5R 1206	SAMSUNG CL31A106MBHNNNE
6	1	C3	CAP MLCC 1206 (Note 1)	N/A
7	3	C5, C8, C13	CAP MLCC 0603 (Note 1)	N/A
8	1	C6	CAP CER X7R	WURTH ELEKTRONIK885012000000
9	2	C7, C10	CAP CER 1UF 50V 10% X5R 0603	SAMSUNG CL10A105KB8NNNC
10	1	C9	CAP CER X7R, GENERAL PURPOSE	WURTH ELEKTRONIK885012000000
11	2	D1, D2	DIO SCHOTTKY (Note 1)	N/A
12	1	D3	DIO SCHOTTKY BARRIER RECTIFIER, 2A	DIODES INCORPORATED DFSL260-7
13	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
14	1	J1	CONN-PCB STRAIGHT SMA PCB DIE CAST (Note 1)	TE CONNECTIVITY LTD 5-1814832-1
15	1	L1	IND POWER WIREWOUND 1.25A, 0.1460HM DCR	WURTH ELEKTRONIK74489430068
16	1	L2	IND POWER (Note 1)	N/A
17	1	OUTPUT	CONN FEMALE 3POS 2.54MM PITCH R/A GOLD	SULLINS PPC031LGBN-RC
18	1	P1	CONN-PCB 3POS HEADER WIRE TO BRD WAFER ASSY STRAIGHT 2MM PITCH (Note 1)	MOLEX 53253-0370
19	1	R1	RES THICK FILM CHIP, GENERAL PURPOSE	YAGEO RC0805JR-071ML
20	1	R10	RES PRECISION THICK FILM CHIP	PANASONIC ERJ-6ENF2002V
21	3	R2, R12, R27	RES THICK FILM 0805 (Note 1)	N/A
22	2	R3, R13	RES THICK FILM 0805 (Note 1)	N/A
23	2	R4, R14	RES STANDARD THICK FILM CHIP JUMPER, FOR AUTOMOTIVE	VISHAY CRCW08050000Z0EA
24	1	R6	RES PRECISION THICK FILM CHIP	PANASONIC ERJ-6ENF1004V
25	1	R8	RES SMD 154K OHM 0.1% 1/8W 0805, AUTOMOTIVE	PANASONIC ERA-6AEB1543V
26	1	R9	RES PRECISION THIN FILM CHIP	VISHAY PAT0805E4022BST1
27	1	U1	IC LOW IQ BOSS/SEPIC/INVERTING CONVERTER WITH 2A, 60V SW	LINEAR TECHNOLOGY LT8362EDD#PBF
28	1	VIOC	CONN FEMALE 2POS 2.54MM PITCH R/A GOLD	SULLINS PPC021LGBN-RC

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

DEMO MANUAL SCP-LT8362-S-EVALZ

SCHEMATIC DIAGRAM



DEMO MANUAL SCP-LT8362-S-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.

Mouser Electronics

Authorized Distributor

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

[Analog Devices Inc.:](#)

[SCP-LT8362-S-EVALZ](#)