

Signal Chain Power LT3483 Inverting Converter

DESCRIPTION

Demonstration circuit SCP-LT3483-EVALZ is an inverting converter featuring the LT3483ES6. The converter generates $-15V$ at $8mA$ to $40mA$ from a $2.7-12V$ input using a dual coupled inductor in an inverting flyback topology.

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 [LT3483](#) buck regulator. Please refer to the [LT3483 datasheet](#) for a complete description of the part.

Design files for this circuit board are available.

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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	Output capacitor rating limited Replace for higher V_{OUT} setting			-39	V
$I_{SW(LIM)}$	Switch Current Limit				200	mA

BOARD IMAGE

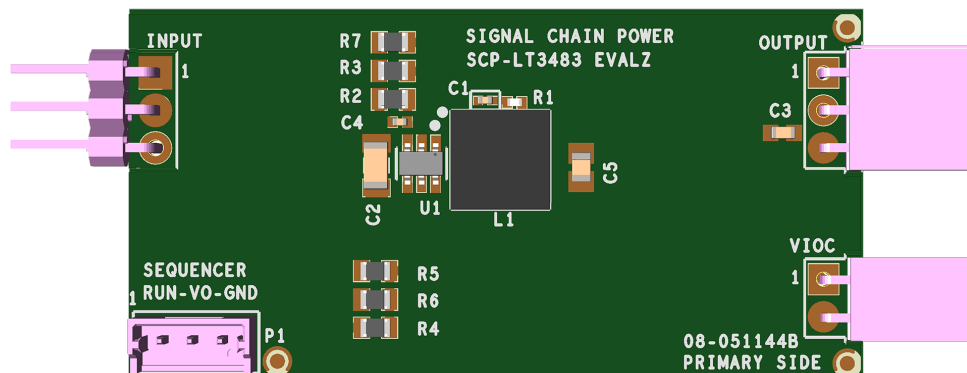


Figure 1. SCP-LT3483-EVALZ Board

QUICK START PROCEDURE

Demonstration circuit SCP-LT3483-EVALZ is easy to set up to evaluate the performance of any SCP hardware configuration. Refer to Figure 2 and follow these steps:

1. The SCP-LT3483-EVALZ ships with a default output voltage of $-15V$. 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-LT3483-EVALZ board (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-LT3483-EVALZ into regulation and sweep V_{SOURCE} through the desired range of operation.

NOTE: Make sure that the input voltage is always within specification. 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.

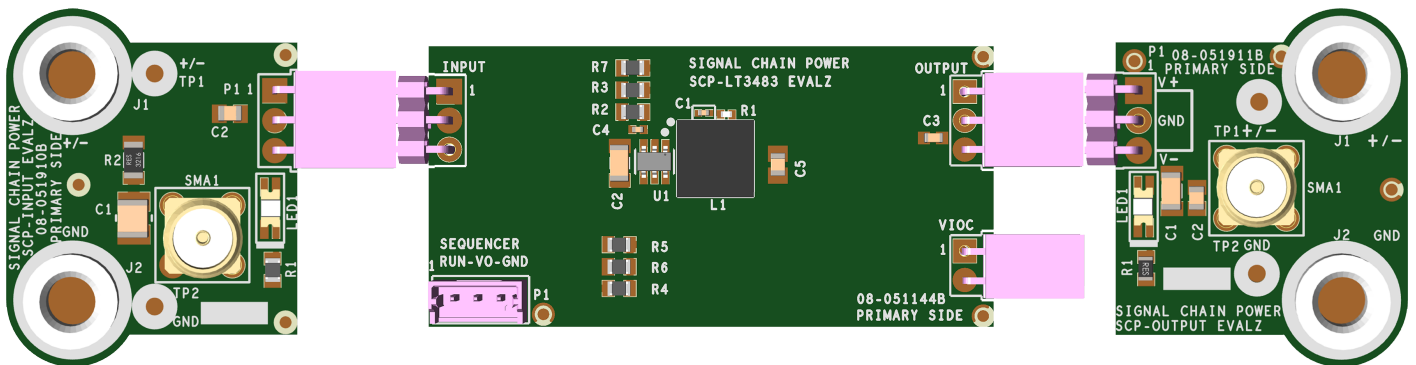


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-LT3483-EVALZ is an inverting converter featuring the LT3483ES6. The converter generates -15V at 8mA to 40mA from a $2.7\text{--}12\text{V}$ input using a dual coupled inductor in an inverting flyback topology.

The output of the SCP-LT3483-EVALZ is resistor-programmable from -1V to -39V . The board can be also configured to drive VIOC-capable linear regulators.

OUTPUT VOLTAGE PROGRAMMING

$$V_{\text{OUT}} = R2 \cdot 10\mu\text{A}$$

Table 2. Resistor selection guide for common output voltages

V _{OUT} (V)	R2 (Ω)
-1.0V	100k
-1.5V	150k
-2.0V	200k
-2.5V	249k
-3.0V	301k
-3.5V	348k
-4.0V	402k
-4.5V	453k
-5.0V	499k
-5.5V	549k
-6.0V	604k
-7.0V	698k
-8.0V	806k
-9.0V	909k
-10.0V	1.00M
-11.0V	1.10M
-12.0V	1.21M
-13.0V	1.30M
-14.0V	1.40M
-15.0V	1.50M
-16.0V	1.62M
-17.0V	1.69M
-18.0V	1.82M
-19.0V	1.91M
-20.0V	2.00M
-25.0V	2.49M
-30.0V	3.01M
-35.0V	3.48M
-39.0V	3.92M

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 1.00M resistor for either pull-up or pull-down resistors R5 and R6, short R4 with 0Ω , and use the drive signal from connector P1.

VOLTAGE INPUT-TO-OUTPUT CONTROL (VIOC) IMPLEMENTATION

To implement the VIOC function for this regulator, set R7 to 0Ω . Refer to the “Configuration Settings” section in the Demo Manual for the low-dropout (LDO) linear regulator 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	125kΩ (internal to LT3483)	R2	R3

$$V_{\text{LDOIN}} - V_{\text{LDOOUT}} = V_{\text{VIOC}} = 1.25V_{\text{REF}} \left(\frac{R_{\text{TOP}}}{R_{\text{BOT}}} \right)$$

$$V_{(\text{MAX})\text{LDOIN}} = 1.25V_{\text{REF}} \left(\frac{R_{\text{TOP}} + R_{\text{MAX}}}{R_{\text{BOT}}} \right) + V_{\text{VIOC}} \left(\frac{R_{\text{MAX}}}{40\text{k}} \right)$$

Because the V_{LDOIN} term is simply the sum of the final output voltage after the LDO and the difference the LT3483 is adding on top, it can be helpful to take the desired final output voltage, add 1.0V , and then look up that voltage-resistor combination from Table 2.

R_{MAX} can then be obtained by figuring out the difference between the maximum and nominal output voltages of the LT3483, divided by the $10\mu\text{A}$ current through the internal feedback resistor.

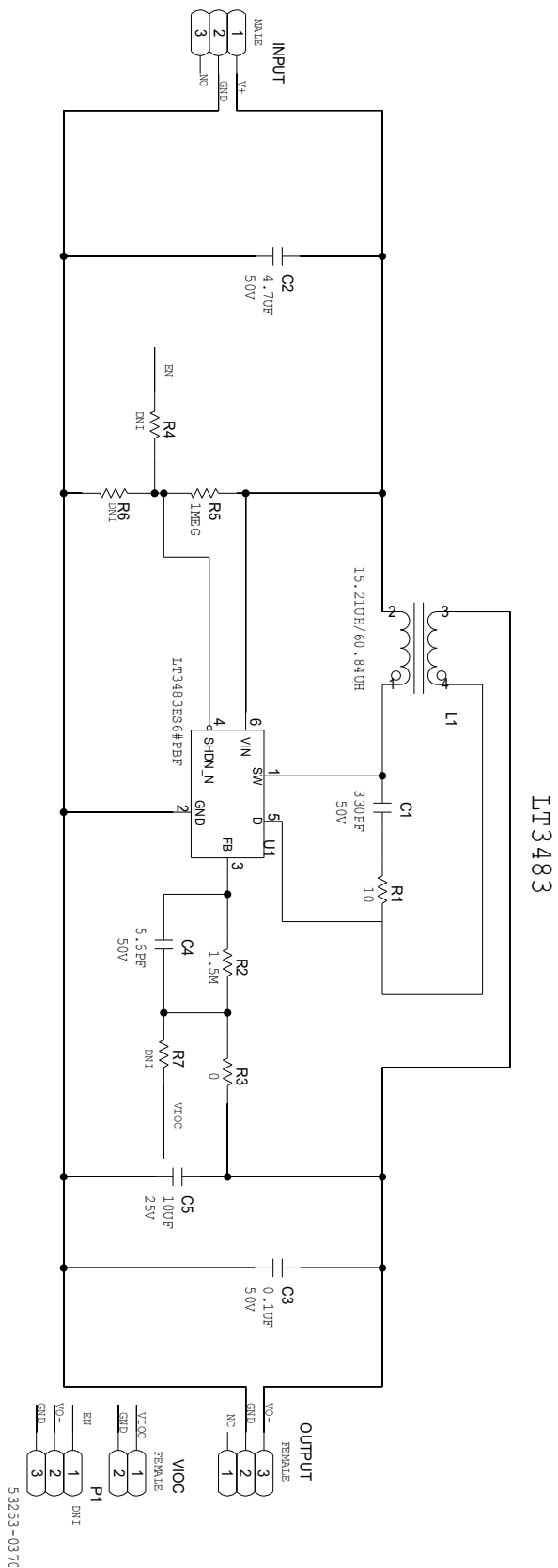
DEMO MANUAL SCP-LT3483-EVALZ

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PCB	ANALOG DEVICES 08_051144b
2	1	C1	CAP CER 330PF 10% 50V X7R 0402	KEMET C0402C331K5RACTU
3	1	C2	CAP CER 4.7UF 50V 10% X7R 1206	SAMSUNG CL31B475KBHNNNE
4	1	C3	CAP CER 0.1UF 50V 10% X7R 0603	SAMSUNG CL10B104KB8NNNC
5	1	C4	CAP CER COG DIELECTRIC	AVX 04025A5R6CAT2A
6	1	C5	CAP CER 10UF 25V 10% X5R 0805	SAMSUNG CL21A106KAYNNNE
7	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
8	1	L1	IND POWER SHIELDED WIREWOUND 0.658A/0.329A, 0.5766OHM/2.31OHM DCR	EATON SDQ12-150-R
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	PANASONIC ERJ-2RKF10R0X
12	1	R2	RES THIN FILM PRECISION	TE CONNECTIVITY CPF0805B1M5E1
13	1	R3	RES STANDARD THICK FILM CHIP JUMPER, FOR AUTOMOTIVE	VISHAY CRCW08050000Z0EA
14	3	R4, R6, R7	RES THICK FILM 0805 (Note 1)	N/A
15	1	R5	RES THICK FILM CHIP, GENERAL PURPOSE	YAGEO RC0805JR-071ML
16	1	U1	IC INVERTING MICROPWR DC/DC CONVERTER	LINEAR TECHNOLOGY LT3483ES6#PBF
17	1	VIOC	CONN FEMALE 2POS 2.54MM PITCH R/A GOLD	SULLINS PPPC021LGBN-RC

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

SCHEMATIC DIAGRAM



DEMO MANUAL SCP-LT3483-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.

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