Signal Chain Power
LT3472 Dual Output Converter

DESCRIPTION

Demonstration circuit SCP-LT3472-EVALZ is a dual output converter featuring the LT3472EDD. The Boost Converter is designed to convert a 2.7V–4.2V input to 15V output at 25mA–45mA load. The Inverting Circuit generates a –8V output at 35mA–65mA from the same input.

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-1X5BKOUT-EVALZ
SCP-THRUBRD-EVALZ
SCP-FILTER-EVALZ
SCP-1X2BKOUT-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 LT3472. Please refer to the LT3472 datasheet for a complete description of the part.

Design files for this circuit board are available.

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	Positive V_{OUT} Negative V_{OUT}			34 –34	V
$I_{SW(LIM)}$	Switch Current Limit		250 300	350 400		mA

BOARD IMAGE

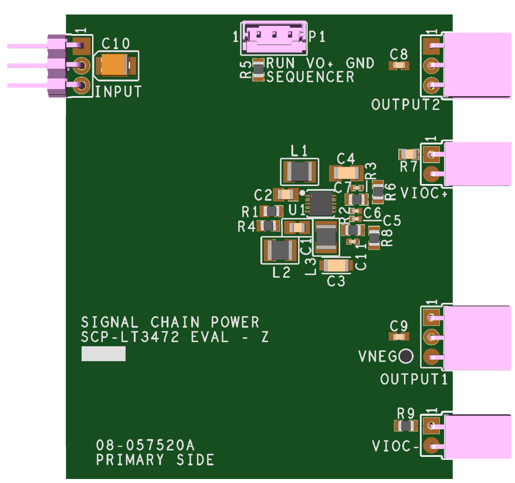


Figure 1. SCP-LT3472-EVALZ Board

QUICK START PROCEDURE

Demonstration circuit SCP-LT3472-EVALZ is easy to set up to evaluate the performance of any SCP hardware configuration.

1. The SCP-LT3472-EVALZ ships with default output voltages of 15V and –8V, respectively. 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-LT3472-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-LT3472-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 voltages. The output should be regulated at the programmed value (±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.

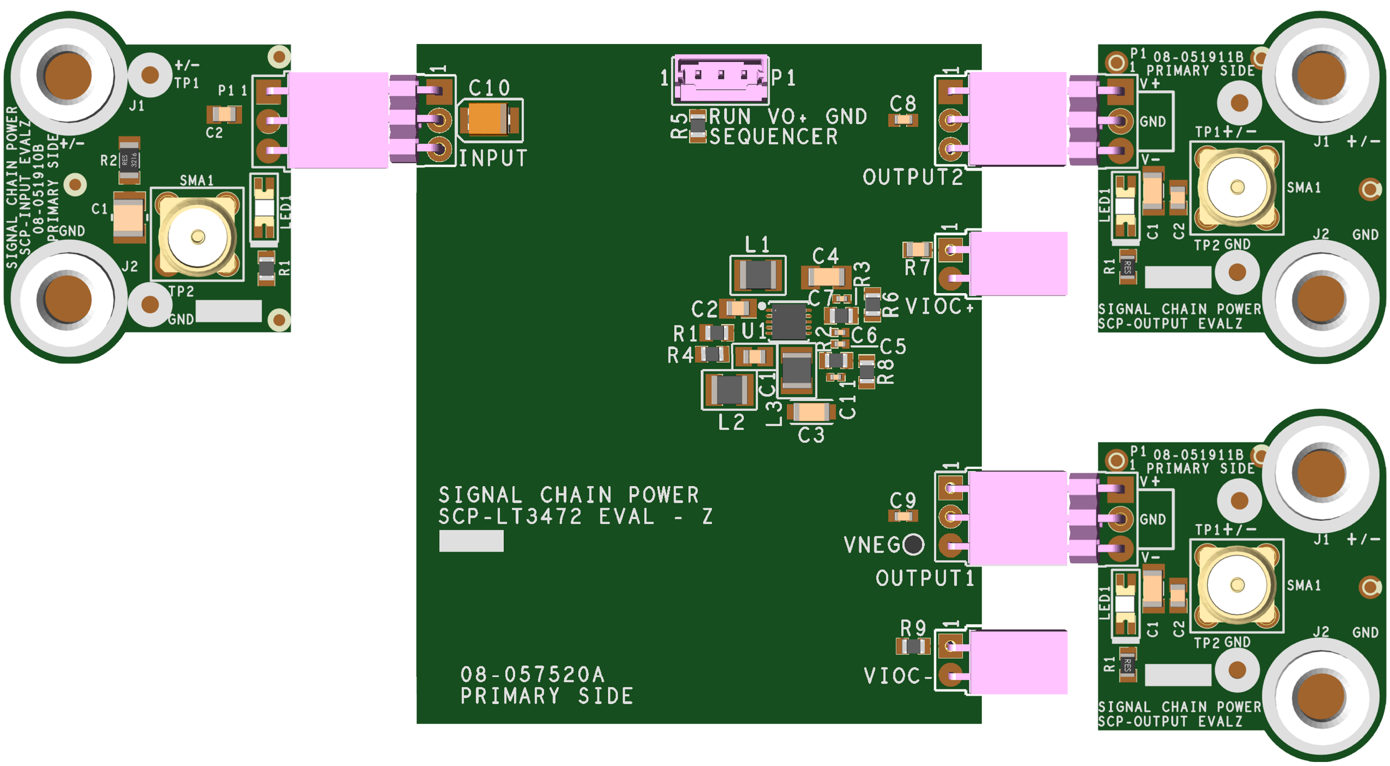


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-LT3472-EVALZ is a dual output converter featuring the LT3472EDD. The Boost Converter is designed to convert a 2.7V–4.2V input to 15V output at 25mA–45mA load. The Inverting Circuit generates a –8V output at 35mA–65mA from the same input.

Each output of the SCP-LT3472-EVALZ is resistor-programmable from |5V| to |34V|. The board can be also configured to drive VIOC-capable linear regulators.

OUTPUT VOLTAGE

$$V_{OUT1} = 1.25V\left(1+\frac{R3}{50k}\right)$$

$$V_{OUT2} = -1.25V\left(\frac{R2}{50k}\right)$$

Table 2. Resistor Selection Guide for Common Output Voltages

$\lvert V_{OUT1}\rvert$ (V)	R3 (Ω)	$\lvert V_{OUT2}\rvert$ (V)	R2 (Ω)
5.0	150k	5.0	200k
5.5	169k	5.5	221k
6.0	189k	6.0	240k
6.5	210k	6.5	261k
7.0	229k	7.0	280k
7.5	249k	7.5	301k
8.0	271k	8.0	320k
8.5	291k	8.5	340k
9.0	309k	9.0	361k
9.5	328k	9.5	379k
10.0	348k	10.0	402k
11.0	388k	11.0	442k
12.0	432k	12.0	481k
13.0	470k	13.0	517k
14.0	511k	14.0	562k
15.0	549k	15.0	597k
16.0	590k	16.0	642k
17.0	626k	17.0	681k
18.0	673k	18.0	723k
19.0	706k	19.0	759k
20.0	750k	20.0	796k
25.0	953k	25.0	1M
30.0	1.15M	30.0	1.20M
34.0	1.30M	34.0	1.35M

$\overline{SHDN}$ PIN CONFIGURATION

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

VOLTAGE INPUT-TO-OUTPUT CONTROL (VIOC) IMPLEMENTATION

To implement the VIOC function for both regulators, set R7 and R9 to 0Ω, respectively. 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 for V_{OUT1}	50k (internal)	R3	R6
V_{OUT} Reference Designators for V_{OUT2}	50k (internal)	R2	R8

Positive VIOC Equations

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

$$V_{(MAX)LDOIN} = 1.25V\left(\frac{R_{BOT}+R_{TOP}+R_{MAX}}{R_{BOT}}\right)+I_{SINK}R_{MAX}$$

I_{SINK} is the current through R_{MAX} which is typically 15µA. Since the divider current is fixed due to the internal low side gain setting feedback resistor and is less than the recommended divider current of 100µA, the effect of the sink current on the maximum linear regulator input voltage cannot not be mitigated and should be taken into consideration.

Negative VIOC Equations

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

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

Because the V_{LDOIN} term is simply the sum of the final output voltage after the LDO and the difference the LT3472 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.

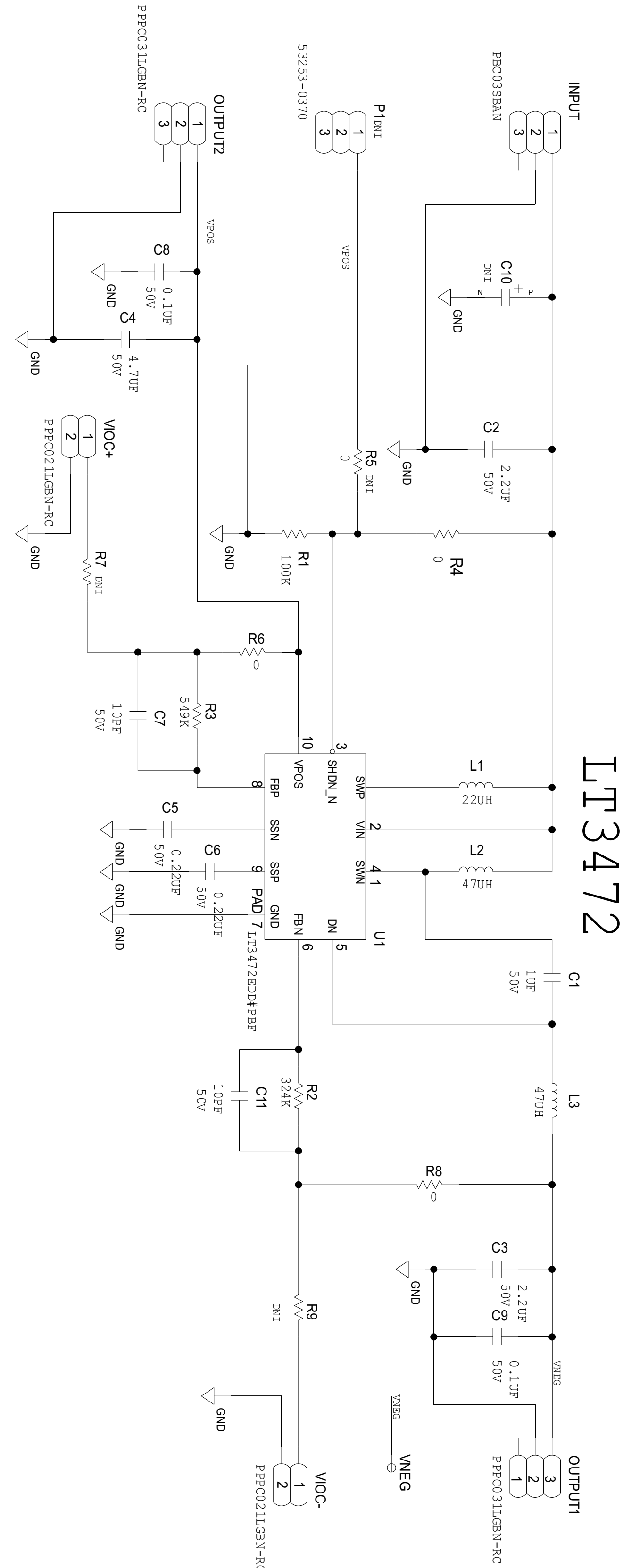
R_{MAX} can then be obtained by figuring out the difference between the maximum and nominal output voltage of the LT3472, divided by the current through the internal R_{BOT} resistor, which is $1.25V/R_{BOT}$.

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PCB	ANALOG DEVICES 08_057520a
2	1	C1	CAP CER X7R	SAMSUNG CL21B105KBFNNNE
3	1	C10	CAP TANTALUM 3528 (Note 1)	N/A
4	1	C2	CAP CER X7R	TAIYO YUDEN UMK212BB7225KG-T
5	1	C3	CAP CER 2.2UF 50V 10% X7R 1206, AUTOMOTIVE	MURATA GCM31CR71H225KA55K
6	1	C4	CAP CER 4.7UF 50V 10% X7R 1206	SAMSUNG CL31B475KBHNNNE
7	2	C5, C6	CAP CER 0.22UF 50V 10% X5R 0402	TAIYO YUDEN UMK105BJ224KV-F
8	2	C7, C11	CAP CER 10PF 50V 5% C0G 0402, AUTOMOTIVE	MURATA GCM1555C1H100JA16D
9	2	C8, C9	CAP CER 0.1UF 50V 10% X7R 0603	SAMSUNG CL10B104KB8NNNC
10	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
11	1	L1	IND HF UNSHIELDED WIREWOUND 0.923OHM DCR, 0.25A	WURTH ELEKTRONIK7440329220
12	2	L2, L3	IND HF UNSHIELDED WIREWOUND 1.69OHM DCR, 0.17A	WURTH ELEKTRONIK7440329470
13	2	OUTPUT1, OUTPUT2	CONN FEMALE 3POS 2.54MM PITCH R/A GOLD	SULLINS PPPC031LGBN-RC
14	1	P1	CONN-PCB 3POS HEADER WIRE TO BRD WAFER ASSY STRAIGHT 2MM PITCH (Note 1)	MOLEX 53253-0370
15	1	R1	RES PRECISION THICK FILM CHIP	PANASONIC ERJ-6ENF1003V
16	1	R2	RES SMD 324k OHM 0.1% 1/8W 0805, AUTOMOTIVE	PANASONIC ERA-6AEB3243V
17	1	R3	RES SMD 549k OHM 0.1% 1/8W 0805, AUTOMOTIVE	PANASONIC ERA-6AEB5493V
18	3	R4, R6, R8	RES STANDARD THICK FILM CHIP JUMPER, FOR AUTOMOTIVE	VISHAY CRCW08050000Z0EA
19	1	R5	RES THICK FILM 0805 (Note 1)	N/A
20	2	R7, R9	RES THICK FILM 0805 (Note 1)	N/A
21	1	U1	IC-ADI BOOST AND INVERTING DC/DC CONVERTER FOR CCD BIAS	ANALOG DEVICES LT3472EDD#PBF
22	2	VIOC+, VIOC-	CONN FEMALE 2POS 2.54MM PITCH R/A GOLD	SULLINS PPPC021LGBN-RC

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

SCHEMATIC DIAGRAM



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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