Signal Chain Power
LT3461 Boost Converter

DESCRIPTION

Demonstration circuit SCP-LT3461-EVALZ features the LT3461 in a 12V output boost converter which operates from an input voltage of 3V to 6V. The maximum output current is 70mA when powered from a 5.0V input and 40mA when powered from a 3.3V 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-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 LT3461. Please refer to the LT3461 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				38	V
$I_{SW(LIM)}$	Switch Current Limit		300	420	600	mA

BOARD IMAGE

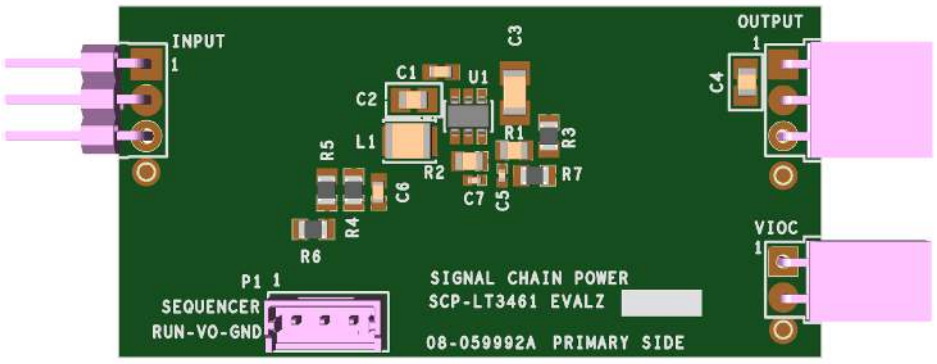


Figure 1. SCP-LT3461-EVALZ Board

QUICK START PROCEDURE

Demonstration circuit SCP-LT3461-EVALZ is easy to set up to evaluate the performance of any SCP hardware configuration.

1. The SCP-LT3461-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-LT3461-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-LT3461-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 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 (±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.

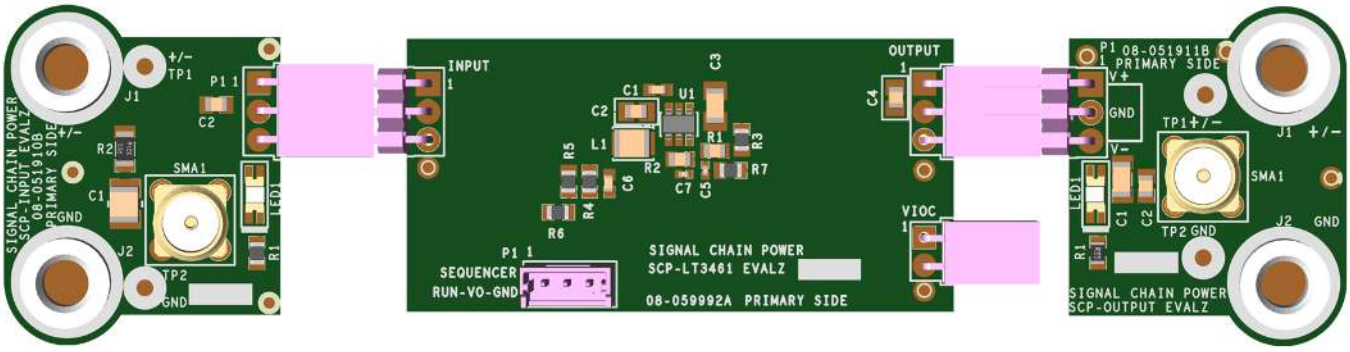


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-LT3461-EVALZ features the LT3461 in a 12V output boost converter which operates from an input voltage of 3V to 6V. The maximum output current is 70mA when powered from a 5.0V input and 40mA when powered from a 3.3V input.

The output of the SCP-LT3461-EVALZ is resistor-programmable from 5V to 38V. The board can be also configured to drive VIOC-capable linear regulators.

OUTPUT VOLTAGE PROGRAMMING

$$V_{OUT} = 1.255V\left(1+\frac{R1}{R2}\right)$$

Table 2. Resistor Selection Guide for Common Output Voltages

V_{OUT} (V)	R1 (Ω)	R2 (Ω)
5.0	45.3k	15.0k
6.0	61.9k	16.5k
7.0	84.5k	18.7k
8.0	102k	19.1k
9.0	140k	22.6k
10.0	191k	27.4k
11.0	221k	28.7k
12.0	261k	30.1k
13.0	274k	29.4k
14.0	287k	28.0k
15.0	301k	27.4k
16.0	316k	26.7k
17.0	332k	26.7k
18.0	348k	26.1k
19.0	365k	26.1k
20.0	383k	25.5k
21.0	402k	25.5k
22.0	422k	25.5k
23.0	442k	25.5k
24.0	464k	25.5k
25.0	487k	25.5k
30.0	536k	23.2k
35.0	634k	23.7k
38.0	681k	23.2k

$\overline{SHDN}$ 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 resistor for either pull-up or pull-down resistors R4 and R5, short R6 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	R2	R1	R3

$$V_{LDOIN} - V_{LDOOUT} = V_{VIOC} = 1.255V\left(\frac{R_{BOT}+R_{TOP}}{R_{BOT}}\right)$$

$$V_{(MAX)LDOIN} = 1.255V\left(\frac{R_{BOT}+R_{TOP}+R_{MAX}}{R_{BOT}}\right)+I_{SINK}R_{MAX}$$

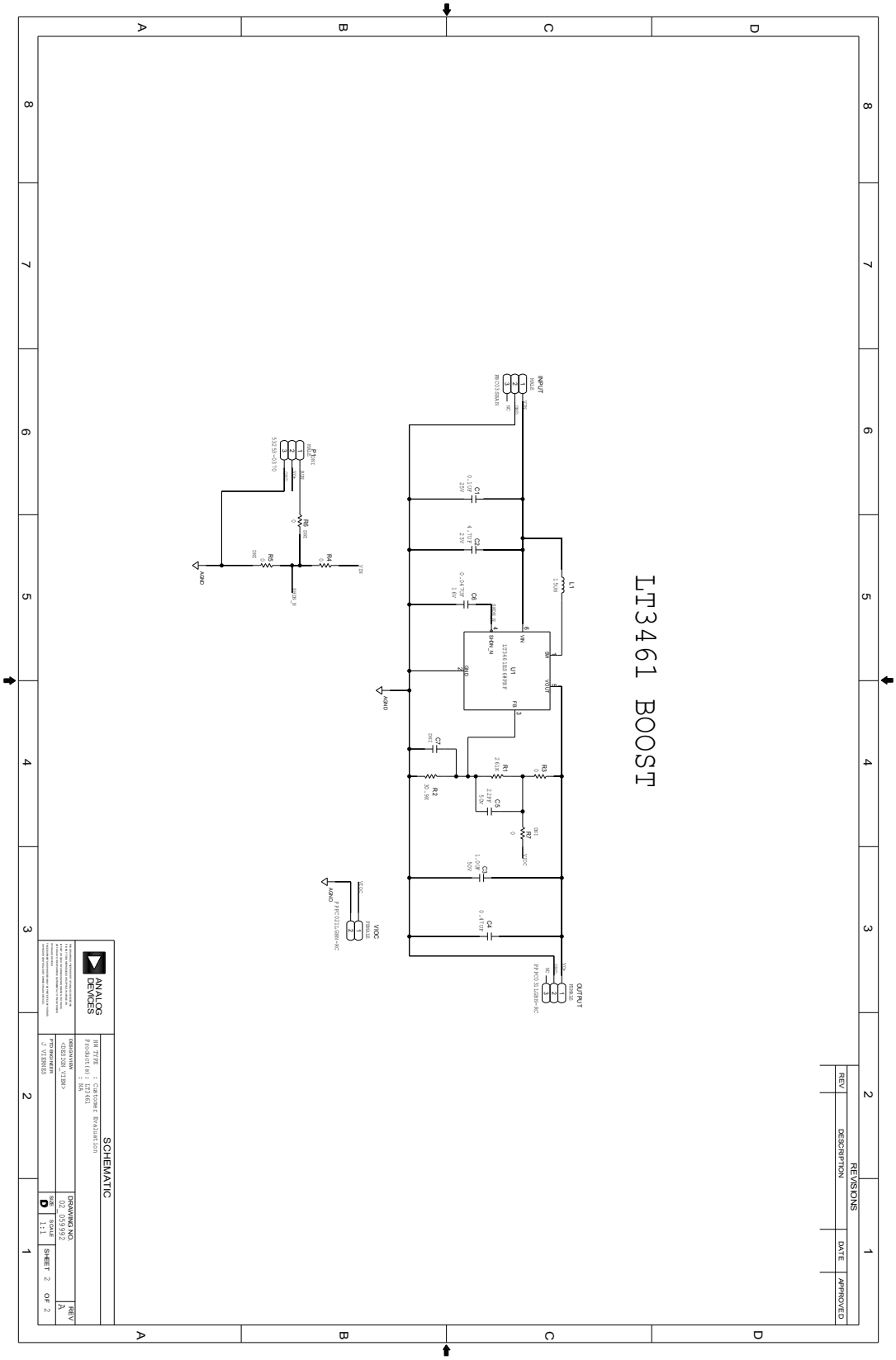
I_{SINK} is the current through R_{MAX} which is typically 15µA. Since the divider current is fixed due to the internal low side gain setting feedback resistor and is less than the recommended divider current of 100µA, the effect of the sink current on the maximum linear regulator input voltage cannot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

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PRINTED CIRCUIT BOARD	ANALOG DEVICES 08_059992a
2	1	C1	CAP CER 0.1uF 25V 10% X7R 0603	SAMSUNG CL10B104KA8NNNC
3	1	C2	CAP CER 4.7uF 25V 10% X5R 0805	SAMSUNG CL21A475KAQNNNG
4	1	C3	CAP CER 1uF 50V 10% X7R 1206	YAGEO CC1206KKX7R9BB105
5	1	C4	CAP CER 0.47uF 50V 10% X7R 0805	SAMSUNG CL21B474KBFNNNG
6	1	C5	CAP CER 22pF 50V 5% C0G 0402 AEC-Q200 LOW ESR	TDK CGA2B2C0G1H220J050BA
7	1	C6	CAP CER 0.047uF 16V 10% X7R 0603	AVX CORPORATION 0603YC473KAT2A
8	1	C7	CAP MLCC 0402 (Note 1)	N/A
9	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
10	1	L1	IND POWER COIL, 0.3A, 0.58OHM DCR	MURATA LQH32CN150K53L
11	1	OUTPUT	CONN FEMALE 3POS 2.54MM PITCH R/A GOLD	SULLINS PPPC031LGBN-RC
12	1	P1	CONN-PCB 3POS HEADER WIRE TO BRD WAFER ASSY STRAIGHT 2MM PITCH (Note 1)	MOLEX 53253-0370
13	1	R1	RES SMD 261K Ohm 1% 1/8W 0805	YAGEO RC0805FR-07261KL
14	1	R2	RES SMD 30.1K Ohm 1% 1/8W 0805 AEC-Q200	PANASONIC ERJ-6ENF3012V
15	2	R3, R4	RES SMD 0 Ohm JUMPER 1/8W 0805 AEC-Q200	VISHAY CRCW08050000Z0EA
16	3	R5, R6, R7	RES SMD 0 Ohm JUMPER 1/8W 0805 AEC-Q200 (Note 1)	VISHAY CRCW08050000Z0EA
17	1	U1	IC-ADI 1.3MEGHZ STEP-UP DC/DC CONVERTERS WITH INTEGRATED SCHOTTKY	ANALOG DEVICES LT3461ES6#PBF
18	1	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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