Signal Chain Power
1 × 5 Breakout Board

DESCRIPTION

Demonstration circuit SCP-1X5BKOUT-EVALZ is a companion hardware tool designed to expand an existing rail into five segments in a Signal Chain Power hardware evaluation matrix. It features one input port and five output ports, along with passive filtering options.

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-5X1-EVALZ
SCP-FILTER-EVALZ
SCP-1X2BKOUT-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.

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				50	V
$V_{OUT(MAX)}$	Max Output Voltage				50	V
$I_{OUT(MAX)}$	Max Output Current				2	A
$I_{LED(MAX)}$	Max Indicator LED Current	See Configuration Section			30	mA

BOARD IMAGE

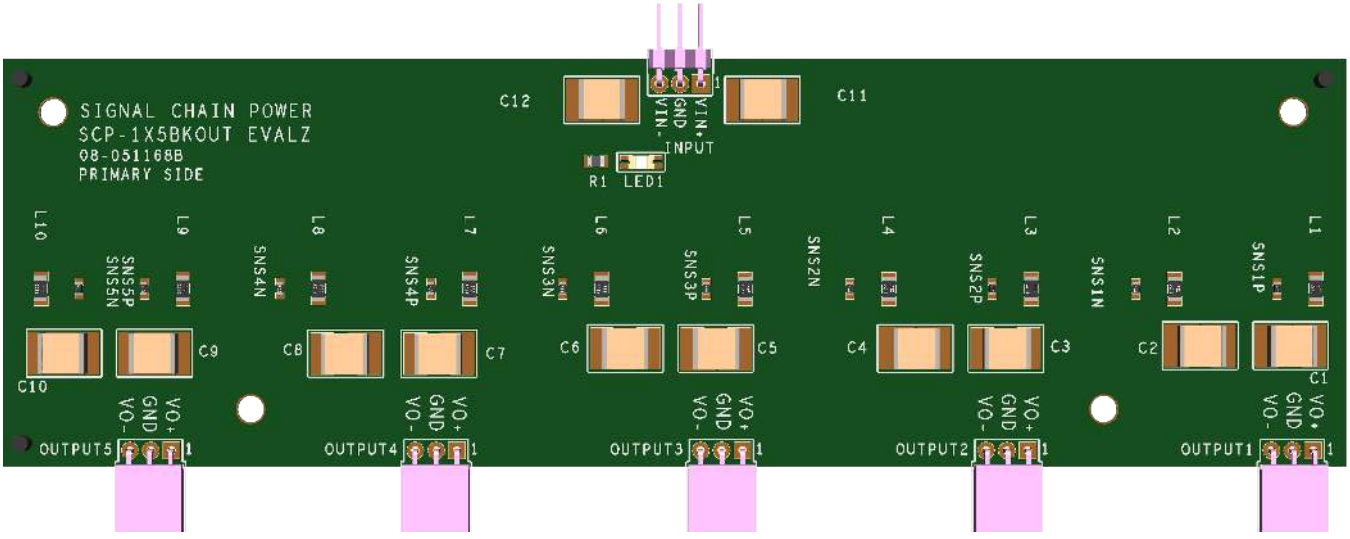


Figure 1. Signal Chain Power 1 × 5 Breakout Board

QUICK START PROCEDURE

Demonstration circuit SCP-1X5BKOUT-EVALZ is easy to set up to evaluate the performance of any SCP hardware configuration.

1. The SCP-1X5BKOUT-EVALZ ships with a bi-directional LED to indicate applied voltage. To set the limiting resistor, 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 board under evaluation 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-1X5BKOUT-EVALZ powers up the device under test 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.

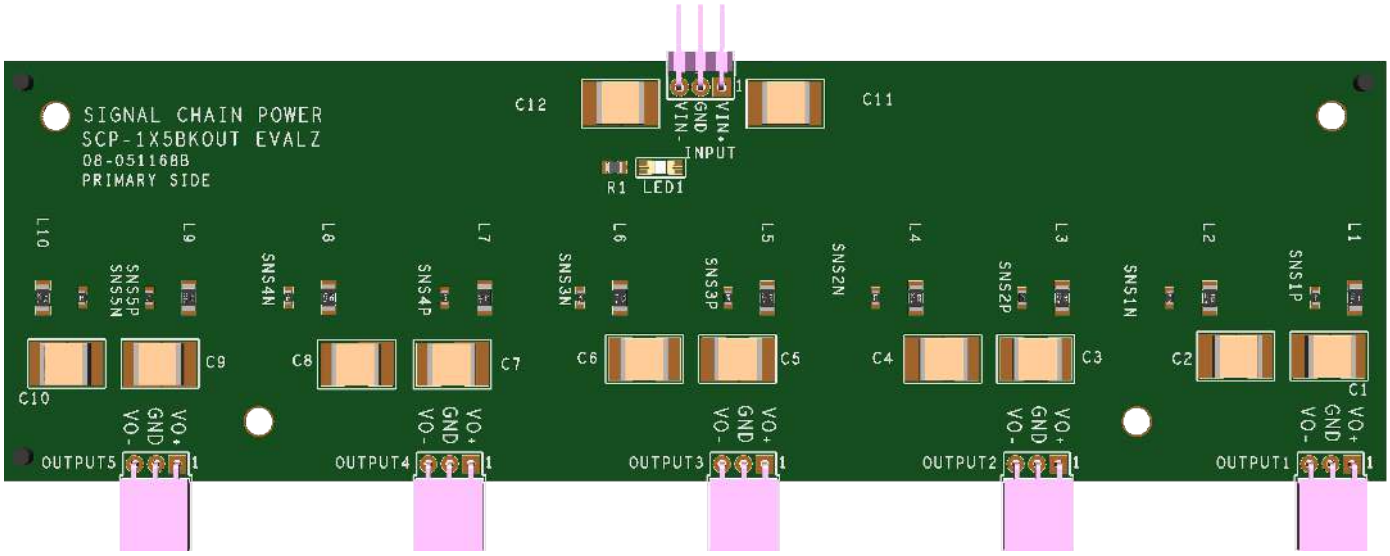


Figure 2. Proper Measurement Equipment Setup (Use SMA connectors for Measuring Input or Output Ripple)

CONFIGURATION SETTINGS

Demonstration circuit SCP-1X5BKOUT-EVALZ is a companion hardware tool designed to expand an existing rail into five segments in a Signal Chain Power hardware evaluation matrix. It features one (1) input port and five (5) output ports, along with passive filtering options.

INDICATOR LED CURRENT

$$I_{LED} = \frac{V_{IN} - \left[2.00V_{MIN};2.40V_{MAX}\right]}{R_1}$$

Table 2. LED Current-Limiting Resistor Selection Table

V_{IN} (V)	R1 (Ω)	V_{IN} (V)	R1 (Ω)
2.5	24.9	23.0	1.05k
3.0	49.9	24.0	1.10k
3.3	9	25.0	1.15k
3.5	75	26.0	1.21k
4.0	100	27.0	1.24k
4.5	124	28.0	1.30k
5.0	150	29.0	1.33k
5.5	174	30.0	1.40k
6.0	200	31.0	1.43k
6.5	226	32.0	1.50k
7.0	249	33.0	1.54k
7.5	274	34.0	1.58k
8.0	301	35.0	1.65k
8.5	324	36.0	1.69k
9.0	348	37.0	1.74k
9.5	374	38.0	1.78k
10.0	402	39.0	1.87k
11.0	453	40.0	1.91k
12.0	499	41.0	1.96k
13.0	549	42.0	2.00k
14.0	604	43.0	2.05k
15.0	649	44.0	2.10k
16.0	698	45.0	2.15k
17.0	750	46.0	2.21k
18.0	806	47.0	2.26k
19.0	845	48.0	2.32k
20.0	909	49.0	2.37k
21.0	953	50.0V	2.43k
22.0	1.00k		

CURRENT SENSE CONFIGURATION

Reference designators L1 to L10 can be used for current sensing. Calculate a corresponding sense resistor value according to:

$$R_{SENSE} = \frac{V_{SENSE(MAX)}}{I_{SENSE(MAX)}}$$

$V_{SENSE(MAX)}$ will create a drop on rail, so ensure the total drop at maximum measured current remains within allowable $V_{IN(MIN)}$ of the following stage.

Connect tightly twisted sense leads across SNS(1-2)P or SNS(1-2)N (depending on rail polarity) as shown in Figure 3, and ensure leads are mechanically strain-relieved with adhesive tape, glue or epoxy to prevent pads from being destroyed if the sense leads are accidentally yanked or ripped away aggressively.

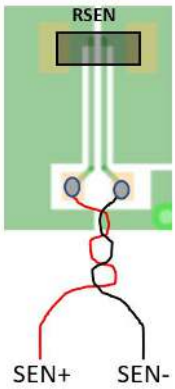


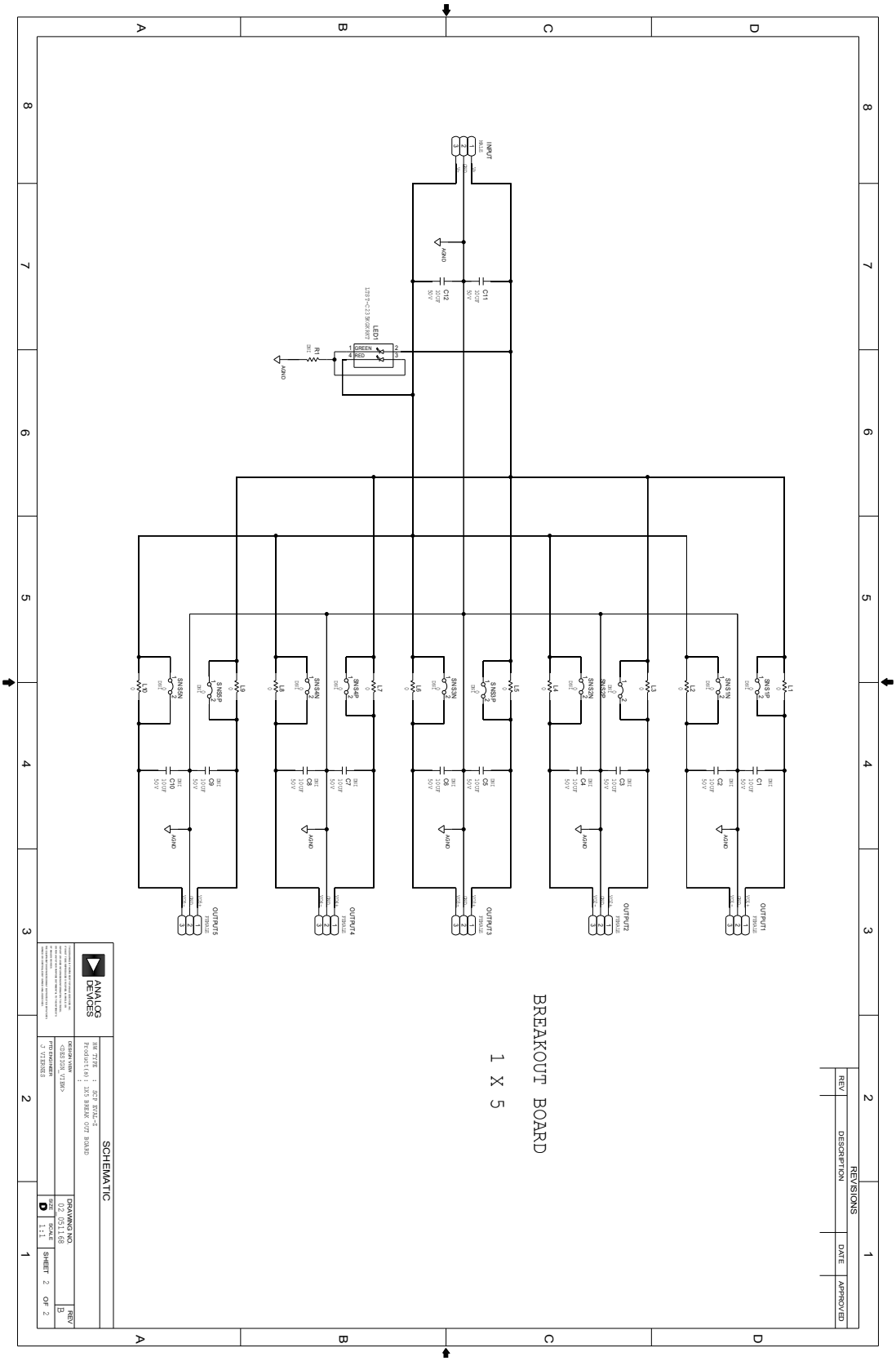
Figure 3. Kelvin Sense Connection

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	PCB	PCB	ANALOG DEVICES 08_051168b
2	10	C1, C2, C3, C4, C5, C6, C7, C8, C9, C10	CAP MLCC 2220 (Note 1)	N/A
3	2	C11, C12	CAP CER X7R	AVX CORPORATION 22205C106KAT2A
4	1	INPUT	CONN-PCB MALE HEADER 3POS 2.54MM PITCH R/A GOLD	SULLINS PBC03SBAN
5	10	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10	RES JMPR SMD 1206	PANASONIC ERJ-8GEY0R00V
6	1	LED1	LED BI-COLOR GREEN/RED 574NM/639NM, FOR NON REVERSE MOUNT USE ALT_SYMBOLS	LITE-ON TECHNOLOGY LTST-C235KGKRKT
7	5	OUTPUT1, OUTPUT2, OUTPUT3, OUTPUT4, OUTPUT5	CONN FEMALE 3POS 2.54MM PITCH R/A GOLD	SULLINS PPPC031LGBN-RC
8	1	R1	RES THICK FILM 0805 (Note 1)	N/A
9	10	SNS_{1N}, SNS_{1P}, SNS_{2N}, SNS_{2P}, SNS_{3N}, SNS_{3P}, SNS_{4N}, SNS_{4P}, SNS_{5N}, SNS_{5P}	RES THICK FILM 0603 (Note 1)	N/A

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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