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TS1100 Current-Sense Amplifier Demo Board

FEATURES

- R_{SENSE}: 50mΩ ± 1%
- Fully Assembled and Tested
- 2in x 2in 2-layer circuit board

COMPONENT LIST

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1µF ±10% capacitor (0805)
C2	1	47nF ±10% capacitor (0805)
R1	1	50mΩ ± 1% (0805)
U1	1	TS1100-25DB/ TS1100-50DB/ TS1100-100DB/ TS1100-200DB
VBATT, VOUT, LOAD	3	Test points

DESCRIPTION

The demo board for the TS1100 is a completely assembled and tested circuit board that can be used for evaluating the current-sense amplifier for all (4) gain options; i.e., 25V/V, 50V/V, 100V/V, and 200V/V.

The board is configured with an R_{SENSE}=R1=50mΩ resistor. The board has a dedicated RS+=VBATT, RS-=LOAD, and output voltage OUT=VOUT test points. For additional information, refer to the TS1100 product datasheet.

All TS1100s are available in a PCB-space saving 5-lead SOT23 surface-mount package.

Product data sheets and additional documentation can be found at www.silabs.com.

ORDERING INFORMATION

Order Number	Description
TS1100-25DB	TS1100-XXX Demo Board
TS1100-50DB	
TS1100-100DB	
TS1100-200DB	
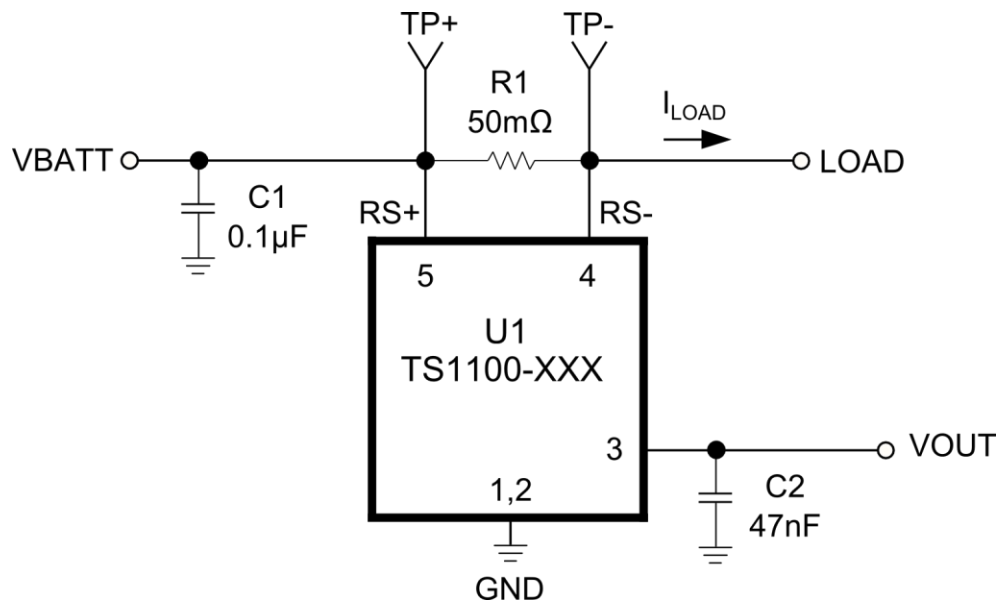
Figure 1. TS1100 current-sense amplifier circuit

The demo board includes an on-board 0.1µF decoupling capacitor at the V_{BATT} input pin and a 47nF capacitor at the V_{OUT} output pin. Depending on the load current desired, an external resistor or active load is to be connected to the LOAD pin.

QUICK START PROCEDURE

Required Equipment

➢ TS1100 demo board

➢ A DC Power Supply, an HP Model HP6624A or equivalent

➢ Two digital voltmeters

➢ Load resistor or an active load (value varies depending on I_{LOAD} desired)

Signal	Eval board
RS+	VBATT
RS-	LOAD
OUT	VOUT
GND	GND

Table 1. Demo board test points

GAIN (V/V)	V_{BATT} (V)	I_{LOAD} (mA)	R_{LOAD} (Ω)	V_{OUT} (V)	MAX V_{SENSE} (mV)
25	6	1600	3.75	2	80
50	6	800	7.5	2	40
100	6	400	15	2	20
200	6	200	30	2	10

Table 2. Demo board test set-up per gain setting

To evaluate the TS1100 current-sense amplifier circuit, the following steps are to be performed:

1) Before connecting the DC power supply to the demo board, turn on the power supply, set the DC voltage to 6V, set its short circuit current limit to 10% higher than the maximum load current in the application, and then turn it off.

2) Connect the DC power supply positive terminal to the pad labeled V_{BATT} and its negative terminal to the adjacent pad labeled GND.

3) Connect a digital voltmeter to the test points labeled TP+ and TP- to measure V_{SENSE}.

4) Connect the positive terminal of a second digital voltmeter to the test point labeled V_{OUT} and the negative terminal to the adjacent test point labeled GND.

5) Based on the selected gain option of the current sense amplifier, select the load resistor or an active load according to Table 2. Connect one end of this resistor or active load to the pad labeled LOAD and the other end to the adjacent pad labeled GND.

6) Turn on the power supply and observe the output voltage at V_{OUT}. The expression for the TS1100's output voltage is given by:

$$V_{OUT} = I_{LOAD} \times 50m\Omega \times R_{OUT}/R1$$

where the TS1100's internal R_{OUT} and R1 resistor values are listed in Table 3.

GAIN(V/V)	R1 (Ω)	ROUT (Ω)
25	400	10k
50	200	10k
100	100	10k
200	100	20k

Table 3. TS1100's Internal Gain Setting Resistors (typical values)

7) The TS1100's actual output voltage V_{OUT} will depend on the TS1100's actual offset voltage V_{OS}, its gain error GE, sense resistor (R_{SENSE}) tolerance of ±1%, and the load resistor tolerance/active load accuracy.
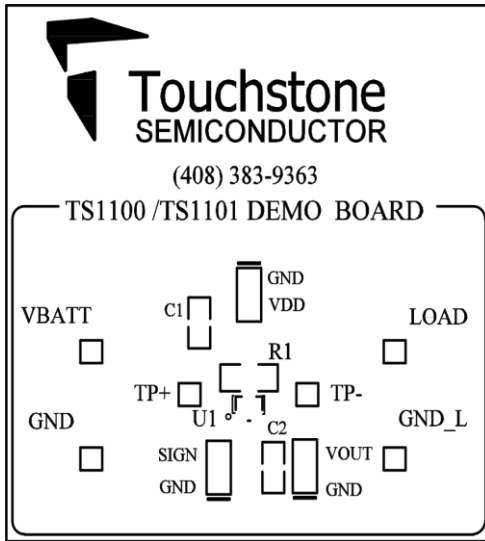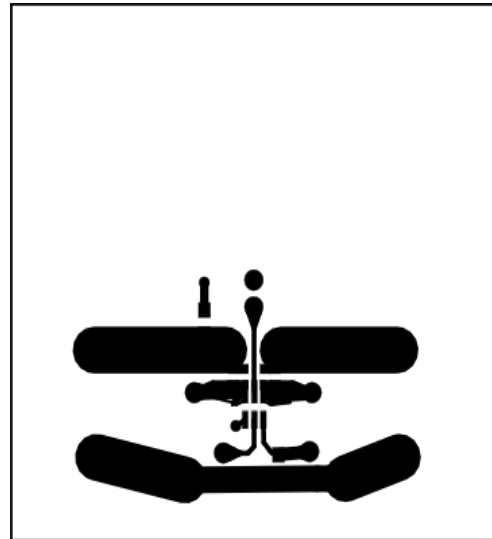
Figure 2. Top Layer Component View

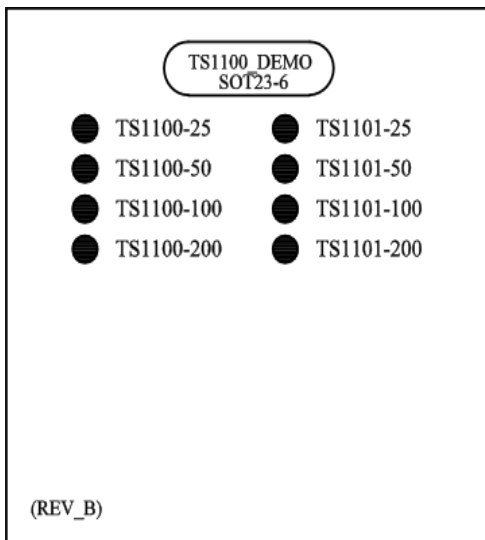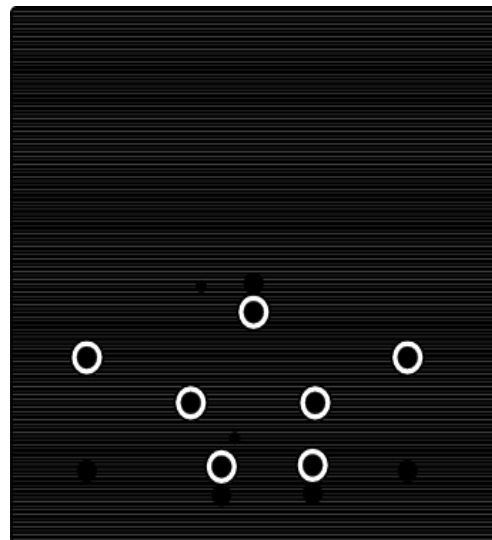**Figure 3. Top Layer Component View #2**

Figure 4. Bottom Layer (GND)

Figure 5. Bottom Layer (GND) #2