

# TS1100 Current-Sense Amplifier Demo Board

## FEATURES

- $R_{SENSE}$ :  $50m\Omega \pm 1\%$
- Fully Assembled and Tested
- 2in x 2in 2-layer circuit board

## COMPONENT LIST

| DESIGNATION          | QTY | DESCRIPTION                                                   |
|----------------------|-----|---------------------------------------------------------------|
| C1                   | 1   | 0.1 $\mu$ F $\pm 10\%$ capacitor (0805)                       |
| C2                   | 1   | 47nF $\pm 10\%$ capacitor (0805)                              |
| R1                   | 1   | 50m $\Omega \pm 1\%$ (0805)                                   |
| U1                   | 1   | TS1100-25DB/<br>TS1100-50DB/<br>TS1100-100DB/<br>TS1100-200DB |
| VBATT, VOUT,<br>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  $R_{SENSE} = R1 = 50m\Omega$  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 on factory web site at [www.touchstonesemi.com](http://www.touchstonesemi.com).

## ORDERING INFORMATION

| Order Number | Description              |
|--------------|--------------------------|
| TS1100-25DB  | TS1100-XXX<br>Demo Board |
| TS1100-50DB  |                          |
| TS1100-100DB |                          |
| TS1100-200DB |                          |

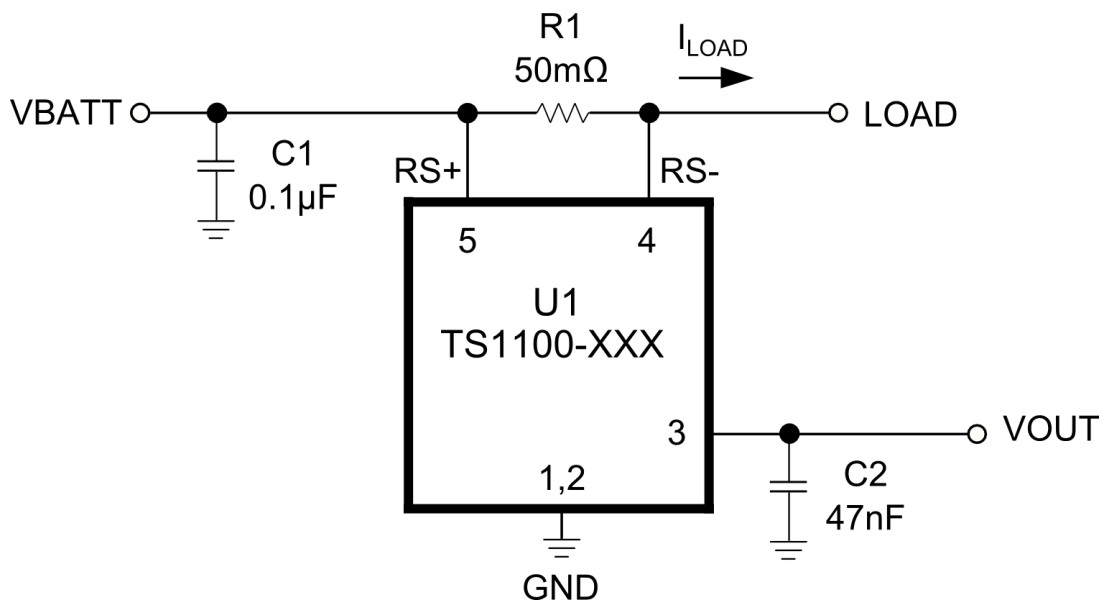


Figure 1. TS1100 current-sense amplifier circuit

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
- A Digital Voltmeter
- 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 test point labeled  $V_{BATT}$  and its negative terminal to the adjacent test point labeled GND.
- 3) Connect the positive terminal of a digital voltmeter to test point labeled  $V_{OUT}$  and the negative terminal to the adjacent test point labeled GND.

- 4) 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 to test point labeled LOAD and the other end to any test point labeled GND on the board.
- 5) 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)

- 6) 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.

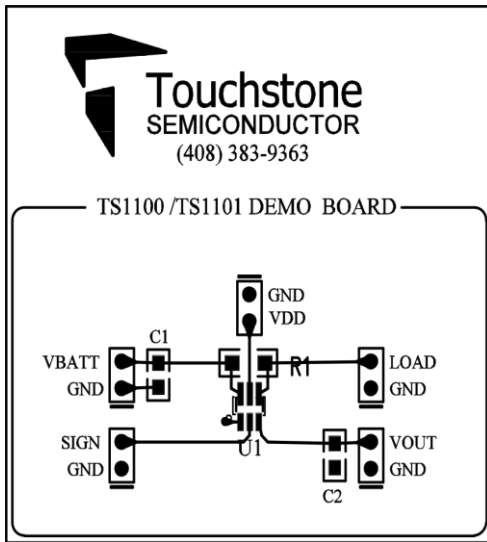


Figure 2. Top Layer Component View

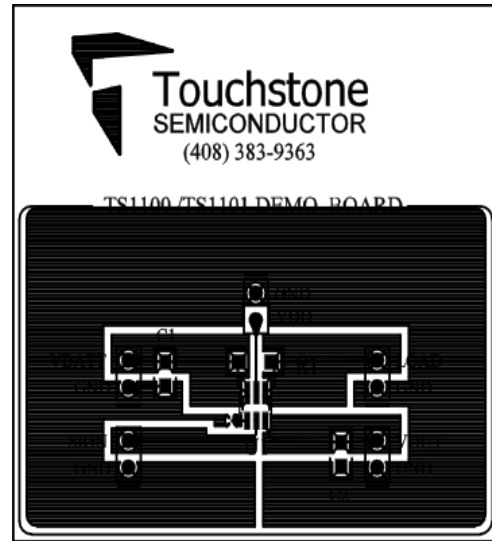


Figure 3. Top Layer Component View #2

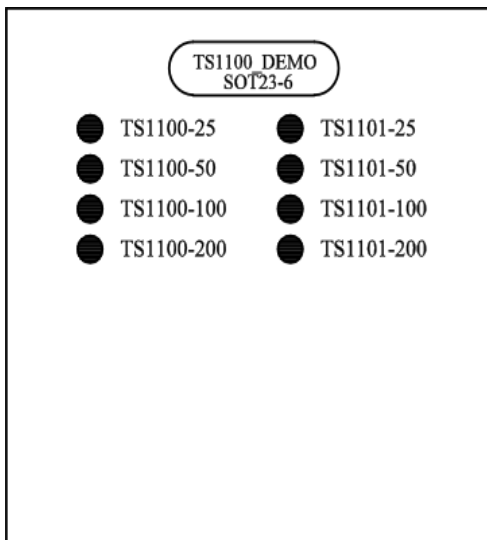


Figure 4. Bottom Layer (GND)

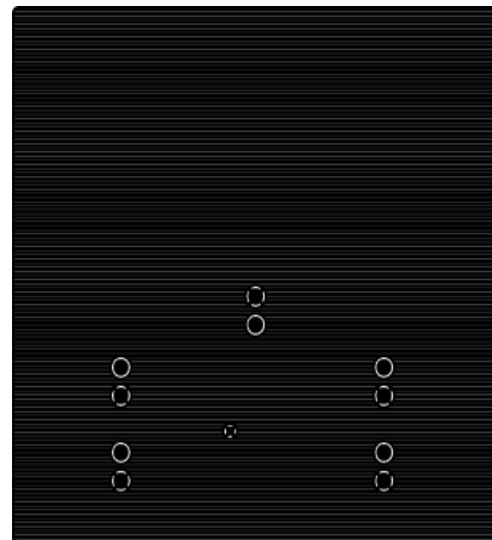


Figure 5. Bottom Layer (GND) #2