

# TS1102 Current-Sense Amplifier Demo Board

## FEATURES

- $R_{SENSE}$ :  $50m\Omega \pm 0.5\%$
- Fully Assembled and Tested
- 2in x 2in 2-layer circuit board

## COMPONENT LIST

DESIGNATION	QTY	DESCRIPTION
C2	1	47nF $\pm 10\%$ capacitor (0805)
R1	1	50m $\Omega \pm 0.5\%$ (0805)
U1	1	TS1102-25DB/ TS1102-50DB/ TS1102-100DB/ TS1102-200DB
VBATT, VOUT, LOAD	3	Test points

## DESCRIPTION

The demo board for the TS1102 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 TS1102 product datasheet.

All TS1102s 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
TS1102-25DB	TS1102-XXX Demo Board
TS1102-50DB	
TS1102-100DB	
TS1102-200DB	

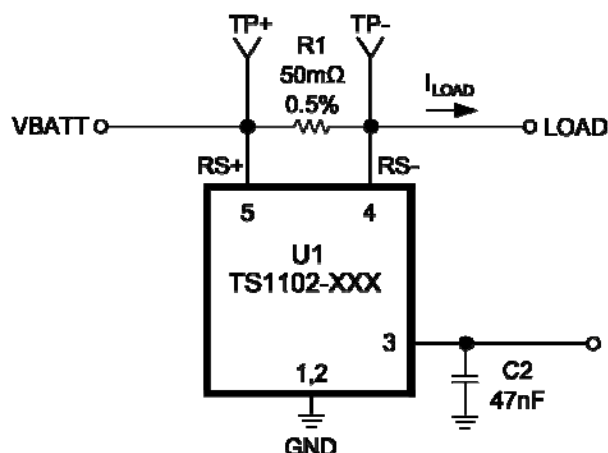


Figure 1. TS1102 current-sense amplifier circuit



Figure 2. TS1102 Demo Board

## DESCRIPTION

The demo board includes an on-board 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

- TS1102 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)	$R_{LOAD}$ ( $\Omega$ )	$V_{OUT}$ (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 TS1102 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 VBATT 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\_L.
- 6) Turn on the power supply and observe the output voltage at  $V_{OUT}$ . The expression for the TS1102's output voltage is given by:

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

where the TS1102's internal  $R_{OUT}$  and R1 resistor values are listed in Table 3.

GAIN(V/V)	R1 ( $\Omega$ )	$R_{OUT}$ ( $\Omega$ )
25	400	10k
50	200	10k
100	100	10k
200	100	20k

Table 3. TS1102's Internal Gain Setting Resistors (typical values)

- 7) The TS1102's actual output voltage  $V_{OUT}$  will depend on the TS1102's actual offset voltage  $V_{OS}$ , its gain error GE, sense resistor ( $R_{SENSE}$ ) tolerance of  $\pm 1\%$ , and the load resistor tolerance/active load accuracy.

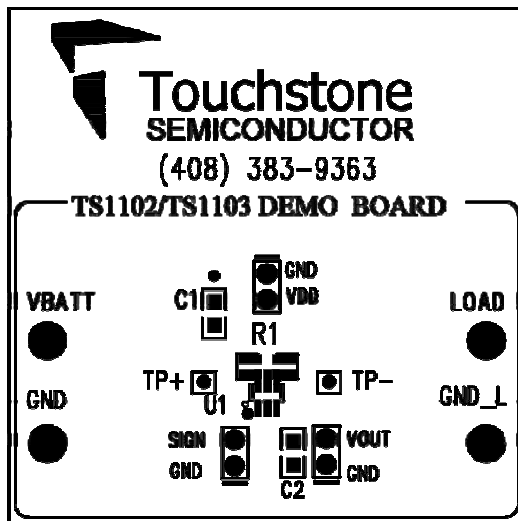


Figure 3. Top Layer Component View

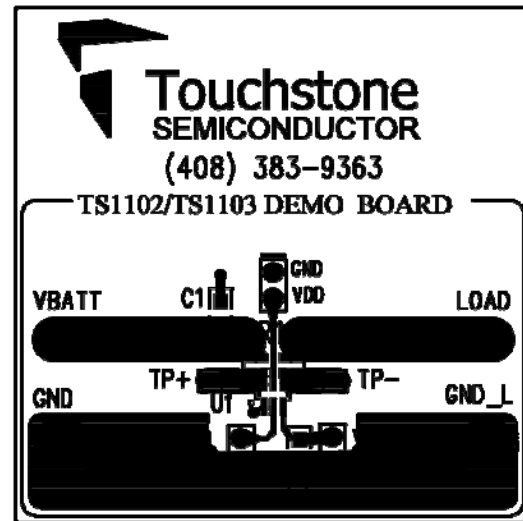


Figure 4. Top Layer Trace View

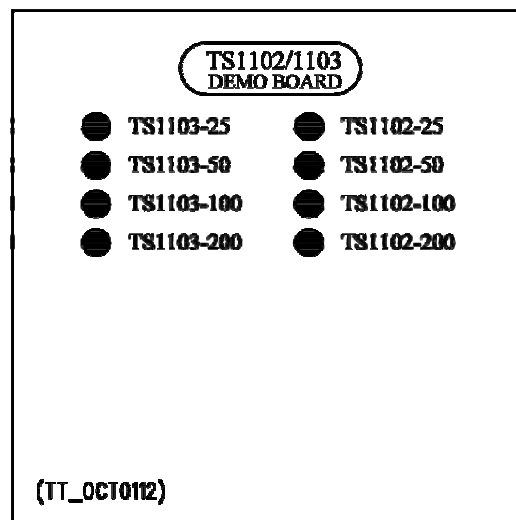


Figure 5. Bottom Layer (GND)