

## DESCRIPTION

The ZXCT1050EV1 evaluation board is intended for the evaluation of the ZXCT1050 device. The ZXCT1050 is a wide input common mode range current monitor. Because this wide input common mode range includes ground, the device is able to measure short circuit currents. It also has an externally programmable transconductance resistor, thus making it a versatile device to use in many applications.

The device produces a current output that is proportional to the current sampled by a small inline sensing resistor,  $R_S$ . The voltage output is scaled by the choice of  $R_S$  ( $R_1$ ,  $R_2$  on the evaluation board),  $R_{GT}$  ( $R_6$  on the evaluation board) and the load resistor ( $R_7$  //  $R_8$  on the evaluation board).

The evaluation board is delivered with the values shown in Figure 1 below. As can be seen,  $R_S$  consists of two resistors ( $R_1$  and  $R_2$ ) which are configured in parallel such that either one or both resistors could be connected by completing the solder-bridge link next to each one.  $R_2$  ( $0.1R$ ) is connected by default.

$R_3$  consists of two pads with a hole in each pad and provides means for connecting an external  $R_S$ .

With the values shown the board produces an output of  $1V/A$

The printed circuit board is common to other devices in the ZXCT family and contains redundant component positions which will not be discussed here as they are not relevant.

## FEATURES

- $V_{CC}$  range 2.7V to 20V
- Supply Range 0V to  $V_{CC} - 2V$ .
- Selectable current measurement range
- 5 Pin SOT23-5 package

## APPLICATIONS

- Battery Charging
- Power Supplies
- Over Current Monitoring
- Low/High side current monitoring

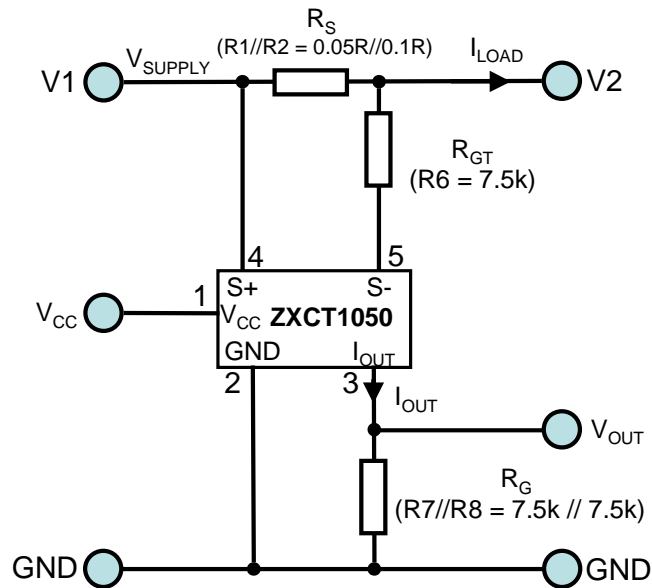


Figure 1 Equivalent circuit diagram for evaluation board ZXCT1050EV1

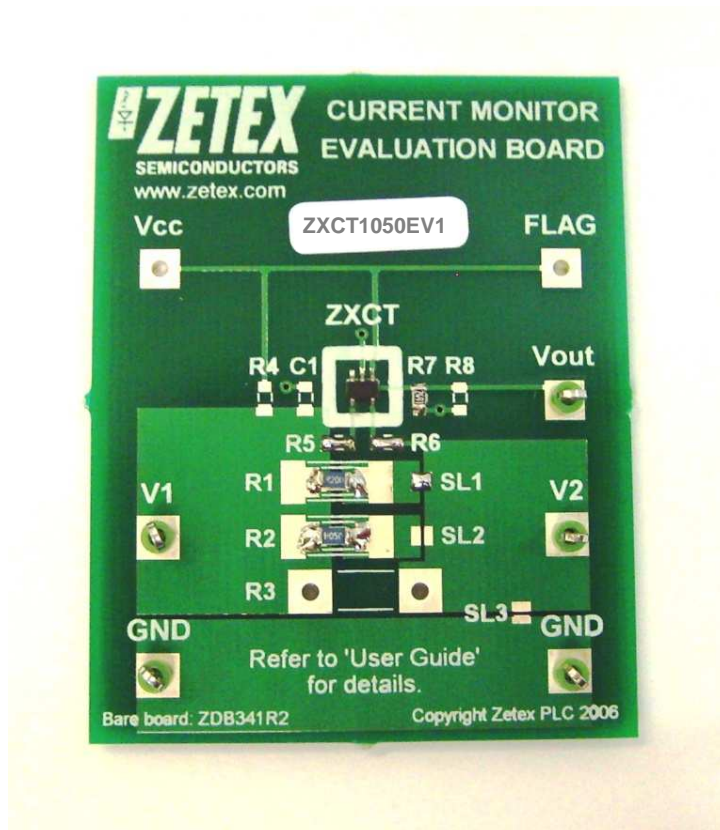


Figure 2 Evaluation board components' layout

### ORDERING INFORMATION

ORDER NUMBER
ZXCT1050EV1

Please note evaluation boards are subject to availability and qualified leads.

### PAD NAMES AND DEFINITIONS

NAME	DESCRIPTION
V1	Supply Voltage
V2	Connection to Load
VOUT	Output Voltage
FLAG	Not used
GND	0V / Ground
SL1,SL2	Solder Links
V <sub>CC</sub>	Device supply

The target applications are battery chargers, power supply units and other applications where high side current measurement is a requirement along with ability to measure down to 0V.

The input voltage (voltage on V1) range for the ZXCT1050EV1 is from zero up to V<sub>CC</sub> - 2 volts. V<sub>CC</sub>, ranges from 2.7V to 20V.

## ZXCT1050EV1 Summary

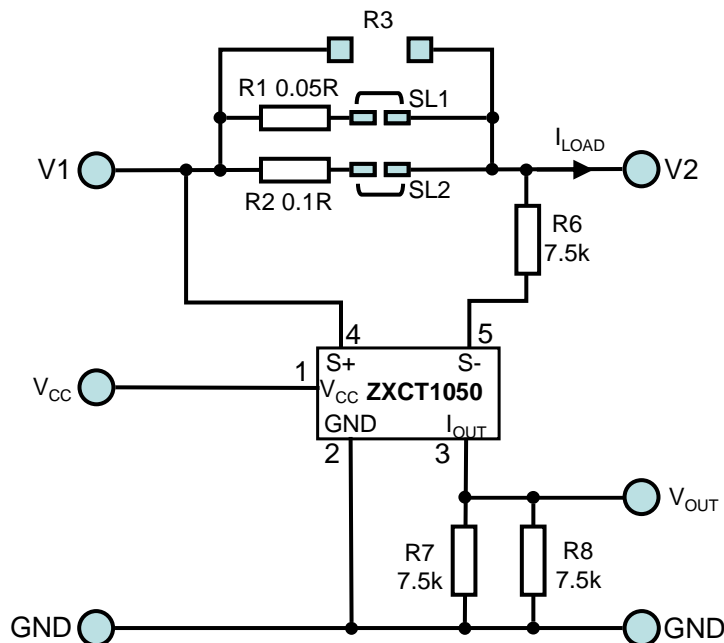


Figure 3 Actual circuit diagram for ZXCT1050EV1

### Sense resistor

The board has been designed with two selectable values of sense resistor. The value of the sense resistor can be chosen by using the solder links SL1 and SL2.

The board is also tracked for a user defined through hole resistor (R3).

The 50mΩ resistor (R1) is selected by shorting SL1 and opening SL2. This results in an output of 0.5 V/A.

The 100mΩ resistor (R2) is selected by shorting SL2 and opening SL1, resulting in an output of 1V/A.

If both links are shorted the effective resistance is 33.33mΩ giving an output of 333.3mV/A.

If both links are open, the optional leaded resistor R3 can be exclusively used as the sense resistor. The maximum power dissipation rating of the resistor must be appropriate to the load current level.

For further information on choosing a value of sense resistor please refer to the ZXCT1050 datasheet.

**Configuration table for ZXCT1050EV1**

<b>LOAD CURRENT (A)</b>	<b>R<sub>SENSE</sub> (mΩ)</b>	<b>V<sub>OUT</sub> (V)</b>	<b>SOLDER LINK CONFIGURATION</b>
1.0	100	1.0	Short SL2
1.0	50	0.5	Short SL1
1.0	33.33	0.33	Short SL1 & SL2

**Configuration for different LOAD currents.**

The board can be configured for different load currents by changing the SMD resistors or fitting a suitable wire ended resistor and opening both solder links. It is important to ensure an appropriate value of  $R_S$  is selected to obtain the desired accuracy for a given output current.

The value of  $I_{OUT}$  is the voltage dropped across the sensing resistor divided by  $R_{GT}$ .

Choosing a larger value for  $R_S$  gives a higher output voltage for a given current resulting in better resolution but at the expense of increased voltage drop and higher dissipation in  $R_S$ .

Increasing the value of the gain resistor,  $R7/R8$ , also increases the sensitivity but at the expense of a higher output impedance. The criterion for minimum input voltage still applies.

The maximum practical value of the gain resistor is limited by the output conductance of the ZXCT1050 and the output voltage that can be tolerated - in practice the gain resistance should not be greater than about 40k.

The ZXCT1050 is optimized for values of  $V_{SENSE}$  between 10mV and 300mV.

**Accuracy**

The ZXCT1050 has a typical 1% accuracy for a  $V_{SENSE}$  of 30mV. The accuracy of the output voltage will be influenced by the tolerance of the external sense used. The ZXCT1050EV1 utilizes 1% sense resistors.

## COMPONENTS LIST

Ref	Value	Package	Part Number	Manufacturer	Notes
R1	50mΩ	2512	LR1206-R050FI	Welwyn	SMD Sense Resistor 1%
R2	100mΩ	1206	LRF2512-R100FW	Welwyn	SMD Sense Resistor 1%
R5	0R	Link			
R6	7.5k	0805			
R7, R8	7.5k	0805			
ZXCT		SOT23-5	ZXCT1050E5	ZETEX	

## SET-UP AND TEST

The board is preset to give an output Voltage of 1V for a load current of 1A (SL2 is shorted to connect in the 100mΩ (R2) sense resistor). To change the board to give an output Voltage of 1V for a current of 2.0A, de-solder SL2 and short SL1. This connects the 50mΩ (R1) sense resistor.

### Required Equipment

1. 1 x 10R 5W resistor (load).
2. 2 x adjustable bench PSU's.
3. 2 x DVM's (one for voltage measurement and one for current measurement)

### 500mA load test

1. Ensure SL2 is shorted.
2. Power  $V_{CC}$  at 15V  $\pm$ 0.2V with a linear bench supply, PSU1.
3. Connect another linear power supply, PSU2, between the V1 and GND terminals.
4. Connect a resistor in series with an ammeter set to 1A or 2A range between the V2 and GND terminals - 10R 5W suggested. If using a different value, make sure its power rating is  $P \geq 2(I^2 \cdot R)$ . Make sure PSU2 is set to zero volts to start with.
5. Switch on PSU1, followed by PSU2.
6. Adjust PSU2 until the ammeter reads 500 mA  $\pm$ 2 mA,
7. Measure  $V_{OUT}$  with a DVM. The output voltage should read 0.5V  $\pm$  25mV.

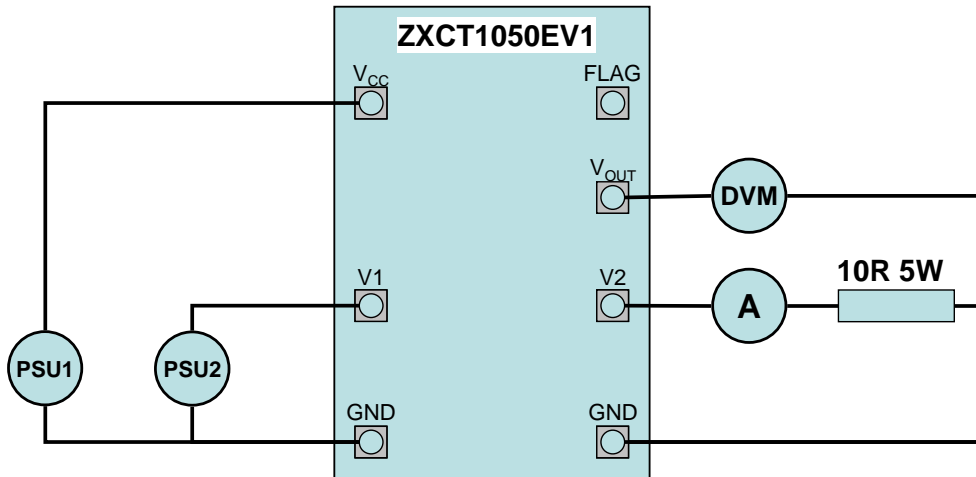
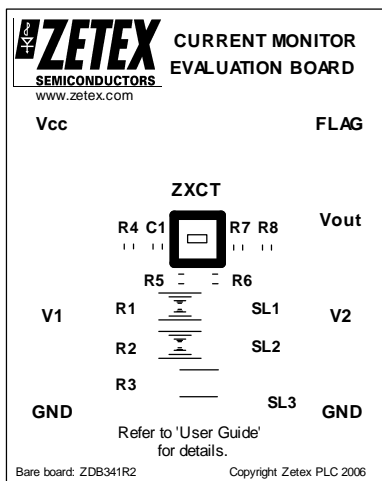
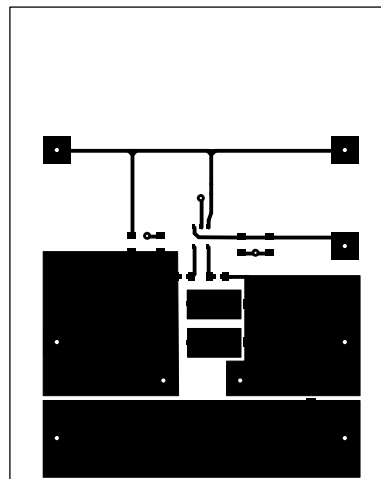


Figure 4 Test diagram for ZXCT1050EV1

## EVALUATION BOARD



Top Silk



Top Copper

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"Not recommended for new designs"	Device is still in production to support existing designs and production
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