ZXCT1010 EV1

ZXCT1010EV1 EVALUATION BOARD USER GUIDE

DESCRIPTION

The ZXCT1010EV1 is intended for the evaluation of the ZXCT1010 device. The ZXCT1010 is a high side current monitor providing a fixed transconductance gain of 10mS (mA/V).

The device produces a current output proportional to the current sampled by a small inline sensing resistor, R_S. The voltage output is scaled by the choice of R_S and the load resistor R7.

As delivered the board is set up to provide an output of 1.5V from a current of 300mA using a 200 mΩ sampling resistor and a 2.49k load resistor.

There is a second resistor (50mΩ) that can be selected by means of a solder link which provides an output of 1.494V (~1.5V) for a load current of 1.2A.

Provision is made for a wire ended sampling resistor of user's choice.

The printed circuit board is common to other devices in the ZXCT family. For the ZXCT1010, neither the FLAG nor the V_{CC} pins are used.

FEATURES

- Supply Range 4.2 to 20V for 1.5V output.
- Selectable current measurement range
- 5 Pin SOT23-5 package

APPLICATIONS

- Battery Charging
- Power Supplies
- Over Current Monitoring

ORDERING INFORMATION

ORDER NUMBER
ZXCT1010EV1

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

PAD NAMES AND DEFINITIONS

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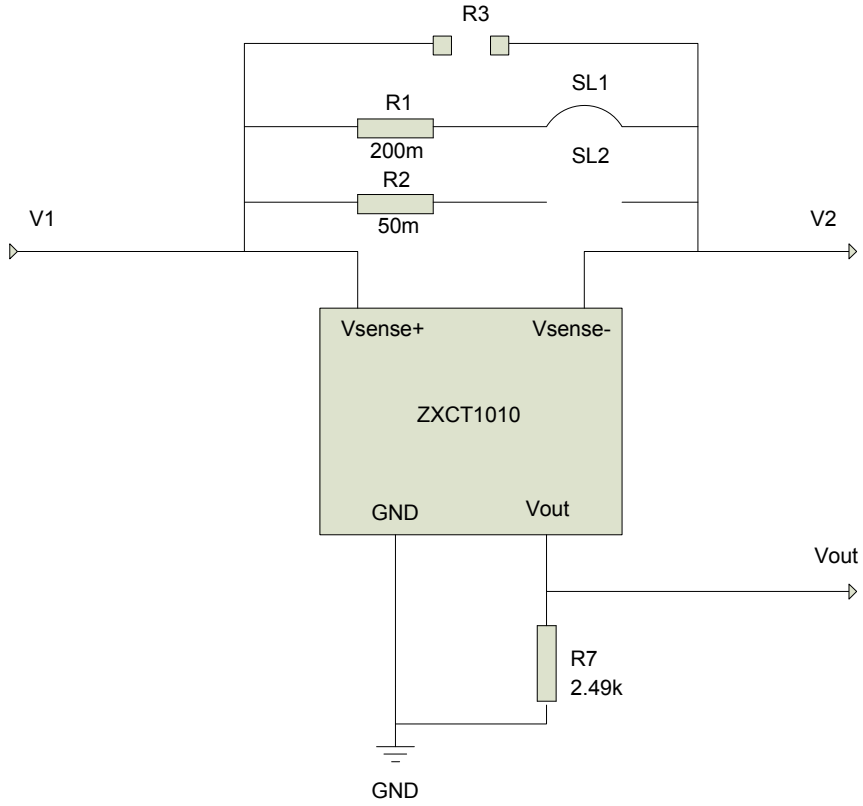
NAME	DESCRIPTION
V1	Supply Voltage
V2	Connection to Load
VOUT	Output Voltage
FLAG	Not used
GND	0V / Ground
SL1,SL2	Solder Links
Vcc	Not used

The ZXCT1010EV1 is configured as shown in figure 1; SL1 is shorted for an output of ~1.5V at 300mA. The target applications are battery chargers, power supply units and other applications where current measurement is required.

The input voltage range for the ZXCT1010EV1 is 20V down to a minimum of (2.7V +V_{OUT}). E.g. if the required full scale output voltage is 1.5 V the input range is 4.2V to 20V.

ZXCT1010EV1 Schematic



Sense resistor R_S

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 200mΩ resistor (R1) is selected by shorting SL1 and opening SL2. This results in an output of 1.5V for a load current of 300mA (assuming that R3 is not fitted).

The 50mΩ resistor (R2) is selected by shorting SL2 and opening SL1, resulting in an output of 1.5V for a load current of 1.2A (assuming that R3 is not fitted).

If both links are shorted the effective resistance is 40mΩ giving an output of 1.5V for a current of 1.5A (assuming that R3 is not fitted).

If both links are open only the optional leaded resistor R3 (if fitted) is in circuit.

The maximum power dissipation rating of the resistor must be appropriate to the load current level.

N.B. The board is set by default with SL1 shorted and SL2 open, using the 200mΩ resistor.

For further information on choosing a value of sense resistor please refer to the ZXCT1010 datasheet .

V_{OUT}

If the preset selectable values of sense resistor are chosen, the device will produce 0.6mA for a 300mA load current or 0.6mA for a 3.0A load current, depending on which link is closed. The current output is directly proportional to the differential voltage across the sense pins of the device.

The output voltage is then proportional to the value of the load resistor R7. As supplied R7 = 2.49K giving 1.5V for a current of 0.6mA.

Configuration table for ZXCT1010EV1

LOAD CURRENT (A)	R_S (mΩ)	VOUT (V)	SOLDER LINK CONFIGURATION
0.3	200	1.5	Short SL1
1.2	50	1.5	Short SL2
1.5	40	1.5	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 transconductance (10mS) times the voltage dropped across the sense resistor, (providing that the voltage on V1 is at least 2.7V higher than V_{OUT}.)

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. It also reduces the minimum voltage at which the device will be linear as V_{OUT} +2.7V is the minimum input voltage for accurate results.

Increasing the value of the gain resistor R7 also increases the sensitivity but at the expense of larger output impedance. The criterion for minimum input voltage still applies.

The maximum practical value of R7 is limited by the output conductance of the ZXCT1010 and the output voltage that can be tolerated - in practice R7 should not be greater than about 5k.

The ZXCT1010 is optimized for values of V_{SENSE} between 1mV and 150mV but may be used up to 800mV.

Example: Scaling for 1.5A load current and a 500mV output.

The ZXCT1010 has a fixed transconductance of 10mS, $\mathbf{I_{OUT} = V_{SENSE}}$/100.
Using the fitted value of R7 (2.49k) an output current of 200uA would be required to produce 500mV output Voltage.
$\mathbf{V_{SENSE}}$ must then be 200uA *100 = 20mV required between V_{SENSE+} and V_{SENSE-}.
The value for R_{SENSE} is thus 20mV /1.5A = 13mΩ.

Accuracy

The ZXCT1010 current monitor IC is a 1%[1] accurate device. The accuracy of the output voltage will be influenced by the tolerance of the external sense used. The ZXCT1010EV1 utilizes 1% accurate sense resistors.

COMPONENTS LIST

Ref	Value	Package	Part Number	Manufacturer	Notes
R1	200mΩ	1206	LR1206-R20FI	Welwyn	SMD Sense Resistor 1%
R2	50mΩ	2512	LRF2512-R050FW	Welwyn	SMD Sense Resistor 1%
ZXCT		SOT23-5	ZXCT1010E5	ZETEX	
R7	2.49kΩ	0805			SMD Sense Resistor 1%

[1] Total error at +100mV sense voltage

SET-UP AND TEST

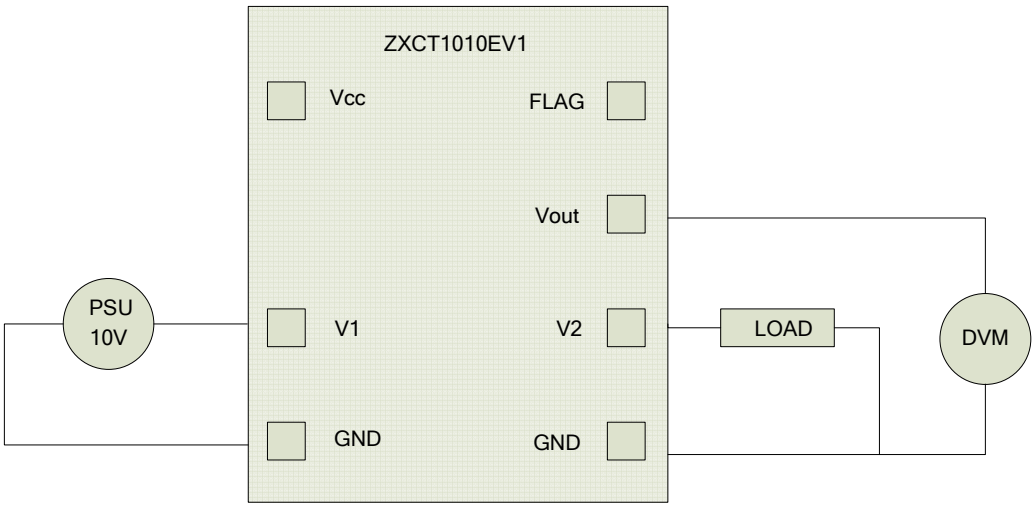
The board is preset to give an output Voltage of 2.5V for a load current of 500mA (SL1 is shorted to connect in the 200mΩ (R1) sense resistor). To change the board to give an output Voltage of 2.5V for a current of 2.0A, de-solder SL1 and short SL2. This connects the 50mΩ (R2) sense resistor.

500mA load test

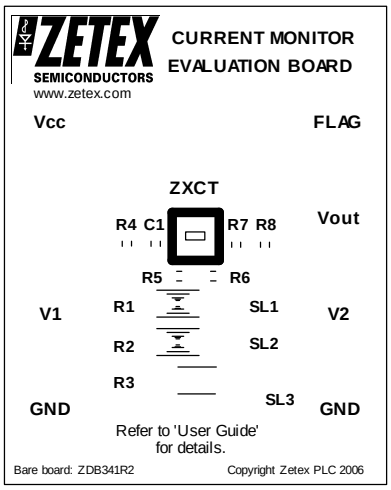
1. Ensure SL1 is shorted.
2. Connect a linear power supply of +10V between the V1 and GND terminals.
3. Set a load current of 500mA between the V2 and GND terminals using a suitable load.
   ***The load must be rated for at least 5W* .**
4. Check with a DVM the supply voltage is +10V between the V1 and GND terminals.
5. Measure VOUT with a DVM. The nominal output voltage should read 2.5V.

The device may also be evaluated with lower power loads and lower currents by increasing the value of R_S. **As the device reacts only to the voltage across this resistor such tests are equally valid.**

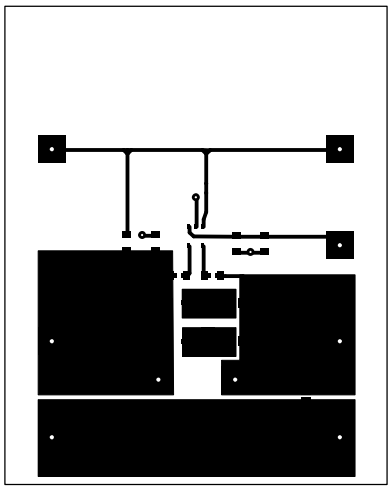
CONNECTION DIAGRAM



EVALUATION BOARD



Top Silk



Top Copper

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