

ZXCT1041 EV1

ZXCT1041EV1 EVALUATION BOARD USER GUIDE

DESCRIPTION

The ZXCT1041EV1 is intended for the evaluation of the ZXCT1041 device. The ZXCT1041 is a high side bi-directional current monitor providing a fixed voltage gain of 10.

The device produces a voltage output proportional to the current sampled by a small inline sensing resistor, R_{sense} . The voltage output is scaled by the choice of R_{sense} . As delivered the board is set up to provide an output of 1.5V from a current of 1.5A using a 100 m Ω sampling resistor.

There is a second 25 m Ω resistor that can be selected by means of a solder link and provides an output of 1.5V for a load current of 6A.

Additionally provision is made for a wire ended sampling resistor of the users choice. An open collector flag output indicates the direction of current flow.

The printed circuit board is common to other devices in the ZXCT family, for the ZXCT1041, the Vcc pin is not 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



ZXCT1041 EV1



ORDERING INFORMATION

ORDER NUMBER
ZXCT1041EV1

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

PAD NAMES AND DEFINITIONS

NAME	DESCRIPTION
V1	Supply Voltage Or Connection to Load/Battery
V2	Supply Voltage Or Connection to Load/Battery
VOUT	Output Voltage
FLAG	Flag Output Indicates direction of current flow
GND	0V / Ground
SL1,SL2	Solder Links
Vcc	Not used

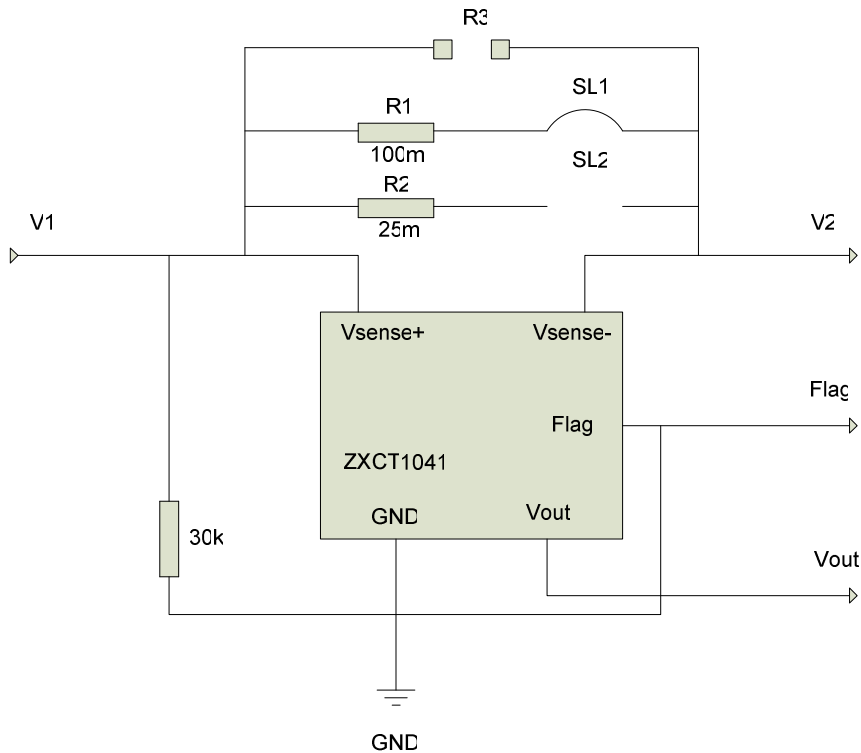
Figure 1: ZXLD1350EV2 evaluation board

The ZXCT1041EV1 is configured as shown in figure 1; SL1 is shorted to output 1.5V for a 1.5A current flow. The target applications are battery chargers, power supply units and other applications where bi-directional current measurement is a requirement.

The input voltage range for the ZXCT1041EV1 is 20V down to a minimum of (2.7V +Vout). Eg if the required full scale output voltage is 1.5 V the input range is 4.2V to 20V.

Note that the Flag output requires a pull-up resistor.

Figure 1 Schematic Diagram of ZXCT1041EV1



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 100mΩ resistor (R1) is selected by shorting SL1 and opening SL2. This results in an output of 1.5V for a load current of 1.5A (assuming that R3 is not fitted).

The 25mΩ resistor (R2) is selected by shorting SL2 and opening SL1, resulting in an output of 1.5V for a load current of 6A (assuming that R3 is not fitted).

If both links are shorted the effective resistance is 20mΩ giving an output of 1.5V for a current of 7.5A (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 100mΩ resistor.

For further information on choosing a value of sense resistor please refer to the ZXCT1041 datasheet.

Vout

If the preset selectable values of sense resistor are chosen, the device will output 1.5V for a 1.5A load current and 1.25V for a 5.0A load current. The output is directly proportional to the differential voltage across the sense pins of the device. The ZXCT1041 will output the same voltage for current flow in either direction, but the level of the Flag output will change.

Configuration table for ZXCT1041EV1

LOAD CURRENT (A)	R _{sense} (mΩ)	VOUT (V)	SOLDER LINK CONFIGURATION
1.5	100	1.5	Short SL1
6.0	25	1.5	Short SL2
7.5	20	1.5	Short SL1 & SL2

FLAG

The direction of current flow can be determined from the flag output pin. The flag output of the device is an open collector output. On board the ZXCT1041EV1 is a 30kΩ resistor which is connected to V1, it may be connected to a lower voltage eg 3V3 if that is appropriate in the application.

If current is flowing from V1 to V2, the FLAG pin will be High, at the same potential as V1 or the supply connected to the collector resistor on the Flag output.

If current is flowing in the reverse direction, i.e. from V2 to V1, the FLAG pin will be Low, typically 60mV.

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_{sense} is selected to obtain the desired accuracy for a given output current.

The value of V_{out} is 10 times the voltage dropped across the sensing resistor, (providing that the input Voltage is more than 2.7V higher than the V_{out}.)

Choosing a larger value for R_{sense} 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_{sense}. 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.

The ZXCT1041 is optimized for values of V_{sense} of either polarity between 0 and 800mV.

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

The ZXCT1041 has a fixed gain of 10. $V_{out} = 10 \times V_{sense}$
 To obtain a 500mV output, 50mV is required between V_{sense+} and V_{sense-}.
 The value for R_{sense} is thus 50mV / 1.5A = 33mΩ.

Accuracy

The ZXCT1041 current monitor IC is a 2%² accurate device. The accuracy of the output voltage will be influenced by the tolerance of the external sense used. The ZXCT1041EV1 utilizes 1% accurate sense resistors.

² Total error at +100mV sense voltage

COMPONENTS LIST

Ref	Value	Package	Part Number	Manufacturer	Notes
R1	100mΩ	1206	LR1206-R10FI	Welwyn	SMD Sense Resistor 1%
R2	25mΩ	2512	LRF2512-R025FW	Welwyn	SMD Sense Resistor 1%
R3	30kΩ	0805		Generic	SMD 1% 0.125W
ZXCT		SOT235	ZXCT1041E5	ZETEX	

SET-UP AND TEST

The board is preset to give an output |Voltage of 1.5V for a load current of 1.5A (SL1 is shorted to connect in the 100mΩ (R1) sense resistor). To change the board to give an output Voltage of 1.5V for a current of 6.0A, de-solder SL1 and short SL2. This connects the 25mΩ (R2) sense resistor.

1.0 Ampere load test (forward current flow)

1. Ensure SL1 is shorted.
2. Connect a linear power supply of +15V between the V1 and GND terminals.
3. Set a load current of 1.5A between the V2 and GND terminals using a suitable load.
The load must be rated for at least 30W.
4. Check with a DVM the supply voltage is +15V between the V1 and GND terminals.
5. Measure VOUT with a DVM. The nominal output voltage should read 1.5V.
6. Measure the FLAG pin with a DVM, it should be High, approximately V1 15Vin this case.

1.0 Ampere load test (reverse current flow)

1. Ensure SL1 is shorted.
2. Connect a linear power supply of +15V between the V2 and GND terminals.
3. Set a load current of 1.5A between the V1 and GND terminals using a suitable load.
The load must be rated for at least 30W.
4. Check with a DVM the supply voltage is +15V between the V2 and GND terminals.
5. Measure VOUT with a DVM. The nominal output voltage should read 1.5V.
7. Measure the FLAG pin with a DVM, it should be logic Low, less than 200mV

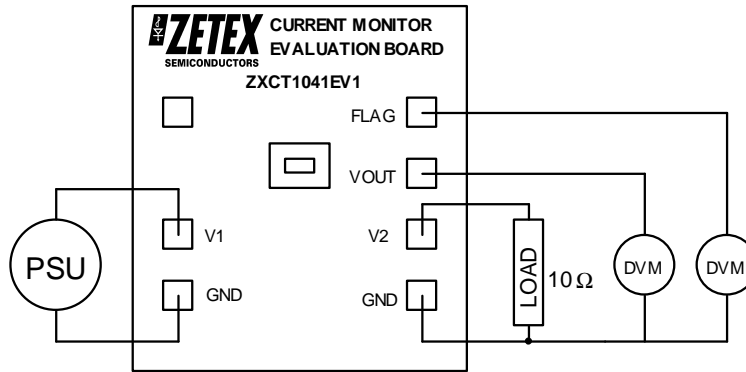
The device may also be evaluated with lower power loads and lower currents by increasing the value of R_{sense} . As the device reacts only to the voltage across this resistor such tests are equally valid.

ZXCT1041 EV1



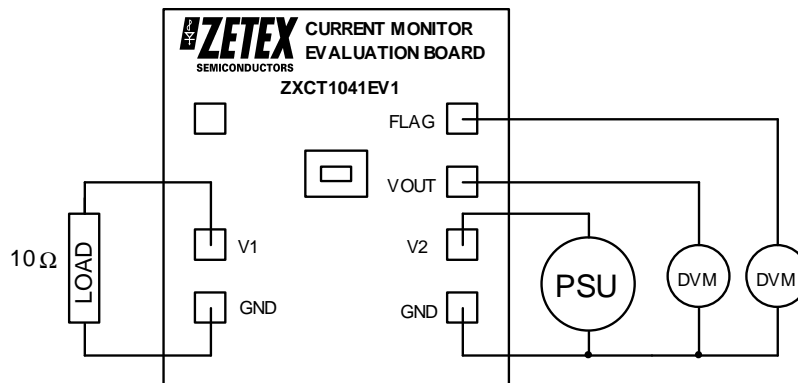
CONNECTION DIAGRAM

Forward Current flow



CONNECTION DIAGRAM.....continued

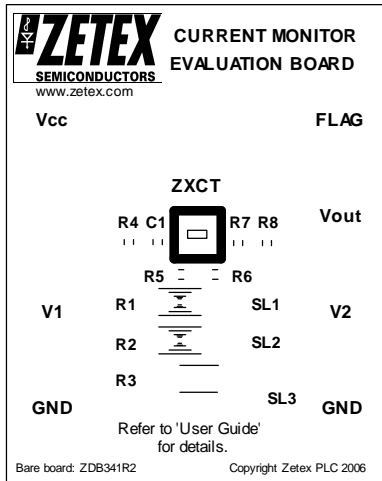
Reverse Current flow



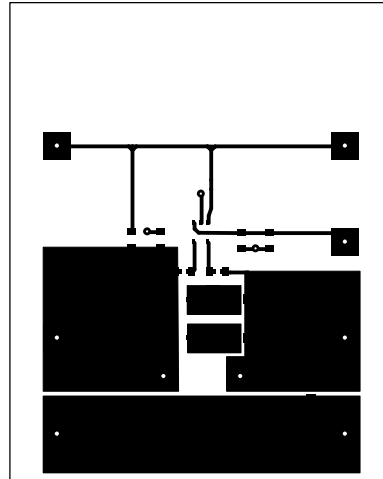
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EVALUATION BOARD



Top Silk



Top Copper

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Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Kustermann-park Balanstraße 59 D-81541 München Germany Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Zetex Inc 700 Veterans Memorial Highway Hauppauge, NY 11788 USA Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com	Zetex (Asia Ltd) 3701-04 Metroplaza Tower 1 Hing Fong Road, Kwai Fong Hong Kong Telephone: (852) 26100 611 Fax: (852) 24250 494 asia.sales@zetex.com	Zetex Semiconductors plc Zetex Technology Park, Chadderton Oldham, OL9 9LL United Kingdom Telephone (44) 161 622 4444 Fax: (44) 161 622 4446 hq@zetex.com

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