

# ZXCT1021 EV1

## ZXCT1021EV1 EVALUATION BOARD USER GUIDE

### DESCRIPTION

The ZXCT1021EV1 is intended for the evaluation of the ZXCT1021 device. The ZXCT1021 is a high side 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 300mA using a 500 m $\Omega$  sampling resistor.

There is a second (50m $\Omega$ ) resistor that can be selected by means of a solder link and provides an output of 1.5V for a load current of 3A.

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 ZXCT1021, neither the FLAG pin nor the Vcc pin 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

|                     |
|---------------------|
| <b>ORDER NUMBER</b> |
| ZXCT1021EV1         |

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

## PAD NAMES AND DEFINITIONS

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

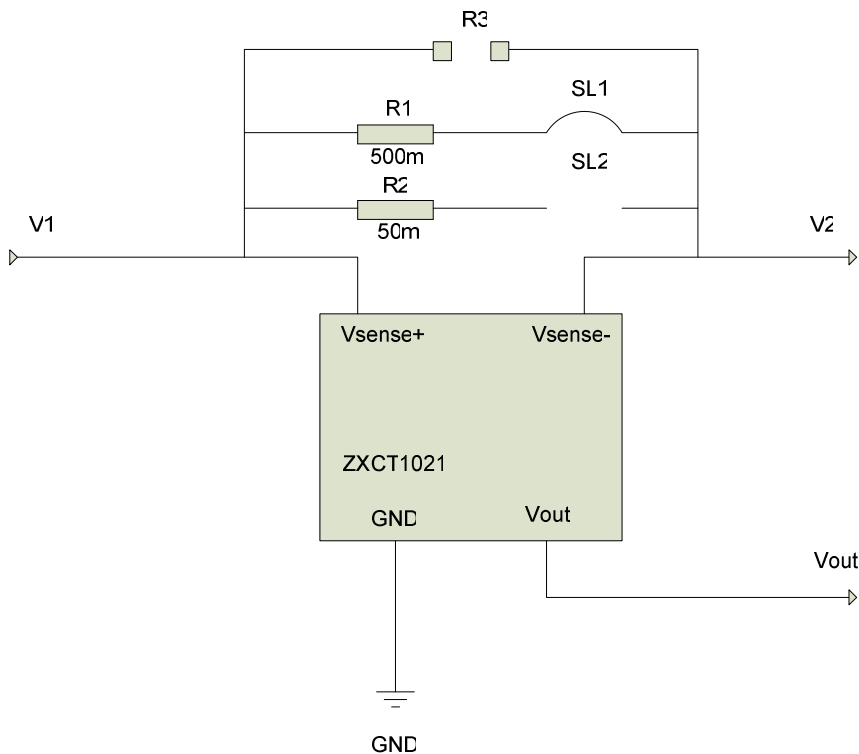
The ZXCT1021EV1 is configured as shown in figure 1; SL1 is shorted to output 1.5V for a 300mA current flow. The target applications are battery chargers, power supply units and other applications where current measurement is a requirement.

The input voltage range for the ZXCT1021EV1 is 20V down to a minimum of (2.7V +Vout). E.g. if the required full scale output voltage is 1.5 V the input range is 4.2V to 20V.

# ZXCT1021 EV1



## ZXCT1021EV1 Schematic



### 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 500mΩ 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 3A (assuming that R3 is not fitted).

If both links are shorted the effective resistance is 45.45mΩ giving an output of 1.5V for a current of 330mA (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 500mΩ resistor.**

For further information on choosing a value of sense resistor please refer to the ZXCT1021 datasheet .

### Vout

If the preset selectable values of sense resistor are chosen, the device will produce 1.5V for a 300mA load current or 1.5V for a 3.0A load current, depending on which link is closed. The output is directly proportional to the differential voltage across the sense pins of the device.

# ZXCT1021 EV1



## Configuration table for ZXCT1021EV1

| LOAD CURRENT (A) | R <sub>sense</sub> (mΩ) | VOUT (V) | SOLDER LINK CONFIGURATION |
|------------------|-------------------------|----------|---------------------------|
| 0.3              | 500                     | 1.5      | Short SL1                 |
| 3.0              | 50                      | 1.5      | Short SL2                 |
| 0.33             | 45.45                   | 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<sub>sense</sub> is selected to obtain the desired accuracy for a given output current.

The value of V<sub>out</sub> is 10 times the voltage dropped across the sensing resistor, (providing that the voltage on V1 is more than 2.7V higher than the V<sub>out</sub>.)

Choosing a larger value for R<sub>sense</sub> 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<sub>sense</sub>. It also reduces the minimum voltage at which the device will be linear as V<sub>out</sub> +2.7V is the minimum input voltage for accurate results.

The ZXCT1021 is optimized for values of V<sub>sense</sub> between 0 and 150mV but may be used up to 800mV.

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

The ZXCT1021 has a fixed gain of 10.  $V_{out} = 10 \times V_{sense}$   
To obtain a 500mV output, 50mV is required between V<sub>sense+</sub> and V<sub>sense-</sub>.  
The value for R<sub>sense</sub> is thus 50mV /1.5A = 33mΩ.

### Accuracy

The ZXCT1021 current monitor IC is a 2%<sup>1</sup> accurate device. The accuracy of the output voltage will be influenced by the tolerance of the external sense used. The ZXCT1021EV1 utilizes 1% accurate sense resistors.

<sup>1</sup> Total error at +100mV sense voltage

### COMPONENTS LIST

| Ref  | Value | Package | Part Number    | Manufacturer | Notes                 |
|------|-------|---------|----------------|--------------|-----------------------|
| R1   | 500mΩ | 1206    | LR1206-R50FI   | Welwyn       | SMD Sense Resistor 1% |
| R2   | 50mΩ  | 2512    | LRF2512-R050FW | Welwyn       | SMD Sense Resistor 1% |
| ZXCT |       | SOT235  | ZXCT1021E5     | ZETEX        |                       |
|      |       |         |                |              |                       |

# ZXCT1021 EV1



## SET-UP AND TEST

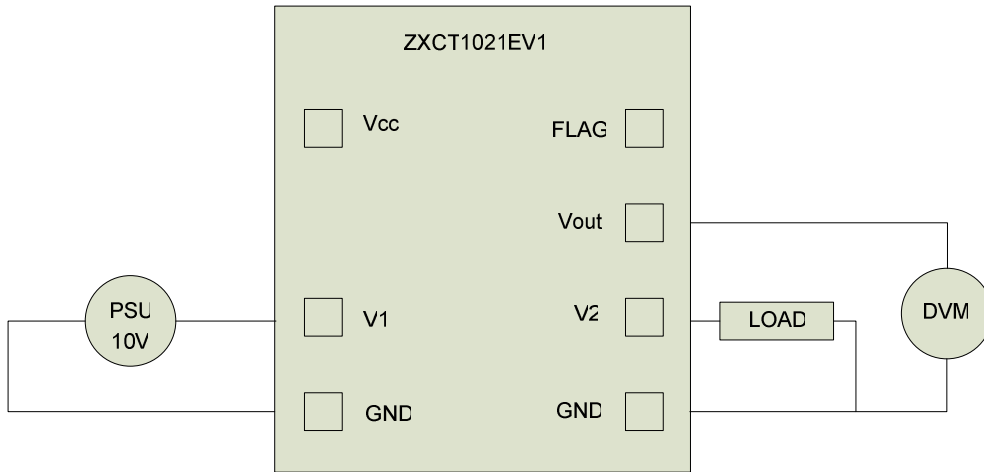
The board is preset to give an output Voltage of 1.5V for a load current of 300mA (SL1 is shorted to connect in the 500mΩ (R1) sense resistor). To change the board to give an output Voltage of 1.5V for a current of 3.0A, de-solder SL1 and short SL2. This connects the 50mΩ (R2) sense resistor.

### 300mA load test

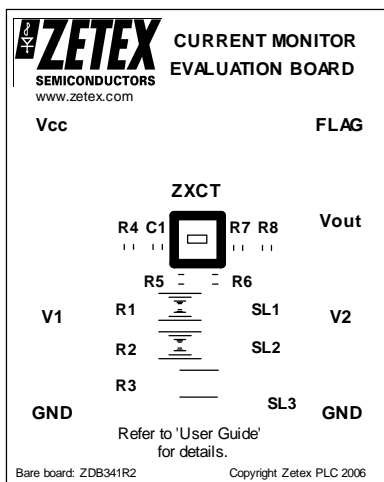
1. Ensure SL1 is shorted.
2. Connect a linear power supply of +10V between the V1 and GND terminals.
3. Set a load current of 300mA between the V2 and GND terminals using a suitable load.  
**The load must be rated for at least 5W.**
4. Check with a DVM the supply voltage is +10V between the V1 and GND terminals.
5. Measure VOUT with a DVM. The nominal output voltage should read 1.5V.

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.

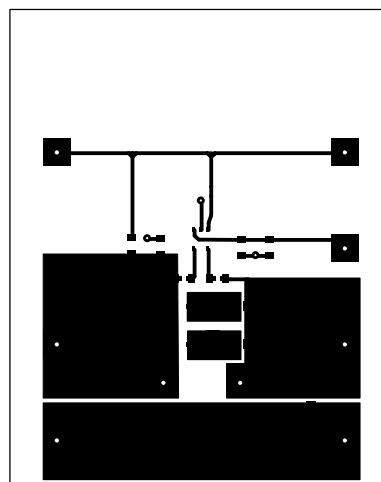
## CONNECTION DIAGRAM



## EVALUATION BOARD



Top Silk



Top Copper

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|                                   |  |
|-----------------------------------|--|
| "Preview"                         | Future device intended for production at some point. Samples may be available  |
| "Active"                          | Product status recommended for new designs                                     |
| "Last time buy (LTB)"             | Device will be discontinued and last time buy period and delivery is in effect |
| "Not recommended for new designs" | Device is still in production to support existing designs and production       |
| "Obsolete"                        | Production has been discontinued   |

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|                       |   |
|-----------------------|---|
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