ZXCT1008EV1 USER GUIDE

DESCRIPTION

The ZXCT1008EV1 is a current monitor evaluation board which measures 0.5A, 2.0A or a 2.5A load current. This current is then translated to a proportional output current which is scaled by an external resistor to give a 2.5V full scale output voltage.

The board has also been designed to incorporate protection from 110V transients and includes and additional current limiting resistor.

The board also incorporates additional solder pads for a user defined sense resistor to cater for additional load currents which may require measuring.

FEATURES

- Supply Range 8 to 20V
- Selectable current measurement range
- 2.5V Output Voltage
- Transient Protected
- 3 Pin SOT23 package

APPLICATIONS

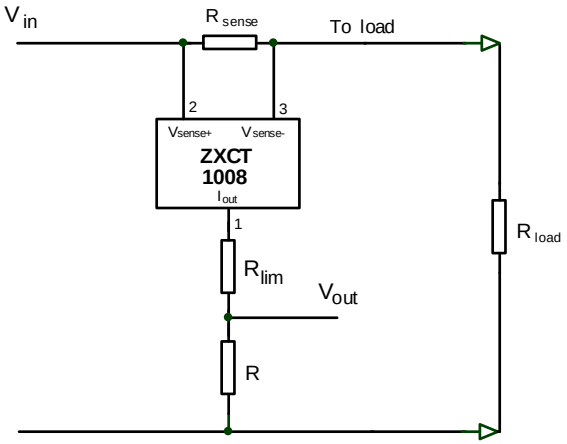
- Battery Charging
- Power Supplies
- DC motor and solenoid control

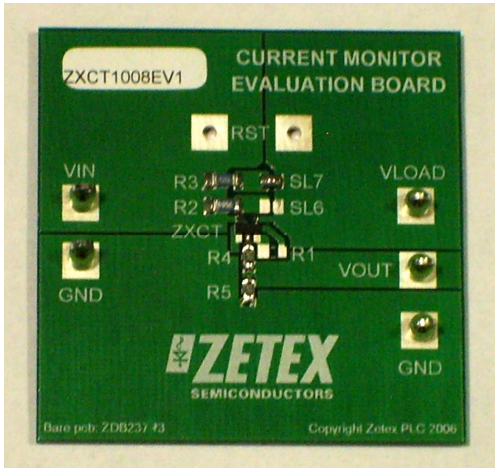
ORDERING INFORMATION

ORDER NUMBER
ZXCT1008EV1

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

TYPICAL APPLICATION CIRCUIT





REFERENCE DESIGN

ZXCT1008EV1 is configured to the reference design below. The target applications are battery chargers, power supply units and automotive current monitoring.

The input voltage is typically between 14 to 16V for the ZXCT1008EV1 with a minimum of 8V. This board takes into account 110V voltage transients which may be present. See scaling for transient protection below for further information.

Rsense

The board has been designed with three set selectable values of Rsense, to measure either a 0.5A, 2.0A or 2.5A range. The value of sense resistor can be chosen by using the solder links SL6 and SL7.

To measure a 0.5A load current, the 200mΩ resistor (R3) should be selected by shorting SL7. To measure a 2.0A current, the 50mΩ resistor (R2) should be selected by shorting SL6. To measure a 2.5A current, short both SL6 and SL7. The 50mΩ in parallel with the 200mΩ will give a 40mΩ resistance. RST is also available if a user defined current load level is required to be measured. This allows the user to scale in a more appropriate value of sense resistor. If the value of sense resistor is changed, the maximum power dissipation of the resistor must be appropriate to the load current level.

NB The board is set by default to measure 0.5A i.e. SL7 is shorted, utilizing the 200mΩ resistor.

For further information on choosing a value of sense resistor please refer to the ZXCT1008 datasheet or Applications note 39.

VOUT

If the preset selectable values of sense resistor are chosen, the device will output 2.5V at both the 0.5A and 2.0A current levels. The board has been designed for each of the sense resistors to develop 100mV across them at the three levels of current.

If a RST is used at a different current level, the value of V_{out} will change.

Configuration table for ZXCT1008EV1

LOAD CURRENT (A)	R_{sense} (mΩ)	VOUT (V)	SOLDERLINK CONFIGURATION
0.5	200	2.5	Short SL7
2.0	50	2.5	Short SL6
2.5	40	2.5	Short SL7 and SL6

Scaling for Transient Protection

The ZXCT1008EV1 has a current limiting resistor R4 which will limit the current from I_{out}. This is of particular use where high voltage transients maybe present.

Assuming the worst case condition of V_{out} = 0V, the minimum value of R_{lim} is given by :

$$R_{\lim}(\min) = \frac{V_{pk} - V_{\max}}{I_{pk}}$$

Assuming 110V transients present;

$$= \frac{110 - 20}{40 \times 10^{-3}} \quad = 2.25k\Omega$$

V_{pk} = Peak transient voltage to be withstood (V)
V_{max} = Maximum Working Volage = 20V
I_{pk} = Peak Output Current = 40mA

The maximum value of Rlim is set by Vin(min), Vout(max) and the dropout voltage.

$$R_{\lim}(\max) = \frac{R_{out}\left[V_{in}(\min) - (V_{dp} + V_{out}(\max))\right]}{V_{out}(\max)}$$

$$= \frac{2.5\times10^{3}\left[8 - (1.5 + 2.5)\right]}{2.5} = 4k\Omega$$

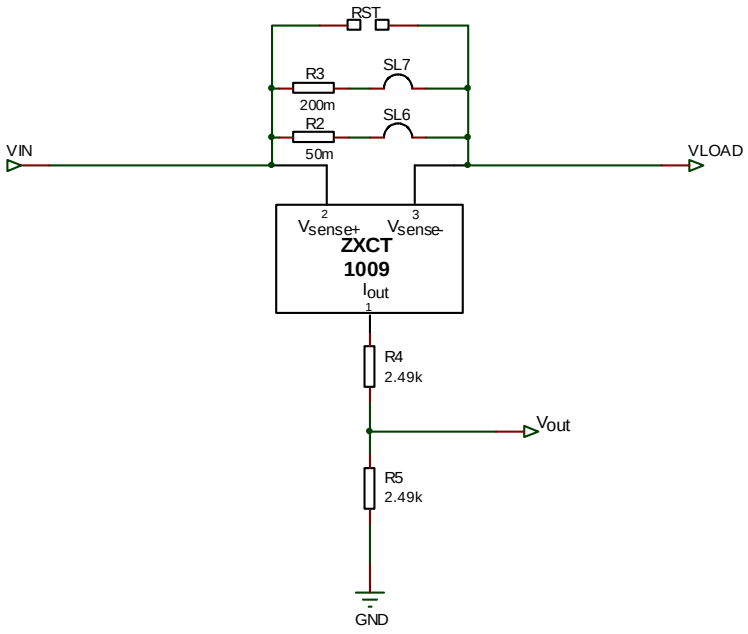
V_{in}(min) = Minimum Supply Operating Voltage (V)
V_{dp} = Dropout Voltage (V)
V_{out}(max) = Maximum Operating Output (V)

Accuracy

The ZXCT1008 current monitor IC is a 2.5%[1] accurate device. The accuracy of the output voltage will be influenced by the tolerance of the external resistors used. The ZXCT1008EV1 uses a 1% accurate sense resistor and a 0.1% accurate output resistors.

[1] Maximum error at 200mV

Schematic Diagram



Materials List

Ref	Value	Package	Part Number	Manufacturer	Notes
R1	Not fitted				Not fitted
R2	50mΩ	1206	LR1206	Welwyn	SMD Sense Resistor 1%
R3	200mΩ	1206	LR1206	Welwyn	SMD Sense Resistor 1%
R4	2.49K	0805			SMD ±25ppm 0.1%
R5	2.49k	0805			SMD ±25ppm 0.1%
ZXCT		SOT23	ZXCT1008F	ZETEX	

ZXCT1008EV1

Set-up and Test

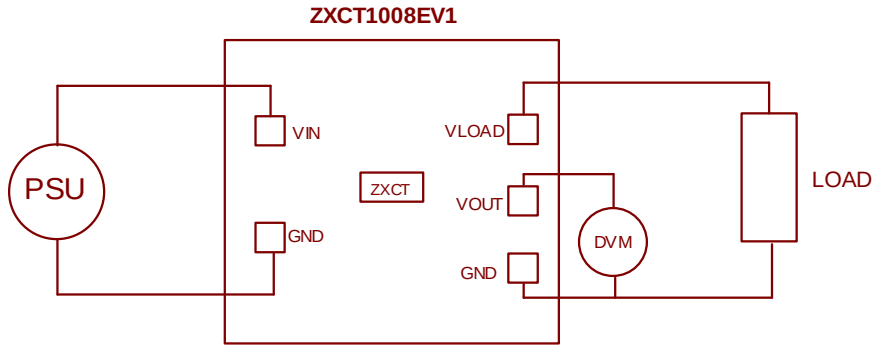
The board is preset to measure 0.5A. SL7 is shorted to connect in the 200mΩ sense resistor. To change the board to measure 2.0A, de-solder SL7 and short SL6.

0.5 Ampere load test

1. Ensure SL7 is shorted.
2. Connect a linear power supply of +10V between the VIN and GND terminals.
3. Set a load current of 0.5A.
4. Turn on the power supply
5. Check with a DVM the supply voltage is +10V between the VIN and GND terminals.
6. Measure VOUT with a DVM. The nominal output voltage should read 2.5V.

The output current can be set by using either an external power resistor or an electronic load. The accuracy of the current set will have an influence on the output voltage.

Connection Diagram



The ZXCT1008EV1 board can also be used to evaluate the ZXCT1009 and ZXCT1011Zetex current monitor devices.

Layout

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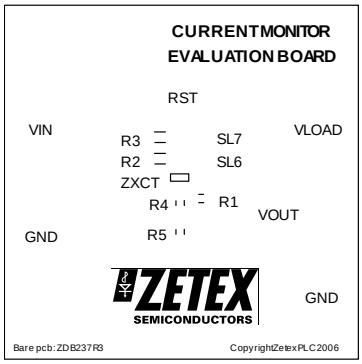
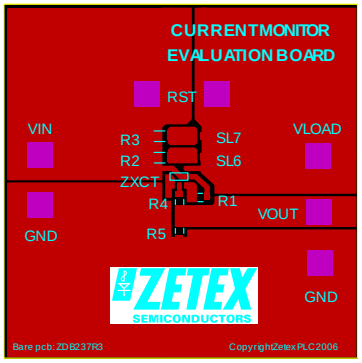
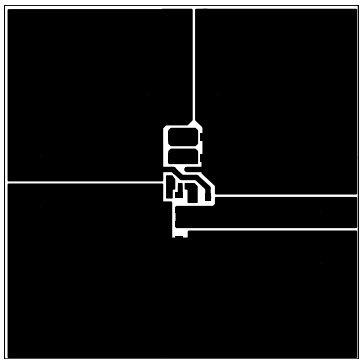


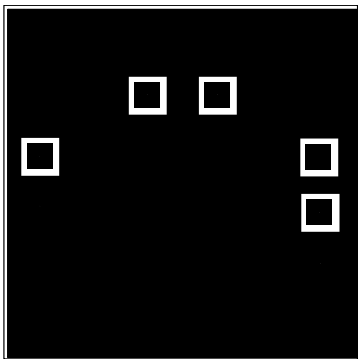
Top Silk



Top composite



Top Copper



Bottom Copper

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