

Figure 1 Evaluation board components' layout

DESCRIPTION

The ZXCT1030EV2 is intended for the evaluation of the ZXCT1030 device. The ZXCT1030 is a high side current sense monitor containing an internal reference and comparator with a non-latching output. Using this device eliminates the need to disrupt the ground plane when sensing a load current. The wide input voltage range of 20V down to as low as 2.2V makes it suitable for a range of applications. Dynamics and supply current are optimized for the processing of fast pulses associated with switch mode applications.

The evaluation board is delivered with the values shown in Figure 2 below. As can be seen, R_S consists of two resistors (R1 and R2) 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. R2 (0.5R) is connected by default.

R3 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 5V/A

The printed circuit board contains redundant component positions which are provided for (but not fitted) to enable the user to experiment if needed.

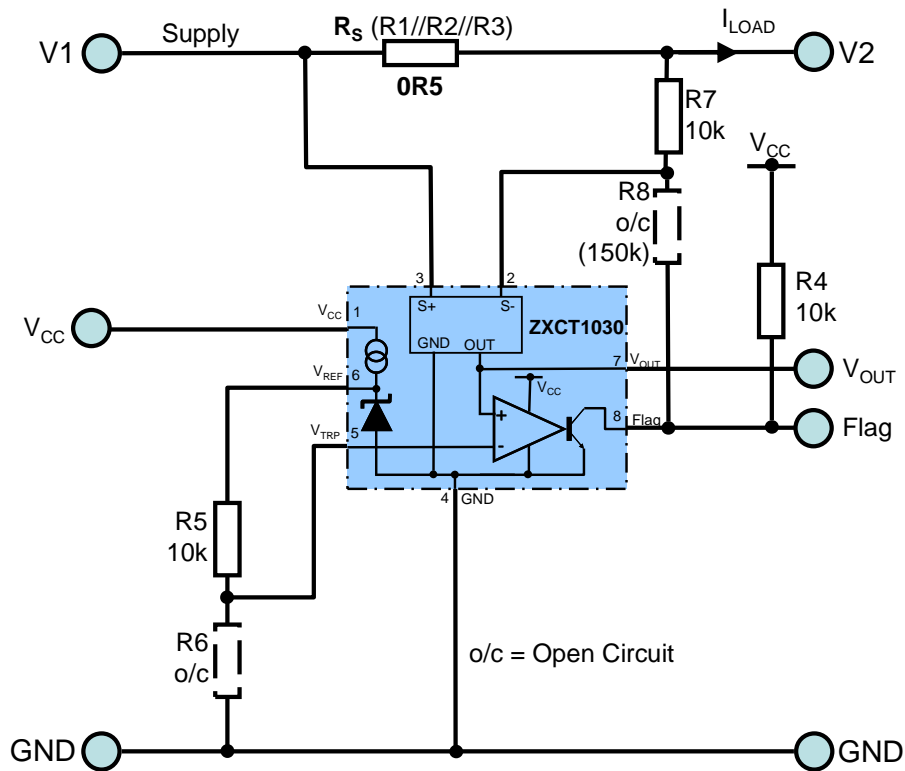


Figure 2 Equivalent circuit diagram for evaluation board ZXCT1030EV2

V_{CC} range 2.2V to 20V
 Supply Range 2.2V to 20V

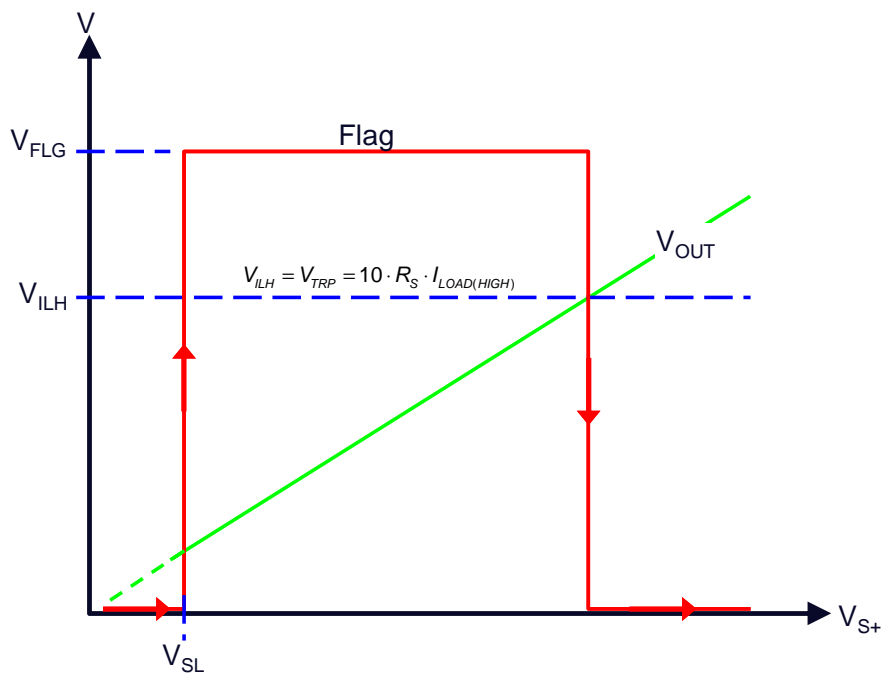


Figure 3 Device' response versus varying supply

ORDERING INFORMATION

ORDER NUMBER
ZXCT1030EV2

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	Tripped flag (low when tripped)
GND	0V / Ground
SL1 – SL5	Optional Solder Links
V _{CC}	Device supply

Both the input voltage (voltage on V1) and V_{CC} range for the ZXCT1030EV2 is from 2.2V to 20V.

ZXCT1030EV2 Summary

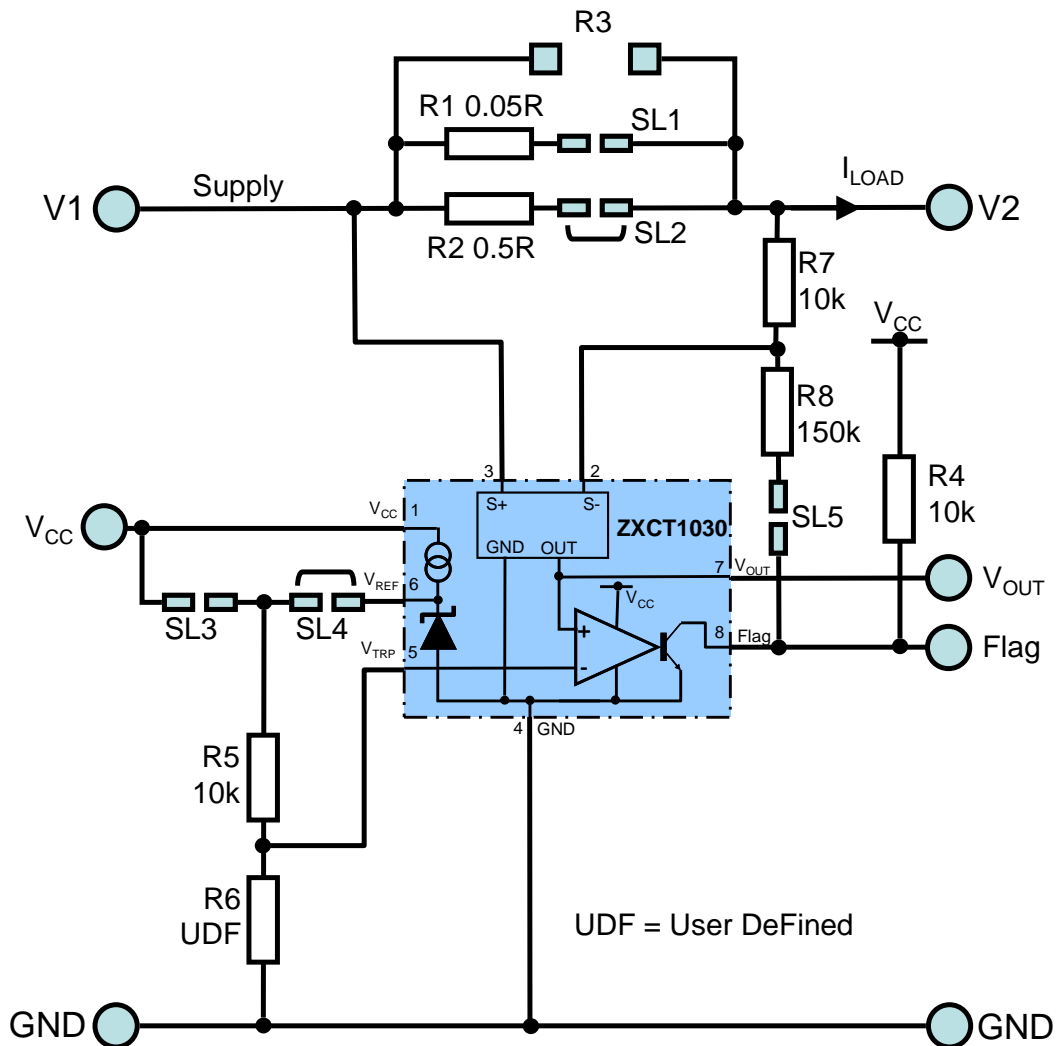


Figure 4 Actual circuit diagram for ZXCT1030EV2

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 500mΩ resistor (R2) is selected by shorting SL2 and opening SL1, resulting in an output of 5V/A.

If both links are shorted the effective resistance is 45.45 mΩ giving an output of 454.5 mV/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 ZXCT1030 datasheet.

Trip current sensitivity and its adjustment

The current at which the ZXCT1030EV2 trips (FLAG goes low) is changed by changing the reference voltage that is fed into the V_{COMP} pin. A resistor position, R6, is available to enable this. Adding R6 to form a potential divider with R5 causes the on-chip reference to be attenuated allowing the ZXCT1030 to trip at a lower current.

This trip current is given by,

$$I_{TRIP} = \frac{V_{REF} \cdot R6}{10 \cdot R_S (R5 + R6)}$$

It can be seen from above that the term,

$$\frac{V_{REF} \cdot R6}{(R5 + R6)} = V_{TRP}$$

Therefore,

$$I_{TRIP} = \frac{V_{TRP}}{10 \cdot R_S} \quad \text{Equation 1}$$

All the values above, with the exception of R6, are either known or can be determined by the user. Therefore determine R6 as follows,

1. Choose the trip current, I_{TRIP} .
2. Compute V_{TRP} (Volts) from Equation 1
3. Compute R6 (k Ω) from,

$$R6 = \frac{R5}{\left(\frac{V_{REF}}{V_{TRP}} - 1\right)} = \frac{10k}{\left(\frac{1.24}{V_{TRP}} - 1\right)}$$

Configuration table for ZXCT1030EV2

LOAD CURRENT (A)	R _{SENSE} (mΩ)	V _{OUT} (V)	SOLDER LINK CONFIGURATION
1.0	50	0.5	Short SL2
1.0	500	5	Short SL1
1.0	45.45	0.454	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 V_{OUT} is the voltage dropped across the sensing resistor multiplied by 10.

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.

The ZXCT1030 is optimized for values of V_{SENSE} around 100mV.

Accuracy

The ZXCT1030 has a typical 3% accuracy for a V_{SENSE} of 100mV. The accuracy of the output voltage will be influenced by the tolerance of the external sense used. The ZXCT1030EV2 utilizes 1% sense resistors.

COMPONENTS LIST

Ref	Value	Package	Part Number	Manufacturer	Notes
R1	50mΩ	2512	LR2512-R050FW	Welwyn	SMD Sense Resistor 1%
R2	500mΩ	2512	LR2512-R500FW	Welwyn	SMD Sense Resistor 1%
R4,5,7	10k	0805			
R8	150k	0805			
ZXCT		SO-8	ZXCT1030N8	Zetex	
I/O's		Test loops	100-108	Hughes	Rapid 17-1835

Required Equipment

1. 1 x 20R 5W resistor (load).
2. 2 x voltage adjustable bench PSUs with voltage and current monitoring and current limiting.
3. 2 x DVMs (DVM1 to read up to 15V, resolution 10mV, and DVM2 to read up to 300mA, resolution 1mA)

SET-UP AND TEST

The board is preset to give an output Voltage of 1V for a load current of 200mA (SL2 is shorted to connect in R2, a 500m Ω , sense resistor).

The board will fail if any of the tests below do not meet the specification indicated, at any stage.

Set-up

1. Ensure SL2 and SL4 are shorted.
2. Switch the outputs of PSU1 and PSU2 to 'OFF'
3. Set PSU1 to 15V \pm 0.1V and limit its current to any value between 10mA and 40mA.
4. Set PSU2 to 0v and limit it's current to 300mA.
5. Connect PSU1 +ve to V_{CC} and -ve to GND.
6. Connect PSU2 +ve to V1 and -ve to GND.
7. Connect DVM1 +ve to FLAG and -ve to GND.
8. Connect one end of a 20R 5W resistor to GND. Connect the other end to the -ve of DVM2 and connect the +ve (current range terminal) of DVM2 to V2. (See diagram).
9. Switch on PSU1, followed by PSU2.

Test Procedure

1. Measure the FLAG voltage indicated on DVM1. It must be <500mV.
 2. Increase the PSU2 voltage slowly and monitor the FLAG voltage until the point at which the FLAG voltage goes 'HIGH'. The FLAG voltage should measure >14V.
 3. Read the PSU2 voltage. It must be 2.6V +100mV, -300mV.
 4. Increase the PSU2 voltage slowly and monitor the FLAG voltage until the point at which the FLAG voltage goes 'LOW'. The FLAG voltage must measure <500mV.
 5. Read the PSU2 voltage. It must be 5.15V \pm 200mV.
 6. Measure the current through the load, on DVM2. It must be 248mA \pm 8mA.
 7. Remove the +ve terminal of DVM1 from the FLAG pin and connect it to the Vout pin. Vout must measure 1.24V \pm 40mV.
 8. Decrease the PSU2 voltage until DVM2 reads a current of 200mA \pm 1mA through the load. Vout must then read 1.0v \pm 40mV.
- END OF TEST

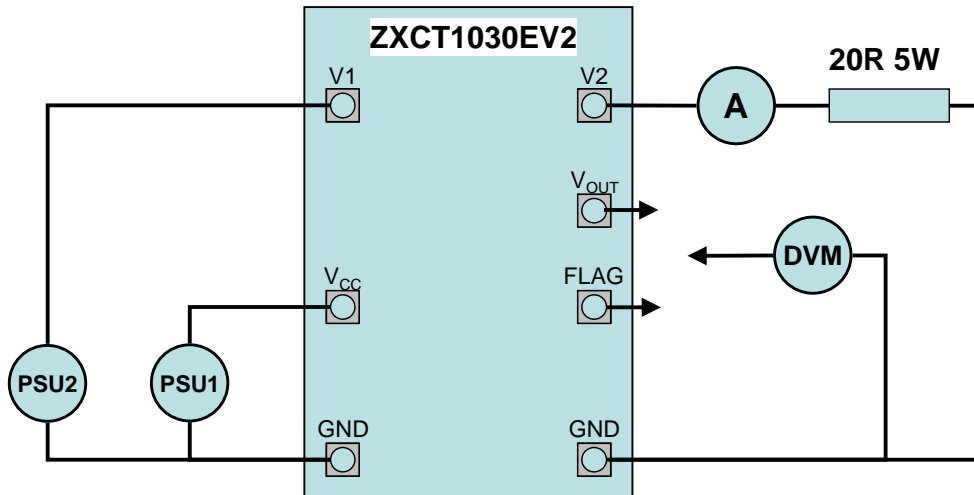
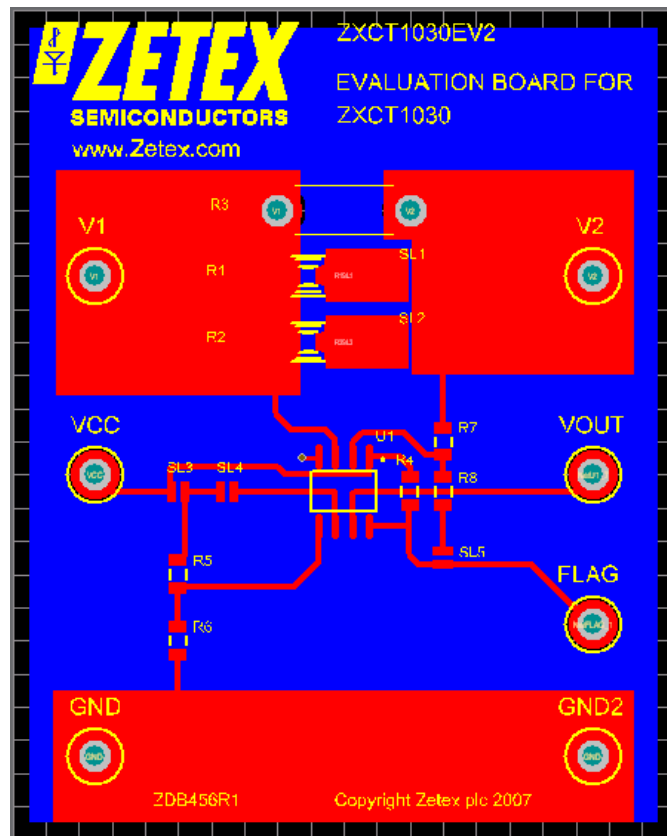


Figure 5 Test diagram for ZXCT1030EV2

EVALUATION BOARD





ZXCT1030EV2
Evaluation Board
User Guide

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