ZXCT1023EV1 USER GUIDE

DESCRIPTION

The ZXCT1023EV1 evaluation board is intended for the evaluation of the ZXCT1023 device.

The ZXCT1023 is a precision high-side current sense monitor, which eliminates the need to disrupt the ground plane when sensing a load current. The ZXCT1023 provides a fixed gain of 50 for applications where minimal sense voltage is required. The very low offset voltage enables a typical accuracy of 3% for sense voltages of only 10mV, giving better tolerances for small value sense resistors necessary at higher currents. The wide input voltage range of 20V down to as low as 2.5V makes it suitable for a range of applications.
It requires no additional components, thus making it a versatile device with minimal component count.

The ZXCT1023 in the TDFN1218-4L package is fitted as supplied, but the PCB allows for fitting the TDFN2020-6L packaged version instead.
There is also a position for fitting a test socket (TSK1) if desired.
R3 consists of two pads with a hole in each pad, or connecting an external R_S if required.
With the values shown, the board produces an output of 2.5V/A

The target applications are battery chargers, power supply units and other applications where high side current measurement is a requirement.

The input voltage (voltage on V_{SUP}) range for the ZXCT1023EV1 is from 2.5V to 20V.

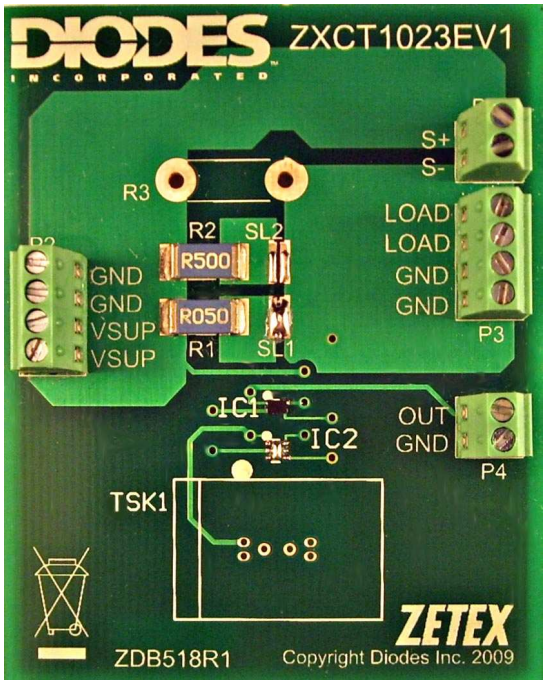


Figure 1. ZXCT1023 Evaluation Board

FEATURES

- High side current sensing
- Supply Range 2.5V to 20V.
- Fixed gain of 50
- 3% typical accuracy
- TDFN1218-4L or TDFN2020-6L package

APPLICATIONS

- Battery Charging
- Power Supplies
- Over-current Monitoring
- Automotive current measurement

ORDERING INFORMATION

ORDER NUMBER
ZXCT1023EV1

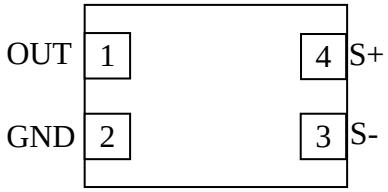
Please note evaluation boards are subject to availability and qualified leads.

PAD NAMES AND DEFINITIONS

NAME	DESCRIPTION
V_{SUP}	Supply Voltage
LOAD	Connection to Load
OUT	Output Voltage
GND	0V / Ground
SL1,SL2	Solder Links

PIN-OUT INFORMATION

(top view)
TDFN1218-4L



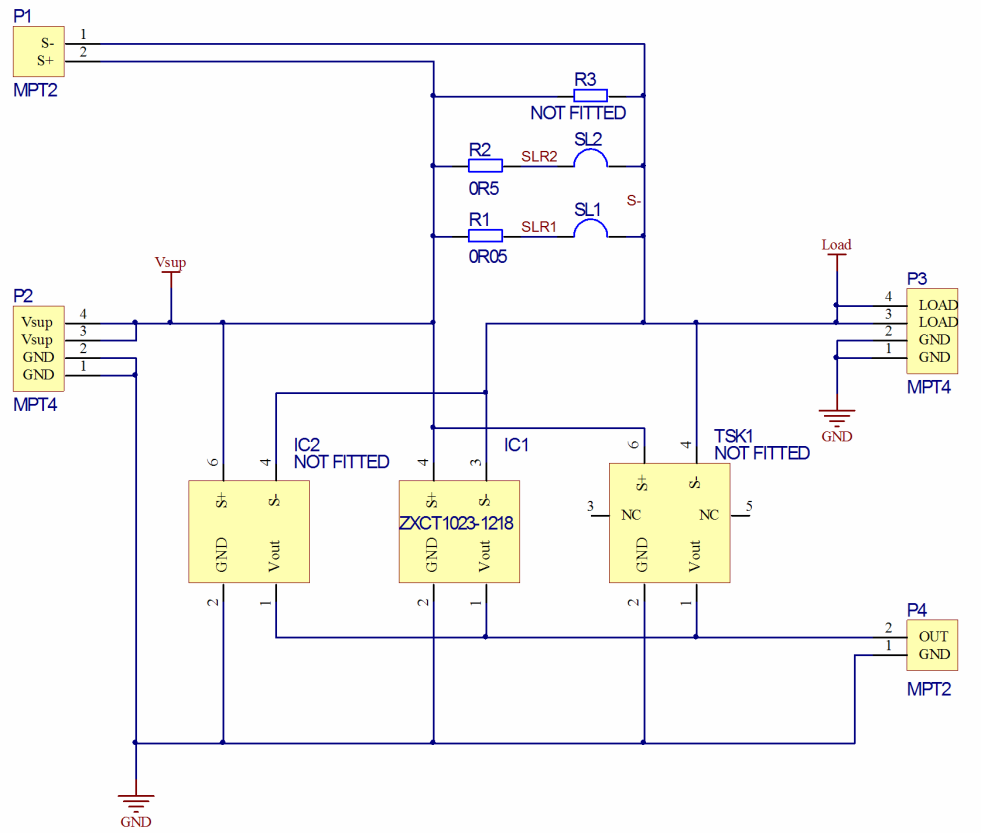


Figure 2. ZXCT1023EV1 Schematic

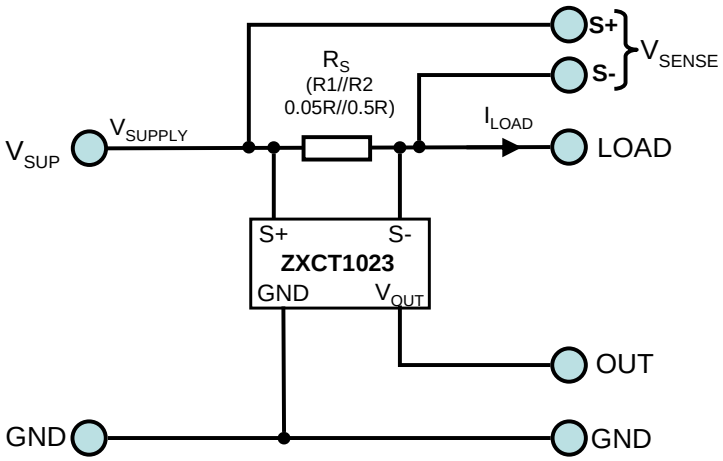


Figure 3. Simplified Schematic

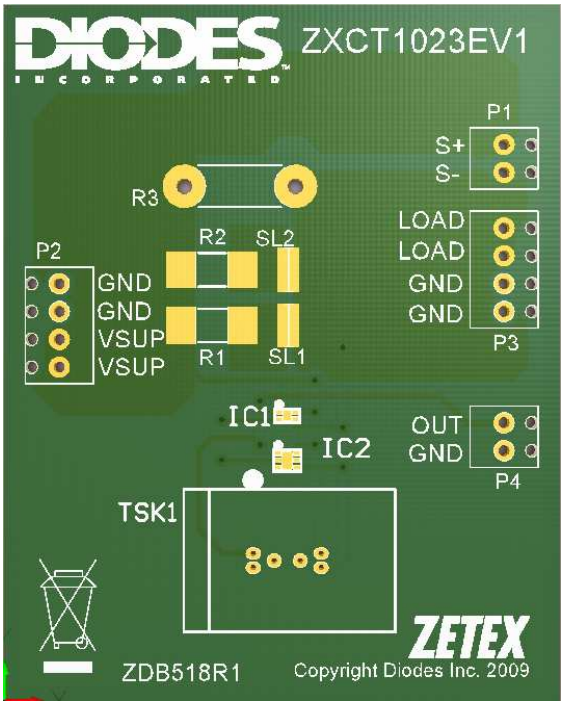


Figure 4. Evaluation board components' layout

Components List

Ref	Value	Package	Part Number	Manufacturer	Notes
R1	50mΩ	2512	LR2512-R050FI	Welwyn	SMD Sense Resistor 1%
R2	500mΩ	2512	LR2512-R500FI	Welwyn	SMD Sense Resistor 1%
R3	NOT FITTED				
IC1	ZXCT1023	TDFN1218	ZXCT1023DFGTC	Diodes Inc	
IC2	NOT FITTED	TDFN2020	ZXCT1023DEETC	Diodes Inc	
TSK1	NOT FITTED		03717 017 X218E	Loranger	DFN2020 socket
P1, P4			1725656	Phoenix	Terminal Block, 2 way
P2, P3			1725672	Phoenix	Terminal Block, 4 way

Configuration table for ZXCT1023EV1

LOAD CURRENT (A)	R_{SENSE} (mΩ)	VOUT (V)	SOLDER LINK CONFIGURATION
1.0	50	2.5	Short SL1
0.1	500	2.5	Short SL2
1.0	45.4	2.273	Short SL1 & SL2

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 50mΩ resistor (R1) is selected by shorting SL1 and opening SL2. This results in an output of 2.5 V/A.

The 500mΩ resistor (R2) is selected by shorting SL2 and opening SL1, resulting in an output of 25V/A.

If both links are shorted the effective resistance is 45.4mΩ giving an output of 2.273V/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.

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 50.

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 ZXCT1023 is optimized for values of V_{SENSE} between 10mV and 100mV.

Accuracy

The ZXCT1023 has a typical 3% accuracy for a V_{SENSE} of between 10mV and 100mV. The accuracy of the output voltage will be influenced by the tolerance of the external sense resistor used. The ZXCT1023EV1 utilizes 1% sense resistors.

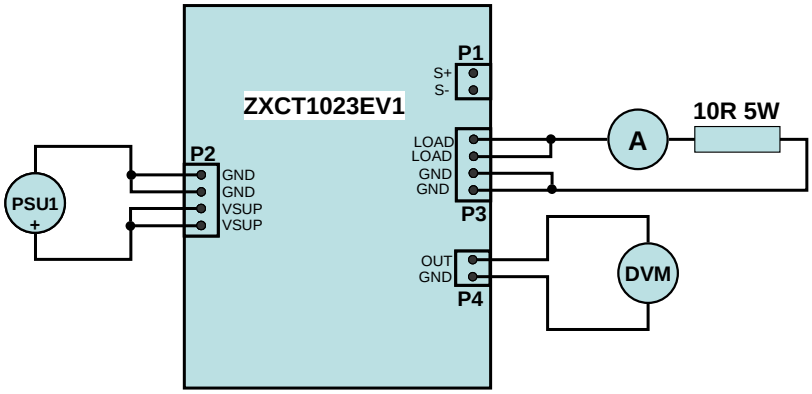


Figure 5. Test diagram for ZXCT1023EV1

SET-UP AND TEST

The board is preset to give an output Voltage of 2.5V for a load current of 1A. SL1 is shorted to connect in the 50mΩ (R2) sense resistor. To change the board to give an output Voltage of 2.5V for a current of 100mA, de-solder SL1 and short SL2. This connects the 500mΩ (R2) sense resistor.

Required Equipment

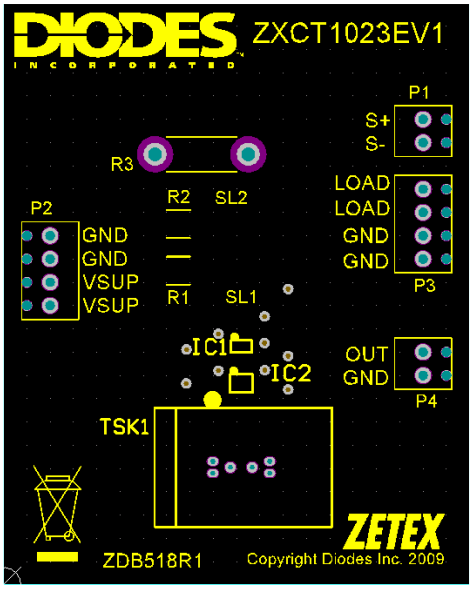
1. 1 x 10R 5W resistor (load).
2. 1 x adjustable bench PSU.
3. 2 x DVMs (one for voltage measurement and one for current measurement)

500mA load test

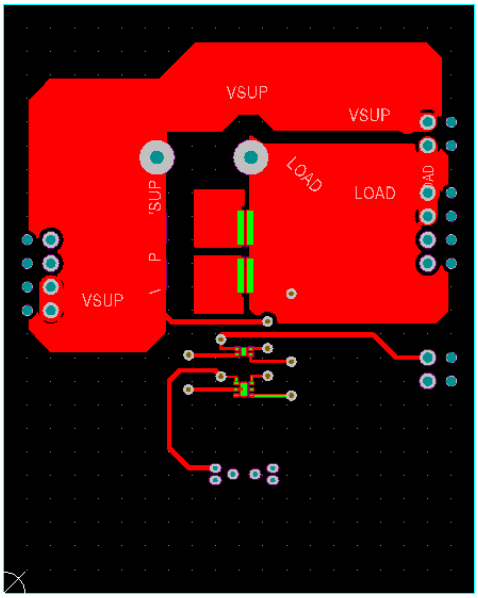
1. Ensure SL1 is shorted.
2. Connect the bench power supply, PSU1, between the VSUP and GND terminals as shown.
3. Connect the resistor in series with an ammeter set to its 1A or 2A range, between the LOAD and GND terminals - 10R 5W suggested. If using a different value, make sure its power rating is $P \geq 2(I^2*R)$. Make sure PSU1 is set to zero volts to start with.
4. Switch on PSU1 and adjust the voltage until the ammeter reads 500 mA ±2 mA,
5. Measure V_{OUT} with a DVM. The output voltage should read 1.25V ± 0.05 V.

End of Test.

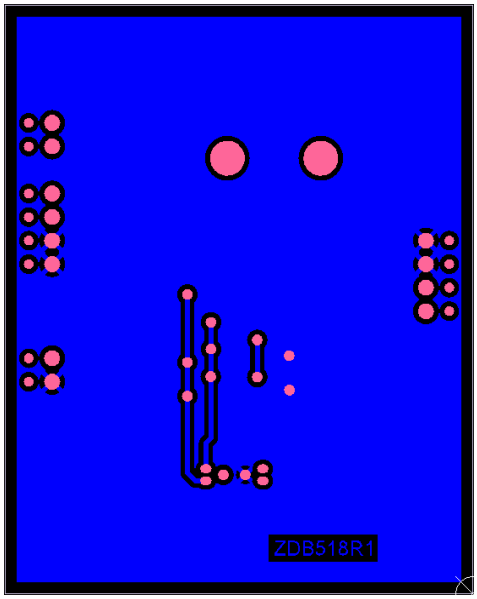
Note: V_{SENSE} can be monitored across connector P1.



Top Silk



Top Copper



Bottom Copper

Figure 6. Board layout

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