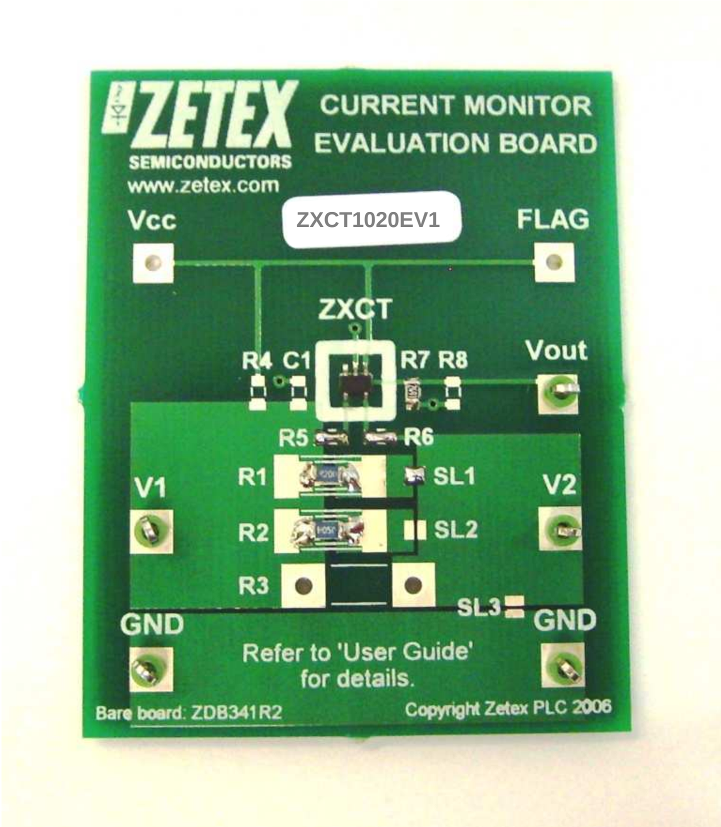


Figure 1 Evaluation board components' layout

DESCRIPTION

The ZXCT1020EV1 evaluation board is intended for the evaluation of the ZXCT1020 device. The ZXCT1020 is a precision high-side current sense monitor. Using this type of device eliminates the need to disrupt the ground plane when sensing a load current. It also has an externally programmable transconductance resistor, thus making it a versatile device to use in many applications.

The device produces a current output that is proportional to the current sampled by a small in-line sensing resistor, R_S. The voltage output is scaled by the choice of R_S (R1, R2 on the evaluation board), R_{GT} (R4 on the evaluation board) and the load resistor (R7 on the evaluation board).

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 (0.1R) 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 1V/A

The printed circuit board is common to other devices in the ZXCT family and contains redundant component positions which will not be discussed here as they are not relevant.

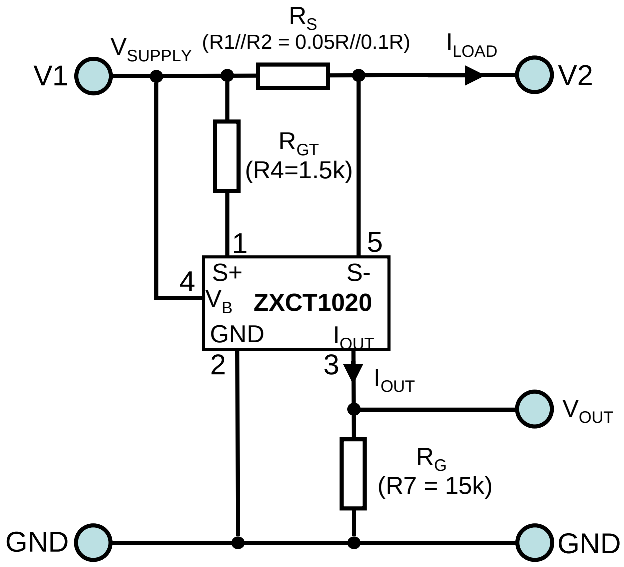


Figure 2 Equivalent circuit diagram for evaluation board ZXCT1020EV1

Operating voltage range: 2.5V to 20V

ORDERING INFORMATION

ORDER NUMBER
ZXCT1020EV1

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

PAD NAMES AND DEFINITIONS

NAME	DESCRIPTION/Usage
V1	Supply Voltage
V2	Connection to Load
VOUT	Output Voltage
FLAG	Not used
GND	0V / Ground
SL1,SL2	Solder Links
V_{CC}	Device pin S+ (connected to V1 via R4)

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 V1) range for the ZXCT1020EV1 is ranges from 2.5V to 20V.

ZXCT1020EV1 Summary

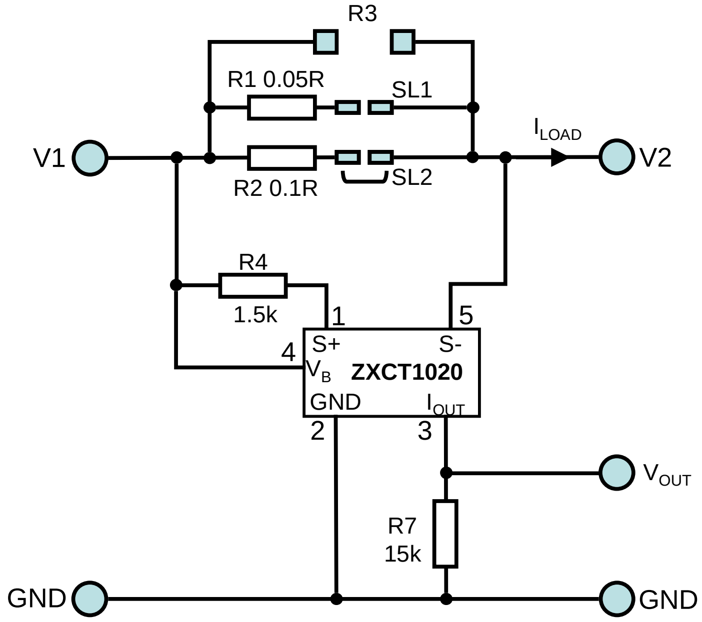


Figure 3 Actual circuit diagram for ZXCT1020EV1

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 100mΩ resistor (R2) is selected by shorting SL2 and opening SL1, resulting in an output of 1V/A.

If both links are shorted the effective resistance is 33.33mΩ giving an output of 333.3mV/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 ZXCT1020 datasheet.

Configuration table for ZXCT1020EV1

LOAD CURRENT (A)	R_{SENSE} (mΩ)	VOUT (V)	SOLDER LINK CONFIGURATION
1.0	100	1.0	Short SL2
1.0	50	0.5	Short SL1
1.0	33.33	0.33	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 I_{OUT} is the voltage dropped across the sensing resistor divided by R_{GT}.

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.

Increasing the value of the gain resistor, R7, also increases the sensitivity but at the expense of a higher output impedance. The criterion for minimum input voltage still applies.

The maximum practical value of the gain resistor is limited by the output conductance of the ZXCT1020 and the output voltage that can be tolerated - in practice the gain resistance should not be greater than about 40k.

The ZXCT1020 is optimized for values of V_{SENSE} around 100mV.

Accuracy

The ZXCT1020 has a typical 2% 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 ZXCT1020EV1 utilizes 1% sense resistors.

COMPONENTS LIST

Ref	Value	Package	Part Number	Manuf-acturer	Notes
R1	50mΩ	2512	LR2512-R050FW	Welwyn	SMD Sense Resistor 1%
R2	100mΩ	2512	LR2512-R100FW	Welwyn	SMD Sense Resistor 1%
R4	1.5k	0805			
R5,R6	0R	Link/0805			
R7	15k	0805			
I/O's		Test loops	100-108	Hughes	Rapid 17-1835
ZXCT		SOT23-5	ZXCT1020E5	ZETEX	

SET-UP AND TEST

The board is preset to give an output Voltage of 1V for a load current of 1A (SL2 is shorted to connect in the 100mΩ (R2) sense resistor). To change the board to give an output Voltage of 1V for a current of 2.0A, de-solder SL2 and short SL1. This connects the 50mΩ (R1) 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)

<u>500mA load test</u>

1. Ensure SL2 is shorted.
2. Connect a resistor in series with the ammeter between the V2 and GND terminals - (10R 5W resistor is suggested, if using a different value, make sure it's power rating is $P \geq 2*I^2*R$).
3. Set ammeter to a suitable range for measuring up to 500mA or 600mA.
4. Set the current limit of PSU1 to 600mA, and set the voltage to 0V.
5. Connect PSU1 to V1.
6. Switch on PSU1 and increase the voltage until the ammeter reads 500mA ± 2mA
7. Measure V_{OUT} with a DVM. The output voltage should read 0.5V ± 25mV.

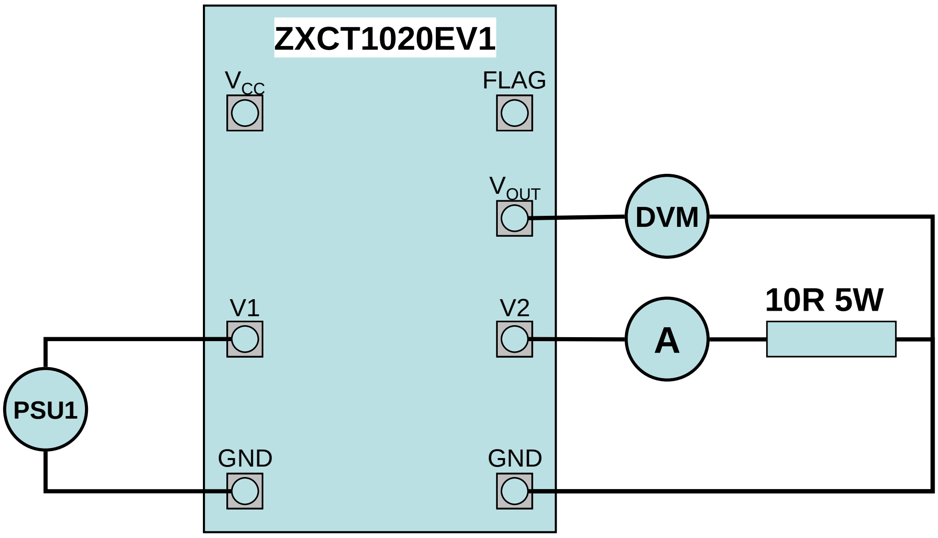
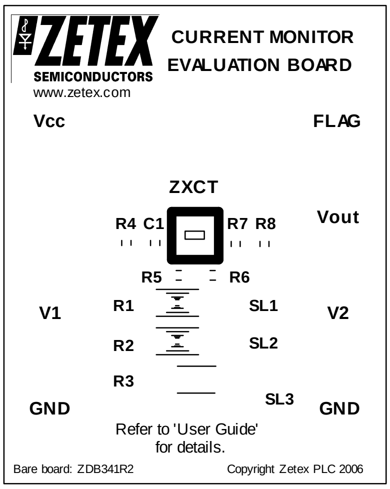
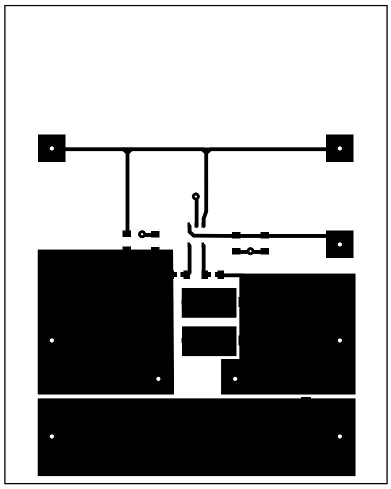


Figure 4 Test diagram for ZXCT1020EV1

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