## LOW OFFSET HIGH-SIDE CURRENT MONITOR

#### **DESCRIPTION**

The ZXCT1021 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

The ZXCT1021 provides a fixed gain of 10 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 sense resistors necessary at higher currents.

The wide input voltage range of 20V down to as low as 2.5V make it suitable for a range of applications. With a minimum operating current of just 25µA, combined with its SOT23-5 package make it suitable for portable better acquirement too. battery equipment too.

### **APPLICATIONS**

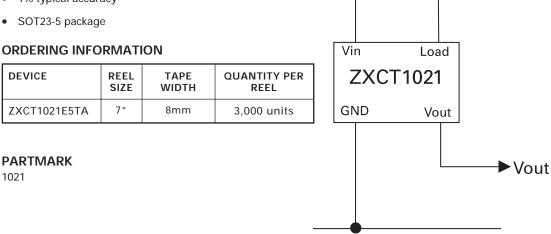
- Battery Chargers
- **Smart Battery Packs**
- DC Motor control
- Over current monitor
- **Power Management**
- Level translating
- Programmable current source

#### **FEATURES**

- · Accurate high-side current sensing
- Output voltage scaling
- 2.5V 20V supply range
- 25μA quiescent current
- 1% typical accuracy

## TYPICAL CIRCUIT APPLICATION

R<sub>sense</sub>



Vin



To load

# **Absolute Maximum Ratings**

 $\begin{array}{ccc} \mbox{Voltage on any pin} & & -0.6\mbox{V to 20V} \\ \mbox{V}_{\mbox{sense}} & & -0.6\mbox{V to Vin } +0.5\mbox{V} \end{array}$ 

Operating Temperature  $-40 \text{ to } 85^{\circ}\text{C}$ Storage Temperature  $-55 \text{ to } 150^{\circ}\text{C}$ Package Power Dissipation  $(T_{A} = 25^{\circ}\text{C})$ SOT23 450mW

# **ELECTRICAL CHARACTERISTICS** Test Conditions $T_A = 25$ °C, $V_{in} = 15$ V

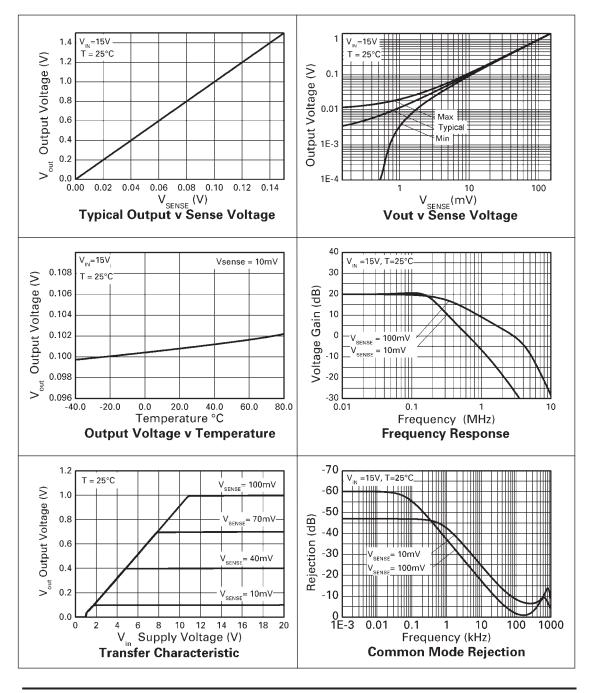
SYMBOL	PARAMETER	CONDITIONS	LIMITS		UNIT	
			Min	Тур	Max	
V <sub>in</sub>	V <sub>CC</sub> range		2.5		20	V
V <sub>out</sub>	Output voltage	V <sub>sense</sub> = 30mV	291	300	309	mV
	(ZXCT1021)	V <sub>sense</sub> = 100mV	0.98	1.00	1.02	V
		V <sub>sense</sub> = 150mV	1.47	1.50	1.53	V
R <sub>out</sub>	Output resistance		10	15	20	ΚΩ
T <sub>c</sub>	Output temperature coefficient			50	300	ppm
Iq	Ground pin current	V <sub>sense</sub> = 0V		25	35	μΑ
V <sub>sense</sub> <sup>(2)</sup>	Sense voltage		0		1.5	V
I <sub>sense</sub>	Load pin input current				100	nA
Acc	Accuracy	V <sub>sense</sub> = 100mV	-2		2	%
Gain	V <sub>out</sub> / V <sub>sense</sub>	V <sub>sense</sub> = 100mV	98	100	102	mV
BW	Bandwidth	V <sub>sense</sub> = 10mV		300		kHz
		V <sub>sense</sub> = 100mV		2		MHz

#### NOTES



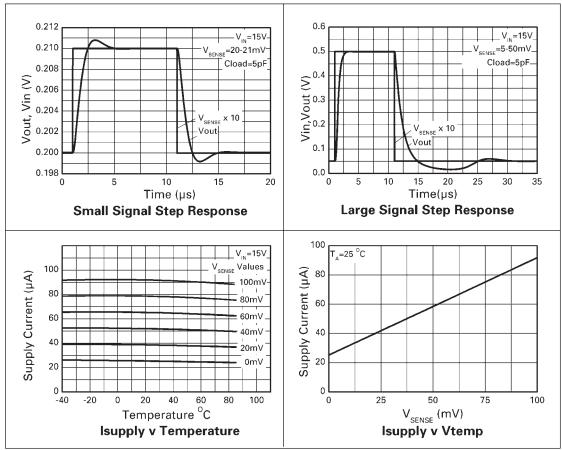
<sup>(2)</sup> V<sub>sense</sub>= V<sub>in</sub> - V<sub>load</sub>

## **TYPICAL CHARACTERISTICS**

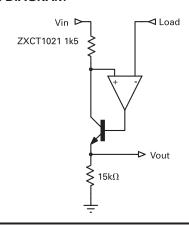




# TYPICAL CHARACTERISTICS



# **BLOCK DIAGRAM**





# **Application Information**

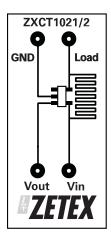
The devices have fixed dc voltage gains of 10, no external scaling resistors are required for the output. Output voltage is simply defined as:

$$V_{out} = 10 \times V_{sense}$$
 (V)

Where  $V_{sense} = V_{in} - V_{Load}$ 

#### PCB trace shunt resistor for low cost solution

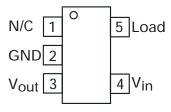
The figure below shows a PCB layout suggestion for a low cost solution where a PCB resistive trace in replacement for a conventional shunt resistor, can be used. The resistor section is 25mm x 0.25mm giving approximately  $150 \text{m}\Omega$  using 1 oz copper. Smaller resistances can be used if required.



Total circuit solution: 1 component. Shows area of 150m $\!\Omega$  sense resistor compared to SOT23 package.

Practical tolerance of the PCB resistor will be around 5% depending on manufacturing methods.

#### **PINOUT**

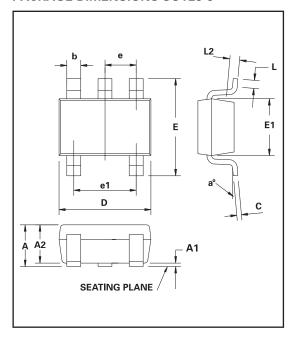


Top view

PIN NAME	PIN FUNCTION
N/C	Not internally connected
GND	Ground
V <sub>out</sub>	Voltage output referenced to GND. Intended to drive high impedance loads
Load	High impedance negative sense voltage input
V <sub>in</sub>	Supply and positive sense voltage input



## **PACKAGE DIMENSIONS SOT23-5**



## **PACKAGE DIMENSIONS**

DIM	Millimetres		Inches		
	MIN	MAX	MIN	MAX	
А	0.90	1.45	0.035	0.057	
A1	0.00	0.15	0.00	0.006	
A2	0.90	1.3	0.035	0.051	
b	0.35	0.50	0.014	0.020	
С	0.09	0.20	0.0035	0.008	
D	2.80	3.00	0.110	0.118	
E	2.60	3.00	0.102	0.118	
E1	1.50	1.75	0.059	0.069	
е	0.95 REF		0.037 REF		
e1	1.90 REF		0.075 REF		
L	0.10	0.60	0.004	0.024	

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Europe	Americas	Asia Pacific	Corporate Headquaters
Zetex GmbH	Zetex Inc	Zetex (Asia) Ltd	Zetex plc
Streitfeldstraße 19	700 Veterans Memorial Hwy	3701-04 Metroplaza Tower 1	Fields New Road, Chadderton
D-81673 München	Hauppauge, NY 11788	Hing Fong Road, Kwai Fong	Oldham, OL9 8NP
Germany	USA	Hong Kong	United Kingdom
Telefon: (49) 89 45 49 49 0	Telephone: (1) 631 360 2222	Telephone: (852) 26100 611	Telephone (44) 161 622 4444
Fax: (49) 89 45 49 49 49	Fax: (1) 631 360 8222	Fax: (852) 24250 494	Fax: (44) 161 622 4446
europe.sales@zetex.com	usa.sales@zetex.com	asia.sales@zetex.com	hq@zetex.com

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