

ZXCT1021 ZXCT1022

LOW OFFSET HIGH-SIDE CURRENT MONITOR

DESCRIPTION

The ZXCT1021/1022 are precision high side current sense monitors. Using this type of device eliminates the need to disrupt the ground plane when sensing a load current.

The ZXCT1021 provides a fixed gain of 10 while the ZXCT1022 has a gain of 100, for applications where minimal sense voltage is required.

The very low offset voltage enables a typical accuracy of 2% 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 25 μ A, combined with its SOT23-5 package make it suitable for portable battery equipment too.

FEATURES

- Accurate high-side current sensing
- Output voltage scaling
- 2.5V – 20V supply range
- 25 μ A quiescent current
- 1% typical accuracy
- SOT23-5 package

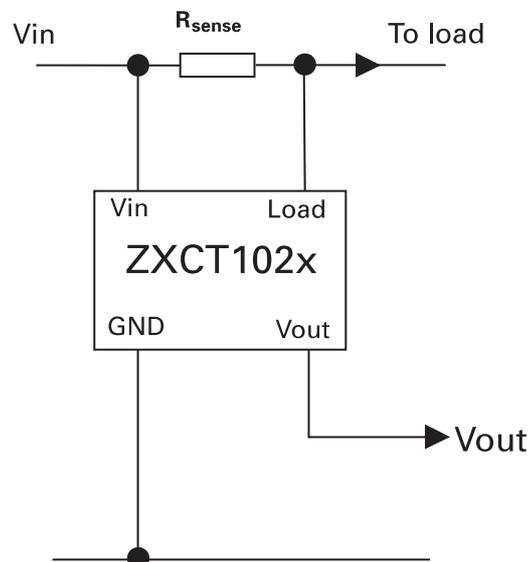
ORDERING INFORMATION

PART NUMBER	PACKAGE	PART MARKING
ZXCT1021E5	SOT23-5	1021
ZXCT1022E5	SOT23-5	1022

APPLICATIONS

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

TYPICAL CIRCUIT APPLICATION



ZXCT1021

ZXCT1022

Absolute Maximum Ratings

Voltage on any pin	-0.6V to 20V (relative to 0v)
V_{sense}	-0.6V to $V_{in} + 0.5V$
Operating Temperature	-40 to 85°C
Storage Temperature	-55 to 125°C
Package Power Dissipation	($T_A = 25^\circ C$)
SOT23	450mW

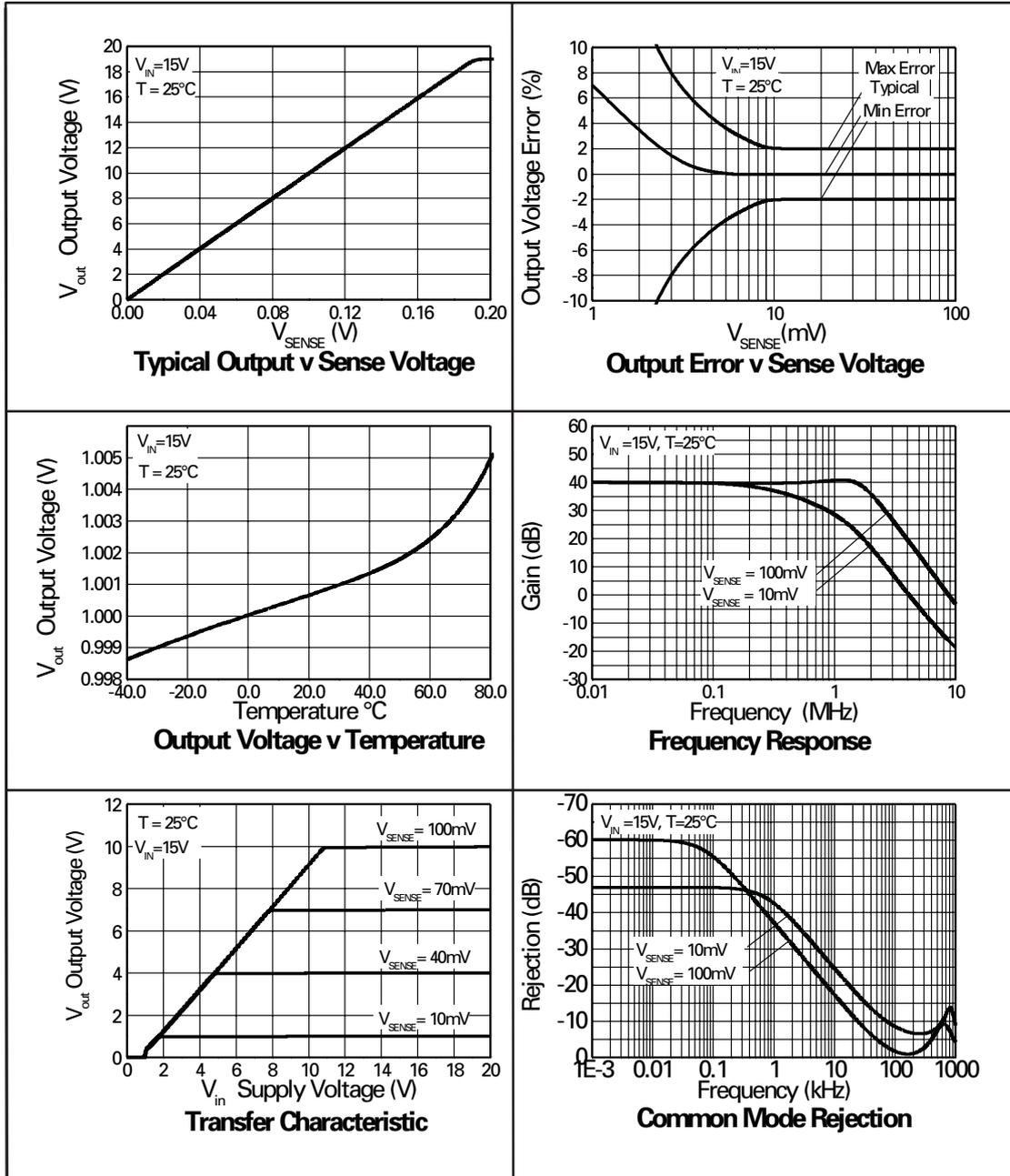
ELECTRICAL CHARACTERISTICS Test Conditions $T_A = 25^\circ C$, $V_{in} = 20V$

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
V_{in}	V_{CC} Range		2.5		20	V
V_{out}	Output Voltage (ZXCT1021)	$V_{sense} = 0V$	0	1	10	mV
		$V_{sense} = 10mV$	98	100	102	mV
		$V_{sense} = 30mV$	294	300	306	mV
		$V_{sense} = 100mV$	0.98	1.00	1.02	V
		$V_{sense} = 150mV$	1.47	1.50	1.53	V
V_{out}	Output Voltage (ZXCT1022)	$V_{sense} = 0V$	0	10	100	mV
		$V_{sense} = 10mV$	0.98	1.0	1.02	V
		$V_{sense} = 30mV$	2.94	3.0	3.06	V
		$V_{sense} = 100mV$	9.8	10.0	10.2	V
		$V_{sense} = 150mV$	14.7	15.0	15.3	V
R_{out}	Output resistance		10	15	20	$K\Omega$
T_c	Output temperature coefficient			50	300	ppm
I_q	Ground pin current	$V_{sense} = 0V$		25	35	μA
V_{sense}^2	Sense Voltage		0		150	mV
I_{sense}	Load pin input current				100	nA
Acc	Accuracy	$V_{sense} = 10mV$	-2		2	%
Gain	V_{out} / V_{sense}	$V_{sense} = 10mV$	98	100	102	mV
BW	Bandwidth	$V_{sense} = 10mVp-p$		300		kHz
		$V_{sense} = 100mVp-p$		2		MHz

$$^2 V_{sense} = V_{in} - V_{load}$$

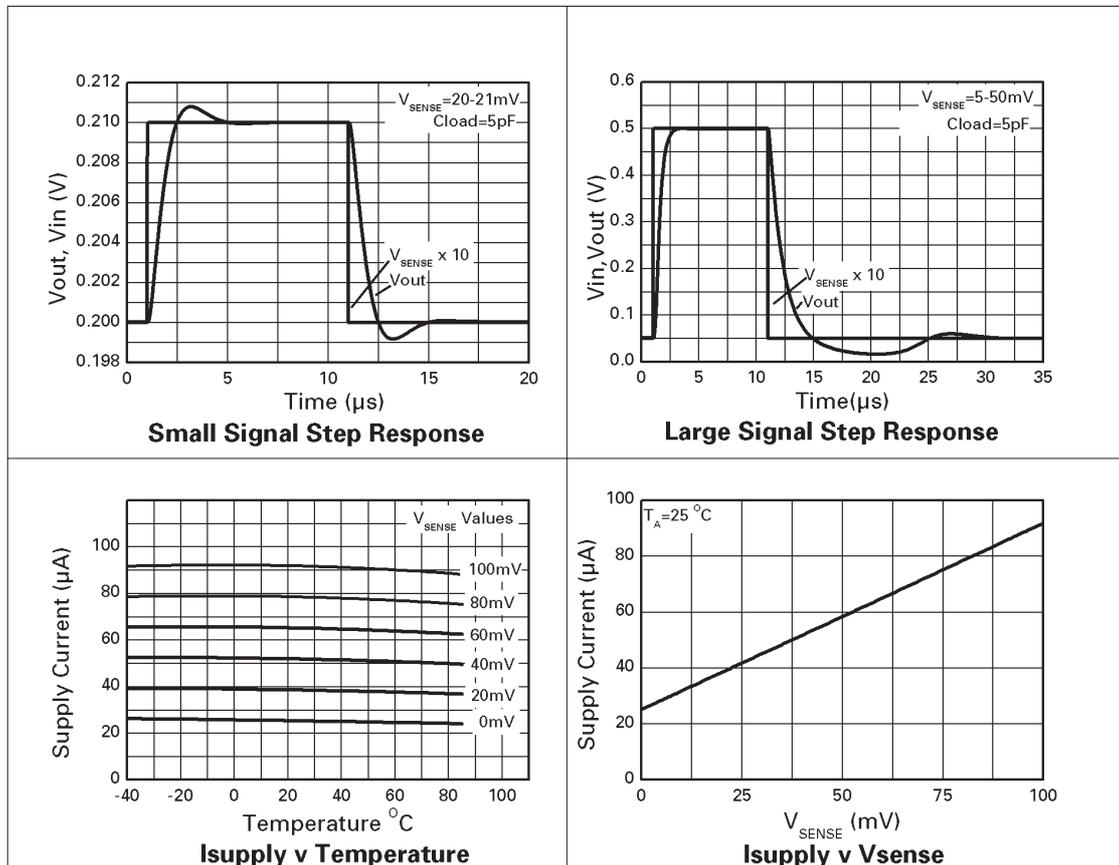
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TYPICAL CHARACTERISTICS

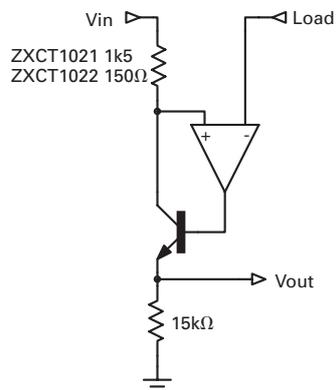


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TYPICAL CHARACTERISTICS



BLOCK DIAGRAM



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Application Information

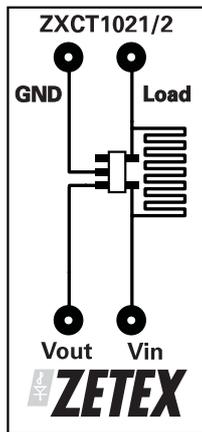
The devices have fixed dc voltage gains of 10 and 100, no external scaling resistors are required for the output. Output voltage is simply defined as:

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

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

PCB trace shunt resistor for low cost solution.

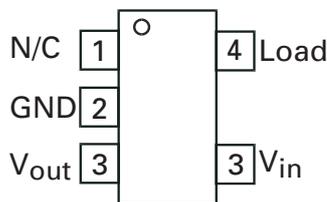
The figure below shows a PCB layout suggestion for a low cost solution where a PCB resistive trace in replacement for a conventional shunt resistor, can be used. The resistor section is 25mm x 0.25mm giving approximately 150mΩ using 1 oz copper. Smaller resistances can be used if required.



Total circuit solution: 1 component. Shows area of 150mΩ 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_{out}	Voltage output referenced to GND. Intended to drive high impedance loads
Load	High impedance negative sense voltage input
V_{in}	Supply and positive sense voltage input

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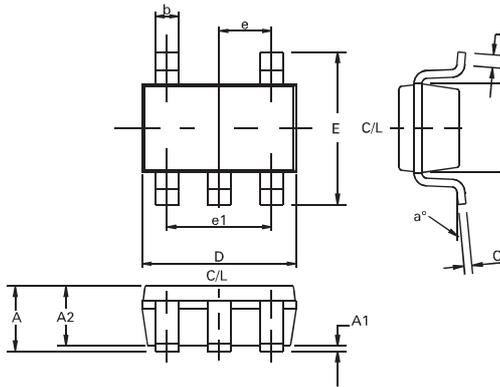
Notes

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Notes

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PACKAGE DIMENSIONS SOT23-5



PACKAGE DIMENSIONS

DIM	Millimetres		Inches	
	MIN	MAX	MIN	MAX
A	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
C	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
e	0.95 REF		0.037 REF	
e1	1.90 REF		0.075 REF	
L	0.10	0.60	0.004	0.024
a°	0	10	0	10

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