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## LOW OFFSET HIGH-SIDE CURRENT MONITOR

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### 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 current.

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 25 $\mu$ A, combined with its SOT23-5 package make it suitable for portable battery equipment too.

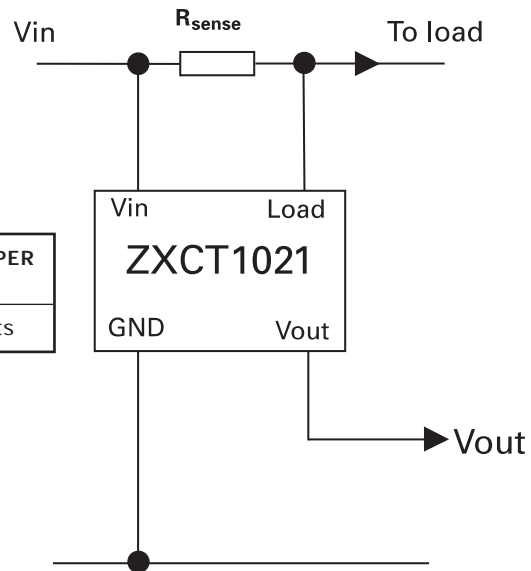
### APPLICATIONS

- 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
- 25 $\mu$ A quiescent current
- 1% typical accuracy
- SOT23-5 package

### TYPICAL CIRCUIT APPLICATION



### ORDERING INFORMATION

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXCT1021E5TA	7"	8mm	3,000 units

### PARTMARK

1021

# ZXCT1021

## Absolute Maximum Ratings

Voltage on any pin	-0.6V to 20V
$V_{sense}$	-0.6V to $V_{in} + 0.5V$
Operating Temperature	-40 to 85°C
Storage Temperature	-55 to 150°C
Package Power Dissipation ( $T_A = 25^\circ C$ )	450mW
SOT23	

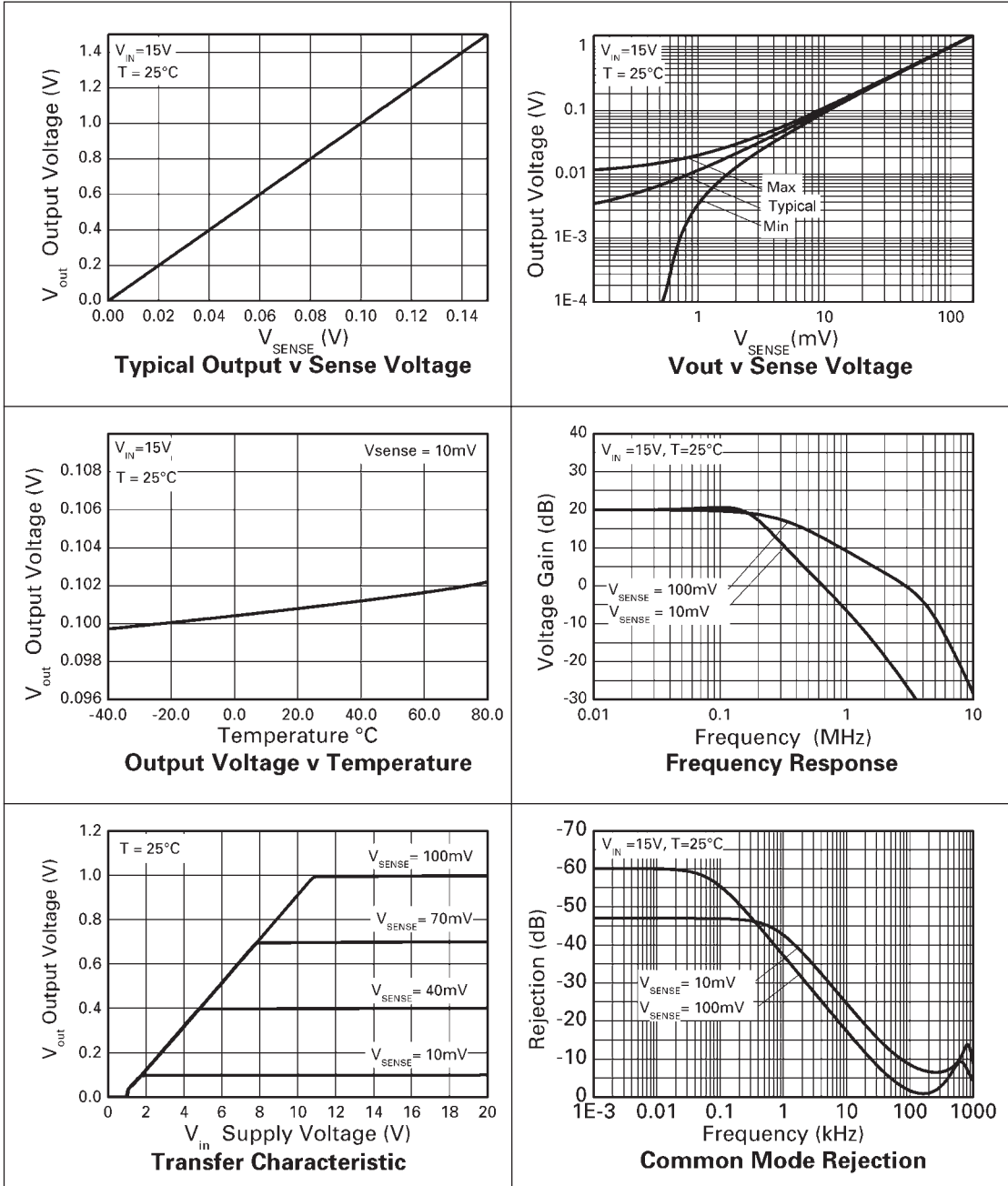
## ELECTRICAL CHARACTERISTICS Test Conditions $T_A = 25^\circ C$ , $V_{in} = 15V$

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
$V_{in}$	$V_{CC}$ range		2.5		20	V
$V_{out}$	Output voltage (ZXCT1021)	$V_{sense} = 30mV$	291	300	309	mV
		$V_{sense} = 100mV$	0.98	1.00	1.02	V
		$V_{sense} = 150mV$	1.47	1.50	1.53	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	$\mu A$
$V_{sense}^{(2)}$	Sense voltage		0		1.5	V
$I_{sense}$	Load pin input current				100	nA
Acc	Accuracy	$V_{sense} = 100mV$	-2		2	%
Gain	$V_{out} / V_{sense}$	$V_{sense} = 100mV$	98	100	102	mV
BW	Bandwidth	$V_{sense} = 10mV$		300		kHz
		$V_{sense} = 100mV$		2		MHz

### NOTES

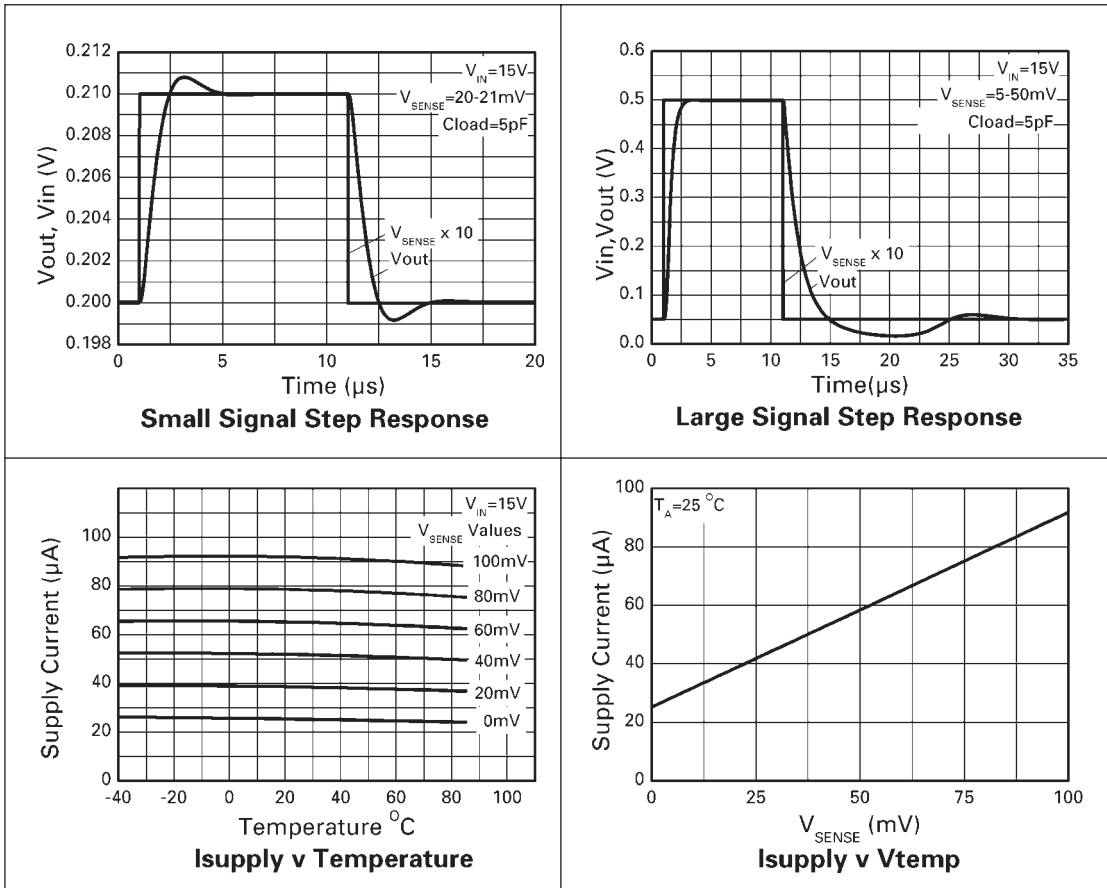
(2)  $V_{sense} = V_{in} - V_{load}$

TYPICAL CHARACTERISTICS

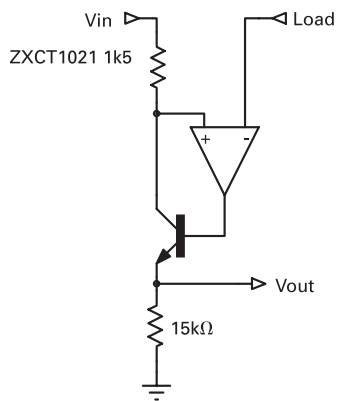


# ZXCT1021

## TYPICAL CHARACTERISTICS



## BLOCK DIAGRAM



# ZXCT1021

## Application Information

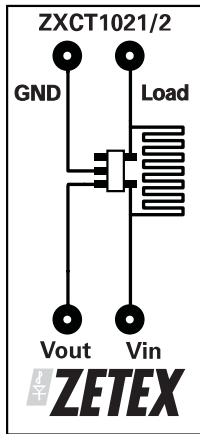
The devices have fixed dc voltage gains of 10, no external scaling resistors are required for the output. Output voltage is simply defined as:

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

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

### PCB trace shunt resistor for low cost solution

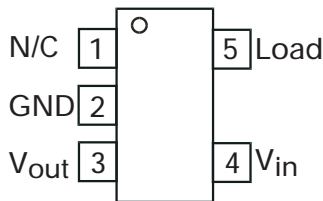
The figure below shows a PCB layout suggestion for a low cost solution where a PCB resistive trace in replacement for a conventional shunt resistor, can be used. The resistor section is 25mm x 0.25mm giving approximately 150mΩ using 1 oz copper. Smaller resistances can be used if required.



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

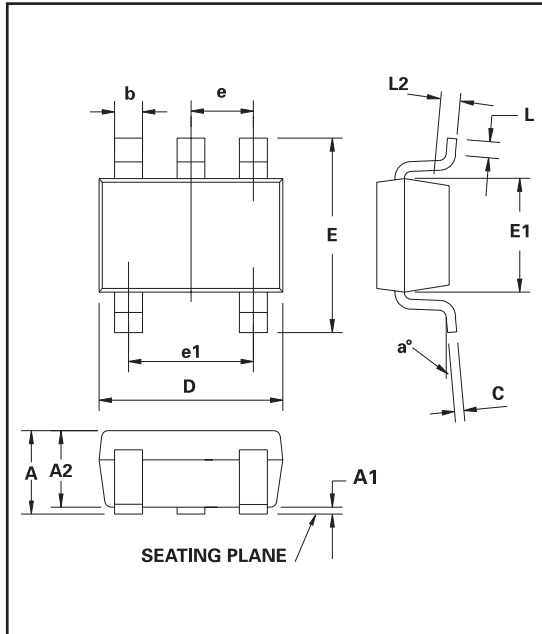


Top view

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

# ZXCT1021

## 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

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