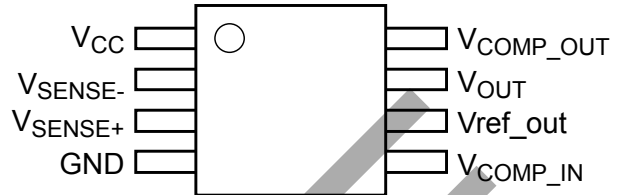


Description

The ZXCT1030 is a high side current sense monitor containing an internal reference and comparator with a non-latching output. Using this device eliminates the need to disrupt the ground plane when sensing a load current.

The wide input voltage range of 20V down to as low as 2.2V make it suitable for a range of applications. Dynamics and supply current are optimized for the processing of fast pulses, associated with switch mode applications.

Pin Assignments



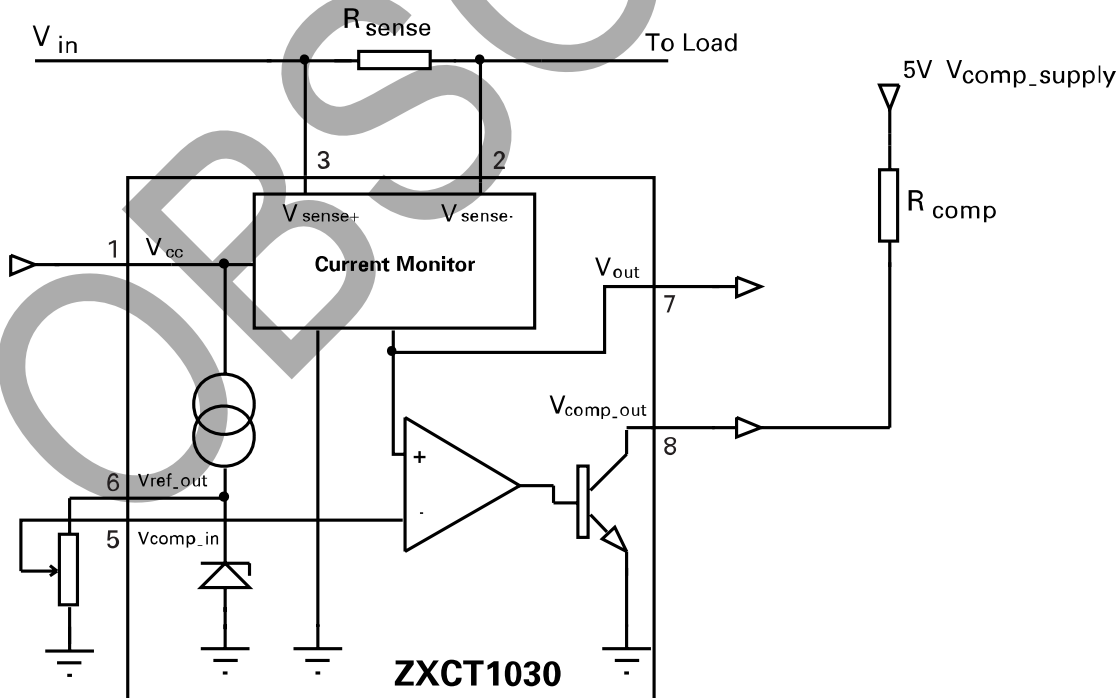
Features

- Low cost, accurate high-side current sensing
- Output voltage scaling
- Up to 18V output
- 2.2V - 20V supply range
- Voltage reference on chip
- Comparator on chip
- SO8 package

Applications

- Battery chargers
- Electronic fuse
- DC motor control
- Over current monitor
- Power management
- Inrush current limiting

Typical Application Circuit



Pin Description

Pin Name	Function
V _{CC}	Supply voltage
V _{SENSE-}	Negative sense input
V _{SENSE+}	Positive sense input
GND	Ground
V _{COMP_IN}	Comparator input, usually a ratio of the reference or other control signal
V _{REF_OUT}	Reference output
V _{OUT}	Current monitor output voltage
V _{COMP_OUT}	Open collector comparator output

Absolute Maximum Ratings

Parameter	Rating	Unit
Voltage on any pin	-0.6 and V _{CC} +0.6	V
Operating Temperature	-40 to 85	°C
Storage Temperature	-55 to 125	°C
Package Power Dissipation	(T _{AMB} = 25)	°C
SO8	700	mW

Recommended Operating Conditions

Parameter	Min	Max	Units
V _{CC}	2.2	20	V
V _{SENSE+}	2.2	V _{CC}	V
V _{SENSE} ^(a)	10	500	mV
V _{OUT}	0	V _{SENSE-} -1V	V
V _{COMP_IN}	0.005	10	V
T _{AMB}	-40	85	°C

Electrical Characteristics (ZXCT1030N8) – Test conditions $T_{AMB} = 25^{\circ}\text{C}$, $V_{IN} = V_{CC} = 15\text{V}$, $R_{COMP} = 10\text{k}\Omega$,

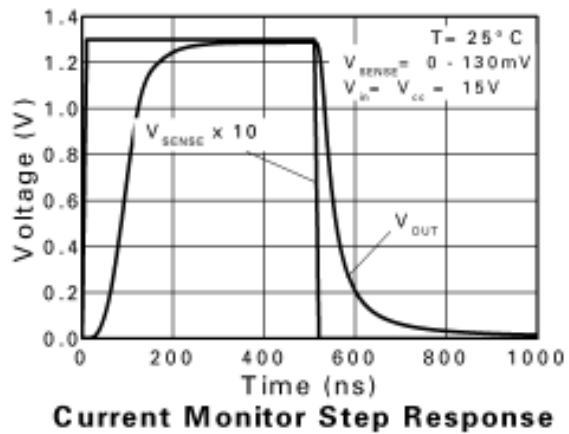
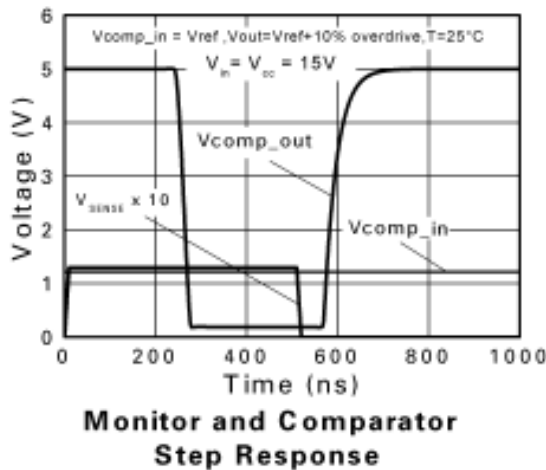
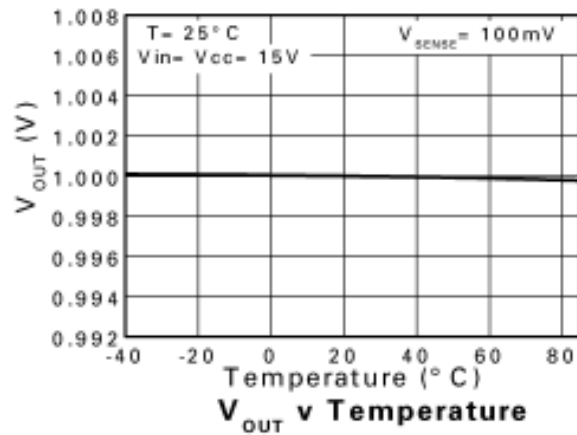
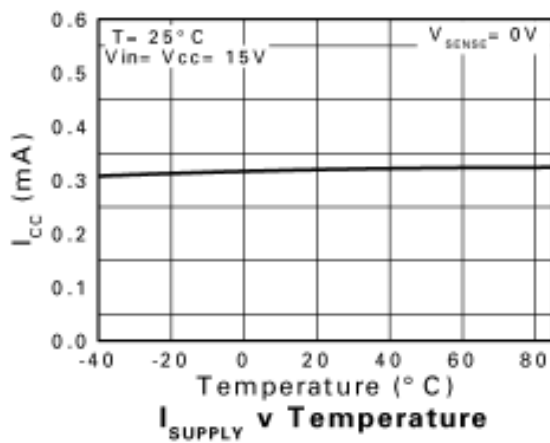
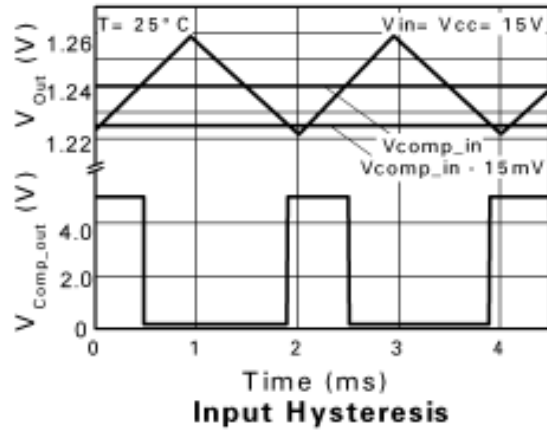
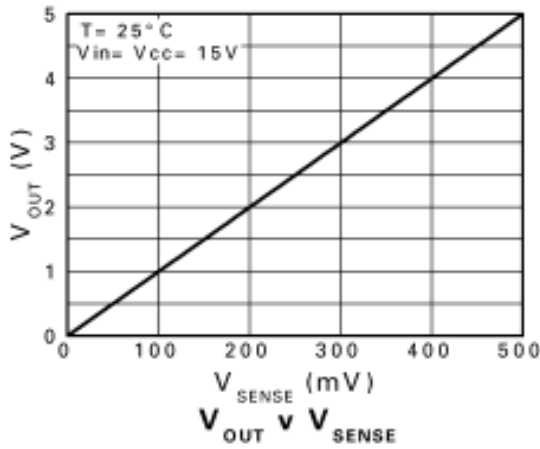
 $V_{COMP_SUPPLY} = 5\text{V}$ unless otherwise stated.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{CC}	V_{CC} Range		2.2		20	V
V_{SENSE+}	Sense+ Range		2.2		V_{CC}	
V_{OUT}	Output Voltage	$V_{SENSE} = 0$ $V_{SENSE} = 10$ $V_{SENSE} = 30$ $V_{SENSE} = 50$ $V_{SENSE} = 100$ $V_{SENSE} = 500$	0 88 284 480 970 4500	2 100 300 500 1000 5000	10 112 316 520 1030 5500	mV
R_{OUT}	Output Resistance	$V_{SENSE-} = 15\text{V}$, $V_{OUT} = 1\text{V}$	1.2	1.5	1.8	k Ω
V_{OUT} T_C	V_{OUT} Temperature Coefficient			30		ppm/ $^{\circ}\text{C}$
I_{CC}	Supply Current	$V_{SENSE-} = 15\text{V}$	170	270	350	μA
I_{SENSE+}	V_{SENSE+} Input Current			48	90	μA
I_{SENSE-}	V_{SENSE-} Input Current	$V_{SENSE-} = 14.9\text{V}$		70	220	nA
$V_{CM(MIN)}^{(B)}$	Minimum Active Common Mode Voltage	$V_{CC} = 15\text{V}$ $V_{COMP_SUPPLY} = 5\text{V}$ $V_{COMP_IN} = V_{REF}$ $V_{SENSE} = 10\text{mV}$	2.8			V
A_{CC}	Accuracy	$V_{SENSE} = 100\text{mV}$	-3		3	%
GAIN	V_{OUT}/V_{SENSE}	$V_{SENSE} = 100\text{mV}$	9.7	10.0	10.3	
BW	Bandwidth	$V_{SENSE} = 10\text{mVp-p}$ $V_{SENSE} = 100\text{mVp-p}$		3 6		MHz
COMPARATOR						
V_{COMP_IN}	Input Voltage		0.005		10	V
V_H	Hysteresis			15		mV
I_B	Input Bias		5	80	150	nA
T_D	Propagation Delay			100		ns
V_{OL}	Output Voltage Low		30	150	200	mV
V_{OH}	Output Voltage High				V_{COMP_SUPPLY}	
I_{OL}	Output Sink Current	$V_{ol} = 0.4\text{V}$	2			mA
I_{OH}	Output High Leakage Current				1.0	μA
Voltage Reference						
V_{REF}		Reference Current = +300 μA to -5 μA	1.200	1.240	1.280	V
Delta V_{REF}	Change in V_{REF}	SOURCE 5 μA to SINK 300 μA		10		mV
T_C				30		ppm/ $^{\circ}\text{C}$
PSR	Supply Rejection			0.01		%/V

Notes: (a) $(V_{SENSE+}) - (V_{SENSE-})$
 (b) Level of V_{SENSE+} where comparator output defaults to 'off'.

OBSOLETE – PART DISCONTINUED

Typical Application Circuits



Voltage output current monitor

Referring to the block diagram, the current monitor takes the small voltage developed across the sense resistor (V_{SENSE}) and transfers it from the large common mode supply voltage to a ground referenced signal with a gain of 10. The sense input common mode range is 2.2V to 20V. In this range, a linear output voltage is delivered.

Reference

The bandgap reference allows the comparator to compare the translated V_{SENSE} with threshold value chosen by the user which can be any voltage from 0 to 1.24V, configured by two external resistors which forms V_{COMP_IN} .

The output current which can be drawn from the comparator reference (I_{REF} source) is limited to 5 μ A, making potentiometers $\geq 250k\Omega$ suitable for setting a threshold level. Where a lower potentiometer resistor value is used, an additional resistor value should be inserted between V_{REF} and V_{CC} to maintain sufficient current for the reference. (as shown in Figure 1).

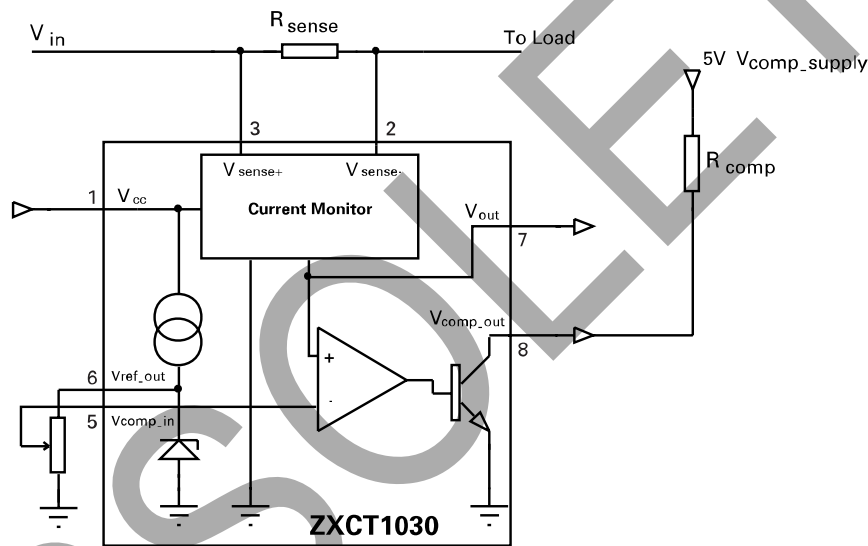


Figure 1: External Resistor for Reference Level

The voltage reference has a maximum current sink capability. This magnitude of current will be influenced by the value of R_1 which is inserted between V_{REF} and V_{CC} . The value of current flowing through R_1 can be expressed as:

$$I = (V_{CC} - V_{REF}) / R_1$$

Comparator

The open collector output is active low and is asserted when $V_{SENSE} \times 10 (V_{OUT}) > V_{COMP_IN}$. It can be connected to any voltage rail up to V_{IN} via a pull-up resistor. Suggest values for the resistor are in the range of 10-100k Ω .

In the case where high load currents or a short circuit occurs, thus reducing the common mode signals ($V+$, $V-$) typically below 2.2V, the comparator will default to the asserted state. This can eliminate a closed loop system 'latch-up' condition, allowing the controller to remove the applied power.

Stability

To ensure stable operation of the ZXCT1030, it is recommended a decoupling capacitor is placed across the V_{CC} and ground connections. A ceramic 10 μ F will be adequate.

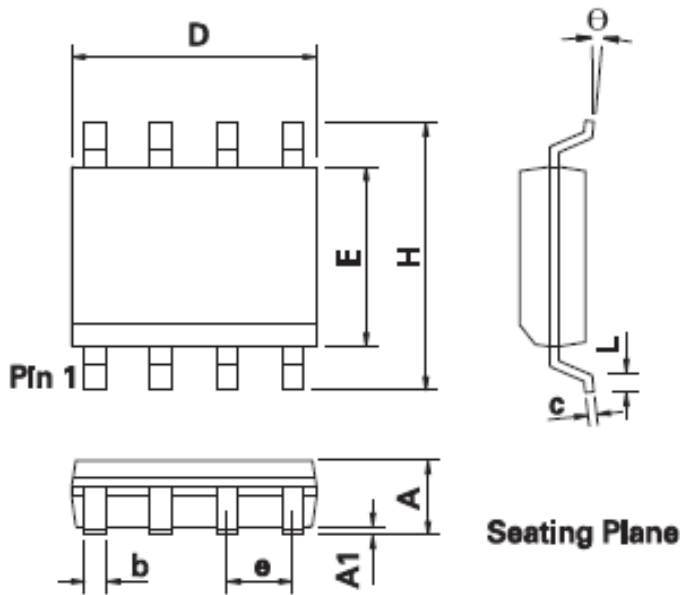
Ordering Information*

Device	Status(*)	Package	Device Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per reel
ZXCT1030X8TA	Obsolete	MSOP8	ZXCT1030	7	12	1000
ZXCT1030N8TA	Active	SO8	ZXCT1030	7	12	500

Notes: *ZXCT1030X8TA is obsolete for more device information please check our obsolete products search on diodes website

OBSOLETE - PART DISCONTINUED

Package Outline – SO8



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	theta	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

Note: Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

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