

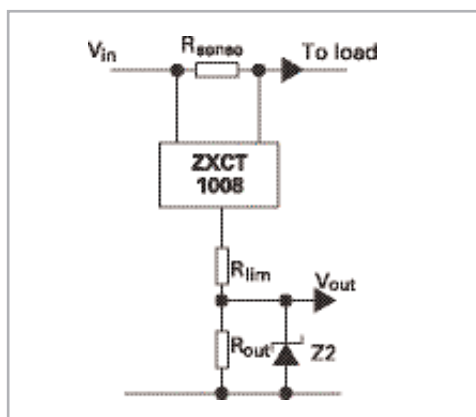
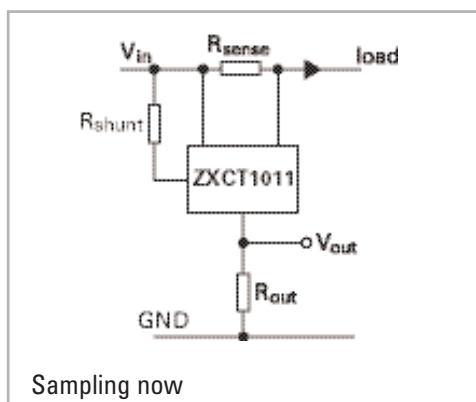
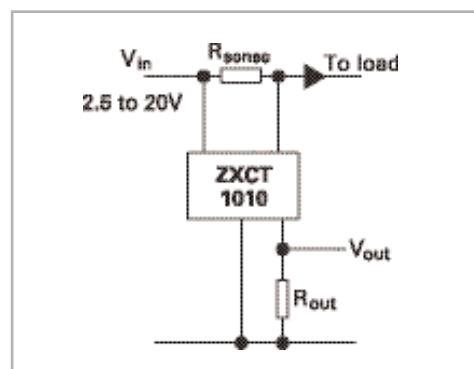
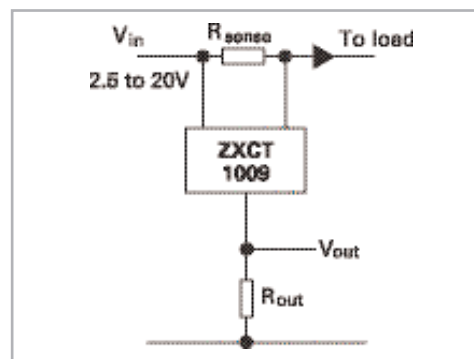
ZXCT1008, ZXCT1009, ZXCT1010 and ZXCT1011

The ZXCT1008 and ZXCT1009 are the simplest of the current monitors. The output is a current which is proportional to the sense voltage, measured across a low value shunt resistor, R_{sense} . The output current can be converted to a voltage and scaled by choice of an appropriate resistor, R_{out} .

Quiescent current of only $4\mu\text{A}$ has minimal impact on system power efficiency.

Operating voltage is from 2.5V to 20V, which makes these parts suitable for a wide range of applications. The operating voltage range can be offset by including a Zener diode in the output pin.

The ZXCT1010 has the same characteristics as the ZXCT1009 but with a separate ground pin to avoid the circuit current flowing through the output resistor. This reduces the current offset and improves accuracy particularly at lower sense voltages.



The ZXCT1011 uses an external resistor to define a reference current. This results in a much lower temperature coefficient, giving better accuracy at temperature extremes without losing any of the parameters found in ZXCT1008/9 devices.

The ZXCT1008 has been characterized for operation in automotive applications. The device withstands high voltage transients similar to those found in automotive systems, including load dump and reverse battery connection. The inclusion of resistor R_{lim} restricts current flow to safe levels during transient incidents. An optional Zener Z2 is included to protect the circuitry connected to V_{out} .

ZXCT1021 and ZXCT1022

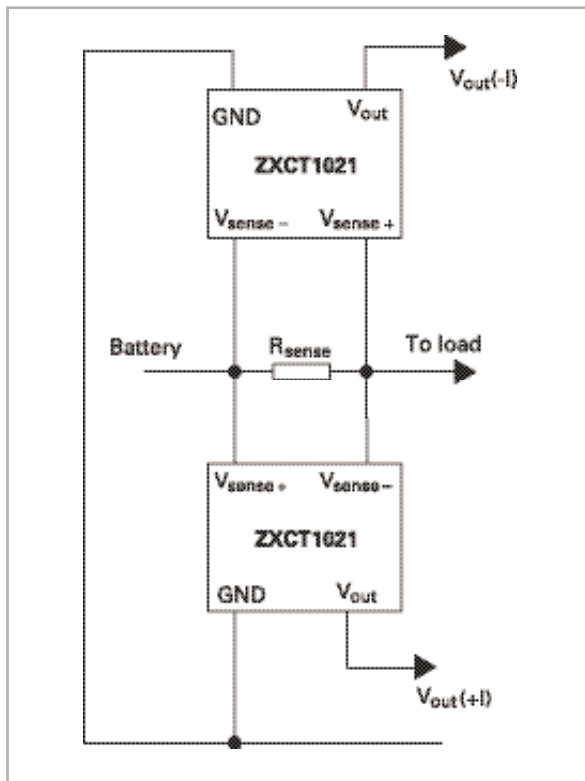
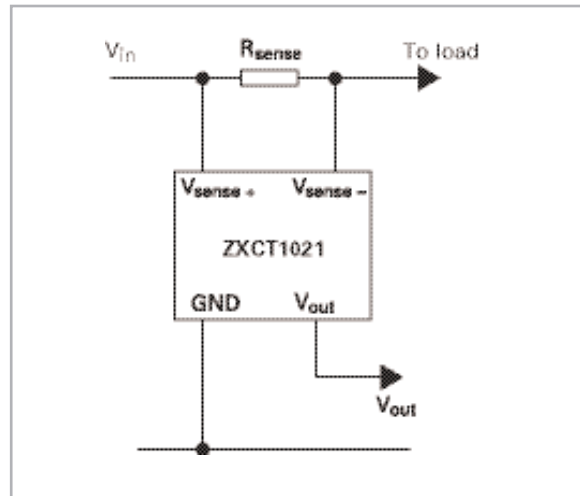
The ZXCT1021 and ZXCT1022 are voltage output current monitors, with fixed gain scaling. The output voltage is proportional to the sense voltage, measured across the low value shunt resistor, R_{sense} .

$$V_{out} = \text{Gain} \times V_{sense}$$

The output is scaled internally by 10 on the ZXCT1021 and 100 on the ZXCT1022. This scaling allows low value sense resistors to be used, thus reducing power dissipation and voltage drop.

Operating voltage range is 2.5V to 20V and quiescent current of only 25 μ A.

The ZXCT1021 and ZXCT1022 are pin compatible with the ZXCT1010, which provides an easy upgrade path for improved performance.



In applications such as battery monitoring, it is necessary to measure current flowing in two directions. This can be achieved with the ZXCT series by connecting 2 devices back to back, as shown in the applications drawing.

With flow from the battery to the load, the lower ZXCT1021 V_{out} is proportional to the current flow. When the battery is under charge then the upper ZXCT1021 V_{out} is proportional to the charge current.

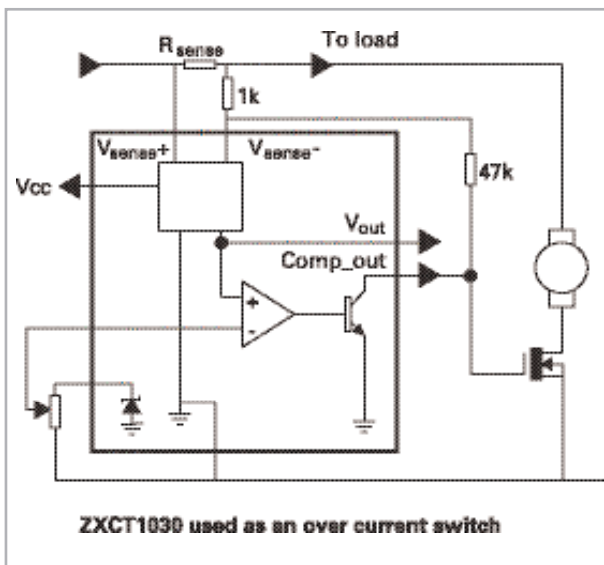
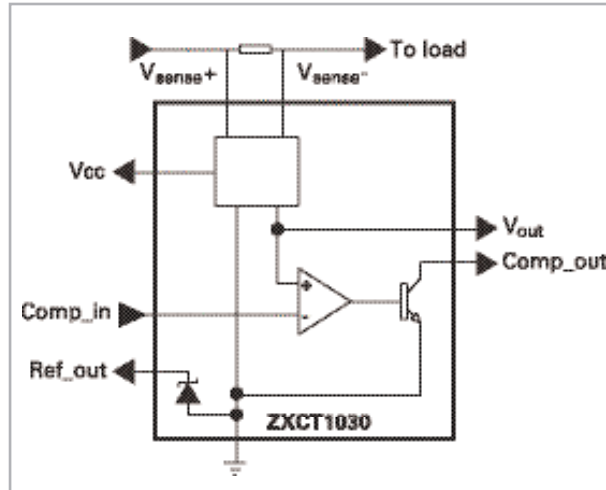
The ZXCT1008, ZXCT1009, ZXCT1010 and ZXCT1022 can be configured in this way to provide bi-directional current measurement.

ZXCT1030

The ZXCT1030 is a voltage output current monitor with fixed gain scaling of 10. A non-latching output comparator and 1.24V voltage reference are also included on-chip to make more integrated solutions possible.

Operating voltage range is 2.2V to 20V and quiescent current is only 270µA.

A separate V_{CC} supply ensures the device gives an output under short circuit conditions. When the V_{sense+} and V_{sense-} falls below about 2.2V, then the comparator defaults to the asserted state.



The on-chip comparator and reference provides functions commonly used for current and power control. By the addition of an N-channel switch and a few resistors it is possible to make an electronic fuse.

In normal operation V_{out} is proportional to the load current. The comparator is not asserted, and the NMOS switch is on with as the gate is high. With an over current fault the comparator is asserted and the internal transistor turns on which causes the external NMOS switch to turn off. Current flowing through the 1kΩ resistor generates a voltage across the monitor which is equivalent to an over current fault, which keeps the switch off.

The system is reset by forcing V_{out} to ground, or by a power up cycle. The current trip threshold is set with an external potential divider.

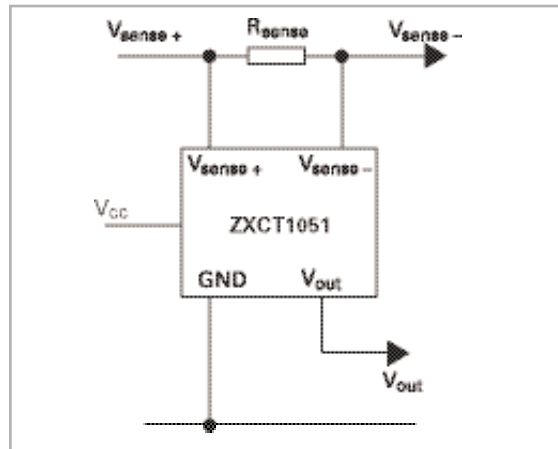
Advanced Information

ZXCT1051

The ZXCT1051 is a low-side voltage output current monitor designed to measure at voltages ranging from under supply to close to ground. This makes the device suitable for systems which need to function under short circuit conditions. An auxiliary power supply is required to feed the device and keep the internal circuitry active.

V_{CC} range is 20V to 3V and V_{sense+} is $V_{CC}-2V$ to 0V. Supply current is 50 μ A and the performance is similar to the ZXCT1021, with internal gain setting of 10.

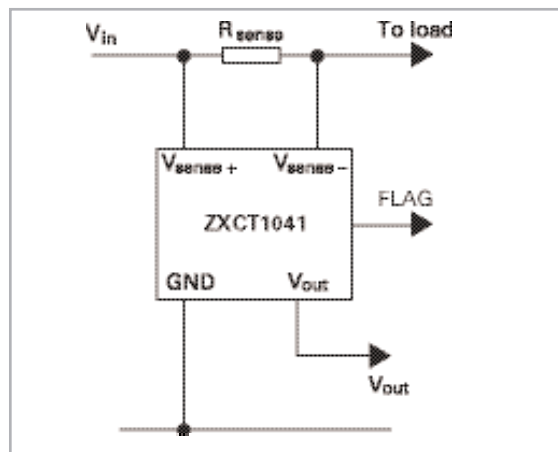
Sampling now



ZXCT1041

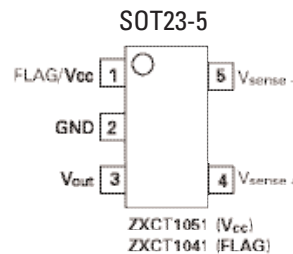
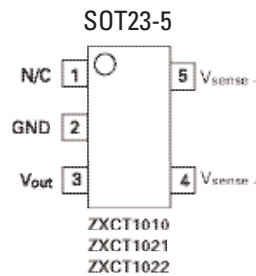
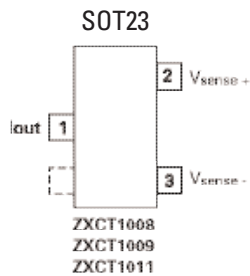
The ZXCT1041 is a bidirectional voltage output current monitor with direction flag. The flag is an open collector output enabling it to be coupled to a wide range of logic level voltages. The voltage output pin is analog and is internally scaled to 10 times V_{sense} .

The ZXCT1041 operates from 2.7V to 20V enabling it to work in a wide range of applications including automotive, motor control and battery gas-gauging.



Package Pin-outs

The ZXCT series parts use small SOT23 and MSOP8 packages. The pin-out is designed to be compatible where possible to allow easy migration between parts.



Applications include:

- Automotive Motor control, solenoid drive, over current detection, lamp failure detection.
- Consumer Power adapters, battery charging, battery management
- Industrial Power supply current control, DC motor control, electronic fuse
- Telecom Power amplifier control loop, supply current monitoring, hot swap inrush current limiting.

Application and design notes include:

- AN39 Current measurement applications handbook - explores the factors for AC and DC current measurement and the implications on cost and performance for different approaches. Basic application topologies are analysed including typical example calculations for configuration.
- AN45 This application note highlights the problems associated with measuring various current levels over a broad range of operating voltage levels. The circuits outlined demonstrate how a 20V current monitor can be used in applications with supply rails up to 250V.
- DN77 Current measurement in high transient voltage environments - considers how the ZXCT1009 withstands and reacts in an environment where high transient voltages are present.

New application notes, design notes and technical papers are generated regularly by Zetex and are available from the web site, www.zetex.com/zxct



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