

## Brief Description

The ZSC31014 is a CMOS integrated circuit for highly accurate amplification and analog-to-digital conversion of differential and half-bridge input signals. The ZSC31014 can compensate the measured signal for offset, 1<sup>st</sup> and 2<sup>nd</sup> order span, and 1<sup>st</sup> and 2<sup>nd</sup> order temperature (Tco and Tcg). It is well suited for sensor-specific correction of bridge sensors. Digital compensation of signal offset, sensitivity, temperature drift, and non-linearity is accomplished via an internal digital signal processor running a correction algorithm with calibration coefficients stored in a non-volatile EEPROM.

The ZSC31014 is adjustable to nearly all piezo-resistive bridge sensors. Measured and corrected bridge values are provided at digital output pins, which can be configured as I<sup>2</sup>C<sup>™</sup>\* or SPI. The digital I<sup>2</sup>C<sup>™</sup> interface can be used for a simple PC-controlled calibration procedure to program calibration coefficients into an on-chip EEPROM. The calibrated ZSC31014 and a specific sensor are mated digitally: fast, precise, and without the cost overhead associated with trimming by external devices or laser trimming.

The ZSC31014's integrated diagnostics functions are well suited for safety-critical applications.

## Features

- High accuracy ( $\pm 0.1\%$  FSO @ -25 to +85°C;  $\pm 0.25\%$  FSO @ -40 to +125°C)
- 2<sup>nd</sup> order charge-balancing analog-to-digital converter provides low noise, 14-bit data at sample rates exceeding 2kHz
- Fast power-up to data output response: 3ms at 4MHz
- Digital compensation of sensor offset, sensitivity, temperature drift, and non-linearity
- Eight programmable analog gain settings combine with a digital gain term; accommodates bridges with spans <1mV/V and high offset
- Internal temperature compensation for sensor correction and for corrected temperature output
- 48-bit customer ID field for module traceability

\* I<sup>2</sup>C<sup>™</sup> is a trademark of NXP.

## Benefits

- Simple PC-controlled configuration and single-pass digital calibration via I<sup>2</sup>C<sup>™</sup> interface – quick and precise; SPI option for measurement mode
- Eliminates need for external trimming components
- On-chip diagnostic features add safety to the application (e.g., EEPROM signature, bridge connection checks, bridge short detection).
- Low-power Sleep Mode lengthens battery life
- Enables multiple sensor networks

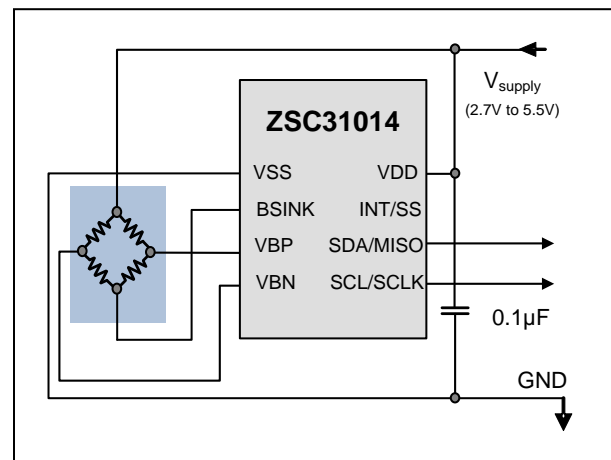
## Available Support

- Evaluation Kit
- Application Notes
- Mass Calibration Solution

## Physical Characteristics

- Wide supply voltage capability: 2.7V to 5.5V
- Current consumption as low as 70µA depending on programmed sample rate
- Low-power Sleep Mode (<2µA @ 25°C)
- Operation temperature: -40°C to +125°C
- Small SOP8 package

### ZSC31014 Application: I<sup>2</sup>C<sup>™</sup> Interface, Low-Power Bsink Option, Internal Temperature Correction



**ZSC31014 Block Diagram**

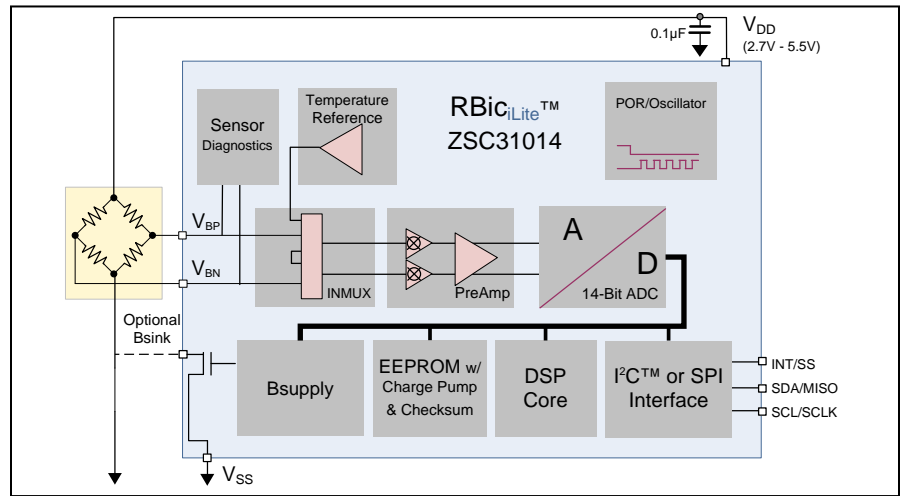
**Applications:**

**Industrial:** building automation, data loggers, pressure meters, leak detection monitoring

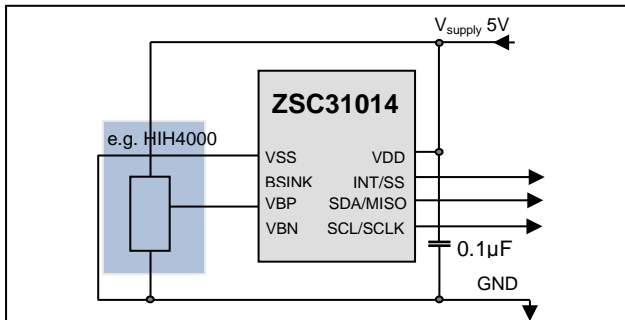
**Medical:** infusion pumps, blood pressure meters, air mattresses, apnea monitors

**White Goods / Appliances:** fluid level, refrigerant

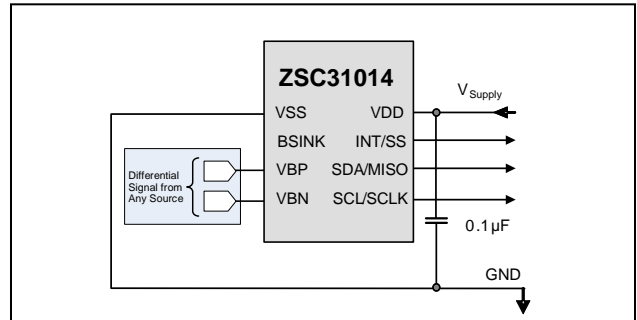
**Consumer:** body monitors, portable monitors, desktop weather stations, bathroom scales, toys/games



**Application: Half-Bridge Voltage Measurement**



**Application: Generic Differential A2D Converter**



**Ordering Examples** (Refer to section 10 in the data sheet for additional options.)

Sales Code	Description	Package
ZSC31014EAB	ZSC31014 Die — Temperature range: -40°C to +125°C	Unsawn on Wafer
ZSC31014EAC	ZSC31014 Die — Temperature range: -40°C to +125°C	Sawn on Wafer Frame
ZSC31014EAG1	ZSC31014 SOP8 (150 mil) — Temperature range: -40° to +125°C	Tube: add "-T" to sales code / Reel: add "-R"
ZSC31014KIT	ZSC31014 SSC Evaluation Kit: Communication Board, SSC Board, Sensor Replacement Board, USB Cable, 5 IC Samples (software can be downloaded on <a href="http://www.IDT.com/ZSC31014">www.IDT.com/ZSC31014</a> )	

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