

## Brief Description

ZSC31050 is a CMOS integrated circuit for highly accurate amplification and sensor-specific correction of bridge sensor and temperature sensor signals. The device provides digital compensation of sensor offset, sensitivity, temperature drift, and non-linearity via a 16-bit RISC microcontroller running a polynomial correction algorithm.

The ZSC31050 accommodates virtually any bridge sensor type (e.g., piezo-resistive, ceramic thick-film, or steel membrane based). In addition, it can interface to a separate temperature sensor. The bi-directional digital interfaces (I<sup>2</sup>C, SPI, and ZACwire™) can be used for a simple PC-controlled one-pass calibration procedure to program a set of calibration coefficients into an on-chip EEPROM. A specific sensor and a ZSC31050 can be mated digitally: fast, precise, and without the cost overhead associated with trimming by external devices or laser. The ZACwire™ interface enables an end-of-line calibration of the sensor module.

Typical applications for the ZSC31050 include industrial, medical, and consumer products. It is specifically engineered for most resistive bridge sensors; e.g., sensors for measuring pressure, force, torque, acceleration, angle, position, and revolution.

## Benefits

- No external trimming components required
- PC-controlled configuration and calibration via digital bus interface – simple, low cost
- High accuracy ( $\pm 0.1\%$  FSO @  $-25$  to  $85^{\circ}\text{C}$ ;  $\pm 0.25\%$  FSO @  $-40$  to  $125^{\circ}\text{C}$ ) \*

## Available Support

- Evaluation kit available
- Support for industrial mass calibration available
- Quick circuit customization possible for large production volumes

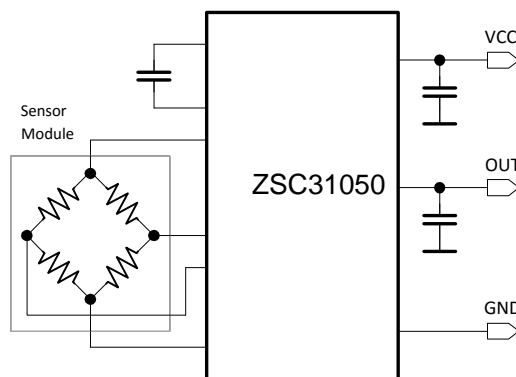
## Features

- Digital compensation of sensor offset, sensitivity, temperature drift, and nonlinearity
- Accommodates nearly all resistive bridge sensor types (signal spans from 1mV/V up to 275mV/V)
- Digital one-pass calibration: quick and precise
- Selectable compensation temperature source: bridge, thermistor, or internal or external diode
- Output options: voltage (0 to 5V), current (4 to 20mA), PWM, I<sup>2</sup>C, SPI, ZACwire™ (one-wire interface), alarm
- Adjustable output resolution (up to 15 bits) versus sampling rate (up to 3.9kHz)
- Current consumption: 2.5mA (typical)
- Selectable bridge excitation: ratiometric voltage, constant voltage, or constant current
- Input channel for separate temperature sensor
- Sensor connection and common mode check (sensor aging detection)
- AEC-Q100 qualification (temperature grade 0)

## Physical Characteristics

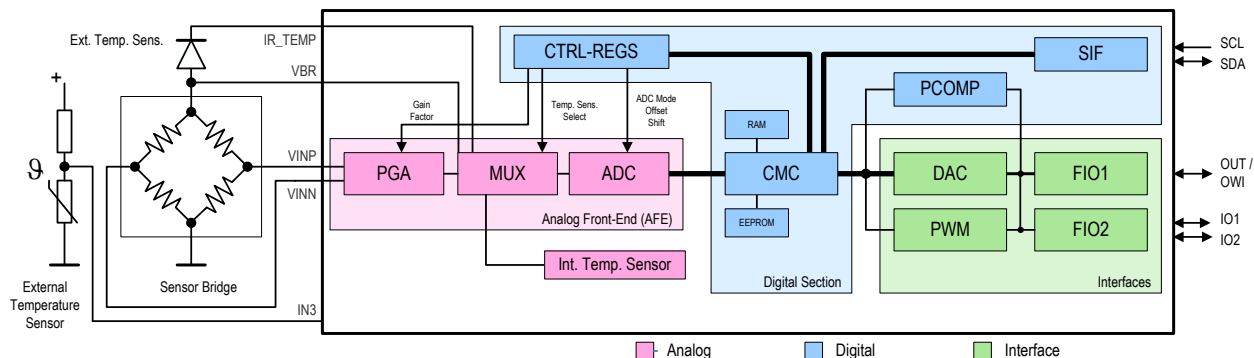
- Operation temperature  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  ( $-40^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$  de-rated, depending on product version)
- Supply voltage: 2.7V to 5.5V;  
with external JFET: 5V to 48 V
- Available in 16-SSOP package or as die

## Basic Circuit Diagram



\* Digital output signal.

## ZSC31050 Block Diagram



### Typical Applications:

#### Consumer Goods

- Weight scales
- Flow meters
- Strain gauges
- Load meters
- HVAC

#### Industrial Applications

- 4-20mA transmitters
- Intelligent sensor networks
- Process automation
- Factory automation

#### Portable Devices

- Altimeters
- Blood pressure monitors

#### Automotive Sensors \*

- Oil pressure
- Temperature sensing
- Strain gauges

\* AEC-Q100 qualified

## Ordering Information *(See section 8 in the data sheet for additional options.)*

Product Sales Code	Description	Package
ZSC31050FEB	ZSC31050 Die — Temperature range: -40°C to +150°C	Unsawn on Wafer
ZSC31050FEC	ZSC31050 Die — Temperature range: -40°C to +150°C	Sawn on Wafer Frame
ZSC31050FEG1	ZSC31050 16-SSOP — Temperature range: -40°C to +150°C	Add "-T" for tube or "-R" for reel to sales code
ZSC31050KITV3P1	ZSC31050 SSC Evaluation Kit V3.1: ZSC31050 Evaluation Board, SSC Communication Board, SSC Sensor Replacement Board, five ZSC31050 16-SSOP samples. Software is downloadable.	
ZSC31050MCSV1P1	Modular Mass Calibration System (MSC) V1.1 for ZSC31050: Four Mass Calibration Boards; SSC Communication Board; four ZSC31050 Mass Calibration Reference Boards, each with a ZSC31050 sample mounted; 30m 10-wire flat cable; 100 connectors. Software is downloadable.	

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