

## Description

The ZSSC4169 is member of IDT's family of CMOS integrated circuits for highly accurate amplification and sensor-specific correction of differential bridge sensor element signals. Featuring a maximum analog pre-amplification in the range of up to 200, the ZSSC4169 is adjustable to nearly all resistive bridges. This datasheet specifies the specific configuration ZSSC4169\_0500\_14, which is for a single, full bridge input on pins BR1P and BR1N.

Digital compensation of offset, gain, sensitivity, temperature drift, and nonlinearity is accomplished via a 16-bit RISC microcontroller. Calibration coefficients and configuration data are stored in the ZSSC4169 nonvolatile memory (NVM), which is reliable in automotive applications.

The ZSSC4169\_0500\_14 configuration supports using the internal PTAT or external diodes as temperature references.

Measured values are provided via a digital SENT interface. The SENT interface enables transmission of sensor data via its Fast Channel as well as transmission of supplementary data via its Serial Data Message (SDM) Channel (also referred to as the "slow" channel) using only one output pin. End-of-line calibration is also supported through this output pin via a One-Wire Interface (OWI). The ZSSC4169 and the calibration equipment communicate digitally, so the noise sensitivity is greatly reduced. Digital calibration helps keep assembly cost low as no trimming by external devices or lasers is needed.

The ZSSC4169 is optimized for automotive environments by overvoltage and reverse polarity protection circuitry, excellent electromagnetic compatibility, and multiple diagnostic features.

## Typical Applications

- Fluid brake pressure sensing (PV)
- Hydraulic pressure sensing (e.g., steering systems with hydraulic steering support)
- Pneumatic pressure sensing (e.g., air brake systems; pneumatic shock absorbers)

## Available Support

- Evaluation Kit
- Application Notes
- Calculation Tools

## Features

- Differential bridge sensor input and on-chip or external temperature sensors, selectable for conditioning of the sensor input signal and/or temperature output
- Digital compensation for offset, gain, and higher order nonlinearity as well as temperature coefficients of measured bridge sensor input signal
- Operating temperature range: -40°C to 150°C
- Accuracy:  $\pm 0.5\%$  FS at -40°C to 150°C
- NVM memory for configuration, calibration data, and configurable measurement and conditioning functionality
- SENT output based on SAE J2716 Revision 3.0 standard using Fast and Serial Data Message Channels
- Supports output of one or more sensor signals and product identification via a single SENT interface connection
- Configurable for nearly all resistive bridge sensors
- One-pass, end-of-line calibration algorithm minimizes production costs
- No external trimming or components required
- Qualified according to AEC-Q100 Grade 0
- Support for the user's ASIL C safety applications

## Physical Characteristics

- Supply voltage: 4.75V to 5.25V
- Over-voltage and reverse polarity protection up to  $\pm 18V$
- Bridge sensor input span: 1 to 800 mV/V
- Bridge sensor signal ADC resolution: 14 bit
- Output resolution: 12-bit via SENT interface
- Package: 24-QFN (4 × 4 mm; wettable flanks)

## ZSSC4169 Basic Circuit



