

## ZSSC4169D-14

Automotive Resistive Sensor Signal Conditioner with SENT Output

### Description

The ZSSC4169D-14 is member of Renesas' 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 ZSSC4169D-14 is adjustable to nearly all resistive bridges.

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 ZSSC4169D-14 nonvolatile memory (NVM), which is reliable in automotive applications.

The ZSSC4169D-14 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 ZSSC4169D-14 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 ZSSC4169D-14 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)

### 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

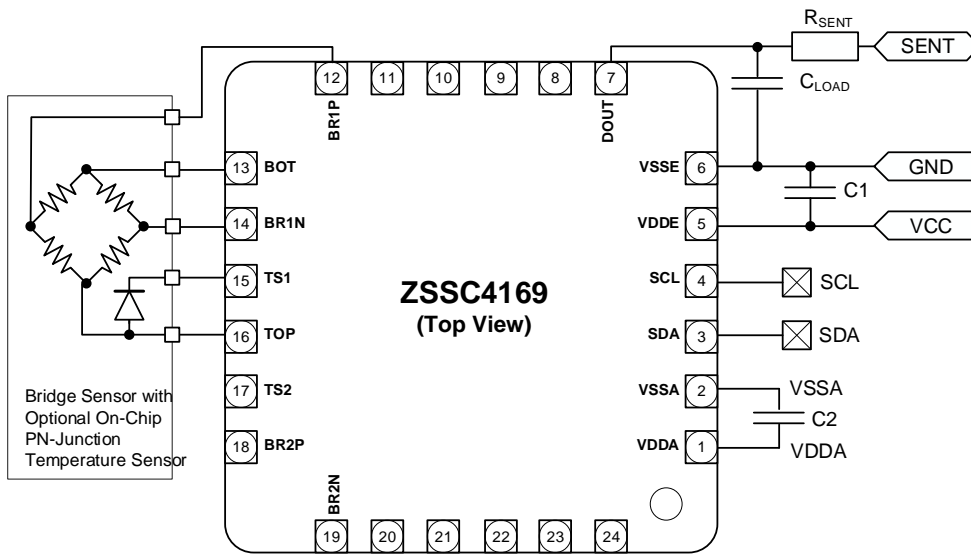
### Physical Characteristics

- 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 x 4 mm; wettable flanks); 16-TSSOP (4.4 x 5mm, exposed pad)

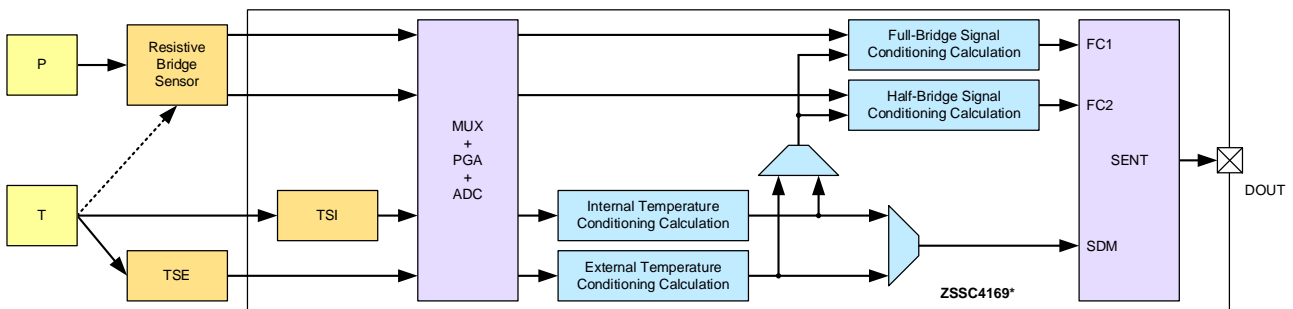
### Available Support

- Evaluation Kit
- Application Notes
- Calculation Tools

### Basic Circuit



### Signal Path



\* Configuration ZSSC4169\_0500\_14 is required for this signal path.

Physical Value    Sensing Element    Circuitry    Conditioning Function

### Ordering Information

Part Number	Description and Package	MSL Rating	Carrier Type	Temperature
ZSSC4169DE1B	Single bridge input, SENT output, internal and/or external temperature measurement, tested wafer	na	Wafer Boxes	40°C to 150°C
ZSSC4169DE1C	Single bridge input, SENT output, internal and/or external temperature measurement, tested die sawn on frame	na	Frame Boxes	40°C to 150°C
ZSSC4169DE1D	Single bridge input, SENT output, internal and/or external temperature measurement, tested die in wafer pack	na	Waffle Pack	40°C to 150°C
ZSSC4169DE4R	Single bridge input, SENT output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks (NLG24S2)	MSL1	13" Reel	-40°C to 150°C
ZSSC4169DE4W	Single bridge input, SENT output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks (NLG24S2)	MSL1	7" Reel	-40°C to 150°C
ZSSC4169DE5R	Single bridge input, SENT output, internal and/or external temperature measurement, 4.4mm x 5.0mm 16-TSSOP with exposed pad (ENG16)	MSL1	13" Reel	-40°C to 150°C
ZSSC4169DE5T	Single bridge input, SENT output, internal and/or external temperature measurement, 4.4mm x 5.0mm 16-TSSOP with exposed pad (ENG16)	MSL1	Tube	-40°C to 150°C
ZSSC4169EVKV1P4	ZSSC4169 SSC Evaluation Kit: Communication Board, SSC Board, Sensor Replacement Board, 5 Samples.			

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