

## ZSSC4161D-03

Automotive Resistive Sensor Signal Conditioner with SENT Output

### Description

The ZSSC4161D-03 is a 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 up to 200, the ZSSC4161D-03 is configurable to nearly all resistive bridges.

Digital compensation of offset, sensitivity, temperature drift, and nonlinearity are accomplished via a 16-bit RISC microcontroller. Calibration coefficients and configuration data are stored in the ZSSC4161D-03 nonvolatile memory (NVM), which is reliable in automotive applications.

The ZSSC4161D-03 supports use of an external diode or internal PTAT as a temperature reference.

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 the One-Wire Interface (OWI). The ZSSC4161D-03 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 ZSSC4161D-03 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)

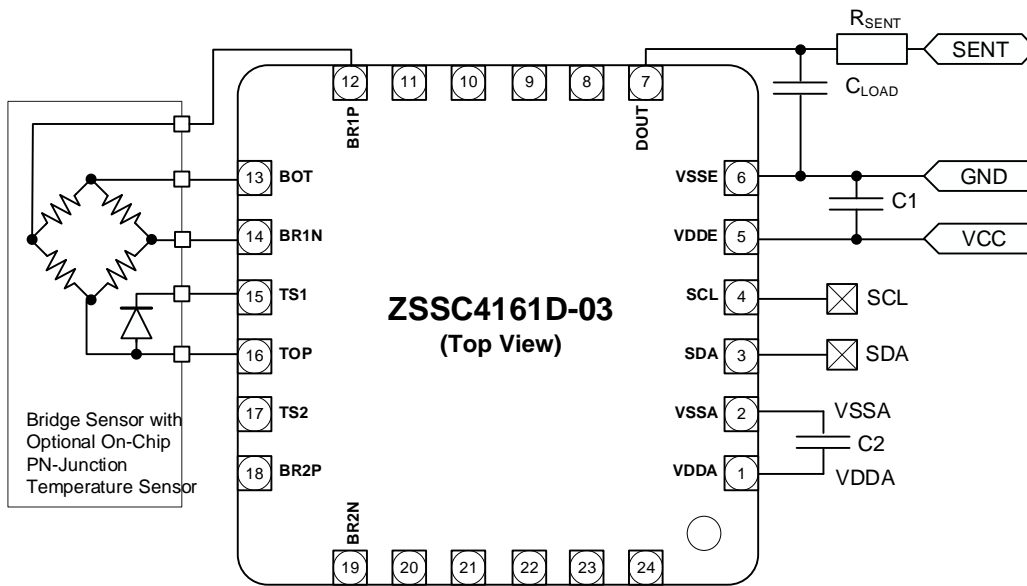
### Features

- One differential full-bridge sensor element measurement
- One internal chip or one external temperature measurement
- Digital compensation for offset, gain, and higher order nonlinearity as well as temperature coefficients of the differential and half-bridge sensor element input signal
- Operating temperature range: -40°C to 150°C
- Accuracy as high as  $\pm 0.50\%$  full scale at -40°C to 150°C
- NVM memory for configuration, calibration data, and configurable measurement and conditioning functionality
- SENT output compliant to SAE J2716 JAN2010 (SENT Rev. 3) and APR2016 (SENT Rev. 4) standard
- 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 B safety applications
- Supply voltage: 4.75V to 5.25V
- Over-voltage and reverse polarity protection up to  $\pm 18V$
- Bridge sensor input span: 1mV/V to 800mV/V
- Bridge sensor signal ADC resolution: 14 bit
- Output resolution: 12-bit via SENT interface
- Package: 24-QFN (4 x 4 mm; wettable flanks)

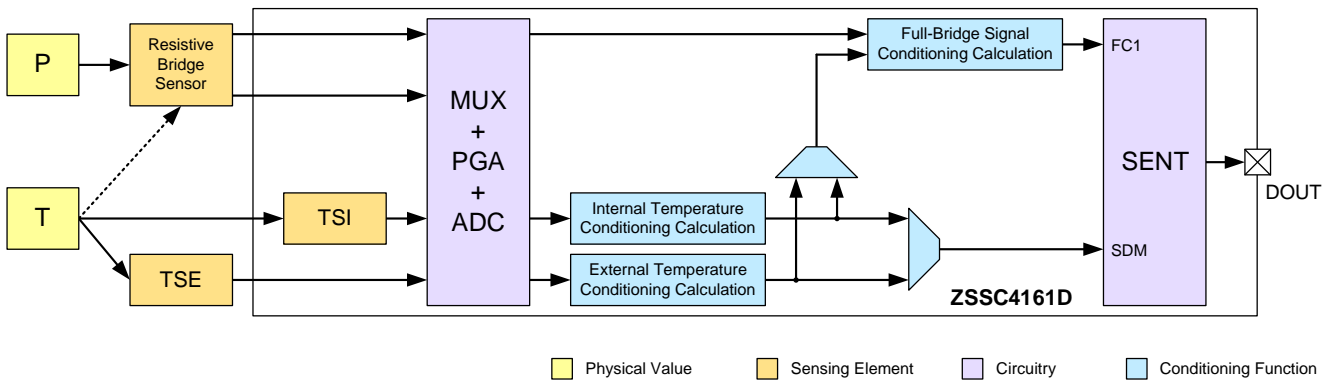
### Available Support

- Evaluation Kit
- Application Notes
- Calculation Tools

### Basic Circuit



### Signal Path



### Ordering Information

Part Number	Description and Package	MSL Rating	Carrier Type	Temperature
ZSSC4161DE4R	Single bridge input, SENT output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks (NLG24P5)	MSL1	13" Reel	-40°C to 150°C
ZSSC4161DE4W	Single bridge input, SENT output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks (NLG24P5)	MSL1	7" Reel	-40°C to 150°C
ZSSC416XEVKV1P4	ZSSC416x SSC Evaluation Kit: Communication Board, SSC Board, Sensor Replacement Board, 5 Samples.			

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