ZSSC4165D-06

Automotive Resistive Sensor Signal Conditioner with SENT Output

Description

The ZSSC4165D-06 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 of up to 200, the ZSSC4165D-06 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 ZSSC4165D-06 nonvolatile memory (NVM), which is reliable in automotive applications.

The ZSSC4165D-06 supports use of two external RTDs (PTC) and the internal PTAT as a 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 Renesas' ZACwire™ one-wire interface (OWI). The ZSSC4165D-06 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 ZSSC4165D-06 is optimized for automotive environments by over-voltage and reverse polarity protection circuitry, excellent electromagnetic compatibility, and multiple diagnostic features.

Typical Applications

- Dual single-ended pressure measurement with optional media temperature
- Differential pressure with optional medium temperature (e.g., exhaust systems)
- Flow and temperature measurement for gas or fluids with the differential pressure method

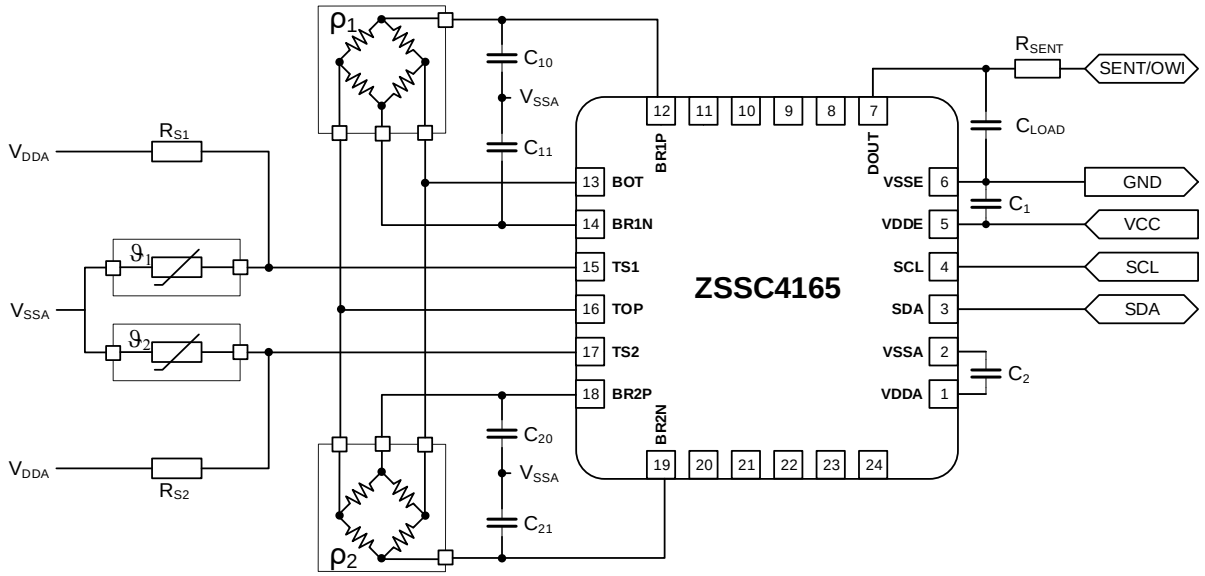
Features

- Two differential full-bridge sensor element measurements
- One internal chip temperature measurement
- Two external RTD temperature measurements
- Digital compensation for offset, gain, and higher order nonlinearity as well as temperature coefficients of the differential sensor element input signals
- Optional channel 1 – channel 2 difference output
- Operating temperature range: -40°C to 150°C
- Accuracy as high as ±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) standards
- 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
- Supply voltage: 4.75V to 5.25V
- Over-voltage and reverse polarity protection up to ±18V
- Bridge sensor input span: 1mV/V to 800mV/V
- Bridge sensor signal ADC resolution: 14 to 18 bit
- Output resolution: 12-bit via SENT interface
- Enhanced diagnostic features for sensor module
- Package: 24-QFN (4 × 4 mm; wettable flanks)

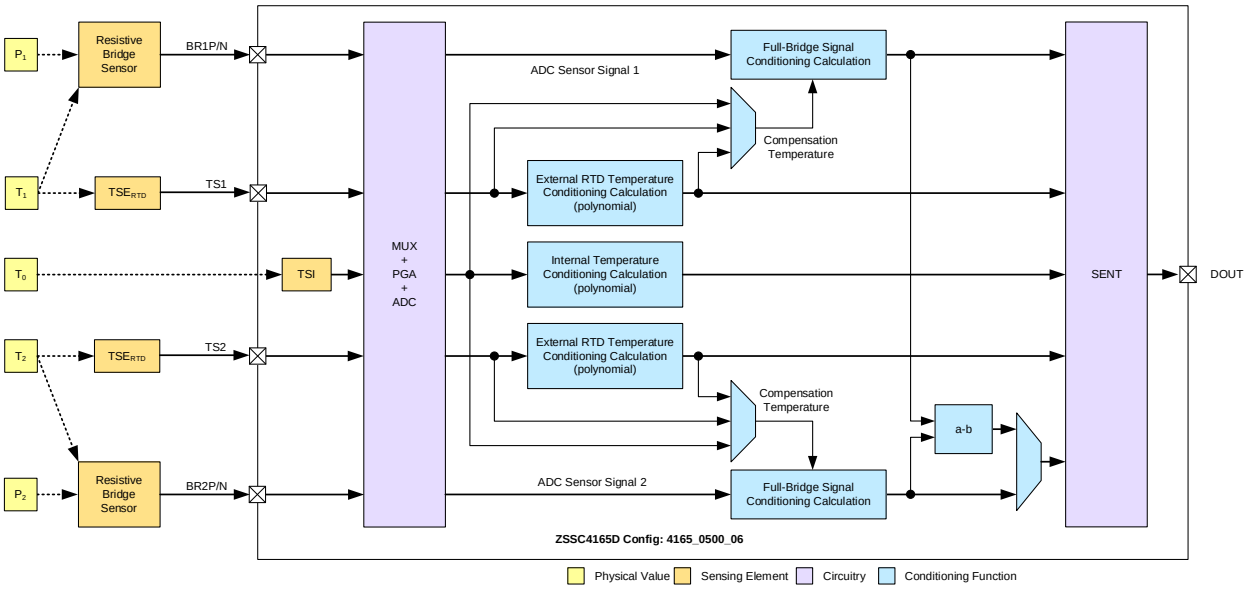
Available Support

- Evaluation Kit
- Application Notes
- Calculation Tools

Basic Circuit



Signal Path



Ordering Information

Part Number	Description and Package	MSL Rating	Carrier Type	Temperature
ZSSC4165DE4R	Dual bridge input, SENT output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks	MSL1	13” Reel	-40°C to 150°C
ZSSC4165DE4W	Dual bridge input, SENT output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks	MSL1	7” Reel	-40°C to 150°C

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