

## ZSSC4161D-01

Automotive Resistive Sensor Signal Conditioner with I2C Output

### Description

The ZSSC4161D-01 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-01 is configurable to nearly all resistive bridges. This datasheet specifies the specific configuration 4161\_0500\_01.

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-01 nonvolatile memory (NVM), which is reliable in automotive applications.

ZSSC4161D-01 supports use of an external diode or internal PTAT as a temperature reference.

Measured values are provided via a digital I2C interface. The I2C interface enables transmission of sensor data according to the standard interface description. End-of-line calibration is also supported through this interface. The ZSSC4161D-01 and the calibration equipment communicate digitally, so the noise sensitivity is greatly reduced. Digital calibration helps keep assembly costs low as no trimming by external devices or lasers is needed.

The ZSSC4161D-01 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 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
- One-pass, end-of-line calibration algorithm minimizes production costs
- I2C interface for programming, calibration, and data output
- Alternative ZACwire™ one-wire interface (OWI) on DOUT pin available for programming/calibration/fault-communication
- No external trimming or components required
- Qualified according to AEC-Q100 Grade 0

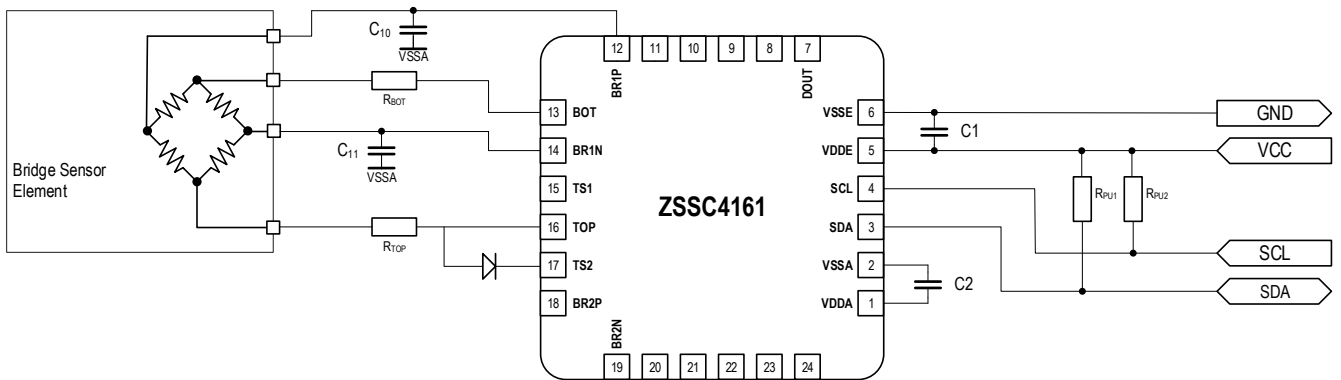
### Physical Characteristics

- Supply voltage: 4.5V to 5.5V
- Over-voltage and reverse polarity protection up to  $\pm 18V$
- Bridge sensor element input span: 1mV/V to 800mV/V
- Output resolution: 15-bit via I2C interface
- Package: 24-QFN (4 × 4 mm; wettable flanks)

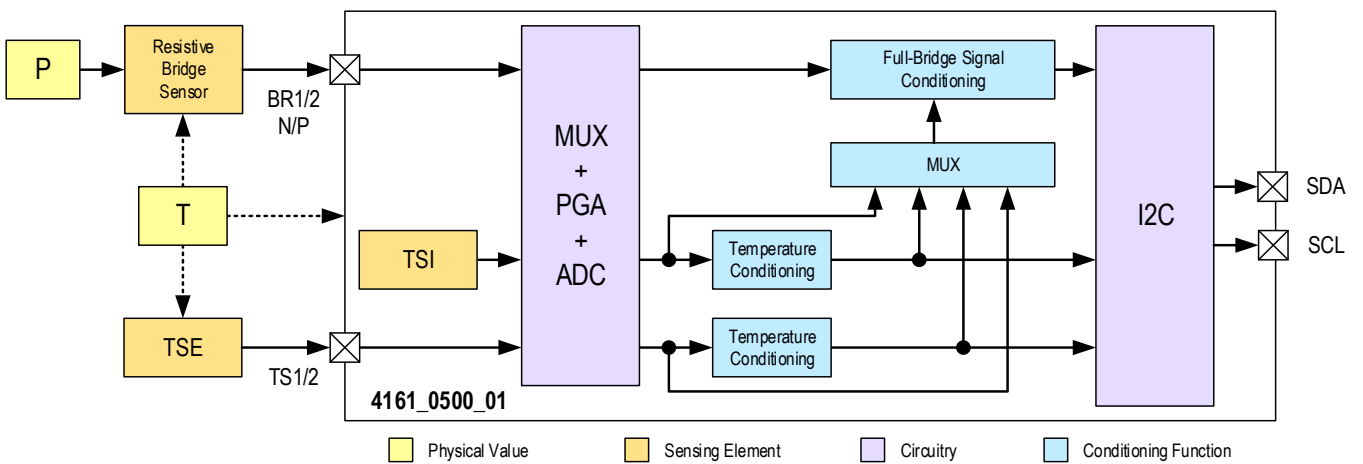
### Available Support

- Evaluation Kit
- Application Notes
- Calculation Tools

### Basic Circuit



### Signal Path



### Ordering Information

| Part Number  | Description and Package  | MSL Rating | Carrier Type | Temperature    |
|--------------|--|------------|--------------|----------------|
| ZSSC4161DE4R | One bridge input, I2C output, internal and/or external temperature measurement, 4 × 4 mm 24-QFN, wettable flanks | MSL1       | 13" Reel     | -40°C to 150°C |
| ZSSC4161DE4W | One bridge input, I2C 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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