

## RAA2S426xB ASIL-C

Automotive Sensor Signal Conditioner with SENT Output

### Description

The RAA2S426x is a member of Renesas' family of CMOS integrated circuits for highly accurate amplification and sensor-specific correction of differential bridge sensor signals. Featuring a maximum analog pre-amplification exceeding 900 with analog sensor offset correction (XSOC), the RAA2S426x is adjustable to nearly all resistive bridges.

Conditioning calculation is accomplished via a 16-bit RISC microcontroller. Calibration coefficients and configuration data are stored in the nonvolatile memory (NVM), which is reliable in automotive applications.

Measured values are provided via a digital SENT interface, which 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 supported through this output pin via the One-Wire Interface (OWI). An I2C interface is also provided for digital sensor output. Digital calibration helps keep assembly cost low as no trimming by external devices or lasers is needed.

The RAA2S426x is optimized for harsh automotive environments by over-voltage and reverse polarity protection circuitry, excellent electromagnetic compatibility, and multiple diagnostic features.

### Typical Applications

- Pressure sensing in engine control, hydraulic and pneumatic systems
- HVAC pressure measurement
- Differential and single ended bridge sensor

### Available Support

- Evaluation Kit
- Application Notes, Functional Description Command Description, and Memory Allocation documents

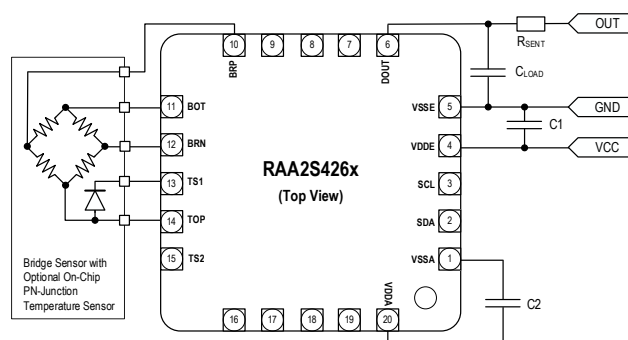
### Physical Characteristics

- Operation supply: 4.5V to 5.5V
- Protection up to  $\pm 18V$
- Robust in automotive environment
- Package: QFN20L (3.5x3.5mm; wettable flanks)

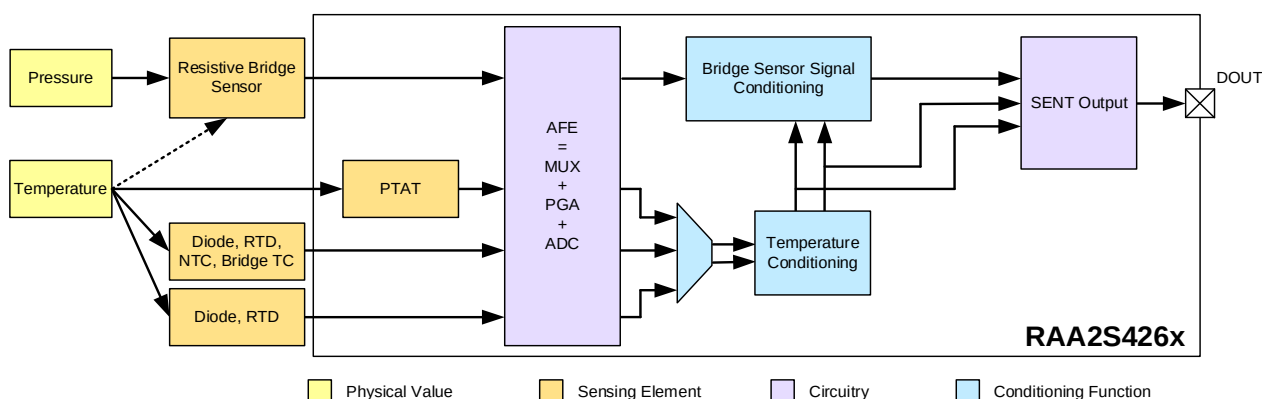
### Features

- Product developed in compliance with ISO 26262:2018 ASIL C.
- Differential bridge sensor input with selectable on-chip or external temperature sensor – PTC, NTC, PN-junction and sensor bridge resistance.
- 1mV/V to 800mV/V sensor span with 12 to 18bit resolution; sensor offset/span ratio up to 10.
- Compensation for offset, gain, and higher order nonlinearity and temperature coefficients of measured bridge sensor input signal.
- Accuracy (QFN20L):
  - 0.25%FS at  $-40^{\circ}C$  to  $+125^{\circ}C$
  - 0.5%FS at  $-40^{\circ}C$  to  $+155^{\circ}C$
- Accuracy (SOP8):
  - 0.5%FS at  $-40^{\circ}C$  to  $+125^{\circ}C$
  - 1%FS at  $-40^{\circ}C$  to  $+155^{\circ}C$
- Internal output update up to 200 $\mu s$  in fastest mode.
- Compliant to SENT standard SAE J2716 Rev. 4 (APR2016), tick time extended to 1 $\mu s$  resulting in SENT output time of 282 $\mu s$  (two fast channels).
- Third order digital LPF with cut-off frequency of 10Hz to 1000Hz.
- Fast in calibration: one-pass, end-of-line calibration algorithm minimizes production costs.
- Minimum number of external components enables design of sensor modules with best-in-class form factor.
- Qualified according to AEC-Q100 Grade 0.
- Operating temperature range of  $-40^{\circ}C$  to  $+155^{\circ}C$  with up to 100hrs extension up to  $+165^{\circ}C$ .

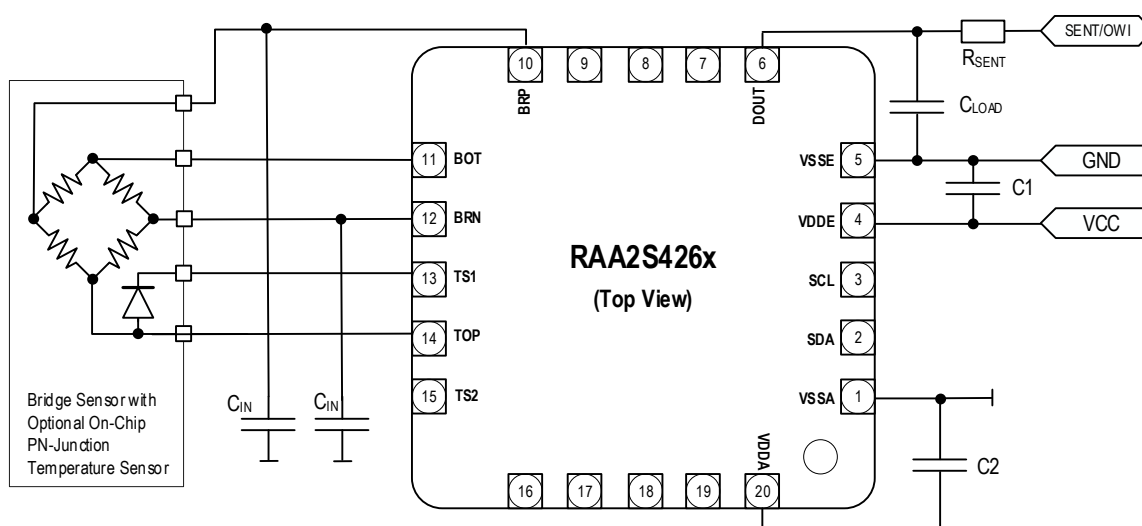
### RAA2S426x Basic Circuit



## Signal Path



## Application Circuit Example



## Ordering Information

| Part Number        | Description and Package                                                    | MSL Rating | Shipping Packaging    | Ambient Temperature |
|--------------------|----------------------------------------------------------------------------|------------|-----------------------|---------------------|
| RAA2S4261B5HNP#JA0 | 3.5mm x 3.5mm QFN20L, wettable flanks                                      | MSL1       | Tape & Reel (13 inch) | -40°C to +155°C     |
| RAA2S4262B5HSP#JA0 | 4.9mm x 3.9mm SOP8                                                         | MSL1       | Tape & Reel (13 inch) | -40°C to +155°C     |
| RAA2S4263B5HWT#FF0 | Wafer Unsawn                                                               | N/A        | WFR                   | -40°C to +155°C     |
| RAA2S4263B5HWT#FF1 | Die sawn on frame                                                          | N/A        | WFR                   | -40°C to +155°C     |
| RAA2S4263B5HWT#AFE | Die on tray, waffle pack                                                   | N/A        | WFP                   | -40°C to +155°C     |
| RAA2S426XKIT       | RAA2S426x Evaluation Kit: Evaluation Board (EVb)                           |            |                       |                     |
| RAA2S4261EXT       | 5 samples of RAA2S4261B, 3 rapid prototype board                           |            |                       |                     |
| RAA2S4262EXT       | SOP8 adapter board, 5 samples of RAA2S4262, 3 pieces rapid prototype board |            |                       |                     |