RAA2S426xB QM

Automotive Sensor Signal Conditioner with SENT Output

Description

The RAA2S426xB QM 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 RAA2S426xB QM 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 RAA2S426xB QM 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

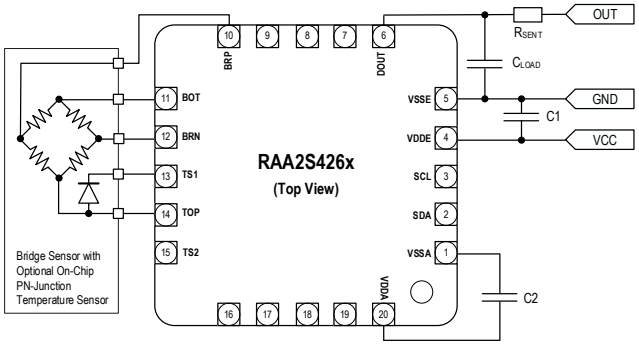
Physical Characteristics

- Operation supply: 4.5V to 5.5V
- Protection up to ±18V
- Robust in automotive environment
- Package: QFN20L (3.5x3.5mm; wettable flanks), SOP8 (4.9mm x 3.9mm)

Features

- 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°C to +125°C
  - 0.5%FS at -40°C to +155°C
- Accuracy (SOP8):
  - 0.5%FS at -40°C to +125°C
  - 1%FS at -40°C to +155°C
- Internal output update up to 200µs in fastest mode.
- Compliant to SENT standard SAE J2716 Rev. 4 (APR2016), tick time extended to 1µs resulting in SENT output time of 282µs (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.
- A 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°C to +155°C with up to 100hrs extension up to +165°C.

RAA2S426xB QM Basic Circuit



Signal Path

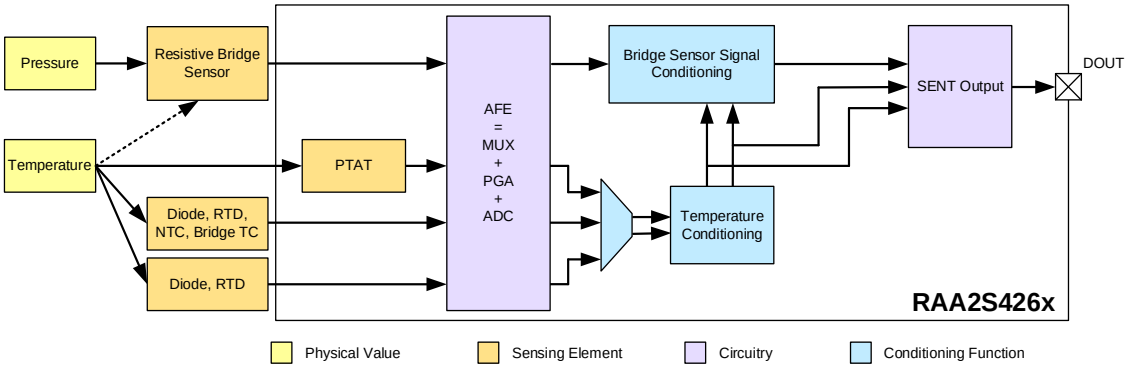
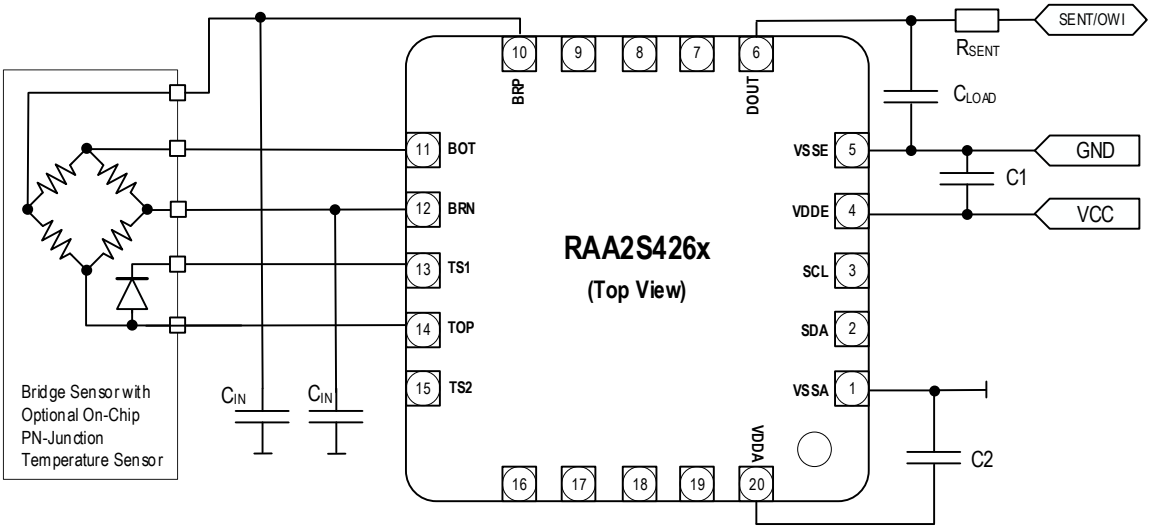


Figure 1. Main Signal Path

Application Circuit Example



Ordering Information

Part Number	Description and Package	MSL Rating	Shipping Packaging	Ambient Temperature
RAA2S4264B5HNP#JA0	3.5mm x 3.5mm QFN20L, wettable flanks	MSL1	Tape & Reel (13 inch)	-40°C to +155°C
RAA2S4266B5HSP#JA0	4.9mm × 3.9mm SOP8	MSL1	Tape & Reel (13 inch)	-40°C to +155°C
RAA2S4267B5HSP#JA0	4.9mm × 3.9mm SOP8 – low speed	MSL1	Tape & Reel (13 inch)	-40°C to +155°C
RAA2S4268B5HWT#FF0	Wafer Unsawn	N/A	WFR	-40°C to +155°C
RAA2S4268B5HWT#FF1	Die sawn on frame	N/A	WFR	-40°C to +155°C
RAA2S4268B5HWT#AFE	Die on tray, waffle pack	N/A	WFP	-40°C to +155°C
RAA2S426XKIT	RAA2S426xB Evaluation Kit: Evaluation Board (EVB)			
RAA2S4264EXT	5 samples of RAA2S4264xB, 3 pieces rapid prototype board			
RAA2S4266EXT	SOP8 adapter board, 5 samples of RAA2S4266, 3 pieces rapid prototype board			
RAA2S4267EXT	SOP8 adapter board, 5 samples of RAA2S4267, 3 pieces rapid prototype board			