Brief Description

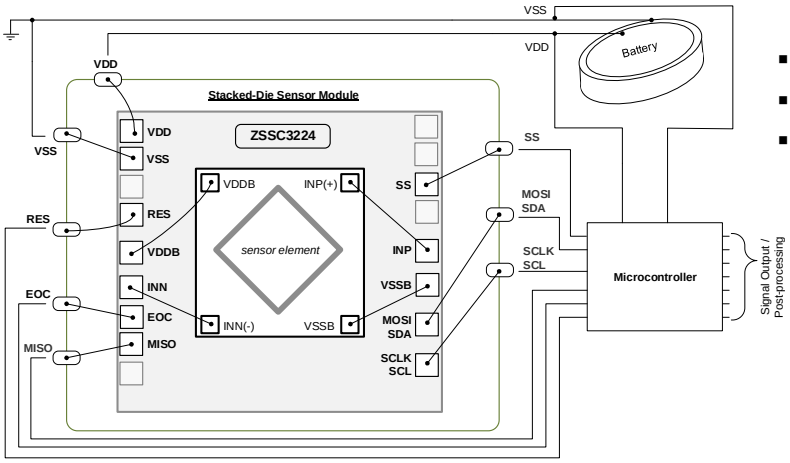
The ZSSC3224 is a sensor signal conditioner (SSC) IC for high-accuracy amplification and analog-to-digital conversion of a differential or pseudo-differential input signal. Designed for high resolution sensor module applications, the ZSSC3224 can perform offset, span, and 1st and 2nd order temperature compensation of the measured signal. Developed for correction of resistive bridge or absolute voltage sensors, it can also provide a corrected temperature output measured with an internal sensor.

The measured and corrected sensor values are provided at the digital output pins, which can be configured as I2C (≤3.4MHz) or SPI (≤20MHz). Digital compensation of signal offset, sensitivity, temperature, and non-linearity is accomplished via a 26-bit internal digital signal processor (DSP) running a correction algorithm. Calibration coefficients are stored on-chip in a highly reliable, non-volatile, multiple-time programmable (MTP) memory. Programming the ZSSC3224 is simple via the serial interface. The interface is used for the PC-controlled calibration procedure, which programs the set of calibration coefficients in memory. The ZSSC3224 provides accelerated signal processing, increased resolution, and improved noise immunity in order to support high-speed control, safety, and real-time sensing applications with the highest requirements for energy efficiency.

Applications

- Barometric altitude measurement for portable navigation or emergency call systems; altitude measurement for car navigation
- Weather forecast
- Fan control
- Industrial, pneumatic, and liquid pressure
- High-resolution temperature measurements
- Object-temperature radiation (via thermopile)

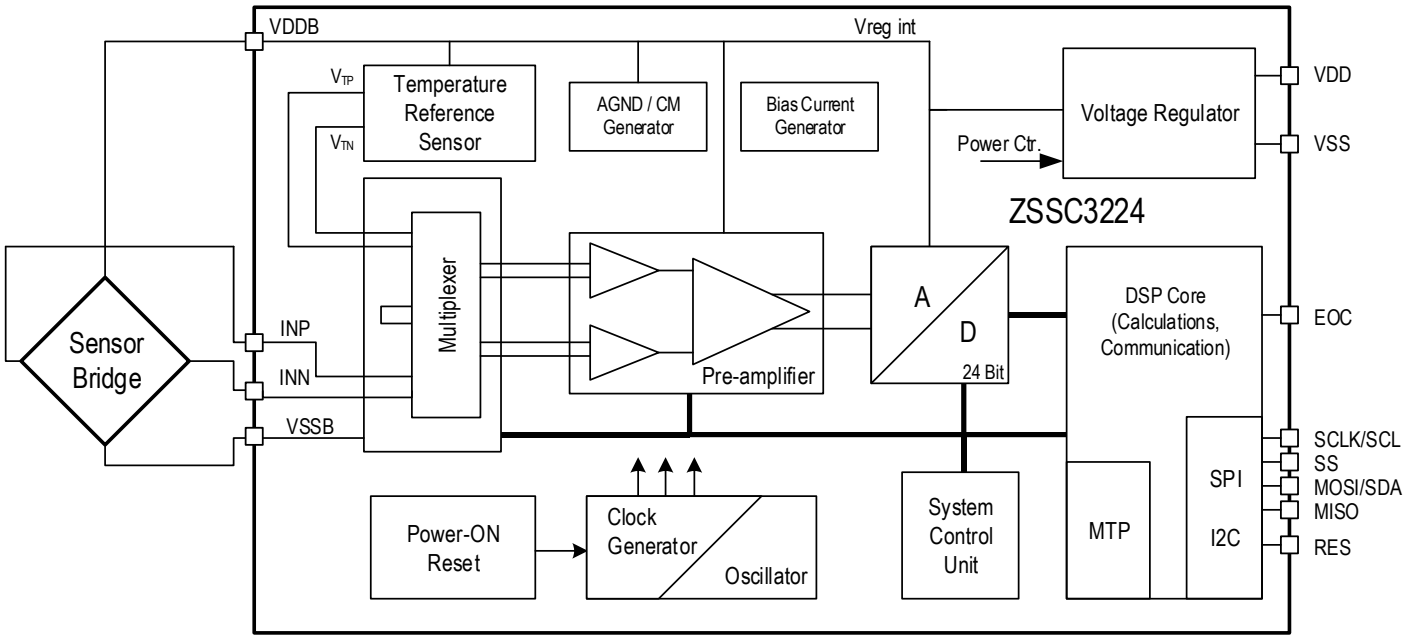
ZSSC3224 Application Example



Features

- Flexible, programmable analog front-end design; up to 24-bit analog-to-digital converter (ADC)
- Fully programmable gain amplifier for optimizing sensor signals: gain range 6.6 to 216 (linear)
- Internal auto-compensated 18-bit temperature sensor
- Digital compensation of individual sensor offset; 1st and 2nd order digital compensation of sensor gain as well as 1st and 2nd order temperature gain and offset drift
- Programmable interrupt operation
- High-speed sensing: e.g., 18-bit conditioned sensor signal measurement rate >200s^{-1}
- Typical sensor elements can achieve an accuracy of better than ±0.10% full scale output (FSO) at -40 to 85°C
- Integrated 26-bit calibration math digital signal processor (DSP)
- Fully corrected signal at digital output
- Layout customized for die-die bonding with sensor for high-density chip-on-board assembly
- One-pass calibration minimizes calibration costs
- No external trimming, filter, or buffering components required
- Highly integrated CMOS design
- Integrated reprogrammable non-volatile memory
- Excellent for low-voltage and low-power battery applications
- Optimized for operation in calibrated resistive (e.g., pressure) sensor or calibrated absolute voltage (e.g., thermopile) sensor modules
- Supply voltage range: 1.68V to 3.6V
- Operating mode current: ~1.0mA (typical)
- Sleep Mode current: 20nA (typical)
- Temperature resolution: <0.7mK/LSB
- Excellent energy-efficiency:
  with 18-bit resolution: <100pJ/step
  with 24-bit resolution: <150nJ/step
- Small die size
- Operation temperature: –40°C to +85°C
- Delivery options: 4.0mm x 4.0mm 24-PQFN and die for wafer bonding

ZSSC3224 Block Diagram



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