

## Brief Description

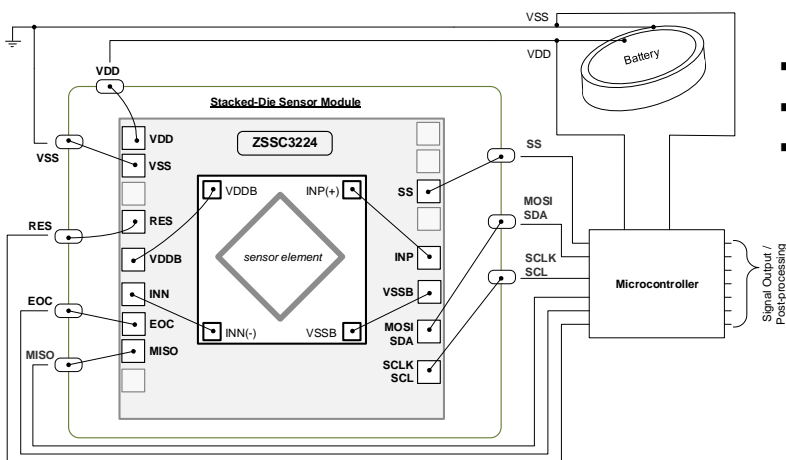
The ZSSC3224 is a sensor signal conditioner (SSC) IC for high-accuracy amplification and analog-to-digital conversion of a differential or pseudo-differential input signal. Designed for high resolution sensor module applications, the ZSSC3224 can perform offset, span, and 1<sup>st</sup> and 2<sup>nd</sup> 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 ( $\leq 3.4\text{MHz}$ ) or SPI ( $\leq 20\text{MHz}$ ). 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)

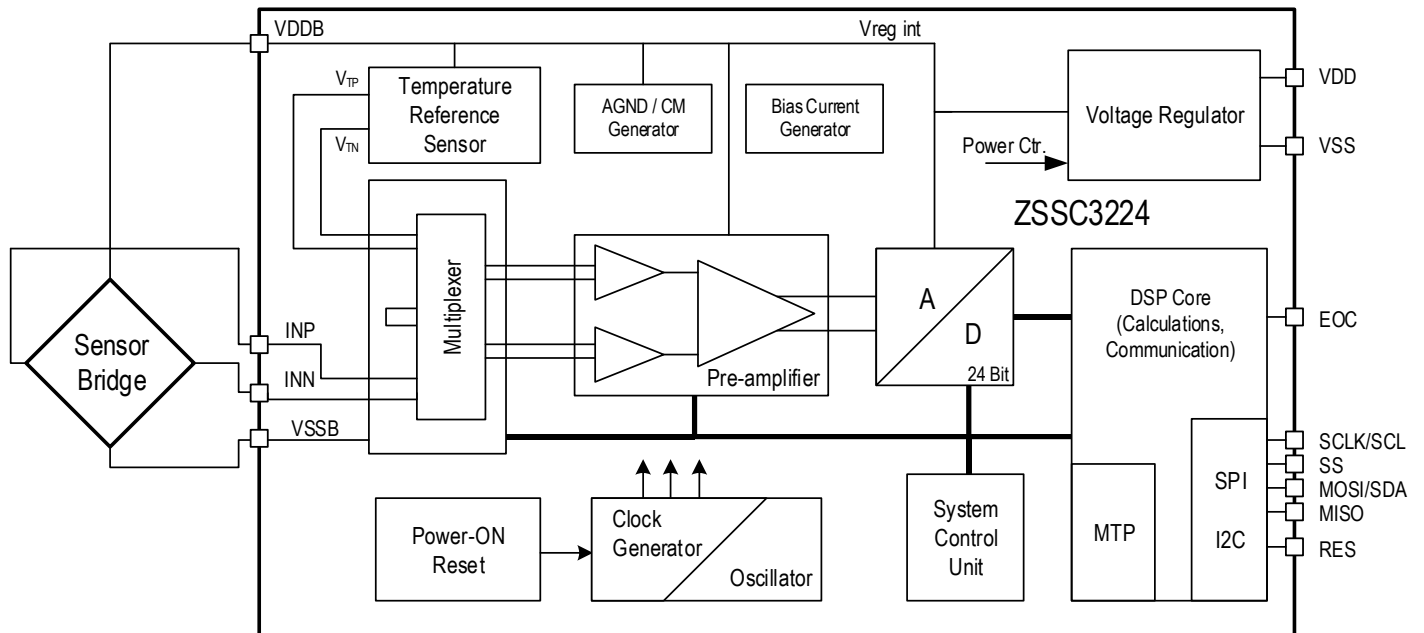
## ZSSC3224 Application Example



## 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; 1<sup>st</sup> and 2<sup>nd</sup> order digital compensation of sensor gain as well as 1<sup>st</sup> and 2<sup>nd</sup> order temperature gain and offset drift
- Programmable interrupt operation
- High-speed sensing: e.g., 18-bit conditioned sensor signal measurement rate  $>200\text{s}^{-1}$
- Typical sensor elements can achieve an accuracy of better than  $\pm 0.10\%$  full scale output (FSO) at  $-40$  to  $85^\circ\text{C}$
- 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:  $\sim 1.0\text{mA}$  (typical)
- Sleep Mode current: 20nA (typical)
- Temperature resolution:  $<0.7\text{mK/LSB}$
- Excellent energy-efficiency:
  - with 18-bit resolution:  $<100\text{pJ/step}$
  - with 24-bit resolution:  $<150\text{nJ/step}$
- Small die size
- Operation temperature:  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$
- Delivery options: 4.0mm x 4.0mm 24-PQFN and die for wafer bonding

## ZSSC3224 Block Diagram



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