

## Brief Description

The ZSSC3018 is a sensor signal conditioner (SSC) integrated circuit for high-accuracy amplification and analog-to-digital conversion of differential or pseudo-differential input signals. Designed for high-resolution sensor module applications, the ZSSC3018 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 I<sup>2</sup>C ( $\leq 3.4\text{MHz}$ ) or SPI ( $\leq 10\text{MHz}$ ). 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 ZSSC3018 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 ZSSC3018 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.

## Features

- Flexible, programmable analog front-end design; up to 18-bit analog-to-digital converter (ADC)
- Fully programmable gain amplifier with gain range from 6.6 to 216 (linear)
- Internal auto-compensated 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 of 1<sup>st</sup> and 2<sup>nd</sup> order temperature gain and offset drift
- Programmable interrupt operation
- High-speed sensing: e.g., 16-bit conditioned sensor signal measurement rate  $>500\text{s}^{-1}$
- Typical sensor system can achieve an accuracy of better than  $\pm 0.10\% \text{ FSO}^* @ -40 \text{ to } 125^\circ\text{C}$

## Benefits

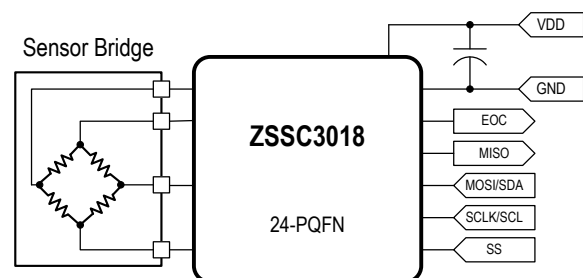
- Integrated 26-bit calibration math DSP
- Fully corrected signal at digital output
- Layout customized for die-die bonding with sensor for high-density chip-on-board assembly
- One-pass calibration minimizes calibration costs
- No external trimming, filter, or buffering components required
- Highly integrated CMOS design
- Integrated reprogrammable non-volatile memory
- Excellent for low-voltage and low-power battery applications
- Optimized for operation in calibrated resistive sensor (e.g., pressure) or calibrated absolute voltage sensor (e.g., thermopile) modules

## Physical Characteristics

- Supply voltage range: 1.68V to 3.6V
- Current consumption:  $\sim 1.0\text{mA}$  (typical) in operating mode
- Sleep Mode current: 50nA (typical) at  $\leq 125^\circ\text{C}$ ; 20nA (typical) at  $\leq 85^\circ\text{C}$
- Temperature resolution:  $< 0.003\text{K/LSB}$
- Best-in-class energy-efficiency:
  - with 16-bit resolution:  $< 140\text{pJ/step}$
  - with 18-bit resolution:  $< 50\text{pJ/step}$
- Operation temperature:  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Delivery options: die or 24-PQFN (4 x 4 mm) package

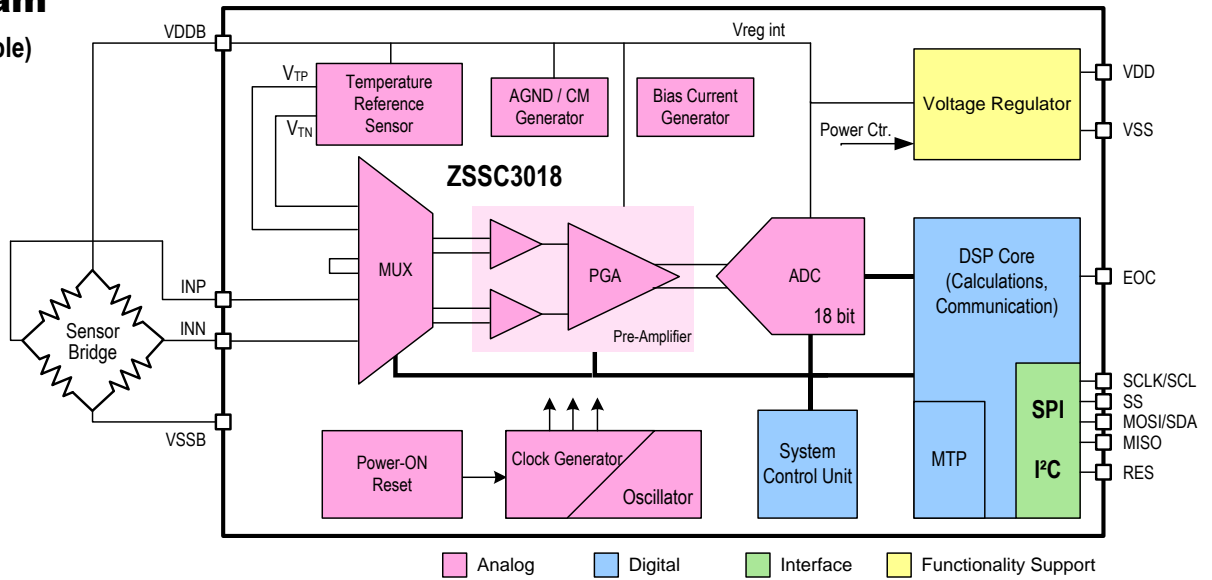
\* FSO = Full Scale Output.

## ZSSC3018 Application Example



## Block Diagram

(Bridge Sensor Example)



### 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)

### Ordering Information

Product Sales Code	Description	Package
ZSSC3018BA3W	ZSSC3018 24-PQFN – temperature range: $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	7" Reel
ZSSC3018BA2B	ZSSC3018 Die – temperature range: $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	Unsawn on Wafer (725 $\mu\text{m}$ )
ZSSC3018BA2C	ZSSC3018 Die – temperature range: $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	Sawn on Wafer Frame
ZSSC3018BA2D	ZSSC3018 Die – temperature range: $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	Sawn in Waffle Pack (for sampling only)
ZSSC3018KITV1P0	Modular ZSSC3018 SSC Evaluation Kit including three interconnecting boards, five ZSSC3018 24-PQFN samples, and cable. Software is available for download on <a href="http://www.IDT.com/ZSSC3018">www.IDT.com/ZSSC3018</a> .	



#### Corporate Headquarters

6024 Silver Creek Valley Road  
San Jose, CA 95138  
[www.IDT.com](http://www.IDT.com)

#### Sales

1-800-345-7015 or 408-284-8200  
Fax: 408-284-2775  
[www.IDT.com/go/sales](http://www.IDT.com/go/sales)

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