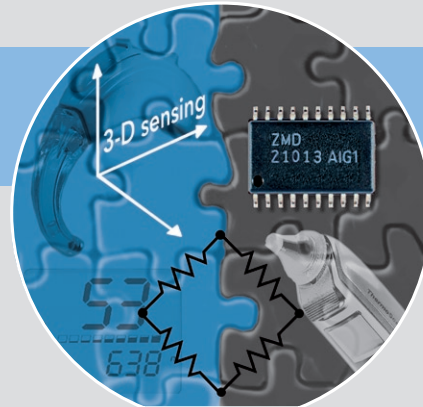


# ZMD21013

## MUSic Low-Power Multi-Channel Sensor Interface Circuits



### Brief Description

The ZMD21013 is optimized for low-voltage and low-power multiple resistive bridge sensor applications, such as battery-operated consumer or industrial products. The ZMD21013 provides programmable amplification and analog-to-digital conversion (ADC) of the sensor signal input with an optional temperature measurement output. This standard product is applicable to almost any one, two, or three dimensional detection devices.

The IC's analog sampling architecture enables a significant reduction of average power consumption via switched measurements. The applied sensor will only be switched on during the sampling time, which leads to typical average power consumption of 25 to 30µW. This makes the ZMD21013 the interface device of choice for low-power sensor-based applications.

By default, the sensor bridges operate in a voltage driven mode. ADC resolution, sample rate, input range, sensitivity, and measurement mode are programmable. In addition, the IC supports an auto-zero mode, which allows monitoring temperature, long-term stability drifts and offsets for compensation and correction purposes.

The ZMD21013 includes an on-chip clock generator and an 16x8 bit EEPROM to store non-volatile configuration data. An SPI-standard digital interface allows flexible adaptability to the respective external digital system components (e.g. microcontrollers).

### Applications and Examples

- Acceleration measurement
- Compass functions
- Density measurement (differential pressure analysis)
- Altimeter and barometer (watches, mobile devices)
- Flow and velocity measurement
- Pressure measurement (fluids, gases)
- Temperature measurement

### Benefits

- Extremely long battery life due to <100nA idle current and 25 to 30µW average power consumption in operation
- Space optimized design with three bridge inputs, high-gain amplification, and parameter handling – all in one IC
- High input amplification allows use of wide range of highly sensitive resistive sensor elements

### Features

- Programmable analog-to-digital conversion of amplified resistive sensor input signals
- Low-power (average 25µW), high-sensitivity, multi-channel sensor interface IC
- 3-channel sensor-bridge input multiplexer
- Completely ratiometric systems
- Inherent temperature measurement mode
- Low-noise SC amplifier with offset compensation and adaptive operational amplifier biasing
- Industrial and consumer temperature range (-25°C to +85°C)
- Internal auto-zero mode
- Voltage-driven (switched or static) bridge mode
- On-chip EEPROM and RC oscillator

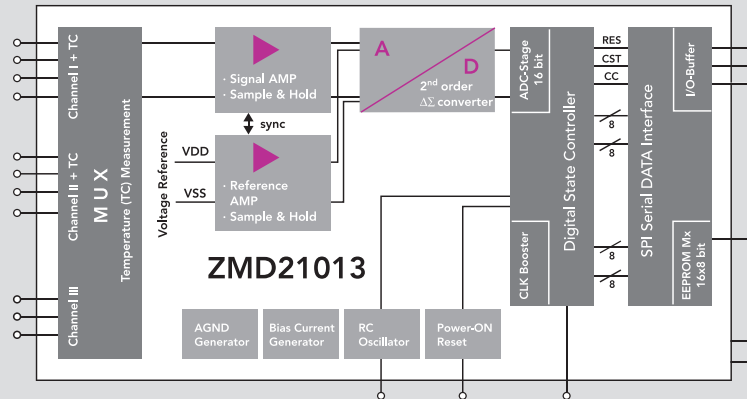
### Interfaces

- Analog signal in: 3 channels, optimized for sensor bridge inputs
- Digital signal out: flexible, full duplex, high-throughput 3-wire SPI
- Optional external clock 28kHz to 36kHz

### Physical Characteristics

- Power supply range: ..... 2.2V to 5.5V
- ADC-resolution: ..... (10, 12, 14, 16)bit
- Input sensitivity: ..... (0.9, 1.8, 3.7, ...)µV/V
- Standby (idle) current: ..... <100nA @ 85°C
- Power consumption: ..... 4.5µW to 22.5µW @ 3V

## Block Diagram

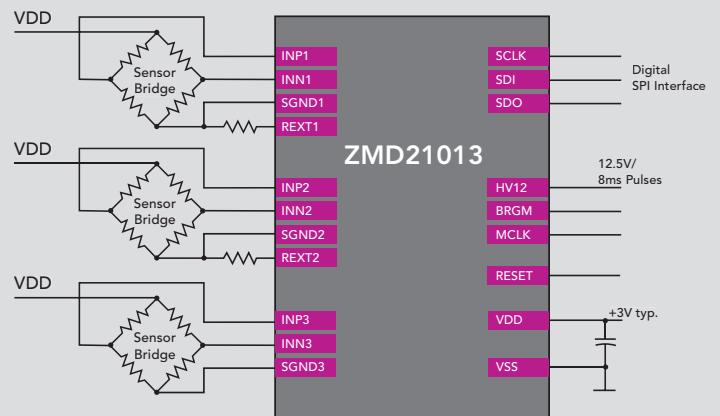


## Ordering Information

| Ordering Code   | Description  | Package           |
|-----------------|--|-------------------|
| ZMD21013 ACG1-T | Low-power multi-channel sensor signal interface circuit for portable customer devices (0°C to +70°C) | TSSOP20 (in tube) |
| ZMD21013 AIG1-T | Low-power multi-channel sensor signal interface circuit for industrial applications (-25°C to +85°C) | TSSOP20 (in tube) |
| ZMD21013 AG1-ES |  |                   |

## Application Circuit (Example)

- Three sensor bridges connected to the ZMD21013
- The upper bridges are connected via a series resistor to VSS to measure the temperature-dependent voltage across the bridge resistance (optional)
- Internal MUX selects the respective input channel and the sensor signal is amplified and digitized



## ZMD21013 Design Tools

| Ordering Code | Description   | Content  |
|---------------|---|--|
| ZMD21013KIT   | Evaluation and development board for the ZMD21013 multi-channel sensor signal interface circuit | Demonstration board (with USB interface), software and ZMD21013 sample |

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