# ASI

# Low Power Pressure and Temperature Smart Sensor with Embedded ADC and uP

*Preliminary Technical Data* **ASI2301**

## FEATURES

**Absolute/relative pressure measurements**

**10-bit digitized pressure sensor outputs**

**10-bit digital temperature sensor output**

**Low Power Consumption**

**Embedded uP**

**Digitally controlled sensitivity and bias calibration**

**Digitally controlled sample rate**

**Auxiliary digital I/O**

**Power management control for low power standby mode**

**SPI® or RS232 compatible serial interfaces**

**Auxiliary 10 bit ADC input**

**Single-supply operation – 2.8V to 3.6V**

## APPLICATIONS

**A single-chip-solution for:**

**Tire pressure sensor (with wireless control)**

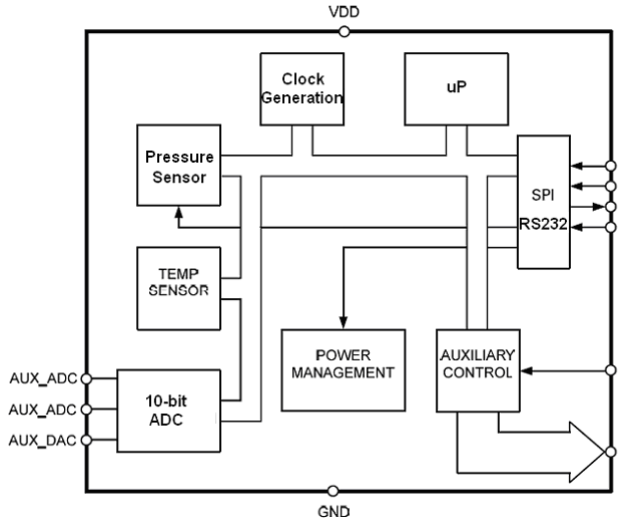
**Sports watch with altimeter sensor**

**Automobile pressure sensing**

**Health monitoring systems, blood pressure monitors**

**Digital Weight Scale**

**Digital all-weather clock with altimeter sensor**




**Functional Block Diagram**

## GENERAL DESCRIPTION

The ASI2301 is a low-power single-chip smart sensor for pressure and temperature measurements. It is available in a single compact package by advance mixed-signal designs and MEMS sensor integration. The sensor's analog outputs are digitized and converted into a convenient format that can be accessed using a simple SPI or RS232 interface. The digital interface provides access to measurements of the pressure, temperature, power supply and two auxiliary analog inputs. The embedded uP offers developers with a system-ready device suitable for many unique and versatile applications, together with reducing development time, cost and program risk

The ASI2301 also offers a comprehensive set of features which can be used to further reduce the hardware complexity of system designs. These integrated features include a configurable 10-bit ADC, configurable digital I/O port, and a programmable uP. The ASI2301 offers two different power management features that can be enabled via the digital port: a programmable duty cycle sleep mode for systems that do not require continuous operation and a low power mode for systems that can trade reduced sample rates for more efficient power operation.

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# MOTION / ACCELERATION SENSOR SPECIFICATIONS

**Table 1**

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| PRESSURE SENSOR | | | | | |
| Input Range | @25°C | | 0 – 20 | | psi |
| Nonlinearity | % of full scale | | ±3 | | % |
| Initial Sensitivity | @25°C | | 256 (programmable) | | LSB/psi |
| Sensitivity Over Temperature | | | 80 | | ppm/°C |
| Bias Over Temperature | | | 80 | | ppm/°C |
| PRESSURE NOISE PERFORMANCE | | | | | |
| Output Noise | @25°C, no averaging | | 30 | | LSB rms |
| Noise Density | @25°C, no averaging | | 3 | | LSB/√Hz rms |
| PRESSURE FREQUENCY RESPONSE | | | | | |
| Overall Sensor Bandwidth | | | 0 to 1000 | | Hz |

# TEMPERATURE SENSOR SPECIFICATIONS

**Table 2**

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| TEMPERATURE SENSOR | | | | | |
| Measurement Range | | | -20 to 108 | | °C |
| Sensitivity | | | 0.5 (calibrated) | | °C/LSB |
| Error at 25°C | | | ±1 (calibrated) | | °C |
| Gain Error | | | ±3 | | % |
| Output Noise | @25°C, no averaging | | 5 | | LSB rms |

# ADC SPECIFICATIONS

**Table 3**

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| ADC INPUT | | | | | |
| Resolution | | | 10 | | Bits |
| Integral Non-Linearity | | | ±2 | | LSB |
| Differential Non-Linearity | | | ±1 | | LSB |
| Offset Error | | | ±2 | | LSB |
| Gain Error | | | ±2 | | LSB |
| Input Range | | 0 | | 2.5 | Volts |
| Input Capacitance | During acquisition | | 20 | | pF |
| CONVERSION RATE | | | | | |
| Typical Conversion Speed | | | 1 | | KS/s |
| Operating Current | | | 100 | | uA |
| Sleep Mode Current | | | <1 | | uA |
| Turn-On Time | | | 300 | | ms |