

## Universal multi purpose data acquisition system

## Features

- 16 bits resolution
- differential inputs
- Single + 5V supply
- Low power 15 mW
- SOIC16 package
- Self- and system-calibration with auto-calibration on power up
- 16 kHz maximum sampling frequency
- Internal temperature measurement
- Internal reference
- Programmable current sources
- Digital comparator
- Active wake-up
- PGA gains 6, 24, 50, 100
- Zero offset
- Zero offset TC
- Extremely low noise
- Internal oscillator with comparator for active wake up
- 3-wire serial interface,  $\mu$ P compatible
- Temperature range – 40 to + 125 °C

## Applications

- Battery management for automotive systems
- Power management
- mV/ $\mu$ V-meter
- Thermocouple temperature measurement
- RTD precision temperature measurement
- High-precision voltage and current measurement

## General description

The AS8500 is a complete, low power data acquisition system for very small signals (i.e. voltages from shunt resistors, thermocouples) that operates on a single 5 V power supply. The chip powers up with a set of default conditions at which time it can be operated as a read-only-converter. Reprogramming is at any time possible by just writing into two internal registers via the serial interface.

The AS8500 has four ground referring inputs which can be switched separately to the internal PGA. Two input channels can also be operated as a fully differential ground free input. The system can measure both positive and negative input signals.

The PGA amplification ranges from 6 to 100 which enables the system to measure signals from 7mV to 120 mV full scale range with high accuracy, linearity and speed.

The chip contains a high precision band gap reference and an active offset compensation that makes the system offset free (better than 0,5  $\mu$ V) and the offset-TC value

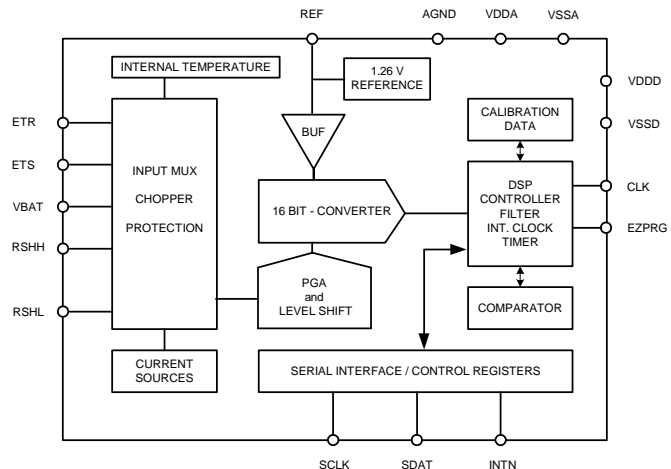


Figure 1: Functional Block Diagram

negligible. The built-in programmable digital filter allows an effective noise suppression if the high speed is not necessary in the application.

The input noise density is only  $35 \text{ nV} / \sqrt{\text{Hz}}$  and due to the high internal chopping frequency the system is free of  $1/f$ -noise down to DC. The 0-10 Hz noise is typical below 1  $\mu$ V i.e. as good or better than any other available chopper amplifier.

For high speed synchronous measurements the chip can run in an automatic switching mode between two input channels with pre-programmed parameter sets.

The circuit has been optimised for the application in battery management systems in automotive systems. As a front end data acquisition system it allows a high quality measurement of current, voltage and temperature of the battery.

With a high quality 100  $\mu\Omega$  resistor the system can handle the starter current of up to 1500 A, a continuous current of  $\pm 300$  A as well as the very low idle current of a few mA in the standby mode. For external temperature measurement the chip can use a wide variety of different temperature sensors such as RTD, PTC, NTC, thermocouples or even diodes or transistors. A built-in programmable current source can be switched to any input and activate these sensors without the need of other external components.

The measurement of the chip temperature with the integrated internal temperature sensor allows in addition the temperature compensation of sensitive parameters which increases the total accuracy considerably.

The flexibility of the system is further increased by a digital comparator that can be assigned to any measured property (current, voltage, temperature) and an active wake-up in the sleep-mode.

All analog input-terminals can be checked for wire break via the SDI-interface.