HAC 830

Oct/2014

HAC 830
Robust Linear Hall-Effect Sensor with Integrated Caps

The HAC 830 is a new member of the Micronas family of programmable linear Hall sensors. It offers optimal Electromagnetic Compatibility (EMC) protection as it integrates the HAL 830 robust multipurpose die and decoupling capacitors within a single mold 3-lead package.

With its integrated capacitors, the HAC 830 meets the stringent ESD and EMC requirements and eliminates the need for a PCB, thus reducing the total system size and cost.

The HAC 830 is a robust multi-purpose Hall sensor for linear displacement and angle detection below 90°. Thanks to the high temperature stability, the sensor can be used in harsh environments and its ability to detect low magnetic fields leads to reduced system costs.

The HAC 830 is based on Micronas' long success in linear Hall-effect sensors, full in-house manufacturing, and automotive-proven zero ppm track record.

Major characteristics such as magnetic field range, sensitivity, output quiescent voltage and output voltage range are programmable in a non-volatile memory. The sensor features a temperature-compensated Hall plate with chopper offset compensation, an A/D converter, digital signal processing, a D/A converter with output driver, an EEPROM with redundancy and lock function for the calibration data, a serial interface for programming the EEPROM, and protection devices at all pins.

The sensor can easily be calibrated for perfectly adjusting its output to the input signals and to compensate for any variations in the application (magnet positioning, temperature drift). This enables operation over the full temperature range with high accuracy. The calculation of the individual sensor characteristics and the programming of the EEPROM can easily be done with a PC and the application kit from Micronas.

The sensor is designed for hostile industrial and automotive applications (T_J = –40 °C up to 170 °C). The HAC 830 is available in the small leaded RoHs package TO92-UP and is AECQ100 qualified.

Features

- High-precision linear Hall-effect sensor with 12-bit analog output
- Offset drift over temperature less than ±0.2% of V_{SUP}
- Integrated capacitors for improved Electromagnetic Compatibility (EMC) and PCB-less applications
- Programmable temperature compensation for sensitivity
- Open-circuit (ground and supply line break) detection with 5 kΩ pull-up and pull-down resistor, overvoltage and undervoltage detection
- Programmable clamping function
- Programming and operation of multiple sensors at the same supply line
- High immunity against ESD up to 8 kV
- Operates from T_J=–40 °C up to 170 °C
- Operates from 4.5 V up to 5.5 V supply voltage in specification and functions up to 8.5 V
- Overvoltage and reverse-voltage protection at all pins, short-circuit protected push-pull output
- Magnetic field measurement range from 30 mT to 100 mT

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Major Applications

Thanks to low temperature drifts and superior EMC/BCI capabilities, the HAC 830 brings major advantages in applications with a long cable connection e.g. chassis height. It is also the optimal system solution for applications without PCB, where the sensor is directly welded on a lead frame, such as:

- Throttle position
- EGR (Exhaust Gas Recirculation)
- Turbo charger

Development Tools

Programming of the EEPROM and calculation of the individual sensor characteristics can easily be done with a PC and the application kit from Micronas:

- Micronas Programming Board (HAL-APB V 5.1)
- LabVIEW™ programming software for Windows®
- LabVIEW Sub VIs

System Architecture

The HAC 830 is a monolithic integrated circuit which provides an output voltage proportional to the magnetic flux through the Hall plate and proportional to the supply voltage (ratiometric behavior).

This voltage is converted to a digital value, processed in the Digital Signal Processing Unit (DSP) according to the settings of the EEPROM registers, converted back to an analog voltage with ratiometric behavior, and buffered by a push-pull output transistor stage.

The HAC 830 is programmable by modulating the supply voltage. No additional programming pin is needed.

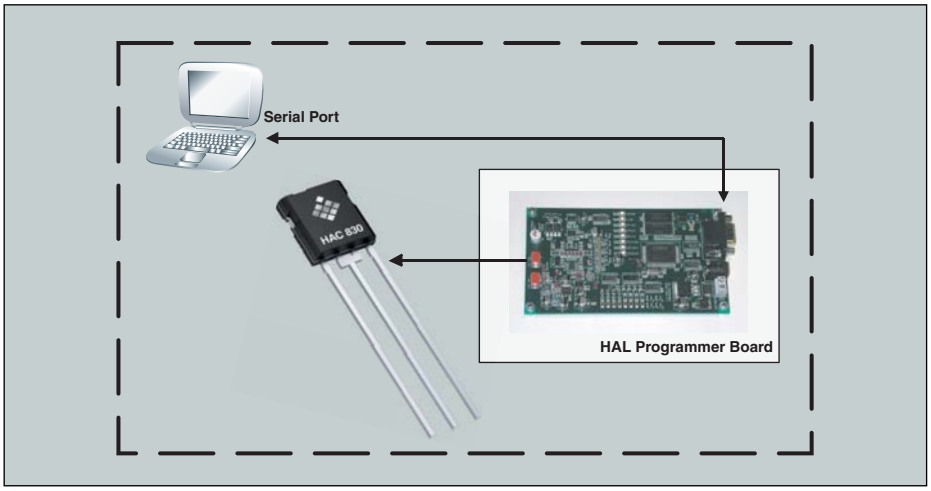

Fig. 1: Development tool setup

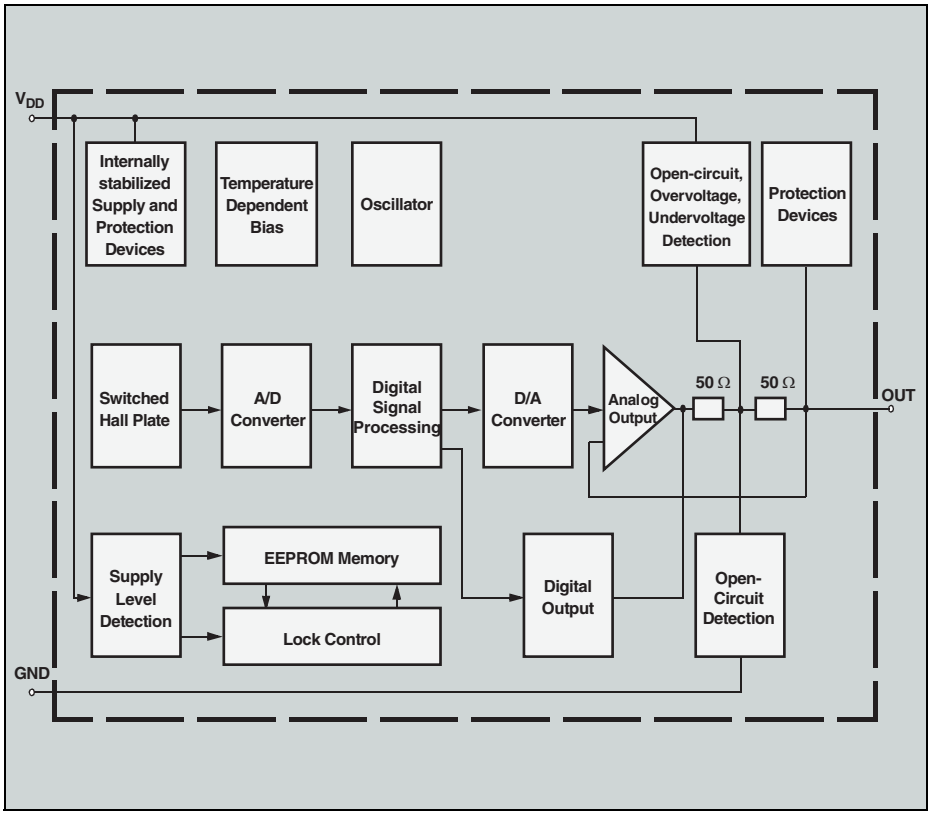

Fig. 2: Block diagram of the HAC 830

Edition Oct. 27, 2014; Order No. PI 000152_001EN

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