

HAL 83x

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HAL 83x Robust Multi-Purpose Linear Hall-Effect Sensor

The HAL 83x family consists of robust multi-purpose Hall sensors for linear displacement and angle detection below 90°. They offer flexibility thanks to the analog and PWM output as well, as to the programmable low-pass filter. Due to the high temperature stability, the sensors can be applied in harsh environments and their ability to detect low magnetic fields leads to reduced system costs.

All new family members will leverage upon 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. All sensors feature a temperature-compensated Hall plate with chopped 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, tempera-

ture 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 ($T_J = -40\text{ °C}$ up to 170 °C). The HAL 83x family is available in the very small leaded RoHs package TO92-UT and is AECQ100 qualified.

HAL 83x Family Overview

Type	Characteristics
HAL 830	Analog output, 30 mT to 100 mT range
HAL 835	Analog and PWM output, 15 mT to 150 mT range, additional features

Features

- ◆ High-precision linear Hall-effect sensor with 12-bit analog output
- ◆ Offset drift over temperature less than $\pm 0.2\%$ of V_{SUP} ($\pm 0.1\%$ for HAL 835)
- ◆ Programmable temperature compensation for sensitivity

- ◆ Open-circuit (ground and supply line break) detection with 5 k Ω 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
- ◆ Operates from -40 °C up to 170 °C junction temperature
- ◆ 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 15 mT up to $\pm 150\text{ mT}$ (HAL 835)
- ◆ Flexible analog or PWM output (HAL 835)
- ◆ Programmable low-pass filter at 80 Hz (less noise) or 2 kHz (faster response) (HAL 835)
- ◆ Backbias cancellation feature enables the measurement of small AC magnetic fields when superposed with large DC fields (HAL 835)

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Major Applications

Due to the sensor's versatile programming characteristics and low temperature drifts, the HAL 83x is the optimal system solution for applications such as:

- ◆ Distance and linear movement measurements
- ◆ Angle sensors like throttle position, pedal position, and EGR applications
- ◆ Contactless potentiometers

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 Programmer Board V5.x
- ◆ Visual Basic® programming software for Windows® 9x/2000/XP/Vista/7/8
- ◆ Visual Basic source code

System Architecture

The HAL 83x 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 HAL 83x is programmable by modulating the supply voltage. No additional programming pin is needed

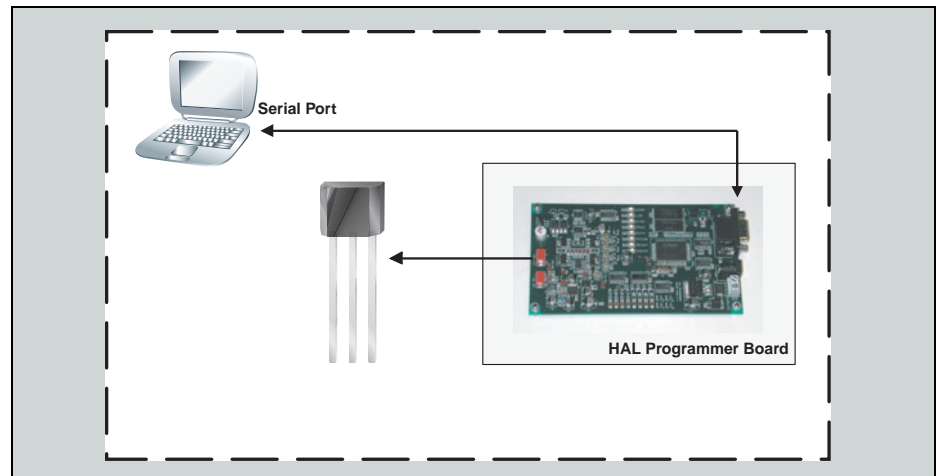


Fig. 1: Development tool setup

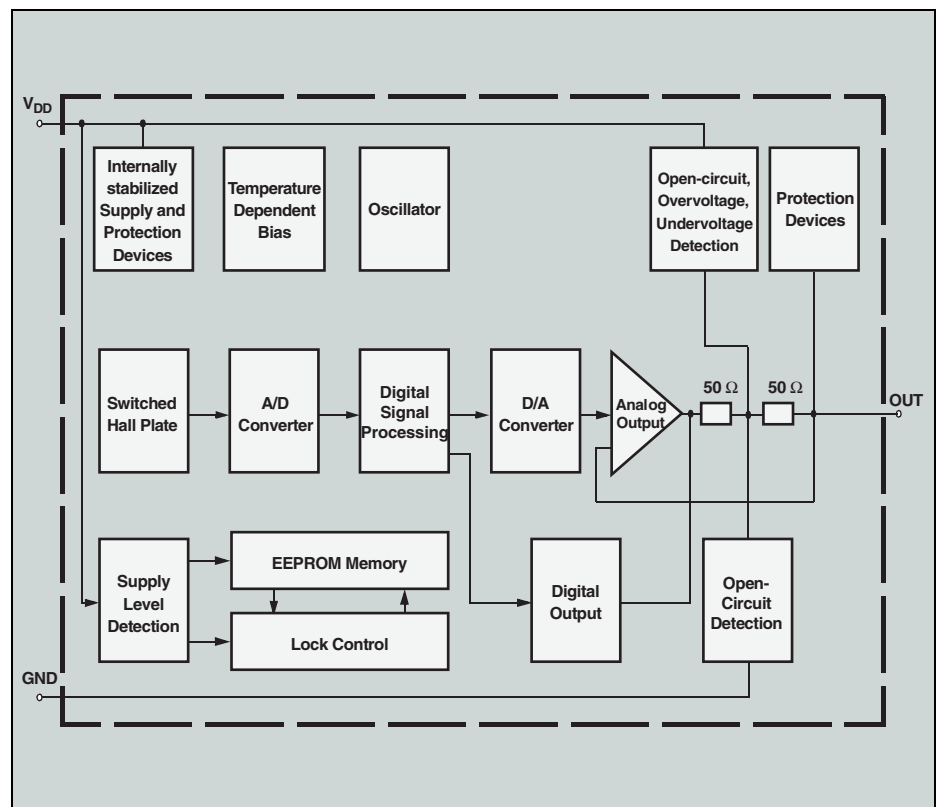


Fig. 2: Block diagram of the HAL 83x

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