HAL 1880

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HAL 1880
Entry-Level Programmable Linear Hall-Effect Sensor

The HAL 1880 is a universal, value-optimized programmable Hall-Effect sensor with a ratiometric, linear analog output. The sensor can be used for magnetic field measurements such as current measurements or detection of mechanical movement, like for small-angle or distance measurements. The sensor is robust and can be used in harsh electrical and mechanical environments.

Major characteristics like magnetic field range, sensitivity, offset and the temperature coefficients are programmable in a non-volatile memory. Several output signal clamping levels can be programmed to indicate various fault conditions like under/overvoltage, under/overflow or thermal supervision.

The HAL 1880 is programmable by modulating the supply voltage with a serial telegram on the sensor's output pin. No additional programming pin is needed. The easy programmability allows a 2-point calibration by adjusting the output signal directly to the input signal (like mechanical angle, distance, or current). Individual adjustment of each sensor during the customer's manufacturing process is possible. With this calibration procedure, the tolerance of the sensor, the magnet and the mechanical positioning can be compensated in the final assembly.

The sensor is designed for industrial and automotive applications, is AEC-Q100 qualified, and operates in the junction temperature range from –40 °C up to 170 °C. The HAL 1880 is available in the very small leaded package TO92UA-2.

Features

- Ratiometric linear output proportional to the magnetic field
- Continuous measurement ranges from ±40 mT to ±160 mT
- Selectable clamping levels with selectable diagnosis
- Comprehensive diagnostic feature set
- Programming via output pin or supply voltage modulation
- Selectable sampling rate
- Overvoltage and reverse-voltage protection at VSUP pin
- Lock function and built-in redundancy for EEPROM
- Programmable temperature characteristics for matching all common magnetic materials
- On-chip temperature compensation
- Active offset compensation
- Operates from –40 °C up to 170 °C junction temperature
- Operates from 4.5 V up to 5.5 V supply voltage in specification
- Operates with static and dynamic magnetic fields up to 5 kHz
- Magnetic characteristics extremely robust against mechanical stress
- Short-circuit protected push-pull output
- EMC and ESD optimized design
- AEC-Q100 qualified

Major Applications

Thanks to the sensors' robust and cost-effective design, the HAL 1880 is the optimal system solution for applications such as:

- Small-angle or linear position measurements
- Gear position detection
- Current sensing
- Rotary selector

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Development Tools

For engineering purpose, TDK-Micronas offers an easy-to-use application kit:

- Magnetic Sensor Programmer (TDK-MSP V1.0)
- LabVIEW™ programming software for Windows®
- LabVIEW Sub VIs
- HAL USB-Kit V1.01

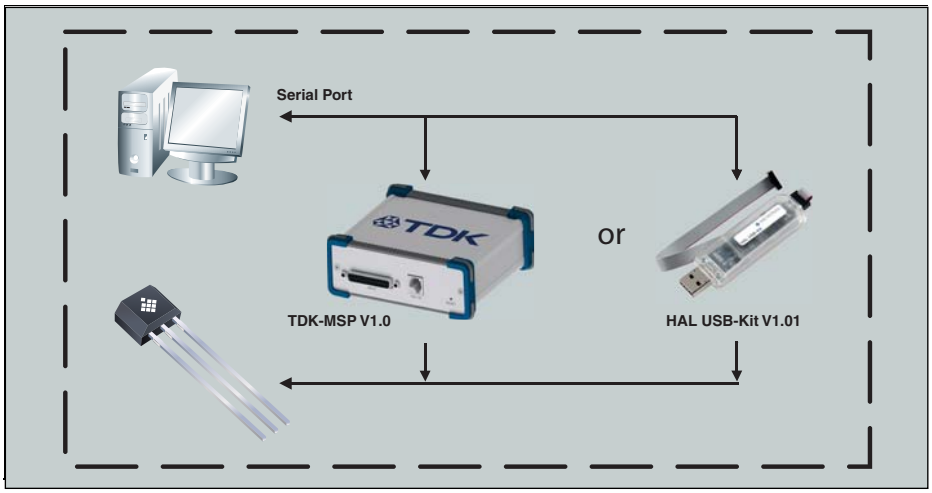

Fig. 1: Development tool setup

System Architecture

The HAL 1880 sensor is a monolithic integrated circuit produced in a proven submicron CMOS technology.

It provides an output voltage proportional to the magnetic flux through the Hall plate and proportional to the supply voltage (ratiometric behavior). Selectable clamping levels for the output voltage as well as diagnostic features are available. The HAL 1880 includes a temperature-compensated Hall plate with spinning-current offset compensation, an A/D converter, digital signal processing, an EEPROM memory with redundancy and lock function for the calibration data and the data register information, a serial interface for programming the EEPROM, and protection devices on all pins. The IC can be programmed via supply or output pin voltage modulation.

The internal digital signal processing is a great benefit because analog offsets, temperature shifts, and mechanical stress do not degrade the sensor accuracy.

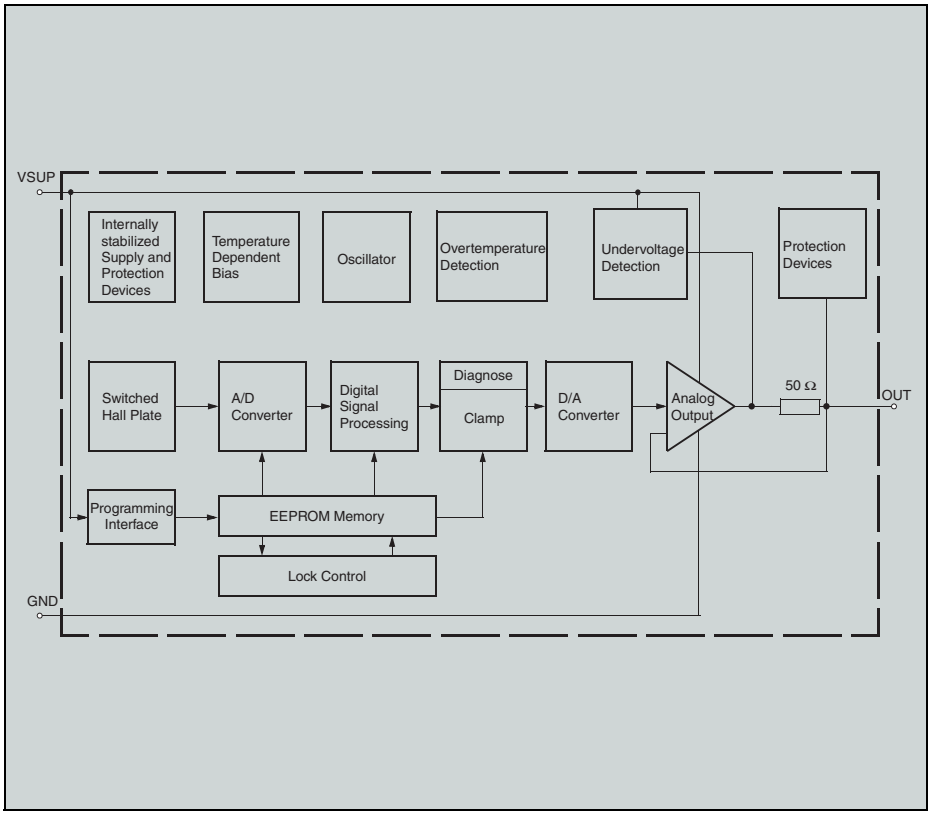

Fig. 2: Block diagram of the HAL 1880

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