MICRONAS

HAL 85x

Oct/2002

HAL 85x
Programmable Hall-Effect Sensors with Arbitrary Output

The HAL 85x complement the existing Hall-effect sensor family HAL 8xx. Both universal magnetic field sensors provide an arbitrary output signal. The sensors are produced in submicron CMOS technology.

In combination with a rotating or moving magnet, the sensors can be employed for angle, distance, and level measurements. The sensors provide either a pulse width modulated (PWM) output signal or a serial Biphase-M output.

Major characteristics like magnetic field range, output characteristic, output format, sensitivity, shift (duty cycle of the PWM output signal or the serial output word), PWM period, low and high current, and the temperature coefficients can easily be adjusted to the magnetic circuit (linear and quadratic) by programming the non-volatile memory. The output characteristic can be set with 32 setpoints with a resolution of 9 bit

The sensors were designed to translate a linear magnetic field into an arbitrary output signal or a non-linear magnetic field into a linear output signal. The sensors are available in the very small leaded package TO-92UT.

Features

- High-precision linear Hall effect sensors with different output formats
- Various programmable magnetic characteristics with non-volatile memory
- Programmable output characteristic (32 setpoints with 9 bit resolution)
- Programmable output formats (PWM or serial Biphase-M)
- Programmable PWM Period
- Open-drain output for HAL 855
- Programmable output current source for HAL 856 (low and high current)
- Digital signal processing
- Temperature characteristics programmable for matching all common magnetic materials
- Programming by modulation of the supply voltage
- Lock function and built-in redundancy for EEPROM memory
- Operates from –40 °C up to 150 °C ambient temperature
- Operates from 4.5 V up to 18 V supply voltage
- Operates with static magnetic fields and dynamic magnetic fields up to 2 kHz
- Choppered offset compensation
- Overvoltage protection on all pins
- Reverse-voltage protection on V_{DD} pins
- Magnetic characteristics extremely robust against mechanical stress
- Short-circuit protected output
- EMC-optimized design

Major Applications

Due to the sensor's versatile programming characteristics, the HAL 85x is the optimal system solution for applications such as:

- Contactless potentiometers
- Rotary position measurement
- Level measurement
- Linear position detection
- Magnetic field detection

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Development Tools

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

- Micronas programmer board (hardware version 5.x)
- Visual Basic programming software for Windows 9x/2000/NT/ME
- Visual Basic source code

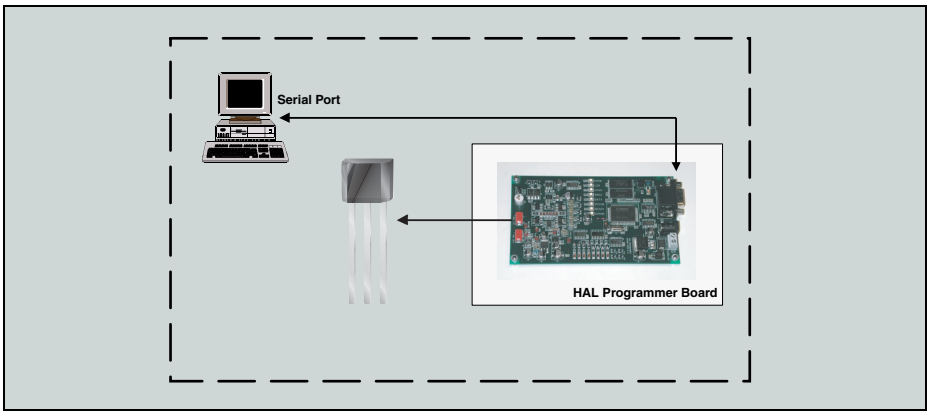

Fig. 1: Development tool setup

System Architecture

The HAL 85x sensors are produced in a proven automotive submicron CMOS technology.

The HAL 85x features a temperature-compensated Hall plate with choppered offset compensation, an A/D converter, digital signal processing, an open-drain output or output current source, an EEPROM memory with redundancy and lock function for the calibration data and the output characteristic, a serial interface for programming the EEPROM, and protection devices on all pins

The HAL 85x is programmable by modulating the supply voltage. No additional programming pin is needed.

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

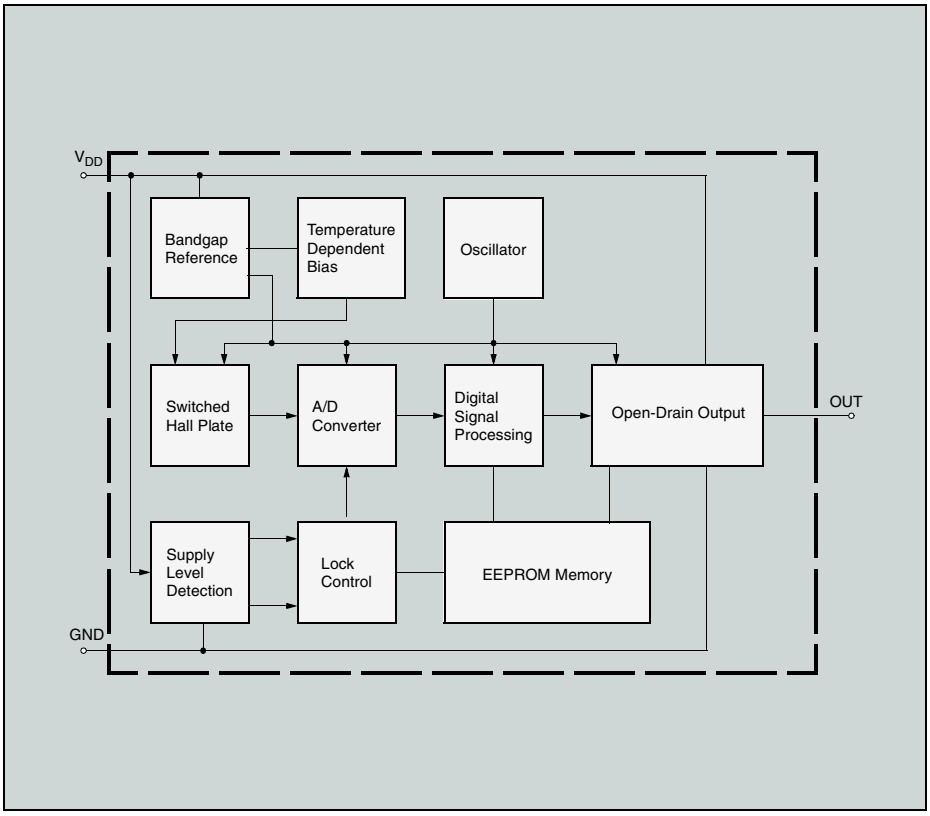

Fig. 2: Block diagram of the HAL 855

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