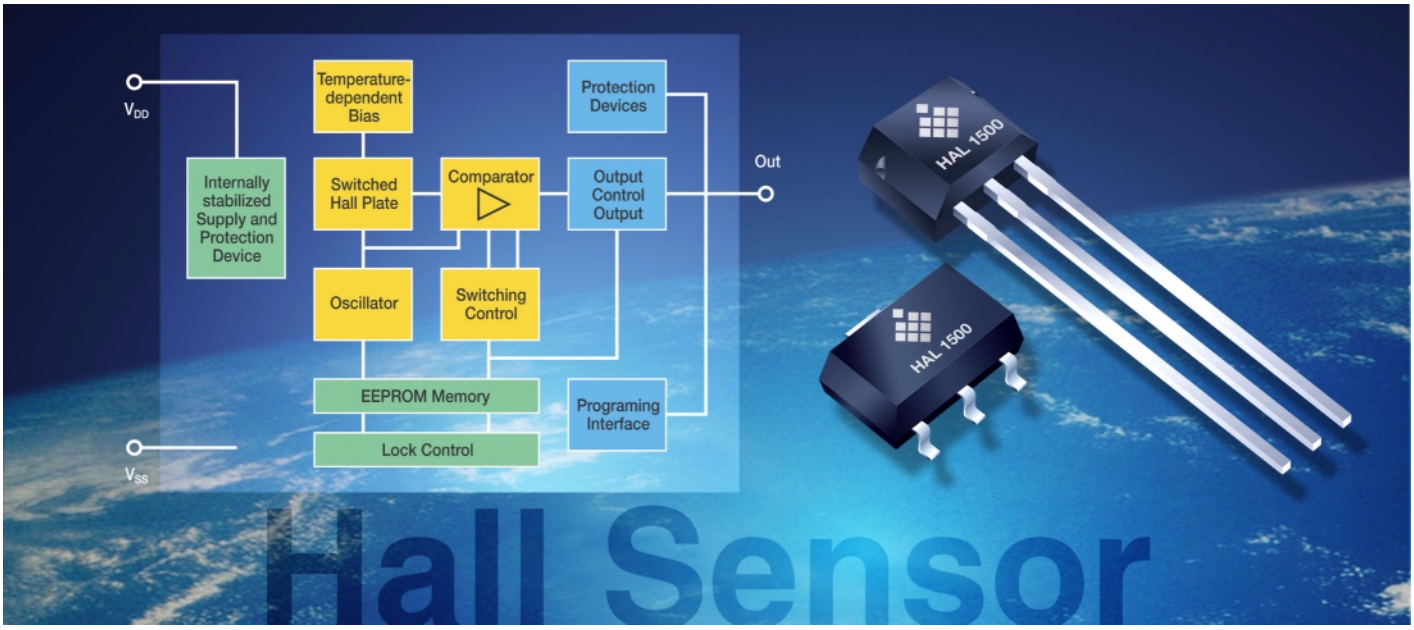
HAL 1500

Oct/2002



HAL 1500
Programmable Low-Voltage Hall-Effect Switch

The HAL 1500 is a programmable Hall switch designed and produced in an automotive submicron CMOS technology and can be used for position detection and rotating speed measurement.

The major magnetic characteristics like switching points, temperature coefficient of switching points, and output switching polarity are programmable in a non-volatile memory.

The HAL 1500 is programmable by modulating the voltage on the output pin of the sensor. No additional programming pin is needed.

An individual adjustment of each sensor during the customer's manufacturing process is possible. With this calibration procedure, the tolerances of the sensor, the magnet and the mechanical positioning can be compensated in the final assembly.

The HAL 1500 eases logistic because its characteristics can be programmed within a wide range. Therefore, one Hall IC type can be used for various applications.

Features

- High-precision programmable Hall-effect sensor with open-drain output
- Programmable via output pin
- Choppered offset compensation
- Operates from 3.5 V to 18 V supply voltage
- Operates from –40 °C to 150 °C ambient temperature
- Operates with magnetic fields from DC to 10 kHz
- Programmable as a digital switch or as a multi-level switch with 4-bit resolution and PWM (Pulse Width Modulated) output signal
- Programmable magnetic switching points (digital switch) or programmable magnetic range and reference level (multi-level switch)
- Programmable temperature coefficient of magnetic switching points
- Lock function and built-in redundancy for EEPROM memory
- Overvoltage protection on all pins and reverse-voltage protection on V_{DD} pin
- Short-circuit protected open-drain output by thermal shut-down
- Magnetic characteristics extremely robust against mechanical stress
- EMC-optimized design
- Available in TO-92UA and SOT-89B package

Major Applications

Due to the sensor's versatile programming characteristics, the HAL 1500 is the optimal system solution for

- Applications with large air gap or weak magnets,
- Rotating speed measurements,
- Camshaft sensors applications,
- Solid state switches,
- Contactless solutions for replacing microswitches,
- Position/end-point detection, and
- Multi-pole magnet applications.

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Development Tools

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

- Micronas programmer board (hardware version 5.0)
- Visual Basic programming software for Windows 9x/2000/NT/ME
- Visual Basic source code

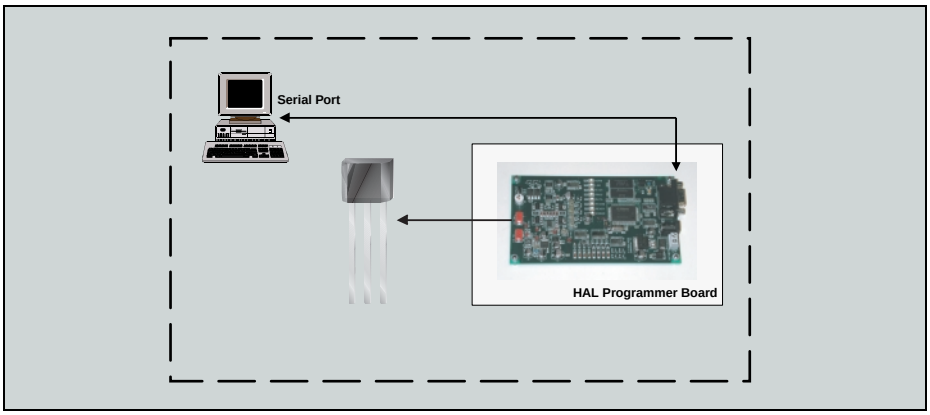

Fig. 1: Development tool setup

System Architecture

The HAL 1500 includes a temperature-compensated Hall plate with active offset compensation, a comparator, an open-drain output transistor, an EEPROM memory with lock function for the calibration data, a serial interface for programming the EEPROM, and protection devices on all pins.
The comparator compares the actual magnetic flux through the Hall plate (Hall voltage) with the programmed reference values (switching points). Accordingly, the output transistor is switched on or off.

Single-Level Switch Output Mode

When the magnetic field exceeds or drops below the programmable threshold levels, the comparator switches to the appropriate state to control the MOSFET (open-drain) output.

Multi-Level Switch Output Mode

An internal counter ramps the switching level. When the counter reaches the level of the external magnetic field, the comparator switches and the sensor provides a PWM-coded output signal.

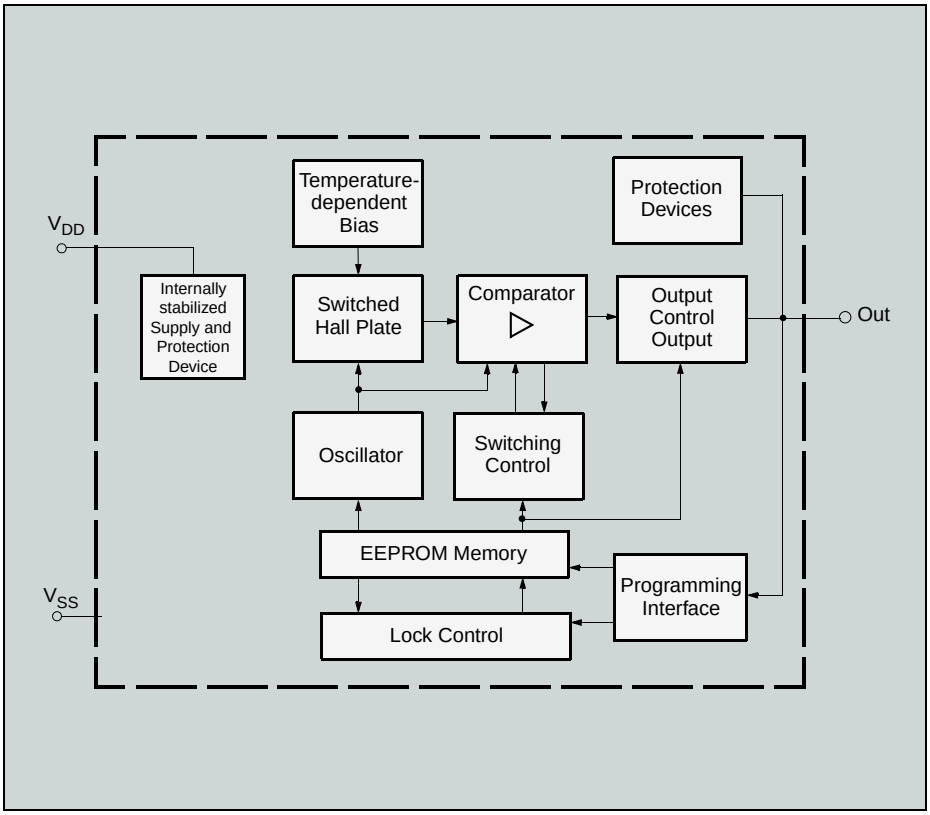

Fig. 2: Block diagram of the HAL 1500

Edition October 1, 2002; Order No. 6251-496-1PI

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