

# HAL 5xy

Sept/2006



## HAL 5xy Multipurpose Hall-Effect Sensor Family

The HAL 5xy family consists of different Hall switches produced in CMOS technology. All sensors include a temperature-compensated Hall plate with active offset compensation, a comparator, and an open-drain output transistor. The comparator compares the actual magnetic flux through the Hall plate (Hall voltage) with the fixed reference values (switching points). Accordingly, the output transistor is switched on or off.

The sensors of this family differ in the switching behavior and the switching points.

The active offset compensation leads to constant magnetic characteristics over supply voltage and temperature range. In addition, the magnetic parameters are robust against mechanical stress effects.

The sensors are designed for industrial and automotive applications and operate with supply voltages from 3.8 V to 24 V in the ambient temperature range from -40 °C up to 150 °C.

All sensors are available in the SMD-package SOT89B-1 and in the leaded versions TO92UA-1 and TO92UA-2.

### Features

- ◆ Switching offset compensation at typically 62 kHz
- ◆ Operates from 3.8 V to 24 V supply voltage
- ◆ Overvoltage protection at all pins
- ◆ Reverse-voltage protection at VDD-pin
- ◆ Magnetic characteristics are robust regarding mechanical stress effects
- ◆ Short-circuit protected open-drain output by thermal shut down
- ◆ Operates with static magnetic fields and dynamic magnetic fields up to 10 kHz
- ◆ Constant switching points over a wide supply voltage range
- ◆ The decrease of magnetic flux density caused by rising temperature in the sensor system is compensated by a built-in negative temperature coefficient of the magnetic characteristics
- ◆ Ideal sensor for applications in extreme automotive and industrial environments
- ◆ EMC corresponding to ISO 7637
- ◆ Operates from -40 °C to 170 °C junction temperature

### Major Applications

The HAL 5xy is the optimal system solution for applications, such as:

- ◆ Endposition detection
- ◆ RPM measurement of motors in various applications, such as power window
- ◆ Brushless DC motors
- ◆ RPM measurements in flow meters
- ◆ Replacement of micro switches

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## Available Types and Switching Behavior

Features	HAL 501	HAL 502	HAL 503	HAL 504	HAL 505	HAL 506	HAL 508	HAL 509	HAL 516	HAL 519	HAL 523
Switching Behavior	bipolar	latching	latching	unipolar	latching	unipolar	unipolar	unipolar	unipolar with inverted output	unipolar with inverted output (north polarity)	unipolar
Sensitivity	very high	high	medium	medium	low	high	medium	low	high	high	low

## System Architecture

The HAL 5xy sensors are monolithic integrated circuits which switch in response to magnetic fields. If a magnetic field with flux lines perpendicular to the sensitive area is applied to the sensor, the biased Hall plate forces a Hall voltage proportional to this field. The Hall voltage is compared with the actual threshold level in the comparator.

The temperature-dependent bias increases the supply voltage of the Hall plates and adjusts the switching points to the decreasing induction of magnets at higher temperatures. If the magnetic field exceeds the threshold levels, the open drain output switches to the appropriate state. The built-in hysteresis eliminates oscillation and provides switching behavior of the output without bouncing.

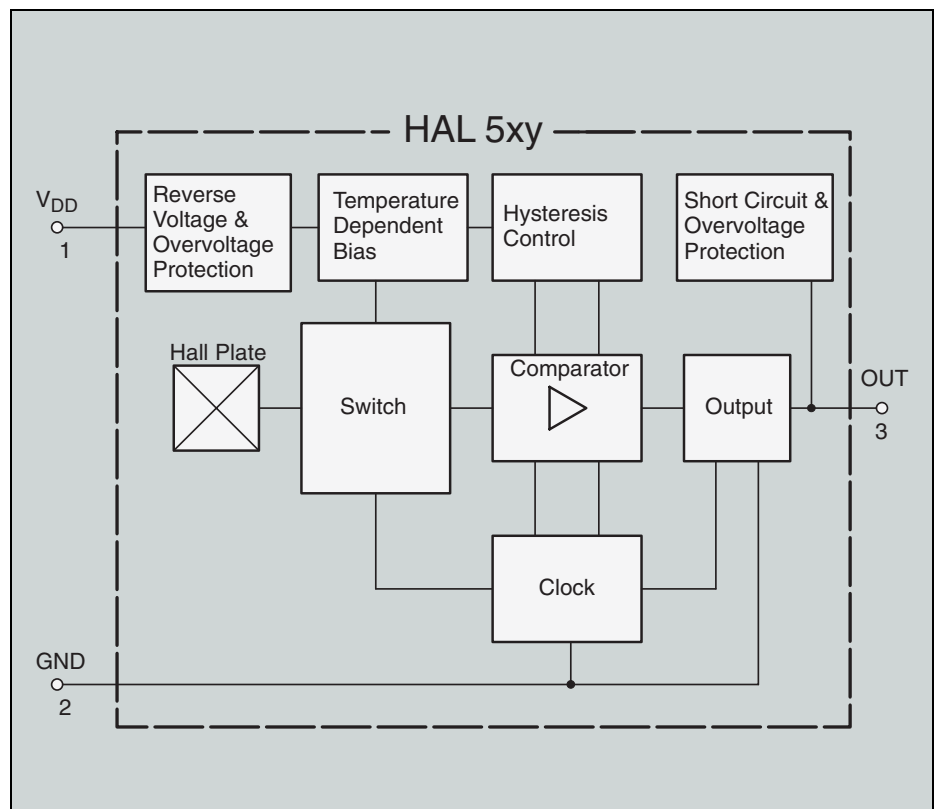


Fig. 1: Block diagram of the HAL 5xy

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Edition Sept. 26, 2006; Order No. 6251-712-1PI