

Introduction

HK50y family consists of different Hall switches produced in BCDMOS technology. All Hall sensors include a temperature-compensated Hall plate with active offset compensation, a comparator, and an output driver. The family consists of 3-wire devices, the corresponding output driver being an open-drain output transistor and a current source respectively. The comparator compares the actual magnetic flux with the fixed reference values (switching points). Accordingly the output transistor is switched on or off in 3-wire version. 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 2.7 V to 30V in ambient temperature range from -40 °C up to 150 °C.

The family AH50y is available in SOT23-3L and the leaded version TO92S packages.

Features

- SOT23-3L and TO92S packages
- Low current consumptions of typ. 2.5 mA
- Operates from 2.7 V to 30 V supply voltage
- Overvoltage protection capability up to 40 V
- Highest ESD performance up to ± 12 kV
- Short-circuit protected open-drain output and thermal shut down for 3-wire applications
- Magnetic characteristics are robust regarding mechanical stress effects
- Constant switching points over a wide supply voltage and temperature range
- Wide operating temperature range from -40 °C to 150 °C
- 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
- Reverse-voltage protection at Vcc pin
- Ideal sensor for applications in extreme automotive and industrial environments
- Qualified according to AEC-Q100 test standard for automotive electronics industry to provide the highest quality expectation

Applications

- Speed and RPM sensing
- Tachometer, counter pickup
- Flow-rate sensing
- Brushless dc motor commutation
- Motor and fan control
- Robotics control
- Proximity sensor
- Position sensor
- Seat position detection
- Seat belt buckles
- Hood/trunk/door latches
- Sun roof/convertible top/tailgate/liftgate actuation
- Brake/clutch pedals
- Electric power steering (EPS)
- Transmissions and shift selectors
- Wiper motor

Package



SOT23-3L

TO92

Contents

Section	Title	Page
1.	HK50y Family Overview	3
2.	Ordering Information	5
2.1	Marking Code	6
2.2	Operating Ambient Temperature Range	6
2.3	Hall Sensor Package Codes	6
3.	Functional Description	6
4.	Diagnostic Features	7
5.	Specifications	8
5.1	Outline Dimensions	8
5.2	Pin assignment	10
5.3	Absolute Maximum Ratings	10
5.4	ESD and Latch-up	11
5.5	Recommended Operating Conditions	11
5.6	Characteristics	12
5.7	Magnetic Characteristics Overview	13
6.	Magnetolectric conversion characteristics	13
7.	Application circuit	14
8.	Data Sheet History	15

1. HK5xy Family Overview

The types within each family differ according to the magnetic flux density values for the magnetic switching points, the temperature behavior of the magnetic switching points, the mode of switching, the number of pins and the average current consumption. Table 1 to Table 4 list some devices classified in terms of switching behavior and sensitivity: higher sensitivity correlates to lower switching points.

Table 1: AH50y 3-wire devices

Type	Sensitivity	Switching Behavior	Sensitivity
HK501		Latching	Very high
HK502		Latching	Very high
HK503		Unipolar	Very high
HK504		Latching	High
HK505		Latching	Medium
HK506		Unipolar	Medium
HK507		Unipolar	Low
HK508		Unipolar	High
HK509		Unipolar inverted	High
HK510		Unipolar	Medium
HK511		Unipolar	Medium

The following definitions outline the device behavior for different switching points:

Latching Sensors:

3-wire: The output turns low with the magnetic south pole on the branded side of the package and turns high with the magnetic north pole on the branded side.

The output does not change if the magnetic field is removed. For changing the output state, the opposite magnetic field polarity must be applied.

High Voltage Hall Effect Switch Family

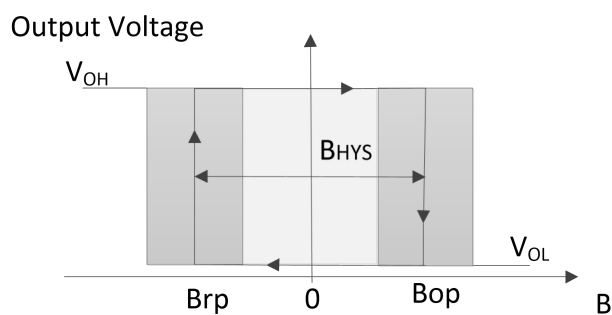


Fig. 1: Definition of magnetic switching points for 3- wire latching sensor.

Bipolar Switching Sensors (3-wire only):

The output turns low with the magnetic south pole on the branded side of the package and turns high with the magnetic north pole on the branded side. The output state is not defined if the magnetic field is removed again. Some sensors will change the output state and some sensors will not.

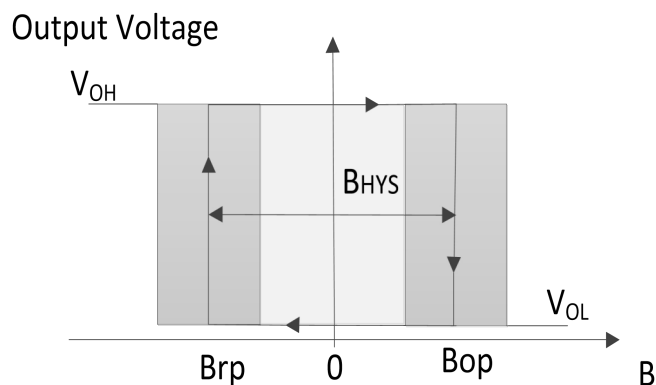


Fig. 2: Definition of magnetic switching points for 3- wire bipolar sensor.

Unipolar Switching Sensors:

3-wire: The output turns low with the magnetic south pole on the branded side of the package and turns high if the magnetic field is removed. The sensor does not respond to the magnetic north pole on the branded side.

High Voltage Hall Effect Switch Family

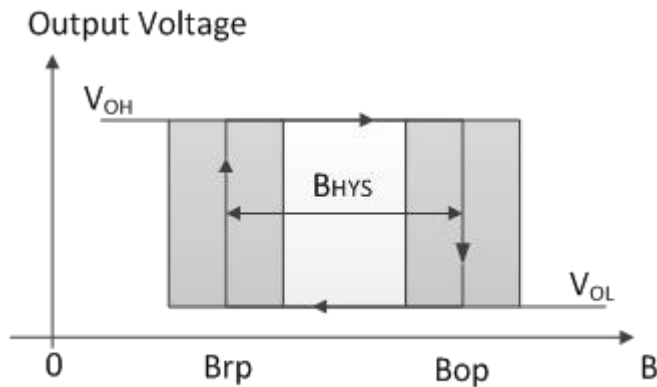


Fig. 3: Definition of magnetic switching points for 3-wire unipolar sensor.

Unipolar Switching Sensors with Inverted Output:

3-wire: The sensor turns to low current consumption with the magnetic south pole on the branded side of the package and turns to high consumption if the magnetic field is removed. The sensor does not respond to the magnetic north pole on the branded side.

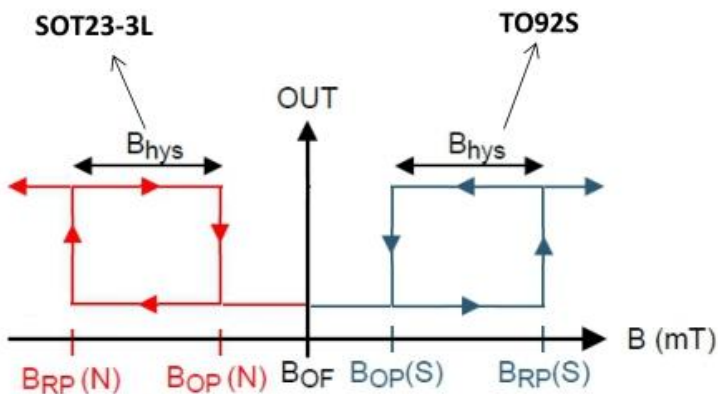


Fig. 3: Definition of magnetic switching points for 3-wire unipolar sensor with inverted output.

2. Ordering Information

2.1. Marking Code

All Hall sensors have a marking on the package surface (branded side). This marking includes the name of the sensor and date code.

2.2. Operating Ambient Temperature Range

The Hall sensors from Vinbelltech are specified to the ambient temperature.

$T_A = -40\text{ }^\circ\text{C}$ up to $150\text{ }^\circ\text{C}$

