

HAL 710/730

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HAL[®] 710/730 Hall-Effect Sensors with Direction Detection

The HAL 710/730 Hall switch family is produced in CMOS technology. The sensors include two independent temperature-compensated Hall plates each equipped with active offset compensation and a comparator. The sensors provide two open-drain outputs – one for “count” and one for “direction” detection.

The comparator compares the actual magnetic flux through the Hall plates (Hall voltage) with the fixed reference values (switching points). The first comparator directly switches the count output. The phase shift between both comparators determine the state of the direction output.

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

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 125 °C.

The HAL 710/730 family is available in the SMD package SOT-89B-3.

Features

- ◆ Operates from 3.8 V to 24 V supply voltage
- ◆ Generation of a direction signal
- ◆ Operates with static magnetic fields and dynamic magnetic fields up to 10 kHz
- ◆ Overvoltage protection at all pins
- ◆ Reverse-voltage protection at V_{DD} pin
- ◆ Magnetic characteristics are robust against mechanical stress effects
- ◆ Short-circuit protected open-drain outputs by thermal shut down
- ◆ Constant switching points over a wide supply voltage and temperature 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
- ◆ High temperature stability for automotive or industrial applications
- ◆ High ESD rating

Major Applications

The HAL 710/730 is the optimal system solution for applications, such as:

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

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Available Types and Switching Behavior

Type	Direction Output: Definition of Output State
HAL 710	Output high, when edge of comparator 1 precedes edge of comparator 2
HAL 730	Output high, when edge of comparator 2 precedes edge of comparator 1

System Architecture

The Hall-effect sensor is a monolithic integrated circuit that switches 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 output without bouncing.

Magnetic offset caused by mechanical stress is compensated for by using the "switching offset compensation technique". Therefore, an internal oscillator provides a two phase clock. The Hall voltage is sampled at the end of the first phase. At the end of the second phase, both sampled and actual Hall voltages are averaged and compared with the actual switching point.

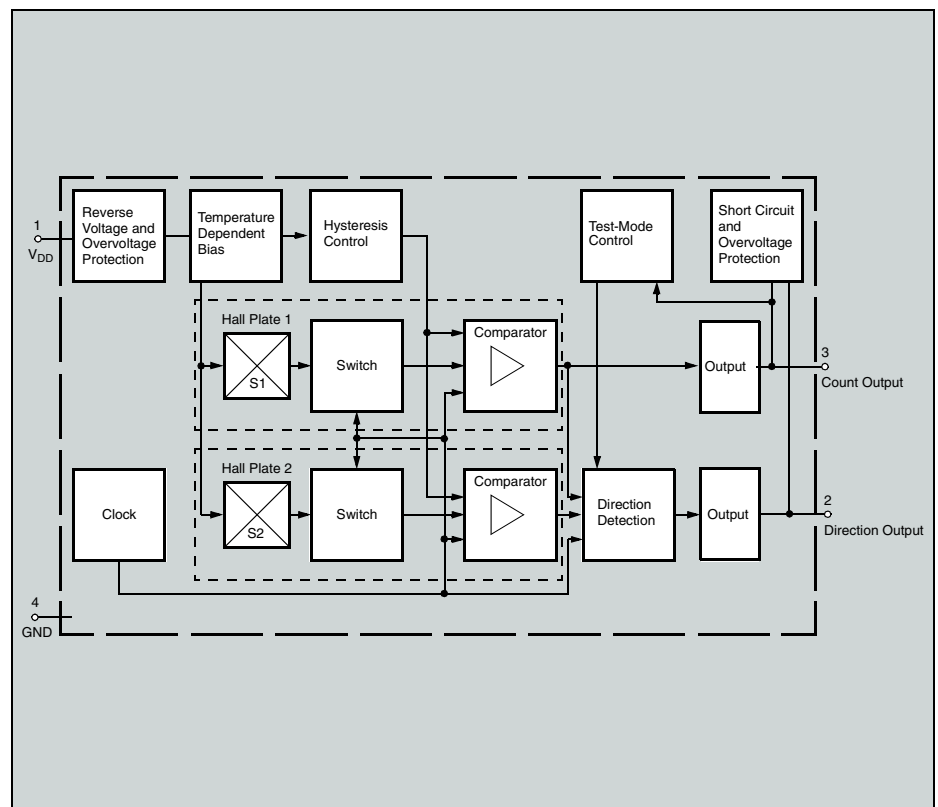


Fig. 1: Block diagram of the HAL 710/730

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