

HAL 15xy

April/2014



HAL 15xy First ISO 26262 Compliant, Low-Power Hall Switch in SOT23 Package

The HAL 15xy family consists of different Hall switches containing a temperature-compensated Hall plate with active offset compensation and comparator, available optionally with open-drain or current output.

As global Hall switch supplier with long-term experience since 1993, 1.5 billion shipped automotive switches and leading expertise in high-quality Hall-effect sensor solutions, Micronas expands its large switch portfolio with the new HAL 15xy family.

All CMOS wafer processing is done in Micronas' facilities in Freiburg (Germany) to ensure best quality control and highest flexibility.

As improved successor of the well-known HAL 5xy family, the HAL 15xy is available as 3-wire version with short-circuit protected open-drain output and 2-wire version with current output. HAL 15xy is available in the smallest SOT23 package and provides lowest power consumption, fast response times, and special safety features like a unique power-on self-test for greater customer benefit at an excellent price-performance ratio.

With different switching-point versions, the HAL 15xy switch family serves a broad variety of automotive and industrial applications under harshest temperature conditions.

HAL 15xy fulfills the latest quality and functional safety standards as AEC-Q100 qualified and ISO 26262 ASIL ready device, enabling our customers to target even the most safety-critical applications.

Features

- ◆ Sampling and output refresh time of 2 μ s
- ◆ 3-wire version with a short-circuit protected open-drain output
- ◆ 2-wire version with current output
- ◆ Very low current consumptions of typ. 1.6 mA and max. 2 mA (3-wire)
- ◆ Wide supply voltage operation from 2.7 V to 24 V
- ◆ Overvoltage protection capability up to 40 V
- ◆ Available in the smallest SOT23 package
- ◆ Highest ESD performance up to \pm 8 kV

- ◆ Reverse-voltage protection at supply pin
- ◆ Operating with static and dynamic magnetic fields up to 12 kHz at lowest output jitter of max. 0.58 μ s (RMS). Customized versions are possible up to 93 kHz.
- ◆ AEC-Q 100 qualification
- ◆ ASIL ready device
- ◆ Additional functional safety features e.g.:
 - Power on self-test
 - Monitoring of bias, undervoltage, and current level
 - Overtemperature shut-down
 - Output current limitation
- ◆ Wide junction temperature range from -40°C to 170°C , specially designed for operation in harsh environments
- ◆ Magnetic characteristics are robust against mechanical stress
- ◆ Broad variety of temperature-compensated constant switching points
- ◆ For TO92UA package, please contact Micronas service

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Major Applications

Our new switch family HAL 15xy is the optimal system solution for applications, such as:

- ◆ Endposition detection
- ◆ Brushless DC motor commutation
- ◆ Revolutions per minute (RPM) or other counting measurements

Available Types and Behavior

Version	Type	Switching Behavior	Switching Points (typ.)		Sensitivity
			B _{ON}	B _{OFF}	
3-wire	HAL1501	bipolar	0.5 mT	-0.5 mT	very high
	HAL1502	latching	2.5 mT	-2.5 mT	high
	HAL1503	unipolar	5.5 mT	3.5 mT	medium
	HAL1506	unipolar	18 mT	16 mT	low
	HAL1507	unipolar	27 mT	23 mT	low
	HAL1508	unipolar	-5.5 mT	-3.5 mT	medium
	HAL1509	unipolar inverted	3.5 mT	5.5 mT	medium
2-wire	HAL1562	latching	12 mT	-12 mT	low
	HAL1563	unipolar inverted	7 mT	9 mT	medium
	HAL1564	unipolar inverted	4 mT	6 mT	medium
	HAL1565	unipolar	6 mT	4 mT	medium
	HAL1566	unipolar	9 mT	7 mT	medium

System Architecture

HAL 15xy 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. If the magnetic field exceeds the threshold levels, the output stage (open drain output for 3-wire devices or current source for 2-wire devices) is switched 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 by using the "switching offset compensation technique".

The device is able to withstand a maximum supply voltage of 24 V for unlimited time and features overvoltage capability up to 40 V load dump.

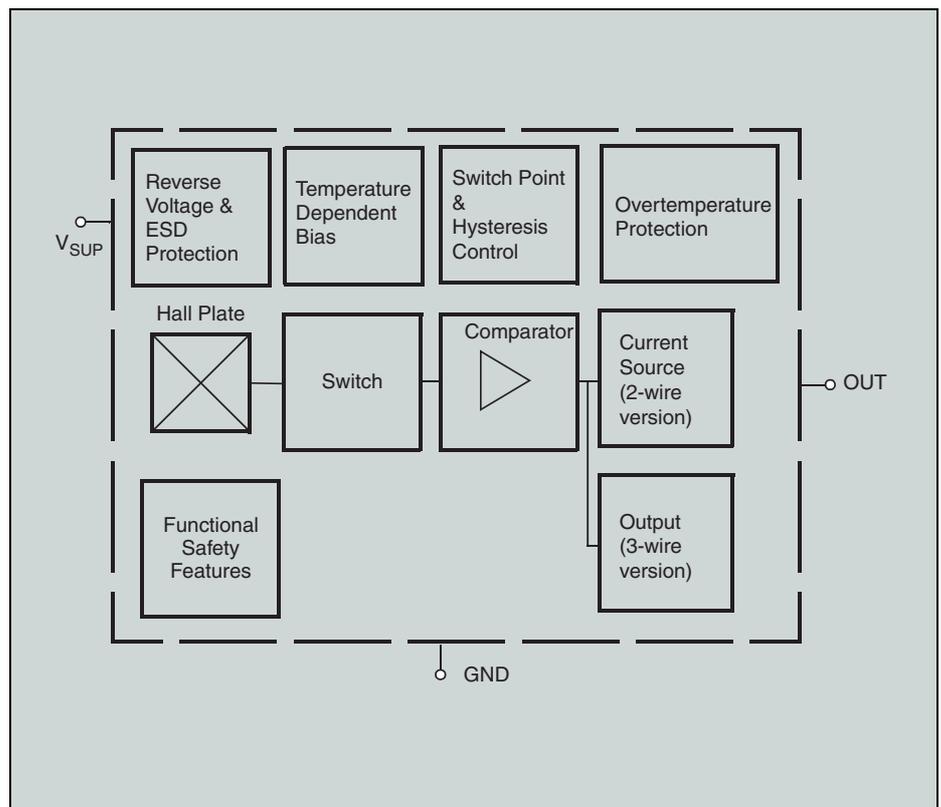


Fig. 1: Block diagram of the HAL 15xy

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