MICRONAS

HAL 15xy

Nov/2018

HAL 15xy
First ISO 26262 Compliant Low-Power Hall Switch

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, TDK-Micronas expands its switch portfolio with the new HAL 15xy family.

All CMOS wafer processing is done in TDK-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 as well as TO92UA 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 harsh 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 µs
- 3-wire version with a short-circuit protected open-drain output
- 2-wire version with current output
- Low current consumption of typ. 1.6 mA
- Wide supply voltage operation from 2.7 V to 24 V
- Overvoltage protection capability up to 40 V
- Available in the small SOT23 and TO92UA package
- High HBM ESD performance of up to ±8 kV
- Reverse-voltage protection at supply pin
- Operating with static and dynamic magnetic fields up to 12 kHz with low output jitter. Customized versions are possible up to 93 kHz.
- AEC-Q100 qualification
- ASIL A ready device (SPFM ≥60%)
- Additional diagnostic features e.g.:
  - Power on self-test (signal path test and wire-break detection)
  - Monitoring of internal bias and current levels
  - Overtemperature protection
  - Output current limitation
  - Defined fail safe state
- Wide junction temperature range from –40 °C to 170 °C, specially designed for operation in harsh environments
- High robustness of magnetic characteristics against mechanical stress
- Broad portfolio of temperature-compensated constant switching points

MICRONAS

HAL 15xy

Nov/2018

Major Applications

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

- Position detection e.g. for seat belt and gear shift
- Index counting e.g. for window lift
- Brushless DC motor commutation e.g. for pumps and fans

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 the output without toggling. 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.

Available Types and Behavior

Version	Type	Switching Behavior	Switching Points (typ.) B_{ON} [mT]	B_{OFF} [mT]	Temp. Coefficient [ppm/K]	2-Wire I_{SUPlow} [mA]	Predecessor
3-wire	HAL1501	bipolar	0.4	–0.4	0	–	HAL501
	HAL1502	latching	2.5	–2.5	–1000	–	HAL502
	HAL1503	unipolar	5.5	3.7	–1000	–	HAL506
	HAL1504	latching	7.6	–7.6	–1200	–	HAL503
	HAL1505	latching	13.5	–13.5	–1200	–	HAL505
	HAL1506	unipolar	18.9	17.3	–1200	–	HAL508
	HAL1507	unipolar	28.2	23.9	–300	–	HAL509
	HAL1508	unipolar	–5.5	–3.7	–1000	–	HAL549
	HAL1509	unipolar inverted	3.7	5.5	–1000	–	HAL516
	HAL1510	unipolar	12	7	–1200	–	HAL504
2-wire	HAL1561	latching	4	–4	0	5 to 7	HAL575
	HAL1562	latching	12	–12	0	5 to 7	HAL579
	HAL1563	unipolar inverted	7.6	9.4	0	5 to 7	HAL584
	HAL1564	unipolar inverted	4.1	6	–1000	2 to 5	HAL566
	HAL1565	unipolar	6	4.1	–1000	2 to 5	HAL556
	HAL1566	unipolar	9.4	7.6	0	5 to 7	HAL574

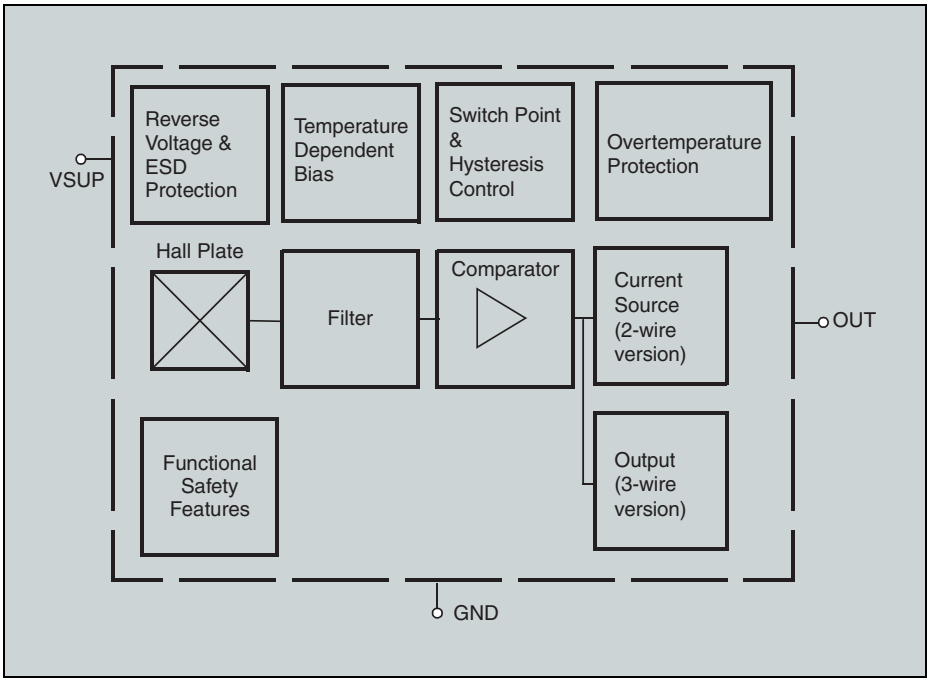

Fig. 1: Block diagram of the HAL 15xy

Edition Nov. 8, 2018; Order No. PI000148_005EN

TDK-Micronas GmbH · Hans-Bunte-Strasse 19 · D-79108 Freiburg (Germany) · P.O. Box 840 · D-79008 Freiburg (Germany)
Tel. +49-761-517-0 · Fax +49-761-517-2174 · www.micronas.com

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- View HAL502UA-A on WIN SOURCE
- Micronas GmbH Information

Optimize Your Supply Chain with WIN SOURCE Solutions

- Global Sourcing Solution
- Obsolete Management
- Cost Control Management
- Shortage Management
- Alternative Solution
- Excess Inventory Management