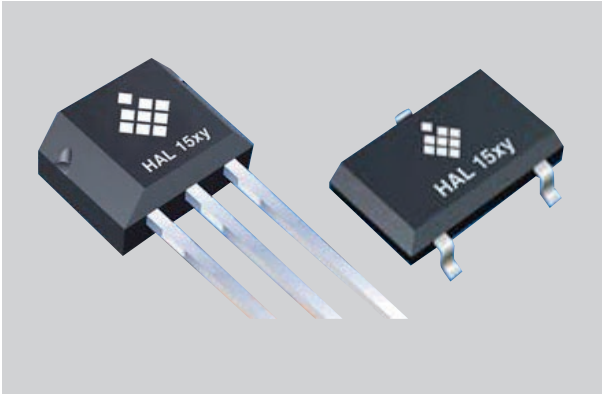


HAL 15xy – FIRST ISO 26262 COMPLIANT LOW-POWER HALL SWITCH



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, 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
- 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 T092UA 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 ready device (SPFM $\geq 60\%$)
- Additional functional safety features e.g.:
 - Power on self-test (signal path test and wire-break detection)
 - Monitoring of bias, undervoltage, and current level
 - 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

APPLICATIONS

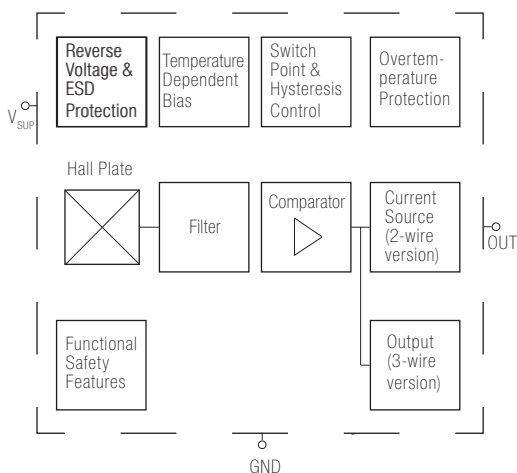
Our new switch family HAL 15xy is the optimal system solution for key applications such as:

- 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

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| AVAILABLE TYPES AND BEHAVIOR | | | | | | | |
|------------------------------|---------------|-------------------|---------------|----------------|-------|--------|-----------------|
| | | | B_{ON} (mT) | B_{OFF} (mT) | | | |
| 3-wire | HAL1501 | bipolar | 0.4 | -0.4 | 0 | – | HAL 501 |
| | HAL1502 | latching | 2.5 | -2.5 | -1000 | – | HAL 502/HAL 202 |
| | HAL1503 | unipolar | 5.5 | 3.7 | -1000 | – | HAL 506 |
| | HAL1506 | unipolar | 18.9 | 17.3 | -1200 | – | HAL 508 |
| | HAL1507 | unipolar | 28.2 | 23.9 | -300 | – | HAL 509 |
| | HAL1508 | unipolar | -5.5 | -3.7 | -1000 | – | HAL 549 |
| | HAL1509 | unipolar inverted | 3.7 | 5.5 | -1000 | – | HAL 516 |
| | 2-wire | HAL1562 | latching | 12 | -12 | 0 | 5 to 7 |
| HAL1563 | | unipolar inverted | 7.6 | 9.4 | 0 | 5 to 7 | HAL 584 |
| HAL1564 | | unipolar inverted | 4.1 | 6 | -1000 | 2 to 5 | HAL 566 |
| HAL1565 | | unipolar | 6 | 4.1 | -1000 | 2 to 5 | HAL 556 |
| HAL1566 | | unipolar | 9.4 | 7.6 | 0 | 5 to 7 | HAL 574 |

SYSTEM ARCHITECTURE



BLOCK DIAGRAM OF THE HAL 15xy

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.