

## Magnetic Sensors

### 3D position Hall sensor product line with unique stray field compensation

- New 3D position sensors based on the Hall-effect allow active stray field compensation of homogenous and gradient fields
- Highly flexible device architecture supports various digital interfaces (SPI, PWM, SENT according to SAE J2716 rev. 2016 and PSI5 rev. 2.x)
- Presentation of HAL 39xy sensors from November 13 to 16, 2018, at the Electronica exhibition in Munich

November 14, 2018

TDK Corporation (TSE 6762) expands its Micronas position sensor portfolio with the Hall-sensor family HAL<sup>®</sup> 39xy featuring stray-field compensation capability built on the highly flexible architecture for multidimensional magnetic-field measurements marketed under the trademark masterHAL<sup>®</sup>. The sensors meet today's and tomorrow's automotive and industrial market needs and offer four different measurement modes in a single device: Linear position detection, rotary 360° angle detection and rotary 180° angle detection with stray field compensation including gradient fields as well as the capability for real 3D magnetic field measurement (BX, BY, BZ).

The heart of the HAL 39xy sensors is the patented 3D HAL<sup>®</sup> pixel cell technology. It helps not only to measure magnetic fields very accurately, but it is also insensitive to stray fields. The unique concept is based on an array of Hall plates. Each measurement mode uses a different combination of them to enable best performance in each mode. The highly flexible sensor array of the masterHAL<sup>®</sup> sensor line helps design engineers to select the best operation mode for any given measurement task. The HAL 39xy is the only solution available on the market that integrates all four modes in a single device. This offers a clear benefit to customers: They only have to qualify one device instead of various different hardware versions. The new sensors are ideal for a wide range of applications, including all kind of valves and actuators, selectors and gear shifters, pedal-position detection, position detection in transmission systems, steering-angle detection, or chassis-position detection.

Thanks to its flexible architecture, the HAL 39xy sensor family offers a wide range of configuration possibilities. It features a powerful DSP and an embedded microcontroller. The DSP is responsible for fast signal processing, while the microcontroller performs the interface configuration and supervision of the functional safety related tasks. TDK-Micronas offers the development of customized firmware for the DSP and the microcontroller. Together with the flexible Hall sensor front-end, this enables customers to realize new kinds of applications. The innovative architecture of the HAL 39xy sensors makes it easy for customers to develop new solutions using fast prototyping techniques. It also enables quick and easy adaptation to changes in interface standards such as SENT, SPI, and PSI5.

First samples will be available in the first quarter 2019. Further sensor variants, for example a dual-die version with redundancy functionality or with integrated capacitors are under

development. TDK showcases the masterHAL® product line from November 13 to 16, 2018, during the Electronica exhibition in Munich at booth 460 in hall B3.

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## Glossary

- 3D HAL® pixel cell: Enables the direct measurement of magnetic fields in three directions X, Y, Z
- Stray-field compensation: Modern Hall-effect sensors must be insensitive against disturbing fields generated by e-motors or power lines in hybrid or electrical vehicles (xHEV)

## Main applications

- All kind of valves and actuators (e.g. cooling valves, EGR, turbocharger actuators)
- Selectors and gear shifters
- Pedal-position detection
- Position detection in transmission systems
- Steering-angle detection
- Chassis position detection

## Main features and benefits

- Stray field robust position detection (linear and rotary up to 360°) covering ISO 11452-8 requirements
- Compensation of stray fields with gradients for applications with 180° rotation
- Real 3D magnetic field measurement of  $B_x$ ,  $B_y$  and  $B_z$
- Transmission of temperature compensated magnetic raw values ( $B_x$ ,  $B_y$ ,  $B_z$ ), up to two calculated angles, angle velocity, magnetic field amplitude and/or chip temperature
- SEooC according to ISO 26262 to support functional safety applications
- Additional switch output
- Wide supply voltage range: 3.0 V ... 16 V
- Suitable for automotive applications, thanks to a wide ambient temperature range from -40 °C up to max. 160 °C

## Key data

Type	HAL 3900, HAL 3930, HAL 3980
Package	SOIC-8
Digital output formats	SPI, PWM & SENT SAE J2716 rev. 2016, PSI5 2.x
Angular error	$\pm 0.6^\circ$ @ 10 mT for rotary setups
Magnetic field amplitude range	10 mT... 130 mT. Down to 5 mT with reduced accuracy
Safety	ASIL-B ready development according ISO 26262
Sample availability	Q1 2019

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## About TDK-Micronas

TDK-Micronas is the most preferred partner for sensing and control. TDK-Micronas serves all major automotive electronics customers worldwide, many of them in long-term partnerships for lasting success. Operational headquarters are based in Freiburg im Breisgau (Germany). Currently, TDK-Micronas employs around 900 persons. For more information about TDK-Micronas and its products, please visit [www.micronas.com](http://www.micronas.com).

## About TDK Corporation

TDK Corporation is a leading electronics company based in Tokyo, Japan. It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK's comprehensive portfolio features passive components such as ceramic, aluminum electrolytic and film capacitors, as well as magnetics, high-frequency, and piezo and protection devices. The product spectrum also includes sensors and sensor systems such as temperature and pressure, magnetic, and MEMS sensors. In addition, TDK provides power supplies and energy devices, magnetic heads and more. These products are marketed under the product brands TDK, EPCOS, InvenSense, Micronas, Tronics and TDK-Lambda. TDK focuses on demanding markets in the areas of information and communication technology and automotive, industrial and consumer electronics. The company has a network of design and manufacturing locations and sales offices in Asia, Europe, and in North and South America. In fiscal 2018, TDK posted total sales of USD 12 billion and employed about 103,000 people worldwide.

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## Contacts for regional media

Region	Contact	Phone	Mail
Global	Mrs. Julia ANDRIS TDK-Micronas Freiburg, Germany	+49 761 517 2531	<a href="mailto:media@micronas.com">media@micronas.com</a>