Press Information

Magnetic Sensors

TDK launches new stray-field robust Fast Hall sensor with analog outputs for ASIL D applications

– New Fast Hall position sensor HAL 3025, featuring high-speed analog sine/cosine outputs and robust stray-field compensation
– Optimized for high-speed motor control up to 60,000 rpm in EV powertrains, steering, and braking systems
– SEooC ASIL D ready according to ISO 26262:2018, supporting the highest functional safety requirements

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TDK Corporation (TSE: 6762) announces the addition of HAL 3025 to its Micronas fast Hall sensor position sensor family. Following the successful launch of HAL 3020 and HAL 3021, HAL 3025 extends the portfolio with a single die sensor that is assessed for stringent ISO 26262 ASIL D requirements and is designed for next generation x-by-wire motor control applications. *

Samples are already available. Start of production is planned for Q2/2026.

HAL 3025 measures a full 360° rotational angle by evaluating the vertical magnetic field component using TDK-Micronas' SixSense technology, the same proven approach used in HAL 3021. By suppressing external DC and AC magnetic stray fields in accordance with ISO 114528, the sensor supports compact motor designs where power electronics are positioned in close proximity to the sensing element. It also eliminates the need for costly magnetic shielding or oversized target magnets, giving designers greater freedom in motor layout design and reducing overall system cost. A simple two-pole ferrite magnet in an end-of-shaft configuration is sufficient.

The HAL 3025 is designed as an SEooC ASIL D ready, implementing a single die failsafe architecture that reduces system complexity, bill of materials, and board space compared with multi-die approaches. The device integrates various on-chip safety monitoring to maximize diagnostic coverage and reduce the amount of external supervision required on the ECU. The result: earlier and broader fault detection, simpler system diagnostics, and higher confidence in safe startup and runtime operation.

Engineered for high-performance motor control, the sensor supports applications with rotational speeds of up to 60,000 rpm. The analog signal path ensures a fast response time and high output bandwidth, which are critical for modern electric powertrains and safety-critical actuators. Using the differential or single-ended sine and cosine analog outputs of HAL 3025, external microcontrollers or Electronic Control Units (ECUs) can calculate the absolute angular position with high resolution.

The device's non-volatile memory allows for the programming of essential signal path parameters, such as sine/cosine gain, offset, orthogonality, 0-angle, and magnetic signal bandwidth, via the sensor's output pin.

This eliminates the need for additional programming pins and provides designers with maximum flexibility for end-of-line calibration.

To ensure long-term reliability in harsh environments, the sensor operates in a junction temperature range from -40 °C to 170 °C and is available in a compact SOIC8 SMD package. The pin-compatible footprint with HAL 3020 and HAL 3021 enables a seamless upgrade for existing designs while providing the enhanced safety level required for next generation x-by-wire motor architectures.

Glossary

- Stray-field compensation: Modern Hall-effect sensors must be insensitive against disturbing fields generated by e-motors or power lines in hybrid or electric vehicles (xEV).
- ASIL D ready: Indicates the device is developed according to ISO 26262 to be integrated into systems requiring the highest Automotive Safety Integrity Level.

Main applications*

- Rotary position measurement for commutation of:
  - Brushless DC motors (BLDC)
  - Permanent magnet synchronous motors (PMSM)
  - AC induction motors (ACIM)
- Steer-by-wire systems:
  - Steering rack actuators
  - Steering wheel actuators
  - Steering wheel angle position
- Brake-by-wire systems:
  - Electrohydraulic braking motors
  - Electromechanical braking motors
- HV traction motors

Main features and benefits**

- High-speed 360° contactless angle measurement up to 60,000 rpm
- Magnetic stray field compensation according to ISO 11452-8:2015
- SEooC ASIL D ready according to ISO 26262:2018
- Integrated diagnostics (wire-break, overvoltage/undervoltage detection, etc.)
- EMC robust differential or single-ended sine/cosine analog output signals
- Operates from -40 °C up to 170 °C junction temperature
- Programmable signal processing: gain, offset, 0-angle, and orthogonality
- Overvoltage and reverse voltage protection

Type	Package	Output Formats	Angular error (over temperature and lifetime)	Delay Time	Safety
HAL 3025	SOIC8	Analog Sine/Cosine	0.1° (with external dynamic offset, gain, orthogonality compensation)	Configurable between 4.6 and 40.4 µs	ASIL D ready

*Any mention of target applications for our products is made without a claim for fit for purpose as this has to be checked at system level.
**All operating parameters must be validated for each customer application by customer's technical experts.

About TDK Corporation
TDK Corporation (TSE:6762) is a global technology company and innovation leader in the electronics industry, based in Tokyo, Japan. With the tagline "In Everything, Better" TDK aims to realize a better future across all aspects of life, industry, and society. For over 90 years, TDK has shaped the world from within; from the pioneering ferrite cores to cassette tapes that defined an era, to powering the digital age with advanced components, sensors, and batteries, leading the way towards a more sustainable future. United by TDK Venture Spirit, a start-up mentality built on visions, courage and mutual trust, TDK's passionate team members around the globe pursue better—for ourselves, customers, partners, and the world. Today, the state-of-the-art technologies of TDK are in everything, from industrial applications, energy systems, electric vehicles, to smartphones and gaming, at the core of modern life. TDK's comprehensive, innovative-driven portfolio includes cutting-edge passive components, sensors and sensor systems, power supplies, lithium-ion and solid-state batteries, magnetic heads, AI and enterprise software solutions, and more—featuring numerous market-leading products. These are marketed under the product brands TDK, InvenSense, Micronas, Tronics, TDK-Lambda, TDK SensEI, and ATL. Positioning the AI ecosystem as a key strategic area, TDK leverages its global network across the automotive, information and communication technology, and industrial equipment sectors to expand its business in a wide range of fields. In fiscal 2026, TDK posted total sales of USD 16.6 billion and employed about 107,000 people worldwide.

About TDK-Micronas
TDK-Micronas is the center of competence for magnetic-field sensors and CMOS integration within the TDK group. TDK-Micronas has gained operational excellence for sensors and actuators production in over 25 years of in-house manufacturing. It was the first company to integrate a Hall-effect based sensor into CMOS technology in 1993. Since then, TDK-Micronas has shipped over eight billion Hall sensors to the automotive and industrial market. The operational headquarters are located in Freiburg im Breisgau (Germany). Currently, TDK-Micronas employs around 1,000 people.

You can download this text and associated images from https://www.micronas.tdk.com/en/tradenews/pr2601.

Further information on the products can be found under www.micronas.tdk.com/en/products/angle-sensors/hal-30xy.

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