

 Press Information

Magnetic Sensors

TDK launches dual-output 3D Hall-effect switch family for precise motor speed and direction sensing

- Dual-output 3D Hall-effect switch for speed and direction sensing in automotive and industrial applications
- Flexible sensor placement with 3D HAL technology and phase-independent signal generation
- Robust design with ASIL B readiness, extended temperature range, and strong EMC resilience

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TDK Corporation (TSE:6762) introduces the Micronas HAL 13xy family, a factory-programmable Hall-effect switch sensor designed for speed and direction detection in automotive and industrial applications. Leveraging TDK-Micronas' proven 3D HAL technology, HAL 13xy features three orthogonal Hall elements (X, Y, Z) arranged in a pixel cell, providing 90° phase separation (quadrature signal) that is inherently independent of magnet pole spacing and air gap. This design enables the simultaneous measurement of two magnetic-field components, offering manufacturers maximum flexibility in sensor and magnet placement.

For the automotive sector, the HAL 13xy family can be employed in applications such as seat-track motors, sunroof drives, tailgate motors, valve position, steering column motors, steering turn-count sensing, and window lifters with anti-pinch functionality. *

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

HAL 13xy delivers two independent open-drain outputs, which can be configured for quadrature speed/speed or speed/direction signals. This flexible output configuration supports compact electric motor control in applications that require precise, reliable, and space-saving sensing technology. With its robust design and versatile outputs, HAL 13xy helps enable smooth motion control, high safety standards, and enhanced user comfort.

Designed for robustness and long-term reliability, HAL 13xy operates from -40 °C to 170 °C junction temperature, supports a wide supply voltage range from 3.0 V to 24 V, and provides strong protection features, including 40 V load dump robustness, -18 V reverse-voltage protection, and short-circuit/thermal protection. The device maintains constant switching points across supply voltage and temperature variations, ensuring stable performance in demanding environments. It is qualified to AEC-Q100 standards for automotive electronics and offers high EMC resilience according to ISO and IEC requirements.

As a Safety Element out of Context (SEooC), and with integrated continuous built-in self-test (BIST), HAL 13xy is ASIL B ready in accordance with ISO 26262, making it suitable for integration into automotive safety-related systems. The sensor operates with both static and dynamic magnetic fields up to 40 kHz and is compatible with a variety of ferrite and rare-earth magnet types, thanks to multiple temperature coefficient options.

With its compact 5-pin SOT23 package, high ESD robustness (up to 4 kV HBM), and configurable sensing axes, the HAL 13xy family gives engineers a versatile and cost-effective solution for precise motor control and position detection in space-constrained automotive and industrial applications.

Glossary

- 3D HAL technology: TDK-Micronas’ proprietary 3D Hall-effect sensing technology with three orthogonal Hall elements for flexible magnetic-field measurement
- Quadrature outputs: Two signals with a 90° phase difference used for precise speed and direction detection

Main applications*

- Seat-track motors
- Sunroof motors
- Tailgate motors
- Valve position
- Steering column motors
- Steering turn-count sensing
- Window lifters with anti-pinch functionality

Main features and benefits**

- Dual-output 3D Hall-effect switch for simultaneous measurement of two orthogonal magnetic-field components
- Flexible sensor and magnet placement, independent of pole spacing and air gap
- Configurable for quadrature (speed/speed) or speed/direction outputs
- Wide supply voltage range from 3.0 V to 24 V
- Operation from -40 °C to 170 °C junction temperature
- 40 V load dump robustness and -18 V reverse-voltage protection
- Continuous built-in self-test (BIST) and short-circuit/thermal protection
- High EMC performance compliant with ISO and IEC standards
- High ESD robustness up to 4 kV HBM
- Compact 5-pin SOT23 package
- Qualified to AEC-Q100 automotive standard
- SEooC ASIL B-ready according to ISO 26262

Type	Package	Output Formats	Supply Voltage	Safety
HAL 13xy	SOT23	Open Drain	3.0 V to 24 V	ASIL B ready, developed according to ISO 26262:2018

*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 SenseEI, 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/pr2602>.

Further information on the products can be found <https://www.micronas.tdk.com/en/products/hall-switches/hal-13xy>.

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