

## Magnetic Sensors

### **TDK introduces flexible Multi-Hall-array sensor for high-precision current sensing**

- Non-intrusive, galvanic isolated contactless current measurement
- Configurable for highly accurate linear current sensing with read-out of multi-Hall-array or for differential coreless and stray-field robust current sensing
- ISO 26262 ASIL-B ready and AEC-Q100 qualified

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TDK Corporation (TSE:6762) expands its Micronas Hall-effect sensor portfolio with the CUR 4000 sensor. The sensor, developed for highly accurate current measurements in automotive and industrial applications, offers non-intrusive, galvanic isolated contactless current sensing. These features will contribute to the future of high-voltage systems of hybrid and electric vehicles (xEV). The product is suited for DC and AC measurements and overcurrent detection in high-power battery monitoring applications and can measure dynamic current ranges up to  $\geq 2000$  A.\* For these kind of measurement tasks, CUR 4000 comes with different configurable modes for linear core-based and differential coreless application setups.

The sensor's production is planned for the second quarter of 2021, with samples already available.

In the linear modes of CUR 4000, a configurable array of Hall elements enables highly accurate measurements for core-based stray-field robust sensor-module designs. The differential mode enables minimal coreless and stray-field robust system designs without shields. Read-out of the complete Hall array provides an output-offset temperature-drift below  $\pm 0.05$  percent full scale. Furthermore, the sensor delivers a hysteresis-free output signal. A non-linearity error of  $\pm 0.2$  percent and a noise performance of  $\pm 0.005$  percent full scale allows precise current measurements with a signal bandwidth of up to 8 kHz.

TDK used proven Hall sensor technology to structure the CUR 4000. Primary characteristics, like temperature dependent gain and offset can be adjusted to the magnetic circuitry by programming the non-volatile memory. CUR 4000 is defined as SEooC ASIL-B ready, according to ISO 26262 with several on-board diagnostic functions, which builds a basis for current sensor modules with a higher ASIL level using redundancy techniques or a combination with other current sensing technologies.

CUR 4000 is available in a small eight-pin SOIC8 SMD package for less complex assembly compared to through-hole packages.

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## Glossary

- xEV = Vehicles including an electric traction motor
- SEooC = Safety Element out of Context
- SPI = Serial Peripheral Interface
- SOIC = Small Outline Integrated Circuit

## Main applications\*

- xEV battery monitoring, battery disconnect unit and overcurrent detection
- Stationary battery management

## Main features and benefits\*\*

- Multi-Hall-array sensor technology for high-precision core-based current sensing
- Configurable for highly accurate linear current sensing with read-out of multi-Hall-array or for differential coreless and stray-field robust current sensing
- Contactless current sensing (non-intrusive)
- SEooC ASIL-B ready according to ISO 26262 to support Functional Safety applications
- Digital (SPI) interface for direct microcontroller connectivity and sensor programming
- Sleep modes (wake-up pin) for low power consumption
- Automotive temperature grade ( $T_A = -40\text{ °C}$  up to  $150\text{ °C}$ )

## Key data

Type	CUR 4000
Package	SOIC8
Output formats	SPI
Accuracy	Measurement error below $\pm 1\%$
Flux density amplitude range	$\pm 100\text{ mT}$
Functional Safety	ASIL-B ready
Temperature Range	$T_A = -40\text{ °C}$ to $150\text{ °C}$
Sample availability	Now available

\* Any mention of target applications for our products are 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 customers' technical experts.

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### About TDK Corporation

TDK Corporation is a world leader in electronic solutions for the smart society based in Tokyo, Japan. Built on a foundation of material sciences mastery, TDK welcomes societal transformation by resolutely remaining at the forefront of technological evolution and deliberately “Attracting Tomorrow.” It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK’s comprehensive, innovation-driven 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 automotive, industrial and consumer electronics, and information and communication technology. The company has a network of design and manufacturing locations and sales offices in Asia, Europe, and in North and South America. In fiscal 2020, TDK posted total sales of USD 12.5 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 has been the first company to integrate a Hall-effect based sensor into CMOS technology in 1993. Since then, TDK-Micronas has shipped over five 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.

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