

# CUR 4000

April/2021



## CUR 4000 Flexible Multi-Hall-Array Sensor for High-Precision Current Sensing

The CUR 4000 is a single-axis contactless magnetic-field sensor for galvanically isolated DC and AC current measurements and can be used in high-voltage battery monitoring systems of hybrid and electric vehicles (xEV).

A flexible Multi-Hall-Array allows linear or differential magnetic-field sensing for contactless and precise current sensing up to  $\geq 2000$  A.

CUR 4000 can be used for different module concepts like core-based or coreless. 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 small 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.

Current sensing modules equipped with the CUR 4000 can be programmed directly in-circuit by a microcontroller via SPI interface.

CUR 4000 is defined as ASIL-B ready SEooC (Safety Element out of Context) according to ISO 26262.

Major characteristics like gain and offset, etc. can be adjusted to the magnetic circuitry by programming the non-volatile memory. The device is qualified according to AEC-Q100-Rev-H and is designed for automotive applications with operation in an ambient temperature range ( $T_A$ ) of  $-40$  °C up to  $+150$  °C.

CUR 4000 is available in a small eight-pin SOIC8 SMD package.

### Features

- ◆ Non-intrusive, galvanically isolated contactless current measurement
- ◆ High-precision, linear magnetic field sensing with flexible Hall plates array for core-based current sensing
- ◆ Differential magnetic-field (stray-field compensated) coreless current sensing without shields

- ◆ ASIL-B ready (SEooC according to ISO 26262)
- ◆ Signal bandwidth up to 8 kHz
- ◆ Programmable linearization with 33 equidistant or 17 variable setpoints
- ◆ Programmable adjustment and temperature compensation for gain and offset
- ◆ Low-power mode with wake-up functionality
- ◆ SPI interface for calibration, test, and debugging via microcontroller
- ◆ Digital 16-bit readout of magnetic-field information via SPI (up to 5 MHz)
- ◆  $\pm 100$  mT magnetic-field range
- ◆ Operates from  $-40$  °C up to  $150$  °C ( $T_A$ )
- ◆ Operates from 3.0 V up to 5.5 V
- ◆ Programmable clamping threshold
- ◆ Over-/undervoltage detection on VSUP
- ◆ Overtemperature supervision
- ◆ Reverse-/overvoltage protection at VSUP
- ◆ Magnetic-field-out-of-range detection
- ◆ SOIC8 SMD package
- ◆ Qualified according to AEC-Q100-Rev-H

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## Application Examples

- ◆ Battery monitoring
- ◆ Battery disconnect unit
- ◆ Stationary battery management

## Development Tools

CUR 4000 can be programmed and calibrated via SPI during the final manufacturing process by adjusting the output signals directly to the input signal.

TDK-Micronas offers an easy-to-use evaluation kit for engineering.

- ◆ TDK SPI Programmer V1.x
- ◆ TDK extension board
- ◆ LabVIEW™ programming software for Windows® including Sub VIs

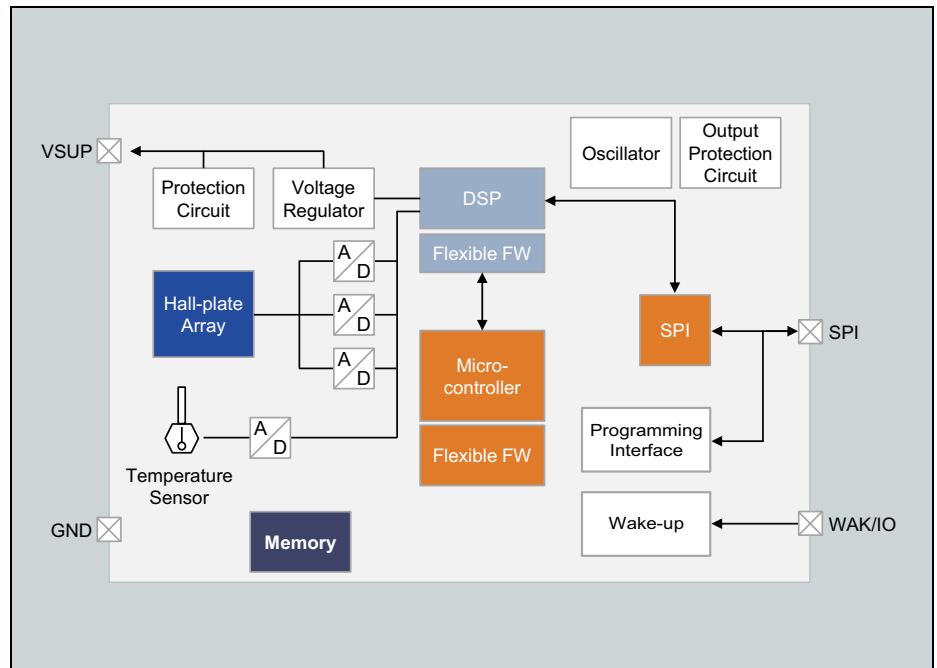


Fig. 1: Block diagram of the CUR 4000

## CUR 4000 Versions

Type	Measurement
CUR4000DJ0000	Linear (Multi Hall Plates)
CUR4000DJ0001	Differential or Linear (Dual Hall Plates)

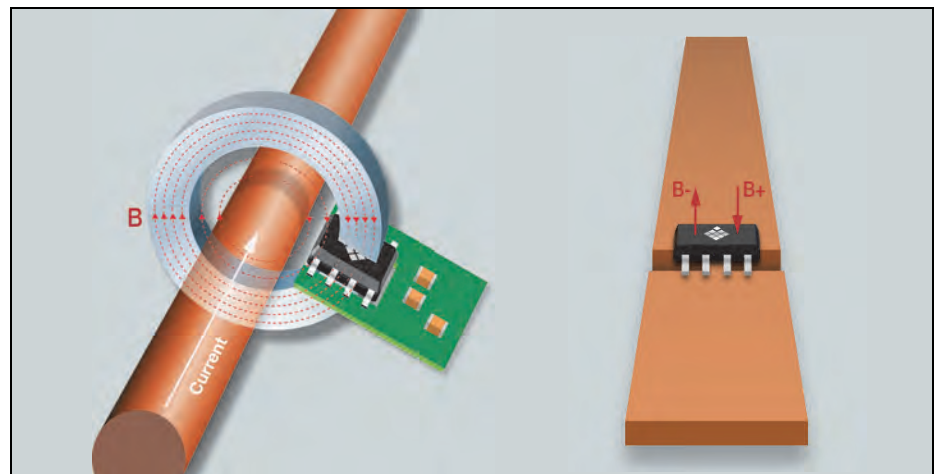


Fig. 2: Sensor application setup

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