

HAL 39xy

Nov/2018



HAL 39xy Programmable 3D Position Sensor Family with Stray-Field Compensation

HAL 39xy is a new generation of 3D position sensors from TDK-Micronas addressing the need for stray field robust linear and rotary position detection as well as ISO 26262 compliant developments.

This new family consist of three family members: HAL 3900 featuring an SPI interface, HAL 3930 with PWM/SENT interface and finally HAL 3980 offering a PSI5 interface. In addition, HAL 3930 has a switch output (configurable hi-/low-side switch). The switch signal is derived from the calculated position information. It is possible to define an on/off switching point along the full-scale range of the position information.

All three devices can measure a 360° angular range, linear movements as well as 3D position. Depending on the sensor type, it is possible to transmit temperature compensated raw values of B_x , B_y , B_z or up to two calculated angles. In case of HAL 3980, it is also possible to transmit the angle velocity.

All devices offer the possibility of using set-point linearization in order to improve the overall output linearity. The customer can select between either 33 equidistant distributed or 17 variable setpoints.

The sensors measure the position of a magnet, based on the Micronas 3D HAL® technology. The devices are able to suppress external magnetic stray fields by using an array of Hall plates. Only a simple two-pole magnet is required to measure a rotation angle. Ideally the magnet should be placed above the sensitive area in an end-of-shaft configuration. Off-axis measurements are possible as well. The sensors are defined as SEoC according to ISO 26262.

Major characteristics like gain and offset, reference position, etc. can be adjusted to the magnetic circuitry by programming the non-volatile memory.

The sensors are designed for automotive and industrial applications and operate in an ambient temperature range of -40 °C up to max. 160 °C.

The HAL 39xy family is available in a very small eight-pin SOIC8 package.

Features

- ◆ Accurate angular measurement up to 360° and linear position detection
- ◆ 3D position detection supporting transmission of two angles out of B_x , B_y , B_z as well as temperature compensated raw values
- ◆ Compensation of magnetic stray fields
- ◆ ASIL-B ready (SEoC according to ISO 26262)
- ◆ Wide supply voltage range: 3.0 V to 16 V
- ◆ Configurable output slew rates
- ◆ 0.1 kHz to 2 kHz PWM (up to 13 bit)
- ◆ SENT according to SAE J 2716 rev. 4
- ◆ Support of three different SENT frames
 - H.1: Two 12 bit fast channels (position & temperature or magnetic amplitude)
 - H.2: 12 bit fast channel
 - H.4: 12 bit secure single sensor
- ◆ SPI interface (Slave, up to 10 MHz)
- ◆ PSI5 interface according to rev. 2.x
- ◆ $T_{A,max.} = -40\text{ °C} \dots 160\text{ °C}$
- ◆ Programming via the sensor's output pin

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Major Applications

HAL 39xy is the optimal system solution for applications such as:

- ◆ Chassis position
- ◆ Turbo-charger actuators
- ◆ Valve position detection
- ◆ EGR
- ◆ Shift position
- ◆ Steering angle
- ◆ Fuel-level measurements
- ◆ Clutch position
- ◆ Transmission position detection

Available Types

Type	Output Format	Output Signals
HAL 3900	SPI	Up to two angle or raw values of B_x , B_y and B_z
HAL 3930	PWM/SENT	Up to two angle values
HAL 3980	PSI5 rev. 2.x	One angle value and angle velocity

Development Tools

HAL 39xy can be programmed during the final manufacturing process by adjusting the output signals directly to the input signal. With this calibration procedure, the tolerances of the sensor, the magnet, and the mechanical positioning can be compensated in the final assembly.

Micronas offers an easy-to-use evaluation kit for engineering:

- ◆ Magnetic Sensor Programmer MSP V1.0
- ◆ LabVIEW™ programming software for Windows® including Sub VIs

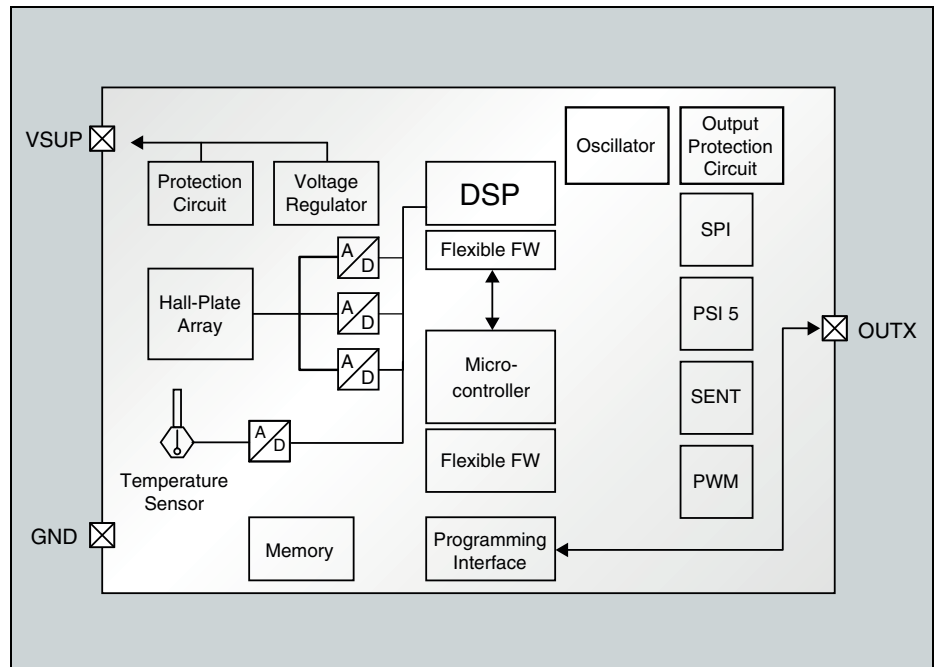


Fig. 1: Block diagram of the HAL 39xy

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Edition Nov. 8, 2018; Order No. PI000164_001EN