HAL 283x

HAL® 283x
Linear Hall-Effect Sensors with SENT Output

The HAL 283x are members of the Micronas varioHAL® (HAL 28xy) family of programmable linear Hall-effect sensors.

The senors feature a digital SENT interface (Single Edge Nibble Transmission). This interface enables a fast and robust data transfer in harsh automotive environments. The implementation of the interface complies with the SAE J2716 SENT standard release 2010-01.

Each SENT message consists of a sequence of pulses. In one protocol, the sensor transmits the magnetic field information, a status information of the sensor, and a CRC checksum for safety reasons. Optional, a pause pulse is added at the end of each protocol to enable a synchronous transmission.

The digital signal processing is of great benefit because analog offsets, temperature shifts, and mechanical stress do not degrade digital signals.

Major characteristics like magnetic field range, sensitivity, offset, and the temperature coefficients of sensitivity and offset can easily be adjusted to the magnetic circuit by programming the non-volatile memory.

The HAL 283x is available in the very small leaded package TO-92UT.

HAL 283x Family Overview

Type	Resolution	Pause Pulse
HAL 2830	12 bit	No
HAL 2831	16 bit	No
HAL 2832	12 bit	Yes
HAL 2833	16 bit	Yes

Features

◆ High-precision linear Hall-effect sensor

◆ Output resolution up to 16 bit

◆ On-board diagnostics and power-on self-test covering memory and full signal path

◆ Typical magnetic ranges from ±20 mT up to ±160 mT in 20 mT steps

◆ Programmable temperature compensation sensitivity (2nd order) and offset (1st order)

◆ Programmable sample periods from 0.5 ms to 22 ms with low-pass filter

◆ SENT output according to SAE J2716

◆ SENT clock tick time customer-programmable between 2 µs and 17.75 µs

◆ Low-time customer-programmable between 3 and 6.75 clock ticks

◆ Sample-accurate transmission

◆ Non-volatile EEPROM with redundancy and lock function

◆ Open-drain output with slew rate control (load independent)

◆ Transmission of temperature and device information by serial data messages

◆ Operating junction temperature range: –40 °C…170 °C

◆ ESD protection (±8 kV HBM) at all pins and reverse protection at V_{SUP} pin

Major Applications

Due to the sensor's versatile programming characteristics and low drifts, the HAL 283x is the optimal system solution for applications such as:

◆ Contactless potentiometers

◆ Angular measurements (e.g. valve, throttle, pedal position, level control system)

◆ Linear movement (e.g. seat track position)

◆ Linear force or torque measurements

◆ Torque measurement (e.g. steering torque)

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Development Tools

For engineering and production purposes, Micronas offers an easy-to-use application kit:

◆ Micronas programmer board
(HAL-APB V1.x)

◆ LabVIEW[TM] programming software for Windows[®] 9x/2000/XP/Vista/7
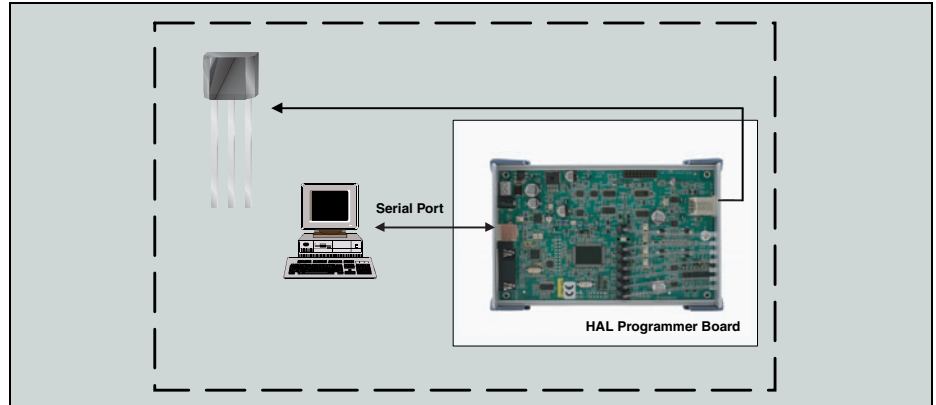
◆ LabVIEW VIs

Fig. 1: Development tool setup

System Architecture

The HAL 283x sensors are produced in a proven automotive technology.

The HAL 283x feature a Hall plate with off-set compensation, an A/D converter for the Hall-plate, an A/D converter for the temperature sensor, digital signal processing (RISC processor), a digital SENT interface, an EEPROM memory with redundancy and lock function for the calibration data, the SENT output configuration, and protection devices on all pins.

The HAL 283x is programmable by means of BiPhase-M telegrams. No additional programming pin is needed. The sensor is programmed through its output pin.
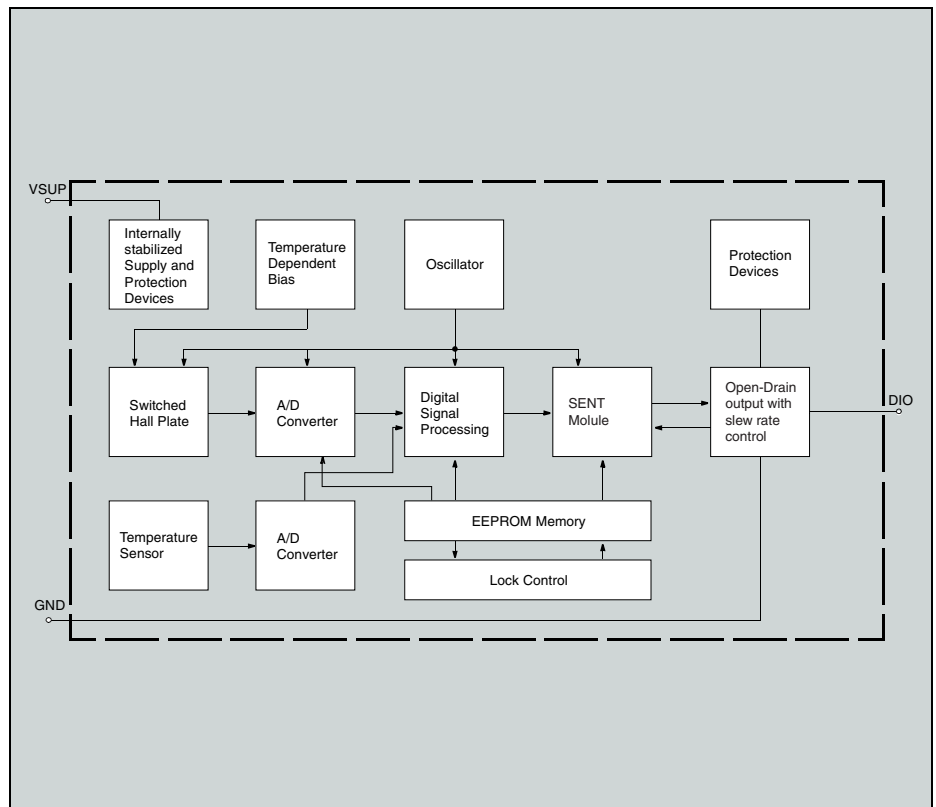

Fig. 2: Block diagram of the HAL 283x