

HAL 24xy

May/2012



HAL[®] 24xy Precise and Robust Programmable Linear Hall-Effect Sensors

The new HAL[®]24xy family offers extended distance measurement, improved robustness and state-of-the-art diagnostic functions for applications under stringent conditions.

All new family members will leverage upon Micronas long success in Linear Hall-effect sensors, full in-house manufacturing and automotive proven 0 ppm track record. It uses Micronas's latest technology node, a new digital architecture as well as further enhanced Hall plates. The sensor provides an improved output linearization by incorporating a flexible compensation function with 16 programmable setpoints. In addition, angles up to 180° can be measured even with a simple magnet configuration.

The major characteristics like magnetic field range, sensitivity, output quiescent voltage and output voltage range are programmable in a non-volatile memory. All sensors feature a temperature-compensated Hall plate with spinning current offset compensation, an A/D converter, digital signal processing, a D/A converter with output driver, an EEPROM memory with redundancy and lock function for the calibration data, a serial interface for programming the EEPROM, and protection devices at all pins.

The sensor can be easily calibrated to adjust perfectly its output to input signals and to compensate for any variations in the applications (magnet positioning, temperature drift). This enables operation over the full temperature range with high accuracy. The calculation of the individual sensor characteristics and the programming of the EEPROM memory can easily be done with a PC and the application kit from Micronas.

The sensor is designed for hostile industrial and automotive applications. The HAL 24xy family is available in the very small leaded RoHs package TO92UT and is AECQ100 qualified.

HAL 242x Family Overview

Type	Output
HAL 2420	2-point calibration
HAL 2425	2-point calibration, 16 setpoints linearization

Main Features

- ◆ High-precision linear Hall-effect sensor with ratiometric 12-bit analog output
- ◆ 16 setpoints for various output signal characteristics

- ◆ High immunity against ESD (8 kV) and EMC
- ◆ Multiple customer-programmable magnetic characteristics in a non-volatile memory with redundancy and lock function
- ◆ Programmable temperature compensation for sensitivity and offset
- ◆ Magnetic field measurements in the range up to 200 mT
- ◆ Low output voltage drifts over temperature
- ◆ Open-circuit (ground and supply line break detection), overvoltage and undervoltage detection
- ◆ Programmable output clamping function
- ◆ Digital readout of temperature and magnetic field information in calibration mode
- ◆ Operates from -40 °C up to 170 °C junction temperature
- ◆ Operates from 4.5 V up to 5.5 V supply voltage in specification
- ◆ Operates with static magnetic fields and dynamic magnetic fields up to 2 kHz
- ◆ Overvoltage and reverse-voltage protection at all pins
- ◆ Short-circuit protected push-pull output

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Major Applications

Due to the sensor's versatile programming characteristics and low temperature drifts, the HAL 24xy is the optimal system solution for applications such as:

- ◆ Distance and linear movement measurements
- ◆ Angle sensors like throttle position, pedal position, and EGR applications,
- ◆ Contactless potentiometers

Development Tools

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

- ◆ Micronas programmer board (HAL-APB V 1.5)
- ◆ LabVIEW™ programming software for Windows® 9x/2000/XP/Vista/7
- ◆ LabVIEW Sub VIs

System Architecture

The HAL 24xy is a monolithic integrated circuit which provides an output voltage proportional to the magnetic flux through the Hall plate and proportional to the supply voltage (ratiometric behavior).

This voltage is converted to a digital value, processed in the Digital Signal Processing Unit (DSP) according to the settings of the EEPROM registers, converted back to an analog voltage with ratiometric behavior, and buffered by a push-pull output transistor stage.

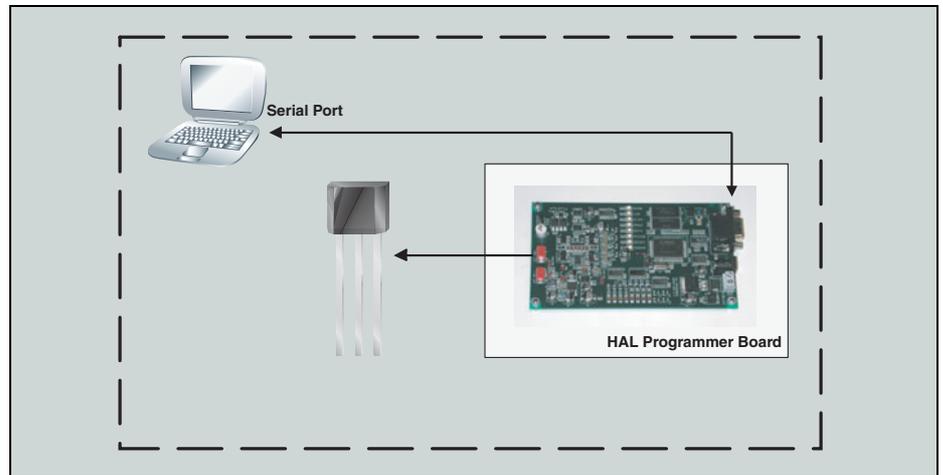


Fig. 1: Development tool setup

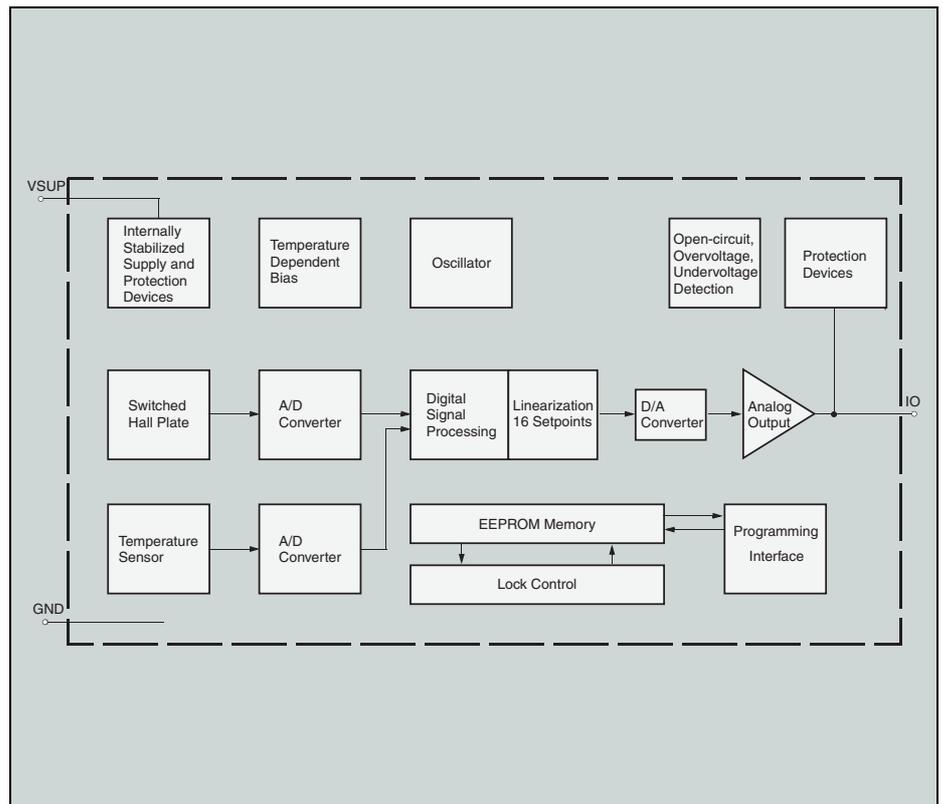


Fig. 2: Block diagram of the HAL 2425

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