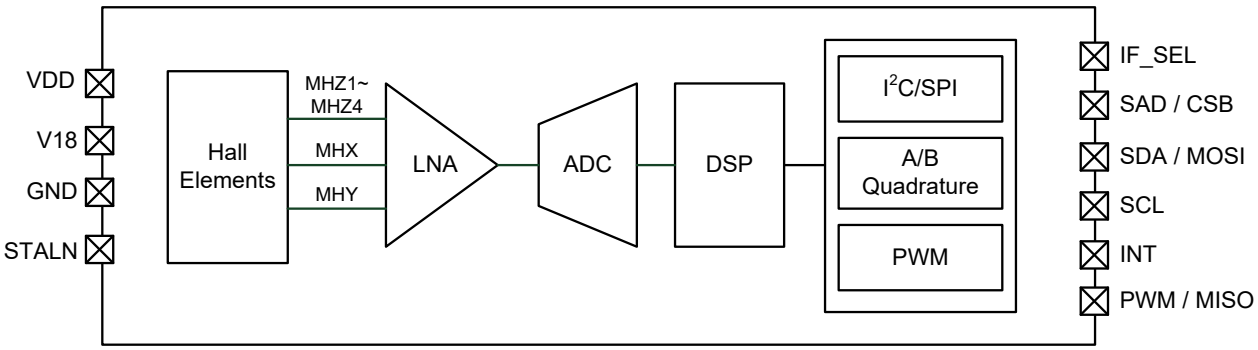
HAECHITECH

3-dimensional Hall Sensor MXM1400

MXM1400 contains 4 z-axis sensors and one x-sensor and one y-sensor. This allows the device to detect:

- the angle of a rotating magnet
- detect if a knob with integrated magnet is pressed
- detect the 3-dimensional distance from the magnet to the IC
  An example is to measure the fill level of a water tank, where a magnet is moving up and down



Functional blocks:

MXM1400 contains a SPI or I²C interface for host communication including initializing and reading out values from the different Hall elements via two ADCs. An incremental quadrature output and a PWM output are dedicated outputs for angle of rotation.

Several Low power modes allow an average current consumption of only 10µA at 5Hz ODR and a power-down current of 0,5µA.

Several programmable digital post processing filter functions reduce noise effectively.

A flexible interrupt system allows triggering on events like leaving a predefined window.

Electrical and environment data:

- Supply voltage: 1,65V to 3,6V
- Operating temperature range: -40°C to +125°C

Packages:

MXM1400 is available in standard SOP10 package (3,9mm body width) or DFN10 package (3x3mm)
Note: If a very small package is needed, MXM1161 can be used which is the same silicon as MXM1400 but in a small WLCSP 9 package.

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Design-in Expertise and Service

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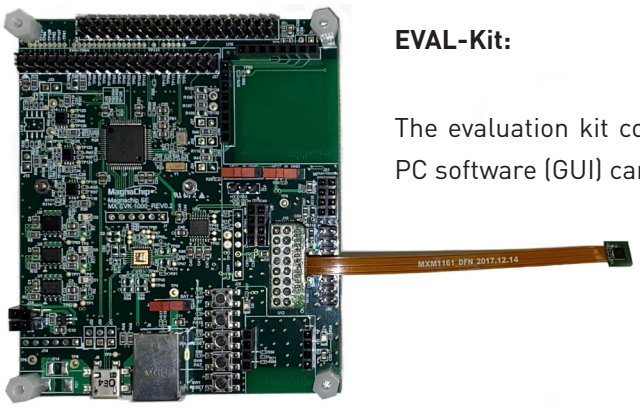


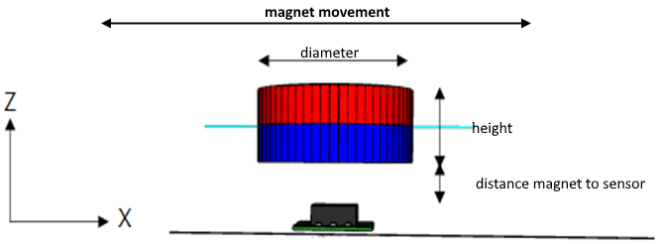
EVAL-Kit:

The evaluation kit contains the base board and the MXM1400 sensor board, while the PC software (GUI) can be downloaded.

How to measure a linear distance, filling level or position of a magnet to the IC:

Setup of measurement:

A magnet is moved horizontally above the sensor. Relevant are the quality of the magnet, diameter, height and the airgap between sensor and magnet.

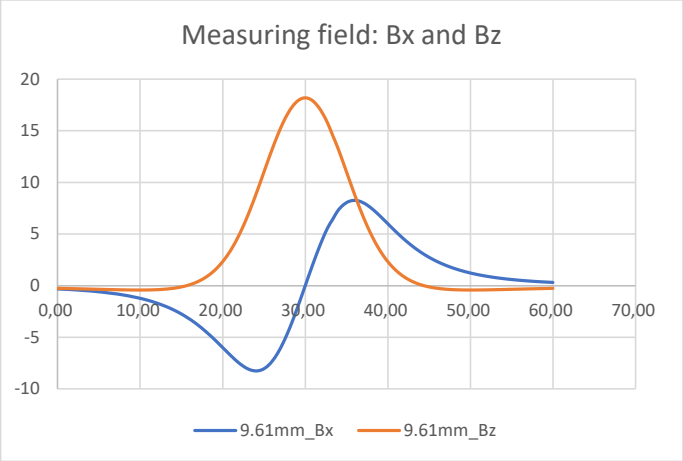


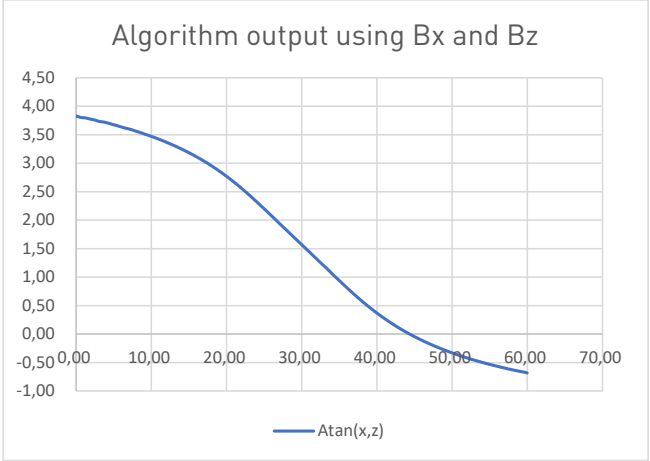
How to determine an absolute distance (x-axis) between magnet and sensor:

Two axis needs to be measured, in this case z and x. The left diagram below shows the curves. Vertical axis (Bz) starts at zero which means the leftmost position. At position 30.00 the magnet is directly above the sensor generates the highest signal. At position 60.00 the magnet is in the rightmost position.

The horizontal axis (Bx) has a zero signal at position 30.00 when the magnet is directly above the sensor and a minimum (maximum) when the magnet is left (right) of the sensor.

The next step is to calculate atan (x,z). The result is shown in the right diagram below. This corresponds directly to the absolute distance. However, one should be aware that the results depend strongly on the quality of the magnet and the air gap.





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