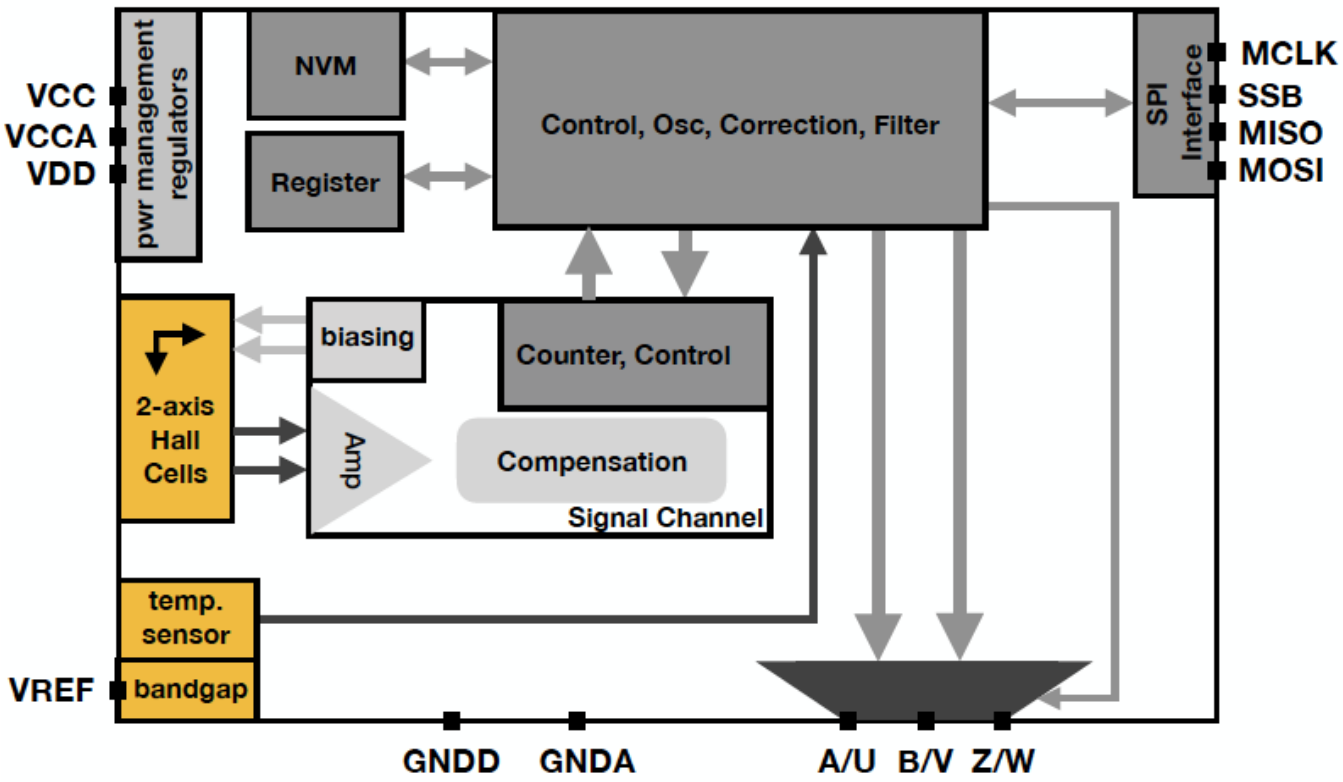
1. GENERAL DESCRIPTION

The SENISENS Fast Magnetic Angle Sensor (FAMAS) SENA2Dx is an integrated magnetic field sensor which measures the in-plane orientation of a magnetic field, such as that of a permanent magnet attached on-axis to a rotating shaft. The integrated signal processing circuit works as a servo loop and tracks the magnetic position digitally. Thus, the angular position of the magnetic field, the direction of rotation and the angular velocity are available within less than 1 µs.
There are three modes of operation available - fast, balanced and high resolution – to offer optimal performance for the required application.

Apart from its fast response the proprietary measurement principle of FAMAS offers unprecedented accuracy for all angles as well as multi-turn capability. In contrast to most common analog angle sensors FAMAS does not require any linearization of its signals for accurate sensing. The measurement has a highly linear response by default with a digital output. Therefore, no external ADC's or angle calculations are needed, saving cost and space, as well as time.
FAMAS is linear over a very high field range, offering low as well as very high magnetic field detection.
The FAMAS sensor offers 3 different signal interfaces: SPI, Quadrature interface with index and UVW. Using only one additional frequency converter for example, the digital output of FAMAs can be easily converted into a proportional analog signal if required without compromising its outstanding performance. This makes FAMAS ideally suited as a more robust and direct replacement for traditional analog angle sensors.
NOTE: For detailed information see the SENA2Dx datasheet.

TYPICAL APPLICATIONS:	FEATURES:
▪ Digital angular sensor, 0–360° ▪ Incremental angular encoder ▪ Fast measurement of the small rotational movements ▪ BLCD motor control ▪ Robotics (actuator control) ▪ Rotational speed control ▪ Steering-angle detection ▪ Industrial sewing machines ▪ Sawing machines	▪ Proprietary Hall based measurement with direct angle-to-digital conversion ▪ Extremely stable and robust against external disturbance and positioning errors ▪ Direction, angle and rotation speed of the magnetic field, from DC up to 300 krpm ▪ Direct angle information, no external ADC or angle calculations required ▪ High angular resolution, i.e. 0.088° ▪ Fast response time, less than 1µs ▪ On-chip Offset, Sensitivity and Temperature correction ▪ Permanent configuration programming possible by inbuilt non-volatile memory ▪ Outputs: SPI, Quadrature interface with Index (ABZ) or AqB, UVW ▪ Commutation signals UVW configurable for 2, 4, 6 and 8 pole magnets ▪ Low magnetic field detection

2. BLOCK DIAGRAM



3. SENSOR OUTPUT

SENA2Dx sensors provides the following three outputs:

- SPI, digital output
- Quadrature interface with Index (ABZ)
- UVW output

One powerful feature of this sensor is the direct digital information on the measured angle, so there is no need for an external analog-to-digital convertor (ADC), nor for any external electronic circuitry required for the calculation of the angle.

Some examples of the integration of SENA2Dx in a customer's data acquisition system are listed below:

3.1 Analog Output - AqB to Frequency Converter

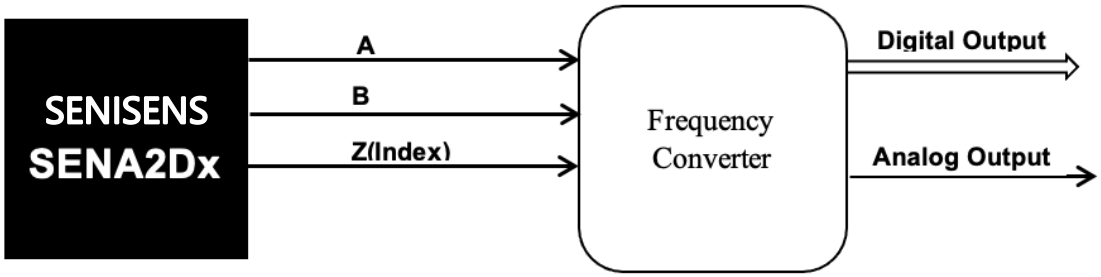


Figure 1: SENA2Dx AqB to Analog Conversion through a Frequency Converter to get the analog voltage proportional to the angle

The output pulses A and B from SENA2Dx are connected to a Frequency Converter, which converts the A and B quadrature output into a voltage that is proportional to the measured angle (i.e., to the encoder position).

3.2 Digital Output - AqB to Quadrature Counter

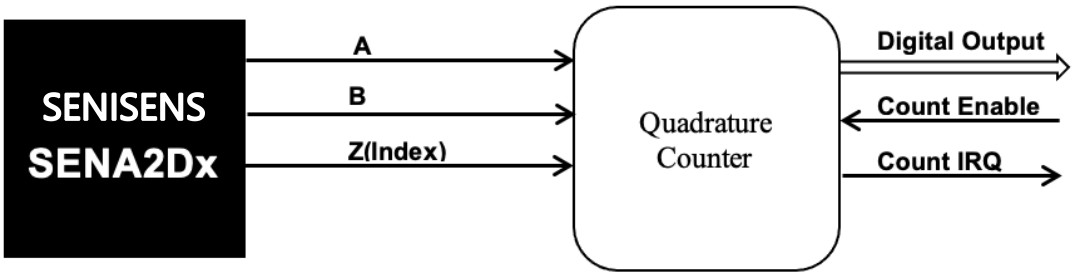


Figure 2: SENA2Dx AqB to Digital Conversion trough a Quadrature Counter to get the direction and count enable signals

The output pulses A and B from SENA2Dx are connected to the decoded input of a Quadrature Counter and is then converted to a non-quadrative, up/down, free running counter (no need for an Analog-to Digital Converter).

3.3 Digital Serial Interface - SPI to Microprocessor

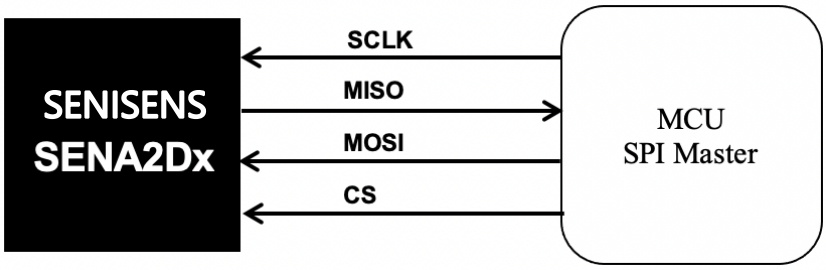


Figure 3: SENA2Dx Connection to a Microprocessor via SPI in a Master-Slave Configuration