

Accurate Position Sensor with Analog Output for Motor Control

ams.com/AS5116



AS5116 – Accurate Position Sensor for Motor Control with Analog Output

- Immune to external magnetic stray fields, overachieves ISO 11452-8
- Conforms to the ISO26262 functional safety standard
- Lower overall system costs and less space required

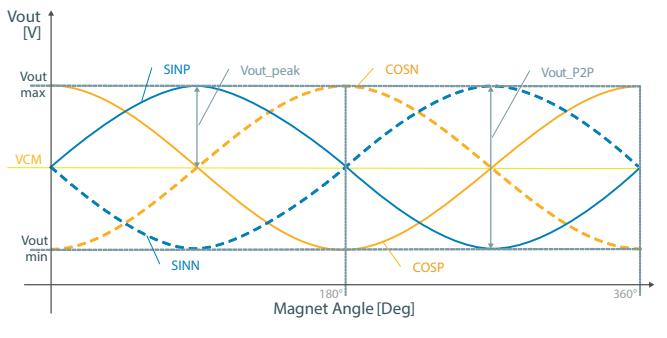
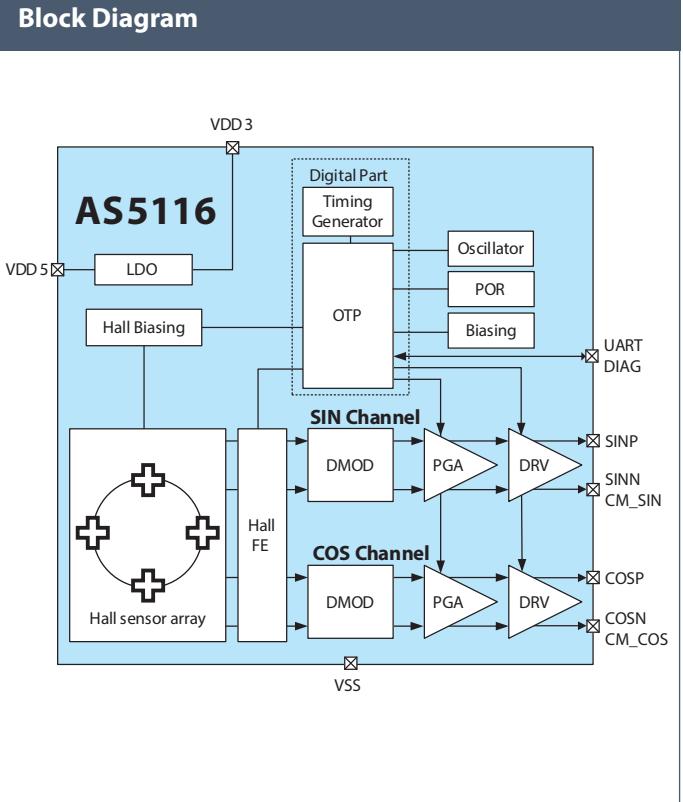
**Sensing
is life.**

General Description

The AS5116 is a contactless magnetic position sensor for accurate angular measurement over a full mechanical turn of 360°. Based on the Hall sensor technology, this device has a robust architecture that measures the orthogonal component of the flux density (Bz), over a full-turn rotation. To measure the angle, only a simple two-pole magnet rotating over the

center of the package is required. The magnet can be placed above or below the device. The absolute angle measurement provides an instant indication of the magnet's angular position. The angle information is provided by means of buffered differential sine and cosine voltages. The AS5116 operates at a supply voltage of 5V or 3.3V.

Features	Benefits	Applications
<ul style="list-style-type: none"> - Contactless angle measurement - Low output noise - Low inherent INL - Magnetic stray field immunity overachieves ISO 11452-8 - Developed according to ISO26262 - Fully differential buffered sine and cosine output signals - AEC-Q100, grade 0 	<ul style="list-style-type: none"> - Highest reliability and durability - Accurate angle measurement - Low system costs – no shielding required - Enabler for safety critical applications - High precision analog output - Small form factor - Fully Automotive-qualified 	<ul style="list-style-type: none"> - Rotor angle sensing in the field of automotive applications - Electric power steering systems - Electric pumps - Actuators in transmission systems <ul style="list-style-type: none"> • Starter/Generator systems • Other 360° angle measurement solutions

Analog Interface	Block Diagram
 <p>The graph illustrates the analog interface of the AS5116. The vertical axis is labeled V_{out} [V] and the horizontal axis is labeled Magnet Angle [Deg]. The sine wave (SINP) has a peak-to-peak voltage of V_{out_P2P} and a maximum voltage of V_{out_max}. The cosine wave (COSN) has a minimum voltage of V_{out_min}. The zero-crossing point is marked at 180°. The output voltage V_{out} is shown as a solid blue line, and the reference voltage V_{CM} is shown as a dashed yellow line. The output voltage V_{out} is the sum of the sine and cosine signals, with a DC offset of V_{CM}.</p>	 <p>The block diagram shows the internal architecture of the AS5116. It consists of a Hall sensor array (containing Hall Effect Elements, Hall FE) connected to two channels: SIN Channel and COS Channel. Each channel includes a DMOD (Differential Modulator), PGA (Programmable Gain Amplifier), and a DRV (Driver). The SIN Channel outputs SINP and SINK CM_SIN. The COS Channel outputs COSP and COSN CM_COS. The digital part includes a Timing Generator, LDO, Hall Biasing, and an OTP (One-Time Programmable) block. The OTP is connected to an oscillator, POR (Power-On Reset), and a biasing circuit. The digital part also provides control signals to the analog channels. The AS5116 is powered by VDD3 and VDD5, and includes a VSS (Ground) pin. A UART DIAG interface is also provided.</p>