

New series of ams magnetic position sensors enables world's best accuracy at high rotation speeds

AS5047D, AS5147 and AS5247 with new DAEC™ compensation technology in a single-chip solution reduces dynamic angle error to almost zero

Unterpremstaetten, Austria (23 June, 2014) -- ams AG (SIX: AMS), a leading provider of high performance analog ICs and sensors, today introduced a new series of magnetic position sensors featuring a breakthrough technology capable of producing extremely accurate angle measurements of rotors spinning at high speed.

The new "47 series" position sensors include the AS5047D, AS5147 and AS5247 with DAEC™ (Dynamic Angle Error Compensation), a patent-pending technology developed by ams that eliminates the measurement error attributable to propagation delay.

- The AS5047D is ideally suited for industrial applications including robots and encoder modules.
- The AS5147 is an AEC-Q100 qualified part for automotive applications such as electronic power steering and pumps.
- The dual-die AS5247 (also AEC-Q100 qualified) is well suited for automotive applications requiring the highest level of functional safety compliance.

All three parts are specified with a maximum $\pm 0.17^\circ$ angle error (excluding integral non-linearity).

This precision measurement performance is the result of implementing DAEC, an algorithm which performs error compensation internally and responds automatically to changes in the speed of rotation. Traditional magnetic rotary position sensor ICs suffer from a propagation delay (typically 100-200 μ s) as they convert raw measurements of magnetic field strength at their embedded magnetic elements into digital angle measurements. During this delay, a spinning rotor's angular displacement changes, so that its actual position when the digital output leaves the sensor differs from its measured position.

The resulting error increases in a linear fashion with increases in the speed of rotation: for a propagation delay of 100 μ s, at 1,000rpm the dynamic angle error is 1.2° and at 10,000rpm it is 12°.

DAEC almost completely eliminates this source of error, dynamically compensating every measurement sample for the speed of rotation at the time the sample is captured. The 47 series sensors provide angle measurements accurate to $\pm 0.08^\circ$ at 7,000rpm, to $\pm 0.14^\circ$ at 12,000rpm and to $\pm 0.17^\circ$ at 14,500rpm.

With its extreme accuracy, the ams 47 Series is ideally suited to all motor control and angle measure-



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ment applications. In high-speed brushless DC (BLDC) motors and permanent magnet synchronous motors (PMSM) the sensor's high accuracy enables better execution of the commutation scheme, resulting in higher torque and efficiency, lower torque ripple and smoother operation.

All three devices provide absolute position measurements as a digital PWM output, and UVW outputs for use in field-oriented commutation schemes. They also provide an incremental ABI output equivalent to the output of an optical encoder. This means an AS5047D IC can replace an optical encoder without requiring the user to change the software interface in the host system's microcontroller or DSP.

The 47 Series devices offer high 14-bit resolution (to 0.022°) in their digital SPI output, and maximum resolution of 2,000 steps per revolution in decimal mode and 2,048 steps per revolution in binary ABI mode.

Like all ams magnetic position sensors, the new 47 Series benefits from a proven differential sensing technique, which offers immunity to stray magnetic fields and enables the devices to be used in electrically noisy environments without any requirement for shielding.

"The introduction of the 47 series marks a radical step forward in magnetic position sensor technology," said Bernd Gessner, Vice President and General Manager of the Automotive Business Unit at ams. "For the first time, designers of high-speed motors can use robust, compact magnetic position sensors without the need to implement a complex error compensation scheme in an external microcontroller or DSP."

The AS5047D, AS5147 and AS5247 will be displayed in the ams booth (stand 909) at the Sensors Expo, Chicago, 24-26 June 2014.

The AS5047D is available for sampling in a 14-pin TSSOP package. It is priced at \$4.21 in 1,000-piece quantities.

The AS5147, priced at \$4.84, is also in a 14-pin TSSOP package.

The AS5247, priced on request, is in an MLF-40, 7mm x 7mm package

General product availability end of July 2014. For more information on the 47 series please visit our website at www.ams.com/Magnetic-Rotary-Position-Sensors/



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about ams

ams develops and manufactures high performance analog semiconductors that solve its customers' most challenging problems with innovative solutions. ams' products are aimed at applications which require extreme precision, accuracy, dynamic range, sensitivity, and ultra-low power consumption. ams' product range includes sensors, sensor interfaces, power management ICs and wireless ICs for customers in the consumer, industrial, medical, mobile communications and automotive markets.

With headquarters in Austria and 9 design centers world wide ams employs over 1,400 people globally and serves more than 7,800 customers around the globe. ams is listed on the SIX Swiss stock exchange (ticker symbol: AMS). More information about ams can be found at www.ams.com.

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