REVOLUTIONARY GMR CRANK/CAMSHAFT SENSORS

Enabling Flexible Design-In and More-Efficient HEV Engine Platforms

BY ALLEGRO
GMR

Next-generation GMR technology gives automakers best-in-class performance and efficiency.

The evolving engine architectures of today demand greater sensor accuracy and positioning flexibility than ever before. The new Allegro ATS16951 crankshaft and ATS16351 camshaft sensors leverage giant-magnetoresistance (GMR) technology to create an ideal pairing for hybrid vehicle engines, two-wheelers, off-road vehicles, and other application designs that require extended air-gap performance. Monolithic integration makes it possible for both sensors to achieve exceptional in-system performance with highly accurate speed, direction, and position detection. Both sensors will help engine designers reduce system complexity, cost, and energy consumption—boosting efficiency and minimizing carbon footprints.

GMR achieves a new level of transient immunity: Tight spaces, often combined with high-current transients, require engine designers to use camshaft sensors that work seamlessly through the resulting stray fields. The differential GMR architecture provides the capability for an air gap up to 50% larger than legacy solutions. This capability improves design-in flexibility and achieves a level of transient immunity not currently available in legacy or competing solutions. The increased air-gap capability also allows for higher reliability and reduced system cost, which is increasingly important in the trending designs of hybrid engines that can include four or more camshaft sensors per engine.

Standardized packaging delivers high-performance system compensation, flexible design-in, and ease of production: The ATS16951 and ATS16351 are both available in a 3-pin package (SM) that is lead (Pb) free, with NiPdAu plating. The 3-pin single inline package (SIP) houses the IC, magnet, and EMC protection components. The precision assembly of the SIP optimizes IC-to-magnet positioning to achieve a reduced-tolerance stack between the IC and the magnet, which increases sensor accuracy and grants ample margin for in-application installation tolerance. The fully integrated, single over-molded package common to both devices helps designers reduce design complexity and simplify the development process, and allows suppliers to standardize production lines while reducing time to market.

Diagnostics ensure reliability and satisfaction: The Allegro Target Profile Diagnostics™ feature makes it possible to assess a target during manufacturing and to detect any subtle tooth anomalies before an engine is installed into a vehicle. The diagnostic feature helps prevent potential warranty returns and increases customer satisfaction.

ATS16351 camshaft sensor

ATS16951 crankshaft sensor

Common 3-pin SIP package (suffix -SM)

Applications

The ATS16351 and ATS16951 are ideal camshaft and crankshaft sensors for:

- Hybrid vehicle engines
- Two-wheelers
- Off-road vehicles
- Application designs that require extended air-gap performance

Best-in-Class Performance in Standardized, Common, Fully Integrated Packaging

Features and Benefits

ATS16951 Crankshaft Sensor

- 40% better edge repeatability compared to legacy solutions

- ASIL B safety design process with integrated diagnostics (pending assessment)

- Integrated back-biased magnet

- Digital speed and direction output for providing ferromagnetic target speed and direction information

- Enhanced algorithm for low jitter, high output accuracy performance, and vibration tolerance, especially for start-stop engines

- Programmable pulse location between center of target feature or edge of target feature

- EEPROM programming for performance optimization and production traceability

- Target Profile Diagnostics™

- Integrated EMC components

The Allegro ATS16951 is significantly more stable over misalignment than legacy solutions.

ATS16351 Camshaft Sensor

- True target state recognition at device power-on (TPOS)

- Programmable to allow optimization of the TPOS performance to the widest variety of engine designs

- EEPROM programming for performance optimization, temperature compensation, and production traceability

- Flexible orientation: Able to be mounted at any angle with correct configuration

- Stray-field immunity: Resists aggressor stray fields found in hybrid vehicle environments

- Backward compatibility with Allegro Hall-effect solutions

- Target Profile Diagnostics™

- Integrated EMC components

- Automatic TPOS optimization for installed location to ensure best first edge accuracy over the life of the engine

The Allegro ATS16351 meets the market requirement across a much wider air gap range than competitive Hall technologies.

Jitter of ATS16951 Crankshaft Sensor
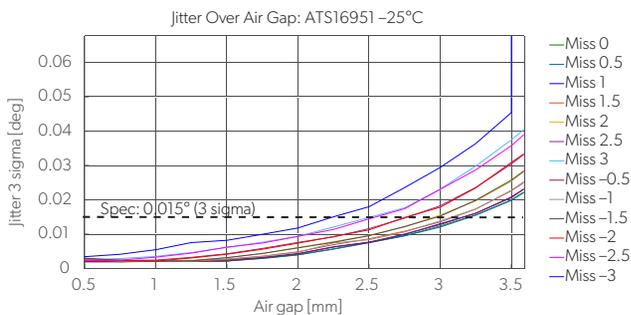
Jitter of ATS16351 versus Legacy Hall-Effect Devices
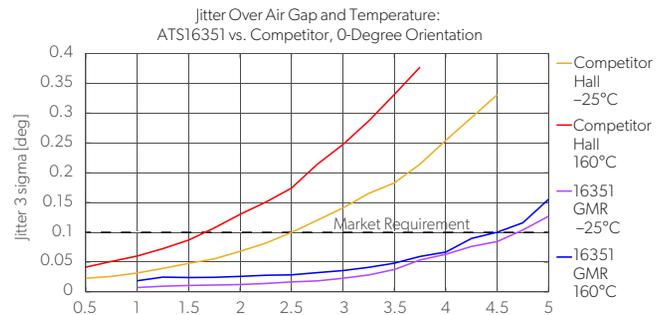
Contact Us for Sales, Samples, and Resources

For product pricing and samples, contact an Allegro sales office or authorized distributor at allegromicro.com/contact-us. For datasheets and more information on Allegro's speed and position sensors, including the new ATS16951 and ATS16351, please visit allegromicro.com.

INNOVATION WITH PURPOSE

ALLEGRO microsystems

AM040 - 03.22