

# HIGH-RESOLUTION GMR WHEEL SENSING

Groundbreaking ADAS Precision  
 and Robustness



A game-changer for autonomous vehicles: The A19360 will help automakers achieve SAE Level 3™ through SAE Level 5™ driving automation.

Replacing the human driver requires higher-resolution sensors to provide vehicle control systems with the precision needed for accurate control in the real world. The Allegro A19360 high-resolution wheel speed and distance sensor provides all the robustness of a standard differential speed sensor, but with up to four times the incremental resolution from the same magnetic encoders used today. This revolution in wheel-speed sensing can significantly increase next-generation advanced driver assistance system (ADAS) capabilities.

*Built on proven, advanced technology for robust automotive sensing:*

Developed with decades of experience in automotive speed sensing, the A19360 incorporates mixed-signal Allegro SolidSpeed Digital Architecture™ to provide the most robust and adaptive performance possible. Our proprietary monolithically-integrated giant magnetoresistance (GMR) technology is designed to sense the rotation of ring magnet encoders commonly used in automotive wheel-speed applications. The A19360 IC captures and digitizes the magnetic signal and applies patented signal processing algorithms to produce a high-resolution incremental output that is resilient to cycle-to-cycle air gap changes or magnetic pole variation. The IC was developed according to ISO 26262 for ASIL B(D) and features integrated diagnostics for inclusion in functional safety systems.

*GMR provides large air gap and ultra-low jitter:* Allegro GMR technology delivers wide air gap sensing that eases system mechanical tolerance requirements and sensor outputs, with extremely accurate periodic switching that is suitable for distance measurement and indirect tire pressure monitoring systems (iTTPMS). The A19360 provides industry-leading performance for the vehicles of tomorrow.



**The A19360 enables enhanced automatic parking, superior low-speed control in dense environments, and better overall vehicle control.**

**Applications**

The A19360 bolsters ADAS performance and capabilities in several key areas:

- Automatic parking and parking width measurement
- Motion path planning
- Superior low-speed control with tighter closed-loop feedback
- Stopping location accuracy
- Autonomous trailer attach
- Faster rotation information after power-up and direction changes
- Traffic jam assist
- Hill hold
- SAE J3016™: SAE Level 4™ and SAE Level 5™ autonomy

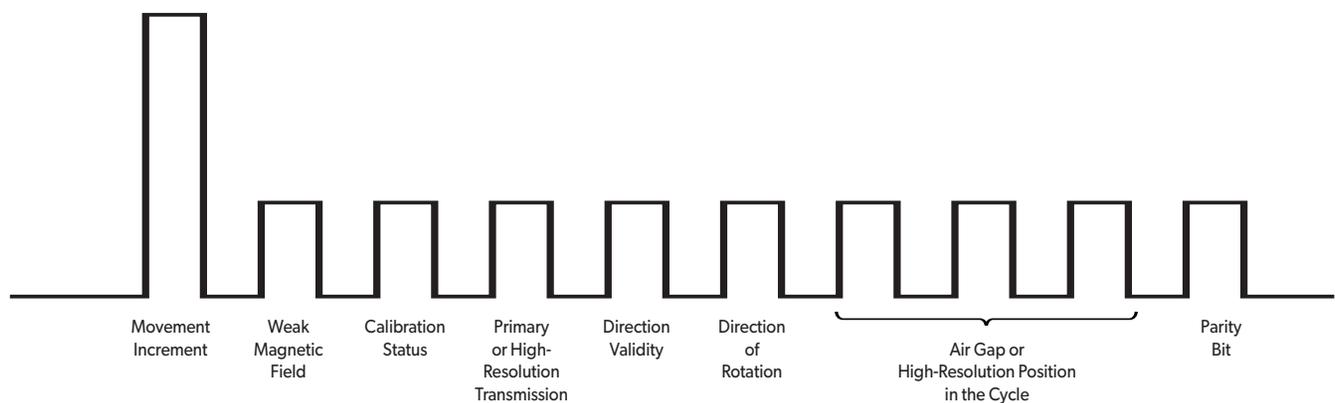
# Adaptive Performance for High Accuracy and Vibration Immunity

## Features and Benefits

- High resolution with equidistant outputs provided per 5 mm of typical tire rotation
- High magnetic sensitivity for large air gaps and low-jitter switching
- Single overmolded package with integrated IC and EMC capacitor
- Robust adaptive performance for high output accuracy and full-pitch vibration immunity
- ISO 26262 ASIL B(D) (pending assessment)
- Can also be used with magnetic encoders with reduced pole count for cost reduction

## Output Data: Advanced Data Efficiently Provided Over Two-Wire Interface

The A19360 transmits advanced data by modulating the current consumption on its two-wire interface, using pulse width or AK protocol. AK protocol data is shown below.



## Pulse Behavior

Standard wheel-speed sensors use thresholds at the steepest slopes of the magnetic signals to generate equidistant output events. Application of this method for high resolution would involve setting thresholds near the peaks of the magnetic cycles, which would impact edge jitter, sudden air gap capability, and duty cycle accuracy. The A19360 uses a different approach to maintain control of pulse accuracy and equidistant spacing. A patented processing algorithm uses real-time magnetic signals to determine the precise position at which to output a pulse, directly correlating to positional displacement of the wheel.

