XENSIV™ – TLE5549iC:
Much more than an ABS sensor!
Discover the first ABS wheel speed sensor with high resolution and immediate direction detection

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Automated driving and vehicle electrification call for better sensor performance, increased computational power and higher system redundancy so the car's environment and position can be sensed more accurately and the car can be controlled in a faster, safer way.

At the same time, electric engines are changing the powertrain architecture, demanding faster, more precise and robust wheel speed information to control the engine in a reliable and smooth way.
The XENSIV™ TLE5549iC is Infineon's first wheel speed sensor (WSS) with high resolution and fast direction detection designed for sophisticated vehicle control systems and autonomous parking applications. This advanced functionality means it is ready for future automotive applications.

Anti-lock braking system (ABS) sensors have been in use for over fifty years to increase car safety and comfort. Reaching beyond standard ABS, traction control system (TCS) and electronic stability control (ESC) applications, more recent sensors with low jitter and rotational direction information are enabling new use cases such as hill holder functions and indirect tire pressure monitoring systems (iTPMS).

Now, to support autonomous parking and driving, OEMs and system-level companies need higher-resolution, faster information on car movements. This information comes directly from the wheels – a ground truth reference positioning the “ego” car. Data from ABS sensors is used by the electronic control unit (ECU) to work out precisely how far the car has moved. This information is merged with the additional environment data from on-board sensors that detect the surroundings such as radar, camera and LIDAR.

Standard wheel speed sensors used in ABS applications provide a system-level resolution on car movements of approximately 2 cm. TLE5549iC improves this movement resolution by a factor of up to four, pushing the limit to just 0.5 cm.
This high resolution is enabling additional use cases such as automated parking in tight spaces, autonomous trailer connection, and much more. It also improves the accuracy of vehicle positioning estimations in areas where the GPS signal is weak.

Thanks to a new sensing element technology, known as linearized TMR (tunnel magnetoresistance), and advanced digital algorithms, Infineon’s new sensor interpolates the magnetic input signal coming from the magnetic encoder wheel and provides additional information to the ECU.
The sensor uses an extension of the standard AK protocol, considered state of the art for ABS applications, to ensure compatibility with existing ECU systems. At most, designers only need to make minor software adaptations to correctly interpret the additional information coming from the sensor. This means that system integrators and OEMs can keep the majority of their system (e.g., magnetic encoder wheel, ECU, measurement and protection circuit) unchanged, and improve the system performance just by replacing the sensor.

The new algorithms also improve power-on performance dramatically. While state-of-the-art wheel speed sensors come with an uncertainty margin of up to ±6 cm in relation to direction of rotation, TLE5549iC establishes the direction of rotation of the wheel after less than ±0.5 cm of movement. In other words, on the very first output protocol.

Other highlights of the TLE5549iC include excellent vibration behavior, extremely accurate duty cycle performance, increased stray field robustness and a higher ASIL level (with support for ASIL-D systems). This impressive lineup of features makes the TLE5549iC the perfect magnetic speed sensor for next-generation ABS platforms. It enables new use cases such as automated parking, automated trailer connection and electric engine control, while ensuring full compatibility with existing systems and application requirements.

Feel free to email us at TLE5549@infineon.com if you have any questions or require support. For more information please visit our websites, www.infineon.com/magnetic-speed
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Published by
Infineon Technologies AG
81726 Munich, Germany

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Date: 05/2021

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