



life.augmented

MEMS Sensors for automotive applications



Contents

- 3 Introduction
- 4 ST's sensing automotive solutions
- 6 Design support

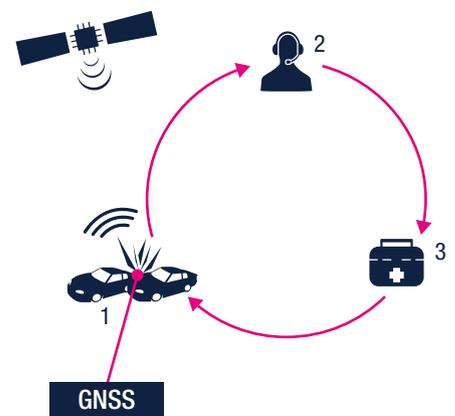
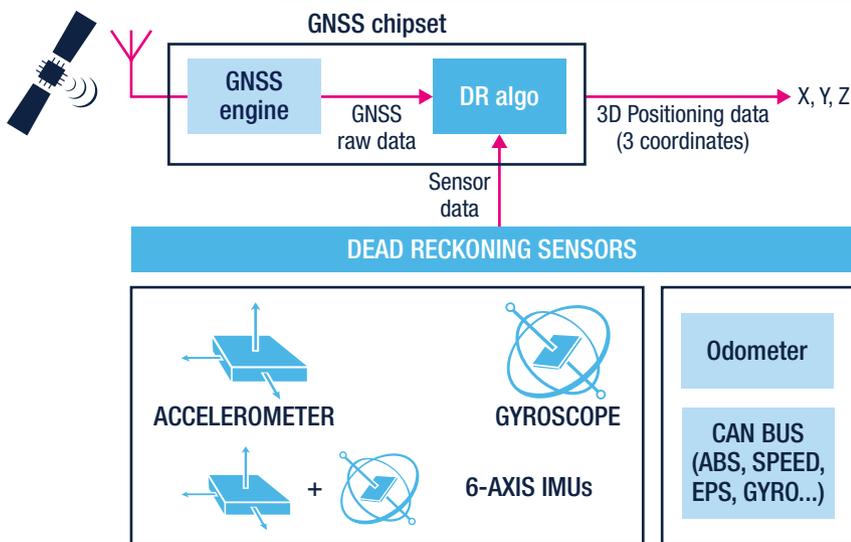
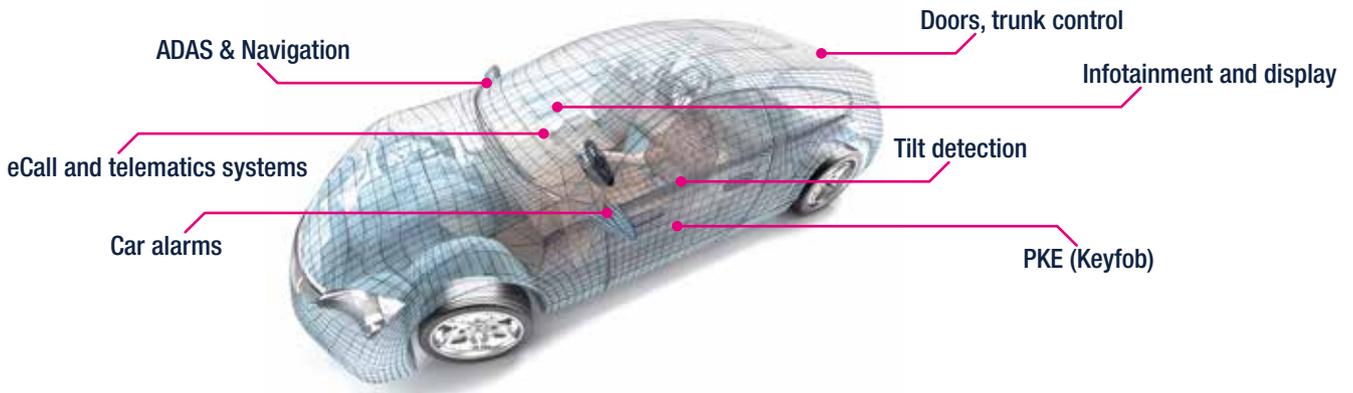
Introduction

ST is one of the leading automotive electronics suppliers, with several years of expertise in the manufacturing and testing of ICs designed to perform under the most stringent automotive environmental conditions.

We are committed to making cars more intelligent, safer and more comfortable to improve the life of millions of people every day.

ST has shipped more than 20 billions MEMS sensors to customers and has a unique sensor portfolio, from discrete to fully-integrated solutions. Dedicated 8-inch wafer production lines with high-volume manufacturing and full in-house dual-sourcing guarantee fast time-to-market, cost-effectiveness and security of supply.

EXAMPLE OF SOME NON-SAFETY-CRITICAL APPLICATIONS



ST's MEMS sensors for automotive applications showcased here are perfect for Global Navigation Satellite System (GNSS) solutions where proven accuracy and robustness are a must.

ST's MEMS sensors are the ideal partner for NON-SAFETY automotive applications including anti-theft systems, vehicle tracking, emergency calls, fleet management, vehicle sharing, infotainment and display.

ST's sensing automotive solutions

Automotive 6 axis inertial module for accurate navigation

Combining a 3D accelerometer and a 3D Gyroscope, ST's ASM330LHH, represents the latest generation of highly performance 6-axis MEMS inertial modules specifically designed and industrialized to be compliant with AEC-Q100 automotive standard. ASM330LHH offers superior stability in the non-safety application segment, ready to enable Dead Reckoning algorithms without data coming from car odometer (odoless).

The design and calibration for outstanding accuracy, together with proven mechanical robustness make the ASM330LHH the right choice for the implementation in Automotive reliable products as tracking in advanced vehicle navigation and telematics applications.

Serving demands for continuous, accurate vehicle location to support automated services, the ASM330LHH lets advanced dead-reckoning algorithms calculate precise position from sensor data if satellite signals are blocked such as in urban canyons, tunnels, covered roadways, parking garages, or dense forests. Its advanced, low-noise, temperature-stable design enables dependable telematics services such as e-tolling, tele-diagnostics, and e-Call assistance. Precision inertial data in six axes also support effectively the accurate positioning required by ADAS systems.

- Dead Reckoning (DR) algorithms in positioning systems
- Vehicle-to-everything (V2X) applications
- Telematics and security systems
- Impact detection and crash reconstruction in eCall applications
- Motion-activated functions
- Driving comfort

ASM330LHH 6-axis inertial module: 3D accelerometer and 3D gyroscope

Key features	Benefits
Superior stability over temperature and time	Enhanced accuracy of dead-reckoning algorithms
Six-channel synchronized output	Enhanced accuracy of dead-reckoning algorithms



AIS2IH high performance 3-axis accelerometer

Key features	Benefits
High performance & high resolution	Enabler for new demanding applications
On the fly switchable power modes, operating up to 115C, robust and tiny	Same sensor can be used in many different applications reducing development and sourcing effort



AIS2DW12 ultra-low-power 3-axis accelerometer

Key features	Benefits
Four different ultra-low-power modes	Low power ideal for battery operated devices such as key-fox
Superior robustness to mechanical shocks and drops	Reliable operation in the field for application, like keyfob, where drop and shocks are frequent



A3G4250D 3-axis digital gyroscope

Key features	Benefits
3-axis	Single device for multiple applications. It enables free mounting and 3D navigation
Stability and linearity over temperature and time	Enable accurate dead-reckoning algorithms



AIS3624DQ 3-axis medium-g accelerometer

Key features	Benefits
Medium-g detection ($\pm 24g$)	Crash recording in telematics and eCall applications
Pin-to-pin compatible with AIS328DQ	



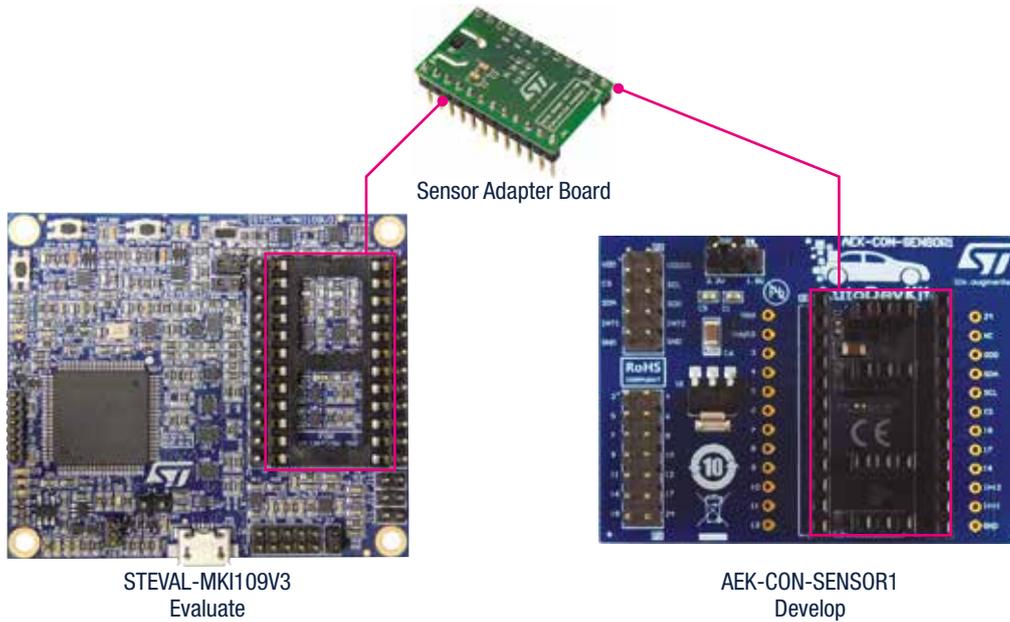
AIS328DQ 3-axis accelerometer

Key features	Benefits
Extended temperature range (up to 105 °C)	Flexibility in mounting the sensor in the vehicle
3-axis	Accurate tilt measurement enable 3D navigation and reliable anti-theft system



Design support

With an extensive expertise in sensor integration and the development of new applications, ST can assist customers in their design-in phase. ST's evaluation kits and firmware allows a real-time evaluation of sensor performance in customer applications.



ST OFFERS A COMPLETE SOLUTION

A full set of DIL24 MEMS non-safety sensor adapter boards for:



EVALUATION

- a professional motherboard based on a high-performance 32-bit microcontroller
- an intuitive graphic user interface software package for real-time access to the sensor configuration registers and to perform sensor data analysis



DEVELOPMENT:

- a connector board designed to interface MEMS sensor boards in DIL 24 socket to an SPC5 MCU discovery board

Usage	Part Number	Description
Performance evaluation	STEVAL-MKI109V3	ST MEMS sensor adapter motherboard based on STM32F103 32-bit ARM Cortex-M3 MCU Interfaces: USB connector and JTAG/SWD for debugging DFU-compatible for USB microprocessor firmware updates Compatible with all ST MEMS sensor adapters
	AEK-CON-SENSOR1	Connector board designed to interface MEMS sensor boards in DIL 24 socket to an SPC5 MCU discovery board
DIL24 adapter boards	AEK-MCU-C4MLIT1	SPC5 MCU discovery board
	STEVAL-MKI193V1	ASM330LHH 3D accelerometer, 3D gyroscope
	STEVAL-MKI110V1	AIS328DQ 3D accelerometer
	STEVAL-MKI206V1	AIS2DW12 3D accelerometer
	STEVAL-MKI218V1	AIS2IH 3D accelerometer
	STEVAL-MKI125V1	A3G4250D 3D digital gyroscope
	STEVAL-MKI158V1	AIS3624DQ 3D medium-g accelerometer

TECHNICAL DOCUMENTS

To see all technical documents and files for a specific product, go to www.st.com/sensors and select the product you are interested in through our product catalog. Each part number has a corresponding web page where you can easily find all associated technical documents and resources.

DEVELOPER LINKS

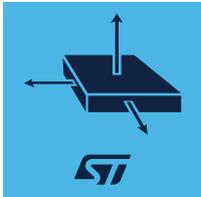
- For more information about MEMS sensors for automotive applications: www.st.com/memsauto
- For more information about MEMS evaluation boards: www.st.com/mems-boards
- Take part in the MEMS and sensors community: <https://community.st.com/community/mems-sensors-community>

For further information, visit <http://www.st.com/en/mems-and-sensors.html>

HOW TO FIND THE SENSOR YOU NEED?

- The ST Sensor Finder is a free smart selector for smartphones and tablets.
- You can select the best sensor among our MEMS (accelerometers, gyroscopes, e-compasses, iNEMO inertial modules, microphones) and sensors (automotive, industrial, environmental).
- Easy access to evaluation tools, typical applications and technical resources.

The ST Sensor Finder is currently available on Google Play and App Store <https://www.st.com/st-sensor-finder>



FIND OUT MORE

www.st.com/sensors-app

life.augmented



Order code: BRMEMSAUTO0621

For more information on ST products and solutions, visit www.st.com

© STMicroelectronics - June 2021 - Printed in the United Kingdom - All rights reserved
ST and the ST logo are registered and/or unregistered trademarks of STMicroelectronics International NV or its affiliates in the EU and/or elsewhere. In particular, ST and the ST logo are Registered in the US Patent and Trademark Office. For additional information about ST trademarks, please refer to www.st.com/trademarks.
All other product or service names are the property of their respective owners.

