

# Final tests of automotive radar sensors made easy

The R&S®AREG100A automotive radar echo generator provides OEM test engineers with a powerful solution for reliable testing of automotive radar sensors during final inspection at the end of assembly lines.



## Your task

As a result of the ongoing development and widespread use of sensors, the active part of driving is shifting more and more from human beings to the onboard systems in motor vehicles. Sensors based on radar technology are the key components of advanced driver assistance systems (ADAS). The radar sensor measures and evaluates the distance, velocity and size of objects. Radar sensors are therefore important, safety-critical subsystems of the ADAS that require reliable and conclusive in-depth testing – from sensor production at Tier 1 suppliers to the auto-makers' final inspection tests. To ensure proper mounting and quality of the integrated radar sensors in the bumpers of the car, final inspection tests are required.

## T&M solution

The R&S®AREG100A automotive radar echo generator is a reliable, lean and simple solution for generating radar echoes for short range, mid range and long range radar

sensors. It is a powerful tool for verifying the proper mounting of the automotive radar sensor in the bumper. The sensor must be mounted correctly in order for the sensor's antenna to illuminate its sector and for its boresight direction to be aligned correctly within the car's coordinate system. Thanks to the R&S®AREG100A and the company's experience in mmWave technology, OEMs can benefit from innovative test solutions for final inspection of the most advanced radar ISM band and E band sensors. The R&S®AREG100A helps to ensure continuous product quality.

## Modularity

The R&S®AREG100A consists of a base unit and a remote frontend. There are separate frontends for the 24 GHz, the 76 GHz and the 79 GHz band. The flexible and modular concept of the R&S®AREG100A supports configurations for up to four different fixed object distances with controllable radar cross section. The frontends have an IF cable connection to the base unit, allowing simple integration into existing assembly line sensor calibration test racks. Each of the frontends is available in a single-antenna configuration to enable superior MIMO testing capabilities and a dual-antenna configuration with high RX/TX isolation for suppressing echo ringaround. Users enjoy a powerful and straightforward GUI with intuitive control via touchscreen or standard remote control interfaces.

## Echo generation

The R&S®AREG100A supports test cases that require an artificial echo from a single object or multiple echoes from different objects. All echoes can be controlled in amplitude and switched on/off individually or all together. This enables a wide variety of functional production test cases. If the radar sensor supplier uses the R&S®AREG100A as an end-of-line tester, simple reconfiguration of the test cases allows a link to the test results provided by the Tier 1 supplier. This ensures a continuous sensor quality crosscheck with the Tier 1 production test results.

## Generation of radial velocities

The user can configure individual Doppler offset frequencies for each echo signal. Echoes from static objects and echoes with superimposed Doppler offset make it possible to test the performance of moving target indicator (MTI) radars.

## Radar sensor validation during final inspection in automotive assembly lines

To ensure the satisfaction of new car buyers and to reduce the OEM's necessary after sales service, radar based ADAS sensors have to work as intended when the car leaves the production line. After the automotive radar sensors are integrated into the car bumpers, it is extremely important to test the proper functioning and initialization of ADAS sensors during final in-depth testing at the end of the automaker's assembly line. Typically cars have one LRR sensor for adaptive cruise control and multiple SRR sensors for collision avoidance systems. All long range radar sensors and short range radar sensors installed in a car are examined. The car is placed on a dynamometer. After the car is precisely aligned, the initialization and testing procedure is executed. OEMs use this test to crosscheck that the sensor is correctly integrated into the bumpers to ensure that the antennas illuminate their defined sectors. The car passes the test if the received power level of the radar echo is within a certain range of the expected value.

### Solution for parallel short range radar testing

Cars typically use multiple short range radar sensors for their collision avoidance systems. Using several R&S®AREG100A automotive radar echo generators (one for each installed radar sensor in the car) allows simultaneous testing. Sensors are typically installed in the front and back corners and in the B pillars of the cars. Parallel testing of automotive radar sensors provides OEMs with a

simple and lean way to optimize the production sequence as well as to condense and minimize test cycle times. To support parallel testing, an independent Doppler frequency shift can be configured in any of the R&S®AREG100A automotive radar echo generators. An individual, artificial radar object with unique velocity is generated for each radar sensor. Unwanted echoes from multipath propagation, such as radar echoes with different Doppler offset from other test stands or due to parallel testing, can be gated out if the radar sensor under test and the R&S®AREG100A are configured with the same unambiguous and identical Doppler offset. This prevents falsified sensor test results, and tests can be executed simultaneously.

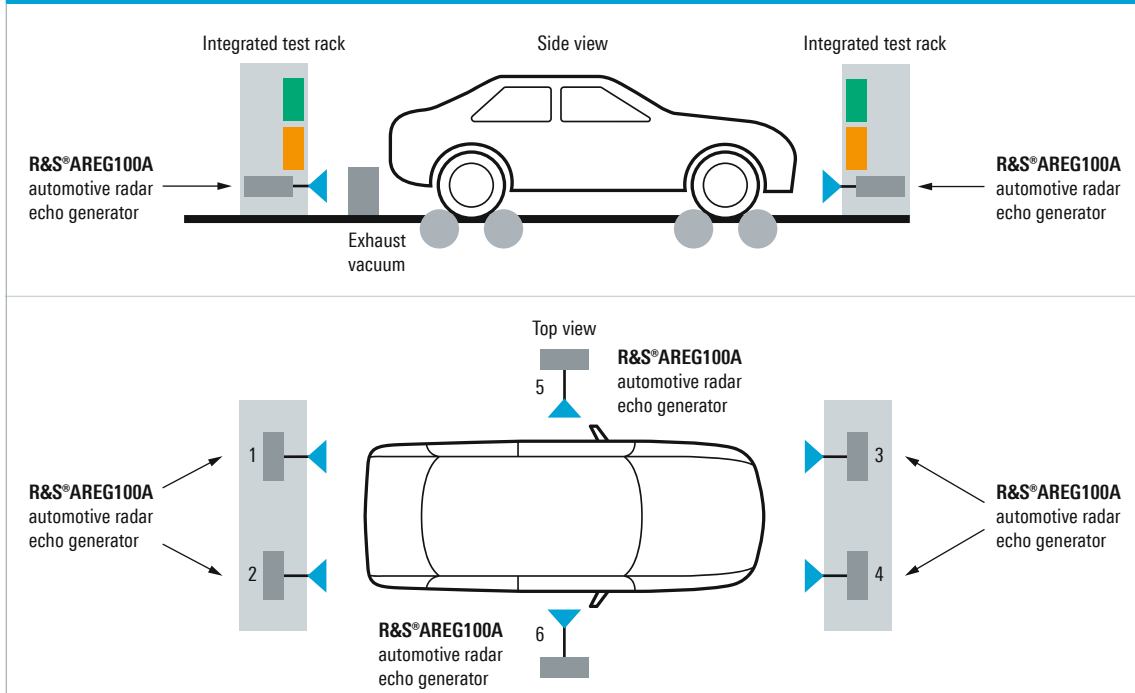
### Benefits and key features

- Supports all automotive radar bands at 24 GHz and 77 GHz/79 GHz with a maximum instantaneous bandwidth of up to 4 GHz
- Wide range of definable test cases with up to four individually switchable object distances, controllable Doppler and radar cross section
- Customer-definable fixed object distances and configurable independent Doppler offset for each object echo
- Remote frontend for simplifying the integration of the R&S®AREG100A into test stands
- Established service network around the globe ensures fast and reliable worldwide support and on-site service

See also

[www.rohde-schwarz.com/product/AREG100A](http://www.rohde-schwarz.com/product/AREG100A)

### Final inspection of the radar sensors at the OEM assembly line with the R&S®AREG100A



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