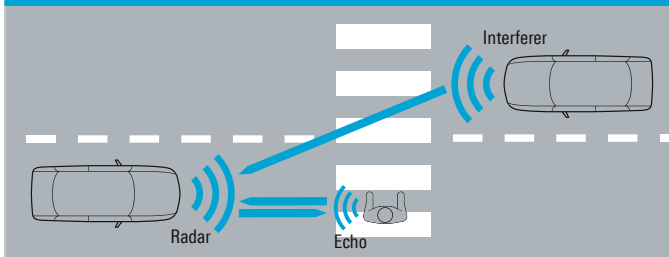


Innovative and simple solution for testing automotive radar sensors against interferers

Drivers rely more and more on advanced driver assistance systems (ADAS) based on radar technology. The radar sensor delivers information about the surrounding traffic environment. It is a must for every radar sensor to detect wanted signals from real objects also in the presence of unwanted interferers. The R&S®AREG100A provides a powerful solution for testing the immunity of radar sensors against interferers.

Typical scenario with small echo from pedestrian and interferer of opposite car due to oncoming traffic



Your task

Until now mutual interference between automotive radar sensors has not been mentioned as a major problem, because only a limited number of cars are equipped with radar systems. However, with the increasing use of ADAS

in small-size, middle-class and upper-class cars, more and more radar sensors are present on the roads. Furthermore, the number of radar-based systems per car is increasing, leading to a larger number of sensors. For example, four to six short-range radar sensors are required for the collision avoidance systems. Various problems occur if additional interfering signals are received by the radar sensor together with the real echo of the object. Through the interferers, often the noise floor increases. This leads to a significantly degraded detection probability of objects that produce echoes with small amplitude, e.g. from pedestrians. This clearly shows that testing the performance of the automotive radar sensor's interferer mitigation technique is a major task.

Due to its safety-relevant nature, the robustness of automotive radar sensors against interferers has also moved into the focus of the standardization authorities. With the radio equipment directive (RED) and the related applicable standards, such as ETSI EN 303396 and ETSI EN 303091-1/2, an obligatory standard became law in Europe. It requires testing the performance of the radar sensor's interferer mitigation technique.

This highlights the fact that the immunity of automotive radar sensors against interferers is one of the key performance indicators of the radar sensor and a prerequisite to provide highly secure ADAS on the road.

T&M solution

Rohde & Schwarz offers the perfect solution for testing automotive radar sensors against interferers. The R&S®AREG100A automotive radar echo generator is the core element of this test system. It is a versatile instrument capable of generating up to four individually switchable echo signals. It is able to add any interferer signal to the wanted echoes to produce typical interference scenarios.

Example of a possible interferer test case

	ECHO 1	ECHO 2	ECHO 3	ECHO 4
Object	Car	Pedestrian	Car	Truck
Range	Close	Close	Medium	Far
RCS	Large	Small	Medium	Medium
Velocity	Low	No	Yes	Yes
Interferer	Strong			

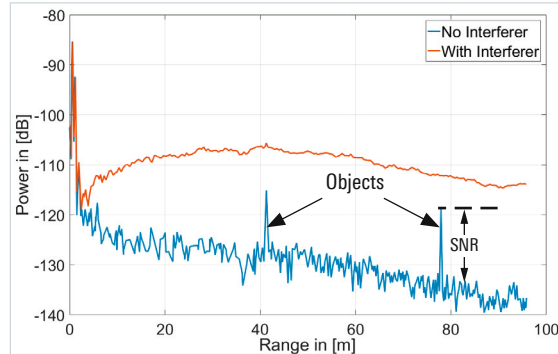
R&S®AREG100A IF input/output interface

By providing an input interface in the IF domain, any analog or vector signal generator can be used in combination with the R&S®AREG100A to simulate a wide range of interferers together with the wanted echoes. The generated interfering signal is superimposed onto the echo signals and upconverted into the ISM band or E band together with the delayed echo signal from the simulated objects of the radar under test. To feed interferers in the IF domain, the only requirement is an RF signal generator with a maximum frequency of up to 6 GHz. This makes testing simple and convenient. The R&S®AREG100A takes care of the upconversion into the ISM band or E band of the interfering signal, which allows the user to fully focus on executing the test. Beyond that, measurement equipment such as spectrum analyzers, power sensors or oscilloscopes can be connected to the IF output port to perform an in-depth radar signal analysis.

Rohde & Schwarz reference solution

The R&S®AREG100A in combination with the R&S®Pulse Sequencer software and a Rohde & Schwarz vector signal generator is the reference solution for testing radar sensors against interferers. The R&S®Pulse Sequencer is a powerful and easy-to-handle PC software suite that enables the calculation of interfering signals, such as FM chirp sequences from radar sensors of oncoming traffic. This test setup provides a powerful method to analyze the sensor's behavior in the presence of interfering signals and to test the performance of the sensor's interferer mitigation technique. The screenshot shows an interference scenario as defined by the RED framework. In this scenario, the echo signals from two objects at different distances are interfered by a

CW signal. Through the CW interferer, the noise level of the radar sensor dramatically increases. As a result, the two objects at 42 m and 78 m are no longer visible for the automotive radar. This example clearly shows the importance of high robustness of the sensors against interferers. The Rohde & Schwarz reference solution is perfect for these test cases.



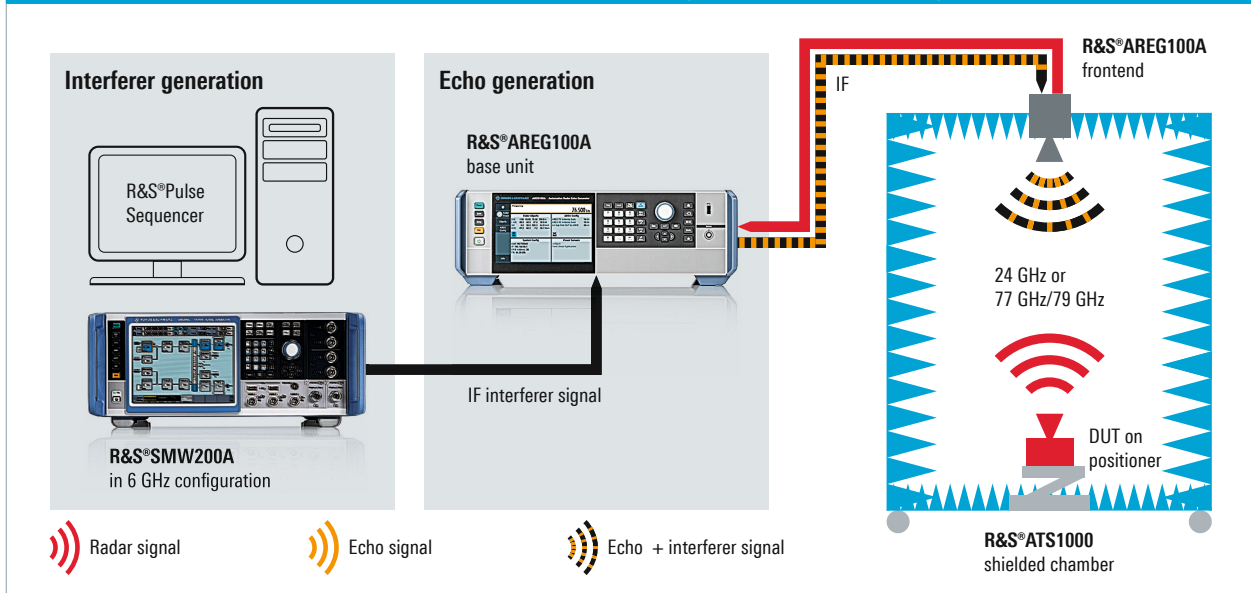
Benefits and key features

- Test robustness of radar sensors against interferers for all automotive radar bands at 24 GHz and 77 GHz/79 GHz
- Simple and easy interferer generation in the ISM band and E band
- Only 6 GHz signal source needed for interferer simulation
- Intuitive definition of interferer test scenarios with R&S®Pulse Sequencer software
- Standalone off-the-shelf solution – no synchronization with radar sensor required

See also

www.rohde-schwarz.com/product/AREG100A

Rohde & Schwarz reference solution for reliable testing of radar sensors against interferers



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