R&S®RadEsT
RADAR ESSENTIAL TESTER

The essential in radar testing:
your allrounder from lab to vehicle

Flyer
Version 01.01

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

The R&S®RadEsT is a versatile and extensive automotive radar target simulator designed to meet all testing needs from the lab to the vehicle. The robust features, wide range of use cases and exceptional value, let the R&S®RadEsT open new possibilities in radar testing. Experience the all-rounder advantage with the R&S®RadEsT – the perfect solution for precise, reliable and dynamic radar target simulation.

Dynamic target simulation

The R&S®RadEsT captures the signal from the radar sensor, modifies and returns it as a simulated radar target. The simulated target can dynamically be configured on the fly for distance (2.5 m to 250 m), velocity/doppler (0 to ±500 km/h) and attenuation/RCS (> 40 dB).

This allows quick simulation of moving targets and qualification of radar sensor based autonomous driving functions, e.g. automatic emergency braking (AEB) or adaptive cruise control (ACC).

Innovative antenna design

The R&S®RadEsT has a flexible antenna design. To simulate targets from a certain angle, the R&S®RadEsT features 12 receive and 12 transmit patch antennas with different polarizations. The angle of the simulated target can be changed without mechanical movement.

To deal with different radar sensors polarizations, a built-in detection mechanism can detect the antenna polarization and choose a suitable antenna pair.

Integrated analysis functionalities

With its internal analysis capabilities, the R&S®RadEsT can directly measure key indicators of radar sensor quality such as equivalent isotopically radiated power (EIRP) and occupied bandwidth.

Small form factor and light weight

The R&S®RadEsT is the most compact automotive radar target simulator with dimensions of just 186.5 mm × 138.6 mm × 275 mm (W × H × D) and weighing only 3.2 kg. This makes setup and integration in any test environment easy. Optional battery powered operation is available for even more portability and flexibility.

Self-check capability

The R&S®RadEsT features self-check capability to identify discrepancies or drifts in its performance metrics and can compare them against predefined thresholds to detect any drift or deterioration in functionality. It alerts users to deviations or abnormalities in the measurement process.

This feature is crucial for maintaining reliability and precision in simulation plus analysis functions, reducing downtime and ensuring consistent performance over time.

Reduced reflections and multipath effects

Small patch antennas together with an absorber covered surface provide a clean RF frontend with very low RCS, suppressing close-range targets and potential multipath reflections.

Shielded environment for better results

To minimize reflections and provide interference-free RF environment, the R&S®RadEsT offers small and compact shielding systems. The R&S®RadEsT-Z50 pyramidal or R&S®RadEsT-Z55 straight shielding system can be used from lab to vehicle level.

FEATURES AND BENEFITS

FEATURES

Dynamic and precise target simulation

Adjust and configure target distance and velocity (Doppler) for functional testing scenarios.

Simulate reflections from various types of road users (RCS) to match real-world conditions.

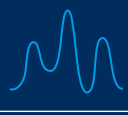
Use full compatibility with MIMO sensors and built-in polarization mechanism.

Verify radar sensors signal level (EIRP)

Directly verify the signal levels from 76 GHz to 81 GHz plus 24 GHz radar sensors with integrated power level measurement.

Determine occupied bandwidth

Directly determine the occupied bandwidth with its integrated bandwidth estimate.



Self-check capability

Perform internal diagnosis and validation to ensure operational integrity and accuracy.

Battery powered

Use the optional batteries for increased portability and flexibility.

BENEFITS

Broad compatibilitiy

Differently polarized antennas make R&S®RadEsT compatible with multiple sensor models for seamless operation from lab to vehicle level.

Compact size and light weight

Compact size and light weight makes integrating the R&S®RadEsT into your testing environment easy.

Quick setup and easy to use

The R&S®RadEsT quickly configures radar target simulation and analysis settings.

Consistent and reliable results

The self-check capability lets the R&S®RadEsT retain measurement accuracy for consistent and reliable results over time.

Outstanding value

The R&S®RadEsT is an exceptional value, with high-end features at an unmatched price point and uncompromising performance.

OPERATION METHODS

Manual operation

The R&S®RadEsT can be operated manually with the buttons on the rear for quick use in the field. Target parameters, e.g. distance, Doppler, RCS and antennas can be selected directly. In addition to target configuration, sensor power level measurements and normalization can be carried out directly.

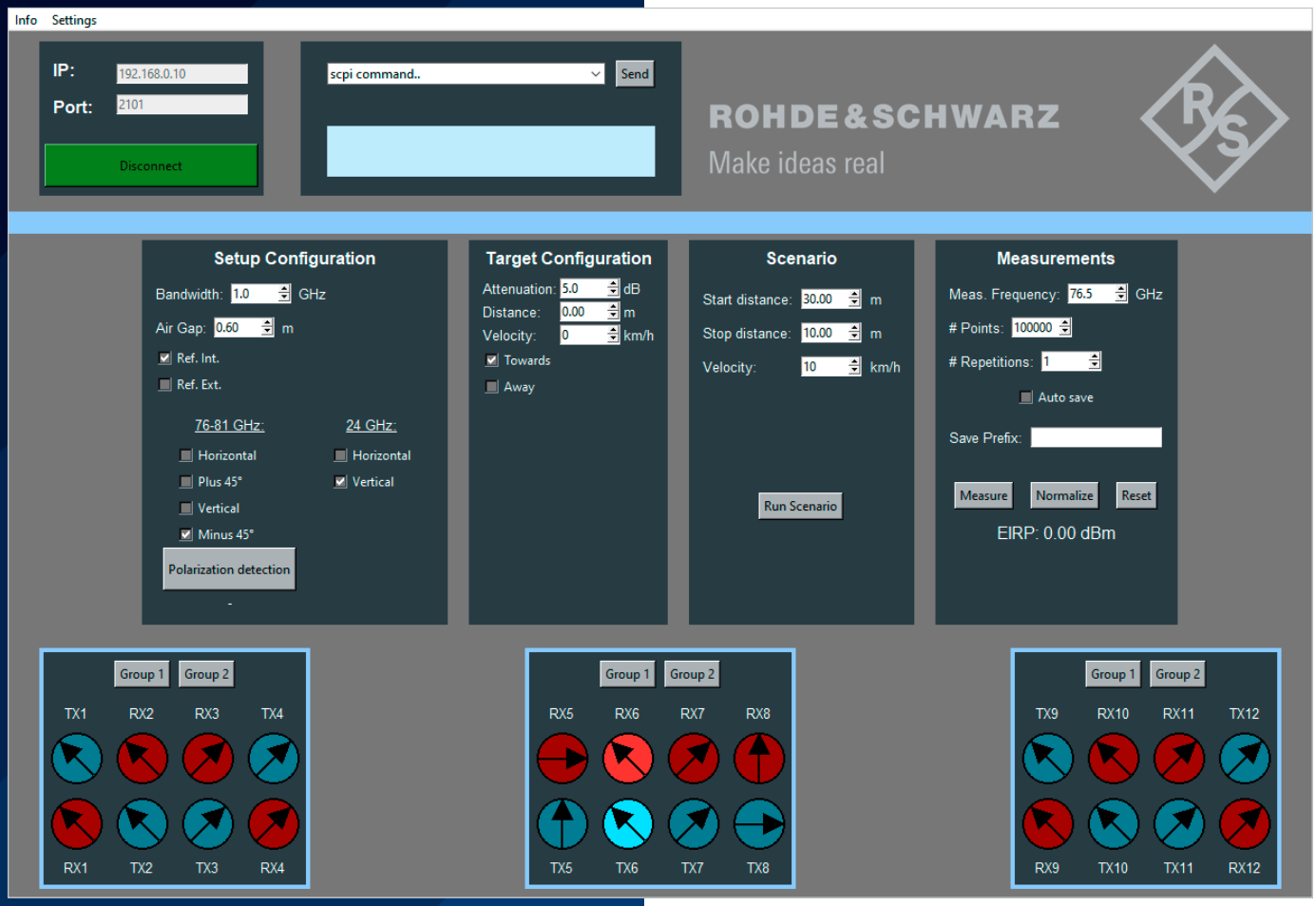
Remote control

A Python GUI provides easy access to target simulation and analysis settings of the R&S®RadEsT for use in laboratories. When the device is connected via LAN; setups, targets and scenarios can be easily configured. Different antennas can be selected for angular movement of targets.

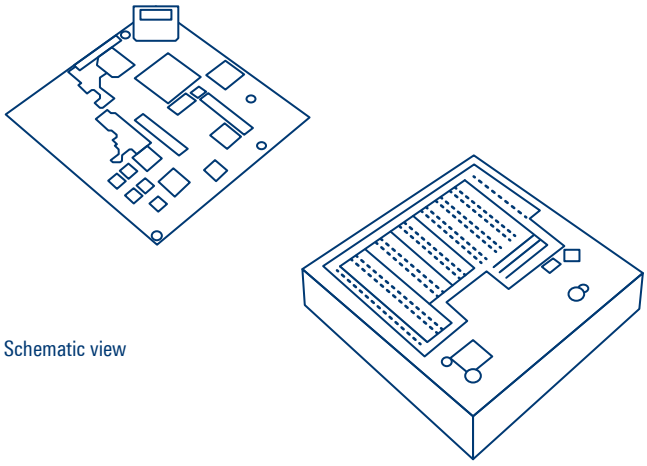
Automated testing

The R&S®RadEsT has SCPI support and Python libraries for easy integration in automated test environments. Hardware based test sequencing further increases automation capabilities.

Python GUI providing a structured view for target simulation and analysis settings



YOUR ALLROUNDER FROM THE LAB ...

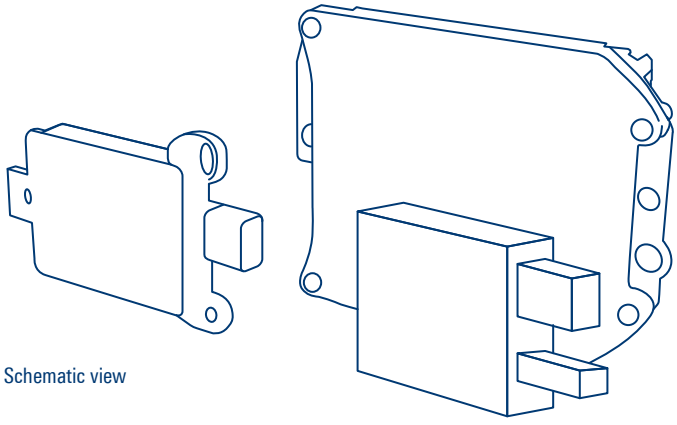


Schematic view

Tier 2: System check and debugging of radar module reference designs

Engineers have to evaluate the performance of basic features, e.g. range calculation and Doppler processing for reference designs.

The R&S®RadEsT is a flexible and reliable solution for such needs. It provides a quick and accurate assessment of the reference design, simplifying the overall design validation process from R&D to field applications.



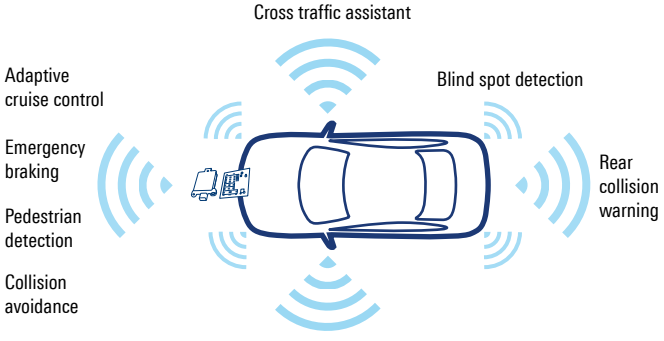
Schematic view

Tier 1: Software verification and functional tests on the radar module

When verifying radar module functions, R&D engineers must perform several tasks to qualify the radar sensor at target level. Key tasks are the simulation of radar objects at varying distances, different angles, changing RCS as well as velocity/Doppler effects.

R&D engineers must verify the outcome of algorithm changes on the fly. Today, complex radar test systems are typically used, leading to time-consuming iterations.

The R&S®RadEsT enables quick and direct radar target simulation on the bench. This opens up new testing methods, increases development efficiency and reduces overall verification time.



OEM: Evaluation of radar sensors

Before OEMs decide on a radar sensor, the sensors must first be extensively evaluated during the decision-making process.

To evaluate radar feature performance and asses the radar sensor design quality, OEM radar validation teams rely on a broad set of measurement and evaluation tools. These are either easy to use but with limited functions or complex and time consuming.

R&S®RadEsT overcomes these constraints providing an all-in-one flexible radar target simulator for quick and easy design evaluation.

... TO THE VEHICLE

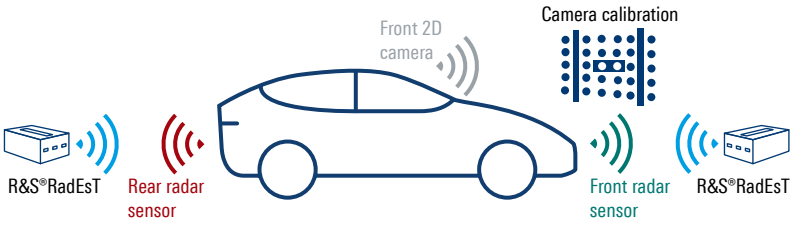
OEM production: radar sensor calibration and alignment

OEMs must make sure that all ADAS/AD functions work properly before a vehicle can leave the production line.

All radar sensors need to be calibrated and aligned, with each sensor assigned a specific target.

In contrast to conventional methods, the R&S®RadEsT can stimulate static and dynamic radar objects for calibration and alignment that require a minimum physical distance. The simulated target can be configured in line with calibration requirements for distance, velocity/Doppler and attenuation/RCS. The R&S®RadEsT is a future-proof solution that meets current and future sensors calibration/alignment requirements.

Integration OEM ADAS/AD calibration and alignment test stand



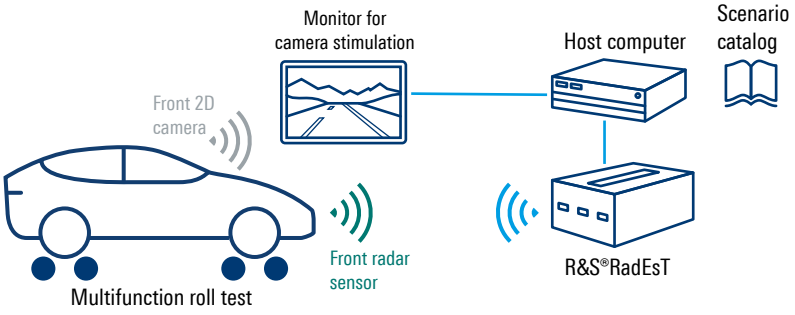
OEM production: Testing of ADAS/AD functions

For AE Level 2+ autonomous vehicles and above, the overall system performance must be ensured for safety-critical functions.

The ADAS/AD functions of the entire vehicle are tested. To test automatic emergency breaking (AEB), adaptive cruise control (ACC), blind spot detection (BSD) or lane keep assistant systems (LKAS), all radar sensors and additional sensors, (e.g. camera, lidar) are stimulated simultaneously.

The compact form factor, low weight and integrated polarization detection, make the R&S®RadEsT very easy to integrate into existing end-of-line (EoL) testing stations and can stimulate all kinds of radar sensors.

Integration into OEM ADAS/AD functional test stand



SPECIFICATIONS IN BRIEF

Specifications in brief		
Frequency		
RF frequency range	object simulation	76.0 GHz to 81.0 GHz
	power measurement	24 GHz, 76.0 GHz to 81.0 GHz
Object simulation		
Range [1]	range	3 m to 250 m
	resolution	0.04 m (typ.)
Doppler	range	0 to ±500 km/h
	resolution	1 km/h
Attenuation (RCS)	range	> 40 dB
	resolution	1 dB (typ.)
System phase noise	at maximum range	< –115 dBc
Power measurement		
Power measurement range [1]	24 GHz	–60 dBm to –25 dBm (–5 dBm to 30 dBm EIRP)
	76 GHz to 79 GHz	–54 dBm to –24 dBm (10 dBm to 40 dBm EIRP)
	> 79 GHz to 81 GHz	–49 dBm to –24 dBm (15 dBm to 40 dBm EIRP)
Level		
Maximum ratings	RX power at frontend [1]	+55 dBm EIRP
	TX power at frontend	+10 dBm EIRP

[1] At 0.5 m distance from the DUT.

ORDERING INFORMATION

Designation	Type	Order No.
Radar essential tester, including power supply and quick start guide	R&S®RadEsT	1344.0005.02
Shielding system, pyramidal, length: 50 cm	R&S®RadEsT-Z50	1341.0156.03
Shielding system, straight, length: 50 cm	R&S®RadEsT-Z55	1341.0156.04

Service at Rohde&Schwarz
You're in great hands

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- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

Rohde&Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

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Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

Rohde&Schwarz training
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PD 3683.9911.32 | Version 01.01 | September 2024 (sk)
R&S®RadEsT Radar Essential Tester
Data without tolerance limits is not binding | Subject to change