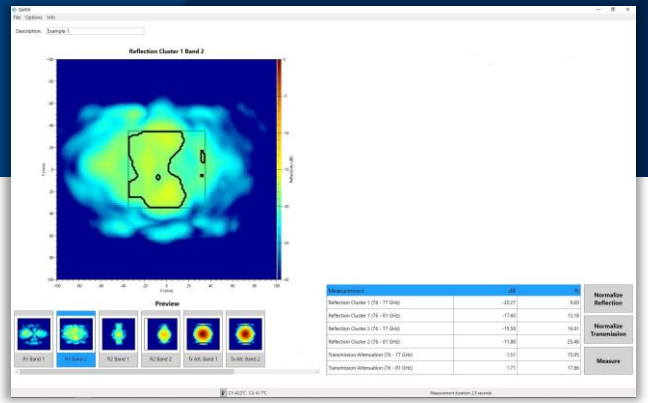
ROHDE&SCHWARZ
Make ideas real

R&S®QAR50 QUALITY AUTOMOTIVE RADOME TESTER

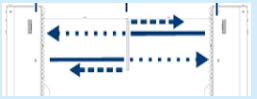
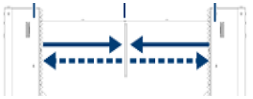
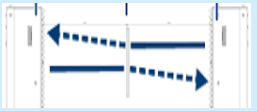
Highest measurement accuracy and repeatability in free space



Highest measurement accuracy and repeatability for transmission and reflection measurements

Precision, reliability and robustness are core competencies for measurement equipment used in production testing. State-of-the-art transmission loss and reflection measurement capabilities are basic features of the R&S®QAR50.

The R&S®QAR50 has several standard measurement and result displays in the 76 GHz to 81 GHz range for evaluating DUT quality.

Measurements	Description
 Base FW standard	**One-way transmission loss** The stimulus signal is split into reflected and transmitted components. The result (transmission attenuation) is the ratio of energy measured at the receiving cluster to the stimulus signal sent by the transmitting cluster. To measure the transmission, both clusters send a signal through the DUT that attenuates the signal. The attenuated signal is measured by the opposite cluster. The transmission attenuation result is the average of those two measurements.
 Base FW standard	**Reflection on both sides** The reflection measurement determines the percentage of energy a DUT reflects in a frequency range used by automotive radar sensors. The result (reflectivity) is the ratio of the reflected energy relative to the energy from the stimulus signal over a certain radar band. Reflected signals reduce radar performance and can even interfere with received signals. High reflection can have various causes in certain areas, including material defects, undesired interaction between several layers of materials, certain excess material or the presence of foreign objects. The R&S®QAR50 can make spatially resolved DUT reflection measurements by linking information collected from the distributed transmit and receive antennas in a coherent operation. The resulting millimeter wave image, diagram and numerical results allow for intuitive evaluations of DUT reflection behavior.
 Option R&S®QAR50-K20	**Transmission phase** When a stimulus signal hits a DUT, it changes the phase characteristics of the signal by a certain amount, depending on the its thickness and material Both clusters send a signal that passes through the DUT to determine the phase characteristics. The opposite cluster measures the phase for the received signal. The final phase results are an average of these two measurements. To calculate phase differences, the R&S®QAR50 compares the phase from normalization measurements (empty space) with those of the actual measurements.

For more information, visit
www.rohde-schwarz.com/product/QAR50

Numerical result table

Measurement	dB	%
Reflection Cluster 1 (76 - 77 GHz)	-20.27	9.69
Reflection Cluster 1 (76 - 81 GHz)	-17.60	13.18
Reflection Cluster 2 (76 - 77 GHz)	-15.59	16.61
Reflection Cluster 2 (76 - 81 GHz)	-11.88	25.48
Transmission Attenuation (76 - 77 GHz)	1.51	15.95
Transmission Attenuation (76 - 81 GHz)	1.71	17.86

The numerical result table displays the measurements as numbers. The table shows the results in dB (reflection and transmission measurement) and as a percentage where the maximum reflection or transmission is equal to 100 %. The interpretation of the percentage depends on the measurement.

- **Reflection measurement:**
  100 % reflection = complete energy is reflected by the DUT
- **Transmission measurement:**
  100 % transmission attenuation = complete energy is attenuated by the DUT (no energy arrives at the receiving cluster)

R&S®QAR50-Z44: Verification set

Compliant verification set with plates for transmission loss and reflection verification. The R&S®QAR50-Z44 can verify the the R&S®QAR50 with national and international standards. This ensures the highest accuracy and repeatability for your measurement results.

Step 1: choose your R&S®QAR50 model

Model		
R&S®QAR50 vertical polarization	R&S®QAR50	1343.0099K02 1343.0099.02
R&S®QAR50 horizontal polarization	R&S®QAR50	1343.0099K03 1343.0099.03

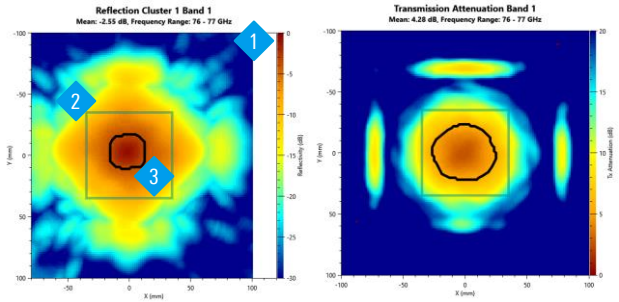
Included: All models come with a power cord, a getting started manual and a 1-year warranty

Step 2: choose your software options and accessories

Options		
Frequency response	R&S®QAR50-K10	1343.2091.02
Phase mask	R&S®QAR50-K20	1343.2110.02
HD reflection	R&S®QAR50-K30	1343.2133.02
Accessories		
Verification Set	R&S®QAR50-Z44	1343.0082.02

All options can be retrofitted

Result displays



1 Color visualization and color map

The resulting image is the measured levels in various colors:

- For reflection measurements, the image shows reflectivity in dB
- For transmission measurements, the image shows transmission attenuation in dB.

The color range depends on the selected color scheme. A color map next to the image indicates which levels correspond to each color.

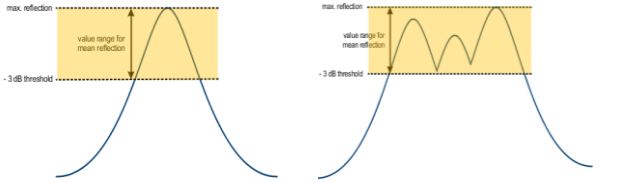
2 Evaluation window for numerical results

A blue rectangle superimposed on the image indicates the part being evaluated for numerical results. The size and location of this evaluation window depends on the configuration.

3 Measurement points

The black line in the blue rectangle surrounding certain areas indicates the measurement points that deviate no more than 3 dB from the maximum reflection value or the minimum attenuation value. There can be several such areas in the image, depending on the DUT characteristics. Those are the measurement points that actually contribute to the mean reflection and attenuation values indicated in the numerical result tables.

Reflection measurements



Mean reflection of homogenous DUT

Mean reflection of non-homogeneous DUT

Measuring a homogenous (= flat, highly reflective) DUT usually results in a Gaussian distribution of reflection values (due to the aperture weight of the antenna array). The values are concentrated in a single area of the image.

The distribution can be different for non-homogeneous DUTs with several highlighted areas in the image, but the evaluation remains the same.

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Trade names are trademarks of the owners | R&S®QAR50: Highest measurement accuracy and repeatability in free space | Data without tolerance limits is not binding
Subject to change |