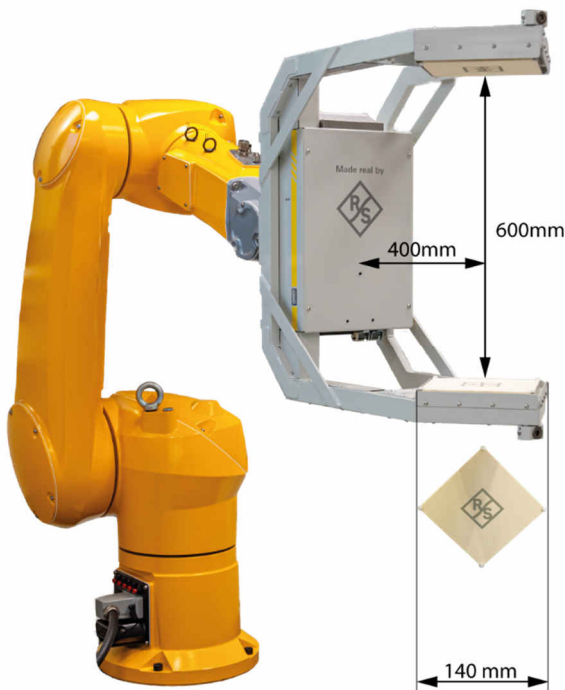


# R&S® QAR50-R (Robot) AUTOMOTIVE RADOME TESTER

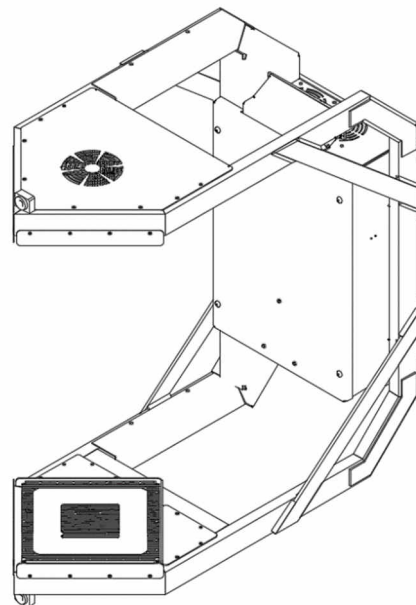
by Löhnert Elektronik GmbH

## Specifications



For a fast and flexible measurement, for example the left and right side of a bumper, Löhnert Elektronik GmbH has developed a solution with a robot in a tight and successful cooperation with Rohde & Schwarz.

The technology is based on the Rohde & Schwarz QAR 50, with a lighter construction and a smaller antenna distance.



Product information

## Table of Contents

<b>Definitions</b>	<b>3</b>
<b>Specifications</b>	<b>5</b>
<b>System</b>	<b>5</b>
<b>Imaging specifications</b>	<b>5</b>
Reflection measurements .....	5
Transmission attenuation measurements .....	6
Transmission phase measurements (using R&S®QAR50-K20 option) .....	6
High resolution reflection measurements (using R&S®QAR50-K30 option) .....	6
<b>Frequency resolved measurements (using R&amp;S®QAR50-K10 option)</b>	<b>6</b>
Frequency resolved reflection measurements (using R&S®QAR50-K10 option) .....	7
Frequency resolved attenuation measurements (using R&S®QAR50-K10 option) .....	7
Connectors and switches .....	8
<b>General data</b>	<b>9</b>
<b>Mass moment of inertia</b>	<b>11</b>
<b>Ordering information</b>	<b>12</b>

Product information

## Definitions

### General

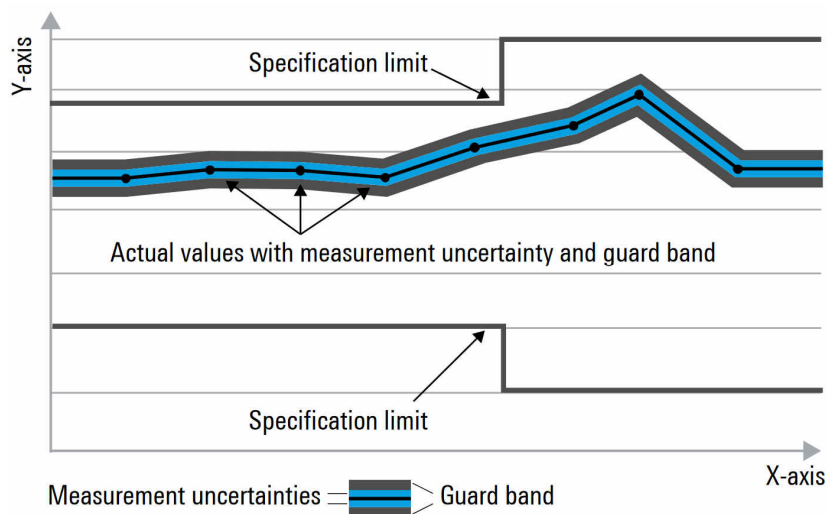
Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 90 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

### Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum.

Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



### Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under "Specifications with limits" above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

### **Specifications without limits**

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

### **Typical data (typ.)**

Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

### **Nominal values (nom.)**

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

### **Measured values (meas.)**

Characterize expected product performance by means of measurement results gained from individual samples.

### **Uncertainties**

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

## Specifications

Specifications apply under the following conditions: 90 minutes warm-up time at specified environmental conditions and after successfully verified calibration.

### System

Measurement time		< 3ms
Measurement cycle	From measurement start to results display (data saving time excluded)	< 4s
Operating system		Windows 10 IoT

### Imaging specifications

Frequency range	start frequency	
	band 1	76 GHz
	band 2	76 GHz
	stop frequency	
	band 1	77 GHz
	band 2	81 GHz
Image size	W x H	200 mm x 200 mm (7.87 in x 7.87 in)
Image pixel size	W x H	1.56 mm x 1.56 mm (0.06 in x 0.06 in)

### Reflection measurements

Image dynamic range	of mean reflection value	> 20 dB
Maximum evaluation area	for the calculation of the mean reflection	100 mm x 100 mm (3.93 in x 3.93 in)
Reproducibility <sup>1</sup> of mean reflection <sup>2</sup>	with 0 dB mean reflection	< 0.2 dB

<sup>1</sup> Reproducibility values are valid, after proper normalization and for temperature changes less than 4K. The DUT has to be positioned within the test fixture.

<sup>2</sup> The mean reflection value is defined as the arithmetic mean of the individually measured reflection values within the range [maxVal - 3 dB; maxVal]. maxVal is the maximum reflection value within the evaluation area.

**Transmission attenuation measurements**

Image dynamic range	of mean transmission attenuation value	> 30 dB
Maximum evaluation area	for the calculation of the mean attenuation	100 mm x 100 mm (3.93 in x 3.93 in)
Reproducibility <sup>1</sup> of mean attenuation <sup>3</sup>	with 0 dB mean attenuation	< 0.1 dB

**Transmission phase measurements (using R&S®QAR50-K20 option)**

Image lateral resolution <sup>4</sup>		≤ 8 mm (0.31 in)
Phase resolution <sup>5</sup>	with 0 dB mean attenuation	±2°

**High resolution reflection measurements (using R&S®QAR50-K30 option)**

Image lateral resolution		≤ 8 mm (0.31 in)
Frequency range	band 2	
	start frequency	76 GHz
	stop frequency	81 GHz
	center frequency	78.5 GHz
	frequency span	5 GHz
Number of frequency steps	band 2	128

**Frequency resolved measurements (using R&S®QAR50-K10 option)**

Frequency range (measurement range)	start frequency	72 GHz
	stop frequency	82 GHz
	center frequency	77 GHz
	frequency span	10 GHz
Number of frequency steps		256
Frequency accuracy		1 MHz
Frequency range (analysis range after time gating)	start frequency	73 GHz
	stop frequency	81 GHz
	center frequency	77 GHz
	frequency span	8 GHz

<sup>3</sup> The mean transmission attenuation value is defined as the arithmetic mean of the individually measured transmission attenuation values within the range [minVal; minVal + 3 dB]. minVal is the minimum transmission attenuation value within the evaluation area.

<sup>4</sup> Lateral image resolution defines the minimum distance of two phase steps to be resolved.

<sup>5</sup> Phase resolution defines the minimum phase difference in a DUT, that can be resolved inside the calculated image.

**Frequency resolved reflection measurements (using R&S®QAR50-K10 option)**

Dynamic range		> 20 dB
Minimum DUT size <sup>6</sup>	W × H	60 mm × 60 mm (2.36 in × 2.36in)
Reproducibility of reflection <sup>7</sup> per frequency point <sup>8</sup>	reproducibility of reflection values in linear scale	
	static	< 7%
	dynamic	< 12%
	with 0 dB reflection	
	static	< 0.4 dB
	dynamic	< 0.4 dB
	with -8 dB reflection	
	static	< 1.6 dB
	dynamic	< 3.0 dB
	with -15 dB reflection	
	static	< 3.0 dB
	dynamic	< 6.0 dB

**Frequency resolved attenuation measurements (using R&S®QAR50-K10 option)**

Dynamic range		> 30 dB
Minimum DUT size <sup>6</sup>	W × H	60 mm × 60 mm (2.36 in × 2.36in)
Reproducibility of attenua- tion <sup>9</sup> per frequency point <sup>8</sup>	reproducibility of transmission attenuation values in linear scale	
	static	< 3%
	dynamic	< 5%
	with 0 dB mean attenuation	
	static	< 0.2 dB
	dynamic	< 0.2 dB
	with 1 dB mean attenuation	
	static	< 0.2 dB
	dynamic	< 0.4 dB

<sup>6</sup> Provided that the evaluation area is set accordingly and fitting to the size of the device under test (DUT). The evaluation window should have at least 10 mm distance to the edge of the DUT. The normalization measurement must be performed using the same window size.

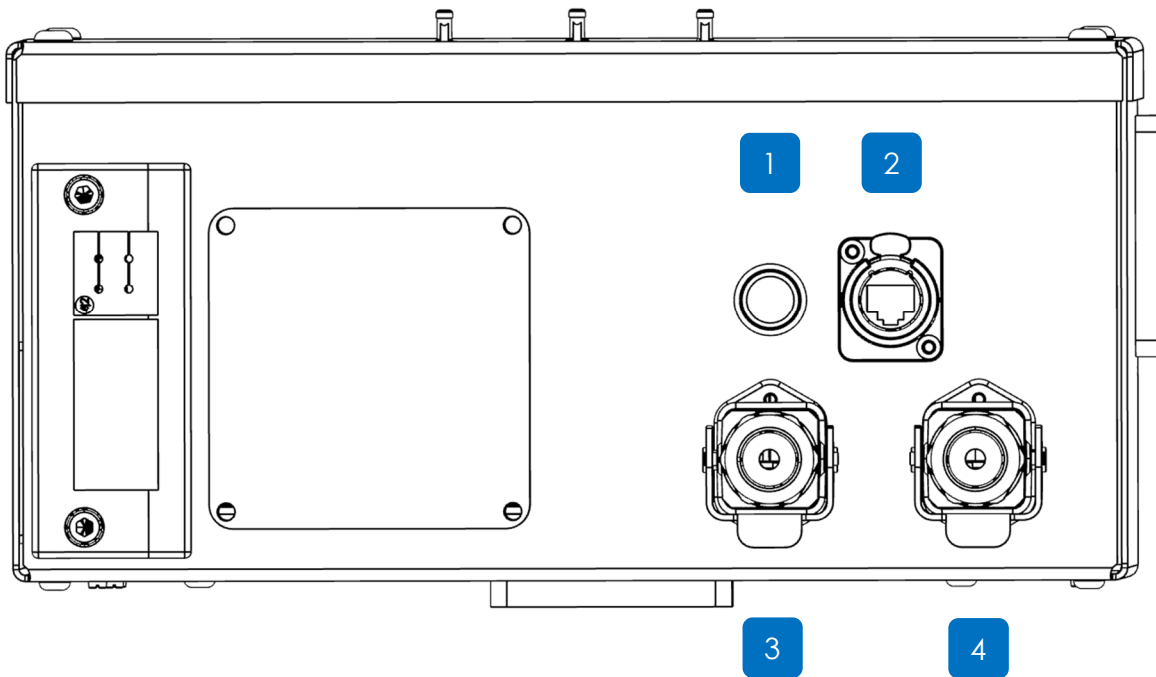
<sup>7</sup> Automatic processing detects the pixel with the highest reflectivity inside the recovered image and calculates the frequency response of this specific point of the DUT.

<sup>8</sup> Time gating is used to reduce standing waves. Measurement values are valid for frequencies between 73 and 81 GHz.

<sup>9</sup> Automatic processing detects the pixel with the lowest transmission attenuation inside the recovered image and calculates the frequency response of this specific point of the DUT.

### Connectors and switches

1.	Button	On /Off
2.	LAN	1 Gbit
3.	Control	
4.	Power	12V +/- 0,5V



Product information



**General data**

<b>Environmental conditions</b>		
Temperature	operating temperature range	+5 °C to +40 °C
	storage temperature range	-10 °C to +60 °C
Humidity		+25 °C/+40 °C, 95 % rel. humidity, cyclic, in line with EN 60068-2-30; +40 °C, 95 % rel. humidity, steady state
Installation altitude		max. 2000 m above sea level
Transport		in line with: <ul style="list-style-type: none"> <li>• EN 60068-2-27</li> <li>• EN 60068-2-31</li> <li>• EN 60068-2-64</li> </ul>
Surroundings	installation to be maintained in low-reflection environment metal walls or strong reflectors in the proximity of the imaging zone to be avoided	

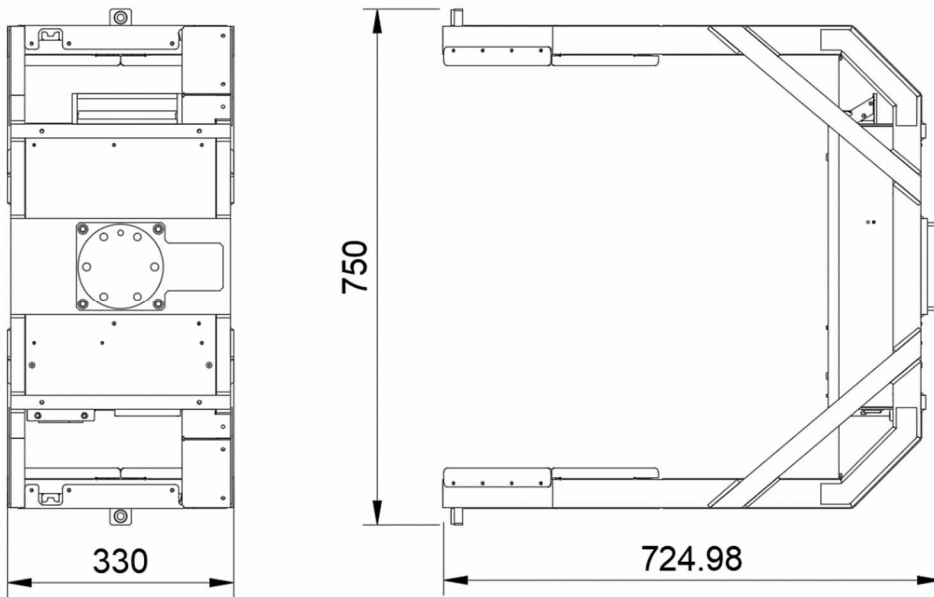
Product information

**Dimensions**

Base unit	W x D x H	724,98 x 750 x 330
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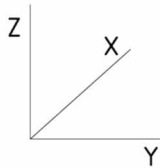
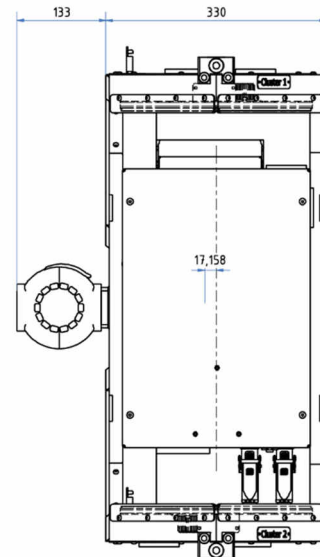
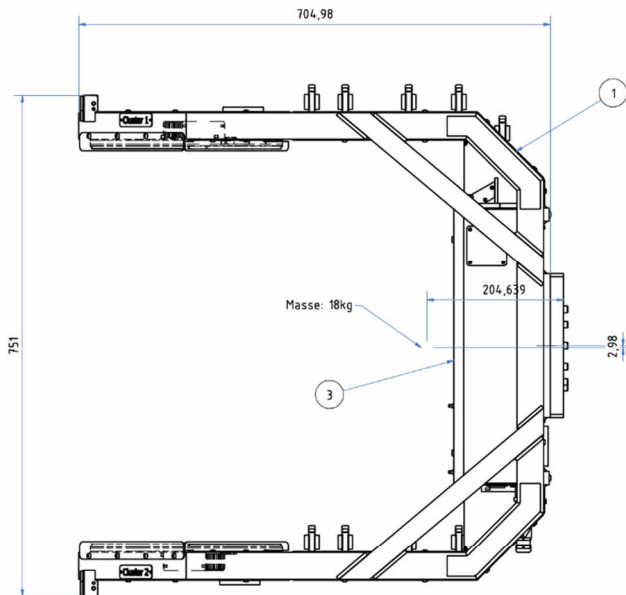
**Weight**

Base unit	20 kg
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Product information

### Mass moment of inertia



Mass moment of inertia  
 $I_{xx}: 2217469,3 \text{ kg/mm}^2$   
 $I_{yy}: -23380,2 \text{ kg/mm}^2$   
 $I_{zz}: -11013,9 \text{ kg/mm}^2$

Product information

## Ordering information

Device	Type	Order No.
Radome tester, vertical polarization	R&S®QAR50-R	L2204024
Radome tester, horizontal polarization	R&S®QAR50-R	L2204024

### Options

Verification set	R&S®QAR50-Z44	1343.0082.02
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### Software options

Frequency response measurement	R&S®QAR50-K10	1343.2091.02
Homogeneity analysis	R&S®QAR50-K20	1343.2110.02
High resolution image	R&S®QAR50-K30	1343.2133.02