

**ROHDE & SCHWARZ**

Make ideas real



# R&S®ATS800R CATR BASED COMPACT 5G NR mmWAVE TEST CHAMBER

Data Sheet | Version 02.00

## Specifications



# CONTENTS

<b>Definitions .....</b>	<b>3</b>
<b>Specifications.....</b>	<b>4</b>
R&S®ATS800R K03 system performance – 20 cm quiet zone (QZ) .....	4
<i>Environmental conditions</i> .....	4
<i>Product conformity</i> .....	5
R&S®CATR-REFL3, CATR reflector, medium size.....	5
R&S®CATR-FEED3 feed antenna for CATR system .....	5
R&S®CATR-RACK1 base rack for R&S®ATS800R mounting .....	5
R&S®CATR-MNTR3 mounting kit for rear side mounting of RRH and RF42 .....	5
R&S®CATR-P3DR 3D positioner for R&S®ATS800R .....	5
R&S®CATR-P3RJ rotary joints for 3D positioner for R&S®ATS800R .....	6
R&S®CATR-TEMP1 extreme temperature condition option.....	6
R&S®CATR-CAM1 camera option, visual and thermal combined.....	6
R&S®CATR-MIMOA 4x4 MIMO anker.....	6
R&S®CATR-HFIXR phantom fixture.....	6
<b>Ordering information .....</b>	<b>7</b>
Basic configuration .....	7
Additional options .....	7
Recommended extras.....	7
<b>Drawings.....</b>	<b>8</b>

# Definitions

## General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 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 designated with the format “parameter: value”.

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

In line with the 3GPP/3GPP2 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

# Specifications

The R&S®ATS800R is a CATR based compact and accurate test chamber for RF testing of antennas, modules or devices in the 5G NR FR2 frequency bands. Values specified are based on system performance level, some individual items might perform better isolated.

## R&S®ATS800R K03 system performance – 20 cm quiet zone (QZ)

General RF parameters		
Frequency range	in-band	20 GHz to 50 GHz (meas.)
Shielding effectiveness <sup>1</sup>	chamber	> 60 dB (meas.)
Feed antenna polarization		dual polarized
RF connectors	feed antenna H/V feed through	2 x PC 2.4 mm (f)
	link/DUT feed through	1 x PC 2.4 mm (f)

Quality of quiet zone <sup>2</sup>		
Quiet zone size		Ø 20 cm (meas.)
Amplitude performance <sup>3</sup>	average amplitude taper	< 1.5 dB (meas.)
	average amplitude ripple	< 0.5 dB (meas.)
Total phase variation	at 28 GHz	±7.5° (meas.)
	at 39 GHz	±10° (meas.)

Chamber specifications		
DUT load capability	static, centered	5 kg
	on positioner, centered	2.5 kg
Power supply	input	100 to 240 V AC, max. 1.4 A
	output	24 V, max. 5 A
Power plug		C13
Weight	wheels mounted	approx. 150 kg (330.7 lb)
	rack mounted	approx. 300 kg (661.4 lb)
Dimensions	wheels mounted (W x H x D)	0.69 m x 1.42 m x 1.21 m (27.17 in x 55.91 in x 47.64 in)
	rack mounted (W x H x D)	0.69 m x 1.98 m x 1.21 m (27.17 in x 77.95 in x 47.64 in)
Wheels	rear lockable	4
Door operation		manually operated, manual closing mechanism
Ventilation rate		140 m³/h (nom.)
Noise level		38 dB(A) (nom.)

Feedthroughs		
Unoccupied feed throughs available	left	3
	right	4
	bottom, front	4
	bottom, rear	1
	back, top	2

## Environmental conditions

Temperature range	operating temperature range	+10 °C to +40 °C
	storage temperature range	–10 °C to +50 °C
Damp heat		75 % relative humidity, noncondensing at +10 °C to +40 °C

<sup>1</sup> From 400 MHz to 60 GHz.

<sup>2</sup> From 23.5 GHz to 44.3 GHz.

<sup>3</sup> Measured from 23.5 GHz to 44.3 GHz.

**Product conformity**

Electromagnetic compatibility	in line with EU – EMC Directive 2014/30/EU	applied harmonized standards: • EN 61326-1, • EN 55011, group I, class B equipment
Electrical safety	in line with EU – LVD 2014/35/EU	applied harmonized and non-harmonized standard: EN 61010-1
International	UL61010-1 CAN C22.2 No. 61010-1-04	
EU – ROHS 2011/65/EU	in line with EU – RoHS Directive	applied harmonized standard: EN IEC 63000

**R&S®CATR-REFL3, CATR reflector, medium size**

Frequency range <sup>4</sup>		6 GHz to 90 GHz (meas.)
Quiet zone		Ø 20 cm
Surface roughness	RMS	< 1 µm
Dimensions		43 cm × 44 cm (16.93 in × 17.32 in)

**R&S®CATR-FEED3 feed antenna for CATR system**

Frequency range	in-band	20 GHz to 50 GHz
Polarization		dual polarized
RF connectors on feedthrough		2 × PC 1.85 mm (m)

**R&S®CATR-RACK1 base rack for R&S®ATS800R mounting**

Instrument capacity		12 HU
Sockets	C13 sockets maximum supply	8 max. 10 A per socket, max. 16 A total
Weight		approx. 150 kg (330.7 lb)

**R&S®CATR-MNTR3 mounting kit for rear side mounting of RRH and RF42**

Maximum number of RRHs		2 (threads available)
Maximum number of RF42	per mounting plate	1 (threads available)
Hole pattern		50 mm × 50 mm (1.97 in × 1.97 in)
Mounting surface	W × H	500 mm × 500 mm (19.68 in × 19.68 in)
Maximum weight		20 kg (44.09 lb)

**R&S®CATR-P3DR 3D positioner for R&S®ATS800R**

Angular resolution	azimuth, elevation	0.01°
Relative accuracy	elevation	
	DUTs up to 1.5 kg	< 0.25° (meas.)
	DUTs up to 2.5 kg	< 0.50° (meas.)
	azimuth	≤ 0.10° (meas.)
Rotating angle	maximum for azimuth, elevation	±182°
Rotating speed	maximum for azimuth, elevation	45°/s
DUT load capability	maximum weight	2.5 kg, centered
	maximum device size	Ø 360 mm
Controller communications interface		USB
Control		SCPI via local TCP/IP, GUI
Application programming interfaces		API for C / C++ / C# / VB.NET / MATLAB®
Power supply	input	100 V to 230 V, max. 1.85 A
	output	36 V, 4.44 A
Temperature range	operating temperature range	+10 °C to +50 °C
Weight		8 kg (17.64 lb)

<sup>4</sup> Higher/lower frequencies are possible with higher mean error inside the quiet zone.

**R&S®CATR-P3RJ rotary joints for 3D positioner for R&S®ATS800R**

DUT RF rotary joint	number of rotary joints	2 (1 × elevation, 1 × azimuth)
	frequency range	≤ 50 GHz
	connector types	PC 2.4 mm female

**R&S®CATR-TEMP1 extreme temperature condition option**

DUT load capability	weight, centered	max. 10 kg
Dimensions of DUT	maximum device size (see drawings on page 9)	
	device height up to Ø 410 mm	< 142 mm
	device height up to Ø 350 mm	< 167 mm
	device height up to Ø 140 mm	< 187 mm
Temperature range		–40 °C to +85 °C
Temperature change <sup>5</sup>	–10 °C to +55 °C (3GPP range)	3 min (meas.)
	+55 °C to –10 °C (3GPP range)	4 min (meas.)
	–40 °C to +85 °C	9 min (meas.)
	+85 °C to –40 °C	13 min (meas.)
Air-in flow volume limits	recommended; maximum	500 l/min; 700 l/min
Air-in flow temperature limits		–60 °C to +125 °C
Relative humidity range		50 % relative humidity, noncondensing at +10 °C to +40 °C
Controlling software		not provided; The temperature has to be controlled in the external temperature forcing system.
Mechanical interface	air-in thread	½" 14 NPT
Weight		6 kg (13.23 lb)

**R&S®CATR-CAM1 camera option, visual and thermal combined**

Image modes		visual, thermal, MSX (IR image with enhanced detail presentation)
		light available
Field of view		48° × 37°
Accuracy	for values from +10 °C to +100 °C	±2 °C (nom.)
Communications interface		Ethernet

**R&S®CATR-MIMOA 4x4 MIMO anker**

Number of dual polarized antennas		2
Antenna mounting		Swivel ball or fixed
Adjustability	in Y-axis, from QZ center	±200 mm
RF connector	back, bottom	4 × SMA feed through (f)

**R&S®CATR-HFIXR phantom fixture**

Maximum DUT weight		5 kg (11.02 lb)
Alignment options in line with 3GPP standard		alignment option 2

<sup>5</sup> Measured at DUT level with 700 l/min flow volume, rate of change may depend on DUT.

# Ordering information

## Basic configuration

Designation	Type	Order No.
CATR based compact 5G NR mmWave test chamber	R&S®ATS800R	1534.3403K03
CATR based compact 5G NR mmWave test chamber	R&S®ATS800R	1534.3403.03
Reflector for benchtop CATR, gold-plated, medium size	R&S®CATR-REFL3	1534.2807.02
Feed antenna, for CATR systems	R&S®CATR-FEED3	1534.2207.03
Alignment structure	R&S®CATR-ALIR3	1534.3303.03

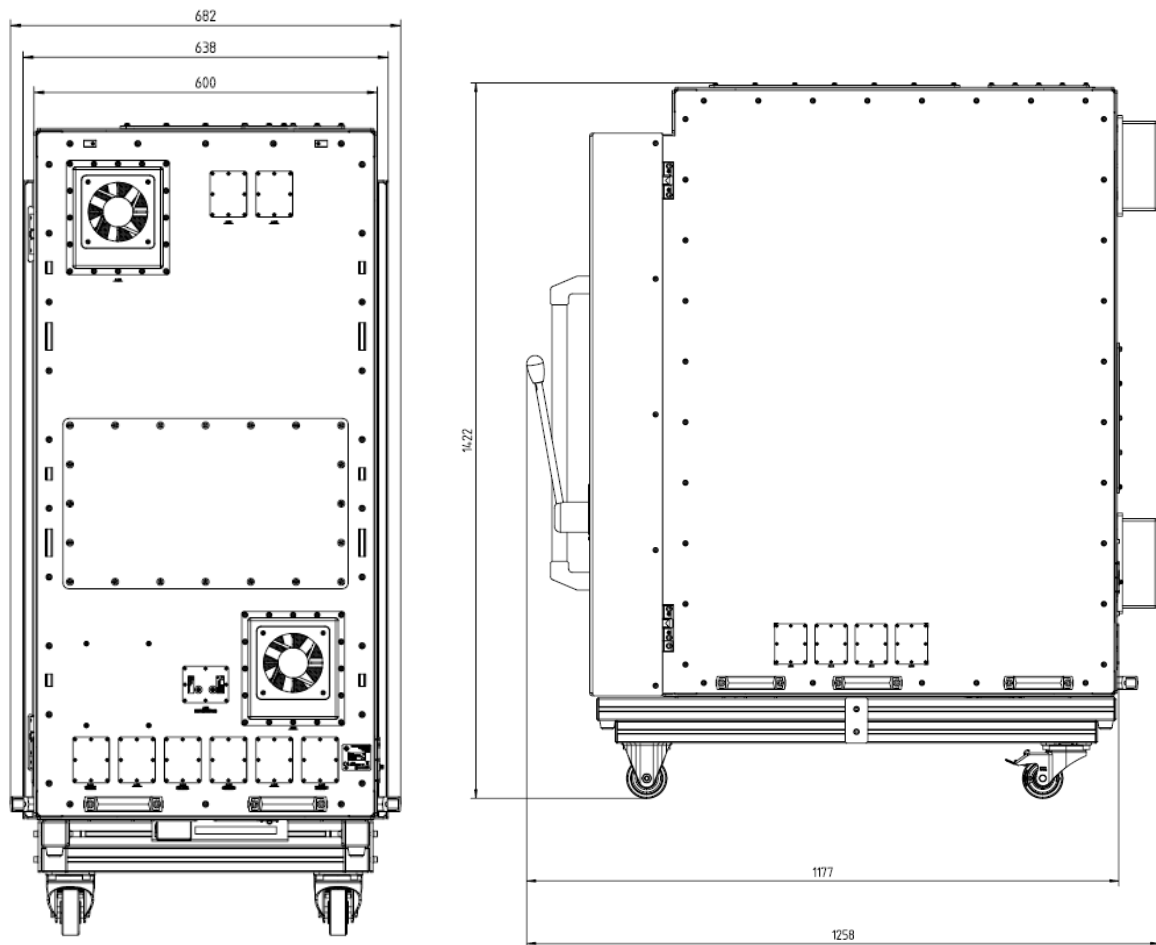
## Additional options

Designation	Type	Order No.
Base rack for R&S®ATS800R mounting, 12 HU	R&S®CATR-RACK1	1540.6198.02
Mounting kit for rear side mounting of RRHs and RF42	R&S®CATR-MNTR3	1534.1975.03
Positioner 3D, motorized azimuth and elevation	R&S®CATR-P3DR	1534.2820.02
RF rotary joints, for CATR-P3DR 3D positioner	R&S®CATR-P3RJ	1540.6669.02
Extreme temperature condition option	R&S®CATR-TEMP1	1534.2220.03
Camera, visual and thermal view	R&S®CATR-CAM1	1534.2471.02
4x4 MIMO anker	R&S®CATR-MIMOA	1538.8880.02
Cover for throughput testing	R&S®CATR-COVER	1540.6598.02
Upgrade kit chamber for K02 to K03 transition	R&S®CATR-U800R	1540.8549.02
Upgrade kit positioner for K02 to K03 transition	R&S®CATR-UP3DR	1540.8561.02

## Recommended extras

Designation	Type	Order No.
Standard gain horn antenna for calibration, 18 GHz to 26.5 GHz	R&S®TC-SGH26	1530.8630.02
Standard gain horn antenna for calibration, 26.5 GHz to 40 GHz	R&S®TC-SGH40	1530.8617.02
Standard gain horn antenna for calibration, 40 GHz to 60 GHz	R&S®TC-SGH60	1530.8623.02
50 GHz RF cable, PC 2.4 mm connectors male/female, length: 1.2 m	R&S®ATS-C50MF	1535.7977.02
50 GHz RF cable, PC 2.4 mm connectors male/male, length: 1.2 m	R&S®ATS-C50MM	1535.7983.02
50 GHz RF cable, PC 2.4 mm connectors male/male, length: 0.3 m	R&S®ATS-C50MM3	3658.4232.02

## Drawings



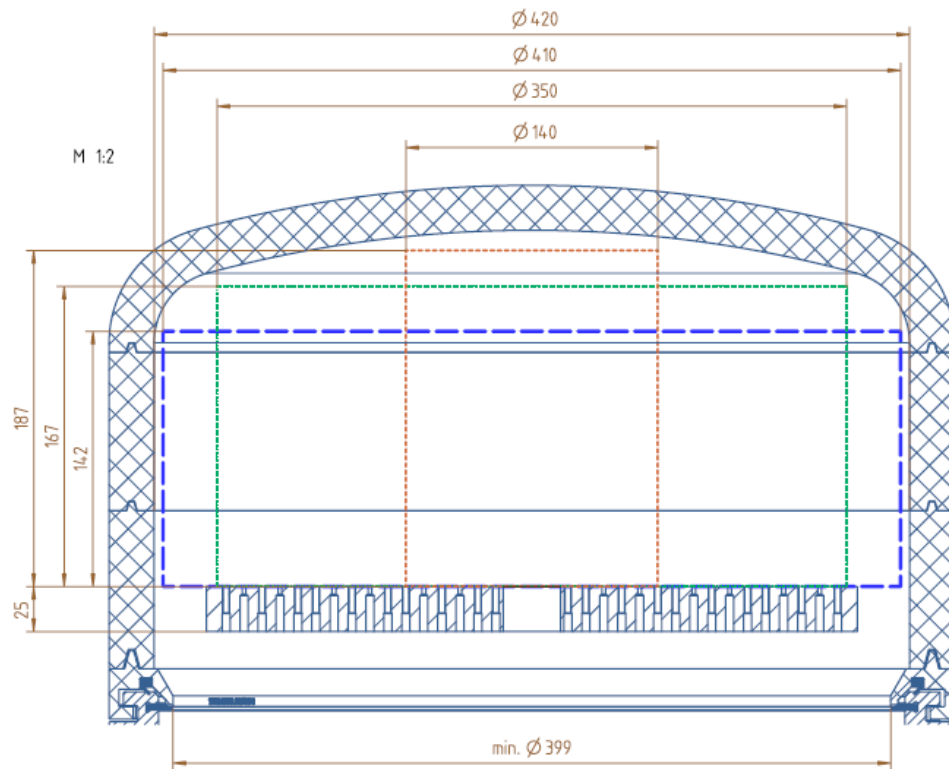
*R&S®ATS800R rear and side view*



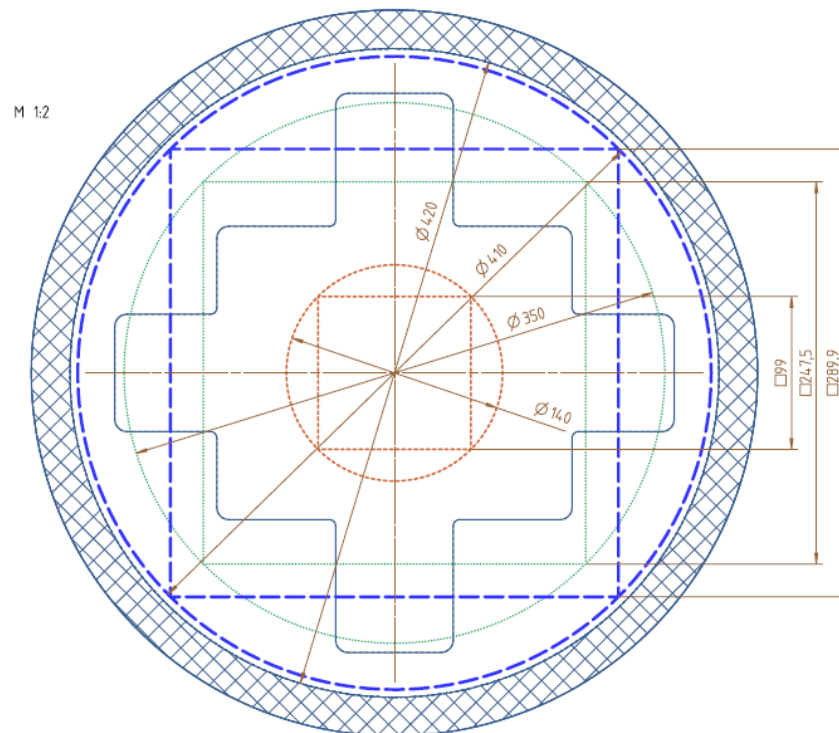
Technical drawing of a cross-shaped metal plate. The drawing includes the following dimensions and annotations:

- Overall Dimensions:**
  - Horizontal: 362 (total), 230 (inner cross), 125 (from center to right edge), 76 (from center to left edge).
  - Vertical: 300 (total), 200 (inner cross), 100 (from center to top edge), 31.5 (from center to bottom edge).
- Internal Features:**
  - A central circular hole with diameter  $\varnothing 32$ .
  - Four rectangular slots, each 40 units wide and 40 units high, located at the ends of the cross arms.
  - Four C-shaped cutouts on the outer edges of the vertical arm.
  - Four C-shaped cutouts on the outer edges of the horizontal arm.
- Annotations:**
  - M4:** Points to a small hole in the left arm.
  - M8:** Points to a small hole in the right arm.
- Material and Surface:**
  - Material:  $\text{AlMgSi0.5}$
  - Surface:  $\text{Anodized}$

**Rohde & Schwarz R&S®ATS800R CATR based compact 5G NR mmWave test chamber**



*R&S®CATR-TEMP1: maximum DUT dimensions, side view*



*R&S®CATR-TEMP1: maximum DUT dimensions, top view*



## 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 more than 85 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.

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

## Service that adds value

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

## 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

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

## Rohde & Schwarz customer support

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

