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R&S®ATS1800C CATR BASED COMPACT 5G NR mmWAVE TEST CHAMBER

Data Sheet | Version 03.00

Specifications



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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 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®ATS1800C is a CATR based compact and accurate test chamber for RF testing of antennas, modules or devices in the 5G NR FR2 frequency bands.

Common data

In-band frequency range	feed antenna	23.5 GHz to 44 GHz
Out-of-band frequency range	chamber	6 GHz to 110 GHz
Shielding effectiveness ¹	chamber	> 90 dB (typ.)
Polarization	feed antenna	dual polarized
RF connectors	feed antenna	2 x 2.4 mm
Quiet zone quality ²	reflector	Ø 30 cm (taper < 1.5 dB, ripple < 0.5 dB)
Angular resolution ³	positioner (optical encoder)	0.03° (azimuth, elevation)
Accumulated positioner error ^{3, 4}	positioner	< 0.5° (azimuth, elevation)
Rotating angle	positioner	> 360° (azimuth, elevation)
DUT load capability	positioner	8 kg, centered
Hardware triggering	positioner	yes (BNC)
Positioner API	positioner	yes (C / C++ / C# / VB.NET / MATLAB®)
Power supply	power filter	100 V to 230 V (AC), 13 A
Internal power socket outlet	power filter	100 V to 230 V (AC), 2 A
Weight	chamber	approx. 500 kg (1102.31 lb)
Dimensions (W x H x D)	chamber	0.90 m x 1.99 m x 1.53 m (2.95 ft x 6.53 ft x 5.02 ft)
Wheels	chamber	4
Door operation	chamber	manually operated, electrical closing mechanism

Environmental conditions

Temperature range	operating temperature range	+20 °C to +30 °C
	storage temperature range	-10 °C to +50 °C
Damp heat		75 % relative humidity, noncondensing at +10 °C to +30°C

Product conformity

Electromagnetic compatibility	in line with EU – EMC Directive 2004/108/EC	applied harmonized standards: <ul style="list-style-type: none"> EN 61326-1, EN 55011, group I, class B equipment
Electrical safety	in line with EU – Machine Directive 2006/42/EC	applied harmonized and nonharmonized standards: <ul style="list-style-type: none"> EN ISO 12100 EN 61010-1 EN 61010-2-120
Restriction of the use of hazardous substances in electrical and electronic equipment	in line with EU – RoHS Directive	applied harmonized standards: EN 50581

¹ From 650 MHz to 60 GHz.

² From 23.5 GHz to 44 GHz.

³ DUT weight used for testing: 2.5 kg.

⁴ Measured worst-case scenario (i.e.: positioner at 90°).

R&S®ATS1800C CATR based compact 5G NR mmWave test chamber

Frequency range		650 MHz to 110 GHz
Shielding effectiveness ¹		> 90 dB (typ.)

R&S®CATR-ABS10 absorber set for R&S®ATS1800C

Type		pyramidal and flat
Frequency range		650 MHz to 110 GHz
Attenuation	reflectivity (20 GHz to 50 GHz)	up to 50 dB
Power handling		800 W/m ² , 0.52 W/in ²

R&S®ATS-F230V power filter

Power rating	rated voltage	100 V to 230 V (AC)
	rated frequency	50 Hz to 60 Hz (-5 %/+10 %)
	rated current	13 A
Connector type		C20
Internal power outlet	power rating	100 V to 230 V (AC), 50 Hz to 60 Hz, 2 A

R&S®CATR-CSCO1 control cable set and feedthrough

Standard feedthrough		1 x USB 2.0 (to DUT on positioner)
		1 x LAN (for positioner control)
		1 x BNC (hardware trigger output)
Optional feedthrough	slots available	5

R&S®CATR-CSR1 RF cable set and feedthrough

Frequency range		up to 50 GHz
Feedthrough	type	1.85 mm female
	number of connectors per feedthrough	2

R&S®CATR-FEED2 feed antenna with OMT for CATR system

Frequency range	in band	23.5 GHz to 44 GHz
Polarization		dual polarized
RF connectors		2 x 2.4 mm

R&S®CATR-ALIC1 alignment structure, for CATR systems in selected chambers

Reflector tilts		left-right and front-back
Adjustment bolts		3
Adjustment range		±2°
Adjustment resolution		< 0.1°
Feed goniometer range		30°
Feed goniometer resolution		< 0.1°

R&S®CATR-REFL1 CATR reflector, large size

Frequency range ^{5, 6}		6 GHz to 90 GHz
Quiet zone ²	Ø	30 cm
	average amplitude taper	< 1.5 dB
	average amplitude ripple	< 0.5 dB
Surface roughness	RMS	< 1 µm
Dimension		54 cm x 56 cm

⁵ Higher/lower frequencies are possible with higher mean error inside the quiet zone.

⁶ For TRP measurements.

R&S®CATR-P3D1 positioner 3D, motorized azimuth and elevation

Angular resolution ³	azimuth, elevation	0.03°
Relative accuracy ³	azimuth, elevation	0.03°
Accumulated positioner error ^{3, 4}	azimuth, elevation	< 0.5°
Rotating angle	azimuth, elevation	±180 °
Rotating speed	maximum	150°/s
DUT load capability	recommended maximum weight	8 kg, centered
	maximum dimensions of the DUT	Ø 45 cm
Communications interface		Ethernet
Application programming interfaces		API for C / C++ / C# / VB.NET / MATLAB®
DUT RF rotary joint/RF connector		50 GHz x 2.4 mm (2 pieces)
Hardware triggering	connection	BNC

R&S®CATR-DFIX1 device fixture for smartphone form factor

DUT load capability	weight	< 2.5 kg (snowflake)
		< 1 kg (clamp)
	size	< 45 cm (velcro)
		< 30 cm (direct mounting)

R&S®CATR-VENT1 two fans (Honeycomb) for R&S®ATS1800C

Nominal voltage range		12 V to 28 V
Ventilation rate		140 m ³ /h
Noise level		38 dB(A)

R&S®TC-TA50CPR link antenna, ruggedized Vivaldi

Frequency range		650 MHz to 50 GHz
RF connectors		MMPX incl. RF cable MMPX (m) to 1.85 mm (m), length: 350 mm
Impedance		50 Ω
Outer dimensions		7 cm x 3 cm (2.76 in x 1.18 in)

R&S®CATR-TEMP2 extreme temperature condition

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	< 230 mm
	device height up to Ø 350 mm	< 255 mm
	device height up to Ø 140 mm	< 275 mm
Temperature range		-40 °C to +85 °C
Temperature change ⁷	-10 °C to +55 °C (3GPP range)	5 min (meas.)
	+55 °C to -10 °C (3GPP range)	7 min (meas.)
	-40 °C to +85 °C	20 min (meas.)
	+85 °C to -40 °C	29 min (meas.)
Air-in flow volume limits	maximum	500 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)

⁷ Measured at DUT level with 500 l/min flow volume, rate of change may depend on DUT.

R&S®CATR-FESW1 manual feed switcher

Number of antennas		up to 4 antennas
Switching type		manual
Stability (switching antennas) ⁸	mean amplitude error	< 0.1 dB (meas.)
	mean phase error	±2.5° (meas.)

R&S®CATR-FE4 OOB feed horn antenna, for CATR system

Frequency range	out of band	6 GHz to 25 GHz
Polarization		dual polarized
RF connectors on feedthrough		2 x PC 2.4 mm (f)

R&S®CATR-FE60 feed antenna with OMT, for CATR system

Frequency range	out of band	36.5 GHz to 61 GHz
Polarization		dual polarized
RF connectors on feedthrough		2 x PC 1.85 mm (f)

R&S®CATR-FE90 feed antenna with OMT, for CATR system

Frequency range	out of band	59 GHz to 92 GHz
Polarization		dual polarized
RF connectors on feedthrough		2 x PC 1.35 mm (f)

R&S®CATR-FS4 feed holder, for R&S®CATR-FE4 on manual feed switcher

Cable length		850 mm
Connector type		2 x PC 1.85 mm (m)
Number of cables		2

R&S®CATR-FS2 feed holder, for R&S®CATR-FEED2 on manual feed switcher

Cable length		1070 mm
Connector type		2 x PC 2.4 mm (m)
Number of cables		2

R&S®CATR-FS60 feed holder, for R&S®CATR-FE60 on manual feed switcher

Cable length		800 mm
Connector type		2 x PC 1.85 mm (m)
Number of cables		2

R&S®CATR-FS90 feed holder, for R&S®CATR-FE90 on manual feed switcher

Cable length		760 mm
Connector type		2 x PC 1.35 mm (m)
Number of cables		2

⁸ Measured with R&S®CATR-FE40 for 23.5 GHz to 44.3 GHz.

Ordering information

Basic configuration

Designation	Type	Order No.
CATR based compact 5G NR mmWave test chamber	R&S®ATS1800C	1534.1800K02
CATR based compact 5G NR mmWave test chamber	R&S®ATS1800C	1534.1800.02
Absorber set for R&S®ATS1800C	R&S®CATR-ABS10	1534.5541.02
Power filter, 230 V	R&S®ATS-F230V	1532.1161.02
Control cable set and feedthrough (USB, LAN, etc.)	R&S®CATR-CSCO1	1534.2288.02
RF cable set and feedthrough 50 GHz	R&S®CATR-CSRF1	1534.2271.02
Feed antenna with OMT for CATR system	R&S®CATR-FEED2	1534.2242.02
Alignment structure, for CATR systems in selected chambers	R&S®CATR-ALIC1	1534.2007.02
CATR reflector, large size	R&S®CATR-REFL1	1534.2307.02
Positioner 3D, motorized azimuth and elevation	R&S®CATR-P3D1	1534.2107.02
Device fixture for smartphone form factor	R&S®CATR-DFIX1	1534.2294.02

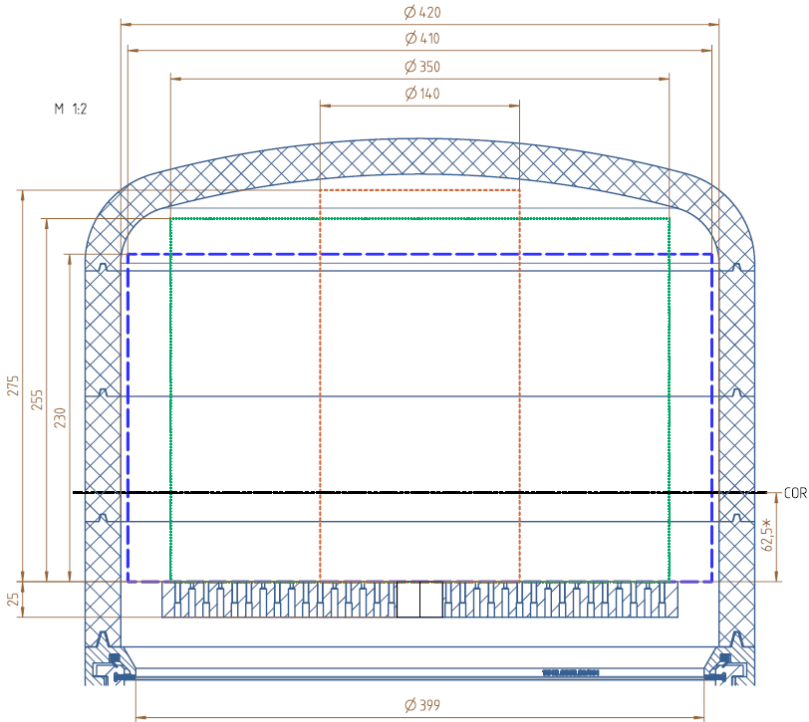
Additional options

Designation	Type	Order No.
Two fans (Honeycomb) for R&S®ATS1800C	R&S®CATR-VENT1	1534.2259.02
Link antenna, ruggedized Vivaldi	R&S®TC-TA50CPR	1531.8633.02
Upgrade for side chamber capability	R&S®CATR-U2SCM	1540.8603.02
Extreme temperature condition	R&S®CATR-TEMP2	1534.2620.02
Manual feed switcher	R&S®CATR-FESW1	1534.3110.02
OOB feed horn antenna, for CATR system, 6 GHz to 25 GHz	R&S®CATR-FE4	1540.6223.02
Feed antenna with OMT, for CATR system, 40 GHz to 60 GHz	R&S®CATR-FE60	1540.6275.02
Feed antenna with OMT, for CATR system, 60 GHz to 90 GHz	R&S®CATR-FE90	1540.6269.02
Feed holder, for R&S®CATR-FE4 on manual feed switcher	R&S®CATR-FS4	1540.6523.02
Feed holder, for R&S®CATR-FEED2 on manual feed switcher	R&S®CATR-FS2	1540.6552.02
Feed holder, for R&S®CATR-FE60 on manual feed switcher	R&S®CATR-FS60	1540.6575.02
Feed holder, for R&S®CATR-FE90 on manual feed switcher	R&S®CATR-FS90	1540.6569.02

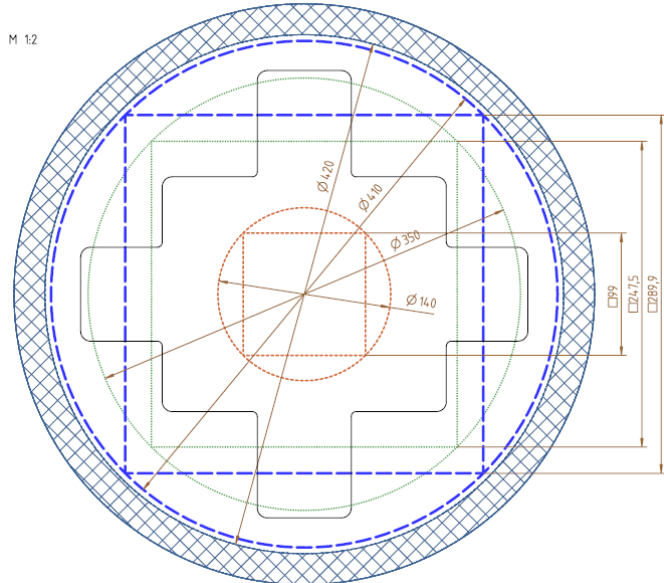
Accessories for calibration

Designation	Type	Order No.
SGH calibration/alignment antenna, 26.5 GHz to 40 GHz	R&S®TC-SGH40	1530.8617.02
Three-path diode power sensor	R&S®NRP50S	1419.0087.02
USB power sensor cable, length: 5 m	R&S®NRP-ZKU	1419.0658.05
50 GHz cable, length: 1.2 m – 1.85 mm (m – f)	R&S®ATS-C50MF	1535.7977.02
50 GHz cable, length: 0.3 m – 2.4 mm (m – m)	R&S®ATS-C50MM3	3658.4232.02

Drawings



R&S[®]CATR-TEMP2: maximum DUT dimensions, side view



R&S[®]CATR-TEMP2: maximum DUT dimensions, top view

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