

FCC - TEST REPORT

Report Number : **64.790.19.02837.01** Date of Issue: October 14, 2022

Model : 433

Product Type : Remote control

Applicant : Extreme Mist PCS LLC

Address : 10446 East Jomax Rd. Suite 105 - 2 scottsdale, AZ 85262 USA

Test Result : Positive Negative



Total pages including Appendices : 20

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 514049

Telephone: 86 755 8828 6998
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3 Description of the Equipment Under Test

Product: Remote control

Model no.:433

FCC ID: 2ATNCEXTREMEMISTPCS

Rating: DC 3V

RF Transmission Frequency: 433.92MHz

Modulation: ASK

Antenna Type: PCB antenna

Antenna Gain: 0dBi

Description of the EUT: The EUT is a Remote control which can transmit control signal at 433.92MHz.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2017 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Test Site	Test Result
§15.207	Conducted emission AC power port	---	N/A
§15.231(b)	Radiated Emission of Carrier Frequency	Site 1	PASS
§15.231 (b)	Radiated Emission, 30MHz to 4.5GHz	Site 1	PASS
§15.231(c)	Bandwidth Measurement	Site 1	PASS
§15.205	Average Factor	Site 1	PASS
§15.231(a)	Transmitter Time	Site 1	PASS

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a permanently PCB antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ATNCEXTREMEMISTPCS complies with Section 15.205, 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: May 28, 2019

Testing Start Date: June 28, 2019

Testing End Date: October 18, 2019

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:

Prepared by:

Tested by:



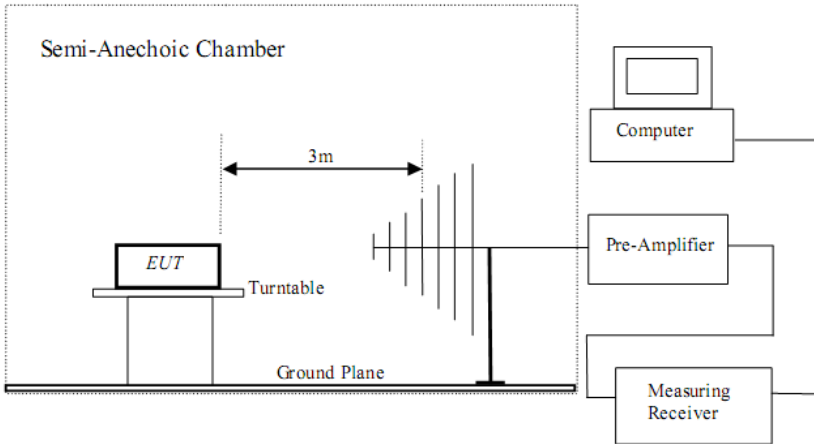
Peter Jia

Matt Zhang

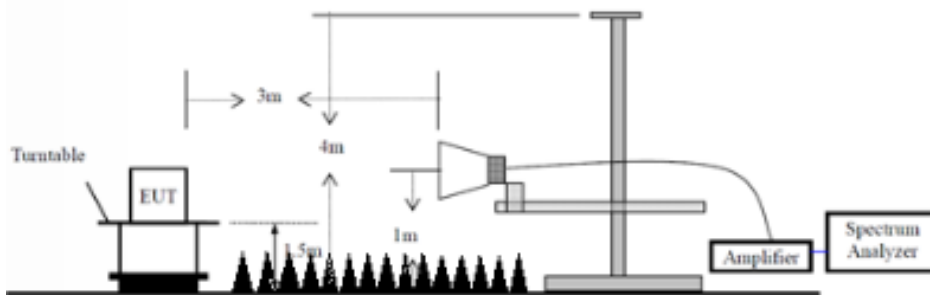
Tree Zhang

7 Test Setups

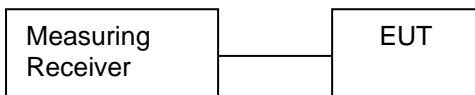
7.1 Radiated test setups Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



8 Test Methodology

8.1 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules.

8.2 Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + \text{System Factor}$$
$$\text{System Factor} = AF + CF + FA - PA$$

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

9 Systems test configuration

Auxiliary Equipment Used during Test:

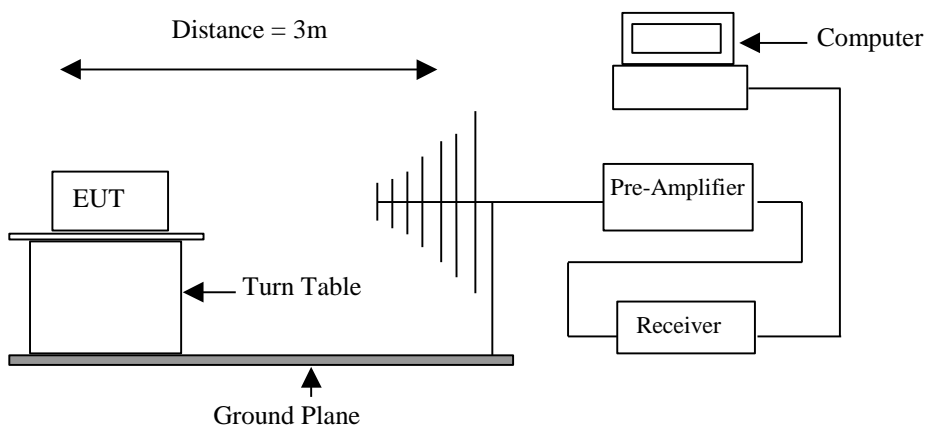
DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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10 Technical Requirement

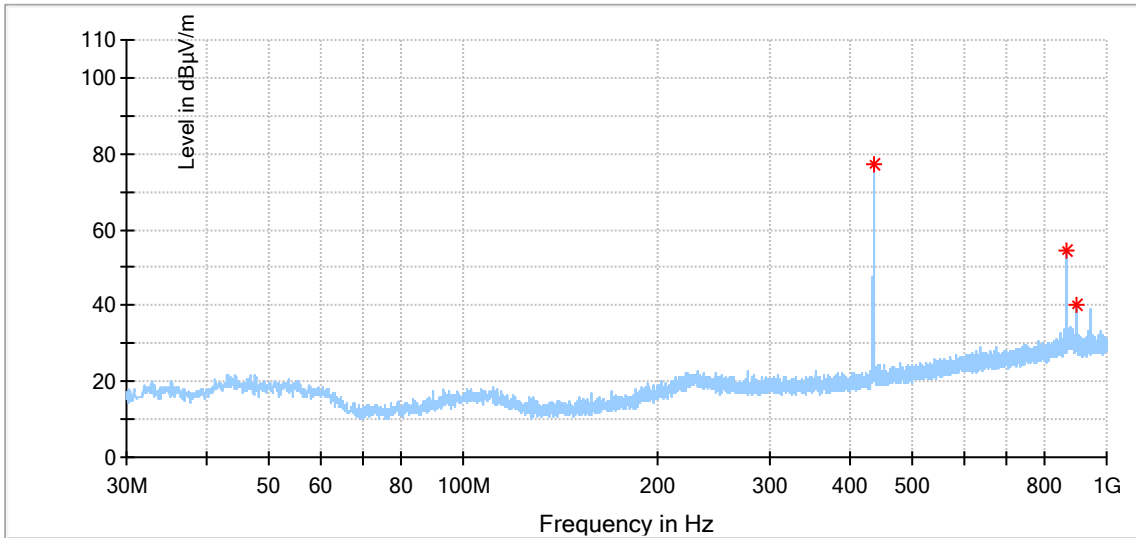
10.1 Radiated Emission of Fundamental Frequency

Test Requirement:	FCC part 15 section 15.231(b)
Test Method:	ANSI C63.4:2014
Test Date:	2019-08-08
Mode of Operation:	TX
Detector Function	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

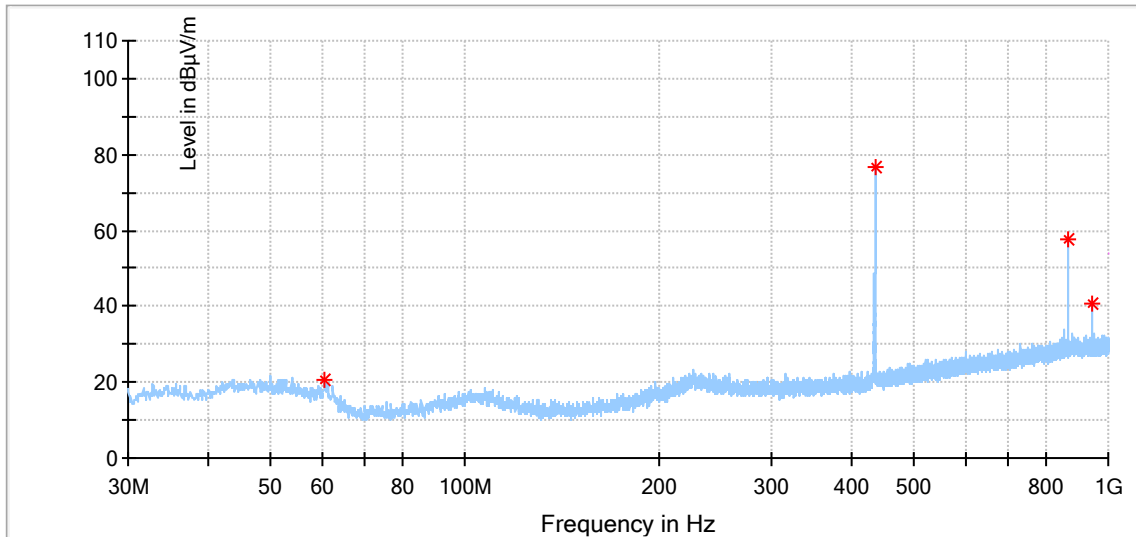
Test Setup:



Results: PASS



Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Limit (dBµV/m)
433.951111	77.24	H	80.83



Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Limit (dBµV/m)
433.951111	76.86	V	80.83

Note:

Remark:

- Calculated measurement uncertainty: 5.12dB(H)&5.10dB(V)
- The test data has considered the antenna factor and cable loss

Limits for Fundamental Frequency: [Section 15.231(b)]:

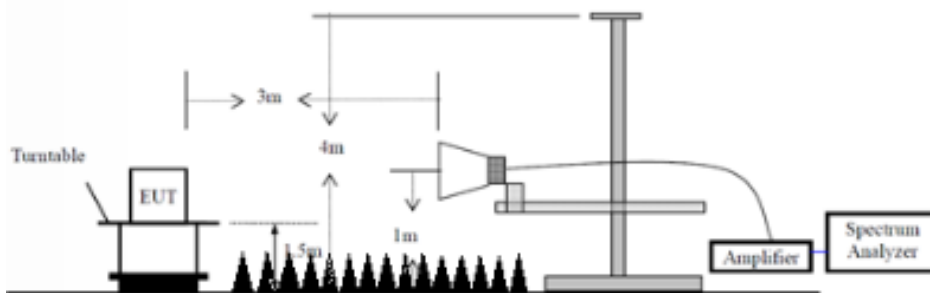
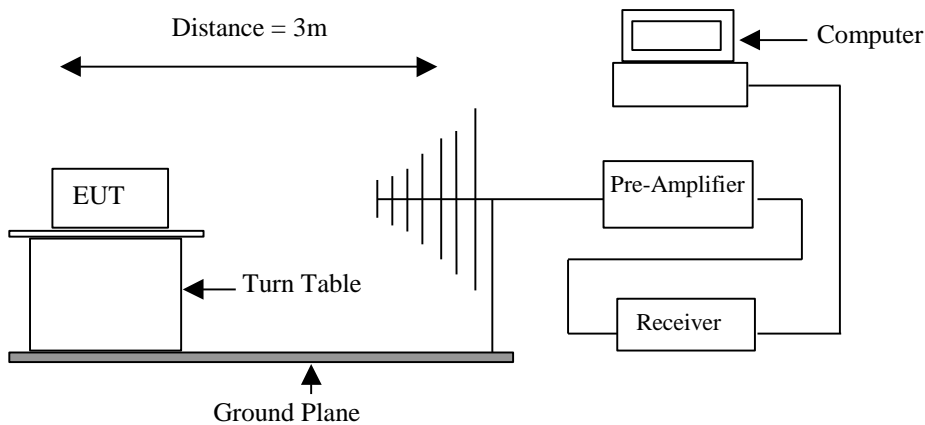
Fundamental Frequency [MHz]	Field Strength of Fundamental [μ V/m]	Field Strength of Fundamental [dB μ V/m]
433.92	10996.67	80.83

Compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR peak detector.

10.2 Spurious Radiated Emission

Test Requirement:	FCC part 15 section 15.231(b)
Test Method:	ANSI C63.4:2014
Test Date:	2019-08-08
Mode of Operation:	TX
Detector Function	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:



Results: PASS

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dB μ V/m		dBuV/m	
867.864	55.54	H	60.83	PK	5.29	Pass
867.864	57.88	V	60.83	PK	2.95	Pass
1301.718	48.56	H	60.83	AV	12.27	Pass
2169.687	54.47	H	60.83	AV	6.36	Pass
1301.718	48.52	V	60.83	AV	12.31	Pass
2169.687	53.86	V	60.83	AV	6.97	Pass

Note: No further spurious emissions found between 30 MHz and lowest internal used/generated frequency.

Remark:

- Calculated measurement uncertainty: 4.91dB(H)&4.89dB(V).

- Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain. Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

Limits for Radiated Emission [Section 15.231(b)]:

Fundamental Frequency [MHz]	Field Strength of Spurious Emission [μ V/m]	Field Strength of Spurious Emission [dB μ V/m]
433.92	1100.27	60.83

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in section 15.209, whichever permits a higher field strength.

The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level.

Limit for Radiated Emission Falling in Restricted Bands [Section 15.209]:

Frequency (MHz)	Field Strength [μ V/m]	Field Strength [dB μ V/m]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

10.3 Bandwidth Measurement

Test Requirement: FCC part 15 section 15.231 (c)
 Test Method: ANSI C63.4:2014
 Test Date: 2019-10-17
 Mode of Operation: TX
 Detector Function: Peak

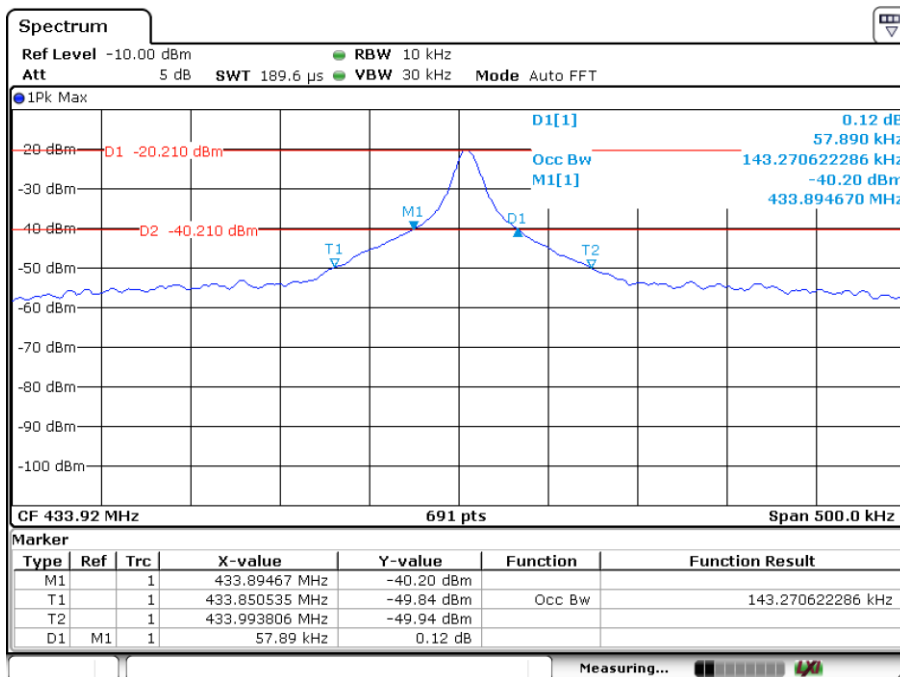
Results: PASS

Refer to the data graph, the 20dB points at lower edge and at higher edge are 433.89467MHz and 434.03794MHz, so the bandwidth of the emission is 0.14327<433.92*0.25%. Therefore, the EUT meets the requirement of section 15.231(c).

Limit for Bandwidth [Section 15.231 (c)]

The bandwidth of the emission shall be no wider than 0.25% if the centre frequency for devices operating above 70MHz and below 900MHz.

Test Result: Result data graph is shown in the following for reference.



Date: 17.OCT.2019 21:15:33

10.4 Average Factor

Average factor in dB = 20 log (duty cycle)

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the specification for output field strengths in accordance with the FCC rules specify measurements with an average detector.

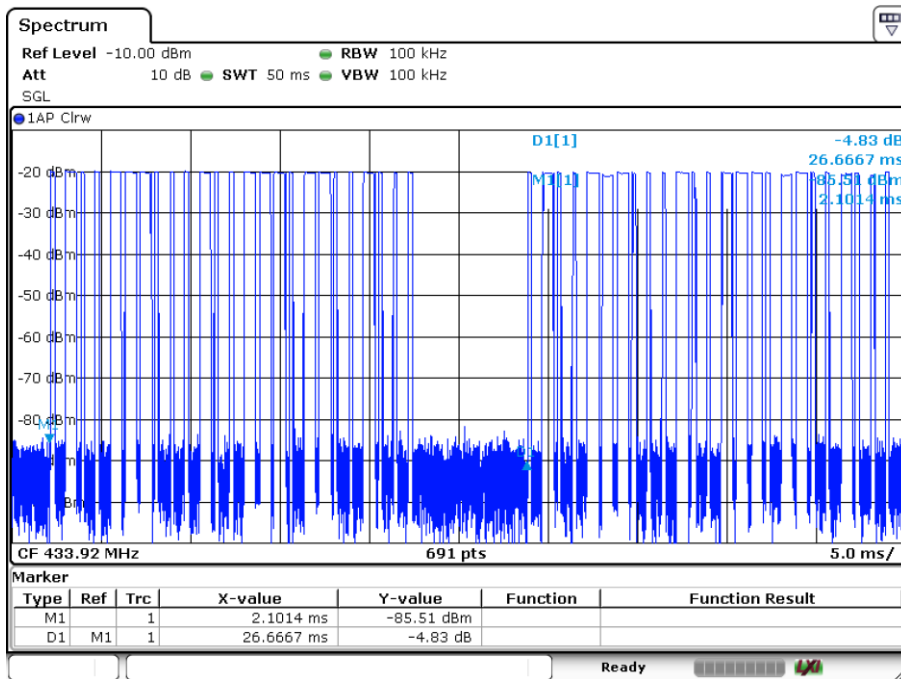
The duty cycle is the total signal on time per one transmission.

The duration of one cycle = 26.6667ms

The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Remark:

- Refer to the following graph for the detail.



Date: 17.OCT.2019 21:23:32

10.5 Transmitter Time

Test Requirement:	FCC part 15 section 15.231 (a)
Test Method:	ANSI C63.4:2014
Test Date:	2019-10-17
Mode of Operation:	TX
Detector Function:	Peak

Results: PASS

According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

Limit for Transmitter Time [Section 15.231 (a)(1)]

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Result: 0.216s

11 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
	LISN	Rohde & Schwarz	ENV4200	100249	2020-6-28
	LISN	Rohde & Schwarz	ENV216	100326	2020-6-28
	ISN	Rohde & Schwarz	ENY81	100177	2020-6-28
	ISN	Rohde & Schwarz	ENY81-CAT6	101664	2020-6-28
	High Voltage Probe	Rohde & Schwarz	TK9420(VT9420)	9420-584	2020-6-24
	RF Current probe	Rohde & Schwarz	EZ-17	100816	2020-7-2
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2020-6-28
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2020-6-28
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2020-6-28
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/100851	2020-6-28
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-28
	Horn Antenna	Rohde & Schwarz	HF907	102294	2020-6-22
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
	3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- 20dB bandwidth and 99% Occupied Bandwidth
- Carrier frequency separation
- Number of hopping frequencies
- Dwell Time
- Spurious RF conducted emissions
- Band edge

RE - Radiated RF tests

- Spurious radiated emissions for transmitter

12 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 5.12dB; Vertical: 5.10dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-25000MHz	Horizontal: 5.01dB; Vertical: 5.00dB;
Uncertainty for Conducted Emission 150KHz-30MHz	U=3.21dB
Uncertainty for conducted power test	1.16dB
Frequency test involved:	0.6×10^{-7}