FCC TEST REPORT

FCC ID: 2ARNM-LJ-ST102

Product Name	:	sonic electric toothbrush
Model Name	:	LJ-ST102,CA5100
Brand Name	:	N/A
Report No.	:	PTC19101106302E-FC01

Prepared for

Guangdong Lejie Intelligent Technology Co., Ltd.

Yuyuan Industrial Park Yuyuan 3rd Road No. 1 Building 2 Floor 401, Huangjiang Town, Dongguan City, Guangdong Province, China

Prepared by

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China

1TEST RESULT CERTIFICATION

Applicant's name	:	Guangdong Lejie Intelligent Technology Co., Ltd.
Address	:	Yuyuan Industrial Park Yuyuan 3rd Road No. 1 Building 2 Floor 401, Huangjiang Town, Dongguan City, Guangdong Province, China
Manufacture's name	:	Guangdong Lejie Intelligent Technology Co., Ltd.
Address	:	Yuyuan Industrial Park Yuyuan 3rd Road No. 1 Building 2 Floor 401, Huangjiang Town, Dongguan City, Guangdong Province, China
Product name	:	sonic electric toothbrush
Model name	:	LJ-ST102
Standards	:	FCC CFR47 Part 18
Test procedure	:	MP5:1986
Test Date	:	Nov 21.2019 to Nov 27.2019
Date of Issue	:	Nov 27.2019
Test Result	:	Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Engineer:

Leo Yang

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager

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2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	18.307	PASS
Radiated Spurious Emissions	18.305	PASS

3 TEST FACILITY

Dongguan Precise Testing & Certification Corp., Ltd.

Address: Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1

4 General Information

4.1 General Description of E.U.T.

Product Name	:	sonic electric toothbrush
Model Name	:	LJ-ST102,CA5100 ((Note: The samples are the same except different model include model name So LJ-ST102 was selected for full tested.))
Operating frequency	:	105-125kHz
Numbers of Channel	:	6 Channels
Antenna Type	:	Inductive Loop Coil Antenna
Antenna Gain	:	N/A
Type of Modulation	:	ASK
Power supply	:	Input:5V 0.5A; Battery: DC 3.7V 2.41Wh

4.2 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode or test configuration mode mentioned above was evaluated respectively.

Pretest Mode	Description
Mode	Keeping TX+Charging mode

For Conducted Emission	
Final Test Mode	Description
Mode	Keeping TX+Charging mode

For Radiated Emission	
Final Test Mode	Description
Mode	Keeping TX+Charging mode

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	0.105	6	0.125				
2	0.109						
3	0.113						
4	0.117						
5	0.121						

5 Equipment During Test

5.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	SER MY5111038	10Hz-30GHz	Aug. 21, 2020
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Aug. 21, 2020
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Aug. 28, 2020
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Aug. 28, 2020

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Aug. 28, 2020
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Aug. 28, 2020
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Aug. 22, 2020
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Aug. 21, 2020
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Aug. 21, 2020
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Aug. 28, 2020
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Apr. 13, 2020
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Aug. 21, 2020
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	Apr. 13, 2020
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Aug. 21, 2020

Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Aug. 21, 2020
RF Cable	R&S	R204	R21X	1GHz-40GHz	Aug. 21, 2020

Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Aug. 28, 2020
Artificial Mains Network	Rohde&Schwarz	ENV216	102453	9KHz-300MHz	Aug. 21, 2020
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Aug. 21, 2020

5.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	

5.3 Description of Support Units

Equipment	Model No.	Series No.
Adapter	Model: PS65B150Y3000S Input: AC120V, 60Hz, 1.5A Output: DC 5V, 3000mA	N/A

6 Conducted Emission

Test Requirement:	:	FCC CFR 47 Part 18 Section 307
Test Method:	:	MP-5:1986
Test Result:	:	PASS
Frequency Range:	:	150kHz to 30MHz
Class/Severity:	:	Class B
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

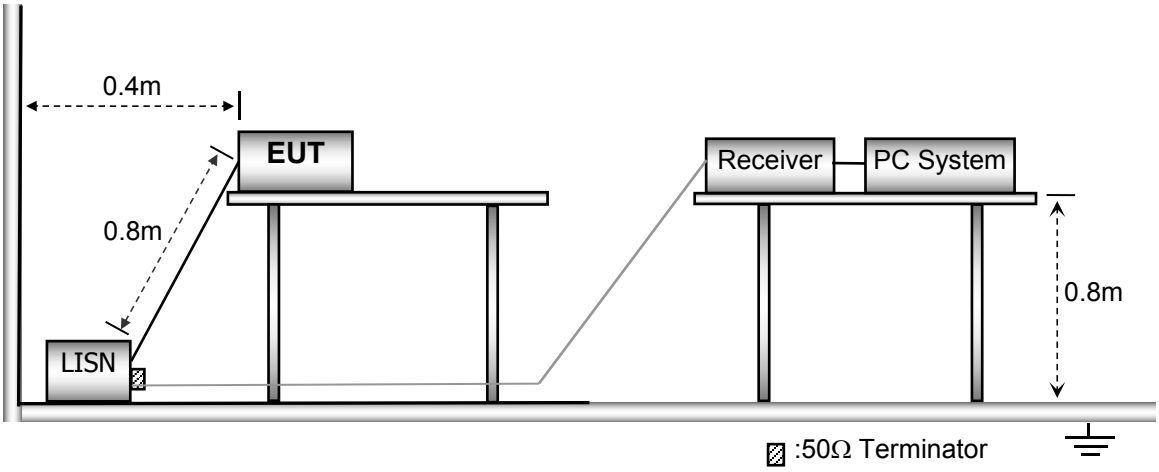
6.1 E.U.T. Operation

Operating Environment **:**

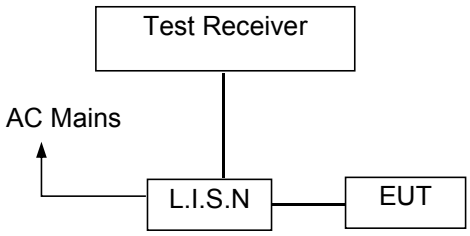
Temperature:	:	25.5 °C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.2kPa
Test Voltage	:	AC 120V/60Hz

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the MP-5:1986.



6.3 Test SET-UP (Block Diagram of Configuration)



6.4 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

6.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:
1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

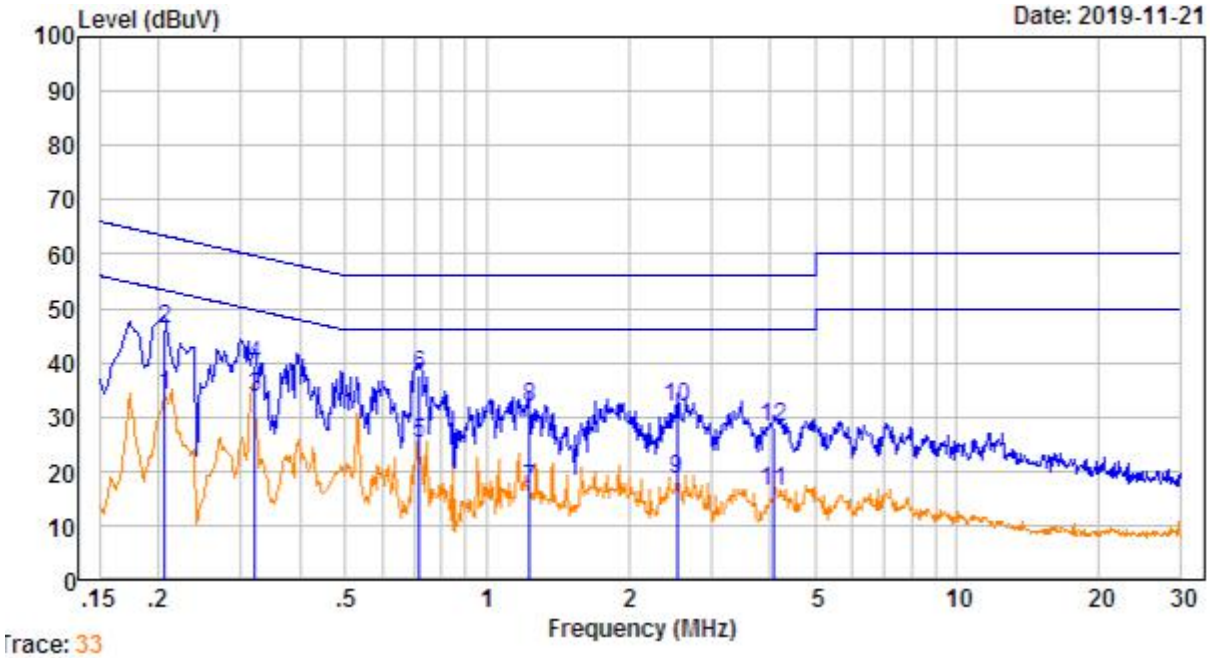
6.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

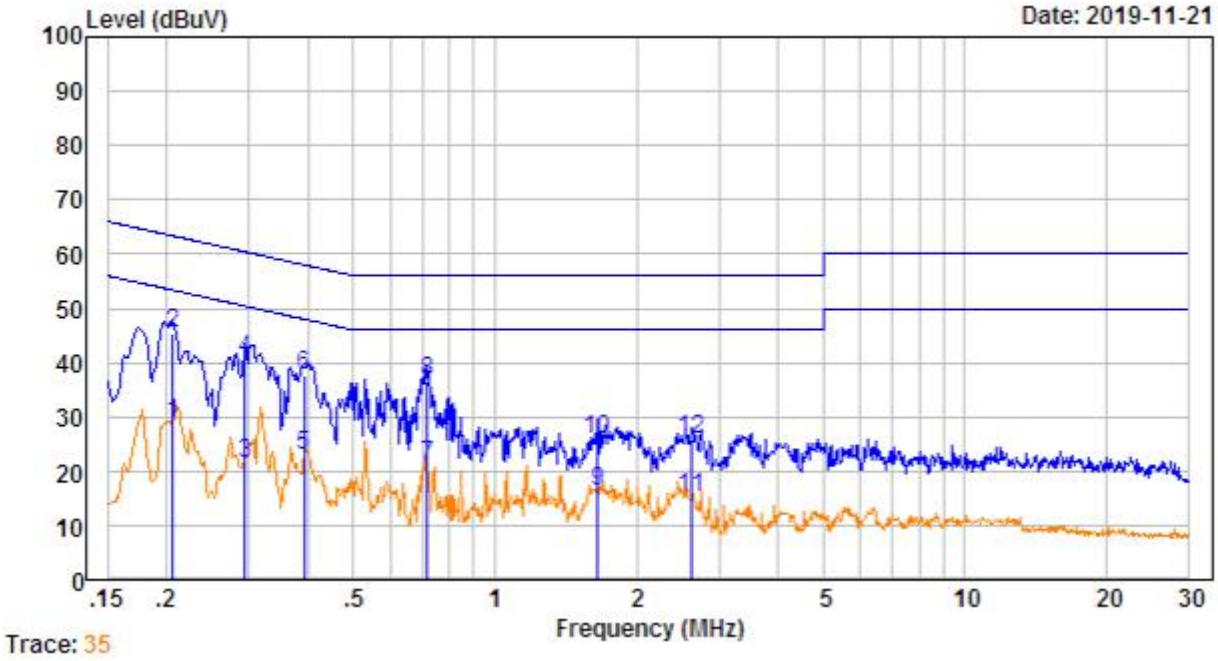
Pass.

Line -120V/60Hz:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBμV	Emission Level dBμV	Limit dBμV	Over Limit dB	Remark
1.	0.206	0.29	9.59	23.91	33.79	53.36	-19.57	Average
2.	0.206	0.29	9.59	36.10	45.98	63.36	-17.38	QP
3.	0.322	0.38	9.60	23.54	33.52	49.66	-16.14	Average
4.	0.322	0.38	9.60	29.44	39.42	59.66	-20.24	QP
5.	0.720	0.44	9.61	14.95	25.00	46.00	-21.00	Average
6.	0.720	0.44	9.61	27.44	37.49	56.00	-18.51	QP
7.	1.236	0.46	9.61	6.38	16.45	46.00	-29.55	Average
8.	1.236	0.46	9.61	21.82	31.89	56.00	-24.11	QP
9.	2.540	0.47	9.62	8.28	18.37	46.00	-27.63	Average
10.	2.540	0.47	9.62	21.74	31.83	56.00	-24.17	QP
11.	4.092	0.47	9.65	6.01	16.13	46.00	-29.87	Average
12.	4.092	0.47	9.65	17.82	27.94	56.00	-28.06	QP

Neutral -120V/60Hz:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBμV	Emission Level dBμV	Limit dBμV	Over Limit dB	Remark
1.	0.206	0.29	9.61	18.86	28.76	53.36	-24.60	Average
2.	0.206	0.29	9.61	35.49	45.39	63.36	-17.97	QP
3.	0.294	0.37	9.62	11.37	21.36	50.41	-29.05	Average
4.	0.294	0.37	9.62	30.73	40.72	60.41	-19.69	QP
5.	0.393	0.40	9.62	12.98	23.00	47.99	-24.99	Average
6.	0.393	0.40	9.62	27.69	37.71	57.99	-20.28	QP
7.	0.720	0.44	9.64	11.06	21.14	46.00	-24.86	Average
8.	0.720	0.44	9.64	26.60	36.68	56.00	-19.32	QP
9.	1.654	0.47	9.64	6.26	16.37	46.00	-29.63	Average
10.	1.654	0.47	9.64	15.61	25.72	56.00	-30.28	QP
11.	2.608	0.47	9.65	5.01	15.13	46.00	-30.87	Average
12.	2.608	0.47	9.65	15.63	25.75	56.00	-30.25	QP

7 Radiated Spurious Emissions

Test Requirement	:	FCC CFR 47 Part 18 Section 305
Test Method	:	MP-5:1986
Test Result	:	PASS
Measurement Distance	:	3m
Limit	:	See the follow table

Except as provided elsewhere in this Subpart 18.305 (b), the field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following table:

Frequency MHz	Distance Meters	Field Strengths Limit	
		dBμV/m	Remark
0.009~30MHz	3	103.5	Quasi-peak
30~88	3	40.0	Quasi-peak
88~216	3	43.5	Quasi-peak
216~960	3	46.0	Quasi-peak
960~1000	3	54.0	Quasi-peak

Remark:
(1) Emission level dBμV/m for 0.009~30MHz = 20log (15) + 40log (300/3) dBμV/m;
(2) Calculated according FCC 18.305.
(3) The smaller limit shall apply at the cross point between two frequency bands.
(4) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

7.1 EUT Operation

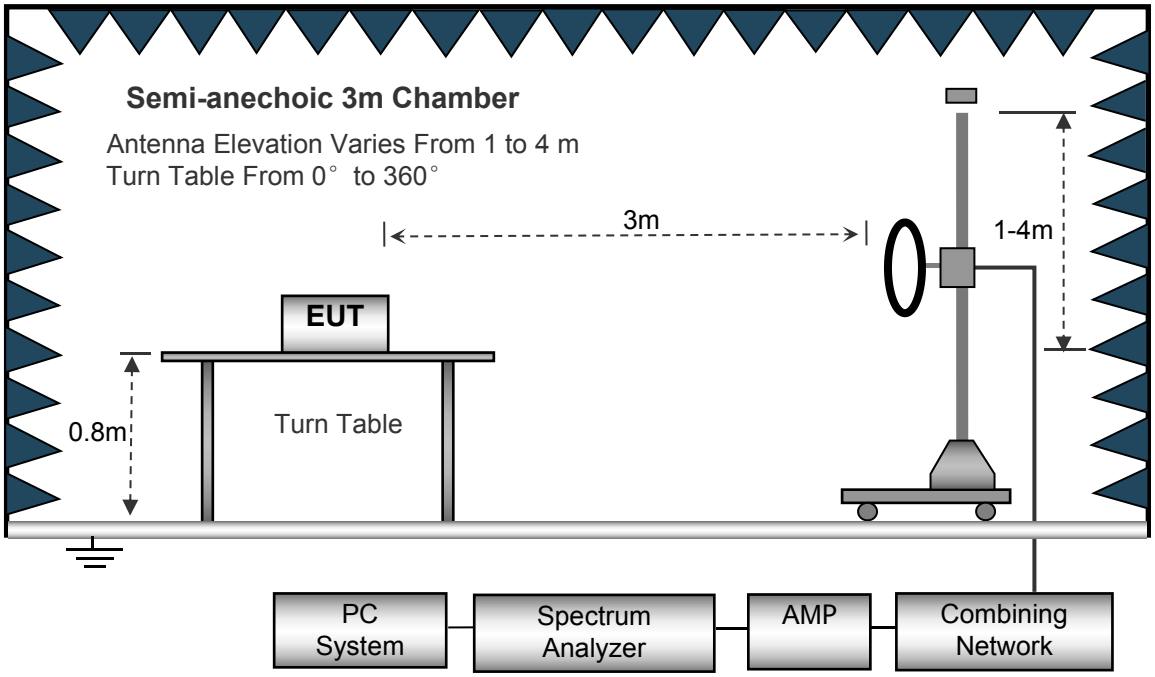
Operating Environment :

Temperature	:	23.5 °C
Humidity	:	51.1 % RH
Atmospheric Pressure	:	101.2kPa

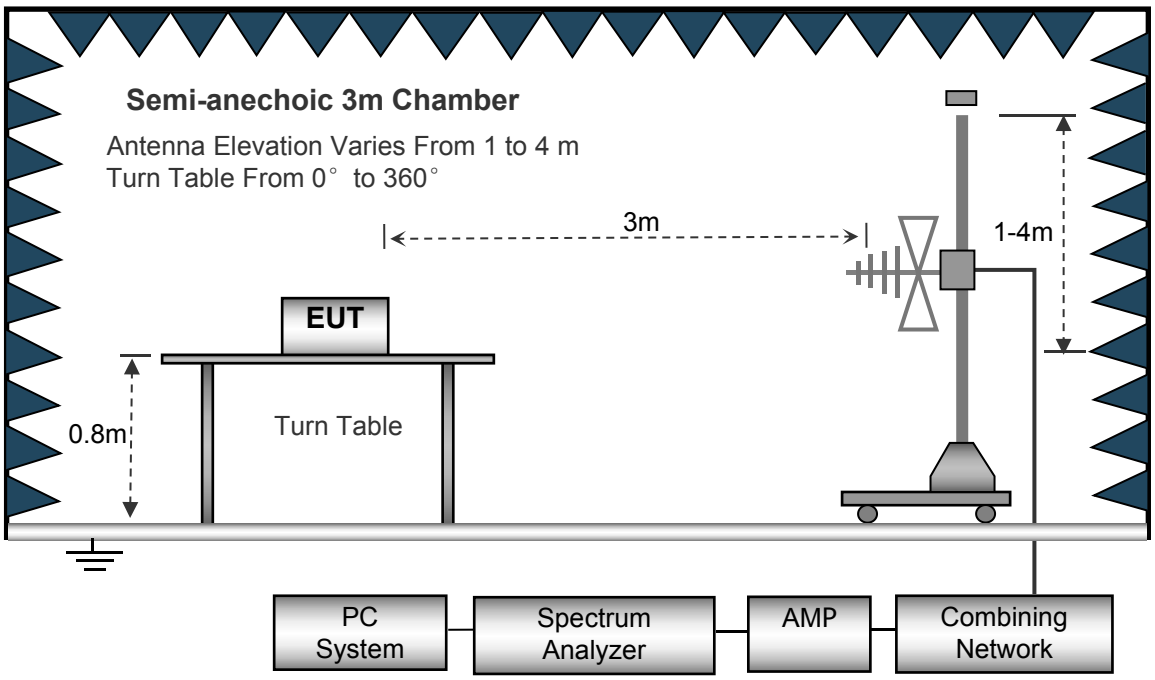
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

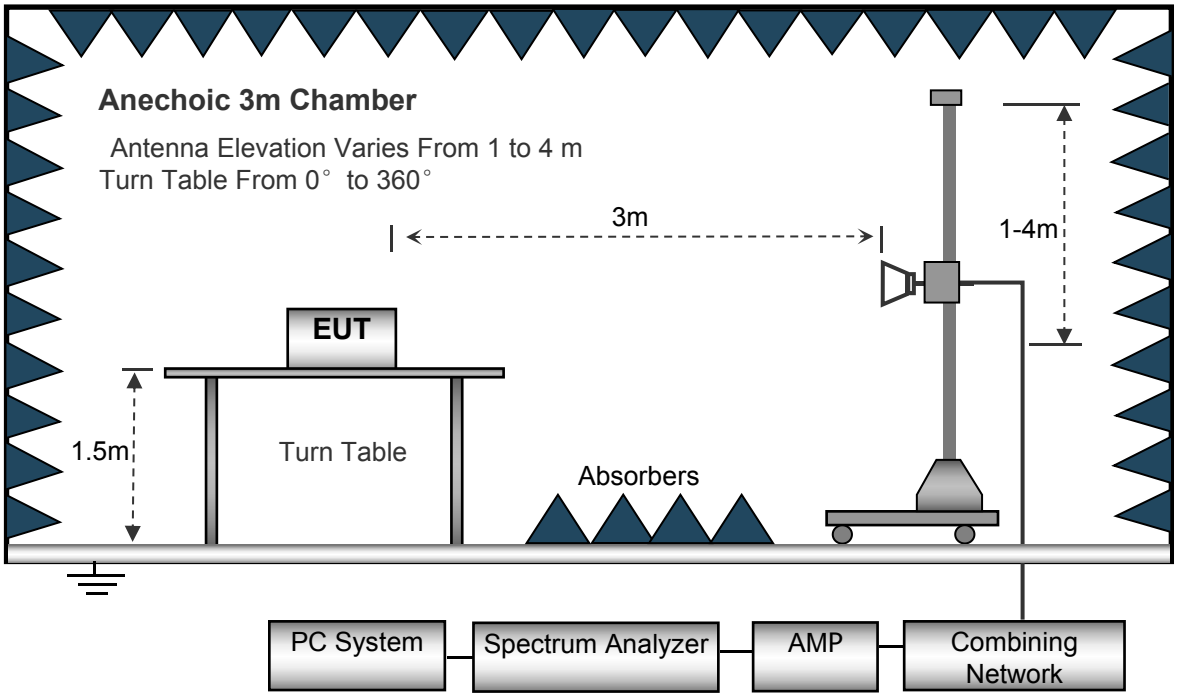
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of MP-5 1986.

2. Below 1000MHz, The EUT was placed on a turn table which is 1.5m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

5. Set to the maximum power setting and enable the EUT transmit continuously.

6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.

7. Test Procedure of measurement (For Above 1GHz):

1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).

2) Change the antenna polarization and repeat 1) with vertical polarization.

3) Make a hardcopy of the spectrum.

4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

5) Change the analyser mode to Clear/ Write and found the cone of emission.

6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.

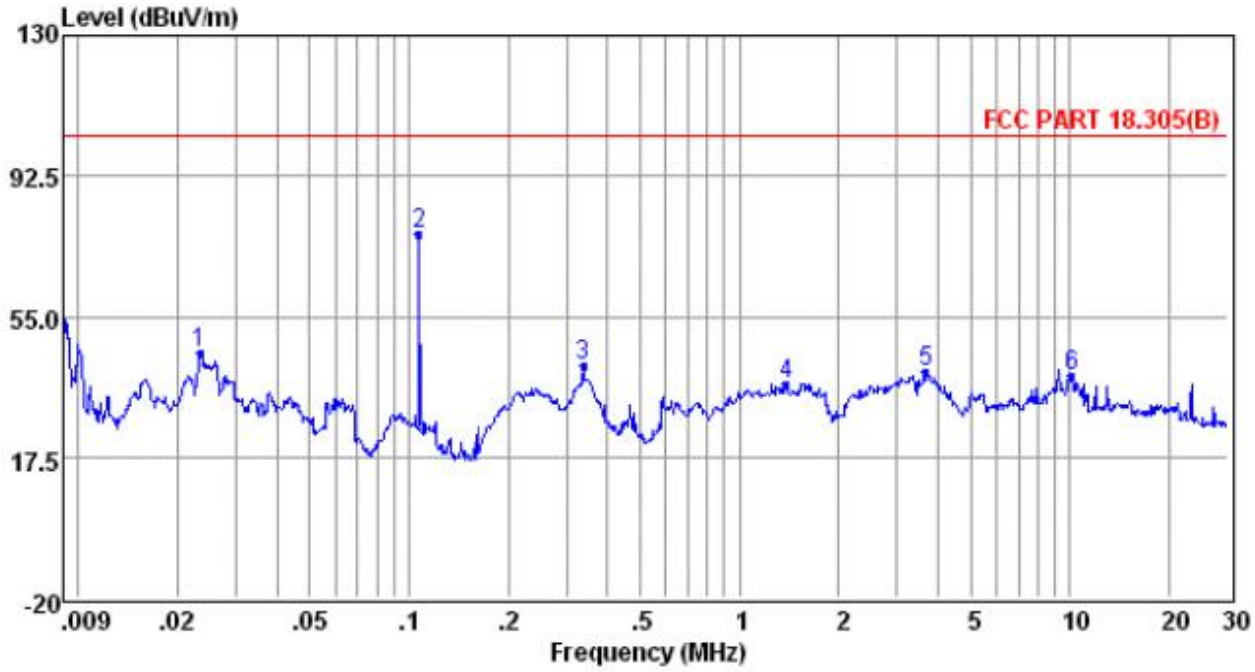
7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.

8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Summary of Test Results

Test Frequency: 9kHz-30MHz

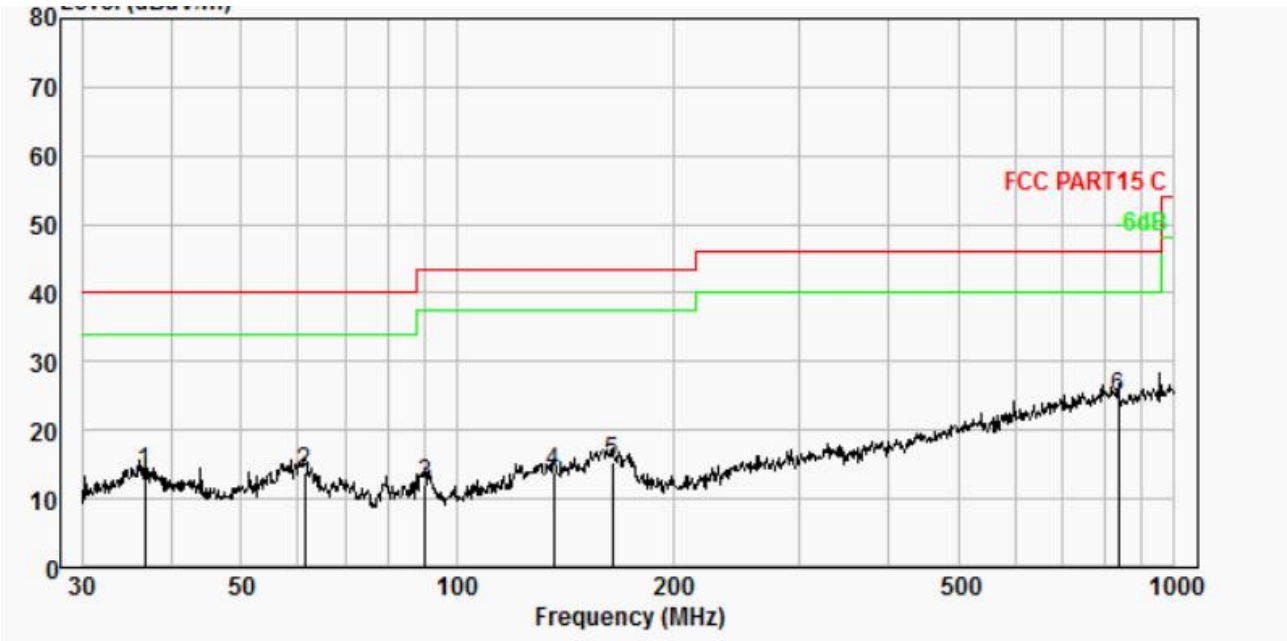


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	0.021	24.17	0.30	20.62	45.09	103.50	-58.41	QP
2	0.109	56.11	0.30	20.44	76.85	103.50	-26.65	QP
3	0.348	21.00	0.30	20.37	41.67	103.50	-61.83	QP
4	1.390	16.48	0.30	20.30	37.08	103.50	-66.42	QP
5	3.676	19.62	0.30	20.29	40.21	103.50	-63.29	QP
6	10.126	18.26	0.30	20.34	38.90	103.50	-64.60	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

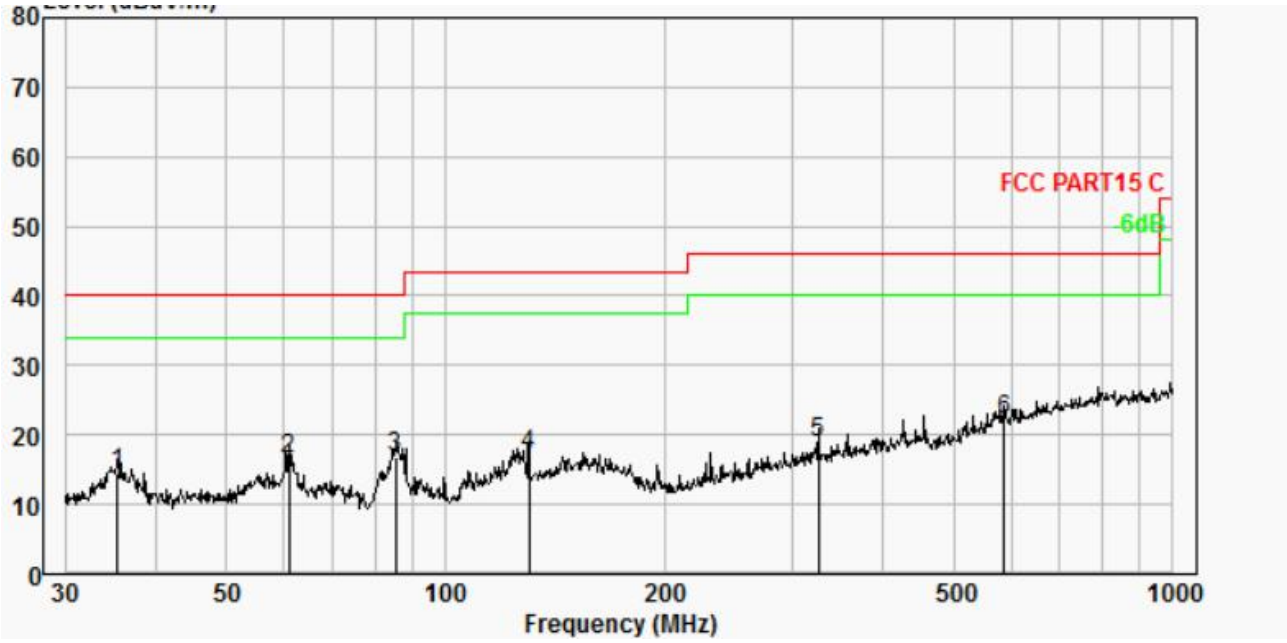
Test Frequency: 30MHz ~ 1GHz

Horizontal:



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	36.637	1.55	12.17	30.20	29.90	14.02	40.00	-25.98	QP
2.	61.346	2.43	11.51	29.87	29.94	13.87	40.00	-26.13	QP
3.	90.220	3.09	9.20	29.82	29.98	12.13	43.50	-31.37	QP
4.	136.460	3.81	13.08	26.98	30.01	13.86	43.50	-29.64	QP
5.	164.908	4.13	13.69	27.70	30.03	15.49	43.50	-28.01	QP
6.	836.244	6.93	21.55	27.50	31.12	24.86	46.00	-21.14	QP

Vertical:



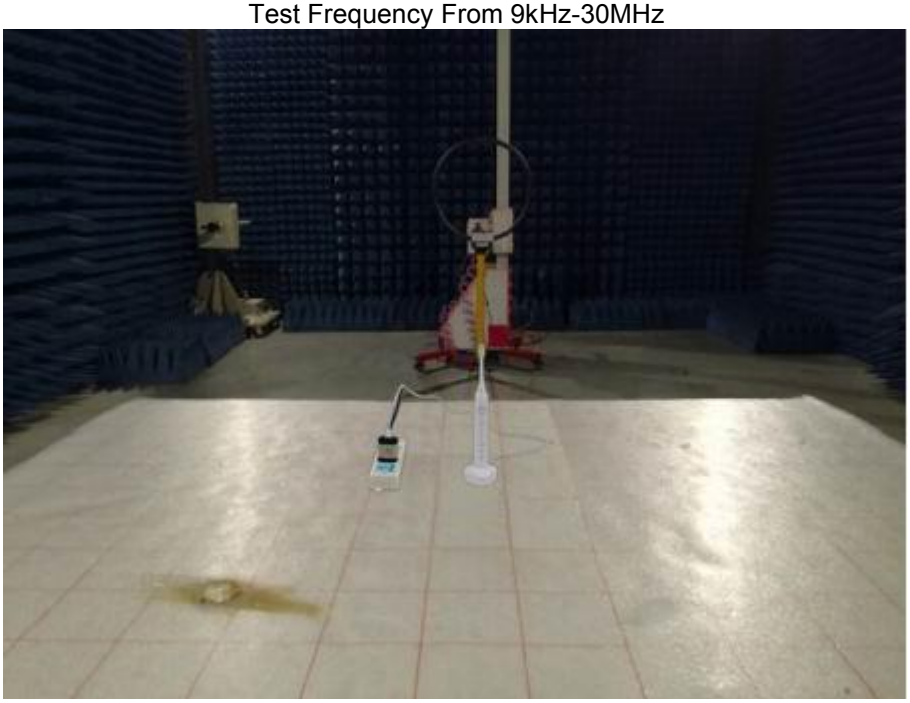
No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	35.375	1.49	12.19	30.65	29.90	14.43	40.00	-25.57	QP
2.	60.918	2.42	11.57	32.41	29.94	16.46	40.00	-23.54	QP
3.	85.298	3.00	8.73	35.07	29.97	16.83	40.00	-23.17	QP
4.	130.379	3.73	12.70	30.74	30.01	17.16	43.50	-26.34	QP
5.	325.596	5.30	13.84	30.24	30.43	18.95	46.00	-27.05	QP
6.	586.844	6.31	18.65	28.13	31.00	22.09	46.00	-23.91	QP

8 TEST PHOTOS

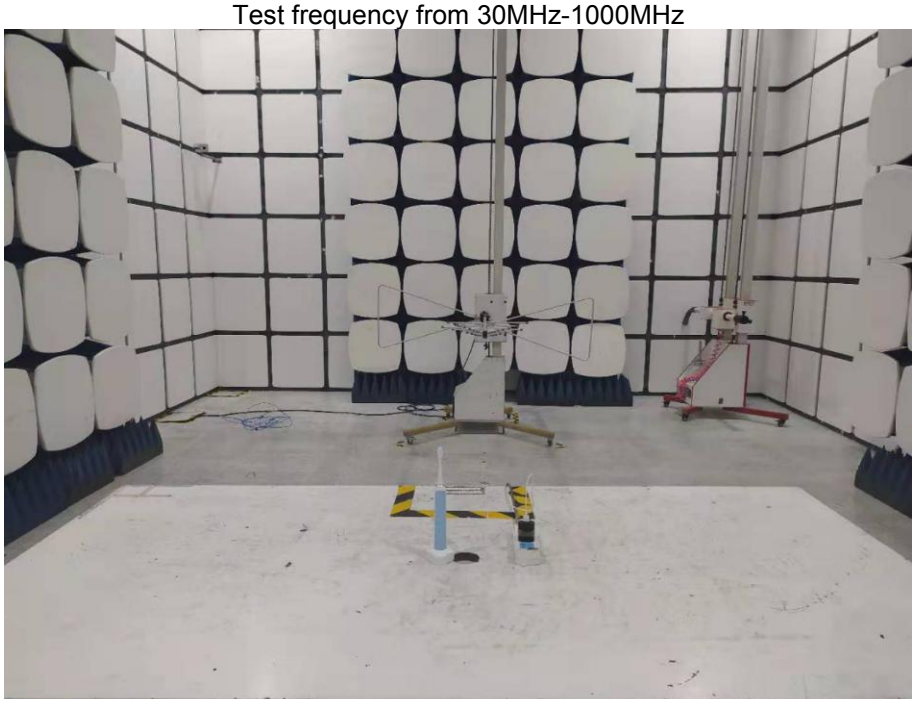
Conducted Emissions

Radiated Spurious Emissions

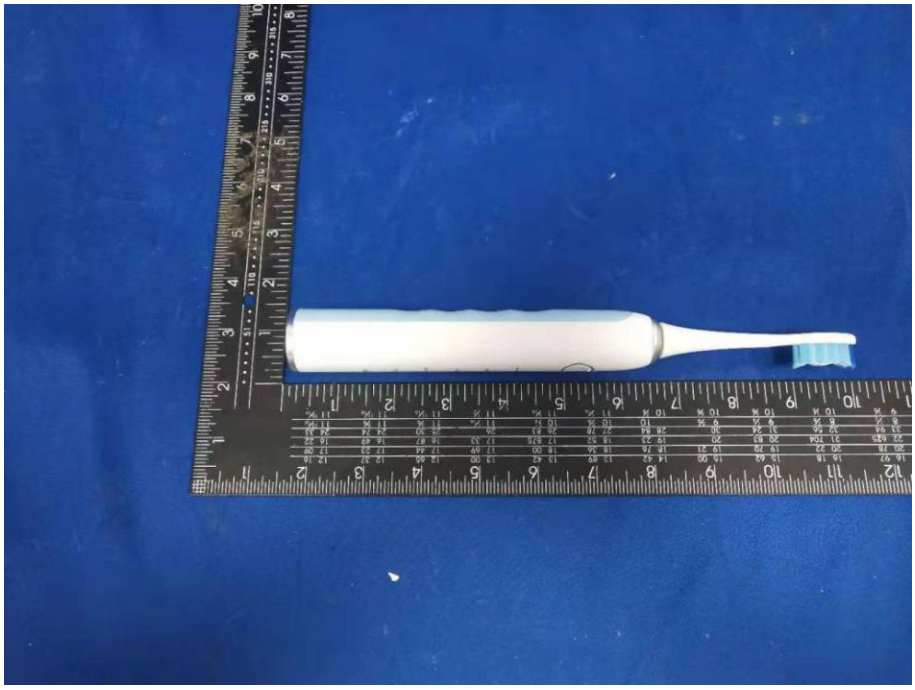
Test Frequency From 9kHz-30MHz

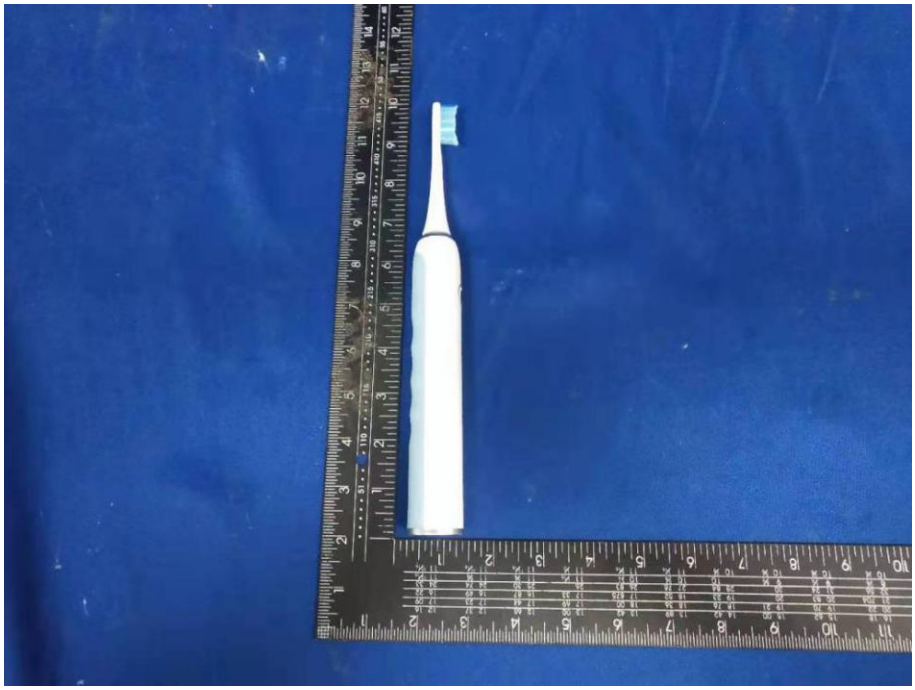


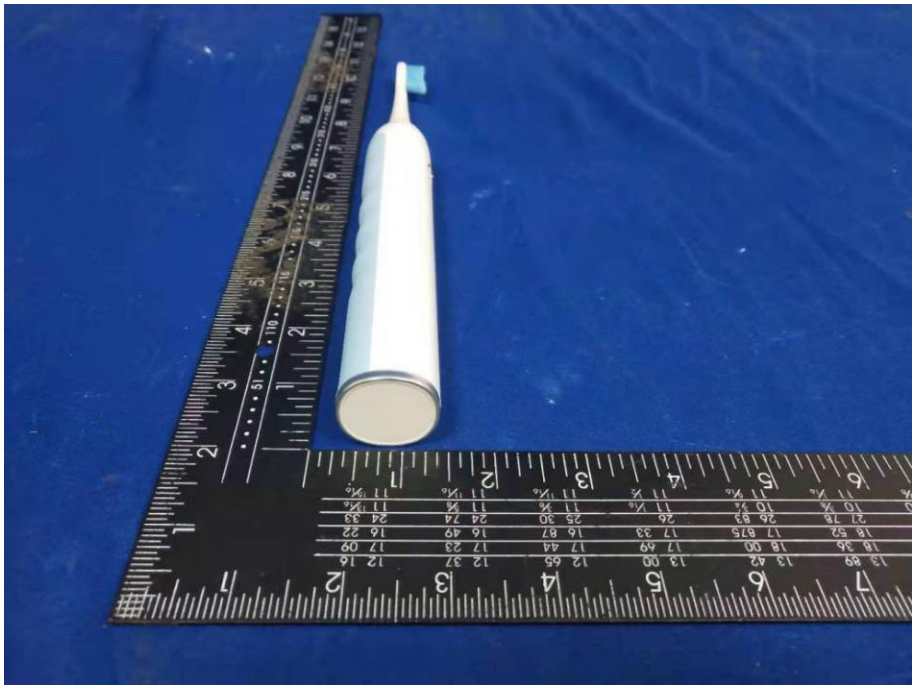
Test frequency from 30MHz-1000MHz

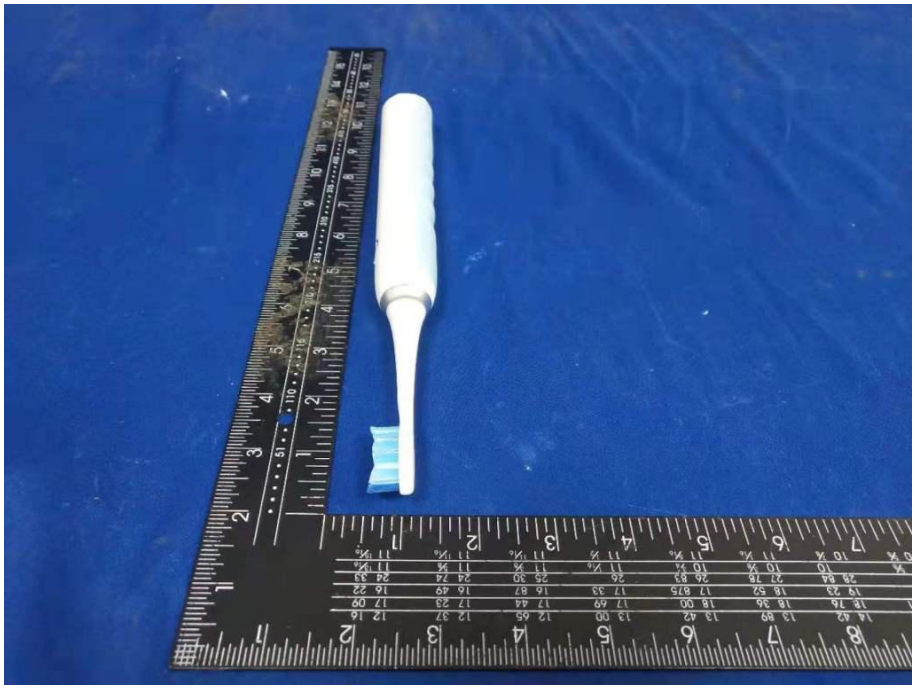


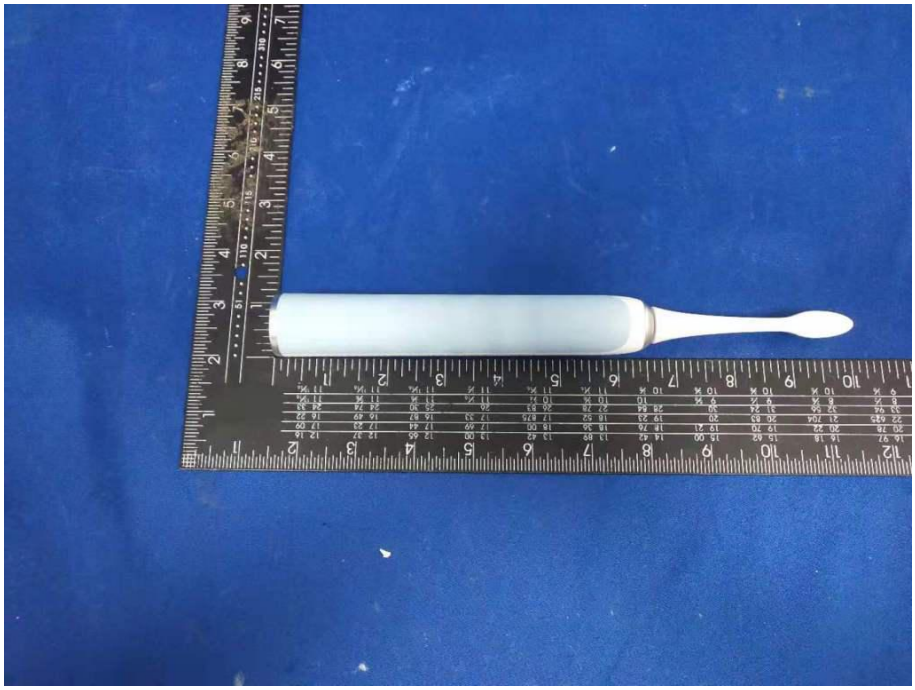
9 EUT PHOTOS

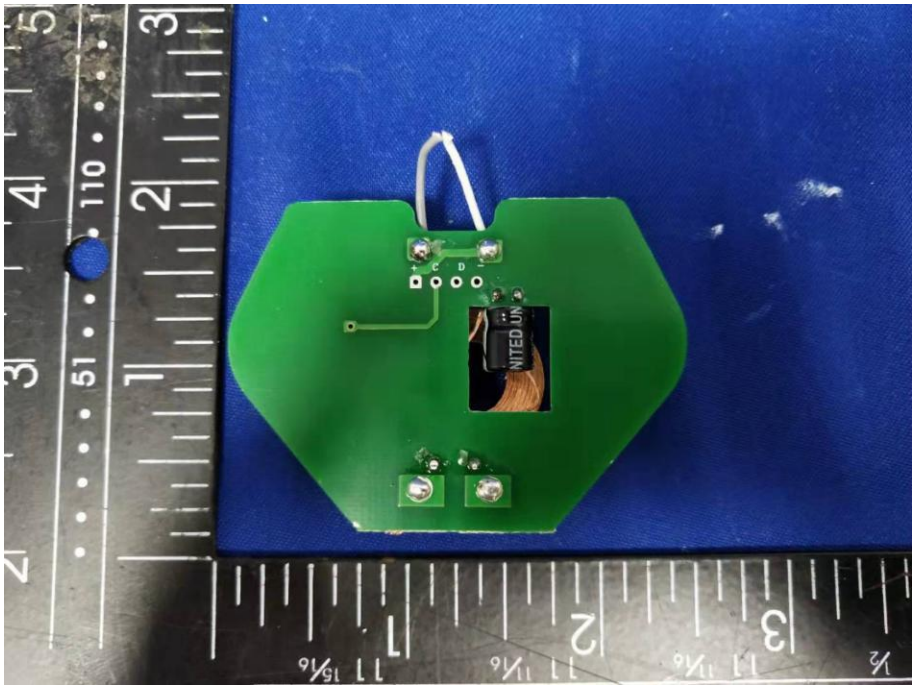








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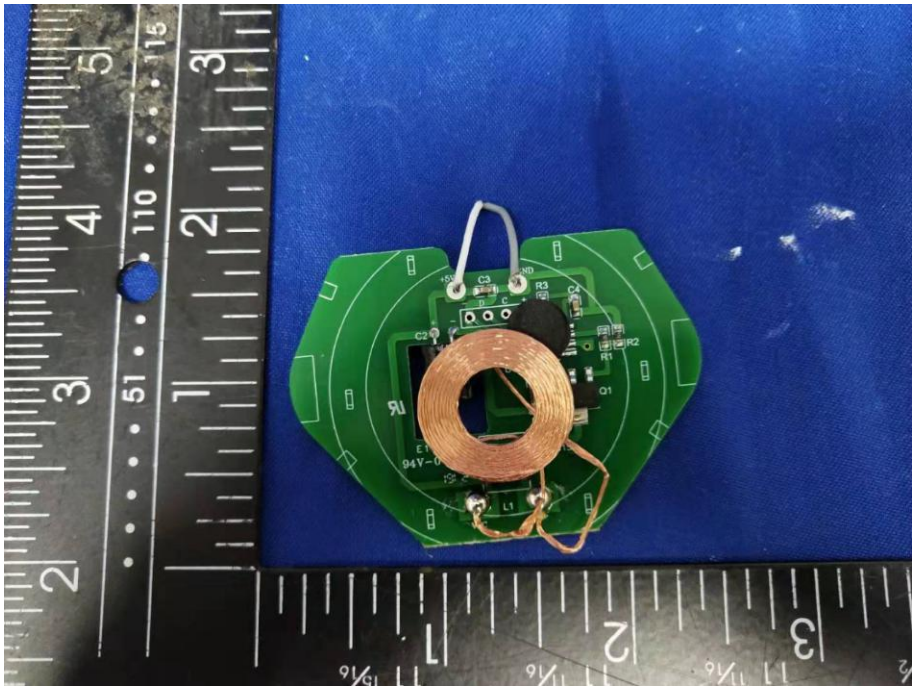

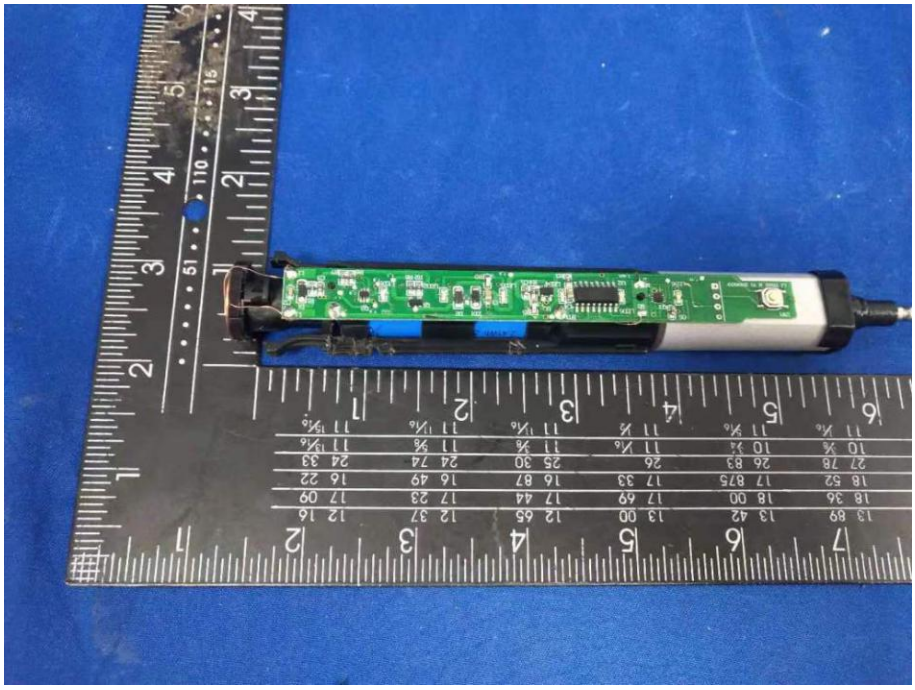

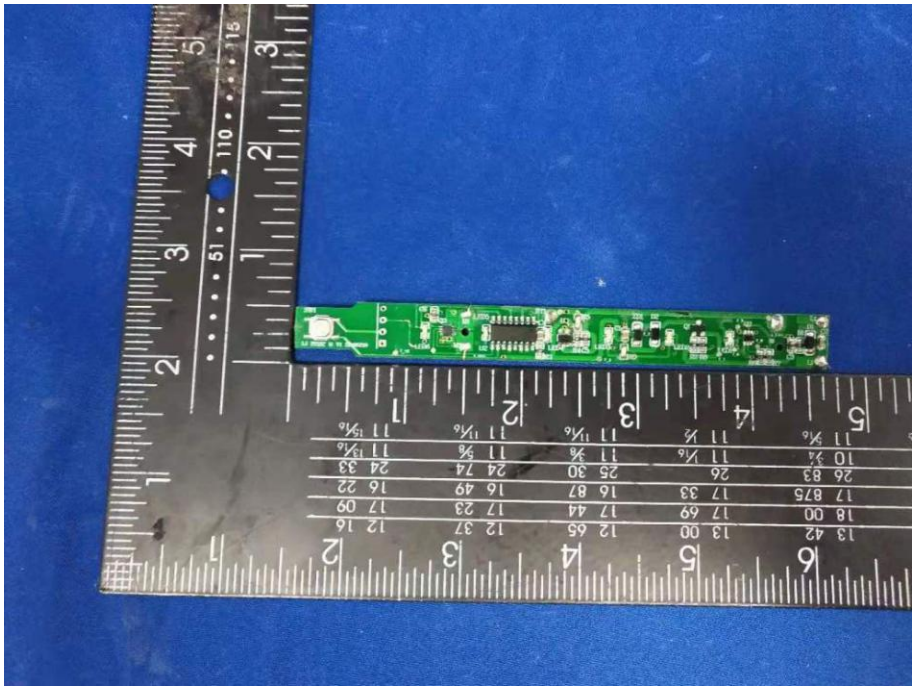

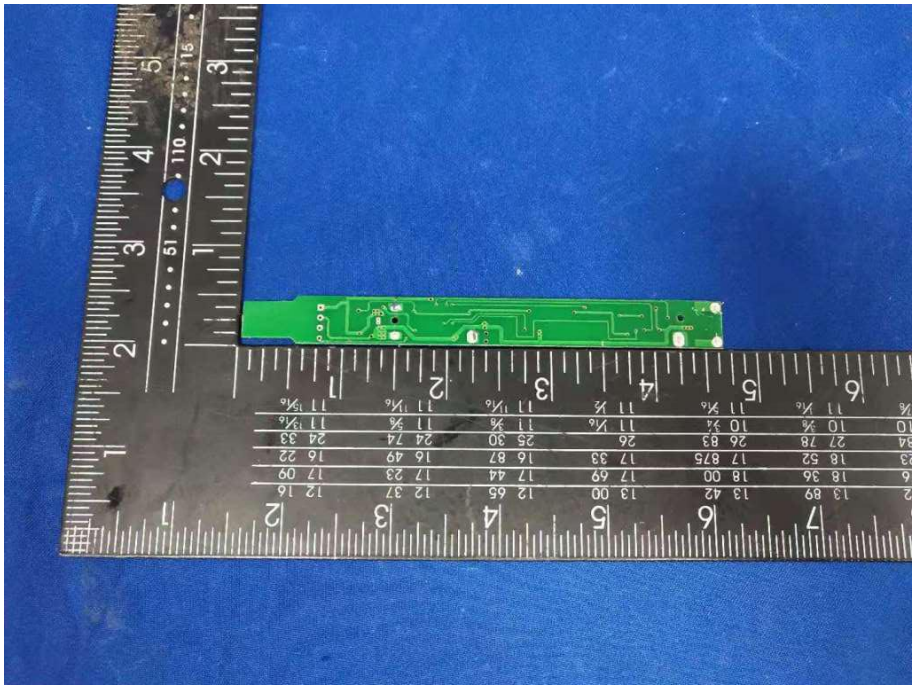

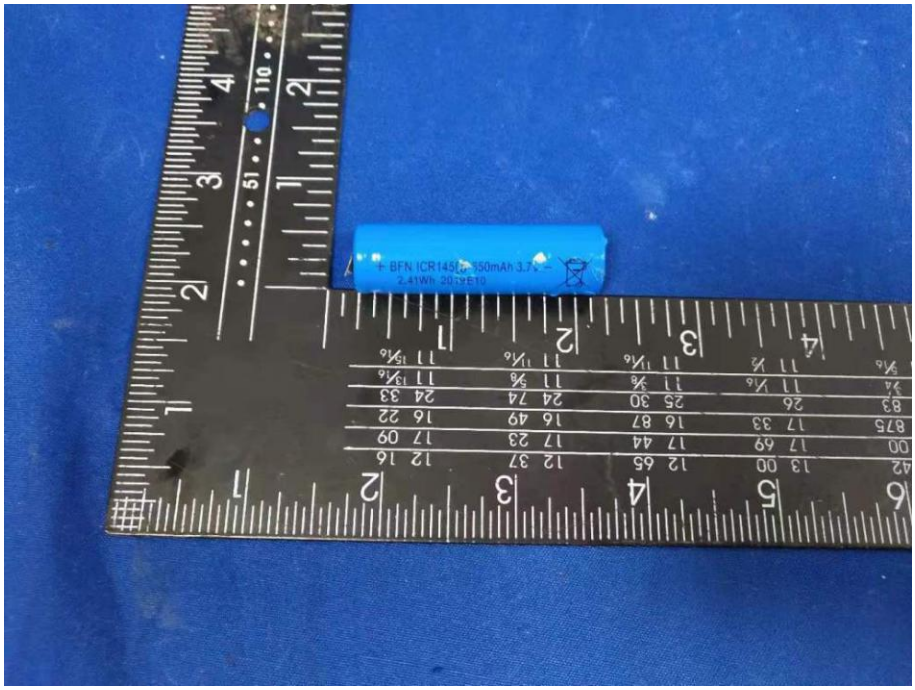

********THE END REPORT********