TEST REPORT

Reference No.	:	WTS18S10127206-1W
FCC ID	:	2ARNM-LJ-ST206
Applicant	:	Guangdong Lejie Intelligent Technology Co., Ltd.
Address	:	Yuyuan Industrial Park Yuyuan 3rd Road No. 1 C Building 401, Huangjiang Town, Dongguan City, Guangdong Province, China, 523750
Manufacturer	:	Guangdong Lejie Intelligent Technology Co., Ltd.
Address	:	Yuyuan Industrial Park Yuyuan 3rd Road No. 1 C Building 401, Huangjiang Town, Dongguan City, Guangdong Province, China, 523750
Product	:	Electric toothbrush
Model(s)	:	LJ-ST106, LJ-ST206
Standards	:	FCC Part 15 subpart C
Date of Receipt sample	:	2018-10-30
Date of Test	:	2018-10-30 to 2018-11-03
Date of Issue	:	2018-11-03
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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2 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China.Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CEC(California energy efficiency), ISED (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.

Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

2.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Scope Covered By	Scope	Note
USA	ISO/IEC 17025	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		WPC	-
Thailand		NTC	-
Singapore		IDA	-

Note:

1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.
2. ISED Canada Registration No.: 7760A

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of …	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd.	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S10127206-1W	2018-10-30	2018-10-30 to 2018-11-03	2018-11-03	original	-	Valid

4 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Spurious Emissions	15.209	PASS
Occupied Bandwidth	15.215	PASS
Antenna Requirement	15.203	PASS

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6 General Information

6.1 General Description of E.U.T

Product:	Electric toothbrush
Model(s):	LJ-ST106, LJ-ST206
Model Difference:	Only the model names and colors are different.
Type of Modulation:	ASK
Frequency Range:	0.1145MHz
Antenna installation:	Coil Antenna
Antenna gain:	0dBi
Input:	DC 5V

6.2 Details of EUT

Ratings: Battery: DC 3.7V 650mAh 2.41Wh

7 Equipment Used during Test

7.1 Equipments List

Conducted Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMI Test Receiver	R&S	ESCI	101155	2018.09.15	2019.09.14
2	LISN	SCHWARZBECK	NSLK 8128	8128-259	2018.09.15	2019.09.14
3	Limiter	CYBERTEK	EM5010	261115-001-0024	2018.09.15	2019.09.14
4	Cable	Laplace	RF300	-	2018.07.18	2019.07.17
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	2018.04.20	2019.04.19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018.04.19	2019.04.18
3	Amplifier	ANRITSU	MH648A	M43381	2018.04.20	2019.04.19
4	Cable	HUBER+SUHNER	CBL2	525178	2018.04.20	2019.04.19
5	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2018.04.17	2019.04.16
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2018.09.14	2019.09.13
2	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2018.09.14	2019.09.13
3	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2018.09.14	2019.09.13
4	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	2018.09.14	2019.09.13

7.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
Apple PC	Apple	A1278	-

7.3 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conducted Emissions	150kHz~30MHz	±3.64dB	(1)
Radiated Spurious Emissions	26KHz~30MHz	±3.03dB	(1)
Radiated Spurious Emissions	30MHz~1000MHz	±5.03dB	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

7.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TES T CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave,Tianhe District, Guangzhou, Guangdong, China.

8 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dBμV between 0.15MHz & 0.5MHz
	56 dBμV between 0.5MHz & 5MHz
	60 dBμV between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

8.1 E.U.T. Operation

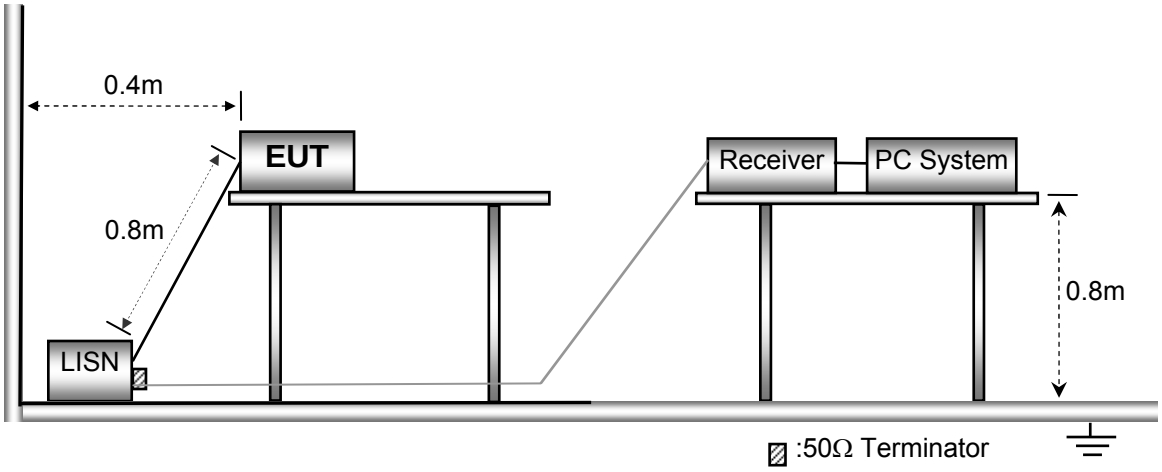
Operating Environment **:**

Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa
EUT Operation **:**	Transmitting mode

The test was performed in transmitting mode, the test data were shown in the report.

8.2 EUT Setup

The EUT was placed on the test table in shielding room.

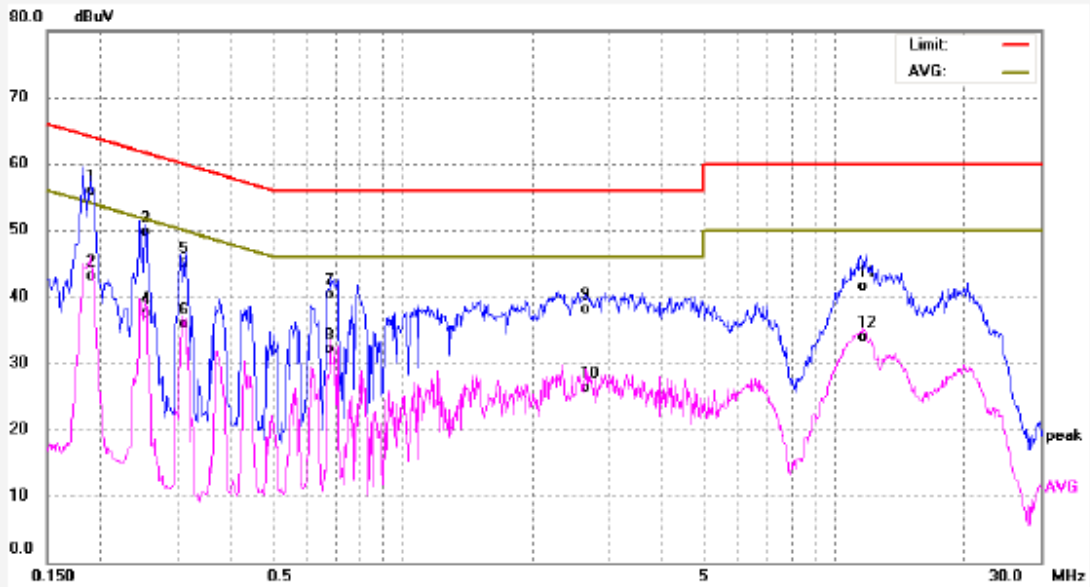


8.3 Measurement Description

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.

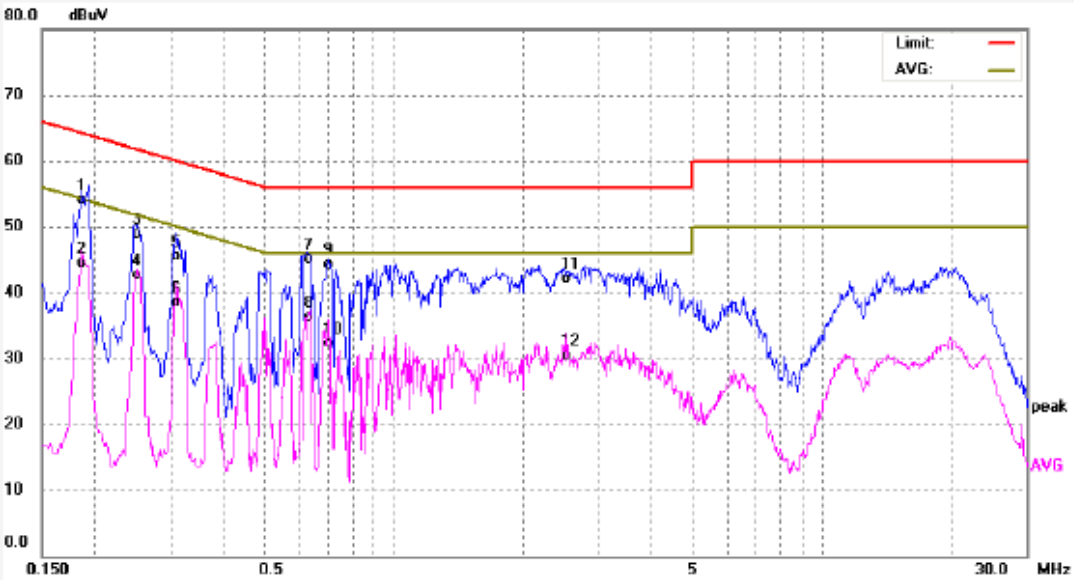
8.4 Conducted Emission Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1900	45.62	10.31	55.93	64.03	-8.10	QP	
2	0.1900	32.83	10.31	43.14	54.03	-10.89	AVG	
3	0.2540	39.36	10.39	49.75	61.62	-11.87	QP	
4	0.2540	27.11	10.39	37.50	51.62	-14.12	AVG	
5	0.3140	34.60	10.41	45.01	59.86	-14.85	QP	
6	0.3140	25.52	10.41	35.93	49.86	-13.93	AVG	
7	0.6820	29.77	10.45	40.22	56.00	-15.78	QP	
8	0.6820	21.75	10.45	32.20	46.00	-13.80	AVG	
9	2.6580	27.38	10.67	38.05	56.00	-17.95	QP	
10	2.6580	15.72	10.67	26.39	46.00	-19.61	AVG	
11	11.6220	30.35	11.12	41.47	60.00	-18.53	QP	
12	11.6220	22.69	11.12	33.81	50.00	-16.19	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1860	43.78	10.31	54.09	64.21	-10.12	QP	
2	0.1860	34.19	10.31	44.50	54.21	-9.71	AVG	
3	0.2500	38.44	10.39	48.83	61.75	-12.92	QP	
4	0.2500	32.37	10.39	42.76	51.75	-8.99	AVG	
5	0.3100	35.13	10.41	45.54	59.97	-14.43	QP	
6	0.3100	28.02	10.41	38.43	49.97	-11.54	AVG	
7	0.6340	34.55	10.47	45.02	56.00	-10.98	QP	
8	0.6340	25.84	10.47	36.31	46.00	-9.69	AVG	
9	0.7019	33.80	10.44	44.24	56.00	-11.76	QP	
10	0.7019	21.83	10.44	32.27	46.00	-13.73	AVG	
11	2.5300	31.37	10.66	42.03	56.00	-13.97	QP	
12	2.5300	19.76	10.66	30.42	46.00	-15.58	AVG	

9 Radiated Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

FCC Part15 Paragraph 15.209

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

9.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

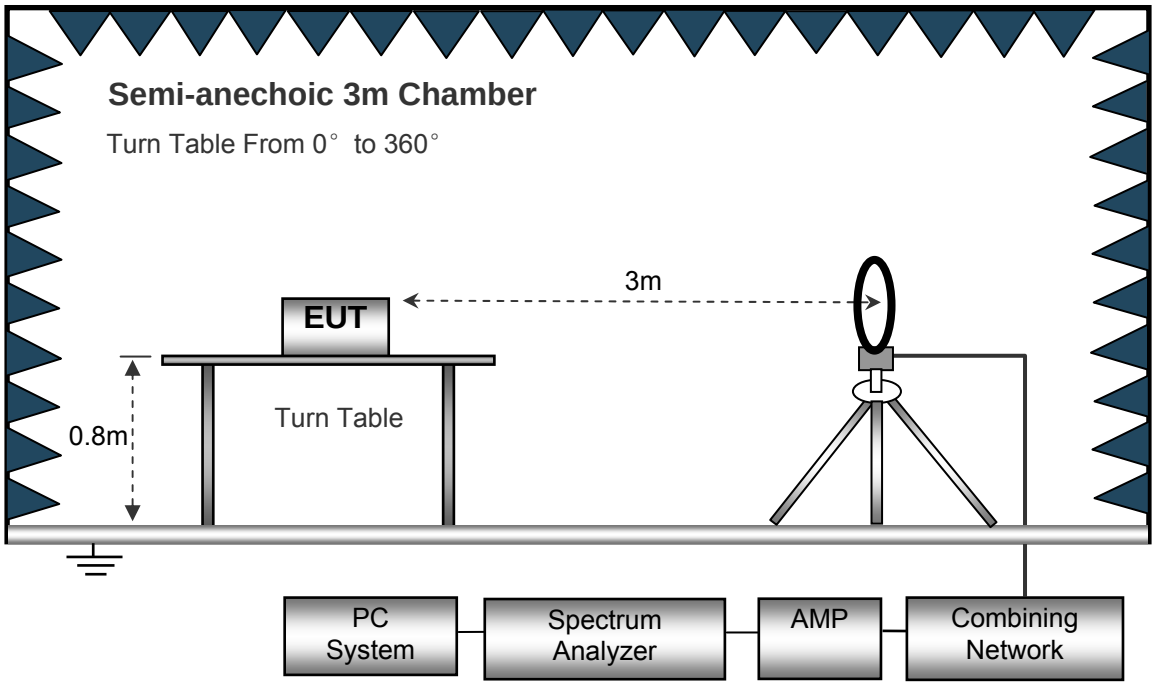
EUT Operation **:**

Only the worst case transmitting mode were record in the report.

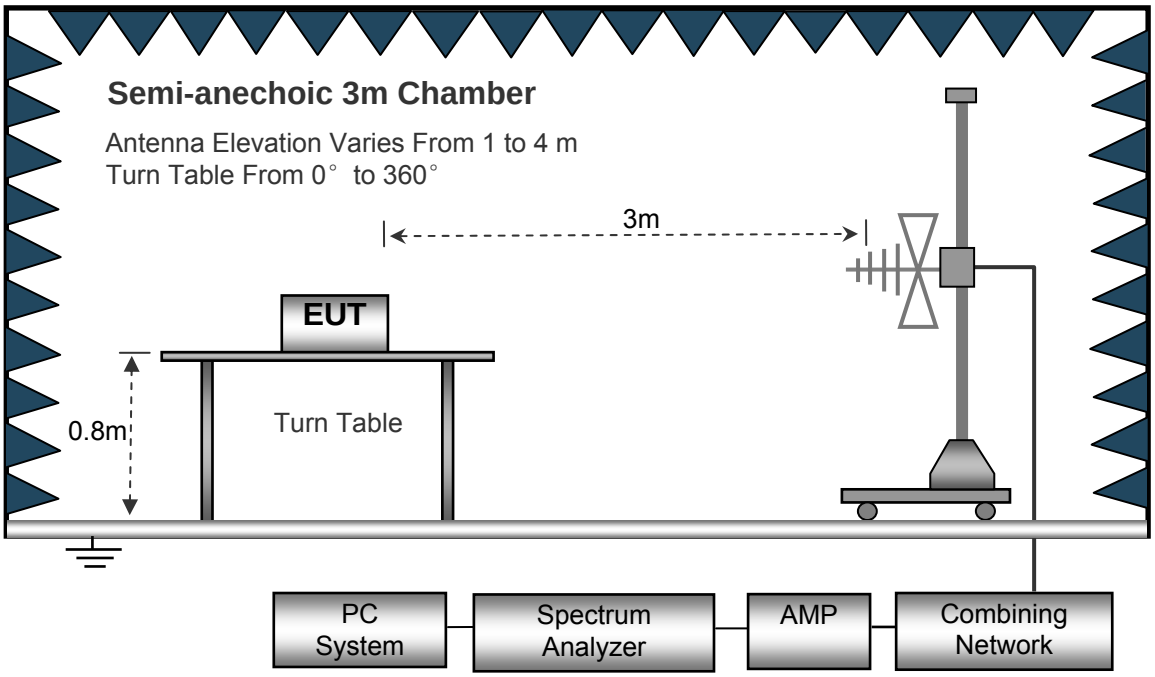
9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013.

The test setup for emission measurement below 30MHz.



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



9.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
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.

9.5 Summary of Test Results

Test Frequency: 9KHz ~ 30MHz, Note: Correct factor = Cable loss + Antenna factor

Frequency (MHz)	Measurement results	Detector	Correct factor	Measurement results (calculated)	Limits	Margin
	dBμV @3m	PK/QP	dB/m	dBμV/m @3m	dBμV/m @3m	dB
0.1145	49.69	QP	18.55	68.24	106.46	-38.22
0.2990	3.69	QP	28.22	31.91	98.09	-66.18
4.6670	10.91	QP	23.70	34.61	69.50	-34.89

Test Frequency: 30MHz ~ 1GHz

Frequency (MHz)	Measurement results (dBμV @3m)	Detector (PK/QP /Ave)	Degree	Height (m)	Polar (H/V)	Correct factor (dB)	Measurement results (calculated) (dBμV/m)	Limit (dBμV/m)	Margin (dB)
34.36	33.81	QP	130	1.7	H	-14.05	19.76	40	-20.24
34.36	33.09	QP	19	1.7	V	-14.05	19.04	40	-20.96
220.98	34.72	QP	20	1.2	H	-13.34	21.38	46.5	-25.12
220.98	36.57	QP	240	1.8	V	-13.34	23.23	46.5	-23.27
519.98	36.15	QP	193	1.9	H	-5.22	30.93	46.5	-15.57
519.98	37.99	QP	222	1.3	V	-5.22	32.77	46.5	-13.73

10 Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.215

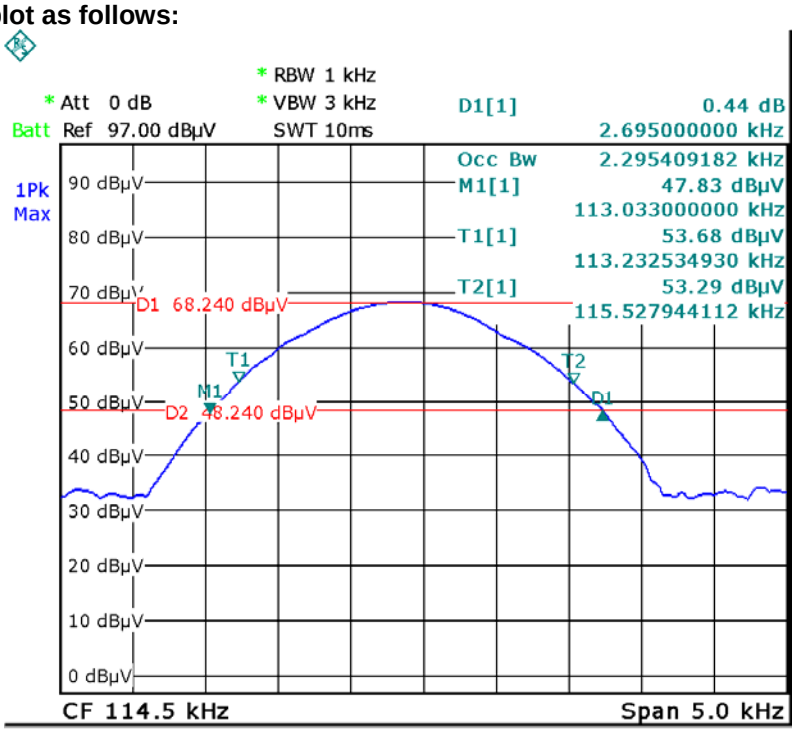
10.1 Test Procedure

1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions;
2. The span of the analyzer shall be set to capture all products of the modulation process,including the emission skirts.
3. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

10.2 Test Result Plot:

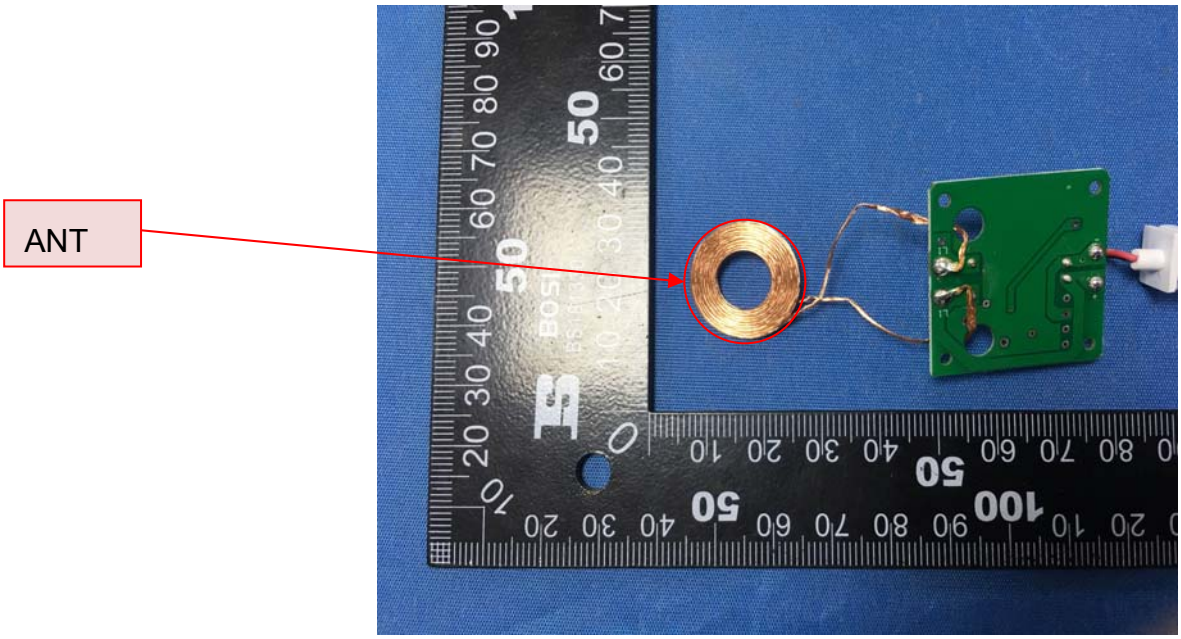
Test Channel(kHz)	99% Bandwidth(kHz)	20dB Bandwidth Emission(KHz)
114.50	2.295	2.695

Test result plot as follows:



11 Antenna Requirement

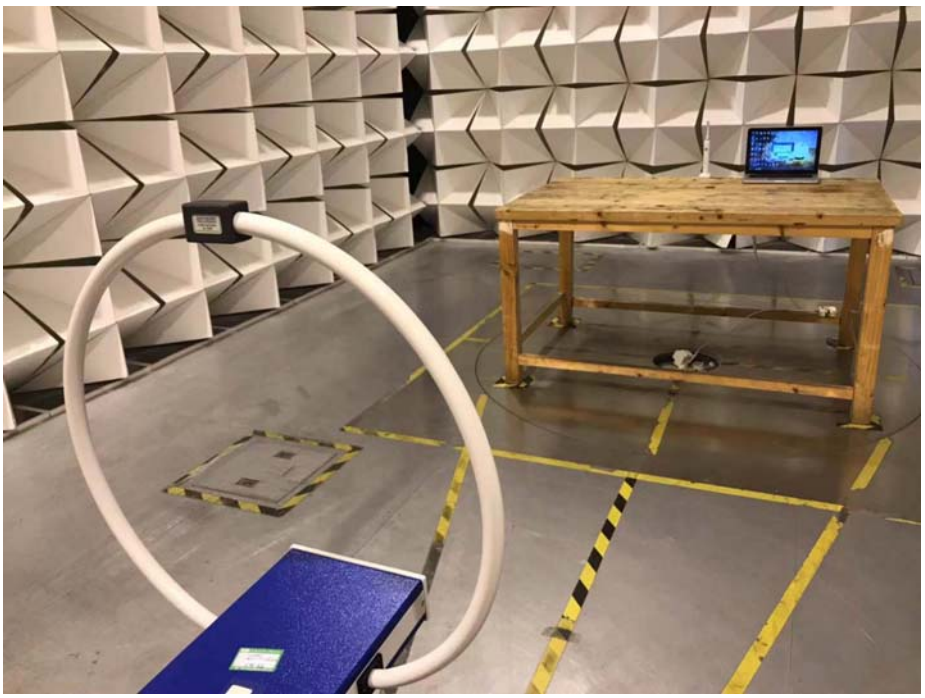
According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product has a Coil antenna, fulfill the requirement of this section.



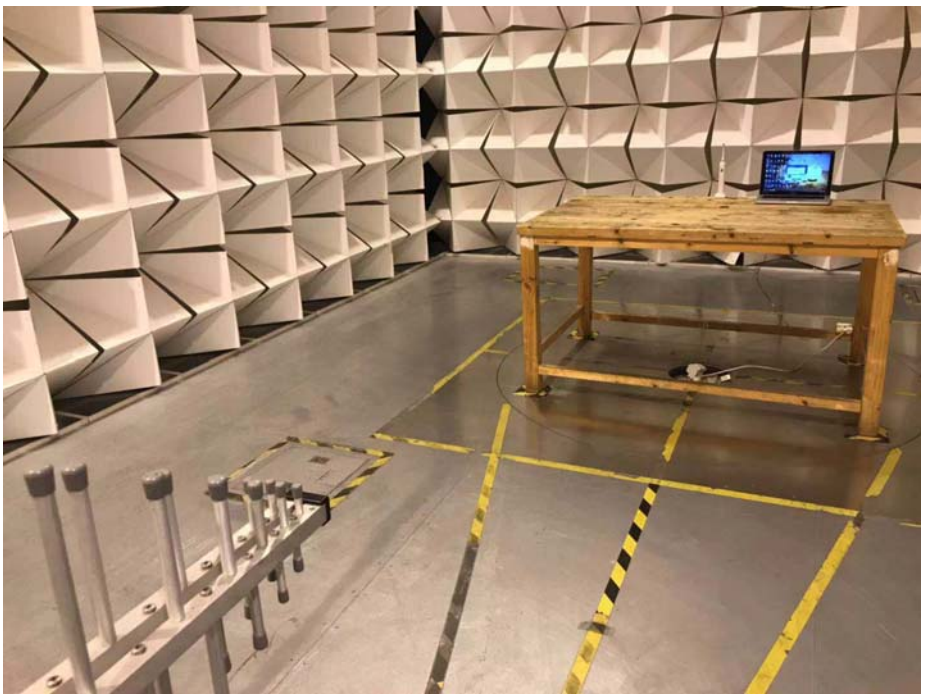
12 Photographs-Test Setup

12.1 Radiation Emission Test Setup

Below 30MHz



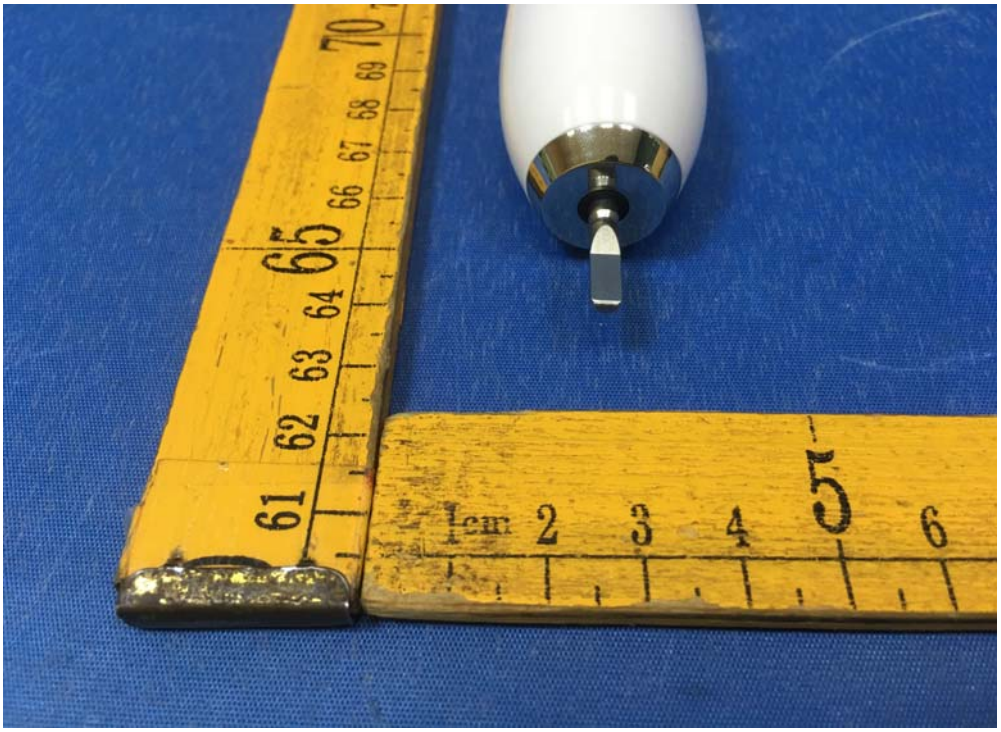
From 30MHz to 1GHz



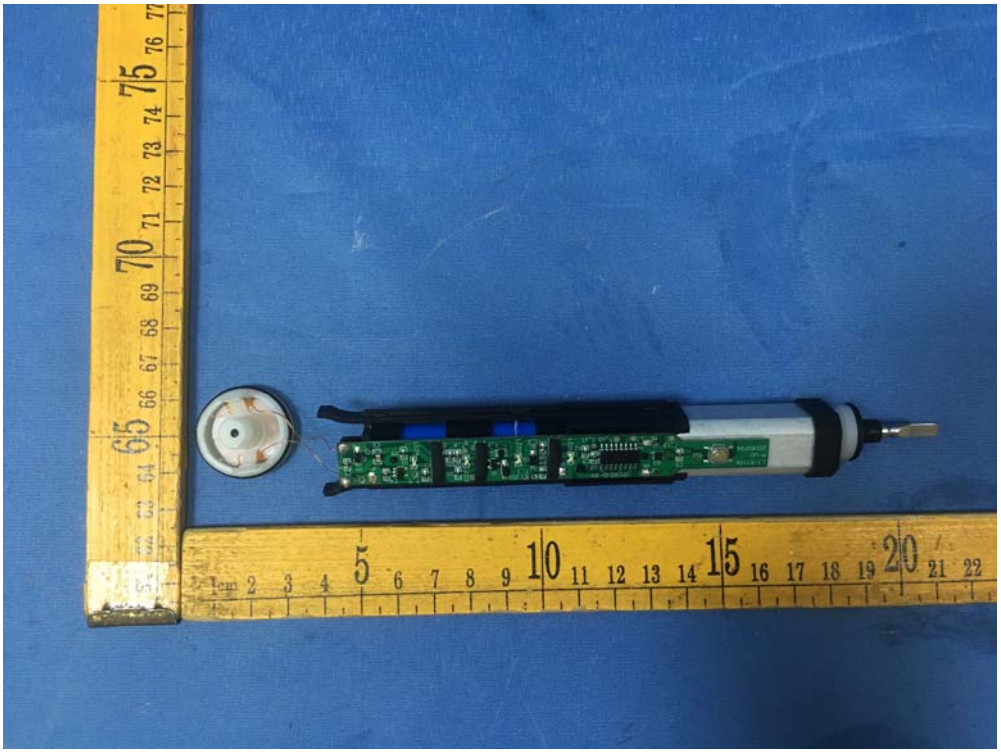
12.2 Photograph – Conducted Emission Test Setup

13 Photographs - Constructional Details

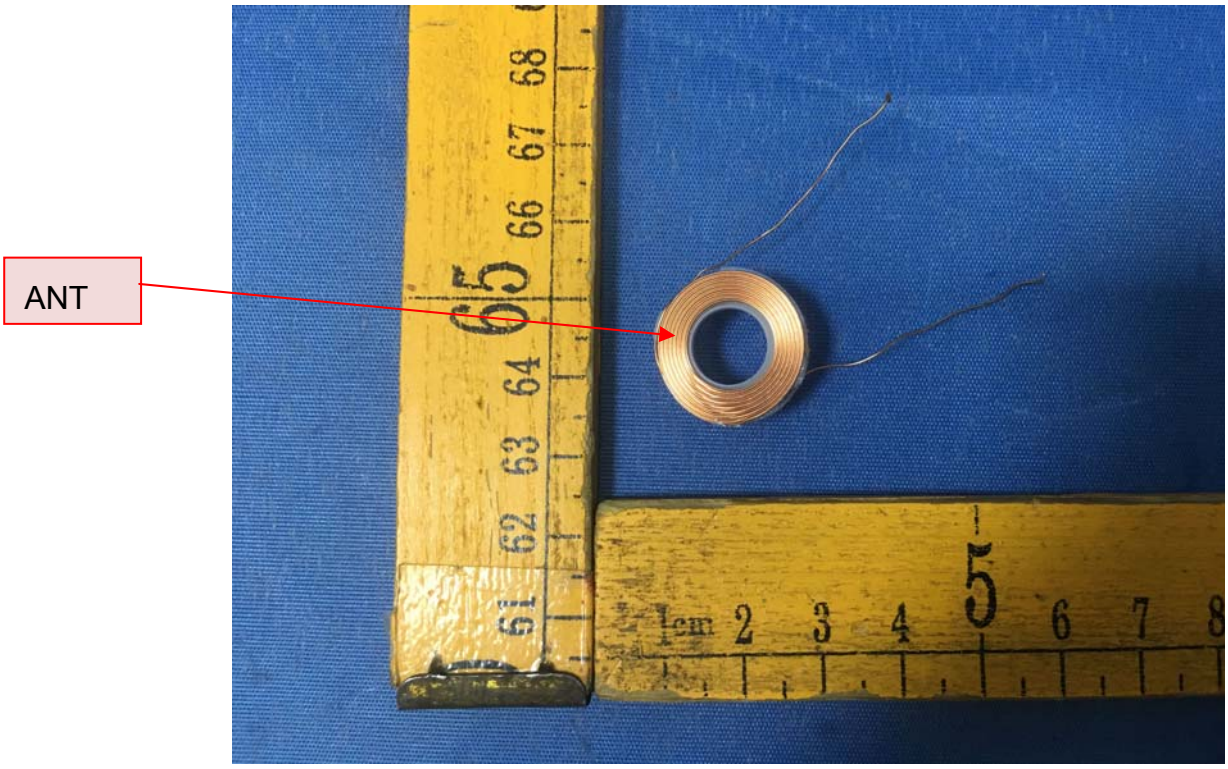
13.1 Model LJ-ST206 – External Photos



13.2 Model LJ-ST206 – Internal Photos



+ BFN ICR14500 650mAh 3.7V –
2.41Wh 2018F20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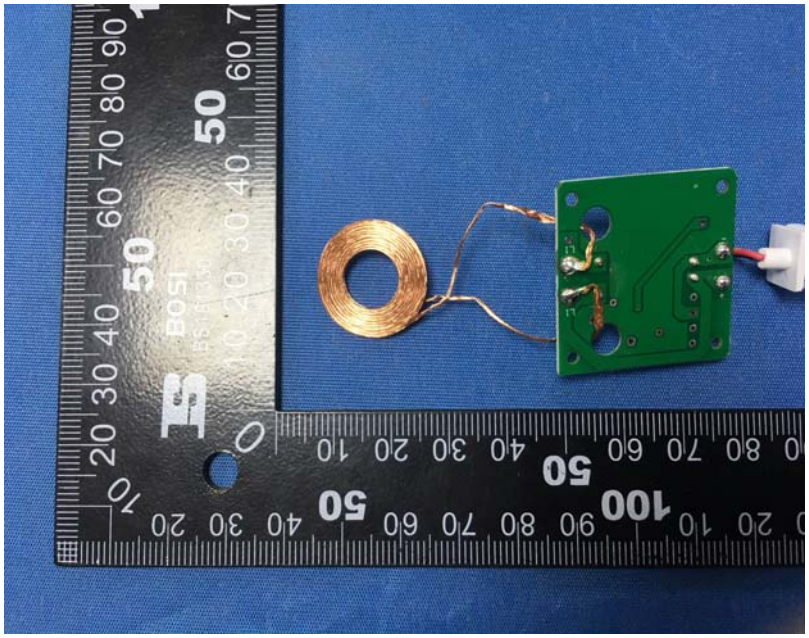

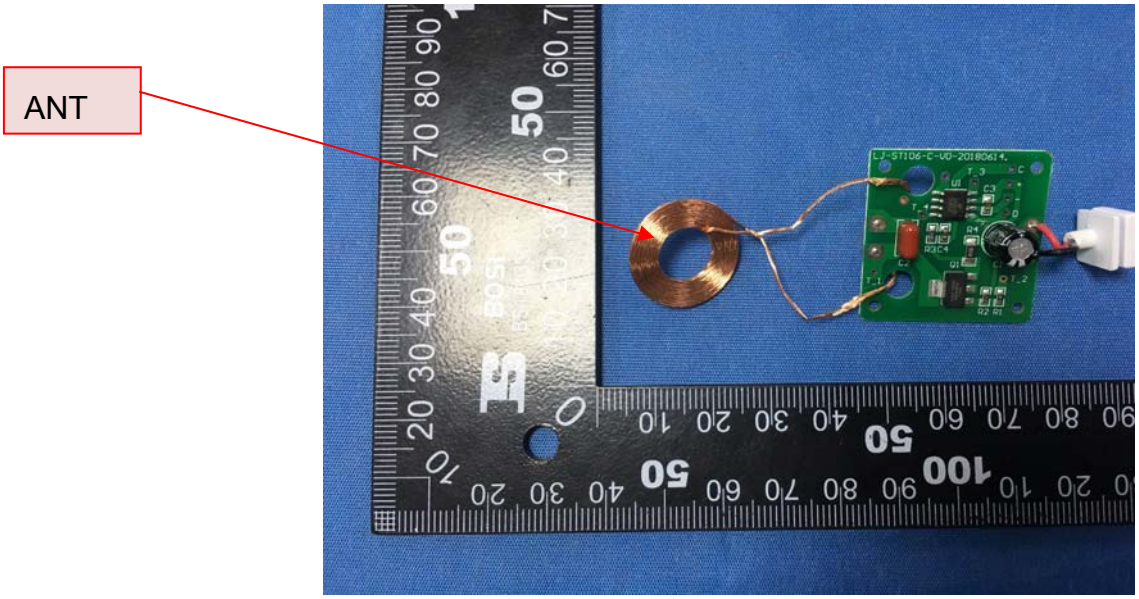

====== End of Report ======