PRECISE TESTING

TEST REPORT

FCC ID: 2AQP6RAYMIC

Product Name	:	Wireless Microphone
Model Name	:	MIC-18200UHF, PDWM1902, PDWM1904, PDWM2400, PDWM2560, PWMA2600, PDWM2800, PDWM3300, PDWM3360, PDWM3365, PDWM3375, PDWM3378, PDWM3400, PDWM3450, PDWM3500, PDWM3700, PDWM4350U, PDWM4360, PDWM4360U, PDWM4520, PDWM4540, PDWM4560, PDWM4650, PDWM4700, PDWM5900, PDWM7300, PDWM8225, PDWM8325, PDWM8250, PDWM8374
Brand Name	:	N/A
Report No.	:	PTC18060417901E-FC01

Prepared for

RAYYOUNG ELETRON LTD.

FLAT/RM B8/F CHARMING BUILDING72 CHEUNG SHA WAN RD KL HK

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	:	RAYYOUNG ELETRON LTD.
Address	:	FLAT/RM B8/F CHARMING BUILDING72 CHEUNG SHA WAN RD KL HK
Manufacture's name	:	RAYYOUNG ELETRON LTD.
Address	:	FLAT/RM B8/F CHARMING BUILDING72 CHEUNG SHA WAN RD KL HK
Product name	:	Wireless Microphone
Model name	:	MIC-18200UHF, PDWM1902, PDWM1904, PDWM2400, PDWM2560, PWMA2600, PDWM2800, PDWM3300, PDWM3360, PDWM3365, PDWM3375, PDWM3378, PDWM3400, PDWM3450, PDWM3500, PDWM3700, PDWM4350U, PDWM4360, PDWM4360U, PDWM4520, PDWM4540, PDWM4560, PDWM4650, PDWM4700, PDWM5900, PDWM7300, PDWM8225, PDWM8325, PDWM8250, PDWM8374
Standards	:	FCC CFR47 Part 15 Section 15.249
Test procedure	:	ANSI C63.10: 2013
Test Date	:	July 17, 2018 to August 01, 2018
Date of Issue	:	August 01, 2018
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 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
AC Power Conducted Emission	15.207	N/A
20dB Bandwidth	15.215(c)	PASS
Band edge	15.249 15.205 15.209	PASS
Field Strength of Fundamental Emissions	15.249(a) 15.249(c) 15.205(a) 15.209(a)	PASS
Radiated Spurious Emissions		PASS
Antenna Requirement	15.203	PASS

Note:

1. The EUT only powered by battery, no need to evaluate AC Power Conducted Emission.

2. The EUT is powered by new batteries during the test.

3 TEST FACILITY

Dongguan Precise Testing&Certification Corp., Ltd.

Building D,Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China, Dongguan, 523129

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	:	Wireless Microphone
Model Name	:	MIC-18200UHF, PDWM1902, PDWM1904, PDWM2400, PDWM2560, PWMA2600, PDWM2800, PDWM3300, PDWM3360, PDWM3365, PDWM3375, PDWM3378, PDWM3400, PDWM3450, PDWM3500, PDWM3700, PDWM4350U, PDWM4360, PDWM4360U, PDWM4520, PDWM4540, PDWM4560, PDWM4650, PDWM4700, PDWM5900, PDWM7300, PDWM8225, PDWM8325, PDWM8250, PDWM8374 (Note: The models are identified (included circuit diagram, PCB layout & components used without any modification) except the model name.)
Operating frequency	:	902MHz-927.87MHz
Numbers of Channel	:	200
Channel Space	:	130KHz
Antenna Type	:	Internal Antenna
Antenna Gain	:	0dBi
Type of Modulation	:	FM
Power supply	:	DC 2*1.5V Battery

4.2 Test Mode

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.
For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode A, Therefore only the test data of the mode was recorded in this report.

Channel List:

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
902.000	908.500	915.000	921.500
902.130	908.630	915.130	921.630
902.260	908.760	915.260	921.760
902.390	908.890	915.390	921.890
902.520	909.020	915.520	922.020
902.650	909.150	915.650	922.150
902.780	909.280	915.780	922.280
902.910	909.410	915.910	922.410
903.040	909.540	916.040	922.540
903.170	909.670	916.170	922.670
903.300	909.800	916.300	922.800
903.430	909.930	916.430	922.930
903.560	910.060	916.560	923.060
903.690	910.190	916.690	923.190
903.820	910.320	916.820	923.320
903.950	910.450	916.950	923.450
904.080	910.580	917.080	923.580
904.210	910.710	917.210	923.710
904.340	910.840	917.340	923.840
904.470	910.970	917.470	923.970
904.600	911.100	917.600	924.100
904.730	911.230	917.730	924.230
904.860	911.360	917.860	924.360
904.990	911.490	917.990	924.490
905.120	911.620	918.120	924.620
905.250	911.750	918.250	924.750

905.380	911.880	918.380	924.880
905.510	912.010	918.510	925.010
905.640	912.140	918.640	925.140
905.770	912.270	918.770	925.270
905.900	912.400	918.900	925.400
906.030	912.530	919.030	925.530
906.160	912.660	919.160	925.660
906.290	912.790	919.290	925.790
906.420	912.920	919.420	925.920
906.550	913.050	919.550	926.050
906.680	913.180	919.680	926.180
906.810	913.310	919.810	926.310
906.940	913.440	919.940	926.440
907.070	913.570	920.070	926.570
907.200	913.700	920.200	926.700
907.330	913.830	920.330	926.830
907.460	913.960	920.460	926.960
907.590	914.090	920.590	927.090
907.720	914.220	920.720	927.220
907.850	914.350	920.850	927.350
907.980	914.480	920.980	927.480
908.110	914.610	921.110	927.610
908.240	914.740	921.240	927.740
908.370	914.870	921.370	927.870

The 3 channels of lower, middle and higher were chosen for test.

Channel	Frequency(MHz)
1	902.000
101	915.000
200	927.870

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	MY56070279	10Hz-30GHz	Apr 07, 2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Oct 09, 2018

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	Sep. 03, 2018
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Aug 31, 2018
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Aug 31, 2018
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep. 03, 2018
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep. 03, 2018
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Oct. 13, 2018
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Aug. 31, 2018
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Aug. 31, 2018
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep. 03, 2018

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.
N/A	N/A	N/A

6 Field Strength of Fundamental Emission and Radiated Spurious Emissions

Test Requirement: : FCC Part C section 15.205 & 15.209 & 15.249

Test Method: : ANSI C63.10: 2013

Test Result: : PASS

Measurement Distance: : 3m

Limit: : See the follow table

15.209 limit:

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	$20\log^{(500)}$

Note: 1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

The field strength of emission from intentional radiators operated within these frequency bands shall comply with the following:

15.249(a) Limit:

Fundamental Frequency	Field strength of fundamental		Field strength of harmonics	
(MHz)	mV/m	dBuV/m	uV/m	dBuV/m
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54
24000-24250	250	108	2500	68

6.1 EUT Operation

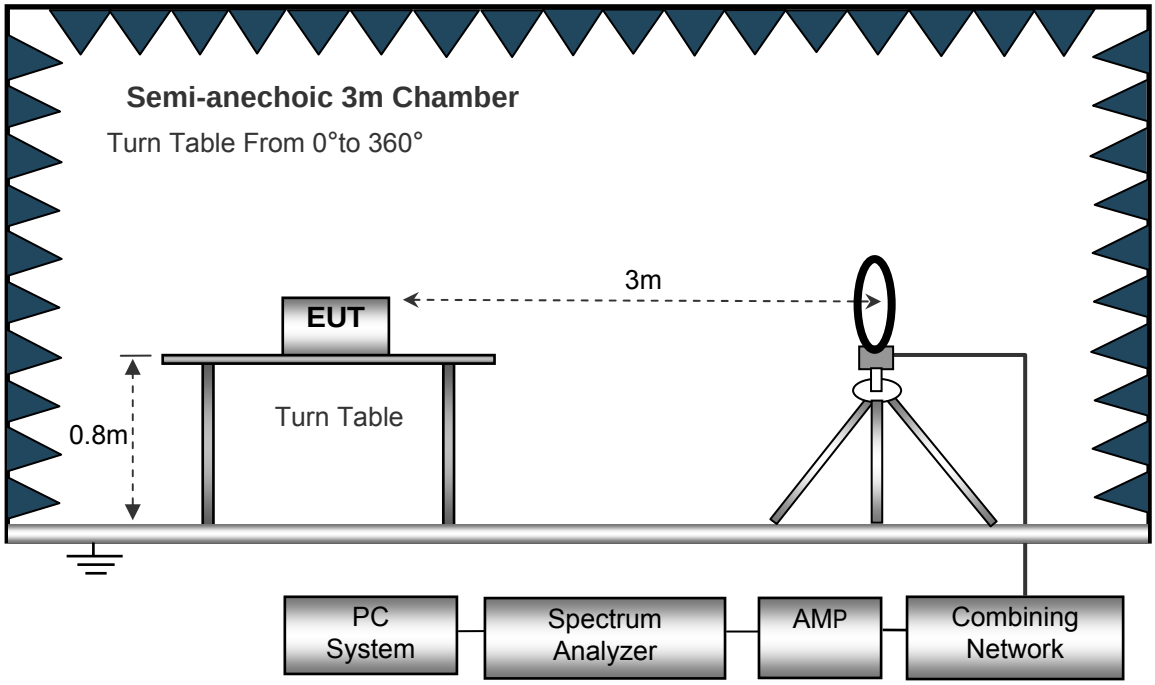
Operating Environment :

Temperature:	:	23.5 °C
Humidity:	:	51.1 % RH
Atmospheric Pressure:	:	101.2kPa
Test Voltage	:	DC 2*1.5V Battery

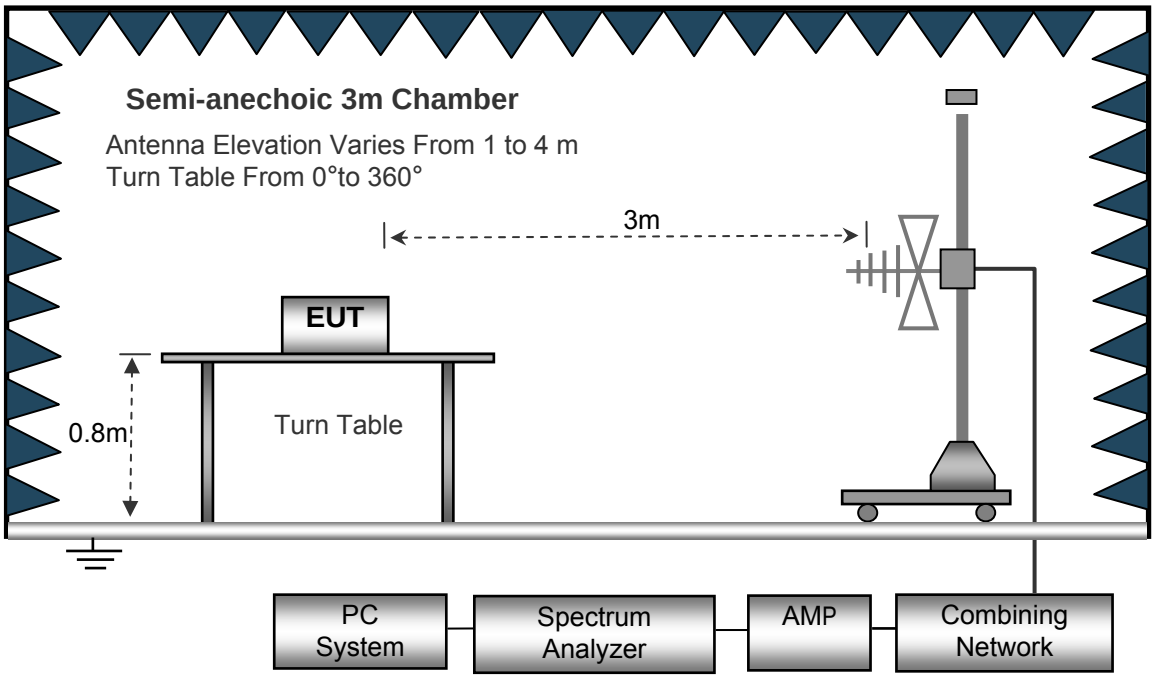
6.2 Test Setup

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

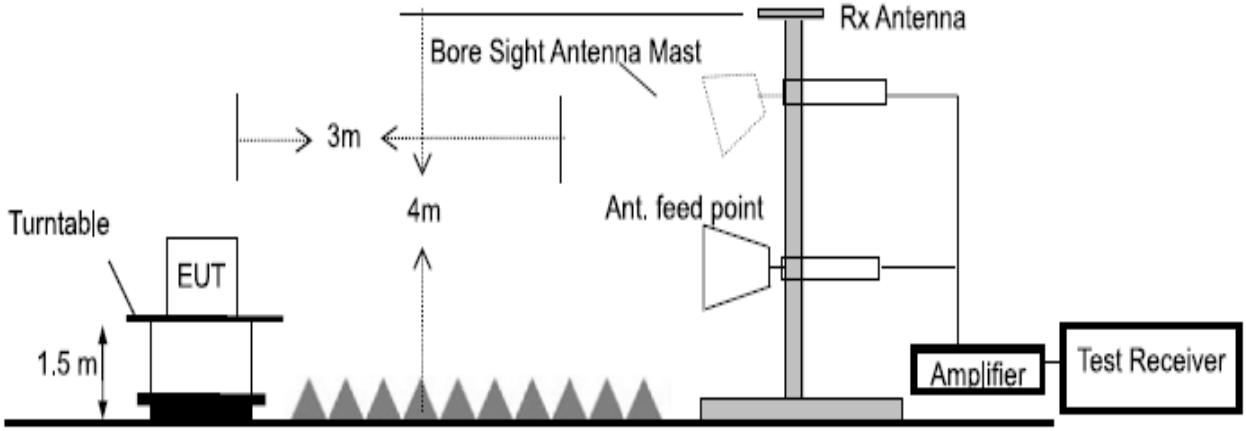
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



6.3 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

6.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.

2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m 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.

6.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

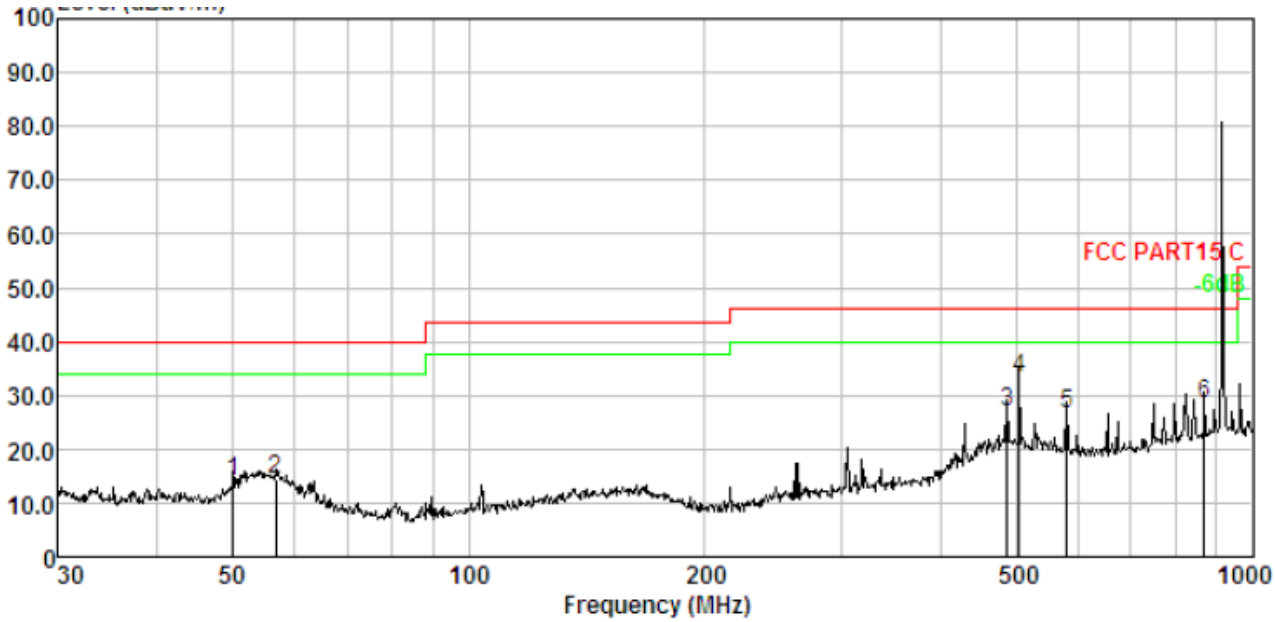
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

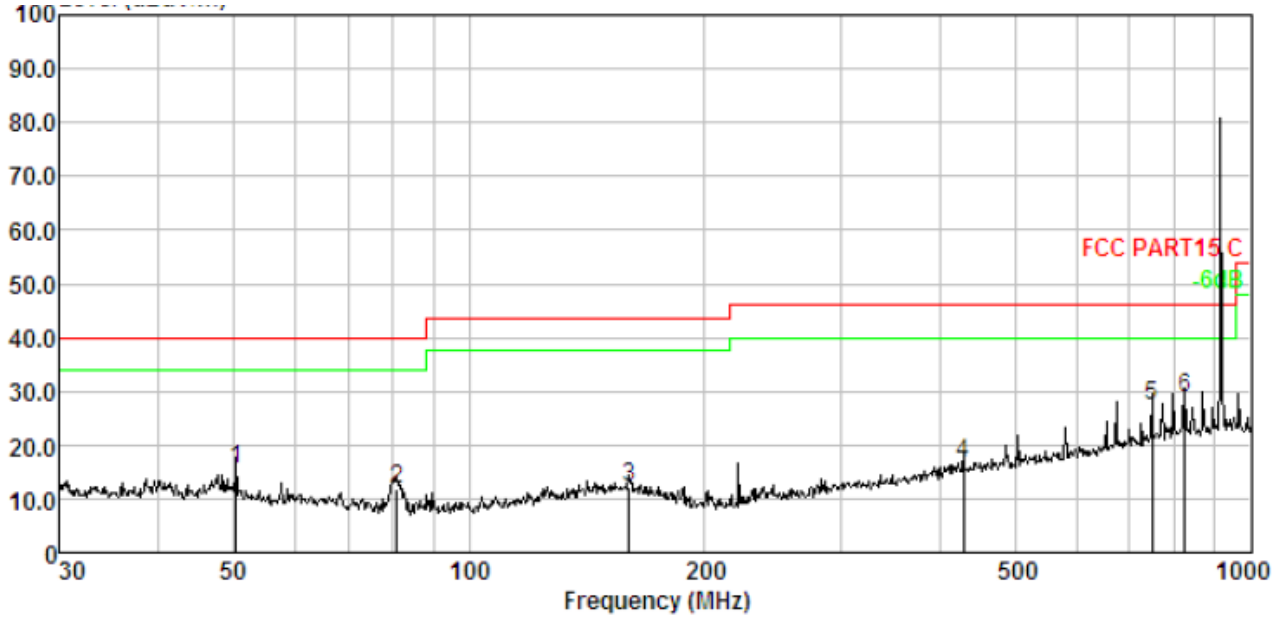
Remark: only the worst data were reported.

Test plot for Horizontal: 902.000MHz



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.	50.057	1.52	12.27	30.34	30.15	13.98	40.00	-26.02	QP
2.	56.792	1.63	12.00	30.92	30.19	14.36	40.00	-25.64	QP
3.	487.315	3.58	16.95	37.48	30.94	27.07	46.00	-18.93	QP
4.	504.706	3.61	17.12	43.32	30.95	33.10	46.00	-12.90	QP
5.	580.703	3.74	18.64	35.33	31.00	26.71	46.00	-19.29	QP
6.	869.130	4.10	22.05	33.44	31.14	28.45	46.00	-17.55	QP

Test plot for Vertical: 902.000MHz



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.	50.409	1.52	12.24	32.01	30.15	15.62	40.00	-24.38	QP
2.	80.927	1.95	8.75	31.54	30.32	11.92	40.00	-28.08	QP
3.	160.346	2.57	13.86	26.42	30.55	12.30	43.50	-31.20	QP
4.	429.523	3.46	15.95	28.28	30.90	16.79	46.00	-29.21	QP
5.	747.483	3.97	21.28	33.25	31.09	27.41	46.00	-18.59	QP
6.	824.597	4.06	21.93	33.91	31.12	28.78	46.00	-17.22	QP

Fundamental and Harmonics Average Result

Frequency	Emission Level	Limit	Margin	Ant. Polar	Detector
(MHz)	(dBμV/m)	(dBμV/m)	Polar	H/V	
902.000	81.32	94	-12.68	H	QP
902.000	83.19	94	-10.81	V	QP
915.000	82.49	94	-11.51	H	QP
915.000	79.41	94	-14.59	V	QP
927.870	84.02	94	-9.98	H	QP
927.870	83.15	94	-10.85	V	QP

Test Frequency 1GHz-10GHz:

Frequency : 902.000MHz

Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
1804	V	59.31	45.26	74	54	-14.69	-8.74
2706	V	58.46	43.21	74	54	-15.54	-10.79
3608	V	57.05	40.19	74	54	-16.95	-13.81
4510	V	55.29	37.26	74	54	-18.71	-16.74
5412	V	50.14	35.16	74	54	-23.86	-18.84
6314	V	48.06	32.09	74	54	-25.94	-21.91
1804	H	58.42	44.29	74	54	-15.58	-9.71
2706	H	57.26	41.08	74	54	-16.74	-12.92
3608	H	56.32	38.13	74	54	-17.68	-15.87
4510	H	54.18	36.29	74	54	-19.82	-17.71
5412	H	50.29	35.24	74	54	-23.71	-18.76
6314	H	47.12	33.18	74	54	-26.88	-20.82

Frequency: 915.000MHz

Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
1830	V	57.04	44.13	74	54	-16.96	-9.87
2745.3	V	53.69	42.08	74	54	-20.31	-11.92
3660	V	51.23	38.16	74	54	-22.77	-15.84
4575	V	45.18	35.22	74	54	-28.82	-18.78
5490	V	42.67	32.48	74	54	-31.33	-21.52
6405	V	39.23	30.16	74	54	-34.77	-23.84
1830	H	55.48	43.29	74	54	-18.52	-10.71
2745.3	H	53.29	41.07	74	54	-20.71	-12.93
3660	H	48.18	38.92	74	54	-25.82	-15.08
4575	H	45.29	34.15	74	54	-28.71	-19.85
5490	H	42.04	31.04	74	54	-31.96	-22.96
6405	H	37.18	28.76	74	54	-36.82	-25.24

Frequency: 927.870MHz

Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
1855.74	V	55.08	45.92	74	54	-18.92	-8.08
2783.61	V	52.84	41.52	74	54	-21.16	-12.48
3711.48	V	48.26	38.27	74	54	-25.74	-15.73
4639.35	V	44.18	36.29	74	54	-29.82	-17.71
5567.22	V	41.92	31.48	74	54	-32.08	-22.52
6495.09	V	38.27	27.56	74	54	-35.73	-26.44
1855.74	H	54.15	46.29	74	54	-19.85	-7.71
2783.61	H	51.92	42.18	74	54	-22.08	-11.82
3711.48	H	48.69	38.46	74	54	-25.31	-15.54
4639.35	H	45.08	35.82	74	54	-28.92	-18.18
5567.22	H	43.62	32.69	74	54	-30.38	-21.31
6495.09	H	40.28	29.57	74	54	-33.72	-24.43

7 BAND EDGE EMISSION

7.1 TEST PROCEDURE

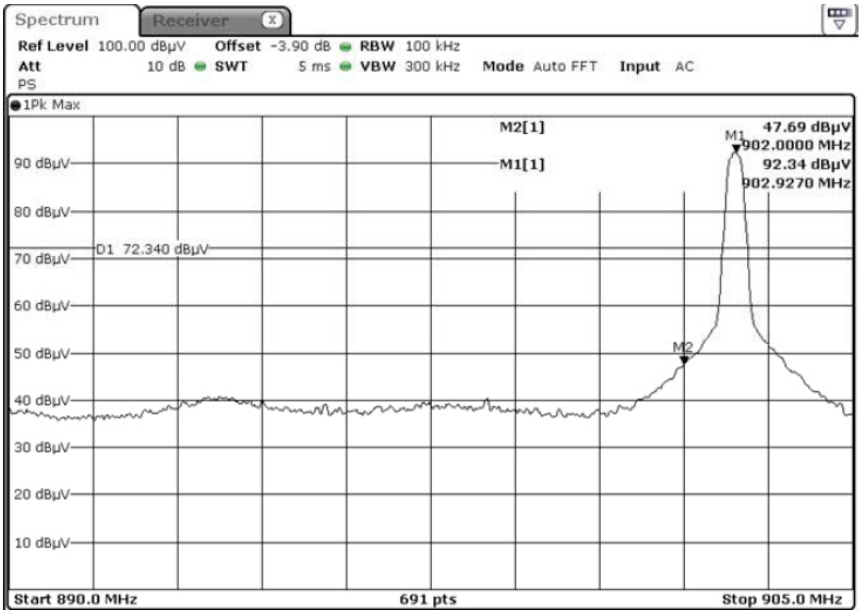
1. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

2. Set RBW to 100KHz and VBW of spectrum analyzer to 300KHz with a convenient frequency span including 100KHz bandwidth from band edge.

3. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

4. Repeat above procedures until all measured frequencies were completed.

7.2 TEST RESULTS



Spectrum
Receiver
Ref Level 100.00 dBµV Offset -3.90 dB RBW 100 kHz
Att 10 dB SWT 5 ms VBW 300 kHz Mode Auto FFT Input AC
PS
1Pk Max
M1[1] 87.35 dBµV
926.7780 MHz
M2[1] 42.32 dBµV
928.0000 MHz
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
M1
D1 67.350 dBµV
M2
Start 925.0 MHz
691 pts
Stop 938.0 MHz

8 20 dB Bandwidth Measurement

Test Method : ANSI C63.10: 2013

8.1 Test Procedure

Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.

Set span = 3MHz, centered on a transmitting channel

RBW≥1% 20dB Bandwidth, VBW≥RBW

Sweep= auto

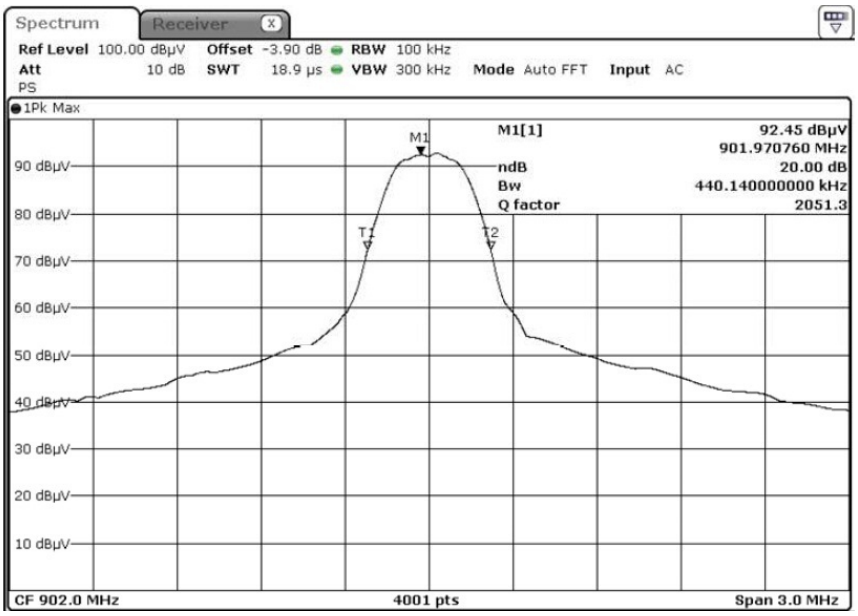
Detector function=peak

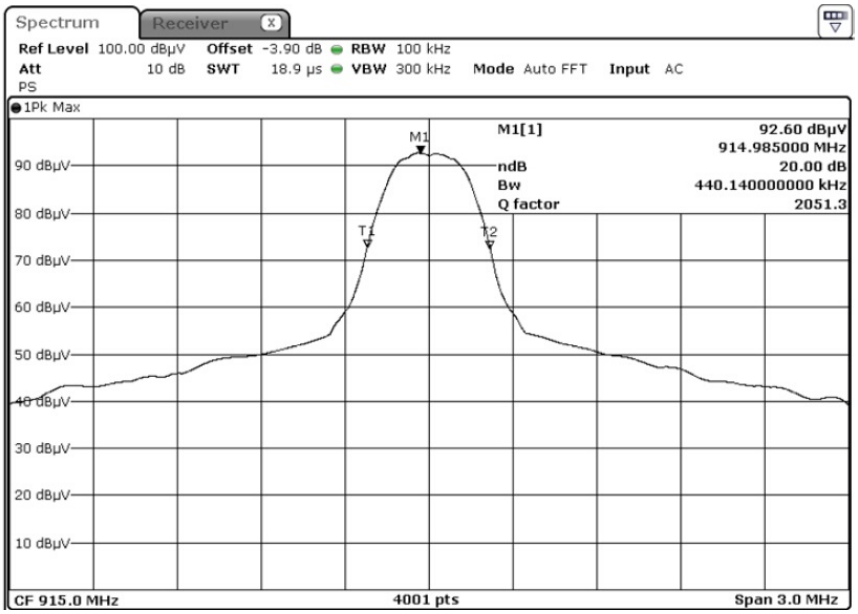
Trace=max hold

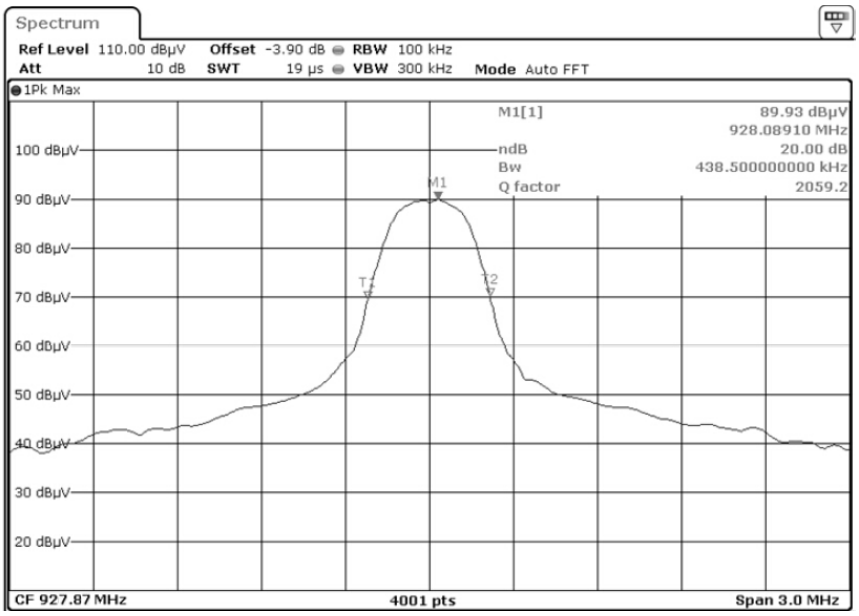
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

8.2 Test Result

Channel number	Channel frequency (MHz)	20dB Down BW(KHz)
01	902.000	440.14
11	915.000	440.14
20	927.870	438.50


Spectrum
Receiver
Ref Level 100.00 dBµV Offset -3.90 dB RBW 100 kHz
Att 10 dB SWT 18.9 µs VBW 300 kHz Mode Auto FFT Input AC
PS
1Pk Max
M1[1]
92.45 dBµV
901.970760 MHz
ndB 20.00 dB
Bw 440.140000000 kHz
Q factor 2051.3
M1
T1
T2
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
CF 902.0 MHz
4001 pts
Span 3.0 MHz


Spectrum
Receiver
Ref Level 100.00 dBµV Offset -3.90 dB RBW 100 kHz
Att 10 dB SWT 18.9 µs VBW 300 kHz Mode Auto FFT Input AC
PS
1Pk Max
M1[1]
92.60 dBµV
914.985000 MHz
ndB 20.00 dB
Bw 440.140000000 kHz
Q factor 2051.3
M1
T1
T2
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
CF 915.0 MHz
4001 pts
Span 3.0 MHz


Spectrum
Ref Level 110.00 dBµV Offset -3.90 dB RBW 100 kHz
Att 10 dB SWT 19 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 89.93 dBµV
928.08910 MHz
ndB 20.00 dB
Bw 438.500000000 kHz
Q factor 2059.2
M1
T1
T2
100 dBµV
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
CF 927.87 MHz
4001 pts
Span 3.0 MHz

9 Antenna Requirement

9.1 Antenna Requirement

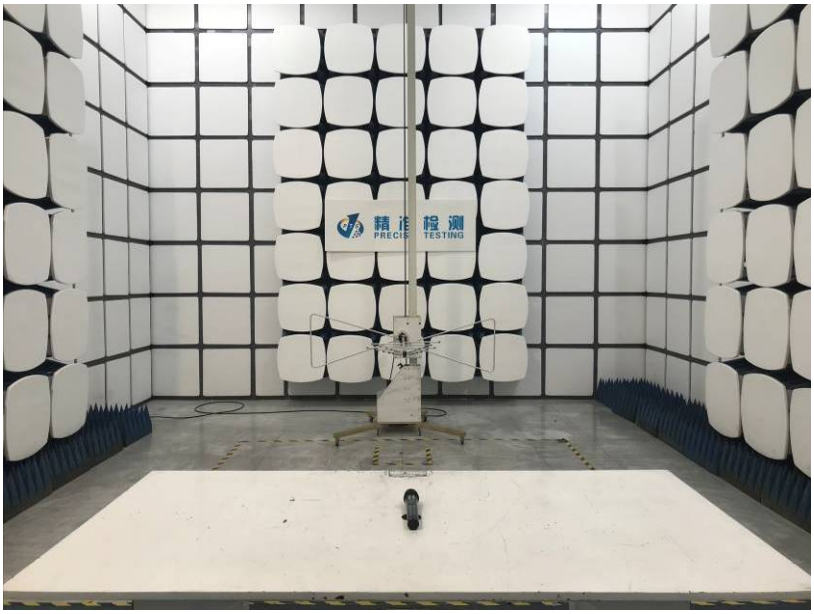
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 Result

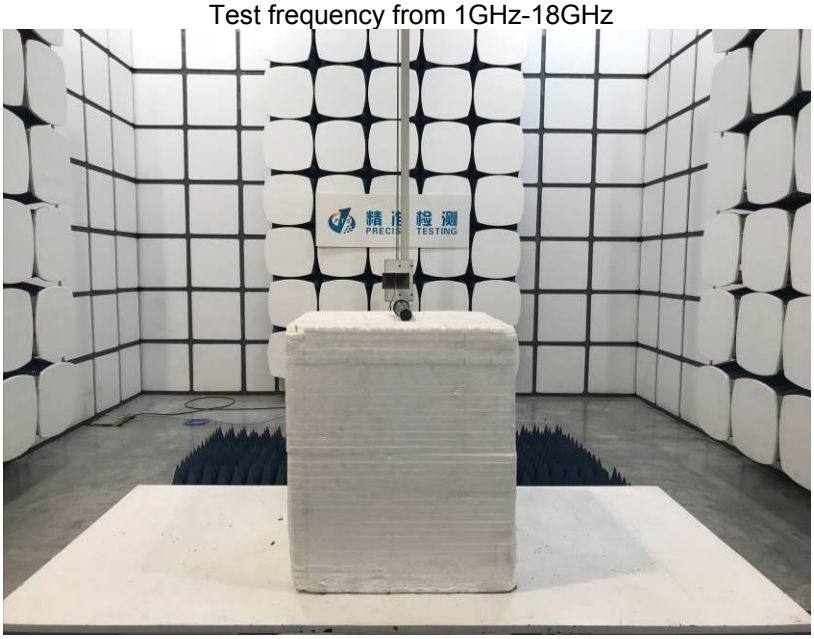
The EUT'S antenna, permanent attached antenna, is internal antenna. The antenna's gain is 0dBi and meets the requirement.

10 TEST PHOTOS

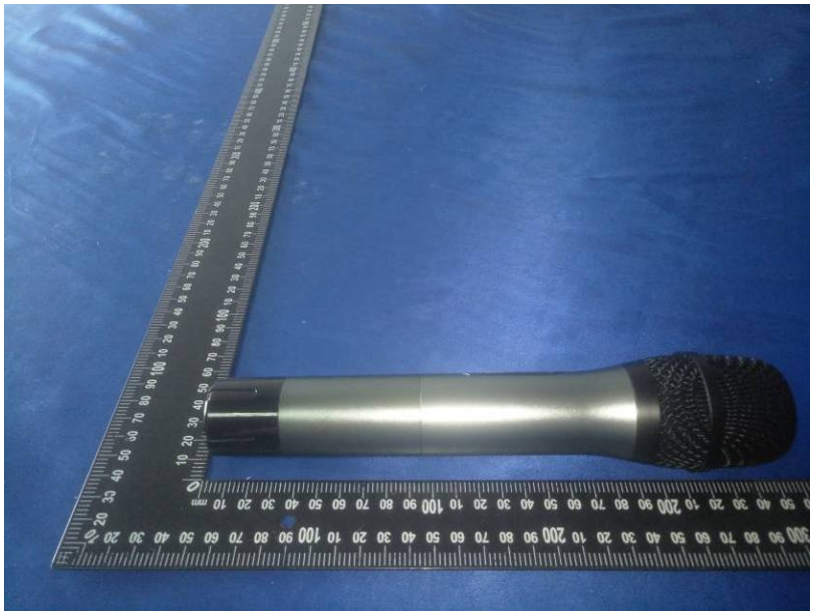
Radiated Spurious Emissions
From 30MHz-1000MHz

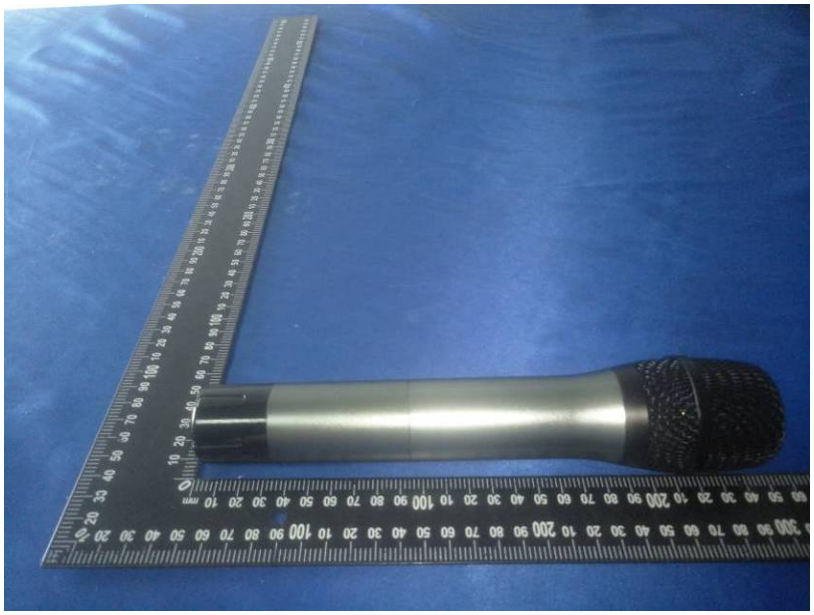


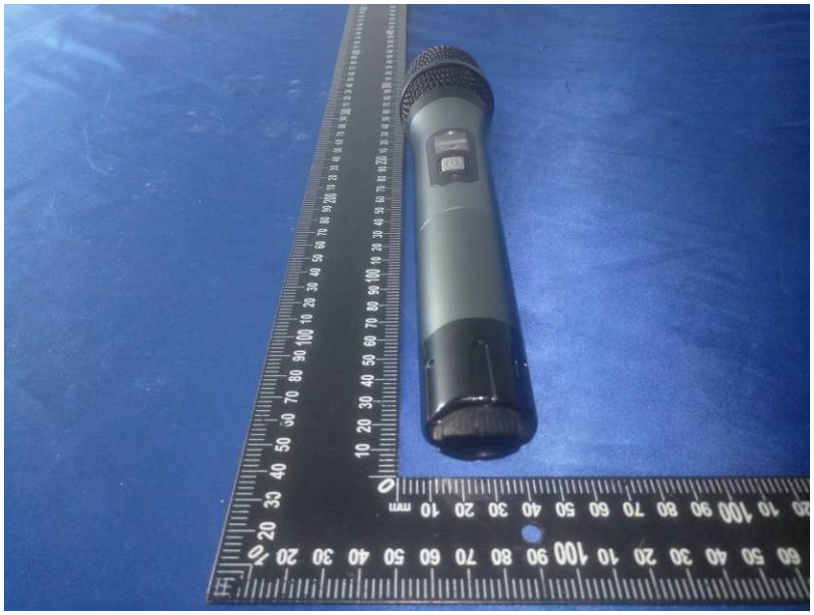
Test frequency from 1GHz-18GHz

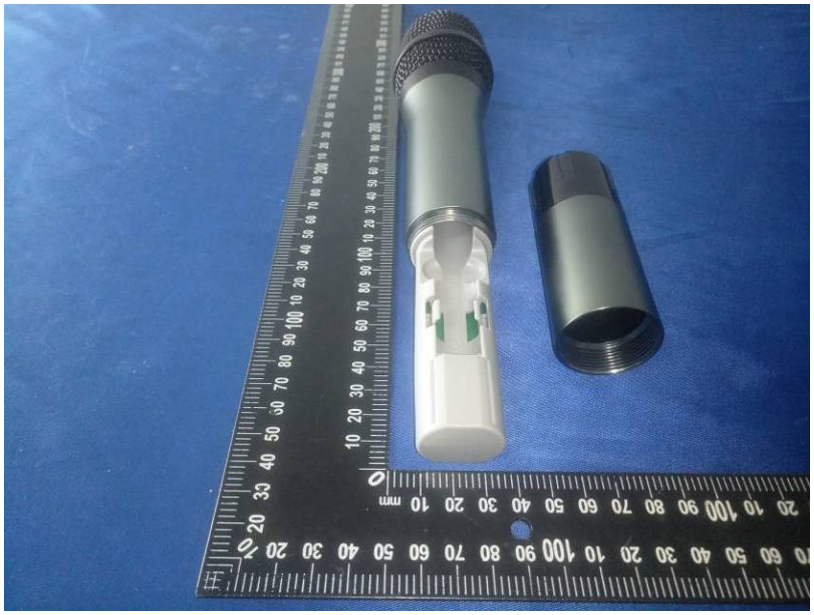


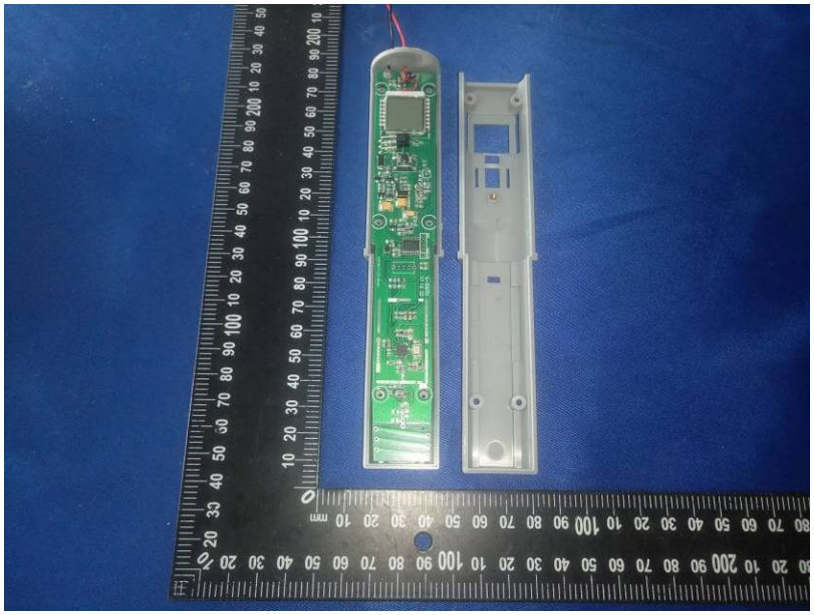
11 EUT PHOTOS

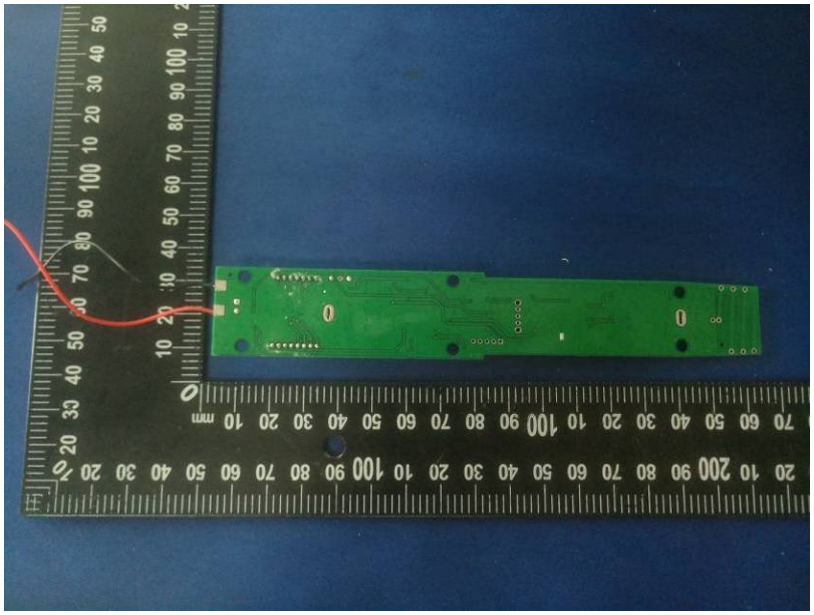


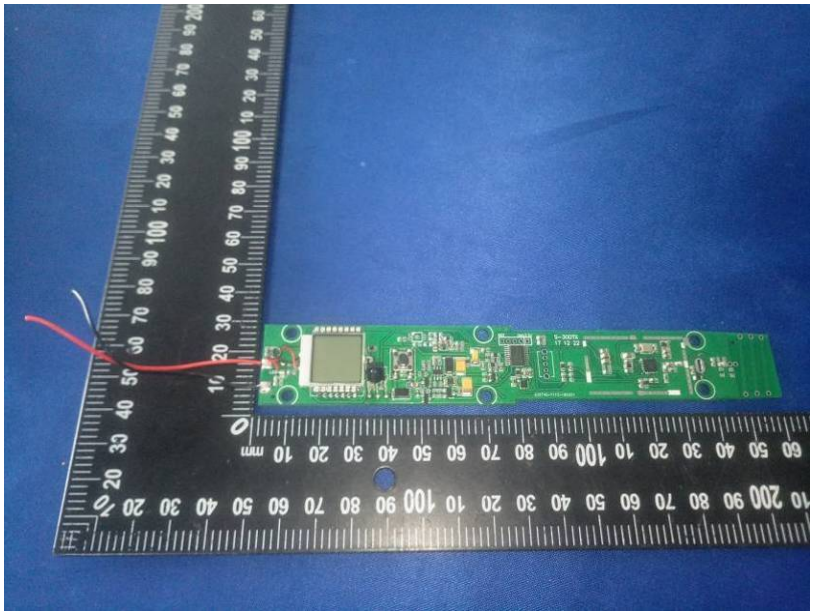


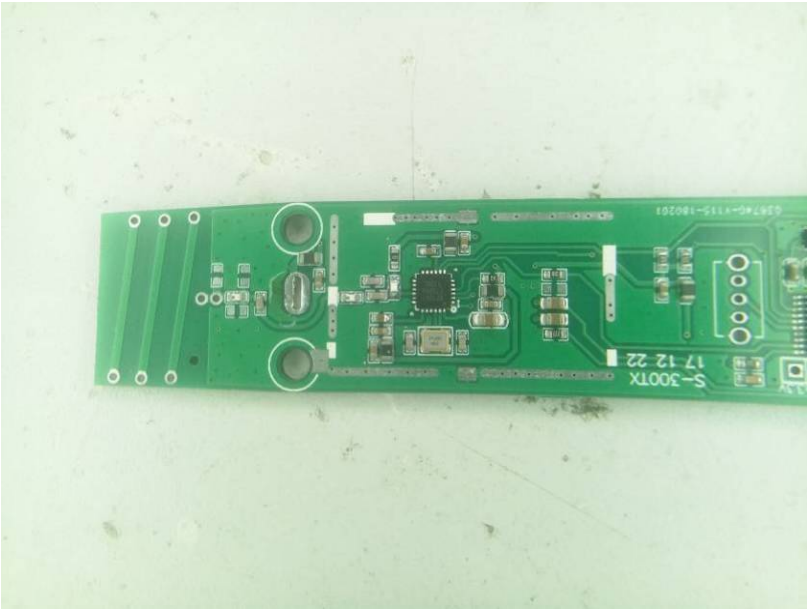












********THE END REPORT********