FCC REPORT

Applicant:	Shenzhen Qiheyuan Technology Co., LTD
Address of Applicant:	Room 301, Building B1, Songfa Industry Park, No. 26, Hexiu West Road, Heping Community, Fuhai Street, Baoan, District, Shenzhen, China
Manufacturer:	Shenzhen Qiheyuan Technology Co., LTD
Address of Manufacturer:	Room 301, Building B1, Songfa Industry Park, No. 26, Hexiu West Road, Heping Community, Fuhai Street, Baoan, District, Shenzhen, China

Equipment Under Test (EUT)

Product Name:	Wireless Speaker
Model No.:	S208, QHY-08, S108, S308, S608, S808, S908, S008
FCC ID:	2AQ6E-S208
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.249
Date of sample receipt:	August 21, 2018
Date of Test:	August 22-30, 2018
Date of report issued:	August 31, 2018
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

This 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.

2 Version

Version No.	Date	Description
00	*August 31, 2018*	*Original*

Prepared By:		***Date:***	*August 31, 2018*
	Project Engineer		
Check By:		***Date:***	*August 31, 2018*
	Reviewer		

3 Contents

Page

1 COVER PAGE 1

2 VERSION 2

3 CONTENTS 3

4 TEST SUMMARY 4

4.1 MEASUREMENT UNCERTAINTY 4

5 GENERAL INFORMATION 5

5.1 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 7
5.3 DESCRIPTION OF SUPPORT UNITS 7
5.4 TEST FACILITY 7
5.5 TEST LOCATION 7

6 TEST INSTRUMENTS LIST 8

7 TEST RESULTS AND MEASUREMENT DATA 10

7.1 ANTENNA REQUIREMENT 10
7.2 CONDUCTED EMISSIONS 11
7.3 RADIATED EMISSION METHOD 14
7.3.1 Field Strength of The Fundamental Signal 16
7.3.2 Spurious emissions 17
7.3.3 Bandedge emissions 22
7.4 20DB OCCUPY BANDWIDTH 23

8 TEST SETUP PHOTO 27

9 EUT CONSTRUCTIONAL DETAILS 29

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark：Test according to ANSI C63.10:2013.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Wireless Speaker
Model No.:	S208, QHY-08, S108, S308, S608, S808, S908, S008
Test Model No:	S208
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color and model name for commercial purpose.	
Serial No.:	BC058791Z
Test sample(s) ID:	GTS201808000153-1
Sample(s) Status	Engineered sample
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, π/4-DQPSK, 8-DPSK
Antenna Type:	PCB antenna
Antenna gain:	0dBi(declare by applicant)
Power supply:	Rechargeable battery: DC3.7V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the dutycycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Pre-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	93.44	94.91	92.61

Final Test Mode:

The EUT was tested in GFSK, π/4-DQPSK, 8-DPSK modulation, and found the GFSK modulation is the worst case.

According to ANSI C63.10 standards, the test results are both the "worst case" and "worst setup":

Y axis (see the test setup photo)

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
APPLE	USB Charger	A1399	N/A

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, January 08, 2018.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS588	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

Conducted:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 27 2018	June. 26 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 27 2018	June. 26 2019
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 27 2018	June. 26 2019
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 27 2018	June. 26 2019
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 27 2018	June. 26 2019
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 27 2018	June. 26 2019
8	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
9	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 27 2018	June. 26 2019

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 27 2018	June. 26 2019
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 27 2018	June. 26 2019
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 27 2018	June. 26 2019
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 27 2018	June. 26 2019

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	June 27 2018	June 26 2019

7 Test results and Measurement Data

7.1 Antenna requirement

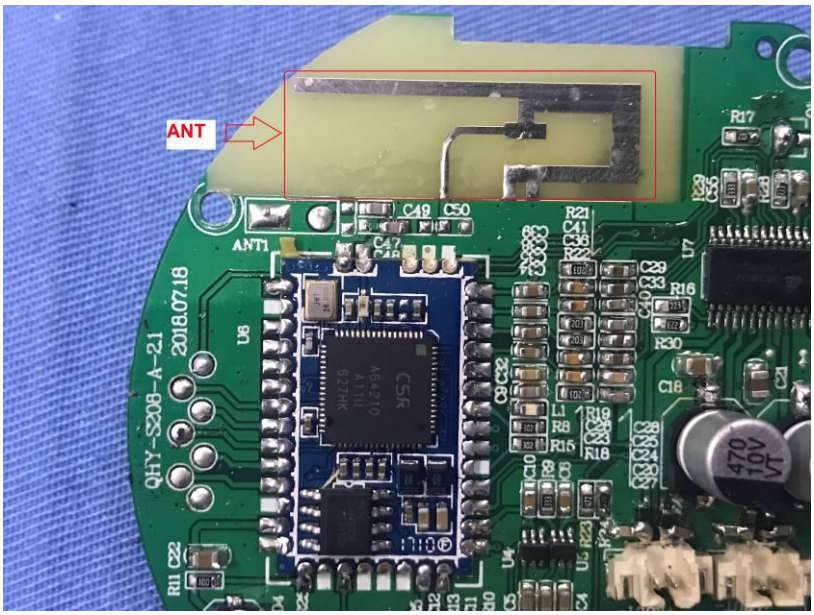
Standard requirement:	FCC Part15 C Section 15.203

15.203 requirement:

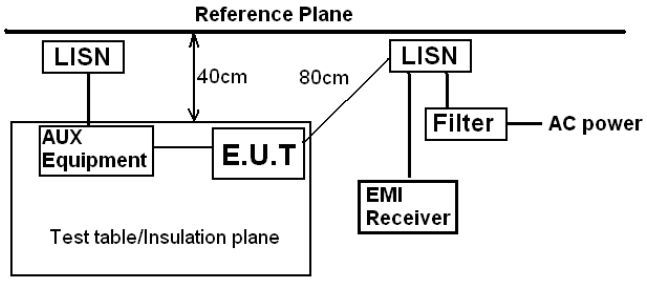
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is PCB antenna, the best case gain of the antenna is 0dBi

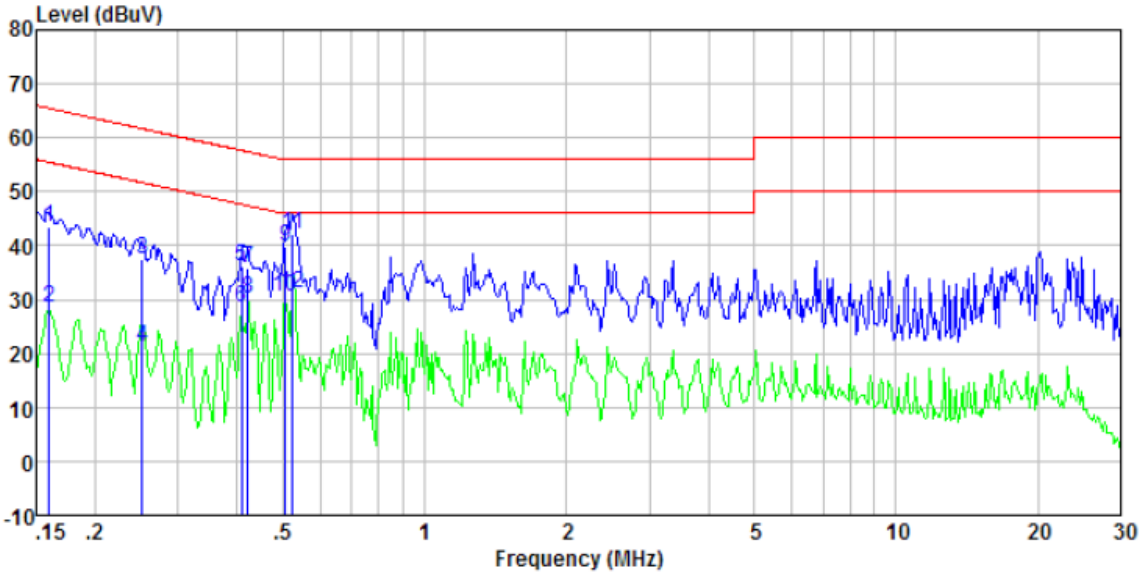


7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test voltage:	AC120V 60Hz
Test results:	Pass

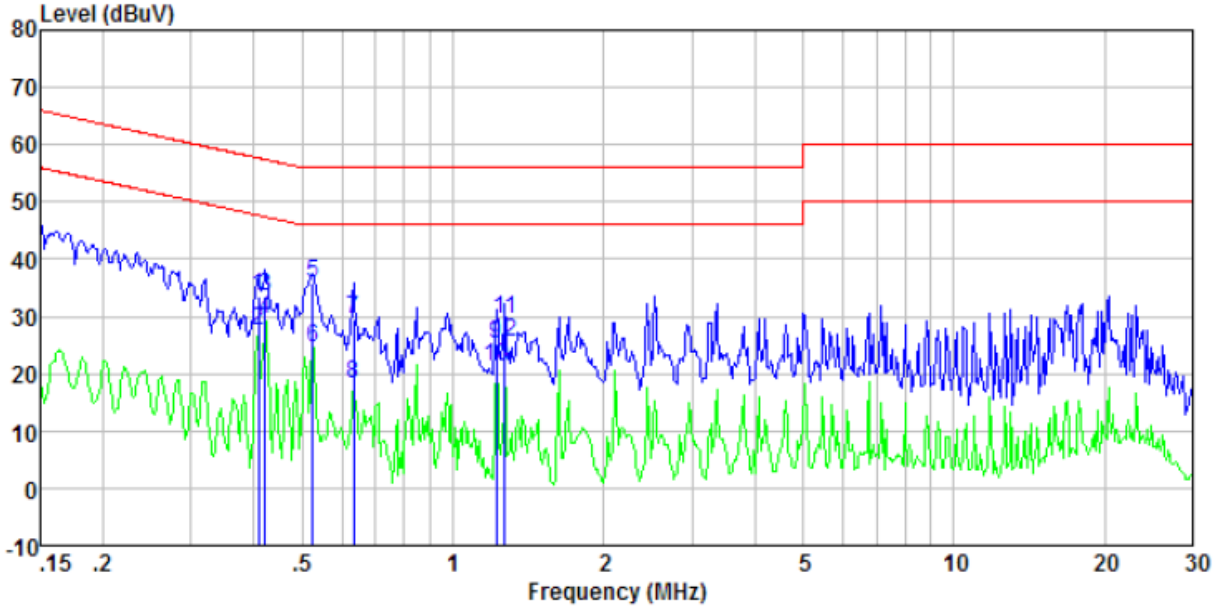
Measurement data

Mode:	**Transmitting mode**	**Test by:**	**Jason**
Temp./Hum.(%H):	**26℃/56%RH**	**Probe:**	**Line**



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.16	42.93	0.40	0.08	43.41	65.47	-22.06	QP
0.16	27.96	0.40	0.08	28.44	55.47	-27.03	Average
0.25	37.06	0.40	0.10	37.56	61.69	-24.13	QP
0.25	20.59	0.40	0.10	21.09	51.69	-30.60	Average
0.41	35.62	0.35	0.11	36.08	57.68	-21.60	QP
0.41	28.11	0.35	0.11	28.57	47.68	-19.11	Average
0.42	35.51	0.34	0.11	35.96	57.42	-21.46	QP
0.42	29.68	0.34	0.11	30.13	47.42	-17.29	Average
0.51	39.53	0.31	0.11	39.95	56.00	-16.05	QP
0.51	30.13	0.31	0.11	30.55	46.00	-15.45	Average
0.52	41.62	0.31	0.11	42.04	56.00	-13.96	QP
0.52	30.64	0.31	0.11	31.06	46.00	-14.94	Average

Mode:	**Transmitting mode**	**Test by:**	**Jason**
Temp./Hum.(%H):	**26℃/56%RH**	**Probe:**	**Neutral**



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.41	33.00	0.35	0.11	33.46	57.68	-24.22	QP
0.41	27.16	0.35	0.11	27.62	47.68	-20.06	Average
0.42	33.20	0.34	0.11	33.65	57.42	-23.77	QP
0.42	29.13	0.34	0.11	29.58	47.42	-17.84	Average
0.52	35.30	0.31	0.11	35.72	56.00	-20.28	QP
0.52	24.17	0.31	0.11	24.59	46.00	-21.41	Average
0.63	29.03	0.28	0.12	29.43	56.00	-26.57	QP
0.63	17.72	0.28	0.12	18.12	46.00	-27.88	Average
1.22	24.73	0.20	0.16	25.09	56.00	-30.91	QP
1.22	20.98	0.20	0.16	21.34	46.00	-24.66	Average
1.27	29.30	0.20	0.16	29.66	56.00	-26.34	QP
1.27	25.16	0.20	0.16	25.52	46.00	-20.48	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.00	Average Value
	114.00	Peak Value

Limit:
(Spurious Emissions)

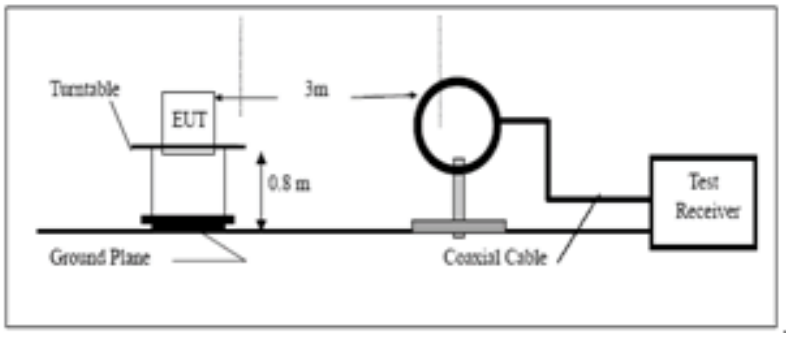
Frequency	Limit (uV/m)	Remark
0.009MHz-0.490MHz	2400/F(kHz) @300m	Quasi-peak Value
0.490MHz-1.705MHz	24000/F(kHz) @30m	Quasi-peak Value
1.705MHz-30.0MHz	30 @30m	Quasi-peak Value
30MHz-88MHz	100 @3m	Quasi-peak Value
88MHz-216MHz	150 @3m	Quasi-peak Value
216MHz-960MHz	200 @3m	Quasi-peak Value
960MHz-1GHz	500 @3m	Quasi-peak Value
Above 1GHz	500 @3m	Average Value
	5000 @3m	Peak Value

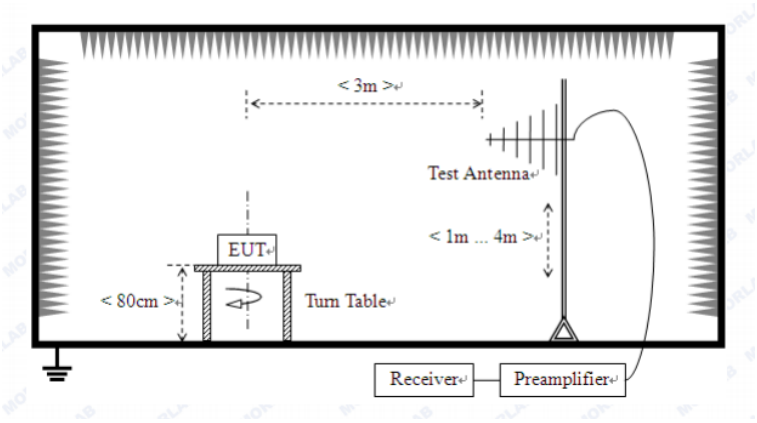
Limit:
(band edge)

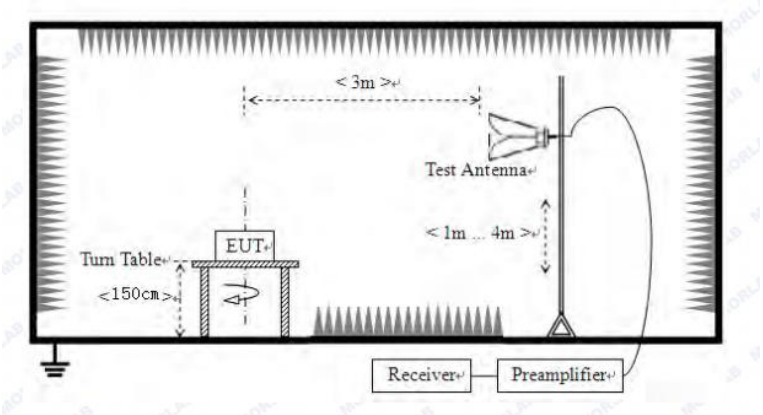
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test setup:

Below 1GHz



<table>
<tr><td></td><td>


Above 1GHz


</td></tr>
<tr><td>Test Procedure:</td><td>
1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6.0 for details</td></tr>
</table>

Test mode:	Refer to section 5.2 for details
Test voltage:	AC120V 60Hz
Test results:	Pass

Measurement data:

7.3.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402.00	90.79	27.58	5.39	30.18	93.58	114.00	-20.42	Vertical
2402.00	88.42	27.58	5.39	30.18	91.21	114.00	-22.79	Horizontal
2441.00	89.22	27.55	5.43	30.06	92.14	114.00	-21.86	Vertical
2441.00	87.45	27.55	5.43	30.06	90.37	114.00	-23.63	Horizontal
2480.00	91.85	27.52	5.47	29.93	94.91	114.00	-19.09	Vertical
2480.00	88.86	27.52	5.47	29.93	91.92	114.00	-22.08	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402.00	83.52	27.58	5.39	30.18	86.31	94.00	-7.69	Vertical
2402.00	80.60	27.58	5.39	30.18	83.39	94.00	-10.61	Horizontal
2441.00	81.45	27.55	5.43	30.06	84.37	94.00	-9.63	Vertical
2441.00	78.40	27.55	5.43	30.06	81.32	94.00	-12.68	Horizontal
2480.00	85.07	27.52	5.47	29.93	88.13	94.00	-5.87	Vertical
2480.00	81.38	27.52	5.47	29.93	84.44	94.00	-9.56	Horizontal

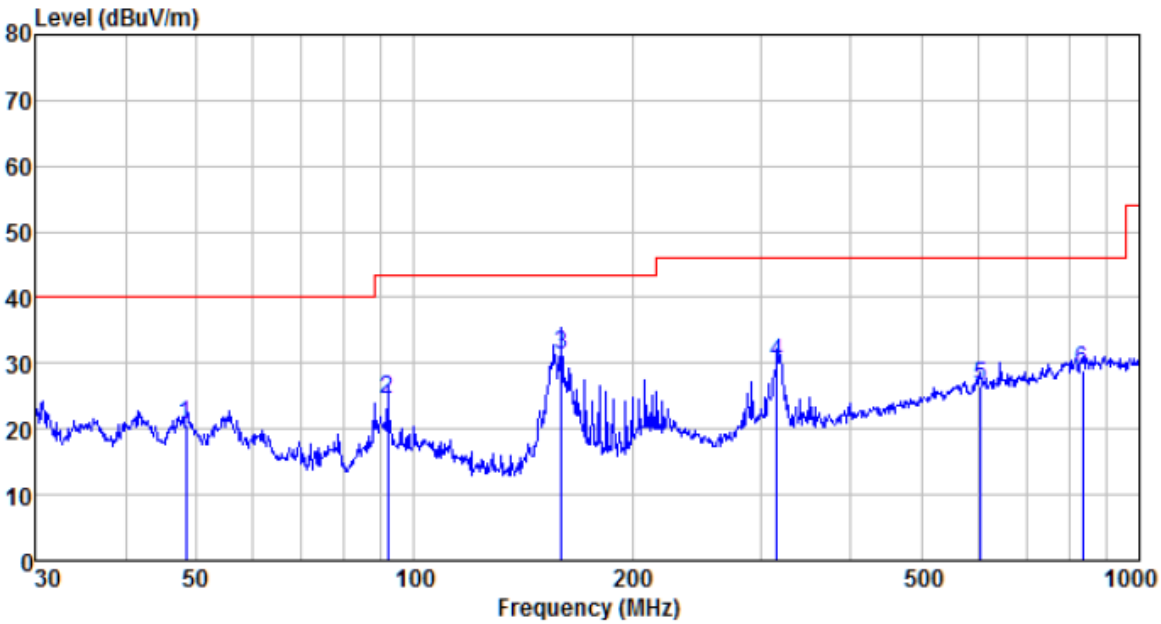
7.3.2 Spurious emissions

- Below 30MHz

  The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

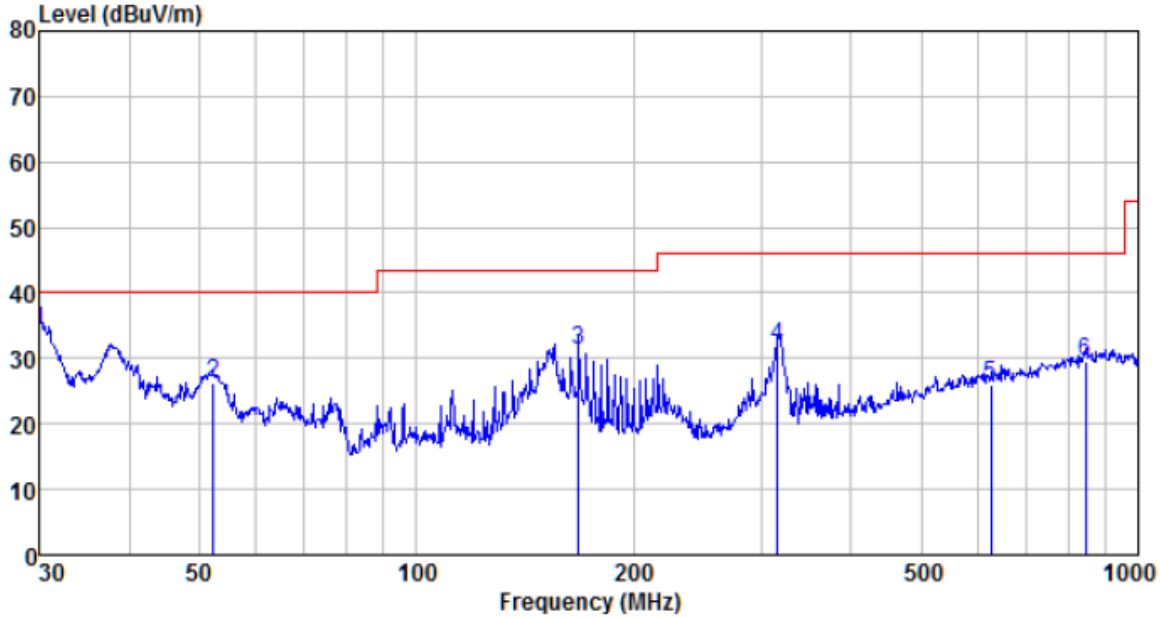
- Below 1GHz

Mode:	**Transmitting mode**	**Test by:**	**Jason**
Temp./Hum.(%H):	**26℃/56%RH**	**Polarziation:**	**Horizontal**



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
48.502	37.83	12.29	0.53	30.01	20.64	40.00	-19.36	QP
91.816	42.86	10.97	0.56	29.91	24.48	43.50	-19.02	QP
159.784	51.52	8.30	1.12	29.63	31.31	43.50	-12.19	QP
316.589	44.82	13.93	1.59	30.14	30.20	46.00	-15.80	QP
603.539	34.18	19.50	2.45	29.49	26.64	46.00	-19.36	QP
836.244	33.63	21.75	2.89	29.28	28.99	46.00	-17.01	QP

Mode:	**Transmitting mode**	**Test by:**	**Jason**
Temp./Hum.(%H):	**26℃/56%RH**	**Polarziation:**	**Vertical**



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
30.000	53.00	11.20	0.12	30.20	34.12	40.00	-5.88	QP
52.391	43.53	12.05	0.62	29.99	26.21	40.00	-13.79	QP
167.824	51.23	8.46	1.14	29.60	31.23	43.50	-12.27	QP
316.589	46.41	13.93	1.59	30.14	31.79	46.00	-14.21	QP
625.078	33.36	19.52	2.51	29.40	25.99	46.00	-20.01	QP
845.088	34.11	21.82	2.90	29.30	29.53	46.00	-16.47	QP

■ Above 1GHz

Test channel:	Lowest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	35.29	31.78	8.60	32.09	43.58	74.00	-30.42	Vertical
7206.00	30.49	36.15	11.65	32.00	46.29	74.00	-27.71	Vertical
9608.00	30.28	37.95	14.14	31.62	50.75	74.00	-23.25	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	39.16	31.78	8.60	32.09	47.45	74.00	-26.55	Horizontal
7206.00	32.07	36.15	11.65	32.00	47.87	74.00	-26.13	Horizontal
9608.00	29.51	37.95	14.14	31.62	49.98	74.00	-24.02	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	24.48	31.78	8.60	32.09	32.77	54.00	-21.23	Vertical
7206.00	19.41	36.15	11.65	32.00	35.21	54.00	-18.79	Vertical
9608.00	18.61	37.95	14.14	31.62	39.08	54.00	-14.92	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	28.49	31.78	8.60	32.09	36.78	54.00	-17.22	Horizontal
7206.00	21.45	36.15	11.65	32.00	37.25	54.00	-16.75	Horizontal
9608.00	18.17	37.95	14.14	31.62	38.64	54.00	-15.36	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

Test channel:	Middle channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	35.29	31.85	8.67	32.12	43.69	74.00	-30.31	Vertical
7323.00	30.49	36.37	11.72	31.89	46.69	74.00	-27.31	Vertical
9764.00	30.28	38.35	14.25	31.62	51.26	74.00	-22.74	Vertical
12205.00	*					74.00		Vertical
14646.00	*					74.00		Vertical
4882.00	39.16	31.85	8.67	32.12	47.56	74.00	-26.44	Horizontal
7323.00	32.07	36.37	11.72	31.89	48.27	74.00	-25.73	Horizontal
9764.00	29.51	38.35	14.25	31.62	50.49	74.00	-23.51	Horizontal
12205.00	*					74.00		Horizontal
14646.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	24.49	31.85	8.67	32.12	32.89	54.00	-21.11	Vertical
7323.00	19.41	36.37	11.72	31.89	35.61	54.00	-18.39	Vertical
9764.00	18.61	38.35	14.25	31.62	39.59	54.00	-14.41	Vertical
12205.00	*					54.00		Vertical
14646.00	*					54.00		Vertical
4882.00	28.49	31.85	8.67	32.12	36.89	54.00	-17.11	Horizontal
7323.00	21.45	36.37	11.72	31.89	37.65	54.00	-16.35	Horizontal
9764.00	18.17	38.35	14.25	31.62	39.15	54.00	-14.85	Horizontal
12205.00	*					54.00		Horizontal
14646.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

Test channel:	Highest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	34.95	31.93	8.73	32.16	43.45	74.00	-30.55	Vertical
7440.00	30.27	36.59	11.79	31.78	46.87	74.00	-27.13	Vertical
9920.00	30.08	38.81	14.38	31.88	51.39	74.00	-22.61	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	38.75	31.93	8.73	32.16	47.25	74.00	-26.75	Horizontal
7440.00	31.81	36.59	11.79	31.78	48.41	74.00	-25.59	Horizontal
9920.00	29.28	38.81	14.38	31.88	50.59	74.00	-23.41	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	24.22	31.93	8.73	32.16	32.72	54.00	-21.28	Vertical
7440.00	19.23	36.59	11.79	31.78	35.83	54.00	-18.17	Vertical
9920.00	18.45	38.81	14.38	31.88	39.76	54.00	-14.24	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	28.19	31.93	8.73	32.16	36.69	54.00	-17.31	Horizontal
7440.00	21.25	36.59	11.79	31.78	37.85	54.00	-16.15	Horizontal
9920.00	17.99	38.81	14.38	31.88	39.30	54.00	-14.70	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

7.3.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Test channel:	Lowest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	35.26	27.59	5.38	30.18	38.05	74.00	-35.95	Horizontal
2390.00	50.96	27.58	5.39	30.18	53.75	74.00	-20.25	Horizontal
2310.00	35.09	27.59	5.38	30.18	37.88	74.00	-36.12	Vertical
2390.00	52.18	27.58	5.39	30.18	54.97	74.00	-19.03	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	27.54	27.59	5.38	30.18	30.33	54.00	-23.67	Horizontal
2390.00	38.32	27.58	5.39	30.18	41.11	54.00	-12.89	Horizontal
2310.00	26.94	27.59	5.38	30.18	29.73	54.00	-24.27	Vertical
2390.00	39.24	27.58	5.39	30.18	42.03	54.00	-11.97	Vertical

Test channel:	Highest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	36.46	27.53	5.47	29.93	39.53	74.00	-34.47	Horizontal
2500.00	37.08	27.55	5.49	29.93	40.19	74.00	-33.81	Horizontal
2483.50	36.03	27.53	5.47	29.93	39.10	74.00	-34.90	Vertical
2500.00	37.36	27.55	5.49	29.93	40.47	74.00	-33.53	Vertical

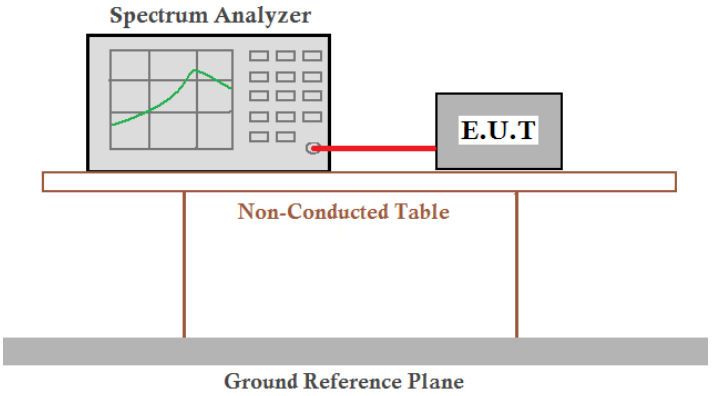
Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	30.27	27.53	5.47	29.93	33.34	54.00	-20.66	Horizontal
2500.00	29.36	27.55	5.49	29.93	32.47	54.00	-21.53	Horizontal
2483.50	30.85	27.53	5.47	29.93	33.92	54.00	-20.08	Vertical
2500.00	28.65	27.55	5.49	29.93	31.76	54.00	-22.24	Vertical

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*

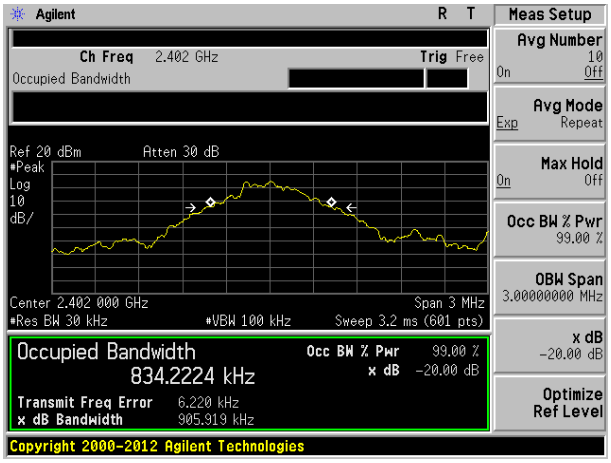
7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2013
Limit:	Operation Frequency range 2400MHz~2483.5MHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

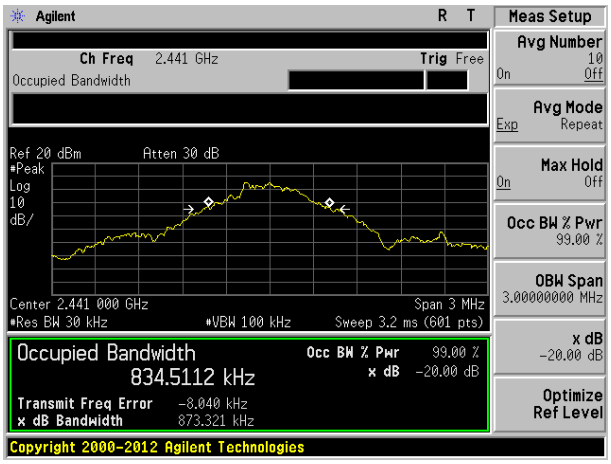
Measurement Data

Test channel	20dB bandwidth(MHz)			Result
	GFSK	π/4-DQPSK	8-DPSK	
Lowest	0.906	1.223	1.212	Pass
Middle	0.873	1.213	1.213	Pass
Highest	0.888	1.212	1.213	Pass

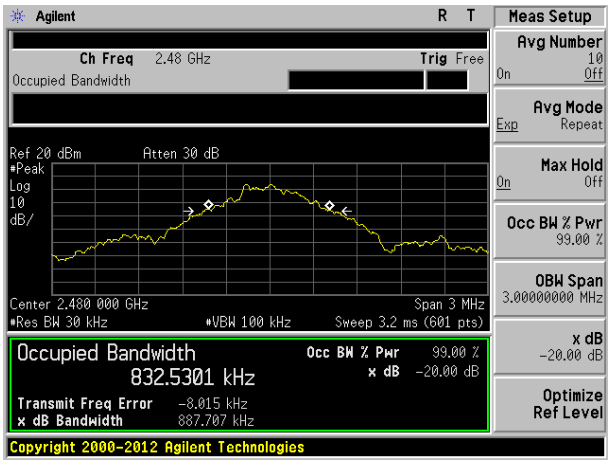
Test plot as follows:
GFSK mode



Lowest channel

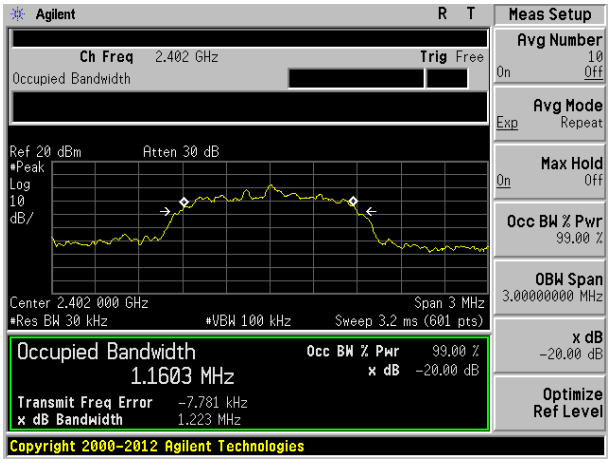


Middle channel

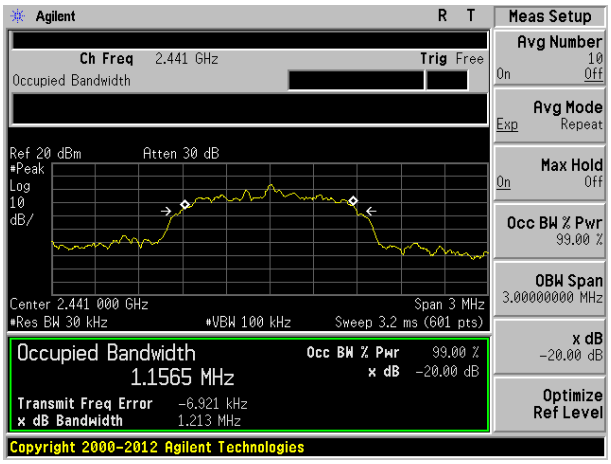


Highest channel

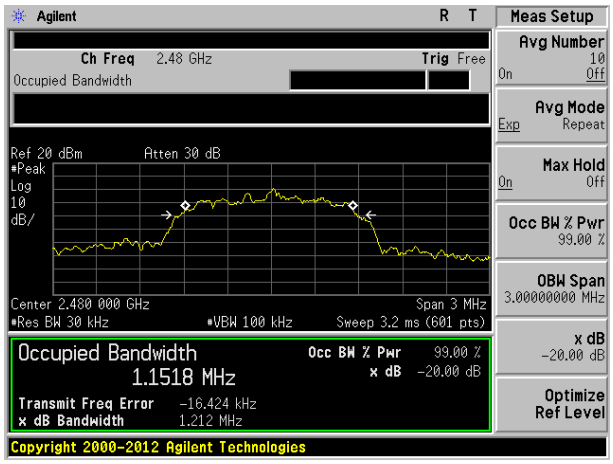
π/4-DQPSK mode



Lowest channel

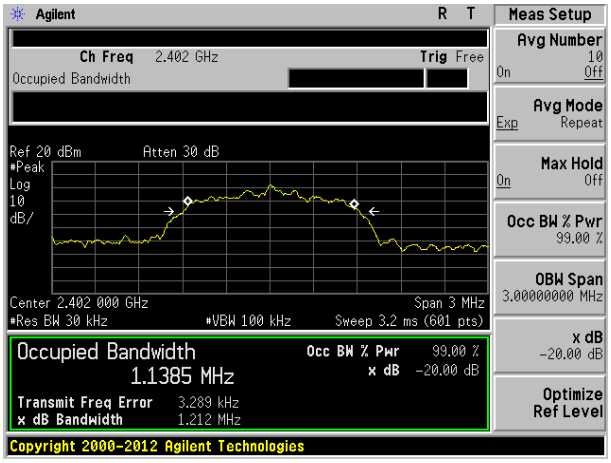


Middle channel

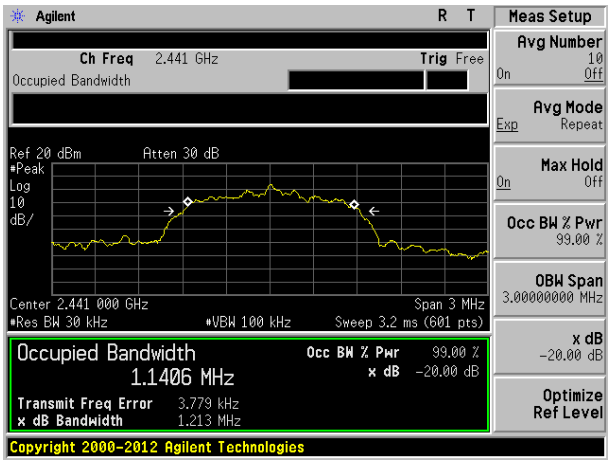


Highest channel

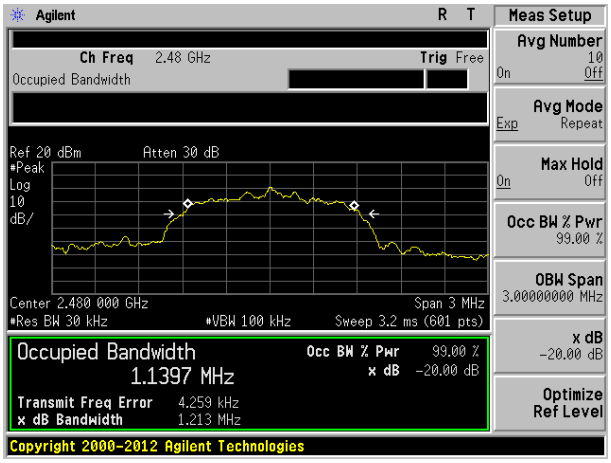
8-DPSK mode



Lowest channel



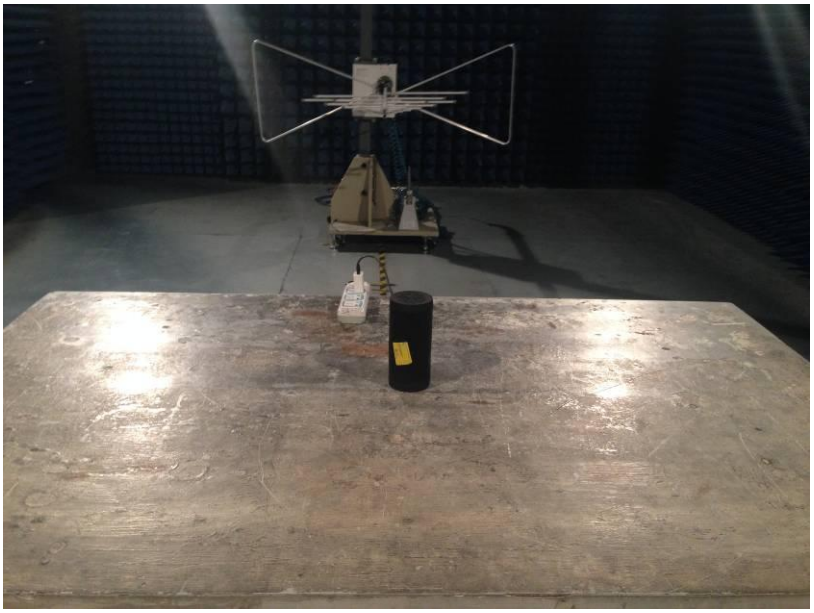
Middle channel

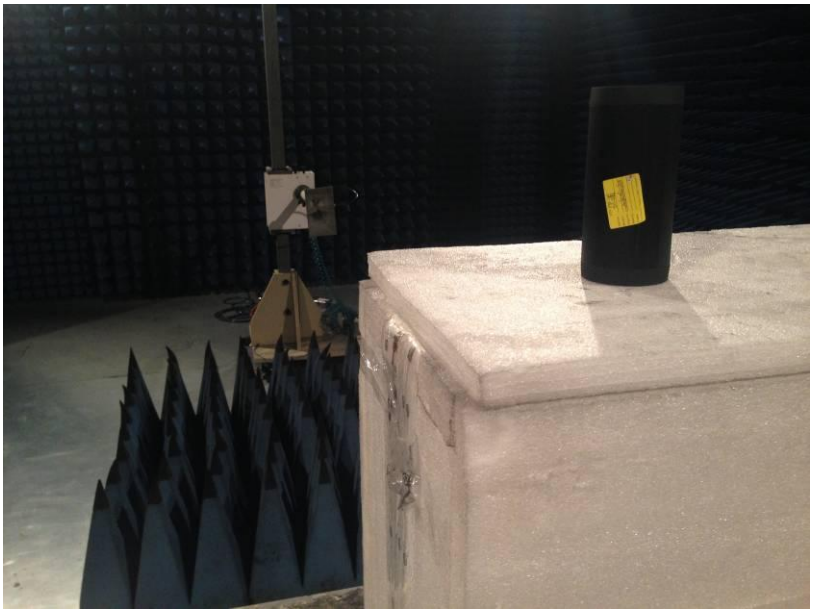


Highest channel

8 Test Setup Photo

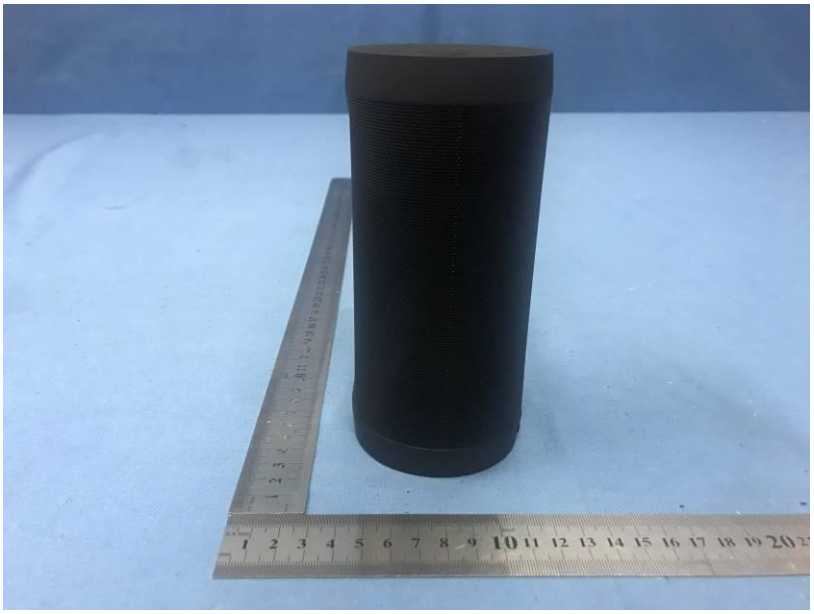
Radiated Emission

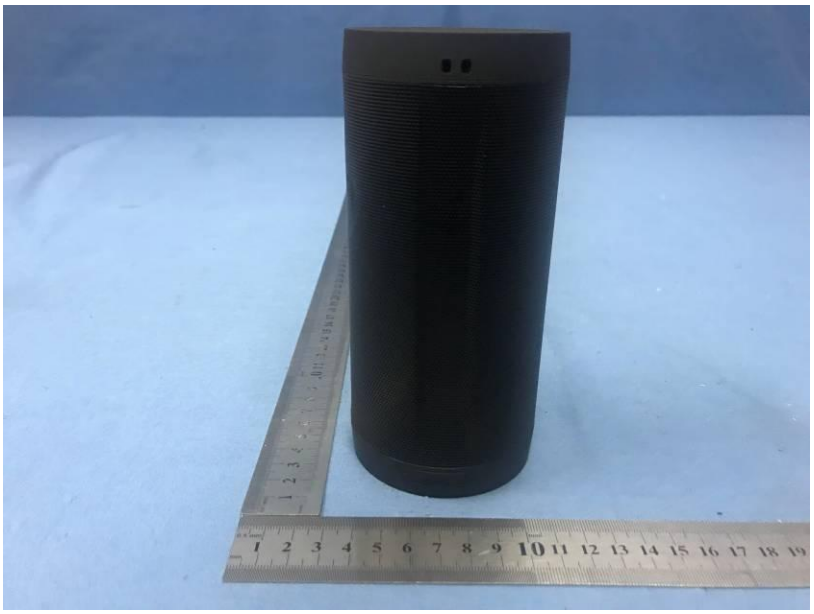


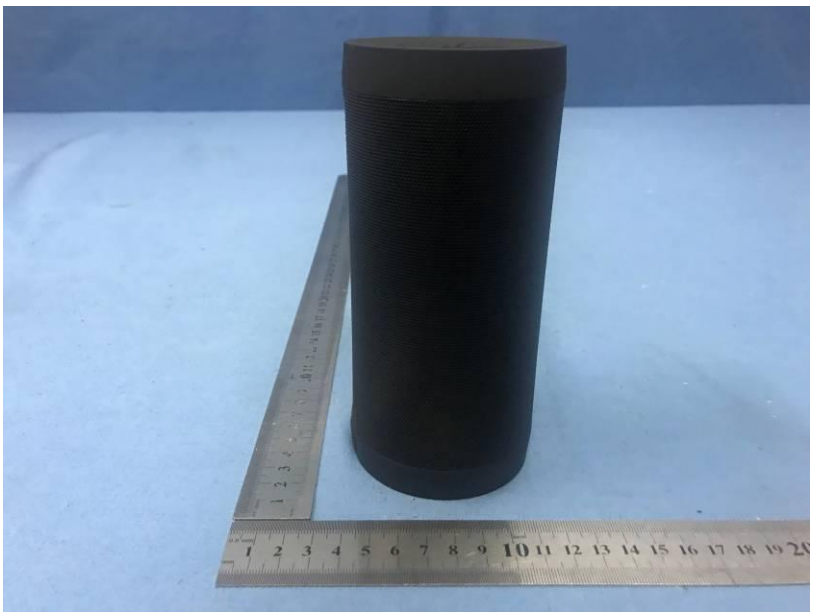


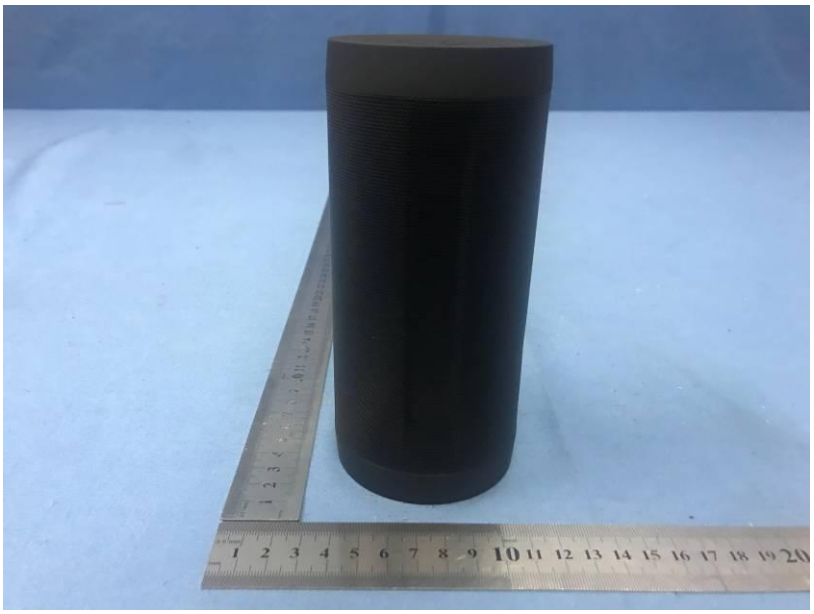
Conducted Emission

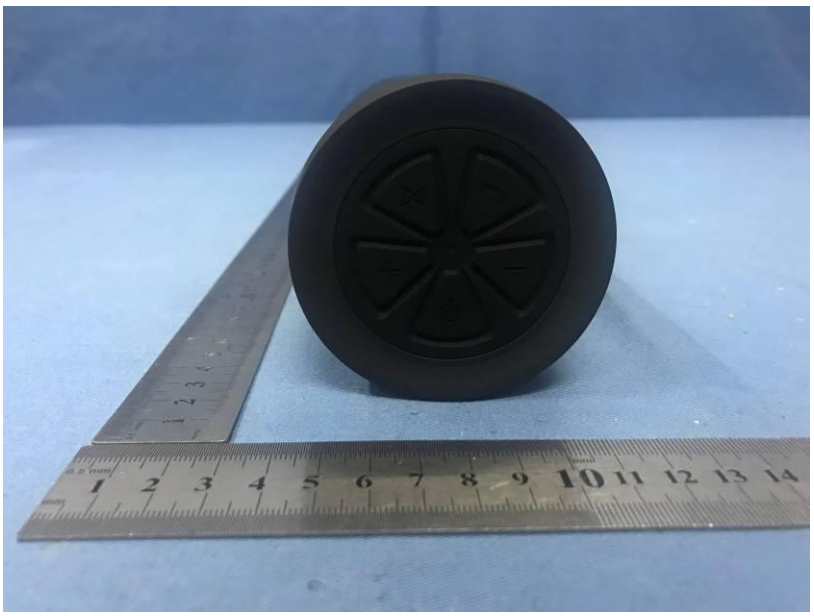
9 EUT Constructional Details

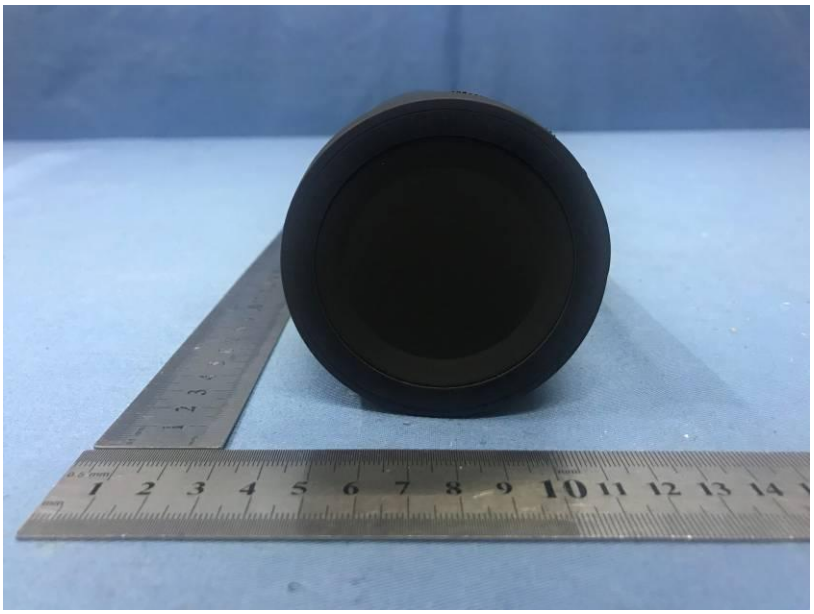


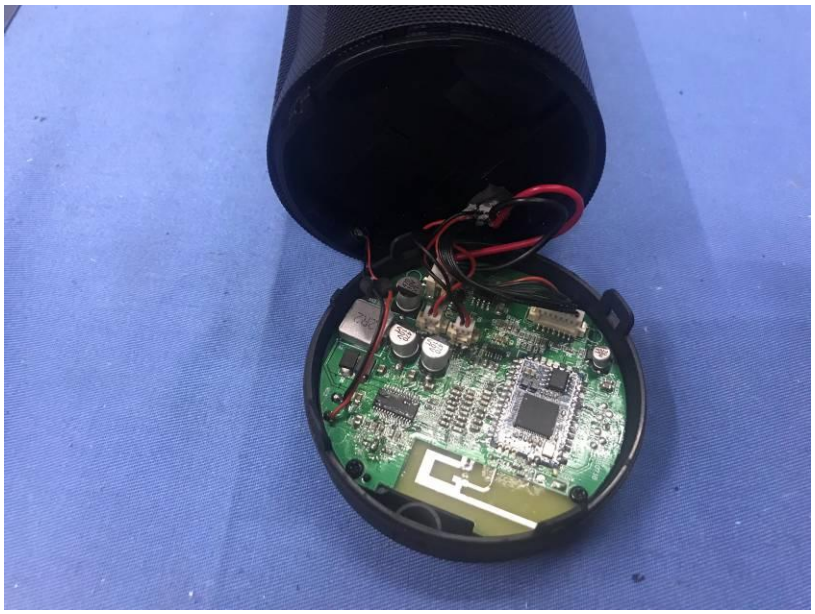


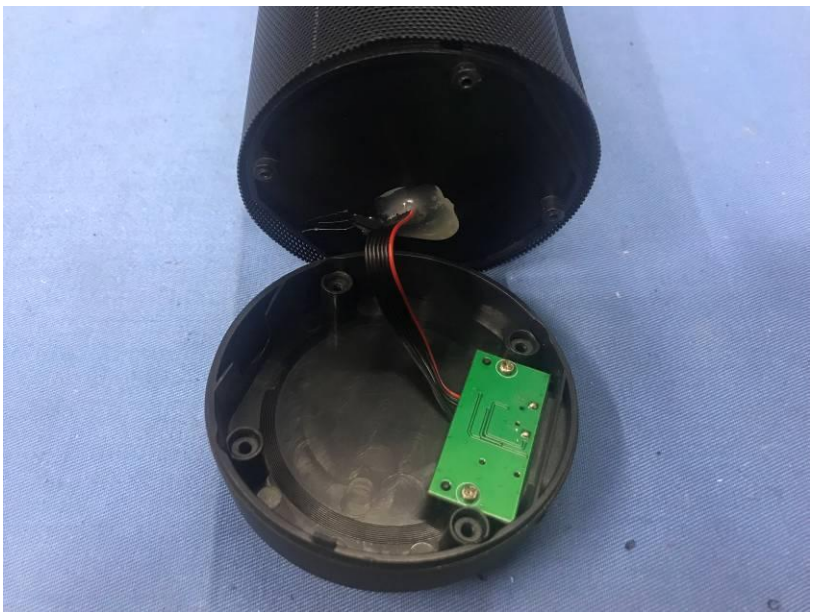


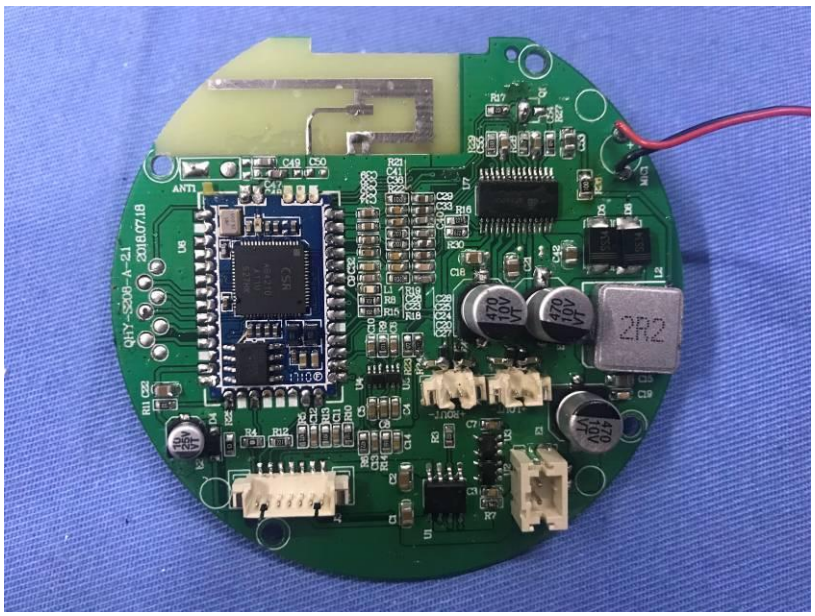


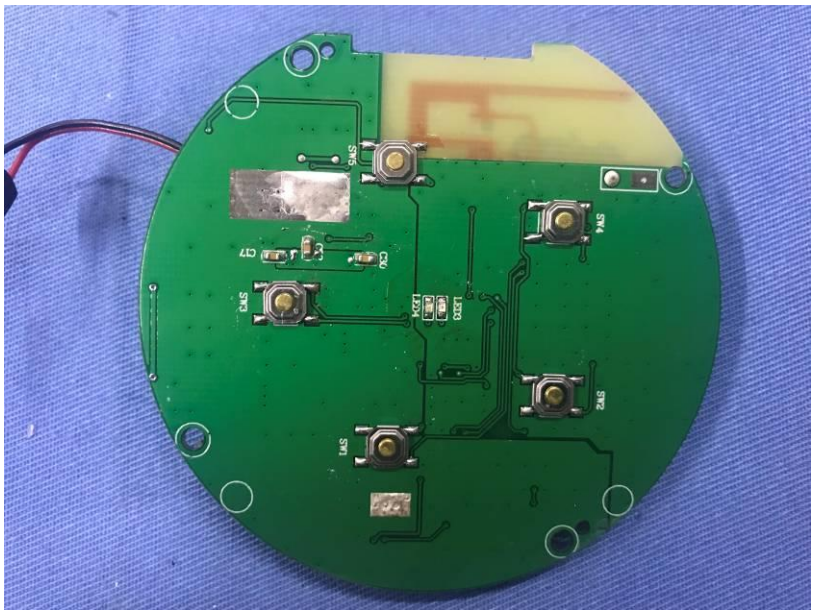


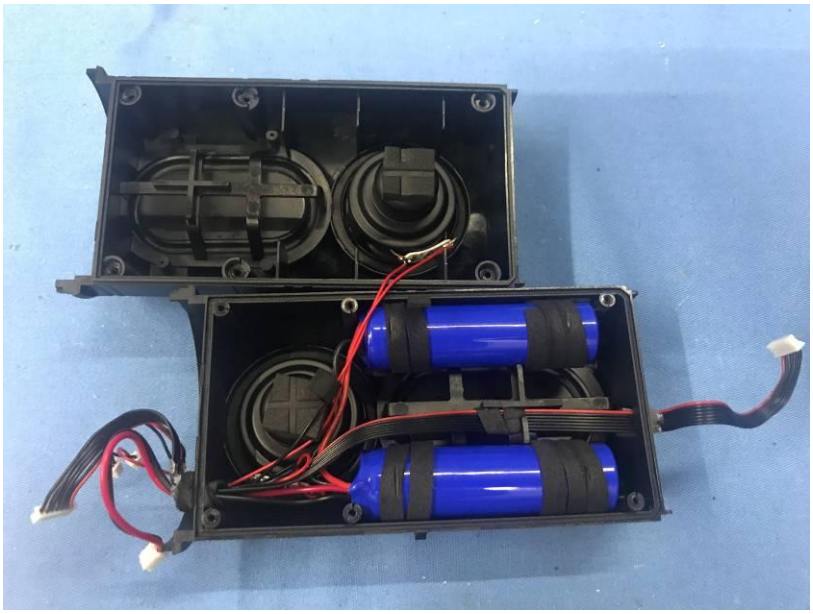




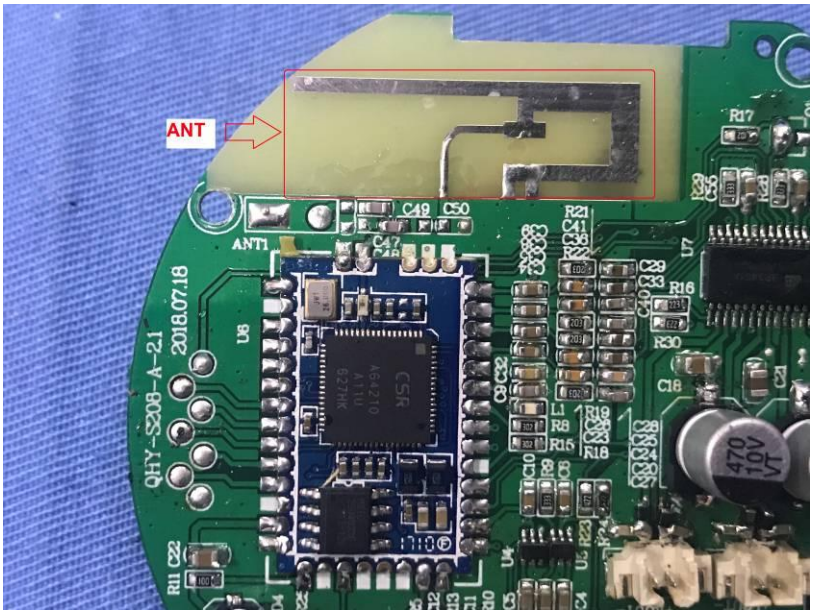



2R2





TEH 18650 3.7V 4400mAh 1807


ANT
ANT1
QHY-S208-A-2.1
2018.07.18
C49
C50
R17
R21
C41
C36
R22
C29
C33
R16
R30
C18
C21
L1
R8
R15
R19
R18
C28
C25
C24
C20
C27
470
10V
VT
U6
U7
U4
U3
R11
C22

------End------