TEST REPORT

Product Name	:	Orange
Brand Mark	:	N/A
Model No.	:	Orange
FCC ID	:	2AZGU-ORANGE
Report Number	:	BLA-EMC-202101-A7904
Date of Sample Receipt	:	2021/1/26
Date of Test	:	2021/1/28 to 2021/3/5
Date of Issue	:	2021/5/31
Test Standard	:	FCC CFR Title 47 Part 15 Subpart C Section 15.249
Test Result	:	Pass

Prepared for:

OUTSHINE IOT TECH LIMITED

RM22 2/F FU TAO BUILDING NO.98 ARGYLE STREET KOWLOON

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.

Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China

TEL: +86-755-23059481

Compiled by: Jozu.

Review by: Sweet.Liang

Approved by: Tomen Li

Date: 2021/5/31

REPORT REVISE RECORD

Version No.	Date	Description
00	2021/5/31	Original

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1 TEST SUMMARY

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Field Strength of the Fundamental Signal	47 CFR Part 15 Subpart C Section 15.249 (a)	ANSI C63.10-2013	PASS
Radiated Emissions	47 CFR Part 15 Subpart C Section 15.249 (a)/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency	47 CFR Part 15 Subpart C Section 15.249(a)/15.205	ANSI C63.10-2013	PASS
20dB Bandwidth	47 CFR Part 15 Subpart C Section 15.215 (c)	ANSI C63.10-2013	PASS

Pass: The EUT complies with the essential requirements in the standard.
N/A: Not Applicable

2 GENERAL INFORMATION

Applicant	OUTSHINE IOT TECH LIMITED
Address	RM22 2/F FU TAO BUILDING NO.98 ARGYLE STREET KOWLOON
Manufacturer	SHENZHEN FRACTAL AUTO TECHNOLOGY COMPANY LIMITED
Address	Room B906, Chang Jiang Mansion, No. 16, Zhong Xin Road, Baoan District, Shenzhen City
Factory	SHENZHEN FRACTAL AUTO TECHNOLOGY COMPANY LIMITED
Address	Room B906, Chang Jiang Mansion, No. 16, Zhong Xin Road, Baoan District, Shenzhen City
Product Name	Orange
Test Model No.	Orange

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	2.5
Software Version	2.1

Operation Frequency:	916.548MHz
Channel numbers:	1
Modulation type:	ASK
Antenna Type:	Internal antenna
Antenna gain:	-8.1dBi(Provided by customer)
Power supply:	DC 3.0V

4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25℃	DC3.0V

5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
TX	Keep the EUT in transmitting mode
Remark: New battery is used during all test. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.	

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30Mz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB

7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
N/A	N/A	N/A	N/A	N/A

8 LABORATORY LOCATION

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co., Ltd.
Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673
No tests were sub-contracted.

9 TEST INSTRUMENTS LIST

Test Equipment Of Radiated Emissions					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Receiver	R&S	ESR7	101199	2020/10/12	2021/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25
Amplifier	SKET	PA-000318G-45	N/A	2020/10/16	2021/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Field Strength of the Fundamental Signal (15.231(b))					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Receiver	R&S	ESR7	101199	2020/10/12	2021/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25

Amplifier	SKET	PA-000318G-45	N/A	2020/10/16	2021/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Dwell Time (15.231(a))					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

Test Equipment Of 20dB Bandwidth					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Spectrum	R&S	FSP40	100817	2020/10/12	2021/10/11
Spectrum	Agilent	N9020A	MY49100060	2020/10/12	2021/10/11
Signal Generator	Agilent	N5182A	MY49060650	2020/10/12	2021/10/11
Signal Generator	Agilent	E8257D	MY44320250	2020/10/12	2021/10/11

1 RADIATED EMISSIONS

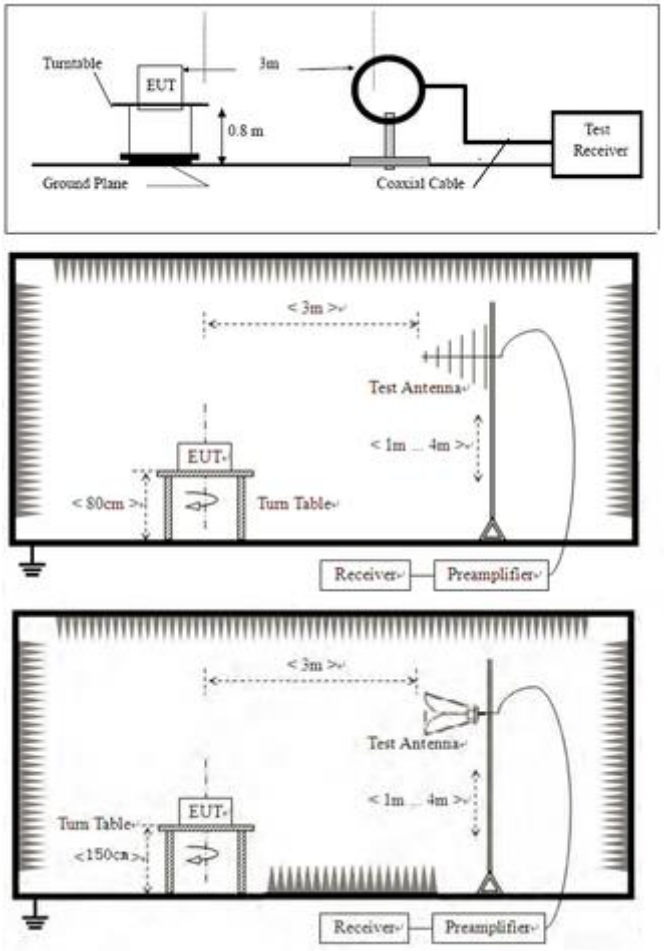
Test Standard	47 CFR Part 15C Section 15.249 and 15.209
Test Method	ANSI C63.10
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25℃
Humidity	60%

1.1 LIMITS

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

1.2 BLOCK DIAGRAM OF TEST SETUP

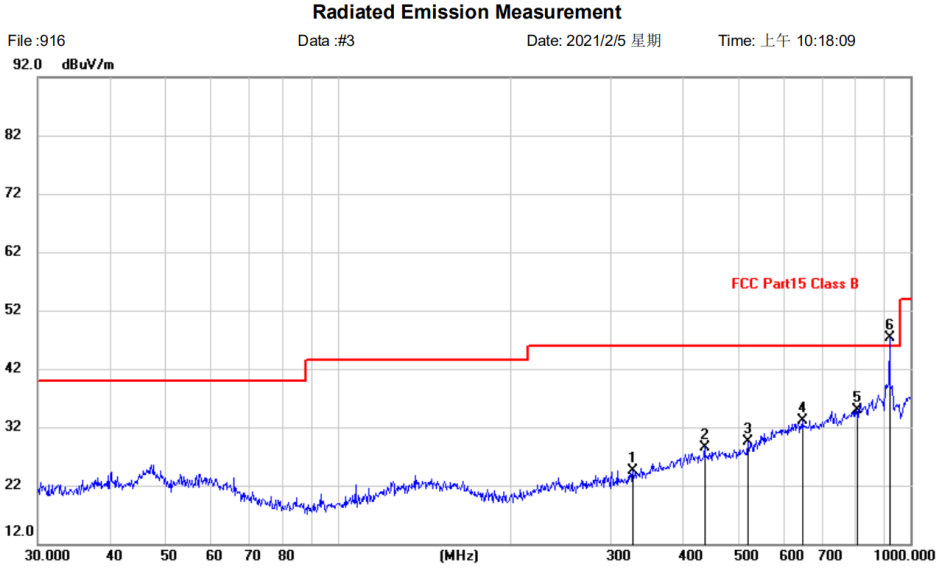


1.3 PROCEDURE

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

1.4 TEST DATA

[TestMode: TX]; [Polarity: Horizontal]



Site
Limit: FCC Part15 Class B
EUT: Orange
M/N: Orange
Mode: TX mode
Note:

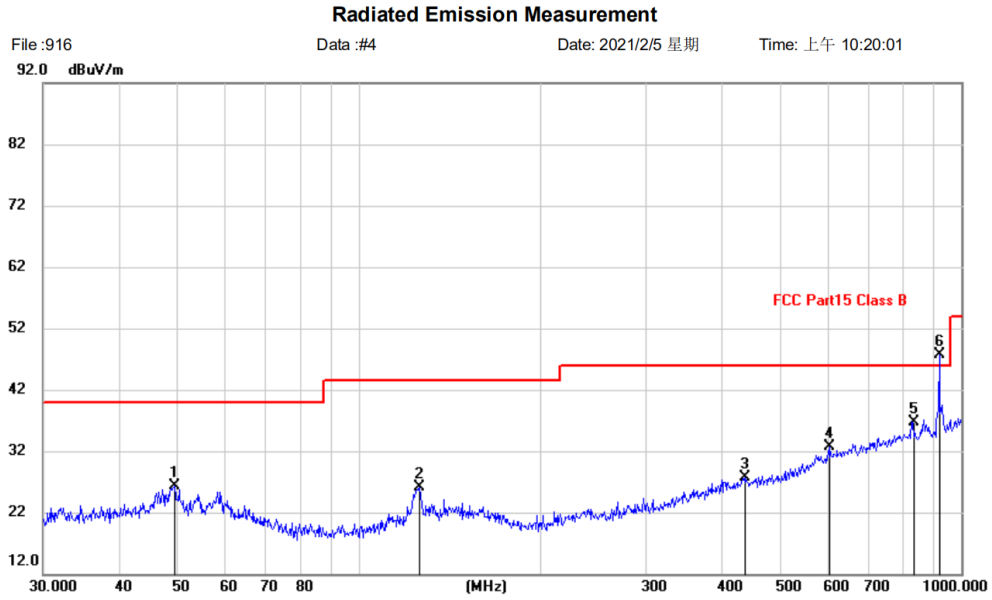
Polarization: *Horizontal*
Power: DC3V
Distance: 3m

Temperature:
Humidity: %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		327.8872	-0.17	24.76	24.59	46.00	-21.41	peak			
2		437.1197	0.93	27.67	28.60	46.00	-17.40	peak			
3		520.8881	0.60	28.86	29.46	46.00	-16.54	peak			
4		647.3854	1.33	31.76	33.09	46.00	-12.91	peak			
5		804.6028	0.54	34.42	34.96	46.00	-11.04	peak			

Test Result: Pass

[TestMode: TX]; [Polarity: Vertical]



Site
Limit: FCC Part15 Class B
EUT: Orange
M/N: Orange
Mode: TX mode
Note:

Polarization: *Vertical*
Power: DC3V
Distance: 3m

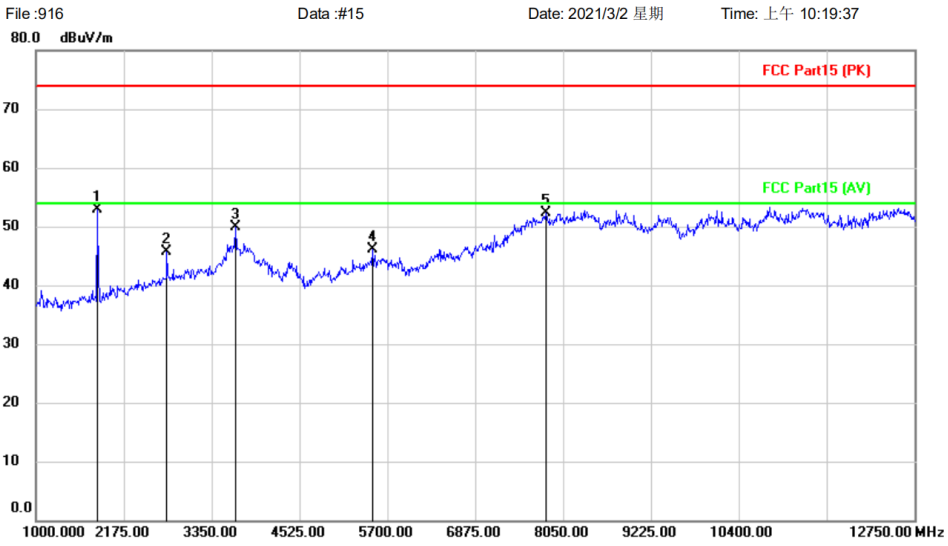
Temperature:
Humidity: %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		49.5328	2.65	23.58	26.23	40.00	-13.77	peak			
2		126.3285	3.42	22.72	26.14	43.50	-17.36	peak			
3		438.6553	0.00	27.68	27.68	46.00	-18.32	peak			
4		605.6592	1.22	31.42	32.64	46.00	-13.36	peak			
5		830.4002	2.19	34.56	36.75	46.00	-9.25	peak			

Test Result: Pass

[TestMode: TX]; [Polarity: Horizontal]

Radiated Emission Measurement



Site
Limit: FCC Part15 (PK)
EUT: Orange
M/N: Orange
Mode: TX mode
Note:

Polarization: ***Horizontal***
Power: DC3V
Distance: 3m

Temperature:
Humidity: %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	1822.500	70.67	-17.72	52.95	74.00	-21.05	peak			
2		2750.750	59.18	-13.48	45.70	74.00	-28.30	peak			
3		3667.250	56.99	-7.13	49.86	74.00	-24.14	peak			
4		5500.250	54.09	-8.07	46.02	74.00	-27.98	peak			
5		7826.750	52.93	-0.67	52.26	74.00	-21.74	peak			

*:Maximum data x:Over limit !:over margin 〈Reference Only

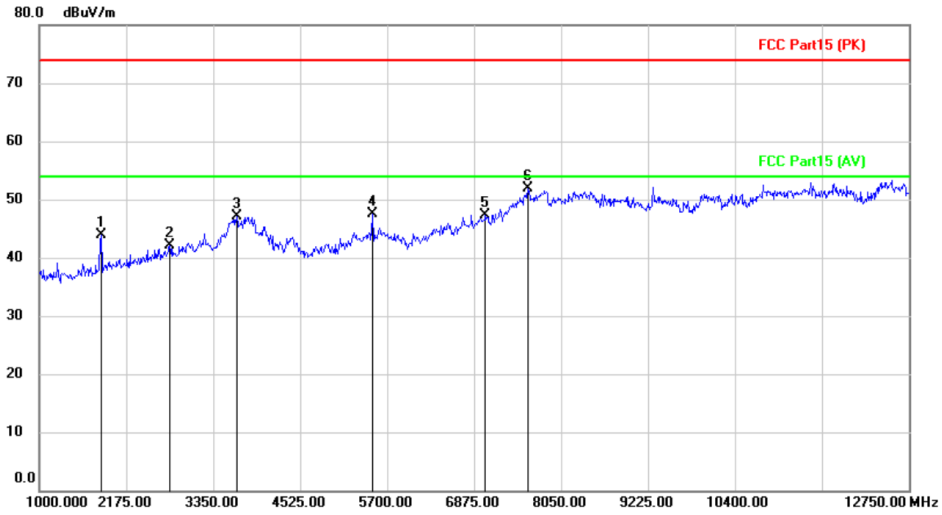
File :916\Data :#15 *Page: 1* Engineer Signature:

Test Result: Pass

[TestMode: TX]; [Polarity: Vertical]

Radiated Emission Measurement

File :916 Data :#16 Date: 2021/3/2 星期 Time: 上午 10:22:35



Site
Limit: FCC Part15 (PK)
EUT: Orange
M/N: Orange
Mode: TX mode
Note:

Polarization: *Vertical*
Power: DC3V
Distance: 3m

Temperature:
Humidity: %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		1834.250	61.58	-17.66	43.92	74.00	-30.08	peak			
2		2762.500	55.54	-13.43	42.11	74.00	-31.89	peak			
3		3667.250	54.20	-7.13	47.07	74.00	-26.93	peak			
4		5500.250	55.65	-8.07	47.58	74.00	-26.42	peak			
5		7027.750	52.73	-5.38	47.35	74.00	-26.65	peak			
6	*	7603.500	53.52	-1.71	51.81	74.00	-22.19	peak			

*:Maximum data x:Over limit !:over margin 〈Reference Only

File :916\Data :#16 *Page: 1* Engineer Signature:

Test Result: Pass

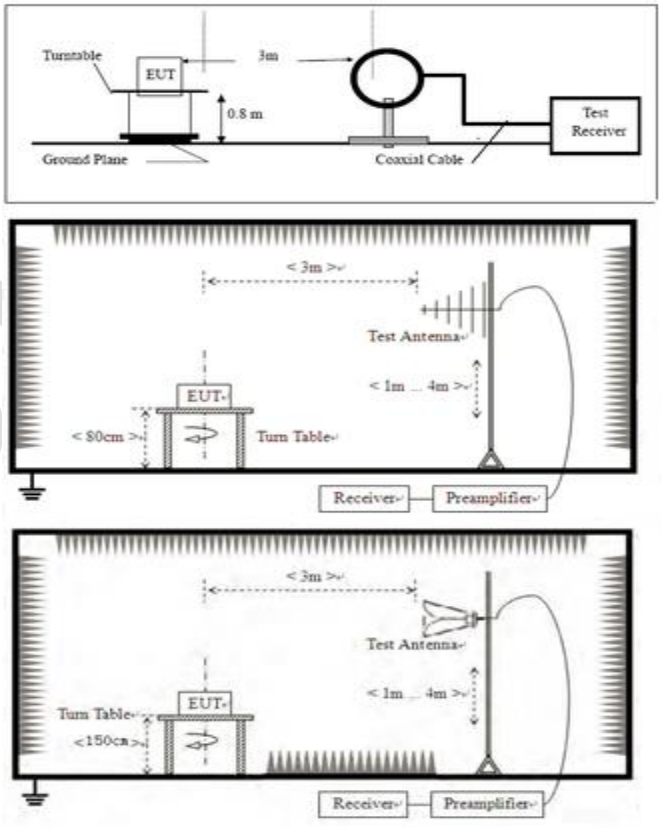
2 RESTRICTED BANDS AROUND FUNDAMENTAL FREQUENCY

Test Standard	47 CFR Part 15C Section 15.209 and 15.205
Test Method	ANSI C63.10
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25℃
Humidity	60%

2.1 LIMITS

Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	902.00	<46 dBuV	Pass
Highest	928.00	<46 dBuV	Pass

2.2 BLOCK DIAGRAM OF TEST SETUP

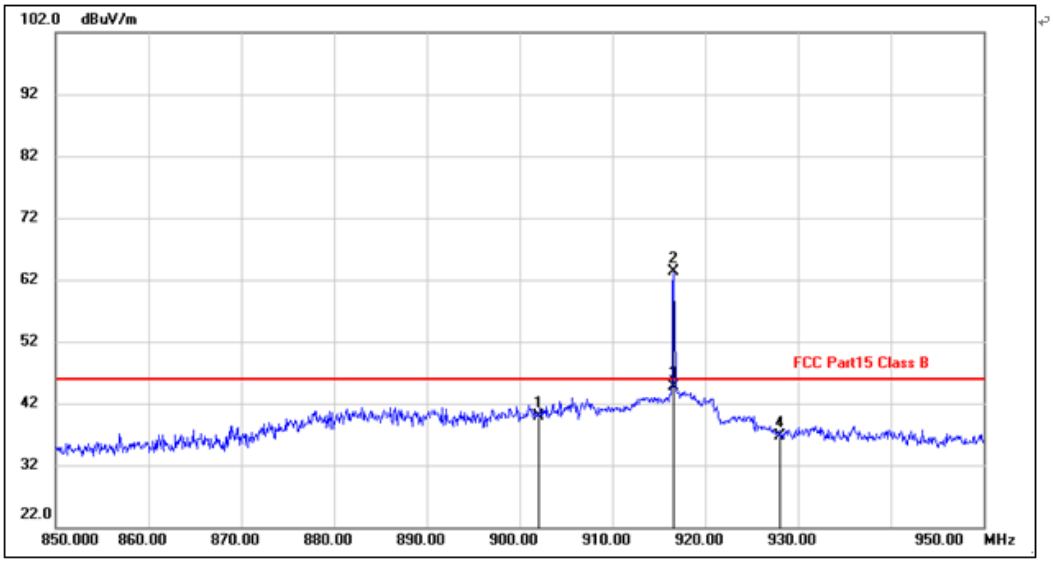


2.3 PROCEDURE

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. 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.
e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
g. 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.
h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2.4 TEST DATA

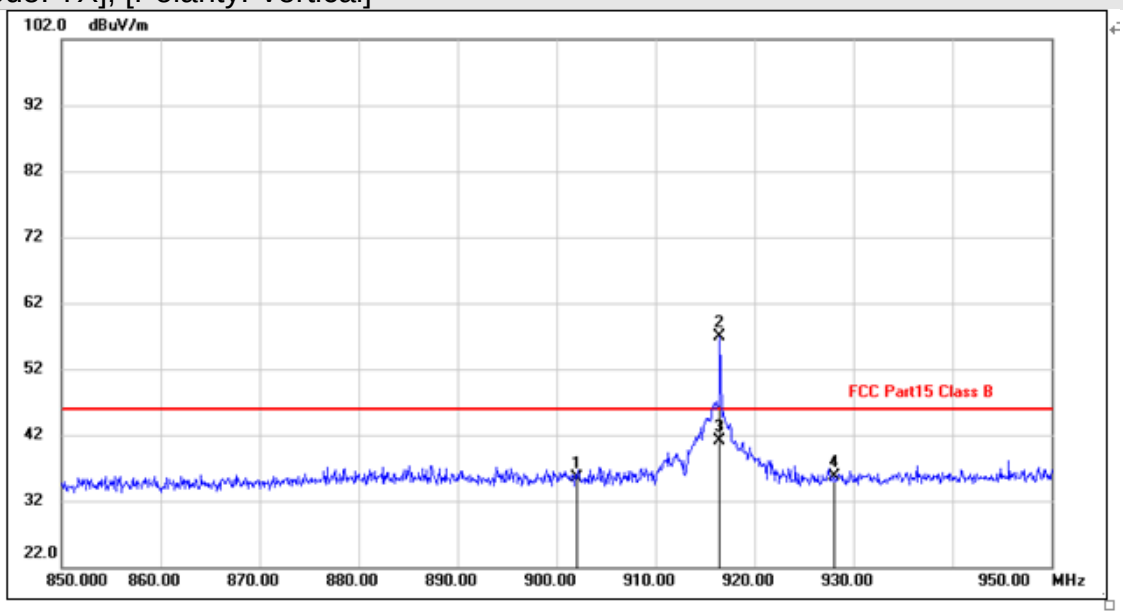
[TestMode: TX]; [Polarity: Horizontal]



No.	Frequency (MHz)	Reading (dBuV)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	902.0000	4.58	35.42	40.00	46.00	-6.00	QP
2	916.6000	27.96	35.43	63.39	46.00	17.39	PK
3	916.6000	9.35	35.43	44.78	46.00	-1.22	QP
4	928.0000	1.21	35.50	36.71	46.00	-9.29	QP

Test Result: Pass

[TestMode: TX]; [Polarity: Vertical]



No.	Frequency (MHz)	Reading (dBuV)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	902.0000	0.08	35.42	35.50	46.00	-10.50	QP
2	916.5000	21.50	35.42	56.92	46.00	10.92	PK
3	916.5000	5.60	35.42	41.02	46.00	-4.98	QP
4	928.0000	0.19	35.50	35.69	46.00	-10.31	QP

Test Result: Pass

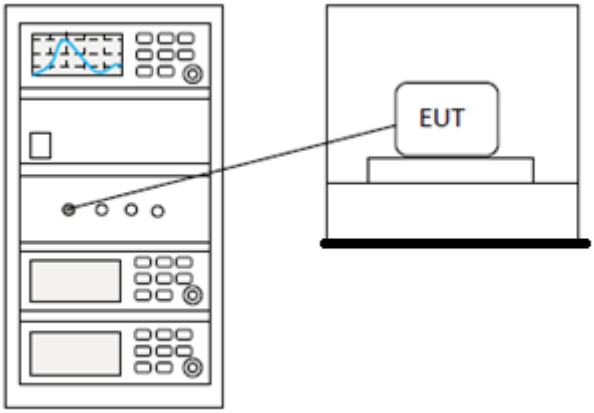
3 20DB BANDWIDTH

Test Standard	47 CFR Part 15C Section 15.215
Test Method	ANSI C63.10
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25℃
Humidity	60%

3.1 LIMITS

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

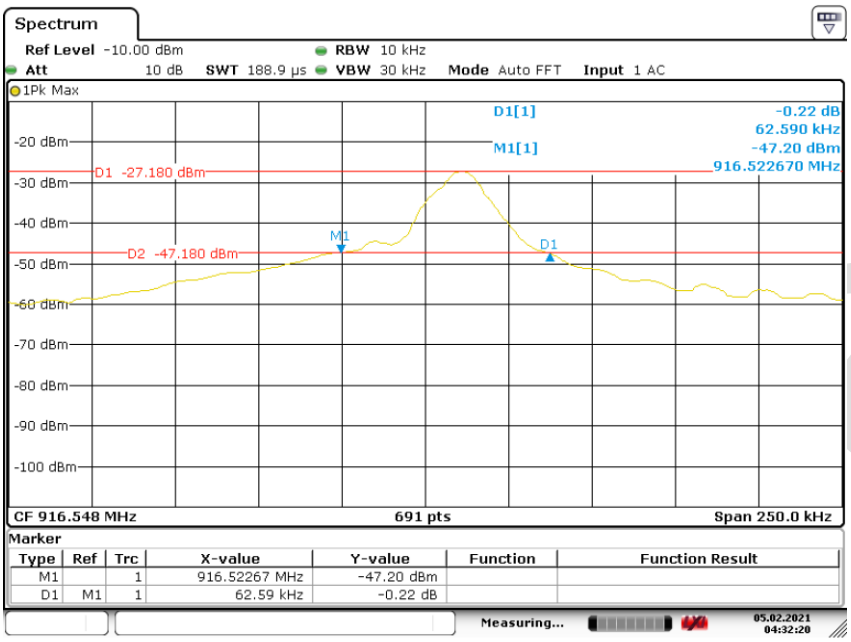
3.2 BLOCK DIAGRAM OF TEST SETUP



3.3 TEST DATA

Test Frequency MHz	20dB Bandwidth kHz	Result
916.548	62.590	Pass

3.4 TEST PLOTS



Date: 5.FEB.2021 04:32:20

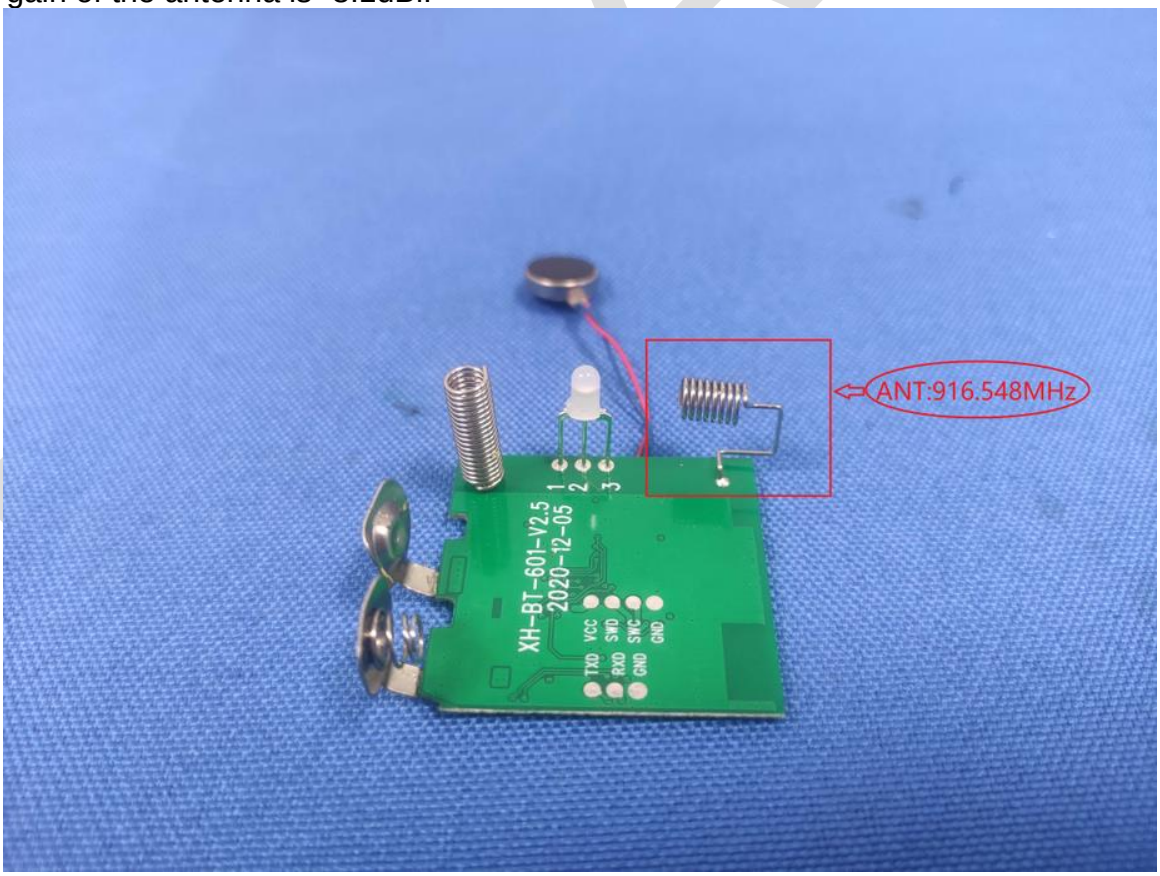
4 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	N/A

4.1 CONCLUSION

Standard 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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

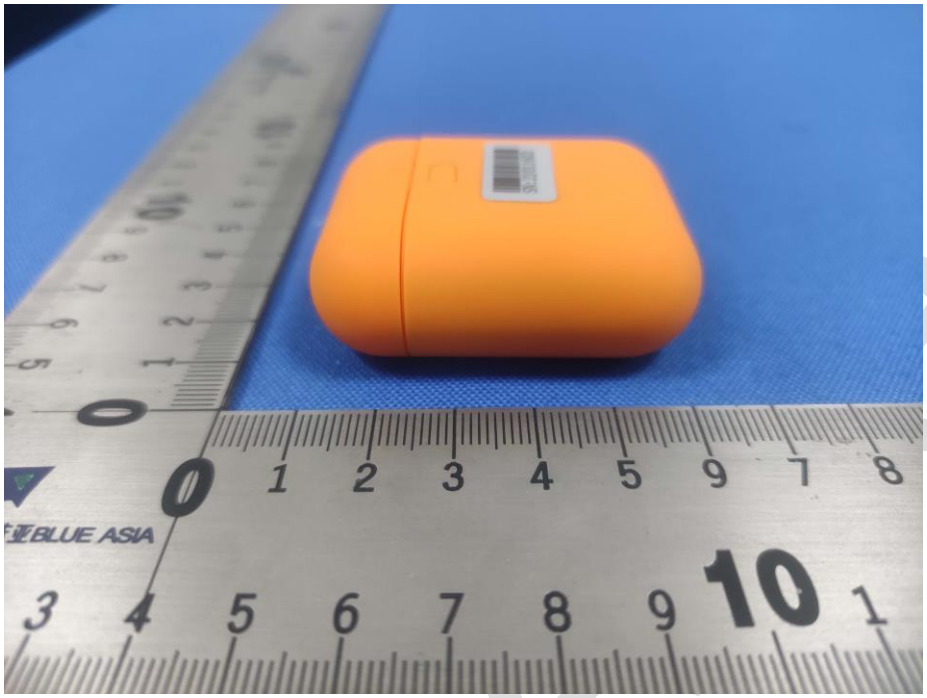
EUT Antenna:
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -8.1dBi.



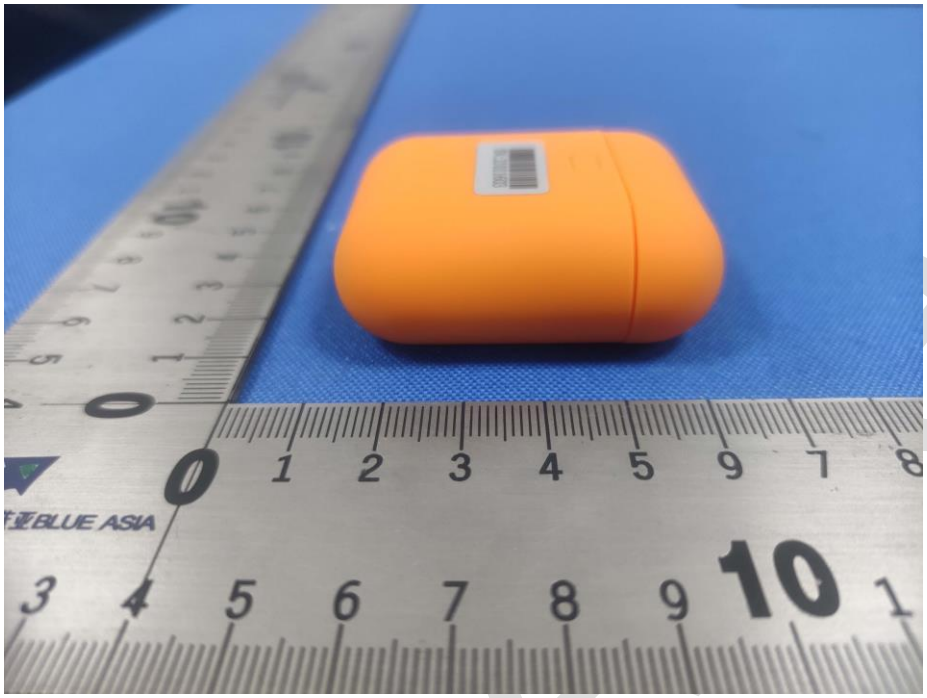
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Radiated Spurious Emissions

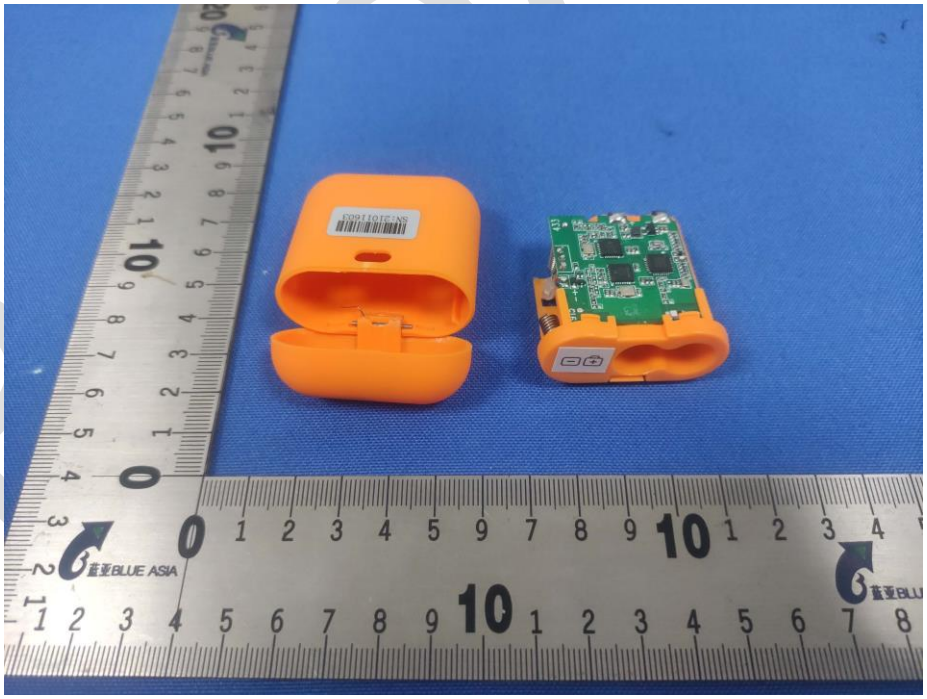
APPENDIX B: PHOTOGRAPHS OF EUT

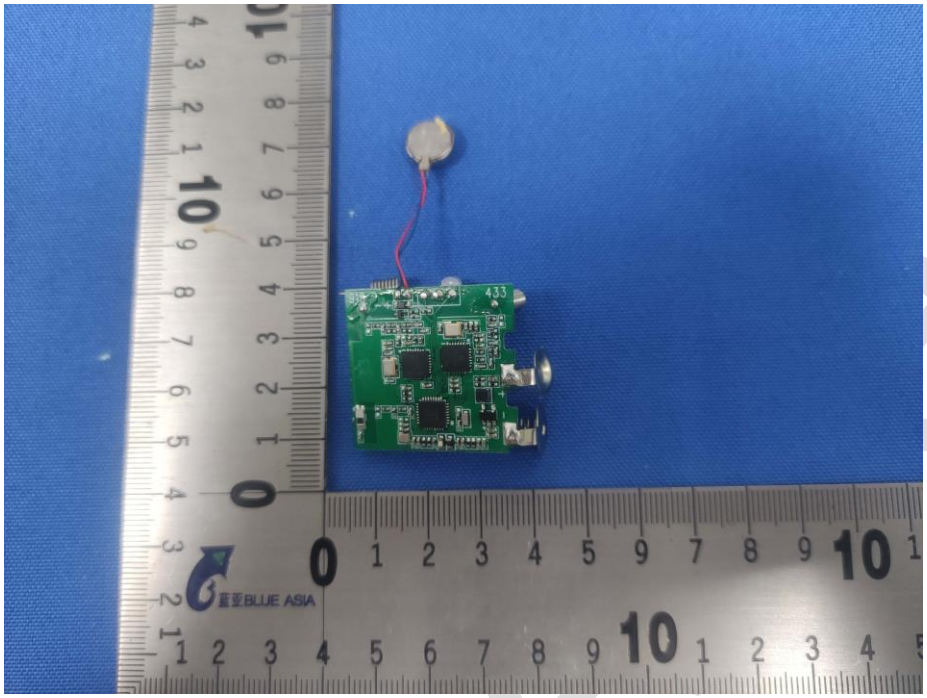

BLUE ASIA

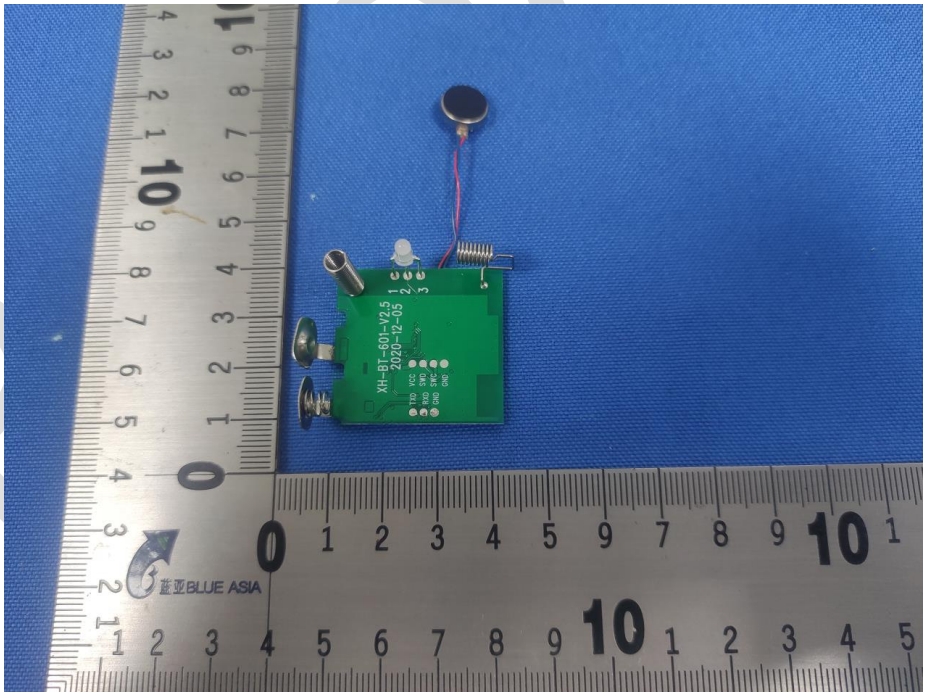

BLUE ASIA


BLUE ASIA


蓝亚BLUE ASIA



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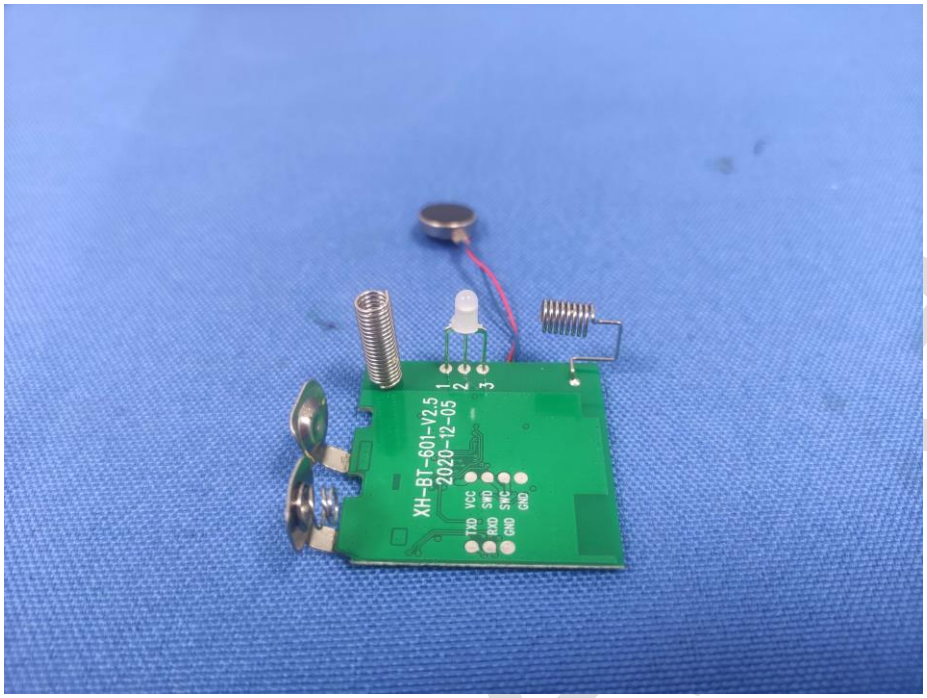
2020-12-05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2020-12-05
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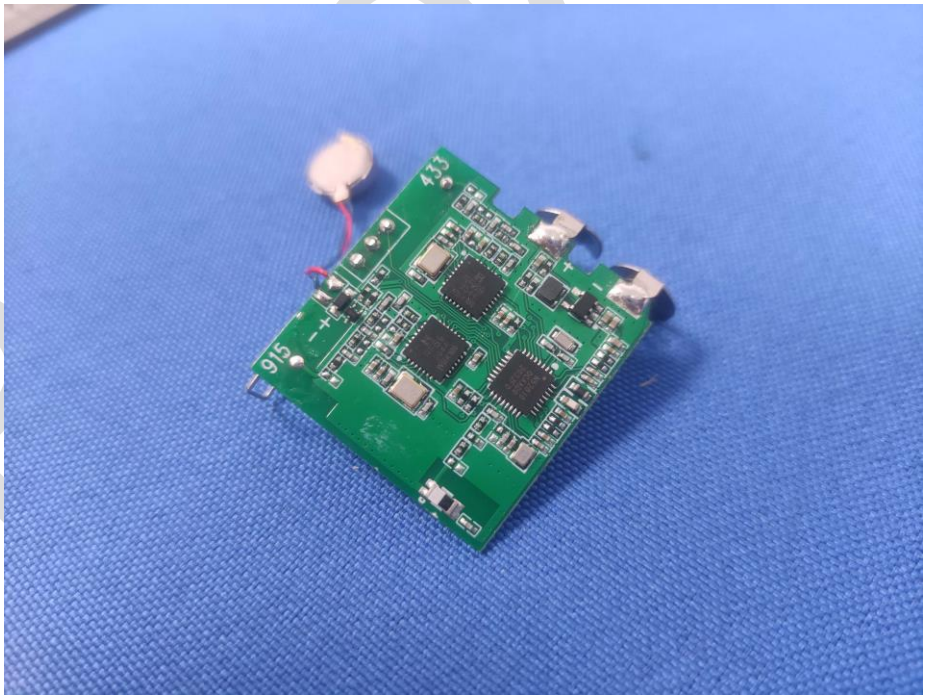
GND
TXD
RXD
GND


433
915

----END OF REPORT----

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