FCC Part 15C Test Report

FCC ID: 2AIRP8580022

Product Name	remote-control for Vigilante Helicopter
Model Name	US858270-5
Brand Name	N/A
Prepared For	ALPHA GROUP CO., LTD.
Address	AULDEYIND. AREA, WENGUAN RD. (CENTRAL), CHENGHAI, SHANTOU,GUANGDONG, CHINA
Prepared by	Shenzhen BCTC Testing Co., Ltd.
Address	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date	April 02, 2018
Date of Report	April 02, 2018
Report No.	BCTC-FY18040200458-1E

TEST RESULT CERTIFICATION

Applicant's name	:	ALPHA GROUP CO., LTD.
Address	:	AULDEYIND. AREA, WENGUAN RD. (CENTRAL), CHENGHAI, SHANTOU,GUANGDONG, CHINA
Manufacture's name	:	ALPHA GROUP CO., LTD.
Address	:	AULDEYIND. AREA, WENGUAN RD. (CENTRAL), CHENGHAI, SHANTOU,GUANGDONG, CHINA
Product name	:	remote-control for Vigilante Helicopter
Model name	:	US858270-5
Brand Name	:	N/A
Standards	:	FCC CFR47 Part 15 Section 15.249

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Prepared By(Engineer):	Eric Yang
Reviewer(Supervisor):	Jade Yang
Approved(Manager):	Carson Zhang

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1 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions (18-25GHz)	15.249(a) 15.249(c) 15.205(a) 15.209(a)	PASS

Note:

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

2 TEST FACILITY

Test Lab: Shenzhen BCTC Testing Co., Ltd.

Address: BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Registered No.: 712850

IC Registration Number: 23583

2.1 Measurement Uncertainty

The reported uncertainty of measurement **y±U,** where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately 95%.

No.	Parameter	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF Power , Conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(<1G)	±4.68dB
5	All emissions, radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

3 General Information

3.1 General Description of E.U.T.

Product Name	:	remote-control for Vigilante Helicopter
Model Name	:	US858270-5
Operating frequency	:	2.410-2.465GHz
Numbers of Channel	:	56
Data Rate	:	1Mbps
Antenna Type	:	Internal Antenna
Antenna Gain	:	0dBi
Type of Modulation	:	GFSK
Power supply	:	DC 3*1.5V Battery
Hardware Version	:	V1.0
Software Version	:	V1.0

3.2 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:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2410**	16	2425	31	2440	46	2455
2	2411	17	2426	32	2441	47	2456
3	2412	18	2427	33	2442	48	2457
4	2413	19	2428	34	2443	49	2458
5	2414	20	2429	35	2444	50	2459
6	2415	21	2430	36	2445	51	2460
7	2416	22	2431	37	2446	52	2461
8	2417	23	2432	38	2447	53	2462
9	2418	24	2433	39	2448	54	2463
10	2419	25	2434	40	2449	55	2464
11	2420	**26**	**2435**	41	2450	**56**	**2465**
12	2421	27	2436	42	2451		
13	2422	28	2437	43	2452		
14	2423	29	2438	44	2453		
15	2424	30	2439	45	2454		

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

Channel	**Frequency(MHz)**
1	2410
26	2435
56	2465

4 Equipment During Test

4.1 Equipments List

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
Spectrum Analyzer	Agilent	E4407B	MY45108040	9KHz-26.5GHz	2018.08.26
Test Receiver	R&S	ESPI	101318	9KHz-7GHz	2018.08.26
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	2018.09.02
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	2018.08.26
RF Cable	R&S	R204	R21X	1GHz-40GHz	2018.08.26

4.2 Description of Support Units

Equipment	Model No.	Series No.
N/A	N/A	N/A

5 Radiated Emission Measurement

5.1 Radiated Emission Limits (Frequency Range 9KHz-1000MHz)

20dBc in any 100KHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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	$20\log^{(500)}$

Limits of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit dBuV/m (at 3m)	
	Peak	Average
Above 1000	74	54

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

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

5.2 Test Procedure

Below 1GHz test procedure as below:

1. The EUT was placed on the top of a rotating table 0.8m above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.

2. The EUT was set 3 meters 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 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. 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.

Above 1GHz test procedure as below:

1. Above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1m to 4m, Both horizontal and vertical polarizations of the antenna are set to make the measurement.

2. Test the EUT in the lowest channel, the middle channel, the highest channel.

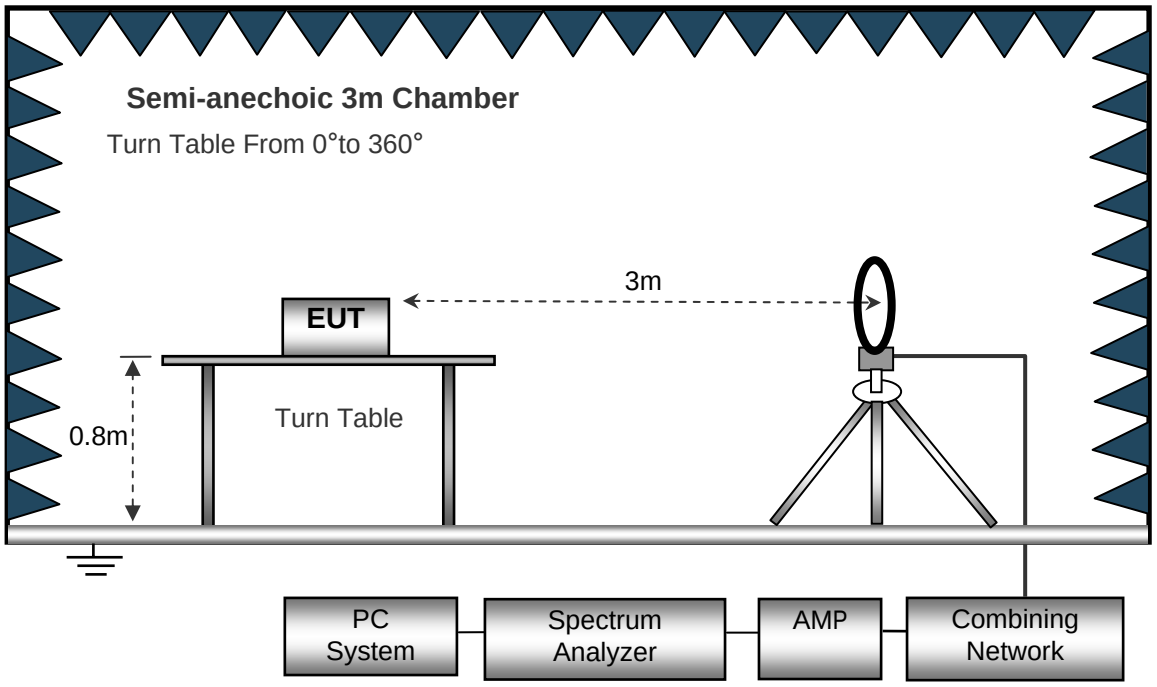
Note:

Both horizontal and vertical antenna polarities were tested. And performed pretest to three orthogonal axis. The worst case emissions were reported.

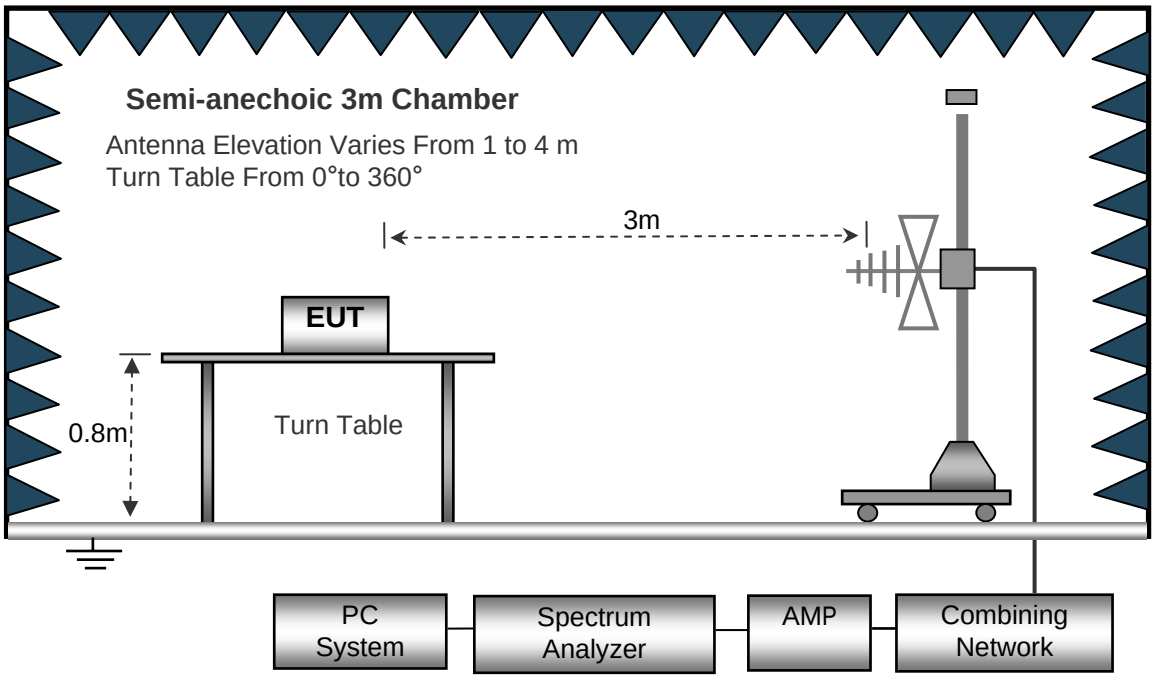
5.3 Test Setup

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

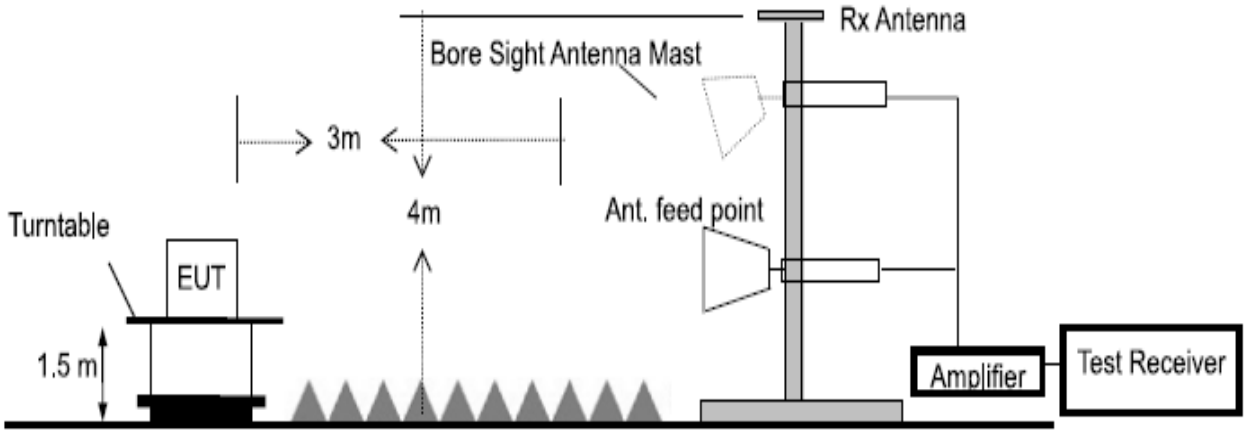
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



5.4 Test Procedure

7. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10: 2013.

8. 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.

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

10. 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.

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

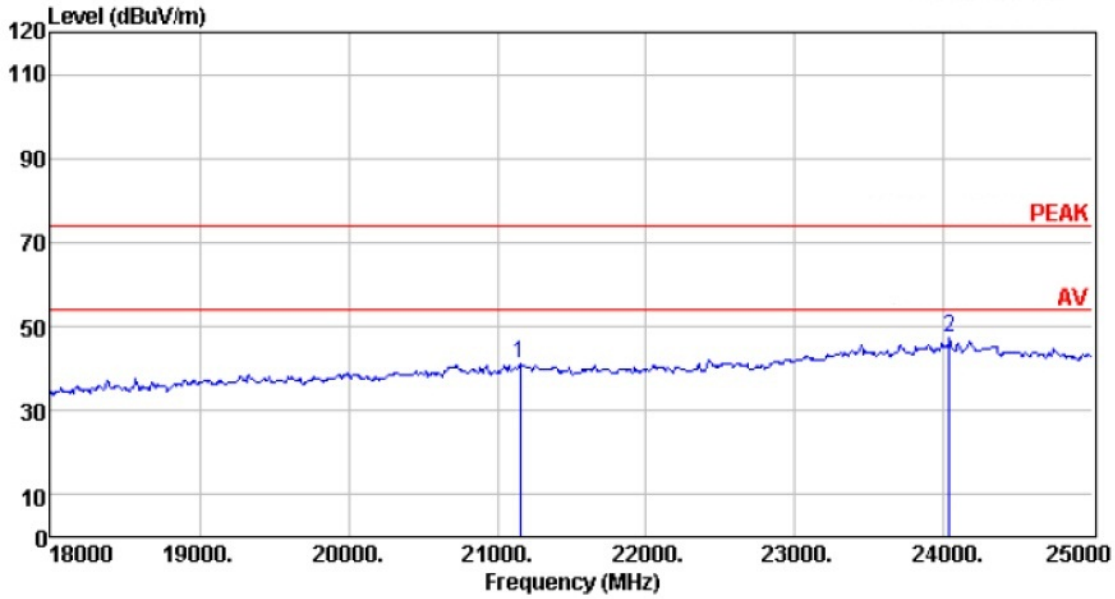
12. Test Procedure of measurement (For Above 1GHz): Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

5.5 Summary of Test Results

Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010hPa	Test Voltage:	DC 3*1.5V Battery
Test Date:	April 02, 2018	Test Engineer:	Eric Yang

Test Channel: 2410MHz

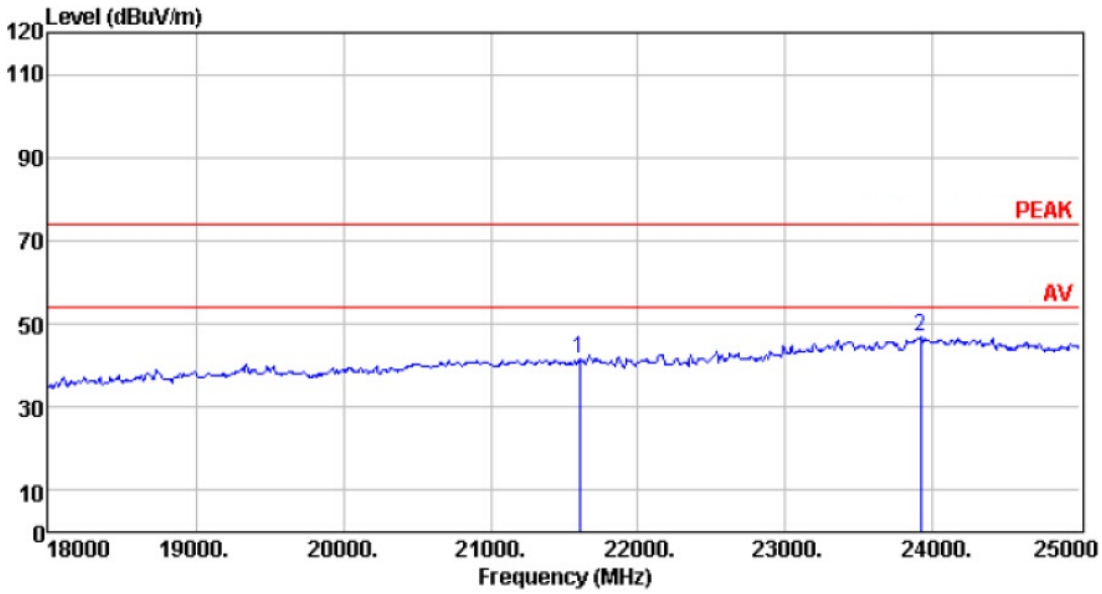
Horizontal:



	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21150.00	46.21	20.20	10.29	41.03	74.00	32.97	Peak
2	24034.00	45.60	22.06	12.38	47.20	74.00	26.80	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Vertical:

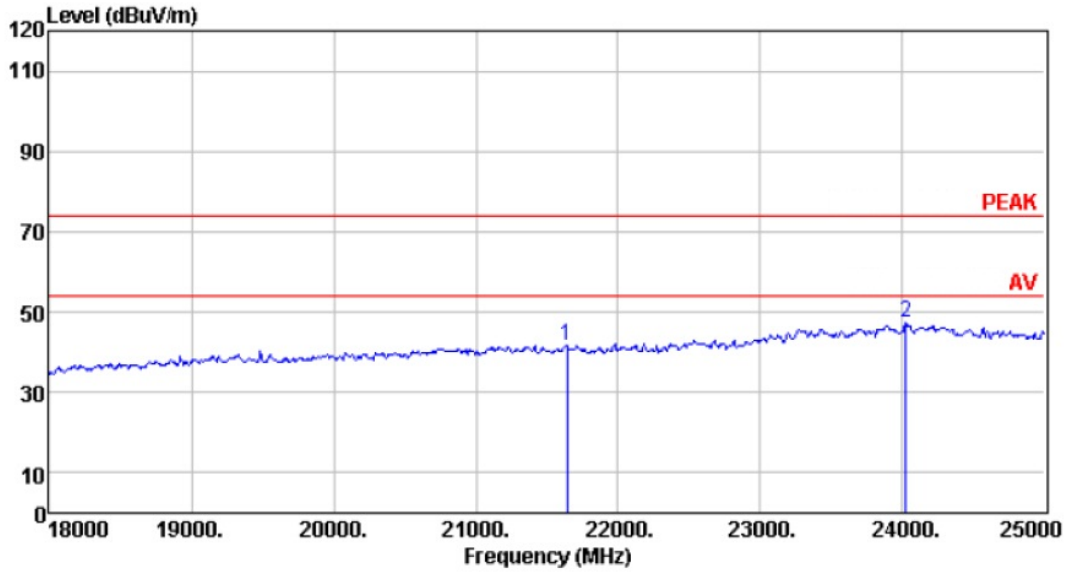


	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21605.00	45.93	20.39	10.37	41.43	74.00	32.57	Peak
2	23915.00	45.62	21.97	12.02	46.73	74.00	27.27	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Test Channel: 2435MHz

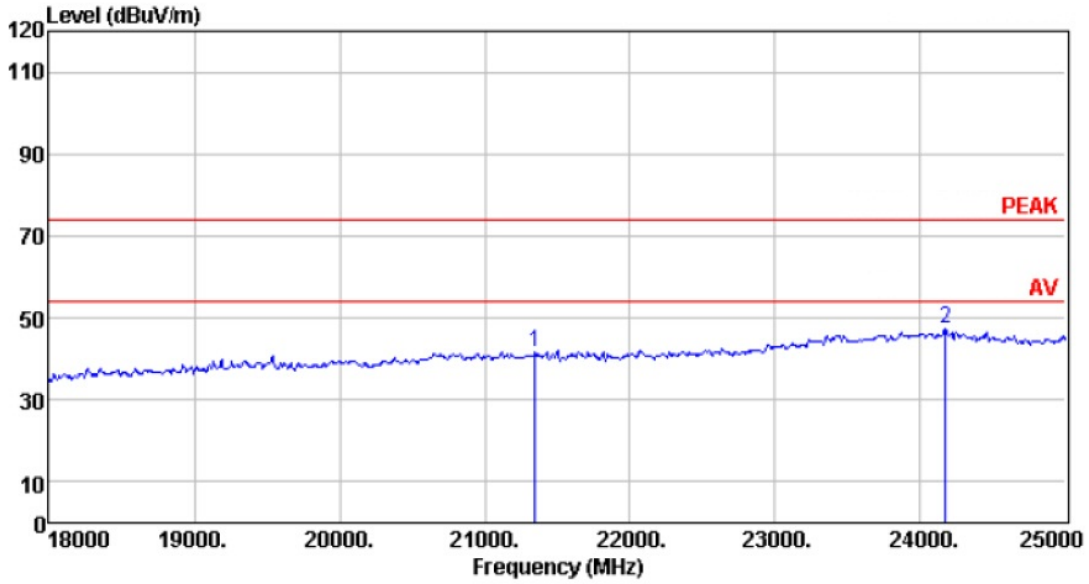
Horizontal:



	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21640.00	45.92	20.41	10.72	41.83	74.00	32.17	Peak
2	24020.00	45.60	22.06	12.39	47.21	74.00	26.79	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Vertical:

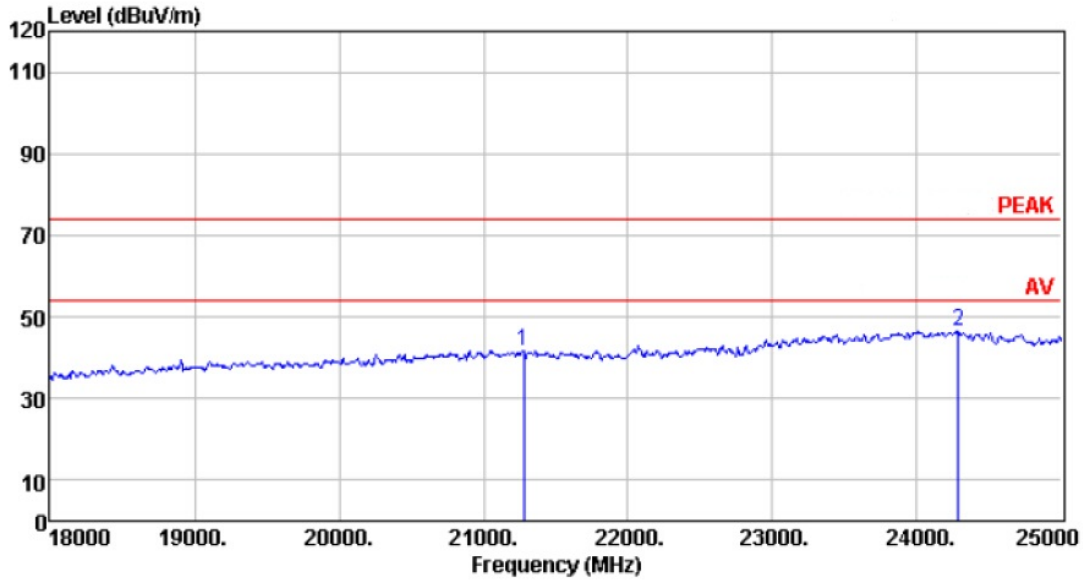


	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21346.00	46.09	20.28	10.78	41.66	74.00	32.34	Peak
2	24174.00	45.64	22.14	12.64	47.35	74.00	26.65	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Test Channel: 2465MHz

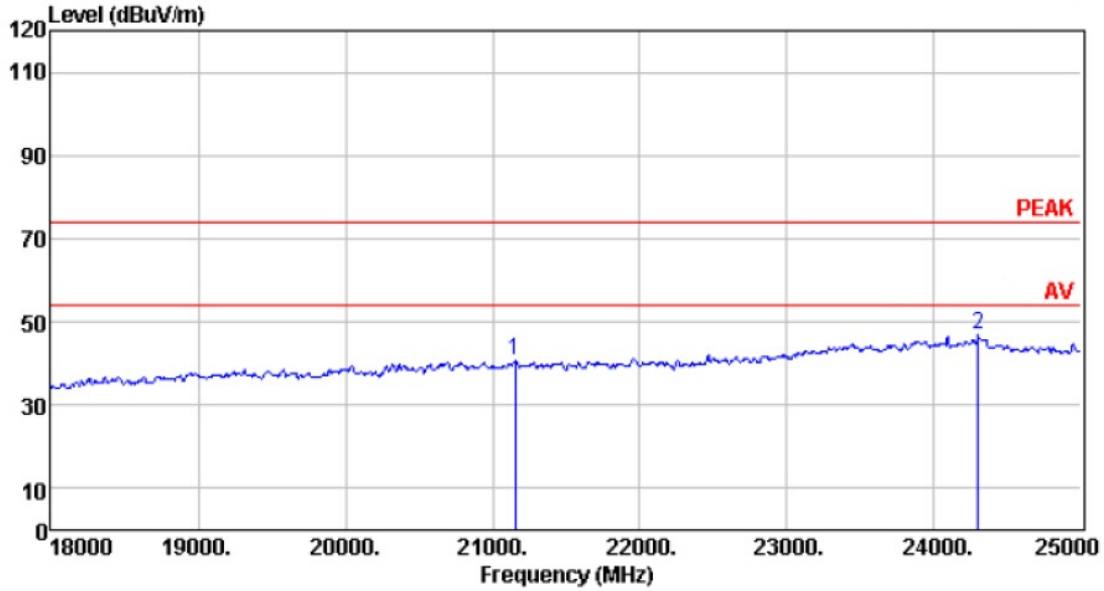
Horizontal:



	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21276.00	46.13	20.25	10.97	41.80	74.00	32.20	Peak
2	24286.00	45.66	22.20	11.87	46.50	74.00	27.50	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

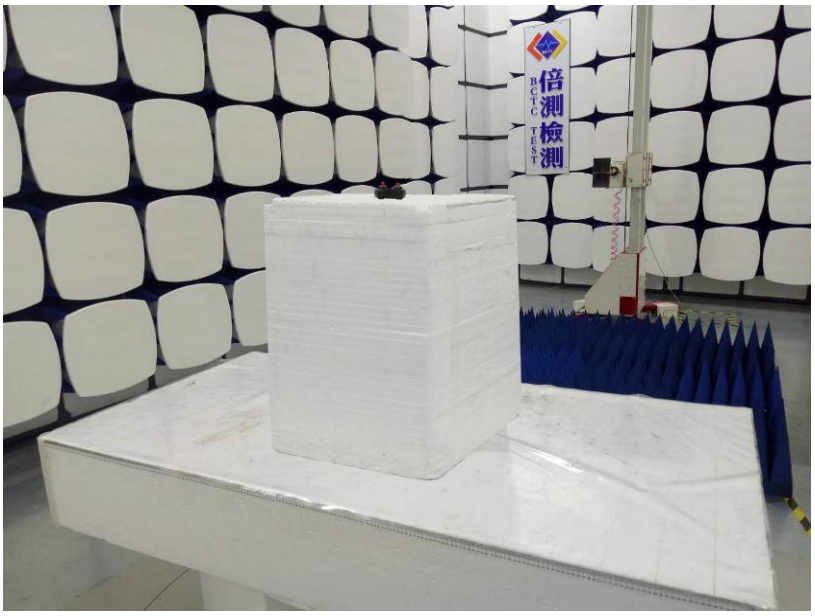
Vertical:



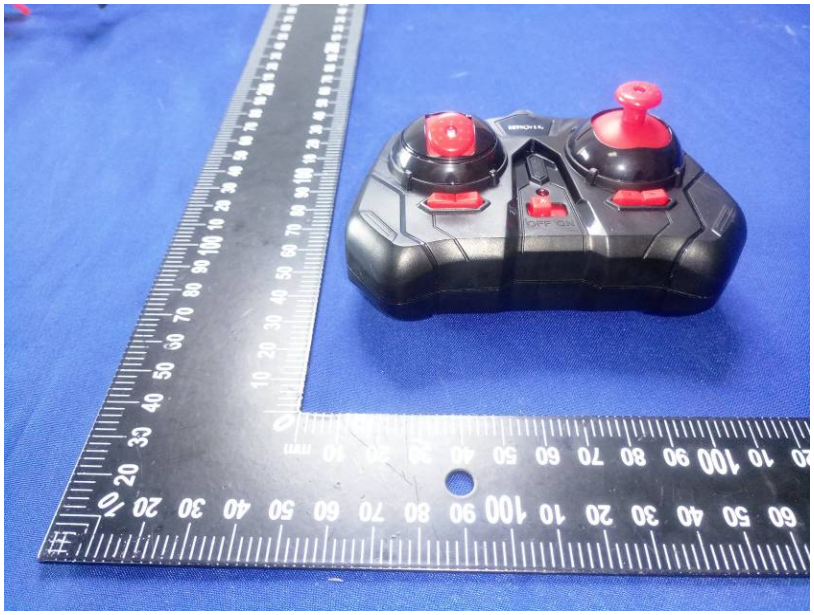
	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21150.00	46.21	20.20	9.99	40.73	74.00	33.27	Peak
2	24300.00	45.66	22.21	12.22	46.83	74.00	27.17	Peak

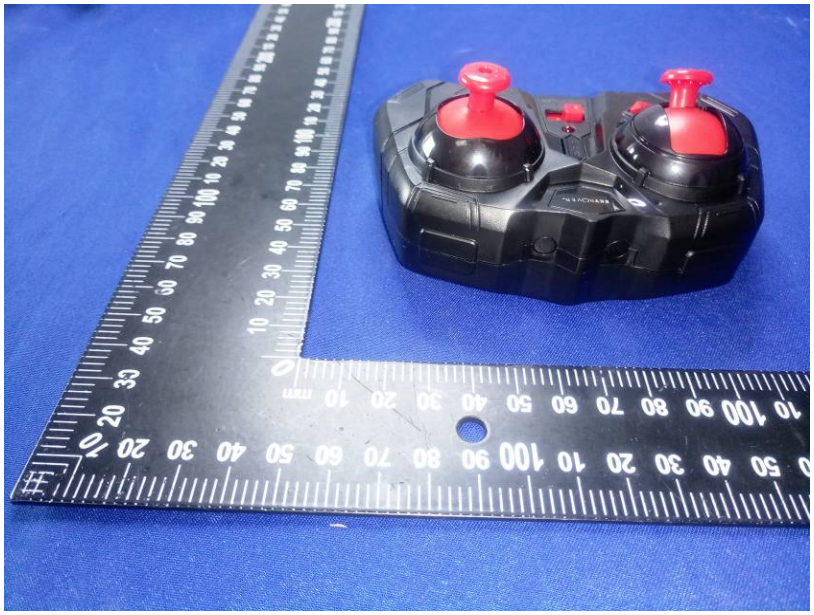
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

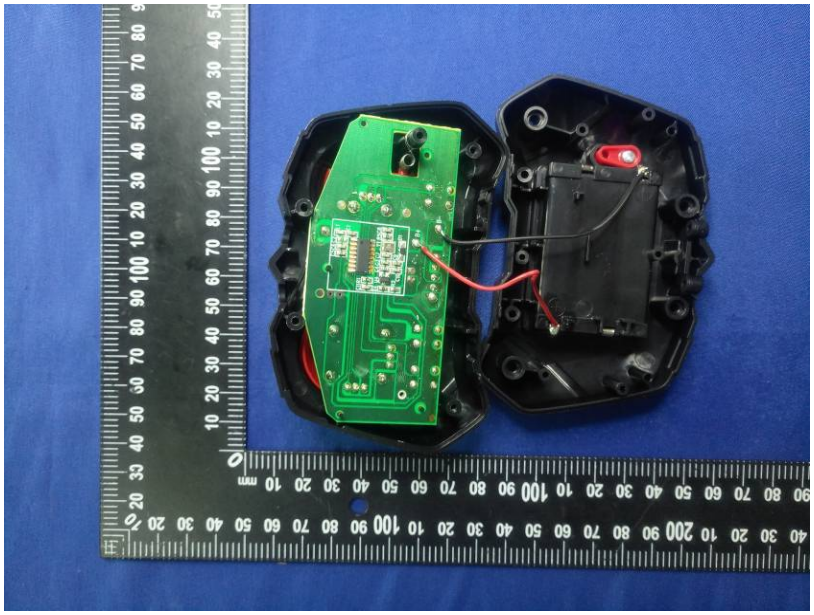
6 TEST PHOTOS

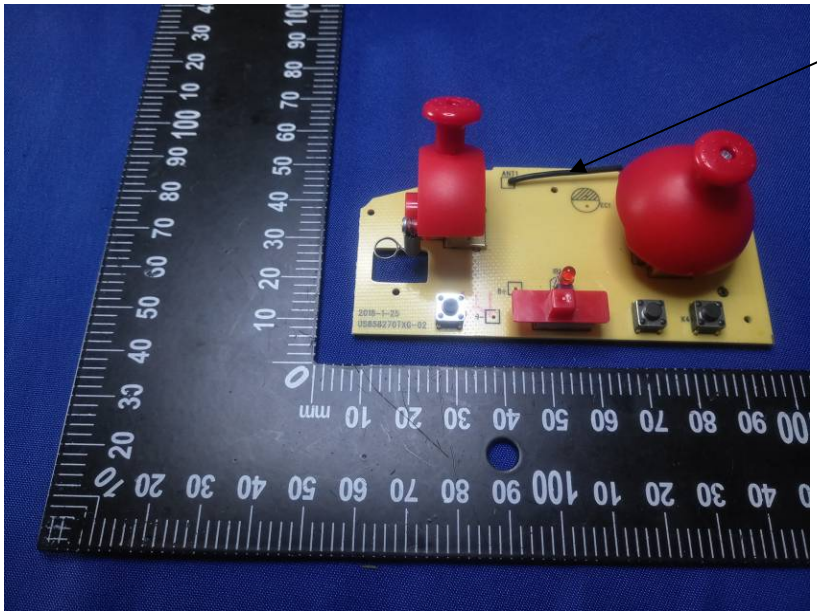


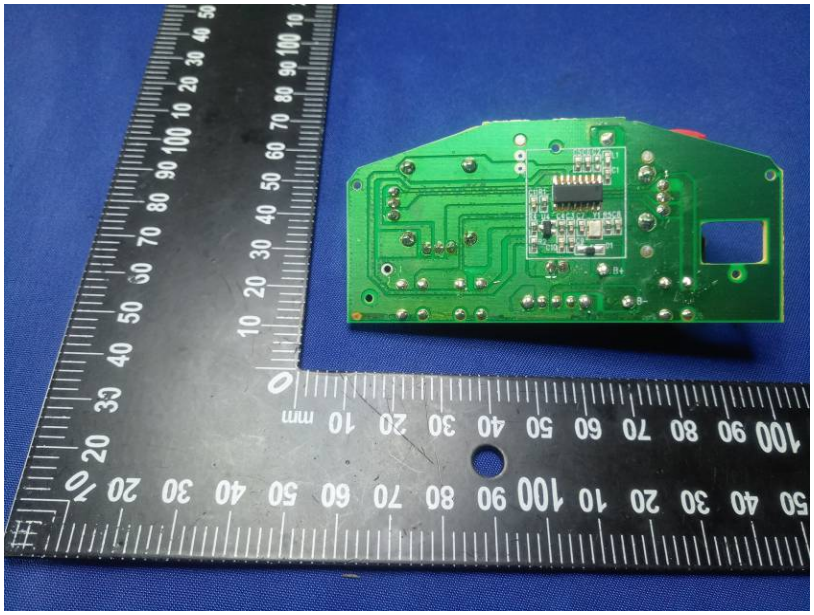
7 EUT PHOTOS








Antenna



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