FCC TEST REPORT

Product Name:	remote controller &WiFi camera
Trade Mark:	N/A
Model No.:	FX-22C
Report Number:	171027003RFC-1
Test Standards:	FCC 47 CFR Part 15 Subpart C
FCC ID:	2AFDJHKFX8GW
Test Result:	PASS
Date of Issue:	June 29, 2018

Prepared for:

HK TECH SCIENCE & TECHNOLOGY CO.,LTD Xiehe Industrial B Zone, Laimei Road, Chenghai District, 515800, Shantou, Guangdong, China

Prepared by:

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	Billy Li Technical Director		*Certified *

Version

Version No.	Date	Description	
V1.0	February 8, 2018	Original	
V2.0	June 29, 2018	Change FCC ID to 2AFDJHKFX8GW	



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	HK TECH SCIENCE & TECHNOLOGY CO.,LTD		
Address of Applicant: Xiehe Industrial B Zone, Laimei Road, Chenghai District, 515800, Sh Guangdong, China			
Manufacturer: HK TECH SCIENCE & TECHNOLOGY CO.,LTD			
Address of Manufacturer:	Xiehe Industrial B Zone, Laimei Road, Chenghai District, 515800, Shantou, Guangdong, China		

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	remote controller &WiFi camera		
Model No.:	FX-22C		
Add, Model No.:	 FX-2, FX-3, FX-3V, FX-4, FX-4VCI, FX-4V, FX-5, FX-5W, FX-6, FX-6C, FX-6CI, FX-7, FX-7C, FX-7CI, FX-7S, FX-8A, FX-8E, FX-8C, FX-8G, FX-9A, FX-9E, FX-9C, FX-11, FX-12V, FX-12, FX-13, FX-14, FX-15, FX-15C, FX-15CI, FX-16C, FX-16CI, FX-17, FX-18, FX-19, FX-20, FX-21, FX-22A, FX-22E, FX-23, FX-24, FX-25, FX-25CI, FX-26, FX-26CI, FX-27A, FX-27E, FX-27C, FX-28, FX-29, FX-29CI, FX-29A, FX-29E, FX-30, FX-31, FX-32, FX-33, FX-34, FX-35A, FX-35E, FX-35C, FX-36, FX-37, D2, D3, D3V, D4, D4VCI, D4V, D5, D5W, D6, D6C, D6CI, D7, D7C, D7CI, D7S, D8A, D8E, D8C, D8G, D9A, D9E, D9C, D11, D12V, D12, D13, D14, D15, D15C, D15CI, D16, D16C, D16CI, D17, D18, D19, D20, D21, D22A, D22E, D22C, D23, D24, D25, D25CI, D26, D27A, D27E, D27C, D28, D29, D29CI, D29A, D29E, D30, D31, D32, D33, D34, D35A, D35E, D35C, D36, D37 		
Trade Mark:	N/A		
DUT Stage:	Identical Prototype		
EUT Supports Function:	2.4 GHz ISM Band: IEEE 802.11b		
Sample Received Date:	October 27, 2017		
Sample Tested Date:	October 27, 2017 to February 5, 2018		

1.2.2 Description of Accessories

DC to DC Adapter			
Input:	5.0 V == 1 A		
Output:	3.7 V == 0.5 A		
AC Cable:	N/A		
DC Cable:	0.6 Meter, Unshielded without ferrite		

Battery			
Battery Type:	Lithium-ion Polymer Rechargeable Battery		
Rated Voltage:	3.7 Vdc		
Rated Capacity:	500 mAh		

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Range:	2400 MHz to 2483.5 MHz		
Support Standards:	IEEE 802.11b		
Type of Modulation:	1: IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK)		
Data Rate:	IEEE 802.11b: Up to 11 Mbps		
Number of Channels:	IEEE 802.11b: 1		
Antenna Type:	Integral Antenna		
Antenna Gain:	2.5 dBi		
Maximum Peak Power:	IEEE 802.11b: 9 dBm		
Normal Test Voltage:	3.7 Vdc@Battery		

1.4 OTHER INFORMATION

Operation Frequency Each of Channel			
IEEE 802.11b			
Channel	Frequency		
1	2412 MHz		

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by	
1	USB Cable	USB-A	0.80 Meter	UnionTrust	

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109 Telephone: +86 (0) 755 2823 0888 Fax: +86 (0) 755 2823 0886

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1.7 TEST FACILITY

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194 Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty		
1	Conducted emission 9KHz-150KHz	±3.8 dB		
2	Conducted emission 150KHz-30MHz	±3.4 dB		
3	Radiated emission 9KHz-30MHz	±4.9 dB		
4	Radiated emission 30MHz-1GHz	±4.7 dB		
5	Radiated emission 1GHz-18GHz	±5.1 dB		
6	Radiated emission 18GHz-26GHz	±5.2 dB		
7	Radiated emission 26GHz-40GHz	±5.2 dB		

2. TEST SUMMARY

	FCC 47 CFR Part 15 Subpart C Test	t Cases	
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	tenna Requirement FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (c)		PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A(note2)
Conducted Peak Output Power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)	KDB 558074 D01 v04 Section 9.1.3	N/A(note2)
6dB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2)	KDB 558074 D01 v04 Section 8.1	N/A(note2)
Power Spectral Density	FCC 47 CFR Part 15 Subpart C Section 15.247 (e)	KDB 558074 D01 v04 Section 10.2	N/A(note2)
Conducted Out of Band Emission	FCC 47 CFR Part 15 Subpart C Section 15.247(d)	KDB 558074 D01 v04 Section 11	N/A(note2)
Radiated Spurious Emissions	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	KDB 558074 D01 v04 Section 12.1	PASS
Band Edge Measurements (Radiated)	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	KDB 558074 D01 v04 Section 12.1	PASS
Note:			

1) N/A: In this whole report not application.

2) Refer to Report No. 14050229 001 for RF Report.

3. EQUIPMENT LIST

	Radiated Emission Test Equipment List							
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)		
>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018		
	Receiver	R&S	ESIB26	100114	Dec. 10, 2017	Dec. 10, 2018		
	EXA Spectrum Analyzer KEYSIGHT		N9010A	MY51440197	Dec. 10, 2017	Dec. 10, 2018		
	Loop Antenna ETS-LINDGREN		6502	00202525	Dec. 17, 2017	Dec. 17, 2018		
	Broadband Antenna ETS-LINDGREN		3142E	00201566	Dec. 17, 2017	Dec. 17, 2018		
	Preamplifier	HP	8447F	2805A02960	Dec. 10, 2017	Dec. 10, 2018		
•	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Dec. 17, 2017	Dec. 17, 2018		
	Multi device ETS-LINDGREN		7006-001	00160105	N/A	N/A		
	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	Jun. 21, 2017	Jun. 21, 2018		
	Test Software	Audix	e3	Sof	Software Version: 9.160323			

4. TEST CONFIGURATION 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests				
Test Condition	Ambient				
Test Condition	Temperature (°C)	Voltage (Vdc)	Relative Humidity (%)		
NT/NV	+15 to +35 3.7 20 to 75				
Remark: 1) NV: Normal Voltage; NT: Normal Temperature					

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)	Tested by
Radiated Spurious Emissions	25.6	53	99.05	Tony Kang
Band Edge Measurements (Radiated)	25.6	53	99.05	Tony Kang

4.2TEST CHANNELS

Mode	Tx/Rx Frequency Test RF Channel Lists		
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	
IEEE 802.11D	2412 10112 10 2402 10112	2412 MHz	

4.3EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11b	1Tx/1Rx	 Keep the EUT in continuously transmitting or receiving with modulation test single.

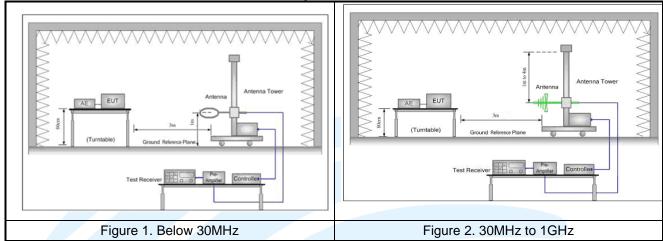
4.4 PRE-SCAN

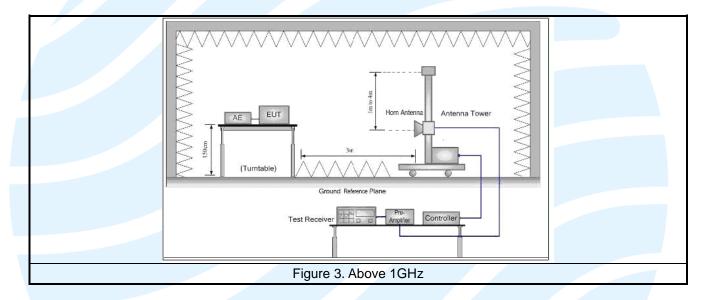
Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below.

Mode	Worst-case data rates
IEEE 802.11b	1 Mbps

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup





4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.7Vdc rechargeable Li-on battery. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	equency Mode Antenna Port		Worst-case axis positioning	
Above 1GHz	1TX	Chain 0	Y axis	

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)		Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	0.960	2.330	0.41	41.20	3.85	1.04	-7.70

Remark:

1) Duty cycle= On Time/ Period;

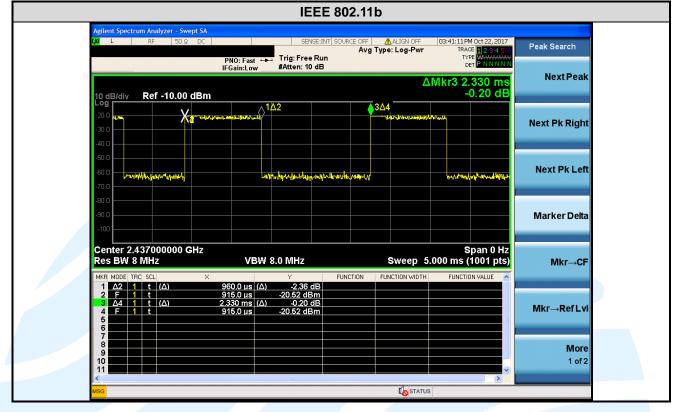
2) Duty Cycle factor = 10 * log(1 / Duty cycle);

3) Average factor = 20 log₁₀ Duty Cycle.

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The test plot as follows



5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION 5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title			
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations			
2	FCC 47 CFR Part 15	Radio Frequency Devices			
3	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices			

5.2ANTENNA REQUIREMENT

Standard Requirement

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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 错

误!未找到引用源。 dBi.

5.3 RADIATED SPURIOUS EMISSIONS

Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209
Test Method:	KDB 558074 D01 v04, Section 12.1
Beasiver Seture	

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

Spurious Emissions

opunious Ennissions				
Frequency	Field strength (microvolt/meter)	Limit (dBµV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)			300
0.490 MHz-1.705 MHz	24000/F(kHz)			30
1.705 MHz-30 MHz	30			30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

- The lower limit shall apply at the transition frequencies. 1.
- Emission level $(dBuV/m) = 20 \log Emission level (uV/m)$. 2.
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the 3. 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.
- **Test Setup:** Refer to section 4.4.1 for details.

Test Procedures:

- From 30 MHz to 1GHz test procedure as below: 1.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic 1) camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top 2) of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum 3) value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned 4) 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 rota table 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.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could 6) 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: 2.
- Different between above is the test site, change from Semi-Anechoic Chamber to fully Anechoic Chamber 1) and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
- Test the EUT in the lowest channel ,middle channel, the Highest channel 2)
- 3) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found

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the Y axis positioning which it is worse case.

Repeat above procedures until all frequencies measured was complete. 4)

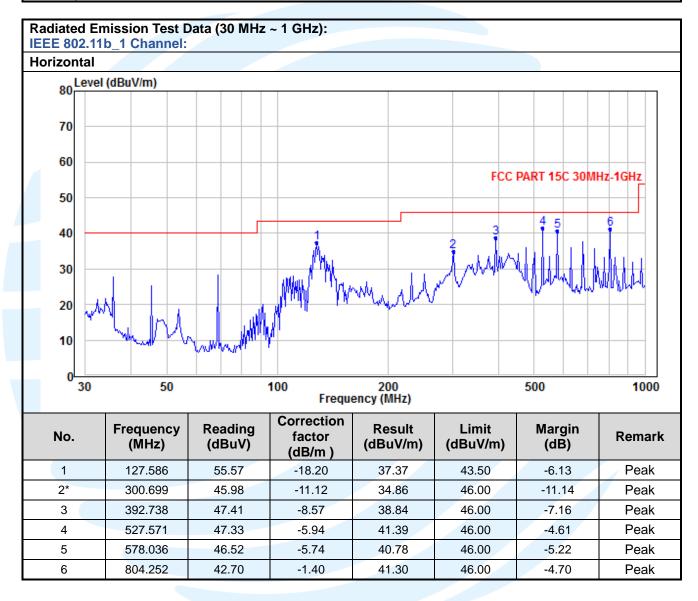
Equipment Used: Refer to section 3 for details. Pass

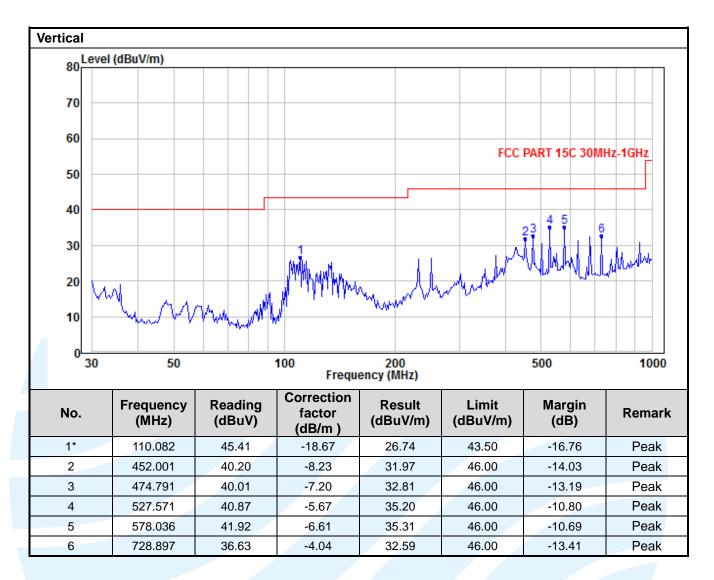
Test Result:

The measurement data as follows:

Radiated Emission Test Data (9 KHz ~ 30 MHz):

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

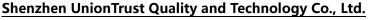




Radiated Emission Test Data (Above 1GHz):						
IEEE 802.11b_1 Channel:						
No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	39.96	74.00	-34.04	Peak	Horizontal
2	7236.00	44.00	74.00	-30.00	Peak	Horizontal
3	4824.00	37.80	74.00	-36.20	Peak	Vertical
4	7236.00	42.09	74.00	-31.91	Peak	Vertical

Remark:

As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, 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. So, only the peak measurements were shown in the report.



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5.4 BAND EDGE MEASUREMENTS (RADIATED)

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method:

KDB 558074 D01 v04, Section 12.1

Limits:

Radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

Frequency	Limit (dBµV/m @3m)	Remark
30 MHz-88 MHz	40.0	Quasi-peak Value
88 MHz-216 MHz	43.5	Quasi-peak Value
216 MHz-960 MHz	46.0	Quasi-peak Value
960 MHz-1 GHz	54.0	Quasi-peak Value
Above 1 GHz	54.0	Average Value
	74.0	Peak Value

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

Radiated band edge measurements at 2390 MHz and 2483.5 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 1 MHz, video bandwidth (VBW) = 3 MHz for peak levels and RBW = 1 MHz and VBW = 10 Hz or 1/T for average levels).

1. Use radiated spurious emission test procedure described in clause 5.10. The transmitter output (antenna port) was connected to the test receiver.

2. Set the PK and AV limit line.

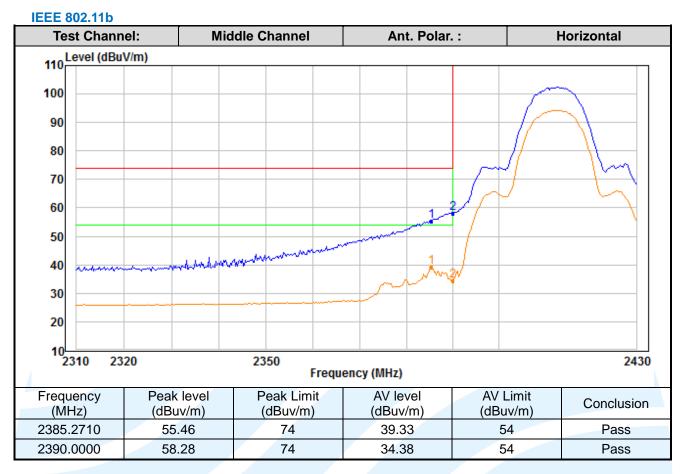
3. Record the fundamental emission and emissions out of the band-edge.

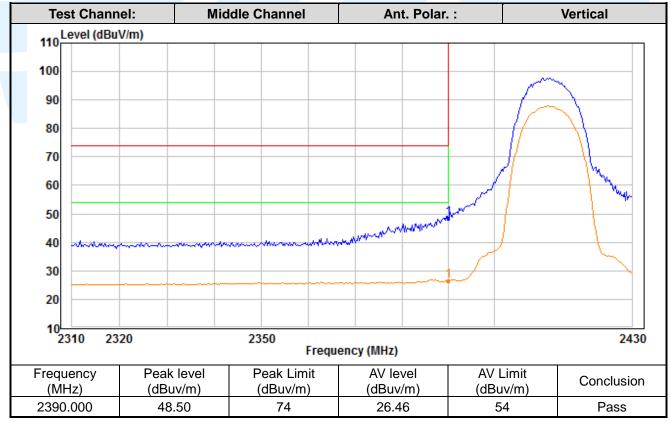
4. Determine band-edge compliance as required.

Refer to section 3 for details. Equipment Used: Pass

Test Result:

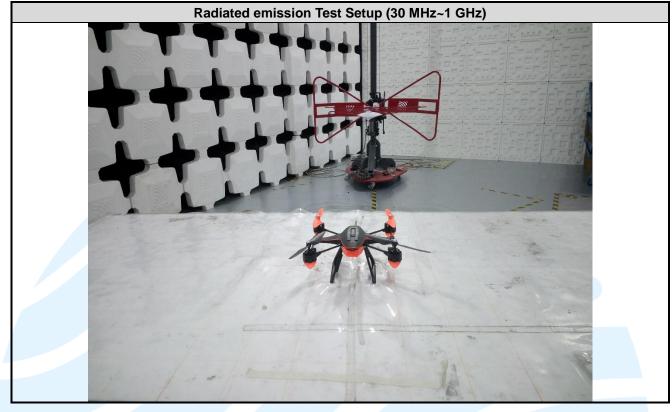
The measurement data as follows:

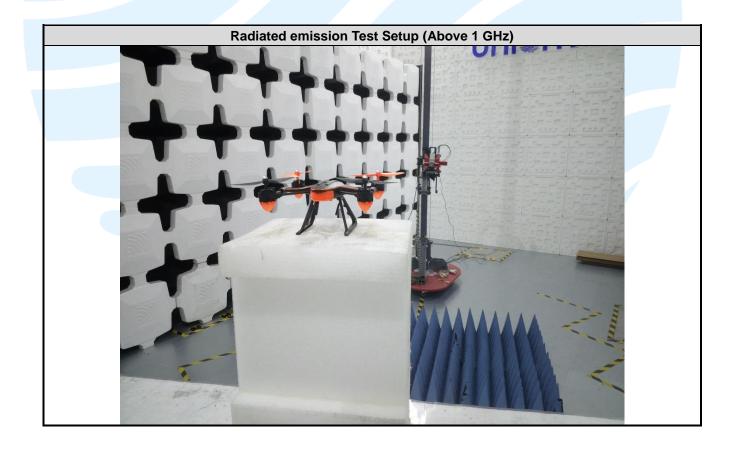




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APPENDIX 1 PHOTOS OF TEST SETUP





*** End of Report ***

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