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Report Template Version: V03 Report Template Revision Date: Mar.1st, 2017

FCC Test Report

Report No.: CQASZ20180700029E-02

Applicant: SHENZHEN HUBSAN TECHNOLOGY CO., LTD.

Address of Applicant: 13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan

District, Shenzhen, China. 518054

Manufacturer: SHENZHEN HUBSAN TECHNOLOGY CO., LTD.

Address of 13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan

Manufacturer: District, Shenzhen, China. 518054

Factory: Dongguan Tengsheng Industrial Co., Ltd.

Address of Factory: A22# Luyi Street, Tianxin Village, Tangxia Town, Dongguan, China.

Equipment Under Test (EUT):

Product: X4 JET
Model No.: H123D
Brand Name: HUBSAN

FCC ID: 2AN75-123DRX

 Standards:
 47 CFR Part 15, Subpart C

 Date of Test:
 2018-07-15 to 2018-07-23

Date of Issue: 2018-07-23

Test Result : PASS*

Tested By:

(Aaron Ma)

Reviewed By: Jack Ai)

Approved By: (Jack Ai)



The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

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



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1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20180700029E-02	Rev.01	Initial report	2018-07-23



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2 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
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013)	PASS

N/A: Not applicable, This EUT is battery power



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4 General Information

4.1 Client Information

Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD.
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China. 518054
Manufacturer:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD.
Address of Manufacturer:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China. 518054
Factory:	Dongguan Tengsheng Industrial Co., Ltd.
Address of Factory:	A22# Luyi Street, Tianxin Village, Tangxia Town, Dongguan, China.

4.2 General Description of EUT

Name:	X4 JET
Model No.:	H123D
Trade Mark :	HUBSAN
Hardware Version:	V05
Software Version:	H123D_FC_V2_0_7, H62_201806191032
Frequency Range:	5735MHz ~ 5840MHz
Modulation Type:	GFSK
Number of Channels:	17 (declared by the client)
Sample Type:	Portable production
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	0.8dBi
Power Supply:	7.6V LiPo battery



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5735MHz	7	5775MHz	13	5815MHz	/	/
2	5740MHz	8	5780MHz	14	5820MHz	/	/
3	5750MHz	9	5790MHz	15	5830MHz	/	/
4	5755MHz	10	5795MHz	16	5835MHz	/	/
5	5760MHz	11	5800MHz	17	5840MHz	/	/
6	5770MHz	12	5810MHz	/	/	/	/

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(CH1)	5735MHz
The Middle channel(CH07)	5795MHz
The Highest channel(CH22)	5840MHz



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4.3 Test Environment and Mode

Operating Environment:	Operating Environment:				
Temperature:	24.0 °C				
Humidity:	52 % RH				
Atmospheric Pressure:	1008 mbar				
Test Mode:	Use test software (RF test) to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.				

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
/	/	/	/	/

4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

Test	Range	Uncertainty	Notes
Radiated Emission	Below 1GHz	±5.12dB	(1)
Radiated Emission	Above 1GHz	±4.60dB	(1)
Conducted Disturbance	0.15~30MHz	±3.34dB	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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4.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.7 Test Facility

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

• CNAS (No. CNAS L5785)

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• ISED Registration No.: 22984-1

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology 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 our files. Registration No.:522263

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.





4.11 Equipment List

Item	Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Due Date
1	EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/24
2	Spectrum analyzer	R&S	FSU26	CQA-038	2018/9/24
3	Spectrum analyzer	R&S	FSU43	CQA-102	2018/9/24
4	Preamplifier	MITEQ	AFS4- 00010300-18- 10P-4	CQA-035	2018/9/24
5	Preamplifier	MITEQ	AMF-6D- 02001800-29- 20P	CQA-036	2018/9/24
5	Preamplifier	Compliance Directions Systems Inc.	PAP-2640-50	CQA-103	2018/9/24
6	Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2019/3/21
7	Bilog Antenna	R&S	HL562	CQA-011	2018/9/24
8	Horn Antenna	R&S	HF906	CQA-012	2018/9/24
9	Horn Antenna	R&S	BBHA 9170	CQA-088	2018/9/24
10	Horn Antenna	A.H.Systems, Inc.	SAS-573	CQA-104	2018/9/24
11	Coax cable (9KHz~40GHz)	CQA	RE-high-02	CQA-078	2018/9/24
12	RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/24



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5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C 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 integrated antenna and no consideration of replacement. The best case gain of the antenna is 0.8dBi.



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5.2 Radiated Emission

Test Requirement:	47 CFR Part 15C Section	n 15.249 and 15.20	09 and 15.20)5			
Test Method:	ANSI C63.10: 2013						
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)						
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark		
	0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak	1	
	0.009MHz-0.090MHz	Average	10kHz	30KHz	Average		
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak		
	0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak]	
	0.110MHz-0.490MHz	Average	10kHz	30KHz	Average		
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak		
	30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak		
	Above 1GHz	Peak	1MHz	3MHz	Peak		
	Above 1G112	Peak	1MHz	10Hz	Average		
	Note: For fundamental f			=5MHz, Peak	detector is for	· PK	
Limit: (Spurious Emissions and band edge)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m	Remark	Measurem distance (
,	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300		
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30		
	1.705MHz-30MHz	30	-	-	30		
	30MHz-88MHz	100	40.0	Quasi-pea	k 3		
	88MHz-216MHz	150	43.	5 Quasi-pea	k 3		
	216MHz-960MHz	200	46.0	Quasi-pea	k 3		
	960MHz-1GHz	500	54.0	Quasi-peal	k 3		
	Above 1GHz	500	54.0) Average	3		
	Note: 1) 15.35(b), Unl emissions is 200 applicable to the emission level rad	dB above the mequipment under t	aximum pe est. This pe	rmitted avera	ge emission	limit	
	2) Emissions rad	liated outside of th	e specified fi	equency band	s, except for		
	harmonics, shall	be attenuated by a	t least 50 dB	below the leve	el of the		
	fundamental or to the general radiated emission limits in Section 15.209,						
	whichever is the lesser attenuation.						
Limit:	Frequency	Limit (dBuV/	/m @3m)	Remark			
(Field strength of the	5725MHz-5875MHz 94.0 Average Value				ue		
fundamental signal)	07 201VII 12 007 01VII 12	5725MHz-5875MHz 114.0 Peak Value					



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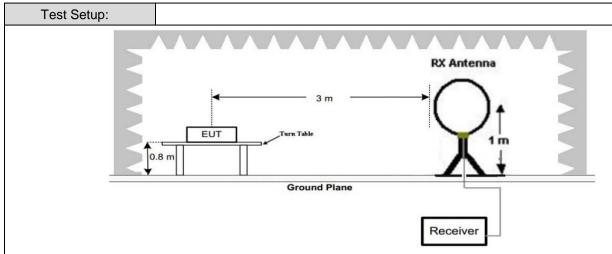
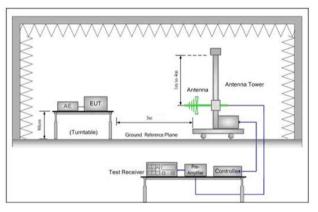


Figure 1. Below 30MHz



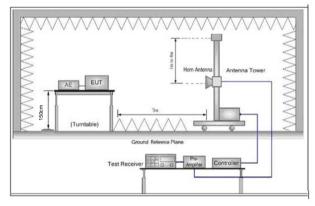


Figure 2. 30MHz to 1GHz

Figure 3. Above 1 GHz

Test Procedure:

- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

Note: For the radiated emission test 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.

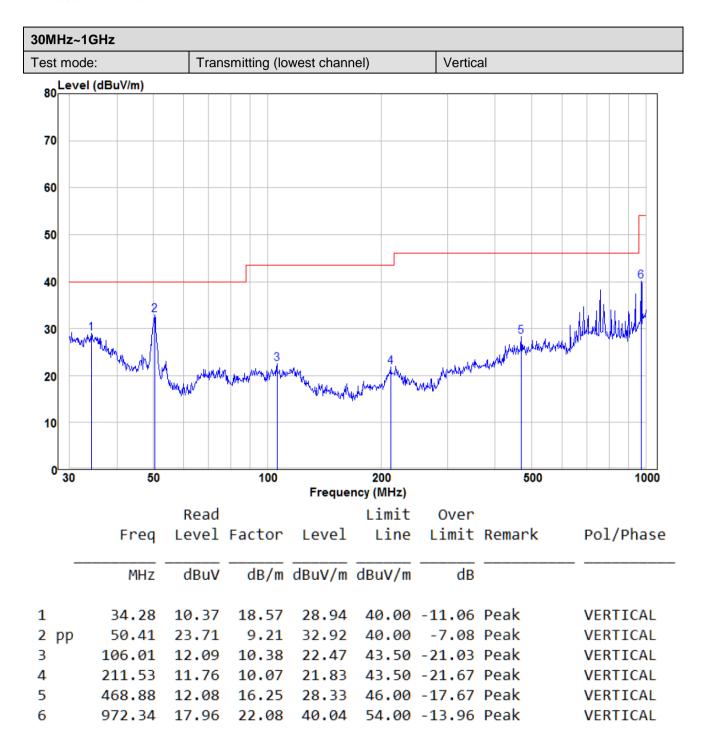
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. 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



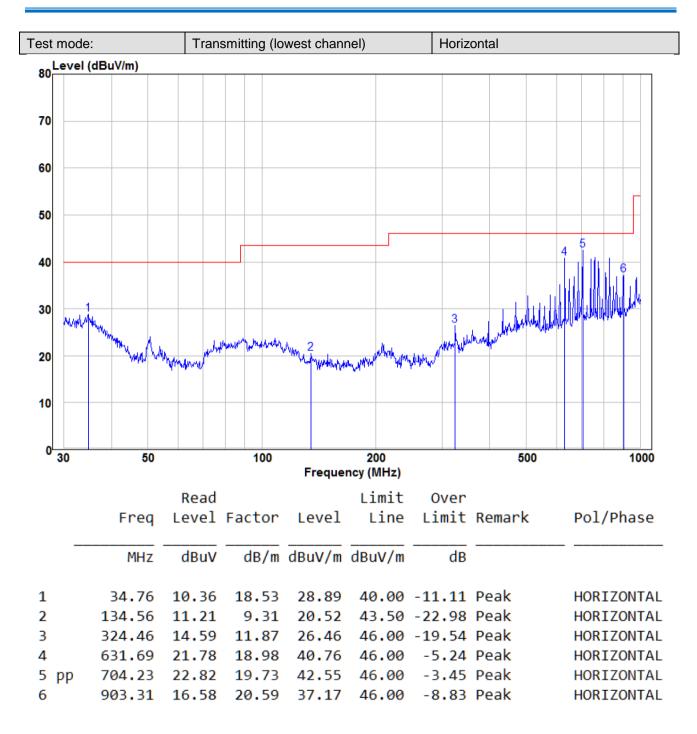
	 was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and 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. g. Test the EUT in the lowest channel,the middle channel,the Highest channel h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete. 			
Instruments Used:	Refer to section 5.11 for details			
Exploratory Test Mode:	Transmitting mode			
Final Test Mode:	Pretest the EUT at Transmitting mode, For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.			
Test Voltage:	DC7.6V			
Test Results:	Pass			



Measurement Data









Above 1GHz							
Test mode:		Transmitting		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	1 1/ V
5725	57.74	-2.77	54.97	74	-19.03	peak	Н
5725	42.35	-2.77	39.58	54	-14.42	AVG	Н
5735	99.12	-2.74	96.38	114	-17.62	peak	Н
5735	94.48	-2.74	91.74	94	-2.26	AVG	Н
11470	49.60	6.84	56.44	74	-17.56	peak	Н
11470	38.71	6.84	45.55	54	-8.45	AVG	Н
17205	42.89	13.02	55.91	74	-18.09	peak	Н
17205	31.22	13.02	44.24	54	-9.76	AVG	Н
5725	56.39	-2.77	53.62	74	-20.38	peak	V
5725	44.20	-2.77	41.43	54	-12.57	AVG	V
5735	95.66	-2.74	92.92	114	-21.08	peak	V
5735	90.73	-2.74	87.99	94	-6.01	AVG	V
11470	49.16	6.84	56.00	74	-18.00	peak	V
11470	36.32	6.84	43.16	54	-10.84	AVG	V
17205	43.31	13.02	56.33	74	-17.67	peak	V
17205	30.85	13.02	43.87	54	-10.13	AVG	V



Test mode:		Transmitting		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
5790	96.37	-2.39	93.98	114	-20.02	peak	Н
5790	93.91	-2.39	91.52	94	-2.48	AVG	Н
11580	47.85	6.97	54.82	74	-19.18	peak	Н
11580	37.14	6.97	44.11	54	-9.89	AVG	Н
17370	41.44	15.71	57.15	74	-16.85	peak	Н
17370	28.17	15.71	43.88	54	-10.12	AVG	Н
5790	95.00	-2.41	92.59	114	-21.41	peak	V
5790	90.61	-2.41	88.20	94	-5.80	AVG	V
11580	48.67	6.97	55.64	74	-18.36	peak	V
11580	38.12	6.97	45.09	54	-8.91	AVG	V
17370	42.36	15.71	58.07	74	-15.93	peak	V
17370	30.63	15.71	46.34	54	-7.66	AVG	V



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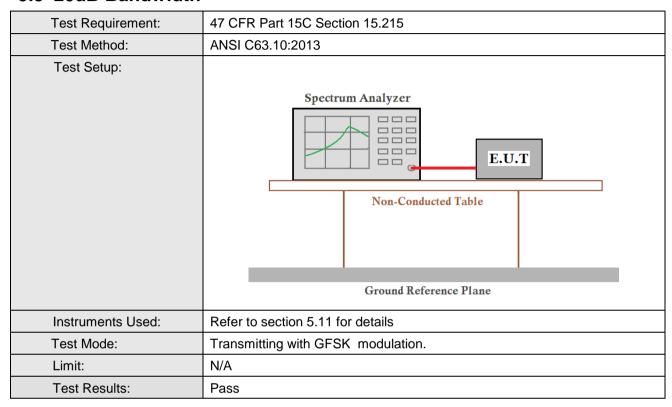
Test mode:		Transmitting		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
5840	97.84	-2.31	95.53	114	-18.47	peak	Н
5840	94.11	-2.31	91.80	94	-2.20	AVG	Н
5875	57.53	-2.21	55.32	74	-18.68	peak	Н
5875	43.58	-2.21	41.37	54	-12.63	AVG	Н
11680	49.15	6.63	55.78	74	-18.22	peak	Н
11680	36.11	6.63	42.74	54	-11.26	AVG	Н
17520	42.12	16.05	58.17	74	-15.83	peak	Н
17520	28.40	16.05	44.45	54	-9.55	AVG	Н
5840	96.22	-2.31	93.91	114	-20.09	peak	V
5840	93.50	-2.31	91.19	94	-2.81	AVG	V
5875	57.83	-2.21	55.62	74	-18.38	peak	V
5875	42.84	-2.21	40.63	54	-13.37	AVG	V
11680	49.62	6.63	56.25	74	-17.75	peak	V
11680	36.72	6.63	43.35	54	-10.65	AVG	V
17520	41.19	16.05	57.24	74	-16.76	peak	V
17520	29.32	16.05	45.37	54	-8.63	AVG	V

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 - Final Test Level =Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 2) Scan from 9kHz to 40GHz, The disturbance above 20GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

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5.3 20dB Bandwidth



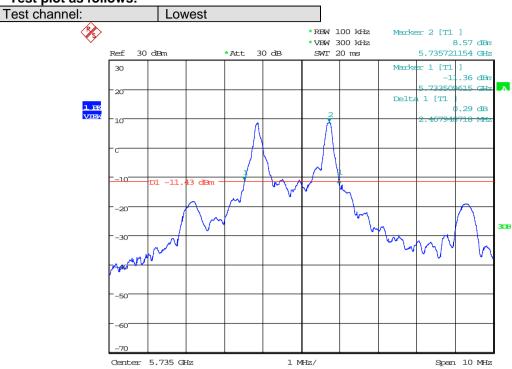
Measurement Data

Test channel	20dB bandwidth (MHz)	Results
Lowest	2.468	Pass
Middle	2.468	Pass
Highest	2.404	Pass

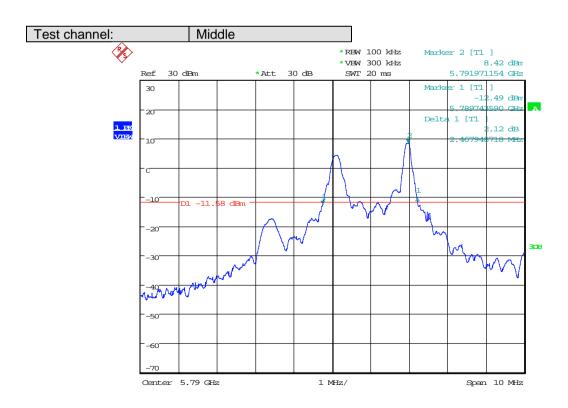


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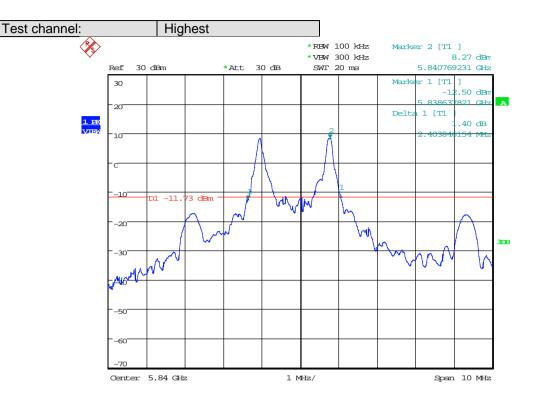
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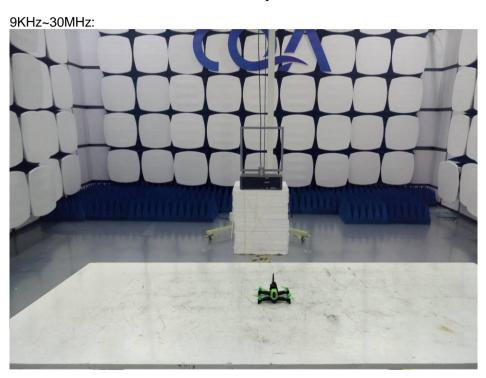


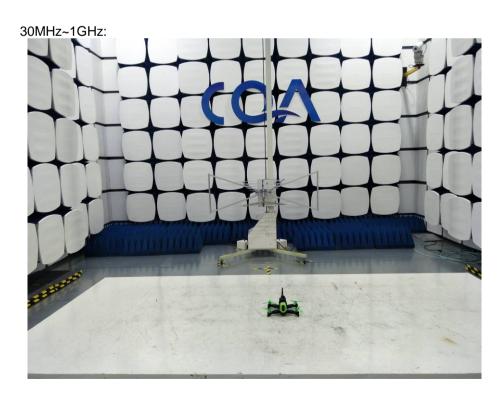
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6 Photographs

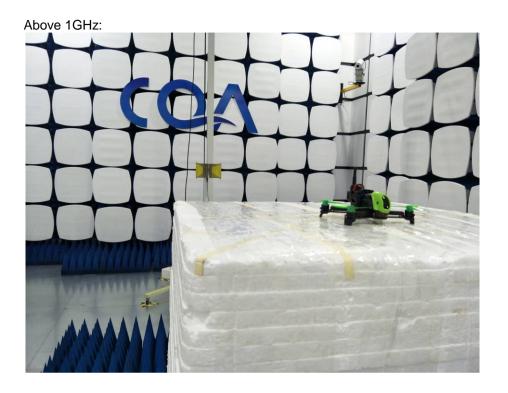
6.1 Radiated Emission Test Setup





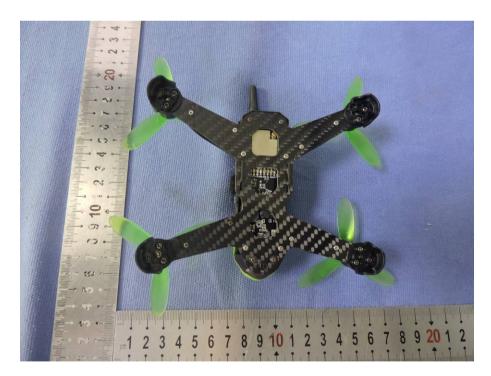






6.2 EUT Constructional Details













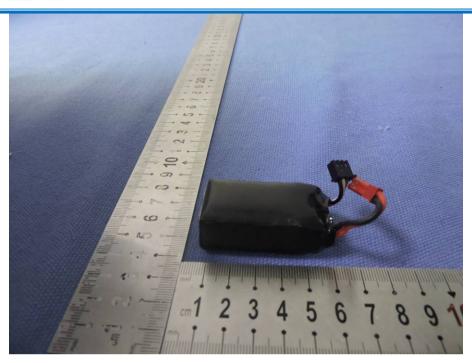






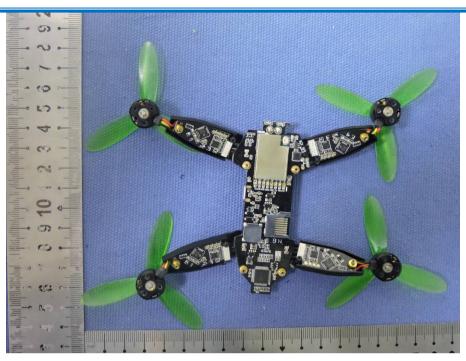


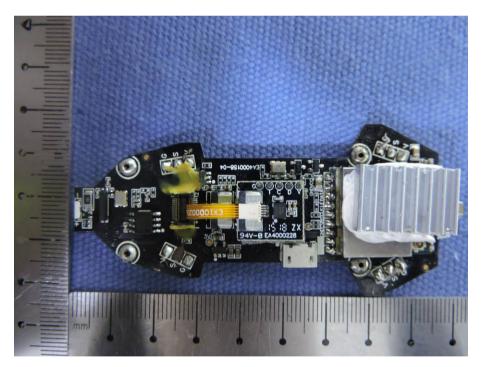




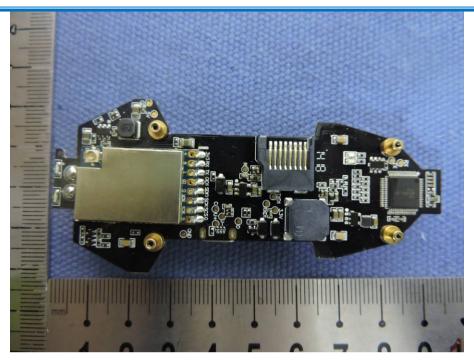


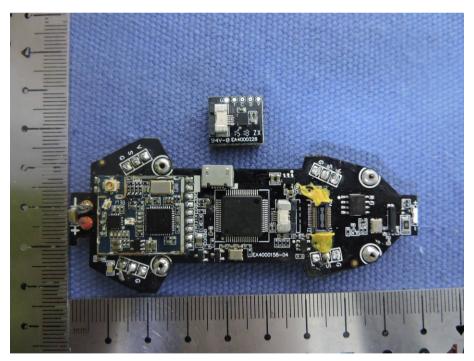




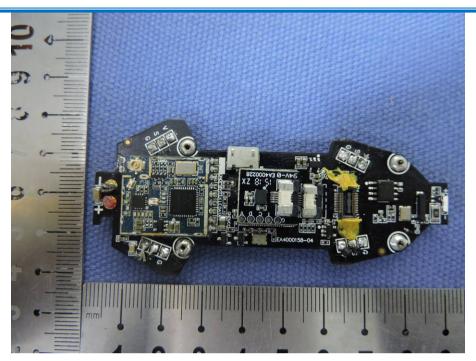


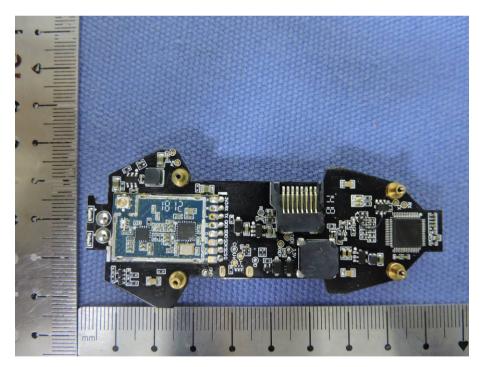




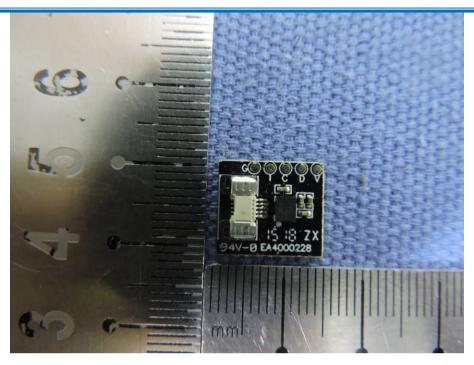


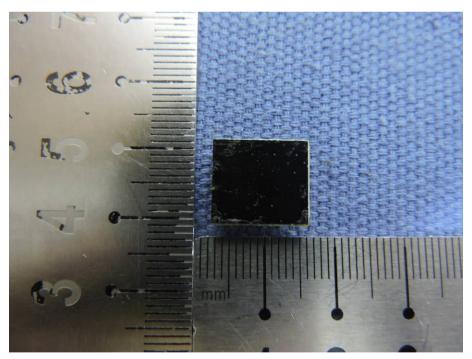




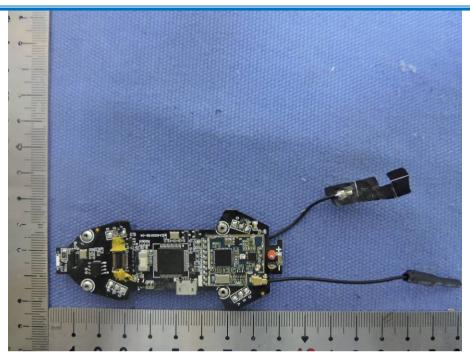


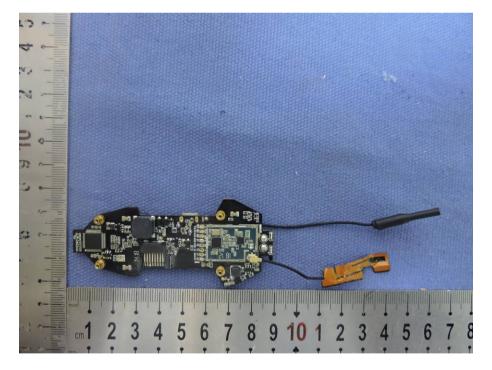




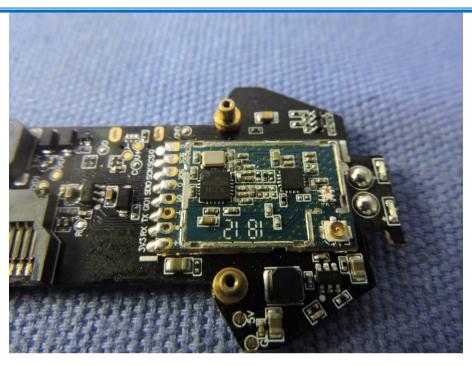


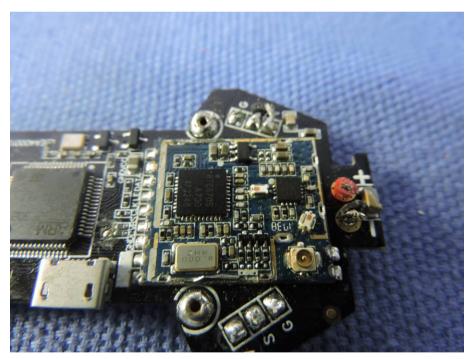




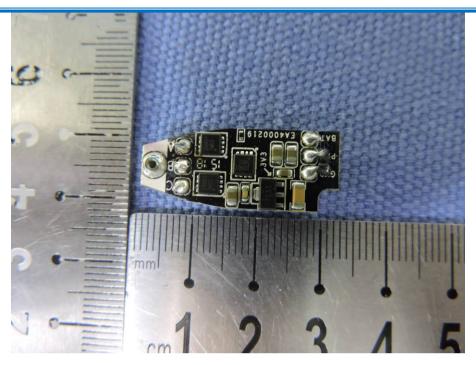


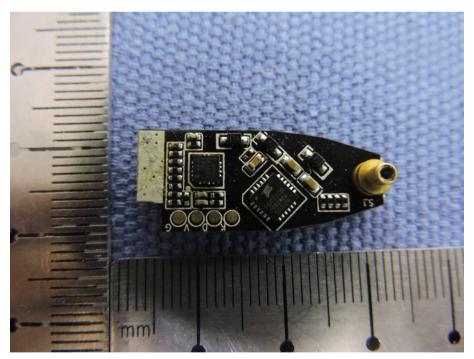








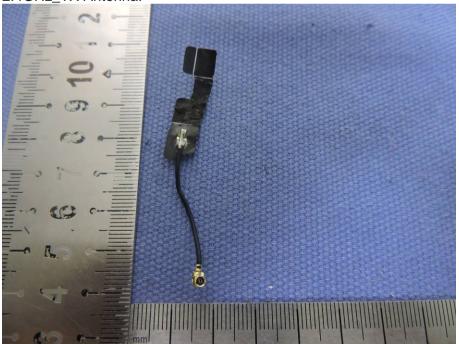




5.8GHz_TX Antenna:



2.4GHz_TX Antenna:



END OF THE REPORT