



FCC TEST REPORT

Prepared For :	HANGZHOU ZT MODEL CO., LTD.
Product Name:	2.4G Radio Control Airplane
Model :	XA02901, XA02903 ,XA02902, XA03701
Prepared By :	Shenzhen BATT Testing Technology Co., Ltd. 11F, Bldg.B, Xinbaoyuan, Xinnanhu Commercial city, Bao'an District, Shenzhen, Guangdong, China. Tel: 86-755-27753991 Fax: 86-755-27754182
Test Date:	July 17, 2012 to July 21, 2012
Date of Report :	July 23, 2012
Report No.:	BATT20120725090E

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TABLE OF CONTENTS

1 TEST CERTIFICATION	3
2 TEST RESULT SUMMARY	4
3 EUT DESCRIPTION	5
4 TEST LAB DETAILS	5
5 Test	6
5.1. CONDUCTED EMISSIONS TEST.....	6
5.2. RADIATED EMISSIONS TEST.....	9
5.3 BAND EDGE TEST.....	20
5.4 ANTENNA REQUIREMENT.....	25
5.5 20dB BANDWIDTH MEASUREMENT.....	26
6 PHOTOGRAPHS OF THE TEST CONFIGURATION	29
7 PHOTOGRAPHS OF EUT	30



1 TEST CERTIFICATION

Product:	2.4G Radio Control Airplane
Model:	XA02901, XA02903 ,XA02902, XA03701
Applicant:	HANGZHOU ZT MODEL CO., LTD. 58 TH XINGWU RD,BEIGAN INDUSRTY DISTRICT,HANGZHOU,ZHEJIANG,CHINA
Factory:	HANGZHOU ZT MODEL CO., LTD. 58 TH XINGWU RD,BEIGAN INDUSRTY DISTRICT,HANGZHOU,ZHEJIANG,CHINA
Trade Mark:	
Tested:	July 17, 2012 to July 21, 2012
Test Voltage:	DC6V, 4 pcs AA batteries
Applicable Standards:	FCC PART 15.249

The test report was prepared by Shenzhen BATT Testing Technology Co., Ltd.and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Prepared by : Hellen Xiao
Hellen Xiao Assistant

Reviewer : Mike Yong
Mike Yong/Supervisor

Approved & Authorized Signer : Jones Song
Jones Song/ Manager




2 TEST RESULT SUMMARY

Standard	Item	Result	Remarks
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS	Not Applicable
FCC Part 15 Subpart C Paragraph 15.249(a) & 15.249(b) Limit	Field Strength of Fundamental	PASS	Complies
FCC Part 15, Paragraph 15.209	Radiated Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(d) Limit	Band Edge Test	PASS	Complies
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS	Complies

Note: 1. The test result judgment is decided by the limit of test standard



3 EUT DESCRIPTION

Product	2.4G Radio Control Airplane
Model	XA02901, XA02903 ,XA02902, XA03701
Trade Mark	 ZT MODEL
Applicant	HANGZHOU ZT MODEL CO., LTD.
Operational Frequency Range	2402-2479MHz
Modulation Type	GFSK
Antenna	Integral Antenna with Gain 0 dBi
Housing material	Plastic
FCC ID:	OJPA02901
EUT Type	<input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample, <input type="checkbox"/> Mass Product Sample.
Serial Number	--
Power Rating	DC6V, 4 pcs AA batteries

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
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4 TEST LAB Details

Name: SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District,
Shenzhen,CHINA.

FCC Registration Number: 899988

Note: All tests were done at SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD



5.1. CONDUCTED EMISSION MEASUREMENT

5.1.1. LIMITS

FREQUENCY (MHz)	Class B (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

5.1.2. TEST INSTRUMENTS

Conducted Emission Shielding Room Test Site (743)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	100139	04/20/2013
LISN	AFJ	LS16C	10010947251	04/20/2013

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).
2. N.C.R = No Calibration Request.



5.1.3. TEST PROCEDURES

Procedure of Preliminary Test

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2003 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2003.

The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

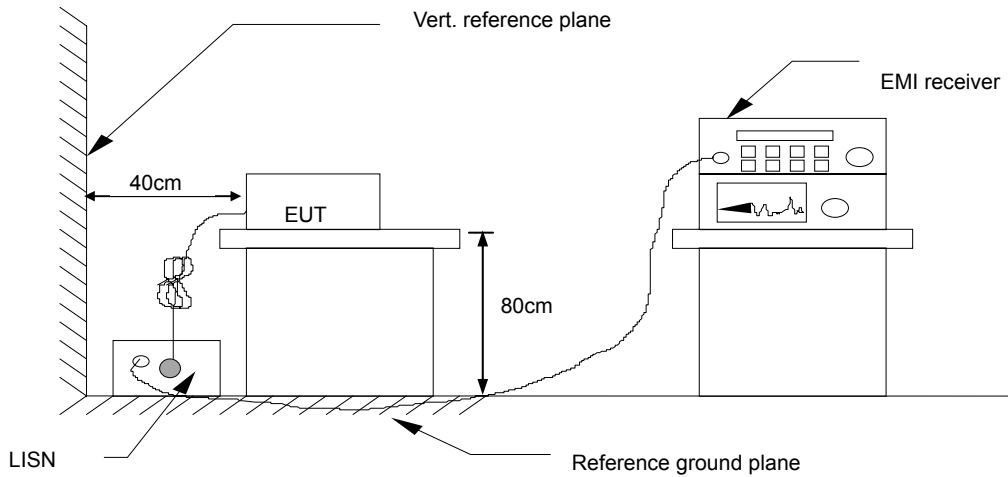
Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

5.1.4. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

5.1.5. TEST RESULTS

Model No.	XA02901	6dB Bandwidth	10 KHz
Environmental Conditions	26°C, 60% RH	Test Mode	Normal Operation
Detector Function	Peak / Quasi-peak/AV	Test Result	Not Applicable
Test By	Tony		

NOTE: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).
 2. “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

- Freq. = Emission frequency in MHz
- Reading level(dBuV) = Receiver reading
- Corr. Factor (dB) = Attenuator factor + Cable loss
- Level (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Level (dBuV) – Limits (dBuV)
- Q.P.=Quasi-Peak

Note: Because the EUT powered by batteries, this test item not applicable



5.2. RADIATED EMISSION MEASUREMENT

5.2.1. LIMITS

FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)		Field Strength of Harmonics (3m)		
	mV/m	dBuV/m	uV/m	dBuV/m	
2400-2483.5	50	94 (Average) 114 (Peak)	500	54 (Average)	74 (Peak)

Frequencies in restricted band are complied to limit on Paragraph 15.209.

FREQUENCY (MHz)	dBuV/m (At 3m)
	Limit
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT

(4) New batteries were installed in the equipment under test for radiated emission testing.

(5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. As to 1G-25G, the final emission level got using PK and AV detector

(6) This is a handheld device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), after pre-test. It was found that the worse radiated emission was get at the Stand position.

5.2.2. TEST INSTRUMENTS

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESVD	100008	04/20/2013
EMI Test Receiver	R&S	ESI26	838786/013	04/20/2013
Pre Amplifier	H.P.	HP8447D	2727A05017	04/20/2013
Pre Amplifier	EM	EM30265	--	04/20/2013
Bilog Antenna	Schwarebeck	VULB9163	9163/340	04/20/2013
Horn Antenna	Schwarebeck	BBHA 9170	BBHA9170265	04/20/2013



Horn Antenna	Schwarebeck	BBHA 9120D	9120D-631	04/20/2013
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- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).
2. N.C.R = No Calibration Request.

5.2.3. TEST PROCEDURE

Procedure of Preliminary Test

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

Support equipment, if needed, was placed as per ANSI C63.4 –2003.

All I/O cables were positioned to simulate typical usage as per ANSI C63.4 –2003.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.4 –2003. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Analyzer / Receiver quickly scanned from 30MHz to 25000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Analyzer / Receiver scanned from 30MHz to 25000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

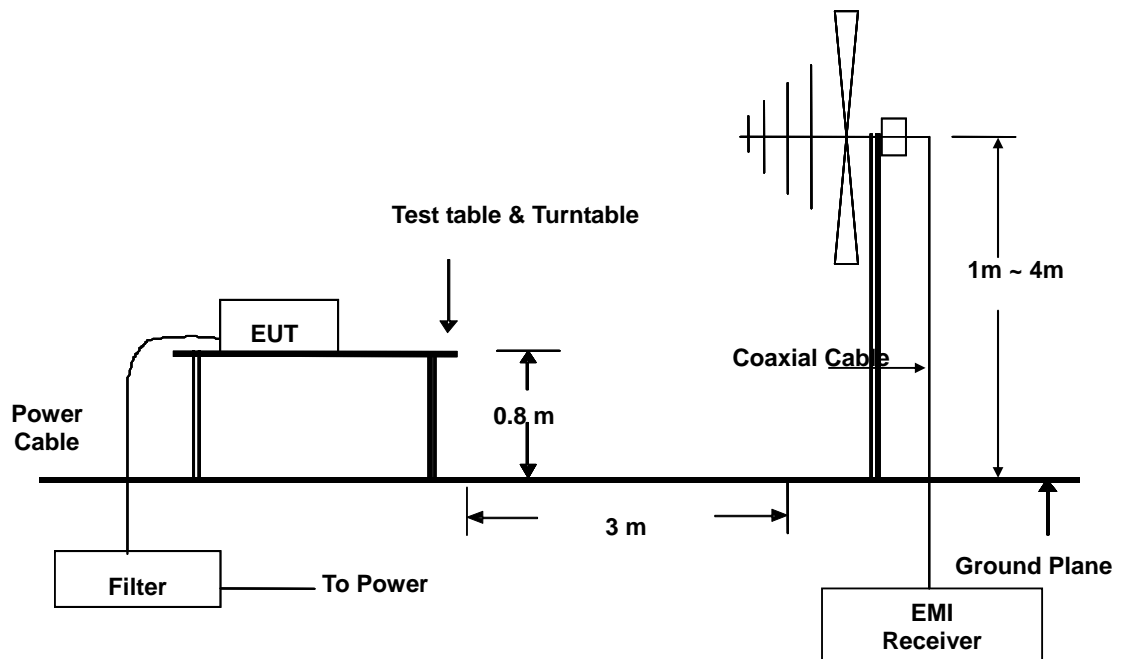
Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P. or AV and Peak reading is presented.

All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz .

Measurements were made at 3 meters.

The test data of the worst-case condition(s) was recorded.

5.2.4. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration

5.2.5 TEST RESULTS

**Fundamental & Harmonics Radiated Emission Data**

Product:	2.4G Radio Control Airplane	Test Mode:	Low Channel- keep transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	6.0VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal/ Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2402	91.9 (PK)	V	114/94	-2.1
2402	88.4 (PK)	H	114/94	-5.6
4804	--	H/V	74/54	--
7206	--	H/V	74/54	--
9608	--	H/V	74/54	--
12010	--	H/V	74/54	--
14412	--	H/V	74/54	--
16814	--	H/V	74/54	--
19216	--	H/V	74/54	--
21618	--	H/V	74/54	--
24020	--	H/V	74/54	--



Product:	2.4G Radio Control Airplane	Test Mode:	Middle Channel- keep transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	6.0VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal/ Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2440	92.1(PK)	V	114/94	-1.9
2440	90.5(PK)	H	114/94	-3.5
4880	--	H	74/54	--
7320	--	V	74/54	--
9760	--	H/V	74/54	--
12200	--	H/V	74/54	--
14640	--	H/V	74/54	--
17080	--	H/V	74/54	--
19520	--	H/V	74/54	--
21960	--	H/V	74/54	--
24400	--	H/V	74/54	--



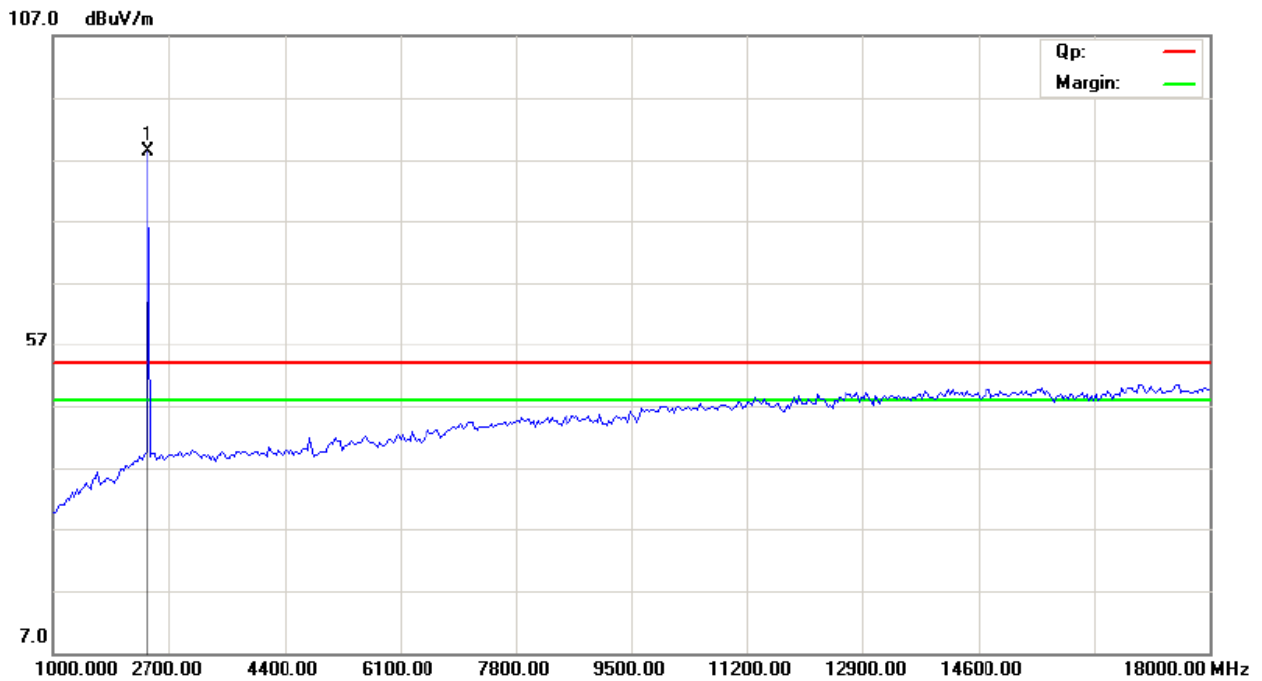
Product:	2.4G Radio Control Airplane	Test Mode:	High Channel- keep transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	6.0VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal/ Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2479	92.6(PK)	H	114/94	-1.4
2479	88.1(PK)	V	114/94	-5.9
4958	--	H/V	74/54	--
7447	--	H/V	74/54	--
9916	--	H/V	74/54	--
12396	--	H/V	74/54	--
14874	--	H/V	74/54	--
17353	--	H/V	74/54	--
19832	--	H/V	74/54	--
22311	--	H/V	74/54	--
24790	--	H/V	74/54	--

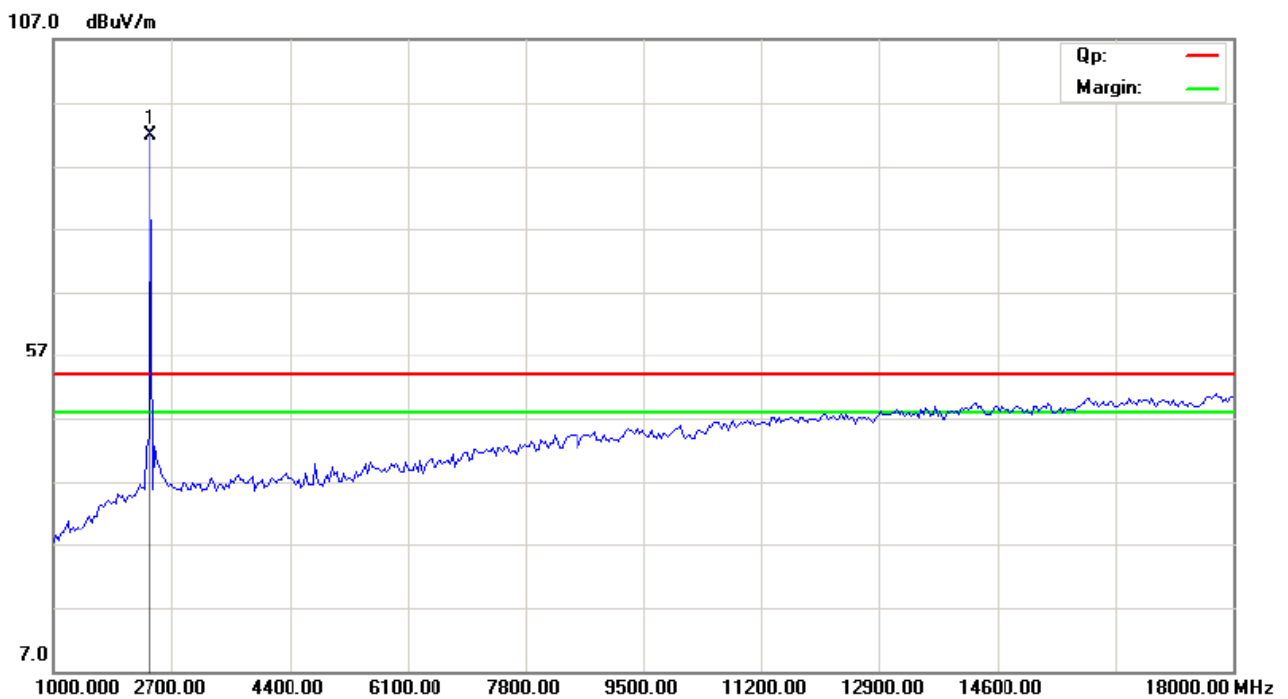
- Note:
- (1) PK= Peak, AV= Average
 - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
 - (3) Margin=Emission-Limits
 - (4) According to section 15.35(b), the peak limit is 20dB higher than the average limit
 - (5) The measured PK value less than the AV limit.

Please refer to the following test plots for details:

Low Channel: Horizontal



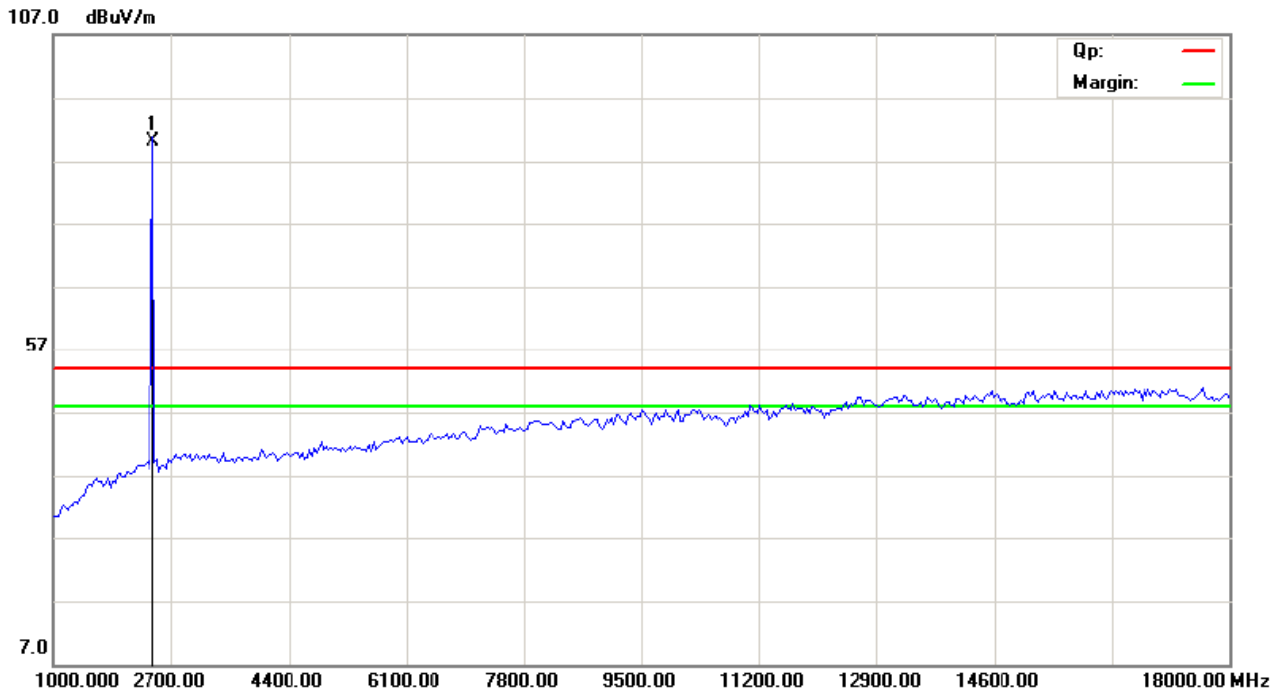
Low Channel : Vertical



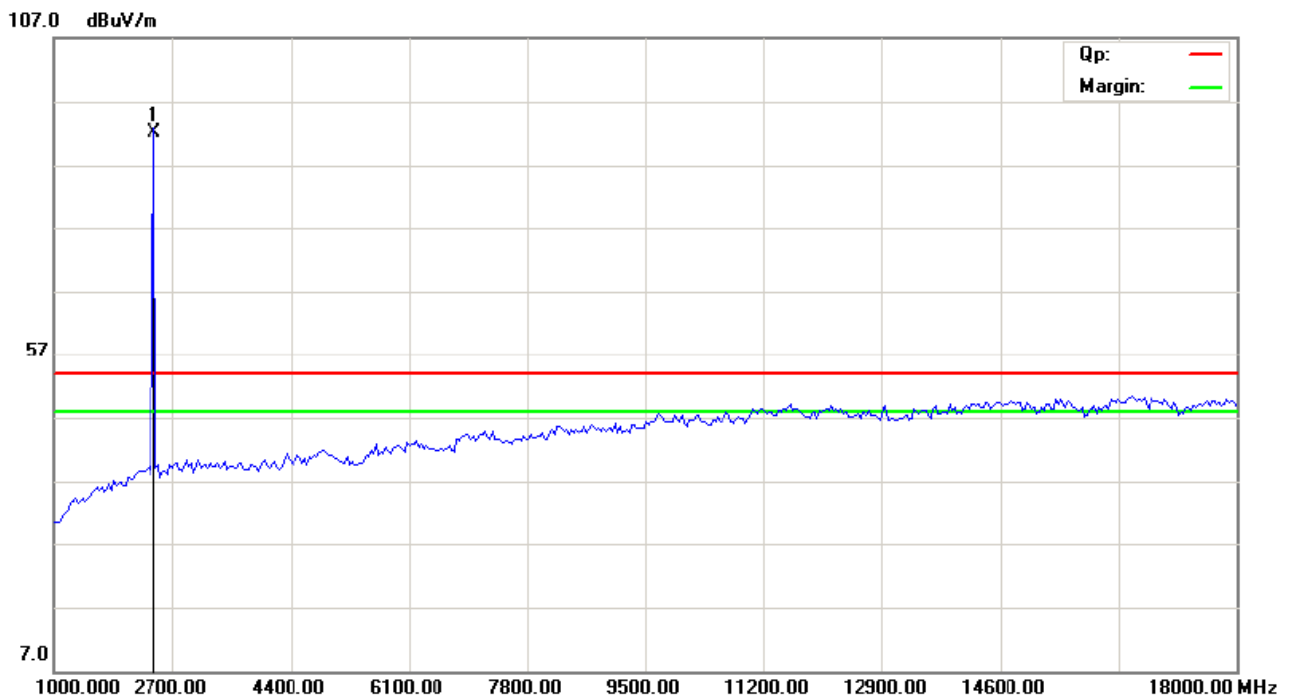


Please refer to the following test plots for details:

Middle Channel: Horizontal

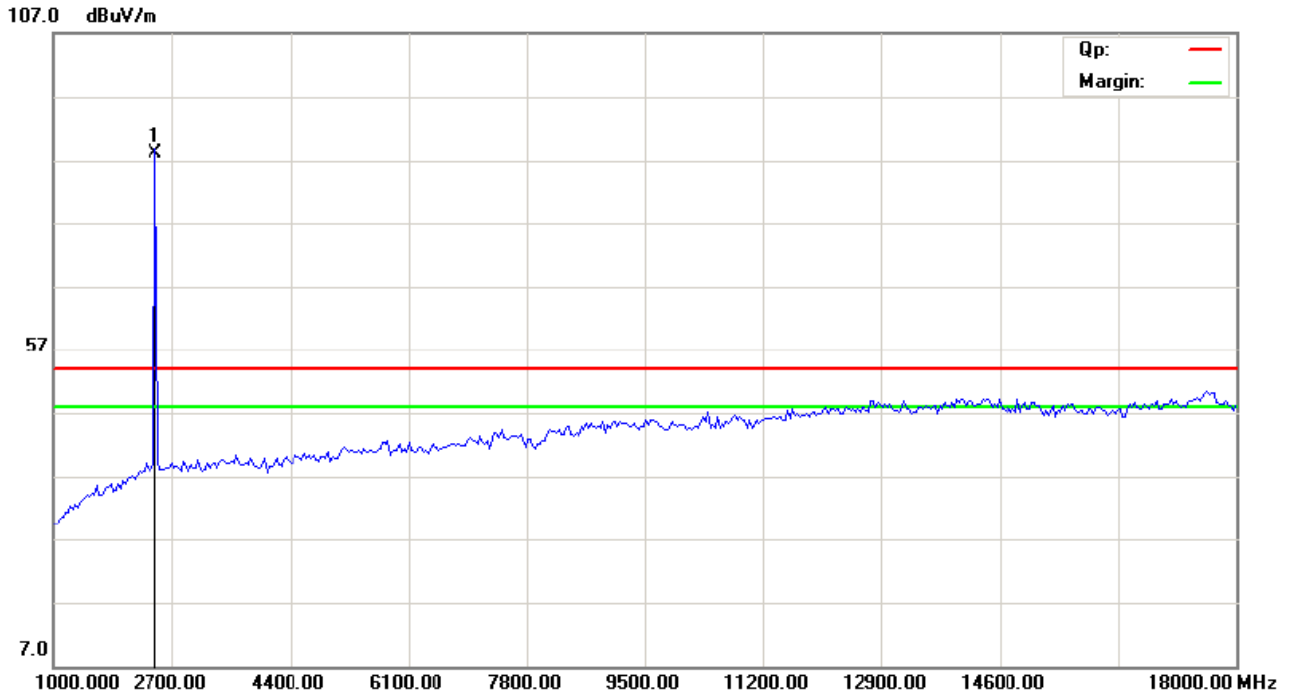


Middle Channel : Vertical

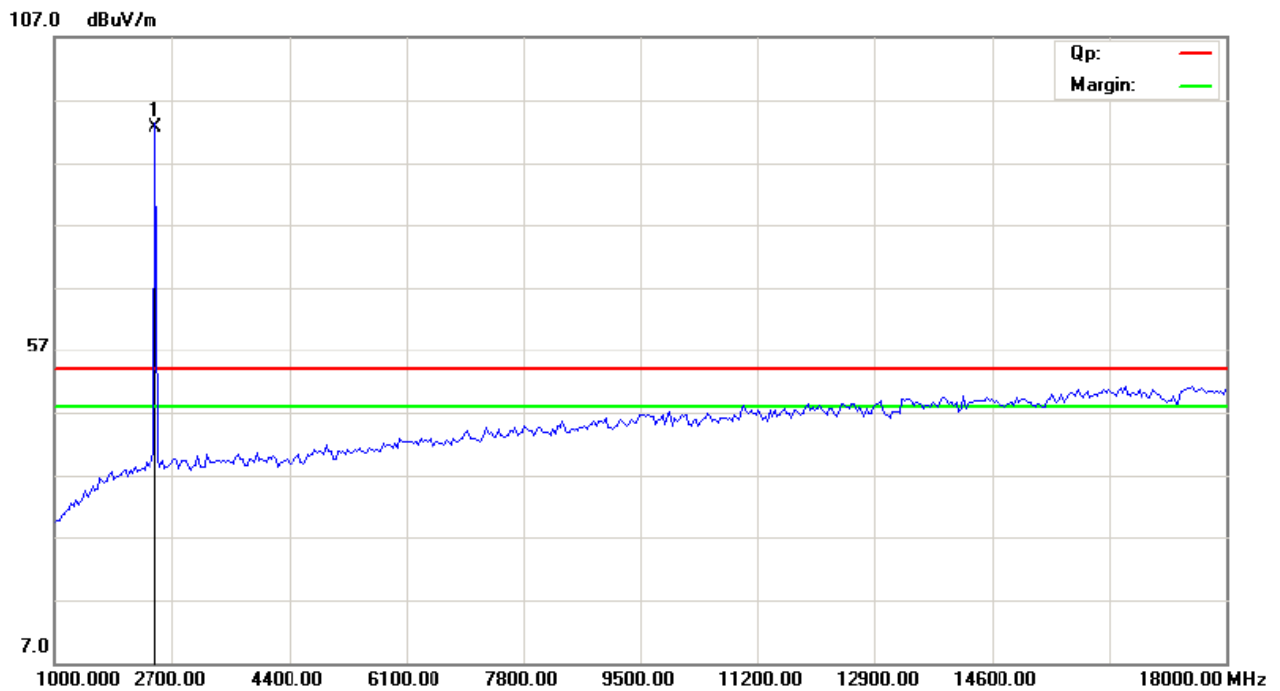


Please refer to the following test plots for details:

High Channel: Horizontal



High Channel : Vertical



Note: for the radiated emissions from 18-25GHz, it was the floor noise.

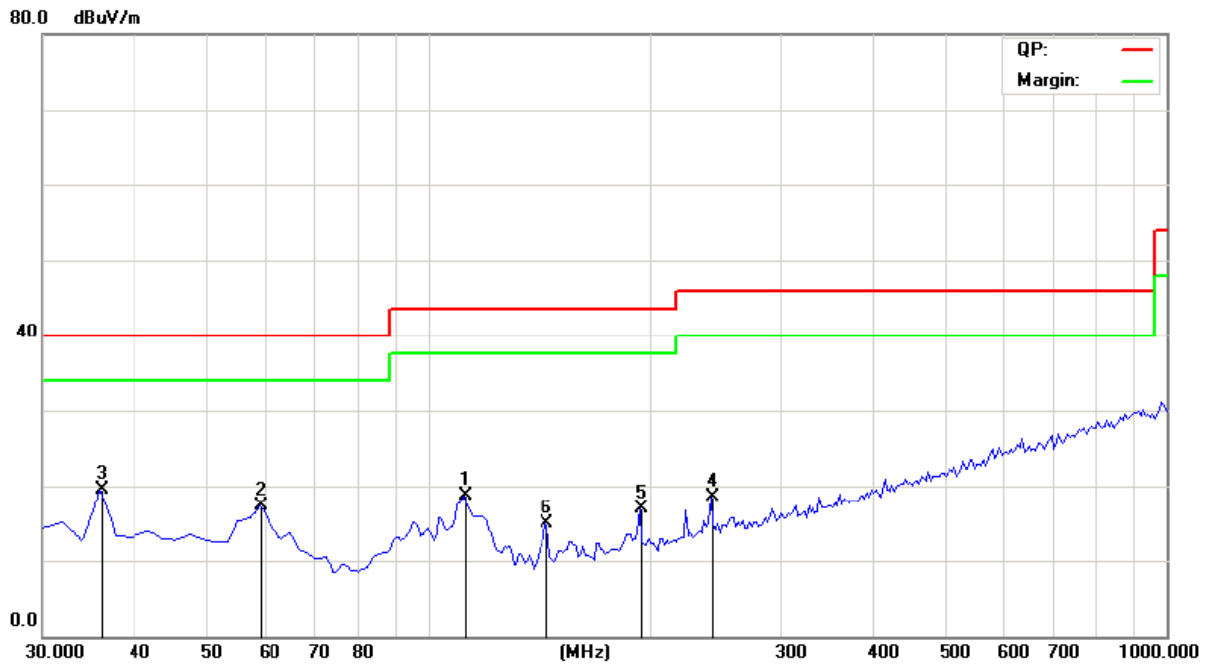
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Mode: Low Channel

Results Pass

Please refer to following diagram for individual



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
111.642	18.64	H	43.5
59.158	17.31	H	40.0
35.832	19.56	H	40.0
241.883	18.48	H	46.0
193.287	16.87	H	43.5
144.689	14.94	H	43.5

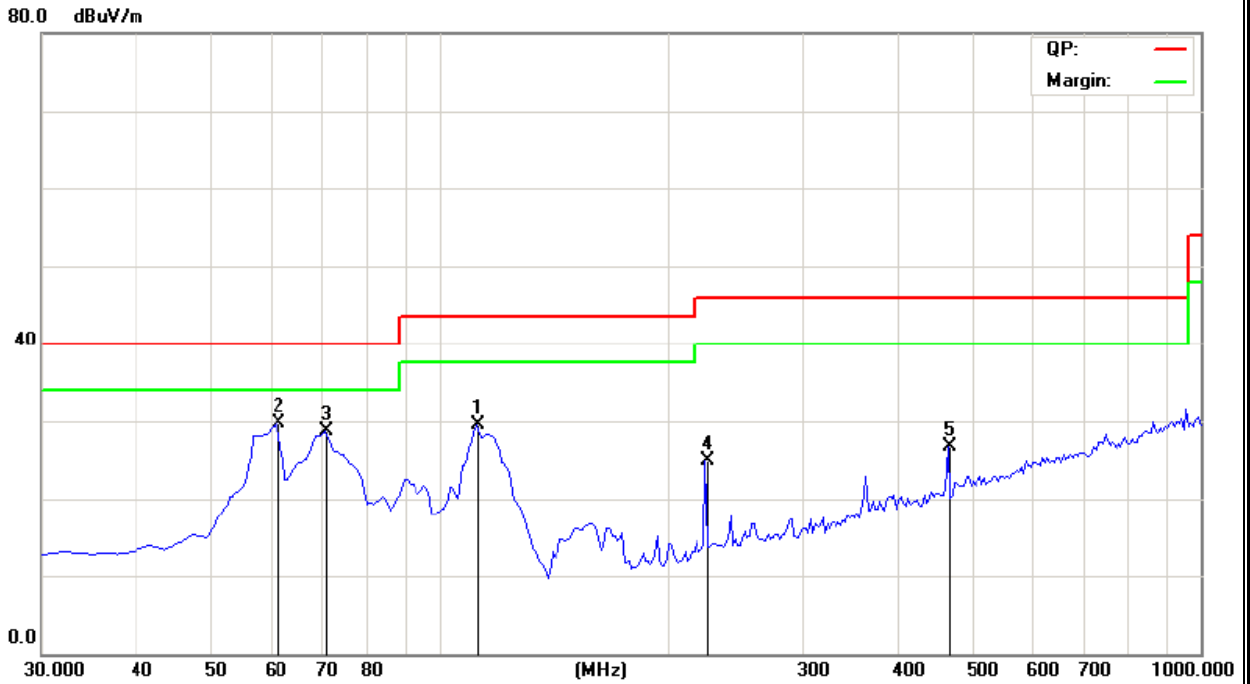
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Mode: Low Channel

Results Pass

Please refer to following diagram for individual



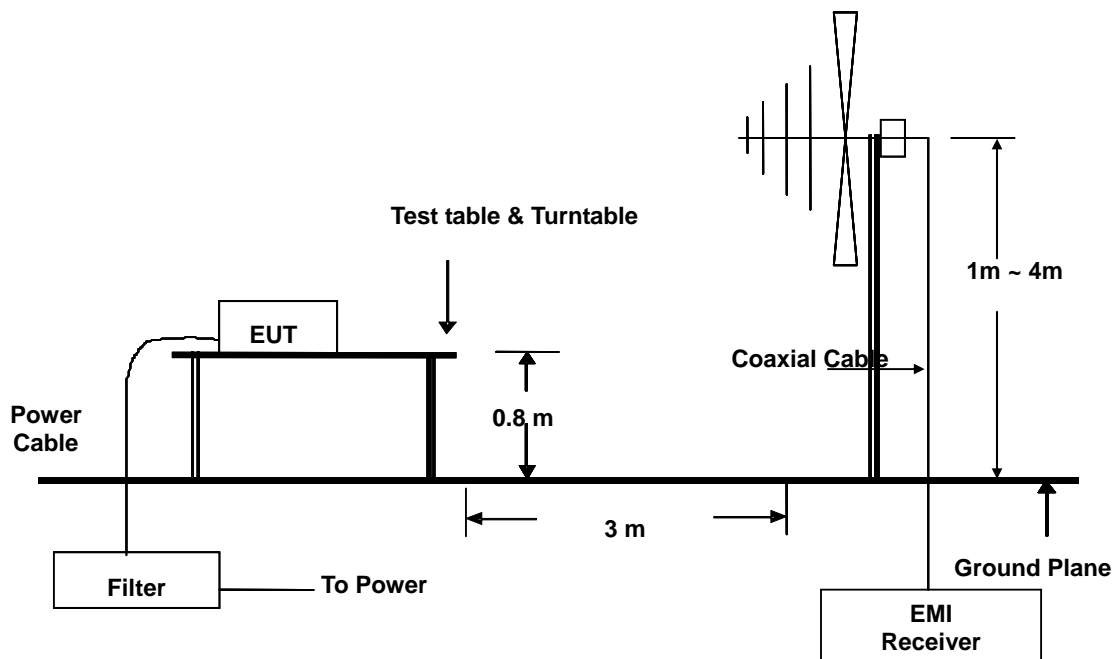
Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
111.643	29.57	V	43.5
61.102	29.64	V	40.0
70.822	28.67	V	40.0
224.389	24.81	V	46.0
465.431	26.67	V	46.0

5.3. BAND EDGE MEASUREMENT

5.3.1 Test Method and test Procedure:

1. The EUT was tested according to ANSI C63.4 –2003.
2. Set Spectrum as RBW=VBW=1MHz and Peak detector used
3. The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
4. The antenna polarization: Vertical polarization and Horizontal polarization.
5. The EUT was configured according to ANSI C63.4-2003
6. Keep EUT transmitting at Low and High Channel

5.3.2 Test Setup

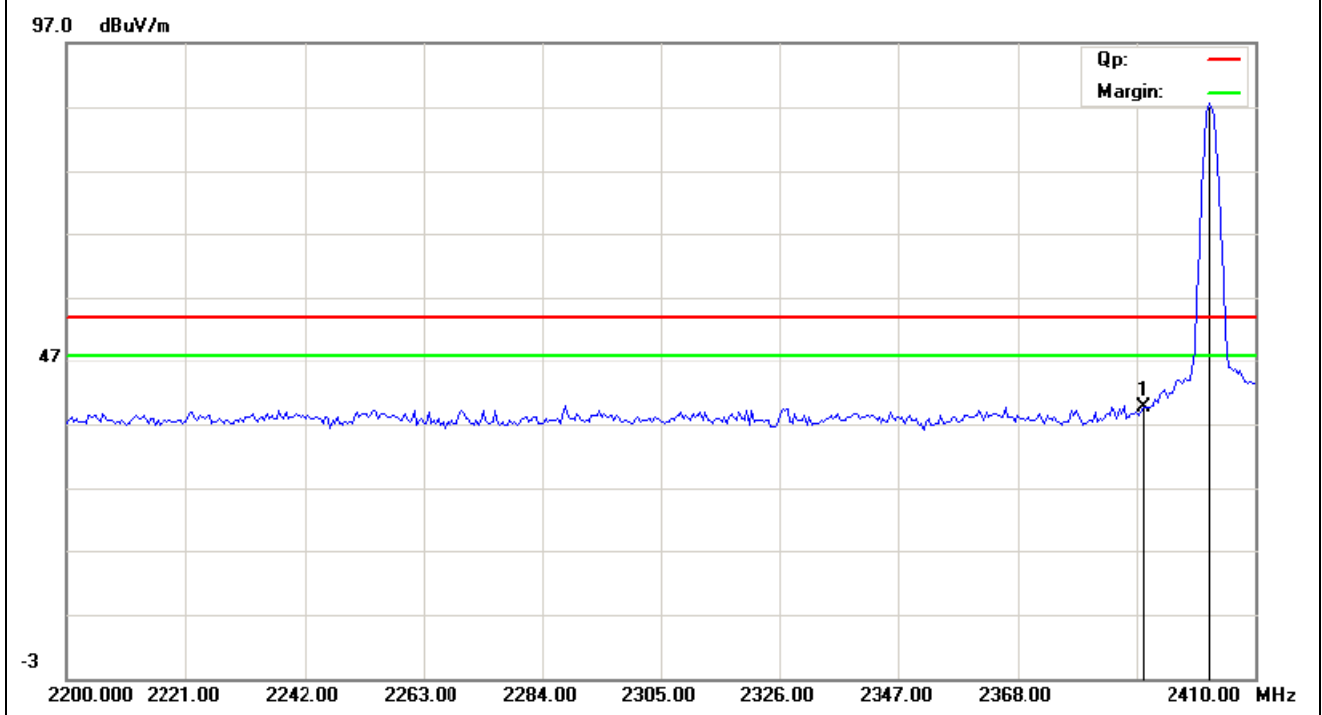


5.3.3 Test Result



Product:	2.4GHz Radio Control Airplane		Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC6V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390MHz	PK (dBμV/m)	39.58	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)
2400MHz	PK (dBμV/m)	60.97	Limit	74(dBμV/m)
	AV(dBμV/m)	39.57		54(dBμV/m)

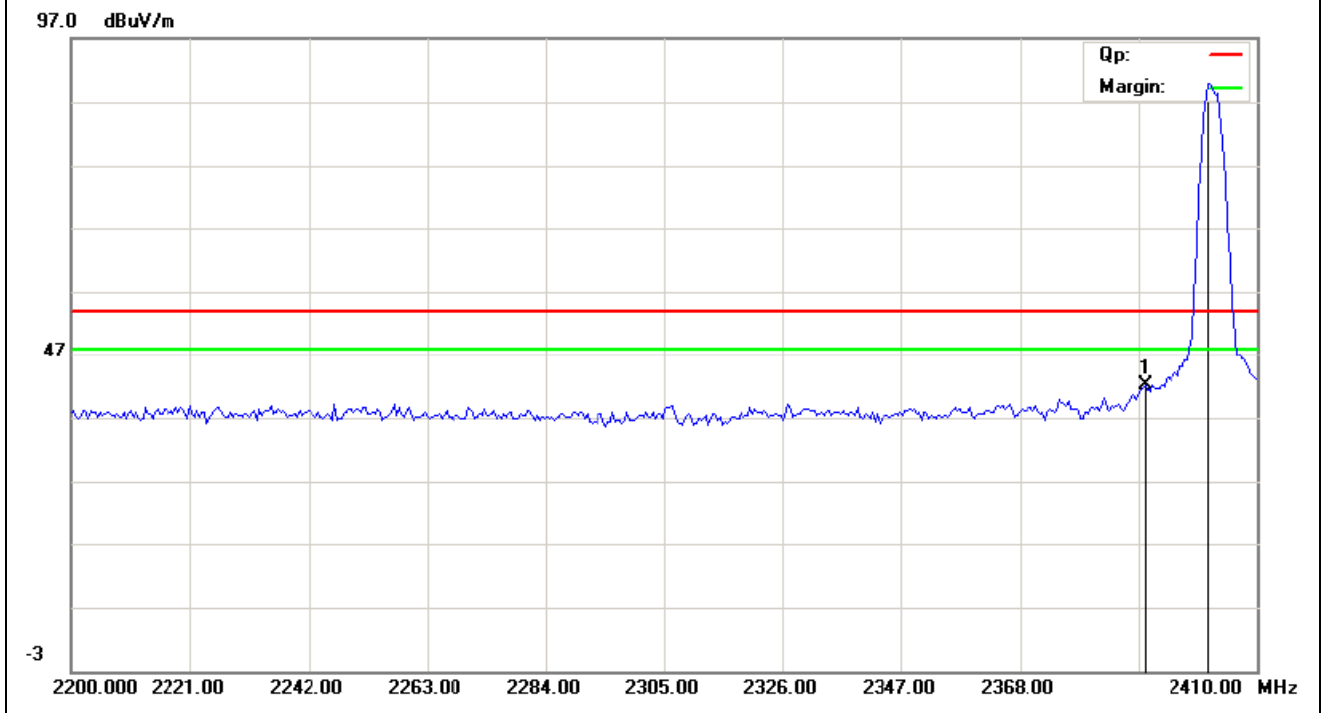
Horizontal





Product:	2.4GHz Radio Control Airplane		Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC6V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390MHz	PK (dB μ V/m)	42.05	Limit	74(dB μ V/m)
	AV(dB μ V/m)	--		54(dB μ V/m)
2400MHz	PK (dB μ V/m)	68.35	Limit	74(dB μ V/m)
	AV(dB μ V/m)	46.76		54(dB μ V/m)

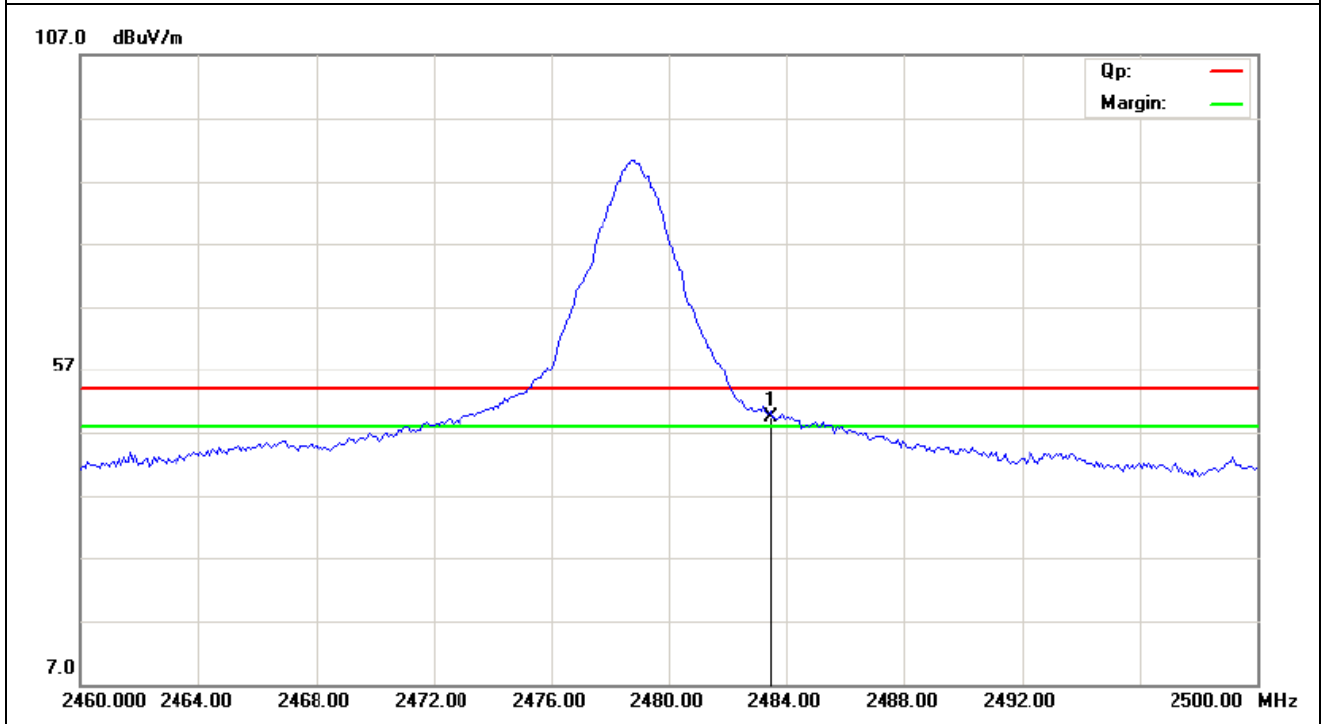
Vertical





Product:	2.4GHz Radio Control Airplane		Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC6V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dB μ V/m)	49.48	Limit	74(dB μ V/m)
	AV(dB μ V/m)	--		54(dB μ V/m)

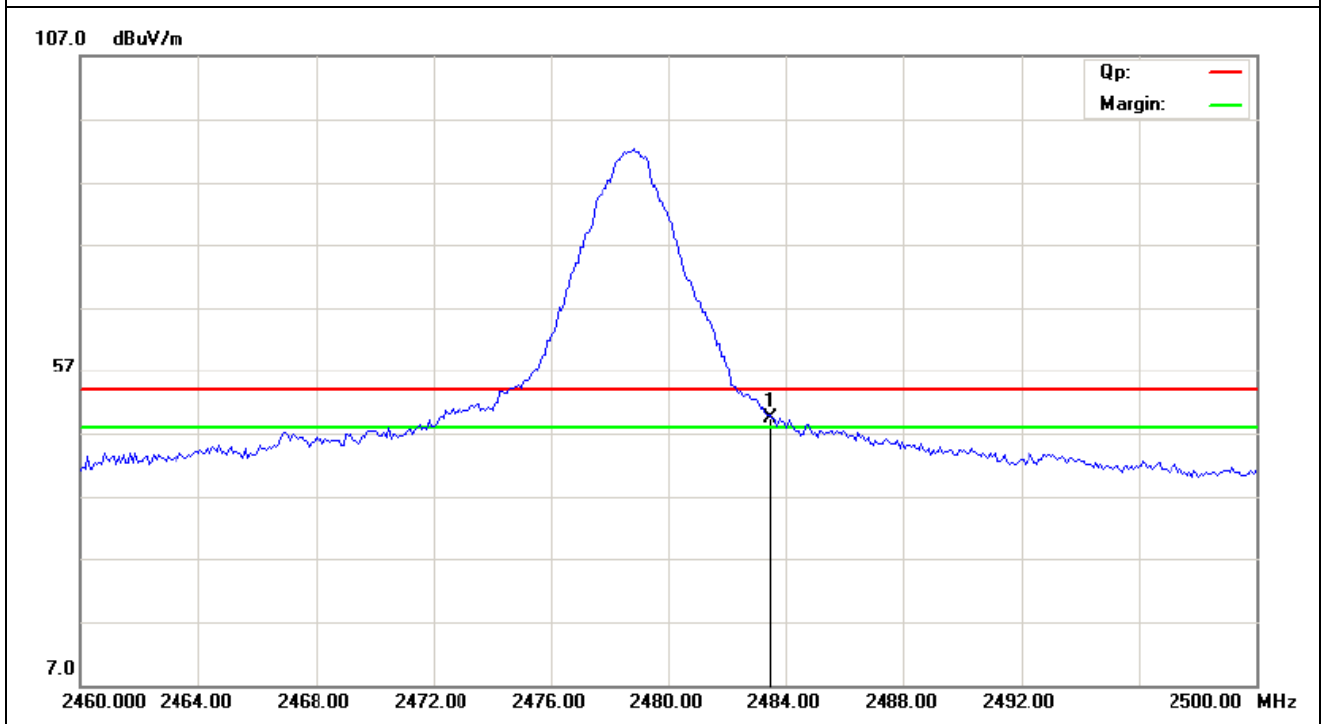
Horizontal





Product:	2.4GHz Radio Control Airplane		Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC6V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dB μ V/m)	49.75	Limit	74(dB μ V/m)
	AV(dB μ V/m)	--		54(dB μ V/m)

Vertical



5.3.4 Limit

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.

Remark: low, mid and high channel all have been tested; only worse case is reported.



5.4 Antenna 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 shall be considered sufficient to comply with the provisions of this section.

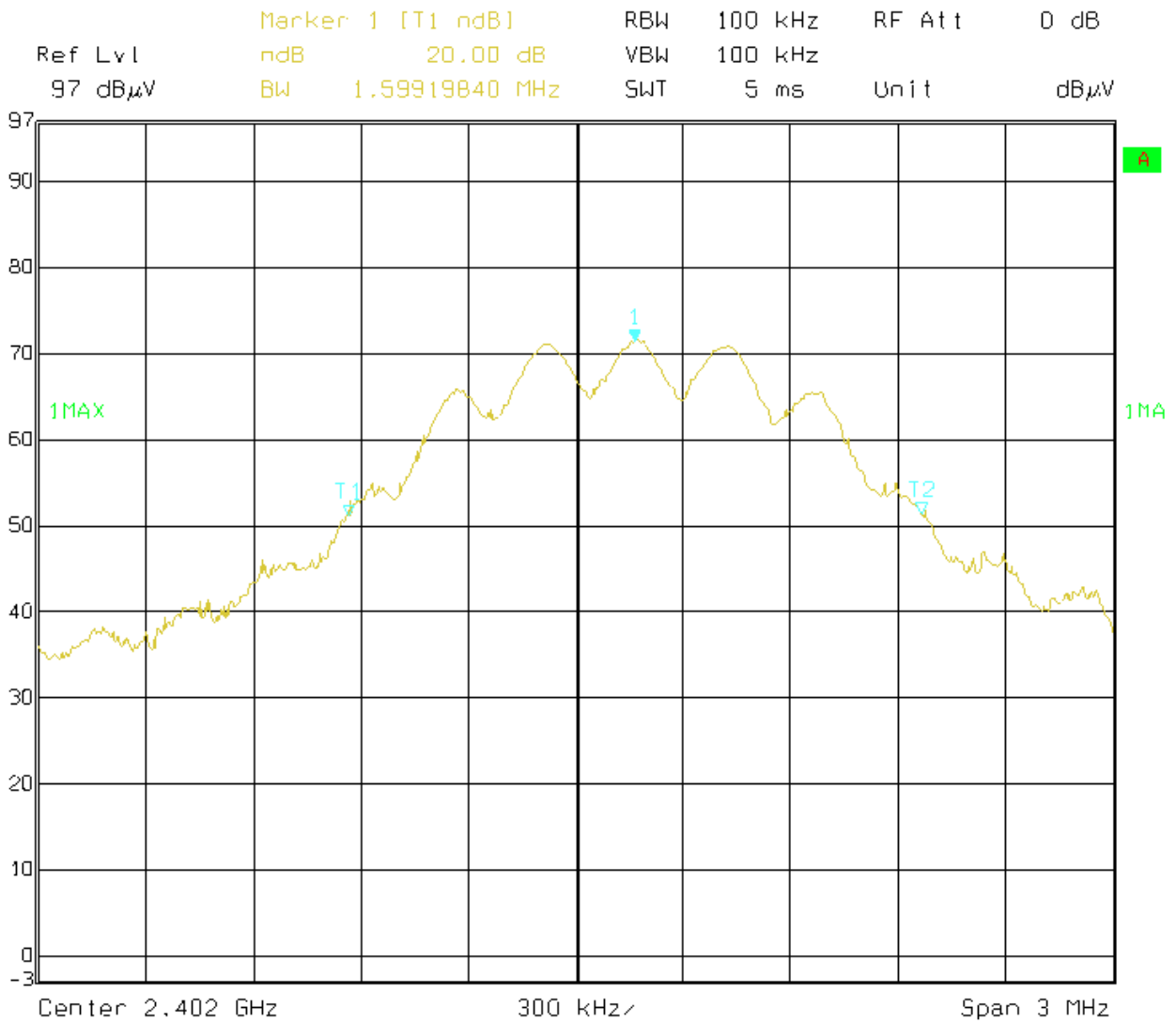
This product has a integral antenna, fulfill the requirement of this section.

Test Result: Pass



5.5 20dB Bandwidth Measurement

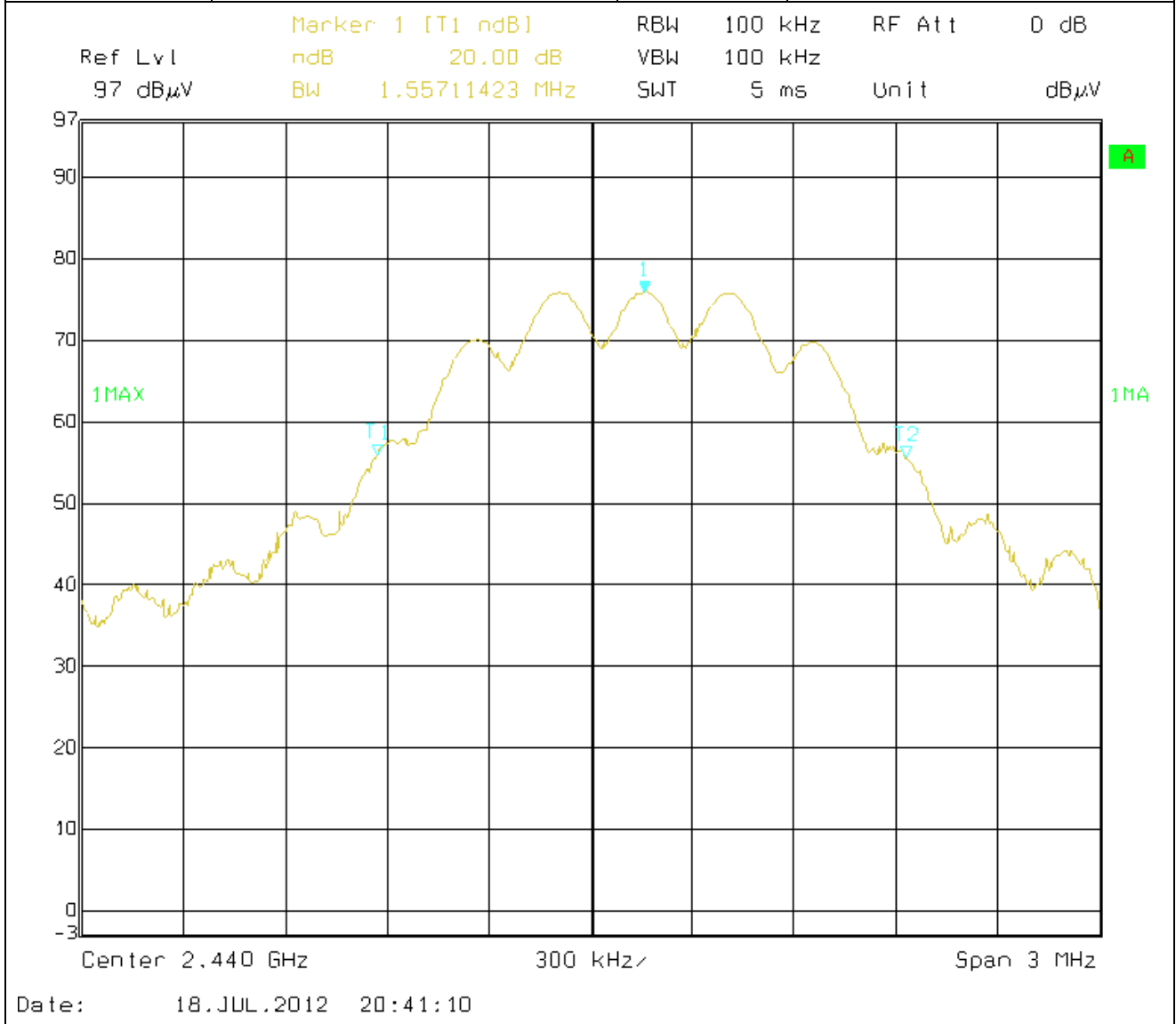
Product:	2.4G Radio Control Airplane	Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC6.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.599MHz	--	--



Date: 18. JUL. 2012 20:39:43

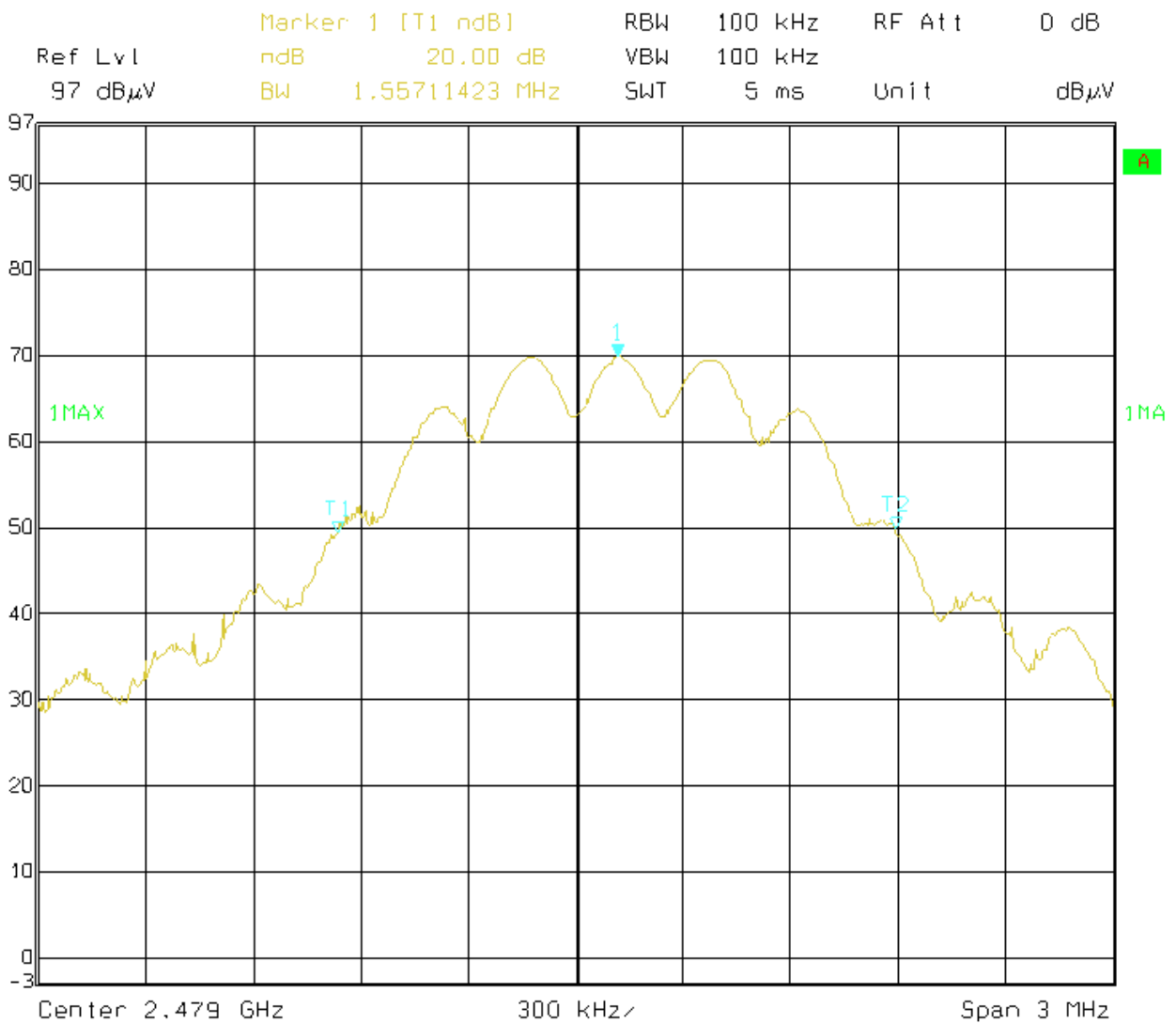


Product:	2.4G Radio Control Airplane	Test Mode:	Middle Channel- keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC6.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.557MHz	--	--





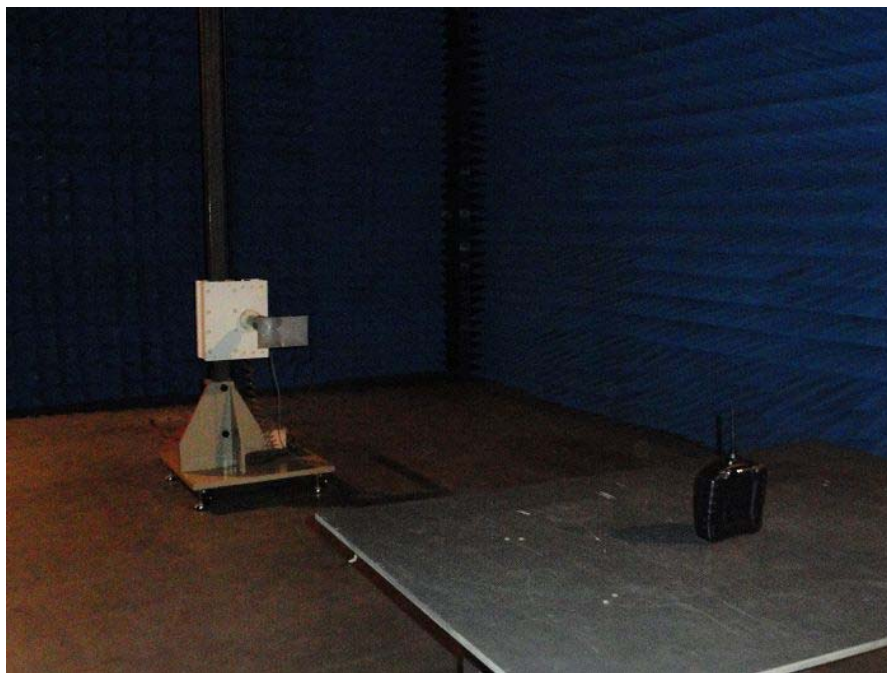
Product:	2.4G Radio Control Airplane	Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC6.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.557MHz	--	--



Date: 18.JUL.2012 20:42:15

6 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST



7 PHOTOGRAPHS OF EUT



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7

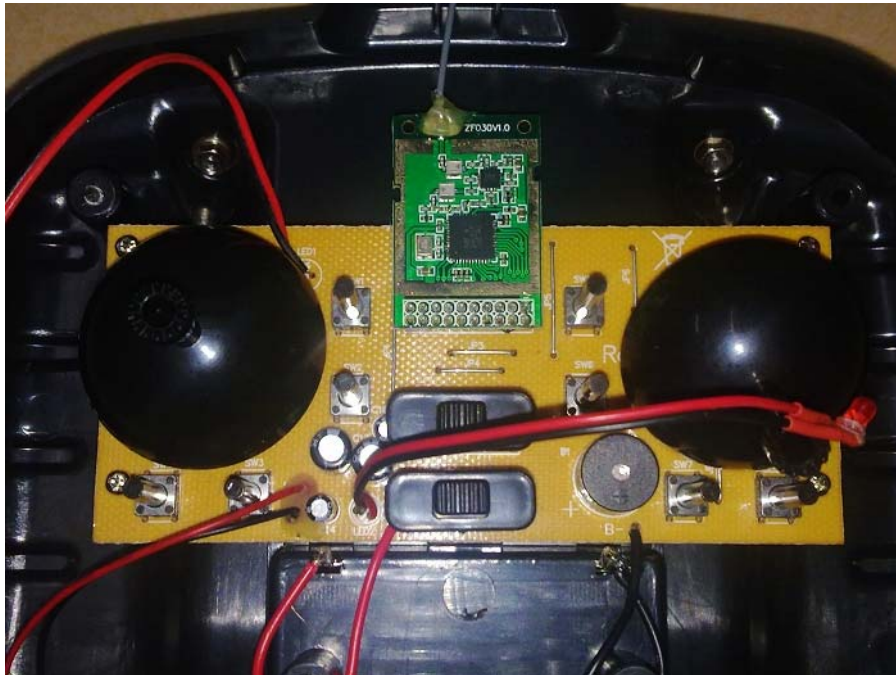


Photo 8

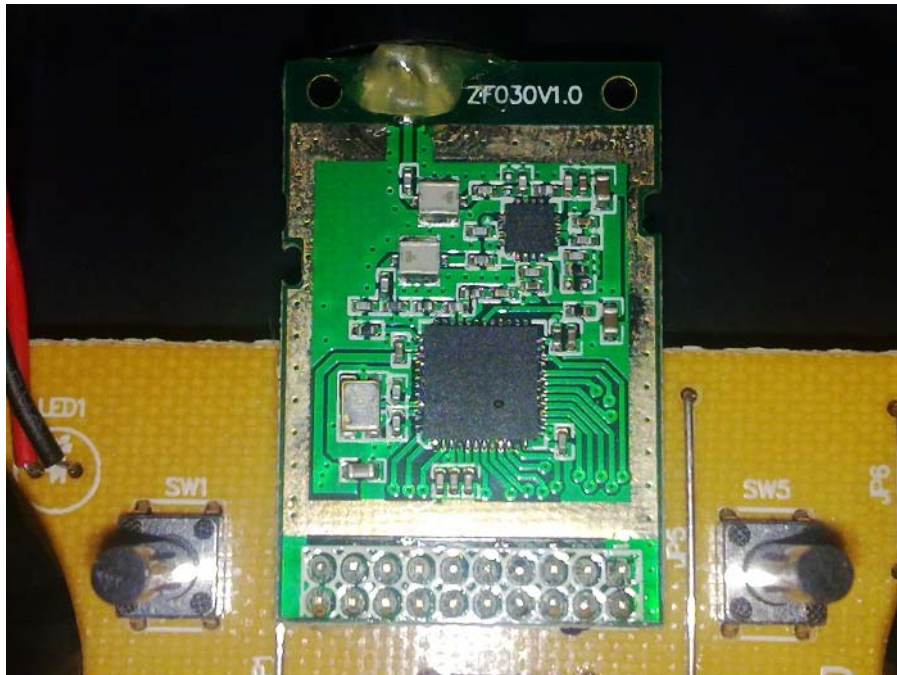


Photo 9



Photo 10

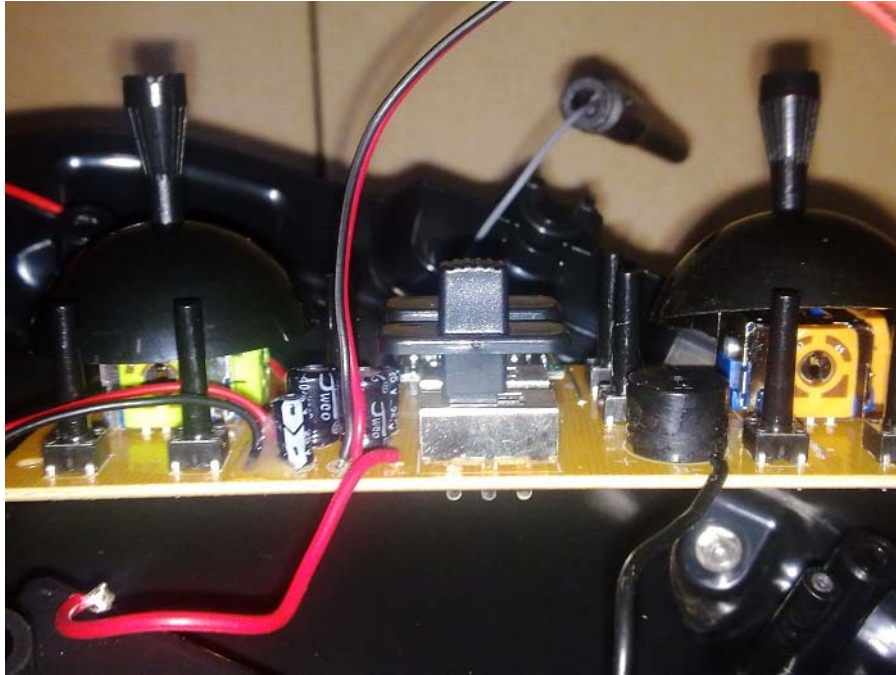


Photo 11

The Report End