



**TEST REPORT**  
**FCC ID: 2AFHF-MW407**  
**For**  
**RUICHUANG TOYS INDUSTRIAL CO., LTD**  
**I/R MINI COPTER**

Model No. : 6601, 6602, 6603, 6613, 6615, 6619, 6620, 6621, 6622, 6623, 6626, 6627, 6628, 6629, 6630, MW101, MW102, MW103, MW104, MW501, MW502, MW410, MW401MP, MW401MY, MW401SP, MW401SY, MW402MP, MW402MY, MW402SP, MW402SY, MW403, MW405, MW406, MW407, MW408, MW409

Prepared for : RUICHUANG TOYS INDUSTRIAL CO., LTD  
Address : FENGXIN INDUSTRY PARK, FENGXIN 1ND RODA, CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA

Prepared by : Shenzhen Alpha Product Testing Co., Ltd.  
Address : Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2<sup>nd</sup> Road, Bao'an, Shenzhen, China

Report No. : T1850881 01

Date of Receipt : July 20, 2015

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Date of Report : July 30, 2015

Version Number : REV0

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## **DECLARATION**

Applicant : RUICHUANG TOYS INDUSTRIAL CO., LTD  
Manufacturer : RUICHUANG TOYS INDUSTRIAL CO., LTD  
Product : I/R MINI COPTER  
  
(A) Model No. : 6601, 6602, 6603, 6613, 6615, 6619, 6620, 6621, 6622,  
6623, 6626, 6627, 6628, 6629, 6630, MW101,  
MW102, MW103, MW104, MW501, MW502,  
(B) Trade Name : N/A  
(C) Power supply : DC 9V from battery

### Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.249: 2014, ANSI C63.4:2014

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart B Class B limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....

# Peter Kang

## Test Engineer

Peer Kang

Approved by (name + signature), .....

Simple Guan  
Project Manager



Date of issue.....

July 30, 2015

## 1 General Information

### 1.1 Description of Device (EUT)

Trade Name : N/A

EUT : I/R MINI COPTER  
6601, 6602, 6603, 6613, 6615, 6619, 6620, 6621, 6622, 6623,  
6626, 6627, 6628, 6629, 6630, MW101, MW102, MW103,  
MW104, MW501, MW502, MW410, MW401MP,  
Model No. : MW401MY, MW401SP, MW401SY, MW402MP,  
MW402MY, MW402SP, MW402SY, MW403, MW405,  
MW406, MW407, MW408, MW409  
All model's the function, software and electric circuit are the  
DIFF. : same, only with a product model named different. so all the test  
were performed on the model MW407.

Type of Antenna : Integral antenna, Maximum Gain is 0dBi

Operation Frequency : 2410-2453MHz

Channel number : 4

Modulation type : GFSK

Power Supply : DC 9V Supply by battery

Software version : N/A

Hardware version : N/A

Applicant : RUICHUANG TOYS INDUSTRIAL CO., LTD

Address : FENGXIN INDUSTRY PARK, FENGXIN 1ND RODA, CHENGHAI  
: DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA

Manufacturer : RUICHUANG TOYS INDUSTRIAL CO., LTD

Address : FENGXIN INDUSTRY PARK, FENGXIN 1ND RODA, CHENGHAI  
: DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA

## 1.2 Description of Test Facility

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2<sup>nd</sup> Road,  
Bao'an, Shenzhen, China

March 25, 2015 File on Federal Communication Commission

Registration Number: 203110

July 18, 2014 Certificated by IC

Registration Number: 12135A

## 2 Summary of Measurement

### 2.1 Summary of test result

Description of Test Item	Standard	Results
Radiated Emission	Section 15.249&15.209	PASS
Occupied bandwidth	FCC Part 15: 15.215& FCC Part 15: 15.249	PASS
Band Edge Compliance	Section 15.249	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207	N/A
Antenna requirement	FCC Part 15: 15.203	PASS

Note: 1 N/A is not applicable.

2 EUT power supply by battery, so Power Line Conducted Emissions test not applicable.

3. The EUT has been tested as an independent unit. And Continual Transmitting in maximum power (The new battery be used during Test).

### 2.2 Test mode

Tested mode, channel information		
Mode	Channel	Frequency (MHz)
GFSK	CH1	2410
	CH2	2423
	CH4	2453

Channel list			
CH1	2410MHz	/	/
CH2	2423MHz	/	/
CH3	2431MHz	/	/
CH4	2453MHz	/	/
/	/	/	/
/	/	/	/
/	/	/	/

## 2.3 Block Diagram



## 2.4 Assistant equipment used for test

Description : N/A

Manufacturer : N/A

Model No. : N/A

## 2.5 Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

## 2.6 Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.70dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.90 dB	Polarize: V
	3.92dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.26 dB	Polarize: H
	4.28 dB	Polarize: V
Uncertainty for conducted RF Power	0.16dB	

## 2.7 Test Equipment

<b>Equipment</b>	<b>Manufacture</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last cal.</b>	<b>Cal Interval</b>
3m Semi-Anechoic	CHENYU	9*6*6	N/A	2014.01.20	3Year
Spectrum analyzer	Agilent	E4407B	MY49510055	2015.01.19	1Year
Receiver	R&S	ESCI	101165	2015.01.19	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2014.01.22	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2015.01.21	2Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	2015.01.21	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2015.01.21	1Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2015.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2015.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2015.01.19	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2015.03.21	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2015.03.21	1Year

### 3 POWER LINE CONDUCTED EMISSION

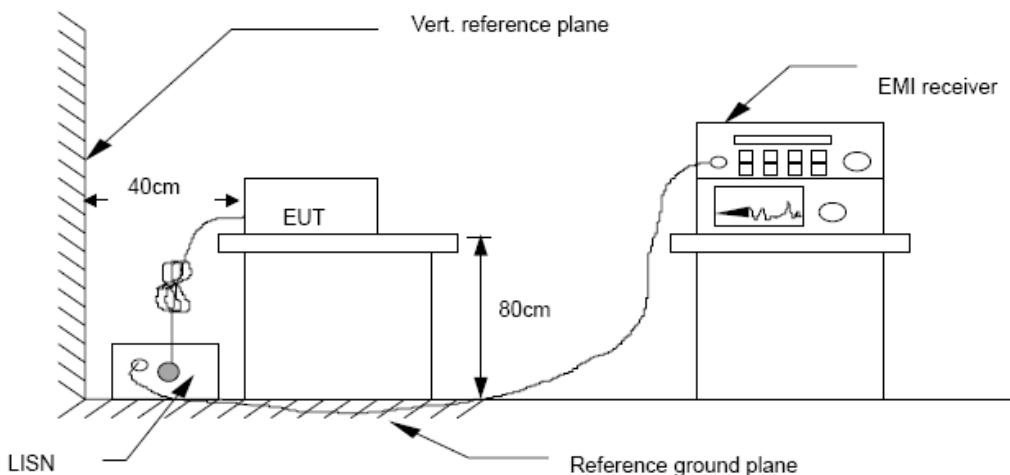
#### 3.1 Conducted Emission Limits(15.209&249)

Frequency MHz	Limits dB( $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.  
 2. The lower limit shall apply at the transition frequencies.

3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

#### 3.2 Test Setup



### 3.3 Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4-2014 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

### 3.4 Test Results

Not applicable for equipment operated with battery power supply.

## 4 Radiation Emission

### 4.1 Radiation Emission Limits(15.209&249 (a))

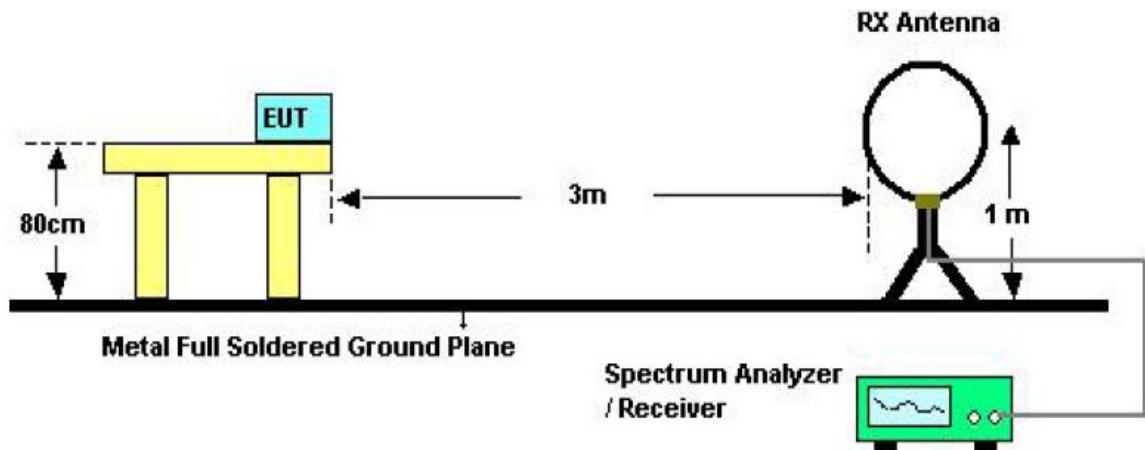
<b>Frequency (MHz)</b>	<b>Field Strength Limits at 3 metres (watts,e.i.r.p.)</b>		
	<b>uV/m</b>	<b>dB uV/m</b>	<b>Measurement distance(m)</b>
0.009-0.490	2400/F(kHz)	XX	300
0.490-1.705	24000/F(kHz)	XX	30
1.705-30	30	29.5	30
30~88	100(3nW)	40	3
88~216	150(6.8nW)	43.5	3
216~960	200(12nW)	46	3
Above960	500(75nW)	54	3
Carrier frequency		93.97(AV)	3
Carrier frequency		113.97(PK)	3

**NOTE:**

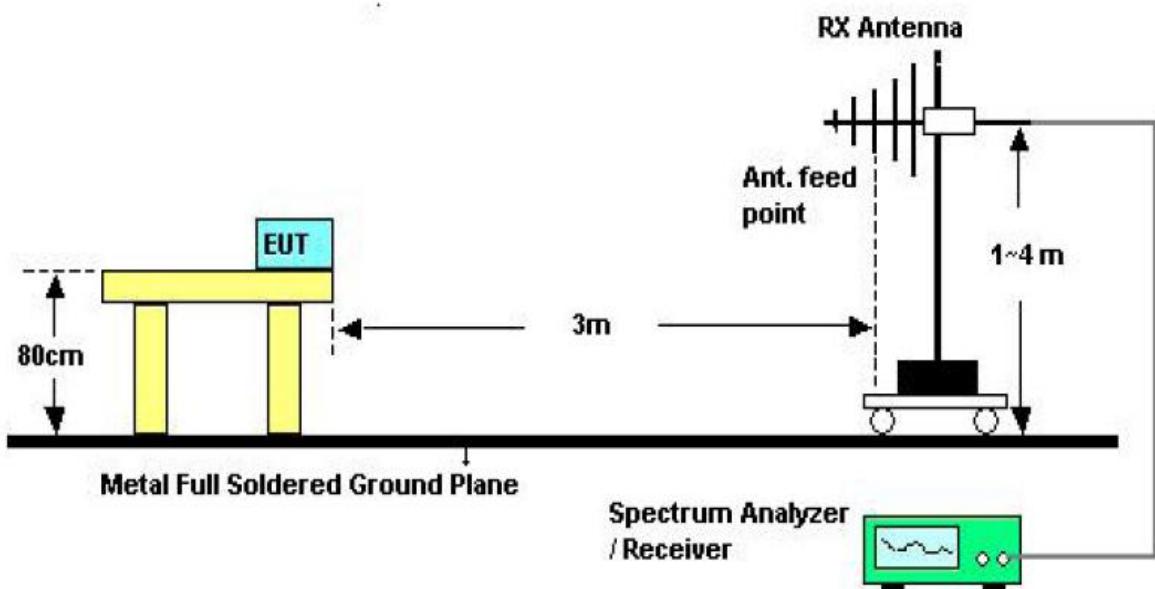
- a) The tighter limit applies at the band edges.
- b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

## 4.2 Test Setup

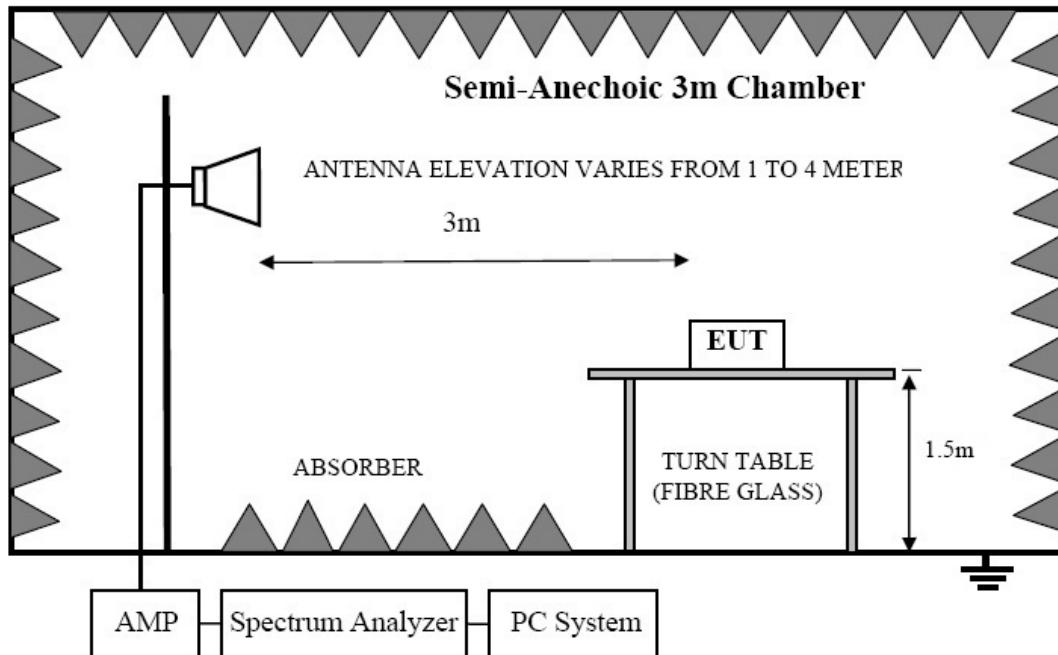
See the next page



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

### 4.3 Test Procedure

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8 m high above ground, and above 1GHz, The EUT was placed on a rotating 1.5 m high above ground, The table was rotated 360 degrees to determine the position of the highest radiation
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked, and then Quasi Peak Detector mode remeasured
- If Peak value comply with QP limit Below 1GHz. The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
- Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.
- For the actual test configuration, please see the test setup photo.

#### 4.4 Test Equipment Setting For emission test.

9KHz~150KHz	RBW 200Hz	VBW 1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHZ~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

#### 4.5 Test Condition

Continual Transmitting in maximum power.

#### 4.6 Test Result

**PASS.**

We have scanned the 10th harmonic from 9KHz to the EUT.

Note: The Radiated emissions is showed the maximum power data of TX test mode and showed worst orthogonal axes with X orthogonal axes.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: **PASS**

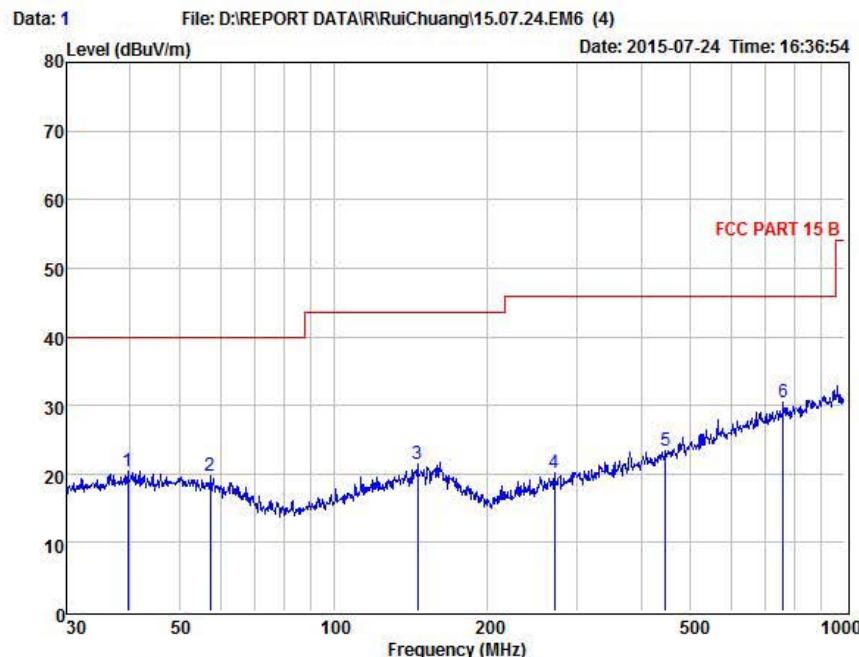
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Below 1GHz test data:

Note: This report only shall the worst case mode for TX 2410MHz.



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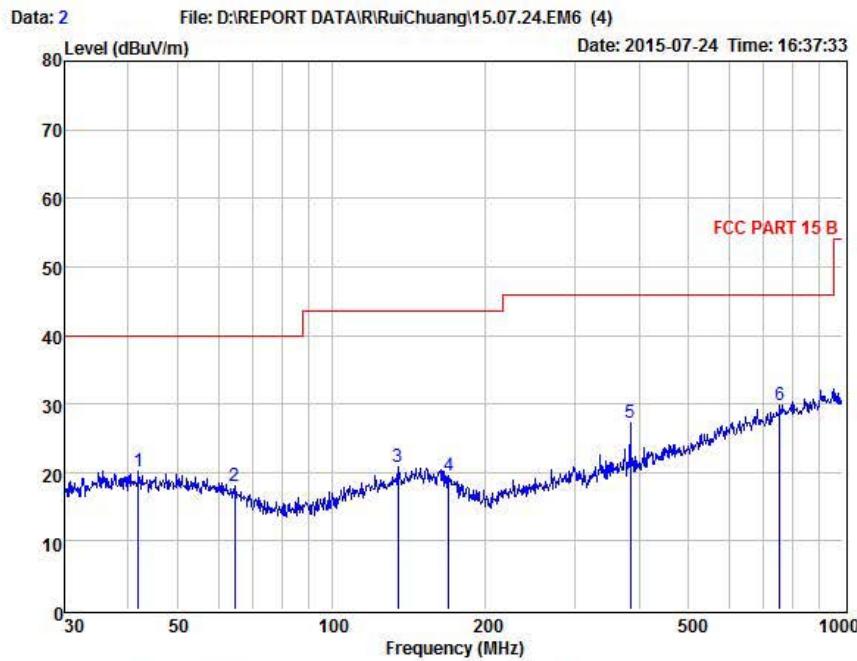


Condition	: FCC PART 15 B		3m	POL:	VERTICAL				
EUT	: I/R MINI COPTER								
Model No	: MW407								
Test Mode	: TX 2410MHz								
Power	: DC 9V from battery								
Test Engineer	: Peter								
Remark	:								
Temp	: 24.2 °C								
Hum	: 54%								
Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	39.58	37.94	14.07	31.89	0.17	20.29	40.00	-19.71	Peak
2	57.39	38.44	12.91	31.77	0.14	19.72	40.00	-20.28	Peak
3	145.86	38.27	13.90	31.20	0.44	21.41	43.50	-22.09	Peak
4	270.37	38.09	12.09	30.67	0.69	20.20	46.00	-25.80	Peak
5	446.41	36.65	15.87	30.03	0.93	23.42	46.00	-22.58	Peak
6	758.04	38.02	20.36	29.16	1.34	30.56	46.00	-15.44	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Condition	:	FCC PART 15 B	3m	POL:	HORIZONTAL				
EUT	:	I/R MINI COPTER							
Model No	:	MW407							
Test Mode	:	TX 2410MHz							
Power	:	DC 9V from battery							
Test Engineer	:	peter							
Remark	:								
Temp	:	24.2°C							
Hum	:	54%							
Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	41.86	38.01	13.93	31.87	0.19	20.26	40.00	-19.74	Peak
2	64.66	37.90	11.59	31.73	0.25	18.01	40.00	-21.99	Peak
3	135.03	38.59	13.08	31.24	0.46	20.89	43.50	-22.61	Peak
4	169.60	36.85	13.18	31.09	0.59	19.53	43.50	-23.97	Peak
5	383.93	42.47	14.48	30.42	0.81	27.34	46.00	-18.66	Peak
6	752.74	37.35	20.29	29.18	1.37	29.83	46.00	-16.17	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



1GHz—25GHz Radiated emission Test result									
EUT: I/R MINI COPTER					M/N: MW407				
Power: DC 9.0V From battery									
Test date: 2015-07-25      Test site: 3m Chamber      Tested by: peter									
Test mode: Tx CH2 2423MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2423	91.78	27.61	3.95	34.97	88.37	113.97	25.60	PK
2	2423	87.05	27.61	3.95	34.97	83.64	93.97	10.33	AV
3	4846	46.47	31.32	5.72	34.17	49.34	74.00	24.66	PK
4	4846	40.53	31.32	5.72	34.17	43.40	54.00	10.60	AV
5	7269	/							
6	9692	/							
7	12115	/							
Antenna Polarity: Horizontal									
1	2423	89.42	27.61	3.95	34.97	86.01	113.97	27.96	PK
2	2423	86.57	27.61	3.95	34.97	83.16	93.97	10.81	AV
3	4846	44.08	31.32	5.72	34.17	46.95	74.00	27.05	PK
4	4846	38.75.	31.32	5.72	34.17	41.62	54.00	12.38	AV
5	7269	/							
6	9692	/							
7	12115	/							



## 5 Occupied bandwidth

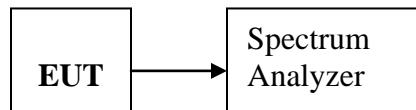
### 5.1 Test limit

Please refer section 15.249

### 5.2 Method of measurement

- a) The bandwidth is measured at an amplitude level reduced 20dB from the reference level.  
The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver RBW set 30KHz, VBW set 30KHz, Sweep time set auto.

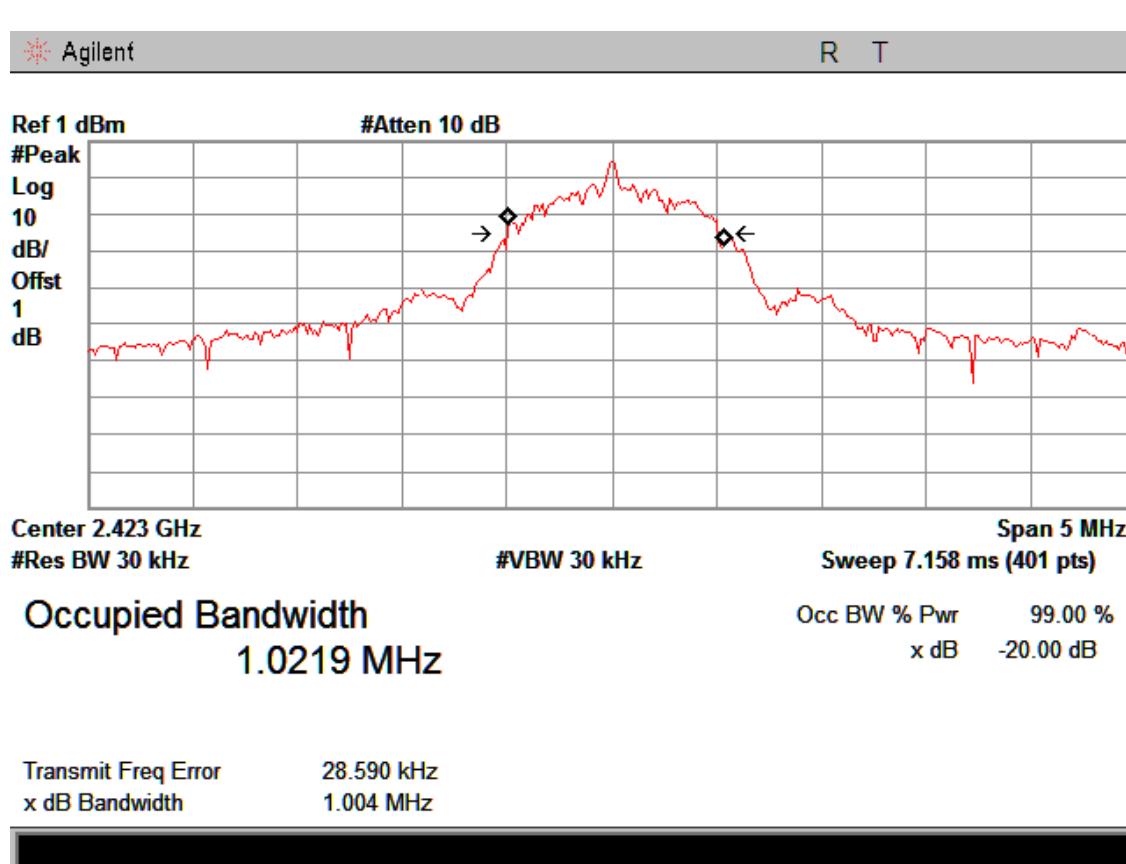
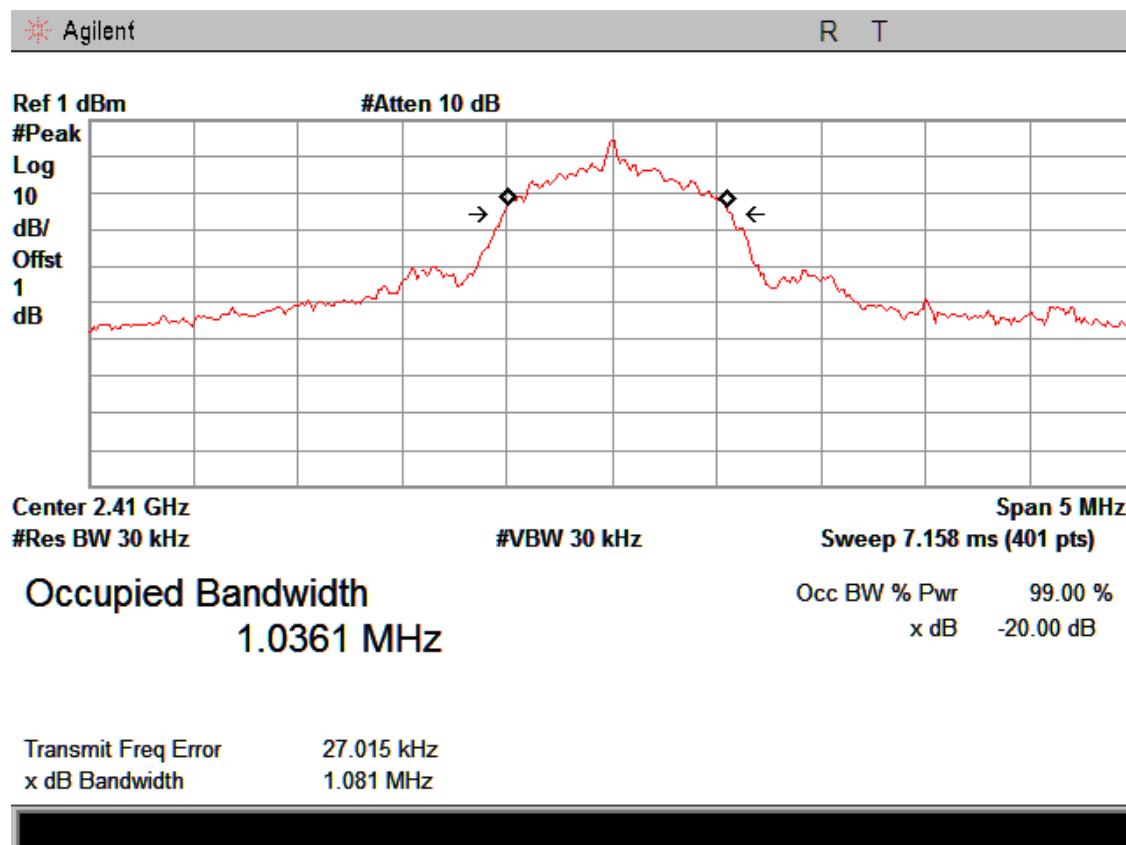
### 5.3 Test Setup

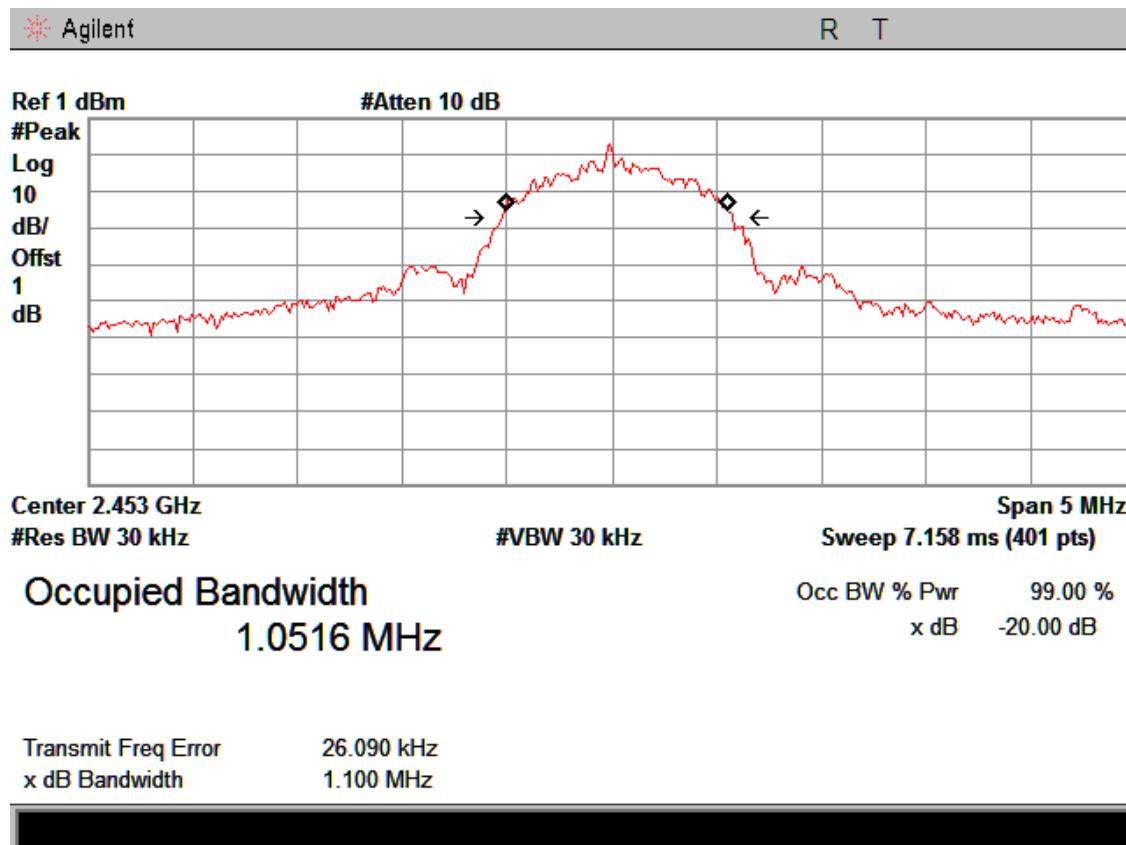


### 5.4 Test Results

Mode	Freq (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Conclusion
GFSK	2410	1.081	1.0361	/	PASS
	2423	1.004	1.0219	/	PASS
	2453	1.100	1.0516	/	PASS

Note: Detailed information please see the following page.





## 6 Band Edge Check

### 6.1 Test limit

Please refer section 15.249 and section 15.205.

249(d) 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.

249(e) As shown in section 15.35(b), for frequencies above 1000MHz, the above field strength limits in paragraphs (a) and (b) of this section 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. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3meters along the antenna azimuth.

### 6.2 Test Procedure

6.2.1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.2. Set spectrum analyzer please see the following test plot.

6.2.3. Set the spectrum analyzer as RBW, VBW=1000 KHz,

6.2.4. Max hold, view and count how many channels in the band.

### 6.3 Test Setup

Please see the section 6.2, above 1GHz Test Setup.

### 6.4 Test Result

**PASS.**

Detailed information please see the following page.





## 7 Antenna Requirement

### 7.1 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 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. 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.

### 7.2 Antenna Connected Construction

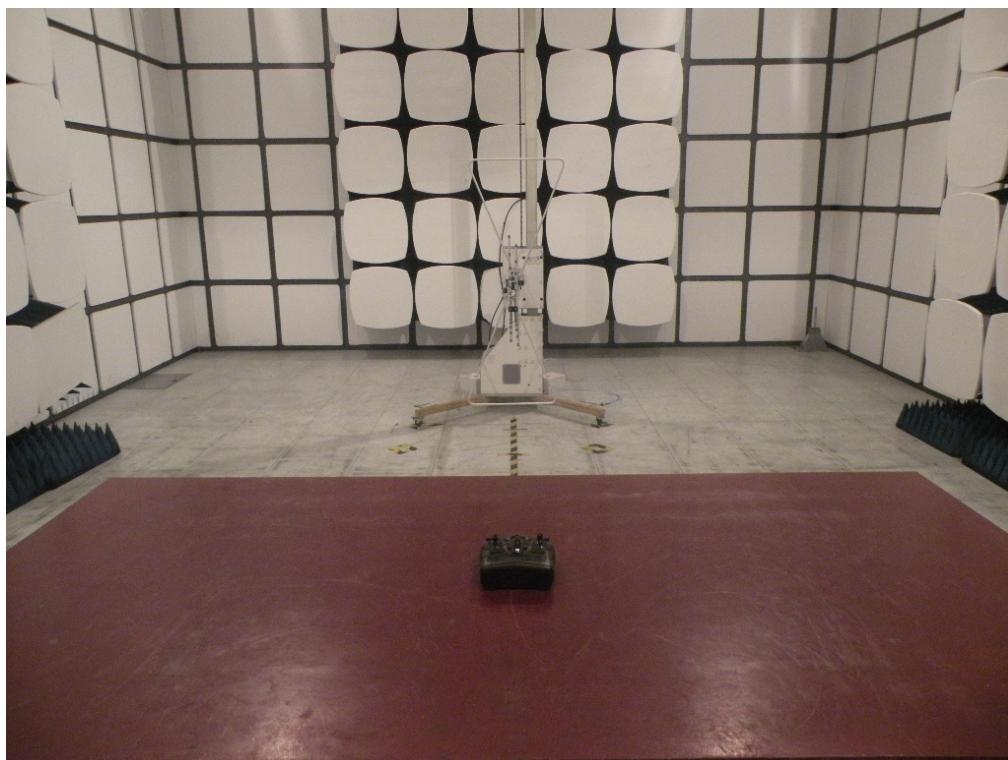
The directional gains of antenna used for transmitting is 0dBi, and the antenna is Multilayer chip Antenna. Please see EUT photo for details.

### 7.3 Result

The EUT antenna is Multilayer chip Antenna. It complies with the standard requirement.

## 8 Photographs of Test Setup

Photographs-Radiated Emission Test Setup in Chamber  
Below 1G



Above 1G



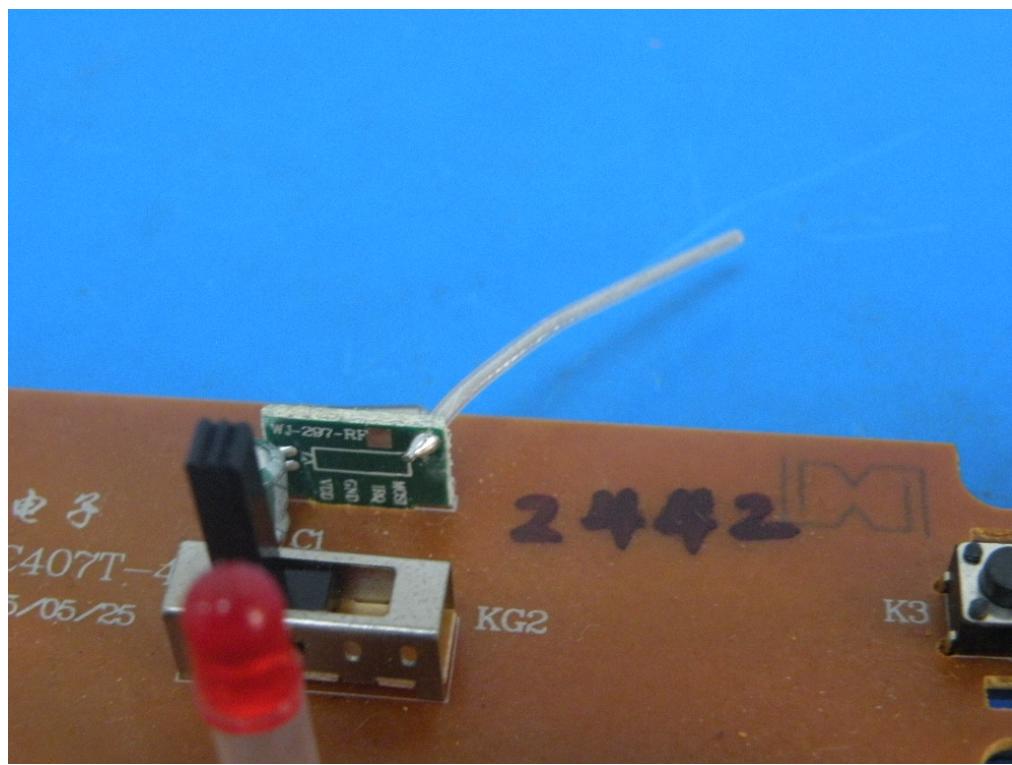
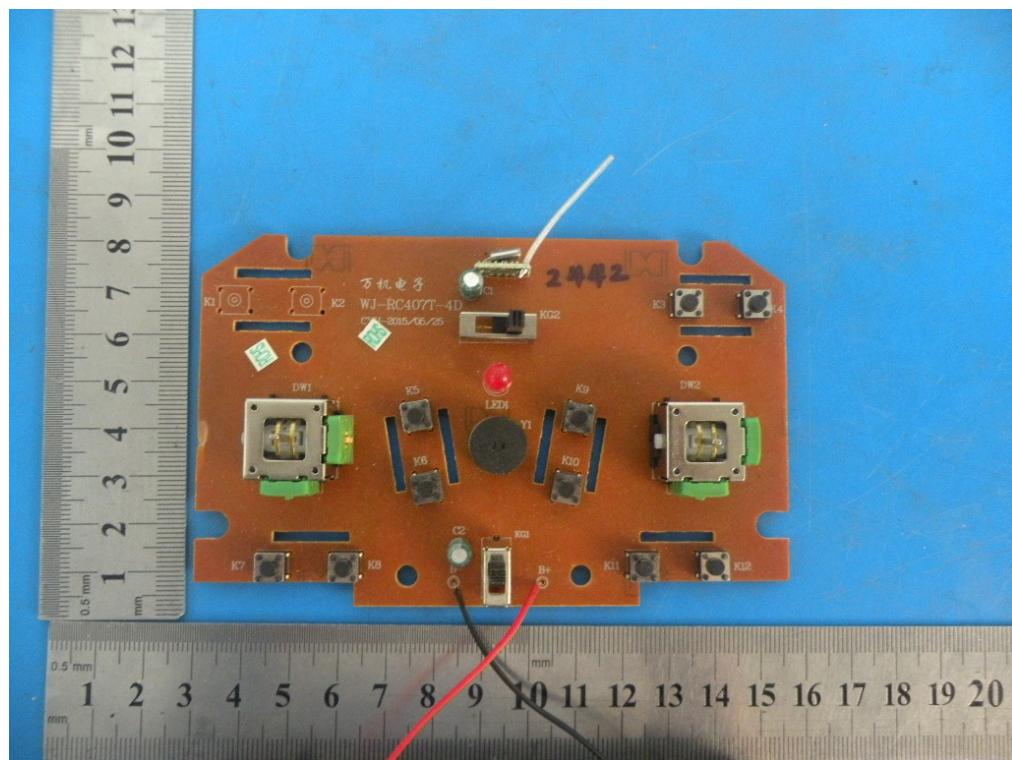
## 9 Photographs of EUT

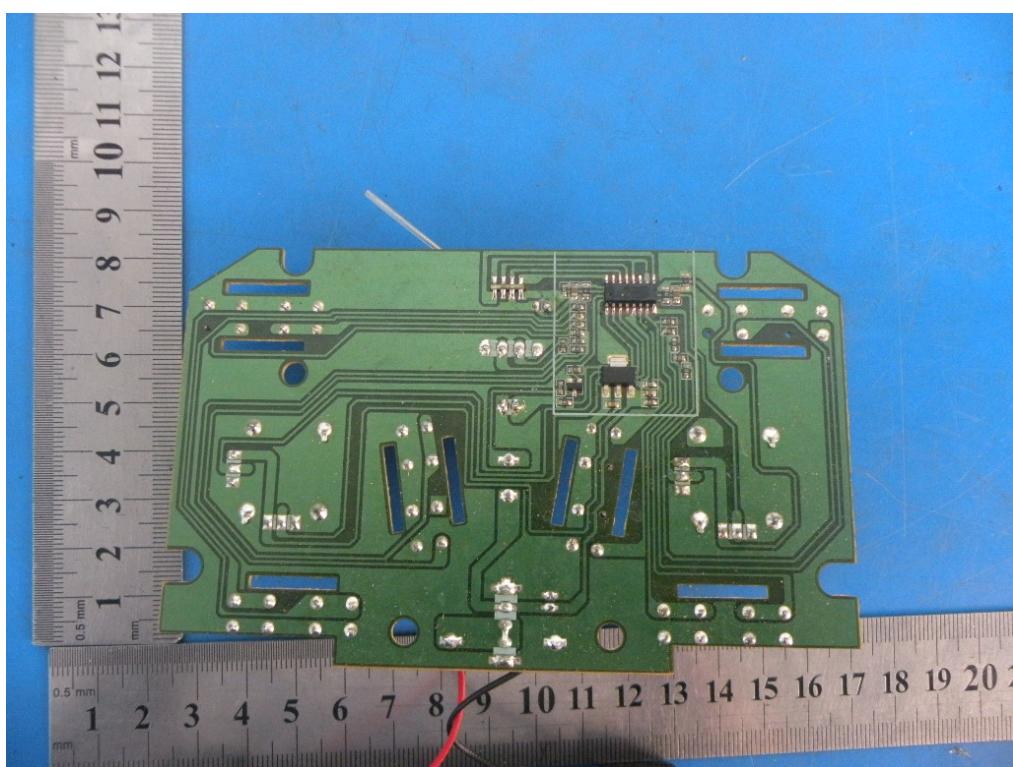
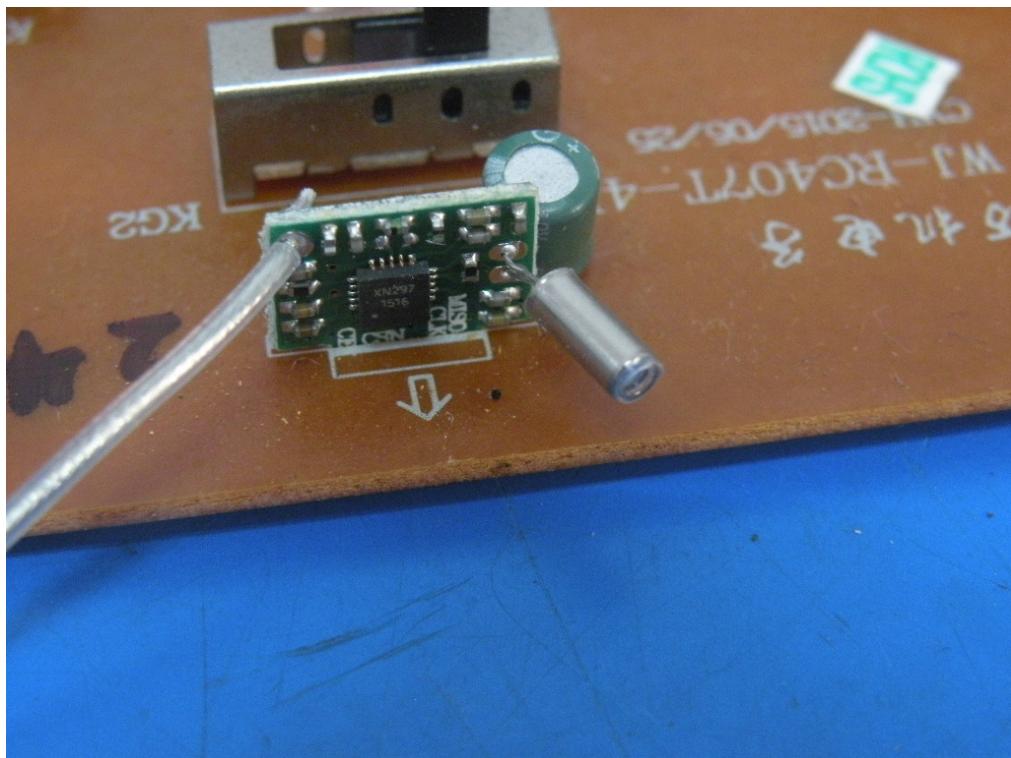












-----END OF REPORT-----