



## FCC - TEST REPORT

Report Number : **68.960.15.037.01** Date of Issue: July 01, 2015

Model : CG031,CG016,CG03,CG018,CG019,CG020,CG021,CG023, CG025,CG026, CG027,CG028,CG032,CG033,CG034,CG035, CG036,CG037,CG038,CG039,CG040,CG041,AZSQ1700, AZSQ1900,AZSQ1900M1

Product Type : REMOTE CONTROL AIRCRAFT

Applicant : AOSENMA TOYS FACTORY

Address : NO 8 MEIHU DISTRICT,CHENGHAI DISTRICT,SHANTOU CITY,GUANGDONG PROVINCE,CHINA

Manufacture : AOSENMA TOYS FACTORY

Address : NO 8 MEIHU DISTRICT,CHENGHAI DISTRICT,SHANTOU CITY,GUANGDONG PROVINCE,CHINA

Test Result :  Positive  Negative

Total pages : 35

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Compliance Certification Services (Shenzhen) Inc.  
No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan  
Town, Baoan District, Shenzhen, China

FCC Registration  
Number:

441872

### 3 Description of the Equipment Under Test

Product: REMOTE CONTROL AIRCRAFT

Model no.: CG031,CG016,CG03,CG018,CG019,CG020,CG021,CG023, CG025,CG026, CG027,CG028,CG032,CG033,CG034,CG035, CG036,CG037,CG038,CG039,CG040,CG041,AZSQ1700, AZSQ1900,AZSQ1900M1

FCC ID: 2AE8UCG031

Brand Name: /

Options and accessories: /

Rating: 6V(4\*AA Battery)

RF Transmission Frequency and Channel : 2405-2475MHz 71 Channels  
(2405, 2406,2407,2408,2409,2410,2411,2412,2413,2414,2415,2416,2417,2418, 2419,2420,2421,2422,2423,2424,2425,2426,2427,2428,2429,2430,2431,2432,2433, 2434,2435,2436,2437,2438,2439,2440,2441,2442,2443,2444,2445,2446,2447,2448, 2449,2450,2451,2452,2453,2454,2455,2456,2457,2458,2459,2460,2461,2462, 2463,2464,2465,2466,2467,2468,2469,2470,2471,2472,2473,2474,2475MHz)

Modulation: GFSK

Antenna Type: Integral

Antenna Gain: 0

Description of the EUT: The EUT is the remote control aircraft with 2.4GHz module transmitter

## 4 Summary of Test Standards

<b>Test Standards</b>	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

## 5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition	Test Result		
	Pass	Fail	N/A
15.207 Conducted emission AC power port	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.205(a), §15.209(a), §15.249(a), §15.249(c) Field strength of emissions and Restricted bands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC §15.215(c) 20dB bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.249(d) Out of band emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: 2AE8UCG031 complies with Section 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules.

### SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: 17 June 2015

Testing Start Date: 17 June 2015

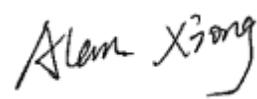
Testing End Date: 30 June 2015

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by: Prepared by:



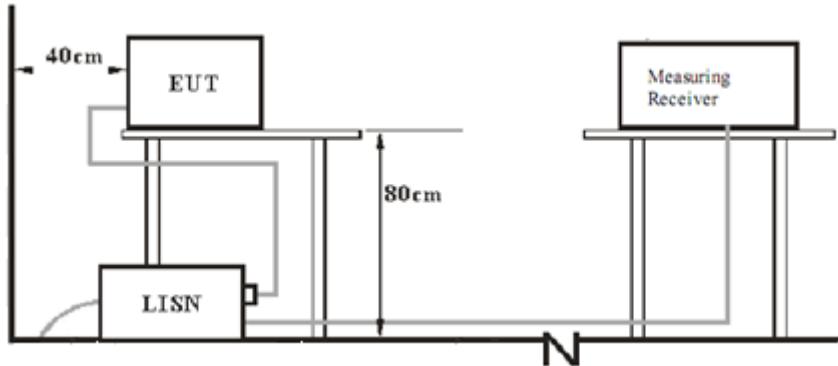
John Zhi  
EMC Project Manager



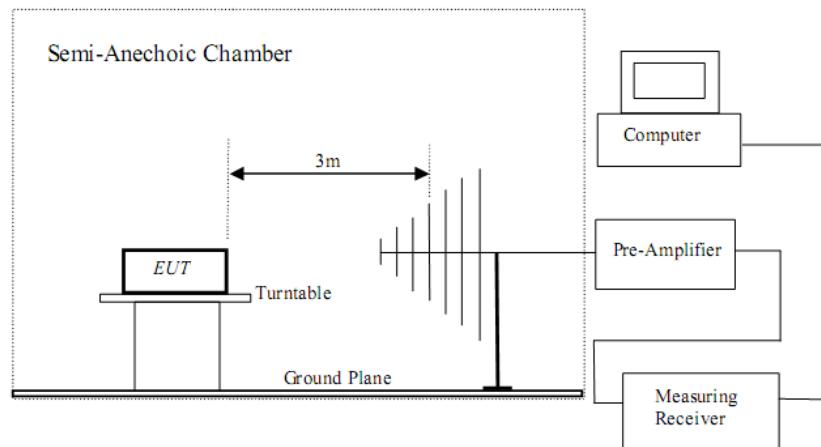
Alan Xiong  
EMC Project Engineer

## 7 Test setups

### 7.1 AC Power Line Conducted Emission test setups



### 7.2 Radiated test setups



## 8 Technical Requirement

### 8.1 Field strength of emissions and Restricted bands

#### Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:  
Span = wide enough to fully capture the emission being measured ,RBW = 1 MHz for  $f \geq 1\text{GHz}$ , 100 kHz for  $f < 1\text{ GHz}$ , VBW  $\geq$  RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from  $20\log(\text{duty cycle}/100\text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

#### Limits

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters.

According to §15.249 (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 §15.209, whichever is the lesser attenuation.

According to §15.205 and Unwanted emissions falling into restricted bands in §15.205 (a) Table 3 shall comply with the limits specified in §15.209.

## Field strength of emissions and Restricted bands

EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

Operating Condition: Transmitting

**Peak value**

Frequency (MHz)	Reading Level (dBuv)	Factor (dB/m)	Measurement (dBuv/m)	Limit (dBuv/m)	Over (dB)	Antenna Polarization
2405	66.17	-3.54	62.63	114	-51.37	Horizontal
2405	68.87	-3.54	65.33	114	-48.67	Vertical
2445	79.05	-3.37	75.68	114	-38.32	Horizontal
2445	76.95	-3.37	73.58	114	-40.42	Vertical
2475	79.40	-3.15	76.25	114	-37.75	Horizontal
2475	76.67	-3.15	73.52	114	-40.48	Vertical

*Remark: Peak value is less than average limit 94dBuV/m, hereby no average value record.*

## Field strength of emissions and Restricted bands

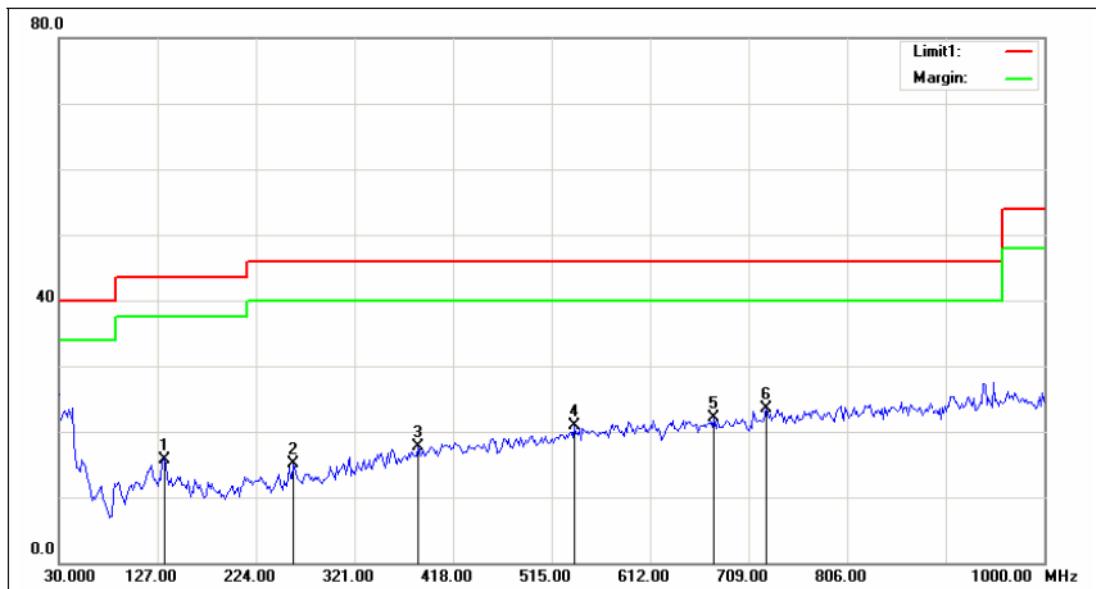
EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Horizontal

Comment: Below 1GHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	133.4667	36.72	-20.92	15.80	43.50	-27.70			peak
2	261.1833	35.02	-19.98	15.04	46.00	-30.96			peak
3	384.0500	34.18	-16.45	17.73	46.00	-28.27			peak
4	537.6332	34.39	-13.42	20.97	46.00	-25.03			peak
5	675.0500	34.30	-12.28	22.02	46.00	-23.98			peak
6*	726.7833	35.21	-11.69	23.52	46.00	-22.48			peak

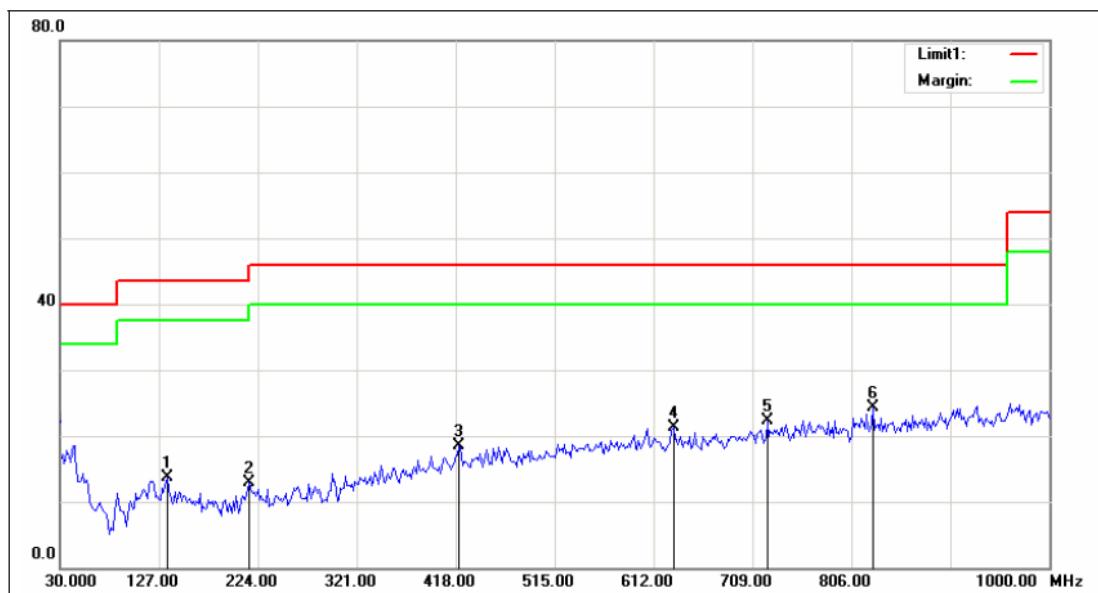
EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Vertical

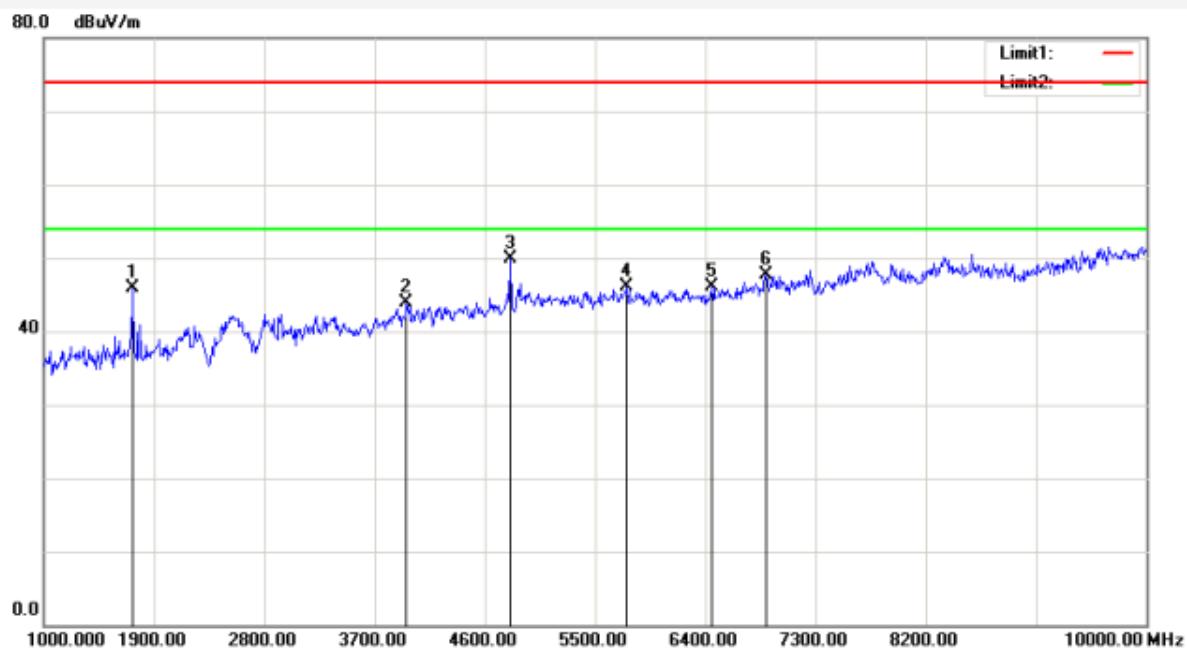
Comment: Below 1GHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	135.0833	34.74	-21.00	13.74	43.50	-29.76			peak
2	215.9167	33.76	-20.82	12.94	43.50	-30.56			peak
3	421.2333	33.94	-15.44	18.50	46.00	-27.50			peak
4	631.4000	33.79	-12.50	21.29	46.00	-24.71			peak
5	723.5500	33.98	-11.77	22.21	46.00	-23.79			peak
6*	827.0167	34.78	-10.52	24.26	46.00	-21.74			peak

EUT: REMOTE CONTROL AIRCRAFT  
 M/N: CG031  
 Operating Condition: Transmitting  
 Ant. Polarity: Horizontal  
 Comment: Above 1GHz

Low Channel



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1729.000	52.35	-6.42	45.93	74.00	-28.07			peak
2	3961.000	42.42	1.43	43.85	74.00	-30.15			peak
3*	4807.000	45.54	4.35	49.89	74.00	-24.11			peak
4	5761.000	40.14	5.98	46.12	74.00	-27.88			peak
5	6454.000	39.22	6.82	46.04	74.00	-27.96			peak
6	6895.000	40.08	7.53	47.61	74.00	-26.39			peak

EUT: REMOTE CONTROL AIRCRAFT

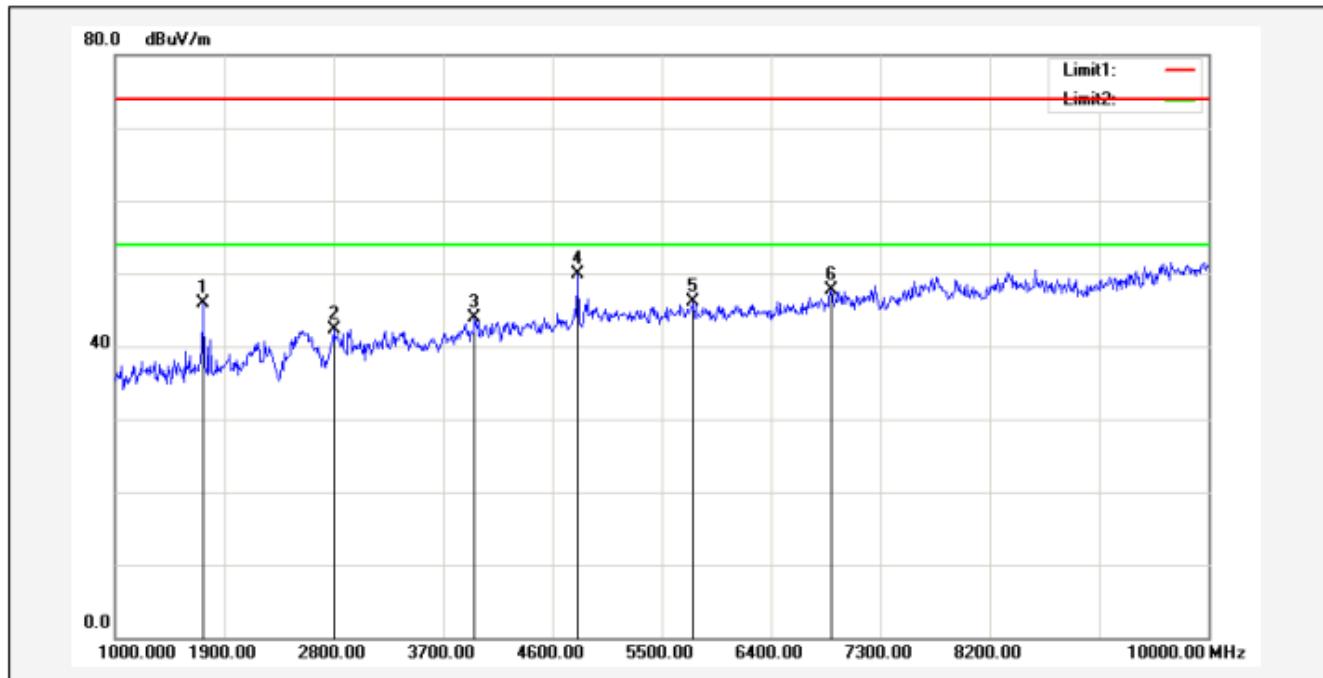
M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Vertical

Comment: Above 1GHz

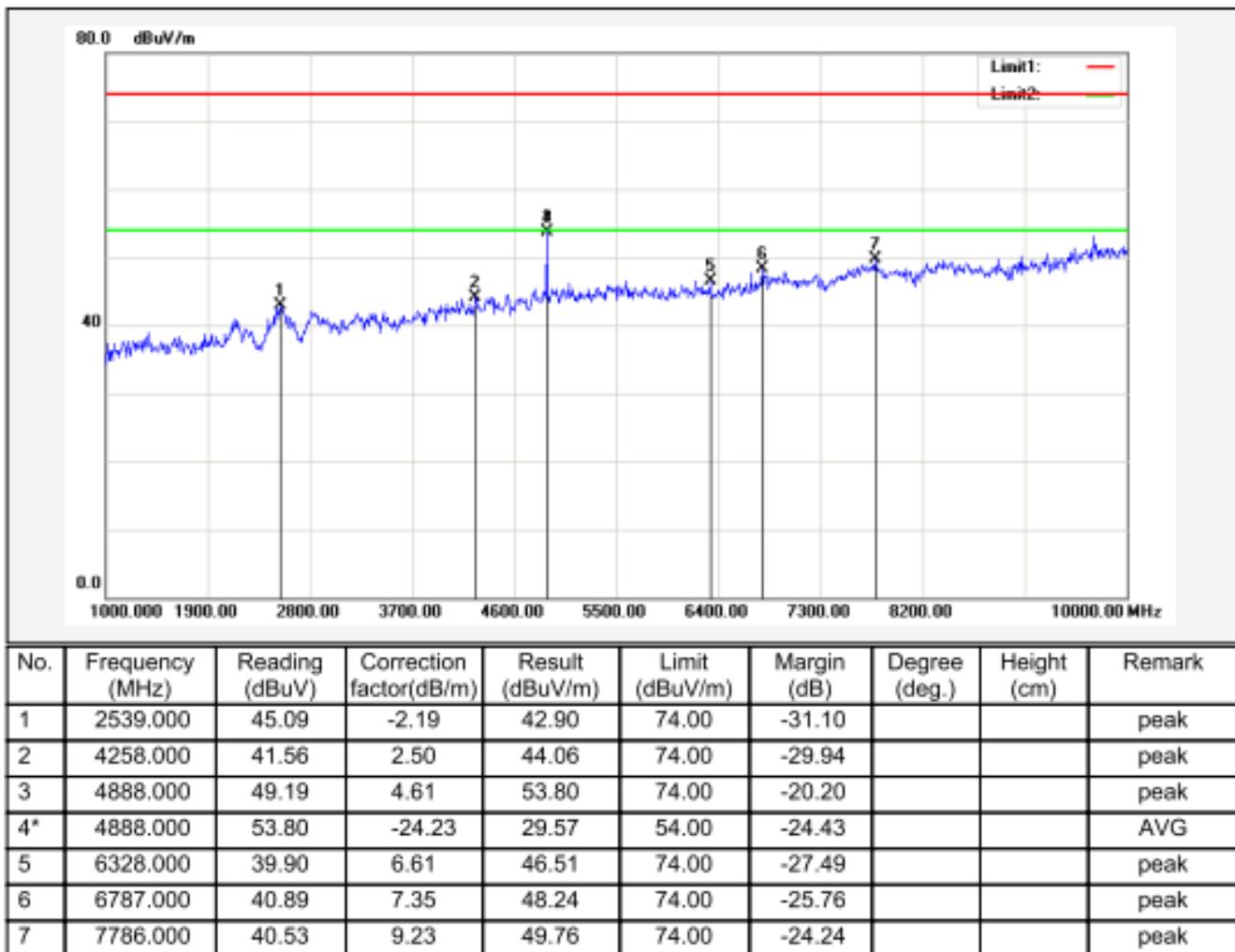
Low Channel



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1729.000	52.35	-6.42	45.93	74.00	-28.07			peak
2	2800.000	44.05	-1.72	42.33	74.00	-31.67			peak
3	3961.000	42.42	1.43	43.85	74.00	-30.15			peak
4*	4807.000	45.54	4.35	49.89	74.00	-24.11			peak
5	5761.000	40.14	5.98	46.12	74.00	-27.88			peak
6	6895.000	40.08	7.53	47.61	74.00	-26.39			peak

EUT: REMOTE CONTROL AIRCRAFT  
 M/N: CG031  
 Operating Condition: Transmitting  
 Ant. Polarity: Horizontal  
 Comment: Above 1GHz

Middle Channel



EUT: REMOTE CONTROL AIRCRAFT

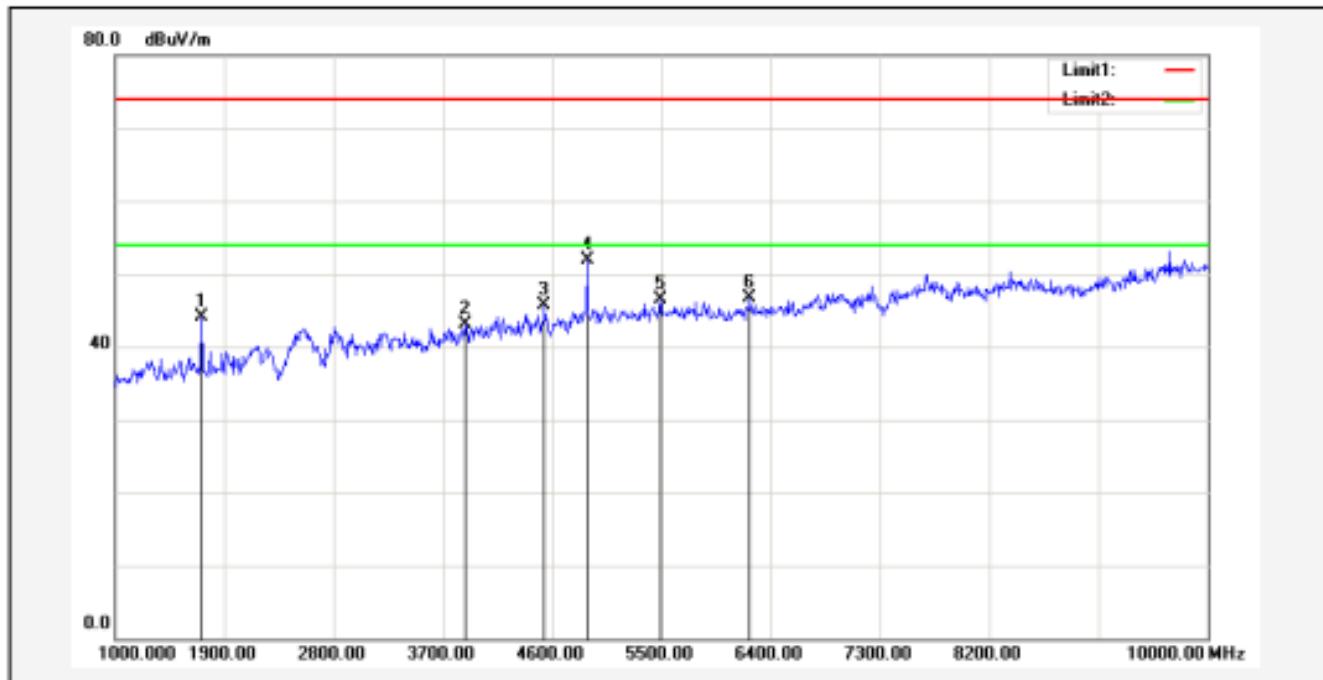
M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Vertical

Comment: Above 1GHz

Middle Channel



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1711.000	50.65	-6.46	44.19	74.00	-29.81			peak
2	3889.000	42.08	1.12	43.20	74.00	-30.80			peak
3	4537.000	42.18	3.47	45.65	74.00	-28.35			peak
4*	4888.000	47.26	4.61	51.87	74.00	-22.13			peak
5	5491.000	40.67	5.85	46.52	74.00	-27.48			peak
6	6229.000	40.28	6.45	46.73	74.00	-27.27			peak

EUT: REMOTE CONTROL AIRCRAFT

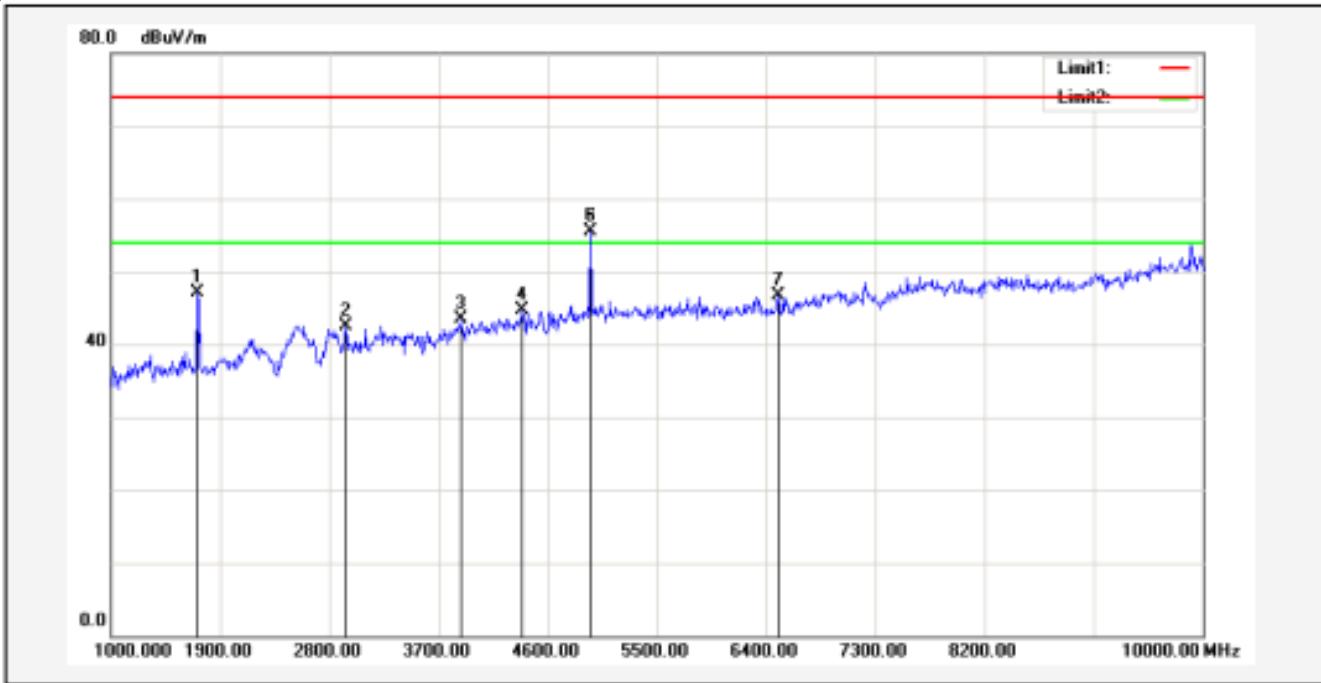
M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Horizontal

Comment: Above 1GHz

High Channel



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1711.000	53.62	-6.46	47.16	74.00	-26.84			peak
2	2935.000	44.07	-1.48	42.59	74.00	-31.41			peak
3	3889.000	42.45	1.12	43.57	74.00	-30.43			peak
4	4393.000	41.65	2.97	44.62	74.00	-29.38			peak
5	4951.000	50.61	4.82	55.43	74.00	-18.57			peak
6*	4951.000	55.43	-24.23	31.20	54.00	-22.80			AVG
7	6499.000	39.76	6.89	46.65	74.00	-27.35			peak

EUT: REMOTE CONTROL AIRCRAFT

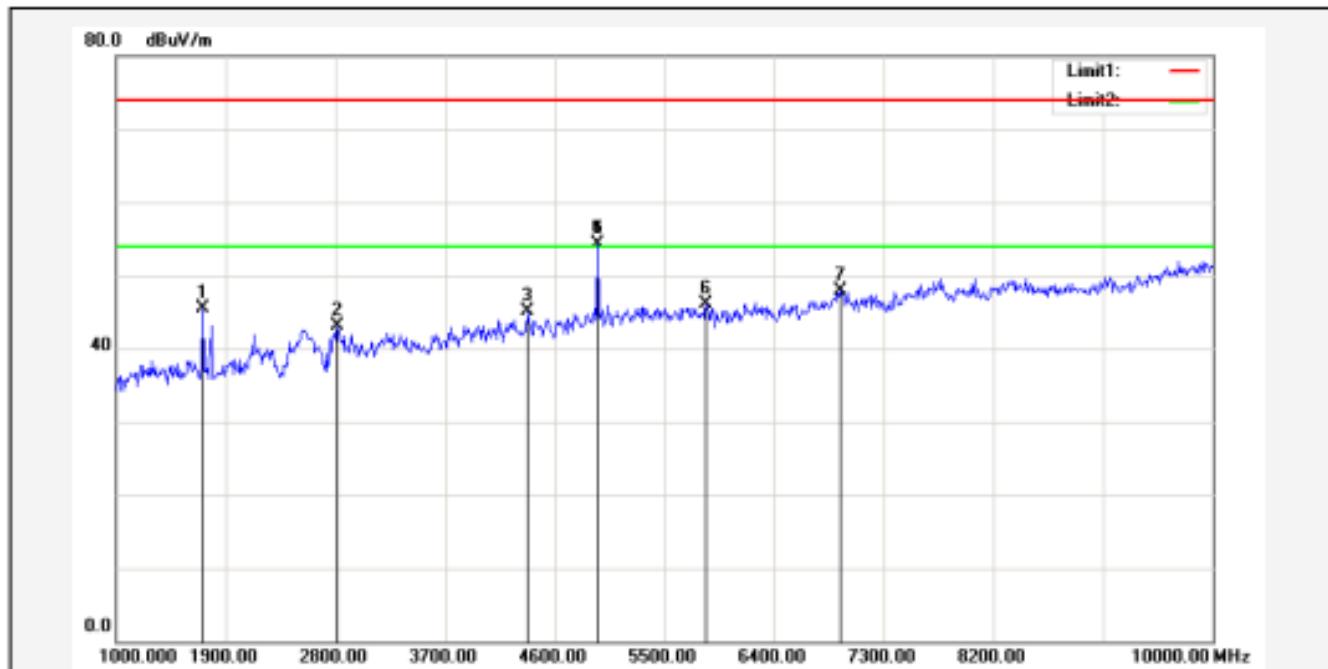
M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Vertical

Comment: Above 1GHz

High Channel



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	1711.000	51.99	-6.46	45.53	74.00	-28.47			peak
2	2818.000	44.76	-1.69	43.07	74.00	-30.93			peak
3	4375.000	42.14	2.91	45.05	74.00	-28.95			peak
4	4951.000	49.50	4.82	54.32	74.00	-19.68			peak
5*	4951.000	54.32	-24.23	30.09	54.00	-23.91			AVG
6	5842.000	40.01	6.01	46.02	74.00	-27.98			peak
7	6940.000	40.22	7.60	47.82	74.00	-26.18			peak

## 8.2 20dB Bandwidth

### Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

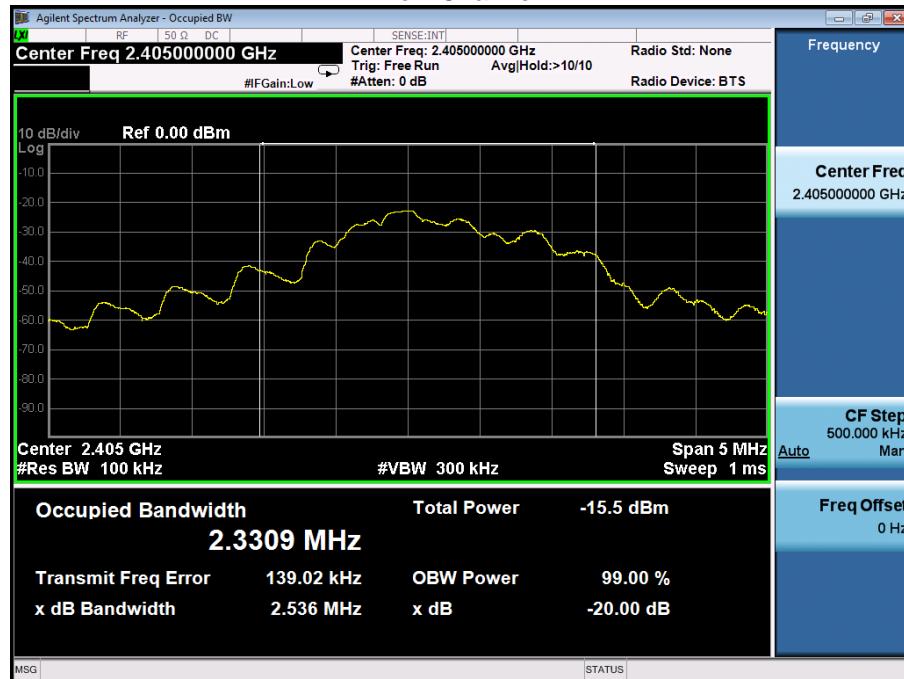
### Limits:

According to 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

## 20dB Bandwidth

Frequency	20dB Bandwidth
MHz	MHz
2405	2.536
2445	2.506
2475	2.529

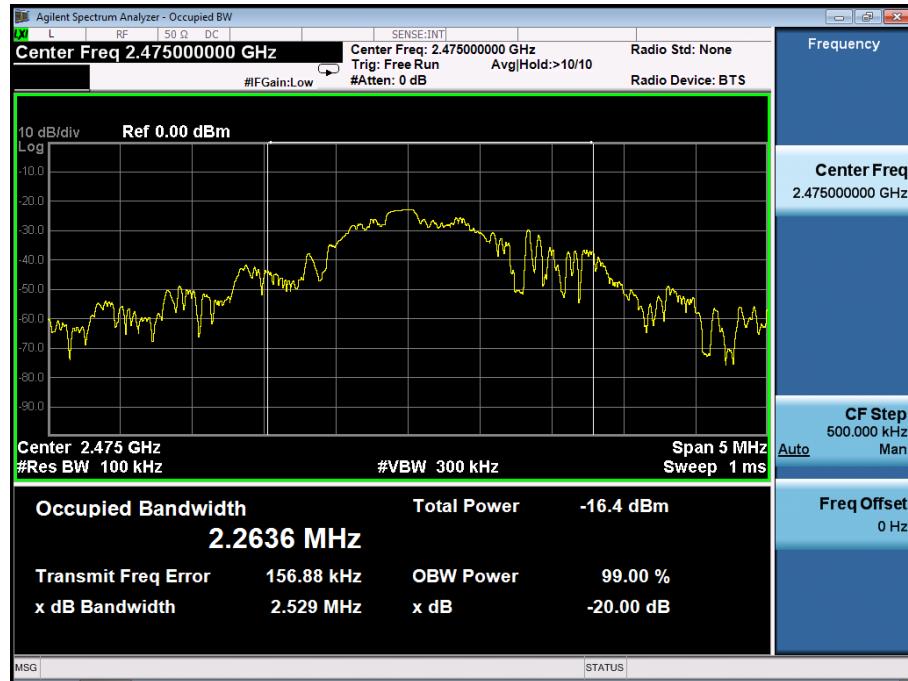
### Low Channel



### Middle Channel



## High Channel



## 8.3 Band edge testing

### Test Method

- 1 Use the following spectrum analyzer settings:  
Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 100 kHz, VBW  $\geq$  RBW, Sweep = auto, Detector function = peak, Trace = max  
hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

### Limit:

According to §15.249(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 §15.209, whichever is the lesser attenuation.

## Band edge testing

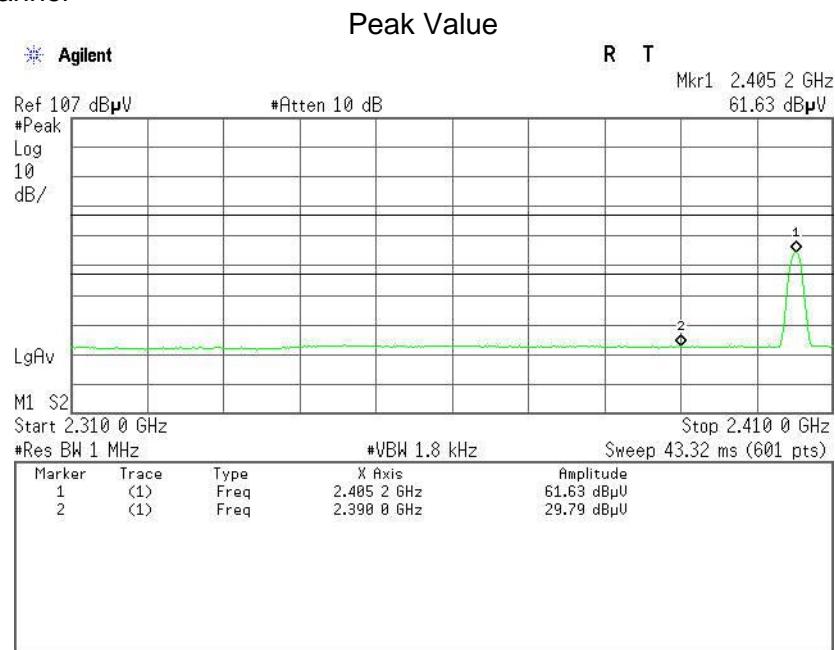
EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Horizontal

Comment: Low Channel



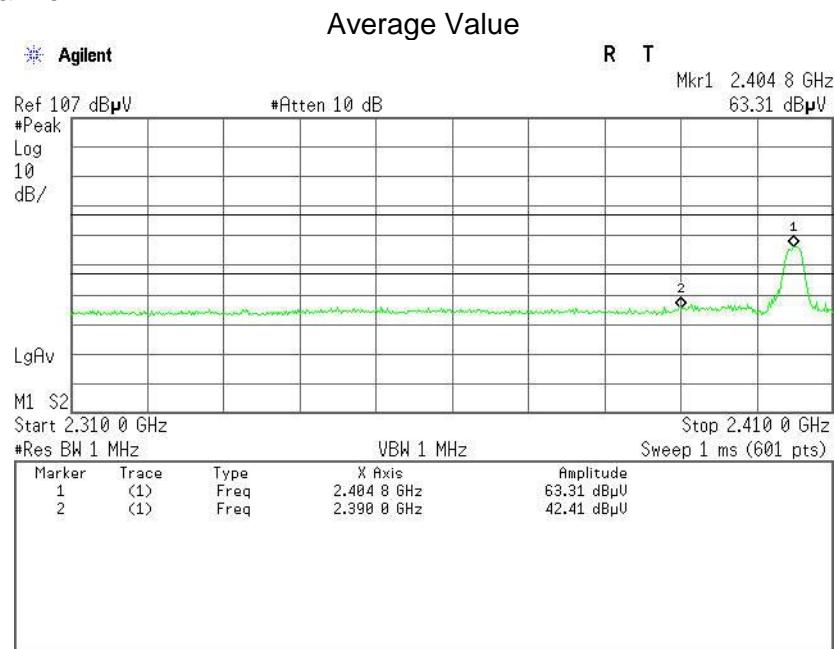
EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

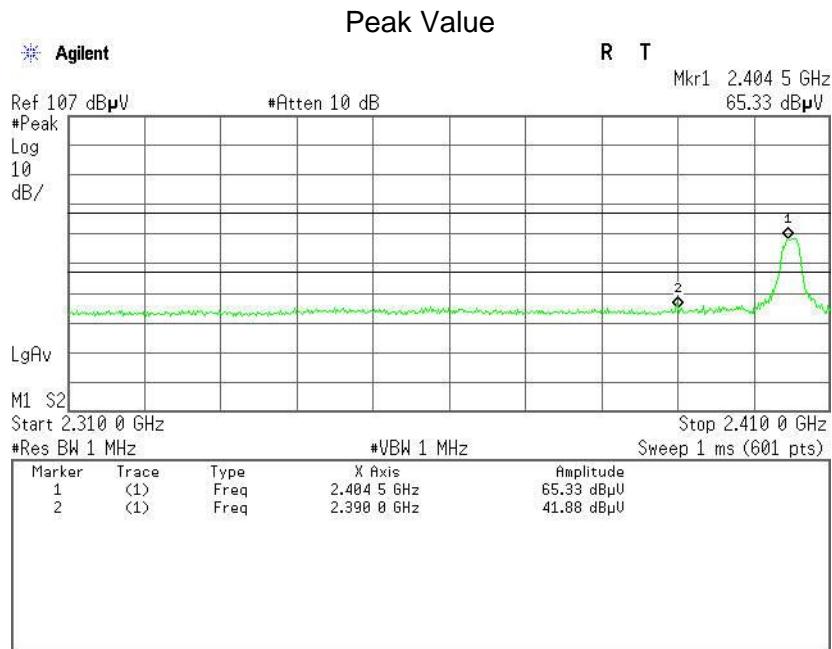
Operating Condition: Transmitting

Ant. Polarity: Horizontal

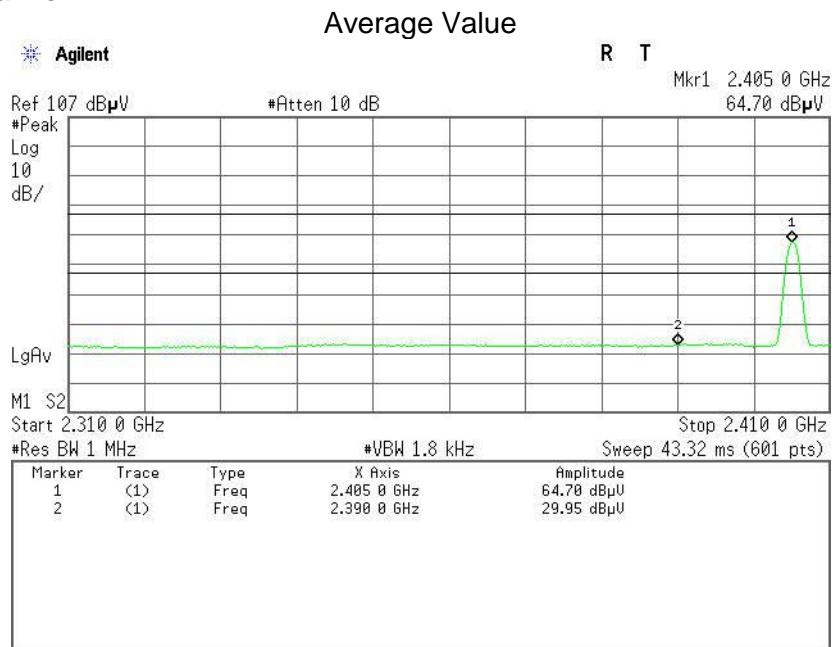
Comment: Low Channel



EUT: REMOTE CONTROL AIRCRAFT  
 M/N: CG031  
 Operating Condition: Transmitting  
 Ant. Polarity: Vertical  
 Comment: Low Channel



EUT: REMOTE CONTROL AIRCRAFT  
 M/N: CG031  
 Operating Condition: Transmitting  
 Ant. Polarity: Vertical  
 Comment: Low Channel



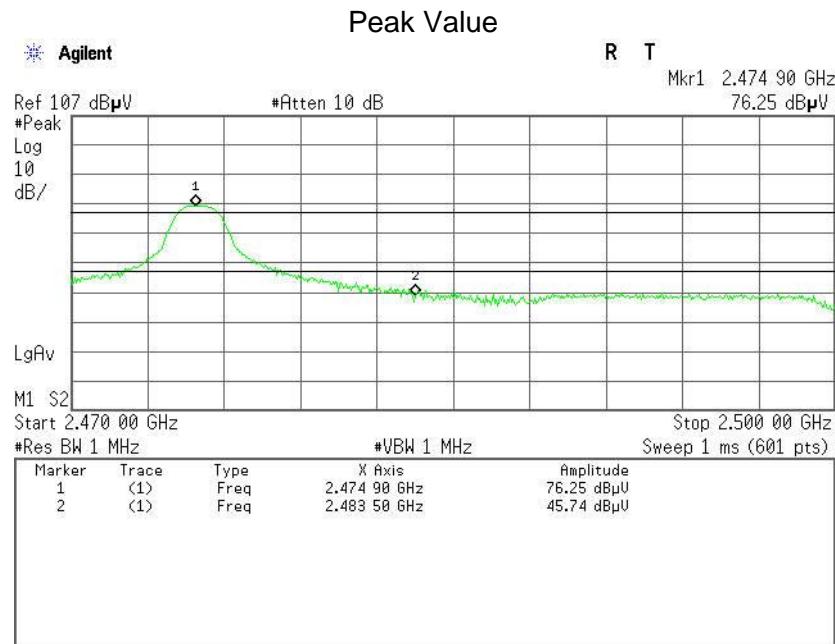
## EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

Operating Condition: Transmitting

Ant. Polarity: Horizontal

Comment: High Channel



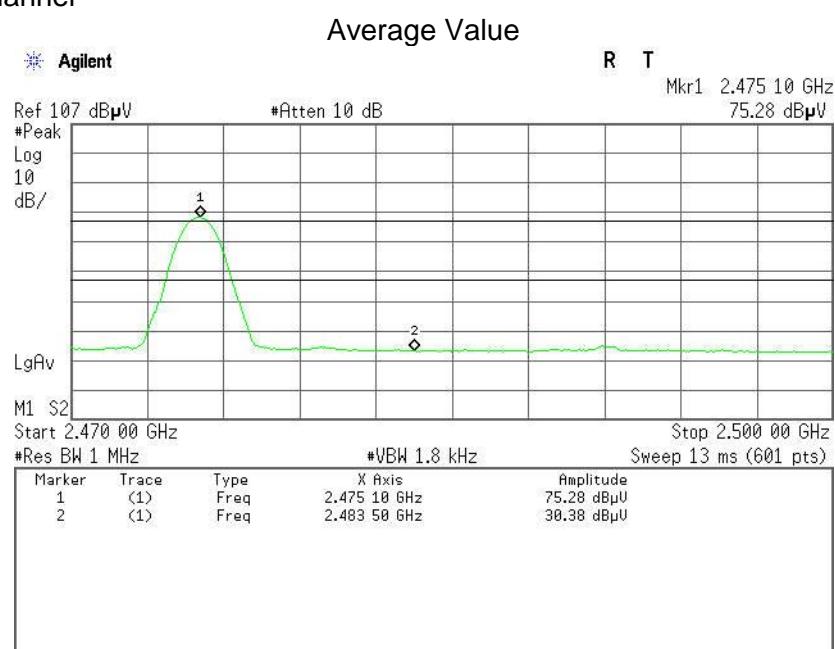
## EUT: REMOTE CONTROL AIRCRAFT

M/N: CG031

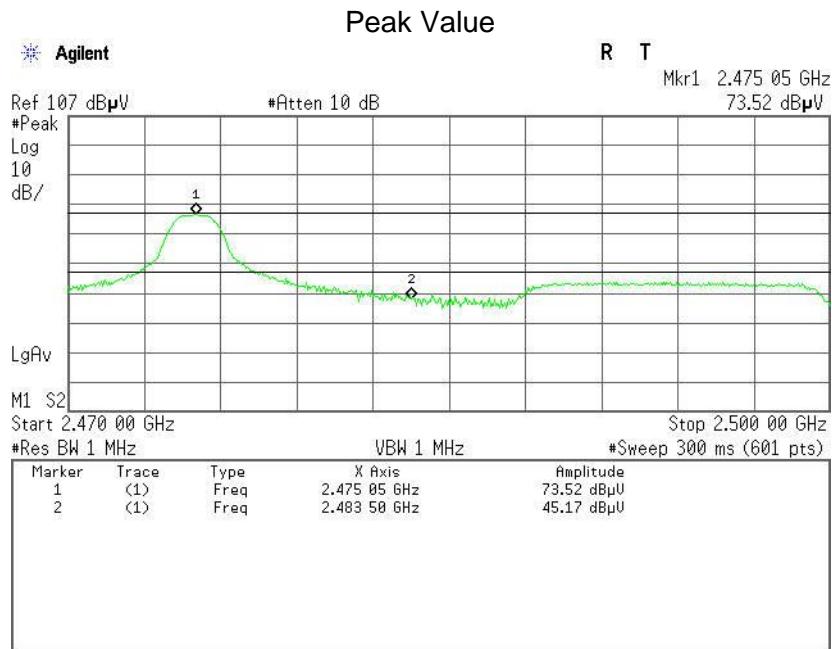
Operating Condition: Transmitting

Ant. Polarity: Horizontal

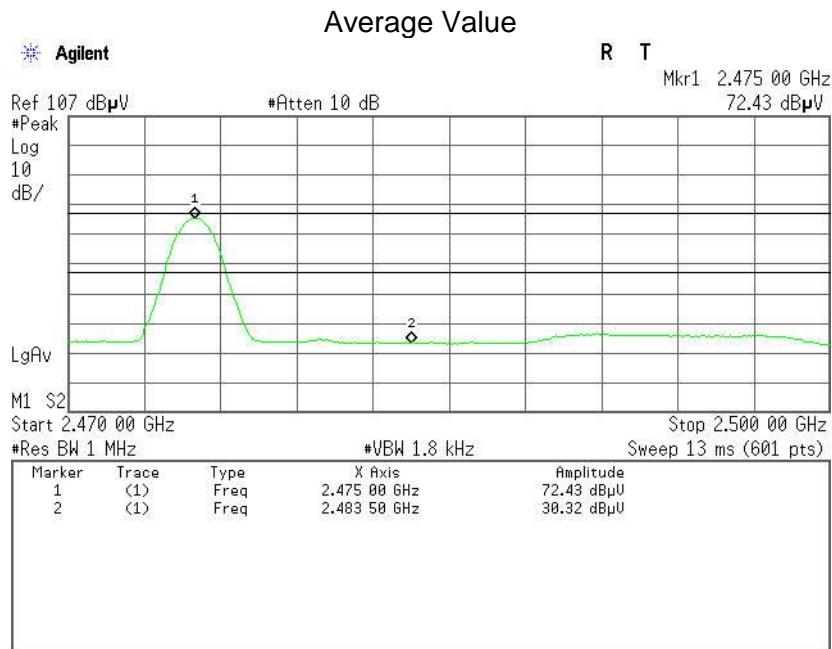
Comment: High Channel



EUT: REMOTE CONTROL AIRCRAFT  
 M/N: CG031  
 Operating Condition: Transmitting  
 Ant. Polarity: Vertical  
 Comment: High Channel



EUT: REMOTE CONTROL AIRCRAFT  
 M/N: CG031  
 Operating Condition: Transmitting  
 Ant. Polarity: Vertical  
 Comment: High Channel



## 9 Test equipment list

### List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL. DATE
C	PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2015

### Radiated Emission Test Site 966(2)

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2015	03/01/2016
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2015	03/17/2016
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2015	03/17/2016
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	07/10/2014	07/09/2015
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/01/2015	03/01/2016
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/01/2015	03/01/2016
Loop Antenna	COM-POWER	AL-130	121044	09/27/2014	09/26/2015
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/28/2015	02/27/2016
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD		LZ-RF / CCS-SZ-3A2		

Remark: N.C.R means no calibration requirement.

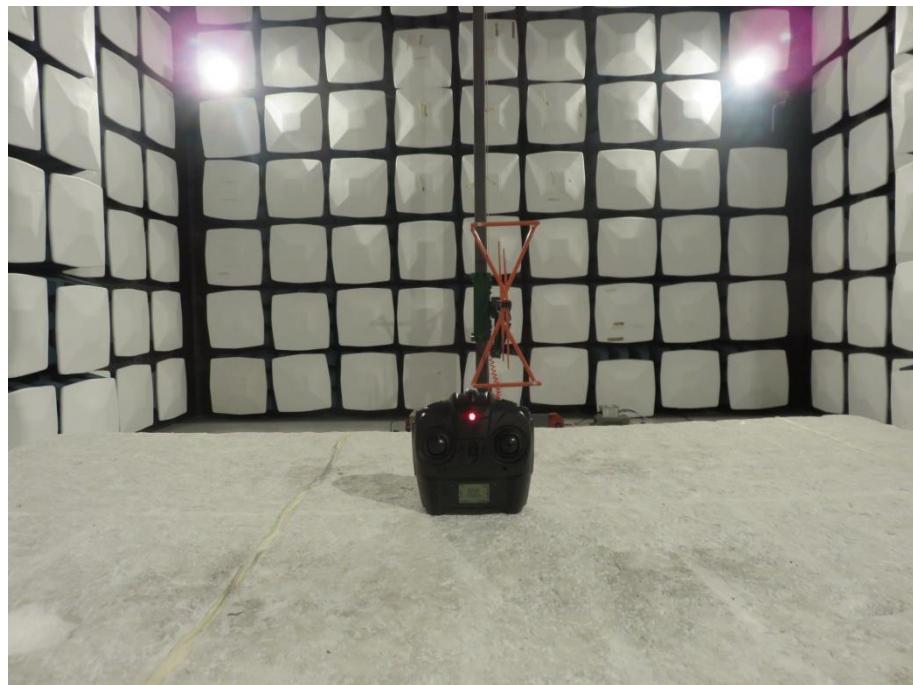
## 10 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

**System Measurement Uncertainty**

Items		Extended Uncertainty
RE	Field strength (dB $\mu$ V/m)	U=4.2dB (30MHz-1GHz) U=3.57dB (1GHz-25GHz)
CE	Disturbance Voltage (dB $\mu$ V)	U=2.4dB
Bandwidth test	--	$1 \times 10^{-9}$
Conducted emission	--	2.4dB

## 11 Photographs of Test Set-ups



## 12 Photographs of EUT

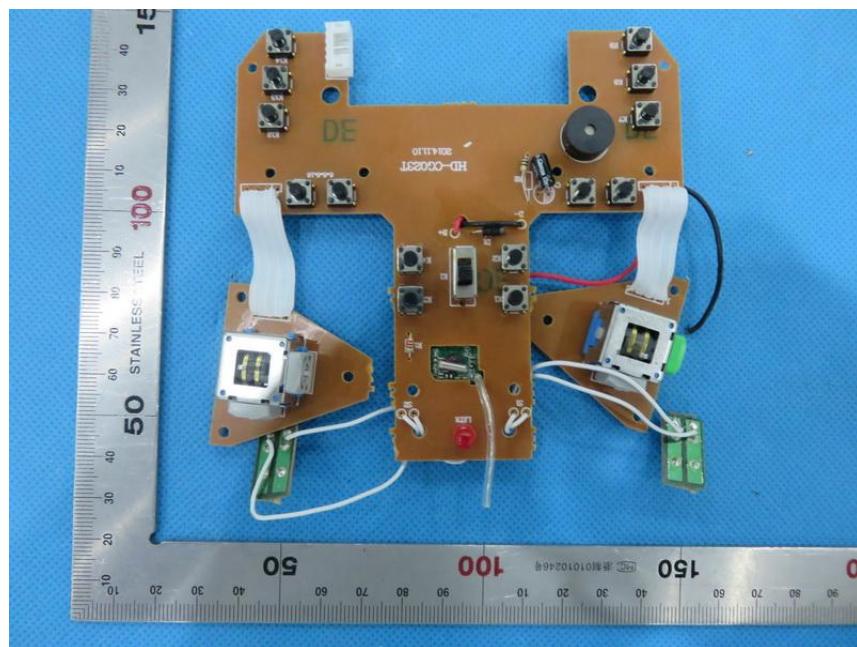
External Photo

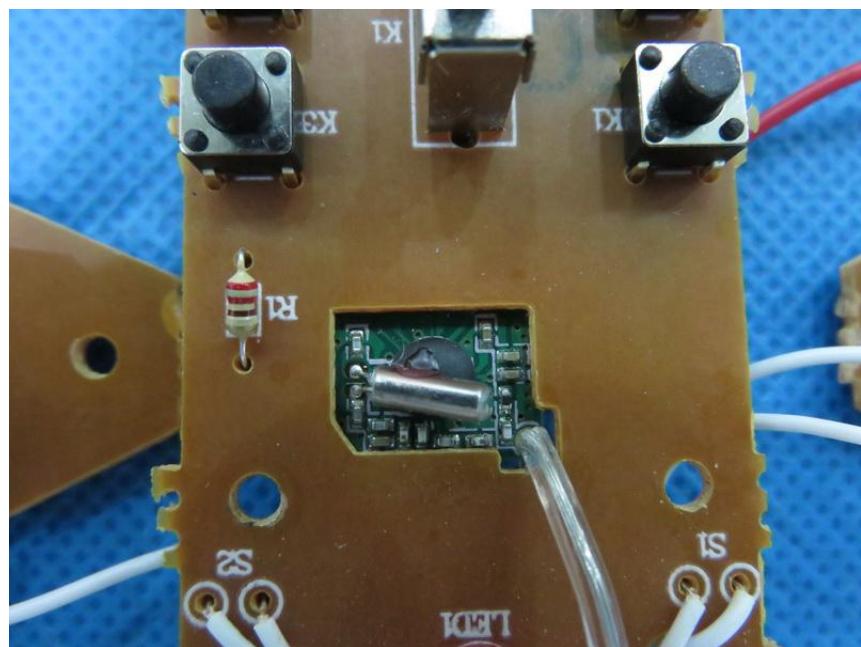
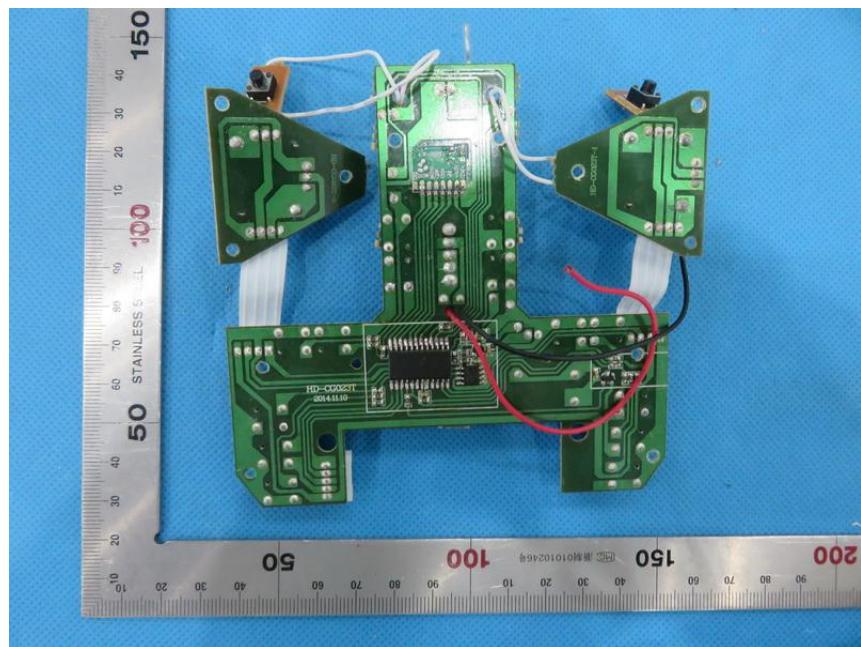


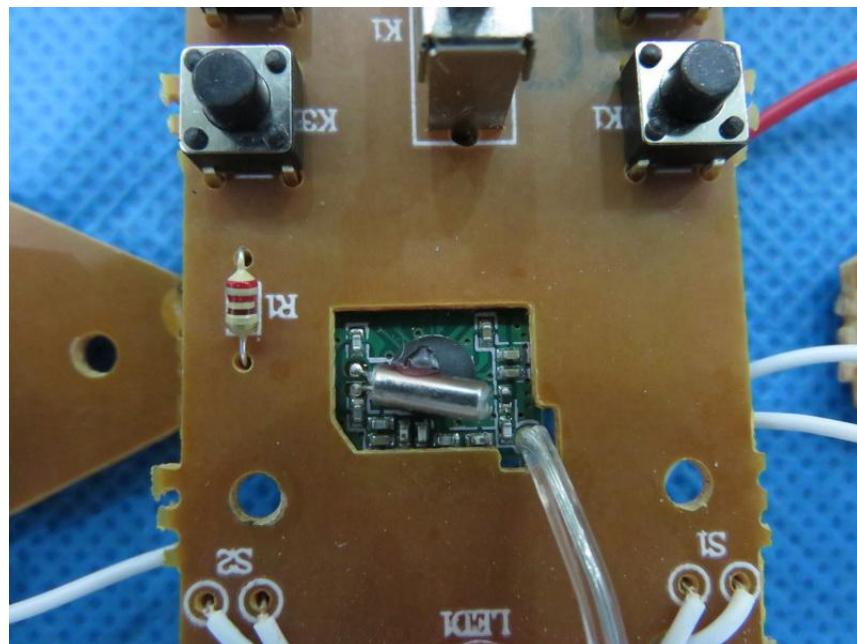




Internal Photo







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**The End**

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