



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3) Date : 15 Apr 2016

Application No. : LU011338(5)

Applicant : Zego Electronic Company Limited (Shenzhen Yangri Electronic Ltd)
Room 703, Kowloon Building,
555 Nathan Road, Kowloon, HK

Sample Description : One(1) item of submitted sample stated to be Controller of Flapper Bot
of Model No. 6910
Sample registration No. : RU013467-001
Radio Frequency : 2405MHz – 2475MHz Transceiver
Rating : 4 x 1.5V AAA size batteries
No. of submitted sample : Three (3) set (s)

Date Received : 22 Mar 2016

Test Period : 24 Mar 2016 to 30 Mar 2016.

Test Requested : FCC Part 15 Certificate (15.249)

Test Method : 47 CFR Part 15 (10-1-15 Edition)
ANSI C63.4 – 2014, ANSI C63.10 - 2013


Test Engineer : Mr. LEUNG Shu-kan, Ken

Test Result : See attached sheet(s) from page 2 to 30.

Conclusion : The submitted sample was found to comply with requirement of FCC Part 15
Subpart B and C.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

Page 1 of 30

FCC ID: 2ACS610TX



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

Table of Contents

1	General Information	3
1.1	General Description	3
1.2	Location of the test site	4
1.3	List of measuring equipment.....	5
1.4	Measurement Uncertainty.....	6
2	Description of the radiated emission test	7
2.1	Test Procedure	7
2.2	Test Result	8
2.3	Radiated Emission Measurement Data	9
3	Description of the Line-conducted Test	13
3.1	Test Procedure	13
3.2	Test Result	13
3.3	Graph and Table of Conducted Emission Measurement Data	13
4	Photograph	14
4.1	Photographs of the Test Setup for Radiated Emission and Conducted Emission.....	14
4.2	Photographs of the External and Internal Configurations of the EUT.....	14
5	Supplementary document.....	15
5.1	Bandwidth.....	15
5.2	EUT Antenna	15
5.3	Duty cycle Calculation.....	15
6	Appendices.....	16



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

1 General Information

1.1 General Description

The equipment under test (EUT) is a controller for Flapper Bot. The EUT is power by 4 x 1.5V AAA size batteries. It operates at 2405MHz – 2475MHz. There are buttons and joysticks on the EUT.

When the buttons are pressed or the joysticks are moved, the EUT will transmit radio control signal to receiver.

The brief circuit description is listed as follows:

- U3 and its associated circuit act as MCU
- U1(module) and its associated circuit act as RF circuit
- U1 and its associated circuit act as power supply circuit
- Y1 and its associated circuit act as oscillator
- S2, S3, S4, S5, S6, S7, S8, S9, VR1, VR2 and its associated circuit act as coppter control



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

1.2 Location of the test site

FCC Registered Test Site Number: 552221

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	R&S	ESCI	100152	27 Sep 2016	1 Year
Spectrum Analyzer	R&S	FSV40	100628	09 Feb 2017	1 Year
Broadband Antenna	Schaffner	CBL6112B	2718	15 Mar 2017	2 Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2018	2 Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2016	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	24 Nov 2016	2 Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	02 Aug 2017	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	02 Aug 2017	2 Years
Coaxial Cable	Schaffner	RG 213/U	N/A	18 May 2016	1 Years
Coaxial Cable	Suhner	RG 214/U	N/A	18 May 2016	1 Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	13 Dec 2016	1 Years



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

Radiated emissions

Frequency	Uncertainty (U_{lab})
30MHz ~ 200MHz (Horizontal)	4.83dB
30MHz ~ 200MHz (Vertical)	4.84dB
200MHz ~1000MHz (Horizontal)	4.87dB
200MHz ~1000MHz (Vertical)	5.94dB
1GHz ~6GHz	4.41dB
6GHz ~18GHz	4.64dB

Conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz~30MHz	2.64dB



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

2 Description of the radiated emission test

2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground for below 1GHz measurement and 1.5m high above the ground for above 1GHz measurement. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 1GHz, broadband antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground.

For above 1GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three orthogonal to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

2.2 Test Result

Subpart C:

Peak Detector data were measured unless otherwise stated.

“#” means emissions appear within the restricted bands shall follow the requirement of section 15.205.

The frequencies from fundamental up to that tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next page (section 2.3).

It was found that the EUT not meet the FCC requirement

Subpart B:

Quasi-Peak Detector data were measured unless otherwise stated.

“#” means emissions appear within the restricted bands shall follow the requirement of section 15.205.

The emissions meet the requirement of section 15.109 are based on measurements employing the CISPR quasi-peak detector below 1000MHz and average detector for frequencies above 1000MHz.

The frequencies from 30MHz to 1000MHz were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next page (section 2.3).

It was found that the EUT meet the FCC requirement.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

2.3 Radiated Emission Measurement Data

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	23	°C
Relative humidity:	73	%

Measurement: Peak RBW: 1MHz VBW: 3MHz Operation mode: Transmission

Testing frequency range: 9kHz to 25GHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBμV)	Transducer Factor (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
2405.182	V	95.1	- 4.2	90.9	114.0	- 23.1
#4809.928	V	54.6	3.7	58.3	74.0	- 15.7
7214.161	H	49.6	11.5	61.1	74.0	- 12.9
7214.175	V	49.5	11.5	61.0	74.0	- 13.0
2432.713	V	94.7	- 4.2	90.5	114.0	- 23.5
#4869.372	H	51.7	3.7	55.4	74.0	- 18.6
#7229.586	V	49.0	11.5	60.5	74.0	- 13.5
#7229.651	H	47.7	11.5	59.2	74.0	- 14.8
2475.193	V	95.2	- 4.3	90.9	114.0	- 23.1
#4947.902	H	49.9	4.0	53.9	74.0	- 20.1
#7425.593	H	48.0	11.5	59.5	74.0	- 14.5
#7425.593	V	49.1	11.5	60.6	74.0	- 13.4

Remark: Other emissions more than 20dB below the limit are not reported.
EUT was placed flat on the table for maximum emission.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

2.3 Radiated Emission Measurement Data (Con't)

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	23	°C
Relative humidity:	73	%

Measurement: Average Operation mode: Transmission

Testing frequency range: 9kHz to 25GHz

Frequency (MHz)	Polarity (H/V)	Peak Field Strength at 3m (dBµV/m)	Average Factor (dB/m)	Average Value at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
2405.182	V	90.9	- 21.2	69.7	94.0	- 24.3
#4809.928	V	58.3	- 21.2	37.1	54.0	- 16.9
7214.161	H	61.1	- 21.2	39.9	54.0	- 14.1
7214.175	V	61.0	- 21.2	39.8	54.0	- 14.2

2432.713	V	90.5	- 21.2	69.3	94.0	- 24.7
#4869.372	H	55.4	- 21.2	34.2	54.0	- 19.8
#7229.586	V	60.5	- 21.2	39.3	54.0	- 14.7
#7229.651	H	59.2	- 21.2	38.0	54.0	- 16.0

2475.193	V	90.9	- 21.2	69.7	94.0	- 24.3
#4947.902	H	53.9	- 21.2	32.7	54.0	- 21.3
#7425.593	V	59.5	- 21.2	38.3	54.0	- 15.7
#7425.593	H	60.6	- 21.2	39.4	54.0	- 14.6

Remark: Other emissions more than 20dB below the limit are not reported.

EUT was placed flat on the table for maximum emission.

Average Value at 3m = Peak Field Strength at 3m + Average Factor.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

2.3 Radiated Emission Measurement Data (Con't)

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	21	°C
Relative humidity:	73	%

Detector: Quasi-peak

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Operation mode: Transmission

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dB μ V)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
49.014	H	6.3	12.8	19.1	40.0	- 20.9
86.889	H	8.4	9.7	18.1	40.0	- 21.9
#126.330	H	8.5	14.4	22.9	43.5	- 20.6
#172.578	H	7.9	11.9	19.8	43.5	- 23.7
207.454	H	8.4	12.0	20.4	43.5	- 25.6
#259.149	H	8.7	15.4	24.1	46.0	- 21.9
304.023	H	8.3	16.8	25.1	46.0	- 20.9

Remark: Other emissions more than 20dB below the limit are not reported.

EUT was placed flat on the table for maximum emission.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

2.3 Radiated Emission Measurement Data (Con't)

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart B

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	21	°C
Relative humidity:	73	%

Detector: Quasi-peak

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Operation mode: Receiving

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dB μ V)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
48.290	H	6.6	12.8	19.4	40.0	- 20.6
96.247	H	9.6	10.1	19.7	43.5	- 23.8
148.755	H	7.5	14.1	21.6	43.5	- 21.9
204.626	H	8.5	12.0	20.5	43.5	- 23.0
#243.572	H	9.9	13.2	23.1	46.0	- 22.9
#278.970	H	9.0	15.4	24.4	46.0	- 21.6
#324.424	H	9.0	16.8	25.8	46.0	- 20.2

Remark: Other emissions more than 20dB below the limit are not reported.

EUT was placed flat on the table for maximum emission.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

3 Description of the Line-conducted Test

3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

No measurement is required as the EUT is a battery-operated product.

3.3 Graph and Table of Conducted Emission Measurement Data

Not Applicable



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

4 Photograph

4.1 Photographs of the Test Setup for Radiated Emission and Conducted Emission

For electronic filing, the photos are saved with filename 2ACS610TX TSup.pdf.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename 2ACS610TX ExPho.pdf and 2ACS610TX InPho.pdf.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

5 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

Document	Filename
ID Label/Location	LabelSmp.jpg
Block Diagram	BlkDia.pdf
Schematic Diagram	Schem.pdf
Users Manual	UserMan.pdf
Operational Description	OpDes.pdf

5.1 Bandwidth

The plot saved in TestRpt2.pdf shows the fundamental emission is confined in the specified band. It shows the 20dB bandwidth met the 15.215 requirement for frequency band 2400 to 2483.5 MHz.

The plot saved in TestRpt3.pdf shows the band edge is fulfil 15.209 requirement.

5.2 EUT Antenna

Appendices A4 shows the antenna is permanently attached and cannot be changed. Therefore it fulfils the section 15.203 requirement.

5.3 Duty cycle Calculation

Appendices A8 shows the plots of duty cycle

All channels are using the same data pattern

Time of one cycle: 3.9ms

Number of pulses in one cycle: 2

Time of one pulse: 170µs

$$\text{Duty cycle} = 2 * 170\mu\text{s} / 3.9\text{ms} = 0.087$$

$$\text{Average factor} = 20 * \log(0.087) = -21.2$$



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

6 Appendices

A1	Photos of the set-up of Radiated Emissions	3	pages
A2	Photos of External Configurations	2	pages
A3	Photos of Internal Configurations	2	pages
A4	EUT Antenna	1	page
A5	ID Label/Location	1	page
A6	Band Edge	2	pages
A7	20dB Bandwidth Plot	2	pages
A8	Duty Cycle Plot	1	page



CMA Testing and Certification Laboratories

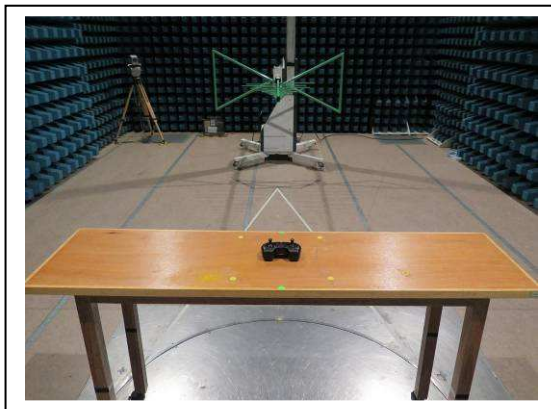
廠商會檢定中心

TEST REPORT

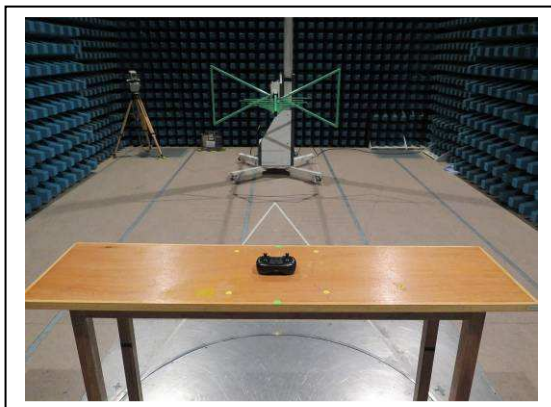
Report No. : AU0021371(3)

Date : 15 Apr 2016

A1. Photos of the set-up of Radiated Emissions



(Front view, 30MHz – 1GHz)



(Back view, 30MHz – 1GHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

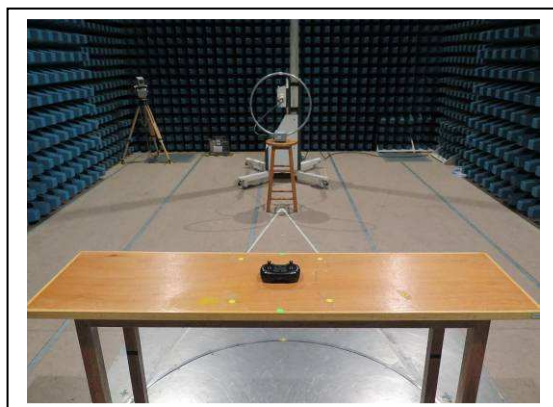
Report No. : AU0021371(3)

Date : 15 Apr 2016

A1. Photos of the set-up of Radiated Emissions



(Front view, 9KHz – 30MHz)



(Back view, 9KHz – 30MHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

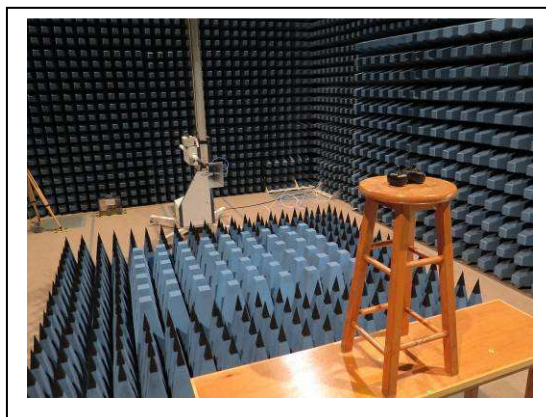
廠商會檢定中心

TEST REPORT

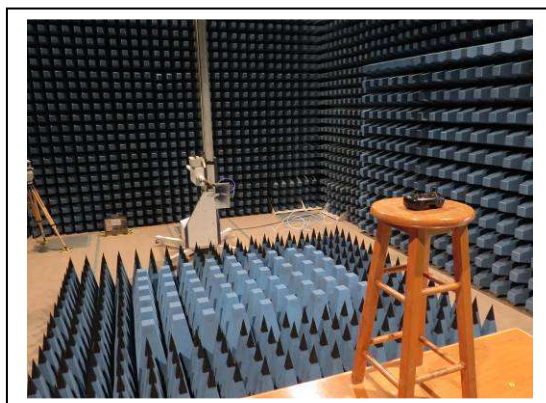
Report No. : AU0021371(3)

Date : 15 Apr 2016

A1. Photos of the set-up of Radiated Emissions



(front view, 1GHz – 25GHz)



(rear view, 1GHz – 25GHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

A2. Photos of External Configuration



External Configuration 1



External Configuration 2

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

A2. Photos of External Configuration



External Configuration 3



External Configuration 4

Tested by:

Handwritten signature of Mr. LEUNG Shu-kan, Ken.

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Handwritten signature of Mr. WONG Lap-pong, Andrew.

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

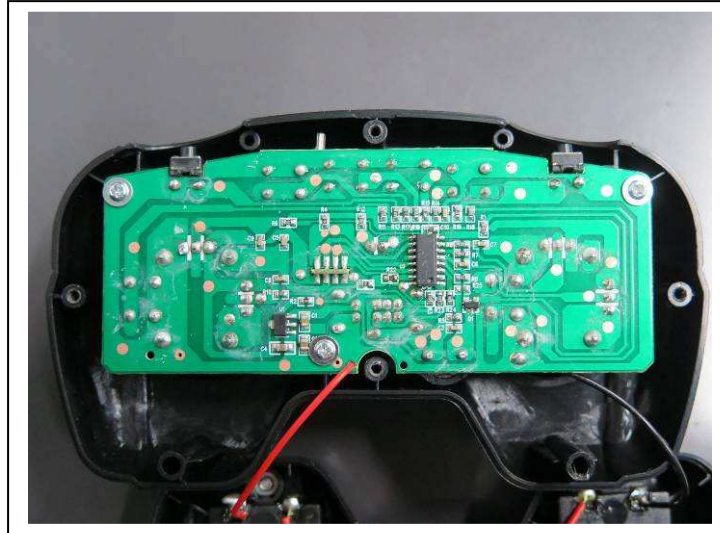
廠商會檢定中心

TEST REPORT

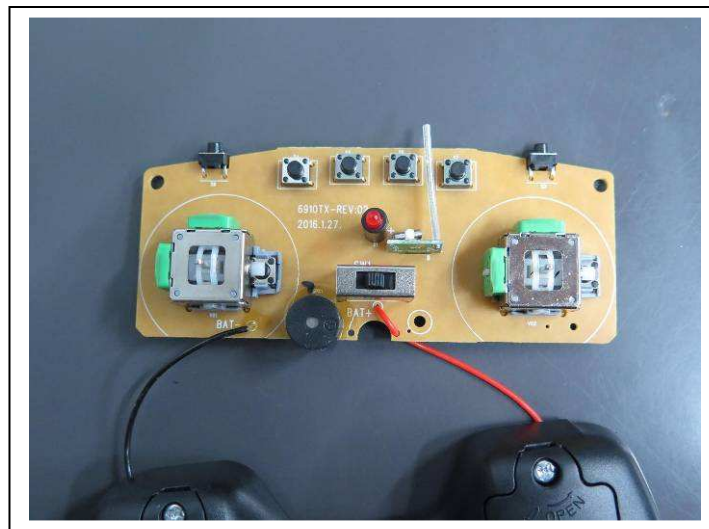
Report No. : AU0021371(3)

Date : 15 Apr 2016

A3. Photos of Internal Configuration



Internal Configuration 1



Internal Configuration 2

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

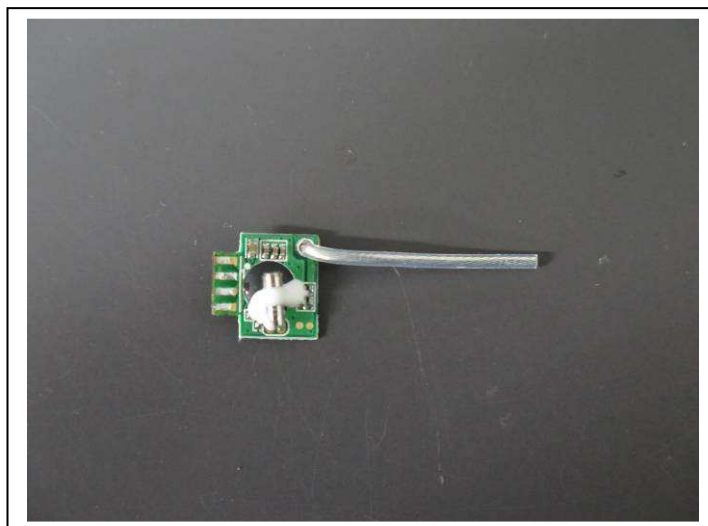
廠商會檢定中心

TEST REPORT

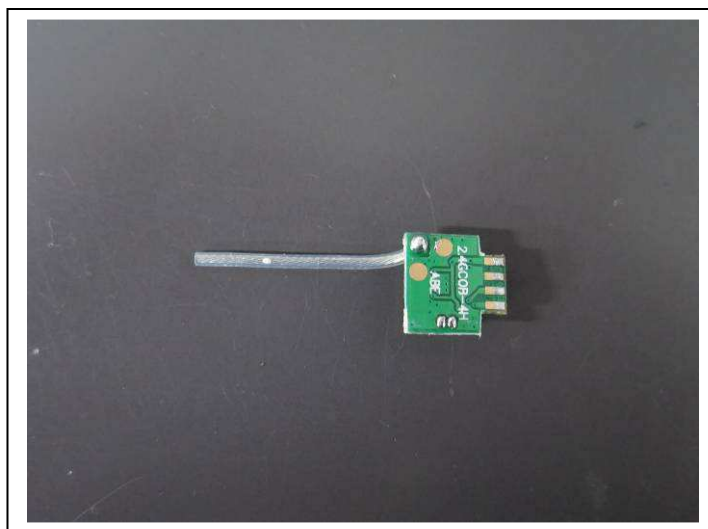
Report No. : AU0021371(3)

Date : 15 Apr 2016

A3. Photos of Internal Configuration



Internal Configuration 3



Internal Configuration 4

Tested by:

Handwritten signature of Mr. LEUNG Shu-kan, Ken.

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Handwritten signature of Mr. WONG Lap-pong, Andrew.

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

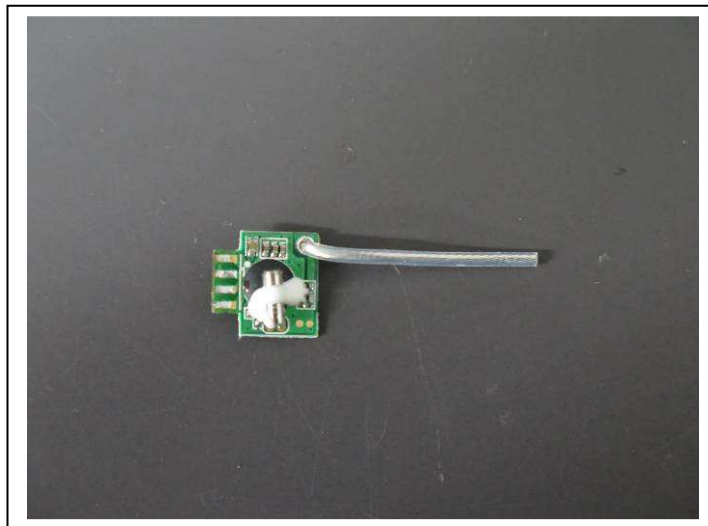
廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

A4. EUT Antenna



Tested by:

A handwritten signature in black ink, appearing to read 'Ken'.

Mr. LEUNG Shu-kan, Ken

Reviewed by:

A handwritten signature in black ink, appearing to read 'AP'.

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

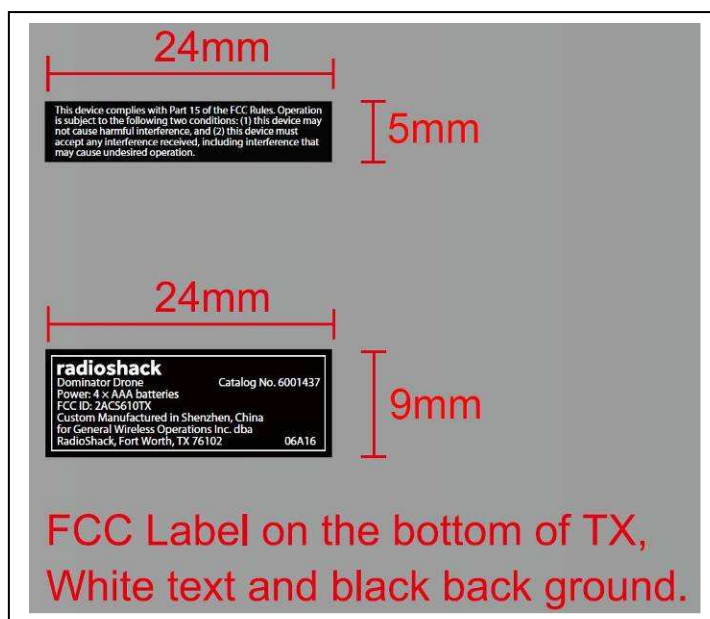
Report No. : AU0021371(3)

Date : 15 Apr 2016

A5. ID Label/Location



ID Label 1



ID Label 2

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

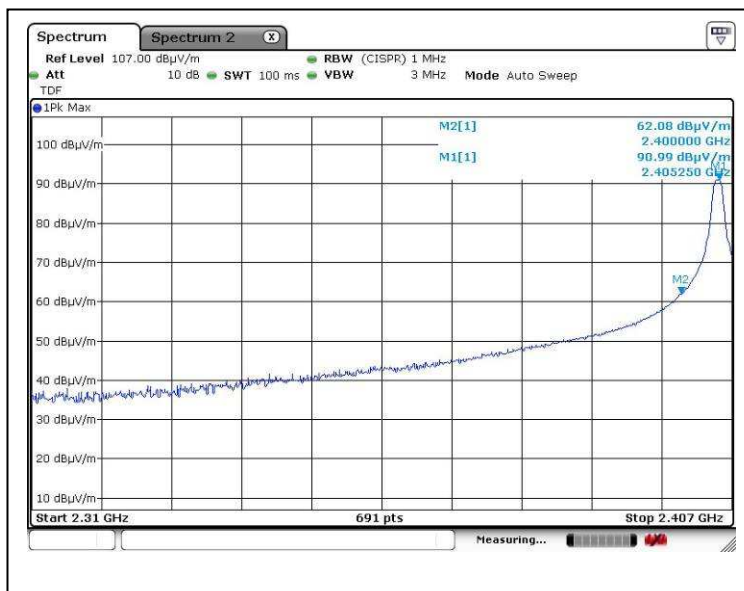
廠商會檢定中心

TEST REPORT

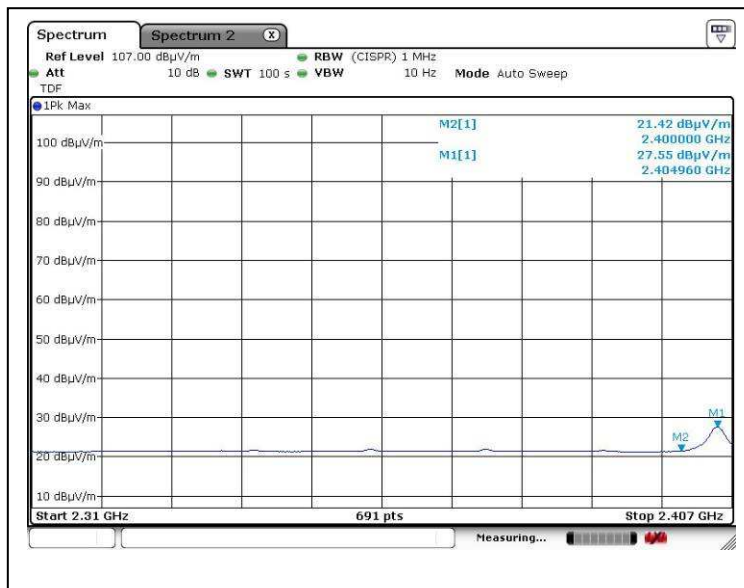
Report No. : AU0021371(3)

Date : 15 Apr 2016

A6. Band Edge



Lower edge (Peak measurement)



Lower edge (Average measurement)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

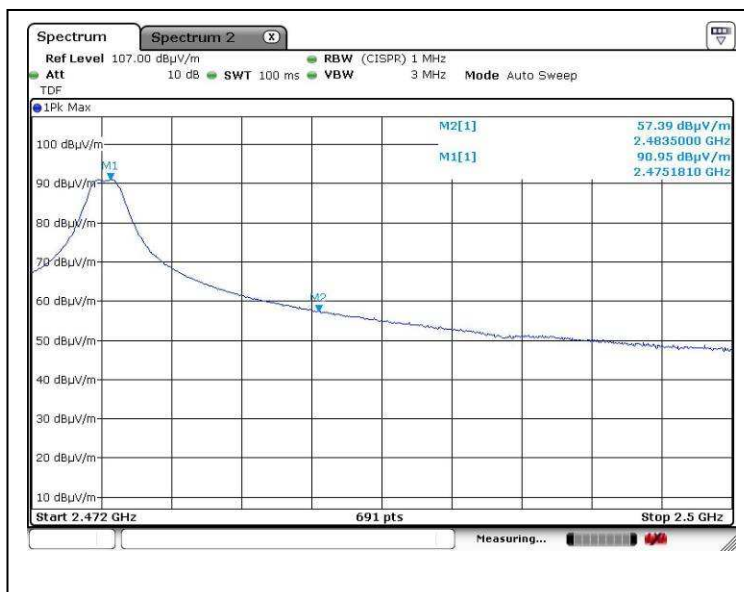
廠商會檢定中心

TEST REPORT

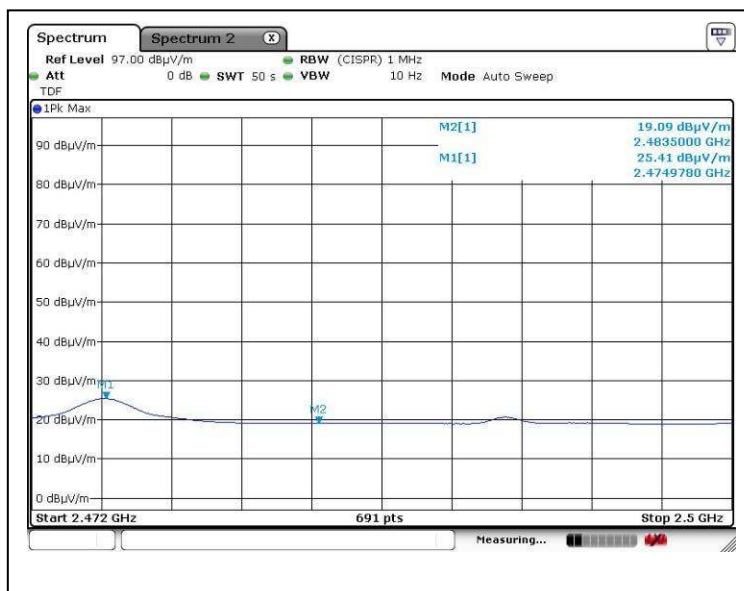
Report No. : AU0021371(3)

Date : 15 Apr 2016

A6. Band Edge



Upper edge (Peak measurement)



Upper edge (Average measurement)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

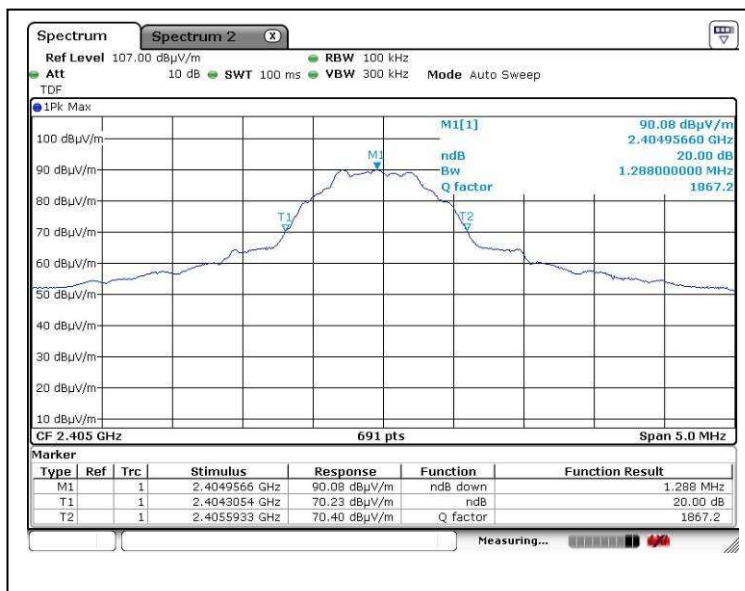
廠商會檢定中心

TEST REPORT

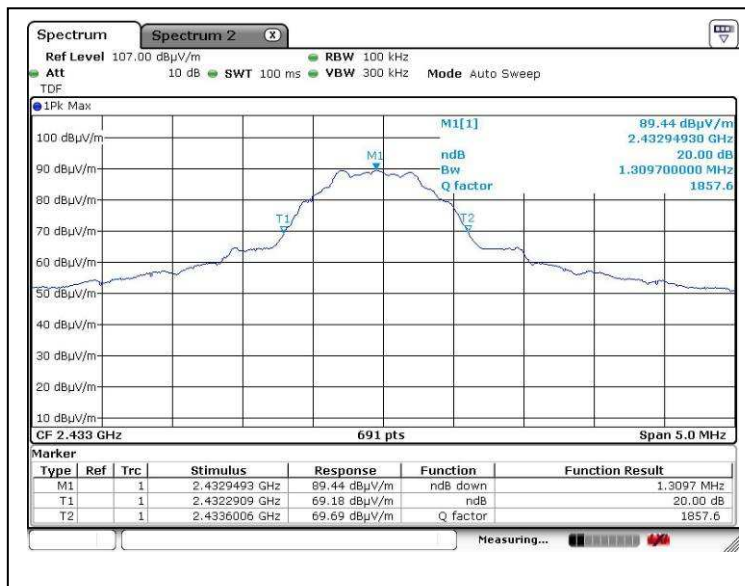
Report No. : AU0021371(3)

Date : 15 Apr 2016

A7. 20dB Bandwidth Plot



Bandwidth 1 (2405MHz)



Bandwidth 2 (2433MHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

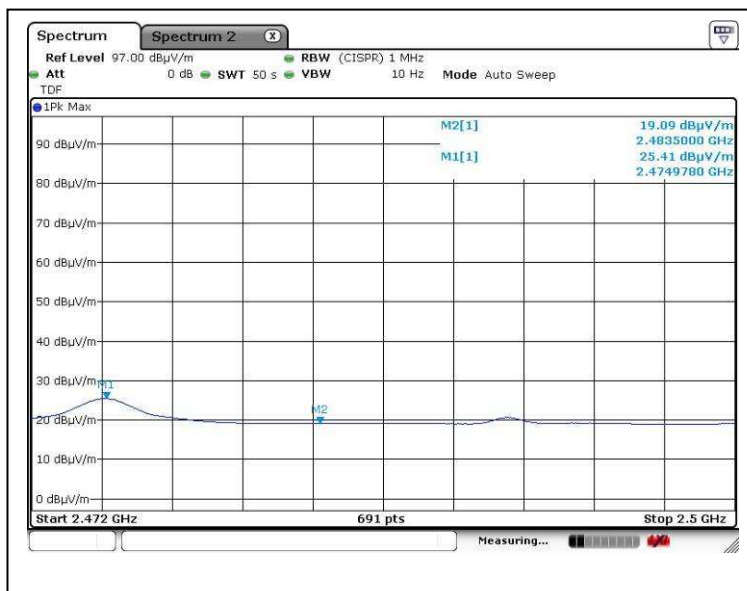
廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

A7. 20dB Bandwidth Plot



Bandwidth 3 (2475MHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



CMA Testing and Certification Laboratories

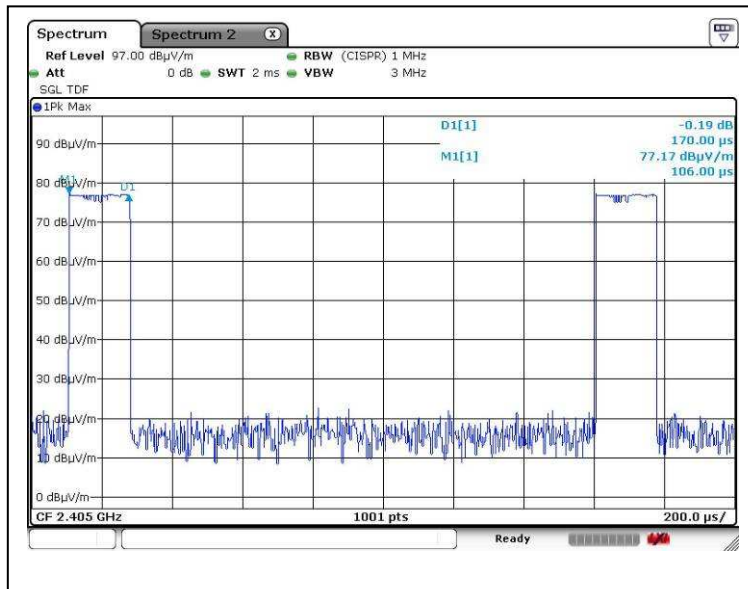
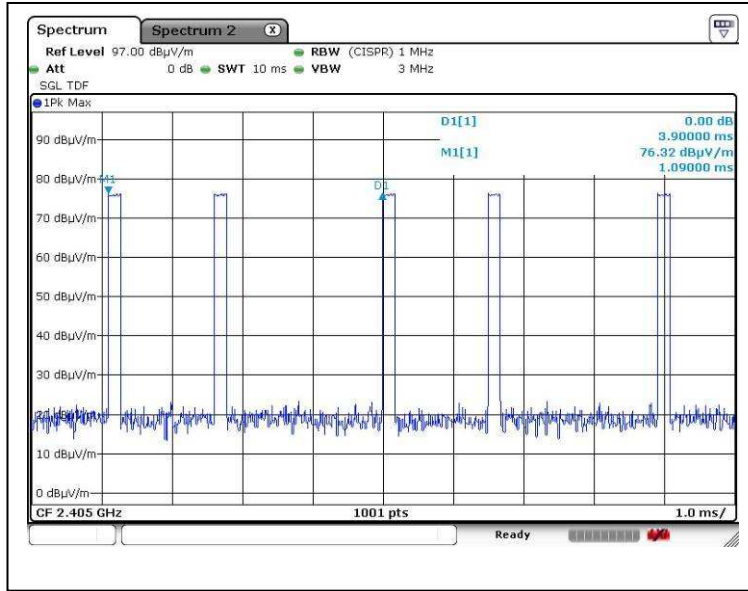
廠商會檢定中心

TEST REPORT

Report No. : AU0021371(3)

Date : 15 Apr 2016

A8. Duty Cycle Plot



***** End of Report *****

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew