



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AT0039652(3) Date : 30 Jan 2015

Application No. : LS025878(8)

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 Helicopter of 8.75" Drone
of Model No. 6001352 and 6001360
Sample registration No. : RS031557-001, RS035181-001
Radio Frequency : 2402MHz – 2475 MHz Transceiver
Rating : 3.7V rechargeable battery
No. of submitted sample : Six (6) set (s)

Date Received : 31 Dec 2014, 22 Jan 2015

Test Period : 12 Jan 2015 to 30 Jan 2015.

Test Requested : FCC Part 15 Certificate

Test Method : 47 CFR Part 15 (10-1-12 Edition)
ANSI C63.4 – 2009

Test Engineer : Mr. LEUNG Shu-kan, Ken


Test Result : See attached sheet(s) from page 2 to 34.

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

Remark : All two models are the same in circuitry and components; and therefore model
6001352 was chosen to be the representative of the test sample. The difference
between the tested model and the declared model(s) is/are the Model no. and Color

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

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FCC ID: 2ACS63RX



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1 General Information

1.1 General Description

The equipment under test (EUT) is a receiver for helicopter. The EUT is power by 3.7V rechargeable battery. It operates at 2402MHz – 2475 MHz. When the receiver receives radio signal from transmitter, it will take corresponding actions.

The brief circuit description is listed as follows:

- U1, U2 and its associated circuit act as MCU
- U3 and its associated circuit act as RF circuit
- Y1 and its associated circuit act as oscillator
- LED1, LED2, LED3, LED4, LED5, LED6, LED7, LED8, LED9, LED10 and its associated circuit act as LED
- M1, M2, M3, M4 and its associated circuit act as motor



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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 C63.4 – 2009. 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 C63.4 – 2009. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
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1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	R&S	ESCI	100152	28 Aug 2015	1 Year
Spectrum Analyzer	R&S	FSV40	100628	02 Feb 2016	1 Year
Broadband Antenna	Schaffner	CBL6112B	2698	19 Feb 2016	2 Years
Loop Antenna	EMCO	6502	00056620	28 Oct 2015	2 Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2016	2 Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	24 Nov 2016	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	18 Jun 2017	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	17 Jun 2017	2 Years
LISN	R&S	ENV216	101232	13 Nov 2015	1 Year
Coaxial Cable	Schaffner	RG 213/U	N/A	19 Feb 2016	1 Years
Coaxial Cable	Suhner	RG 214/U	N/A	19 Feb 2016	1 Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	24 Nov 2016	2 Years
EMI Test Receiver	R&S	ESCI	100152	28 Aug 2015	1 Year

Support equipment:

Adaptor

Model: A1299

Supply by CMA



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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)	4.63dB
30MHz ~ 200MHz (Vertical)	4.65dB
200MHz ~1000MHz (Horizontal)	4.45dB
200MHz ~1000MHz (Vertical)	4.41dB

Conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz~30MHz	2.47dB



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2 Description of the radiated emission test

2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009.

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. 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.



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2.2 Test Result

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 meet the FCC requirement.



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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:	29	°C
Relative humidity:	61	%

Measurement: Peak RBW: 1MHz VBW: 3MHz

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)
2401.788	H	92.0	- 4.1	87.9	114.0	- 26.1
#4756.978	V	60.3	3.8	64.1	74.0	- 9.9
#4757.130	H	55.6	3.8	59.4	74.0	- 14.6
7205.375	V	43.1	11.7	54.8	74.0	- 19.2
2432.816	H	89.8	- 4.1	85.7	114.0	- 28.3
#4867.289	H	61.4	3.8	65.2	74.0	- 8.8
#4867.507	V	59.3	3.8	63.1	74.0	- 10.9
#7298.810	H	40.3	11.7	52.0	74.0	- 22.0
2474.905	V	87.1	- 4.3	82.8	114.0	- 31.2
#4949.833	H	61.2	4.1	65.3	74.0	- 8.7
#4949.817	V	61.9	4.1	66.0	74.0	- 8.0
#7424.816	H	43.4	11.7	55.1	74.0	- 18.9

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



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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:	29	°C
Relative humidity:	61	%

Measurement: Average RBW: 1MHz VBW: 10Hz

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)
2401.759	H	52.0	- 4.1	47.9	94.0	- 46.1
#4803.576	V	38.2	3.8	42.0	54.0	- 12.0
#4803.556	H	37.1	3.8	40.9	54.0	- 13.1
7205.371	V	29.1	11.7	40.8	54.0	- 13.2

2432.959	H	51.0	- 4.1	46.9	94.0	- 47.1
#4867.442	V	23.2	3.8	27.0	54.0	- 27.0
#4867.525	H	23.5	3.8	27.3	54.0	- 26.7
#7298.814	H	26.7	11.7	38.4	54.0	- 15.6

2474.988	V	49.3	- 4.3	45.0	94.0	- 49.0
#4949.865	H	39.1	4.1	43.2	54.0	- 10.8
#4949.867	V	40.0	4.1	44.1	54.0	- 9.9
#7424.858	H	28.8	11.7	40.5	54.0	- 13.5

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



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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:	20	° C
Relative humidity:	60	%

Detector: Quasi-peak

Mode: Transmission

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
66.673	H	6.8	7.5	14.3	40.0	- 25.7
99.992	H	8.6	10.4	19.0	43.5	- 24.5
130.576	H	7.7	13.7	21.4	43.5	- 22.1
175.760	H	5.9	12.2	18.1	43.5	- 25.4
244.354	H	9.3	12.1	21.4	46.0	- 24.6
298.848	H	8.8	14.7	23.5	46.0	- 22.5
341.161	H	9.9	15.5	25.4	46.0	- 20.6

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



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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:	20	° C
Relative humidity:	60	%

Detector: Quasi-peak

Mode: Charging

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
84.294	H	6.9	8.8	15.7	40.0	- 24.3
133.464	H	7.7	13.8	21.5	43.5	- 22.0
176.701	H	5.9	12.1	18.0	43.5	- 25.5
233.674	H	7.5	12.7	20.2	46.0	- 25.8
270.702	H	10.0	12.7	22.7	46.0	- 23.3
318.589	H	7.8	16.5	24.3	46.0	- 21.7
391.029	H	11.4	16.5	27.9	46.0	- 18.1

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



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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 C63.4 – 2009. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

The EUT is connected to adaptor.

It was found that the EUT met the FCC requirement.

3.3 Graph and Table of Conducted Emission Measurement Data

For electronic filling, the document is saved with filename TestRpt2.pdf.



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4 Photograph

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

For electronic filing, the photos are saved with filename 2ACS63RX TSup.pdf.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename 2ACS63RX ExPho.pdf and 2ACS63RX InPho.pdf.



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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 TestRpt3.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 TestRpt4.pdf shows the band edge is fulfil 15.209 requirement.



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6 Appendices

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A2	Photos of the set-up of Conducted Emissions	2	pages
A3	Photos of External Configurations	2	pages
A4	Photos of Internal Configurations	2	pages
A5	ID Label/Location	1	page
A6	Conducted Emission Measurement Data	3	pages
A7	Band Edge	2	pages
A8	20dB Bandwidth Plot	2	pages



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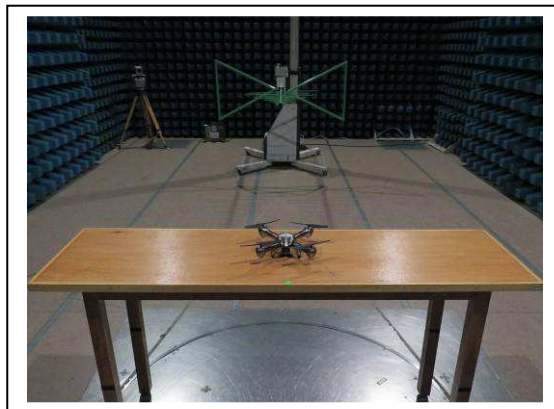
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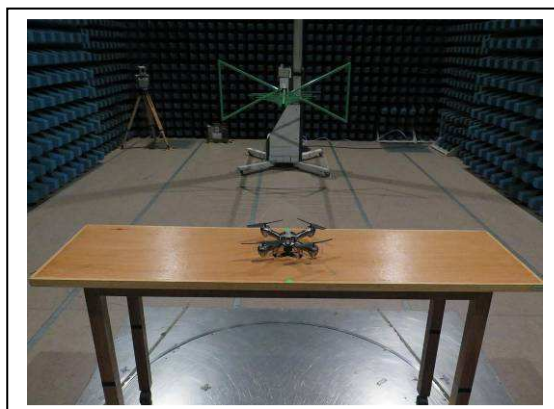
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A1. Photos of the set-up of Radiated Emissions



(Front view, 30MHz – 1GHz)



(Back view, 30MHz – 1GHz)



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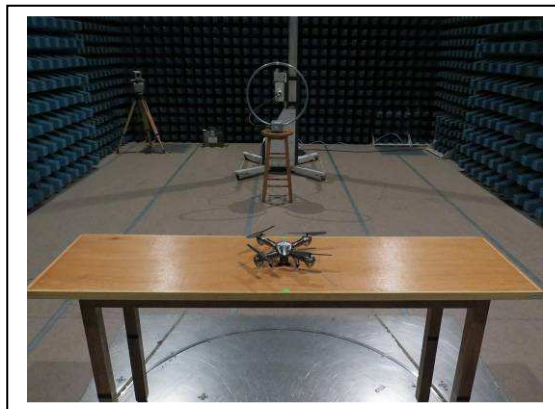
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A1. Photos of the set-up of Radiated Emissions



(Front view, 9KHz – 30MHz)



(Back view, 9KHz – 30MHz)



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A1. Photos of the set-up of Radiated Emissions



(front view, 1GHz – 25GHz)



(rear view, 1GHz – 25GHz)



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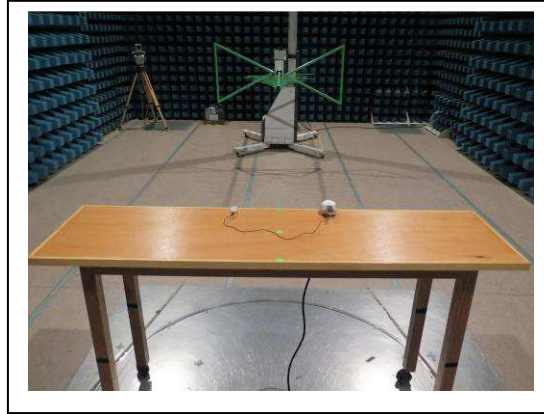
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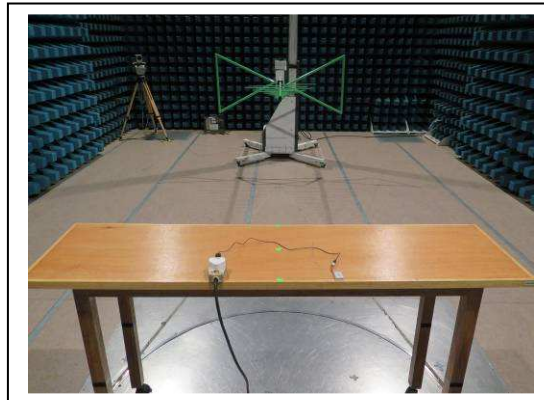
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A1. Photos of the set-up of Radiated Emissions



(front view, charging)



(rear view, charging)



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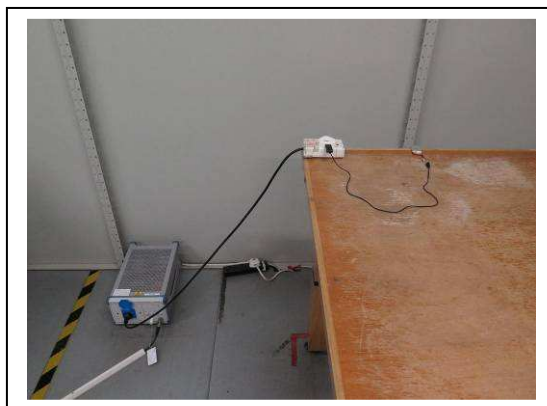
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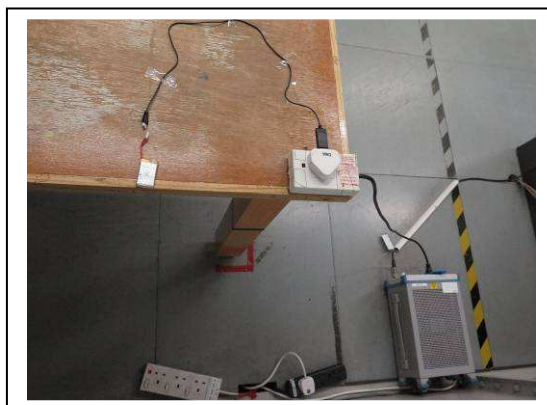
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A2 Photos of the set-up of Conducted Emission



(front view)



(rear view)



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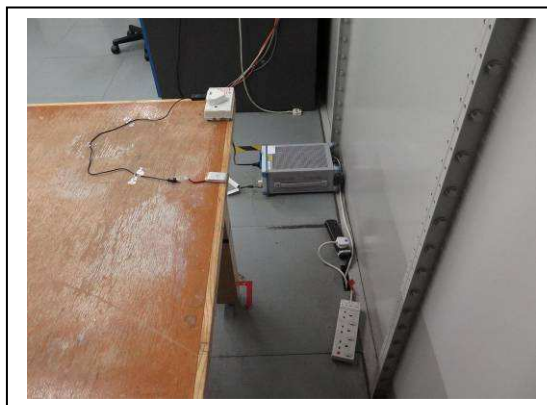
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A2 Photos of the set-up of Conducted Emission



(side view)



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A3. Photos of External Configuration



External Configuration 1



External Configuration 2



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A3. Photos of External Configuration



External Configuration 3



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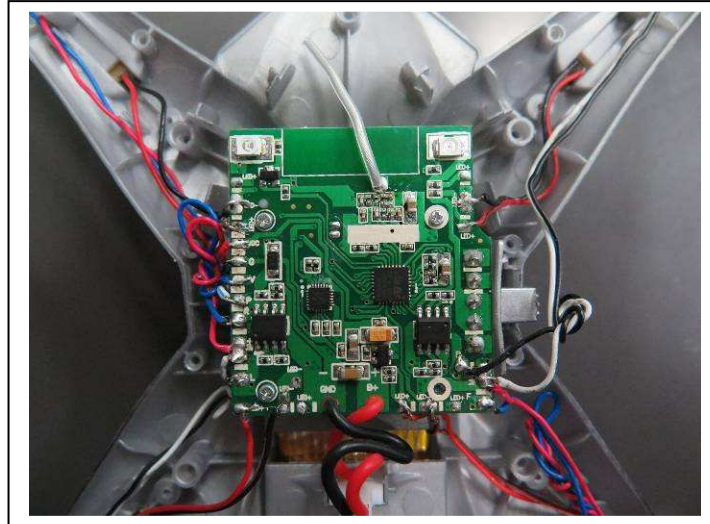
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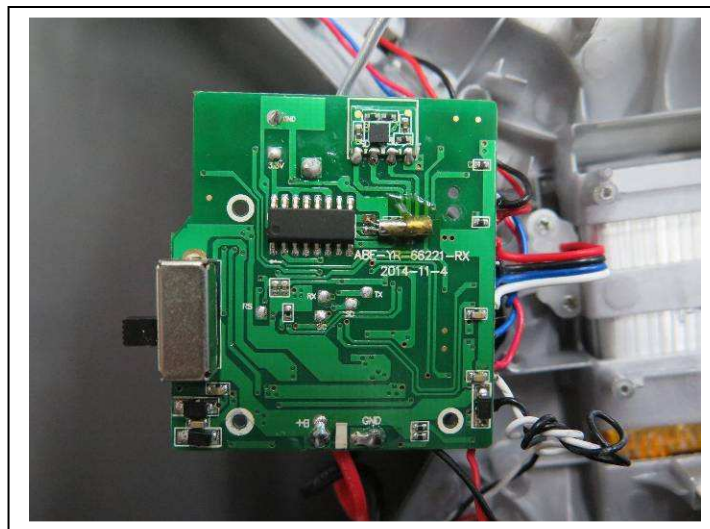
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A4. Photos of Internal Configuration



Internal Configuration 1



Internal Configuration 2



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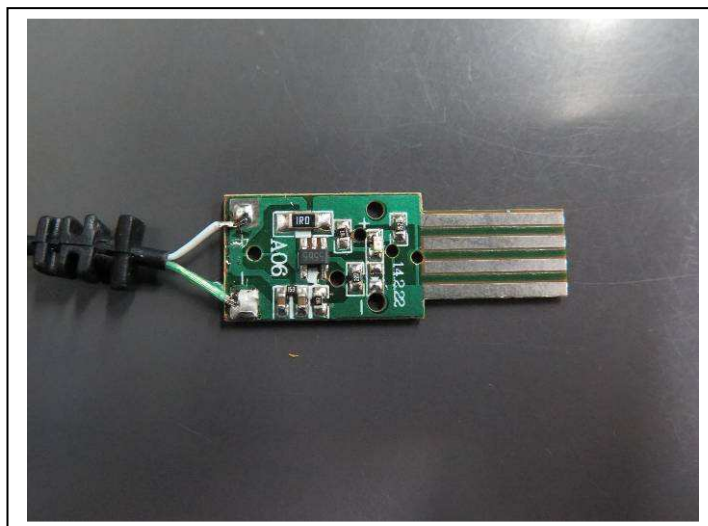
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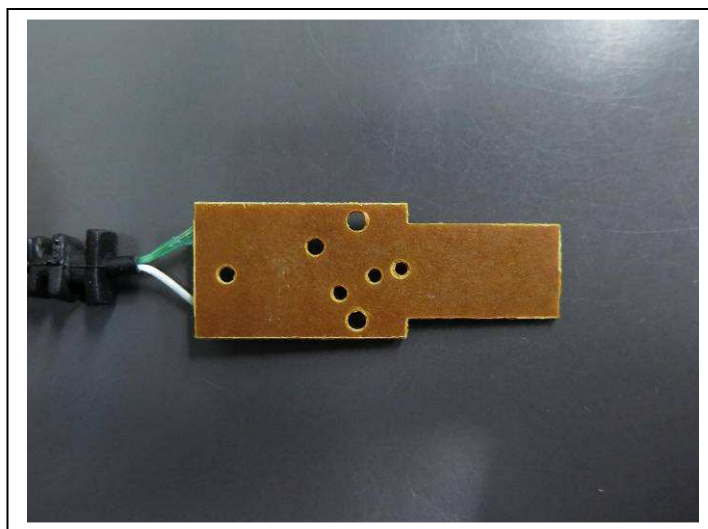
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A4. Photos of Internal Configuration



Internal Configuration 3



Internal Configuration 4



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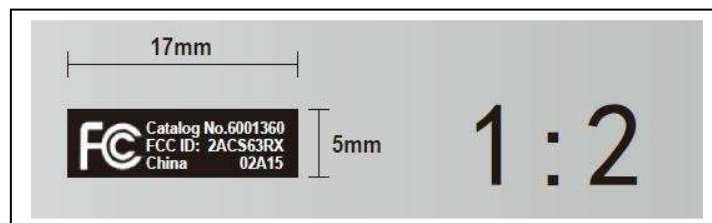
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A5. ID Label/Location



Label 1



Label 2

FCC ID: 2ACS63RX

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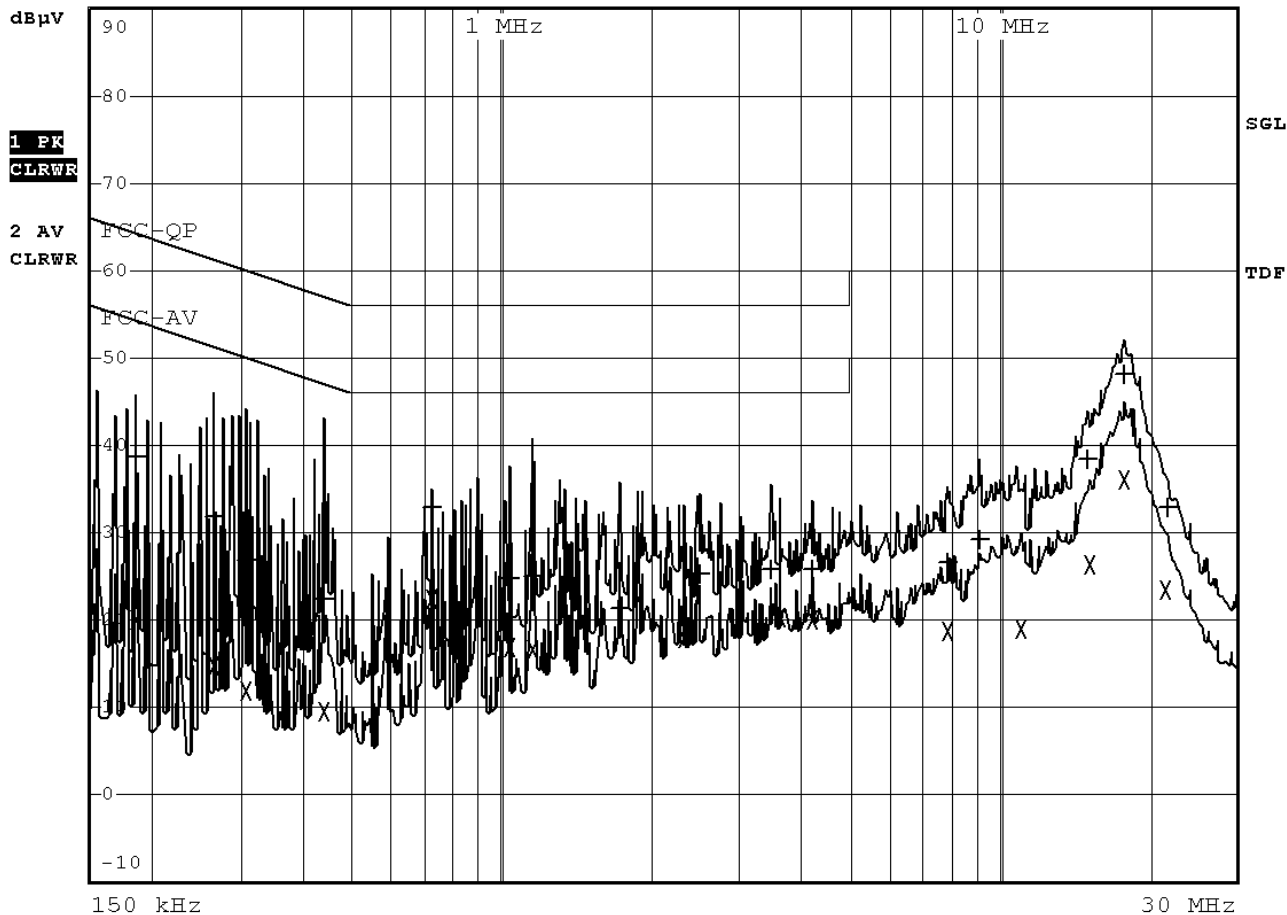
A6 Conducted Emission Measurement Date



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF





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A6 Conducted Emission Measurement Data

EDIT PEAK LIST (Final Measurement Results)					
Trace1:		FCC-QP			
Trace2:		FCC-AV			
Trace3:		---			
TRACE	FREQUENCY	LEVEL dB μ V		DELTA LIMIT dB	
1 Quasi Peak	186 kHz	38.72	N gnd	-25.49	
2 Average	186 kHz	20.09	N gnd	-34.12	
1 Quasi Peak	267 kHz	31.98	N gnd	-29.22	
2 Average	267 kHz	14.92	N gnd	-36.28	
1 Quasi Peak	307.5 kHz	26.81	N gnd	-33.22	
2 Average	307.5 kHz	11.87	N gnd	-38.16	
1 Quasi Peak	442.5 kHz	22.32	N gnd	-34.68	
2 Average	442.5 kHz	9.45	N gnd	-37.55	
1 Quasi Peak	725 kHz	32.92	N gnd	-23.07	
2 Average	725 kHz	22.47	N gnd	-23.52	
1 Quasi Peak	1.0355 MHz	24.88	N gnd	-31.11	
2 Average	1.0355 MHz	16.95	N gnd	-29.04	
1 Quasi Peak	1.157 MHz	25.05	N gnd	-30.94	
2 Average	1.157 MHz	16.75	N gnd	-29.24	
1 Quasi Peak	1.733 MHz	21.29	N gnd	-34.70	
2 Average	1.877 MHz	22.42	N gnd	-23.57	
2 Average	2.327 MHz	17.84	N gnd	-28.15	
1 Quasi Peak	2.516 MHz	25.40	L1 gnd	-30.59	
1 Quasi Peak	3.4745 MHz	25.84	N gnd	-30.15	
2 Average	3.641 MHz	20.42	N gnd	-25.57	



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A6 Conducted Emission Measurement Date

EDIT PEAK LIST (Final Measurement Results)					
Trace1:		FCC-QP			
Trace2:		FCC-AV			
Trace3:		---			
TRACE	FREQUENCY	LEVEL dB μ V		DELTA LIMIT dB	
1 Quasi Peak	4.226 MHz	25.94	N gnd	-30.06	
2 Average	4.226 MHz	19.96	N gnd	-26.03	
1 Quasi Peak	7.952 MHz	26.74	N gnd	-33.25	
2 Average	7.952 MHz	18.69	N gnd	-31.30	
1 Quasi Peak	9.1355 MHz	29.17	N gnd	-30.82	
2 Average	11.0705 MHz	18.98	L1 gnd	-31.01	
1 Quasi Peak	15.0485 MHz	38.30	N gnd	-21.69	
2 Average	15.152 MHz	26.37	L1 gnd	-23.62	
2 Average	17.753 MHz	36.11	N gnd	-13.88	
1 Quasi Peak	17.915 MHz	48.13	N gnd	-11.86	
2 Average	21.6725 MHz	23.52	N gnd	-26.47	
1 Quasi Peak	21.938 MHz	32.98	N gnd	-27.01	



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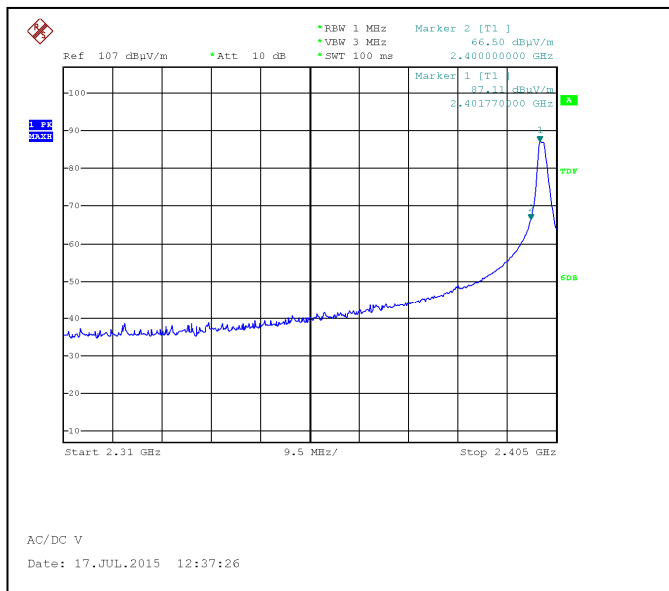
廠商會檢定中心

TEST REPORT

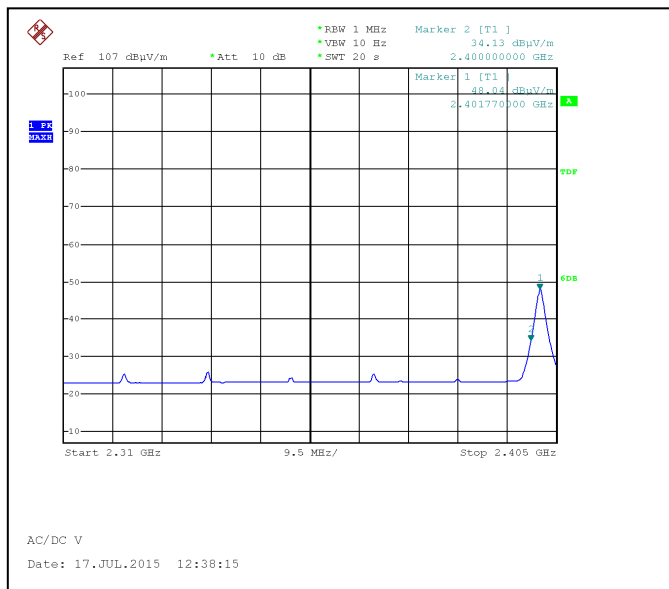
Report No. : AT0039652(3)

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A7. Band Edge



Lower edge (Peak measurement)



Lower edge (Average measurement)



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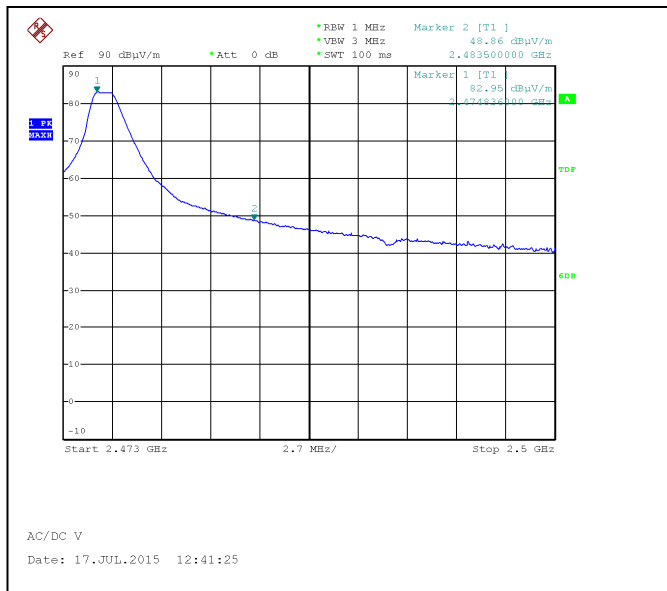
廠商會檢定中心

TEST REPORT

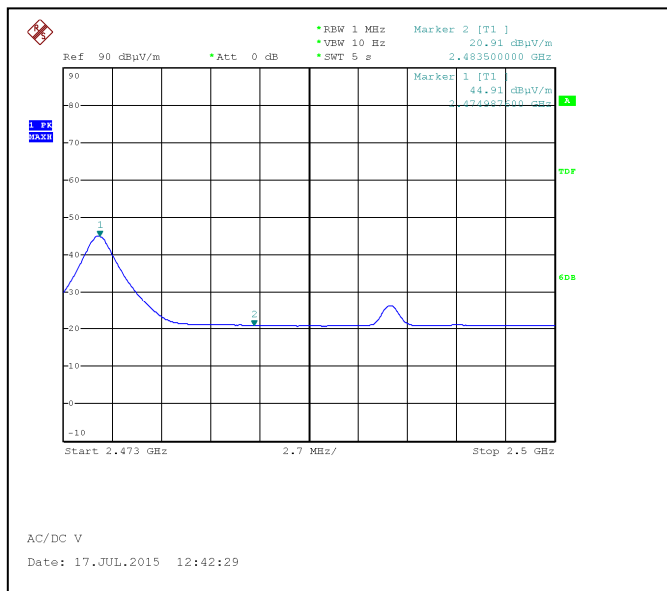
Report No. : AT0039652(3)

Date : 30 Jan 2015

A7. Band Edge



Upper edge (Peak measurement)



Upper edge (Average measurement)



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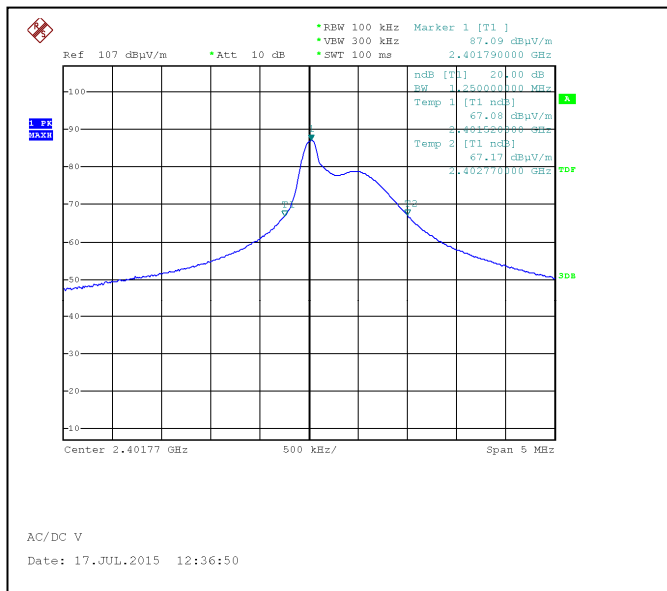
廠商會檢定中心

TEST REPORT

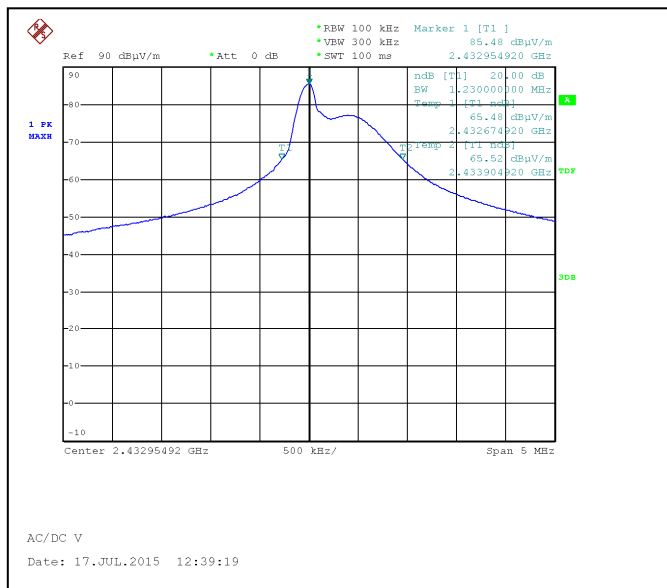
Report No. : AT0039652(3)

Date : 30 Jan 2015

A8. 20dB Bandwidth Plot



Bandwidth 1 (2402MHz)



Bandwidth 2 (2433MHz)



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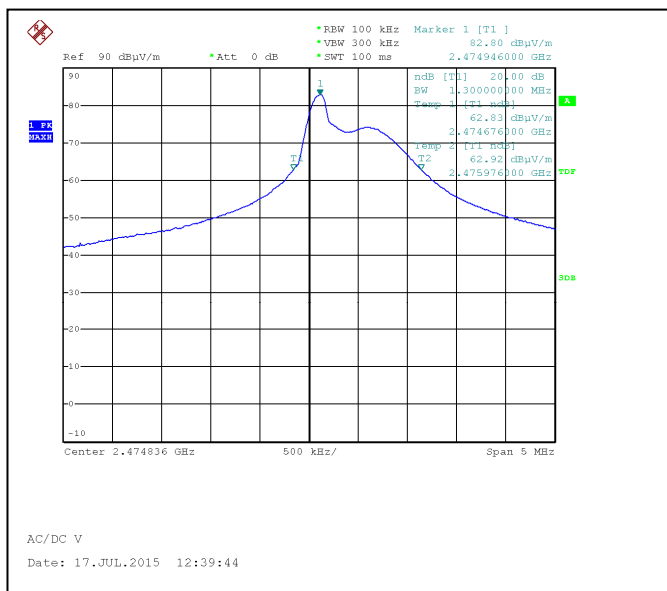
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TEST REPORT

Report No. : AT0039652(3)

Date : 30 Jan 2015

A8. 20dB Bandwidth Plot



Bandwidth 3 (2475MHz)

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

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew