

廠商會檢定中心

## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

Application No. : LS046023(4)

Applicant : Asian Express Holdings Limited

4F,-4, No.669 Jingping Rd., Zhonghe City, TaiPei county 235

Taiwan R.O.C, Taiwan

Client : Asian Express Holdings Limited

Rm804 Sino Centre,582-592 Nathan Road,

Mongkok, Kowloon, Hong Kong.

Sample Description : One(1) item of submitted sample stated to be

 Sample Description
 Model No.

 Sonic Drone HD
 PL-1280 / PL-1281 / PL-1282 / PL-1283 / PL-1284 / PL-1285 / PL-1286 / PL-1287 / PL-1289 / PL-1289

Sample registration No. : RS052000-001

Radio Frequency : 2407MHz – 2472 MHz Transceiver

Rating : 3.7V rechargeable battery

No. of submitted sample : Two (2) piece (s)

Date Received : 01 Dec 2014

Test Period : 02 Dec 2014 to 15 Dec 2014.
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 36.

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

Subpart B and C.

Remark : All ten models are the same in circuitry and components; and therefore model PL-

1280 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.

For and on behalf of

CMA Industrial Development Foundation Limited

Authorized Signature : Mr. WONG Lap-pone Andrew

Manager Electrical Division

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FCC ID: VLEPL1280-R

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#### 1 General Information

### 1.1 General Description

The equipment under test (EUT) is a transceiver for Sonic Drone HD. The EUT is power by 3.7V rechargeable battery. It operates at 2407MHz – 2472MHz. When it switchs on and received radio signal, it will take the corresponding action.

The brief circuit description is listed as follows:

- U4 and its associated circuit act as RF circuit
- U1, U2 and its associated circuit act as MCU
- Y1 and its associated circuit act as oscillator
- IC2, IC3 and its associated circuit act as power regulator
- M1, M2, M3, M4 and its associated circuit act as motor

- M1, M2, M3, M4 and its associated circuit act as motor - D2, D6 and its associated circuit act as LED

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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, Fo Tan, Shatin, New Territories, Hong Kong.

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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	1Year
Spectrum Analyzer	R&S	FSV40	100628	17 Dec 2014	1Year
Broadband Antenna	Schaffner	CBL6112B	2718	06 Jan 2015	1Year
Loop Antenna	EMCO	6502	00056620	28 Oct 2015	1Year
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2016	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	18 Jun 2015	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	24 Nov 2016	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	17 Jun 2015	2Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	24 Nov 2016	2Years
LISN	Rohde & Schwarz	ENV216	101232	13 Nov 2015	1Year
Coaxial Cable	Tyco Electronics	RG58C/U	N/A	13 Nov 2015	1Year

### 1.4 List of supporting equipment

Adaptor: Model: A1299 (Supplied by CMA)

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#### 1.5 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 <sub>lab</sub> )
30MHz ~ 200MHz (Horizontal)	4.63dB
30MHz ~ 200MHz (Vertical)	4.65dB
200MHz ~1000MHz (Horizontal)	4.45dB
200MHz ~1000MHz (Vertical)	4.41dB

#### Conducted emissions

Conducted timestons					
Frequency	Uncertainty (U <sub>lab</sub> )				
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:

ParameterRecorded valueAmbient temperature:23° CRelative humidity:59%

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

Testing frequency range: 9kHz to 25GHz

Channel	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)
	2407.875	V	86.6	- 6.3	80.3	114.0	- 33.7
Low	#4815.592	V	54.2	2.4	56.6	74.0	- 17.4
Low	#4815.656	Н	49.1	2.4	51.5	74.0	- 22.5
	7222.367	Н	38.2	10.8	49.0	74.0	- 25.0
	2451.219	V	87.3	- 6.3	81.0	114.0	- 33.0
M: 141.	#4903.833	Н	50.6	2.4	53.0	74.0	- 21.0
Middle	#4902.468	V	56.7	2.4	59.1	74.0	- 14.9
	#7354.056	V	36.5	10.8	47.3	74.0	- 26.7
	2472.253	V	86.9	- 6.3	80.6	114.0	- 33.4
High	#4944.550	Н	52.4	2.4	54.8	74.0	- 19.2
	#4945.747	V	53.9	2.4	56.3	74.0	- 17.7
	#7417.628	V	36.8	10.8	47.6	74.0	- 26.4

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

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## **TEST REPORT**

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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:

ParameterRecorded valueAmbient temperature:23° CRelative humidity:59%

Detector: Average RBW: 1MHz VBW: 10Hz Operation mode: Transmission

Testing frequency range: 9kHz to 25GHz

Channel	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)
	2407.615	V	27.0	- 6.3	20.7	94.0	- 73.3
Low	#4815.143	V	23.7	2.4	26.1	54.0	- 27.9
Low	#4815.150	Н	22.9	2.4	25.3	54.0	- 28.7
	7227.859	Н	18.8	10.8	29.6	54.0	- 24.4
	2451.580	V	27.7	- 6.3	21.4	94.0	- 72.6
M: 141.	#4903.062	V	23.9	2.4	26.3	54.0	- 27.7
Middle	#4903.088	Н	23.2	2.4	25.6	54.0	- 28.4
	#7359.714	V	18.9	10.8	29.7	54.0	- 24.3
	2472.492	V	28.6	- 6.3	22.3	94.0	- 71.7
High	#4945.013	Н	23.1	2.4	25.5	54.0	- 28.5
	#4945.440	V	23.0	2.4	25.4	54.0	- 28.6
	#7423.460	V	19.1	10.8	29.9	54.0	- 24.1

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:** 

ParameterRecorded valueAmbient temperature:24° CRelative humidity:58%

Detector: Quasi-peak RBW: 120kHz VBW: 300kHz

Testing frequency range: 9kHz to 25GHz Operation mode: Transmission

	5 1 .	- ·		T: 110 1	· · · · ·	3.5
Frequency	Polarity	Reading	Antenna Factor	Field Strength	Limit at 3m	Margin
(MHz)	(H/V)	at 3m	and Cable Loss	at 3m	$(dB\mu V/m)$	(dB)
		(dBµV)	(dB/m)	$(dB\mu V/m)$		
#253.300	Н	20.3	15.4	35.7	46.0	- 10.3
#253.531	V	12.4	15.4	27.8	46.0	- 18.2
288.019	Н	22.7	15.4	38.1	46.0	- 7.9
#407.192	Н	19.0	20.6	39.6	46.0	- 6.4
430.448	Н	17.1	20.6	37.7	46.0	- 8.3
552.071	V	16.5	22.2	38.7	46.0	- 7.3
670.120	V	18.8	22.8	41.6	46.0	- 4.4

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:**

ParameterRecorded valueAmbient temperature:24° CRelative humidity:58%

Detector: Quasi-peak RBW: 120kHz

VBW: 300kHz Operation mode: Receiving

Frequency	Polarity	Reading	Antenna Factor	Field Strength	Limit at 3m	Margin
(MHz)	(H/V)	at 3m	and Cable Loss	at 3m	$(dB\mu V/m)$	(dB)
		(dBµV)	(dB/m)	$(dB\mu V/m)$		
199.011	Н	27.8	11.2	39.0	43.5	- 4.5
235.734	Н	19.5	13.2	32.7	46.0	- 13.3
#275.220	Н	20.5	15.4	35.9	46.0	- 10.1
340.487	Н	16.2	16.8	33.0	46.0	- 13.0
392.311	Н	18.9	16.8	35.7	46.0	- 10.3
591.891	Н	15.8	22.2	38.0	46.0	- 8.0
708.917	V	15.3	23.5	38.8	46.0	- 7.2

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:

ParameterRecorded valueAmbient temperature:24° CRelative humidity:58%

Detector: Quasi-peak RBW: 120kHz

VBW: 300kHz Operation mode: Charging

1 B 11 1 S G G K 1 1	DW. 500kHz Operation mode. Charging						
Frequency	Polarity	Reading	Antenna Factor	Field Strength	Limit at 3m	Margin	
(MHz)	(H/V)	at 3m	and Cable Loss	at 3m	$(dB\mu V/m)$	(dB)	
		(dBµV)	(dB/m)	$(dB\mu V/m)$	-		
65.008	V	13.2	7.6	20.8	40.0	- 19.2	
85.419	Н	10.4	8.5	18.9	40.0	- 21.1	
142.960	Н	9.2	14.1	23.3	43.5	- 20.2	
203.416	Н	9.5	12.0	21.5	43.5	- 22.0	
259.548	Н	9.6	15.4	25.0	46.0	- 21.0	
359.249	Н	11.3	16.8	28.1	46.0	- 17.9	
474.322	Н	10.5	20.6	31.1	46.0	- 24.9	

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 connected to adaptor for charging

It was found that the EUT met the FCC requirement.

### 3.3 Graph and Table of Conducted Emission Measurement Data

For electronic filing, 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 TSup1.jpg to TSup11.jpg.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename ExPho1.jpg to ExPho3.jpg and InPho1.jpg to InPho6.jpg.

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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.

### 5.2 Duty cycle

Not Applicable

### **5.3** Transmission time

Not Applicable

#### **5.4** Power Spectral Density

Not Applicable

### 5.5 Average on time

Not Applicable

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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	3	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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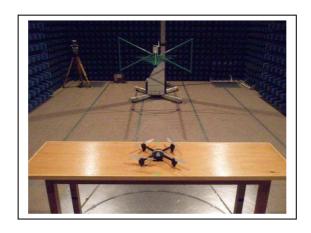


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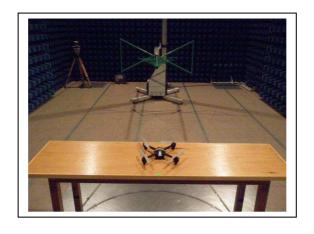
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## A1. Photos of the set-up of Radiated Emissions



(Front view, 30MHz – 1GHz)



(Back view, 30HMz - 1GHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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## **TEST REPORT**

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## 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

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## **TEST REPORT**

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## A1. Photos of the set-up of Radiated Emissions



(Front view, 1GHz – 25GHz)



(Back view, above 1GHz – 25GHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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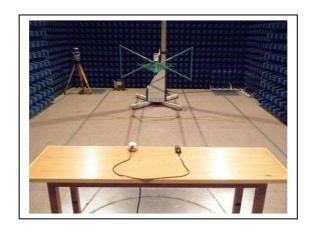


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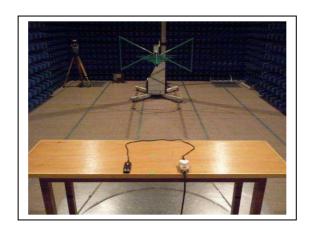
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## A1. Photos of the set-up of Radiated Emissions



(Front view, Charging)



(Back view, Charging)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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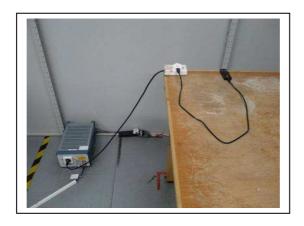


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## A2. Photos of the set-up of Conducted Emission



(front view)



(rear view)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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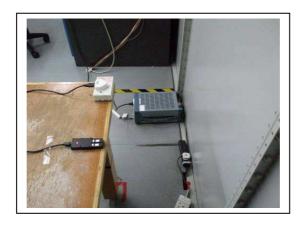


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## A2. Photos of the set-up of Conducted Emission



(side view)

Tested by:

FCC ID: VLEPL1280-R

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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## **TEST REPORT**

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## **A3.** Photos of External Configurations



(External Configuration 1)



(External Configuration 2)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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## **TEST REPORT**

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## A3. Photos of External Configurations



(External Configuration 3)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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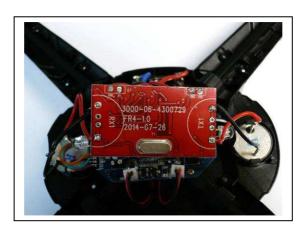


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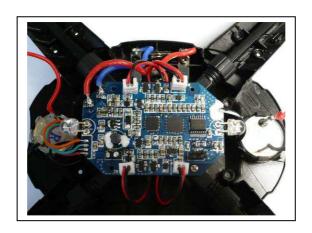
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## **A4.** Photos of Internal Configurations



Internal Configuration 1



**Internal Configuration 2** 

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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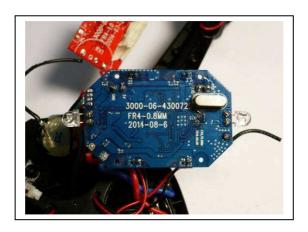


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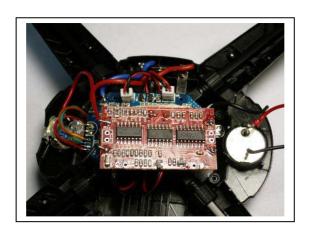
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## **A4.** Photos of Internal Configurations



**Internal Configuration 3** 



Internal Configuration 4

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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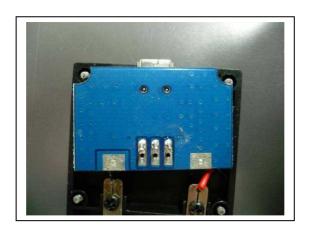
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## **A4.** Photos of Internal Configurations



**Internal Configuration 5** 



Internal Configuration 6

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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### A5. ID Label / Location



ID Label 1

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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### **A6.** Conducted Emission Measurement Date

RBW 9 kHz
MT 1 s
Att 10 dB AUTO PREAMP OFF

dB \( \text{dB} \text{\text{W}} \)

1 PK

GURWR

150 kHz 30 MHz

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

10 MHz

SGL

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廠商會檢定中心

## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

#### A6. Conducted Emission Measurement Date

	EDIT PEAK LIST (Final Measurement Results)							
Tra	cel:	FCC-QP						
Tra	ce2:	FCC-AV						
Tra	ce3:							
	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB				
1	Quasi Peak	150 kHz	41.79 N gnd	-24.20				
2	Average	150 kHz	26.26 N gnd	-29.73				
1	Quasi Peak	262.5 kHz	45.21 N gnd	-16.13				
2	Average	280.5 kHz	34.20 N gnd	-16.59				
1	Quasi Peak	379.5 kHz	35.26 N gnd	-23.02				
2	Average	397.5 kHz	23.10 N gnd	-24.79				
1	Quasi Peak	420 kHz	42.23 N gnd	-15.21				
2	Average	558.5 kHz	28.27 N gnd	-17.72				
2	Average	662 kHz	22.23 N gnd	-23.77				
1	Quasi Peak	774.5 kHz	31.88 N gnd	-24.12				
2	Average	837.5 kHz	26.74 N gnd	-19.25				
1	Quasi Peak	1.0625 MHz	30.32 L1 gnd	-25.67				
1	Quasi Peak	1.3955 MHz	31.19 N gnd	-24.80				
2	Average	1.3955 MHz	23.96 N gnd	-22.03				
1	Quasi Peak	1.7015 MHz	28.81 N gnd	-27.18				
2	Average	1.7015 MHz	22.15 N gnd	-23.84				
2	Average	2.228 MHz	22 <b>.</b> 68 N gnd	-23.31				
1	Quasi Peak	2.588 MHz	26.63 N gnd	-29.36				
1	Quasi Peak	3.155 MHz	26.13 N gnd	-29.86				
2	Average	3.326 MHz	20.71 N gnd	-25.28				

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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廠商會檢定中心

## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

#### **A6** Conducted Emission Measurement Date

EDIT PEAK LIST (Final Measurement Results)				
Trace1: FCC-QP				
Trace2:		FCC-AV		
Trace3:				
	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	4.658 MHz	24.78 N gnd	-31 <b>.</b> 21
2	Average	4.901 MHz	18.49 N gnd	-27 <b>.</b> 50
1	Quasi Peak	7.3895 MHz	25.27 L1 gnd	-34.72
2	Average	7.493 MHz	14.79 N gnd	-35.20
1	Quasi Peak	9.797 MHz	27.73 N gnd	-32 <b>.</b> 27
2	Average	10.6475 MHz	16.75 L1 gnd	-33.24
1	Quasi Peak	15.3185 MHz	34.35 N gnd	-25.64
2	Average	15.44 MHz	21.76 L1 gnd	-28 <b>.</b> 23
2	Average	17.483 MHz	28.51 N gnd	-21.49
1	Quasi Peak	18.1445 MHz	40.36 N gnd	-19.63
1	Quasi Peak	21.6365 MHz	24.64 N gnd	-35.35
2	Average	21.6365 MHz	13.38 N gnd	-36.61

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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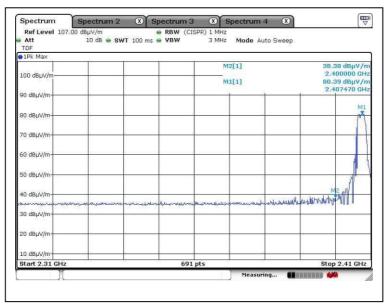


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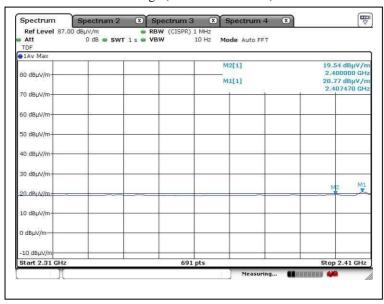
## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

### A7. Band Edge



Lower edge (Peak measurement)



Lower edge (Average measurement)

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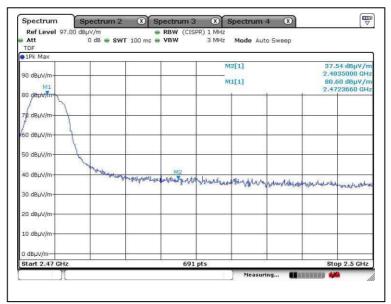


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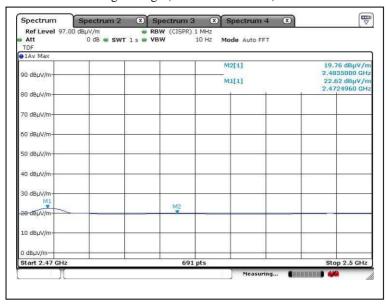
## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

## A7. Band Edge



Higher edge (Peak measurement)



Higher edge (Average measurement)

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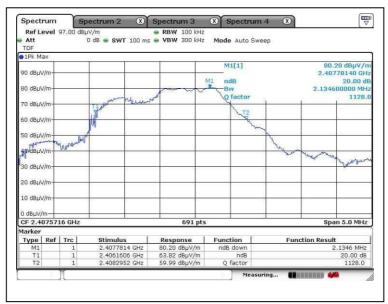


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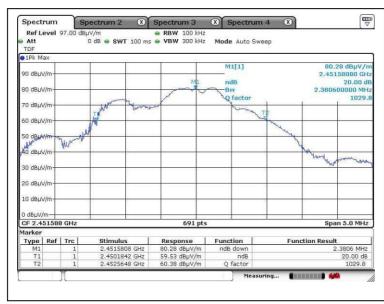
## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

### A8. 20dB Bandwidth Plot



Bandwidth 1 (2407MHz)



Bandwidth 2 (2452MHz)

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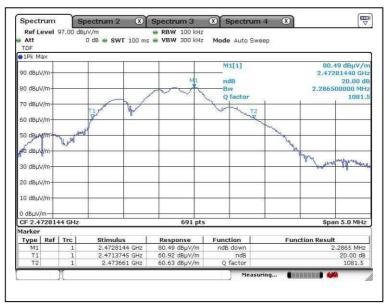


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## **TEST REPORT**

Report No. : AS0076327(3) Date : 23 Dec 2014

### A8. 20dB Bandwidth Plot



Bandwidth 3 (2472MHz)

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

Tested by:

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