



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AU0049859(2) Date : 09 Aug 2016

Application No. : LU001948(0)

Applicant : P.S.L. Limited
8/F, Cheung Lung Ind. Bldg, 10 Cheung Yee Street,
Cheung Sha Wan, Kowloon, Hong Kong

Sample Description : One(1) item of submitted sample stated to be Sound Shell BT of Model No. CM5170A
Sample registration No. : RU017150-001
Radio Frequency : 2402MHz – 2480 MHz Transceiver
Rating : 3.7V rechargeable battery

Date Received : 07 Mar 2016

Test Period : 09 Mar Jun 2016 to 24 Mar 2016.

Test Requested : FCC Part 15 Certificate (15.247), FCC Part 15 Verification Procedure

Test Method : 47 CFR Part 15 (10-1-15 Edition), ANSI C63.4 – 2014, ANSI C63.10 – 2013
FCC Public Notice DA 00-705

Test Engineer : Mr. LEUNG Shu-kan, Ken

Test Result : See attached sheet(s) from page 2 to 58.

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

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FCC ID: 2AD55-CM5170A



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1 General Information

1.1 General Description

The equipment under test (EUT) is a Bluetooth Earphone. The EUT is power by 3.7V rechargeable battery. The EUT receives digital audio signal from other wireless device and playback the audio signal.

For the Bluetooth mode, it supports standard Bluetooth V4.1+EDR or below revision protocol for data synchronization. After paring with other standard Bluetooth device, it can play the music.

A non standardized Bluetooth protocol or other Gaussian frequency-shift keying (GFSK) digital modulation signal was unable to synchronize the Bluetooth speaker.

A Bluetooth trademark was printed on the speaker enclosure to indicate it communicate with Bluetooth protocol only.

Pseudorandom frequency hopping sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF Channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1600 hops/s.

Example of a 79 hopping sequence in data mode: 40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54...

Equal Hopping Frequency Use

All Bluetooth units participating in the piconet are time and hop-synchronized to the channel.

System Receiver Input Bandwidth

The input bandwidth of the receiver is 1 MHz. In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single multisport (packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence.. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.



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Equipment Description

15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply With all of The regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.

15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate it channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

The brief circuit description is listed as follows:

- U2 and its associated circuit act as flash memory
- U1 and its associated circuit act as MCU
- L4, C15, L5, L2, C27 and its associated circuit act as RF circuit
- Y1 and its associated circuit act as oscillator
- J2 and its associated circuit act as mic in
- J5, J6 and its associated circuit act as speaker out

Antenna type : PCB Antenna

Antenna gain : 0dBi

Modulation technique : GFSK

Number of channel : 79 channels



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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 C63.10 – 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,
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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	27 Sep 2016	1Year
Spectrum Analyzer	R&S	FSV40	100628	09 Feb 2017	1Year
Broadband Antenna	Schaffner	CBL6112B	2718	15 Mar 2017	2Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2018	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2016	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	24 Nov 2016	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	02 Aug 2017	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	02 Aug 2017	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	18 May 2017	1Years
Coaxial Cable	Suhner	RG 214/U	N/A	18 May 2017	1Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	13 Dec 2016	1Years
LISN	R&S	ENV216	101323	21 Oct 2016	1Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	01 Nov 2016	1Year

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)	4.83dB
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



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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 C63.10 – 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.



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2.2 Test Result

Summary

Section in FCC part 15	Description	Result
15.205(a), 15.209, 15.247(d)	Transmitter radiated spurious field strength and other emissions	Page 11-13
15.209	Receiver emissions	Page 14
15.209	Voltage disturbance	Page 17, 32-34
15.247 (a)(1), Part 2.1 and DA-00705	Hopping sequence	Page 35, 36
15.247 (a)(1)	20dB bandwidth and 99% bandwidth	Page 37-40
15.247 (a)(1)	Channel Spacing (Frequency separation)	Page 41, 42
15.247 (a)(1)(iii)	Number of hopping frequency	Page 43
15.247 (d)	Band Edge	Page 44-47
15.247 (a)(1)(iii)	Dwell Time (Bluetooth Average On Time)	Page 48-56
15.247 (b)(1)	Maximum Peak output power	Page 10, 57, 58

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 than 20dB below limited were not report. Thus, those higher emissions were presented in next page (section 2.3)

Subpart B:

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.



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2.3 Data of Conducted Emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	26	° C
Relative humidity:	66	%

Measurement: Peak RBW: 1MHz VBW: 3MHz

Frequency (MHz)	Reading (dBm)	Reading (mW)	Limit (mW)	Margin (mW)
2401.866	- 2.96	0.506	1000.0	- 999.494
2440.886	- 3.40	0.457	1000.0	- 999.543
2480.053	- 3.97	0.401	1000.0	- 999.599

Remark:

The EUT is directly connected to spectrum analyzer for measurement



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2.4 Radiated Emission Measurement Data

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	26	° C
Relative humidity:	66	%

Measurement: Peak

RBW: 1MHz

VBW: 3MHz

Testing frequency range: 9kHz to 25GHz

Mode: Transmission

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)
2402.119	H	96.3	- 4.2	92.1	114.0	- 21.9
#4804.339	H	50.7	3.7	54.4	74.0	- 19.6
7206.344	V	45.7	3.7	57.2	74.0	- 16.8
7206.450	H	46.0	11.5	57.5	74.0	- 16.5
2441.179	H	93.5	- 4.2	89.3	114.0	- 24.7
#4882.249	V	48.0	3.7	51.7	74.0	- 22.3
#7322.515	H	48.2	3.7	59.7	74.0	- 14.3
#7323.389	V	47.6	11.5	59.1	74.0	- 14.9
2480.114	H	90.4	- 4.3	86.1	114.0	- 27.9
#4960.154	V	47.5	4.0	51.5	74.0	- 22.5
#7439.535	V	46.0	4.0	57.5	74.0	- 16.5
#7440.294	H	42.7	11.5	54.2	74.0	- 19.8

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



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2.4 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:	26	° C
Relative humidity:	66	%

Measurement: Average

RBW: 1MHz

VBW: 10Hz

Testing frequency range: 9kHz to 25GHz

Mode: Transmission

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)
2401.945	H	81.6	- 4.2	77.4	94.0	- 16.6
#4803.945	H	42.3	3.7	46.0	54.0	- 8.0
7205.910	H	36.3	11.5	47.8	54.0	- 6.2
7205.930	V	35.7	11.5	47.2	54.0	- 6.8
2440.965	H	79.3	- 4.2	75.1	94.0	- 18.9
#4881.940	V	39.7	3.7	43.4	54.0	- 10.6
#7322.910	V	37.4	11.5	48.9	54.0	- 5.1
#7322.915	H	38.3	11.5	49.8	54.0	- 4.2
2479.930	H	76.8	- 4.3	72.5	94.0	- 21.5
#4959.925	V	39.2	4.0	43.2	54.0	- 10.8
#7439.930	V	36.0	11.5	47.5	54.0	- 6.5
#7439.935	H	32.6	11.5	44.1	54.0	- 9.9

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



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2.4 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:	26	° C
Relative humidity:	66	%

Detector: Quasi-peak

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Operation mode: Transmission

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)
75.277	H	10.6	8.0	18.6	40.0	- 21.4
114.504	H	10.1	12.2	22.3	43.5	- 21.2
160.828	H	8.3	11.9	20.2	43.5	- 23.3
214.658	H	8.2	12.0	20.2	43.5	- 23.3
253.337	H	8.5	15.4	23.9	46.0	- 22.1
291.885	H	9.3	15.4	24.7	46.0	- 21.3
321.902	H	8.8	16.8	25.6	46.0	- 20.4

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



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2.4 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:	26	° C
Relative humidity:	66	%

Detector: Quasi-peak

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Operation mode: Receiving

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)
71.044	H	8.0	8.0	16.0	40.0	- 24.0
114.481	H	10.2	12.2	22.4	43.5	- 21.1
164.850	H	8.1	11.9	20.0	43.5	- 23.5
224.258	H	8.9	11.8	20.7	46.0	- 25.3
264.632	H	8.7	15.4	24.1	46.0	- 21.9
289.200	H	9.2	15.4	24.6	46.0	- 21.4
320.475	H	8.8	16.8	25.6	46.0	- 20.4

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



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2.4 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:	26	° C
Relative humidity:	66	%

Detector: Quasi-peak

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Operation mode: Play Music

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)
48.947	H	6.8	12.4	19.2	40.0	- 20.8
83.801	H	8.9	8.8	17.7	40.0	- 22.3
119.955	H	10.3	12.6	22.9	43.5	- 20.6
177.392	H	7.7	12.1	19.8	43.5	- 23.7
233.606	H	9.1	12.7	21.8	46.0	- 24.2
277.692	H	9.4	15.1	24.5	46.0	- 21.5
310.804	H	8.9	16.5	25.4	46.0	- 20.6

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



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2.4 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:	26	° C
Relative humidity:	66	%

Detector: Quasi-peak

RBW: 120kHz

VBW: 300kHz

Testing frequency range: 9kHz to 25GHz

Operation mode: Charging

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)
52.273	H	7.9	10.0	17.9	40.0	- 22.1
94.526	H	8.5	10.8	19.3	43.5	- 24.2
138.734	H	8.9	13.8	22.7	43.5	- 20.8
182.895	H	8.7	11.3	20.0	43.5	- 23.5
227.207	H	9.9	11.3	21.2	46.0	- 24.8
272.401	H	9.3	15.1	24.4	46.0	- 21.6
308.793	H	8.8	16.5	25.3	46.0	- 20.7

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 C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

The EUT connected to an adaptor for charging

3.3 Graph and Table of Conducted Emission Measurement Data

The plots in Appendices A6 show the graph and data of conducted emission.



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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 2AD55-CM5170A TSup.pdf.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename 2AD55-CM5170A ExPho.pdf and 2AD55-CM5170A 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 plots in Appendices A8 and A9 show the 20dB bandwidth and 99% bandwidth:

Frequency Channel (MHz)	20dB bandwidth (kHz)	99% bandwidth (kHz)
2402	1138.9	1033.9
2441	1133.9	1038.9
2480	1138.9	1088.9

The plots in Appendices A10 show the channel spacing has minimum 25 kHz or two-third of 20dB bandwidth of hopping channel.

Frequency (MHz)	Channel spacing (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum bandwidth (kHz)
2402	1001.0	667.3	25
2441	989.0	659.3	25
2480	994.5	663.0	25

The plots in Appendices A11 show the frequency hopping channel over 75 hopping frequency.

The plots in Appendices A12 show the fundamental emission is confined in the specified band. It shows the 20dB bandwidth and band edge meet the 15.247(d) and 15.205 requirement.



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5.2 Hopping sequence

The plots in Appendices A7 show the hopping sequence is pseudorandom randomly distributed. Four example of continuous fundamental frequency hopping pattern was as below:

The 1st example of fundamental frequency = 2.4522600GHz

The 2nd example of fundamental frequency = 2.4061310GHz

The 3rd example of fundamental frequency = 2.4310730GHz

The 4th example of fundamental frequency = 2.4696110GHz

Result:

Fc 1 – Fc 2 = +46.129MHz

Fc 2 – Fc 3 = -24.942MHz

Fc 3 – Fc 4 = -38.538MHz

It was found the hopping pattern is pseudorandom random.



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5.3 Average on time

The plots in Appendices A13 show the average on time for frequency hopping channel is within 0.4 seconds.

The calculation for average on time as below:

Average hopping channel = Number of transmitted carrier / Sweep time

Average on time = Packet on time x Average hopping channel

Dwell time = Average on time x Total frequency hopping channel x 0.4

Test result:

Frequency Channel (MHz)	Packet	Dwell Time (Seconds)	Limit (Seconds)	Margin (Seconds)
2402	DH1	0.135	0.4	- 0.265
2402	DH3	0.265	0.4	- 0.135
2402	DH5	0.315	0.4	- 0.085
2441	DH1	0.135	0.4	- 0.265
2441	DH3	0.265	0.4	- 0.135
2441	DH5	0.315	0.4	- 0.085
2480	DH1	0.135	0.4	- 0.265
2450	DH3	0.265	0.4	- 0.135
2480	DH5	0.315	0.4	- 0.085

5.4 Antenna requirement

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



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6 Appendices

A1	Photos of the set-up of Radiated Emissions	3	pages
A2	Photos of the set-up of Conducted Emissions	1	page
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	Hopping sequence	2	pages
A8	20 dB bandwidth	2	pages
A9	99% bandwidth	2	pages
A10	Bluetooth Channel Spacing	2	pages
A11	Bluetooth Hopping Channel	1	page
A12	Band Edge	4	pages
A13	Bluetooth Average on time	9	pages
A14	Transmission Power	2	pages



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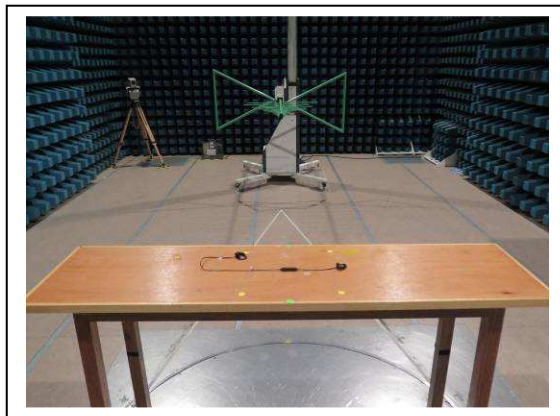
廠商會檢定中心

TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A1. Photos of the set-up of Radiated Emissions



30Hz – 1GHz



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. : AU0049859(2)

Date : 09 Aug 2016

A1. Photos of the set-up of Radiated Emissions



1GHz – 25GHz

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



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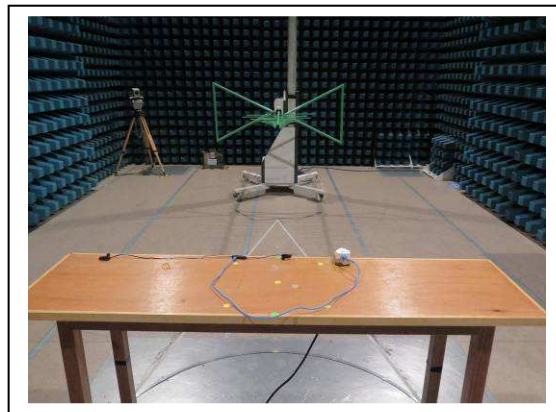
廠商會檢定中心

TEST REPORT

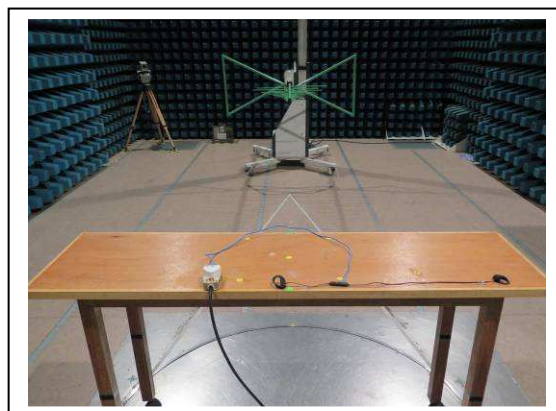
Report No. : AU0049859(2)

Date : 09 Aug 2016

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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TEST REPORT

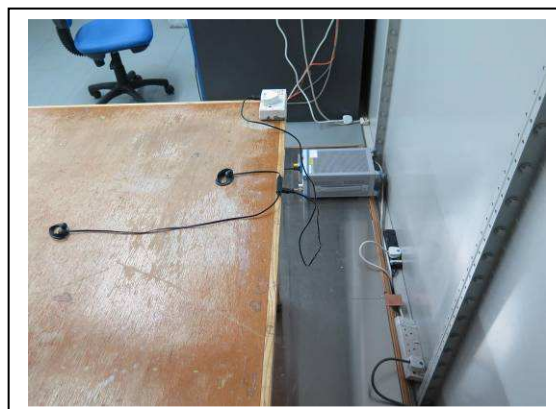
Report No. : AU0049859(2)

Date : 09 Aug 2016

A2. Photos of the set-up of Conducted Emissions



Front view



Side view

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

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

FCC ID: 2AD55-CM5170A

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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

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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TEST REPORT

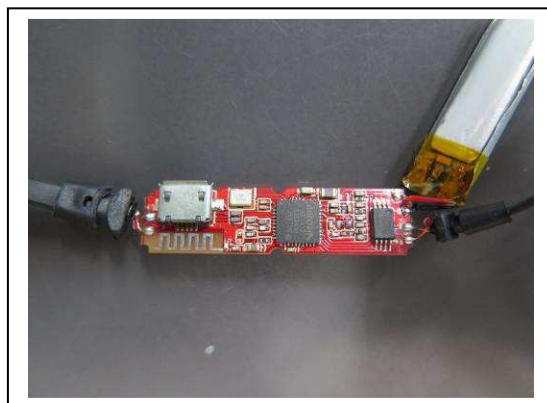
Report No. : AU0049859(2)

Date : 09 Aug 2016

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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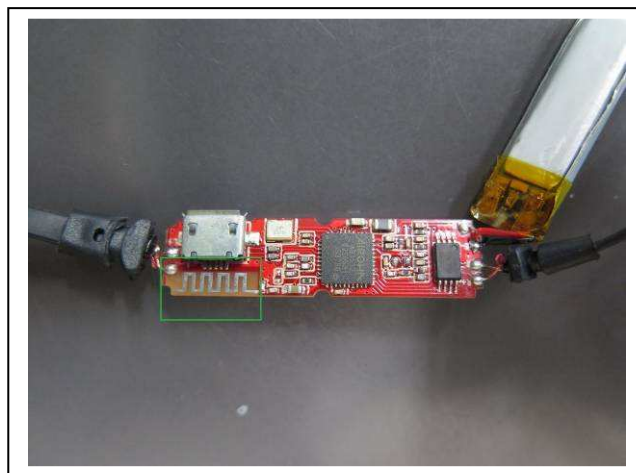
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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A4 Photos of Internal Configurations



EUT Antenna

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



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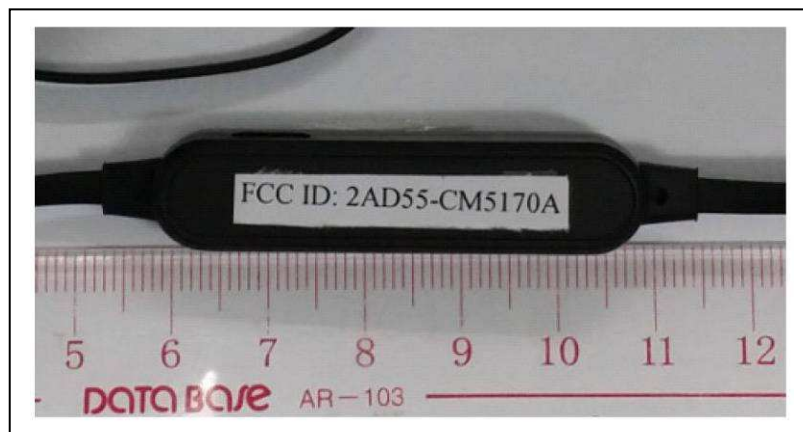
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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A5 ID Label / Location



ID Label 1

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A



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Report No. : AU0049859(2)

Date : 09 Aug 2016

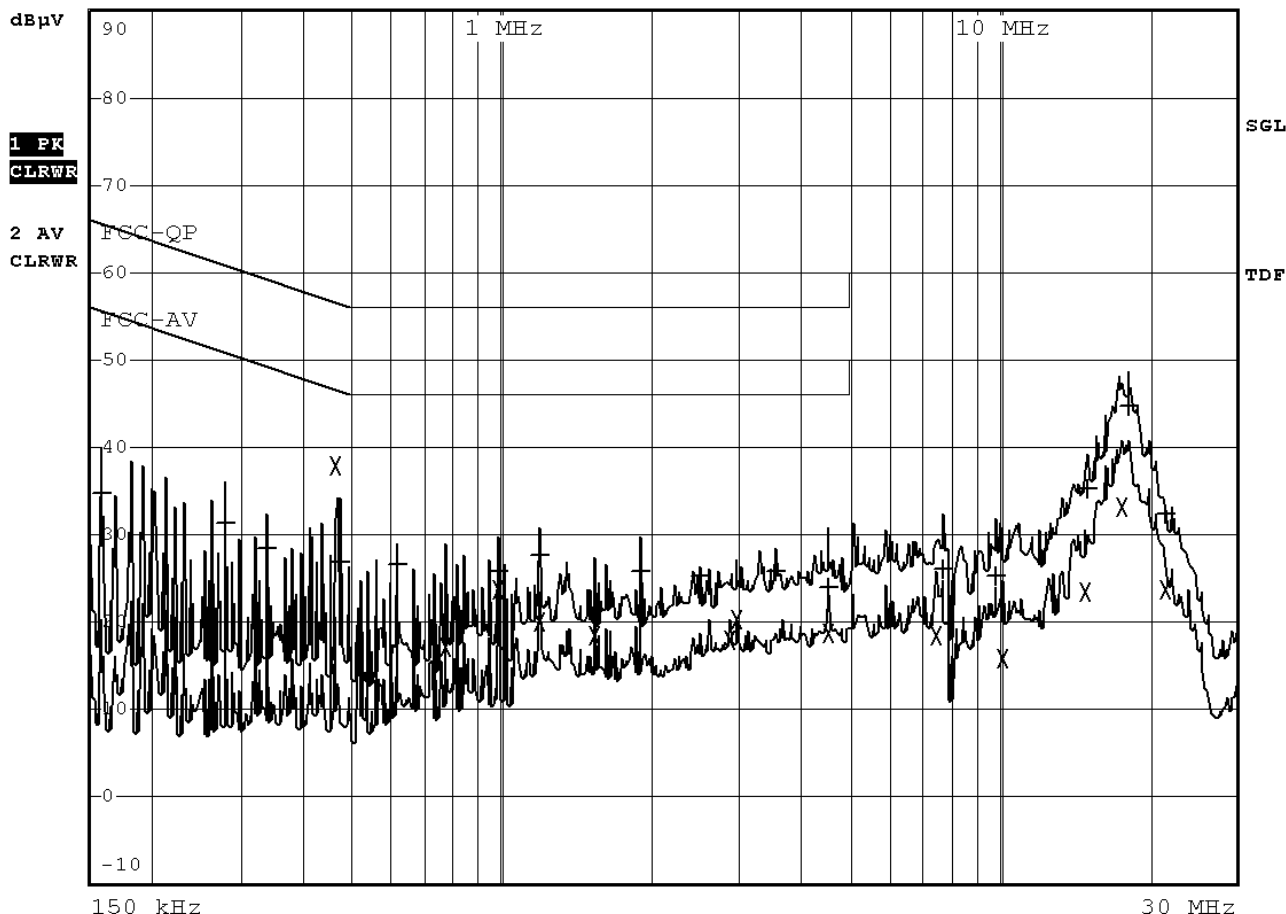
A6 Conducted Emission Measurement Date



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

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	159 kHz	34.68	N gnd	-30.83
1 Quasi Peak	280.5 kHz	31.26	N gnd	-29.54
1 Quasi Peak	339 kHz	28.47	N gnd	-30.75
2 Average	465 kHz	37.85	N gnd	-8.74
1 Quasi Peak	478.5 kHz	26.91	N gnd	-29.45
1 Quasi Peak	617 kHz	26.69	N gnd	-29.30
2 Average	774.5 kHz	17.16	N gnd	-28.83
1 Quasi Peak	981.5 kHz	25.87	N gnd	-30.13
2 Average	981.5 kHz	23.78	N gnd	-22.22
1 Quasi Peak	1.193 MHz	27.57	N gnd	-28.42
2 Average	1.193 MHz	19.96	N gnd	-26.03
2 Average	1.5395 MHz	18.49	N gnd	-27.50
1 Quasi Peak	1.904 MHz	25.72	N gnd	-30.27
1 Quasi Peak	2.5205 MHz	25.27	N gnd	-30.72
2 Average	2.8805 MHz	18.03	N gnd	-27.97
2 Average	2.984 MHz	20.28	N gnd	-25.71
1 Quasi Peak	3.5555 MHz	25.71	N gnd	-30.28
1 Quasi Peak	4.523 MHz	24.11	L1 gnd	-31.88
2 Average	4.523 MHz	18.68	N gnd	-27.31
2 Average	7.4615 MHz	18.36	L1 gnd	-31.63

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. : AU0049859(2)

Date : 09 Aug 2016

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	7.7 MHz	26.01	L1 gnd	-33.98
1 Quasi Peak	9.8825 MHz	25.34	N gnd	-34.66
2 Average	10.1255 MHz	15.80	L1 gnd	-34.19
2 Average	14.8955 MHz	23.51	L1 gnd	-26.49
1 Quasi Peak	14.9945 MHz	35.30	N gnd	-24.69
2 Average	17.7395 MHz	33.24	N gnd	-16.75
1 Quasi Peak	18.2255 MHz	44.73	N gnd	-15.26
2 Average	21.596 MHz	23.65	N gnd	-26.34
1 Quasi Peak	21.6365 MHz	32.50	N gnd	-27.49

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



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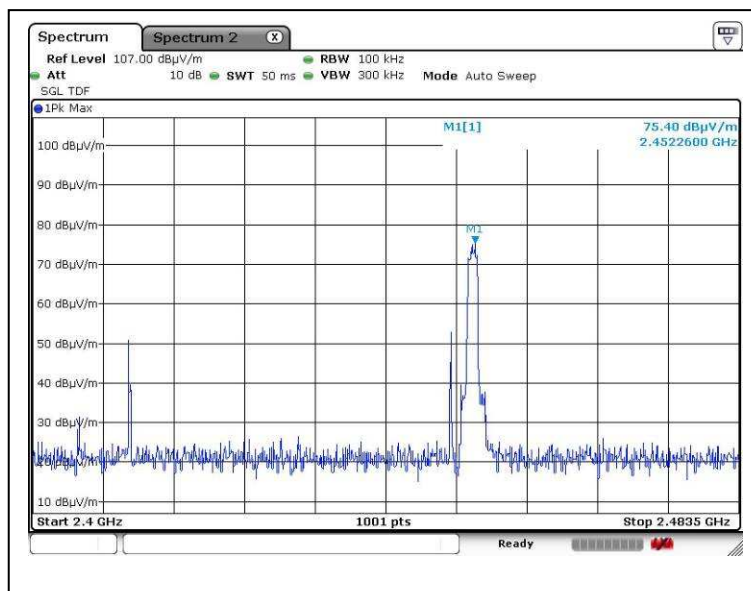
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TEST REPORT

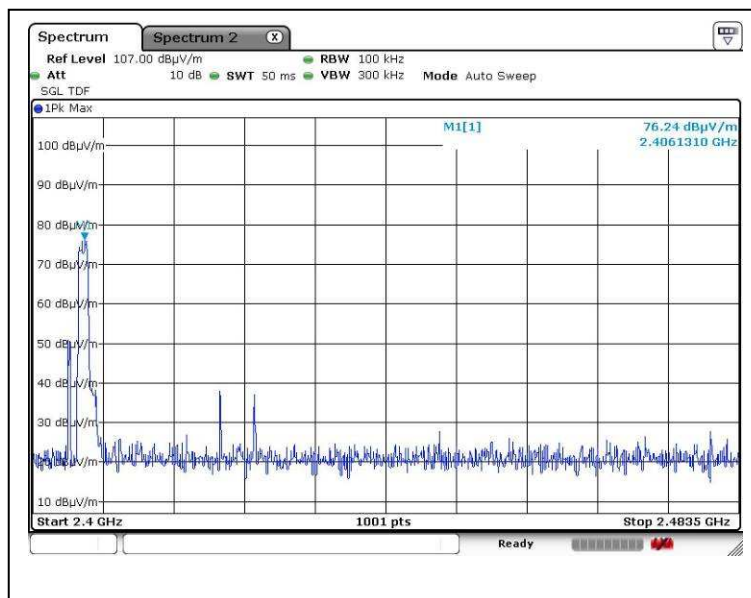
Report No. : AU0049859(2)

Date : 09 Aug 2016

A7. Hopping sequence



1st example of fundamental frequency



2nd example of fundamental frequency

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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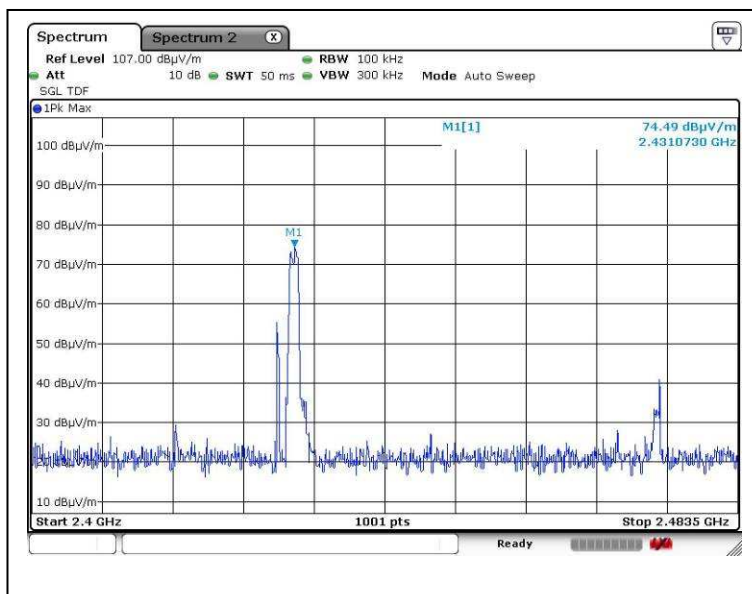
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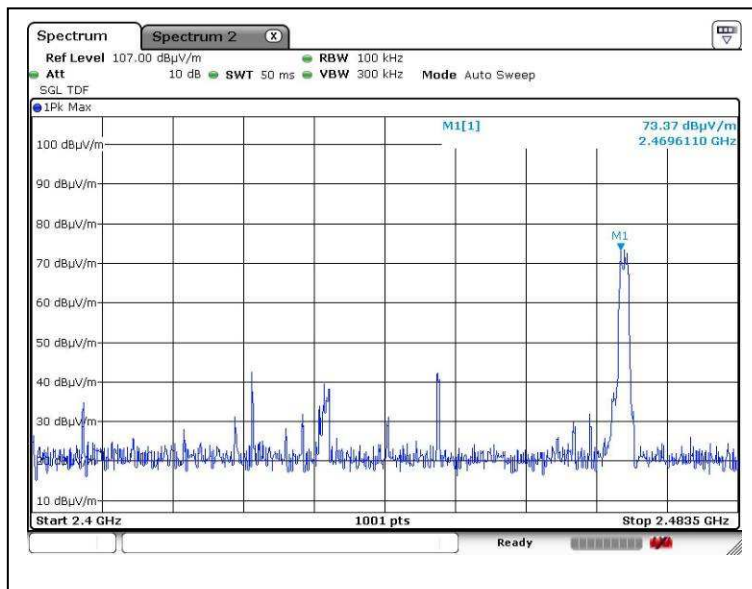
Report No. : AU0049859(2)

Date : 09 Aug 2016

A7. Hopping sequence



3rd example of fundamental frequency



4th example of fundamental frequency

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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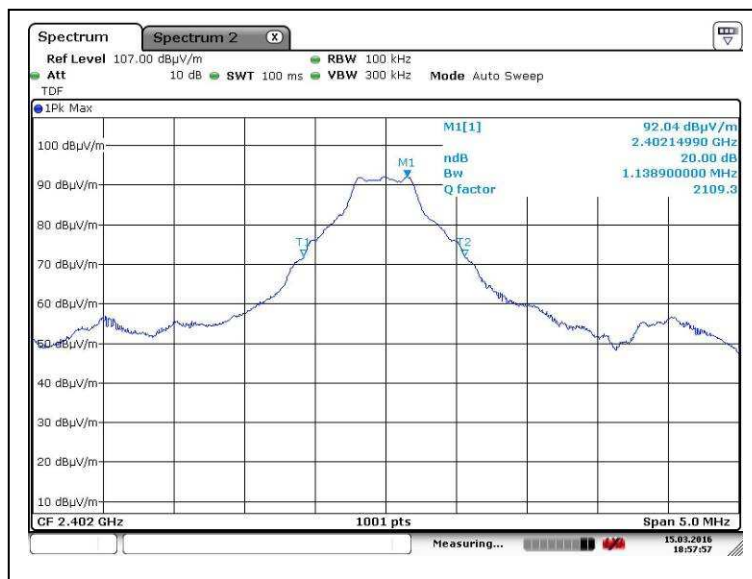
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TEST REPORT

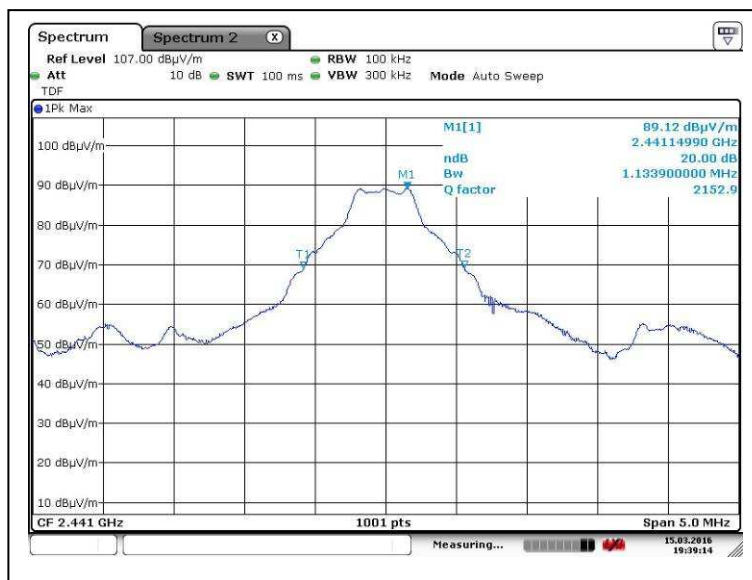
Report No. : AU0049859(2)

Date : 09 Aug 2016

A8. 20 dB bandwidth



Lower channel



Middle channel

Tested by:

Ken

Mr. LEUNG Shu-kan, Ken

Reviewed by:

PR

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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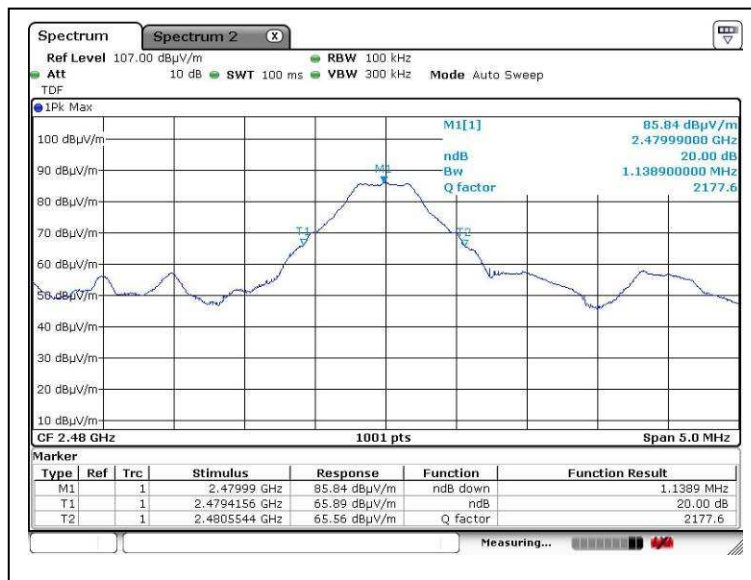
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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A8. 20 dB bandwidth



Higher channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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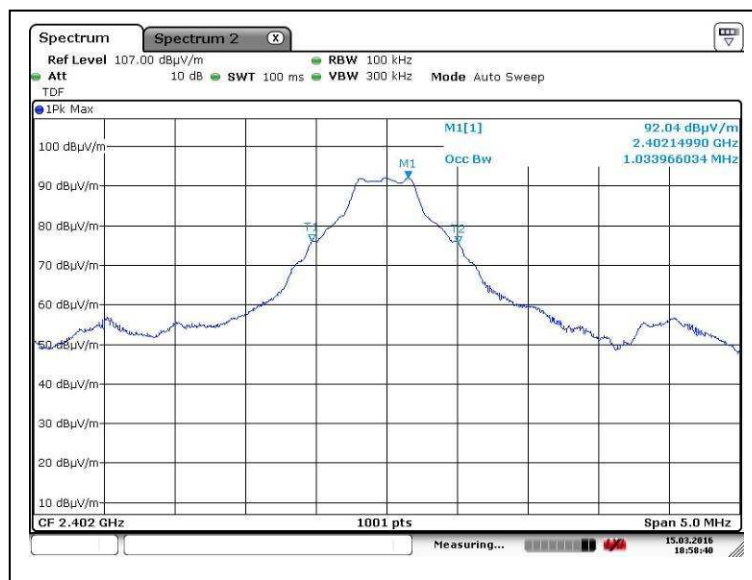
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TEST REPORT

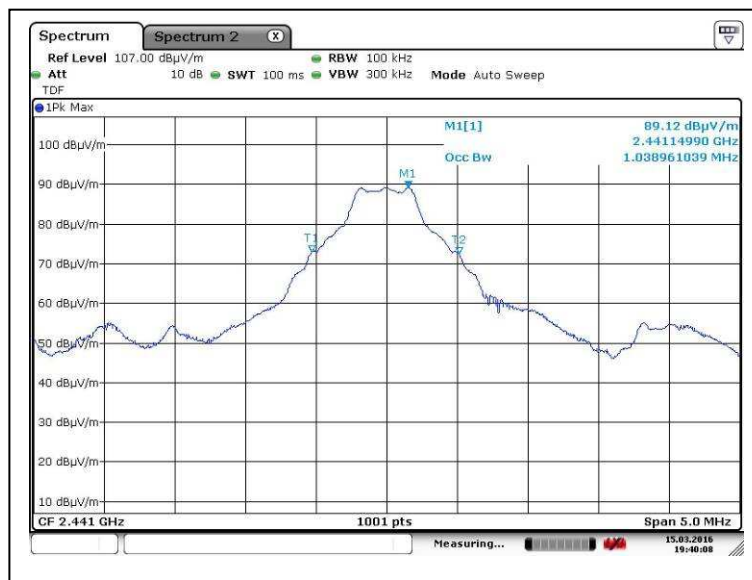
Report No. : AU0049859(2)

Date : 09 Aug 2016

A9. 99% bandwidth



Lower channel



Middle channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



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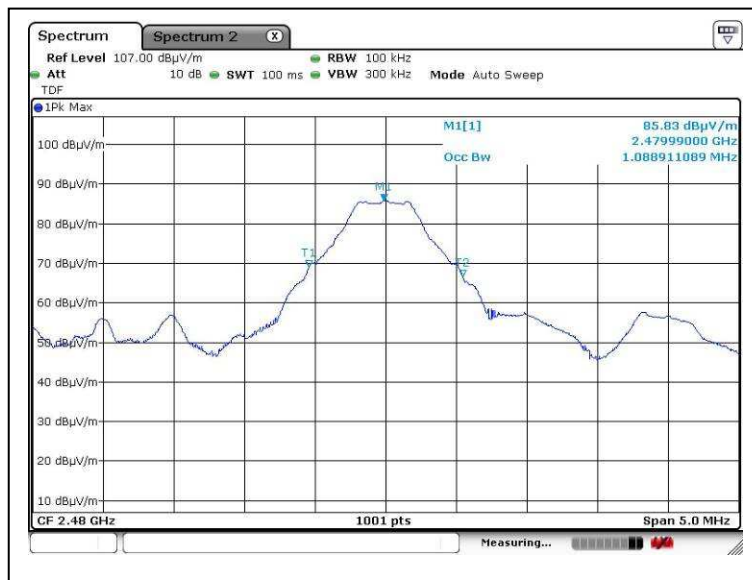
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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A9. 99% bandwidth



Higher channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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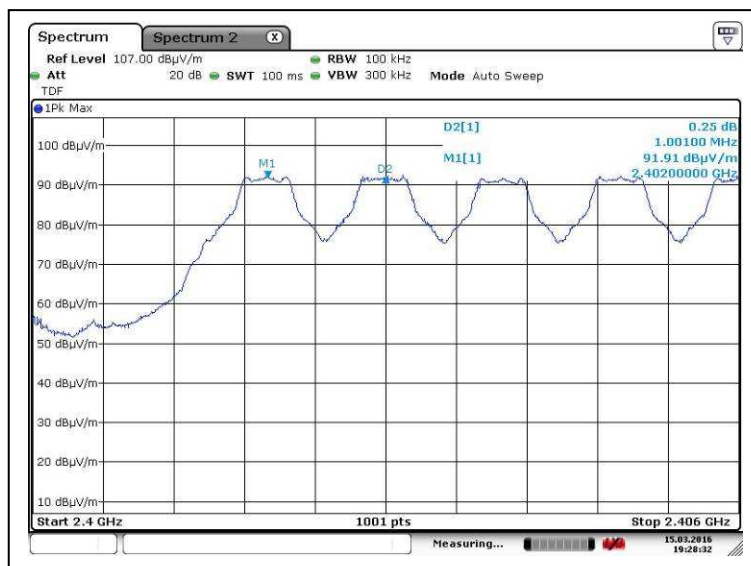
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TEST REPORT

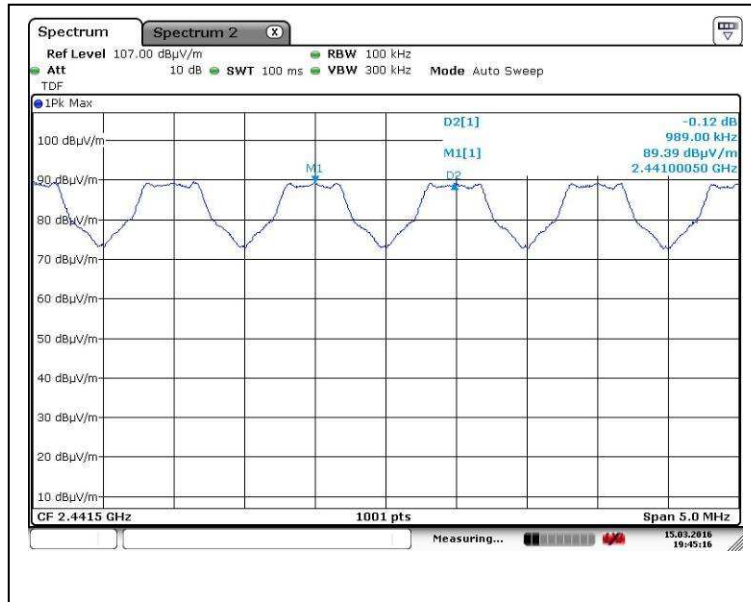
Report No. : AU0049859(2)

Date : 09 Aug 2016

A10. Bluetooth Channel Spacing



CH00-CH01



CH39-CH40

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A



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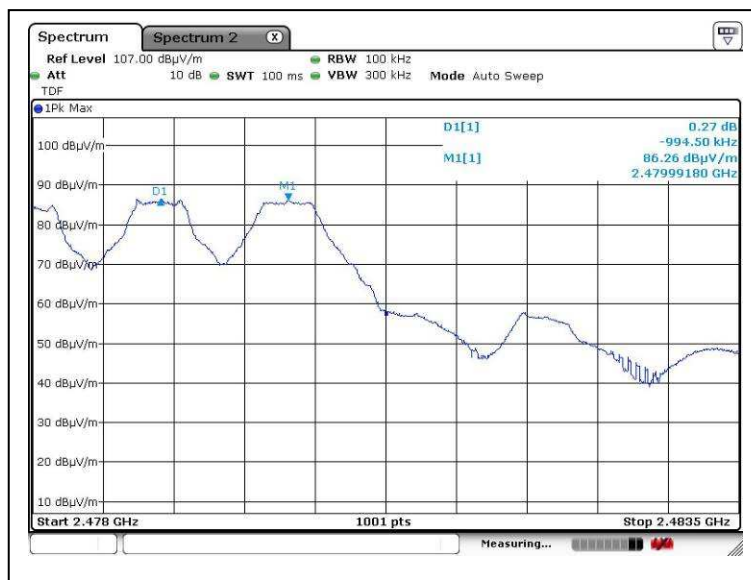
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TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A10. Bluetooth Channel Spacing



CH77-CH78

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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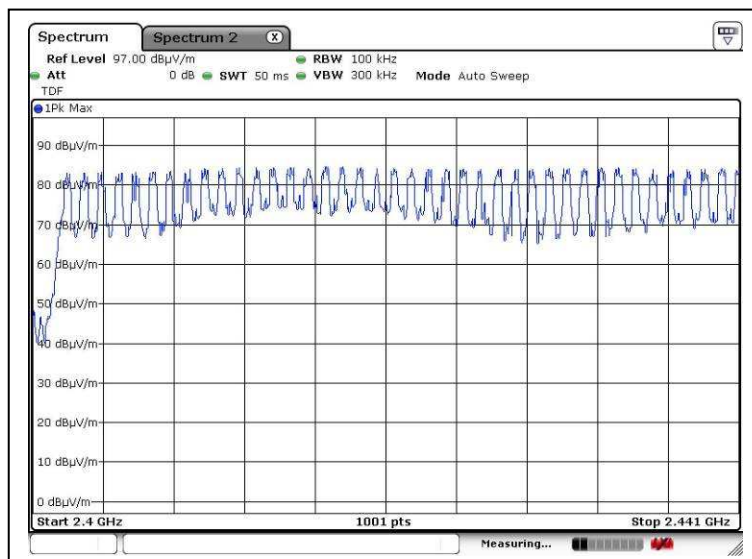
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TEST REPORT

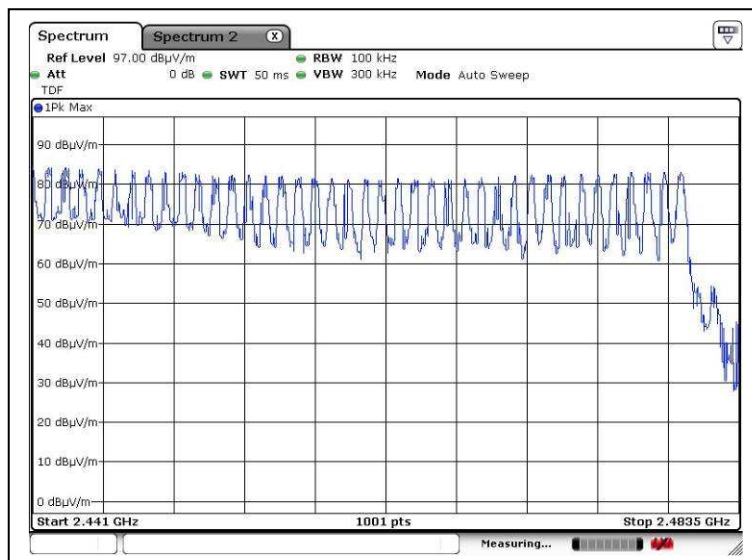
Report No. : AU0049859(2)

Date : 09 Aug 2016

A11. Bluetooth Hopping Channel



CH00-CH39



CH39-CH78

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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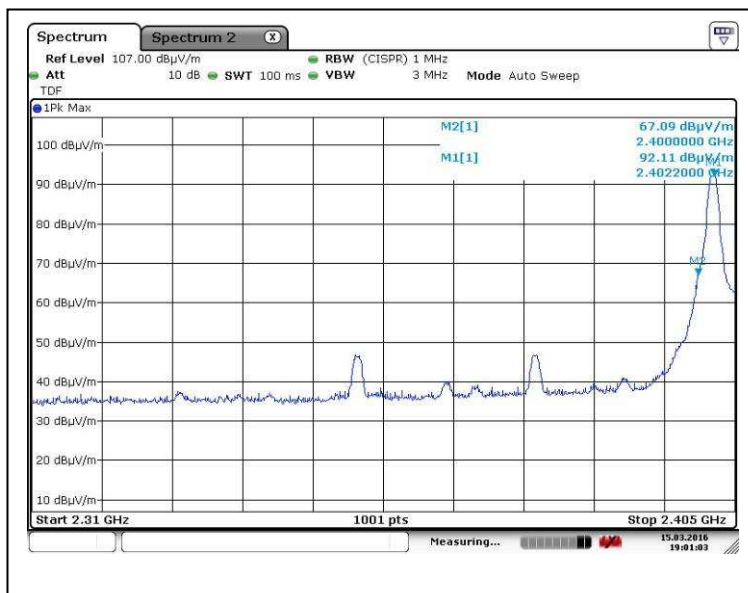
廠商會檢定中心

TEST REPORT

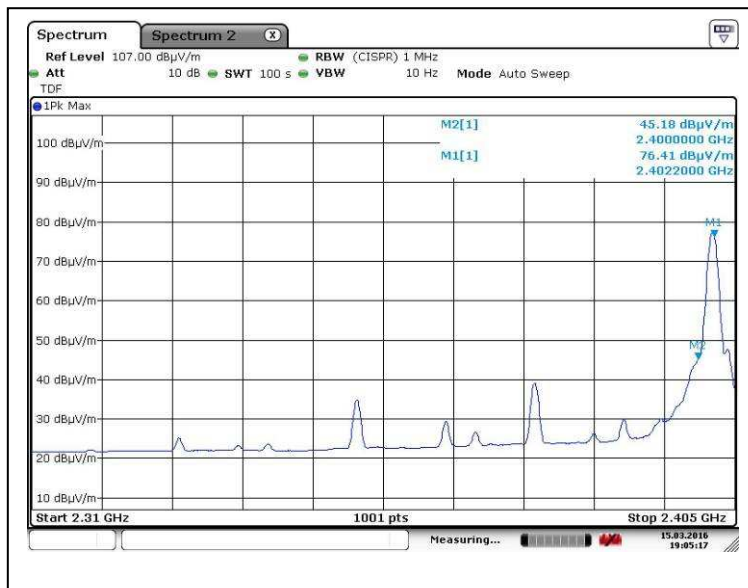
Report No. : AU0049859(2)

Date : 09 Aug 2016

A12. Band Edge



Lower edge (Peak measurement, non-hopping)



Lower edge (Average measurement, non-hopping)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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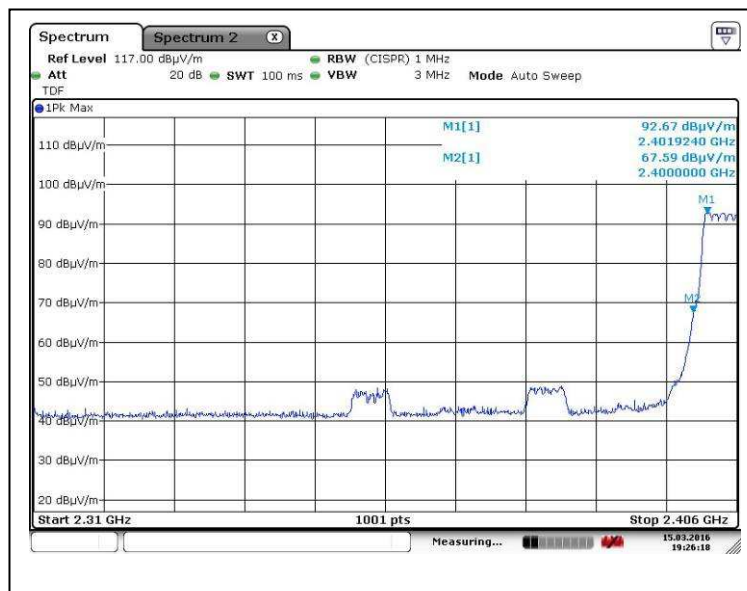
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TEST REPORT

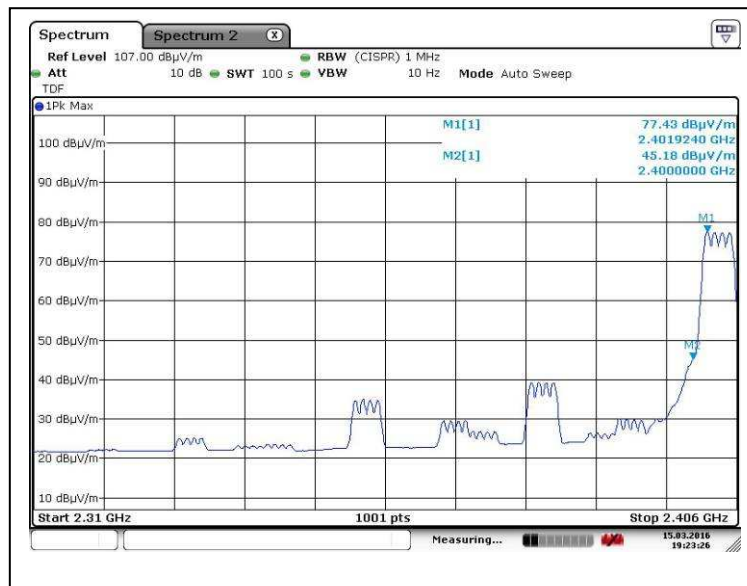
Report No. : AU0049859(2)

Date : 09 Aug 2016

A12. Band Edge



Lower edge (Peak measurement, hopping)



Lower edge (Average measurement, hopping)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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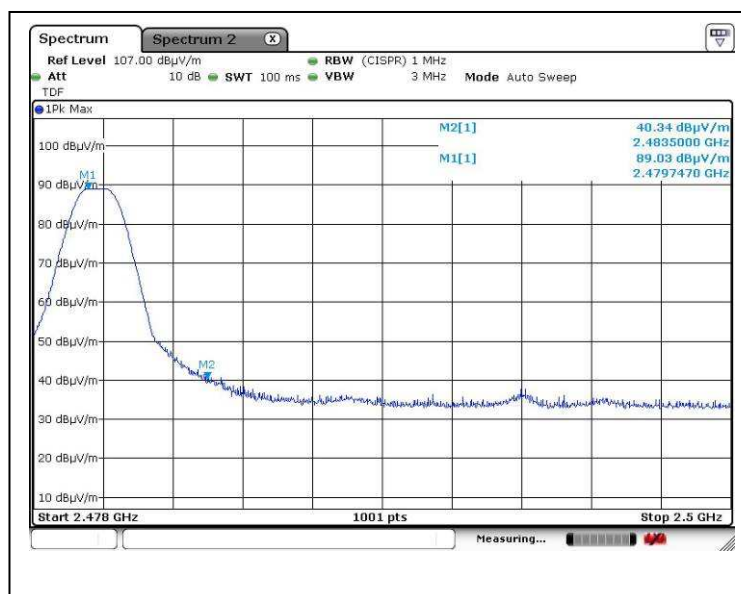
廠商會檢定中心

TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A12. Band Edge



Higher edge (Peak measurement, non-hopping)



Higher edge (Average measurement, non-hopping)

Tested by:

Ken

Mr. LEUNG Shu-kan, Ken

Reviewed by:

PR

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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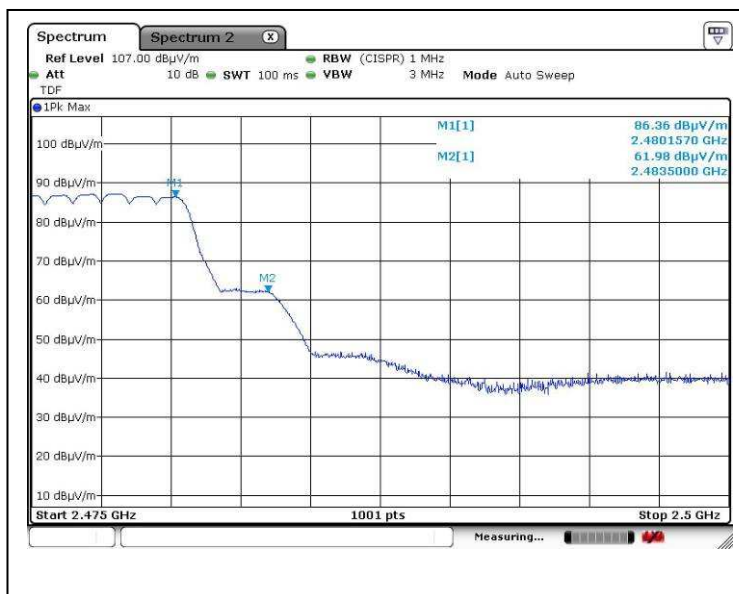
廠商會檢定中心

TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A12. Band Edge



Higher edge (Peak measurement, hopping)



Higher edge (Average measurement, hopping)

Tested by:

Ken

Mr. LEUNG Shu-kan, Ken

Reviewed by:

PR

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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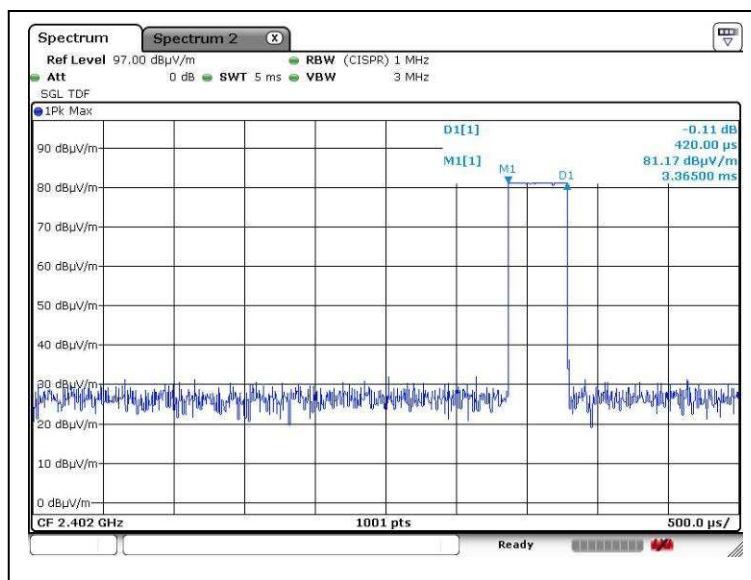
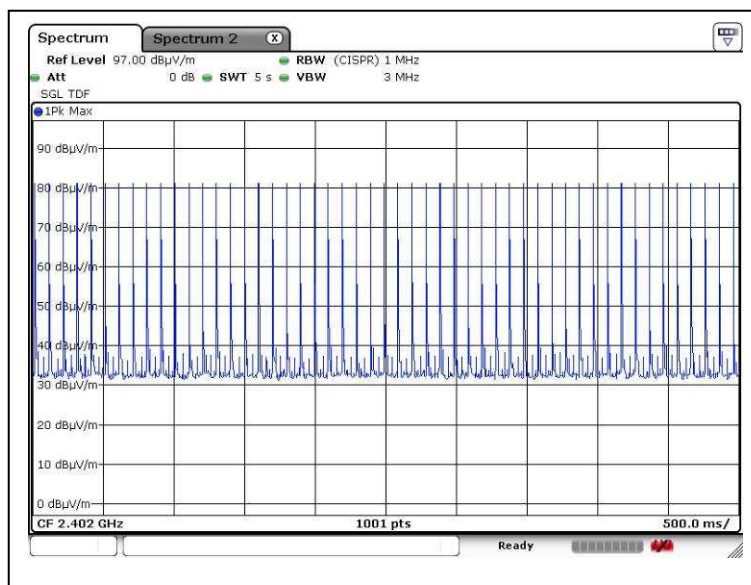
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 00
Packet: DH1



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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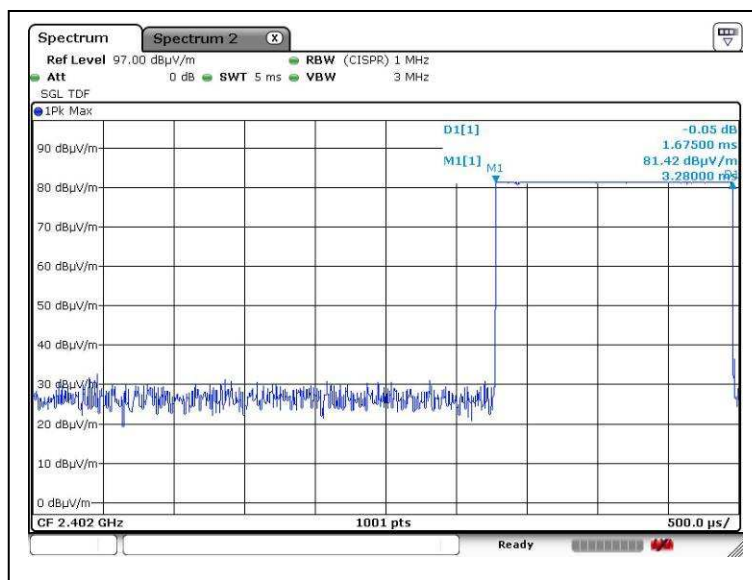
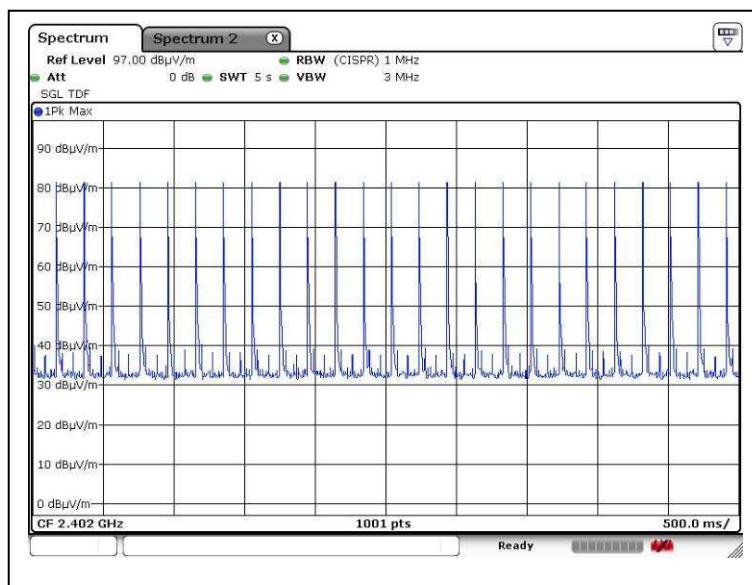
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 00
Packet: DH3



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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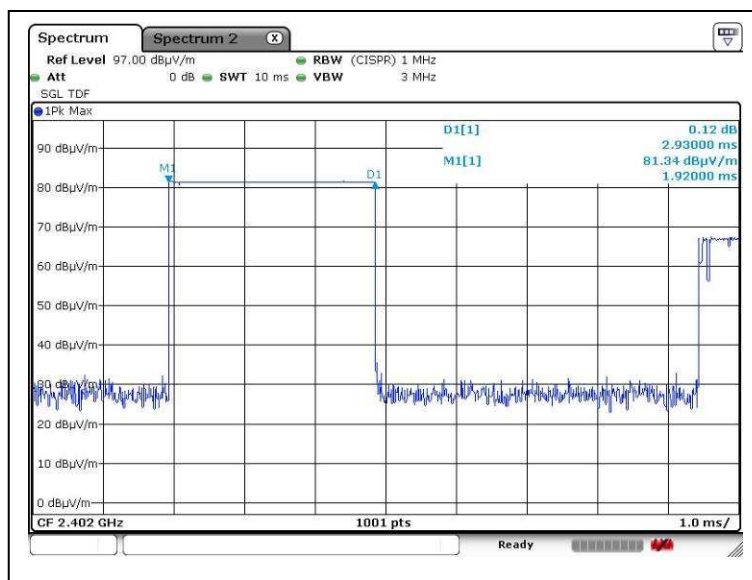
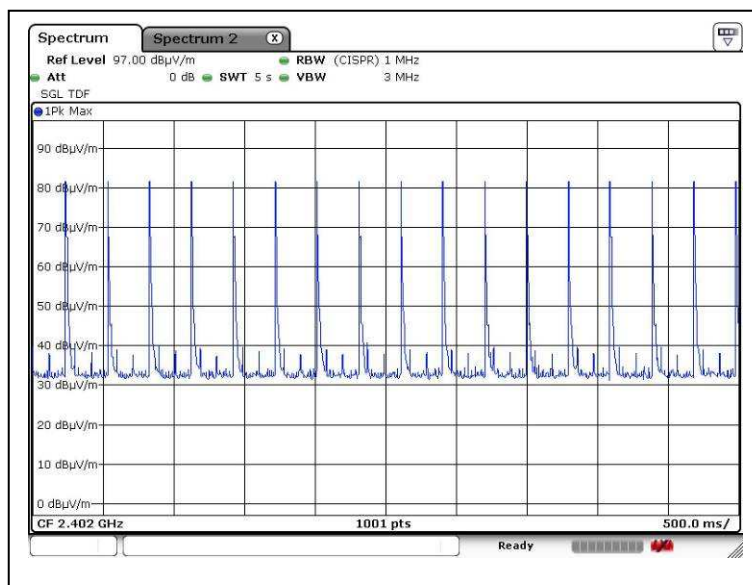
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 00
Packet: DH5



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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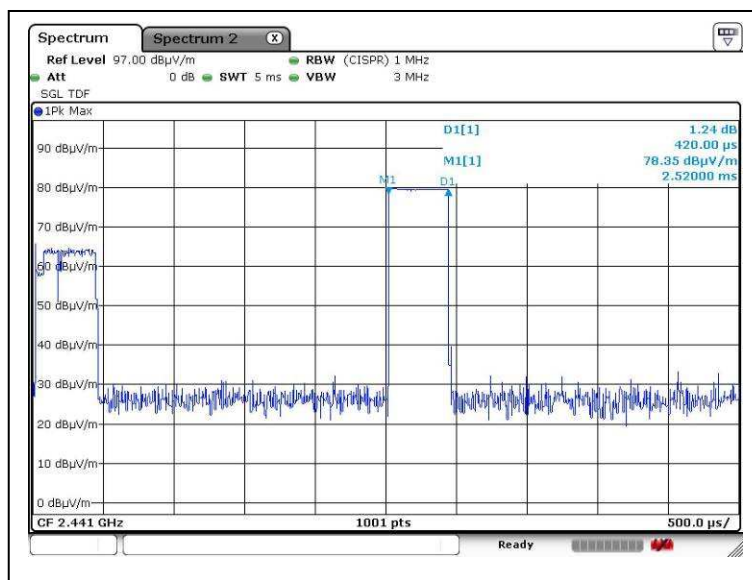
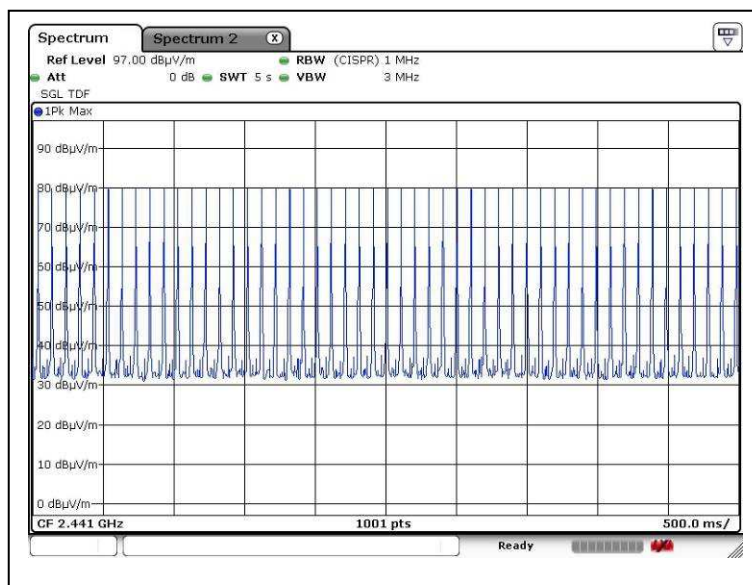
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 39
Packet: DH1



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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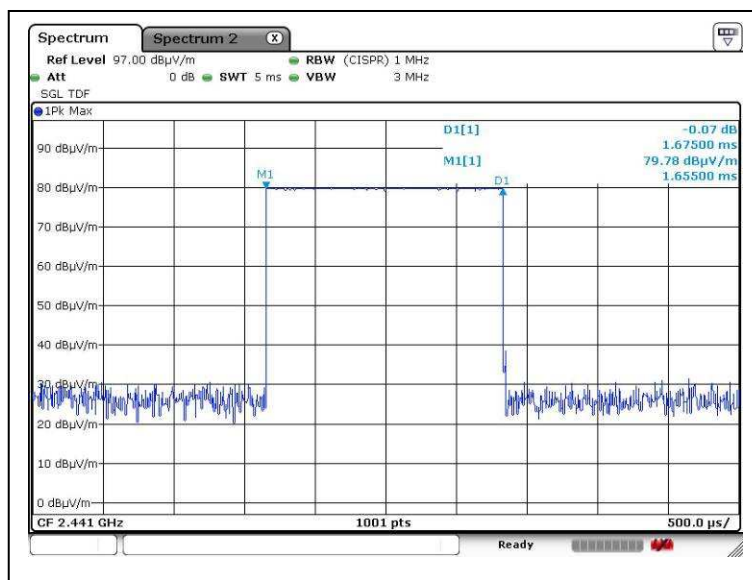
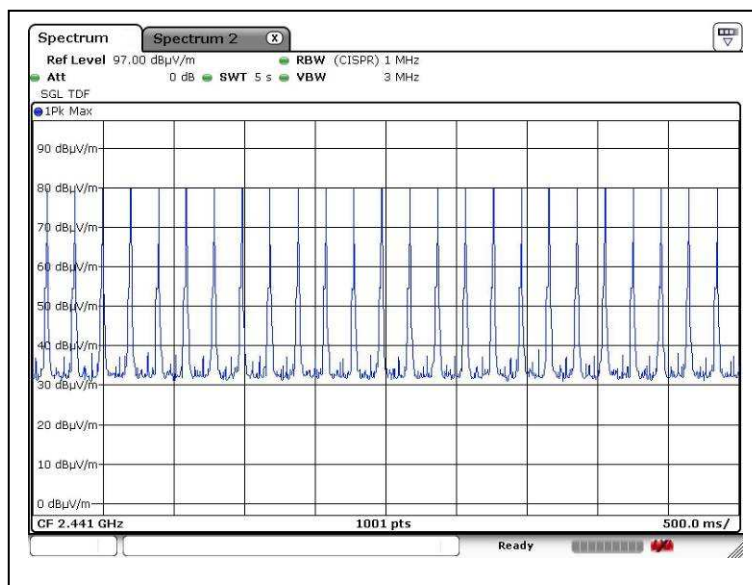
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 39
Packet: DH3



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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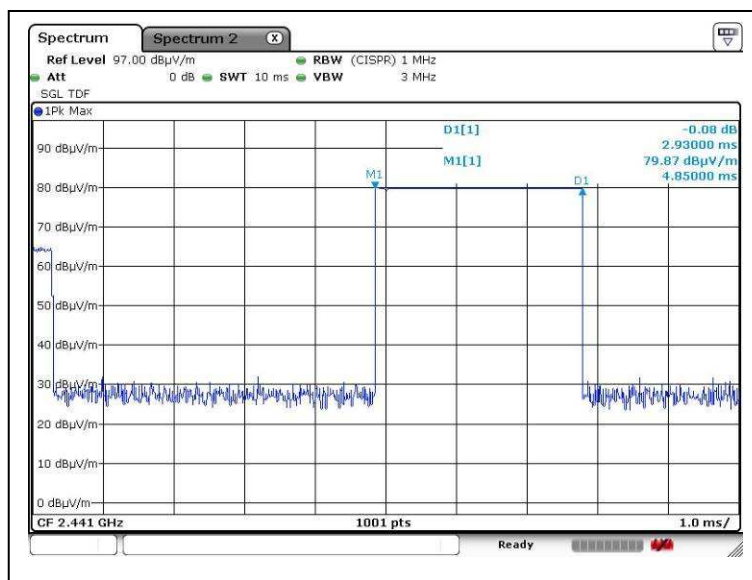
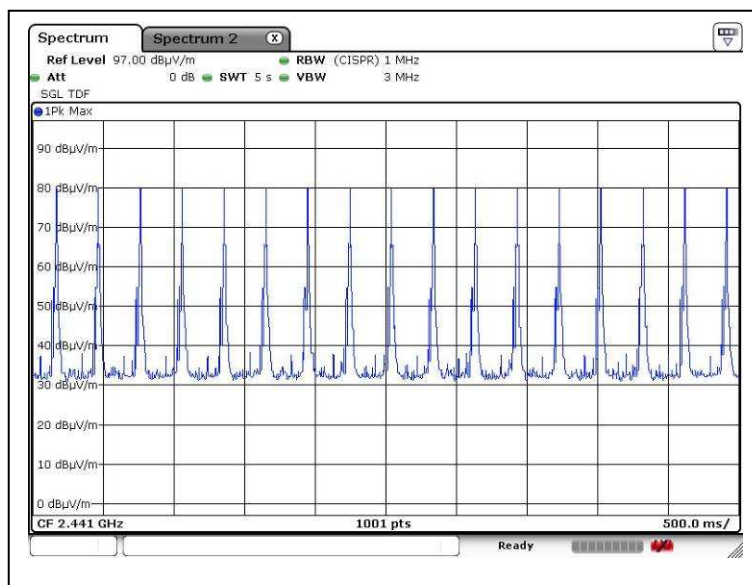
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 39
Packet: DH5



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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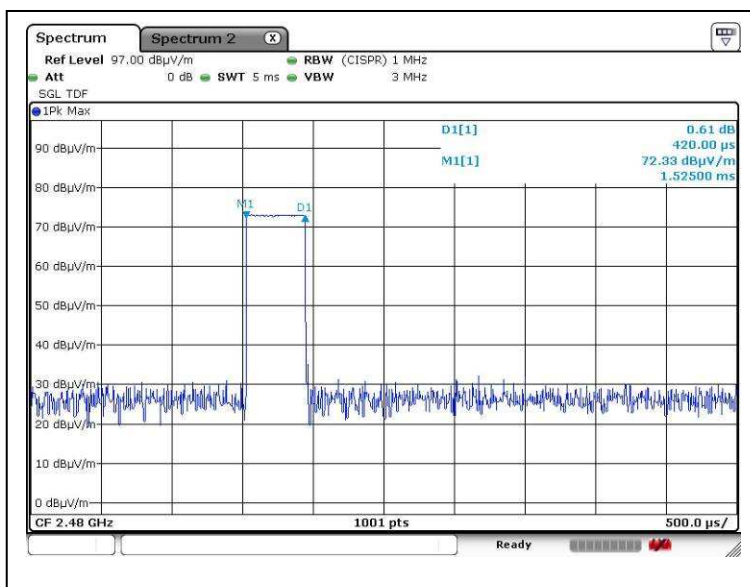
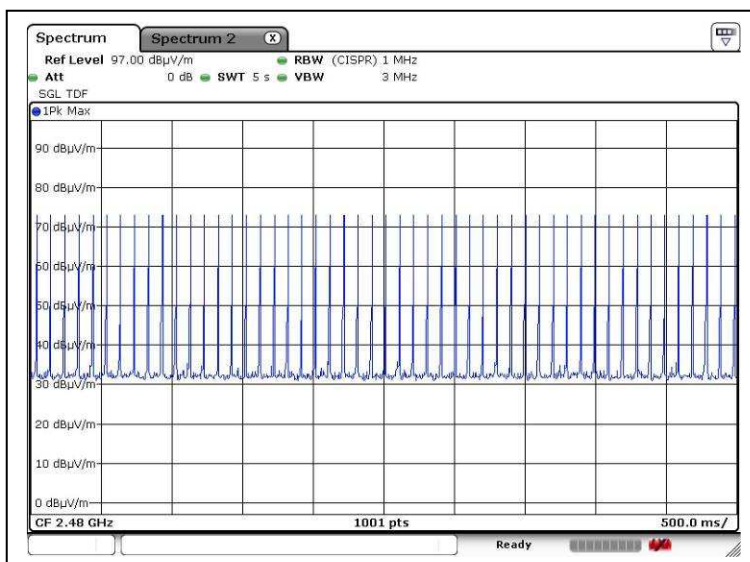
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 78
Packet: DH1



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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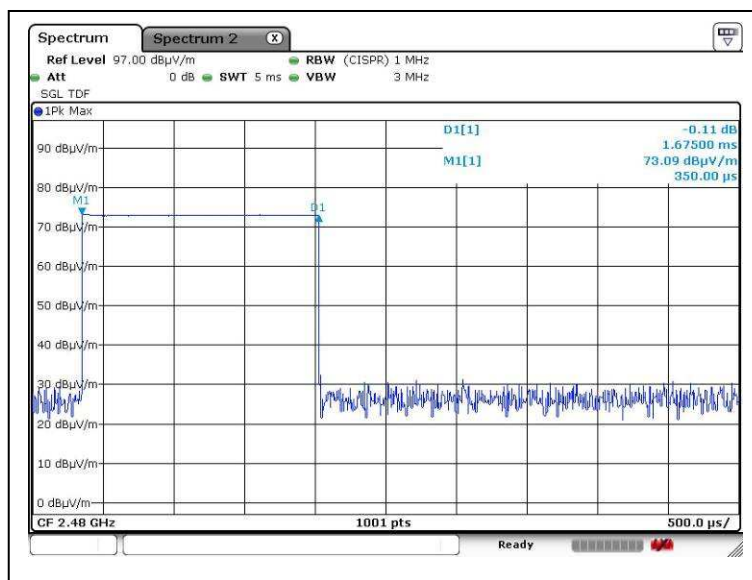
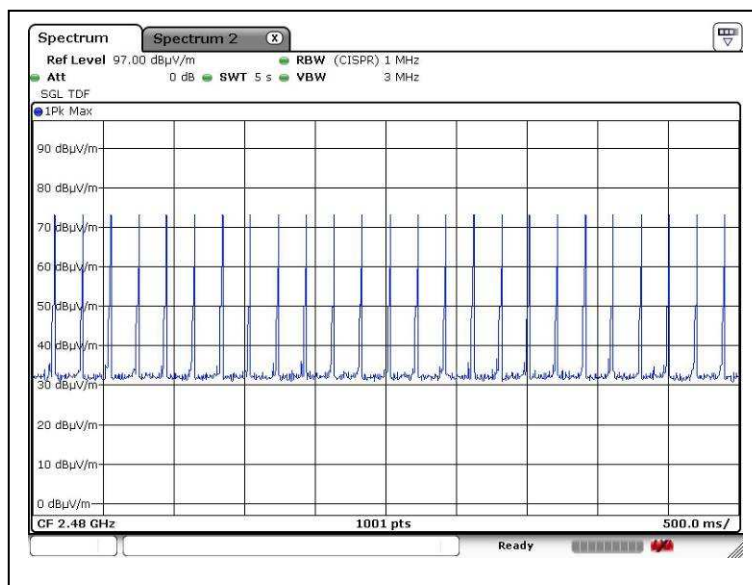
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 78
Packet: DH3



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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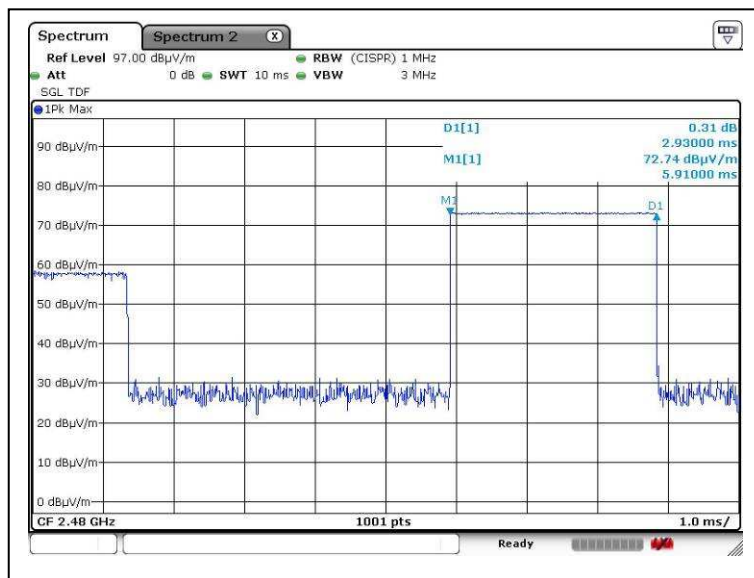
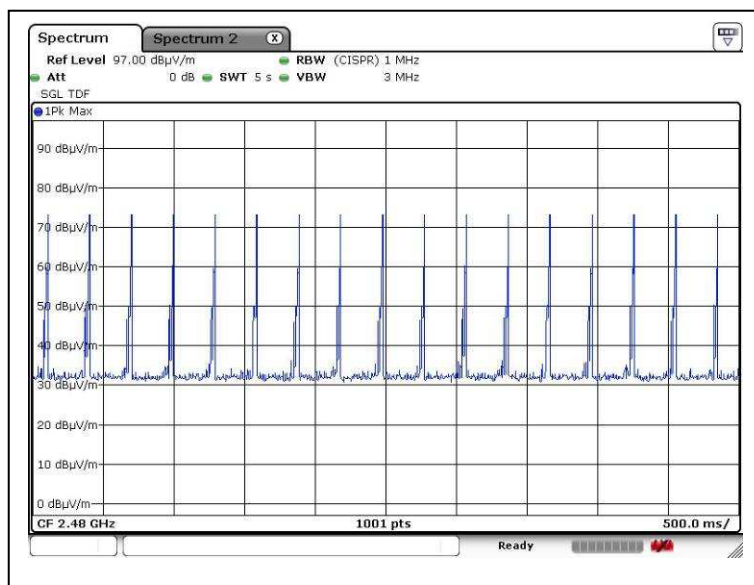
TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A13. Bluetooth Average On Time

Channel: 78
Packet: DH5



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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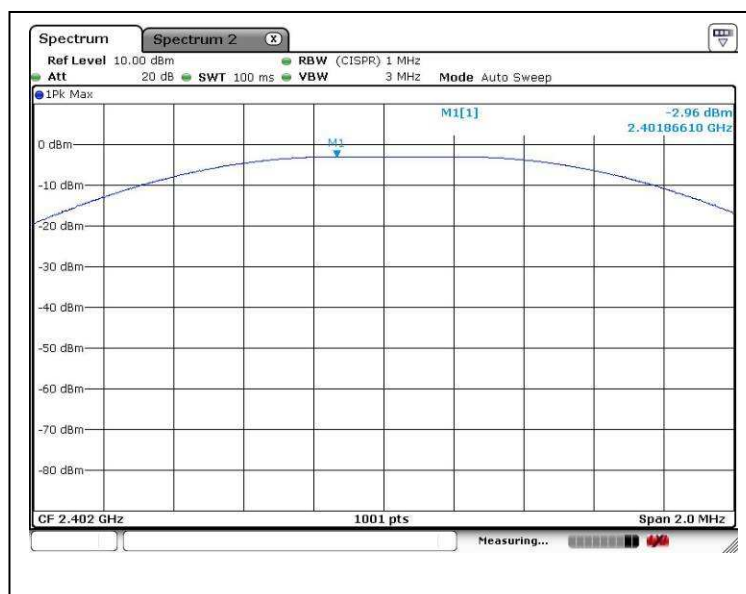
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TEST REPORT

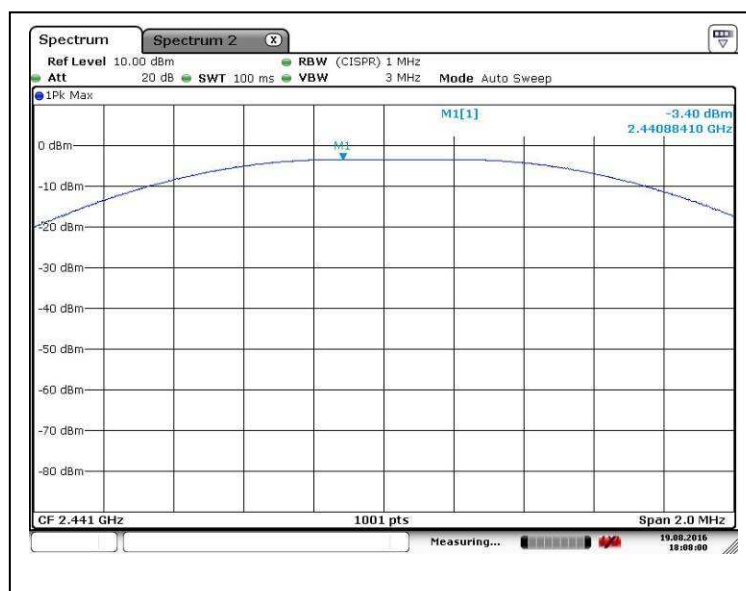
Report No. : AU0049859(2)

Date : 09 Aug 2016

A14. Transmission Power



Lower channel



Middle channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

FCC ID: 2AD55-CM5170A

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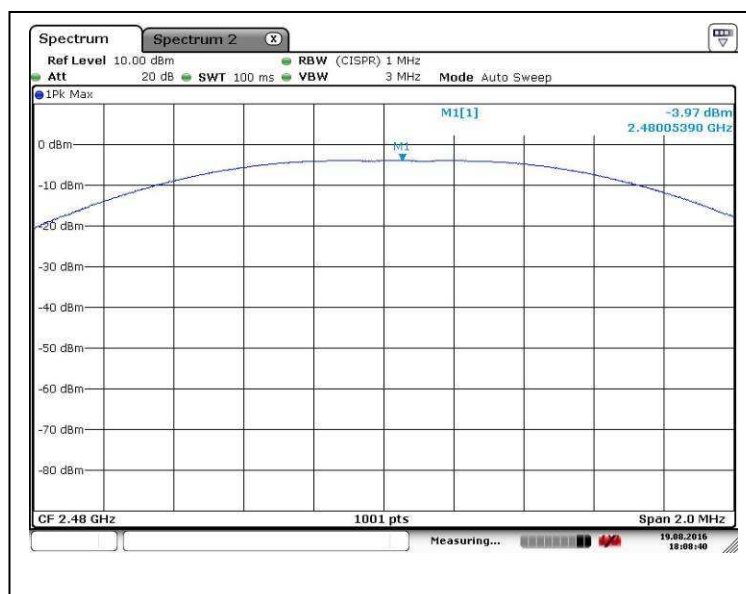
廠商會檢定中心

TEST REPORT

Report No. : AU0049859(2)

Date : 09 Aug 2016

A14. Transmission Power



Higher channel

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

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew