

廠商會檢定中心

TEST REPORT

Report No.	:	AU0006085(8)	Date:	26 Jan 2016

Application No. : LT047591(4)

Applicant : Marathon Watch Company Limited

30 Mural Street #10, Richmond Hill,

Ontario, Canada, L4B 1B5

Sample Description : One(1) item of submitted sample stated to be <u>Tabletop Bluetooth Clock System</u> of

Model No. CL800002

Sample registration No. : RT054682-001, RT055795-001 Radio Frequency : 2402MHz – 2480 MHz Transceiver

Rating : 2 x 1.5V AA size batteries

No. of submitted sample : Three (3) piece (s)

Date Received : 23 Nov 2015, 11 Dec 2015

Test Period : 16 Dec 2015 to 24 Dec 2015.

Test Requested : FCC Part 15 Certificate (15.247)

Industry Canada Interference Causing Equipment Standard RSS-247

Test Method : 47 CFR Part 15 (10-1-14 Edition), ANSI C63.10 – 2013

Industry Canada RSS-Gen Issue 4

KDB 558074 D01 DTS Meas Guidance v03r03

Test Engineer : Mr. LEUNG Shu-kan, Ken

Test Result : See attached sheet(s) from page 2 to 31.

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

Subpart C and Industry Canada RSS-247 Issue 1.

For and on behalf of

CMA Industrial Development Foundation Limited

Authorized Signature : _____ Page 1 of 31 Mr. WONG Lap-pone Andrew

Manager Electrical Division



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

Table of Contents

1	Gen	eral Information	. 3
	1.1	General Description	. 3
	1.2	Location of the test site	
	1.3	List of measuring equipment.	. 5
	1.4	Measurement Uncertainty	. 6
2	Des	cription of the radiated emission test	. 7
	2.1	Test Procedure	. 7
	2.2	Test Result	. 8
	2.3	Radiated Emission Measurement Data	. 9
	2.4	Data of Conducted Emission	10
3	Des	cription of the Line-conducted Test	11
	3.1	Test Procedure	11
	3.2	Test Result	11
	3.3	Graph and Table of Conducted Emission Measurement Data	11
4	Pho	tograph	12
	4.1	Photographs of the Test Setup for Radiated Emission and Conducted Emission	12
	4.2	Photographs of the External and Internal Configurations of the EUT	12
5	Sup	plementary document	13
	5.1	Bandwidth	13
	5.2	Power Spectral Density	13
	5.3	Antenna requirement	
6	App	pendices	14

Page 2 of 31



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

1 General Information

1.1 General Description

The equipment under test (EUT) is a Bluetooth Temperature sensor. The EUT is power by $2 \times 1.5 \text{V}$ AA sizes batteries. It operates at 2402 MHz - 2480 MHz. The MCU will measure the temperature and humidity. It will transmit the measured data to other wireless device when connected with EUT by Bluetooth.

The brief circuit description is listed as follows:

- U1	and its associated circuit act as MCU
- X1	and its associated circuit act as oscillator
- LCD	and its associated circuit act as display
- TH1	and its associated circuit act as thermistor
- HD	and its associated circuit act as humidity sensor
- BT	and its associated circuit act as Bluetooth module

Page 3 of 31



Report No. : AU0006085(8) Date : 26 Jan 2016

1.2 Location of the test site

FCC Registered Test Site Number: 552221

Industry Canada Registered Test Site Number: 4093A

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.

Page 4 of 31



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 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	1Year
Spectrum Analyzer	R&S	FSV40	100628	02 Feb 2016	1Year
Broadband Antenna	Schaffner	CBL6112B	2692	19 Feb 2016	2Years
Loop Antenna	EMCO	6502	00056620	28 Oct 2016	1Year
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2016	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	18 Jun 2017	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	24 Nov 2016	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	17 Jun 2017	2Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	24 Nov 2016	1Year

Page 5 of 31



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 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)	4.66dB		
30MHz ~ 200MHz (Vertical)	4.67dB		
200MHz ~1000MHz (Horizontal)	4.68dB		
200MHz ~1000MHz (Vertical)	4.67dB		

Conducted emissions

Conducted Unicolonic			
Frequency	Uncertainty (U _{lab})		
150kHz~30MHz	2.63dB		

FCC ID: 2AGNSCL800002 IC: 20921-CL800002 Page 6 of 31



Report No. : AU0006085(8) Date : 26 Jan 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.

Page 7 of 31



Report No. : AU0006085(8) Date : 26 Jan 2016

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 and RSS-Gen 8.10.

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 and RSS requirement.

Page 8 of 31



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

2.3 Radiated Emission Measurement Data

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C and RSS

Environmental conditions:

ParameterRecorded valueAmbient temperature:23° CRelative humidity:48%

Measurement: Peak RBW: 1MHz VBW: 3MHz

Testing frequency range: 9kHz to 25GHz

ig inequency ru	inge. >itil	10 20 OII				
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)
2401.676	V	87.0	- 4.1	82.9	114.0	- 31.1
#4804.574	V	43.4	3.8	47.2	74.0	- 26.8
7205.009	V	39.8	11.7	51.5	74.0	- 22.5
7206.224	Н	41.1	11.7	52.8	74.0	- 21.2
2439.670	V	88.4	- 4.1	84.3	114.0	- 29.7
#4879.905	Н	39.3	3.8	43.1	74.0	- 30.9
#4879.956	V	44.0	3.8	47.8	74.0	- 26.2
#7320.664	Н	39.9	11.7	51.6	74.0	- 22.4
2479.668	V	86.0	- 4.3	81.7	114.0	- 32.3
#4960.549	V	43.3	4.1	47.4	74.0	- 26.6
#7438.836	Н	40.0	11.7	51.7	74.0	- 22.3
#7441.073	V	38.8	11.7	50.5	74.0	- 23.5

Remark: Peak measurement values are lower than average limit, therefore average measurement is not necessary

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

Page 9 of 31



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

2.4 Data of Conducted Emission

Environmental conditions:

ParameterRecorded valueAmbient temperature:23° CRelative humidity:48%

Measurement: Peak RBW: 1MHz VBW: 3MHz

Frequency (MHz)	Reading (dBm)	Reading (mW)	Limit (mW)	Margin (mW)
2402.312	- 6.48	0.225	1000.0	- 999.775
2439.641	- 6.20	0.240	1000.0	- 999.760
2479.984	- 6.89	0.205	1000.0	- 999.795

Page 10 of 31



Report No. : AU0006085(8) Date : 26 Jan 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

Page 11 of 31



Report No. : AU0006085(8) Date : 26 Jan 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 2AGNSCL800002 TSup.pdf.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename 2AGNSCL800002 ExPho.pdf and 2AGNSCL800002 InPho.pdf.

FCC ID: 2AGNSCL800002 IC: 20921-CL800002 Page 12 of 31



Report No. : AU0006085(8) Date : 26 Jan 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 band edge is fulfil 15.205 restricted band, 15.247(d) and RSS-247 clause 5.5 requirement.

The plot saved in TestRpt3.pdf shows the 6dB bandwidth has minimum 500kHz for frequency channel 2402MHz, 2440MHz and 2480MHz. It fulfils the section 15.247(a)(2) and RSS-247 clause 5.2 (1) requirement.

5.2 Power Spectral Density

The plot saved in TestRpt4.pdf shows the frequency channel 2402MHz, 2440MHz and 2480MHz were not excess 8dBm for 3kHz bandwidth. It fulfils the section 15.247(e) and RSS-247 clause 5.2 (2) requirement.

5.3 Antenna requirement

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

Page 13 of 31



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

6 Appendices

A1	Photos of the set-up of Radiated Emissions	3	pages
A2	Photos of External Configurations	1	page
A3	Photos of Internal Configurations	1	page
A4	EUT Antenna	1	page
A5	ID Label/Location	1	page
A6	Band Edge	2	pages
A7	6dB Bandwidth Plot	2	pages
A8	99% Bandwidth Plot	2	pages
A9	Power Spectral Density	2	pages
A10	Transmission Power	2	pages

Page 14 of 31



廠商會檢定中心

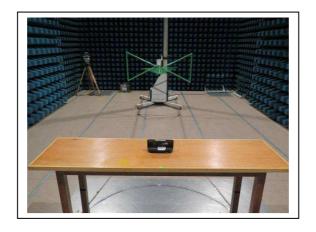
TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A1. Photos of the set-up of Radiated Emissions



(Front view, 30Hz - 1GHz)



(Back view, 30MHz – 1GHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 15 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 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

Page 16 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A1. Photos of the set-up of Radiated Emissions



(Front view, above 1GHz)



(Back view, above 1GHz)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 17 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002



廠商會檢定中心

TEST REPORT

Report No. 26 Jan 2016 AU0006085(8) Date:

A2 Photos of External Configurations



External Configuration 1



External Configuration 2

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 18 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

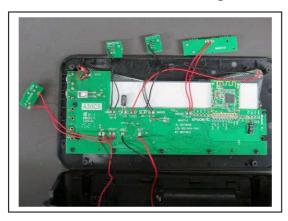


廠商會檢定中心

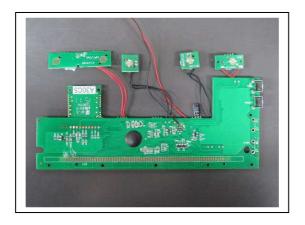
TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A3 Photos of Internal Configurations



Internal Configuration 1



Internal Configuration 2

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 19 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

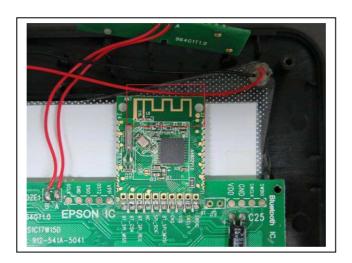


廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A4. EUT Antenna



Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 20 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

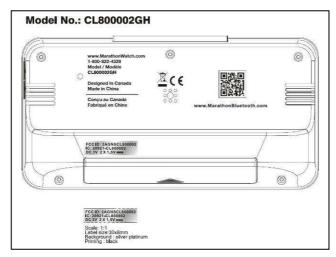


廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A5. ID Label / Location



ID Label

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 21 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

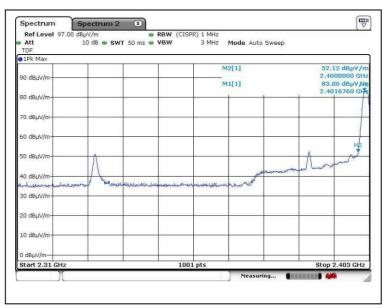


廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 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

Page 22 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

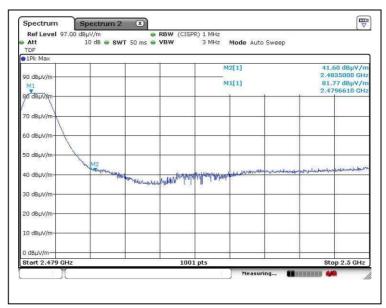


廠商會檢定中心

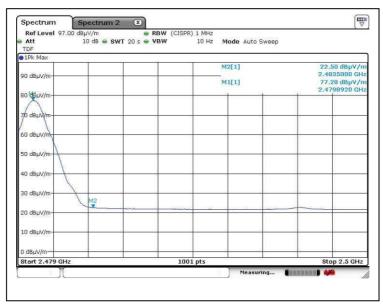
TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A6. Band Edge



Higher edge (Peak measurement)



Higher edge (Average measurement)

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 23 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

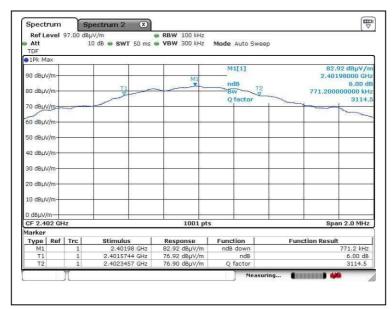


廠商會檢定中心

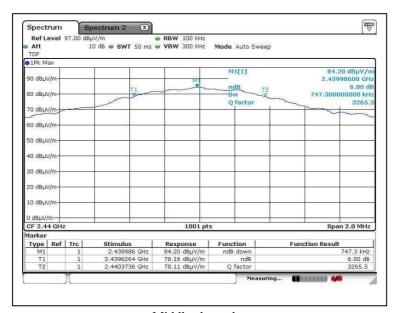
TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A7. 6dB Bandwidth Plot



Lower channel



Middle channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 24 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

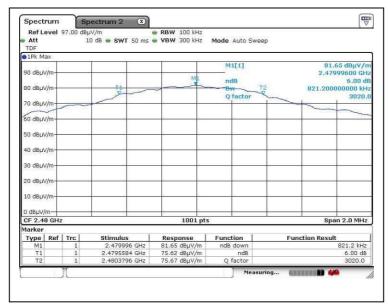


廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A7. 6dB Bandwidth Plot



Higher channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 25 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

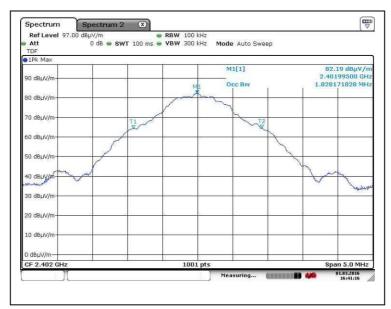


廠商會檢定中心

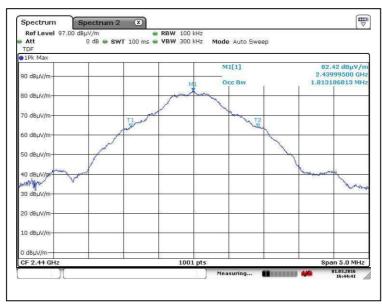
TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A8. 99% Bandwidth Plot



Lower channel



Middle channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 26 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002



廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A8. 99% Bandwidth Plot



Higher channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 27 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

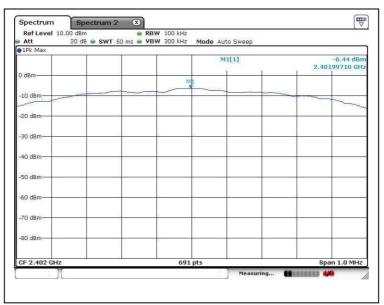


廠商會檢定中心

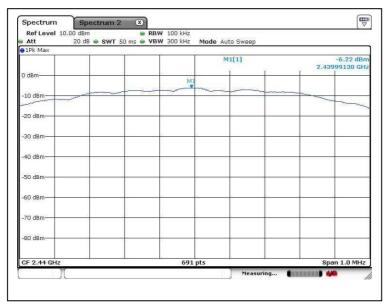
TEST REPORT

Report No. 26 Jan 2016 AU0006085(8) Date:

A9. **Power Spectral Density**



Lower channel



Middle channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 28 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

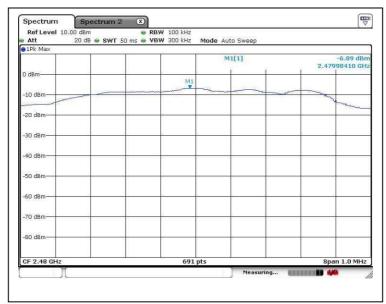


廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A9. Power Spectral Density



Higher channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 29 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

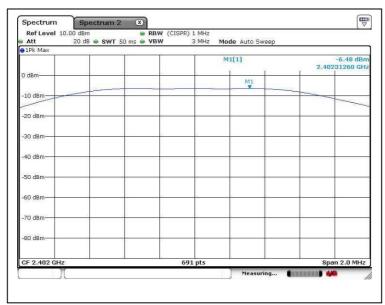


廠商會檢定中心

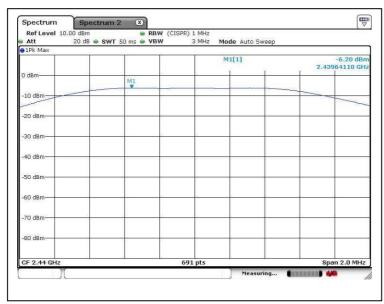
TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A10. Transmission Power



Lower channel



Middle channel

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 30 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002

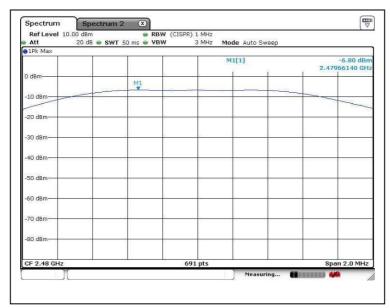


廠商會檢定中心

TEST REPORT

Report No. : AU0006085(8) Date : 26 Jan 2016

A10. Transmission Power



Higher channel

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

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

Page 31 of 31

FCC ID: 2AGNSCL800002 IC: 20921-CL800002