

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standards:** 47 CFR FCC Part 15, Subpart B, Class B  
**ANSI C63.4:2014**

**Report No.:** FDBHCP-WTW-P22060701

**FCC ID:** ACJ932BH2201

**Test Model:** BH2201

**Received Date:** Jun. 21, 2022

**Test Date:** Jul. 05 ~ Jul. 26, 2022

**Issued Date:** Aug. 29, 2022

**Applicant:** Panasonic Corporation of North America

**Address:** Two Riverfront Plaza, 9th Floor, Newark New Jersey, United States,  
07102-5490

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location (1):** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, TAIWAN

**Test Location (2):** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**FCC Registration /** 328930 / TW1050

**Designation Number:**

**Approved by :**

*Leo Hsu*

**Date:** Aug. 29, 2022

Leo Hsu / Project Engineer

This test report consists of 36 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The test results in the report only apply to the tested sample. The test results in this report are traceable to the national or international standards.



**Prepared by :** Vida Chen / Specialist

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

## Table of Contents

<b>Release Control Record</b> .....	<b>3</b>
<b>1 Certification</b> .....	<b>4</b>
<b>2 Summary of Test Results</b> .....	<b>5</b>
2.1 Measurement Uncertainty .....	5
2.2 Modification Record.....	5
<b>3 General Information</b> .....	<b>6</b>
3.1 Description of EUT .....	6
3.2 Primary Clock Frequencies of Internal Source .....	6
3.3 Features of EUT .....	6
3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode .....	7
3.5 Test Program Used and Operation Descriptions.....	7
3.6 Connection Diagram of EUT and Peripheral Devices.....	8
3.7 Configuration of Peripheral Devices and Cable Connections .....	9
<b>4 Test Instruments</b> .....	<b>10</b>
4.1 Radiated Emissions up to 1 GHz .....	10
4.2 Radiated Emissions above 1 GHz .....	11
4.3 Antenna-Conducted Power Measurement.....	12
<b>5 Limits of Test Items</b> .....	<b>13</b>
5.1 Radiated Emissions up to 1 GHz .....	13
5.2 Radiated Emissions above 1 GHz .....	13
5.3 Antenna-conducted Power Measurement.....	13
<b>6 Test Arrangements</b> .....	<b>14</b>
6.1 Radiated Emissions up to 1 GHz .....	14
6.2 Radiated Emissions above 1 GHz .....	15
6.3 Antenna-Conducted Power Measurement.....	16
<b>7 Test Results of Emission</b> .....	<b>17</b>
7.1 Radiated Emissions up to 1 GHz .....	17
7.2 Radiated Emissions above 1 GHz .....	21
7.3 Antenna-conducted Power Measurement.....	29
<b>8 Pictures of Test Arrangements</b> .....	<b>35</b>
<b>9 Information of the Testing Laboratories</b> .....	<b>36</b>



### Release Control Record

Issue No.	Description	Date Issued
FDBHCP-WTW-P22060701	Original release.	Aug. 29, 2022

## 1 Certification

**Product:** Display Audio

**Brand:** Panasonic

**Test Model:** BH2201

**Sample Status:** Engineering sample

**Applicant:** Panasonic Corporation of North America

**Test Date:** Jul. 05 ~ Jul. 26, 2022

**Standards:** 47 CFR FCC Part 15, Subpart B, Class B  
ANSI C63.4:2014

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

## 2 Summary of Test Results

The test items that the EUT needs to perform according to its interfaces and functions evaluation are as follows:

FCC Part 15 Clause	Test Item	Result/Remarks	Verdict
15.109	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -4.43dB at 798.04MHz	Pass
	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -14.94dB at 7844.83MHz	Pass
15.111	Antenna-Conducted Power Test (30MHz ~ 960MHz)	Minimum passing Class B margin is -1.28dB at 390.84MHz	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.57 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.04 dB
Antenna-conducted Power Measurement	30MHz ~ 960MHz	5.60 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 Description of EUT

Product	Display Audio
Brand	Panasonic
Test Model	BH2201
Sample Status	Engineering sample
Operating Software	N/A
Equipment Radio Type	Receiver
FM Frequency Band	87.5-108.0 MHz (50/100 kHz step) or 87.5-107.9 MHz (200 kHz step)
Power Supply Rating	10-16Vdc
Accessory Device	N/A
Data Cable Supplied	N/A

#### 3.2 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 2480MHz provided by Panasonic Corporation of North America, for detailed internal source, please refer to the manufacturer's specifications.

#### 3.3 Features of EUT

The tests reported herein were performed according to the method specified by Panasonic Corporation of North America, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

### 3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT consumes battery of rating 12Vdc.

For radiated emission test, the EUT has been pre-tested under following test modes, and test mode 1 was the worst cases for final test.

Mode	Test Condition
1	EUT with Speaker + Play Color bar from USB Flash + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
2	EUT with Speaker + Play Music from BT + BT Link + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
3	EUT with Speaker + Camera preview + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
4	EUT with Speaker + FM 88MHz + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
5	EUT with Speaker + FM 98MHz + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
6	EUT with Speaker + FM 108MHz + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
7	EUT with Speaker + DAB 202.928MHz + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc

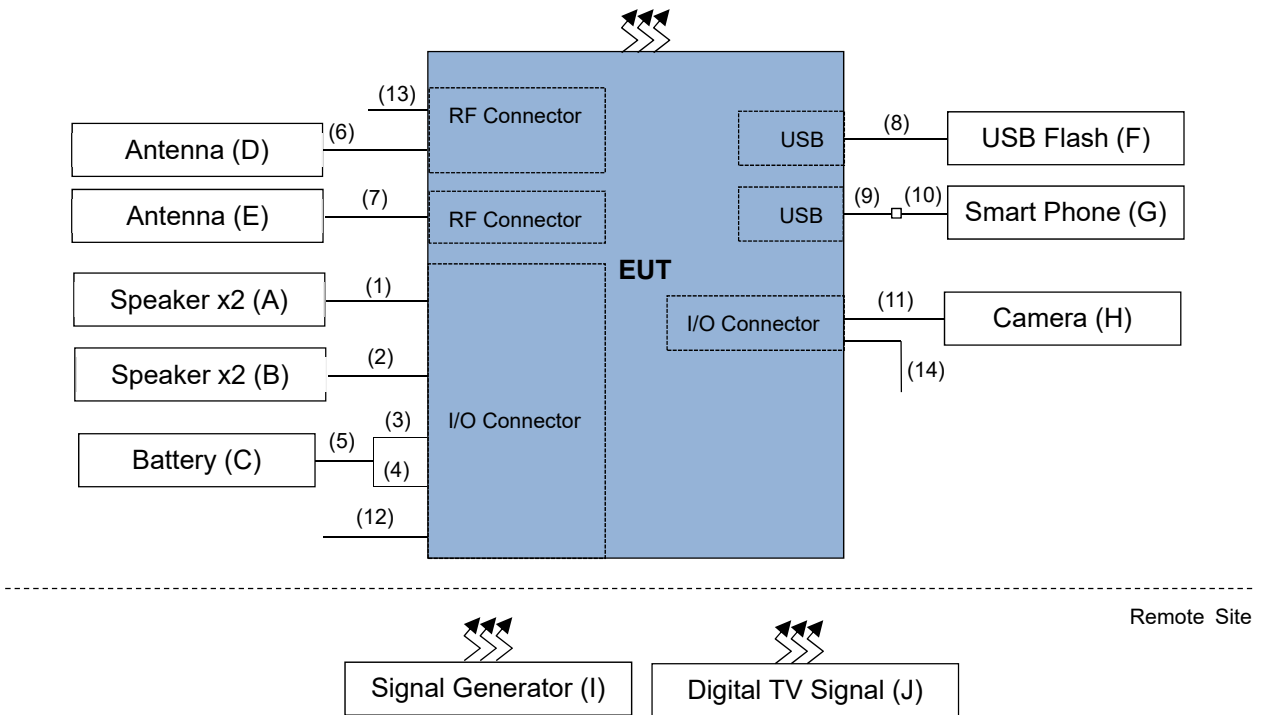
Test modes are presented in the report as below.

Mode	Test Condition
Radiated emission up to 1GHz test	
A	EUT with Speaker + Play Color bar from USB Flash + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
B	EUT with Speaker + DAB 202.928MHz + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
Radiated emission above 1GHz test	
A	EUT with Speaker + Play Color bar from USB Flash + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
B	EUT with Speaker + DAB 202.928MHz + Antenna *2 + USB with Flash + USB with Phone (Charger), 12 Vdc
Antenna-conducted power measurement test	
A	EUT with Speaker + FM 88MHz + Antenna *2, 12 Vdc
B	EUT with Speaker + FM 98MHz + Antenna *2, 12 Vdc
C	EUT with Speaker + FM 108MHz + Antenna *2, 12 Vdc
D	EUT with Speaker + DAB 174.928MHz + Antenna *2, 12 Vdc
E	EUT with Speaker + DAB 202.928MHz + Antenna *2, 12 Vdc
F	EUT with Speaker + DAB 229.072MHz + Antenna *2, 12 Vdc

### 3.5 Test Program Used and Operation Descriptions

- a. The EUT powered by battery and placed on the test table.
- b. Turned on the power of all equipment.
- c. The volume control was adjusted to be 1/8 of the rated audio output power.
- d. Signal Generator sent FM signal to EUT and EUT played audio signal to speaker.
- e. Signal Generator sent AM signal to EUT and EUT played audio signal to speaker.
- f. Digital TV Signal Generator sent DAB signal to EUT and EUT played audio signal to speaker.
- g. The EUT read mpeg files from USB Flash and EUT played video/audio signal on internal display and monitor.
- h. The EUT linked with Smart Phone play music via BT
- i. The Camera Link with EUT captured video image via USB Cable, then EUT displayed on its screen.

### 3.6 Connection Diagram of EUT and Peripheral Devices





### 3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Speaker x2	NA	JC125-025	NA	NA	-
B.	Speaker x2	Logitech	THX	NA	NA	-
C.	Battery	SMF	NX120-7L	NA	NA	-
D.	Antenna	NA	NA	NA	NA	-
E.	Antenna	NA	NA	NA	NA	-
F.	USB Flash	HP	X5000m	NA	NA	-
G.	Smart Phone	APPLE	iPhone5	NA	NA	-
H.	Camera	NA	NA	NA	NA	Provided by client
I.	Signal Generator	R&S	SMJ100A	101943	NA	-
J.	Digital TV Singal Generator	BSK	DTV-500	FQC-00725	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items I-J acted as a communication partners to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	I/O cable	2	0.9	N	0	Provided by client
2.	I/O cable	2	0.9	N	0	Provided by client
3.	DC cable	1	0.95	N	0	Provided by client
4.	DC cable	1	0.95	N	0	Provided by client
5.	DC cable	2	1.1	N	0	-
6.	RF cable	1	0.4	Y	0	Provided by client
7.	RF cable	1	0.5	Y	0	Provided by client
8.	USB cable	1	1.9	Y	0	Provided by client
9.	USB cable	1	1.9	Y	0	Provided by client
10.	USB cable	1	1	Y	0	-
11.	I/O cable	1	1.1	N	0	Provided by client
12.	I/O cable	1	0.9	N	0	Provided by client
13.	I/O cable	1	1	N	0	Provided by client
14.	I/O cable	1	0.45	N	0	Provided by client

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 Radiated Emissions up to 1 GHz

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer Agilent	E4446A	MY51100039	Dec. 07, 2021	Dec. 06, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-149	Oct. 29, 2021	Oct. 28, 2022
RF signal cable (with 5dB PAD) Times	LMR-400 (18M)	CABLE-CH2-01	Jan. 15, 2022	Jan. 14, 2023
Preamplifier Agilent (Below 1GHz)	8447D	2944A10629	Mar. 19, 2022	Mar. 18, 2023
Software BV ADT	BV ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Controller BV ADT	SC100	SC93021702	NA	NA

- Note: 1. The test was performed in HwaYa Chamber 2 (966 Chamber 1).  
 2. The VCCI Site Registration No. is R-20018.  
 3. The test site validated date: 2021/12/8 (NSA).  
 4. Test Date: 2022/7/5

#### 4.2 Radiated Emissions above 1 GHz

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer Agilent	E4446A	MY51100039	Dec. 07, 2021	Dec. 06, 2022
PXA S Analyzer KEYSIGHT	N9030B	MY57141885	Jun. 01, 2022	May 31, 2023
BILOG Antenna SCHWARZBECK	VULB9168	9168-149	Oct. 29, 2021	Oct. 28, 2022
RF signal cable (with 5dB PAD) Times	LMR-400 (18M)	CABLE-CH2-01	May 14, 2022	May 13, 2023
HORN Antenna (with 4dB PAD) SCHWARZBECK	BBHA 9120 D	9120D-405	Nov. 14, 2021	Nov. 13, 2022
Pre-Amplifier Agilent (Above 1GHz)	8449B	3008A01961	Sep. 04, 2021	Sep. 03, 2022
Software BV ADT	BV ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Controller BV ADT	SC100	SC93021702	NA	NA
BandPass Filter (2.4G) MICRO-TRONICS	BRM17690-01	003	Sep. 04, 2021	Sep. 03, 2022
BandPass Filter (5G) MICRO-TRONICS	BRM50716-01	G011	Sep. 04, 2021	Sep. 03, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-1000	170819	Sep. 04, 2021	Sep. 03, 2022
RF Coaxial Cable Rosnol	K1K50-UP0279- K1K50-3000	181129-1	Sep. 04, 2021	Sep. 03, 2022
RF Coaxial Cable JUNFLON+EMC	JUNFLON+EMC104- SM-SM-6000	Cable-CH2- 02(MWX3221308 G003+130710)	Jan. 15, 2022	Jan. 14, 2023
Fix tool for Boresight antenna	BAF-01	2	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Sep. 04, 2021	Sep. 03, 2022
HORN Antenna (with 3dB PAD) SCHWARZBECK	BBHA 9170	148	Nov. 14, 2021	Nov. 13, 2022

- Note: 1. The test was performed in HwaYa Chamber 2 (966 Chamber 1).  
 2. The VCCI Site Registration No. is G-10018.  
 3. The test site validated date: 2022/1/8 (VSWR)  
 4. Test Date: 2022/7/5

### 4.3 Antenna-Conducted Power Measurement

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver R&S	ESR3	102412	Jan. 22, 2022	Jan. 21, 2023
Matching Pad EMCI	EMCI-3PDSM75BF	N/A	Dec. 20, 2021	Dec. 19, 2022
Pre_Amplifier HP	8447D	2944A08118	Feb. 16, 2022	Feb. 15, 2023
RF Coaxial Cable Wonpro	5D-FB	FCC-APC-01	Dec. 07, 2021	Dec. 06, 2022
Software BVADT	Radiated_V8.7.08	NA	NA	NA
Vector Signal Generator ROHDE & SCHWARZ	SMJ100A	101943	Apr.18, 2022	Apr.17, 2023

- Note: 1. The test was performed in Linkou 966 Chamber 2 (CH 7).  
 2. The test site validated date: 2021/9/25 (NSA).  
 3. Test Date: 2022/7/26~27

## 5 Limits of Test Items

### 5.1 Radiated Emissions up to 1 GHz

Radiated Emissions Limits at 10 meters (dB $\mu$ V/m)				
Frequencies (MHz)	FCC Part 15B, Class A	FCC Part 15B, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5		

Radiated Emissions Limits at 3 meters (dB $\mu$ V/m)				
Frequencies (MHz)	FCC Part 15B, Class A	FCC Part 15B, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960			57.5	47.5
960-1000	60	54		

Notes: 1. The lower limit shall apply at the transition frequencies.

### 5.2 Radiated Emissions above 1 GHz

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

Radiated Emissions Limits at 3 meters (dB $\mu$ V/m)		
Frequency range	Class A	Class B
Above 1GHz	Avg: 60 Peak: 80	Avg: 54 Peak: 74

Notes: 1. These limit levels apply for a measurement distance of 3 m. If using a different measurement distance, the measured levels shall be extrapolated to the 3 m limit distance using a factor of 20 dB per decade of distance. The measurement distance shall place the measurement antenna in the far field of the ITE or digital apparatus under test.

### 5.3 Antenna-conducted Power Measurement

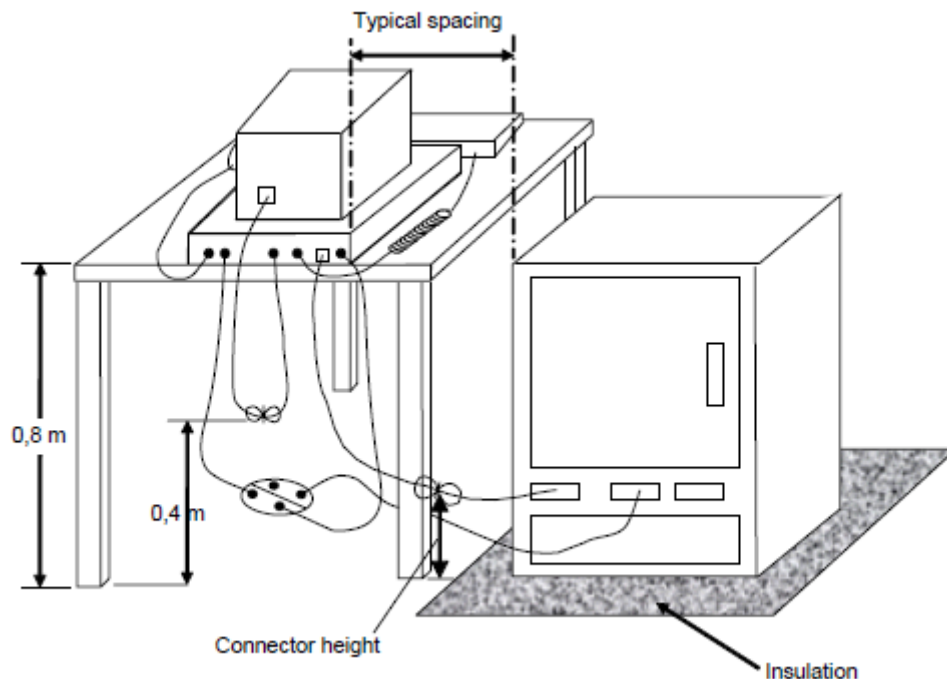
Frequency (MHz)	Limits (nW $\rightarrow$ dBuV)	
30 – 960	2 nW	51.81 dBuV

## 6 Test Arrangements

### 6.1 Radiated Emissions up to 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.

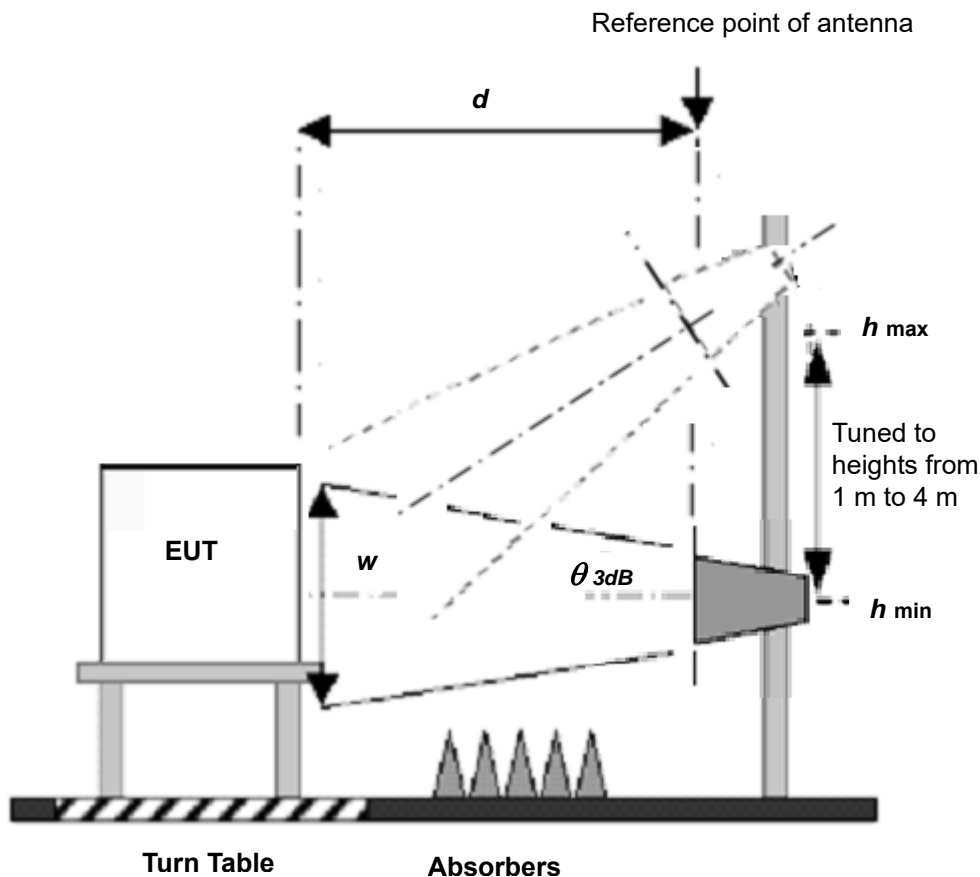


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

## 6.2 Radiated Emissions above 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set  $d = 3$  meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.



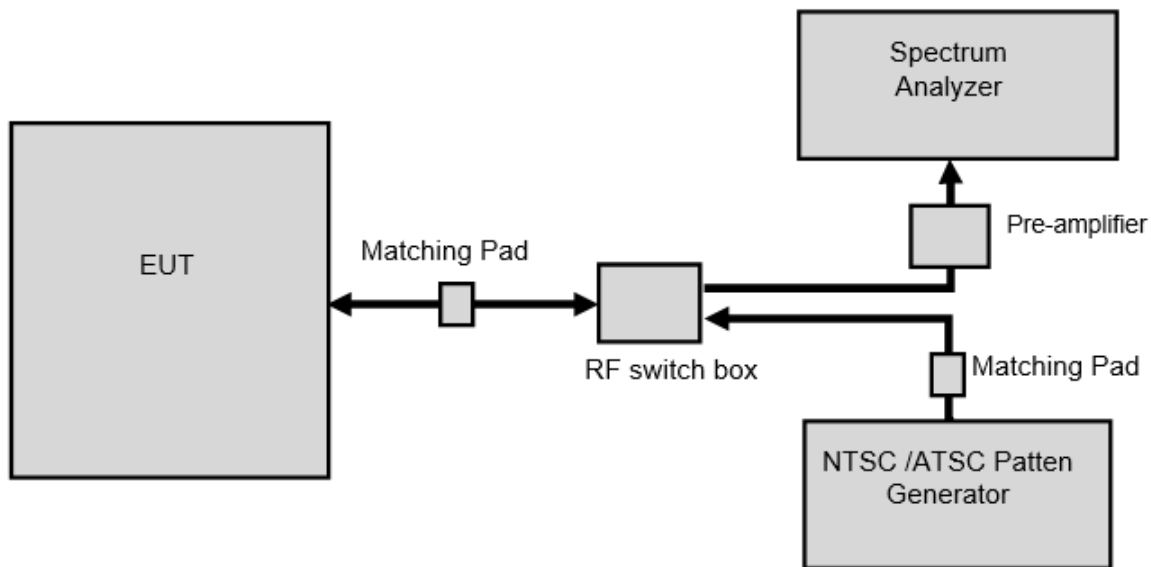
For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 6.3 Antenna-Conducted Power Measurement

- The antenna terminals of the EUT and the auxiliary signal generator(NTSC/ATSC) are connected to the measuring receiver by means of coaxial cables.
- RF switch box shall be switched to auxiliary signal generator side.
- The output level of the auxiliary signal generator would be set to give 70dB ( $\mu\text{V}$ ) at the antenna input of the EUT on  $75\Omega$  impedance. (For Analog signal in)
- The output level of the auxiliary signal generator would be set to give VHF 50 dB ( $\mu\text{V}$ ) and UHF 54 dB ( $\mu\text{V}$ ) at the antenna input of the EUT on  $75\Omega$  impedance. (For Digital signal in)
- RF switch box shall be switched to spectrum analyzer side.
- The measuring receiver is tuned to the test frequency and the disturbance level is measured, taking into account the attenuation between the receiver antenna terminal and the measuring receiver input.
- The test shall then be repeated with EUT switched off, to check that the measured disturbance voltage is not due to the auxiliary generator.
- In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed on antenna input terminal emission measurement.
- Conducted emissions were investigated over the frequency range from 30MHz to 960MHz using a receiver bandwidth of 120kHz.

Note:

- Emission level = Reading + Correction Factor
- Correction factor = Insertion loss + Cable loss – amplifier gain.
- Margin value = Emission level – Limit value.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



## 7 Test Results of Emission

### 7.1 Radiated Emissions up to 1 GHz

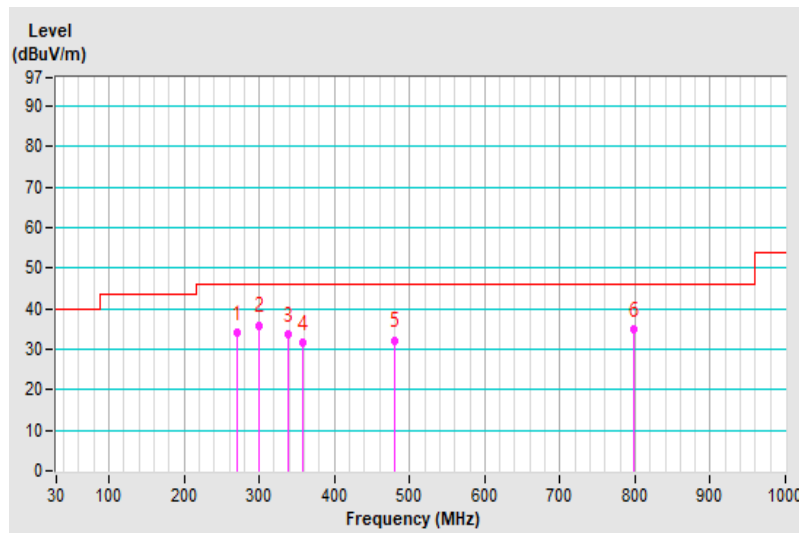
#### Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	270.96	34.01 QP	46.00	-11.99	1.00 H	125	41.94	-7.93
2	300.01	35.91 QP	46.00	-10.09	1.00 H	109	43.21	-7.30
3	338.67	33.50 QP	46.00	-12.50	1.00 H	305	39.91	-6.41
4	357.15	31.54 QP	46.00	-14.46	1.00 H	192	37.70	-6.16
5	479.23	32.20 QP	46.00	-13.80	2.00 H	196	36.22	-4.02
6	798.04	34.92 QP	46.00	-11.08	2.00 H	360	32.89	2.03

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

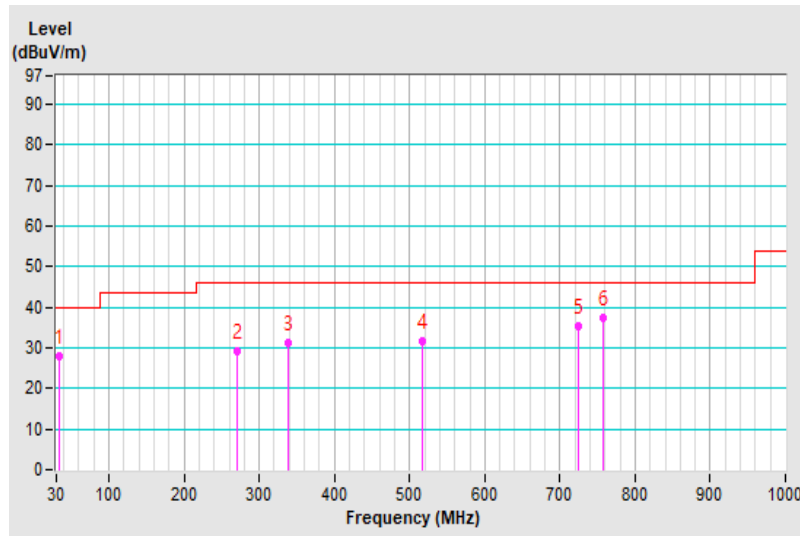


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	34.75	27.77 QP	40.00	-12.23	1.00 V	263	38.07	-10.30
2	270.96	29.27 QP	46.00	-16.73	2.00 V	188	37.20	-7.93
3	338.67	31.34 QP	46.00	-14.66	2.00 V	164	37.75	-6.41
4	516.09	31.64 QP	46.00	-14.36	2.00 V	2	34.95	-3.31
5	724.99	35.16 QP	46.00	-10.84	1.00 V	12	34.28	0.88
6	758.02	37.25 QP	46.00	-8.75	1.00 V	22	35.77	1.48

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



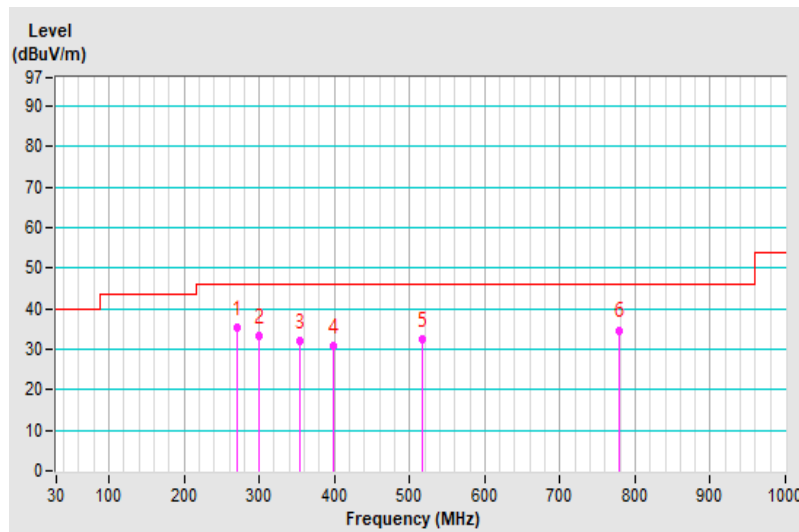
**Mode B**

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	270.96	35.15 QP	46.00	-10.85	1.00 H	123	43.08	-7.93
2	300.01	33.19 QP	46.00	-12.81	1.00 H	96	40.49	-7.30
3	354.82	31.87 QP	46.00	-14.13	1.00 H	110	38.10	-6.23
4	399.15	30.90 QP	46.00	-15.10	1.00 H	14	36.45	-5.55
5	516.09	32.47 QP	46.00	-13.53	2.00 H	305	35.78	-3.31
6	778.34	34.68 QP	46.00	-11.32	1.00 H	30	32.86	1.82

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

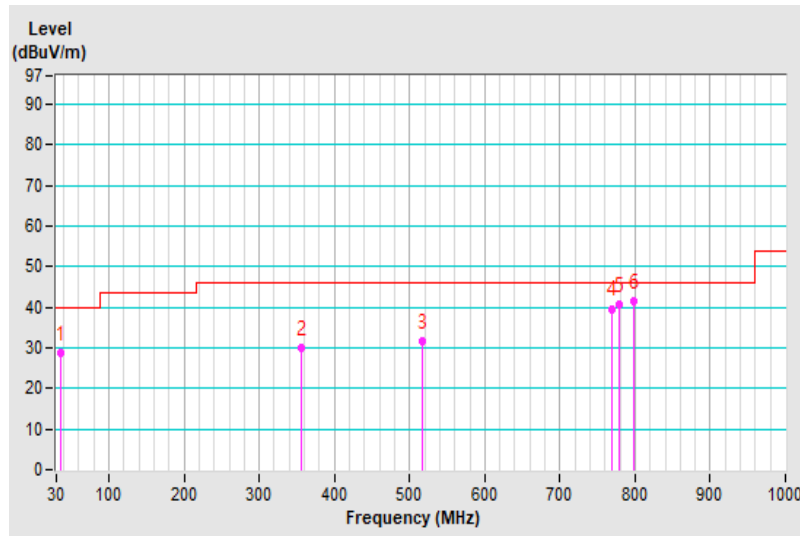


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.04	28.72 QP	40.00	-11.28	1.00 V	109	38.96	-10.24
2	355.16	30.01 QP	46.00	-15.99	2.00 V	166	36.23	-6.22
3	516.09	31.49 QP	46.00	-14.51	2.00 V	354	34.80	-3.31
4	768.26	39.64 QP	46.00	-6.36	1.00 V	345	38.03	1.61
5	778.00	40.78 QP	46.00	-5.22	1.00 V	345	38.99	1.79
<b>6</b>	<b>798.04</b>	<b>41.57 QP</b>	<b>46.00</b>	<b>-4.43</b>	<b>4.00 V</b>	<b>355</b>	<b>39.54</b>	<b>2.03</b>

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



## 7.2 Radiated Emissions above 1 GHz

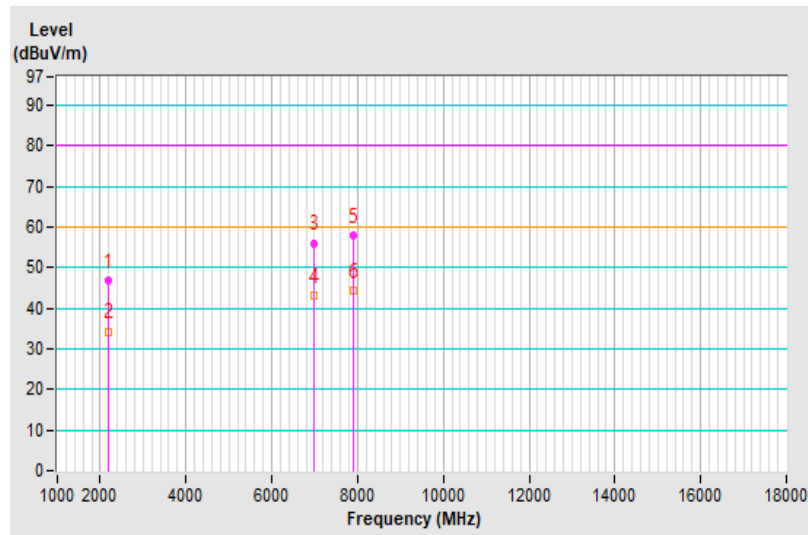
### Mode A

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2199.61	46.67 PK	80.00	-33.33	1.79 H	279	42.54	4.13
2	2199.61	34.28 AV	60.00	-25.72	1.79 H	279	30.15	4.13
3	7000.12	56.04 PK	80.00	-23.96	1.08 H	255	41.24	14.80
4	7000.12	43.00 AV	60.00	-17.00	1.08 H	255	28.20	14.80
5	7902.94	57.81 PK	80.00	-22.19	1.57 H	116	41.04	16.77
6	7902.94	44.45 AV	60.00	-15.55	1.57 H	116	27.68	16.77

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

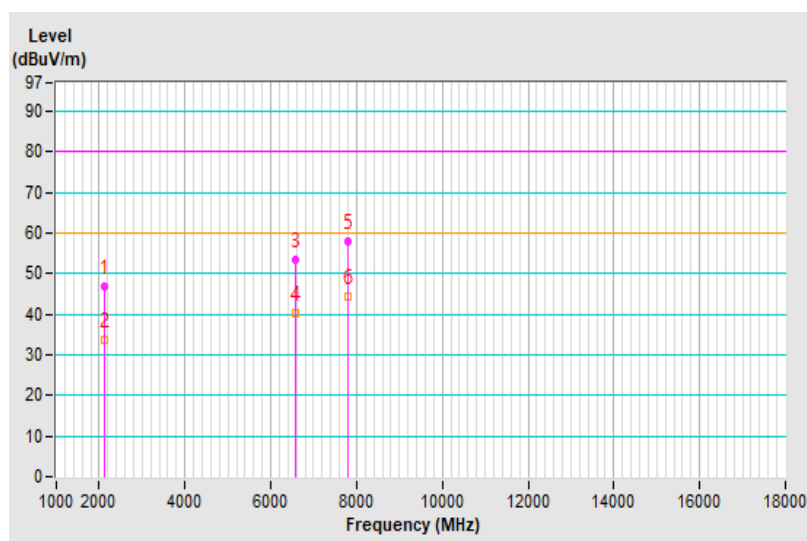


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2129.04	46.77 PK	80.00	-33.23	1.48 V	330	43.94	2.83
2	2129.04	33.58 AV	60.00	-26.42	1.48 V	330	30.75	2.83
3	6562.20	53.23 PK	80.00	-26.77	1.38 V	333	39.97	13.26
4	6562.20	40.29 AV	60.00	-19.71	1.38 V	333	27.03	13.26
5	7815.77	57.94 PK	80.00	-22.06	1.07 V	267	41.31	16.63
6	7815.77	44.48 AV	60.00	-15.52	1.07 V	267	27.85	16.63

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

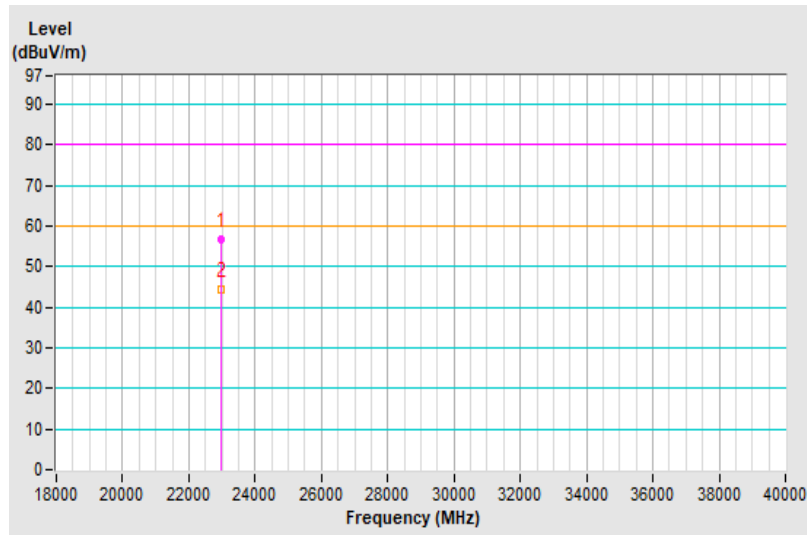


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Horizontal at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	22987.67	56.59 PK	80.00	-23.41	1.92 H	29	52.61	3.98
2	22987.67	44.48 AV	60.00	-15.52	1.92 H	29	40.50	3.98

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

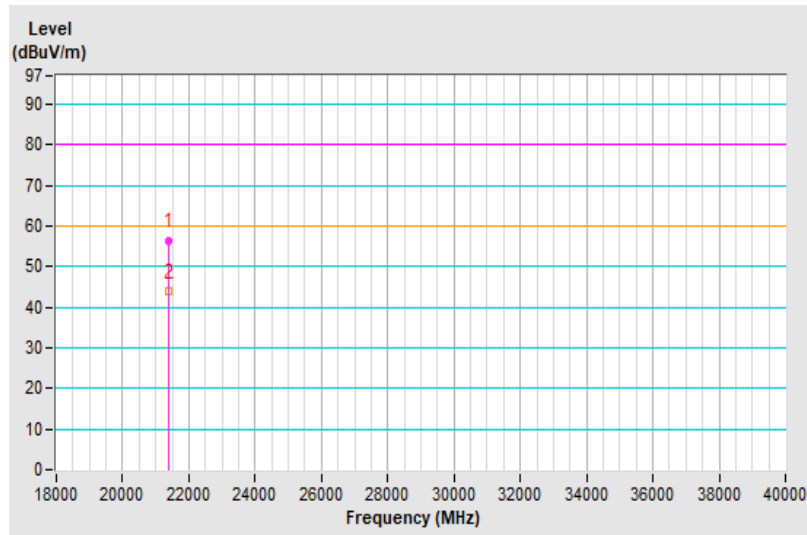


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Vertical at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	21370.77	56.46 PK	80.00	-23.54	1.57 V	18	54.42	2.04
2	21370.77	44.05 AV	60.00	-15.95	1.57 V	18	42.01	2.04

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value





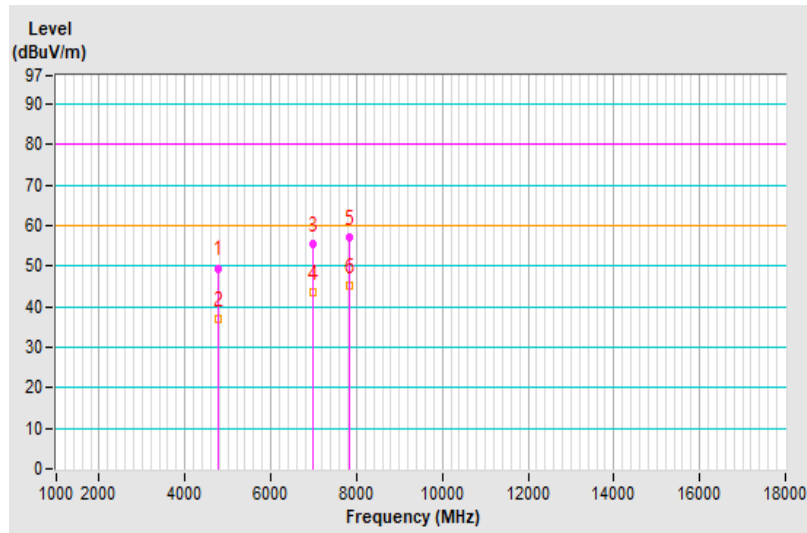
**Mode B**

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4781.47	49.51 PK	80.00	-30.49	1.57 H	203	41.38	8.13
2	4781.47	36.83 AV	60.00	-23.17	1.57 H	203	28.70	8.13
3	6983.52	55.58 PK	80.00	-24.42	1.60 H	227	40.90	14.68
4	6983.52	43.44 AV	60.00	-16.56	1.60 H	227	28.76	14.68
5	7844.83	57.06 PK	80.00	-22.94	1.58 H	132	40.33	16.73
<b>6</b>	<b>7844.83</b>	<b>45.06 AV</b>	<b>60.00</b>	<b>-14.94</b>	<b>1.58 H</b>	<b>132</b>	<b>28.33</b>	<b>16.73</b>

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

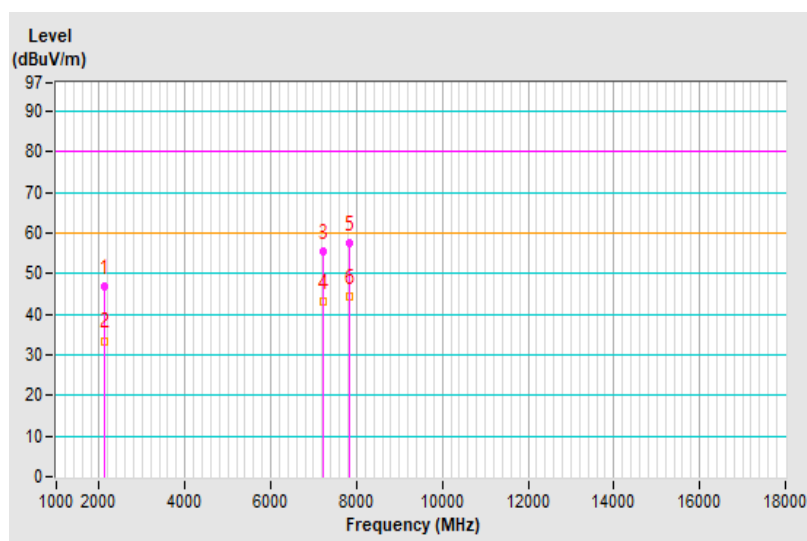


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2129.04	46.72 PK	80.00	-33.28	1.87 V	120	43.89	2.83
2	2129.04	33.48 AV	60.00	-26.52	1.87 V	120	30.65	2.83
3	7213.89	55.61 PK	80.00	-24.39	1.59 V	351	40.19	15.42
4	7213.89	43.25 AV	60.00	-16.75	1.59 V	351	27.83	15.42
5	7819.92	57.57 PK	80.00	-22.43	1.13 V	70	40.93	16.64
6	7819.92	44.38 AV	60.00	-15.62	1.13 V	70	27.74	16.64

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

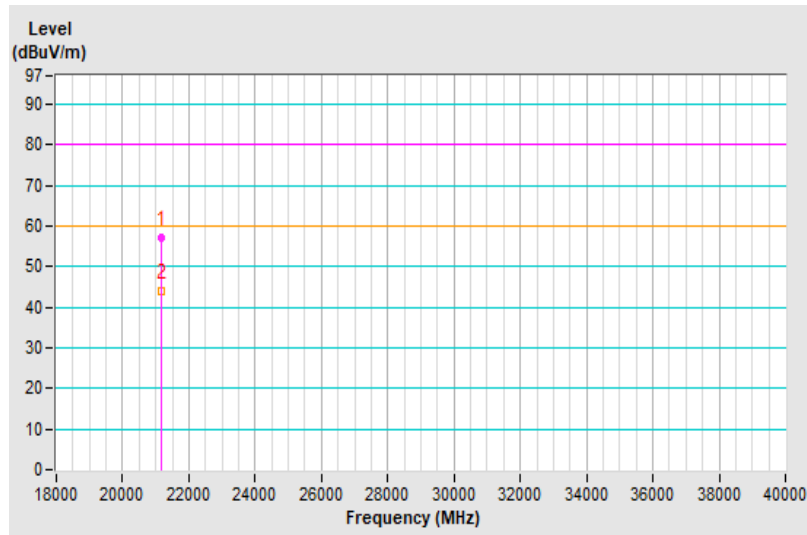


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Horizontal at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	21177.39	57.07 PK	80.00	-22.93	1.91 H	107	54.68	2.39
2	21177.39	44.01 AV	60.00	-15.99	1.91 H	107	41.62	2.39

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

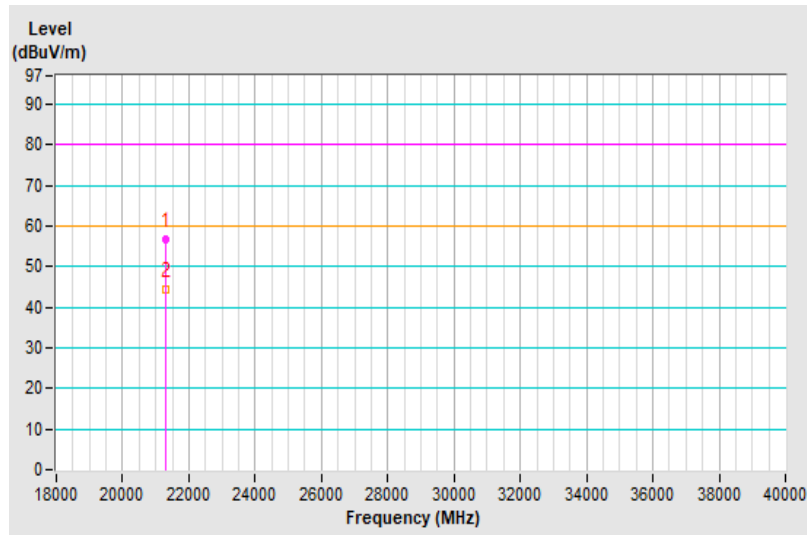


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	12 Vdc (battery)	Environmental Conditions	23°C, 67% RH
Tested By	Brian Kuo		

Antenna Polarity & Test Distance : Vertical at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	21290.20	56.57 PK	80.00	-23.43	1.03 V	351	54.41	2.16
2	21290.20	44.21 AV	60.00	-15.79	1.03 V	351	42.05	2.16

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



### 7.3 Antenna-conducted Power Measurement

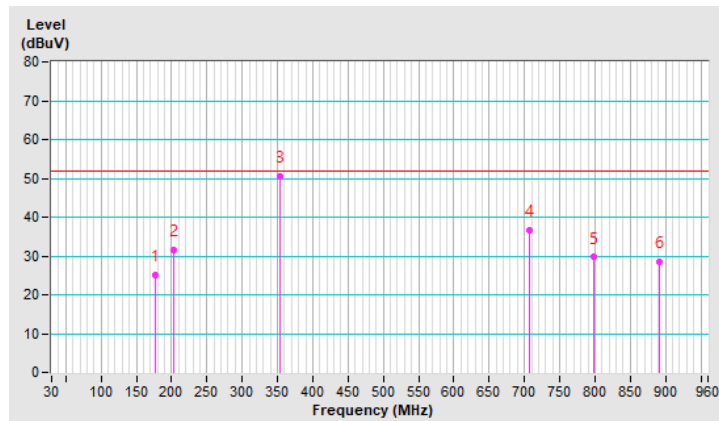
#### Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	25°C, 75% RH
Tested By	Vincent Lin		

No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading (dBuV)	Correction Factor (dB)
1	177.25	25.07	51.81	-26.74	43.21	-18.14
2	203.60	31.50	51.81	-20.31	49.30	-17.80
3	353.95	50.51	51.81	-1.30	66.90	-16.39
4	707.35	36.54	51.81	-15.27	51.27	-14.73
5	798.80	29.69	51.81	-22.12	43.72	-14.03
6	890.25	28.44	51.81	-23.37	41.19	-12.75

Remarks:

1. Emission Level = Reading + Correction Factor
2. Correction Factor = Insertion loss + Cable loss – amplifier gain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



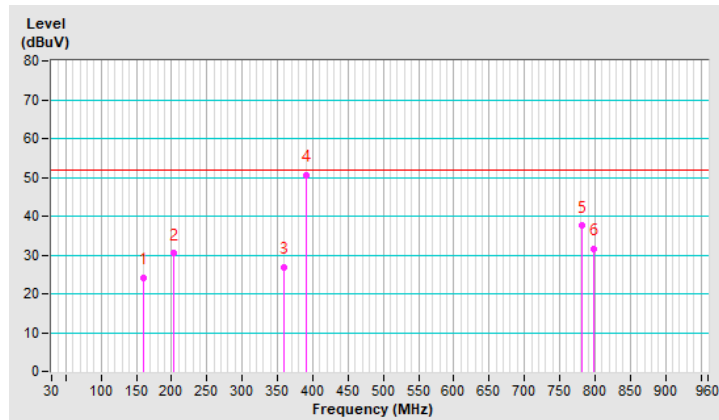
**Mode B**

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	25°C, 75% RH
Tested By	Vincent Lin		

No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading (dBuV)	Correction Factor (dB)
1	160.20	24.15	51.81	-27.66	42.55	-18.40
2	202.98	30.36	51.81	-21.45	48.17	-17.81
3	359.22	26.87	51.81	-24.94	43.26	-16.39
<b>4</b>	<b>390.84</b>	<b>50.53</b>	<b>51.81</b>	<b>-1.28</b>	<b>66.97</b>	<b>-16.44</b>
5	781.44	37.53	51.81	-14.28	51.93	-14.40
6	798.18	31.49	51.81	-20.32	45.53	-14.04

Remarks:

1. Emission Level = Reading + Correction Factor
2. Correction Factor = Insertion loss + Cable loss – amplifiergain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



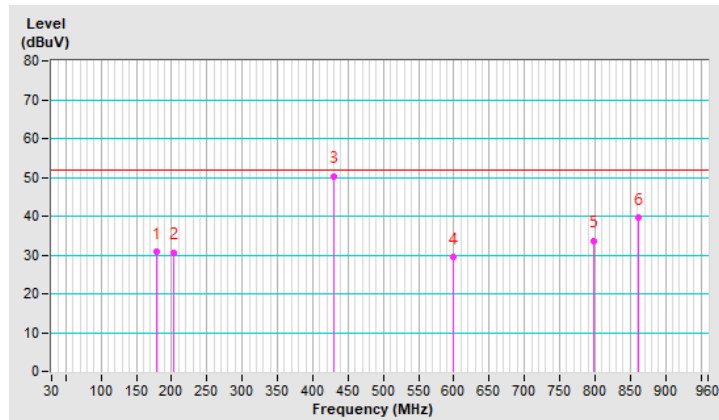
**Mode C**

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	25°C, 75% RH
Tested By	Vincent Lin		

No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading (dBuV)	Correction Factor (dB)
1	178.80	30.72	51.81	-21.09	48.83	-18.11
2	202.98	30.58	51.81	-21.23	48.39	-17.81
3	429.90	50.11	51.81	-1.70	66.66	-16.55
4	599.16	29.37	51.81	-22.44	45.36	-15.99
5	798.18	33.56	51.81	-18.25	47.60	-14.04
6	861.42	39.50	51.81	-12.31	52.47	-12.97

Remarks:

1. Emission Level = Reading + Correction Factor
2. Correction Factor = Insertion loss + Cable loss – amplifiergain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



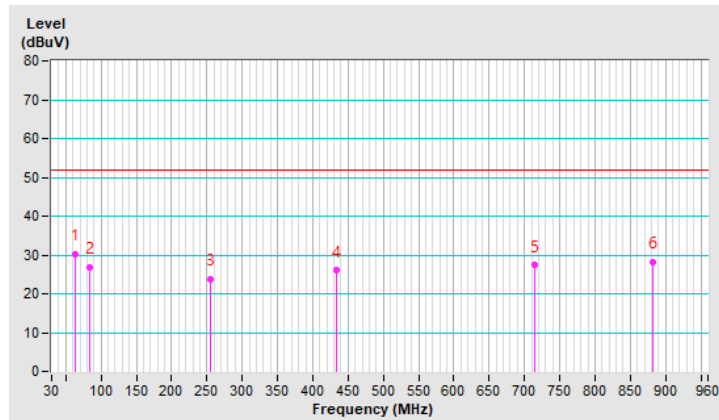
**Mode D**

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	25°C, 75% RH
Tested By	Vincent Lin		

No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading (dBuV)	Correction Factor (dB)
1	63.48	30.18	51.81	-21.63	49.54	-19.36
2	83.94	26.75	51.81	-25.06	45.97	-19.22
3	255.06	23.66	51.81	-28.15	40.84	-17.18
4	433.62	25.96	51.81	-25.85	42.48	-16.52
5	714.48	27.34	51.81	-24.47	42.02	-14.68
6	881.88	28.12	51.81	-23.69	40.91	-12.79

Remarks:

1. Emission Level = Reading + Correction Factor
2. Correction Factor = Insertion loss + Cable loss – amplifiergain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value





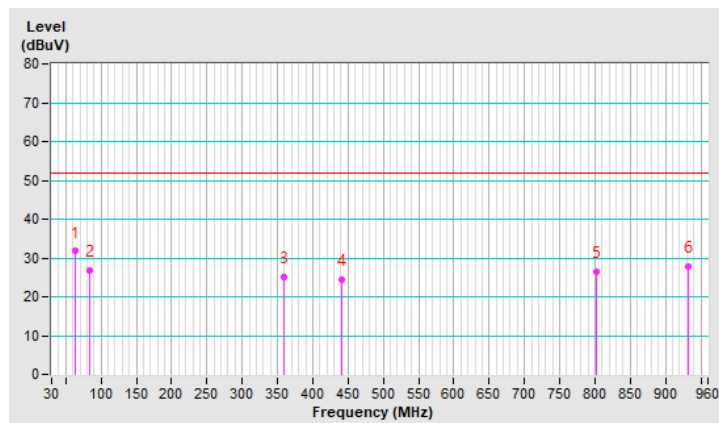
**Mode E**

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	25°C, 75% RH
Tested By	Vincent Lin		

No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading (dBuV)	Correction Factor (dB)
1	63.48	31.77	51.81	-20.04	51.13	-19.36
2	83.94	26.86	51.81	-24.95	46.08	-19.22
3	359.22	25.24	51.81	-26.57	41.63	-16.39
4	441.06	24.33	51.81	-27.48	40.81	-16.48
5	801.90	26.36	51.81	-25.45	40.33	-13.97
6	932.10	27.79	51.81	-24.02	40.04	-12.25

Remarks:

1. Emission Level = Reading + Correction Factor
2. Correction Factor = Insertion loss + Cable loss – amplifiergain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



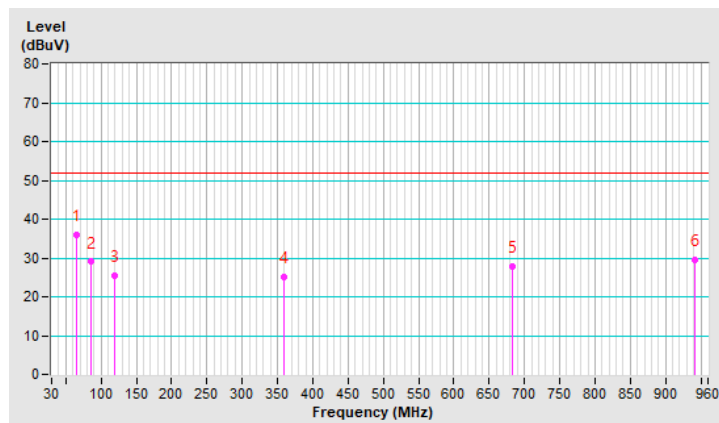
**Mode F**

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	12 Vdc (battery)	Environmental Conditions	25°C, 75% RH
Tested By	Vincent Lin		

No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading (dBuV)	Correction Factor (dB)
1	65.34	35.87	51.81	-15.94	55.23	-19.36
2	85.80	29.05	51.81	-22.76	48.26	-19.21
3	119.28	25.35	51.81	-26.46	44.24	-18.89
4	359.22	25.24	51.81	-26.57	41.63	-16.39
5	682.86	27.82	51.81	-23.99	42.81	-14.99
6	941.40	29.44	51.81	-22.37	41.55	-12.11

Remarks:

1. Emission Level = Reading + Correction Factor
2. Correction Factor = Insertion loss + Cable loss – amplifiergain
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)



## 9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Lin Kou EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

Fax: 886-3-6668323

**Hwa Ya EMC/RF/Safety Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.

--- END ---