

# FCC Test Report

**FCC ID** : JVPU2-D  
**Equipment** : Mouse for e-Sports  
**Model No.** : U2-D  
**Brand Name** : ZOWIE  
**Applicant** : BENQ CORPORATION  
**Address** : 16 Jihu Road, Neihu, Taipei 114, Taiwan  
**Standard** : 47 CFR FCC Part 15.249  
**Received Date** : Jul. 20, 2023  
**Tested Date** : Jul. 31 ~ Aug. 03, 2023

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:

  
\_\_\_\_\_  
Along Chen / Assistant Manager

  
\_\_\_\_\_  
Gary Chang / Manager

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**Appendix A. Unwanted Emission**  
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## Release Record

Report No.	Version	Description	Issued Date
FR372002	Rev. 01	Initial issue	Sep. 04, 2023

## Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.788MHz 27.66 (Margin -18.34dB) - AV	Pass
15.249(a)	Field Strength of Fundamental	Meet the requirement of limit	Pass
15.249(a)(d)	Field Strength of Harmonics and Emissions Radiated outside of the Specified Frequency Bands	Meet the requirement of limit	Pass
15.215(c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

### Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

### Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

# 1 General Description

## 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Modulation	Ch. Freq. (MHz)	Channel Number	Data Rate
2400-2483.5	GFSK	2403-2481	1-79 [79]	2Mbps

### 1.1.2 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)
1	BENQ Corporation	U2 ANT	LDS Antenna	NA	1.35

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

<b>Power Type</b>	5Vdc from host 3.7Vdc from battery
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### 1.1.4 Accessories

No.	Equipment	Description
1	Battery	Brand: Hangzhou Future Power Technology Co., Ltd Model: FT602030P/300mAh Rating: 300mAh, 3.7V
2	USB cable	Brand: Brand: Le Prestique Electronics Manufacturing Model: F41-2500-061-004 Line: 2.05m non-shielded one core
3	USB cable	Brand: Le Prestique Electronics Manufacturing Ltd. Model: F41-2500-083-005 Line: 2.0m shielded without core

### 1.1.5 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	79	2481
20	2422	40	2442	60	2462	---	---

### 1.1.6 Test Tool and Duty Cycle

Test Tool	radio_test, Version: 1.0.0.0	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	100	0

### 1.1.7 Power Index of Test Tool

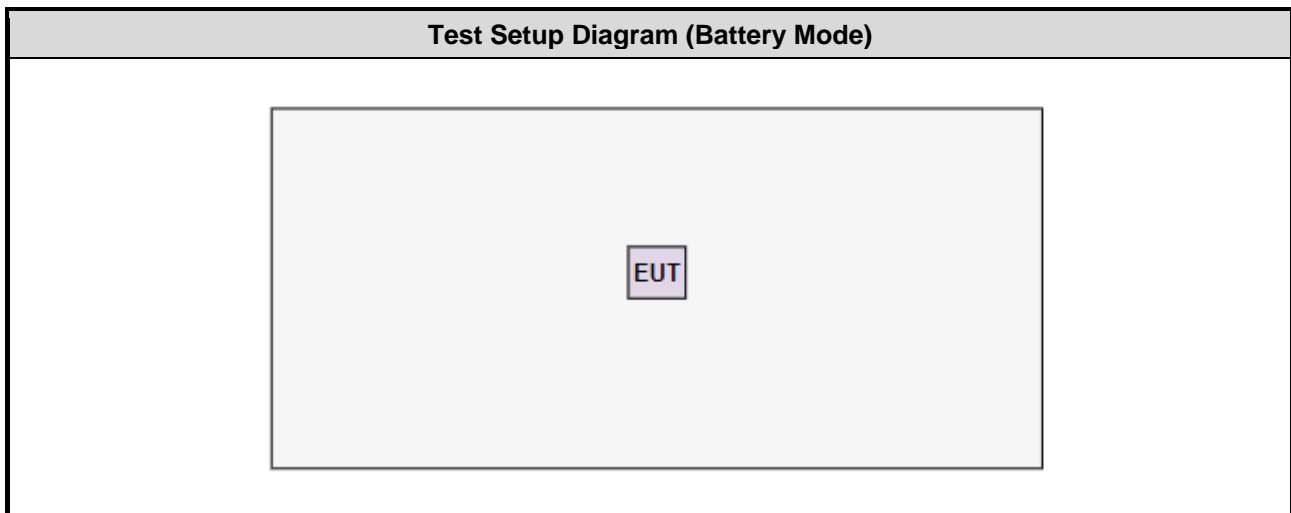
Modulation Mode	Test Frequency (MHz)		
	2403	2441	2481
GFSK	4dBm	4dBm	4dBm

## 1.2 Local Support Equipment List

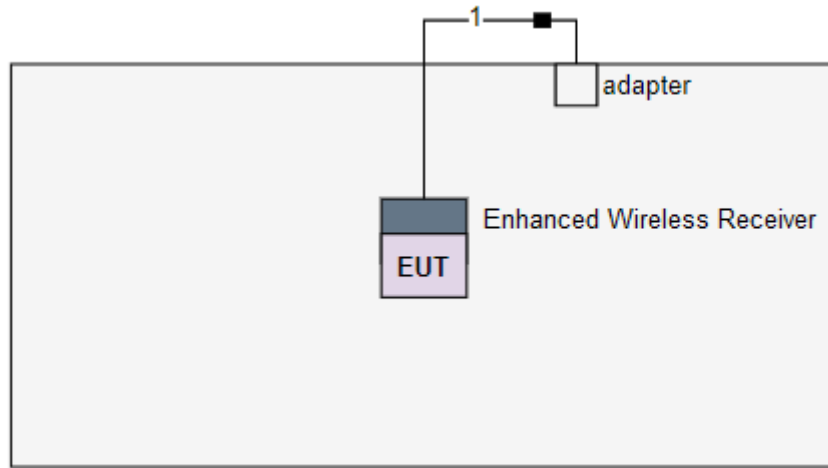
Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Laptop	DELL	Latitude 5400	DoC	---
For charging mode use only					
2	Enhanced Wireless Receiver	ZOWIE	ER-81	---	Provided by applicant.
3	Adapter	Samsung	ETA-U90JWS	---	---

Note: The support Laptop was removed from test table after sending command to control EUT to transmit continuously.

## 1.3 Test Setup Chart



**Test Setup Diagram (Charging Mode)**



No.	Signal cable / Length (m)
1	USB, 2.05m non-shielded with one core.



## 1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Aug. 03, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101658	Feb. 17, 2023	Feb. 16, 2024
LISN	R&S	ENV216	101579	May 09, 2023	May 08, 2024
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127667	Jan .03, 2023	Jan .02, 2024
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 17, 2022	Oct. 16, 2023
50 ohm terminal (Support Unit)	NA	50	01	Jun. 14, 2023	Jun. 13, 2024
Measurement Software	AUDIX	e3	6.120210k	NA	NA

Note: Calibration Interval of instruments listed above is one year.

Test Item	Radiated Emission				
Test Site	966 chamber3 / (03CH03-WS)				
Tested Date	Jul. 31, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 03, 2023	Mar. 02, 2024
Spectrum Analyzer	R&S	FSV40	101499	Mar. 16, 2023	Mar. 15, 2024
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 01, 2022	Oct. 31, 2023
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Jul. 04, 2023	Jul. 03, 2024
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 15, 2022	Dec. 14, 2023
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 27, 2022	Oct. 26, 2023
Preamplifier	EMC	EMC02325	980187	Jul. 10, 2023	Jul. 09, 2024
Preamplifier	Agilent	83017A	MY39501308	Oct. 26, 2022	Oct. 25, 2023
Preamplifier	EMC	EMC184045SE	980903	Jul. 17, 2023	Jul. 16, 2024
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 04, 2022	Oct. 03, 2023
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 23, 2022	Sep. 22, 2023
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 23, 2022	Sep. 22, 2023
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 23, 2022	Sep. 22, 2023
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 23, 2022	Sep. 22, 2023
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 23, 2022	Sep. 22, 2023
Attenuator	Pasternack	PE7005-10	10-3	Oct. 14, 2022	Oct. 13, 2023
HIGHPASS FILTER	WI	WHK3.1-18G-10SS	43	Sep. 28, 2022	Sep. 27, 2023
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

## 1.5 Test Standards

47 CFR FCC Part 15.249  
ANSI C63.10-2013

## 1.6 Deviation from Test Standard and Measurement Procedure

None

## 1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ( $k=2$ )).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	$\pm 34.130$ Hz
AC conducted emission	$\pm 2.92$ dB
Unwanted Emission $\leq 1$ GHz	$\pm 3.96$ dB
Unwanted Emission $> 1$ GHz	$\pm 4.51$ dB

## 2 Test Configuration

### 2.1 Testing Facility

<b>Test Laboratory</b>	International Certification Corporation
<b>Test Site</b>	CO01-WS
<b>Address of Test Site</b>	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)
<b>Test Site</b>	03CH03-WS
<b>Address of Test Site</b>	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807C
- CAB identifier: TW2732

### 2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
AC Power Line Conducted Emissions	Charging	-	-	-
Unwanted Emissions ≤ 1GHz	GFSK	2441	2 Mbps	-
	Charging	-	-	-
Unwanted Emissions > 1GHz	GFSK	2403, 2441, 2481	2 Mbps	-
20dB bandwidth Field Strength of Fundamental	GFSK	2403, 2441, 2481	2 Mbps	-

Note: Two USB cable (2.05m and 2m) had been covered during the pretest, and found that USB cable 2.05m was the worst case and was selected for final test.

## 3 Transmitter Test Results

### 3.1 Unwanted Emission

This section includes field strength of fundamental, field strength of harmonics and emissions radiated outside of the operating frequency bands.

#### 3.1.1 Limit of field strength of fundamental and field strength of harmonics

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400–2483.5 MHz	50	500

#### 3.1.2 Limit of Unwanted Emissions

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in below table, whichever is the lesser attenuation.

Radiated emission limits			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

**Note 1:**  
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

**Note 2:**  
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

### 3.1.3 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

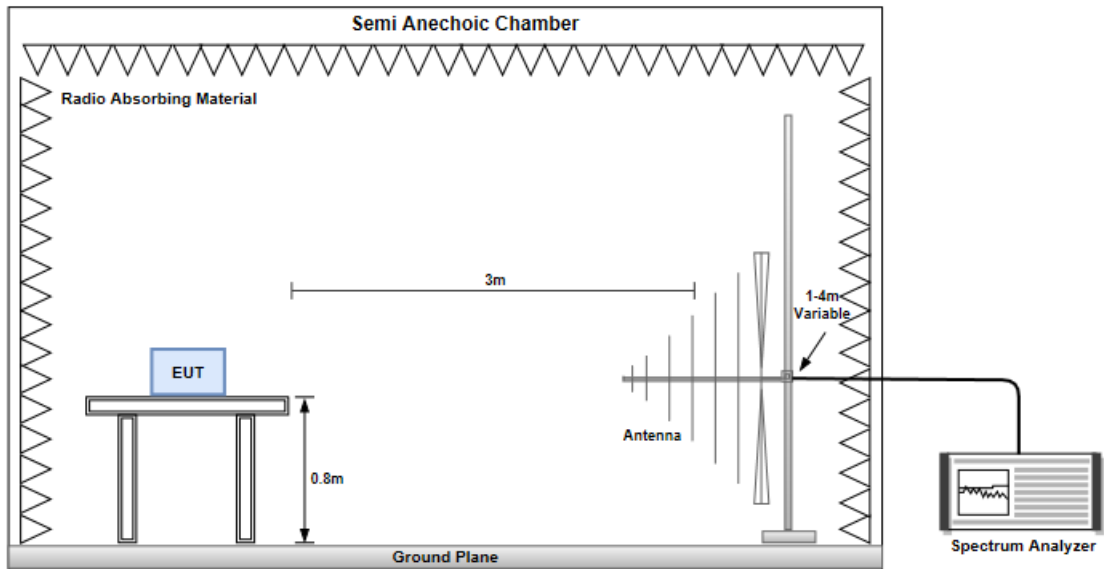
1. Radiated emission below 1GHz  
120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental  
RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for field strength of fundamental and harmonics  
The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{0.095797 * 100 \text{ ms}}{100 \text{ ms}} = -20.37\text{dB}$$

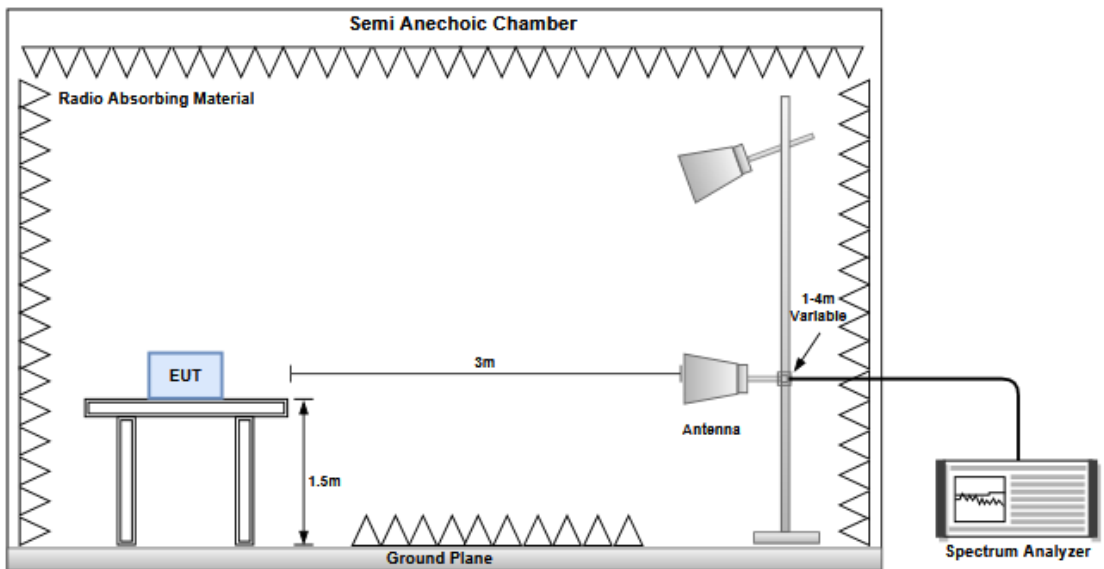
4. Radiated emission above 1GHz / Average value for other emissions  
RBW=1MHz, VBW=1/T and Peak detector
5. Radiated emission Peak value for fundamental  
RBW=2MHz, VBW=10MHz and Peak detector

### 3.1.4 Test Setup

#### Radiated Emissions below 1 GHz



#### Radiated Emissions above 1 GHz



### 3.1.5 Test Results

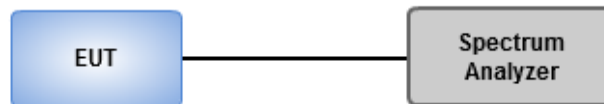
Refer to Appendix A.

## 3.2 20dB and Occupied Bandwidth

### 3.2.1 Test Procedures

1. Set resolution bandwidth (RBW) = 20 kHz, Video bandwidth = 100 kHz.
2. Detector = Peak(20 dB bandwidth) / Sample(Occupied bandwidth), Trace mode = max hold
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.
5. Use the occupied measurement function of spectrum analyzer to measure 99% occupied bandwidth.

### 3.2.2 Test Setup



### 3.2.3 Test Results

<b>Ambient Condition</b>	24°C / 62%	<b>Tested By</b>	Paul Lin
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Refer to Appendix B.

### 3.3 AC Power Line Conducted Emissions

#### 3.3.1 Limit of AC Power Line Conducted Emissions

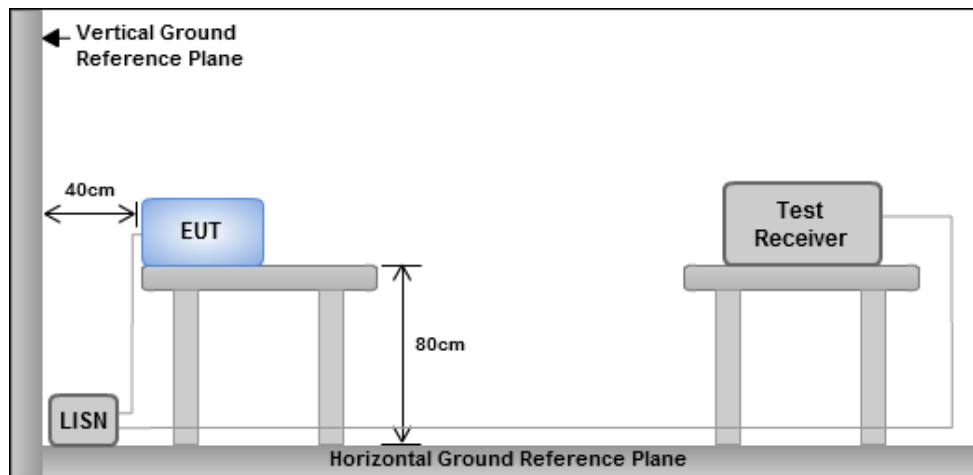
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: \* Decreases with the logarithm of the frequency.

#### 3.3.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

#### 3.3.3 Test Setup



- Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

#### 3.3.4 Test Results

Refer to Appendix C.



## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

### **Linkou**

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou  
District, New Taipei City, Taiwan  
(R.O.C.)

### **Kwei Shan**

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)  
No.2-1, Lane 6, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)

### **Kwei Shan Site II**

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC\_Service@icertifi.com.tw

==END==



Unwanted Emissions (Below 1GHz)

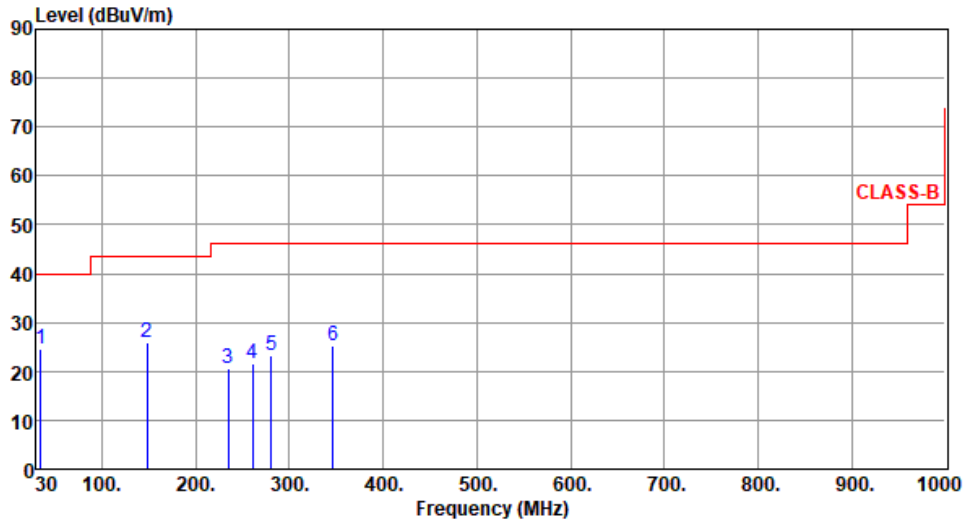
Modulation	GFSK	Test Freq. (MHz)	2441						
Polarization	Horizontal								
Test By :Paul Lin      Temperature(°C):24      Humidity(%):62									
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	51.34	23.63	40.00	-16.37	31.50	-7.87	Peak	---	---
2	119.24	23.57	43.50	-19.93	34.69	-11.12	Peak	---	---
3	254.07	21.67	46.00	-24.33	31.29	-9.62	Peak	---	---
4	280.26	22.85	46.00	-23.15	31.31	-8.46	Peak	---	---
5	319.06	23.80	46.00	-22.20	30.98	-7.18	Peak	---	---
6	372.41	24.82	46.00	-21.18	30.62	-5.80	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).  
 Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



<b>Modulation</b>	GFSK	<b>Test Freq. (MHz)</b>	2441
<b>Polarization</b>	Vertical		

Test By :Paul Lin      Temperature(°C):24      Humidity(%):62



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	34.85	24.47	40.00	-15.53	33.73	-9.26	Peak	---	---
2	148.34	25.89	43.50	-17.61	34.53	-8.64	Peak	---	---
3	234.67	20.43	46.00	-25.57	30.98	-10.55	Peak	---	---
4	260.86	21.46	46.00	-24.54	30.80	-9.34	Peak	---	---
5	280.26	23.40	46.00	-22.60	31.86	-8.46	Peak	---	---
6	346.22	25.10	46.00	-20.90	31.72	-6.62	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



<b>Mode</b>	Charging mode									
<b>Polarization</b>	Horizontal									
Test By : Paul Lin			Temperature(°C): 24			Humidity(%): 62				
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn	
	MHz	level	dBuV/m	dB	reading	dB/m		High	Table	
					dBuV			cm	deg	
1	36.79	23.82	40.00	-16.18	32.81	-8.99	Peak	---	---	
2	54.25	24.73	40.00	-15.27	32.76	-8.03	Peak	---	---	
3	126.03	21.83	43.50	-21.67	32.49	-10.66	Peak	---	---	
4	149.31	22.20	43.50	-21.30	30.71	-8.51	Peak	---	---	
5	280.26	23.32	46.00	-22.68	31.78	-8.46	Peak	---	---	
6	346.22	24.44	46.00	-21.56	31.06	-6.62	Peak	---	---	

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



<b>Mode</b>	Charging mode									
<b>Polarization</b>	Vertical									
Test By : Paul Lin			Temperature(°C): 24			Humidity(%): 62				
<p>The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red step function represents the CLASS-B limit, starting at 40 dBuV/m from 30 MHz to 100 MHz, rising to 45 dBuV/m at 200 MHz, and rising to 55 dBuV/m at 900 MHz. Six blue vertical lines indicate emission peaks at 35.82 MHz, 51.34 MHz, 148.34 MHz, 302.57 MHz, 382.11 MHz, and 428.67 MHz.</p>										
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg	
1	35.82	27.54	40.00	-12.46	36.90	-9.36	Peak	---	---	
2	51.34	25.91	40.00	-14.09	33.78	-7.87	Peak	---	---	
3	148.34	25.81	43.50	-17.69	34.45	-8.64	Peak	---	---	
4	302.57	23.39	46.00	-22.61	31.25	-7.86	Peak	---	---	
5	382.11	25.15	46.00	-20.85	30.55	-5.40	Peak	---	---	
6	428.67	26.58	46.00	-19.42	30.65	-4.07	Peak	---	---	

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

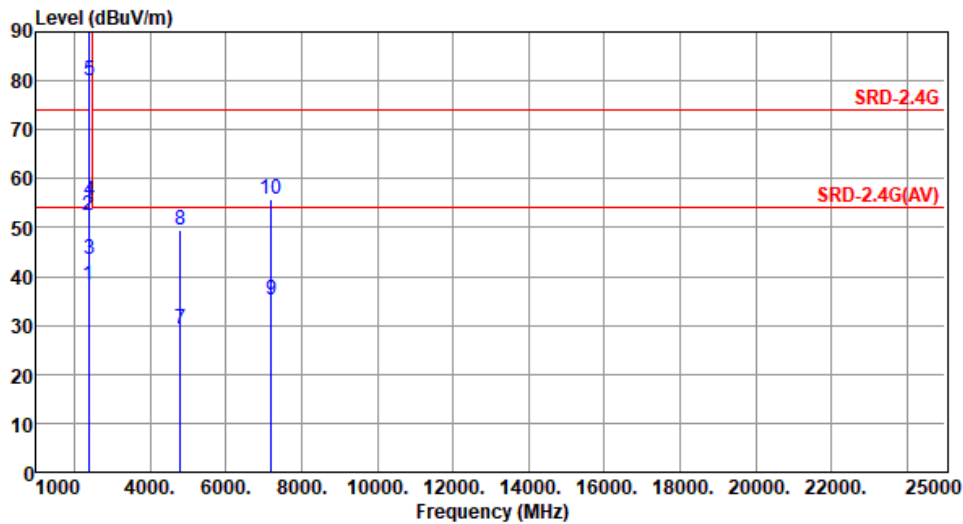
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



Unwanted Emissions (Above 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2403
Polarization	Horizontal		

Test By :Paul Lin      Temperature(°C):24      Humidity(%):62



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	38.33	54.00	-15.67	40.08	-1.75	Average	100	179
2	2390.00	52.37	74.00	-21.63	54.12	-1.75	Peak	100	179
3	2400.00	43.52	54.00	-10.48	45.32	-1.80	Average	100	179
4	2400.00	55.56	74.00	-18.44	57.36	-1.80	Peak	100	179
5	2403.00	80.13	94.00	-13.87			Average	100	179
6	2403.00	100.50	114.00	-13.50	102.31	-1.81	Peak	100	179
7	4806.00	29.15	54.00	-24.85			Average	115	46
8	4806.00	49.52	74.00	-24.48	44.75	4.77	Peak	115	46
9	7209.00	35.31	54.00	-18.69			Average	100	259
10	7209.00	55.68	74.00	-18.32	44.89	10.79	Peak	100	259

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

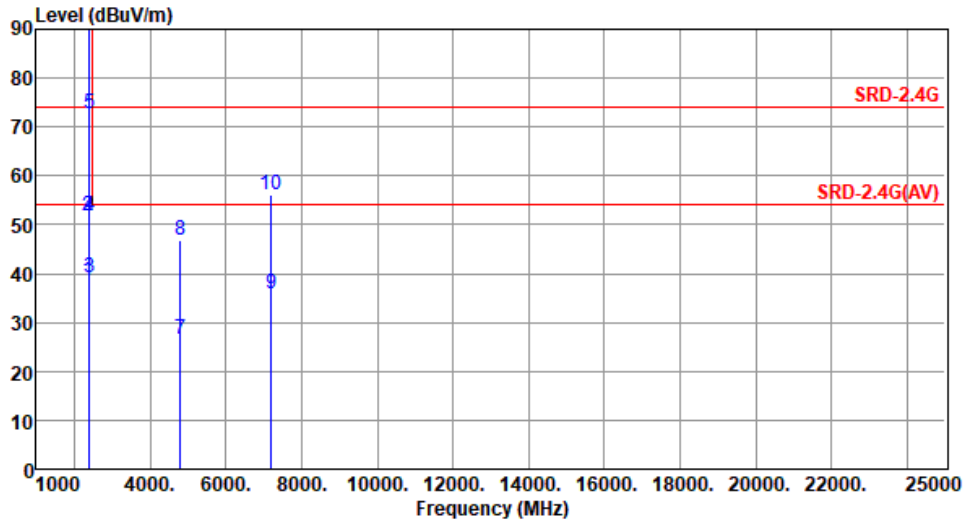
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: When average value is calculated not measured, no SA reading and factor value are listed.



<b>Modulation</b>	GFSK	<b>Test Freq. (MHz)</b>	2403
<b>Polarization</b>	Vertical		

Test By :Paul Lin      Temperature(°C):24      Humidity(%):62



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	38.46	54.00	-15.54	40.21	-1.75	Average	345	210
2	2390.00	51.70	74.00	-22.30	53.45	-1.75	Peak	345	210
3	2400.00	39.35	54.00	-14.65	41.15	-1.80	Average	345	210
4	2400.00	51.68	74.00	-22.32	53.48	-1.80	Peak	345	210
5	2403.00	72.76	94.00	-21.24			Average	345	210
6	2403.00	93.13	114.00	-20.87	94.94	-1.81	Peak	345	210
7	4806.00	26.54	54.00	-27.46			Average	100	258
8	4806.00	46.91	74.00	-27.09	42.14	4.77	Peak	100	258
9	7209.00	35.77	54.00	-18.23			Average	115	226
10	7209.00	56.14	74.00	-17.86	45.35	10.79	Peak	115	226

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

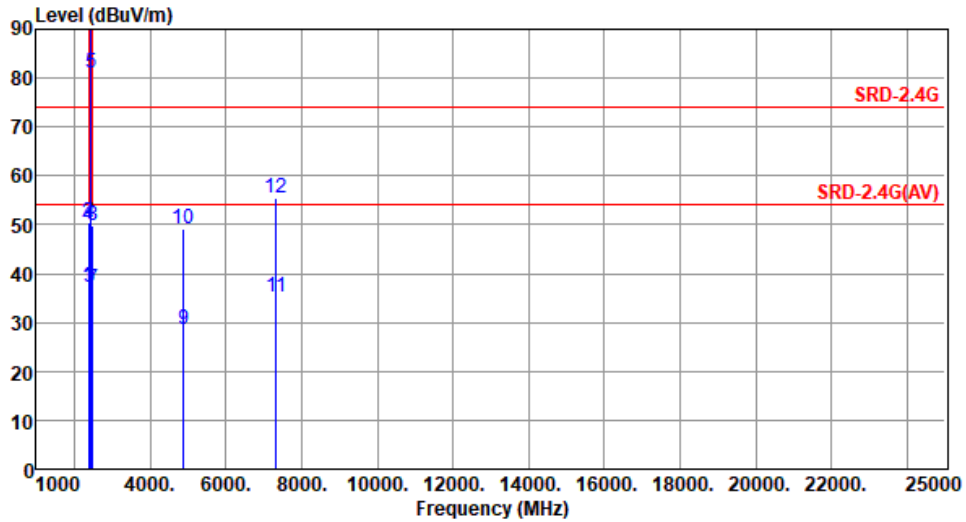
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: When average value is calculated not measured, no SA reading and factor value are listed.



<b>Modulation</b>	GFSK	<b>Test Freq. (MHz)</b>	2441
<b>Polarization</b>	Horizontal		

Test By : Paul Lin      Temperature(°C): 24      Humidity(%): 62



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	37.15	54.00	-16.85	38.90	-1.75	Average	100	175
2	2390.00	50.46	74.00	-23.54	52.21	-1.75	Peak	100	175
3	2400.00	37.23	54.00	-16.77	39.03	-1.80	Average	100	175
4	2400.00	50.51	74.00	-23.49	52.31	-1.80	Peak	100	175
5	2441.00	80.89	94.00	-13.11			Average	100	175
6	2441.00	101.26	114.00	-12.74	103.11	-1.85	Peak	100	175
7	2483.50	36.78	54.00	-17.22	38.68	-1.90	Average	100	175
8	2483.50	49.93	74.00	-24.07	51.83	-1.90	Peak	100	175
9	4882.00	28.72	54.00	-25.28			Average	119	43
10	4882.00	49.09	74.00	-24.91	44.18	4.91	Peak	119	43
11	7323.00	35.20	54.00	-18.80			Average	101	258
12	7323.00	55.57	74.00	-18.43	44.78	10.79	Peak	101	258

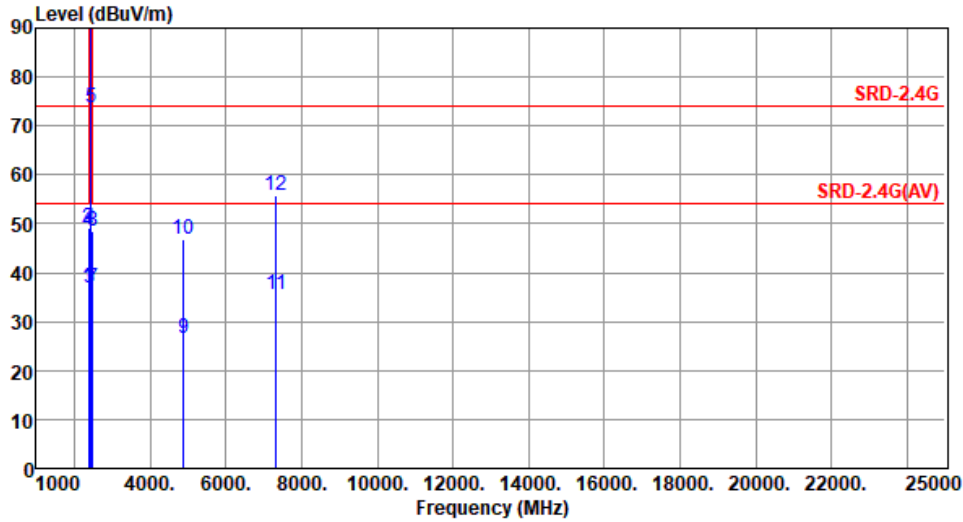
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).  
 Note 3: When average value is calculated not measured, no SA reading and factor value are listed.





<b>Modulation</b>	GFSK	<b>Test Freq. (MHz)</b>	2441
<b>Polarization</b>	Vertical		

Test By :Paul Lin      Temperature(°C):24      Humidity(%):62



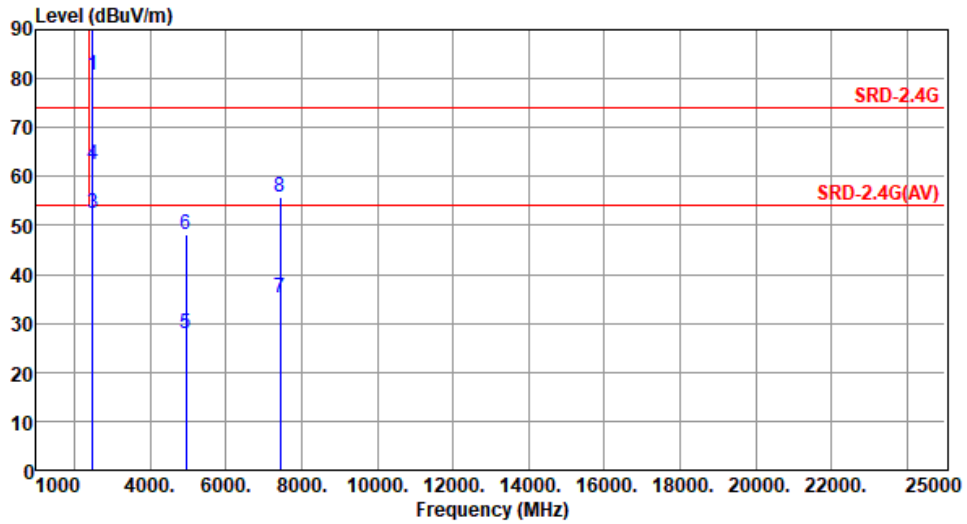
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	36.91	54.00	-17.09	38.66	-1.75	Average	348	217
2	2390.00	49.22	74.00	-24.78	50.97	-1.75	Peak	348	217
3	2400.00	36.98	54.00	-17.02	38.78	-1.80	Average	348	217
4	2400.00	49.27	74.00	-24.73	51.07	-1.80	Peak	348	217
5	2441.00	73.80	94.00	-20.20			Average	348	217
6	2441.00	94.17	114.00	-19.83	96.02	-1.85	Peak	348	217
7	2483.50	36.81	54.00	-17.19	38.71	-1.90	Average	348	217
8	2483.50	48.63	74.00	-25.37	50.53	-1.90	Peak	348	217
9	4882.00	26.42	54.00	-27.58			Average	100	254
10	4882.00	46.79	74.00	-27.21	41.88	4.91	Peak	100	254
11	7323.00	35.57	54.00	-18.43			Average	117	221
12	7323.00	55.94	74.00	-18.06	45.15	10.79	Peak	117	221

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).  
 Note 3: When average value is calculated not measured, no SA reading and factor value are listed.



<b>Modulation</b>	GFSK	<b>Test Freq. (MHz)</b>	2481
<b>Polarization</b>	Horizontal		

Test By :Paul Lin      Temperature(°C):24      Humidity(%):62



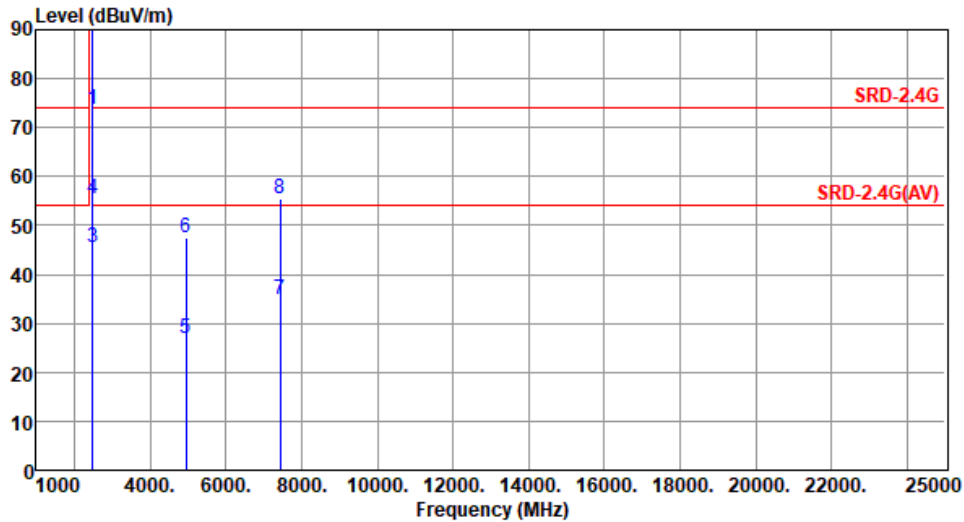
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2481.00	80.60	94.00	-13.40			Average	129	168
2	2481.00	100.97	114.00	-13.03	102.86	-1.89	Peak	129	168
3	2483.50	52.41	54.00	-1.59	54.31	-1.90	Average	129	168
4	2483.50	62.30	74.00	-11.70	64.20	-1.90	Peak	129	168
5	4962.00	27.80	54.00	-26.20			Average	121	50
6	4962.00	48.17	74.00	-25.83	43.10	5.07	Peak	121	50
7	7443.00	35.33	54.00	-18.67			Average	100	222
8	7443.00	55.70	74.00	-18.30	44.81	10.89	Peak	100	222

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).  
 Note 3: When average value is calculated not measured, no SA reading and factor value are listed.



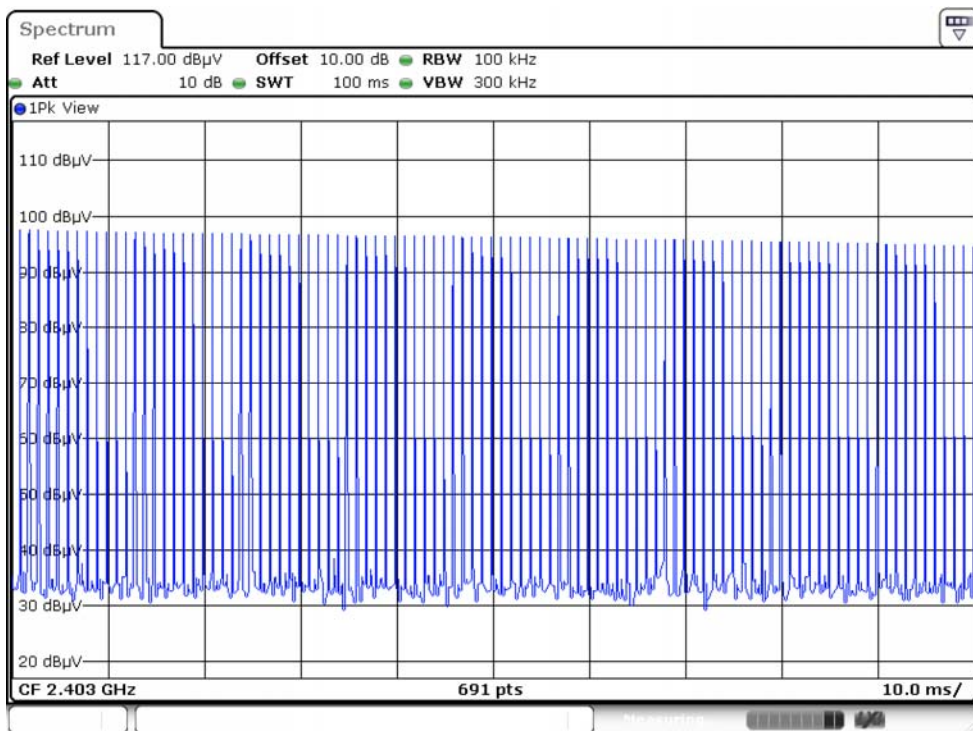
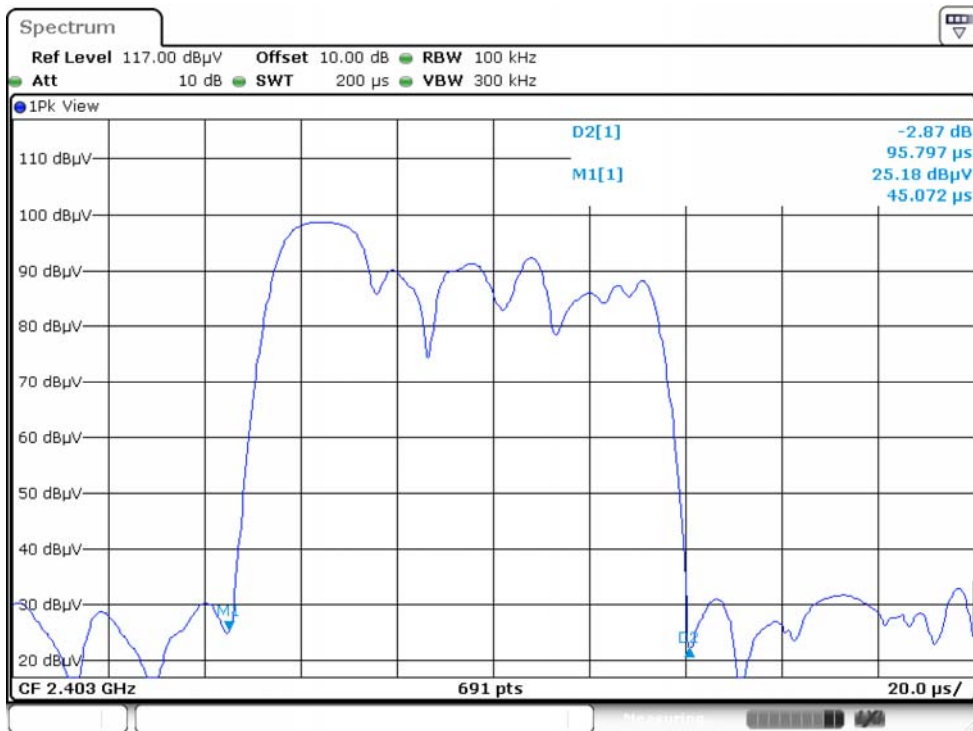
<b>Modulation</b>	GFSK	<b>Test Freq. (MHz)</b>	2481
<b>Polarization</b>	Vertical		

Test By :Paul Lin      Temperature(°C):24      Humidity(%):62



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2481.00	73.79	94.00	-20.21			Average	333	219
2	2481.00	94.16	114.00	-19.84	96.05	-1.89	Peak	333	219
3	2483.50	45.57	54.00	-8.43	47.47	-1.90	Average	333	219
4	2483.50	55.43	74.00	-18.57	57.33	-1.90	Peak	333	219
5	4962.00	27.06	54.00	-26.94			Average	118	262
6	4962.00	47.43	74.00	-26.57	42.36	5.07	Peak	118	262
7	7443.00	34.96	54.00	-19.04			Average	112	205
8	7443.00	55.33	74.00	-18.67	44.44	10.89	Peak	112	205

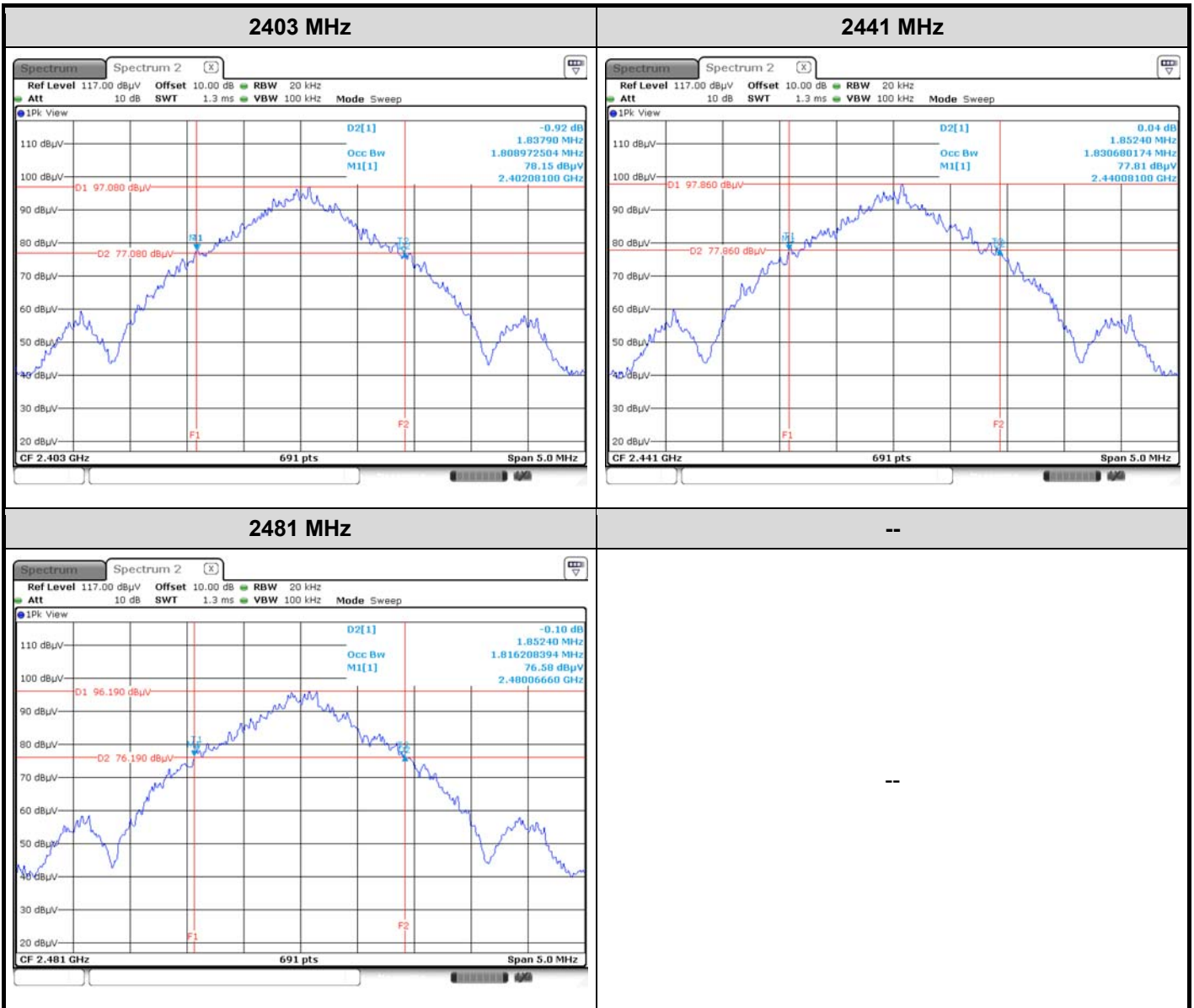
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).  
 Note 3: When average value is calculated not measured, no SA reading and factor value are listed.



$$20\log(\text{Duty cycle}) = 20\log \frac{0.095797 \times 100 \text{ ms}}{100 \text{ ms}} = -20.37\text{dB}$$



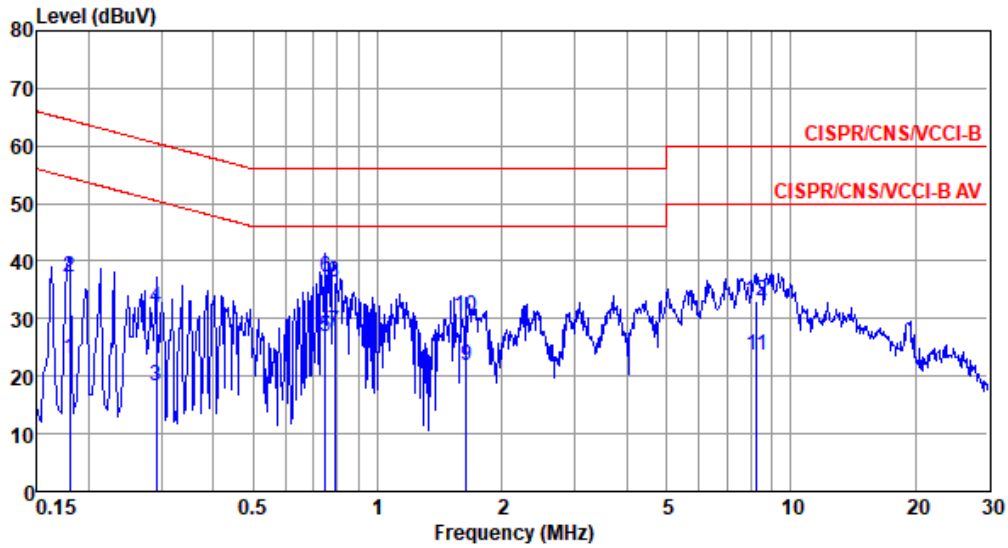
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2403	1.838	1.809
2441	1.852	1.831
2481	1.852	1.816





Mode	Charging mode
Power Phase	Line

Test by : Wish Yu      Temperature: 23°C      Humidity: 63%



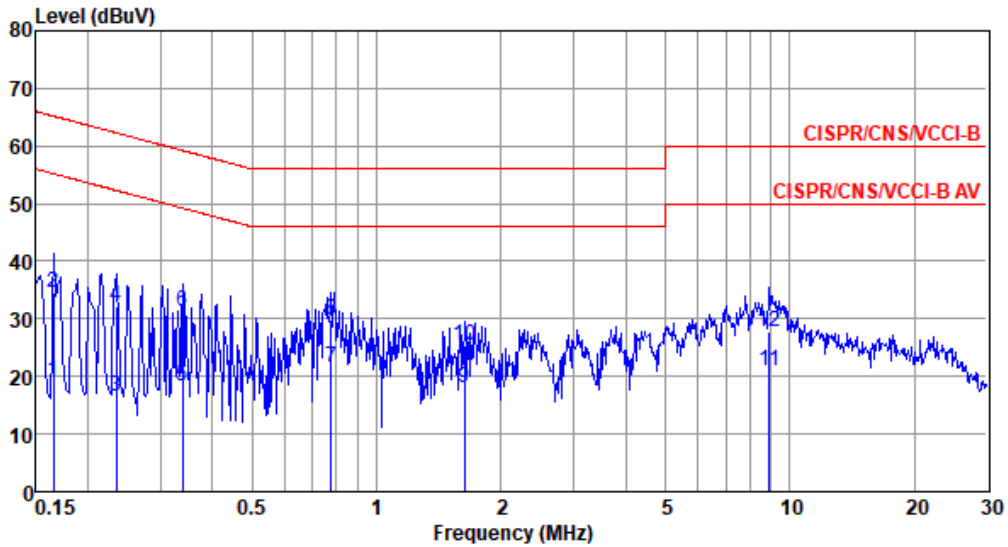
	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.180	23.12	54.50	-31.38	13.25	9.62	0.06	0.19	Average
2	0.180	37.12	64.50	-27.38	27.25	9.62	0.06	0.19	QP
3	0.291	18.31	50.50	-32.19	8.38	9.62	0.06	0.25	Average
4	0.291	31.84	60.50	-28.66	21.91	9.62	0.06	0.25	QP
5	0.747	26.99	46.00	-19.01	16.95	9.63	0.09	0.32	Average
6	0.747	37.06	56.00	-18.94	27.02	9.63	0.09	0.32	QP
7*	0.788	27.66	46.00	-18.34	17.61	9.63	0.10	0.32	Average
8	0.788	36.45	56.00	-19.55	26.40	9.63	0.10	0.32	QP
9	1.636	21.80	46.00	-24.20	11.70	9.63	0.12	0.35	Average
10	1.636	30.38	56.00	-25.62	20.28	9.63	0.12	0.35	QP
11	8.279	23.57	50.00	-26.43	13.13	9.68	0.32	0.44	Average
12	8.279	33.13	60.00	-26.87	22.69	9.68	0.32	0.44	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).  
 Note 2: Over Limit (dB) = Level (dBuV) - Limit Line (dBuV).



Mode	Charging mode
Power Phase	Neutral

Test by : Wish Yu      Temperature: 23°C      Humidity: 63%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.165	19.06	55.21	-36.15	9.19	9.63	0.06	0.18	Average
2	0.165	34.42	65.21	-30.79	24.55	9.63	0.06	0.18	QP
3	0.234	16.43	52.30	-35.87	6.53	9.63	0.06	0.21	Average
4	0.234	32.22	62.30	-30.08	22.32	9.63	0.06	0.21	QP
5	0.339	18.26	49.22	-30.96	8.31	9.62	0.06	0.27	Average
6	0.339	31.40	59.22	-27.82	21.45	9.62	0.06	0.27	QP
7*	0.775	21.49	46.00	-24.51	11.44	9.63	0.10	0.32	Average
8	0.775	29.92	56.00	-26.08	19.87	9.63	0.10	0.32	QP
9	1.628	18.11	46.00	-27.89	8.00	9.64	0.12	0.35	Average
10	1.628	25.50	56.00	-30.50	15.39	9.64	0.12	0.35	QP
11	8.916	20.91	50.00	-29.09	10.43	9.70	0.34	0.44	Average
12	8.916	27.71	60.00	-32.29	17.23	9.70	0.34	0.44	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).  
 Note 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).