

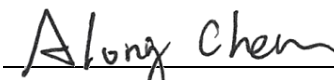
FCC C2PC Test Report

FCC ID : JVPER-80
Equipment : Enhanced Wireless Receiver
Model No. : ER-80
Brand Name : ZOWIE
Applicant : BENQ CORPORATION
Address : 16 Jihu Road, Neihu, Taipei 114, Taiwan
Standard : 47 CFR FCC Part 15.249
Received Date : Aug. 23, 2022
Tested Date : Aug. 23 ~ Aug. 25, 2022

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
Appendix B. 20dB and Occupied Bandwidth
Appendix C. AC Power Line Conducted Emissions

Release Record

Report No.	Version	Description	Issued Date
FR260609-01	Rev. 01	Initial issue	Sep. 06, 2022

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.546MHz 30.59 (Margin -15.41dB) - 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

This is a Class II Permissive Change report (C2PC).

This report is issued as a supplementary report to original report no. FR260609. The modifications are concerned with following items:

- Adding channels for 1Mbps data rate by software setting.
- To enable 2Mbps data rate by software setting.

In this report, only 2Mbps data was record in the following sections. No additional test results of 1Mbps data rate since L/M/H channel is not changed even if channels are adding.

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	2403-2475	1-73 [73]	1 Mbps
2400-2483.5	GFSK	2403-2475	1-73 [73]	2 Mbps

1.1.2 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)
1	BENQ Corporation	ER-80 ANT	Patch Antenna	NA	5.69

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Type	5Vdc from host
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1.1.4 Accessories

No.	Equipment	Description
1	USB cable	Brand: Le Prestique Electronics Manufacturing Model: USB Type-C cable 2.05m non-shielded with one core

1.1.5 Channel List

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

1.1.6 Test Tool and Duty Cycle

Test Tool	Bus Hound, Version: 7.00	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	18.98	7.22

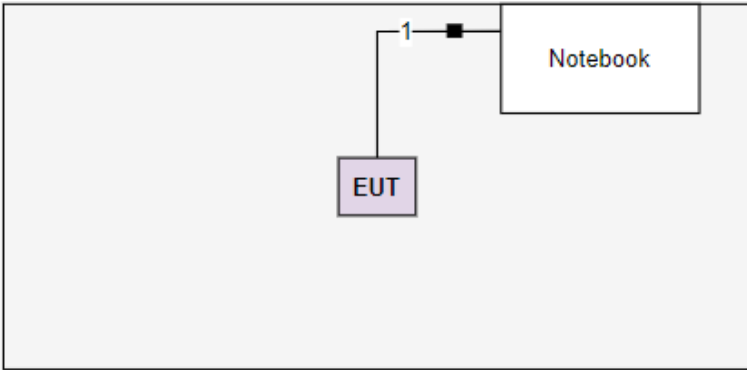
1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)		
	2403	2440	2475
GFSK	Default	Default	Default

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude 5400	DoC	---

1.3 Test Setup Chart

Test Setup Diagram (TX mode with notebook)	
	
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. 25, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101658	Feb. 16, 2022	Feb. 15, 2023
LISN	R&S	ENV216	101579	Apr. 21, 2022	Apr. 20, 2023
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127667	Jan .07, 2022	Jan .06, 2023
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 19, 2021	Oct. 18, 2022
50 ohm terminal (Support Unit)	NA	50	01	May 10, 2022	May 09, 2023
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 chamber1 / (03CH01-WS)				
Tested Date	Aug. 23 ~ Aug. 24, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 15, 2022	Mar. 14, 2023
Spectrum Analyzer	R&S	FSV40	101498	Nov. 29, 2021	Nov. 28, 2022
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 08, 2021	Nov. 07, 2022
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 03, 2022	Aug. 02, 2023
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 03, 2021	Dec. 02, 2022
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2021	Nov. 03, 2022
Preamplifier	EMC	EMC02325	980225	Jun. 28, 2022	Jun. 27, 2023
Preamplifier	EMC	EMC118A45SE	980898	Jul. 16, 2022	Jul. 15, 2023
Preamplifier	EMC	EMC184045SE	980903	Jul. 16, 2022	Jul. 15, 2023
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 05, 2021	Oct. 04, 2022
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 05, 2021	Oct. 04, 2022
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 05, 2021	Oct. 04, 2022
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 05, 2021	Oct. 04, 2022
RF Cable	EMC	EMC104-35M-35M-8000	210920	Oct. 05, 2021	Oct. 04, 2022
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 05, 2021	Oct. 04, 2022
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	± 34.130 Hz
AC conducted emission	± 2.92 dB
Unwanted Emission ≤ 1 GHz	± 3.41 dB
Unwanted Emission > 1 GHz	± 4.59 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- 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	GFSK	2440	2 Mbps	TX
Unwanted Emissions \leq 1GHz	GFSK	2440	2 Mbps	TX
Field Strength of Fundamental Unwanted Emissions > 1GHz 20dB bandwidth	GFSK	2403 / 2440 / 2475	2 Mbps	TX

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:

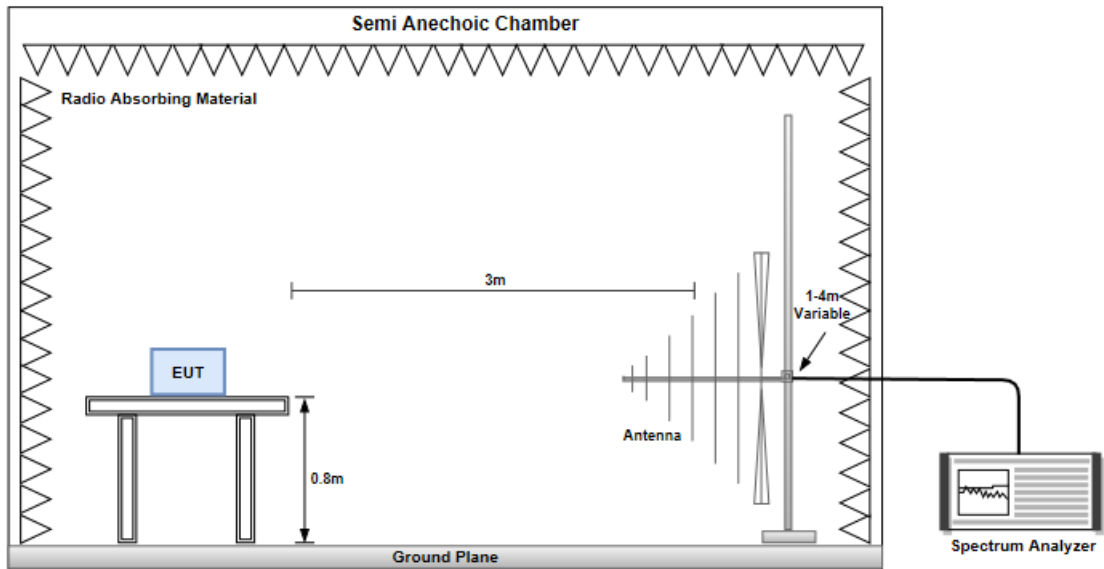
1. Radiated emission below 1GHz
120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental
RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for field strength of fundamental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

$$20\log(\text{Duty cycle}) = 20\log \frac{0.072464 \times 13\text{ms}}{100 \text{ ms}} = -40.52\text{dB}$$

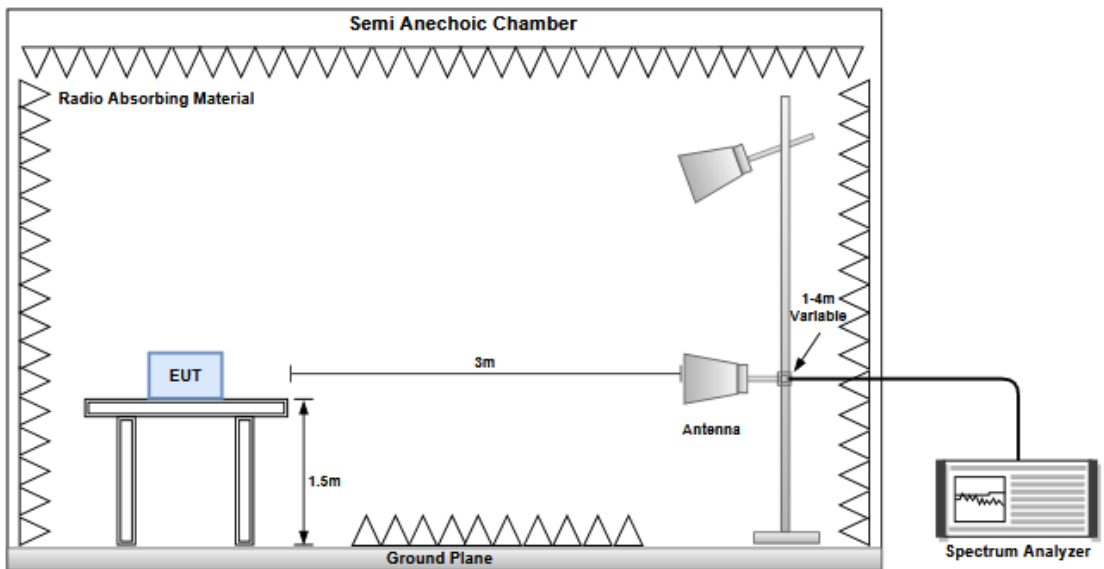
4. Radiated emission above 1GHz / Average value for other emissions
RBW=1MHz, VBW=1/T and Peak detector
5. Radiated emission Peak value for fundamental
RBW=2MHz, VBW=10MHz and Peak detector

3.1.4 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.1.5 Test Results

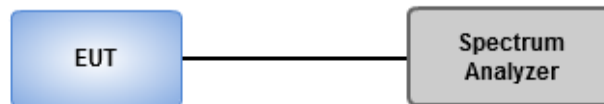
Refer to Appendix A.

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

Ambient Condition	24°C / 63%	Tested By	Brad Wu
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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

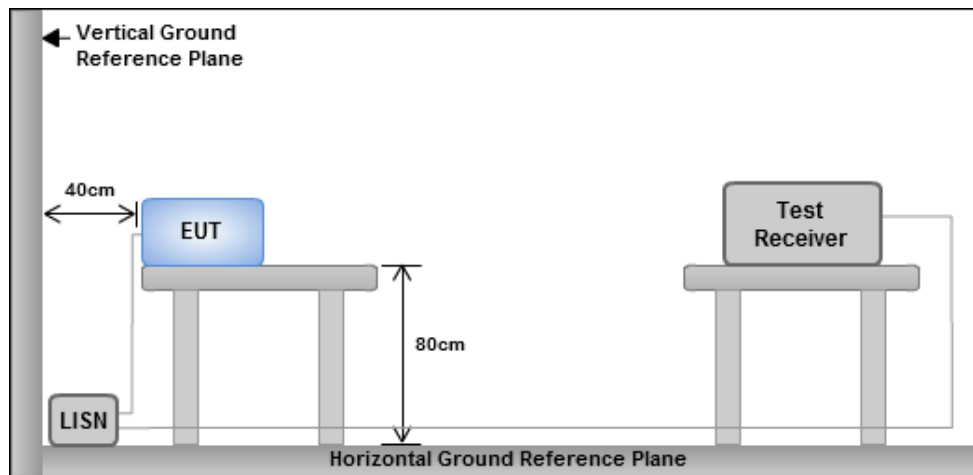
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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 Ω 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 333, 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==



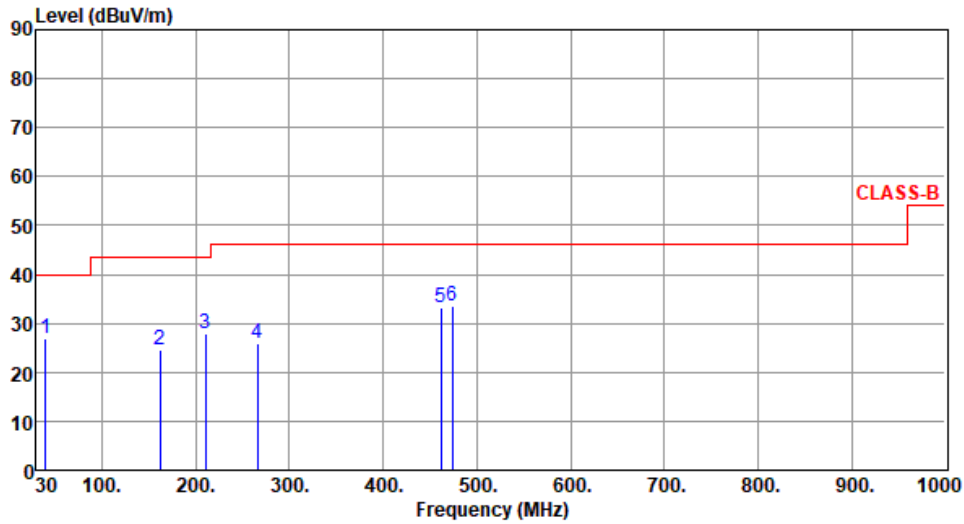
Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2440						
Polarization	Horizontal								
Test By :Akun Chung Temperature(°C):24 Humidity(%):65									
<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, stepping up to 45 dBuV/m at 100 MHz, and to 55 dBuV/m at 950 MHz. Six blue vertical lines indicate emission peaks labeled 1 through 6, with their respective frequencies and levels listed in the table below.</p>									
	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	90.14	24.16	43.50	-19.34	38.72	-14.56	Peak	---	---
2	161.92	29.61	43.50	-13.89	38.80	-9.19	Peak	---	---
3	210.42	31.80	43.50	-11.70	43.80	-12.00	Peak	---	---
4	257.95	31.07	46.00	-14.93	40.75	-9.68	Peak	---	---
5	485.90	35.29	46.00	-10.71	38.87	-3.58	Peak	---	---
6	511.12	35.48	46.00	-10.52	38.50	-3.02	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.									



Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):24 Humidity(%):65



	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	39.70	26.94	40.00	-13.06	35.60	-8.66	Peak	---	---
2	161.92	24.63	43.50	-18.87	33.82	-9.19	Peak	---	---
3	210.42	27.94	43.50	-15.56	39.94	-12.00	Peak	---	---
4	265.71	25.86	46.00	-20.14	34.99	-9.13	Peak	---	---
5	461.65	33.33	46.00	-12.67	37.31	-3.98	Peak	---	---
6	474.26	33.59	46.00	-12.41	37.45	-3.86	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).

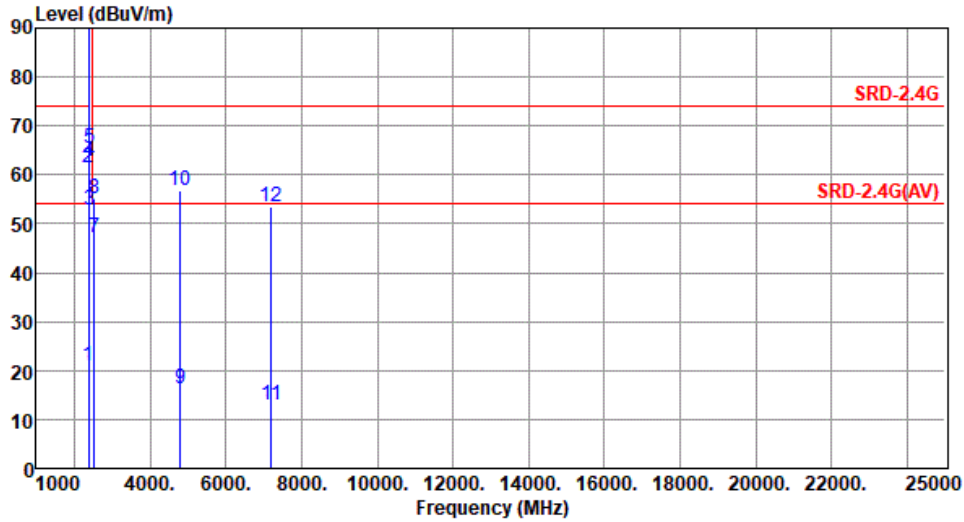
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



Unwanted Emissions (Above 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2403
Polarization	Horizontal		

Test By :Brad Wu Temperature(°C):24 Humidity(%):63



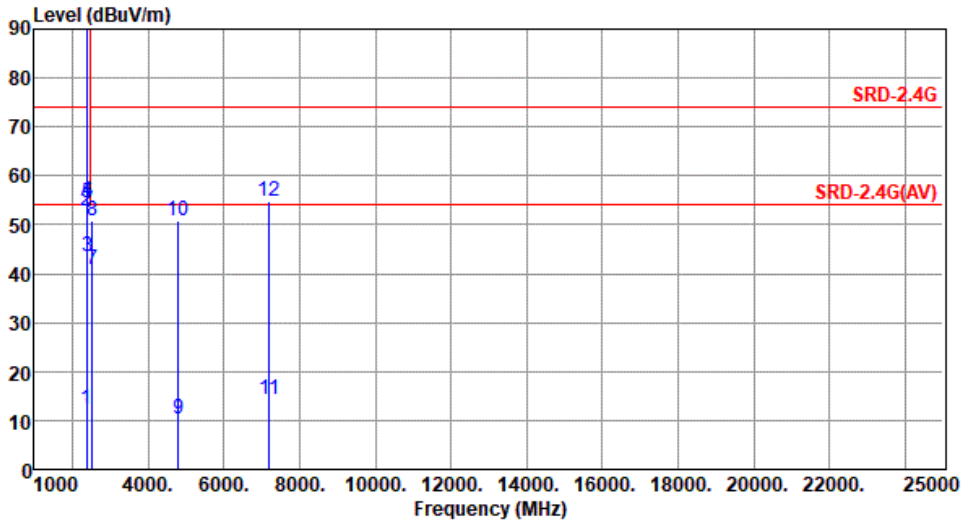
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2371.00	20.99	54.00	-33.01			Average	100	6
2	2371.00	61.51	74.00	-12.49	66.65	-5.14	Peak	100	6
3	2400.00	52.96	54.00	-1.04	58.22	-5.26	Average	100	6
4	2400.00	62.85	74.00	-11.15	68.11	-5.26	Peak	100	6
5	2403.00	65.43	94.00	-28.57			Average	100	6
6	2403.00	105.95	114.00	-8.05	111.22	-5.27	Peak	100	6
7	2531.00	47.10	54.00	-6.90	52.28	-5.18	Average	100	6
8	2531.00	54.99	74.00	-19.01	60.17	-5.18	Peak	100	6
9	4806.00	16.43	54.00	-37.57			Average	251	48
10	4806.00	56.95	74.00	-17.05	57.83	-0.88	Peak	251	48
11	7209.00	13.00	54.00	-41.00			Average	100	210
12	7209.00	53.52	74.00	-20.48	49.34	4.18	Peak	100	210

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.



Modulation	GFSK	Test Freq. (MHz)	2403
Polarization	Vertical		

Test By :Brad Wu Temperature(°C):24 Humidity(%):63



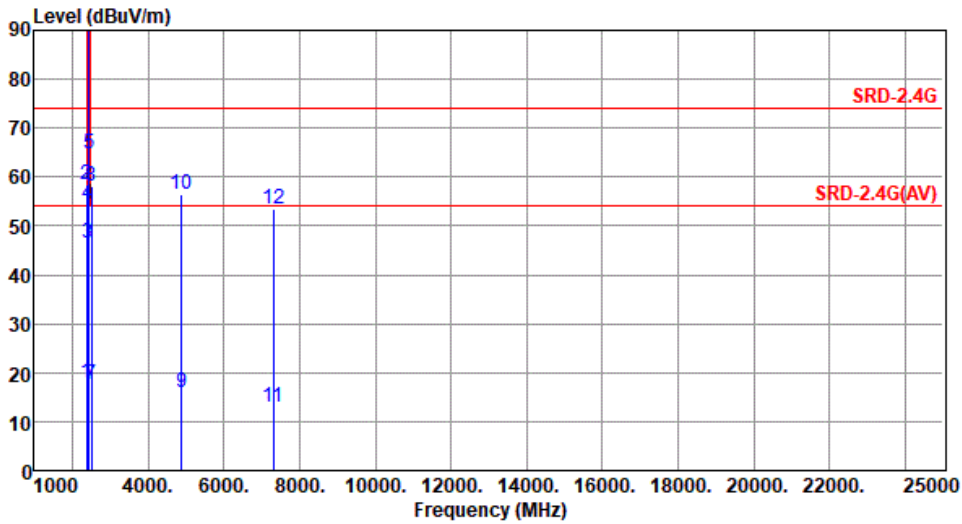
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2371.00	12.25	54.00	-41.75			Average	319	49
2	2371.00	52.77	74.00	-21.23	57.91	-5.14	Peak	319	49
3	2400.00	43.45	54.00	-10.55	48.71	-5.26	Average	319	49
4	2400.00	54.65	74.00	-19.35	59.91	-5.26	Peak	319	49
5	2403.00	54.33	94.00	-39.67			Average	319	49
6	2403.00	94.85	114.00	-19.15	100.12	-5.27	Peak	319	49
7	2531.00	40.93	54.00	-13.07	46.11	-5.18	Average	319	49
8	2531.00	50.76	74.00	-23.24	55.94	-5.18	Peak	319	49
9	4806.00	10.44	54.00	-43.56			Average	100	54
10	4806.00	50.96	74.00	-23.04	51.84	-0.88	Peak	100	54
11	7209.00	14.23	54.00	-39.77			Average	100	161
12	7209.00	54.75	74.00	-19.25	50.57	4.18	Peak	100	161

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.



Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Horizontal		

Test By :Brad Wu Temperature(°C):24 Humidity(%):63



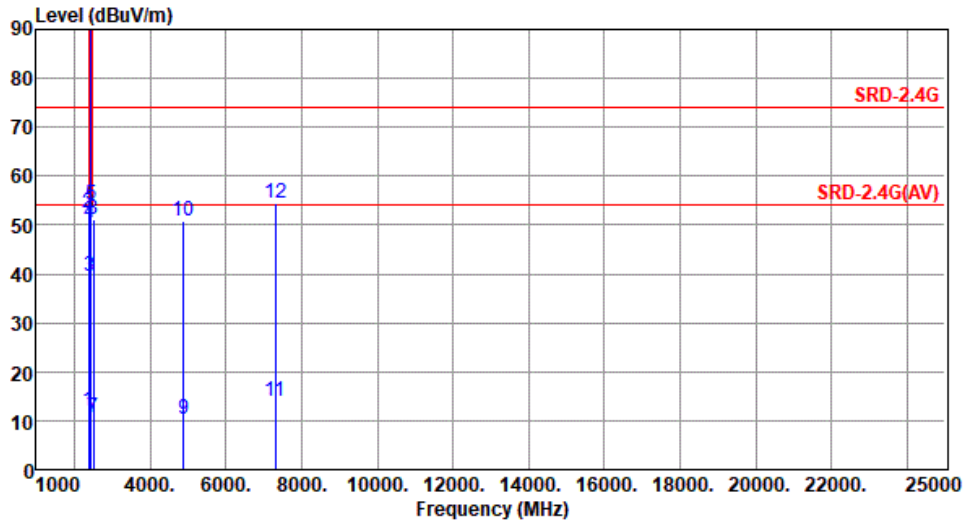
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2376.00	18.00	54.00	-36.00			Average	100	8
2	2376.00	58.52	74.00	-15.48	63.68	-5.16	Peak	100	8
3	2400.00	46.40	54.00	-7.60	51.66	-5.26	Average	100	8
4	2400.00	54.43	74.00	-19.57	59.69	-5.26	Peak	100	8
5	2440.00	64.82	94.00	-29.18			Average	100	8
6	2440.00	105.34	114.00	-8.66	110.68	-5.34	Peak	100	8
7	2504.00	17.47	54.00	-36.53			Average	100	8
8	2504.00	57.99	74.00	-16.01	63.25	-5.26	Peak	100	8
9	4880.00	16.07	54.00	-37.93			Average	252	42
10	4880.00	56.59	74.00	-17.41	57.54	-0.95	Peak	252	42
11	7320.00	12.79	54.00	-41.21			Average	100	209
12	7320.00	53.31	74.00	-20.69	48.99	4.32	Peak	100	209

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.



Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical		

Test By :Brad Wu Temperature(°C):24 Humidity(%):63



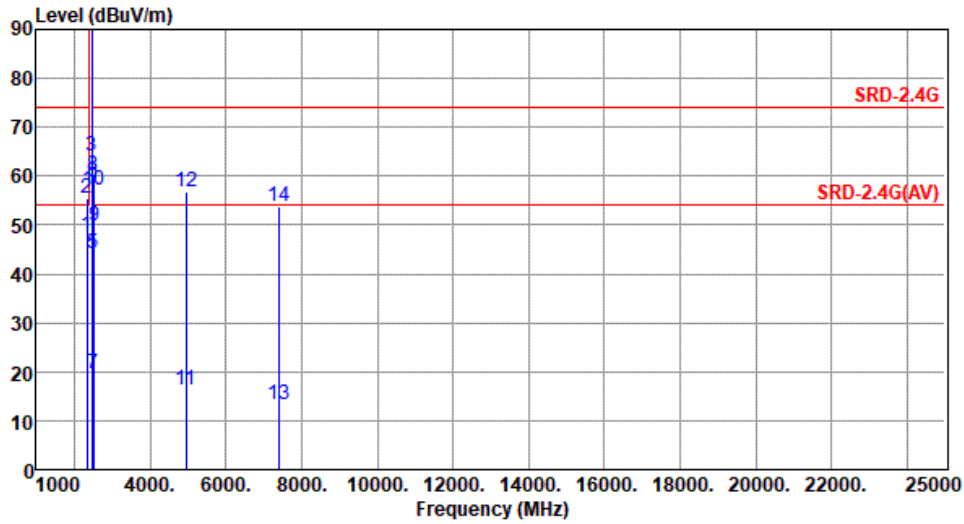
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2376.00	11.93	54.00	-42.07			Average	311	49
2	2376.00	52.45	74.00	-21.55	57.61	-5.16	Peak	311	49
3	2400.00	39.66	54.00	-14.34	44.92	-5.26	Average	311	49
4	2400.00	50.59	74.00	-23.41	55.85	-5.26	Peak	311	49
5	2440.00	54.13	94.00	-39.87			Average	311	49
6	2440.00	94.65	114.00	-19.35	99.99	-5.34	Peak	311	49
7	2504.00	10.71	54.00	-43.29			Average	311	49
8	2504.00	51.23	74.00	-22.77	56.49	-5.26	Peak	311	49
9	4880.00	10.27	54.00	-43.73			Average	100	48
10	4880.00	50.79	74.00	-23.21	51.74	-0.95	Peak	100	48
11	7320.00	14.00	54.00	-40.00			Average	100	168
12	7320.00	54.52	74.00	-19.48	50.20	4.32	Peak	100	168

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.



Modulation	GFSK	Test Freq. (MHz)	2475
Polarization	Horizontal		

Test By :Brad Wu Temperature(°C):24 Humidity(%):63



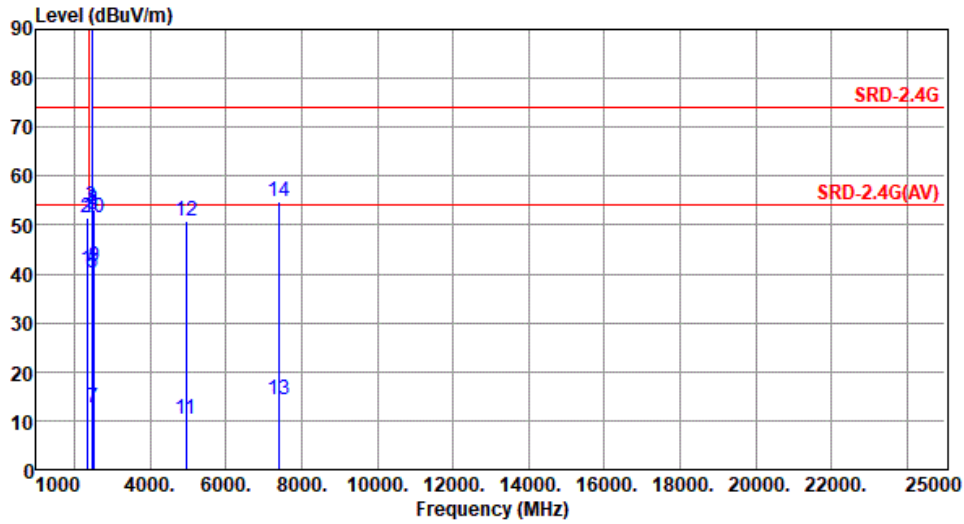
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2347.00	47.87	54.00	-6.13	52.91	-5.04	Average	100	15
2	2347.00	55.40	74.00	-18.60	60.44	-5.04	Peak	100	15
3	2475.00	64.00	94.00	-30.00			Average	100	15
4	2475.00	104.52	114.00	-9.48	109.84	-5.32	Peak	100	15
5	2483.50	44.27	54.00	-9.73	49.58	-5.31	Average	100	15
6	2483.50	58.74	74.00	-15.26	64.05	-5.31	Peak	100	15
7	2507.00	19.50	54.00	-34.50			Average	100	15
8	2507.00	60.02	74.00	-13.98	65.28	-5.26	Peak	100	15
9	2539.00	49.86	54.00	-4.14	55.02	-5.16	Average	100	15
10	2539.00	57.04	74.00	-16.96	62.20	-5.16	Peak	100	15
11	4950.00	16.29	54.00	-37.71			Average	248	46
12	4950.00	56.81	74.00	-17.19	57.92	-1.11	Peak	248	46
13	7425.00	13.14	54.00	-40.86			Average	100	212
14	7425.00	53.66	74.00	-20.34	49.35	4.31	Peak	100	212

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.



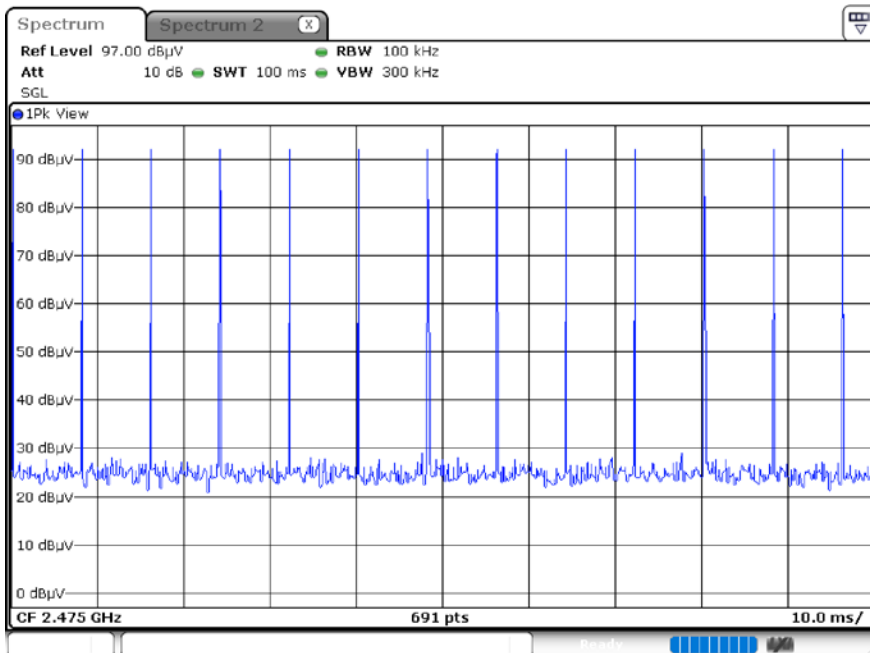
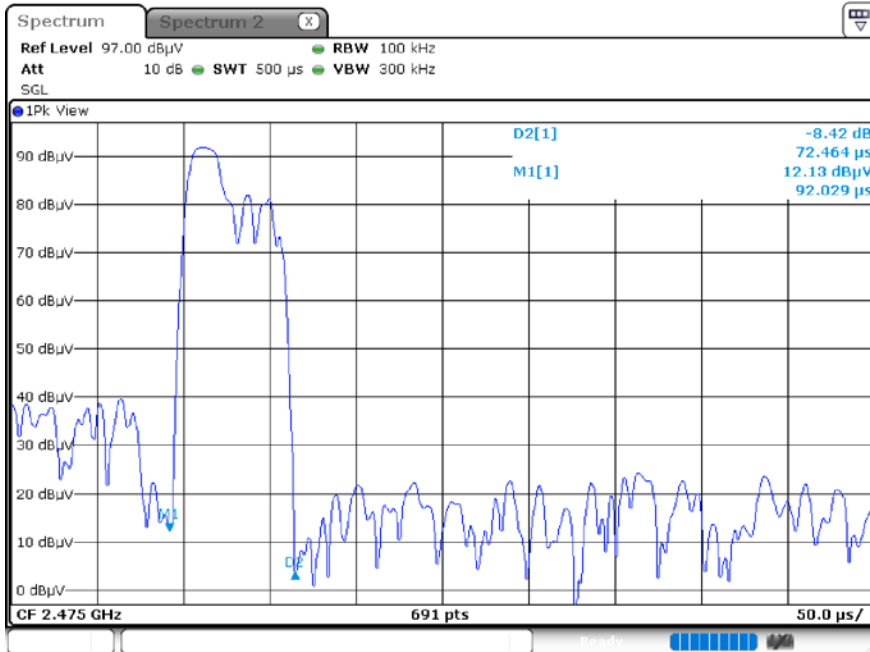
Modulation	GFSK	Test Freq. (MHz)	2475
Polarization	Vertical		

Test By :Brad Wu Temperature(°C):24 Humidity(%):63



	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	2347.00	40.94	54.00	-13.06	45.98	-5.04	Average	326	54
2	2347.00	51.42	74.00	-22.58	56.46	-5.04	Peak	326	54
3	2475.00	53.88	94.00	-40.12			Average	326	54
4	2475.00	94.40	114.00	-19.60	99.72	-5.32	Peak	326	54
5	2483.50	40.26	54.00	-13.74	45.57	-5.31	Average	326	54
6	2483.50	52.22	74.00	-21.78	57.53	-5.31	Peak	326	54
7	2507.00	12.51	54.00	-41.49			Average	326	54
8	2507.00	53.03	74.00	-20.97	58.29	-5.26	Peak	326	54
9	2539.00	41.43	54.00	-12.57	46.59	-5.16	Average	326	54
10	2539.00	51.45	74.00	-22.55	56.61	-5.16	Peak	326	54
11	4950.00	10.40	54.00	-43.60			Average	100	53
12	4950.00	50.92	74.00	-23.08	52.03	-1.11	Peak	100	53
13	7425.00	14.17	54.00	-39.83			Average	100	161
14	7425.00	54.69	74.00	-19.31	50.38	4.31	Peak	100	161

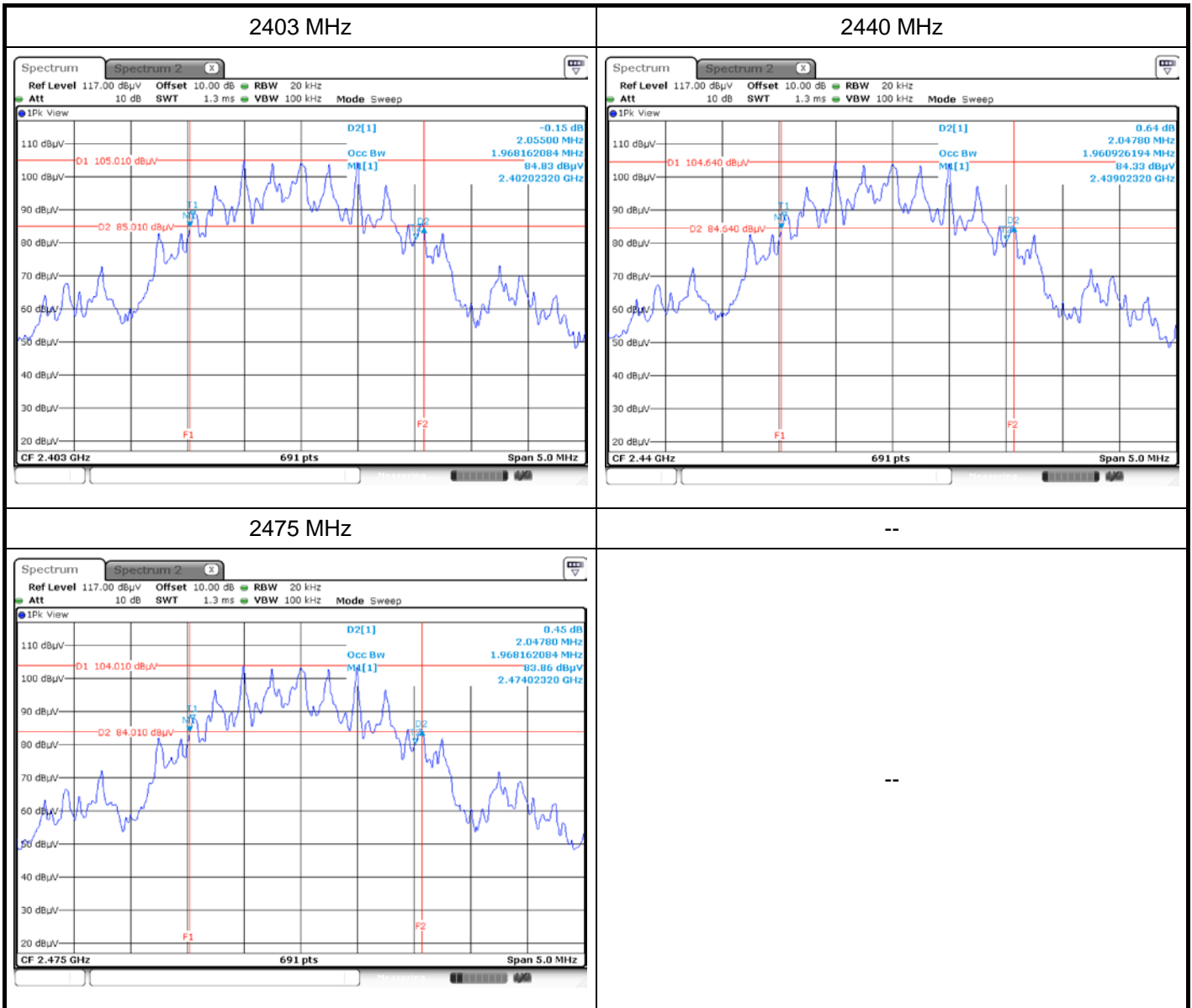
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
 *Factor includes antenna factor , cable loss and amplifier gain
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
 Note 3: When average value is calculated not measured, no SA reading and factor value are listed.



$$20\log(\text{Duty cycle}) = 20\log \frac{0.072464 \times 13 \text{ ms}}{100 \text{ ms}} = -40.52\text{dB}$$



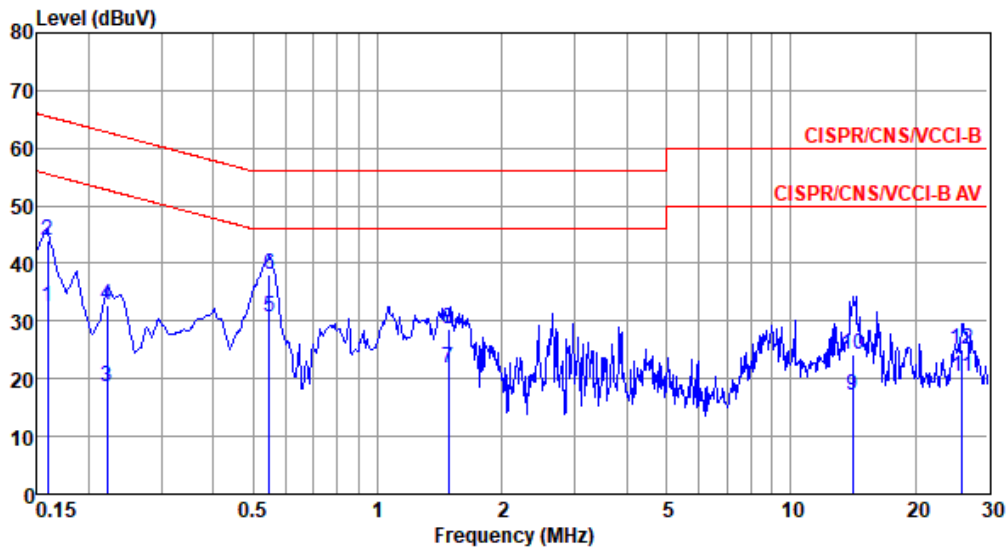
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2403.0	2.055	1.968
2440.0	2.048	1.961
2475.0	2.048	1.968





Modulation Mode	GFSK	Test Freq. (MHz)	2440
Power Phase	Line		

Test by : Brad Wu Temperature: 24°C Humidity: 65%



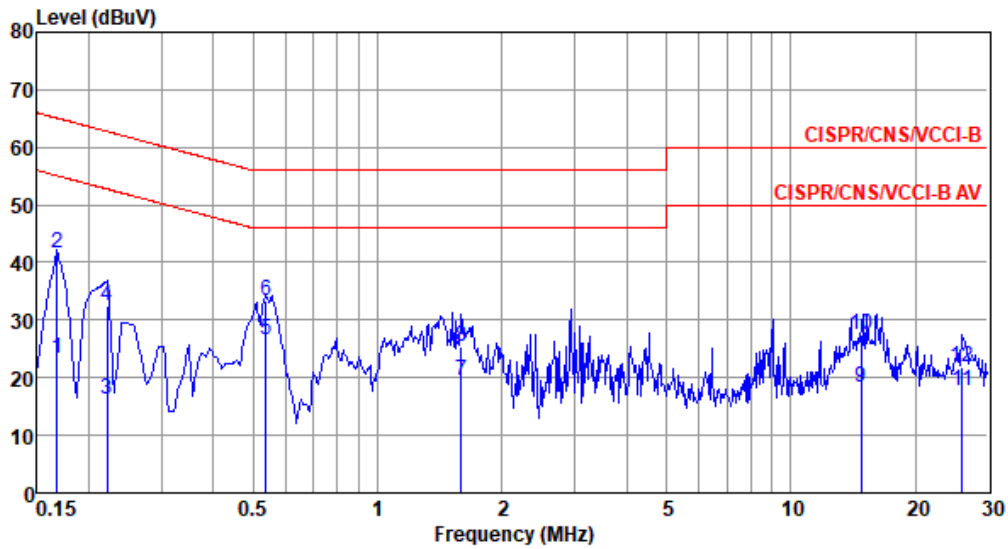
	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.159	32.52	55.52	-23.00	22.60	9.68	0.08	0.16	Average
2	0.159	44.01	65.52	-21.51	34.09	9.68	0.08	0.16	QP
3	0.222	18.53	52.74	-34.21	8.59	9.68	0.08	0.18	Average
4	0.222	32.90	62.74	-29.84	22.96	9.68	0.08	0.18	QP
5*	0.546	30.59	46.00	-15.41	20.59	9.67	0.11	0.22	Average
6	0.546	38.09	56.00	-17.91	28.09	9.67	0.11	0.22	QP
7	1.487	21.77	46.00	-24.23	11.61	9.69	0.18	0.29	Average
8	1.487	28.65	56.00	-27.35	18.49	9.69	0.18	0.29	QP
9	14.138	17.22	50.00	-32.78	6.48	9.74	0.54	0.46	Average
10	14.138	24.21	60.00	-35.79	13.47	9.74	0.54	0.46	QP
11	26.001	20.33	50.00	-29.67	9.34	9.69	0.71	0.59	Average
12	26.001	25.00	60.00	-35.00	14.01	9.69	0.71	0.59	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).



Modulation Mode	GFSK	Test Freq. (MHz)	2440
Power Phase	Neutral		

Test by : Brad Wu Temperature: 24°C Humidity: 65%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.168	23.19	55.08	-31.89	13.33	9.61	0.08	0.17	Average
2	0.168	41.51	65.08	-23.57	31.65	9.61	0.08	0.17	QP
3	0.222	16.09	52.74	-36.65	6.22	9.61	0.08	0.18	Average
4	0.222	32.33	62.74	-30.41	22.46	9.61	0.08	0.18	QP
5*	0.538	26.54	46.00	-19.46	16.60	9.61	0.11	0.22	Average
6	0.538	33.49	56.00	-22.51	23.55	9.61	0.11	0.22	QP
7	1.593	19.51	46.00	-26.49	9.41	9.62	0.19	0.29	Average
8	1.593	25.46	56.00	-30.54	15.36	9.62	0.19	0.29	QP
9	14.828	18.30	50.00	-31.70	7.52	9.75	0.56	0.47	Average
10	14.828	27.54	60.00	-32.46	16.76	9.75	0.56	0.47	QP
11	26.001	17.67	50.00	-32.33	6.59	9.78	0.71	0.59	Average
12	26.001	21.76	60.00	-38.24	10.68	9.78	0.71	0.59	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).