FCC TEST REPORT
FCC ID:2BFZE-D203

Report Number.....:	**ZHT-240903012E**
Date of Test.....:	Sept. 03, 2024 to Sept. 11, 2024
Date of issue.....:	Sept. 11, 2024
Test Result.....:	PASS
Testing Laboratory.....:	Guangdong Zhonghan Testing Technology Co., Ltd.
Address .....:	Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name .....:	Dongguan Langao Electronics Co., Ltd.
Address .....:	4/F, Building A1, Zhongzhi TOD SunAC Technology Empowerment Industrial Park, Tianxin Village, Huangjiang Town, DongGuan City Guangdong Province China
Manufacturer's name .....:	Dongguan Langao Electronics Co., Ltd.
Address .....:	4/F, Building A1, Zhongzhi TOD SunAC Technology Empowerment Industrial Park, Tianxin Village, Huangjiang Town, DongGuan City Guangdong Province China
Test specification:	
Standard.....:	FCC Part 15 Subpart C Section 15.249
Test procedure.....:	ANSI C63.10:2013
Non-standard test method .....:	N/A

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Product name.....:	**2.4G Wireless Mouse**
Trademark .....:	/
Model/Type reference.....:	D203
Model Difference.....:	D203R, J203, JR203, D206, D209, D530, D550, D560, K3, PC428, GEPC428AB, PC414, PC315, PC359, ECCAS21, PC428A D203 is the test model, while other models are derivative models. These models are the same on the circuit, with only different model names. Therefore, the test data of D203 can represent the remaining models.
Ratings.....:	Input: 5 V⎓500 mA or DC 3.7V powered by battery

Testing procedure and testing location:

Testing Laboratory.....:	**Guangdong Zhonghan Testing Technology Co., Ltd.**
Address.....:	Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tested by (name + signature).....:	Leon Li
Reviewer (name + signature).....:	Baret Wu
Approved (name + signature).....:	Levi Lee

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1. VERSION

Report No.	Version	Description	Approved
ZHT-240903012E	Rev.01	Initial issue of report	Sept. 11, 2024

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Judgment	Remark
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.215	Channel Bandwidth& 99% OCB	PASS	
FCC part 15.249	Band Edge	PASS	
FCC part 15.205/15.209	Spurious Emission	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

2.1 TEST FACILITY

Guangdong Zhonghan Testing Technology Co., Ltd.
Add. : Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an Distric Shenzhen, Guangdong, China

FCC Registration Number:255941
Designation Number: CN0325
IC Registered No.: 29832
CAB identifier: CN0143

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF conducted power	±0.16dB
3	Conducted spurious emissions	±0.21dB
4	All radiated emissions (9k-30MHz)	±4.68dB
5	All radiated emissions (<1G)	±4.68dB
6	All radiated emissions (>1G)	±4.89dB
7	Temperature	±0.5°C
8	Humidity	±2%
9	Occupied Bandwidth	±4.96%

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	2.4G Wireless Mouse
Test Model No.:	D203
Hardware Version:	V1.0
Software Version:	V1.0
Sample(s) Status:	Engineer sample
Operation Frequency:	2408MHz~2474MHz
Channel Numbers:	34
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	-0.61dBi
Power supply:	Input: 5 V⎓500 mA or DC 3.7V powered by battery

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2408	10	2426	19	2444	28	2462
2	2410	11	2428	20	2446	29	2464
3	2412	12	2430	21	2448	30	2466
4	2414	13	2432	22	2450	31	2468
5	2416	14	2434	23	2452	32	2470
6	2418	15	2436	24	2454	33	2472
7	2420	16	2438	25	2456	34	2474
8	2422	17	2440	26	2458		
9	2424	18	2442	27	2460		

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

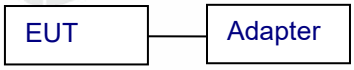
Channel	Frequency
The lowest channel	2408MHz
The middle channel	2440MHz
The Highest channel	2474MHz

3.2 DESCRIPTION OF TEST MODES

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: EUT use new battery during the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

3.3 TEST SETUP CONFIGURATION

Conducted Emission



Radiated Emission

3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Adapter	N/A	HW-059200CHQ	N/A	AE

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

3.5EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1	Receiver	R&S	ESCI	100874	May 10, 2024	May 09, 2025
2	Loop antenna	EMCI	LAP600	272	May 10, 2024	May 09, 2025
3	Amplifier	Schwarzbeck	BBV 9743 B	00378	May 10, 2024	May 09, 2025
4	Amplifier	Schwarzbeck	BBV 9718 B	00040	May 10, 2024	May 09, 2025
5	Bilog Antenna	Schwarzbeck	VULB9162	00498	May 28, 2024	May 27, 2025
6	Horn Antenna	Schwarzbeck	BBHA9120D	02623	May 16, 2024	May 15, 2025
7	Horn Antenna	A.H.SYSTEMS	SAS574	588	May 10, 2024	May 09, 2025
8	Amplifier	AEROFLEX	100KHz-40GHz	097	May 10, 2024	May 09, 2025
9	Spectrum Analyzer	R&S	FSV40	101413	May 10, 2024	May 09, 2025
10	966 Anechoic Chamber	EMToni	9m6m6m	/	Nov. 25, 2021	Nov. 24, 2024
11	Spectrum Analyzer	KEYSIGHT	N9020A	MY53420208	May 10, 2024	May 09, 2025
12	WIDBAND RADIO COMMUNICATION TESTER	R&S	CMW500	109863	May 10, 2024	May 09, 2025
13	Single Generator	Agilent	N5182A	MY48180575	May 10, 2024	May 09, 2025
14	Power Sensor	MWRFtest	MW100-RFCB	/	May 10, 2024	May 09, 2025
15	Power Amplifier Shielding Room	EMToni	2m3m3m	/	Nov. 25, 2021	Nov. 24, 2024

Conduction Test equipment

Equipment	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
Receiver	R&S	ESCI	100874	May 10, 2024	May 09, 2025
LISN	R&S	ENV216	102794	May 10, 2024	May 09, 2025
ISN CAT 6	Schwarzbeck	NTFM 8158	00318	May 10, 2024	May 09, 2025
ISN CAT 5	Schwarzbeck	CAT5 8158	00343	May 10, 2024	May 09, 2025
Capacitive Voltage Probe	Schwarzbeck	CVP 9222 C	00101	May 10, 2024	May 09, 2025
Current Transformer Clamp	Schwarzbeck	SW 9605	SW9605 #209	May 10, 2024	May 09, 2025
CE Shielding Room	EMToni	9m4m3m	/	Nov. 25, 2021	Nov. 24, 2024

Conducted Test equipment

Item	Equipment	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	R&S	FSV40	101413	May 10, 2024	May 09, 2025
2	Spectrum Analyzer	KEYSIGHT	N9020A	MY53420208	May 10, 2024	May 09, 2025
3	Power Sensor	MWRFtest	MW100-RFCB	/	May 10, 2024	May 09, 2025

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) *Decreases with the logarithm of the frequency.

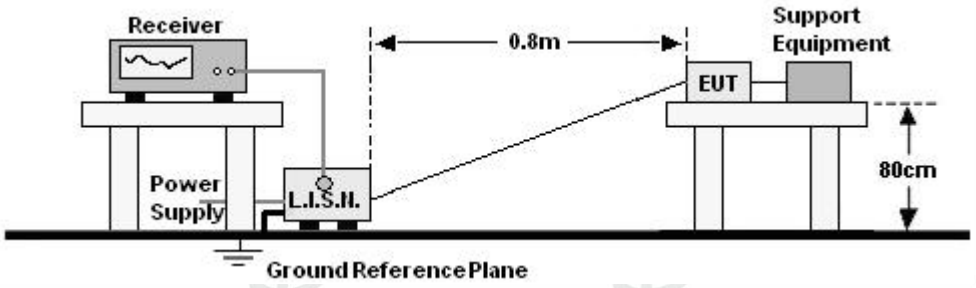
4.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP

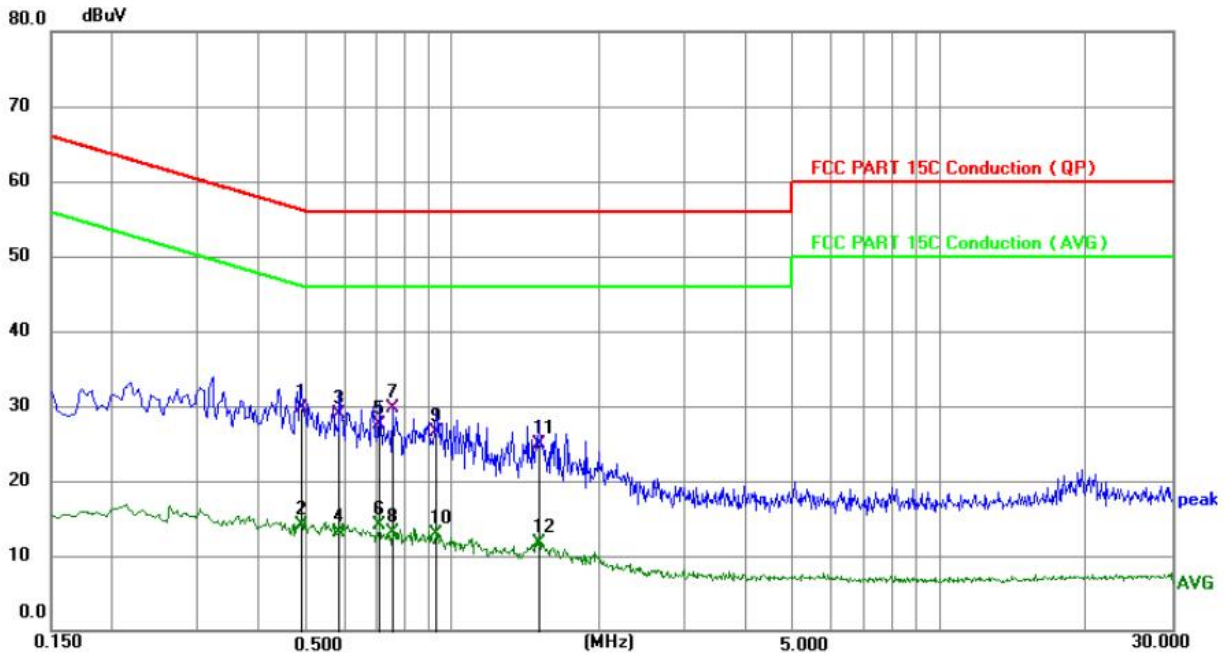


4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.1.6 Test result

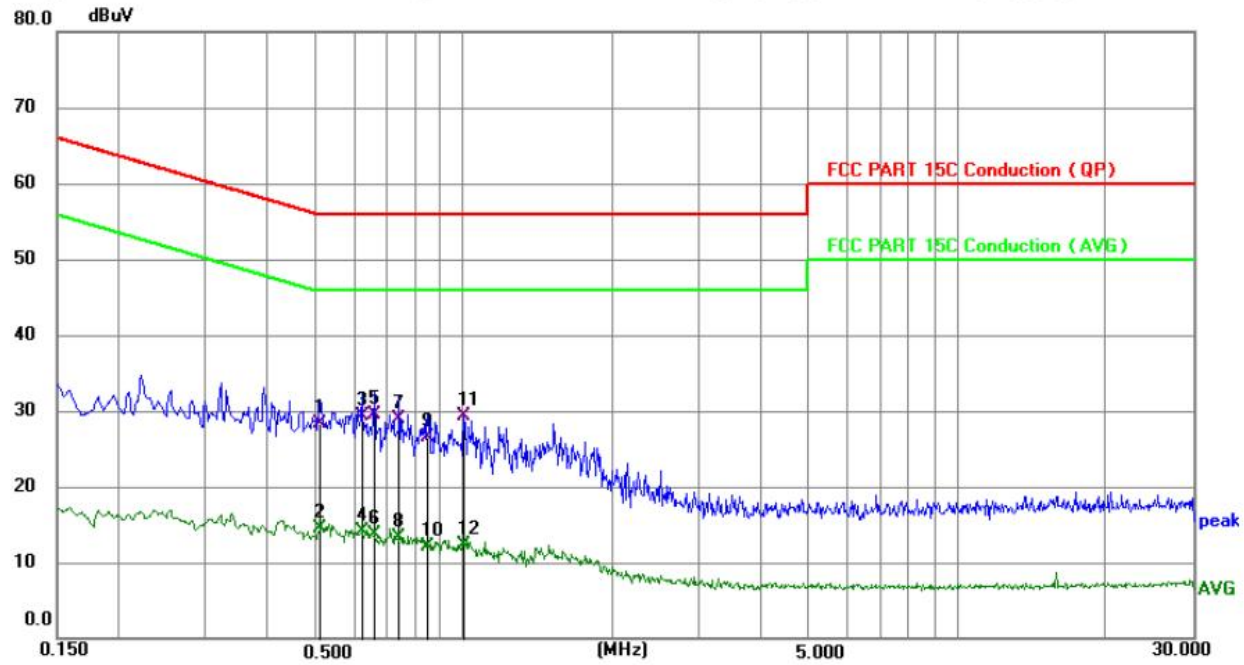
Temperature:	24.3℃	Relative Humidity :	50%
Pressure:	101kPa	Phase :	L
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4874	19.75	10.01	29.76	56.21	-26.45	QP	P	
2	0.4874	4.06	10.01	14.07	46.21	-32.14	AVG	P	
3	0.5865	18.96	10.03	28.99	56.00	-27.01	QP	P	
4	0.5865	3.17	10.03	13.20	46.00	-32.80	AVG	P	
5	0.7080	17.52	10.04	27.56	56.00	-28.44	QP	P	
6	0.7080	4.16	10.04	14.20	46.00	-31.80	AVG	P	
7 *	0.7530	19.61	10.04	29.65	56.00	-26.35	QP	P	
8	0.7530	3.01	10.04	13.05	46.00	-32.95	AVG	P	
9	0.9240	16.49	10.05	26.54	56.00	-29.46	QP	P	
10	0.9240	2.84	10.05	12.89	46.00	-33.11	AVG	P	
11	1.5044	14.84	10.06	24.90	56.00	-31.10	QP	P	
12	1.5044	1.59	10.06	11.65	46.00	-34.35	AVG	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

Temperature:	24.3℃	Relative Humidity :	50%
Pressure:	101kPa	Phase :	N
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.5100	18.31	10.02	28.33	56.00	-27.67	QP	P	
2	0.5100	4.43	10.02	14.45	46.00	-31.55	AVG	P	
3	0.6225	19.25	10.03	29.28	56.00	-26.72	QP	P	
4	0.6225	4.06	10.03	14.09	46.00	-31.91	AVG	P	
5 *	0.6584	19.51	10.03	29.54	56.00	-26.46	QP	P	
6	0.6584	3.62	10.03	13.65	46.00	-32.35	AVG	P	
7	0.7395	18.80	10.04	28.84	56.00	-27.16	QP	P	
8	0.7395	3.28	10.04	13.32	46.00	-32.68	AVG	P	
9	0.8475	16.47	10.05	26.52	56.00	-29.48	QP	P	
10	0.8475	2.01	10.05	12.06	46.00	-33.94	AVG	P	
11	1.0004	19.20	10.06	29.26	56.00	-26.74	QP	P	
12	1.0004	2.34	10.06	12.40	46.00	-33.60	AVG	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

4.2.1 RADIATED EMISSION LIMITS

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoiccamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of avariable-height antenna tower.

c. The antenna 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.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

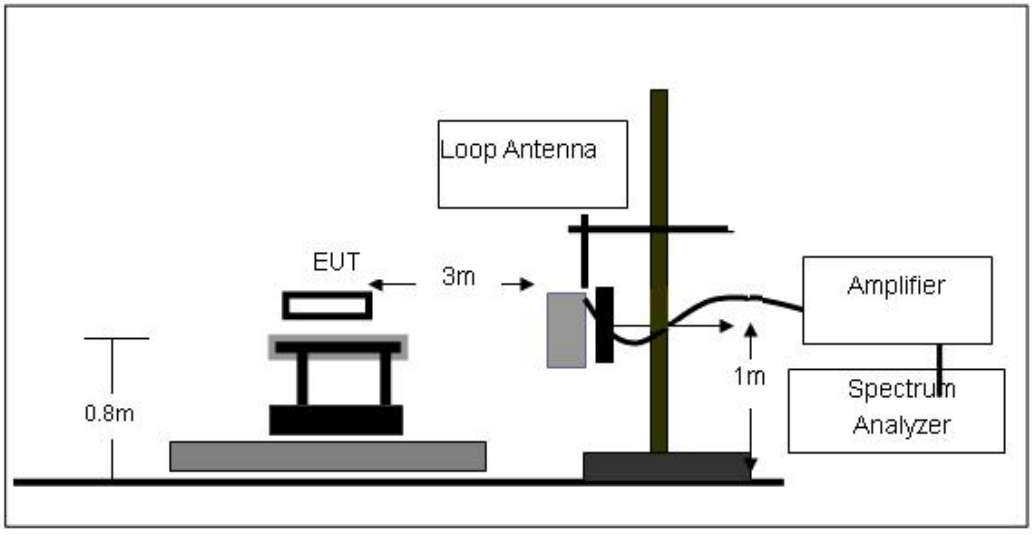
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

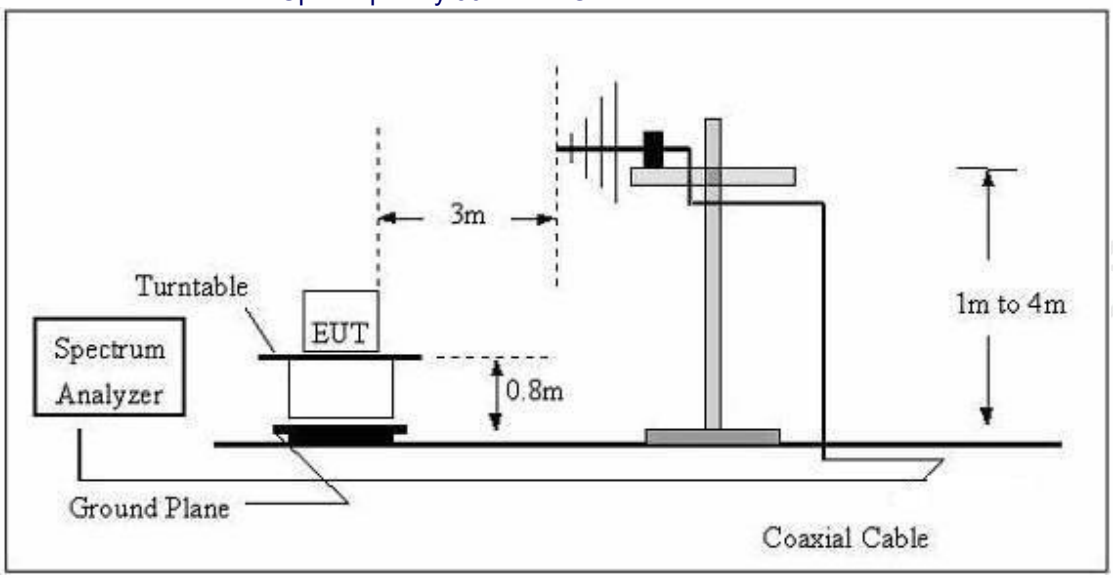
No deviation

4.2.4 TEST SETUP

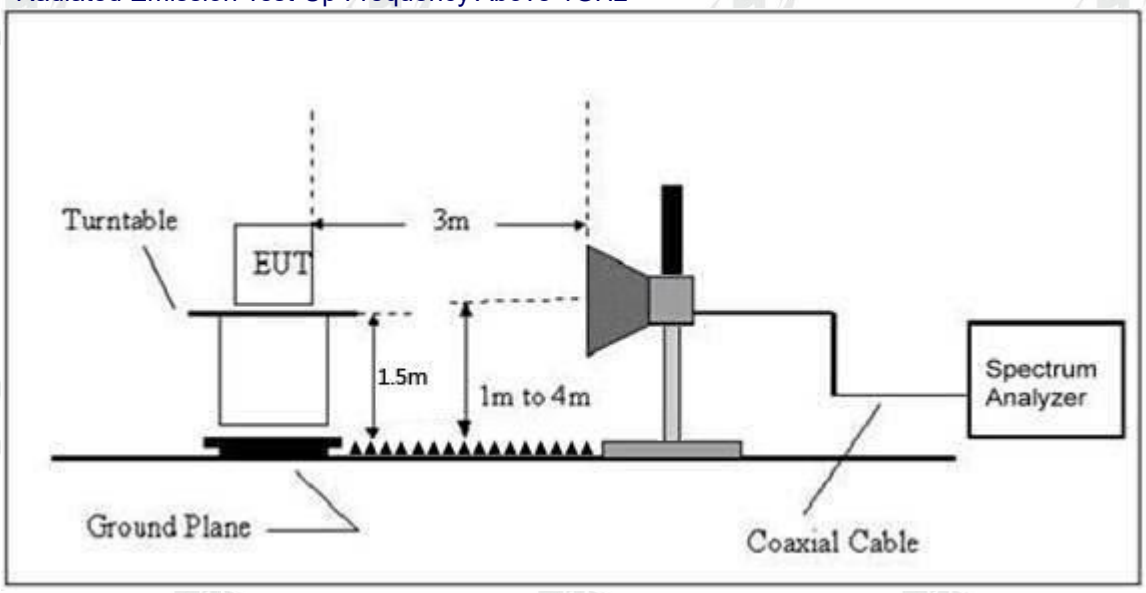
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

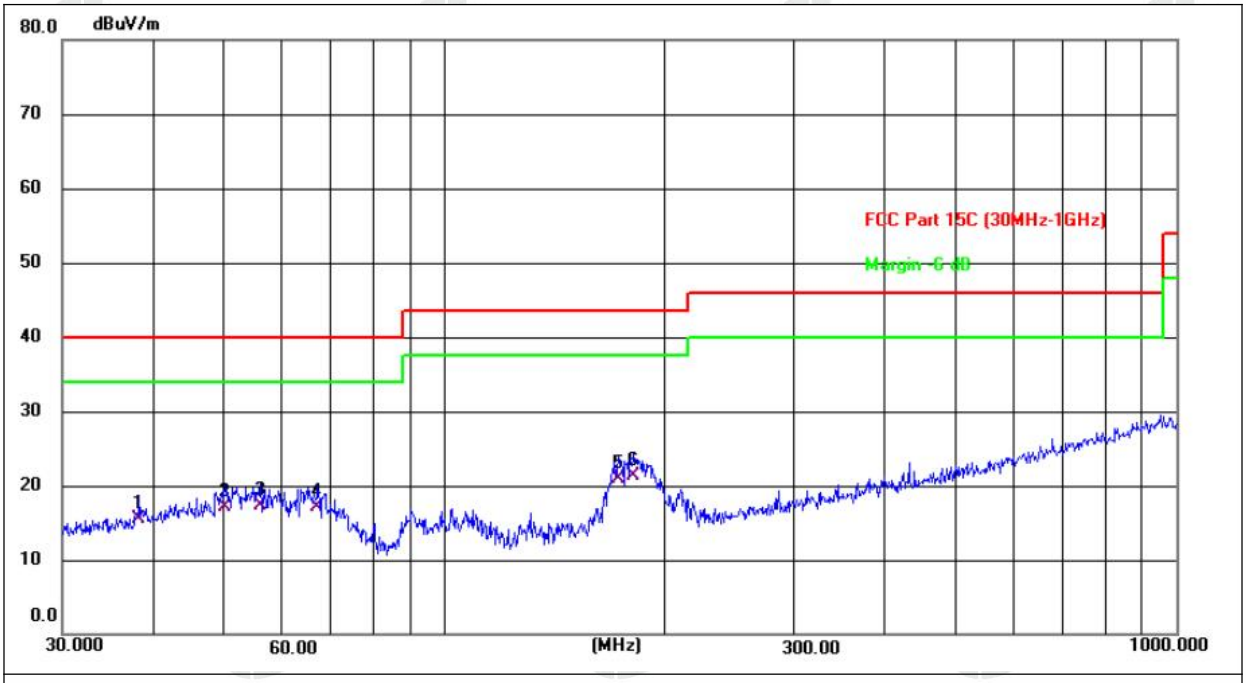
4.2.6 TEST RESULTS

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

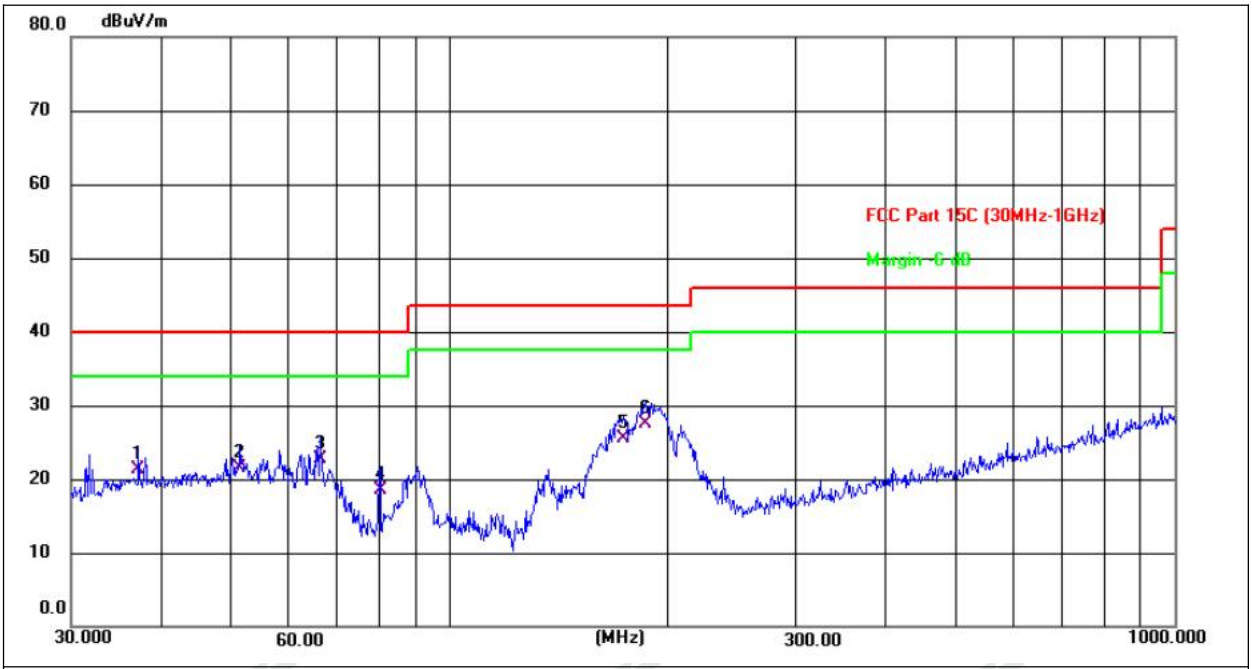
Between 30MHz – 1GHz

Temperature :	25.1℃	Relative Humidity :	50%
Pressure :	101kPa	Polarization :	Horizontal
Test Voltage :	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	38.2120	25.46	-10.00	15.46	40.00	-24.54	QP
2	50.0566	25.91	-8.75	17.16	40.00	-22.84	QP
3	56.0007	26.69	-9.39	17.30	40.00	-22.70	QP
4	66.9670	29.24	-12.06	17.18	40.00	-22.82	QP
5	172.5987	33.73	-12.74	20.99	43.50	-22.51	QP
6 *	181.2834	33.47	-12.24	21.23	43.50	-22.27	QP

Temperature :	25.1℃	Relative Humidity :	50%
Pressure :	101kPa	Polarization :	Vertical
Test Voltage :	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	37.1550	31.41	-10.18	21.23	40.00	-18.77	QP
2	51.3004	30.43	-8.87	21.56	40.00	-18.44	QP
3	66.2660	34.62	-11.84	22.78	40.00	-17.22	QP
4	80.0805	33.08	-14.61	18.47	40.00	-21.53	QP
5	173.8135	38.21	-12.68	25.53	43.50	-17.97	QP
6 *	186.4407	39.35	-11.87	27.48	43.50	-16.02	QP

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2.The emission levels of other frequencies are very lower than the limit and not show in test report.

Fundamental Test

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	2408	86.45	30.22	4.85	23.98	85.06	114.00	-28.94	Pk
V	2408	71.41	30.22	4.85	23.98	70.02	94.00	-23.98	AV
V	2440	81.47	30.22	4.85	23.98	80.08	114.00	-33.92	Pk
V	2440	70.25	30.22	4.85	23.98	68.86	94.00	-25.14	AV
V	2474	84.41	30.22	4.85	23.98	83.02	114.00	-30.98	Pk
V	2474	72.15	30.22	4.85	23.98	70.76	94.00	-23.24	AV
H	2408	85.24	30.22	4.85	23.98	83.85	114.00	-30.15	Pk
H	2408	70.78	30.22	4.85	23.98	69.39	94.00	-24.61	AV
H	2440	83.25	30.22	4.85	23.98	81.86	114.00	-32.14	Pk
H	2440	72.74	30.22	4.85	23.98	71.35	94.00	-22.65	AV
H	2474	82.26	30.22	4.85	23.98	80.87	114.00	-33.13	Pk
H	2474	70.47	30.22	4.85	23.98	69.08	94.00	-24.92	AV

1GHz~25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2408MHz									
V	4816.00	60	30.55	5.77	24.66	59.88	74	-14.12	Pk
V	4816.00	42.43	30.55	5.77	24.66	42.31	54	-11.69	AV
V	7224.00	59.07	30.33	6.32	24.55	59.61	74	-14.39	Pk
V	7224.00	41.89	30.33	6.32	24.55	42.43	54	-11.57	AV
V	9632.00	58.34	30.55	5.77	24.66	58.22	74	-15.78	Pk
V	9632.00	44.89	30.55	5.77	24.66	44.77	54	-9.23	AV
V	12040.00	55.32	30.33	6.32	24.55	55.86	74	-18.14	Pk
V	12040.00	42.97	30.33	6.32	24.55	43.51	54	-10.49	AV
H	4816.00	55.38	30.55	5.77	24.66	55.26	74	-18.74	Pk
H	4816.00	41.74	30.55	5.77	24.66	41.62	54	-12.38	AV
H	7224.00	58.01	30.33	6.32	24.55	58.55	74	-15.45	Pk
H	7224.00	44.54	30.33	6.32	24.55	45.08	54	-8.92	AV
H	9632.00	55.43	30.55	5.77	24.66	55.31	74	-18.69	Pk
H	9632.00	41.69	30.55	5.77	24.66	41.57	54	-12.43	AV
H	12040.00	56.88	30.33	6.32	24.55	57.42	74	-16.58	Pk
H	12040.00	41.92	30.33	6.32	24.55	42.46	54	-11.54	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2440MHz									
V	4880.00	55.45	30.55	5.77	24.66	55.33	74	-18.67	Pk
V	4880.00	41.66	30.55	5.77	24.66	41.54	54	-12.46	AV
V	7320.00	56.53	30.33	6.32	24.55	57.07	74	-16.93	Pk
V	7320.00	43.95	30.33	6.32	24.55	44.49	54	-9.51	AV
V	9760.00	57.55	30.55	5.77	24.66	57.43	74	-16.57	Pk
V	9760.00	41.52	30.55	5.77	24.66	41.4	54	-12.6	AV
V	12200.00	56.88	30.33	6.32	24.55	57.42	74	-16.58	Pk
V	12200.00	44.66	30.33	6.32	24.55	45.2	54	-8.8	AV
H	4880.00	58.05	30.55	5.77	24.66	57.93	74	-16.07	Pk
H	4880.00	43.53	30.55	5.77	24.66	43.41	54	-10.59	AV
H	7320.00	55.8	30.33	6.32	24.55	56.34	74	-17.66	Pk
H	7320.00	44.74	30.33	6.32	24.55	45.28	54	-8.72	AV
H	9760.00	55.55	30.55	5.77	24.66	55.43	74	-18.57	Pk
H	9760.00	41.96	30.55	5.77	24.66	41.84	54	-12.16	AV
H	12200.00	55.64	30.33	6.32	24.55	56.18	74	-17.82	Pk
H	12200.00	42	30.33	6.32	24.55	42.54	54	-11.46	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2474MHz									
V	4948.00	57.91	30.55	5.77	24.66	57.79	74	-16.21	Pk
V	4948.00	41.25	30.55	5.77	24.66	41.13	54	-12.87	AV
V	7422.00	56.66	30.33	6.32	24.55	57.2	74	-16.8	Pk
V	7422.00	43.5	30.33	6.32	24.55	44.04	54	-9.96	AV
V	9896.00	57.07	30.55	5.77	24.66	56.95	74	-17.05	Pk
V	9896.00	41.18	30.55	5.77	24.66	41.06	54	-12.94	AV
V	12370.00	56.76	30.33	6.32	24.55	57.3	74	-16.7	Pk
V	12370.00	41.76	30.33	6.32	24.55	42.3	54	-11.7	AV
H	4948.00	57.77	30.55	5.77	24.66	57.65	74	-16.35	Pk
H	4948.00	41.11	30.55	5.77	24.66	40.99	54	-13.01	AV
H	7422.00	56.26	30.33	6.32	24.55	56.8	74	-17.2	Pk
H	7422.00	43.04	30.33	6.32	24.55	43.58	54	-10.42	AV
H	9896.00	56.37	30.55	5.77	24.66	56.25	74	-17.75	Pk
H	9896.00	44.01	30.55	5.77	24.66	43.89	54	-10.11	AV
H	12370.00	55.59	30.33	6.32	24.55	56.13	74	-17.87	Pk
H	12370.00	44.39	30.33	6.32	24.55	44.93	54	-9.07	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

5. RADIATED BAND EMISSIONMEASUREMENT

5.1 TEST REQUIREMENT:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	See below

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	Average	1MHz	3MHz	Average

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna 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.

d. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reportedin a data sheet.

g. Test the EUT in the lowest channel,the Highest channel

Note:

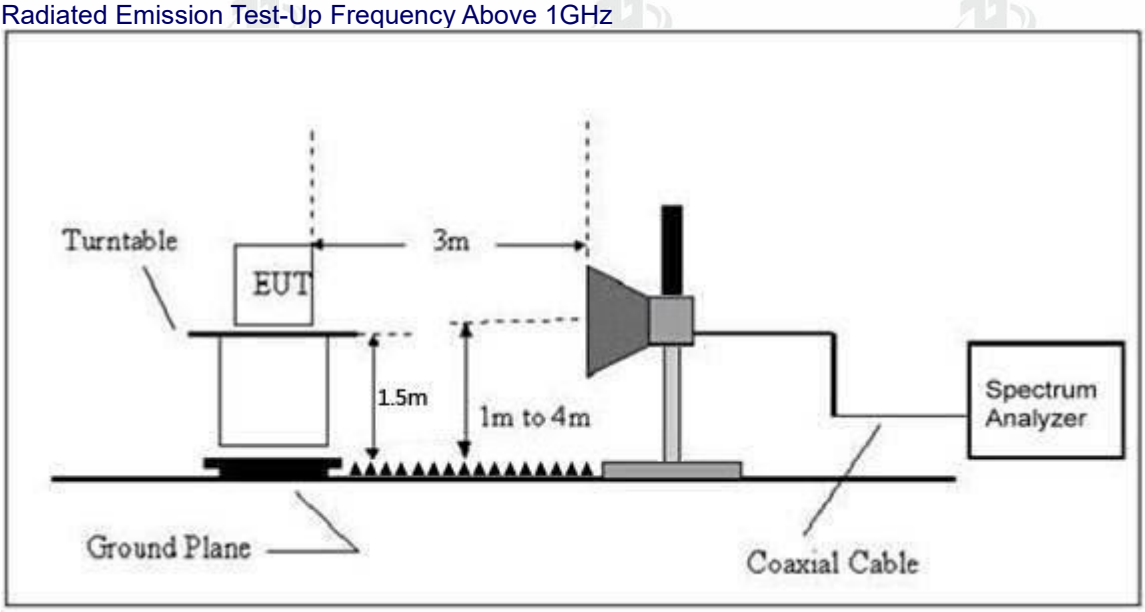
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULT

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
GFSK	Low Channel: 2408MHz										
	H	2390.00	60.90	30.22	4.85	23.98	59.51	74.00	-14.49	PK	PASS
	H	2390.00	48.08	30.22	4.85	23.98	46.69	54.00	-7.31	AV	PASS
	H	2400.00	62.02	30.22	4.85	23.98	60.63	74.00	-13.37	PK	PASS
	H	2400.00	47.10	30.22	4.85	23.98	45.71	54.00	-8.29	AV	PASS
	V	2390.00	60.93	30.22	4.85	23.98	59.54	74.00	-14.46	PK	PASS
	V	2390.00	48.42	30.22	4.85	23.98	47.03	54.00	-6.97	AV	PASS
	V	2400.00	62.39	30.22	4.85	23.98	61.00	74.00	-13.00	PK	PASS
	V	2400.00	47.76	30.22	4.85	23.98	46.37	54.00	-7.63	AV	PASS
	High Channel: 2474MHz										
	H	2483.50	62.06	30.22	4.85	23.98	60.67	74.00	-13.33	PK	PASS
	H	2483.50	48.48	30.22	4.85	23.98	47.09	54.00	-6.91	AV	PASS
	H	2500.00	61.51	30.22	4.85	23.98	60.12	74.00	-13.88	PK	PASS
	H	2500.00	47.73	30.22	4.85	23.98	46.34	54.00	-7.66	AV	PASS
	V	2483.50	59.16	30.22	4.85	23.98	57.77	74.00	-16.23	PK	PASS
	V	2483.50	48.18	30.22	4.85	23.98	46.79	54.00	-7.21	AV	PASS
	V	2500.00	59.29	30.22	4.85	23.98	57.90	74.00	-16.10	PK	PASS
	V	2500.00	48.52	30.22	4.85	23.98	47.13	54.00	-6.87	AV	PASS

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

6. Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.215
Test Method:	ANSI C63.10:2013

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.249) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.215	Bandwidth	2400-2483.5	PASS

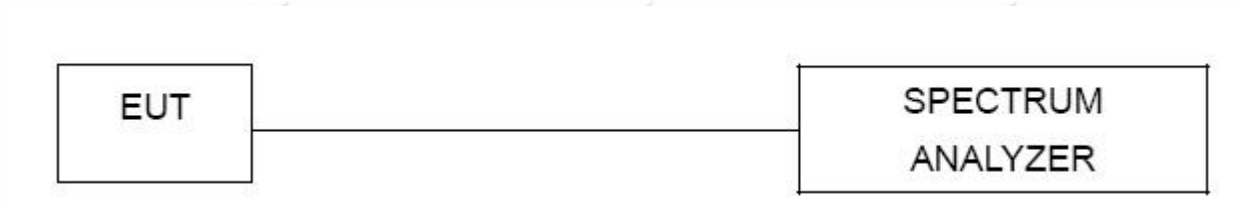
6.2 TEST PROCEDURE

1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

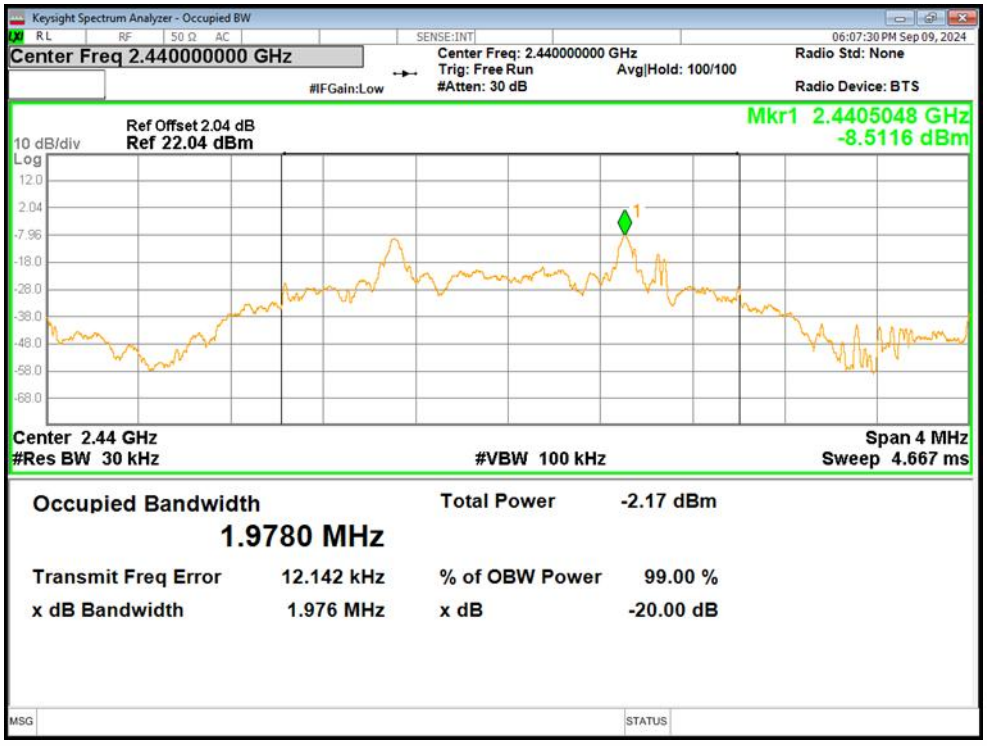
6.6 TEST RESULTS

Temperature：	25.6℃	Relative Humidity：	51%
Test Mode ：	GFSK	Test Voltage ：	DC 3.7V

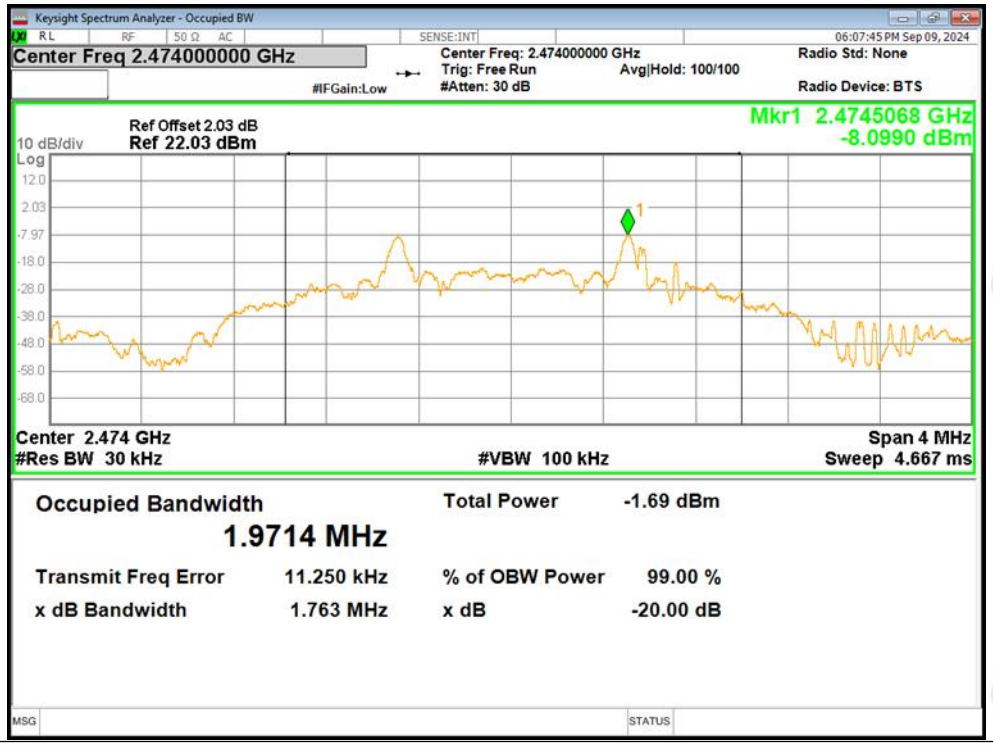
Test channel	Channel Bandwidth (MHz)	Result
Lowest	2.003	Pass
Middle	1.978	
Highest	1.971	

CH 01

CH17


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:INT
06:07:30 PM Sep 09, 2024
Center Freq 2.440000000 GHz
Center Freq: 2.440000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 2.04 dB
10 dB/div
Ref 22.04 dBm
Log
Mkr1 2.4405048 GHz
-8.5116 dBm
12.0
2.04
-7.96
-18.0
-28.0
-38.0
-48.0
-58.0
-68.0
Center 2.44 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 4 MHz
Sweep 4.667 ms
Occupied Bandwidth
1.9780 MHz
Total Power
-2.17 dBm
Transmit Freq Error
12.142 kHz
% of OBW Power
99.00 %
x dB Bandwidth
1.976 MHz
x dB
-20.00 dB
MSG
STATUS

CH34


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:INT
06:07:45 PM Sep 09, 2024
Center Freq 2.474000000 GHz
Center Freq: 2.474000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 2.03 dB
10 dB/div
Ref 22.03 dBm
Log
Mkr1 2.4745068 GHz
-8.0990 dBm
12.0
2.03
-7.97
-18.0
-28.0
-38.0
-48.0
-58.0
-68.0
Center 2.474 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 4 MHz
Sweep 4.667 ms
Occupied Bandwidth
1.9714 MHz
Total Power
-1.69 dBm
Transmit Freq Error
11.250 kHz
% of OBW Power
99.00 %
x dB Bandwidth
1.763 MHz
x dB
-20.00 dB
MSG
STATUS

7.ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna:	
The antenna is PCB Antenna, the best case gain of the antennas is -0.61dBi, reference to the appendix II for details	

8. TEST SETUP PHOTO

Reference to the appendix I for details.

9. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※