FCC TEST REPORT
FCC ID:2A594-YXE-512SE

Report Number	ZKT-240729L8948E-1
Date of Test	July.24,2024
Date of issue	July.24,2024-August 14,2024
Total number of pages	August 15,2024
Test Result	PASS

Testing Laboratory	**Shenzhen ZKT Technology Co., Ltd.**
Address	1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name	**Shenzhen Yunxinger Technology Co., Ltd**
Address	2nd Floor, No. 5, 2nd Road, Xinmulao Village Industrial Park, Pinghu Town, Longgang District, Shenzhen,China

Manufacturer's name	**Shenzhen Yunxinger Technology Co., Ltd**
Address	2nd Floor, No. 5, 2nd Road, Xinmulao Village Industrial Park, Pinghu Town, Longgang District, Shenzhen,China

Test specification:	
Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.249 ANSI C63.10:2013
Test procedure	/
Non-standard test method	N/A

Test Report Form No	TRF-EL-111_V0
Test Report Form(s) Originator	ZKT Testing
Master TRF	Dated: 2022-02-21

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	Wireless DMX512 Controller
Trademark	N/A
Model/Type reference	YXE-512SE
Ratings	Adapter Model:0910 INPUT:100-240V~50/60Hz OUTPUT:9Vdc Max.1A

Testing procedure and testing location:

Testing Laboratory..... :	Shenzhen ZKT Technology Co., Ltd.
Address..... :	1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China
Tested by (name + signature)..... :	Jim Liu
Reviewer (name + signature)..... :	Jackson Fang
Approved (name + signature)..... :	Lake Xie

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1.VERSION

Report No.	Version	Description	Approved
ZKT-240729L8948E-1	Rev.01	Initial issue of report	August 15,2024

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 15.203	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part15.249(a)	Field Strength of Fundamental	PASS	
FCC part 15.249	Fundamental &Radiated Spurious Emission Measurement	PASS	
FCC part 15.215 (c)	20dB Channel Bandwidth	PASS	
FCC part 15.205	Band Edge	PASS	

NOTE:

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

2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.
Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225
Designation Number: CN1299
IC Registered No.: 27033

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 power conducted	±0.16dB
3	Spurious emissions conducted	±0.21dB
4	All emissions radiated(<1G)	±4.68dB
5	All emissions radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Wireless DMX512 Controller
Model No.:	YXE-512SE
Hardware Version:	H1.0
Software Version:	S1.0
Sample(s) Status:	Engineer sample
Operation Frequency:	2405MHz, 2440MHz, 2475MHz
Channel Numbers:	3
Modulation Type:	GFSK
Antenna Type:	External antenna
Antenna gain:	2dBi
Power supply:	Adapter Model:0910 INPUT:100-240V~50/60Hz OUTPUT:9Vdc Max.1A

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405 MHz						
2	2440MHz						
3	2475MHz						

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	2405MHz
The middle channel	2440MHz
The Highest channel	2475MHz

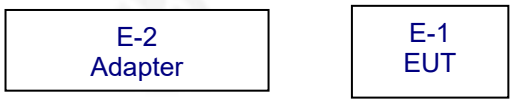
3.2 DESCRIPTION OF TEST MODES

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: 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.	

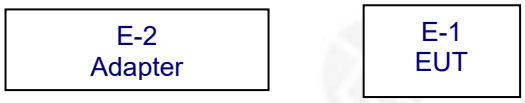
Test Software	RF Test Tool
Power level setup	<0dBm

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Emission



Conducted Spurious



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	Wireless DMX512 Controller	N/A	YXE-512SE	/	EUT
E-2	Adapter	N/A	0910	/	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	/	/	/	/

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.

3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Equipment List:

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	A.17.05	Nov. 02, 2023	Nov. 01, 2024
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Nov. 02, 2023	Nov. 01, 2024
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	100969	4.32	Nov. 02, 2023	Nov. 01, 2024
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	N/A	Nov. 13, 2023	Nov. 12, 2024
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	N/A	Nov. 13, 2023	Nov. 12, 2024
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	N/A	Nov. 13, 2023	Nov. 12, 2024
7	Loop Antenna	TESEQ	HLA6121	58357	N/A	Nov. 16, 2023	Nov. 15, 2024
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	60747	N/A	Nov. 02, 2023	Nov. 01, 2024
9	Amplifier (1GHz-26.5GHz)	HuiPu	8449B	3008A00315	N/A	Nov. 02, 2023	Nov. 01, 2024
10	Amplifier (500MHz-40GHz)	QuanJuDa	DLE-161	097	N/A	Nov. 02, 2023	Nov. 01, 2024
11	Test Cable	N/A	R-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
12	Test Cable	N/A	R-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
13	Test Cable	N/A	R-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
14	Test Cable	N/A	RF-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
15	Test Cable	N/A	RF-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
16	Test Cable	N/A	RF-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
17	ESG Signal Generator	Agilent	E4421B	N/A	B.03.84	Nov. 02, 2023	Nov. 01, 2024
18	Signal Generator	Agilent	N5182A	N/A	A.01.87	Nov. 02, 2023	Nov. 01, 2024
19	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	N/A	Nov. 16, 2023	Nov. 15, 2024
20	Wideband Radio Communication Test	R&S	CMW500	106504	V 3.7.22	Nov. 02, 2023	Nov. 01, 2024
21	MWRF Power Meter Test system	MW	MW100-RF CB	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
22	D.C. Power Supply	LongWei	TPR-6405D	N/A	N/A	\	\
23	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	N/A	\	\
24	RF Software	MW	MTS8310	V2.0.0.0	N/A	\	\
25	Turntable	MF	MF-7802BS	N/A	N/A	\	\
26	Antenna tower	MF	MF-7802BS	N/A	N/A	\	\

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	N/A	Nov. 14, 2023	Nov. 13, 2024
2	LISN	CYBERTEK	EM5040A	E1850400149	N/A	Nov. 02, 2023	Nov. 01, 2024
3	Test Cable	N/A	C-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
4	Test Cable	N/A	C-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
5	Test Cable	N/A	C-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
6	EMI Test Receiver	R&S	ESCI3	101393	4.42 SP3	Nov. 02, 2023	Nov. 01, 2024
7	Triple-Loop Antenna	N/A	RF300	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
8	Absorbing Clamp	DZ	ZN23201	15034	N/A	Nov. 07, 2023	Nov. 06, 2024
9	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	N/A	\	\

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
	Quas-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.

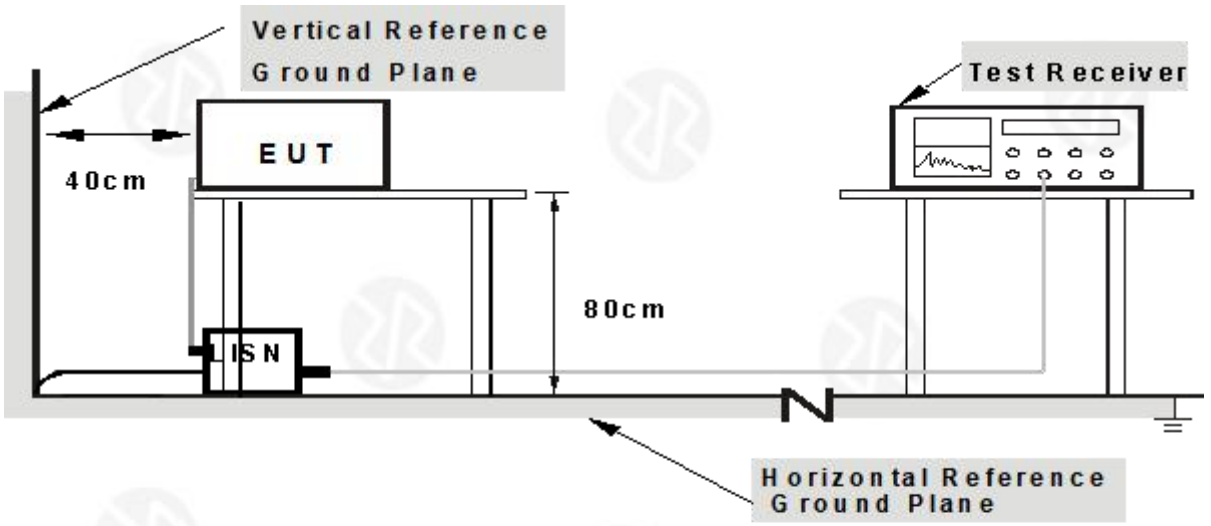
4.1.2 TEST PROCEDURE

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



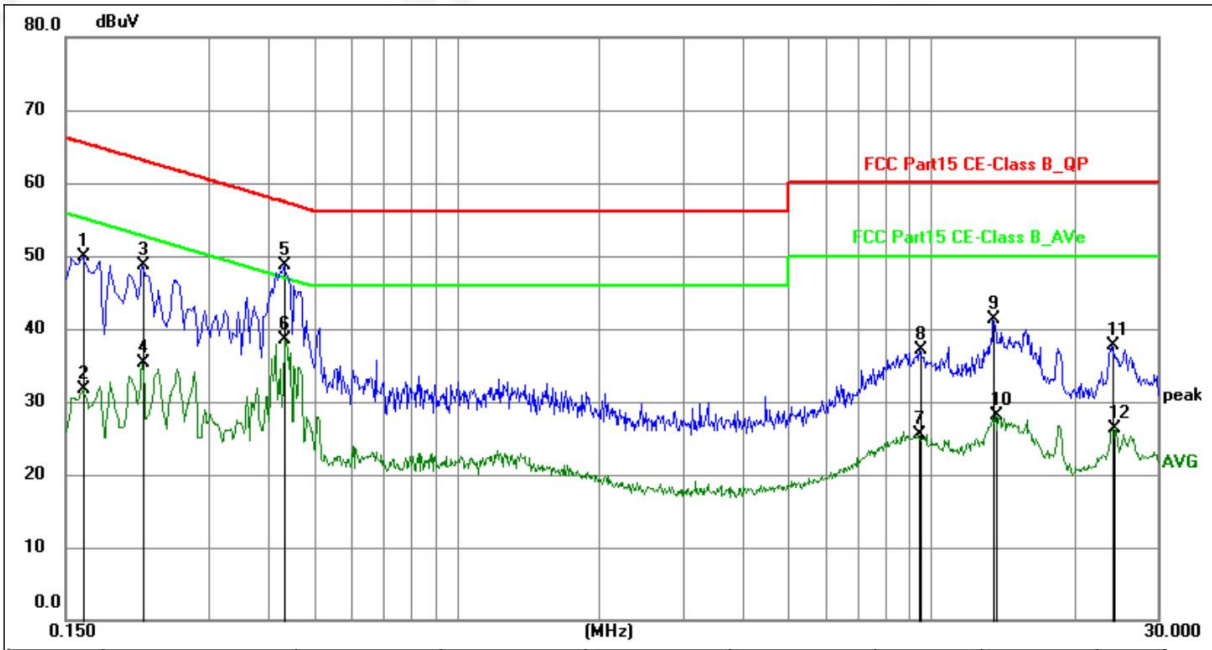
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

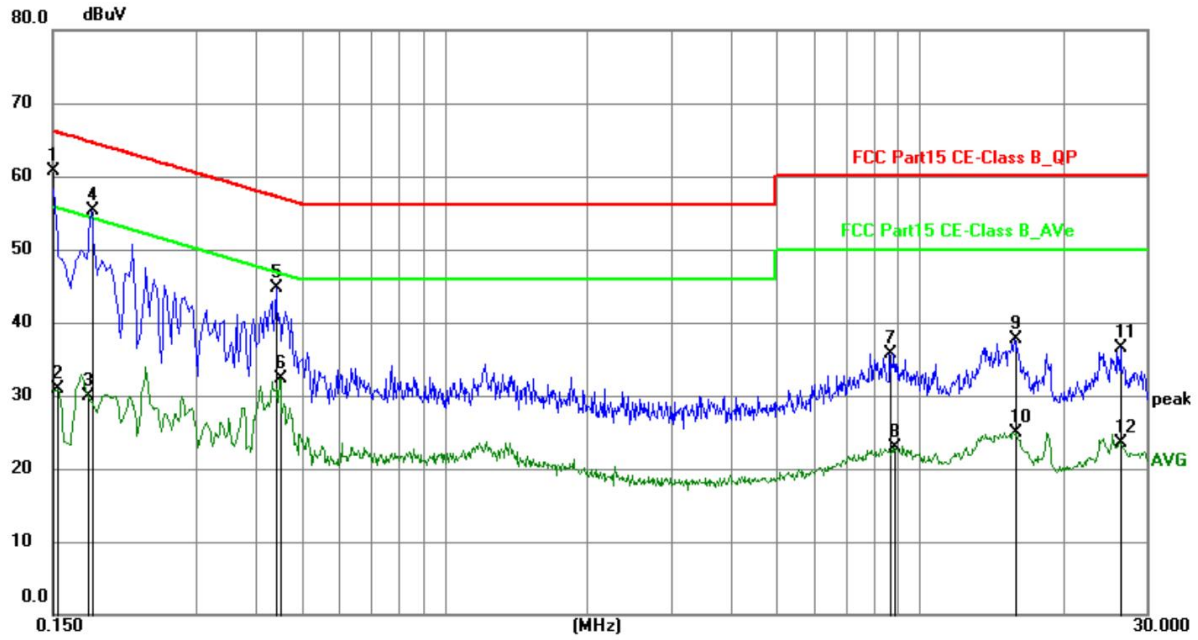
Temperature :	26℃	Relative Humidity:	60%
Pressure :	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	TX



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1635	28.97	20.91	49.88	65.28	-15.40	QP	P
2	0.1635	10.81	20.91	31.72	55.28	-23.56	AVG	P
3	0.2174	27.58	21.03	48.61	62.92	-14.31	QP	P
4	0.2174	14.30	21.03	35.33	52.92	-17.59	AVG	P
5	0.4334	27.77	20.92	48.69	57.19	-8.50	QP	P
6	0.4334	17.52	20.92	38.44	47.19	-8.75	AVG	P
7	9.4425	3.67	21.92	25.59	50.00	-24.41	AVG	P
8	9.4961	15.23	21.93	37.16	60.00	-22.84	QP	P
9	13.5464	18.67	22.63	41.30	60.00	-18.70	QP	P
10	13.6722	5.41	22.65	28.06	50.00	-21.94	AVG	P
11	24.0900	13.27	24.37	37.64	60.00	-22.36	QP	P
12	24.1980	1.93	24.38	26.31	50.00	-23.69	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.The test data shows only the worst case GFSK-2405MHz.

Temperature :	26℃	Relative Humidity:	60%
Pressure :	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	TX



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1500	39.85	20.84	60.69	66.00	-5.31	QP	P
2	0.1532	9.98	20.85	30.83	55.82	-24.99	AVG	P
3	0.1785	8.93	20.94	29.87	54.56	-24.69	AVG	P
4	0.1814	34.38	20.94	55.32	64.42	-9.10	QP	P
5	0.4425	23.72	20.89	44.61	57.01	-12.40	QP	P
6	0.4515	11.49	20.88	32.37	46.85	-14.48	AVG	P
7	8.6820	13.89	21.83	35.72	60.00	-24.28	QP	P
8	8.8350	1.12	21.86	22.98	50.00	-27.02	AVG	P
9	15.8233	14.62	23.05	37.67	60.00	-22.33	QP	P
10	15.9090	1.82	23.07	24.89	50.00	-25.11	AVG	P
11	26.4705	11.76	24.78	36.54	60.00	-23.46	QP	P
12	26.4705	-1.20	24.78	23.58	50.00	-26.42	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.The test data shows only the worst case GFSK-2405MHz.

4.2 RADIATED EMISSION MEASUREMENT

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td colspan="5">ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">9kHz to 25GHz</td></tr>
<tr><td>Test site:</td><td colspan="5">Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td colspan="5"><table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Value</td></tr>
<tr><td>9KHz-150KHz</td><td>Quasi-peak</td><td>200Hz</td><td>600Hz</td><td>Quasi-peak</td></tr>
<tr><td>150KHz-30MHz</td><td>Quasi-peak</td><td>9KHz</td><td>30KHz</td><td>Quasi-peak</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average</td></tr>
</table></td></tr>
</table>

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

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
Note:

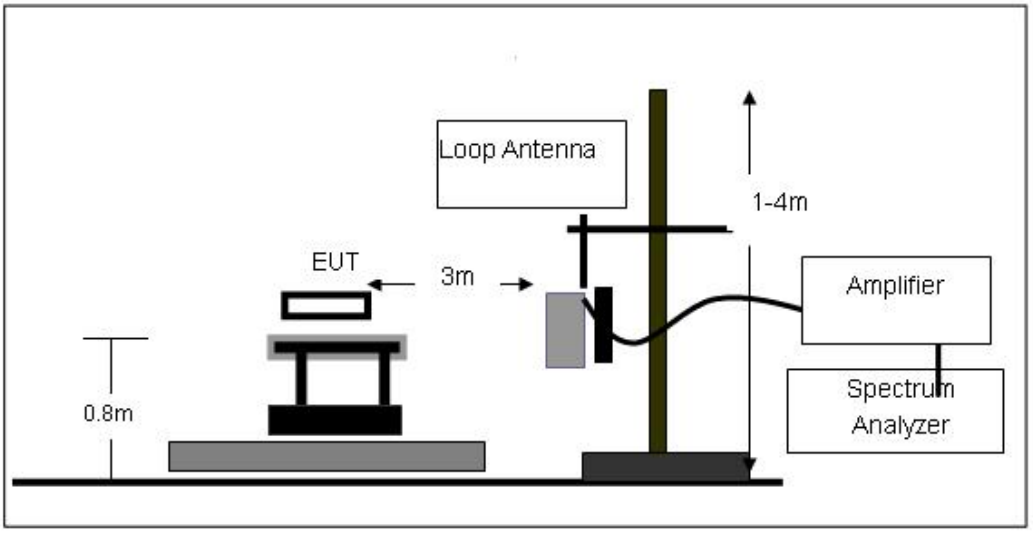
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

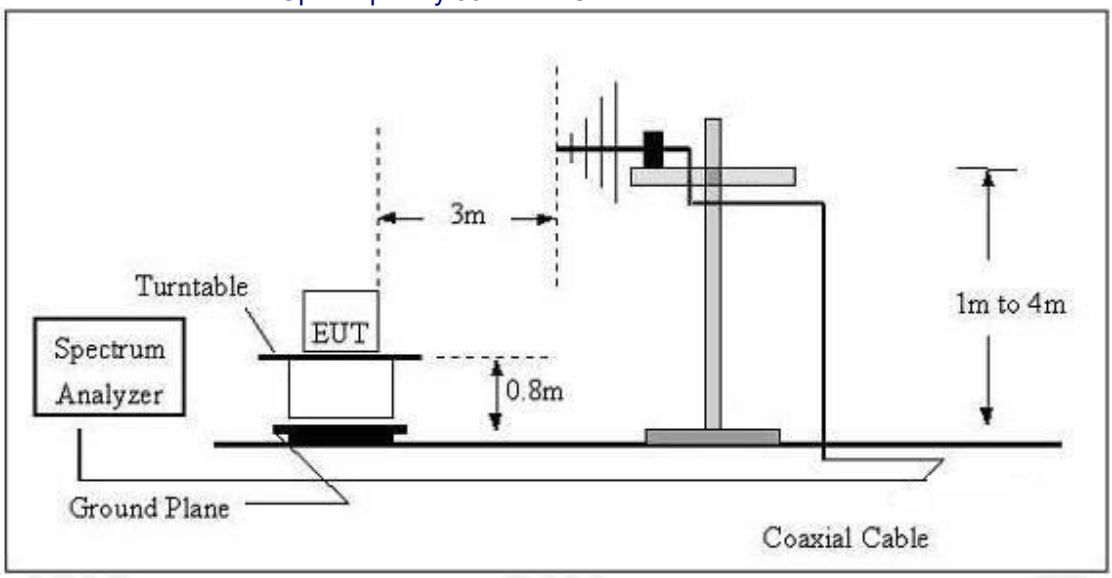
No deviation

4.2.4 TEST SETUP

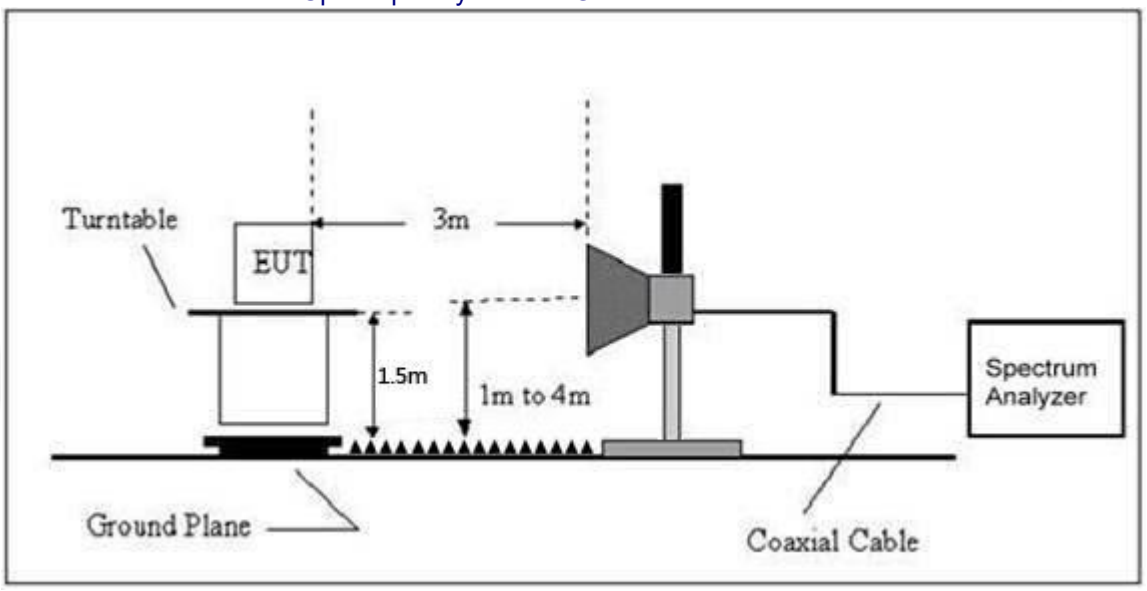
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.5 EUT OPERATING CONDITIONS

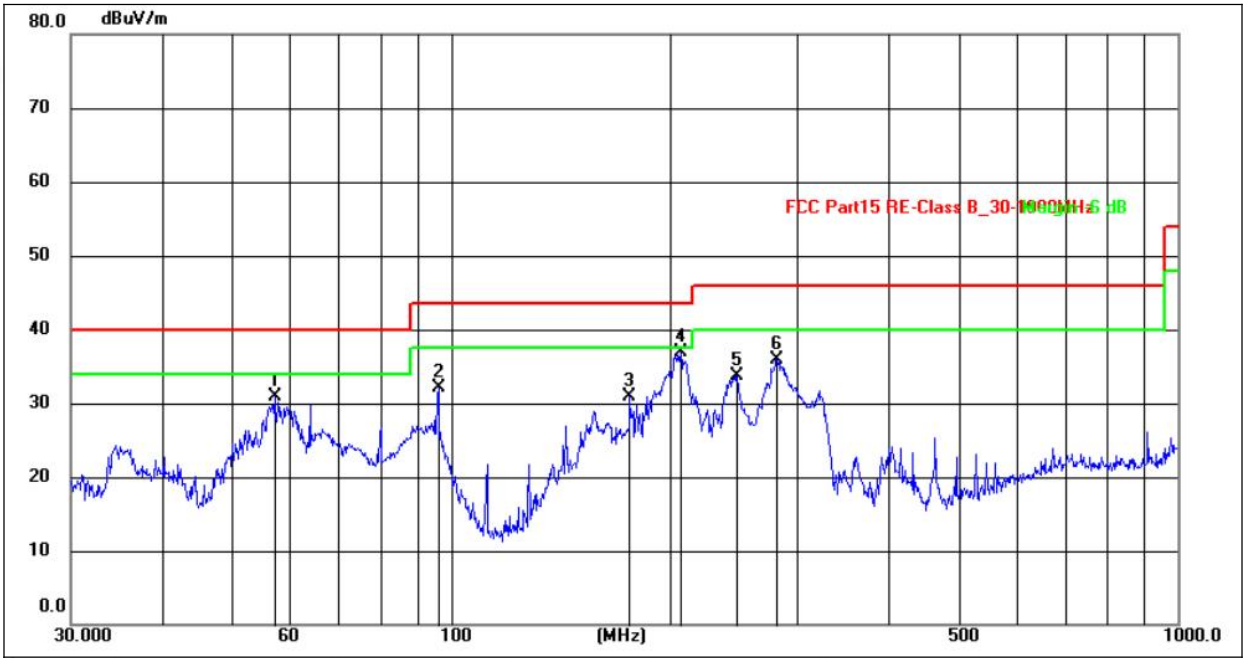
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 TEST RESULTS (Between 9KHz – 30 MHz)

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.

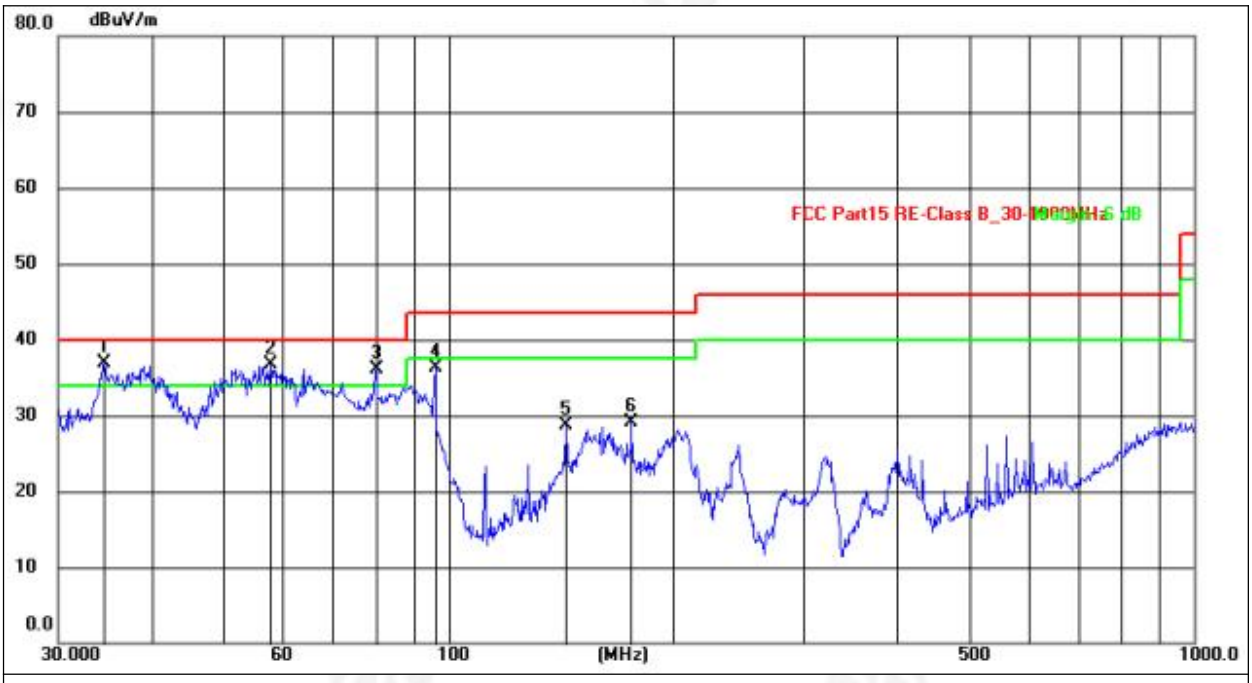
Between 30MHz – 1GHz

Temperature:	26℃	Relative Humidity:	60%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	57.1914	45.14	-14.18	30.96	40.00	-9.04	QP
2	96.0985	52.06	-19.96	32.10	43.50	-11.40	QP
3	176.2686	48.46	-17.54	30.92	43.50	-12.58	QP
4	207.1225	55.29	-18.44	36.85	43.50	-6.65	QP
5	247.6818	49.74	-16.00	33.74	46.00	-12.26	QP
6	281.0074	50.38	-14.47	35.91	46.00	-10.09	QP

Temperature:	26℃	Relative Humidity:	60%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.6385	54.51	-17.67	36.84	40.00	-3.16	QP
2	57.7962	54.75	-18.09	36.66	40.00	-3.34	QP
3	80.0806	57.96	-21.87	36.09	40.00	-3.91	QP
4	96.0986	57.66	-21.32	36.34	43.50	-7.16	QP
5	143.8295	49.45	-20.79	28.66	43.50	-14.84	QP
6	176.2686	49.10	-19.91	29.19	43.50	-14.31	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.

GFSK 1GHz~25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2405MHz									
V	4810.00	53.58	30.55	5.77	24.66	53.46	74.00	-20.54	Pk
V	7215.00	43.93	30.55	5.77	24.66	43.81	54.00	-10.19	AV
V	7215.00	52.99	30.33	6.32	24.55	53.53	74.00	-20.47	Pk
V	7215.00	44.45	30.33	6.32	24.55	44.99	54.00	-9.01	AV
V	9620.00	51.90	30.85	7.45	24.69	53.19	74.00	-20.81	Pk
V	9620.00	43.71	30.85	7.45	24.69	45.00	54.00	-9.00	AV
V	12025.00	55.41	31.02	8.99	25.57	58.95	74.00	-15.05	Pk
V	12025.00	44.16	31.02	8.99	25.57	47.70	54.00	-6.30	AV
H	4810.00	52.17	30.55	5.77	24.66	52.05	74.00	-21.95	Pk
H	7215.00	44.62	30.55	5.77	24.66	44.50	54.00	-9.50	AV
H	7215.00	53.85	30.33	6.32	24.55	54.39	74.00	-19.61	Pk
H	7215.00	44.32	30.33	6.32	24.55	44.86	54.00	-9.14	AV
H	9620.00	52.44	30.85	7.45	24.69	53.73	74.00	-20.27	Pk
H	9620.00	44.64	30.85	7.45	24.69	45.93	54.00	-8.07	AV
H	12025.00	54.16	31.02	8.99	25.57	57.70	74.00	-16.3	Pk
H	12025.00	43.76	31.02	8.99	25.57	47.30	54.00	-6.70	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2440MHz									
V	4880.00	54.37	30.55	5.77	24.66	54.25	74.00	-19.75	Pk
V	4860.00	44.87	30.55	5.77	24.66	44.75	54.00	-9.25	AV
V	7320.00	54.27	30.33	6.32	24.55	54.81	74.00	-19.19	Pk
V	7320.00	44.44	30.33	6.32	24.55	44.98	54.00	-9.02	AV
V	9760.00	53.08	30.85	7.45	24.69	54.37	74.00	-19.63	Pk
V	9760.00	44.36	30.85	7.45	24.69	45.65	54.00	-8.35	AV
V	12200.00	52.59	31.02	8.99	25.57	56.13	74.00	-17.87	Pk
V	12200.00	44.5	31.02	8.99	25.57	48.04	54.00	-5.96	AV
H	4880.00	54.76	30.55	5.77	24.66	54.64	74.00	-19.36	Pk
H	4860.00	44.64	30.55	5.77	24.66	44.52	54.00	-9.48	AV
H	7320.00	55.14	30.33	6.32	24.55	55.68	74.00	-18.32	Pk
H	7320.00	44.03	30.33	6.32	24.55	44.57	54.00	-9.43	AV
H	9760.00	51.84	30.85	7.45	24.69	53.13	74.00	-20.87	Pk
H	9760.00	44.85	30.85	7.45	24.69	46.14	54.00	-7.86	AV
H	12200.00	51.23	31.02	8.99	25.57	54.77	74.00	-19.23	Pk
H	12200.00	44.88	31.02	8.99	25.57	48.42	54.00	-5.58	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2475MHz									
V	4950.00	54.30	30.55	5.77	24.66	54.18	74.00	-19.82	Pk
V	4950.00	44.58	30.55	5.77	24.66	44.46	54.00	-9.54	AV
V	7425.00	53.47	30.33	6.32	24.55	54.01	74.00	-19.99	Pk
V	7425.00	43.62	30.33	6.32	24.55	44.16	54.00	-9.84	AV
V	9900.00	51.35	30.85	7.45	24.69	52.64	74.00	-21.36	Pk
V	9900.00	44.24	30.85	7.45	24.69	45.53	54.00	-8.47	AV
V	12375.00	52.10	31.02	8.99	25.57	55.64	74.00	-18.36	Pk
V	12375.00	44.08	31.02	8.99	25.57	47.62	54.00	-6.38	AV
H	4950.00	52.43	30.55	5.77	24.66	52.31	74.00	-21.69	Pk
H	4950.00	43.84	30.55	5.77	24.66	43.72	54.00	-10.28	AV
H	4950.00	52.16	30.33	6.32	24.55	52.70	74.00	-21.30	Pk
H	4950.00	44.07	30.33	6.32	24.55	44.61	54.00	-9.39	AV
H	4950.00	52.70	30.85	7.45	24.69	53.99	74.00	-20.01	Pk
H	4950.00	44.29	30.85	7.45	24.69	45.58	54.00	-8.42	AV
H	4950.00	55.24	31.02	8.99	25.57	58.78	74.00	-15.22	Pk
H	4950.00	43.91	31.02	8.99	25.57	47.45	54.00	-6.55	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. BANDWIDTH OF FREQUENCY BAND EDGE

5.1 TEST REQUIREMENT:

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td>All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>Average</td><td>1MHz</td><td>3MHz</td><td>Average</td></tr>
</table>
<table>
<tr><th>Fundamental frequency</th><th>Field strength of fundamental@3m (millivolts/meter)</th><th>Average Limit@3m dBμV/m</th><th>Peak Limit@3m dBμV/m</th></tr>
<tr><td>902-928MHz</td><td>50</td><td>94</td><td>114</td></tr>
<tr><td>2407-2477MHz</td><td>50</td><td>94</td><td>114</td></tr>
<tr><td>5725-5875MHz</td><td>50</td><td>94</td><td>114</td></tr>
<tr><td>24.0-24.25</td><td>250</td><td>108</td><td>128</td></tr>
</table>
Note：
1. Average Limit (dBμV/m)=20×log[1000×Field Strength (mV/m)].
2. Peak Limit (dBμV/m)= Average Limit (dBμV/m)+20dB
</td></tr>
</table>

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 § 15.209, whichever is the lesser attenuation

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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the Highest channel

Note:

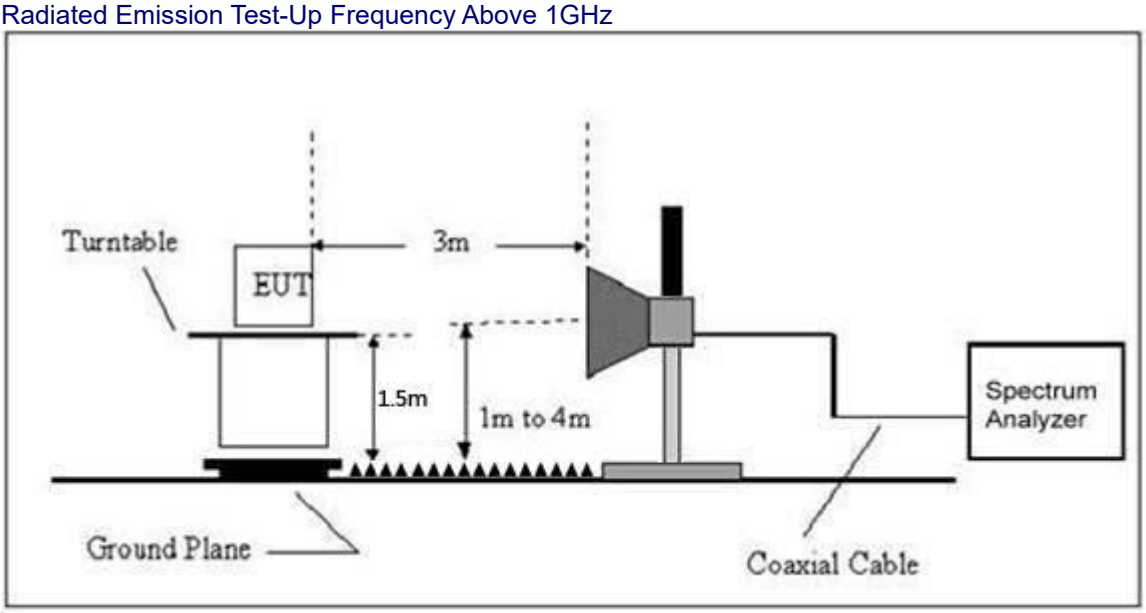
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



6.5 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

Test frequency (MHz)	Fundamental Frequency (MHz)	Field strength of fundamental level (dBμV/m)		Limit (dBuV)		Result	Antenna Pole (H/V)
		AVG	Peak	AVG	Peak		
2405	2405.021	86.97	89.35	94	114	Pass	H
	2405.015	84.76	88.35	94	114	Pass	V
2440	2440.013	89.64	90.26	94	114	Pass	H
	2440.017	87.14	90.75	94	114	Pass	V
2475	2475.018	87.43	91.24	94	114	Pass	H
	2475.021	85.26	91.52	94	114	Pass	V

	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)	Detector Type	Result
GFSK	Low Channel: 2405MHz									
	H	2390.00	56.65	30.22	4.85	23.98	55.26	74.00	PK	PASS
	H	2390.00	47.05	30.22	4.85	23.98	45.66	54.00	AV	PASS
	H	2400.00	56.43	30.22	4.85	23.98	55.04	74.00	PK	PASS
	H	2400.00	47.34	30.22	4.85	23.98	45.95	54.00	AV	PASS
	V	2390.00	55.48	30.22	4.85	23.98	54.09	74.00	PK	PASS
	V	2390.00	47.12	30.22	4.85	23.98	45.73	54.00	AV	PASS
	V	2400.00	56.91	30.22	4.85	23.98	55.52	74.00	PK	PASS
	V	2400.00	47.25	30.22	4.85	23.98	45.86	54.00	AV	PASS
	High Channel: 2475MHz									
	H	2483.50	56.77	30.22	4.85	23.98	55.38	74.00	PK	PASS
	H	2483.50	46.77	30.22	4.85	23.98	45.38	54.00	AV	PASS
	H	2500.00	57.04	30.22	4.85	23.98	55.65	74.00	PK	PASS
	H	2500.00	46.61	30.22	4.85	23.98	45.22	54.00	AV	PASS
	V	2483.50	56.36	30.22	4.85	23.98	54.97	74.00	PK	PASS
	V	2483.50	46.91	30.22	4.85	23.98	45.52	54.00	AV	PASS
	V	2500.00	56	30.22	4.85	23.98	54.61	74.00	PK	PASS
	V	2500.00	47.2	30.22	4.85	23.98	45.81	54.00	AV	PASS

7. CHANNEL BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10: 2013

7.1 APPLIED PROCEDURES / LIMIT

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

7.2 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 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) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP

7.5 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.

7.6 TEST RESULT

Measurement Data :

2405MHz

2440MHz

2475MHz


Keysight Spectrum Analyzer - Occupied BW
RF
50 Ω AC
SENSE:INT
09:00:02 PM Aug 14, 2024
Center Freq: 2.475000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
Frequency
15 dB/div
Log
Ref 10.00 dBm
-5.00
-20.0
-35.0
-50.0
-65.0
-80.0
-95.0
-110
-125
Center 2.475 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
Occupied Bandwidth
965.45 kHz
Total Power
-6.55 dBm
Transmit Freq Error
-7.345 kHz
% of OBW Power
99.00 %
x dB Bandwidth
1.120 MHz
x dB
-20.00 dB
Center Freq
2.475000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

8.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 antennas are External antenna, the best case gain of the antennas are 2dBi, reference to the appendix II for details.	

9. TEST SETUP PHOTO

Reference to the appendix I for details.

10. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※