

FCC TEST REPORT

FCC ID:2BNFE-J-10

Product : **Judge Box**
Model Name : **J-10**
Brand : **/**
Report No. : **NCT240525326XE1-1**

Prepared for

KPNP CO., LTD.

#1805, 19,Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

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1 TEST RESULT CERTIFICATION

Applicant's name : KPNP CO., LTD.
Address : #1805, 19,Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea
Manufacture's name : KPNP CO., LTD.
Address : #1805, 19,Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea
Product name : Judge Box
Model name : J-10
Standards : FCC PART 15 C 15.249
Test procedure : ANSI C63.10:2020
Date of test : Dec. 23, 2024-Jan. 19, 2025
Date of Issue : Jan. 19, 2025

This device described above has been tested by NCT, 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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Test Engineer:


Keven Wu / Engineer

Technical Manager:


Henry Wang / Manager

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2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	FCC part 15.207	PASS
Fundamental & Radiated Spurious Emission Measurement	15.249(a); 15.209	PASS
Band edge	15.249(d); 15.205	PASS
20dB Bandwidth	15.215	PASS
Antenna Requirement	15.203	PASS

Remark:

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

2.1 Test Site

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27

The certificate is valid until 2028.01.07

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)

The Certificate Registration Number is L8251

Designation Number: CN1347

Test Firm Registration Number: 894804

Accredited by A2LA, June 14, 2023

The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018

The Conformity Assessment Body Identifier is CN0150

Company Number: 30806

Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.

Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Judge Box
Model Name	:	J-10
Sample ID	:	24-001#
Sample(s) Status:	:	Engineer sample
Series Model	:	N/A
Model Different.:	:	N/A
Operating frequency	:	2405-2480MHz
Number of Channels	:	16 channels
Type of Modulation	:	GFSK
Antenna installation	:	PCB Antenna
Antenna Gain	:	1dBi
Power supply	:	DC 3.7V by battery
Hardware Version	:	N/A
Software Version	:	N/A
Remark: the Antenna gain is provided by customer from Antenna spec. and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.		

3.2 Channel List

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The details of test channels and bandwidth were for RF conductive measurement.

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2405	07	2435	13	2465
02	2410	08	2440	14	2470
03	2415	09	2445	15	2475
04	2420	10	2450	16	2480
05	2425	11	2455		
06	2430	12	2460		

Note:

1. Test of channel was included the lowest, middle and highest frequency in highest data rate and to perform the test, then record on this report.

3.3 Test Setup Configuration

Radiated Emission(30MHz-1GHz)



Radiated Emission(above 1GHz)



Conducted Spurious



3.4 Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
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Test Software	FCC RF-Test
Power level setup	< 0 dBm

	Channel	Frequency(MHz)
Low Channel	01	2405
Mid Channel	08	2440
High Channel	16	2480

4 Equipment During Test

4.1 Equipments List

Conducted emission Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	944 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESPI	101604	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	ENV 216	102796	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	VN1-13S	004023	CRANAGE	2024/6/17	2025/6/16
Cable	RG223-1500MM	NA	RG	2024/6/17	2025/6/16

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESCI	101178	Rohde & Schwarz	2024/6/17	2025/6/16
Amplifier (30MHz-1GHz)	BBV 9743 B	00374	SCHNWARZBECK	2024/6/17	2025/6/16
Bilog Antenna (30MHz-1GHz)	VULB9162	00473	SCHNWARZBECK	2023/3/19	2025/3/18
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHNWARZBECK	2023/3/19	2025/3/18
Preamplifier (1GHz-18GHz)	BBV 9718D	0024	SCHNWARZBECK	2024/6/17	2025/6/16
Spectrum Analyzer (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2024/6/17	2025/6/16
Preamplifier (18GHz-40GHz)	BBV 9721	0056	SCHNWARZBECK	2024/6/17	2025/6/16
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNWARZBECK	2024/6/17	2025/6/16
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	CHNWARZBECK	2024/6/17	2025/6/16

MXG Signal Analyzer	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2024/6/17	2025/6/16
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2024/6/17	2025/6/16
Power Sensor	TR1029-2	512364	Techoy	2024/6/17	2025/6/16
RF Swith	TR1029-1	512364	Techoy	2024/6/17	2025/6/16
Cable	DA800-4000MM	NA	DA	2024/6/17	2025/6/16
Cable	DA800-11000MM	NA	DA	2024/6/17	2025/6/16

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ-EMC	Ver.EMC-CON 3A1.1+
2	EMC radiation test system	FALA	EZ-EMC	Ver.FA-03A2 RE+
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 ⁻⁶
Bandwidth	± 1.5 x 10 ⁻⁶
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(9kHz~30MHz)	±4.51dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	

4.3 Description of Support Units

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	AC Adapter	HUAWEI	HW-050450C00	/	Auxiliary

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.

5 Conducted Emission

Test Requirement	: FCC CFR 47 Part 15 Section 15.207
Test Method	: ANSI C63.10:2020
Test Result	: PASS
Frequency Range	: 150kHz to 30MHz
Class/Severity	: Class B

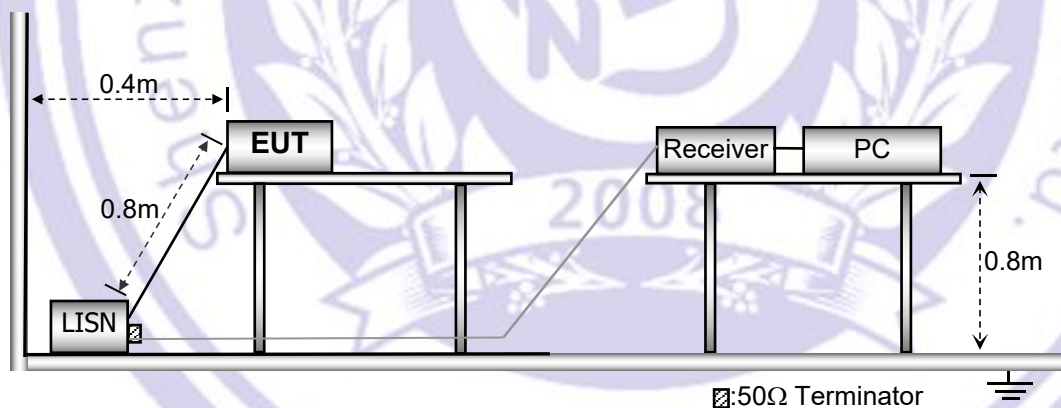
5.1 E.U.T. Operation

Operating Environment :

Temperature	: 25.5 °C
Humidity	: 51 % RH
Atmospheric Pressure	: 101.2kPa

5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2020.



5.3 Test SET-UP (Block Diagram of Configuration)



5.4 Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

5.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.6 Measurement Description

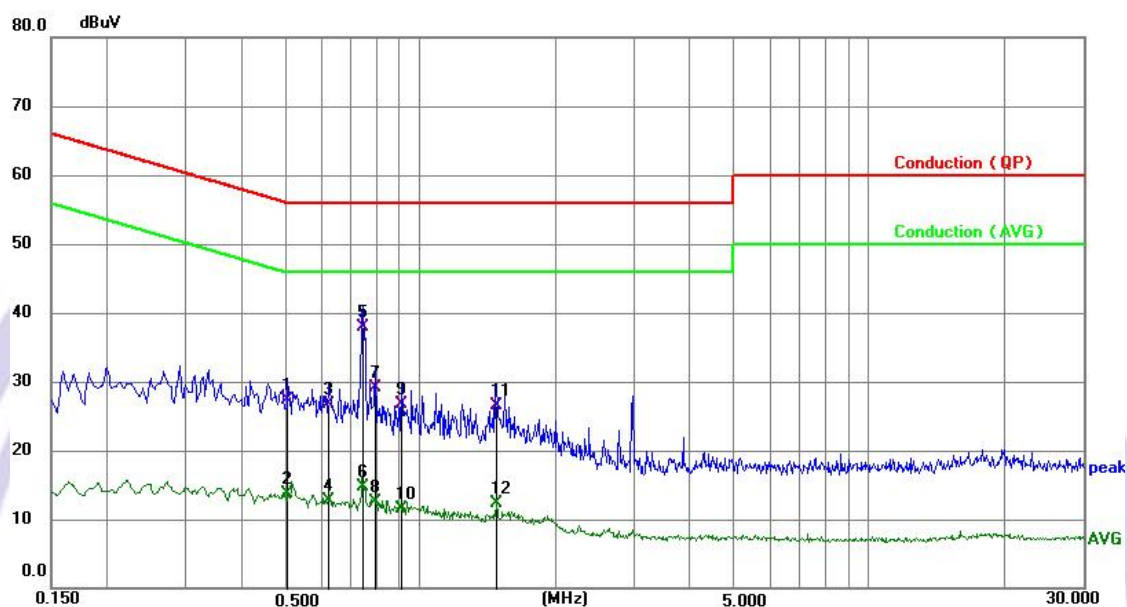
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.7 Conducted Emission Test Result

Pass

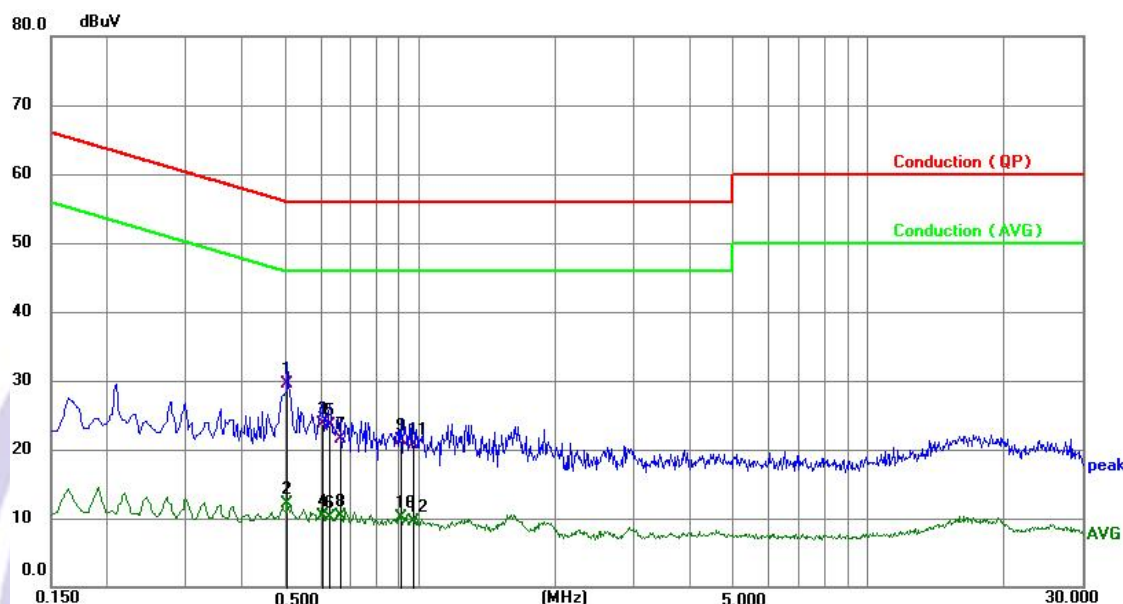
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case.

Channel:	Middle	Phase :	L
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.5054	17.25	10.02	27.27	56.00	-28.73	QP
2	0.5054	3.60	10.02	13.62	46.00	-32.38	AVG
3	0.6225	16.58	10.03	26.61	56.00	-29.39	QP
4	0.6225	2.75	10.03	12.78	46.00	-33.22	AVG
5 *	0.7440	27.81	10.04	37.85	56.00	-18.15	QP
6	0.7440	4.66	10.04	14.70	46.00	-31.30	AVG
7	0.7934	19.16	10.04	29.20	56.00	-26.80	QP
8	0.7934	2.51	10.04	12.55	46.00	-33.45	AVG
9	0.9060	16.75	10.05	26.80	56.00	-29.20	QP
10	0.9060	1.42	10.05	11.47	46.00	-34.53	AVG
11	1.4730	16.49	10.07	26.56	56.00	-29.44	QP
12	1.4730	2.30	10.07	12.37	46.00	-33.63	AVG

Channel:	Middle	Phase :	N
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1 *	0.5054	19.58	10.02	29.60	56.00	-26.40	QP
2	0.5054	2.17	10.02	12.19	46.00	-33.81	AVG
3	0.6045	13.66	10.03	23.69	56.00	-32.31	QP
4	0.6045	0.27	10.03	10.30	46.00	-35.70	AVG
5	0.6270	13.44	10.03	23.47	56.00	-32.53	QP
6	0.6270	0.06	10.03	10.09	46.00	-35.91	AVG
7	0.6630	11.51	10.03	21.54	56.00	-34.46	QP
8	0.6630	0.33	10.03	10.36	46.00	-35.64	AVG
9	0.9060	11.22	10.05	21.27	56.00	-34.73	QP
10	0.9060	0.10	10.05	10.15	46.00	-35.85	AVG
11	0.9645	10.74	10.06	20.80	56.00	-35.20	QP
12	0.9645	-0.55	10.06	9.51	46.00	-36.49	AVG

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. Measurement Level = Reading level + Correct Factor

6 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.249,
Test Method : ANSI C63.10:2020
Test Result : PASS
Measurement Distance : 3m
Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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).

6.1 EUT Operation

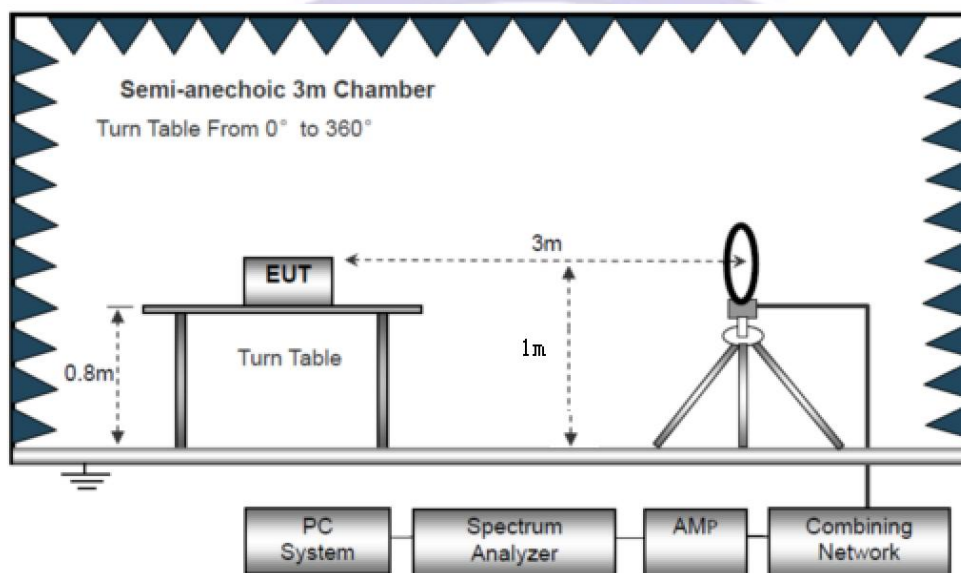
Operating Environment :

Temperature : 23.5 °C
Humidity : 51.1 % RH
Atmospheric Pressure : 101.2kPa

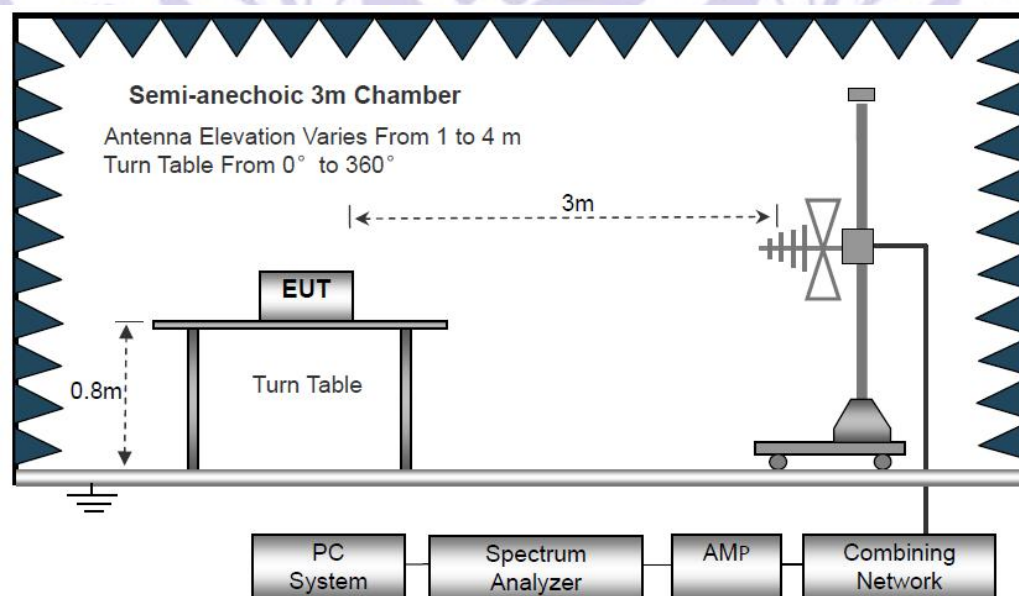
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

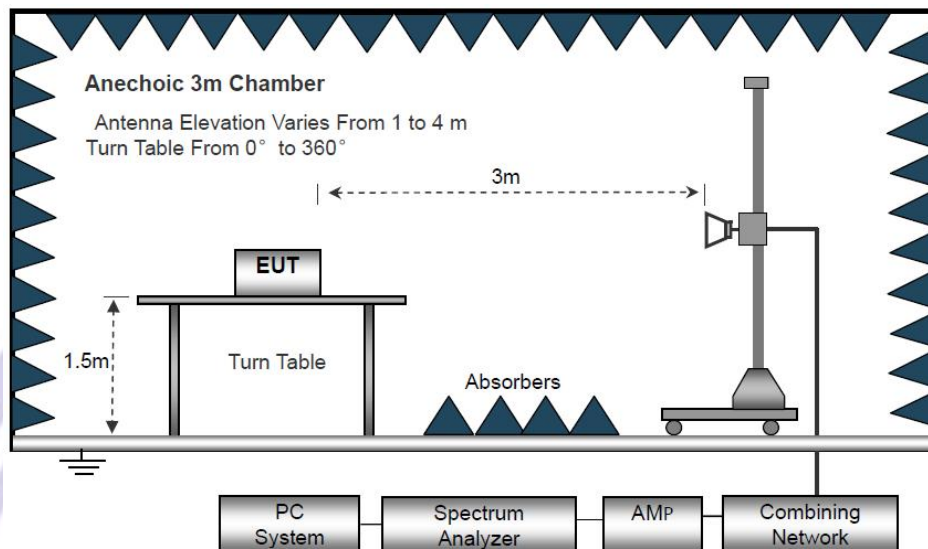
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



6.3 Spectrum Analyzer Setup

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value

6.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.
2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
7. Test Procedure of measurement (For Above 1GHz):
 - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
 - 2) Change the antenna polarization and repeat 1) with vertical polarization.
 - 3) Make a hardcopy of the spectrum.
 - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
 - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
 - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
 - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
 - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.
8. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

6.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

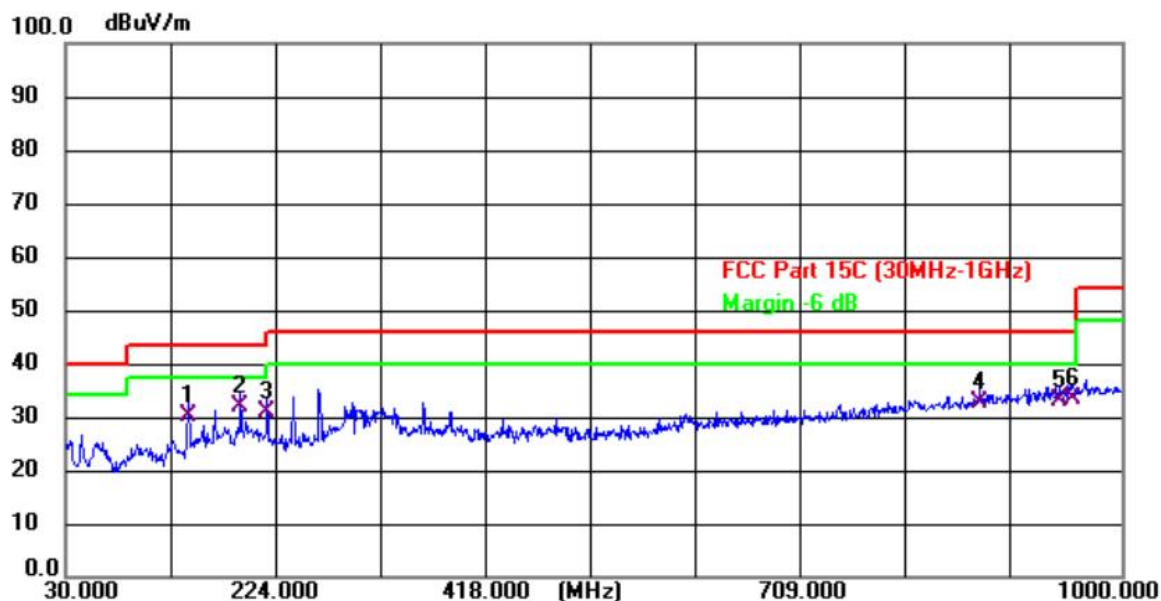
Distance extrapolation factor = $40\log(\text{Specific distance} / \text{test distance})$ (dB);
Limit line = Specific limits (dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

Pass.

Please refer to the following test plots for the worst test mode (GFSK (CH00: 2405MHz)).

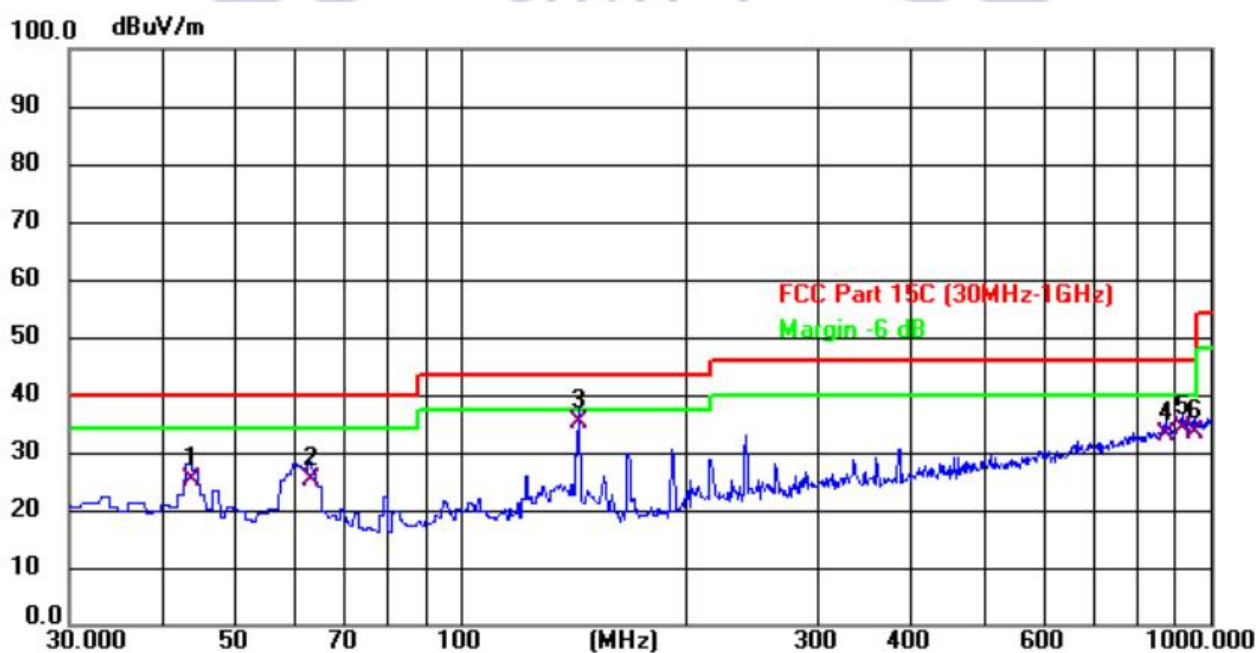
Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	142.520	44.16	-13.85	30.31	43.50	-13.19	QP
2 *	191.020	43.55	-11.75	31.80	43.50	-11.70	QP
3	215.270	41.39	-10.57	30.82	43.50	-12.68	QP
4	870.020	30.41	2.13	32.54	46.00	-13.46	QP
5	943.740	29.90	3.05	32.95	46.00	-13.05	QP
6	955.380	30.18	3.17	33.35	46.00	-12.65	QP

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	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	43.580	33.89	-8.84	25.05	40.00	-14.95	QP
2	62.980	36.77	-11.47	25.30	40.00	-14.70	QP
3 *	143.490	49.04	-13.88	35.16	43.50	-8.34	QP
4	870.020	30.95	2.13	33.08	46.00	-12.92	QP
5	915.610	31.30	2.76	34.06	46.00	-11.94	QP
6	953.440	30.23	3.15	33.38	46.00	-12.62	QP

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor

FIELD STRENGTH CALCULATION

Frequency	Emission Level	Limits	Margin	Horizontal / Vertical	Detector Type
MHz	dBμV/m	dBμV/m	dBμV/m		
2405	96.85	114	-18.31	H	PK
2405	84.45	94	-10.77	H	AV
2405	95.54	114	-19.42	V	PK
2405	85.14	94	-9.81	V	AV
2440	94.85	114	-20.37	H	PK
2440	86.45	94	-8.74	H	AV
2440	94.94	114	-20.31	V	PK
2440	86.45	94	-8.88	V	AV
2480	93.58	114	-21.72	H	PK
2480	81.45	94	-13.75	H	AV
2480	92.41	114	-22.63	V	PK
2480	82.18	94	-12.85	V	AV

Test Frequency 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	56.29	30.55	5.77	24.66	56.17	74	-17.83	Pk
V	4810.00	41.39	30.55	5.77	24.66	41.27	54	-12.73	AV
V	7215.00	57.75	30.33	6.32	24.55	58.29	74	-15.71	Pk
V	7215.00	44.37	30.33	6.32	24.55	44.91	54	-9.09	AV
V	9620.00	58.74	30.55	5.77	24.66	58.62	74	-15.38	Pk
V	9620.00	41.9	30.55	5.77	24.66	41.78	54	-12.22	AV
V	12025.00	55.9	30.33	6.32	24.55	56.44	74	-17.56	Pk
V	12025.00	42.81	30.33	6.32	24.55	43.35	54	-10.65	AV
H	4810.00	59.69	30.55	5.77	24.66	59.57	74	-14.43	Pk
H	4810.00	41.17	30.55	5.77	24.66	41.05	54	-12.95	AV
H	7215.00	57.26	30.33	6.32	24.55	57.8	74	-16.2	Pk
H	7215.00	42.95	30.33	6.32	24.55	43.49	54	-10.51	AV
H	9620.00	58.08	30.55	5.77	24.66	57.96	74	-16.04	Pk
H	9620.00	41.7	30.55	5.77	24.66	41.58	54	-12.42	AV
H	12025.00	56.54	30.33	6.32	24.55	57.08	74	-16.92	Pk
H	12025.00	41.67	30.33	6.32	24.55	42.21	54	-11.79	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	58.53	30.55	5.77	24.66	58.41	74	-15.59	Pk
V	4880.00	41.78	30.55	5.77	24.66	41.66	54	-12.34	AV
V	7320.00	55.43	30.33	6.32	24.55	55.97	74	-18.03	Pk
V	7320.00	43.12	30.33	6.32	24.55	43.66	54	-10.34	AV
V	9760.00	55.14	30.55	5.77	24.66	55.02	74	-18.98	Pk
V	9760.00	42.29	30.55	5.77	24.66	42.17	54	-11.83	AV
V	12200.00	59.76	30.33	6.32	24.55	60.3	74	-13.7	Pk
V	12200.00	44.71	30.33	6.32	24.55	45.25	54	-8.75	AV
H	4880.00	58.5	30.55	5.77	24.66	58.38	74	-15.62	Pk
H	4880.00	43.29	30.55	5.77	24.66	43.17	54	-10.83	AV
H	7320.00	58.77	30.33	6.32	24.55	59.31	74	-14.69	Pk
H	7320.00	44.18	30.33	6.32	24.55	44.72	54	-9.28	AV
H	9760.00	59.86	30.55	5.77	24.66	59.74	74	-14.26	Pk
H	9760.00	44.35	30.55	5.77	24.66	44.23	54	-9.77	AV
H	12200.00	57.28	30.33	6.32	24.55	57.82	74	-16.18	Pk
H	12200.00	43.17	30.33	6.32	24.55	43.71	54	-10.29	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:2480MHz									
V	4920.00	57.33	30.55	5.77	24.66	57.21	74	-16.79	Pk
V	4920.00	41.63	30.55	5.77	24.66	41.51	54	-12.49	AV
V	7380.00	56.22	30.33	6.32	24.55	56.76	74	-17.24	Pk
V	7380.00	44.79	30.33	6.32	24.55	45.33	54	-8.67	AV
V	9840.00	56.88	30.55	5.77	24.66	56.76	74	-17.24	Pk
V	9840.00	41.09	30.55	5.77	24.66	40.97	54	-13.03	AV
V	12300.00	55.34	30.33	6.32	24.55	55.88	74	-18.12	Pk
V	12300.00	41.25	30.33	6.32	24.55	41.79	54	-12.21	AV
H	4920.00	55.69	30.55	5.77	24.66	55.57	74	-18.43	Pk
H	4920.00	41.41	30.55	5.77	24.66	41.29	54	-12.71	AV
H	7380.00	55.42	30.33	6.32	24.55	55.96	74	-18.04	Pk
H	7380.00	41.61	30.33	6.32	24.55	42.15	54	-11.85	AV
H	9840.00	59.27	30.55	5.77	24.66	59.15	74	-14.85	Pk
H	9840.00	41.46	30.55	5.77	24.66	41.34	54	-12.66	AV
H	12300.00	55.78	30.33	6.32	24.55	56.32	74	-17.68	Pk
H	12300.00	43.63	30.33	6.32	24.55	44.17	54	-9.83	AV

Note: 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.

Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

	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)	Detect or Type	Result
GFSK		Low Channel: 2405MHz									
	H	2390.00	60.18	30.22	4.85	23.98	58.79	74.00	-15.21	PK	PASS
	H	2390.00	46.92	30.22	4.85	23.98	45.53	54.00	-8.47	AV	PASS
	H	2400.00	62.40	30.22	4.85	23.98	61.01	74.00	-12.99	PK	PASS
	H	2400.00	48.17	30.22	4.85	23.98	46.78	54.00	-7.22	AV	PASS
	V	2390.00	61.64	30.22	4.85	23.98	60.25	74.00	-13.75	PK	PASS
	V	2390.00	48.96	30.22	4.85	23.98	47.57	54.00	-6.43	AV	PASS
	V	2400.00	61.18	30.22	4.85	23.98	59.79	74.00	-14.21	PK	PASS
	V	2400.00	46.93	30.22	4.85	23.98	45.54	54.00	-8.46	AV	PASS
		High Channel: 2480MHz									
	H	2483.50	62.34	30.22	4.85	23.98	60.95	74.00	-13.05	PK	PASS
	H	2483.50	47.82	30.22	4.85	23.98	46.43	54.00	-7.57	AV	PASS
	H	2500.00	62.90	30.22	4.85	23.98	61.51	74.00	-12.49	PK	PASS
	H	2500.00	48.83	30.22	4.85	23.98	47.44	54.00	-6.56	AV	PASS
	V	2483.50	61.93	30.22	4.85	23.98	60.54	74.00	-13.46	PK	PASS
	V	2483.50	46.53	30.22	4.85	23.98	45.14	54.00	-8.86	AV	PASS
	V	2500.00	61.21	30.22	4.85	23.98	59.82	74.00	-14.18	PK	PASS
	V	2500.00	47.52	30.22	4.85	23.98	46.13	54.00	-7.87	AV	PASS

Remark:

- Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
- The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

7 20dB Bandwidth Measurement

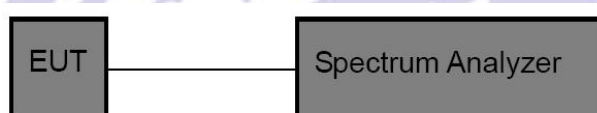
Test Requirement : FCC CFR47 Part 15 Section 15.249

Test Method : ANSI C63.10:2020

Test Limit

Section	Test Item
15.249	Bandwidth

7.1 Test Setup



7.2 Test Procedure

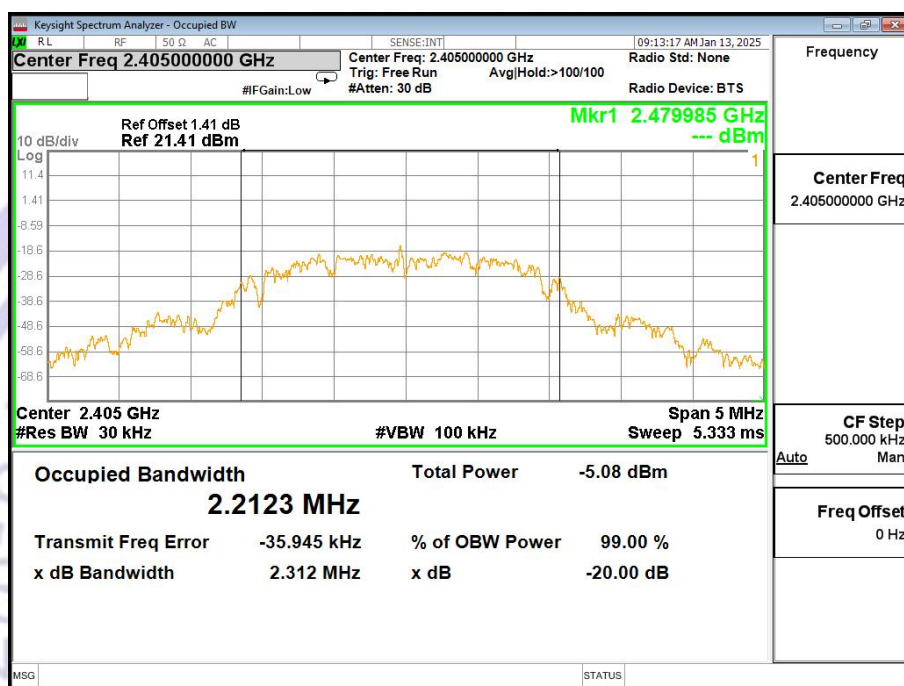
1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW) $\geq$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

7.3 Test Result

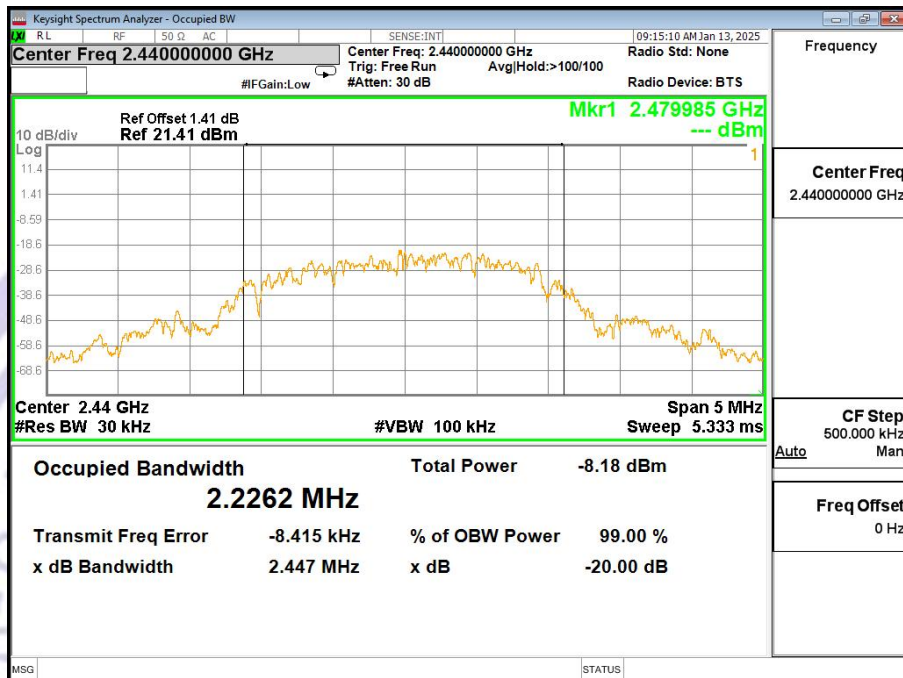
Channel number	Channel frequency (MHz)	-20dB Occupy Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Result
01	2405	2.312	/	Pass
08	2440	2.447	/	Pass
16	2480	2.450	/	Pass

-20dB Occupy Bandwidth

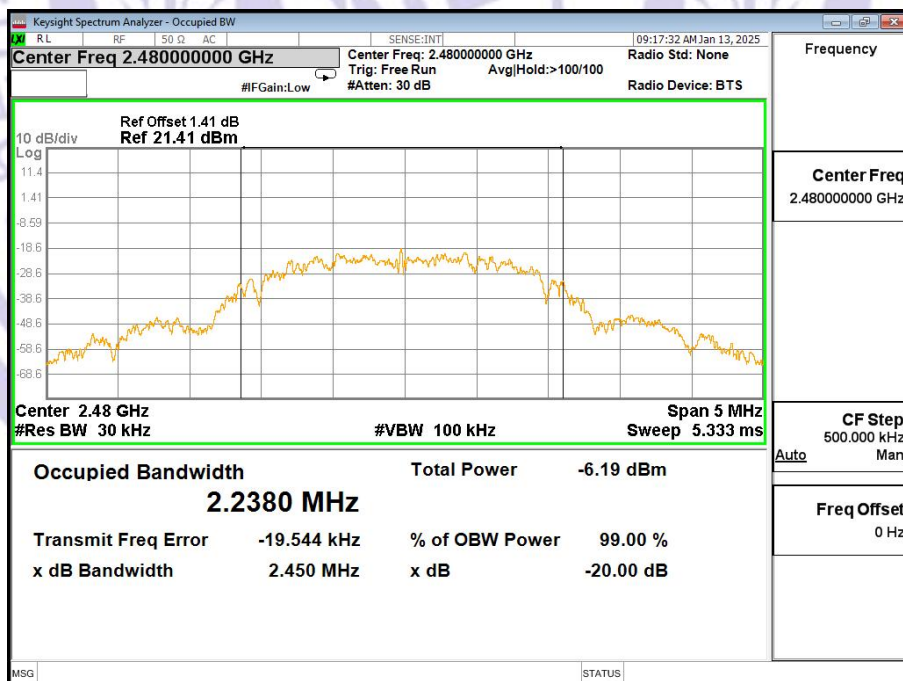
CH01



CH08



CH16



8 Antenna Application

8.1 Antenna Requirement

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.

8.2 Result

The antenna is PCB Antenna, the best case gain of the antennas is 1dBi, reference to the attachment for details.

9 Test Setup Photos and EUT Photos

Please see the attachment for details.

*****THE END REPORT*****

