



# **FCC TEST REPORT**

## **FCC ID: 2ATWT-HD151001**

**Product** : PC Wireless Controller  
**Model Name** : HD-151 001+, HD-151 PRO +, 001+, HD-151 001+PRO  
**Brand** : N/A  
**Report No.** : NCT23047235E

Prepared for

**Shenzhen Hong Jingda Electronics Co., LTD.**  
**4th Floor, Building A1, Jiuwei Third Industrial Zone, Jiuwei Community,**  
**Hangcheng Street, Baoan District, Shenzhen, China**

Prepared by

**Shenzhen NCT Testing Technology Co., Ltd.**  
**A101, B2, Fuqiao 6th Area, Xintian Community, Fuhai Street,**  
**Baoan District, Shenzhen, China**

**TEL: 400-8868-419**

**FAX: 86-755-27790922**

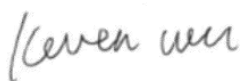
## 1 TEST RESULT CERTIFICATION

Applicant's name : Shenzhen Hong Jingda Electronics Co.,LTD.  
Address : 4th Floor, Building A1, Jiuwei Third Industrial Zone, Jiuwei Community, Hangcheng Street, Baoan District, Shenzhen, China  
Manufacture's name : Shenzhen Hong Jingda Electronics Co.,LTD.  
Address : 4th Floor, Building A1, Jiuwei Third Industrial Zone, Jiuwei Community, Hangcheng Street, Baoan District, Shenzhen, China  
Product name : PC Wireless Controller  
Model name : HD-151 001+, HD-151 PRO +, 001+, HD-151 001+PRO  
Standards : FCC CFR47 Part 15 Section 15.247  
Test procedure : ANSI C63.10:2013  
Date of Receipt : Nov. 13, 2023  
Test Date : Nov. 13, 2023 - Nov. 25, 2023  
Date of Issue : Nov. 25, 2023

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	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Conducted Spurious Emission	15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS

Remark:

1. The EUT is powered by full-charged battery during the test.

## 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

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

Site Location : A101&B2, Fuqiao 6th Area , Xintian Community, Fuhai Street,  
Baoan District, Shenzhen, China

### 3 General Information

#### 3.1 General Description of E.U.T.

Product Name	:	PC Wireless Controller
Model Name	:	HD-151 001+
Sample ID	:	NCT23047235#
Sample(s) Status:	:	Engineering Sample
Series Model	:	HD-151 PRO +, 001+, HD-151 001+PRO
Model Different.:	:	All models have same Power circuits diagram, RF Module and PCB Layout, Internal construction and rated power.
Operating frequency	:	2402 ~ 2475 MHz
Number of Channels	:	3 Channels
Type of Modulation	:	GFSK
Antenna installation	:	PCB Antenna
Antenna Gain	:	0 dBi
Power supply	:	DC 3.7V
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:

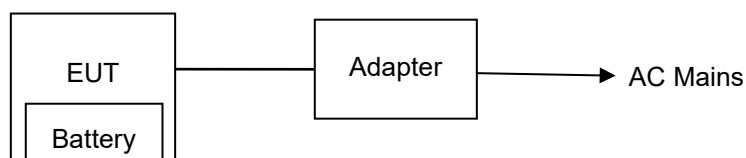
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	01	2440	02	2475

Note:

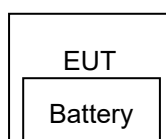
1. Test of channel was included the lowest, middle and highest frequency in highest data rate and to perform the test, then record on this report.

## 3.3 Test Setup Configuration

Conducted Emission



Radiated Emission





### 3.4 Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
	GFSK
Mode 1	2402MHz
Mode 2	2440MHz
Mode 3	2475MHz

## 4 Equipment During Test

### 4.1 Equipments List

#### Conducted emission Test Equipment

Conducted emission					
Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
EMI Test Receiver	ESPI	101604	RS	2023/6/21	2024/6/20
LISN	ENV 216	102796	RS	2023/3/17	2024/3/16
LISN	VN1-13S	004023	CRANAGE	2023/6/21	2024/6/20

#### Radiated emission & Radio Frequency Test Equipment

Radiated emission					
Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
EMI Test Receiver	ESCI	101178	RS	2023/6/21	2024/6/20
Spectrum Analyzer	N9020A	MY50510202	Agilent	2023/6/21	2024/6/20
Amplifier	BBV 9743 B	00374	SCHWARZBECK	2023/6/21	2024/6/20
Bilog Antenna (30MHz-1GHz)	VULB9162	00473	SCHNARZBECK	2023/3/19	2025/3/18
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHNARZBECK	2023/3/19	2024/3/18
Preamplifier	BBV 9718D	00042	SCHNARZBECK	2023/6/21	2024/6/20
Broadband Antenna (15GHz-40GHz)	SAS-574	588	A.H.System	2023/7/13	2024/7/12
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNARZBECK	2023/6/6	2024/6/5

#### Peak Output Power Test Equipment

Peak Output Power					
Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
Power Meter	E4419B	230480	Agilent	2023/6/21	2024/6/20
RF Cable	MWX322	MY50510202	1305G006	2023/6/21	2024/6/20
10dB Attenuator	2AS102-K10S3	N/A	Rosenberger	2023/6/21	2024/6/20

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	AUDIX	e3	6.120718
2	EMC radiation test system	AUDIX	e3	6.120718
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 <sup>-6</sup>
Bandwidth	± 1.5 x 10 <sup>-6</sup>
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
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
1	PC Wireless Controller	N/A	HD-151 001+	N/A	EUT
2	Notebook	Lenovo	G475	GB14477457	AE
3	Adapter	GAT	GAT-0501000U	N/A	AE

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: 2013
Test Result	:	PASS
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B

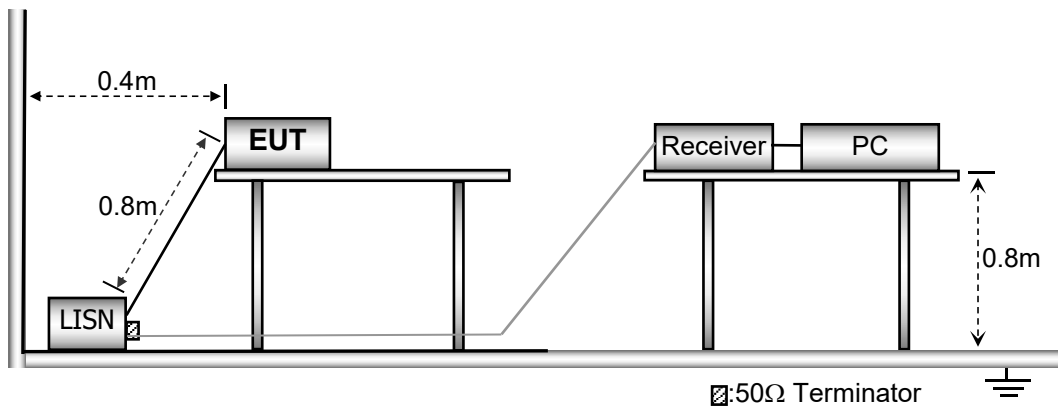
### 5.1 E.U.T. Operation

Operating Environment :

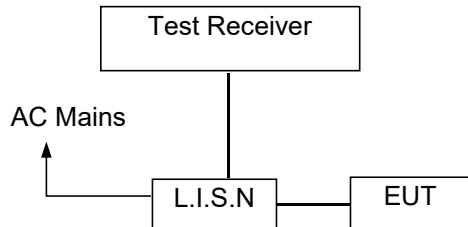
Temperature	:	25.5 °C
Humidity	:	51 % RH
Atmospheric Pressure	:	101.2kPa

### 5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



### 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

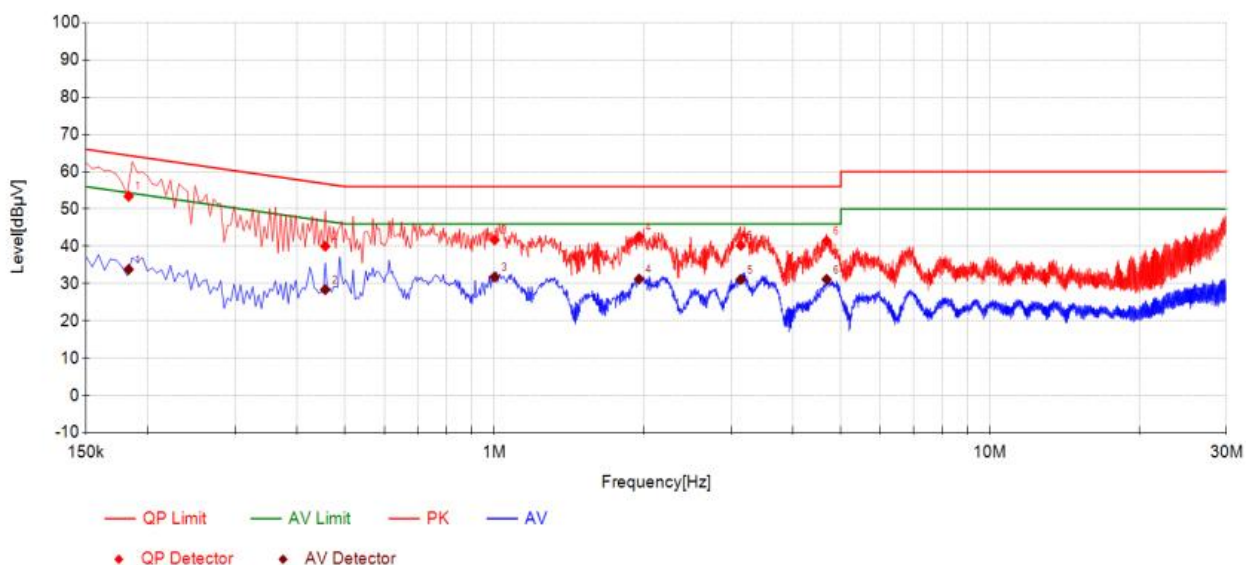
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

### 5.7 Conducted Emission Test Result

Pass.

All the modulation modes were tested the data of the worst mode (AC 120V/60Hz, GFSK TX 2402MHz) are recorded in the following pages and the others modulation methods do not exceed the limits.

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 1

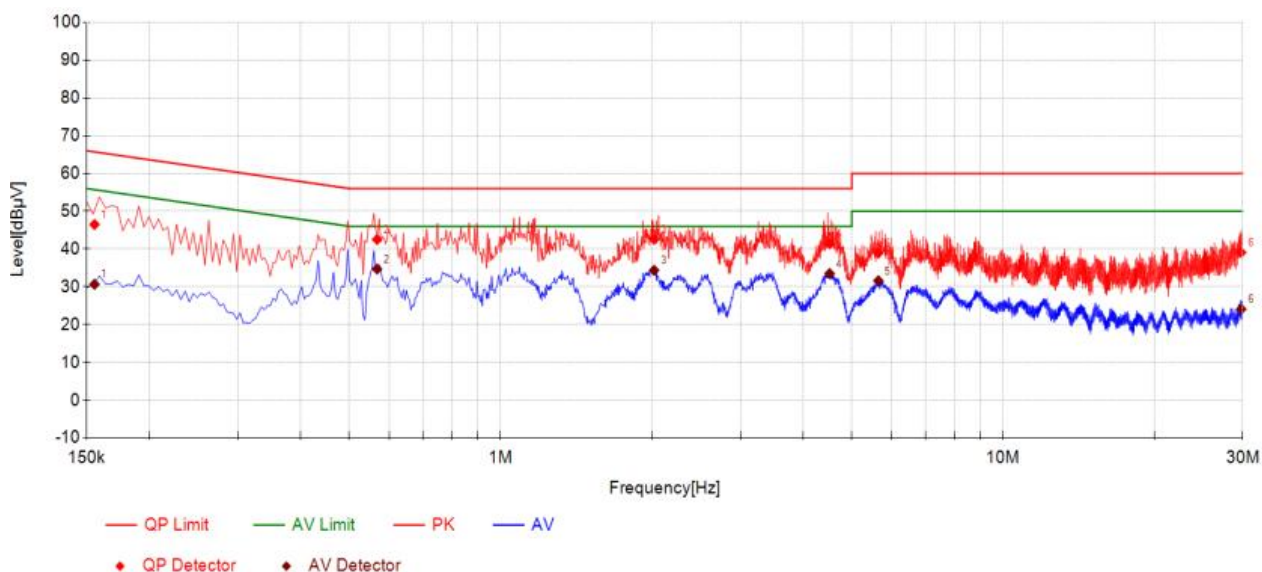


No.	Freq. [MHz]	QP Value [dB µ V]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1829	53.43	64.35	10.92	33.80	54.35	20.55	PASS
2	0.4558	40.03	56.77	16.74	28.35	46.77	18.42	PASS
3	1.0011	41.71	56.00	14.29	31.75	46.00	14.25	PASS
4	1.959	42.61	56.00	13.39	31.18	46.00	14.82	PASS
5	3.1425	40.19	56.00	15.81	31.08	46.00	14.92	PASS
6	4.6815	41.41	56.00	14.59	31.13	46.00	14.87	PASS

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.

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 1



No.	Freq. [MHz]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1555	46.48	65.70	19.22	30.65	55.70	25.05	PASS
2	0.5677	42.51	56.00	13.49	34.69	46.00	11.31	PASS
3	2.0213	42.55	56.00	13.45	34.37	46.00	11.63	PASS
4	4.5192	41.42	56.00	14.58	33.50	46.00	12.50	PASS
5	5.6481	38.93	60.00	21.07	31.59	50.00	18.41	PASS
6	29.7959	39.09	60.00	20.91	24.08	50.00	25.92	PASS

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.



## 6 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247  
 Test Method : ANSI C63.10:2013  
 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(kHz)	300	10000 * 2400/F(kHz)	20log <sup>(2400/F(kHz))</sup> + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40
30 ~ 88	100	3	100	20log <sup>(100)</sup>
88 ~ 216	150	3	150	20log <sup>(150)</sup>
216 ~ 960	200	3	200	20log <sup>(200)</sup>
Above 960	500	3	500	20log <sup>(500)</sup>

### 6.1 EUT Operation

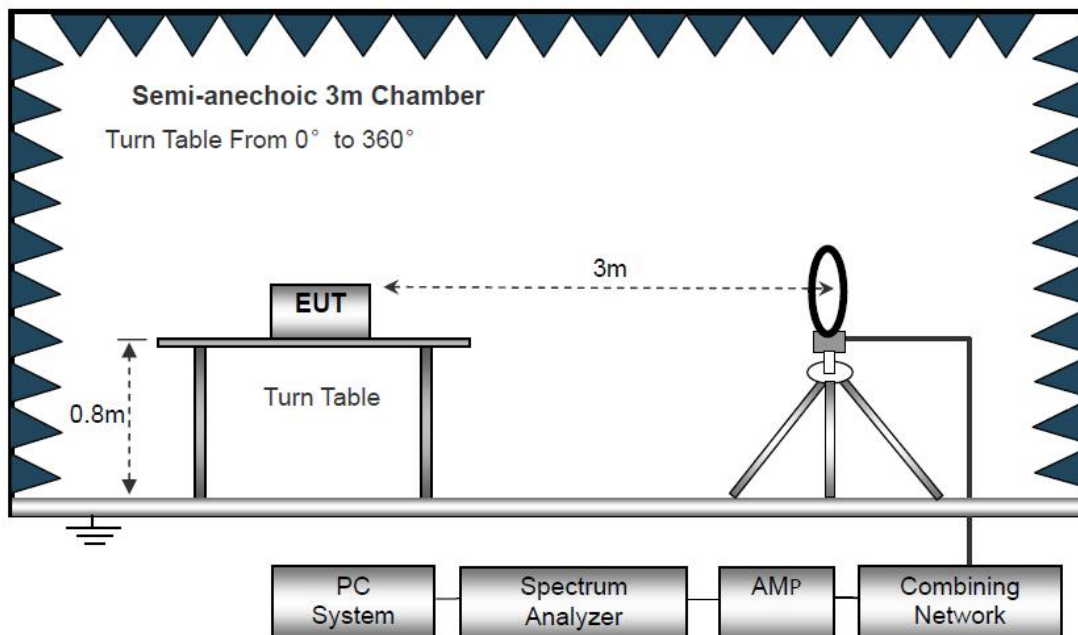
Operating Environment :

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

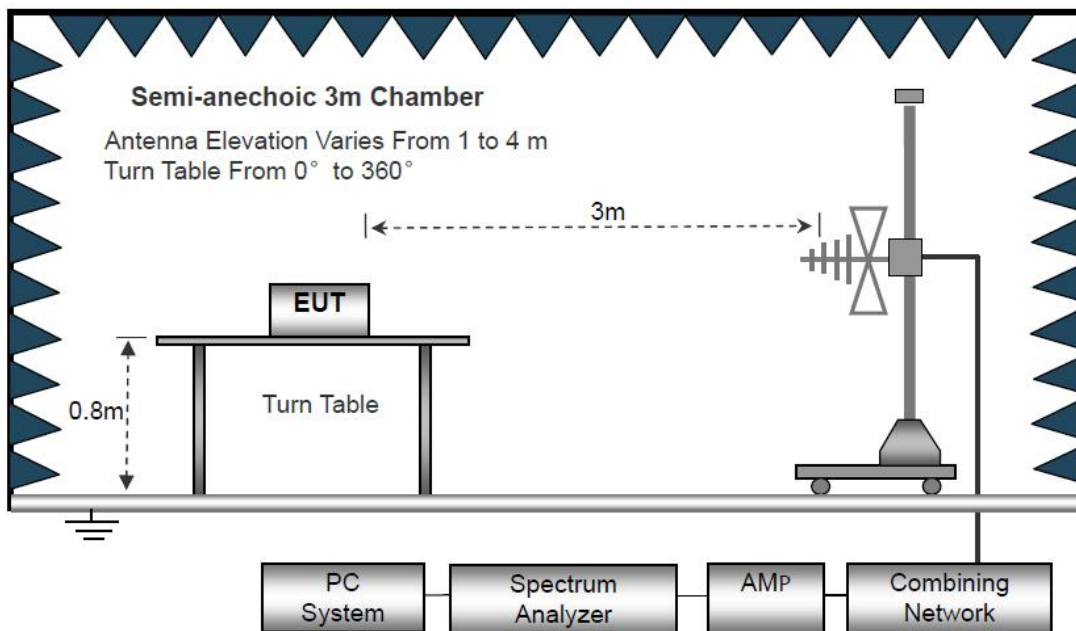
## 6.2 Test Setup

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

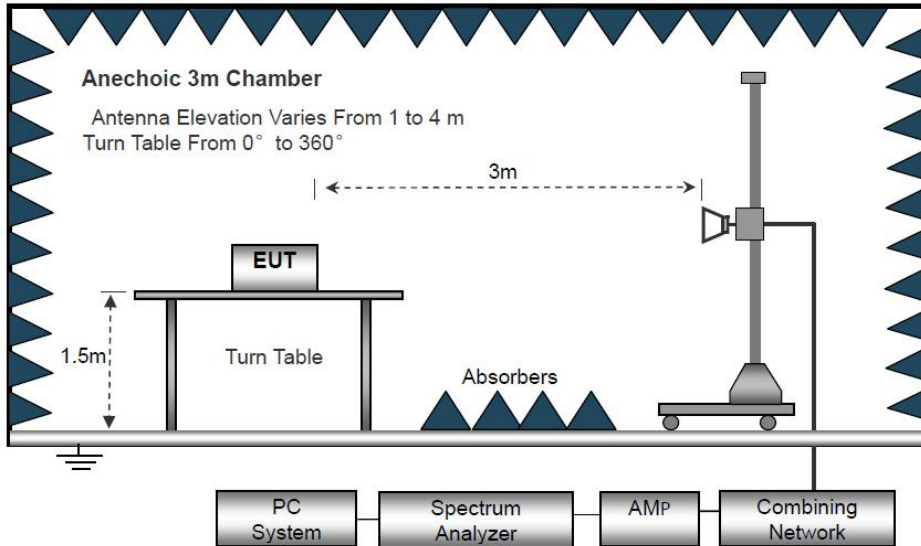
The test setup for emission measurement below 30MHz



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.

For Average Measurement:

VBW=10Hz, when duty cycle is no less than 98 percent.

VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T( $\mu$ s)	1/T(KHz)	Average Correction Factor	VBW Setting
2402-2475	100	-	-	0	10Hz

## 6.5 Summary of Test Results

### Test Frequency: 9KHz-30MHz

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

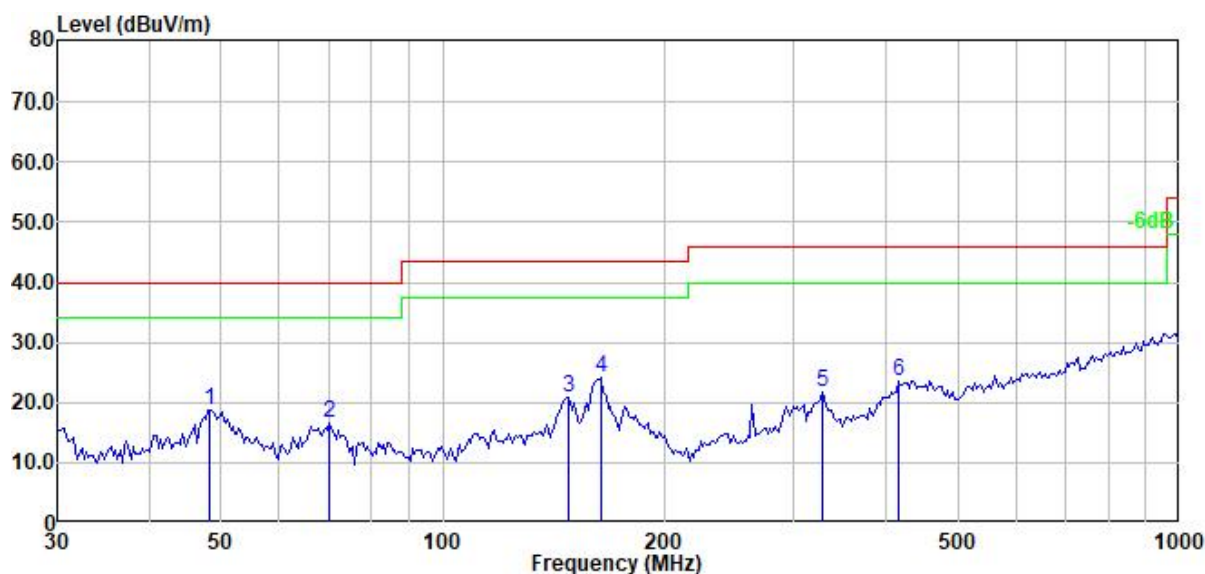
Distance extrapolation factor =  $40\log(\text{Specific distance}/\text{test distance})$  (dB);  
Limit line = Specific limits (dBuV) + distance extrapolation factor.

### Test Frequency: 30MHz ~ 1GHz

Pass.

Please refer to the following test plots for the worst test mode (GFSK (CH00: 2402MHz)).

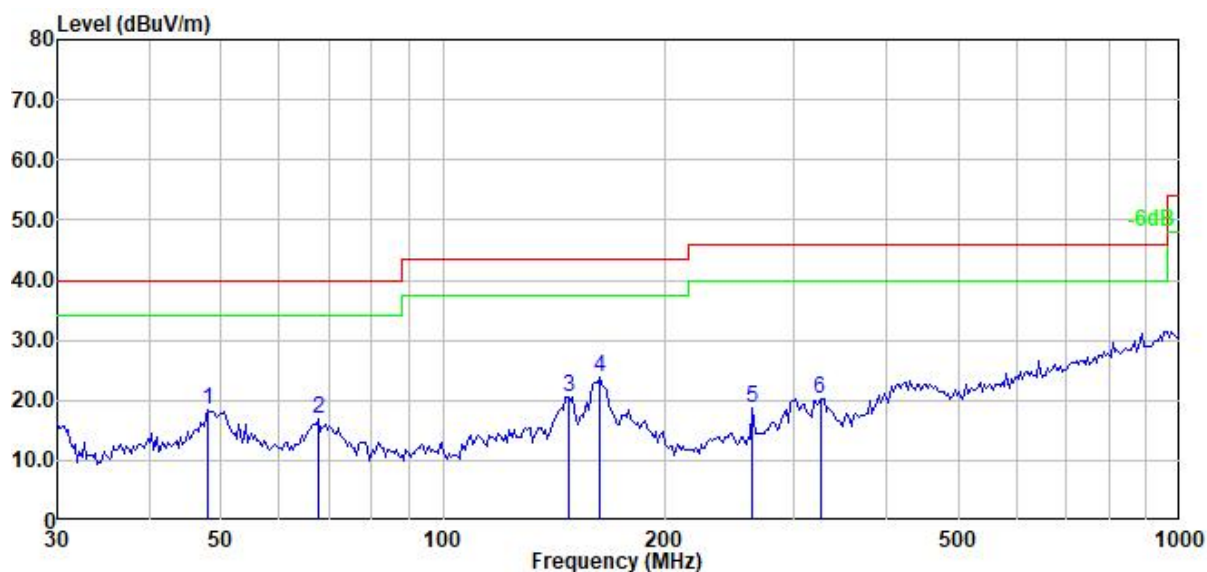
Temperature:	26°C	Relative Humidity:	53%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage :	DC 3.7V	Test Mode :	Mode 1



	Read Freq	Read Level	Level	Factor	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dBuV/m	dB/m	dBuV/m	dB		
1	48.378	31.31	18.82	-12.49	40.00	-21.18	Horizontal	QP
2	70.210	31.33	16.75	-14.58	40.00	-23.25	Horizontal	QP
3	147.875	32.45	20.88	-11.57	43.50	-22.62	Horizontal	QP
4	164.313	35.61	24.20	-11.41	43.50	-19.30	Horizontal	QP
5	327.155	31.16	21.78	-9.38	46.00	-24.22	Horizontal	QP
6	415.449	30.86	23.58	-7.28	46.00	-22.42	Horizontal	QP

Remark: Level=Reading Level + Factor; Factor = Antenna Factor + Cable Loss - Pre-amplifier.

Temperature:	26°C	Relative Humidity:	53%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage :	DC 3.7V	Test Mode :	Mode 1



	Read	Limit	Over					
	Freq	Level	Level	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dBuV/m	dB/m	dBuV/m	dB		
1	48.039	30.91	18.43	-12.48	40.00	-21.57	Horizontal	QP
2	67.786	31.15	17.02	-14.13	40.00	-22.98	Horizontal	QP
3	147.875	32.21	20.64	-11.57	43.50	-22.86	Horizontal	QP
4	163.162	35.04	23.70	-11.34	43.50	-19.80	Horizontal	QP
5	263.115	30.98	18.85	-12.13	46.00	-27.15	Horizontal	QP
6	324.865	29.70	20.35	-9.35	46.00	-25.65	Horizontal	QP

Remark: Level=Reading Level + Factor; Factor = Antenna Factor + Cable Loss - Pre-amplifier.



**Test Frequency 1GHz-25GHz:**

GFSK Low Channel (2402MHz)								
Detector: Peak Value								
Frequency	Reading Level	Ant. Factor	Cable Loss	Pre-Amp. Gain (dB)	Emission Level	Limit	Margin	Polarity
(MHz)	(dBuV)	(dB/m)	(dB)		(dBuV/m)	(dBuV/m)	(dB)	(H/V)
4804	53.26	30.16	6.66	38.32	51.76	74.00	-22.24	V
4804	51.18	30.16	6.66	38.32	49.68	74.00	-24.32	H
7206	52.19	30.22	6.69	38.49	50.61	74.00	-23.39	V
7206	53.44	30.22	6.69	38.49	51.86	74.00	-22.14	H
9608	54.24	30.59	6.72	39.15	52.40	74.00	-21.60	V
9608	54.69	30.59	6.72	39.15	52.85	74.00	-21.15	H
Detector: Average Value								
4804	41.48	30.16	6.66	38.32	39.98	54.00	-14.02	V
4804	41.51	30.16	6.66	38.32	40.01	54.00	-13.99	H
7206	40.35	30.22	6.69	38.49	38.77	54.00	-15.23	V
7206	41.18	30.22	6.69	38.49	39.60	54.00	-14.40	H
9608	41.22	30.59	6.72	39.15	39.38	54.00	-14.62	V
9608	40.32	30.59	6.72	39.15	38.48	54.00	-15.52	H
GFSK Middle Channel (2440MHz)								
Detector: Peak Value								
Frequency	Reading Level	Ant. Factor	Cable Loss	Pre-Amp. Gain (dB)	Emission Level	Limit	Margin	Polarity
(MHz)	(dBuV)	(dB/m)	(dB)		(dBuV/m)	(dBuV/m)	(dB)	(H/V)
4880	54.42	30.18	6.68	38.52	52.76	74.00	-21.24	V
4880	52.27	30.18	6.68	38.52	50.61	74.00	-23.39	H
7320	51.23	30.22	6.73	39.46	48.72	74.00	-25.28	V
7320	51.57	30.22	6.73	39.46	49.06	74.00	-24.94	H
9760	52.14	30.54	6.81	40.71	48.78	74.00	-25.22	V
9760	52.17	30.54	6.81	40.71	48.81	74.00	-25.19	H

Detector: Average Value								
4880	39.41	30.18	6.68	38.52	37.75	54.00	-16.25	V
4880	39.25	30.18	6.68	38.52	37.59	54.00	-16.41	H
7320	40.42	30.22	6.73	39.46	37.91	54.00	-16.09	V
7320	39.25	30.22	6.73	39.46	36.74	54.00	-17.26	H
9760	39.17	30.54	6.81	40.71	35.81	54.00	-18.19	V
9760	40.36	30.54	6.81	40.71	37.00	54.00	-17.00	H
GFSK High Channel (2475MHz)								
Detector: Peak Value								
Frequency	Reading Level	Ant. Factor	Cable Loss	Pre-Amp. Gain (dB)	Emission Level	Limit	Margin	Polarity
(MHz)	(dBuV)	(dB/m)	(dB)		(dBuV/m)	(dBuV/m)	(dB)	(H/V)
4950	52.77	30.31	6.66	38.51	51.23	74.00	-22.77	V
4950	50.54	30.31	6.66	38.51	49.00	74.00	-25.00	H
7425	53.29	30.32	6.71	39.44	50.88	74.00	-23.12	V
7425	51.64	30.32	6.71	39.44	49.23	74.00	-24.77	H
9900	52.33	30.66	6.78	40.69	49.08	74.00	-24.92	V
9900	51.31	30.66	6.78	40.71	48.04	74.00	-25.96	H
Detector: Average Value								
4950	40.46	30.31	6.66	38.51	38.92	54.00	-15.08	V
4950	39.58	30.31	6.66	38.51	38.04	54.00	-15.96	H
7425	39.18	30.32	6.71	39.44	36.77	54.00	-17.23	V
7425	38.53	30.32	6.71	39.44	36.12	54.00	-17.88	H
9900	39.68	30.66	6.78	40.69	36.43	54.00	-17.57	V
9900	40.22	30.66	6.78	40.69	36.97	54.00	-17.03	H

Note: 1. The testing has been conformed to 10\*2475MHz=24750MHz.

2. All other emissions more than 30dB below the limit.

3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

Margin=Emission Level-Limit

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

Test Mode: Low Channel 2402MHz									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2390.00	55.46	28.08	6.81	37.12	53.23	74.00	-20.77	H	Peak
2390.00	34.71	28.08	6.81	37.12	32.48	54.00	-21.52	H	Average
2390.00	56.26	28.67	6.72	37.26	54.39	74.00	-19.61	V	Peak
2390.00	36.77	28.67	6.72	37.26	34.90	54.00	-19.10	V	Average

Test Mode: High Channel 2475MHz									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2483.50	54.53	27.38	6.15	36.29	51.77	74.00	-22.23	H	Peak
2483.50	36.27	27.38	6.15	36.29	33.51	54.00	-20.49	H	Average
2483.50	53.57	27.43	6.68	36.79	50.89	74.00	-23.11	V	Peak
2483.50	37.29	27.43	6.68	36.79	34.61	54.00	-19.39	V	Average

## 7 Conduct Band Edge And Spurious Emissions Measurement

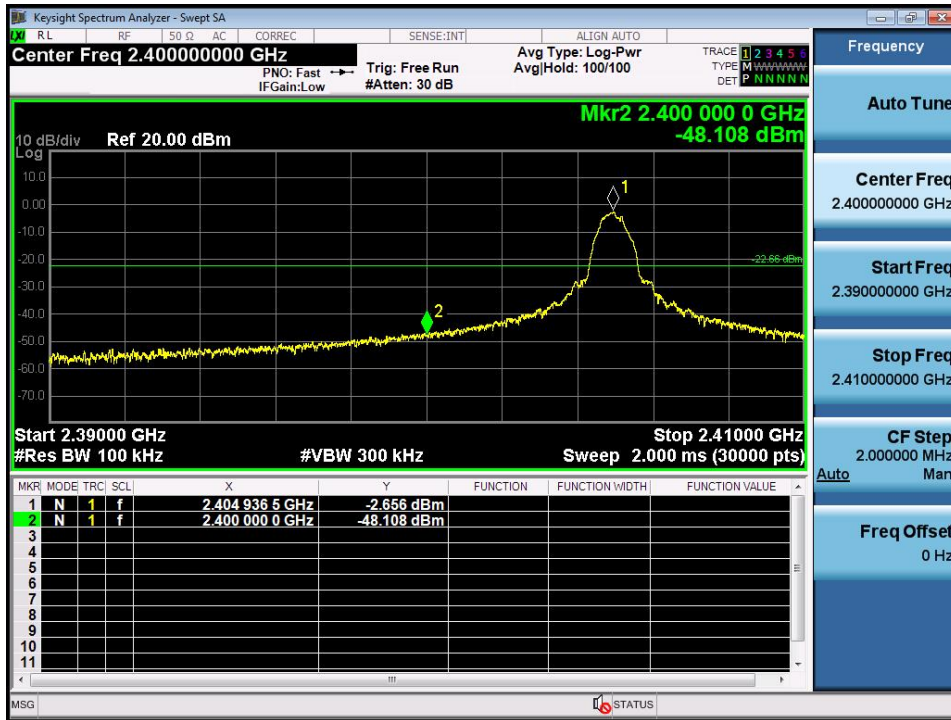
Test Requirement	:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 7.1 Test Procedure

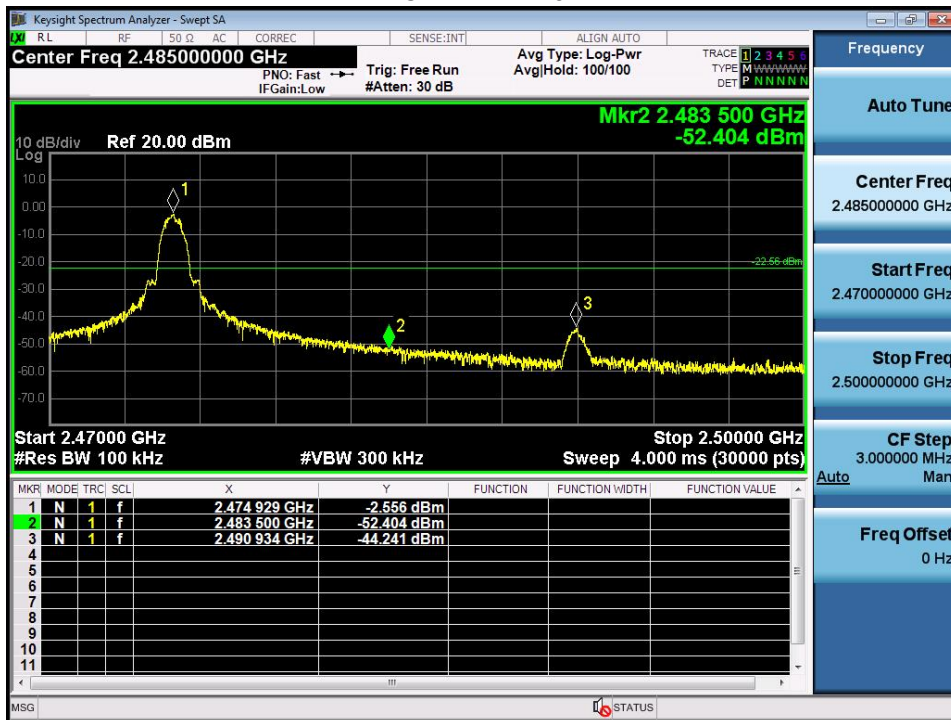
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold

## 7.2 Test Result

Channel 2402

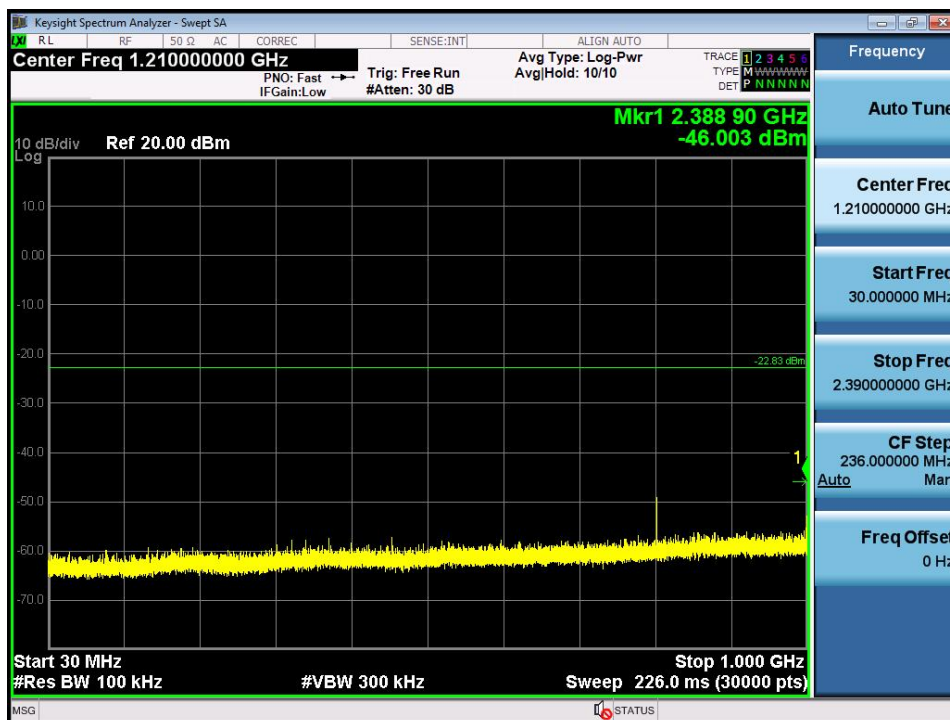


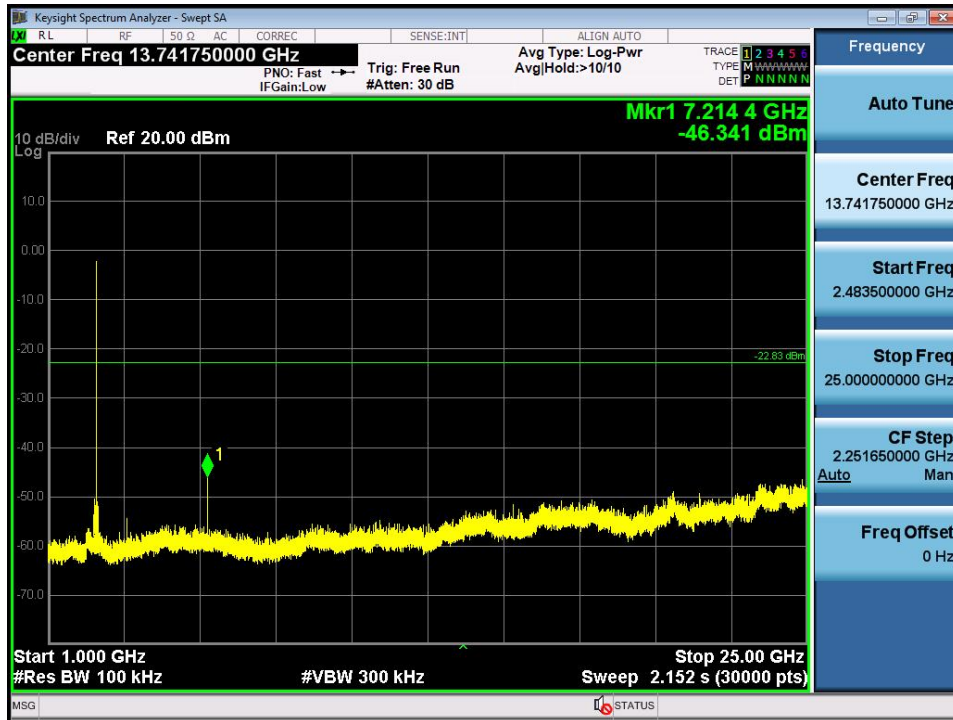
Channel 2475



For Conduct spurious emissions

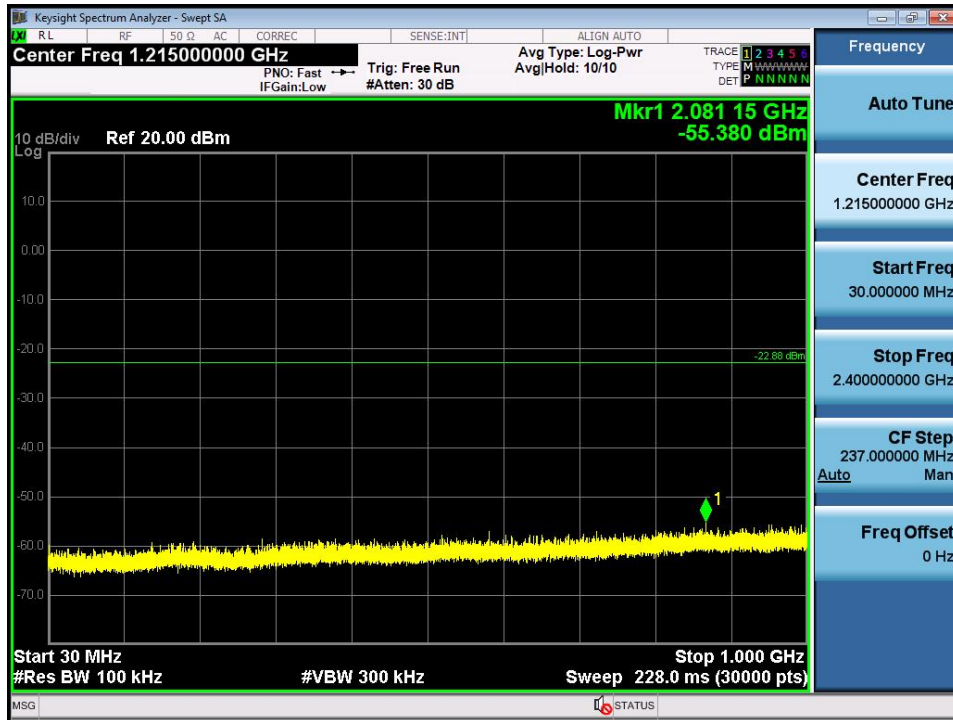
### Channel 2402





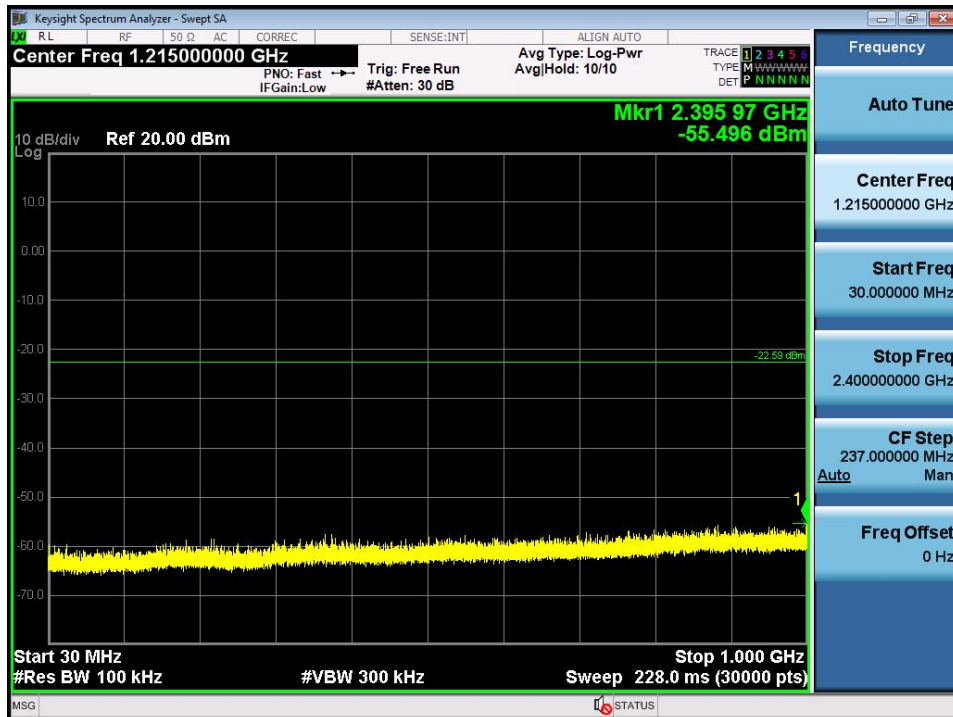
Channel 2440

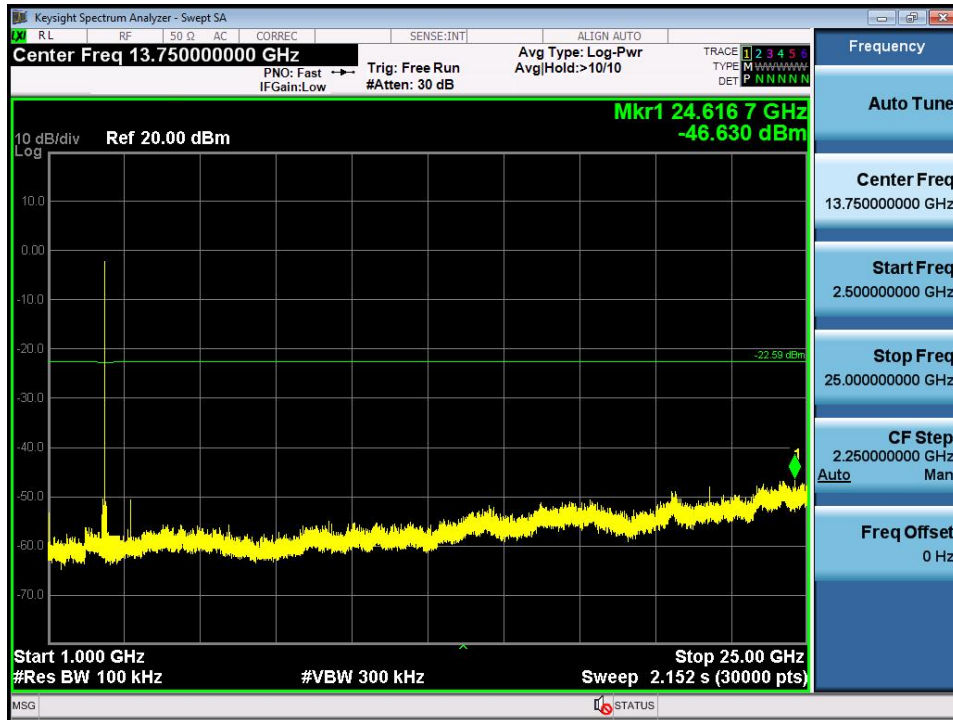






## Channel 2475





## 8 6dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247  
 Test Method : ANSI C63.10:2013  
 Test Limit : Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

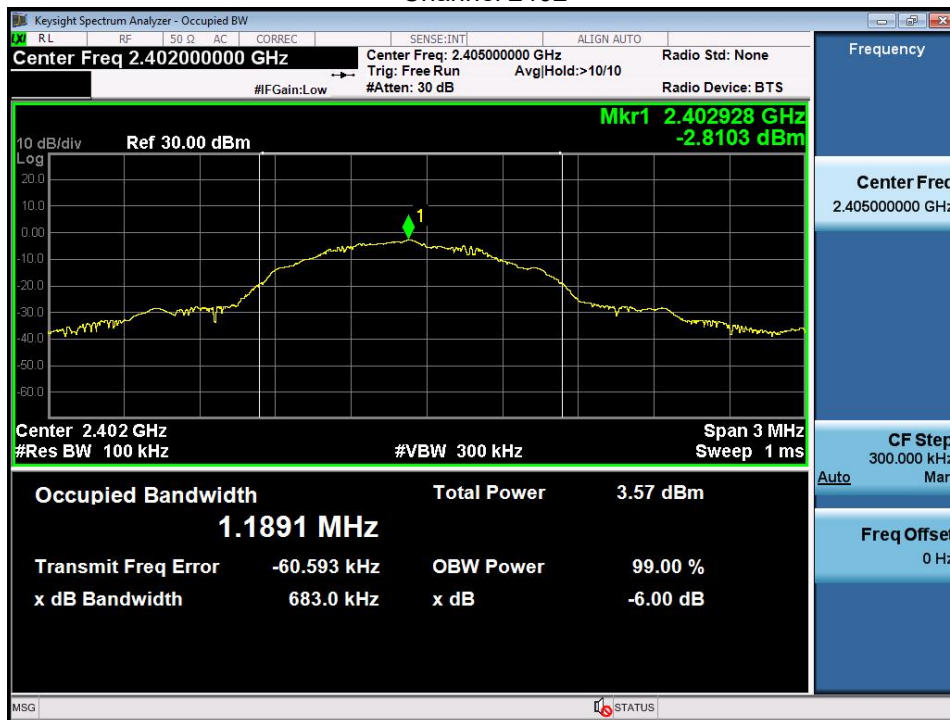
### 8.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

### 8.2 Test Result

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Required Limit (KHz)
00	2402	0.683	>500
01	2440	0.710	>500
02	2475	0.740	>500

Channel 2402



## Channel 2440



## Channel 2475



## 9 Maximum Peak Output Power

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

### 9.1 Test Procedure

1. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power and record the results in the test report.

### 9.2 Test Result

Channel number	Channel Frequency(MHz)	Peak Power Output(dBm)	Peak Power Output(W)	Peak Power Limit(W)	Verdict
00	2402	-1.98	0.000634	1	PASS
01	2440	-2.01	0.000630	1	PASS
02	2475	-2.11	0.000615	1	PASS

## 10 Power Spectral density

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013  
 Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation

Test Limit : operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

### 10.2 Test Result

Channel number	Channel frequency (MHz)	Measurement level (dBm)	Required Limit (dBm/3kHz)	Pass/Fail
		PSD/3kHz		
00	2402	-15.39	8	PASS
01	2440	-15.64	8	PASS
02	2475	-15.77	8	PASS

Channel 2402



Channel 2440



## Channel 2475





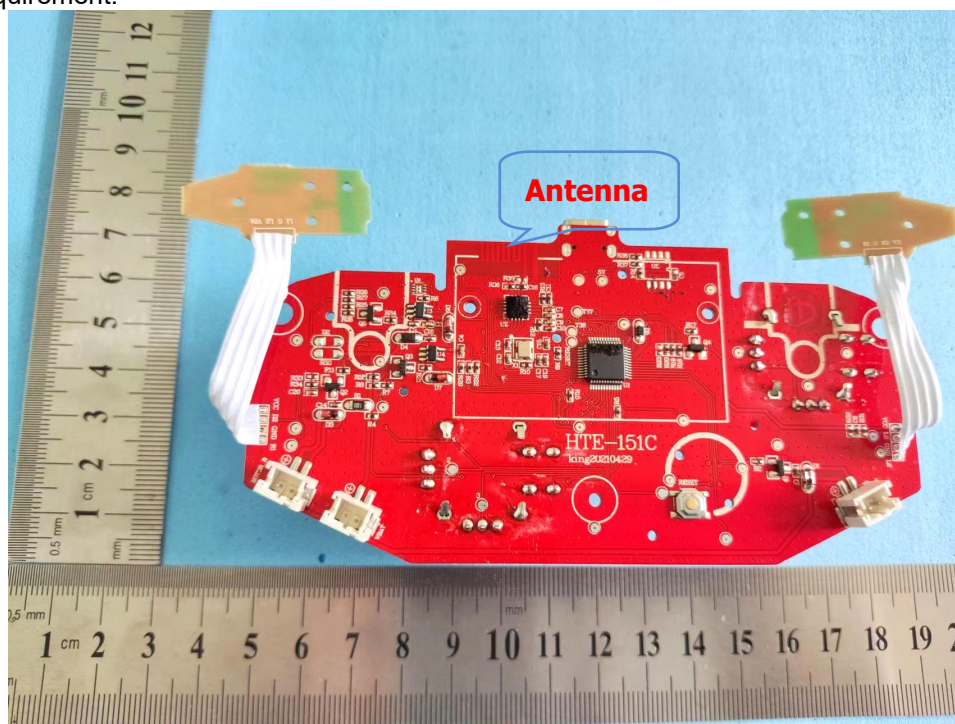
## 11 Antenna Application

### 11.1 Antenna Requirement

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 11.2 Result

The EUT'S antenna, permanent attached antenna, is internal PCB antenna. The antenna's gain is 0 dBi and meets the requirement.

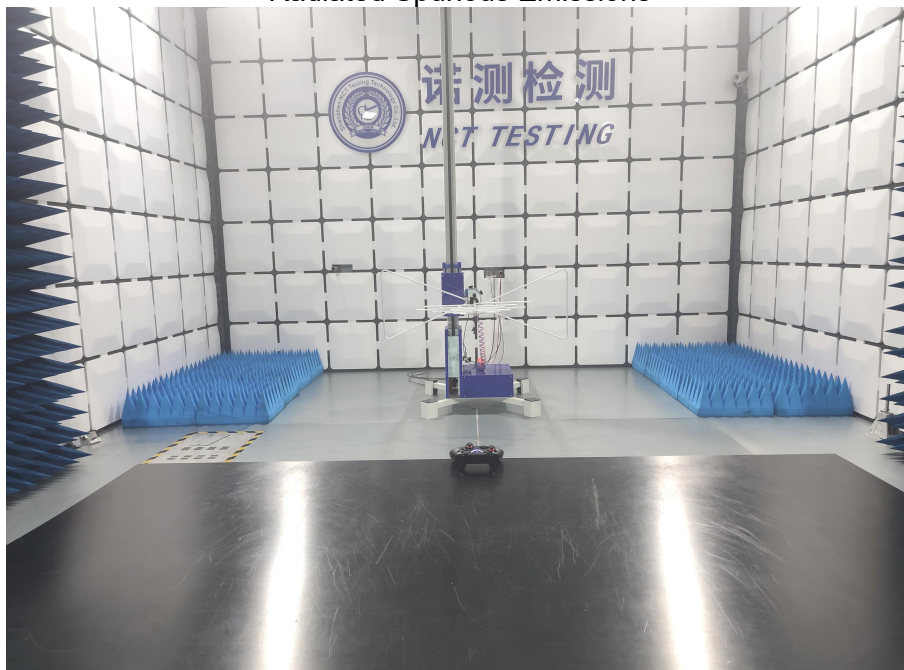


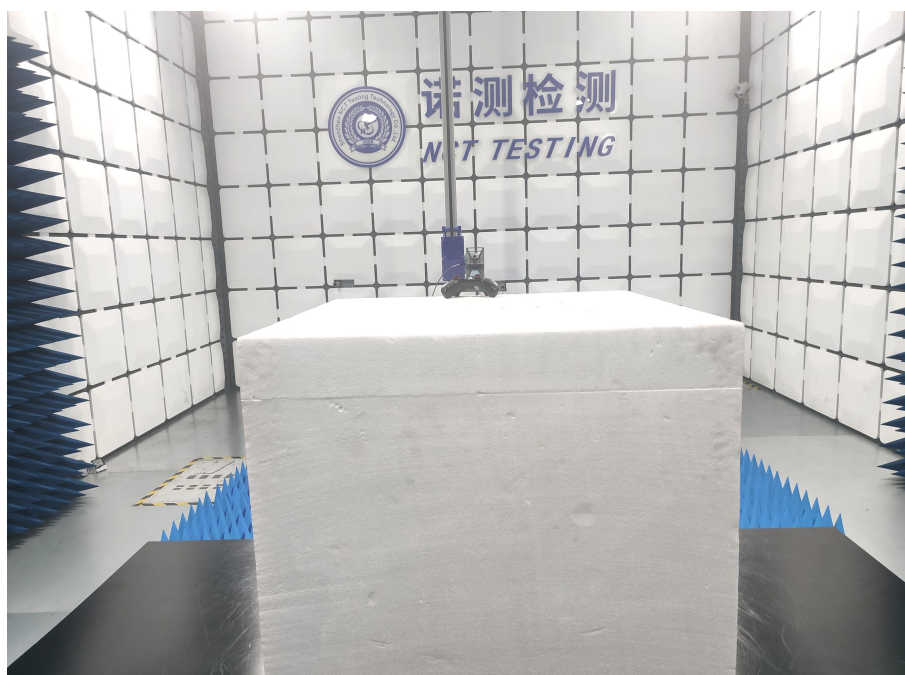
## 12 Test Setup

Conducted Emissions



Radiated Spurious Emissions





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