FCC TEST REPORT

FCC ID: 2BHKO-HX-7500

Product	:	POS
Model Name	:	HX-7500
Brand	:	Uniwell
Report No.	:	NCT23030212XE

Prepared for

Shenzhen Zhongshou Bussiness Machine Co., Ltd.

3A, 16th Build, Bilang Industrial Park, Shuiku Road, Jiangshi Village, Gongming Town, Guangming New District, Shenzhen, China.

Prepared by

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1 TEST RESULT CERTIFICATION

Applicant's name	:	Shenzhen Zhongshou Bussiness Machine Co., Ltd.
Address	:	3A, 16th Build, Bilang Industrial Park, Shuiku Road, Jiangshi Village, Gongming Town, Guangming New District, Shenzhen, China.
Manufacture's name	:	Shenzhen Zhongshou Bussiness Machine Co., Ltd.
Address	:	3A, 16th Build, Bilang Industrial Park, Shuiku Road, Jiangshi Village, Gongming Town, Guangming New District, Shenzhen, China.
Product name	:	POS
Model name	:	HX-7500
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013
Date of test	:	Jul. 01, 2024-Jul. 13, 2024
Date of Issue	:	Jul. 13, 2024

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

Contents

Page

1 TEST RESULT CERTIFICATION **2**

2 TEST SUMMARY **5**

3 GENERAL INFORMATION **6**

3.1 GENERAL DESCRIPTION OF E.U.T. 6

3.2 CHANNEL LIST 7

3.3 TEST SITE 8

4 EQUIPMENT DURING TEST **9**

4.1 EQUIPMENTS LIST 9

4.2 MEASUREMENT UNCERTAINTY 11

4.3 DESCRIPTION OF SUPPORT UNITS 11

5 CONDUCTED EMISSION **12**

5.1 E.U.T. OPERATION 12

5.2 EUT SETUP 12

5.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 13

5.4 MEASUREMENT PROCEDURE 13

5.5 CONDUCTED EMISSION LIMIT 13

5.6 MEASUREMENT DESCRIPTION 13

5.7 CONDUCTED EMISSION TEST RESULT 13

6 RADIATED SPURIOUS EMISSIONS **16**

6.1 EUT OPERATION 16

6.2 TEST SETUP 17

6.3 SPECTRUM ANALYZER SETUP 18

6.4 TEST PROCEDURE 19

6.5 SUMMARY OF TEST RESULTS 20

7 CONDUCTED SPURIOUS EMISSION **29**

7.1 TEST PROCEDURE 29

7.2 TEST RESULT 29

8 BAND EDGE MEASUREMENT **42**
8.1 TEST PROCEDURE 42
8.2 TEST RESULT 43
9 6DB BANDWIDTH MEASUREMENT **47**
9.1 TEST PROCEDURE 47
9.2 TEST RESULT 47
10 MAXIMUM PEAK OUTPUT POWER **54**
10.1 TEST PROCEDURE 54
10.2 TEST RESULT 54
11 POWER SPECTRAL DENSITY **55**
11.1 TEST PROCEDURE 55
11.2 TEST RESULT 55
12 ANTENNA APPLICATION **62**
12.1 ANTENNA REQUIREMENT 62
12.2 RESULT 62
13 TEST SETUP **63**
14 EUT PHOTOS **65**

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)(3)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS
Remark: N/A: Not Applicable		

3 General Information

3.1 General Description of E.U.T.

Product Name	:	POS
Model Name	:	HX-7500
Sample ID	:	240701A-001
Sample(s) Status:	:	Engineer sample
Series Model	:	/
Model Different.:	:	/
Specification	:	802.11b/g/n HT20/40
Operation Frequency	:	2412-2462MHz for 802.11b/g/n20; 2422-2452MHz for 802.11n40;
Number of Channel	:	11 channels for 802.11b/g/n20; 7 channels for 802.11n40;
Type of Modulation	:	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Antenna installation	:	FPC Antenna
Antenna Gain	:	2 dBi
Power supply	:	DC 12V/5A From adapter input AC 120V/60Hz
Hardware Version	:	V1.0
Software Version	:	V1.0
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.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

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

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20): MCS0; 802.11n (HT40): MCS0;were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n (HT20)/n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462
3	2422	6	2437	9	2452

3.3 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

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
Spectrum Analyze （10Hz-26.5GHz）	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
Amplifi （30MHz-1GHz）	BBV 9743 B	00374	SCHNARZBECK	2024/6/17	2025/6/16
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	2025/3/18
Pream plifier （1GHz-18GHz）	BBV 9718D	0024	SCHNARZBECK	2024/6/17	2025/6/16
Spectrum Analyze （1GHz-40GHz）	FSV 40	100952	Rohde & Schwarz	2024/6/17	2025/6/16
Pream plifier （15GHz-40GHz）	BBV 9718D	0024	SCHNARZBECK	2024/6/17	2025/6/16
Broadband Antenna （15GHz-40GHz）	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNARZBECK	2024/6/17	2025/6/16

Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHNARZBECK	2024/6/17	2025/6/16
MXG Signal Analyzer	N9020A	101178	RS	2024/6/17	2025/6/16
MXG Vector Signal Generator	N5182A	MY50510202	Agilent	2024/6/17	2025/6/16
MXG Analog Signal Generator	N5181A	00374	SCHWARZBECK	2024/6/17	2025/6/16
Power Sensor	TR1029-2	00473	SCHNARZBECK	2024/6/17	2025/6/16
RF Swith	TR1029-1	02622	SCHNARZBECK	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	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^{-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(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

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	POS	meoof	HX-7500	N/A	EUT
E-2	ADAPTER	N/A	OLD72Z1-120500	N/A	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: 2013
Test Result	:	PASS
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B

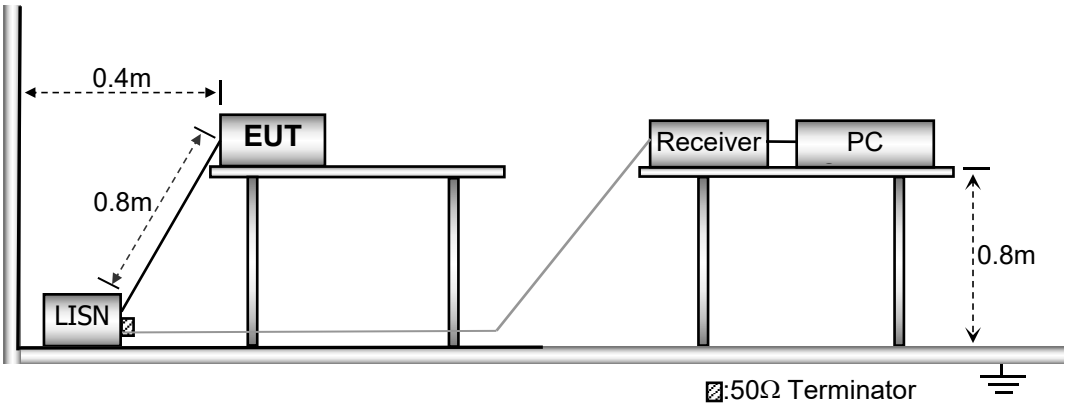
5.1 E.U.T. Operation

Operating Environment :

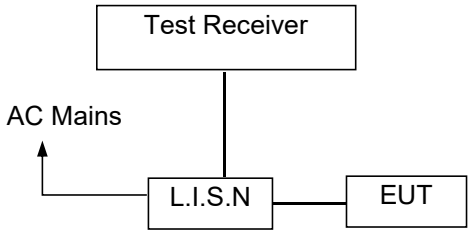
Temperature	:	24.5 °C
Humidity	:	51.3 % RH
Atmospheric Pressure	:	101.11kPa

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

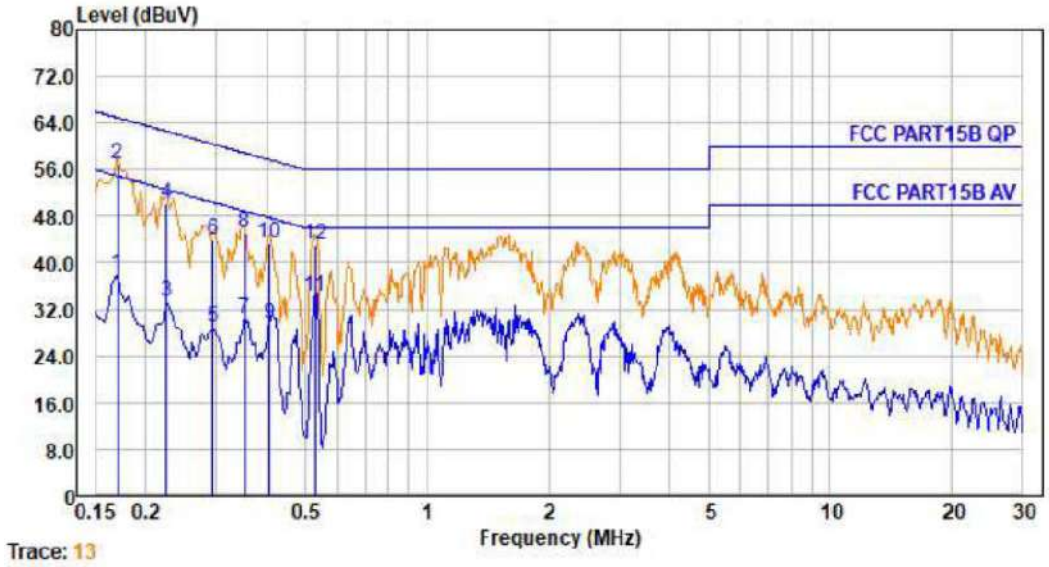
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.7 Conducted Emission Test Result

Pass.

Please refer to the following pages.

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



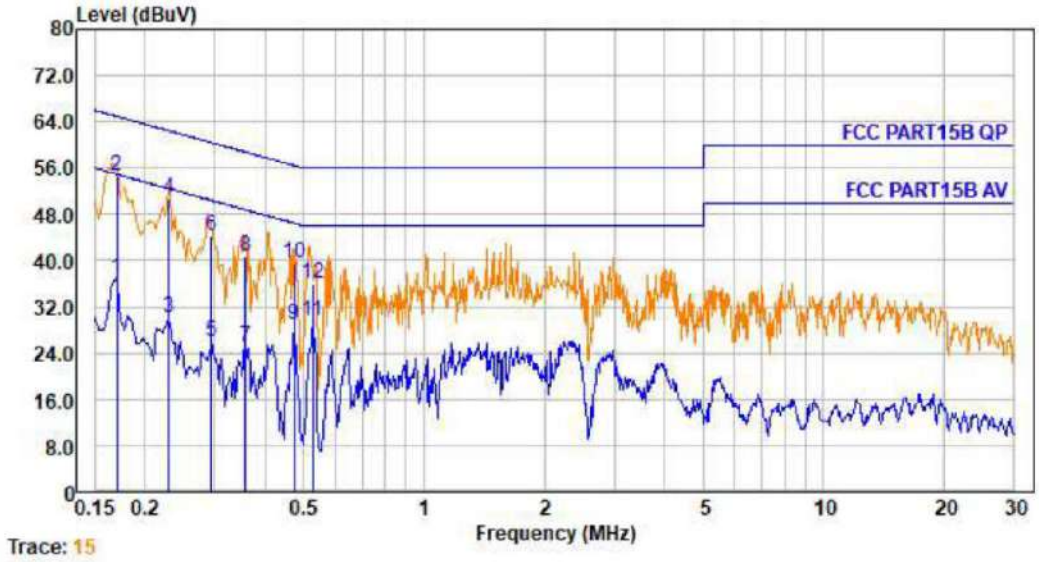
No.	Freq MHz	Cable Loss dB	LISN Factor dB/m	Receiver Reading dBuV	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	0.170	0.00	9.54	28.51	38.05	54.94	-16.89	Average
2.	0.170	0.00	9.54	47.37	56.91	64.94	-8.03	QP
3.	0.226	0.01	9.55	23.67	33.23	52.61	-19.38	Average
4.	0.226	0.01	9.55	40.71	50.27	62.61	-12.34	QP
5.	0.294	0.01	9.56	19.34	28.91	50.41	-21.50	Average
6.	0.294	0.01	9.56	34.42	43.99	60.41	-16.42	QP
7.	0.352	0.01	9.56	20.80	30.37	48.91	-18.54	Average
8.	0.352	0.01	9.56	35.47	45.04	58.91	-13.87	QP
9.	0.406	0.01	9.57	19.99	29.57	47.73	-18.16	Average
10.	0.406	0.01	9.57	33.87	43.45	57.73	-14.28	QP
11.	0.527	0.01	9.57	24.72	34.30	46.00	-11.70	Average
12.	0.527	0.01	9.57	33.64	43.22	56.00	-12.78	QP

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



No.	Freq MHz	Cable Loss dB	LISN Factor dB/m	Receiver Reading dBuV	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	0.170	0.00	9.54	27.51	37.05	54.94	-17.89	Average
2.	0.170	0.00	9.54	45.14	54.68	64.94	-10.26	QP
3.	0.230	0.01	9.55	20.61	30.17	52.44	-22.27	Average
4.	0.230	0.01	9.55	41.12	50.68	62.44	-11.76	QP
5.	0.294	0.01	9.56	16.29	25.86	50.41	-24.55	Average
6.	0.294	0.01	9.56	34.82	44.39	60.41	-16.02	QP
7.	0.358	0.01	9.57	15.62	25.20	48.78	-23.58	Average
8.	0.358	0.01	9.57	31.24	40.82	58.78	-17.96	QP
9.	0.474	0.01	9.58	19.28	28.87	46.45	-17.58	Average
10.	0.474	0.01	9.58	29.87	39.46	56.45	-16.99	QP
11.	0.527	0.01	9.58	19.93	29.52	46.00	-16.48	Average
12.	0.527	0.01	9.58	26.42	36.01	56.00	-19.99	QP

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

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)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
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	$20\log^{(500)}$

6.1 EUT Operation

Operating Environment :

Temperature: : 24.5°C

Humidity: : 52 % RH

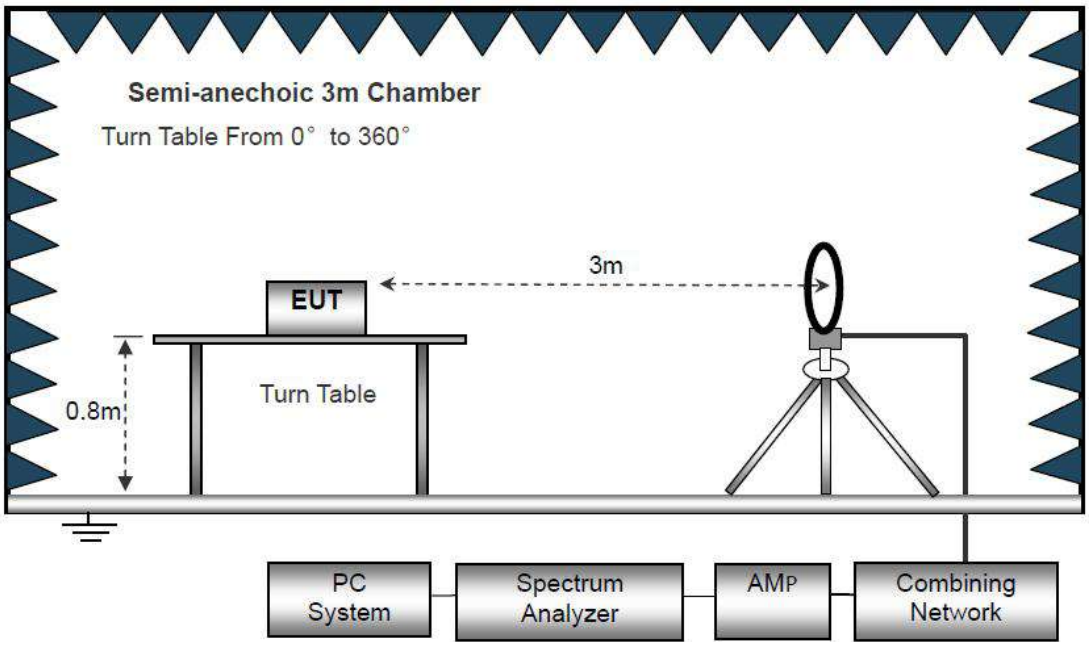
Atmospheric Pressure: : 101.11kPa

Test Voltage : AC 120V 60Hz

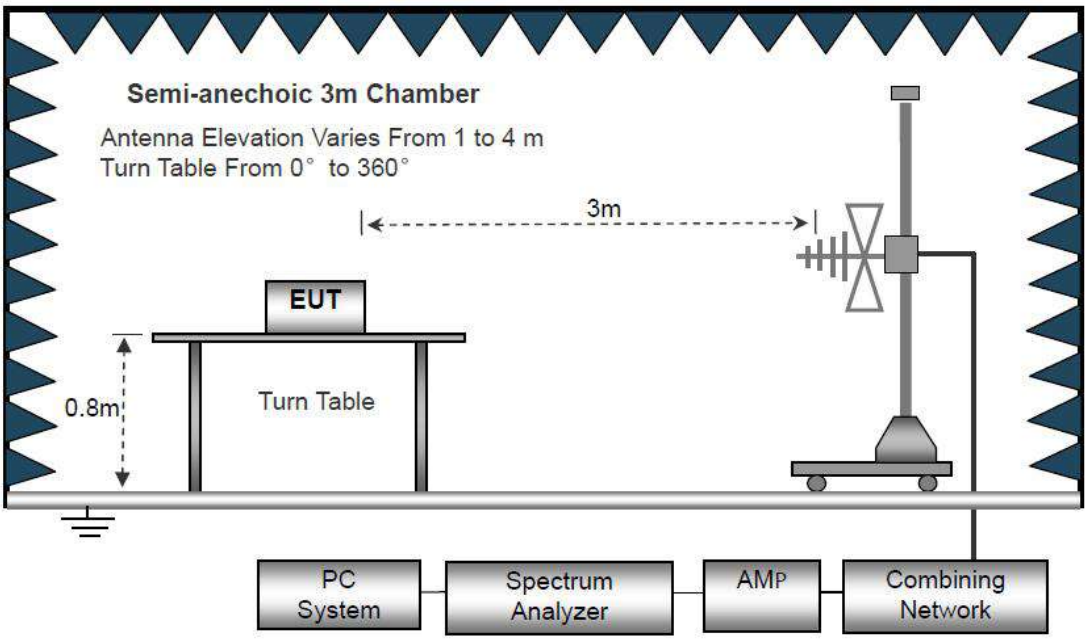
6.2 Test Setup

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

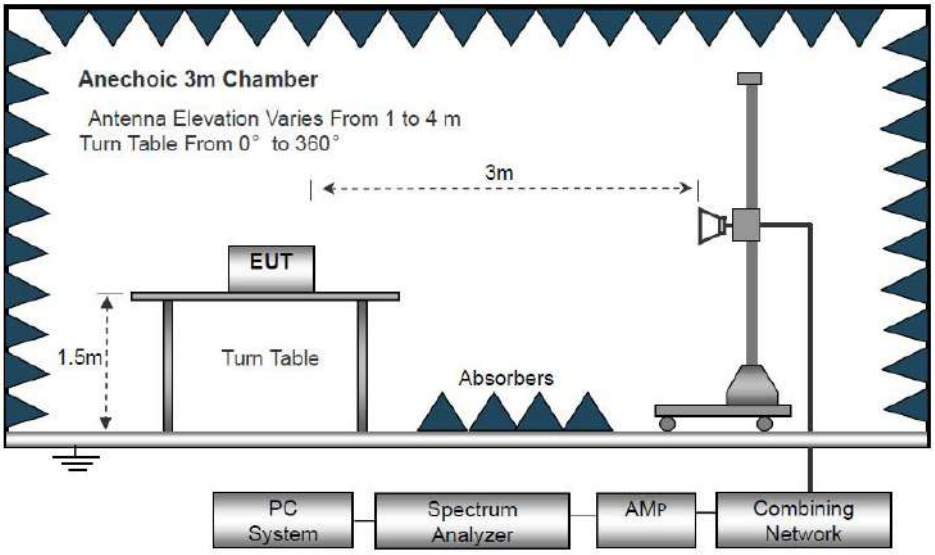
The test setup for emission measurement below 30MHz



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

Below 30MHz			
IF Bandwidth	:	10kHz	
Resolution Bandwidth	:	10kHz	
Video Bandwidth	:	10kHz	
30MHz ~ 1GHz			
Detector	:	PK	QP
Resolution Bandwidth	:	100kHz	120kHz
Video Bandwidth	:	300kHz	300kHz
Above 1GHz			
Detector	:	PK	AV
Resolution Bandwidth	:	1MHz	1MHz
Video Bandwidth	:	3MHz	10Hz

6.4 Test Procedure

1. 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.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6. Repeat above procedures until the measurements for all frequencies are complete.

7. 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.

8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room

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.

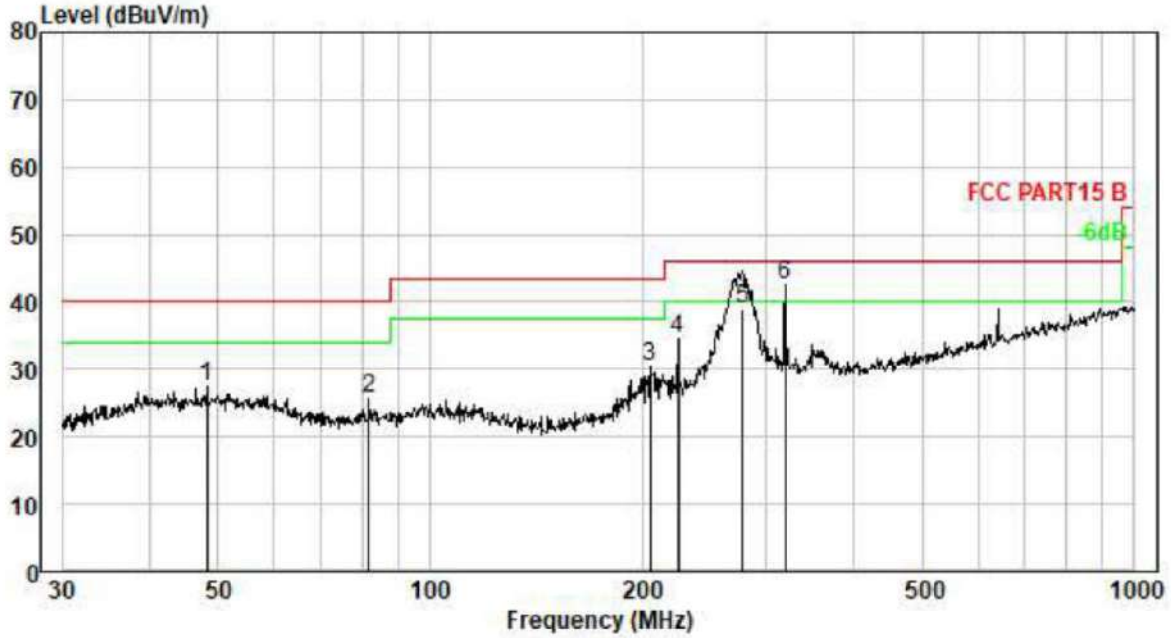
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

All the modulation modes were tested the data of the worst mode (TX 802.11b Low Channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

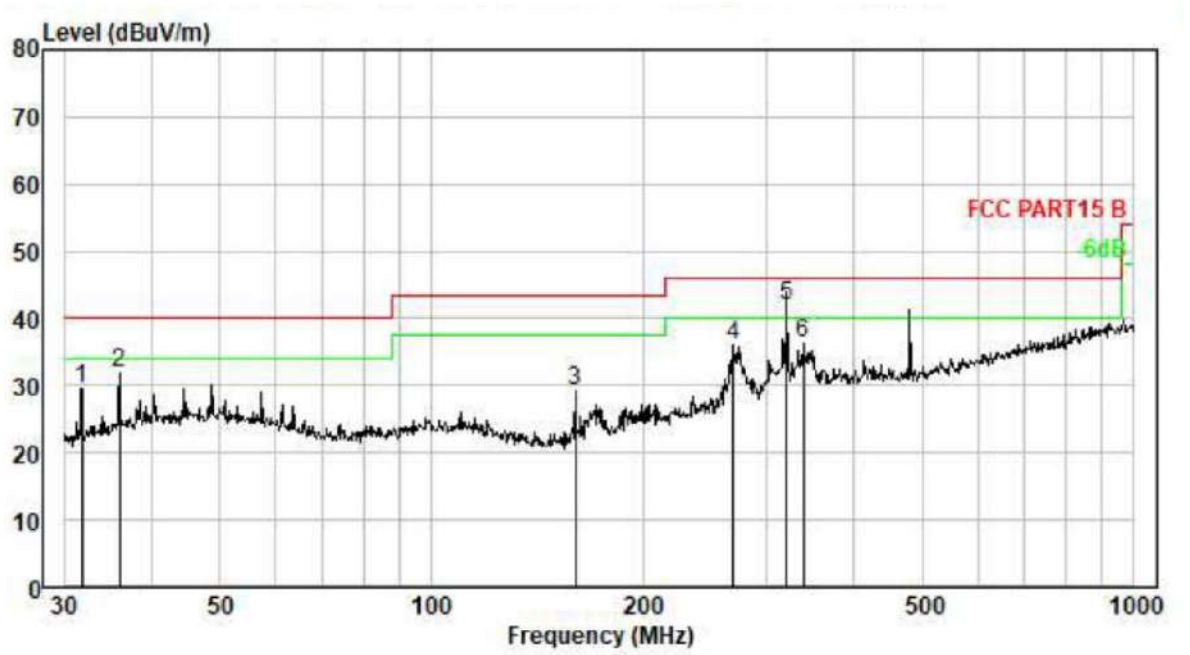
Please refer to the following test plots:

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBµV	Emission Level dBµV/m	Limit dBµV/m	Over Limit dB	Remark
1	48.163	0.42	12.67	14.25	27.34	40.00	-12.66	QP
2	81.783	0.61	9.74	15.29	25.64	40.00	-14.36	QP
3	205.675	1.08	11.60	17.84	30.52	43.50	-12.98	QP
4	225.308	1.12	12.25	21.21	34.58	46.00	-11.42	QP
5	278.067	1.24	13.76	23.99	38.99	46.00	-7.01	QP
6	319.937	1.31	14.64	26.42	42.37	46.00	-3.63	QP

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBμV	Emission Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
1	31.843	0.26	10.20	19.10	29.56	40.00	-10.44	QP
2	36.001	0.31	11.44	20.00	31.75	40.00	-8.25	QP
3	160.346	0.94	8.82	19.36	29.12	43.50	-14.38	QP
4	269.428	1.22	13.53	21.31	36.06	46.00	-9.94	QP
5	321.061	1.31	14.65	26.06	42.02	46.00	-3.98	QP
6	338.400	1.34	14.93	20.15	36.42	46.00	-9.58	QP

Test Frequency: From 1GHz to 18GHz

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:2412MHz									
V	4824.00	43.54	34.11	5.04	32.44	46.91	74.00	-27.09	PK
V	4824.00	38.94	34.11	5.04	32.44	42.31	54.00	-11.69	AV
V	7236.00	43.64	32.57	6.30	35.89	53.26	74.00	-20.74	PK
V	7236.00	28.69	32.57	6.30	35.89	38.31	54.00	-15.69	AV
V	9648.00	38.17	32.96	7.56	38.40	51.17	74.00	-22.83	PK
V	9648.00	24.41	32.96	7.56	38.40	37.41	54.00	-16.59	AV
V	12060.00	35.67	32.06	8.92	39.01	51.54	74.00	-22.46	PK
V	12060.00	21.96	32.06	8.92	39.01	37.83	54.00	-16.17	AV
H	4824.00	48.78	34.11	5.04	32.44	52.15	74.00	-21.85	PK
H	4824.00	34.43	34.11	5.04	32.44	37.80	54.00	-16.20	AV
H	7236.00	39.3	32.57	6.30	35.89	48.92	74.00	-25.08	PK
H	7236.00	27.28	32.57	6.30	35.89	36.90	54.00	-17.10	AV
H	9648.00	38.49	32.96	7.56	38.40	51.49	74.00	-22.51	PK
H	9648.00	24.63	32.96	7.56	38.40	37.63	54.00	-16.37	AV
H	12060.00	37.16	32.06	8.92	39.01	53.03	74.00	-20.97	PK
H	12060.00	24.94	32.06	8.92	39.01	40.81	54.00	-13.19	AV

Radiated Band Emission Measuremen:

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:2437MHz									
V	4874.00	50.82	34.08	5.08	32.57	54.39	74.00	-19.61	PK
V	4874.00	38.13	34.08	5.08	32.57	41.70	54.00	-12.30	AV
V	7311.00	42.82	32.62	6.34	35.95	52.49	74.00	-21.51	PK
V	7311.00	32.37	32.62	6.34	35.95	42.04	54.00	-11.96	AV
V	9748.00	39.81	32.93	7.58	38.40	52.86	74.00	-21.14	PK
V	9748.00	31.66	32.93	7.58	38.40	44.71	54.00	-9.29	AV
V	12185.00	44.65	31.97	8.89	39.04	60.61	74.00	-13.39	PK
V	12185.00	29.12	31.97	8.89	39.04	45.08	54.00	-8.92	AV
H	4874.00	44.37	34.08	5.08	32.57	47.94	74.00	-26.06	PK
H	4874.00	32.81	34.08	5.08	32.57	36.38	54.00	-17.62	AV
H	7311.00	43.27	32.62	6.34	35.95	52.94	74.00	-21.06	PK
H	7311.00	30.27	32.62	6.34	35.95	39.94	54.00	-14.06	AV
H	9748.00	45.57	32.93	7.58	38.40	58.62	74.00	-15.38	PK
H	9748.00	26.39	32.93	7.58	38.40	39.44	54.00	-14.56	AV
H	12185.00	35.08	31.97	8.89	39.04	51.04	74.00	-22.96	PK
H	12185.00	23.91	31.97	8.89	39.04	39.87	54.00	-14.13	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:2462MHz									
V	4924.00	49.22	34.05	5.14	32.79	53.10	74.00	-20.90	PK
V	4924.00	32.06	34.05	5.14	32.79	35.94	54.00	-18.06	AV
V	7386.00	40.96	32.67	6.36	35.99	50.64	74.00	-23.36	PK
V	7386.00	28.25	32.67	6.36	35.99	37.93	54.00	-16.07	AV
V	9848.00	39.37	32.89	7.59	38.37	52.44	74.00	-21.56	PK
V	9848.00	27.45	32.89	7.59	38.37	40.52	54.00	-13.48	AV
V	12310.00	36.18	31.88	8.82	39.06	52.18	74.00	-21.82	PK
V	12310.00	25.59	31.88	8.82	39.06	41.59	54.00	-12.41	AV
H	4924.00	44.35	34.05	5.14	32.79	48.23	74.00	-25.77	PK
H	4924.00	34.25	34.05	5.14	32.79	38.13	54.00	-15.87	AV
H	7386.00	43.54	32.67	6.36	35.99	53.22	74.00	-20.78	PK
H	7386.00	29.06	32.67	6.36	35.99	38.74	54.00	-15.26	AV
H	9848.00	41.00	32.89	7.59	38.37	54.07	74.00	-19.93	PK
H	9848.00	28.27	32.89	7.59	38.37	41.34	54.00	-12.66	AV
H	12310.00	39.10	31.88	8.82	39.06	55.10	74.00	-18.90	PK
H	12310.00	27.17	31.88	8.82	39.06	43.17	54.00	-10.83	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.
4. We test all the mode and recorded the worst mode in the report.

	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
802.11b	Low Channel 2412MHz									
	H	2390.00	58.25	35.17	3.48	27.49	54.05	74.00	PK	PASS
	H	2390.00	50.16	35.17	3.48	27.49	45.96	54.00	AV	PASS
	H	2400.00	59.49	35.16	3.49	27.52	55.34	74.00	PK	PASS
	H	2400.00	49.96	35.16	3.49	27.52	45.81	54.00	AV	PASS
	V	2390.00	58.05	35.17	3.48	27.49	53.85	74.00	PK	PASS
	V	2390.00	49.86	35.17	3.48	27.49	45.66	54.00	AV	PASS
	V	2400.00	59.15	35.16	3.49	27.52	55.00	74.00	PK	PASS
	V	2400.00	50.17	35.16	3.49	27.52	46.02	54.00	AV	PASS
	High Channel 2462MHz									
	H	2483.50	57.75	35.11	3.56	27.75	53.95	74.00	PK	PASS
	H	2483.50	48.61	35.11	3.56	27.75	44.81	54.00	AV	PASS
	H	2500.00	59.57	35.10	3.57	27.80	55.84	74.00	PK	PASS
	H	2500.00	49.54	35.10	3.57	27.80	45.81	54.00	AV	PASS
	V	2483.50	58.57	35.11	3.56	27.75	54.77	74.00	PK	PASS
	V	2483.50	50.17	35.11	3.56	27.75	46.37	54.00	AV	PASS
	V	2500.00	58.66	35.10	3.57	27.80	54.93	74.00	PK	PASS
	V	2500.00	49.41	35.10	3.57	27.80	45.68	54.00	AV	PASS
802.11g	Low Channel 2412MHz									
	H	2390.00	57.31	35.17	3.48	27.49	53.11	74.00	PK	PASS
	H	2390.00	49.44	35.17	3.48	27.49	45.24	54.00	AV	PASS
	H	2400.00	58.60	35.16	3.49	27.52	54.45	74.00	PK	PASS

	H	2400.00	49.85	35.16	3.49	27.52	45.70	54.00	AV	PASS
	V	2390.00	57.29	35.17	3.48	27.49	53.09	74.00	PK	PASS
	V	2390.00	48.63	35.17	3.48	27.49	44.43	54.00	AV	PASS
	V	2400.00	58.74	35.16	3.49	27.52	54.59	74.00	PK	PASS
	V	2400.00	49.03	35.16	3.49	27.52	44.88	54.00	AV	PASS
	High Channel 2462MHz									
	H	2483.50	57.27	35.11	3.56	27.75	53.47	74.00	PK	PASS
	H	2483.50	48.30	35.11	3.56	27.75	44.50	54.00	AV	PASS
	H	2500.00	58.66	35.10	3.57	27.80	54.93	74.00	PK	PASS
	H	2500.00	49.02	35.10	3.57	27.80	45.29	54.00	AV	PASS
	V	2483.50	57.57	35.11	3.56	27.75	53.77	74.00	PK	PASS
	V	2483.50	49.99	35.11	3.56	27.75	46.19	54.00	AV	PASS
	V	2500.00	58.32	35.10	3.57	27.80	54.59	74.00	PK	PASS
	V	2500.00	49.16	35.10	3.57	27.80	45.43	54.00	AV	PASS
802.11 n20	Low Channel 2412MHz									
	H	2390.00	57.97	35.17	3.48	27.49	53.77	74.00	PK	PASS
	H	2390.00	49.53	35.17	3.48	27.49	45.33	54.00	AV	PASS
	H	2400.00	60.12	35.16	3.49	27.52	55.97	74.00	PK	PASS
	H	2400.00	49.45	35.16	3.49	27.52	45.30	54.00	AV	PASS
	V	2390.00	57.83	35.17	3.48	27.49	53.63	74.00	PK	PASS
	V	2390.00	49.92	35.17	3.48	27.49	45.72	54.00	AV	PASS
	V	2400.00	59.55	35.16	3.49	27.52	55.40	74.00	PK	PASS
	V	2400.00	49.83	35.16	3.49	27.52	45.68	54.00	AV	PASS
	High Channel 2462MHz									
	H	2483.50	58.03	35.11	3.56	27.75	54.23	74.00	PK	PASS
	H	2483.50	48.85	35.11	3.56	27.75	45.05	54.00	AV	PASS

	H	2500.00	59.43	35.10	3.57	27.80	55.70	74.00	PK	PASS
	H	2500.00	49.63	35.10	3.57	27.80	45.90	54.00	AV	PASS
	V	2483.50	58.46	35.11	3.56	27.75	54.66	74.00	PK	PASS
	V	2483.50	49.65	35.11	3.56	27.75	45.85	54.00	AV	PASS
	V	2500.00	58.55	35.10	3.57	27.80	54.82	74.00	PK	PASS
	V	2500.00	50.34	35.10	3.57	27.80	46.61	54.00	AV	PASS
802.11 n40	Low Channel 2422MHz									
	H	2390.00	56.79	35.17	3.48	27.49	52.59	74.00	PK	PASS
	H	2390.00	48.61	35.17	3.48	27.49	44.41	54.00	AV	PASS
	H	2400.00	58.73	35.16	3.49	27.52	54.58	74.00	PK	PASS
	H	2400.00	49.02	35.16	3.49	27.52	44.87	54.00	AV	PASS
	V	2390.00	57.16	35.17	3.48	27.49	52.96	74.00	PK	PASS
	V	2390.00	49.60	35.17	3.48	27.49	45.40	54.00	AV	PASS
	V	2400.00	58.77	35.16	3.49	27.52	54.62	74.00	PK	PASS
	V	2400.00	49.09	35.16	3.49	27.52	44.94	54.00	AV	PASS
	High Channel 2452MHz									
	H	2483.50	57.42	35.11	3.56	27.75	53.62	74.00	PK	PASS
	H	2483.50	47.84	35.11	3.56	27.75	44.04	54.00	AV	PASS
	H	2500.00	58.89	35.10	3.57	27.80	55.16	74.00	PK	PASS
	H	2500.00	49.07	35.10	3.57	27.80	45.34	54.00	AV	PASS
	V	2483.50	57.36	35.11	3.56	27.75	53.56	74.00	PK	PASS
	V	2483.50	49.40	35.11	3.56	27.75	45.60	54.00	AV	PASS
	V	2500.00	58.04	35.10	3.57	27.80	54.31	74.00	PK	PASS
	V	2500.00	49.46	35.10	3.57	27.80	45.73	54.00	AV	PASS

Remark:

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

7 Conducted Spurious Emission

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
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)).

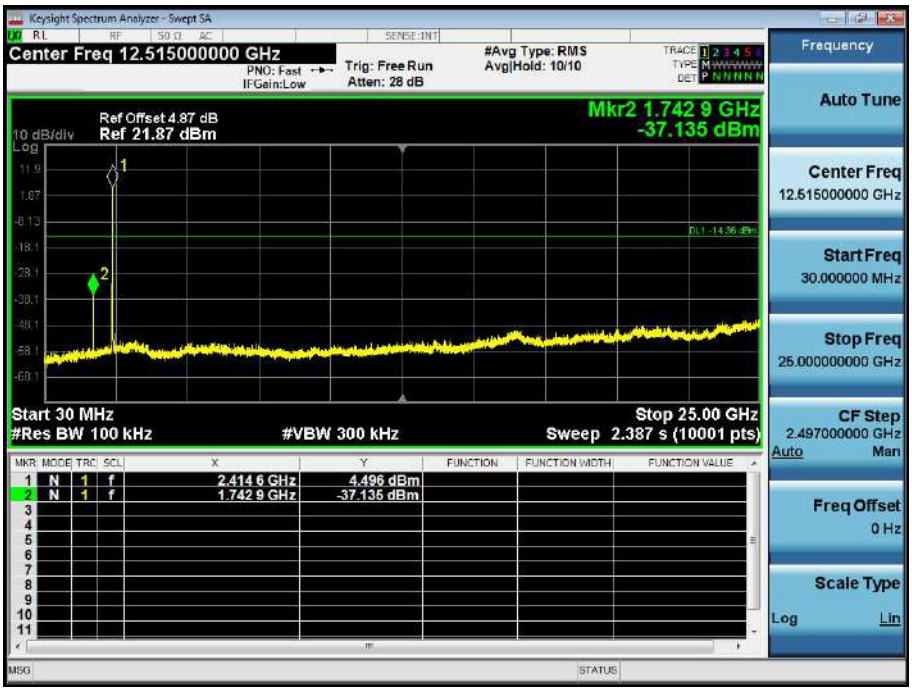
7.1 Test Procedure

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

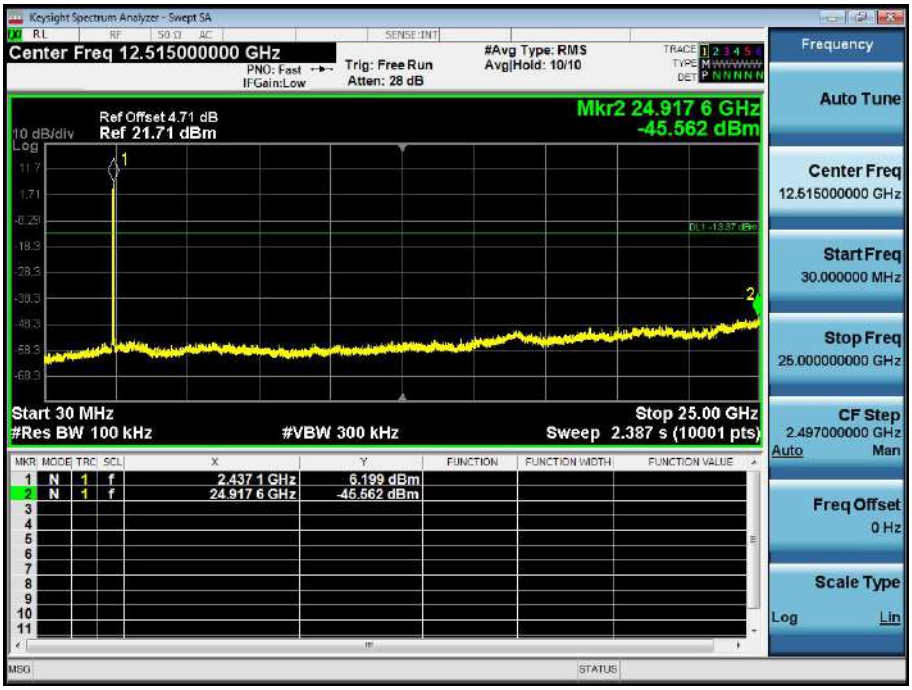
7.2 Test Result

802.11 b

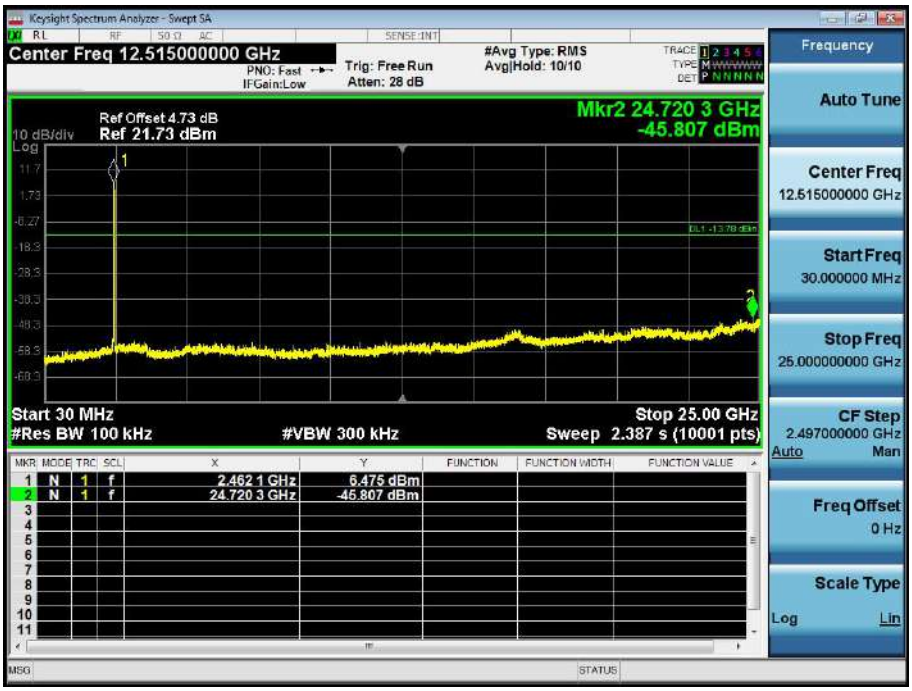
Low Channel



Middle Channel

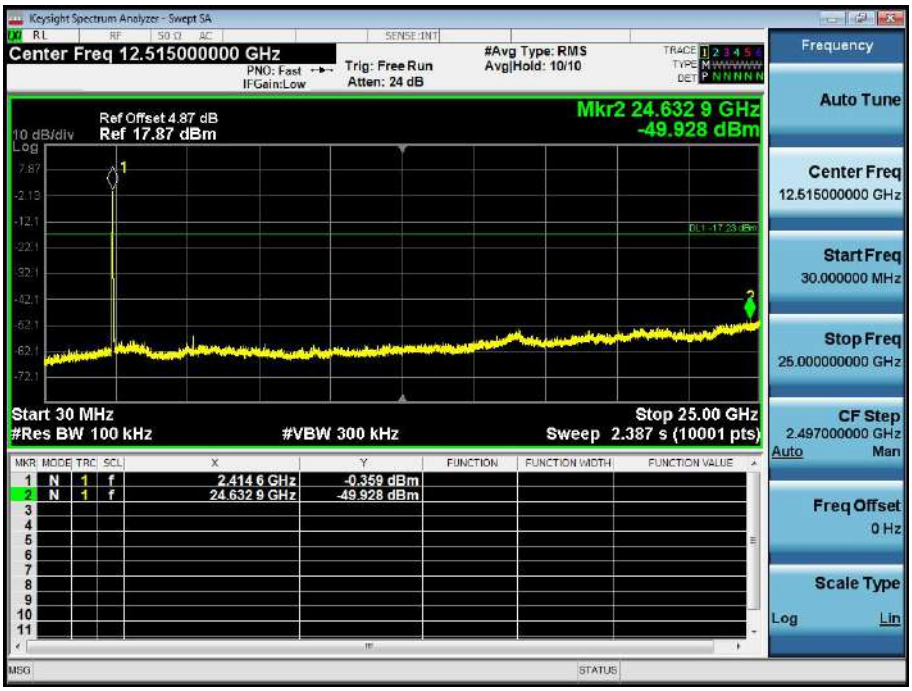


High Channel

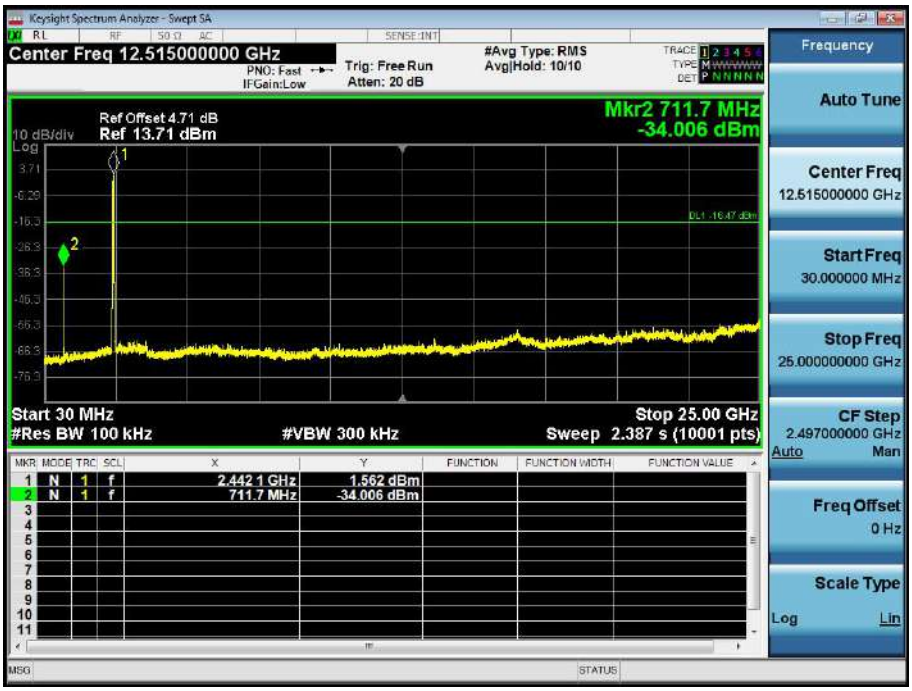


802.11g

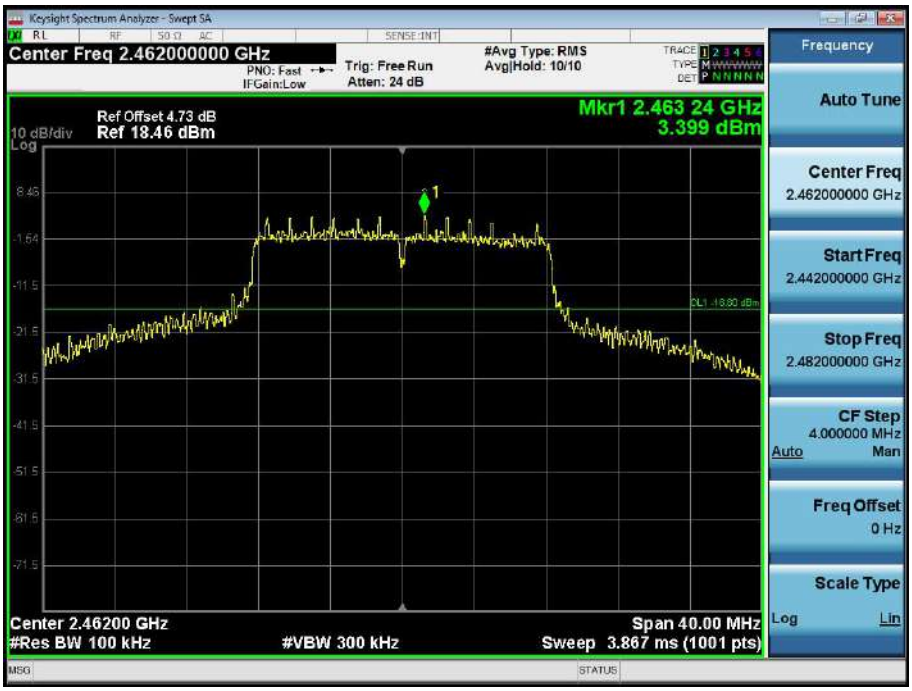
Low Channel

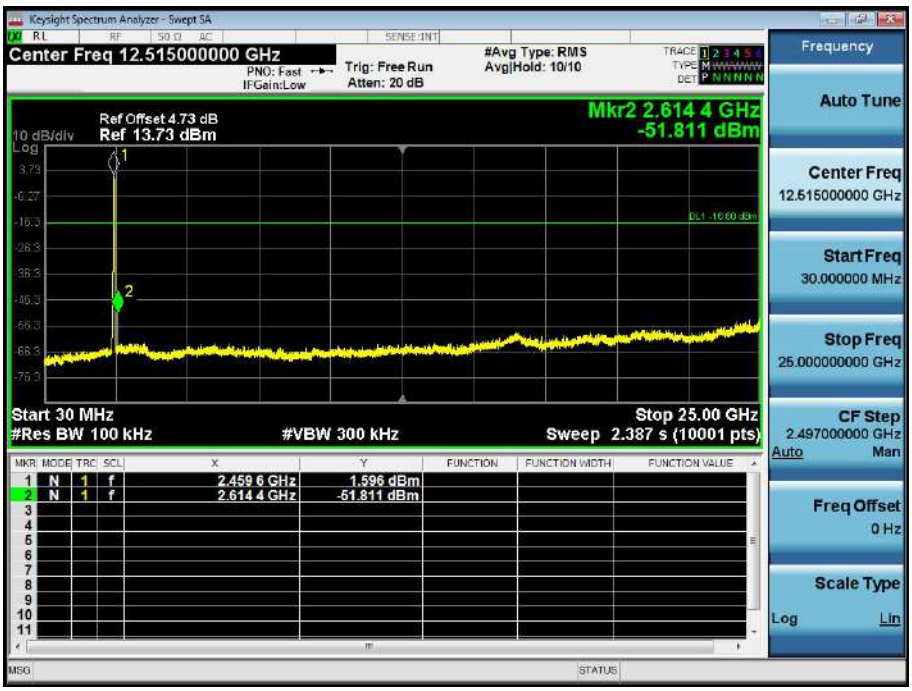


Middle Channel



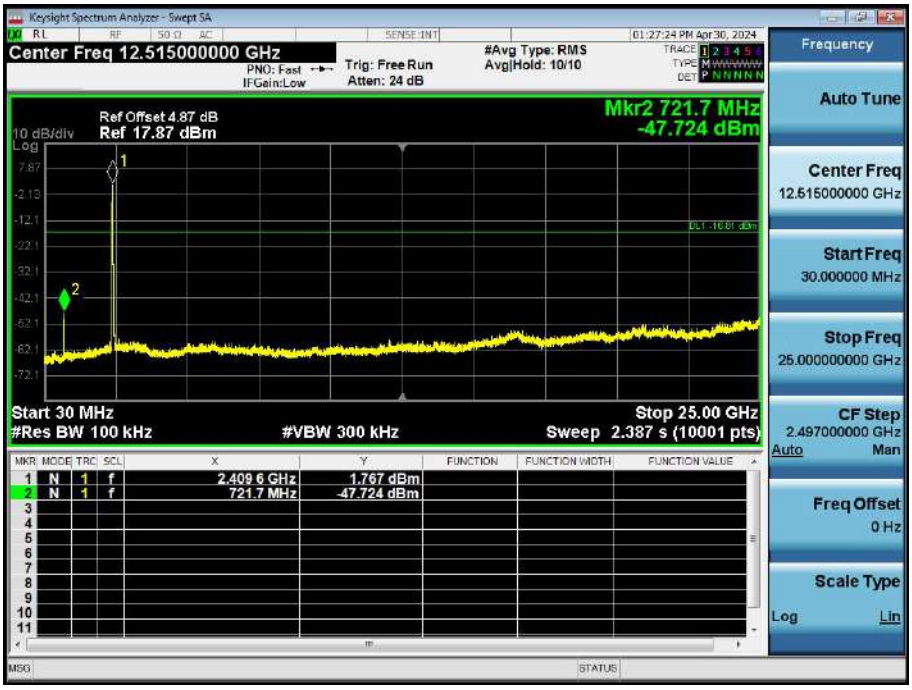
High Channel



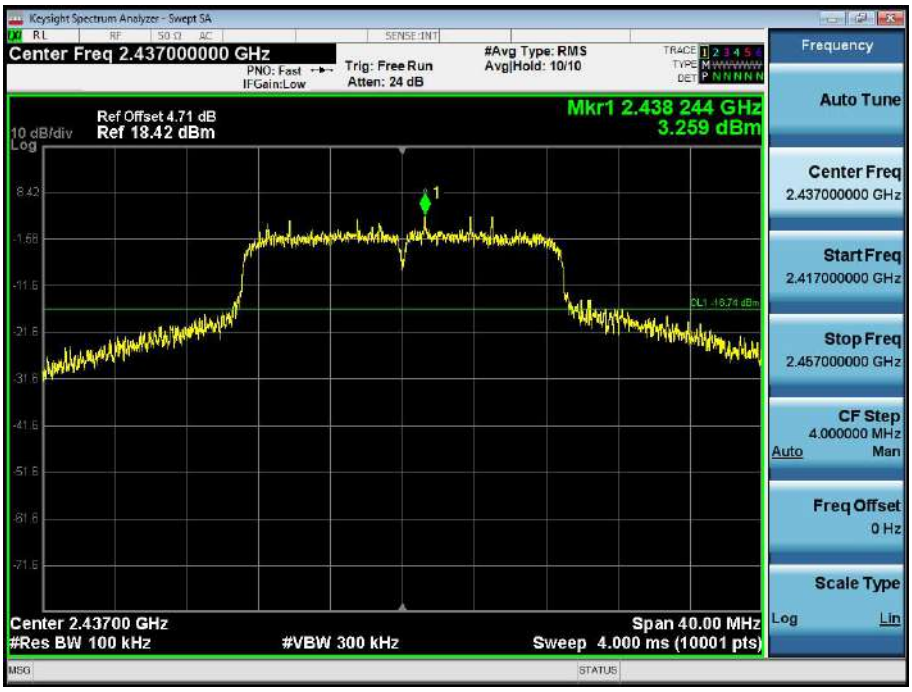


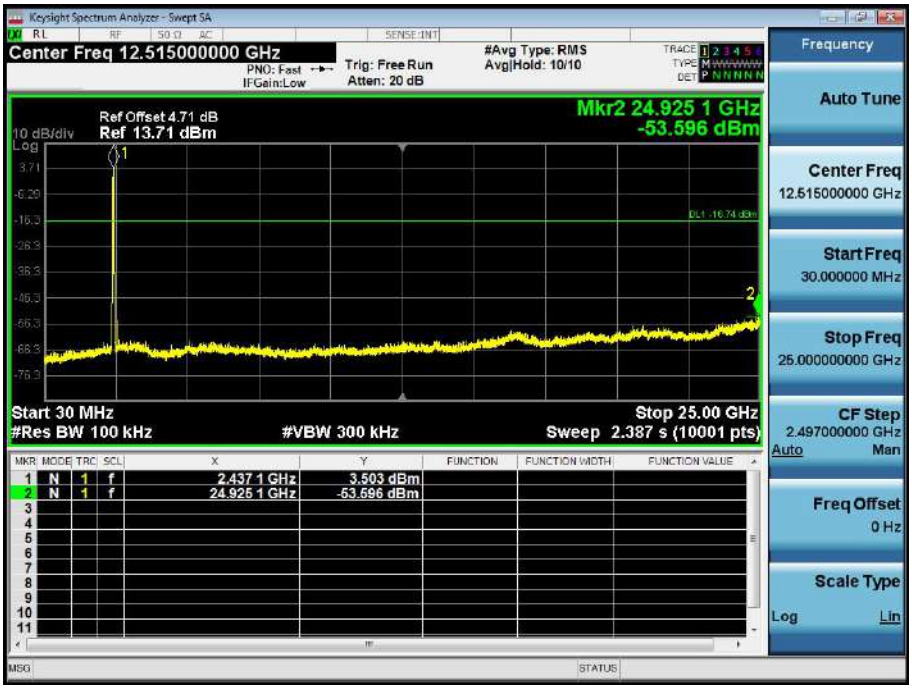
802.11n-HT20

Low Channel

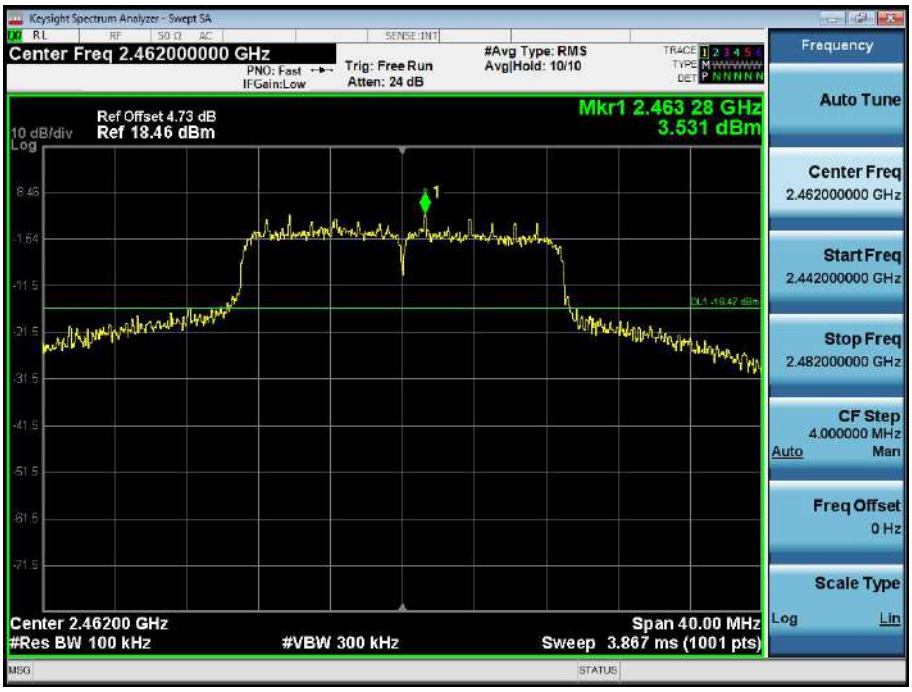


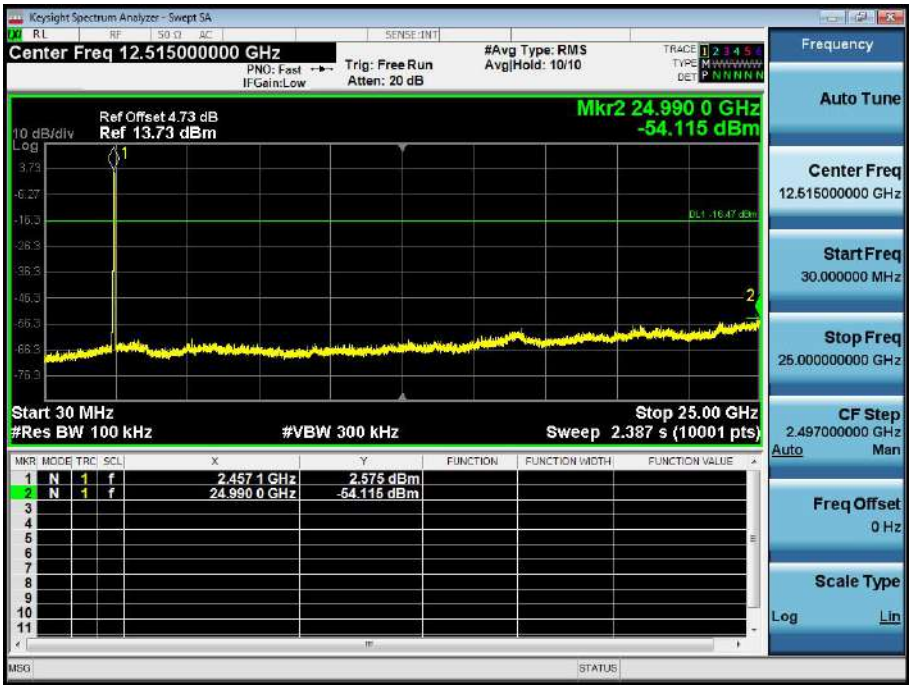
Middle Channel





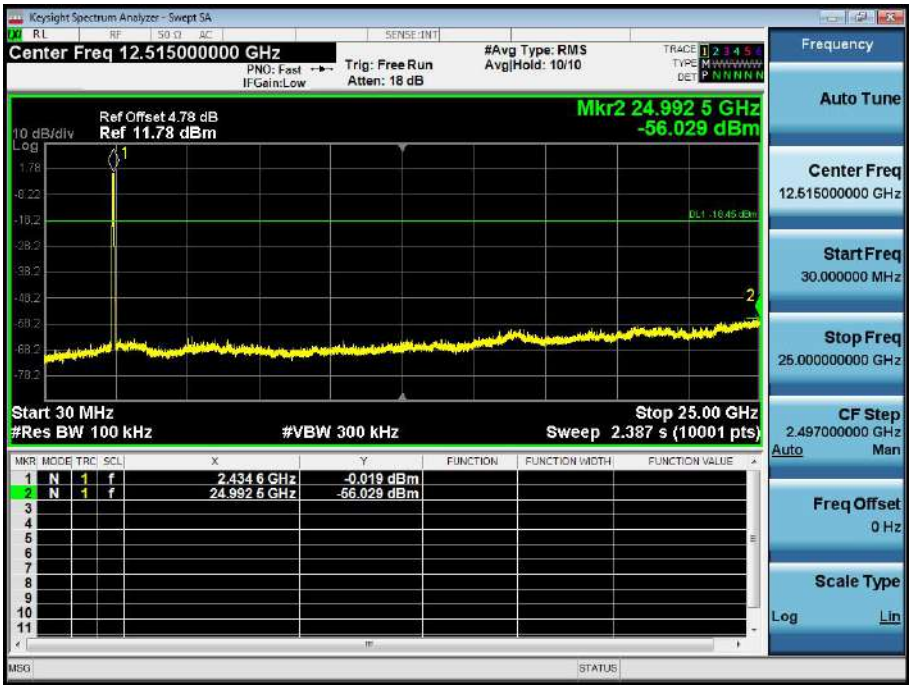
High Channel



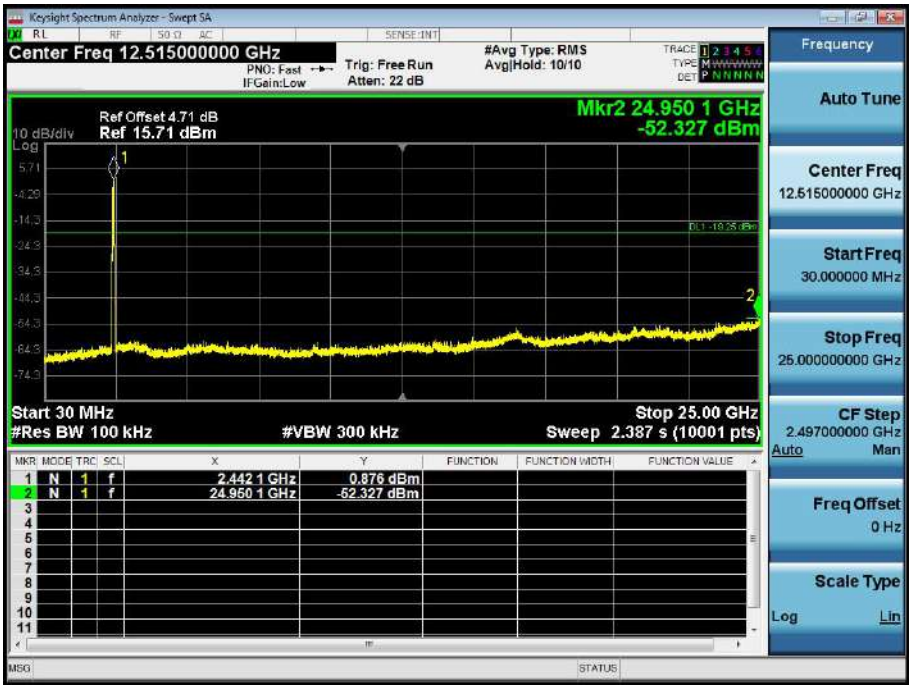


802.11n-HT40

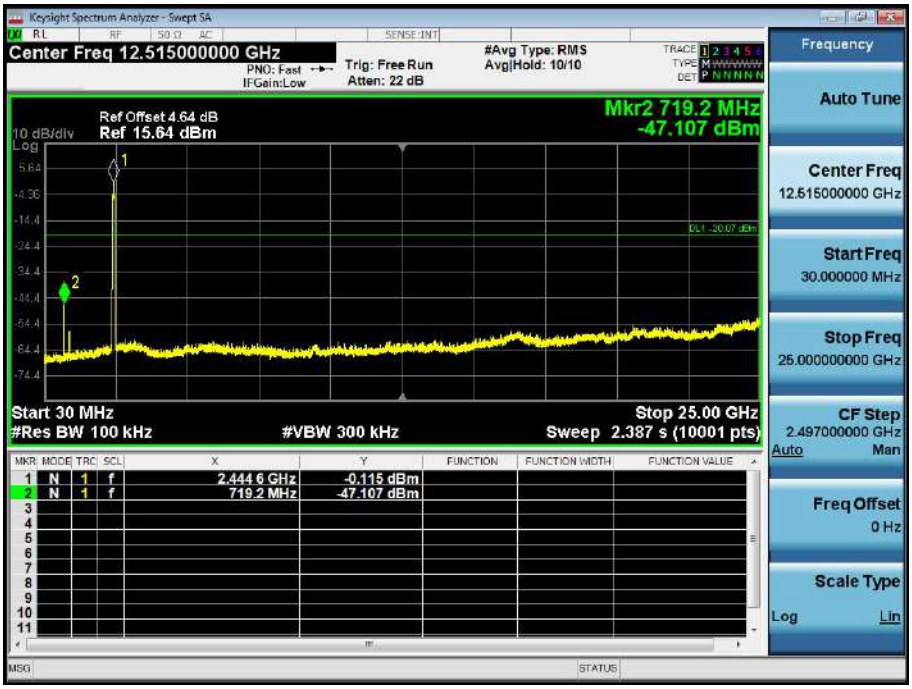
Low Channel



Middle Channel



High Channel



8 Band Edge 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)).

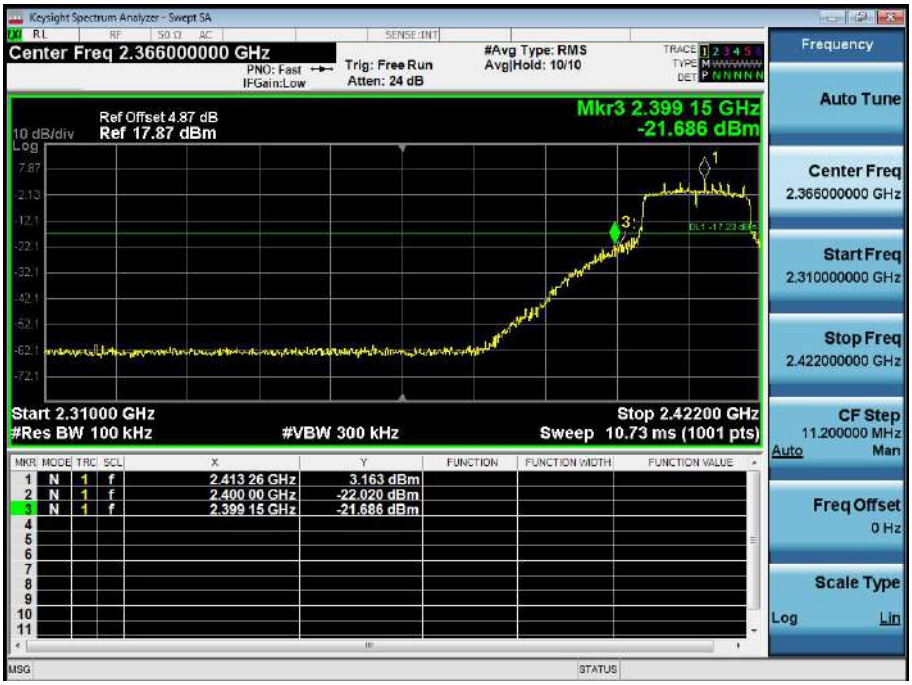
8.1 Test Procedure

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, Sweep = auto
Detector function = peak, Trace = max hold

8.2 Test Result

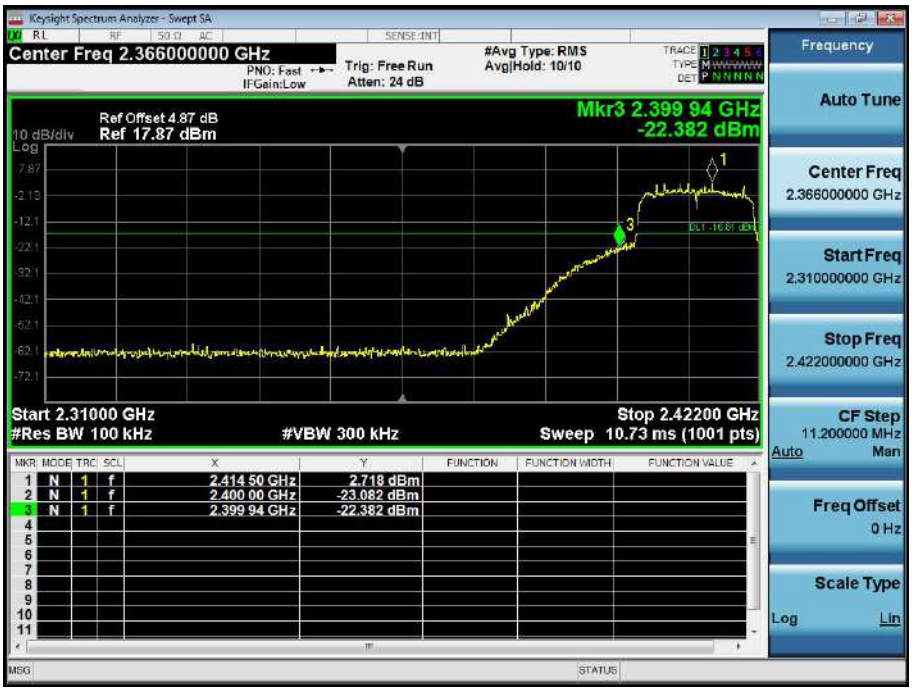
802.11b

802.11g


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.366000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 4.87 dB
10 dB/div
Ref 17.87 dBm
Mkr3 2.399 15 GHz
-21.686 dBm
Start 2.31000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.42200 GHz
Sweep 10.73 ms (1001 pts)
1 N 1 f 2.413 26 GHz 3.163 dBm
2 N 1 f 2.400 00 GHz -22.020 dBm
3 N 1 f 2.399 15 GHz -21.686 dBm
Frequency
Auto Tune
Center Freq
2.366000000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.422000000 GHz
CF Step
11.200000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

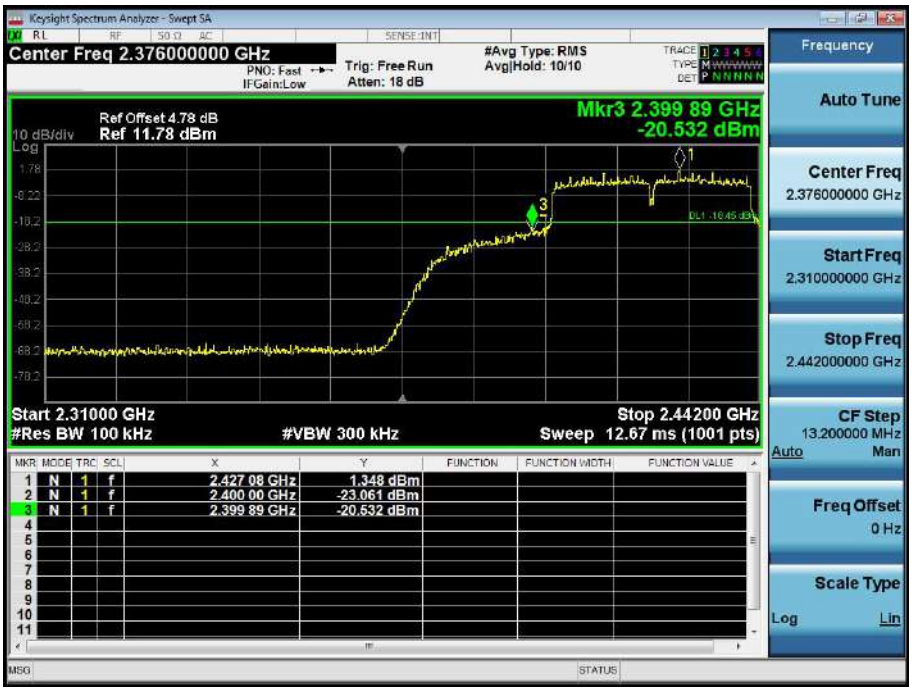
Keysight Spectrum Analyzer - Swept SA
Center Freq 2.476000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 4.73 dB
10 dB/div
Ref 13.73 dBm
Mkr3 2.483 584 GHz
-33.998 dBm
Start 2.45200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 4.600 ms (1001 pts)
1 N 1 f 2.469 488 GHz 3.181 dBm
2 N 1 f 2.483 500 GHz -35.984 dBm
3 N 1 f 2.483 584 GHz -33.998 dBm
Frequency
Auto Tune
Center Freq
2.476000000 GHz
Start Freq
2.452000000 GHz
Stop Freq
2.500000000 GHz
CF Step
4.800000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

802.11n 20


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.366000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 4.87 dB
10 dB/div
Ref 17.87 dBm
Mkr3 2.399 94 GHz
-22.382 dBm
Start 2.31000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.42200 GHz
Sweep 10.73 ms (1001 pts)
1 N 1 f 2.414 50 GHz 2.718 dBm
2 N 1 f 2.400 00 GHz -23.082 dBm
3 N 1 f 2.399 94 GHz -22.382 dBm
Frequency
Auto Tune
Center Freq
2.366000000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.422000000 GHz
CF Step
11.200000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.476000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 4.73 dB
10 dB/div
Ref 13.73 dBm
Mkr3 2.483 632 GHz
-30.885 dBm
Start 2.45200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 4.600 ms (1001 pts)
1 N 1 f 2.456 992 GHz 3.726 dBm
2 N 1 f 2.483 500 GHz -32.049 dBm
3 N 1 f 2.483 632 GHz -30.885 dBm
Frequency
Auto Tune
Center Freq
2.476000000 GHz
Start Freq
2.452000000 GHz
Stop Freq
2.500000000 GHz
CF Step
4.800000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

802.11n 40


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.376000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 4.78 dB
10 dB/div
Ref 11.78 dBm
Mkr3 2.399 89 GHz
-20.532 dBm
Start 2.31000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.44200 GHz
Sweep 12.67 ms (1001 pts)
2.427 08 GHz 1.348 dBm
2.400 00 GHz -23.061 dBm
2.399 89 GHz -20.532 dBm
Frequency
Auto Tune
Center Freq
2.376000000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.442000000 GHz
CF Step
13.200000 MHz
Auto Man
Freq Offset
0 Hz
Scale Type
Log Lin

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.466000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 4.64 dB
10 dB/div
Ref 15.64 dBm
Mkr3 2.484 496 GHz
-25.784 dBm
Start 2.43200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 6.533 ms (1001 pts)
2.444 512 GHz 0.334 dBm
2.483 600 GHz -30.249 dBm
2.484 496 GHz -25.784 dBm
Frequency
Auto Tune
Center Freq
2.466000000 GHz
Start Freq
2.432000000 GHz
Stop Freq
2.500000000 GHz
CF Step
6.800000 MHz
Auto Man
Freq Offset
0 Hz
Scale Type
Log Lin

9 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.

9.1 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

9.2 Test Result

Test CH	-6dB Occupy Bandwidth (MHz)					
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)	Limit(KHz)	Result
Lowest	8.592	15.83	16.86	35.61	>500	Pass
Middle	8.603	16.09	16.88	36.19		
Highest	8.620	16.35	17.13	36.58		

802.11b Low Channel

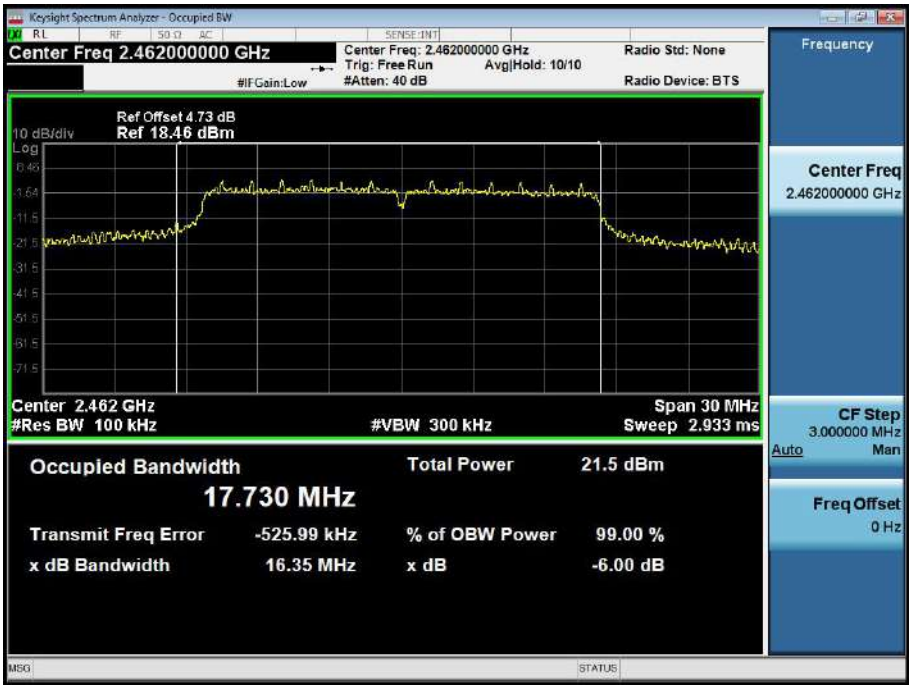
802.11b Middle Channel

802.11b High Channel

802.11g Low Channel

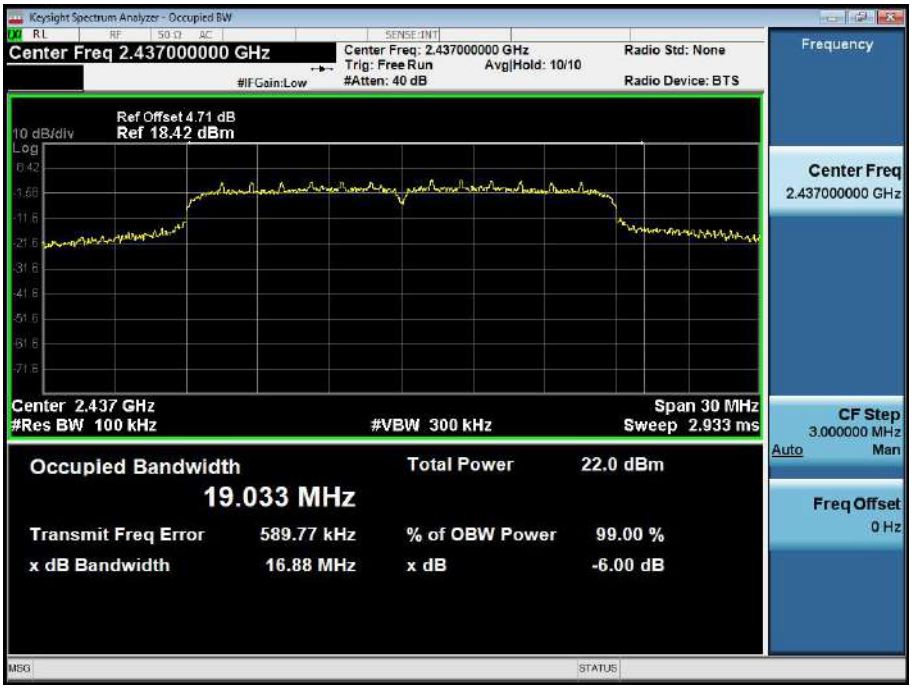
802.11g Middle Channel

802.11g High Channel



802.11n20 Low Channel

802.11n20 Middle Channel



802.11n20 High Channel

802.11n40 Low Channel

802.11n40 Middle Channel

802.11n40 High Channel

10 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.

10.1 Test Procedure

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

10.2 Test Result

	Maximum Peak Output Power (dBm)				Limit
	802.11b	802.11g	802.11n20	802.11n40	
Low Channel	17.62	16.33	15.45	14.50	1W(30dBm)
Middle Channel	17.37	16.08	15.03	14.21	1W(30dBm)
High Channel	17.34	16.19	15.17	14.07	1W(30dBm)

Note:

1. For power test the duty cycle is 100% in continous transmitting mode;

2. TX means Transmit, RX means Receive.

11 Power Spectral density

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation 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.

11.1 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.

11.2 Test Result

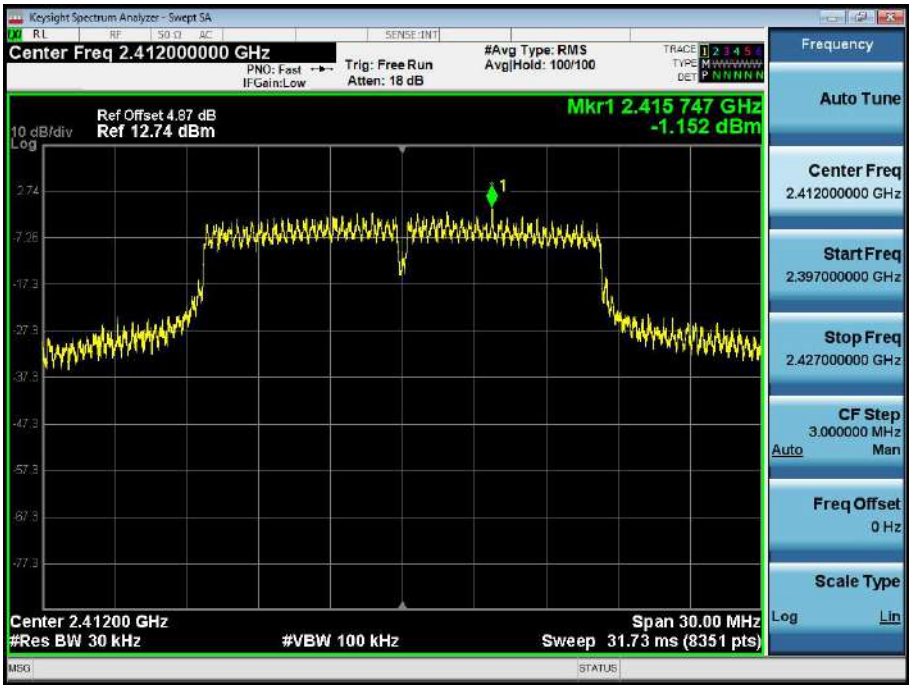
	Power Spectral density（dBm/3kHz）				Limit
	802.11b	802.11g	802.11n20	802.11n40	
Low Channel	3.541	-1.152	-1.4666	-3.922	8dBm/3kHz
Middle Channel	3.854	-0.429	-1.026	-4.148	8dBm/3kHz
High Channel	2.444	-1.208	-1.281	-5.033	8dBm/3kHz

802.11b Low Channel

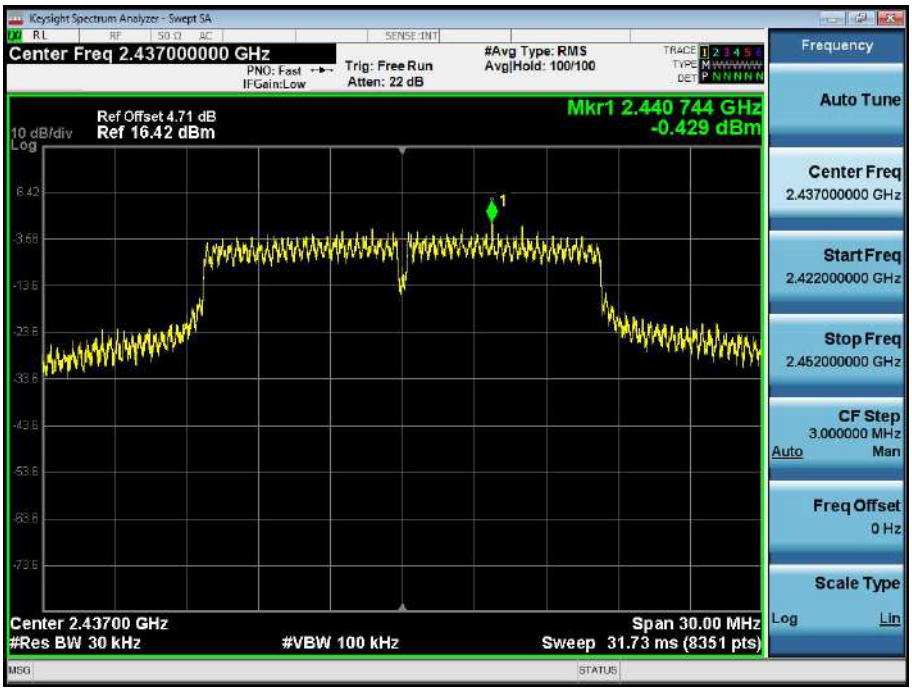
802.11b Middle Channel

802.11b High Channel

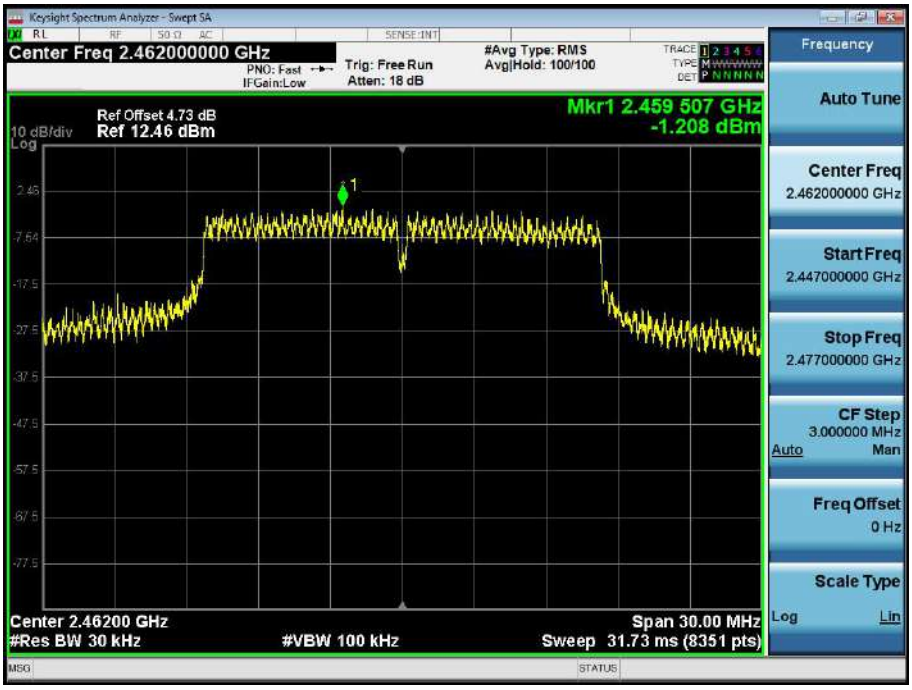
802.11g Low Channel



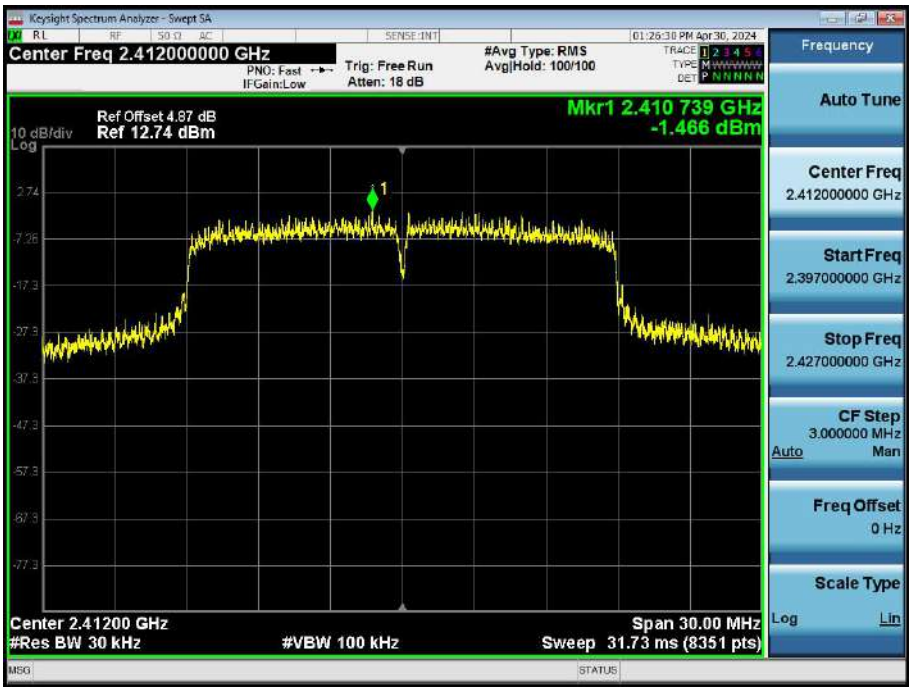
802.11g Middle Channel



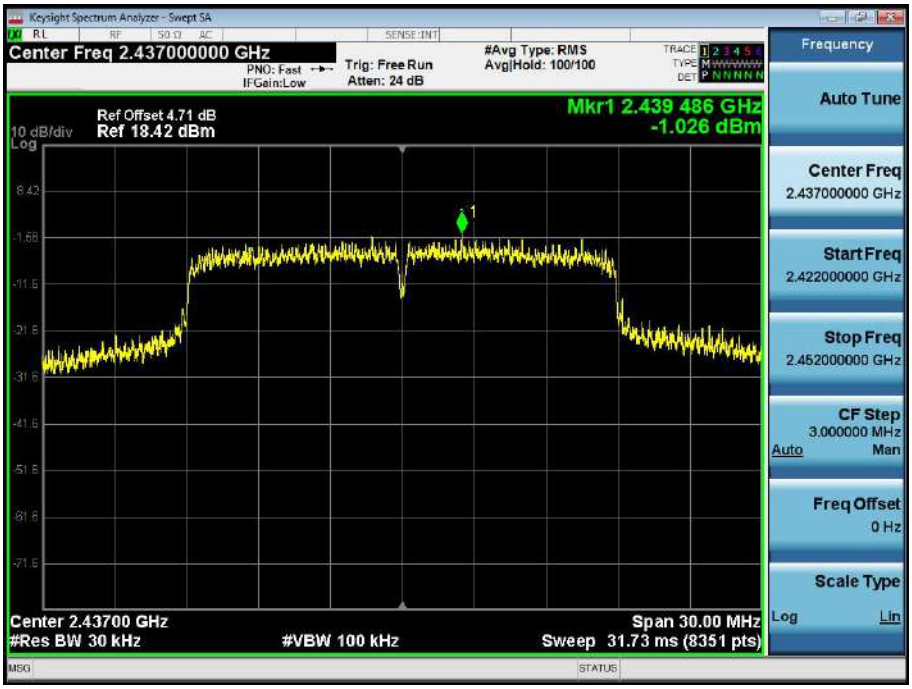
802.11g High Channel



802.11n20 Low Channel

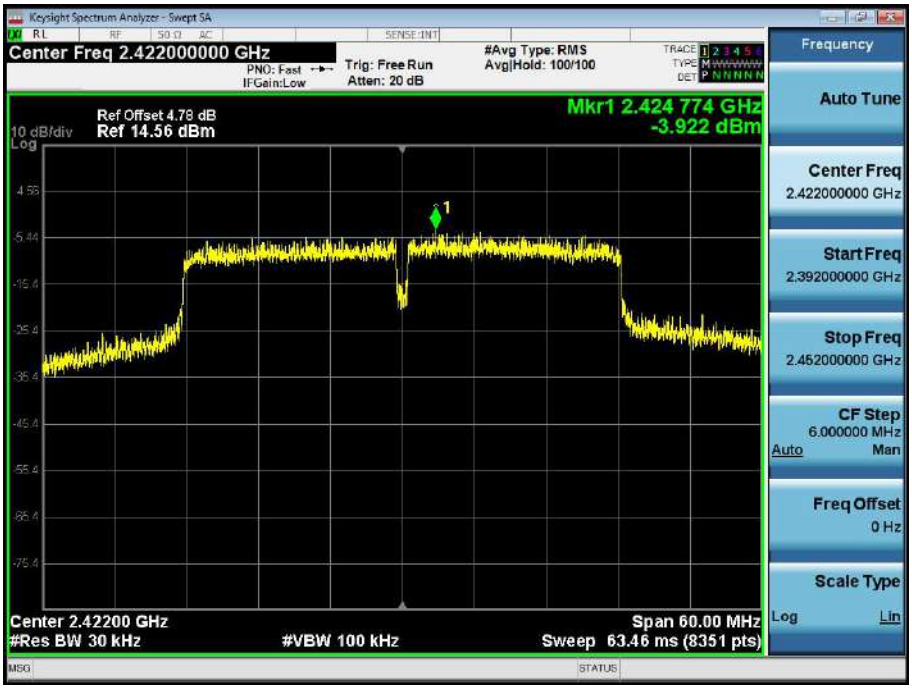


802.11n20 Middle Channel

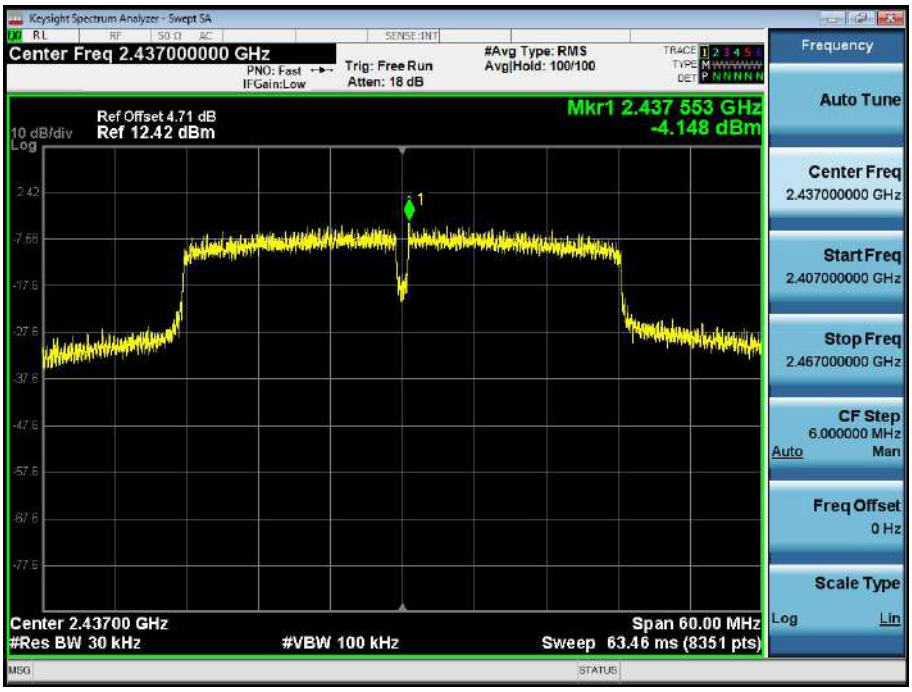


802.11n20 High Channel

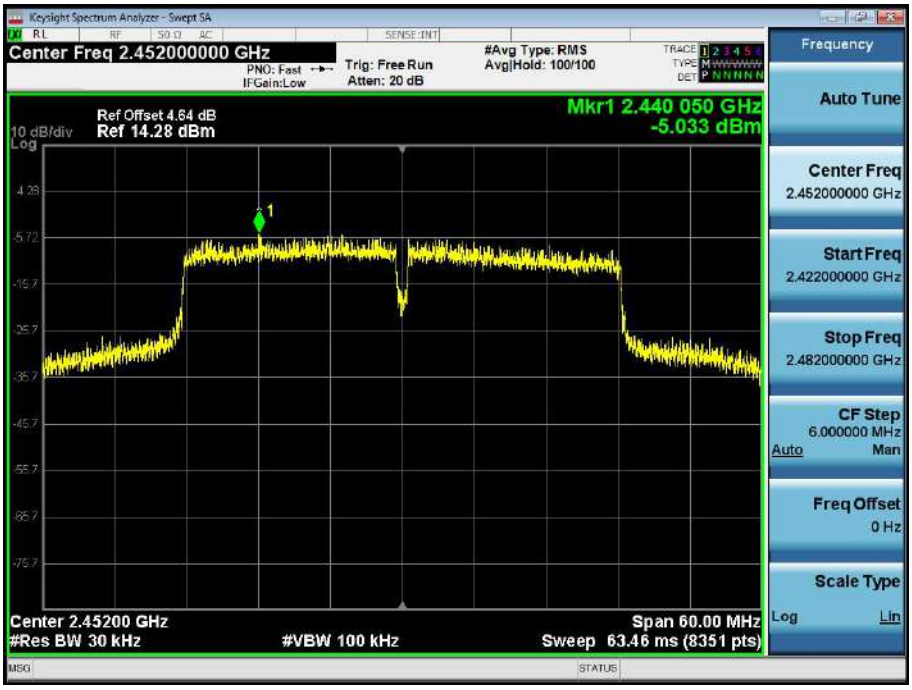
802.11n40 Low Channel



802.11n40 Middle Channel



802.11n40 High Channel



12 Antenna Application

12.1 Antenna Requirement

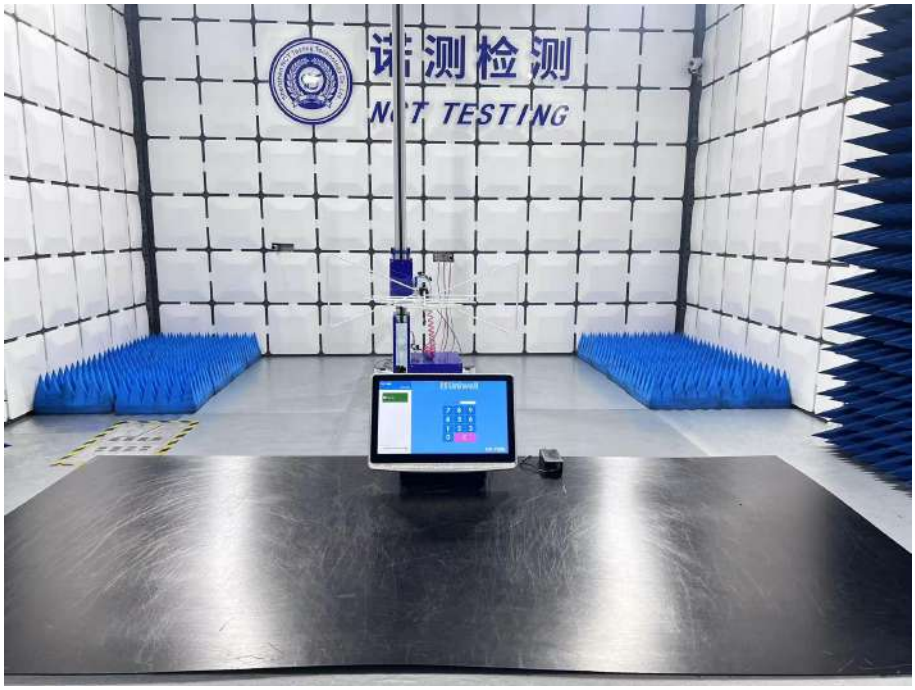
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

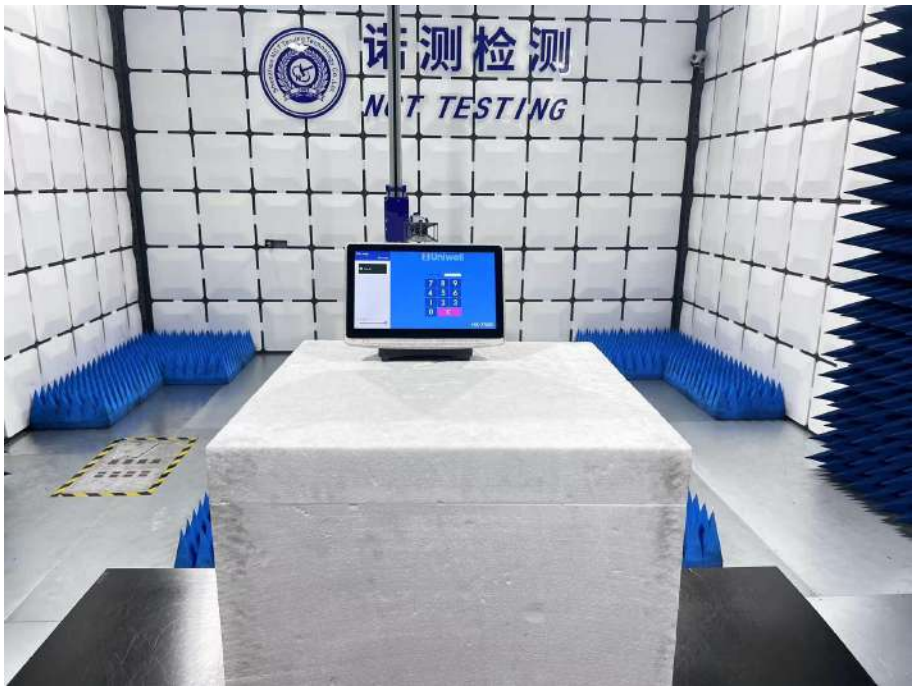
12.2 Result

The EUT'S antenna, permanent attached antenna, is internal FPC antenna. The antenna's gain is 2 dBi and meets the requirement.

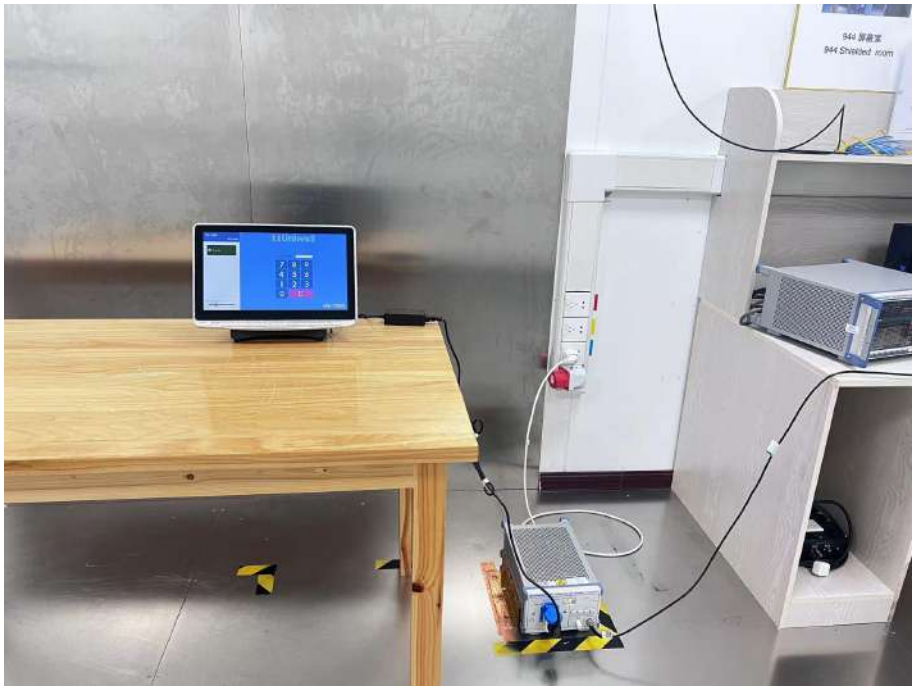
13 Test Setup

Radiated Emissions





Conducted Emission



14 EUT Photos

Reference to the attachment for details.

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