FCC Part 15C&RSS-247 TEST REPORT

FCC ID: 2A2PN-L10

IC:27884-L10

Product	:	**Robot vacuum cleaner**
Model Name	:	**D10**
Series Model	:	**L10**
HVIN	:	**D10**
Brand	:	**Laresar, Vyzzle**
Report No.	:	**NCT24035700**

Prepared for

Ekoo Electronic Co., Ltd

B09, Block B, F2, Bldg.B, Runfeng Pioneer Park, No.973, Minzhi Avenue, Minzhi St., Longhua, Shenzhen, CHINA 518000

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

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

TEL: 400-8868-419

FAX: 86-755-27790922

1 TEST RESULT CERTIFICATION

Applicant's name	:	Ekoo Electronic Co., Ltd
Address	:	B09, Block B, F2, Bldg.B, Runfeng Pioneer Park, No.973, Minzhi Avenue, Minzhi St., Longhua, Shenzhen, CHINA 518000
Manufacture's name	:	Ekoo Electronic Co., Ltd
Address	:	B09, Block B, F2, Bldg.B, Runfeng Pioneer Park, No.973, Minzhi Avenue, Minzhi St., Longhua, Shenzhen, CHINA 518000
Product name	:	Robot vacuum cleaner
Model name	:	D10
Series Model	:	L10
HVIN	:	D10
Standards	:	FCC CFR47 Part 15 Section 15.247 RSS-247 Issue 3, February 2017 RSS-GEN Issue 5 April 2018 Amendment 2(February 2021)
Test procedure	:	ANSI C63.10:2013
Date of test	:	Aug. 16, 2024 to Sep. 05, 2024
Date of Issue	:	Sep. 06, 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.

This report shall not be reproduced except in full, without the written approval of NCT, this document may be altered or revised by NCT, personal only, and shall be noted in the revision of the document.

Test Engineer:

Hugh Zhang

Hugh Zhang / Engineer

Technical Manager:

Henry Wang / Manager

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

Contents

Page

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	FCC part 15.207 RSS-Gen § 8.8 RSS-247 § 3.1	PASS
Radiated Spurious Emissions	FCC part 15.205/15.209 RSS-Gen § 8.9&8.10	PASS
Conducted Spurious Emission	FCC part 15.205/15.209 RSS-247 § 5.5	PASS
Band edge	FCC part 15.247(d) RSS-247 § 5.5	PASS
6dB&99% Bandwidth	FCC part 15.247 (a)(2) RSS-GEN § 6.7 RSS-247 § 5.2	PASS
Maximum Peak Output Power	FCC part 15.247 (b)(3) RSS-247 § 5.4	PASS
Power Spectral Density	FCC part 15.247 (e) RSS-247 § 5.2	PASS
Antenna Requirement	FCC part 15.203/15.247 (c) RSS-GEN § 6.8	PASS

Remark:

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

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Robot vacuum cleaner
Model Name	:	D10
Series Model	:	L10
HVIN	:	D10
Model difference	:	All models have same circuits diagram, PCB Layout, construction and rated power,only different is the model name.
Sample ID	:	240903037
Sample(s) Status:	:	Engineer sample
Specification	:	802.11b/g/n HT20;n HT40
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	:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n(20)/ n(40): OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Antenna installation	:	PCB Antenna
Antenna Gain	:	3dBi
Power supply	:	Battery: 14.4VDC, Nominal Capacity: 2600mAh, Rated Capacity: 2500 mAh Charging through the charging stand and adapter Adapter Input: AC 100-240V, 50/60Hz, 0.35A Max Output: DC 20V, 0.6A
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.		

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

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)/n (HT40):

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

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

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

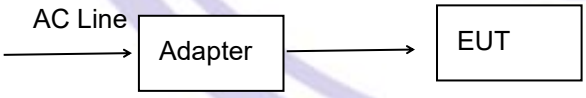
Company Number: 30806

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

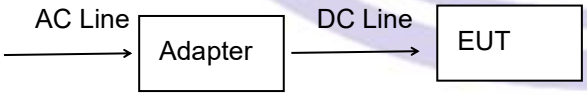
Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

3.4 Test Setup Configuration

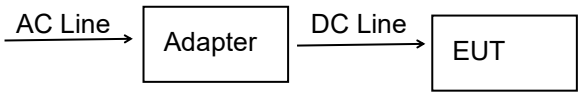
Conducted Emission



Radiated Emission



Conducted Spurious



Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

3.5 Test Mode

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

Test Software	WiFiSRRC_V2.7.2
Power level setup	< 10 dBm

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	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
Pream plifier（1GHz-18GHz）	BBV 9718D	00042	SCHNWARZBECK	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	SCHNWARZBECK	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	SCHNWARZBECK	2024/6/20	2025/6/19

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Amplifier (9KHz-30MHz)	CVP 9222 C	00109	CHNWARZBECK	2024/6/18	2025/6/17
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 meter	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	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

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

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
Radiated Emission(25GHz~40GHz)	±3.38dB
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	Robot vacuum cleaner	Laresar, Vyzzle	D10	N/A	EUT
E-2	Notebook	Lenovo	LN-A0403A3C	36001672	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.

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

5 Conducted Emission

Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207, RSS-Gen§8.8, RSS-247§ 3.1
Test Method	:	ANSI C63.10: 2013
Test Result	:	PASS
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B

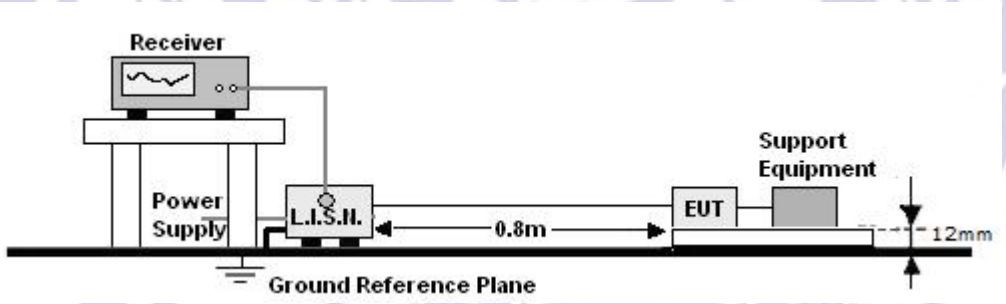
5.1 E.U.T. Operation

Operating Environment :

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

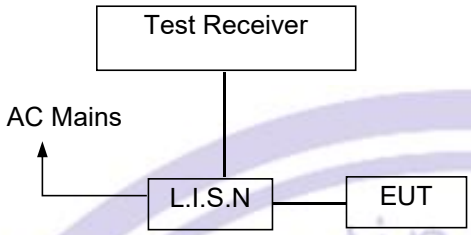
5.2 EUT Setup

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



Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

5.3 Test SET-UP (Block Diagram of Configuration)



5.4 Measurement Procedure

1. The EUT was placed on a table, which is 12mm 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.

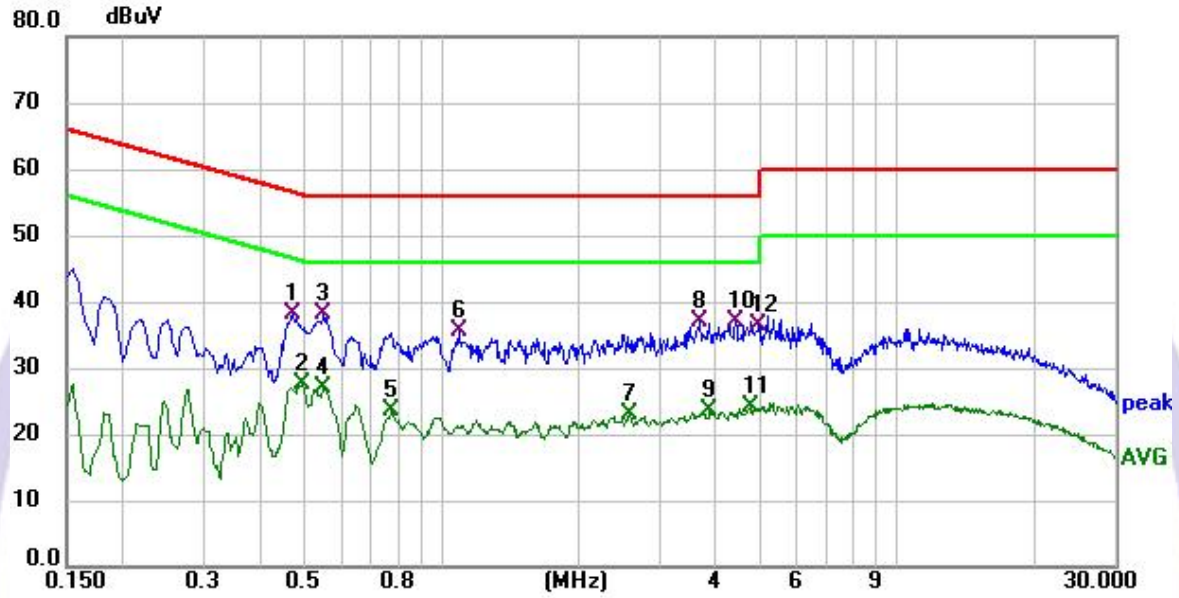
5.7 Conducted Emission Test Result

Pass.

Please refer to the following pages.

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Note:	D10



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.469	28.19	9.97	38.16	56.53	-18.37	QP	P	
2	0.492	17.77	9.91	27.68	46.13	-18.45	AVG	P	
3 *	0.550	28.17	10.02	38.19	56.00	-17.81	QP	P	
4	0.550	17.06	10.02	27.08	46.00	-18.92	AVG	P	
5	0.775	13.28	10.22	23.50	46.00	-22.50	AVG	P	
6	1.090	25.89	9.81	35.70	56.00	-20.30	QP	P	
7	2.593	12.79	10.09	22.88	46.00	-23.12	AVG	P	
8	3.700	27.19	9.68	36.87	56.00	-19.13	QP	P	
9	3.871	13.92	9.62	23.54	46.00	-22.46	AVG	P	
10	4.420	27.21	9.75	36.96	56.00	-19.04	QP	P	
11	4.753	14.15	9.89	24.04	46.00	-21.96	AVG	P	
12	4.969	26.42	9.98	36.40	56.00	-19.60	QP	P	

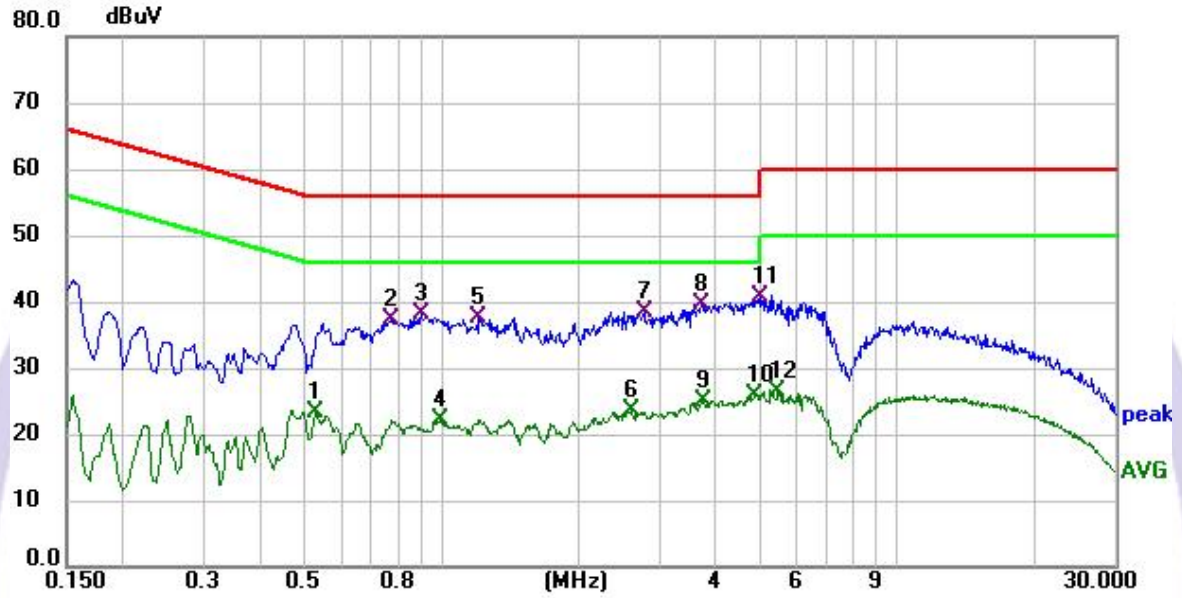
Notes: 1.An initial pre-scan was performed on the line and neutral lines with peak detector.

2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

3.Mesurement Level = Reading level + Correct Factor

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Phase ：	N
Test Voltage ：	AC 120V/60Hz	Note:	D10



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.528	13.14	10.05	23.19	46.00	-22.81	AVG	P	
2	0.775	27.40	9.99	37.39	56.00	-18.61	QP	P	
3	0.901	28.10	9.96	38.06	56.00	-17.94	QP	P	
4	0.996	12.29	9.93	22.22	46.00	-23.78	AVG	P	
5	1.207	27.57	9.94	37.51	56.00	-18.49	QP	P	
6	2.602	13.91	9.78	23.69	46.00	-22.31	AVG	P	
7	2.782	28.78	9.73	38.51	56.00	-17.49	QP	P	
8	3.718	29.67	9.97	39.64	56.00	-16.36	QP	P	
9	3.772	15.04	10.00	25.04	46.00	-20.96	AVG	P	
10	4.888	16.13	9.74	25.87	46.00	-20.13	AVG	P	
11 *	5.000	30.89	9.70	40.59	56.00	-15.41	QP	P	
12	5.475	16.61	9.73	26.34	50.00	-23.66	AVG	P	

Notes: 1.An initial pre-scan was performed on the line and neutral lines with peak detector.

2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

3.Mesurement Level = Reading level + Correct Factor

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

6 Radiated Spurious Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209 & 15.247 RSS-Gen §8.9, RSS-Gen §8.10
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 :

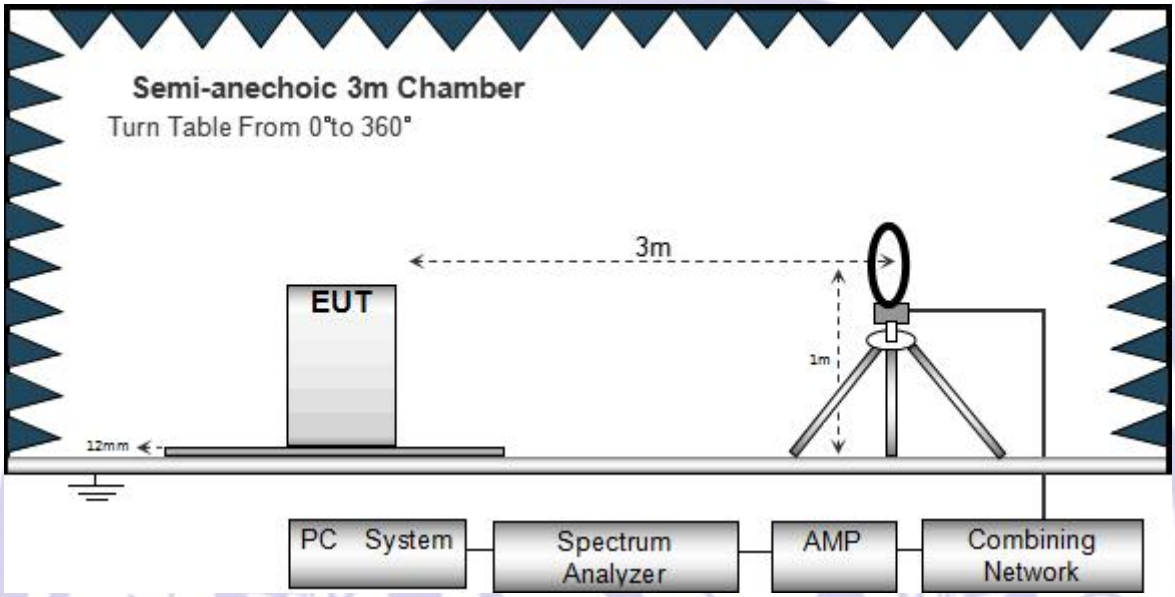
Temperature:	:	24.5°C
Humidity:	:	52 % RH
Atmospheric Pressure:	:	101.11kPa
Test Voltage	:	DC 22V From adapter input AC 120V/60Hz

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

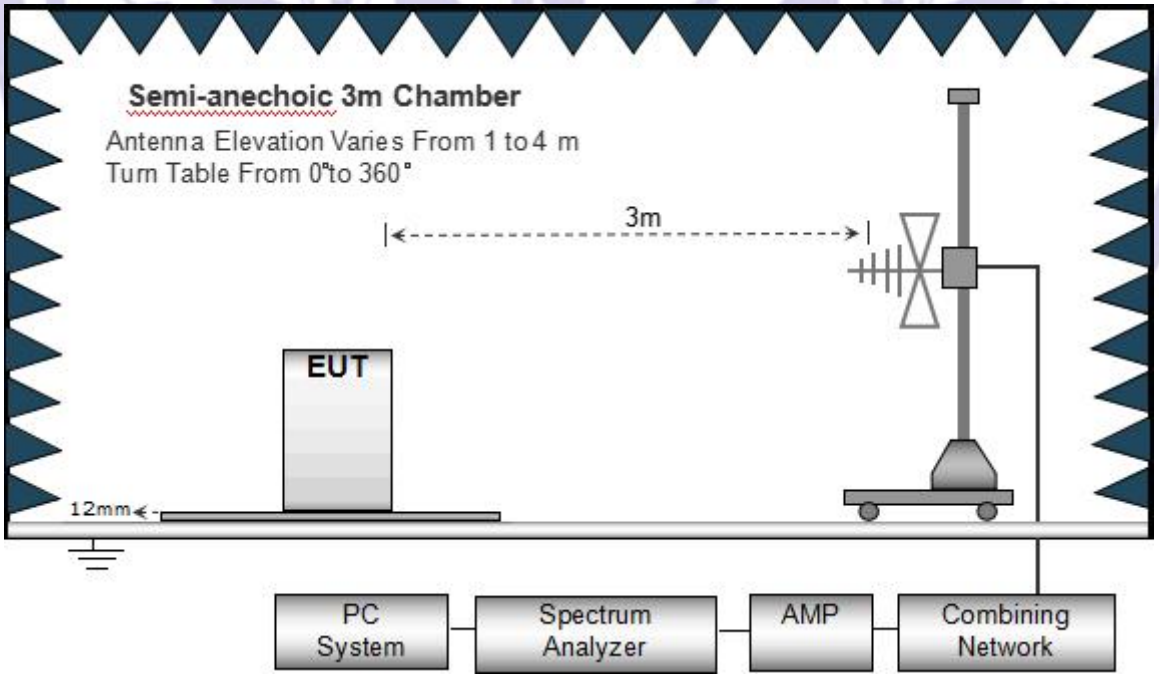
6.2 Test Setup

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

The test setup for emission measurement below 30MHz

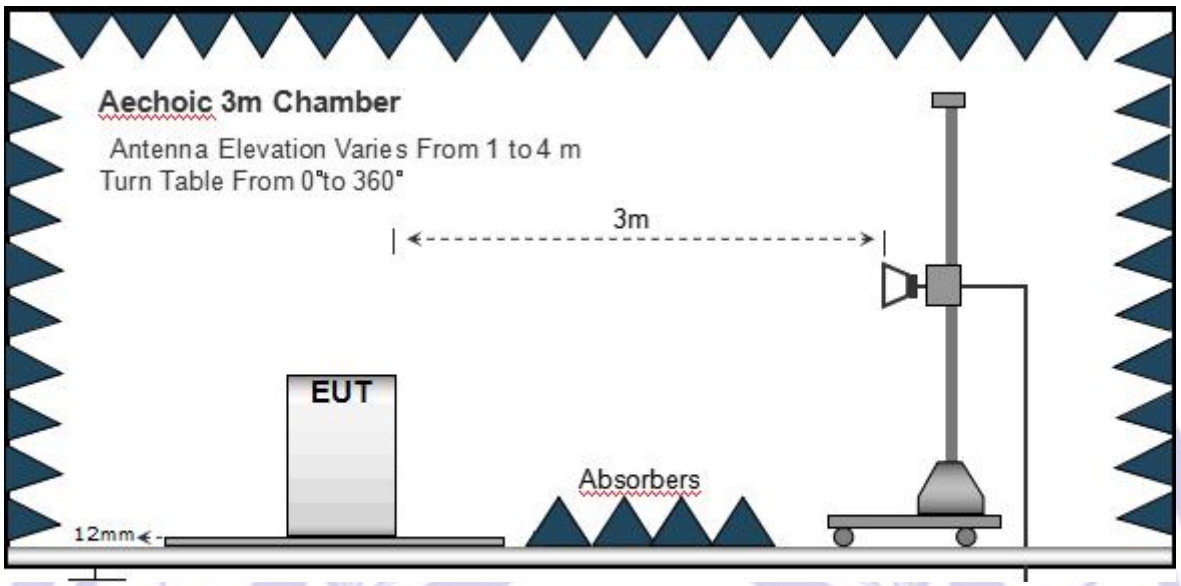


The test setup for emission measurement from 30 MHz to 1 GHz.



Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

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

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

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 12mm above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 12mm 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.

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

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.

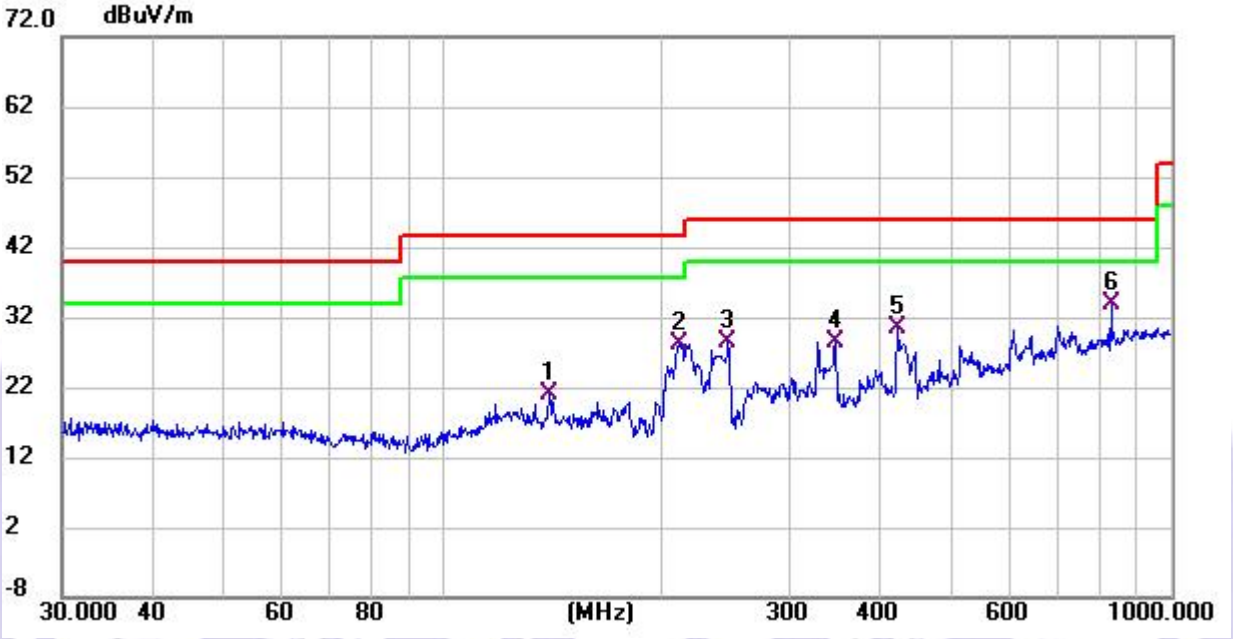
Test Frequency: 30MHz ~ 1GHz

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:

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 14.4V	Note:	D10



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	139.851	7.97	13.10	21.07	43.50	-22.43	QP			P	
2	211.526	17.47	10.76	28.23	43.50	-15.27	QP			P	
3	246.815	16.16	12.29	28.45	46.00	-17.55	QP			P	
4	346.809	13.65	14.82	28.47	46.00	-17.53	QP			P	
5	422.058	13.69	16.61	30.30	46.00	-15.70	QP			P	
6 *	827.493	10.06	23.90	33.96	46.00	-12.04	QP			P	

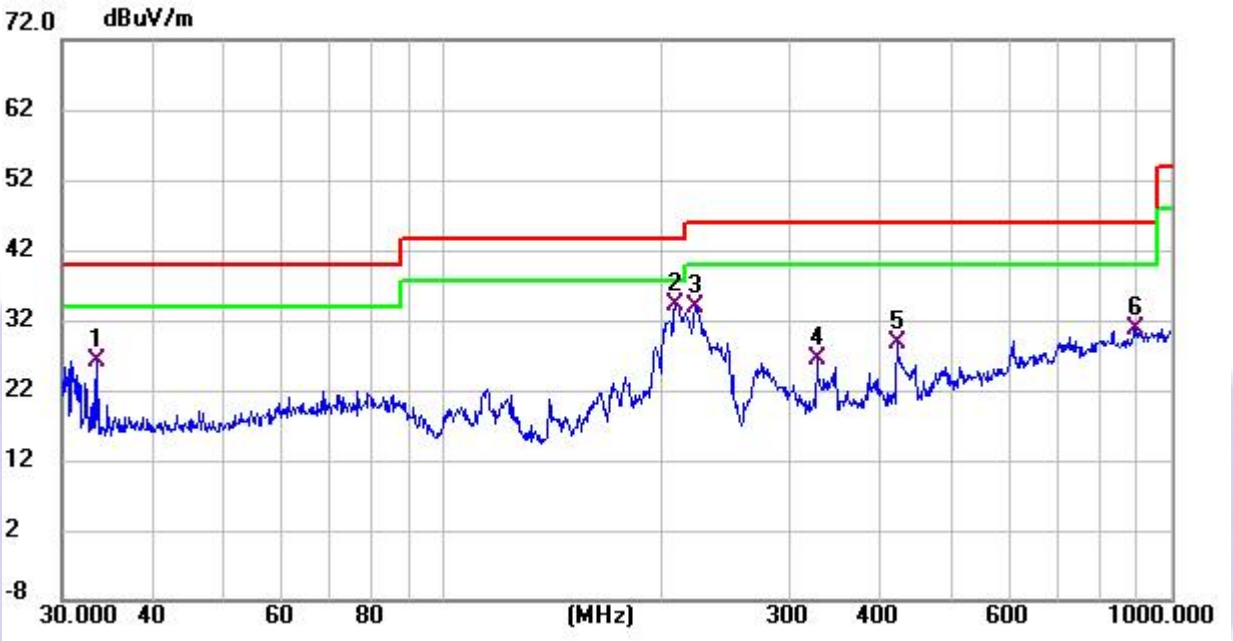
Remark:

Emission Level=Reading+Factor

Factor=Cable Loss+ANT Factor-Preamp Factor

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 14.4V	Note:	D10



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	33.562	13.37	12.70	26.07	40.00	-13.93	QP			P	
2 *	209.313	23.54	10.70	34.24	43.50	-9.26	QP			P	
3	222.950	22.54	11.21	33.75	46.00	-12.25	QP			P	
4	326.740	12.17	14.31	26.48	46.00	-19.52	QP			P	
5	420.580	12.17	16.58	28.75	46.00	-17.25	QP			P	
6	896.996	5.62	25.04	30.66	46.00	-15.34	QP			P	

Remark:

Emission Level=Reading+Factor

Factor=Cable Loss+ANT Factor-Preamp Factor

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Test Frequency: From 1GHz to 25GHz

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Note:	D10
Test Voltage:	DC 14.4V		

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	4804	51.29	30.55	5.77	24.66	51.17	74	-22.83	PK
V	4804	39.61	30.55	5.77	24.66	39.49	54	-14.51	AV
V	7206	44.47	30.33	6.32	24.55	45.01	74	-28.99	PK
V	7206	32.83	30.33	6.32	24.55	33.37	54	-20.63	AV
V	9608	47.25	30.85	7.45	24.69	48.54	74	-25.46	PK
V	9608	33.42	30.85	7.45	24.69	34.71	54	-19.29	AV
V	12010	42.23	31.02	8.99	25.57	45.77	74	-28.23	PK
V	12010	31.74	31.02	8.99	25.57	35.28	54	-18.72	AV
H	4804	49.04	30.55	5.77	24.66	48.92	74	-25.08	PK
H	4804	37.29	30.55	5.77	24.66	37.17	54	-16.83	AV
H	7206	48.81	30.33	6.32	24.55	49.35	74	-24.65	PK
H	7206	34.92	30.33	6.32	24.55	35.46	54	-18.54	AV
H	9608	42.37	30.85	7.45	24.69	43.66	74	-30.34	PK
H	9608	32.28	30.85	7.45	24.69	33.57	54	-20.43	AV
H	12010	38.23	31.02	8.99	25.57	41.77	74	-32.23	PK
H	12010	32.18	31.02	8.99	25.57	35.72	54	-18.28	AV

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

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	4882	47.42	30.55	5.77	24.66	47.30	74	-26.70	PK
V	4882	34.81	30.55	5.77	24.66	34.69	54	-19.31	AV
V	7323	45.52	30.33	6.32	24.55	46.06	74	-27.94	PK
V	7323	33.18	30.33	6.32	24.55	33.72	54	-20.28	AV
V	9764	40.57	30.85	7.45	24.69	41.86	74	-32.14	PK
V	9764	28.06	30.85	7.45	24.69	29.35	54	-24.65	AV
V	12205	36.81	31.02	8.99	25.57	40.35	74	-33.65	PK
V	12205	25.13	31.02	8.99	25.57	28.67	54	-25.33	AV
H	4882	48.56	30.55	5.77	24.66	48.44	74	-25.56	PK
H	4882	37.27	30.55	5.77	24.66	37.15	54	-16.85	AV
H	7323	43.46	30.33	6.32	24.55	44.00	74	-30.00	PK
H	7323	33.03	30.33	6.32	24.55	33.57	54	-20.43	AV
H	9764	39.66	30.85	7.45	24.69	40.95	74	-33.05	PK
H	9764	26.23	30.85	7.45	24.69	27.52	54	-26.48	AV
H	12205	38.55	31.02	8.99	25.57	42.09	74	-31.91	PK
H	12205	29.47	31.02	8.99	25.57	33.01	54	-20.99	AV

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

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	4960	46.38	30.55	5.77	24.66	46.26	74	-27.74	PK
V	4960	36.44	30.55	5.77	24.66	36.32	54	-17.68	AV
V	7440	43.46	30.33	6.32	24.55	44.00	74	-30.00	PK
V	7440	33.66	30.33	6.32	24.55	34.20	54	-19.80	AV
V	9920	42.03	30.85	7.45	24.69	43.32	74	-30.68	PK
V	9920	29.60	30.85	7.45	24.69	30.89	54	-23.11	AV
V	12400	37.81	31.02	8.99	25.57	41.35	74	-32.65	PK
V	12400	29.95	31.02	8.99	25.57	33.49	54	-20.51	AV
H	4960	48.15	30.55	5.77	24.66	48.03	74	-25.97	PK
H	4960	36.25	30.55	5.77	24.66	36.13	54	-17.87	AV
H	7440	47.11	30.33	6.32	24.55	47.65	74	-26.35	PK
H	7440	32.95	30.33	6.32	24.55	33.49	54	-20.51	AV
H	9920	42.26	30.85	7.45	24.69	43.55	74	-30.45	PK
H	9920	30.06	30.85	7.45	24.69	31.35	54	-22.65	AV
H	12400	40.38	31.02	8.99	25.57	43.92	74	-30.08	PK
H	12400	27.23	31.02	8.99	25.57	30.77	54	-23.23	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 (802.11b) in the report.

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

Radiated Band Emission Measuremen:

	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	56.58	30.22	4.85	23.98	55.19	74	PK	PASS
	H	2390	48.83	30.22	4.85	23.98	47.44	54	AV	PASS
	H	2400	60.80	30.22	4.85	23.98	59.41	74	PK	PASS
	H	2400	48.99	30.22	4.85	23.98	47.60	54	AV	PASS
	V	2390	58.89	30.22	4.85	23.98	57.50	74	PK	PASS
	V	2390	49.95	30.22	4.85	23.98	48.56	54	AV	PASS
	V	2400	60.82	30.22	4.85	23.98	59.43	74	PK	PASS
	V	2400	50.51	30.22	4.85	23.98	49.12	54	AV	PASS
	High Channel 2462MHz									
	H	2483.5	57.38	35.11	3.56	27.75	53.58	74	PK	PASS
	H	2485.5	48.32	35.11	3.56	27.75	44.52	54	AV	PASS
	H	2483.5	60.11	35.1	3.57	27.8	56.38	74	PK	PASS
	H	2485.5	50.19	35.1	3.57	27.8	46.46	54	AV	PASS
	V	2483.5	58.88	35.11	3.56	27.75	55.08	74	PK	PASS
	V	2485.5	52.00	35.11	3.56	27.75	48.20	54	AV	PASS
	V	2483.5	58.63	35.1	3.57	27.8	54.90	74	PK	PASS
	V	2485.5	50.84	35.1	3.57	27.8	47.11	54	AV	PASS
802.11g	Low Channel 2412MHz									
	H	2390	56.80	30.22	4.85	23.98	55.41	74	PK	PASS
	H	2390	49.64	30.22	4.85	23.98	48.25	54	AV	PASS
	H	2400	59.22	30.22	4.85	23.98	57.83	74	PK	PASS
	H	2400	49.28	30.22	4.85	23.98	47.89	54	AV	PASS

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

	V	2390	57.93	30.22	4.85	23.98	56.54	74	PK	PASS
	V	2390	51.12	30.22	4.85	23.98	49.73	54	AV	PASS
	V	2400	58.59	30.22	4.85	23.98	57.20	74	PK	PASS
	V	2400	49.00	30.22	4.85	23.98	47.61	54	AV	PASS
	High Channel 2462MHz									
	H	2483.5	56.65	35.11	3.56	27.75	52.85	74	PK	PASS
	H	2485.5	48.23	35.11	3.56	27.75	44.43	54	AV	PASS
	H	2483.5	59.56	35.1	3.57	27.8	55.83	74	PK	PASS
	H	2485.5	49.73	35.1	3.57	27.8	46.00	54	AV	PASS
	V	2483.5	58.09	35.11	3.56	27.75	54.29	74	PK	PASS
	V	2485.5	49.39	35.11	3.56	27.75	45.59	54	AV	PASS
	V	2483.5	56.99	35.1	3.57	27.8	53.26	74	PK	PASS
	V	2485.5	49.60	35.1	3.57	27.8	45.87	54	AV	PASS
802.11 n20	Low Channel 2412MHz									
	H	2390	58.11	30.22	4.85	23.98	56.72	74	PK	PASS
	H	2390	49.19	30.22	4.85	23.98	47.80	54	AV	PASS
	H	2400	60.35	30.22	4.85	23.98	58.96	74	PK	PASS
	H	2400	50.04	30.22	4.85	23.98	48.65	54	AV	PASS
	V	2390	57.23	30.22	4.85	23.98	55.84	74	PK	PASS
	V	2390	50.95	30.22	4.85	23.98	49.56	54	AV	PASS
	V	2400	60.02	30.22	4.85	23.98	58.63	74	PK	PASS
	V	2400	50.26	30.22	4.85	23.98	48.87	54	AV	PASS
	High Channel 2462MHz									
	H	2483.5	59.50	35.11	3.56	27.75	55.70	74	PK	PASS
	H	2485.5	49.30	35.11	3.56	27.75	45.50	54	AV	PASS
	H	2483.5	59.12	35.1	3.57	27.8	55.39	74	PK	PASS

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

	H	2485.5	51.24	35.1	3.57	27.8	47.51	54	AV	PASS
	V	2483.5	58.92	35.11	3.56	27.75	55.12	74	PK	PASS
	V	2485.5	50.17	35.11	3.56	27.75	46.37	54	AV	PASS
	V	2483.5	60.54	35.1	3.57	27.8	56.81	74	PK	PASS
	V	2485.5	50.81	35.1	3.57	27.8	47.08	54	AV	PASS
802.11 n40	Low Channel 2422MHz									
	H	2390	59.16	30.22	4.85	23.98	57.77	74	PK	PASS
	H	2390	50.28	30.22	4.85	23.98	48.89	54	AV	PASS
	H	2400	60.18	30.22	4.85	23.98	58.79	74	PK	PASS
	H	2400	50.38	30.22	4.85	23.98	48.99	54	AV	PASS
	V	2390	59.34	30.22	4.85	23.98	57.95	74	PK	PASS
	V	2390	50.28	30.22	4.85	23.98	48.89	54	AV	PASS
	V	2400	59.08	30.22	4.85	23.98	57.69	74	PK	PASS
	V	2400	51.84	30.22	4.85	23.98	50.45	54	AV	PASS
	High Channel 2452MHz									
	H	2483.5	58.15	35.11	3.56	27.75	54.35	74	PK	PASS
	H	2485.5	51.93	35.11	3.56	27.75	48.13	54	AV	PASS
	H	2483.5	62.03	35.1	3.57	27.8	58.30	74	PK	PASS
	H	2485.5	52.09	35.1	3.57	27.8	48.36	54	AV	PASS
	V	2483.5	58.55	35.11	3.56	27.75	54.75	74	PK	PASS
	V	2485.5	51.20	35.11	3.56	27.75	47.40	54	AV	PASS
	V	2483.5	59.68	35.1	3.57	27.8	55.95	74	PK	PASS
	V	2485.5	51.15	35.1	3.57	27.8	47.42	54	AV	PASS

Remark:

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

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

7 Conduct Band Edge And Spurious Emissions Measurement

Test Requirement	:	FCC CFR47 Part 15 Section 15.247, RSS-247 § 5.5
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)). RSS-247 § 5.5： In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

7.1 Test Procedure

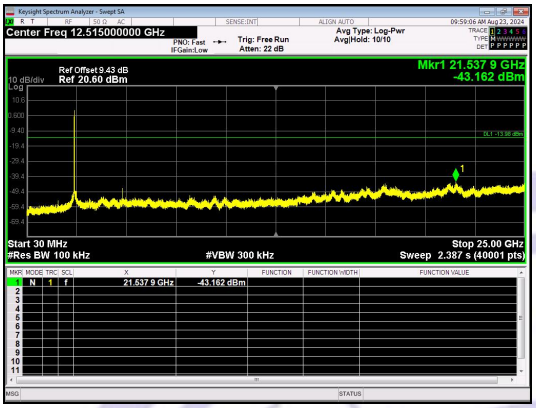
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

7.2 Test Result

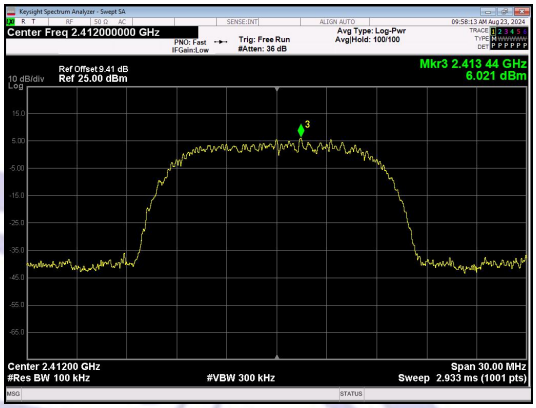
Mode	Channel	Ant.	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
IEEE 802.11b	1	0	2396.97	-38.747	-13.98	-24.767	PASS
			2400.00	-42.078	-13.98	-28.098	PASS
			21537.9	-43.162	-13.98	-29.182	PASS
	6		21218.3	-42.516	-14.29	-28.226	PASS
	11		2483.50	-42.964	-14.1	-28.864	PASS
			21140.9	-43.516	-14.1	-29.416	PASS
IEEE 802.11g	1		2393.20	-41.281	-21.7	-19.581	PASS
			2400.00	-43.079	-21.7	-21.379	PASS
			21228.9	-43.276	-21.7	-21.576	PASS
	6		21570.4	-43.601	-21.8	-21.801	PASS
	11		2483.50	-43.440	-21.58	-21.860	PASS
			21576.6	-43.270	-21.58	-21.690	PASS
IEEE 802.11n_20	1		2396.45	-41.018	-21.8	-19.218	PASS
			2400.00	-43.224	-21.8	-21.424	PASS
			24420.7	-43.314	-21.8	-21.514	PASS
	6		21149.0	-43.939	-21.9	-22.039	PASS
	11		2483.50	-43.833	-21.48	-22.353	PASS
			21572.9	-43.067	-21.48	-21.587	PASS
IEEE 802.11n_40	3		2397.36	-40.515	-23.47	-17.045	PASS
			2400.00	-42.857	-23.47	-19.387	PASS
			21206.4	-42.977	-23.47	-19.507	PASS
	6		21145.9	-43.412	-23.59	-19.822	PASS
	9		2483.50	-44.620	-23.42	-21.200	PASS
			24975.7	-42.528	-23.42	-19.108	PASS

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn



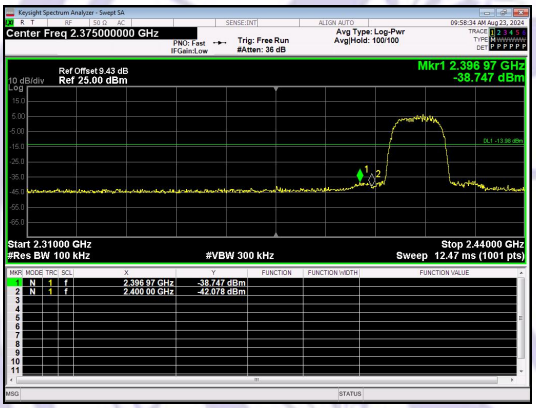
30.0 MHz - 25000.0 MHz

IEEE 802.11b_Channel 1_20MHz_Antenna 0



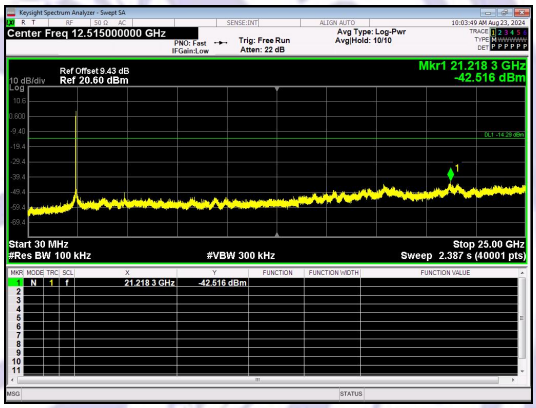
In-Band Reference Level

IEEE 802.11b_Channel 1_20MHz_Antenna 0



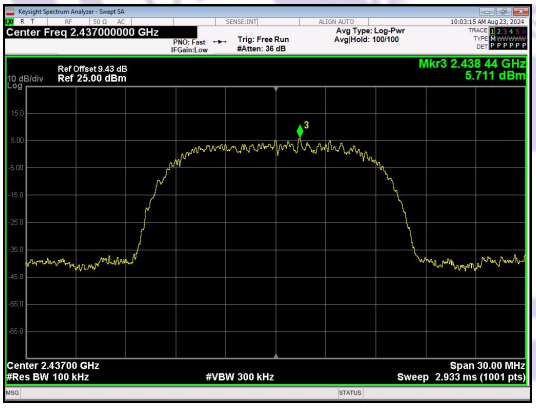
Out Of Band Emission

IEEE 802.11b_Channel 1_20MHz_Antenna 0



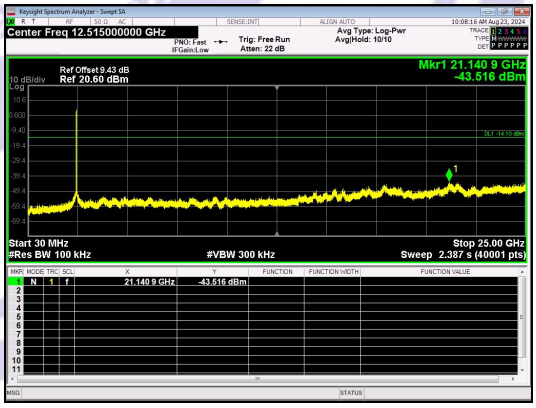
30.0 MHz - 25000.0 MHz

IEEE 802.11b_Channel 6_20MHz_Antenna 0



In-Band Reference Level

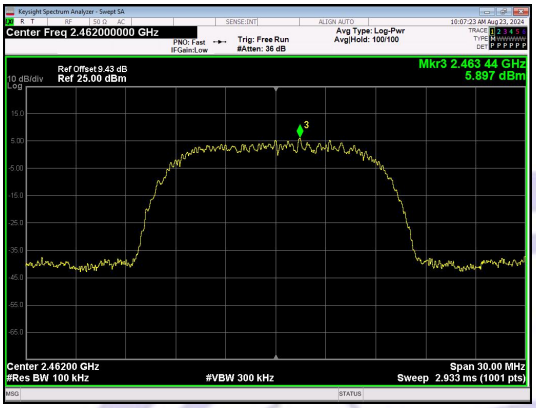
IEEE 802.11b_Channel 6_20MHz_Antenna 0



30.0 MHz - 25000.0 MHz

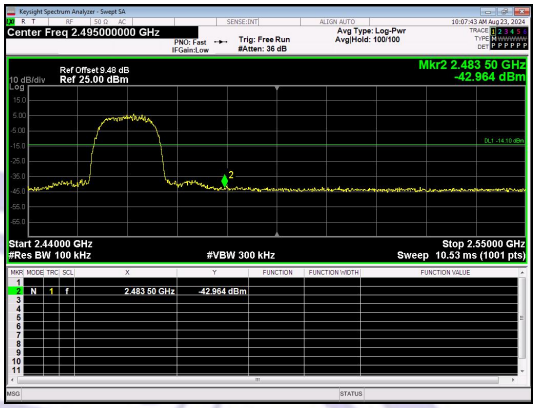
IEEE 802.11b_Channel 11_20MHz_Antenna 0

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn



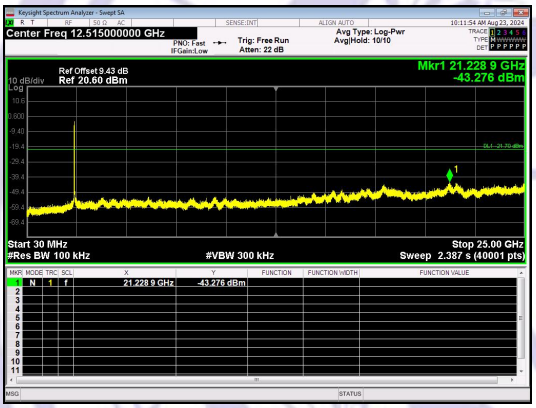
In-Band Reference Level

IEEE 802.11b_Channel 11_20MHz_Antenna 0



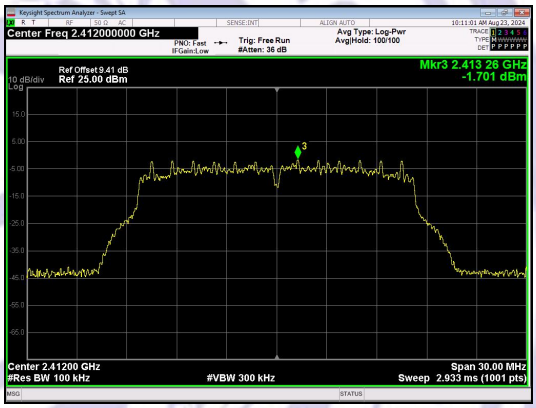
Out Of Band Emission

IEEE 802.11b_Channel 11_20MHz_Antenna 0



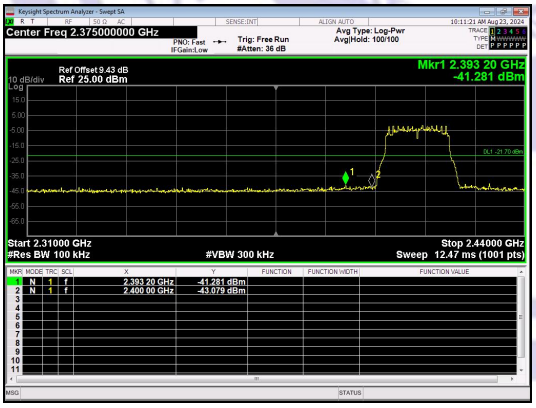
30.0 MHz - 25000.0 MHz

IEEE 802.11g_Channel 1_20MHz_Antenna 0



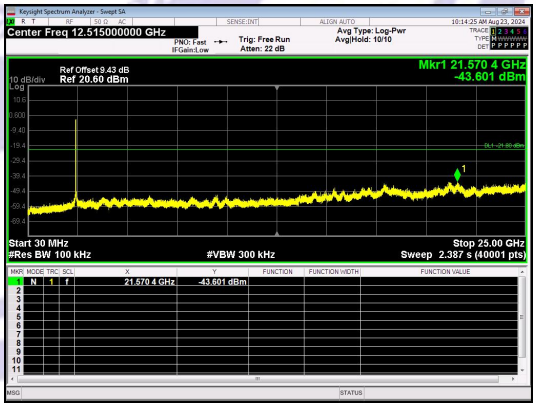
In-Band Reference Level

IEEE 802.11g_Channel 1_20MHz_Antenna 0



Out Of Band Emission

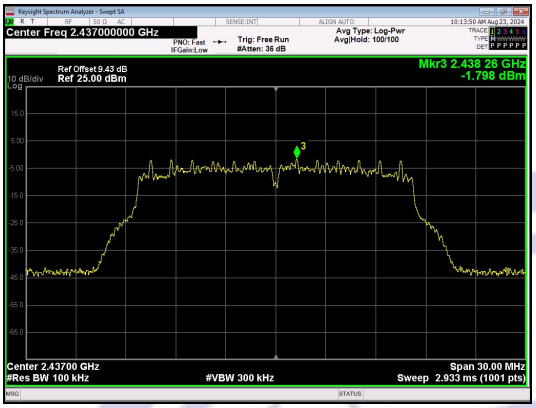
IEEE 802.11g_Channel 1_20MHz_Antenna 0



30.0 MHz - 25000.0 MHz

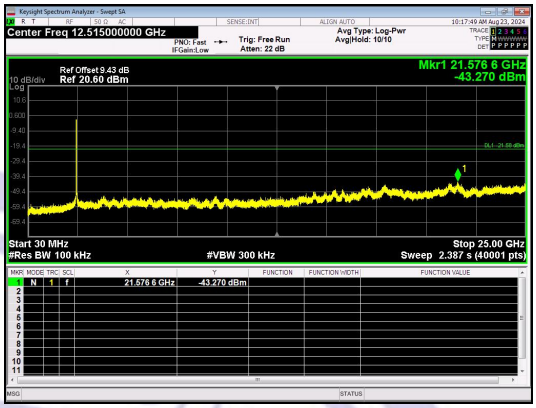
IEEE 802.11g_Channel 6_20MHz_Antenna 0

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn



In-Band Reference Level

IEEE 802.11g_Channel 6_20MHz_Antenna 0

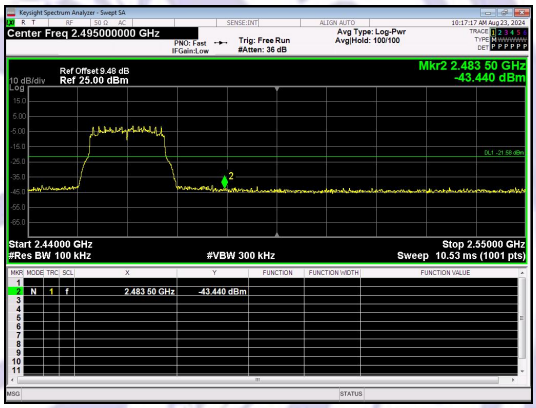


30.0 MHz - 25000.0 MHz

IEEE 802.11g_Channel 11_20MHz_Antenna 0

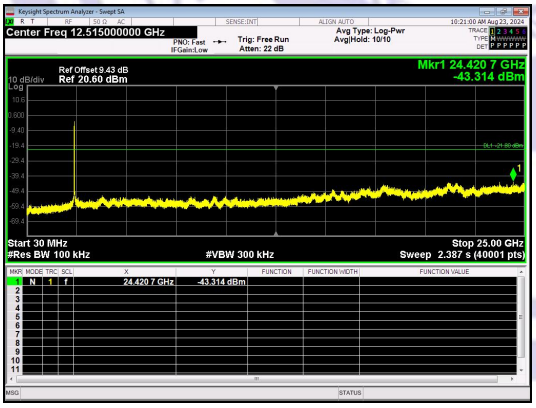
In-Band Reference Level

IEEE 802.11g_Channel 11_20MHz_Antenna 0



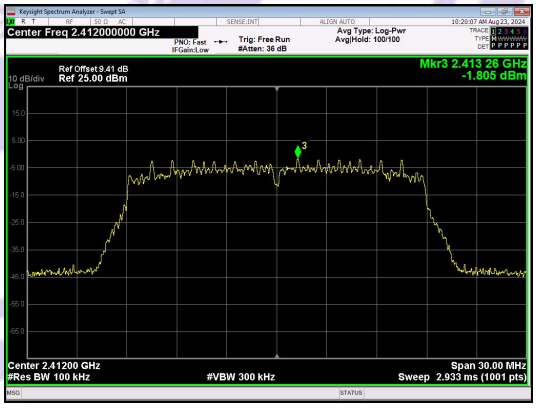
Out Of Band Emission

IEEE 802.11g_Channel 11_20MHz_Antenna 0



30.0 MHz - 25000.0 MHz

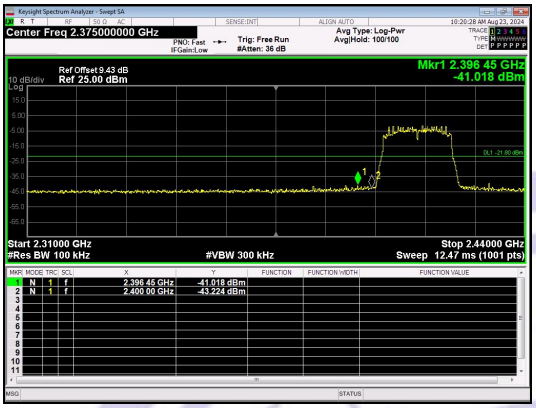
IEEE 802.11n_Channel 1_20MHz_Antenna 0



In-Band Reference Level

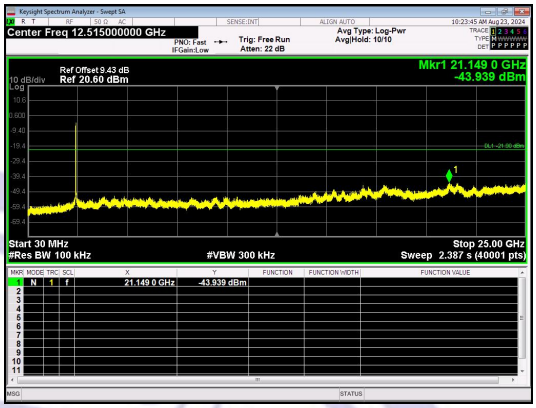
IEEE 802.11n_Channel 1_20MHz_Antenna 0

Hotline: 400-8868-419
http://www.ncttesting.cn
Fax: 86-755-27790922



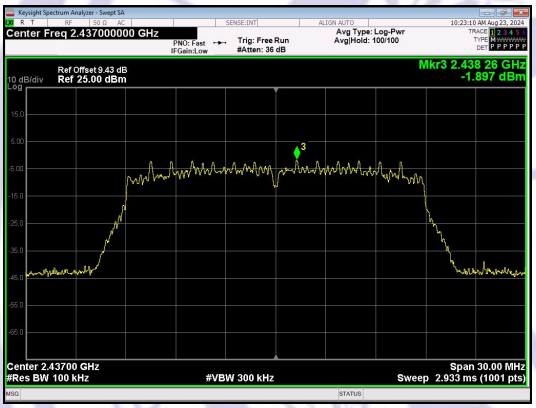
Out Of Band Emission

IEEE 802.11n_Channel 1_20MHz_Antenna 0



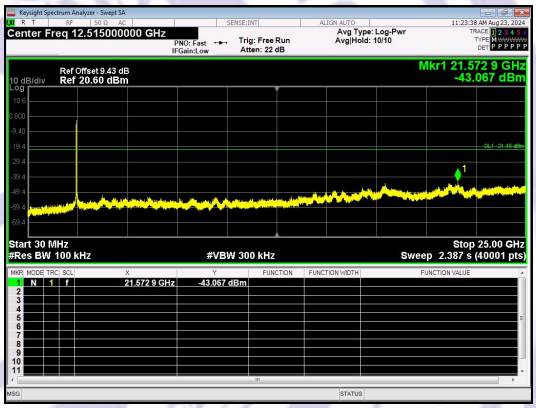
30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 6_20MHz_Antenna 0



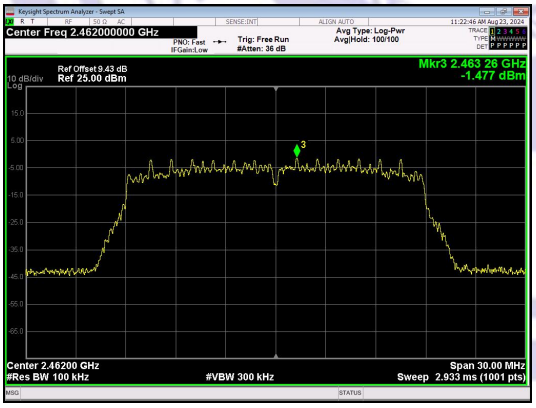
In-Band Reference Level

IEEE 802.11n_Channel 6_20MHz_Antenna 0



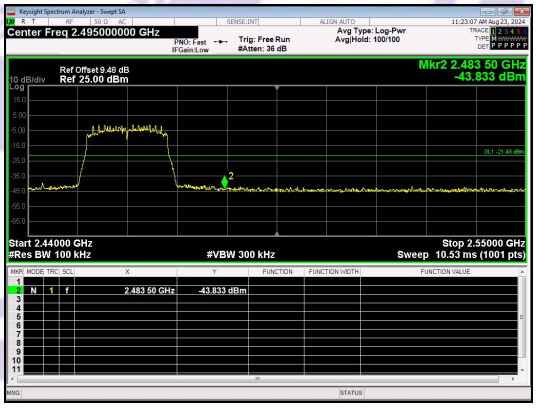
30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 11_20MHz_Antenna 0



In-Band Reference Level

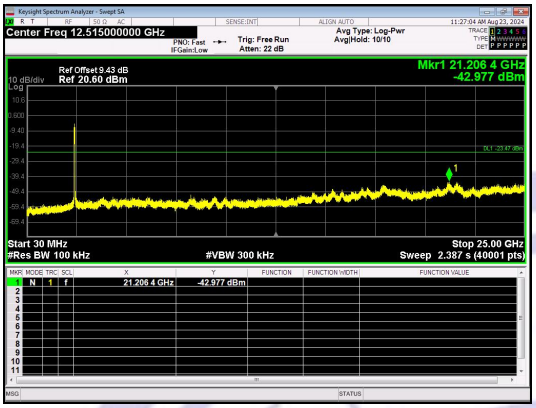
IEEE 802.11n_Channel 11_20MHz_Antenna 0



Out Of Band Emission

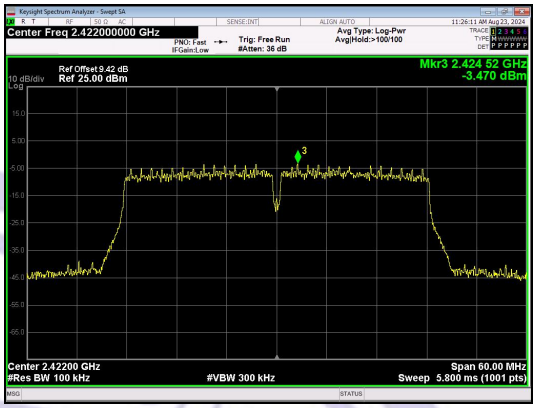
IEEE 802.11n_Channel 11_20MHz_Antenna 0

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn



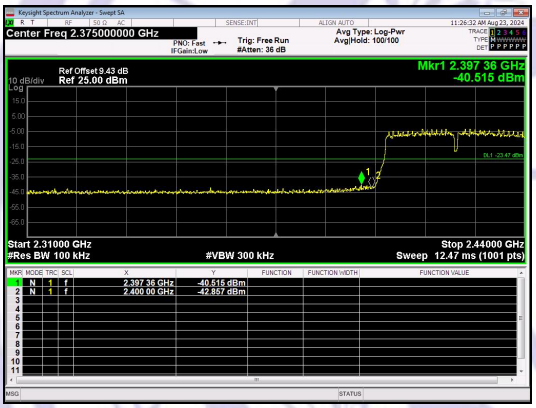
30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 3_40MHz_Antenna 0



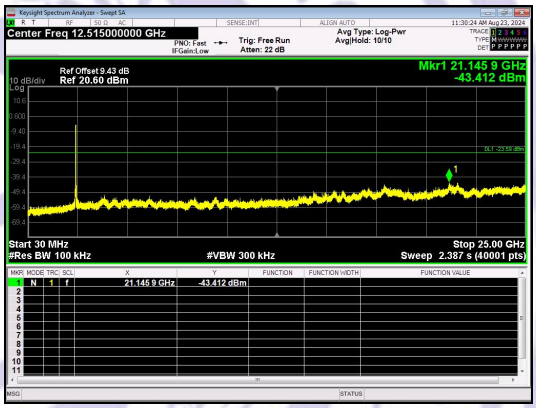
In-Band Reference Level

IEEE 802.11n_Channel 3_40MHz_Antenna 0



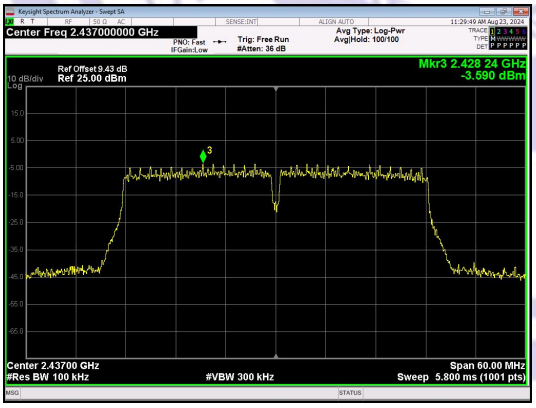
Out Of Band Emission

IEEE 802.11n_Channel 3_40MHz_Antenna 0



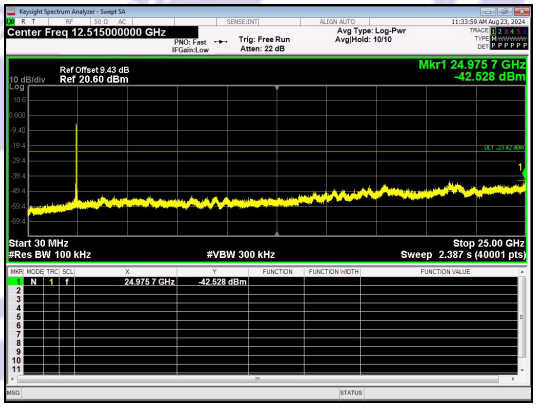
30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 6_40MHz_Antenna 0



In-Band Reference Level

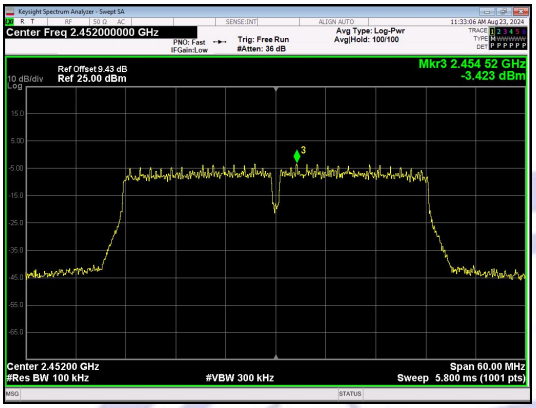
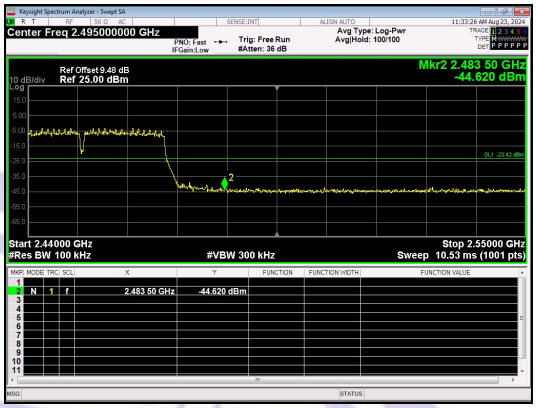
IEEE 802.11n_Channel 6_40MHz_Antenna 0



30.0 MHz - 25000.0 MHz

IEEE 802.11n_Channel 9_40MHz_Antenna 0

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

	
In-Band Reference Level **IEEE 802.11n_Channel 9_40MHz_Antenna 0**	**Out Of Band Emission** **IEEE 802.11n_Channel 9_40MHz_Antenna 0**

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn

8 6dB&99% Bandwidth Measurement

Test Requirement	:	FCC CFR47 Part 15 Section 15.247, RSS-GEN §6.7& RSS-247 §5.2
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

For 6dB Bandwidth Measurement

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

For 99% Bandwidth Measurement

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 = 1%-5% OBW, VBW ≥ 3RBW

8.2 Test Result

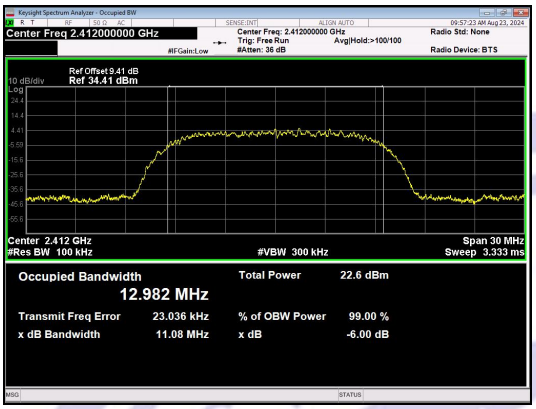
Test CH	-6dB Occupy Bandwidth (MHz)					
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)	Limit(KHz)	Result
Lowest	11.08	15.77	16.52	35.87	>500	Pass
Middle	11.09	15.79	16.85	36.38		
Highest	11.08	15.77	16.89	36.26		

Test CH	99% Occupy Bandwidth (MHz)					
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)	Limit(KHz)	Result
Lowest	13.056	16.446	17.603	36.151	/	Pass
Middle	13.046	16.439	17.626	36.201		
Highest	12.993	16.430	17.619	36.171		

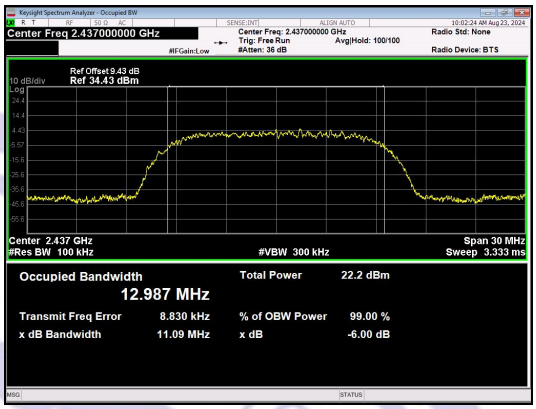
Test Graphs

Hotline: 400-8868-419 Fax: 86-755-27790922
http://www.ncttesting.cn

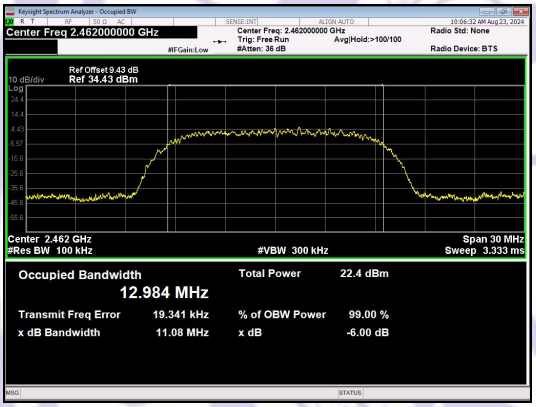
6dB Bandwidth



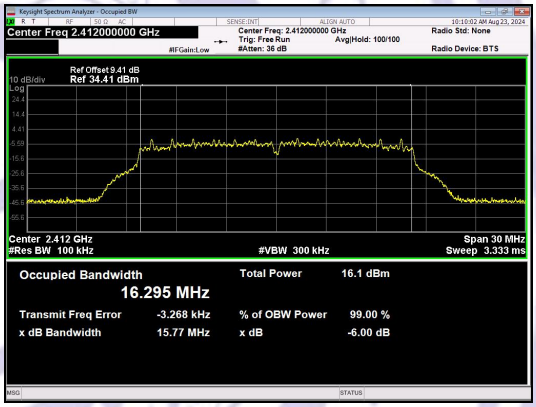
IEEE 802.11b_Channel 1_20MHz_Antenna 0



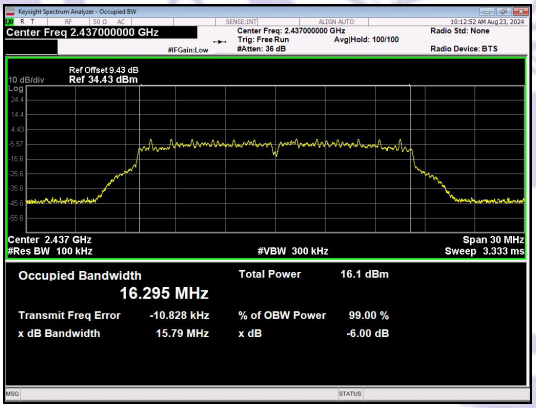
IEEE 802.11b_Channel 6_20MHz_Antenna 0



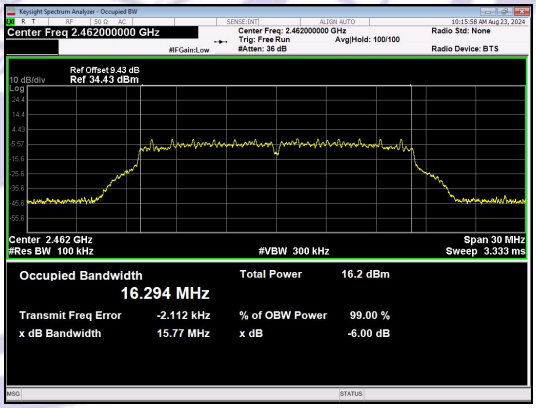
IEEE 802.11b_Channel 11_20MHz_Antenna 0



IEEE 802.11g_Channel 1_20MHz_Antenna 0



IEEE 802.11g_Channel 6_20MHz_Antenna 0



IEEE 802.11g_Channel 11_20MHz_Antenna 0

Hotline: 400-8868-419
Fax: 86-755-27790922
http://www.ncttesting.cn