TEST REPORT

FCC ID:2BHJP-CXZ502

Product	:	**carplay**
Model Name	:	**CXZ502, CXZ501**
Brand	:	**N/A**
Report No.	:	**NCT24029551-3**

Prepared for

Dongguan Chenxin Zheng hardware plastic technology Co., LTD

No. 78, Qinglin Road, Qingxi Town, Dongguan City, China

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

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1 TEST RESULT CERTIFICATION

Applicant’s name	:	Dongguan Chenxin Zheng hardware plastic technology Co., LTD
Address	:	No. 78, Qinglin Road, Qingxi Town, Dongguan City, China
Manufacture's name	:	Dongguan Chenxin Zheng hardware plastic technology Co., LTD
Address	:	No. 78, Qinglin Road, Qingxi Town, Dongguan City, China
Product name	:	carplay
Model name	:	CXZ502
Additional model	:	CXZ501
Model Different	:	Only the model name and color are different, PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Standards	:	FCC CFR Title 47 Part 15 Subpart C Section 15.407 ANSI C63.10:2013 KDB 789033 D02 v02r01
Test procedure	:	ANSI C63.10:2013
Test Date	:	Jun. 25 ~ Aug. 09, 2024
Date of Issue	:	Aug. 09, 2024
Test Result	:	Pass

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:

Hugh Zhang

Hugh Zhang / Engineer

Technical Manager:

Henry Wang

Henry Wang / Manager

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2 Test Summary

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.407(b), 15.209	Radiated Spurious Emission	PASS	
15.207	Conducted Emission	PASS	
15.407 (a) 15.407 (e)	99% , 6dB and 26dB Bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
15.407(b)	Band Edge	PASS	
15.407 (a)	Power Spectral Density	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

Remark:

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

3 TEST FACILITY

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 General Information

4.1 General Description of E.U.T.

Product Name:	carplay
Model Name:	CXZ502
Sample ID:	N/A
Sample(s) Status:	Engineer sample
Additional model:	CXZ501
Model Different:	Only the model name and color are different, PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Operation Frequency:	WIFI 5.2G: 5150MHz~5250MHz WIFI 5.8G:5745MHz~5825MHz
Modulation type:	OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/n
Antenna Type:	PCB Antenna
Antenna gain:	3.08dBi@5.2GHz; 5.12dBi@5.8GHz
Power supply:	DC 5V From Type-C Port
Hardware Version:	N/A
Software Version:	N/A
Remark:	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. 5G Wifi & BT share one antenna and cannot be transmitted at the same time.

802.11a/n(20MHz) Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	44	5220	48	5240

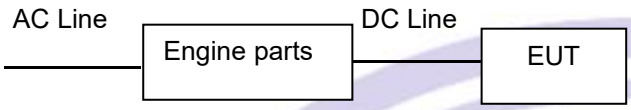
802.11n(40MHz) Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230	-	-	-	-

802.11a/n(20 MHz) Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

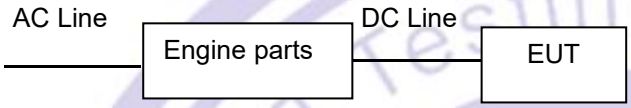
802.11n(40MHz) Frequency Channel					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	-	-

4.2 Test Setup Configuration

Conducted Emission



Radiated Emission



Conducted Spurious

4.3 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	nsmod /mnt/system/ko/8733bs.ko
Power level setup	10

5 Equipment During Test

5.1 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

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 Sensor	TR1029-2	512364	Techoy	2024/6/17	2025/6/16
RF Swith	TR1029-1	512364	Techoy	2024/6/17	2025/6/16
Cable	DA800-4000MM	NA	DA	2024/6/17	2025/6/16
Cable	DA800-11000MM	NA	DA	2024/6/17	2025/6/16

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	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

5.2 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%	

5.3 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	carplay	N/A	CXZ502	N/A	EUT
E-2	Adapter	N/A	M4-050200U	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.

6 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
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

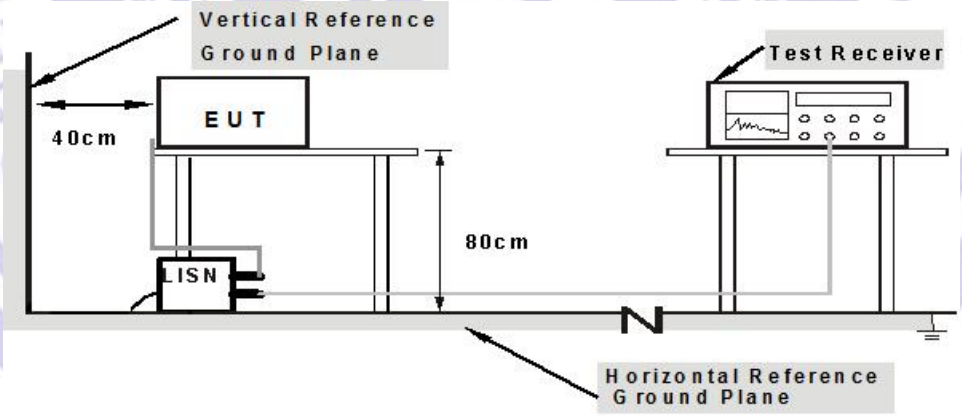
6.1 E.U.T. Operation

Operating Environment **:**

Temperature:	:	23.2°C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.12 kPa
Test Voltage	:	AC 120V/60Hz

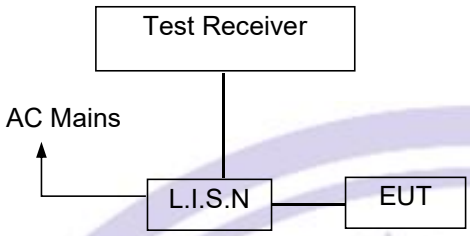
6.2 EUT Setup

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



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

6.3 Test SET-UP (Block Diagram of Configuration)



6.4 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.

6.5 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.

6.6 Measurement Description

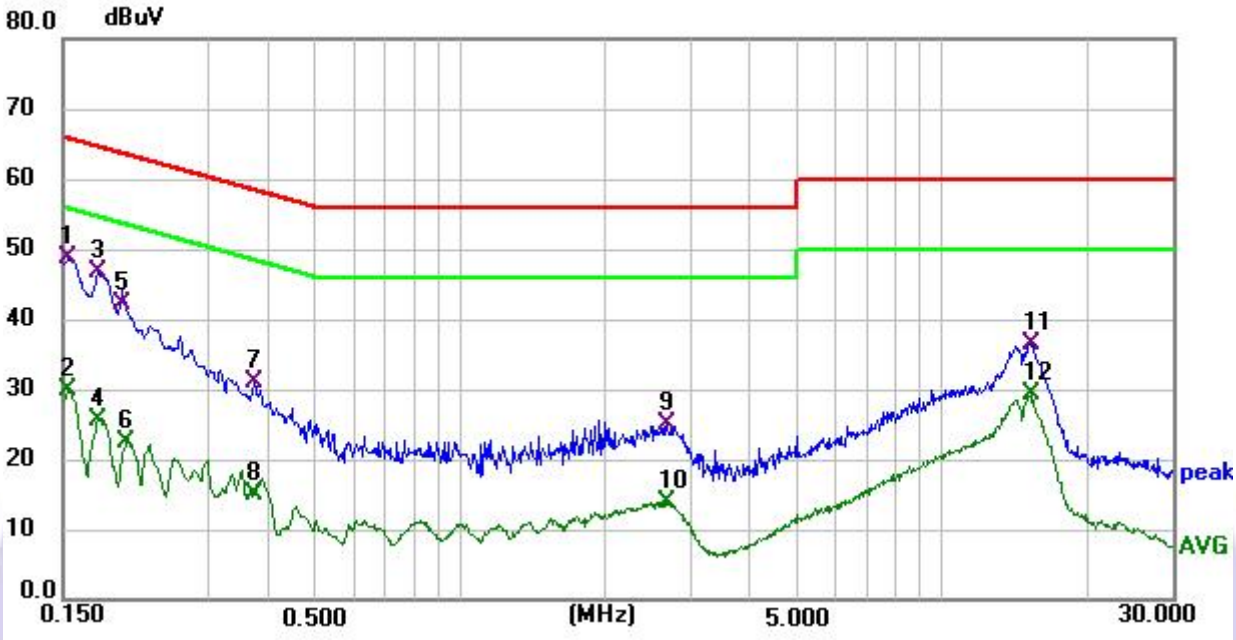
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Pass

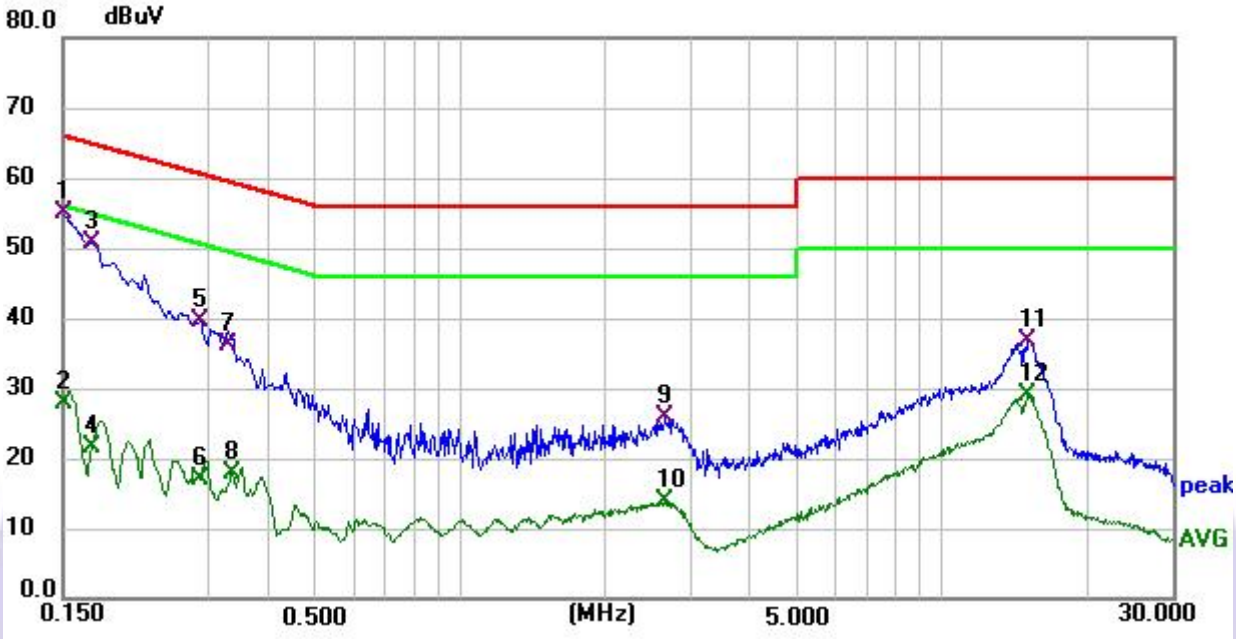
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (802.11a,Middle channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Channel:	Middle	Phase :	L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.154	38.90	9.83	48.73	65.79	-17.06	QP	P	
2	0.154	19.99	9.83	29.82	55.79	-25.97	AVG	P	
3	0.177	36.70	9.95	46.65	64.63	-17.98	QP	P	
4	0.177	15.71	9.95	25.66	54.63	-28.97	AVG	P	
5	0.200	32.00	10.06	42.06	63.61	-21.55	QP	P	
6	0.203	12.24	10.06	22.30	53.49	-31.19	AVG	P	
7	0.375	21.18	9.80	30.98	58.39	-27.41	QP	P	
8	0.375	5.07	9.80	14.87	48.39	-33.52	AVG	P	
9	2.683	15.27	9.85	25.12	56.00	-30.88	QP	P	
10	2.683	3.95	9.85	13.80	46.00	-32.20	AVG	P	
11	15.250	26.19	10.27	36.46	60.00	-23.54	QP	P	
12	15.250	18.94	10.27	29.21	50.00	-20.79	AVG	P	

Channel:	Middle	Phase :	N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.150	45.15	9.81	54.96	66.00	-11.04	QP	P	
2	0.150	18.09	9.81	27.90	56.00	-28.10	AVG	P	
3	0.172	40.88	9.92	50.80	64.86	-14.06	QP	P	
4	0.172	11.77	9.92	21.69	54.86	-33.17	AVG	P	
5	0.289	29.59	9.97	39.56	60.55	-20.99	QP	P	
6	0.289	7.01	9.97	16.98	50.55	-33.57	AVG	P	
7	0.330	26.36	9.75	36.11	59.45	-23.34	QP	P	
8	0.335	8.15	9.71	17.86	49.33	-31.47	AVG	P	
9	2.674	15.92	9.85	25.77	56.00	-30.23	QP	P	
10	2.674	3.97	9.85	13.82	46.00	-32.18	AVG	P	
11	15.100	26.44	10.26	36.70	60.00	-23.30	QP	P	
12	15.100	18.62	10.26	28.88	50.00	-21.12	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

7 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.407

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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature : 24.5 °C

Humidity : 55.5% RH

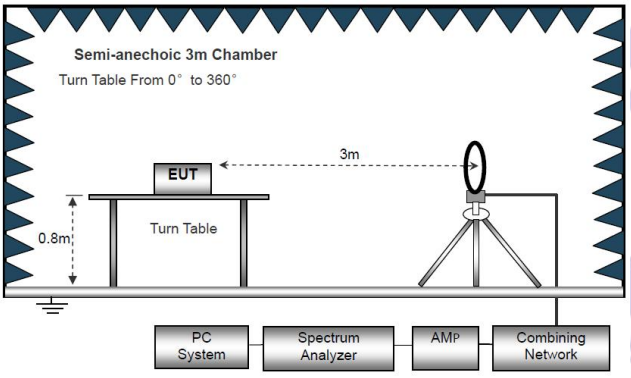
Atmospheric Pressure : 101.3kPa

Test Voltage : AC 120V60Hz

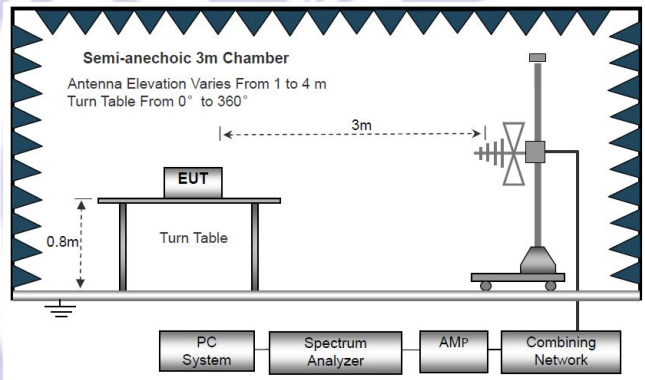
7.2 Test Setup

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

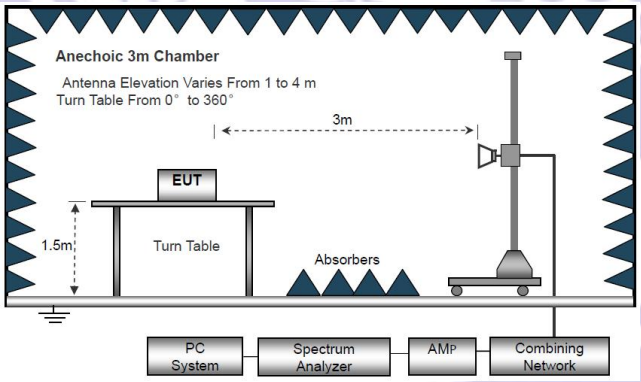
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.

2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

5. Set to the maximum power setting and enable the EUT transmit continuously.

6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.

7. Test Procedure of measurement (For Above 1GHz):

1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).

2) Change the antenna polarization and repeat 1) with vertical polarization.

3) Make a hardcopy of the spectrum.

4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

5) Change the analyser mode to Clear/ Write and found the cone of emission.

6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.

7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.

8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

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.

7.5 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:

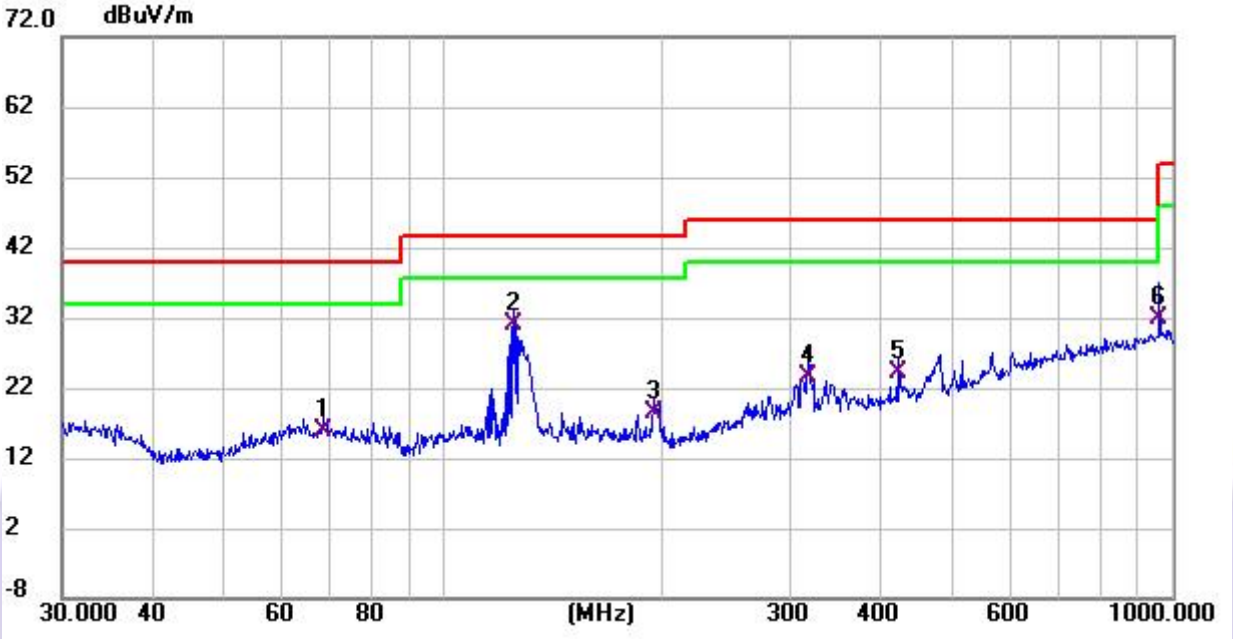
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

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

Test Frequency: 30MHz ~ 1GHz

Please refer to the following test plots,Low Channel Worst case 802.11a for record:

Test plot for Horizontal



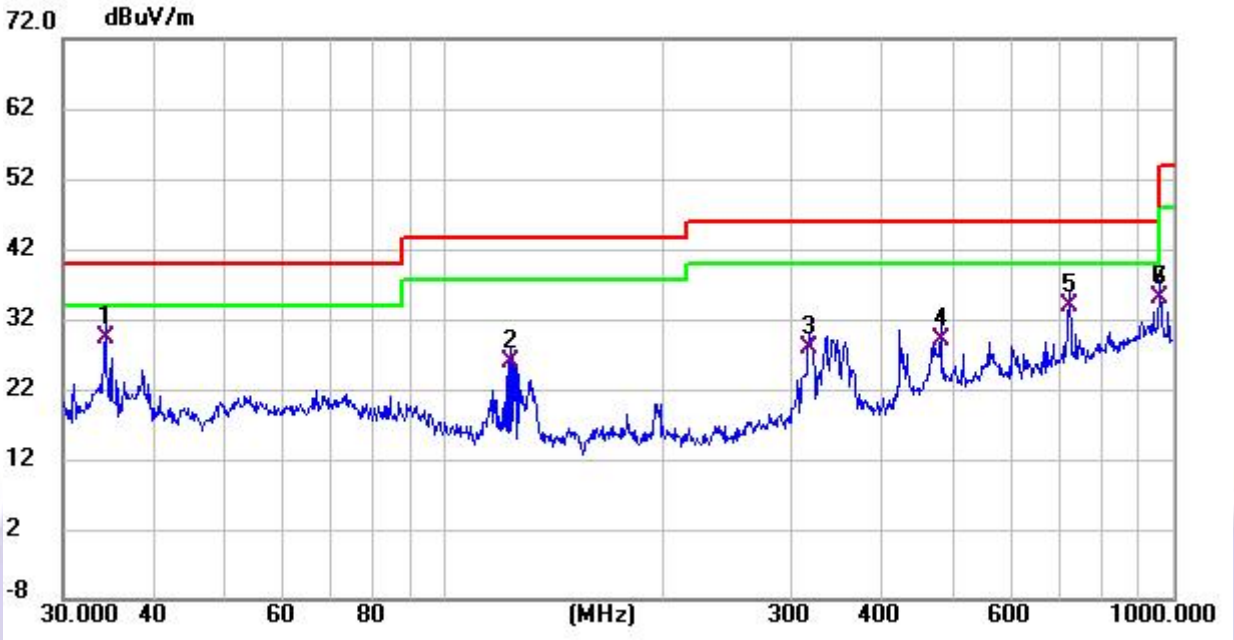
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	68.391	3.52	12.35	15.87	40.00	-24.13	QP			P	
2 *	125.007	19.79	11.29	31.08	43.50	-12.42	QP			P	
3	194.453	7.54	10.75	18.29	43.50	-25.21	QP			P	
4	317.701	9.40	14.31	23.71	46.00	-22.29	QP			P	
5	422.058	7.92	16.35	24.27	46.00	-21.73	QP			P	
6	962.162	8.18	23.70	31.88	54.00	-22.12	QP			P	

Remark:

Emission Level=Reading+Factor

Factor=Cable Loss+ANT Factor-Preamp Factor

Test plot for Vertical



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 *	34.276	16.25	13.04	29.29	40.00	-10.71	QP			P	
2	123.265	13.83	12.17	26.00	43.50	-17.50	QP			P	
3	317.701	13.64	14.30	27.94	46.00	-18.06	QP			P	
4	480.528	11.62	17.41	29.03	46.00	-16.97	QP			P	
5	721.726	12.34	21.56	33.90	46.00	-12.10	QP			P	
6	958.794	9.51	25.42	34.93	46.00	-11.07	QP			P	
7	958.794	9.51	25.42	34.93	46.00	-11.07	QP			P	

Remark:

Emission Level=Reading+Factor

Factor=Cable Loss+ANT Factor-Preamp Factor

Test Frequency 1GHz-40GHz

802.11a

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:5745MHz									
V	11490	40.98	32.29	8.39	38.9	55.98	74	-18.02	PK
V	11490	20.15	32.29	8.39	38.9	35.15	54	-18.85	AV
V	17233.3	36.28	31.19	9.62	40.37	55.08	74	-18.92	PK
V	17233.3	20.51	31.19	9.62	40.37	39.31	54	-14.69	AV
V	22980	37.15	27.02	7.2	38.98	56.31	74	-17.69	PK
V	22980	17.14	27.02	7.2	38.98	36.30	54	-17.70	AV
V	28723.3	36.32	27.1	7.56	40.18	56.96	74	-17.04	PK
V	28723.3	15.67	27.1	7.56	40.18	36.31	54	-17.69	AV
H	11490	42.67	32.29	8.39	38.9	57.67	74	-16.33	PK
H	11490	20.93	32.29	8.39	38.9	35.93	54	-18.07	AV
H	17233.3	37.10	31.19	9.62	40.37	55.90	74	-18.10	PK
H	17233.3	17.10	31.19	9.62	40.37	35.90	54	-18.10	AV
H	22980	35.39	27.02	7.2	38.98	54.55	74	-19.45	PK
H	22980	19.66	27.02	7.2	38.98	38.82	54	-15.18	AV
H	28723.3	36.49	27.1	7.56	40.18	57.13	74	-16.87	PK
H	28723.3	15.49	27.1	7.56	40.18	36.13	54	-17.87	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:5785MHz									
V	11570	40.27	32.26	8.48	38.9	55.39	74	-18.61	PK
V	11570	16.33	32.26	8.48	38.9	31.45	54	-22.55	AV
V	17353.3	35.61	31.08	9.67	40.61	54.81	74	-19.19	PK
V	17353.3	14.23	31.08	9.67	40.61	33.43	54	-20.57	AV
V	23140	34.51	27.03	7.24	39.03	53.75	74	-20.25	PK
V	23140	16.11	27.03	7.24	39.03	35.35	54	-18.65	AV
V	28923.3	35.70	27.1	7.58	40.34	56.52	74	-17.48	PK
V	28923.3	15.37	27.1	7.58	40.34	36.19	54	-17.81	AV
H	11570	36.03	32.26	8.48	38.9	51.15	74	-22.85	PK
H	11570	18.24	32.26	8.48	38.9	33.36	54	-20.64	AV
H	17353.3	34.08	31.08	9.67	40.61	53.28	74	-20.72	PK
H	17353.3	14.81	31.08	9.67	40.61	34.01	54	-19.99	AV
H	23140	35.12	27.03	7.24	39.03	54.36	74	-19.64	PK
H	23140	15.02	27.03	7.24	39.03	34.26	54	-19.74	AV
H	28923.3	35.04	27.1	7.58	40.34	55.86	74	-18.14	PK
H	28923.3	12.41	27.1	7.58	40.34	33.23	54	-20.77	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:5825MHz									
V	11650	42.85	32.23	8.56	38.9	58.08	74	-15.92	PK
V	11650	30.85	32.23	8.56	38.9	46.08	54	-7.92	AV
V	17473.3	41.34	30.97	9.73	40.85	60.95	74	-13.05	PK
V	17473.3	27.20	30.97	9.73	40.85	46.81	54	-7.19	AV
V	23300	41.16	27.03	7.26	39.06	60.45	74	-13.55	PK
V	23300	23.57	27.03	7.26	39.06	42.86	54	-11.14	AV
V	29123.3	39.76	27.1	7.61	40.4	60.67	74	-13.33	PK
V	29123.3	21.56	27.1	7.61	40.4	42.47	54	-11.53	AV
H	11650	43.76	32.23	8.56	38.9	58.99	74	-15.01	PK
H	11650	29.84	32.23	8.56	38.9	45.07	54	-8.93	AV
H	17473.3	42.57	30.97	9.73	40.85	62.18	74	-11.82	PK
H	17473.3	26.26	30.97	9.73	40.85	45.87	54	-8.13	AV
H	23300	43.60	27.03	7.26	39.06	62.89	74	-11.11	PK
H	23300	22.17	27.03	7.26	39.06	41.46	54	-12.54	AV
H	29123.3	36.43	27.1	7.61	40.4	57.34	74	-16.66	PK
H	29123.3	23.43	27.1	7.61	40.4	44.34	54	-9.66	AV

802.11a

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:5180MHz									
V	10360	45.00	32.7	7.72	38.59	58.61	74	-15.39	PK
V	10360	24.14	32.7	7.72	38.59	37.75	54	-16.25	AV
V	15540	41.98	31.74	9.44	39.29	58.97	74	-15.03	PK
V	15540	15.95	31.74	9.44	39.29	32.94	54	-21.06	AV
V	20720	41.03	26.93	6.64	37.94	58.68	74	-15.32	PK
V	20720	18.60	26.93	6.64	37.94	36.25	54	-17.75	AV
V	25900	35.31	27.1	7.9	39.32	55.43	74	-18.57	PK
V	25900	21.68	27.1	7.9	39.32	41.80	54	-12.20	AV
H	10360	38.53	32.7	7.72	38.59	52.14	74	-21.86	PK
H	10360	22.06	32.7	7.72	38.59	35.67	54	-18.33	AV
H	15540	37.12	31.74	9.44	39.29	54.11	74	-19.89	PK
H	15540	22.80	31.74	9.44	39.29	39.79	54	-14.21	AV
H	20720	40.56	26.93	6.64	37.94	58.21	74	-15.79	PK
H	20720	16.45	26.93	6.64	37.94	34.10	54	-19.90	AV
H	25900	37.89	27.1	7.9	39.32	58.01	74	-15.99	PK
H	25900	20.44	27.1	7.9	39.32	40.56	54	-13.44	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:5200MHz									
V	10400	43.42	32.69	7.73	38.62	57.08	74	-16.92	PK
V	10400	25.67	32.69	7.73	38.62	39.33	54	-14.67	AV
V	15600	38.78	31.72	9.45	39.28	55.79	74	-18.21	PK
V	15600	20.78	31.72	9.45	39.28	37.79	54	-16.21	AV
V	20800	36.94	26.93	6.73	37.96	54.70	74	-19.30	PK
V	20800	20.20	26.93	6.73	37.96	37.96	54	-16.04	AV
V	26000	38.68	27.1	7.94	39.3	58.82	74	-15.18	PK
V	26000	16.81	27.1	7.94	39.3	36.95	54	-17.05	AV
H	10400	41.94	32.69	7.73	38.62	55.60	74	-18.40	PK
H	10400	19.72	32.69	7.73	38.62	33.38	54	-20.62	AV
H	15600	39.35	31.72	9.45	39.28	56.36	74	-17.64	PK
H	15600	21.28	31.72	9.45	39.28	38.29	54	-15.71	AV
H	20800	38.09	26.93	6.73	37.96	55.85	74	-18.15	PK
H	20800	17.30	26.93	6.73	37.96	35.06	54	-18.94	AV
H	26000	36.25	27.1	7.94	39.3	56.39	74	-17.61	PK
H	26000	15.50	27.1	7.94	39.3	35.64	54	-18.36	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:5240MHz									
V	10480	39.74	32.66	7.74	38.68	53.50	74	-20.50	PK
V	10480	24.86	32.66	7.74	38.68	38.62	54	-15.38	AV
V	15720	36.41	31.68	9.48	39.26	53.47	74	-20.53	PK
V	15720	16.99	31.68	9.48	39.26	34.05	54	-19.95	AV
V	20960	36.67	26.94	6.91	37.99	54.63	74	-19.37	PK
V	20960	19.70	26.94	6.91	37.99	37.66	54	-16.34	AV
V	26200	38.01	27.1	7.89	39.5	58.30	74	-15.70	PK
V	26200	14.81	27.1	7.89	39.5	35.10	54	-18.90	AV
H	10480	45.71	32.66	7.74	38.68	59.47	74	-14.53	PK
H	10480	23.49	32.66	7.74	38.68	37.25	54	-16.75	AV
H	15720	40.43	31.68	9.48	39.26	57.49	74	-16.51	PK
H	15720	20.15	31.68	9.48	39.26	37.21	54	-16.79	AV
H	20960	37.95	26.94	6.91	37.99	55.91	74	-18.09	PK
H	20960	20.45	26.94	6.91	37.99	38.41	54	-15.59	AV
H	26200	35.00	27.1	7.89	39.5	55.29	74	-18.71	PK
H	26200	17.18	27.1	7.89	39.5	37.47	54	-16.53	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. The worst mode is 802.11a, only the worst data is recorded.

Restrict Band EMISSION MEASUREMENT

Frequency	Meter Reading	antenna Factor	cable loss	preamp factor	Emission Level	Limit	Margin	Polar	Detector Type	Result
(MHz)	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(H/V)		
802.11a:5180MHz										
5150	51.50	33.14	5.29	33.88	57.53	74	-16.47	V	PK	Pass
5150	34.59	33.14	5.29	33.88	40.62	54	-13.38	V	AV	Pass
5145	52.69	33.14	5.29	33.88	58.72	74	-15.28	V	PK	Pass
5145	33.55	33.14	5.29	33.88	39.58	54	-14.42	V	AV	Pass
5150	54.28	33.14	5.29	33.88	60.31	74	-13.69	H	PK	Pass
5150	34.20	33.14	5.29	33.88	40.23	54	-13.77	H	AV	Pass
5145	50.67	33.14	5.29	33.88	56.70	74	-17.30	H	PK	Pass
5145	34.03	33.14	5.29	33.88	40.06	54	-13.94	H	AV	Pass
802.11a:5240MHz										
5350	56.24	33.06	5.44	33.72	62.34	74	-11.66	V	PK	Pass
5350	35.95	33.06	5.44	33.72	42.05	54	-11.95	V	AV	Pass
5370	50.86	33.05	5.45	33.7	56.96	74	-17.04	V	PK	Pass
5370	35.88	33.05	5.45	33.7	41.98	54	-12.02	V	AV	Pass
5350	55.20	33.06	5.44	33.72	61.30	74	-12.70	H	PK	Pass
5350	35.89	33.06	5.44	33.72	41.99	54	-12.01	H	AV	Pass
5370	53.11	33.05	5.45	33.7	59.21	74	-14.79	H	PK	Pass
5370	34.25	33.05	5.45	33.7	40.35	54	-13.65	H	AV	Pass
802.11n20:5180MHz										
5150	52.03	33.14	5.29	33.88	58.06	74	-15.94	V	PK	Pass

5150	36.92	33.14	5.29	33.88	42.95	54	-11.05	V	AV	Pass
5145	53.79	33.14	5.29	33.88	59.82	74	-14.18	V	PK	Pass
5145	34.58	33.14	5.29	33.88	40.61	54	-13.39	V	AV	Pass
5150	53.62	33.14	5.29	33.88	59.65	74	-14.35	H	PK	Pass
5150	35.99	33.14	5.29	33.88	42.02	54	-11.98	H	AV	Pass
5145	52.11	33.14	5.29	33.88	58.14	74	-15.86	H	PK	Pass
5145	34.29	33.14	5.29	33.88	40.32	54	-13.68	H	AV	Pass
802.11n20:5240MHz										
5350	54.82	33.06	5.44	33.72	60.92	74	-13.08	V	PK	Pass
5350	38.06	33.06	5.44	33.72	44.16	54	-9.84	V	AV	Pass
5370	52.40	33.05	5.45	33.7	58.50	74	-15.50	V	PK	Pass
5370	34.76	33.05	5.45	33.7	40.86	54	-13.14	V	AV	Pass
5350	55.08	33.06	5.44	33.72	61.18	74	-12.82	H	PK	Pass
5350	42.23	33.06	5.44	33.72	48.33	54	-5.67	H	AV	Pass
5370	53.47	33.05	5.45	33.7	59.57	74	-14.43	H	PK	Pass
5370	37.72	33.05	5.45	33.7	43.82	54	-10.18	H	AV	Pass
802.11n40:5190MHz										
5150	55.31	33.14	5.29	33.88	61.34	74	-12.66	V	PK	Pass
5150	39.28	33.14	5.29	33.88	45.31	54	-8.69	V	AV	Pass
5145	51.87	33.14	5.29	33.88	57.90	74	-16.10	V	PK	Pass
5145	36.56	33.14	5.29	33.88	42.59	54	-11.41	V	AV	Pass
5150	56.03	33.14	5.29	33.88	62.06	74	-11.94	H	PK	Pass
5150	42.94	33.14	5.29	33.88	48.97	54	-5.03	H	AV	Pass
5145	53.61	33.14	5.29	33.88	59.64	74	-14.36	H	PK	Pass
5145	37.83	33.14	5.29	33.88	43.86	54	-10.14	H	AV	Pass

802.11n40:5230MHz										
5350	56.33	33.06	5.44	33.72	62.43	74	-11.57	V	PK	Pass
5350	38.20	33.06	5.44	33.72	44.30	54	-9.70	V	AV	Pass
5370	54.49	33.05	5.45	33.7	60.59	74	-13.41	V	PK	Pass
5370	33.98	33.05	5.45	33.7	40.08	54	-13.92	V	AV	Pass
5350	52.86	33.06	5.44	33.72	58.96	74	-15.04	H	PK	Pass
5350	42.38	33.06	5.44	33.72	48.48	54	-5.52	H	AV	Pass
5370	52.50	33.05	5.45	33.7	58.60	74	-15.40	H	PK	Pass
5370	33.59	33.05	5.45	33.7	39.69	54	-14.31	H	AV	Pass

Remark:

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

   Margin= Emission Level - Limit

2. If peak below the average limit, the average emission was no test.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8 POWER SPECTRAL DENSITY TEST

8.1 Test Standard and Limit

According to FCC §15.407(3)

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum

power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi

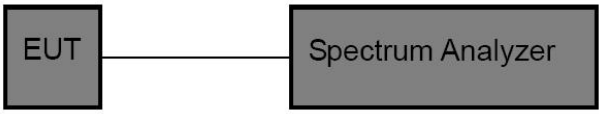
without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to RSS-247 6.2

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5.725-5.85 GHz,the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

8.2 Test Setup



8.3 Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,

2. Spectrum Setting:

   RBW > the 20 dB bandwidth of the emission being measured

   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

   VBW ≥ RBW

   Sweep = auto

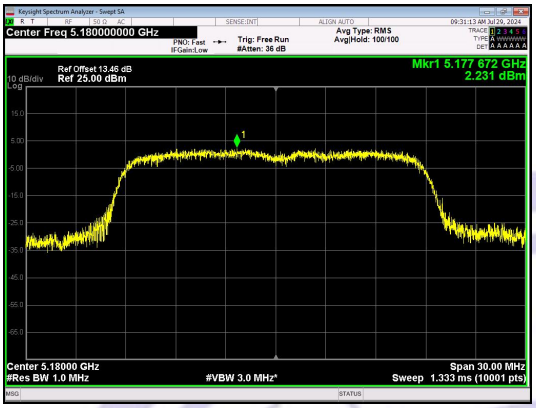
   Detector function = peak

   Trace = max hold

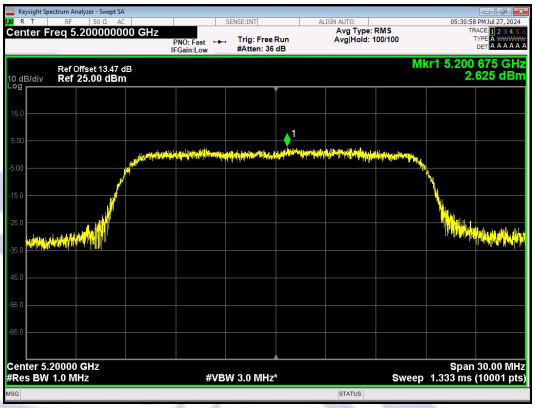
8.4 Test Data

Mode	Channel	Ant. 0 Meas PSD (dBm/MHz)	Limit (dBm/MHz)	Result
IEEE 802.11a	36	2.231	11	PASS
	40	2.625		PASS
	48	3.829		PASS
IEEE 802.11n_20	36	3.884		PASS
	40	3.359		PASS
	48	4.742		PASS
IEEE 802.11n_40	38	-1.916		PASS
	46	0.007		PASS

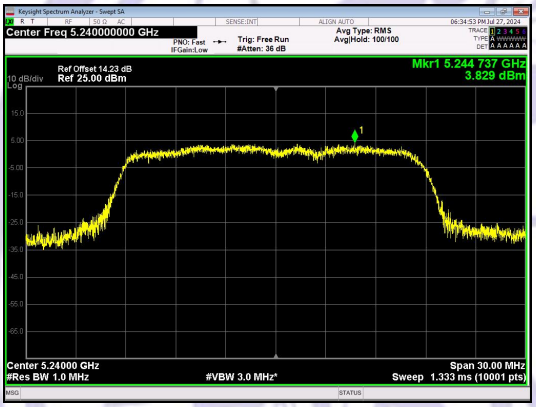
Mode	Channel	Ant. 0 Meas PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
IEEE 802.11a	149	-0.812	30	PASS
	157	-2.310		PASS
	165	-3.029		PASS
IEEE 802.11n_20	149	-0.958		PASS
	157	-2.927		PASS
	165	-4.090		PASS
IEEE 802.11n_40	151	-5.478		PASS
	159	-8.855		PASS



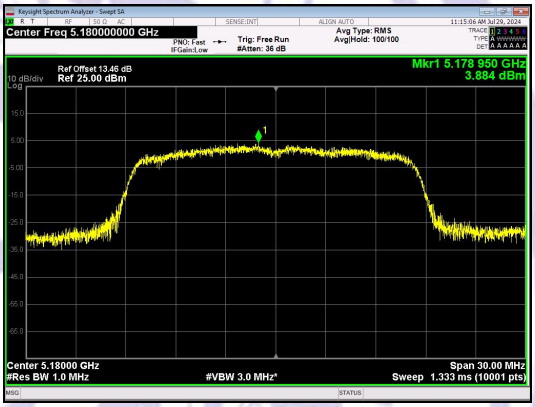
IEEE 802.11a_Channel 36_20MHz_Antenna 0



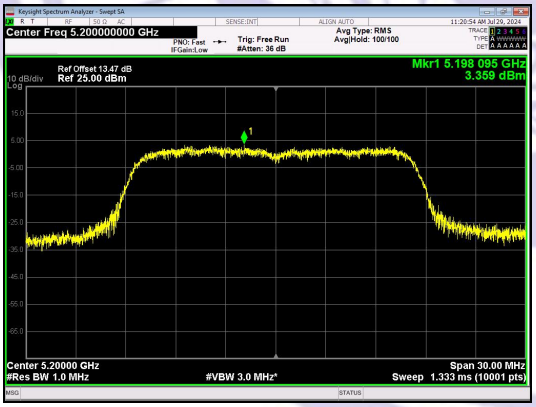
IEEE 802.11a_Channel 40_20MHz_Antenna 0



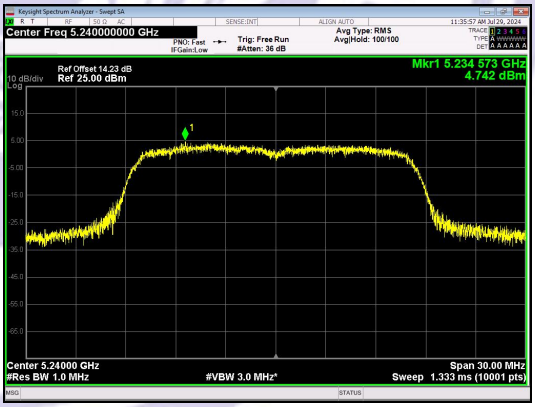
IEEE 802.11a_Channel 48_20MHz_Antenna 0



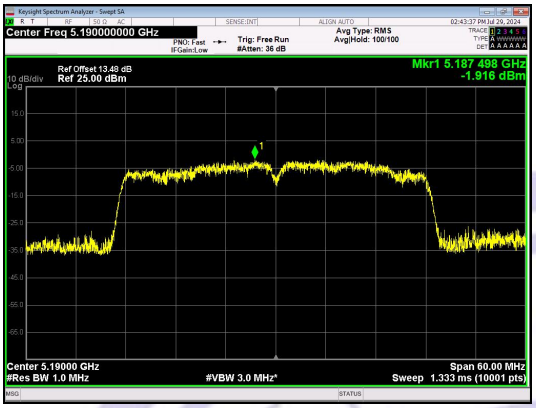
IEEE 802.11n_Channel 36_20MHz_Antenna 0



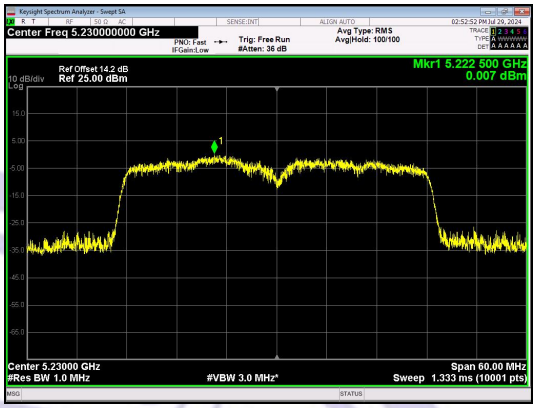
IEEE 802.11n_Channel 40_20MHz_Antenna 0



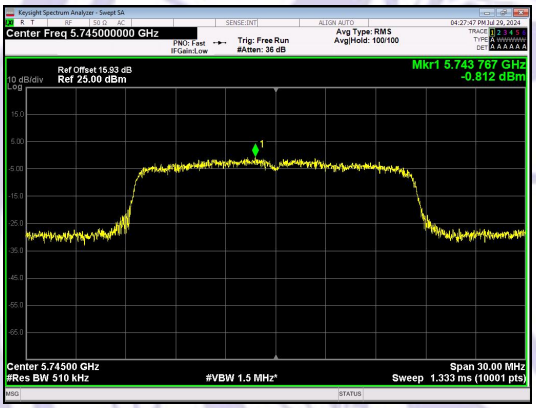
IEEE 802.11n_Channel 48_20MHz_Antenna 0



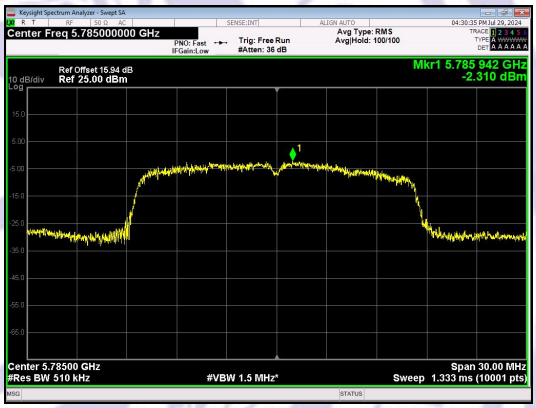
IEEE 802.11n_Channel 38_40MHz_Antenna 0



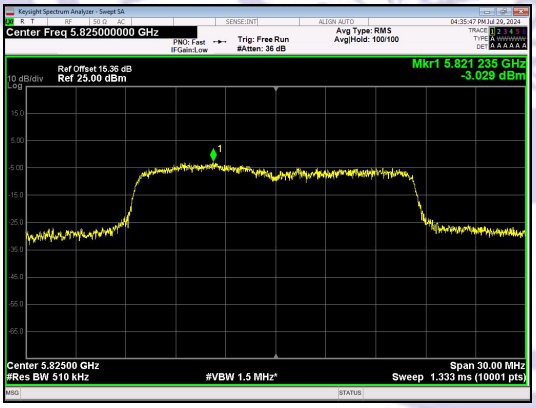
IEEE 802.11n_Channel 46_40MHz_Antenna 0



IEEE 802.11a_Channel 149_20MHz_Antenna 0

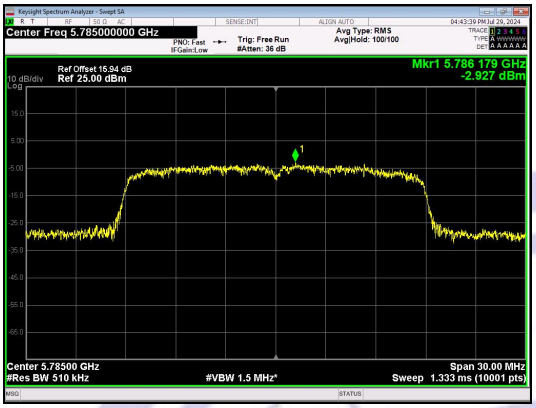


IEEE 802.11a_Channel 157_20MHz_Antenna 0



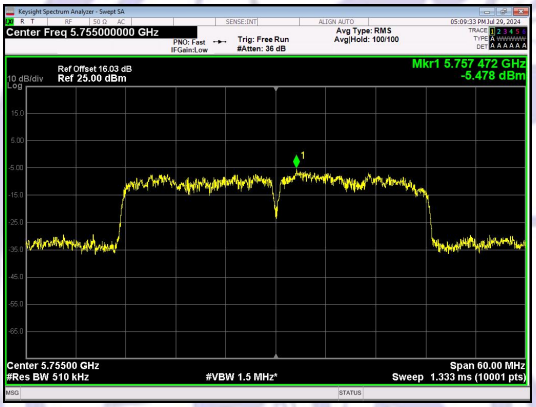
IEEE 802.11a_Channel 165_20MHz_Antenna 0

IEEE 802.11n_Channel 149_20MHz_Antenna 0

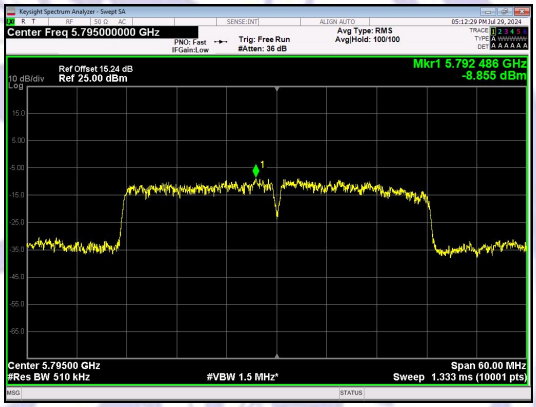


IEEE 802.11n_Channel 157_20MHz_Antenna 0

IEEE 802.11n_Channel 165_20MHz_Antenna 0



IEEE 802.11n_Channel 151_40MHz_Antenna 0



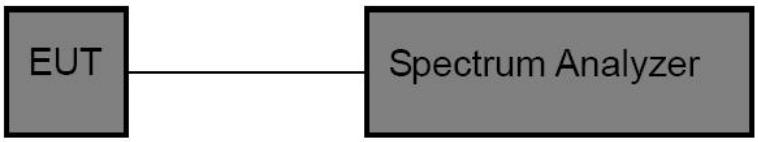
IEEE 802.11n_Channel 159_40MHz_Antenna 0

9 26DB & 6DB & 99% Emission Bandwidth Test

9.1 Test Standard

Test Standard	FCC Part15 C Section 15.407, RSS-247
	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band, the minimum bandwidth 6 dB bandwidth of U-NII devices shall be at least 500KHz. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

9.2 Test Setup



9.3 Test Procedure

a) Set RBW = 100KHz.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.

2. Set span = 1.5 times to 3.3 times the OBW.

3. Set RBW = 1 % to 5 % of the OBW

4. Set VBW ≥ 3 · RBW

5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

6. Use the 99 % power bandwidth function of the instrument (if available).

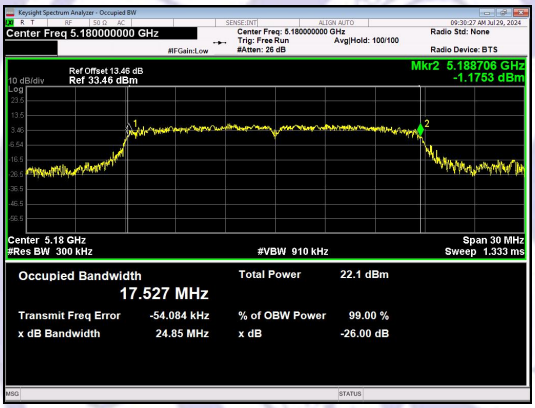
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

9.4 Test Data

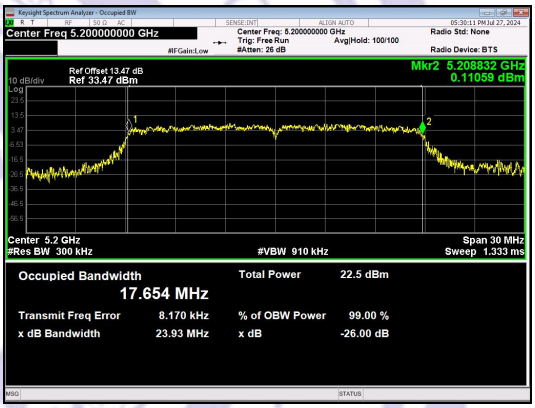
99% Bandwidth:

Mode	Channel	Ant.	Center Frequency (MHz)	99% BW (MHz)
IEEE 802.11a	36	0	5180	17.527
	40		5200	17.654
	48		5240	17.622
IEEE 802.11n_20	36		5180	16.508
	40		5200	16.504
	48		5240	16.471
IEEE 802.11n_40	38		5190	35.980
	46		5230	35.899

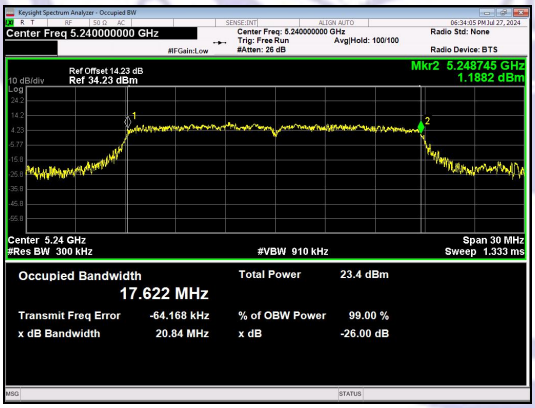
Mode	Channel	Ant.	Center Frequency (MHz)	99% BW (MHz)
IEEE 802.11a	149	0	5745	16.570
	157		5785	16.619
	165		5825	16.750
IEEE 802.11n_20	149		5745	17.731
	157		5785	17.798
	165		5825	17.942
IEEE 802.11n_40	151		5755	36.073
	159		5795	36.143



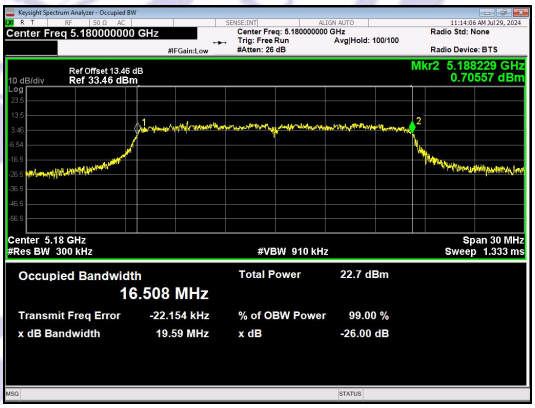
IEEE 802.11a_Channel 36_20MHz_Antenna 0



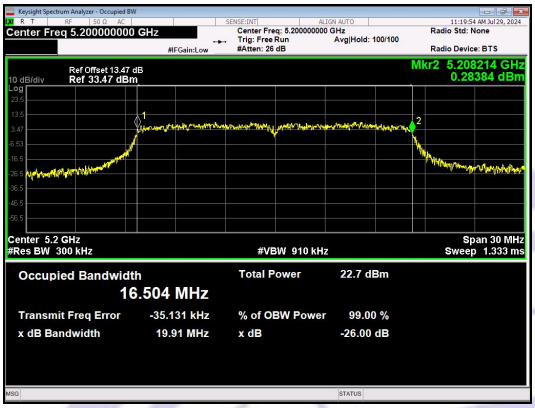
IEEE 802.11a_Channel 40_20MHz_Antenna 0



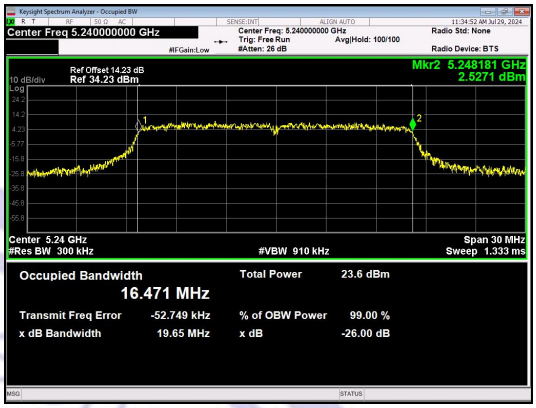
IEEE 802.11a_Channel 48_20MHz_Antenna 0



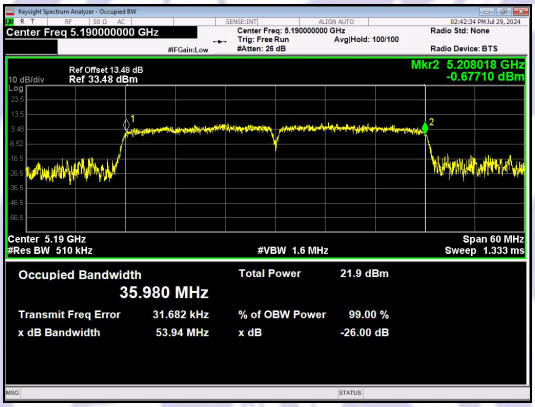
IEEE 802.11n_Channel 36_20MHz_Antenna 0



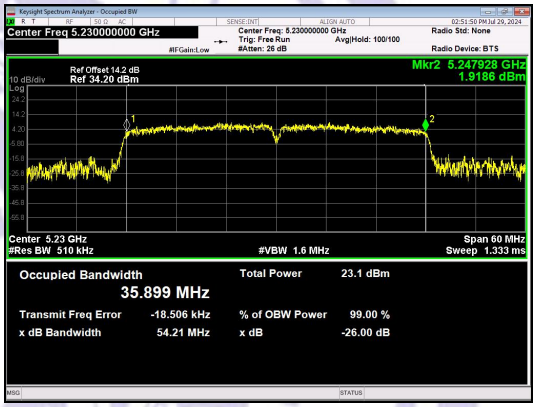
IEEE 802.11n_Channel 40_20MHz_Antenna 0



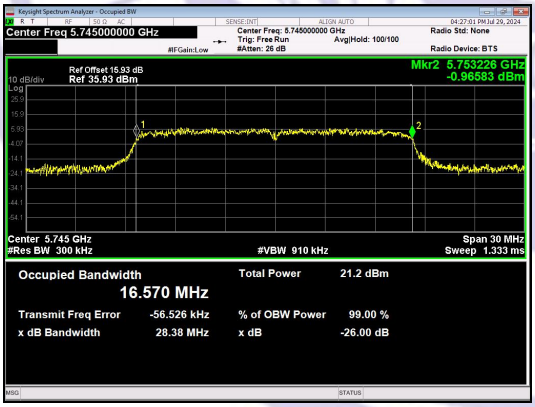
IEEE 802.11n_Channel 48_20MHz_Antenna 0



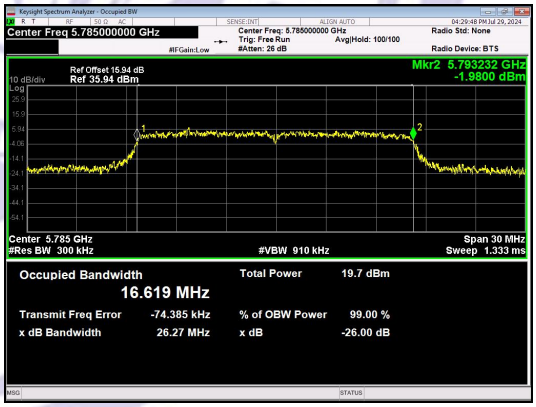
IEEE 802.11n_Channel 38_40MHz_Antenna 0



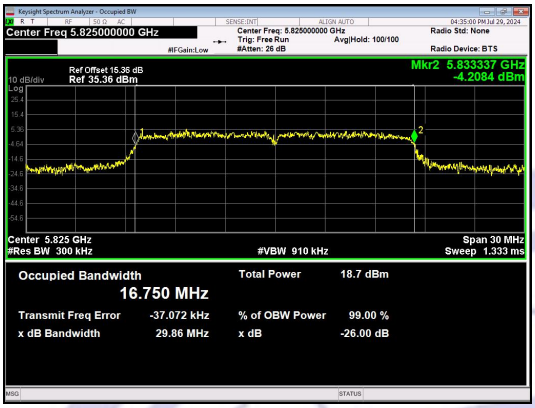
IEEE 802.11n_Channel 46_40MHz_Antenna 0



IEEE 802.11a_Channel 149_20MHz_Antenna 0



IEEE 802.11a_Channel 157_20MHz_Antenna 0



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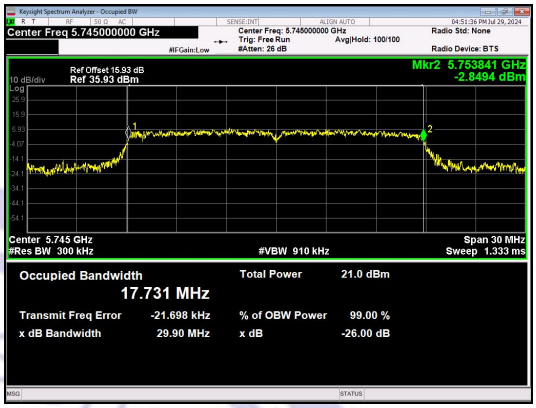
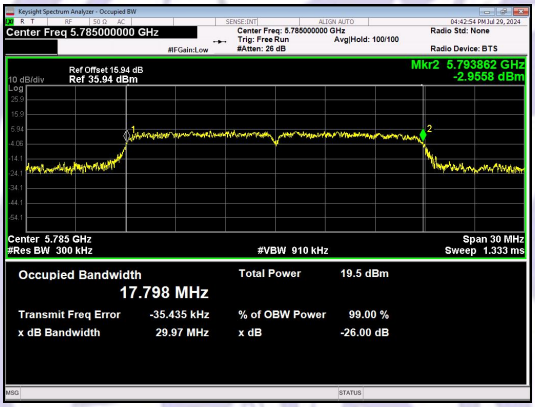
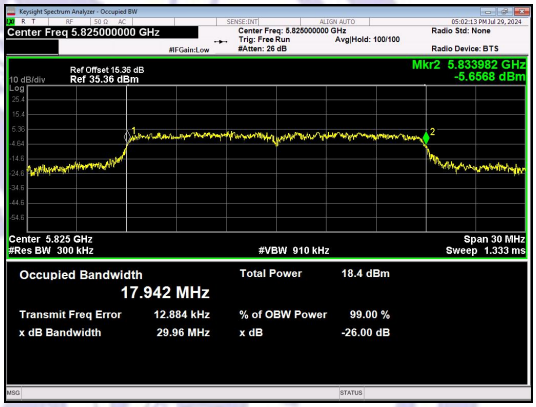


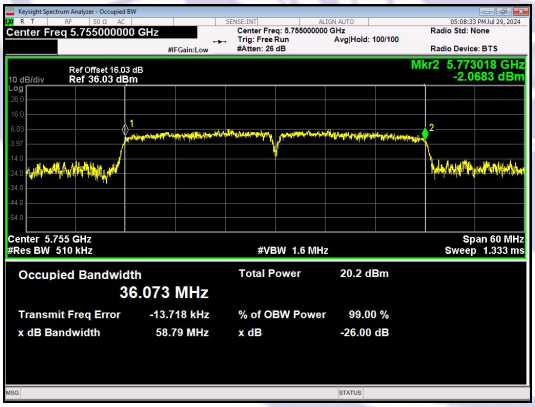
IEEE 802.11n_Channel 149_20MHz_Antenna 0



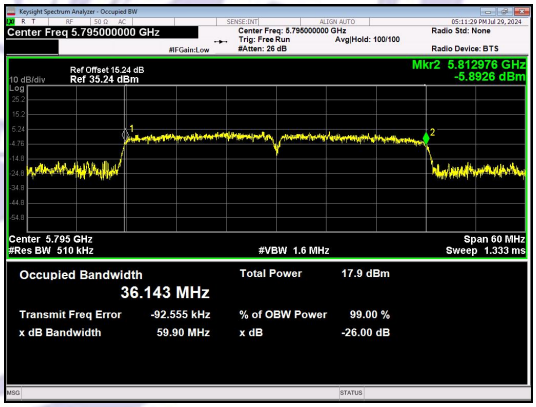
IEEE 802.11n_Channel 157_20MHz_Antenna 0



IEEE 802.11n_Channel 165_20MHz_Antenna 0



IEEE 802.11n_Channel 151_40MHz_Antenna 0

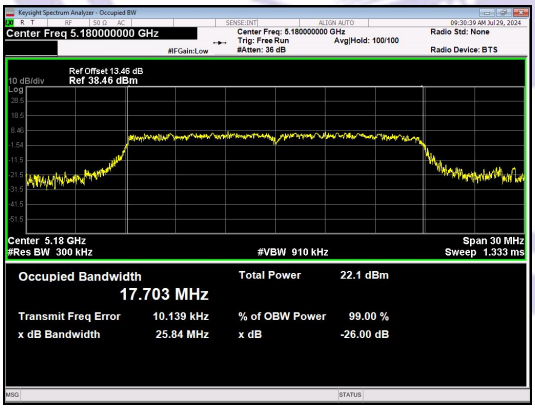


IEEE 802.11n_Channel 159_40MHz_Antenna 0

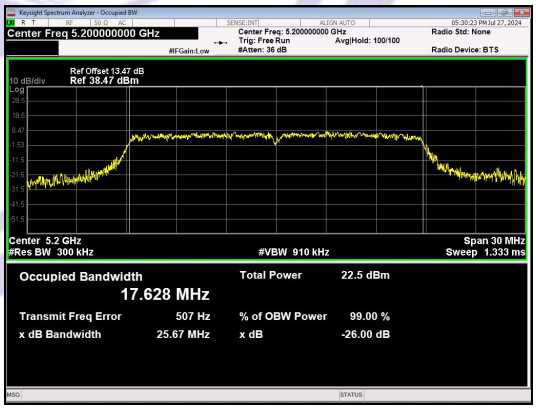
26dB Bandwidth:

Mode	Channel	Ant.	Center Frequency (MHz)	26 dB Bandwidth (MHz)
IEEE 802.11a	36	0	5180	25.84
	40		5200	25.67
	48		5240	25.73
IEEE 802.11n_20	36		5180	19.34
	40		5200	19.07
	48		5240	19.32
IEEE 802.11n_40	38		5190	58.00
	46		5230	54.93

Mode	Channel	Ant.	Center Frequency (MHz)	26 dB Bandwidth (MHz)
IEEE 802.11a	149	0	5745	26.58
	157		5785	28.11
	165		5825	29.89
IEEE 802.11n_20	149		5745	29.47
	157		5785	29.66
	165		5825	29.99
IEEE 802.11n_40	151		5755	59.42
	159		5795	59.95



IEEE 802.11a_Channel 36_20MHz_Antenna 0



IEEE 802.11a_Channel 40_20MHz_Antenna 0