TEST REPORT

FCC ID:2AO8RNI-3431

Product	:	Orb Cam 2
Model Name	:	NI-3431, NI-3432, NI-3433, NI-3434
Brand	:	Netvue
Report No.	:	NCT230501287XE-2

Prepared for

Netvue Technologies Co.,Ltd.

Room A501-502, Academy of Aerospace Technology, 10 Kejinan Road, Nanshan District, Shenzhen, China, 518057

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

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TEL: 400-8868-419

FAX: 86-755-27790922

1 TEST RESULT CERTIFICATION

Applicant’s name	:	Netvue Technologies Co.,Ltd.
Address	:	Room A501-502, Academy of Aerospace Technology, 10 Kejinan Road, Nanshan District, Shenzhen, China, 518057
Manufacture's name	:	Netvue Technologies Co.,Ltd.
Address	:	Room A501-502, Academy of Aerospace Technology, 10 Kejinan Road, Nanshan District, Shenzhen, China, 518057
Product name	:	Orb Cam 2
Model name	:	NI-3431, NI-3432, NI-3433, NI-3434
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	:	Dec. 15, 2023-Jan. 08, 2024
Date of Issue	:	Jan. 08, 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:

Keven Wu / Engineer

Technical Manager:

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:	Orb Cam 2
Model No.:	NI-3431
Sample ID	20231215A-001#
Sample(s) Status:	Engineer sample
Operation Frequency:	WIFI 5.2G: 5150MHz~5250MHz WIFI 5.8G:5725MHz~5850MHz
Modulation type:	802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM
Antenna Type:	FPCB Antenna
Antenna gain:	3.17 dBi
Power supply	DC 5V From adapter input AC 120V/60Hz
Hardware Version:	N02IPA-MB 20230921
Software Version:	1851
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.

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

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

802.11ac (80MHz) Frequency Channel	
Channel	Frequency (MHz)
42	5210

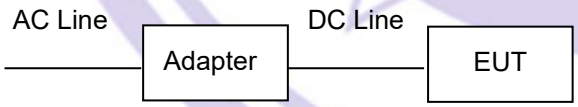
802.11a/ac/n(20 MHz) Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

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

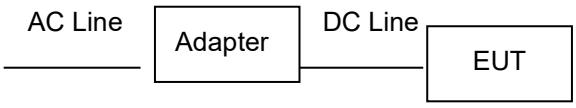
802.11ac(80MHz) Frequency Channel	
Channel	Frequency (MHz)
155	5775

4.2 Test Setup Configuration

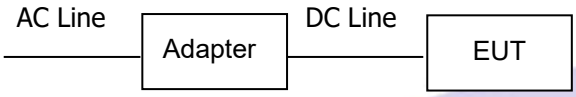
Conducted Emission



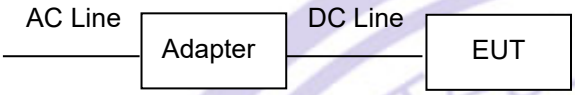
Radiated Emission(30MHz-1GHz)



Radiated Emission(above 1GHz)



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	HiBurn-025
Power level setup	20

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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	2023/6/21	2024/6/20
LISN	ENV 216	102796	Rohde & Schwarz	2023/6/21	2024/6/20
LISN	VN1-13S	004023	CRANAGE	2023/6/21	2024/6/20
Cable	RG223-1500MM	NA	RG	2023/6/21	2024/6/20

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	2023/6/21	2024/6/20
Amplifi（30MHz-1GHz）	BBV 9743 B	00374	SCHNWARZBECK	2023/6/21	2024/6/20
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	0024	SCHNWARZBECK	2023/6/21	2024/6/20
Spectrum Analyze（10Hz-40GHz）	FSV 40	100952	Rohde & Schwarz	2023/6/21	2024/6/20
Pream plifier（18GHz-40GHz）	BBV 9721	0056	SCHNWARZBECK	2023/6/21	2024/6/20
Double Ridge Guide Horn Antenna（18GHz-40GHz）	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Loop Antenna (9KHz-30MHz)	FMZB 1513-60	00115	SCHNWARZBECK	2023/6/21	2024/6/20
Amplifier (9KHz-30MHz)	BBV 9745	00109	CHNWARZBECK	2023/6/21	2024/6/20

MXG Signal Analyzer	N9020A	MY50510202	Agilent	2023/6/21	2024/6/20
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2023/6/21	2024/6/20
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2023/6/21	2024/6/20
Power Sensor	TR1029-2	512364	Techoy	2023/6/21	2024/6/20
RF Swith	TR1029-1	512364	Techoy	2023/6/21	2024/6/20
Cable	DA800-4000MM	NA	DA	2023/6/21	2024/6/20
Cable	DA800-11000MM	NA	DA	2023/6/21	2024/6/20

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	AUDIX	e3	6.120718
2	EMC radiation test system	AUDIX	e3	6.120718
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

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	Orb Cam 2	Netvue	NI-3431	N/A	EUT
E-2	Travel Charger	TIANYIN	TPA-46B050100UU	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

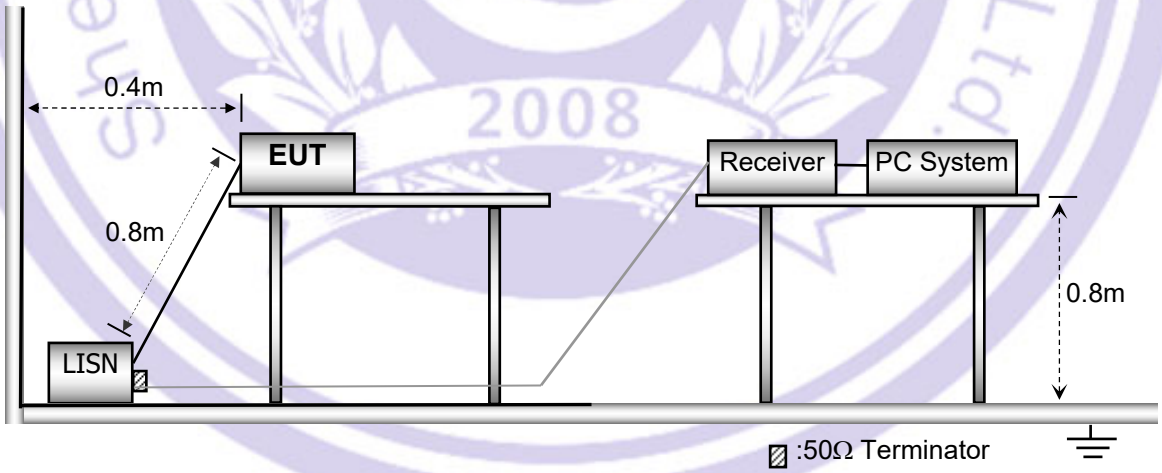
Humidity: : 51 % RH

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



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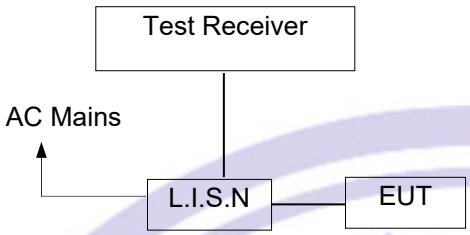
6.3 Test SET-UP (Block Diagram of Configuration)



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

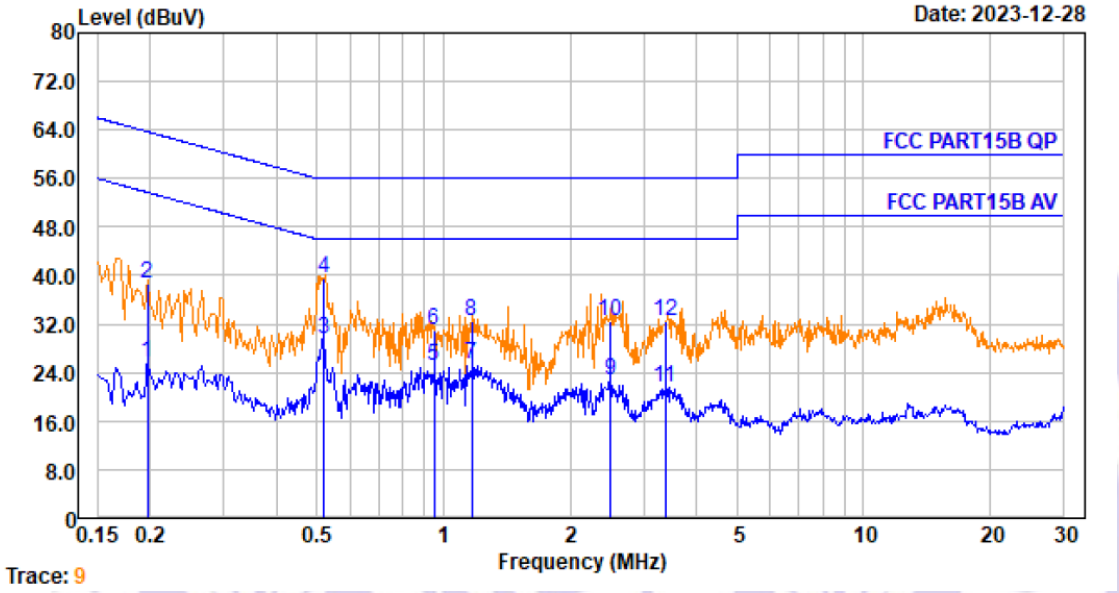
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Pass

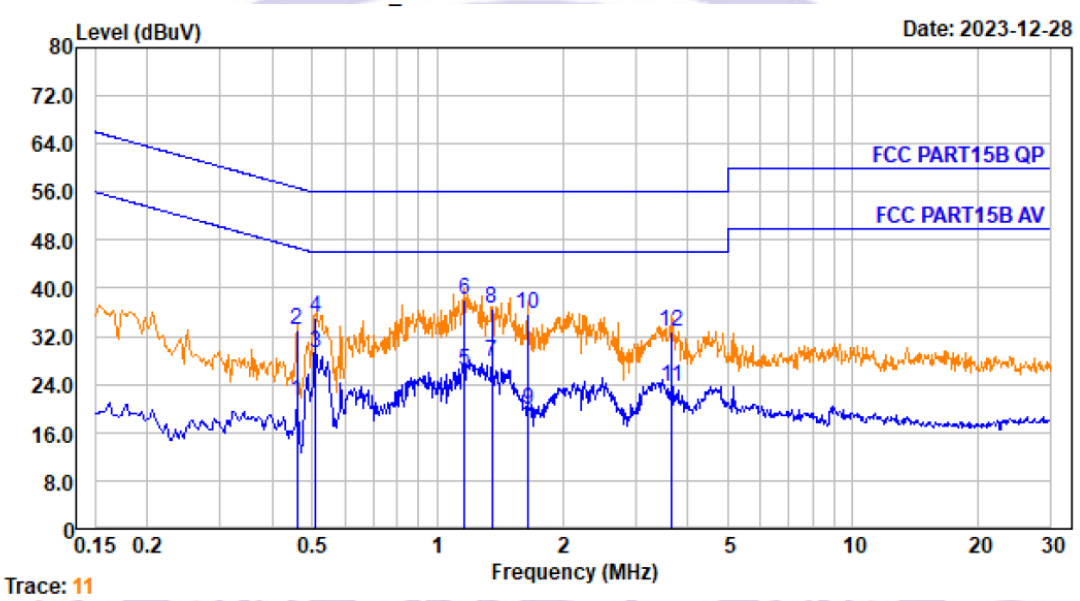
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (802.11a,Lowest channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	AC 120V		



No.	Freq MHz	Cable Loss dB	LISN Factor dB/m	Receiver Reading dBuV	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	0.198	0.01	9.55	6.04	25.75	53.71	-27.96	Average
2.	0.198	0.01	9.55	19.00	38.71	63.71	-25.00	QP
3.	0.518	0.01	9.57	9.96	29.65	46.00	-16.35	Average
4.	0.518	0.01	9.57	19.91	39.60	56.00	-16.40	QP
5.	0.948	0.02	9.58	5.42	25.11	46.00	-20.89	Average
6.	0.948	0.02	9.58	11.40	31.09	56.00	-24.91	QP
7.	1.166	0.03	9.58	5.70	25.39	46.00	-20.61	Average
8.	1.166	0.03	9.58	12.70	32.39	56.00	-23.61	QP
9.	2.500	0.05	9.59	2.89	22.59	46.00	-23.41	Average
10.	2.500	0.05	9.59	12.89	32.59	56.00	-23.41	QP
11.	3.381	0.06	9.60	1.95	21.65	46.00	-24.35	Average
12.	3.381	0.06	9.60	12.91	32.61	56.00	-23.39	QP

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	AC 120V		



No.	Freq MHz	Cable Loss dB	LISN Factor dB/m	Receiver Reading dBuV	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	0.459	0.01	9.58	1.43	21.14	46.71	-25.57	Average
2.	0.459	0.01	9.58	13.40	33.11	56.71	-23.60	QP
3.	0.510	0.01	9.58	9.54	29.24	46.00	-16.76	Average
4.	0.510	0.01	9.58	15.51	35.21	56.00	-20.79	QP
5.	1.160	0.03	9.58	6.48	26.17	46.00	-19.83	Average
6.	1.160	0.03	9.58	18.40	38.09	56.00	-17.91	QP
7.	1.352	0.03	9.58	8.01	27.70	46.00	-18.30	Average
8.	1.352	0.03	9.58	17.00	36.69	56.00	-19.31	QP
9.	1.654	0.04	9.58	0.16	19.85	46.00	-26.15	Average
10.	1.654	0.04	9.58	16.10	35.79	56.00	-20.21	QP
11.	3.661	0.07	9.62	3.92	23.65	46.00	-22.35	Average
12.	3.661	0.07	9.62	12.90	32.63	56.00	-23.37	QP

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

7 Radiated Spurious Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209 & 15.407 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	$20\log^{(500)}$

7.1 EUT Operation

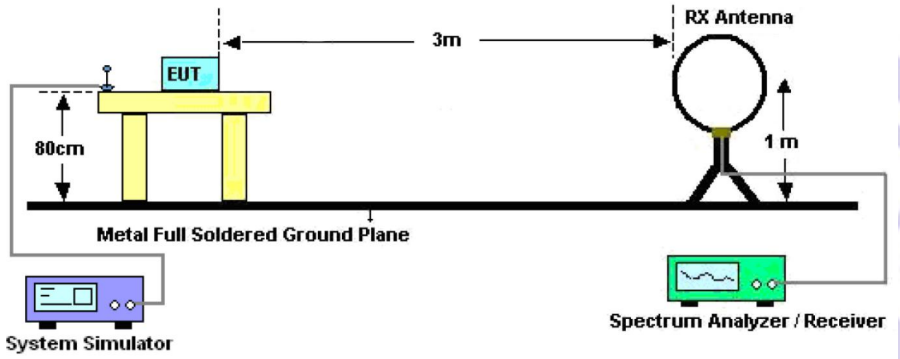
Operating Environment :

Temperature	:	24.5 °C
Humidity	:	55.5% RH
Atmospheric Pressure	:	101.3kPa
Test Voltage	:	AC 120V60Hz

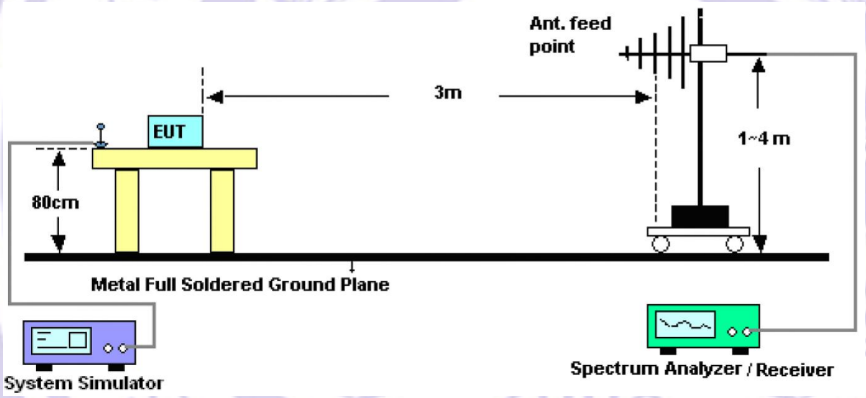
7.2 Test Setup

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

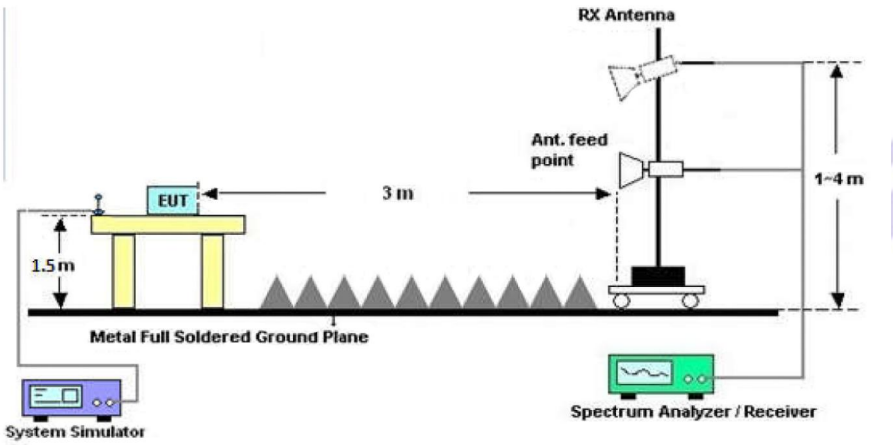
The test setup for emission measurement below 30MHz.



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:

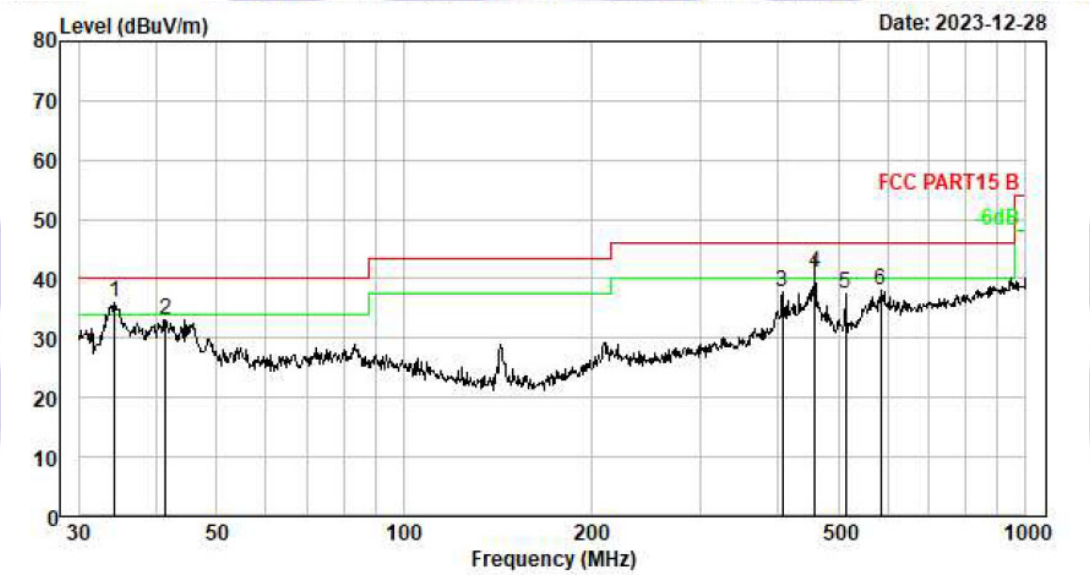
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

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:

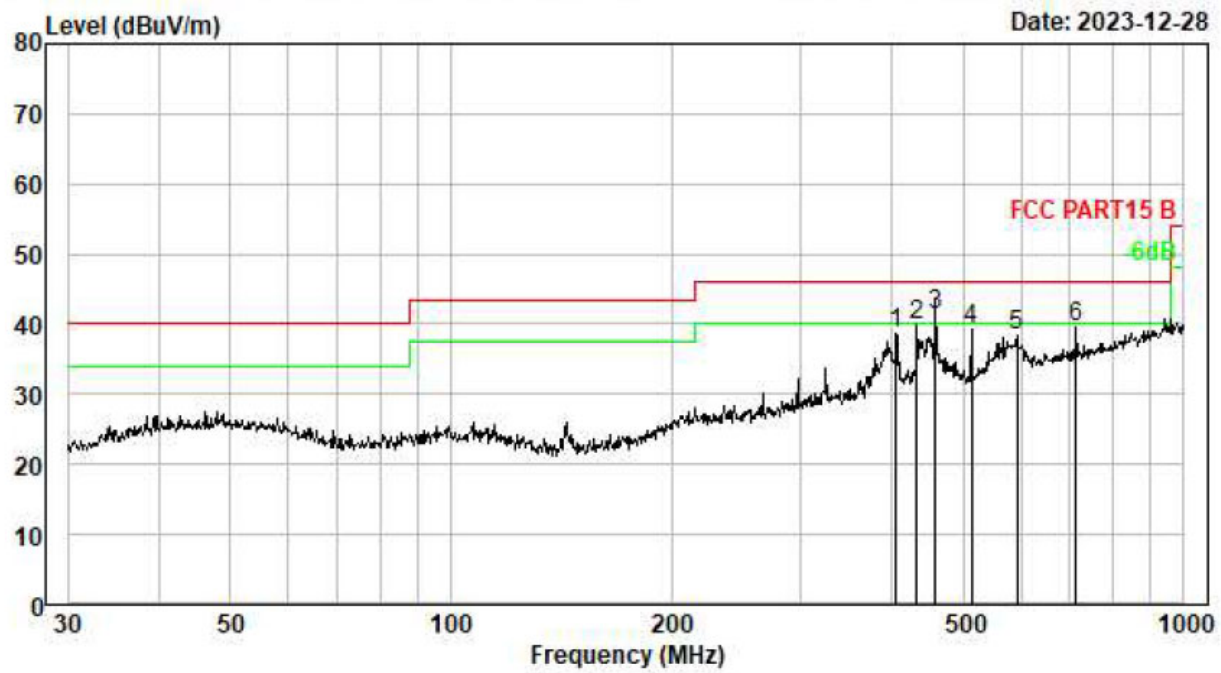
Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Preamp Gain dB	Receiver Reading dBµV	Emission Level dBµV/m	Limit dBµV/m	Over Limit dB	Remark
1	34.276	0.29	10.94	0.00	24.73	35.96	40.00	-4.04	QP
2	41.422	0.36	12.53	0.00	20.21	33.10	40.00	-6.90	QP
3	406.088	1.44	15.89	0.00	20.59	37.92	46.00	-8.08	QP
4	459.114	1.50	16.66	0.00	22.91	41.07	46.00	-4.93	QP
5	513.633	1.57	17.45	0.00	18.34	37.36	46.00	-8.64	QP
6	584.790	1.69	18.66	0.00	17.63	37.98	46.00	-8.02	QP

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

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



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Preamp Gain dB	Receiver Reading dBµV	Emission Level dBµV/m	Limit dBµV/m	Over Limit dB	Remark
1	404.667	1.44	15.87	0.00	21.41	38.72	46.00	-7.28	QP
2	432.546	1.47	16.29	0.00	22.16	39.92	46.00	-6.08	QP
3	459.114	1.50	16.66	0.00	23.11	41.27	46.00	-4.73	QP
4	513.633	1.57	17.45	0.00	20.28	39.30	46.00	-6.70	QP
5	593.050	1.71	18.79	0.00	17.88	38.38	46.00	-7.62	QP
6	714.173	1.88	20.64	0.00	17.06	39.58	46.00	-6.42	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP 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	47.52	32.29	8.39	38.90	62.52	74.00	-11.48	PK
V	11490	27	32.29	8.39	38.90	42.00	54.00	-12.00	AV
V	17233.3	41.68	31.19	9.62	40.37	60.48	74.00	-13.52	PK
V	17233.3	22.98	31.19	9.62	40.37	41.78	54.00	-12.22	AV
V	22980	42.9	27.02	7.20	38.98	62.06	74.00	-11.94	PK
V	22980	23.88	27.02	7.20	38.98	43.04	54.00	-10.96	AV
V	28723.3	41.11	27.10	7.56	40.18	61.75	74.00	-12.25	PK
V	28723.3	20.58	27.10	7.56	40.18	41.22	54.00	-12.78	AV
H	11490	48.88	32.29	8.39	38.90	63.88	74.00	-10.12	PK
H	11490	29.22	32.29	8.39	38.90	44.22	54.00	-9.78	AV
H	17233.3	45.32	31.19	9.62	40.37	64.12	74.00	-9.88	PK
H	17233.3	22	31.19	9.62	40.37	40.80	54.00	-13.20	AV
H	22980	41.37	27.02	7.20	38.98	60.53	74.00	-13.47	PK
H	22980	20.95	27.02	7.20	38.98	40.11	54.00	-13.89	AV
H	28723.3	39.43	27.10	7.56	40.18	60.07	74.00	-13.93	PK
H	28723.3	22.86	27.10	7.56	40.18	43.50	54.00	-10.50	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	41.01	32.26	8.48	38.90	56.13	74.00	-17.87	PK
V	11570	22.49	32.26	8.48	38.90	37.61	54.00	-16.39	AV
V	17353.3	39.84	31.08	9.67	40.61	59.04	74.00	-14.96	PK
V	17353.3	19.71	31.08	9.67	40.61	38.91	54.00	-15.09	AV
V	23140	38.74	27.03	7.24	39.03	57.98	74.00	-16.02	PK
V	23140	18.18	27.03	7.24	39.03	37.42	54.00	-16.58	AV
V	28923.3	38.63	27.10	7.58	40.34	59.45	74.00	-14.55	PK
V	28923.3	20.49	27.10	7.58	40.34	41.31	54.00	-12.69	AV
H	11570	44.5	32.26	8.48	38.90	59.62	74.00	-14.38	PK
H	11570	21.92	32.26	8.48	38.90	37.04	54.00	-16.96	AV
H	17353.3	40.3	31.08	9.67	40.61	59.50	74.00	-14.50	PK
H	17353.3	17.1	31.08	9.67	40.61	36.30	54.00	-17.70	AV
H	23140	40.67	27.03	7.24	39.03	59.91	74.00	-14.09	PK
H	23140	17.6	27.03	7.24	39.03	36.84	54.00	-17.16	AV
H	28923.3	38.87	27.10	7.58	40.34	59.69	74.00	-14.31	PK
H	28923.3	20.23	27.10	7.58	40.34	41.05	54.00	-12.95	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	46.49	32.23	8.56	38.90	61.72	74.00	-12.28	PK
V	11650	28.17	32.23	8.56	38.90	43.40	54.00	-10.60	AV
V	17473.3	45.07	30.97	9.73	40.85	64.68	74.00	-9.32	PK
V	17473.3	23.44	30.97	9.73	40.85	43.05	54.00	-10.95	AV
V	23300	39.53	27.03	7.26	39.06	58.82	74.00	-15.18	PK
V	23300	26.07	27.03	7.26	39.06	45.36	54.00	-8.64	AV
V	29123.3	40.63	27.10	7.61	40.40	61.54	74.00	-12.46	PK
V	29123.3	21.39	27.10	7.61	40.40	42.30	54.00	-11.70	AV
H	11650	46.42	32.23	8.56	38.90	61.65	74.00	-12.35	PK
H	11650	28.35	32.23	8.56	38.90	43.58	54.00	-10.42	AV
H	17473.3	42.23	30.97	9.73	40.85	61.84	74.00	-12.16	PK
H	17473.3	25.43	30.97	9.73	40.85	45.04	54.00	-8.96	AV
H	23300	46.08	27.03	7.26	39.06	65.37	74.00	-8.63	PK
H	23300	22.54	27.03	7.26	39.06	41.83	54.00	-12.17	AV
H	29123.3	35.94	27.10	7.61	40.40	56.85	74.00	-17.15	PK
H	29123.3	20.29	27.10	7.61	40.40	41.20	54.00	-12.80	AV

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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	40.14	32.70	7.72	38.59	53.75	74	-20.25	PK
V	10360	21.94	32.70	7.72	38.59	35.55	54	-18.45	AV
V	15540	42.36	31.74	9.44	39.29	59.35	74	-14.65	PK
V	15540	18.54	31.74	9.44	39.29	35.53	54	-18.47	AV
V	20720	42.26	26.93	6.64	37.94	59.91	74	-14.09	PK
V	20720	14.75	26.93	6.64	37.94	32.4	54	-21.6	AV
V	25900	39.07	27.10	7.90	39.32	59.19	74	-14.81	PK
V	25900	18.75	27.10	7.90	39.32	38.87	54	-15.13	AV
H	10360	39.56	32.70	7.72	38.59	53.17	74	-20.83	PK
H	10360	24.34	32.70	7.72	38.59	37.95	54	-16.05	AV
H	15540	36.15	31.74	9.44	39.29	53.14	74	-20.86	PK
H	15540	22.35	31.74	9.44	39.29	39.34	54	-14.66	AV
H	20720	38.58	26.93	6.64	37.94	56.23	74	-17.77	PK
H	20720	19.18	26.93	6.64	37.94	36.83	54	-17.17	AV
H	25900	36.17	27.10	7.90	39.32	56.29	74	-17.71	PK
H	25900	17.79	27.10	7.90	39.32	37.91	54	-16.09	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	43.59	32.69	7.73	38.62	57.25	74	-16.75	PK
V	10400	21.05	32.69	7.73	38.62	34.71	54	-19.29	AV
V	15600	37.71	31.72	9.45	39.28	54.72	74	-19.28	PK
V	15600	18.91	31.72	9.45	39.28	35.92	54	-18.08	AV
V	20800	37.79	26.93	6.73	37.96	55.55	74	-18.45	PK
V	20800	17.76	26.93	6.73	37.96	35.52	54	-18.48	AV
V	26000	36.39	27.10	7.94	39.30	56.53	74	-17.47	PK
V	26000	17.33	27.10	7.94	39.30	37.47	54	-16.53	AV
H	10400	41.01	32.69	7.73	38.62	54.67	74	-19.33	PK
H	10400	25.07	32.69	7.73	38.62	38.73	54	-15.27	AV
H	15600	38.93	31.72	9.45	39.28	55.94	74	-18.06	PK
H	15600	17.55	31.72	9.45	39.28	34.56	54	-19.44	AV
H	20800	41	26.93	6.73	37.96	58.76	74	-15.24	PK
H	20800	21.35	26.93	6.73	37.96	39.11	54	-14.89	AV
H	26000	35.37	27.10	7.94	39.30	55.51	74	-18.49	PK
H	26000	13.83	27.10	7.94	39.30	33.97	54	-20.03	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	43.84	32.66	7.74	38.68	57.6	74	-16.4	PK
V	10480	25.17	32.66	7.74	38.68	38.93	54	-15.07	AV
V	15720	38.16	31.68	9.48	39.26	55.22	74	-18.78	PK
V	15720	20.1	31.68	9.48	39.26	37.16	54	-16.84	AV
V	20960	37.62	26.94	6.91	37.99	55.58	74	-18.42	PK
V	20960	19.95	26.94	6.91	37.99	37.91	54	-16.09	AV
V	26200	36.58	27.10	7.89	39.50	56.87	74	-17.13	PK
V	26200	14.61	27.10	7.89	39.50	34.9	54	-19.1	AV
H	10480	43.13	32.66	7.74	38.68	56.89	74	-17.11	PK
H	10480	25.44	32.66	7.74	38.68	39.2	54	-14.8	AV
H	15720	39.71	31.68	9.48	39.26	56.77	74	-17.23	PK
H	15720	19.03	31.68	9.48	39.26	36.09	54	-17.91	AV
H	20960	37.71	26.94	6.91	37.99	55.67	74	-18.33	PK
H	20960	18.36	26.94	6.91	37.99	36.32	54	-17.68	AV
H	26200	35.16	27.10	7.89	39.50	55.45	74	-18.55	PK
H	26200	13.93	27.10	7.89	39.50	34.22	54	-19.78	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	52.09	33.14	5.29	33.88	56.64	74	-17.36	V	PK	Pass
5150	33.25	33.14	5.29	33.88	37.80	54	-16.20	V	AV	Pass
5145	53.19	33.14	5.29	33.88	57.74	74	-16.26	V	PK	Pass
5145	33.29	33.14	5.29	33.88	37.84	54	-16.16	V	AV	Pass
5150	53.68	33.14	5.29	33.88	58.23	74	-15.77	H	PK	Pass
5150	34.13	33.14	5.29	33.88	38.68	54	-15.32	H	AV	Pass
5145	51.03	33.14	5.29	33.88	55.58	74	-18.42	H	PK	Pass
5145	32.71	33.14	5.29	33.88	37.26	54	-16.74	H	AV	Pass
802.11a:5240MHz										
5350	55.28	33.06	5.44	33.72	60.06	74	-13.94	V	PK	Pass
5350	35.23	33.06	5.44	33.72	40.01	54	-13.99	V	AV	Pass
5370	50.47	33.05	5.45	33.70	55.27	74	-18.73	V	PK	Pass
5370	34.53	33.05	5.45	33.70	39.33	54	-14.67	V	AV	Pass
5350	54.70	33.06	5.44	33.72	59.48	74	-14.52	H	PK	Pass
5350	36.48	33.06	5.44	33.72	41.26	54	-12.74	H	AV	Pass
5370	52.44	33.05	5.45	33.70	57.24	74	-16.76	H	PK	Pass
5370	35.03	33.05	5.45	33.70	39.83	54	-14.17	H	AV	Pass
802.11n20:5180MHz										
5150	52.52	33.14	5.29	33.88	57.07	74	-16.93	V	PK	Pass

5150	35.96	33.14	5.29	33.88	40.51	54	-13.49	V	AV	Pass
5145	52.22	33.14	5.29	33.88	56.77	74	-17.23	V	PK	Pass
5145	34.19	33.14	5.29	33.88	38.74	54	-15.26	V	AV	Pass
5150	52.87	33.14	5.29	33.88	57.42	74	-16.58	H	PK	Pass
5150	36.20	33.14	5.29	33.88	40.75	54	-13.25	H	AV	Pass
5145	51.25	33.14	5.29	33.88	55.80	74	-18.20	H	PK	Pass
5145	34.91	33.14	5.29	33.88	39.46	54	-14.54	H	AV	Pass
802.11n20:5240MHz										
5350	54.56	33.06	5.44	33.72	59.34	74	-14.66	V	PK	Pass
5350	36.92	33.06	5.44	33.72	41.70	54	-12.30	V	AV	Pass
5370	51.67	33.05	5.45	33.70	56.47	74	-17.53	V	PK	Pass
5370	33.92	33.05	5.45	33.70	38.72	54	-15.28	V	AV	Pass
5350	53.75	33.06	5.44	33.72	58.53	74	-15.47	H	PK	Pass
5350	41.76	33.06	5.44	33.72	46.54	54	-7.46	H	AV	Pass
5370	52.71	33.05	5.45	33.70	57.51	74	-16.49	H	PK	Pass
5370	37.23	33.05	5.45	33.70	42.03	54	-11.97	H	AV	Pass
802.11ac20:5180MHz										
5150	52.37	33.14	5.29	33.88	56.92	74	-17.08	V	PK	Pass
5150	36.02	33.14	5.29	33.88	40.57	54	-13.43	V	AV	Pass
5145	53.15	33.14	5.29	33.88	57.70	74	-16.30	V	PK	Pass
5145	36.60	33.14	5.29	33.88	41.15	54	-12.85	V	AV	Pass
5150	53.21	33.14	5.29	33.88	57.76	74	-16.24	H	PK	Pass
5150	36.55	33.14	5.29	33.88	41.10	54	-12.90	H	AV	Pass
5145	50.71	33.14	5.29	33.88	55.26	74	-18.74	H	PK	Pass
5145	37.37	33.14	5.29	33.88	41.92	54	-12.08	H	AV	Pass

802.11ac20:5240MHz										
5350	54.34	33.06	5.44	33.72	59.12	74	-14.88	V	PK	Pass
5350	39.00	33.06	5.44	33.72	43.78	54	-10.22	V	AV	Pass
5370	52.12	33.05	5.45	33.70	56.92	74	-17.08	V	PK	Pass
5370	37.85	33.05	5.45	33.70	42.65	54	-11.35	V	AV	Pass
5350	55.62	33.06	5.44	33.72	60.40	74	-13.60	H	PK	Pass
5350	42.38	33.06	5.44	33.72	47.16	54	-6.84	H	AV	Pass
5370	53.62	33.05	5.45	33.70	58.42	74	-15.58	H	PK	Pass
5370	37.64	33.05	5.45	33.70	42.44	54	-11.56	H	AV	Pass
802.11n40:5190MHz										
5150	54.60	33.14	5.29	33.88	59.15	74	-14.85	V	PK	Pass
5150	38.38	33.14	5.29	33.88	42.93	54	-11.07	V	AV	Pass
5145	51.51	33.14	5.29	33.88	56.06	74	-17.94	V	PK	Pass
5145	36.63	33.14	5.29	33.88	41.18	54	-12.82	V	AV	Pass
5150	55.13	33.14	5.29	33.88	59.68	74	-14.32	H	PK	Pass
5150	42.99	33.14	5.29	33.88	47.54	54	-6.46	H	AV	Pass
5145	53.24	33.14	5.29	33.88	57.79	74	-16.21	H	PK	Pass
5145	37.27	33.14	5.29	33.88	41.82	54	-12.18	H	AV	Pass
802.11n40:5230MHz										
5350	54.98	33.06	5.44	33.72	59.76	74	-14.24	V	PK	Pass
5350	37.37	33.06	5.44	33.72	42.15	54	-11.85	V	AV	Pass
5370	54.51	33.05	5.45	33.70	59.31	74	-14.69	V	PK	Pass
5370	33.58	33.05	5.45	33.70	38.38	54	-15.62	V	AV	Pass
5350	52.97	33.06	5.44	33.72	57.75	74	-16.25	H	PK	Pass
5350	42.15	33.06	5.44	33.72	46.93	54	-7.07	H	AV	Pass

5370	52.51	33.05	5.45	33.70	57.31	74	-16.69	H	PK	Pass
5370	32.62	33.05	5.45	33.70	37.42	54	-16.58	H	AV	Pass
802.11ac40:5190MHz										
5150	55.33	33.14	5.29	33.88	59.88	74	-14.12	V	PK	Pass
5150	35.93	33.14	5.29	33.88	40.48	54	-13.52	V	AV	Pass
5145	51.11	33.14	5.29	33.88	55.66	74	-18.34	V	PK	Pass
5145	34.83	33.14	5.29	33.88	39.38	54	-14.62	V	AV	Pass
5150	55.55	33.14	5.29	33.88	60.10	74	-13.90	H	PK	Pass
5150	38.26	33.14	5.29	33.88	42.81	54	-11.19	H	AV	Pass
5145	52.59	33.14	5.29	33.88	57.14	74	-16.86	H	PK	Pass
5145	35.35	33.14	5.29	33.88	39.90	54	-14.10	H	AV	Pass
802.11ac40:5230MHz										
5350	52.57	33.06	5.44	33.72	57.35	74	-16.65	V	PK	Pass
5350	36.49	33.06	5.44	33.72	41.27	54	-12.73	V	AV	Pass
5370	52.84	33.05	5.45	33.70	57.64	74	-16.36	V	PK	Pass
5370	35.21	33.05	5.45	33.70	40.01	54	-13.99	V	AV	Pass
5350	54.04	33.06	5.44	33.72	58.82	74	-15.18	H	PK	Pass
5350	35.90	33.06	5.44	33.72	40.68	54	-13.32	H	AV	Pass
5370	51.62	33.05	5.45	33.70	56.42	74	-17.58	H	PK	Pass
5370	34.40	33.05	5.45	33.70	39.20	54	-14.80	H	AV	Pass
802.11ac80:5210MHz										
5150	54.14	33.09	5.36	33.81	58.78	74	-15.22	V	PK	Pass
5150	37.40	33.09	5.36	33.81	42.04	54	-11.96	V	AV	Pass
5145	51.09	33.09	5.36	33.81	55.73	74	-18.27	V	PK	Pass

5145	35.22	33.09	5.36	33.81	39.86	54	-14.14	V	AV	Pass
5150	53.80	33.09	5.36	33.81	58.44	74	-15.56	H	PK	Pass
5150	37.33	33.09	5.36	33.81	41.97	54	-12.03	H	AV	Pass
5145	53.10	33.09	5.36	33.81	57.74	74	-16.26	H	PK	Pass
5145	36.93	33.09	5.36	33.81	41.57	54	-12.43	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

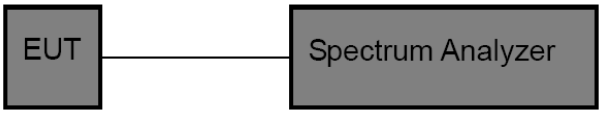
without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment 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

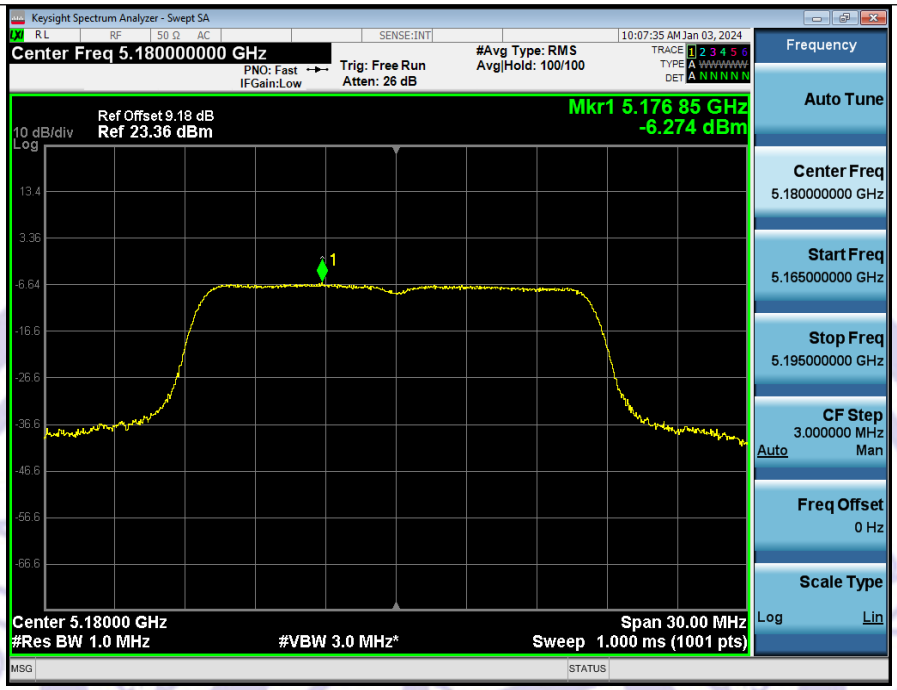
   Detector function = peak

   Trace = max hold

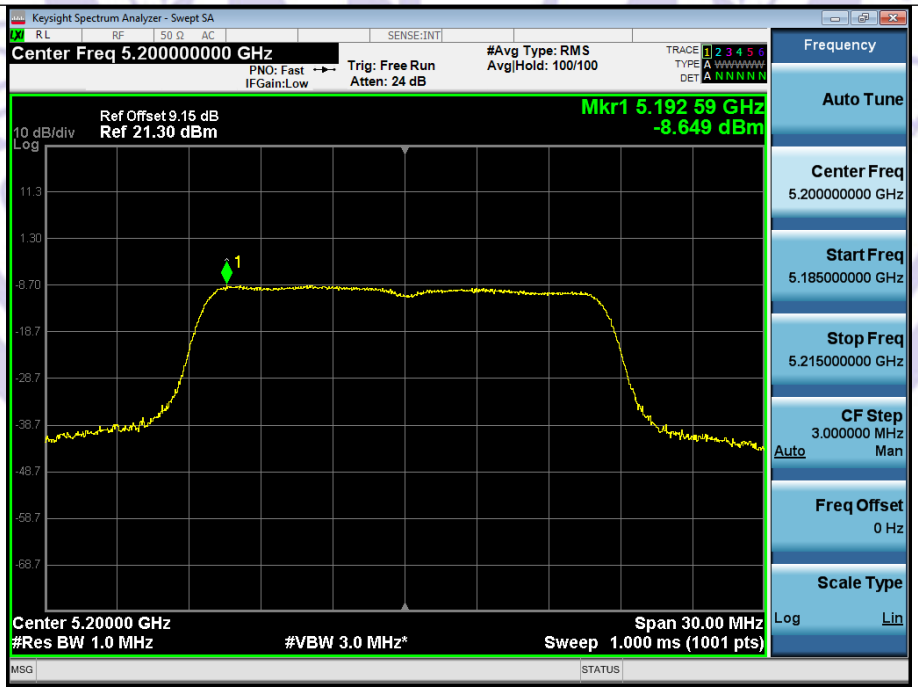
8.4 Test Data

Modulation	Frequency (MHz)	PSD(dBm/MHz)	limit(dBm)	Result
802.11a	5180.00	-6.274	11	Pass
802.11a	5200.00	-8.649	11	Pass
802.11a	5240.00	-10.393	11	Pass
802.11n(HT20)	5180.00	-6.587	11	Pass
802.11n(HT20)	5200.00	-7.361	11	Pass
802.11n(HT20)	5240.00	-9.925	11	Pass
802.11ac(VHT20)	5180.00	-5.685	11	Pass
802.11ac(VHT20)	5200.00	-7.339	11	Pass
802.11ac(VHT20)	5240.00	-9.756	11	Pass
802.11n(HT40)	5190.00	-9.713	11	Pass
802.11n(HT40)	5230.00	-12.517	11	Pass
802.11ac(VHT40)	5190.00	-9.740	11	Pass
802.11ac(VHT40)	5230.00	-12.789	11	Pass
802.11ac(VHT80)	5210.00	-12.415	11	Pass

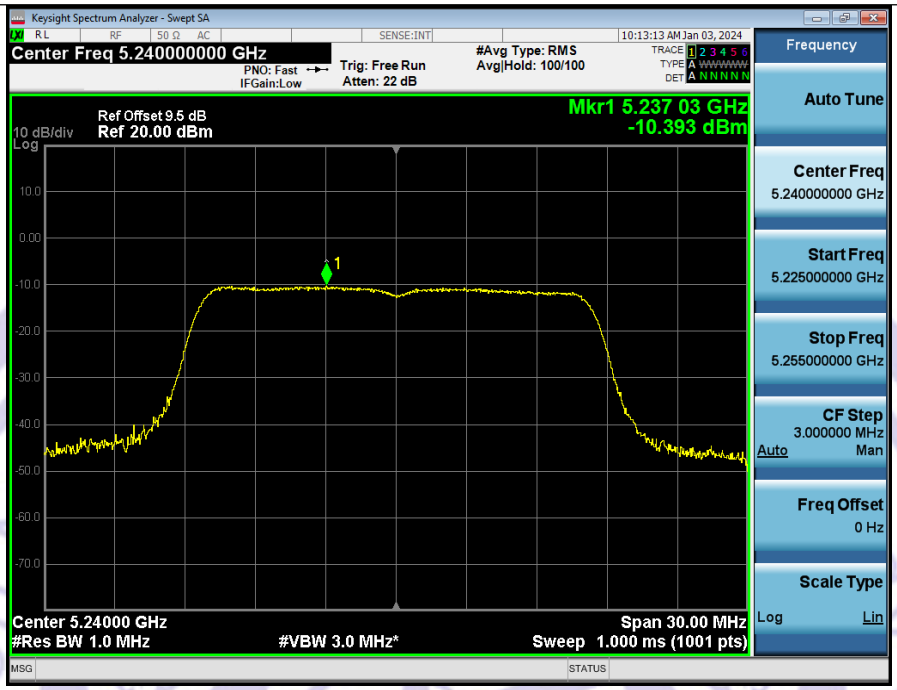
Power_Spectral_Density_NVNT_ANT1_802_11a_5180



Power_Spectral_Density_NVNT_ANT1_802_11a_5200



Power_Spectral_Density_NVNT_ANT1_802_11a_5240

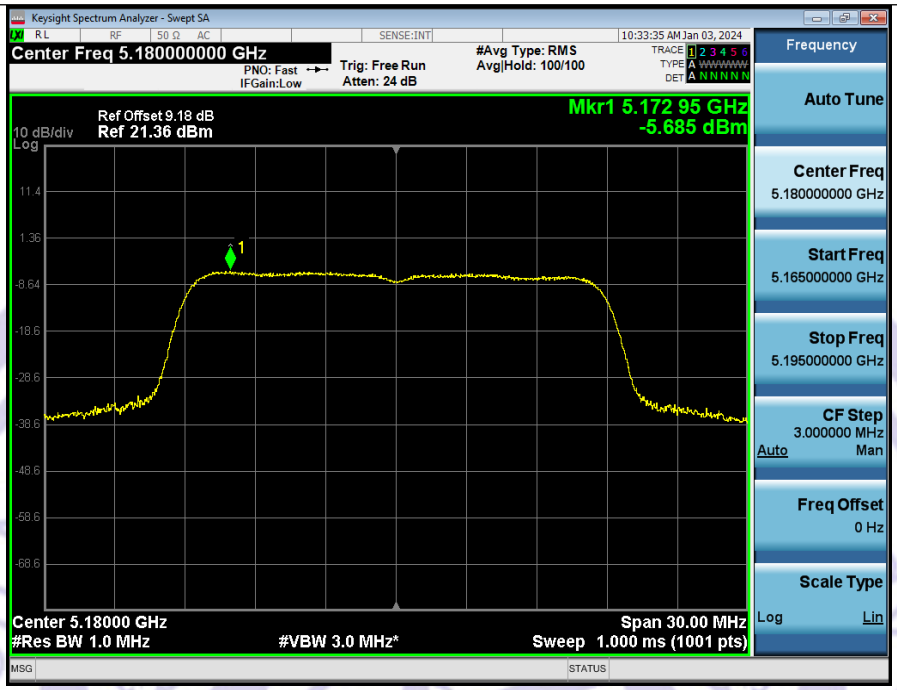


Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_5180

Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_5200

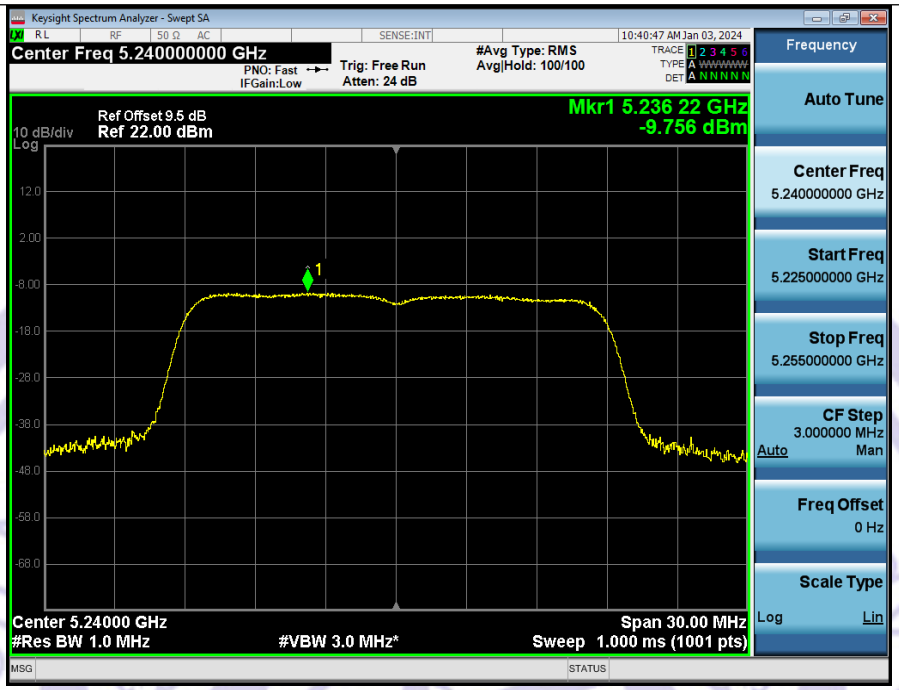
Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_5240

Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT20)_5180

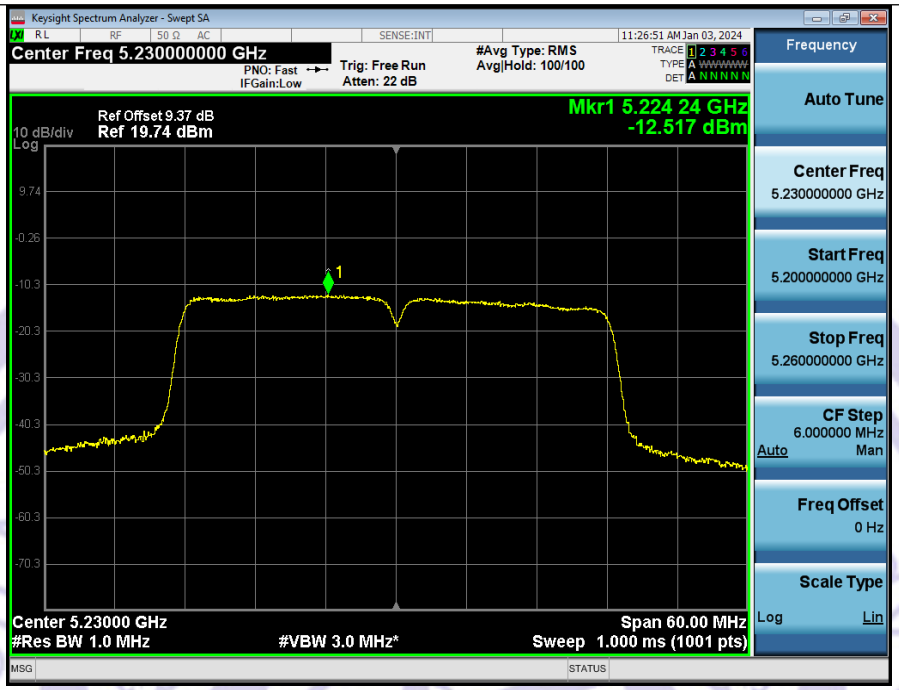


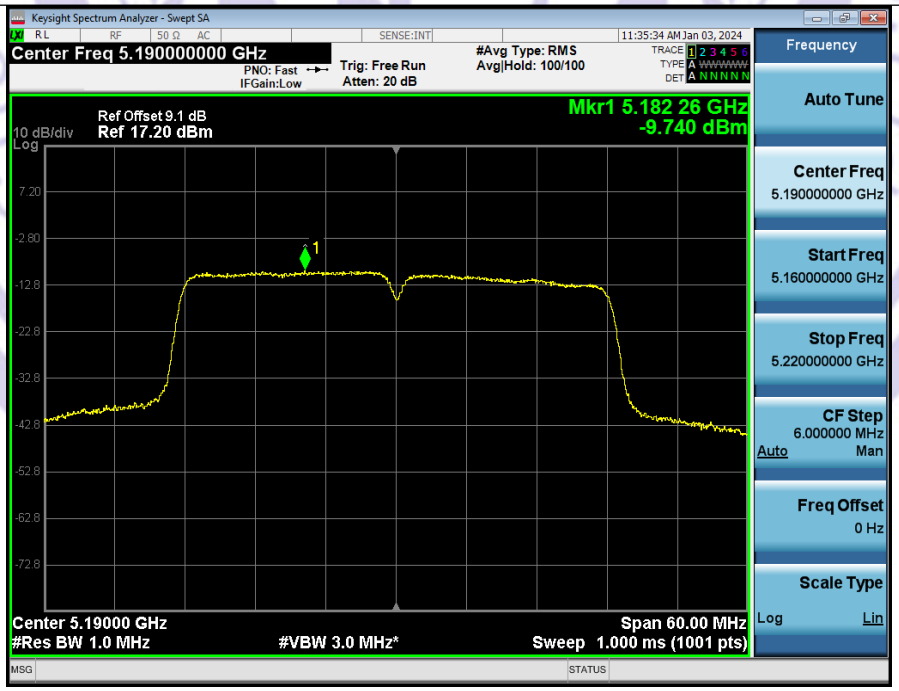
Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT20)_5200

Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT20)_5240

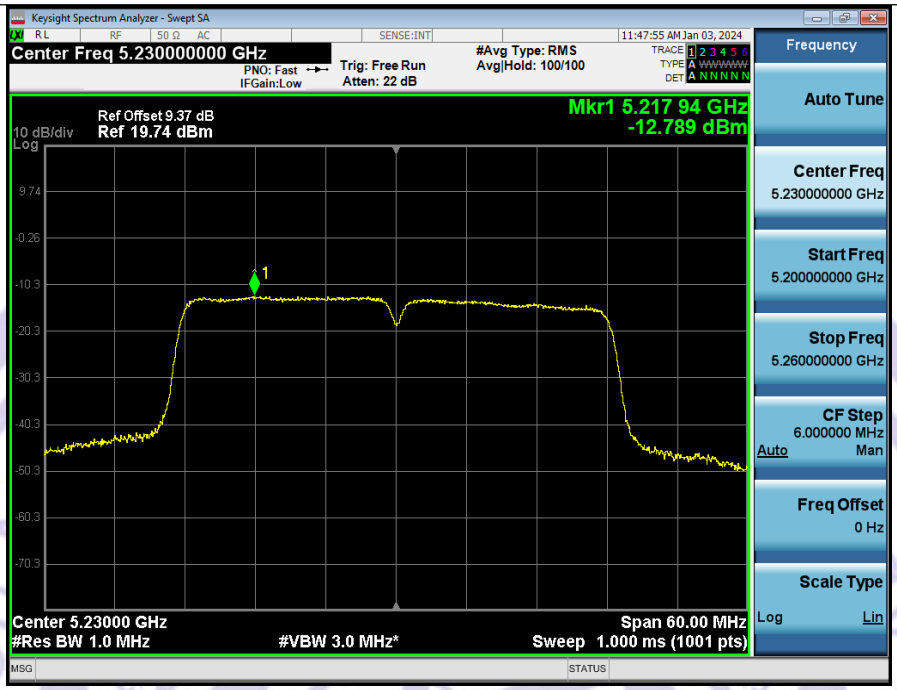


Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_5190

Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_5230


Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT40)_5190


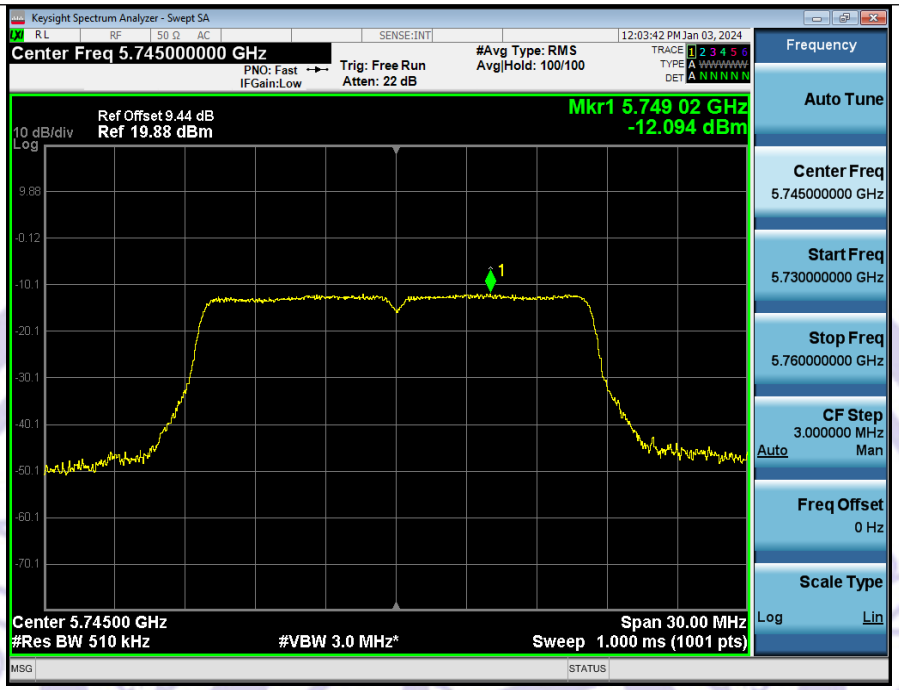
Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT40)_5230



Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT80)_5210

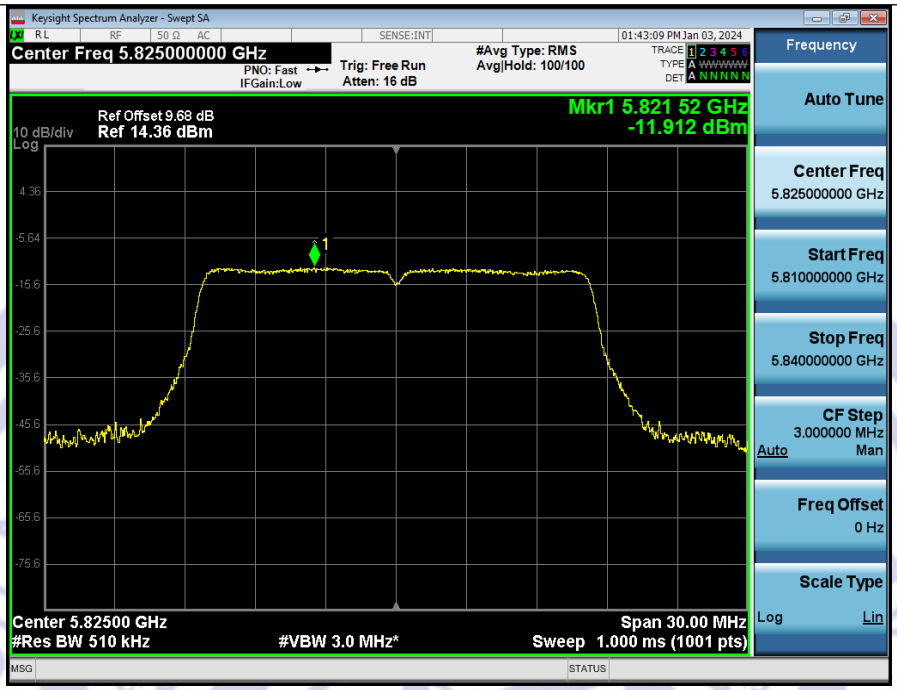
Modulation	Frequency (MHz)	PSD(dBm/500kHz)	limit(dBm/500kHz)	Result
802.11a	5745.00	-12.094	30	Pass
802.11a	5785.00	-10.459	30	Pass
802.11a	5825.00	-11.912	30	Pass
802.11n(HT20)	5745.00	-11.483	30	Pass
802.11n(HT20)	5785.00	-9.979	30	Pass
802.11n(HT20)	5825.00	-12.214	30	Pass
802.11ac(VHT20)	5745.00	-11.647	30	Pass
802.11ac(VHT20)	5785.00	-10.162	30	Pass
802.11ac(VHT20)	5825.00	-11.736	30	Pass
802.11n(HT40)	5755.00	-13.983	30	Pass
802.11n(HT40)	5795.00	-13.758	30	Pass
802.11ac(VHT40)	5755.00	-13.986	30	Pass
802.11ac(VHT40)	5795.00	-13.723	30	Pass
802.11ac(VHT80)	5775.00	-16.412	30	Pass

Power_Spectral_Density_NVNT_ANT1_802_11a_5745

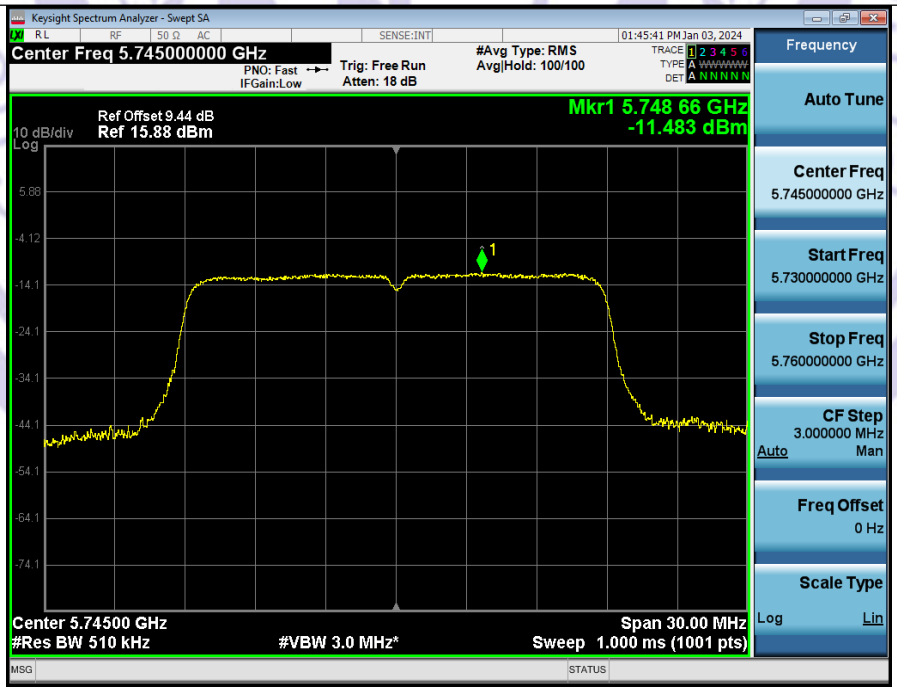


Power_Spectral_Density_NVNT_ANT1_802_11a_5785

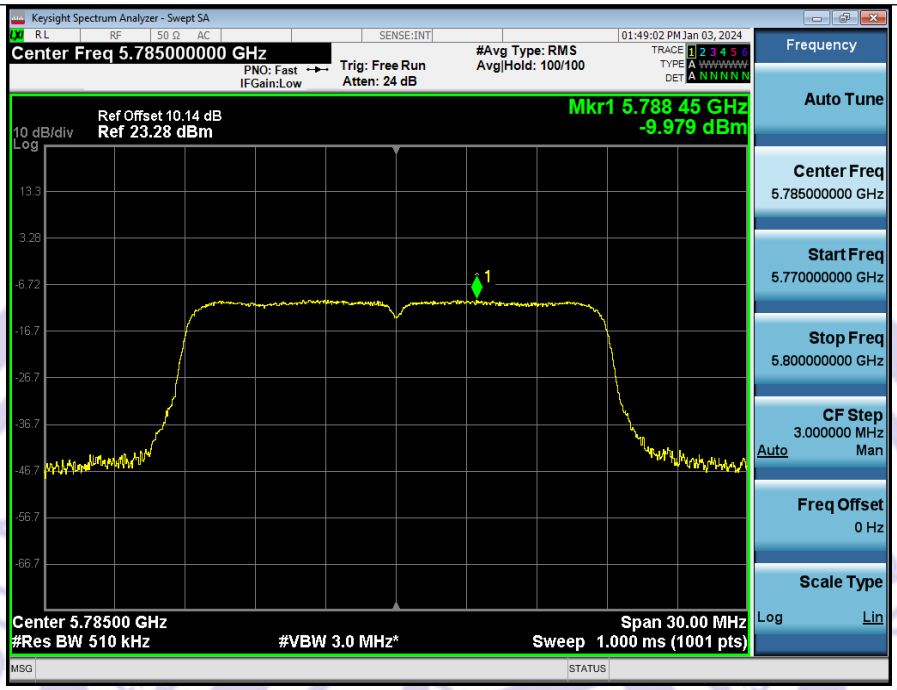
Power_Spectral_Density_NVNT_ANT1_802_11a_5825



Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_5745

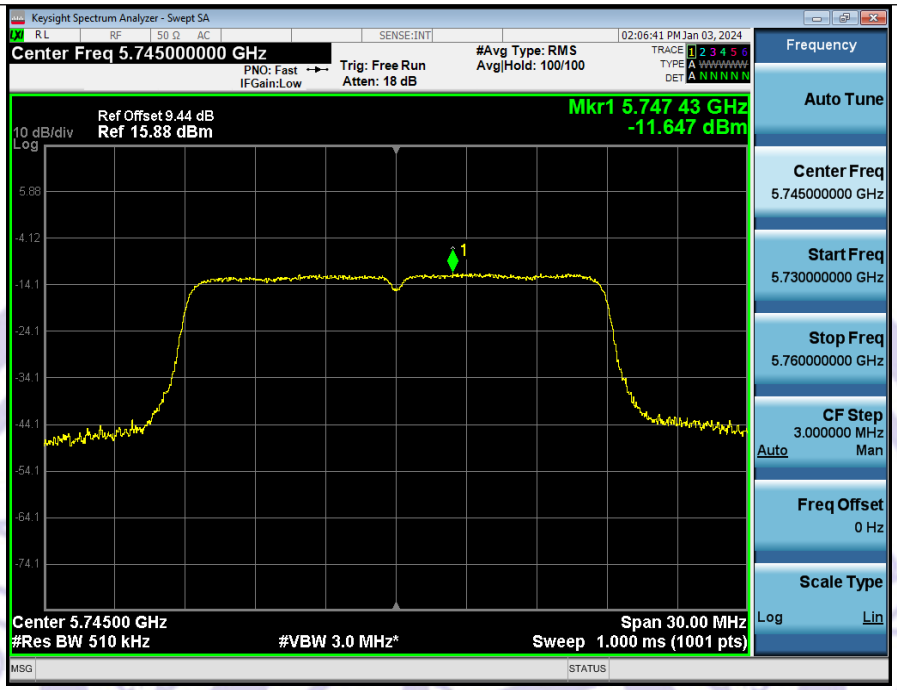


Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_5785

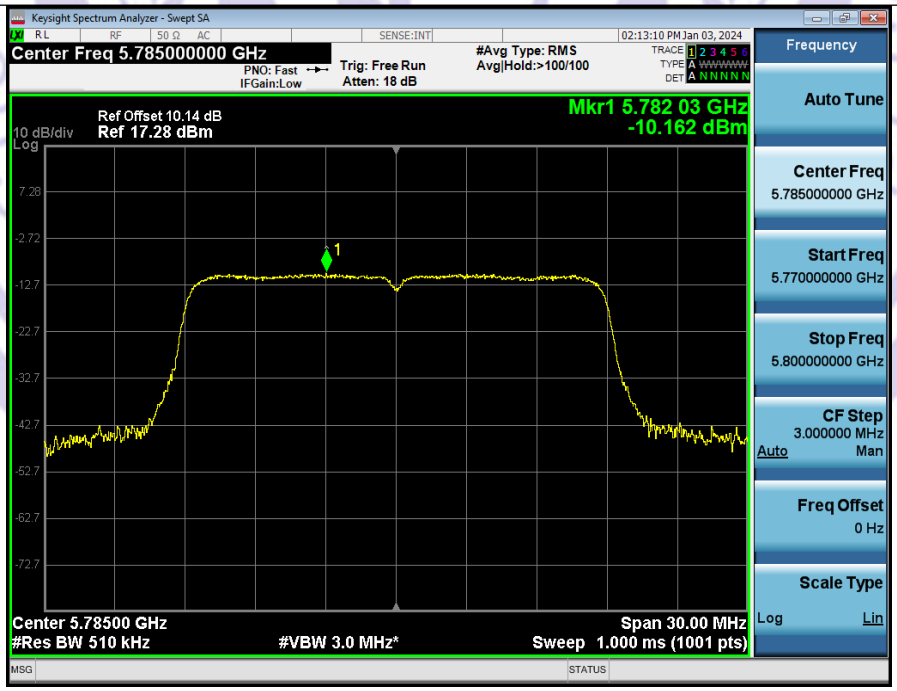


Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_5825

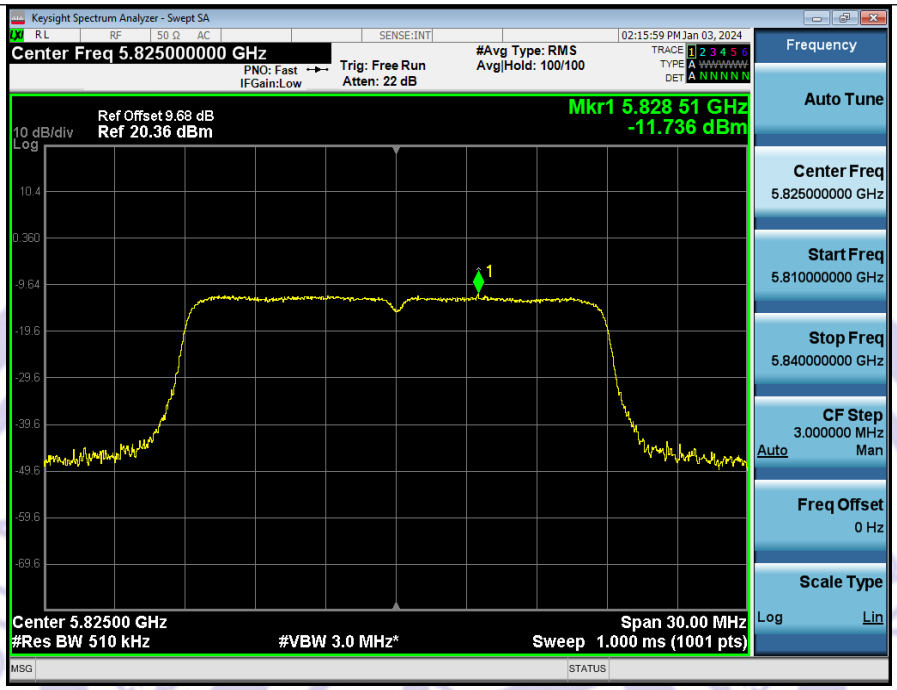
Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT20)_5745



Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT20)_5785



Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT20)_5825



Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_5755

Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_5795


Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT40)_5755


Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT40)_5795

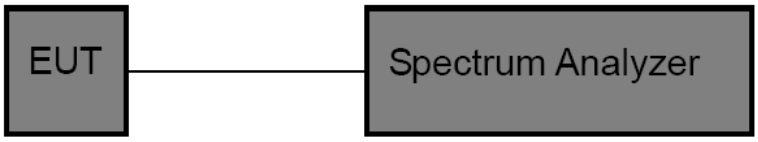
Power_Spectral_Density_NVNT_ANT1_802_11ac(VHT80)_5775

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 = 1000KHz.

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.

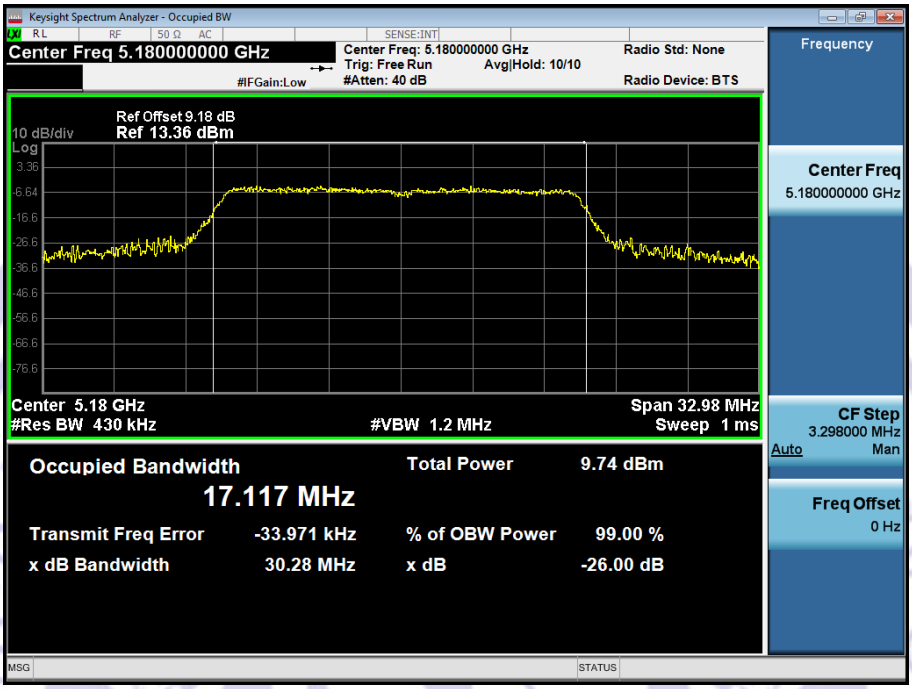
6. Use the 99 % power bandwidth function of the instrument (if available).

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.

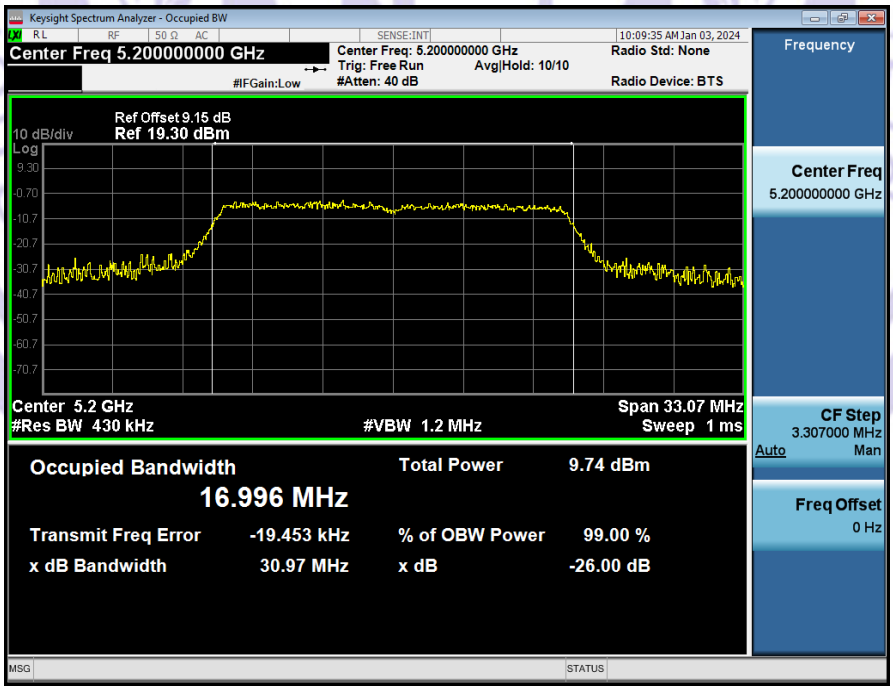
9.4 Test Data

Modulation	Frequency(MHz)	-26dB_Emission_Bandwidth(MHz)
802.11a	5180.00	30.28
802.11a	5200.00	30.97
802.11a	5240.00	31.87
802.11n(HT20)	5180.00	31.35
802.11n(HT20)	5200.00	32.35
802.11n(HT20)	5240.00	28.37
802.11ac(VHT20)	5180.00	31.77
802.11ac(VHT20)	5200.00	32.19
802.11ac(VHT20)	5240.00	32.66
802.11n(HT40)	5190.00	47.54
802.11n(HT40)	5230.00	54.77
802.11ac(VHT40)	5190.00	53.38
802.11ac(VHT40)	5230.00	59.68
802.11ac(VHT80)	5210.00	99.70

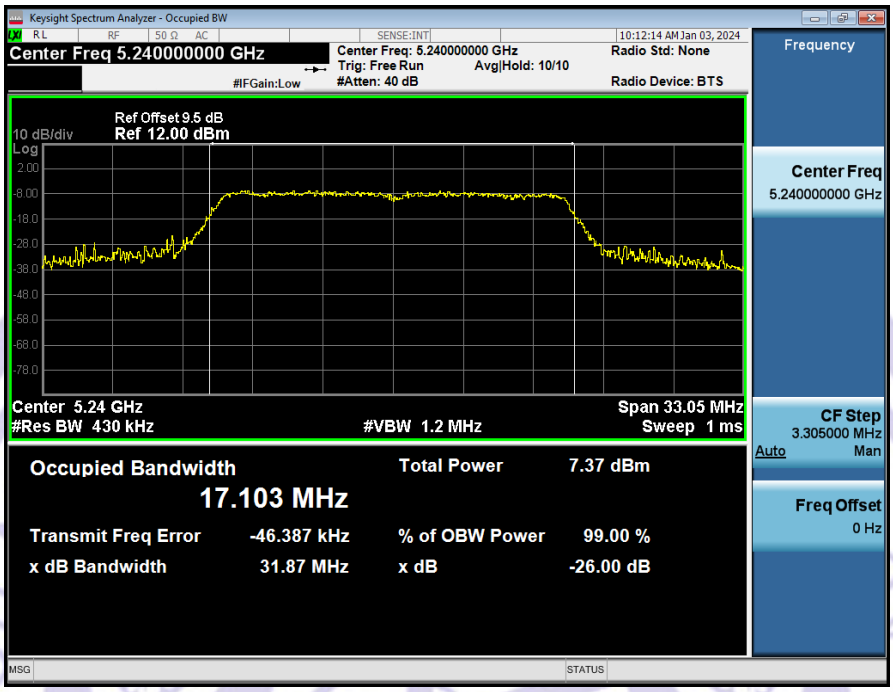
802_11a20_5180



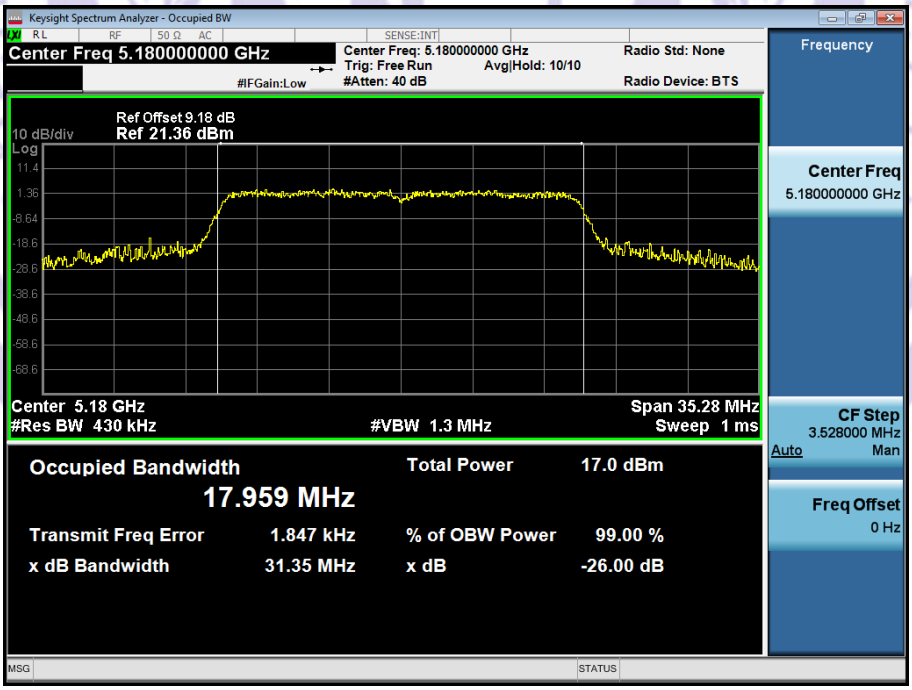
802_11a20_5200



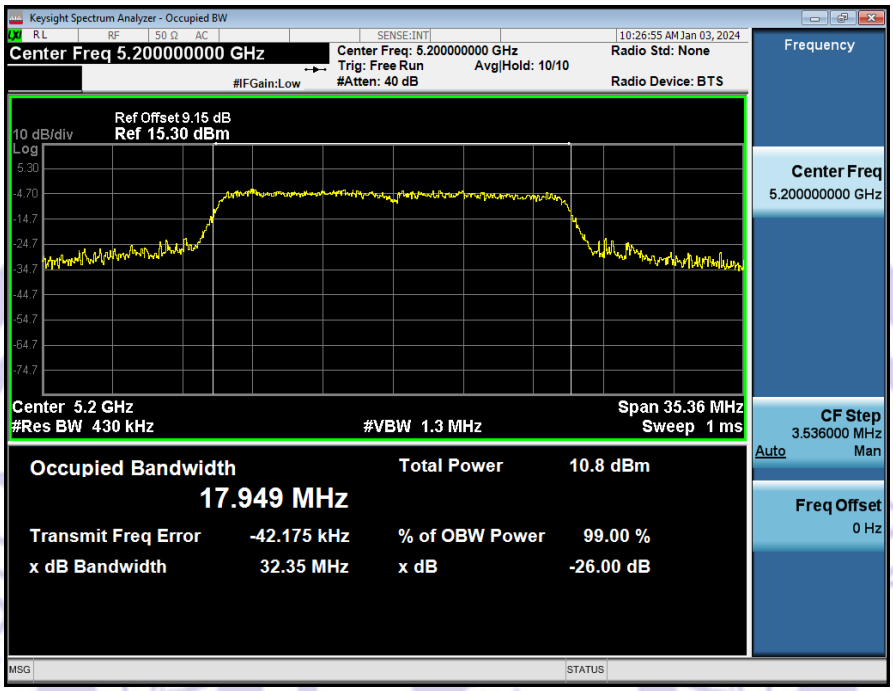
802_11a20_5240



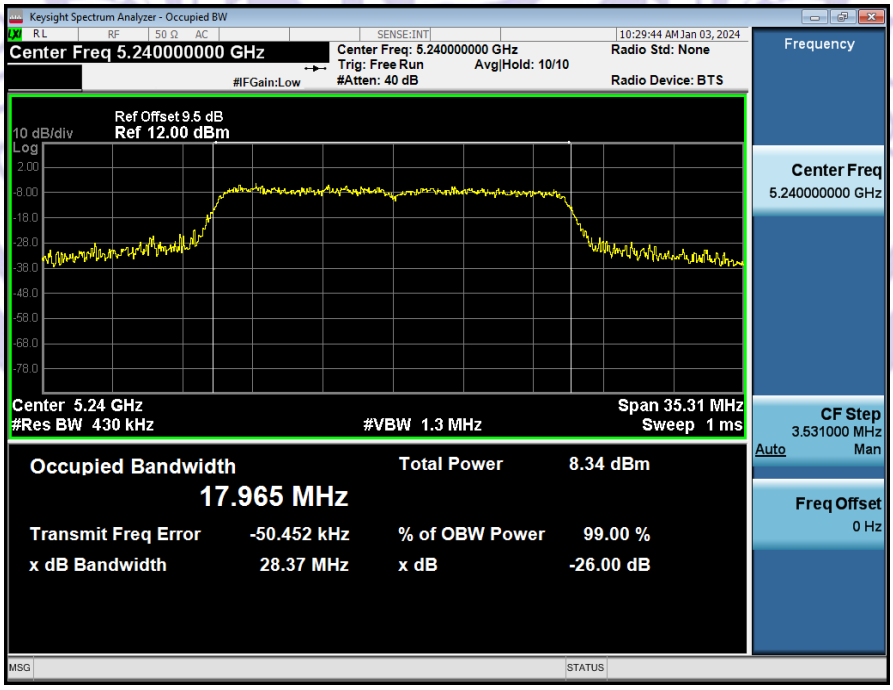
802_11n20_5180



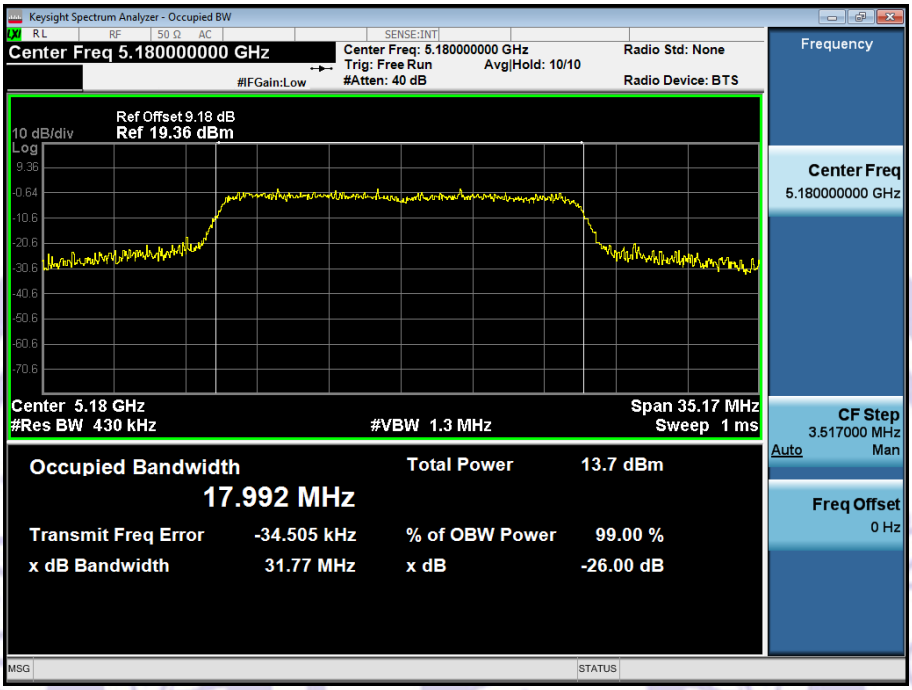
802_11n20_5200



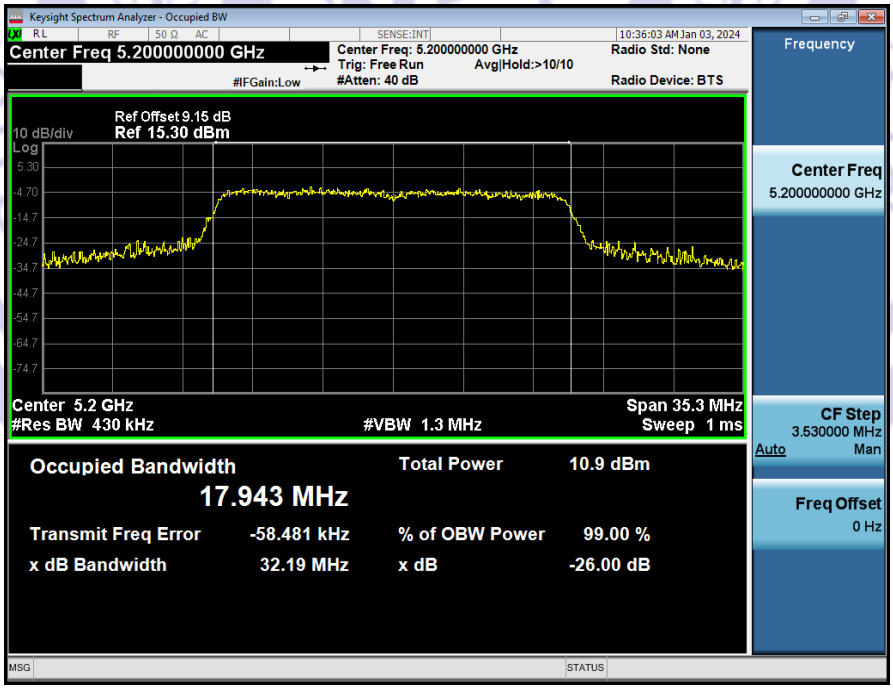
802_11n20_5240



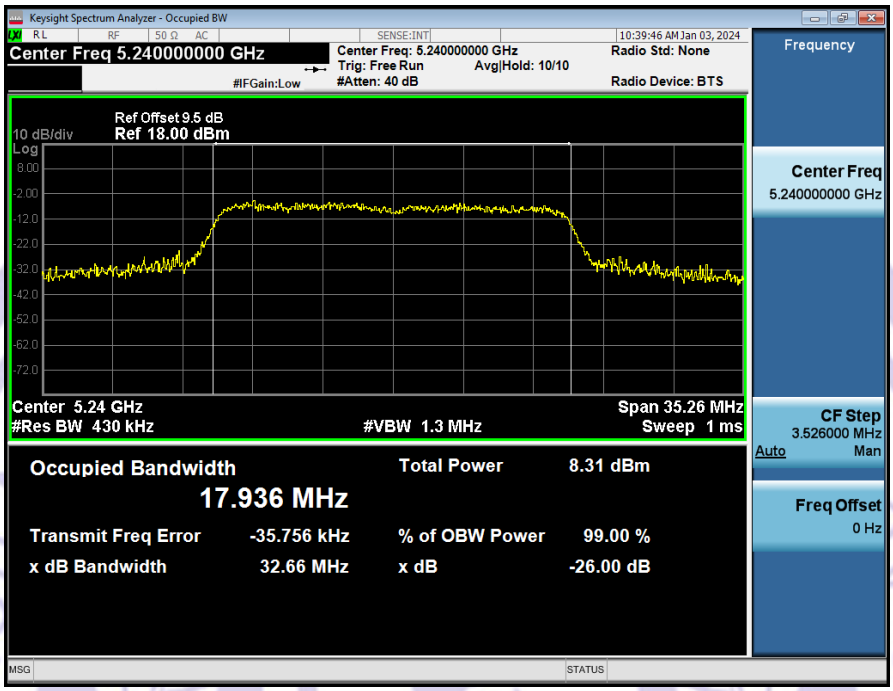
802_11ac20_5180



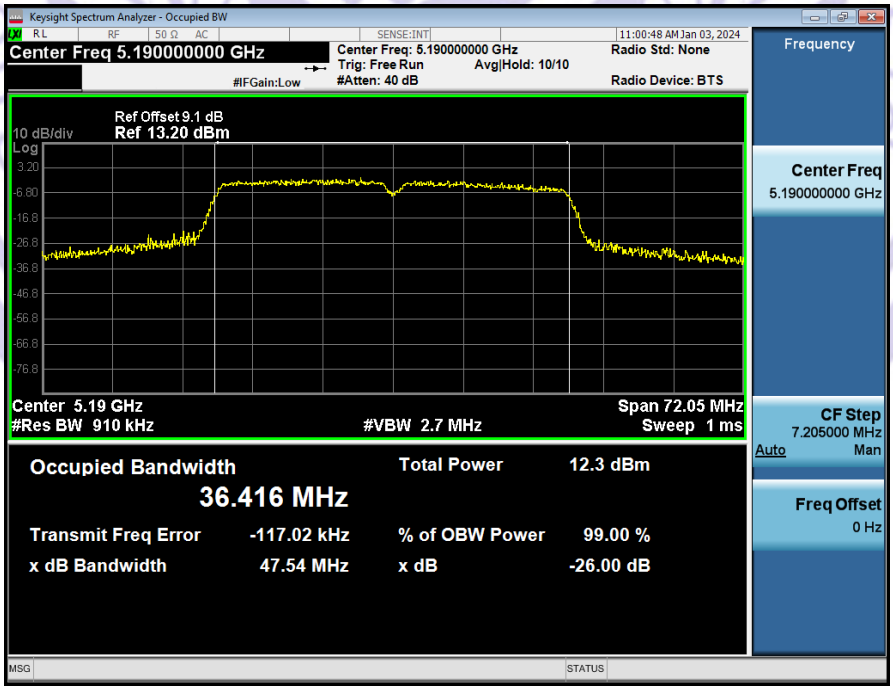
802_11ac20_5200



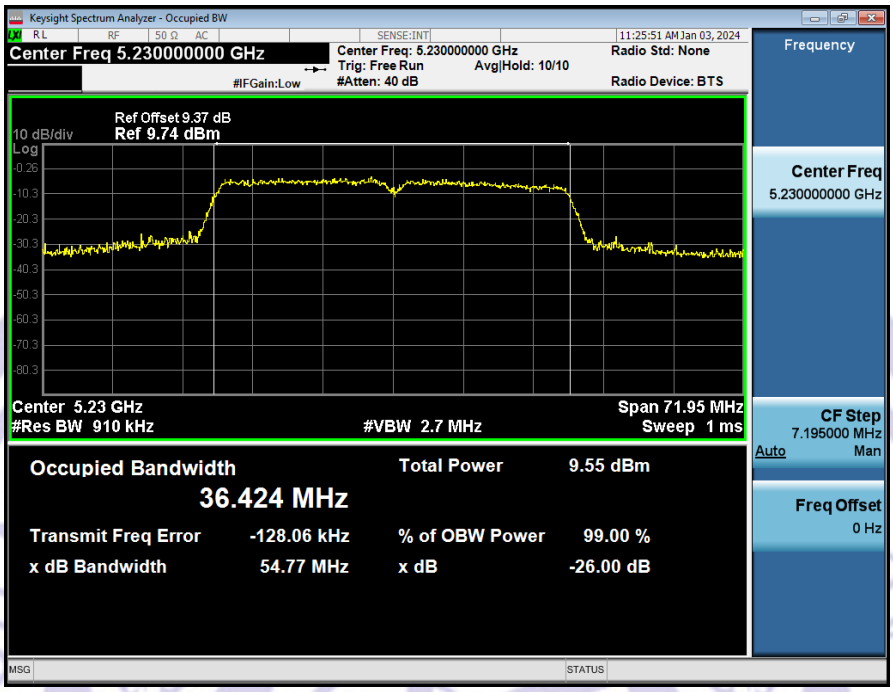
802_11ac20_5240



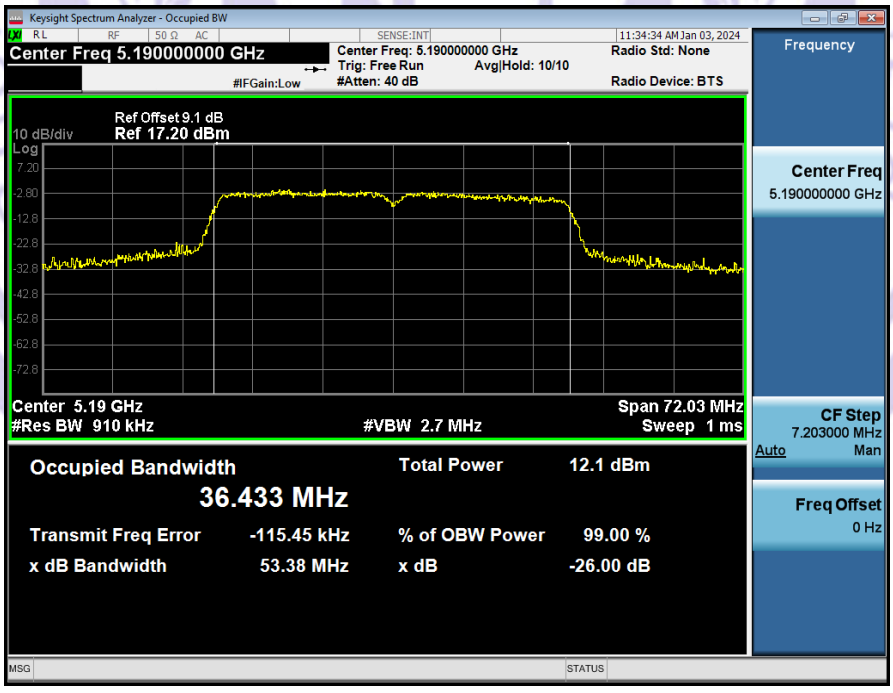
802_11n40_5190



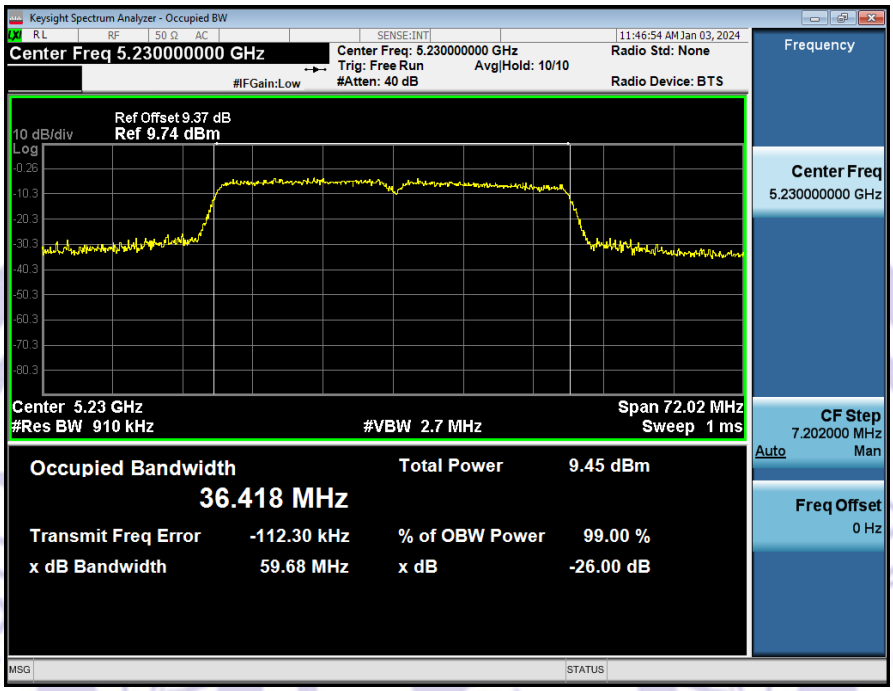
802_11n40_5230



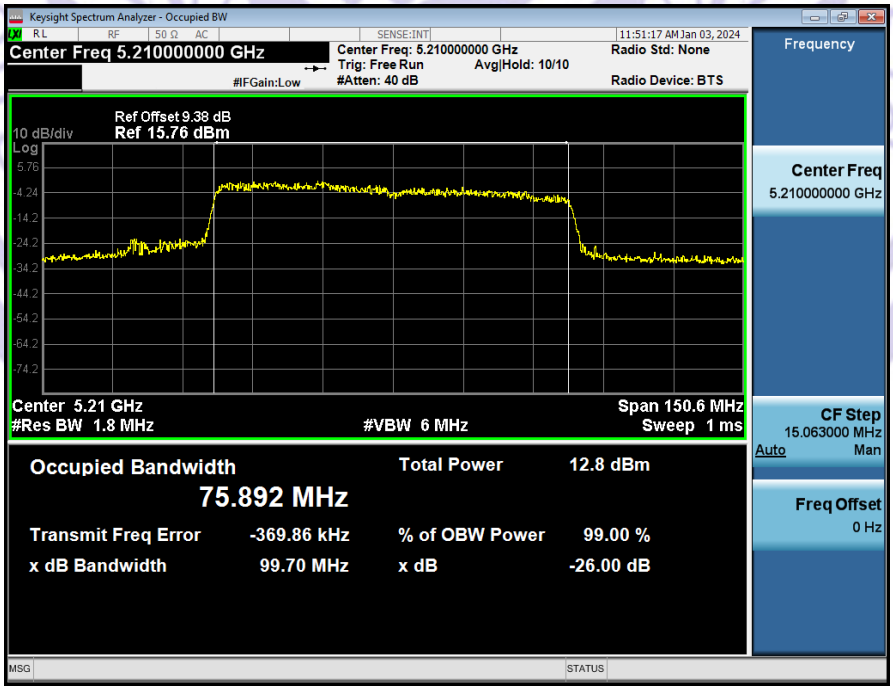
802_11ac40_5190



802_11ac40_5230

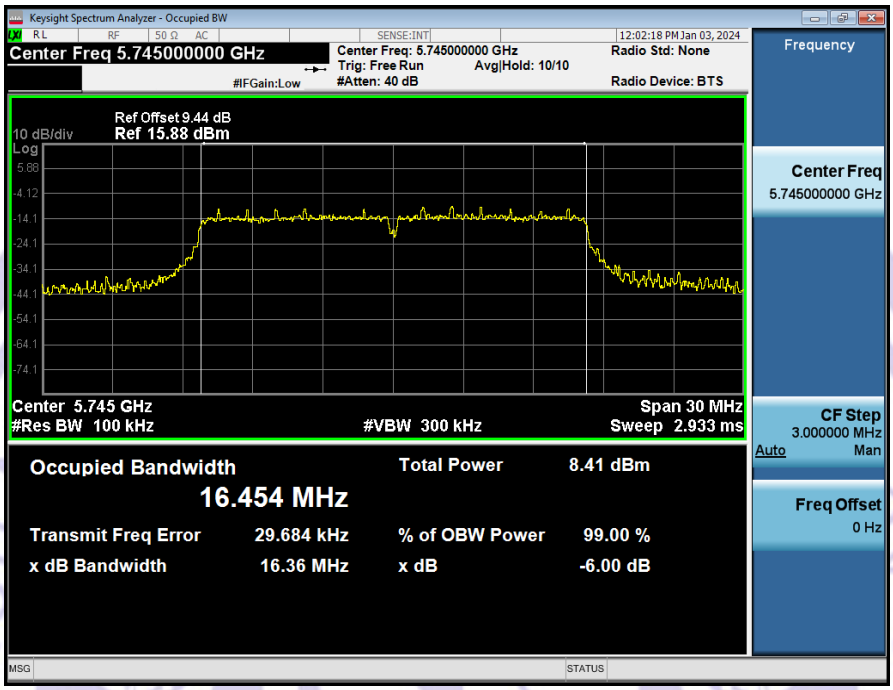


802_11ac80_5210

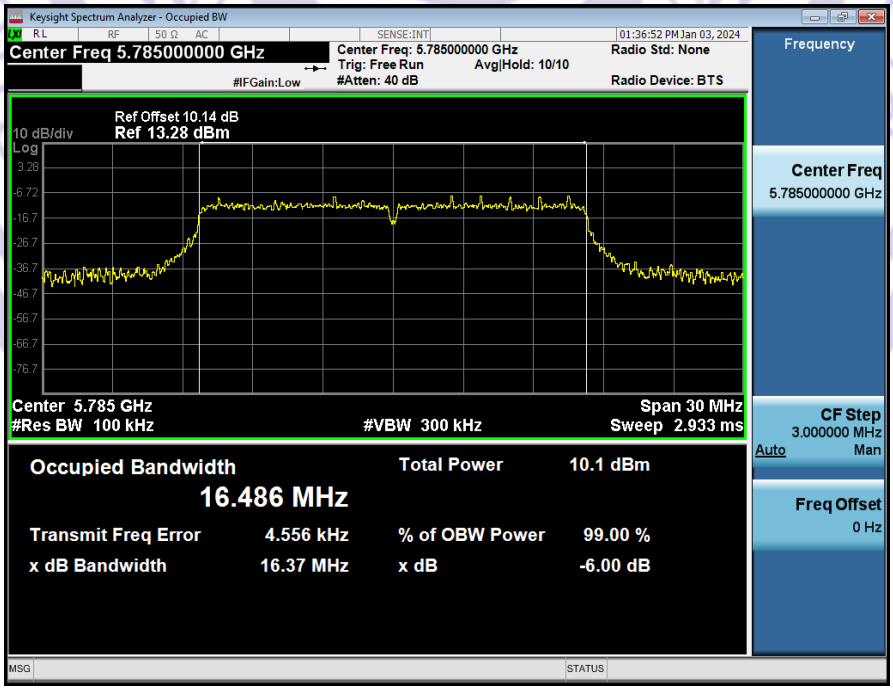


	Test Channel	6dB Bandwidth (MHz)	6dB Bandwidth Limit (MHz)	Result
		ANT 1		
802.11a	5745.00	16.36	>0.5	Pass
	5785.00	16.37	>0.5	Pass
	5825.00	16.36	>0.5	Pass
802.11n HT20	5745.00	17.39	>0.5	Pass
	5785.00	17.41	>0.5	Pass
	5825.00	17.43	>0.5	Pass
802.11n HT40	5755.00	17.22	>0.5	Pass
	5795.00	17.42	>0.5	Pass
802.11ac VHT20	5745.00	17.56	>0.5	Pass
	5785.00	35.58	>0.5	Pass
	5825.00	35.58	>0.5	Pass
802.11ac VHT40	5755.00	35.67	>0.5	Pass
	5795.00	35.41	>0.5	Pass
802.11ac VHT80	5775.00	75.33	>0.5	Pass

802_11a20_5745



802_11a20_5785



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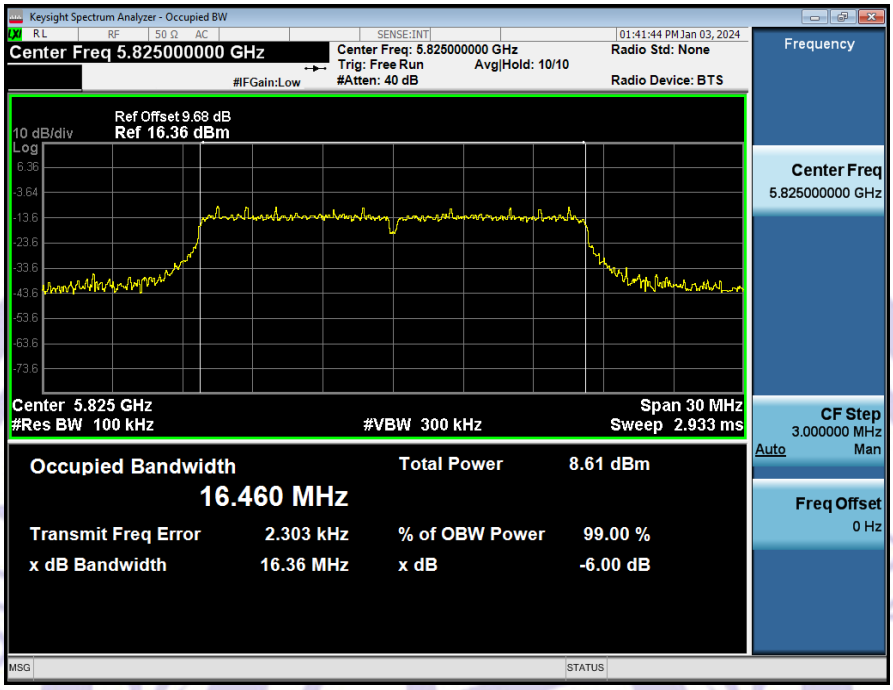

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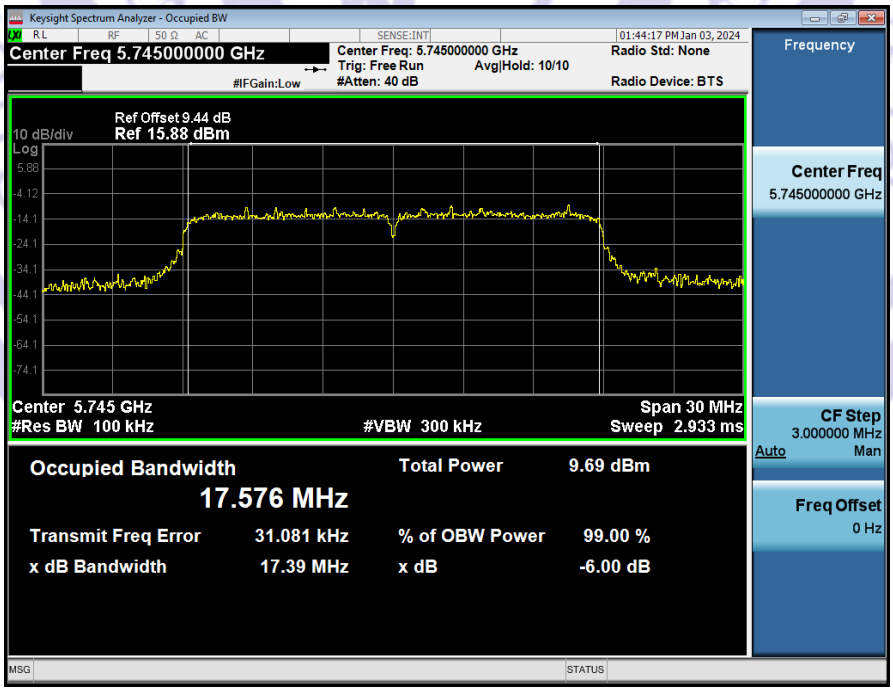

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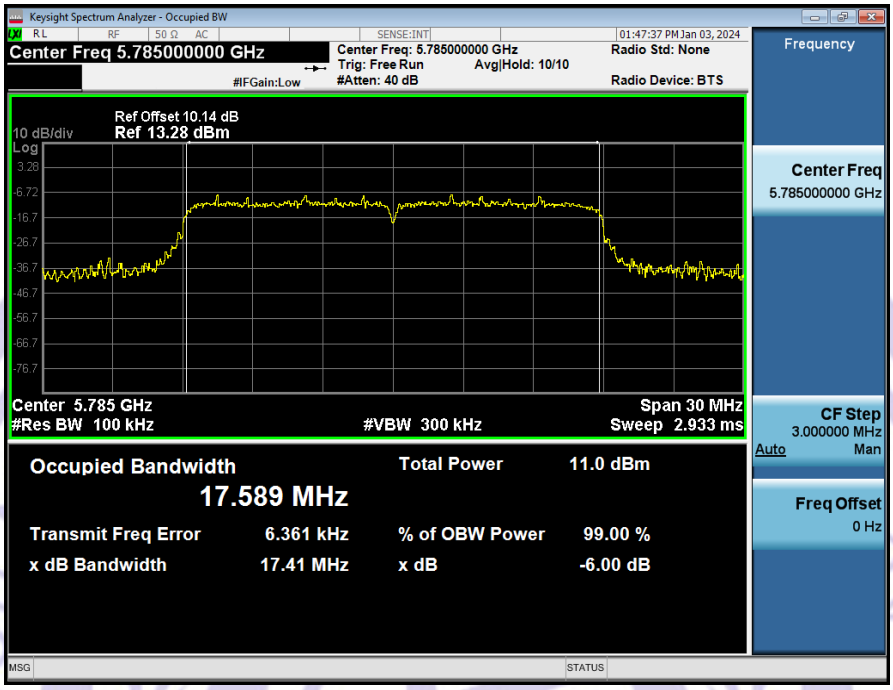

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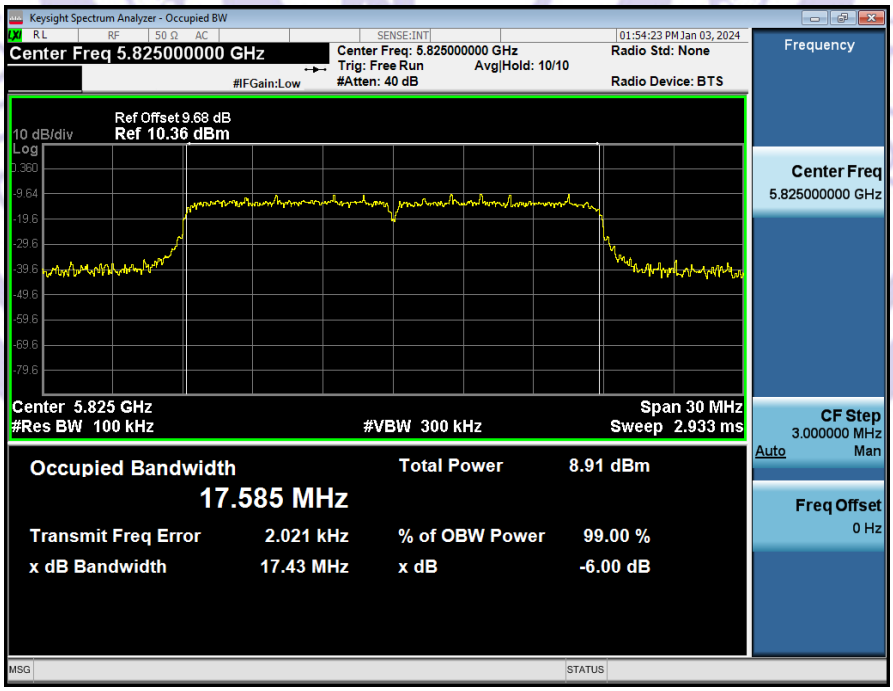

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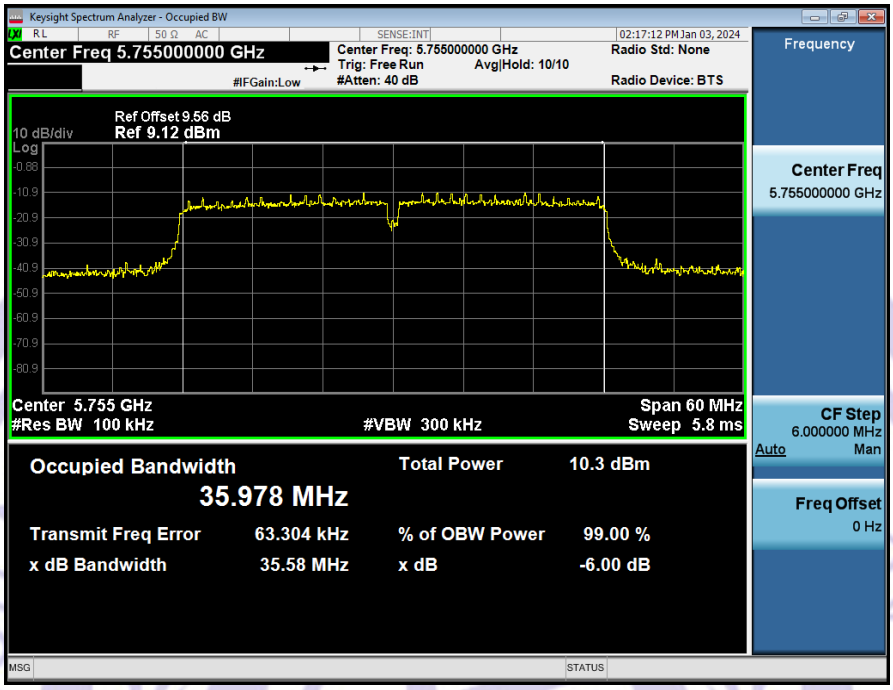

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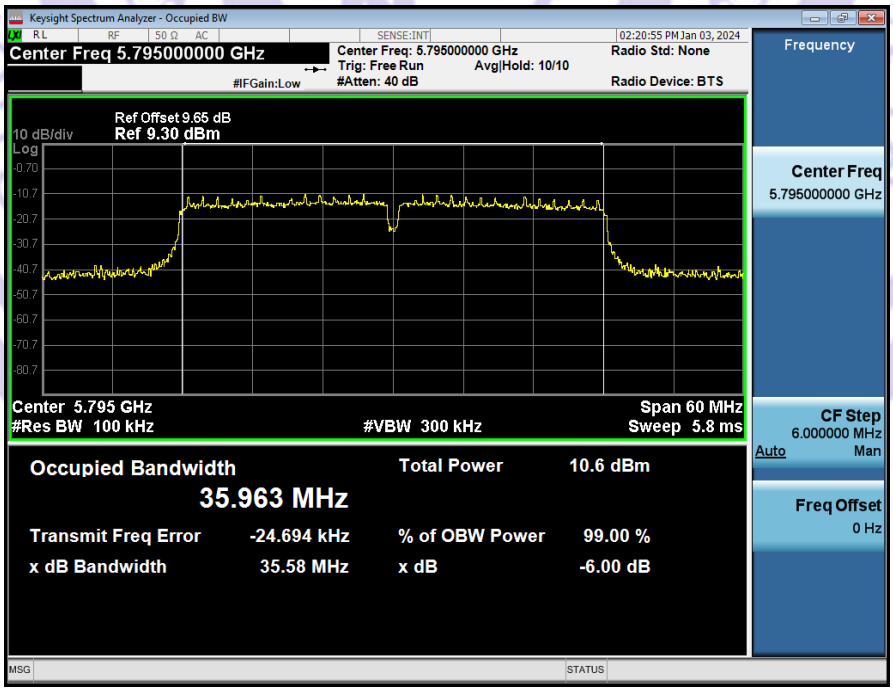

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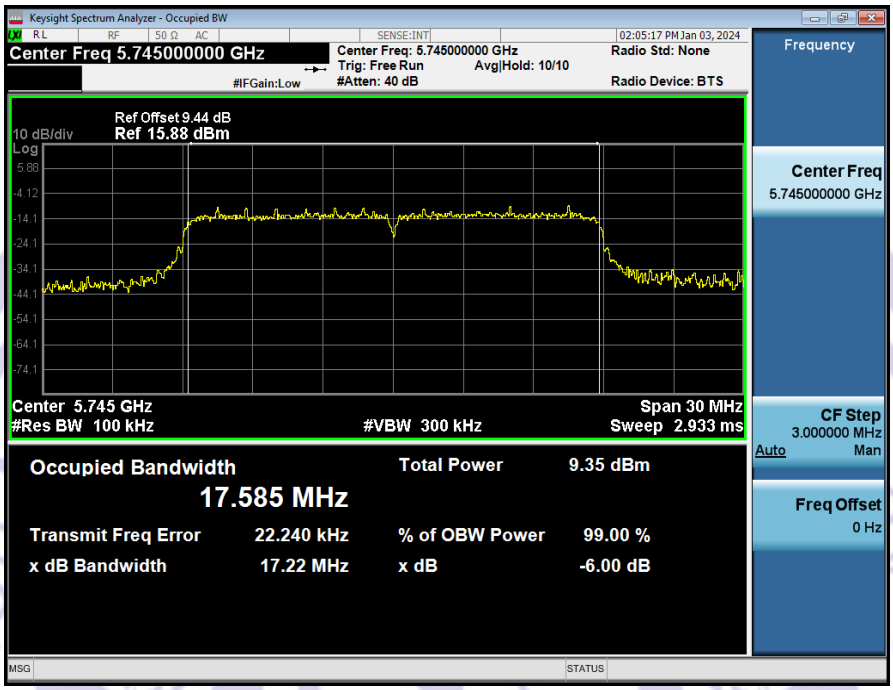
802_11ac20_5745



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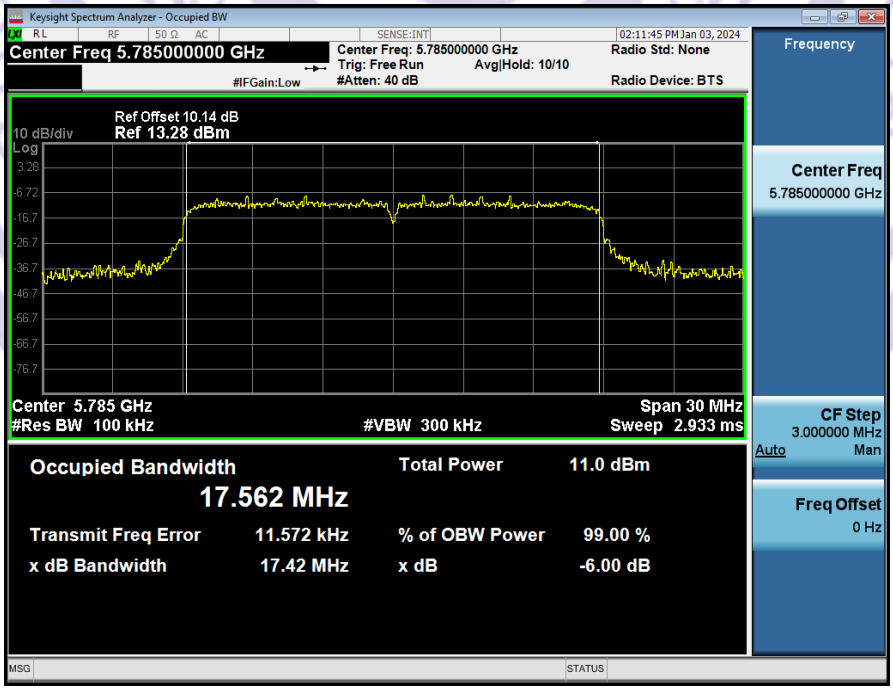

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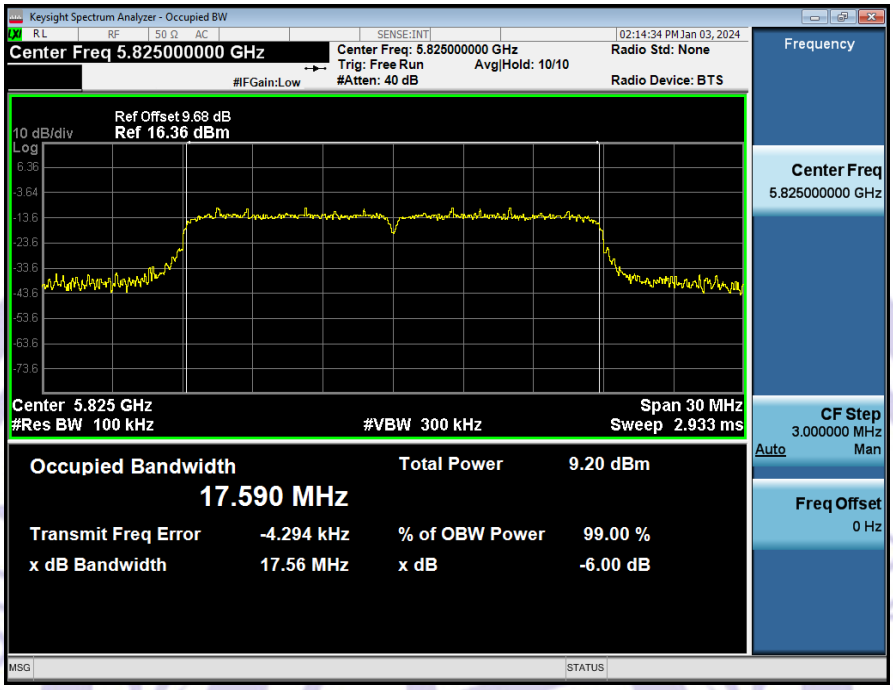

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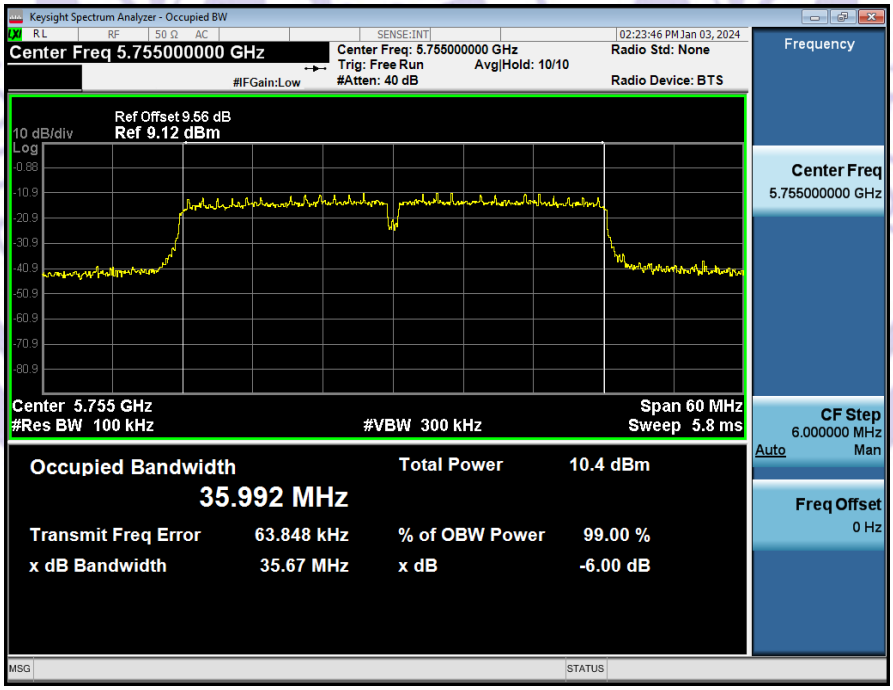

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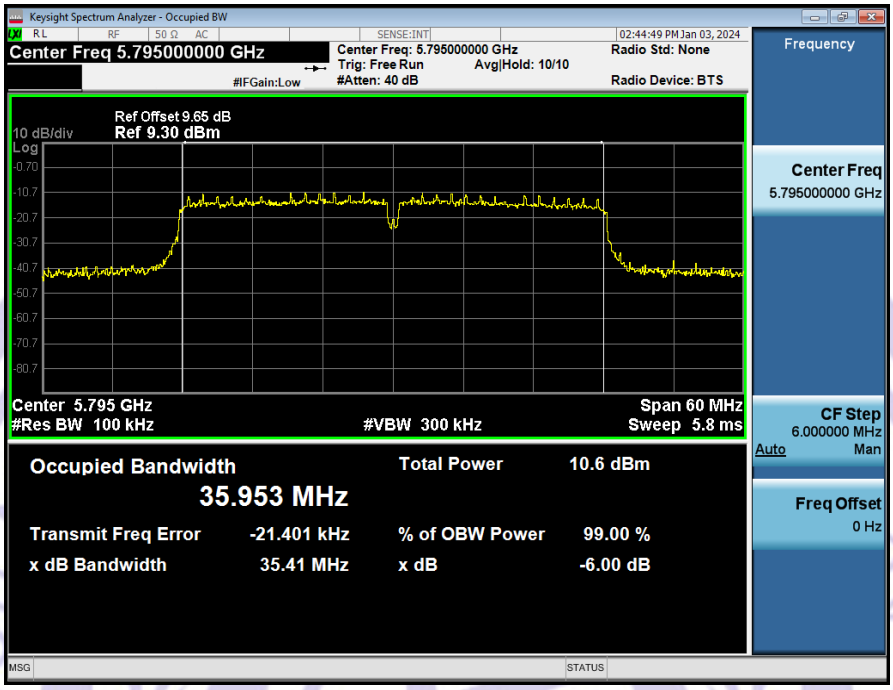

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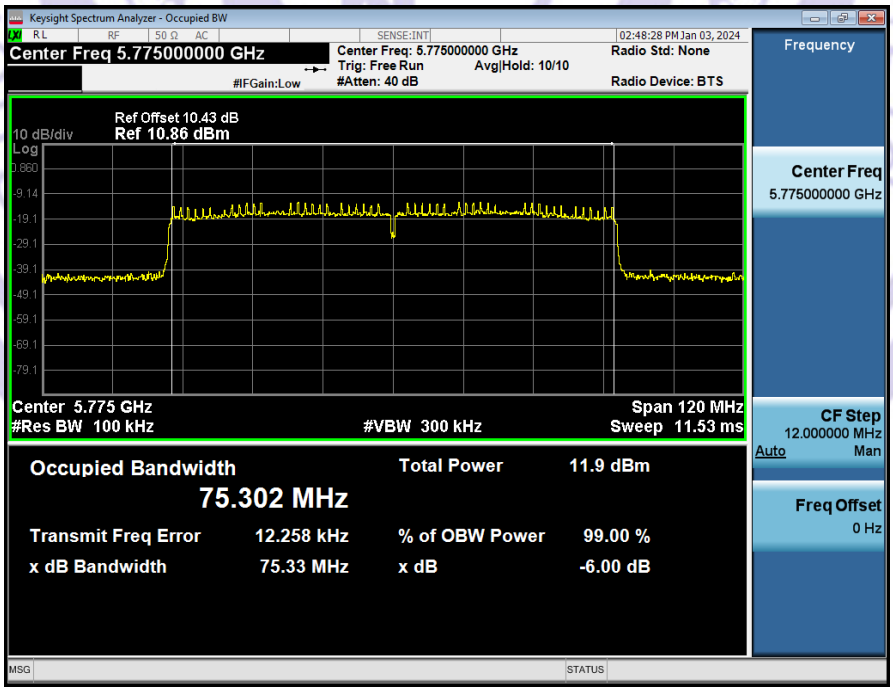


10 Maximum Conducted Output Power

10.1 Test Standard and Limit

According to FCC §15.407

For an outdoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, 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).

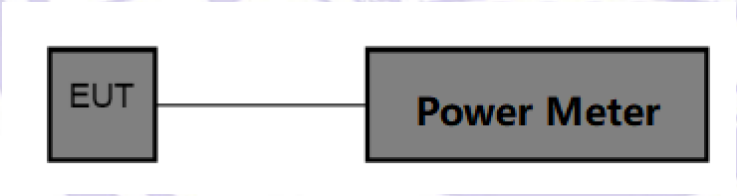
For the band 5.725–5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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 conducted output power over the frequency band of operation shall not exceed 1 W.

10.2 Test Setup



10.3 Test Procedure

The EUT was directly connected to the Power meter

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower

than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.

(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

10.4 Test Data

	Test Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
			ANT	
802.11a20	CH36	5180	15.68	24
	CH40	5200	14.87	24
	CH48	5240	14.09	24
802.11n20	CH36	5180	15.26	24
	CH40	5200	14.64	24
	CH48	5240	13.86	24
802.11n40	CH38	5190	12.45	24
	CH46	5230	12.19	24
802.11ac20	CH36	5180	15.05	24
	CH40	5200	14.58	24
	CH48	5240	13.77	24
802.11ac40	CH38	5190	12.39	24
	CH46	5230	12.08	24
802.11ac80	CH42	5210	11.65	24

Note: For power test the duty cycle is 100% in continous transmitting mode

	Test Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
			ANT	
802.11a20	CH149	5745	12.84	30
	CH157	5785	11.86	30
	CH165	5825	12.37	30
802.11n20	CH149	5745	12.53	30
	CH157	5785	11.72	30
	CH165	5825	12.05	30
802.11n40	CH151	5755	11.69	30
	CH159	5795	11.22	30
802.11ac20	CH149	5745	12.41	30
	CH157	5785	11.69	30
	CH165	5825	12.12	30
802.11ac40	CH151	5755	11.42	30
	CH159	5795	11.02	30
802.11ac80	CH155	5775	10.51	30

Note: For power test the duty cycle is 100% in continous transmitting mode

11 Out of Band Emissions and Spurious Emission

11.1 Test Standard and Limit

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

RSS-247 Section 6.2

Devices shall comply with the following:

All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.; or

All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device, except devices installed in vehicles, shall be labelled or include in the user manual the following text “for indoor use only.”

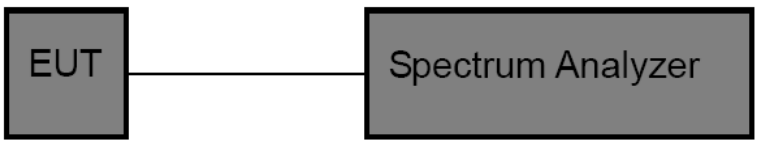
Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;

15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;

10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

11.2 Test Setup



11.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.

4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

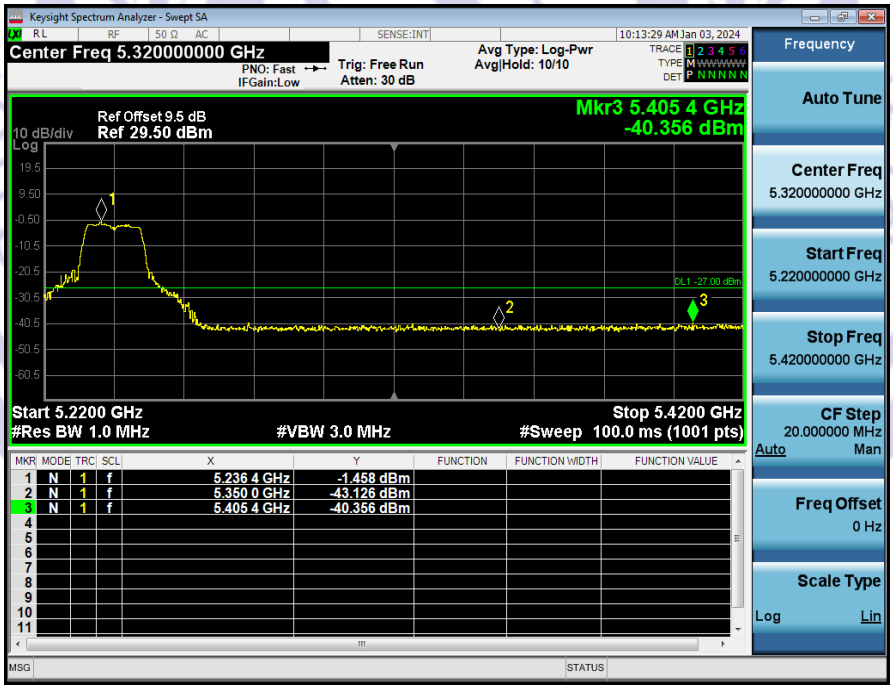
5. Repeat above procedures until all measured frequencies were complete.

11.4 Test Data

5.180~5.240 GHz							
Condition	**Antenna**	**Modulation**	**TX_Frequency (MHz)**	**Max. Mark Frequency(MHz)**	**Spurious level(dBm)**	**limit(dBm)**	**Result**
NVNT	ANT1	802.11a	5180.00	5148.80	-39.21	-27	Pass
NVNT	ANT1	802.11a	5240.00	5405.40	-40.36	-27	Pass
NVNT	ANT1	802.11n(HT20)	5180.00	5149.40	-37.19	-27	Pass
NVNT	ANT1	802.11n(HT20)	5240.00	5358.40	-40.17	-27	Pass
NVNT	ANT1	802.11ac(VHT20)	5180.00	5148.60	-36.84	-27	Pass
NVNT	ANT1	802.11ac(VHT20)	5240.00	5406.20	-40.32	-27	Pass
NVNT	ANT1	802.11n(HT40)	5190.00	5149.73	-31.56	-27	Pass
NVNT	ANT1	802.11n(HT40)	5230.00	5388.71	-40.45	-27	Pass
NVNT	ANT1	802.11ac(VHT40)	5190.00	5148.47	-29.66	-27	Pass
NVNT	ANT1	802.11ac(VHT40)	5230.00	5401.94	-40.37	-27	Pass
NVNT	ANT1	802.11ac(VHT80)	5210.00	5144.48	-31.22	-27	Pass
NVNT	ANT1	802.11ac(VHT80)	5210.00	5354.90	-40.34	-27	Pass
Note:The test diagram has integrated antenna gain to Offset Settings.							

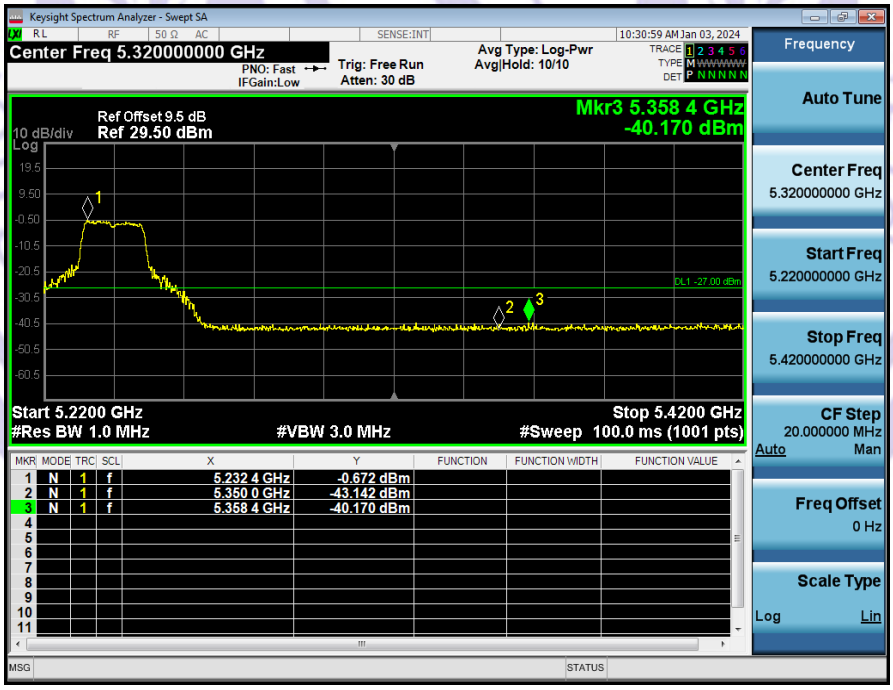
(802.11a) Band Edge, Left Side

(802.11a) Band Edge, Right Side

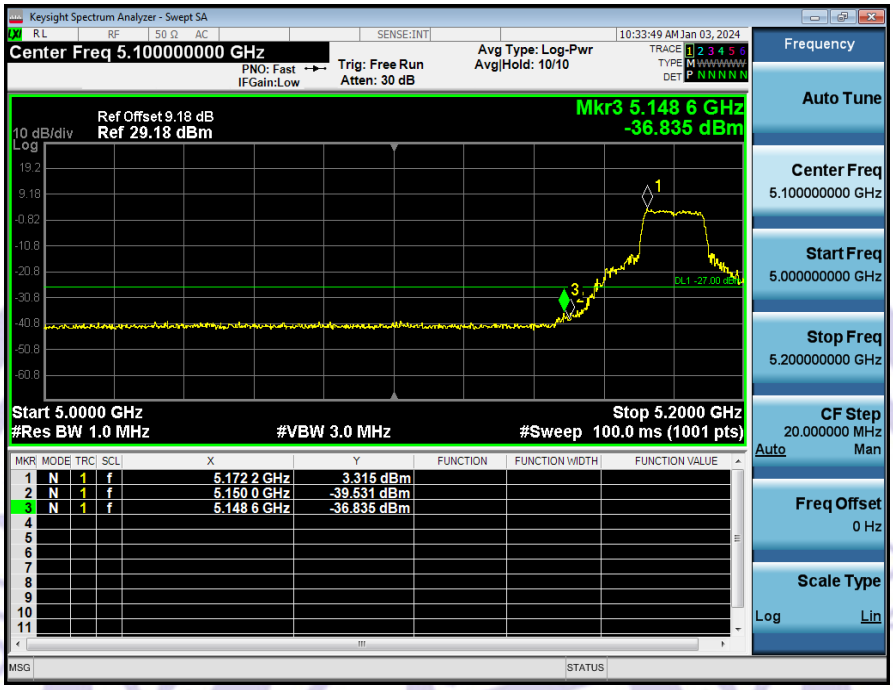


(802.11n20) Band Edge, Left Side

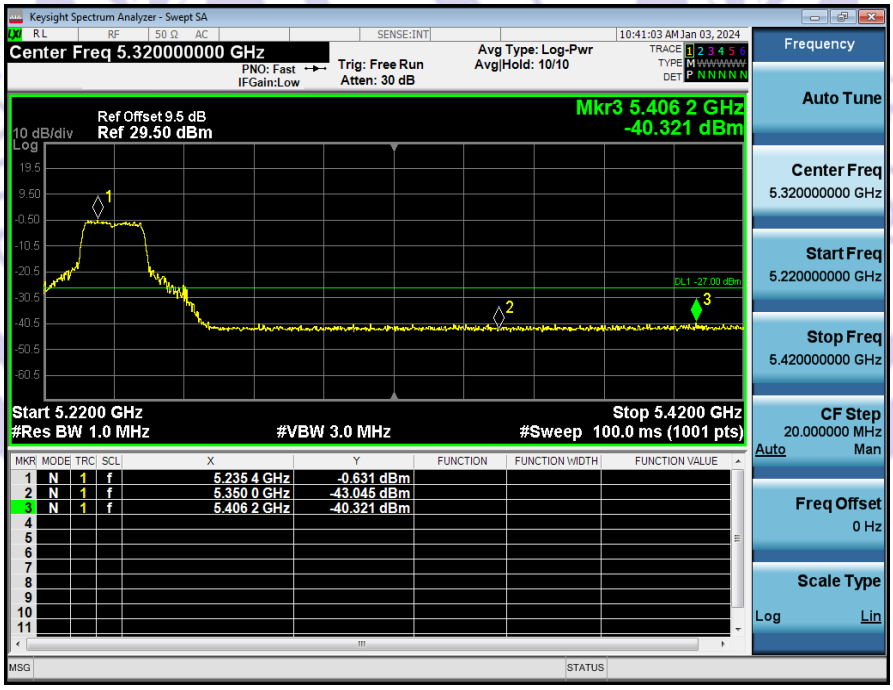
(802.11n20) Band Edge, Right Side



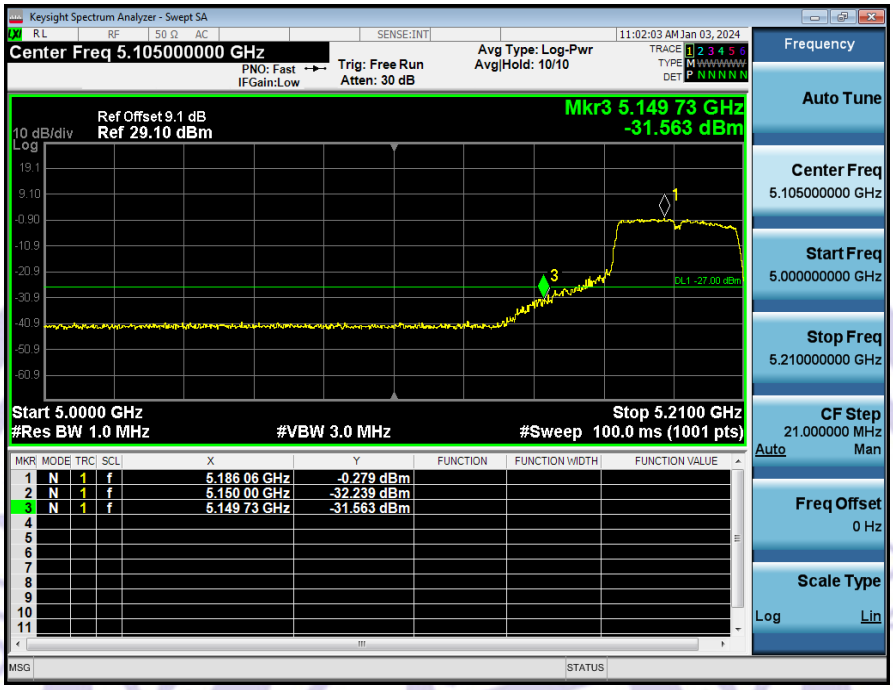
(802.11ac20) Band Edge, Left Side



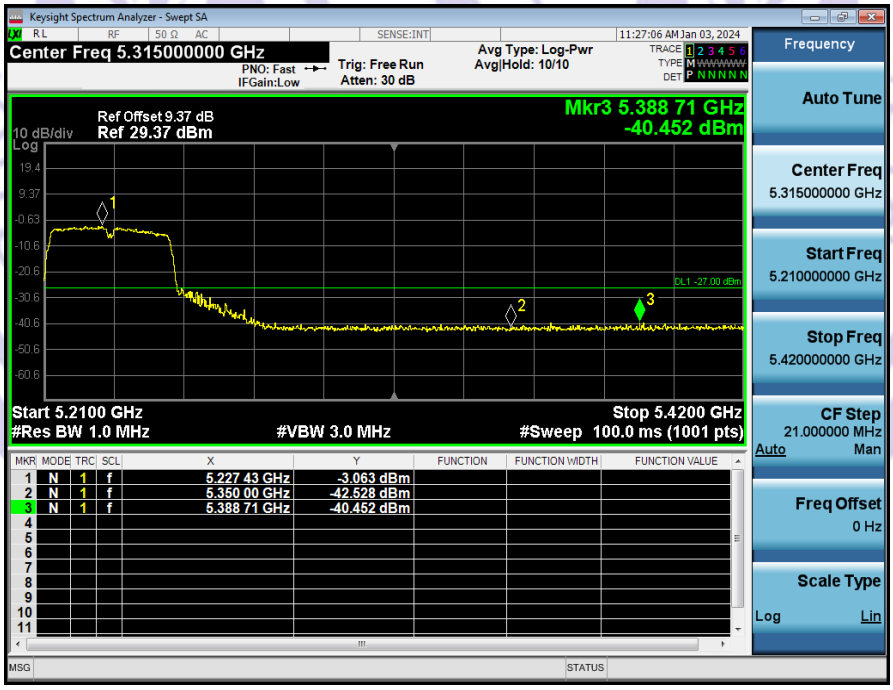
(802.11ac20) Band Edge, Right Side



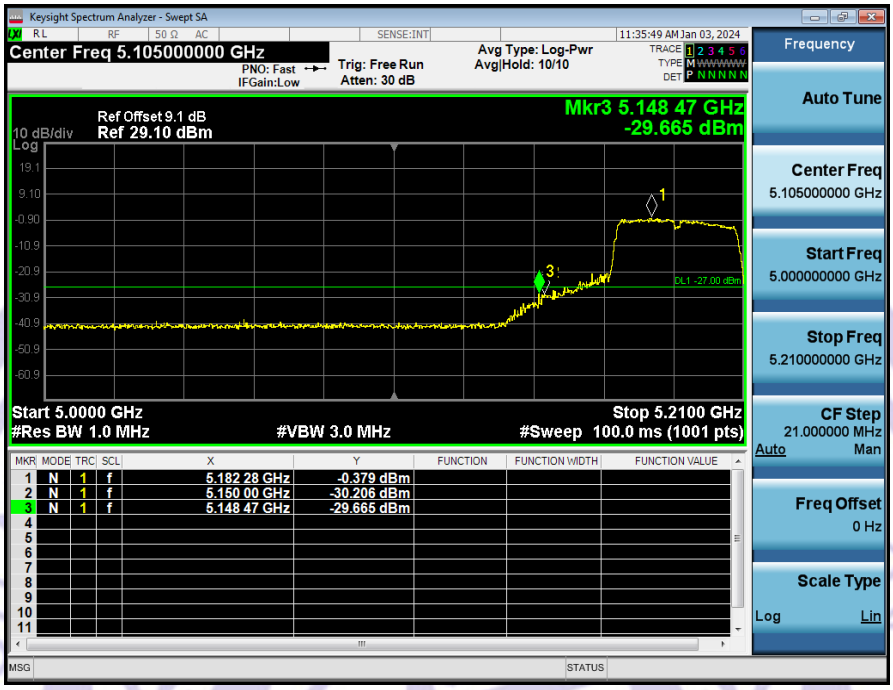
(802.11n40) Band Edge, Left Side



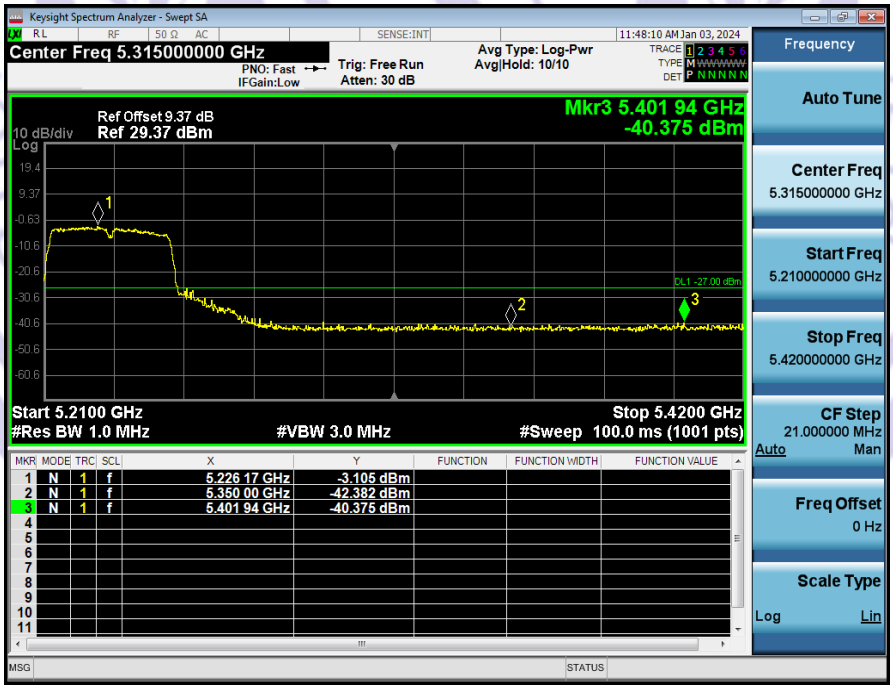
(802.11n40) Band Edge, Right Side



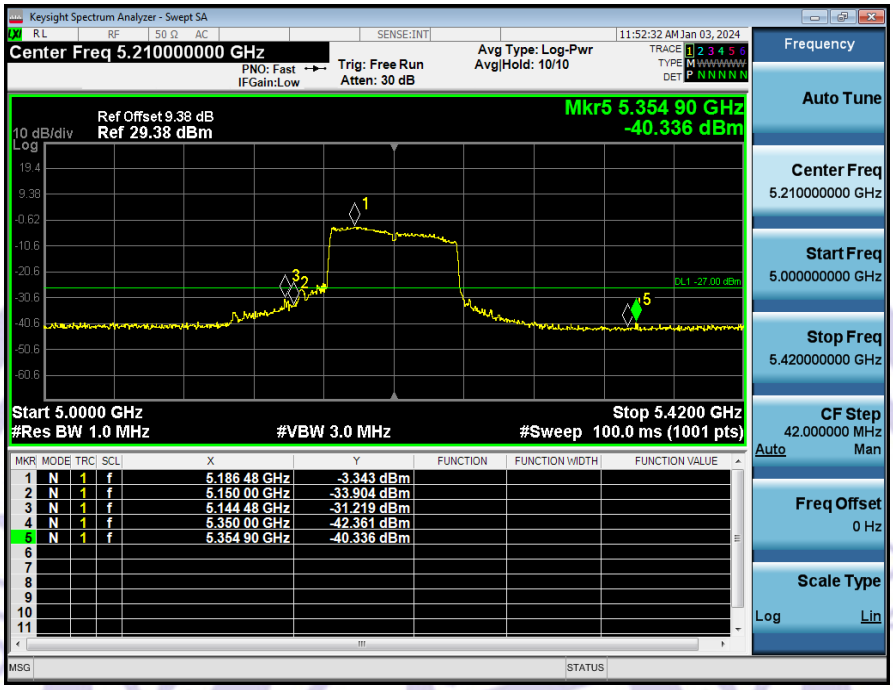
(802.11ac40) Band Edge, Left Side



(802.11ac40) Band Edge, Right Side



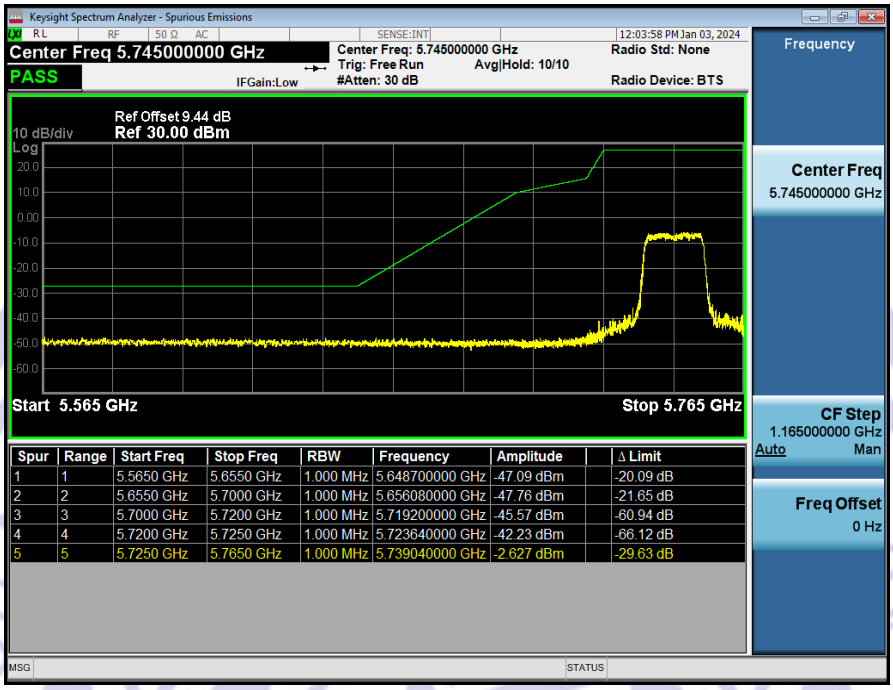
(802.11ac80) Band Edge



5.745~5.825 GHz								
Condition	Antenna	Modulation	TX_Frequency (MHz)	Frequency Area(MHz)	Frequency(MHz)	Amplitude(dBm)	Limit(dBm)	Result
NVNT	ANT1	802.11a	LCH	5565-5655	5648.700	-47.09	-27.00	Pass
NVNT	ANT1	802.11a	LCH	5655-5700	5656.080	-47.76	-26.11	Pass
NVNT	ANT1	802.11a	LCH	5700-5720	5719.200	-45.57	15.38	Pass
NVNT	ANT1	802.11a	LCH	5720-5725	5723.640	-42.23	23.90	Pass
NVNT	ANT1	802.11a	HCH	5850-5855	5853.495	-45.83	19.03	Pass
NVNT	ANT1	802.11a	HCH	5855-5875	5868.840	-47.30	11.72	Pass
NVNT	ANT1	802.11a	HCH	5875-5920	5913.340	-46.91	-21.52	Pass
NVNT	ANT1	802.11a	HCH	5920-6005	5989.105	-42.66	-27.00	Pass
NVNT	ANT1	802.11n(HT20)	LCH	5565-5655	5603.790	-47.03	-27.00	Pass
NVNT	ANT1	802.11n(HT20)	LCH	5655-5700	5669.940	-47.31	-14.72	Pass
NVNT	ANT1	802.11n(HT20)	LCH	5700-5720	5719.000	-45.41	15.32	Pass
NVNT	ANT1	802.11n(HT20)	LCH	5720-5725	5724.880	-38.45	26.73	Pass
NVNT	ANT1	802.11n(HT20)	HCH	5850-5855	5853.345	-45.63	19.37	Pass
NVNT	ANT1	802.11n(HT20)	HCH	5855-5875	5872.700	-47.24	10.64	Pass
NVNT	ANT1	802.11n(HT20)	HCH	5875-5920	5913.565	-47.32	-21.71	Pass
NVNT	ANT1	802.11n(HT20)	HCH	5920-6005	5946.605	-42.37	-27.00	Pass
NVNT	ANT1	802.11ac(VHT20)	LCH	5565-5655	5583.810	-46.92	-27.00	Pass
NVNT	ANT1	802.11ac(VHT20)	LCH	5655-5700	5656.845	-47.41	-25.48	Pass
NVNT	ANT1	802.11ac(VHT20)	LCH	5700-5720	5718.520	-45.51	15.19	Pass
NVNT	ANT1	802.11ac(VHT20)	LCH	5720-5725	5722.460	-41.24	21.21	Pass
NVNT	ANT1	802.11ac(VHT20)	HCH	5850-5855	5851.075	-41.78	24.55	Pass
NVNT	ANT1	802.11ac(VHT20)	HCH	5855-5875	5873.960	-47.17	10.29	Pass
NVNT	ANT1	802.11ac(VHT20)	HCH	5875-5920	5913.115	-47.21	-21.34	Pass
NVNT	ANT1	802.11ac(VHT20)	HCH	5920-6005	5978.310	-42.27	-27.00	Pass
NVNT	ANT1	802.11n(HT40)	LCH	5595-5655	5620.380	-46.49	-27.00	Pass
NVNT	ANT1	802.11n(HT40)	LCH	5655-5700	5657.385	-47.61	-25.04	Pass
NVNT	ANT1	802.11n(HT40)	LCH	5700-5720	5712.040	-46.52	13.37	Pass

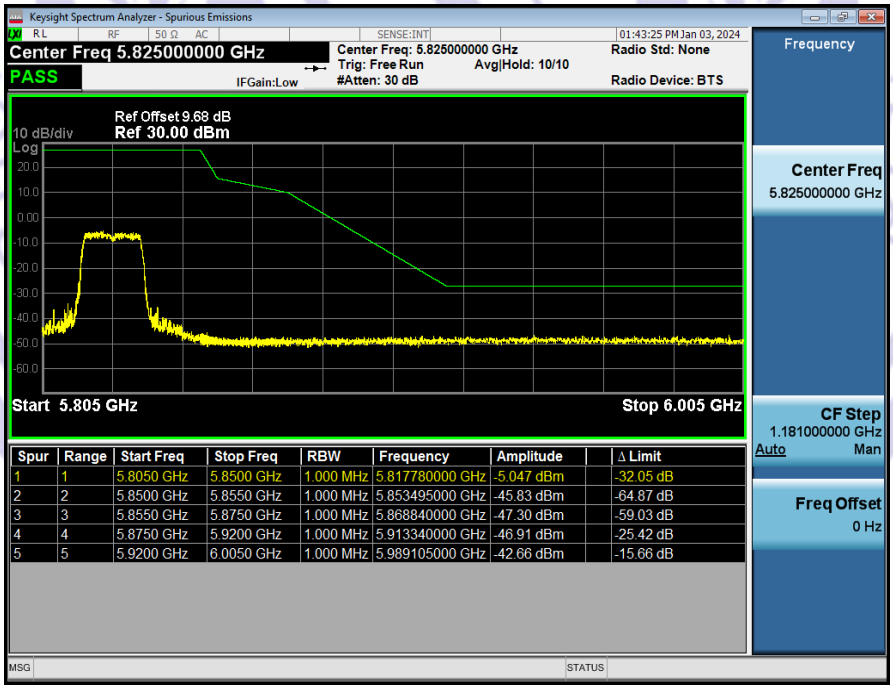
NVNT	ANT1	802.11n(HT40)	LCH	5720-5725	5720.990	-43.63	17.86	Pass
NVNT	ANT1	802.11n(HT40)	HCH	5850-5855	5854.520	-46.85	16.69	Pass
NVNT	ANT1	802.11n(HT40)	HCH	5855-5875	5874.280	-47.05	10.20	Pass
NVNT	ANT1	802.11n(HT40)	HCH	5875-5920	5919.190	-47.33	-26.33	Pass
NVNT	ANT1	802.11n(HT40)	HCH	5920-5955	5927.875	-42.89	-27.00	Pass
NVNT	ANT1	802.11ac(VHT40)	LCH	5595-5655	5608.740	-46.78	-27.00	Pass
NVNT	ANT1	802.11ac(VHT40)	LCH	5655-5700	5655.450	-47.37	-26.63	Pass
NVNT	ANT1	802.11ac(VHT40)	LCH	5700-5720	5716.540	-46.00	14.63	Pass
NVNT	ANT1	802.11ac(VHT40)	LCH	5720-5725	5721.655	-43.27	19.37	Pass
NVNT	ANT1	802.11ac(VHT40)	HCH	5850-5855	5854.595	-46.18	16.52	Pass
NVNT	ANT1	802.11ac(VHT40)	HCH	5855-5875	5873.380	-47.01	10.45	Pass
NVNT	ANT1	802.11ac(VHT40)	HCH	5875-5920	5919.730	-46.43	-26.78	Pass
NVNT	ANT1	802.11ac(VHT40)	HCH	5920-5955	5930.885	-42.85	-27.00	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5650-5655	5651.470	-46.21	-27.00	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5655-5700	5659.005	-46.42	-23.71	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5700-5720	5714.400	-45.37	14.03	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5720-5725	5720.055	-42.75	15.73	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5850-5855	5854.970	-46.48	15.67	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5855-5875	5868.160	-46.33	11.92	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5875-5920	5916.940	-46.10	-24.48	Pass
NVNT	ANT1	802.11ac(VHT80)	MCH	5920-5925	5923.190	-40.72	-27.00	Pass
Note:The test diagram has integrated antenna gain to Offset Settings.								

(802.11a) Band Edge, Left Side



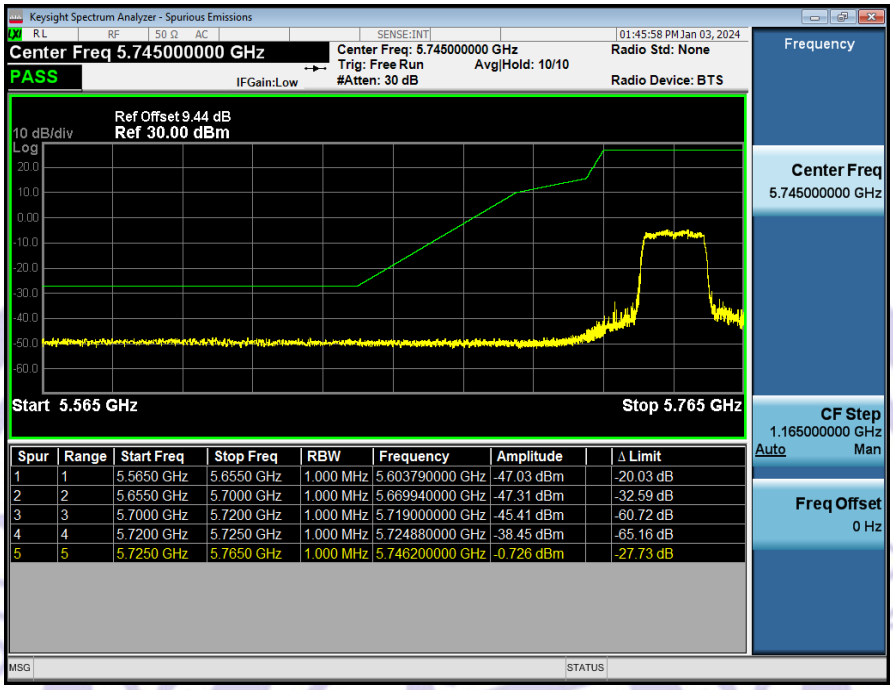
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	5.5650 GHz	5.6550 GHz	1.000 MHz	5.648700000 GHz	-47.09 dBm	-20.09 dB
2	2	5.6550 GHz	5.7000 GHz	1.000 MHz	5.656080000 GHz	-47.76 dBm	-21.65 dB
3	3	5.7000 GHz	5.7200 GHz	1.000 MHz	5.719200000 GHz	-45.57 dBm	-60.94 dB
4	4	5.7200 GHz	5.7250 GHz	1.000 MHz	5.723640000 GHz	-42.23 dBm	-66.12 dB
5	5	5.7250 GHz	5.7650 GHz	1.000 MHz	5.739040000 GHz	-2.627 dBm	-29.63 dB

(802.11a) Band Edge, Right Side

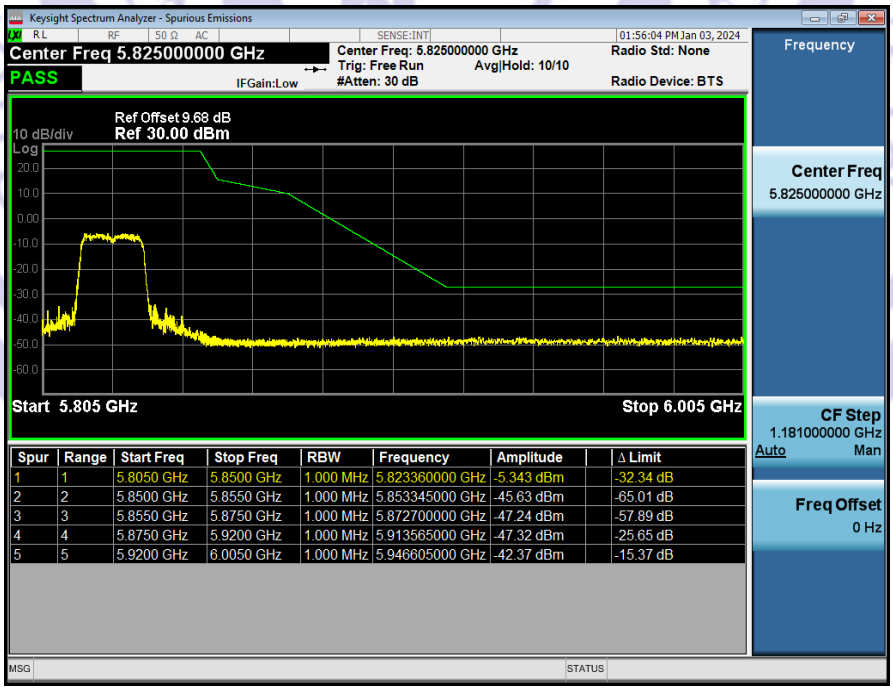


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	5.8050 GHz	5.8500 GHz	1.000 MHz	5.817780000 GHz	-5.047 dBm	-32.05 dB
2	2	5.8500 GHz	5.8550 GHz	1.000 MHz	5.853495000 GHz	-45.83 dBm	-64.87 dB
3	3	5.8550 GHz	5.8750 GHz	1.000 MHz	5.868840000 GHz	-47.30 dBm	-59.03 dB
4	4	5.8750 GHz	5.9200 GHz	1.000 MHz	5.913340000 GHz	-46.91 dBm	-25.42 dB
5	5	5.9200 GHz	6.0050 GHz	1.000 MHz	5.989105000 GHz	-42.66 dBm	-15.66 dB

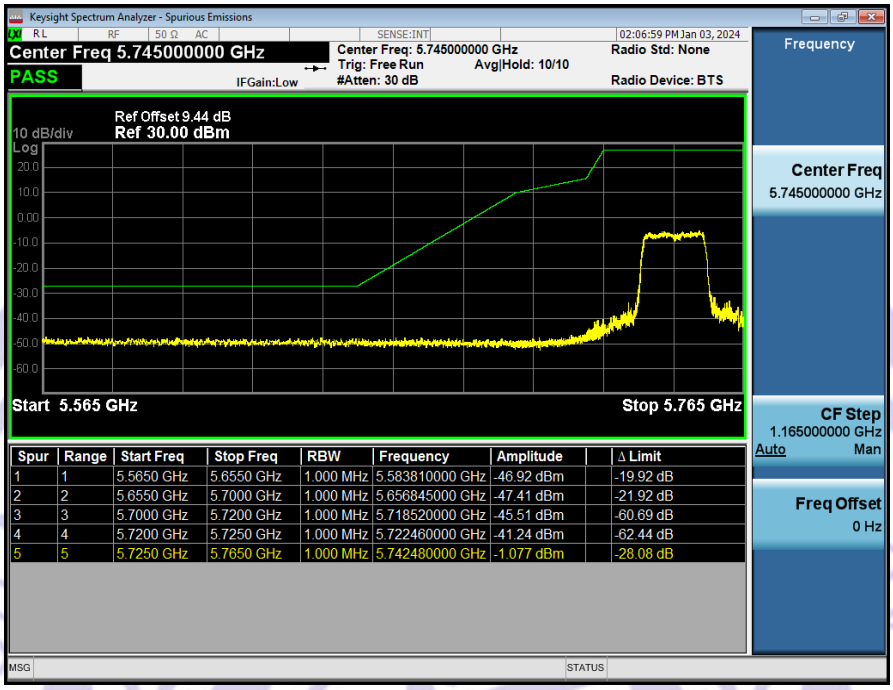
(802.11n20) Band Edge, Left Side



(802.11n20) Band Edge, Right Side

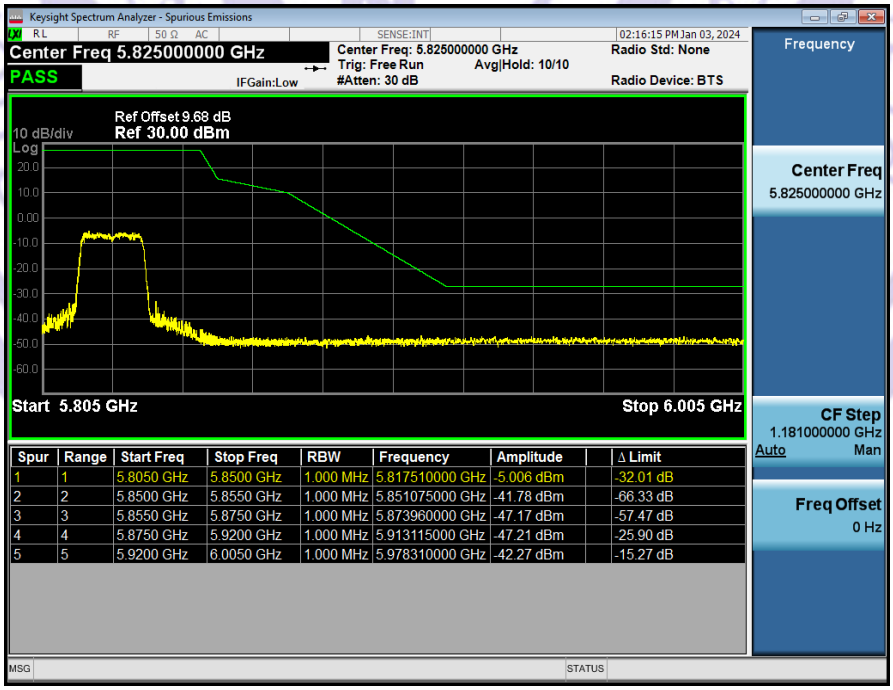


(802.11ac20) Band Edge, Left Side



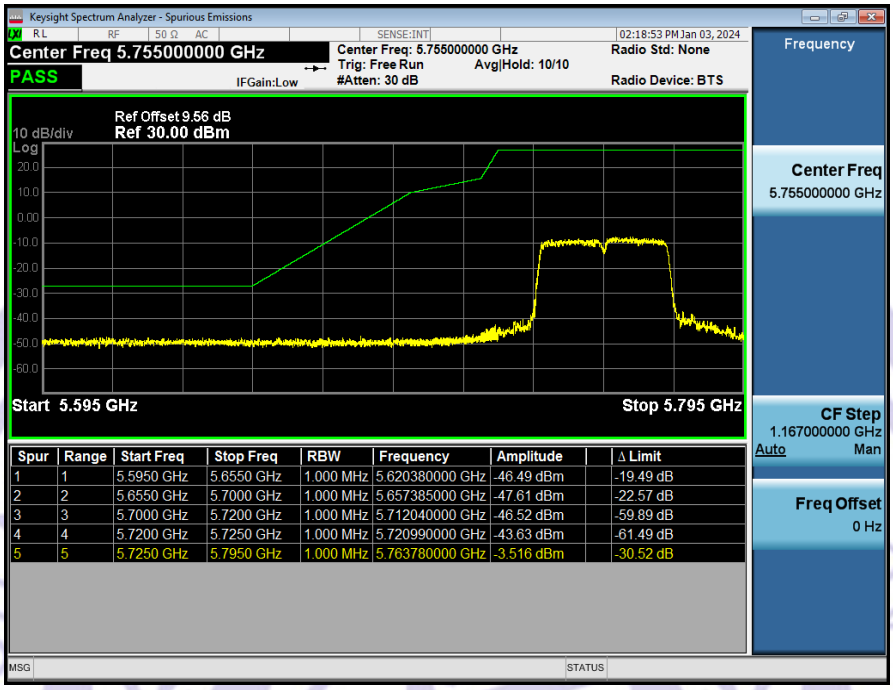
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	5.5650 GHz	5.6550 GHz	1.000 MHz	5.583810000 GHz	-46.92 dBm	-19.92 dB
2	2	5.6550 GHz	5.7000 GHz	1.000 MHz	5.656845000 GHz	-47.41 dBm	-21.92 dB
3	3	5.7000 GHz	5.7200 GHz	1.000 MHz	5.718520000 GHz	-45.51 dBm	-60.69 dB
4	4	5.7200 GHz	5.7250 GHz	1.000 MHz	5.722460000 GHz	-41.24 dBm	-62.44 dB
5	5	5.7250 GHz	5.7650 GHz	1.000 MHz	5.742480000 GHz	-1.077 dBm	-28.08 dB

(802.11ac20) Band Edge, Right Side

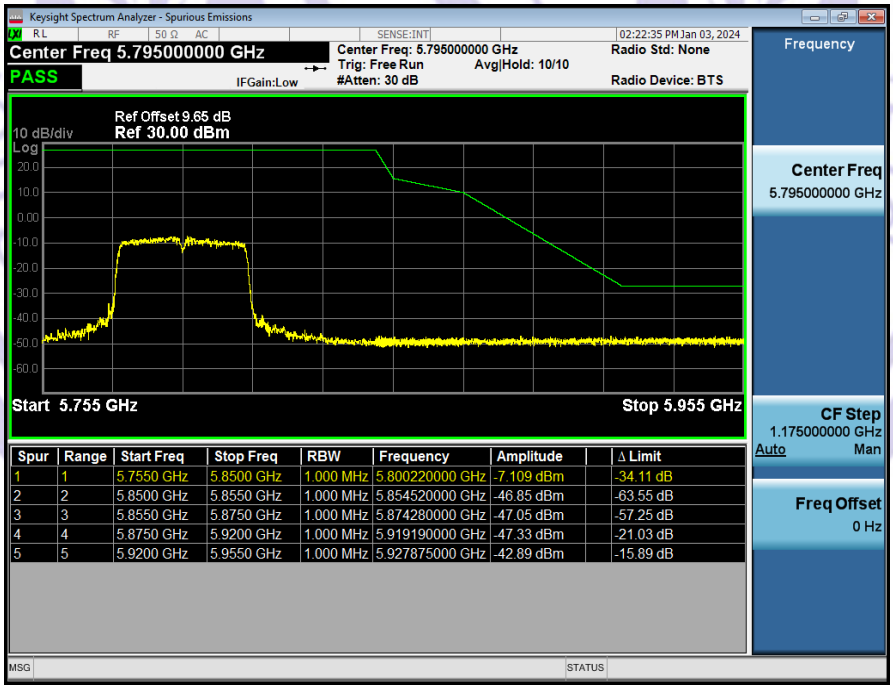


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	5.8050 GHz	5.8500 GHz	1.000 MHz	5.817510000 GHz	-5.006 dBm	-32.01 dB
2	2	5.8500 GHz	5.8550 GHz	1.000 MHz	5.851075000 GHz	-41.78 dBm	-66.33 dB
3	3	5.8550 GHz	5.8750 GHz	1.000 MHz	5.873960000 GHz	-47.17 dBm	-57.47 dB
4	4	5.8750 GHz	5.9200 GHz	1.000 MHz	5.913115000 GHz	-47.21 dBm	-25.90 dB
5	5	5.9200 GHz	6.0050 GHz	1.000 MHz	5.978310000 GHz	-42.27 dBm	-15.27 dB

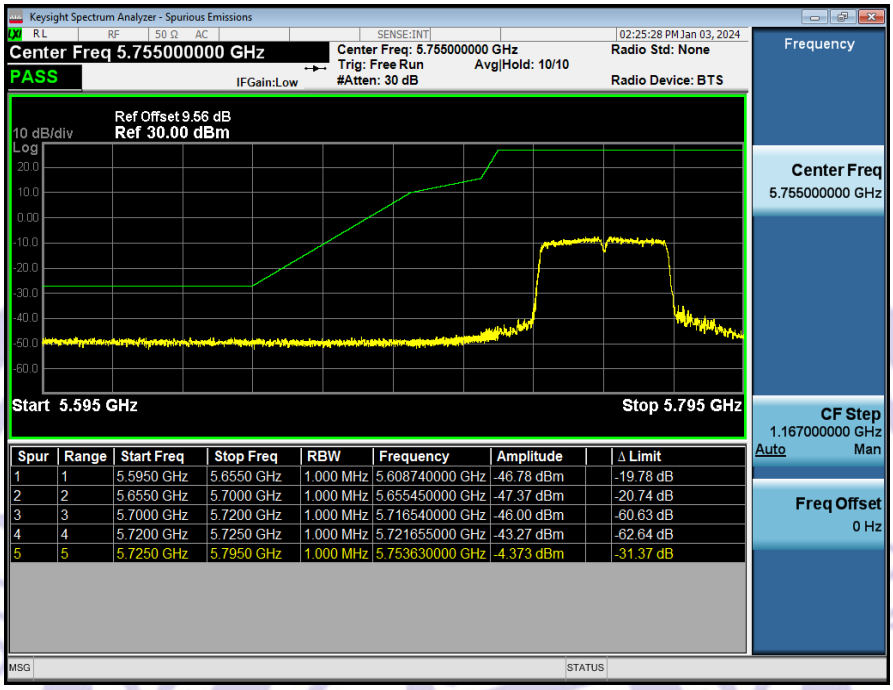
(802.11n40) Band Edge, Left Side



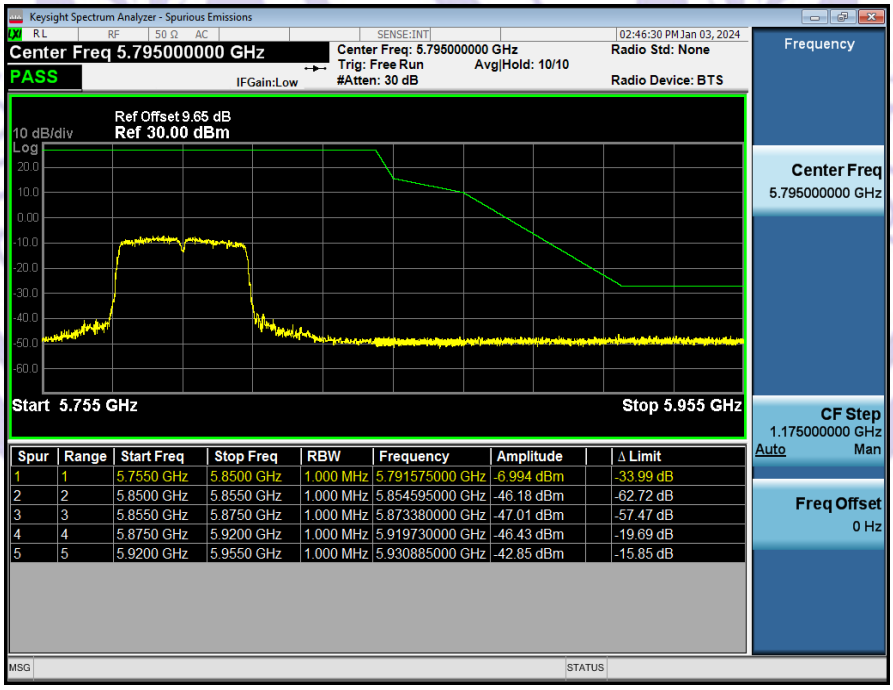
(802.11n40) Band Edge, Right Side



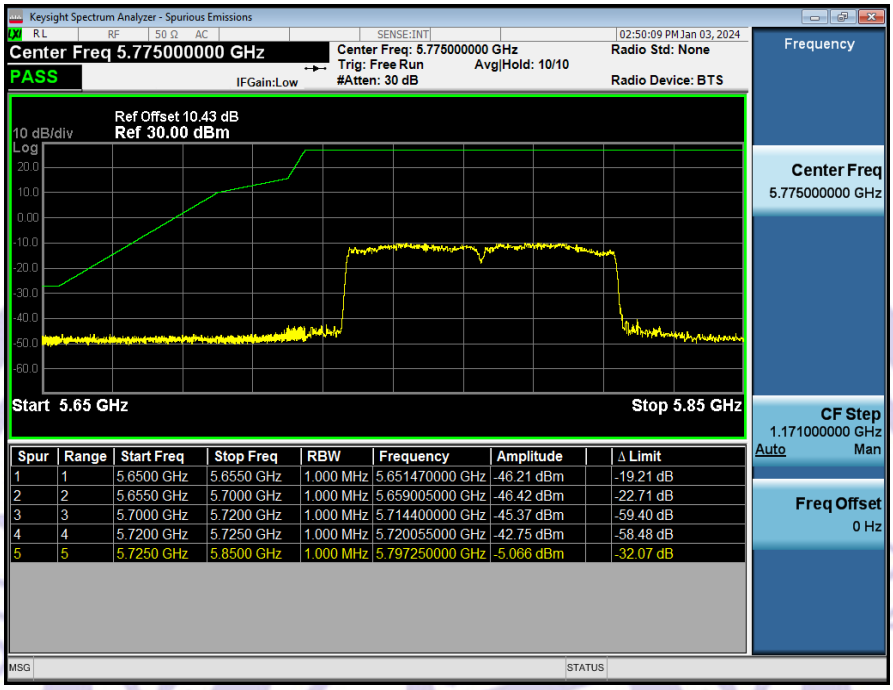
(802.11ac40) Band Edge, Left Side

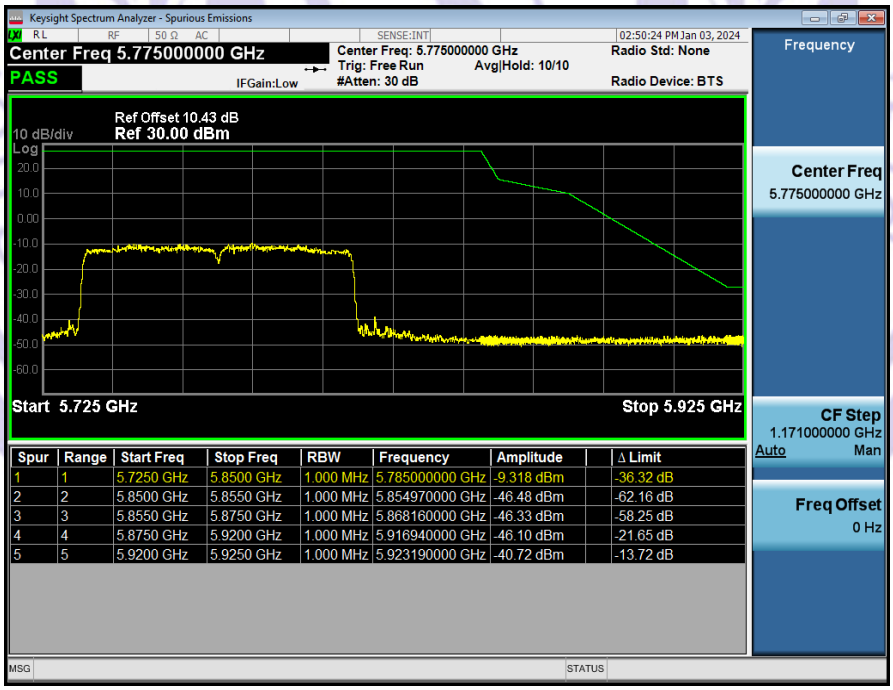


(802.11ac40) Band Edge, Right Side



(802.11ac80) Band Edge





12 Frequency Stability Measurement

12.1 Test Standard and Limit

FCC

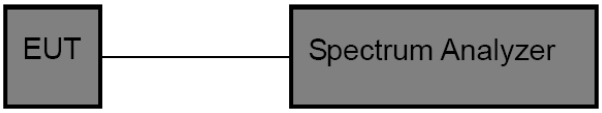
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

IC

If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation. In addition, its occupied bandwidth shall be entirely outside the restricted bands and the prohibited TV bands of 54 72 MHz, 76-88 MHz, 174-216 MHz, and 470-602 MHz, unless otherwise indicated.

12.2 Test Setup



12.3 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.

2. EUT have transmitted absence of modulation signal and fixed channelize.

3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.

4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.

5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).

6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the

nominal value

7. Extreme temperature is -20°C~50°C.

12.4 Test Data

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
			802.11a	802.11n HT20	802.11ac VHT20	802.11a	802.11 n HT20	802.11 ac VHT20
132V	-20℃	5180	5180.0117	5180.0176	5180.0134	-0.0117	-0.0176	-0.0134
		5200	5200.0173	5200.0165	5200.0103	-0.0173	-0.0165	-0.0103
		5240	5240.0103	5240.0102	5240.0109	-0.0103	-0.0102	-0.0109
108V		5180	5180.0188	5180.0175	5180.0177	-0.0188	-0.0175	-0.0177
		5200	5200.0160	5200.0127	5200.0116	-0.0160	-0.0127	-0.0116
		5240	5240.0187	5240.0128	5240.0110	-0.0187	-0.0128	-0.0110
120V	25℃	5180	5180.0118	5180.0197	5180.0131	-0.0118	-0.0197	-0.0131
		5200	5200.0141	5200.0170	5200.0125	-0.0141	-0.0170	-0.0125
		5240	5240.0138	5240.0117	5240.0175	-0.0138	-0.0117	-0.0175
132V	50℃	5180	5180.0169	5180.0143	5180.0188	-0.0169	-0.0143	-0.0188
		5200	5200.0169	5200.0186	5200.0172	-0.0169	-0.0186	-0.0172
		5240	5240.0103	5240.0138	5240.0155	-0.0103	-0.0138	-0.0155
108V		5180	5180.0110	5180.0116	5180.0195	-0.0110	-0.0116	-0.0195
		5200	5200.0110	5200.0104	5200.0199	-0.0110	-0.0104	-0.0199
		5240	5240.0196	5240.0166	5240.0190	-0.0196	-0.0166	-0.0190

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac VHT40	802.11n HT40	802.11ac VHT40
132V	-20℃	5190	5190.0171	5190.0190	-0.0171	-0.0190
		5230	5230.0182	5230.0118	-0.0182	-0.0118
108V		5190	5190.0194	5190.0121	-0.0194	-0.0121
		5230	5230.0138	5230.0141	-0.0138	-0.0141
120V	25℃	5190	5190.0103	5190.0179	-0.0103	-0.0179
		5230	5230.0147	5230.0155	-0.0147	-0.0155
132V	50℃	5190	5190.0192	5190.0187	-0.0192	-0.0187
		5230	5230.0185	5230.0180	-0.0185	-0.0180
108V		5190	5190.0103	5190.0104	-0.0103	-0.0104
		5230	5230.0125	5230.0186	-0.0125	-0.0186

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
			802.11ac VHT80	802.11ac VHT80
132V	-20℃	5210	5210.0104	-0.0104
108V		5210	5210.0124	-0.0124
120V	25℃	5210	5210.0106	-0.0106
132V	50℃	5210	5210.0100	-0.0100
108V		5210	5210.0170	-0.0170

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
			802.11a	802.11n HT20	802.11ac VHT20	802.11a	802.11 n HT20	802.11 ac VHT20
132V	-20℃	5745	5745.0268	5745.0313	5745.0284	-0.0268	-0.0313	-0.0284
		5785	5785.0253	5785.0196	5785.0313	-0.0253	-0.0196	-0.0313
		5825	5825.0163	5825.0178	5825.0183	-0.0163	-0.0178	-0.0183
108V		5745	5745.0187	5745.0105	5745.0143	-0.0187	-0.0105	-0.0143
		5785	5785.0319	5785.0323	5785.0303	-0.0319	-0.0323	-0.0303
		5825	5825.0352	5825.0368	5825.0271	-0.0352	-0.0368	-0.0271
120V	25℃	5745	5745.0323	5745.0172	5745.0273	-0.0323	-0.0172	-0.0273
		5785	5785.0339	5785.0251	5785.0416	-0.0339	-0.0251	-0.0416
		5825	5825.0224	5825.0082	5825.0181	-0.0224	-0.0082	-0.0181
132V	50℃	5745	5745.0480	5745.0488	5745.0628	-0.0480	-0.0488	-0.0628
		5785	5785.0417	5785.0397	5785.0287	-0.0417	-0.0397	-0.0287
		5825	5825.0453	5825.0624	5825.0449	-0.0453	-0.0624	-0.0449
108V		5745	5745.0393	5745.0243	5745.0367	-0.0393	-0.0243	-0.0367
		5785	5785.0193	5785.0212	5785.0090	-0.0193	-0.0212	-0.0090
		5825	5825.0567	5825.0617	5825.0744	-0.0567	-0.0617	-0.0744

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac VHT40	802.11n HT40	802.11ac VHT40
132V	-20℃	5755.0375	5755.0534	5755.0427	-0.0534	-0.0427
		5795.0577	5795.0633	5795.0525	-0.0633	-0.0525
108V		5755.0040	5755.0189	5755.0471	-0.0189	-0.0471
		5795.0278	5795.0449	5795.0322	-0.0449	-0.0322
120V	25℃	5755.0256	5755.0259	5755.0050	-0.0259	-0.0050
		5795.0377	5795.0361	5795.0442	-0.0361	-0.0442
132V	50℃	5755.0418	5755.0272	5755.0274	-0.0272	-0.0274
		5795.0179	5795.0301	5795.0334	-0.0301	-0.0334
108V		5755.0225	5755.0300	5755.0196	-0.0300	-0.0196
		5795.0417	5795.0361	5795.0399	-0.0361	-0.0399

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
			802.11ac VHT80	802.11ac VHT80
132V	-20℃	5775	5775.0024	-0.0024
108V		5775	5775.0238	-0.0238
120V	25℃	5775	5775.0297	-0.0297
132V	50℃	5775	5775.0060	-0.0060
108V		5775	5775.0493	-0.0493

13 Antenna Requirement

13.1 Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. According to RSS-GEN section 6.8 The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list. For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below). When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

13.2 Antenna Connected Construction

The antenna is FPCB Antenna which permanently attached, and the best case gain of the antenna is 3.17 dBi. It complies with the standard requirement.

14 TEST SETUP & EUT PHOTOGRAPH

Please see the attachment for details.

---------- End of Report ----------