



TEST REPORT

Applicant: Nanjing Nagasoft Corporation
Address of Applicant: Room 701, Fuying Building A, 100 Tuanjie Road, Gaoxing District, Nanjing, Jiangsu, China
Manufacturer/Factory: Nanjing Nagasoft Corporation
Address of Manufacturer: Room 701, Fuying Building A, 100 Tuanjie Road, Gaoxing District, Nanjing, Jiangsu, China
Product Name: Nagasoft Live Production all-in-one device
Model No.: NSCaster X2
Trade Mark: NAGASOFT
FCC ID: 2AT7D-X2
Applicable standards: FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of Test: Jul.11, 2022 - Aug.05, 2022
Date of report issued: Aug.17, 2022
Test Result : PASS *

Remark:

* In the configuration tested, the EUT complied with the standards specified above.

The results shown in this test report refer only to the sample(s) tested , this test report cannot be reproduced, except in full without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver

Prepared By

Shenzhen ETR Standard Technology Co., Ltd.

Address: No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



Compiled by:

Project Engineer

Reviewed by:

Project Manager

Approved by:

Authorized Signature



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1 Test Summary

Test Item	Section in CFR 47	Result	Test by
Antenna requirement	15.203	Pass	/
AC Power Line Conducted Emission	15.207	Pass	Qiao Li
Conducted Output Power	15.407 (a)(1)/(a)(3)	Pass	Yvan Fan
26dB Bandwidth and 99% Occupied Bandwidth	15.407 (a)(12)	Pass	Yvan Fan
6dB Bandwidth	15.407 (e)	Pass	Yvan Fan
Power Spectral Density	15.407(a)(1)/(a)(3)	Pass	Yvan Fan
Band Edge	15.407(b)(1)/(b)(4)	Pass	Yvan Fan
Spurious Emission	15.205/15.209 15.407(b)(1)/(b)(4)/(b)(8)	Pass	Qiao Li
Frequency Stability	15.407(g)	Pass	Yvan Fan

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.
2. Test according to ANSI C63.10:2013.

1.1 Measurement Uncertainty

Test Item	Measurement Uncertainty	Notes
Occupied Channel Bandwidth	±0.55%	(1)
RF output power, conducted	±0.99dB	(1)
Power Spectral Density, conducted	±0.61dB	(1)
Unwanted Emissions, conducted	±0.64dB	(1)
AC Power Line Conducted Emission	± 3.02dB	(1)
Radiated emissions 9K-30MHz	±3.98dB	(1)
Radiated emissions 30M- 1GHz	±4.30dB	(1)
Radiated emissions 1GHz-18GHz	±4.35dB	(1)
Radiated emissions 18GHz-40GHz	±4.59 dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

2 General Information

2.1 General Description of EUT

Product Name:	Nagasoftware Live Production all-in-one device
Model No.:	NSCaster X2
Difference of model(s)	N/A
Test Model:	NSCaster X2
Hardware Version:	REV:1.2
Software Version:	2.0.169.0
Sample(s) Status:	Engineer sample
Operation Frequency:	☒ 5180-5240MHz for 802.11a/n(HT20)/ac20; 5190-5230MHz for 802.11n(HT40)/ac40; 5210MHz for 802.11 ac80; ☐ 5745-5825 MHz for 802.11a/n(HT20)/ac20; 5755-5795 MHz for 802.11n(HT40)/ac40; 5775MHz for 802.11 ac80;
Channel numbers:	☒ 4 channels for 802.11a/n20/ac20 in the 5180-5240MHz band; 2 channels for 802.11 n40/ac40 in the 5190-5230MHz band ; 1 channels for 802.11 ac80 in the 5210MHz band ; ☐ 5 channels for 802.11a/n20/ac20 in the 5745-5825MHz band ; 2 channels for 802.11 n40/ac40 in the 5755-5795MHz band ; 1 channels for 802.11 ac80 in the 5775MHz band
Channel bandwidth:	802.11a/802.11n(HT20)/ 802.11ac(HT20): 20MHz 802.11n(HT40)/ 802.11ac(HT40) : 40MHz 802.11ac(HT80) : 80MHz
Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac(VHT/20/40/80):NSS1, MCS0-MCS9
Modulation technology:	Orthogonal Frequency Division Multiplexing (OFDM) with BPSK/QPSK/16QAM/64QAM/256QAM
Antenna Type:	Integrated antenna
Antenna gain:	3dBi(Declare by applicant)
Power supply:	DC 19V form adapter with AC 100-240V 50/60Hz

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	38	5190MHz	40	5200MHz	42	5210MHz
44	5220MHz	46	5230MHz	48	5240MHz	/	/

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)		
	802.11 a /n(HT20)/ac(HT20)	802.11 n(HT40)/ac(HT40)	802.11ac(HT80)
Lowest channel	5180	5190	5210
Middle channel	5200		
Highest channel	5240	5230	

2.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode(or with a duty cycle $\geq 98\%$)
<i>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.</i>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pretest Mode	Description
Mode 1	802.11a / n 20 CH36/ CH40/ CH 48
Mode 2	802.11n 40 CH38/ CH 46
Mode 3	802.11 ac80 CH 42/CH 155
Mode 4	802.11a / n 20 CH36/ CH40/ CH 48
Mode 5	Link Mode

Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a / n 20 CH36/ CH40/ CH 48
Mode 2	802.11n 40 CH38/ CH 46
Mode 3	802.11 ac80 CH 42/CH 155
Mode 4	802.11a / n 20 CH36/ CH40/ CH 48

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.



2.3 Description of Support Units

Equipment	Model	S/N	Manufacturer
Led display	SE2416H	/	DELL
HDMI cable	1.5m	/	/

2.4 Deviation from Standards

None.

2.5 Abnormalities from Standard Conditions

None.

2.6 Test Facility

Test laboratory:	Shenzhen ETR Standard Technology Co., Ltd.
CNAS Registration Number:	L11864
A2LA Certificate Number:	6640.01
FCC Designation Number:	CN1326
FCC Test Firm Registration:	183064

2.7 Test Location

All tests were performed at:	
Laboratory location:	No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	+86 755 85259392

2.8 Additional Instructions

Test Software	http://192.168.0.XXX/CGI/wifi-test.cgi
Power level setup	≤20dBm



3 Test Instruments list

Conducted Emission

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI3	100605	2022.3.09	2023.3.08
2	amplifier	EMtrace	RP01A	50117	2022.3.09	2023.3.08
3	Artificial power network	schwarabeck	NSLK8127	8127483	2022.3.09	2023.3.08
4	Artificial power network	ETS	3186/2NM	1132	2022.3.09	2023.3.08
5	10dB attenuator	HUBER+SUNNER	10dB	/	2022.3.09	2023.3.08
6	Cable 4	HUBER SUNNER	3M	/	2022.3.09	2022.3.08
7	Absorbing Clamp	schwarabeck	MDS21	D69250	2022.3.11	2023.3.10

Radiated Emission & RF Conducted test:

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESPI7	100605	2022.3.09	2023.3.08
2	Broadband antenna	schwarabeck	VULB9168	1064	2022.3.11	2024.3.10
3	Horn antenna	schwarabeck	BBHA9120D	9120D-1145	2022.3.11	2024.3.10
4	amplifier	EMtrace	RP01A	50117	2022.3.09	2023.3.08
5	amplifier	Space-Dtronics	EWLAN0118G-P40	19113001	2022.3.09	2023.3.08
6	Spectrum analyzer	KEYSIGHT	N9020A	MY55370280	2022.3.09	2023.3.08
7	Power detector box	MWRFTest	MW100-PSB	MW201020JYT	2021.11.19	2022.11.18
8	Signal generator	Agilent	N5182A	MY49060455	2021.11.19	2022.11.18
9	Spectrum analyzer	Rohde&schwarz	FSV40	100363	2022.3.09	2023.3.08
10	amplifier	Aeroflex	DLE-161	097	2022.3.09	2023.3.08
11	Horn antenna	Com-Power	SAS-574	588	2022.3.11	2024.3.10
12	Loop antenna	schwarabeck	FMZB 1519 B	1519	2022.3.11	2024.3.10
13	Cable 6	HUBER SUNNER	0.5M	/	2022.3.09	2023.3.08
14	Cable7	HUBER SUNNER	2.0M	/	2022.3.09	2023.3.08
15	Cable8	HUBER SUNNER	6.0M	/	2022.3.09	2023.3.08

Note: the calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).

Software Name	Manufacturer	Model	Version
RF test software	MWRFTest	MTS 8310	V2.0.0.0
Conducted test software	EZ-EMC	Farad	Ver.EMC-CON 3A1.1
Radiated test software	EZ-EMC	Farad	Ver.FA-03A2 RE

4 Test results and Measurement Data

4.1 Antenna requirement

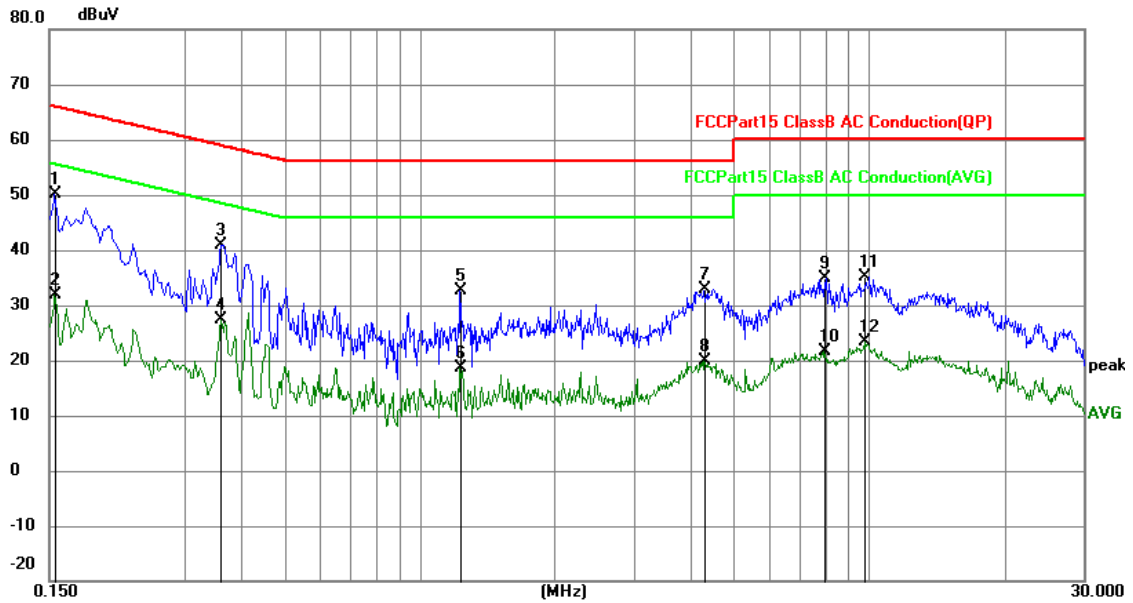
Standard requirement:	FCC Part15 C Section 15.203
<i>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique 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.</i>	
E.U.T Antenna:	
<i>The antennas are Integrated antenna, the best case gain of the antennas are 3dBi, reference to the appendix II for details</i>	

4.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207						
Test Method:	ANSI C63.10:2013						
Test Frequency Range:	150KHz to 30MHz						
Class / Severity:	Class B						
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto						
Limit:	Frequency range (MHz)		Limit (dBuV)				
			Quasi-peak		Average		
	0.15-0.5		66 to 56*		56 to 46*		
	0.5-5		56		46		
	5-30		60		50		
* Decreases with the logarithm of the frequency.							
Test setup:	Reference Plane Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m						
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.						
Test Instruments:	Refer to section 3.0 for details						
Test mode:	Refer to section 2.2 for details						
Test environment:	Temp.:	25.6°C	Humid.:	55%	Press.:	1012mbar	
Test voltage:	AC 120V, 60Hz						
Test results:	Pass						

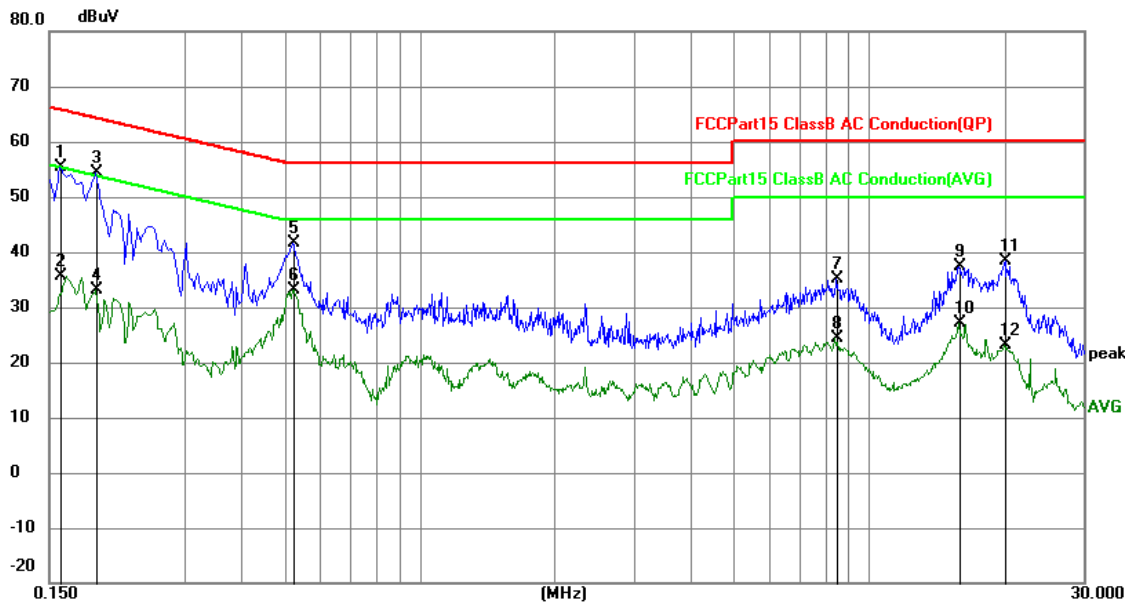
Measurement data

Line:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1544	37.70	12.49	50.19	65.76	-15.57	QP
2	0.1544	19.45	12.49	31.94	55.76	-23.82	AVG
3	0.3613	28.48	12.38	40.86	58.70	-17.84	QP
4	0.3613	15.03	12.38	27.41	48.70	-21.29	AVG
5	1.2300	20.29	12.29	32.58	56.00	-23.42	QP
6	1.2300	6.37	12.29	18.66	46.00	-27.34	AVG
7	4.3079	20.46	12.33	32.79	56.00	-23.21	QP
8	4.3079	7.45	12.33	19.78	46.00	-26.22	AVG
9	7.9439	22.57	12.37	34.94	60.00	-25.06	QP
10	7.9439	9.36	12.37	21.73	50.00	-28.27	AVG
11	9.7980	22.65	12.40	35.05	60.00	-24.95	QP
12	9.7980	11.09	12.40	23.49	50.00	-26.51	AVG

Neutral:

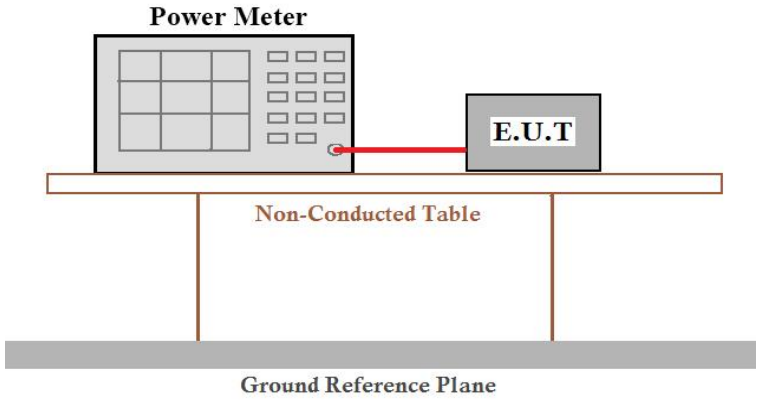


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1590	44.97	10.48	55.45	65.52	-10.07	QP
2	0.1590	25.04	10.48	35.52	55.52	-20.00	AVG
3	0.1905	43.86	10.46	54.32	64.01	-9.69	QP
4	0.1905	22.58	10.46	33.04	54.01	-20.97	AVG
5	0.5235	31.35	10.36	41.71	56.00	-14.29	QP
6	0.5235	22.84	10.36	33.20	46.00	-12.80	AVG
7	8.4930	24.69	10.38	35.07	60.00	-24.93	QP
8	8.4930	13.99	10.38	24.37	50.00	-25.63	AVG
9	15.8235	26.88	10.45	37.33	60.00	-22.67	QP
10	15.8235	16.60	10.45	27.05	50.00	-22.95	AVG
11	20.0670	27.77	10.55	38.32	60.00	-21.68	QP
12	20.0670	12.56	10.55	23.11	50.00	-26.89	AVG

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. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

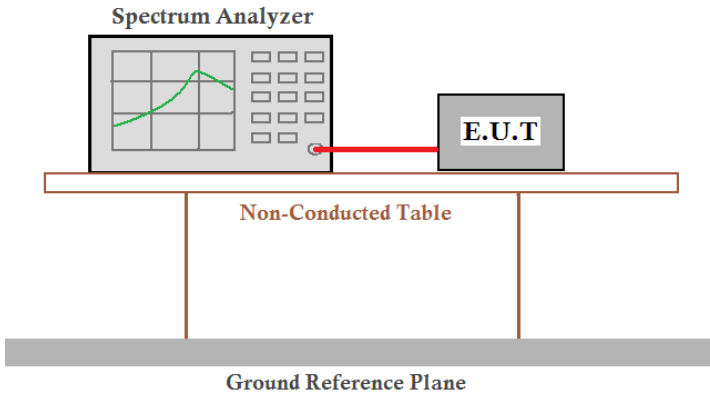
4.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 E Section 15.407 (a)(1)/(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	5150-5250MHz : 250mW 5725~5850MHz : 1W
Test setup:	
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

Measurement Data

Test Channel	Frequency	Maximum output power	LIMIT	Result
	(MHz)	(dBm)	dBm	
TX 802.11a Mode				
CH36	5180	13.59	23.98	Pass
CH40	5200	13.63	23.98	Pass
CH48	5240	13.32	23.98	Pass
TX 802.11 n20 Mode				
CH36	5180	13.66	23.98	Pass
CH40	5200	13.71	23.98	Pass
CH48	5240	13.46	23.98	Pass
TX 802.11 ac20 Mode				
CH36	5180	13.49	23.98	Pass
CH40	5200	14.00	23.98	Pass
CH48	5240	14.61	23.98	Pass
TX 802.11 n40 Mode				
CH38	5190	11.84	23.98	Pass
CH46	5230	11.67	23.98	Pass
TX 802.11 ac40 Mode				
CH38	5190	12.34	23.98	Pass
CH46	5230	12.63	23.98	Pass
TX 802.11 ac80 Mode				
CH42	5210	10.36	23.98	Pass

4.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(a)(12)&15.407(e)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	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.
Test setup:	
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

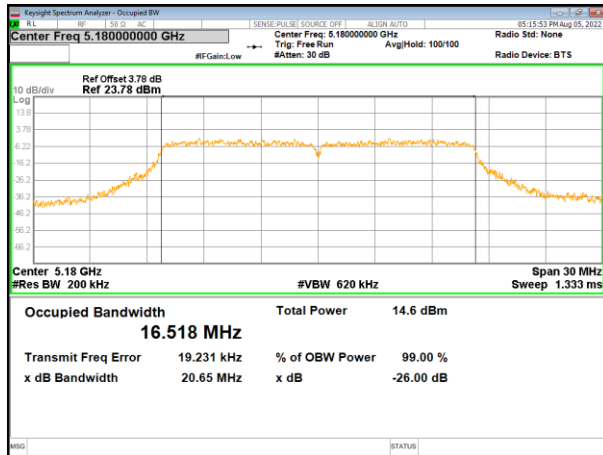
Measurement Data

Test CH	-26dB Channel Bandwidth (MHz)						Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)	
Lowest	20.65	21.08	20.43	42.00	41.65	--	Pass
Middle	20.28	20.65	20.58	--	--	80.43	
Highest	20.51	21.04	20.20	42.25	40.74	--	

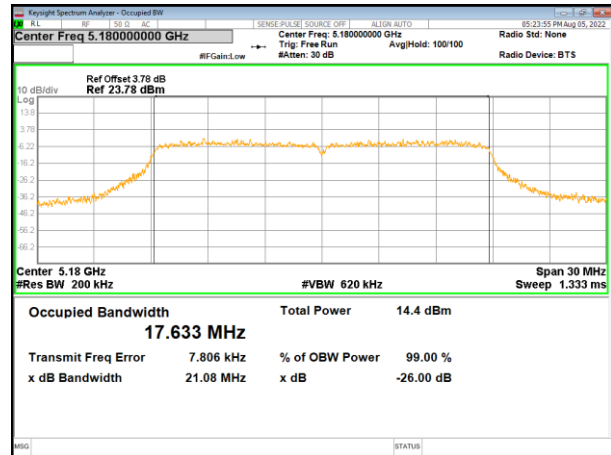
Test CH	99% Occupy Bandwidth (MHz)						Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)	
Lowest	16.518	17.633	17.629	36.350	36.214	--	Pass
Middle	16.603	17.628	17.625	--	--	75.645	
Highest	16.542	17.700	17.563	36.283	36.407	--	

Test plot

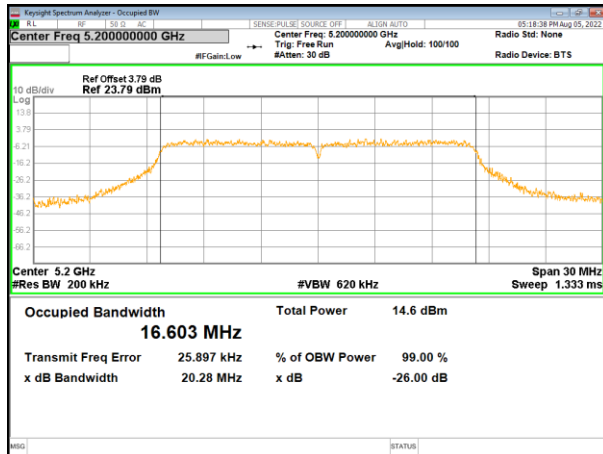
(802.11a) plot on channel 36



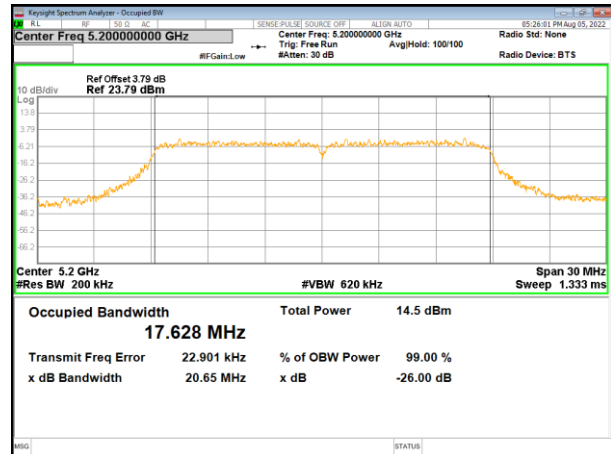
(802.11 n20) plot on channel 36



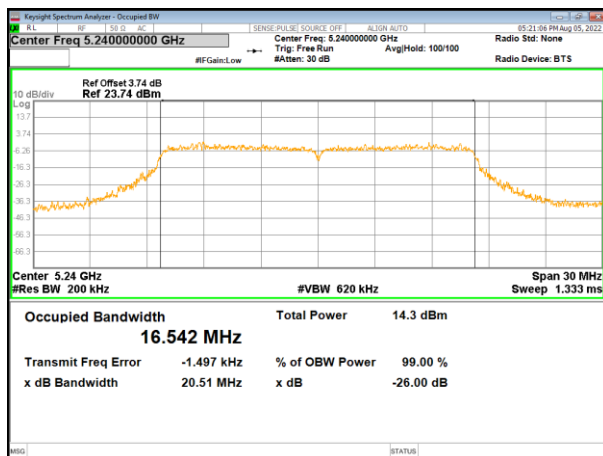
(802.11a) plot on channel 40



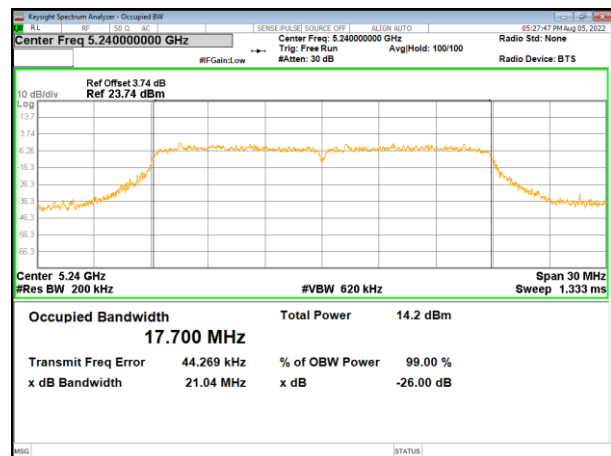
(802.11 n20) plot on channel 40



(802.11a) plot on channel 48

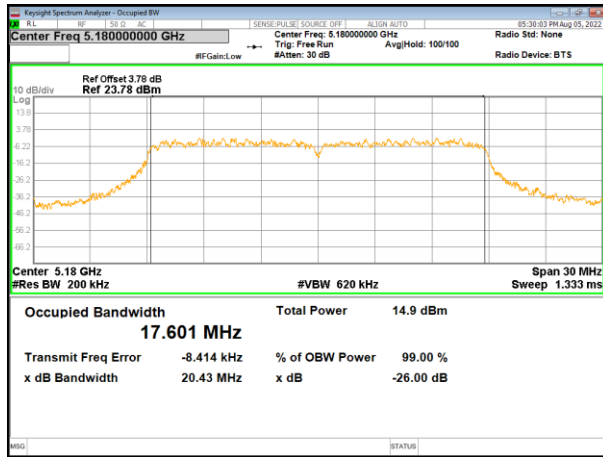


(802.11 n20) plot on channel 48

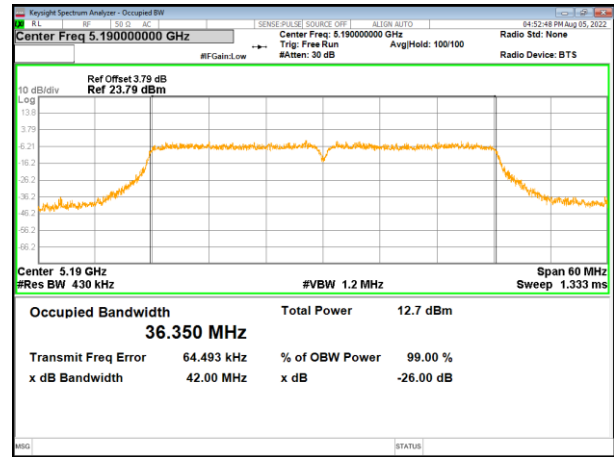


Test plot

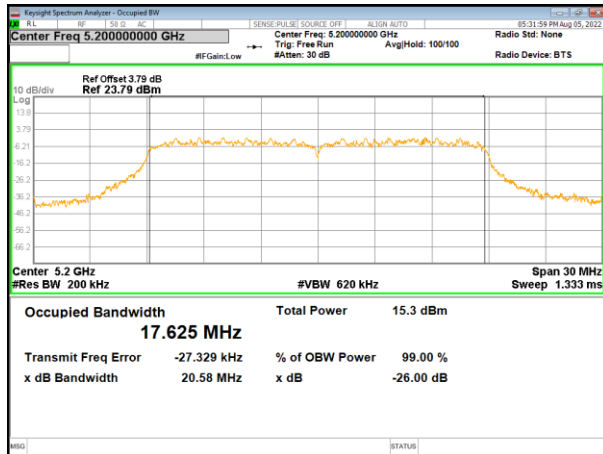
(802.11ac20) plot on channel 36



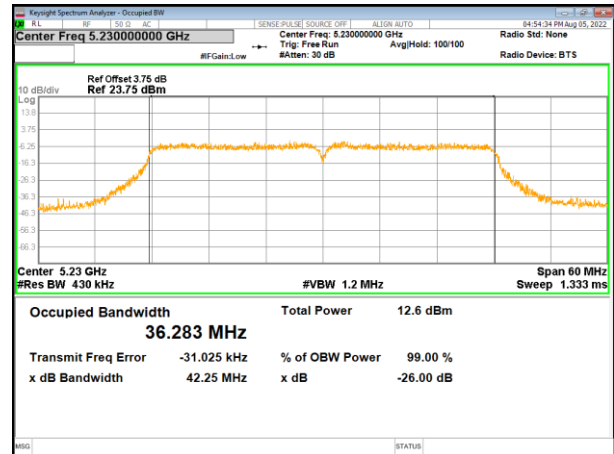
(802.11 n40) plot on channel 38



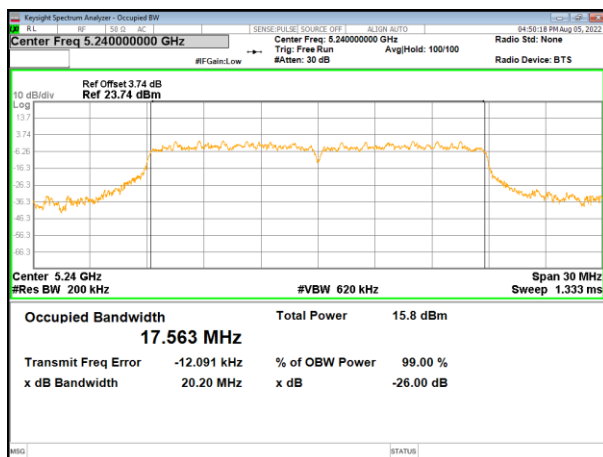
(802.11ac20) plot on channel 40



(802.11 n40) plot on channel 46

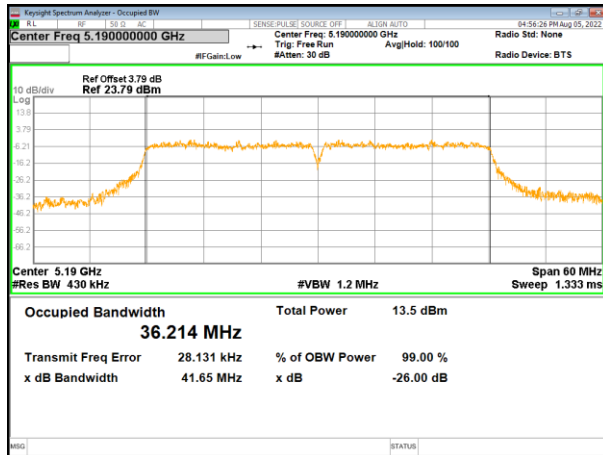


(802.11ac20) plot on channel 48

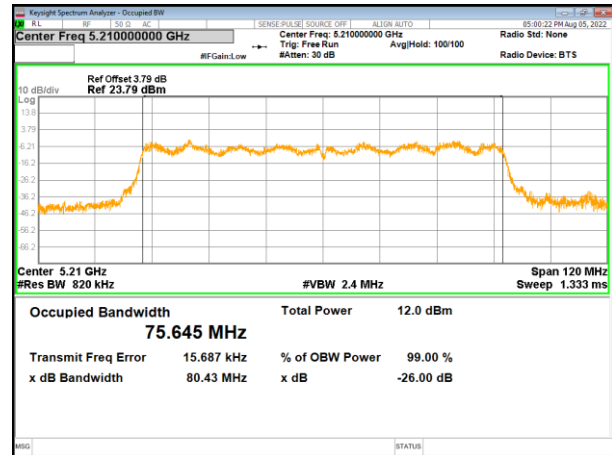


Test plot

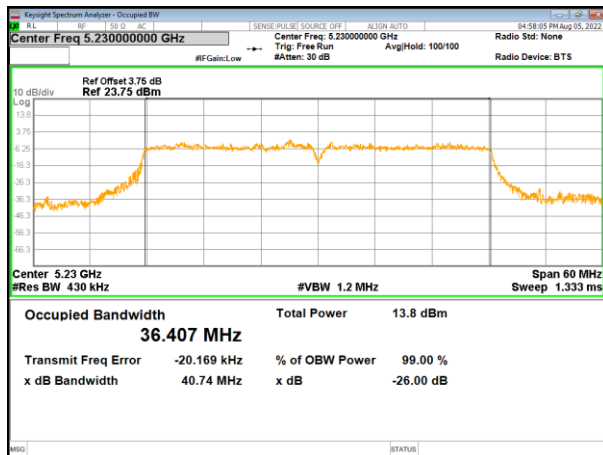
(802.11ac40) plot on channel 38



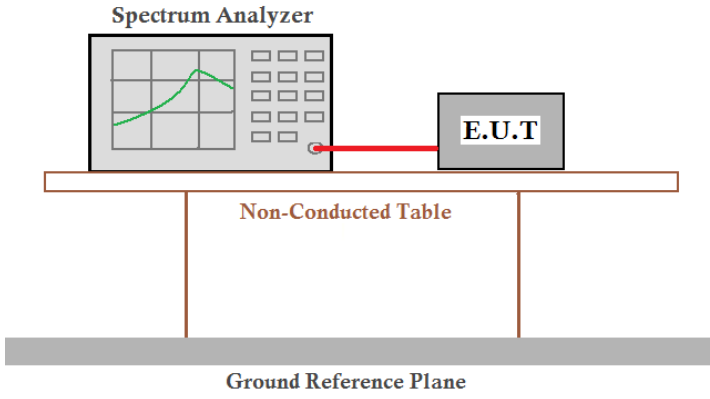
(802.11ac80) plot on channel 42



(802.11ac40) plot on channel 46



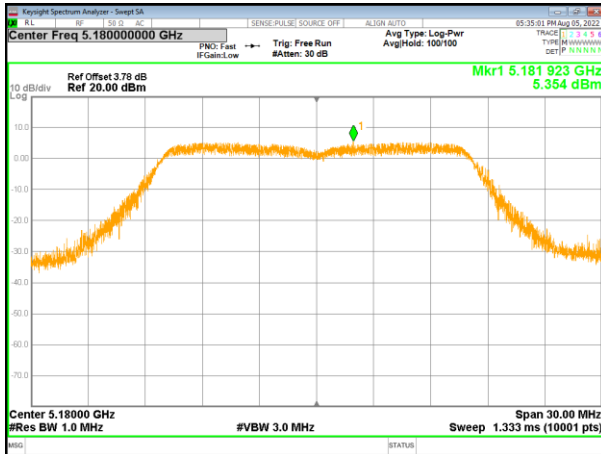
4.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(1)/ (a)(3)	
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	
Limit:	Frequency band (MHz)	Limit
	5150-5250	≤17dBm/1MHz for master device
		≤11dBm/1MHz for client device
	5250-5350	≤11dBm/1MHz for client device
	5470-5725	≤11dBm/1MHz for client device
	5725-5850	≤30dBm/500kHz
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test results:	Pass	

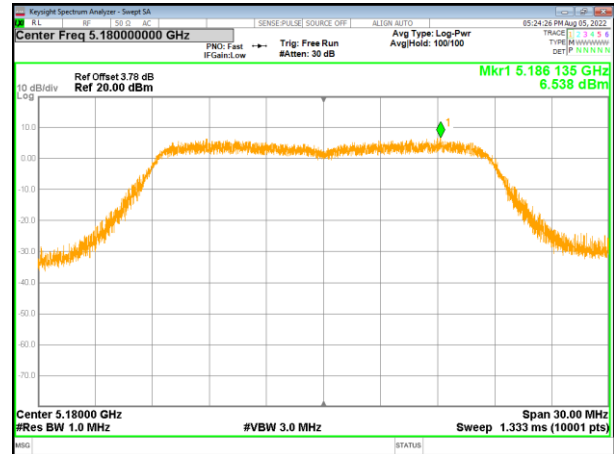
Measurement Data

Mode	Frequency	Measured Power Density (dBm/MHz)	Limit (dBm/MHz)
802.11 a	5180 MHz	5.354	11
	5200 MHz	6.253	11
	5240 MHz	6.208	11
802.11 n20	5180 MHz	6.538	11
	5200 MHz	6.197	11
	5240 MHz	5.869	11
802.11 ac20	5180 MHz	6.116	11
	5200 MHz	6.544	11
	5240 MHz	8.245	11
802.11 n40	5190 MHz	1.055	11
	5230 MHz	1.147	11
802.11 ac40	5190 MHz	-0.248	11
	5230 MHz	1.741	11
802.11 ac80	5210 MHz	-1.563	11

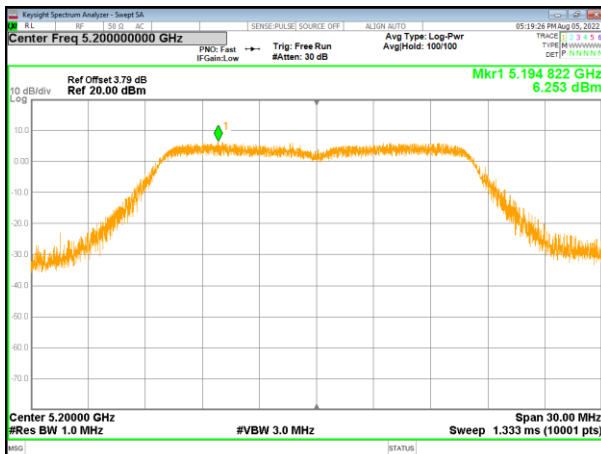
(802.11a) PSD plot on channel 36



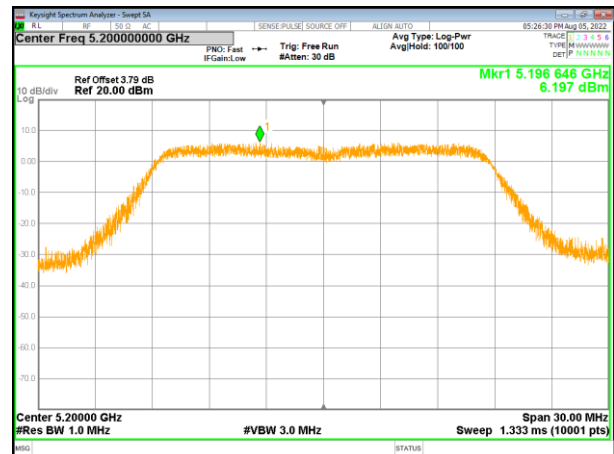
(802.11n20) PSD plot on channel 36



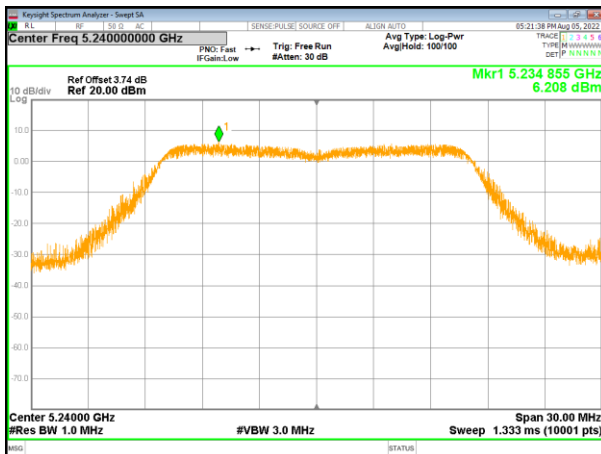
(802.11a) PSD plot on channel 40



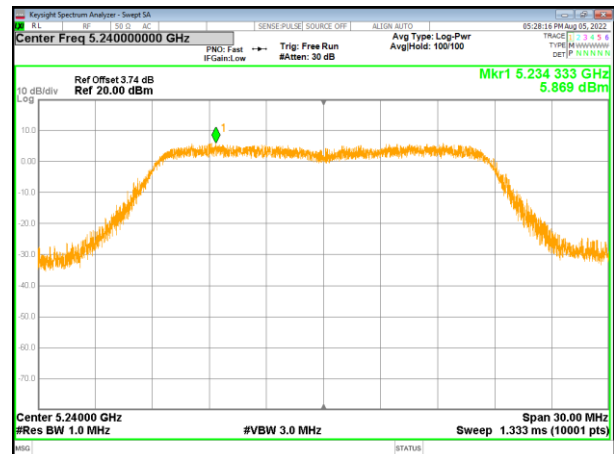
(802.11n20) PSD plot on channel 40



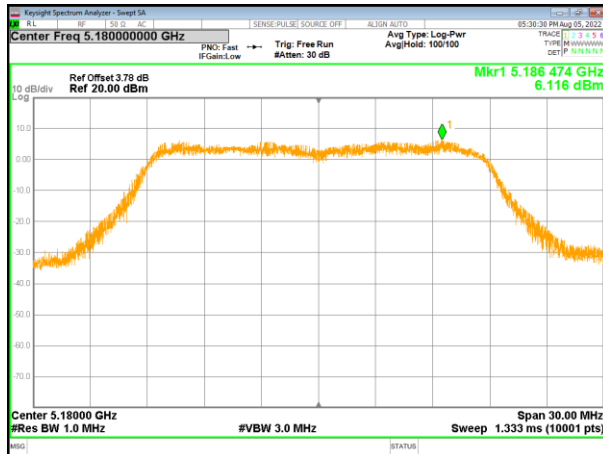
(802.11a) PSD plot on channel 48



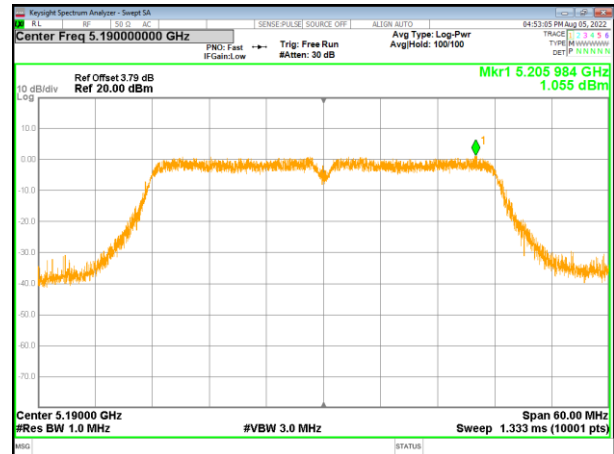
(802.11n20) PSD plot on channel 48



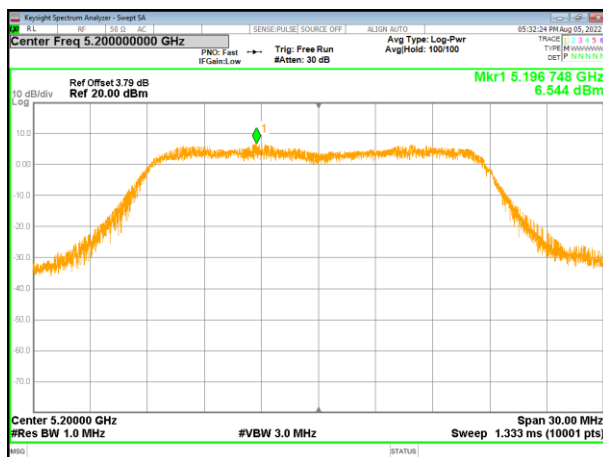
(802.11ac20) PSD plot on channel 36



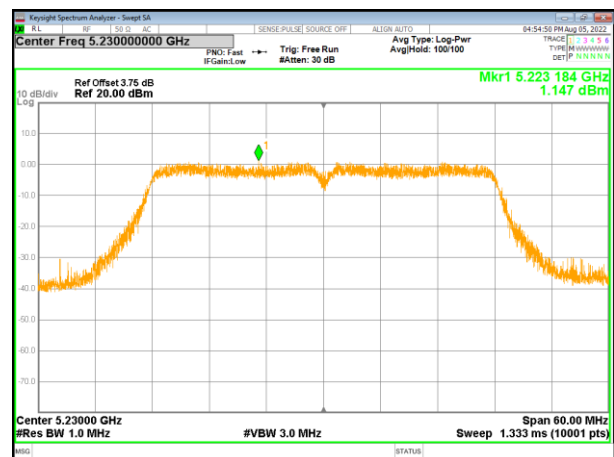
(802.11n40) PSD plot on channel 38



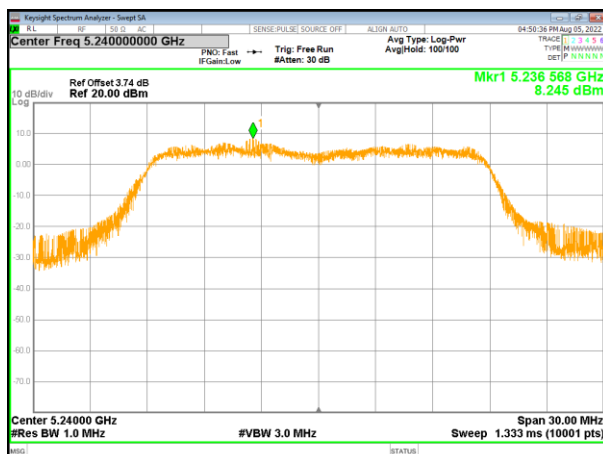
(802.11ac20) PSD plot on channel 40



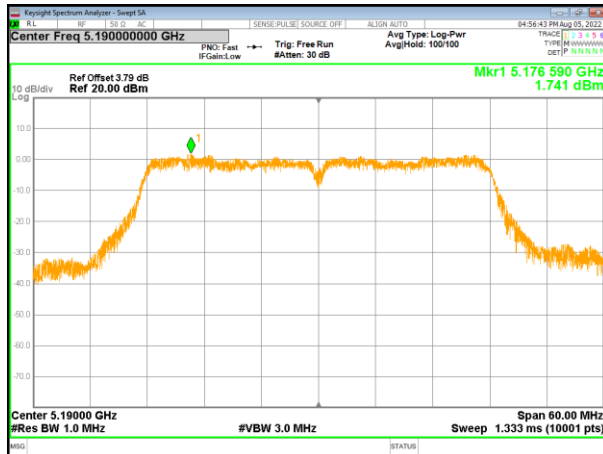
(802.11n40) PSD plot on channel 46



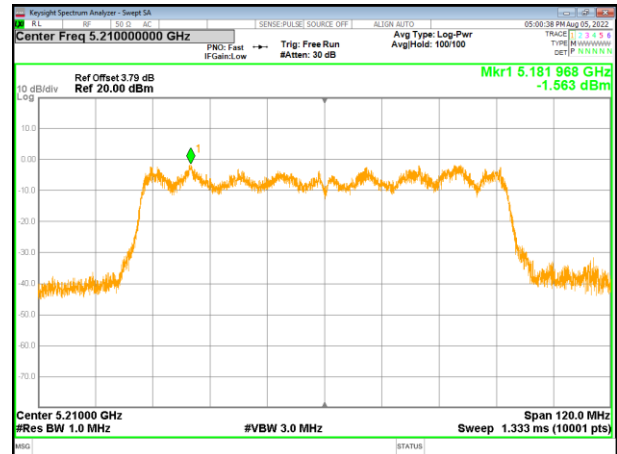
(802.11ac20) PSD plot on channel 48



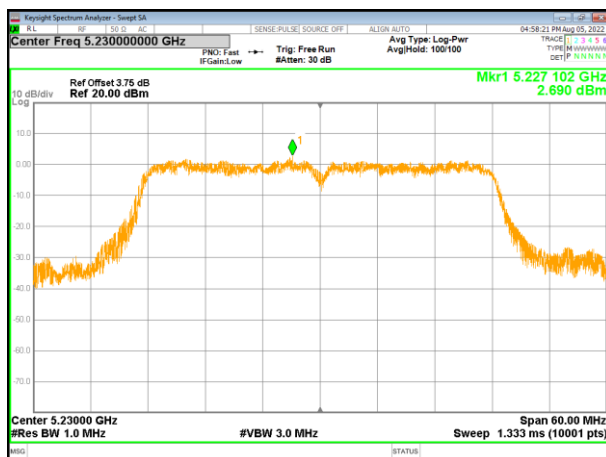
(802.11ac40) PSD plot on channel 38



(802.11ac80) PSD plot on channel 42

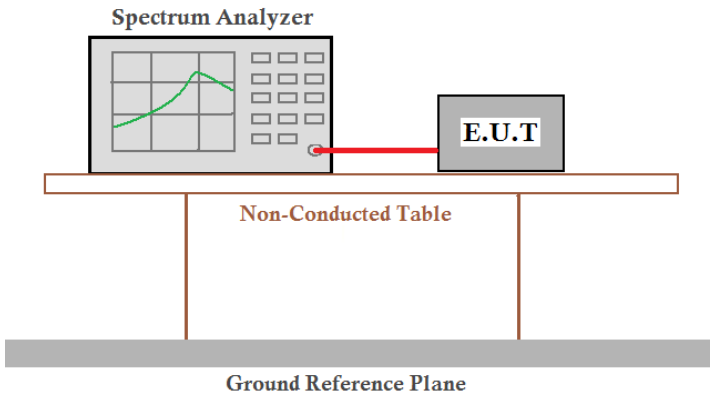


(802.11ac40) PSD plot on channel 46



4.6 Band edge

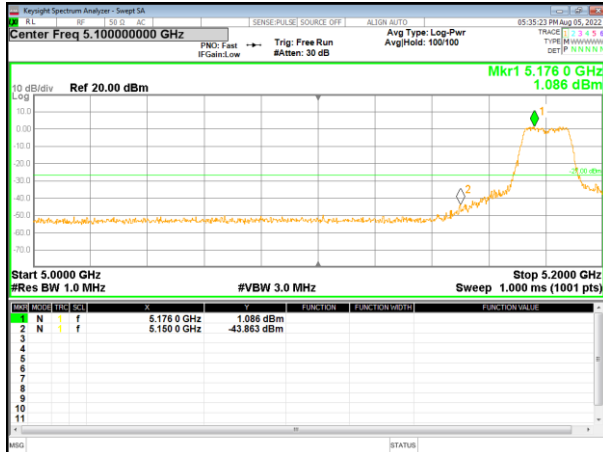
4.6.1 Conducted test Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.
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..
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

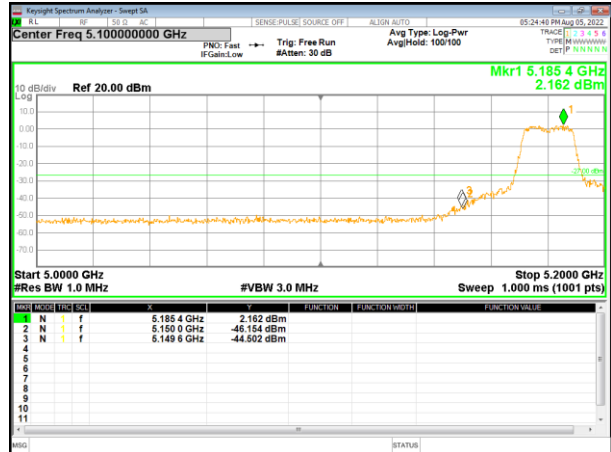
Remarks:/

5.180~5.240 GHz

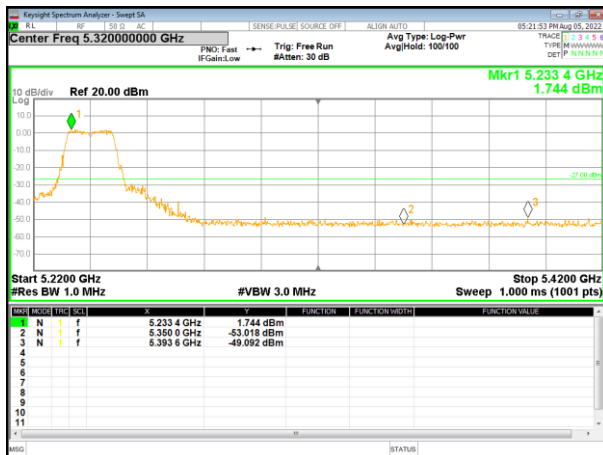
(802.11a) Band Edge, Left Side



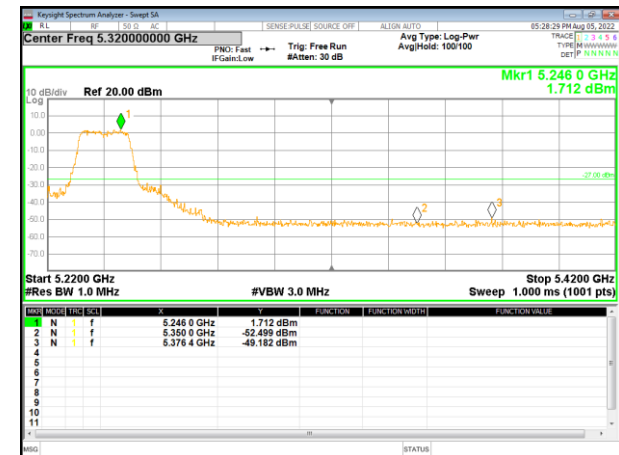
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

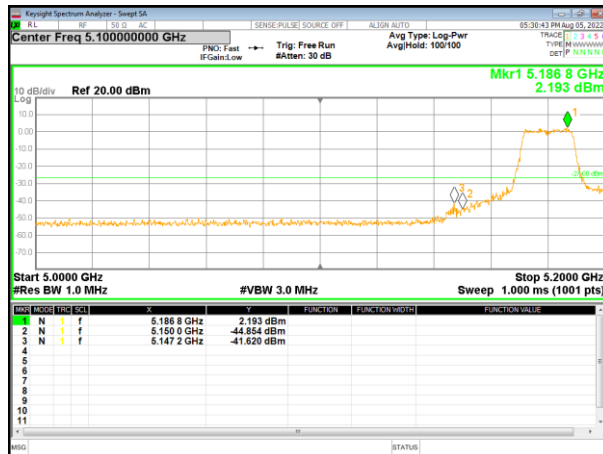


(802.11n20) Band Edge, Right Side

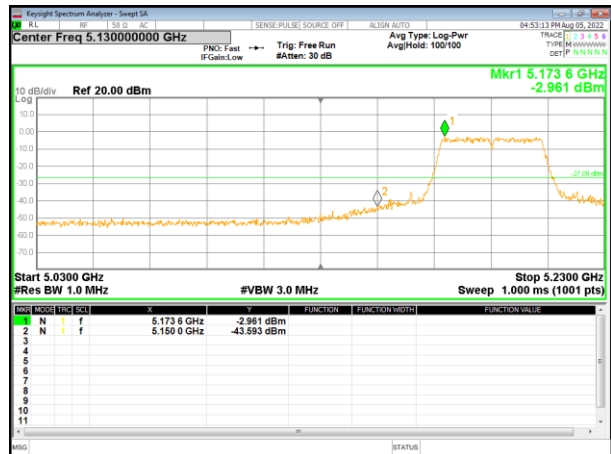


5.180~5.240 GHz

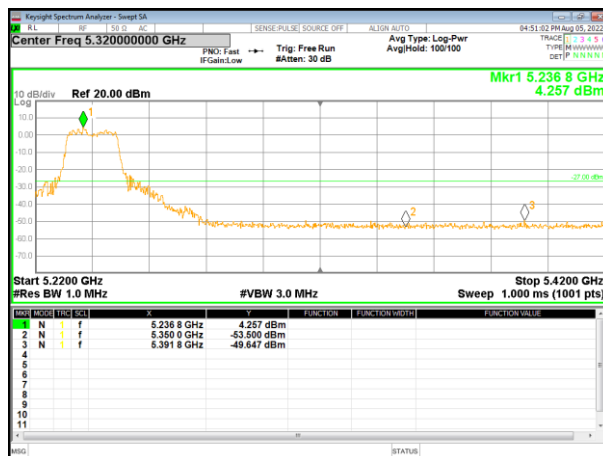
(802.11ac20) Band Edge, Left Side



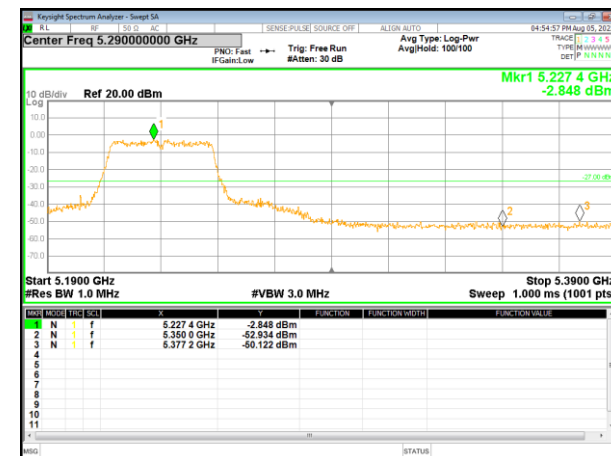
(802.11n40) Band Edge, Left Side



(802.11ac20) Band Edge, Right Side



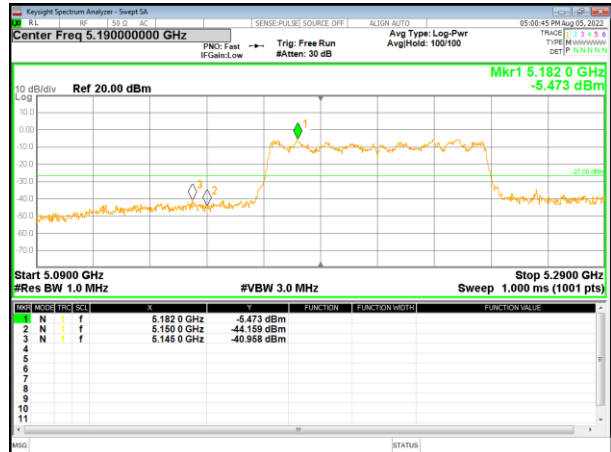
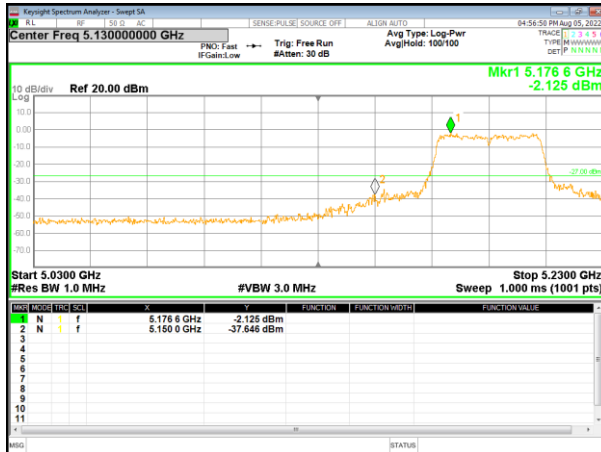
(802.11n40) Band Edge, Right Side



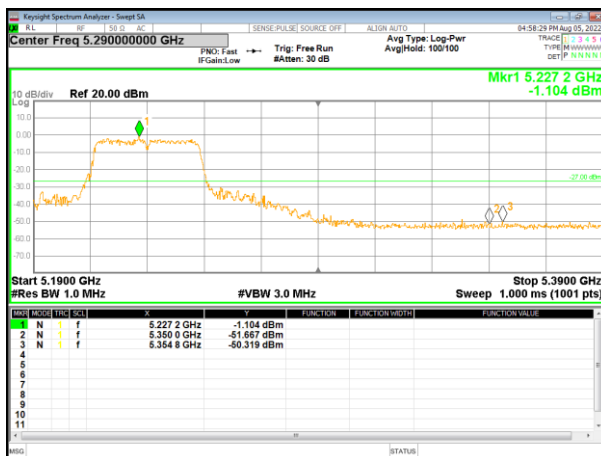
5.180~5.240 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge

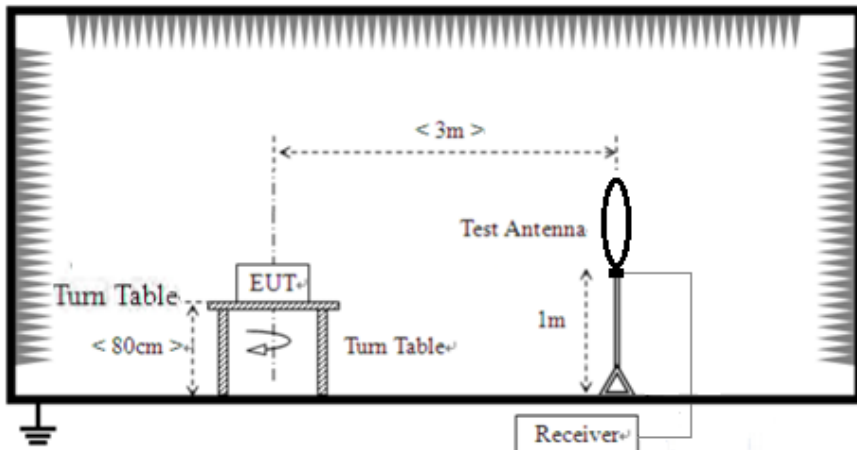


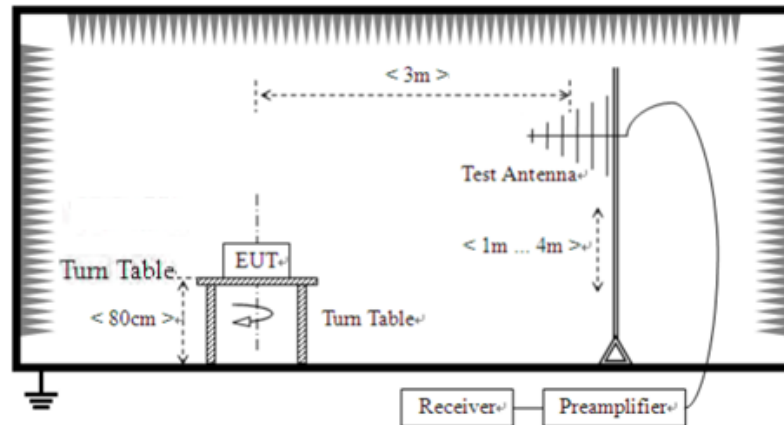
(802.11ac40) Band Edge, Right Side



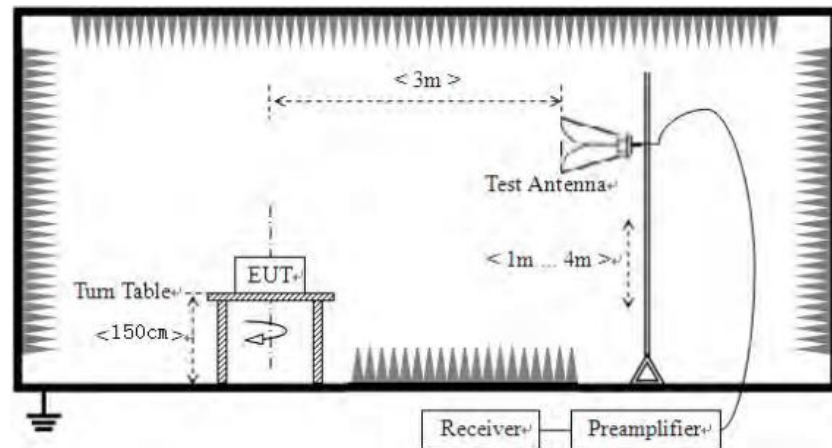
4.7 Spurious Emission

4.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	9kHz to 40GHz					
Test site:	Measurement Distance: 3m					
Receiver setup:	Frequency	Detector	RBW	VBW	Value	
	9kHz-150KHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value	
	150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value	
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value	
	Above 1GHz	Peak	1MHz	3MHz	Peak Value	
		AV	1MHz	3MHz	Average Value	
Limit:	Frequency		Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz		2400/F(KHz)	QP	300m	
	0.490MHz-1.705MHz		24000/F(KHz)	QP	300m	
	1.705MHz-30MHz		30	QP	30m	
	30MHz-88MHz		100	QP	3m	
	88MHz-216MHz		150	QP		
	216MHz-960MHz		200	QP		
	960MHz-1GHz		500	QP		
	Frequency		Limit (dBm/MHz)	Remark		
	Above 1GHz		-27.0	Peak Value		
	Test setup:	For radiated emissions from 9kHz to 30MHz				
						
Test setup:	For radiated emissions from 30MHz to1GHz					



For radiated emissions above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average

	method as specified and then reported in a data sheet.					
	7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.					
Test Instruments:	Refer to section 3.0 for details					
Test mode:	Refer to section 2.2 for details					
Test environment:	Temp.:	24.9°C	Humid.:	56%	Press.:	1012mbar
Test voltage:	DC 19V from adapter					
Test results:	Pass					

Remarks:

1. All antennas was tested, only show the worst case mode test data.
2. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.
3. According to KDB 789033 D02v02r01 section G) 1) d), for measurements above 1000 MHz @3m distance, the limit of field strength is computed as follows:
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$
For example, if $\text{EIRP} = -27\text{dBm}$
 $E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$
- 4.

Measurement Data:

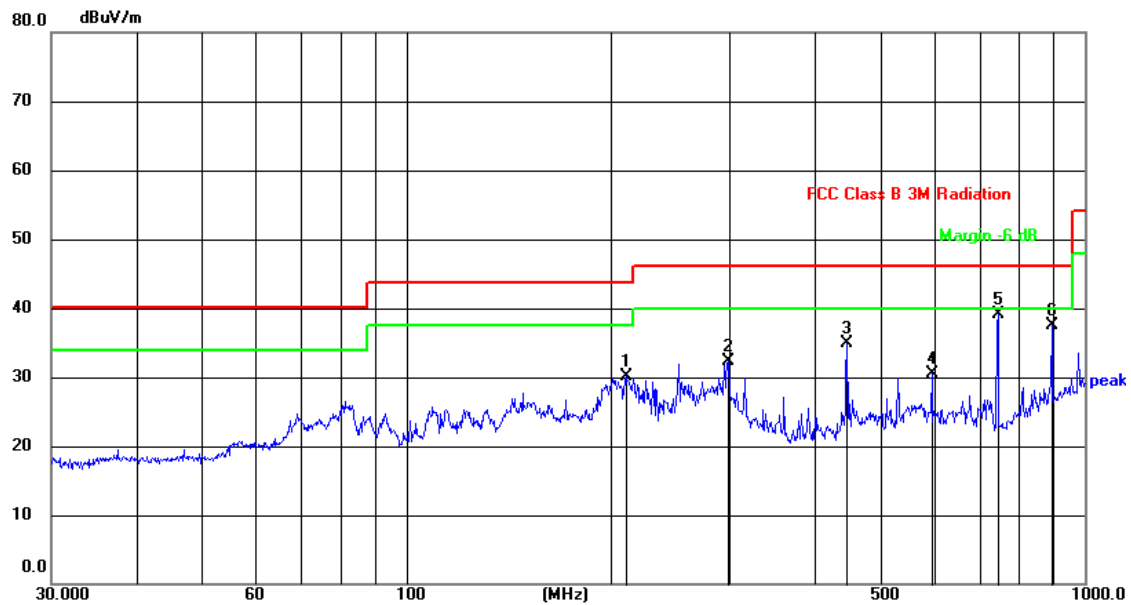
9 kHz ~ 30 MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Below 1GHz

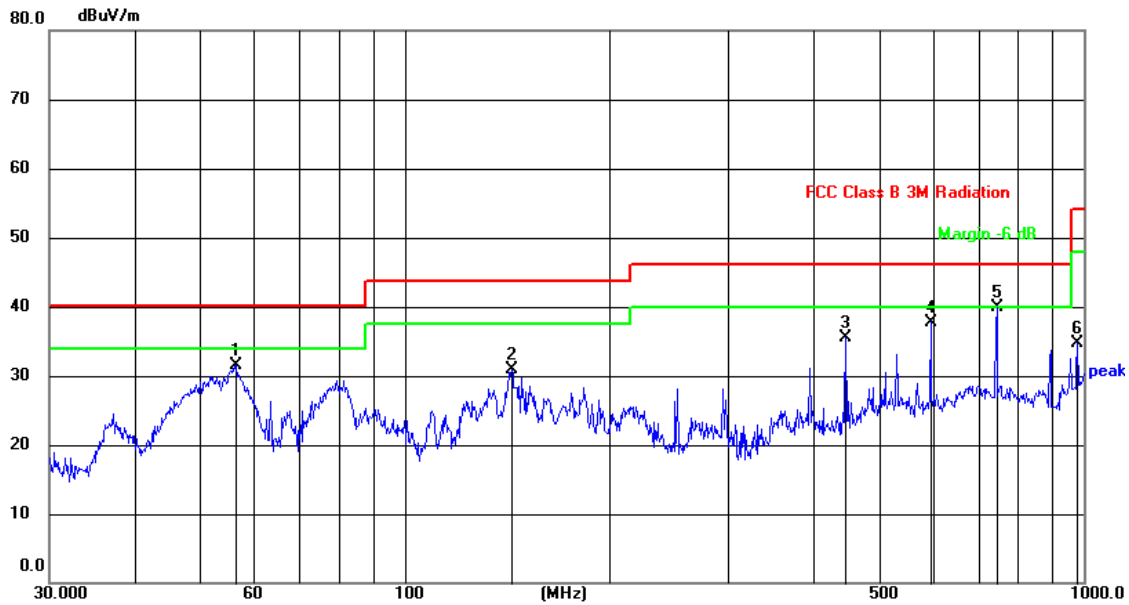
Temperature:	24.9℃	Relative Humidity:	56%
Pressure:	1010 hPa	Test Voltage :	DC19V
Test Mode :	5.2G TX- 802.11ac20		

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	210.7860	48.54	-18.51	30.03	43.50	-13.47	QP
2	298.2681	50.75	-18.50	32.25	46.00	-13.75	QP
3	446.4139	49.78	-14.87	34.91	46.00	-11.09	QP
4	595.1326	41.00	-10.41	30.59	46.00	-15.41	QP
5	744.8659	47.27	-8.26	39.01	46.00	-6.99	QP
6	893.8564	44.09	-6.64	37.45	46.00	-8.55	QP

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	56.5929	52.31	-20.81	31.50	40.00	-8.50	QP
2	143.8291	49.78	-18.94	30.84	43.50	-12.66	QP
3	446.4139	50.33	-14.88	35.45	46.00	-10.55	QP
4	595.1326	49.03	-11.31	37.72	46.00	-8.28	QP
5	744.8659	48.15	-8.25	39.90	46.00	-6.10	QP
6	979.1802	38.71	-4.07	34.64	54.00	-19.36	QP

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. The test data shows only the worst case 802.11ac20 mode

**Above 1GHz:**

Temperature:	24.9℃	Relative Humidity:	56%
Pressure:	1010 hPa	Test Voltage :	DC19V
Test Mode :	5.2G TX- 802.11ac20		

802.11ac20

Polar (H/V)	Frequency	Meter Read n g	Pre- amplifier	Cable Loss	A tenna Factor	Emission Level	Limits	Margin	Detect or Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:5180MHz									
V	10360.00	53.96	46.2	8.27	38.5	54.53	68.20	-19.47	PK
V	10360.00	42.29	46.2	8.27	38.5	42.86	54.00	-11.14	AV
V	15540.00	50.42	46.3	10.35	38.7	53.17	74.00	-20.83	PK
V	15540.00	40.84	46.3	10.35	38.7	43.59	54.00	-10.41	AV
V	20720.00	61.15	57.4	11.93	37.8	53.48	74.00	-20.52	PK
V	20720.00	50.48	57.4	11.93	37.8	42.81	54.00	-11.19	AV
V	25900.00	58.09	56.5	13.45	39.7	54.74	68.20	-19.26	PK
V	25900.00	46.88	56.5	13.45	39.7	43.53	54.00	-10.47	AV
H	10360.00	53.70	46.2	8.27	38.5	54.27	68.20	-19.73	PK
H	10360.00	42.05	46.2	8.27	38.5	42.62	54.00	-11.38	AV
H	15540.00	50.79	46.3	10.35	38.7	53.54	74.00	-20.46	PK
H	15540.00	38.88	46.3	10.35	38.7	41.63	54.00	-12.37	AV
H	20720.00	62.12	57.4	11.93	37.8	54.45	74.00	-19.55	PK
H	20720.00	51.39	57.4	11.93	37.8	43.72	54.00	-10.28	AV
H	25900.00	57.64	56.5	13.45	39.7	54.29	68.20	-19.71	PK
H	25900.00	47.20	56.5	13.45	39.7	43.85	54.00	-10.15	AV

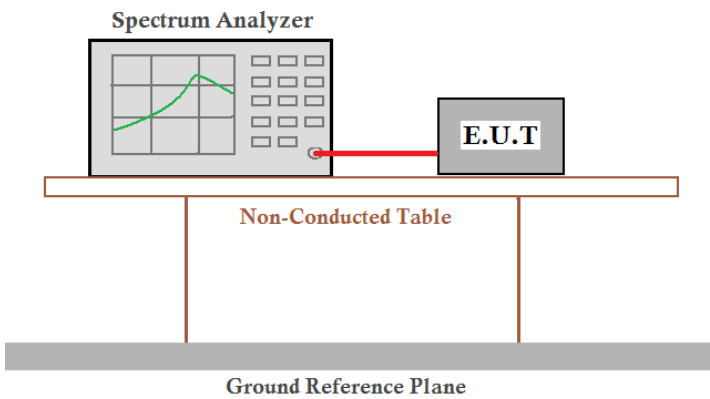
Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detect or Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:5200MHz									
V	10400.00	52.98	46.2	8.27	38.5	53.55	68.20	-20.45	PK
V	10400.00	42.05	46.2	8.27	38.5	42.62	54.00	-11.38	AV
V	15600.00	51.18	46.3	10.35	38.4	53.63	74.00	-20.37	PK
V	15600.00	40.27	46.3	10.35	38.4	42.72	54.00	-11.28	AV
V	20800.00	62.39	57.4	11.93	37.8	54.72	74.00	-19.28	PK
V	20800.00	51.32	57.4	11.93	37.8	43.65	54.00	-10.35	AV
V	26000.00	56.81	56.5	13.45	39.8	53.56	68.20	-20.44	PK
V	26000.00	45.44	56.5	13.45	39.8	42.19	54.00	-11.81	AV
H	10400.00	52.87	46.2	8.27	38.5	53.44	68.20	-20.56	PK
H	10400.00	42.11	46.2	8.27	38.5	42.68	54.00	-11.32	AV
H	15600.00	50.63	46.3	10.35	38.4	53.08	74.00	-20.92	PK
H	15600.00	40.26	46.3	10.35	38.4	42.71	54.00	-11.29	AV
H	20800.00	61.00	57.4	11.93	37.8	53.33	74.00	-20.67	PK
H	20800.00	50.08	57.4	11.93	37.8	42.41	54.00	-11.59	AV
H	26000.00	55.40	56.5	13.45	39.8	52.15	68.20	-21.85	PK
H	26000.00	43.88	56.5	13.45	39.8	40.63	54.00	-13.37	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)	Detect or Type
High Channel:5240MHz									
V	10480.00	54.06	46.2	8.27	38.6	54.73	68.20	-19.27	PK
V	10480.00	42.97	46.2	8.27	38.6	43.64	54.00	-10.36	AV
V	15720.00	51.10	46.3	10.35	38.4	53.55	74.00	-20.45	PK
V	15720.00	39.03	46.3	10.35	38.4	41.48	54.00	-12.52	AV
V	20960.00	62.66	57.4	11.93	37.5	54.69	74.00	-19.31	PK
V	20960.00	50.35	57.4	11.93	37.5	42.38	54.00	-11.62	AV
V	26200.00	56.69	56.5	13.45	40.1	53.74	68.20	-20.26	PK
V	26200.00	45.86	56.5	13.45	40.1	42.91	54.00	-11.09	AV
H	10480.00	52.60	46.2	8.27	38.6	53.27	68.20	-20.73	PK
H	10480.00	41.27	46.2	8.27	38.6	41.94	54.00	-12.06	AV
H	15720.00	50.12	46.3	10.35	38.4	52.57	74.00	-21.43	PK
H	15720.00	40.66	46.3	10.35	38.4	43.11	54.00	-10.89	AV
H	20960.00	61.61	57.4	11.93	37.5	53.64	74.00	-20.36	PK
H	20960.00	50.26	57.4	11.93	37.5	42.29	54.00	-11.71	AV
H	26200.00	56.86	56.5	13.45	40.1	53.91	68.20	-20.09	PK
H	26200.00	45.58	56.5	13.45	40.1	42.63	54.00	-11.37	AV

Remark:

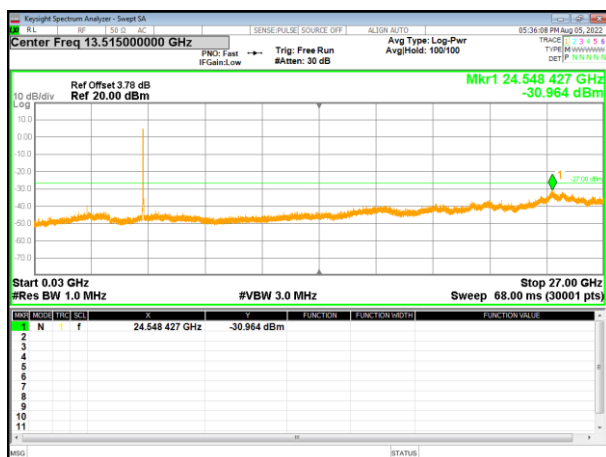
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. The worst mode is 802.11ac20, only the worst data is recorded.

4.7.2 Conducted Emission Method

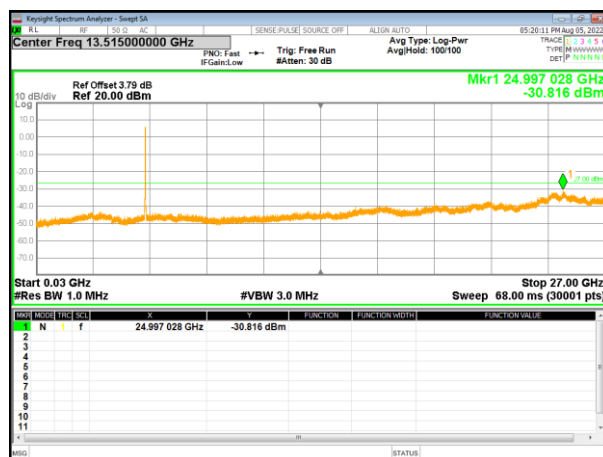
Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)
Test Method:	ANSI C63.10:2013
Limit:	-27dBm/MHz
Test setup:	 The diagram illustrates the test setup for conducted emissions. A Spectrum Analyzer, shown with a green trace on its screen, is connected to an Equipment Under Test (E.U.T.) by a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a Non-Conducted Table. This table is supported by two vertical legs and rests on a thick, grey Ground Reference Plane.
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

Test Plot

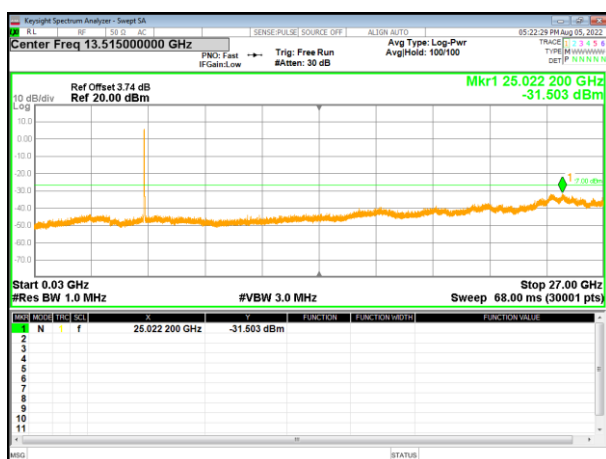
802.11a on channel 36



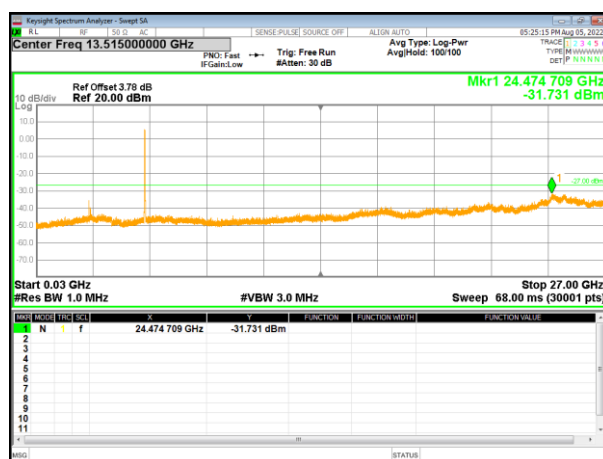
802.11a on channel 40



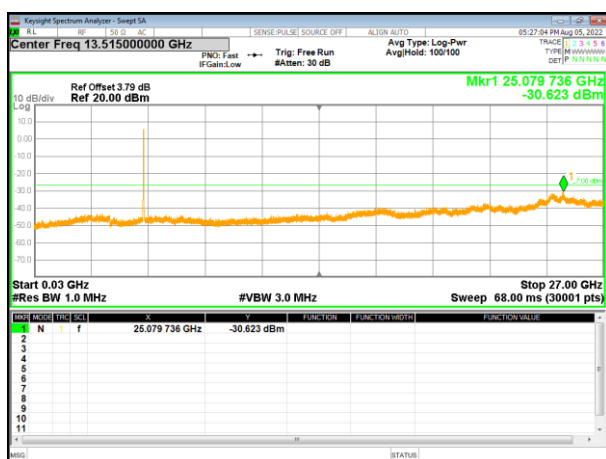
802.11a on channel 48



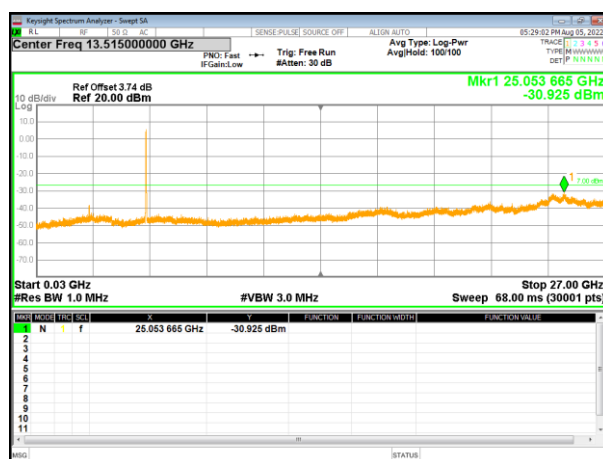
802.11n20 on channel 36



802.11n20 on channel 40

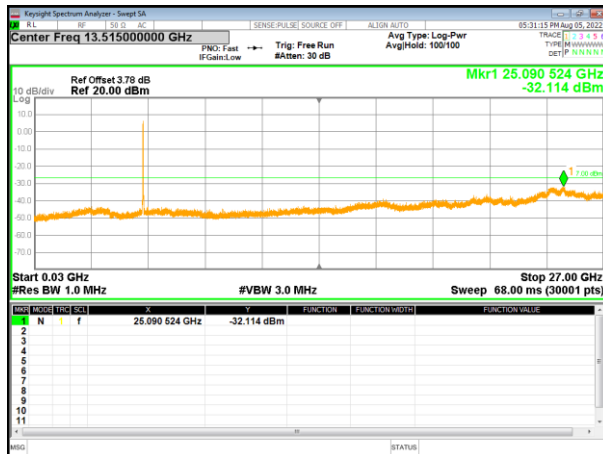


802.11n20 on channel 48

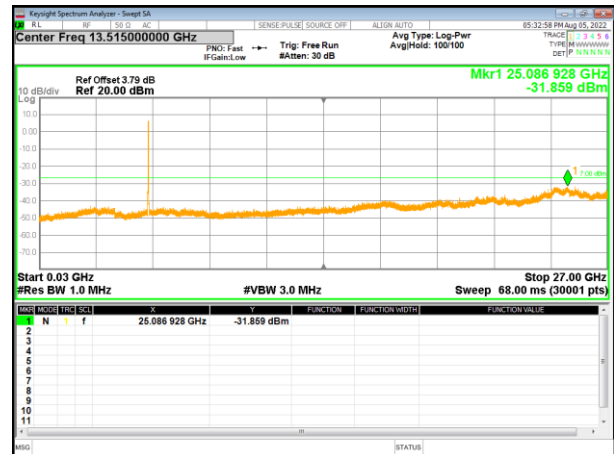


Test Plot

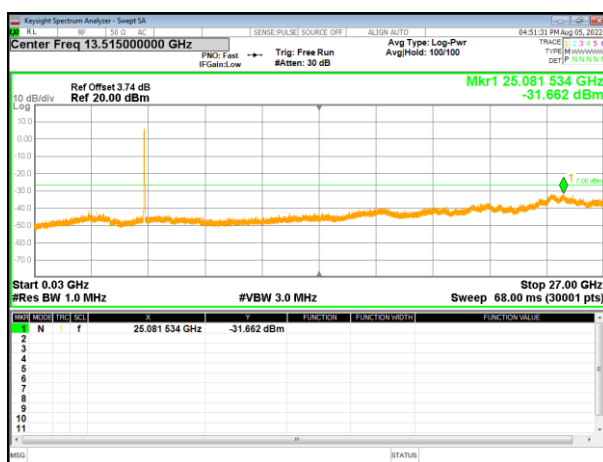
802.11ac20 on channel 36



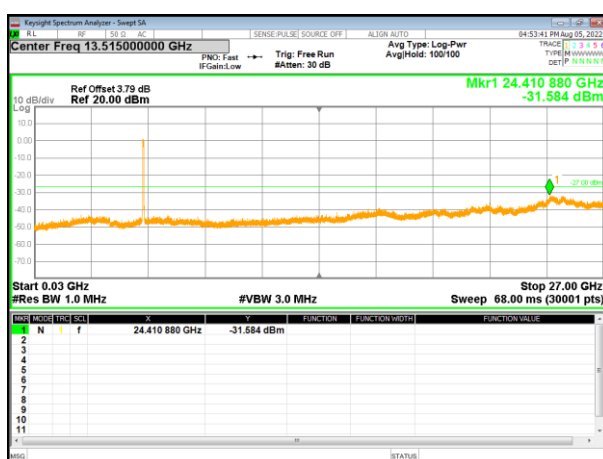
802.11ac20 on channel 40



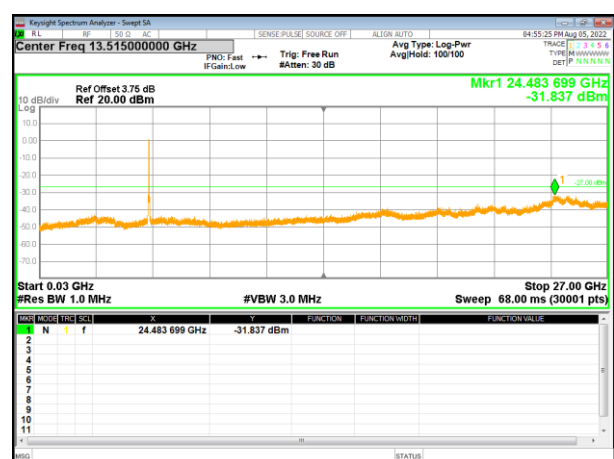
802.11ac20 on channel 48



802.11n40 on channel 38

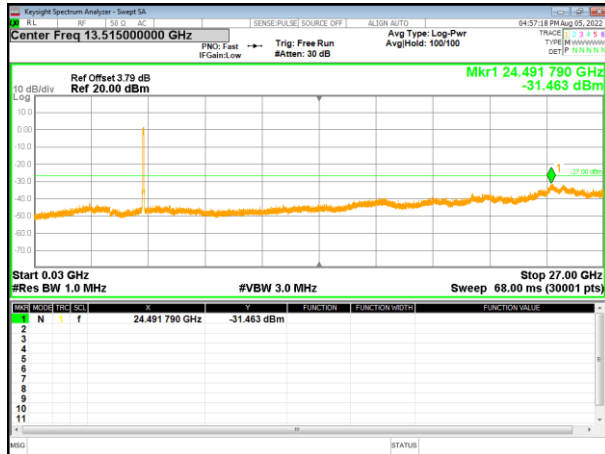


802.11n40 on channel 46

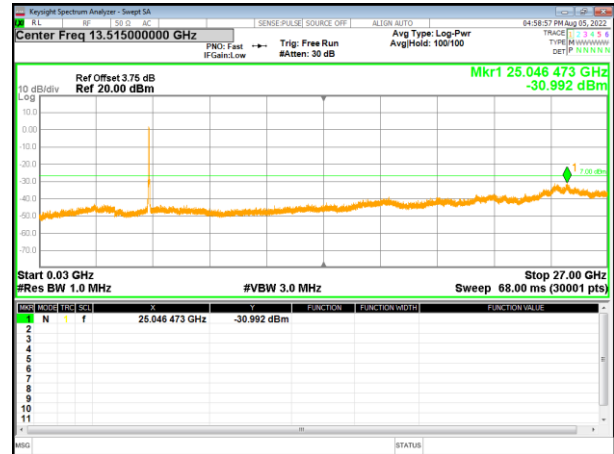


Test Plot

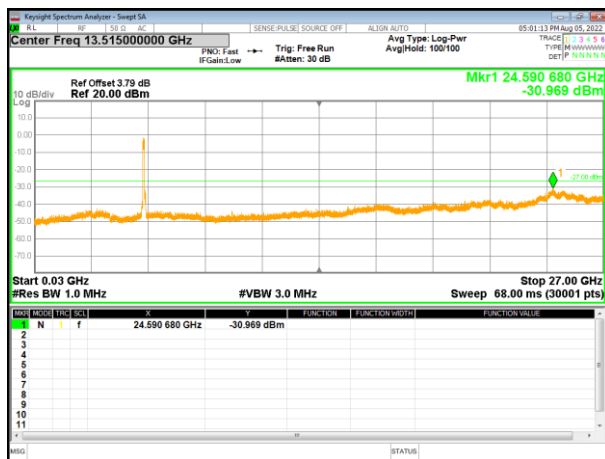
802.11ac40 on channel 38



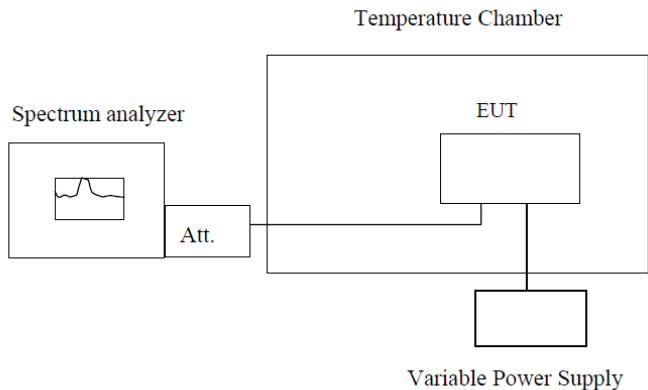
802.11ac40 on channel 46



802.11ac80 on channel 42



4.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	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
Test Procedure:	a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minute s. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 3.0 for details
Test mode:	Refer to section 2.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.

Measurement data:

Frequency stability versus Temp.					
Power Supply: DC 19V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5180	5179.9860	5179.9860	5179.9650	5179.9650
	5190	5189.9820	5189.9820	5189.9760	5189.9760
	5200	5199.9770	5199.9770	5199.9670	5199.9670
	5210	5209.9830	5209.9830	5209.9680	5209.9680
	5220	5219.9780	5219.9780	5219.9750	5219.9750
	5230	5229.9760	5229.9760	5229.9930	5229.9930
	5240	5239.9490	5239.9490	5239.9650	5239.9650
-20	5180	5179.9770	5179.9760	5179.7630	5179.9650
	5190	5189.9680	5189.9770	5199.9350	5189.9760
	5200	5199.9760	5199.9680	5199.9330	5199.9670
	5210	5209.9680	5299.9760	5209.9880	5209.9680
	5220	5219.9890	5219.9680	5219.9770	5219.9750
	5230	5229.9670	5229.9890	5229.9640	5229.9930
	5240	5239.9850	5239.9670	5239.9810	5239.9650
-10	5180	5239.9850	5239.9670	5239.9810	5239.9650
	5190	5189.9820	5189.9820	5189.9760	5189.9760
	5200	5199.9770	5199.9770	5199.9670	5199.9670
	5210	5209.9830	5209.9830	5209.9680	5209.9680
	5220	5219.9780	5219.9780	5219.9750	5219.9750
	5230	5229.9760	5229.9760	5229.9930	5229.9930
	5240	5239.9490	5239.9490	5239.9650	5239.9650
0	5180	5179.9860	5179.9650	5179.9650	5179.9760
	5190	5189.9820	5189.9760	5189.9760	5189.9770
	5200	5199.9770	5199.9670	5199.9670	5199.9680
	5210	5209.9830	5209.9680	5209.9680	5299.9760
	5220	5219.9780	5219.9750	5219.9750	5219.9680
	5230	5229.9760	5229.9930	5229.9930	5229.9890
	5240	5179.9860	5179.9650	5179.9650	5239.9670
10	5180	5239.9670	5239.9810	5179.9860	5179.9650
	5190	5189.9820	5189.9760	5189.9820	5189.9760
	5200	5199.9770	5199.9670	5199.9770	5199.9670
	5210	5209.9830	5209.9680	5209.9830	5209.9680
	5220	5219.9780	5219.9750	5219.9780	5219.9750
	5230	5229.9760	5229.9930	5229.9760	5229.9930
	5240	5239.9490	5239.9650	5179.9860	5179.9650

20	5180	5179.9860	5179.9760	5179.9650	5179.9770
	5190	5189.9820	5189.9770	5189.9760	5189.9680
	5200	5199.9770	5199.9680	5199.9670	5199.9760
	5210	5209.9830	5299.9760	5209.9680	5209.9680
	5220	5219.9780	5219.9680	5219.9750	5219.9890
	5230	5229.9760	5229.9890	5229.9930	5229.9670
	5240	5239.9490	5239.9670	5239.9650	5239.9850
30	5180	5179.7630	5179.9650	5179.9770	5179.9860
	5190	5199.9350	5189.9760	5189.9680	5179.9860
	5200	5199.9330	5199.9670	5199.9760	5189.9820
	5210	5209.9880	5209.9680	5209.9680	5199.9770
	5220	5219.9770	5219.9750	5219.9890	5209.9830
	5230	5229.9640	5229.9930	5229.9670	5219.9780
	5240	5239.9810	5239.9650	5239.9850	5229.9760
40	5180	5179.9650	5179.9760	5179.7630	5179.9650
	5190	5189.9760	5189.9770	5199.9350	5189.9760
	5200	5199.9670	5199.9680	5199.9330	5199.9670
	5210	5209.9680	5299.9760	5209.9880	5209.9680
	5220	5219.9750	5219.9680	5219.9770	5219.9750
	5230	5229.9930	5229.9890	5229.9640	5229.9930
	5240	5239.9650	5239.9670	5239.9810	5239.9650
50	5180	5179.9860	5179.9760	5179.9770	5179.9380
	5190	5189.9820	5189.9770	5189.9680	5189.9680
	5200	5199.9770	5199.9680	5199.9760	5199.9930
	5210	5209.9830	5299.9760	5209.9680	5209.9770
	5220	5219.9780	5219.9680	5219.9890	5219.9680
	5230	5229.9760	5229.9890	5229.9670	5229.9960
	5240	5239.9490	5239.9670	5239.9850	5239.9840

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
16.15	5180	5179.9650	5179.9650	5179.9770	5180.1010
	5190	5189.9760	5189.9760	5189.9680	5199.9760
	5200	5199.9670	5199.9670	5199.9760	5200.0010
	5210	5209.9680	5209.9680	5209.9680	5209.9790
	5220	5219.9750	5219.9750	5219.9890	5219.9940
	5230	5229.9930	5229.9930	5229.9670	5229.9870
	5240	5239.9650	5239.9650	5239.9850	5239.9950
19.00	5180	5179.9770	5179.9950	5179.9650	5179.9770
	5190	5189.9680	5180.1010	5189.9760	5189.9680
	5200	5199.9760	5199.9760	5199.9670	5199.9760
	5210	5209.9680	5210.0010	5209.9680	5209.9680
	5220	5219.9890	5219.9790	5219.9750	5219.9890
	5230	5229.9670	5229.9940	5229.9930	5229.9670
	5240	5239.9850	5239.9870	5239.9650	5239.9850
21.85	5180	5179.9650	5179.9770	5179.9760	5179.9650
	5190	5189.9760	5189.9680	5189.9770	5189.9760
	5200	5199.9670	5199.9760	5199.9680	5199.9670
	5210	5209.9680	5209.9680	5299.9760	5209.9680
	5220	5219.9750	5219.9890	5219.9680	5219.9750
	5230	5229.9930	5229.9670	5229.9890	5229.9930
	5240	5239.9650	5239.9850	5239.9670	5239.9650

5 Test Setup Photo

Reference to the **appendix I** for details.

6 EUT Constructional Details

Reference to the **appendix II** for details.

-----END-----