TEST REPORT

Applicant:	Shenzhen suqiao computer technology co., Ltd
Address of Applicant:	503C-4, World Trade Plaza podium, No.9 Fuhong Road, Funan Community, Futian Street, Shenzhen
Manufacturer/Factory:	Shenzhen suqiao computer technology co., Ltd
Address of Manufacturer	503C-4, World Trade Plaza podium, No.9 Fuhong Road, Funan Community, Futian Street, Shenzhen
Product Name:	Mini PC
Model No.:	ren2000,ren5000,ren3000,ren4000,ren6000,ren7000,ren8000, ren9000,ren6,ren7,ren8,ren9,ren10,ren11,ren12,ren13,ren14,ren15
Trade Mark:	N/A
FCC ID:	2BB5T-REN2000
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of Test:	Jan.19, 2024- Jan.25, 2024
Date of report issued:	Feb.19, 2024
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.

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Compiled by:	Reviewed by:	Approved by:
Carl Kang	Smith Chen	Smith Chen
Project Engineer	Project Manager	Authorized Signature

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Report Revision History		
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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	Carr Kang
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:	Mini PC
Model No.:	ren2000,ren5000,ren3000,ren4000,ren6000,ren7000,ren8000,ren9000,ren6,ren7,ren8,ren9,ren10,ren11,ren12,ren13,ren14,ren15
Difference of model(s)	All the model are the same circuit and RF module, except the model names and colors
Test Model:	ren2000
Hardware Version:	N/A
Software Version:	N/A
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:	4.81 dBi(Declare by applicant) Note: Antenna information is provided by applicant, Testing lab is not responsible for the accuracy of the information.
Battery	N/A
Power supply:	DC 19V from Adapter

Note: Other information please refer user manual.

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	/	/
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	151	5755MHz	153	5765MHz	155	5775MHz
157	5785MHz	159	5795MHz	161	5805MHz	/	/
165	5825MHz	/					

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	

Test channel	**Frequency (MHz)**		
	802.11 a /n(HT20)/ac(HT20)	802.11 n(HT40)/ac(HT40)	802.11ac(HT80)
Lowest channel	5745	5755	5775
Middle channel	5785		
Highest channel	5825	5795	

2.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode(or with a duty cycle ≥ 98%)

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.

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 48 802.11a /n 20 CH149/ CH157/ CH 165
Mode 2	802.11n 40 CH38/ CH 46 802.11n 40 CH 151 / CH 159
Mode 3	802.11 ac80 CH 42/CH 155
Mode 4	802.11a / n 20 CH36/ CH40/ CH 48 802.11a /n 20 CH149/ CH157/ CH 165
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 48 802.11a /n 20 CH149/ CH157/ CH 165
Mode 2	802.11n 40 CH38/ CH 46 802.11n 40 CH 151 / CH 159
Mode 3	802.11 ac80 CH 42/CH 155
Mode 4	802.11a / n 20 CH36/ CH40/ CH 48 802.11a /n 20 CH149/ CH157/ CH 165

Note:

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

2.3 Description of Support Units

No.	Description	Manufacturer	Model	Serial Number
1	monitor	DELL	SE2416HC	/
2	mouse	DELL	/	/
3	keyboard	DELL	/	/
4	Adapter	JHD	JHD-AP065U-190342BA-A	/

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	RTL8852B_PCIE_MP_Package_ALPHA_v1.0.54
Power level setup	Default

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	2023.3.02	2024.3.01
2	Artificial power network	schwarabeck	NSLK8127	8127483	2023.3.02	2024.3.01
3	Artificial power network	ETS	3186/2NM	1132	2023.3.02	2024.3.01
4	10dB attenuator	HUBER+SUHNER	10dB	/	2023.3.02	2024.3.01
5	Cable 4	HUBER SUNNER	3M	/	2023.3.02	2024.3.01
6	Absorbing Clamp	schwarabeck	MDS21	D69250	2023.3.06	2024.3.05

Radiated Emission &RF Conducted test:

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101032	2023.3.02	2024.3.01
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	2023.3.02	2024.3.01
5	Amplifier	Space-Dtronics	EWLAN0118G-P40	19113001	2023.3.02	2024.3.01
6	Spectrum analyzer	KEYSIGHT	N9020A	MY55370280	2023.3.02	2024.3.01
7	Power detector meter	MWRFtest	MW100-PSB	MW201020JYT	2023.10.18	2024.10.17
8	Signal generator	Agilent	N5182A	MY49060455	2023.10.18	2024.10.17
9	Spectrum analyzer	Rohde&schwarz	FSU40	1166.1660K43	2023.8.16	2024.8.15
10	Amplifier	SKET	LNPA_1840-50	SK2019040302	2023.8.16	2024.8.15
11	Horn antenna	schwarabeck	BBHA 9170	946	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	/	2023.3.02	2024.3.01
14	Cable7	HUBER SUNNER	2.0M	/	2023.3.02	2024.3.01
15	Cable8	HUBER SUNNER	6.0M	/	2023.3.02	2024.3.01
16	Filter	Xin bo	XBLBQ-GTA29	210410-3-2	2023.3.06	2024.3.05

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
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.*	
E.U.T Antenna:	
The antenna is Integrated antenna, the best case gain of the antenna is 4.81 dBi, reference to the appendix II for details.	

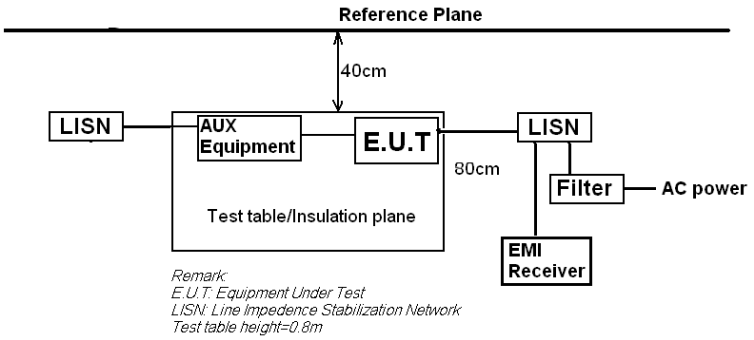
4.2 Conducted Emissions

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:



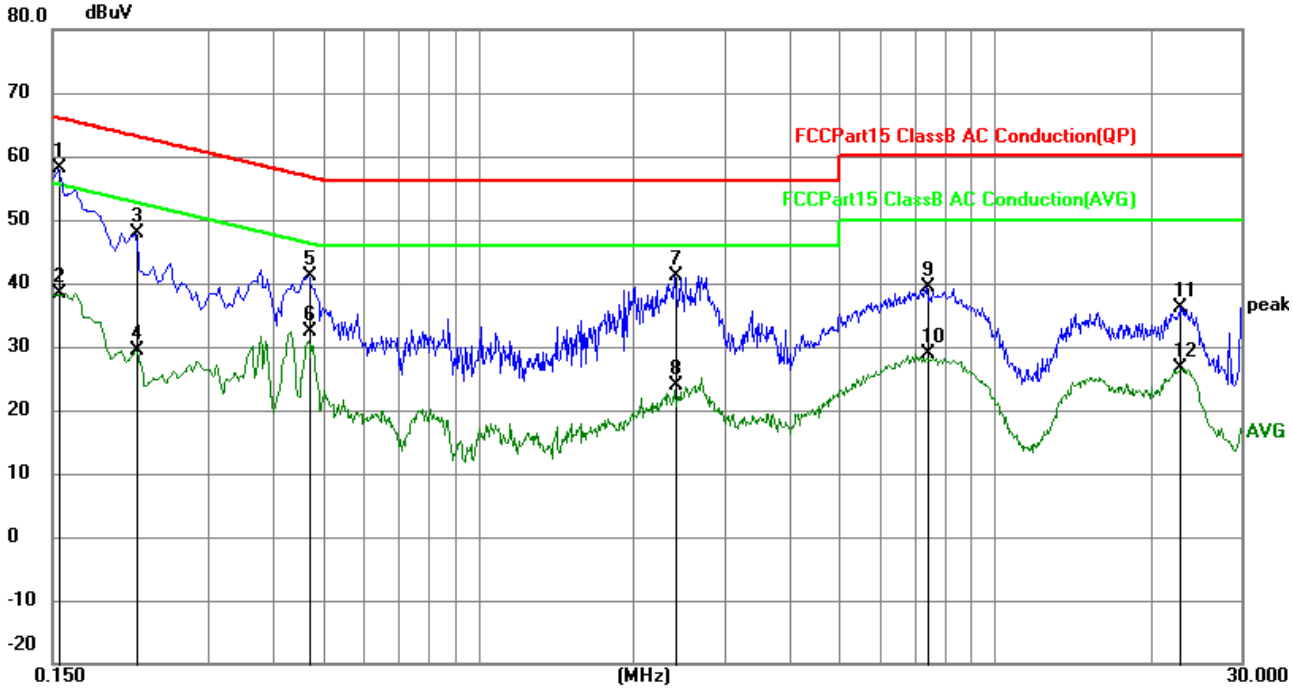
Test procedure:

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.:	50%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

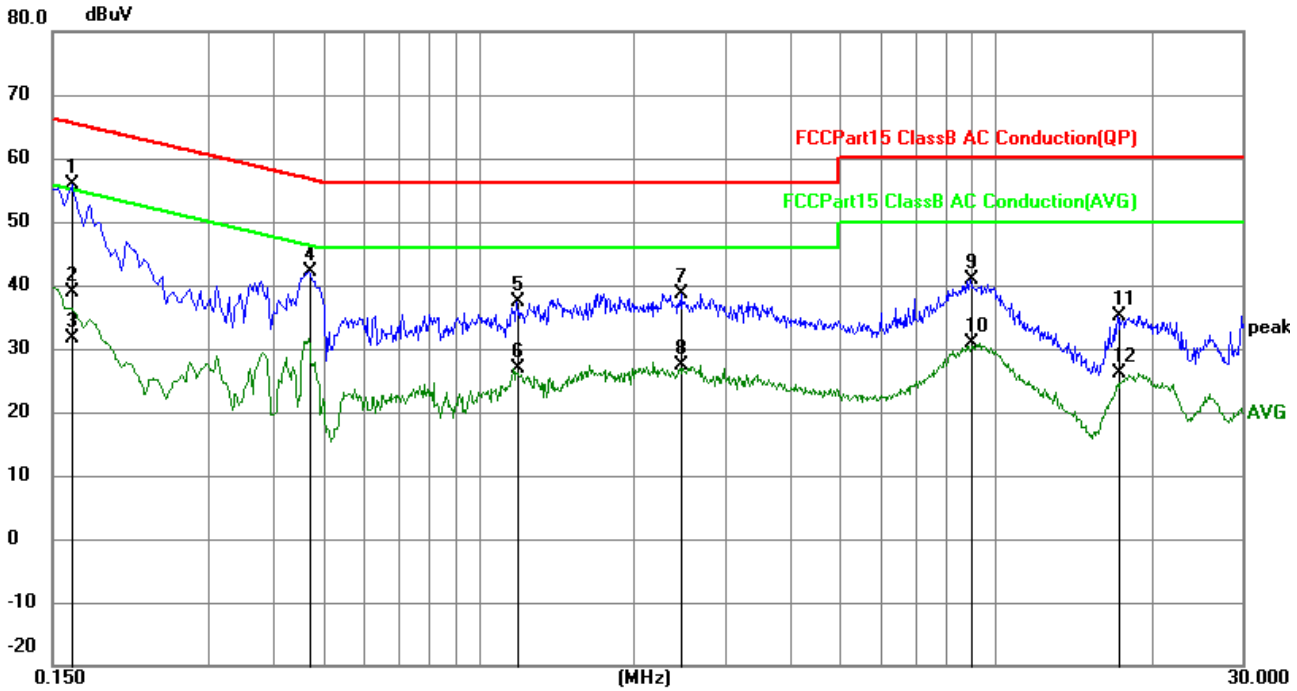
Remark:
1. Both high voltage and low voltage have been tested, and the report only shows the worst case data with AC 120V/60Hz.
2. All mode have been tested, the report only shows the worst mode (802.11 n 5825MHz) data.

Measurement data
Line:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1544	48.26	9.80	58.06	65.76	-7.70	QP
2	0.1544	28.46	9.80	38.26	55.76	-17.50	AVG
3	0.2174	37.97	9.82	47.79	62.92	-15.13	QP
4	0.2174	19.64	9.82	29.46	52.92	-23.46	AVG
5	0.4693	31.12	9.93	41.05	56.53	-15.48	QP
6	0.4693	22.38	9.93	32.31	46.53	-14.22	AVG
7	2.4043	31.28	9.85	41.13	56.00	-14.87	QP
8	2.4043	13.93	9.85	23.78	46.00	-22.22	AVG
9	7.3905	29.48	9.83	39.31	60.00	-20.69	QP
10	7.3905	19.12	9.83	28.95	50.00	-21.05	AVG
11	22.8300	26.59	9.61	36.20	60.00	-23.80	QP
12	22.8300	16.93	9.61	26.54	50.00	-23.46	AVG

Neutral:

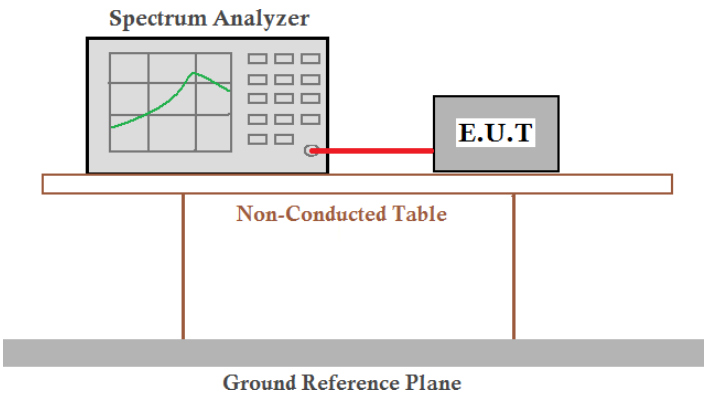


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1635	45.96	9.80	55.76	65.28	-9.52	QP
2	0.1635	29.10	9.80	38.90	55.28	-16.38	AVG
3	0.1635	21.85	9.80	31.65	55.28	-23.63	AVG
4	0.4693	32.08	9.93	42.01	56.53	-14.52	QP
5	1.1894	27.56	9.94	37.50	56.00	-18.50	QP
6	1.1894	16.95	9.94	26.89	46.00	-19.11	AVG
7	2.4719	28.81	9.84	38.65	56.00	-17.35	QP
8	2.4719	17.59	9.84	27.43	46.00	-18.57	AVG
9	8.9250	31.01	9.84	40.85	60.00	-19.15	QP
10	8.9250	21.01	9.84	30.85	50.00	-19.15	AVG
11	17.2454	25.42	9.72	35.14	60.00	-24.86	QP
12	17.2454	16.35	9.72	26.07	50.00	-23.93	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 Duty cycle

Test Method :	ANSI C63.10:2013	
Limit:	/	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 24.4 C	Humid.: 55%RH
Test voltage:	DC 19V	
Test results:	Pass	

Measurement Result

5180-5240MHz

Mode	Test Channel	Frequency (MHz)	Duty cycle (%)	Correction Factor (dB)
TX 802.11a Mode	CH36	5180	92.13	0.36
	CH40	5200	93.19	0.31
	CH48	5240	93.20	0.31
TX 802.11n20 Mode	CH36	5180	95.14	0.22
	CH40	5200	94.16	0.26
	CH48	5240	91.16	0.40
TX 802.11ac20 Mode	CH36	5180	93.33	0.30
	CH40	5200	91.46	0.39
	CH48	5240	94.11	0.26
TX 802.11n40 Mode	CH38	5190	94.11	0.26
	CH46	5230	93.25	0.30
TX 802.11a40 Mode	CH38	5190	92.42	0.34
	CH46	5230	93.40	0.30
TX 802.11ac80 Mode	CH42	5210	90.98	0.36

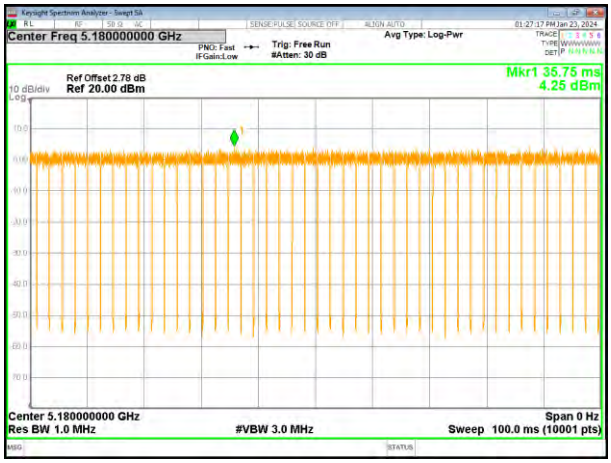
5745-5825 MHz

Mode	Test Channel	Frequency (MHz)	Duty cycle (%)	Correction Factor (dB)
TX 802.11a Mode	CH149	5745	97.15	0.13
	CH157	5785	97.20	0.12
	CH165	5825	97.20	0.12
TX 802.11n20 Mode	CH149	5745	92.15	0.36
	CH157	5785	95.23	0.21
	CH165	5825	95.13	0.22
TX 802.11ac20 Mode	CH149	5745	85.43	0.68
	CH157	5785	94.27	0.26
	CH165	5825	94.09	0.26
TX 802.11n40 Mode	CH151	5755	96.20	0.17
	CH159	5795	96.18	0.17
TX 802.11a40 Mode	CH151	5755	96.58	0.15
	CH159	5795	96.36	0.16
TX 802.11ac80 Mode	CH155	5775	93.07	0.31

Test plot

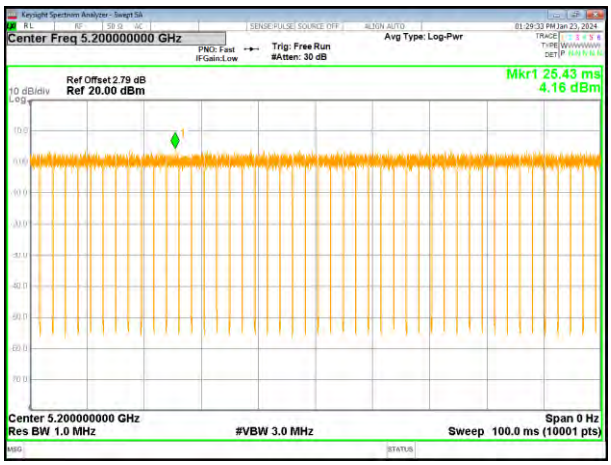
5180-5240MHz

(802.11a) plot on channel 36

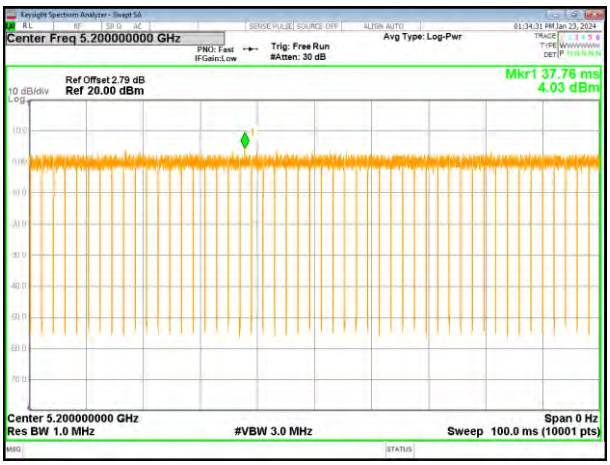


(802.11 n20) plot on channel 36

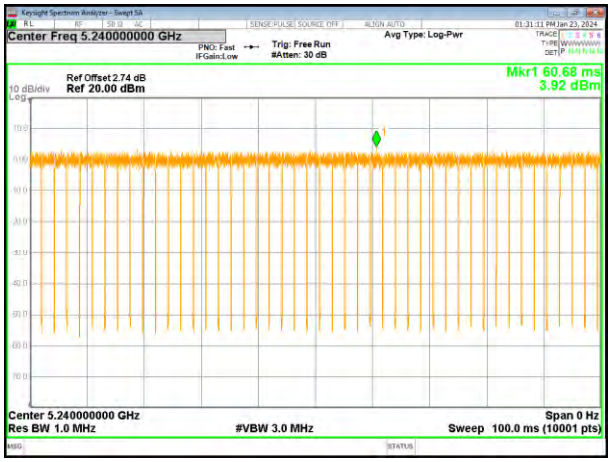
(802.11a) plot on channel 40



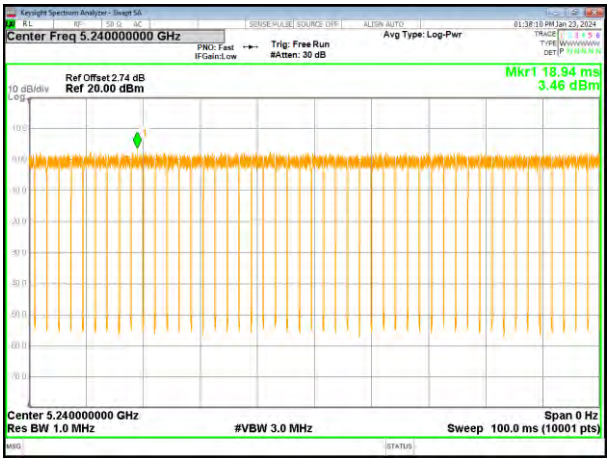
(802.11 n20) plot on channel 40



(802.11a) plot on channel 48

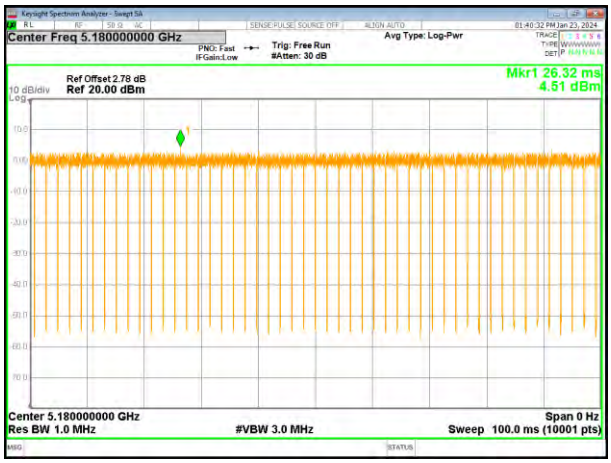


(802.11 n20) plot on channel 48

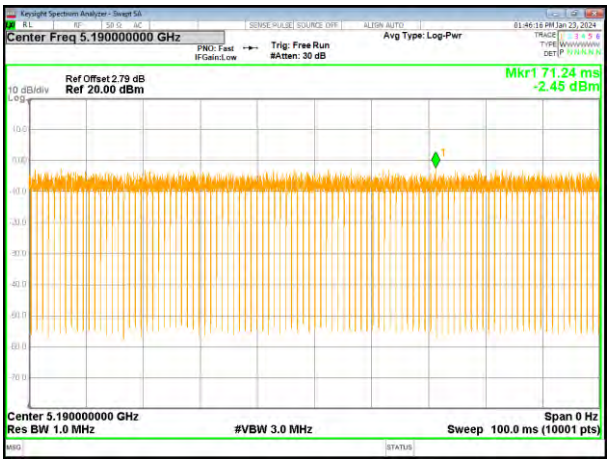


Test plot

(802.11ac20) plot on channel 36

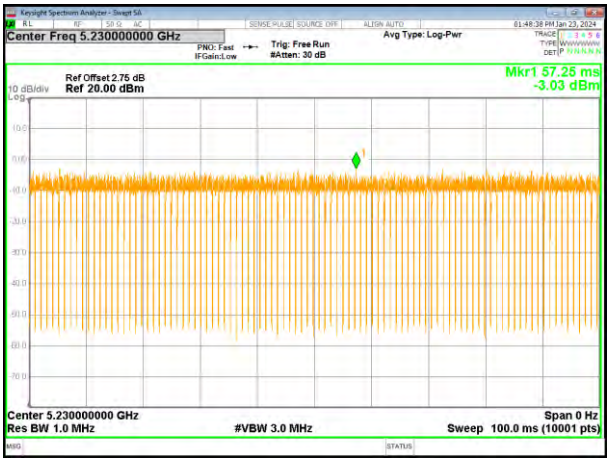


(802.11 n40) plot on channel 38



(802.11ac20) plot on channel 40

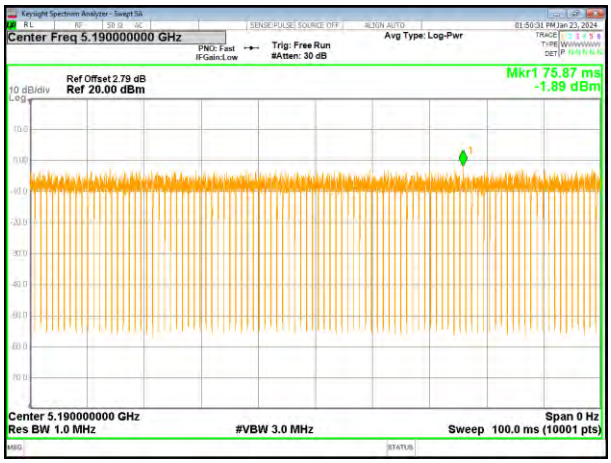
(802.11 n40) plot on channel 46



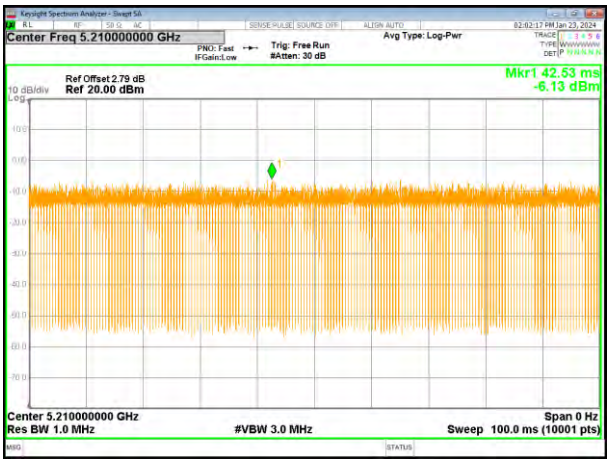
(802.11ac20) plot on channel 48

Test plot

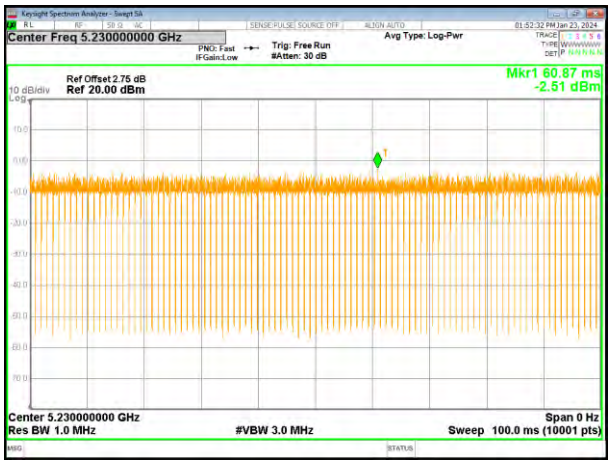
(802.11ac40) plot on channel 38



(802.11ac80) plot on channel 42

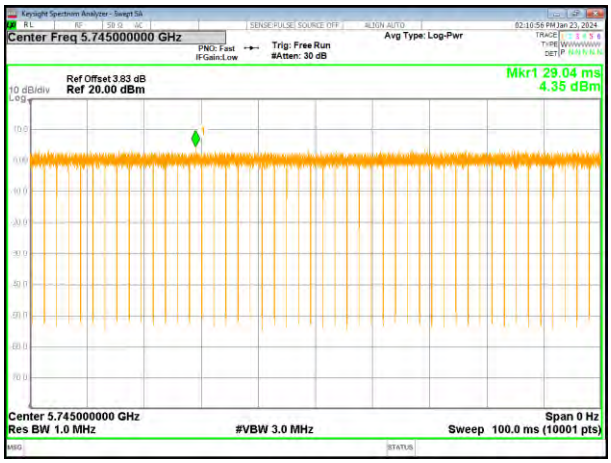


(802.11ac40) plot on channel 46

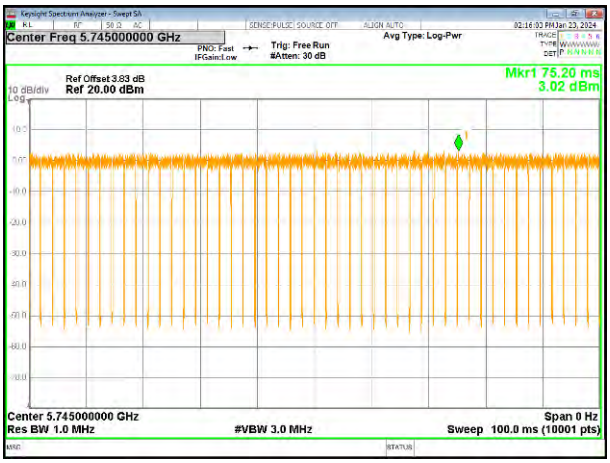


5745-5825 MHz

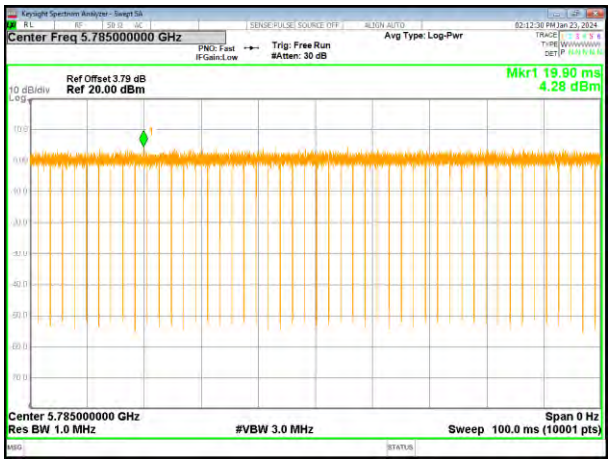
(802.11a) plot on channel 36



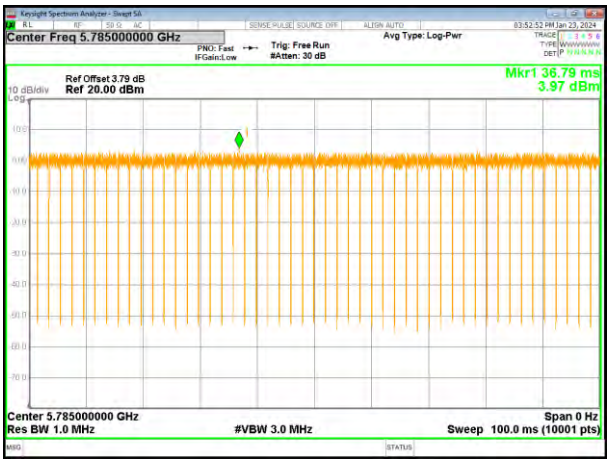
(802.11 n20) plot on channel 36



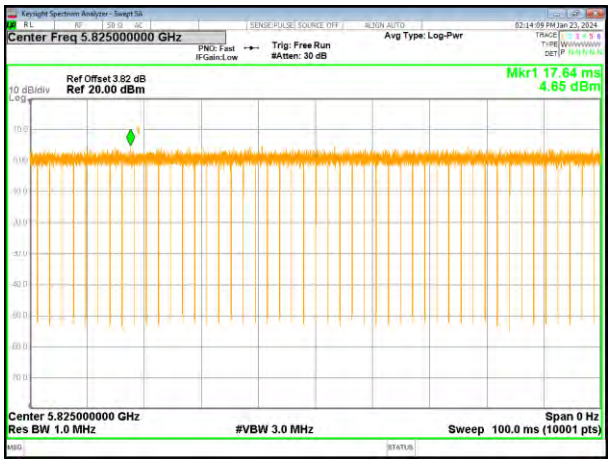
(802.11a) plot on channel 40



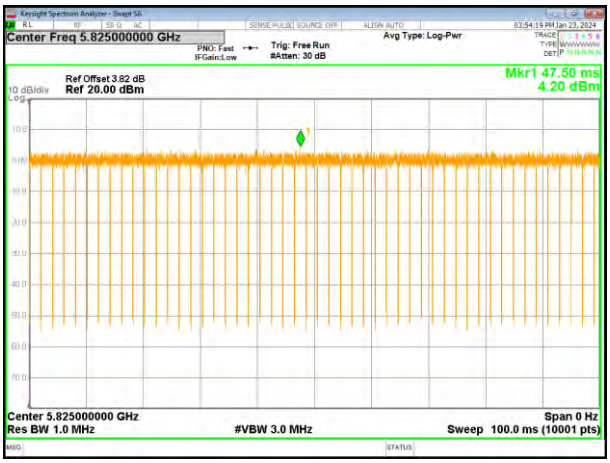
(802.11 n20) plot on channel 40



(802.11a) plot on channel 48

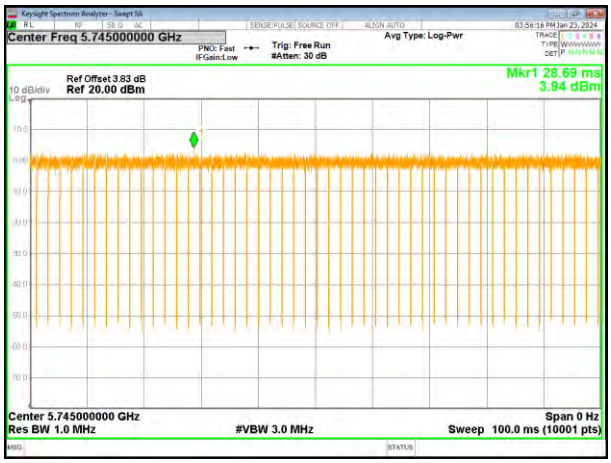


(802.11 n20) plot on channel 48

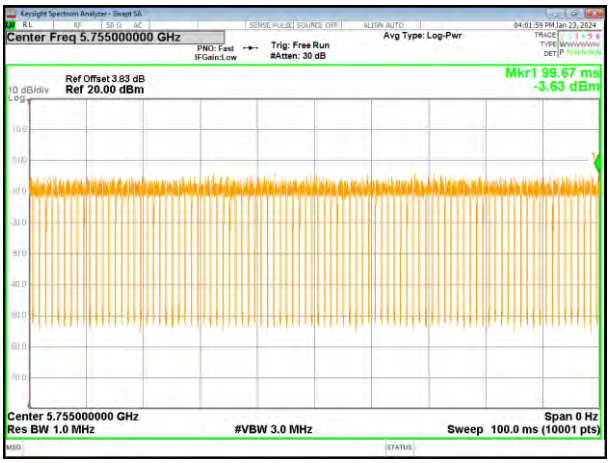


Test plot

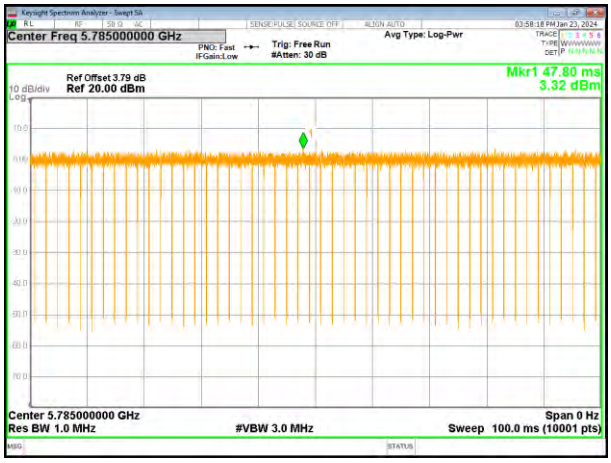
(802.11ac20) plot on channel 36



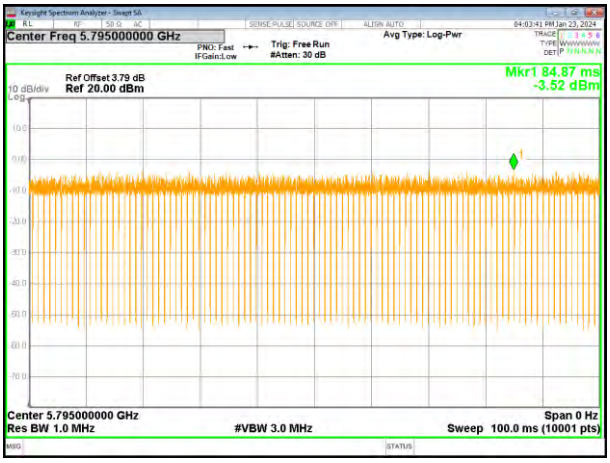
(802.11 n40) plot on channel 38



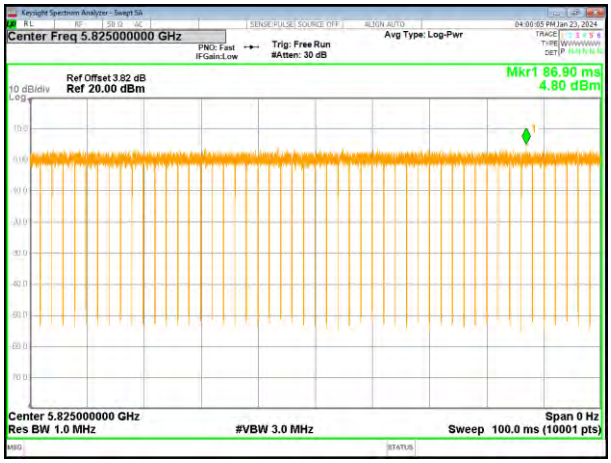
(802.11ac20) plot on channel 40



(802.11 n40) plot on channel 46

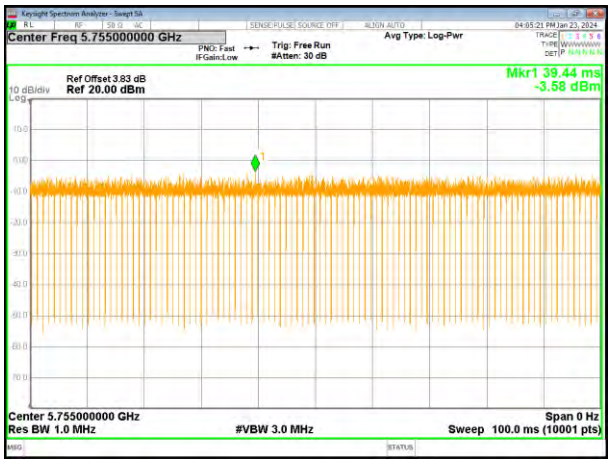


(802.11ac20) plot on channel 48

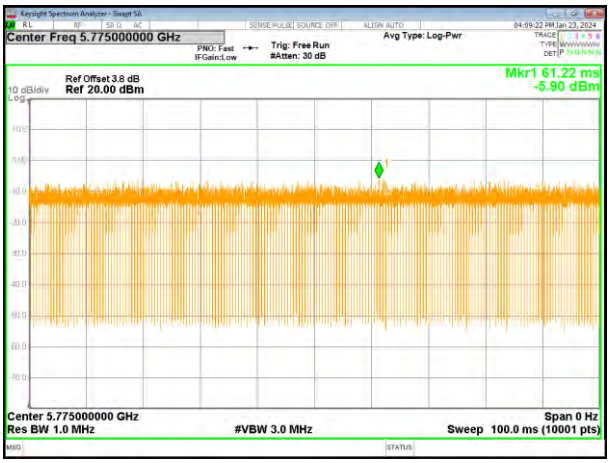


Test plot

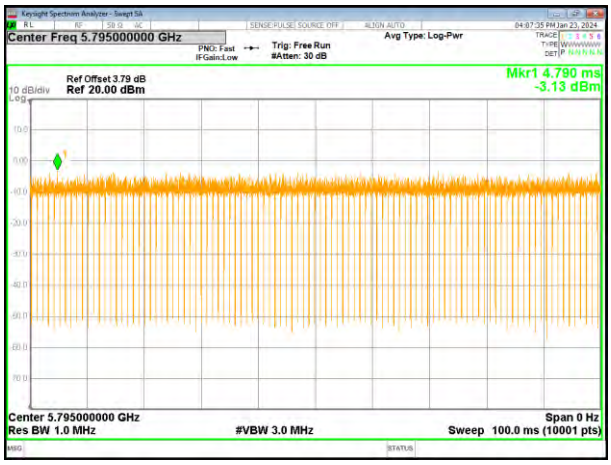
(802.11ac40) plot on channel 38



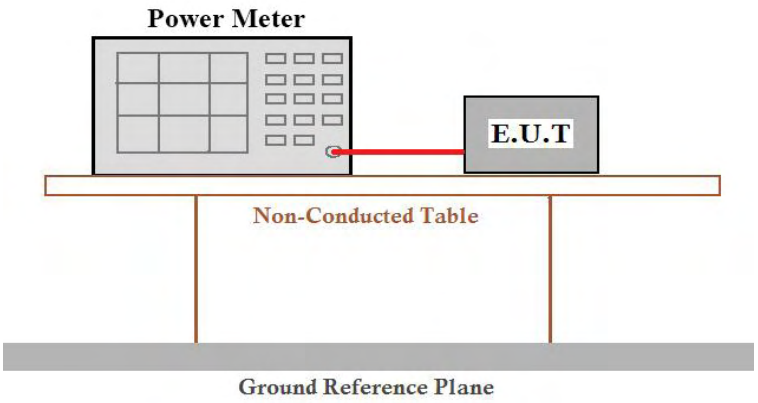
(802.11ac80) plot on channel 42



(802.11ac40) plot on channel 46



4.4 Conducted 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 environment:	Temp.: 24.4°C	Humid.: 55%RH
Test voltage:	DC 19V	
Test results:	Pass	

Measurement Result

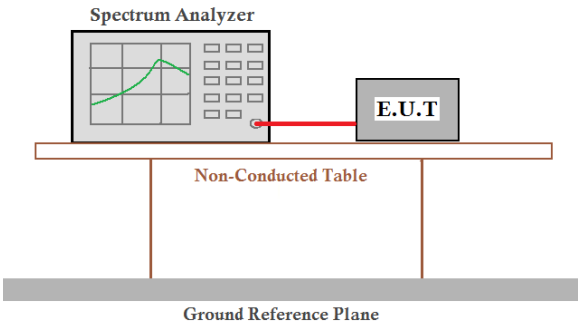
5180-5240MHz

Test Mode	Frequency	Correction Factor	Maximum output power	Total Power	LIMIT	Result
	(MHz)	(dB)	(dBm)	(dBm)	dBm	
802.11a	5180	0.36	12.79	13.15	23.98	Pass
	5200	0.31	12.55	12.86	23.98	Pass
	5240	0.31	12.06	12.37	23.98	Pass
802.11 n20	5180	0.22	12.93	13.15	23.98	Pass
	5200	0.26	12.53	12.79	23.98	Pass
	5240	0.40	11.96	12.36	23.98	Pass
02.11 ac20	5180	0.26	12.81	13.07	23.98	Pass
	5200	0.26	12.53	12.79	23.98	Pass
	5240	0.30	11.94	12.24	23.98	Pass
802.11 n40	5190	0.30	11.40	11.70	23.98	Pass
	5230	0.39	10.85	11.24	23.98	Pass
802.11 ac40	5190	0.34	11.45	11.79	23.98	Pass
	5230	0.30	10.81	11.11	23.98	Pass
802.11 ac80	5210	0.41	9.17	9.58	23.98	Pass

5745-5825 MHz

Test Channel	Frequency	Correction Factor	Maximum output power	Total Power	LIMIT	Result
	(MHz)	(dB)	(dBm)	(dBm)	dBm	
802.11a	5745	0.13	12.69	12.82	30	Pass
	5785	0.12	12.59	12.71	30	Pass
	5825	0.12	12.77	12.89	30	Pass
802.11 n20	5745	0.36	12.43	12.79	30	Pass
	5785	0.21	12.38	12.59	30	Pass
	5825	0.22	12.61	12.83	30	Pass
02.11 ac20	5745	0.26	9.78	10.04	30	Pass
	5785	0.17	10.09	10.26	30	Pass
	5825	0.17	12.21	12.38	30	Pass
802.11 n40	5755	0.68	12.48	13.16	30	Pass
	5795	0.26	12.69	12.95	30	Pass
802.11 ac40	5755	0.15	9.77	9.92	30	Pass
	5795	0.16	10.05	10.21	30	Pass
802.11 ac80	5775	0.31	9.47	9.78	30	Pass

4.5 Bandwidth 99% Occupy 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 environment:	Temp.: 24.4°C	Humid.: 55%RH
Test voltage:	DC 19V	
Test results:	Pass	

Measurement Result

5180-5240MHz

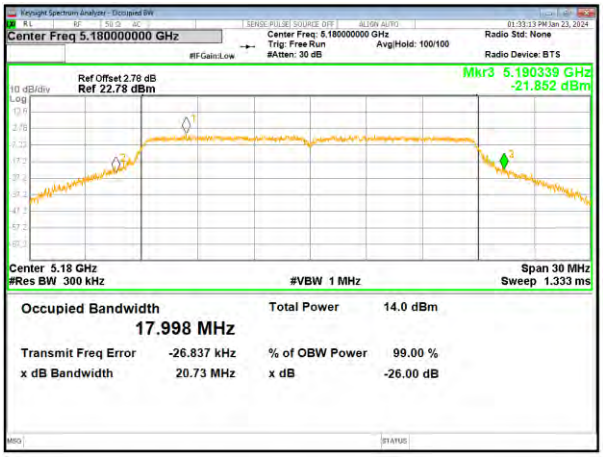
Test CH	-26dB Channel Bandwidth (MHz)						Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)	
Lowest	20.02	20.73	24.23	44.69	45.01	--	Pass
Middle	19.53	20.68	23.74	--	--	81.34	
Highest	20.88	22.08	24.12	43.13	45.08	--	

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	16.694	17.833	17.854	36.361	36.352	--	Pass
Middle	16.698	17.848	17.862	--	--	75.086	
Highest	16.704	17.829	17.870	36.419	36.353	--	

Test plot -26dB Channel Bandwidth

(802.11a) plot on channel 36

(802.11 n20) plot on channel 36



(802.11a) plot on channel 40

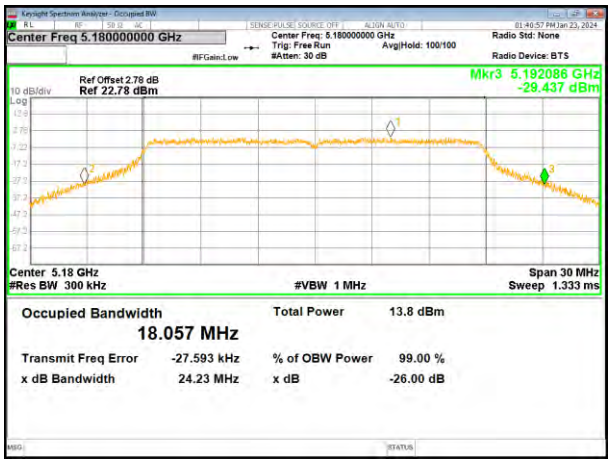
(802.11 n20) plot on channel 40

(802.11a) plot on channel 48

(802.11 n20) plot on channel 48

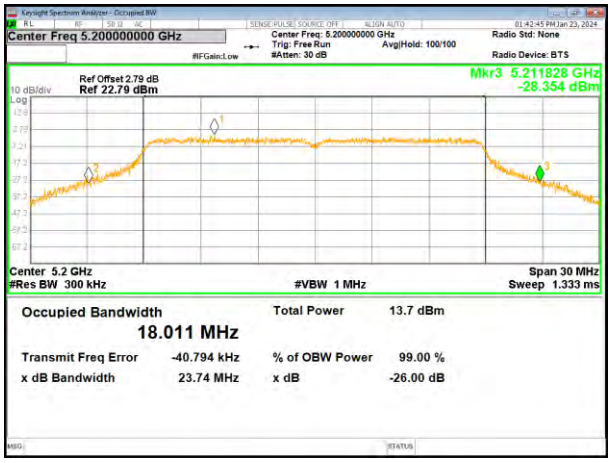
Test plot

(802.11ac20) plot on channel 36



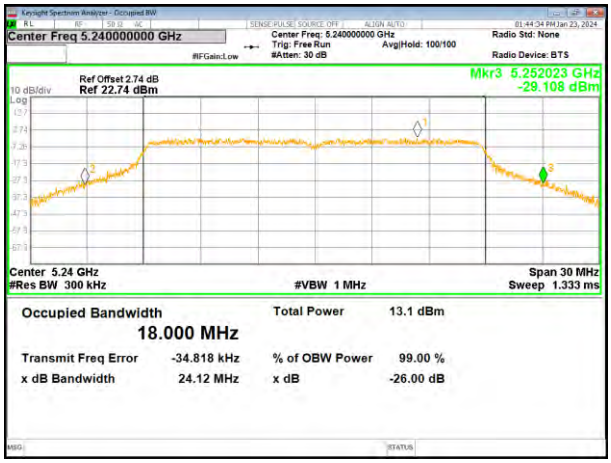
(802.11 n40) plot on channel 38

(802.11ac20) plot on channel 40



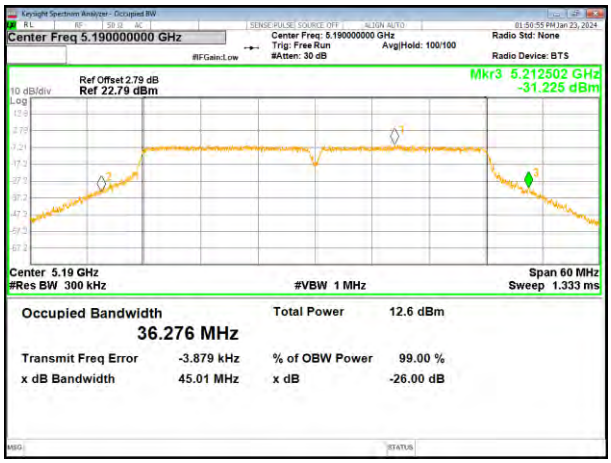
(802.11 n40) plot on channel 46

(802.11ac20) plot on channel 48

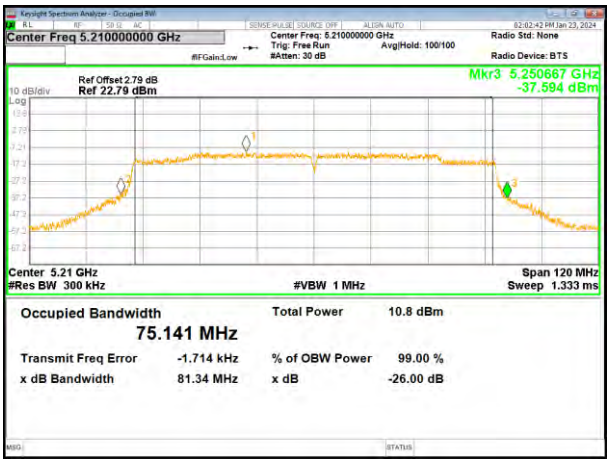


Test plot

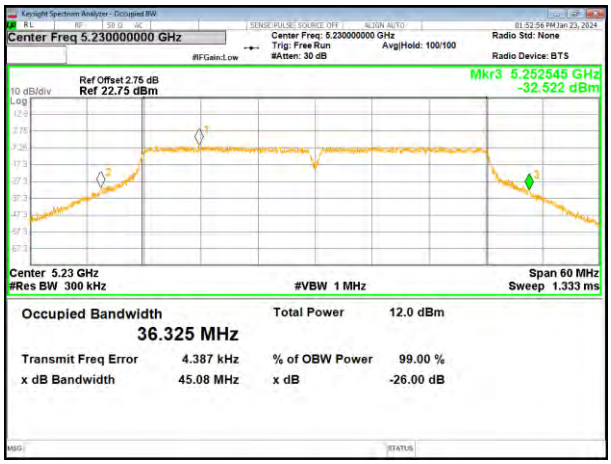
(802.11ac40) plot on channel 38



(802.11ac80) plot on channel 42

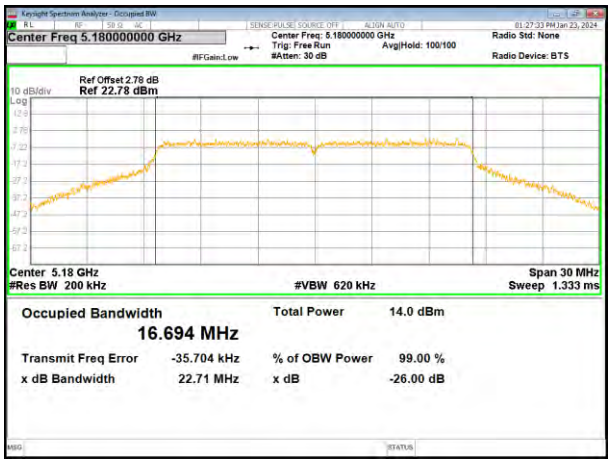


(802.11ac40) plot on channel 46

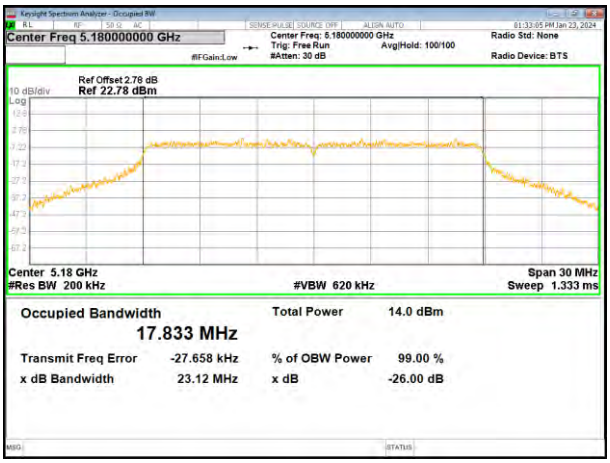


Test plot 99% Occupy Bandwidth

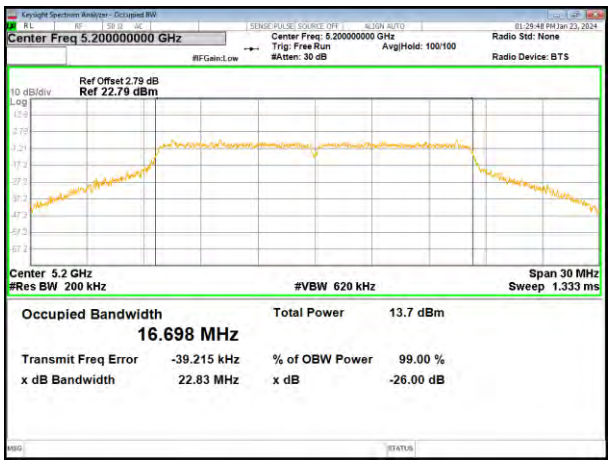
(802.11a) plot on channel 36



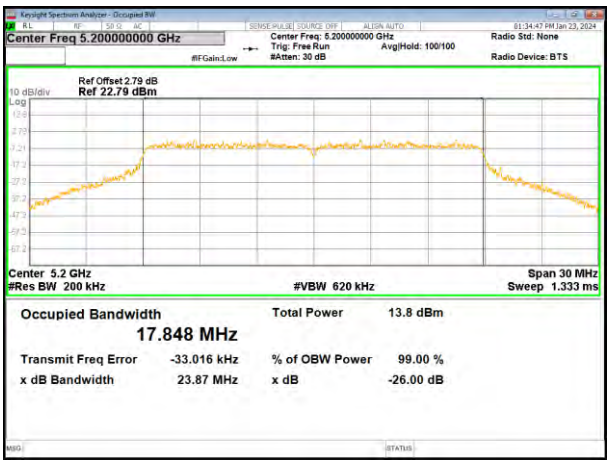
(802.11 n20) plot on channel 36



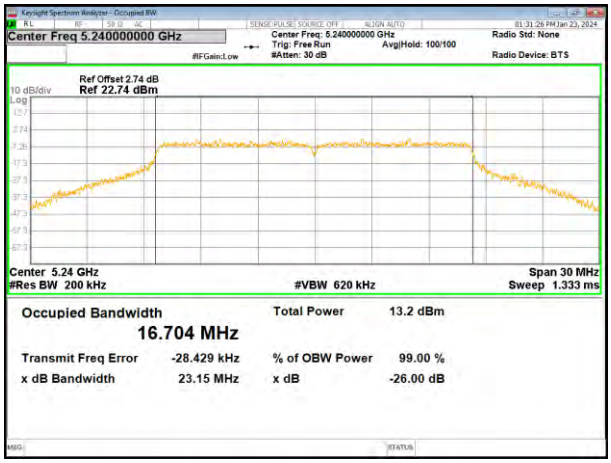
(802.11a) plot on channel 40



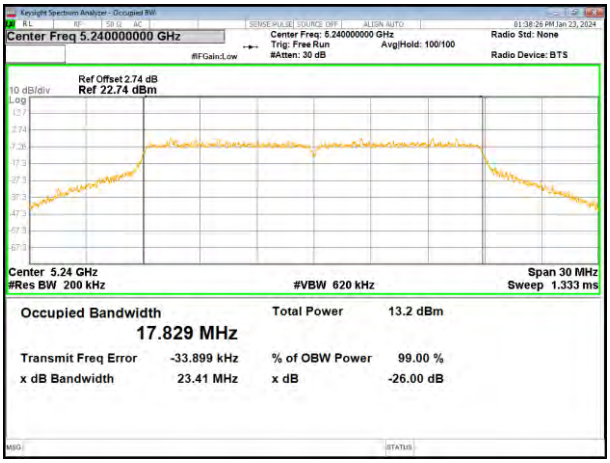
(802.11 n20) plot on channel 40



(802.11a) plot on channel 48

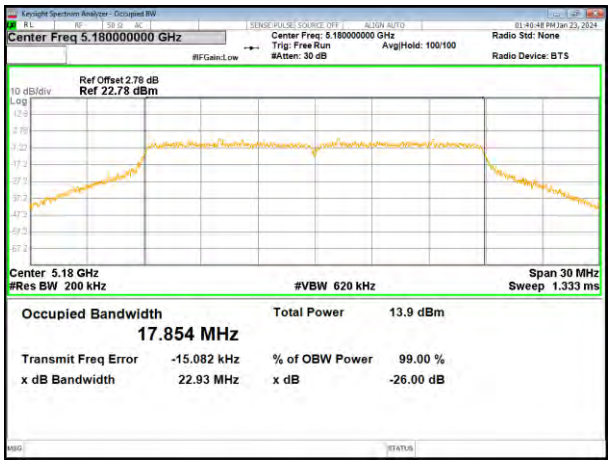


(802.11 n20) plot on channel 48

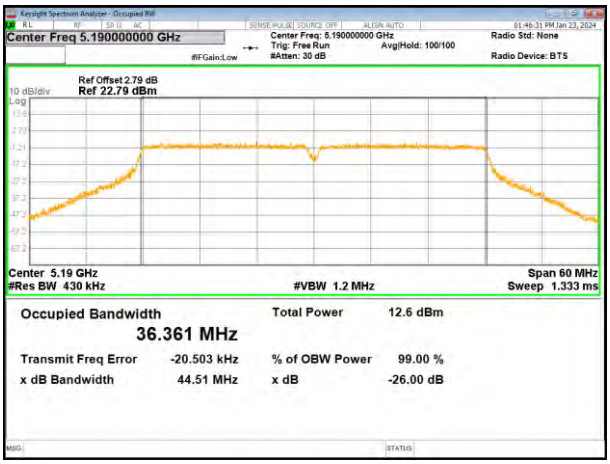


Test plot

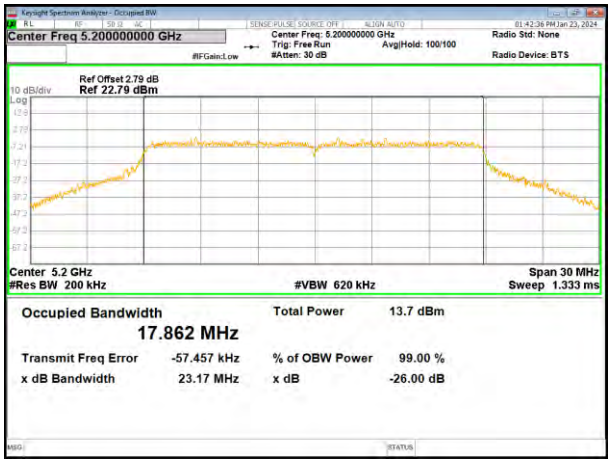
(802.11ac20) plot on channel 36



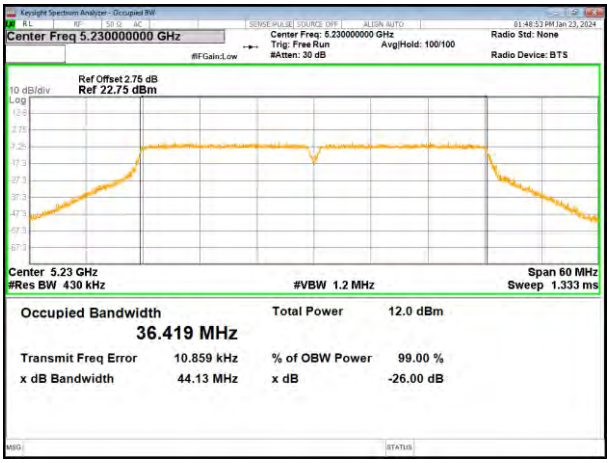
(802.11 n40) plot on channel 38



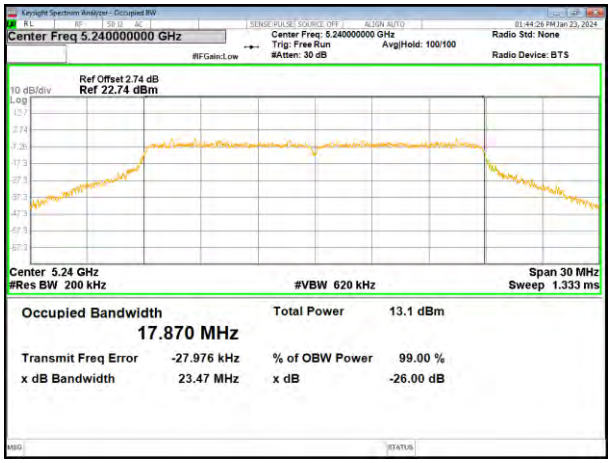
(802.11ac20) plot on channel 40



(802.11 n40) plot on channel 46

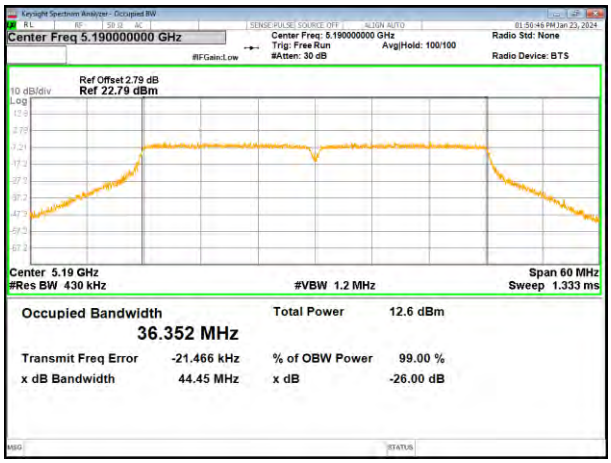


(802.11ac20) plot on channel 48

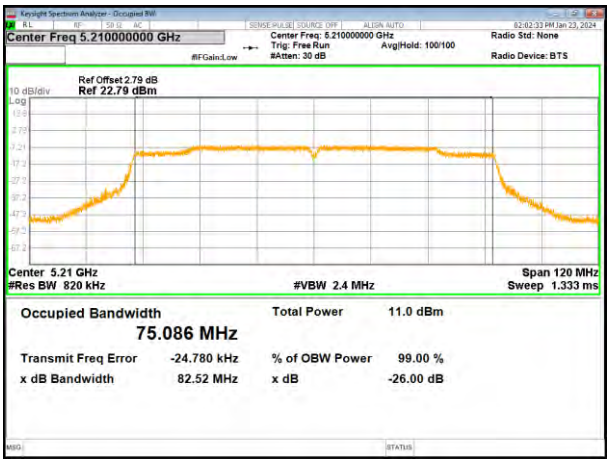


Test plot

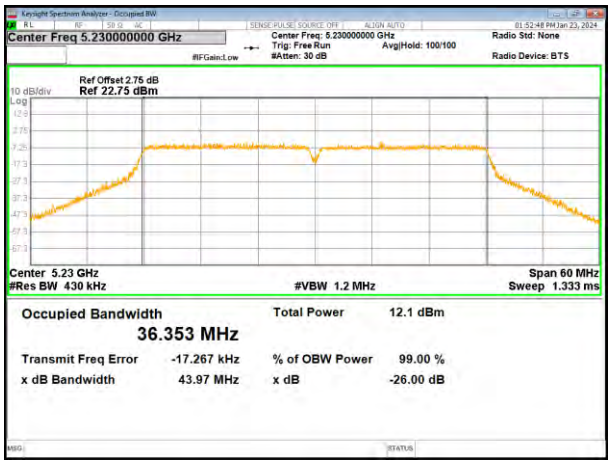
(802.11ac40) plot on channel 38



(802.11ac80) plot on channel 42



(802.11ac40) plot on channel 46



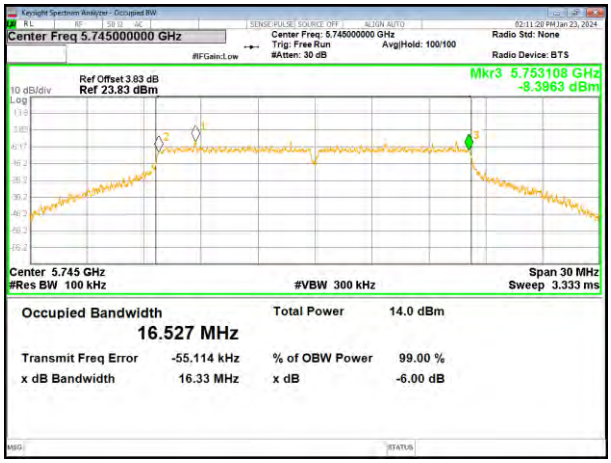
5745-5825MHz

Test CH	-6dB Channel Bandwidth (MHz)						Limit (KHz)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	16.33	17.55	17.58	36.31	36.33	--	>500	Pass
Middle	16.36	17.59	17.53	--	--	73.80		
Highest	16.33	17.55	17.56	36.04	36.31	--		

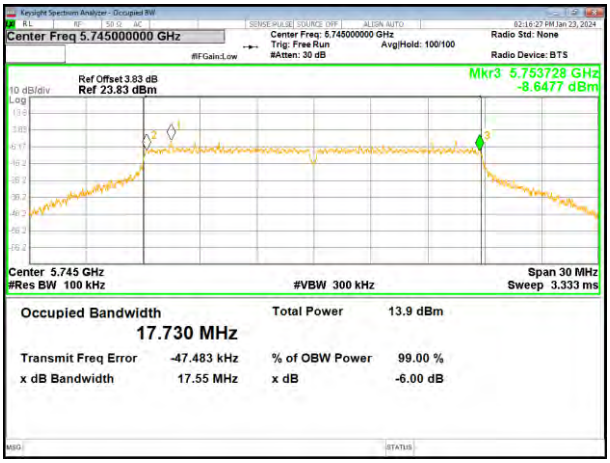
Remark: “---“is not applicable

Test plot

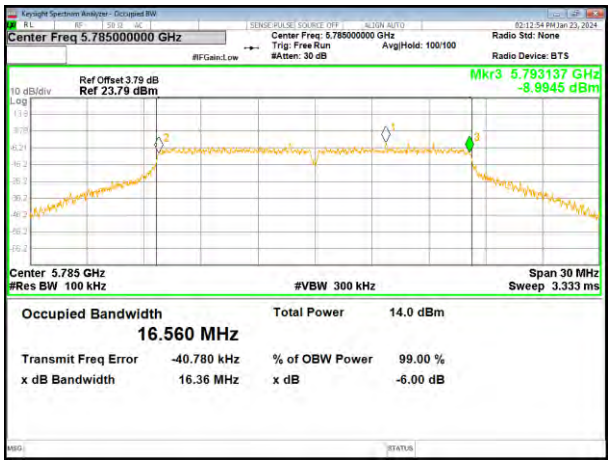
(802.11a) plot on channel 149



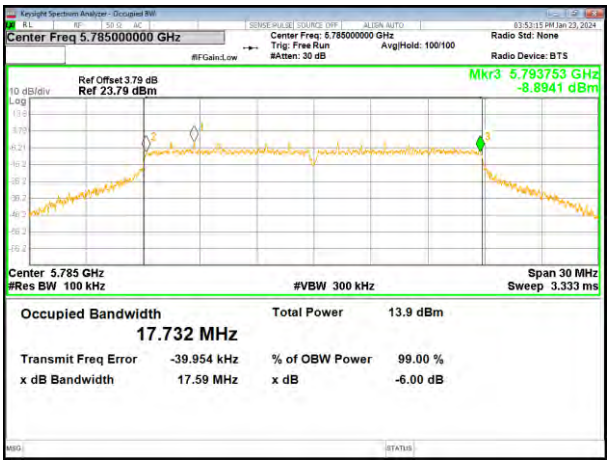
(802.11 n20) plot on channel 149



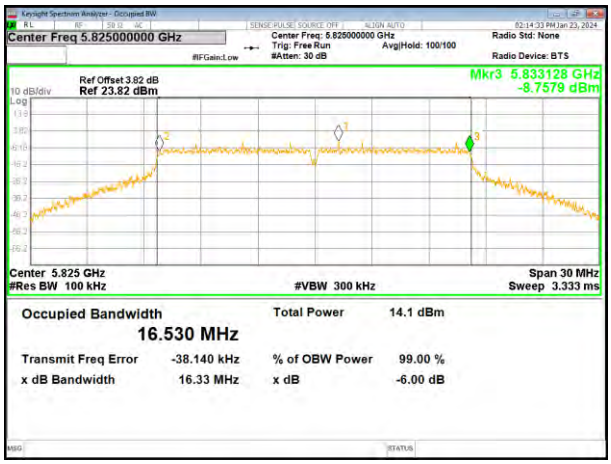
(802.11a) plot on channel 157



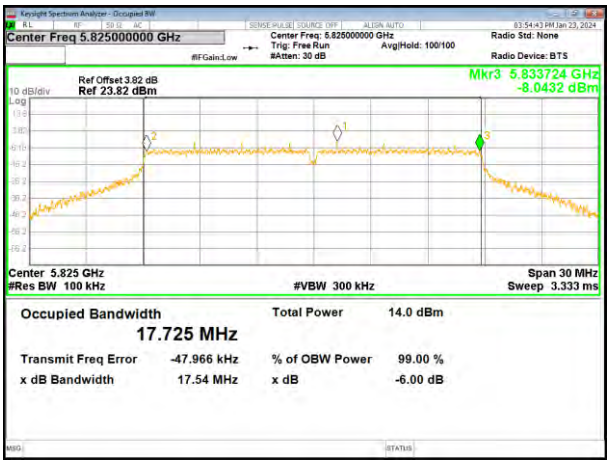
(802.11 n20) plot on channel 157



(802.11a) plot on channel 165

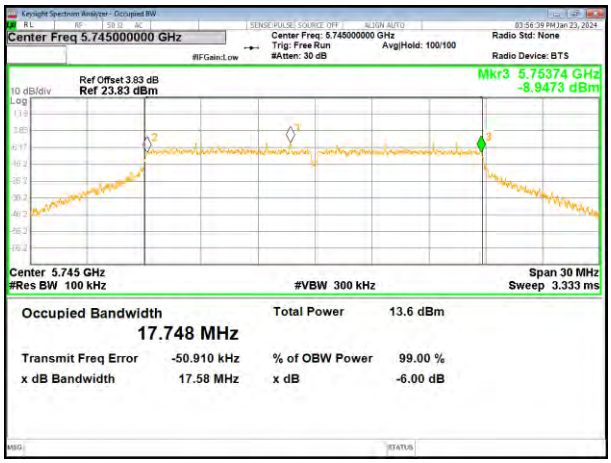


(802.11 n20) plot on channel 165

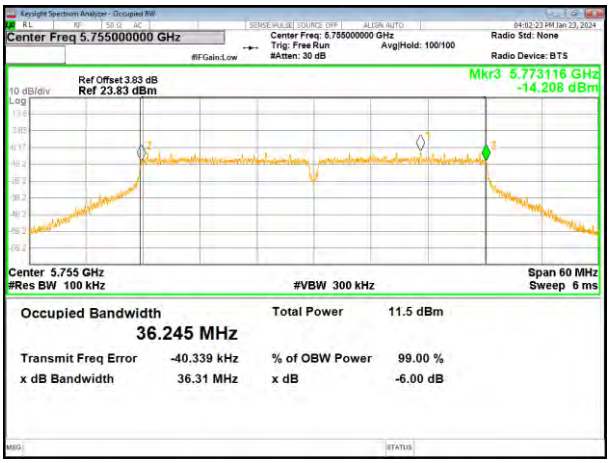


Test plot

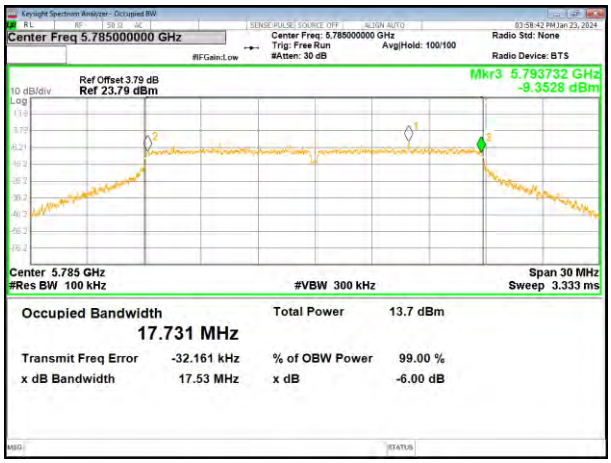
(802.11ac20) plot on channel 149



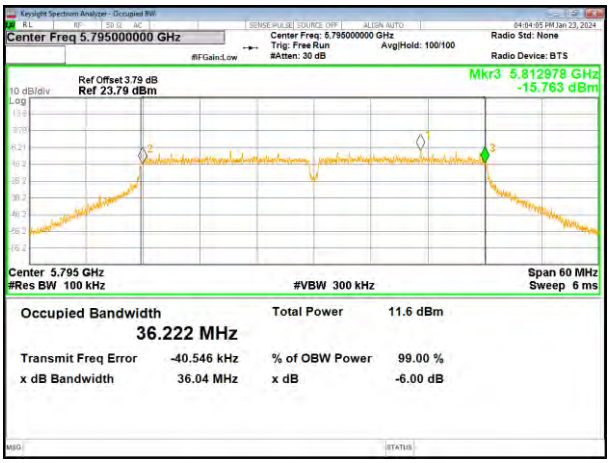
(802.11 n40) plot on channel 151



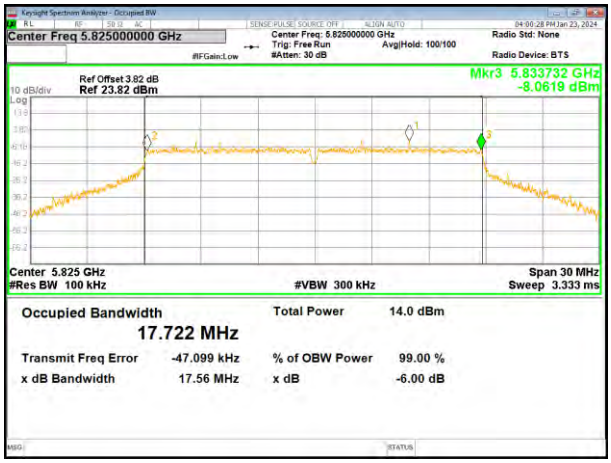
(802.11ac20) plot on channel 157



(802.11 n40) plot on channel 159

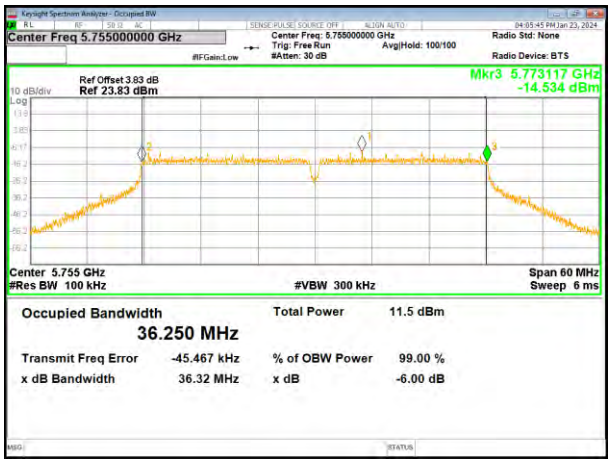


(802.11ac20) plot on channel 165

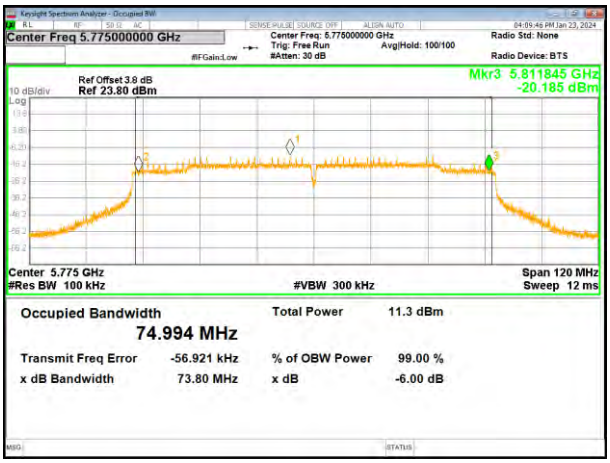


Test plot

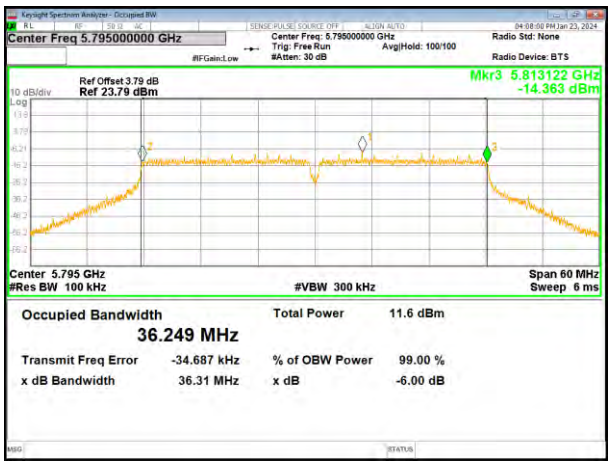
(802.11 ac40) plot on channel 151



(802.11 ac80) plot on channel 155



(802.11 ac40) plot on channel 159

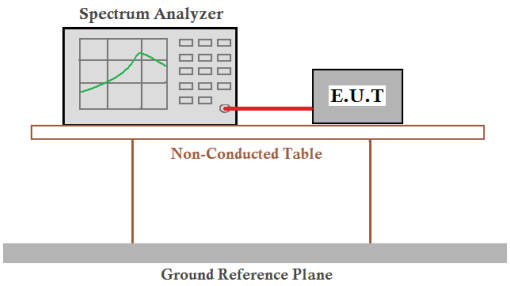


4.6 Power Spectral Density

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:



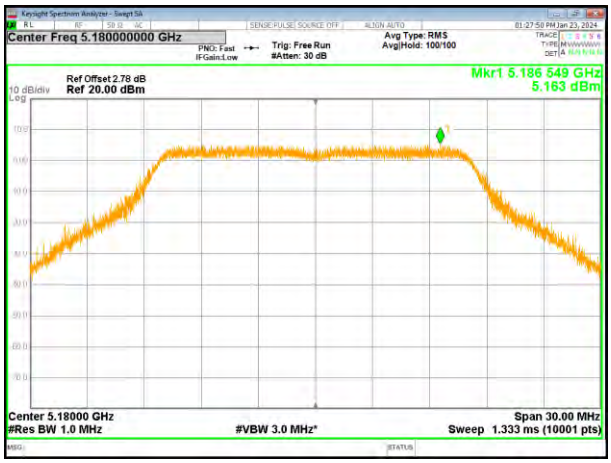
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 24.4°C	Humid.: 55%RH
Test voltage:	DC 19V	
Test results:	Pass	

Measurement Result

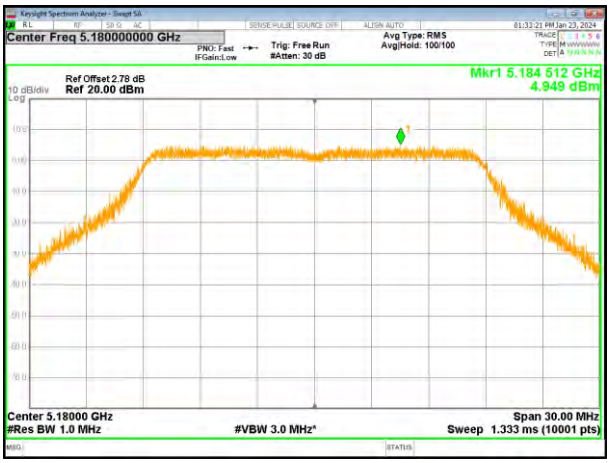
5180-5240MHz

Mode	Frequency	Measured Power Density (dBm/MHz)	Correction Factor (dB)	Total Power Density (dBm/MHz)	Limit (dBm/MHz)
802.11 a	5180 MHz	5.163	0.36	5.523	11
	5200 MHz	4.805	0.31	5.115	11
	5240 MHz	4.557	0.31	4.867	11
802.11 n20	5180 MHz	4.949	0.22	5.169	11
	5200 MHz	4.787	0.26	5.047	11
	5240 MHz	3.964	0.40	4.364	11
802.11 ac20	5180 MHz	4.916	0.26	5.176	11
	5200 MHz	4.576	0.26	4.836	11
	5240 MHz	4.225	0.30	4.525	11
802.11 n40	5190 MHz	1.319	0.30	1.619	11
	5230 MHz	0.387	0.39	0.777	11
802.11 ac40	5190 MHz	0.857	0.34	1.197	11
	5230 MHz	0.352	0.30	0.652	11
802.11 ac80	5210 MHz	-3.317	0.41	-2.907	11

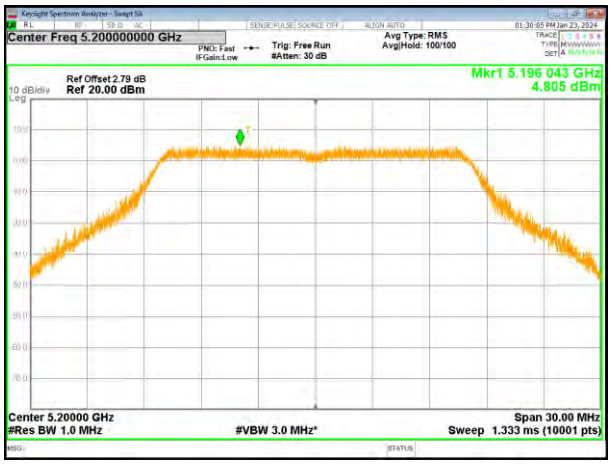
(802.11a) PSD plot on channel 36



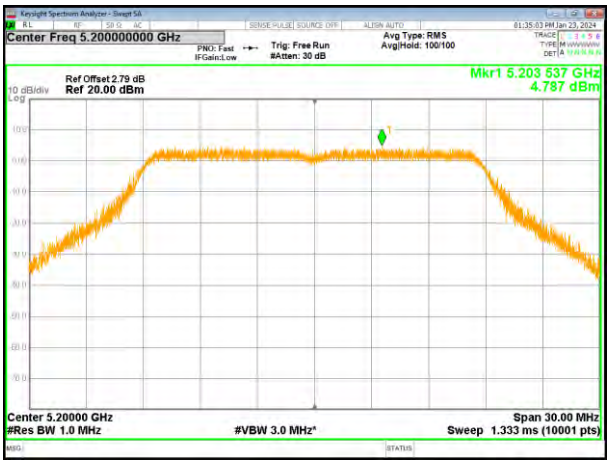
(802.11n20) PSD plot on channel 36



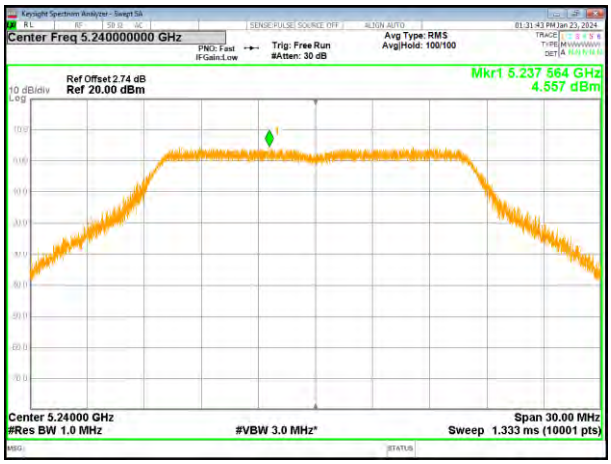
(802.11a) PSD plot on channel 40



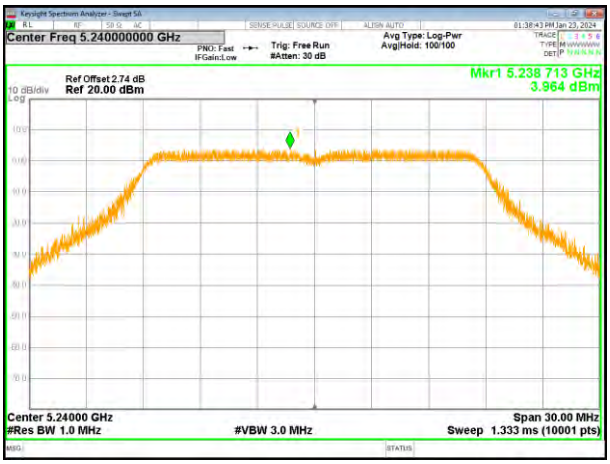
(802.11n20) PSD plot on channel 40



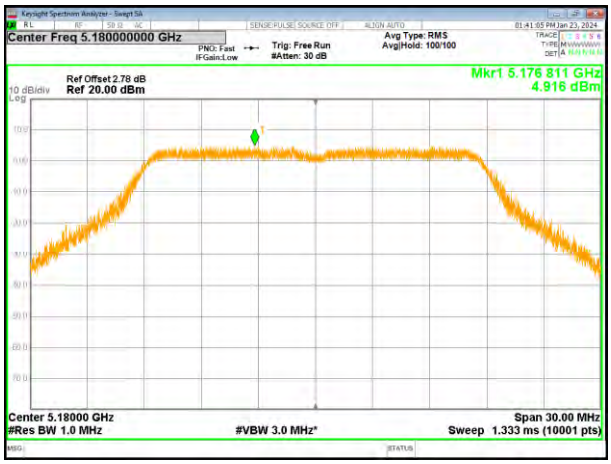
(802.11a) PSD plot on channel 48



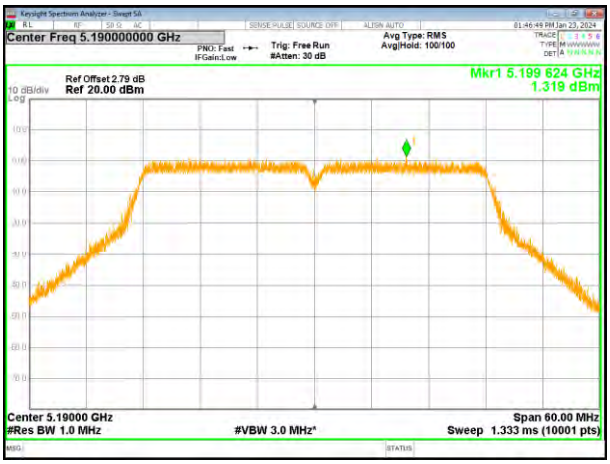
(802.11n20) PSD plot on channel 48



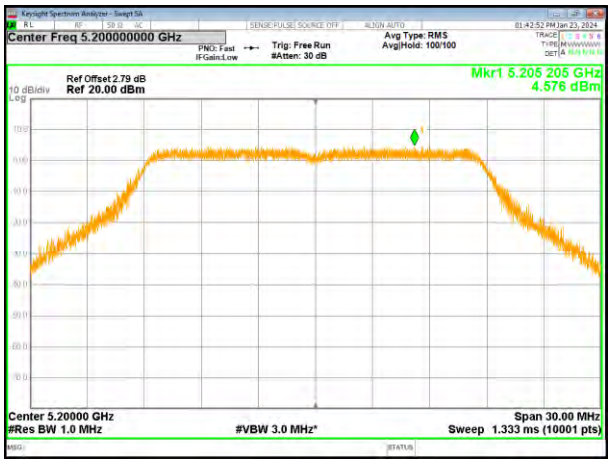
(802.11ac20) PSD plot on channel 36



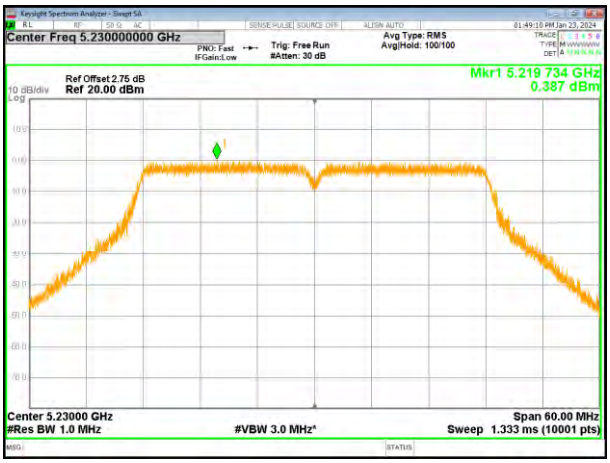
(802.11n40) PSD plot on channel 38



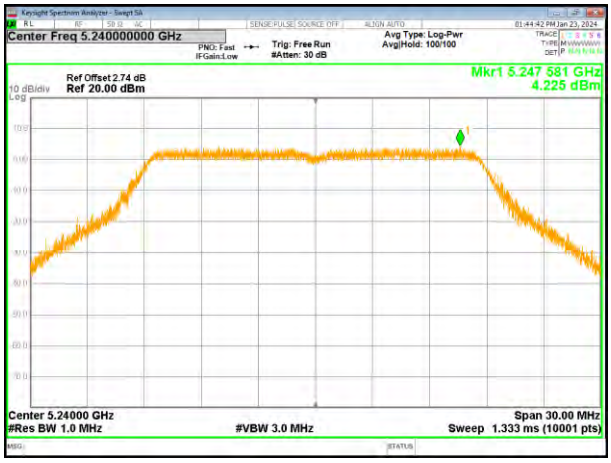
(802.11ac20) PSD plot on channel 40



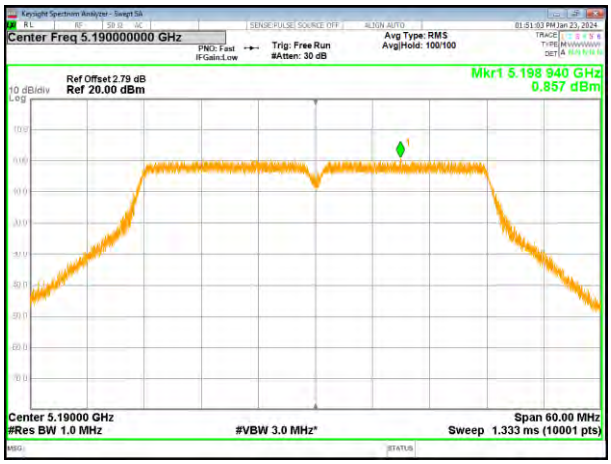
(802.11n40) PSD plot on channel 46



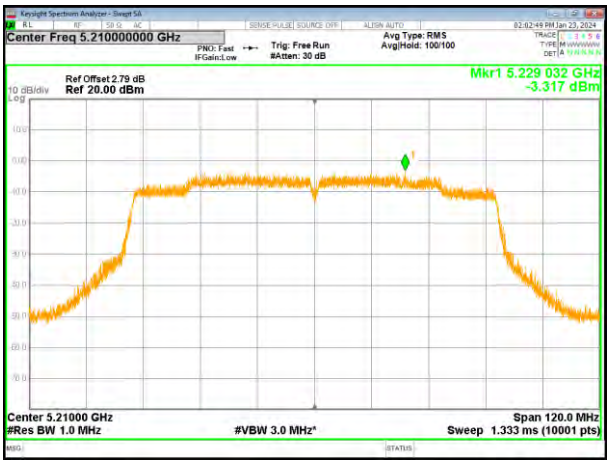
(802.11ac20) PSD plot on channel 48



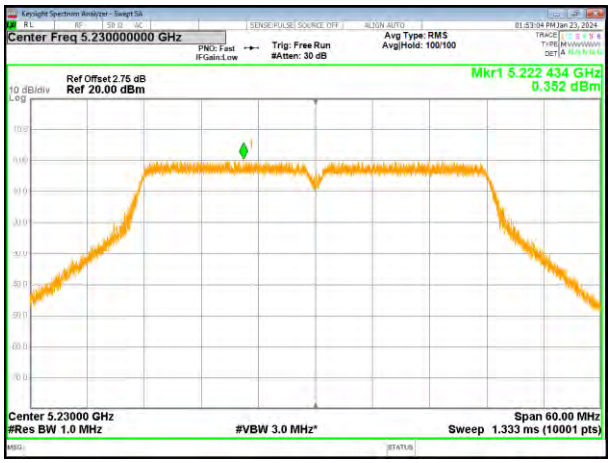
(802.11ac40) PSD plot on channel 38



(802.11ac80) PSD plot on channel 42



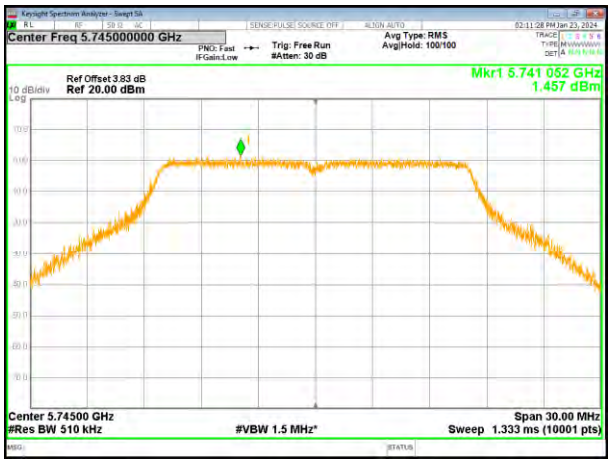
(802.11ac40) PSD plot on channel 46



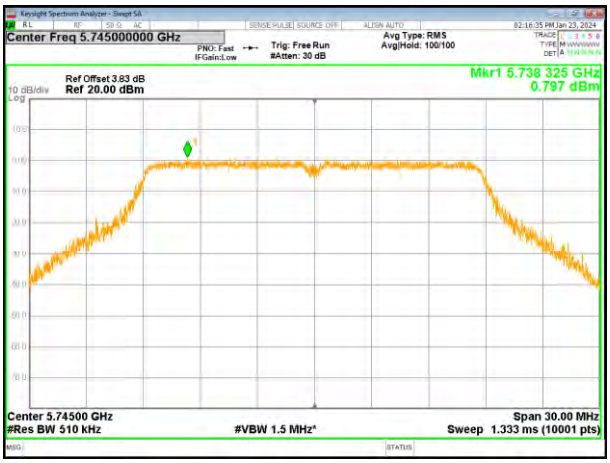
Mode	Frequency (MHz)	Measured Power Density (dBm/510KHz)	Measured Power Density (dBm/500KHz)	Correction Factor (dB)	Total Power Density (dBm/500KHz)	Limit (dBm/MHz)
802.11 a	5745	1.457	1.371	0.13	1.501	30
	5785	1.335	1.249	0.12	1.369	30
	5825	1.474	1.388	0.12	1.508	30
802.11 n20	5745	0.797	0.711	0.36	1.071	30
	5785	0.898	0.812	0.21	1.022	30
	5825	1.383	1.297	0.22	1.517	30
802.11ac20	5745	0.652	0.566	0.26	0.826	30
	5785	1.118	1.032	0.17	1.202	30
	5825	1.097	1.011	0.17	1.181	30
802.11 n40	5755	-4.598	-4.684	0.68	-4.004	30
	5795	-3.594	-3.68	0.26	-3.420	30
802.11ac40	5755	-3.889	-3.975	0.15	-3.825	30
	5795	-4.104	-4.190	0.16	-4.030	30
802.11ac80	5775	-6.784	-6.870	0.31	-6.560	30

Note: If the measurement is X dBm/510kHz, thus X dBm/510kHz = $(10^{X/10})$*(500 / 510) dBm/500kHz

(802.11a) PSD plot on channel 149

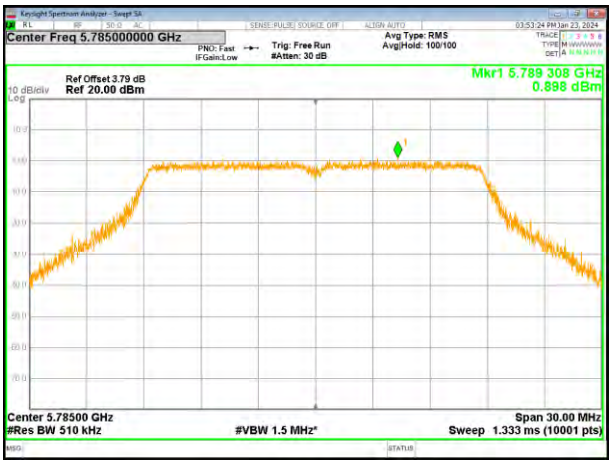


(802.11n20) PSD plot on channel 149

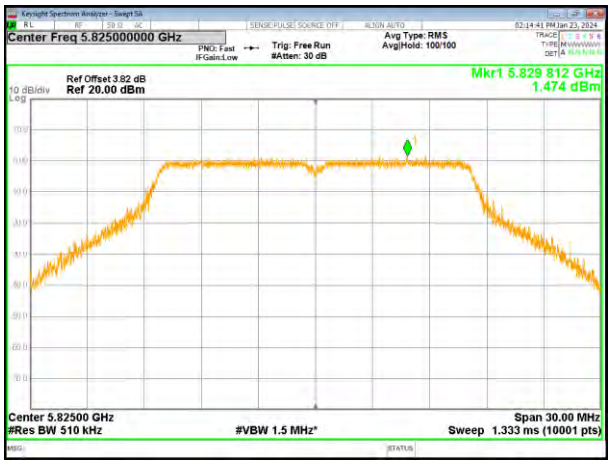


(802.11a) PSD plot on channel 157

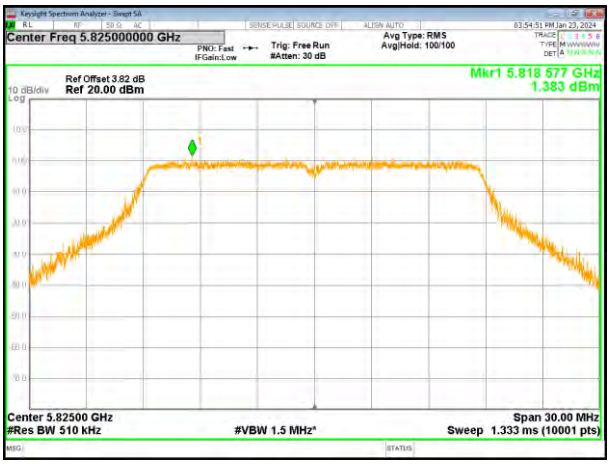
(802.11n20) PSD plot on channel 157



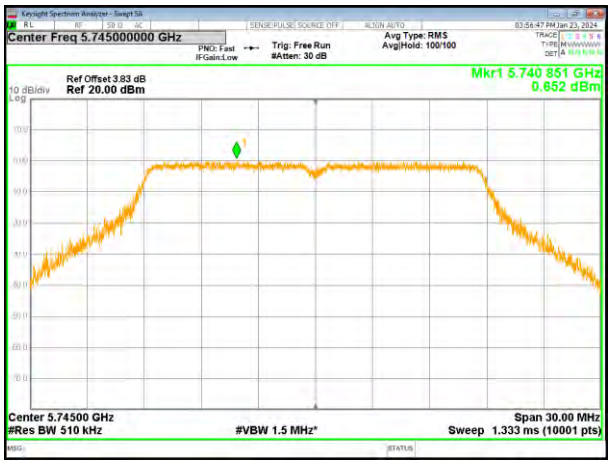
(802.11a) PSD plot on channel 165



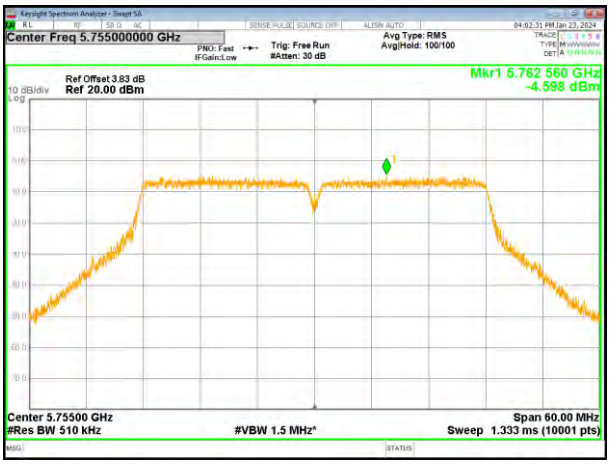
(802.11n20) PSD plot on channel 165



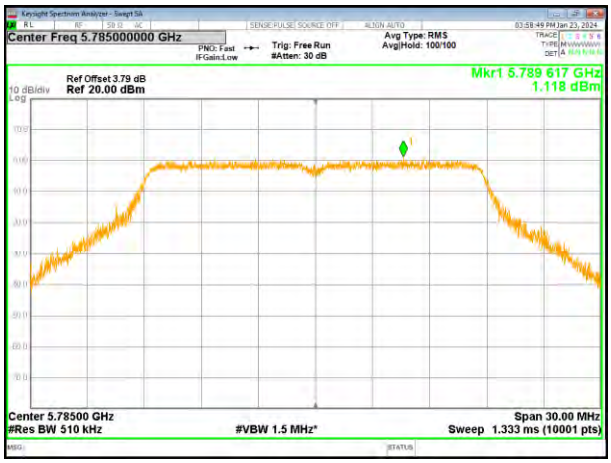
(802.11ac20) PSD plot on channel 149



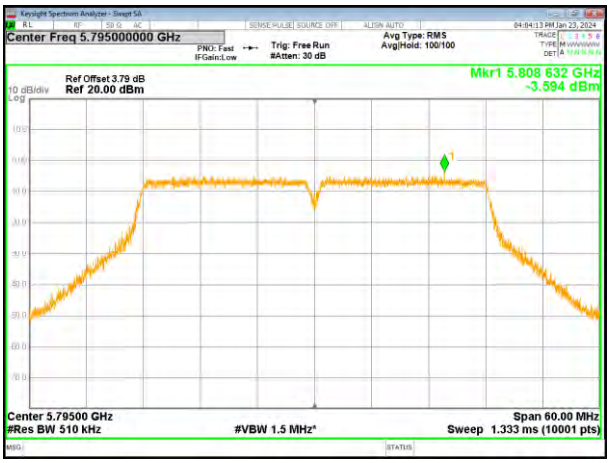
(802.11n40) PSD plot on channel 151



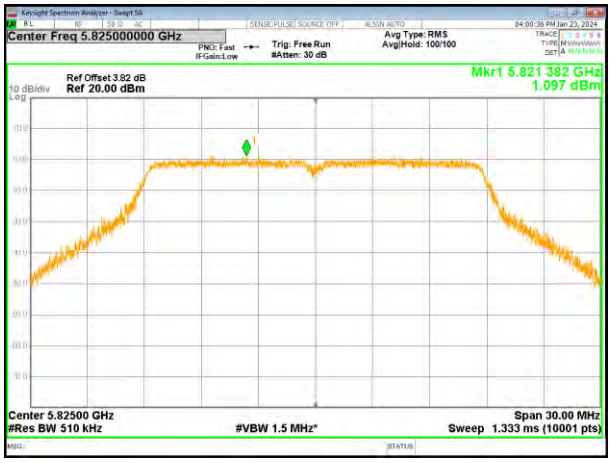
(802.11ac20) PSD plot on channel 157



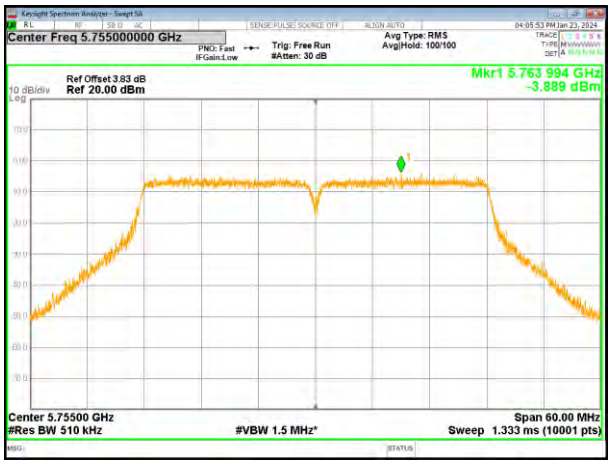
(802.11n40) PSD plot on channel 159



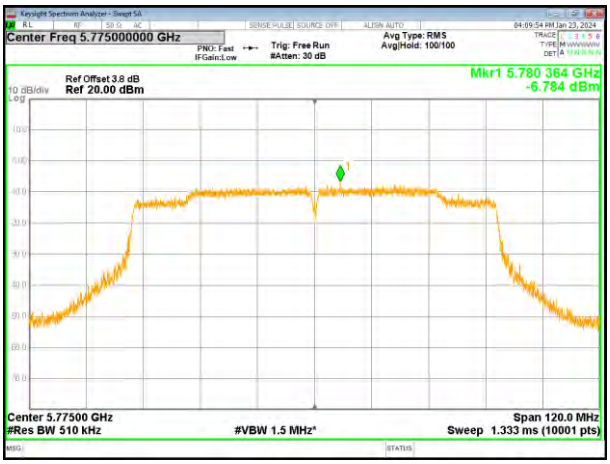
(802.11ac20) PSD plot on channel 165



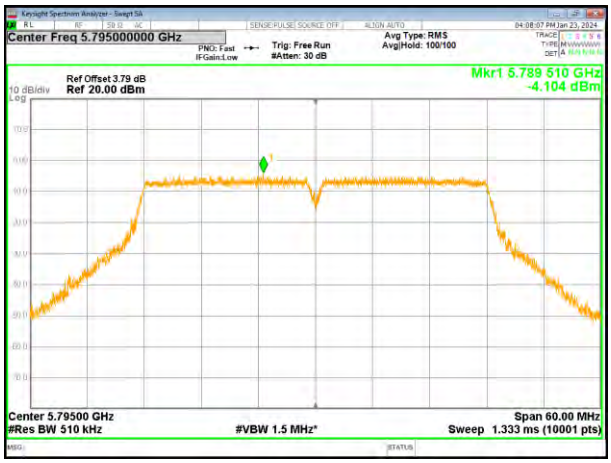
(802.11ac40) PSD plot on channel 151



(802.11ac80) PSD plot on channel 155

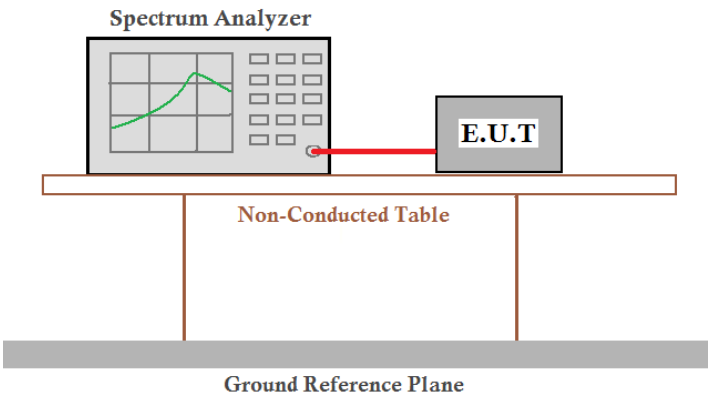


(802.11ac40) PSD plot on channel 159



4.7 Band edge

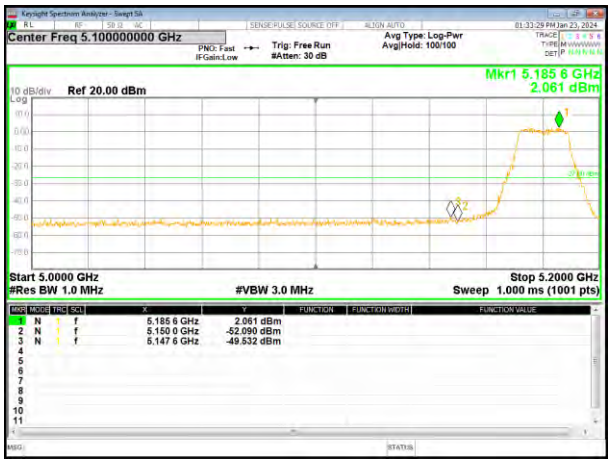
4.7.1 Conducted test Method

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:		
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 environment:	Temp.: 24.4°C	Humid.: 44%RH
Test voltage:	DC19V	
Test results:	Pass	

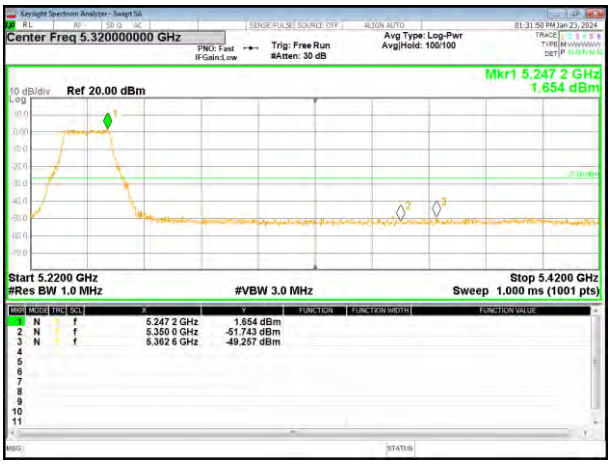
5.180~5.240 GHz

(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

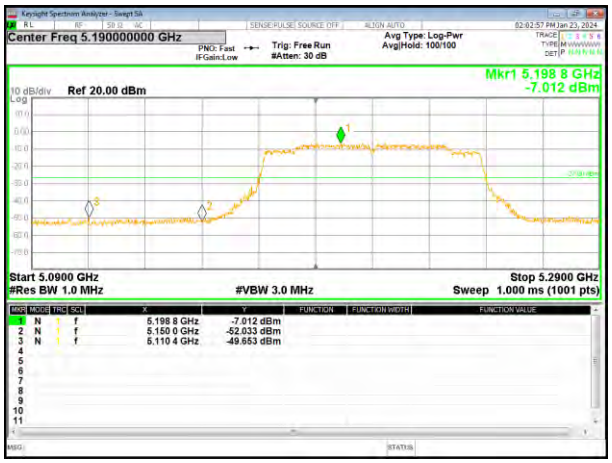
(802.11ac20) Band Edge, Right Side

(802.11n40) Band Edge, Right Side

5.180~5.240 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge

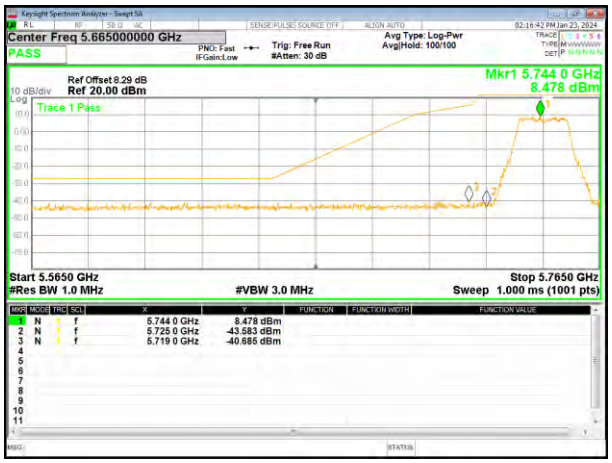


(802.11ac40) Band Edge, Right Side

5.745~5.825 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

5.745~5.825 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

5.745~5.825 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge

(802.11ac40) Band Edge, Right Side

4.8 Spurious Emission

4.8.1 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

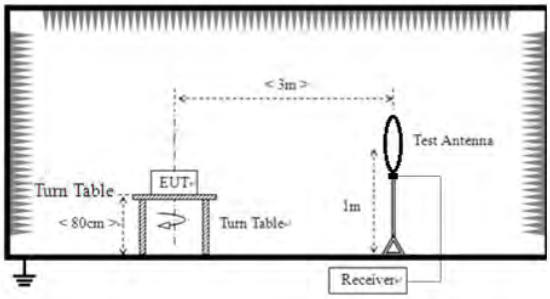
Limit:

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	

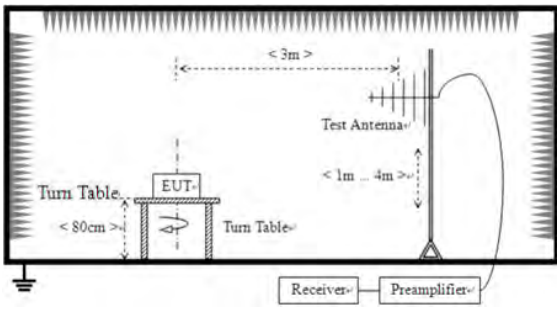
Frequency	Limit (dBm/MHz)	Remark
Above 1GHz	-27.0	Peak Value

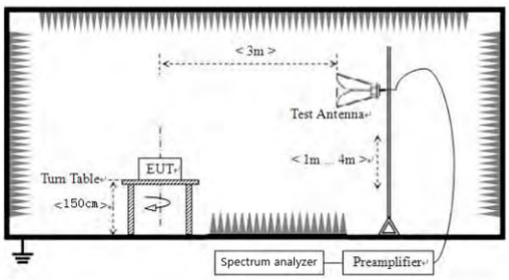
Test setup:

For radiated emissions from 9kHz to 30MHz



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. 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 results:	Pass

Remarks:

1. *The report only shows the worst mode.*
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.*

Measurement Data:

9 kHz ~ 30 MHz

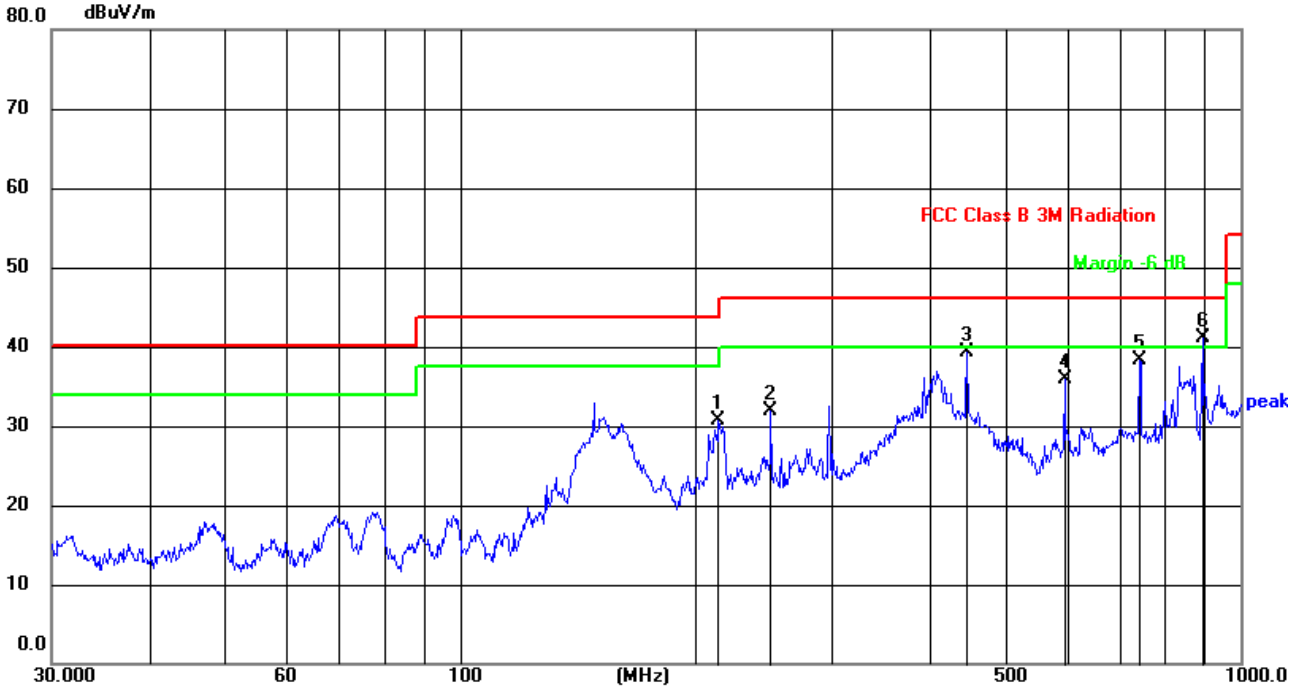
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Below 1GHz

Remark: The test data shows only the worst case 802.11a mode.

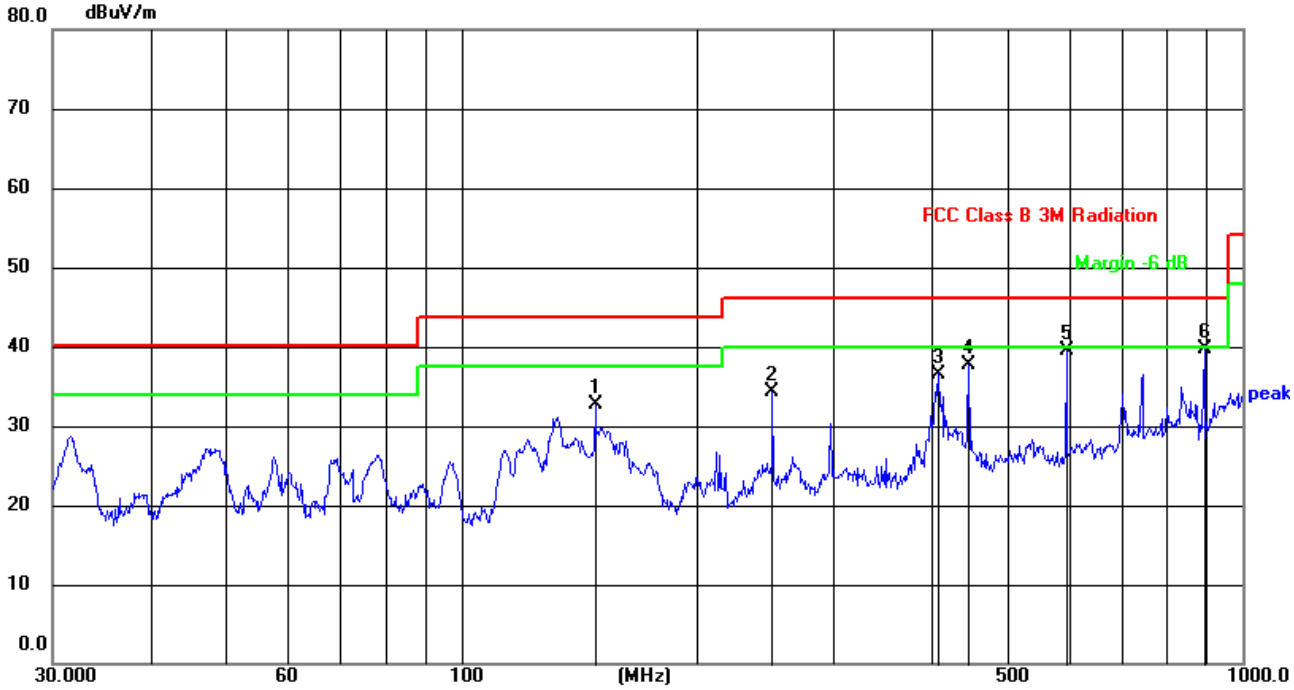
Temperature:	24.4℃	Relative Humidity:	55%
Pressure:	101.2kPar	Test Voltage :	DC 19V
Test Mode :	5.2G TX- 802.11a (5180MHz)		

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	214.5141	54.28	-23.53	30.75	43.50	-12.75	QP
2	250.3009	54.23	-22.25	31.98	46.00	-14.02	QP
3	446.4139	54.98	-15.65	39.33	46.00	-6.67	QP
4	595.1326	47.77	-11.86	35.91	46.00	-10.09	QP
5	742.2586	46.53	-8.27	38.26	46.00	-7.74	QP
6	893.8564	46.64	-5.54	41.10	46.00	-4.90	QP

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	148.4410	53.34	-20.68	32.66	43.50	-10.84	QP
2	250.3009	56.55	-22.25	34.30	46.00	-11.70	QP
3	407.5144	53.58	-16.98	36.60	46.00	-9.40	QP
4	446.4139	53.38	-15.65	37.73	46.00	-8.27	QP
5	595.1326	51.36	-11.86	39.50	46.00	-6.50	QP
6	893.8564	45.28	-5.54	39.74	46.00	-6.26	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 802.11a mode

Above 1GHz:

Temperature:	24.4℃	Relative Humidity:	55%
Pressure:	101.2kPar	Test Voltage :	DC 19V
Test Mode :	5.2G TX- 802.11a		

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
Low Channel:5180MHz									
V	10360.00	46.75	46.20	8.27	38.50	47.32	68.20	-20.88	PK
V	10360.00	37.78	46.20	8.27	38.50	38.35	54.00	-15.65	AV
V	15540.00	43.69	46.30	10.35	38.70	46.44	74.00	-27.56	PK
V	15540.00	34.64	46.30	10.35	38.70	37.39	54.00	-16.61	AV
V	20720.00	52.51	57.40	11.93	37.80	44.84	68.20	-23.36	PK
V	20720.00	43.39	57.40	11.93	37.80	35.72	54.00	-18.28	AV
V	25900.00	50.3	56.50	13.45	39.70	46.95	68.20	-21.25	PK
V	25900.00	41.17	56.50	13.45	39.70	37.82	54.00	-16.18	AV
H	10360.00	45.71	46.20	8.27	38.50	46.28	68.20	-21.92	PK
H	10360.00	36.28	46.20	8.27	38.50	36.85	54.00	-17.15	AV
H	15540.00	42.9	46.30	10.35	38.70	45.65	74.00	-28.35	PK
H	15540.00	32.69	46.30	10.35	38.70	35.44	54.00	-18.56	AV
H	20720.00	54.56	57.40	11.93	37.80	46.89	68.20	-21.31	PK
H	20720.00	44.53	57.40	11.93	37.80	36.86	54.00	-17.14	AV
H	25900.00	52.46	56.50	13.45	39.70	49.11	68.20	-19.09	PK
H	25900.00	41.08	56.50	13.45	39.70	37.73	54.00	-16.27	AV

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:5200MHz									
V	10400.00	46.49	46.20	8.27	38.50	47.06	68.20	-21.14	PK
V	10400.00	36.86	46.20	8.27	38.50	37.43	54.00	-16.57	AV
V	15600.00	43.79	46.30	10.35	38.40	46.24	74.00	-27.76	PK
V	15600.00	36.17	46.30	10.35	38.40	38.62	54.00	-15.38	AV
V	20800.00	54.29	57.40	11.93	37.80	46.62	68.20	-21.58	PK
V	20800.00	44.58	57.40	11.93	37.80	36.91	54.00	-17.09	AV
V	26000.00	49.58	56.50	13.45	39.80	46.33	68.20	-21.87	PK
V	26000.00	41.98	56.50	13.45	39.80	38.73	54.00	-15.27	AV
H	10400.00	46.37	46.20	8.27	38.50	46.94	68.20	-21.26	PK
H	10400.00	36.89	46.20	8.27	38.50	37.46	54.00	-16.54	AV
H	15600.00	44.78	46.30	10.35	38.40	47.23	74.00	-26.77	PK
H	15600.00	36.40	46.30	10.35	38.40	38.85	54.00	-15.15	AV
H	20800.00	53.44	57.40	11.93	37.80	45.77	68.20	-22.43	PK
H	20800.00	42.88	57.40	11.93	37.80	35.21	54.00	-18.79	AV
H	26000.00	49.36	56.50	13.45	39.80	46.11	68.20	-22.09	PK
H	26000.00	46.49	56.50	13.45	39.80	37.85	54.00	-16.15	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	10480.00	40.85	46.20	8.27	38.60	41.52	68.20	-26.68	PK
V	10480.00	33.75	46.20	8.27	38.60	34.42	54.00	-19.58	AV
V	15720.00	43.86	46.30	10.35	38.40	46.31	74.00	-27.69	PK
V	15720.00	33.99	46.30	10.35	38.40	36.44	54.00	-17.56	AV
V	20960.00	50.00	57.40	11.93	37.50	42.03	68.20	-26.17	PK
V	20960.00	43.43	57.40	11.93	37.50	35.46	54.00	-18.54	AV
V	26200.00	46.01	56.50	13.45	40.10	43.06	68.20	-25.14	PK
V	26200.00	37.97	56.50	13.45	40.10	35.02	54.00	-18.98	AV
H	10480.00	40.78	46.20	8.27	38.60	41.45	68.20	-26.75	PK
H	10480.00	33.21	46.20	8.27	38.60	33.88	54.00	-20.12	AV
H	15720.00	43.27	46.30	10.35	38.40	45.72	74.00	-28.28	PK
H	15720.00	31.13	46.30	10.35	38.40	33.58	54.00	-20.42	AV
H	20960.00	50.00	57.40	11.93	37.50	42.03	68.20	-26.17	PK
H	20960.00	43.92	57.40	11.93	37.50	35.95	54.00	-18.05	AV
H	26200.00	46.71	56.50	13.45	40.10	43.76	68.20	-24.44	PK
H	26200.00	41.01	56.50	13.45	40.10	38.06	54.00	-15.94	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.

Temperature:	24.4℃	Relative Humidity:	55%
Pressure:	1010 hPa	Test Voltage :	DC 19V
Test Mode :	5.8G TX- 802.11a		

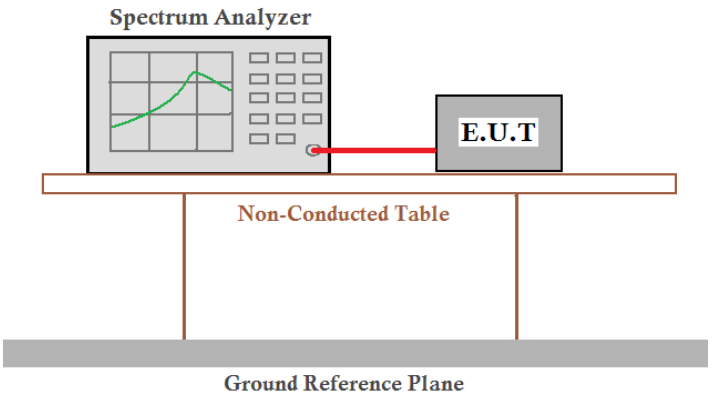
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenn Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Typ
Low Channel:5745MHz									
V	11490.00	44.67	46.10	8.77	39.10	46.44	74.00	-27.56	PK
V	11490.00	33.44	46.10	8.77	39.10	35.21	54.00	-18.79	AV
V	17235.00	40.28	47.60	11.10	38.70	42.48	68.20	-25.72	PK
V	17235.00	33.79	47.60	11.10	38.70	35.99	54.00	-18.01	AV
V	22980.00	51.85	56.90	12.73	37.70	45.38	74.00	-28.62	PK
V	22980.00	40.09	56.90	12.73	37.70	33.62	54.00	-20.38	AV
V	28725.00	43.09	55.60	14.25	40.30	42.04	68.20	-26.16	PK
V	28725.00	37.18	55.60	14.25	40.30	36.13	54.00	-17.87	AV
H	11490.00	43.87	46.10	8.77	39.10	45.64	74.00	-28.36	PK
H	11490.00	33.19	46.10	8.77	39.10	34.96	54.00	-19.04	AV
H	17235.00	39.89	47.60	11.10	38.70	42.09	68.20	-26.11	PK
H	17235.00	33.21	47.60	11.10	38.70	35.41	54.00	-18.59	AV
H	22980.00	55.71	56.90	12.73	37.70	49.24	74.00	-24.76	PK
H	22980.00	44.09	56.90	12.73	37.70	37.62	54.00	-16.38	AV
H	28725.00	47.08	55.60	14.25	40.30	46.03	68.20	-22.17	PK
H	28725.00	40.50	55.60	14.25	40.30	39.45	54.00	-14.55	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	11570.00	44.58	46.10	8.77	39.10	46.35	74.00	-27.65	PK
V	11570.00	34.06	46.10	8.77	39.10	35.83	54.00	-18.17	AV
V	17355.00	38.79	47.60	11.10	38.70	40.99	68.20	-27.21	PK
V	17355.00	32.66	47.60	11.10	38.70	34.86	54.00	-19.14	AV
V	23140.00	53.88	56.90	12.73	37.70	47.41	74.00	-26.59	PK
V	23140.00	43.22	56.90	12.73	37.70	36.75	54.00	-17.25	AV
V	28925.00	45.11	55.60	14.25	40.30	44.06	68.20	-24.14	PK
V	28925.00	38.66	55.60	14.25	40.30	37.61	54.00	-16.39	AV
H	11570.00	43.91	46.10	8.77	39.10	45.68	74.00	-28.32	PK
H	11570.00	34.64	46.10	8.77	39.10	36.41	54.00	-17.59	AV
H	17355.00	39.72	47.60	11.10	38.70	41.92	68.20	-26.28	PK
H	17355.00	33.59	47.60	11.10	38.70	35.79	54.00	-18.21	AV
H	23140.00	56.89	56.90	12.73	37.70	50.42	74.00	-23.58	PK
H	23140.00	44.05	56.90	12.73	37.70	37.58	54.00	-16.42	AV
H	28925.00	45.67	55.60	14.25	40.30	44.62	68.20	-23.58	PK
H	28925.00	39.86	55.60	14.25	40.30	38.81	54.00	-15.19	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	11650.00	43.79	46.10	8.77	39.10	45.56	74.00	-28.44	PK
V	11650.00	32.25	46.10	8.77	39.10	34.02	54.00	-19.98	AV
V	17475.00	39.72	47.90	11.23	38.90	41.95	68.20	-26.25	PK
V	17475.00	33.73	47.90	11.23	38.90	35.96	54.00	-18.04	AV
V	23300.00	50.45	57.10	12.73	37.80	43.88	68.20	-24.32	PK
V	23300.00	43.90	57.10	12.73	37.80	37.33	54.00	-16.67	AV
V	29125.00	45.04	55.80	14.25	40.50	43.99	68.20	-24.21	PK
V	29125.00	39.58	55.80	14.25	40.50	38.53	54.00	-15.47	AV
H	11650.00	43.18	46.10	8.77	39.10	44.95	74.00	-29.05	PK
H	11650.00	31.59	46.10	8.77	39.10	33.36	54.00	-20.64	AV
H	17475.00	39.44	47.90	11.23	38.90	41.67	68.20	-26.53	PK
H	17475.00	33.60	47.90	11.23	38.90	35.83	54.00	-18.17	AV
H	23300.00	50.34	57.10	12.73	37.80	43.77	68.20	-24.43	PK
H	23300.00	44.40	57.10	12.73	37.80	37.83	54.00	-16.17	AV
H	29125.00	47.08	55.80	14.25	40.50	46.03	68.20	-22.17	PK
H	29125.00	41.67	55.80	14.25	40.50	40.62	54.00	-13.38	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.

4.8.2 Conducted Emission Method

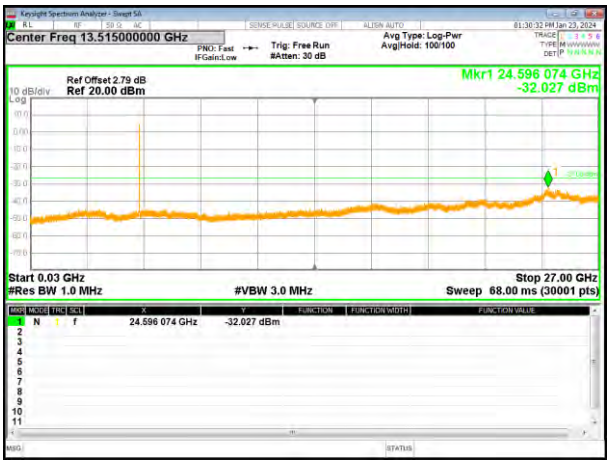
Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)	
Test Method:	ANSI C63.10:2013	
Limit:	-27dBm/MHz	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 4.4°C	Humid.: 55%RH
Test voltage:	DC19V	
Test results:	Pass	

5180-5240MHz

Test Plot

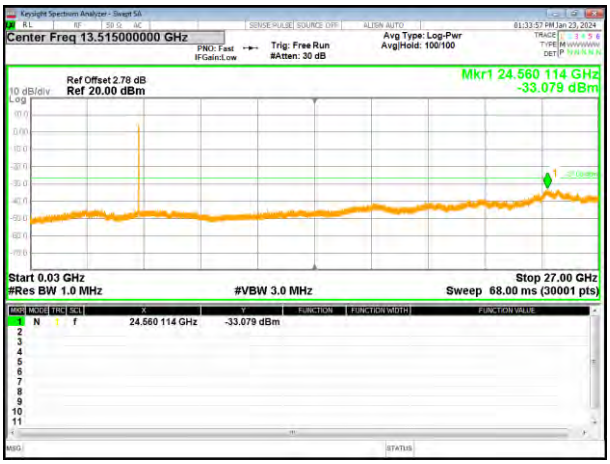
802.11a on channel 36

802.11a on channel 40

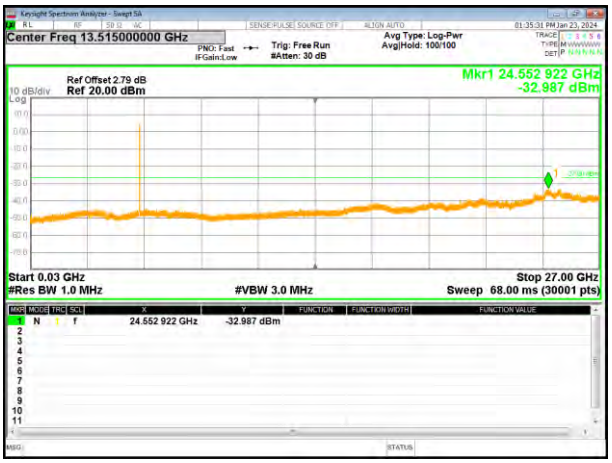


802.11a on channel 48

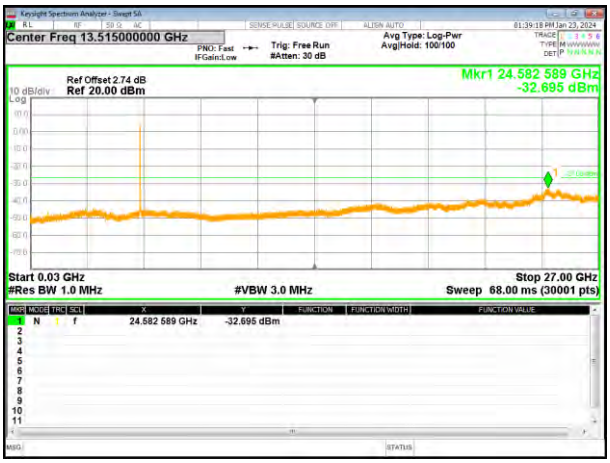
802.11n20 on channel 36



802.11n20 on channel 40

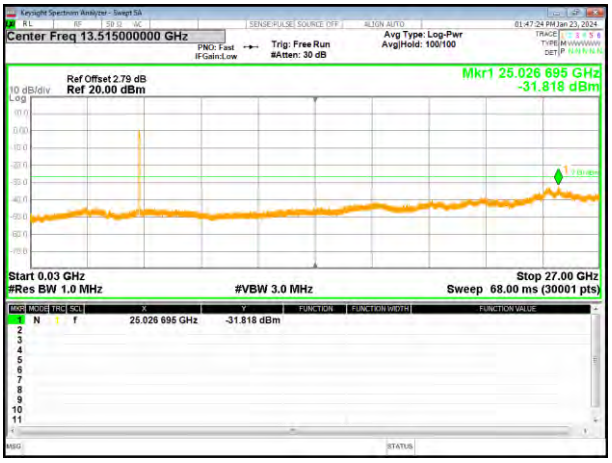


802.11n20 on channel 48

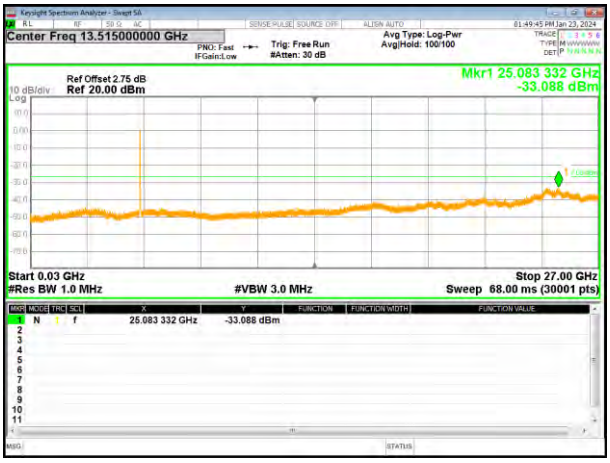


Test Plot

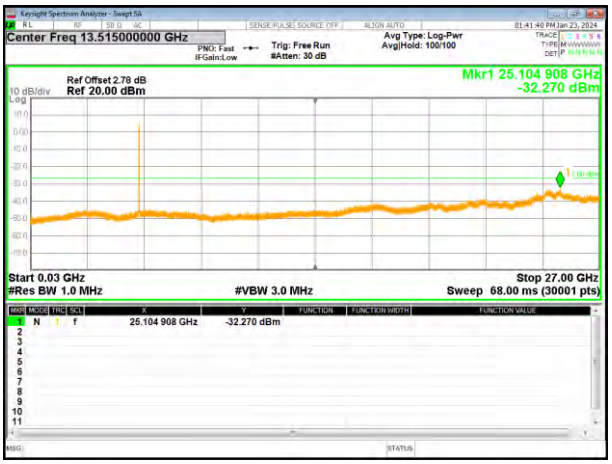
802.11ac20 on channel 36



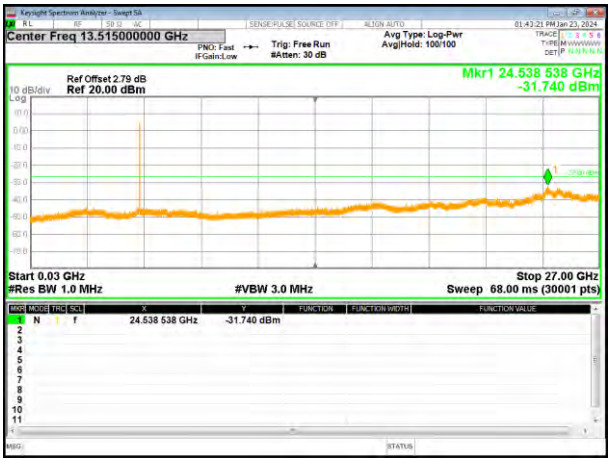
802.11ac20 on channel 40



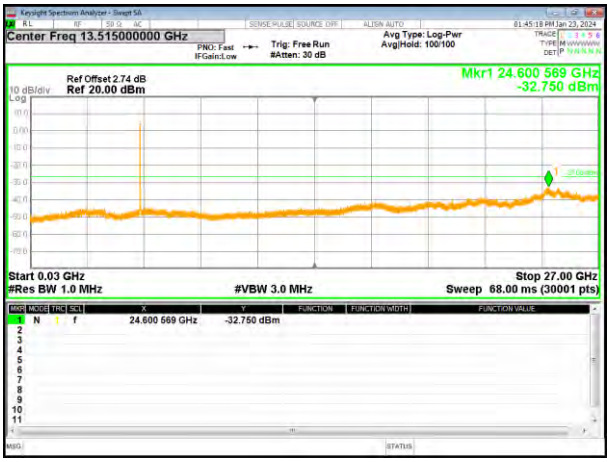
802.11ac20 on channel 48



802.11n40 on channel 38



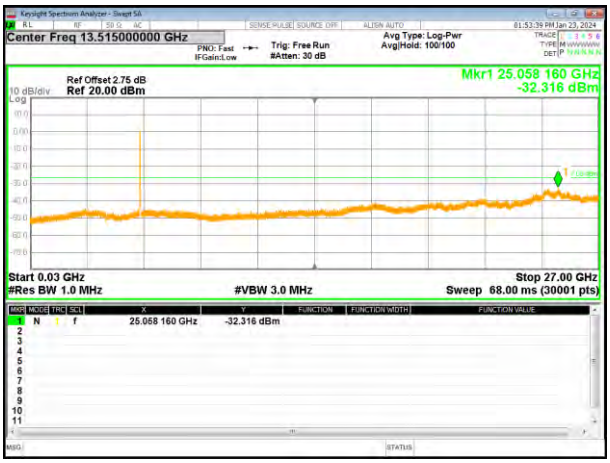
802.11n40 on channel 46



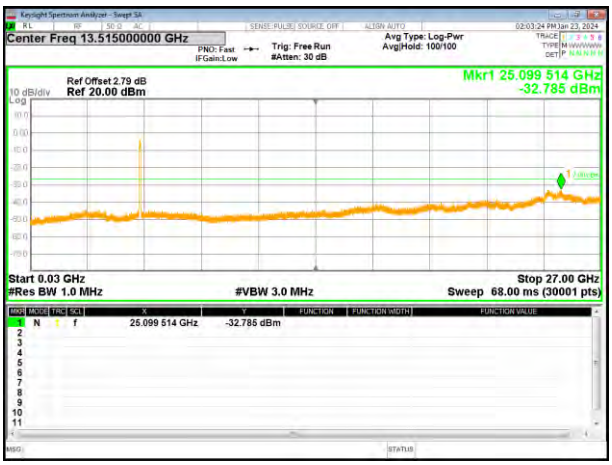
Test Plot

802.11ac40 on channel 38

802.11ac40 on channel 46



802.11ac80 on channel 42



5745-5825MHz

Test Plot

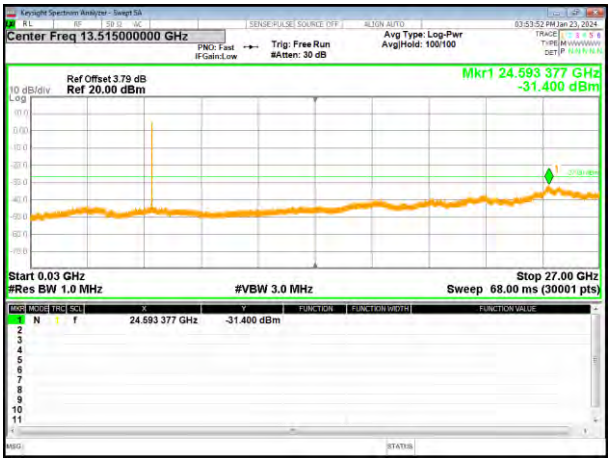
802.11a on channel 149

802.11a on channel 157

802.11a on channel 165

802.11n20 on channel 149

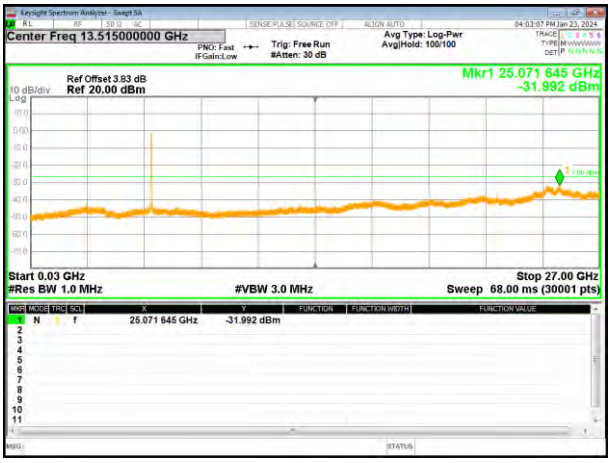
802.11n20 on channel 157



802.11n20 on channel 165

Test Plot

802.11ac20 on channel 149



802.11ac20 on channel 157

802.11ac20 on channel 165

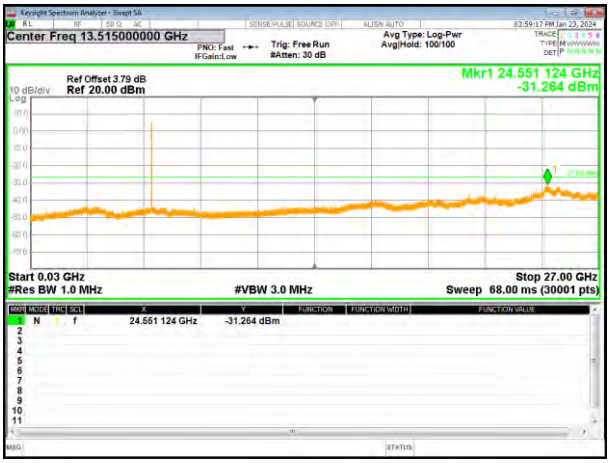
802.11n40 on channel 151

802.11n40 on channel 159

Test Plot

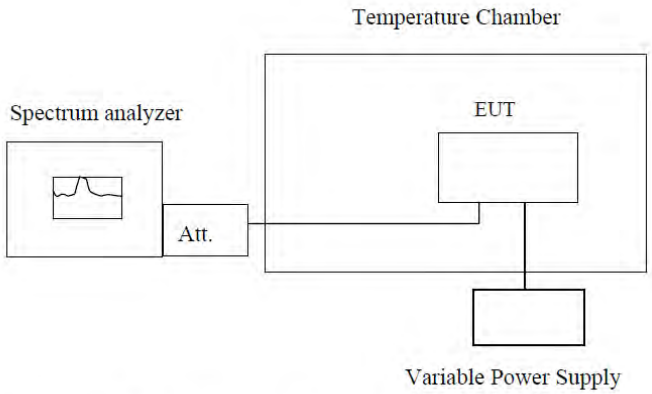
802.11ac40 on channel 151

802.11ac40 on channel 159



802.11ac80 on channel 155

4.9 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	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5180	5179.950	5180.138	5179.568	5179.804
	5190	5189.961	5190.129	5189.564	5189.794
	5200	5199.952	5200.137	5199.558	5199.802
	5210	5209.953	5210.129	5209.563	5209.794
	5220	5219.960	5220.150	5219.558	5219.813
	5230	5229.978	5230.128	5229.554	5229.791
	5240	5239.963	5240.147	5239.527	5239.809
-20	5180	5179.962	5180.138	5179.568	5179.813
	5190	5189.953	5190.129	5189.567	5189.808
	5200	5199.961	5200.137	5199.560	5199.803
	5210	5209.953	5210.129	5209.549	5209.809
	5220	5219.974	5220.150	5219.559	5219.802
	5230	5229.952	5230.128	5299.550	5229.800
	5240	5239.970	5240.147	5239.559	5239.773
-10	5180	5179.971	5180.147	5179.547	5179.792
	5190	5189.967	5190.143	5189.558	5189.802
	5200	5199.962	5200.138	5199.548	5199.793
	5210	5209.968	5210.144	5209.548	5209.794
	5220	5219.963	5220.139	5219.555	5219.799
	5230	5229.961	5230.137	5229.571	5229.817
	5240	5239.934	5240.111	5239.543	5239.789
0	5180	5179.966	5180.179	5179.870	5179.801
	5190	5189.957	5190.171	5189.861	5189.830
	5200	5199.965	5200.179	5199.869	5199.855
	5210	5209.957	5210.171	5209.861	5209.839
	5220	5219.978	5220.192	5219.882	5219.829
	5230	5229.956	5230.170	5229.859	5229.857
	5240	5239.974	5240.189	5239.877	5239.845
10	5180	5179.950	5180.138	5179.568	5179.804
	5190	5189.961	5190.129	5189.564	5189.794
	5200	5199.952	5200.137	5199.558	5199.802
	5210	5209.953	5210.129	5209.563	5209.794
	5220	5219.960	5220.150	5219.558	5219.813
	5230	5229.978	5230.128	5229.554	5229.791
	5240	5239.963	5240.147	5239.527	5239.809
20	5180	5180.028	5179.391	5179.817	5179.566

	5190	5189.971	5190.180	5189.861	5189.830
	5200	5199.966	5200.171	5199.869	5199.855
	5210	5209.972	5300.182	5209.861	5209.839
	5220	5219.967	5220.171	5219.882	5219.829
	5230	5229.965	5230.192	5229.859	5229.857
	5240	5239.938	5240.171	5239.877	5239.845
30	5180	5179.954	5180.179	5179.870	5179.849
	5190	5189.965	5190.171	5189.861	5179.849
	5200	5199.956	5200.179	5199.869	5189.844
	5210	5209.957	5210.171	5209.861	5199.839
	5220	5219.964	5220.192	5219.882	5209.845
	5230	5229.982	5230.170	5229.859	5219.839
	5240	5239.954	5240.189	5239.877	5229.837
40	5180	5179.966	5180.178	5179.656	5179.828
	5190	5189.957	5190.180	5199.828	5189.838
	5200	5199.965	5200.171	5199.826	5199.829
	5210	5209.957	5300.182	5209.881	5209.830
	5220	5219.978	5220.171	5219.870	5219.836
	5230	5229.956	5230.192	5229.856	5229.854
	5240	5239.974	5240.171	5239.873	5239.826
50	5180	5179.966	5180.179	5179.870	5179.801
	5190	5189.957	5190.171	5189.861	5189.830
	5200	5199.965	5200.179	5199.869	5199.855
	5210	5209.957	5210.171	5209.861	5209.839
	5220	5219.978	5220.192	5219.882	5219.829
	5230	5229.956	5230.170	5229.859	5229.857
	5240	5239.974	5240.189	5239.877	5239.845

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
16.15	5180	5179.975	5180.182	5179.870	5179.964
	5190	5189.971	5200.176	5189.861	5199.838
	5200	5199.966	5200.204	5199.869	5199.863
	5210	5209.972	5210.182	5209.861	5209.841
	5220	5219.967	5220.197	5219.882	5219.855
	5230	5229.965	5230.190	5229.859	5229.848
	5240	5239.938	5240.199	5239.873	5239.856
19.0	5180	5179.975	5180.182	5179.870	5179.964
	5190	5189.971	5200.176	5189.861	5199.838
	5200	5199.966	5200.204	5199.869	5199.863
	5210	5209.972	5210.182	5209.861	5209.841
	5220	5219.967	5220.197	5219.882	5219.855
	5230	5229.965	5230.190	5229.859	5229.848
	5240	5239.938	5240.199	5239.873	5239.856
21.85	5180	5179.858	5180.188	5179.858	5180.182
	5190	5189.869	5190.185	5189.869	5200.176
	5200	5199.860	5200.180	5199.860	5200.204
	5210	5209.861	5210.186	5209.861	5210.182
	5220	5219.868	5220.181	5219.868	5220.197
	5230	5229.885	5230.179	5229.885	5230.190
	5240	5239.857	5240.153	5239.857	5240.199

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	5745	5744.951	5744.968	5745.214	5744.859
	5755	5754.961	5754.982	5755.186	5754.875
	5775	5774.982	5774.967	5775.210	5774.860
	5785	5784.958	5784.954	5785.210	5784.846
	5795	5794.954	5794.948	5795.201	5794.840
	5825	5824.952	5824.982	5825.217	5824.874
-20	5745	5744.948	5745.200	5744.845	5744.825
	5755	5754.963	5755.202	5754.870	5754.838
	5775	5774.962	5775.206	5774.851	5774.823
	5785	5784.965	5785.198	5784.859	5784.809
	5795	5794.975	5795.189	5794.857	5794.803
	5825	5824.957	5825.199	5824.867	5824.836
-10	5745	5744.968	5745.214	5744.861	5744.814
	5755	5754.962	5755.186	5754.874	5754.832
	5775	5774.967	5775.210	5774.860	5774.812
	5785	5784.954	5785.210	5784.846	5784.839
	5795	5794.948	5795.200	5794.840	5794.830
	5825	5824.982	5825.221	5824.874	5824.838
0	5745	5744.952	5745.179	5744.861	5744.815
	5755	5754.977	5755.195	5754.863	5754.840
	5775	5774.958	5775.195	5774.866	5774.836
	5785	5784.967	5785.198	5784.857	5784.819
	5795	5794.965	5795.211	5794.848	5794.808
	5825	5824.975	5825.191	5824.857	5824.742
10	5745	5744.952	5745.189	5744.850	5744.810
	5755	5754.977	5755.206	5754.857	5754.821
	5775	5774.958	5775.208	5774.849	5774.838
	5785	5784.967	5785.190	5784.840	5784.813
	5795	5794.965	5795.207	5794.847	5794.809
	5825	5824.975	5825.206	5824.776	5824.811
20	5745	5744.968	5745.214	5744.859	5744.814
	5755	5754.982	5755.186	5754.875	5754.832
	5775	5774.967	5775.210	5774.860	5774.812
	5785	5784.954	5785.210	5784.846	5784.838
	5795	5794.948	5795.201	5794.840	5794.830
	5825	5824.982	5825.217	5824.874	5824.838
30	5745	5744.958	5745.200	5744.844	5744.839
	5755	5754.965	5755.202	5754.867	5754.810
	5775	5774.982	5775.206	5774.868	5774.833
	5785	5784.958	5785.198	5784.849	5784.832
	5795	5794.954	5795.189	5794.866	5794.823
	5825	5824.957	5825.199	5824.864	5824.837
40	5745	5744.968	5745.184	5744.861	5744.808
	5755	5754.982	5755.209	5754.863	5754.840
	5775	5774.967	5775.191	5774.866	5774.836
	5785	5784.954	5785.200	5784.857	5784.819
	5795	5794.948	5795.198	5794.848	5794.808

	5825	5824.982	5825.209	5824.857	5824.742
50	5745	5744.968	5745.214	5744.861	5744.814
	5755	5754.962	5755.186	5754.874	5754.832
	5775	5774.967	5775.210	5774.860	5774.812
	5785	5784.954	5785.210	5784.846	5784.839
	5795	5794.948	5795.200	5794.840	5794.830
	5825	5824.982	5825.221	5824.874	5824.838

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	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	5745	5744.947	5745.189	5744.850	5744.809
	5755	5754.963	5755.196	5754.867	5754.833
	5775	5774.962	5775.189	5774.868	5774.814
	5785	5784.965	5785.181	5784.849	5784.822
	5795	5794.976	5795.188	5794.867	5794.820
	5825	5824.957	5825.118	5824.864	5824.829
19.0	5745	5744.968	5745.214	5744.861	5744.814
	5755	5754.962	5755.186	5754.874	5754.832
	5775	5774.967	5775.210	5774.860	5774.812
	5785	5784.954	5785.210	5784.846	5784.839
	5795	5794.948	5795.200	5794.840	5794.830
	5825	5824.982	5825.221	5824.874	5824.838
21.85	5745	5744.968	5745.214	5744.861	5744.814
	5755	5754.962	5755.186	5754.874	5754.832
	5775	5774.967	5775.210	5774.860	5774.812
	5785	5784.954	5785.210	5784.846	5784.839
	5795	5794.948	5795.200	5794.840	5794.830
	5825	5824.982	5825.221	5824.874	5824.838

5 Test Setup Photo

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

6 EUT Constructional Details

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

------END------