



TEST REPORT

Applicant: DiXiang Industrial (Shenzhen) Co., Ltd.
Address of Applicant: 502, workshop 6255, Henggang section, Longgang Avenue, Yuanshan street, Longgang District, Shenzhen
Manufacturer/Factory: DiXiang Industrial (Shenzhen) Co., Ltd.
Address of Manufacturer: 502, workshop 6255, Henggang section, Longgang Avenue, Yuanshan street, Longgang District, Shenzhen
Product Name: Laptop computer
Model No.: HFBOOK, HFBOOK1, HFBOOK2, HFBOOK3, HFBOOK4, HFBOOK5, HFBOOK6, HFBOOK7, HFBOOK8, HFBOOK9, HFBOOK10, HFBOOK11, HFBOOK12, HFBOOK13, HFBOOK14, HFBOOK15, HFBOOK16, HFBOOK17, HFBOOK18, HFBOOK19, HFBOOK20, HFBOOK21, HFBOOK22, HFBOOK23, HFBOOK24, HFBOOK25, HFBOOK26, HFBOOK27, HFBOOK28, HFBOOK29, HFBOOK30, HFBOOK31, HFBOOK32, HFBOOK33, HFBOOK34, HFBOOK35, HFBOOK36, HFBOOK37, HFBOOK38, HFBOOK39, HFBOOK40, HFBOOK41, HFBOOK42, HFBOOK43, HFBOOK45
Trade Mark: N/A
FCC ID: 2A6XH-HFBOOK
Applicable standards: FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of Test: May. 12, 2022- May.18, 2022
Date of report issued: May. 23, 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

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Report Revision History

Report No.	Description	Issue Date
ET-22050254E03	Original	May. 23, 2022



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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:	Laptop computer
Model No.:	HFBOOK,HFBOOK,HFBOOK1,HFBOOK2,HFBOOK3,HFBOOK4 HFBOOK5,HFBOOK6,HFBOOK7,HFBOOK8,HFBOOK9,HFBOOK10 HFBOOK11,HFBOOK12,HFBOOK13,HFBOOK14,HFBOOK15 HFBOOK16,HFBOOK17,HFBOOK18,HFBOOK19,HFBOOK20 HFBOOK21,HFBOOK22,HFBOOK23,HFBOOK24,HFBOOK25 HFBOOK26,HFBOOK27,HFBOOK28,HFBOOK29,HFBOOK30 HFBOOK31,HFBOOK32,HFBOOK33,HFBOOK34,HFBOOK35 HFBOOK36,HFBOOK37,HFBOOK38,HFBOOK39,HFBOOK40 HFBOOK41,HFBOOK42,HFBOOK43,HFBOOK45
Test Model:	HFBOOK
Difference of model(s)	All models different of product names, other are same.
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:	2dBi(Declare by applicant)
Power supply:	DC 12V form adapter or DC 7.4V from battery

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 $\geq$ 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 48 802.11a /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

None.

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	Special test command provided by manufacturer
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	ESC13	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+SUHNER	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	MWRFTtest	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	MWRFTtest	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:</i> <i>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 integral antenna, the best case gain of the antennas are 2dBi, reference to the appendix II for details</i>	

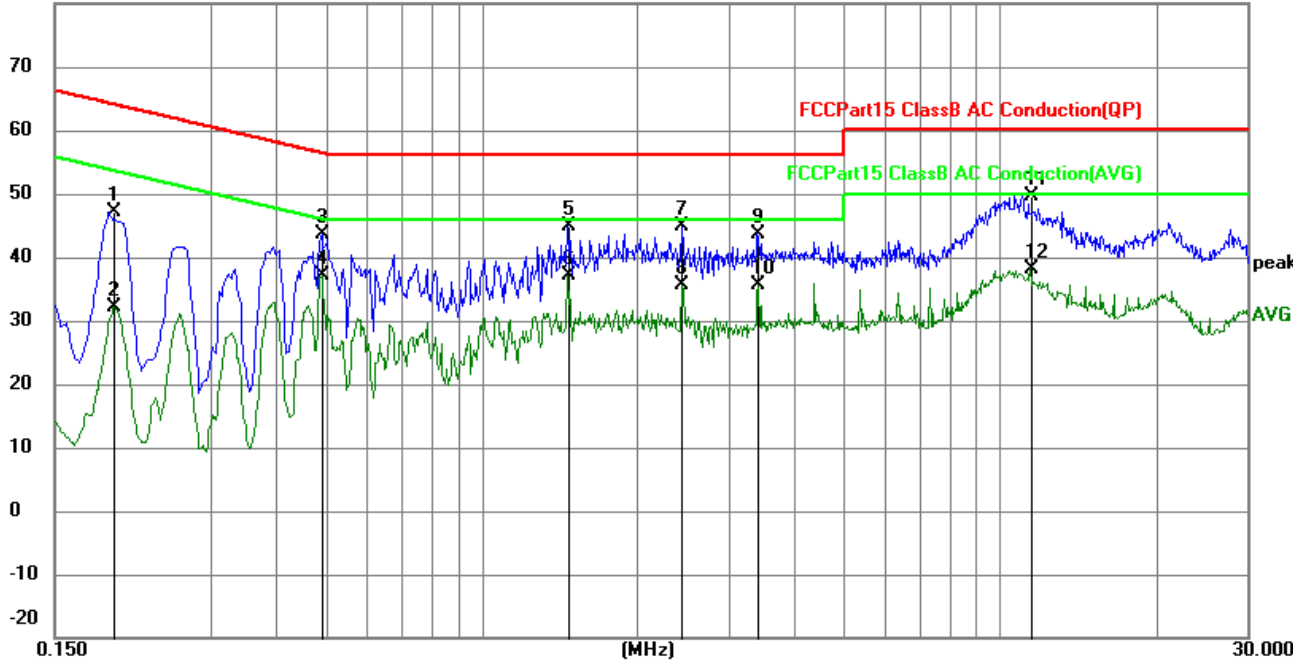
4.2 Conducted Emissions

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 <i>Remark:</i> 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 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	24.2°C	Humid.:	57%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement data

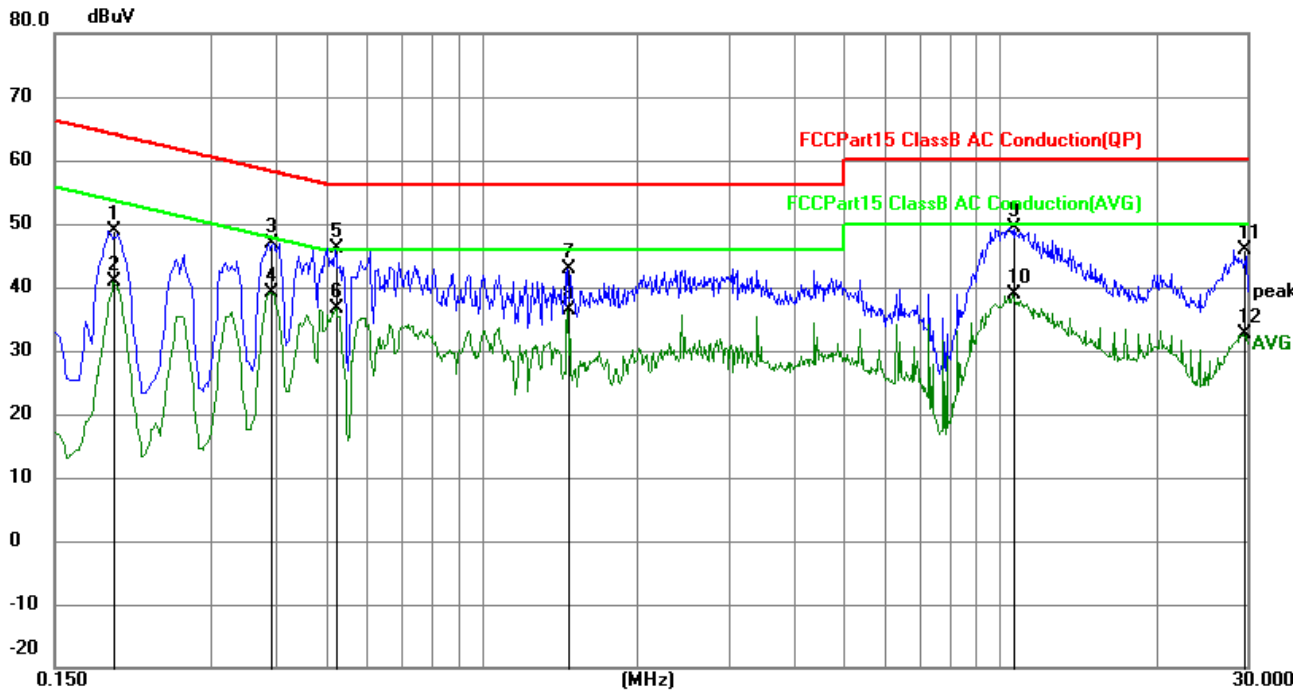
Line:

80.0 dBuV



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1945	34.64	12.46	47.10	63.84	-16.74	QP
2	0.1945	19.79	12.46	32.25	53.84	-21.59	AVG
3	0.4915	31.30	12.36	43.66	56.14	-12.48	QP
4	0.4915	24.88	12.36	37.24	46.14	-8.90	AVG
5	1.4640	32.68	12.30	44.98	56.00	-11.02	QP
6	1.4640	24.82	12.30	37.12	46.00	-8.88	AVG
7	2.4346	32.65	12.31	44.96	56.00	-11.04	QP
8	2.4346	23.44	12.31	35.75	46.00	-10.25	AVG
9	3.4174	31.26	12.32	43.58	56.00	-12.42	QP
10	3.4174	23.23	12.32	35.55	46.00	-10.45	AVG
11	11.4376	37.28	12.41	49.69	60.00	-10.31	QP
12	11.4376	25.84	12.41	38.25	50.00	-11.75	AVG

Neutral:

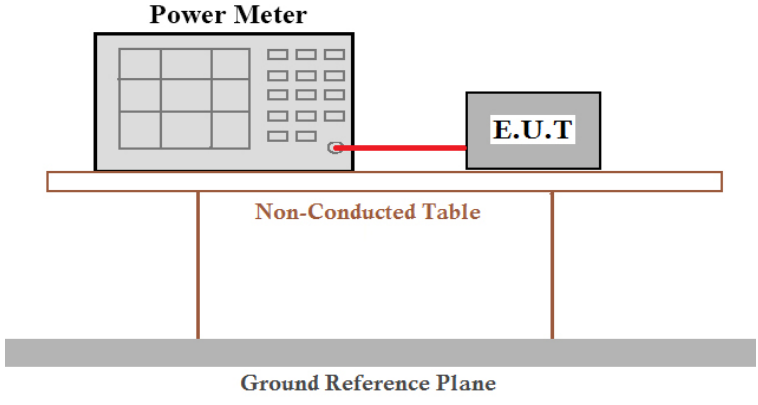


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1949	36.50	12.46	48.96	63.83	-14.87	QP
2	0.1949	28.37	12.46	40.83	53.83	-13.00	AVG
3	0.3930	34.57	12.38	46.95	58.00	-11.05	QP
4	0.3930	26.66	12.38	39.04	48.00	-8.96	AVG
5	0.5235	33.82	12.36	46.18	56.00	-9.82	QP
6	0.5235	24.28	12.36	36.64	46.00	-9.36	AVG
7	1.4640	30.62	12.30	42.92	56.00	-13.08	QP
8	1.4640	23.97	12.30	36.27	46.00	-9.73	AVG
9	10.5675	36.92	12.40	49.32	60.00	-10.68	QP
10	10.5675	26.39	12.40	38.79	50.00	-11.21	AVG
11	29.6160	33.15	12.70	45.85	60.00	-14.15	QP
12	29.6160	20.02	12.70	32.72	50.00	-17.28	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 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

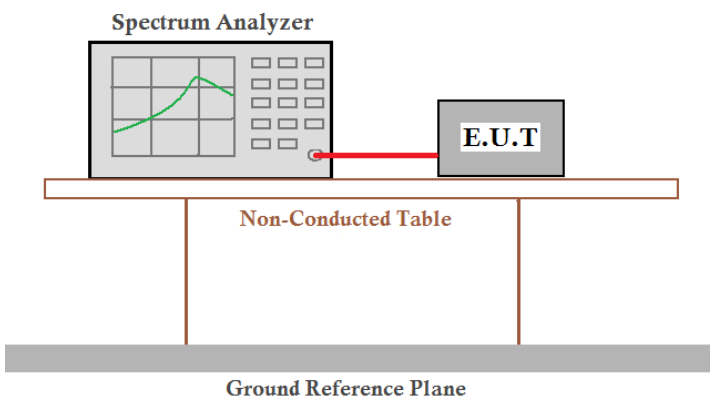
Measurement Data

Test Channel	Frequency	Maximum output power	LIMIT	Result
	(MHz)	(dBm)	dBm	
TX 802.11a Mode				
CH36	5180	7.19	23.98	Pass
CH40	5200	6.88	23.98	Pass
CH48	5240	7.08	23.98	Pass
TX 802.11 n20 Mode				
CH36	5180	7.96	23.98	Pass
CH40	5200	6.87	23.98	Pass
CH48	5240	6.47	23.98	Pass
TX 802.11 ac20 Mode				
CH36	5180	7.24	23.98	Pass
CH40	5200	6.86	23.98	Pass
CH48	5240	6.52	23.98	Pass
TX 802.11 n40 Mode				
CH38	5190	6.02	23.98	Pass
CH46	5230	5.62	23.98	Pass
TX 802.11 ac40 Mode				
CH38	5190	6.45	23.98	Pass
CH46	5230	5.76	23.98	Pass
TX 802.11 ac80 Mode				
CH42	5210	4.05	23.98	Pass



Test Channel	Frequency	Maximum output power.	LIMIT	Result
	(MHz)	(dBm)	dBm	
TX 802.11a Mode				
CH149	5745	6.97	30	Pass
CH157	5785	6.48	30	Pass
CH165	5825	5.73	30	Pass
TX 802.11 n20 Mode				
CH149	5745	7.18	30	Pass
CH157	5785	6.43	30	Pass
CH165	5825	5.86	30	Pass
TX 802.11 ac20 Mode				
CH149	5745	7.03	30	Pass
CH157	5785	6.39	30	Pass
CH165	5825	5.83	30	Pass
TX 802.11 n40 Mode				
CH151	5755	6.05	30	Pass
CH159	5795	5.30	30	Pass
TX 802.11 ac40 Mode				
CH151	5755	4.84	30	Pass
CH159	5795	4.73	30	Pass
TX 802.11 ac80 Mode				
CH155	5775	4.67	30	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:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

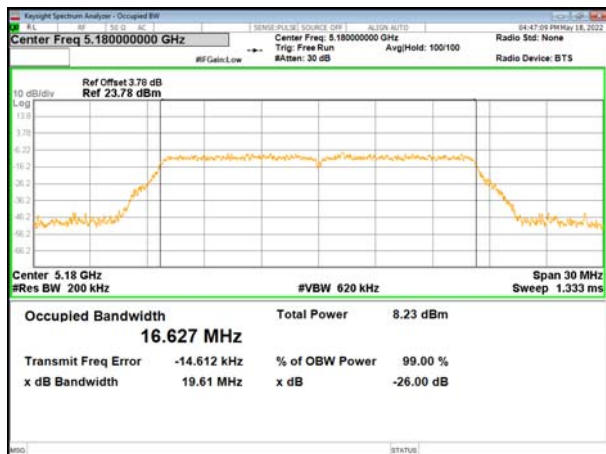
5180-5240MHz

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	19.61	19.90	19.89	39.61	39.84	--	Pass
Middle	19.55	19.83	19.81	--	--	82.21	
Highest	19.76	19.85	19.84	39.75	39.78	--	

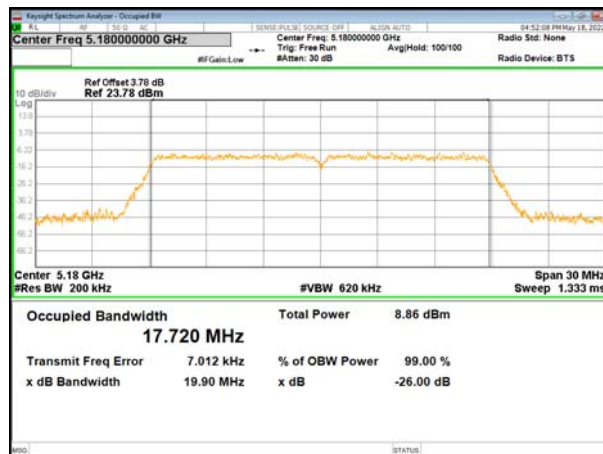
Test CH	99% Occupy Bandwidth (MHz)						Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)	
Lowest	16.627	17.720	17.696	36.179	36.160	--	Pass
Middle	16.601	17.708	17.704	--	--	75.153	
Highest	16.638	17.723	17.729	36.208	36.154	--	

Test plot

(802.11a) plot on channel 36



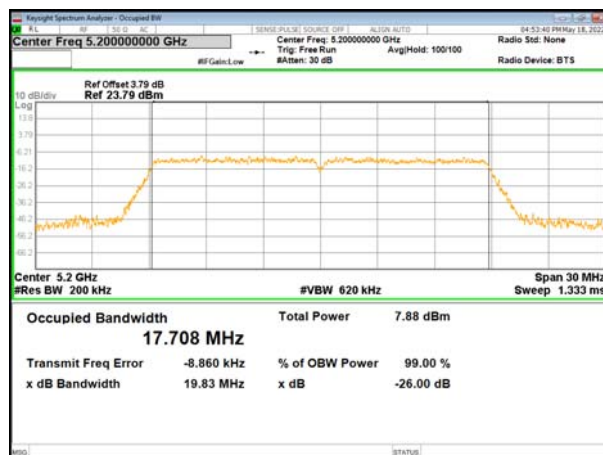
(802.11 n20) plot on channel 36



(802.11a) plot on channel 40



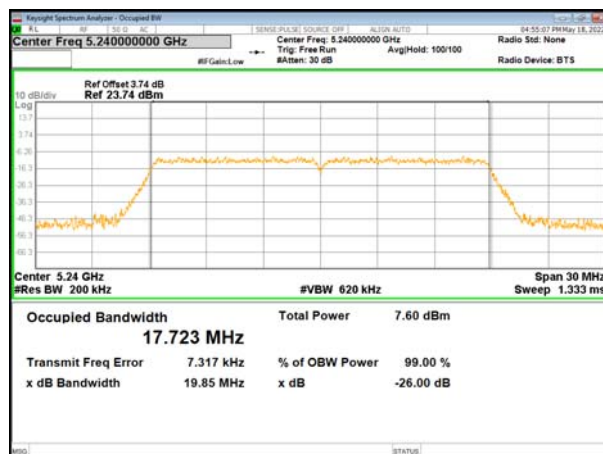
(802.11 n20) plot on channel 40



(802.11a) plot on channel 48

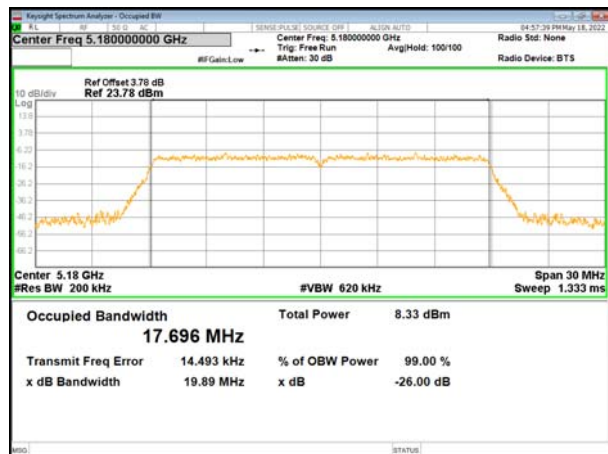


(802.11 n20) plot on channel 48

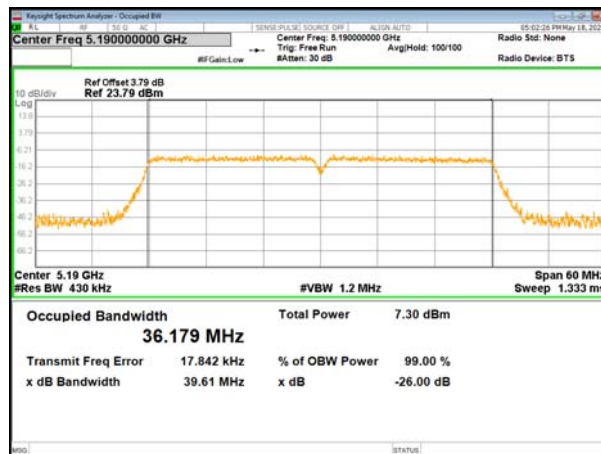


Test plot

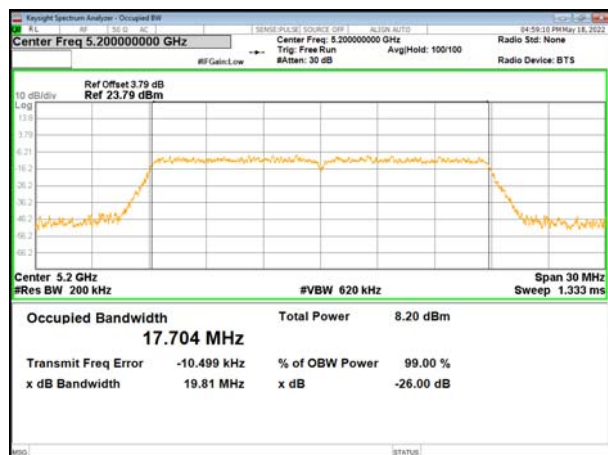
(802.11ac20) plot on channel 36



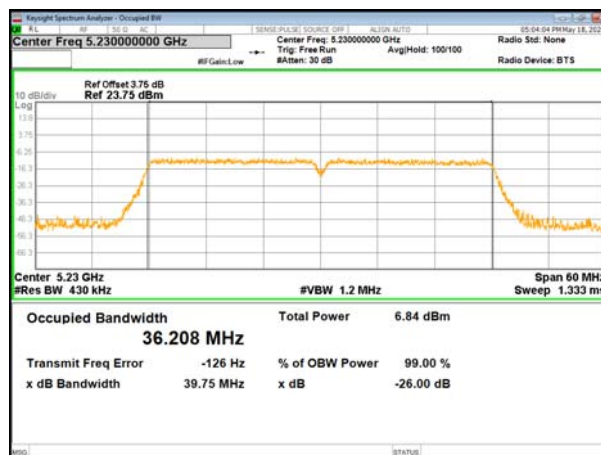
(802.11 n40) plot on channel 38



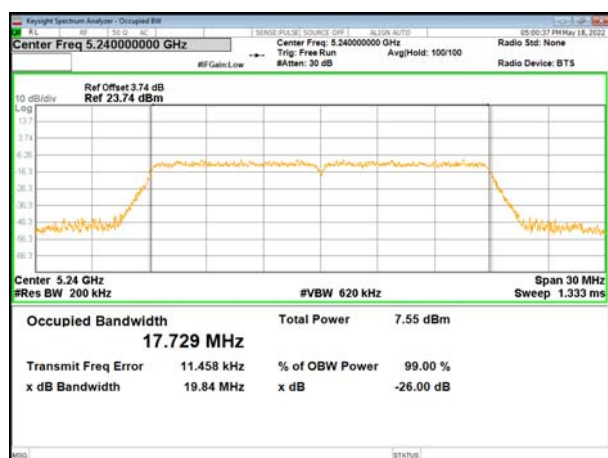
(802.11ac20) plot on channel 40



(802.11 n40) plot on channel 46



(802.11ac20) plot on channel 48

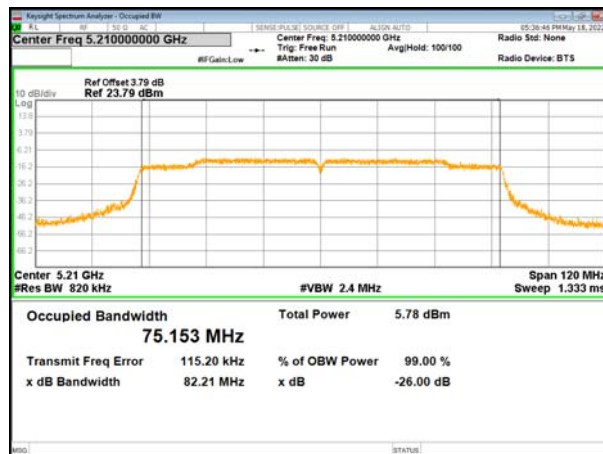


Test plot

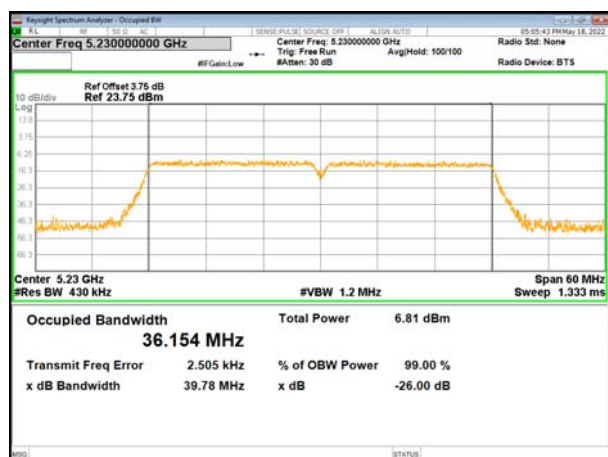
(802.11ac40) plot on channel 38



(802.11ac80) plot on channel 42



(802.11ac40) plot on channel 46





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	16.38	17.58	17.59	36.30	36.31	--	>500	Pass
Middle	16.35	17.66	17.58	--	--	75.07		
Highest	16.39	17.63	17.61	36.31	36.33	--		

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

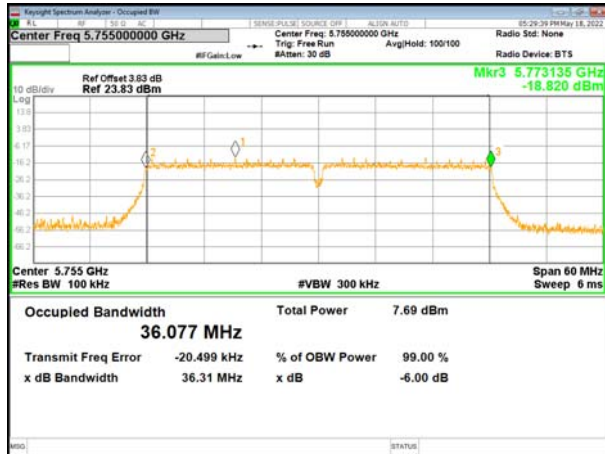


(802.11ac20) plot on channel 165



Test plot

(802.11 ac40) plot on channel 151



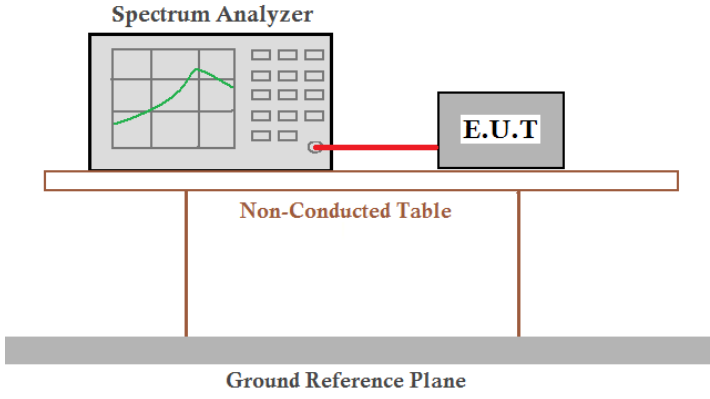
(802.11 ac80) plot on channel 155



(802.11 ac40) plot on channel 159



4.5 Power Spectral Density

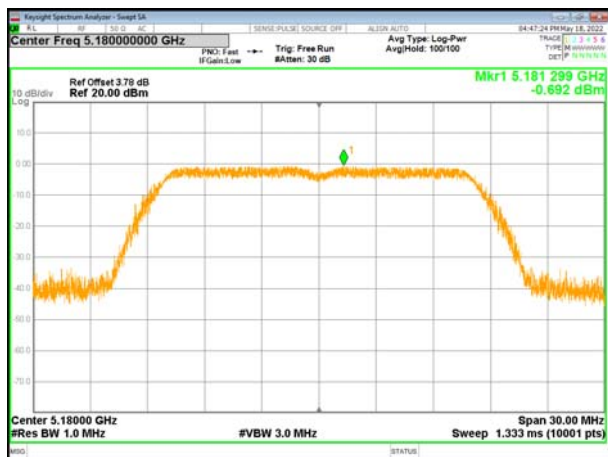
Test Requirement:	FCC Part15 E Section 15.407(a)(1)/ (a)(3)	
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	
Limit:	Frequency band (MHz)	Limit
	5150-5250	≤17dBm/1MHz for master device
		≤11dBm/1MHz for client device
	5250-5350	≤11dBm/1MHz for client device
	5470-5725	≤11dBm/1MHz for client device
	5725-5850	≤30dBm/500kHz
Test setup:		
Test Instruments:	Refer to section 6.0 for details	
Test mode:	Refer to section 5.2 for details	
Test results:	Pass	

Measurement Data

5180-5240MHz

Mode	Frequency	Measured Power Density (dBm/MHz)	Limit (dBm/MHz)
802.11 a	5180 MHz	-0.692	11
	5200 MHz	-0.840	11
	5240 MHz	-0.727	11
802.11 n20	5180 MHz	-0.264	11
	5200 MHz	-0.487	11
	5240 MHz	-1.459	11
802.11 ac20	5180 MHz	-0.604	11
	5200 MHz	-1.192	11
	5240 MHz	-1.826	11
802.11 n40	5190 MHz	-4.237	11
	5230 MHz	-5.217	11
802.11 ac40	5190 MHz	-4.386	11
	5230 MHz	-5.133	11
802.11 ac80	5210 MHz	-9.147	11

(802.11a) PSD plot on channel 36



(802.11n20) PSD plot on channel 36



(802.11a) PSD plot on channel 40



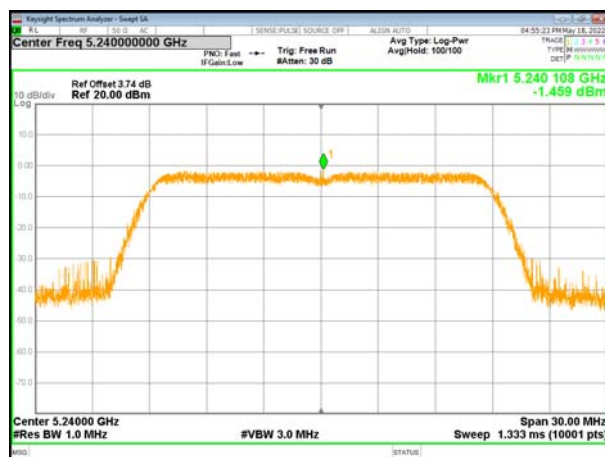
(802.11n20) PSD plot on channel 40



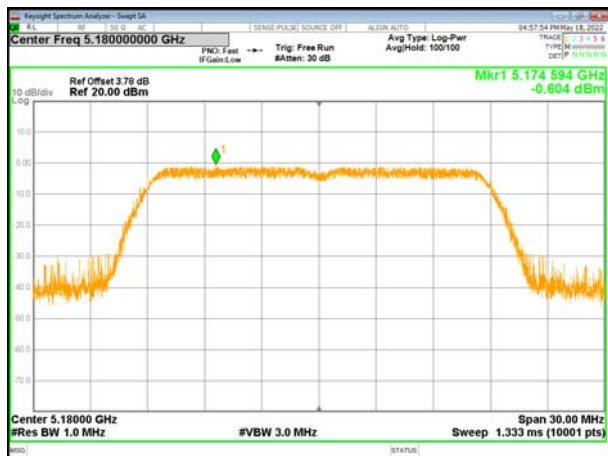
(802.11a) PSD plot on channel 48



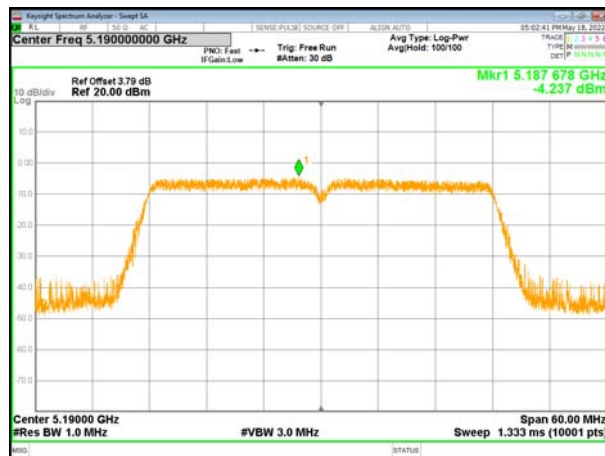
(802.11n20) PSD plot on channel 48



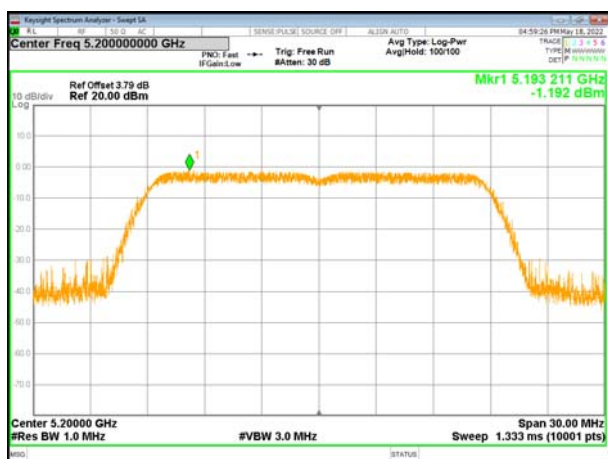
(802.11ac20) PSD plot on channel 36



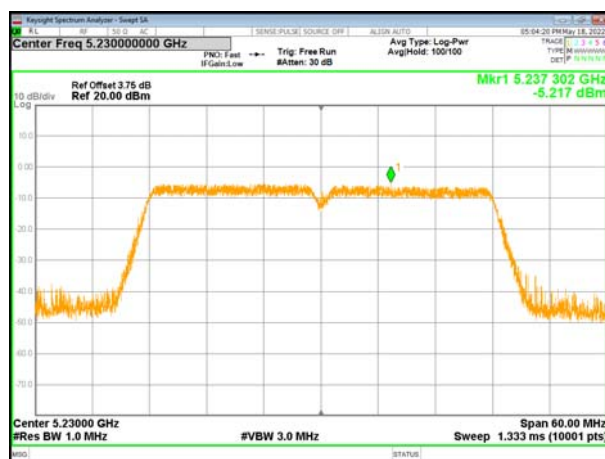
(802.11n40) PSD plot on channel 38



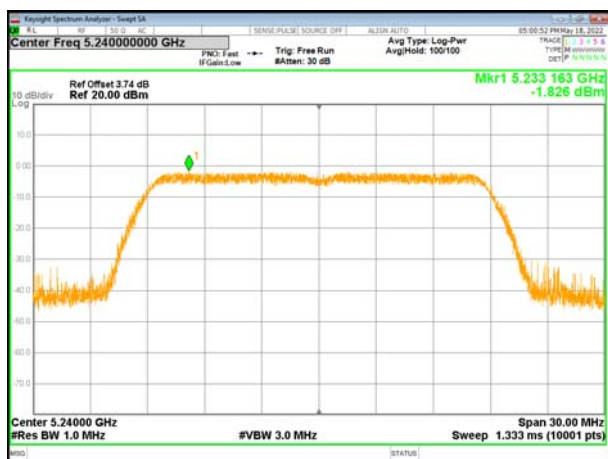
(802.11ac20) PSD plot on channel 40



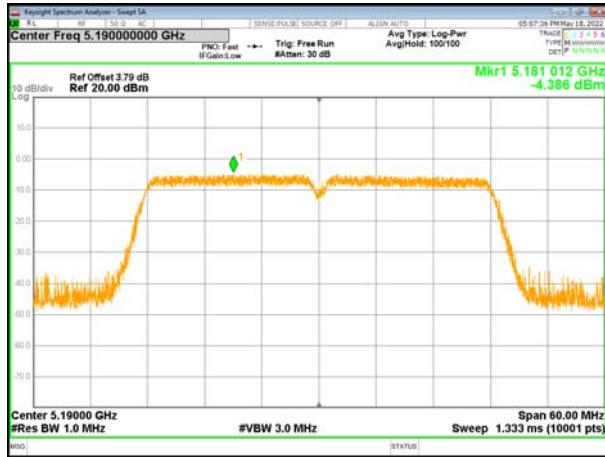
(802.11n40) PSD plot on channel 46



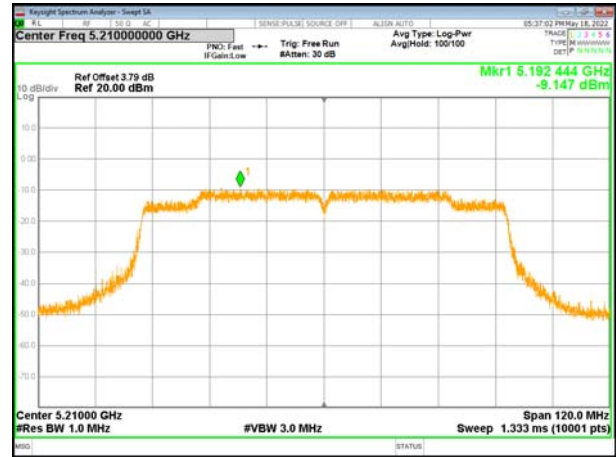
(802.11ac20) PSD plot on channel 48



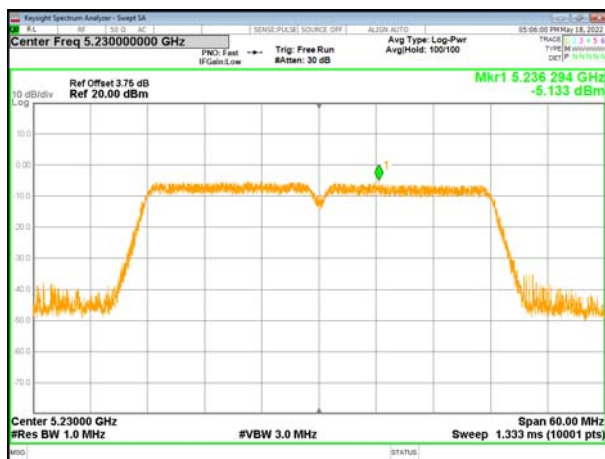
(802.11ac40) PSD plot on channel 38



(802.11ac80) PSD plot on channel 42



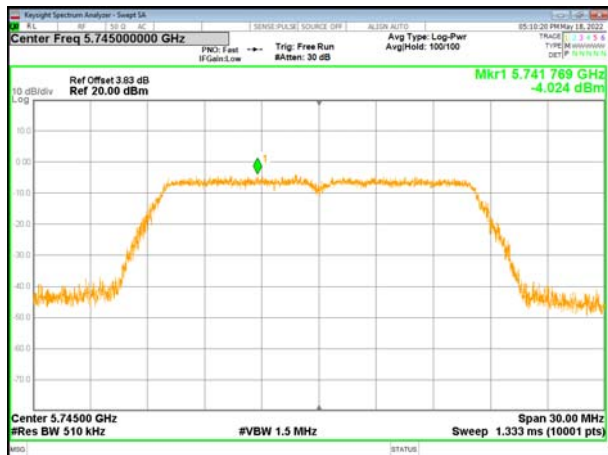
(802.11ac40) PSD plot on channel 46



Mode	Frequency	Measured Power Density (dBm/510KHz)	Measured Power Density (dBm/500KHz)	Limit (dBm/MHz)
802.11 a	5745 MHz	-4.024	-4.110	30
	5785 MHz	-4.980	-5.066	30
	5825 MHz	-4.442	-4.528	30
802.11 n20	5745 MHz	-4.206	-4.292	30
	5785 MHz	-5.076	-5.162	30
	5825 MHz	-5.960	-6.046	30
802.11 ac20	5745 MHz	-4.504	-4.590	30
	5785 MHz	-4.969	-5.055	30
	5825 MHz	-5.686	-5.772	30
802.11 n40	5755 MHz	-8.595	-8.681	30
	5795 MHz	-9.295	-9.381	30
802.11 ac40	5755 MHz	-8.498	-8.584	30
	5795 MHz	-8.227	-8.313	30
802.11 AC80	5775 MHz	-12.356	-12.442	30

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

(802.11a) PSD plot on channel 149



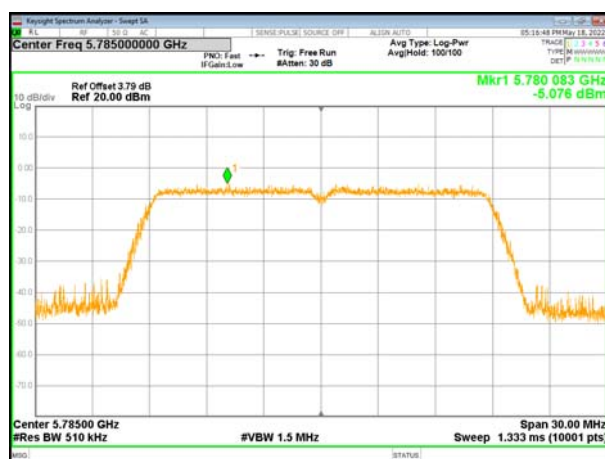
(802.11n20) PSD plot on channel 149



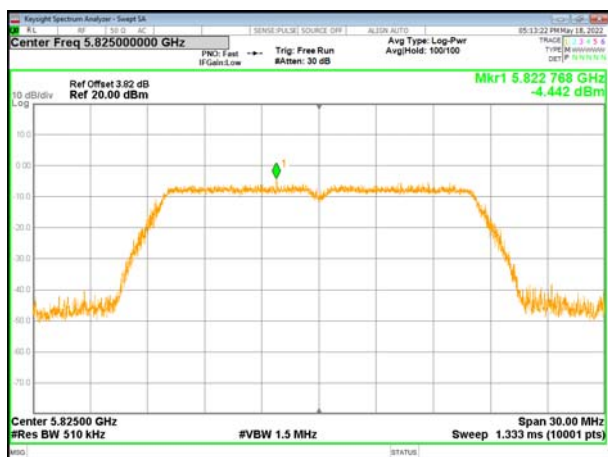
(802.11a) PSD plot on channel 157



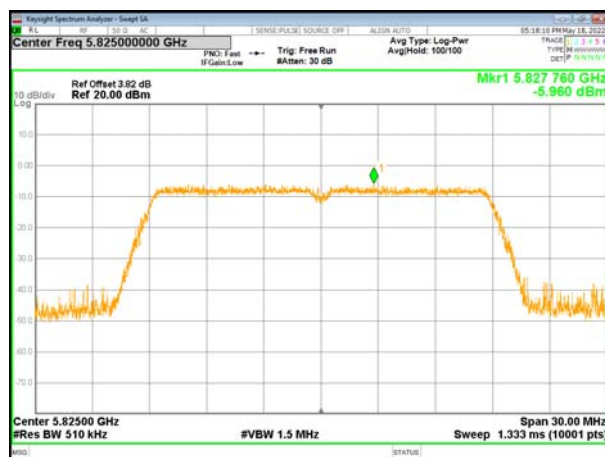
(802.11n20) PSD plot on channel 157



(802.11a) PSD plot on channel 165



(802.11n20) PSD plot on channel 165



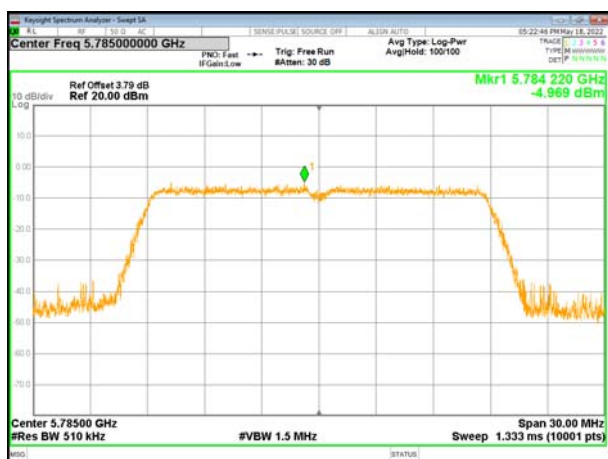
(802.11ac20) PSD plot on channel 149



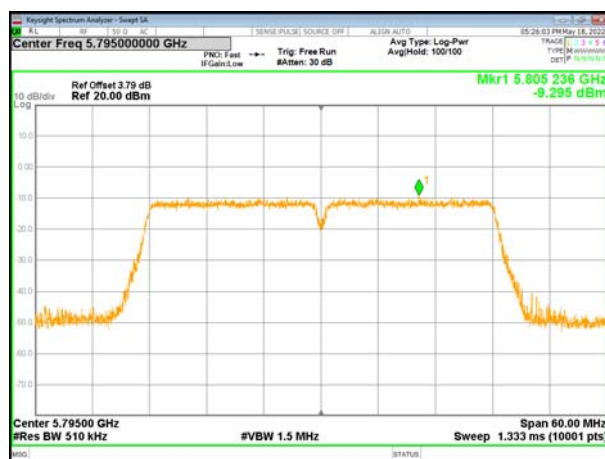
(802.11n40) PSD plot on channel 151



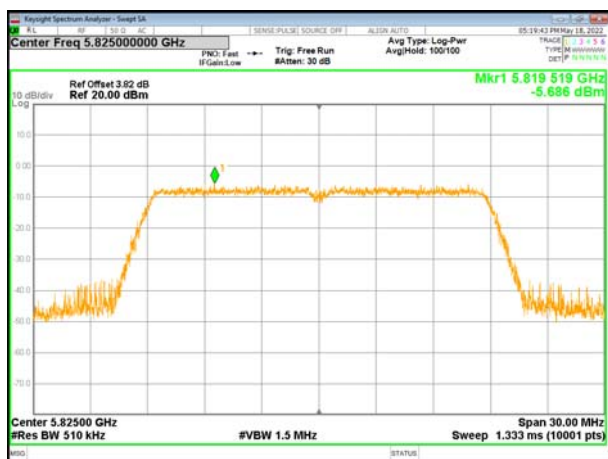
(802.11ac20) PSD plot on channel 157



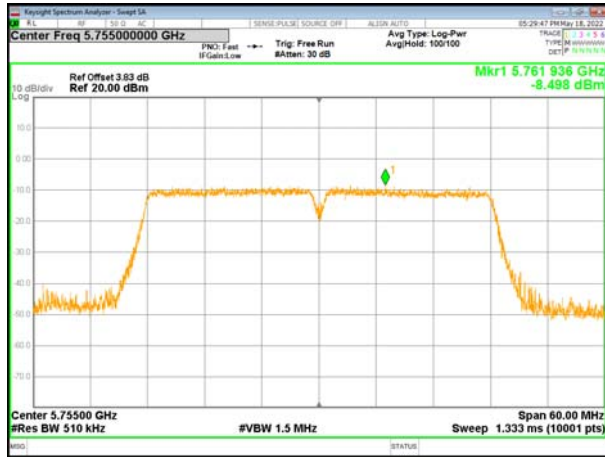
(802.11n40) PSD plot on channel 159



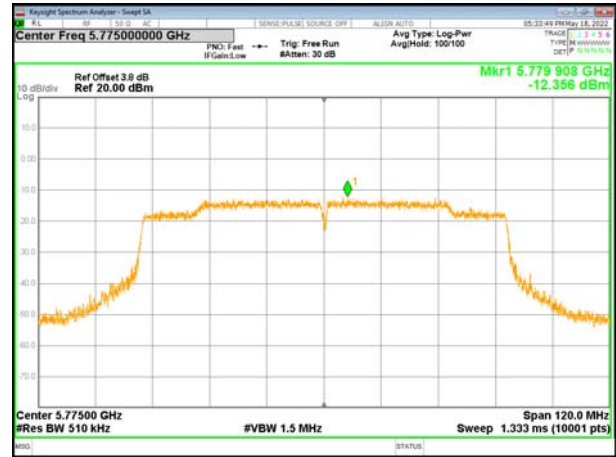
(802.11ac20) PSD plot on channel 165



(802.11ac40) PSD plot on channel 151



(802.11ac80) PSD plot on channel 155

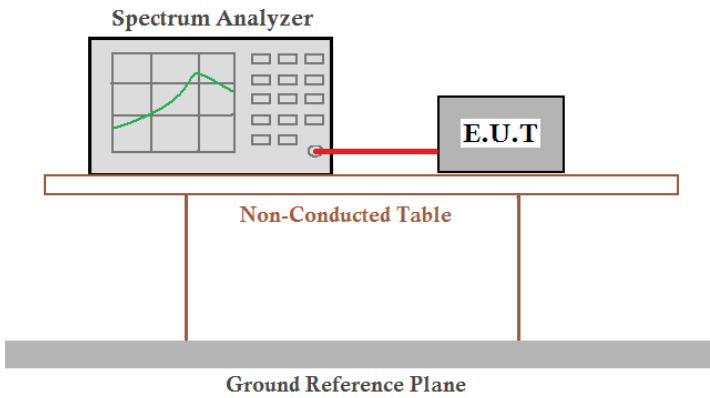


(802.11ac40) PSD plot on channel 159



4.6 Band edge

4.6.1 Conducted test Method

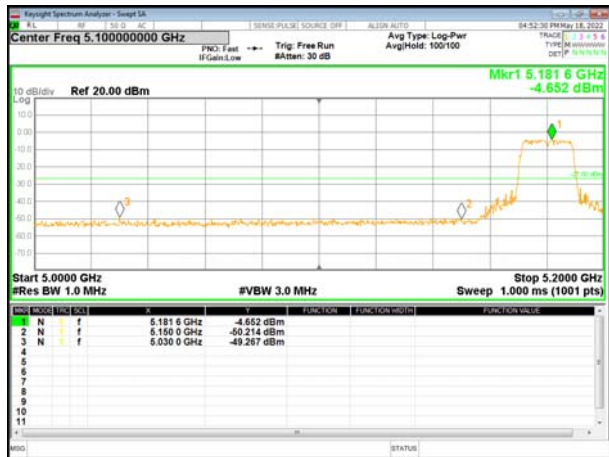
Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below 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 via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is 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 6.0 for details
Test mode:	Refer to section 5.2 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



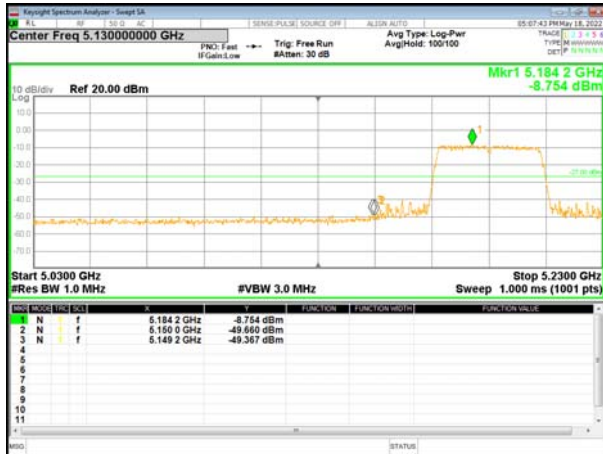
(802.11n40) Band Edge, Right Side



5.180~5.240 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge



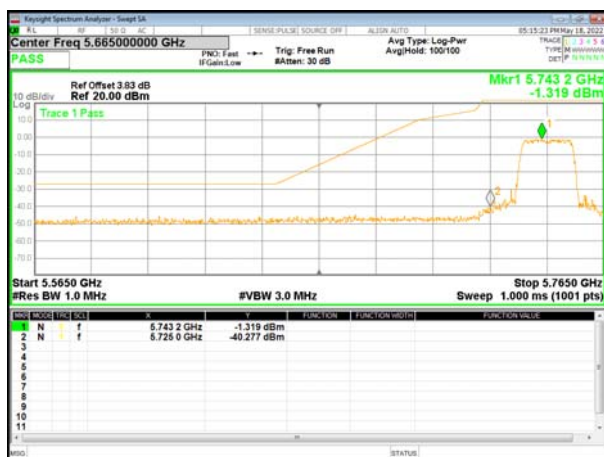
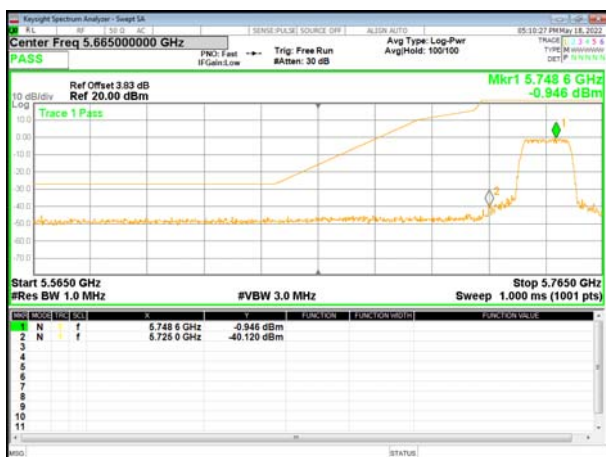
(802.11ac40) Band Edge, Right Side



5.745~5.825 GHz

(802.11a) Band Edge, Left Side

(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

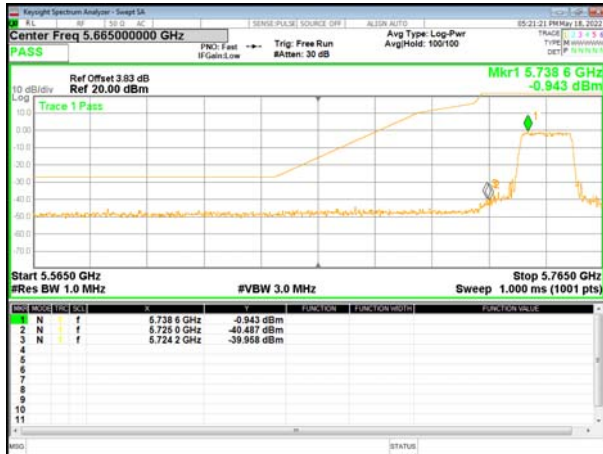
(802.11n20) Band Edge, Right Side



5.745~5.825 GHz

(802.11ac20) Band Edge, Left Side

(802.11n40) Band Edge, Left Side



(802.11ac20) Band Edge, Right Side

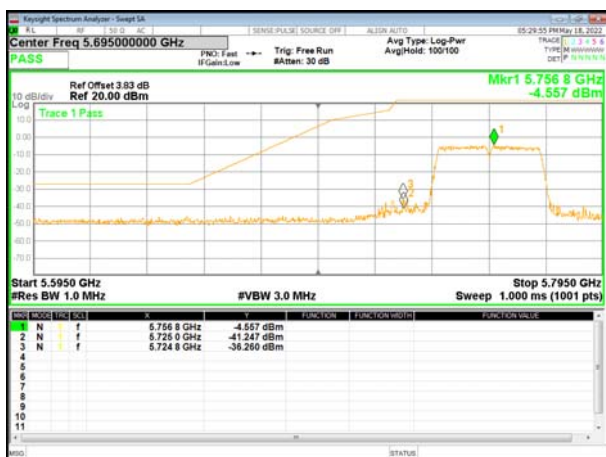
(802.11n40) Band Edge, Right Side



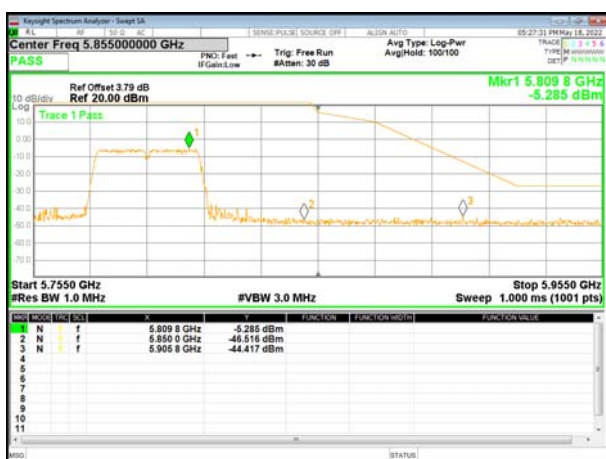
5.745~5.825 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge

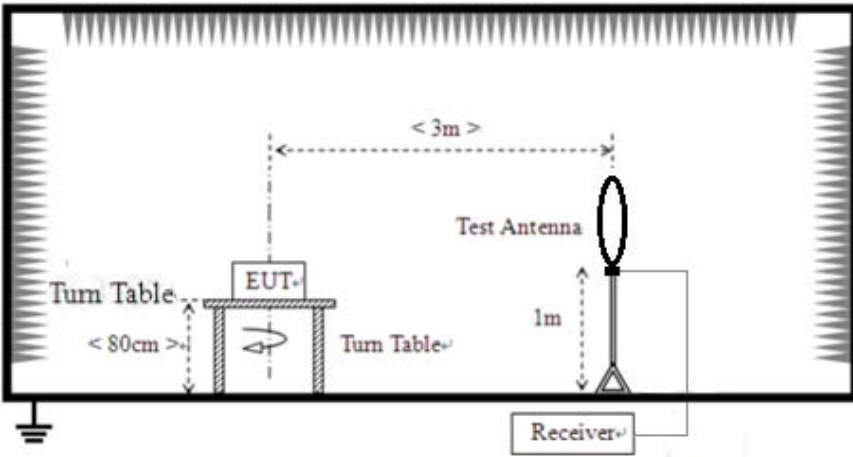


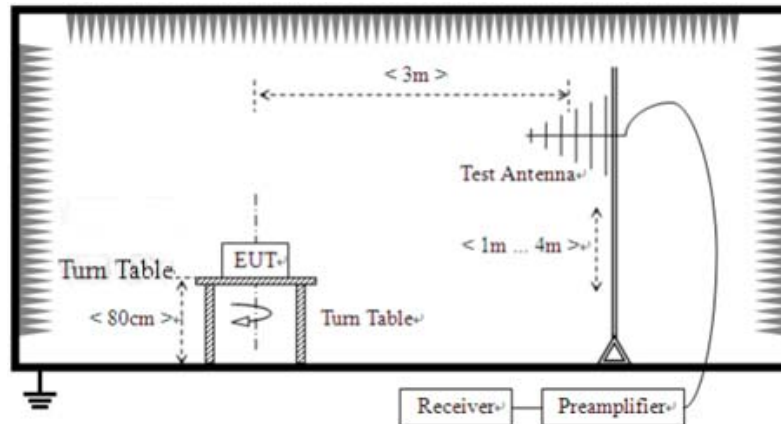
(802.11ac40) Band Edge, Right Side



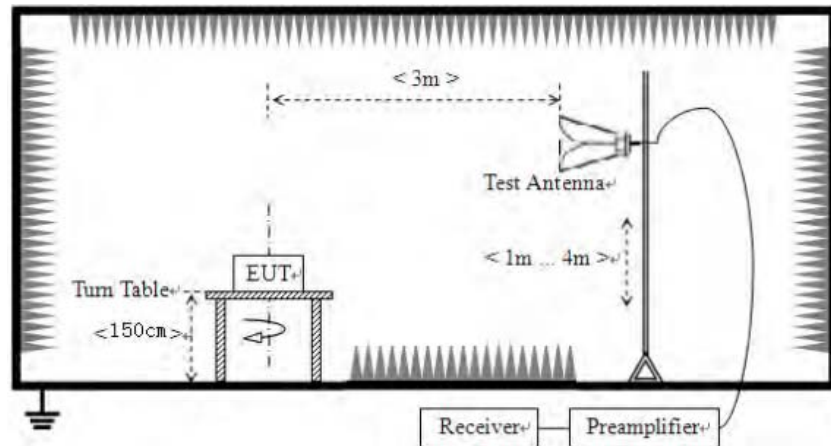
4.7 Spurious Emission

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				
						
	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 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25.6 °C	Humid.:	55%	Press.:	1012mbar
Test voltage:	DC 12V from adapter or DC 7.4V from battery					
Test results:	Pass					

Remarks:

1. All antennas was tested, only show the worst case 802.11n20 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.

Measurement Data:

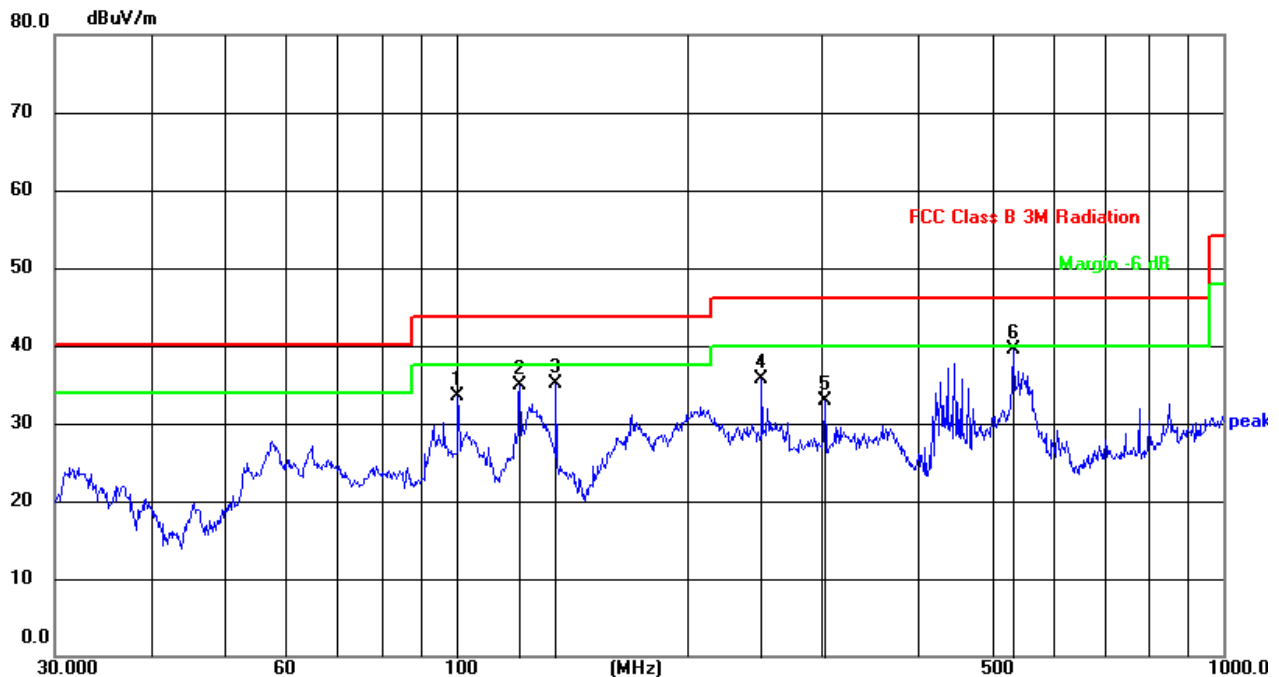
9 kHz ~ 30 MHz

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

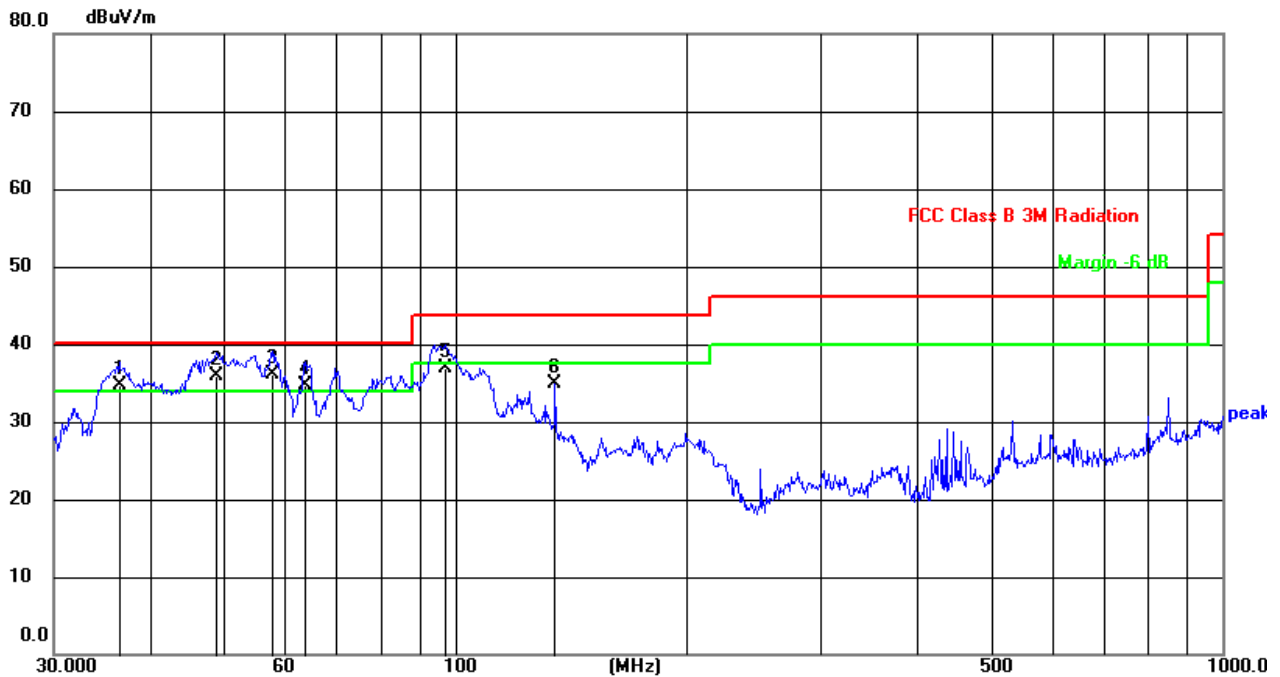
Temperature:	25.6℃	Relative Humidity:	55%
Pressure:	1010 hPa	Test Voltage :	DC12V
Test Mode :	5.2G TX- 802.11n20		

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	100.5806	53.55	-20.07	33.48	43.50	-10.02	QP
2	121.1230	54.16	-19.24	34.92	43.50	-8.58	QP
3	135.0318	53.87	-18.85	35.02	43.50	-8.48	QP
4	250.3009	53.87	-18.20	35.67	46.00	-10.33	QP
5	302.4811	51.29	-18.46	32.83	46.00	-13.17	QP
6	531.9633	52.44	-12.95	39.49	46.00	-6.51	QP

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.5090	55.69	-21.08	34.61	40.00	-5.39	QP
2	48.8427	56.89	-20.99	35.90	40.00	-4.10	QP
3	57.7961	56.87	-20.78	36.09	40.00	-3.91	QP
4	63.7588	55.28	-20.64	34.64	40.00	-5.36	QP
5	97.1148	56.86	-19.99	36.87	43.50	-6.63	QP
6	135.0318	53.79	-18.96	34.83	43.50	-8.67	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 802.11n20 mode

**Above 1GHz:**

Temperature:	25.6℃	Relative Humidity:	55%
Pressure:	1010 hPa	Test Voltage :	DC7.4V
Test Mode :	5.2G TX- 802.11n20		

802.11n20

Polar (H/V)	Frequency	Meter Read n g	Pre- amplifie r	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detect or Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:5180MHz									
V	10360.00	56.87	46.20	8.27	38.50	57.44	74.00	-16.56	PK
V	10360.00	44.11	46.20	8.27	38.50	44.68	54.00	-9.32	AV
V	15540.00	52.89	46.30	10.35	38.70	55.64	74.00	-18.36	PK
V	15540.00	40.88	46.30	10.35	38.70	43.63	54.00	-10.37	AV
V	20720.00	61.86	57.40	11.93	37.80	54.19	74.00	-19.81	PK
V	20720.00	51.42	57.40	11.93	37.80	43.75	54.00	-10.25	AV
V	25900.00	58.99	56.50	13.45	39.70	55.64	74.00	-18.36	PK
V	25900.00	48.24	56.50	13.45	39.70	44.89	54.00	-9.11	AV
H	10360.00	54.79	46.20	8.27	38.50	55.36	74.00	-18.64	PK
H	10360.00	43.05	46.20	8.27	38.50	43.62	54.00	-10.38	AV
H	15540.00	51.33	46.30	10.35	38.70	54.08	74.00	-19.92	PK
H	15540.00	38.87	46.30	10.35	38.70	41.62	54.00	-12.38	AV
H	20720.00	64.10	57.40	11.93	37.80	56.43	74.00	-17.57	PK
H	20720.00	52.11	57.40	11.93	37.80	44.44	54.00	-9.56	AV
H	25900.00	60.01	56.50	13.45	39.70	56.66	74.00	-17.34	PK
H	25900.00	48.07	56.50	13.45	39.70	44.72	54.00	-9.28	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	53.07	46.20	8.27	38.50	53.64	74.00	-20.36	PK
V	10400.00	43.26	46.20	8.27	38.50	43.83	54.00	-10.17	AV
V	15600.00	51.10	46.30	10.35	38.40	53.55	74.00	-20.45	PK
V	15600.00	41.28	46.30	10.35	38.40	43.73	54.00	-10.27	AV
V	20800.00	62.06	57.40	11.93	37.80	54.39	74.00	-19.61	PK
V	20800.00	51.15	57.40	11.93	37.80	43.48	54.00	-10.52	AV
V	26000.00	56.78	56.50	13.45	39.80	53.53	74.00	-20.47	PK
V	26000.00	47.96	56.50	13.45	39.80	44.71	54.00	-9.29	AV
H	10400.00	53.90	46.20	8.27	38.50	54.47	74.00	-19.53	PK
H	10400.00	43.69	46.20	8.27	38.50	44.26	54.00	-9.74	AV
H	15600.00	51.09	46.30	10.35	38.40	53.54	74.00	-20.46	PK
H	15600.00	40.87	46.30	10.35	38.40	43.32	54.00	-10.68	AV
H	20800.00	61.14	57.40	11.93	37.80	53.47	74.00	-20.53	PK
H	20800.00	49.84	57.40	11.93	37.80	42.17	54.00	-11.83	AV
H	26000.00	56.88	56.50	13.45	39.80	53.63	74.00	-20.37	PK
H	26000.00	47.36	56.50	13.45	39.80	44.11	54.00	-9.89	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	52.98	46.20	8.27	38.60	53.65	74.00	-20.35	PK
V	10480.00	42.58	46.20	8.27	38.60	43.25	54.00	-10.75	AV
V	15720.00	50.40	46.30	10.35	38.40	52.85	74.00	-21.15	PK
V	15720.00	39.73	46.30	10.35	38.40	42.18	54.00	-11.82	AV
V	20960.00	61.50	57.40	11.93	37.50	53.53	74.00	-20.47	PK
V	20960.00	51.35	57.40	11.93	37.50	43.38	54.00	-10.62	AV
V	26200.00	56.76	56.50	13.45	40.10	53.81	74.00	-20.19	PK
V	26200.00	46.72	56.50	13.45	40.10	43.77	54.00	-10.23	AV
H	10480.00	52.82	46.20	8.27	38.60	53.49	74.00	-20.51	PK
H	10480.00	42.06	46.20	8.27	38.60	42.73	54.00	-11.27	AV
H	15720.00	50.06	46.30	10.35	38.40	52.51	74.00	-21.49	PK
H	15720.00	39.81	46.30	10.35	38.40	42.26	54.00	-11.74	AV
H	20960.00	61.58	57.40	11.93	37.50	53.61	74.00	-20.39	PK
H	20960.00	51.51	57.40	11.93	37.50	43.54	54.00	-10.46	AV
H	26200.00	57.03	56.50	13.45	40.10	54.08	74.00	-19.92	PK
H	26200.00	46.11	56.50	13.45	40.10	43.16	54.00	-10.84	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 802.11n20, only the worst data is recorded.



Temperature:	25.6℃	Relative Humidity:	55%
Pressure:	1010 hPa	Test Voltage :	DC7.4V
Test Mode :	5.8G TX- 802.11n20		

802.11n20

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)	Detect or Typ
Low Channel:5745MHz									
V	11490.00	49.77	46.10	8.77	39.10	51.54	74.00	-22.46	PK
V	11490.00	40.62	46.10	8.77	39.10	42.39	54.00	-11.61	AV
V	17235.00	48.08	47.60	11.10	38.70	50.28	74.00	-23.72	PK
V	17235.00	39.55	47.60	11.10	38.70	41.75	54.00	-12.25	AV
V	22980.00	56.94	56.90	12.73	37.70	50.47	74.00	-23.53	PK
V	22980.00	48.05	56.90	12.73	37.70	41.58	54.00	-12.42	AV
V	28725.00	53.49	55.60	14.25	40.30	52.44	74.00	-21.56	PK
V	28725.00	44.16	55.60	14.25	40.30	43.11	54.00	-10.89	AV
H	11490.00	50.86	46.10	8.77	39.10	52.63	74.00	-21.37	PK
H	11490.00	40.59	46.10	8.77	39.10	42.36	54.00	-11.64	AV
H	17235.00	48.28	47.60	11.10	38.70	50.48	74.00	-23.52	PK
H	17235.00	39.31	47.60	11.10	38.70	41.51	54.00	-12.49	AV
H	22980.00	58.79	56.90	12.73	37.70	52.32	74.00	-21.68	PK
H	22980.00	48.20	56.90	12.73	37.70	41.73	54.00	-12.27	AV
H	28725.00	55.68	55.60	14.25	40.30	54.63	74.00	-19.37	PK
H	28725.00	44.92	55.60	14.25	40.30	43.87	54.00	-10.13	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
Middle Channel:5785MHz									
V	11570.00	49.56	46.10	8.77	39.10	51.33	74.00	-22.67	PK
V	11570.00	40.30	46.10	8.77	39.10	42.07	54.00	-11.93	AV
V	17355.00	49.05	47.70	11.10	38.40	50.85	74.00	-23.15	PK
V	17355.00	39.94	47.70	11.10	38.40	41.74	54.00	-12.26	AV
V	23140.00	58.00	56.90	12.73	37.80	51.63	74.00	-22.37	PK
V	23140.00	48.45	56.90	12.73	37.80	42.08	54.00	-11.92	AV
V	28925.00	53.68	55.60	14.25	40.50	52.83	74.00	-21.17	PK
V	28925.00	44.07	55.60	14.25	40.50	43.22	54.00	-10.78	AV
H	11570.00	51.85	46.10	8.77	39.10	53.62	74.00	-20.38	PK
H	11570.00	42.29	46.10	8.77	39.10	44.06	54.00	-9.94	AV
H	17355.00	48.48	47.70	11.10	38.40	50.28	74.00	-23.72	PK
H	17355.00	39.97	47.70	11.10	38.40	41.77	54.00	-12.23	AV
H	23140.00	58.66	56.90	12.73	37.80	52.29	74.00	-21.71	PK
H	23140.00	49.55	56.90	12.73	37.80	43.18	54.00	-10.82	AV
H	28925.00	55.31	55.60	14.25	40.50	54.46	74.00	-19.54	PK
H	28925.00	45.16	55.60	14.25	40.50	44.31	54.00	-9.69	AV

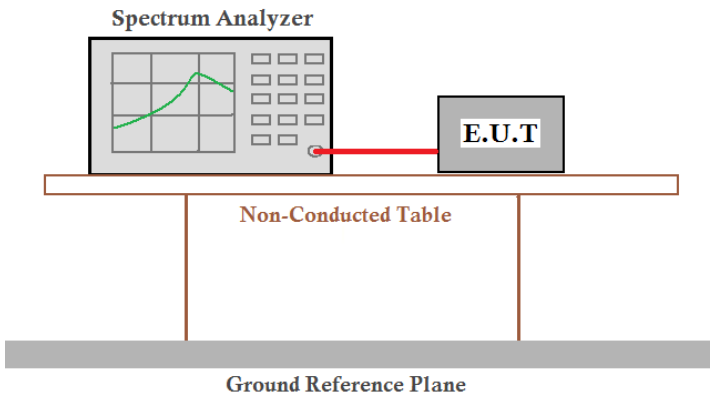


Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detect or Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:5825MHz									
V	11650.00	49.85	46.10	8.77	39.10	51.62	74.00	-22.38	PK
V	11650.00	39.82	46.10	8.77	39.10	41.59	54.00	-12.41	AV
V	17475.00	47.86	47.90	11.23	38.90	50.09	74.00	-23.91	PK
V	17475.00	39.24	47.90	11.23	38.90	41.47	54.00	-12.53	AV
V	23300.00	58.30	57.10	12.73	37.80	51.73	74.00	-22.27	PK
V	23300.00	47.96	57.10	12.73	37.80	41.39	54.00	-12.61	AV
V	29125.00	54.80	55.80	14.25	40.50	53.75	74.00	-20.25	PK
V	29125.00	44.38	55.80	14.25	40.50	43.33	54.00	-10.67	AV
H	11650.00	51.98	46.10	8.77	39.10	53.75	74.00	-20.25	PK
H	11650.00	42.40	46.10	8.77	39.10	44.17	54.00	-9.83	AV
H	17475.00	49.63	47.90	11.23	38.90	51.86	74.00	-22.14	PK
H	17475.00	40.49	47.90	11.23	38.90	42.72	54.00	-11.28	AV
H	23300.00	60.43	57.10	12.73	37.80	53.86	74.00	-20.14	PK
H	23300.00	48.81	57.10	12.73	37.80	42.24	54.00	-11.76	AV
H	29125.00	55.88	55.80	14.25	40.50	54.83	74.00	-19.17	PK
H	29125.00	45.21	55.80	14.25	40.50	44.16	54.00	-9.84	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 802.11n20, only the worst data is recorded.

4.7.2 Conducted Emission Method

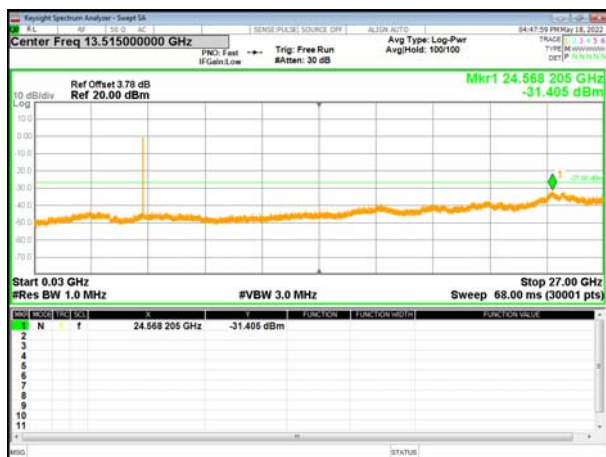
Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)
Test Method:	ANSI C63.10:2013
Limit:	-27dBm/MHz
Test setup:	 The diagram illustrates the test setup for conducted emissions. A Spectrum Analyzer is connected to an Equipment Under Test (E.U.T.) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass



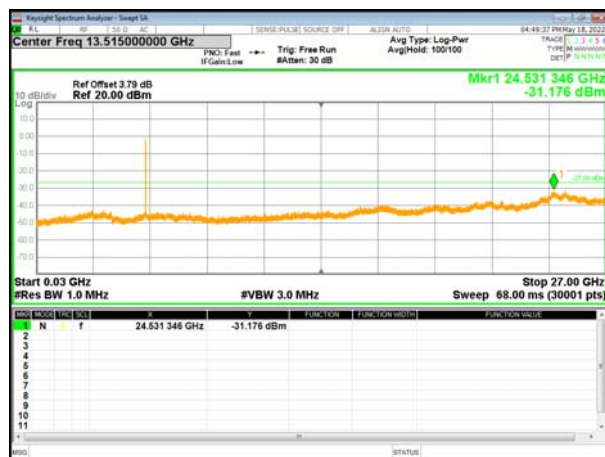
5180-5240MHz

Test Plot

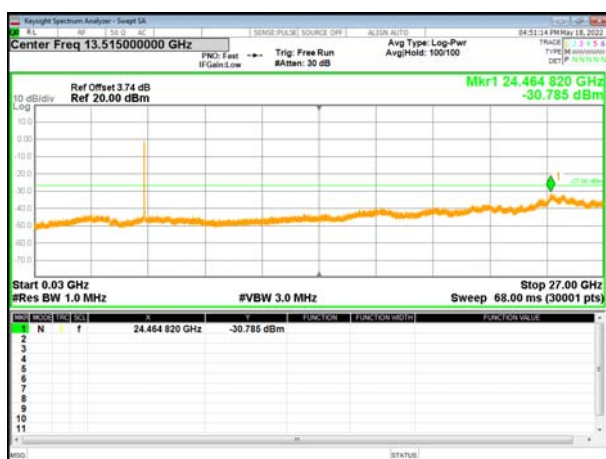
802.11a on channel 36



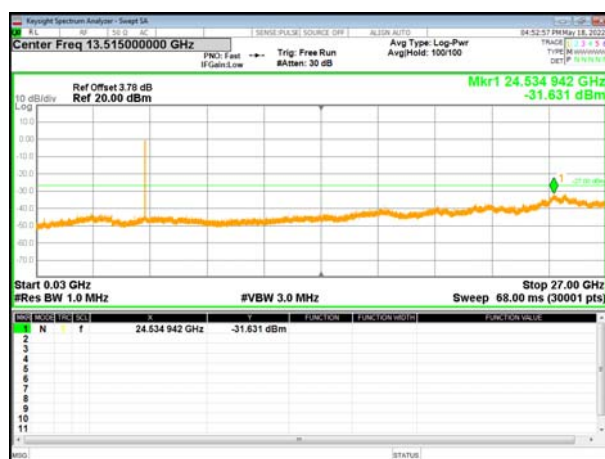
802.11a on channel 40



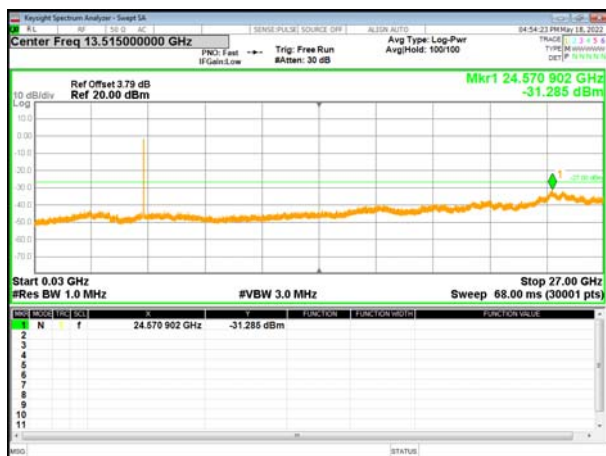
802.11a on channel 48



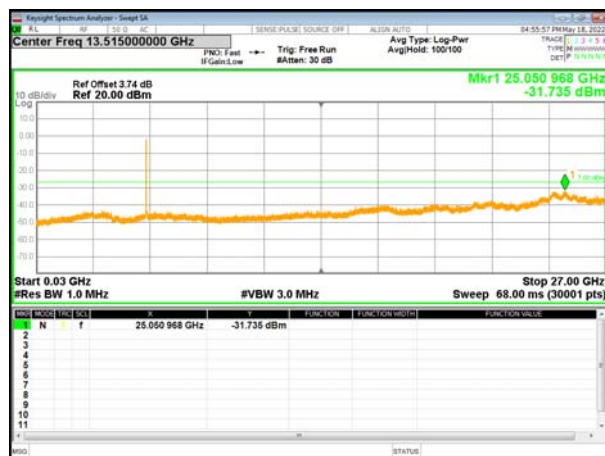
802.11n20 on channel 36



802.11n20 on channel 40

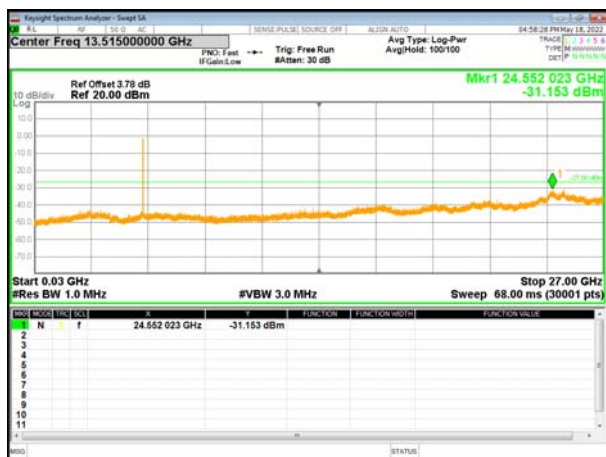


802.11n20 on channel 48

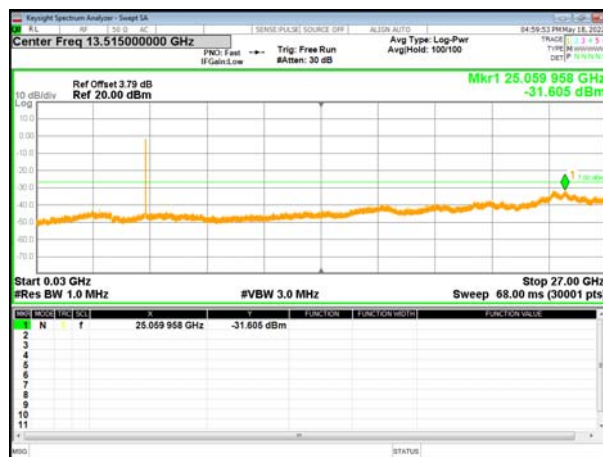


Test Plot

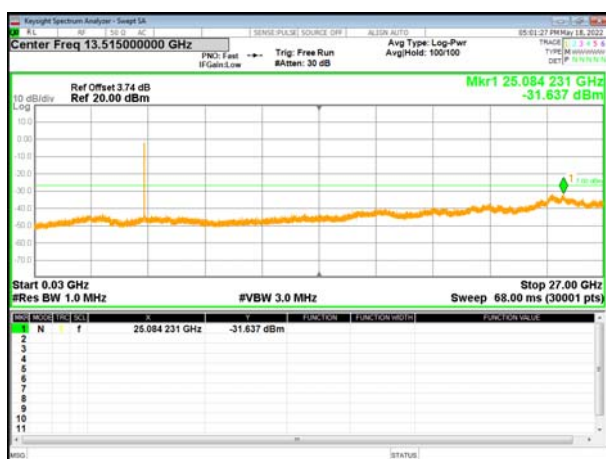
802.11ac20 on channel 36



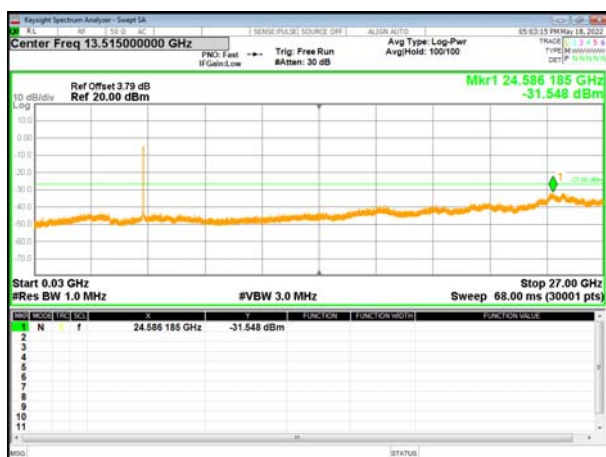
802.11ac20 on channel 40



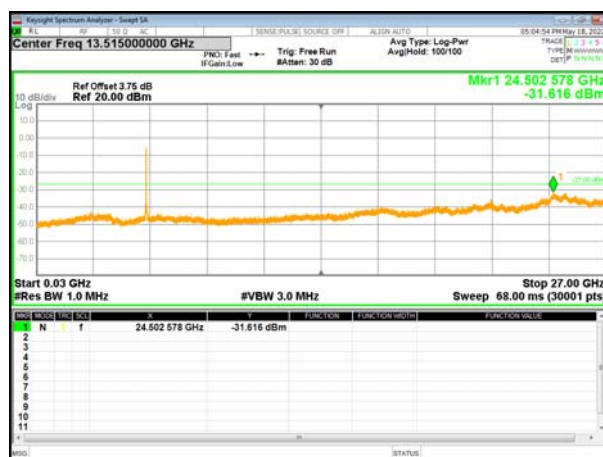
802.11ac20 on channel 48



802.11n40 on channel 38

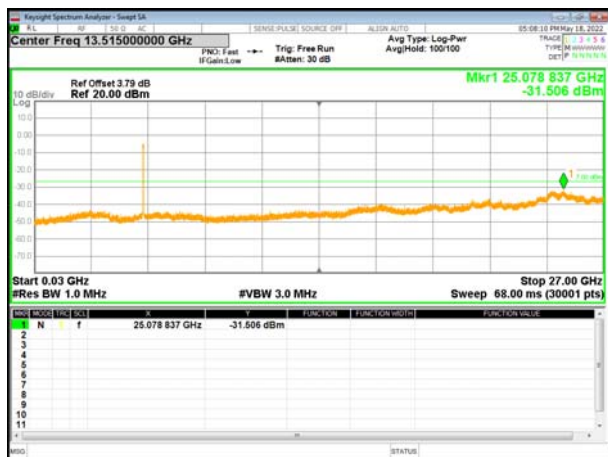


802.11n40 on channel 46

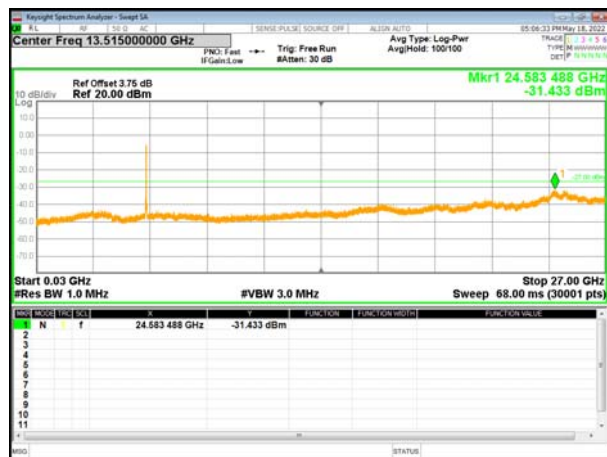


Test Plot

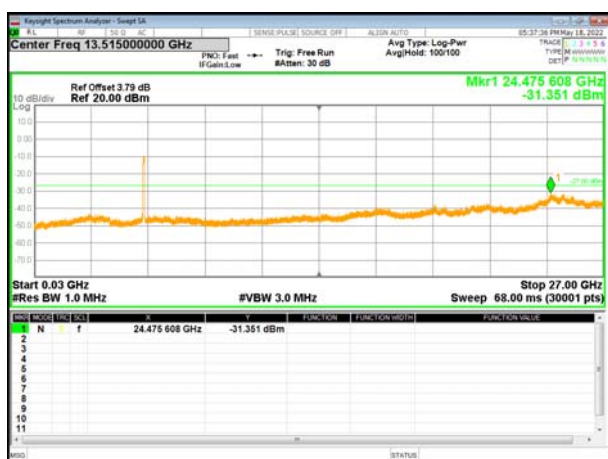
802.11ac40 on channel 38



802.11ac40 on channel 46



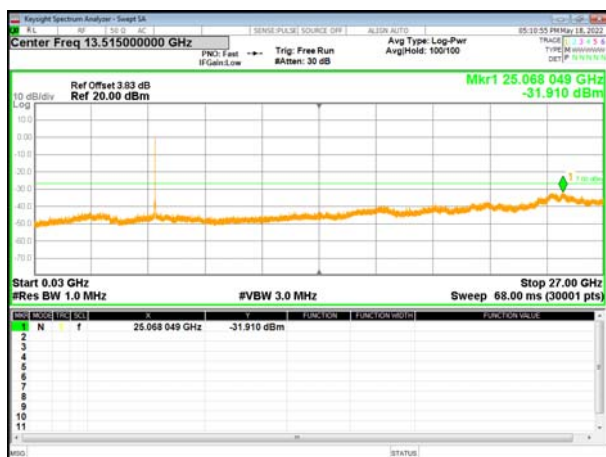
802.11ac80 on channel 42



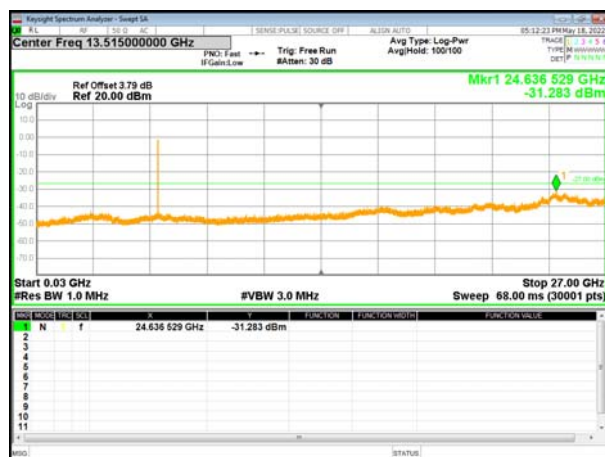
5745-5825MHz

Test Plot

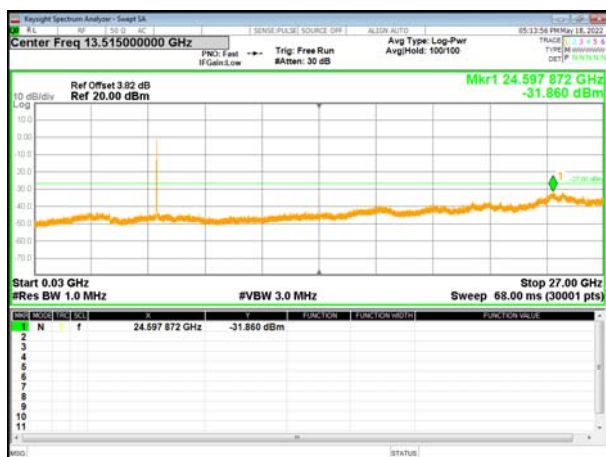
802.11a on channel 149



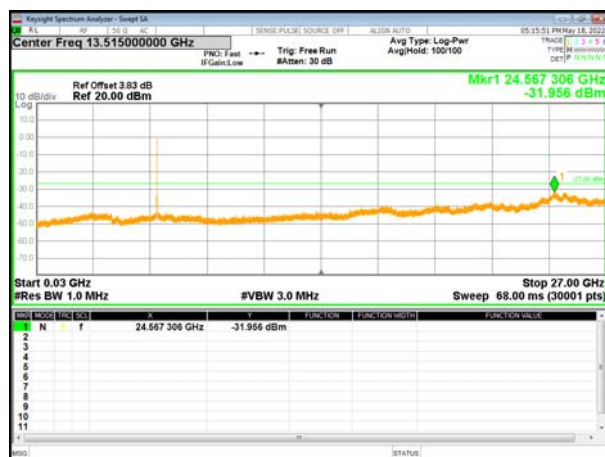
802.11a on channel 157



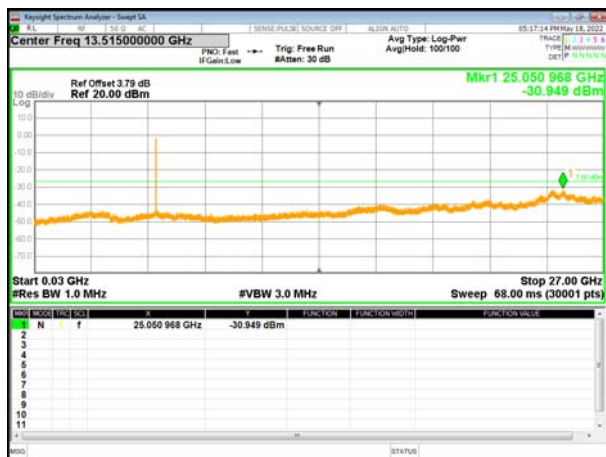
802.11a on channel 165



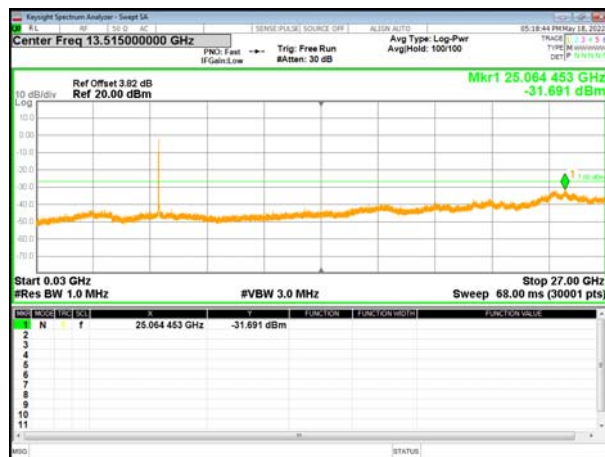
802.11n20 on channel 149



802.11n20 on channel 157

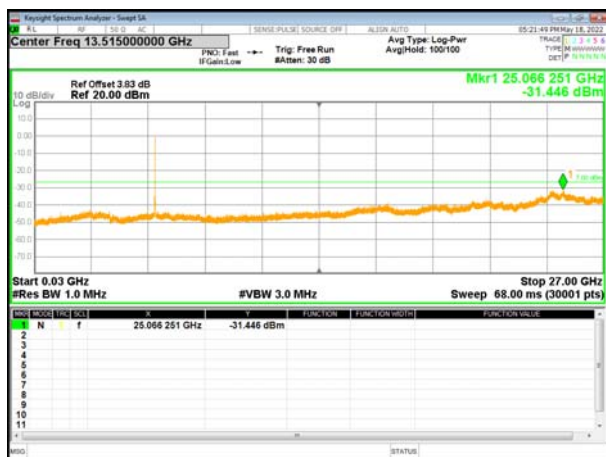


802.11n20 on channel 165

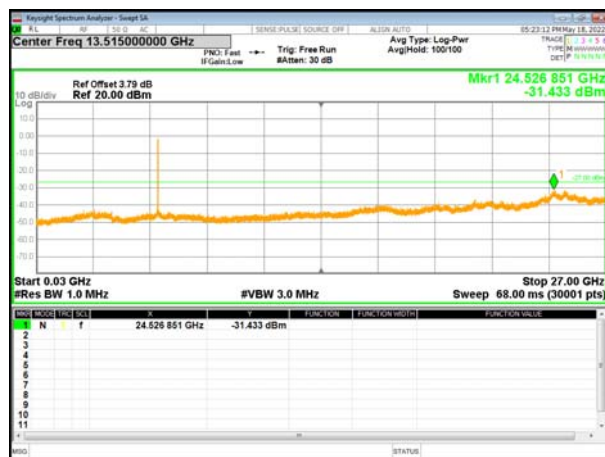


Test Plot

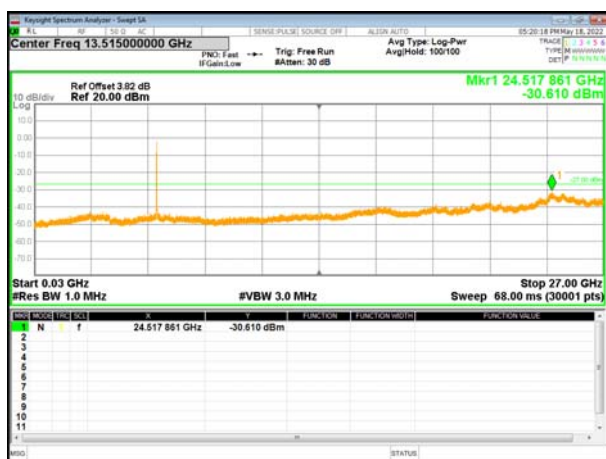
802.11ac20 on channel 149



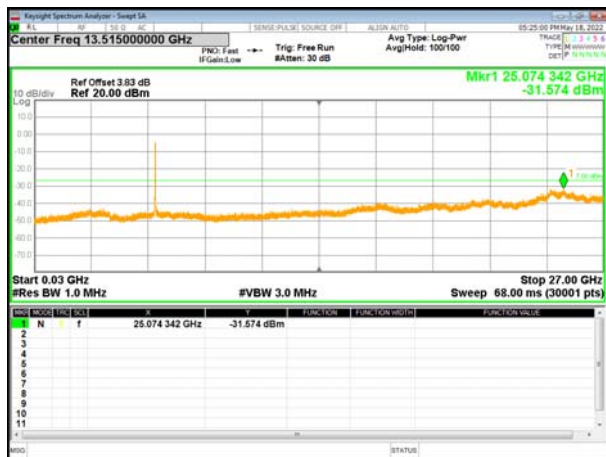
802.11ac20 on channel 157



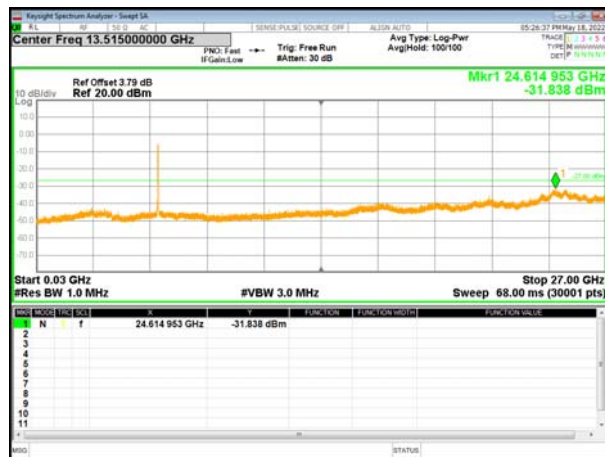
802.11ac20 on channel 165



802.11n40 on channel 151

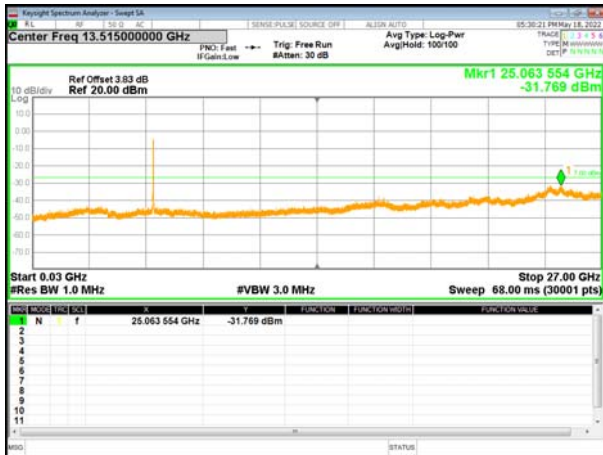


802.11n40 on channel 159

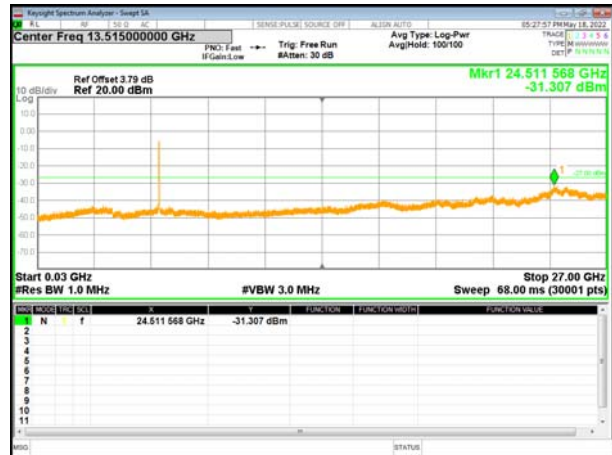


Test Plot

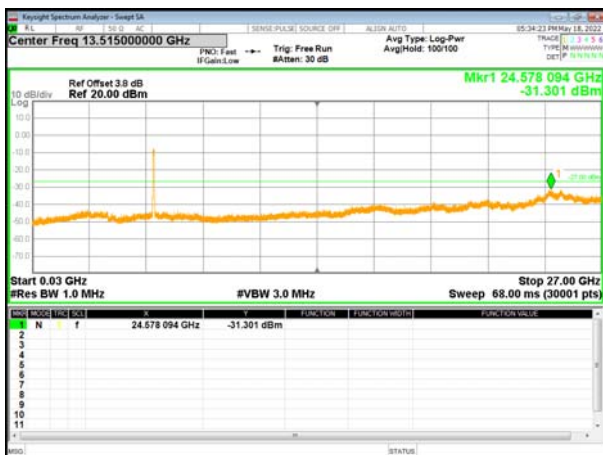
802.11ac40 on channel 151



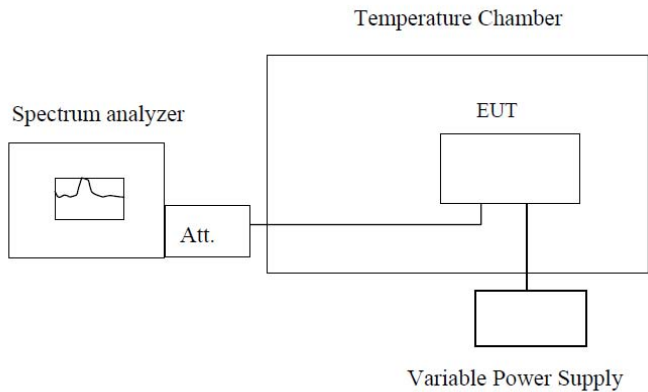
802.11ac40 on channel 159



802.11ac80 on channel 155



4.8 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 5.10 for details
Test mode:	Refer to section 5.2 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: DC7.4V					
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	5179.9710	5179.9650	5179.9860	5179.9820
	5190	5189.9650	5189.9760	5189.9820	5189.9680
	5200	5199.9780	5199.9670	5199.9770	5199.9690
	5210	5209.9820	5209.9680	5209.9830	5209.9910
	5220	5219.9680	5219.9750	5219.9780	5219.9770
	5230	5229.9610	5229.9930	5229.9760	5229.9870
	5240	5239.9890	5239.9780	5239.9490	5239.9930
-20	5180	5180.1010	5179.9810	5179.9770	5179.9650
	5190	5199.9760	5189.9750	5189.9680	5189.9760
	5200	5200.0010	5199.9750	5199.9760	5199.9670
	5210	5209.9790	5209.9870	5209.9680	5209.9680
	5220	5219.9940	5219.9780	5219.9890	5219.9750
	5230	5229.9870	5299.9810	5229.9670	5229.9930
	5240	5239.9950	5239.9780	5239.9850	5239.9780
-10	5180	5179.9710	5179.9650	5179.9860	5179.9820
	5190	5189.9650	5189.9760	5189.9820	5189.9680
	5200	5199.9780	5199.9670	5199.9770	5199.9690
	5210	5209.9820	5209.9680	5209.9830	5209.9910
	5220	5219.9680	5219.9750	5219.9780	5219.9770
	5230	5229.9610	5229.9930	5229.9760	5229.9870
	5240	5239.9890	5239.9780	5239.9490	5239.9930
0	5180	5189.9760	5179.9770	5179.9770	5179.9650
	5190	5199.9670	5189.9680	5189.9680	5189.9760
	5200	5209.9680	5199.9760	5199.9760	5199.9670
	5210	5219.9750	5209.9680	5209.9680	5209.9680
	5220	5229.9930	5219.9890	5219.9890	5219.9750
	5230	5239.9650	5229.9670	5229.9670	5229.9930
	5240	5189.9760	5239.9850	5239.9850	5239.9780
10	5180	5179.9770	5179.9860	5179.9650	5179.9860
	5190	5189.9680	5189.9820	5189.9760	5189.9820
	5200	5199.9760	5199.9770	5199.9670	5199.9770
	5210	5209.9680	5209.9830	5209.9680	5209.9830
	5220	5219.9890	5219.9780	5219.9750	5219.9780
	5230	5229.9670	5229.9760	5229.9930	5229.9760
	5240	5239.9850	5239.9490	5239.9650	5239.9490



20	5180	5179.9860	5179.9950	5179.9760	5179.9770
	5190	5189.9850	5180.1010	5189.9770	5189.9680
	5200	5199.9790	5199.9760	5199.9680	5199.9760
	5210	5209.9690	5210.0010	5299.9760	5209.9680
	5220	5219.9790	5219.9790	5219.9680	5219.9890
	5230	5299.9770	5229.9940	5229.9890	5229.9670
	5240	5239.9810	5239.9870	5239.9670	5239.9850
30	5180	5179.9760	5179.9810	5179.9710	5179.9810
	5190	5189.9770	5189.9750	5189.9650	5189.9750
	5200	5199.9680	5199.9750	5199.9780	5199.9750
	5210	5299.9760	5209.9870	5209.9820	5209.9870
	5220	5219.9680	5219.9780	5219.9680	5219.9780
	5230	5229.9890	5299.9810	5229.9610	5299.9810
	5240	5239.9670	5239.9780	5239.9890	5239.9780
40	5180	5179.9710	5179.9950	5179.9760	5179.9860
	5190	5189.9650	5189.9650	5189.9680	5179.9860
	5200	5199.9780	5199.9780	5199.9760	5189.9820
	5210	5209.9820	5209.9820	5209.9680	5199.9770
	5220	5219.9680	5219.9680	5219.9890	5209.9830
	5230	5229.9610	5229.9610	5229.9670	5219.9780
	5240	5239.9890	5239.9890	5239.9850	5229.9760
50	5180	5179.9770	5179.9710	5179.9810	5179.9910
	5190	5189.9680	5189.9650	5189.9750	5189.9830
	5200	5199.9760	5199.9780	5199.9750	5199.9070
	5210	5209.9680	5209.9820	5209.9870	5209.9690
	5220	5219.9890	5219.9680	5219.9780	5219.9840
	5230	5229.9670	5229.9610	5299.9810	5299.9760
	5240	5239.9850	5239.9890	5239.9780	5239.9850

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)
6.29	5180	5179.9760	5179.9760	5179.9810	5179.9710
	5190	5189.9770	5189.9770	5189.9750	5189.9650
	5200	5199.9680	5199.9680	5199.9750	5199.9780
	5210	5299.9760	5299.9760	5209.9870	5209.9820
	5220	5219.9680	5219.9680	5219.9780	5219.9680
	5230	5229.9890	5229.9890	5299.9810	5229.9610
	5240	5239.9670	5239.9670	5239.9780	5239.9890
7.4	5180	5179.9810	5179.9860	5179.9380	5179.9760
	5190	5189.9750	5189.9820	5189.9680	5189.9770
	5200	5199.9750	5199.9770	5199.9930	5199.9680
	5210	5209.9870	5209.9830	5209.9770	5299.9760
	5220	5219.9780	5219.9780	5219.9680	5219.9680
	5230	5299.9810	5229.9760	5229.9960	5229.9890
	5240	5239.9780	5239.9490	5239.9840	5239.9670
8.51	5180	5179.9380	5180.1010	5179.9650	5179.9860
	5190	5189.9680	5199.9760	5189.9760	5189.9820
	5200	5199.9930	5200.0010	5199.9670	5199.9770
	5210	5209.9770	5209.9790	5209.9680	5209.9830
	5220	5219.9680	5219.9940	5219.9750	5219.9780
	5230	5229.9960	5229.9870	5229.9930	5229.9760
	5240	5239.9840	5239.9950	5239.9650	5239.9490



Frequency stability versus Temp.					
Power Supply: DC7.4V					
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	5744.9680	5744.9690	5744.9630	5745.0333
	5755	5754.9750	5754.9760	5754.9880	5744.59880
	5775	5774.9670	5774.9930	5774.9690	5754.9820
	5785	5784.9590	5784.9690	5784.9780	5774.9830
	5795	5794.9660	5794.9650	5794.9760	5784.9860
	5825	5824.8950	5824.9680	5824.9860	5794.9690
-20	5745	5754.9760	5754.9750	5754.9760	5754.9570
	5755	5774.9930	5774.9670	5774.9930	5774.9680
	5775	5784.9690	5784.9590	5784.9690	5784.9750
	5785	5794.9650	5794.9660	5794.9650	5794.9930
	5795	5824.9680	5824.8950	5824.9680	5824.9850
	5825	5754.9760	5754.9750	5754.9760	5754.9570
-10	5745	5744.9690	5744.9680	5744.9690	5744.9680
	5755	5754.9760	5754.9750	5754.9760	5754.9570
	5775	5774.9930	5774.9670	5774.9930	5774.9680
	5785	5784.9690	5784.9590	5784.9690	5784.9750
	5795	5794.9650	5794.9660	5794.9650	5794.9930
	5825	5824.9680	5824.8950	5824.9680	5824.9850
0	5745	5744.9630	5744.9680	5744.9680	5744.9690
	5755	5754.9880	5754.9850	5754.9750	5754.9760
	5775	5774.9690	5774.9860	5774.9670	5774.9930
	5785	5784.9780	5784.9680	5784.9590	5784.9690
	5795	5794.9760	5794.9850	5794.9660	5794.9650
	5825	5824.9860	5824.9830	5824.8950	5824.9680
10	5745	5744.9580	5744.9790	5744.9630	5744.9680
	5755	5754.9740	5754.9810	5754.9880	5754.9750
	5775	5774.9730	5774.9840	5774.9690	5774.9670
	5785	5784.9760	5784.9760	5784.9780	5784.9590
	5795	5794.9870	5794.9670	5794.9760	5794.9660
	5825	5824.9680	5824.9760	5824.9860	5824.8950
20	5745	5744.9680	5744.9690	5744.9680	5744.9930
	5755	5754.9870	5754.9760	5754.9850	5754.9650
	5775	5774.9670	5774.9930	5774.9860	5774.9880
	5785	5784.9940	5784.9690	5784.9680	5784.9880
	5795	5794.9860	5794.9650	5794.9850	5794.9790
	5825	5824.9950	5824.9680	5824.9830	5824.9940
30	5745	5744.9580	5744.9790	5744.9630	5744.9680
	5755	5754.9740	5754.9810	5754.9880	5754.9750
	5775	5774.9730	5774.9840	5774.9690	5774.9670
	5785	5784.9760	5784.9760	5784.9780	5784.9590
	5795	5794.9870	5794.9670	5794.9760	5794.9660
	5825	5824.9680	5824.9760	5824.9860	5824.8950
40	5745	5744.9790	5744.9680	5744.9630	5744.9630
	5755	5754.9810	5754.9850	5754.9880	5754.9880
	5775	5774.9840	5774.9860	5774.9690	5774.9690
	5785	5784.9760	5784.9680	5784.9780	5784.9780



	5795	5794.9670	5794.9850	5794.9760	5794.9760
	5825	5824.9760	5824.9830	5824.9860	5824.9860
50	5745	5744.59880	5744.9580	5744.9630	5744.9460
	5755	5754.9820	5754.9740	5754.9880	5754.9680
	5775	5774.9830	5774.9730	5774.9690	5774.9770
	5785	5784.9860	5784.9760	5784.9780	5784.9680
	5795	5794.9690	5794.9870	5794.9760	5794.9790
	5825	5824.9650	5824.9680	5824.9860	5824.9820

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)
6.29	5745	5744.9790	5744.9690	5744.9790	5744.9680
	5755	5754.9810	5754.9760	5754.9810	5754.9850
	5775	5774.9840	5774.9930	5774.9840	5774.9860
	5785	5784.9760	5784.9690	5784.9760	5784.9680
	5795	5794.9670	5794.9650	5794.9670	5794.9850
	5825	5824.9760	5824.9680	5824.9760	5824.9830
7.4	5745	5744.9680	5744.9690	5744.9680	5744.9930
	5755	5754.9870	5754.9760	5754.9850	5754.9650
	5775	5774.9670	5774.9930	5774.9860	5774.9880
	5785	5784.9940	5784.9690	5784.9680	5784.9880
	5795	5794.9860	5794.9650	5794.9850	5794.9790
	5825	5824.9950	5824.9680	5824.9830	5824.9940
8.51	5745	5744.9790	5744.9790	5744.9680	5744.9580
	5755	5754.9810	5754.9810	5754.9870	5754.9740
	5775	5774.9840	5774.9840	5774.9670	5774.9730
	5785	5784.9760	5784.9760	5784.9940	5784.9760
	5795	5794.9670	5794.9670	5794.9860	5794.9870
	5825	5824.9760	5824.9760	5824.9950	5824.9680



5 Test Setup Photo

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

6 EUT Constructional Details

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

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