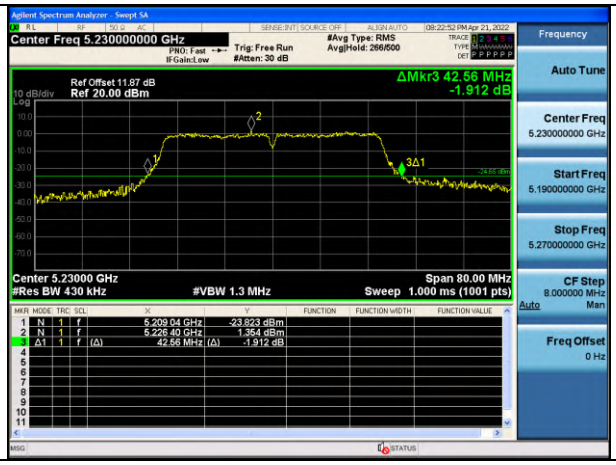
26dBc bandwidth

802.11n HT40

CH 38

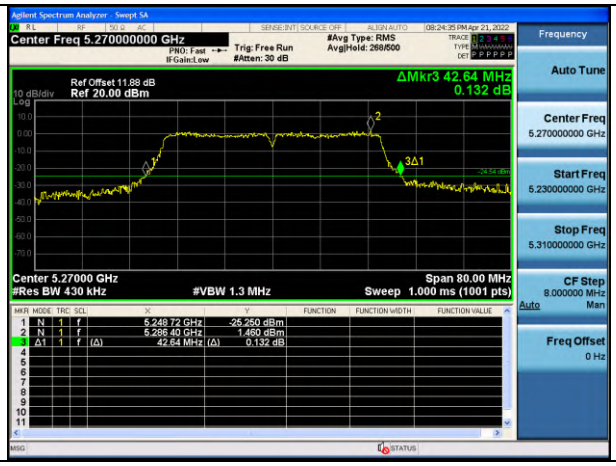
CH 62

CH 46



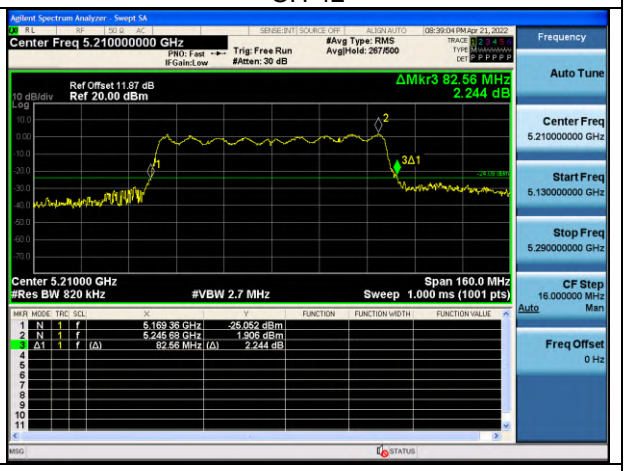
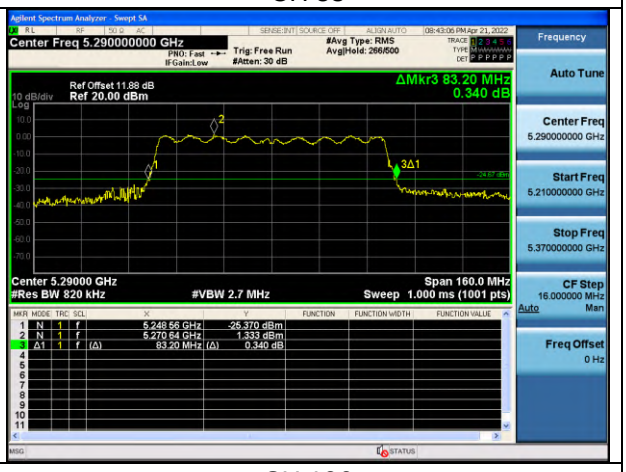
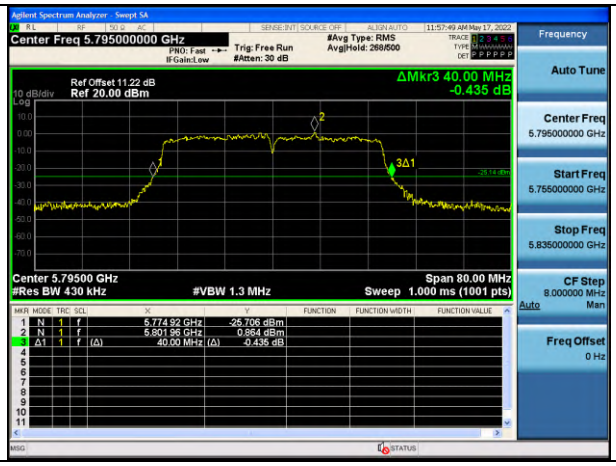
CH 102

CH 54



CH 110

26dBc bandwidth

802.11n HT40	802.11ac VHT80
CH 134	CH 42
	
CH 151	CH 58
	
CH 159	CH 106
	

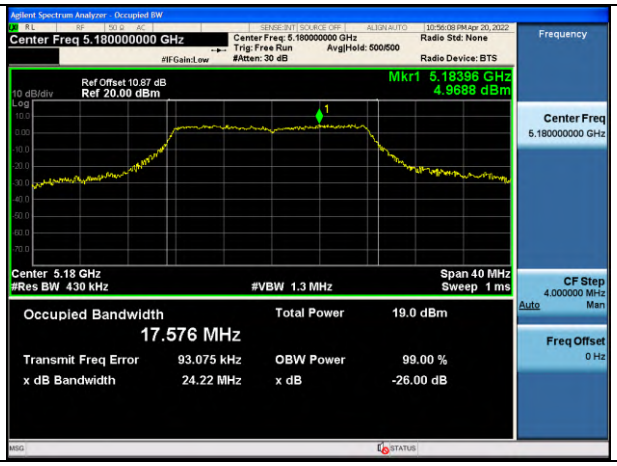
26dBc bandwidth

802.11ac VHT80	
CH 122	CH 155
	

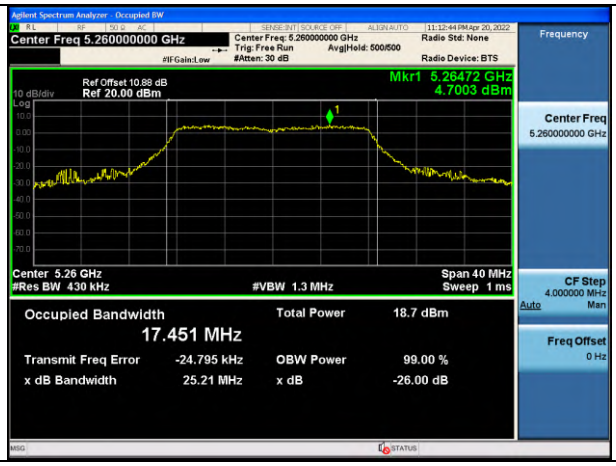
Occupied bandwidth

802.11a

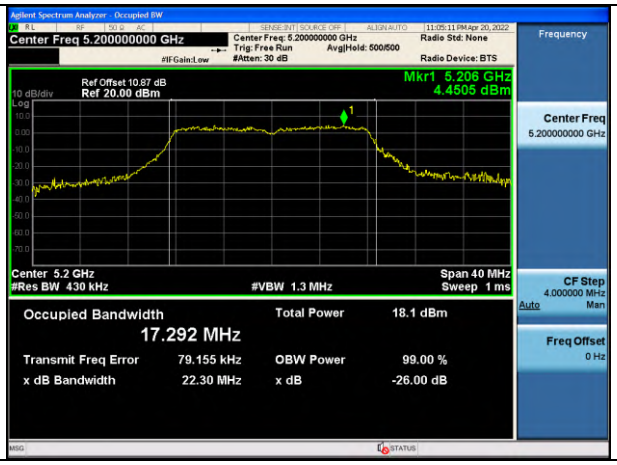
CH 36



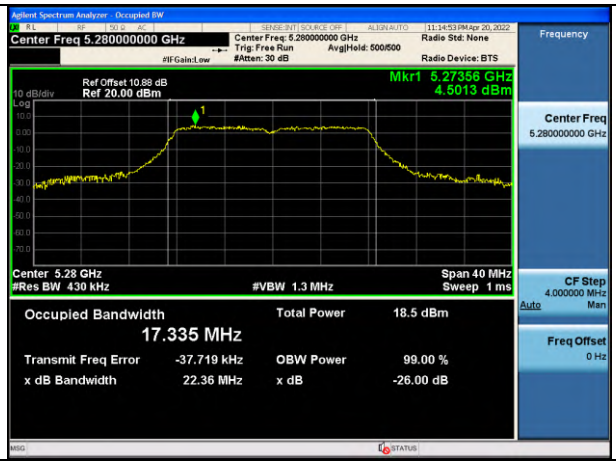
CH 52



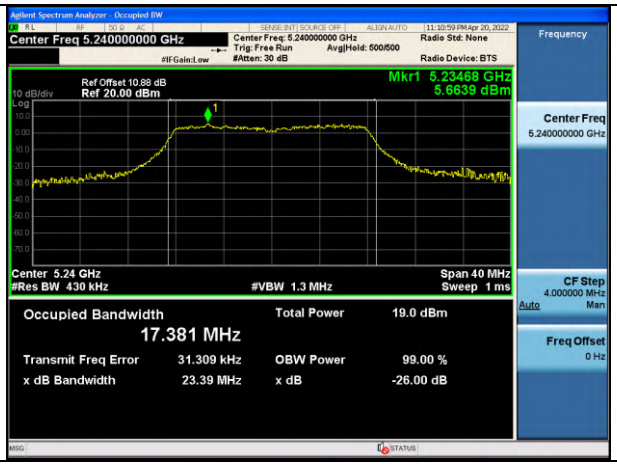
CH 40



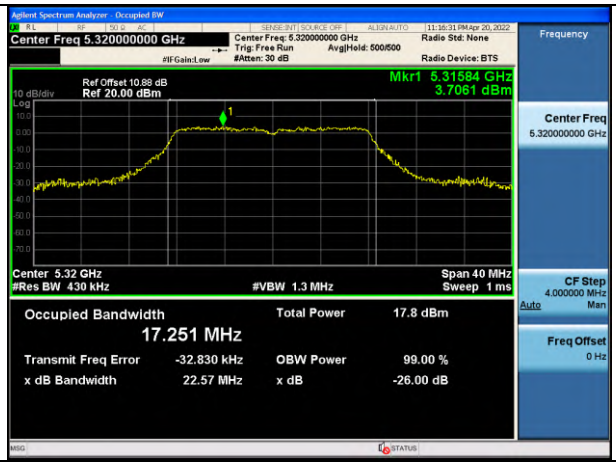
CH 56



CH 48



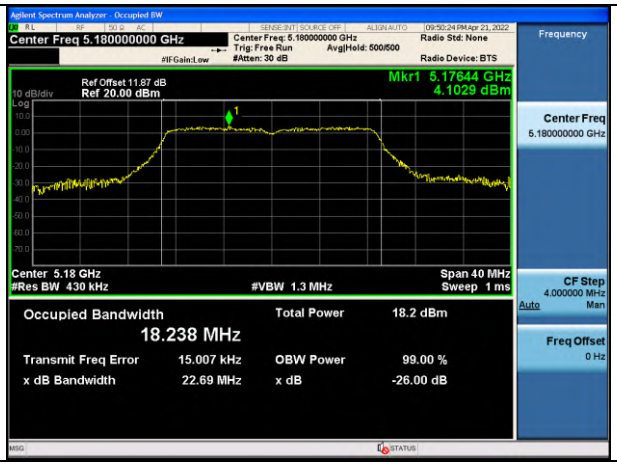
CH 64



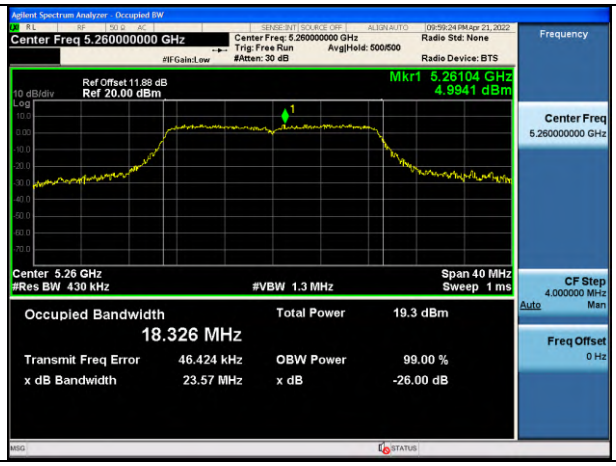
Occupied bandwidth

802.11n HT20

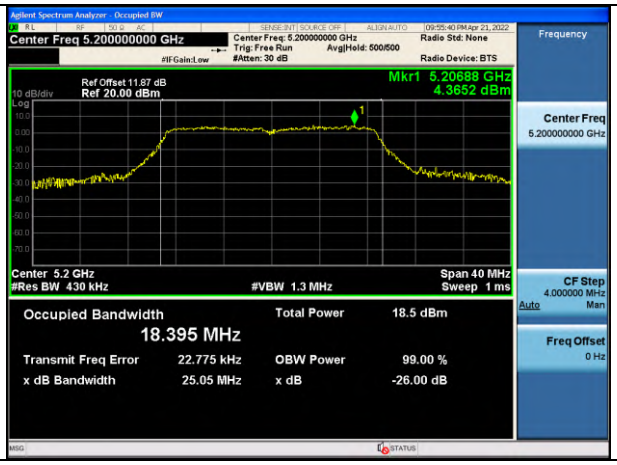
CH 36



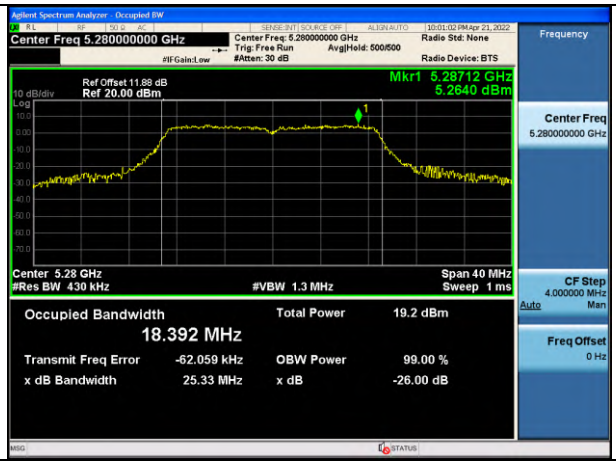
CH 52



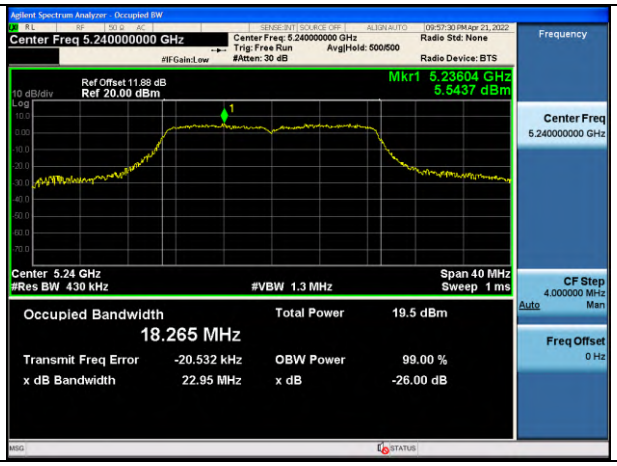
CH 40



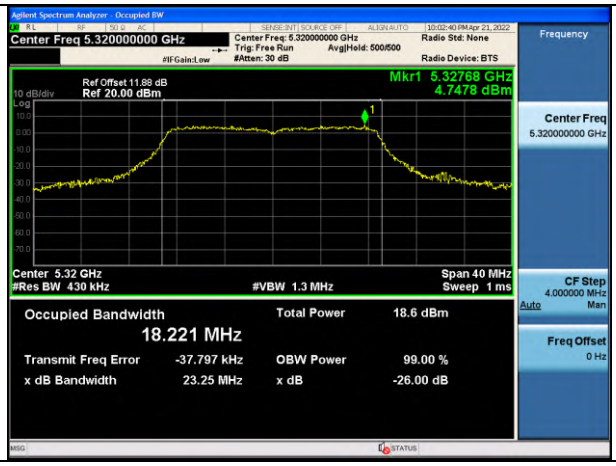
CH 56



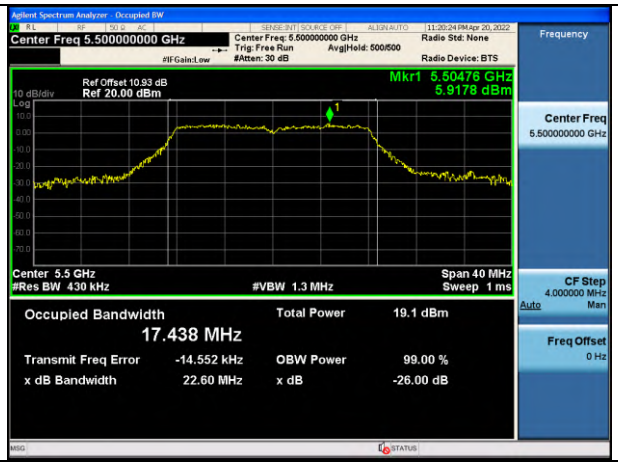
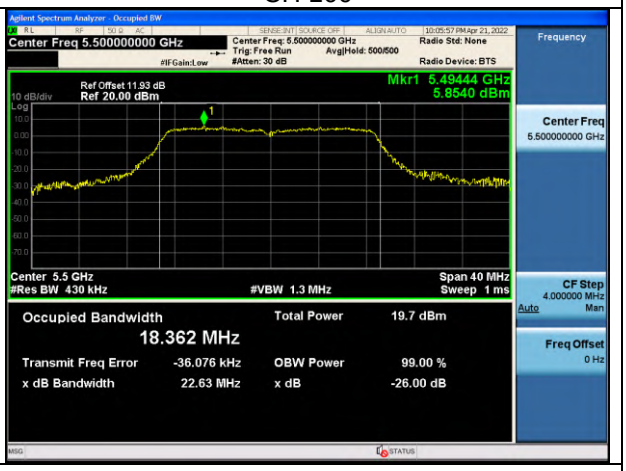
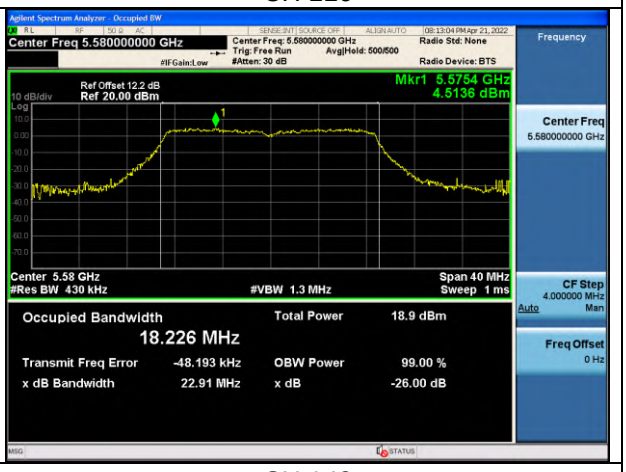
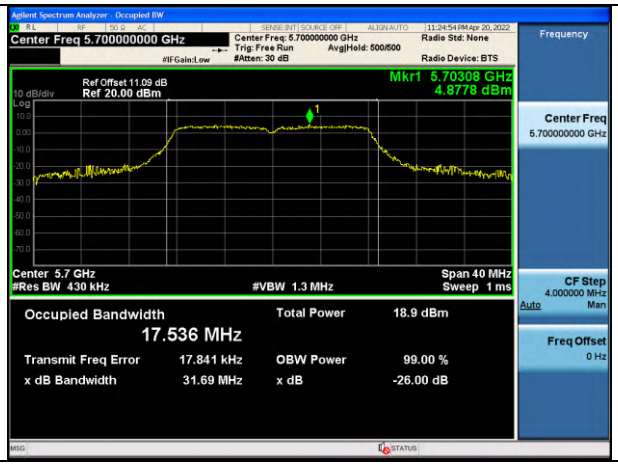
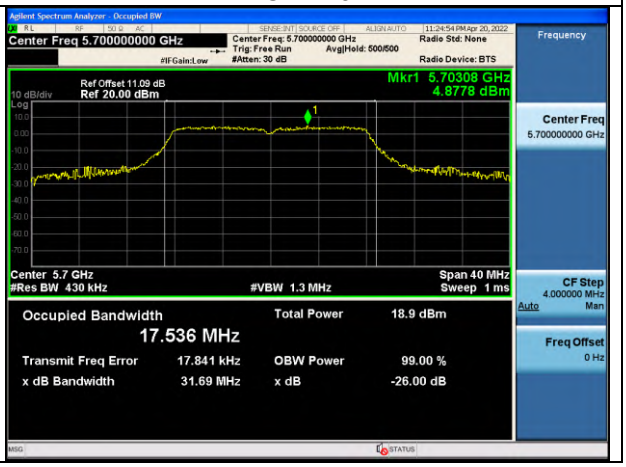
CH 48



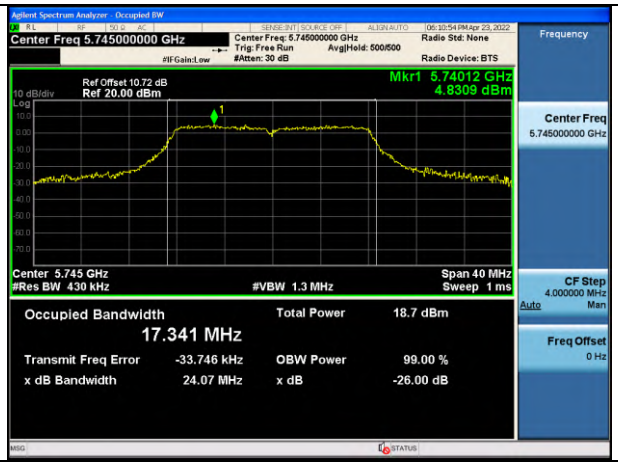
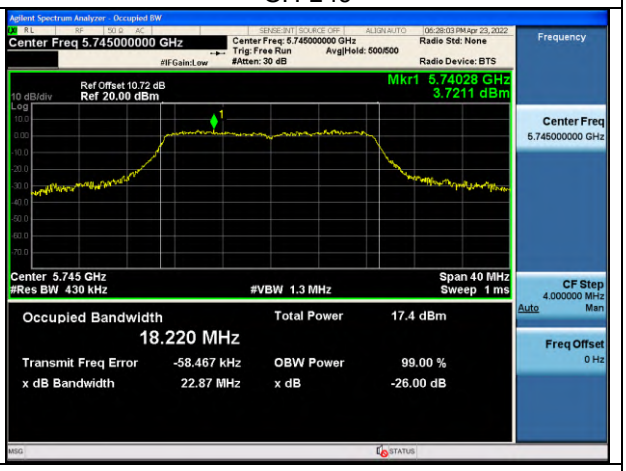
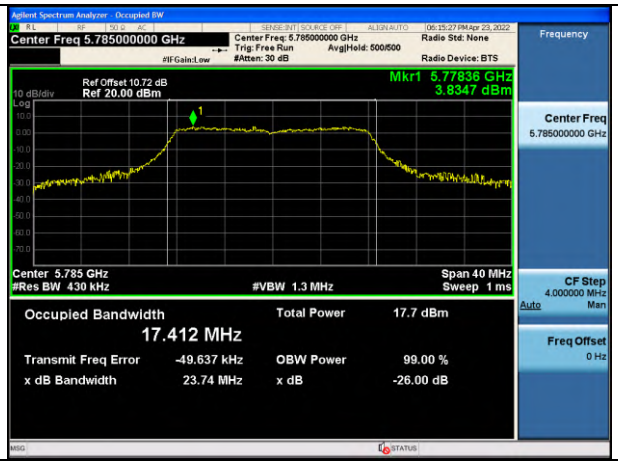
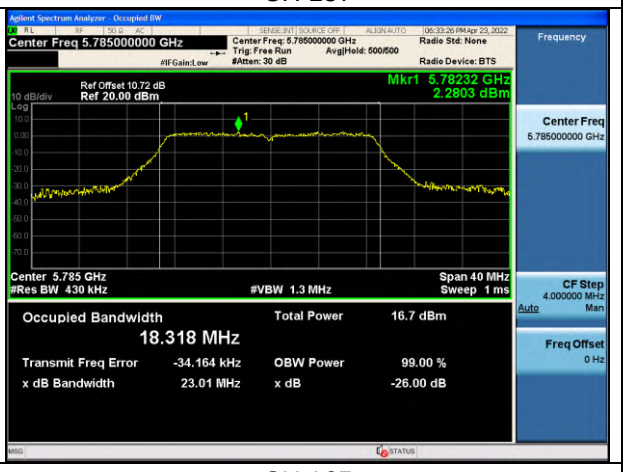
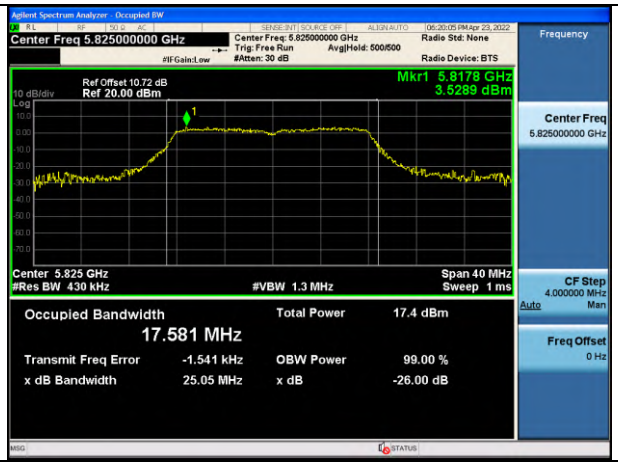
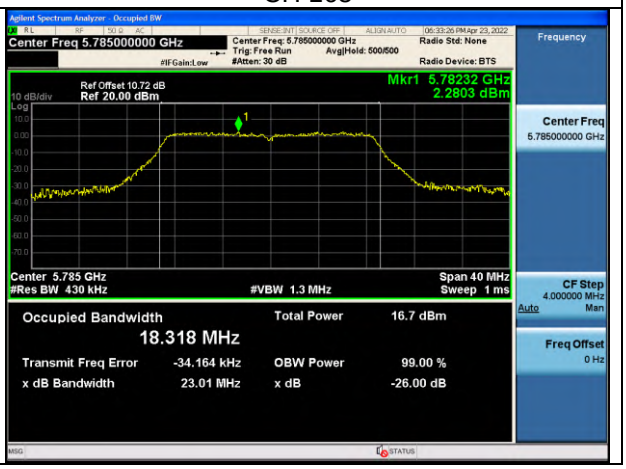
CH 64



Occupied bandwidth

802.11a	802.11n HT20
CH 100	CH 100
	
CH 116	CH 116
	
CH 140	CH 140
	

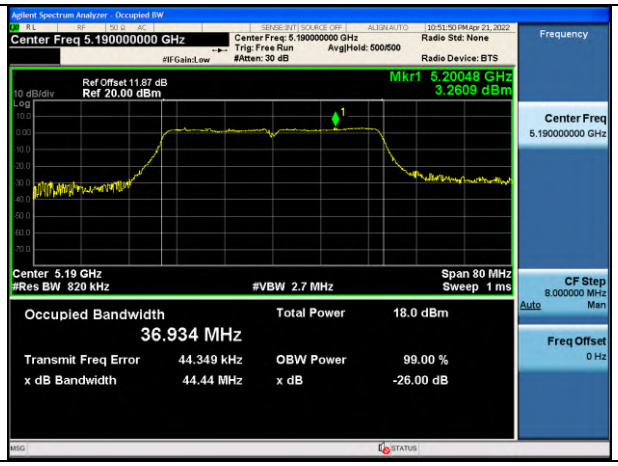
Occupied bandwidth

802.11a	802.11n HT20
CH 149	CH 149
	
CH 157	CH 157
	
CH 165	CH 165
	

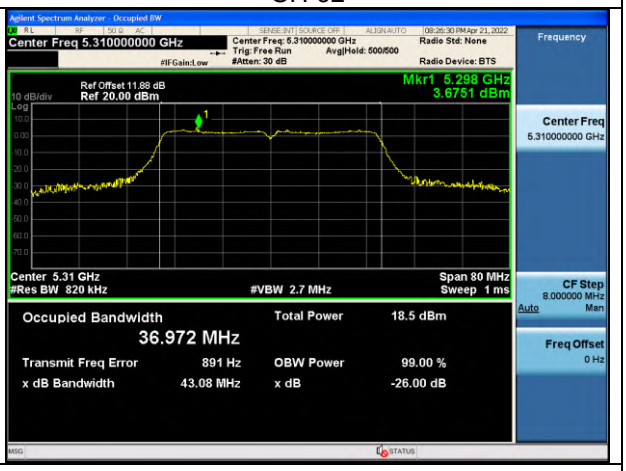
Occupied bandwidth

802.11n HT40

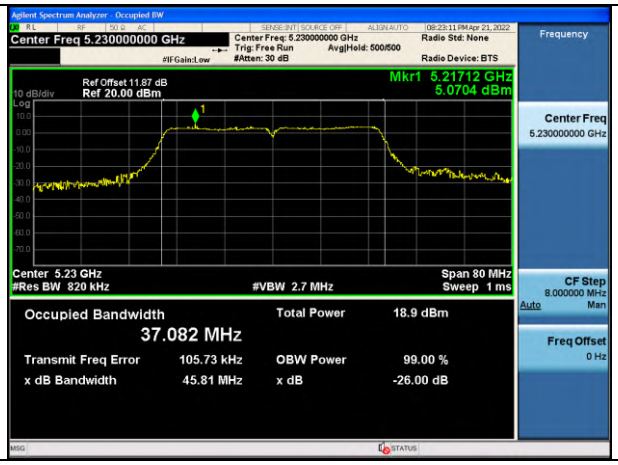
CH 38



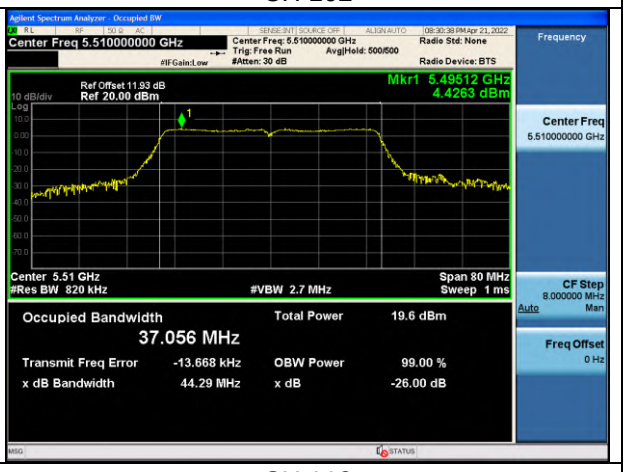
CH 62



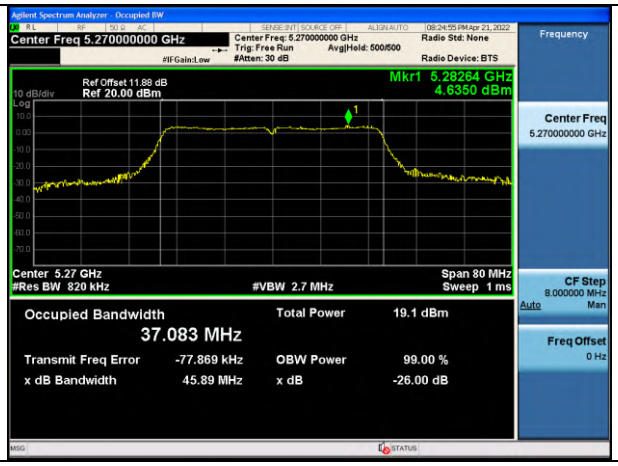
CH 46



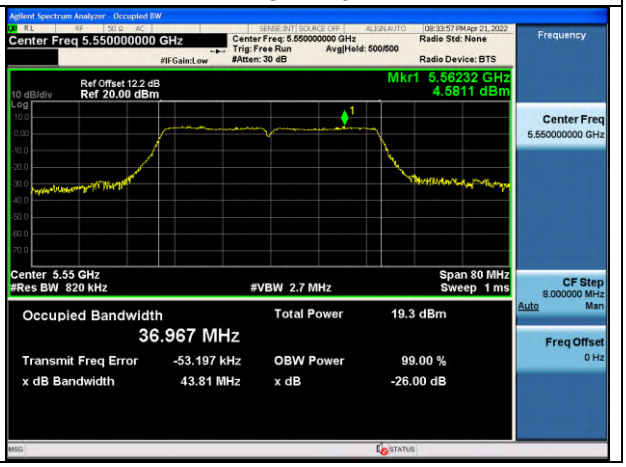
CH 102



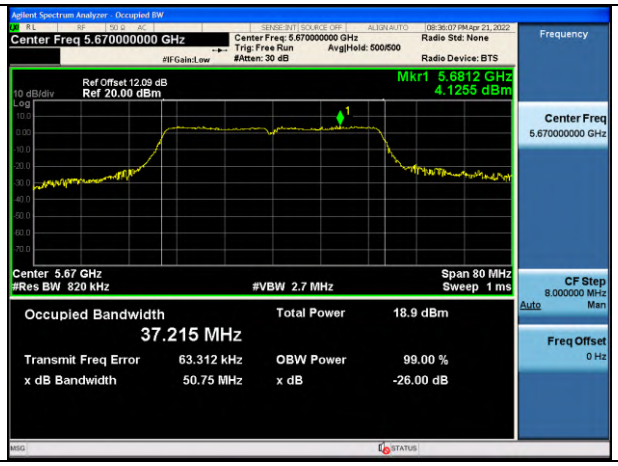
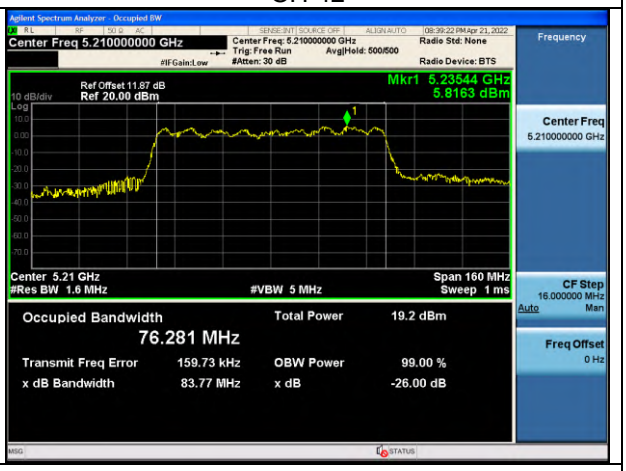
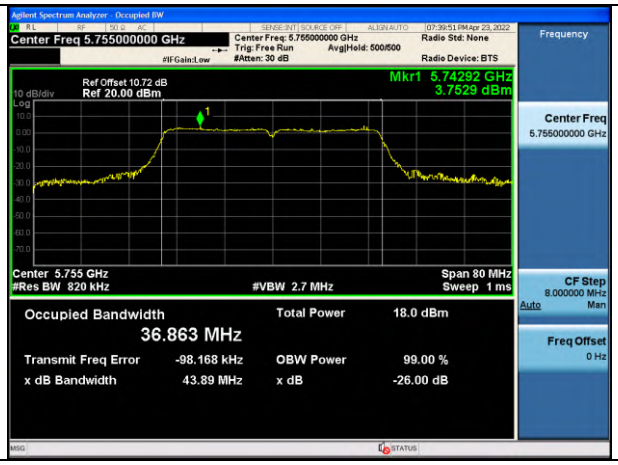
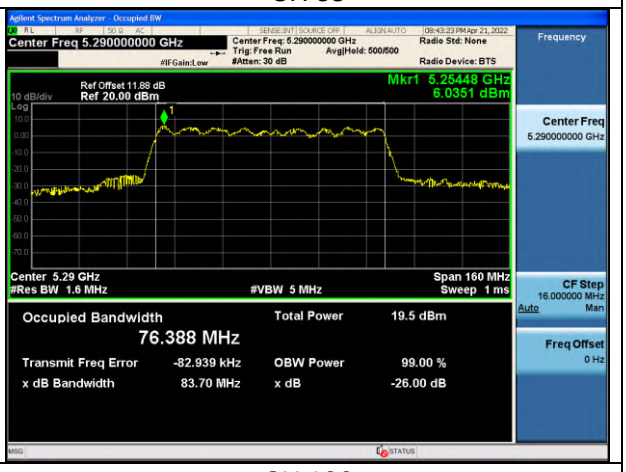
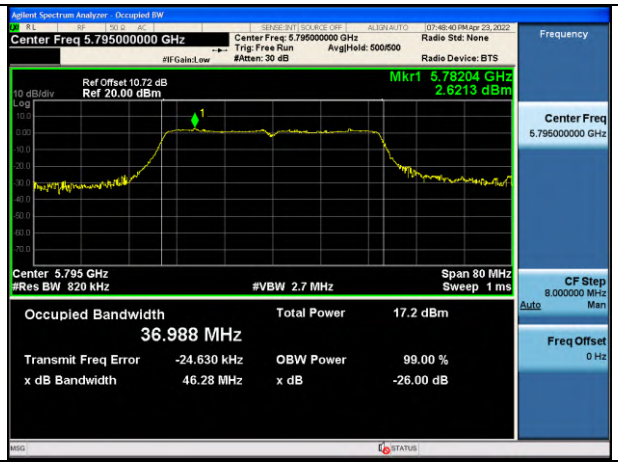
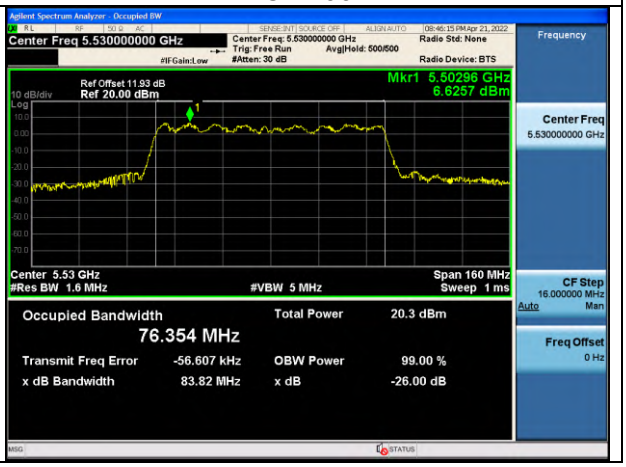
CH 54



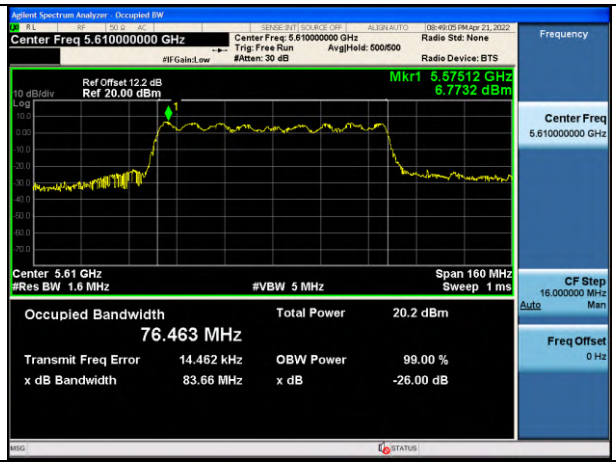
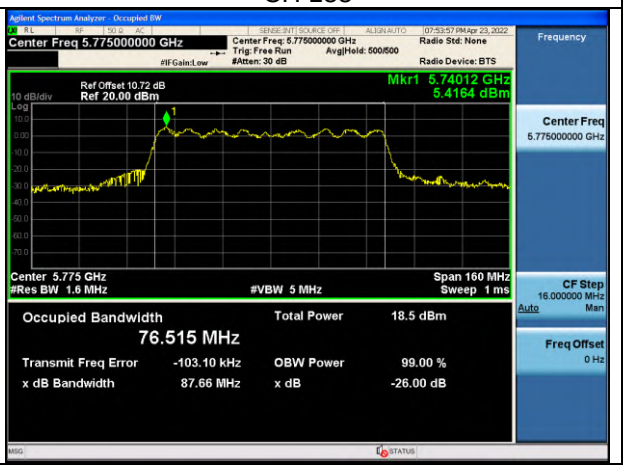
CH 110



Occupied bandwidth

802.11n HT40	802.11ac VHT80
CH 134	CH 42
	
CH 151	CH 58
	
CH 159	CH 106
	

Occupied bandwidth

802.11ac VHT80	
CH 122	CH 155
	

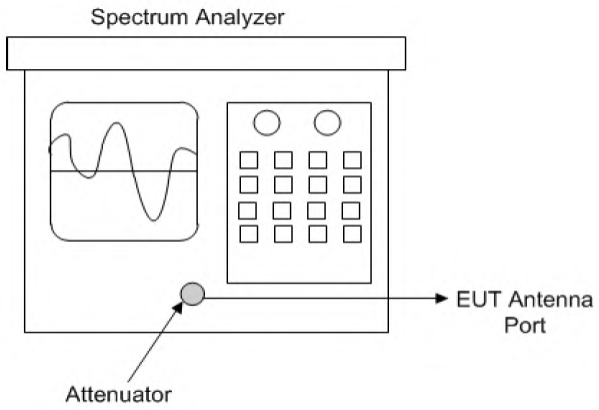
3.4 Peak Power Spectral Density Measurement

3.4.1 Limits of Peak Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm/3kHz.

Operation Band	EUT Category		Limit
U-NII-1	-	Outdoor Access Point	17dBm/ MHz
	-	Fixed point-to-point Access Point	
	-	Indoor Access Point	
	√	Mobile and Portable client device	11dBm/ MHz
U-NII-2A	-		11dBm/ MHz
U-NII-2C	-		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

3.4.2 Test Setup



Spectrum analyzer test configuration

3.4.3 Test Instruments

Refer to section 5 to get information of above instrument.

3.4.4 Test Procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1MHz, Set VBW =3mHz, Detector = RMS
3) Set Channel power measure = 1MHz
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

Using method SA-2

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 300 kHz, Set VBW =1 MHz, Detector = RMS
3) Set Channel power measure = 1MHz
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle)

3.4.5 Deviation from Test Standard

No deviation.

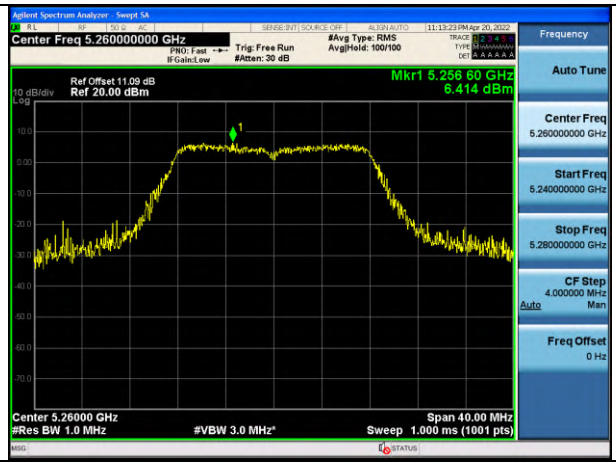
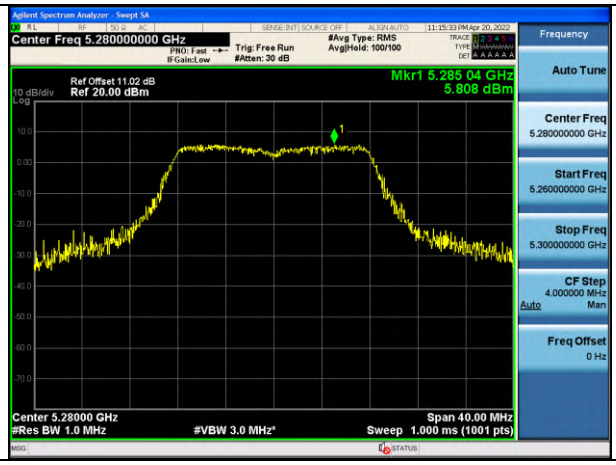
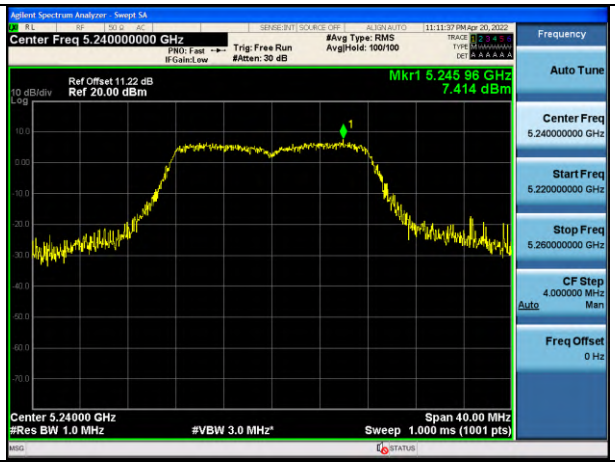
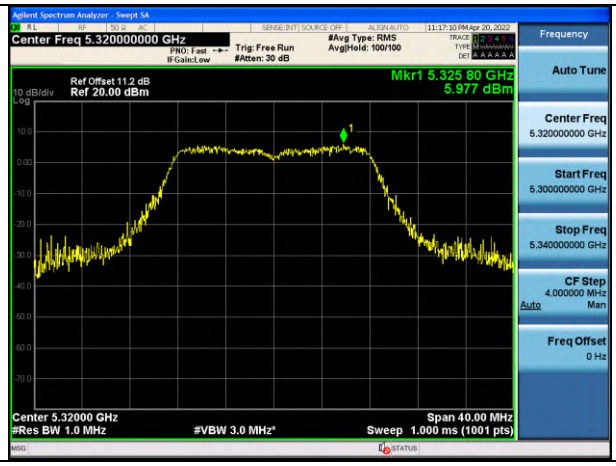
3.4.6 EUT Operating Condition

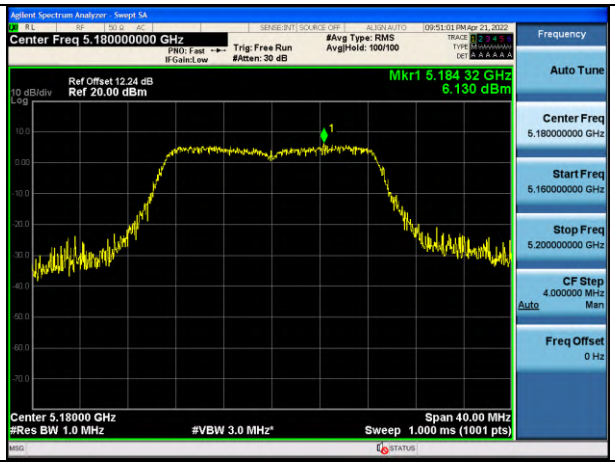
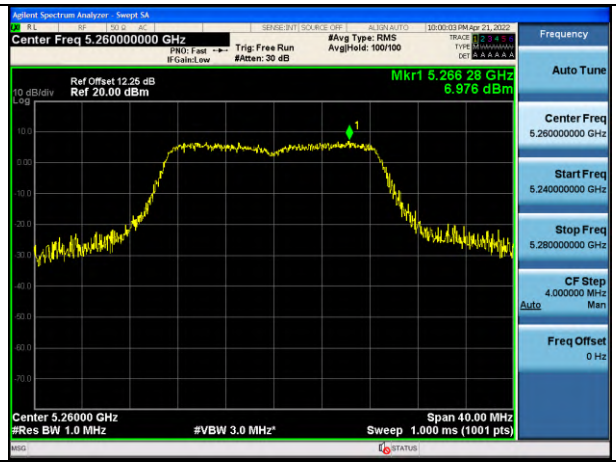
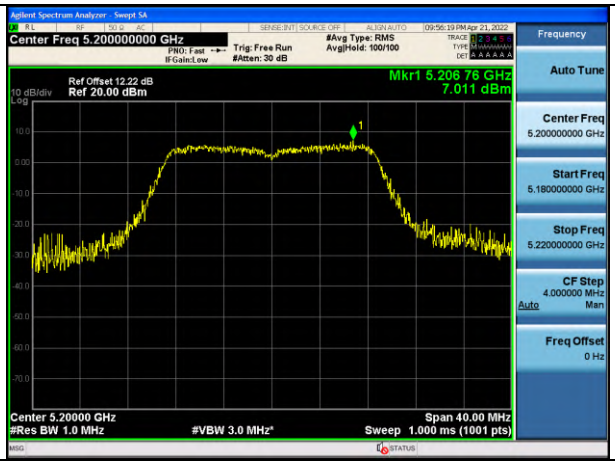
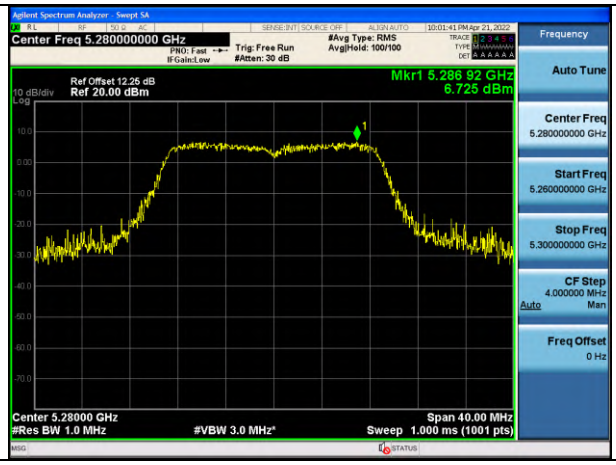
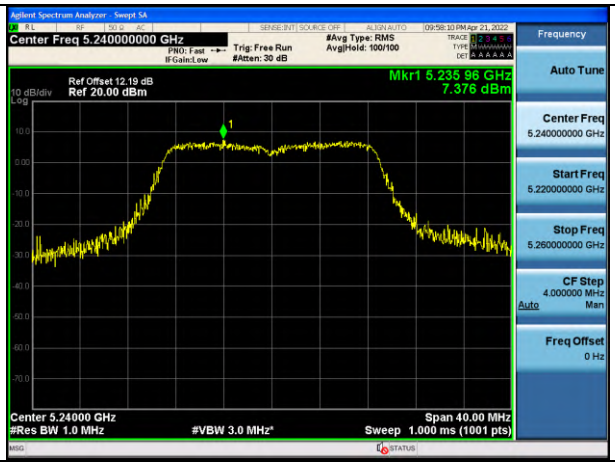
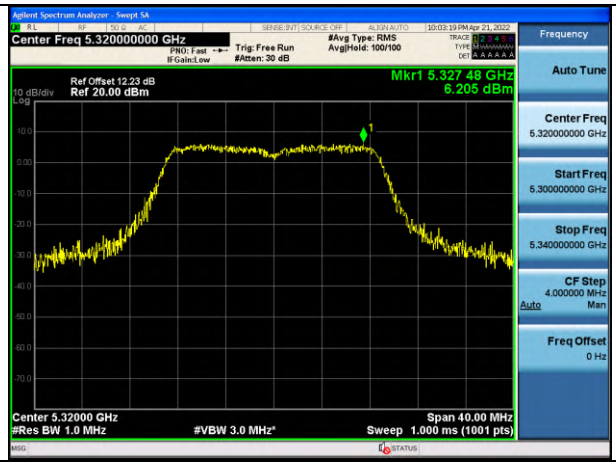
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

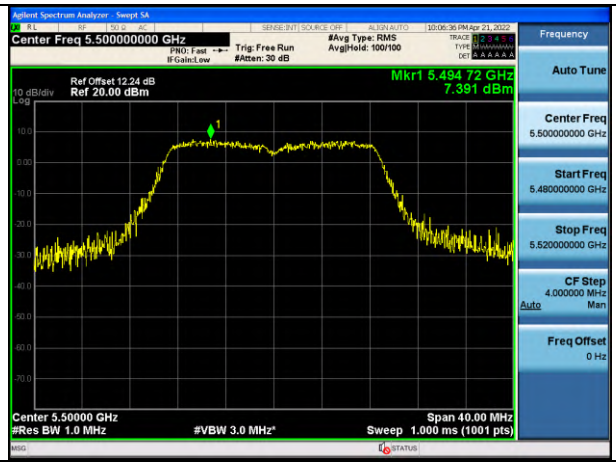
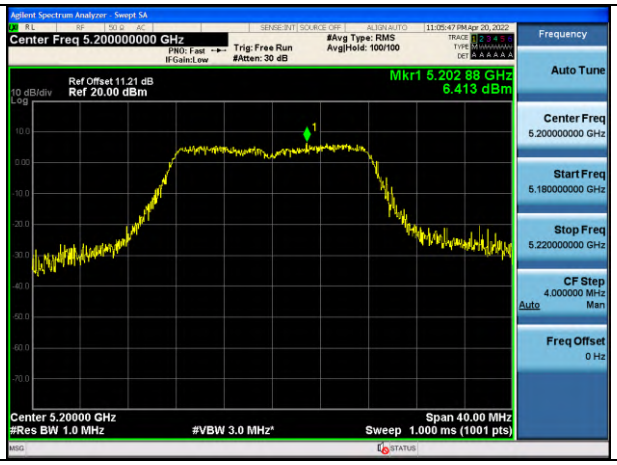
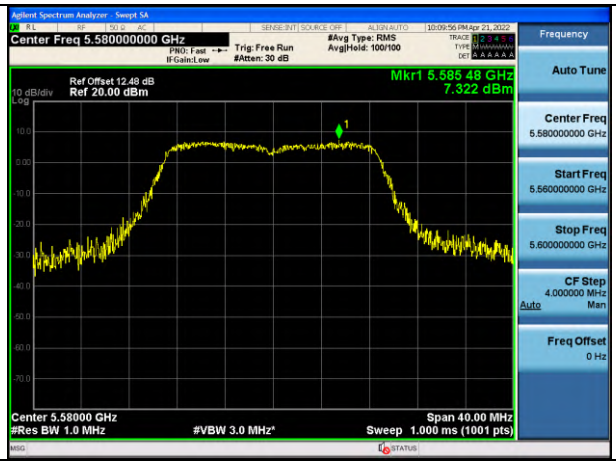
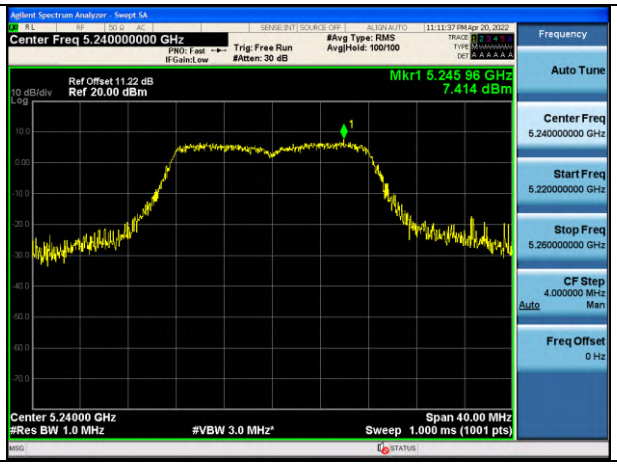
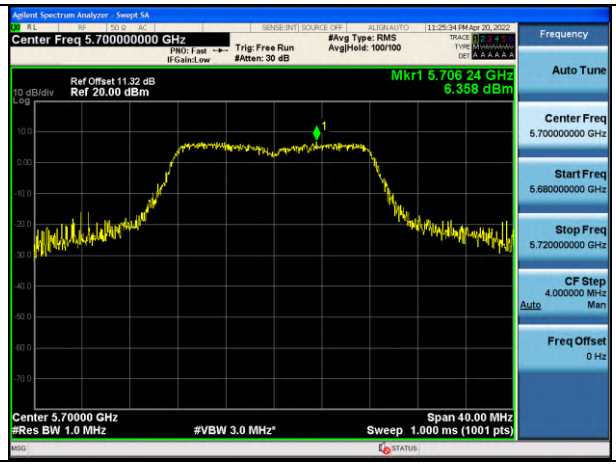
3.4.7 Test Results

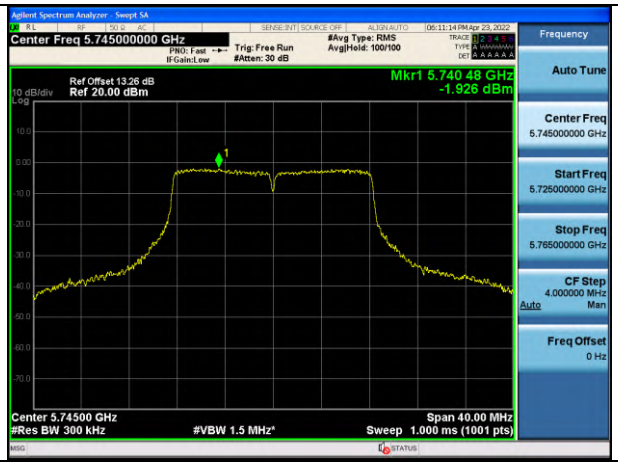
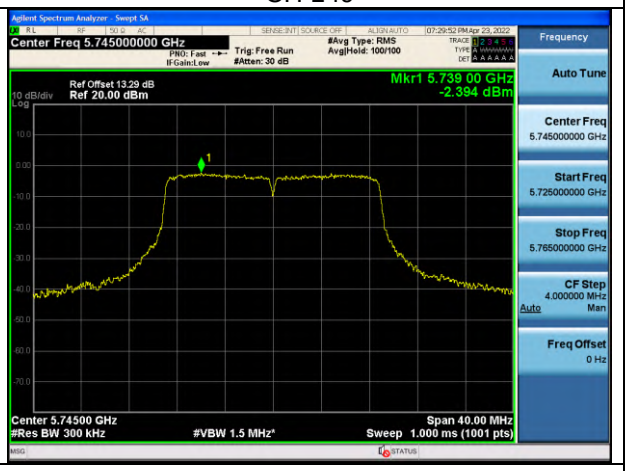
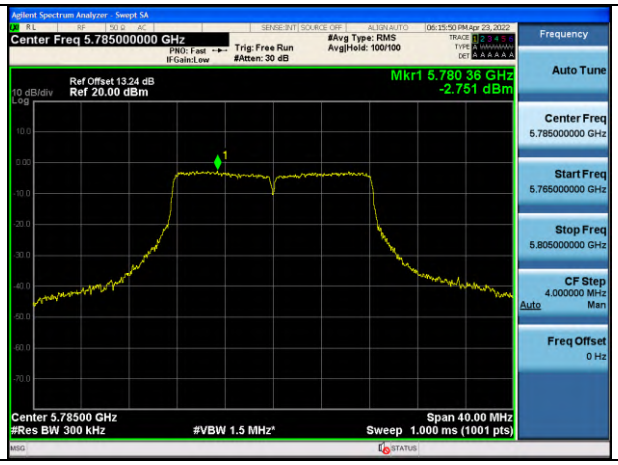
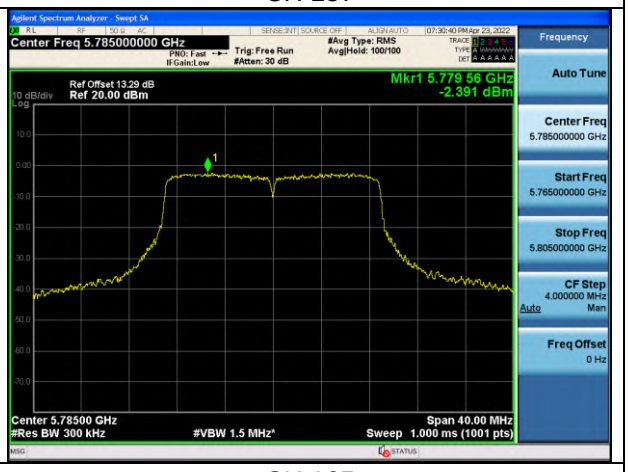
Test mode	Channel Number	Freq. (MHz)	Maximum conducted PSD (dBm)	Duty cycle factor (dB)	RBW factor (dB)	Total PSD (dBm)	Limit (dBm)	Verdict
11a	36	5180	6.435	0.34	-	6.775	11	Pass
	40	5200	6.413	0.34	-	6.753	11	Pass
	48	5240	7.414	0.34	-	7.754	11	Pass
	52	5260	6.414	0.34	-	6.754	11	Pass
	56	5280	5.808	0.34	-	6.148	11	Pass
	64	5320	5.977	0.34	-	6.317	11	Pass
	100	5500	7.296	0.34	-	7.636	11	Pass
	116	5580	7.572	0.34	-	7.912	11	Pass
	140	5700	6.774	0.34	-	7.114	11	Pass
	149	5745	-1.926	0.34	2.218	0.632	30	Pass
	157	5785	-2.751	0.34	2.218	-0.193	30	Pass
	165	5825	-2.959	0.34	2.218	-0.401	30	Pass
11n HT20	36	5180	6.130	0.35	-	6.48	11	Pass
	40	5200	7.011	0.35	-	7.361	11	Pass
	48	5240	7.376	0.35	-	7.726	11	Pass
	52	5260	6.976	0.35	-	7.326	11	Pass
	56	5280	6.725	0.35	-	7.075	11	Pass
	64	5320	6.205	0.35	-	6.555	11	Pass
	100	5500	7.391	0.35	-	7.741	11	Pass
	116	5580	7.322	0.35	-	7.672	11	Pass
	140	5700	6.358	0.35	-	6.708	11	Pass
	149	5745	-2.394	0.35	2.218	0.174	30	Pass
	157	5785	-2.391	0.35	2.218	0.177	30	Pass
	165	5825	-3.793	0.35	2.218	-1.225	30	Pass
11n HT40	38	5190	2.015	0.71	-	2.725	11	Pass
	46	5230	4.302	0.71	-	5.012	11	Pass
	54	5270	4.164	0.71	-	4.874	11	Pass
	62	5310	2.920	0.71	-	3.63	11	Pass
	102	5510	4.000	0.71	-	4.71	11	Pass
	110	5550	3.782	0.71	-	4.492	11	Pass
	134	5670	3.440	0.71	-	4.15	11	Pass
	151	5755	-6.053	0.71	2.218	-3.125	30	Pass
	159	5795	-6.875	0.71	2.218	-3.947	30	Pass
11ac VHT80	42	5210	1.470	1.30	-	2.77	11	Pass
	58	5290	1.514	1.30	-	2.814	11	Pass
	106	5530	1.756	1.30	-	3.056	11	Pass
	122	5610	-0.209	1.30	-	1.091	11	Pass
	155	5775	-8.373	1.30	2.218	-4.855	30	Pass

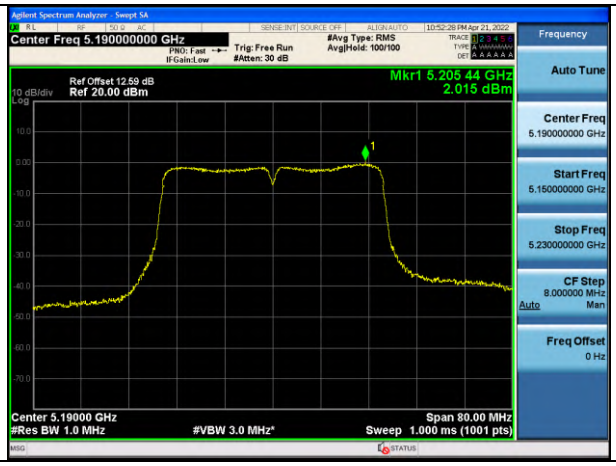
Note: For devices operating in the bands 5.15−5.25 GHz, 5.25−5.35 GHz, and 5.47−5.725 GHz, the preceding procedures make use of 1 MHz RBW.
For devices operating in the band 5.725−5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Cause the spectrum analyzers do not have 500 kHz RBW, The use of RBW is 300 kHz. it will be add the factor: 10*Log(500kHz/300kHz).

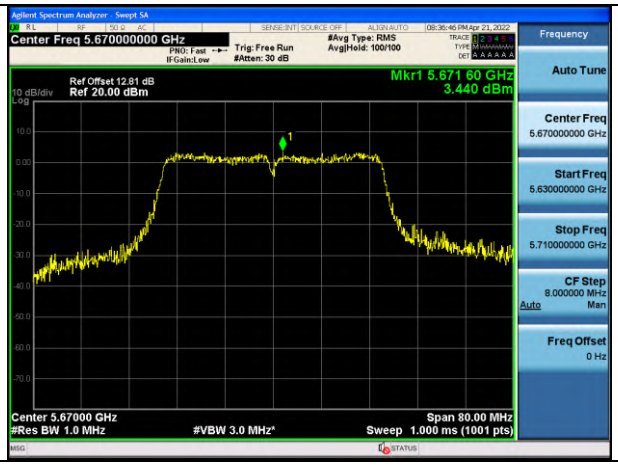
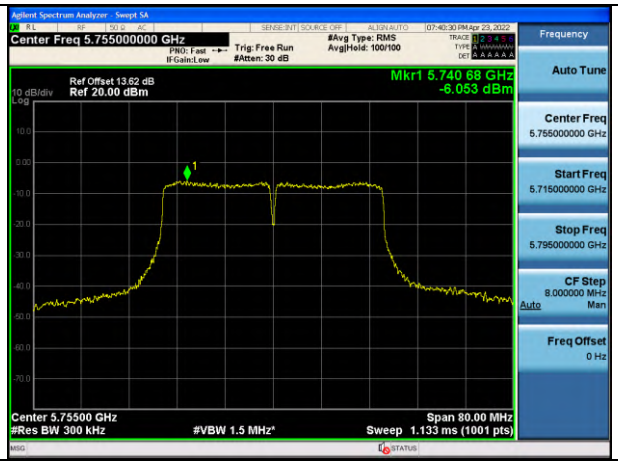
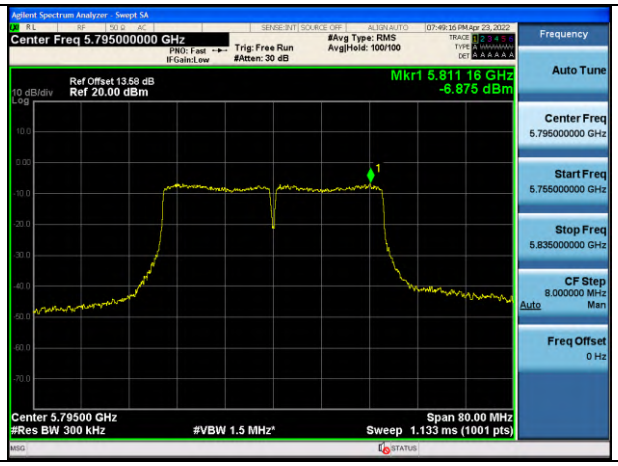
802.11a	
CH 36	CH 52
	
CH 40	CH 56
	
CH 48	CH 64
	

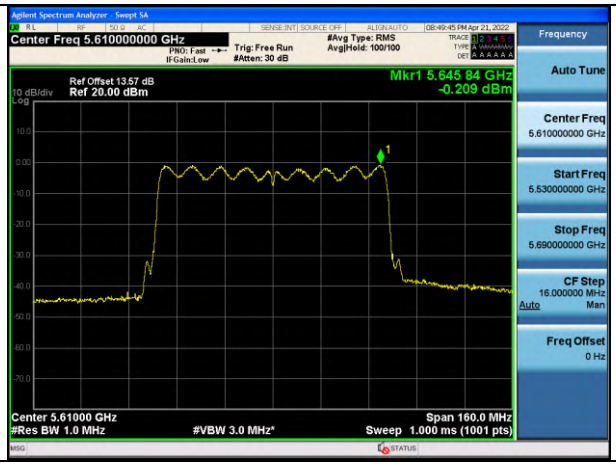
802.11n HT20	
CH 36	CH 52
	
CH 40	CH 56
	
CH 48	CH 64
	

802.11a	802.11n HT20
CH 100	CH 100
	
CH 116	CH 116
	
CH 140	CH 140
	

802.11a	802.11n HT20
CH 149	CH 149
	
CH 157	CH 157
	
CH 165	CH 165
	

802.11n HT40	
CH 38	CH 62
	
CH 46	CH 102
	
CH 54	CH 110
	

802.11n HT40	802.11ac VHT80
CH 134	CH 42
	
CH 151	CH 58
	
CH 159	CH 106
	

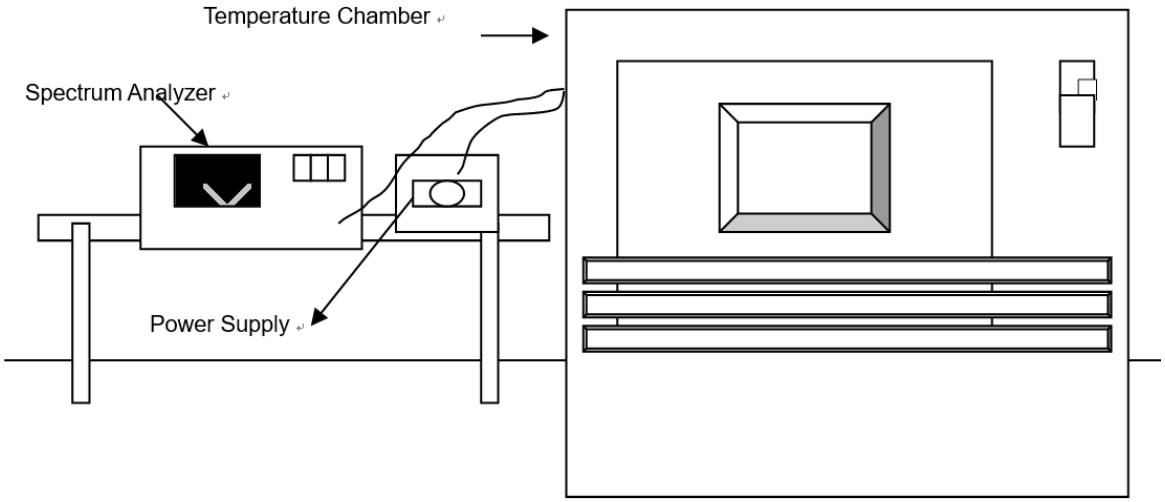
802.11ac VHT80	
CH 122	CH 155
	

3.5 Frequency Stability

3.5.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation.

3.5.2 Test Setup



3.5.3 Test Instruments

Refer to section 5 to get information of above instrument.

3.5.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC 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 +20degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

3.5.5 Deviation from Test Standard

No deviation.

3.5.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at the channel frequencies individually.

3.5.7 Test Result

Frequency stability versus temp.									
Operating frequency: 5180MHz									
Temp. (℃)	Power supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift
50	5	5179.9789	-0.00041	5179.9818	-0.00035	5179.9786	-0.00041	5179.9815	-0.00036
40	5	5179.9856	-0.00028	5179.9886	-0.00022	5179.9873	-0.00025	5179.9901	-0.00019
30	5	5180.0048	0.00009	5180.0028	0.00005	5180.0044	0.00008	5180.0047	0.00009
20	5	5179.9898	-0.00020	5179.9947	-0.00010	5179.9925	-0.00014	5179.9915	-0.00016
10	5	5179.9898	-0.00020	5179.9899	-0.00019	5179.9873	-0.00025	5179.9916	-0.00016
0	5	5180.0095	0.00018	5180.0129	0.00025	5180.0114	0.00022	5180.0111	0.00021
-10	5	5179.9775	-0.00043	5179.9766	-0.00045	5179.9762	-0.00046	5179.9791	-0.00040
-20	5	5180.0206	0.00040	5180.0216	0.00042	5180.0221	0.00043	5180.0189	0.00036
-30	5	5180.0186	0.00036	5180.0207	0.00040	5180.0222	0.00043	5180.0202	0.00039

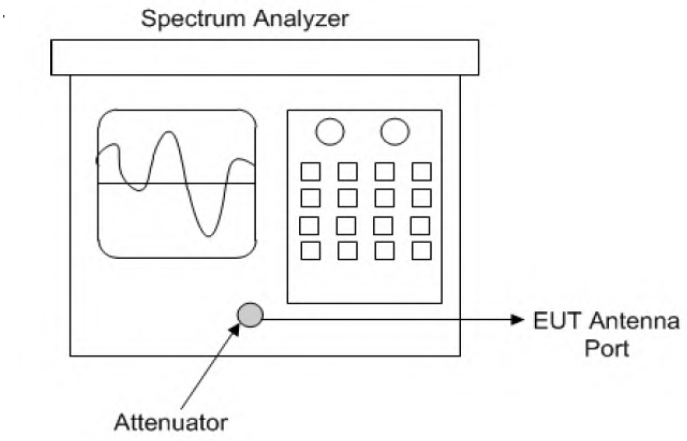
Frequency stability versus temp.									
Operating frequency: 5180MHz									
Temp. (℃)	Power supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift
20	5.5	5179.9895	-0.00020	5179.9941	-0.00011	5179.9923	-0.00015	5179.9909	-0.00018
	5	5179.9898	-0.00020	5179.9947	-0.00010	5179.9925	-0.00014	5179.9915	-0.00016
	4.5	5179.9905	-0.00018	5179.9944	-0.00011	5179.9921	-0.00015	5179.9915	-0.00016

3.6 6dB Bandwidth Measurement

3.6.1 Limits of Conducted Out of Band Emission Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

3.6.2 Test Setup



3.6.3 Test Instruments

Refer to section 5 to get information of above instrument.

3.6.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) 2 3 x RBW, Detector = Peak.
c. Trace mode = maxhold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

3.6.5 Deviation from Test Standard

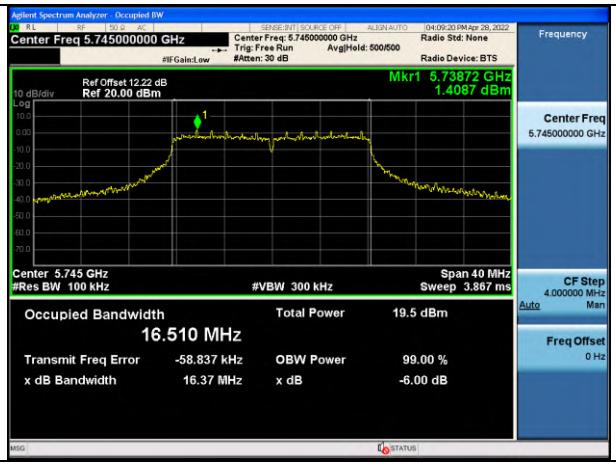
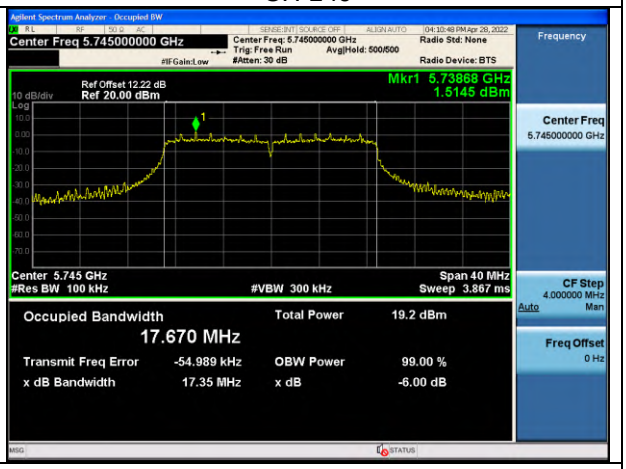
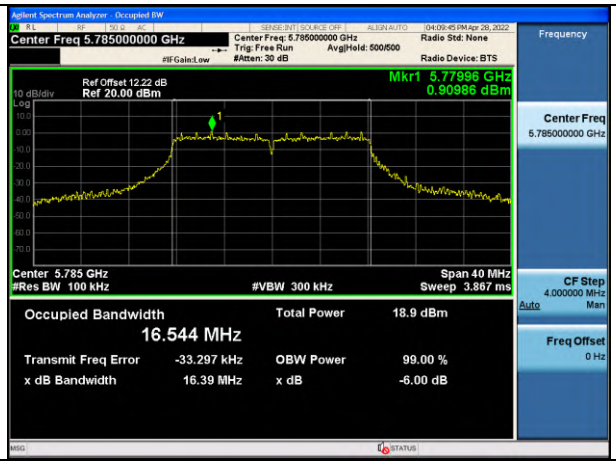
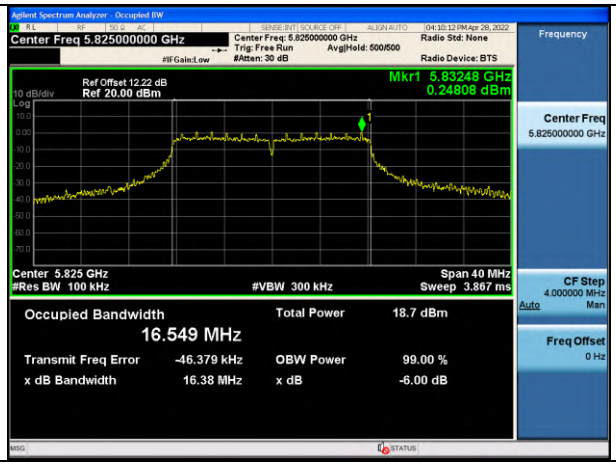
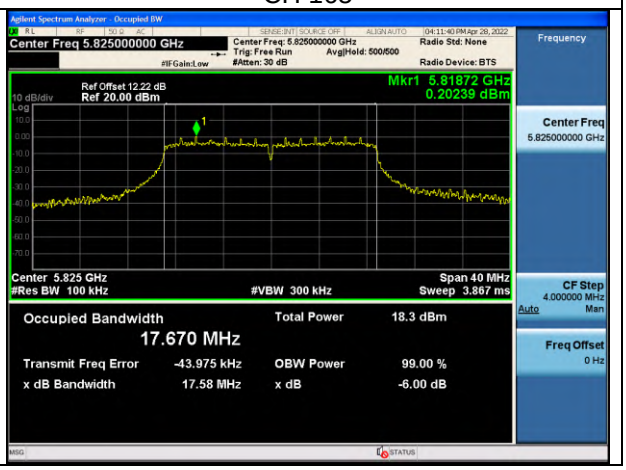
No deviation.

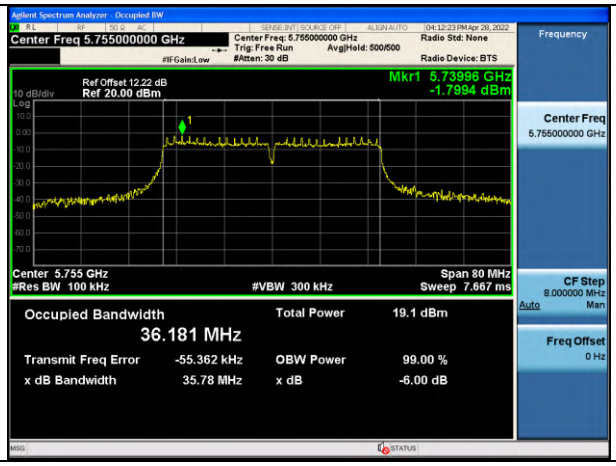
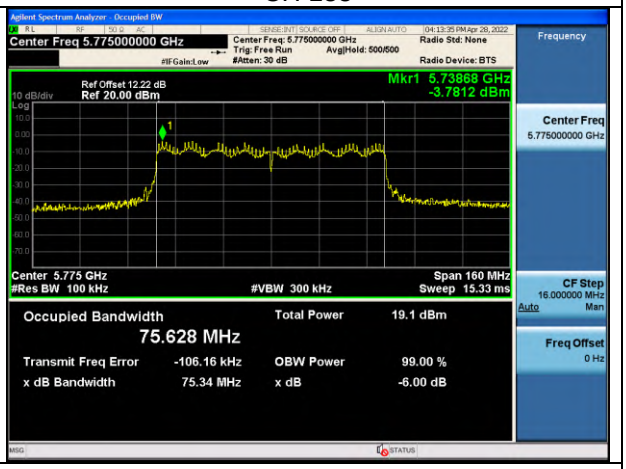
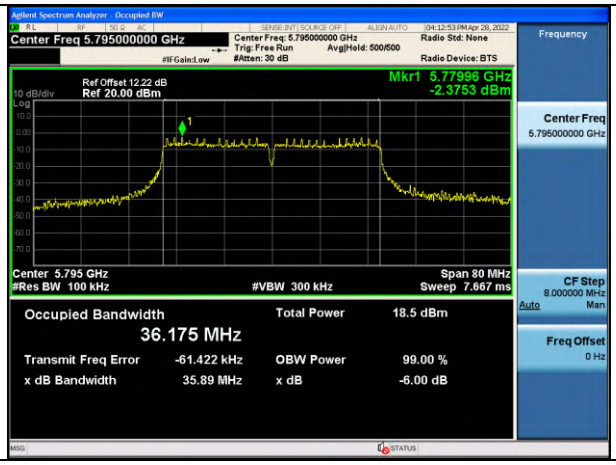
3.6.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.6.7 Test results

Test mode	Channel Number	Freq. (MHz)	6dBc bandwidth (MHz)	Limit (MHz)	Verdict
11a	149	5745	16.510	≥0.5	Pass
	157	5785	16.544	≥0.5	Pass
	165	5825	16.549	≥0.5	Pass
11n HT20	149	5745	17.670	≥0.5	Pass
	157	5785	17.659	≥0.5	Pass
	165	5825	17.670	≥0.5	Pass
11n HT40	151	5755	36.181	≥0.5	Pass
	159	5795	36.175	≥0.5	Pass
11ac VHT80	155	5775	75.628	≥0.5	Pass

802.11a	802.11n HT20
CH 149	CH 149
	
CH 157	CH 157
	
CH 165	CH 165
	

802.11n HT40	802.11ac VHT80
CH151	CH 155
	
CH159	
	

4. Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

5. Test Instruments

Description & Manufacturer	Model No.	Serial No.	Due Date of Calibration
Spectrum Keysight	N9020A	MY51240612	2021/09/16
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2021/09/16
Power Meter 10Hz~18GHz Tonscend	JS0806-2	188060126	2021/09/16
Signal generator Keysight	E4421B	GB40051020	2021/09/16
Signal generator Keysight	N5182A	MY47420944	2021/09/16
Test Software Tonscend	JS0806-2	NA	NA
Hygrothermograph Yuhuaze	HTC-1	NA	2021/09/16

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
2. The test was performed in Chamber 1.

Appendix – Information on The Testing Laboratories

We, Hwa-Hsing (Dongguan) Co., Ltd., A global provider of TESTING and CERTIFICATION services for consumer products, electronic products and wireless information technology products. Adhering to the core values “HONEST and TRUSTWORTHY, OBJECTIVE and IMPARTIALITY, RIGOROUS and AFFICIENT”, commitment to provide professional, perfect and efficient comprehensive ONE-STOP solution of TESTING and CERTIFICATION services for Manufacturers, Buyers, Traders, Brands, Retailers. Assist client to better manage risk, protect their brands, reduce costs and cut time to over 150 markets in global. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lab Address: No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China
Contact Tel: 0769-83078199
Email: Customerservice.dg@hwa-hsing.com
Web Site: www.hwa-hsing.com

--- END ---