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	CH Freq.	Maximum conducted PSD (dBm)		Duty cycle factor	300/500kHz RBW factor	Total PSD	Max. Limit	Verdict
		(MHz)	ANT 1	ANT 2	(dB)	(dB)	(dBm)	(dBm)	
11a	36	5180	3.611	-1.001	2.552	-	7.453	10.99	Pass
	40	5200	4.117	2.78	2.552	-	9.062	10.99	Pass
	48	5240	3.737	5.029	2.552	-	9.994	10.99	Pass
	52	5260	3.532	4.231	2.552	-	9.458	10.99	Pass
	56	5280	3.741	4.872	2.552	-	9.906	10.99	Pass
	64	5320	3.294	4.451	2.552	-	9.474	10.99	Pass
	100	5500	5.986	4.369	2.552	-	10.815	10.99	Pass
	116	5580	5.191	5.375	2.552	-	10.847	10.99	Pass
	140	5700	0.486	1.468	2.552	-	6.567	10.99	Pass
	149	5745	-0.51	-2.239	2.552	2.218	6.492	29.99	Pass
	157	5785	-2.031	-2.018	2.552	2.218	5.756	29.99	Pass
	165	5825	-3.956	-2.704	2.552	2.218	4.496	29.99	Pass
11n HT20	36	5180	-0.339	1.509	0.491	-	4.184	10.99	Pass
	40	5200	0.183	1.587	0.491	-	4.443	10.99	Pass
	48	5240	1.277	2.032	0.491	-	5.173	10.99	Pass
	52	5260	1.341	0.905	0.491	-	4.630	10.99	Pass
	56	5280	1.703	1.366	0.491	-	5.040	10.99	Pass
	64	5320	2.389	1.338	0.491	-	5.397	10.99	Pass
	100	5500	-0.578	1.102	0.491	-	3.845	10.99	Pass
	116	5580	0.761	0.953	0.491	-	4.360	10.99	Pass
	140	5700	2.224	-1.089	0.491	-	4.378	10.99	Pass
	149	5745	-0.273	-2.219	0.491	2.218	4.582	29.99	Pass
	157	5785	-1.262	-2.036	0.491	2.218	4.088	29.99	Pass
	165	5825	-2.182	-1.268	0.491	2.218	4.019	29.99	Pass
11n HT40	38	5190	-4.037	-2.427	4.302	-	4.154	10.99	Pass
	46	5230	-2.609	0.139	4.302	-	6.291	10.99	Pass
	54	5270	-3.16	-2.983	4.302	-	4.241	10.99	Pass
	62	5310	-2.429	-1.712	4.302	-	5.256	10.99	Pass
	102	5510	-3.708	-2.192	4.302	-	4.428	10.99	Pass
	110	5550	-1.983	-1.615	4.302	-	5.517	10.99	Pass
	134	5670	-0.145	-4.642	4.302	-	5.476	10.99	Pass
	151	5755	-4.554	-6.64	4.302	2.218	4.057	29.99	Pass
	159	5795	-6.689	-5.424	4.302	2.218	3.519	29.99	Pass
11ac VHT80	42	5210	-8.567	-7.795	6.735	-	1.581	10.99	Pass
	58	5290	-6.712	-6.108	6.735	-	3.345	10.99	Pass
	106	5530	-5.377	-5.559	6.735	-	4.278	10.99	Pass
	122	5610	-3.133	-4.968	6.735	-	5.791	10.99	Pass
	155	5775	-8.757	-9.141	6.735	2.218	3.018	29.99	Pass

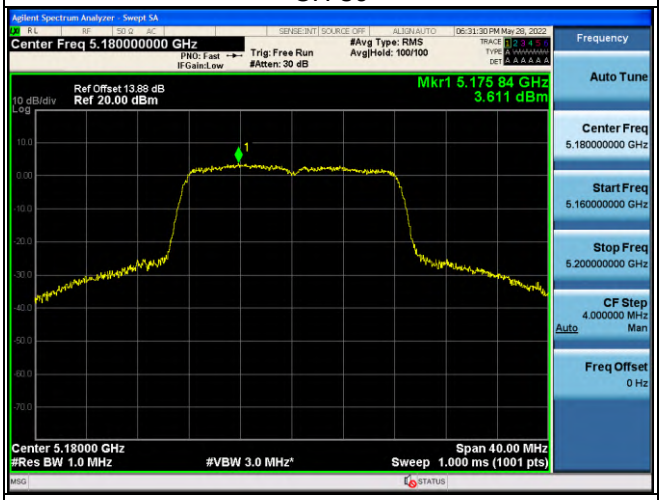
Note:

1. 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.
2. 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).
3. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
4. Directional gain = 3.0dBi + 10log(2) = 6.01dBi >6dBi , so the power density limit need to reduce 0.01.

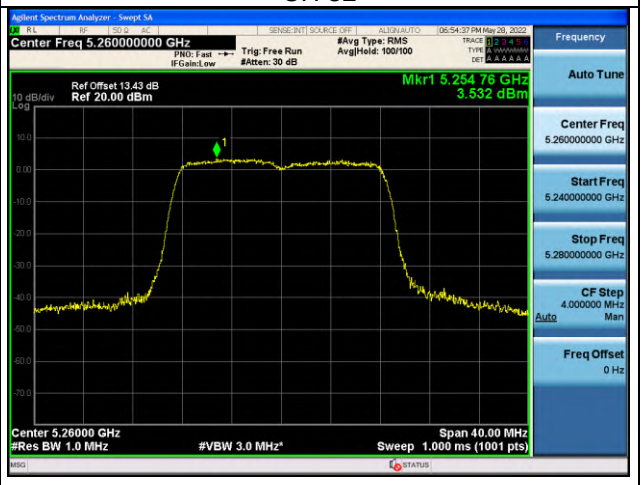
Peak Power Spectral Density-ANT0

802.11a

CH 36



CH 52



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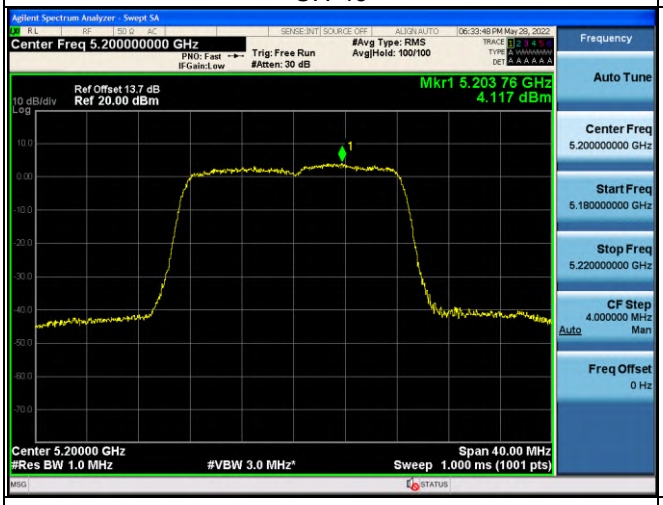

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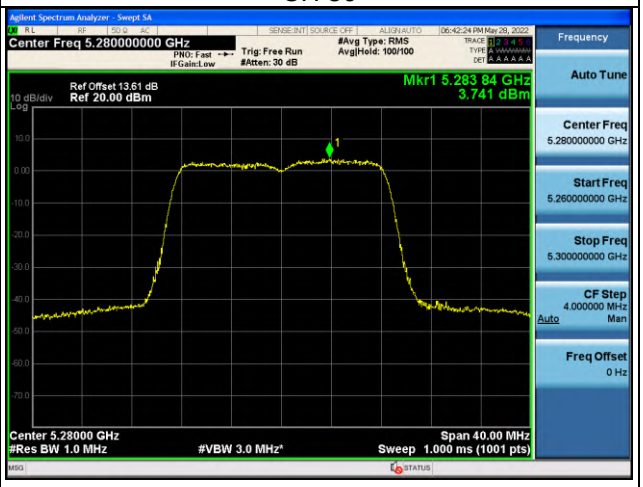

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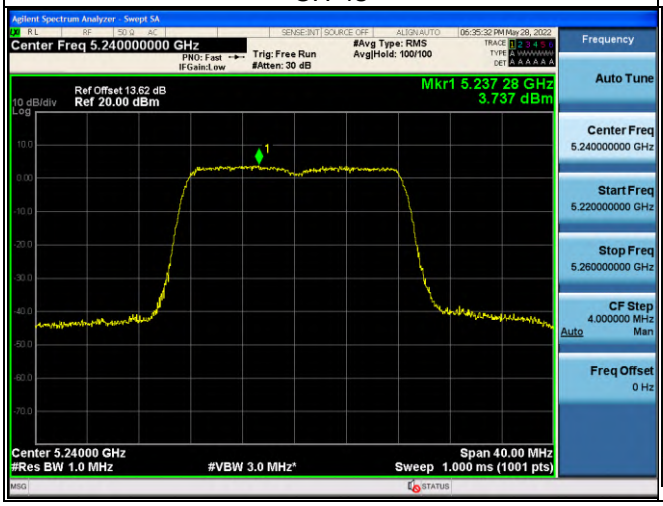

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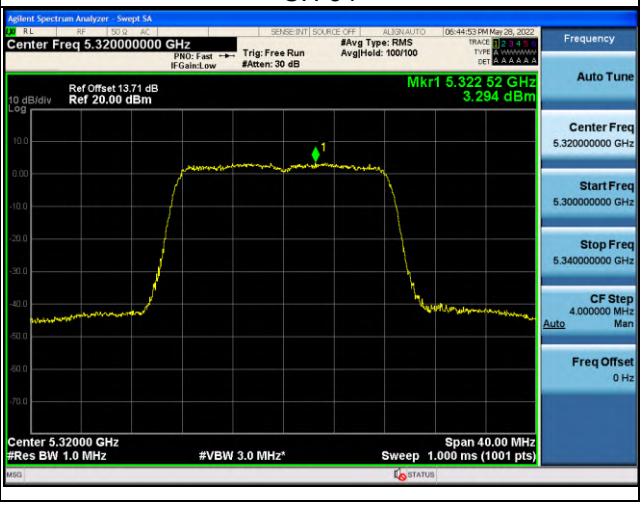

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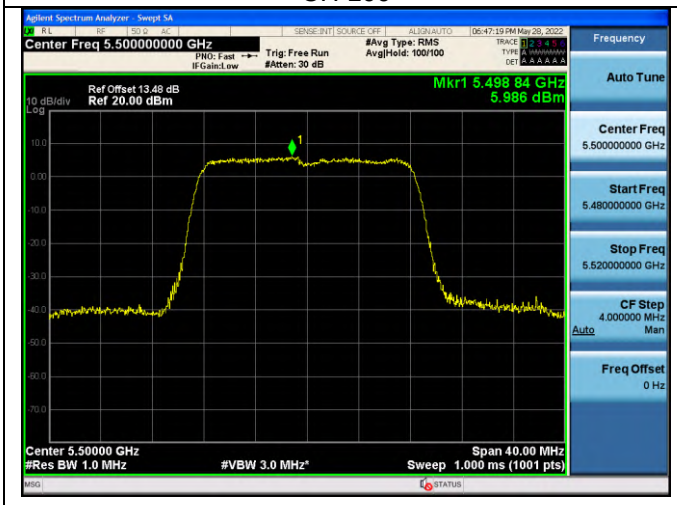	
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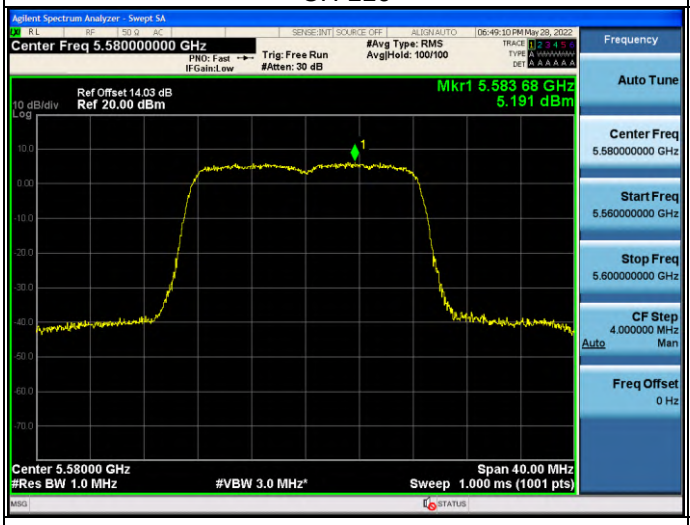	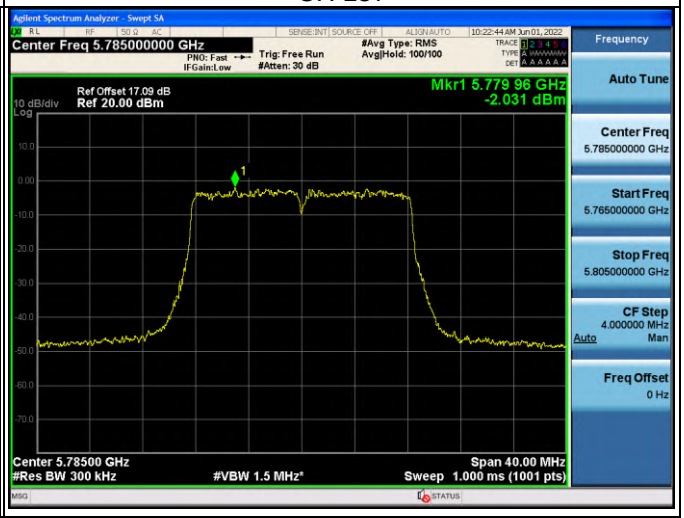
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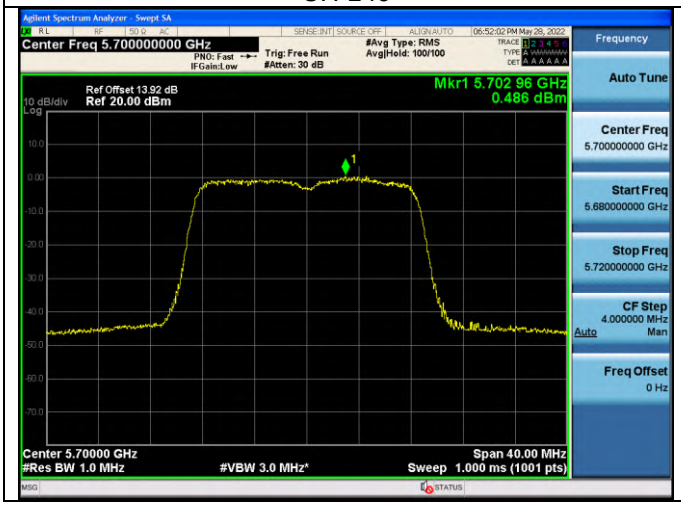	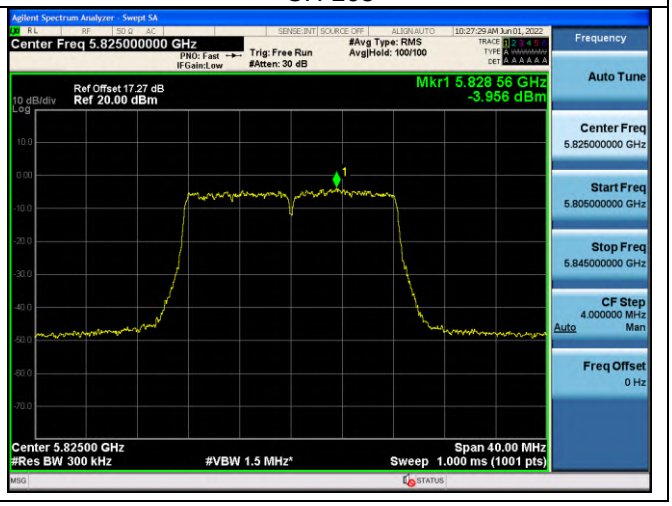

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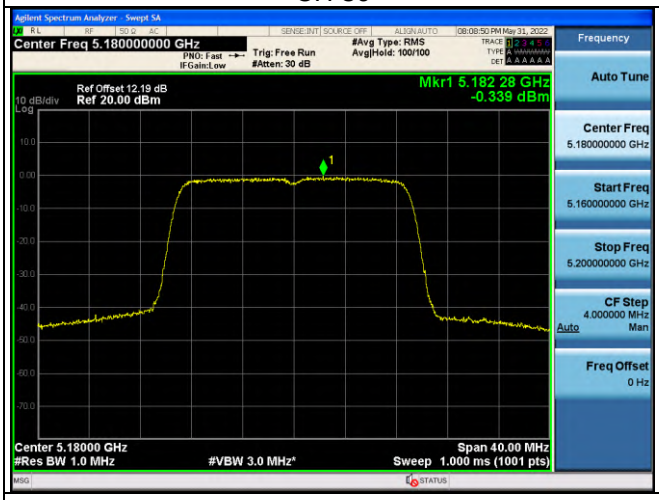	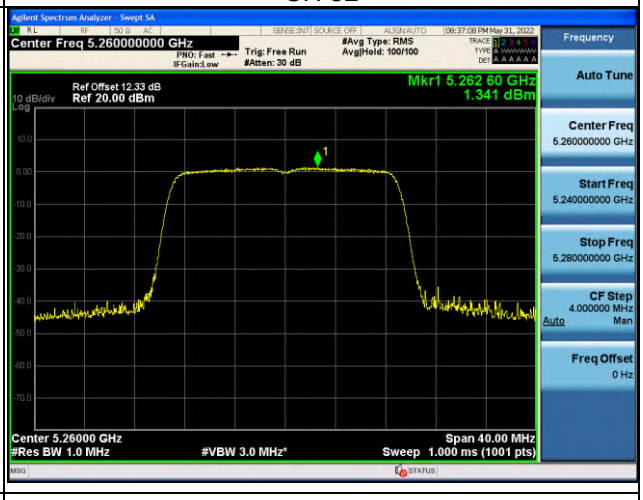
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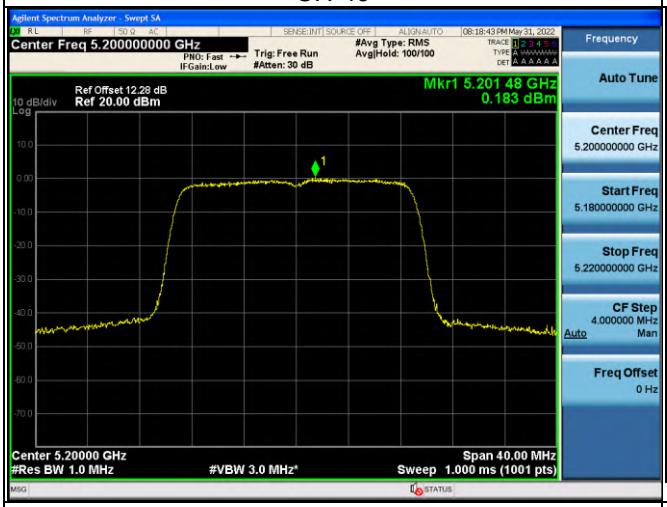	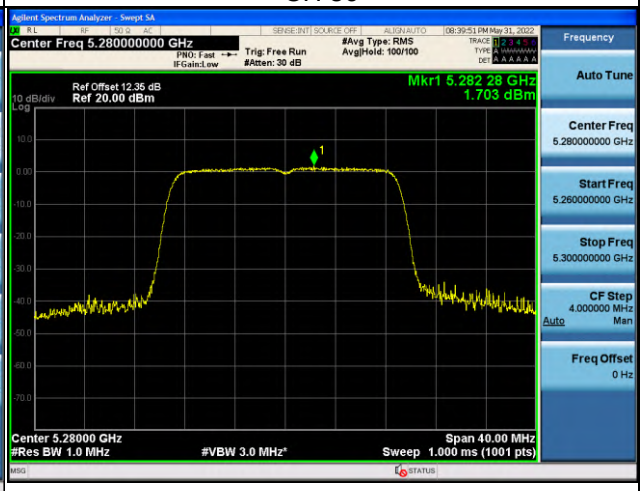
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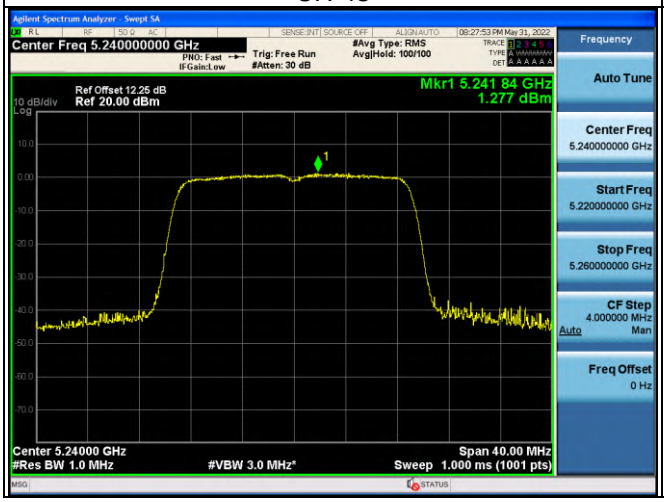	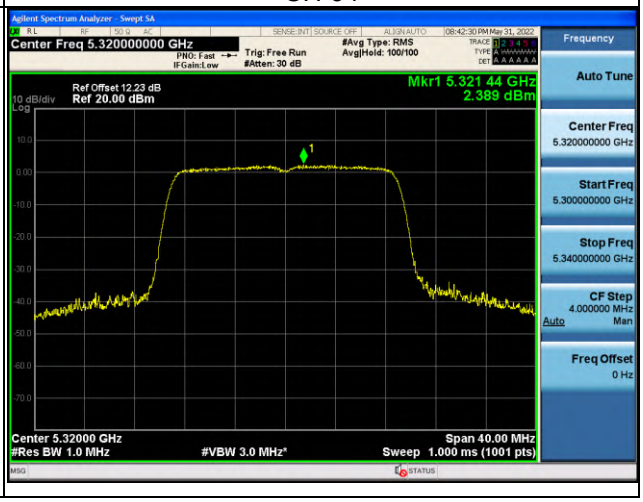

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	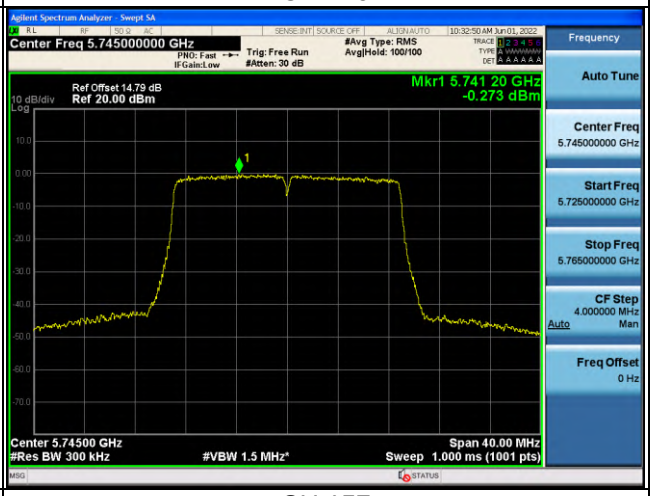
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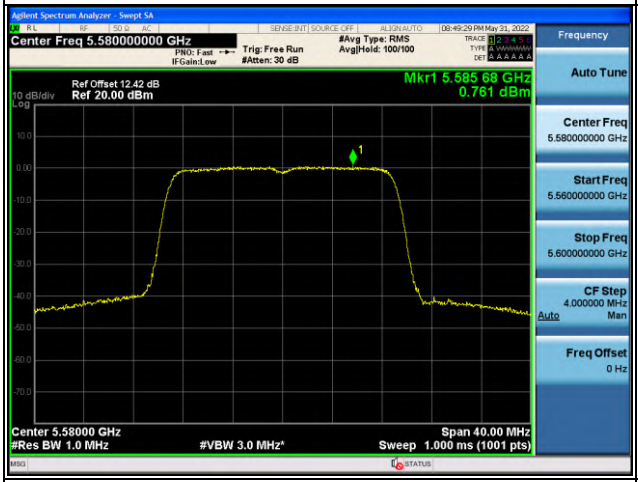	
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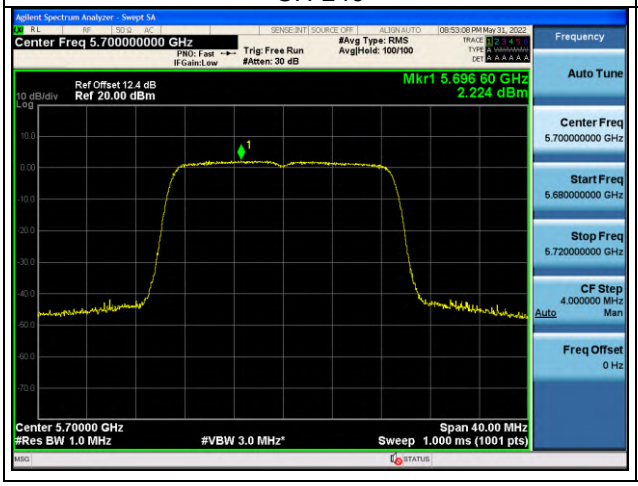	

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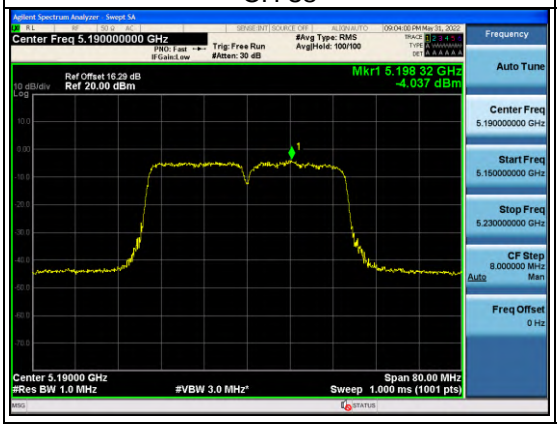	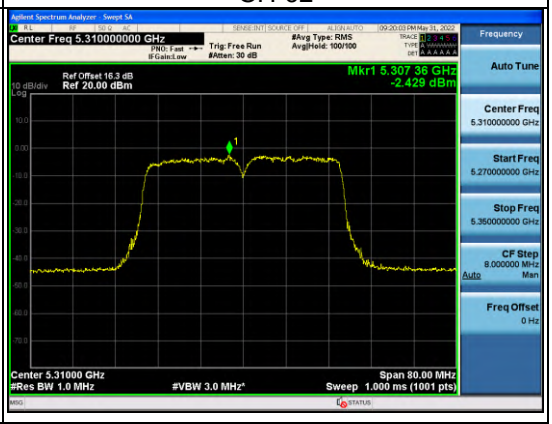
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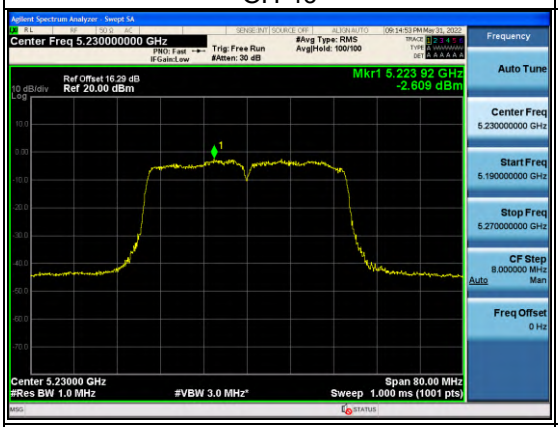	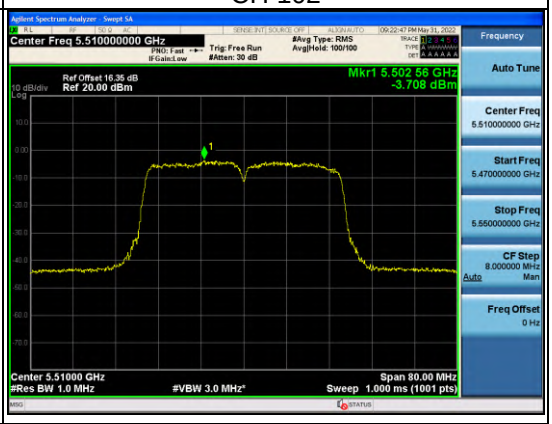
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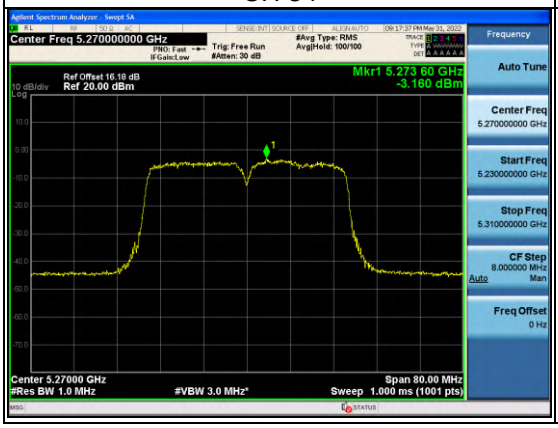	

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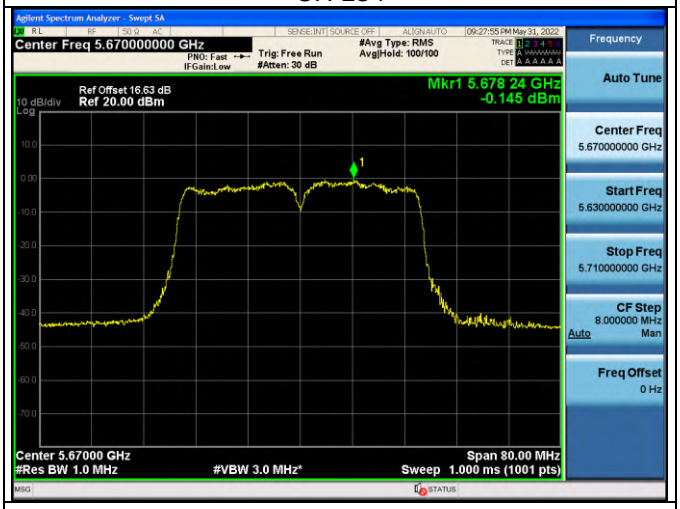
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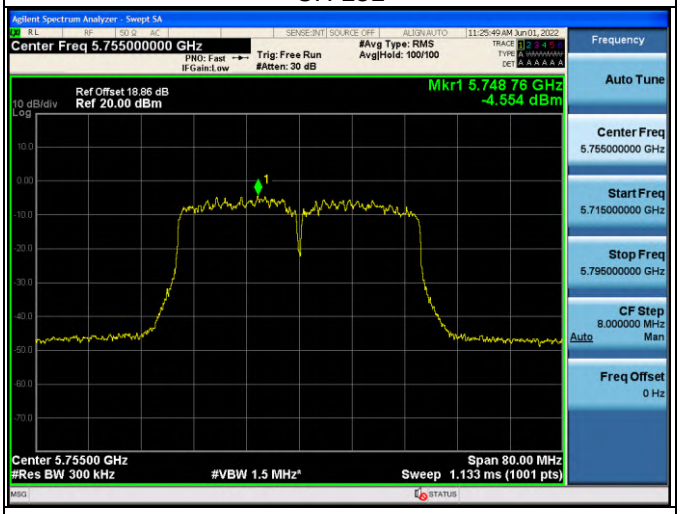
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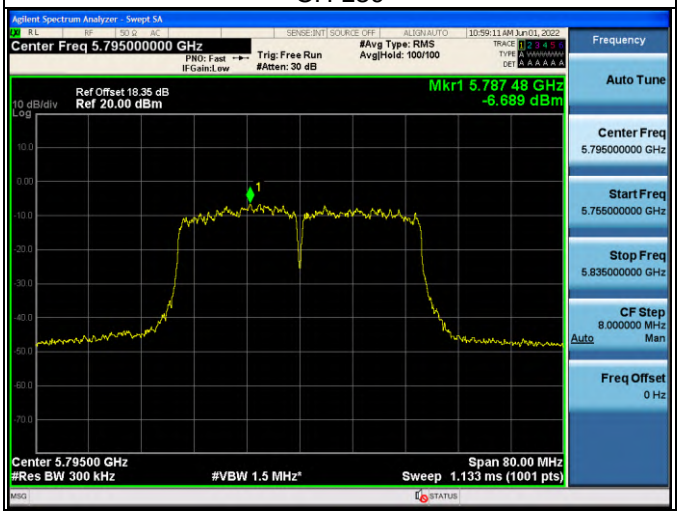

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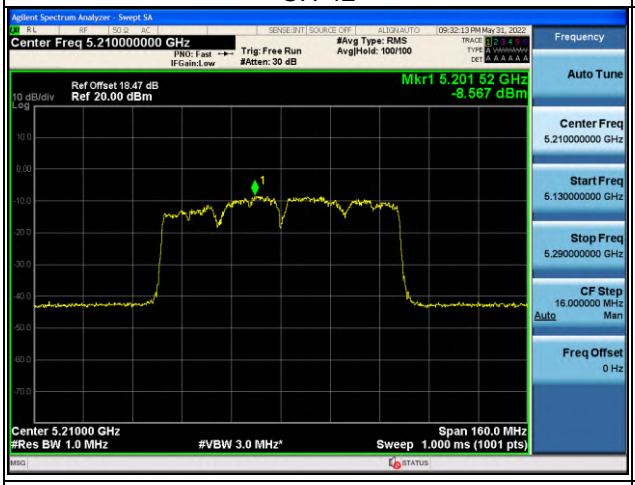	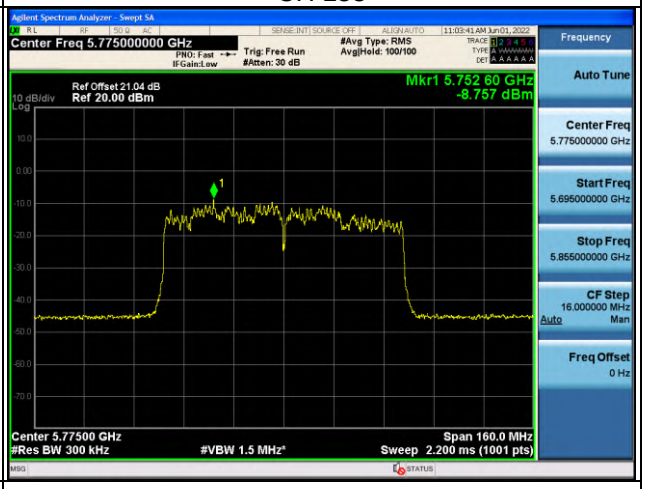
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	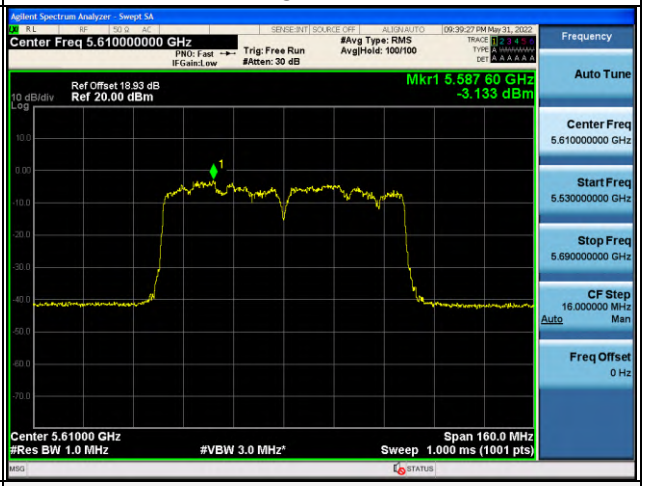
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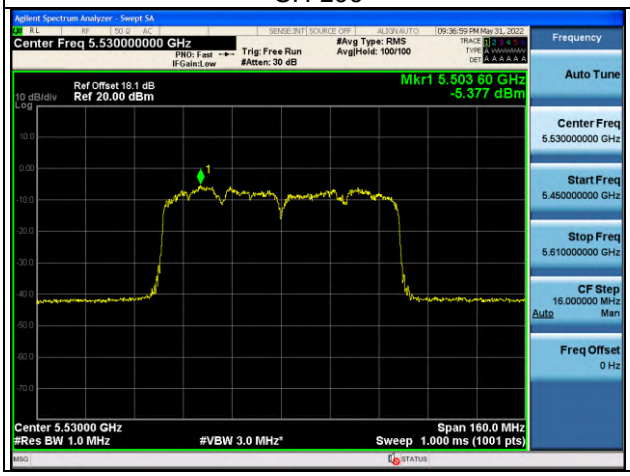
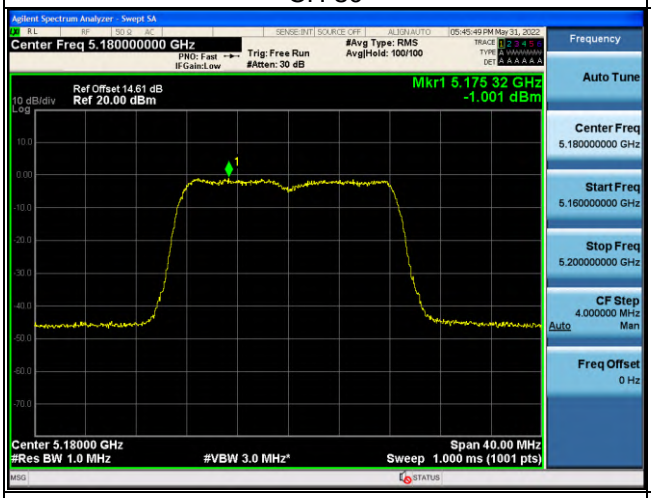
	

Peak Power Spectral Density-ANT1

802.11a

CH 36



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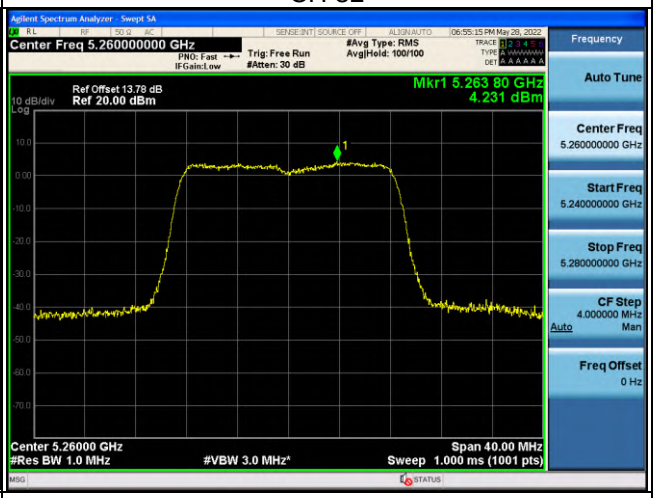

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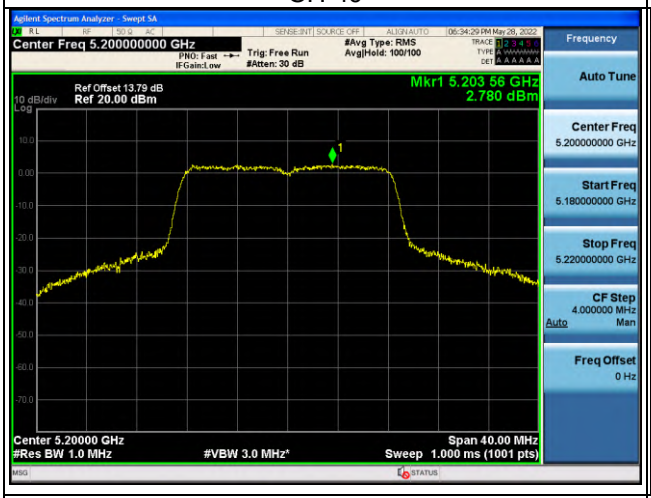
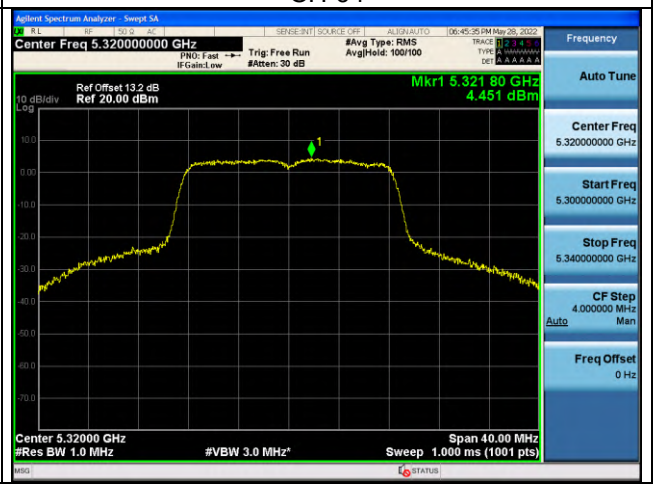


CH 56

CH 48

CH 64



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	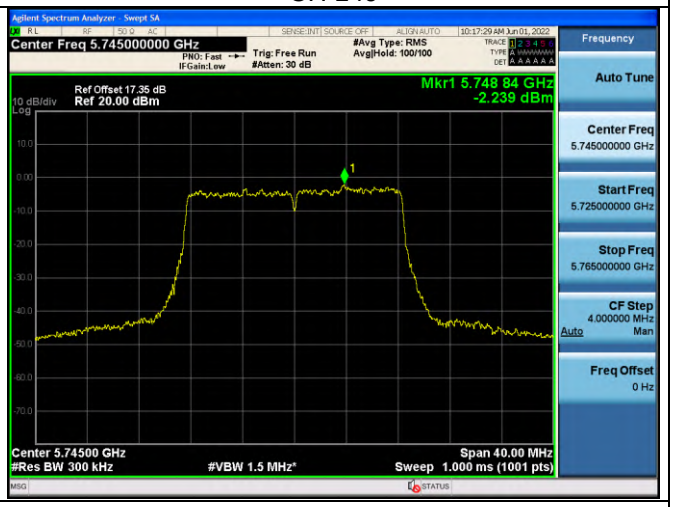
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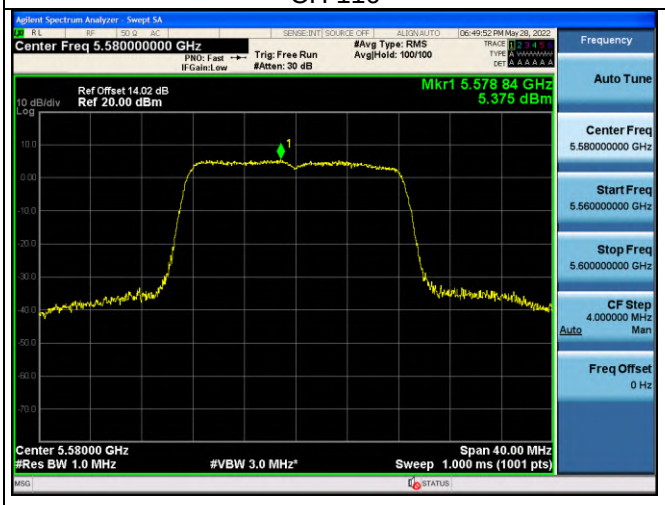	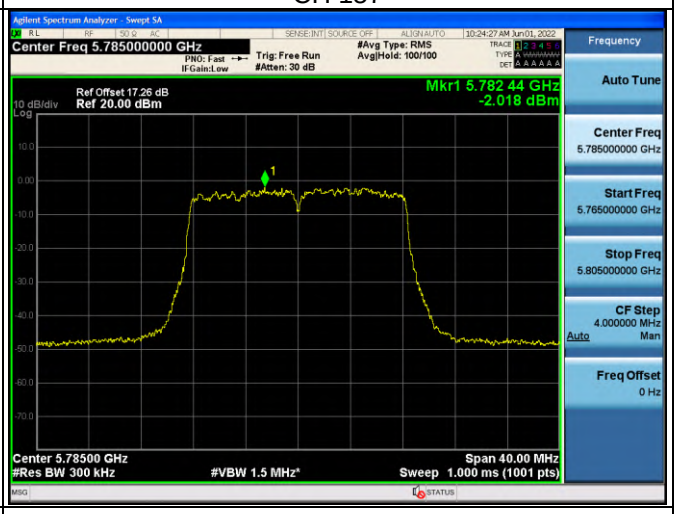
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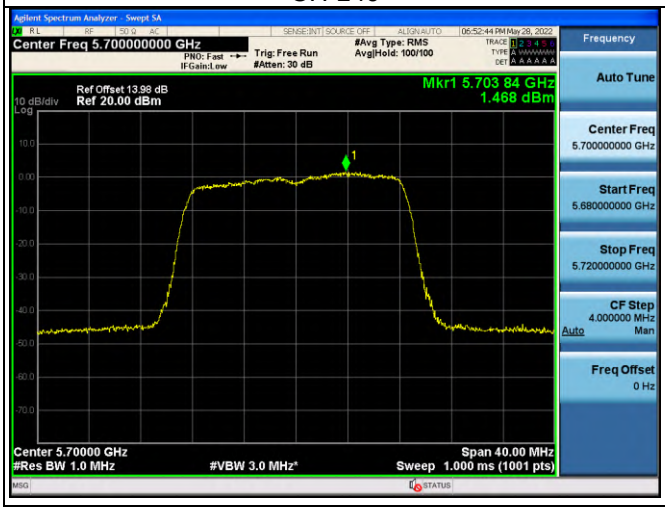	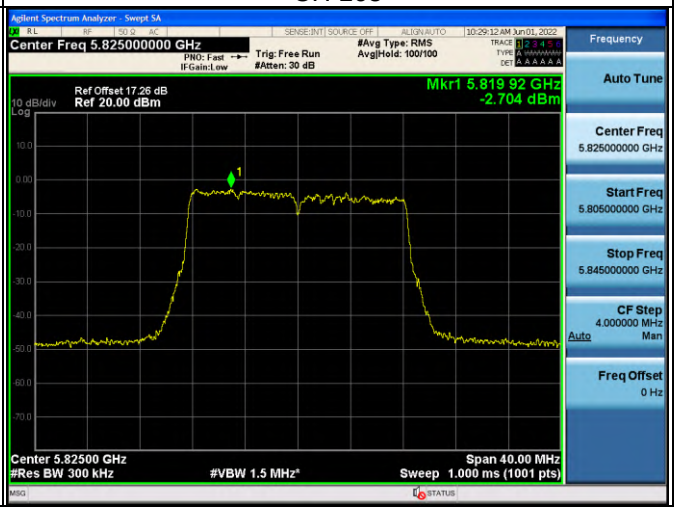

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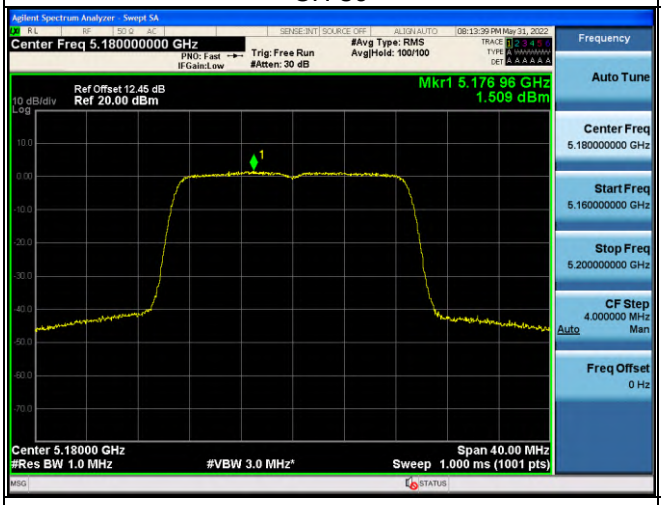	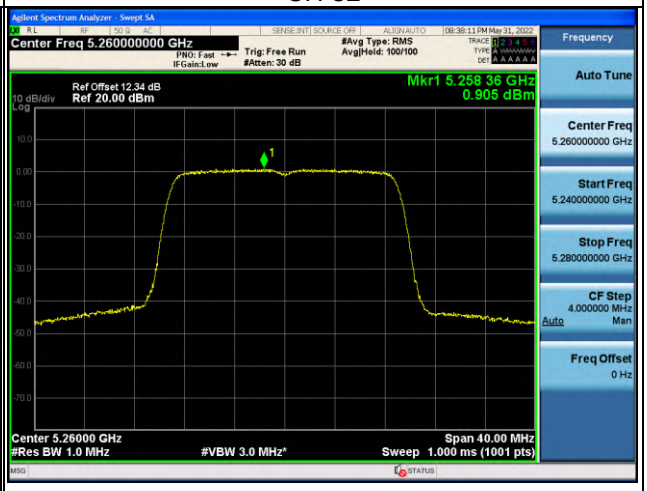
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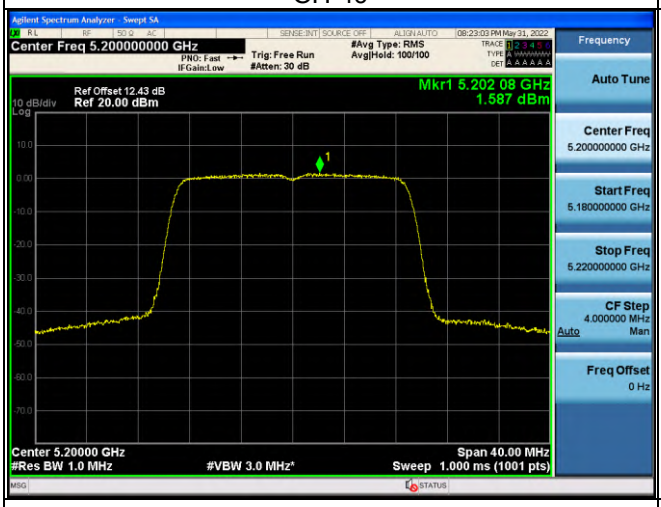	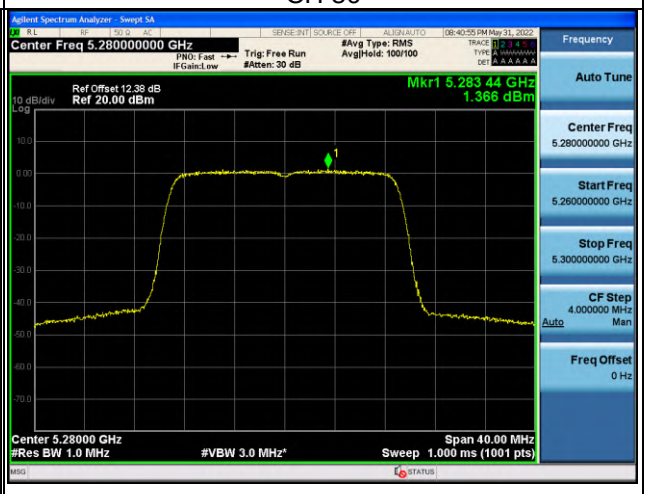
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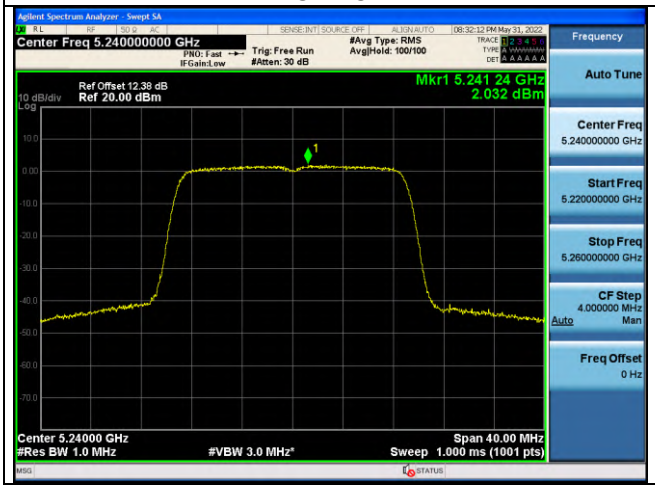
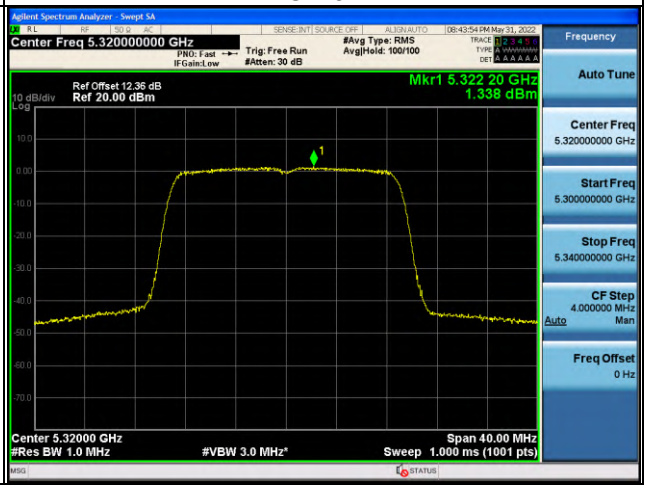
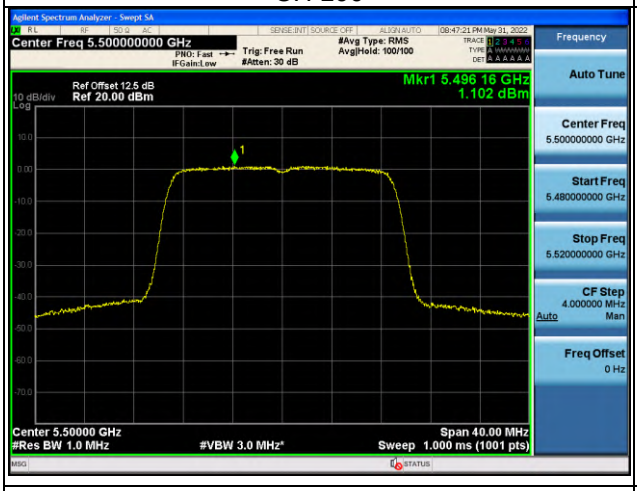
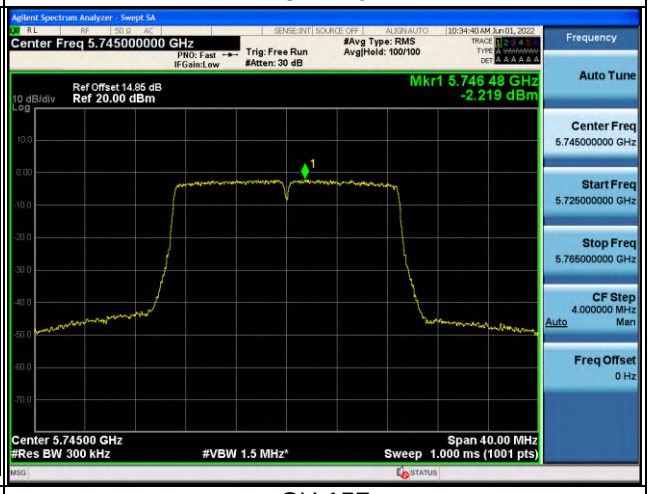
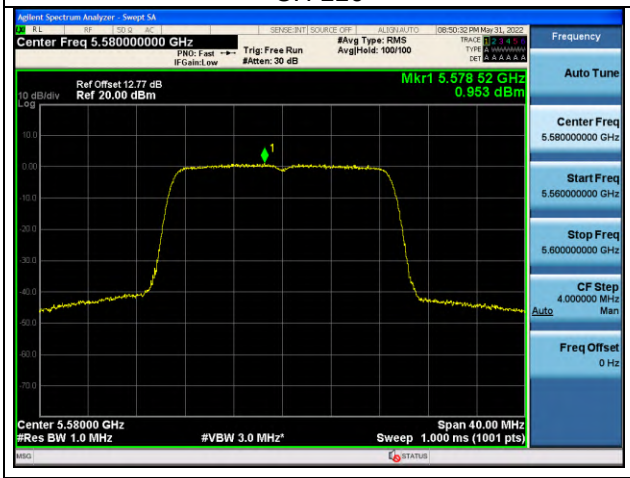
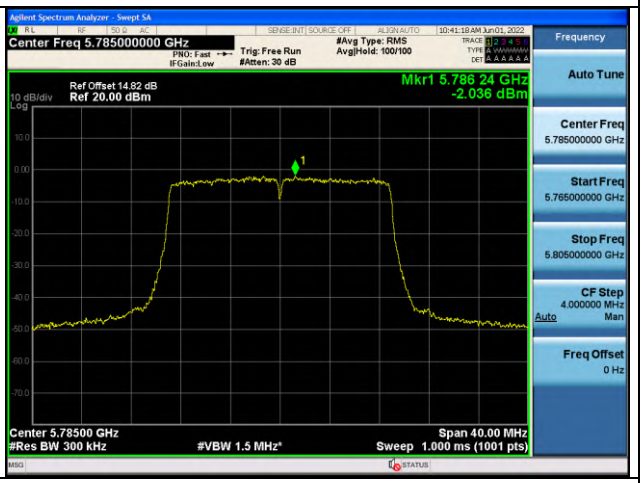
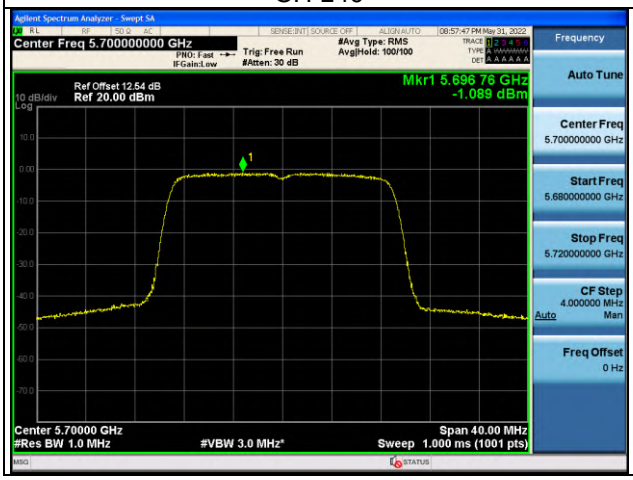
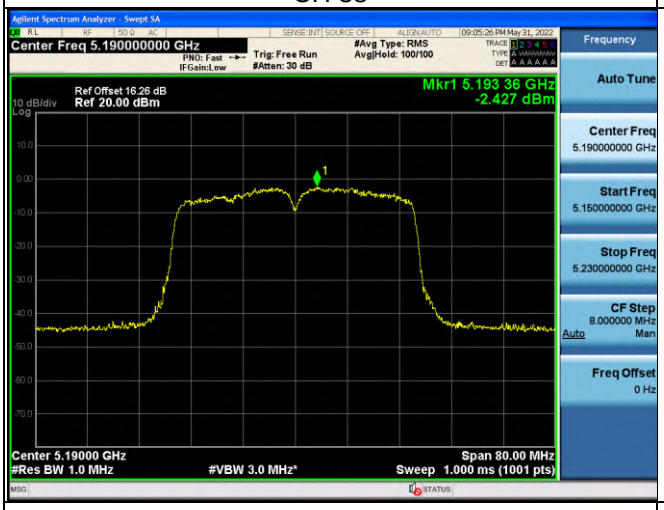
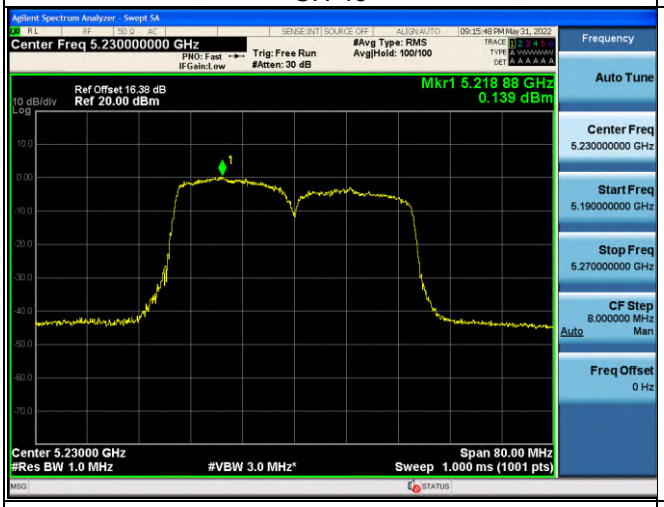
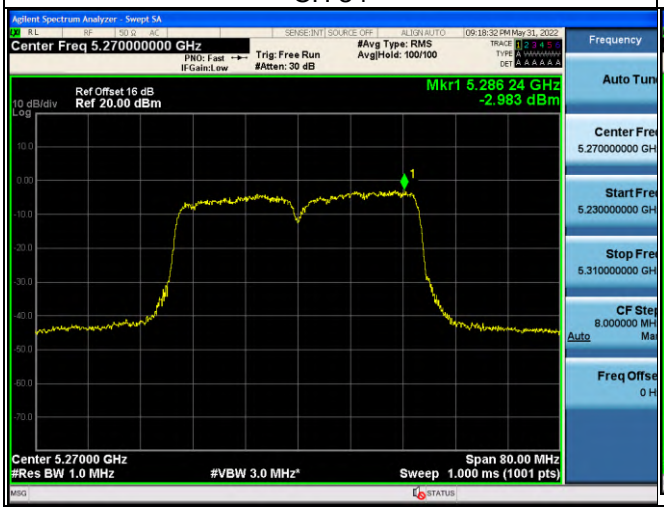
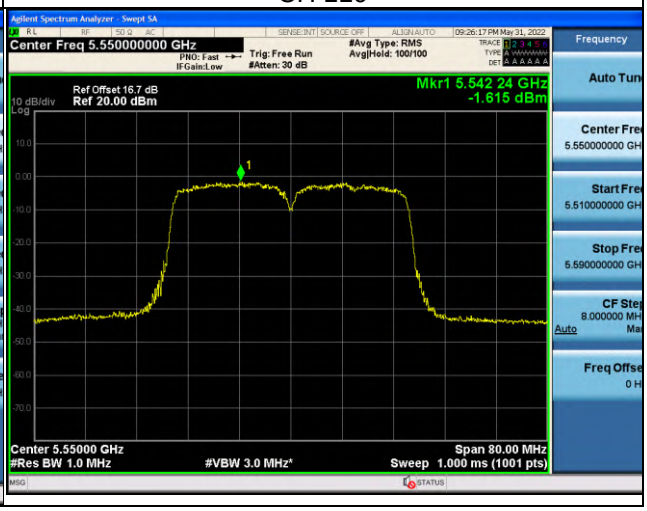
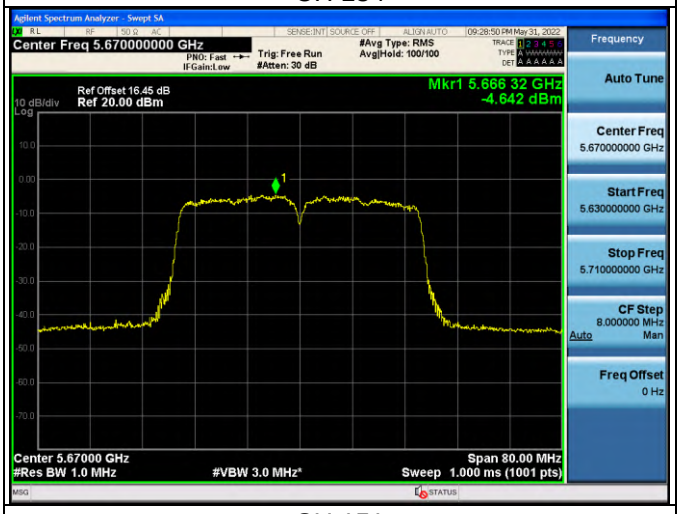
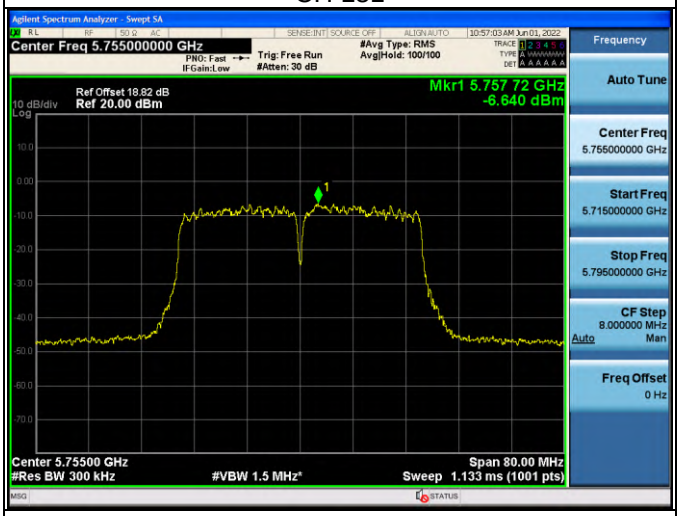
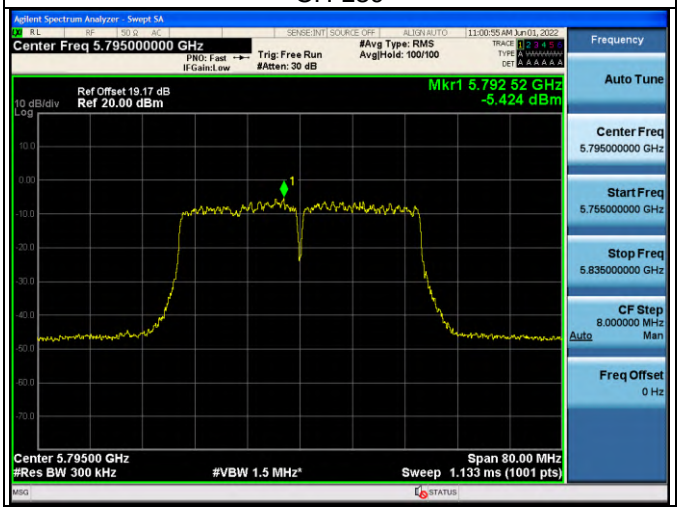
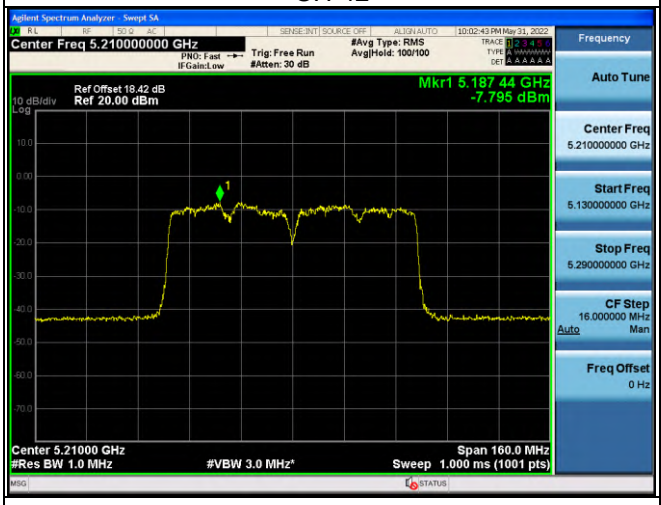
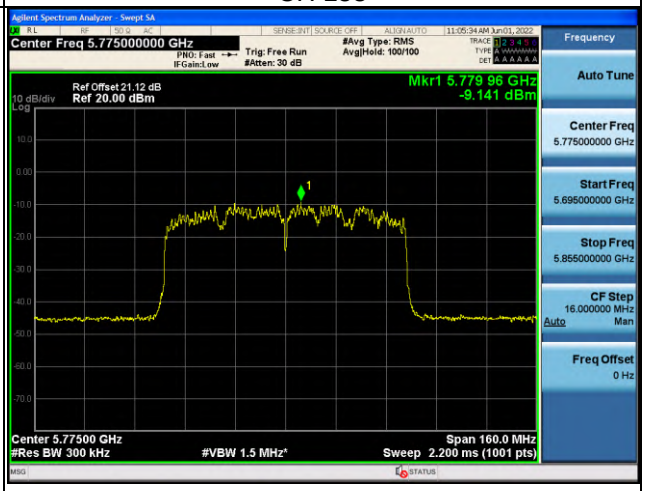
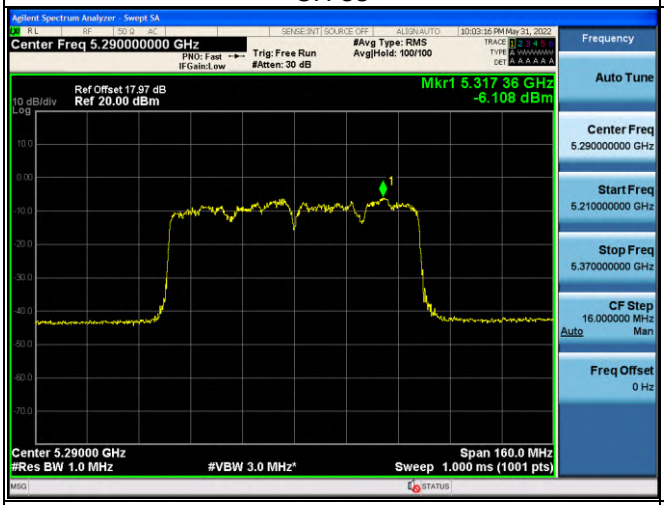
	

802.11n HT20	802.11n HT20
CH 100	CH 149
	
CH 116	CH 157
	
CH 140	CH 165
	

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

802.11n HT40
CH 134

CH 151

CH 159


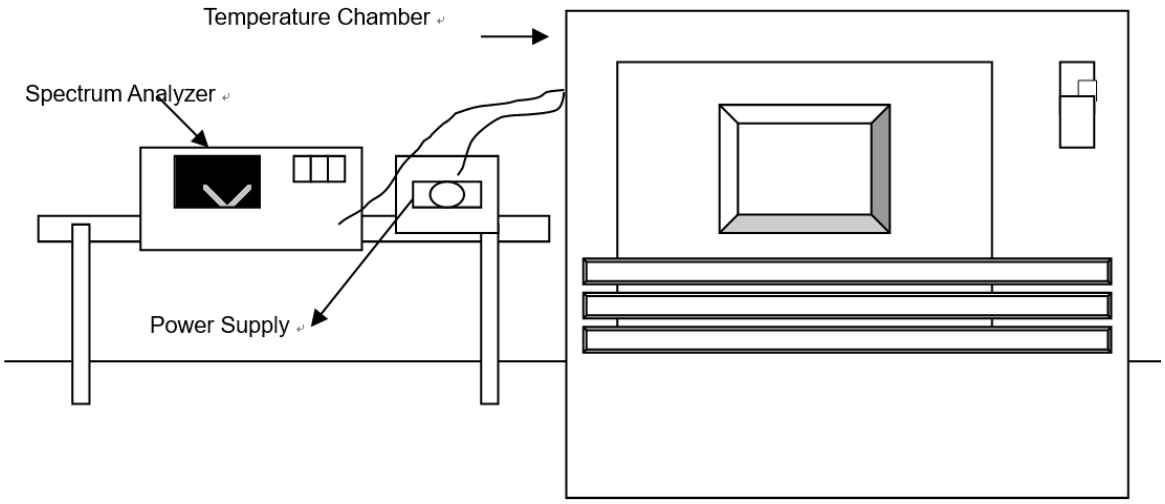
802.11ac VHT80	
CH 42	CH 155
	
CH 58	CH 122
	
CH 106	
	

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.-ANT 0									
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
25	138	5179.987	0.013	5180.002	-0.002	5179.998	0.002	5179.996	0.004
	120	5179.992	0.008	5180.007	-0.007	5179.996	0.004	5180.006	-0.006
	102	5179.996	0.004	5179.992	0.008	5179.992	0.008	5180.009	-0.009

Frequency stability versus temp..-ANT 0									
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	120	5179.987	0.013	5180.006	-0.006	5179.988	0.012	5180.011	-0.011
40	120	5179.992	0.008	5180.009	-0.009	5179.992	0.008	5180.004	-0.004
30	120	5179.989	0.011	5180.009	-0.009	5179.994	0.006	5180.014	-0.014
20	120	5179.992	0.008	5180.011	-0.011	5180.023	-0.023	5179.997	0.003
10	120	5180.004	-0.004	5179.988	0.012	5179.978	0.022	5180.009	-0.009
0	120	5179.991	0.009	5179.986	0.014	5179.992	0.008	5179.986	0.014
-10	120	5180.013	-0.013	5180.009	-0.009	5179.991	0.009	5180.006	-0.006
-20	120	5180.022	-0.022	5180.011	-0.011	5180.009	-0.009	5180.011	-0.011
-30	120	5179.989	0.011	5179.992	0.008	5179.992	0.008	5180.009	-0.009

Frequency stability versus temp.-ANT 1									
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
25	0	5179.992	0.008	5180.002	-0.002	5180.006	-0.006	5179.989	0.011
	0	5179.996	0.004	5180.009	-0.009	5180.002	-0.002	5179.991	0.009
	0	5179.9961	0.0039	5179.995	0.005	5180.011	-0.011	5180.004	-0.004

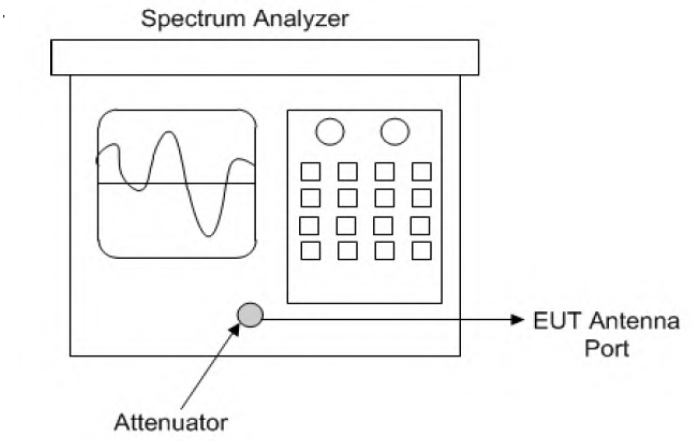
Frequency stability versus temp..-ANT 1									
Operating frequency: 5180MHz									
Temp.	Power supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
(℃)		Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift
50	0	5179.988	0.012	5179.992	0.008	5180.014	-0.014	5179.991	0.009
40	0	5179.992	0.008	5180.009	-0.009	5179.978	0.022	5180.013	-0.013
30	0	5179.991	0.009	5179.992	0.008	5180.011	-0.011	5179.978	0.022
20	0	5180.013	-0.013	5179.992	0.008	5180.009	-0.009	5180.022	-0.022
10	0	5179.978	0.022	5180.004	-0.004	5179.978	0.022	5180.006	-0.006
0	0	5179.992	0.008	5179.991	0.009	5179.992	0.008	5180.022	-0.022
-10	0	5179.991	0.009	5180.013	-0.013	5180.006	-0.006	5179.989	0.011
-20	0	5180.009	-0.009	5180.022	-0.022	5180.011	-0.011	5180.013	-0.013
-30	0	5179.992	0.008	5179.989	0.011	5180.009	-0.009	5180.014	-0.014

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.

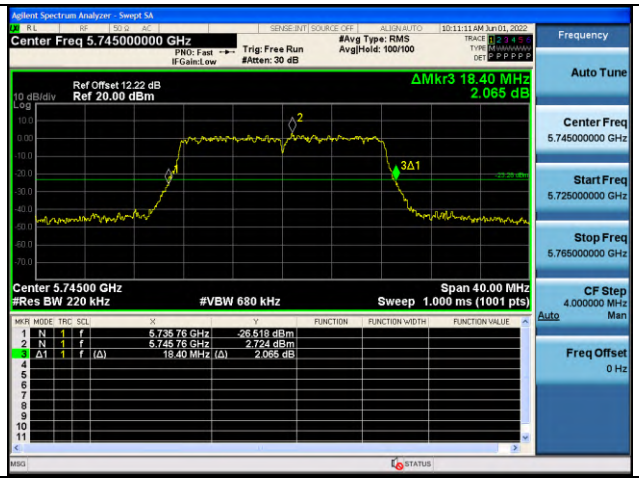
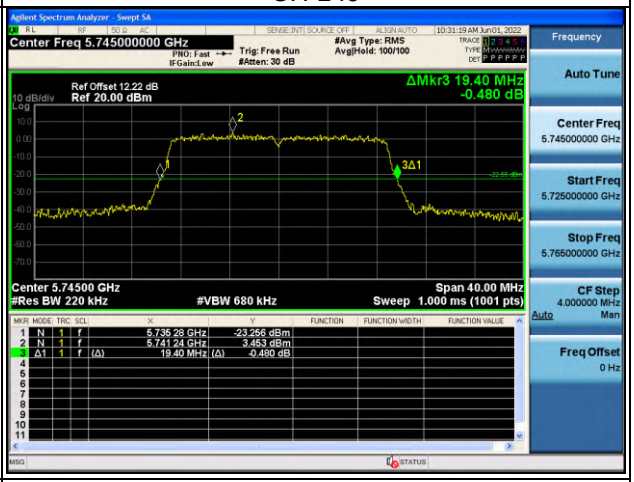
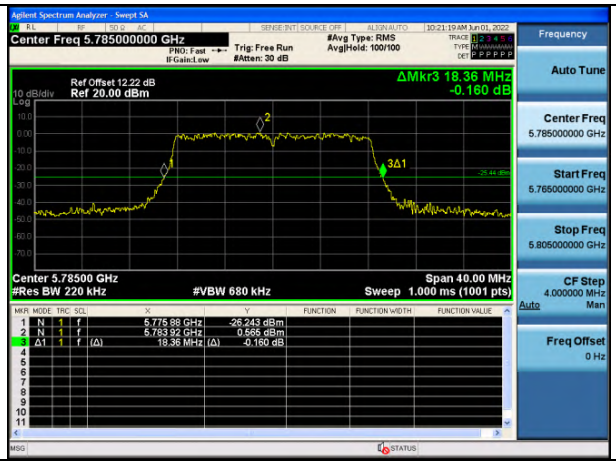
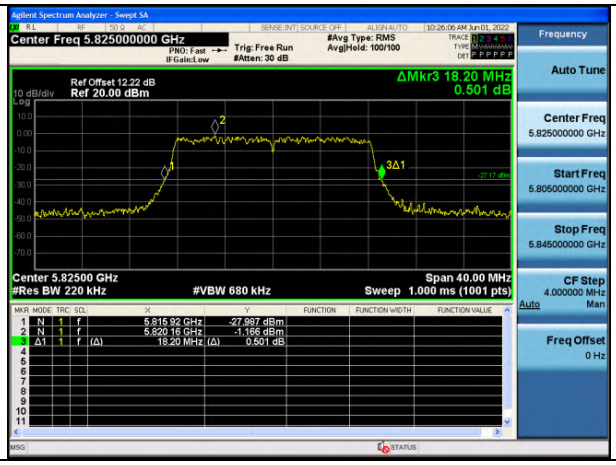
3.6.6 EUT Operating Condition

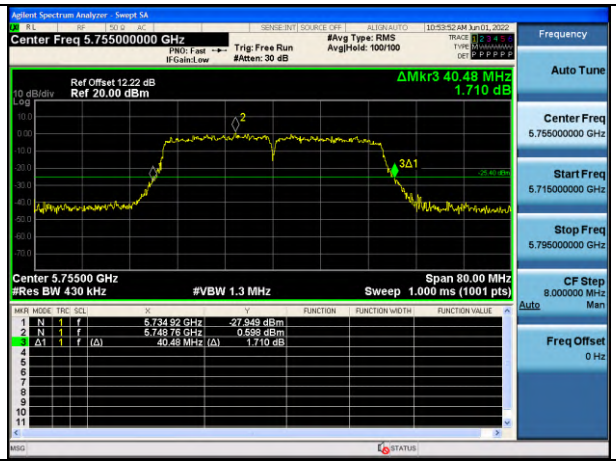
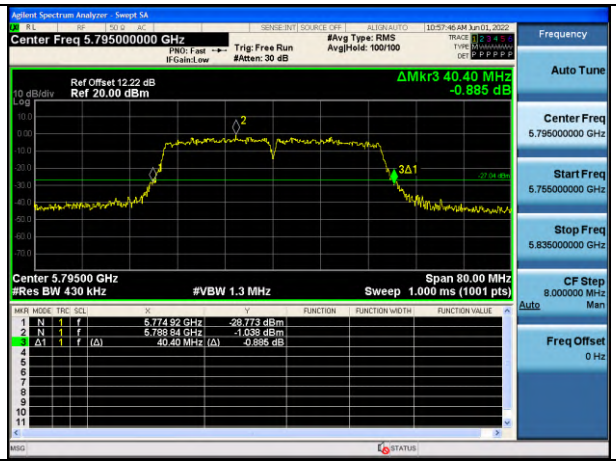
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.6.7 Test results

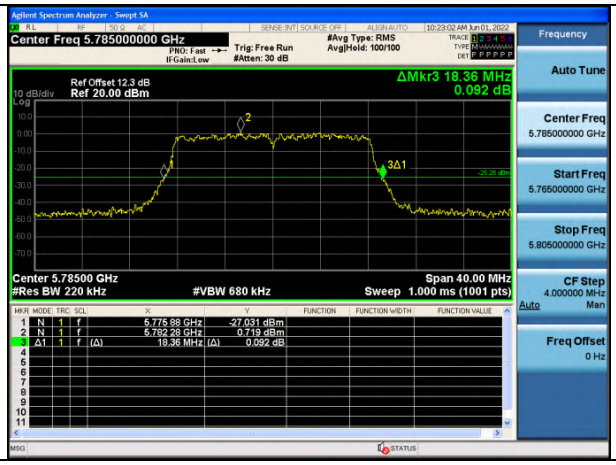
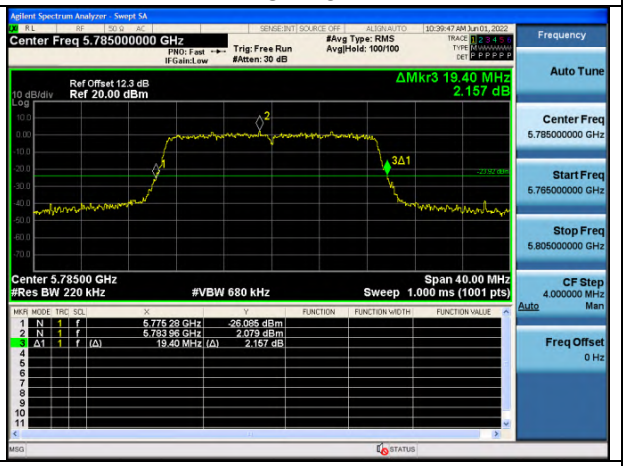
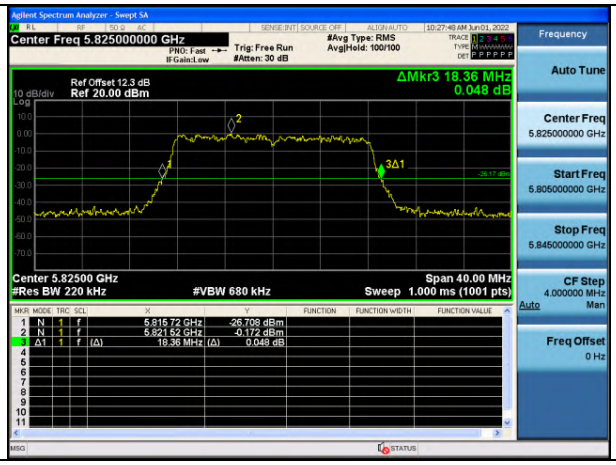
Test mode	Channel Number	Freq. (MHz)	6dBc bandwidth (MHz)		Limit (MHz)	Verdict
			ANT0	ANT1		
11a	149	5745	18.400	18.520	≥0.5	Pass
	157	5785	18.360	18.360	≥0.5	Pass
	165	5825	18.200	18.320	≥0.5	Pass
11n HT20	149	5745	19.400	19.320	≥0.5	Pass
	157	5785	19.320	19.400	≥0.5	Pass
	165	5825	19.560	19.400	≥0.5	Pass
11n HT40	151	5755	40.480	40.720	≥0.5	Pass
	159	5795	40.400	40.720	≥0.5	Pass
11ac VHT80	155	5775	80.160	80.800	≥0.5	Pass

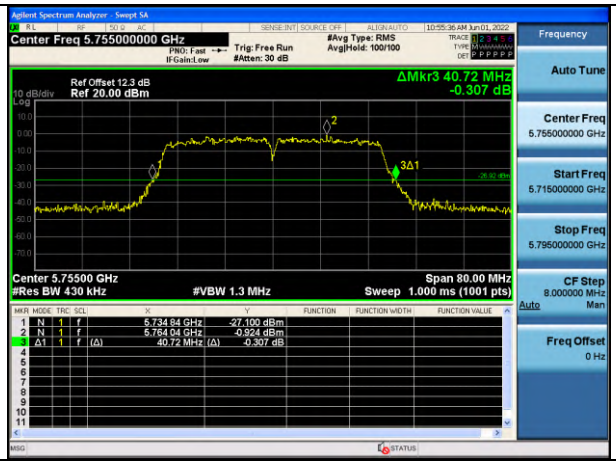
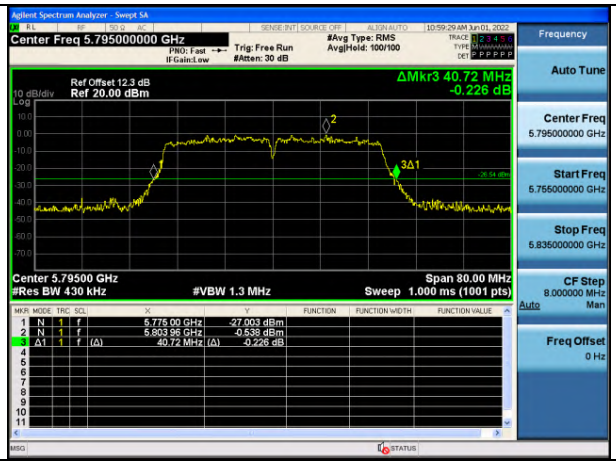
ANT0

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	
	

ANT1

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.	Next Date of Calibration
Spectrum Keysight	N9020A	MY51240612	2022/09/12
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2022/09/12
Power Meter 10Hz~18GHz Tonscend	JS0806-2	188060126	2022/09/12
Signal generator Keysight	E4421B	GB40051020	2022/09/12
Signal generator Keysight	N5182A	MY47420944	2022/09/12
Test Software Tonscend	JS0806-2	NA	NA
Hygrothermograph Yuhuaze	HTC-1	NA	2022/09/12

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:

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