Test Procedure

The measurement is according to section 3 of KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

Test Mode

Please refer to the clause 2.4.

Test Result

Mode	Channel	Ant. 1 (dBm)	Ant. 2 (dBm)	Total (dBm)	Limit (dBm)	Result
IEEE 802.11a	36	13.291	14.908	N/A	24	PASS
	40	13.720	15.023	N/A	24	PASS
	48	13.713	14.697	N/A	24	PASS
	52	13.505	14.510	N/A	24	PASS
	56	13.080	14.019	N/A	24	PASS
	64	12.379	13.206	N/A	24	PASS
	100	10.679	11.649	N/A	24	PASS
	116	11.912	12.761	N/A	24	PASS
	140	14.330	15.280	N/A	24	PASS
	149	14.924	15.736	N/A	30	PASS
	157	15.069	15.830	N/A	30	PASS
	165	14.536	15.326	N/A	30	PASS
IEEE 802.11n_20	36	8.811	9.208	12.024	24	PASS
	40	8.256	9.093	11.705	24	PASS
	48	7.772	8.727	11.286	24	PASS
	52	7.402	8.223	10.842	24	PASS
	56	6.966	7.716	10.367	24	PASS
	64	6.084	6.952	9.550	24	PASS
	100	4.623	5.340	8.007	24	PASS
	116	5.881	6.748	9.346	24	PASS
	140	8.551	9.316	11.961	24	PASS
	149	8.762	9.699	12.266	30	PASS
	157	8.890	9.770	12.363	30	PASS
	165	8.355	9.251	11.836	30	PASS
IEEE 802.11n_40	38	8.228	8.960	11.620	24	PASS
	46	8.045	8.887	11.497	24	PASS
	54	7.342	8.171	10.787	24	PASS
	62	6.865	7.679	10.301	24	PASS
	102	5.280	6.359	8.863	24	PASS
	110	5.897	6.702	9.328	24	PASS
	134	8.375	9.253	11.846	24	PASS
	151	9.544	10.481	13.048	30	PASS
	159	9.451	10.450	12.989	30	PASS
IEEE 802.11ac_20	36	8.960	9.782	12.401	24	PASS
	40	8.918	9.873	12.432	24	PASS
	48	9.392	10.315	12.888	24	PASS
	52	10.065	10.985	13.560	24	PASS
	56	10.336	11.117	13.754	24	PASS
	64	10.146	11.046	13.630	24	PASS
	100	9.621	10.555	13.123	24	PASS
	116	8.918	9.910	12.453	24	PASS
	140	9.414	10.412	12.952	24	PASS
	149	8.850	9.765	12.342	30	PASS
	157	9.792	10.708	13.284	30	PASS
	165	10.625	11.656	14.181	30	PASS
IEEE 802.11ac_40	38	9.103	10.086	12.633	24	PASS
	46	9.500	10.302	12.930	24	PASS
	54	10.390	11.254	13.854	24	PASS
	62	10.314	11.300	13.845	24	PASS
	102	9.706	10.599	13.186	24	PASS
	110	9.208	10.124	12.700	24	PASS

	134	9.569	9.938	12.768	24	PASS
	151	9.608	10.518	13.097	30	PASS
	159	9.439	10.524	13.026	30	PASS
IEEE 802.11ac_80	42	9.433	9.221	12.339	24	PASS
	58	6.758	7.747	10.291	24	PASS
	106	5.374	6.307	8.876	24	PASS
	122	6.304	7.083	9.721	24	PASS
	155	9.450	10.361	12.940	30	PASS

3.6. Power Spectral Density

Limit

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a)

For the 5.15~5.25GHz band:

- Outdoor AP

  The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
  If G_{Tx}>6dBi, then PSD =17-(G_{Tx}-6).

- Indoor AP

  The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
  If G_{Tx}>6dBi, then PSD =17-(G_{Tx}-6).

- Point-to-point AP

  The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
  If G_{Tx}>23dBi, then PSD =17-(G_{Tx}-23).

- Client devices

  The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
  If G_{Tx}>6dBi, then PSD =11-(G_{Tx}-6).

For the 5.25~5.35GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If G_{Tx}>6dBi, then PSD =11-(G_{Tx}-6).

For the 5.47~5.725GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If G_{Tx}>6dBi, then PSD =11-(G_{Tx}-6).

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)

  The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.
  If G_{Tx}>6dBi, then PSD =30-(G_{Tx}-6).

- Point-to-point systems (P2P)

  The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.

Note: G_{Tx}: EUT Antenna gain.

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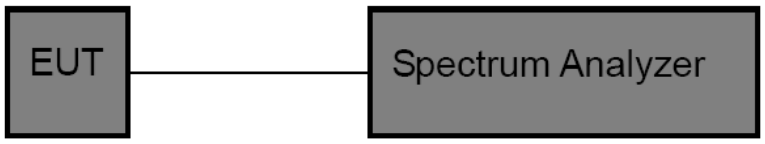
IC Power&PSD Limit

Frequency	Type of devices	Maximum Conducted Output Power	EIRP Output Power	Conducted Power Spectral Density	EIRP Power Spectral Density
5150MHz-5250MHz	in vehicles		30mW or 1.76 + 10 × log10B dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices		200mW or 10 + 10 × log10B dBm, whichever is less (B=99% OBW in MHz)		10dBm/MHz
5250MHz-5350MHz	in vehicles		30mW or 1.76 + 10 × log10B dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices	250mW or 11 + 10 × log10B dBm, whichever is less (B=99% OBW in MHz)	1W or 17 + 10 ×log10B dBm, whichever is less (B=99% OBW in MHz)	11dBm/Mhz	
5470MHz-5600MHz 5650MHz-5725MHz	ALL Devices	250mW or 11 + 10 × log10B dBm, whichever is less (B=99% OBW in MHz)	1W or 17 + 10 ×log10B dBm, whichever is less (B=99% OBW in MHz)	11dBm/Mhz	
5725MHz-5850MHz	ALL Devices	1W		30dBm/500KHz	

Test Configuration



Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Set analyzer center frequency to transmitting frequency.
(3) Set the span to encompass the entire emissions bandwidth (EBW) (alternatively, the entire 99% OBW) of the signal.
(4) RBW=1MHz for devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz RBW=500kHz for devices operating in the band 5.725-5.85 GHz.
(5) Set the VBW to: ⩾ 3 RBW
(6) Detector: AVG
(7) Trace: Max Hold and View
(7) Sweep time: auto
(8) Trace average at least 100 traces in power averaging.
(9) User the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.

NOTE: The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

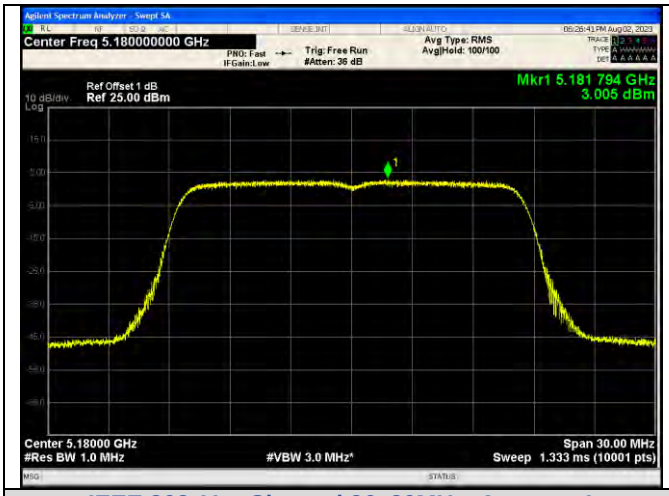
Test Mode

Please refer to the clause 2.4.

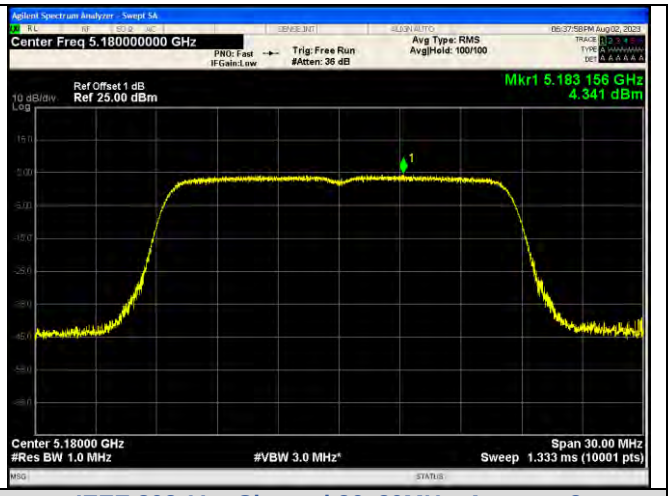
Test Result

Mode	Channel	Ant. 1 Meas PSD (dBm/MHz or dBm/0.5MHz)	Ant. 2 Meas PSD (dBm/MHz or dBm/0.5MHz)	Total PSD (dBm/MHz or dBm/0.5MHz)	Limit (dBm/MHz or dBm/0.5MHz)	Result
IEEE 802.11a	36	3.005	4.341	N/A	11	PASS
	40	3.268	4.380	N/A		PASS
	48	3.599	4.503	N/A		PASS
	52	3.255	4.418	N/A		PASS
	56	2.780	3.621	N/A		PASS
	64	1.876	2.730	N/A		PASS
	100	0.294	1.305	N/A		PASS
	116	0.978	1.810	N/A		PASS
	140	3.803	4.783	N/A		PASS
	149	1.396	2.116	N/A		PASS
	157	1.554	2.364	N/A		PASS
	165	0.991	1.883	N/A		PASS
IEEE 802.11n_20	36	-2.107	-1.462	1.261		PASS
	40	-2.606	-1.652	0.930		PASS
	48	-2.792	-1.863	0.731		PASS
	52	-3.067	-2.345	0.342		PASS
	56	-3.303	-2.868	-0.047		PASS
	64	-4.699	-3.912	-1.254		PASS
	100	-5.959	-5.102	-2.476		PASS
	116	-5.226	-4.267	-1.687		PASS
	140	-2.295	-1.579	1.110		PASS
	149	-5.037	-4.151	-1.538		PASS
	157	-4.781	-4.100	-1.394		PASS
	165	-5.450	-4.604	-1.973		PASS
IEEE 802.11n_40	38	-5.331	-4.651	-1.920		PASS
	46	-5.782	-4.756	-2.182		PASS
	54	-6.243	-5.433	-2.762		PASS
	62	-7.045	-6.196	-3.542		PASS
	102	-8.382	-7.165	-4.674		PASS
	110	-8.203	-7.481	-4.769		PASS
	134	-5.115	-4.258	-1.608		PASS
	151	-7.385	-6.367	-3.789		PASS
	159	-7.121	-5.892	-3.406		PASS
IEEE 802.11ac_20	36	-1.307	-0.354	2.228		PASS
	40	-1.641	-0.410	2.051		PASS
	48	-1.598	-0.767	1.870		PASS
	52	-0.858	0.001	2.625		PASS
	56	-0.497	0.529	3.080		PASS
	64	-0.552	0.316	2.936		PASS
	100	-1.053	-0.045	2.513		PASS
	116	-2.107	-1.253	1.374		PASS
	140	-0.907	0.306	2.775		PASS
	149	-4.830	-3.601	-1.139		PASS
	157	-4.230	-3.424	-0.776		PASS
	165	-3.131	-2.293	0.341		PASS
IEEE 802.11ac_40	38	-4.233	-3.374	-0.725		PASS
	46	-4.573	-3.541	-0.970		PASS
	54	-3.391	-2.682	0.034		PASS
	62	-3.382	-2.428	0.179		PASS
	102	-3.603	-2.784	-0.117		PASS
	110	-4.354	-3.311	-0.744		PASS
	134	-4.161	-3.628	-0.829		PASS
	151	-7.284	-6.379	-3.751		PASS
	159	-7.304	-6.129	-3.620		PASS
IEEE 802.11ac_80	42	-7.263	-7.298	-4.181		PASS
	58	-9.215	-8.291	-5.627		PASS
	106	-10.504	-9.709	-6.987		PASS
	122	-9.986	-9.623	-6.701		PASS
	155	-9.625	-8.531	-5.942		PASS

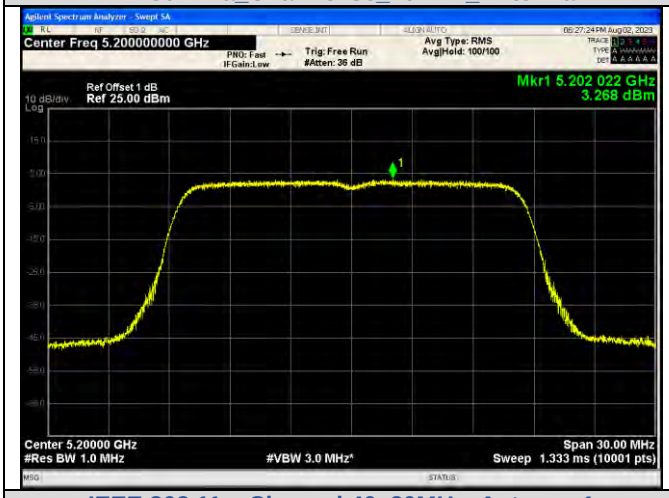
Test plot as follows:



IEEE 802.11a_Channel 36_20MHz_Antenna 1

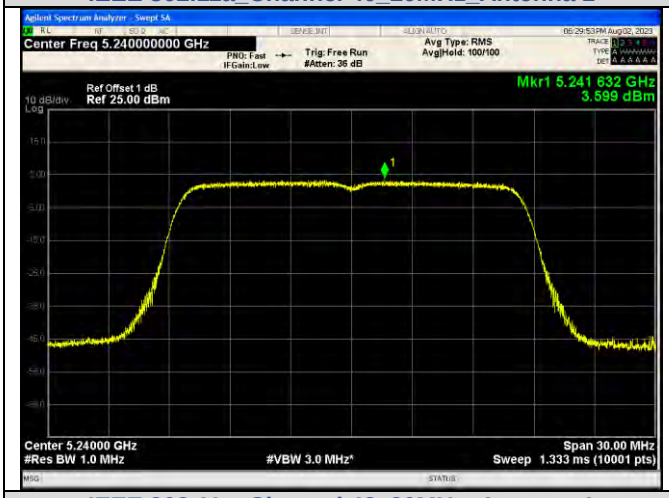


IEEE 802.11a_Channel 36_20MHz_Antenna 2

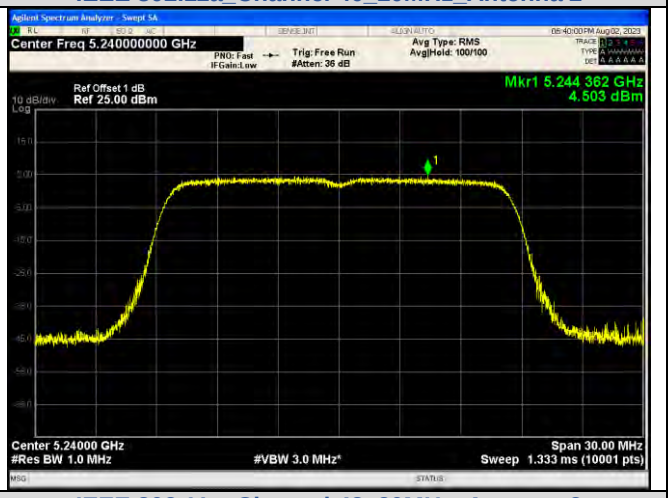


IEEE 802.11a_Channel 40_20MHz_Antenna 1

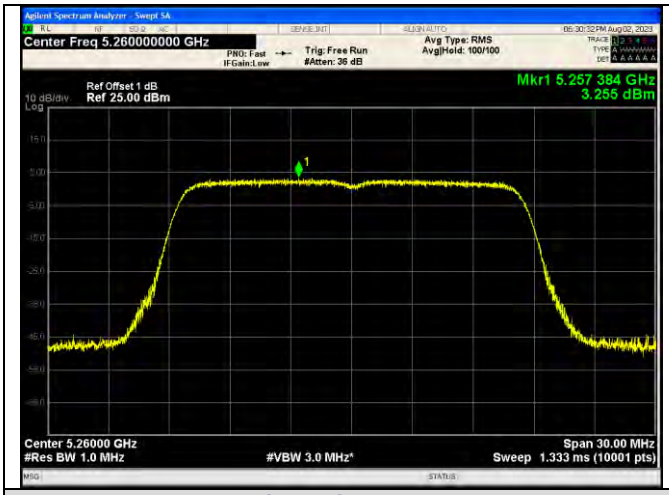
IEEE 802.11a_Channel 40_20MHz_Antenna 2



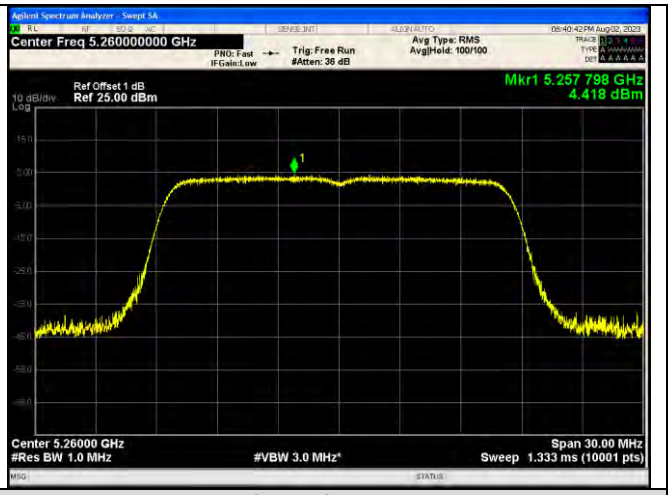
IEEE 802.11a_Channel 48_20MHz_Antenna 1



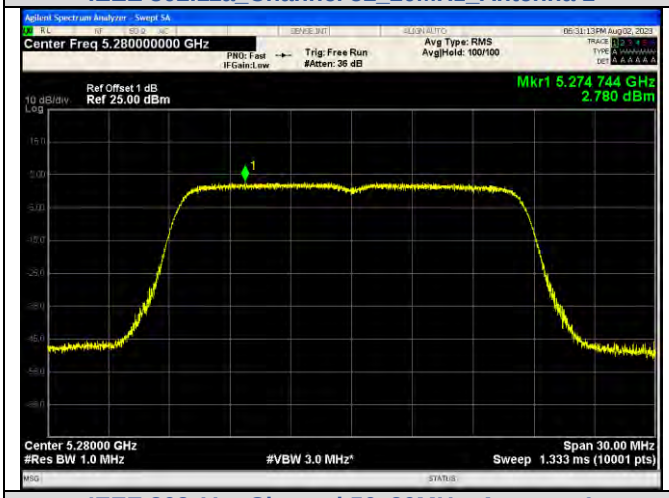
IEEE 802.11a_Channel 48_20MHz_Antenna 2



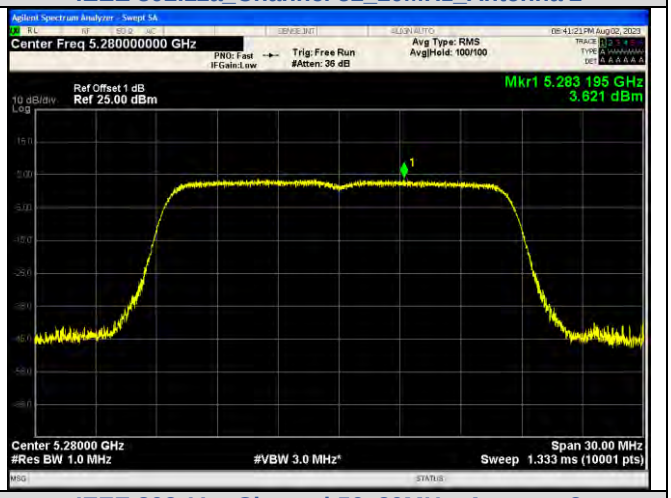
IEEE 802.11a_Channel 52_20MHz_Antenna 1



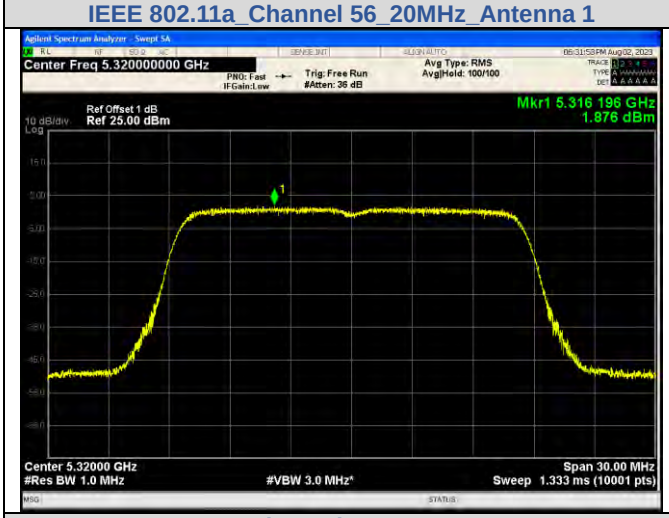
IEEE 802.11a_Channel 52_20MHz_Antenna 2



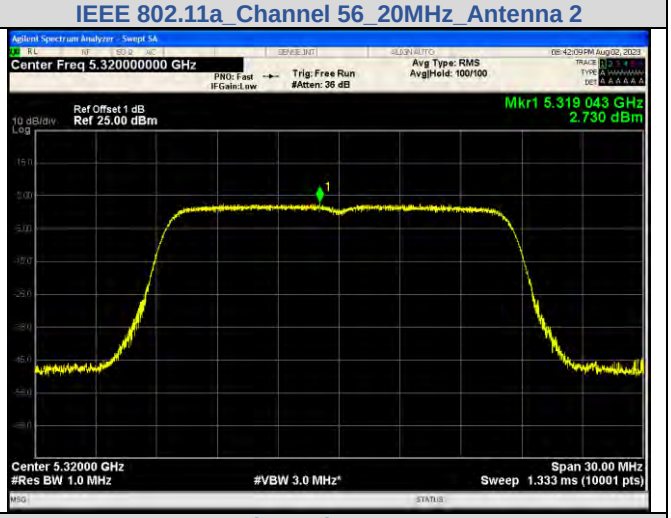
IEEE 802.11a_Channel 56_20MHz_Antenna 1



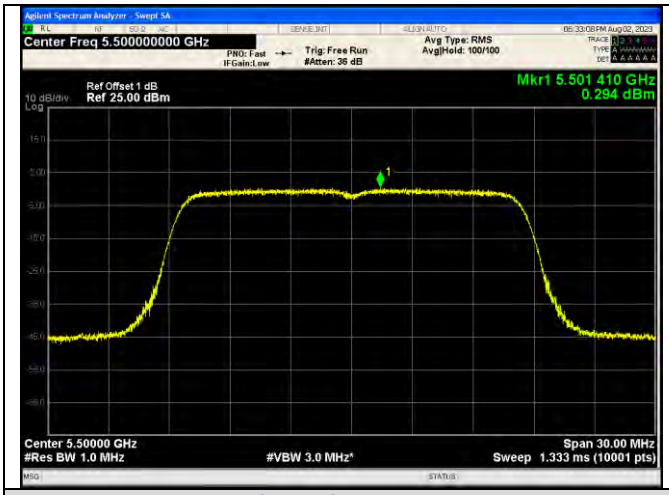
IEEE 802.11a_Channel 56_20MHz_Antenna 2



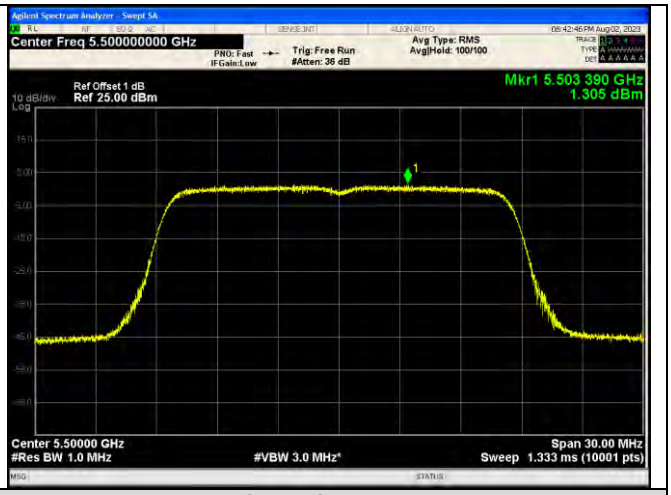
IEEE 802.11a_Channel 64_20MHz_Antenna 1



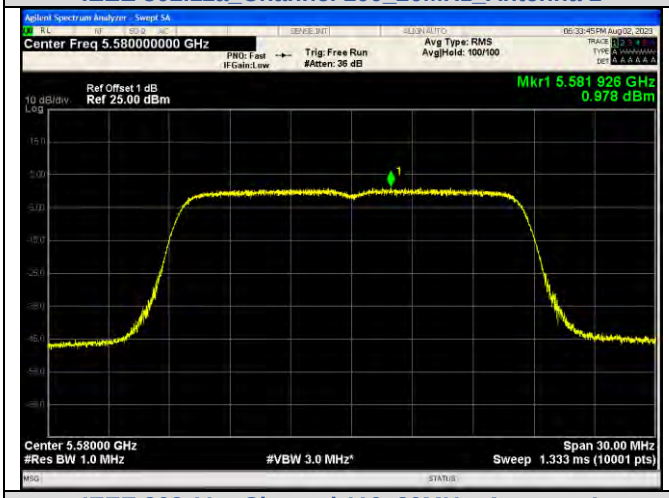
IEEE 802.11a_Channel 64_20MHz_Antenna 2



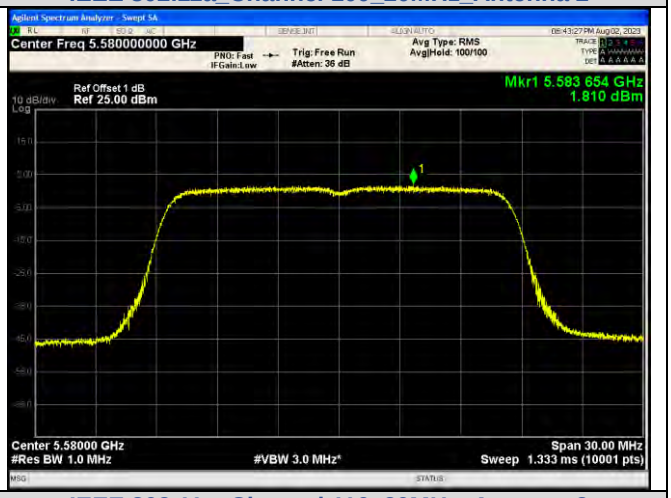
IEEE 802.11a_Channel 100_20MHz_Antenna 1



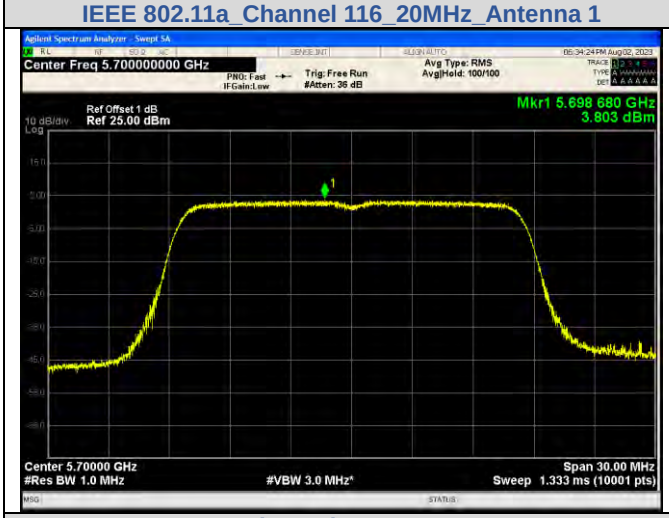
IEEE 802.11a_Channel 100_20MHz_Antenna 2



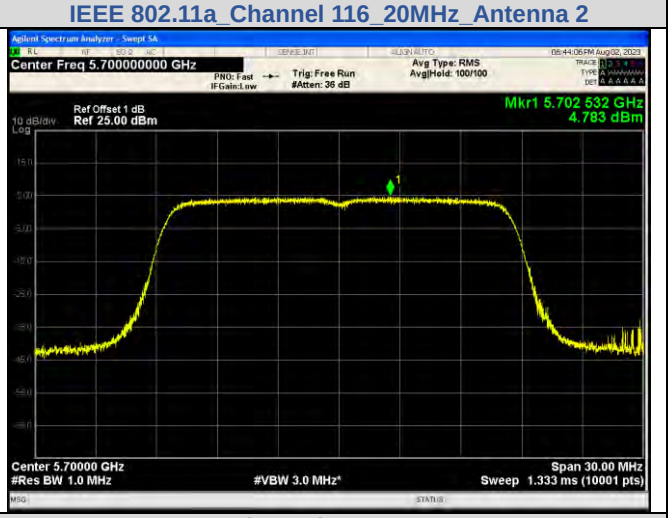
IEEE 802.11a_Channel 116_20MHz_Antenna 1



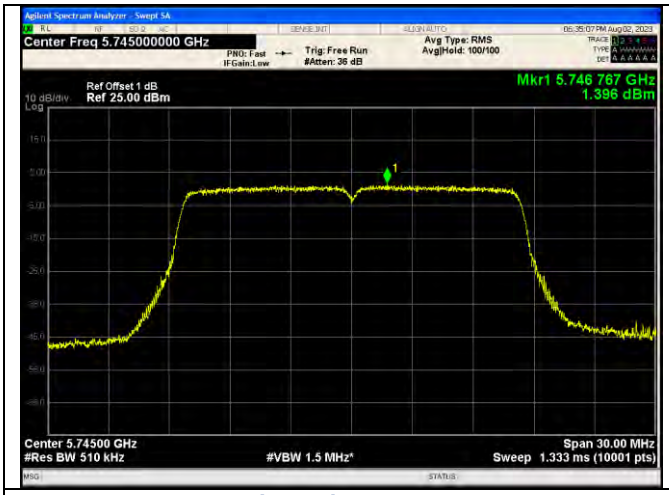
IEEE 802.11a_Channel 116_20MHz_Antenna 2



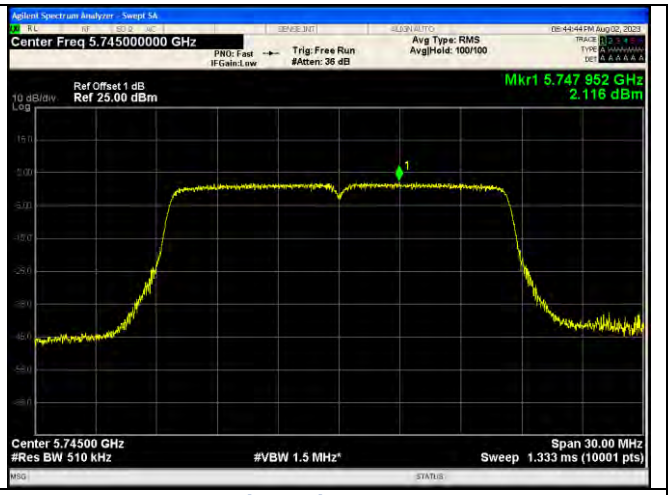
IEEE 802.11a_Channel 140_20MHz_Antenna 1



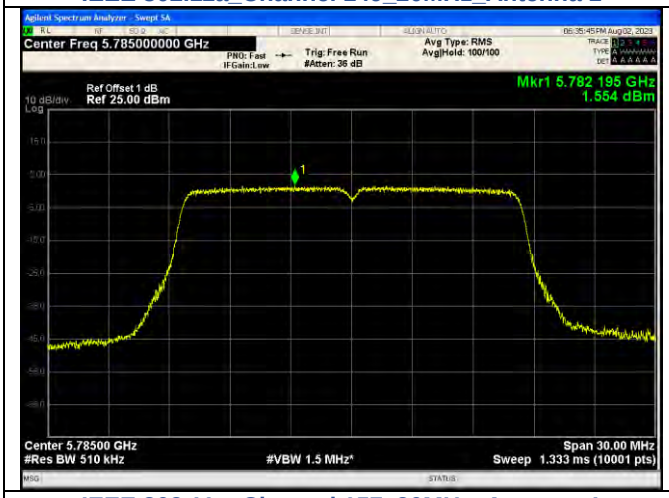
IEEE 802.11a_Channel 140_20MHz_Antenna 2



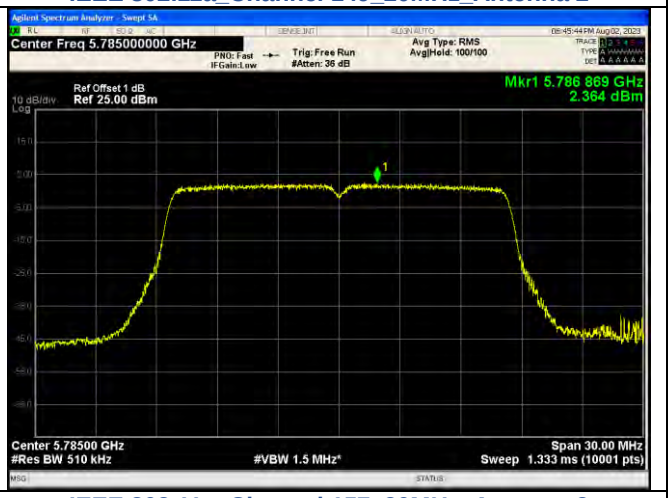
IEEE 802.11a_Channel 149_20MHz_Antenna 1



IEEE 802.11a_Channel 149_20MHz_Antenna 2



IEEE 802.11a_Channel 157_20MHz_Antenna 1

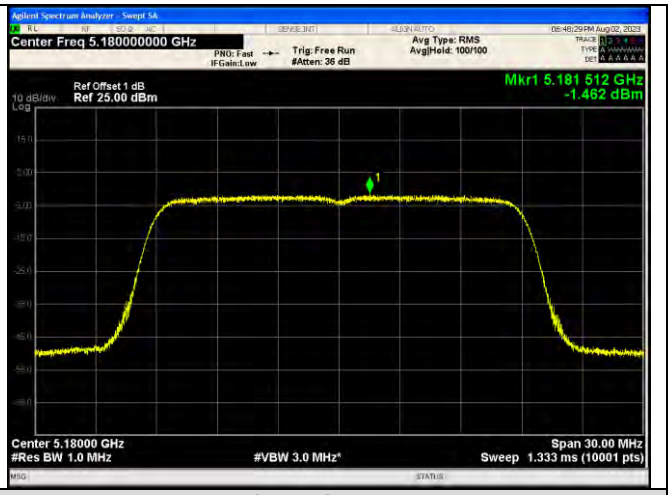


IEEE 802.11a_Channel 157_20MHz_Antenna 2

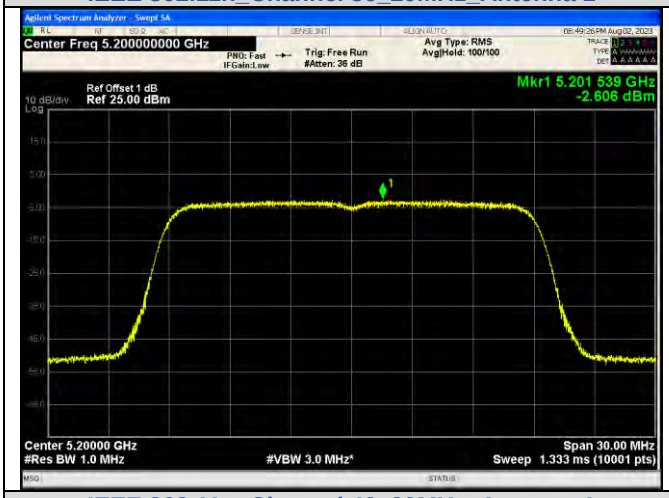
IEEE 802.11a_Channel 165_20MHz_Antenna 1

IEEE 802.11a_Channel 165_20MHz_Antenna 2

IEEE 802.11n_Channel 36_20MHz_Antenna 1

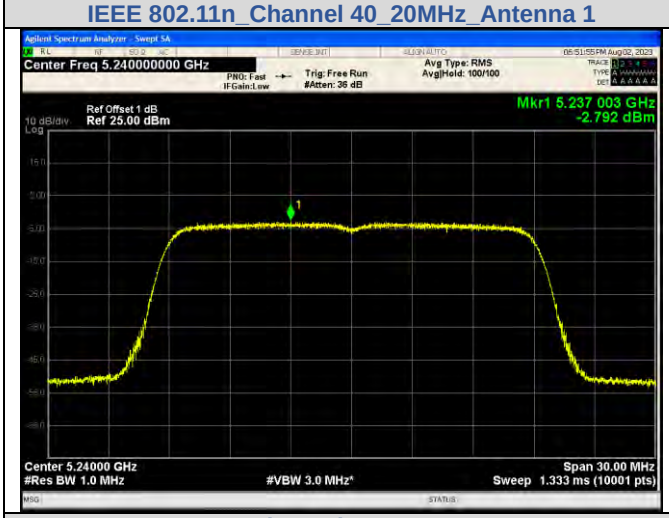


IEEE 802.11n_Channel 36_20MHz_Antenna 2

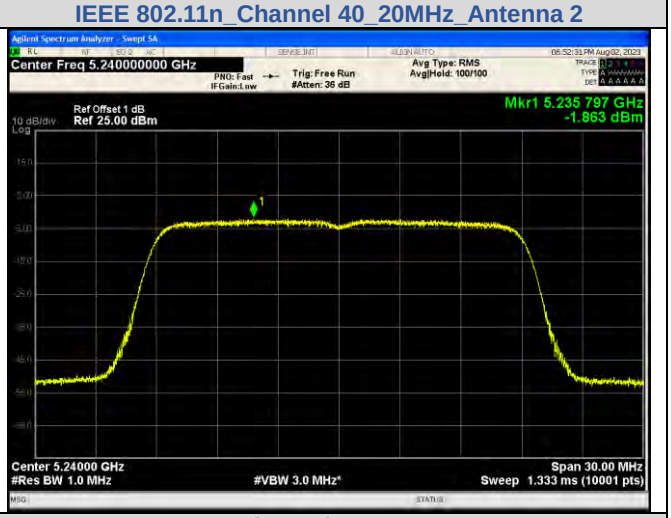


IEEE 802.11n_Channel 40_20MHz_Antenna 1

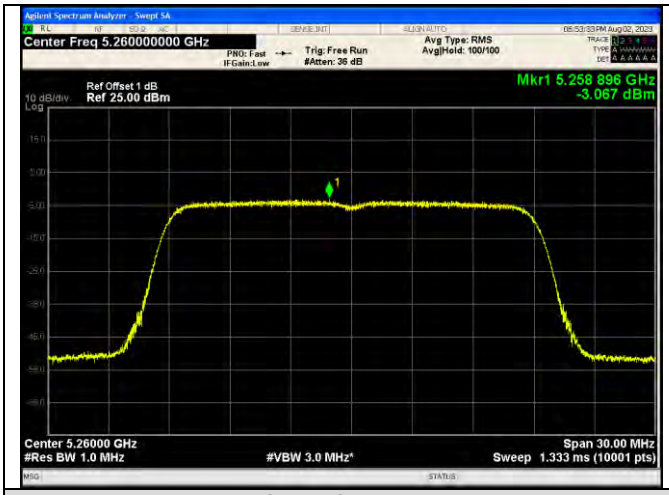
IEEE 802.11n_Channel 40_20MHz_Antenna 2



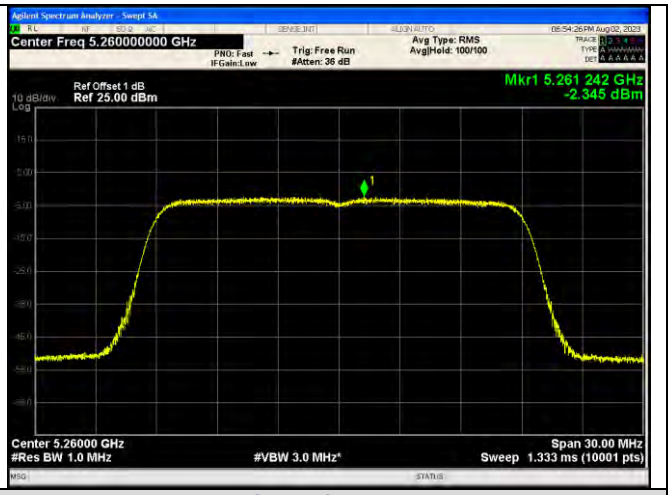
IEEE 802.11n_Channel 48_20MHz_Antenna 1



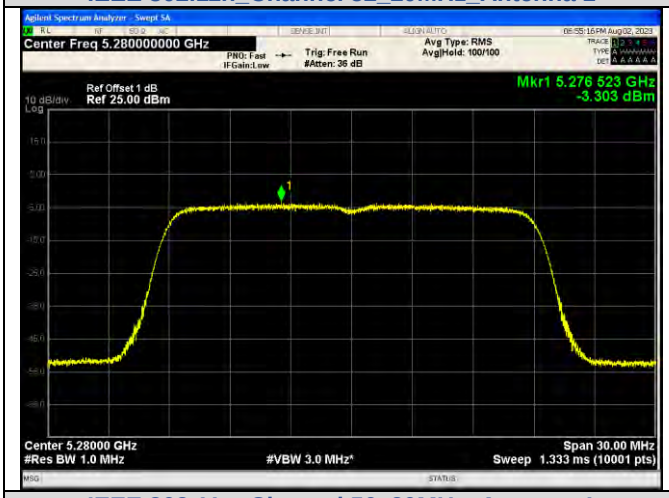
IEEE 802.11n_Channel 48_20MHz_Antenna 2



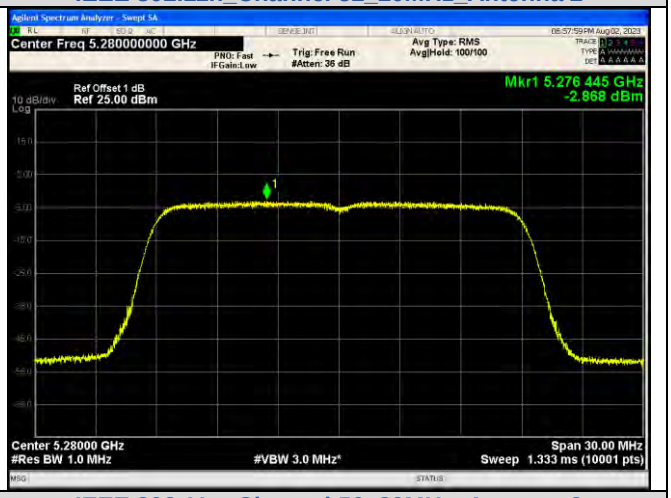
IEEE 802.11n_Channel 52_20MHz_Antenna 1



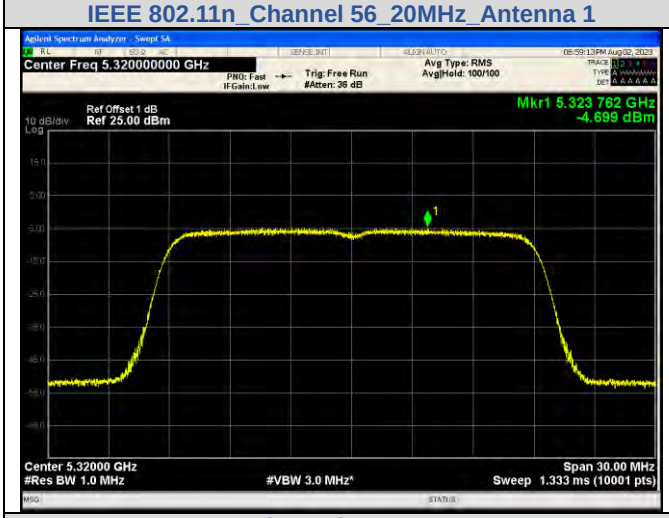
IEEE 802.11n_Channel 52_20MHz_Antenna 2



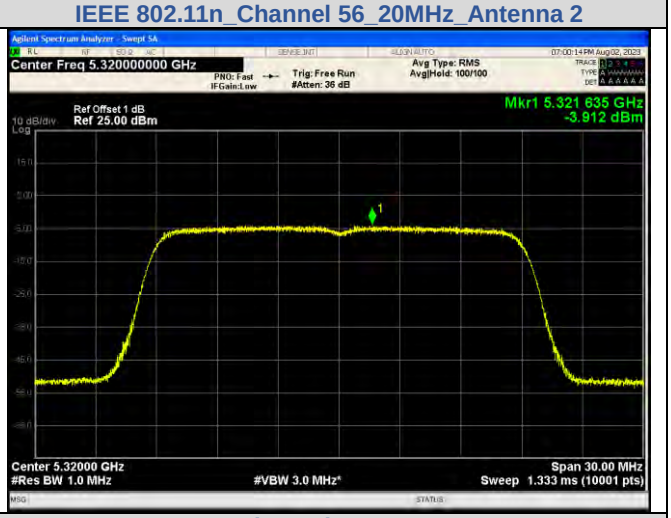
IEEE 802.11n_Channel 56_20MHz_Antenna 1



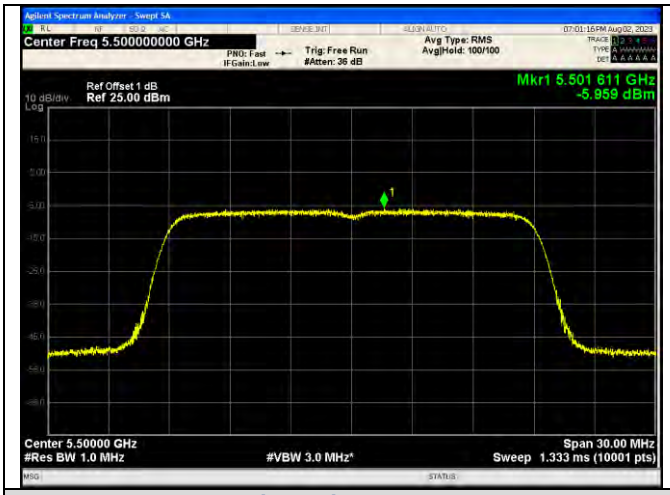
IEEE 802.11n_Channel 56_20MHz_Antenna 2



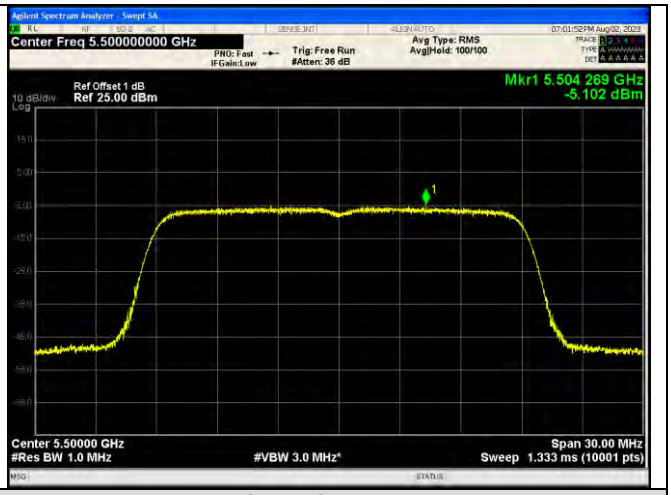
IEEE 802.11n_Channel 64_20MHz_Antenna 1



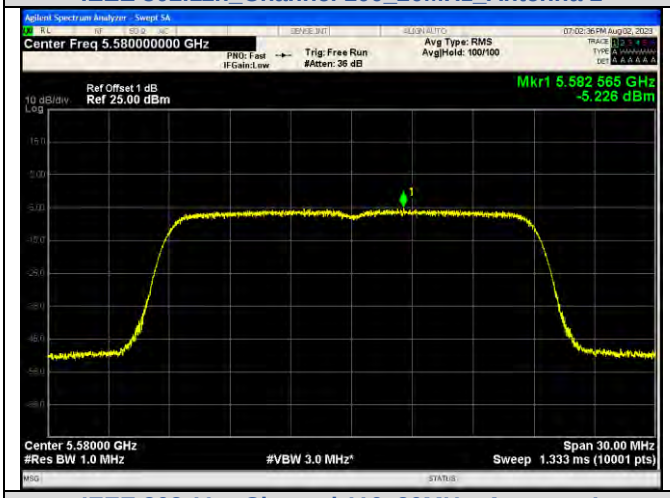
IEEE 802.11n_Channel 64_20MHz_Antenna 2



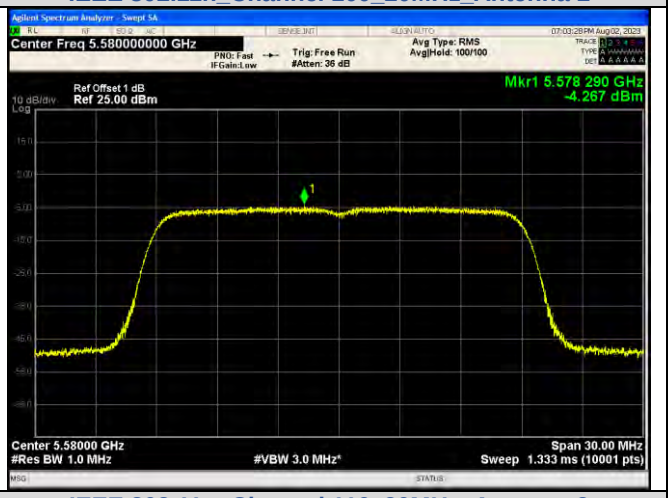
IEEE 802.11n_Channel 100_20MHz_Antenna 1



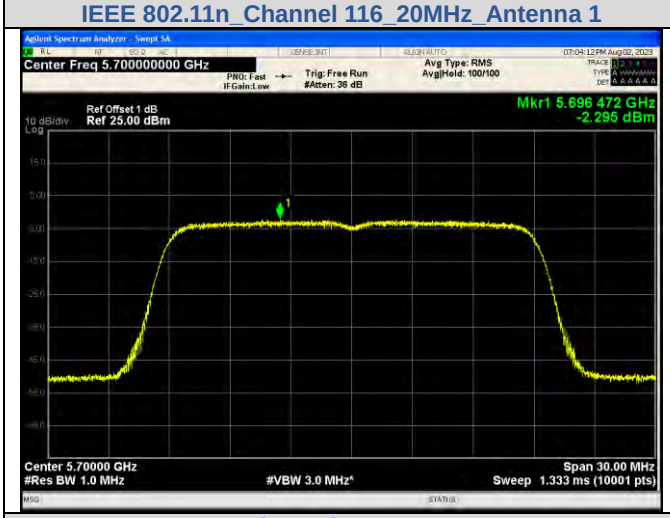
IEEE 802.11n_Channel 100_20MHz_Antenna 2



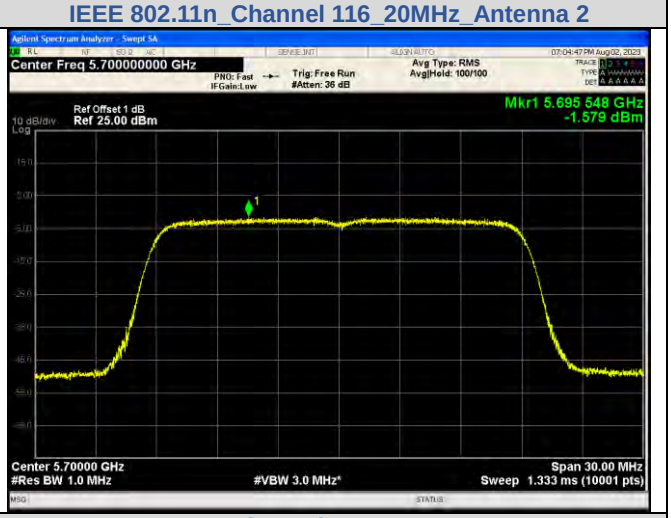
IEEE 802.11n_Channel 116_20MHz_Antenna 1



IEEE 802.11n_Channel 116_20MHz_Antenna 2



IEEE 802.11n_Channel 140_20MHz_Antenna 1



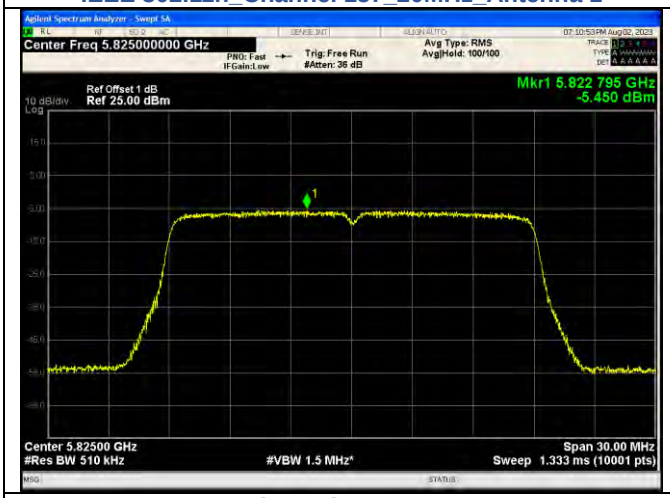
IEEE 802.11n_Channel 140_20MHz_Antenna 2

IEEE 802.11n_Channel 149_20MHz_Antenna 1

IEEE 802.11n_Channel 149_20MHz_Antenna 2

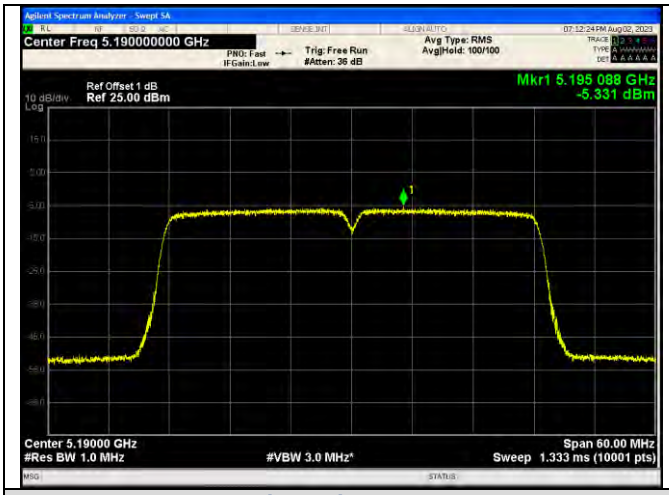
IEEE 802.11n_Channel 157_20MHz_Antenna 1

IEEE 802.11n_Channel 157_20MHz_Antenna 2



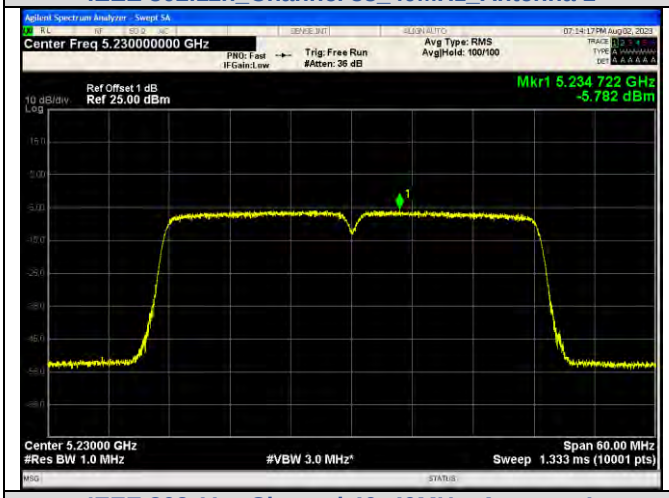
IEEE 802.11n_Channel 165_20MHz_Antenna 1

IEEE 802.11n_Channel 165_20MHz_Antenna 2



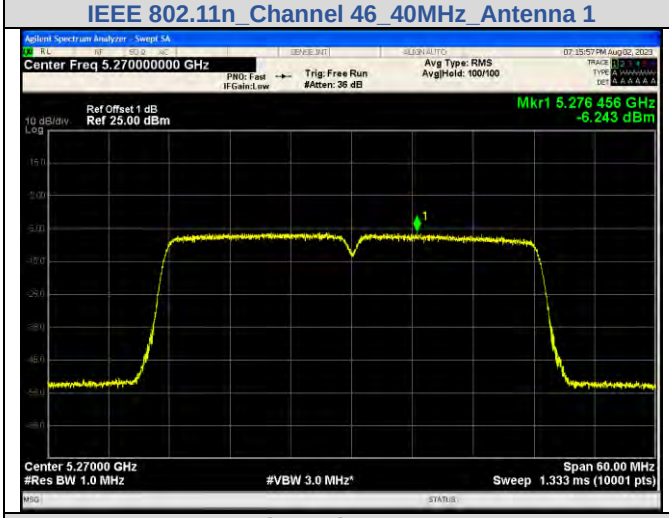
IEEE 802.11n_Channel 38_40MHz_Antenna 1

IEEE 802.11n_Channel 38_40MHz_Antenna 2

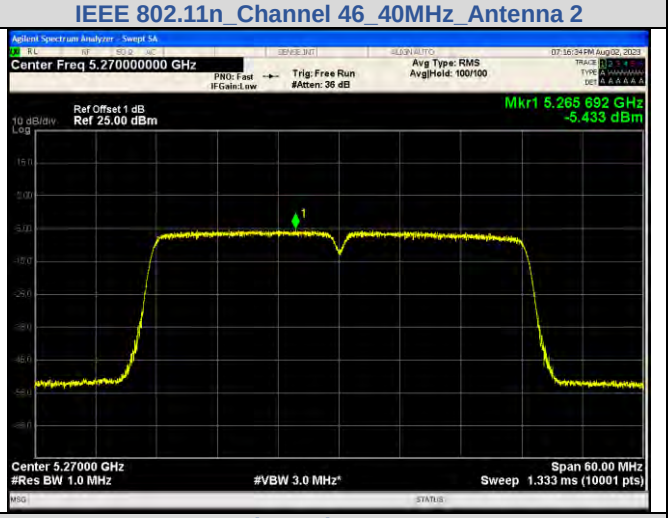


IEEE 802.11n_Channel 46_40MHz_Antenna 1

IEEE 802.11n_Channel 46_40MHz_Antenna 2



IEEE 802.11n_Channel 54_40MHz_Antenna 1

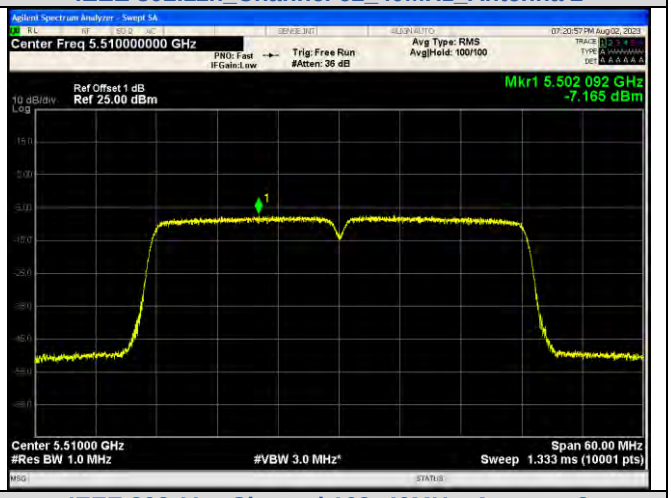


IEEE 802.11n_Channel 54_40MHz_Antenna 2

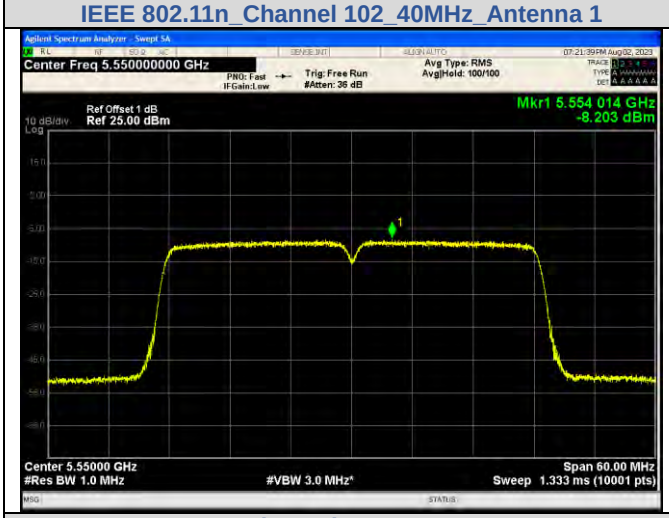
IEEE 802.11n_Channel 62_40MHz_Antenna 1

IEEE 802.11n_Channel 62_40MHz_Antenna 2

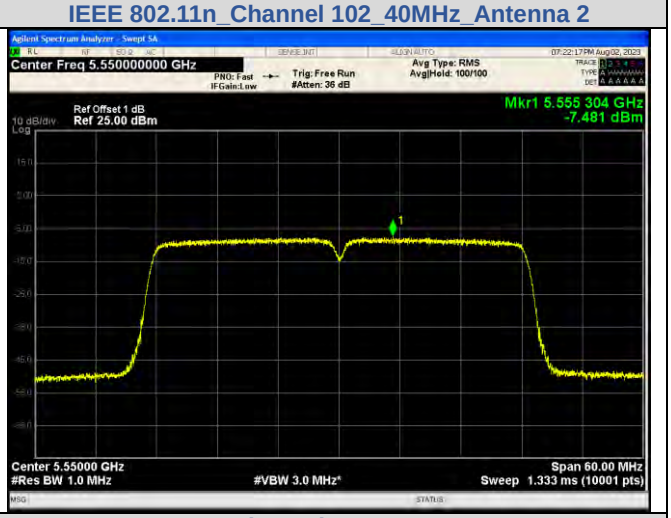
IEEE 802.11n_Channel 102_40MHz_Antenna 1



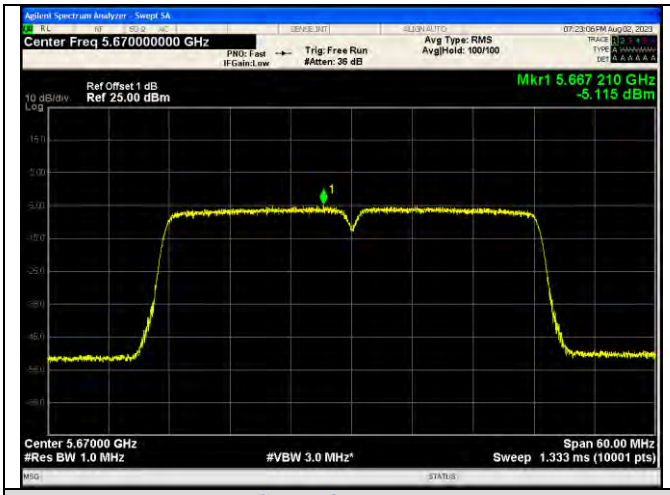
IEEE 802.11n_Channel 102_40MHz_Antenna 2



IEEE 802.11n_Channel 110_40MHz_Antenna 1

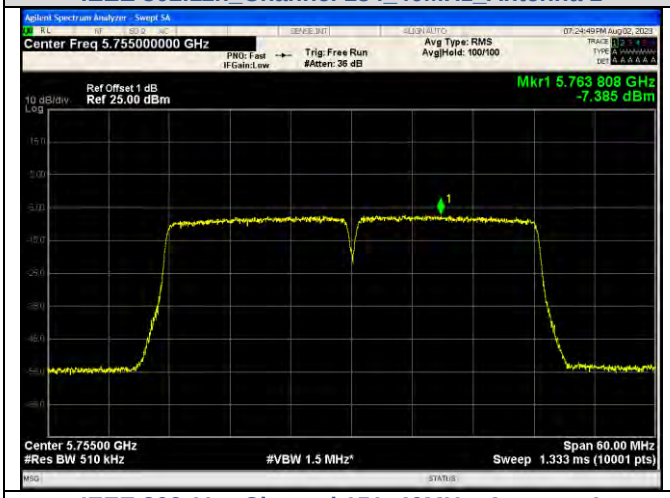


IEEE 802.11n_Channel 110_40MHz_Antenna 2

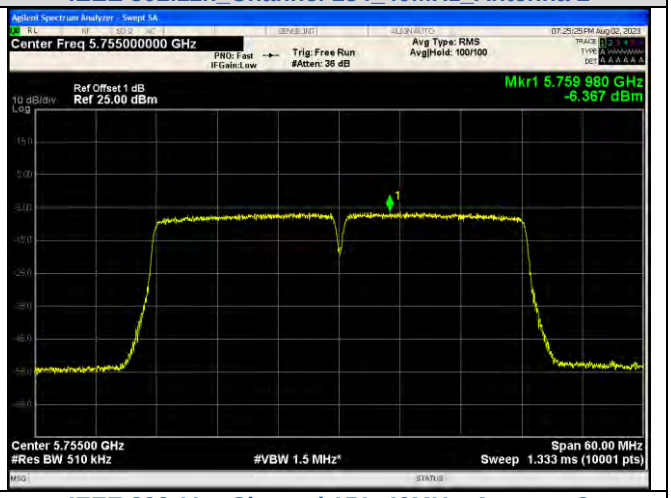


IEEE 802.11n_Channel 134_40MHz_Antenna 1

IEEE 802.11n_Channel 134_40MHz_Antenna 2



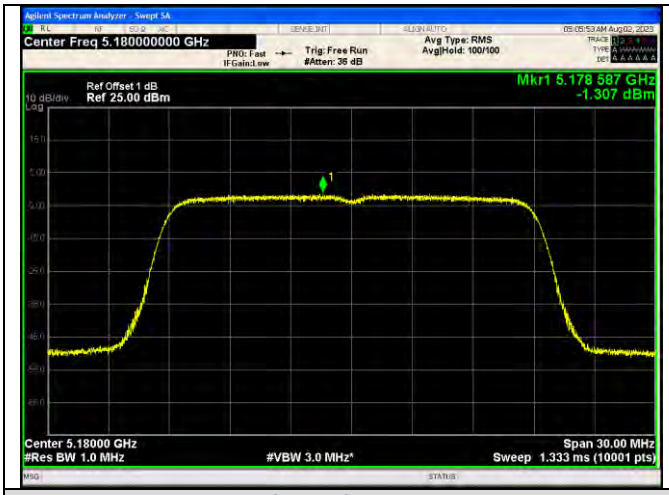
IEEE 802.11n_Channel 151_40MHz_Antenna 1



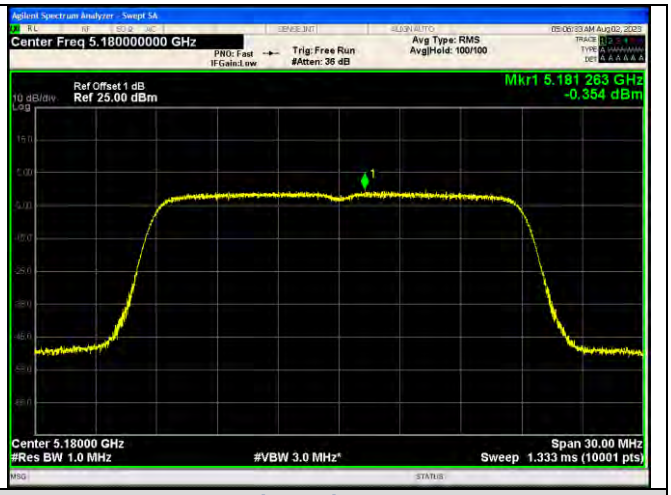
IEEE 802.11n_Channel 151_40MHz_Antenna 2

IEEE 802.11n_Channel 159_40MHz_Antenna 1

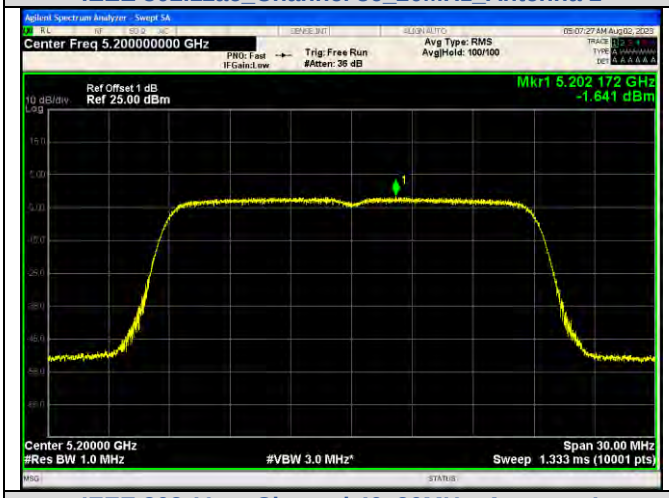
IEEE 802.11n_Channel 159_40MHz_Antenna 2



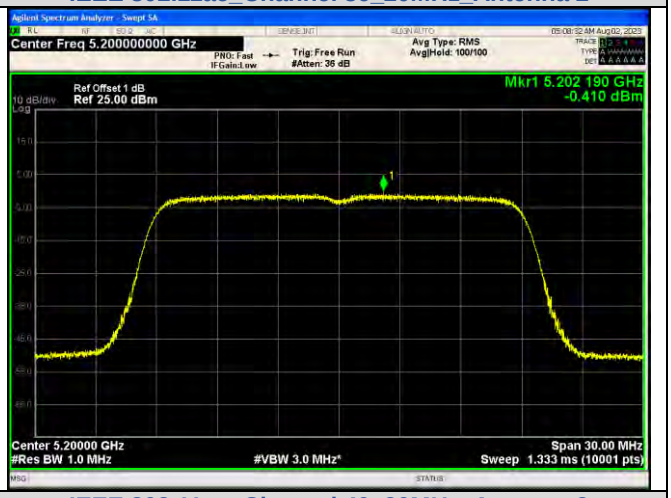
IEEE 802.11ac_Channel 36_20MHz_Antenna 1



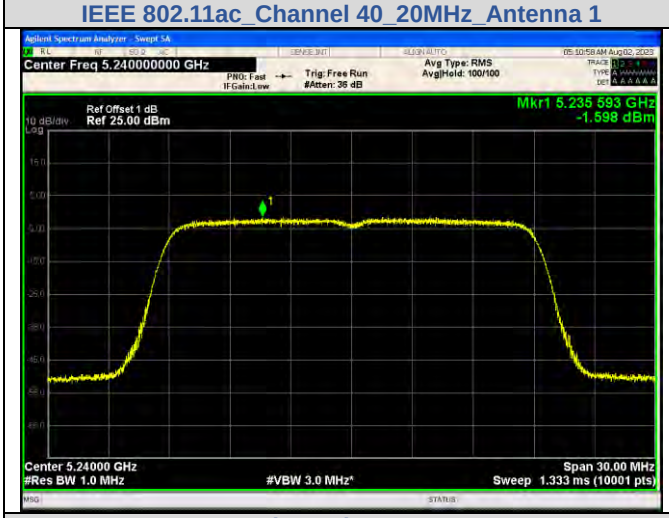
IEEE 802.11ac_Channel 36_20MHz_Antenna 2



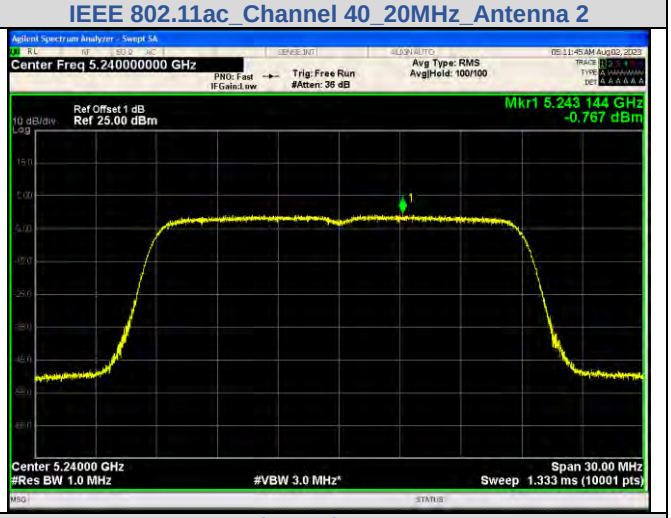
IEEE 802.11ac_Channel 40_20MHz_Antenna 1



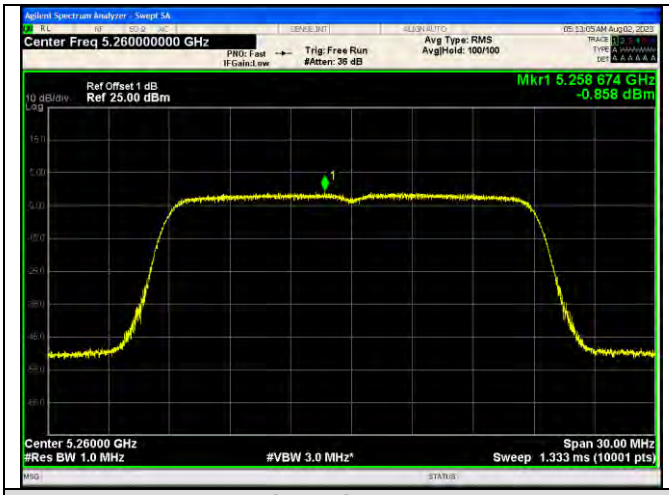
IEEE 802.11ac_Channel 40_20MHz_Antenna 2



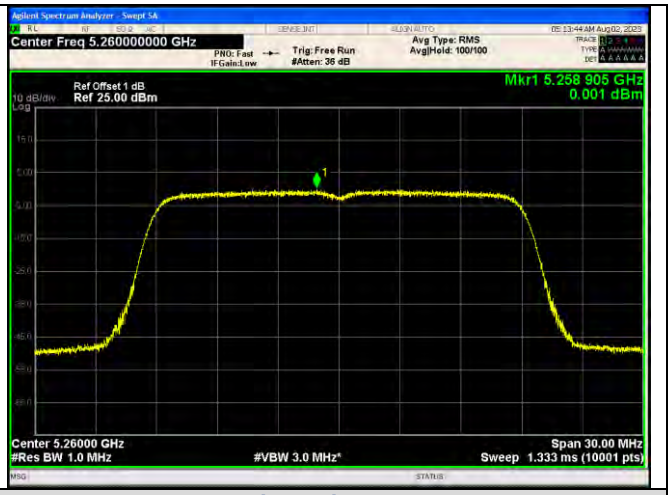
IEEE 802.11ac_Channel 48_20MHz_Antenna 1



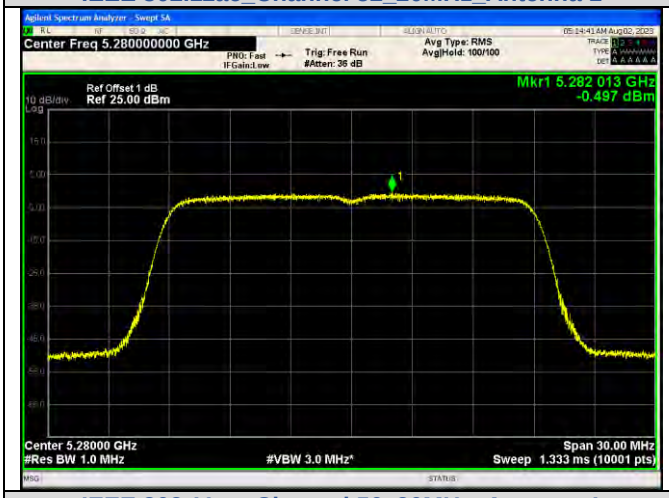
IEEE 802.11ac_Channel 48_20MHz_Antenna 2



IEEE 802.11ac_Channel 52_20MHz_Antenna 1

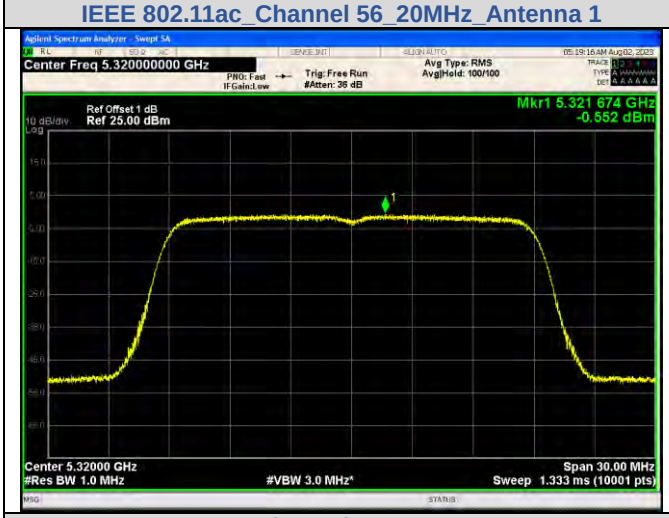


IEEE 802.11ac_Channel 52_20MHz_Antenna 2

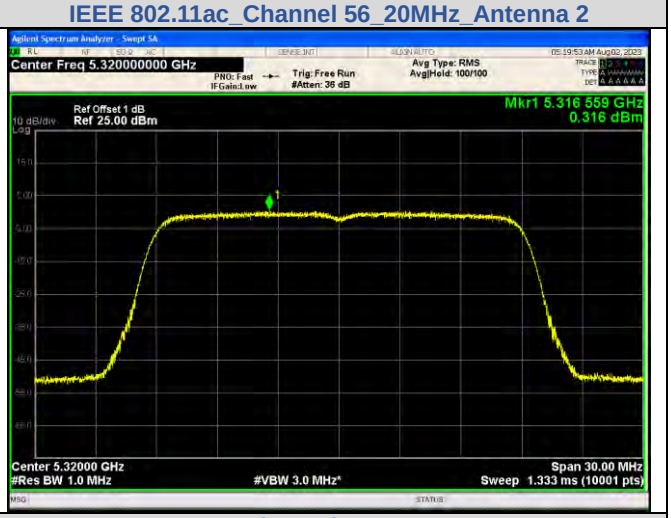


IEEE 802.11ac_Channel 56_20MHz_Antenna 1

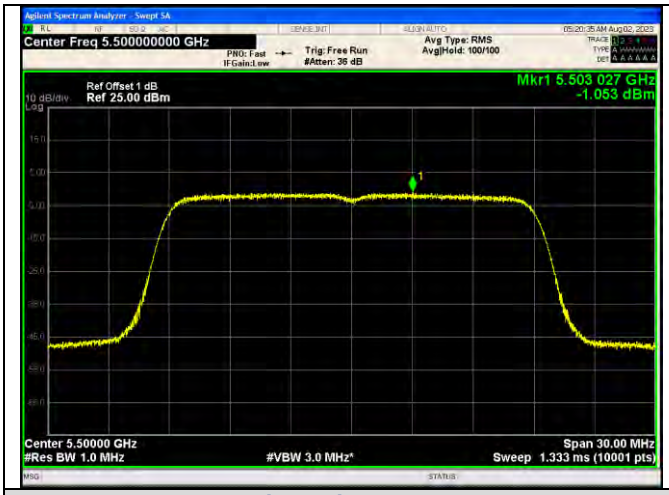
IEEE 802.11ac_Channel 56_20MHz_Antenna 2



IEEE 802.11ac_Channel 64_20MHz_Antenna 1

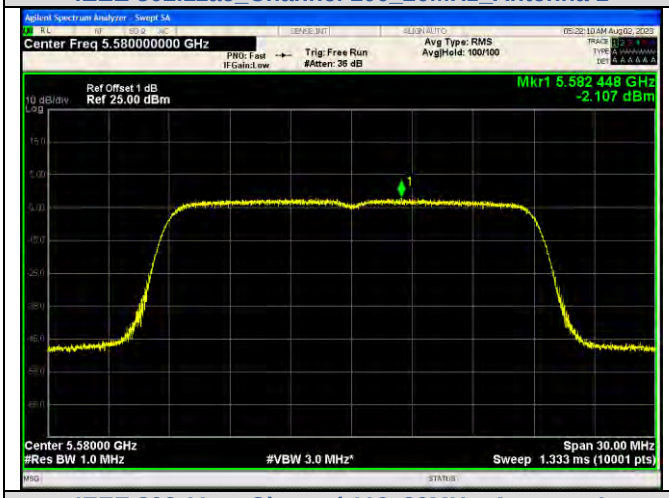


IEEE 802.11ac_Channel 64_20MHz_Antenna 2

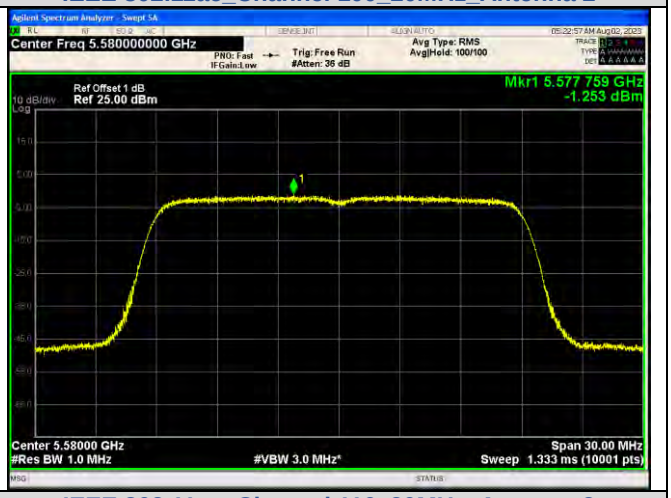


IEEE 802.11ac_Channel 100_20MHz_Antenna 1

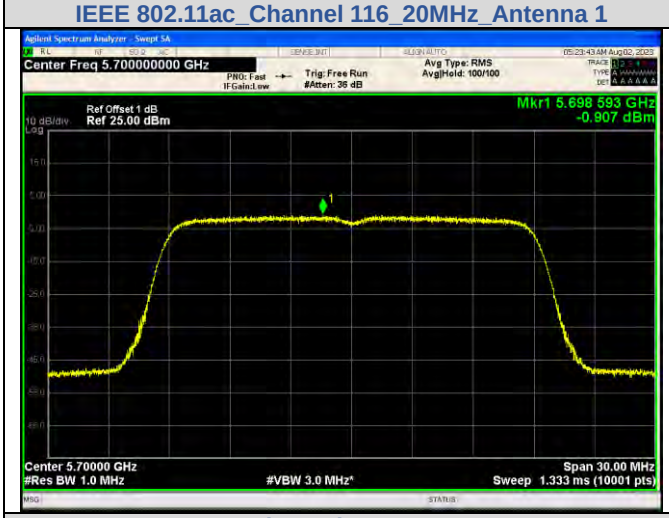
IEEE 802.11ac_Channel 100_20MHz_Antenna 2



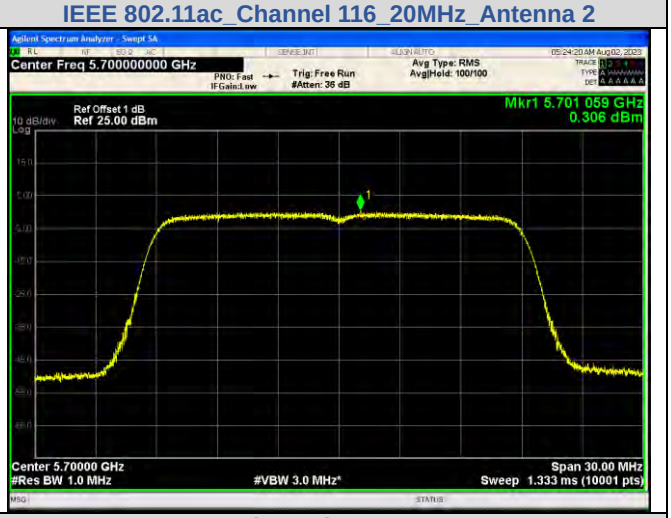
IEEE 802.11ac_Channel 116_20MHz_Antenna 1



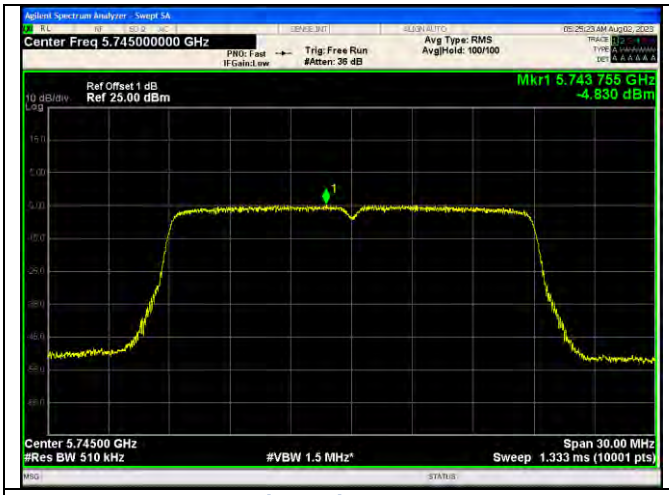
IEEE 802.11ac_Channel 116_20MHz_Antenna 2



IEEE 802.11ac_Channel 140_20MHz_Antenna 1



IEEE 802.11ac_Channel 140_20MHz_Antenna 2



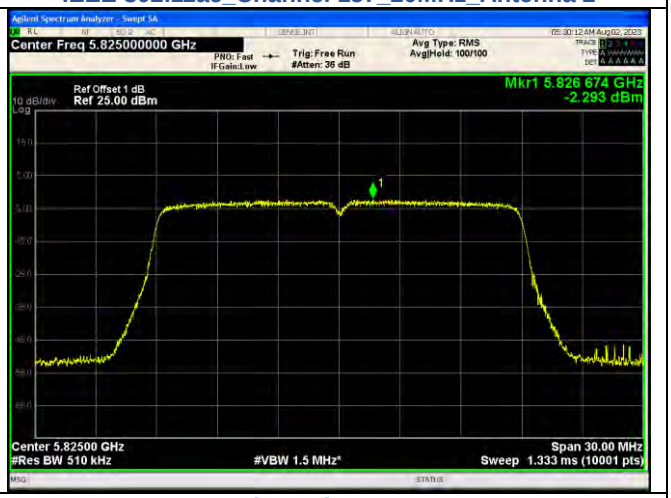
IEEE 802.11ac_Channel 149_20MHz_Antenna 1

IEEE 802.11ac_Channel 149_20MHz_Antenna 2

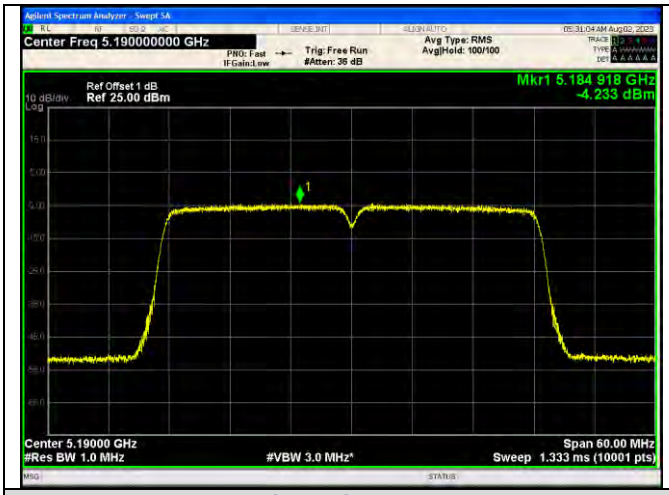
IEEE 802.11ac_Channel 157_20MHz_Antenna 1

IEEE 802.11ac_Channel 157_20MHz_Antenna 2

IEEE 802.11ac_Channel 165_20MHz_Antenna 1

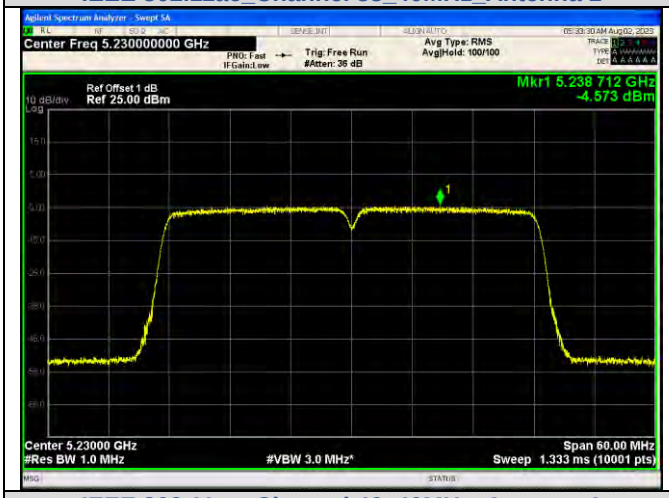


IEEE 802.11ac_Channel 165_20MHz_Antenna 2



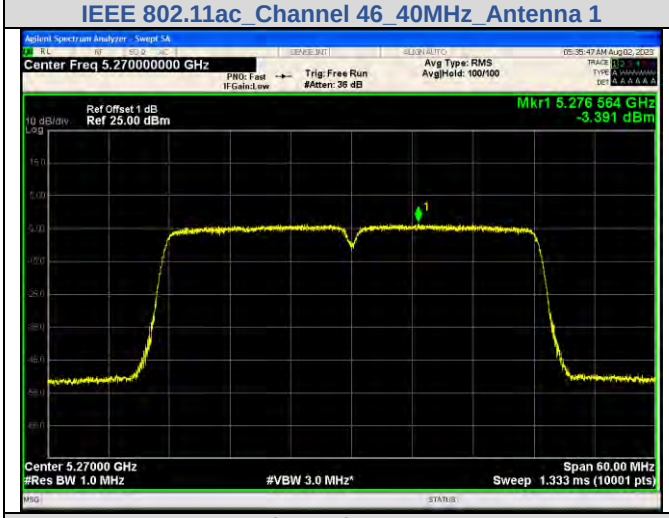
IEEE 802.11ac_Channel 38_40MHz_Antenna 1

IEEE 802.11ac_Channel 38_40MHz_Antenna 2

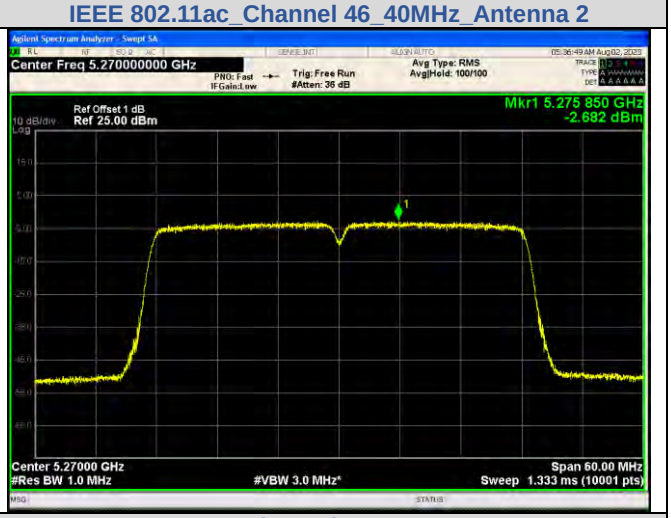


IEEE 802.11ac_Channel 46_40MHz_Antenna 1

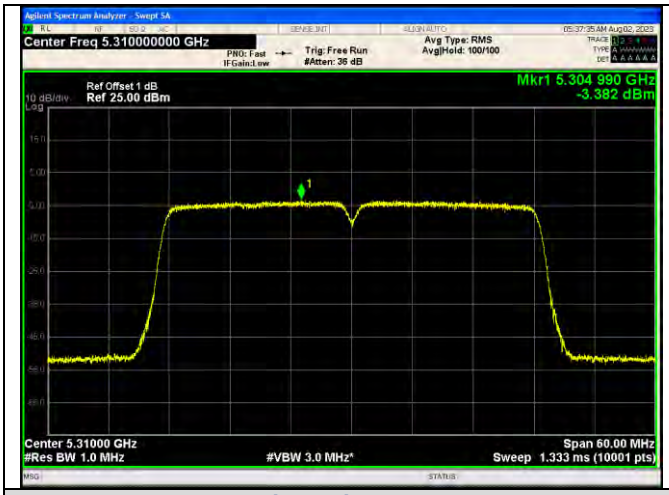
IEEE 802.11ac_Channel 46_40MHz_Antenna 2



IEEE 802.11ac_Channel 54_40MHz_Antenna 1

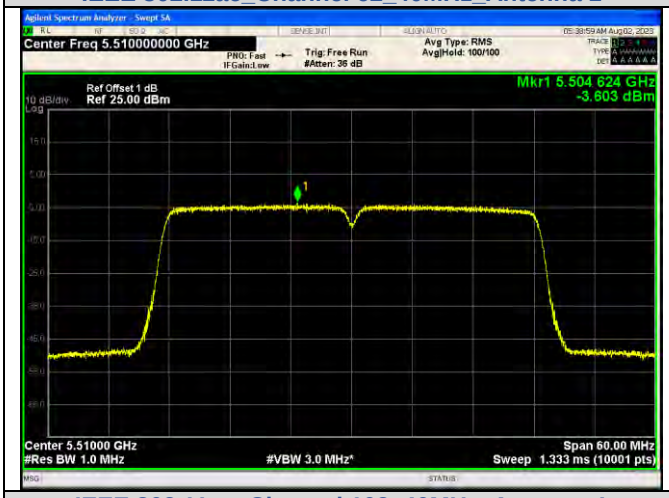


IEEE 802.11ac_Channel 54_40MHz_Antenna 2



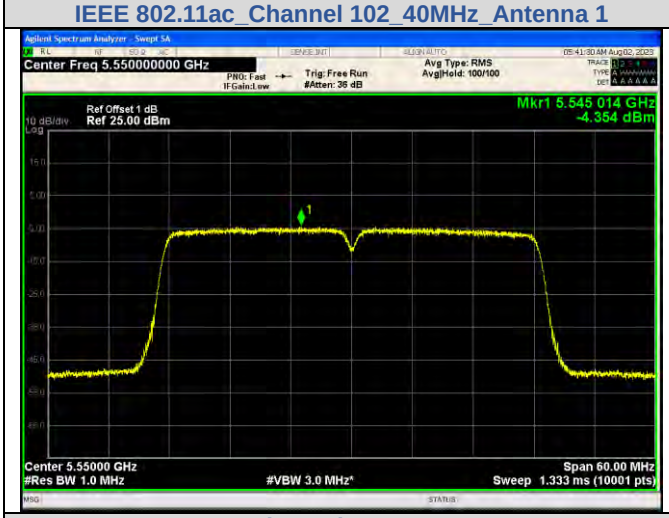
IEEE 802.11ac_Channel 62_40MHz_Antenna 1

IEEE 802.11ac_Channel 62_40MHz_Antenna 2

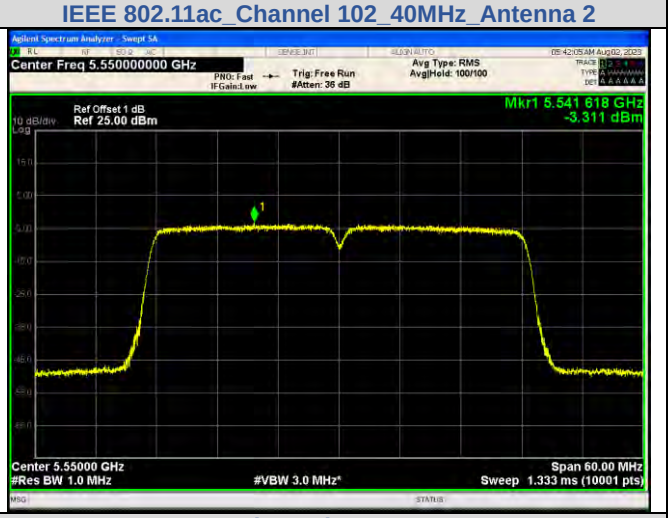


IEEE 802.11ac_Channel 102_40MHz_Antenna 1

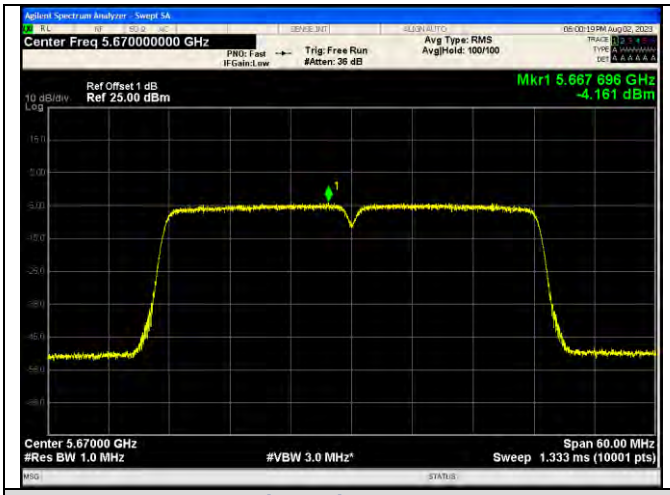
IEEE 802.11ac_Channel 102_40MHz_Antenna 2



IEEE 802.11ac_Channel 110_40MHz_Antenna 1



IEEE 802.11ac_Channel 110_40MHz_Antenna 2



IEEE 802.11ac_Channel 134_40MHz_Antenna 1

IEEE 802.11ac_Channel 134_40MHz_Antenna 2

IEEE 802.11ac_Channel 151_40MHz_Antenna 1

IEEE 802.11ac_Channel 151_40MHz_Antenna 2

IEEE 802.11ac_Channel 159_40MHz_Antenna 1

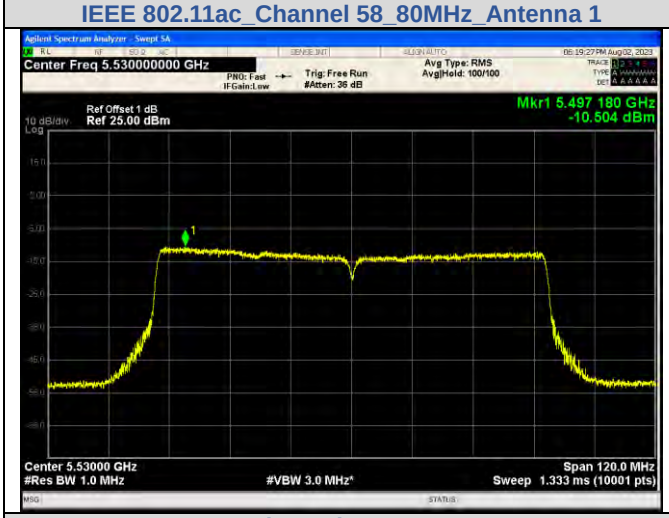
IEEE 802.11ac_Channel 159_40MHz_Antenna 2

IEEE 802.11ac_Channel 42_80MHz_Antenna 1

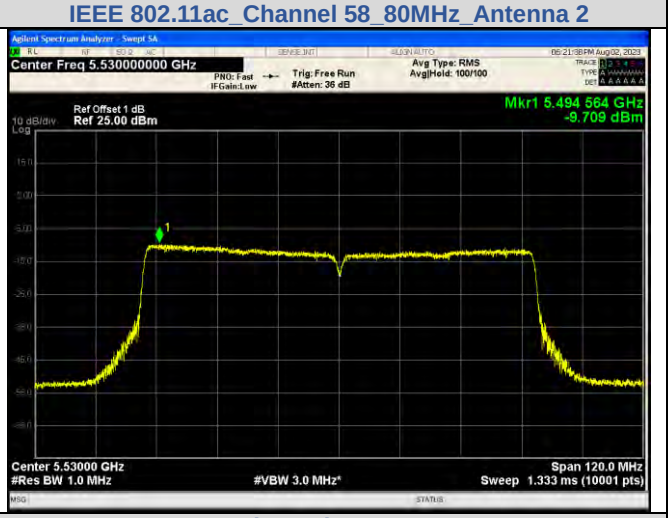
IEEE 802.11ac_Channel 42_80MHz_Antenna 2

IEEE 802.11ac_Channel 58_80MHz_Antenna 1

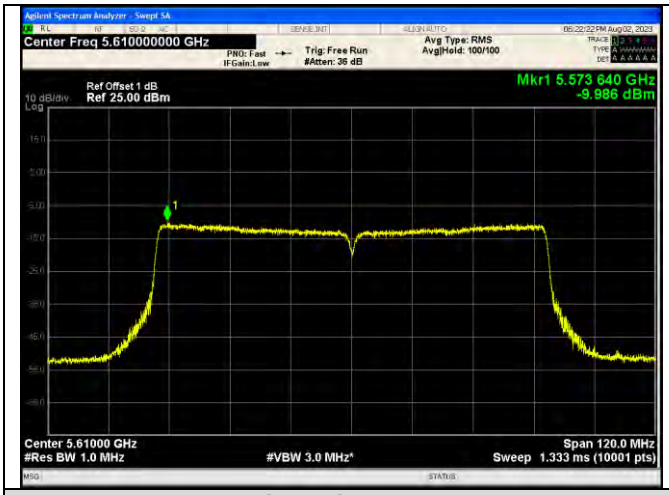
IEEE 802.11ac_Channel 58_80MHz_Antenna 2



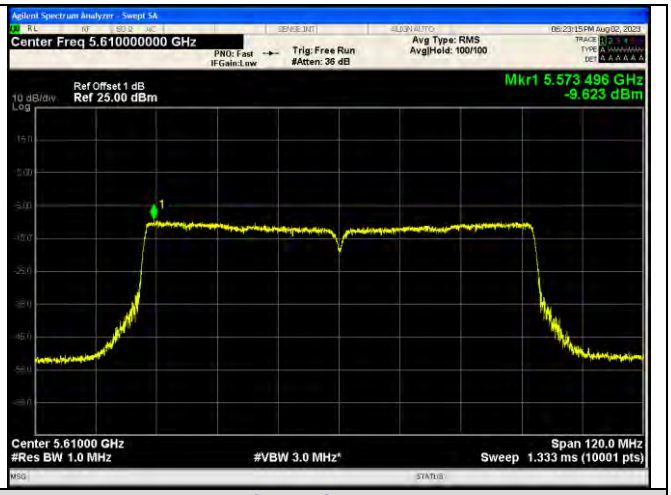
IEEE 802.11ac_Channel 106_80MHz_Antenna 1



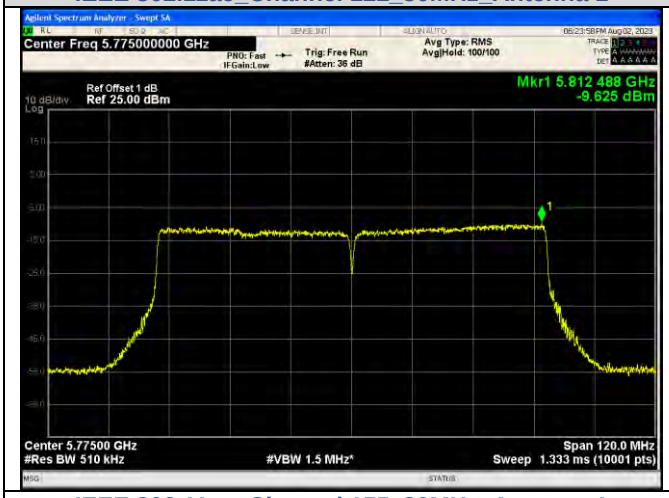
IEEE 802.11ac_Channel 106_80MHz_Antenna 2



IEEE 802.11ac_Channel 122_80MHz_Antenna 1



IEEE 802.11ac_Channel 122_80MHz_Antenna 2



IEEE 802.11ac_Channel 155_80MHz_Antenna 1

IEEE 802.11ac_Channel 155_80MHz_Antenna 2

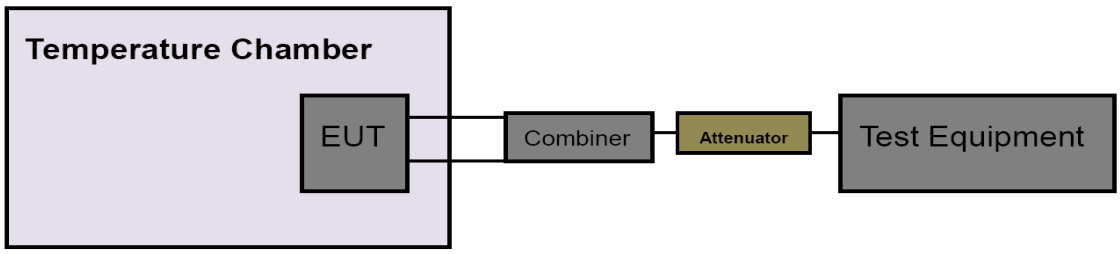
3.7. Frequency Stability

Limit

FCC CFR Title 47 Part 15 Subpart E Section 15.407(g) / RSS-Gen 6.11

Test Item	Limit	Frequency Range (MHz)
Frequency Stability	Specified in the user's manual, the transmitter center frequency tolerance shall be ±20 ppm maximum for the 5 GHz band (IEEE 802.11n specification)	5150~5250
		5250~5350
		5500~5700
		5725~5850

Test Configuration



Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above.

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Set analyzer center frequency to transmitting frequency.
(3) Set the span to encompass the entire emissions bandwidth (EBW) of the signal.
(4) Set the RBW to: 8MHz, VBW=8MHz with peak detector and max hold settings.
(5) The test extreme voltage is to change the primary supply voltage from 4.5V to 5.5V percent of the nominal value.
(6) Extreme temperature is 0℃~40℃

NOTE: The EUT was set to continuously transmitting in continuously un-modulation transmitting mode.

Test Mode

Please refer to the clause 2.4.

Test Result

Voltage								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20M	Ant 1	5180	NV	NT	-10000	-1.930502	20	Pass
			LV	NT	-9000	-1.737452	20	Pass
			HV	NT	-7000	-1.351351	20	Pass
	Ant 2	5180	NV	NT	-14000	-2.661597	20	Pass
			LV	NT	-12000	-2.307692	20	Pass
			HV	NT	-13000	-2.5	20	Pass
	Ant 1	5200	NV	NT	-12000	-2.307692	20	Pass
			LV	NT	-13000	-2.5	20	Pass
			HV	NT	-13000	-2.5	20	Pass
	Ant 2	5200	NV	NT	-14000	-2.692308	20	Pass
			LV	NT	-13000	-2.5	20	Pass
			HV	NT	-12000	-2.307692	20	Pass
	Ant 1	5240	NV	NT	-12000	-2.290076	20	Pass
			LV	NT	-12000	-2.290076	20	Pass
			HV	NT	-13000	-2.480916	20	Pass
	Ant 2	5240	NV	NT	-13000	-2.480916	20	Pass
			LV	NT	-13000	-2.480916	20	Pass
			HV	NT	-13000	-2.480916	20	Pass
	Ant 1	5260	NV	NT	-14000	-2.661597	20	Pass
			LV	NT	-14000	-2.661597	20	Pass
			HV	NT	-14000	-2.661597	20	Pass
	Ant 2	5260	NV	NT	-14000	-2.661597	20	Pass
			LV	NT	-14000	-2.661597	20	Pass
			HV	NT	-14000	-2.661597	20	Pass
	Ant 1	5280	NV	NT	-14000	-2.651515	20	Pass
			LV	NT	-14000	-2.651515	20	Pass
			HV	NT	-14000	-2.651515	20	Pass
	Ant 2	5280	NV	NT	-14000	-2.651515	20	Pass
			LV	NT	-14000	-2.651515	20	Pass
			HV	NT	-14000	-2.651515	20	Pass
	Ant 1	5320	NV	NT	-14000	-2.631579	20	Pass
			LV	NT	-13000	-2.443609	20	Pass
			HV	NT	-14000	-2.631579	20	Pass
	Ant 2	5320	NV	NT	-14000	-2.631579	20	Pass
			LV	NT	-14000	-2.631579	20	Pass
			HV	NT	-14000	-2.631579	20	Pass
	Ant 1	5500	NV	NT	-14000	-2.545455	20	Pass
			LV	NT	-14000	-2.545455	20	Pass
			HV	NT	-14000	-2.545455	20	Pass
	Ant 2	5500	NV	NT	-14000	-2.545455	20	Pass
			LV	NT	-14000	-2.545455	20	Pass
			HV	NT	-14000	-2.545455	20	Pass
	Ant 1	5580	NV	NT	-70000	-12.544803	20	Pass
			LV	NT	-71000	-12.724014	20	Pass
			HV	NT	-71000	-12.724014	20	Pass
	Ant 2	5580	NV	NT	-71000	-12.724014	20	Pass
			LV	NT	-70000	-12.544803	20	Pass
			HV	NT	-70000	-12.544803	20	Pass
	Ant 1	5700	NV	NT	-71000	-12.724014	20	Pass
			LV	NT	-71000	-12.45614	20	Pass
			HV	NT	-71000	-12.45614	20	Pass
	Ant 2	5700	NV	NT	-71000	-12.724014	20	Pass
			LV	NT	-71000	-12.45614	20	Pass
			HV	NT	-71000	-12.45614	20	Pass
	Ant 1	5745	NV	NT	-71000	-12.724014	20	Pass

Voltage								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
			LV	NT	-72000	-12.532637	20	Pass
			HV	NT	-71000	-12.358573	20	Pass
	Ant 2	5745	NV	NT	-70000	-12.184508	20	Pass
			LV	NT	-70000	-12.184508	20	Pass
			HV	NT	-70000	-12.184508	20	Pass
	Ant 1	5785	NV	NT	-70000	-12.184508	20	Pass
			LV	NT	-71000	-12.27312	20	Pass
			HV	NT	-71000	-12.27312	20	Pass
	Ant 2	5785	NV	NT	-70000	-12.184508	20	Pass
			LV	NT	-71000	-12.27312	20	Pass
			HV	NT	-71000	-12.27312	20	Pass
	Ant 1	5825	NV	NT	-70000	-12.184508	20	Pass
			LV	NT	-71000	-12.188841	20	Pass
			HV	NT	-71000	-12.188841	20	Pass
	Ant 2	5825	NV	NT	-70000	-12.184508	20	Pass
			LV	NT	-71000	-12.188841	20	Pass
			HV	NT	-71000	-12.188841	20	Pass
40M	Ant 1	5190	NV	NT	-64000	-12.331407	20	Pass
			LV	NT	-64000	-12.331407	20	Pass
			HV	NT	-64000	-12.331407	20	Pass
	Ant 2	5190	NV	NT	-64000	-12.237094	20	Pass
			LV	NT	-63000	-12.138728	20	Pass
			HV	NT	-64000	-12.331407	20	Pass
	Ant 1	5230	NV	NT	-63000	-12.138728	20	Pass
			LV	NT	-64000	-12.237094	20	Pass
			HV	NT	-64000	-12.237094	20	Pass
	Ant 2	5230	NV	NT	-63000	-12.138728	20	Pass
			LV	NT	-64000	-12.237094	20	Pass
			HV	NT	-64000	-12.237094	20	Pass
	Ant 1	5270	NV	NT	-63000	-12.138728	20	Pass
			LV	NT	-64000	-12.144213	20	Pass
			HV	NT	-64000	-12.144213	20	Pass
	Ant 2	5270	NV	NT	-63000	-12.138728	20	Pass
			LV	NT	-64000	-12.144213	20	Pass
			HV	NT	-64000	-12.144213	20	Pass
	Ant 1	5310	NV	NT	-63000	-12.138728	20	Pass
			LV	NT	-65000	-12.241055	20	Pass
			HV	NT	-65000	-12.241055	20	Pass
	Ant 2	5310	NV	NT	-63000	-12.138728	20	Pass
			LV	NT	-65000	-12.241055	20	Pass
			HV	NT	-65000	-12.241055	20	Pass
	Ant 1	5510	NV	NT	-71000	-12.885662	20	Pass
			LV	NT	-71000	-12.885662	20	Pass
			HV	NT	-72000	-13.067151	20	Pass
	Ant 2	5510	NV	NT	-46000	-8.348457	20	Pass
			LV	NT	-46000	-8.348457	20	Pass
			HV	NT	-45000	-8.166969	20	Pass
	Ant 1	5550	NV	NT	-40000	-7.207207	20	Pass
			LV	NT	-40000	-7.207207	20	Pass
			HV	NT	-38000	-6.846847	20	Pass
	Ant 2	5550	NV	NT	-31000	-5.585586	20	Pass
			LV	NT	-31000	-5.585586	20	Pass
			HV	NT	-57000	-10.27027	20	Pass
	Ant 1	5670	NV	NT	-67000	-11.816578	20	Pass
			LV	NT	-67000	-11.816578	20	Pass
			HV	NT	-67000	-11.816578	20	Pass
	Ant 2	5670	NV	NT	-68000	-11.992945	20	Pass

Voltage								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
			LV	NT	-68000	-11.992945	20	Pass
			HV	NT	-68000	-11.992945	20	Pass
	Ant 1	5755	NV	NT	-68000	-11.992945	20	Pass
			LV	NT	-69000	-11.989574	20	Pass
			HV	NT	-70000	-12.163336	20	Pass
	Ant 2	5755	NV	NT	-70000	-12.163336	20	Pass
			LV	NT	-70000	-12.163336	20	Pass
			HV	NT	-70000	-12.163336	20	Pass
	Ant 1	5795	NV	NT	-70000	-12.163336	20	Pass
			LV	NT	-70000	-12.079379	20	Pass
			HV	NT	-70000	-12.079379	20	Pass
	Ant 2	5795	NV	NT	-70000	-12.163336	20	Pass
			LV	NT	-70000	-12.079379	20	Pass
			HV	NT	-70000	-12.079379	20	Pass
80M	Ant 1	5210	NV	NT	-70000	-12.163336	20	Pass
			LV	NT	-63000	-12.092131	20	Pass
			HV	NT	-63000	-12.092131	20	Pass
	Ant 2	5210	NV	NT	-63000	-12.092131	20	Pass
			LV	NT	-63000	-12.092131	20	Pass
			HV	NT	-63000	-12.092131	20	Pass
	Ant 1	5290	NV	NT	-63000	-12.092131	20	Pass
			LV	NT	-64000	-12.098299	20	Pass
			HV	NT	-64000	-12.098299	20	Pass
	Ant 2	5290	NV	NT	-64000	-12.098299	20	Pass
			LV	NT	-64000	-12.098299	20	Pass
			HV	NT	-65000	-12.287335	20	Pass
	Ant 1	5530	NV	NT	-65000	-12.287335	20	Pass
			LV	NT	-68000	-12.296564	20	Pass
			HV	NT	-68000	-12.296564	20	Pass
	Ant 2	5530	NV	NT	-65000	-12.287335	20	Pass
			LV	NT	-65000	-11.754069	20	Pass
			HV	NT	-65000	-11.754069	20	Pass
	Ant 1	5610	NV	NT	-67000	-11.942959	20	Pass
			LV	NT	-67000	-11.942959	20	Pass
			HV	NT	-68000	-12.121212	20	Pass
	Ant 2	5610	NV	NT	-68000	-12.121212	20	Pass
			LV	NT	-68000	-12.121212	20	Pass
			HV	NT	-68000	-12.121212	20	Pass
	Ant 1	5775	NV	NT	-68000	-12.121212	20	Pass
			LV	NT	-70000	-12.121212	20	Pass
			HV	NT	-70000	-12.121212	20	Pass
	Ant 2	5775	NV	NT	-70000	-12.121212	20	Pass
			LV	NT	-70000	-12.121212	20	Pass
			HV	NT	-70000	-12.121212	20	Pass

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20M	Ant 1	5180	NV	0	4000	0.772201	20	Pass
			NV	10	4000	0.772201	20	Pass
			NV	20	4000	0.772201	20	Pass
			NV	30	3000	0.579151	20	Pass
			NV	40	3000	0.579151	20	Pass
	Ant 2	5180	NV	0	4000	0.772201	20	Pass
			NV	10	4000	0.772201	20	Pass
			NV	20	4000	0.772201	20	Pass
			NV	30	4000	0.772201	20	Pass
			NV	40	4000	0.772201	20	Pass
	Ant 1	5200	NV	0	-13000	-2.500000	20	Pass
			NV	10	-13000	-2.500000	20	Pass
			NV	20	-13000	-2.500000	20	Pass
			NV	30	-13000	-2.500000	20	Pass
			NV	40	-13000	-2.500000	20	Pass
	Ant 2	5200	NV	0	-9000	-1.730769	20	Pass
			NV	10	-8000	-1.538462	20	Pass
			NV	20	-8000	-1.538462	20	Pass
			NV	30	-8000	-1.538462	20	Pass
			NV	40	-7000	-1.346154	20	Pass
	Ant 1	5240	NV	0	-13000	-2.480916	20	Pass
			NV	10	-13000	-2.480916	20	Pass
			NV	20	-13000	-2.480916	20	Pass
			NV	30	-13000	-2.480916	20	Pass
			NV	40	-13000	-2.480916	20	Pass
	Ant 2	5240	NV	0	-14000	-2.671756	20	Pass
			NV	10	-13000	-2.480916	20	Pass
			NV	20	-13000	-2.480916	20	Pass
			NV	30	-14000	-2.671756	20	Pass
			NV	40	-13000	-2.480916	20	Pass
	Ant 1	5260	NV	0	-14000	-2.661597	20	Pass
			NV	10	-14000	-2.661597	20	Pass
			NV	20	-14000	-2.661597	20	Pass
			NV	30	-14000	-2.661597	20	Pass
			NV	40	-14000	-2.661597	20	Pass
	Ant 2	5260	NV	0	-14000	-2.661597	20	Pass
			NV	10	-14000	-2.661597	20	Pass
			NV	20	-14000	-2.661597	20	Pass
			NV	30	-14000	-2.661597	20	Pass
			NV	40	-14000	-2.661597	20	Pass
	Ant 1	5280	NV	0	-14000	-2.651515	20	Pass
			NV	10	-14000	-2.651515	20	Pass
			NV	20	-14000	-2.651515	20	Pass
			NV	30	-14000	-2.651515	20	Pass
			NV	40	-14000	-2.651515	20	Pass
	Ant 2	5280	NV	0	-14000	-2.651515	20	Pass
			NV	10	-14000	-2.651515	20	Pass
			NV	20	-14000	-2.651515	20	Pass
			NV	30	-14000	-2.651515	20	Pass
			NV	40	-14000	-2.651515	20	Pass
	Ant 1	5320	NV	0	-14000	-2.631579	20	Pass
			NV	10	-14000	-2.631579	20	Pass
			NV	20	-14000	-2.631579	20	Pass
			NV	30	-14000	-2.631579	20	Pass
			NV	40	-14000	-2.631579	20	Pass
	Ant 2	5320	NV	0	-14000	-2.631579	20	Pass

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
			NV	10	-14000	-2.631579	20	Pass
			NV	20	-14000	-2.631579	20	Pass
			NV	30	-14000	-2.631579	20	Pass
			NV	40	-14000	-2.631579	20	Pass
	Ant 1	5500	NV	0	-14000	-2.545455	20	Pass
			NV	10	-14000	-2.545455	20	Pass
			NV	20	-14000	-2.545455	20	Pass
			NV	30	-14000	-2.545455	20	Pass
			NV	40	-14000	-2.545455	20	Pass
	Ant 2	5500	NV	0	-14000	-2.545455	20	Pass
			NV	10	-14000	-2.545455	20	Pass
			NV	20	-14000	-2.545455	20	Pass
			NV	30	-14000	-2.545455	20	Pass
			NV	40	-14000	-2.545455	20	Pass
	Ant 1	5580	NV	0	-70000	-12.544803	20	Pass
			NV	10	-70000	-12.544803	20	Pass
			NV	20	-70000	-12.544803	20	Pass
			NV	30	-70000	-12.544803	20	Pass
			NV	40	-70000	-12.544803	20	Pass
	Ant 2	5580	NV	0	-70000	-12.544803	20	Pass
			NV	10	-70000	-12.544803	20	Pass
			NV	20	-70000	-12.544803	20	Pass
			NV	30	-70000	-12.544803	20	Pass
			NV	40	-70000	-12.544803	20	Pass
	Ant 1	5700	NV	0	-71000	-12.456140	20	Pass
			NV	10	-71000	-12.456140	20	Pass
			NV	20	-71000	-12.456140	20	Pass
			NV	30	-71000	-12.456140	20	Pass
			NV	40	-71000	-12.456140	20	Pass
	Ant 2	5700	NV	0	-71000	-12.456140	20	Pass
			NV	10	-71000	-12.456140	20	Pass
			NV	20	-71000	-12.456140	20	Pass
			NV	30	-71000	-12.456140	20	Pass
			NV	40	-71000	-12.456140	20	Pass
	Ant 1	5745	NV	0	-71000	-12.358573	20	Pass
			NV	10	-71000	-12.358573	20	Pass
			NV	20	-71000	-12.358573	20	Pass
			NV	30	-71000	-12.358573	20	Pass
			NV	40	-70000	-12.184508	20	Pass
	Ant 2	5745	NV	0	-70000	-12.184508	20	Pass
			NV	10	-70000	-12.184508	20	Pass
			NV	20	-70000	-12.184508	20	Pass
			NV	30	-70000	-12.184508	20	Pass
			NV	40	-70000	-12.184508	20	Pass
	Ant 1	5785	NV	0	-71000	-12.273120	20	Pass
			NV	10	-71000	-12.273120	20	Pass
			NV	20	-71000	-12.273120	20	Pass
			NV	30	-71000	-12.273120	20	Pass
			NV	40	-71000	-12.273120	20	Pass
	Ant 2	5785	NV	0	-71000	-12.273120	20	Pass
			NV	10	-70000	-12.100259	20	Pass
			NV	20	-71000	-12.273120	20	Pass
			NV	30	-71000	-12.273120	20	Pass
			NV	40	-70000	-12.100259	20	Pass
	Ant 1	5825	NV	0	-71000	-12.188841	20	Pass
			NV	10	-71000	-12.188841	20	Pass
			NV	20	-71000	-12.188841	20	Pass

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
			NV	30	-71000	-12.188841	20	Pass
			NV	40	-71000	-12.188841	20	Pass
	Ant 2	5825	NV	0	-71000	-12.188841	20	Pass
			NV	10	-71000	-12.188841	20	Pass
			NV	20	-71000	-12.188841	20	Pass
			NV	30	-71000	-12.188841	20	Pass
			NV	40	-71000	-12.188841	20	Pass
40M	Ant 1	5190	NV	0	-64000	-12.331407	20	Pass
			NV	10	-64000	-12.331407	20	Pass
			NV	20	-64000	-12.331407	20	Pass
			NV	30	-64000	-12.331407	20	Pass
			NV	40	-64000	-12.331407	20	Pass
	Ant 2	5190	NV	0	-64000	-12.331407	20	Pass
			NV	10	-64000	-12.331407	20	Pass
			NV	20	-64000	-12.331407	20	Pass
			NV	30	-64000	-12.331407	20	Pass
			NV	40	-64000	-12.331407	20	Pass
	Ant 1	5230	NV	0	-64000	-12.237094	20	Pass
			NV	10	-64000	-12.237094	20	Pass
			NV	20	-64000	-12.237094	20	Pass
			NV	30	-64000	-12.237094	20	Pass
			NV	40	-64000	-12.237094	20	Pass
	Ant 2	5230	NV	0	-64000	-12.237094	20	Pass
			NV	10	-64000	-12.237094	20	Pass
			NV	20	-64000	-12.237094	20	Pass
			NV	30	-64000	-12.237094	20	Pass
			NV	40	-64000	-12.237094	20	Pass
	Ant 1	5270	NV	0	-64000	-12.144213	20	Pass
			NV	10	-64000	-12.144213	20	Pass
			NV	20	-64000	-12.144213	20	Pass
			NV	30	-65000	-12.333966	20	Pass
			NV	40	-64000	-12.144213	20	Pass
	Ant 2	5270	NV	0	-65000	-12.333966	20	Pass
			NV	10	-65000	-12.333966	20	Pass
			NV	20	-65000	-12.333966	20	Pass
			NV	30	-65000	-12.333966	20	Pass
			NV	40	-65000	-12.333966	20	Pass
	Ant 1	5310	NV	0	-65000	-12.241055	20	Pass
			NV	10	-65000	-12.241055	20	Pass
			NV	20	-65000	-12.241055	20	Pass
			NV	30	-65000	-12.241055	20	Pass
			NV	40	-65000	-12.241055	20	Pass
	Ant 2	5310	NV	0	-65000	-12.241055	20	Pass
			NV	10	-65000	-12.241055	20	Pass
			NV	20	-65000	-12.241055	20	Pass
			NV	30	-65000	-12.241055	20	Pass
			NV	40	-65000	-12.241055	20	Pass
	Ant 1	5510	NV	0	-62000	-11.252269	20	Pass
			NV	10	-54000	-9.800363	20	Pass
			NV	20	-54000	-9.800363	20	Pass
			NV	30	-49000	-8.892922	20	Pass
			NV	40	-49000	-8.892922	20	Pass
	Ant 2	5510	NV	0	-44000	-7.985481	20	Pass
			NV	10	-43000	-7.803993	20	Pass
			NV	20	-43000	-7.803993	20	Pass
			NV	30	-43000	-7.803993	20	Pass
			NV	40	-42000	-7.622505	20	Pass

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
	Ant 1	5550	NV	0	-34000	-6.126126	20	Pass
			NV	10	-34000	-6.126126	20	Pass
			NV	20	-33000	-5.945946	20	Pass
			NV	30	-33000	-5.945946	20	Pass
			NV	40	-33000	-5.945946	20	Pass
	Ant 2	5550	NV	0	-65000	-11.711712	20	Pass
			NV	10	-66000	-11.891892	20	Pass
			NV	20	-66000	-11.891892	20	Pass
			NV	30	-66000	-11.891892	20	Pass
			NV	40	-66000	-11.891892	20	Pass
	Ant 1	5670	NV	0	-68000	-11.992945	20	Pass
			NV	10	-68000	-11.992945	20	Pass
			NV	20	-68000	-11.992945	20	Pass
			NV	30	-68000	-11.992945	20	Pass
			NV	40	-68000	-11.992945	20	Pass
	Ant 2	5670	NV	0	-68000	-11.992945	20	Pass
			NV	10	-68000	-11.992945	20	Pass
			NV	20	-68000	-11.992945	20	Pass
			NV	30	-68000	-11.992945	20	Pass
			NV	40	-68000	-11.992945	20	Pass
	Ant 1	5755	NV	0	-70000	-12.163336	20	Pass
			NV	10	-70000	-12.163336	20	Pass
			NV	20	-70000	-12.163336	20	Pass
			NV	30	-70000	-12.163336	20	Pass
			NV	40	-70000	-12.163336	20	Pass
	Ant 2	5755	NV	0	-70000	-12.163336	20	Pass
			NV	10	-70000	-12.163336	20	Pass
			NV	20	-70000	-12.163336	20	Pass
			NV	30	-70000	-12.163336	20	Pass
			NV	40	-70000	-12.163336	20	Pass
	Ant 1	5795	NV	0	-70000	-12.079379	20	Pass
			NV	10	-71000	-12.251941	20	Pass
			NV	20	-71000	-12.251941	20	Pass
			NV	30	-70000	-12.079379	20	Pass
			NV	40	-70000	-12.079379	20	Pass
	Ant 2	5795	NV	0	-70000	-12.079379	20	Pass
			NV	10	-70000	-12.079379	20	Pass
			NV	20	-70000	-12.079379	20	Pass
			NV	30	-70000	-12.079379	20	Pass
			NV	40	-70000	-12.079379	20	Pass
80M	Ant 1	5210	NV	0	-63000	-12.092131	20	Pass
			NV	10	-63000	-12.092131	20	Pass
			NV	20	-63000	-12.092131	20	Pass
			NV	30	-63000	-12.092131	20	Pass
			NV	40	-63000	-12.092131	20	Pass
	Ant 2	5210	NV	0	-63000	-12.092131	20	Pass
			NV	10	-63000	-12.092131	20	Pass
			NV	20	-63000	-12.092131	20	Pass
			NV	30	-64000	-12.284069	20	Pass
			NV	40	-64000	-12.284069	20	Pass
	Ant 1	5290	NV	0	-64000	-12.098299	20	Pass
			NV	10	-64000	-12.098299	20	Pass
			NV	20	-64000	-12.098299	20	Pass
			NV	30	-64000	-12.098299	20	Pass
			NV	40	-64000	-12.098299	20	Pass
	Ant 2	5290	NV	0	-65000	-12.287335	20	Pass
			NV	10	-65000	-12.287335	20	Pass

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
			NV	20	-65000	-12.287335	20	Pass
			NV	30	-65000	-12.287335	20	Pass
			NV	40	-65000	-12.287335	20	Pass
	Ant 1	5530	NV	0	-67000	-12.115732	20	Pass
			NV	10	-65000	-11.754069	20	Pass
			NV	20	-63000	-11.392405	20	Pass
			NV	30	-61000	-11.030741	20	Pass
			NV	40	-60000	-10.849910	20	Pass
	Ant 2	5530	NV	0	-66000	-11.934901	20	Pass
			NV	10	-66000	-11.934901	20	Pass
			NV	20	-66000	-11.934901	20	Pass
			NV	30	-66000	-11.934901	20	Pass
			NV	40	-66000	-11.934901	20	Pass
	Ant 1	5610	NV	0	-68000	-12.121212	20	Pass
			NV	10	-68000	-12.121212	20	Pass
			NV	20	-68000	-12.121212	20	Pass
			NV	30	-68000	-12.121212	20	Pass
			NV	40	-68000	-12.121212	20	Pass
	Ant 2	5610	NV	0	-68000	-12.121212	20	Pass
			NV	10	-68000	-12.121212	20	Pass
			NV	20	-68000	-12.121212	20	Pass
			NV	30	-68000	-12.121212	20	Pass
			NV	40	-68000	-12.121212	20	Pass
	Ant 1	5775	NV	0	-70000	-12.121212	20	Pass
			NV	10	-70000	-12.121212	20	Pass
			NV	20	-70000	-12.121212	20	Pass
			NV	30	-70000	-12.121212	20	Pass
			NV	40	-70000	-12.121212	20	Pass
	Ant 2	5775	NV	0	-70000	-12.121212	20	Pass
			NV	10	-70000	-12.121212	20	Pass
			NV	20	-70000	-12.121212	20	Pass
			NV	30	-70000	-12.121212	20	Pass
			NV	40	-70000	-12.121212	20	Pass

3.8. Antenna Requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203
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 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.

Test Result

The directional gain of the antenna is less than 6dBi, please refer to the EUT internal photographs antenna photo.

3.9. Dynamic Frequency Selection

Requirement

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Limit

1. DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

2. DFS Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μsec is selected, the number of pulses would be Round up $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{3066}\right)\right\}$ = Round up {17.2} = 18.

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type wave forms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each wave form. The hopping sequence is different for each wave form and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

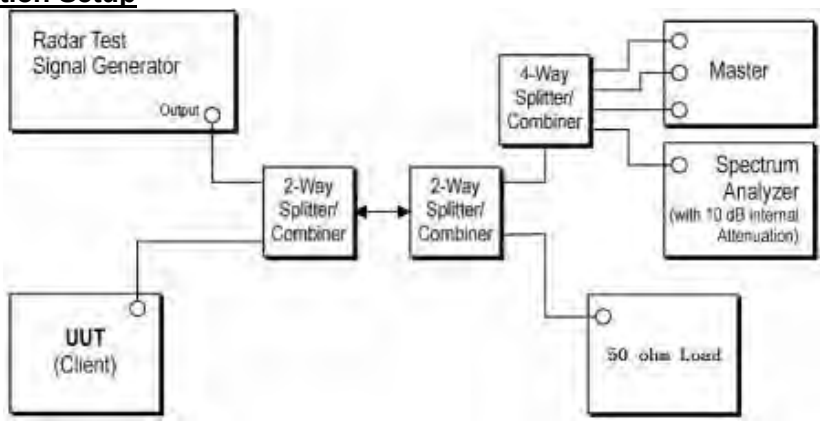
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250–5724MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

Calibration of Radar Waveform

Radar Waveform Calibration Procedure

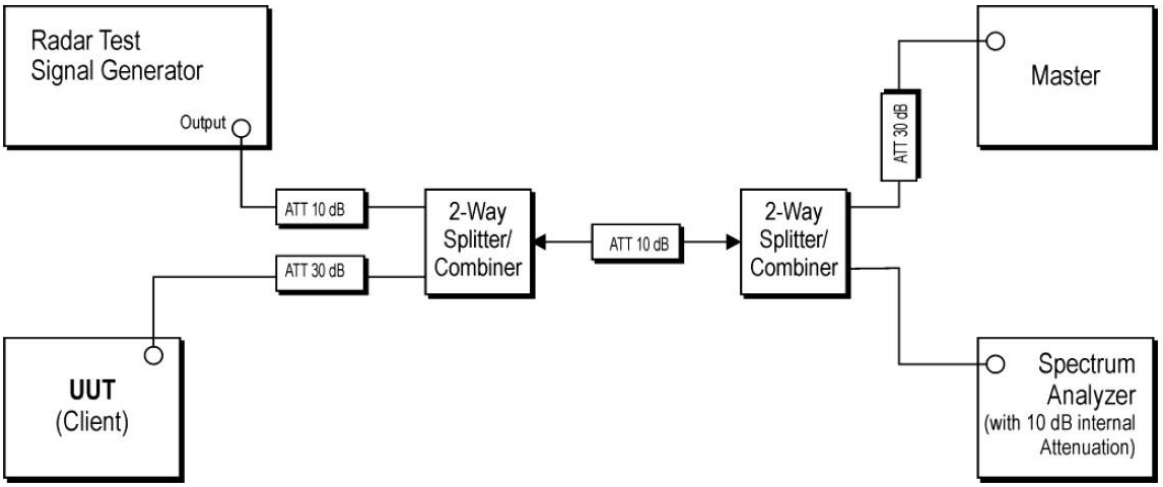
1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master
2) The interference Radar Detection Threshold Level is -62dBm + 0dBi +1dB = -61dBm that had been taken into account the output power range and antenna gain.
3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.
4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was - -62dBm + 0dBi +1dB = -61dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

Conducted Calibration Setup

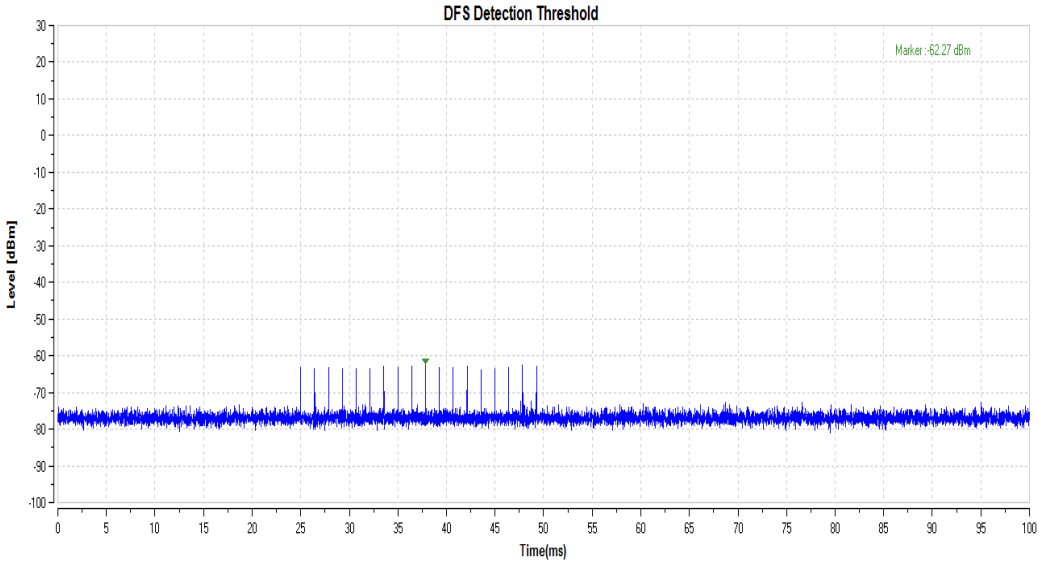


Test Configuration

Setup for Client with injection at the Master



Radar Waveform Calibration Result

Reference DFS test signal	
802.11ac(VHT80) 5290MHz	

Test Procedure

1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file “iperf.exe” specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (0.3ms) =S (12000ms) / B (4000); where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: C (ms)= N X Dwell (0.3ms); where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.
8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

Test Mode

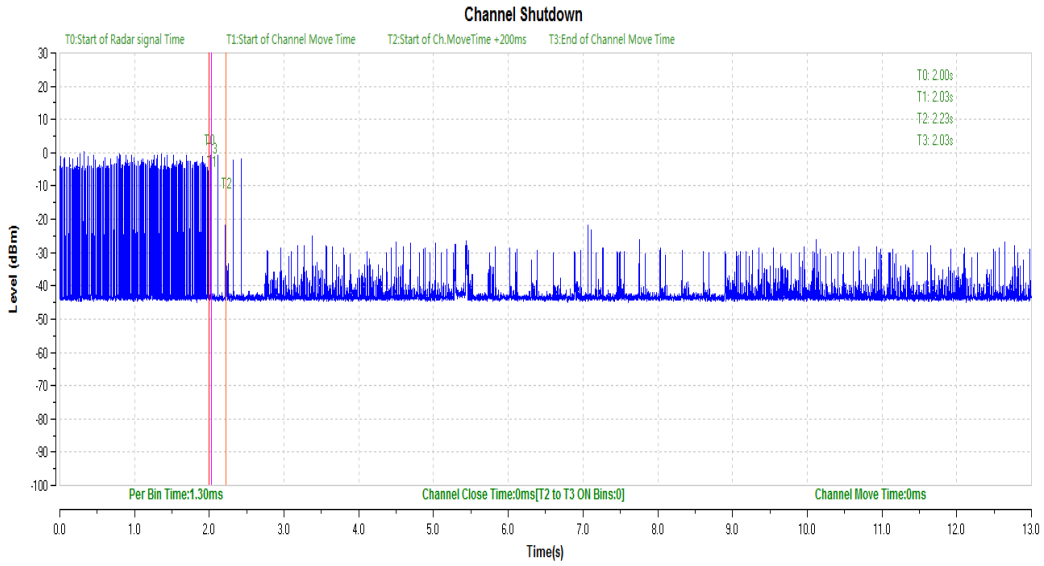
Please refer to the clause 2.4.

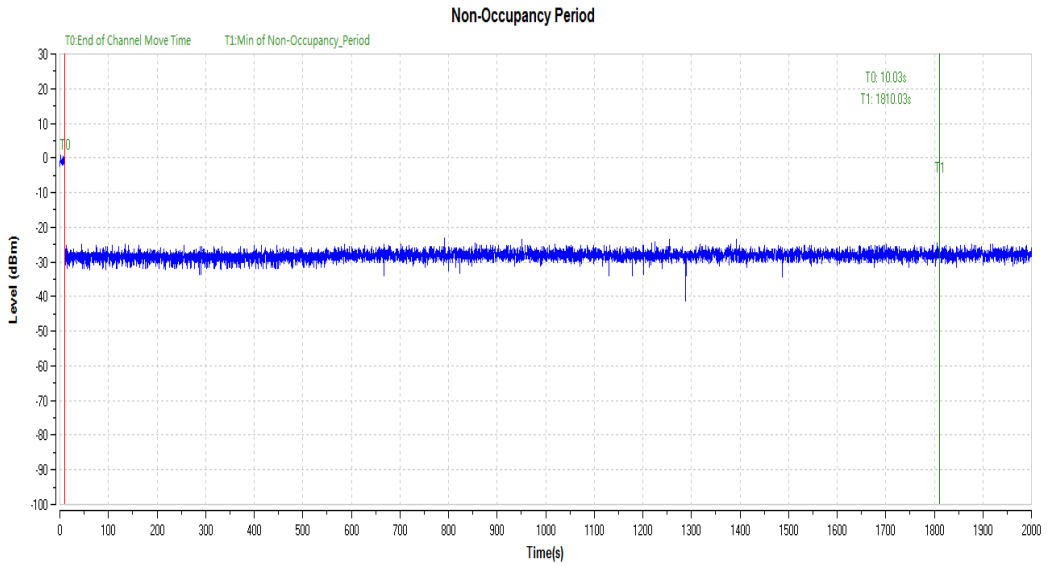
Test Result

☒ **Passed** ☐ **Not Applicable**

The product in this report belongs to Client Without Radar Detection.

Frequency	Test Item	Test Result	Limit	Verdict
802.11ac(VHT80) 5290MHz	Channel Move Time	0ms	< 10s	Pass
	Channel Closing Transmission Time	0ms	< 200+60ms	Pass
	Non-Occupancy Period	See test graph	≥1800	Pass

Channel Move Time & Channel Closing Transmission Time	
802.11ac(VHT80) 5290MHz	

Non-Occupancy Period	
802.11ac(VHT80) 5290MHz	

**********THE END**********