the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3)For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.44 dB.

Test Results

Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11a	0.983	0.000
802.11n HT20	0.981	0.000
802.11n HT40	0.965	0.156
802.11ac VHT20	0.981	0.000
802.11ac VHT40	0.963	0.164
802.11ac VHT80	0.927	0.330
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

Power Index								
Channel	802.11a	802.11n HT20	802.11ac VHT20	Channel	802.11n HT40	802.11ac VHT40	Channel	802.11ac VHT80
CH36	16	16	15	CH38	16	15	CH42	14
CH40	16	16	15	CH46	16	15	/	/
CH48	16	16	15	/	/	/	/	/
CH52	16	16	15	CH54	16	15	CH58	14
CH60	16	16	15	CH62	16	15	/	/
CH64	16	16	15	/	/	/	/	/
CH100	20	20	20	CH102	20	20	/	/
CH120	20	20	20	CH118	20	20	CH122	18
CH140	20	20	20	CH134	20	20	CH138	18
CH144	20	20	20	CH142	20	20	/	/
CH149	19	19	18	CH151	19	17	CH155	18
CH157	19	19	18	CH159	19	17	/	/
CH165	19	19	18	/	/	/	/	/

Test Mode		Channel/ Frequency (MHz)	B=26 dB bandwidth (MHz)	Limit 11 dBm + 10 log B (dBm)	Final Limit (dBm)
U-NII-2A	802.11a	52/5260	22.96	24.61>24	24
		60/5300	22.71	24.56>24	24
		64/5320	22.84	24.59>24	24
	802.11n HT20	52/5260	23.85	24.77>24	24
		60/5300	23.66	24.74>24	24
		64/5320	24.18	24.83>24	24
	802.11n HT40	54/5270	41.43	27.17>24	24
		62/5310	40.79	27.11>24	24
	802.11ac VHT20	52/5260	22.72	24.56>24	24
		60/5300	23.91	24.79>24	24
		64/5320	23.29	24.67>24	24
	802.11ac VHT40	54/5270	41.80	27.21>24	24
		62/5310	41.07	27.14>24	24
	802.11ac VHT80	58/5290	96.62	30.85>24	24
U-NII-2C	802.11a	100/5500	23.59	24.73>24	24
		120/5600	23.33	24.68>24	24
		140/5700	24.07	24.81>24	24
		144/5720	24.97	24.97>24	24
	802.11n HT20	100/5500	23.87	24.78>24	24
		120/5600	24.44	24.88>24	24
		140/5700	24.15	24.83>24	24
		144/5720	24.04	24.81>24	24
	802.11n HT40	102/5510	42.34	27.27>24	24
		118/5590	64.47	29.09>24	24
		134/5670	44.34	27.47>24	24
		142/5710	49.39	27.94>24	24
	802.11ac VHT20	100/5500	24.36	24.87>24	24
		120/5600	24.68	24.92>24	24
		140/5700	23.92	24.79>24	24
		144/5720	24.25	24.85>24	24
	802.11ac VHT40	102/5510	44.96	27.53>24	24
		118/5590	42.21	27.25>24	24
		134/5670	47.35	27.75>24	24
		142/5710	41.49	27.18>24	24
	802.11ac VHT80	122/5610	86.98	30.39>24	24
		138/5690	99.96	31.00>24	24
Note: 250mW=24dBm					

U-NII-1

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	16.41	16.41	24	PASS
	40/5200	16.17	16.17	24	PASS
	48/5240	15.45	15.45	24	PASS
802.11n HT20	36/5180	16.24	16.24	24	PASS
	40/5200	16.09	16.09	24	PASS
	48/5240	15.39	15.39	24	PASS
802.11n HT40	38/5190	16.78	16.94	24	PASS
	46/5230	16.20	16.36	24	PASS
802.11ac VHT20	36/5180	15.35	15.35	24	PASS
	40/5200	15.16	15.16	24	PASS
	48/5240	14.42	14.42	24	PASS
802.11ac VHT40	38/5190	15.82	15.99	24	PASS
	46/5230	15.24	15.40	24	PASS
802.11ac VHT80	42/5210	14.33	14.66	24	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2A

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	52/5260	15.27	15.27	24	PASS
	60/5300	14.82	14.82	24	PASS
	64/5320	14.54	14.54	24	PASS
802.11n HT20	52/5260	15.07	15.07	24	PASS
	60/5300	14.56	14.56	24	PASS
	64/5320	14.34	14.34	24	PASS
802.11n HT40	54/5270	15.64	15.80	24	PASS
	62/5310	15.15	15.31	24	PASS
802.11ac VHT20	52/5260	14.03	14.03	24	PASS
	60/5300	13.51	13.51	24	PASS
	64/5320	13.39	13.39	24	PASS
802.11ac VHT40	54/5270	14.77	14.94	24	PASS
	62/5310	14.18	14.34	24	PASS
802.11ac VHT80	58/5290	13.16	13.49	24	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2C

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	100/5500	16.06	16.06	24	PASS
	120/5600	15.84	15.84	24	PASS
	140/5700	15.99	15.99	24	PASS
	144/5720	15.40	15.40	24	PASS
802.11n HT20	100/5500	15.89	15.89	24	PASS
	120/5600	15.62	15.62	24	PASS
	140/5700	15.68	15.68	24	PASS
	144/5720	15.08	15.08	24	PASS
802.11n HT40	102/5510	16.31	16.46	24	PASS
	118/5590	16.30	16.45	24	PASS
	134/5670	15.93	16.09	24	PASS
	142/5710	15.98	16.14	24	PASS
802.11ac VHT20	100/5500	15.77	15.77	24	PASS
	120/5600	15.64	15.64	24	PASS
	140/5700	15.74	15.74	24	PASS
	144/5720	15.13	15.13	24	PASS
802.11ac VHT40	102/5510	16.30	16.46	24	PASS
	118/5590	16.30	16.46	24	PASS
	134/5670	15.95	16.12	24	PASS
	142/5710	16.01	16.17	24	PASS
802.11ac VHT80	122/5610	14.09	14.42	24	PASS
	138/5690	14.26	14.59	24	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-3

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	144/5720	8.55	8.55	30	PASS
	149/5745	15.73	15.73	30	PASS
	157/5785	16.04	16.04	30	PASS
	165/5825	16.13	16.13	30	PASS
802.11n HT20	144/5720	8.85	8.85	30	PASS
	149/5745	15.55	15.55	30	PASS
	157/5785	15.83	15.83	30	PASS
	165/5825	15.93	15.93	30	PASS
802.11n HT40	142/5710	5.22	5.38	30	PASS
	151/5755	16.09	16.25	30	PASS
	159/5795	16.38	16.53	30	PASS
802.11ac VHT20	144/5720	8.76	8.76	30	PASS
	149/5745	14.61	14.61	30	PASS
	157/5785	14.90	14.90	30	PASS
	165/5825	15.04	15.04	30	PASS
802.11ac VHT40	142/5710	5.39	5.55	30	PASS
	151/5755	14.49	14.65	30	PASS
	159/5795	14.60	14.76	30	PASS
802.11ac VHT80	138/5690	0.56	0.89	30	PASS
	155/5775	15.08	15.41	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.3. Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

1. Frequency stability with respect to ambient temperature

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.

i) Lower the chamber temperature by not more that 10°C, and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

2. Frequency stability when varying supply voltage

Unless otherwise specified, these tests shall be made at ambient room temperature (+15°C to +25 °C). An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.

a) Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency-measuring instrument.

b) Tune the EUT to one of the number of frequencies required in 5.6. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).
c) Measure the frequency at each of the frequencies specified in 5.6.
d) Repeat the above procedure at 85% and 115% of the nominal supply voltage.

Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936Hz

Test Results

Voltage (V)	Temperature (°C)	U-NII-1 Test Results			
		5200MHz			
		1min	2min	5min	10min
3.8	-30	5199.990078	5199.982883	5199.979365	5199.969662
3.8	-20	5199.986459	5199.978774	5199.969555	5199.963188
3.8	-10	5199.989942	5199.974721	5199.966172	5199.959201
3.8	0	5199.981608	5199.969058	5199.965346	5199.958783
3.8	10	5199.979814	5199.968195	5199.961225	5199.957764
3.8	20	5199.971990	5199.966537	5199.953666	5199.957161
3.8	30	5199.964499	5199.959602	5199.950787	5199.956081
3.8	40	5199.963155	5199.953788	5199.949669	5199.953474
3.8	50	5199.960383	5199.949697	5199.941897	5199.953017
3.5	20	5199.960034	5199.943900	5199.934042	5199.948900
4	20	5199.956158	5199.936443	5199.932664	5199.946110
Max. ΔMHz		-0.043842	-0.063557	-0.067336	-0.053890
PPM		-8.431154	-12.222500	-12.949231	-10.363462

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
3.8	-30	5300.004356	5299.996956	5299.995087	5299.989316
3.8	-20	5299.995706	5299.991212	5299.990412	5299.979395
3.8	-10	5299.986442	5299.986563	5299.984520	5299.977209
3.8	0	5299.995231	5299.981415	5299.985526	5299.976321
3.8	10	5299.990527	5299.974463	5299.977732	5299.973552
3.8	20	5299.990051	5299.970639	5299.970815	5299.972017
3.8	30	5299.986546	5299.970133	5299.965322	5299.962570
3.8	40	5299.980475	5299.967060	5299.956363	5299.953154
3.8	50	5299.977443	5299.959083	5299.954946	5299.944848
3.5	20	5299.976167	5299.957083	5299.954689	5299.935480
4	20	5299.973775	5299.950861	5299.954160	5299.931242
Max. ΔMHz		-0.026225	-0.049139	-0.045840	-0.068758
PPM		-4.948113	-9.271509	-8.649057	-12.973208

Voltage (V)	Temperature (°C)	U-NII-2C Test Results			
		5580MHz			
		1min	2min	5min	10min
3.8	-30	5579.998416	5579.997064	5579.994501	5579.987567
3.8	-20	5579.989814	5579.987407	5579.993461	5579.986318
3.8	-10	5579.984129	5579.986004	5579.990480	5579.979265
3.8	0	5579.985525	5579.983084	5579.988007	5579.985177
3.8	10	5579.976866	5579.975480	5579.979855	5579.979907
3.8	20	5579.974869	5579.969966	5579.978430	5579.976679
3.8	30	5579.971321	5579.969303	5579.971173	5579.975692
3.8	40	5579.963889	5579.964544	5579.971096	5579.970481
3.8	50	5579.954387	5579.956682	5579.962677	5579.965097
3.5	20	5579.952860	5579.949170	5579.958364	5579.961411
4	20	5579.943379	5579.948976	5579.953262	5579.961404
Max. ΔMHz		-0.056621	-0.051024	-0.046738	-0.038596
PPM		-10.147133	-9.144086	-8.375986	-6.916846

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
3.8	-30	5784.997816	5784.993177	5784.987234	5784.986644
3.8	-20	5784.988935	5784.991558	5784.982247	5784.983276
3.8	-10	5784.986784	5784.984579	5784.976063	5784.980656
3.8	0	5784.982177	5784.989308	5784.976758	5784.976282
3.8	10	5784.975517	5784.989302	5784.975449	5784.970225
3.8	20	5784.971443	5784.980076	5784.966811	5784.969964
3.8	30	5784.968223	5784.972157	5784.960943	5784.962202
3.8	40	5784.960521	5784.964633	5784.951530	5784.956587
3.8	50	5784.955481	5784.963487	5784.947079	5784.953152
3.5	20	5784.954495	5784.959720	5784.937971	5784.948867
4	20	5784.948234	5784.956948	5784.933941	5784.944444
Max. ΔMHz		-0.051766	-0.043052	-0.066059	-0.055556
PPM		-8.948315	-7.442005	-11.419015	-9.603457

5.4. Power Spectral Density

Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

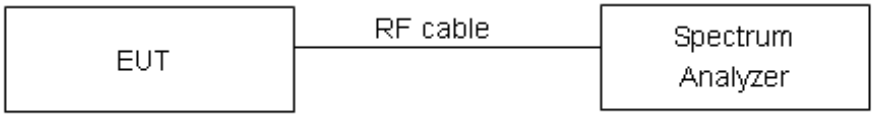
Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable.

Set RBW = 1MHz, VBW =3MHz for the band 5.150-5.250GHz, 5.250-5.350GHz, 5.470-5.725GHz.
Set RBW = 470kHz, VBW =1.5MHz for the band 5.725-5.850GHz

The conducted PSD is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

Test setup



Limits

Rule FCC Part 15.407(a)(1)/ FCC Part 15.407(a)(2) / FCC Part 15.407(a)(3)
For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500kHz band. If transmittingantennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Frequency Bands/GHz	Limits
5.15-5.25	11dBm/MHz
5.25-5.35 and 5.47-5.725	11dBm/MHz
5.725-5.85	30dBm/500kHz

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.

Test Results:

U-NII-1

Mode	Channel/ Frequency (MHz)	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36/5180	6.56	6.56	11	PASS
	40/5200	6.35	6.35	11	PASS
	48/5240	5.60	5.60	11	PASS
802.11n HT20	36/5180	6.18	6.18	11	PASS
	40/5200	5.99	5.99	11	PASS
	48/5240	5.38	5.38	11	PASS
802.11n HT40	38/5190	3.59	3.75	11	PASS
	46/5230	3.04	3.20	11	PASS
802.11ac VHT20	36/5180	5.40	5.40	11	PASS
	40/5200	5.04	5.04	11	PASS
	48/5240	4.17	4.17	11	PASS
802.11ac VHT40	38/5190	2.77	2.93	11	PASS
	46/5230	2.18	2.34	11	PASS
802.11ac VHT80	42/5210	-1.60	-1.27	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-2A

Mode	Channel /Frequency (MHz)	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	52/5260	5.62	5.62	11	PASS
	60/5300	4.76	4.76	11	PASS
	64/5320	4.47	4.47	11	PASS
802.11n HT20	52/5260	4.73	4.73	11	PASS
	60/5300	4.66	4.66	11	PASS
	64/5320	4.09	4.09	11	PASS
802.11n HT40	54/5270	2.56	2.72	11	PASS
	62/5310	2.26	2.42	11	PASS
802.11ac VHT20	52/5260	4.02	4.02	11	PASS
	60/5300	3.43	3.43	11	PASS
	64/5320	3.16	3.16	11	PASS
802.11ac VHT40	54/5270	1.51	1.67	11	PASS
	62/5310	1.26	1.42	11	PASS
802.11ac VHT80	58/5290	-3.12	-2.79	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-2C

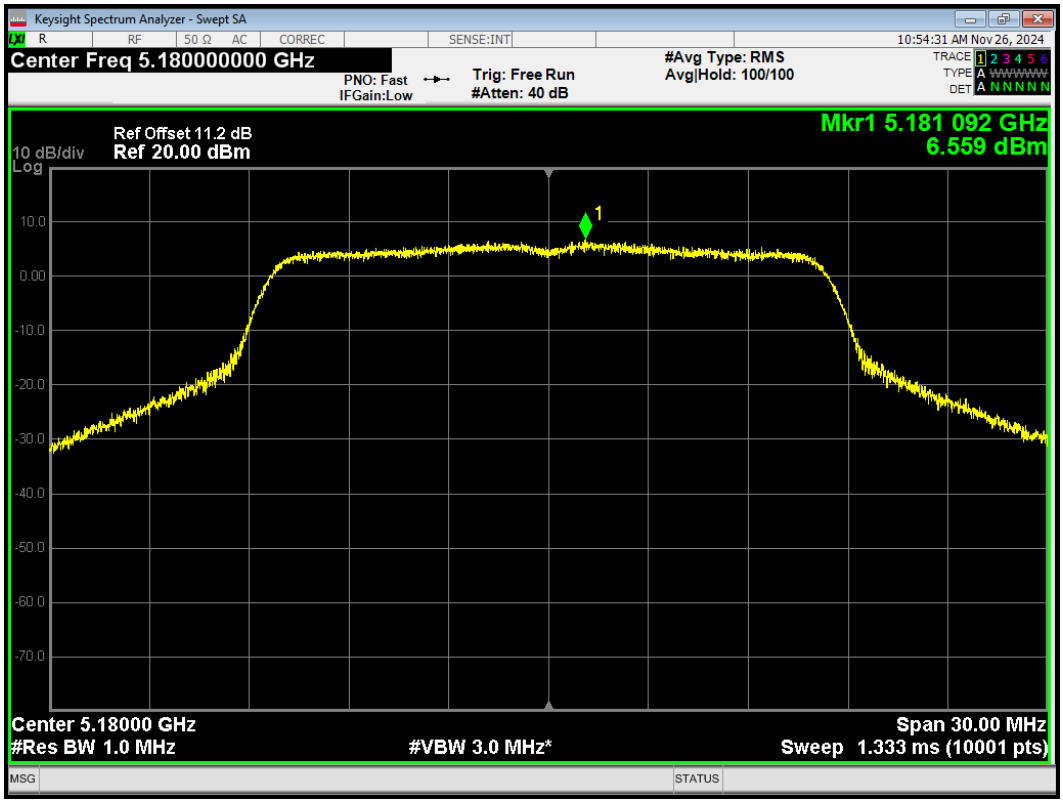
Mode	Channel /Frequency (MHz)	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	100/5500	6.24	6.24	11	PASS
	120/5600	5.91	5.91	11	PASS
	140/5700	6.14	6.14	11	PASS
	144/5720	6.45	6.45	11	PASS
802.11n HT20	100/5500	5.80	5.80	11	PASS
	120/5600	5.51	5.51	11	PASS
	140/5700	5.66	5.66	11	PASS
	144/5720	5.76	5.76	11	PASS
802.11n HT40	102/5510	3.26	3.42	11	PASS
	118/5590	3.10	3.26	11	PASS
	134/5670	2.67	2.83	11	PASS
	142/5710	3.34	3.50	11	PASS
802.11ac VHT20	100/5500	5.36	5.36	11	PASS
	120/5600	5.47	5.47	11	PASS
	140/5700	5.49	5.49	11	PASS
	144/5720	5.98	5.98	11	PASS
802.11ac VHT40	102/5510	3.28	3.44	11	PASS
	118/5590	2.97	3.13	11	PASS
	134/5670	3.25	3.41	11	PASS
	142/5710	2.90	3.06	11	PASS
802.11ac VHT80	122/5610	-2.24	-1.91	11	PASS
	138/5690	-2.11	-1.78	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-3

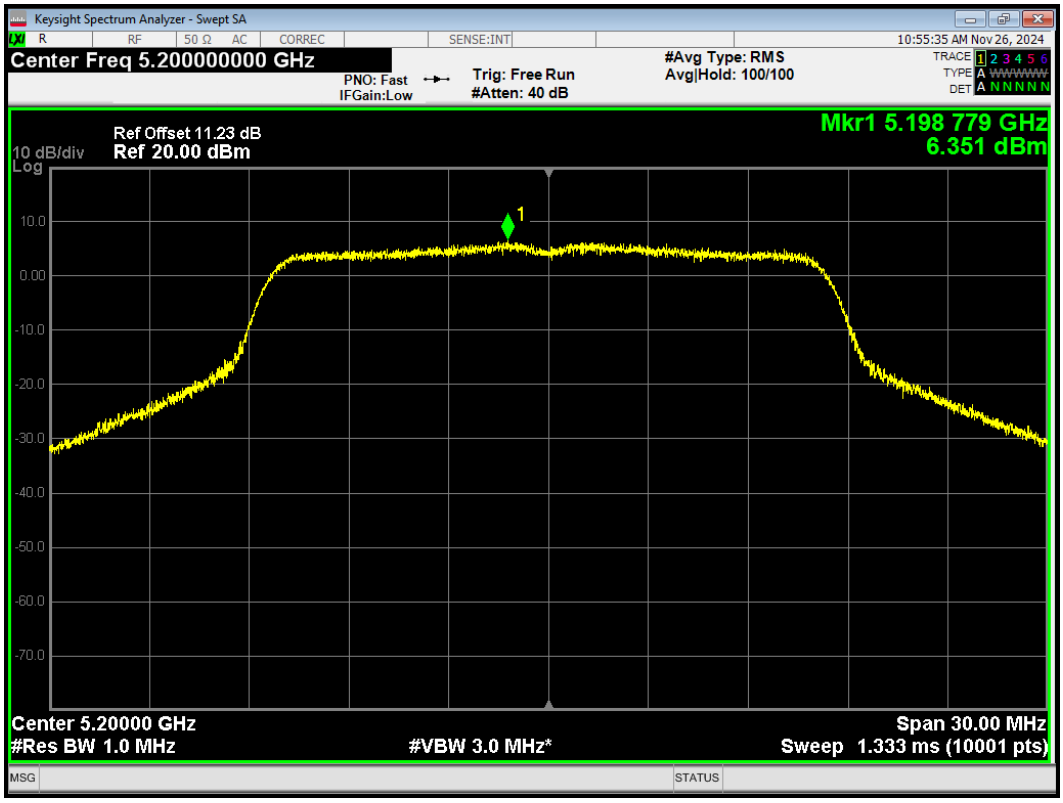
Mode	Channel /Frequency (MHz)	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	144/5720	1.47	1.74	30	PASS
	149/5745	2.60	2.87	30	PASS
	157/5785	2.87	3.14	30	PASS
	165/5825	3.03	3.30	30	PASS
802.11n HT20	144/5720	1.03	1.30	30	PASS
	149/5745	2.38	2.65	30	PASS
	157/5785	2.64	2.91	30	PASS
	165/5825	2.33	2.60	30	PASS
802.11n HT40	142/5710	-1.76	-1.33	30	PASS
	151/5755	-0.21	0.22	30	PASS
	159/5795	-0.10	0.33	30	PASS
802.11ac VHT20	144/5720	0.88	1.15	30	PASS
	149/5745	1.27	1.54	30	PASS
	157/5785	1.55	1.82	30	PASS
	165/5825	1.57	1.84	30	PASS
802.11ac VHT40	142/5710	-2.14	-1.71	30	PASS
	151/5755	-2.13	-1.70	30	PASS
	159/5795	-2.01	-1.58	30	PASS
802.11ac VHT80	138/5690	-6.66	-6.06	30	PASS
	155/5775	-4.74	-4.14	30	PASS
Note: PSD=Read Value+Duty cycle correction factor +10*log(500/470)					

U-NII-1

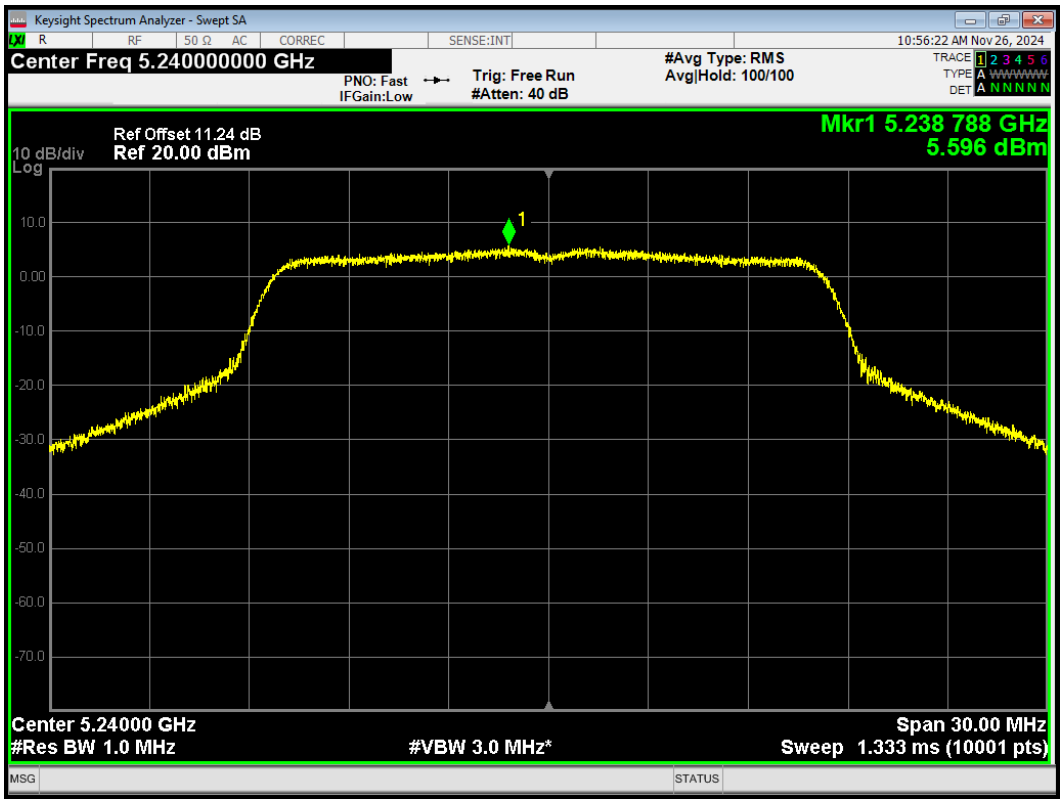
PSD 802.11a 5180MHz



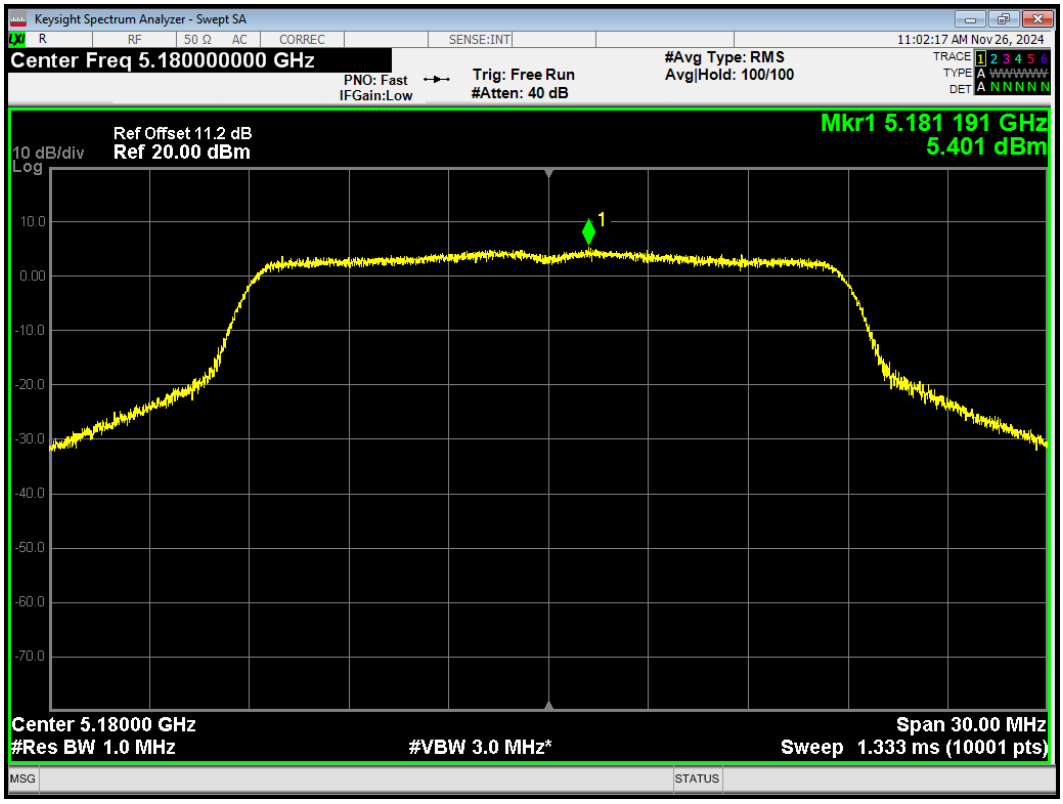
PSD 802.11a 5200MHz



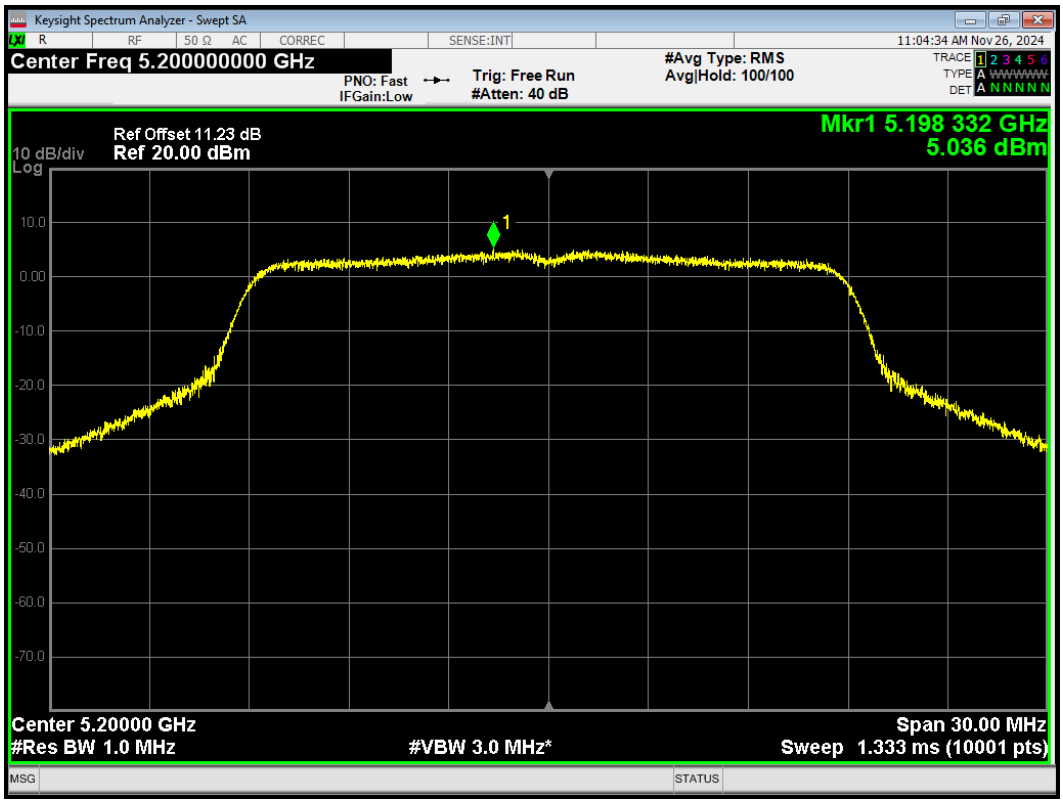
PSD 802.11a 5240MHz



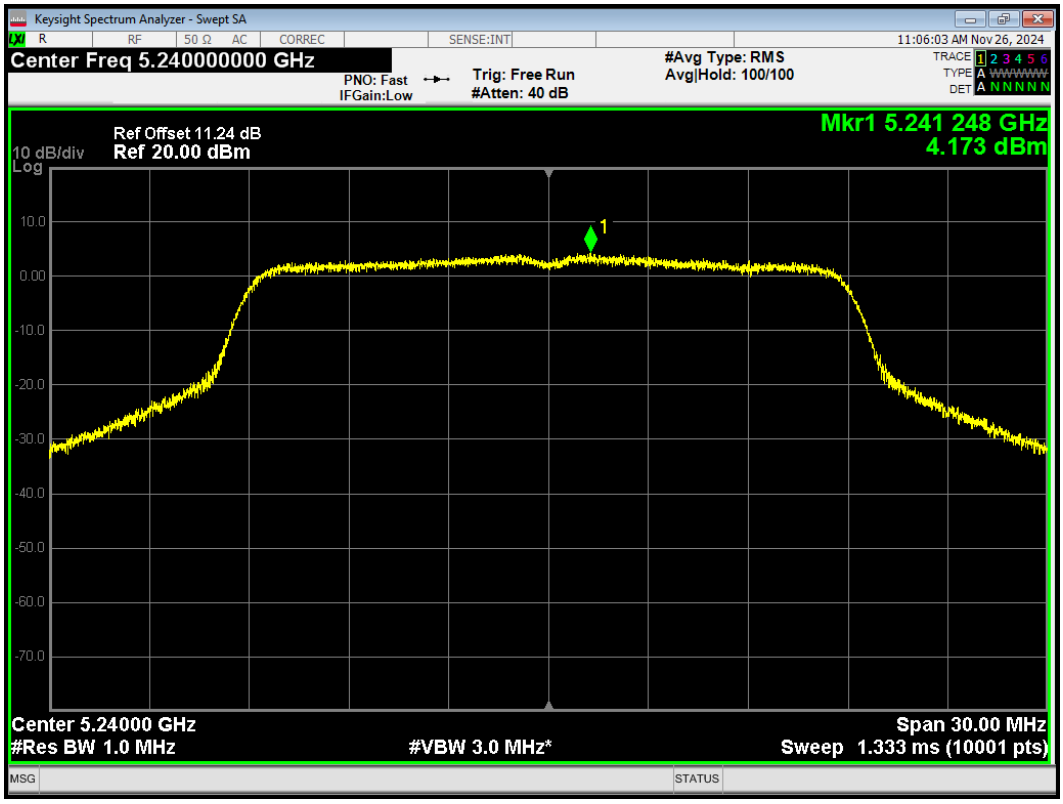
PSD 802.11ac(VHT20) 5180MHz



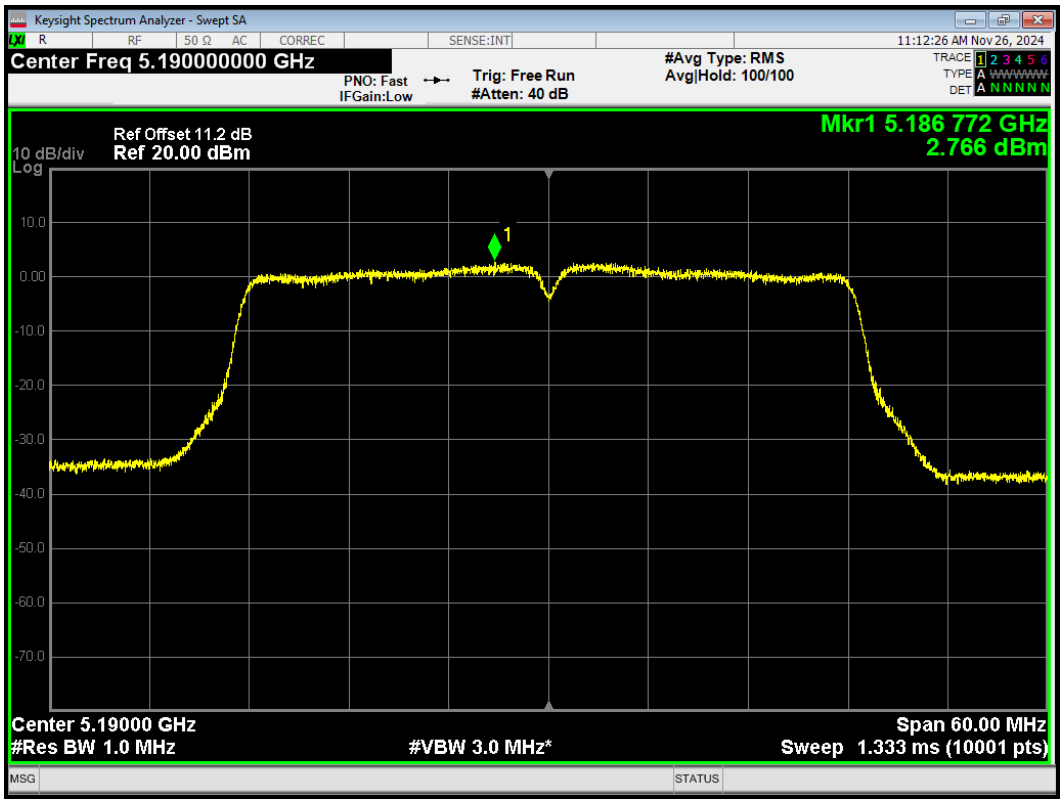
PSD 802.11ac(VHT20) 5200MHz



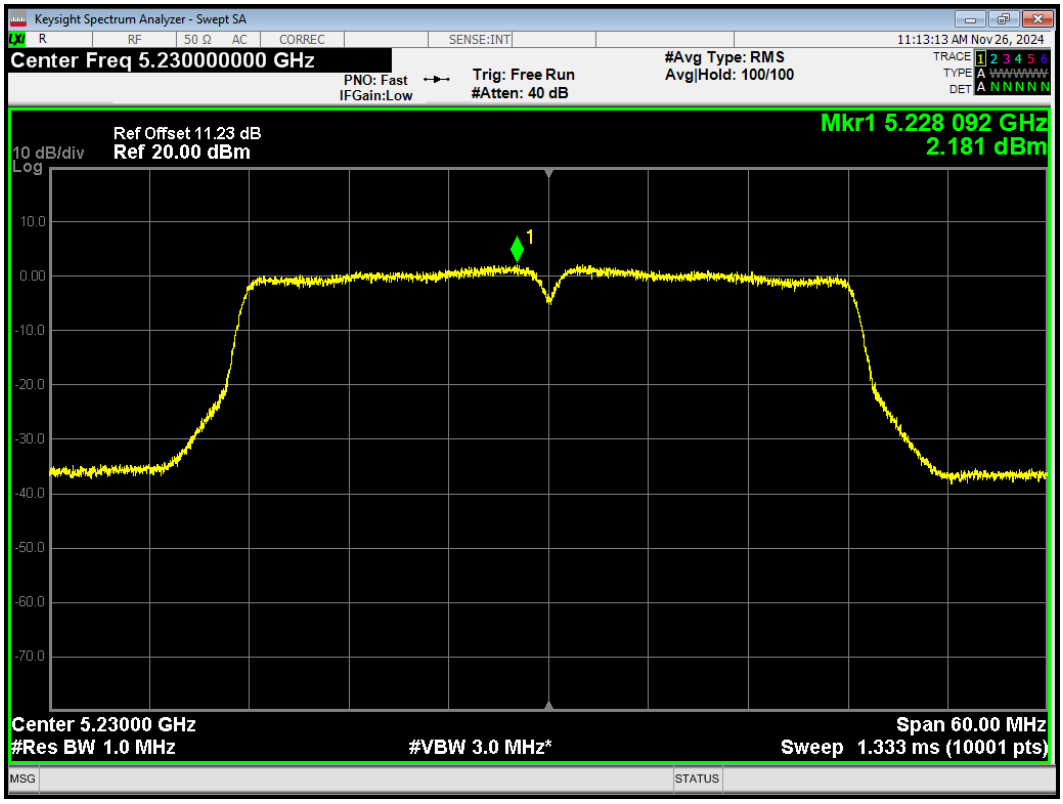
PSD 802.11ac(VHT20) 5240MHz



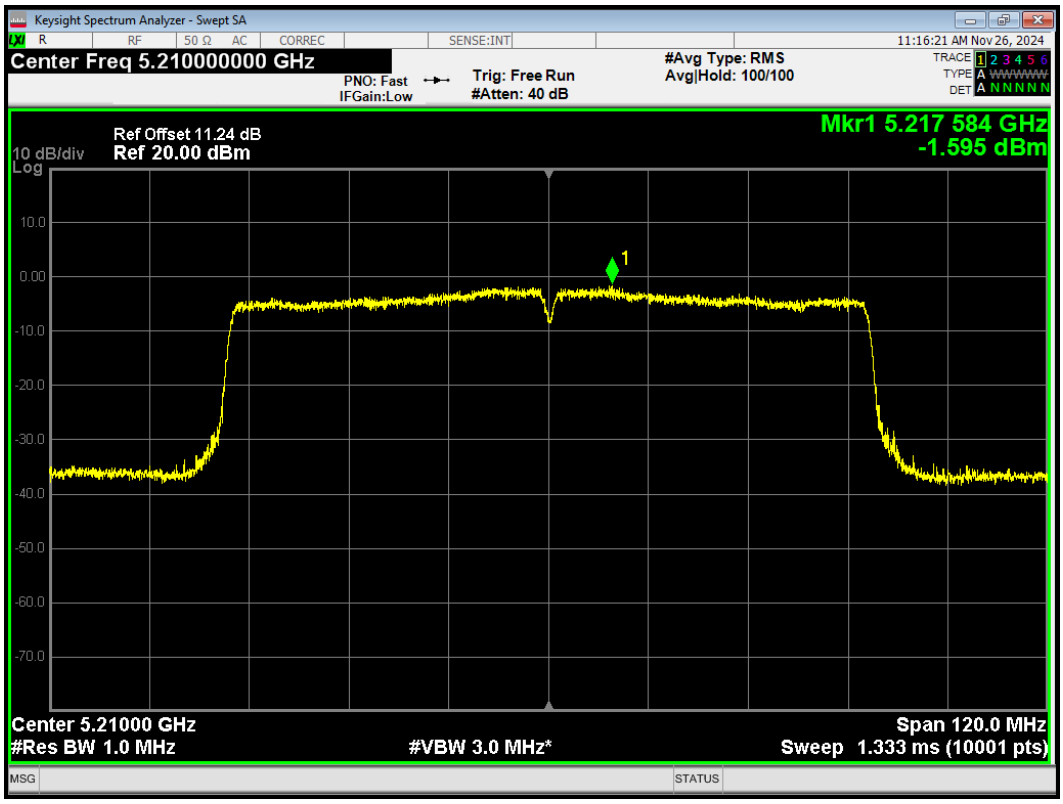
PSD 802.11ac(VHT40) 5190MHz



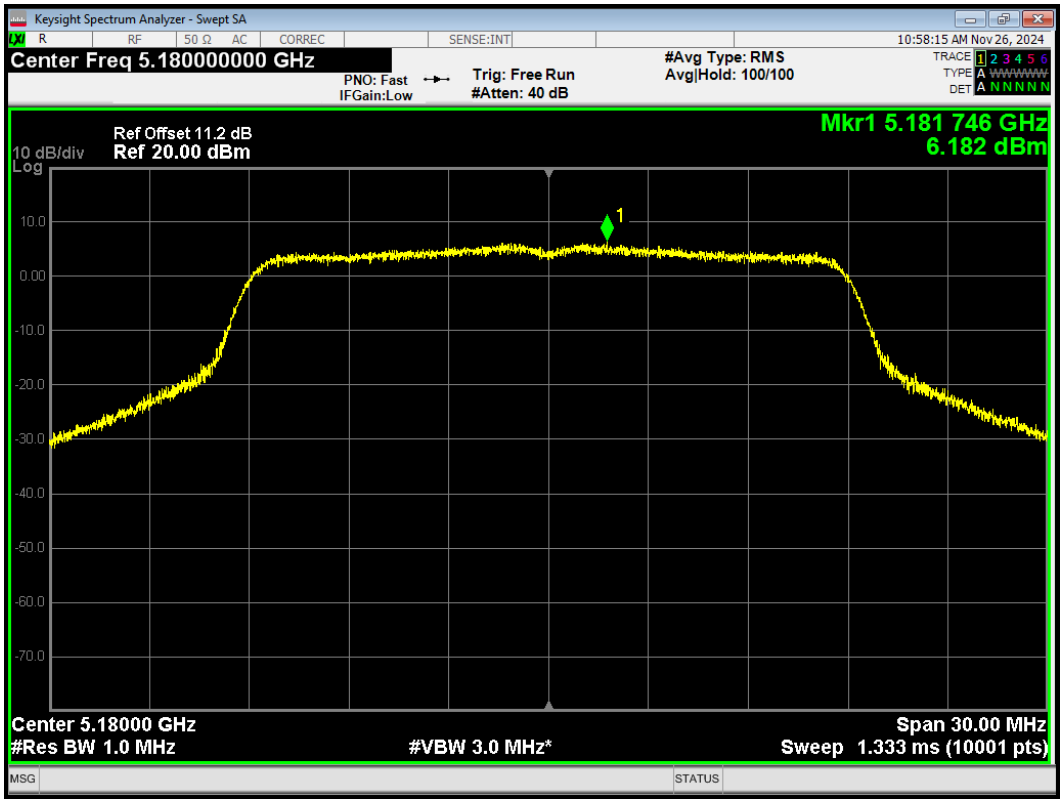
PSD 802.11ac(VHT40) 5230MHz



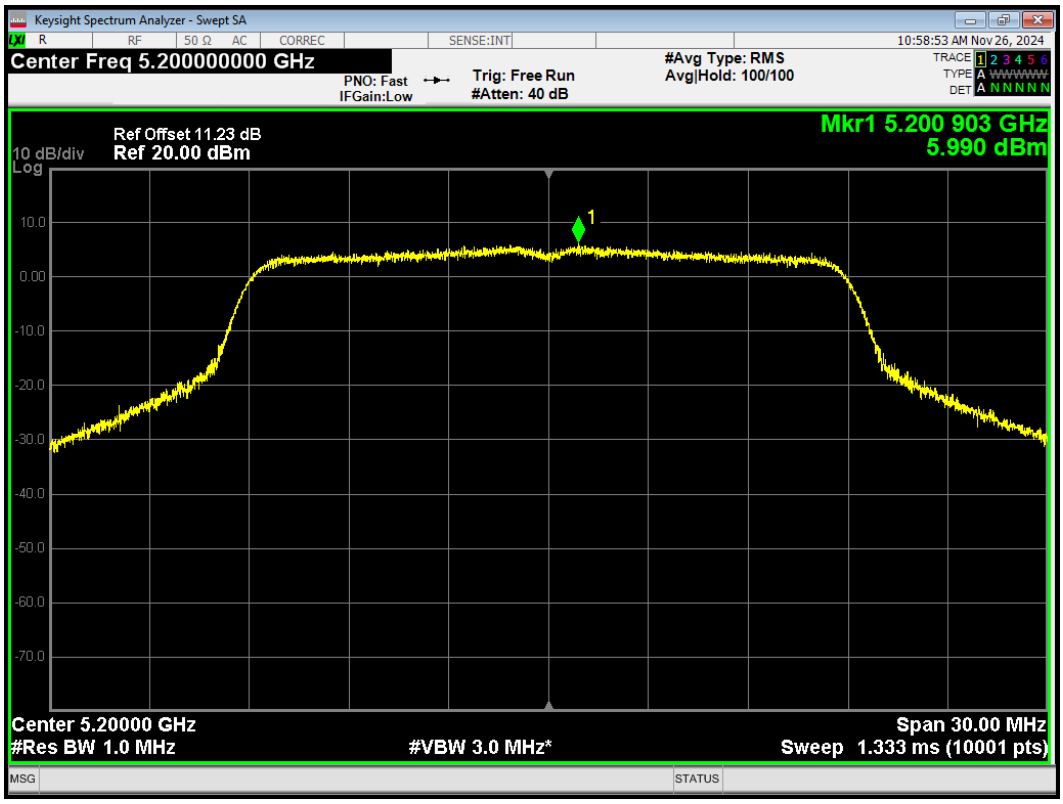
PSD 802.11ac(VHT80) 5210MHz



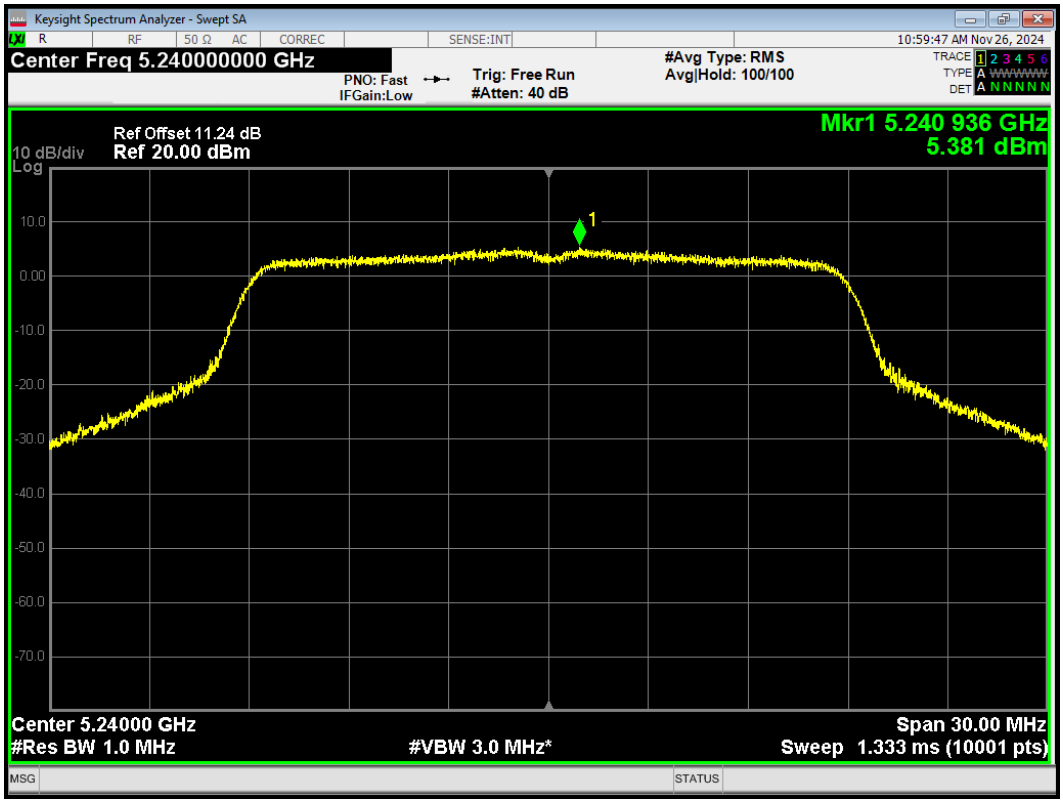
PSD 802.11n(HT20) 5180MHz



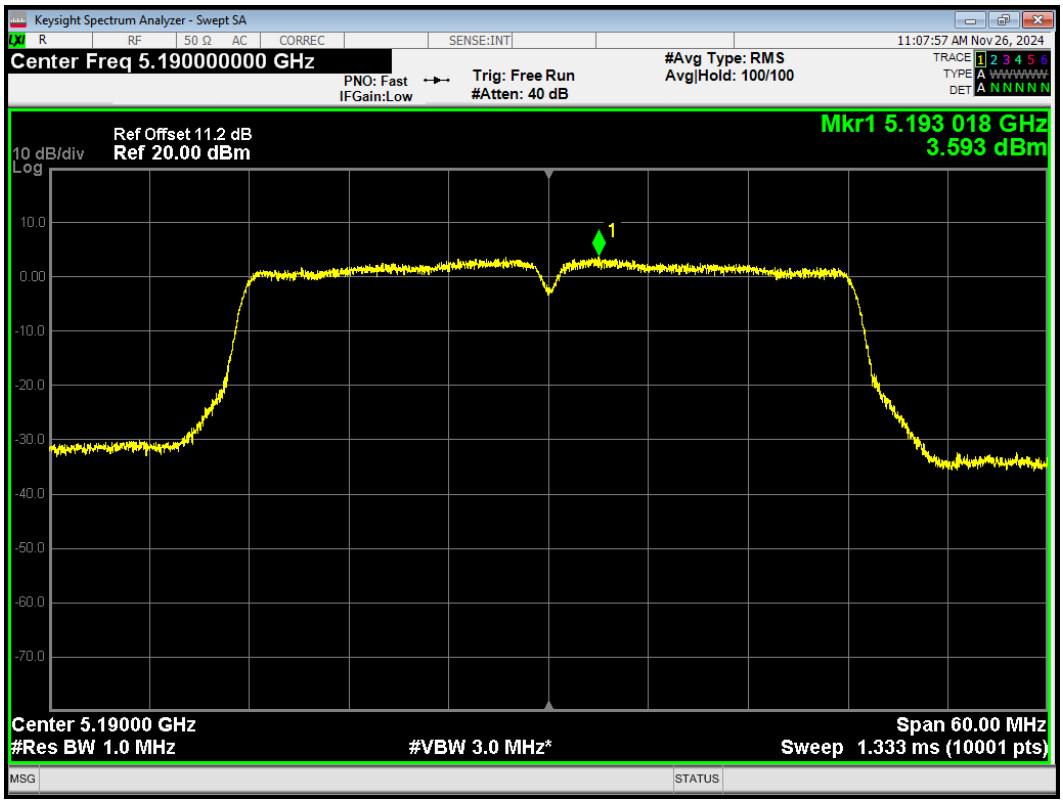
PSD 802.11n(HT20) 5200MHz



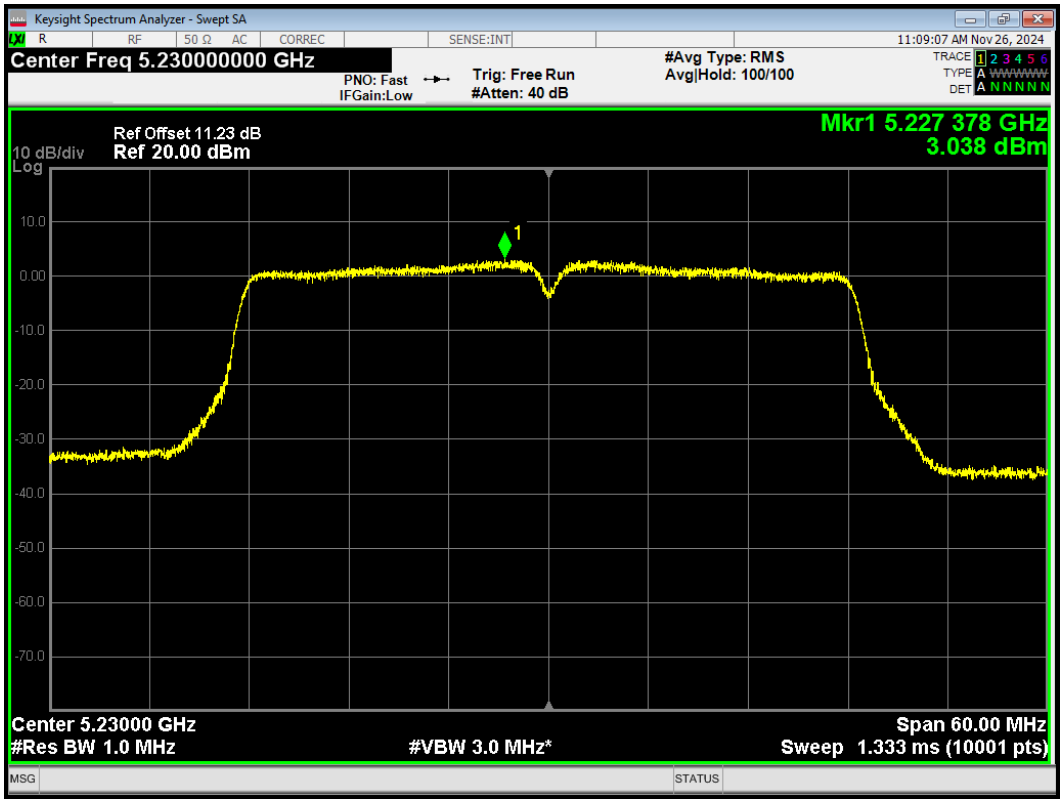
PSD 802.11n(HT20) 5240MHz



PSD 802.11n(HT40) 5190MHz

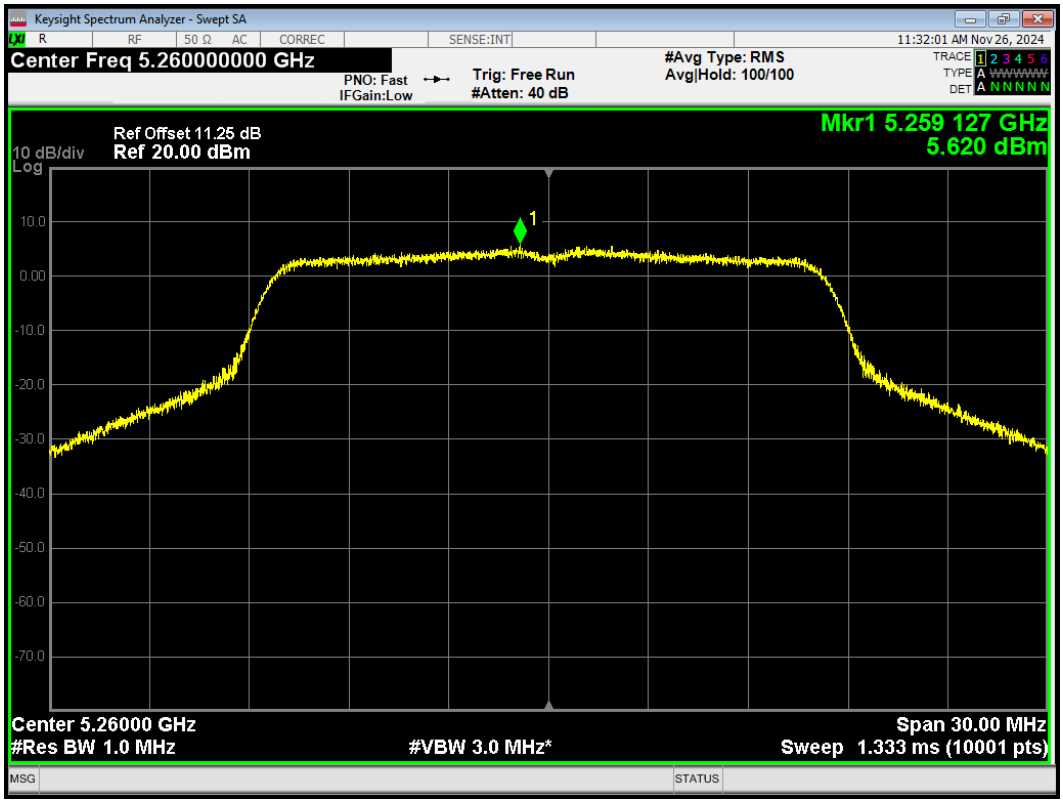


PSD 802.11n(HT40) 5230MHz

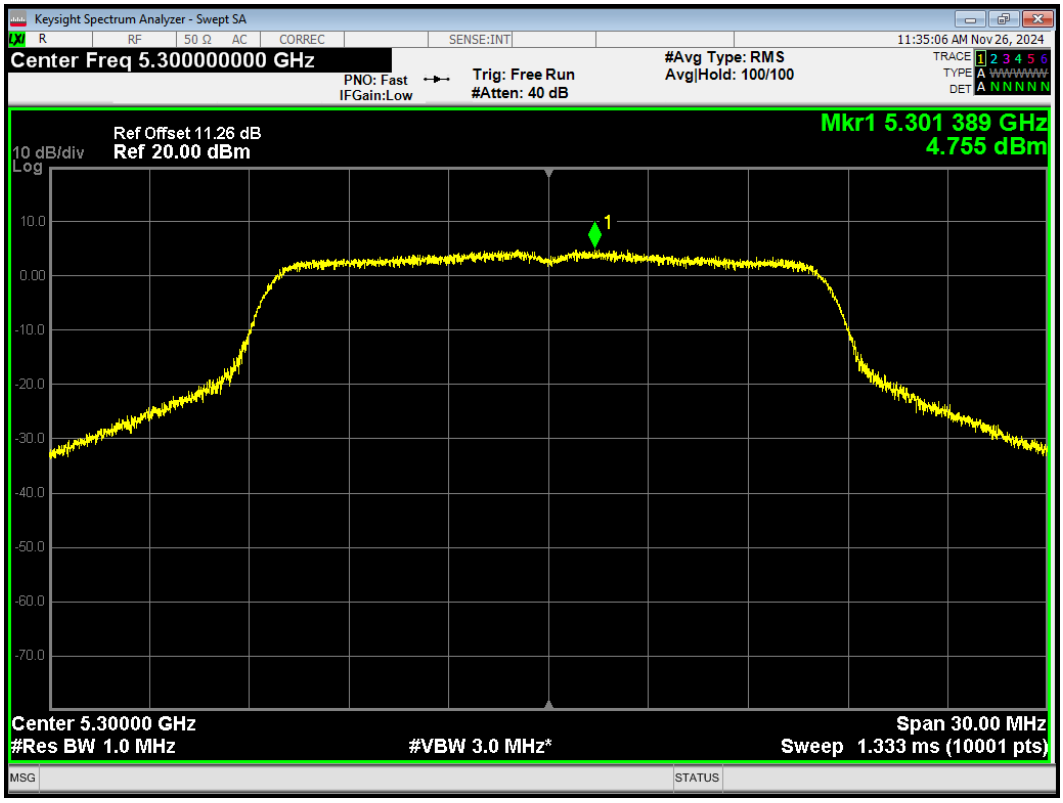


U-NII-2A

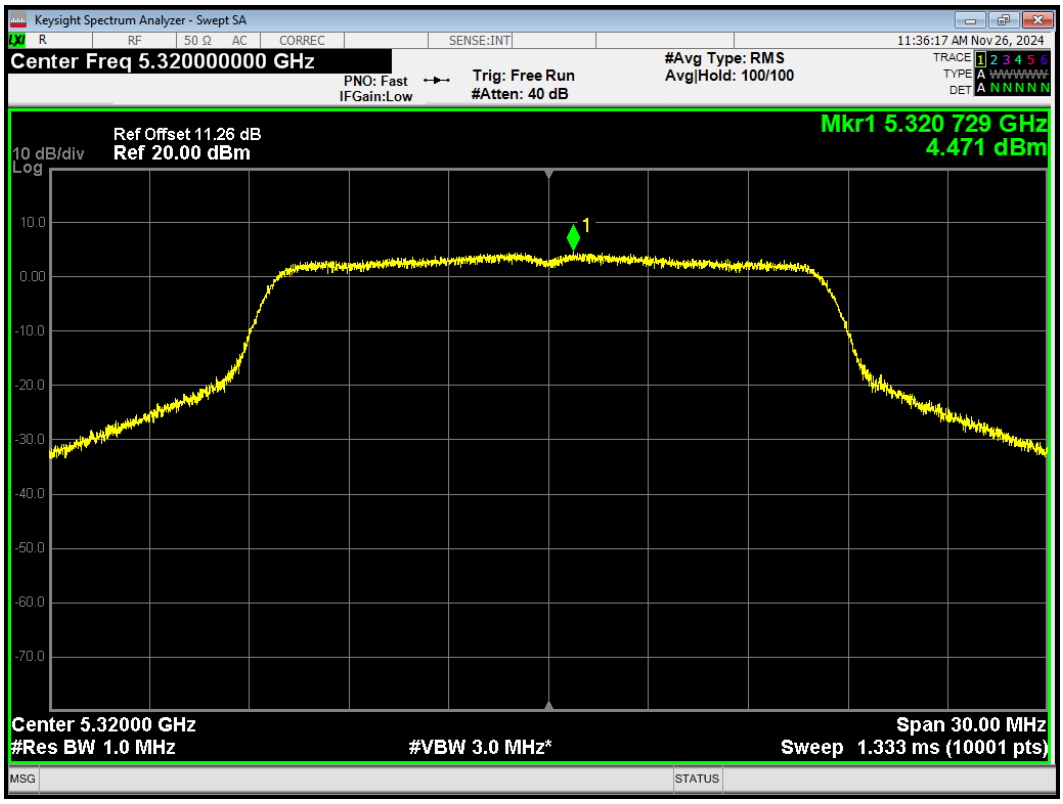
PSD 802.11a 5260MHz



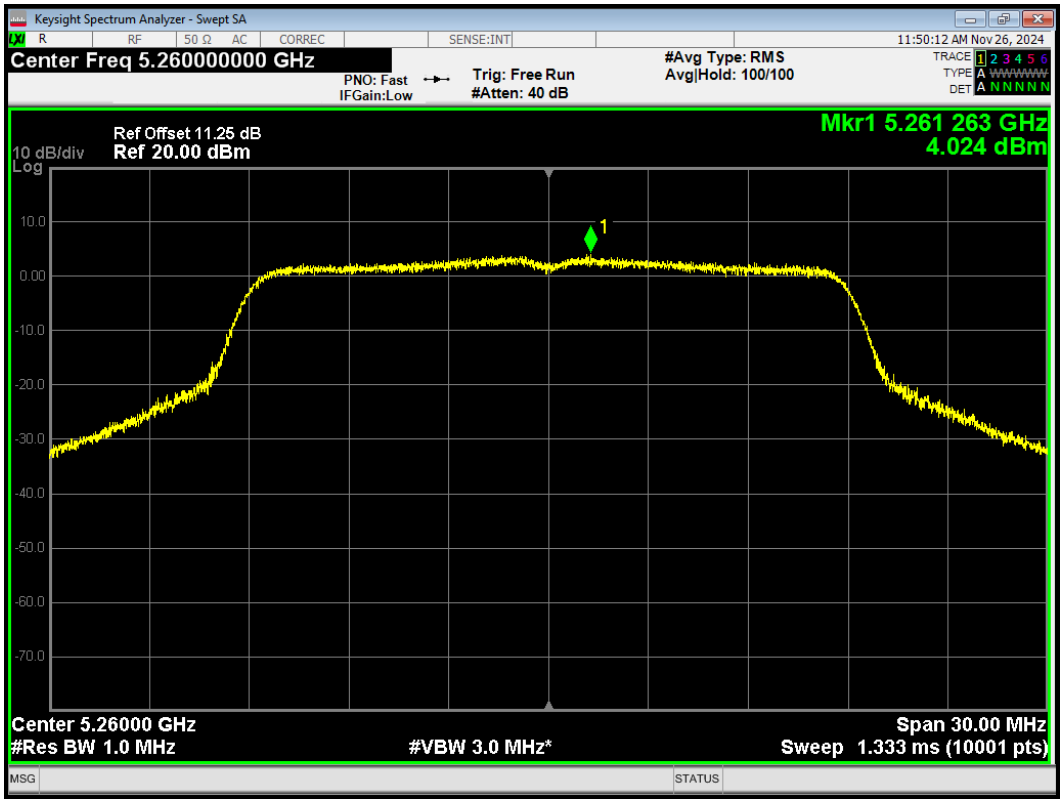
PSD 802.11a 5300MHz



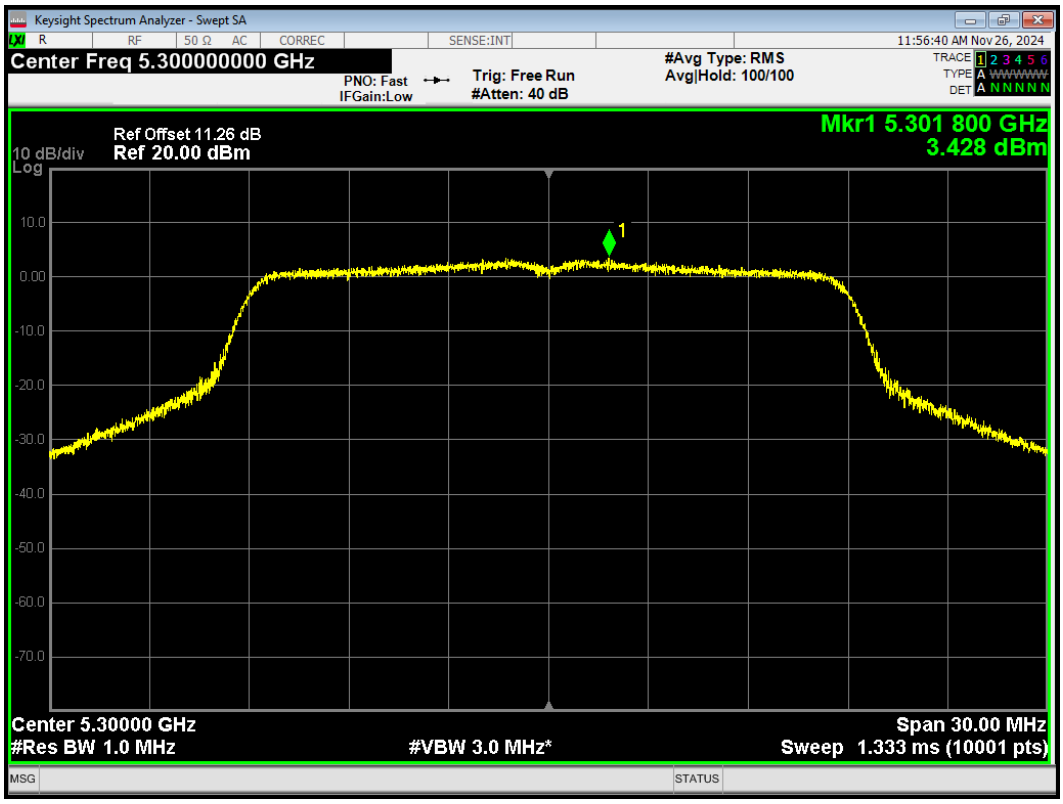
PSD 802.11a 5320MHz



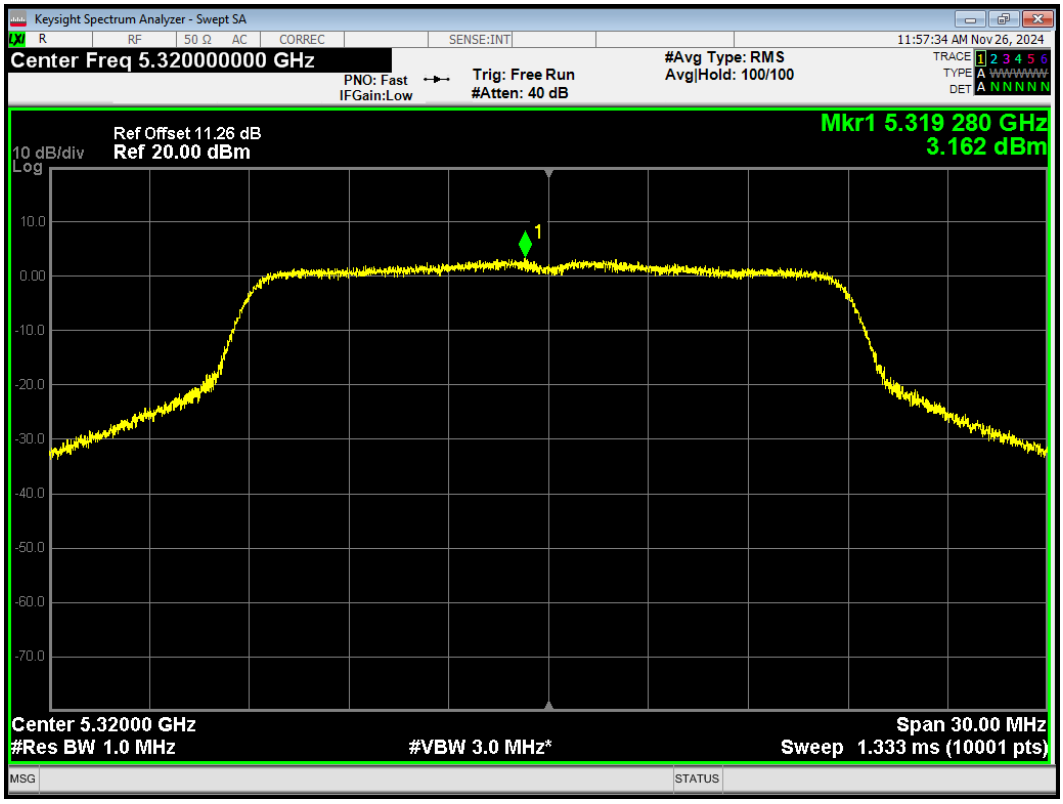
PSD 802.11ac(VHT20) 5260MHz



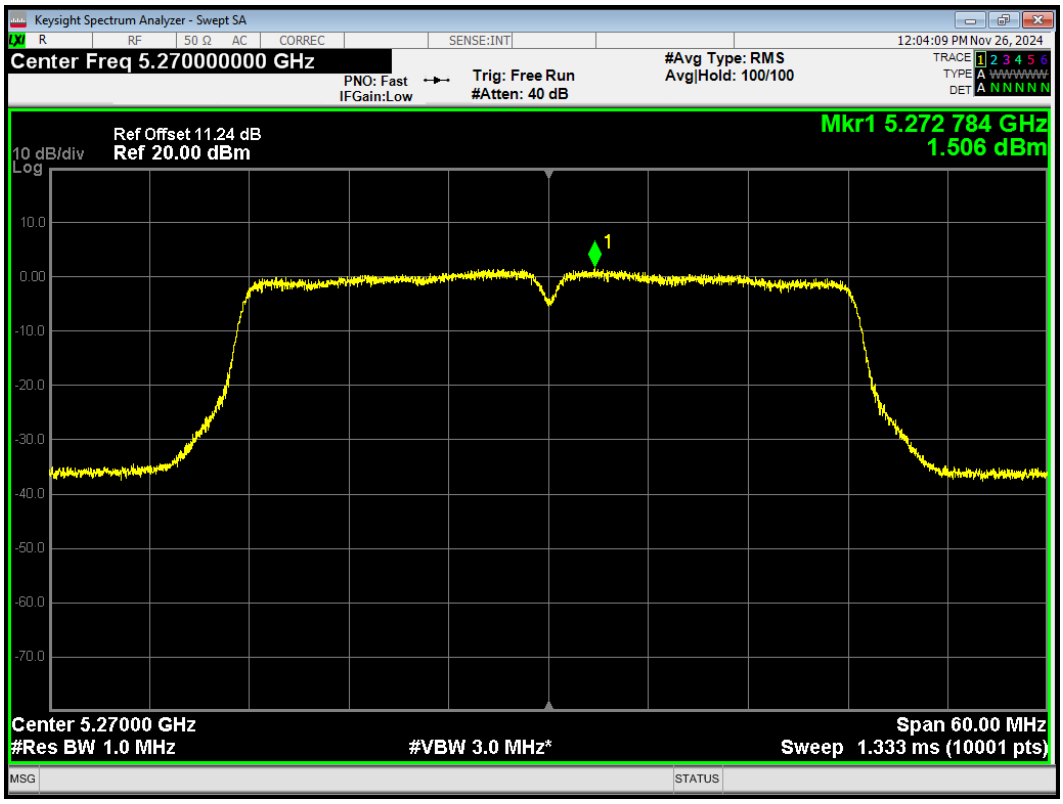
PSD 802.11ac(VHT20) 5300MHz



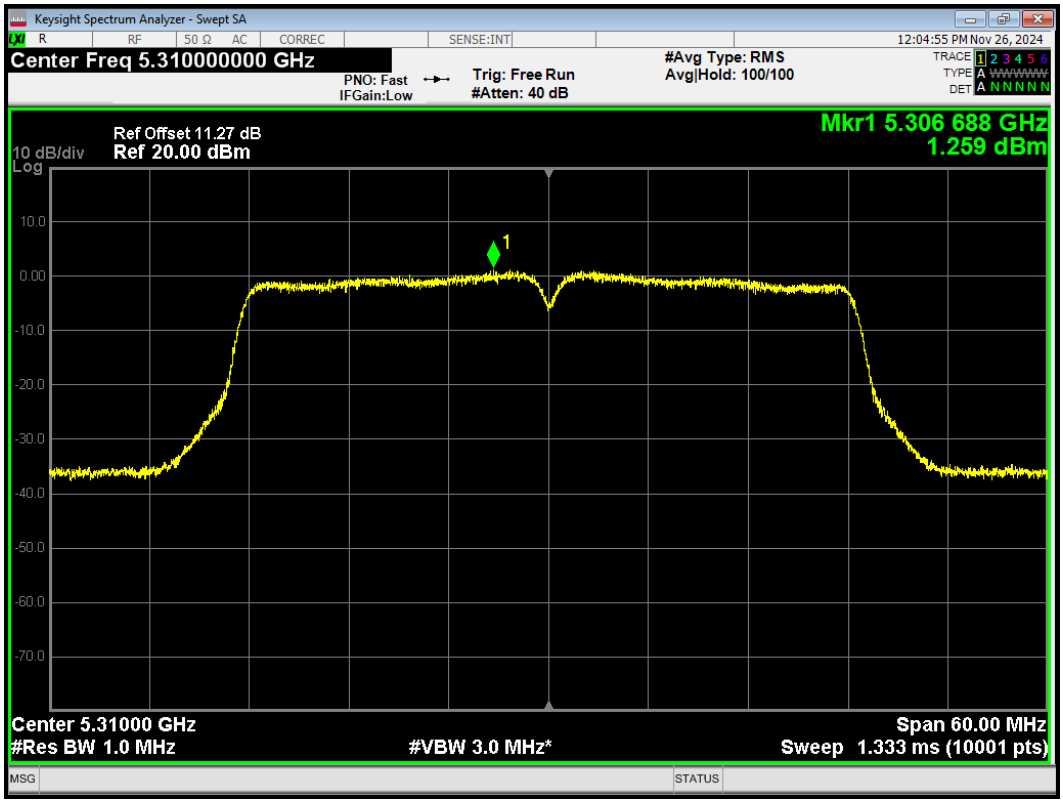
PSD 802.11ac(VHT20) 5320MHz



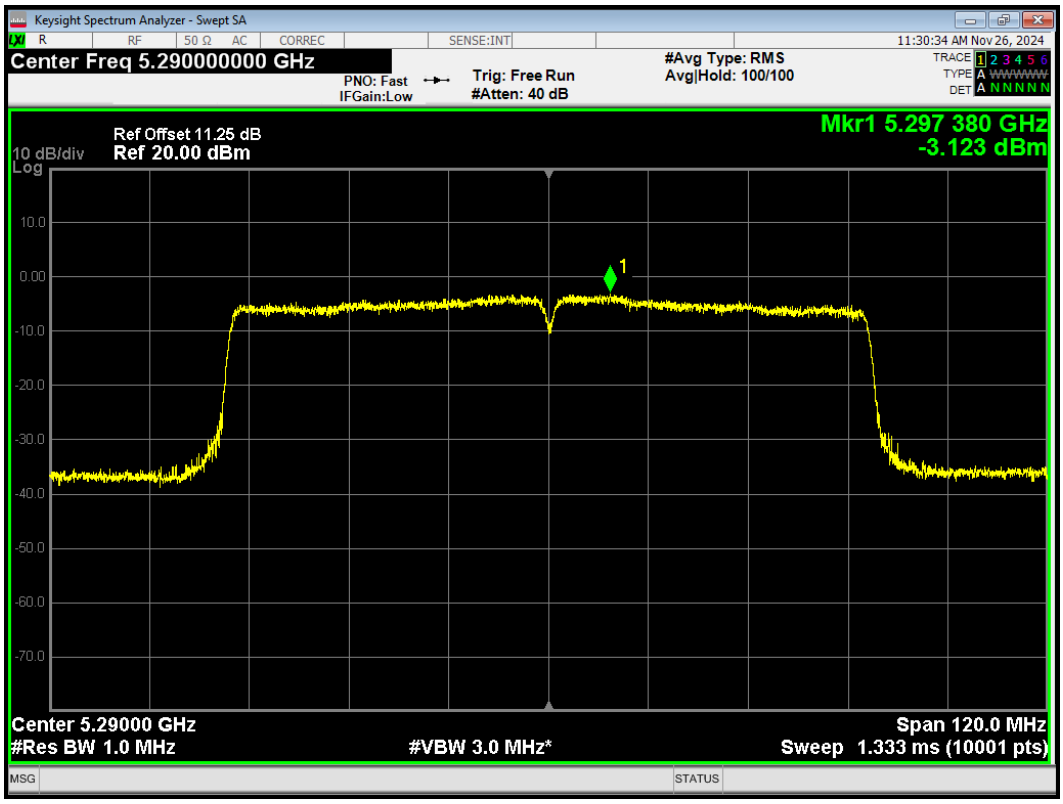
PSD 802.11ac(VHT40) 5270MHz



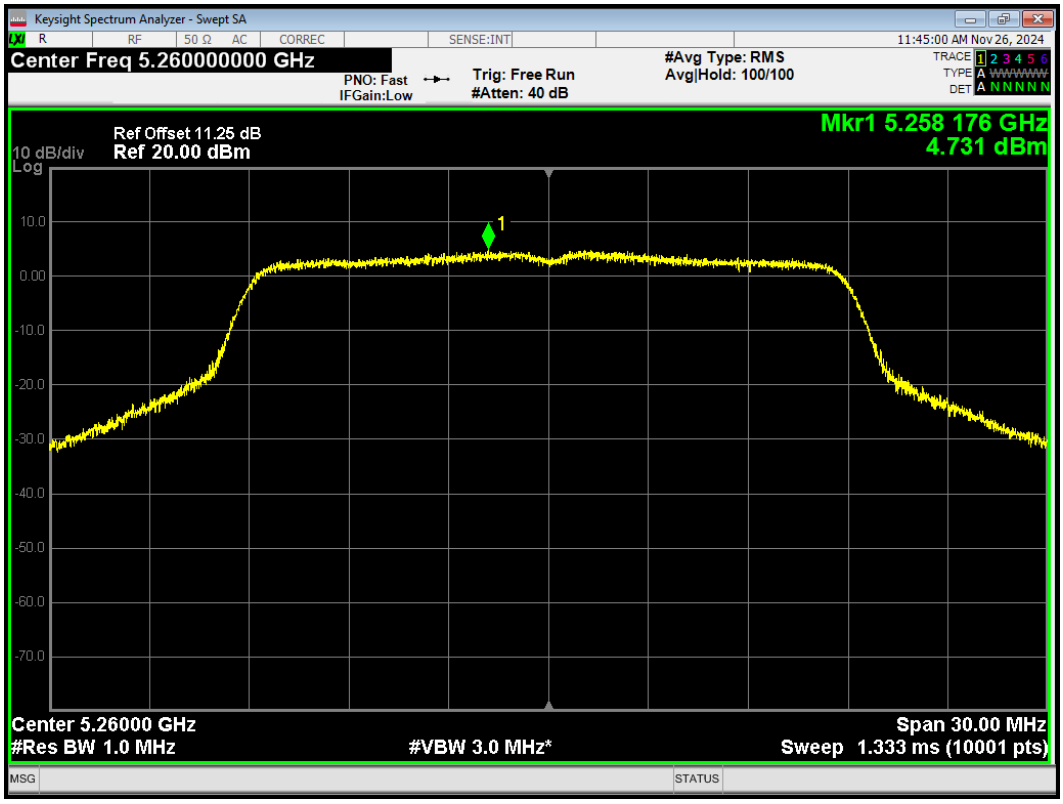
PSD 802.11ac(VHT40) 5310MHz



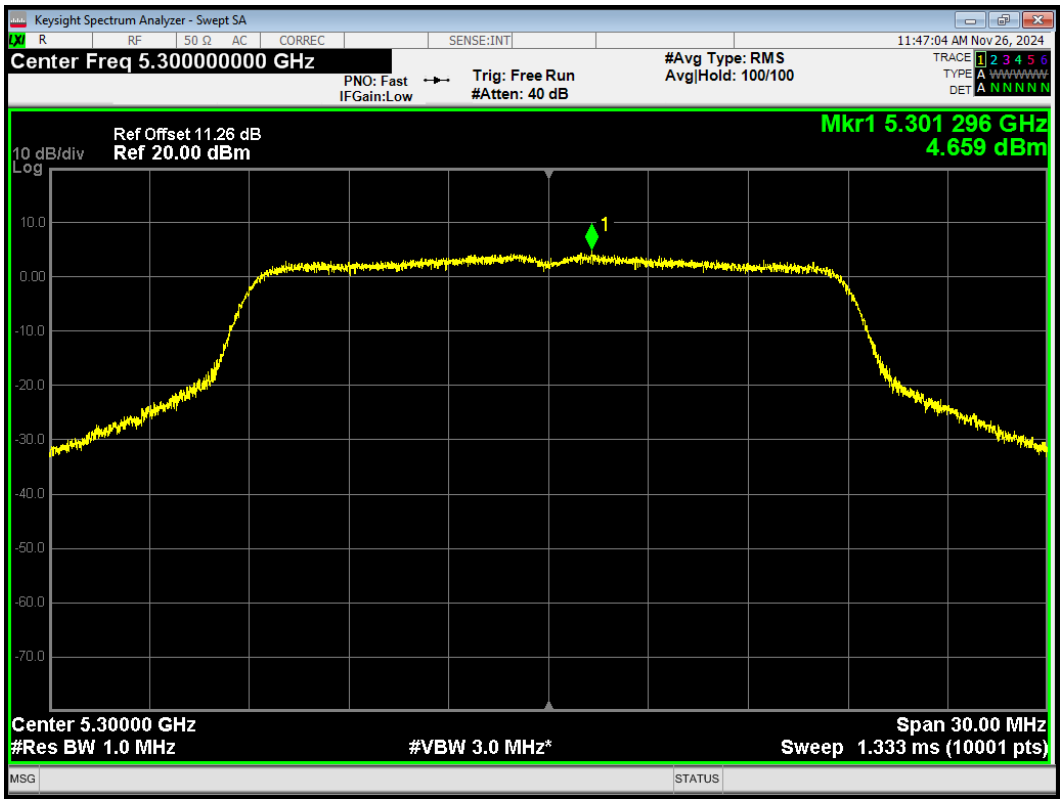
PSD 802.11ac(VHT80) 5290MHz



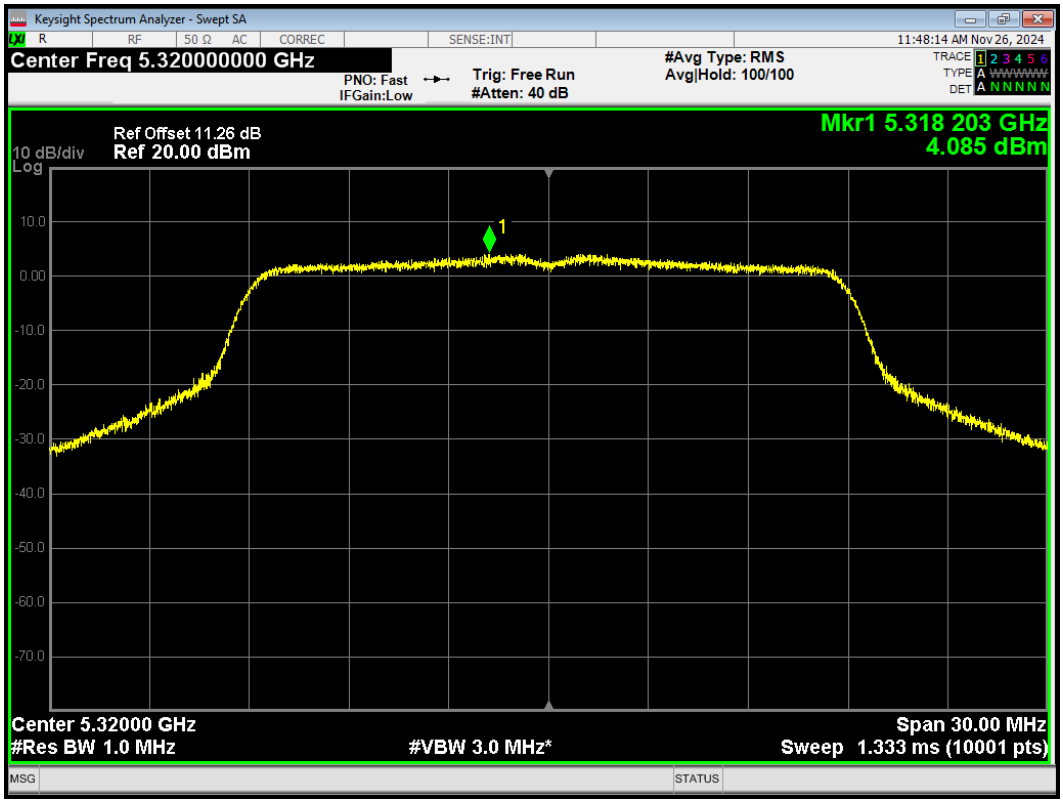
PSD 802.11n(HT20) 5260MHz



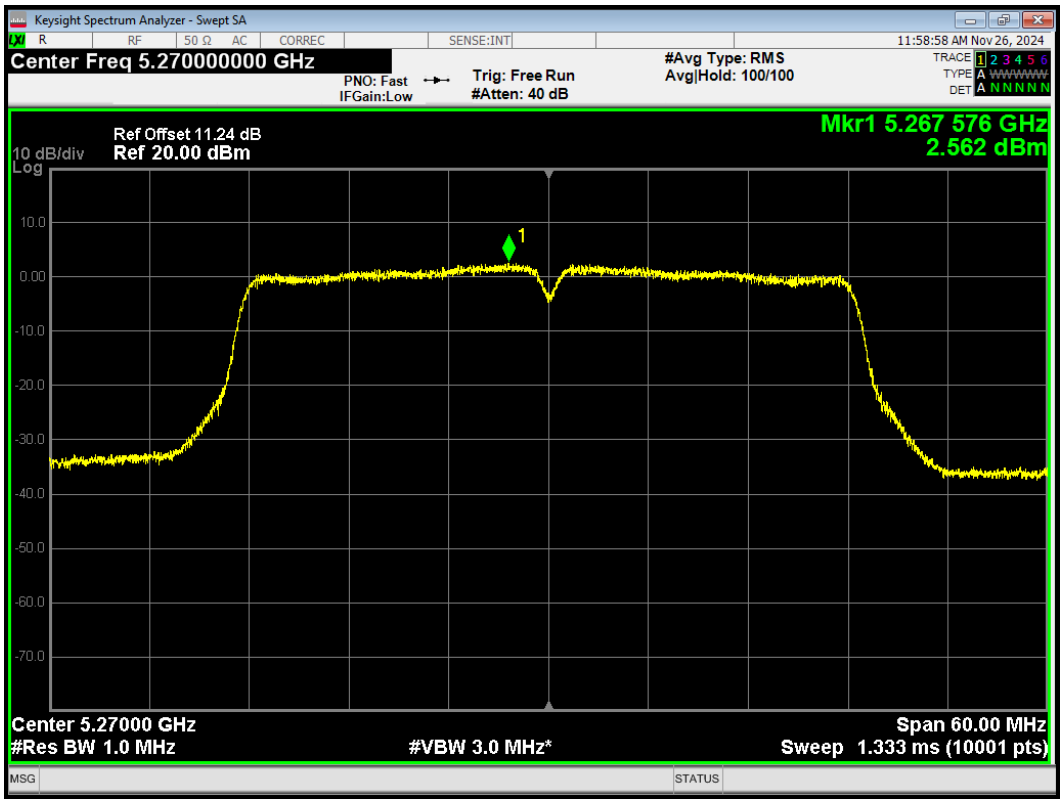
PSD 802.11n(HT20) 5300MHz



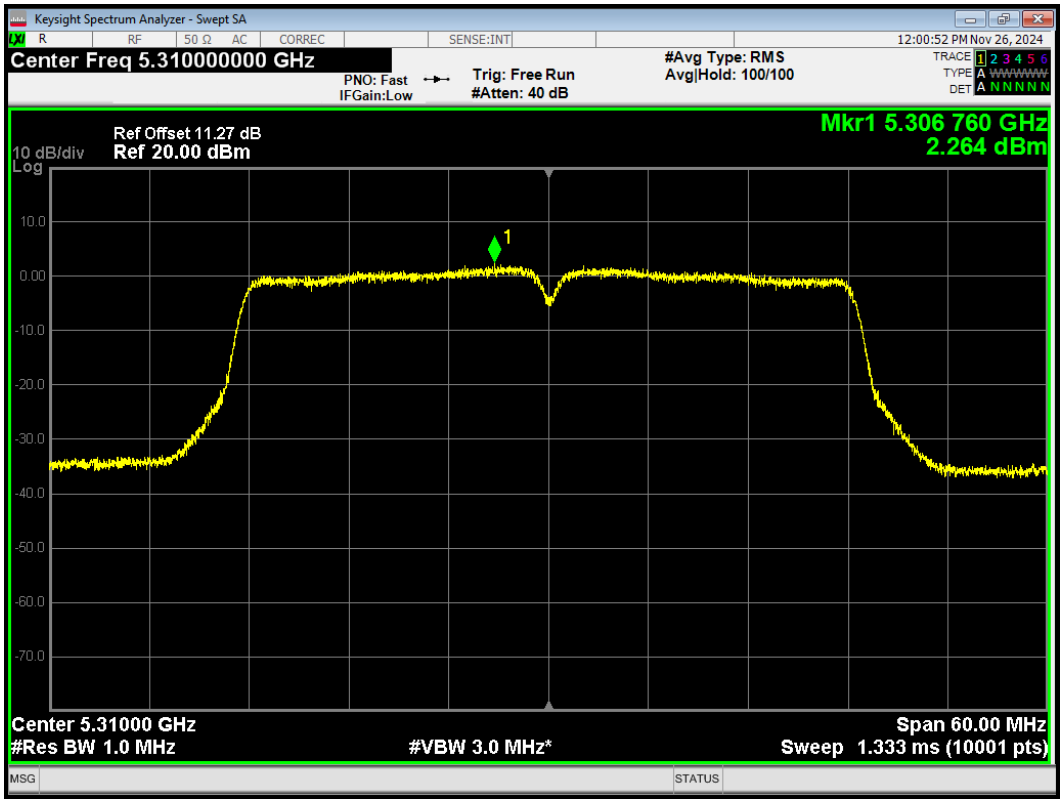
PSD 802.11n(HT20) 5320MHz



PSD 802.11n(HT40) 5270MHz

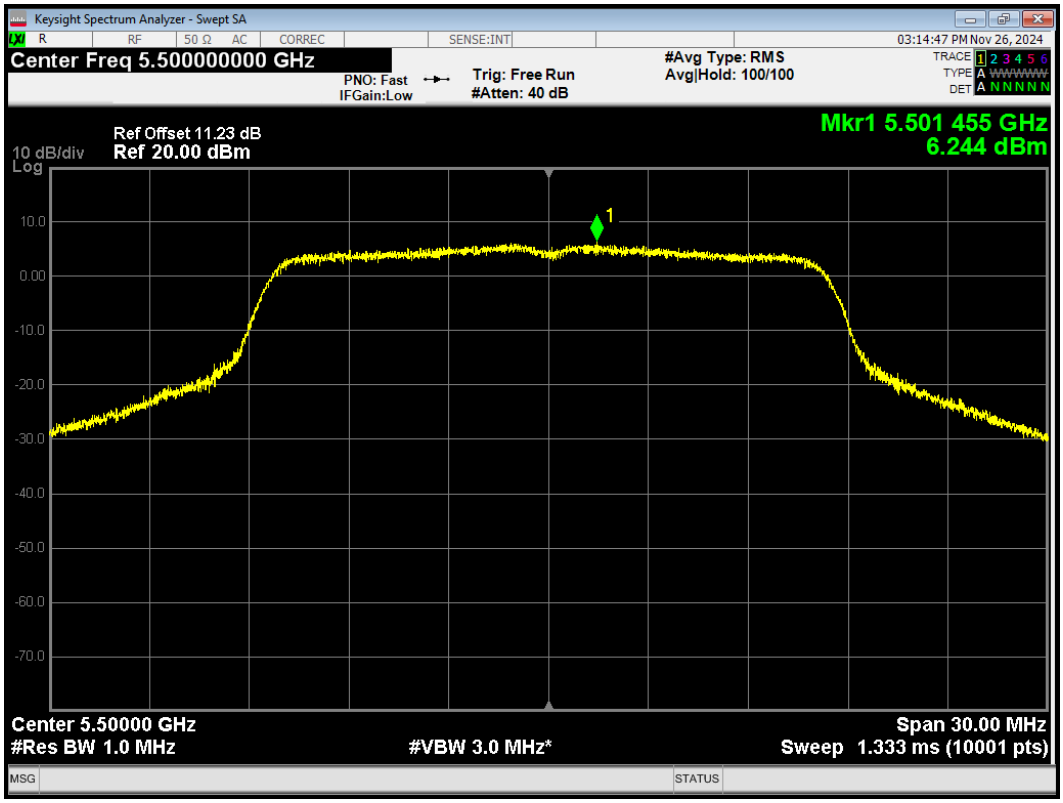


PSD 802.11n(HT40) 5310MHz

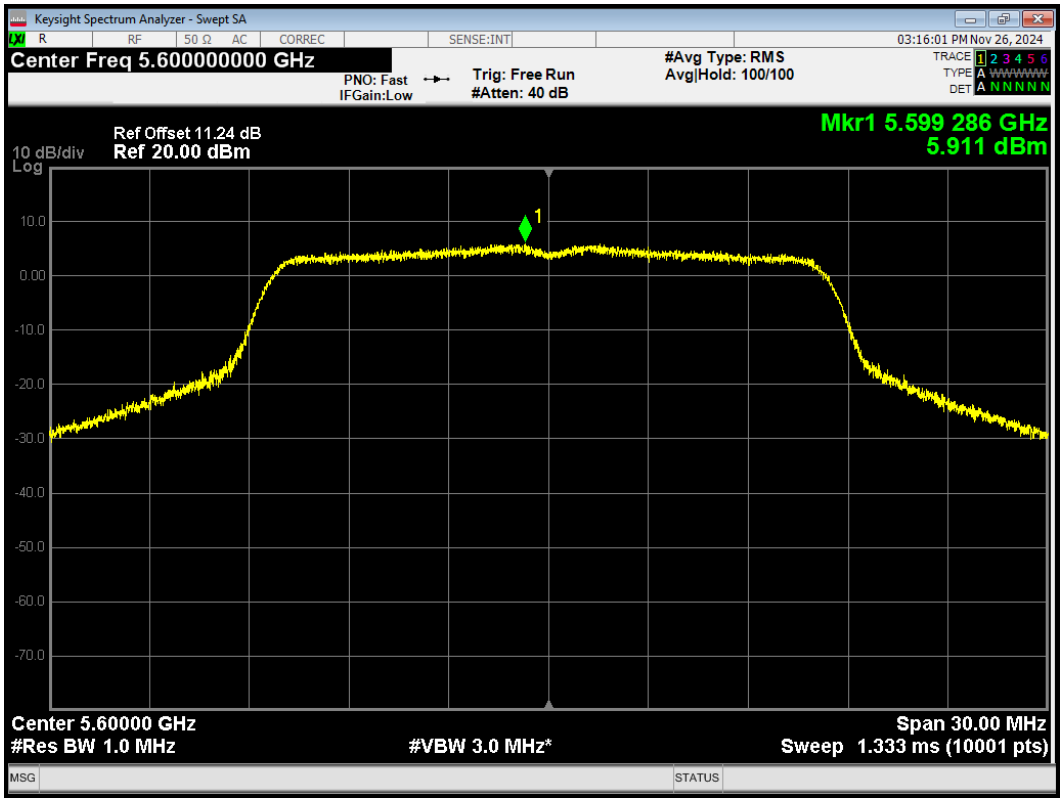


U-NII-2C

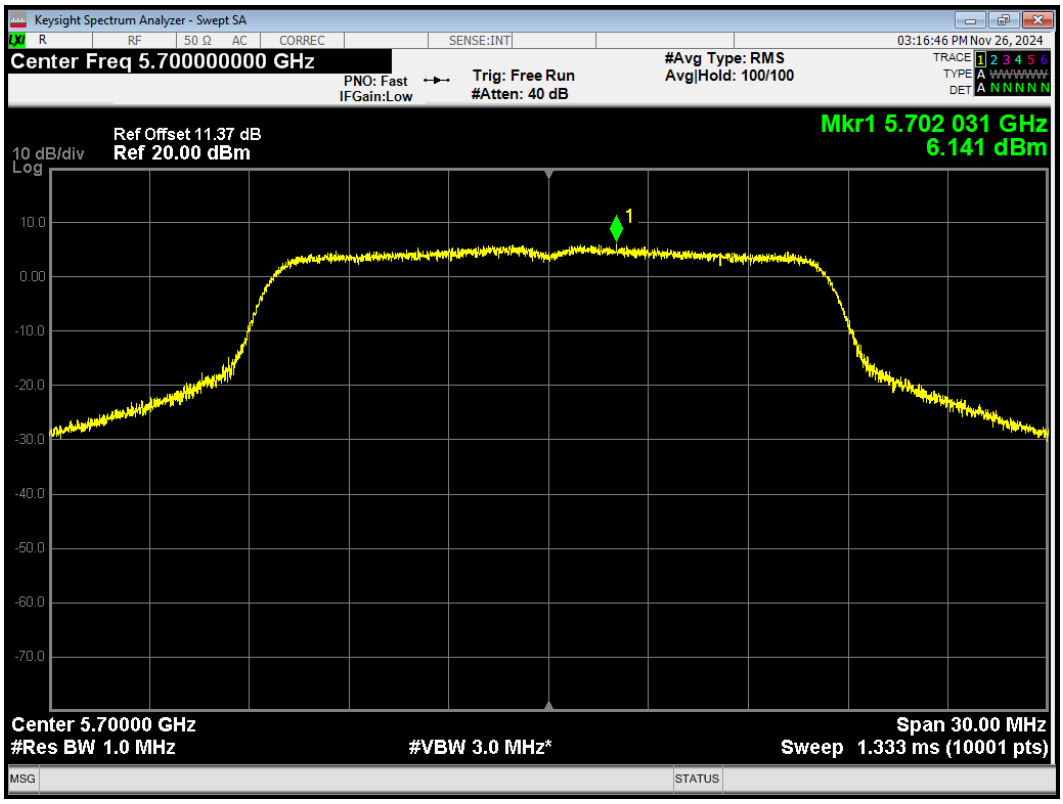
PSD 802.11a 5500MHz



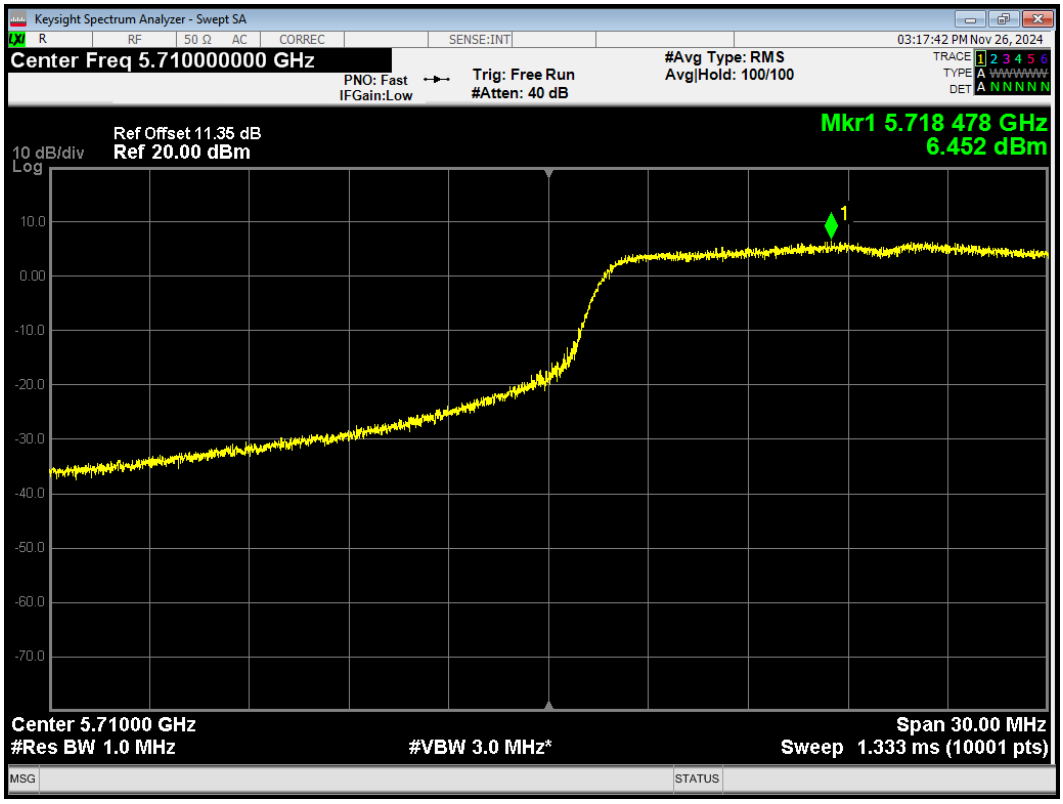
PSD 802.11a 5600MHz



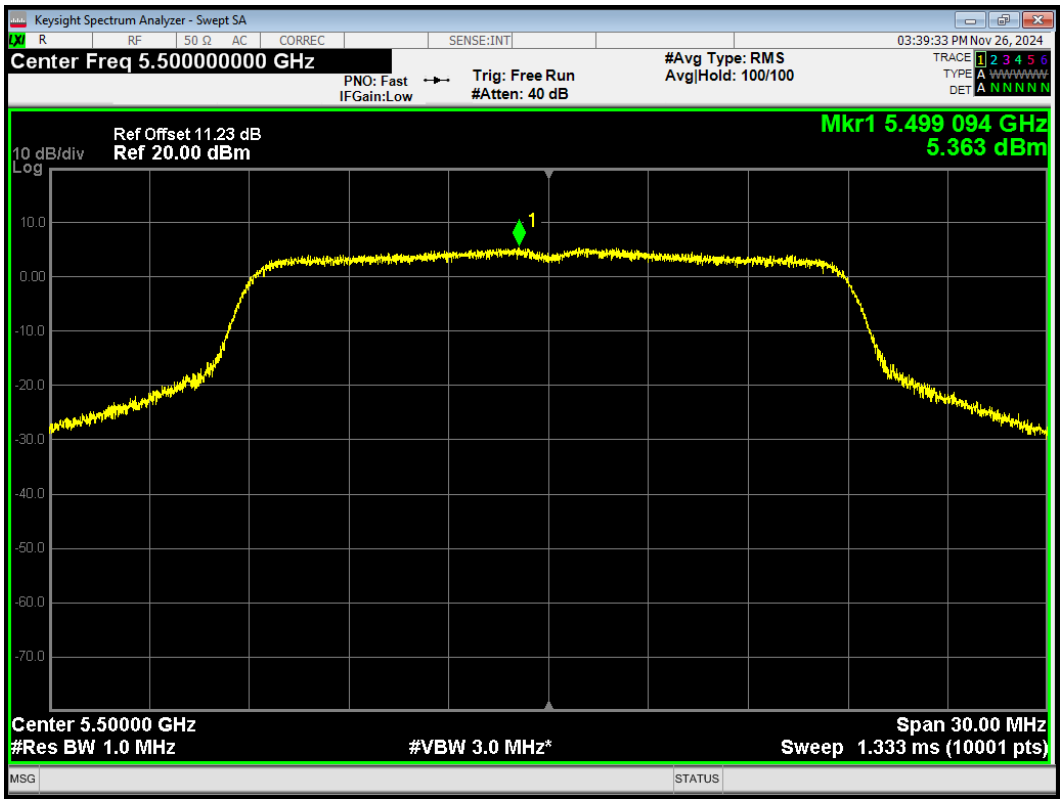
PSD 802.11a 5700MHz



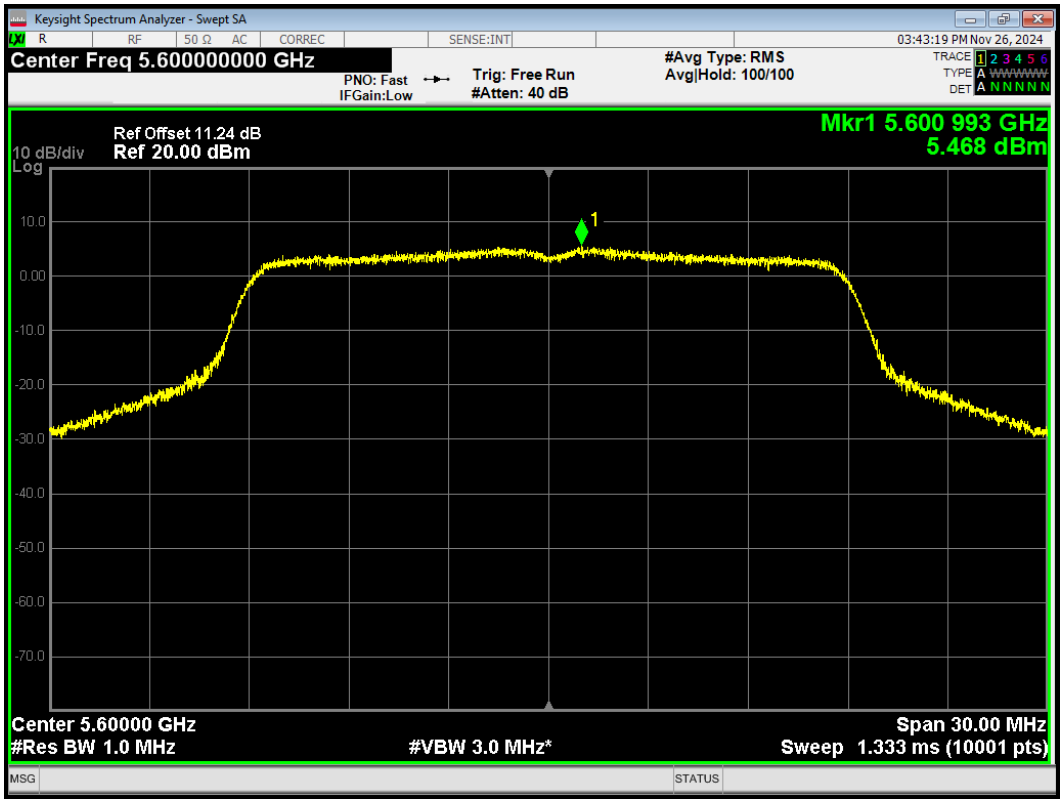
PSD 802.11a 5720MHz



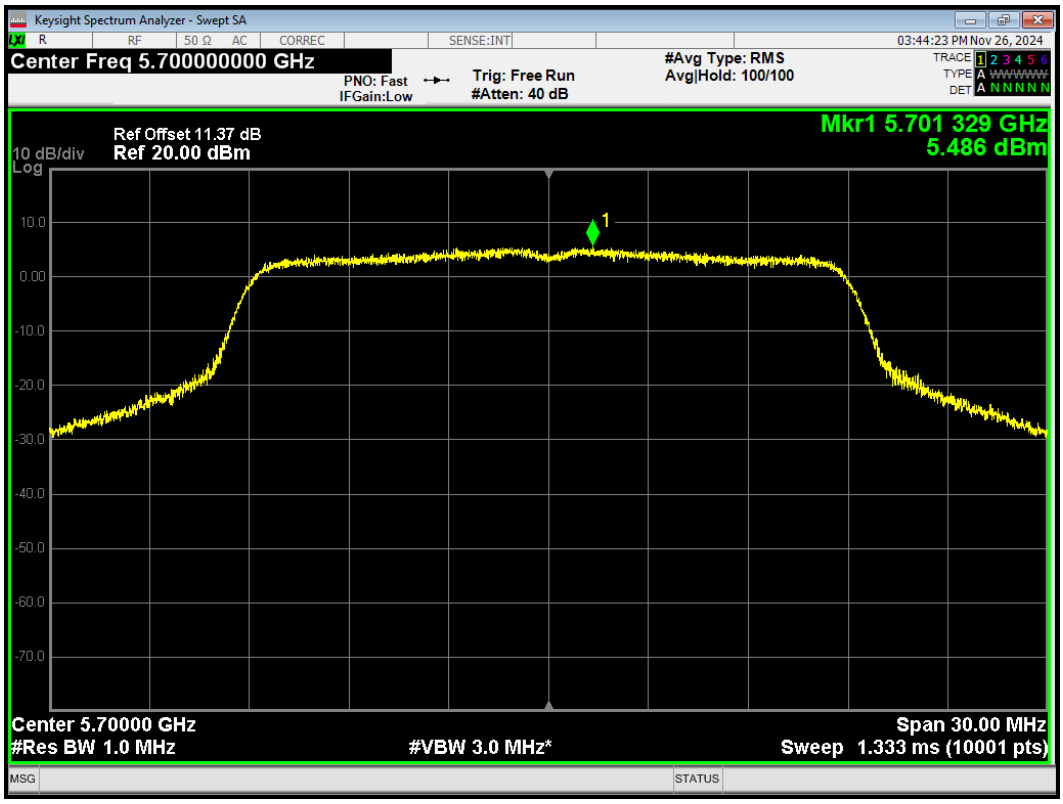
PSD 802.11ac(VHT20) 5500MHz



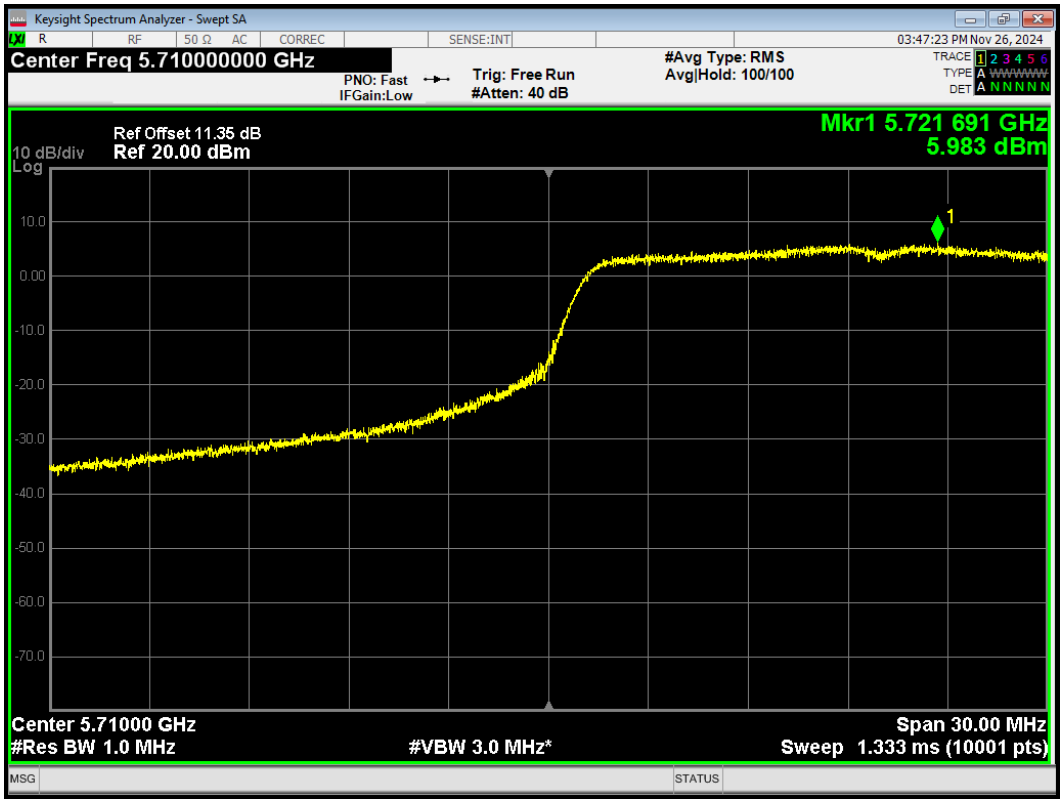
PSD 802.11ac(VHT20) 5600MHz



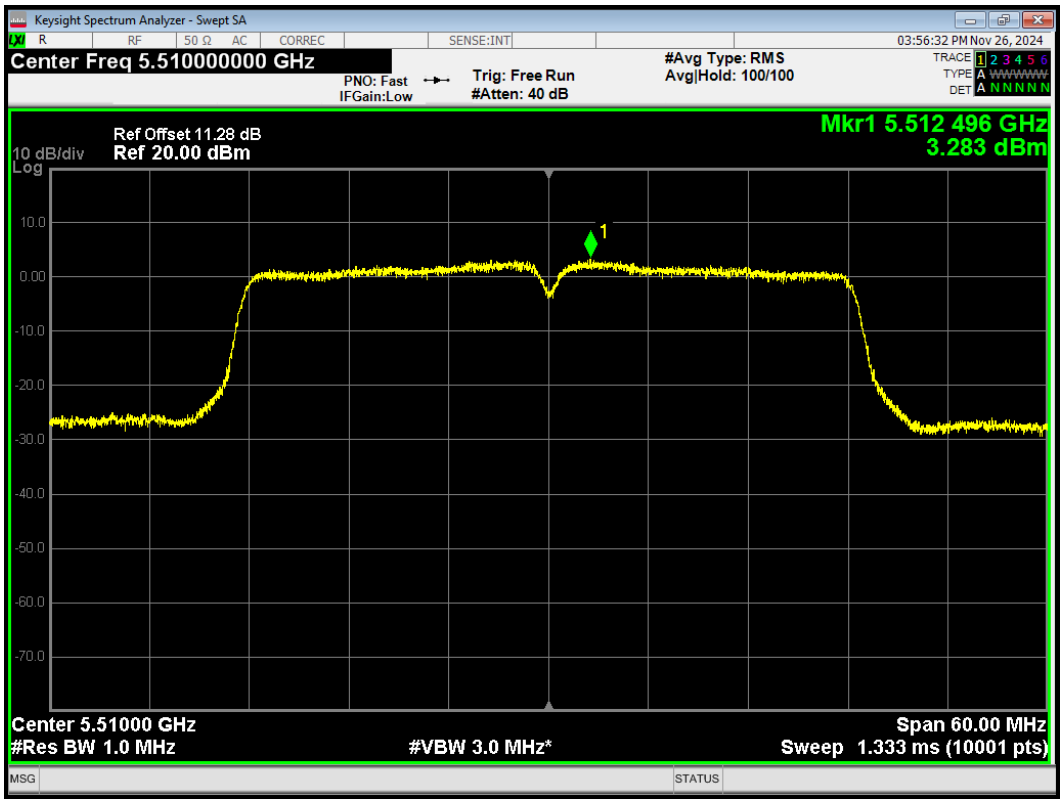
PSD 802.11ac(VHT20) 5700MHz



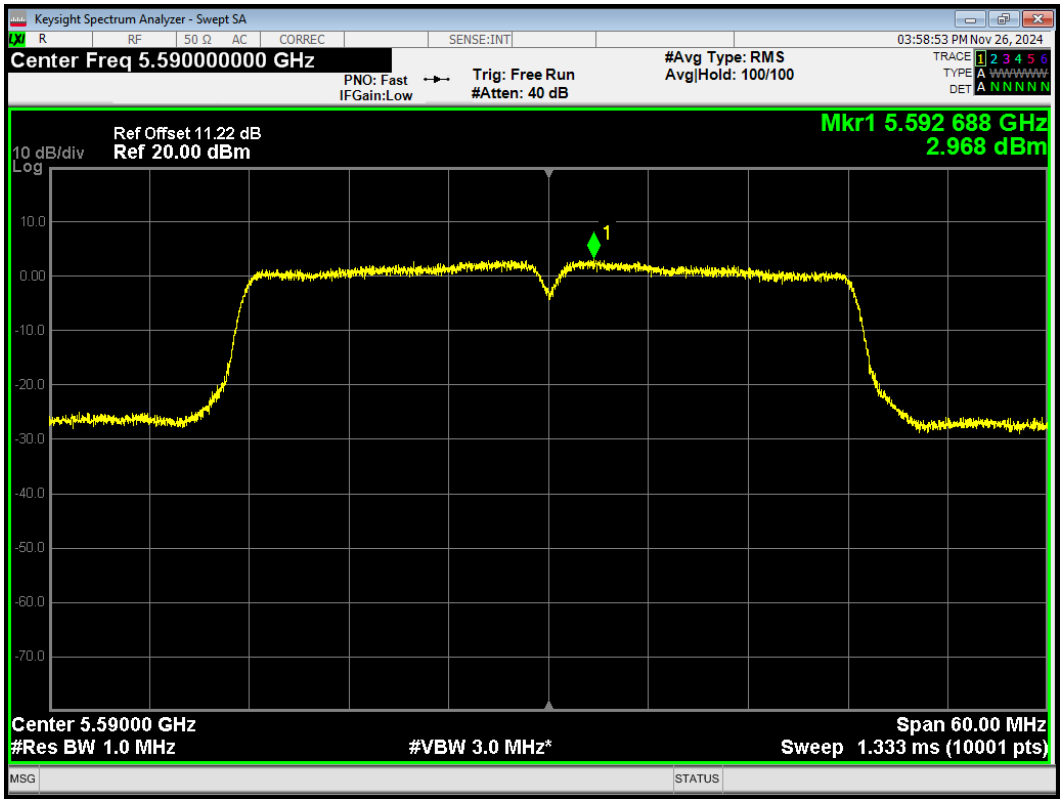
PSD 802.11ac(VHT20) 5720MHz



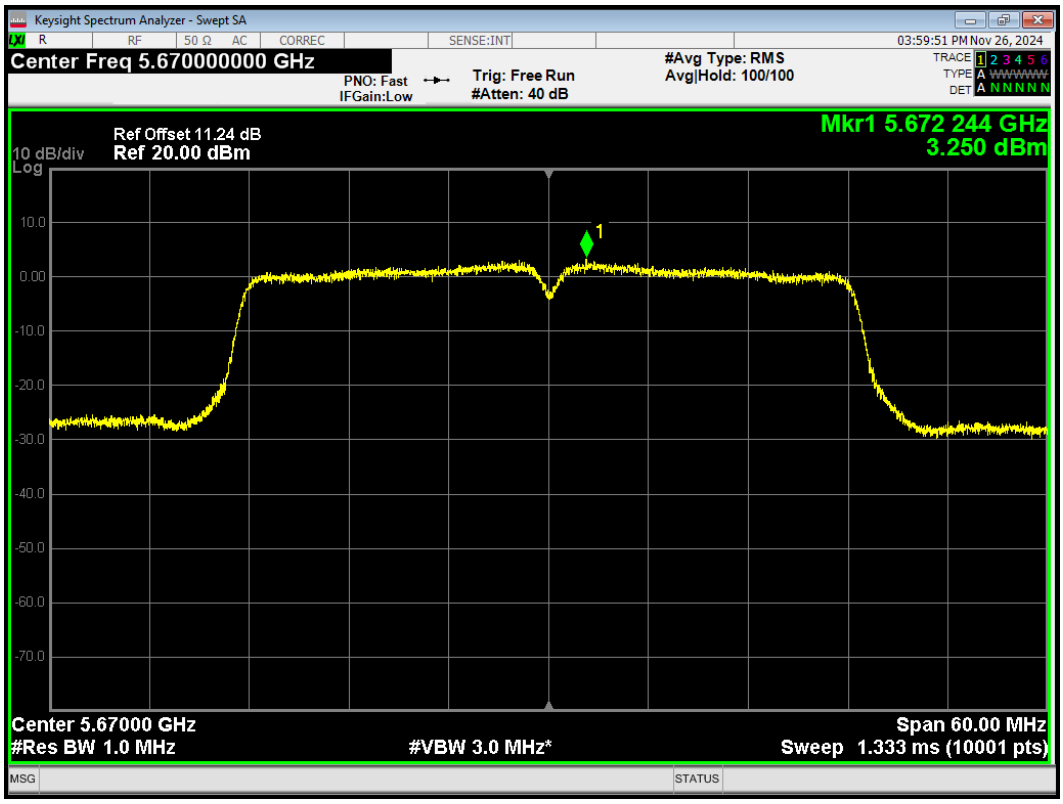
PSD 802.11ac(VHT40) 5510MHz



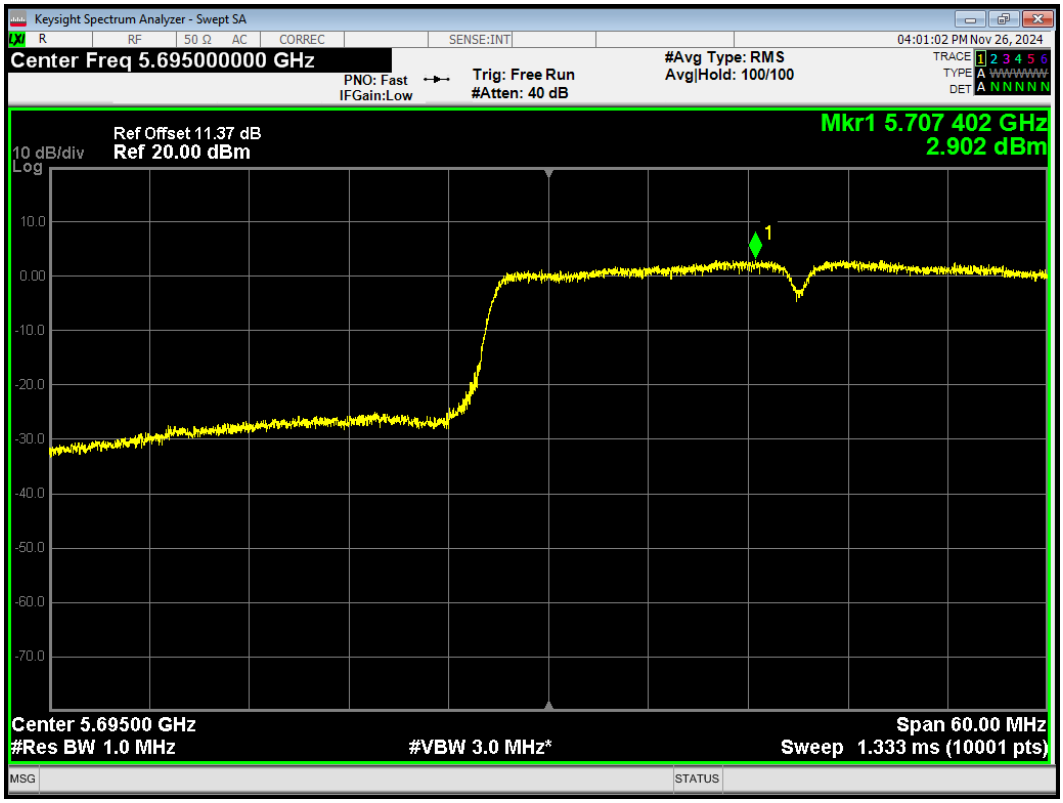
PSD 802.11ac(VHT40) 5590MHz



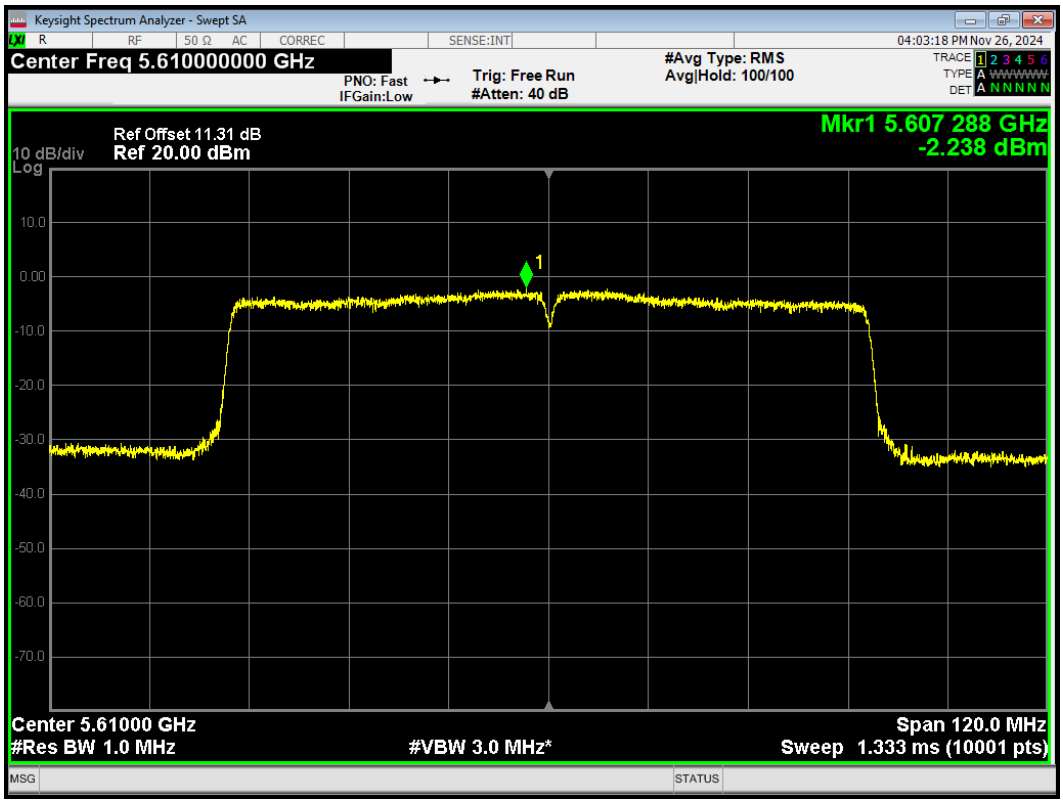
PSD 802.11ac(VHT40) 5670MHz



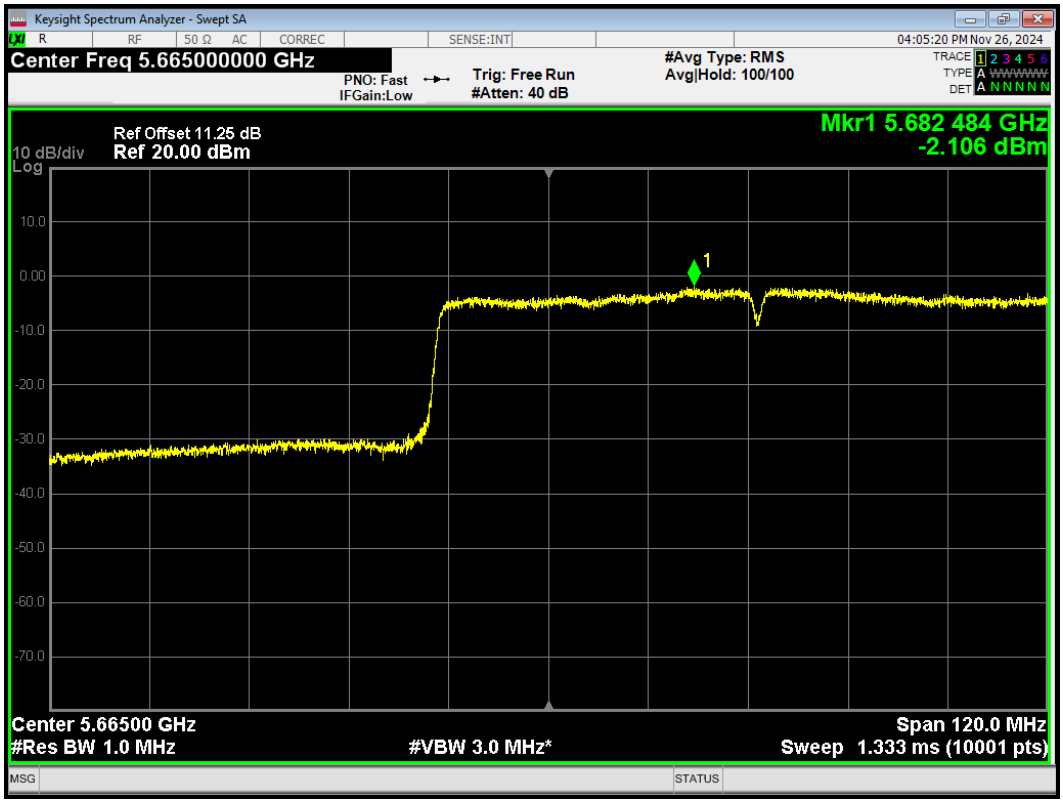
PSD 802.11ac(VHT40) 5710MHz



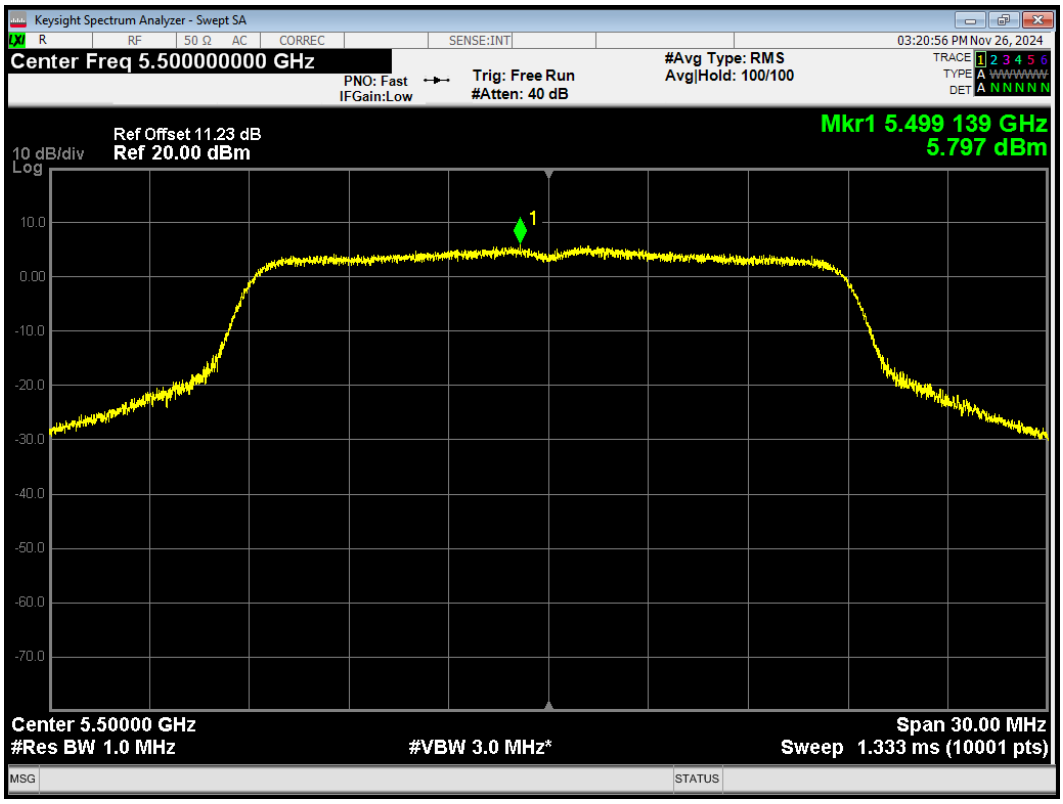
PSD 802.11ac(VHT80) 5610MHz



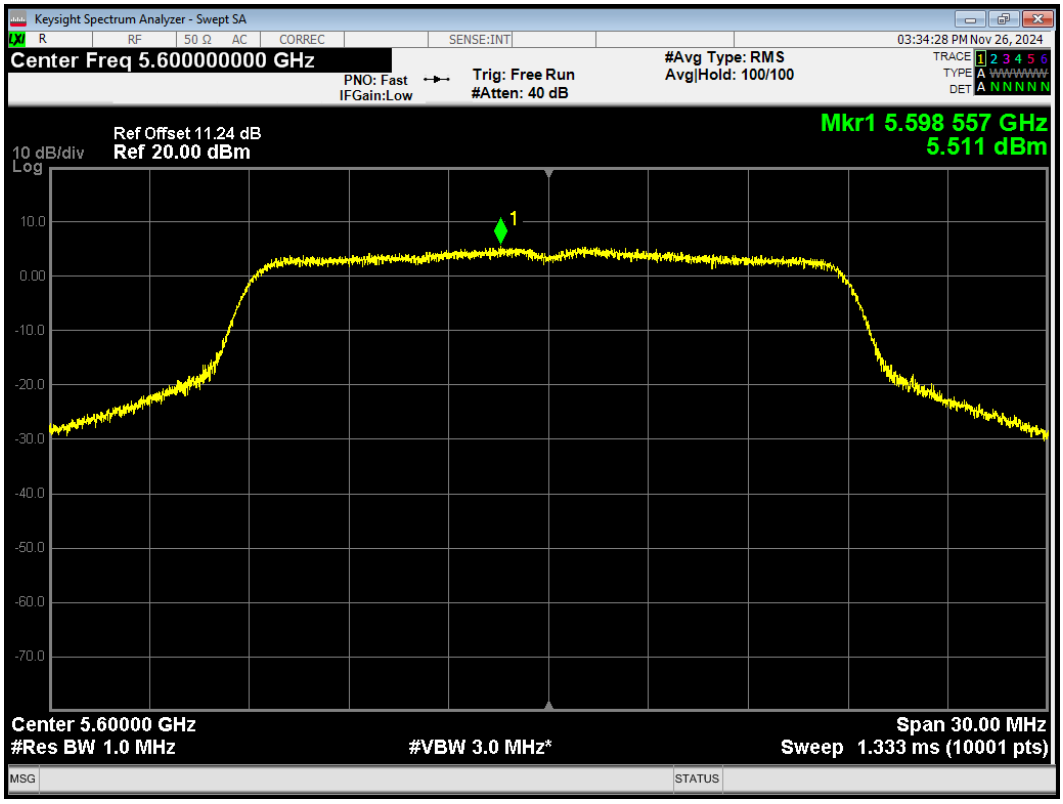
PSD 802.11ac(VHT80) 5690MHz



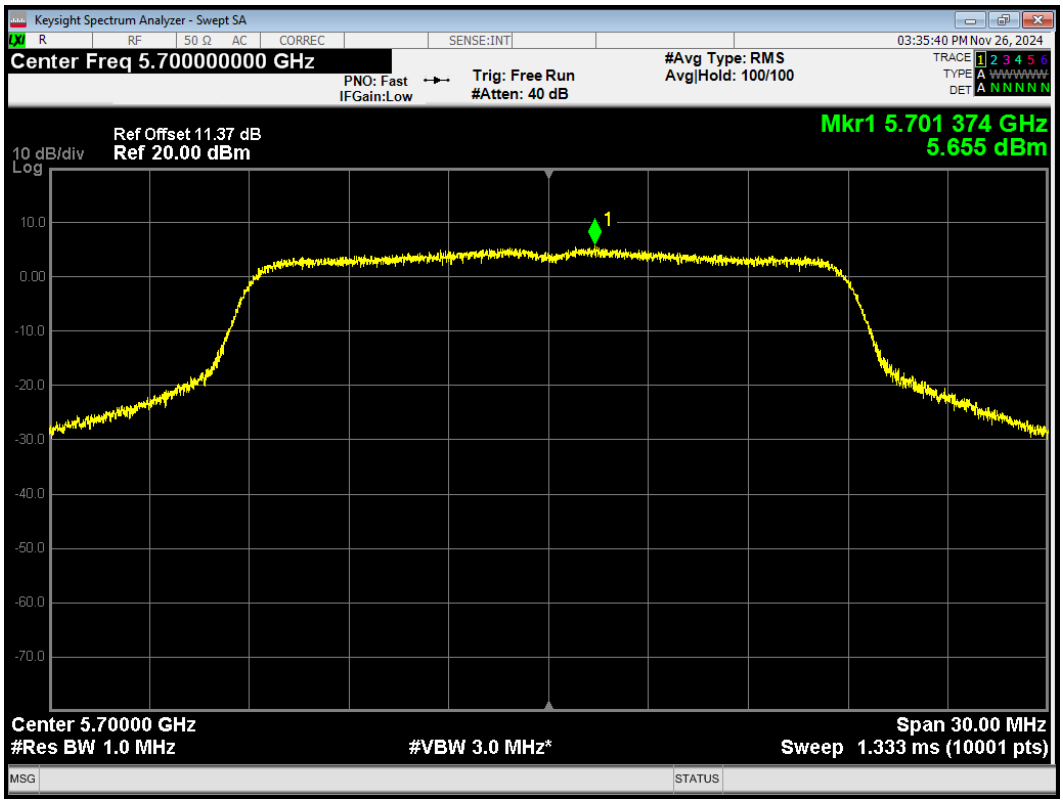
PSD 802.11n(HT20) 5500MHz



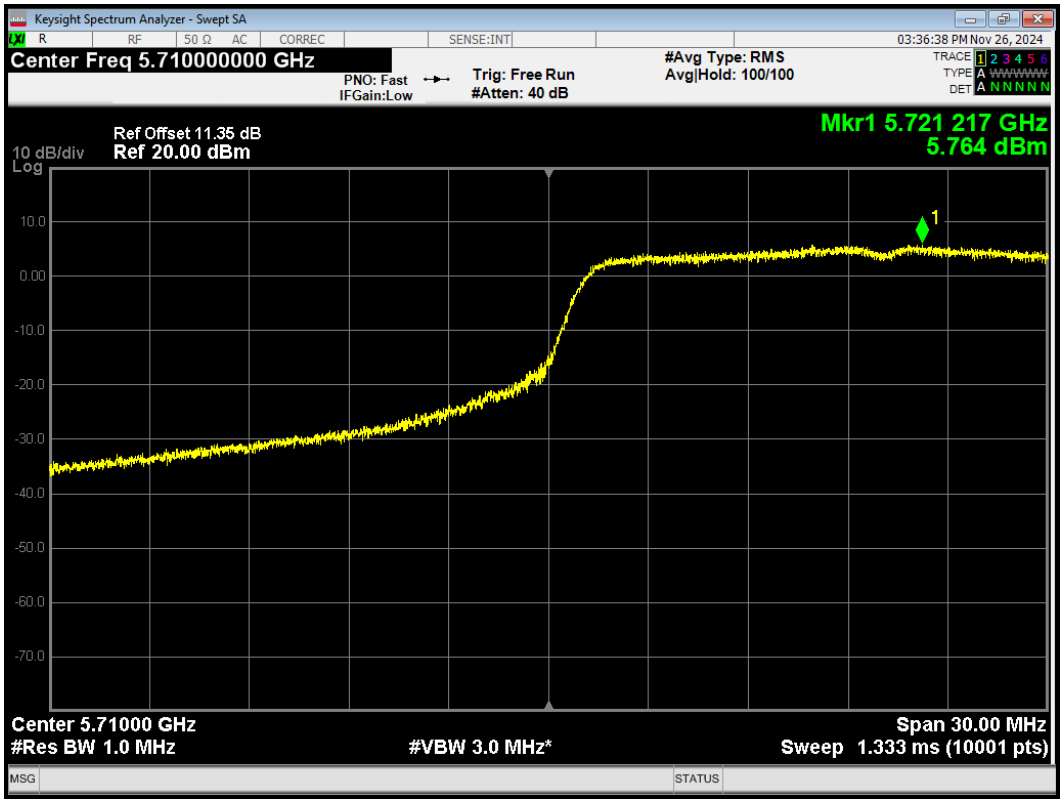
PSD 802.11n(HT20) 5600MHz



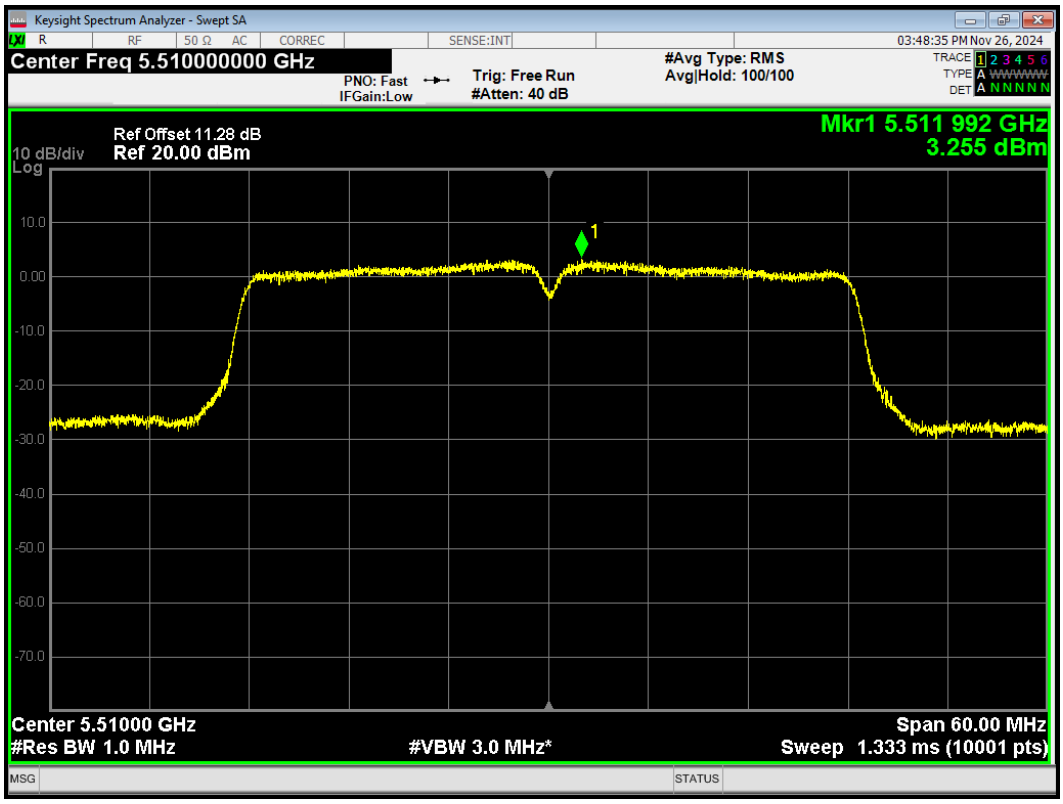
PSD 802.11n(HT20) 5700MHz



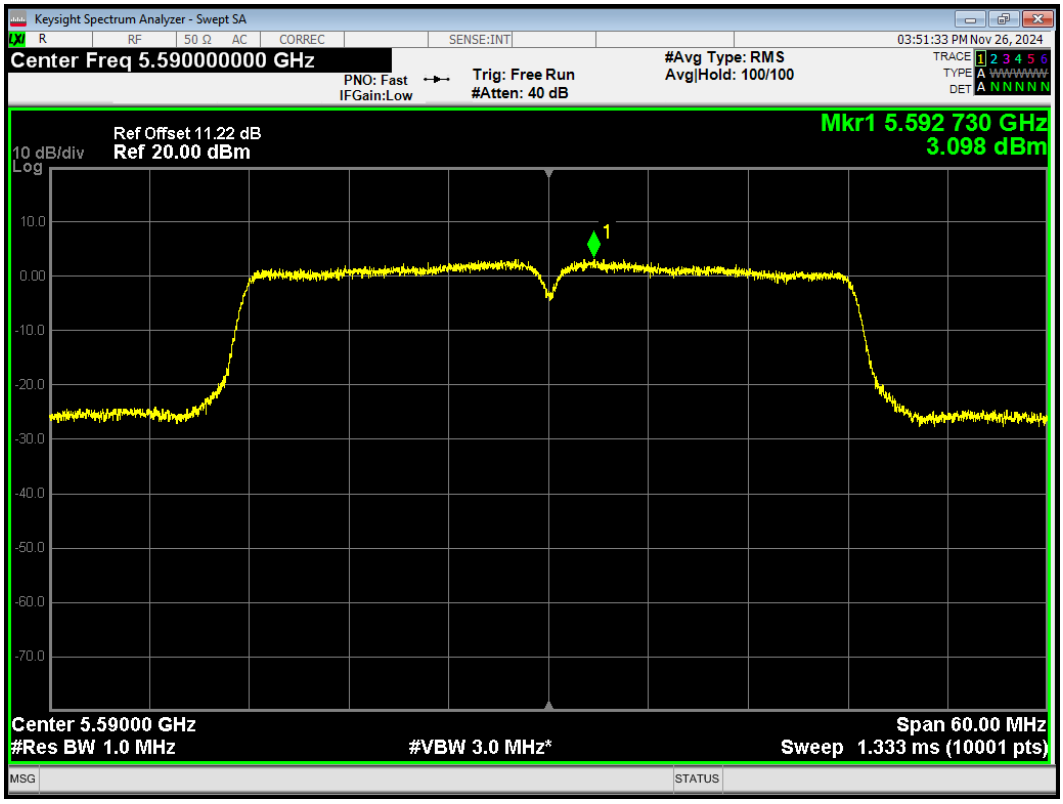
PSD 802.11n(HT20) 5720MHz



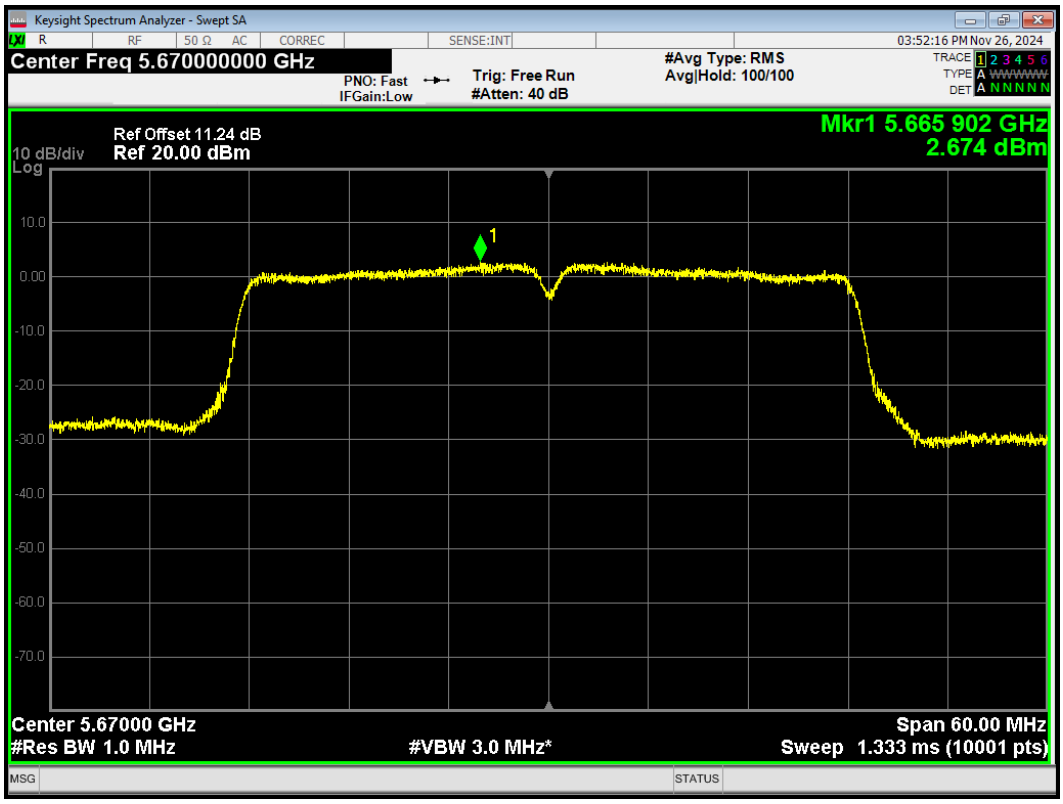
PSD 802.11n(HT40) 5510MHz



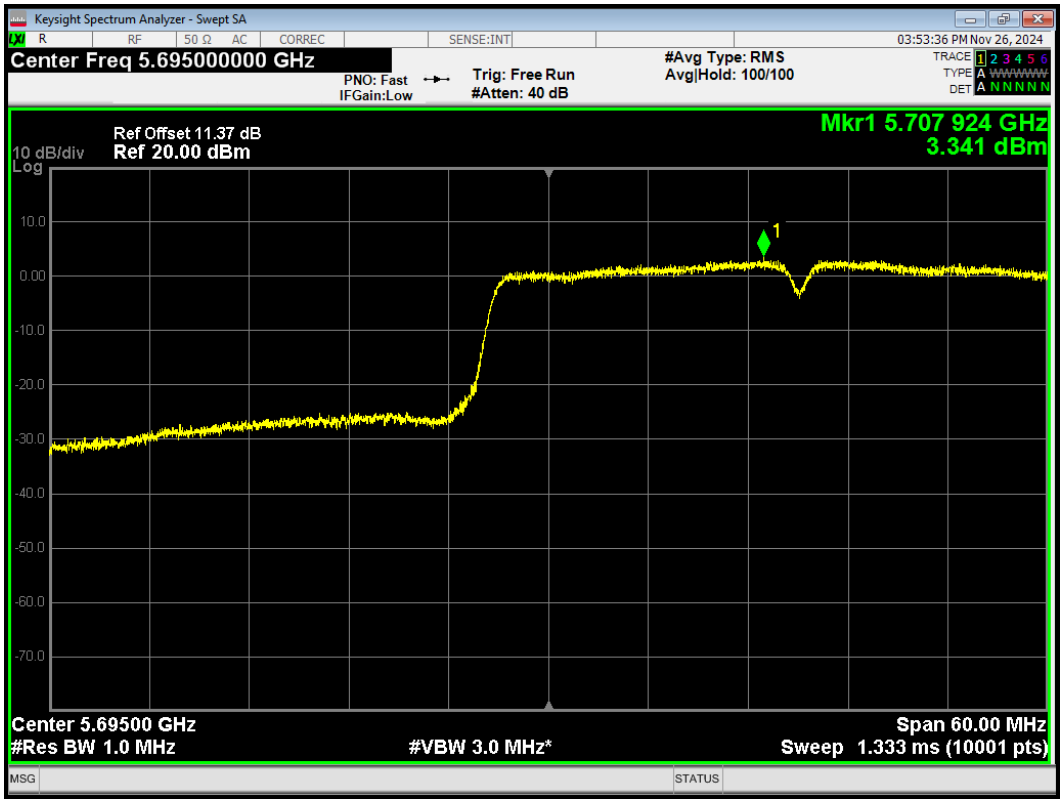
PSD 802.11n(HT40) 5590MHz



PSD 802.11n(HT40) 5670MHz

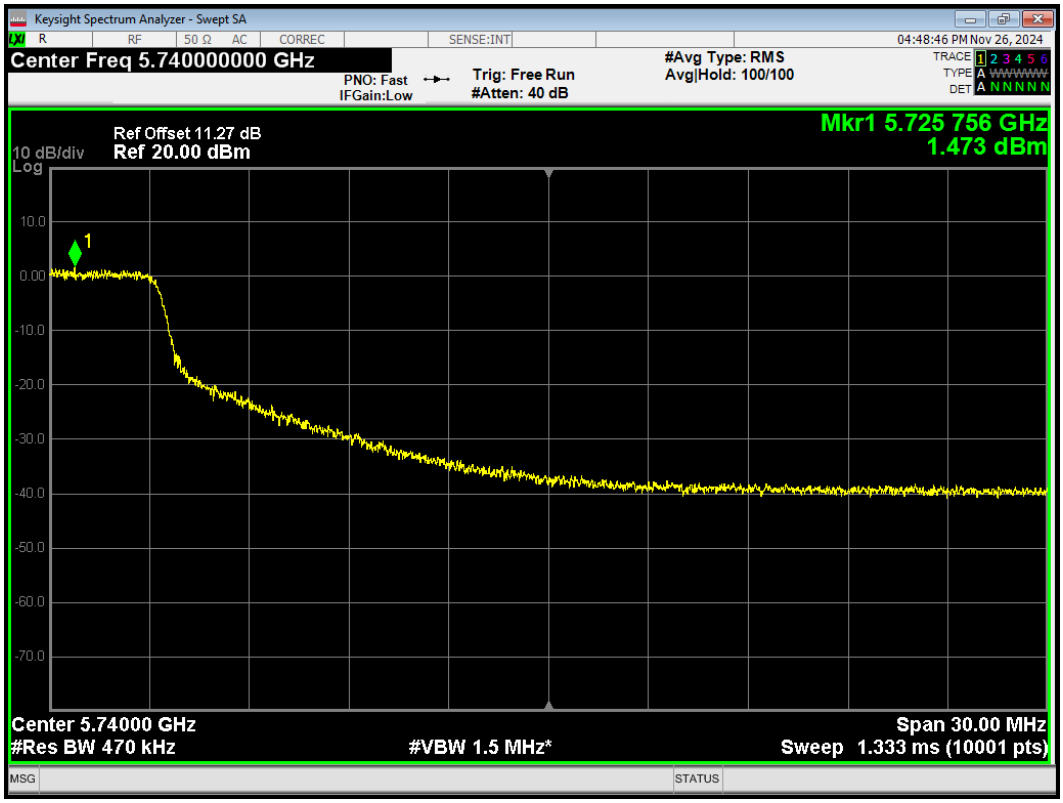


PSD 802.11n(HT40) 5710MHz

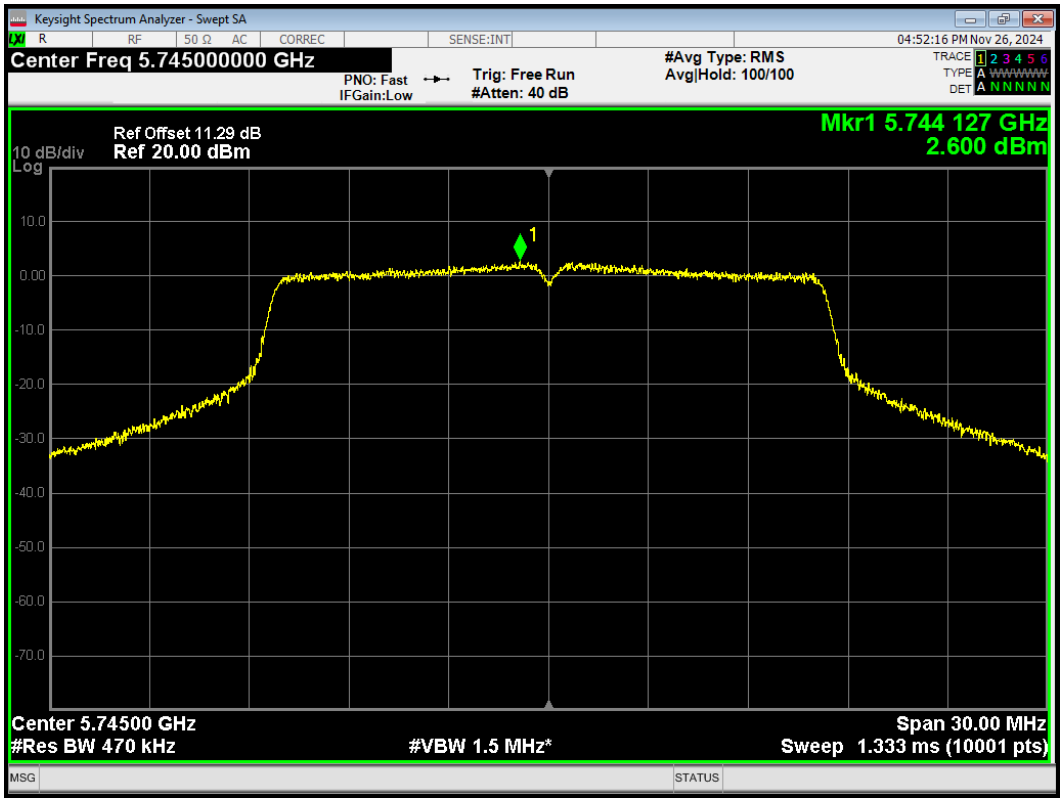


U-NII-3

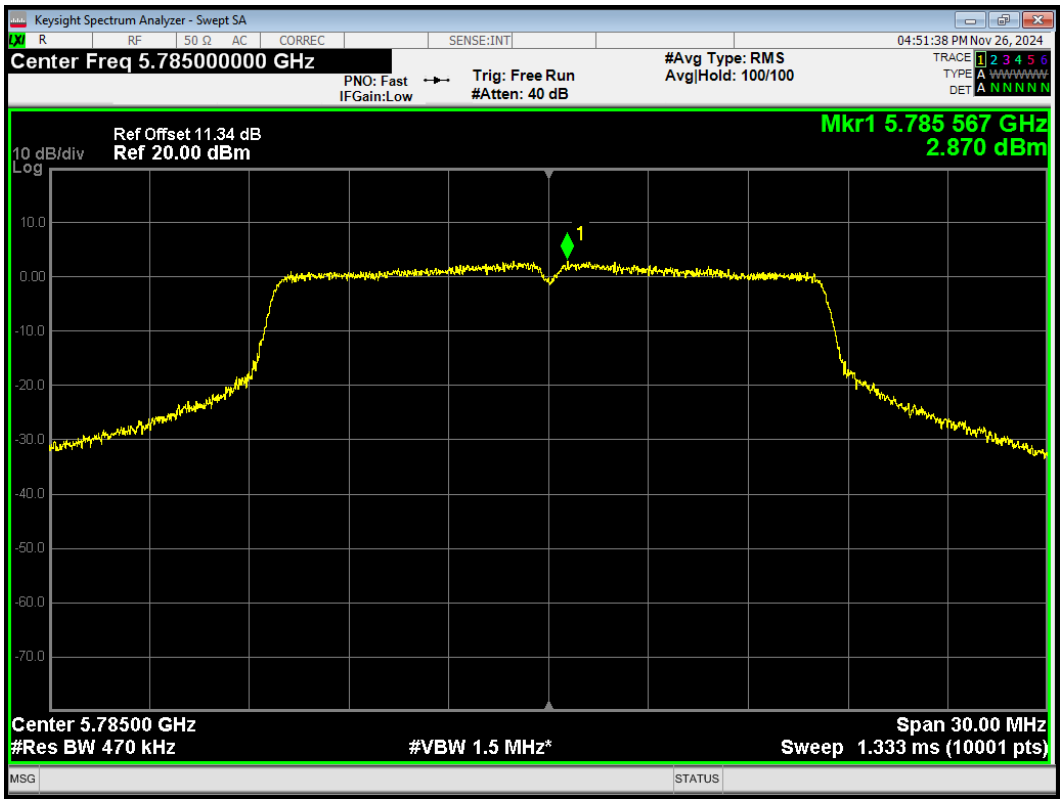
PSD 802.11a 5720MHz



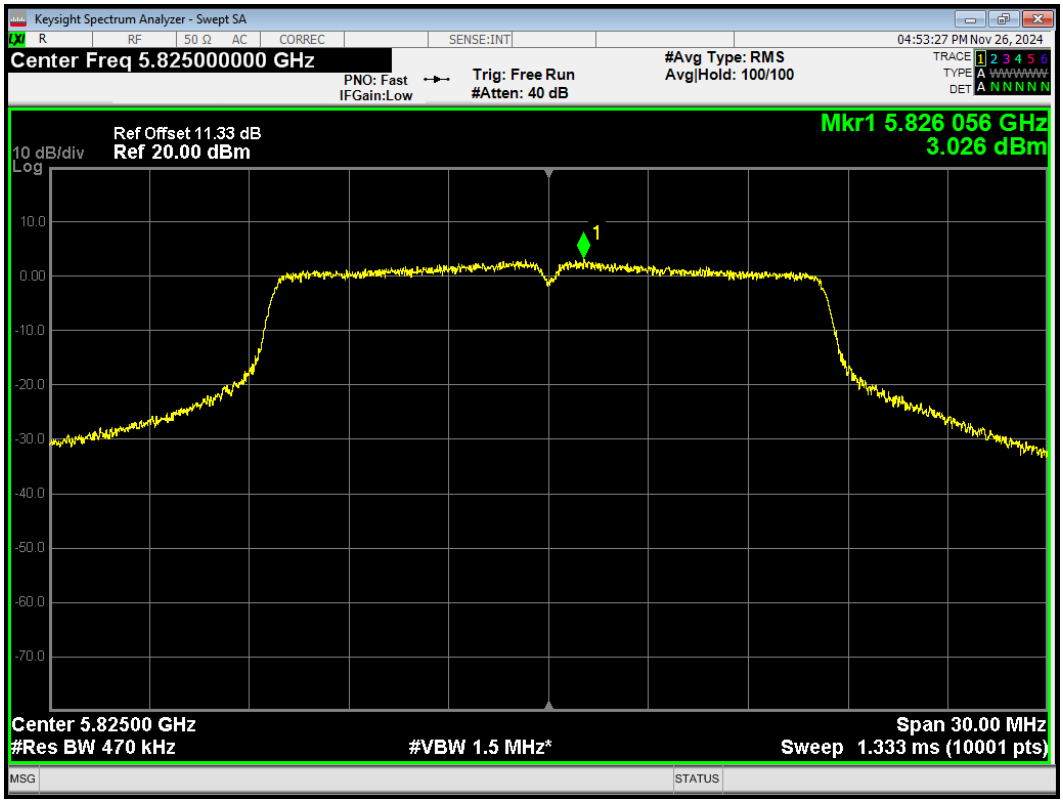
PSD 802.11a 5745MHz



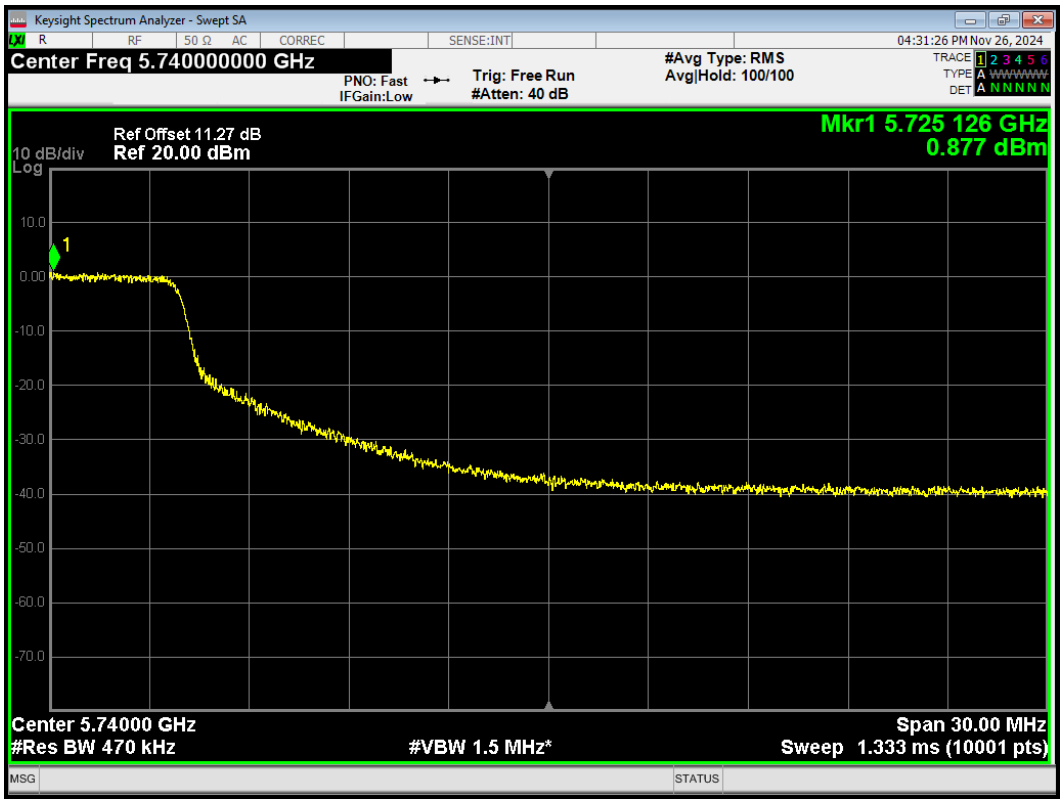
PSD 802.11a 5785MHz



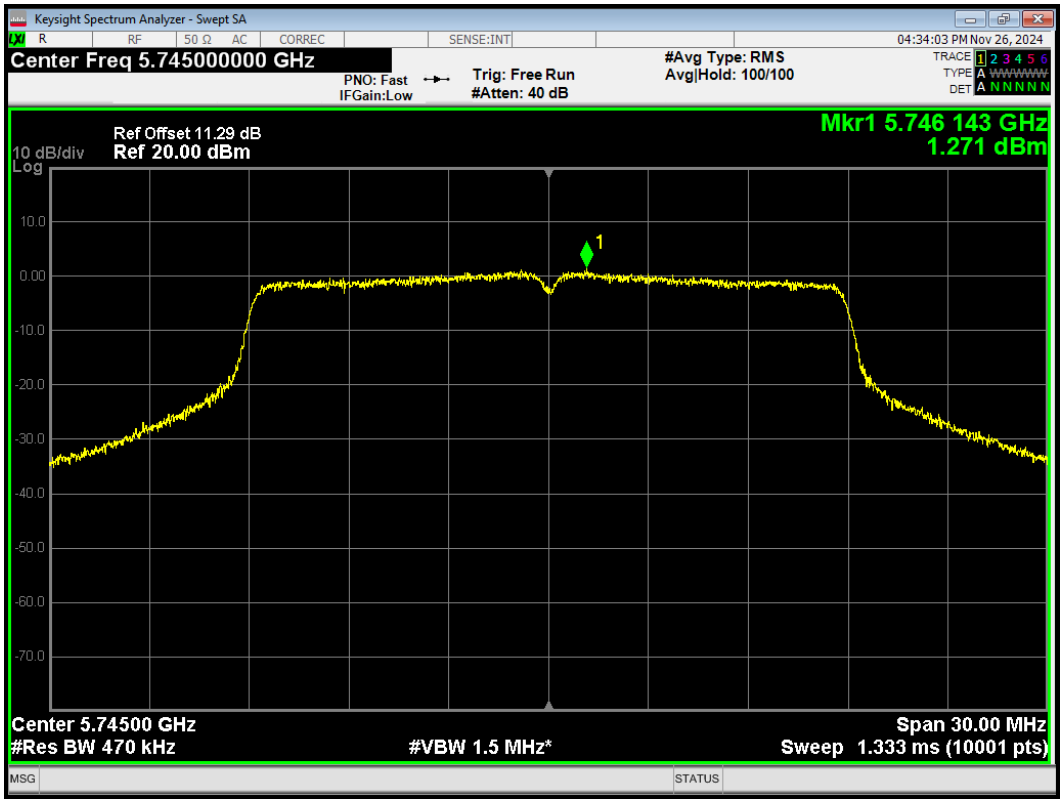
PSD 802.11a 5825MHz



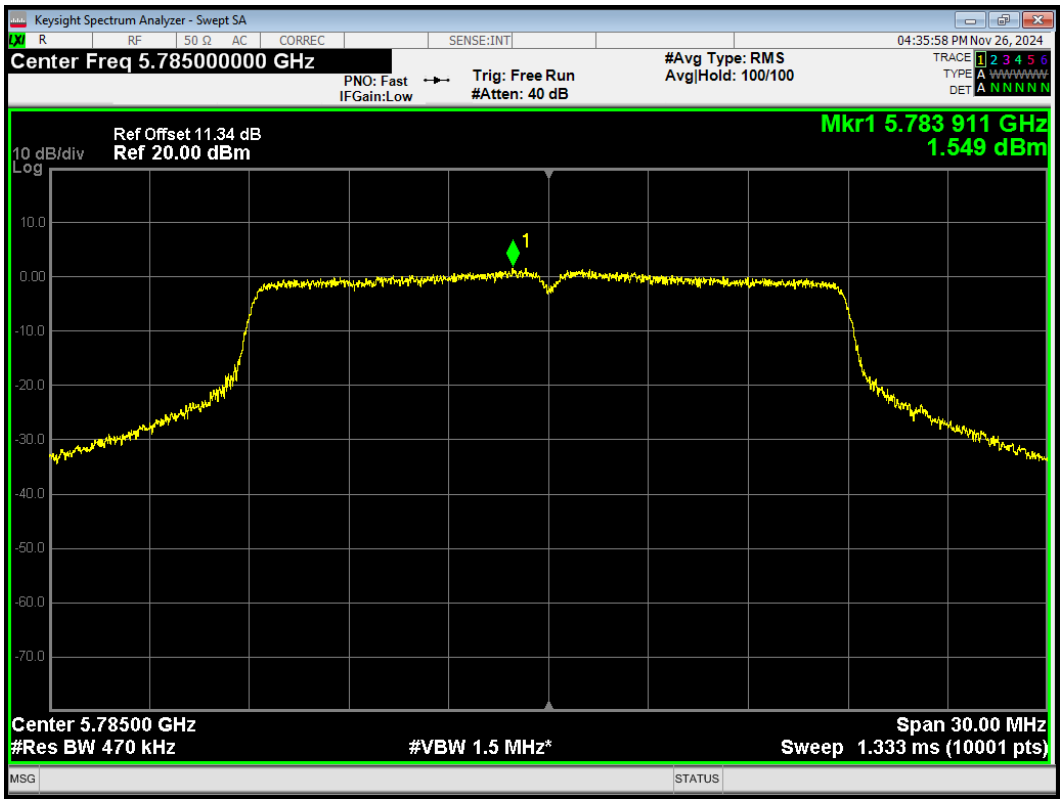
PSD 802.11ac(VHT20) 5720MHz



PSD 802.11ac(VHT20) 5745MHz



PSD 802.11ac(VHT20) 5785MHz



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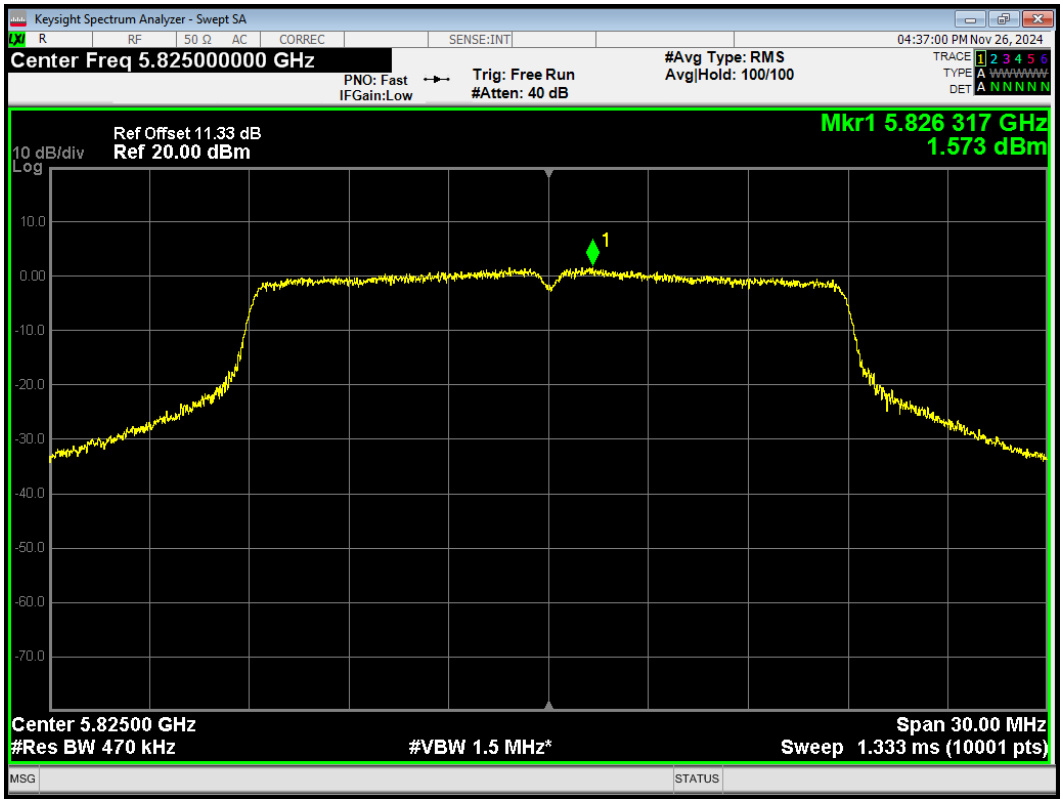

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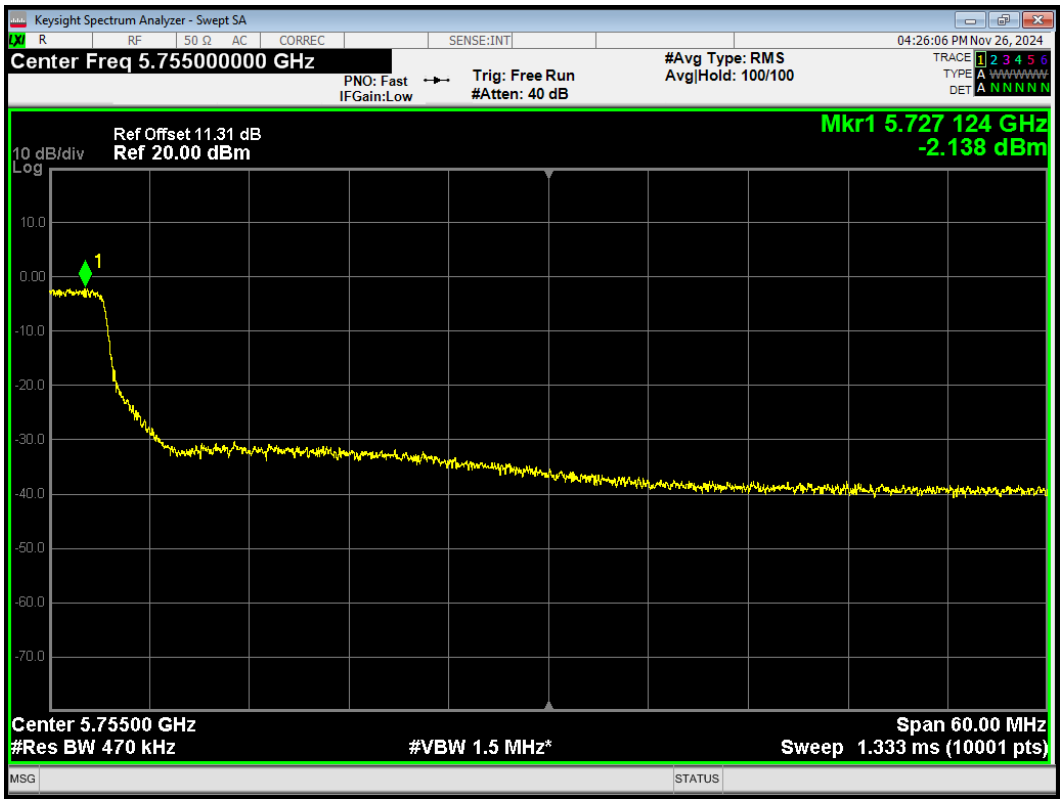
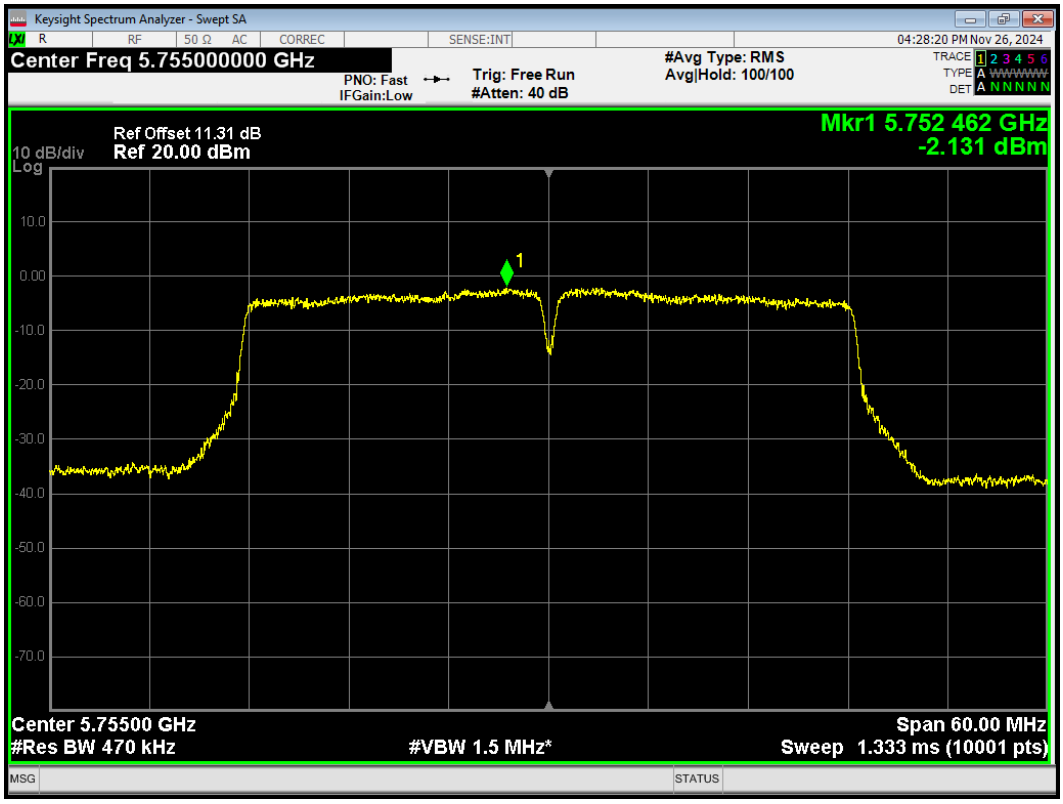


PSD 802.11ac(VHT40) 5755MHz



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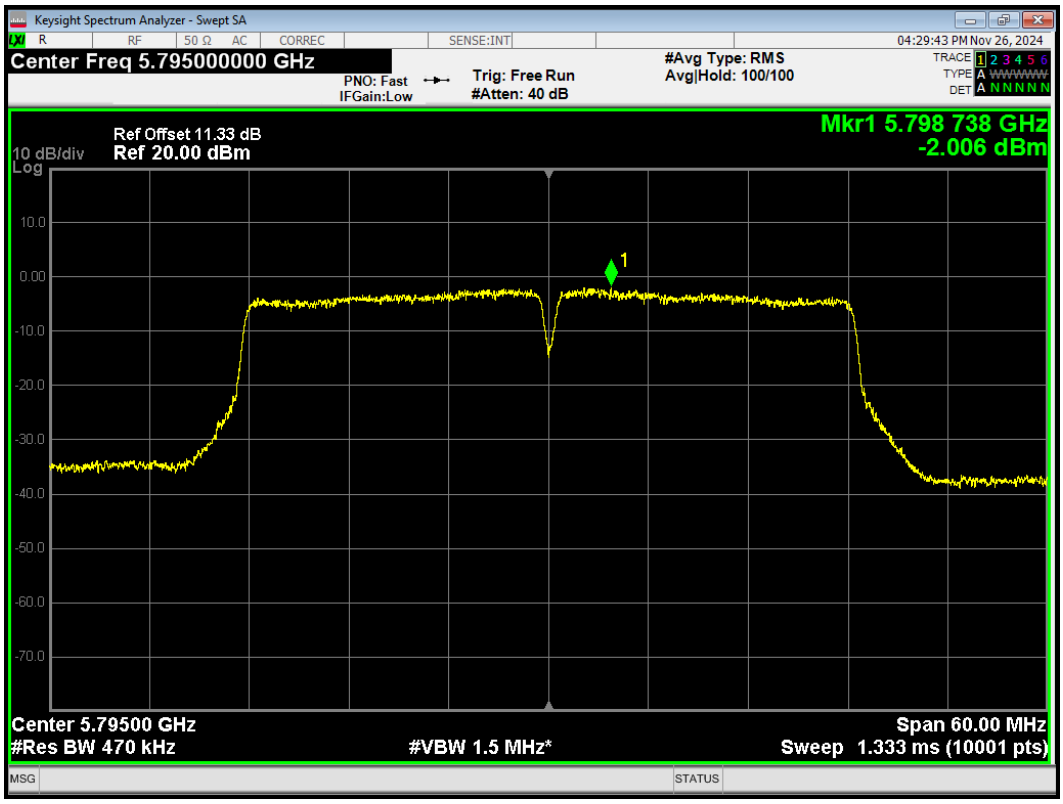

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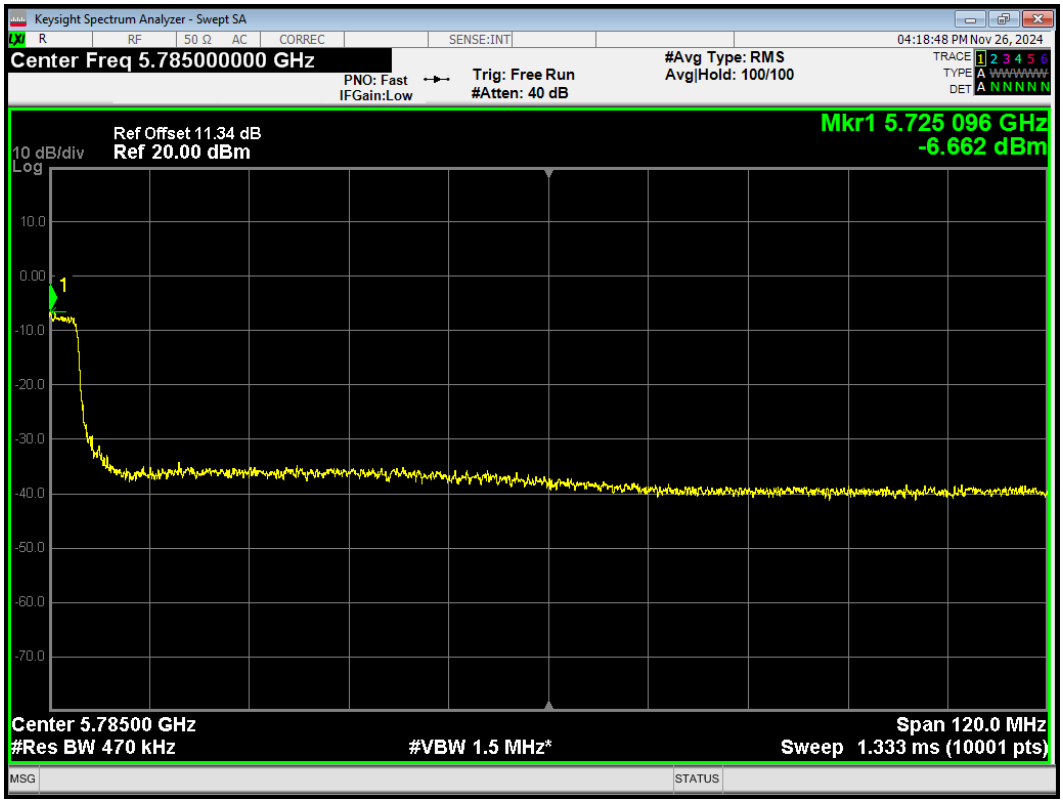
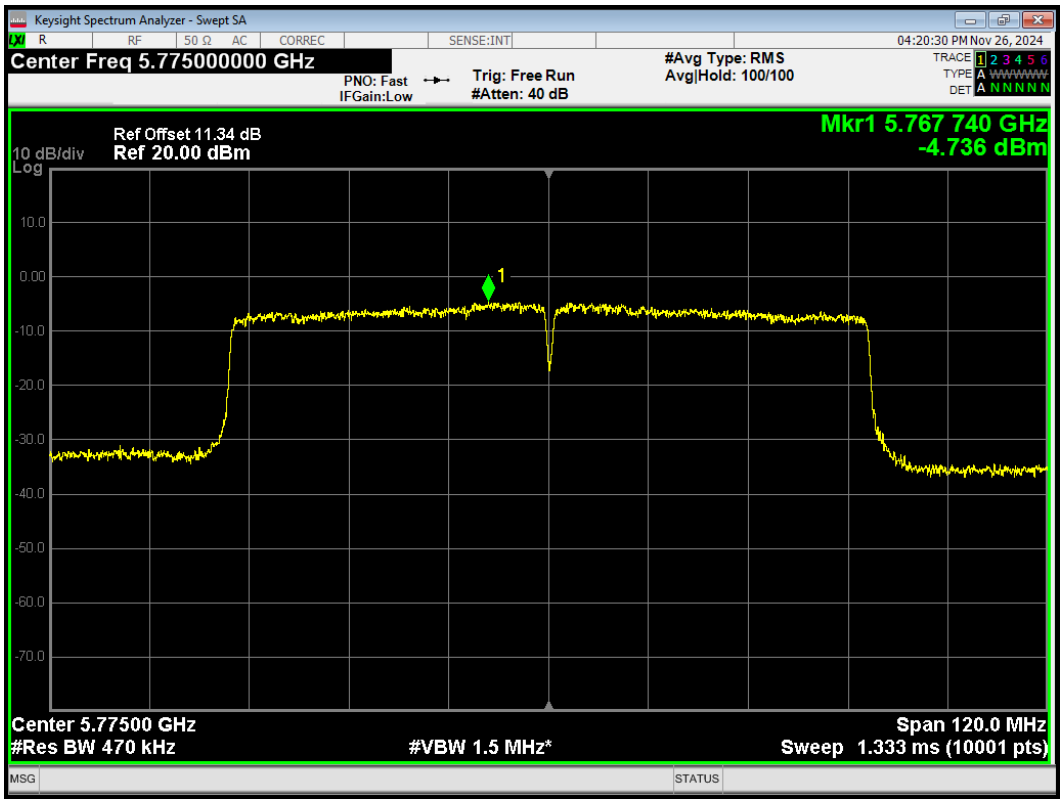
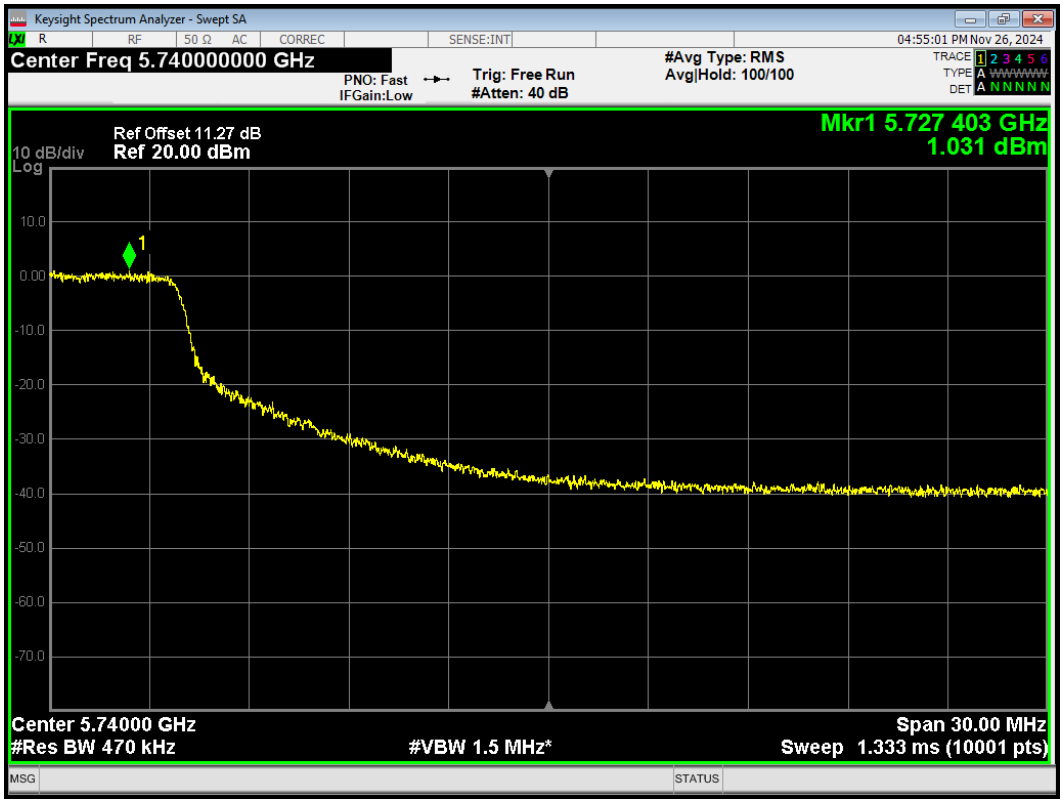


PSD 802.11ac(VHT80) 5775MHz



PSD 802.11n(HT20) 5720MHz



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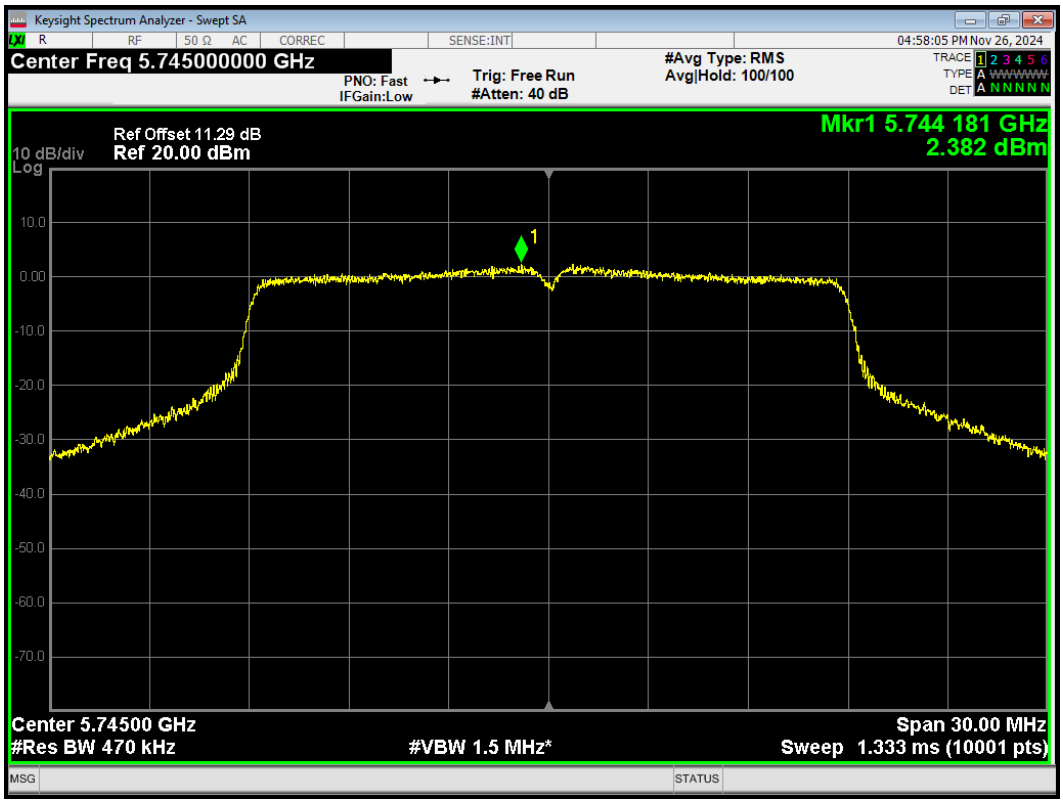
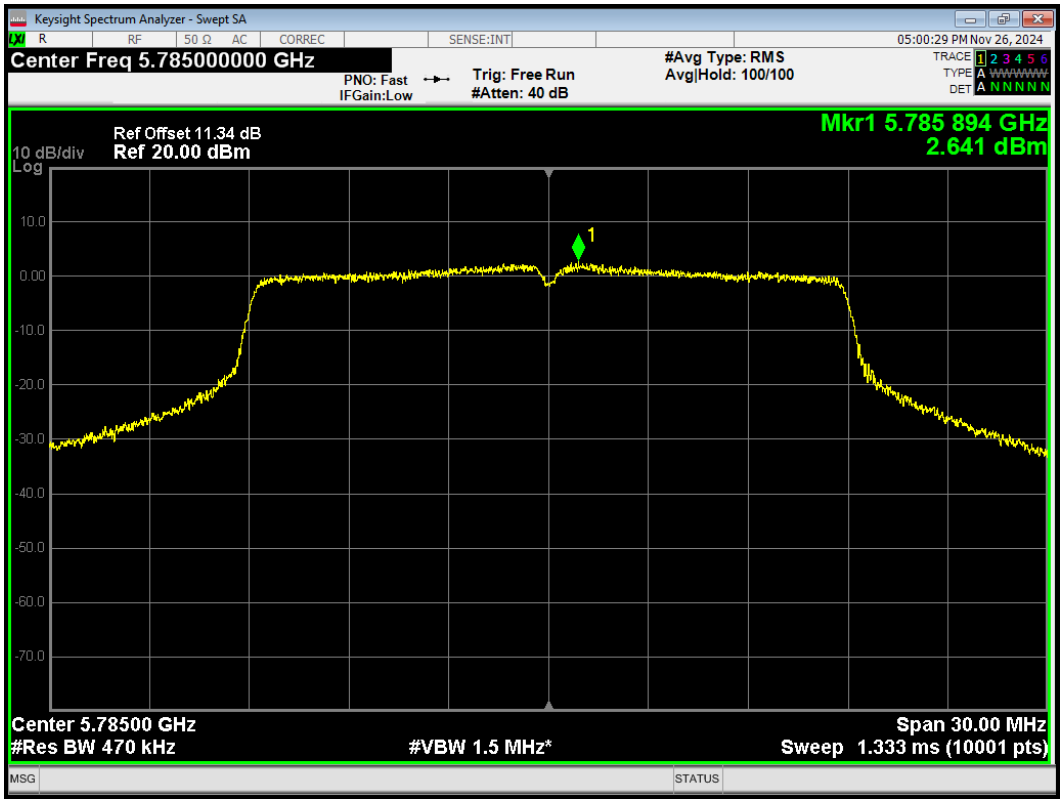
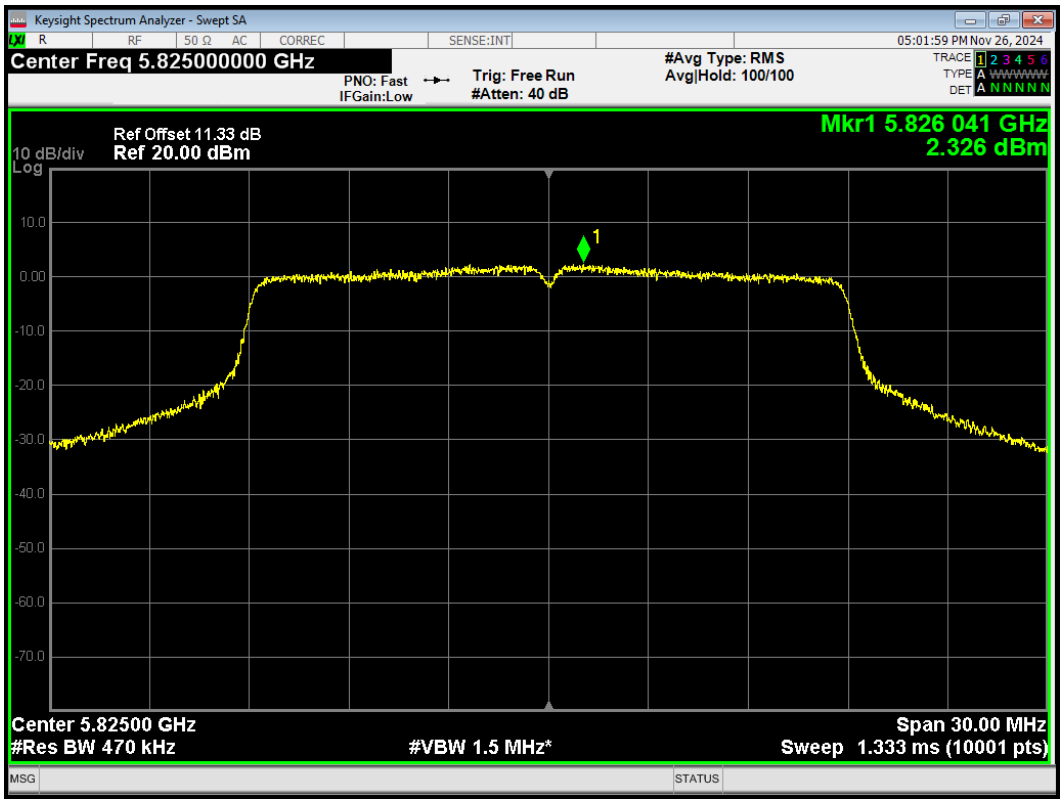


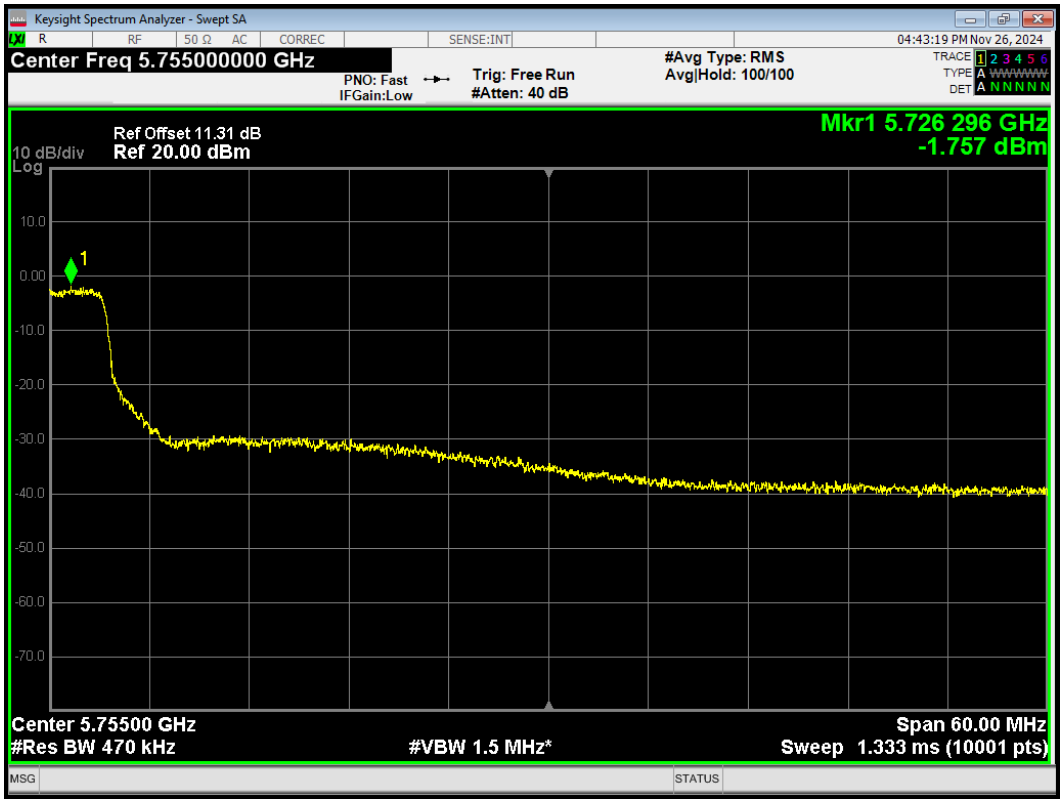
PSD 802.11n(HT20) 5785MHz



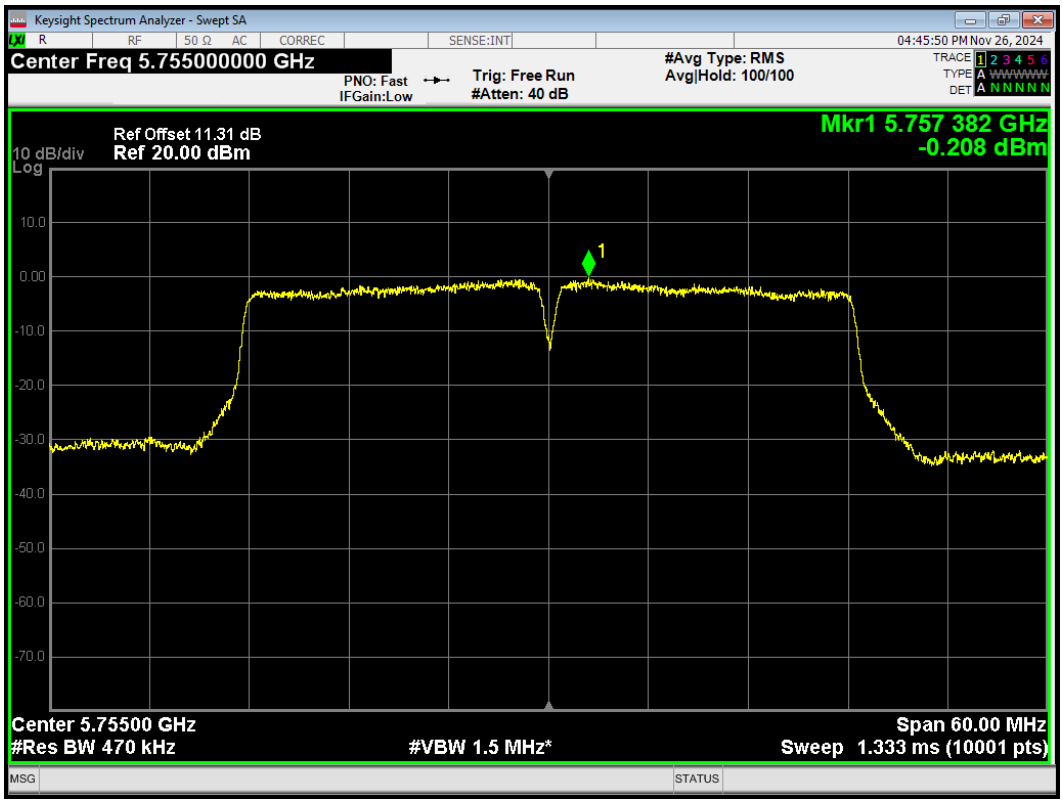
PSD 802.11n(HT20) 5825MHz



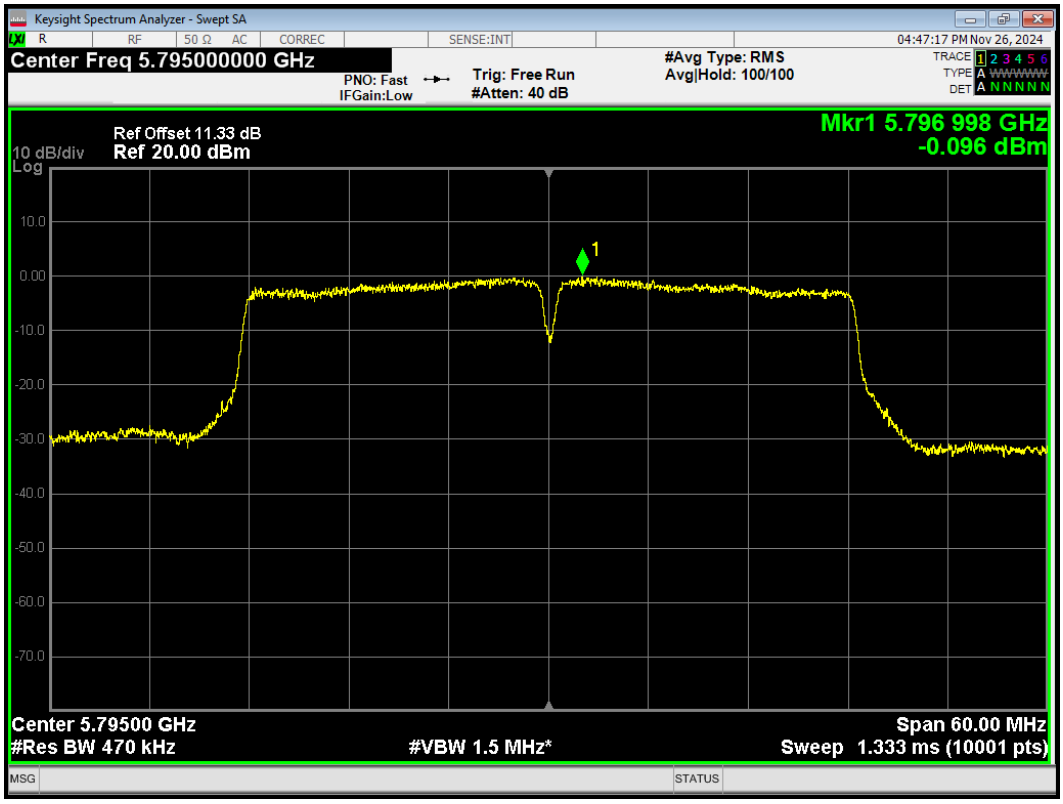
PSD 802.11n(HT40) 5710MHz



PSD 802.11n(HT40) 5755MHz



PSD 802.11n(HT40) 5795MHz



5.5. Unwanted Emission

Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.10. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.
Sweep the whole frequency band range from 9kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.
Set the spectrum analyzer in the following:
9kHz~150 kHz
RBW=200Hz, VBW=1kHz/ Sweep=AUTO
150 kHz~30MHz
RBW=9kHz, VBW=30kHz,/ Sweep=AUTO
Below 1GHz
RBW=100kHz / VBW=300kHz / Sweep=AUTO
a) Peak emission levels are measured by setting the instrument as follows:
Above 1GHz
PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO
b) Average emission levels are measured by setting the instrument as follows:
Above 1GHz
AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO
c) Detector: The measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and

OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.

3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

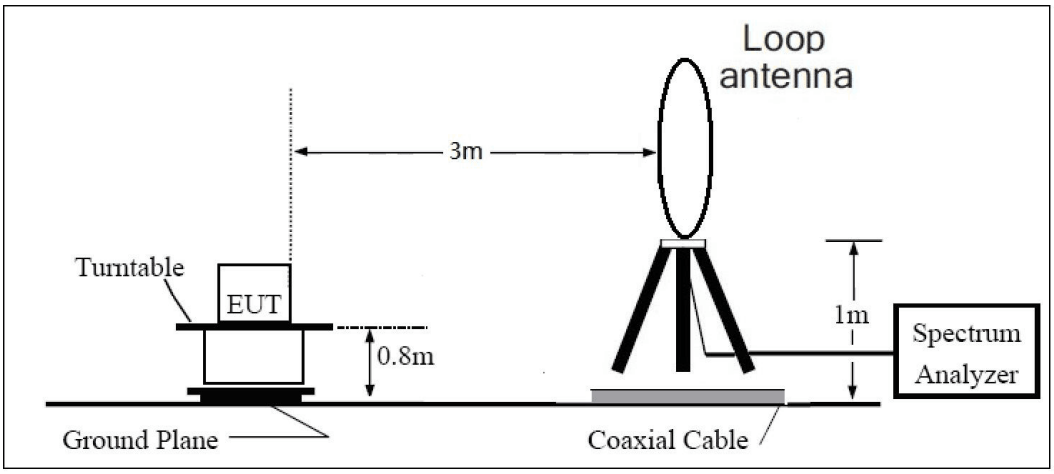
Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz. For regulatory requirements that specify averaging only over the transmit duration (e.g., digital transmission system [DTS] and Unlicensed National Information Infrastructure [U-NII]), the video bandwidth shall be greater than [1 / (minimum transmitter on time)] and no less than 1 Hz.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the loop antenna is vertical, others antenna are vertical and horizontal.

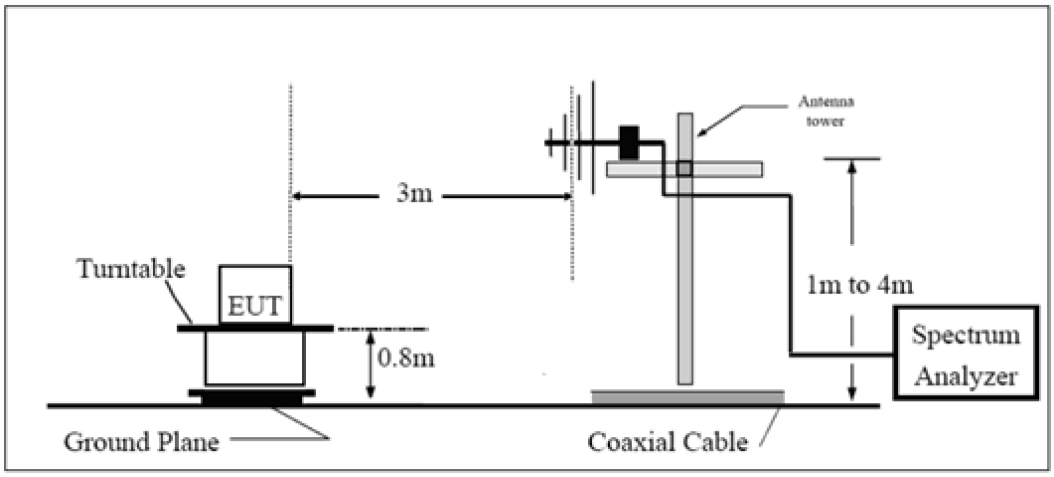
The test is in transmitting mode.

Test setup

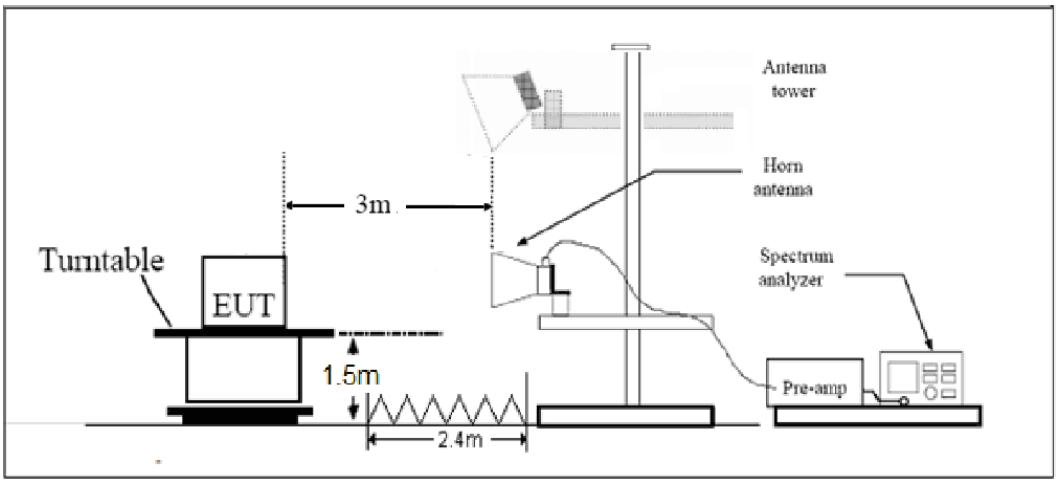
9kHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

(1) For transmitters operating in the 5725-5850 MHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz(68.2dBμV/m).

(3) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz(68.2dBμV/m).

(4) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz(68.2dBμV/m).

Note: the following formula is used to convert the EIRP to field strength

§1、E[dBμV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and

d = distance at which field strength limit is specified in the rules;

§2、E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters

(5) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table.

Frequency of emission (MHz)	Field strength(μV/m)	Field strength(dBμV/m)
0.009–0.490	2400/F(kHz)	/
0.490–1.705	24000/F(kHz)	/
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
9kHz-30MHz	3.55 dB
30MHz-200MHz	4.17 dB
200MHz-1GHz	4.84 dB
1-18GHz	4.35 dB
18-26.5GHz	5.90 dB
26.5GHz~40GHz	5.92 dB