



- 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  $k = 2$ ,  $U = 936\text{Hz}$

**Test Results**

Voltage (V)	Temperature (°C)	U-NII-1 Test Results			
		5200MHz			
		1min	2min	5min	10min
3.85 V	-20	5199.997683	5199.990353	5199.986901	5199.986704
3.85 V	-10	5200.002367	5199.981287	5199.983716	5199.978906
3.85 V	0	5199.996486	5199.979064	5199.979064	5199.974008
3.85 V	10	5199.986986	5199.975733	5199.971948	5199.971907
3.85 V	20	5199.981470	5199.972005	5199.967563	5199.970330
3.85 V	30	5199.976732	5199.962165	5199.962794	5199.965460
3.85 V	40	5199.967457	5199.954222	5199.955975	5199.961552
3.85 V	50	5199.961546	5199.946680	5199.946423	5199.953501
3.65 V	20	5199.957629	5199.939572	5199.941828	5199.944561
4.20V	20	5199.948198	5199.937133	5199.935682	5199.938402
Max. ΔMHz		-0.051802	-0.062867	-0.064318	-0.061598
PPM		-9.961995	-12.089778	-12.368842	-11.845844

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
3.85 V	-20	5300.007413	5300.003261	5299.996100	5299.993532
3.85 V	-10	5300.000779	5299.998060	5299.989587	5299.983572
3.85 V	0	5299.996680	5299.994502	5299.982835	5299.978059
3.85 V	10	5299.991728	5299.985554	5299.977814	5299.975766
3.85 V	20	5299.991531	5299.977681	5299.977004	5299.970334
3.85 V	30	5299.989457	5299.975616	5299.976947	5299.964334
3.85 V	40	5299.980354	5299.966413	5299.971992	5299.961537
3.85 V	50	5299.973818	5299.966333	5299.966109	5299.953968
3.65 V	20	5299.967940	5299.963312	5299.964489	5299.947377
4.20V	20	5299.966234	5299.962842	5299.957676	5299.941299
Max. ΔMHz		-0.033766	-0.037158	-0.042324	-0.058701
PPM		-6.370884	-7.011030	-7.985705	-11.075671



Voltage (V)	Temperature (°C)	U-NII-2C Test Results			
		5580MHz			
		1min	2min	5min	10min
3.85 V	-20	5580.005301	5579.997390	5579.987601	5579.984620
3.85 V	-10	5580.001630	5579.991777	5579.982678	5579.981614
3.85 V	0	5579.993599	5579.991167	5579.977448	5579.979294
3.85 V	10	5579.990783	5579.991065	5579.974950	5579.978365
3.85 V	20	5579.984497	5579.984970	5579.968986	5579.974649
3.85 V	30	5579.980508	5579.983803	5579.968894	5579.971493
3.85 V	40	5579.971502	5579.976961	5579.968062	5579.967878
3.85 V	50	5579.969197	5579.975171	5579.965390	5579.966696
3.65 V	20	5579.963541	5579.966805	5579.963899	5579.966414
4.20V	20	5579.960017	5579.965006	5579.954687	5579.960958
Max. ΔMHz		-0.039983	-0.034994	-0.045313	-0.039042
PPM		-7.165459	-6.271331	-8.120567	-6.996695

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
3.85 V	-20	5785.007936	5785.005418	5784.998383	5784.988589
3.85 V	-10	5785.005285	5785.002362	5784.995523	5784.982515
3.85 V	0	5785.002371	5785.000745	5784.995183	5784.979434
3.85 V	10	5784.995039	5784.993842	5784.989297	5784.978321
3.85 V	20	5784.985200	5784.987768	5784.979513	5784.974933
3.85 V	30	5784.978874	5784.985576	5784.979169	5784.968859
3.85 V	40	5784.977384	5784.979462	5784.975136	5784.965251
3.85 V	50	5784.970296	5784.977907	5784.967757	5784.960884
3.65 V	20	5784.961673	5784.969436	5784.965142	5784.952674
4.20V	20	5784.955586	5784.963626	5784.963892	5784.945482
Max. ΔMHz		-0.044414	-0.036374	-0.036108	-0.054518
PPM		-7.677506	-6.287661	-6.241650	-9.423981

## 5.4. Power Spectral Density

### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

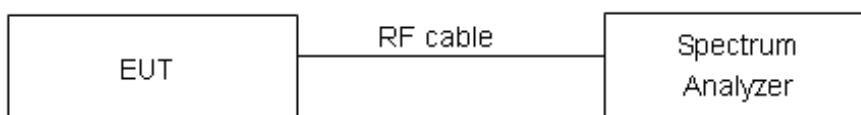
### Method of Measurement

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)/ Part 15.407(a)(2) / 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 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.

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 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.

Frequency Bands/MHz	Limits
5150-5250	11dBm/MHz
5.25-5.35 GHz and 5.47-5.725 GHz	11dBm/MHz
5725-5850	30dBm/500kHz

### Measurement Uncertainty

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

**Test Results:**

Note: Power Spectral Density =Read Value+Duty cycle correction factor

**U-NII-1**

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	5.71	5.84	11	PASS
	40	5.64	5.77	11	PASS
	48	5.84	5.97	11	PASS
802.11n HT20	36	4.53	4.67	11	PASS
	40	4.55	4.69	11	PASS
	48	4.70	4.84	11	PASS
802.11n HT40	38	-0.94	-0.66	11	PASS
	46	-0.25	0.03	11	PASS
802.11ac VHT20	36	2.21	2.35	11	PASS
	40	2.35	2.49	11	PASS
	48	2.48	2.62	11	PASS
802.11ac VHT40	38	-0.80	-0.53	11	PASS
	46	-0.58	-0.31	11	PASS
802.11ac VHT80	42	-3.77	-3.24	11	PASS

**U-NII-2A**

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	52	5.70	5.83	11	PASS
	60	5.95	6.08	11	PASS
	64	6.03	6.16	11	PASS
802.11n HT20	52	4.63	4.77	11	PASS
	60	5.20	5.34	11	PASS
	64	4.69	4.83	11	PASS
802.11n HT40	54	-0.35	-0.07	11	PASS
	62	-0.37	-0.09	11	PASS
802.11ac VHT20	52	2.54	2.68	11	PASS
	60	2.76	2.90	11	PASS
	64	2.53	2.67	11	PASS



802.11ac VHT40	54	-0.19	0.08	11	PASS
	62	-0.34	-0.07	11	PASS
802.11ac VHT80	58	-3.79	-3.26	11	PASS

## U-NII-2C

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	100	4.81	4.94	11	PASS
	104	6.09	6.22	11	PASS
	420	5.21	5.34	11	PASS
	436	5.29	5.42	11	PASS
	140	4.01	4.14	11	PASS
	144	5.55	5.68	11	PASS
802.11n HT20	100	4.14	4.28	11	PASS
	120	3.54	3.68	11	PASS
	136	3.96	4.10	11	PASS
	140	3.13	3.27	11	PASS
	144	3.91	4.05	11	PASS
802.11n HT40	102	-0.75	-0.47	11	PASS
	118	-1.27	-0.99	11	PASS
	134	-0.69	-0.41	11	PASS
802.11ac VHT20	100	2.07	2.21	11	PASS
	120	1.80	1.94	11	PASS
	140	1.69	1.83	11	PASS
	144	1.59	1.73	11	PASS
802.11ac VHT40	102	-0.69	-0.42	11	PASS
	118	-1.31	-1.04	11	PASS
	134	-0.17	0.10	11	PASS
802.11ac VHT80	122	-4.56	-4.03	11	PASS



## U-NII-3

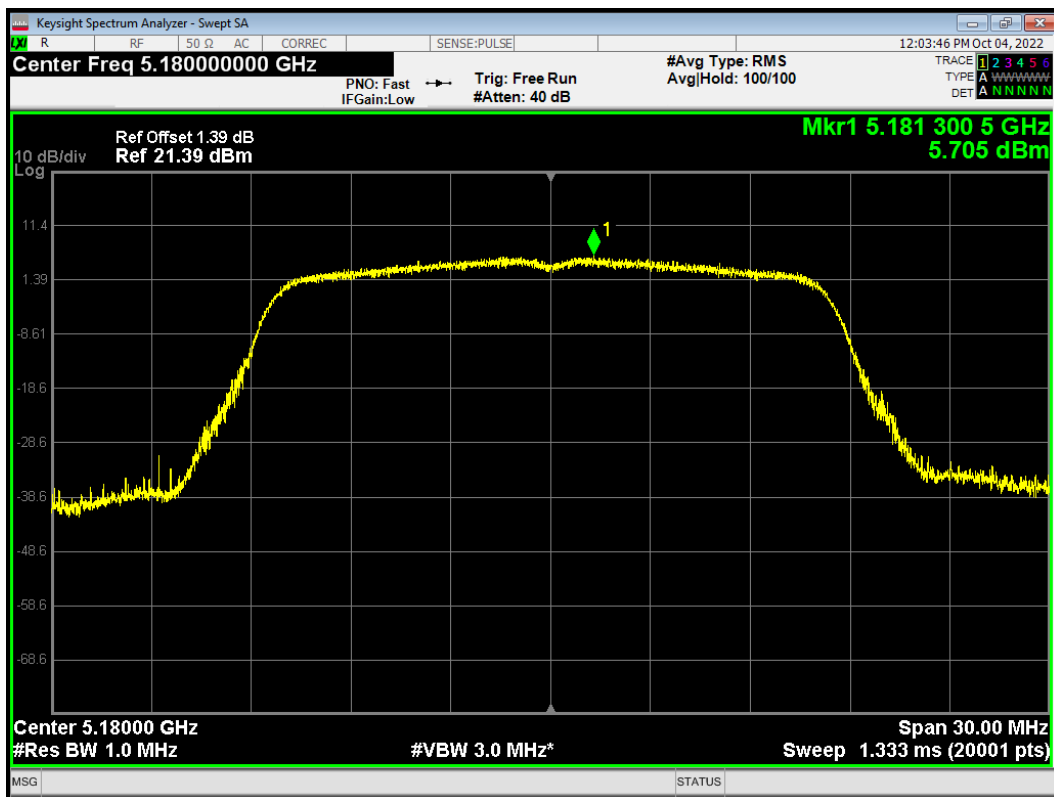
Mode	Channel Number	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	144	-0.44	-0.04	30	PASS
	149	2.32	2.72	30	PASS
	157	2.17	2.57	30	PASS
	165	2.73	3.13	30	PASS
802.11n HT20	144	-1.70	-1.29	30	PASS
	149	0.92	1.33	30	PASS
	157	0.88	1.29	30	PASS
	165	0.90	1.31	30	PASS
802.11n HT40	151	-4.01	-3.46	30	PASS
	159	-4.49	-3.94	30	PASS
802.11ac VHT20	144	-3.85	-3.44	30	PASS
	149	-1.06	-0.65	30	PASS
	157	-1.33	-0.92	30	PASS
	165	-0.96	-0.55	30	PASS
802.11ac VHT40	151	-4.23	-3.69	30	PASS
	159	-4.49	-3.95	30	PASS
802.11ac VHT80	155	-7.36	-6.56	30	PASS

Note: PSD=Read Value+Duty cycle correction factor +10\*log(500/470)



## U-NII-1

## PSD 802.11a 5180MHz

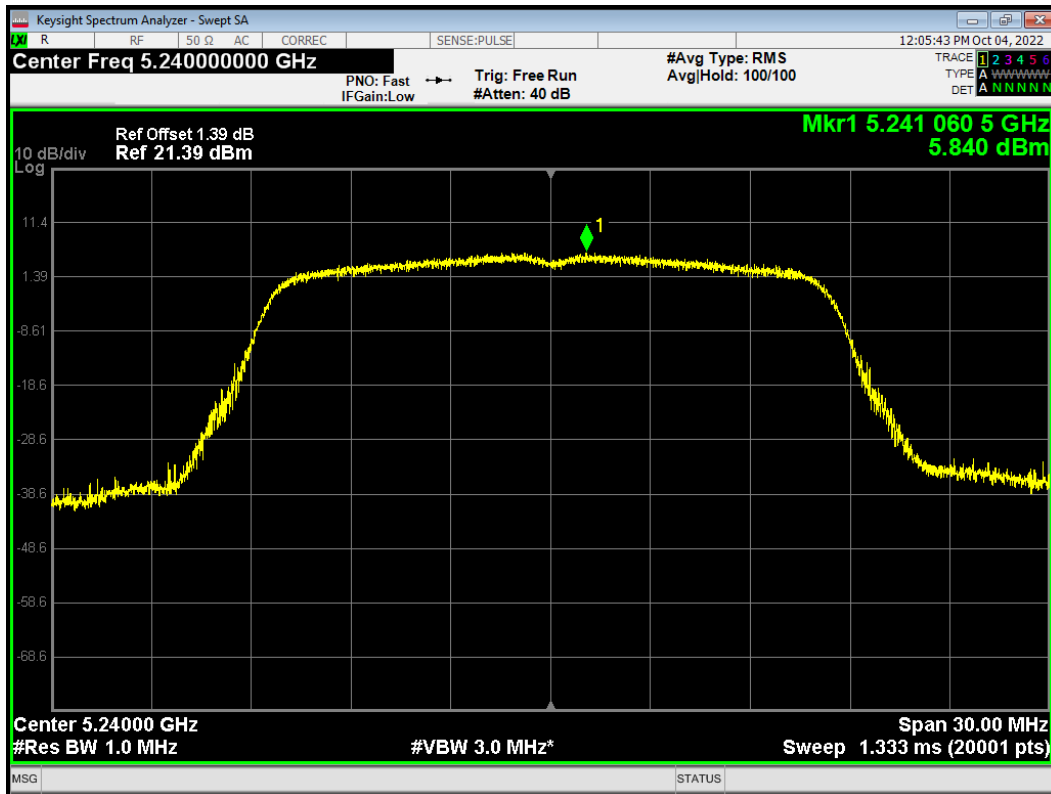


## PSD 802.11a 5200MHz

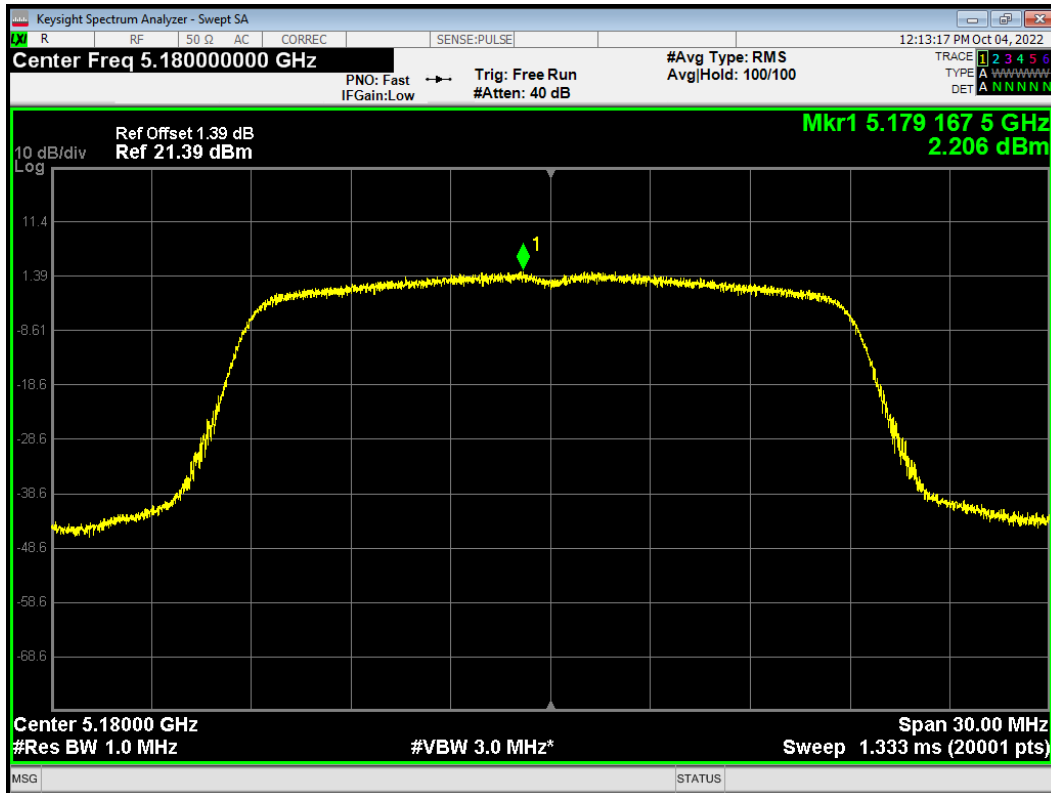




PSD 802.11a 5240MHz

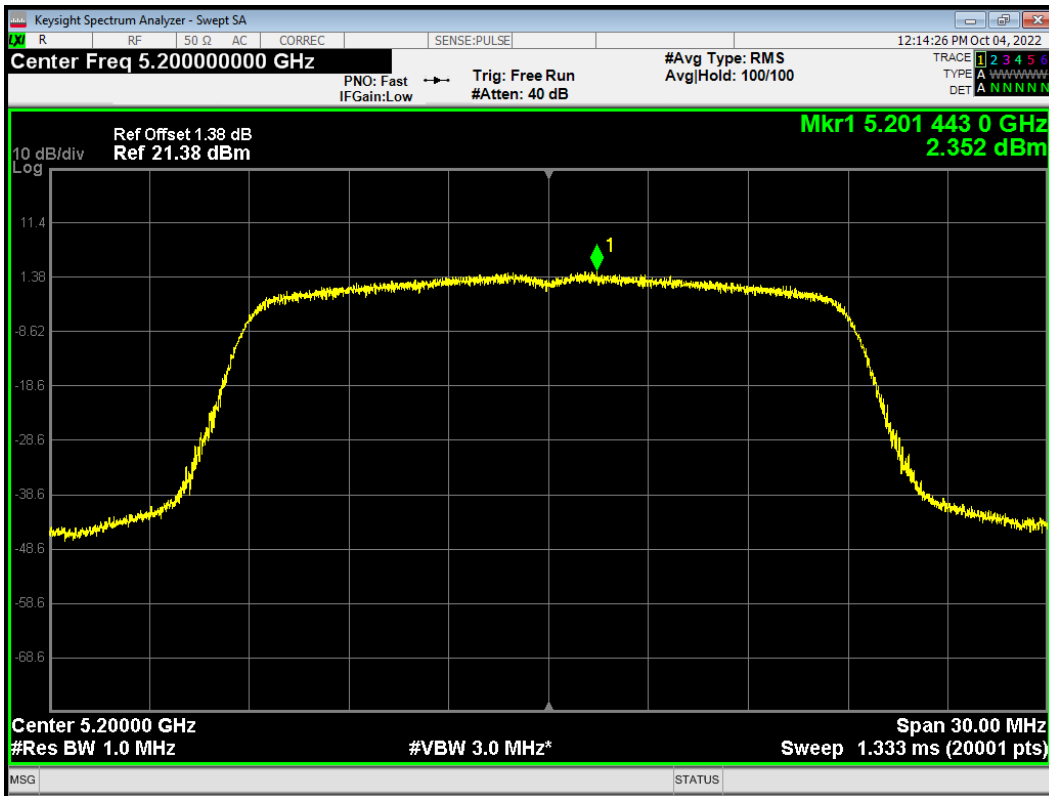


PSD 802.11ac (VHT20) 5180MHz

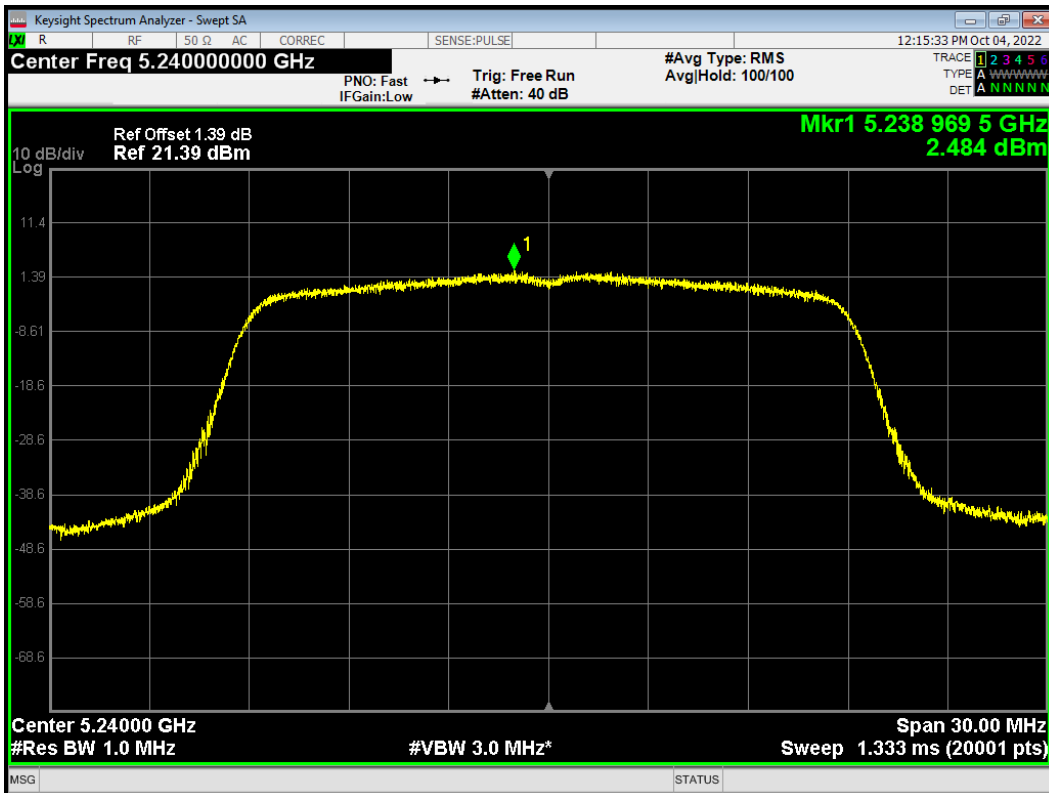




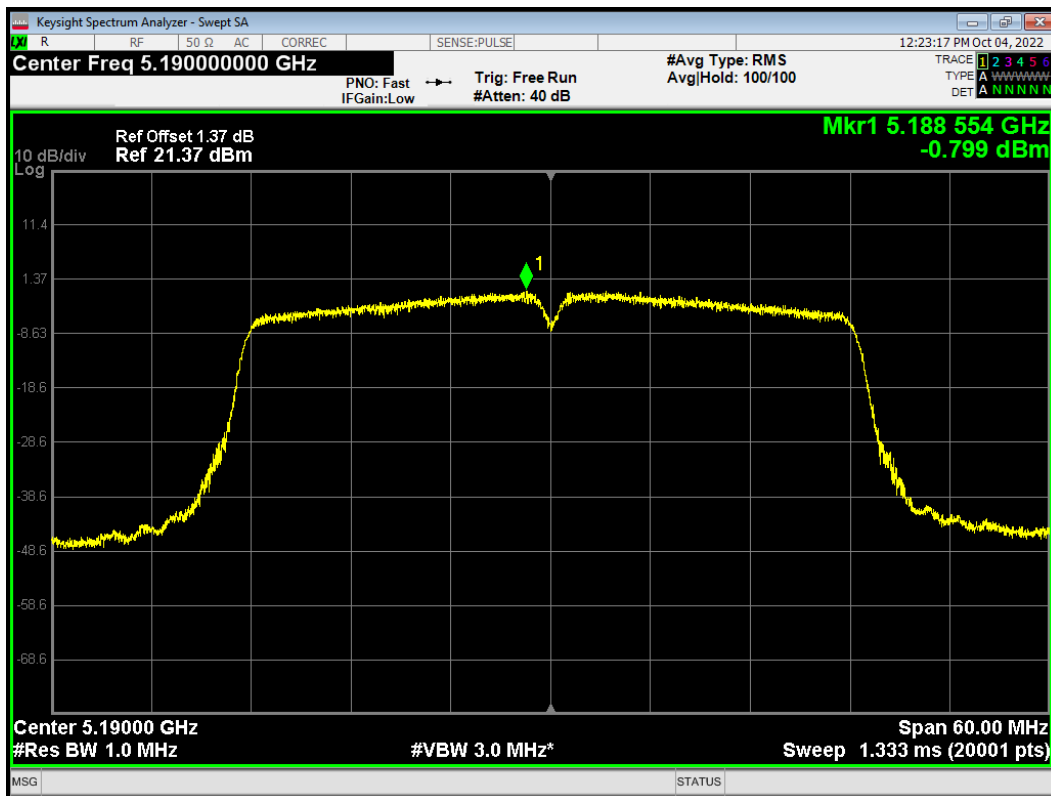
PSD 802.11ac (VHT20) 5200MHz



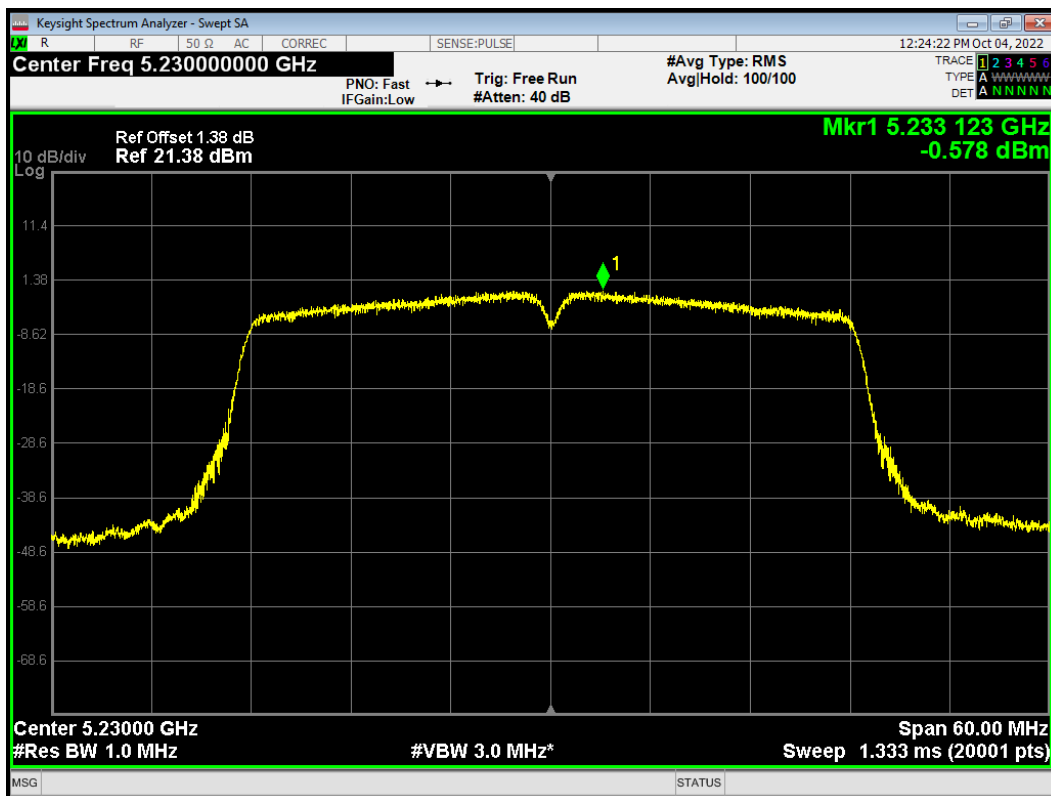
PSD 802.11ac (VHT20) 5240MHz



PSD 802.11ac (VHT40) 5190MHz

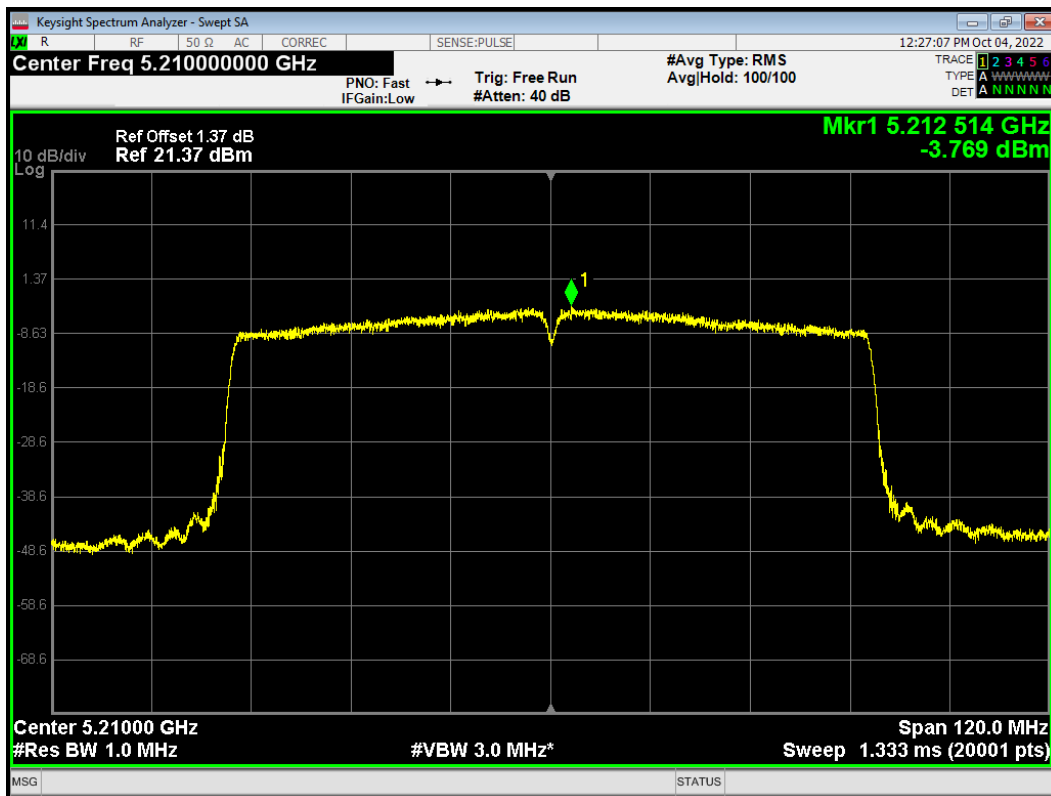


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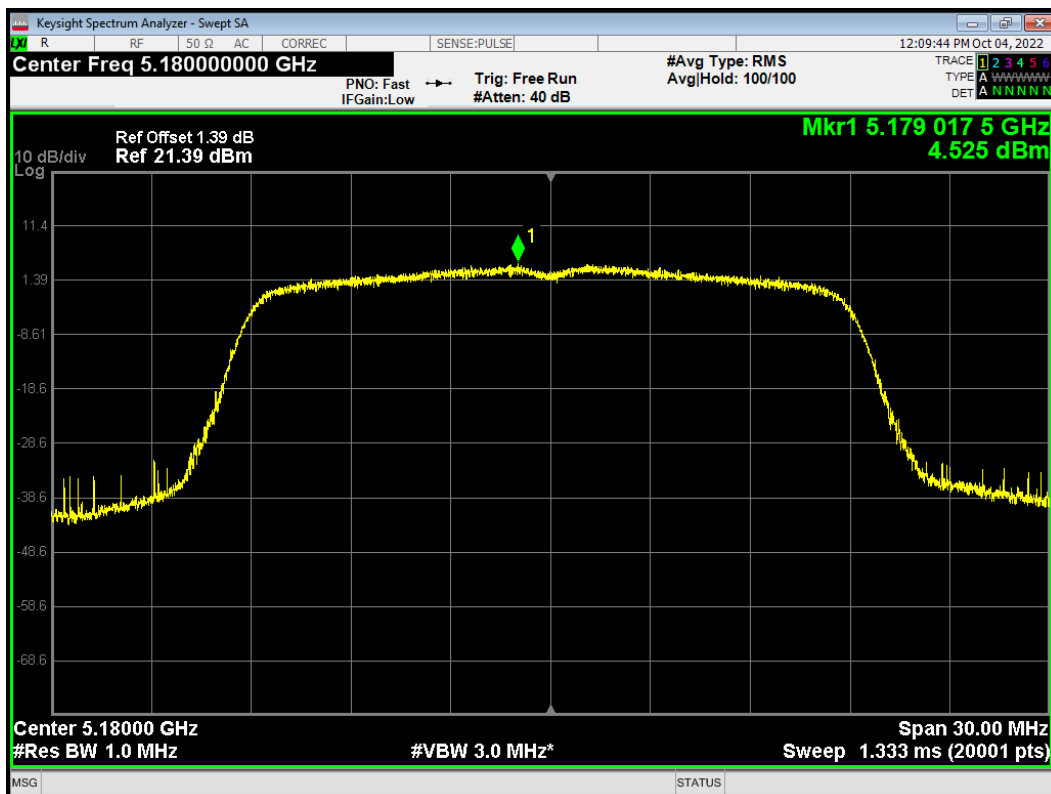




PSD 802.11ac (VHT80) 5210MHz

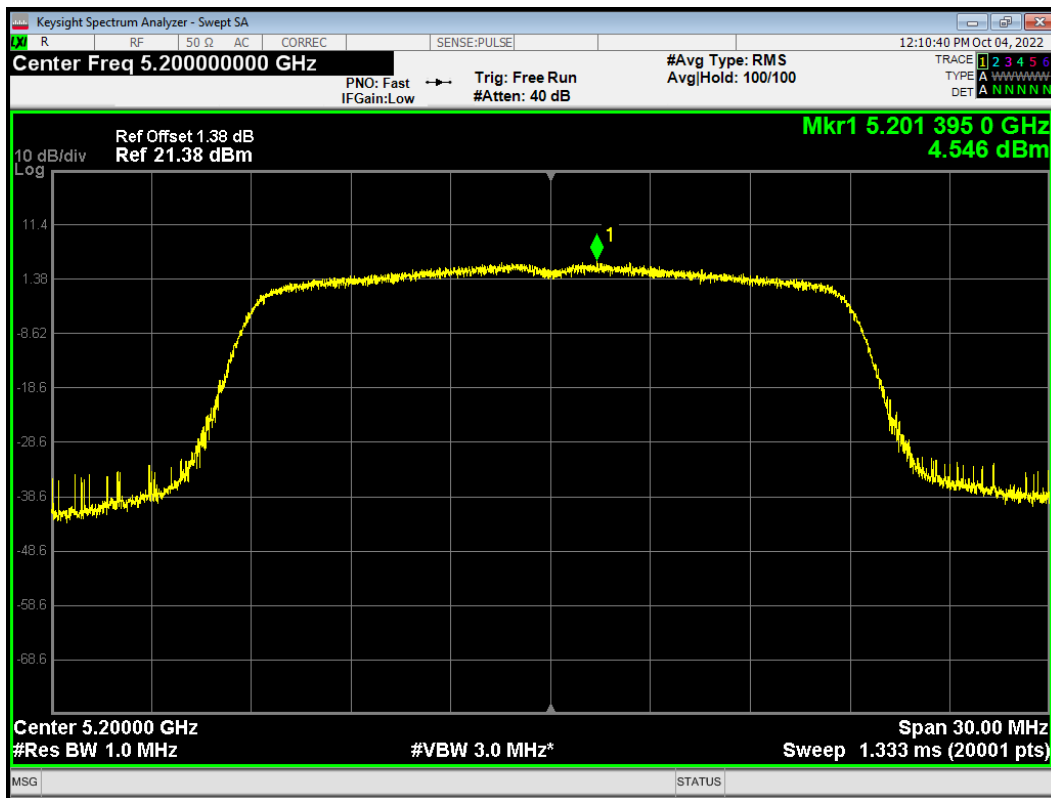


PSD 802.11n (HT20) 5180MHz

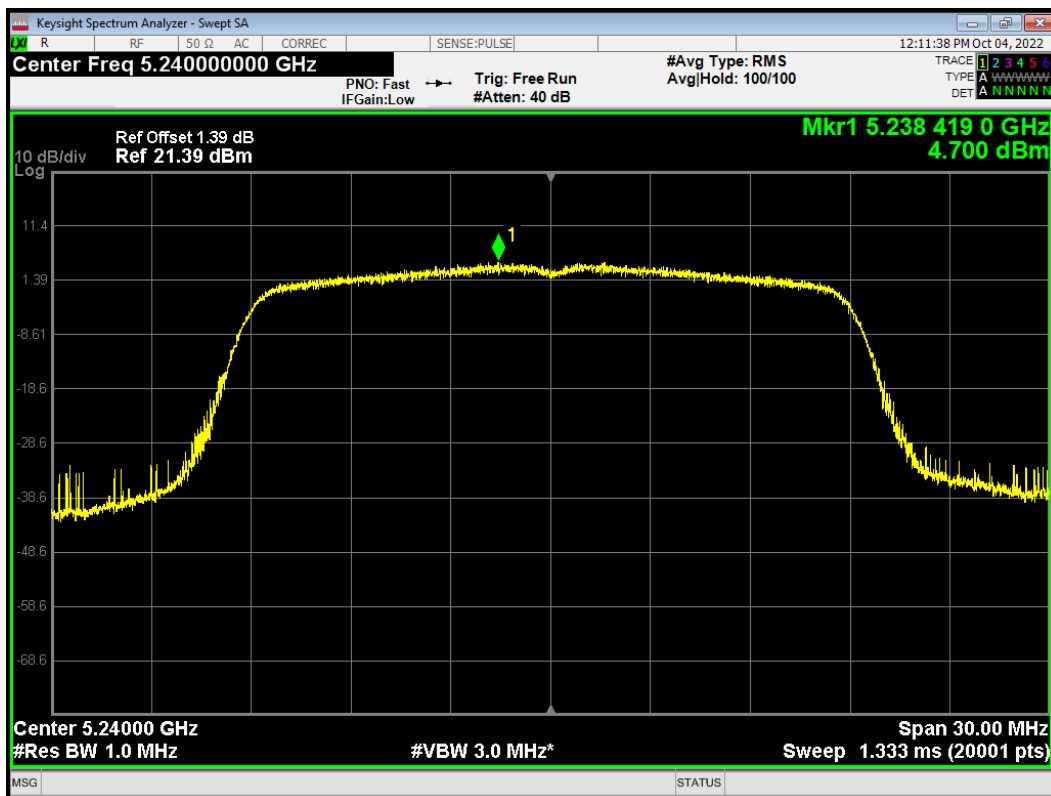




PSD 802.11n (HT20) 5200MHz

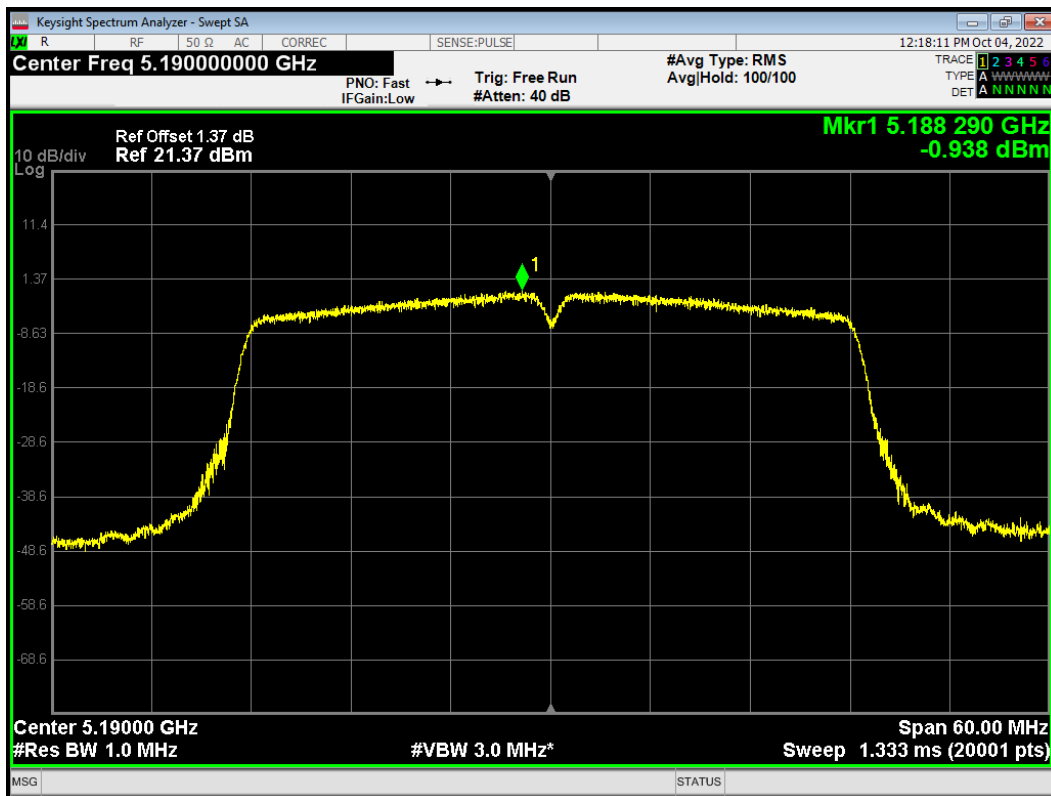


PSD 802.11n (HT20) 5240MHz

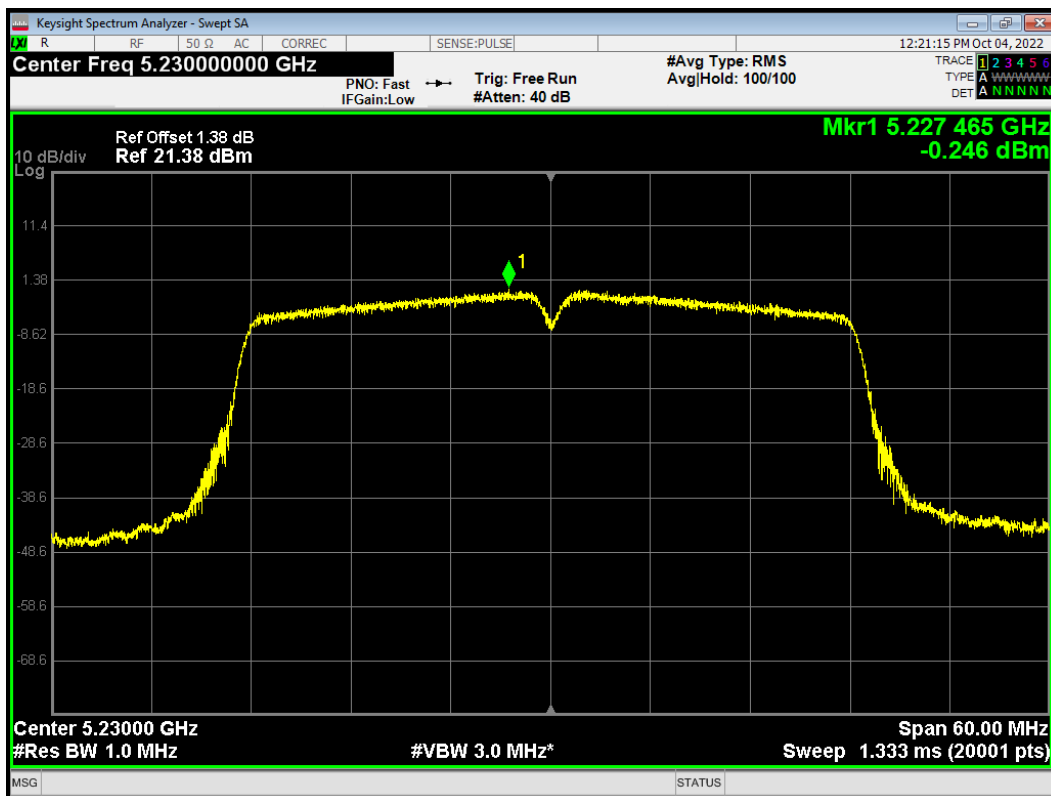




PSD 802.11n (HT40) 5190MHz



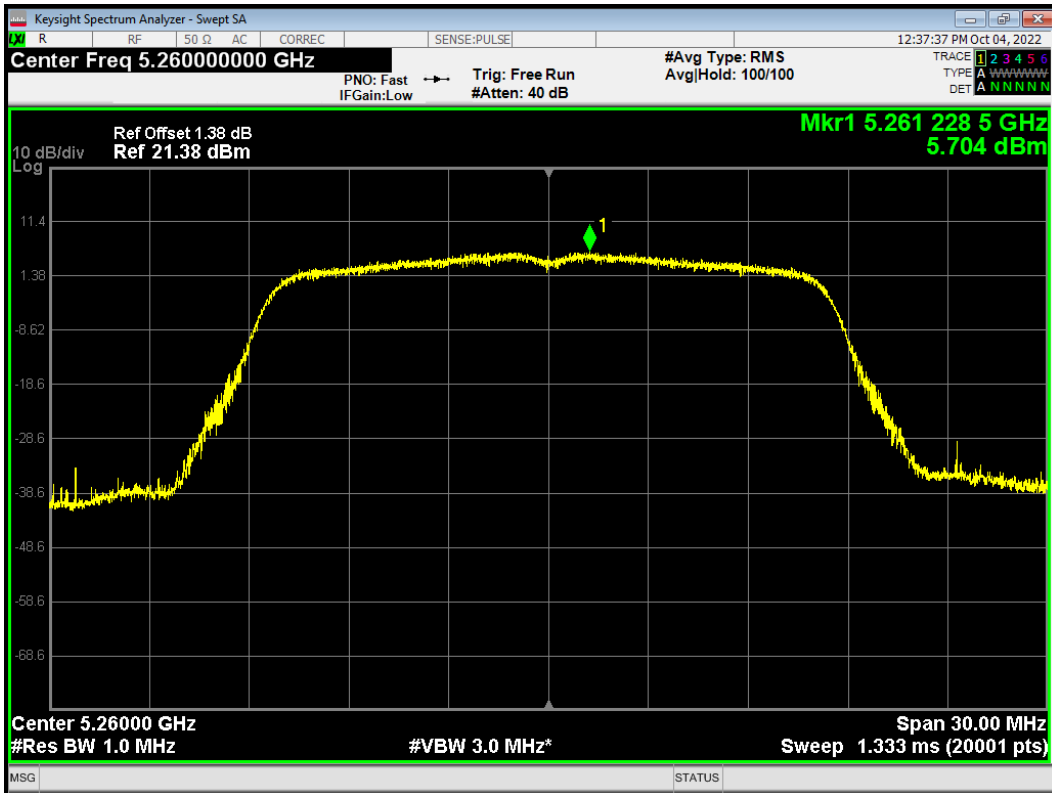
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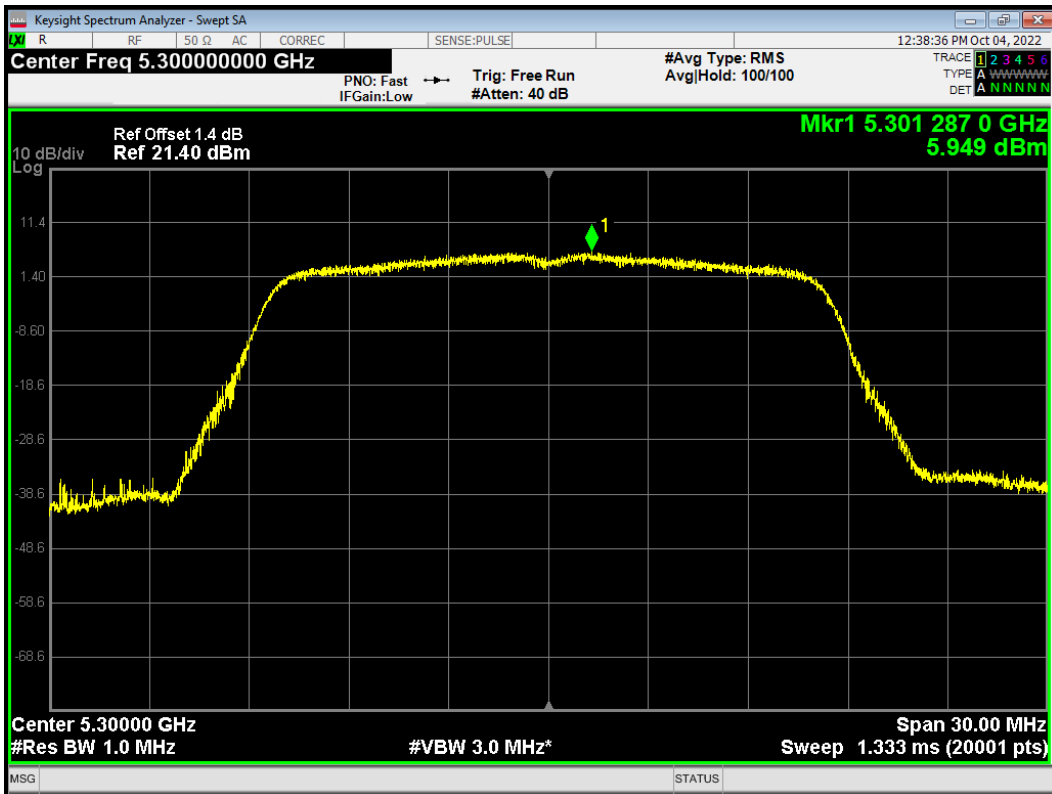


U-NII-2A

PSD 802.11a 5260MHz



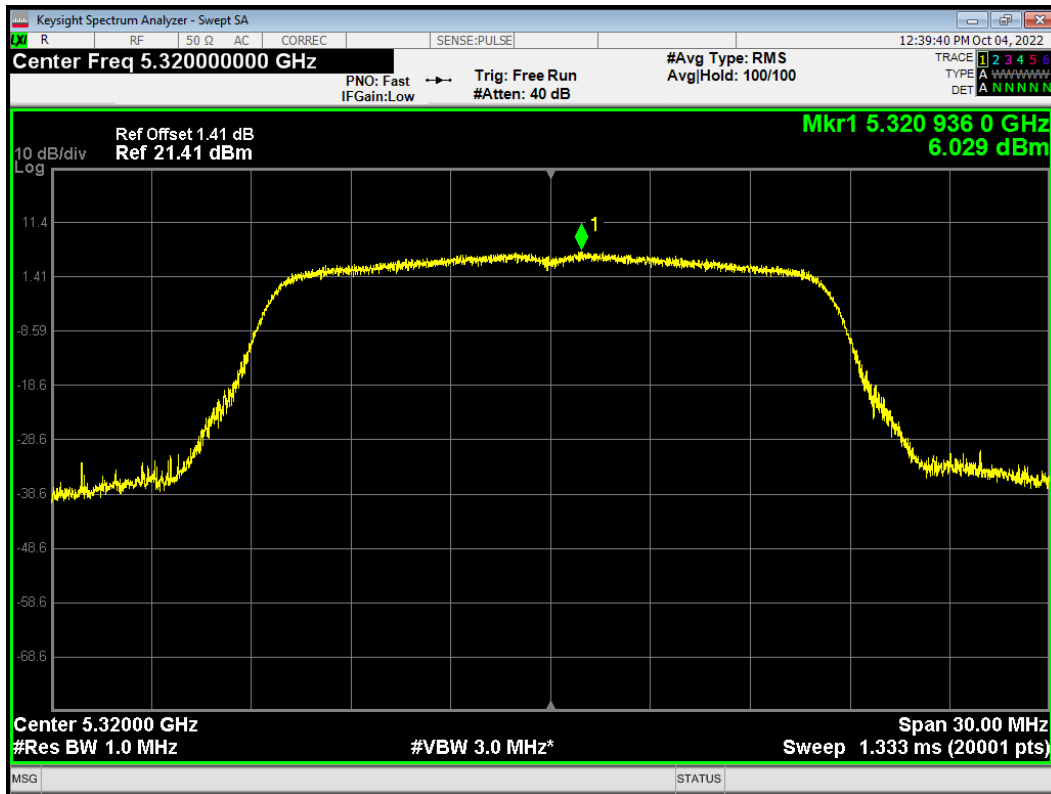
PSD 802.11a 5300MHz



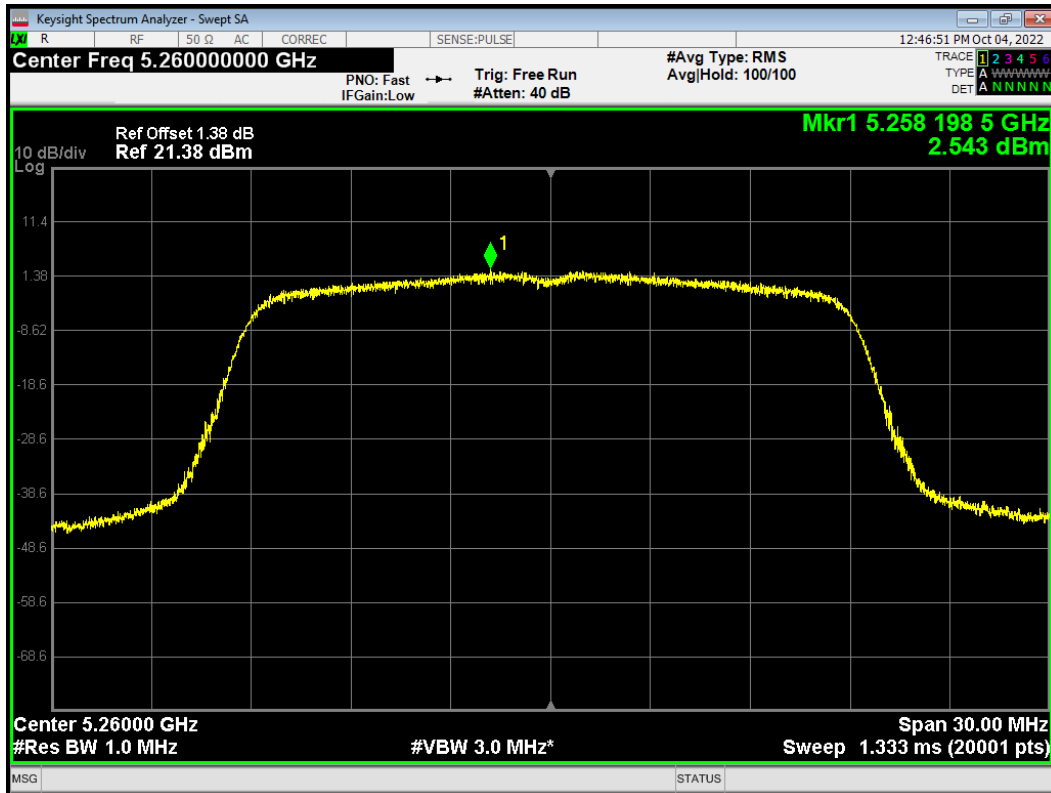




PSD 802.11a 5320MHz

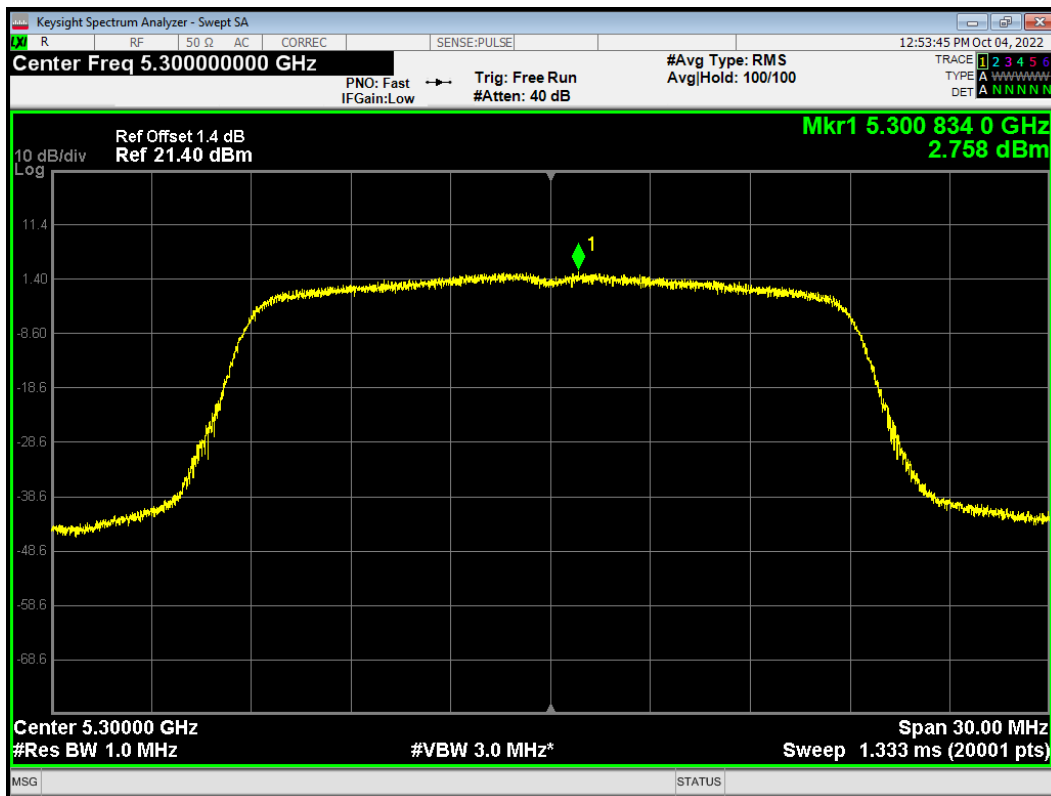


PSD 802.11ac (VHT20) 5260MHz

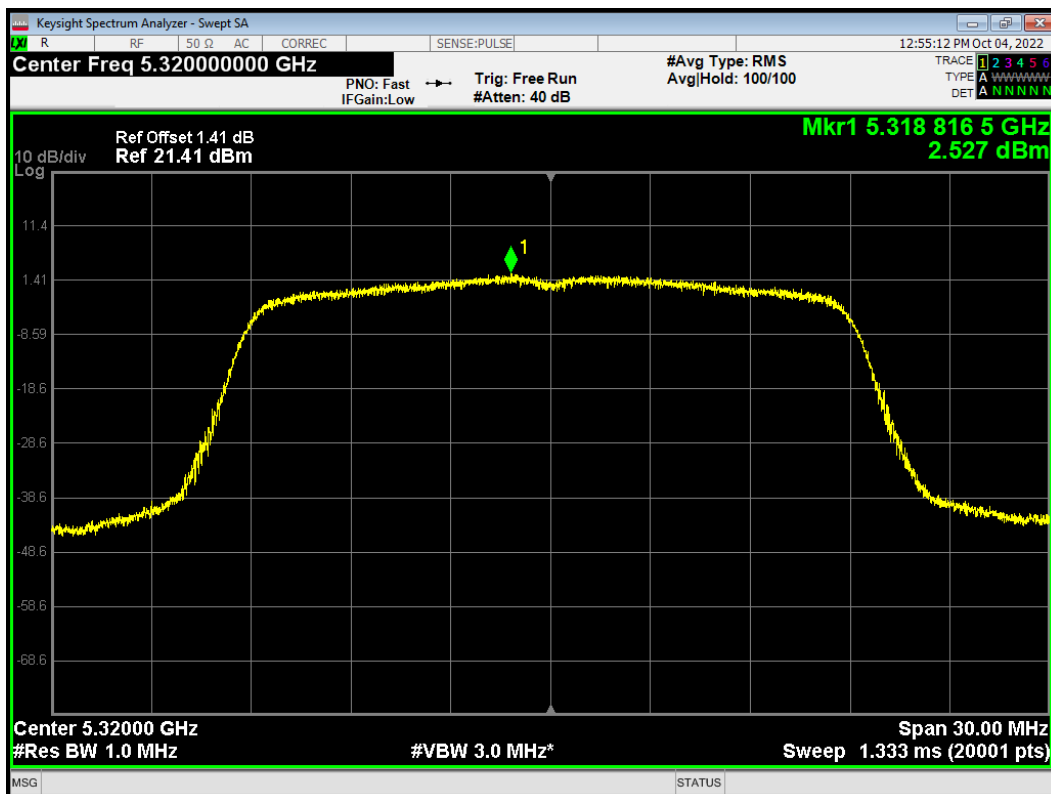




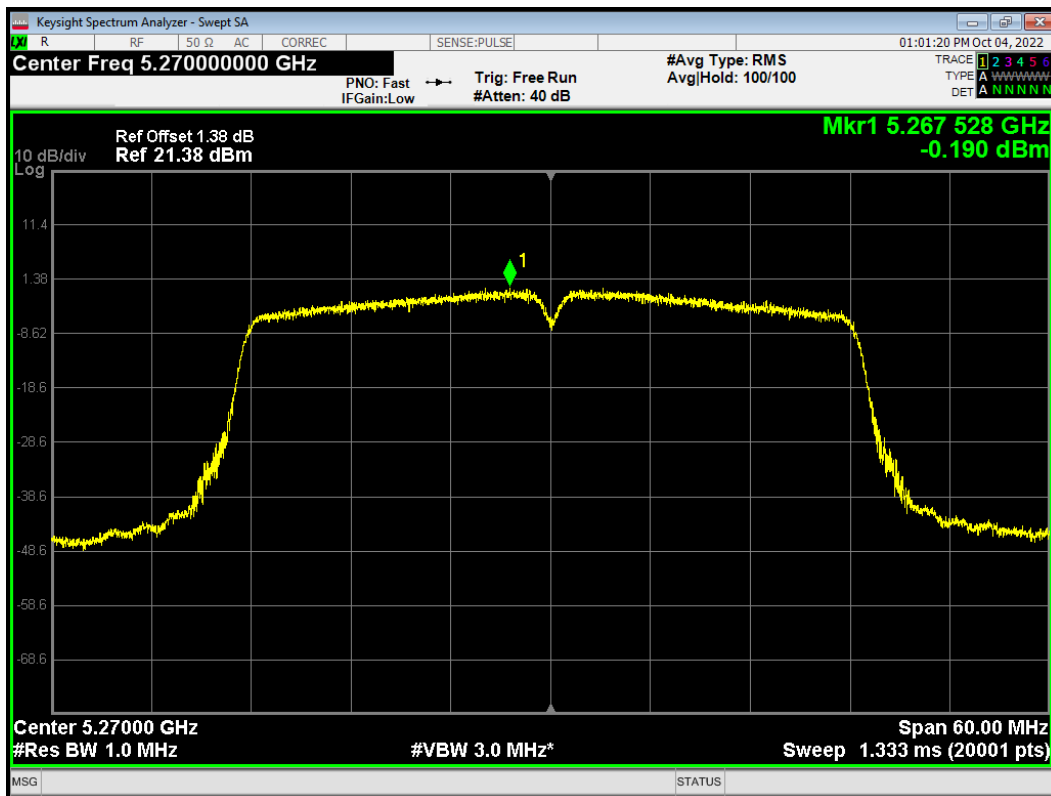
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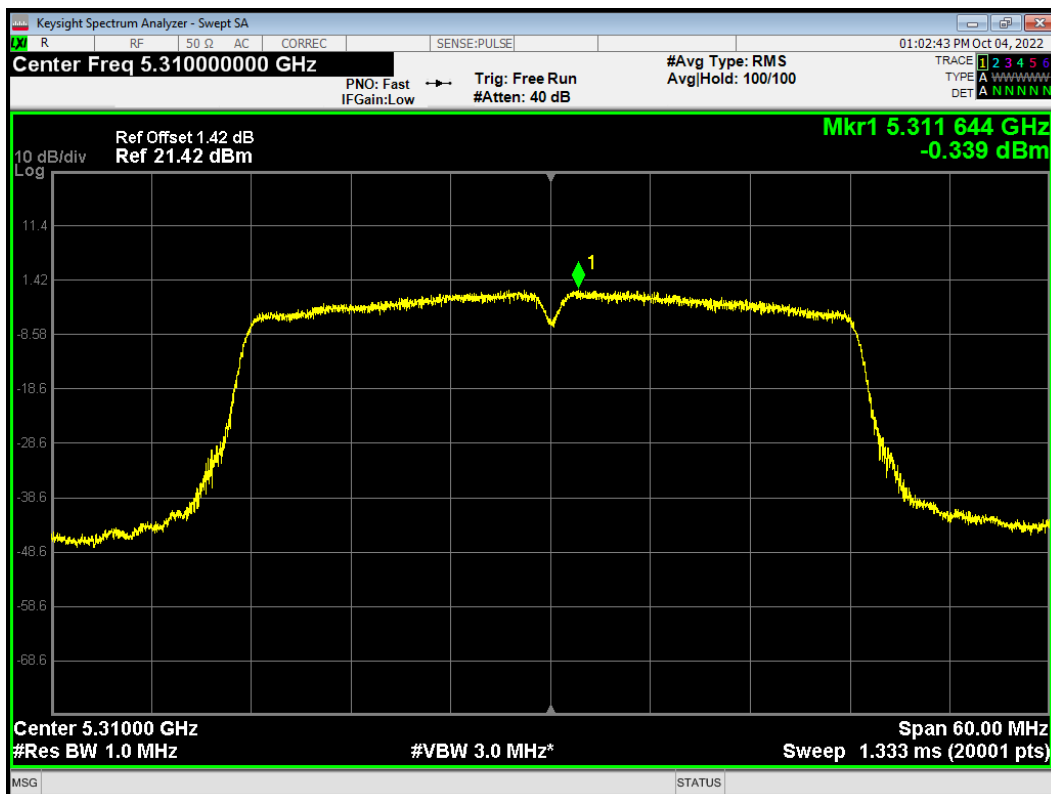
PSD 802.11ac (VHT20) 5320MHz



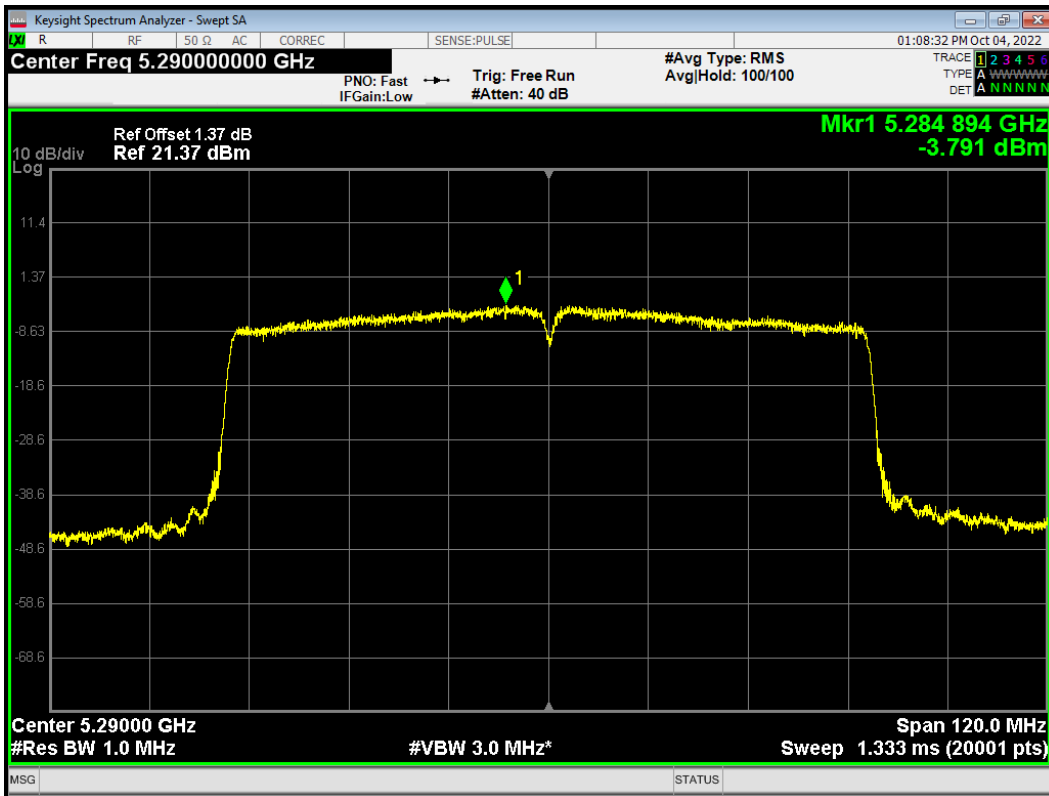
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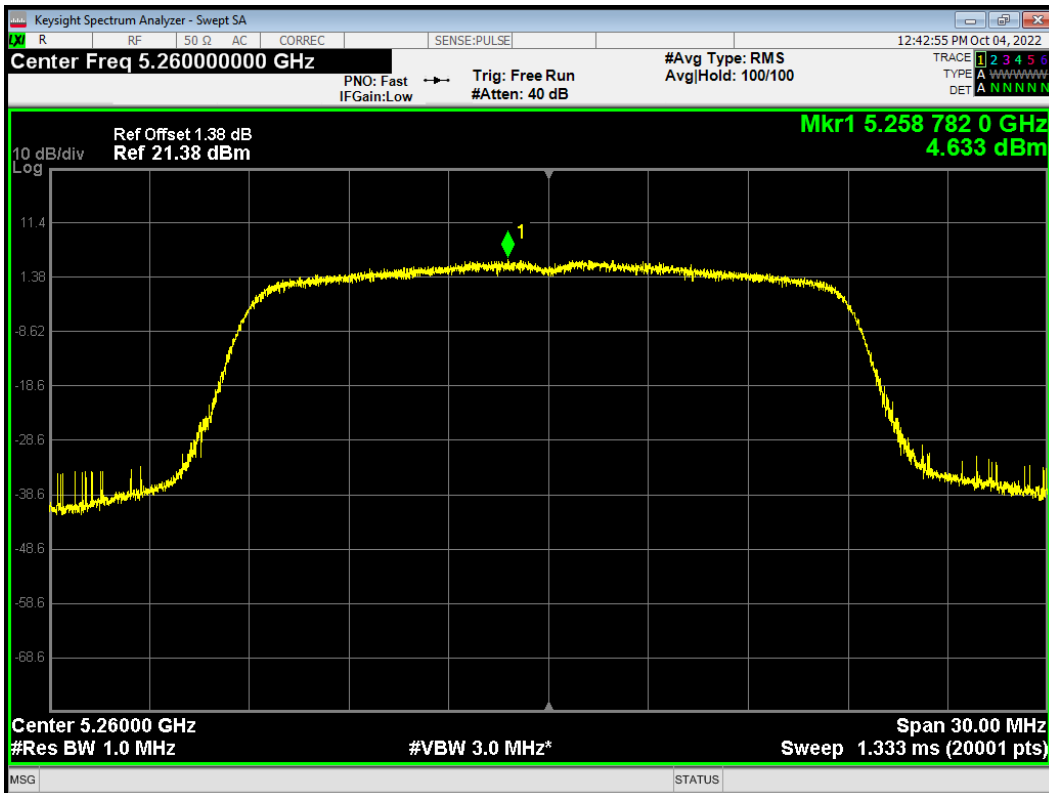
PSD 802.11ac (VHT40) 5310MHz



PSD 802.11ac (VHT80) 5290MHz

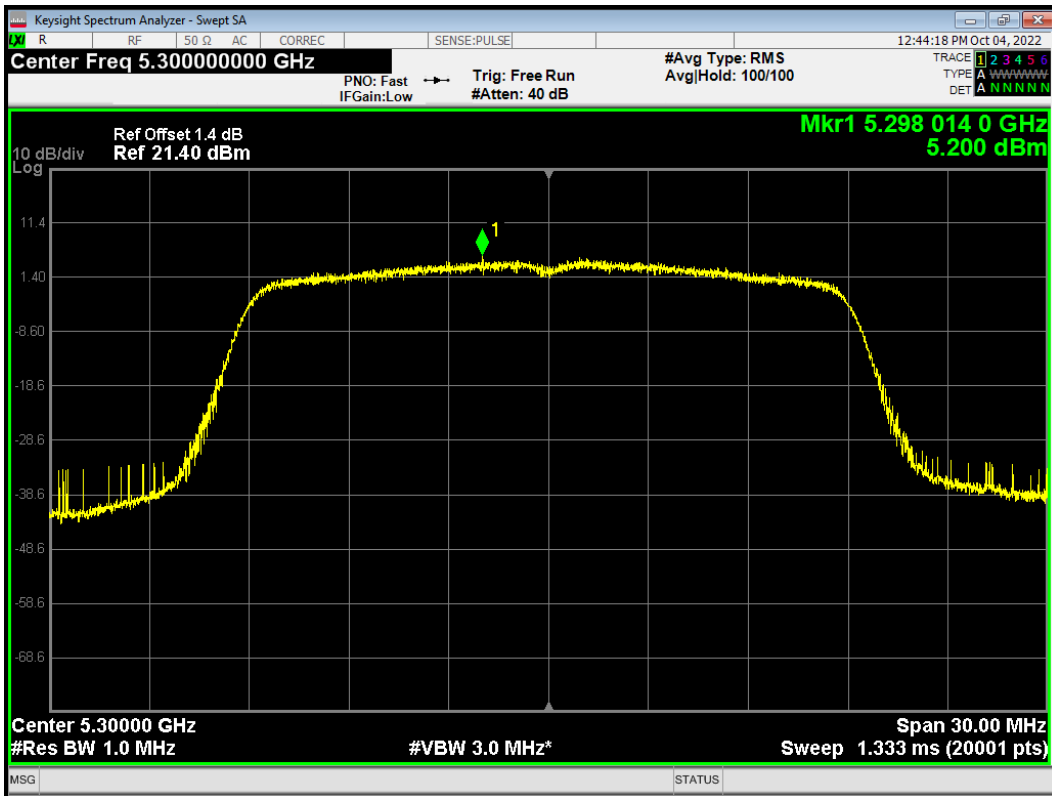


PSD 802.11n (HT20) 5260MHz

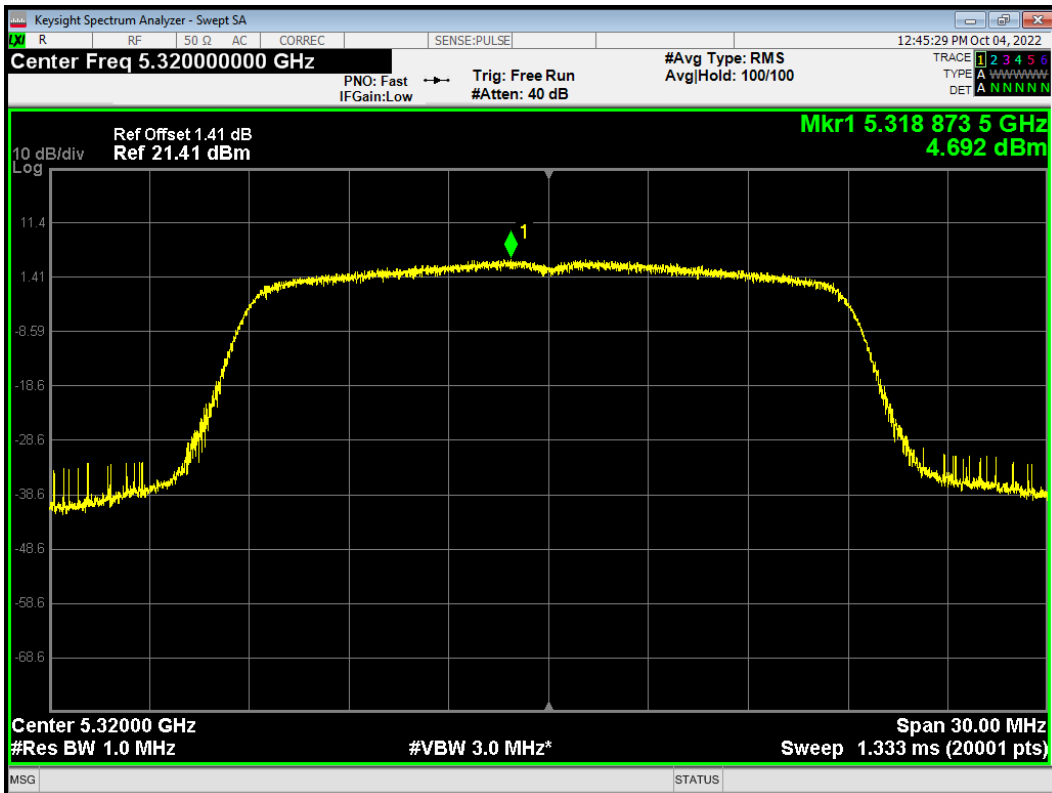




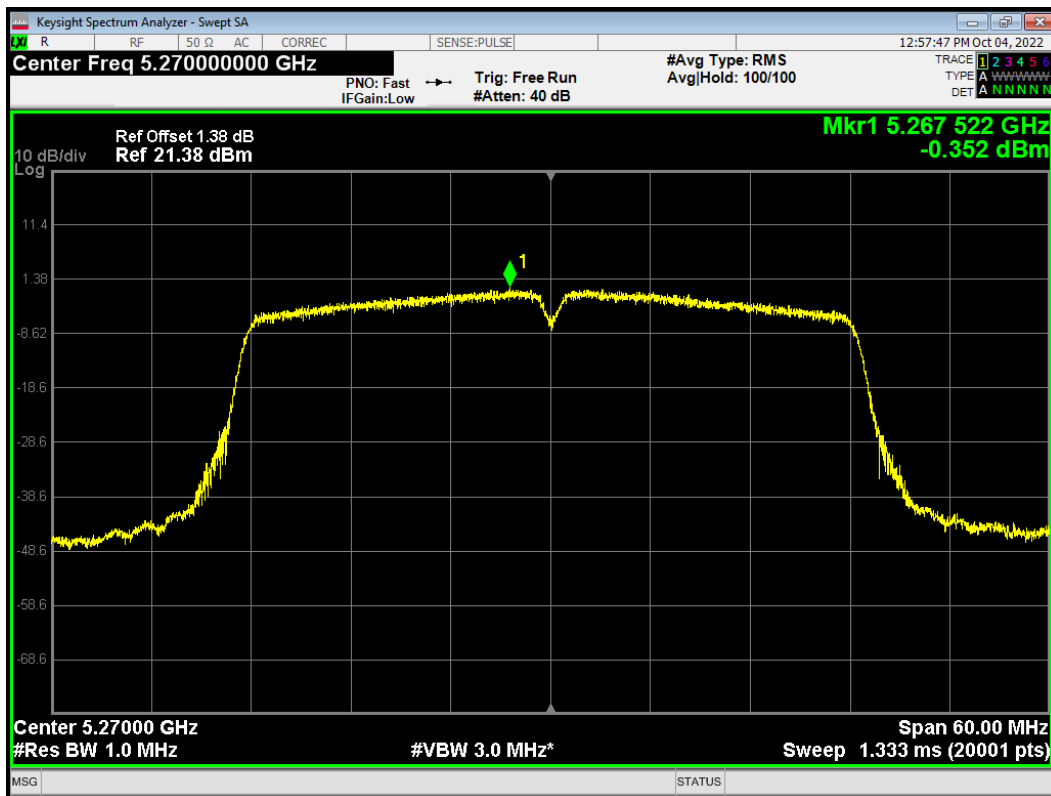
PSD 802.11n (HT20) 5300MHz



PSD 802.11n (HT20) 5320MHz



PSD 802.11n (HT40) 5270MHz



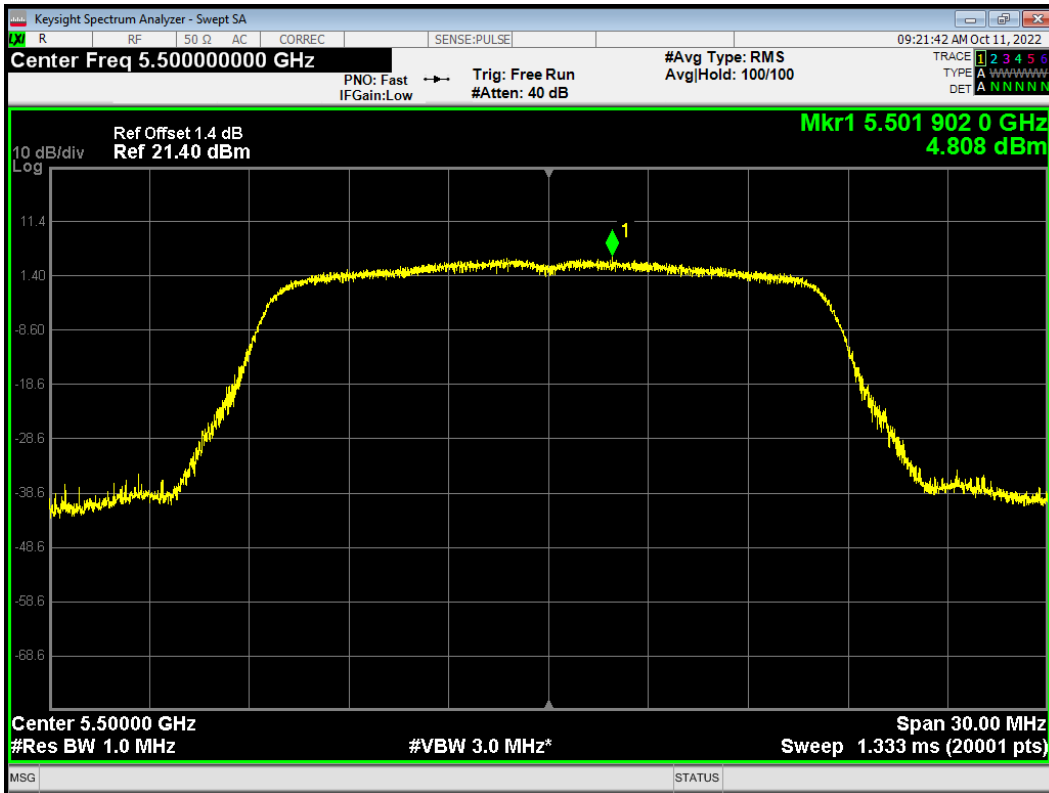
PSD 802.11n (HT40) 5310MHz



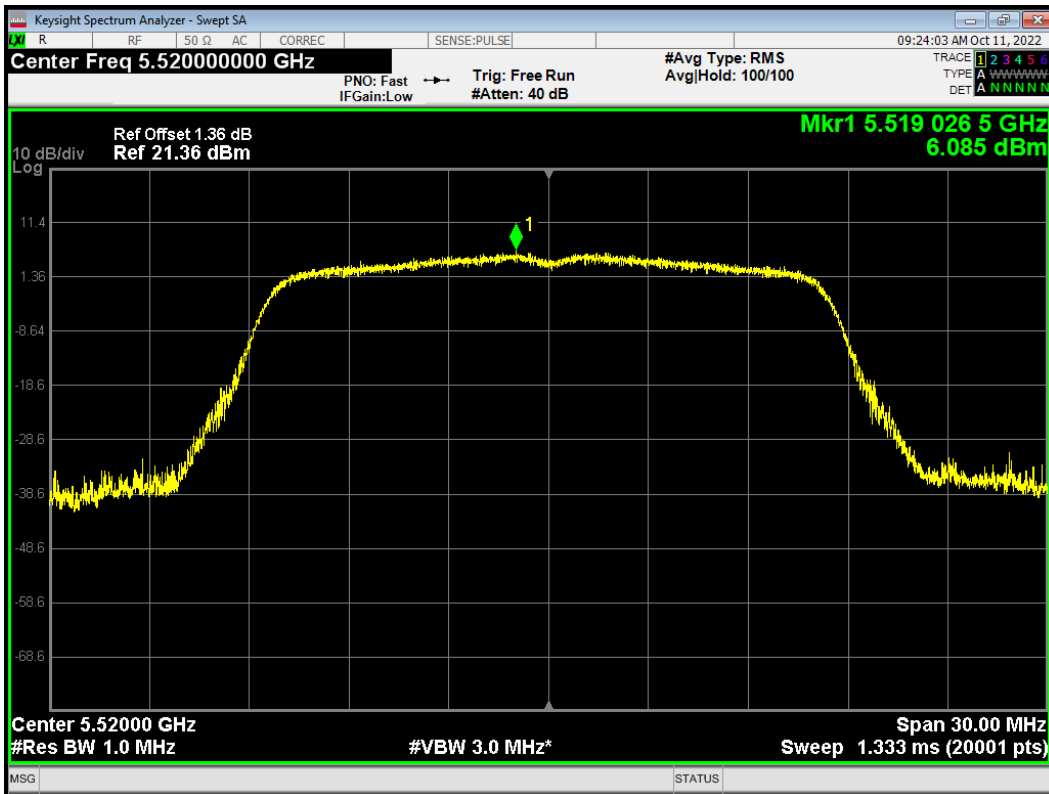


U-NII-2C

PSD 802.11a 5500MHz

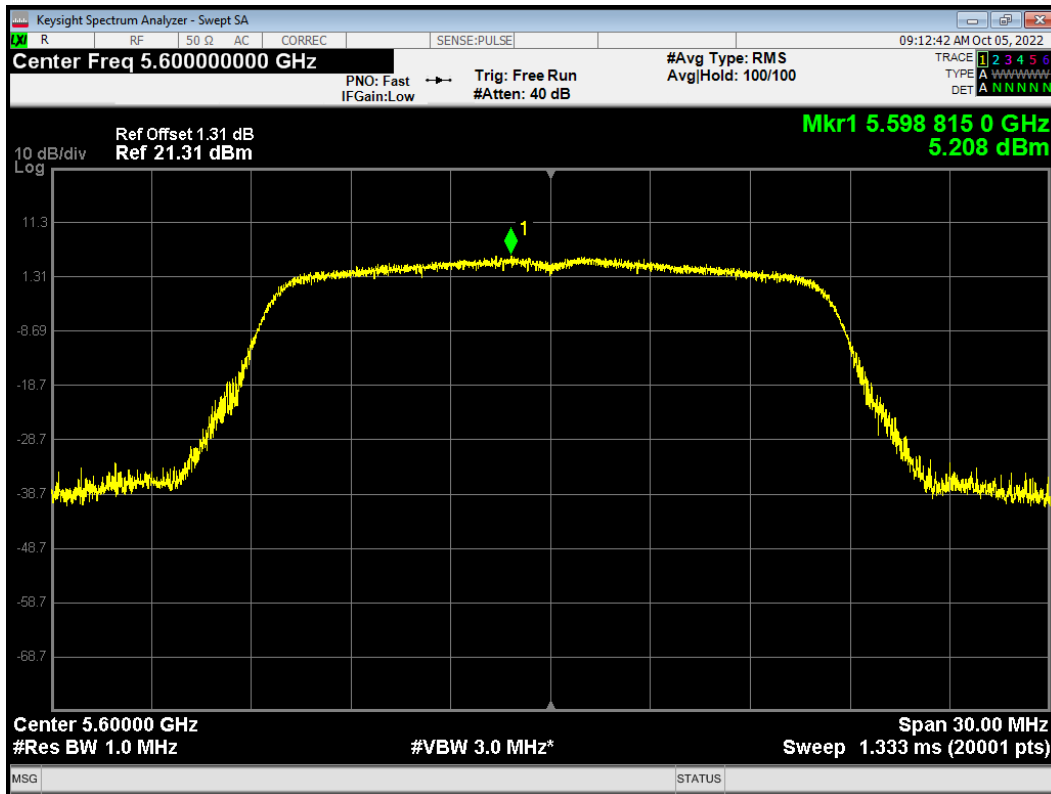


PSD 802.11a 5520MHz

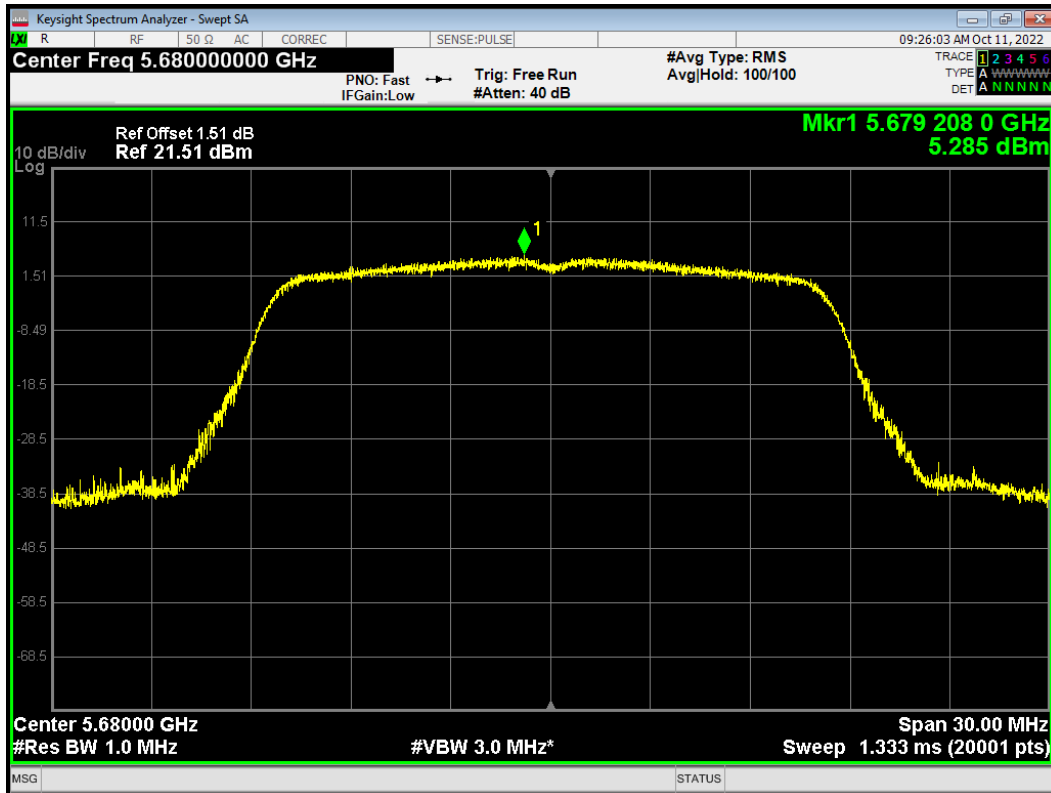




PSD 802.11a 5600MHz



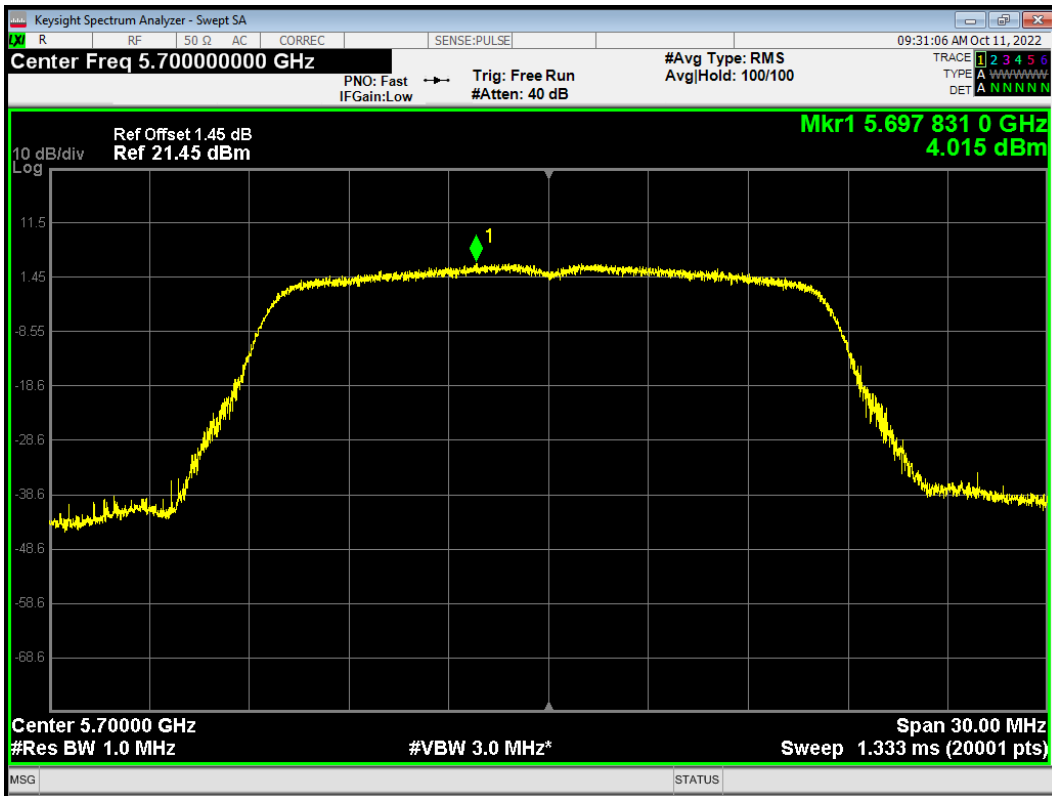
PSD 802.11a 5680MHz



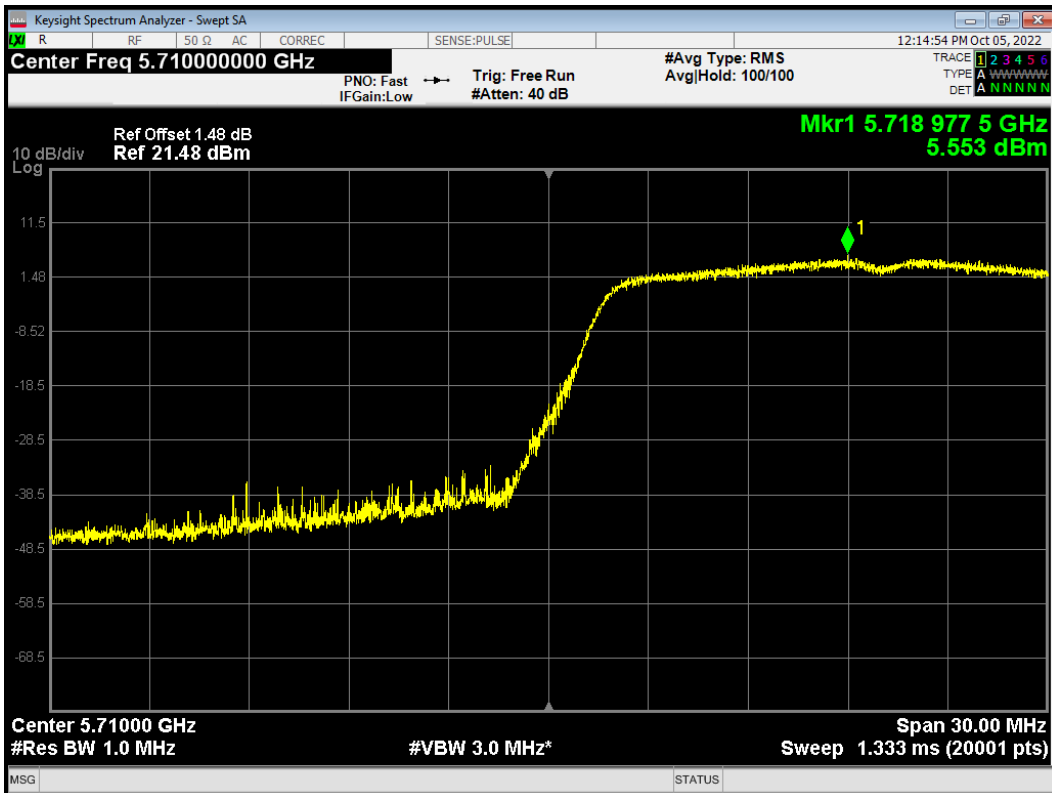




PSD 802.11a 5700MHz

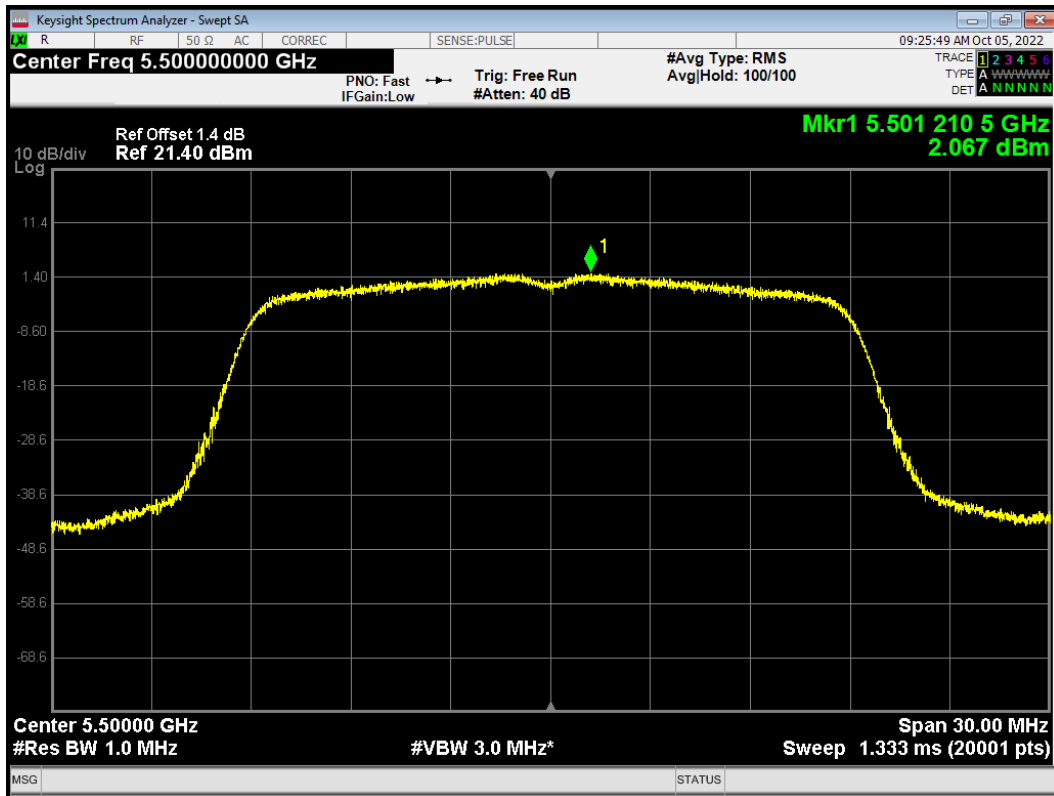


PSD 802.11a 5720MHz

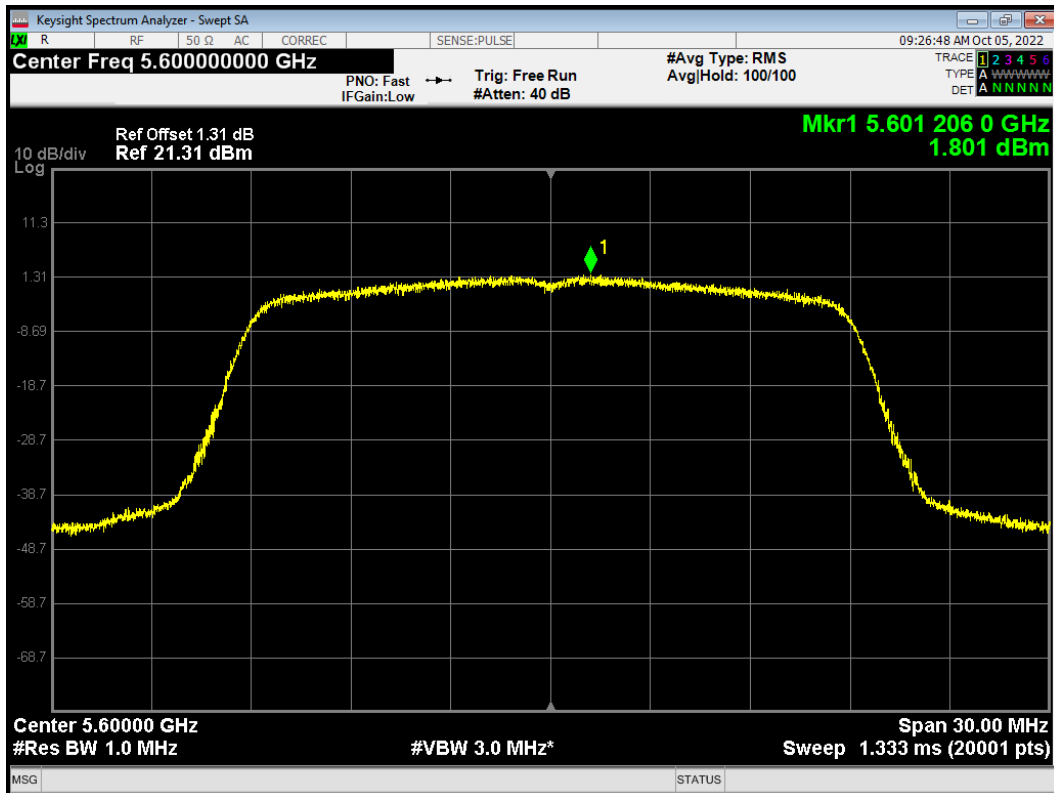




PSD 802.11ac (VHT20) 5500MHz

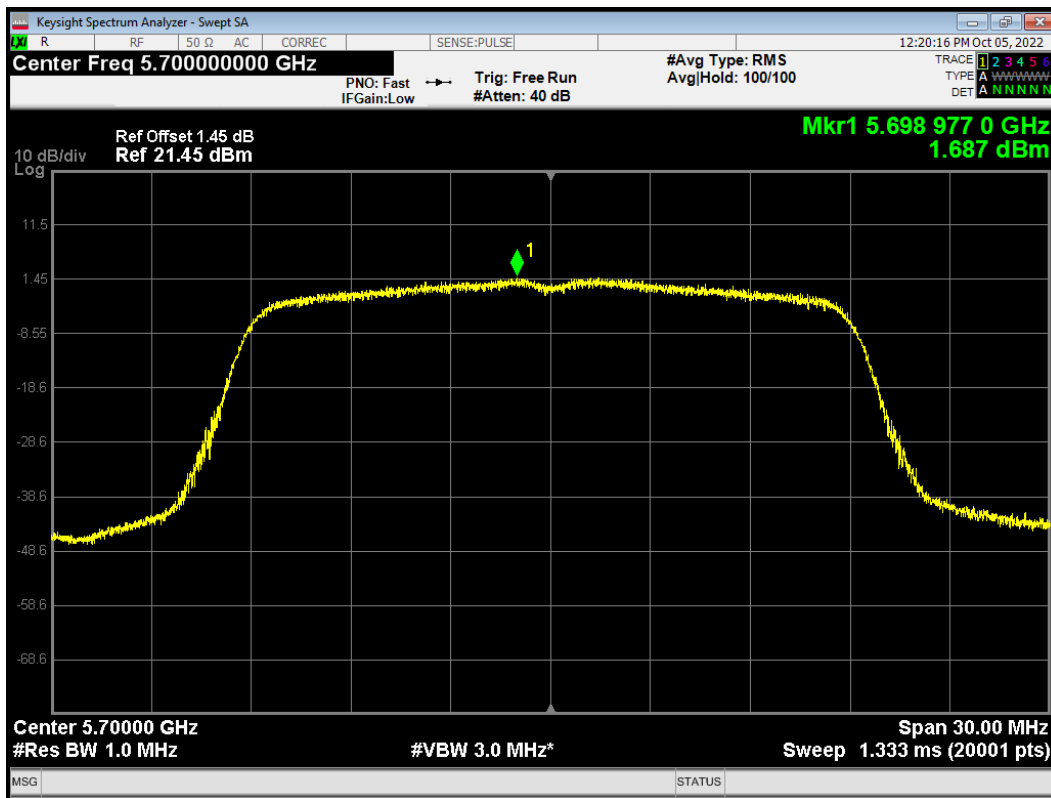


PSD 802.11ac (VHT20) 5600MHz

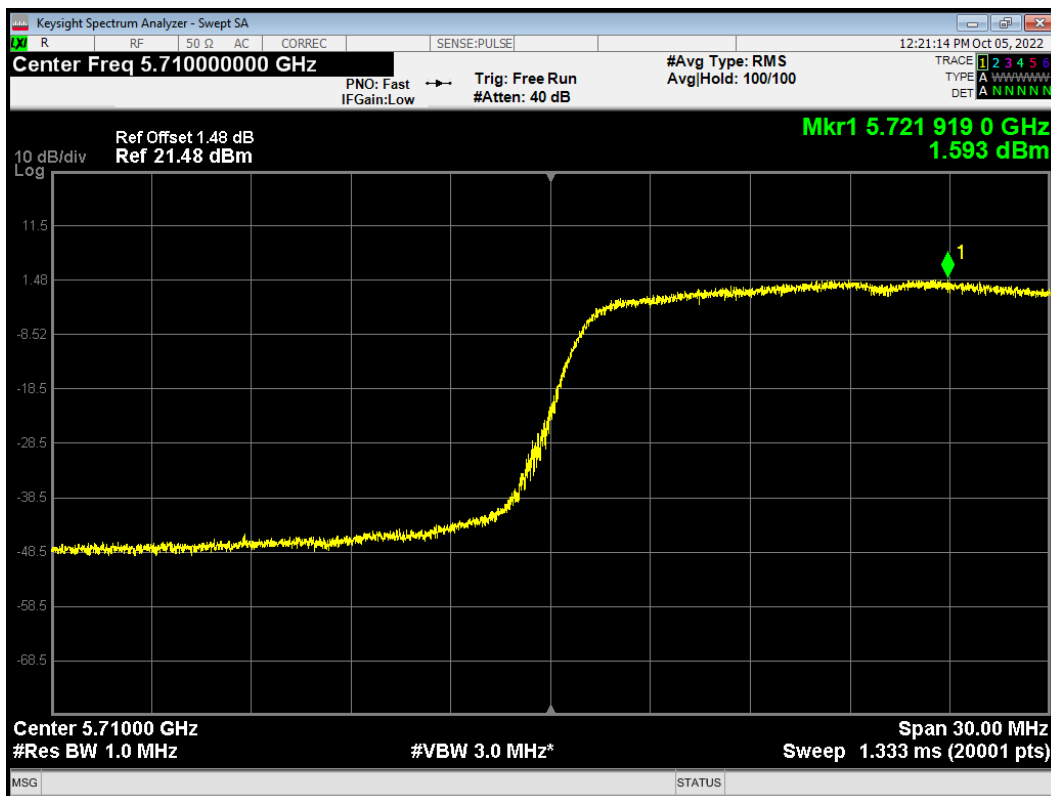




PSD 802.11ac (VHT20) 5700MHz

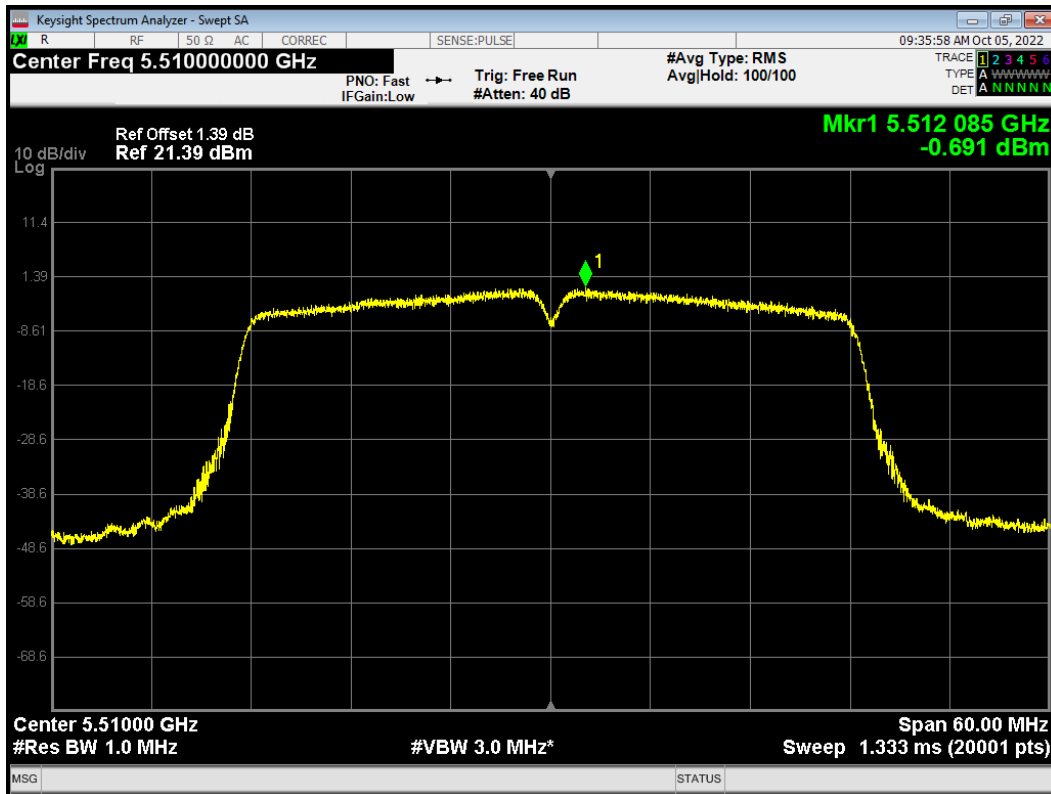


PSD 802.11ac(VHT20) 5720MHz

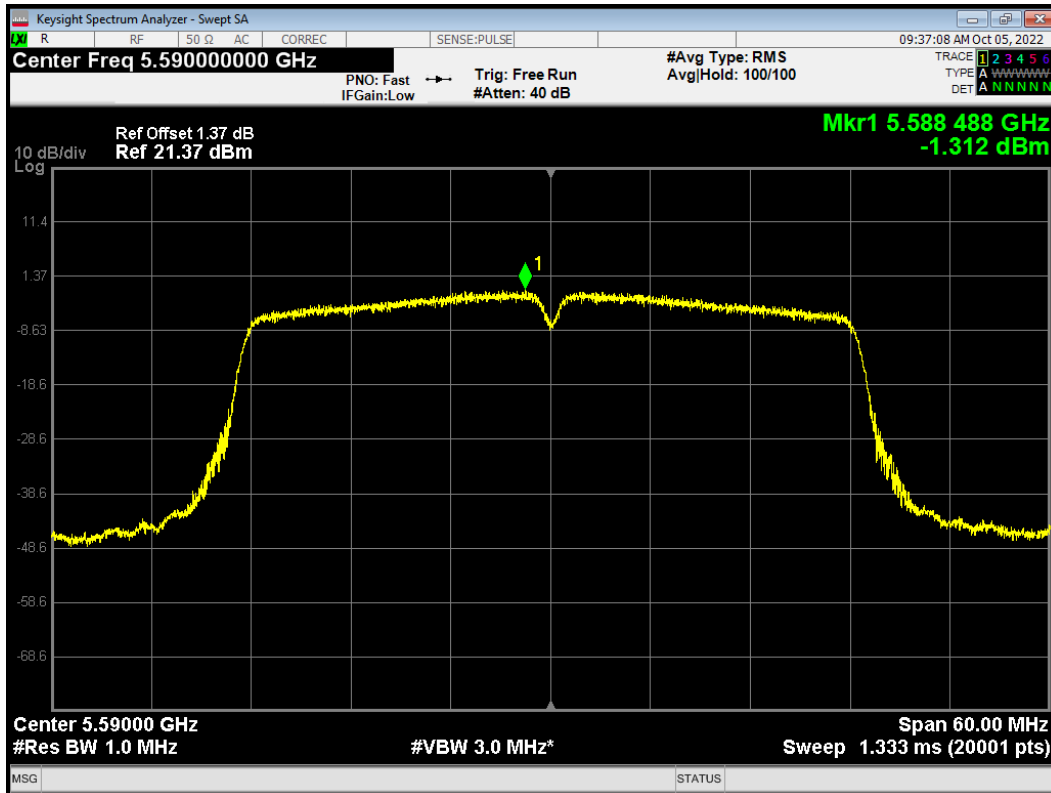




PSD 802.11ac (VHT40) 5510MHz

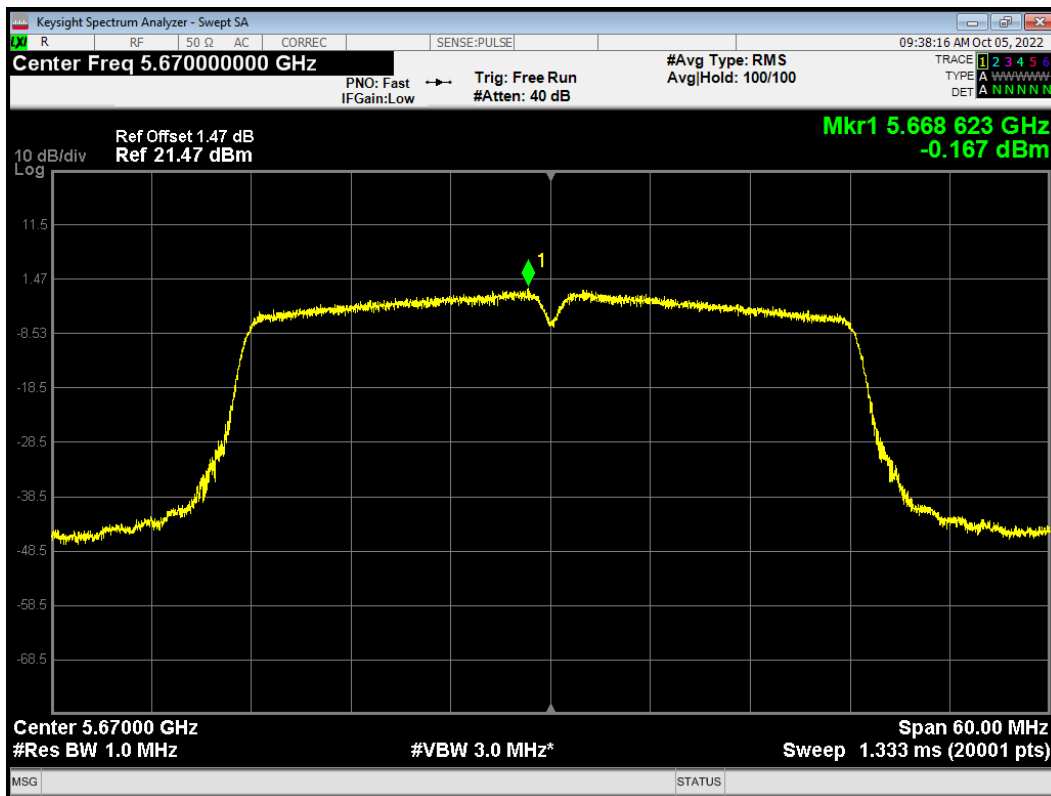


PSD 802.11ac (VHT40) 5590MHz

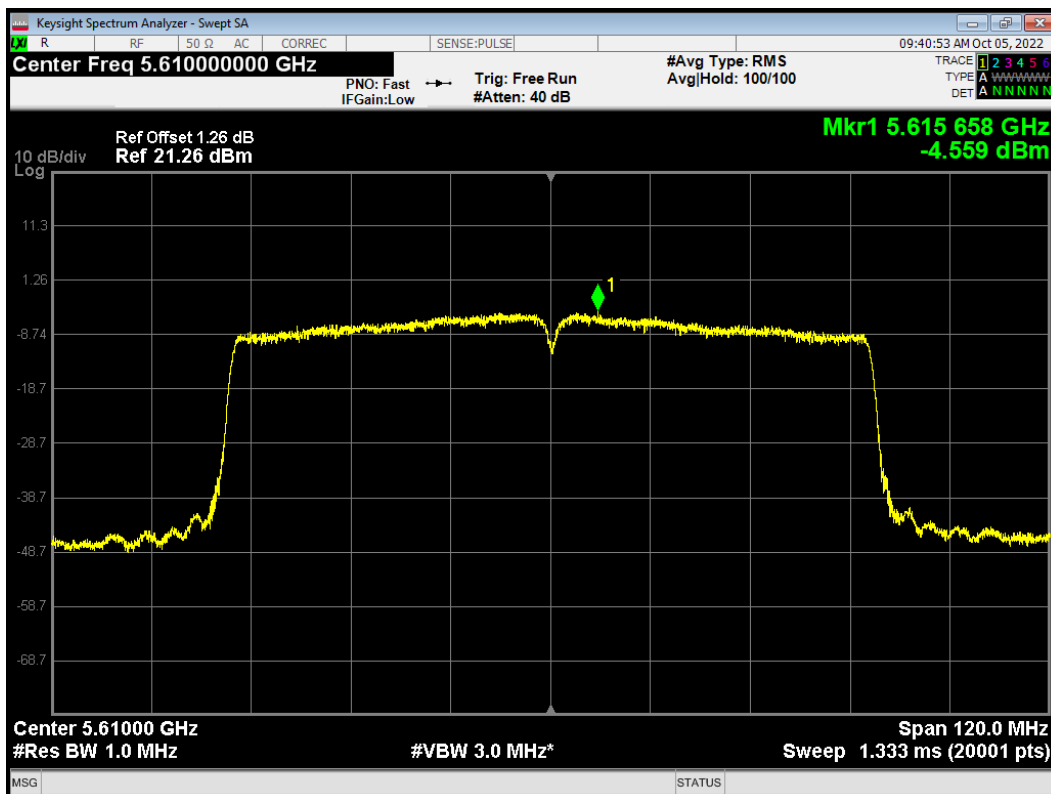




PSD 802.11ac (VHT40) 5670MHz

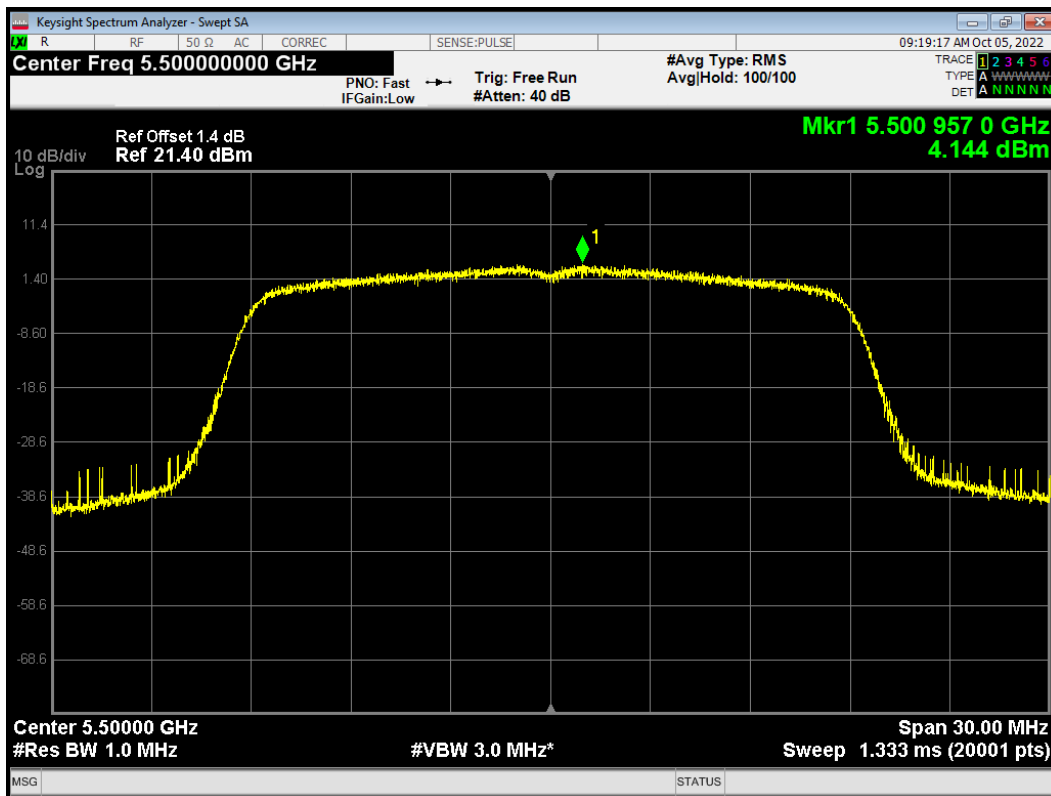


PSD 802.11ac (VHT80) 5610MHz

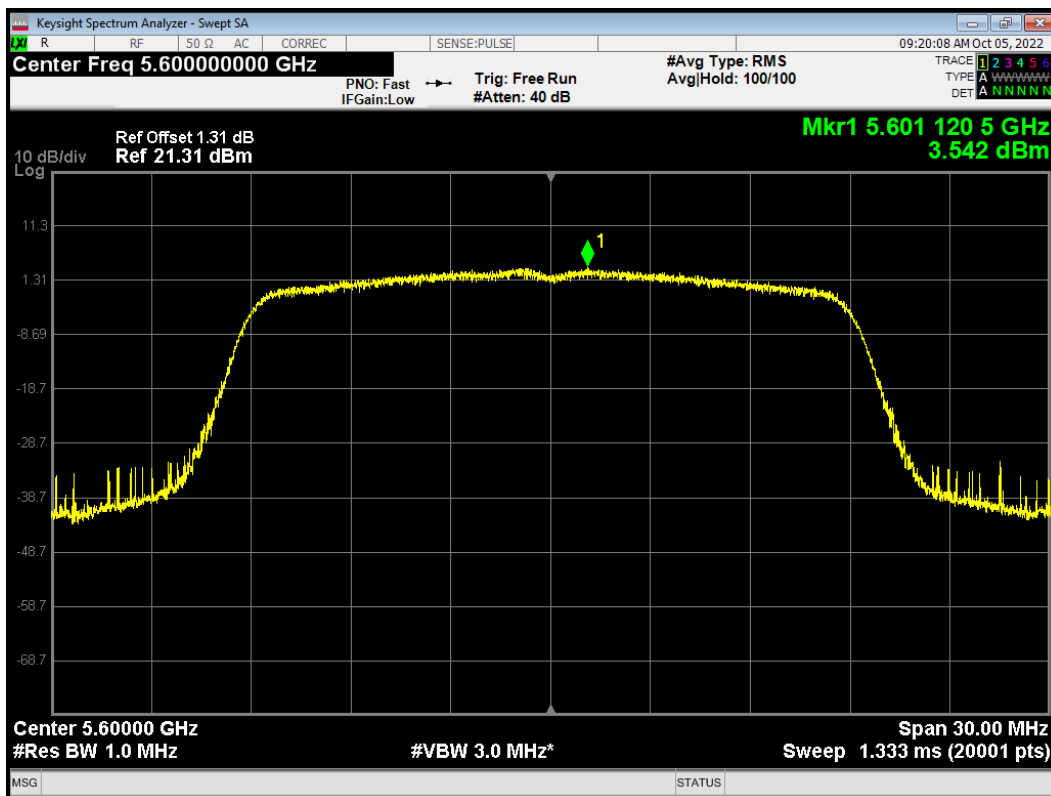




PSD 802.11n (HT20) 5500MHz

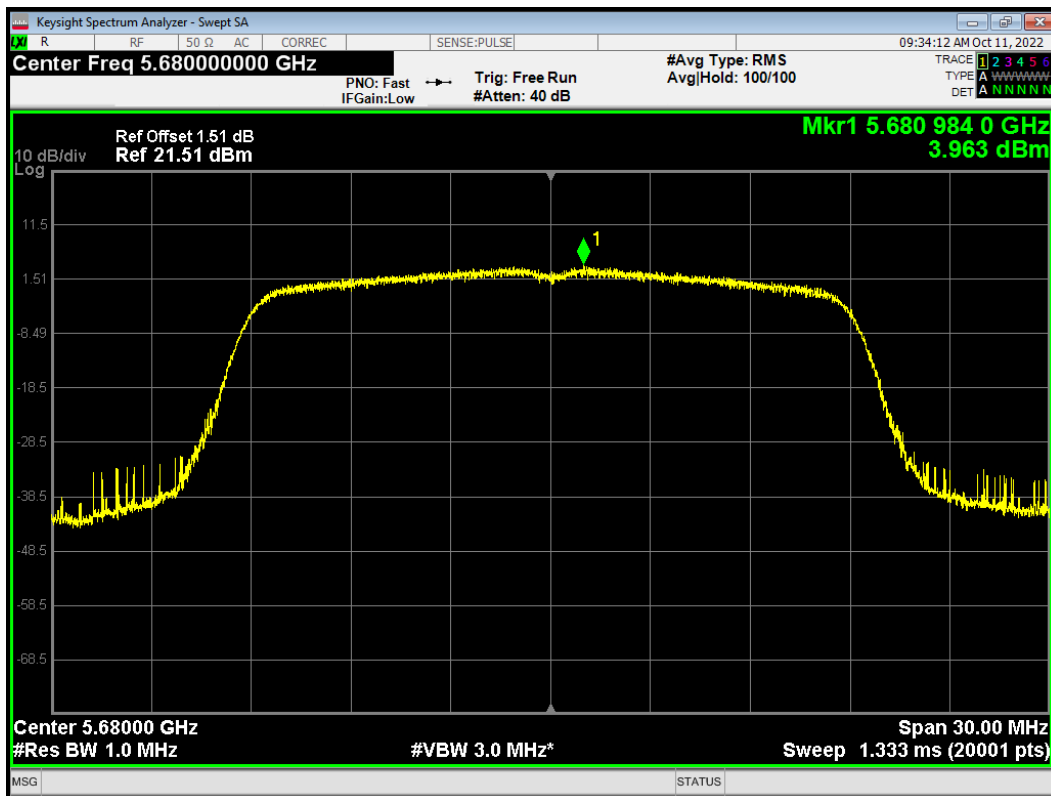


PSD 802.11n (HT20) 5600MHz

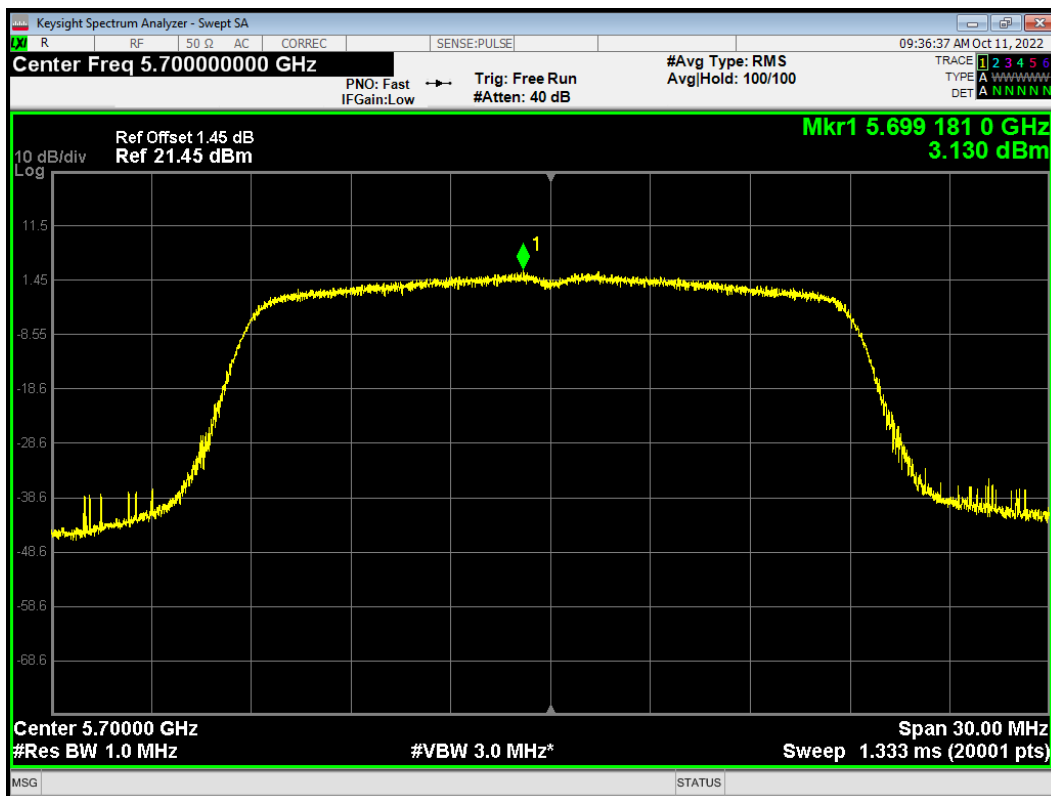




PSD 802.11n (HT20) 5680MHz

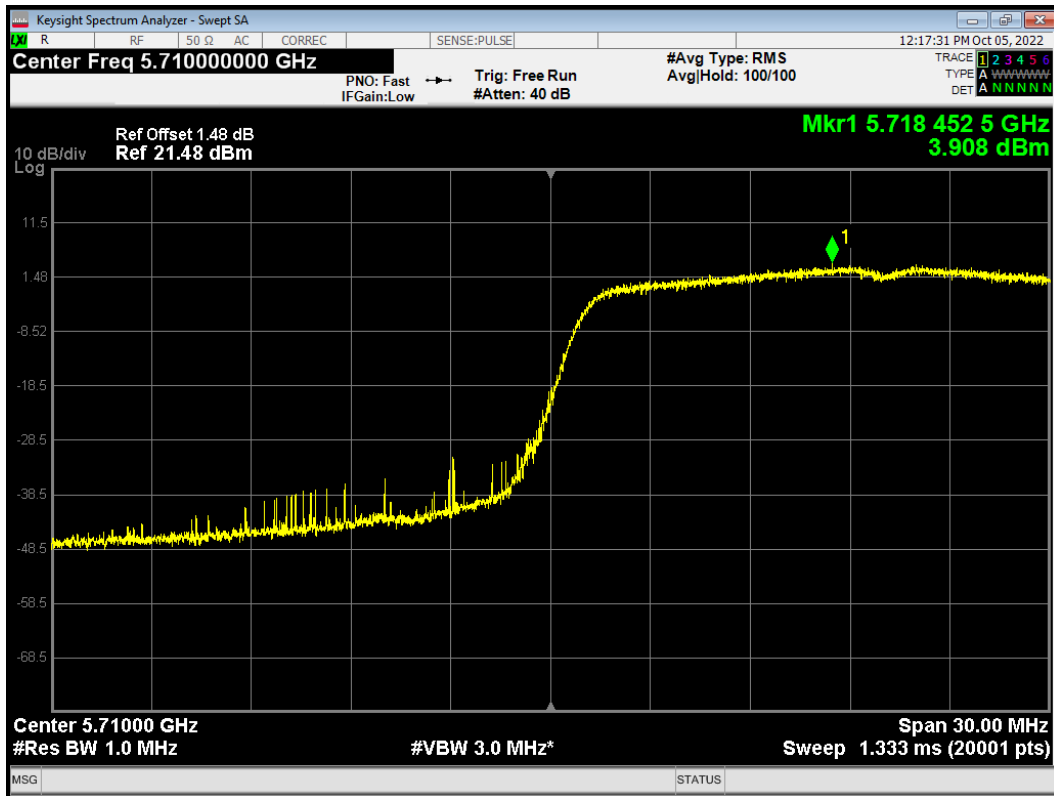


PSD 802.11n (HT20) 5700MHz

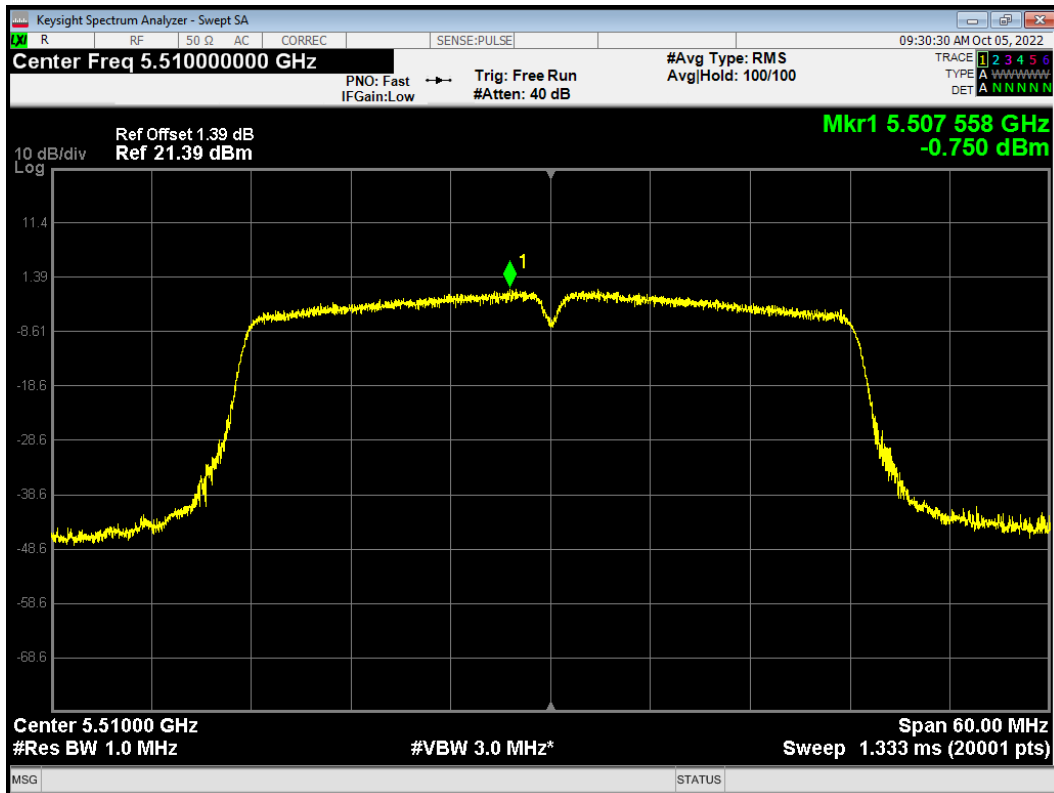




PSD 802.11n(HT20) 5720MHz



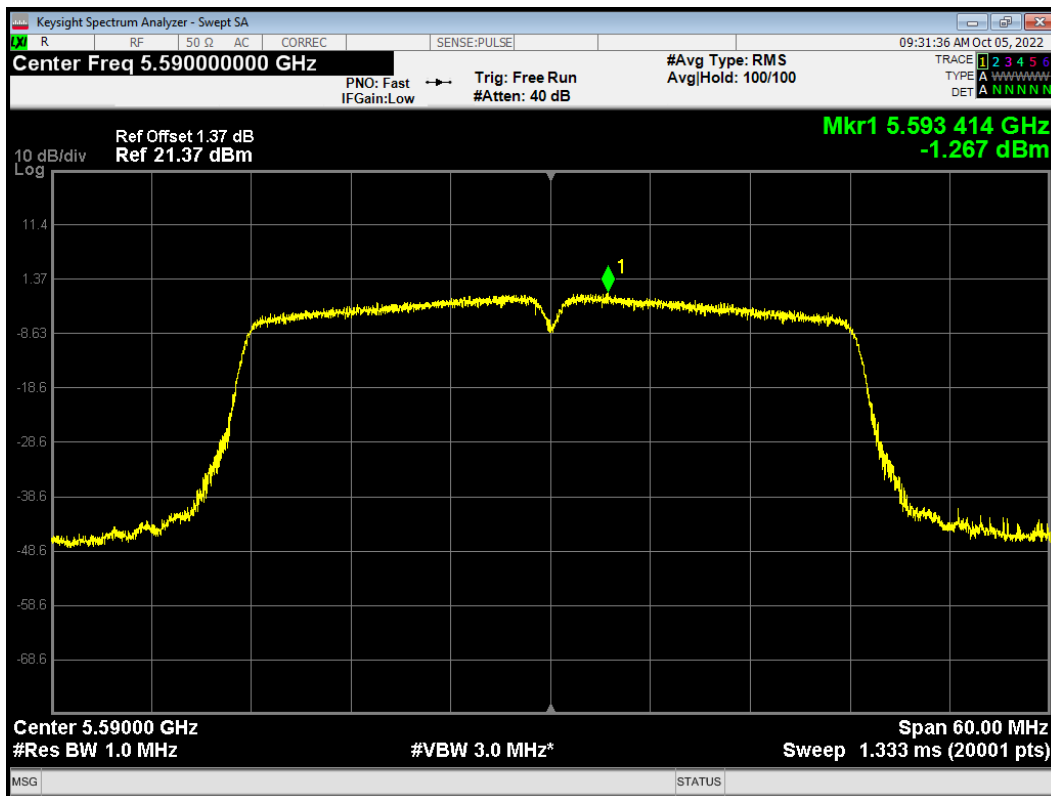
PSD 802.11n (HT40) 5510MHz



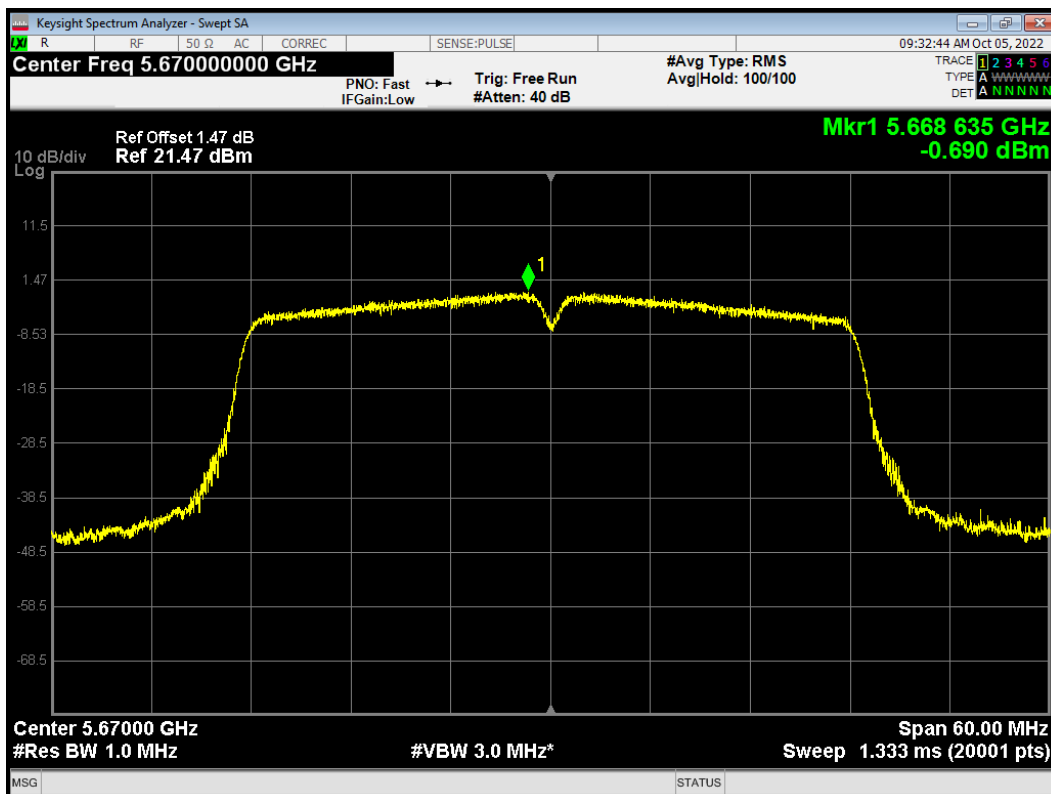




### PSD 802.11n (HT40) 5590MHz



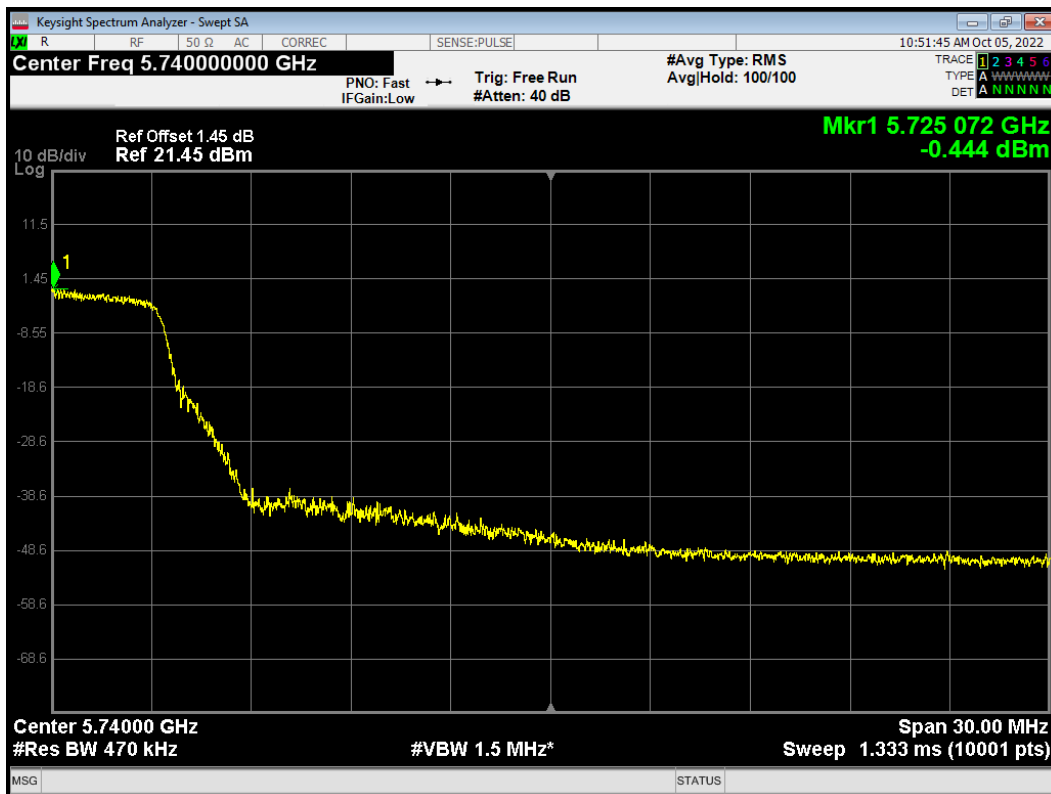
### PSD 802.11n (HT40) 5670MHz



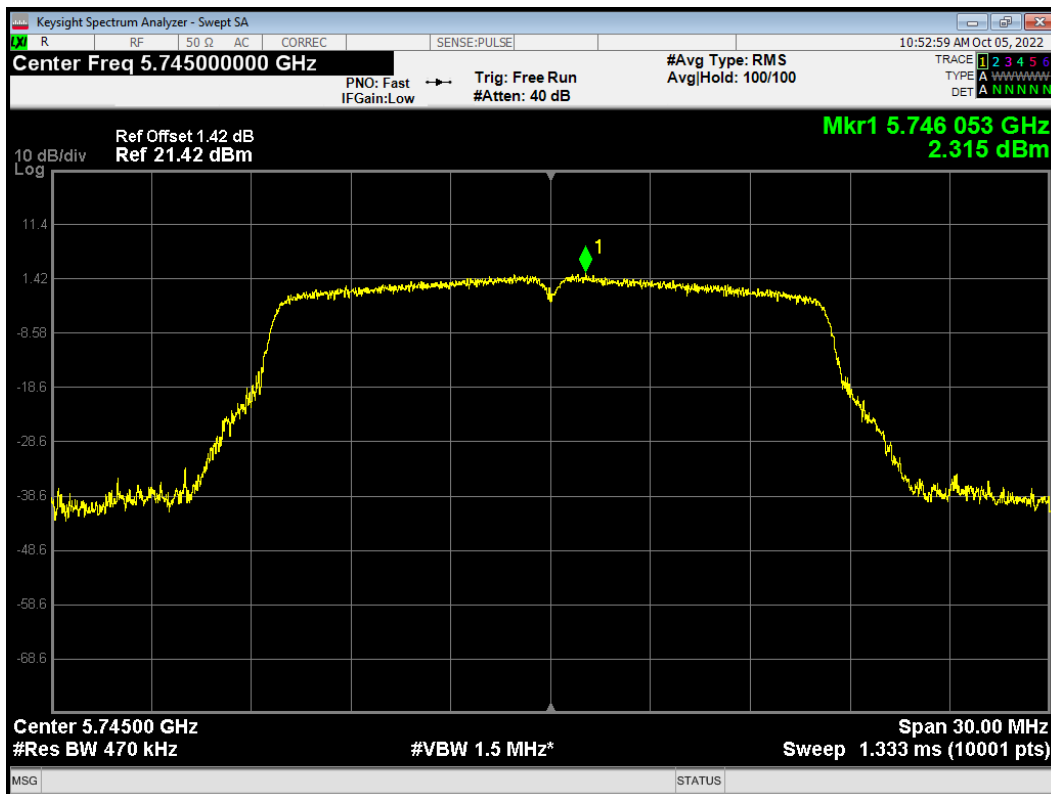


U-NII-3

PSD 802.11a 5720MHz

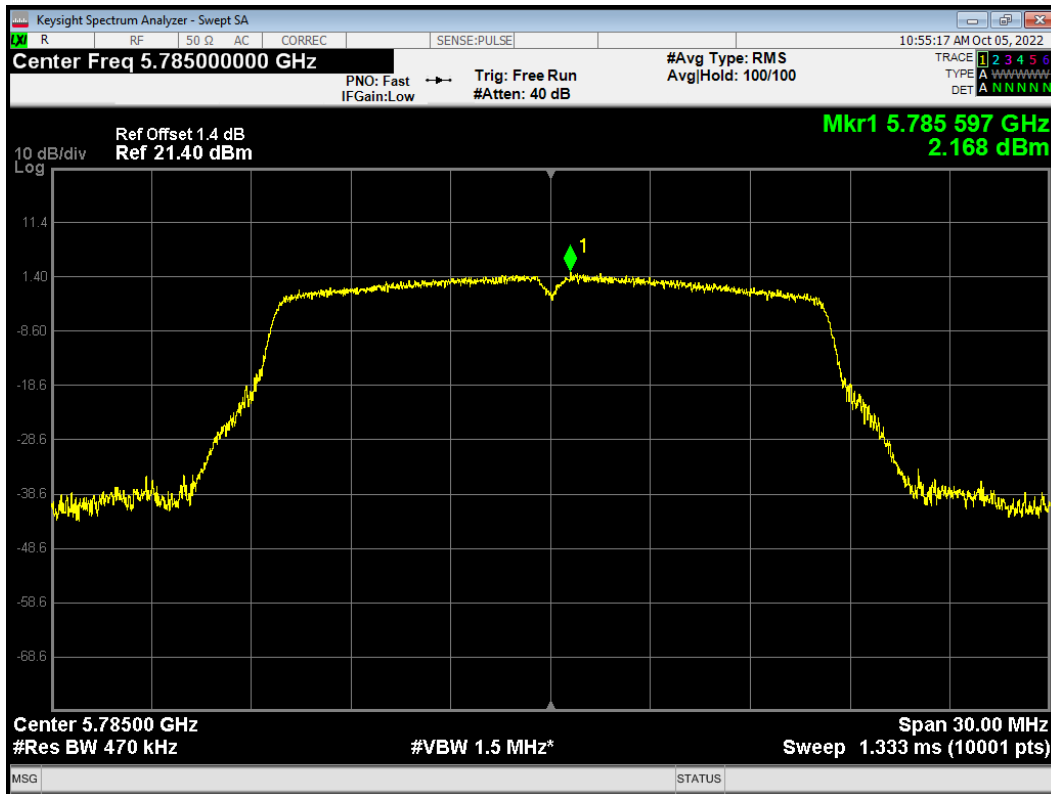


PSD 802.11a 5745MHz

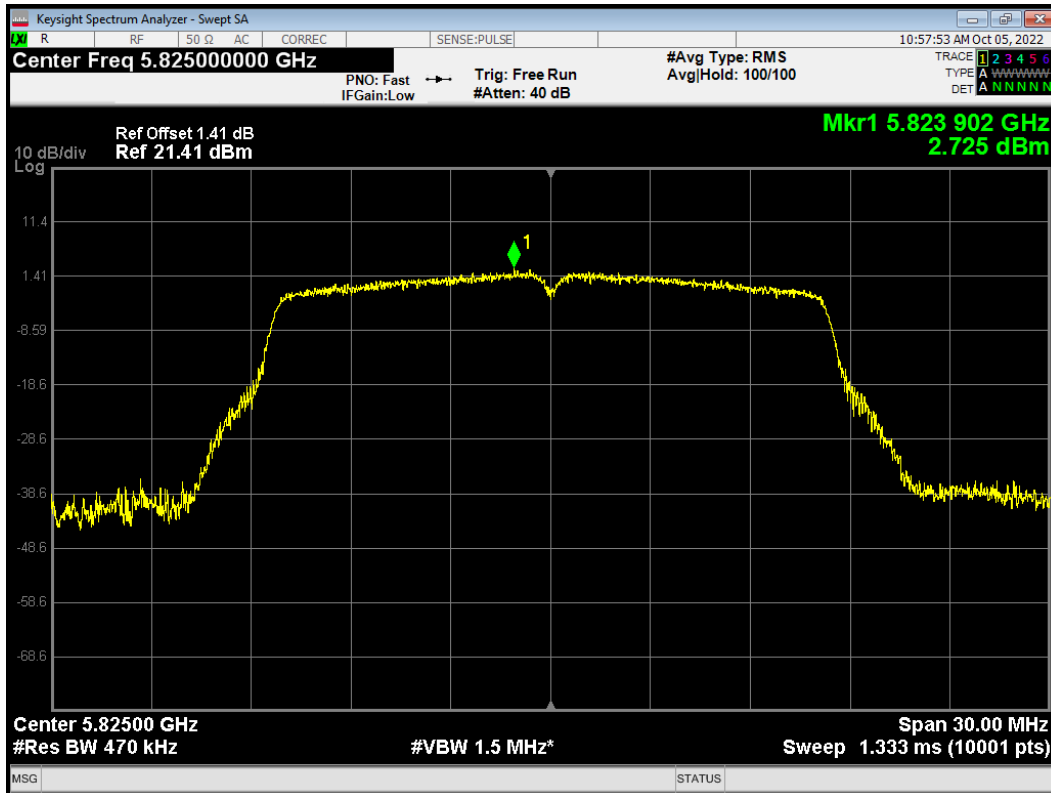




PSD 802.11a 5785MHz

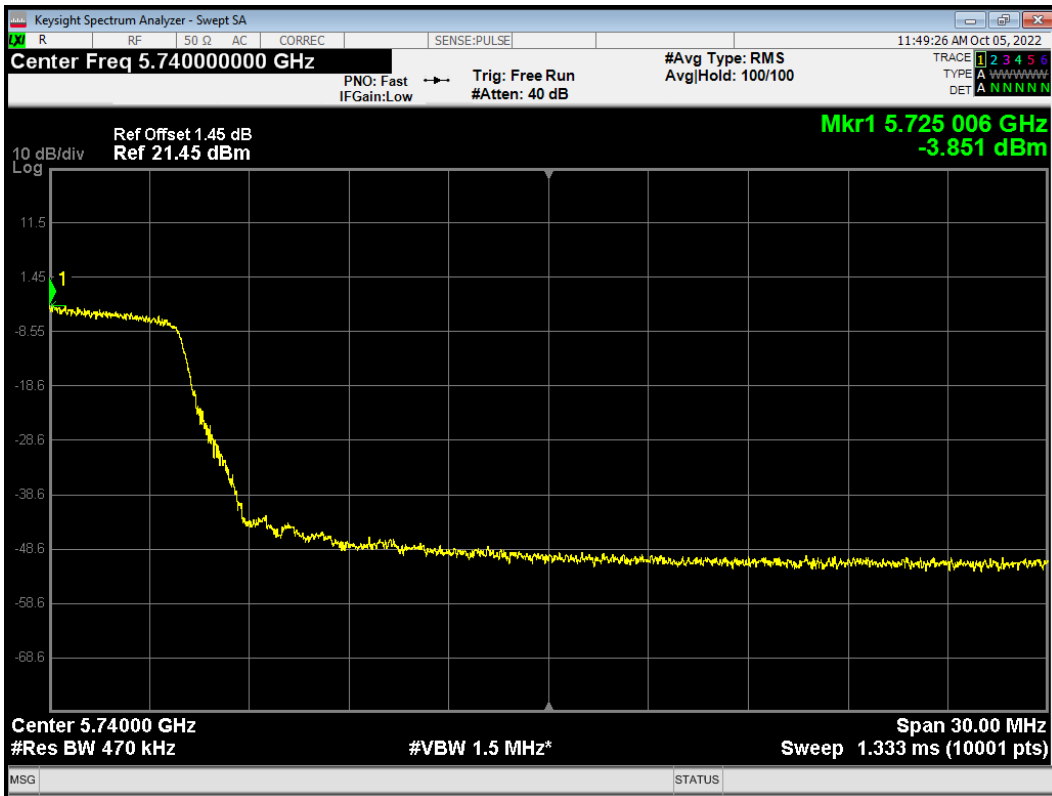


PSD 802.11a 5825MHz

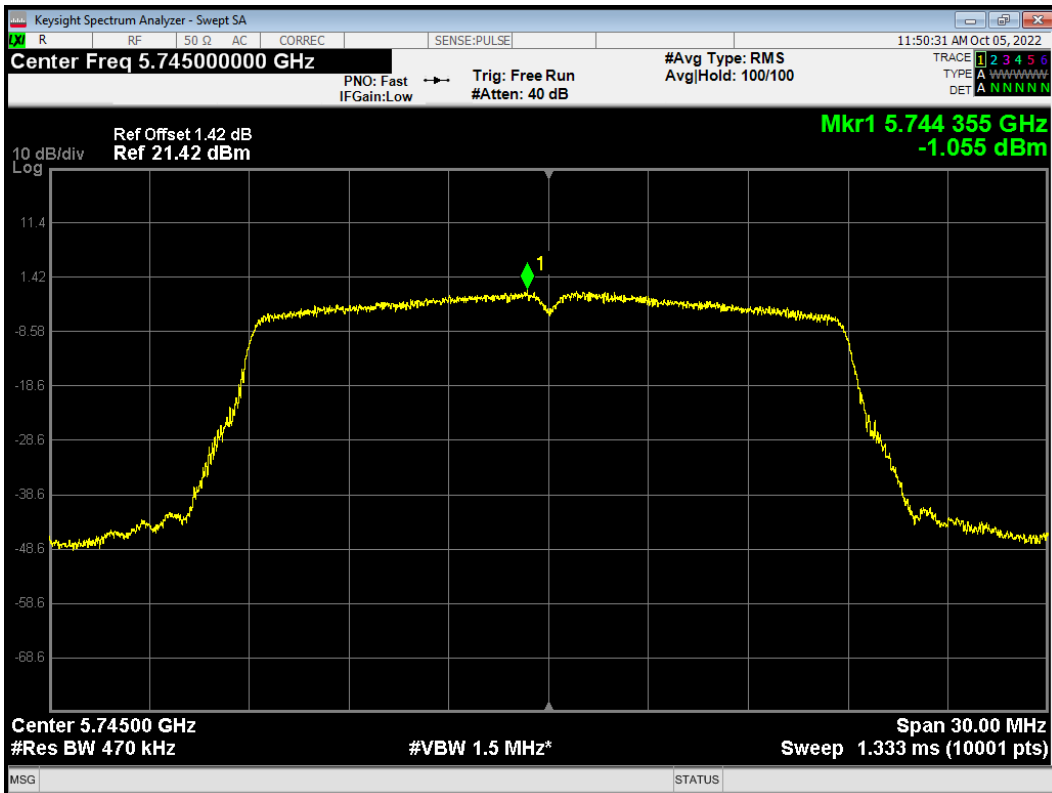




PSD 802.11ac (VHT20) 5720MHz

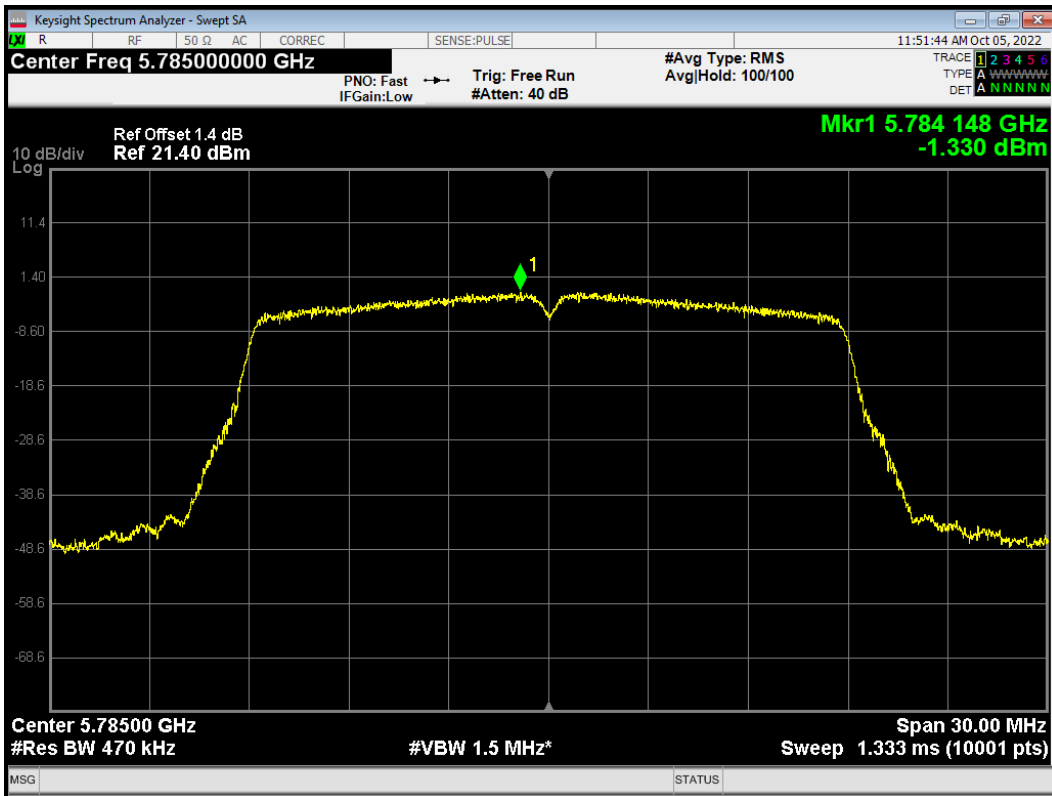


PSD 802.11ac (VHT20) 5745MHz

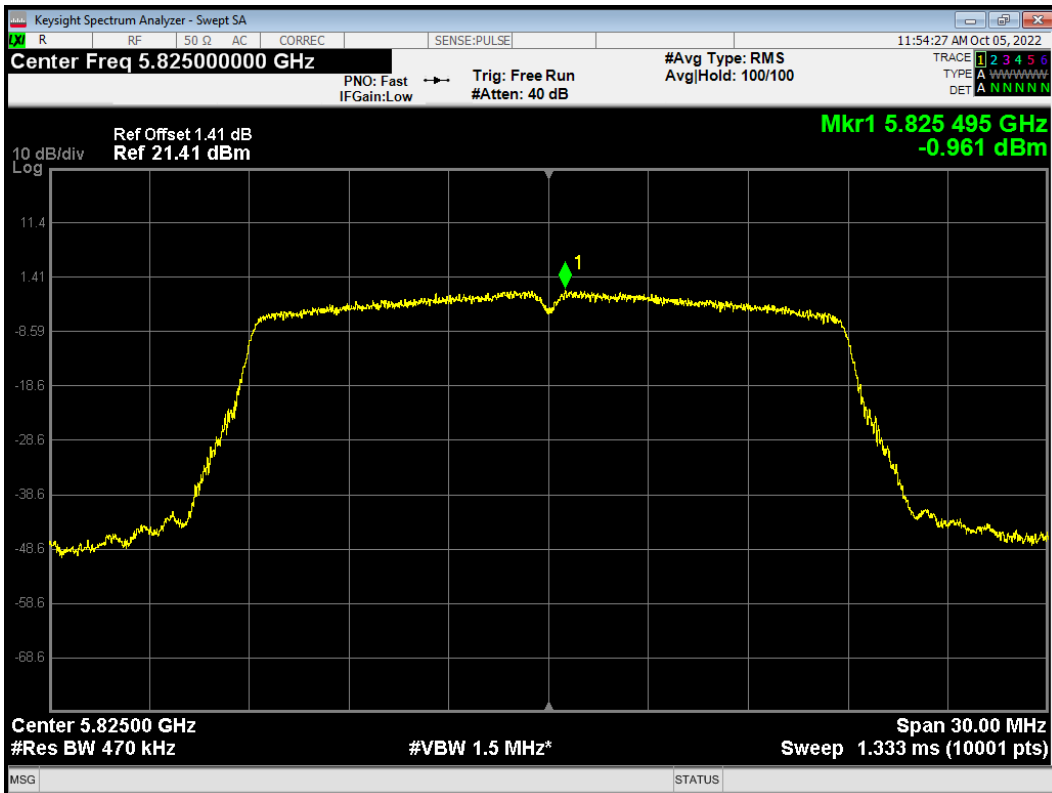




PSD 802.11ac (VHT20) 5785MHz

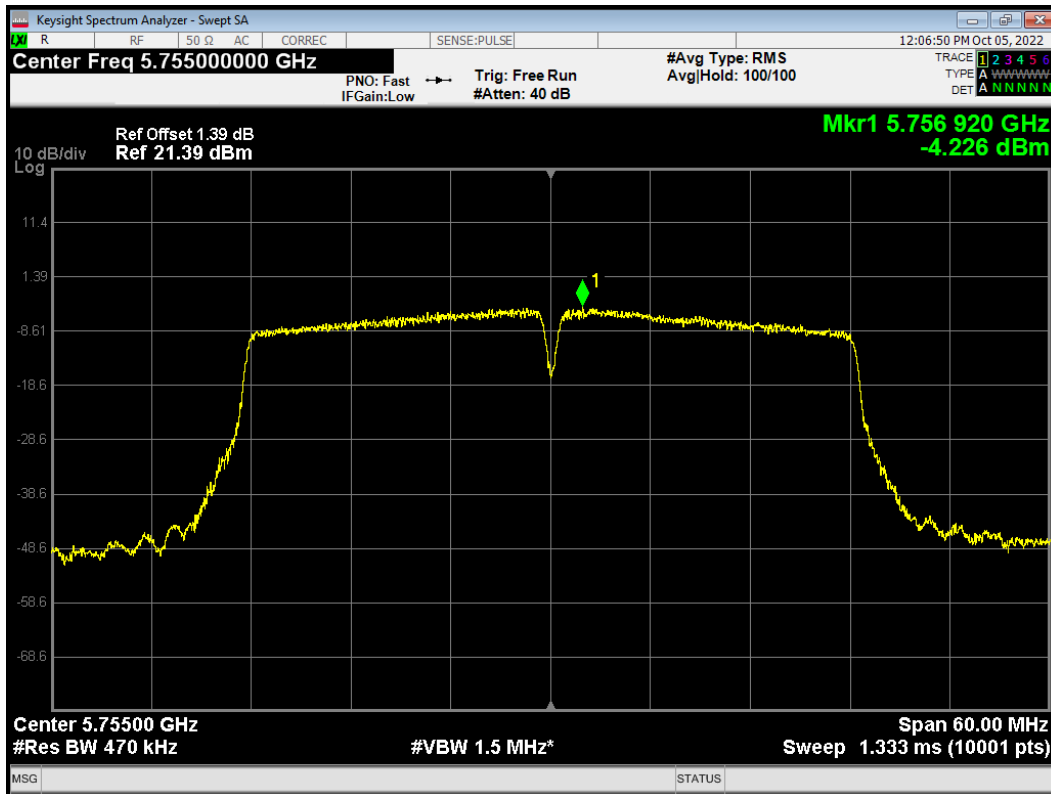


PSD 802.11ac (VHT20) 5825MHz

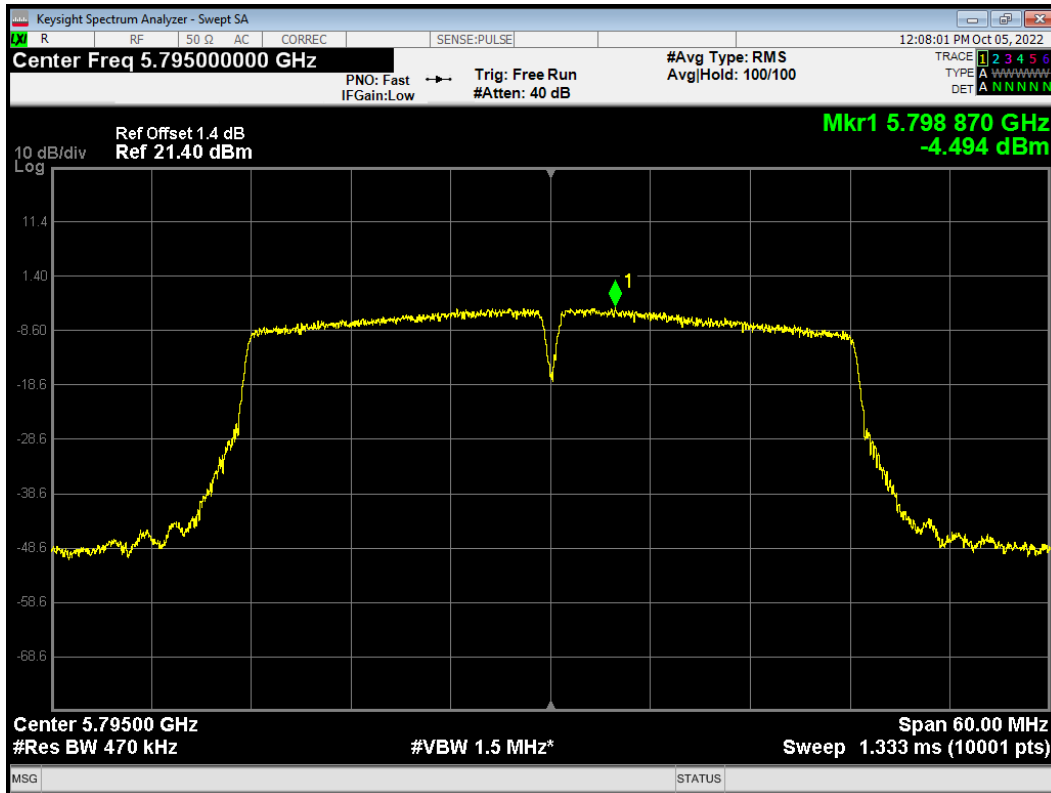




PSD 802.11ac (VHT40) 5755MHz

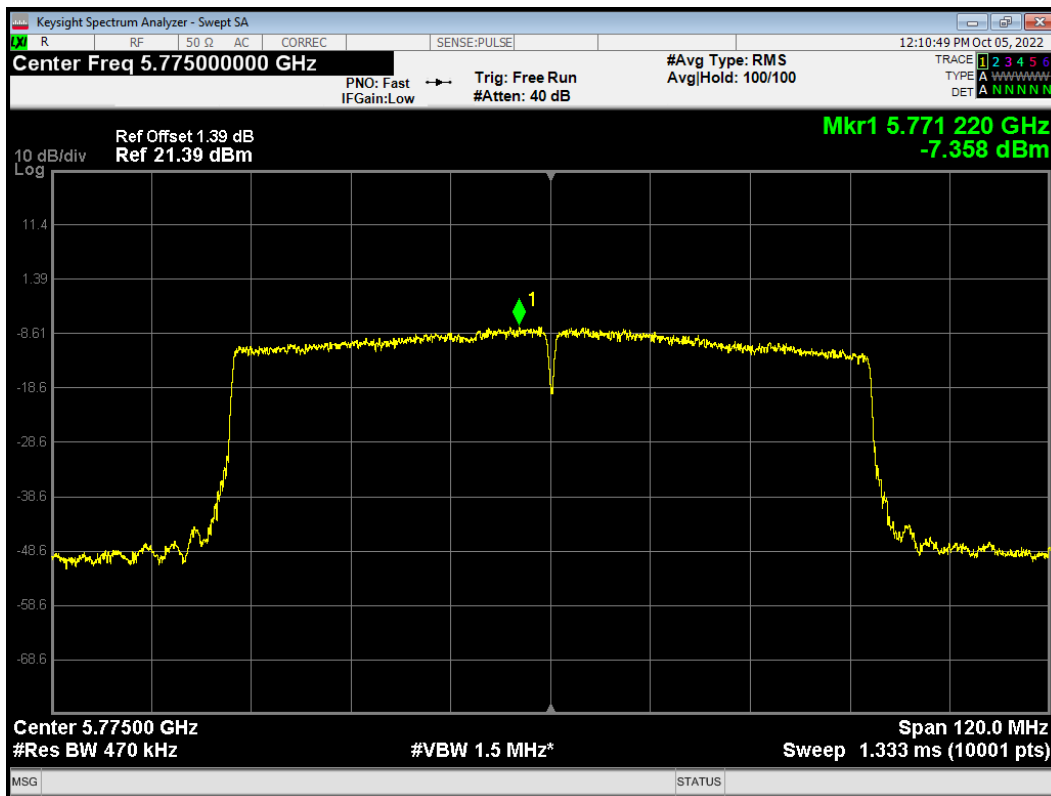


PSD 802.11ac (VHT40) 5795MHz

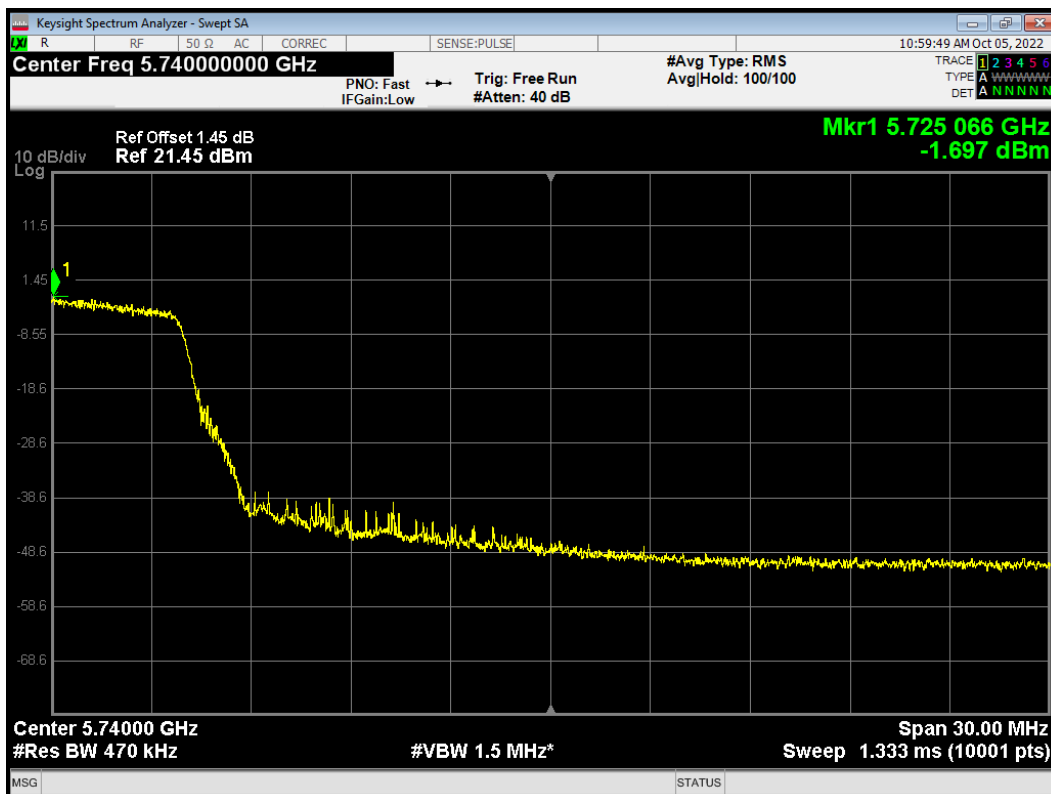




### PSD 802.11ac (VHT80) 5775MHz

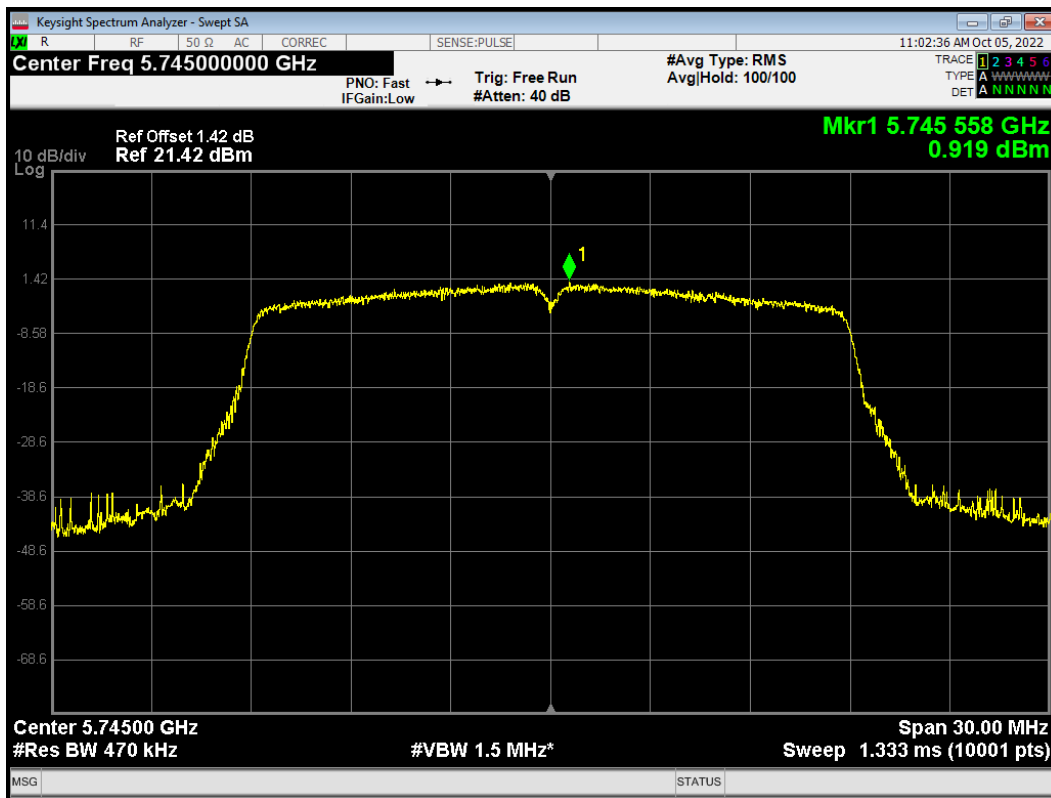


### PSD 802.11n (HT20) 5720MHz

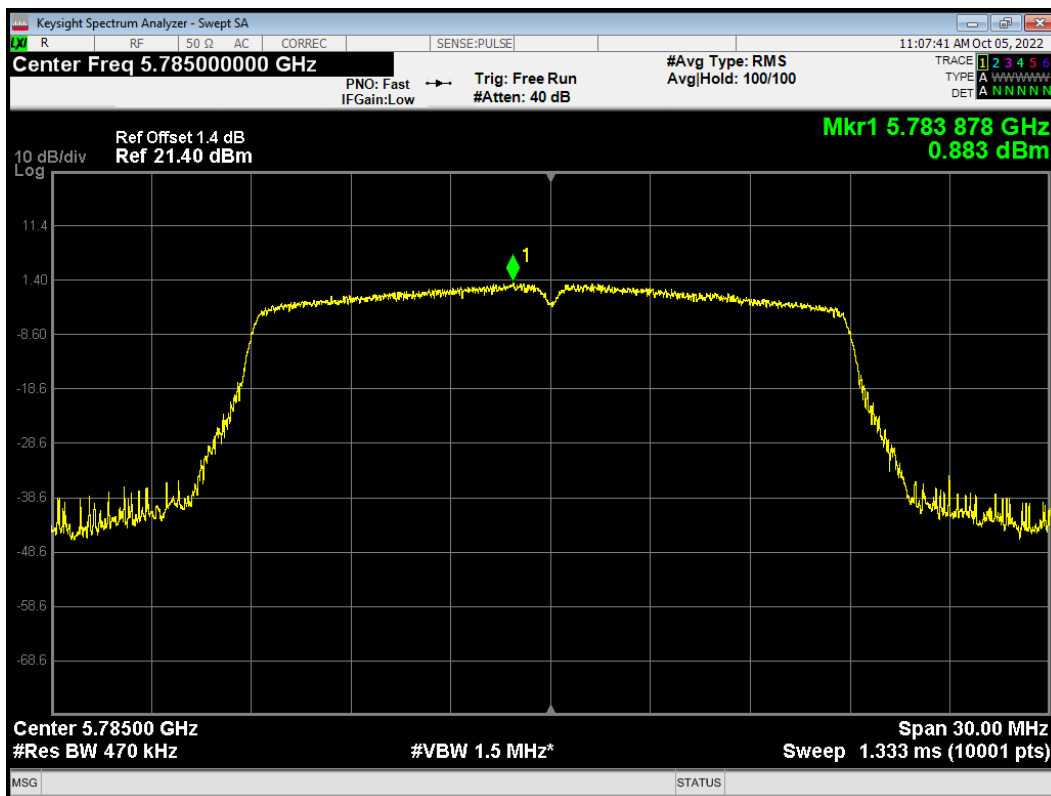




PSD 802.11n (HT20) 5745MHz



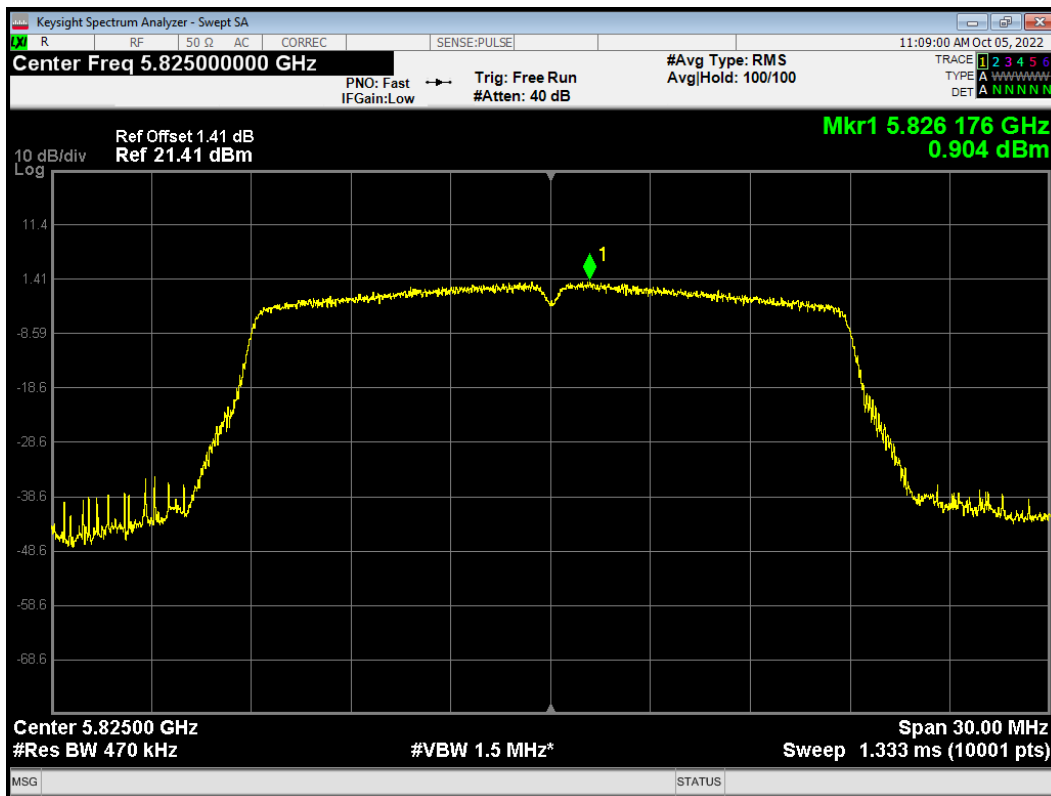
PSD 802.11n (HT20) 5785MHz



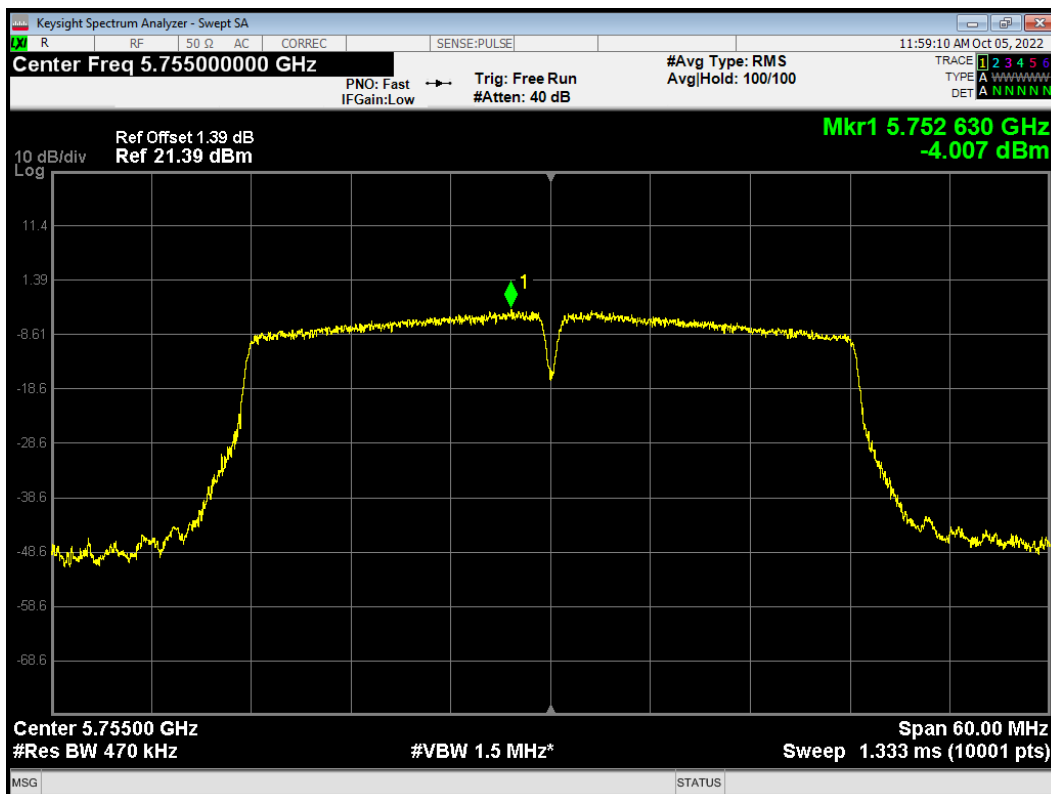




PSD 802.11n (HT20) 5825MHz

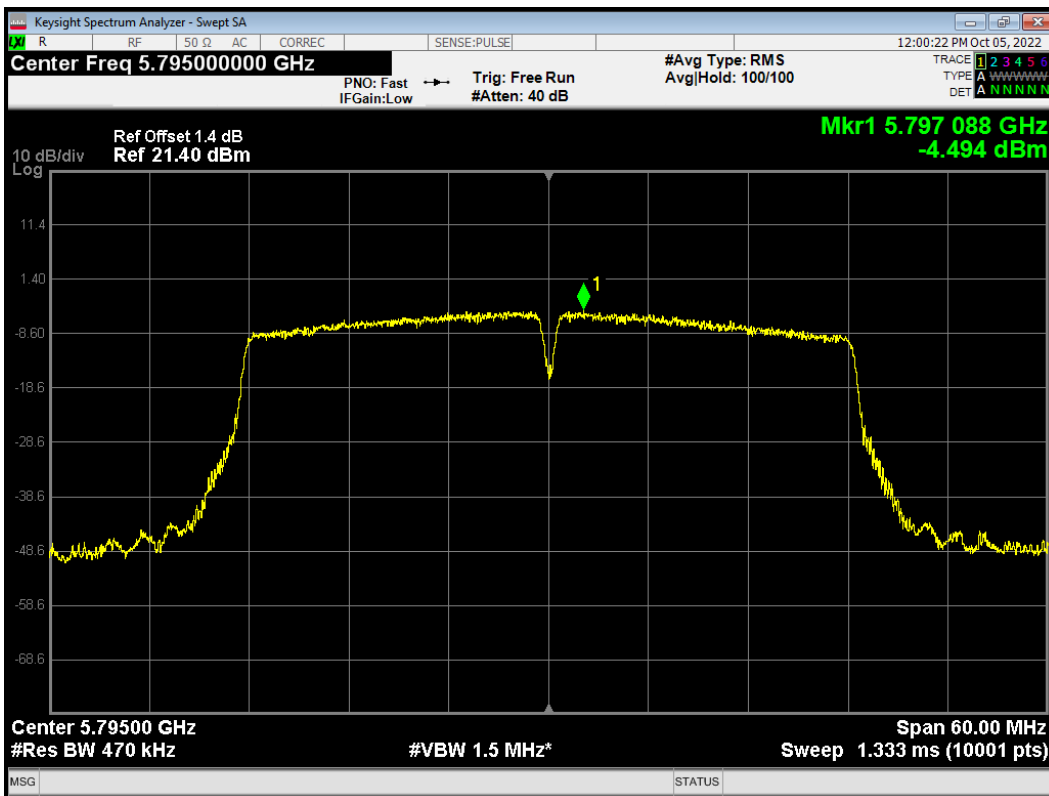


PSD 802.11n (HT40) 5755MHz





PSD 802.11n (HT40) 5795MHz



## 5.5. Unwanted Emission

### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

### 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.

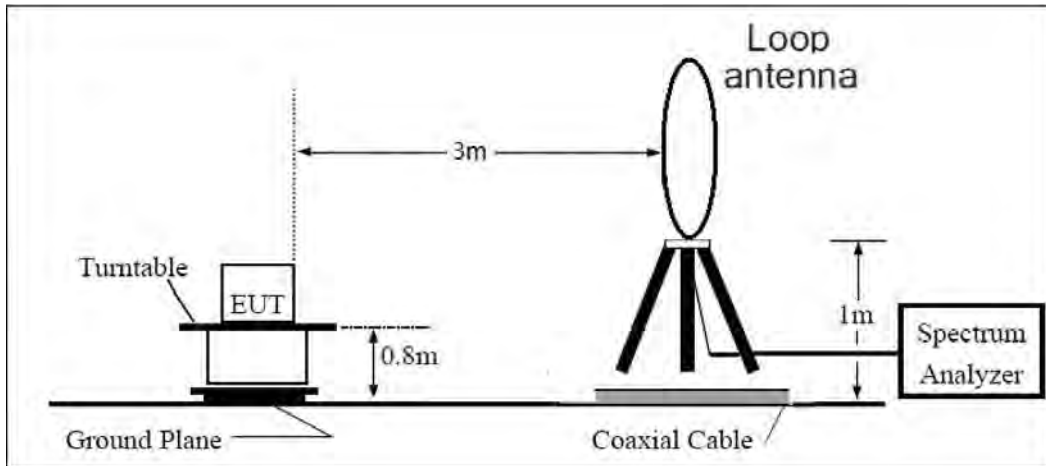
Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz. For regulatory requirements that specify averaging only over the transmit duration (e.g., digital transmission system [DTS] and Unlicensed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

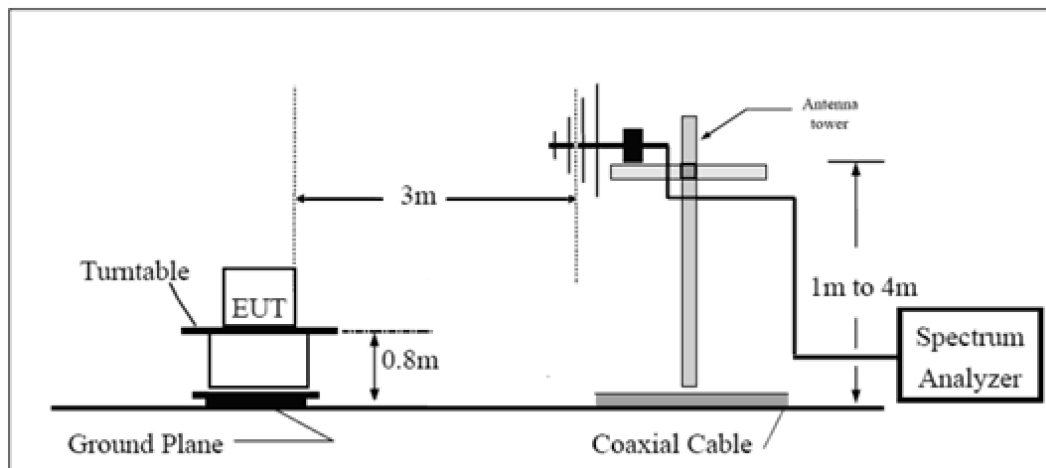
The test is in transmitting mode.

**Test setup**

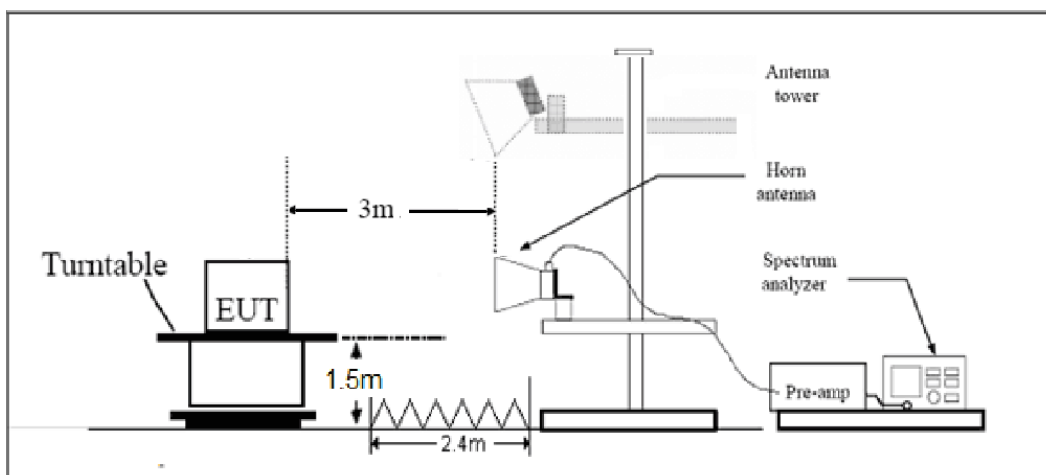
**9KHz~ 30MHz**



**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、  $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] - 20 \log(d[\text{meters}]) + 104.77$ , where E = field strength and

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

§2、  $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2$ , 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
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	( <sup>2</sup> )
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



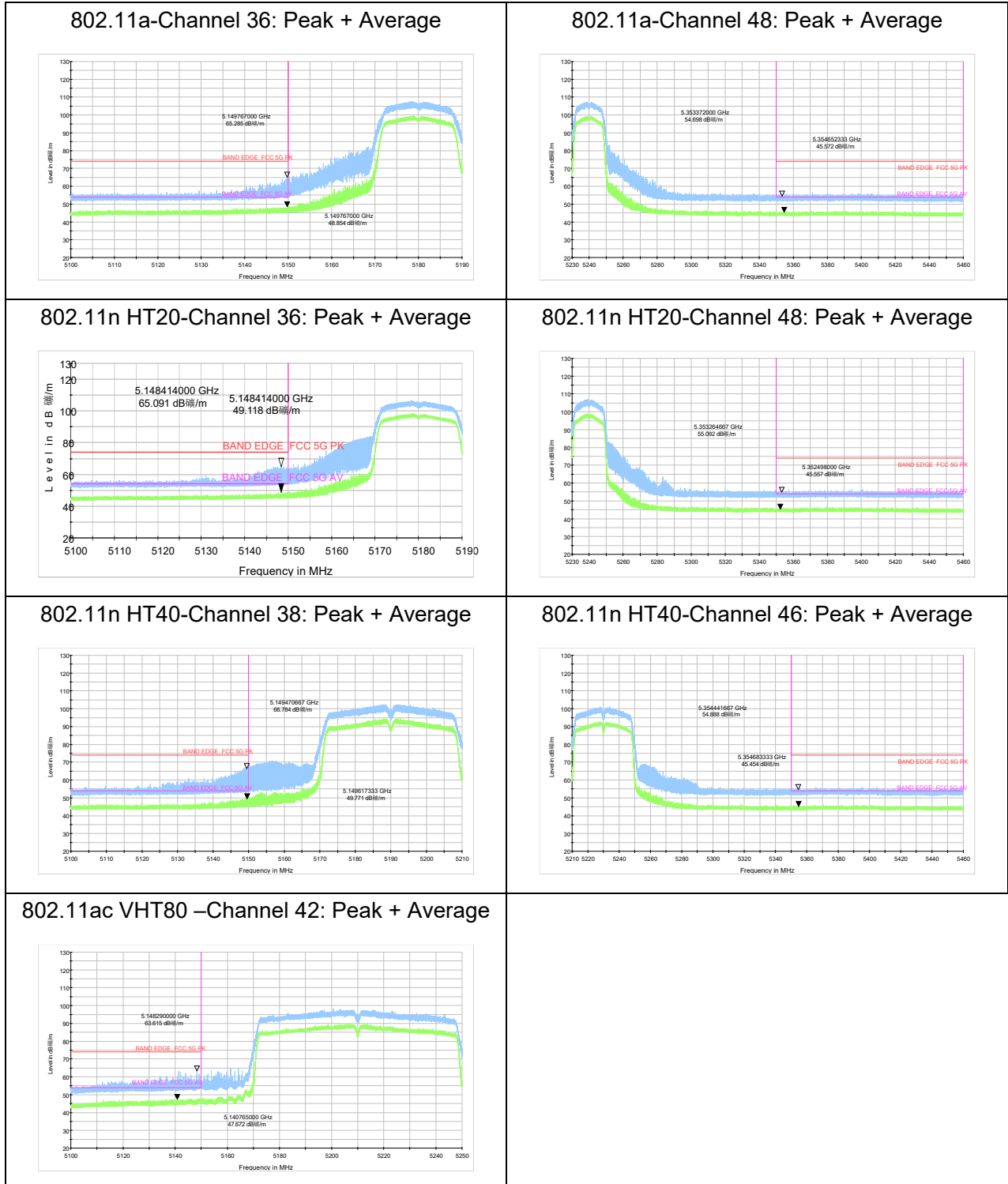
**Test Results:**

The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for V20MHz/V40MHz, therefore investigated worst case to representative mode in test report.

A symbol (dB $\mu$ V/m) in the test plot below means (dB $\mu$ V/m)

**The signal beyond the limit is carrier.**

**U-NII-1**

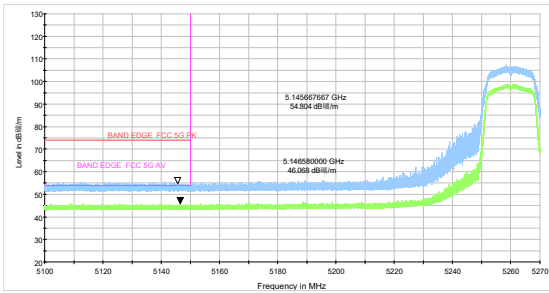




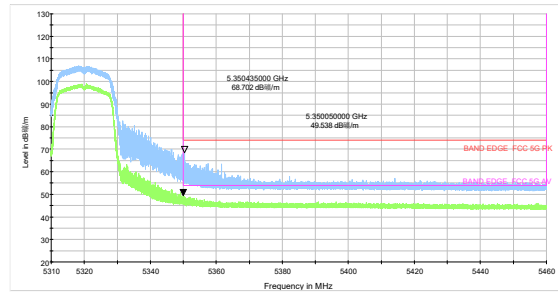


U-NII-2A

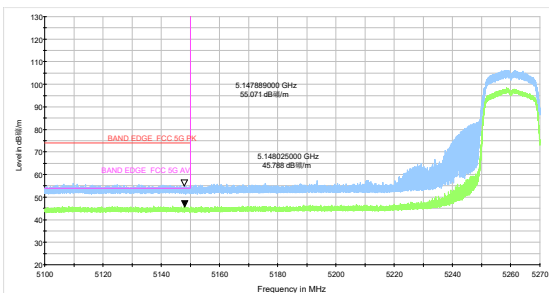
802.11a-Channel 52: Peak + Average



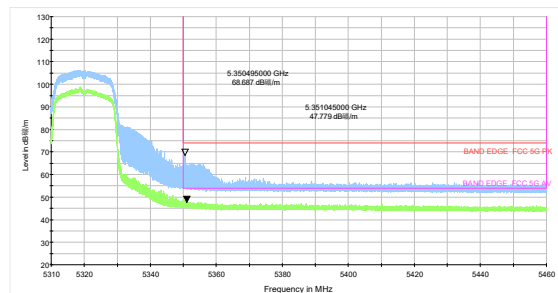
802.11a-Channel 64: Peak + Average



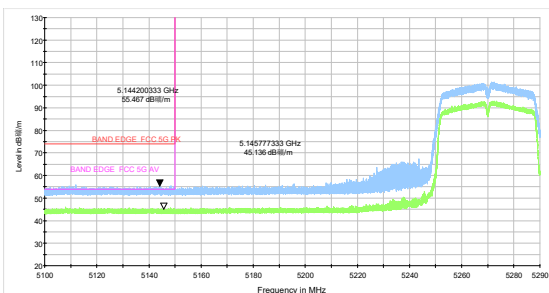
802.11n HT20-Channel 52: Peak + Average



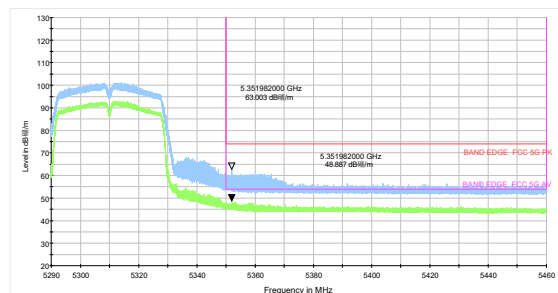
802.11n HT20-Channel 64: Peak + Average



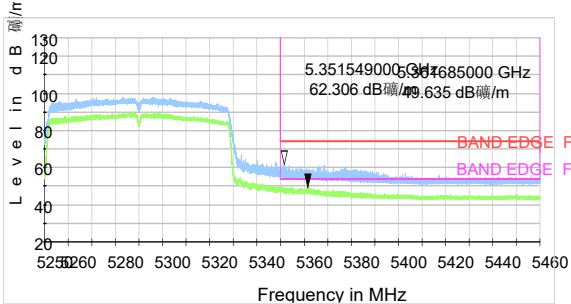
802.11n HT40-Channel 54: Peak + Average



802.11n HT40-Channel 62: Peak + Average



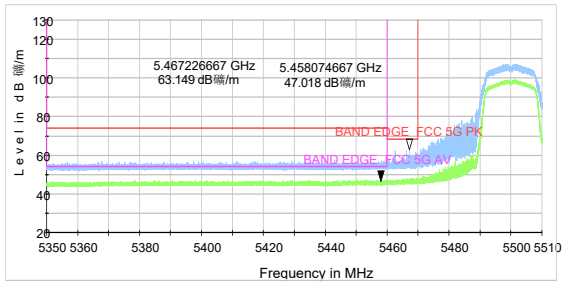
802.11ac VHT80 -Channel 58: Peak + Average



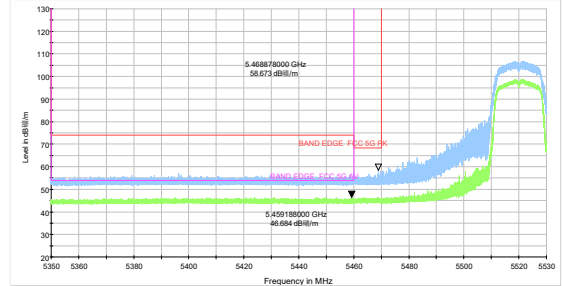


U-NII-2C

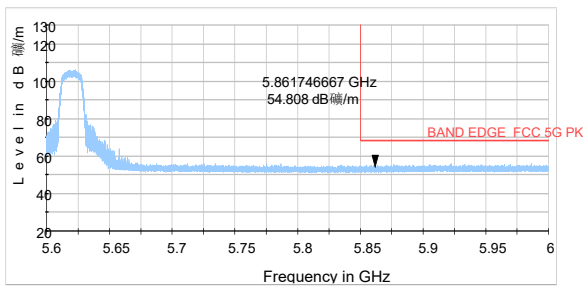
802.11a-Channel 100: Peak + Average



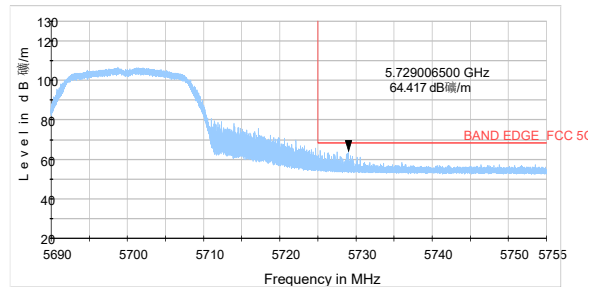
802.11a-Channel 104: Peak + Average



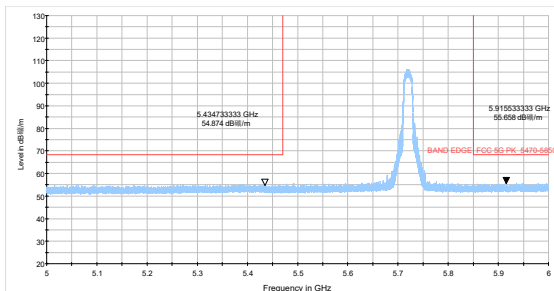
802.11a-Channel 124: Peak



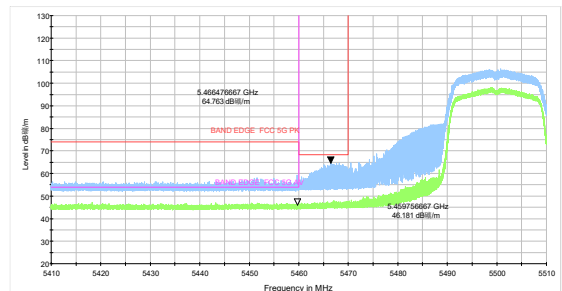
802.11a-Channel 140: Peak



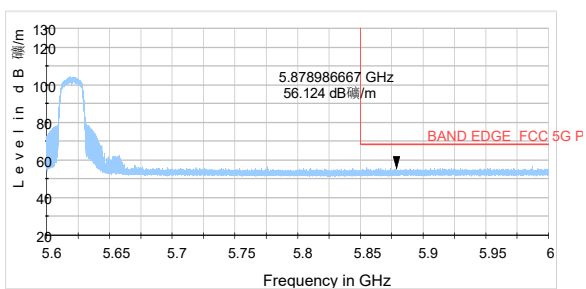
802.11a-Channel 144: Peak



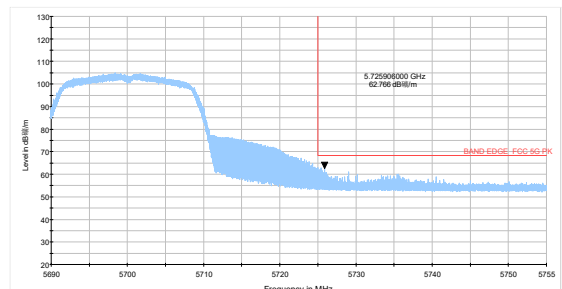
802.11n HT20-Channel 100: Peak + Average



802.11n HT20-Channel 124: Peak

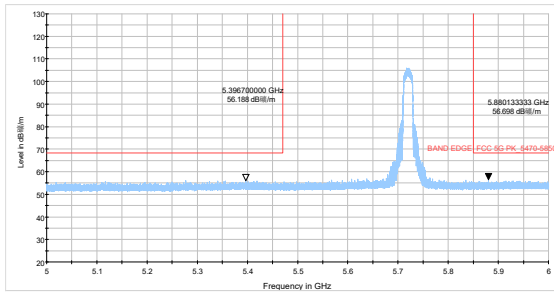


802.11n HT20-Channel 140: Peak

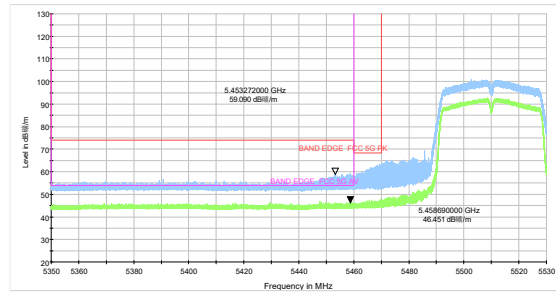




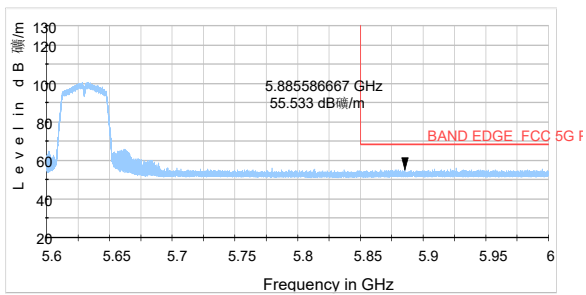
802.11n HT20-Channel 144: Peak



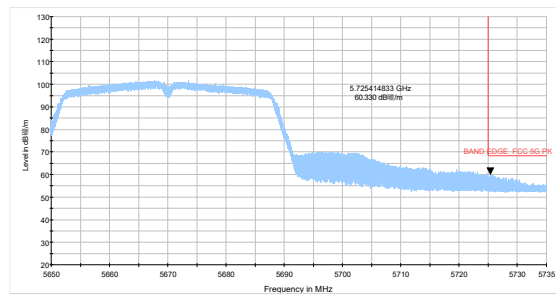
802.11n HT40-Channel 102: Peak + Average



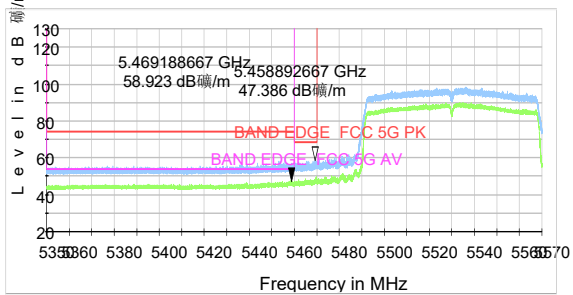
802.11n HT40-Channel 126: Peak



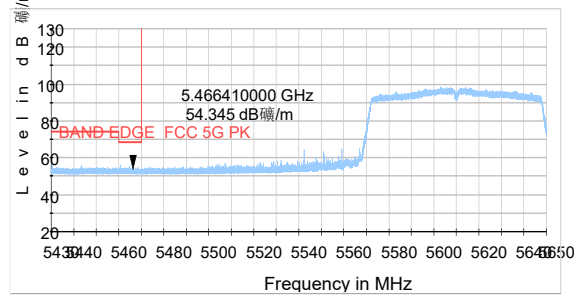
802.11n HT40-Channel 134: Peak



802.11ac VHT80-Channel 106: Peak + Average



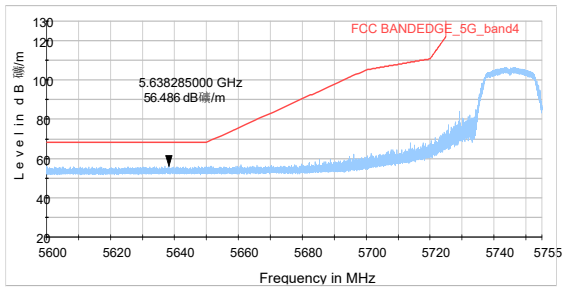
802.11ac VHT80-Channel 122: Peak



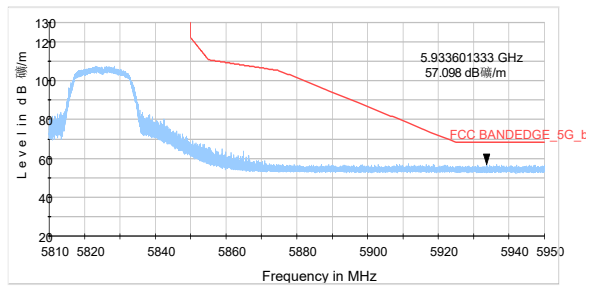


U-NII-3

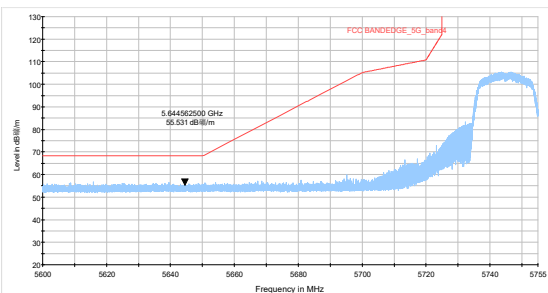
802.11a-Channel 149: Peak



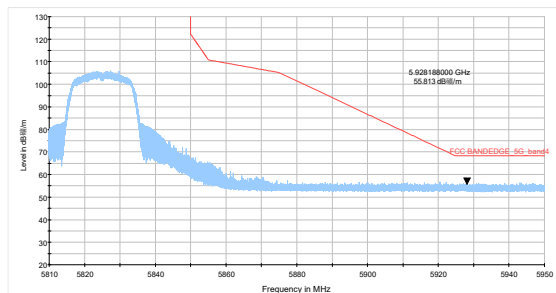
802.11a-Channel 165: Peak



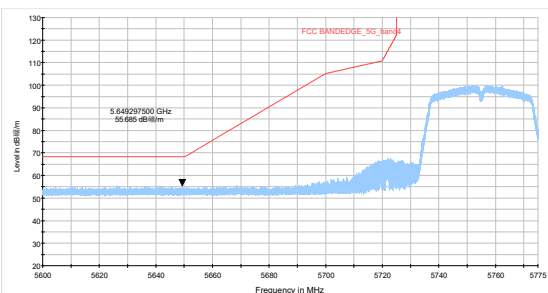
802.11n HT20-Channel 149: Peak



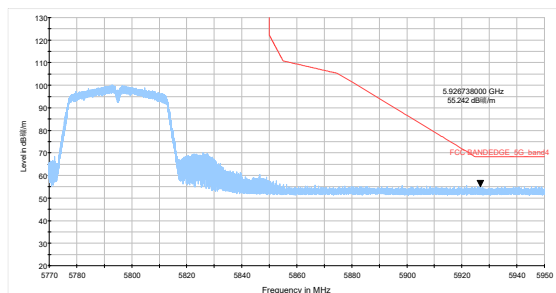
802.11n HT20-Channel 165: Peak



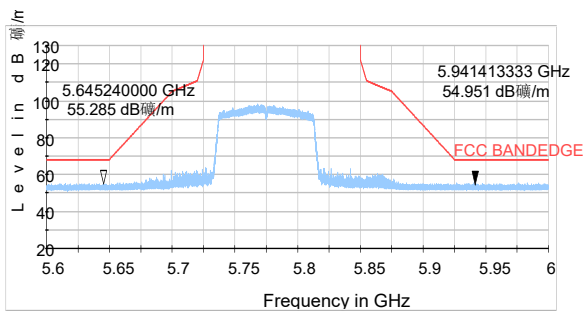
802.11n HT40-Channel 151: Peak



802.11n HT40-Channel 159: Peak



802.11ac VHT80- Channel 155: Peak



**Result of RE**

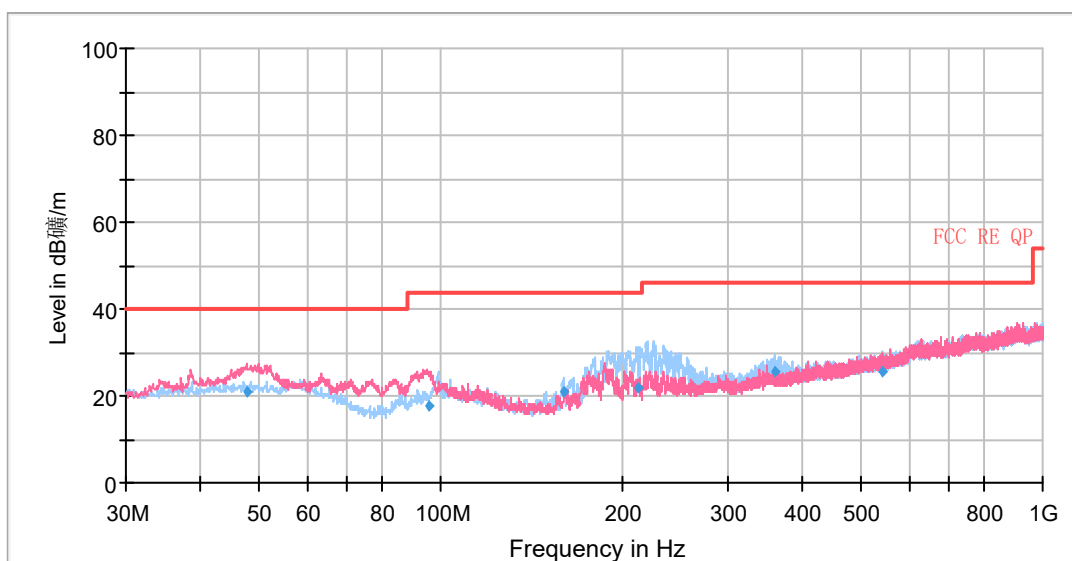
**Test result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the Emissions in the frequency band 9kHz-30MHz are more than 20dB below the limit are not reported.

A symbol (dB<sub>磁</sub>/m) in the test plot below means (dB $\mu$ V/m)

During the test, the Radiates Emission from 30MHz to 1GHz was performed in all modes with all channels, 802.11a, Channel 100 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

**Continuous TX mode:**



Radiates Emission from 30MHz to 1GHz

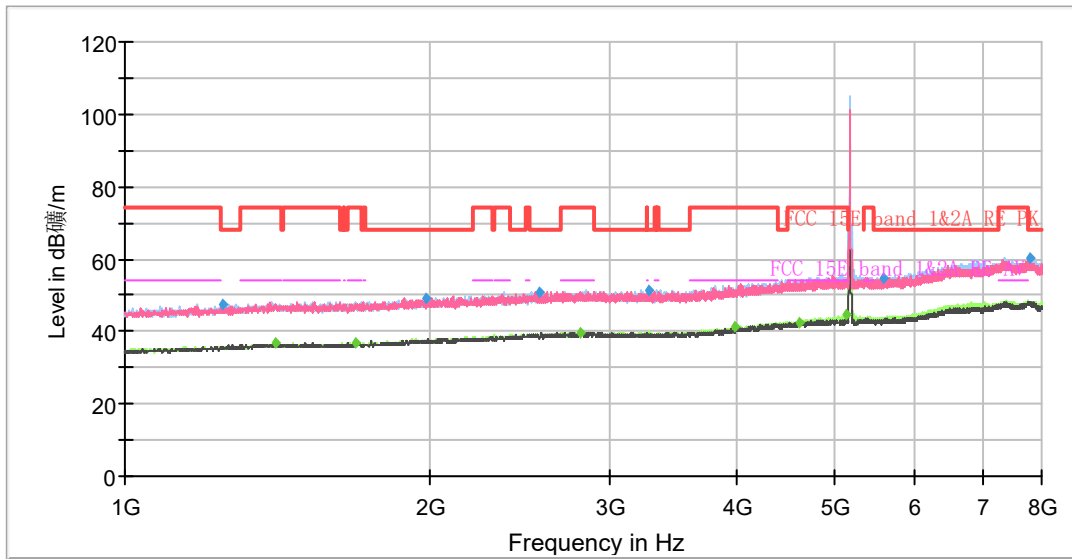
Frequency (MHz)	Quasi-Peak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
47.66	20.89	40.00	19.11	105.0	V	250.00	15
95.71	17.54	43.50	25.96	105.0	V	82.00	13
160.38	20.87	43.50	22.63	220.0	H	266.00	11
212.28	22.02	43.50	21.48	125.0	H	289.00	13
359.11	25.55	46.00	20.45	100.0	H	298.00	18
541.59	25.46	46.00	20.54	180.0	H	52.00	21

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

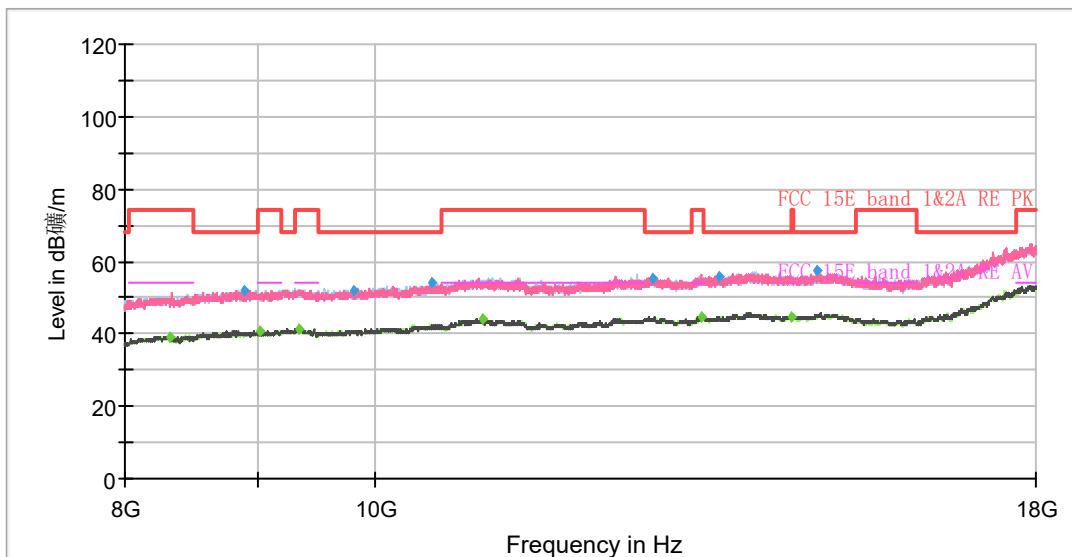
**2. Margin = Limit – Quasi-Peak**



802.11a CH36



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz

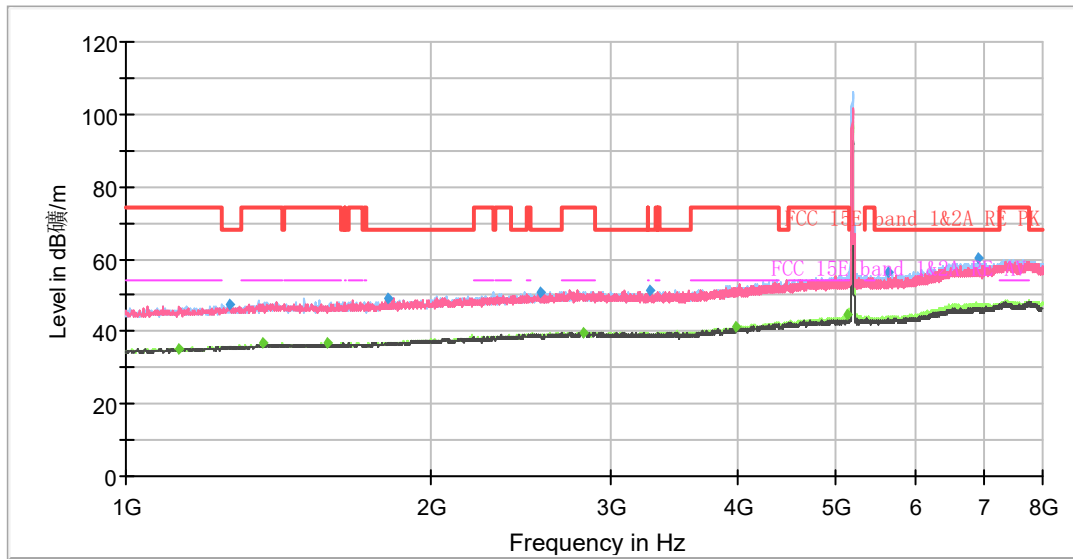


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1249.38	47.59	---	68.20	20.61	500.00	100.0	H	6.00	-8
1406.00	---	36.66	54.00	17.34	500.00	200.0	V	12.00	-7
1685.13	---	36.70	54.00	17.30	500.00	100.0	H	110.00	-6
1983.50	49.06	---	68.20	19.14	500.00	200.0	H	357.00	-5
2561.00	50.91	---	68.20	17.29	500.00	200.0	H	353.00	-4
2812.13	---	39.73	54.00	14.27	500.00	100.0	H	44.00	-3
3281.13	51.41	---	68.20	16.79	500.00	100.0	H	89.00	-3
3982.00	---	41.19	54.00	12.81	500.00	100.0	H	89.00	-1
4625.13	---	42.54	54.00	11.46	500.00	100.0	H	51.00	1
5129.13	---	44.66	54.00	9.34	500.00	100.0	H	0.00	3
5597.25	54.85	---	68.20	13.35	500.00	100.0	H	38.00	4
7780.38	60.51	---	68.20	7.69	500.00	200.0	H	299.00	9

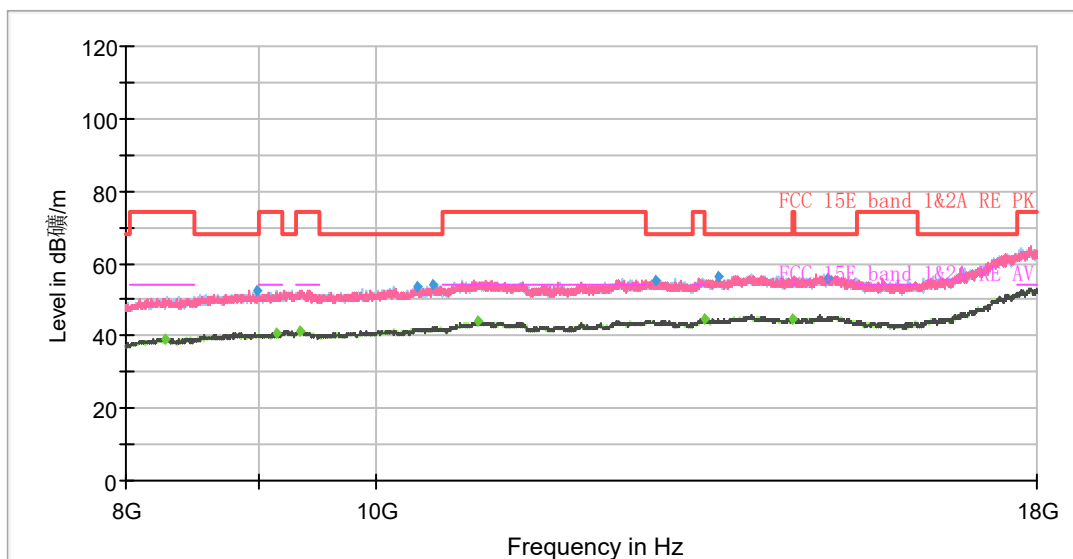
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit - MAX Peak/ Average

## 802.11a CH40



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz





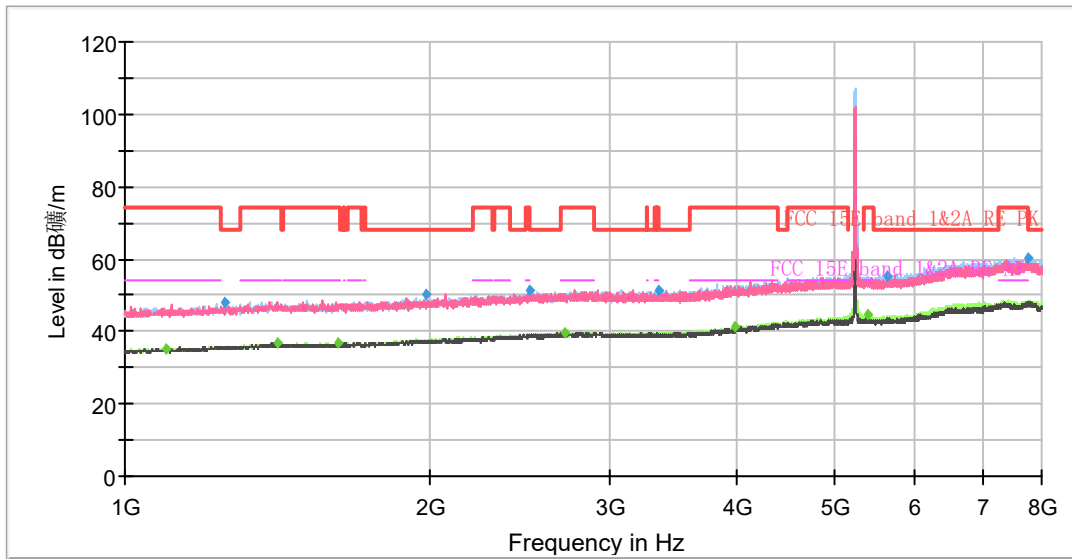
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1126.88	---	35.14	54.00	18.86	500.00	100.0	H	245.00	-9
1263.38	47.68	---	68.20	20.52	500.00	200.0	H	269.00	-8
1362.25	---	36.61	54.00	17.39	500.00	100.0	H	2.00	-7
1577.50	---	36.78	54.00	17.22	500.00	100.0	H	185.00	-6
1811.13	49.19	---	68.20	19.01	500.00	100.0	H	2.00	-6
2556.63	50.89	---	68.20	17.31	500.00	100.0	V	185.00	-4
2826.13	---	39.82	54.00	14.18	500.00	100.0	H	119.00	-3
3283.75	51.34	---	68.20	16.86	500.00	100.0	H	286.00	-3
3982.88	---	41.18	54.00	12.82	500.00	200.0	V	0.00	-1
5126.50	---	44.75	54.00	9.25	500.00	100.0	H	258.00	3
5642.75	56.30	---	68.20	11.90	500.00	200.0	H	309.00	4
6899.25	60.27	---	68.20	7.93	500.00	100.0	H	105.00	9

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

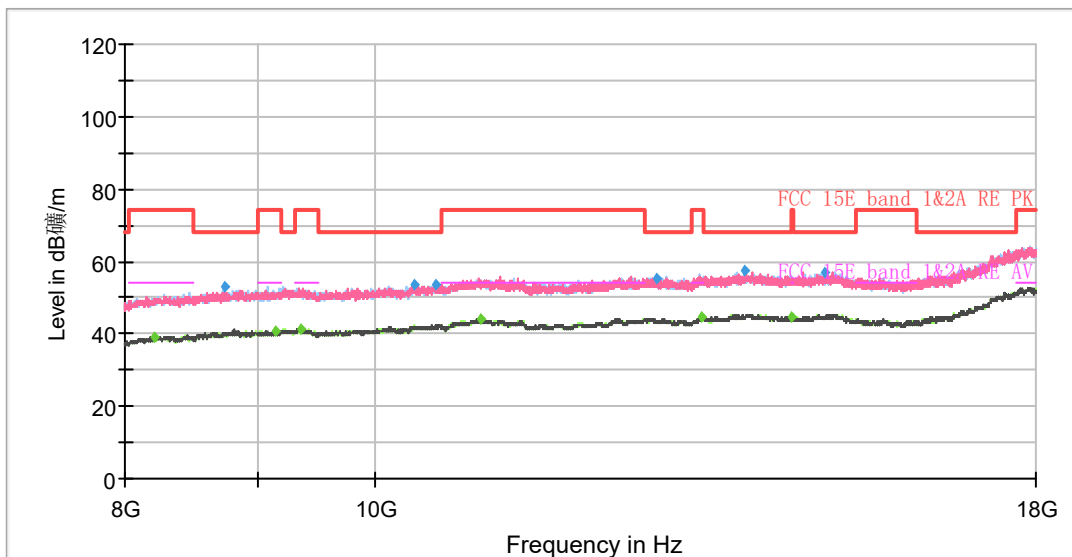
2. Margin = Limit - MAX Peak/ Average



### 802.11a CH48



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz

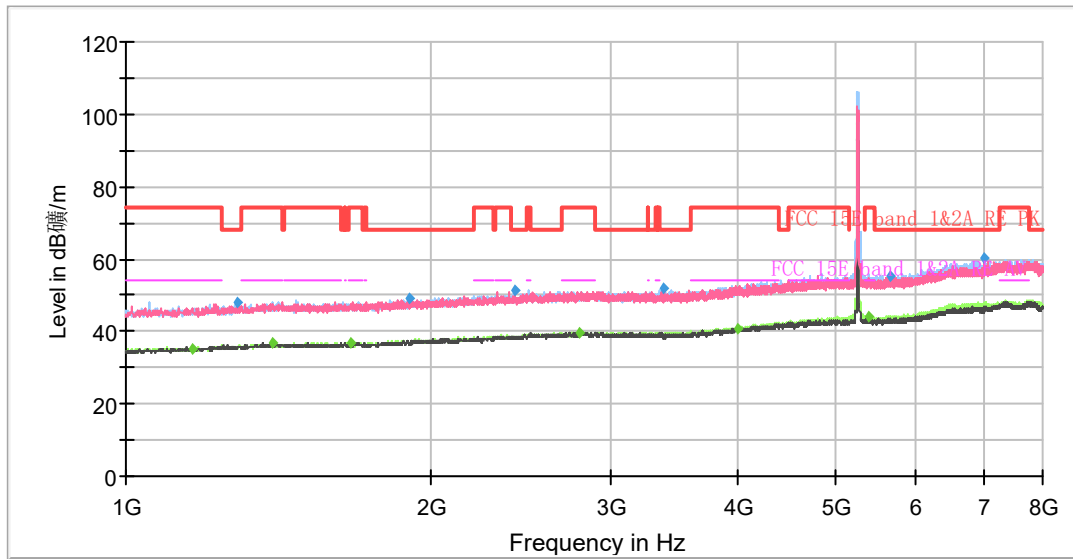


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1096.25	---	35.06	54.00	18.94	500.00	100.0	V	310.00	-9
1252.88	47.74	---	68.20	20.46	500.00	100.0	V	297.00	-8
1413.00	---	36.78	54.00	17.22	500.00	100.0	V	0.00	-7
1619.50	---	36.95	54.00	17.05	500.00	200.0	V	172.00	-6
1977.38	50.06	---	68.20	18.14	500.00	100.0	H	49.00	-5
2502.38	51.13	---	68.20	17.07	500.00	100.0	H	0.00	-4
2716.75	---	39.79	54.00	14.21	500.00	100.0	H	156.00	-4
3360.75	51.53	---	68.20	16.67	500.00	100.0	H	242.00	-3
3989.00	---	41.31	54.00	12.69	500.00	100.0	H	10.00	-1
5391.63	---	44.47	54.00	9.53	500.00	200.0	H	1.00	4
5647.13	55.39	---	68.20	12.81	500.00	200.0	H	352.00	4
7758.50	60.38	---	68.20	7.82	500.00	200.0	V	206.00	9

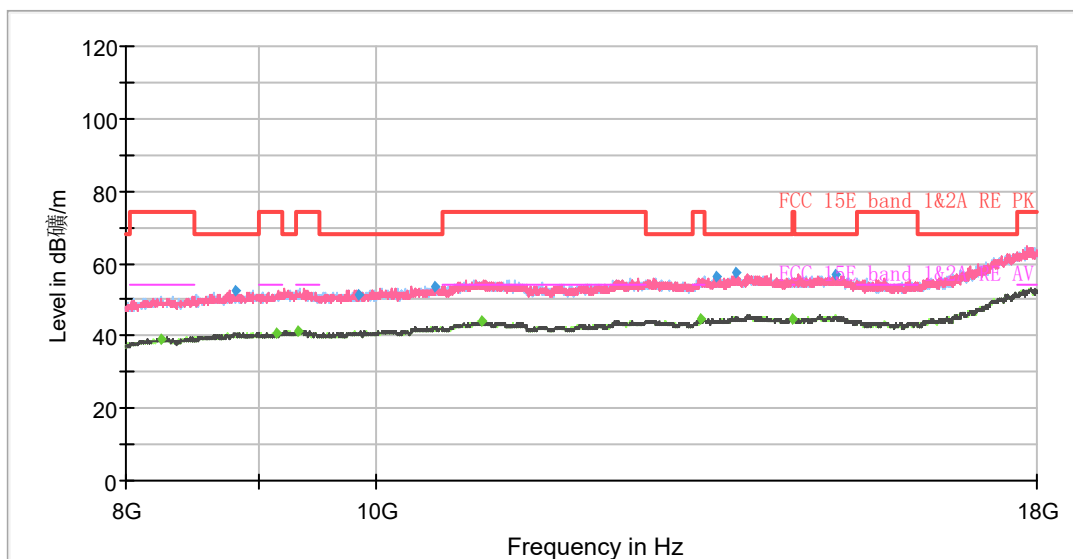
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit - MAX Peak/ Average

## 802.11a CH52



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz

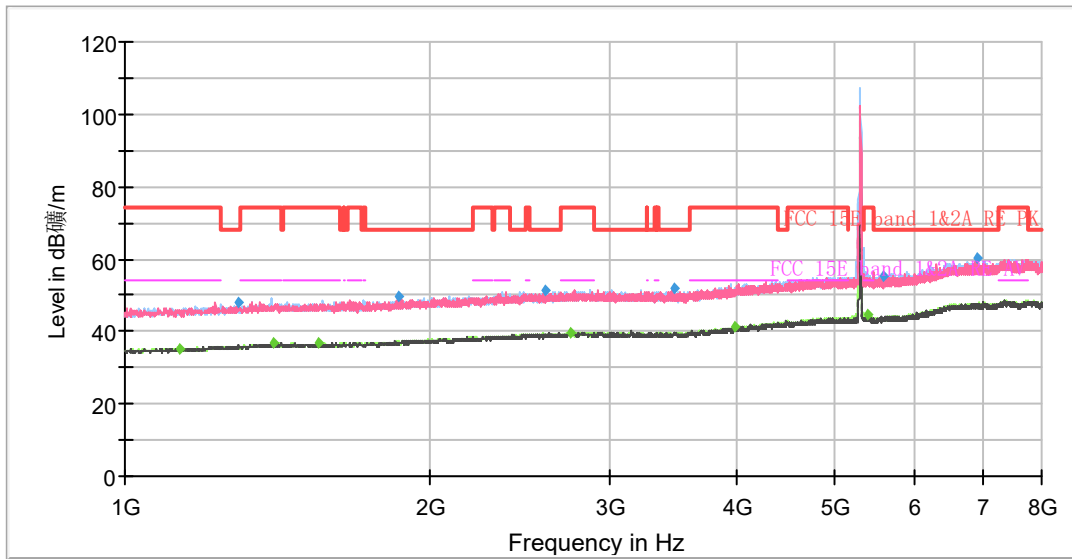


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1162.75	---	35.31	54.00	18.69	500.00	200.0	H	0.00	-9
1287.00	47.79	---	68.20	20.41	500.00	200.0	V	62.00	-8
1392.00	---	36.84	54.00	17.16	500.00	200.0	H	102.00	-7
1661.50	---	37.05	54.00	16.95	500.00	200.0	H	267.00	-6
1898.63	48.93	---	68.20	19.27	500.00	200.0	H	68.00	-5
2415.75	51.22	---	68.20	16.98	500.00	100.0	V	148.00	-4
2799.00	---	39.74	54.00	14.26	500.00	100.0	H	119.00	-3
3392.25	52.06	---	68.20	16.14	500.00	200.0	V	103.00	-3
3998.63	---	41.01	54.00	12.99	500.00	200.0	H	351.00	-1
5396.88	---	44.27	54.00	9.73	500.00	200.0	H	358.00	4
5655.88	55.34	---	68.20	12.86	500.00	200.0	H	321.00	4
7001.63	60.19	---	68.20	8.01	500.00	200.0	H	76.00	8

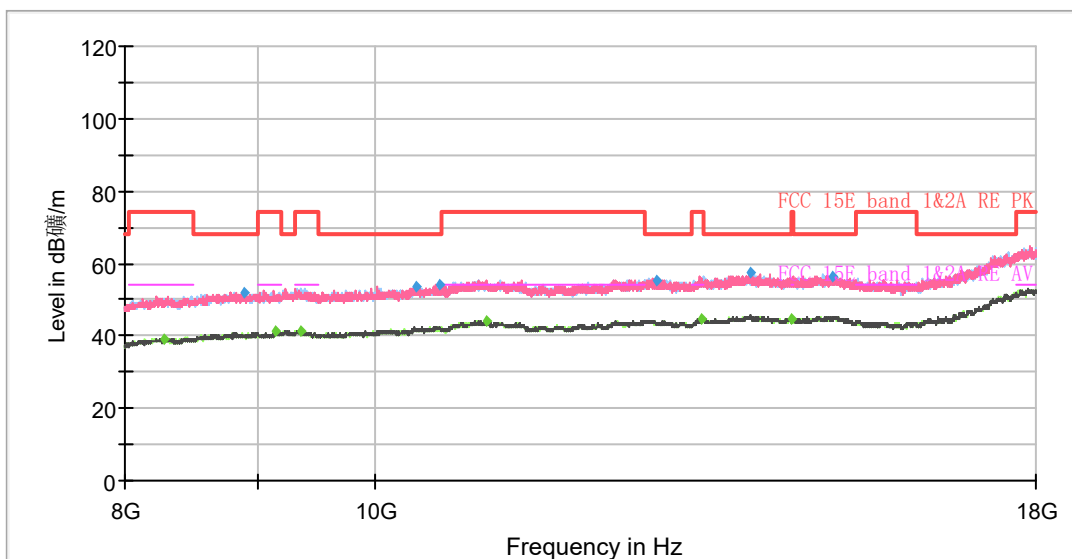
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit - MAX Peak/ Average

802.11a CH60



Radiates Emission from 1GHz to 8GHz  
 Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz

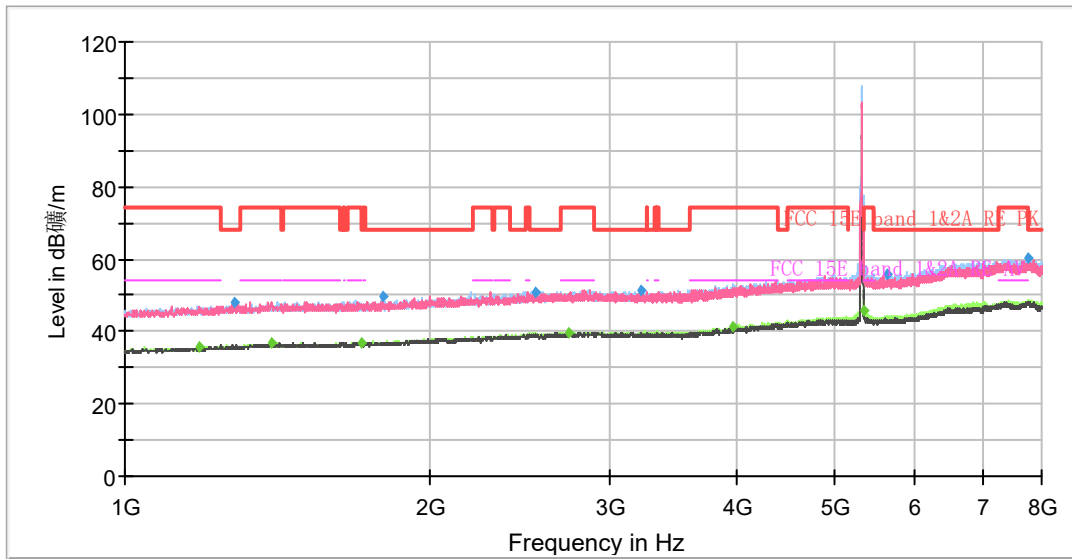


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1132.13	---	35.32	54.00	18.68	500.00	200.0	V	103.00	-9
1292.25	47.84	---	68.20	20.36	500.00	100.0	H	50.00	-8
1398.13	---	36.75	54.00	17.25	500.00	200.0	H	276.00	-7
1553.88	---	36.97	54.00	17.03	500.00	100.0	H	285.00	-6
1861.00	49.75	---	68.20	18.45	500.00	200.0	V	56.00	-6
2598.63	51.22	---	68.20	16.98	500.00	100.0	H	96.00	-4
2753.50	---	39.64	54.00	14.36	500.00	200.0	V	18.00	-4
3481.50	51.64	---	68.20	16.56	500.00	200.0	H	125.00	-3
3987.25	---	41.21	54.00	12.79	500.00	200.0	V	37.00	-1
5388.13	---	44.89	54.00	9.11	500.00	100.0	H	0.00	4
5591.13	55.42	---	68.20	12.78	500.00	200.0	H	250.00	4
6917.63	60.14	---	68.20	8.06	500.00	100.0	H	122.00	9

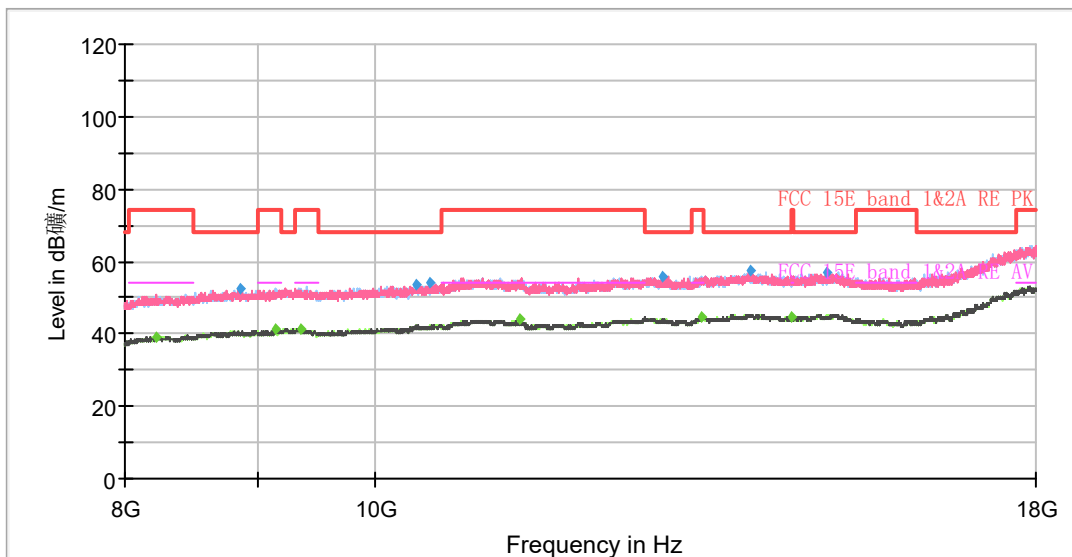
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit - MAX Peak/ Average

802.11a CH64



Radiates Emission from 1GHz to 8GHz  
 Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz





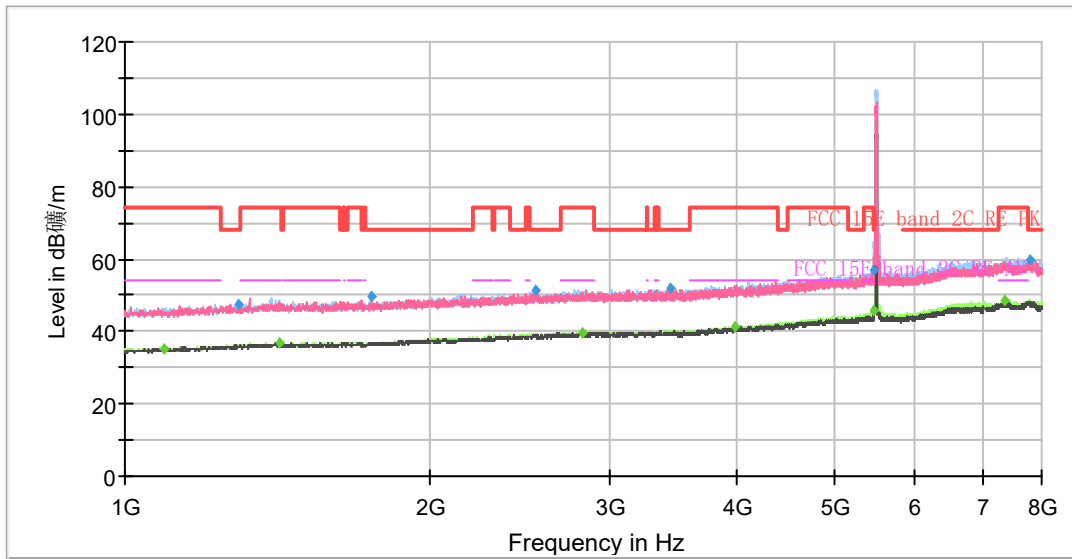
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1182.00	---	35.59	54.00	18.41	500.00	100.0	V	6.00	-8
1280.00	48.16	---	68.20	20.04	500.00	200.0	H	133.00	-8
1392.00	---	36.64	54.00	17.36	500.00	100.0	V	186.00	-7
1708.75	---	36.92	54.00	17.08	500.00	100.0	H	174.00	-6
1793.63	49.53	---	68.20	18.67	500.00	200.0	V	0.00	-6
2537.38	50.99	---	68.20	17.21	500.00	200.0	V	164.00	-4
2737.75	---	39.68	54.00	14.32	500.00	200.0	H	332.00	-4
3222.50	51.41	---	68.20	16.79	500.00	200.0	H	319.00	-3
3964.50	---	41.15	54.00	12.85	500.00	100.0	H	101.00	-1
5351.38	---	46.03	54.00	7.97	500.00	100.0	H	347.00	4
5639.25	55.67	---	68.20	12.53	500.00	200.0	H	272.00	4
7762.88	60.33	---	68.20	7.87	500.00	200.0	V	64.00	9

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

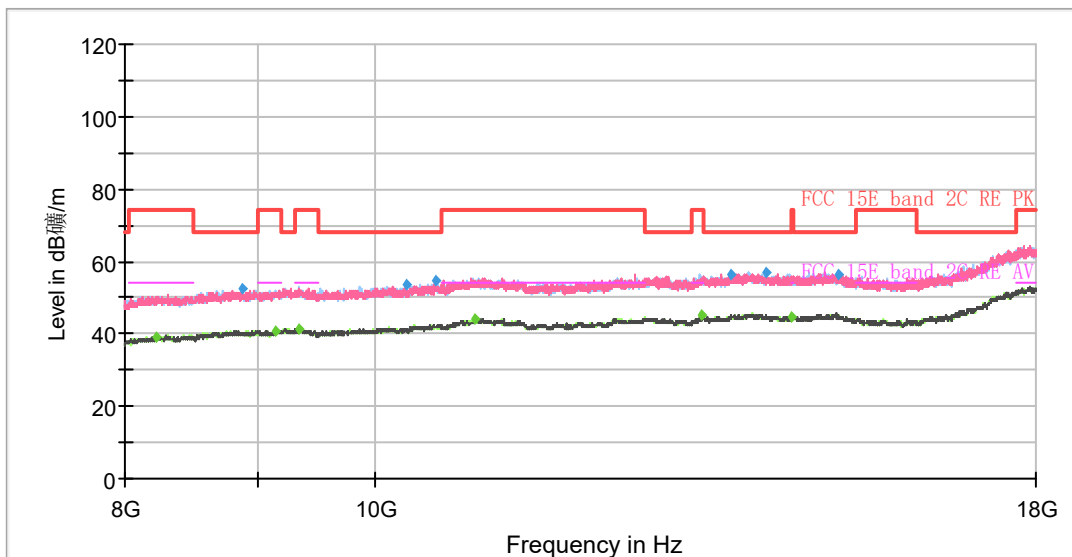
2. Margin = Limit - MAX Peak/ Average



### 802.11a CH100



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz

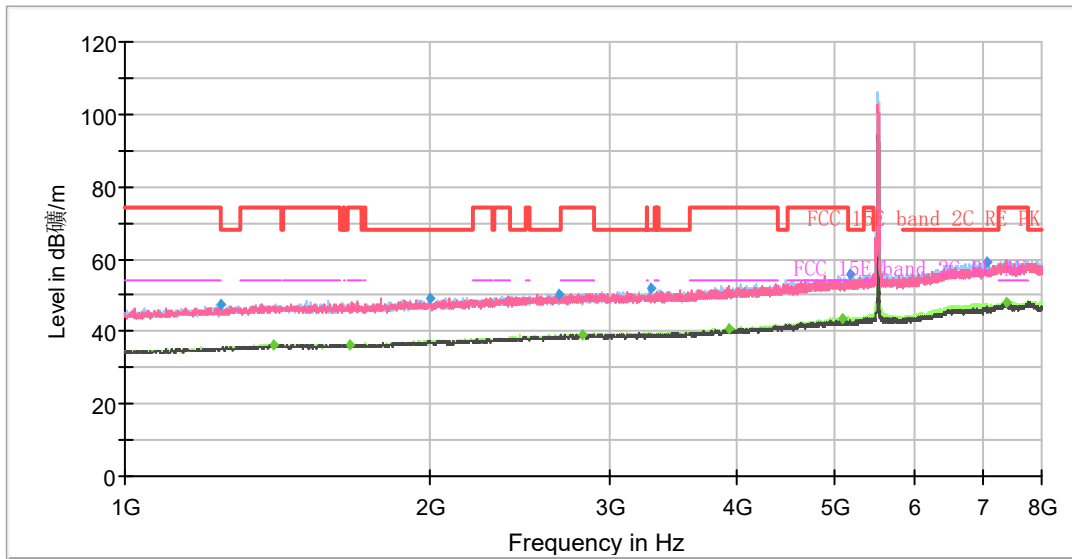


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1091.00	---	35.10	54.00	18.90	500.00	200.0	H	37.00	-9
1295.75	47.51	---	68.20	20.69	500.00	100.0	H	131.00	-8
1421.75	---	36.98	54.00	17.02	500.00	200.0	H	4.00	-7
1747.25	49.54	---	68.20	18.66	500.00	200.0	H	30.00	-6
2541.75	51.25	---	68.20	16.95	500.00	100.0	H	1.00	-4
2817.38	---	39.71	54.00	14.29	500.00	200.0	H	58.00	-3
3444.75	51.64	---	68.20	16.56	500.00	100.0	V	251.00	-3
3984.63	---	41.42	54.00	12.58	500.00	200.0	H	160.00	-1
5452.00	---	45.82	54.00	8.18	500.00	100.0	H	300.00	4
5469.50	56.89	---	68.20	11.31	500.00	200.0	H	304.00	4
7351.63	---	48.57	54.00	5.43	500.00	200.0	H	126.00	9
7791.75	59.90	---	68.20	8.30	500.00	200.0	H	0.00	9

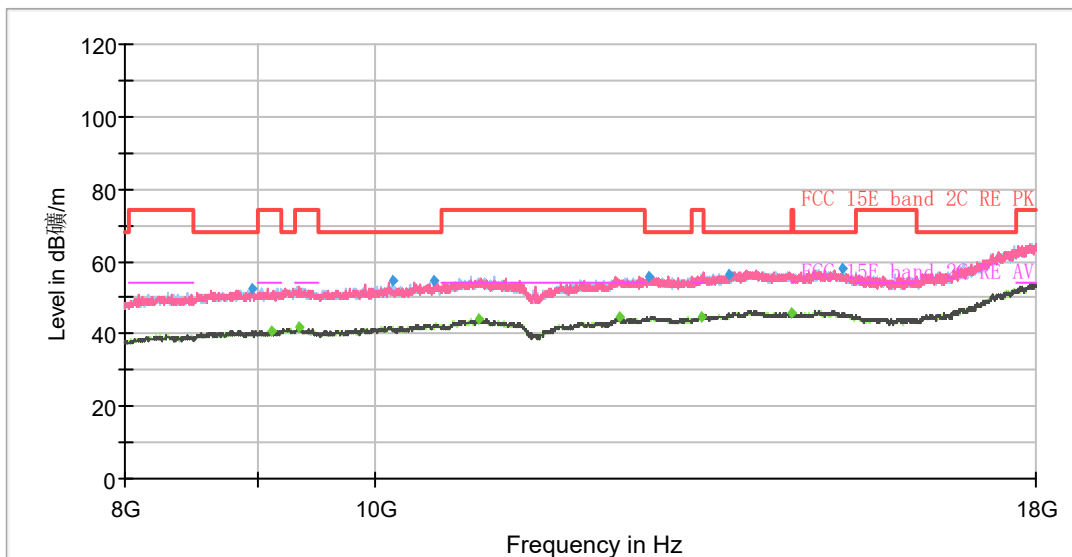
**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

**2. Margin = Limit - MAX Peak/ Average**

## 802.11a CH104



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz



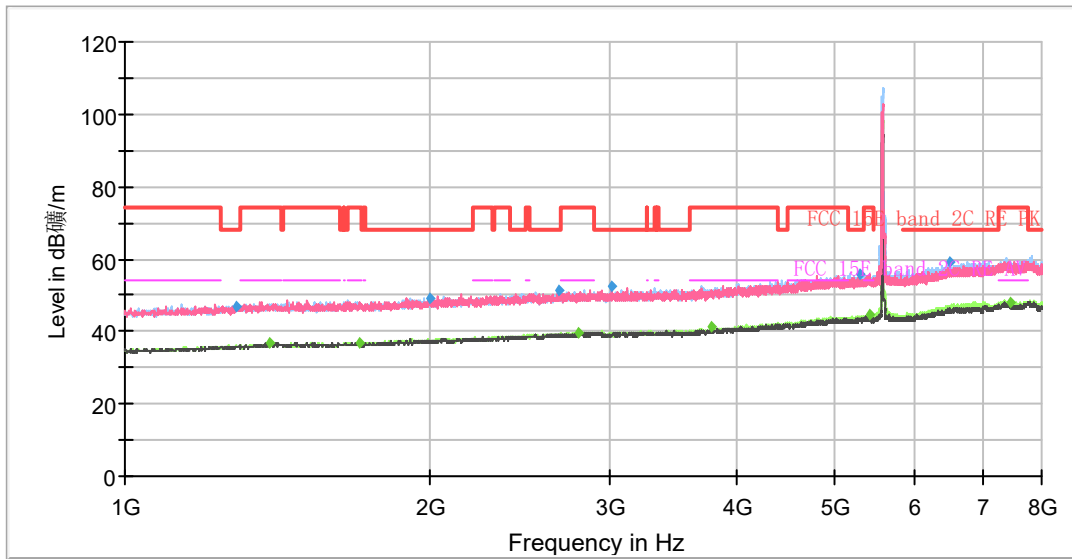
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1243.25	47.18	---	68.20	21.02	500.00	100.0	H	5.00	-8
1399.00	---	36.51	54.00	17.49	500.00	200.0	H	58.00	-7
1661.50	---	36.47	54.00	17.53	500.00	200.0	V	54.00	-6
1994.00	49.18	---	68.20	19.02	500.00	100.0	V	265.00	-5
2673.88	50.32	---	68.20	17.88	500.00	200.0	V	336.00	-4
2816.50	---	39.27	54.00	14.73	500.00	200.0	H	72.00	-3
3290.75	51.68	---	68.20	16.52	500.00	200.0	H	51.00	-3
3933.88	---	40.71	54.00	13.29	500.00	200.0	H	112.00	-1
5097.63	---	43.63	54.00	10.37	500.00	100.0	H	335.00	3
5169.38	55.54	---	68.20	12.66	500.00	200.0	H	99.00	3
7068.13	58.95	---	68.20	9.25	500.00	200.0	H	86.00	8
7383.13	---	48.03	54.00	5.97	500.00	200.0	H	207.00	9

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

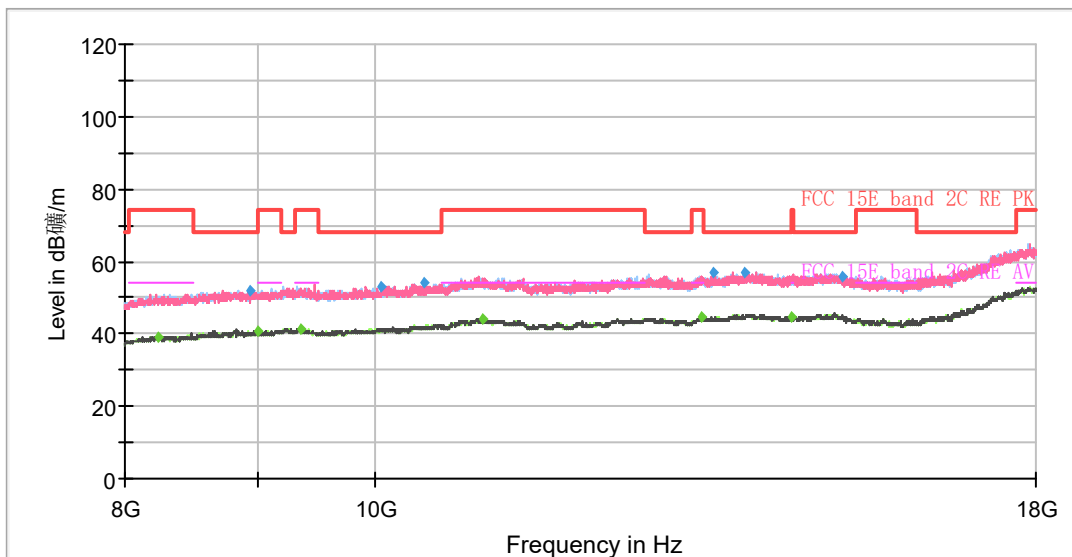
2. Margin = Limit - MAX Peak/ Average



802.11a CH116



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz

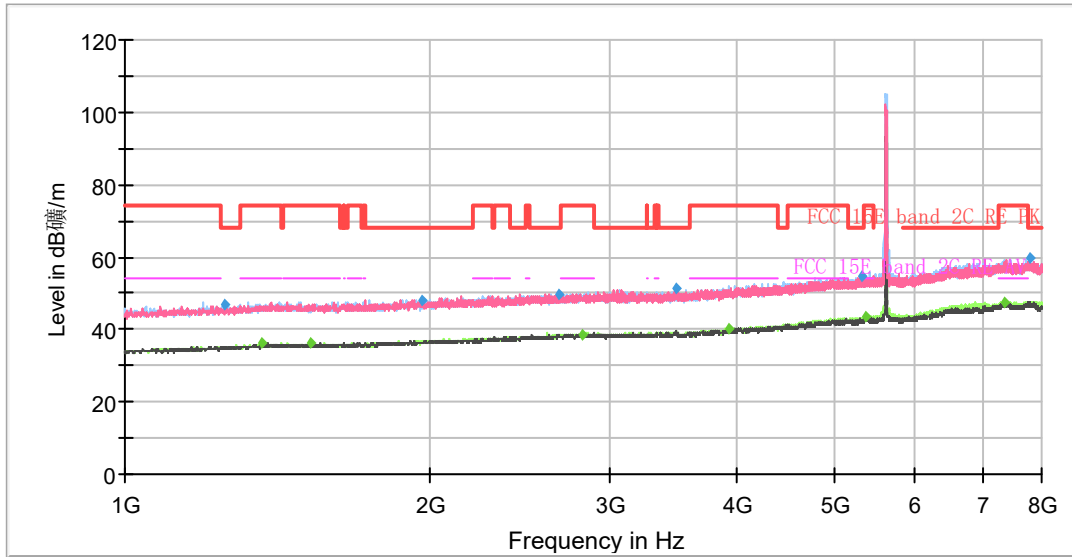


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1287.00	46.98	---	68.20	21.22	500.00	200.0	H	124.00	-8
1389.38	---	36.97	54.00	17.03	500.00	100.0	H	225.00	-7
1706.13	---	36.92	54.00	17.08	500.00	100.0	V	146.00	-6
1997.50	49.21	---	68.20	18.99	500.00	200.0	V	95.00	-5
2673.00	51.54	---	68.20	16.66	500.00	200.0	H	195.00	-4
2802.50	---	39.55	54.00	14.45	500.00	100.0	H	347.00	-3
3016.88	52.69	---	68.20	15.51	500.00	100.0	V	112.00	-3
3778.13	---	41.42	54.00	12.58	500.00	200.0	H	83.00	-2
5287.50	55.63	---	68.20	12.57	500.00	100.0	H	294.00	3
5416.13	---	44.51	54.00	9.49	500.00	200.0	H	0.00	4
6502.00	58.95	---	68.20	9.25	500.00	100.0	H	359.00	8
7449.63	---	47.99	54.00	6.01	500.00	200.0	H	215.00	9

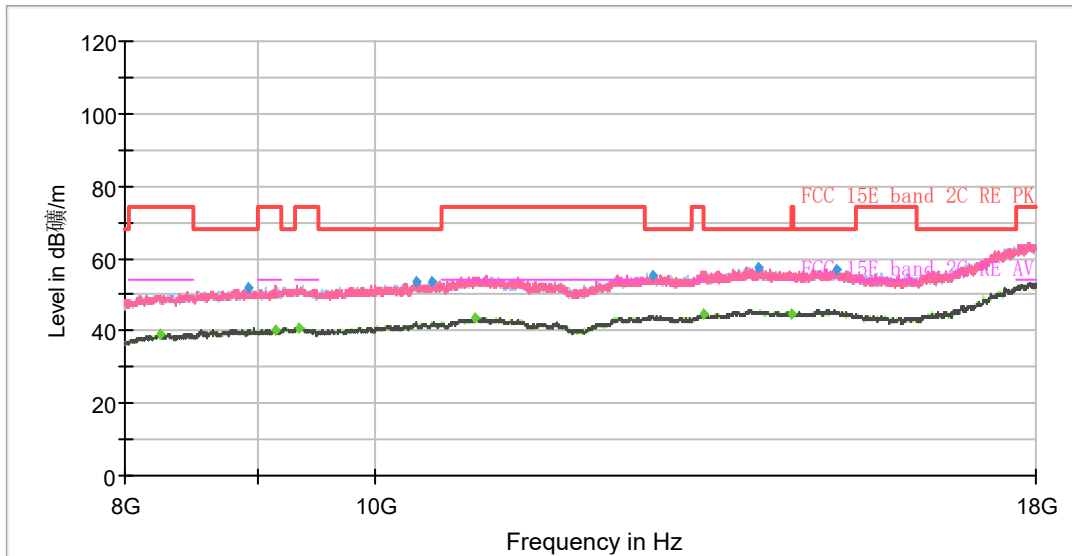
**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

**2. Margin = Limit –MAX Peak/ Average**

## 802.11a CH124



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz



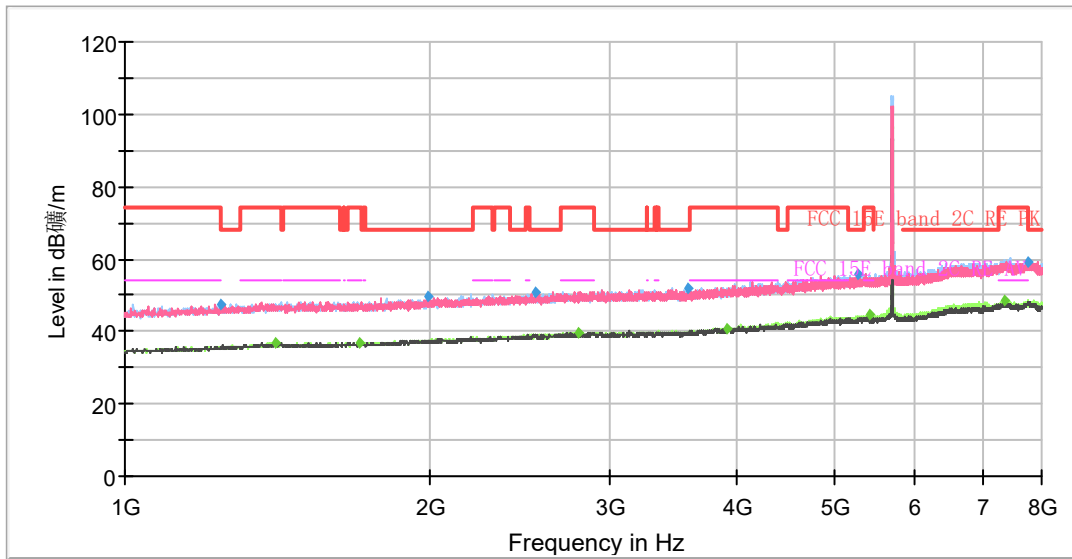


Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1252.00	46.70	---	68.20	21.50	500.00	200.0	H	210.00	-8
1361.38	---	36.22	54.00	17.78	500.00	100.0	V	327.00	-7
1525.88	---	36.35	54.00	17.65	500.00	200.0	V	243.00	-6
1959.88	48.19	---	68.20	20.01	500.00	200.0	H	142.00	-5
2680.88	49.82	---	68.20	18.38	500.00	200.0	H	175.00	-4
2827.00	---	38.75	54.00	15.25	500.00	200.0	V	250.00	-3
3492.00	51.26	---	68.20	16.94	500.00	200.0	H	2.00	-3
3934.75	---	40.23	54.00	13.77	500.00	200.0	H	196.00	-1
5322.50	54.94	---	68.20	13.26	500.00	100.0	H	333.00	4
5373.25	---	43.61	54.00	10.39	500.00	100.0	H	333.00	4
7365.63	---	47.56	54.00	6.44	500.00	100.0	H	326.00	9
7776.88	59.72	---	68.20	8.48	500.00	200.0	H	115.00	9

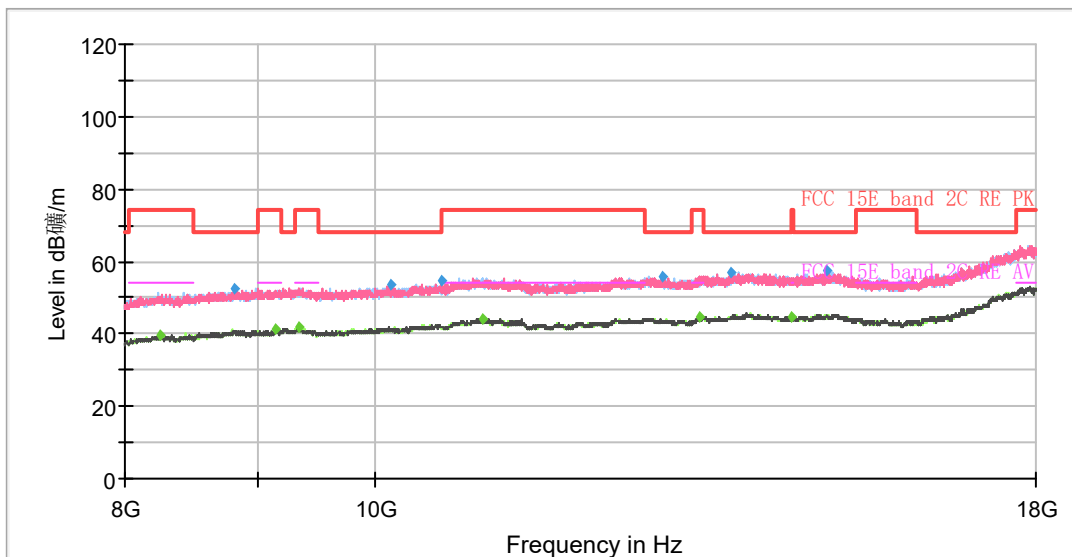
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit - MAX Peak/ Average

## 802.11a CH140



Radiates Emission from 1GHz to 8GHz  
Note: The signal beyond the limit is carrier.



Radiates Emission from 8GHz to 18GHz



Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1243.25	47.51	---	68.20	20.69	500.00	200.0	H	181.00	-8
1407.75	---	36.92	54.00	17.08	500.00	200.0	H	0.00	-7
1701.75	---	36.95	54.00	17.05	500.00	200.0	V	191.00	-6
1992.25	49.54	---	68.20	18.66	500.00	100.0	H	188.00	-5
2533.00	50.69	---	68.20	17.51	500.00	100.0	H	343.00	-4
2797.25	---	39.77	54.00	14.23	500.00	200.0	H	52.00	-3
3585.63	51.71	---	68.20	16.49	500.00	200.0	V	0.00	-2
3925.13	---	41.01	54.00	12.99	500.00	100.0	V	56.00	-1
5272.63	55.64	---	68.20	12.56	500.00	200.0	H	24.00	3
5416.13	---	44.58	54.00	9.42	500.00	100.0	H	295.00	4
7360.38	---	48.50	54.00	5.50	500.00	200.0	H	2.00	9
7758.50	59.28	---	68.20	8.92	500.00	200.0	V	321.00	9

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit - MAX Peak/ Average