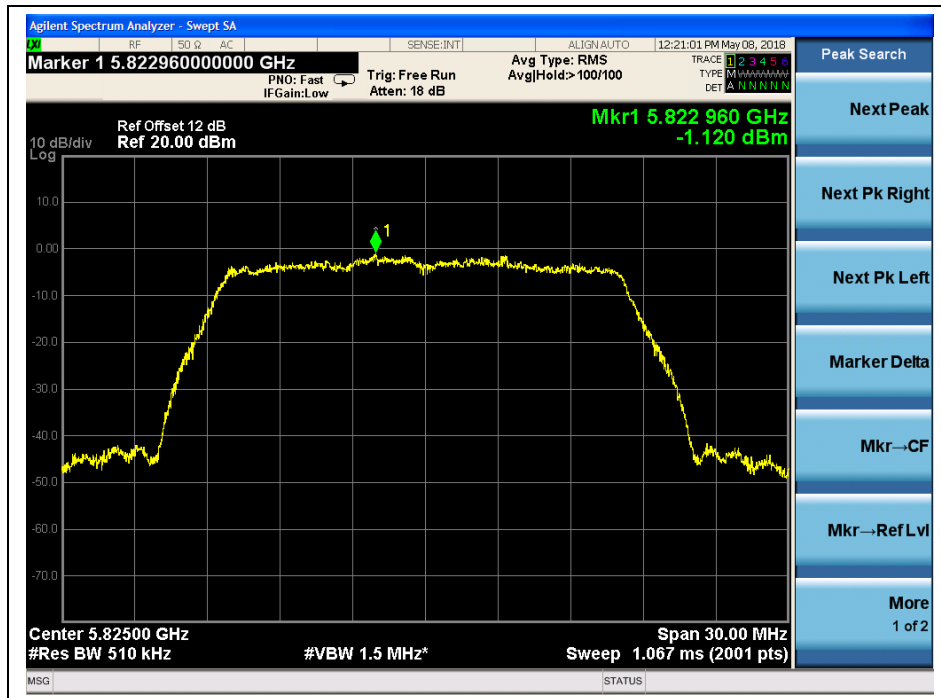
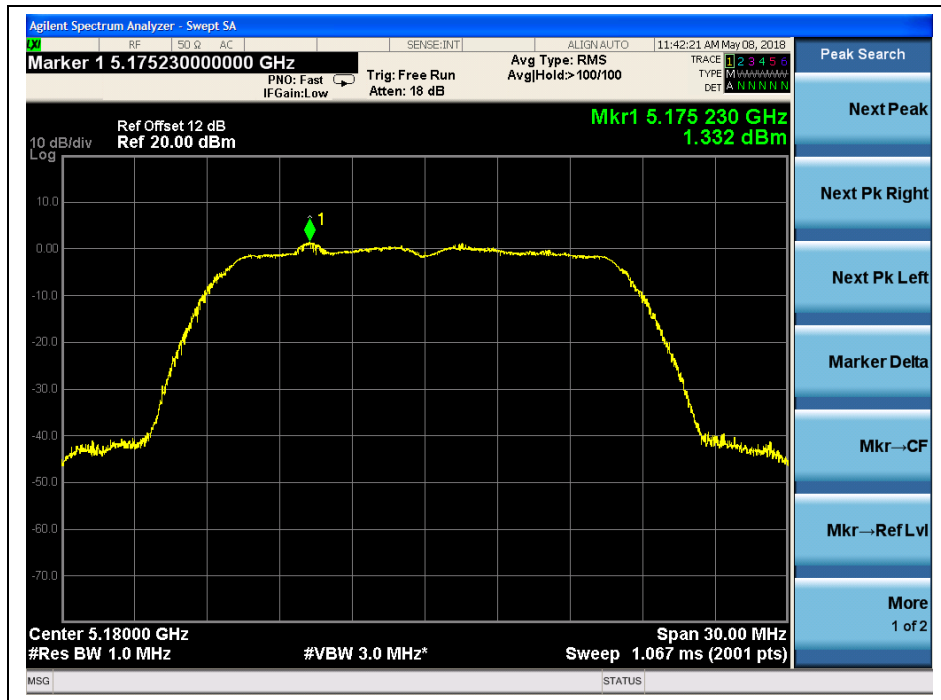


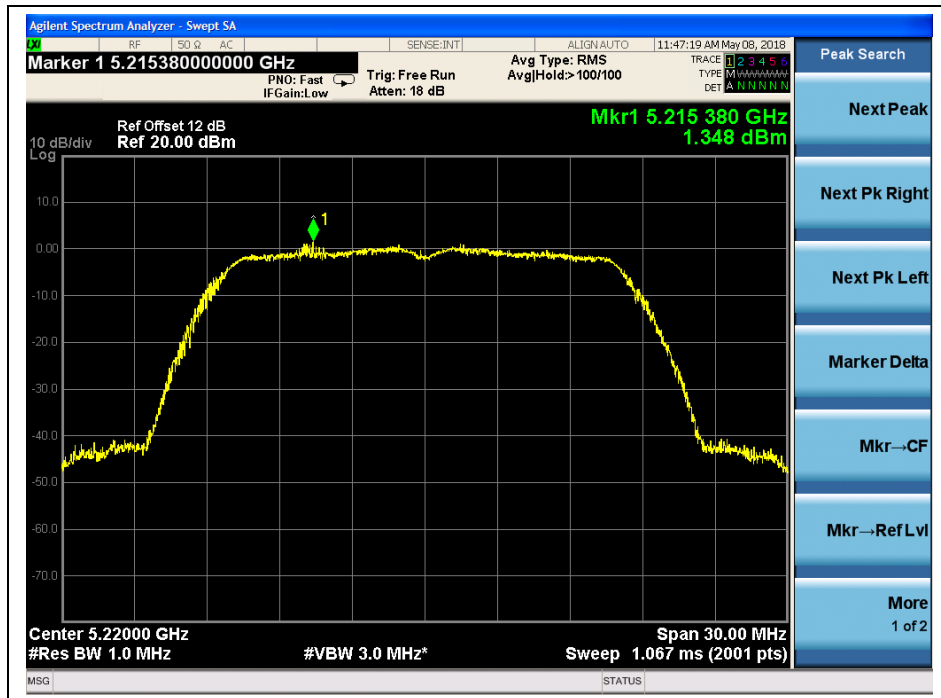
(Channel 157, 5785MHz, 802.11a, ANT0)



(Channel 165, 5825MHz, 802.11a, ANT0)



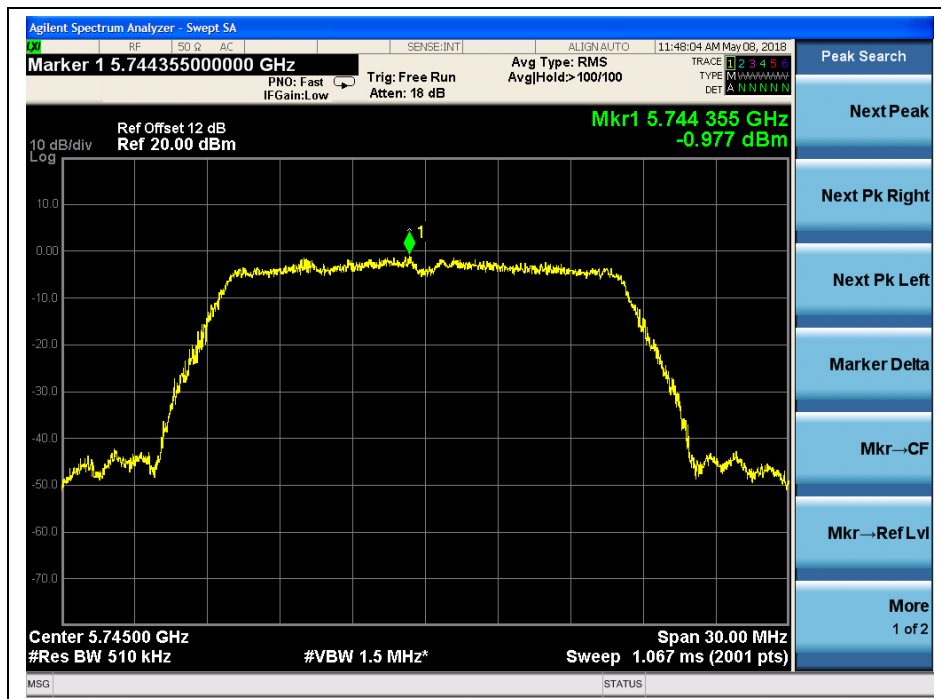
(Channel 36, 5180MHz, 802.11a, ANT1)



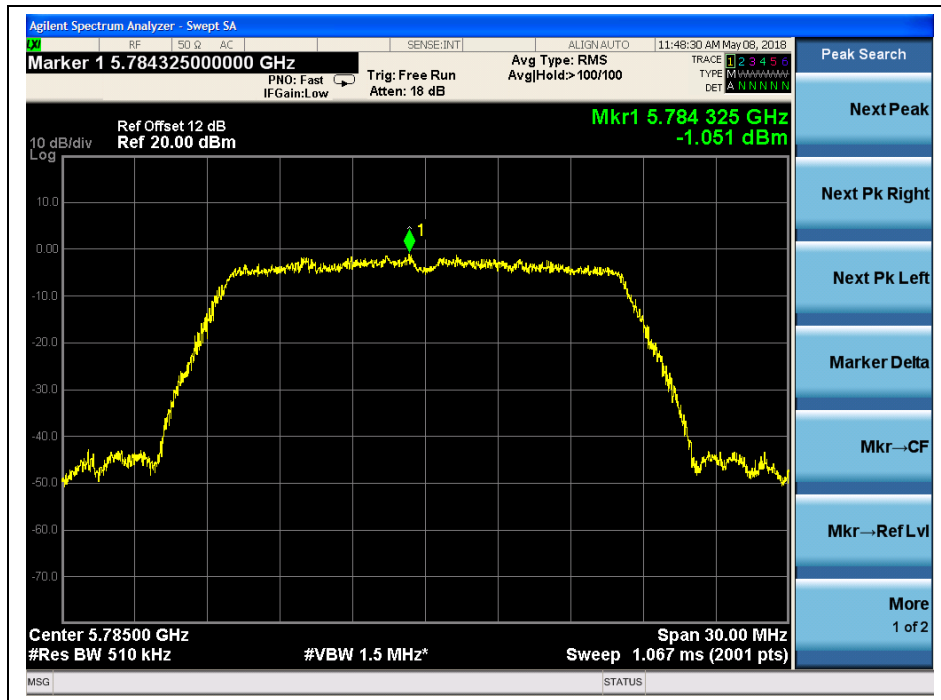
(Channel 44, 5220 MHz, 802.11a, ANT1)



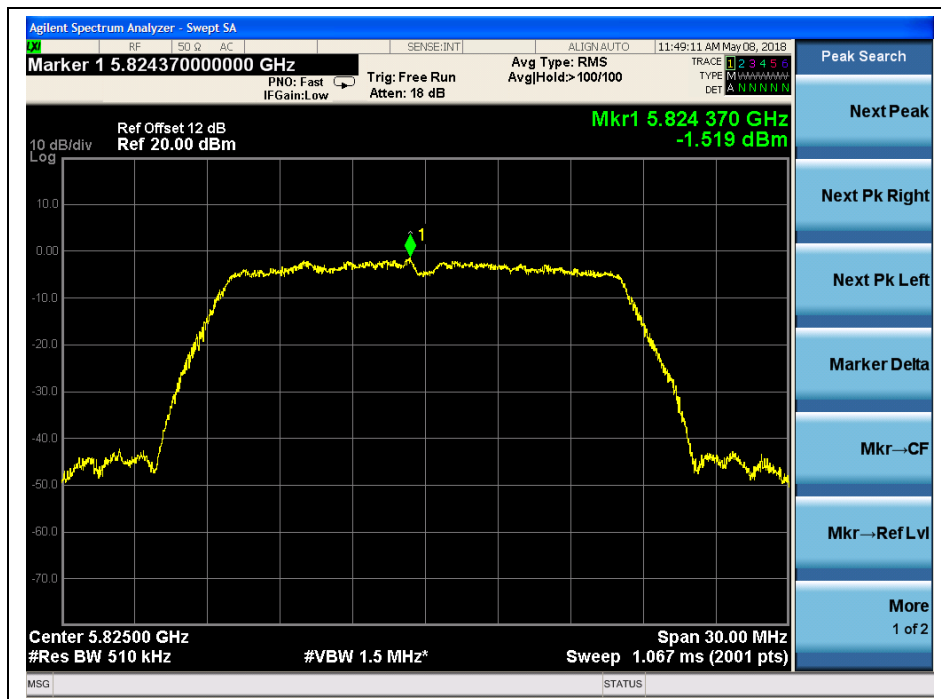
(Channel 48, 5240MHz, 802.11a, ANT1)



(Channel 149, 5745MHz, 802.11a, ANT1)



(Channel 157, 5785MHz, 802.11a, ANT1)



(Channel 165, 5825MHz, 802.11a, ANT1)



**802.11n (HT20) Test mode**

**A. Test Verdict:**

Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/MHz)	ANT1 Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	-0.37	1.71	11	PASS
44	5220	0.10	1.45		
48	5240	-0.64	1.27		
Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/500KHz)	ANT1 Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	-0.57	0.48	30	PASS
157	5785	-0.97	0.45		
165	5825	-1.23	0.43		

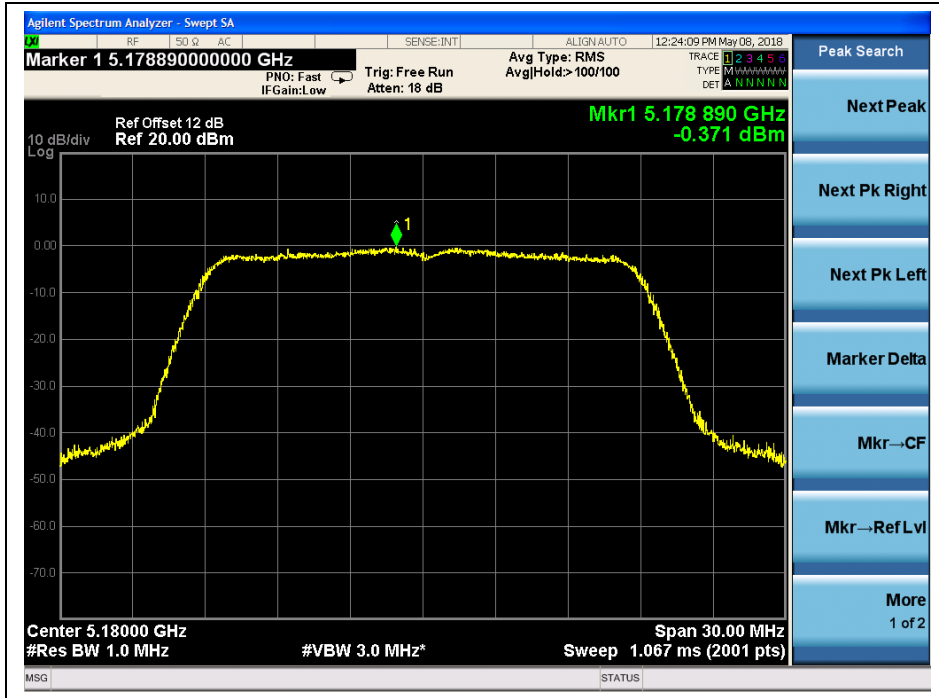
**Total Peak Power spectral density (ANT0+ANT1)**

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	3.80	7.49	PASS
44	5220	3.84		
48	5240	3.43		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	3.00	26.49	PASS
157	5785	2.81		
165	5825	2.69		

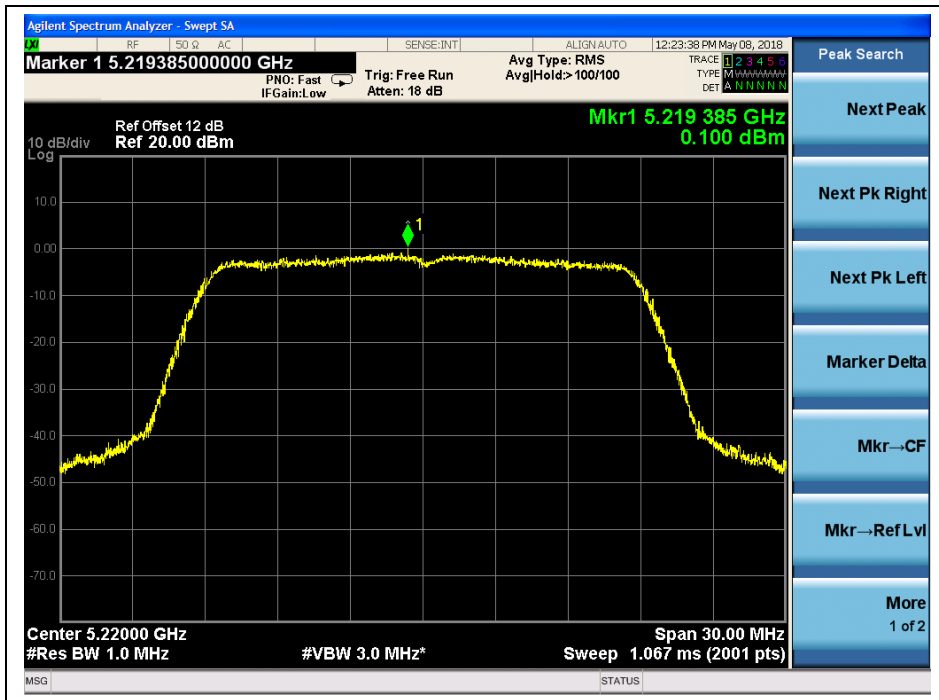
**Note:** Directional gain = 6.5dBi + 10log(2) = 9.51dBi > 6dBi, so the power limit shall be reduced to 11-(9.51-6) = 7.49dBm for 5.15-5.25 GHz band and be reduced 30-(9.51-6) = 26.49dBm for 5.725-5.85 GHz band.



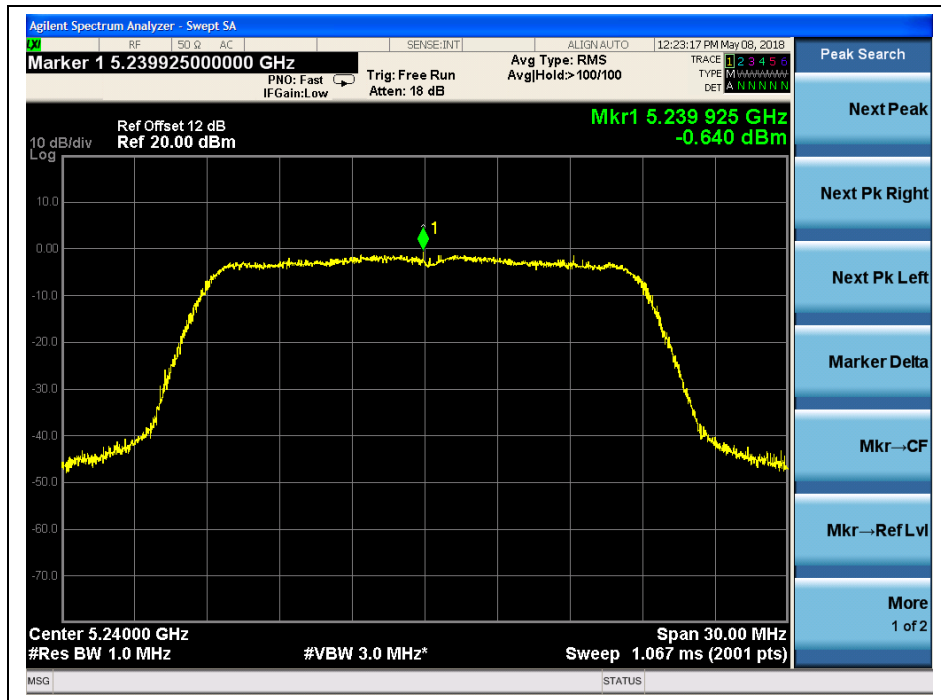
B. Test Plots



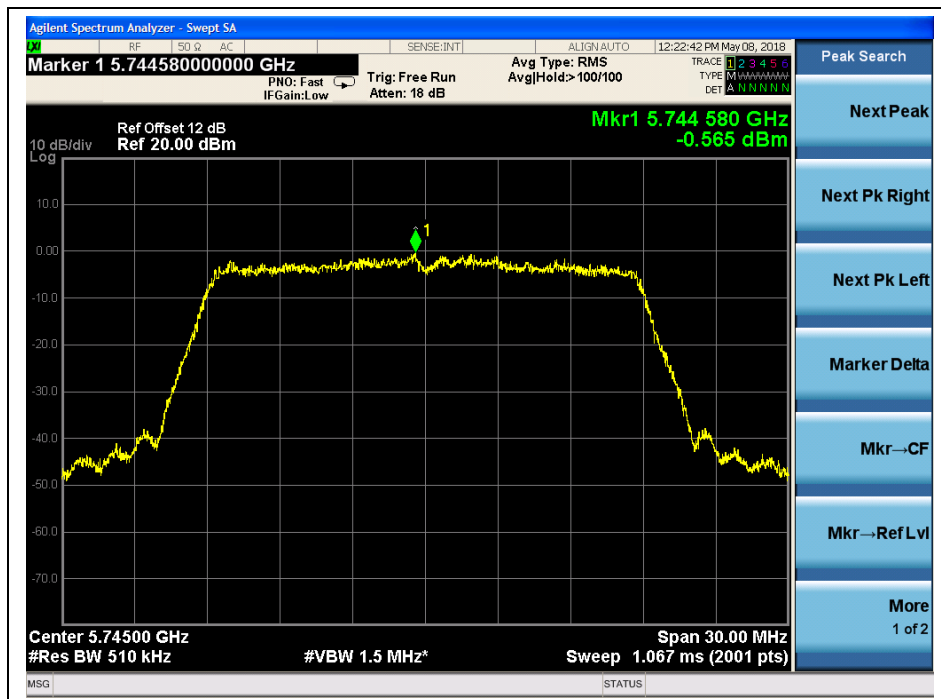
(Channel 36, 5180MHz, 802.11 n (HT20), ANT0)



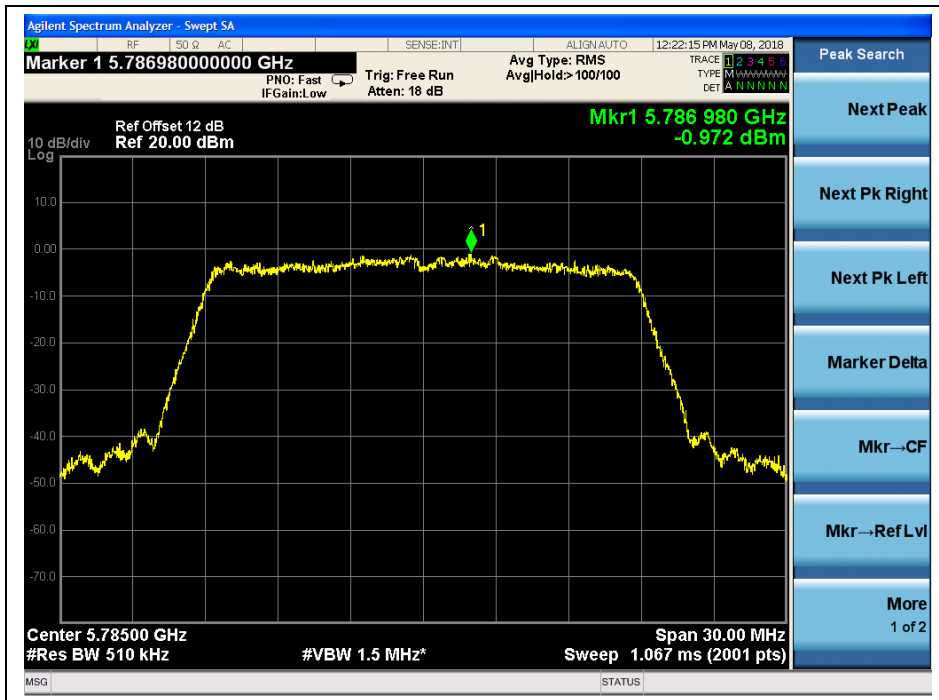
(Channel 44, 5220 MHz, 802.11 n (HT20), ANT0)



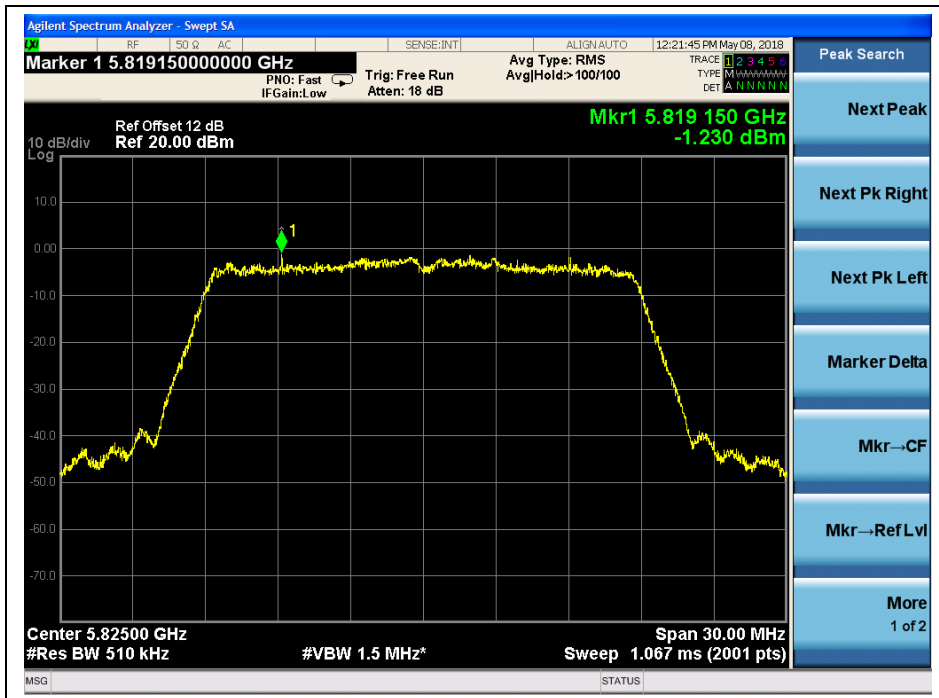
(Channel 48, 5240MHz, 802.11 n (HT20), ANT0)



(Channel 149, 5745MHz, 802.11 n (HT20), ANT0)

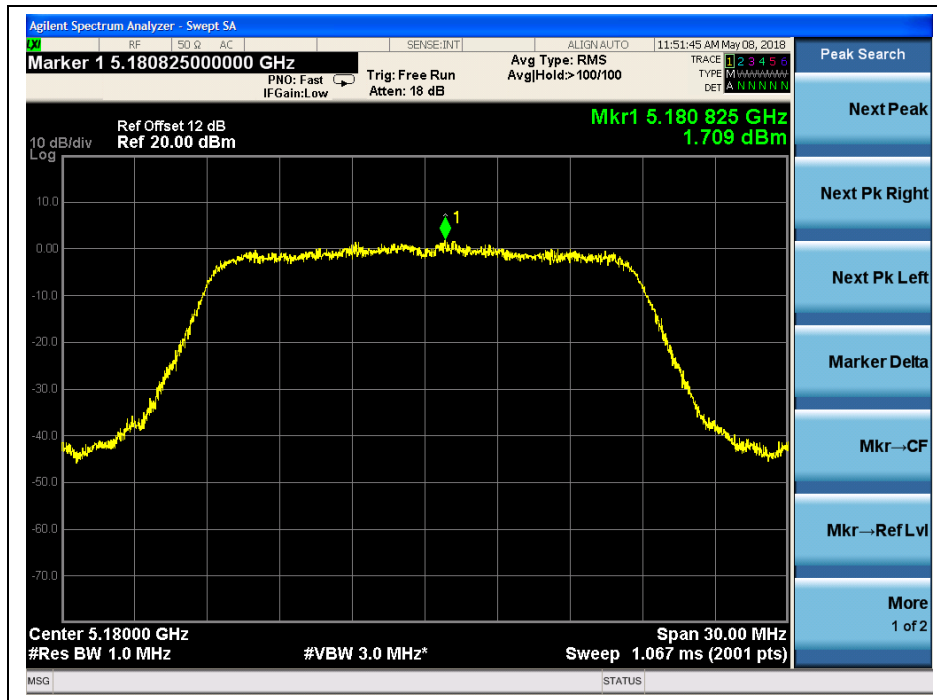


(Channel 157, 5785MHz, 802.11 n (HT20), ANT0)

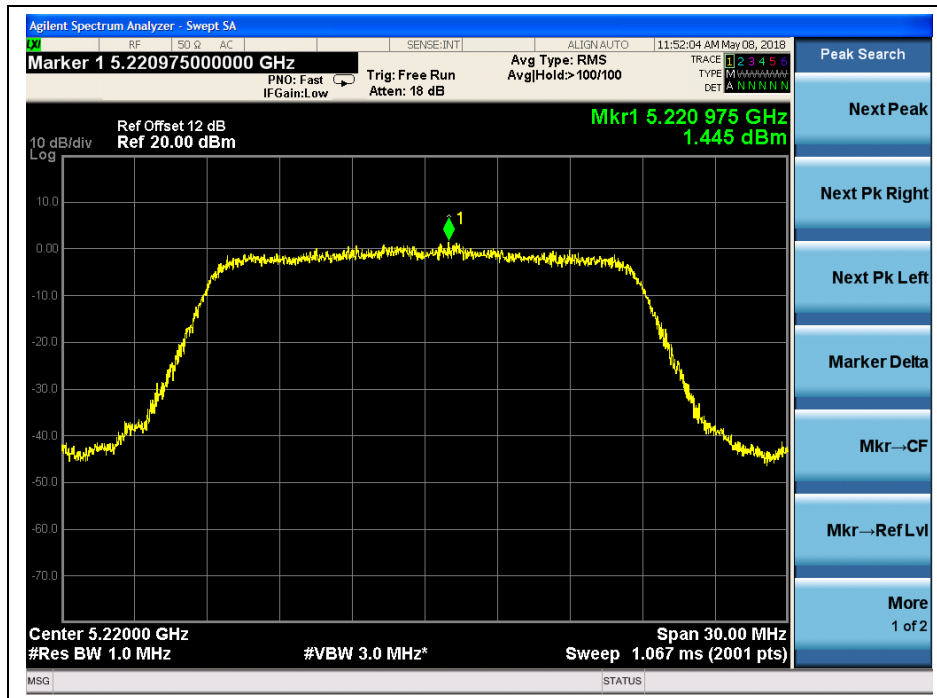


(Channel 165, 5825MHz, 802.11 n (HT20), ANT0)

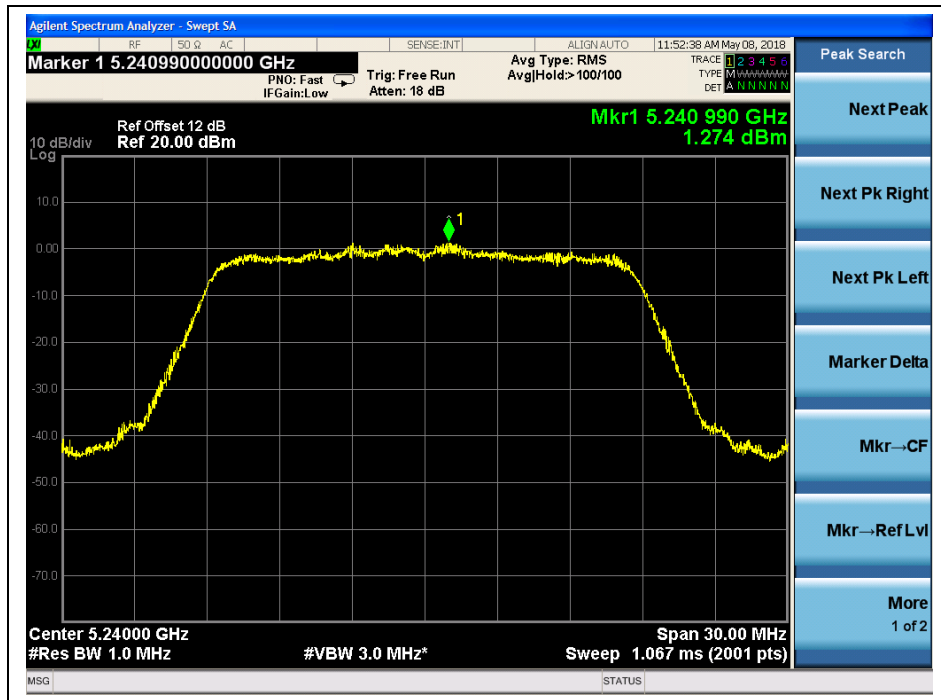




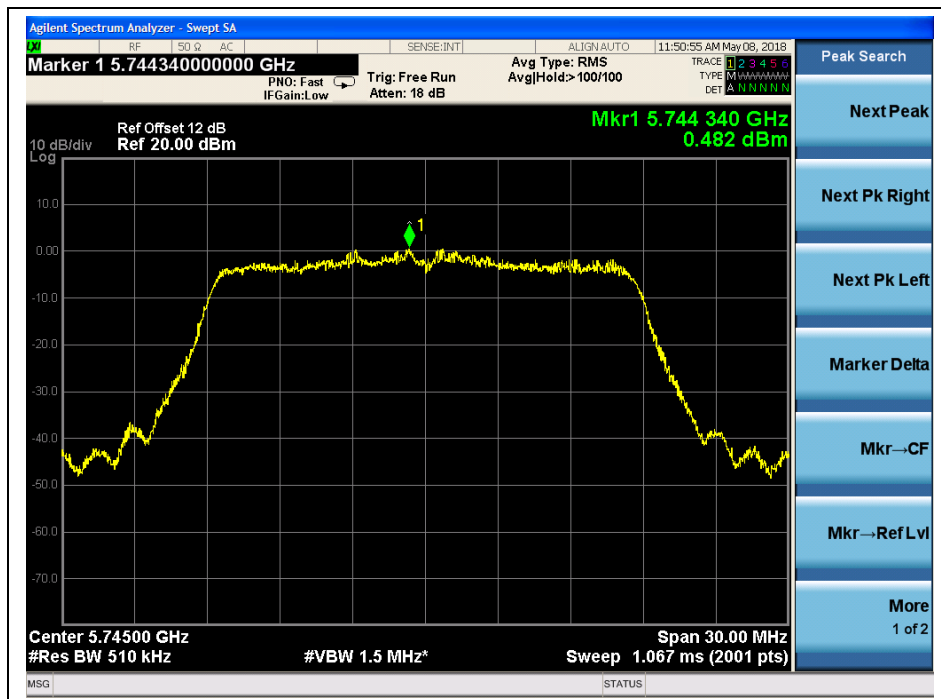
(Channel 36, 5180MHz, 802.11 n (HT20), ANT1)



(Channel 44, 5220 MHz, 802.11 n (HT20), ANT1)



(Channel 48, 5240MHz, 802.11 n (HT20), ANT1)



(Channel 149, 5745MHz, 802.11 n (HT20), ANT1)



(Channel 157, 5785MHz, 802.11 n (HT20), ANT1)



(Channel 165, 5825MHz, 802.11 n (HT20), ANT1)



**802.11n (HT40) Test mode**

**A. Test Verdict:**

Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/MHz)	ANT1 Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	-2.19	-1.28	11	PASS
46	5230	-2.19	-1.98		
Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/500KHz)	ANT1 Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-2.67	-1.94	30	PASS
159	5795	-3.20	-2.05		

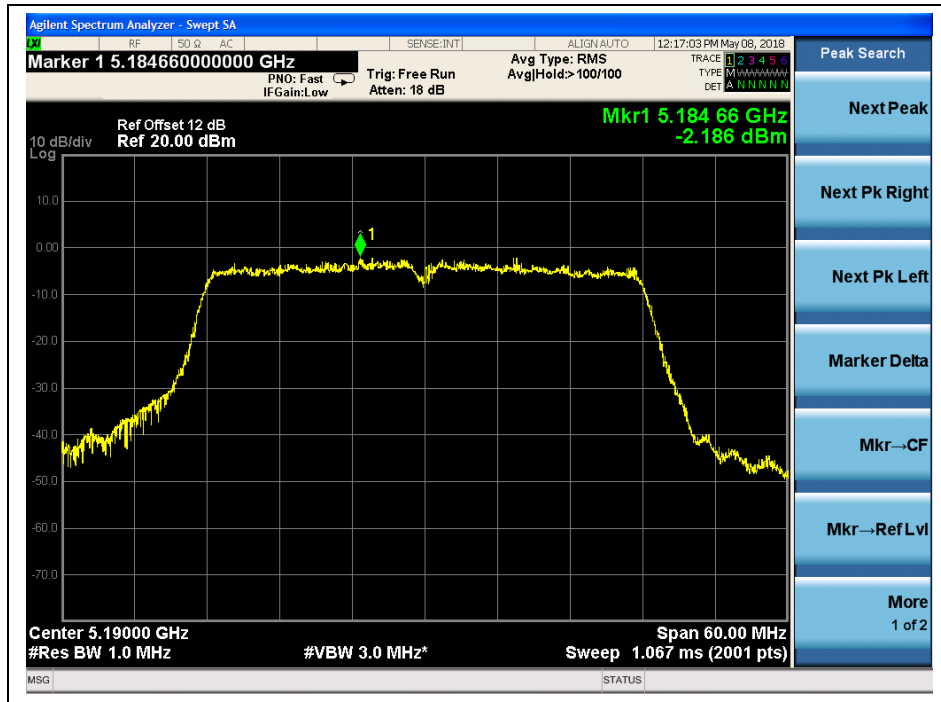
**Total Peak Power spectral density (ANT0+ANT1)**

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	1.30	7.49	PASS
46	5230	0.93		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	0.72	26.49	PASS
159	5795	0.42		

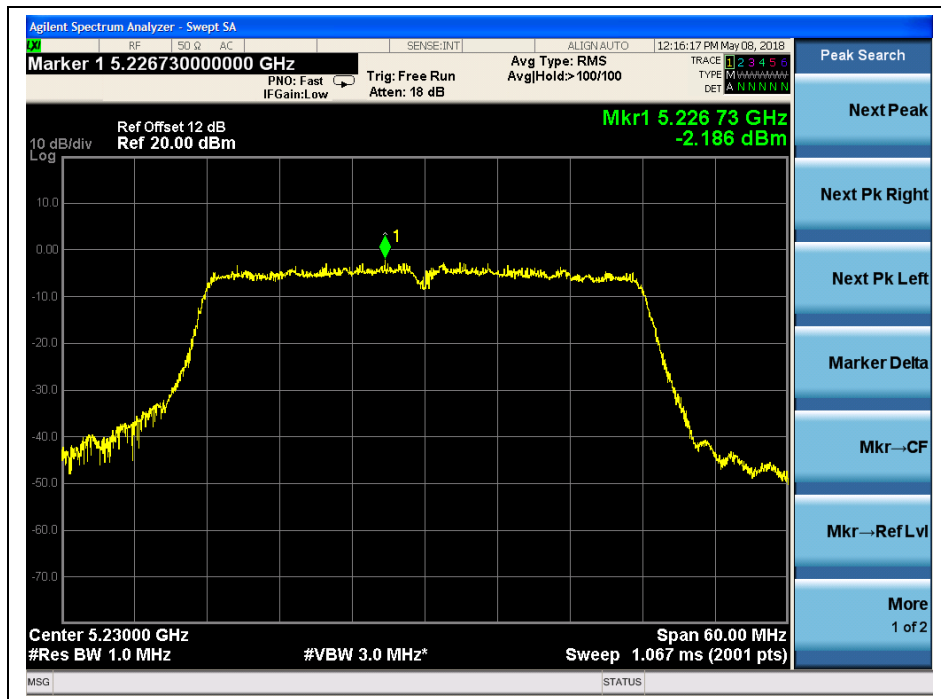
**Note:** Directional gain = 6.5dBi + 10log(2) = 9.51dBi > 6dBi, so the power limit shall be reduced to 11-(9.51-6) = 7.49dBm for 5.15-5.25 GHz band and be reduced 30-(9.51-6) = 26.49dBm for 5.725-5.85 GHz band.



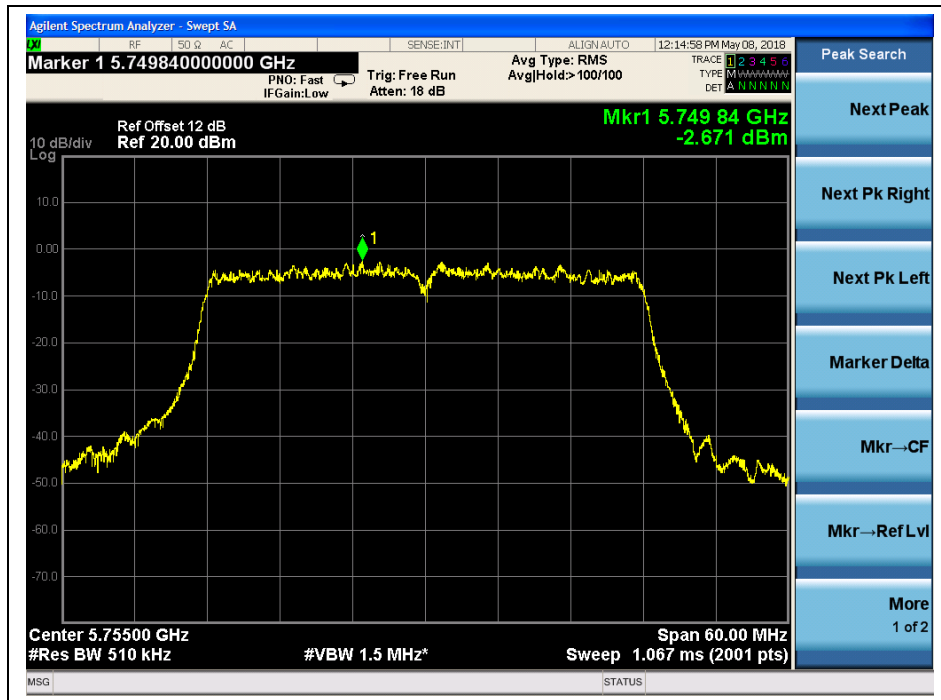
B. Test Plots



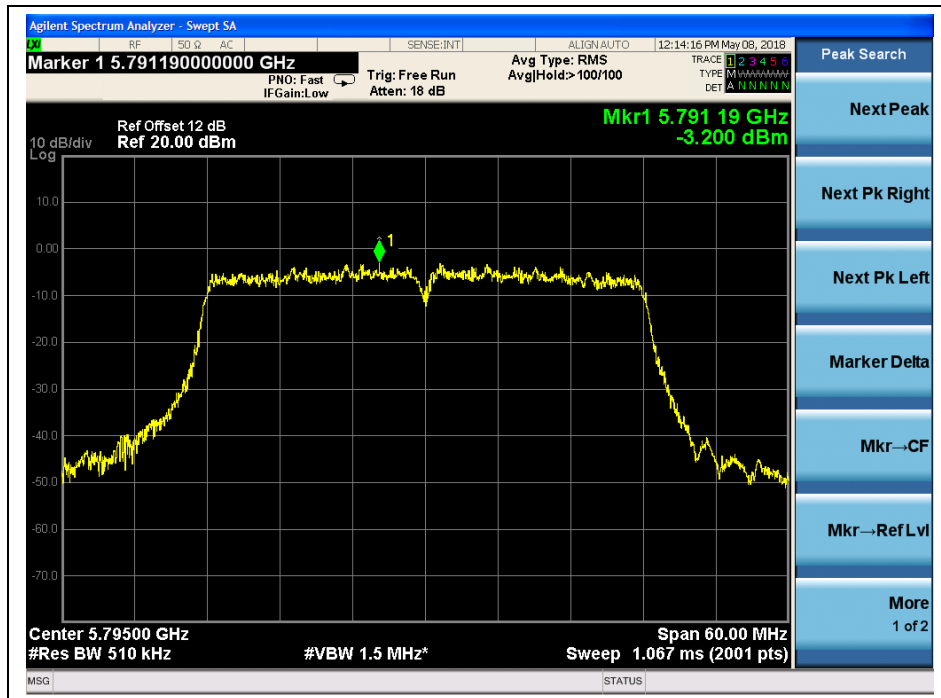
(Channel 38, 5190MHz, 802.11n (HT40), ANT0)



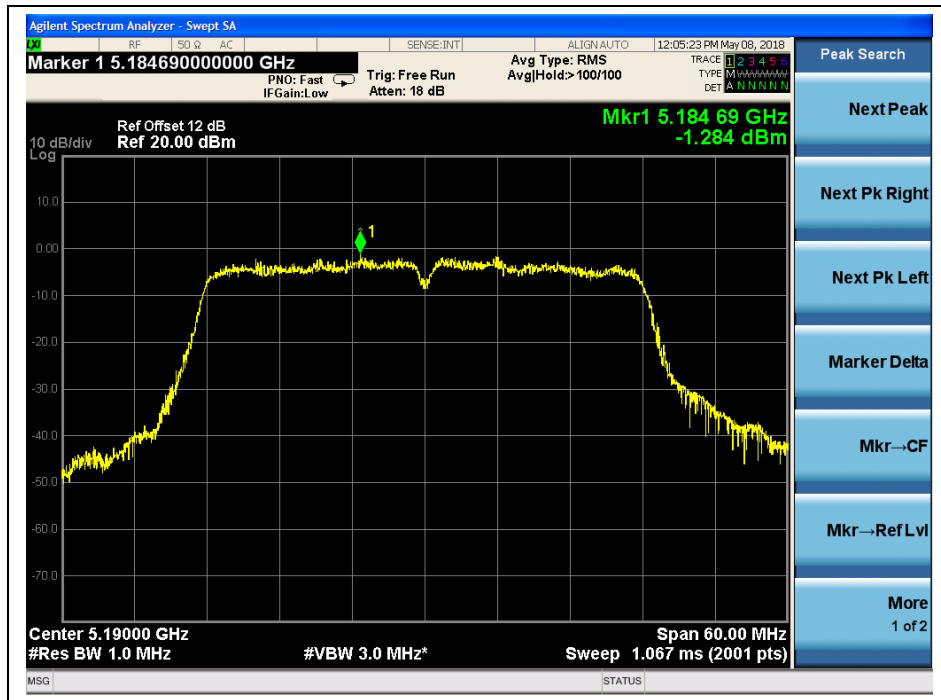
(Channel 46, 5230 MHz, 802.11n (HT40), ANT0)



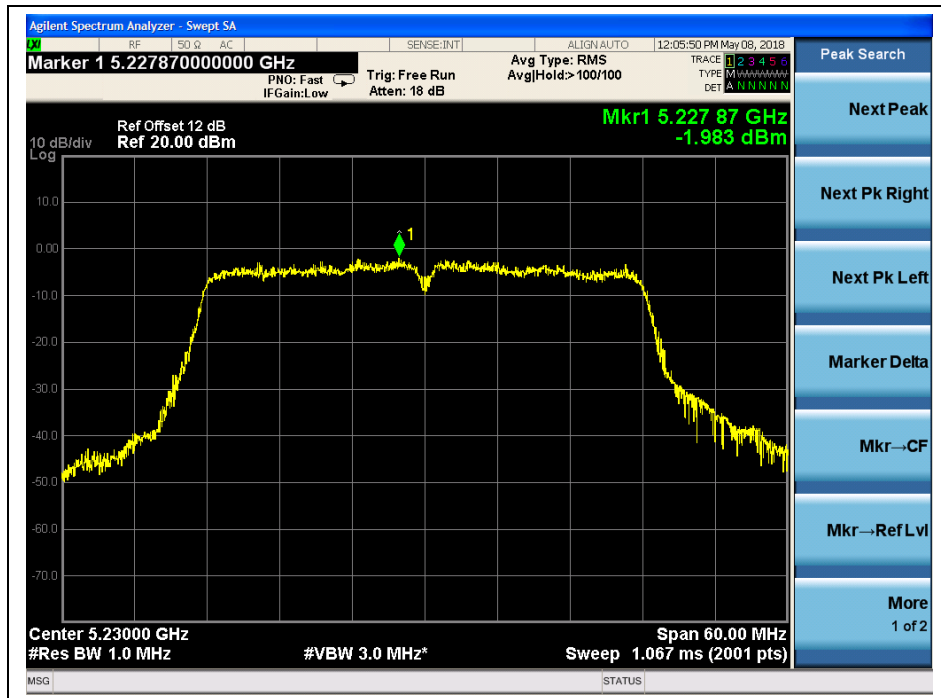
(Channel 151, 5755 MHz, 802.11n (HT40), ANT0)



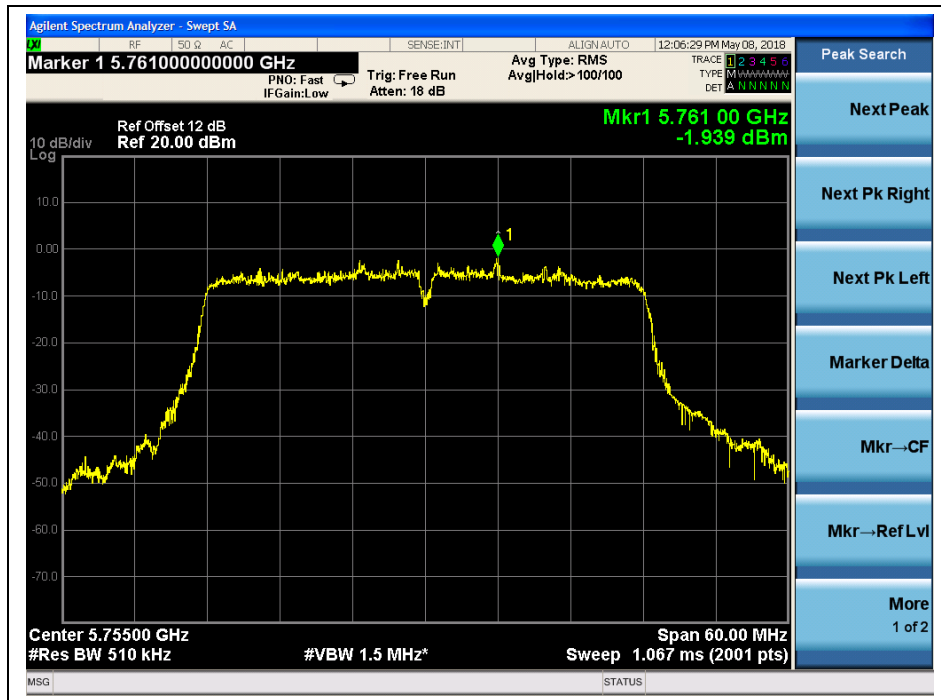
(Channel 159, 5795MHz, 802.11n (HT40), ANT0)



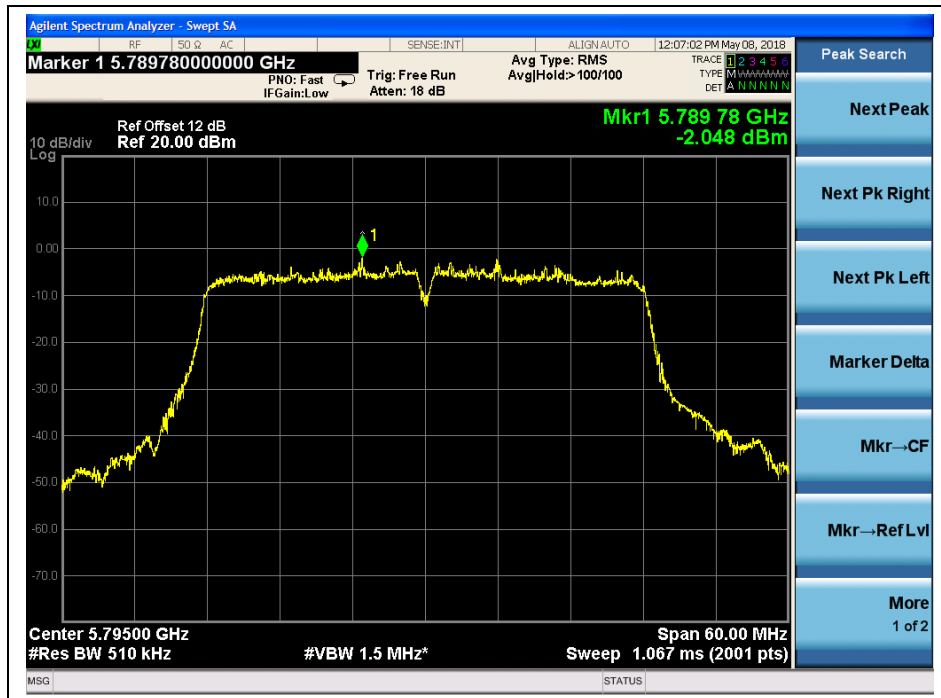
(Channel 38, 5190MHz, 802.11n (HT40), ANT1)



(Channel 46, 5230 MHz, 802.11n (HT40), ANT1)



(Channel 151, 5755 MHz, 802.11n (HT40), ANT1)



(Channel 159, 5795MHz, 802.11n (HT40), ANT1)





**802.11 ac (VHT20) Test mode**

**A. Test Verdict:**

Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/MHz)	ANT1 Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	1.99	1.84	11	PASS
44	5220	1.42	1.31		
48	5240	0.89	1.09		
Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/500KHz)	ANT1 Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	1.21	0.12	30	PASS
157	5785	0.78	-0.03		
165	5825	0.35	-0.27		

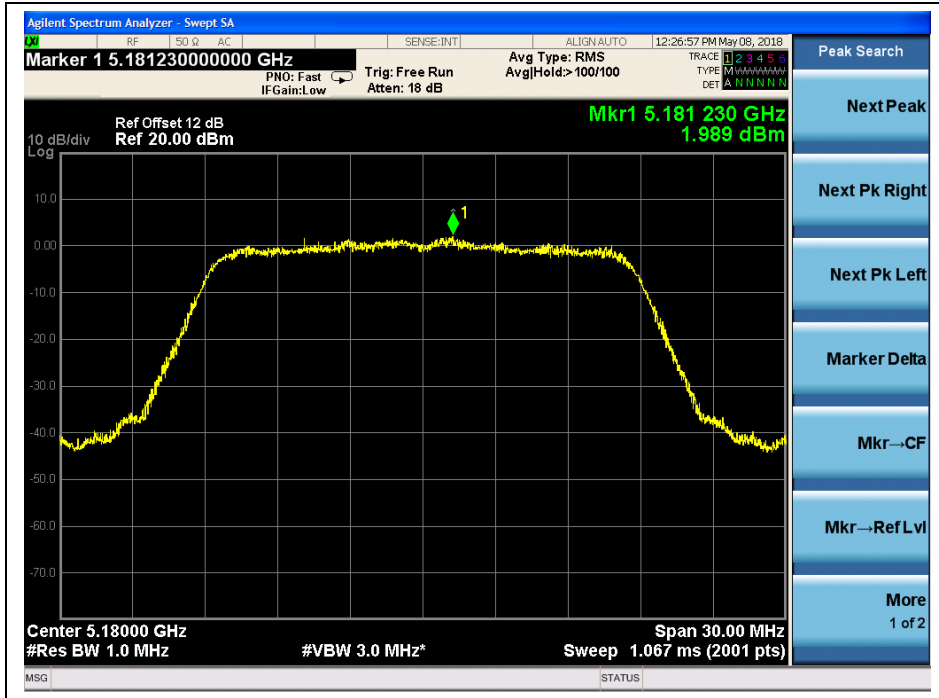
**Total Peak Power spectral density (ANT0+ANT1)**

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	4.93	7.49	PASS
44	5220	4.38		
48	5240	4.00		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	3.71	26.49	PASS
157	5785	3.40		
165	5825	3.06		

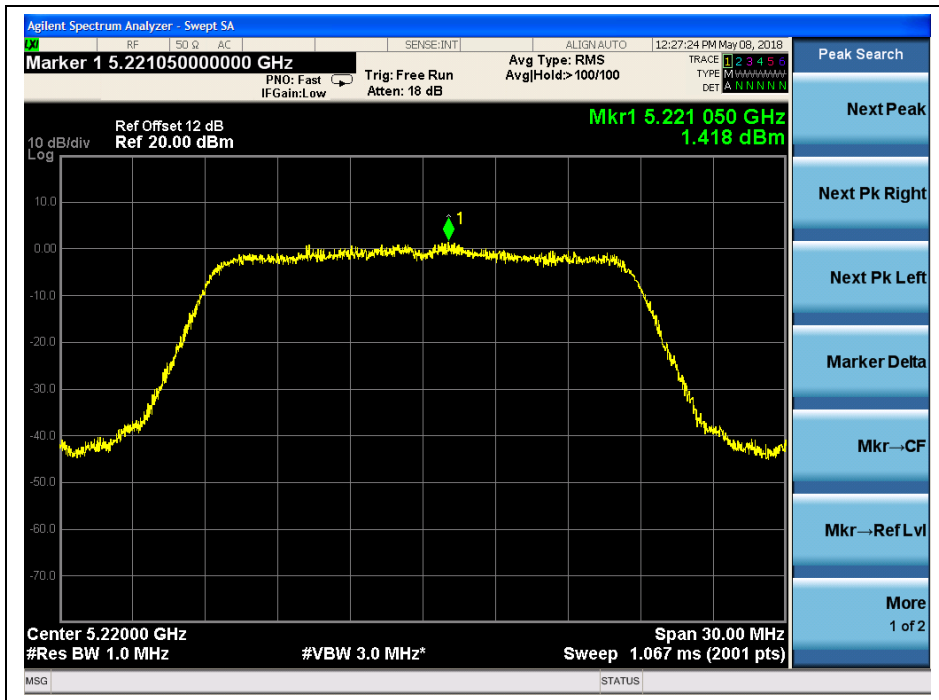
**Note:** Directional gain = 6.5dBi + 10log(2) = 9.51dBi > 6dBi, so the power limit shall be reduced to 11-(9.51-6) = 7.49dBm for 5.15-5.25 GHz band and be reduced 30-(9.51-6) = 26.49dBm for 5.725-5.85 GHz band.



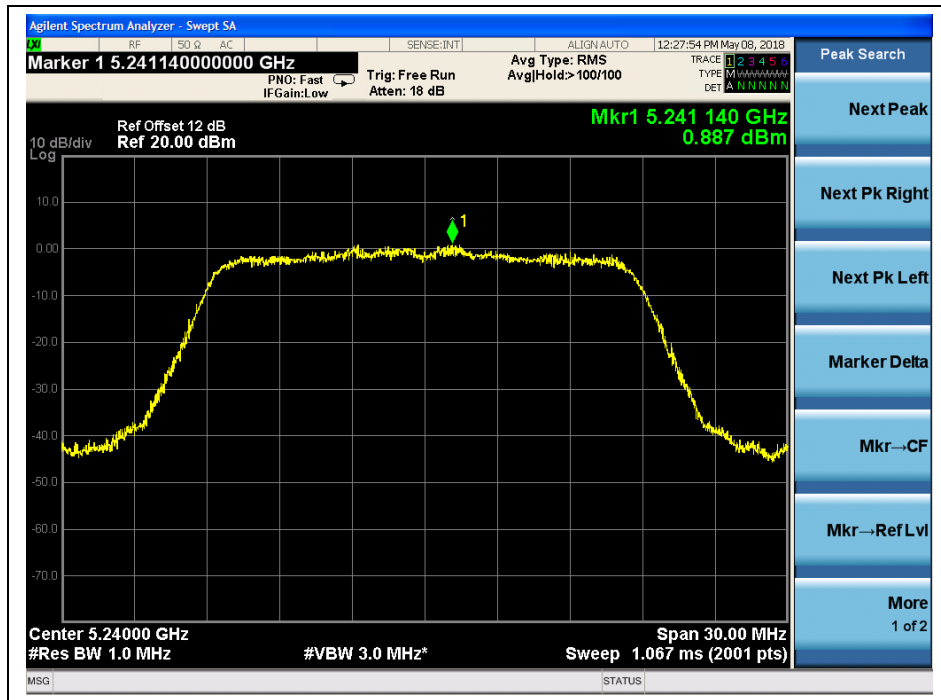
B. Test Plots



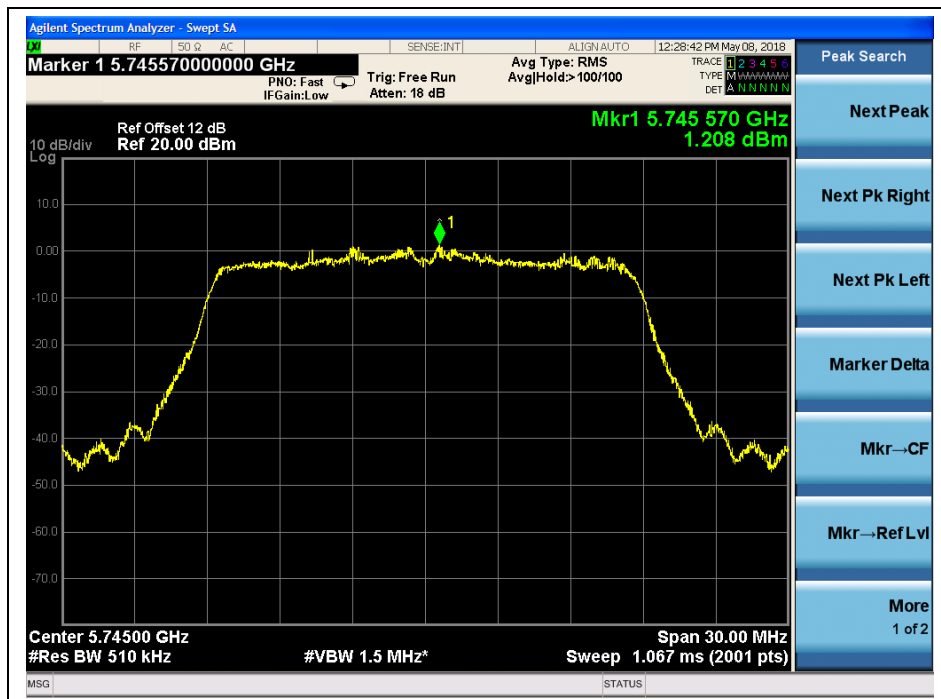
(Channel 36, 5180MHz, 802.11 ac (VHT20), ANT0)



(Channel 44, 5220 MHz, 802.11 ac (VHT20), ANT0)



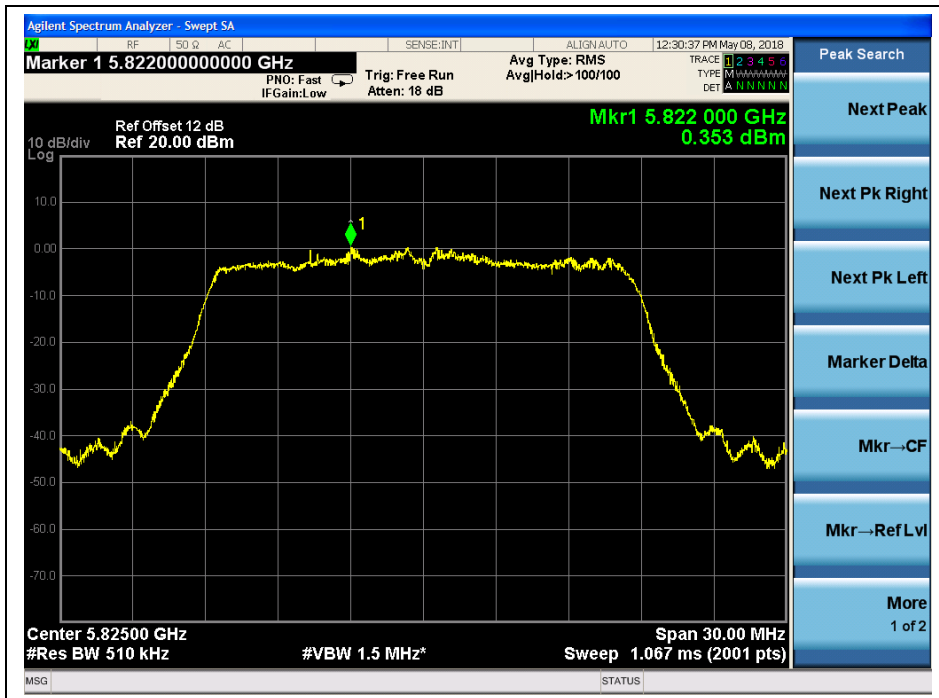
(Channel 48, 5240MHz, 802.11 ac (VHT20), ANT0)



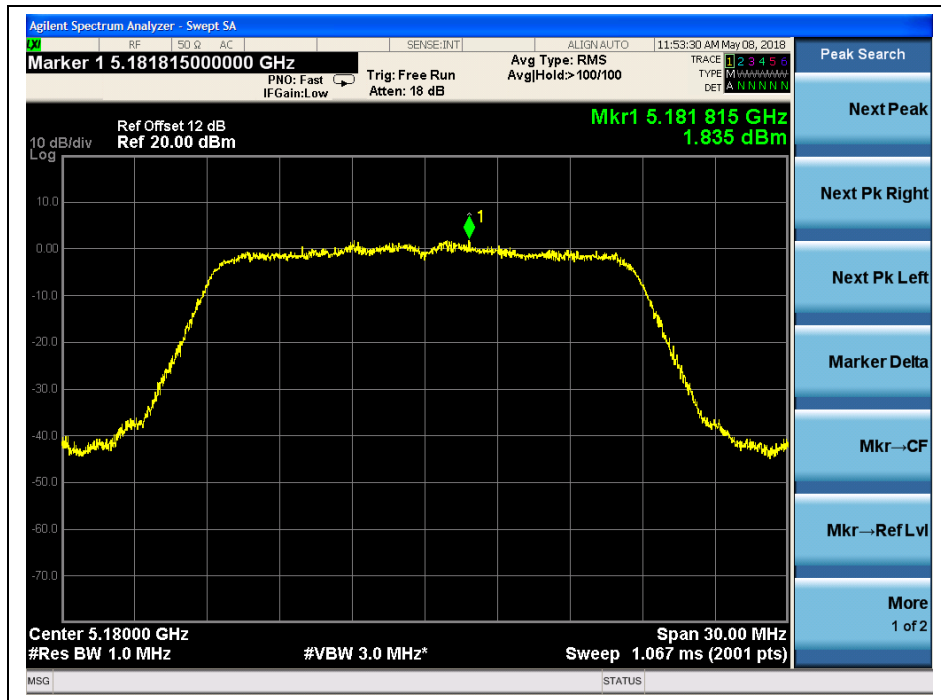
(Channel 149, 5745MHz, 802.11 ac (VHT20), ANT0)



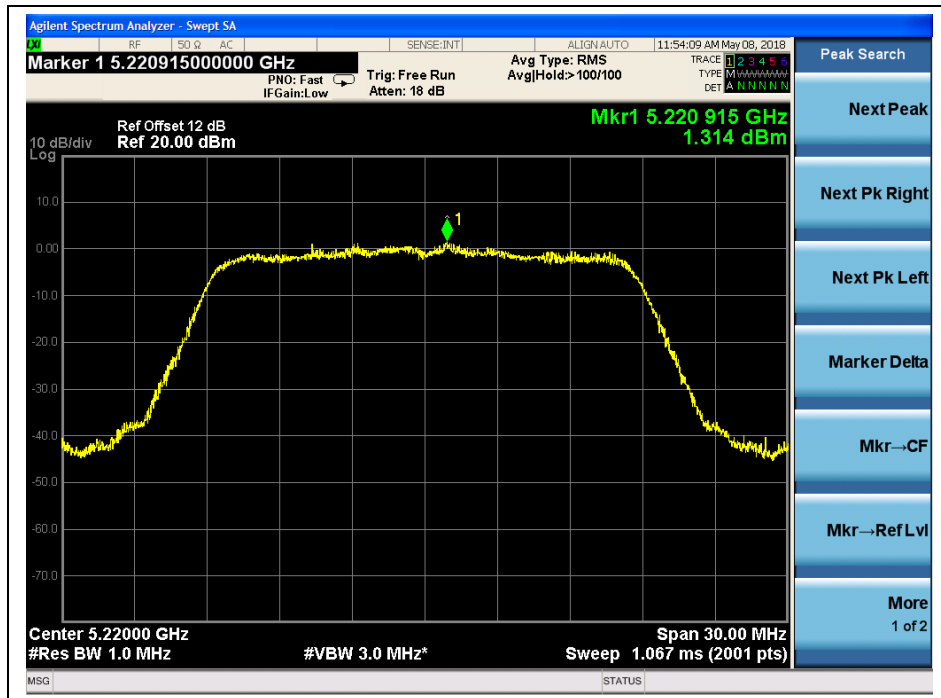
(Channel 157, 5785MHz, 802.11 ac (VHT20), ANT0)



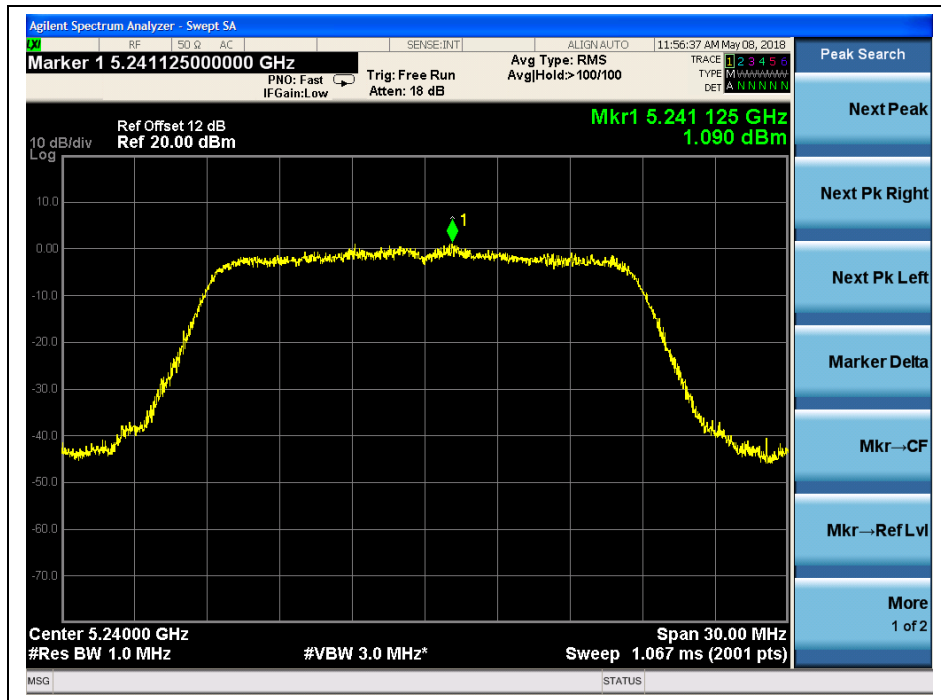
(Channel 165, 5825MHz, 802.11 ac (VHT20), ANT0)



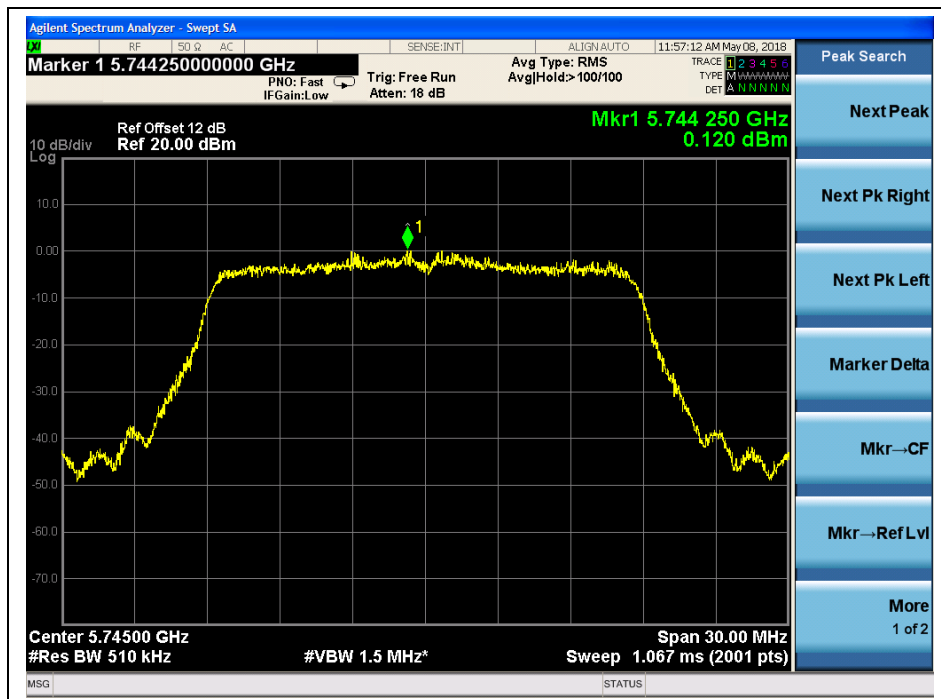
(Channel 36, 5180MHz, 802.11 ac (VHT20), ANT1)



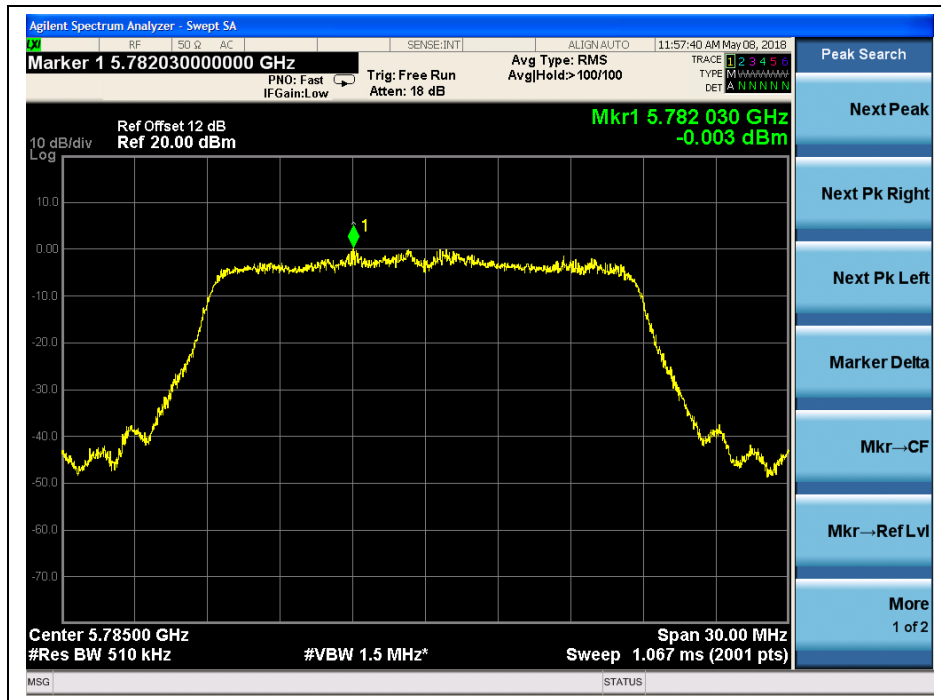
(Channel 44, 5220 MHz, 802.11 ac (VHT20), ANT1)



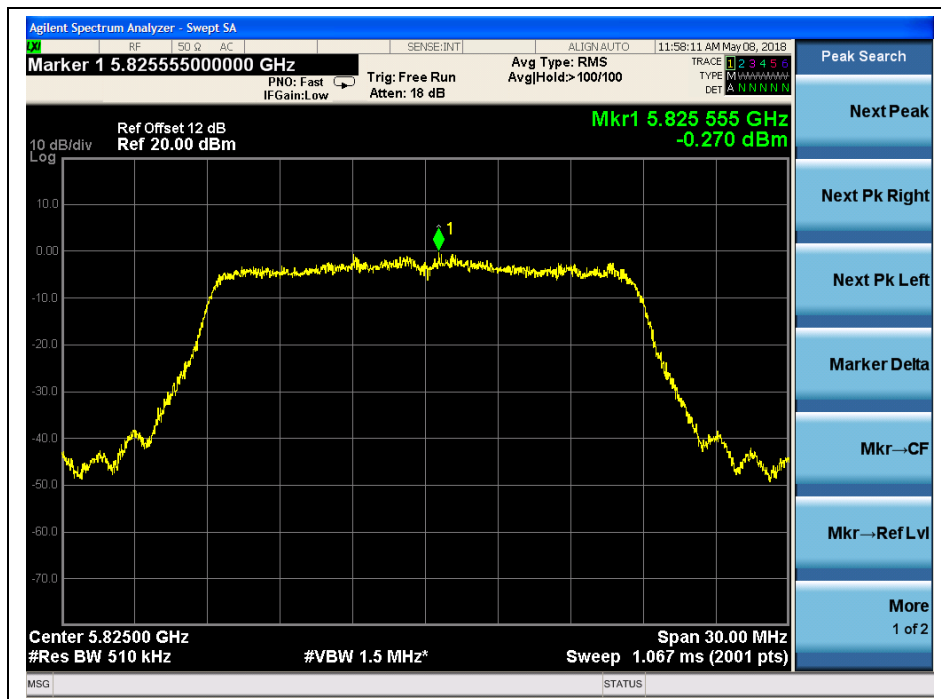
(Channel 48, 5240MHz, 802.11 ac (VHT20), ANT1)



(Channel 149, 5745MHz, 802.11 ac (VHT20), ANT1)



(Channel 157, 5785MHz, 802.11 ac (VHT20), ANT1)



(Channel 165, 5825MHz, 802.11 ac (VHT20), ANT1)



**802.11 ac (VHT40) Test mode**

**A. Test Verdict:**

Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/MHz)	ANT1 Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	-1.04	-1.07	11	PASS
46	5230	-1.82	-1.58		
Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/500KHz)	ANT1 Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-1.92	-2.46	30	PASS
159	5795	-2.58	-2.34		

**Total Peak Power spectral density (ANT0+ANT1)**

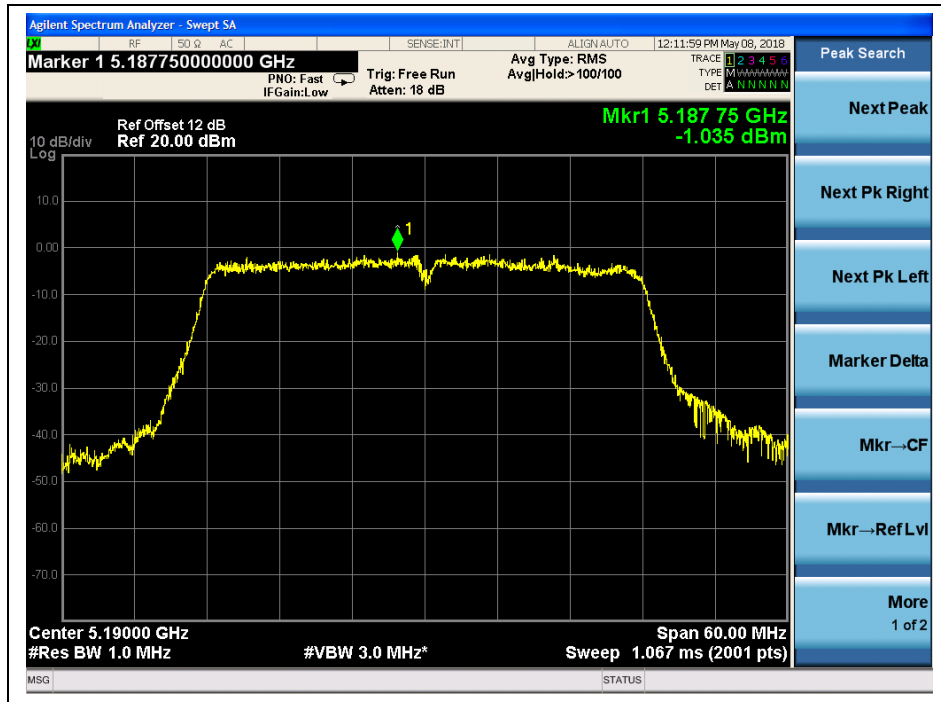
Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	1.96	7.49	PASS
46	5230	1.31		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	0.83	26.49	PASS
159	5795	0.55		

**Note:** Directional gain = 6.5dBi + 10log(2) = 9.51dBi > 6dBi, so the power limit shall be reduced to 11-(9.51-6) = 7.49dBm for 5.15-5.25 GHz band and be reduced 30-(9.51-6) = 26.49dBm for 5.725-5.85 GHz band.

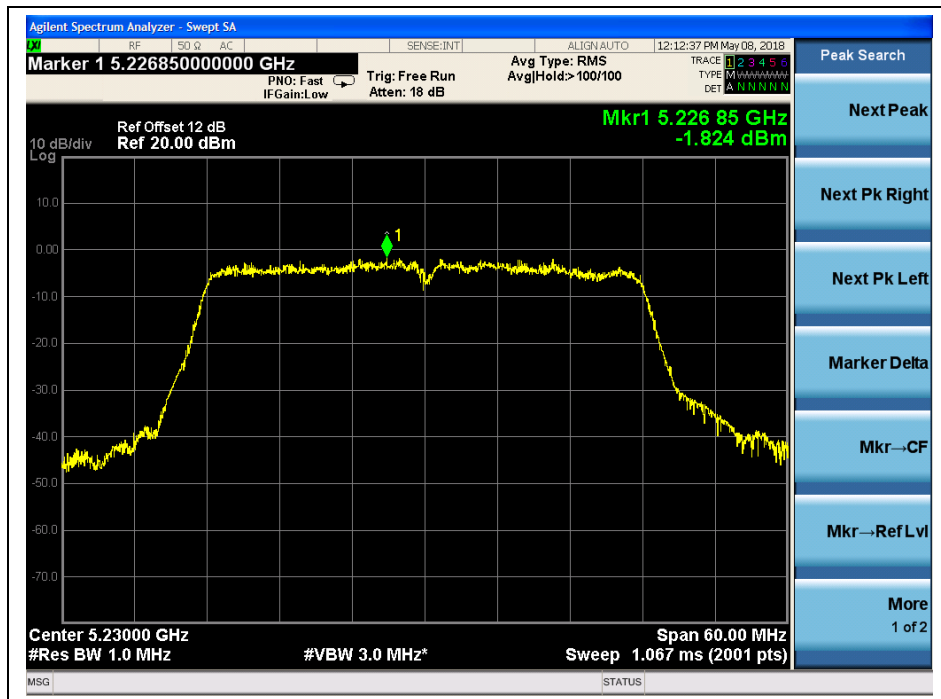




B. Test Plots



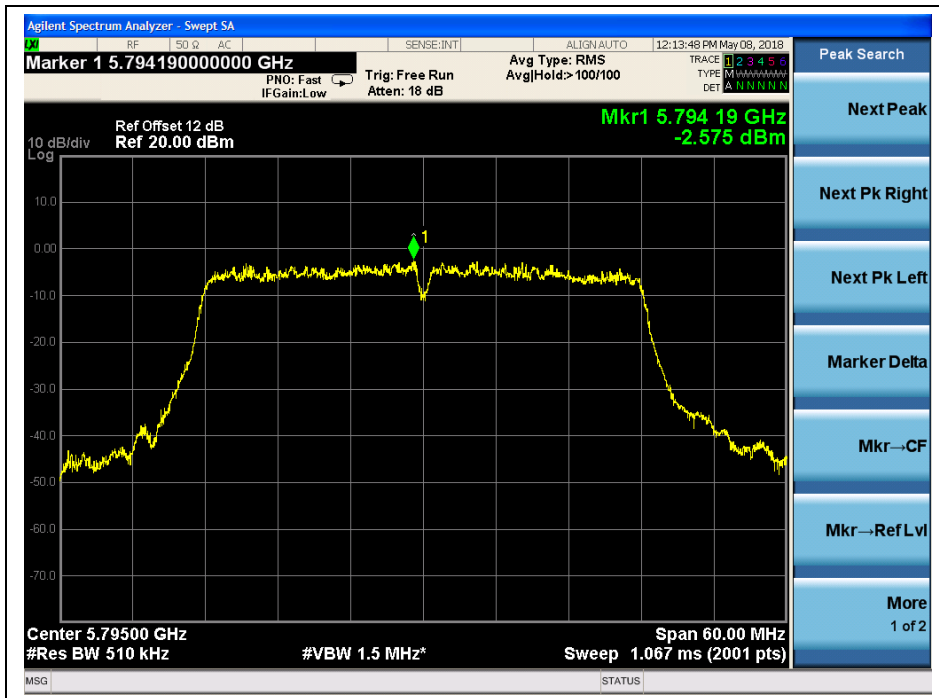
(Channel 38, 5190MHz, 802.11 ac (VHT40), ANT0)



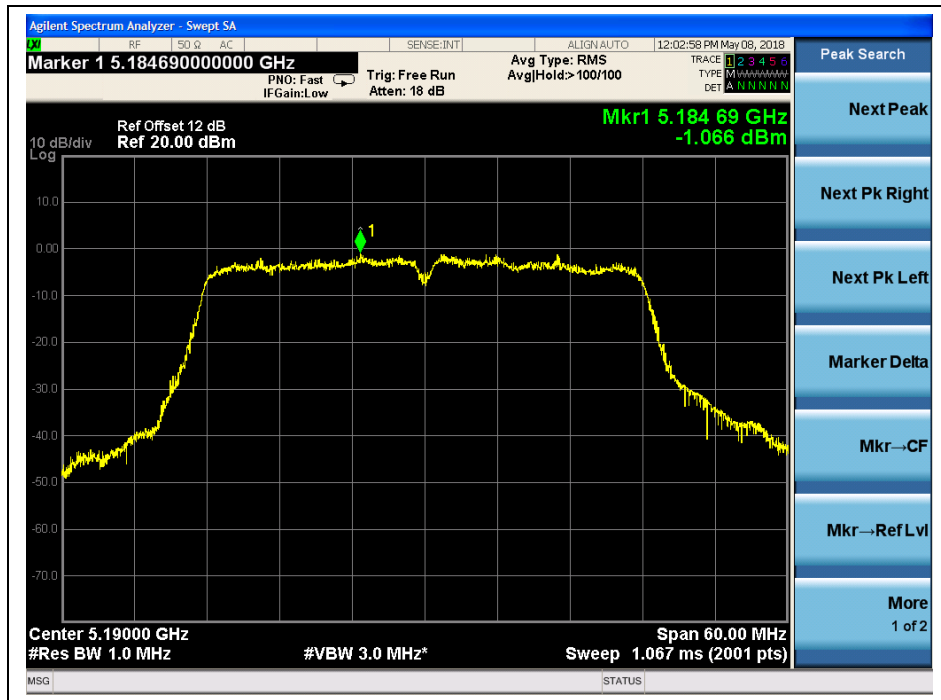
(Channel 46, 5230 MHz, 802.11 ac (VHT40), ANT0)



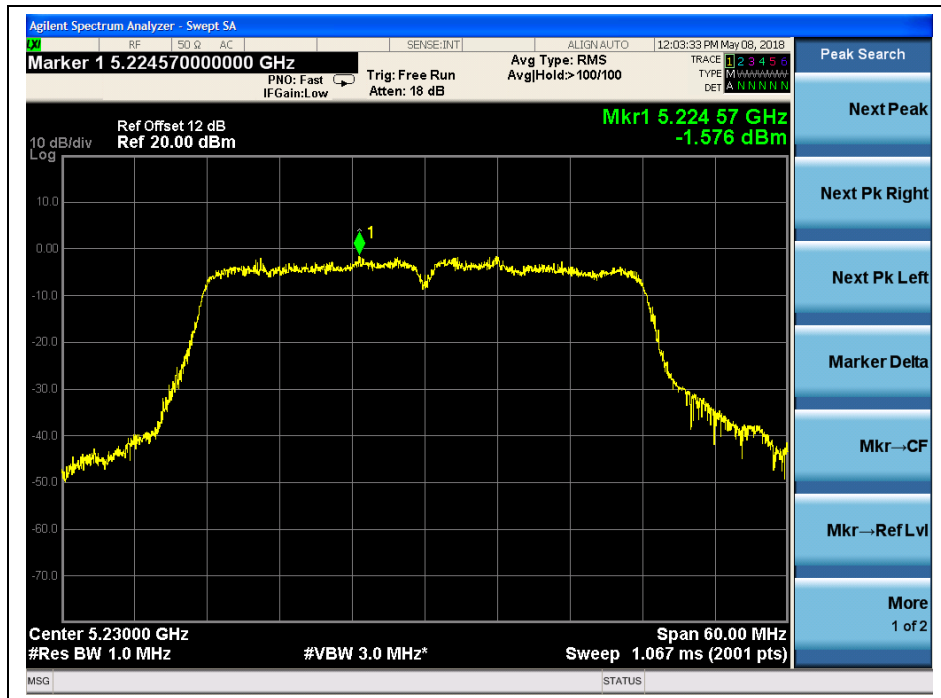
(Channel 151, 5755 MHz, 802.11 ac (VHT40), ANT0)



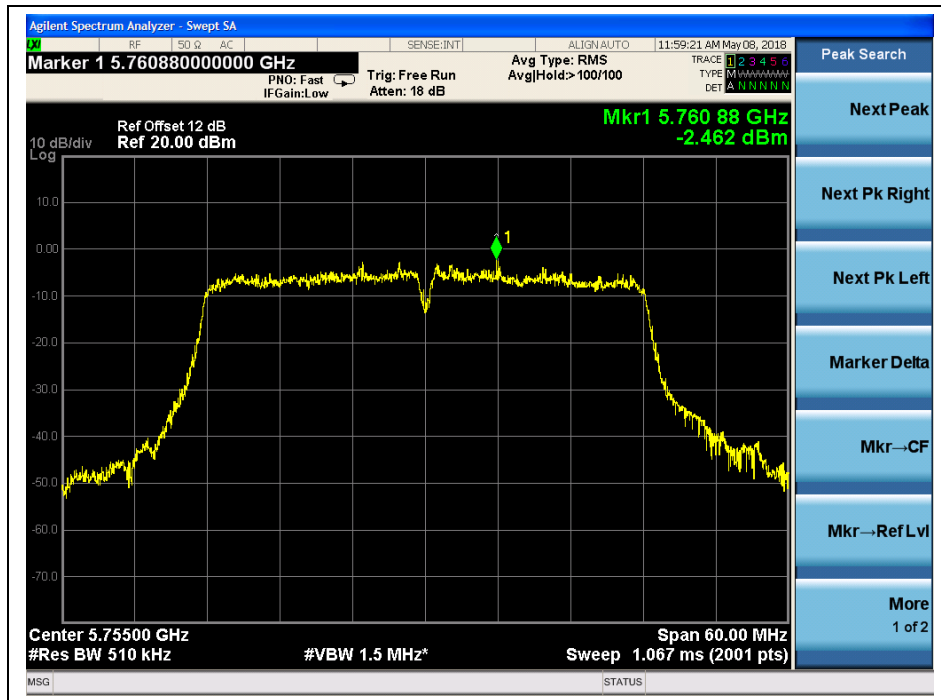
(Channel 159, 5795MHz, 802.11 ac (VHT40), ANT0)



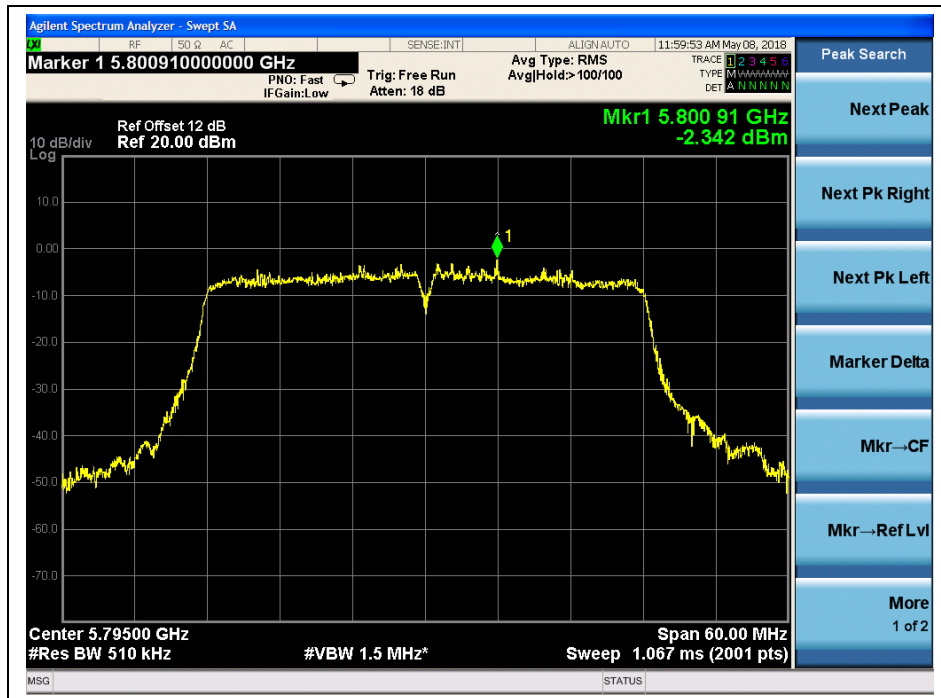
(Channel 38, 5190MHz, 802.11 ac (VHT40), ANT1)



(Channel 46, 5230 MHz, 802.11 ac (VHT40), ANT1)



(Channel 151, 5755 MHz, 802.11 ac (VHT40), ANT1)



(Channel 159, 5795MHz, 802.11ac (VHT40), ANT1)

**802.11ac (VHT80) Test mode****A. Test Verdict:**

Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/MHz)	ANT1 Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	-3.57	-3.75	11	PASS
Channel	Frequency (MHz)	ANT0 Measured PPSD (dBm/500KHz)	ANT1 Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-5.62	-4.97	30	PASS

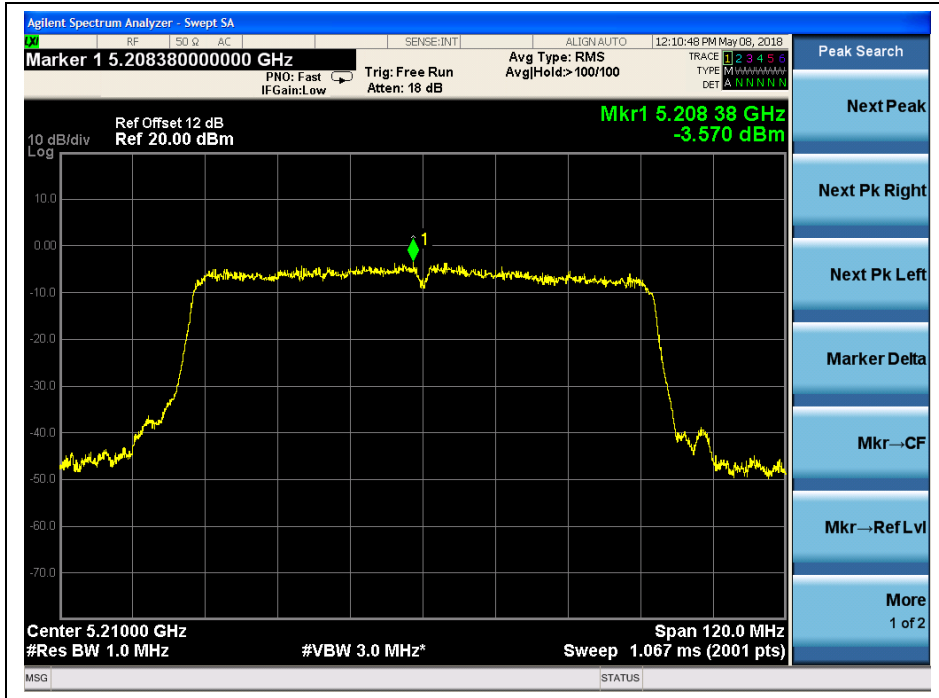
**Total Peak Power spectral density (ANT0+ANT1)**

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	-0.65	7.49	PASS
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-2.27	26.49	PASS

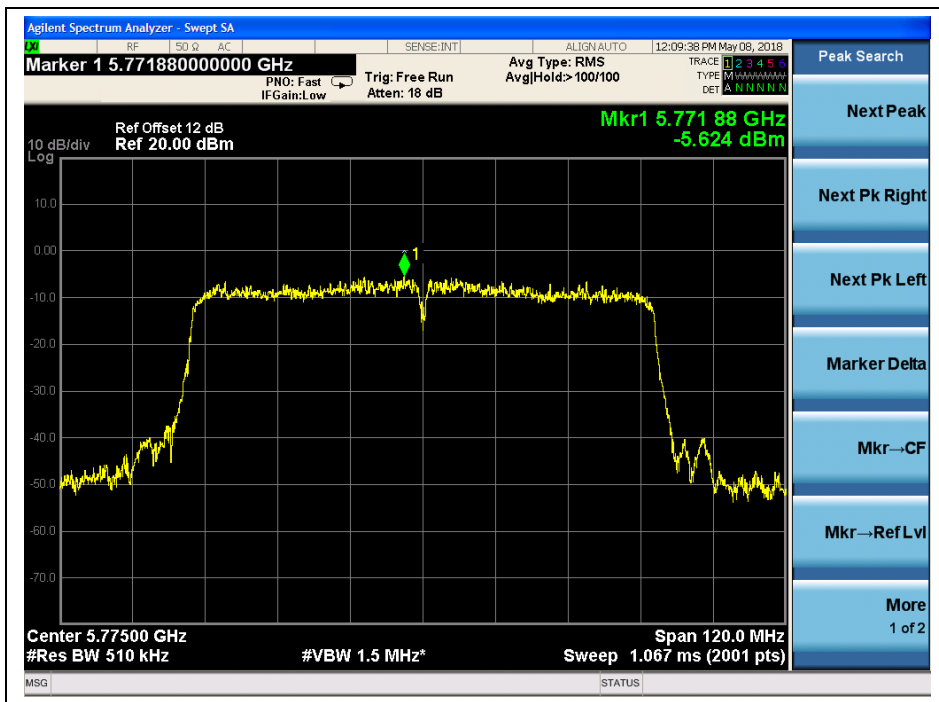
**Note:** Directional gain = 6.5dBi + 10log(2) = 9.51dBi > 6dBi, so the power limit shall be reduced to 11-(9.51-6) = 7.49dBm for 5.15-5.25 GHz band and be reduced 30-(9.51-6) = 26.49dBm for 5.725-5.85 GHz band.



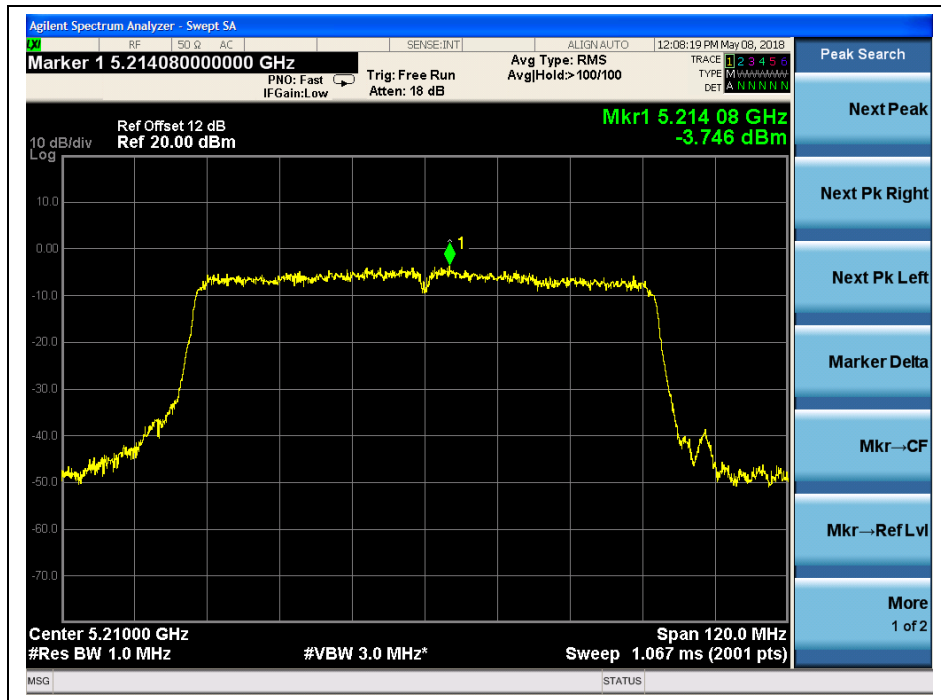
B. Test Plot:



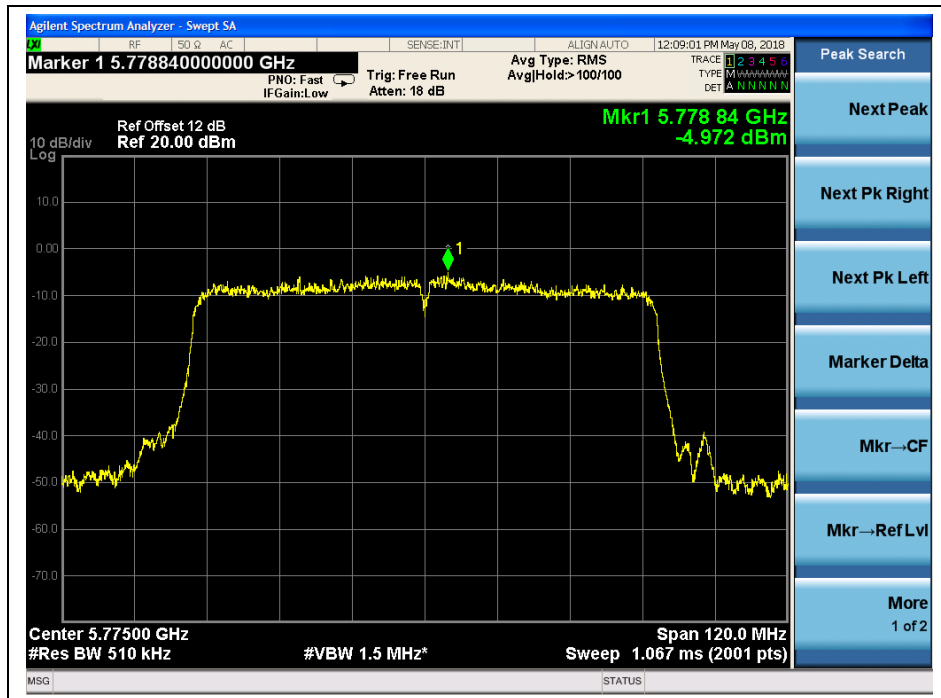
(Channel 42, 5210MHz, 802.11ac (VHT80), ANT0)



(Channel 155, 5775MHz, 802.11ac (VHT80), ANT0)



(Channel 42, 5210MHz, 802.11ac (VHT80), ANT1)



(Channel 155, 5775MHz, 802.11ac (VHT80), ANT1)



## 2.5. Restricted Frequency Bands

### 2.5.1. Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) 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 EIRP of -27dBm/MHz.
- (2) 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 EIRP of -27dBm/MHz.
- (3) 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 EIRP of -27dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz 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. The following formula is used to convert the equipment isotropic radiated power(eirp) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \mu\text{V/m}$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

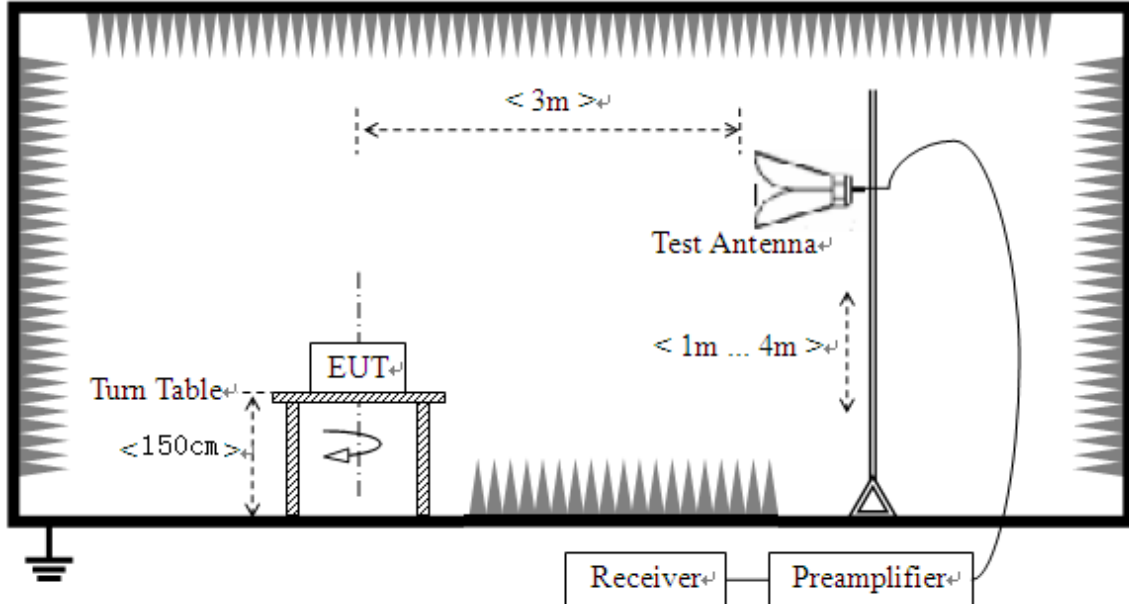
All out of band emissions appearing in a restricted band as specified in Section 15.205 of Part 15 C must not exceed the limits shown in Table as below per Section 15.209.

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3



## 2.5.2. Test Description

### A. Test Setup



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

KDB 789033 Section H) 3)5)6(d)) was used in order to prove compliance

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.



### 2.5.3. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna;  $U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain;  $A_{\text{Factor}}$ : Antenna Factor at 3m

**Note:** Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

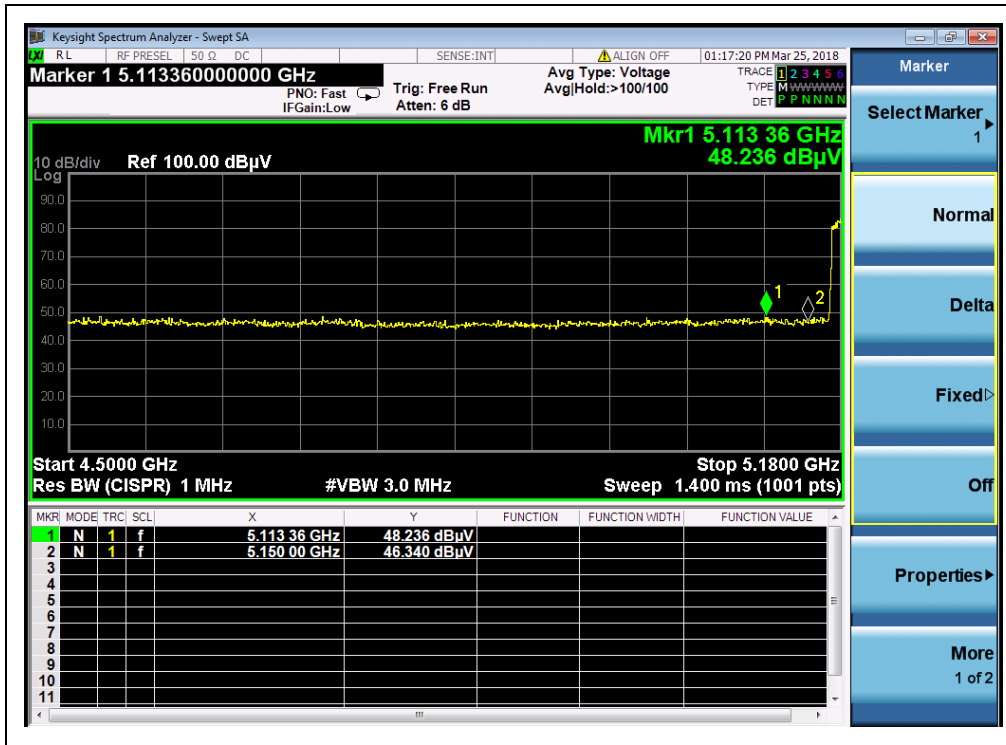
### 802.11a Test mode

#### A. Test Verdict:

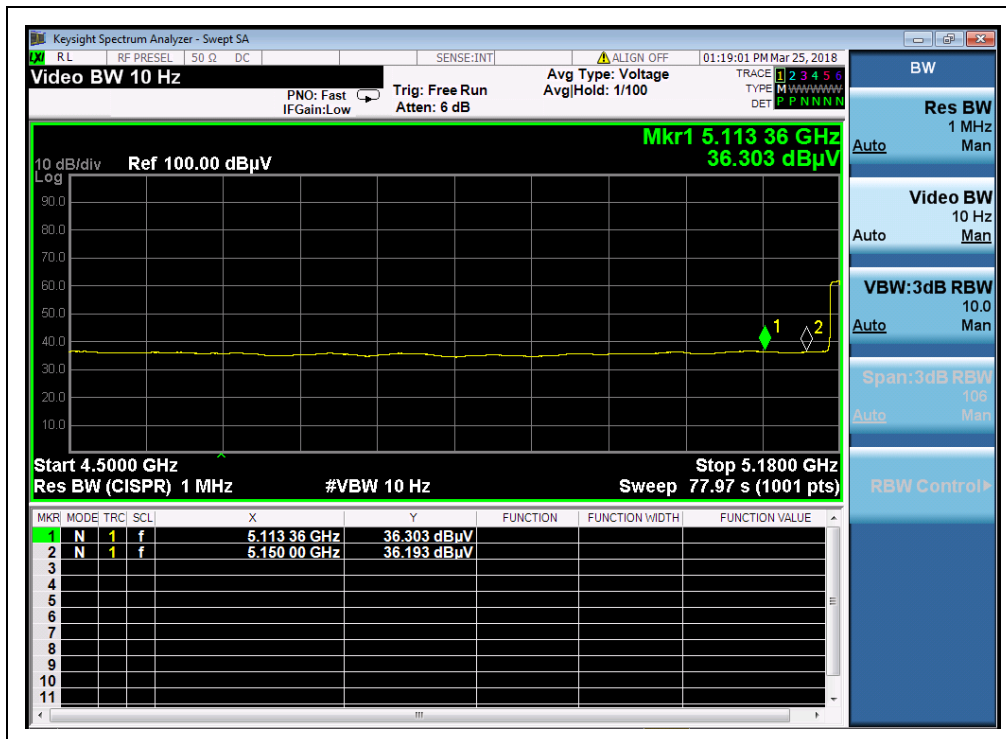
Channel	Frequency (MHz)	Detector	Receiver Reading	$A_T$ (dB)	$A_{\text{Factor}}$ (dB@3m)	Max. Emission E (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Verdict
		PK/ AV	$U_R$ (dB $\mu$ V)					
36	5113.36	PK	48.24	-50.65	32.11	29.70	74	PASS
36	5113.36	AV	36.30	-50.65	32.11	17.76	54	PASS
48	5368.64	PK	46.09	-50.65	32.11	27.55	74	PASS
48	5368.64	AV	34.30	-50.65	32.11	15.76	54	PASS
149	5710.60	PK	46.72	-50.65	32.11	28.18	108.20	PASS
149	5723.01	AV	35.88	-50.65	32.11	17.34	54	PASS
165	5864.03	PK	46.88	-50.65	32.11	28.34	85.54	PASS
165	5851.18	AV	35.55	-50.65	32.11	17.01	54	PASS



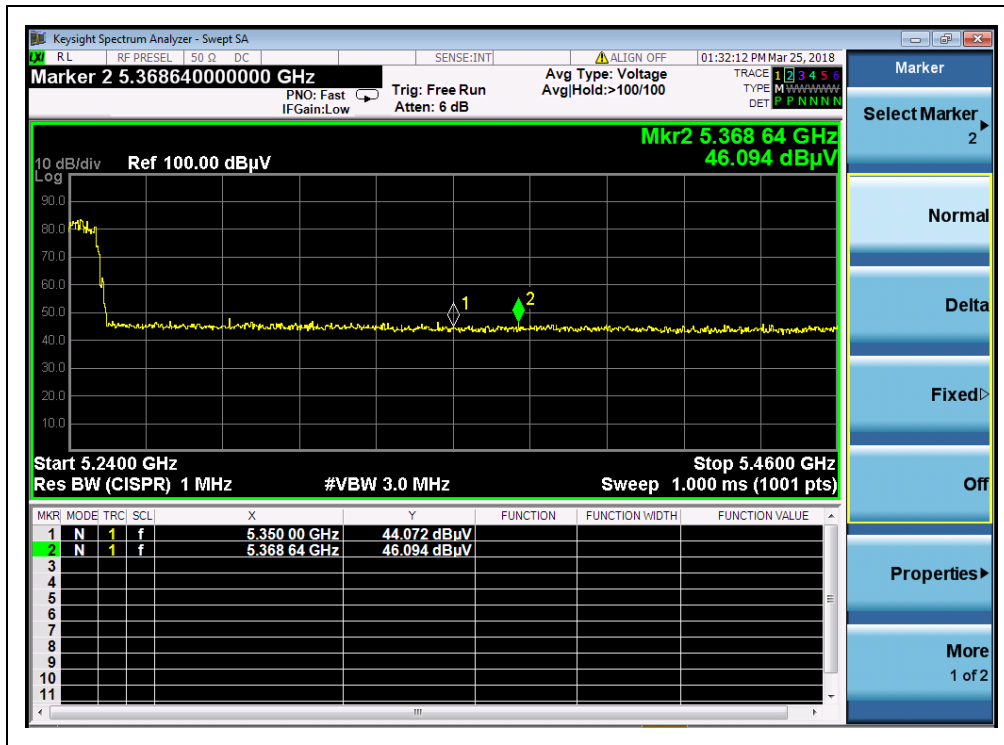
B. Test Plots:



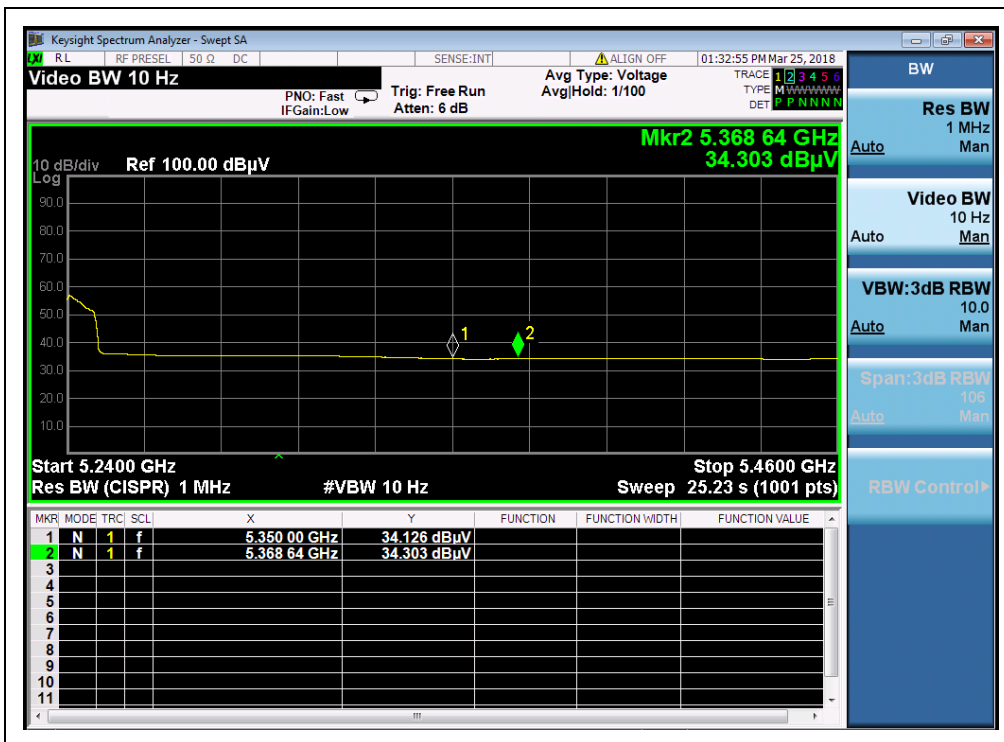
(Channel 36, PEAK, 802.11a)



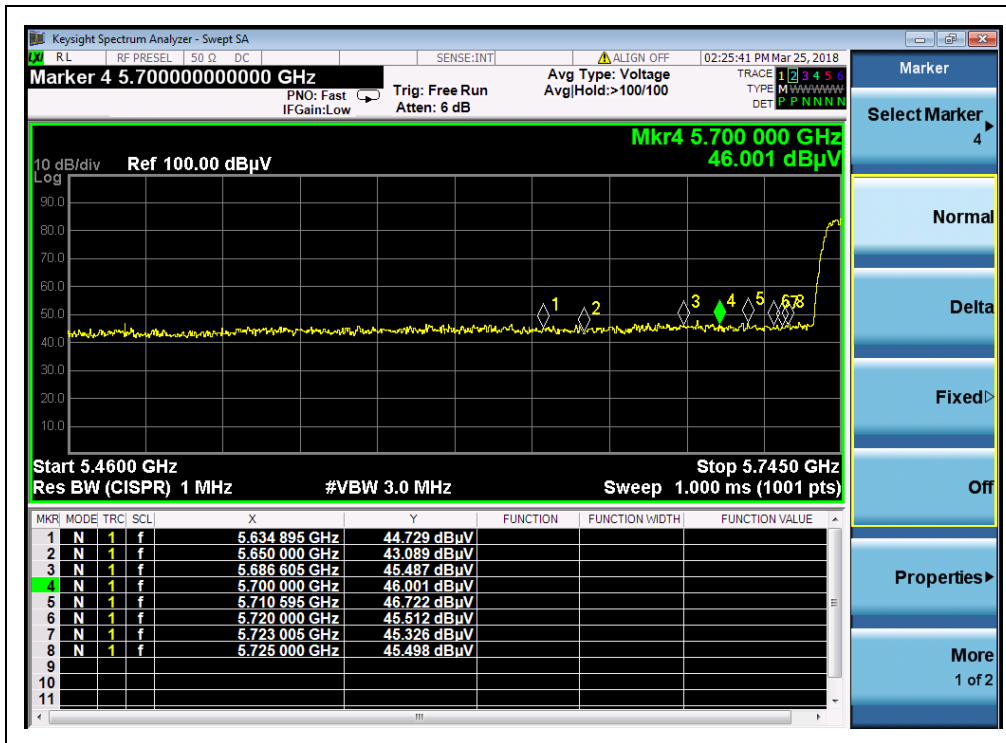
(Channel 36, AVG, 802.11a)



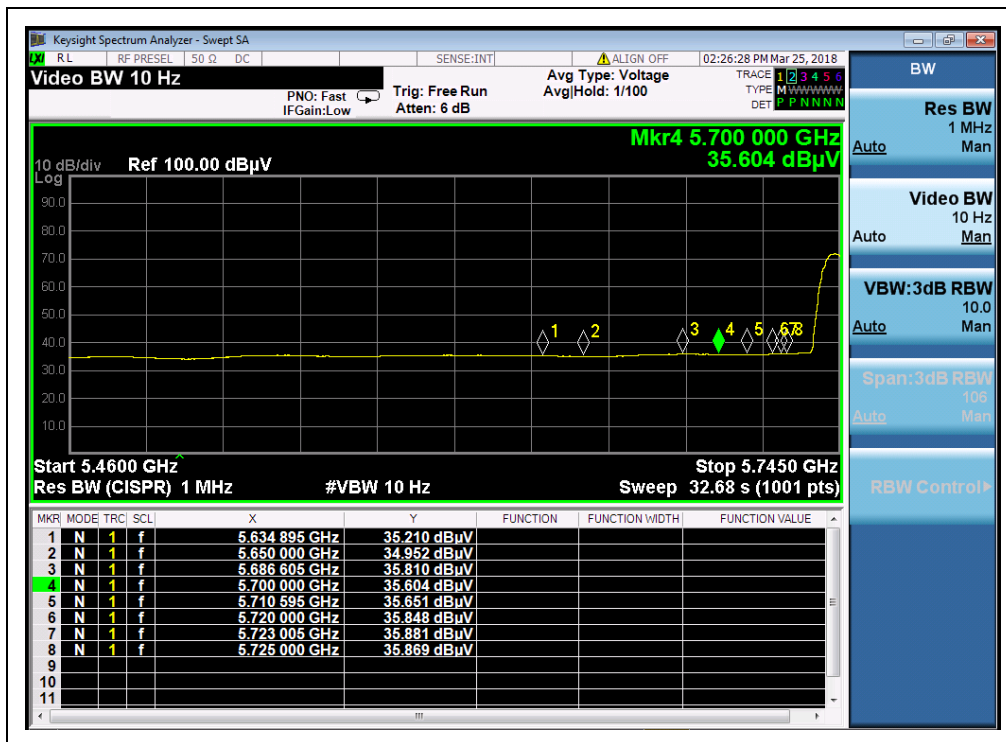
(Channel 48, PEAK, 802.11a)



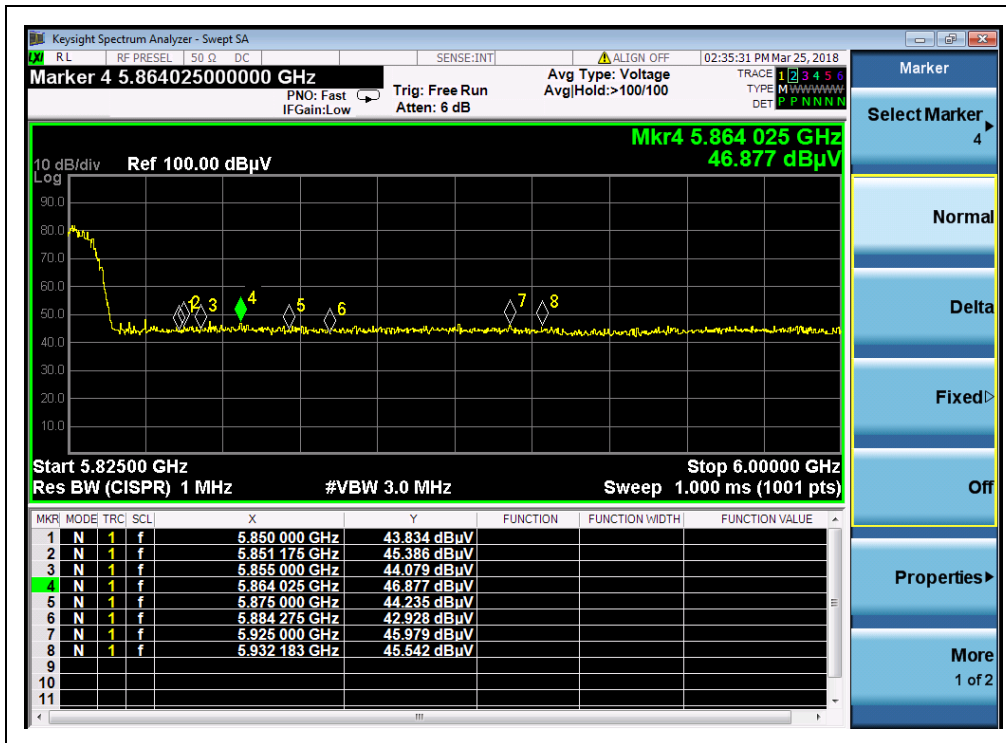
(Channel 48, AVG, 802.11a)



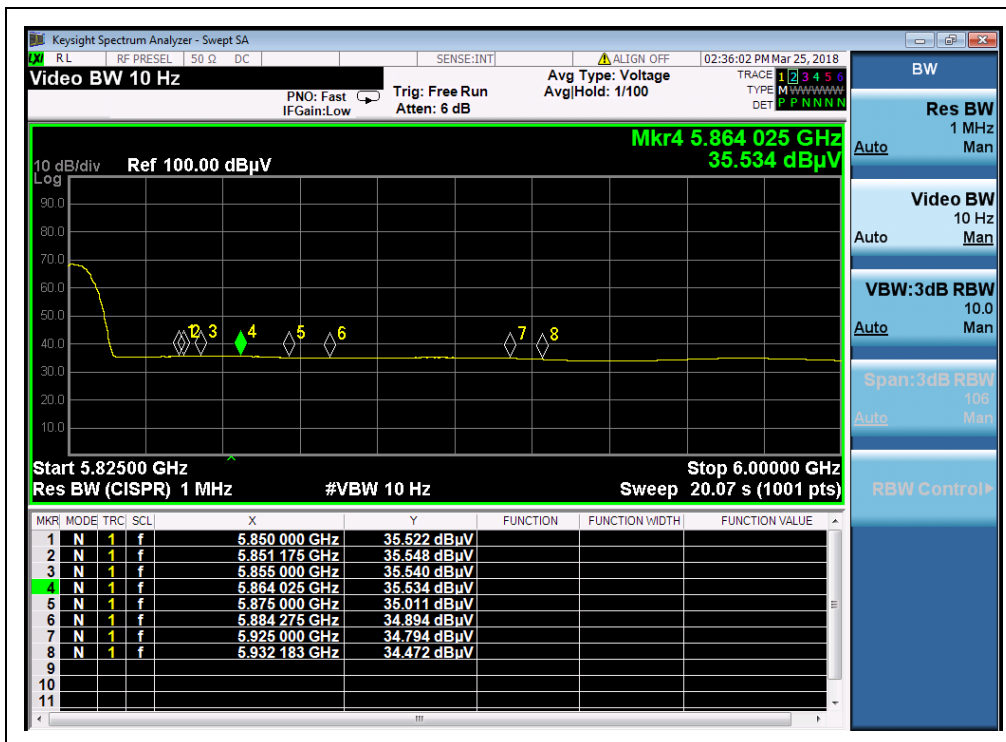
(Channel 149, PEAK, 802.11a)



(Channel 149, AVG, 802.11a)



(Channel 165, PEAK, 802.11a)



(Channel 165, AVG, 802.11a)

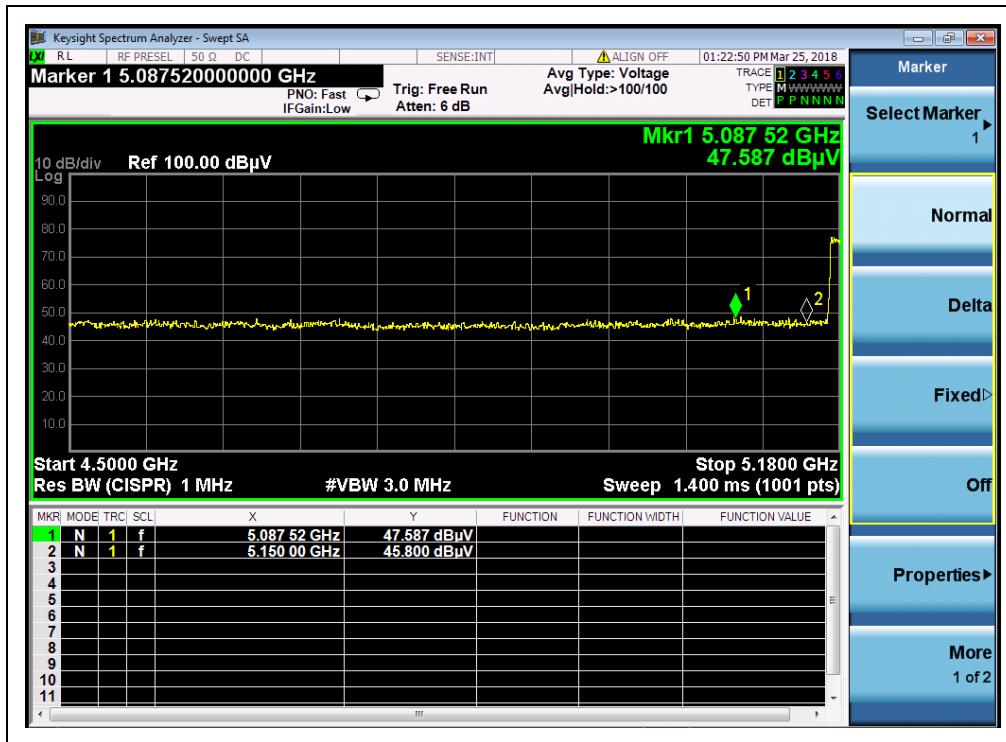


**802.11n (HT20) Test mode**

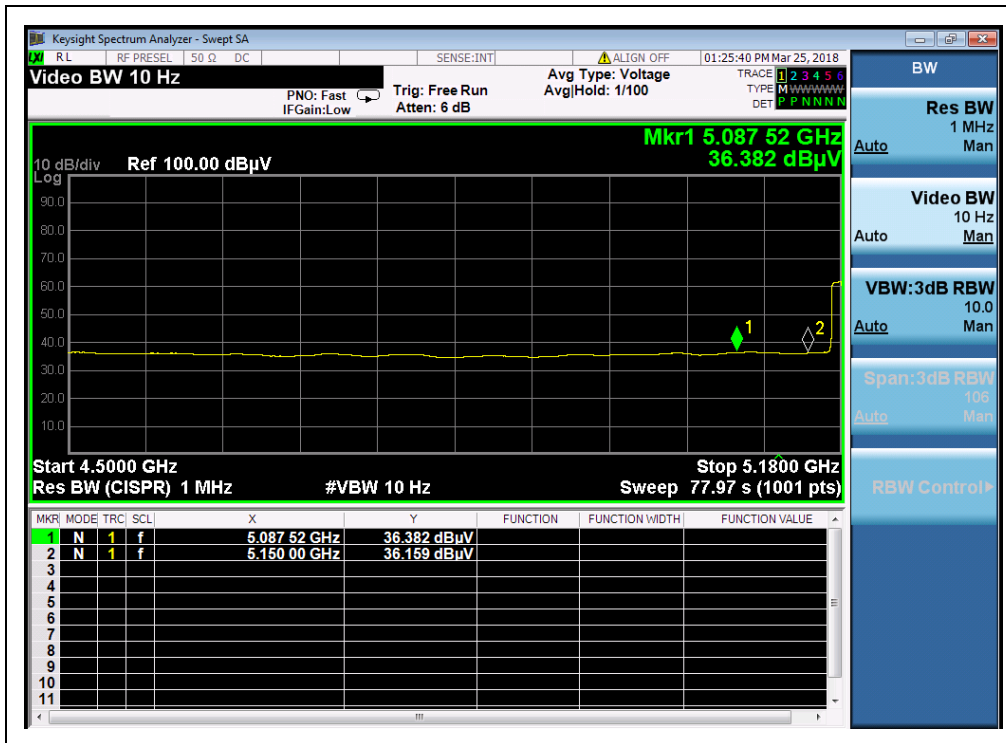
**A. Test Verdict:**

Channel	Frequency (MHz)	Detector	Receiver Reading	$A_T$	$A_{Factor}$	Max. Emission	Limit	Verdict
		PK/ AV	$U_R$ (dBuV)	(dB)	(dB@3m)	E (dBuV/m)	(dBuV/m)	
36	5087.52	PK	47.59	-50.65	32.11	29.05	74	PASS
36	5087.52	AV	36.38	-50.65	32.11	17.84	54	PASS
48	5353.68	PK	45.35	-50.65	32.11	26.81	74	PASS
48	5353.68	AV	34.05	-50.65	32.11	15.51	54	PASS
149	5700.00	PK	46.75	-50.65	32.11	28.21	105.23	PASS
149	5693.45	AV	35.82	-50.65	32.11	17.28	54	PASS
165	5936.38	PK	45.55	-50.65	32.11	27.01	68.23	PASS
165	5852.58	AV	35.55	-50.65	32.11	17.01	54	PASS

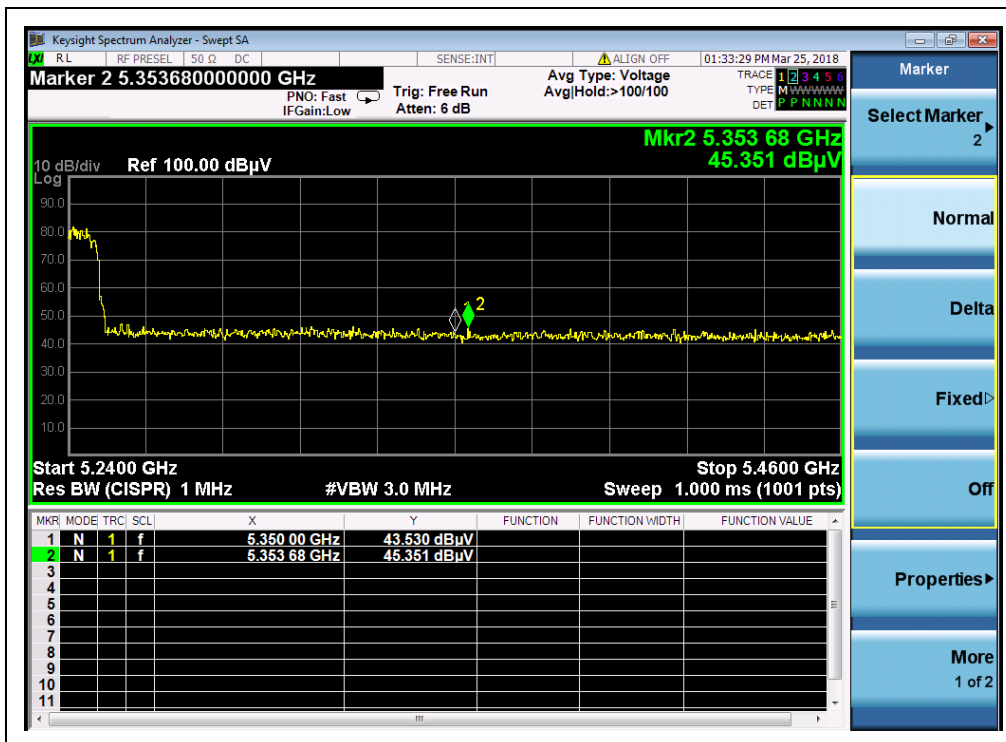
**B. Test Plots:**



(Channel 36, PEAK, 802.11n (HT20))

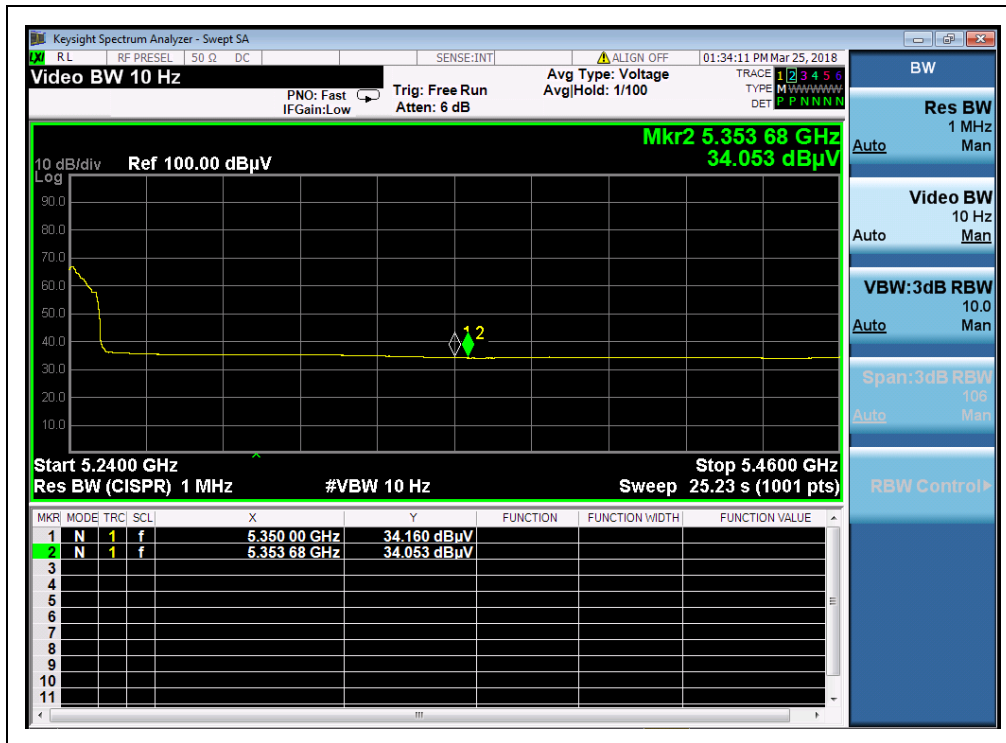


(Channel 36, AVG, 802.11 n (HT20))

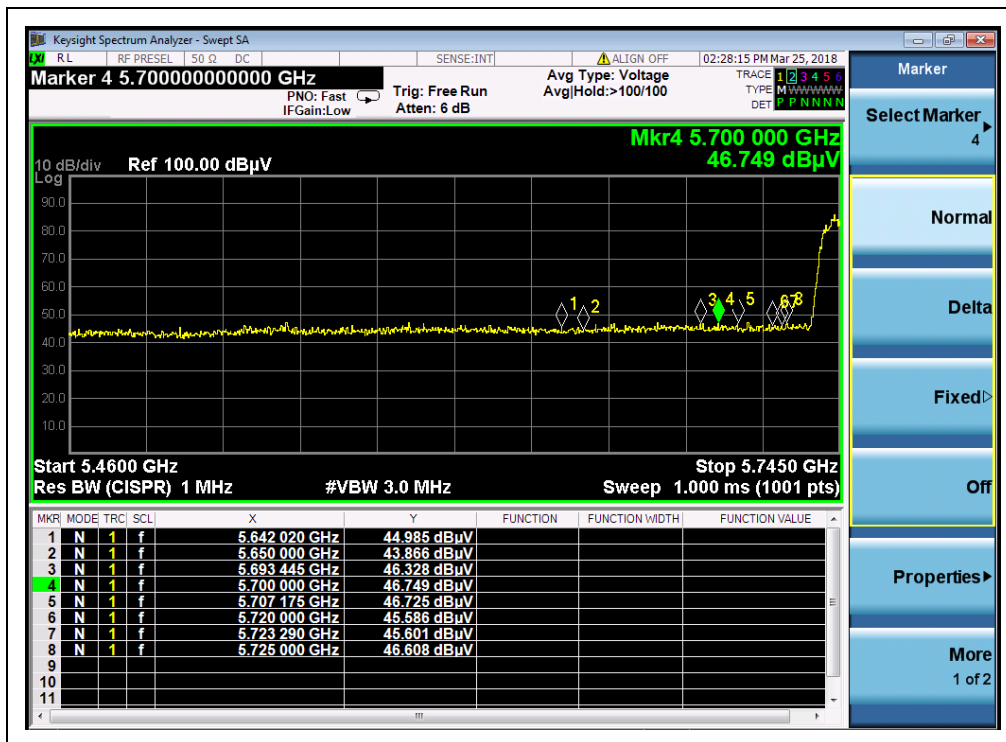


(Channel 48, PEAK, 802.11 n (HT20))

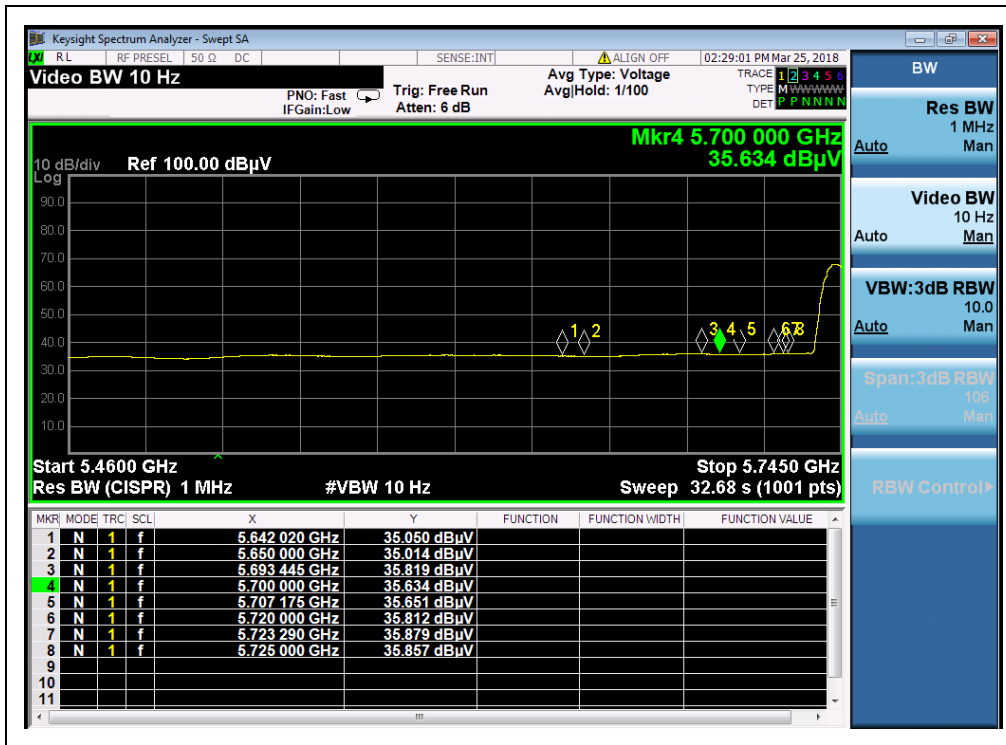




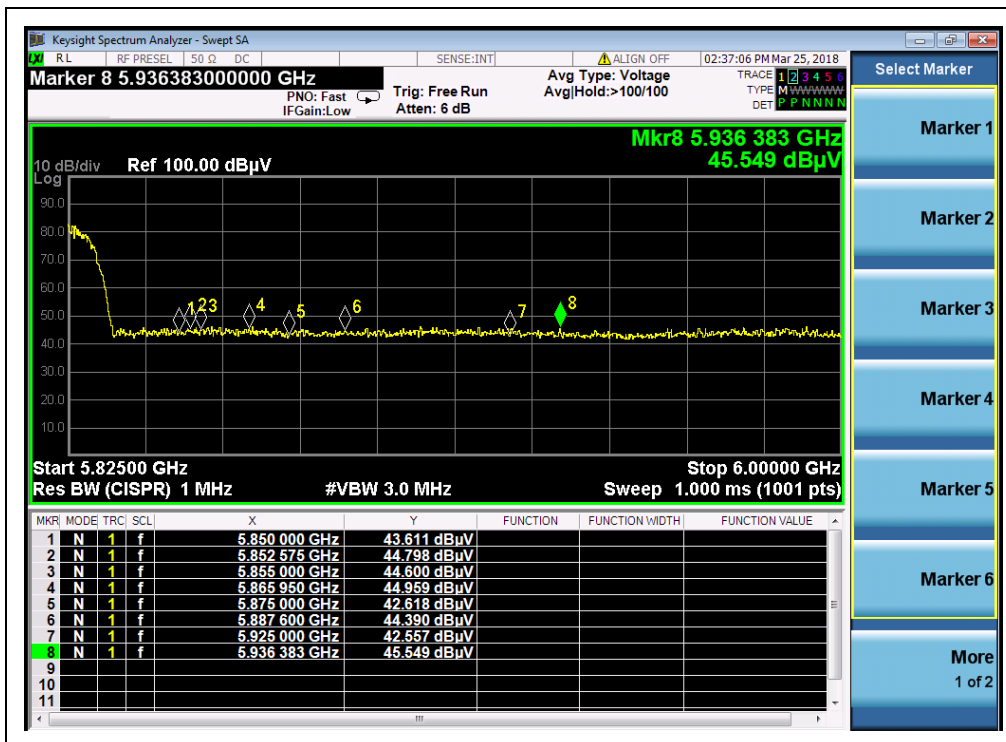
(Channel 48, AVG, 802.11n (HT20))



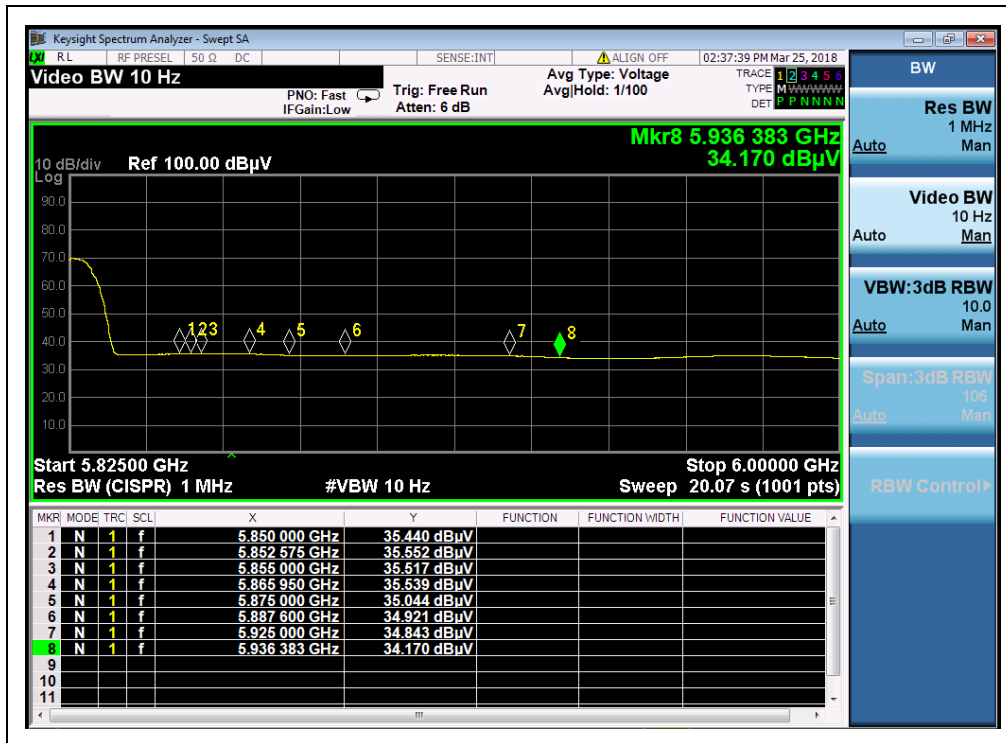
(Channel 149, PEAK, 802.11 n (HT20))



(Channel 149, AVG, 802.11 n (HT20))



(Channel 165, PEAK, 802.11 n (HT20))



(Channel 165, AVG, 802.11 n (HT20))

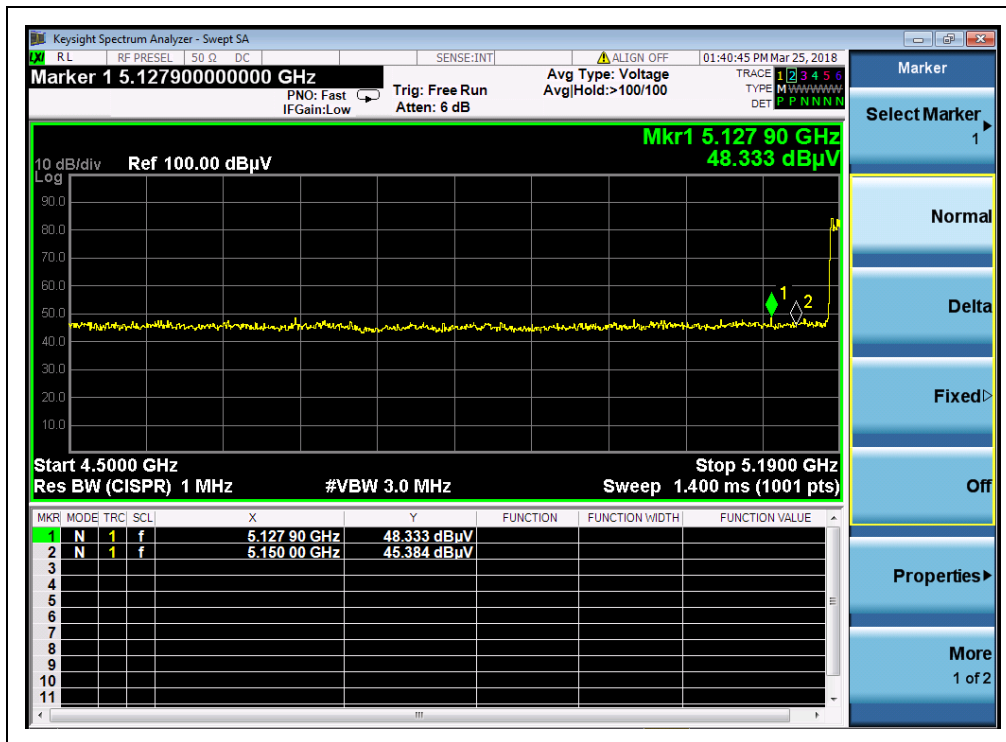


**802.11n (HT40) Test mode**

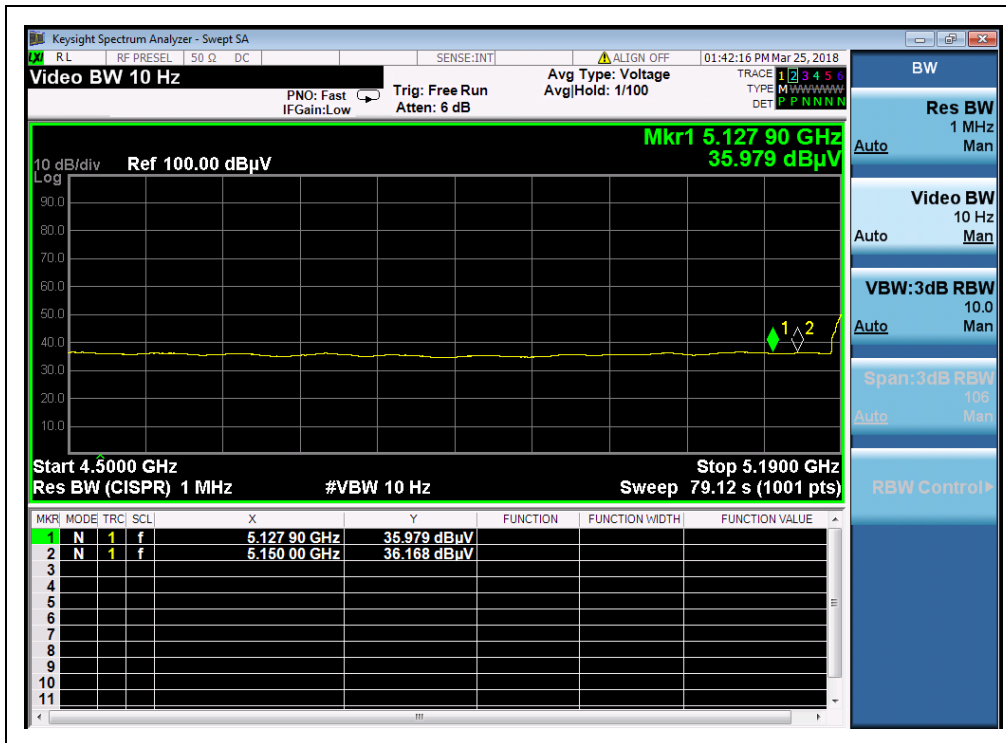
**A. Test Verdict:**

Channel	Frequency (MHz)	Detector	Receiver Reading	A <sub>T</sub> (dB)	A <sub>Factor</sub> (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV	U <sub>R</sub> (dBuV)					
38	5127.90	PK	48.33	-50.65	32.11	29.79	74	PASS
38	5127.90	AV	35.98	-50.65	32.11	17.44	54	PASS
46	5374.90	PK	43.11	-50.65	32.11	24.57	74	PASS
46	5374.90	AV	34.43	-50.65	32.11	15.89	54	PASS
151	5676.25	PK	47.49	-50.65	32.11	28.95	87.65	PASS
151	5720.00	AV	35.80	-50.65	32.11	17.26	54	PASS
159	5871.00	PK	46.90	-50.65	32.11	28.36	66.03	PASS
159	5855.00	AV	35.54	-50.65	32.11	17.00	54	PASS

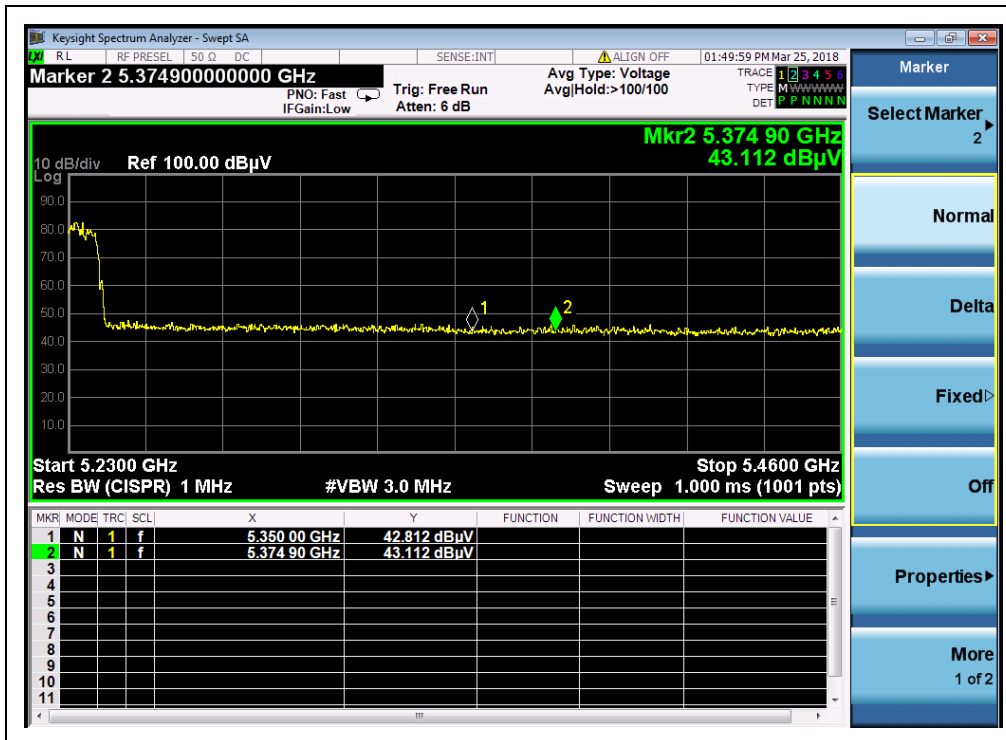
**B. Test Plots:**



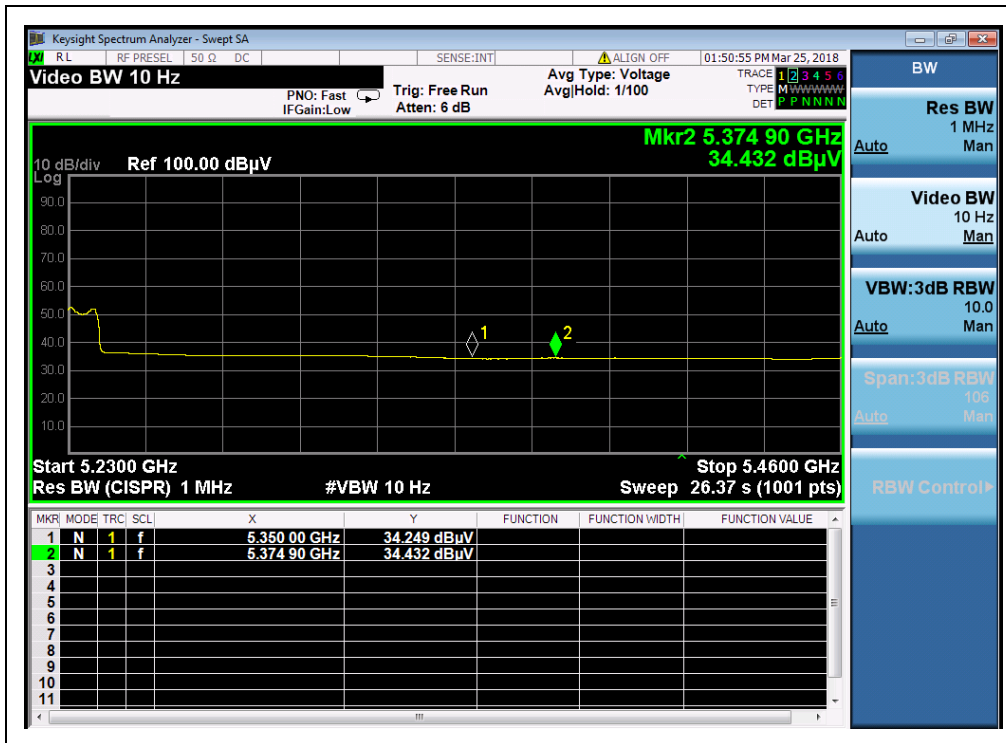
(Channel 38, PEAK, 802.11n (HT40))



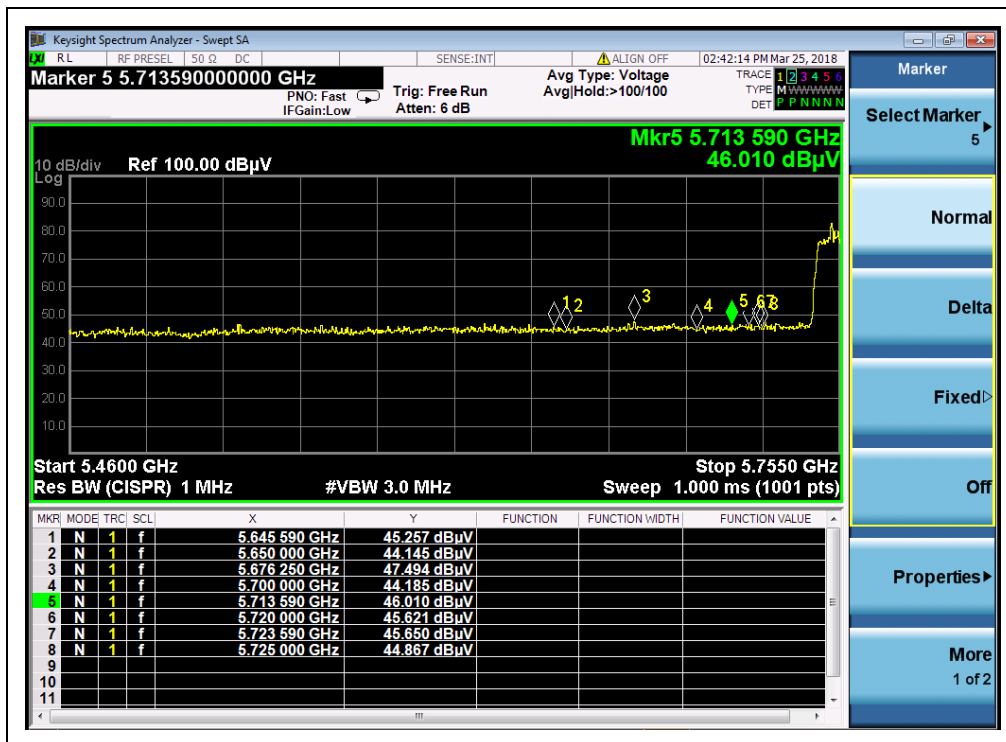
(Channel 38, AVG, 802.11n (HT40))



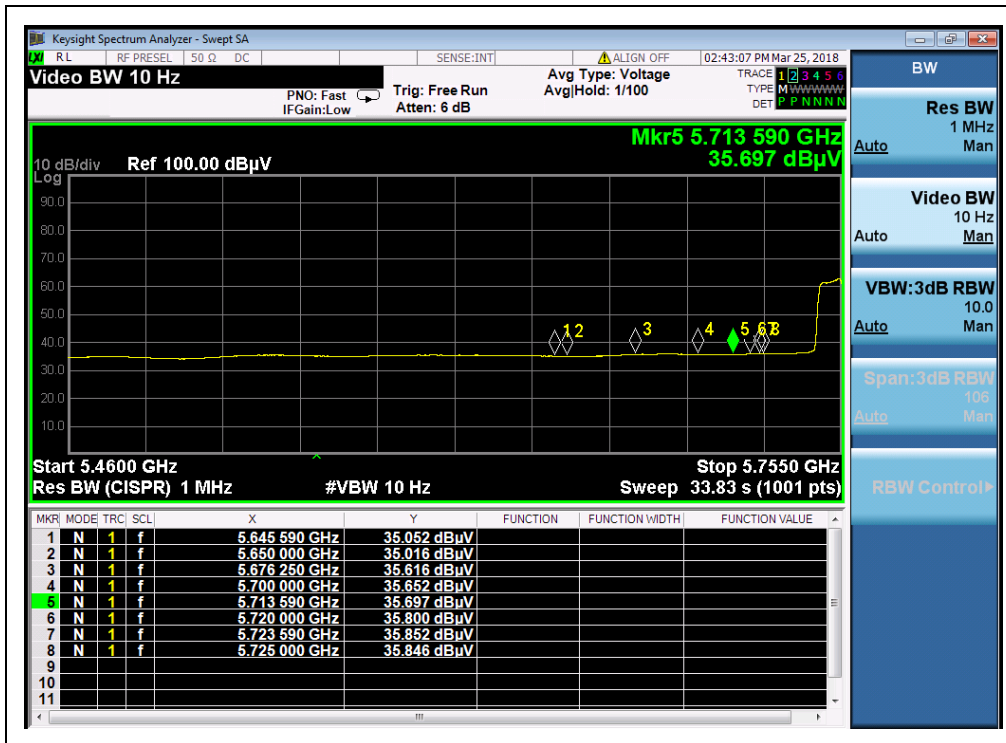
(Channel 46, PEAK, 802.11n (HT40))



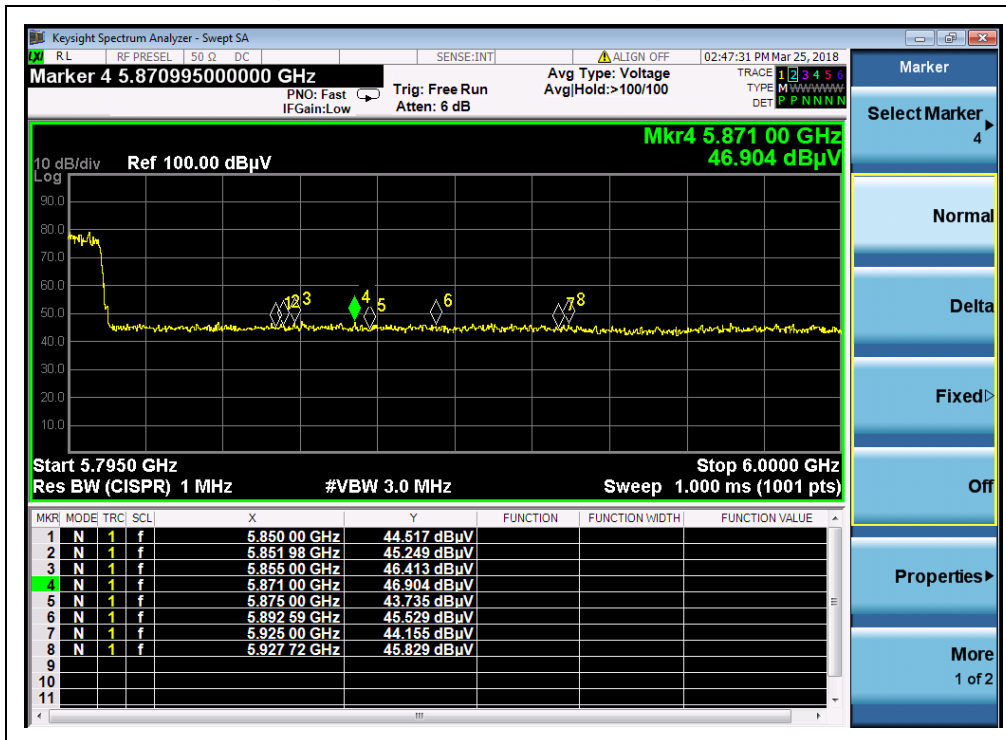
(Channel 46, AVG, 802.11n (HT40))



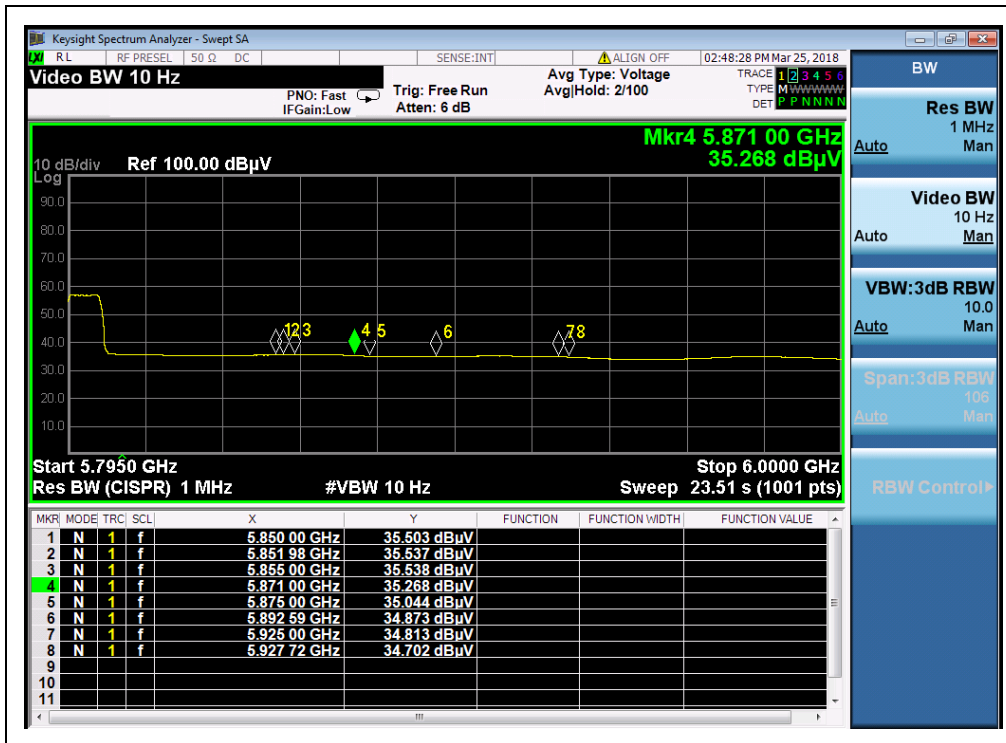
(Channel 151, PEAK, 802.11n (HT40))



(Channel 151, AVG, 802.11n (HT40))



(Channel 159, PEAK, 802.11n (HT40))



(Channel 159, AVG, 802.11n (HT40))



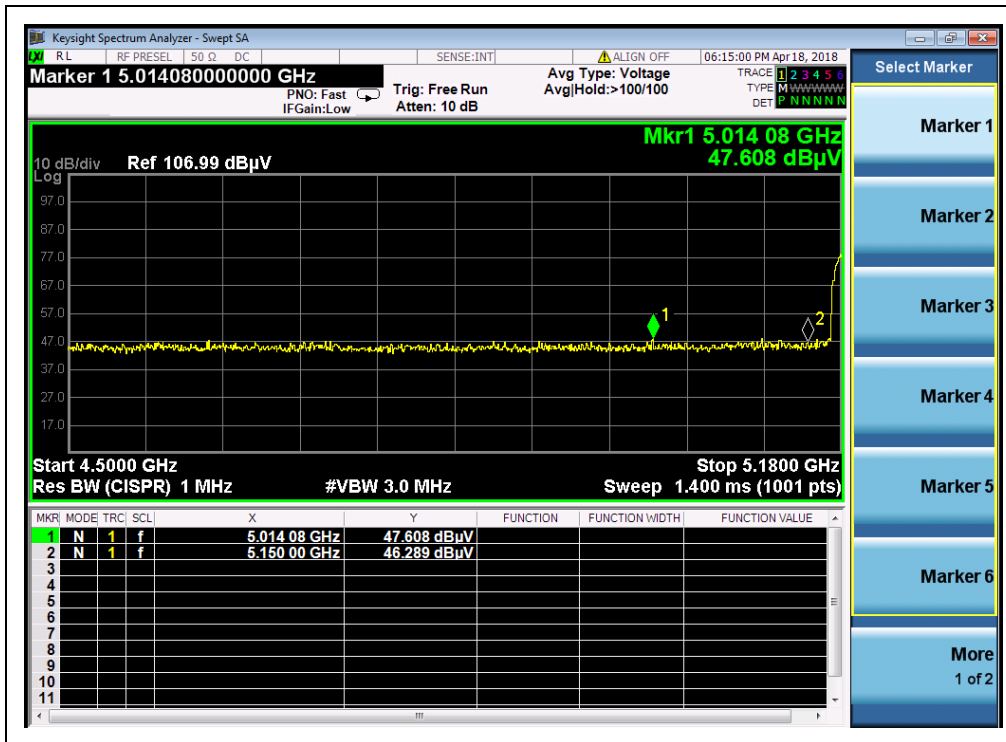


**802.11ac (VHT20) Test mode**

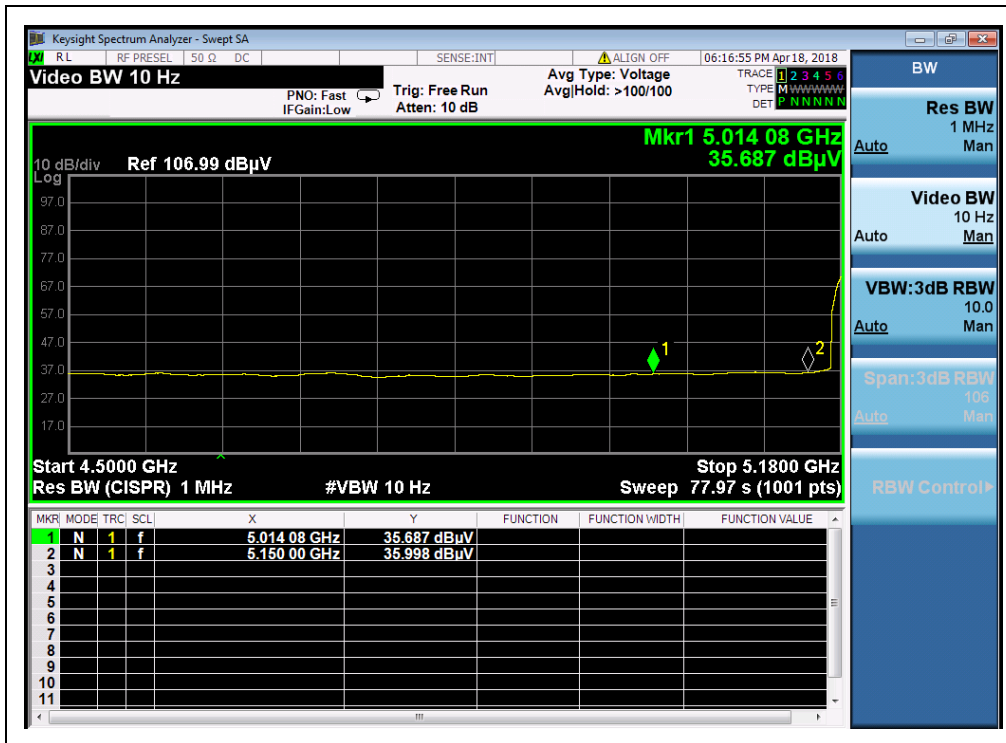
**A. Test Verdict:**

Channel	Frequency (MHz)	Detector	Receiver Reading	A <sub>T</sub> (dB)	A <sub>Factor</sub> (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV	U <sub>R</sub> (dBuV)					
36	5014.08	PK	47.61	-50.65	32.11	29.07	74	PASS
36	5014.08	AV	35.69	-50.65	32.11	17.15	54	PASS
48	5360.58	PK	42.78	-50.65	32.11	24.24	74	PASS
48	5360.58	AV	34.31	-50.65	32.11	15.77	54	PASS
149	5718.21	PK	61.28	-50.65	32.11	42.74	110.33	PASS
149	5720.00	AV	42.07	-50.65	32.11	23.53	54	PASS
165	5851.39	PK	59.15	-50.65	32.11	40.61	119.06	PASS
165	5851.56	AV	40.71	-50.65	32.11	22.17	54	PASS

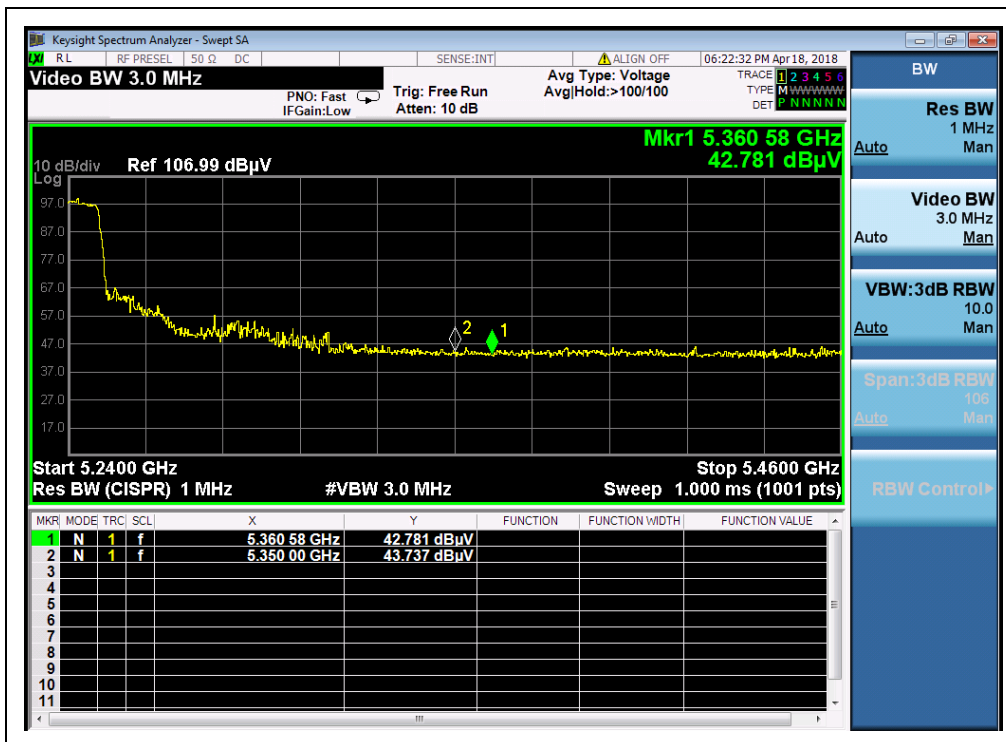
**B. Test Plots:**



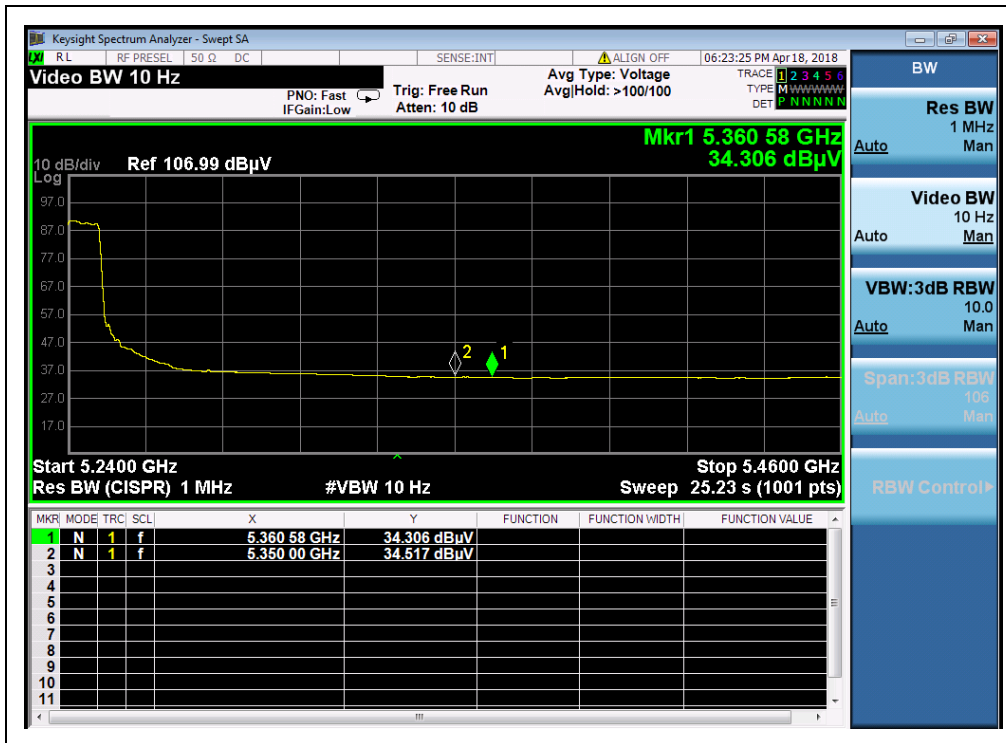
(Channel 36, PEAK, 802.11 ac (VHT20))



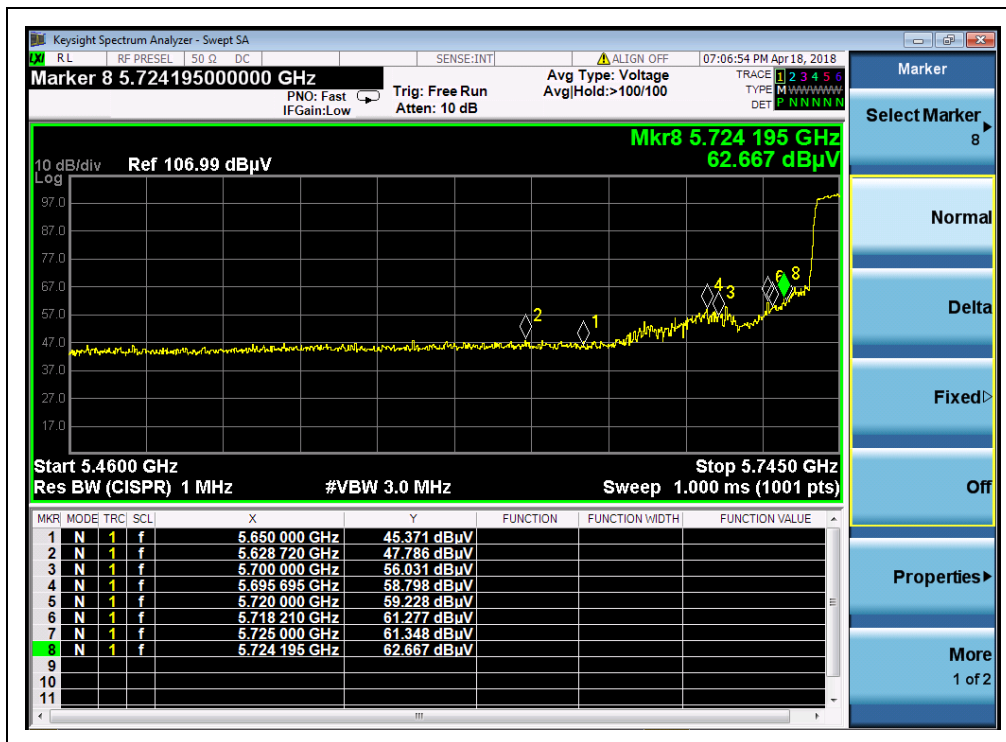
(Channel 36, AVG, 802.11 ac (VHT20))



(Channel 48, PEAK, 802.11 ac (VHT20))



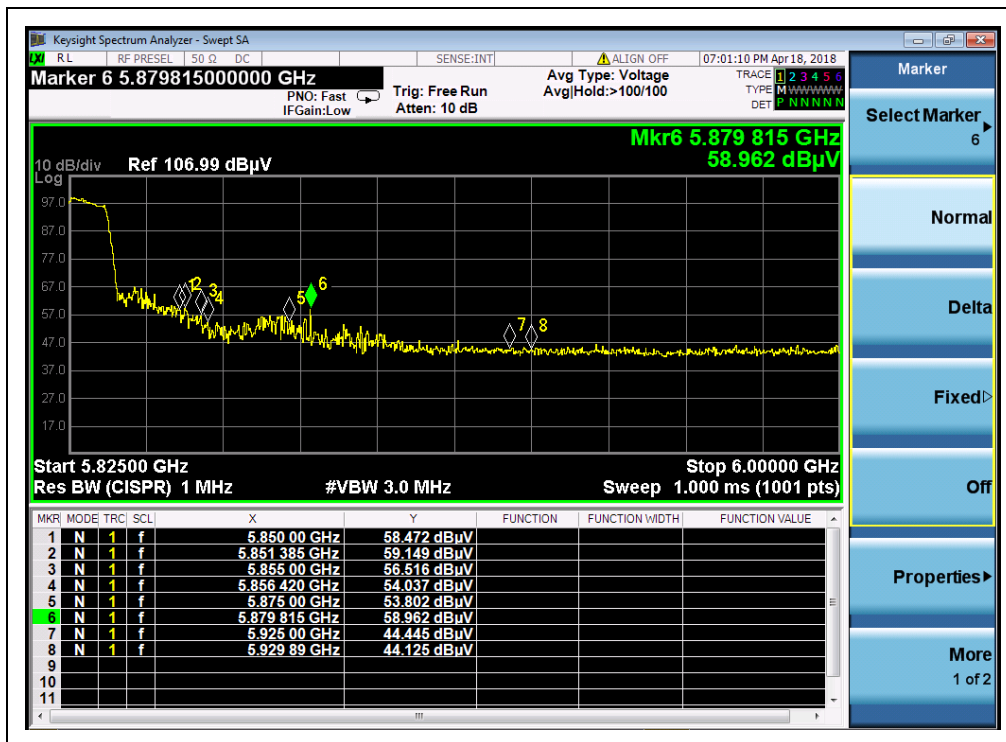
(Channel 48, AVG, 802.11 ac (VHT20))



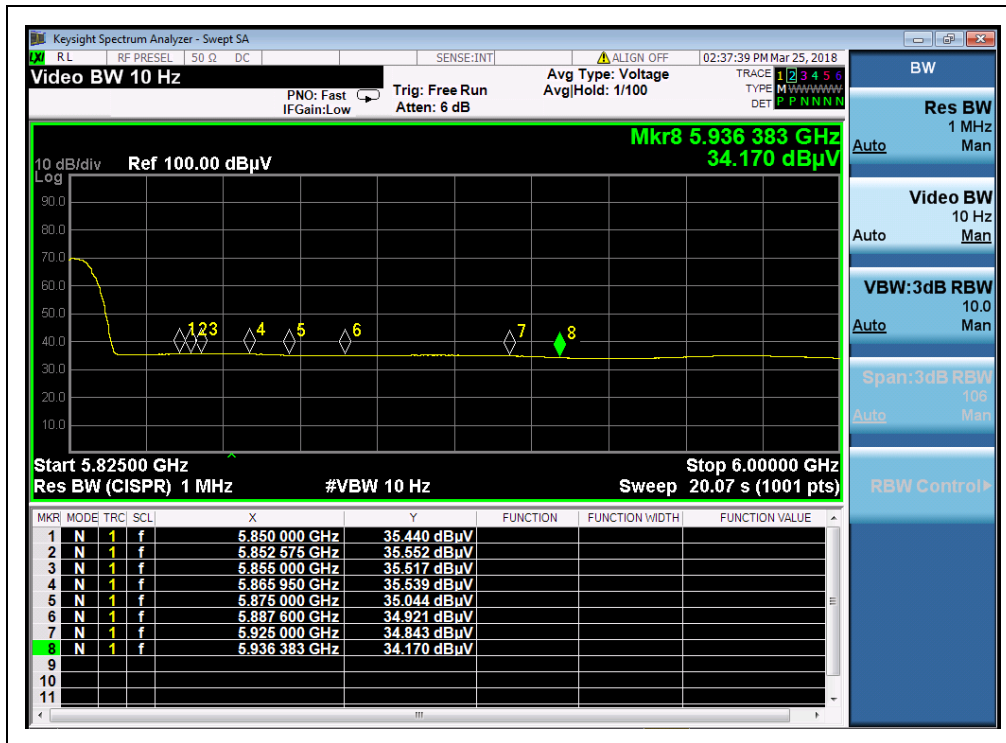
(Channel 149, PEAK, 802.11 ac (VHT20))



(Channel 149, AVG, 802.11 ac (VHT20))



(Channel 165, PEAK, 802.11 ac (VHT20))



(Channel 165, AVG, 802.11 ac (VHT20))