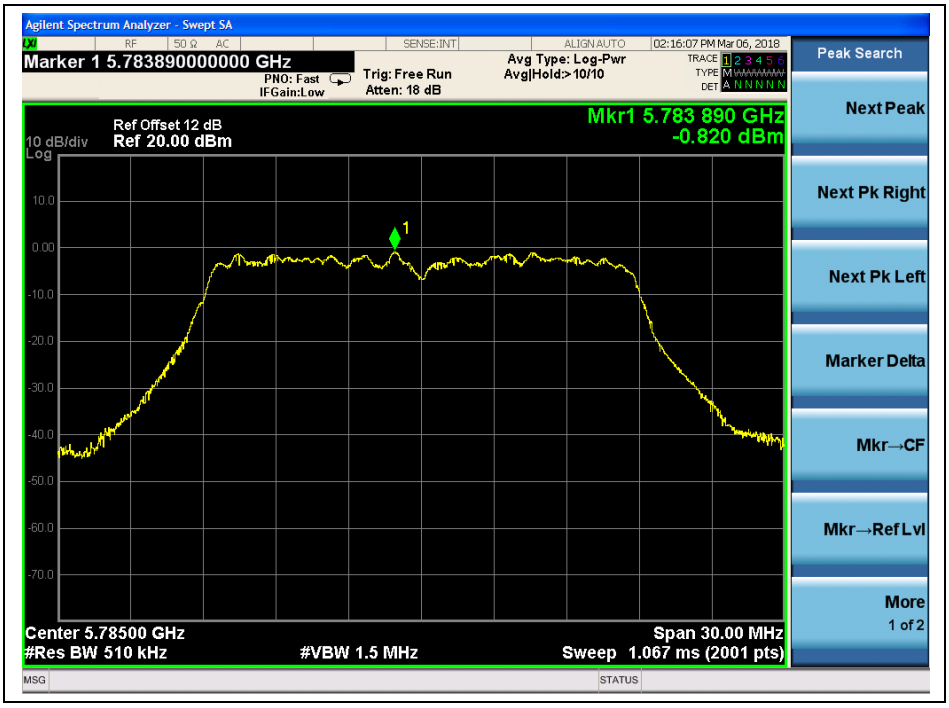
(Channel 149, 5745MHz, 802.11 n (HT20), ANT J4)



(Channel 157, 5785MHz, 802.11 n (HT20), ANT J4)

(Channel 165, 5825MHz, 802.11 n (HT20), ANT J4)

802.11n (HT40) Test mode

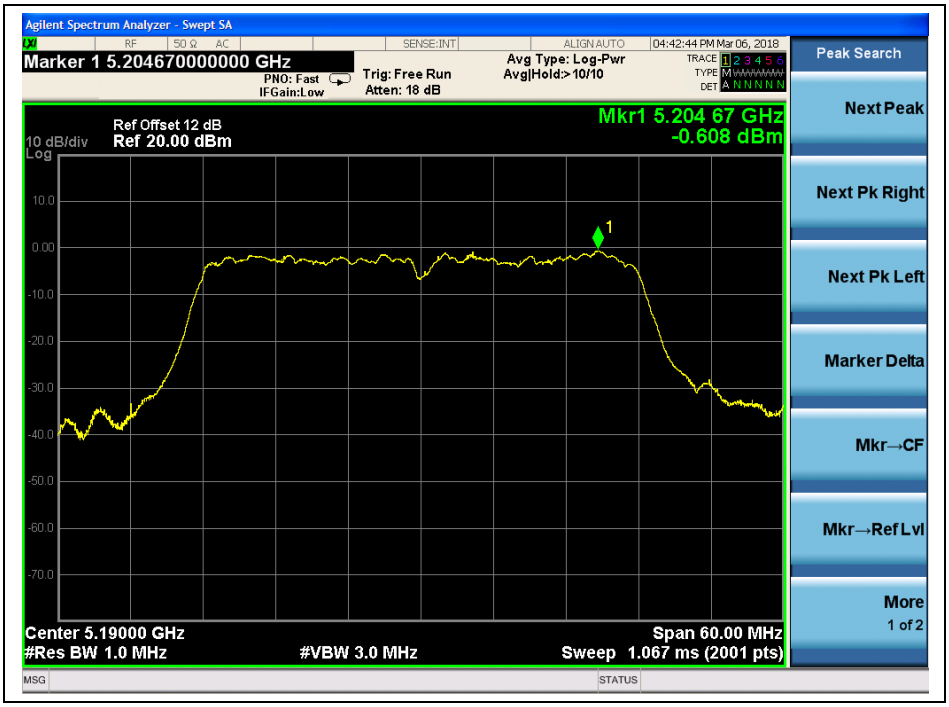
A. Test Verdict:

Channel	Frequency (MHz)	ANT J3		ANT J4		Limit (dBm/MHz)
		Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	
38	5190	-0.61	1.94	-0.74	1.53	11
46	5230	-0.96	1.59	-0.05	2.22	
54	5270	-1.54	1.01	-2.41	-0.14	
62	5310	-0.96	1.59	-2.25	0.02	
102	5510	-4.06	-1.51	-2.07	0.20	
126	5630	-4.85	-2.30	-2.36	-0.09	
142	5710	-3.76	-1.21	-3.26	-0.99	
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Limit (dBm/500KHz)
151	5755	-3.36	-0.81	-2.92	-0.65	30
159	5795	-5.02	-2.47	-3.29	-1.02	

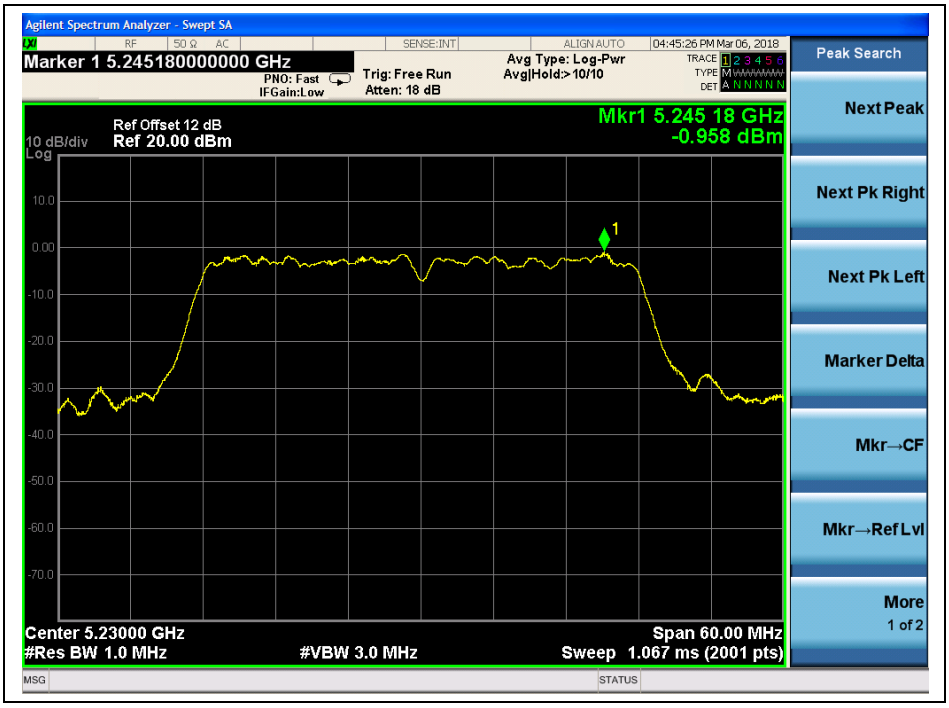
Total Peak Power spectral density (ANT J3+ANT J4)

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	4.749	10.99	PASS
46	5230	4.926		
54	5270	3.482		
62	5310	3.884		
102	5510	2.438		
126	5630	1.954		
142	5710	1.911		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	2.280	29.99	PASS
159	5795	1.325		
Note: Directional gain = 3.0dBi + 10log(2) = 6.01dBi > 6dBi, so the power spectral density limit shall be 11-(6.01-6) = 10.99 dBm/MHz for 5.18-5.24 GHz band, 5.26-5.32 GHz band, 5.50-5.70 GHz band and 30-(6.01-6) = 29.99 dBm/500KHz for 5.745-5.825 GHz band.				

B. Test Plots



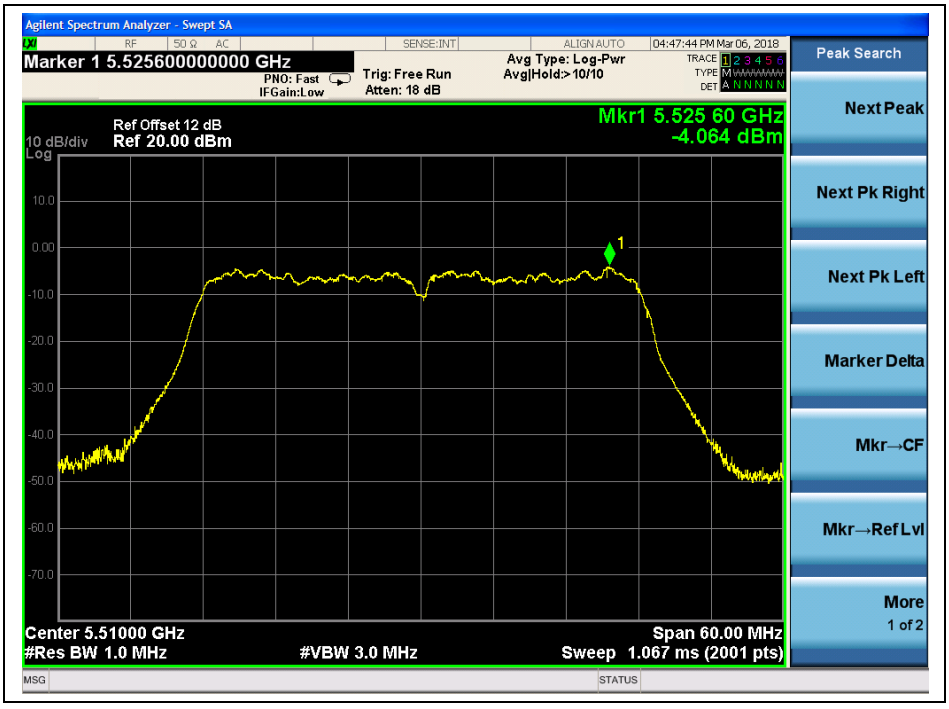
(Channel 38, 5190MHz, 802.11n (HT40), ANT J3)



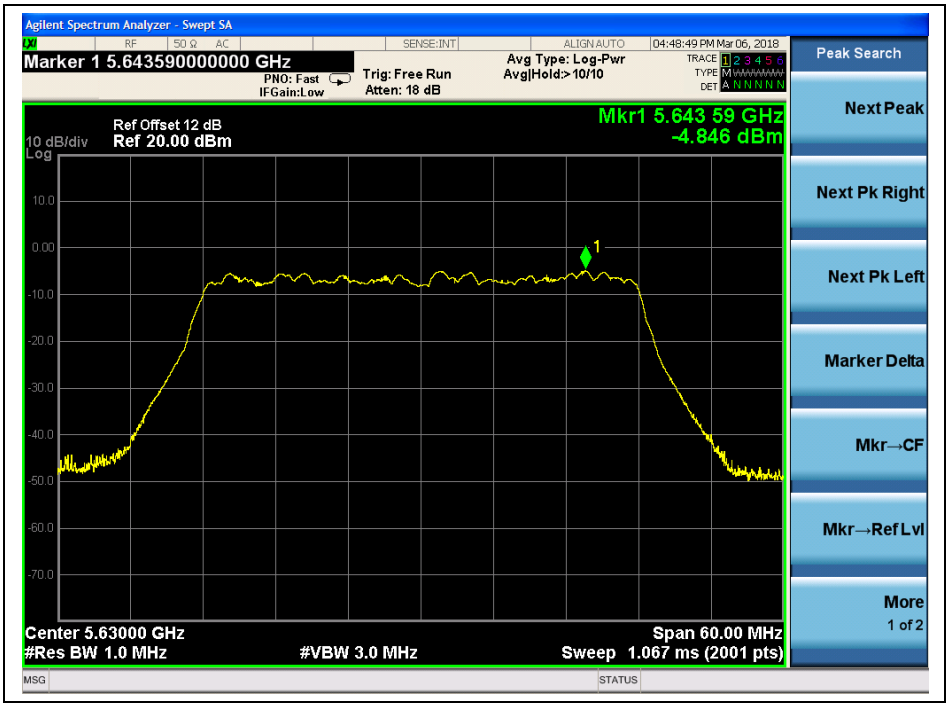
(Channel 46, 5230 MHz, 802.11n (HT40), ANT J3)

(Channel 54, 5270MHz, 802.11n (HT40), ANT J3)

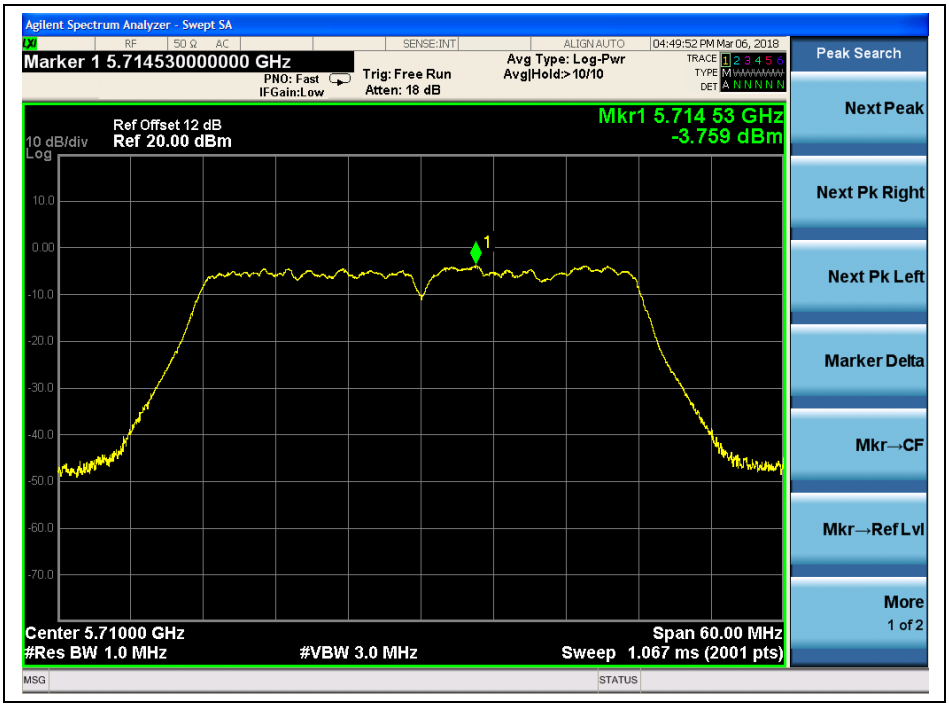
(Channel 62, 5310 MHz, 802.11n (HT40), ANT J3)



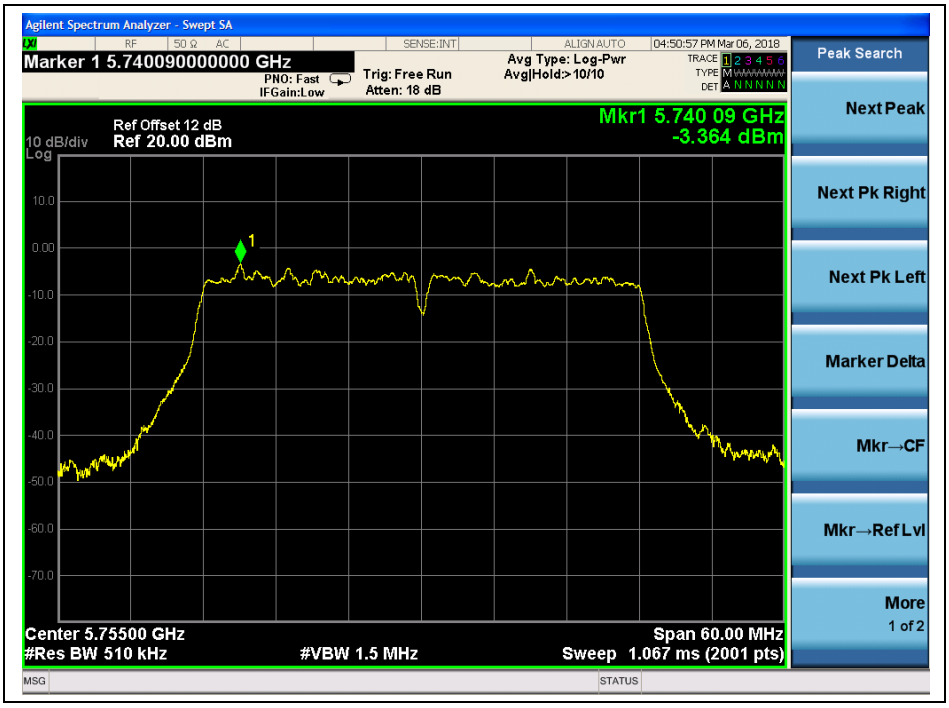
(Channel 102, 5510MHz, 802.11n (HT40), ANT J3)



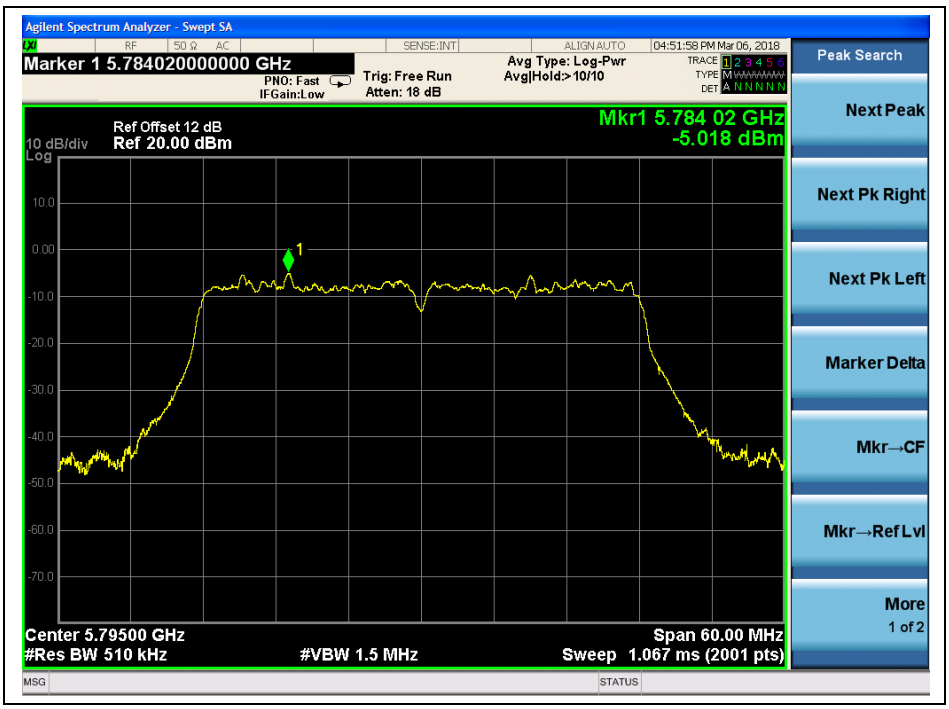
(Channel 126, 5630 MHz, 802.11n (HT40), ANT J3)



(Channel 142, 5710MHz, 802.11n (HT40), ANT J3)



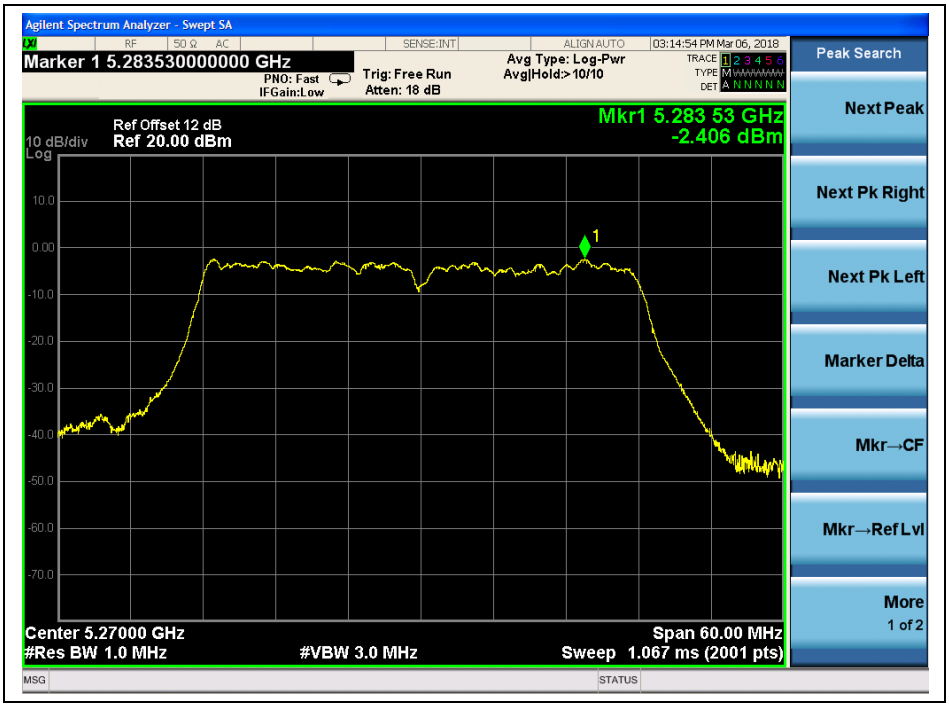
(Channel 151, 5755 MHz, 802.11n (HT40), ANT J3)



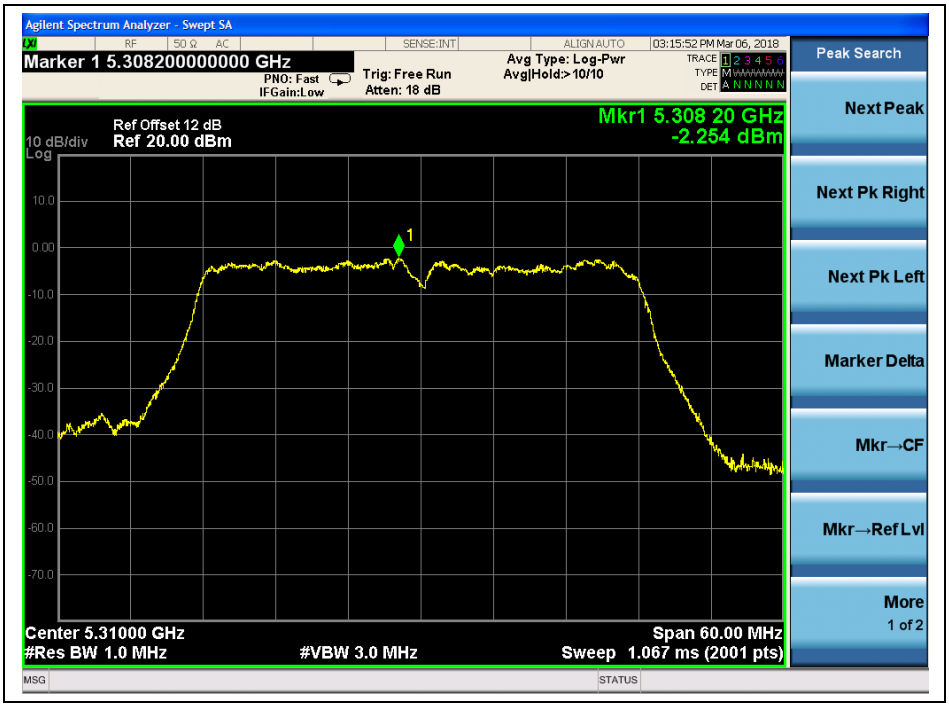
(Channel 159, 5795MHz, 802.11n (HT40), ANT J3)

(Channel 38, 5190MHz, 802.11n (HT40), ANT J4)

(Channel 46, 5230 MHz, 802.11n (HT40), ANT J4)

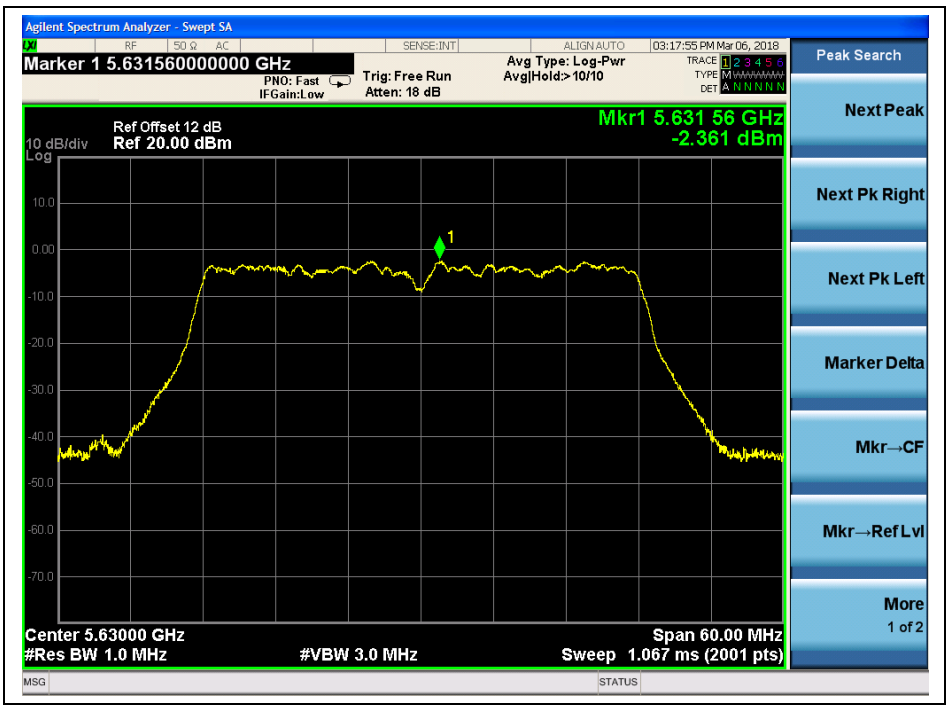


(Channel 54, 5270MHz, 802.11n (HT40), ANT J4)

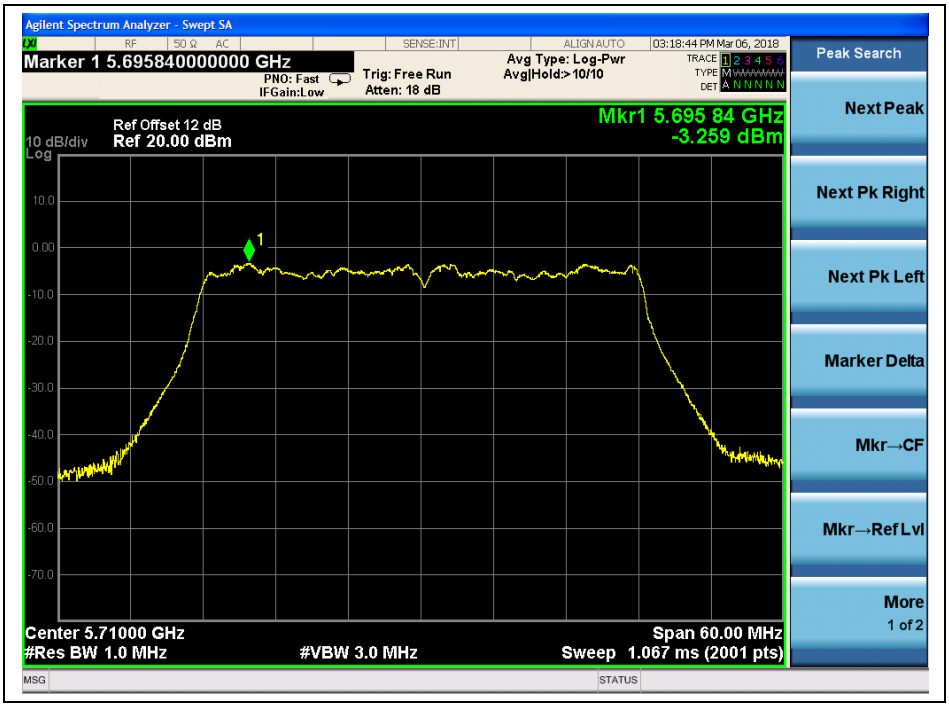


(Channel 62, 5310 MHz, 802.11n (HT40), ANT J4)

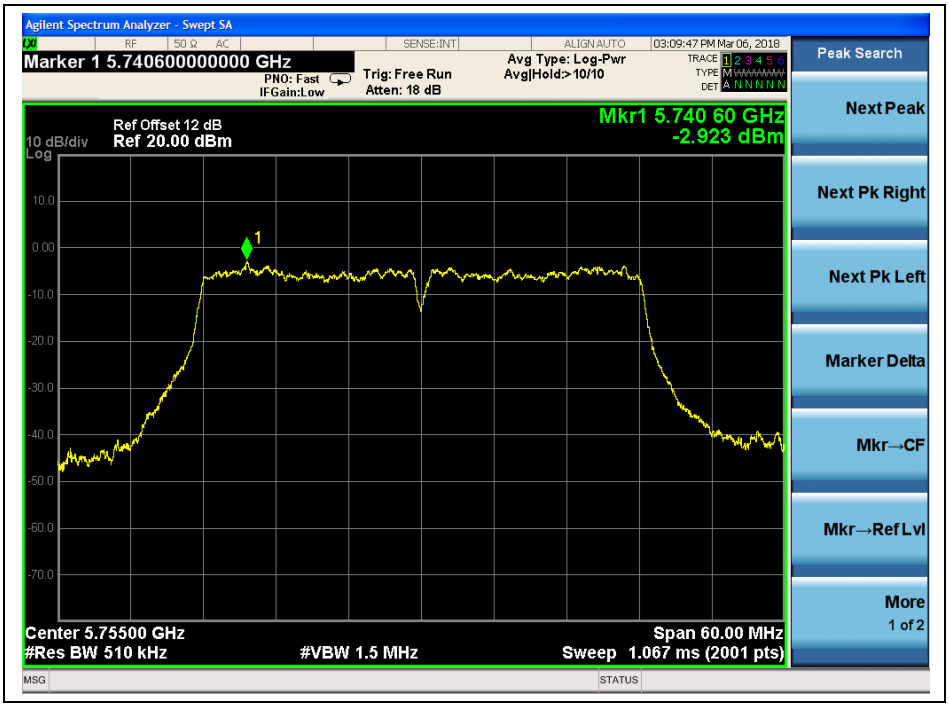
(Channel 102, 5510MHz, 802.11n (HT40), ANT J4)



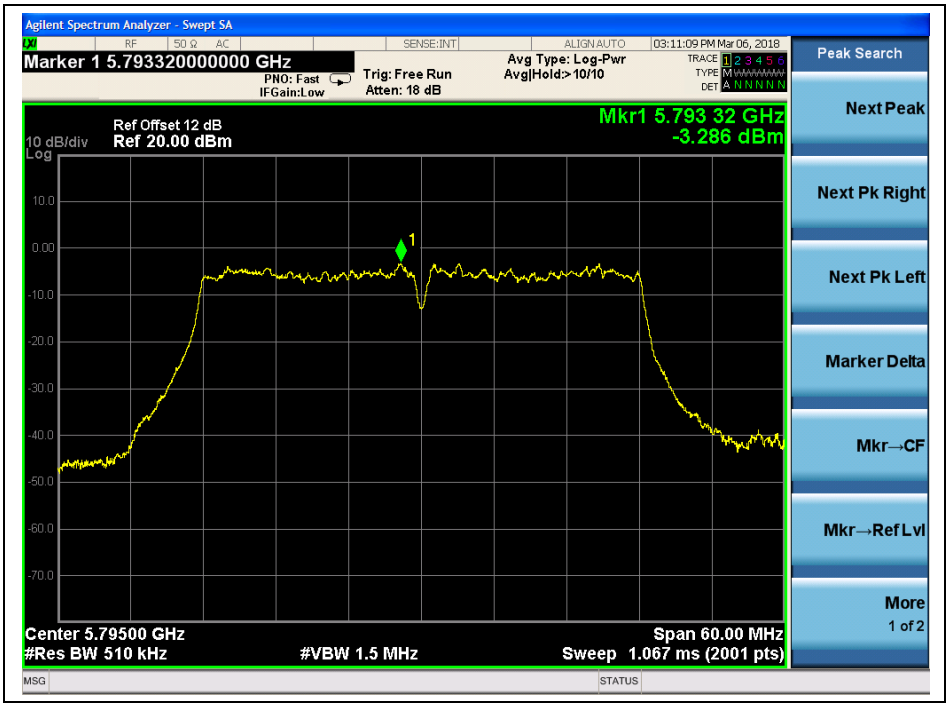
(Channel 126, 5630 MHz, 802.11n (HT40), ANT J4)



(Channel 142, 5710MHz, 802.11n (HT40), ANT J4)



(Channel 151, 5755 MHz, 802.11n (HT40), ANT J4)



(Channel 159, 5795MHz, 802.11n (HT40), ANT J4)

802.11ac (VHT20) Test mode

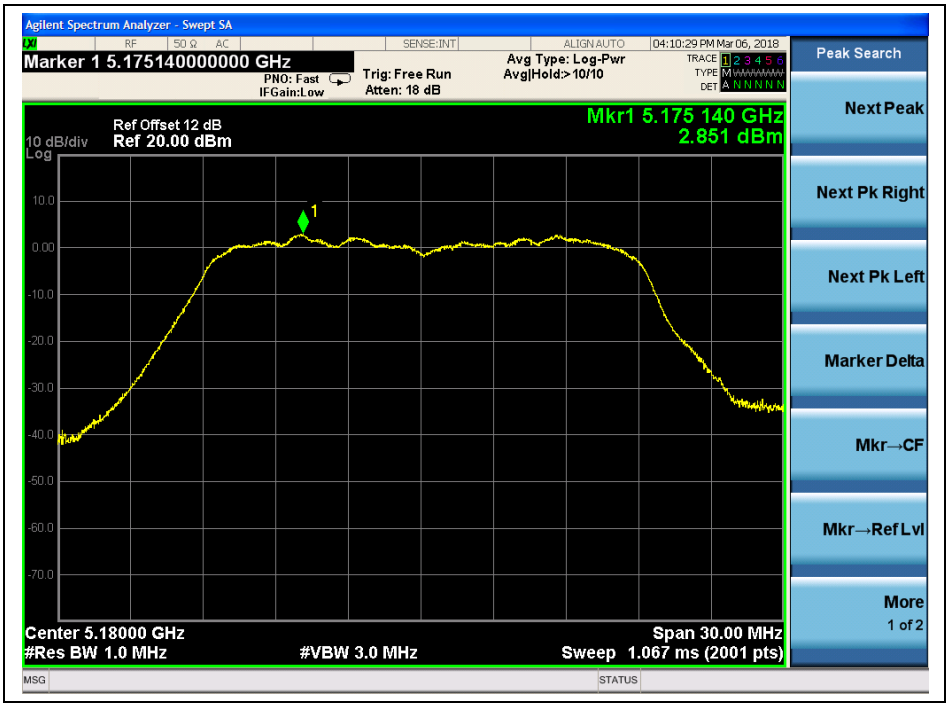
A. Test Verdict:

Channel	Frequency (MHz)	ANT J3		ANT J4		Limit (dBm/MHz)
		Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	
36	5180	2.85	4.43	3.39	5.13	11
44	5220	2.57	4.15	2.91	4.65	
48	5240	2.12	3.70	1.24	2.98	
52	5260	2.08	3.66	-0.03	1.71	
60	5300	1.65	3.23	-0.49	1.25	
64	5320	1.22	2.80	-1.51	0.23	
100	5500	-0.74	0.84	-1.17	0.57	
120	5600	-1.95	-0.37	-0.13	1.61	
144	5720	0.65	2.23	-0.84	0.90	
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Limit (dBm/500KHz)
149	5745	-1.48	0.10	-1.17	0.57	30
157	5785	-2.24	-0.66	-1.52	0.22	
165	5825	-3.06	-1.48	-0.51	1.23	

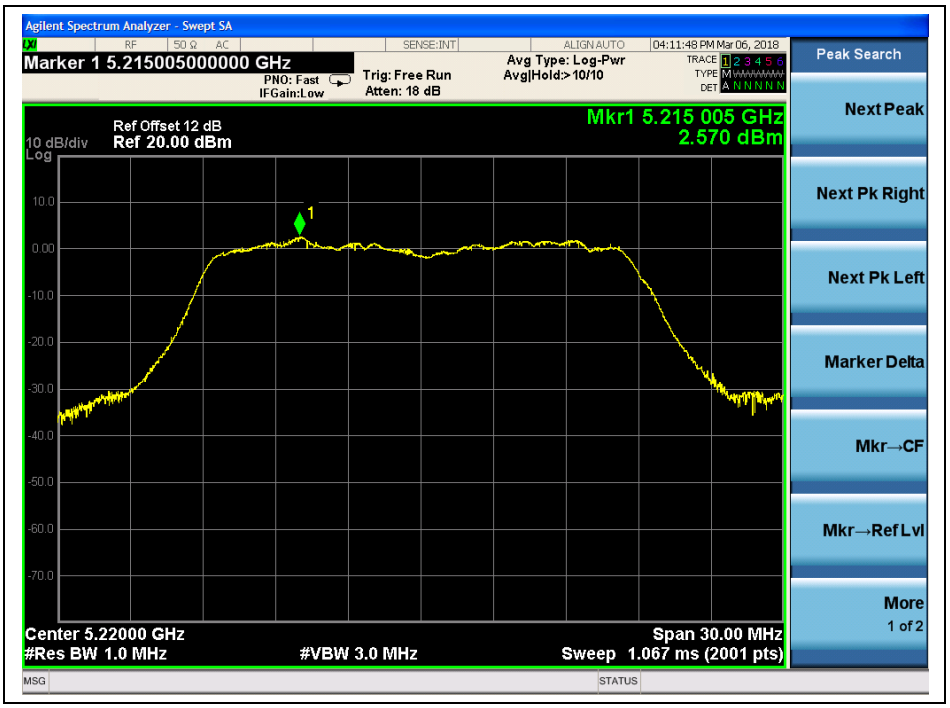
Total Peak Power spectral density (ANT J3+ANT J4)

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	7.807	10.99	PASS
44	5220	7.420		
48	5240	6.368		
52	5260	5.806		
60	5300	5.365		
64	5320	4.715		
100	5500	3.720		
120	5600	3.744		
144	5720	4.628		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	3.354	29.99	PASS
157	5785	2.815		
165	5825	3.096		
Note: Directional gain = 3.0dBi + 10log(2) = 6.01dBi > 6dBi, so the power spectral density limit shall be 11-(6.01-6) = 10.99 dBm/MHz for 5.18-5.24 GHz band, 5.26-5.32 GHz band, 5.50-5.70 GHz band and 30-(6.01-6) = 29.99 dBm/500KHz for 5.745-5.825 GHz band.				

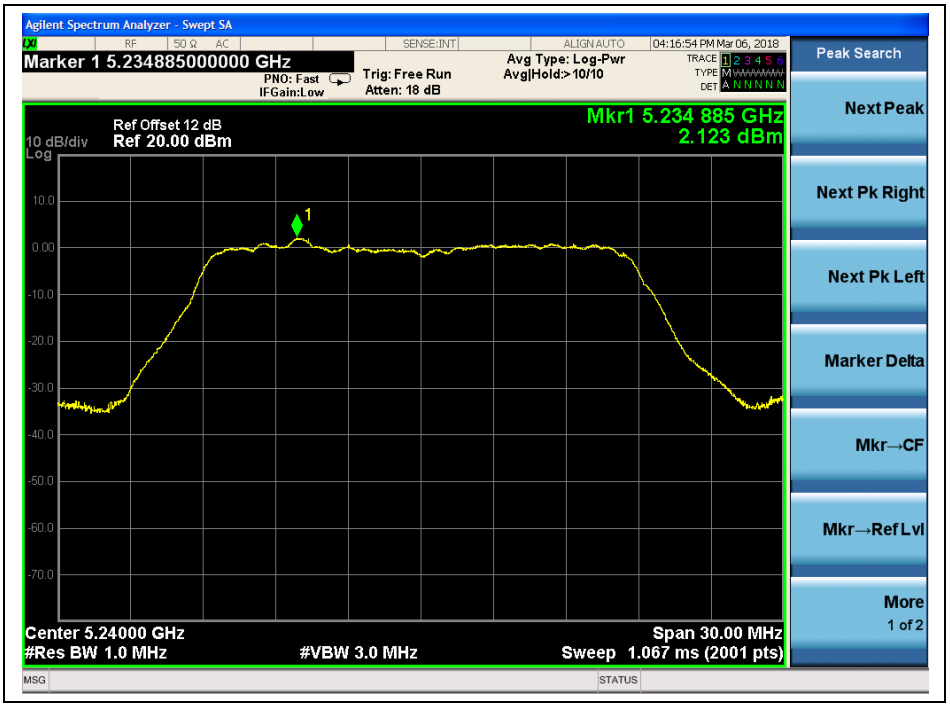
B. Test Plots



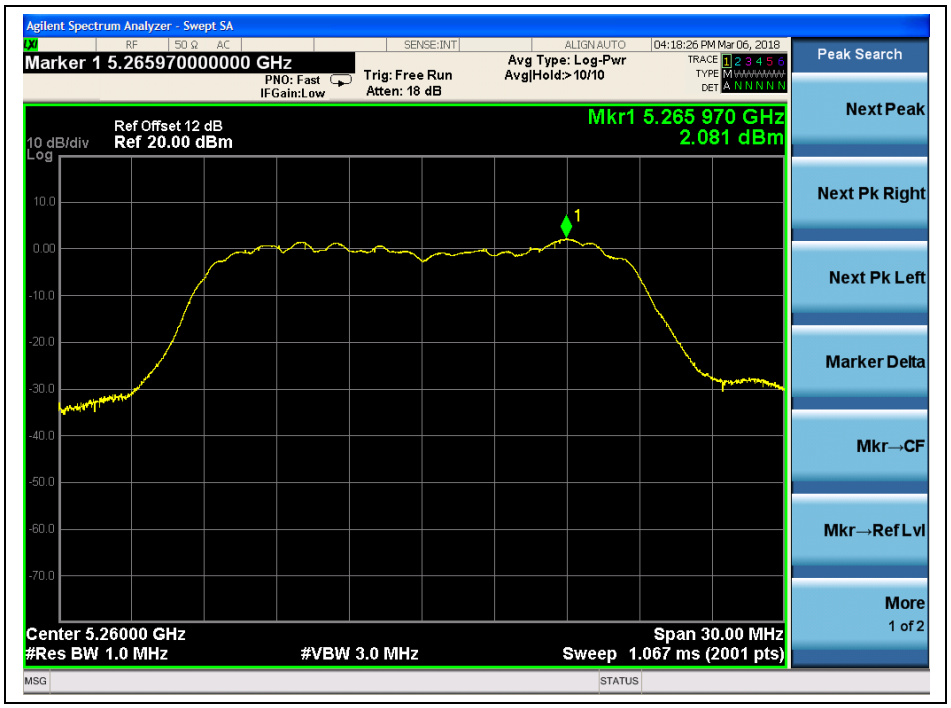
(Channel 36, 5180MHz, 802.11ac (VHT20), ANT J3)



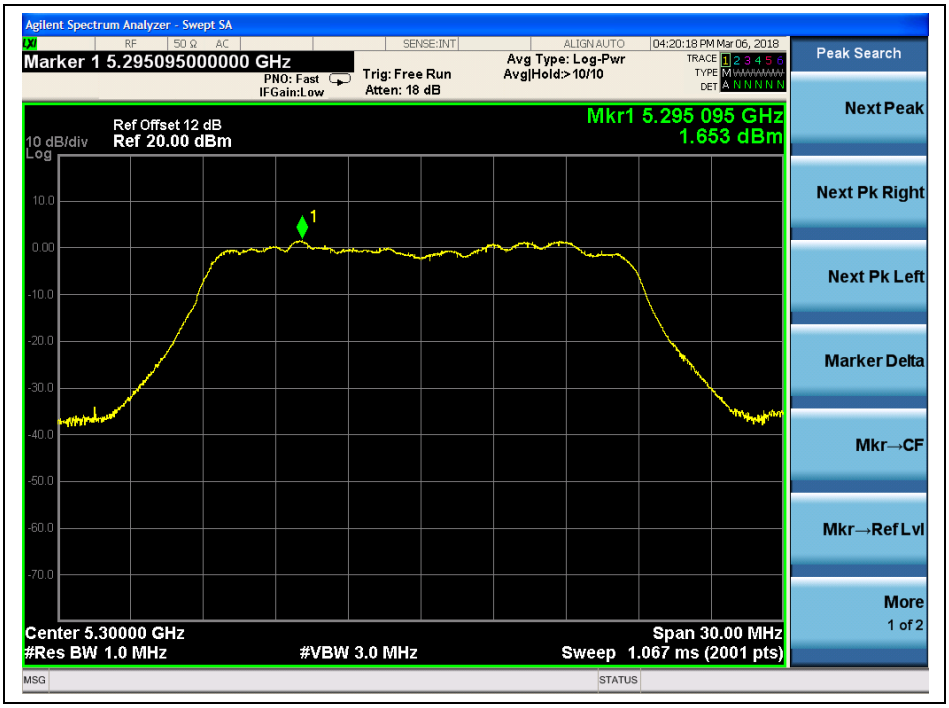
(Channel 44, 5220 MHz, 802.11ac (VHT20), ANT J3)



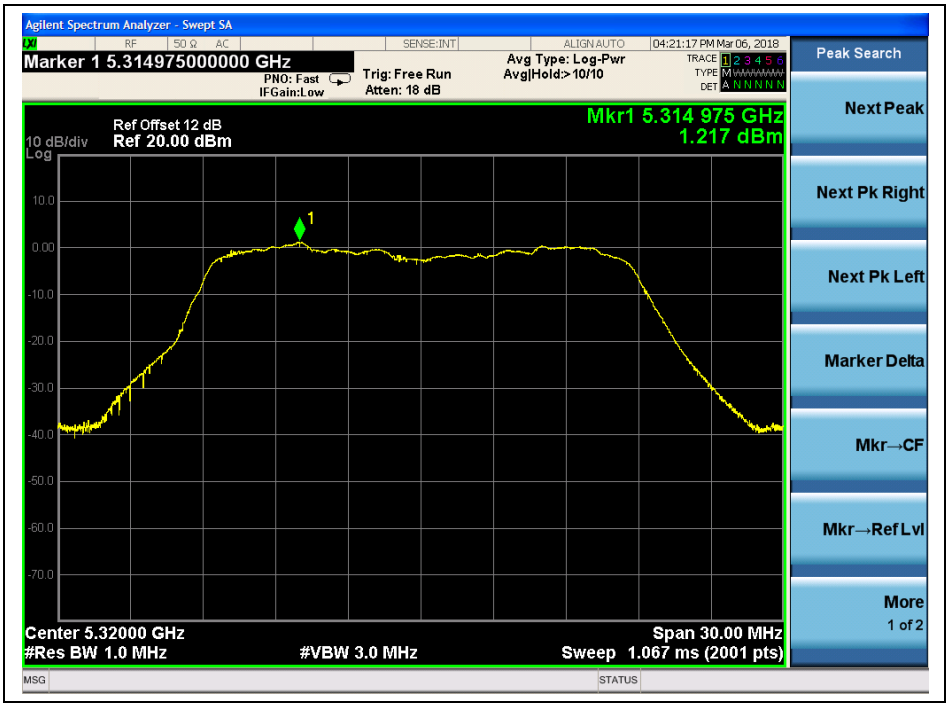
(Channel 48, 5240MHz, 802.11 ac (VHT20), ANT J3)



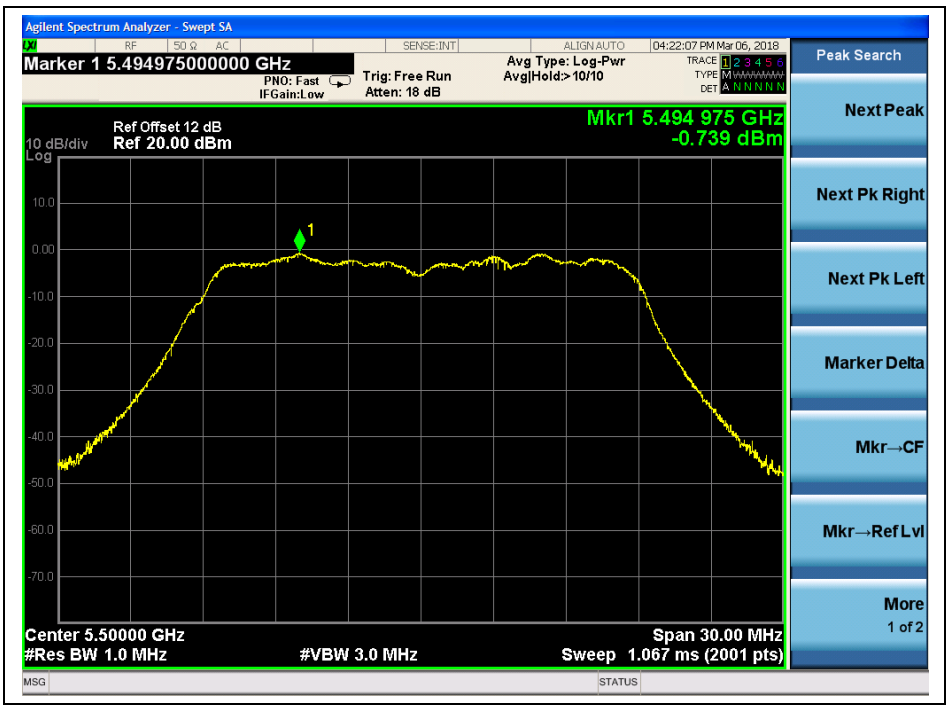
(Channel 52, 5260MHz, 802.11ac (VHT20), ANT J3)



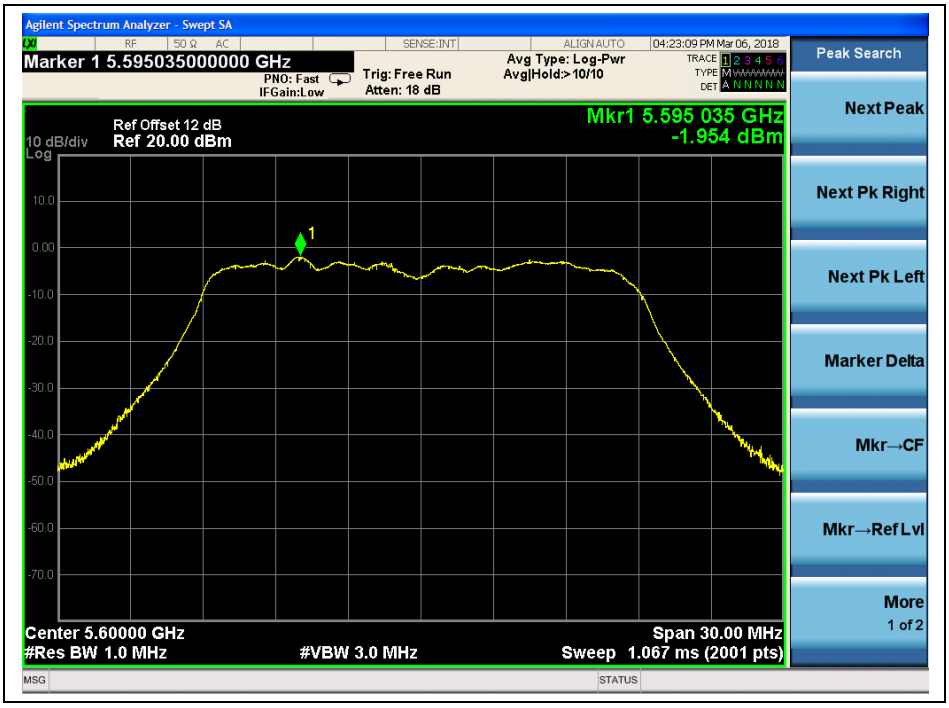
(Channel 60, 5300 MHz, 802.11ac (VHT20), ANT J3)



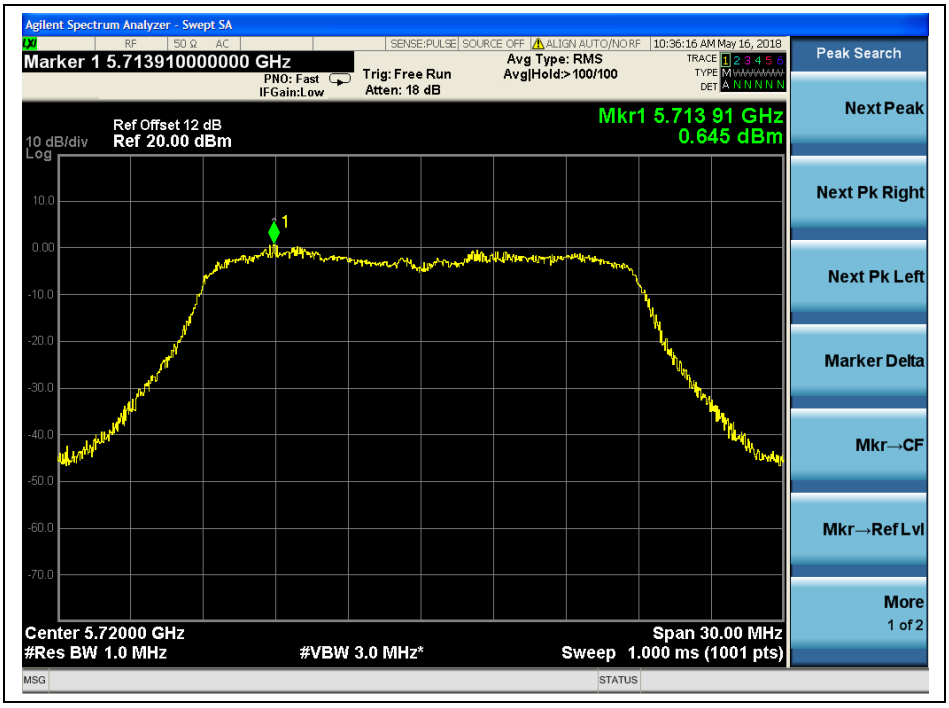
(Channel 64, 5320MHz, 802.11 ac (VHT20), ANT J3)



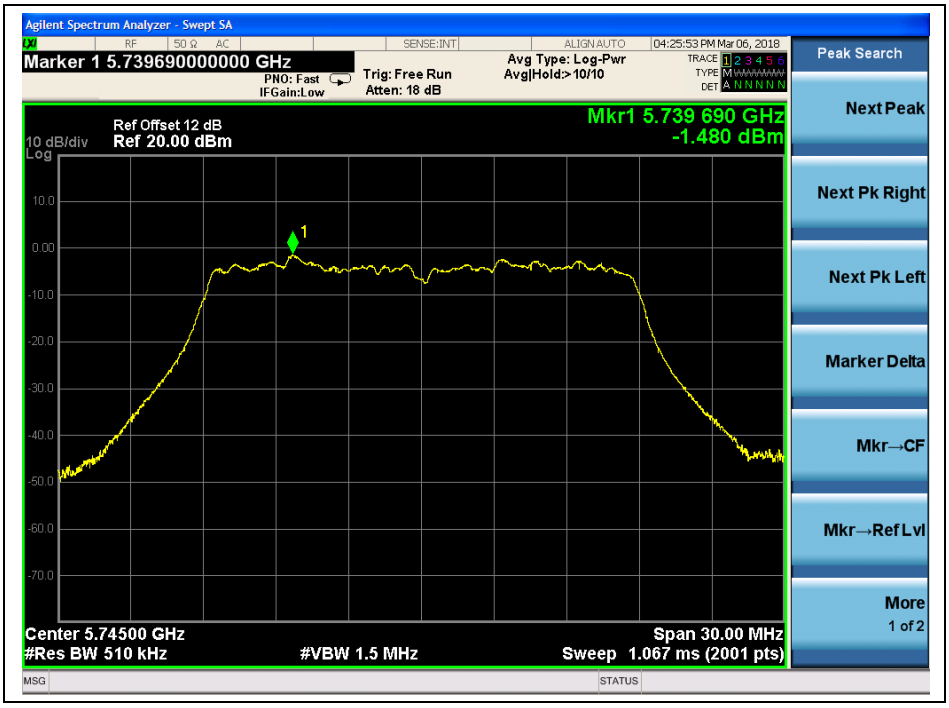
(Channel 100, 5500MHz, 802.11ac (VHT20), ANT J3)



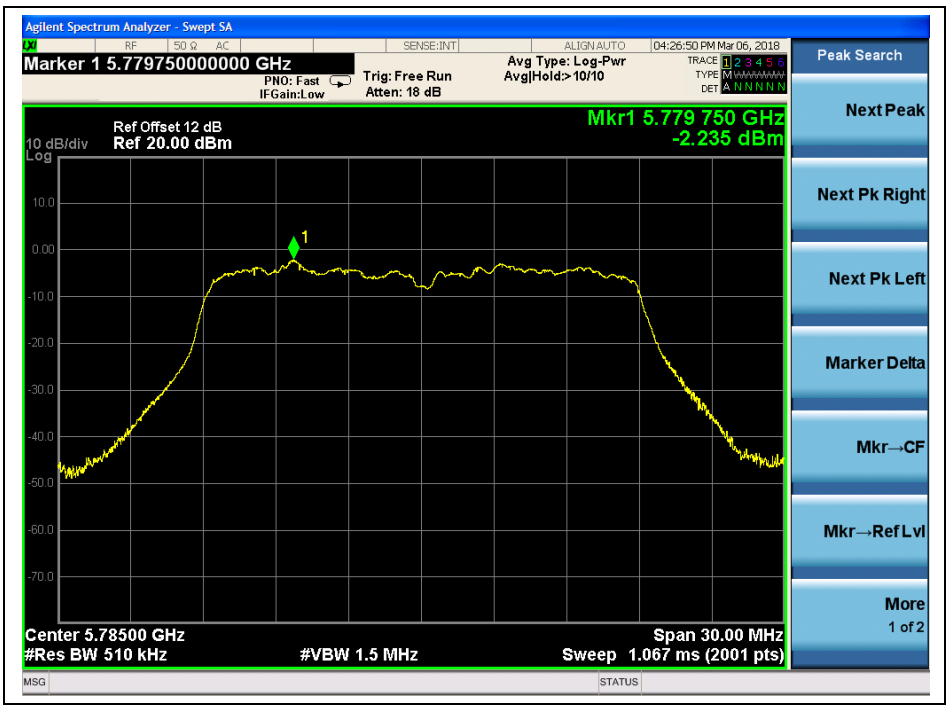
(Channel 120, 5600 MHz, 802.11ac (VHT20), ANT J3)



(Channel 144, 5720MHz, 802.11 ac (VHT20), ANT J3)

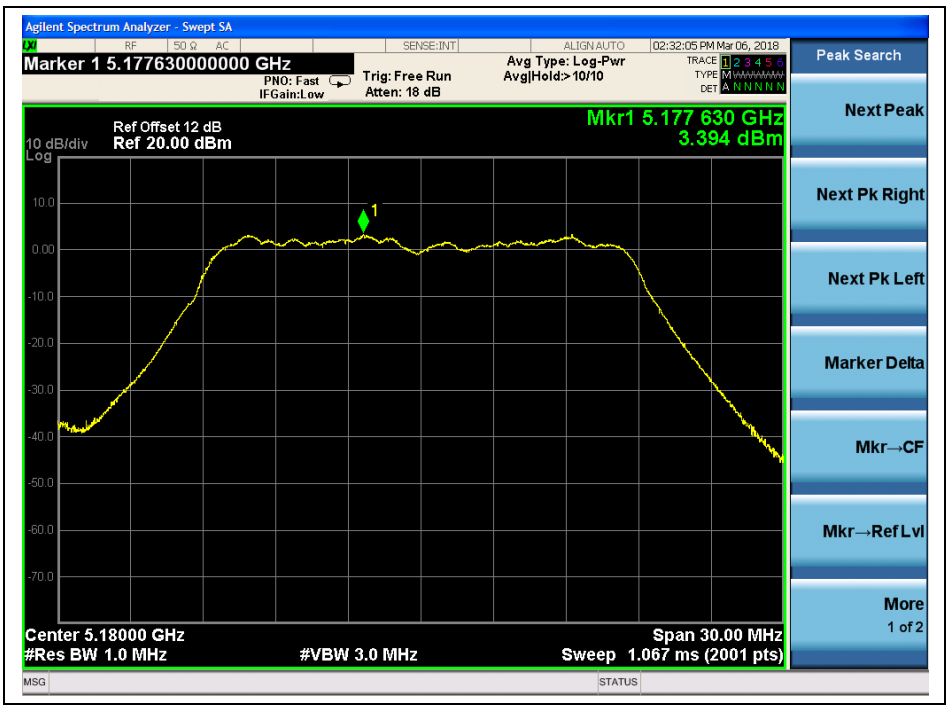


(Channel 149, 5745MHz, 802.11 ac (VHT20), ANT J3)



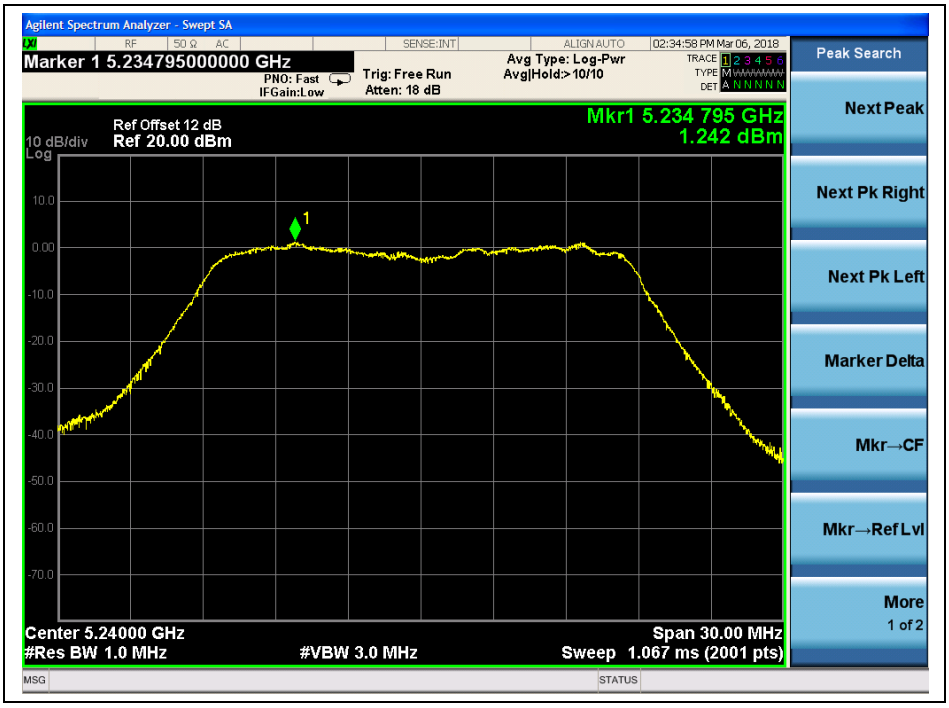
(Channel 157, 5785MHz, 802.11 ac (VHT20), ANT J3)

(Channel 165, 5825MHz, 802.11 ac (VHT20), ANT J3)



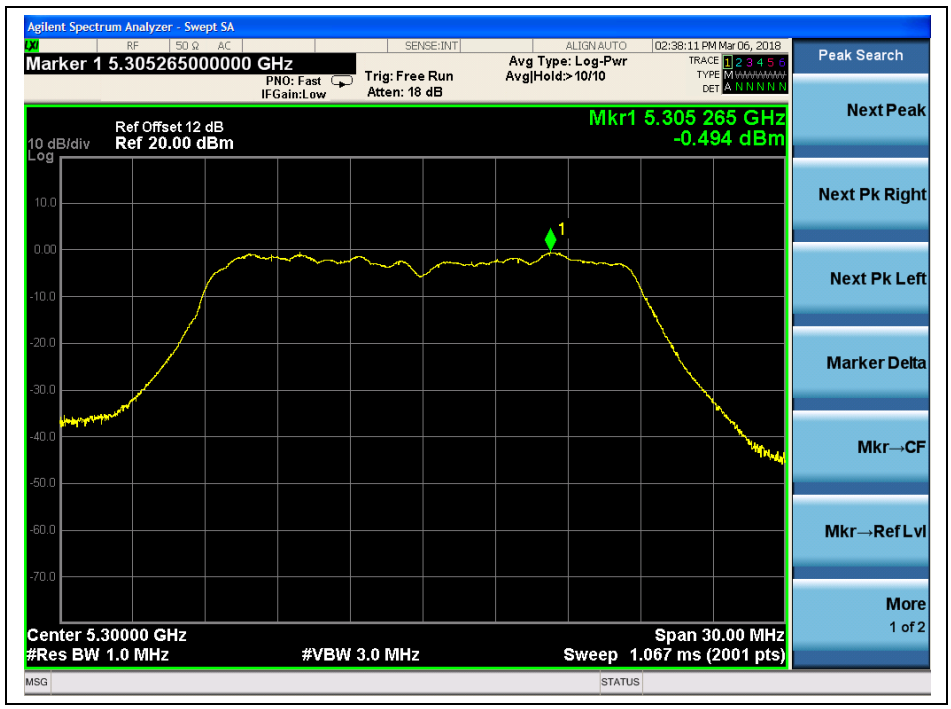
(Channel 36, 5180MHz, 802.11 ac (VHT20), ANT J4)

(Channel 44, 5220 MHz, 802.11 ac (VHT20), ANT J4)



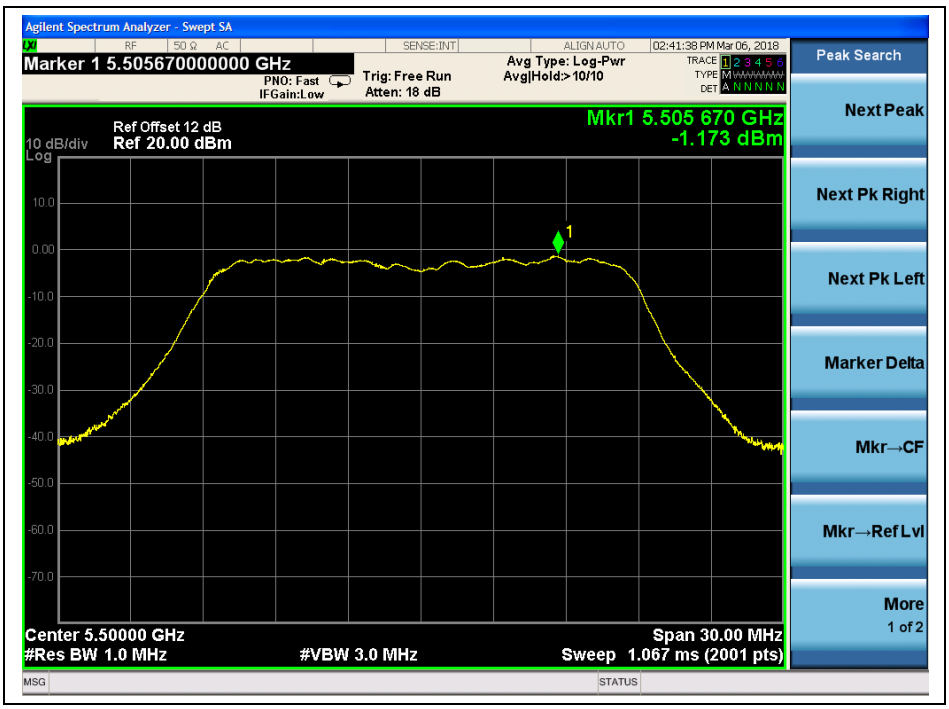
(Channel 48, 5240MHz, 802.11 ac (VHT20), ANT J4)

(Channel 52, 5260MHz, 802.11ac (VHT20), ANT J4)



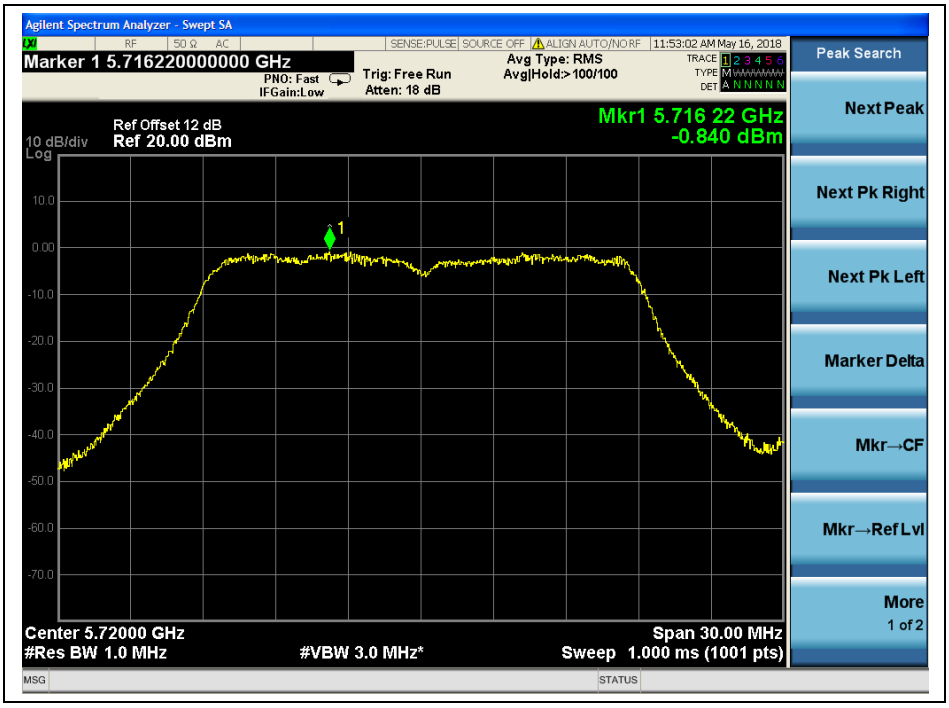
(Channel 60, 5300 MHz, 802.11ac (VHT20), ANT J4)

(Channel 64, 5320MHz, 802.11 ac (VHT20), ANT J4)



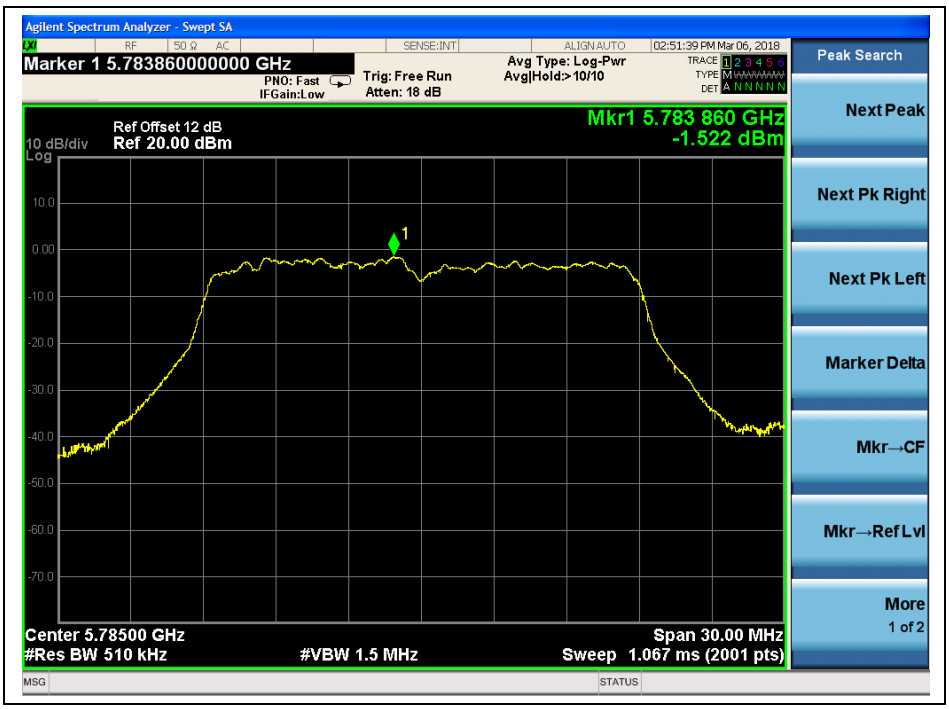
(Channel 100, 5500MHz, 802.11ac (VHT20), ANT J4)

(Channel 120, 5600 MHz, 802.11ac (VHT20), ANT J4)

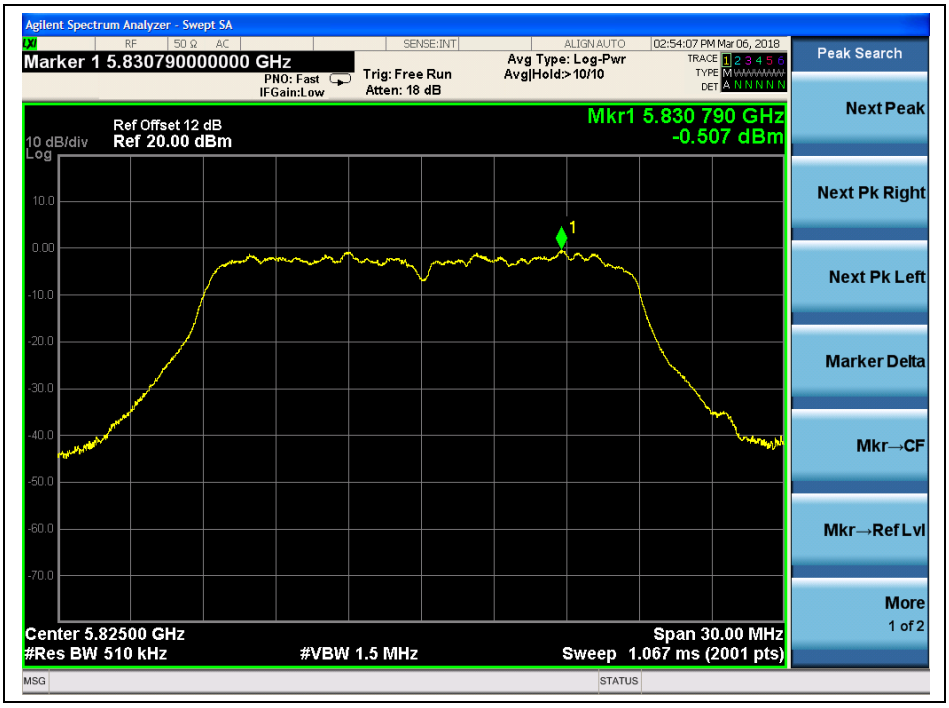


(Channel 144, 5720MHz, 802.11 ac (VHT20), ANT J4)

(Channel 149, 5745MHz, 802.11 ac (VHT20), ANT J4)



(Channel 157, 5785MHz, 802.11 ac (VHT20), ANT J4)



(Channel 165, 5825MHz, 802.11 ac (VHT20), ANT J4)

802.11ac (VHT40) Test mode

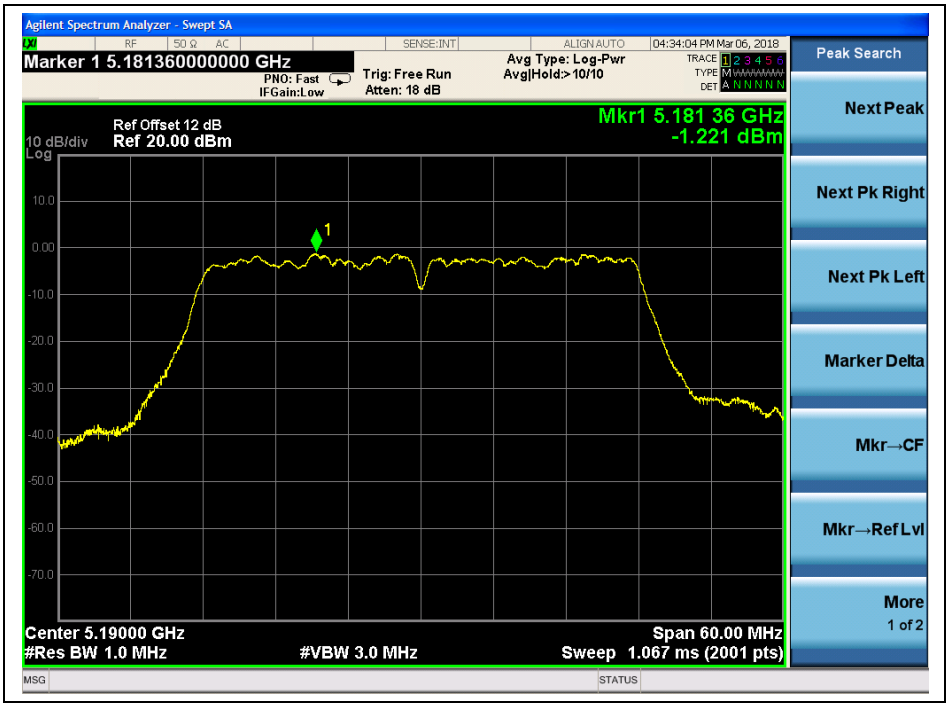
A. Test Verdict:

Channel	Frequency (MHz)	ANT J3		ANT J4		Limit (dBm/MHz)
		Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	
38	5190	-1.22	0.78	-0.56	1.46	11
46	5230	0.02	2.02	0.51	2.53	
54	5270	-0.68	1.32	-0.88	1.14	
62	5310	-1.79	0.21	-2.40	-0.38	
102	5510	-4.14	-2.14	-2.56	-0.54	
126	5630	-4.25	-2.25	-2.36	-0.34	
142	5710	-3.52	-1.52	-1.75	0.27	
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Limit (dBm/500KHz)
151	5755	-2.15	-0.15	-2.75	-0.73	30
159	5795	-5.10	-3.10	-2.66	-0.64	

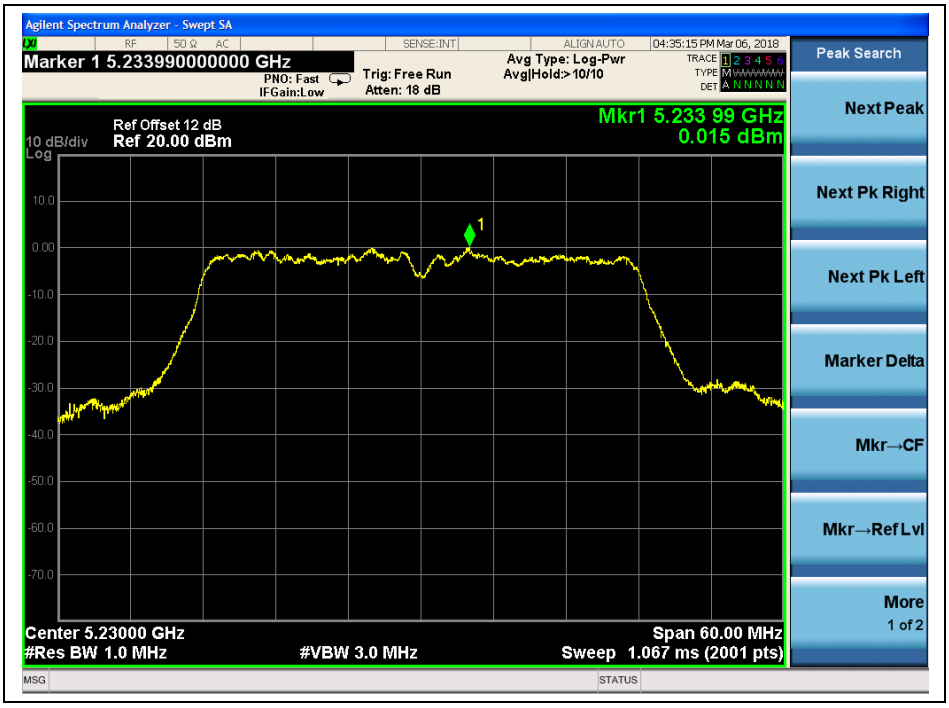
Total Peak Power spectral density (ANT J3+ANT J4)

Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	4.141	10.99	PASS
46	5230	5.291		
54	5270	4.239		
62	5310	2.933		
102	5510	1.741		
126	5630	1.817		
142	5710	2.474		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	2.578	29.99	PASS
159	5795	1.310		
Note: Directional gain = 3.0dBi + 10log(2) = 6.01dBi > 6dBi, so the power spectral density limit shall be 11-(6.01-6) = 10.99 dBm/MHz for 5.18-5.24 GHz band, 5.26-5.32 GHz band, 5.50-5.70 GHz band and 30-(6.01-6) = 29.99 dBm/500KHz for 5.745-5.825 GHz band.				

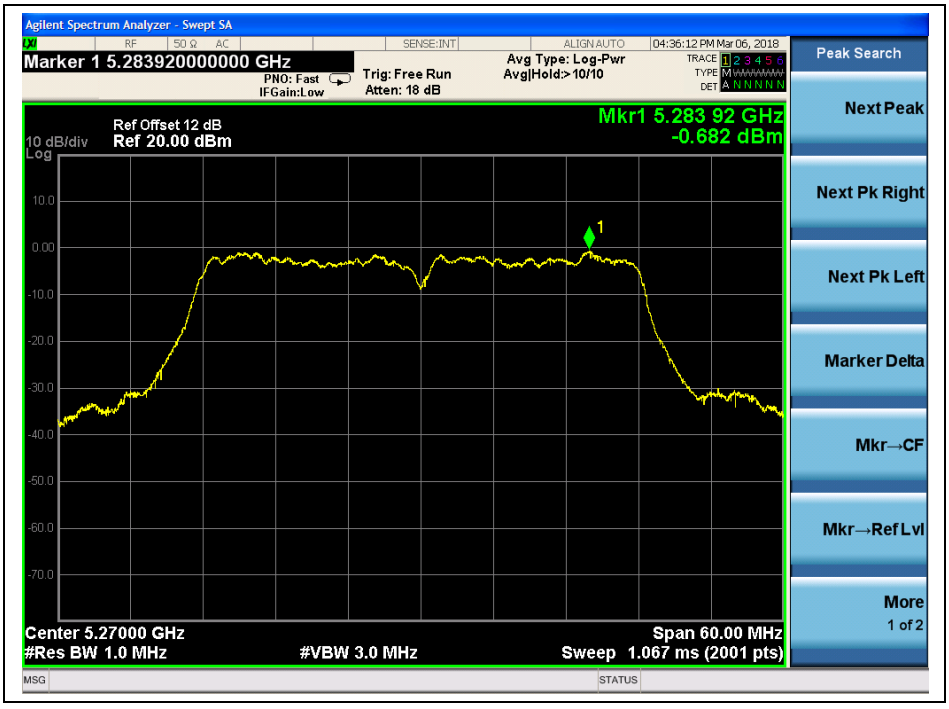
B. Test Plots



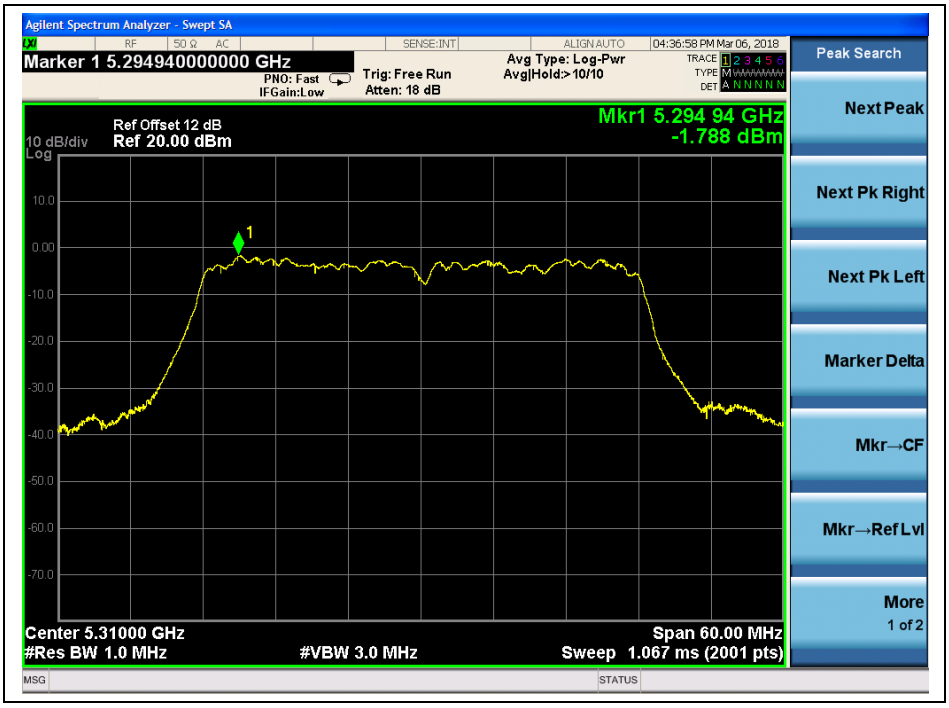
(Channel 38, 5190MHz, 802.11ac (VHT40), ANT J3)



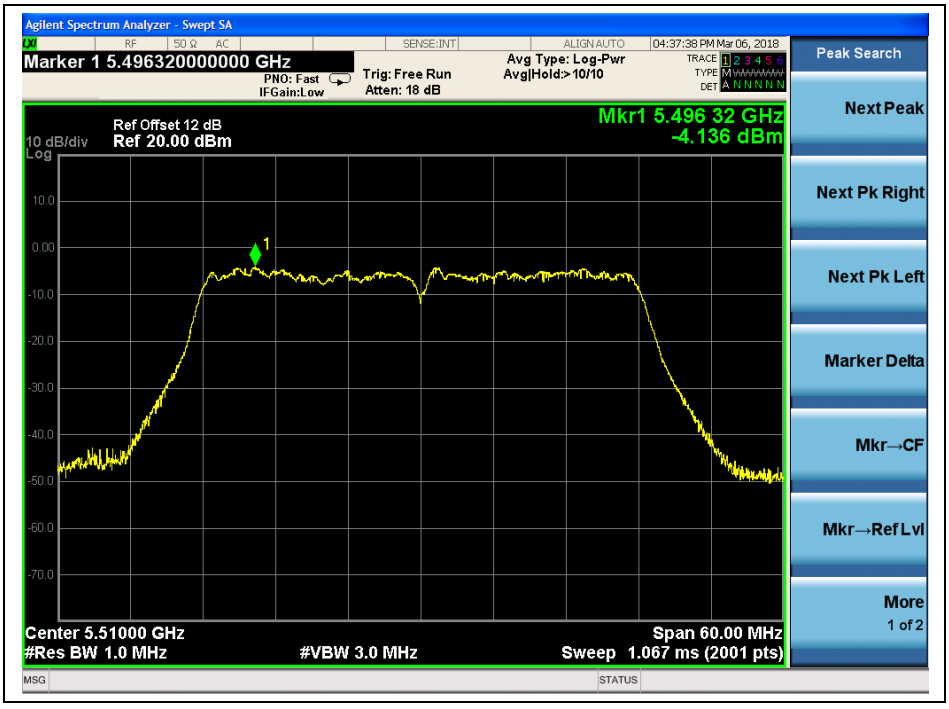
(Channel 46, 5230 MHz, 802.11 ac (VHT40), ANT J3)



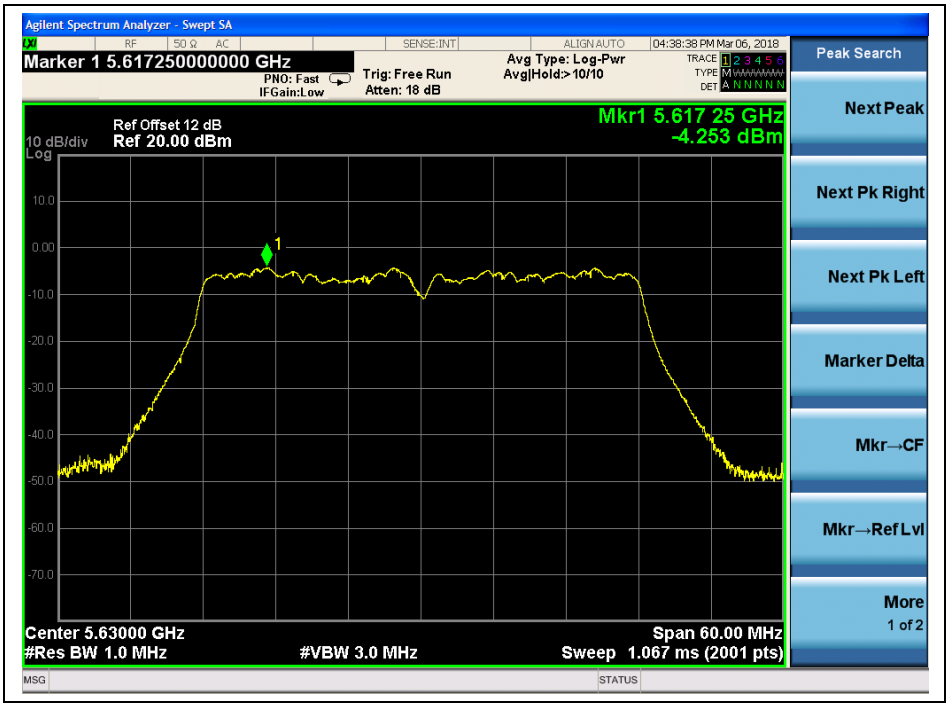
(Channel 54, 5270MHz, 802.11 ac (VHT40), ANT J3)



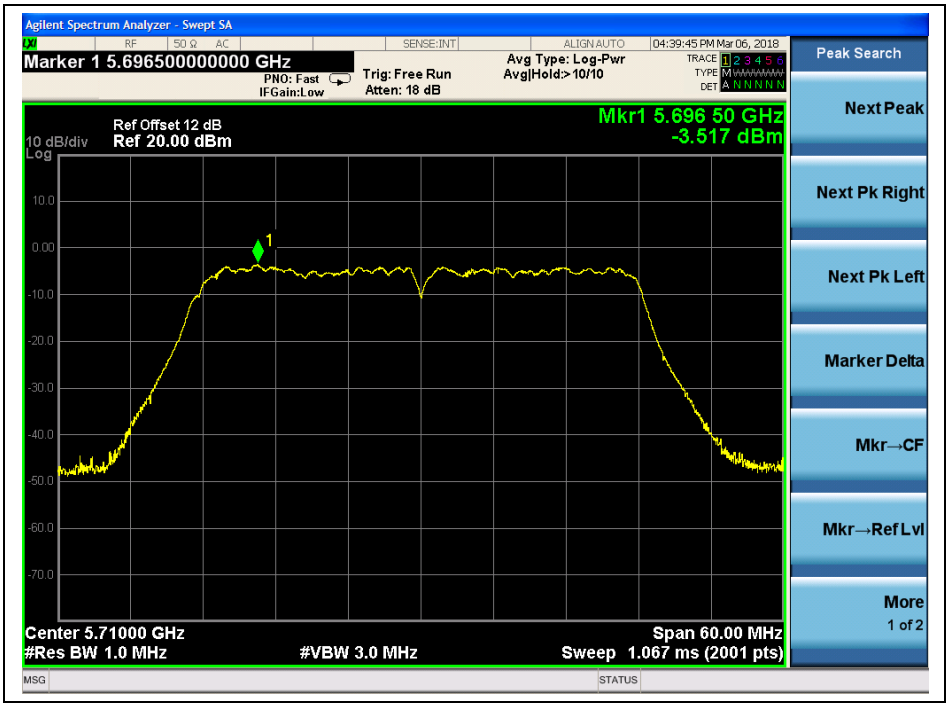
(Channel 62, 5310 MHz, 802.11 ac (VHT40), ANT J3)



(Channel 102, 5510MHz, 802.11 ac (VHT40), ANT J3)

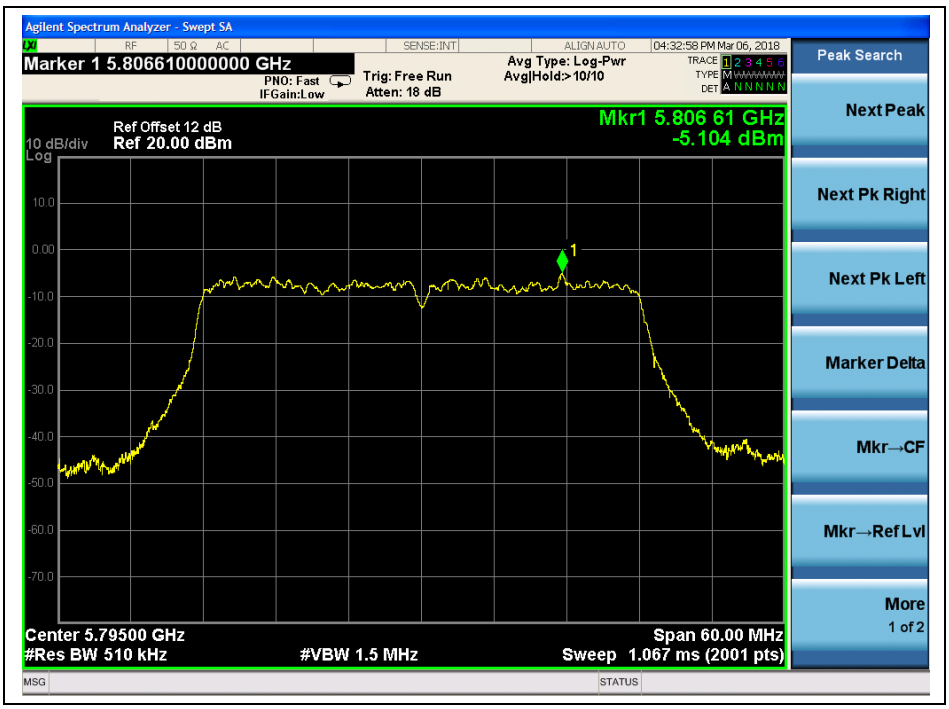


(Channel 126, 5630 MHz, 802.11 ac (VHT40), ANT J3)

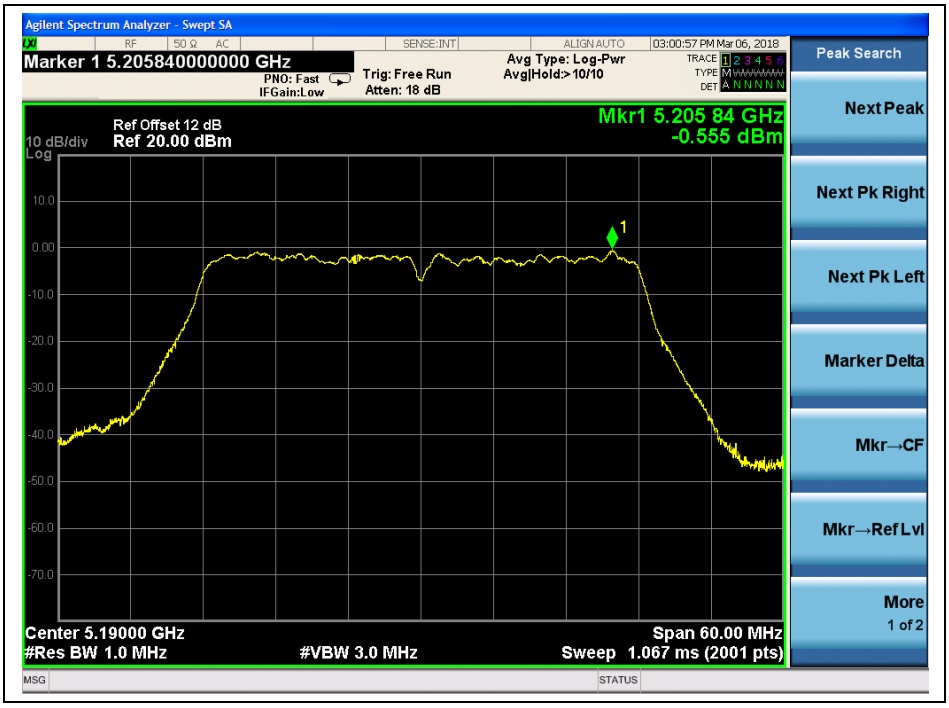


(Channel 142, 5710MHz, 802.11 ac (VHT40), ANT J3)

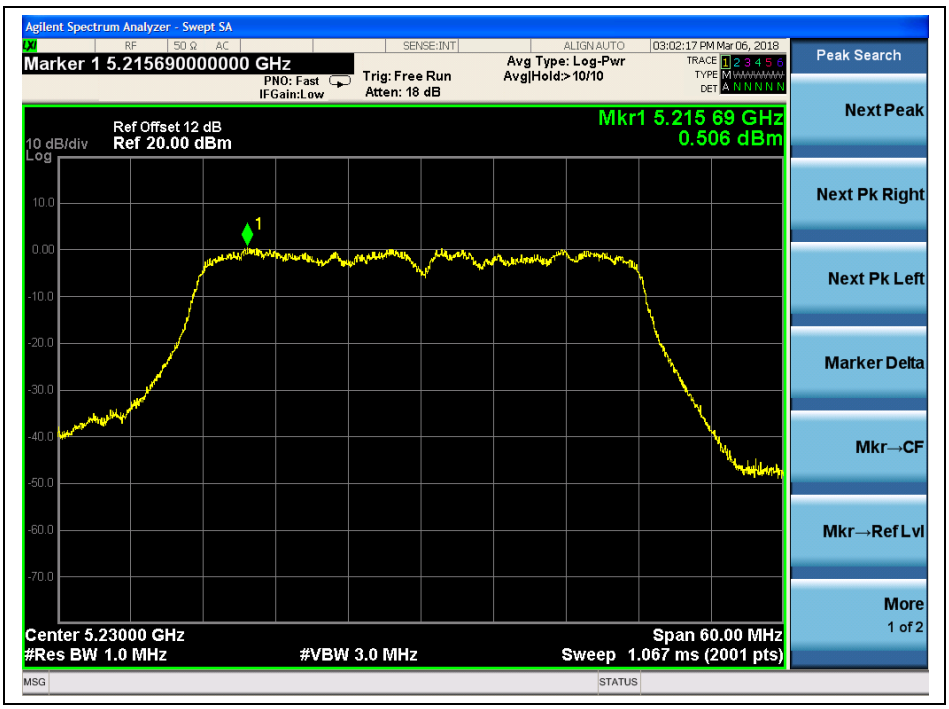
(Channel 151, 5755 MHz, 802.11 ac (VHT40), ANT J3)



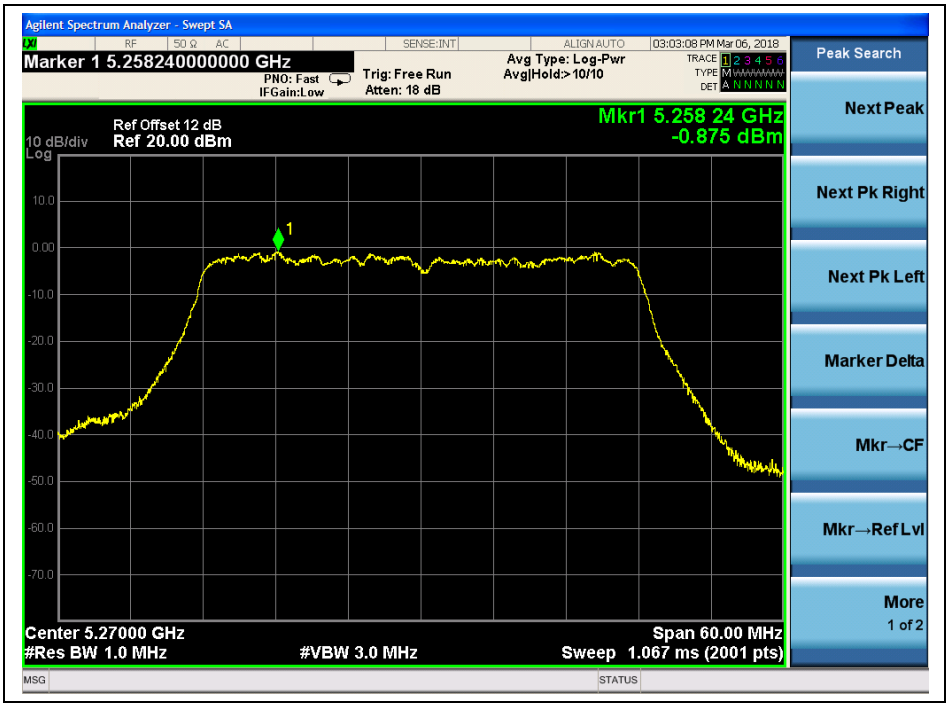
(Channel 159, 5795MHz, 802.11 ac (VHT40), ANT J3)



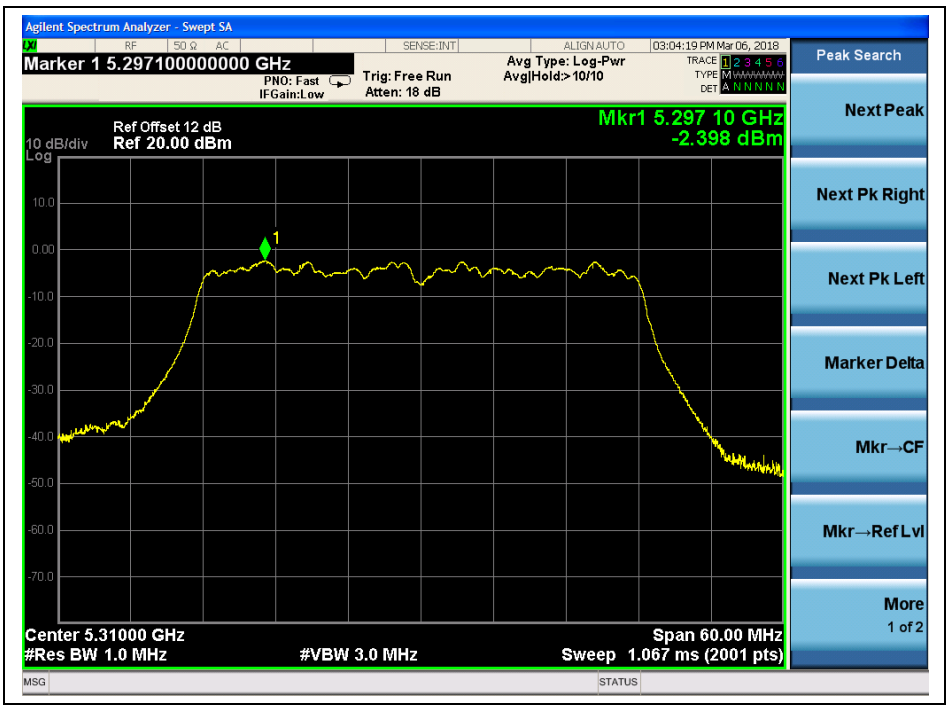
(Channel 38, 5190MHz, 802.11 ac (VHT40), ANT J4)



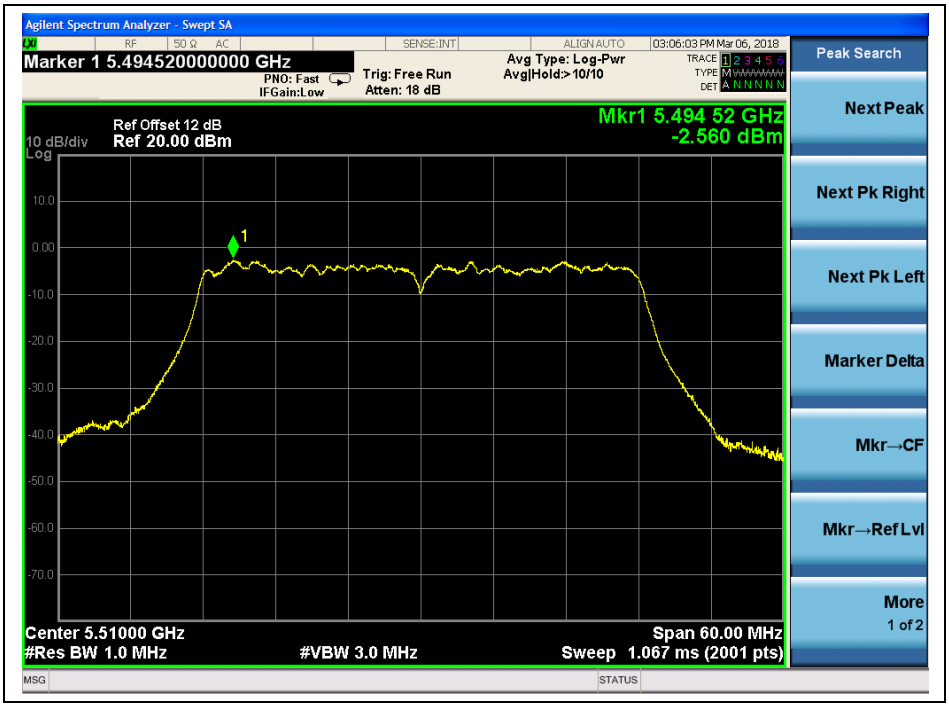
(Channel 46, 5230 MHz, 802.11 ac (VHT40), ANT J4)



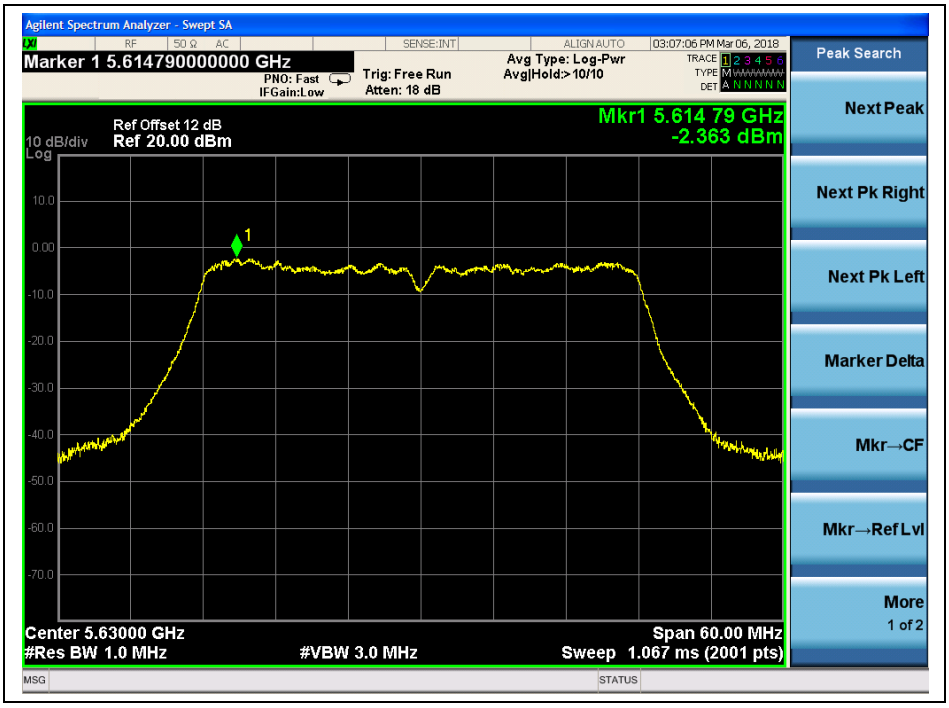
(Channel 54, 5270MHz, 802.11 ac (VHT40), ANT J4)



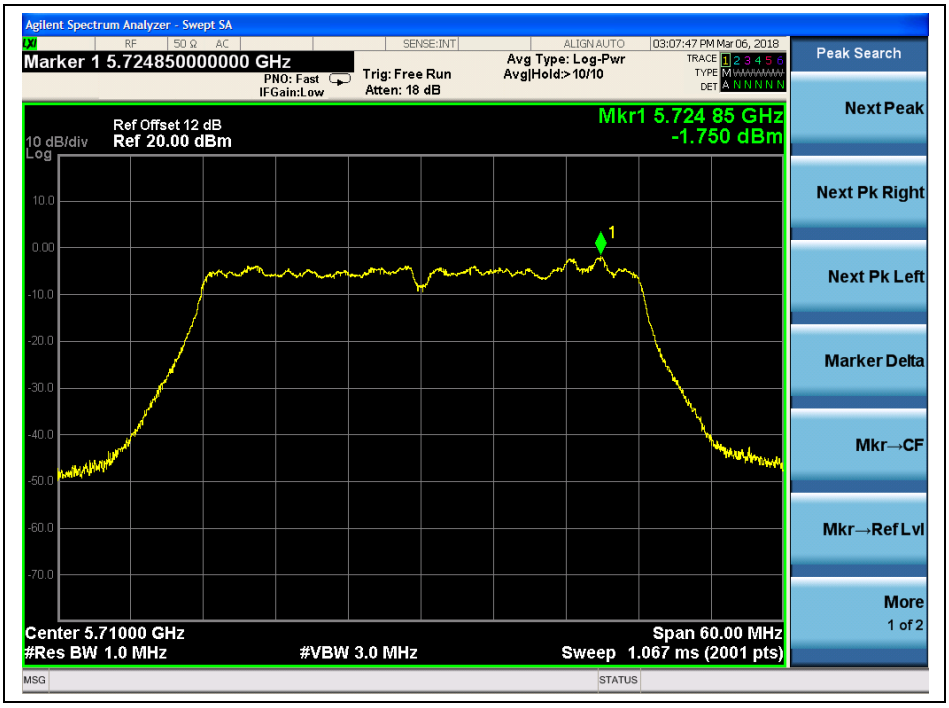
(Channel 62, 5310 MHz, 802.11 ac (VHT40), ANT J4)



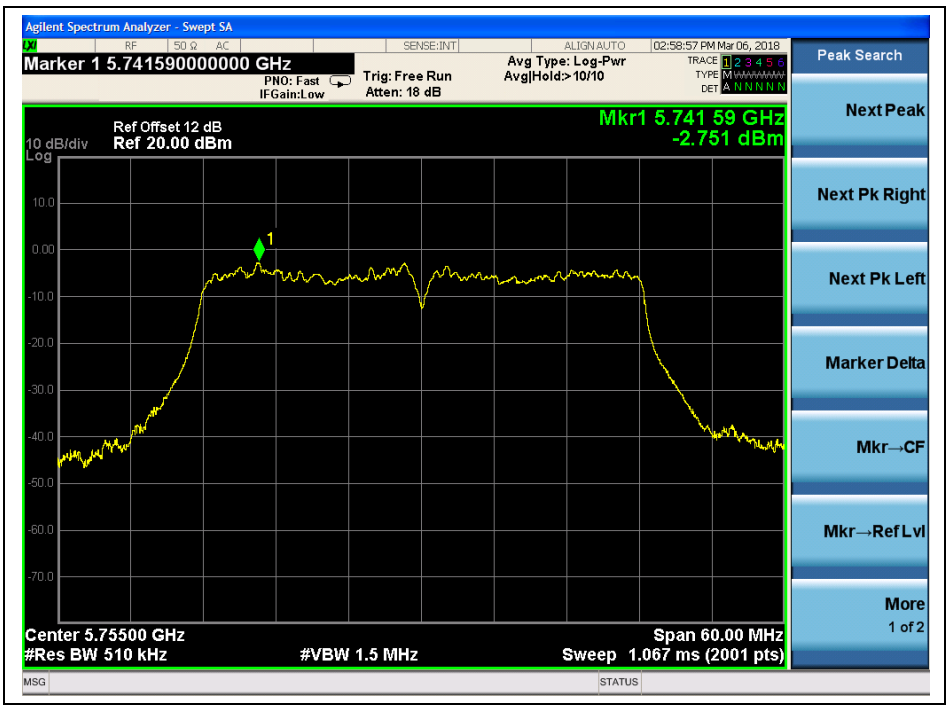
(Channel 102, 5510MHz, 802.11 ac (VHT40), ANT J4)



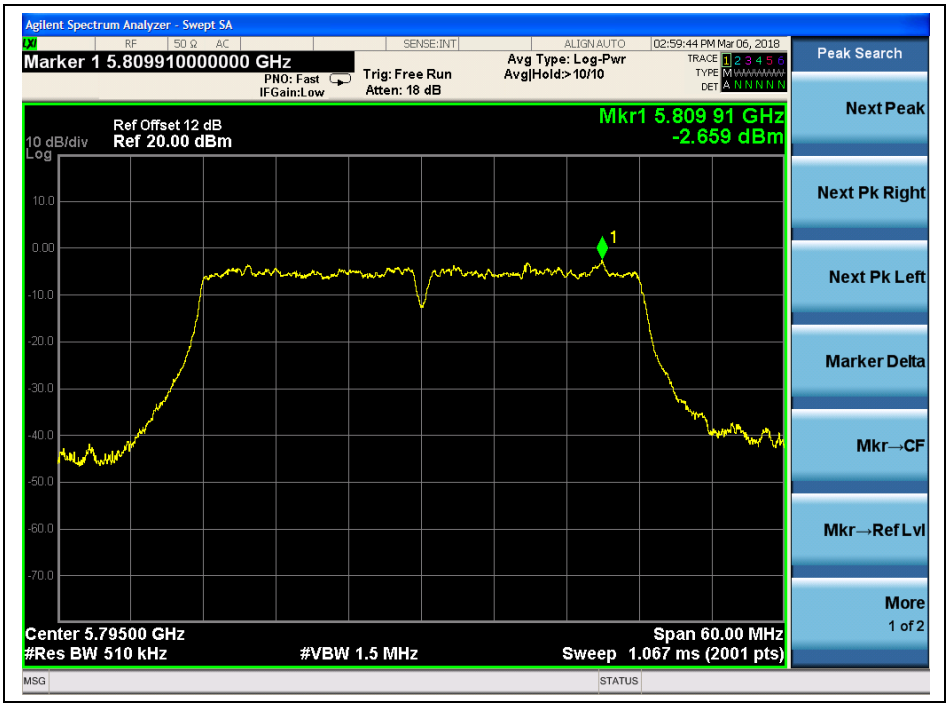
(Channel 126, 5630 MHz, 802.11 ac (VHT40), ANT J4)



(Channel 142, 5710MHz, 802.11 ac (VHT40), ANT J4)



(Channel 151, 5755 MHz, 802.11 ac (VHT40), ANT J4)



(Channel 159, 5795MHz, 802.11 ac (VHT40), ANT J4)

802.11ac (VHT80) Test mode

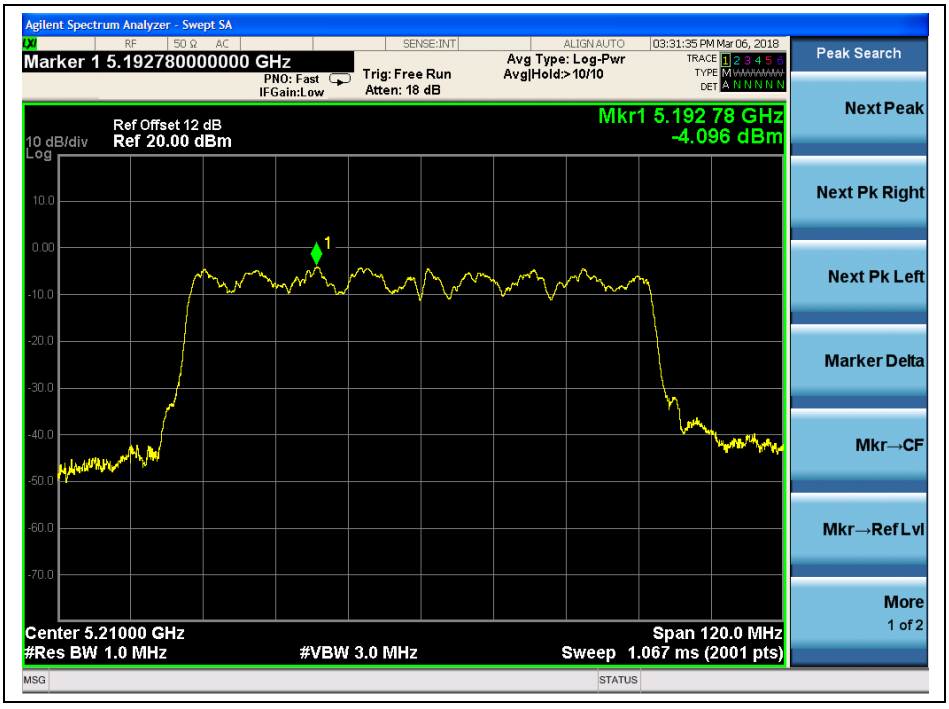
A. Test Verdict:

Channel	Frequency (MHz)	ANT J3		ANT J4		Limit (dBm/MHz)
		Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/MHz)	Calibrated with Duty cycle factor	
42	5210	-4.10	-1.27	-2.49	0.36	11
58	5290	-4.81	-1.98	-5.21	-2.36	
106	5530	-8.04	-5.21	-6.70	-3.85	
122	5610	-8.86	-6.03	-6.56	-3.71	
138	5690	-6.88	-4.05	-6.51	-3.66	
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Measured PSD (dBm/500KHz)	Calibrated with Duty cycle factor	Limit (dBm/500KHz)
155	5775	-9.22	-6.39	-7.26	-4.41	30

Total Peak Power spectral density (ANT J3+ANT J4)

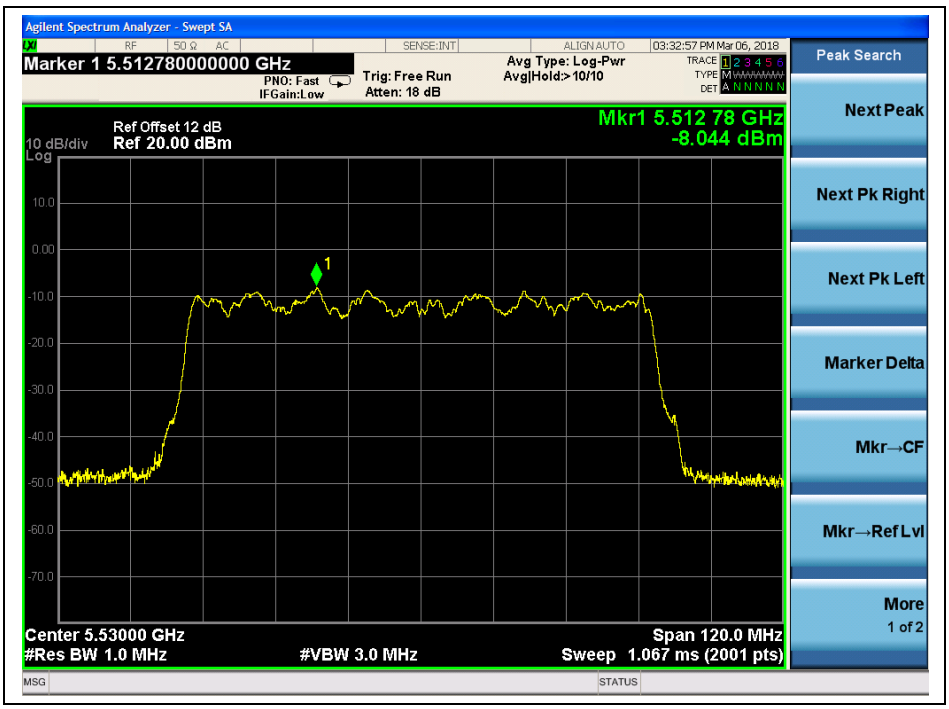
Channel	Frequency (MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	2.631	10.99	PASS
58	5290	0.843		
106	5530	-1.467		
122	5610	-1.707		
138	5690	-0.841		
Channel	Frequency (MHz)	Total PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-2.278	29.99	PASS
Note: Directional gain = 3.0dBi + 10log(2) = 6.01dBi > 6dBi, so the power spectral density limit shall be 11-(6.01-6) = 10.99 dBm/MHz for 5.18-5.24 GHz band, 5.26-5.32 GHz band, 5.50-5.70 GHz band and 30-(6.01-6) = 29.99 dBm/500KHz for 5.745-5.825 GHz band.				

B. Test Plots

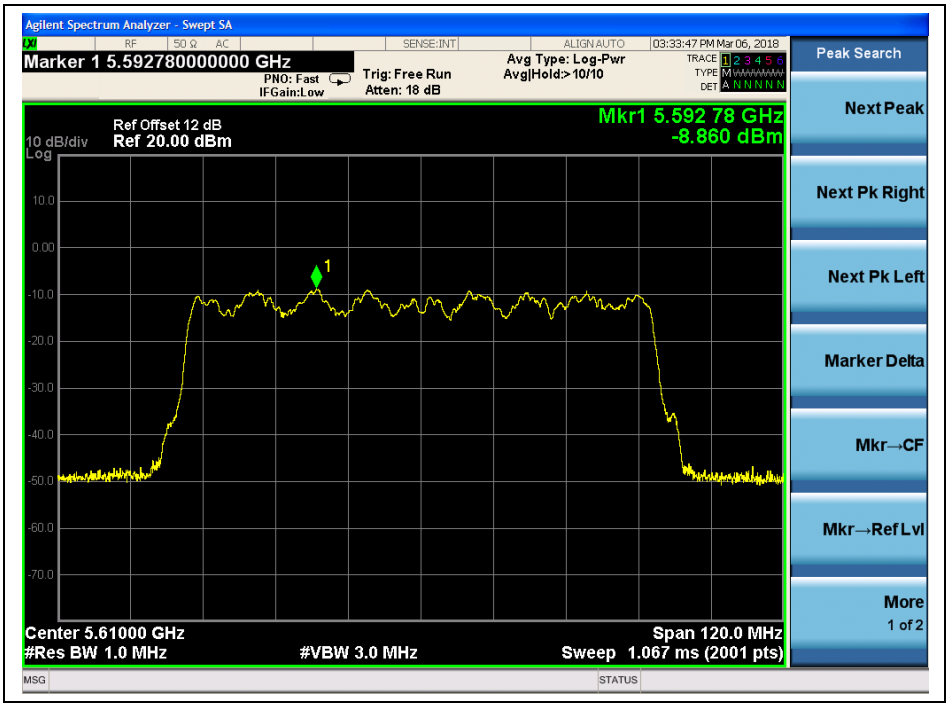


(Channel 42, 5210MHz, 802.11ac (VHT80), ANT J3)

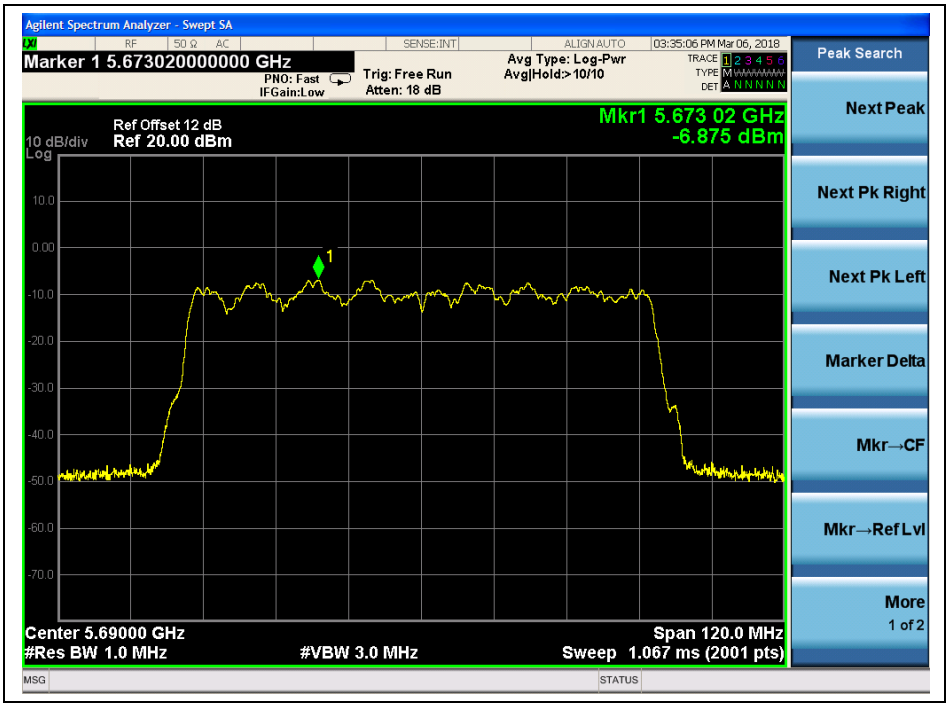
(Channel 58, 529 MHz, 802.11ac (VHT80), ANT J3)



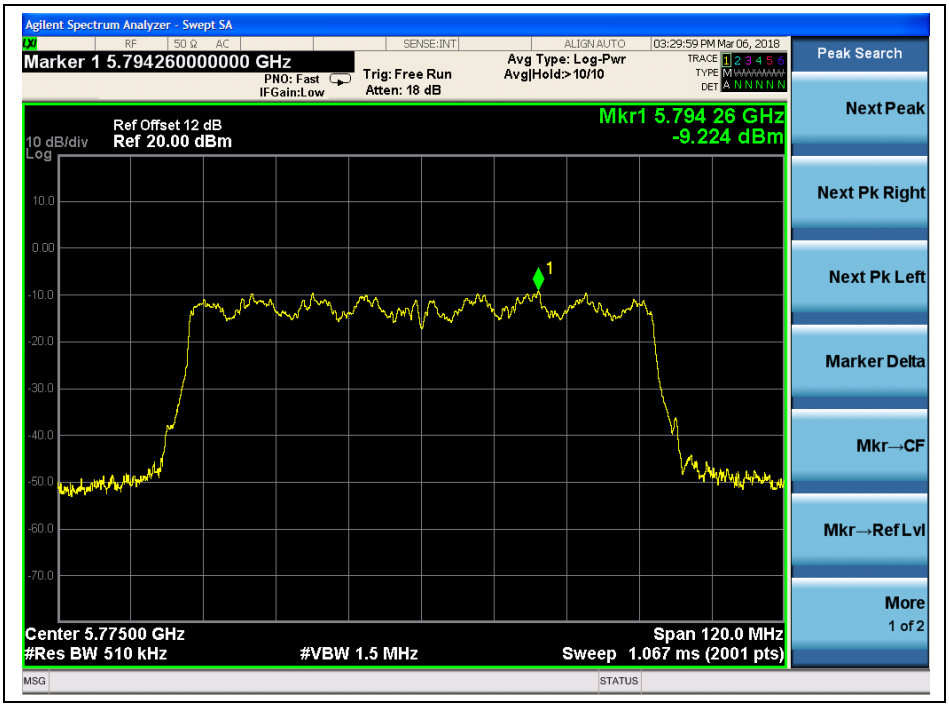
(Channel 106, 5530MHz, 802.11ac (VHT80), ANT J3)



(Channel 122, 5610 MHz, 802.11ac (VHT80), ANT J3)

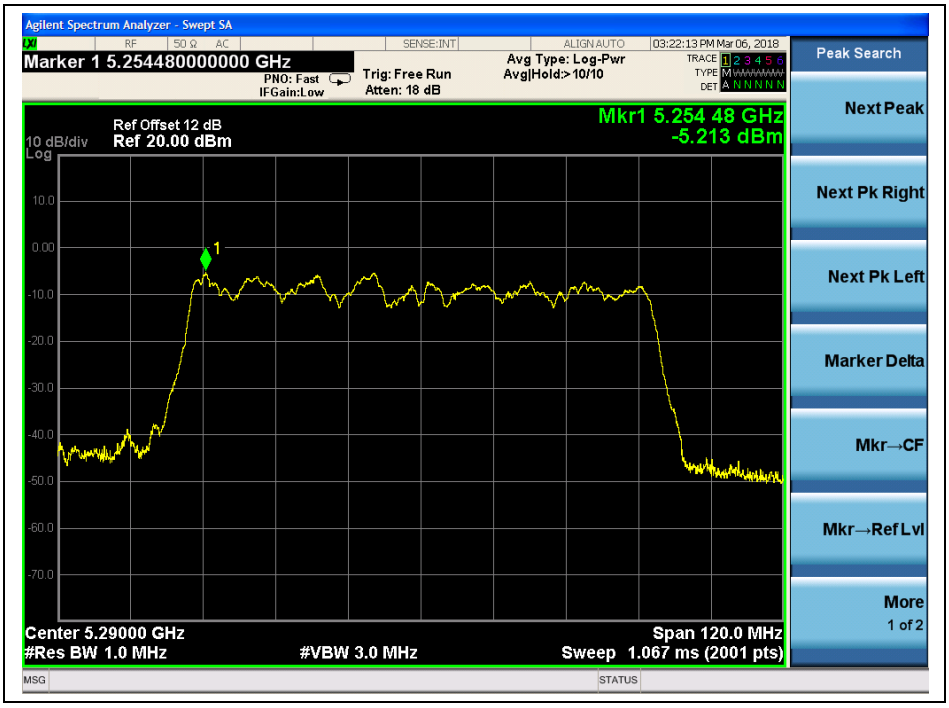


(Channel 138, 5690 MHz, 802.11ac (VHT80), ANT J3)



(Channel 155, 5775MHz, 802.11ac (VHT80), ANT J3)

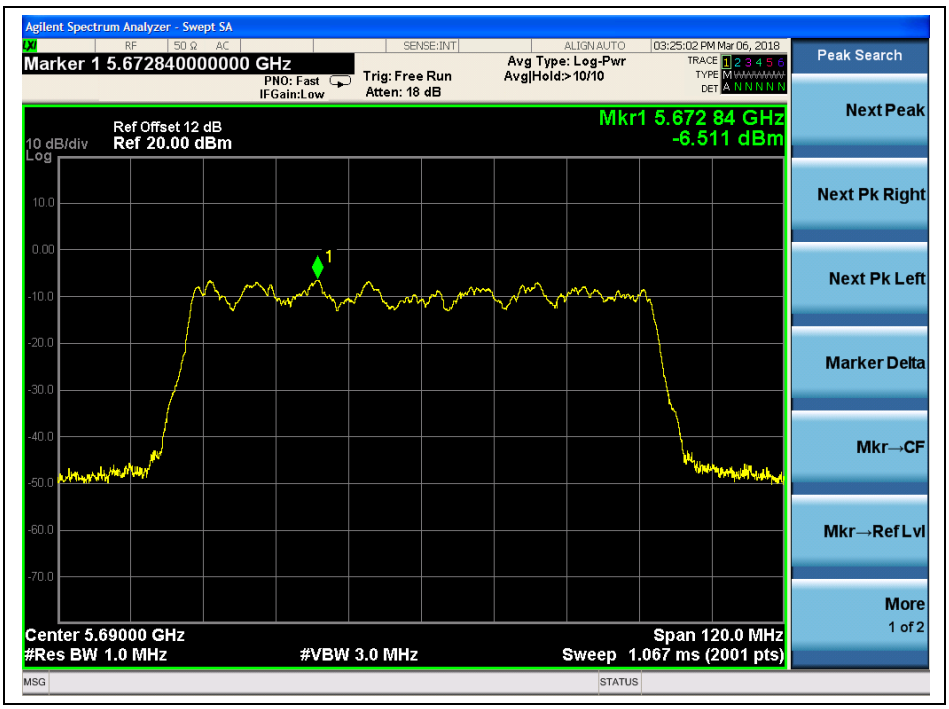
(Channel 42, 5210MHz, 802.11ac (VHT80), ANT J4)



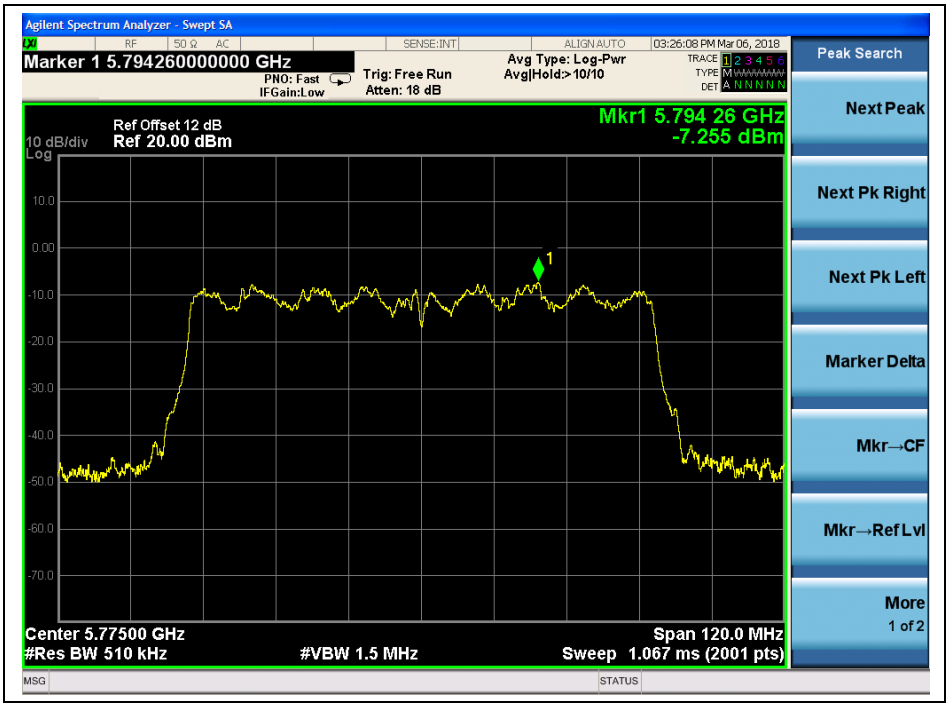
(Channel 58, 5290 MHz, 802.11ac (VHT80), ANT J4)

(Channel 106, 5530MHz, 802.11ac (VHT80), ANT J4)

(Channel 122, 5610 MHz, 802.11ac (VHT80), ANT J4)



(Channel 138, 5690 MHz, 802.11ac (VHT80), ANT J4)



(Channel 155, 5775 MHz, 802.11ac (VHT80), ANT J4)

2.6. Restricted Frequency Bands

2.6.1. 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);

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

where P is the EIRP in Watts

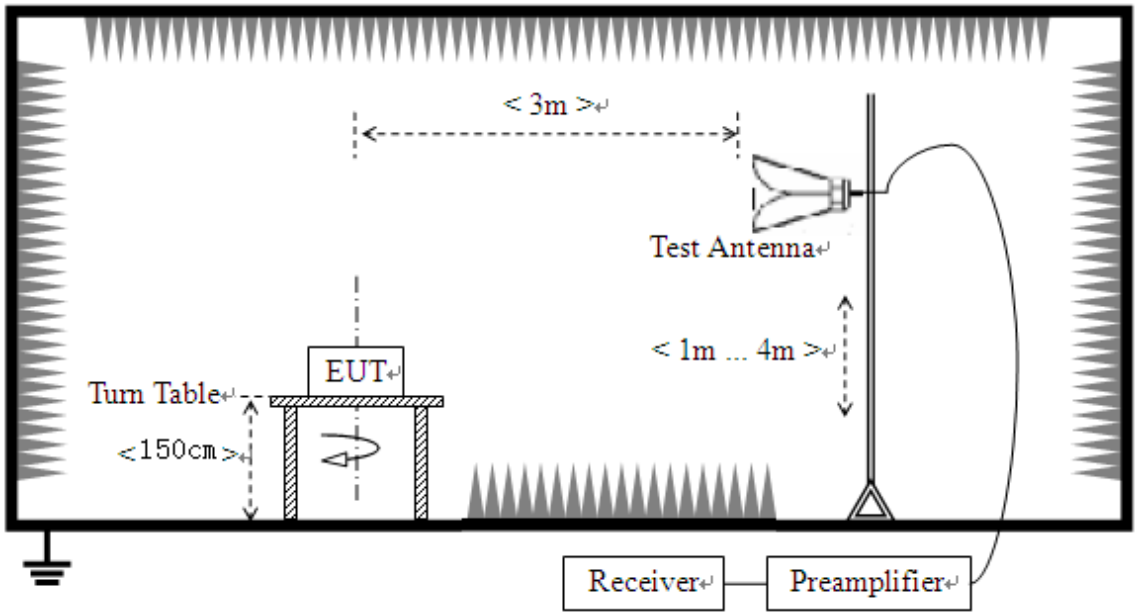
Therefore: -27 dBm/MHz = 68.23 dBuV/m

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

2.6.2. 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.

2.6.3. Test Result

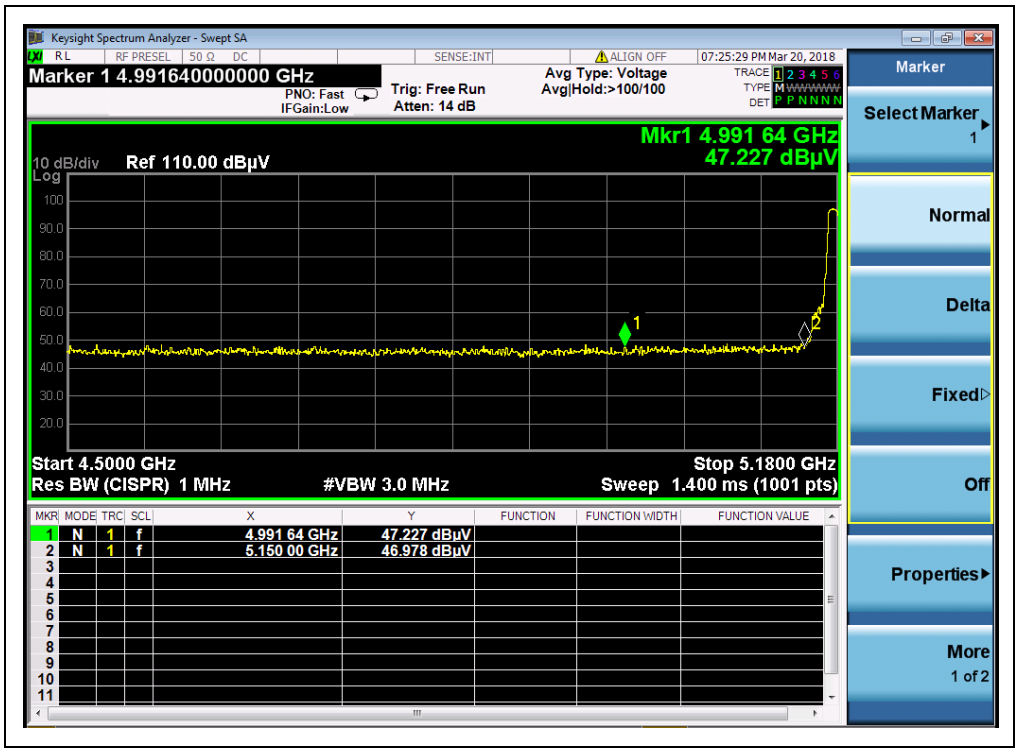
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; A_T =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna; U_R: Receiver Reading
G_{preamp}: Preamplifier Gain; A_{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

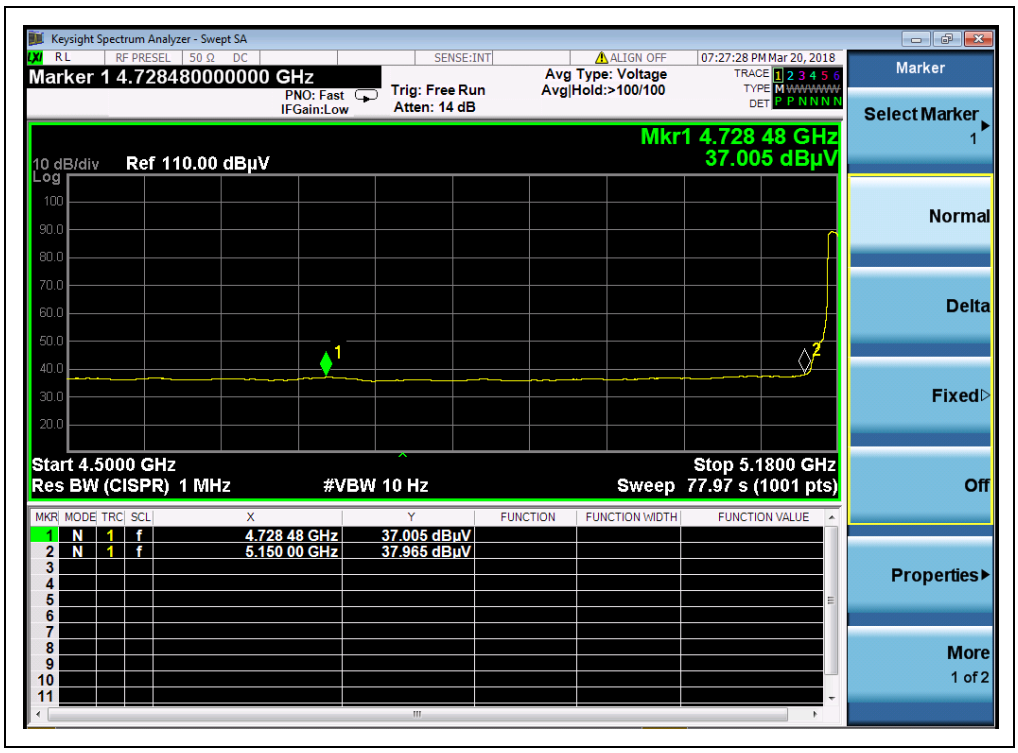
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
36	4991.64	PK	47.23	-50.65	32.11	28.69	74	PASS
36	4728.48	AV	37.01	-50.15	31.92	18.78	54	PASS
64	5387.10	PK	46.35	-52.24	31.57	25.68	74	PASS
64	5387.10	AV	35.20	-52.24	31.57	14.53	54	PASS
100	5112.20	PK	48.86	-51.67	31.86	29.05	74	PASS
100	5112.20	AV	37.22	-51.67	31.86	17.41	54	PASS
144	5785.30	PK	48.53	-53.17	32.98	28.34	68.23	PASS
144	5734.30	AV	37.29	-53.12	32.96	17.13	54	PASS
149	5720.00	PK	53.25	-53.37	33.28	33.16	110.83	PASS
149	5723.01	AV	38.54	-53.25	33.31	18.60	54	PASS
165	5867.25	PK	50.80	-53.53	33.46	30.73	76.53	PASS
165	5853.15	AV	37.31	-53.55	33.42	17.18	54	PASS

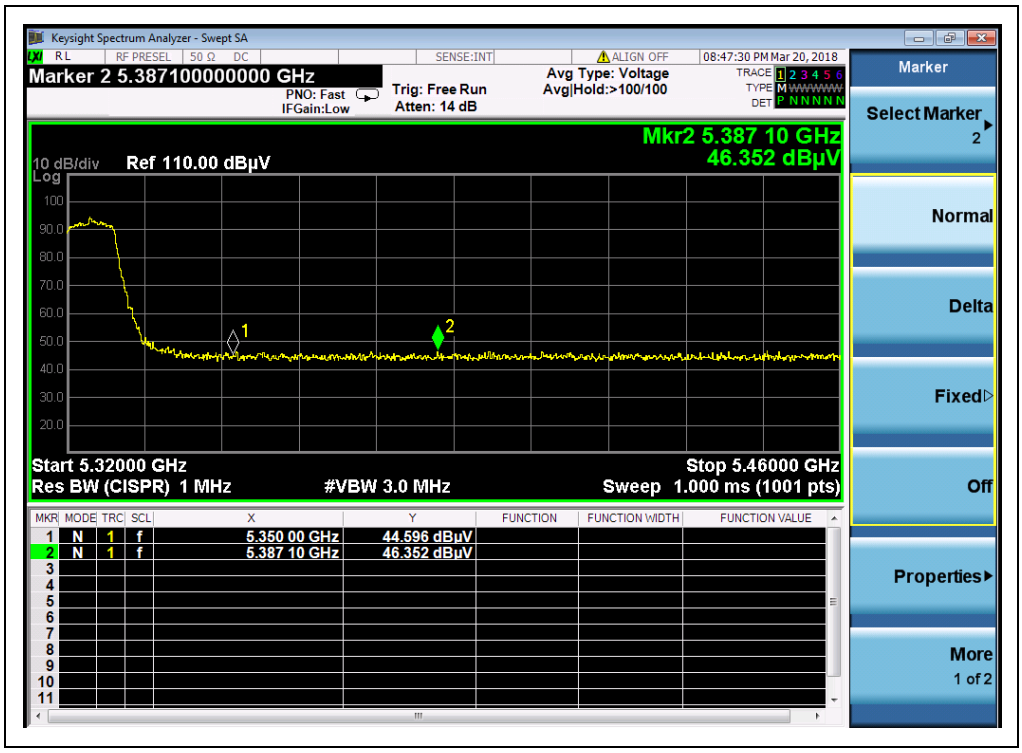
B. Test Plots:



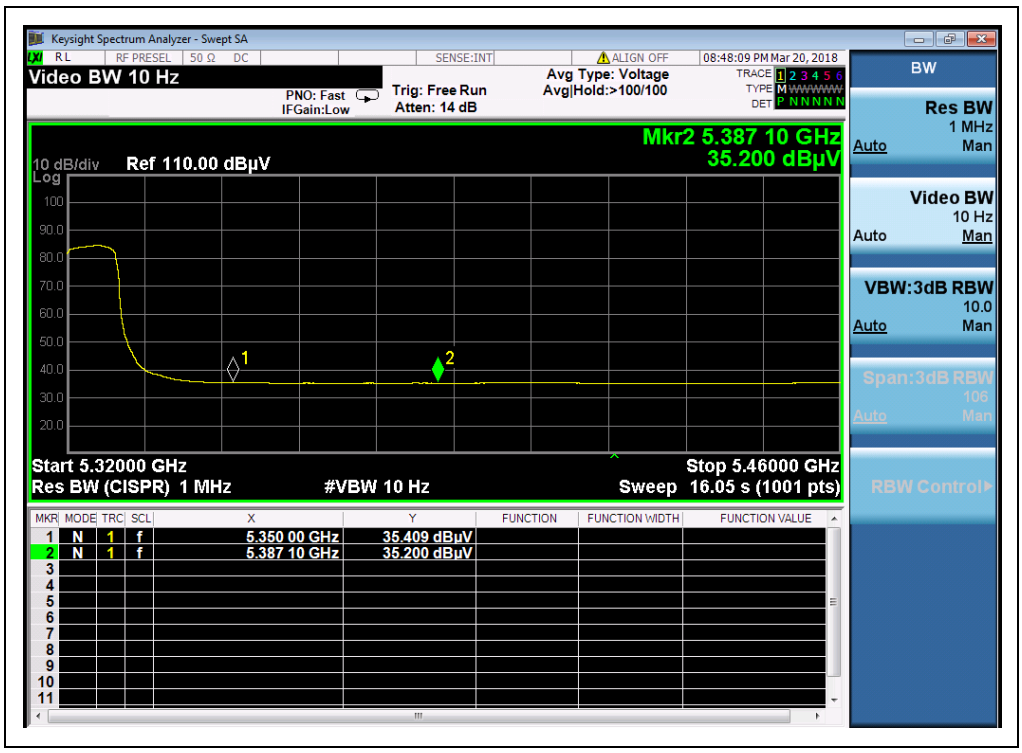
(Channel 36, PEAK, 802.11a)



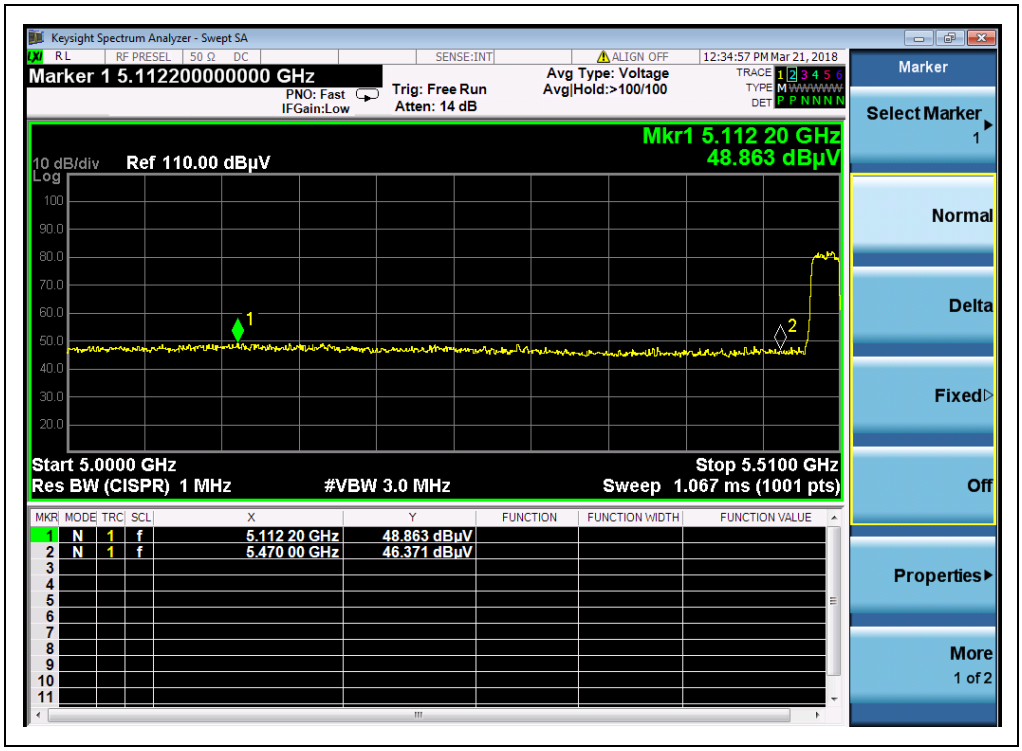
(Channel 36, AVG, 802.11a)



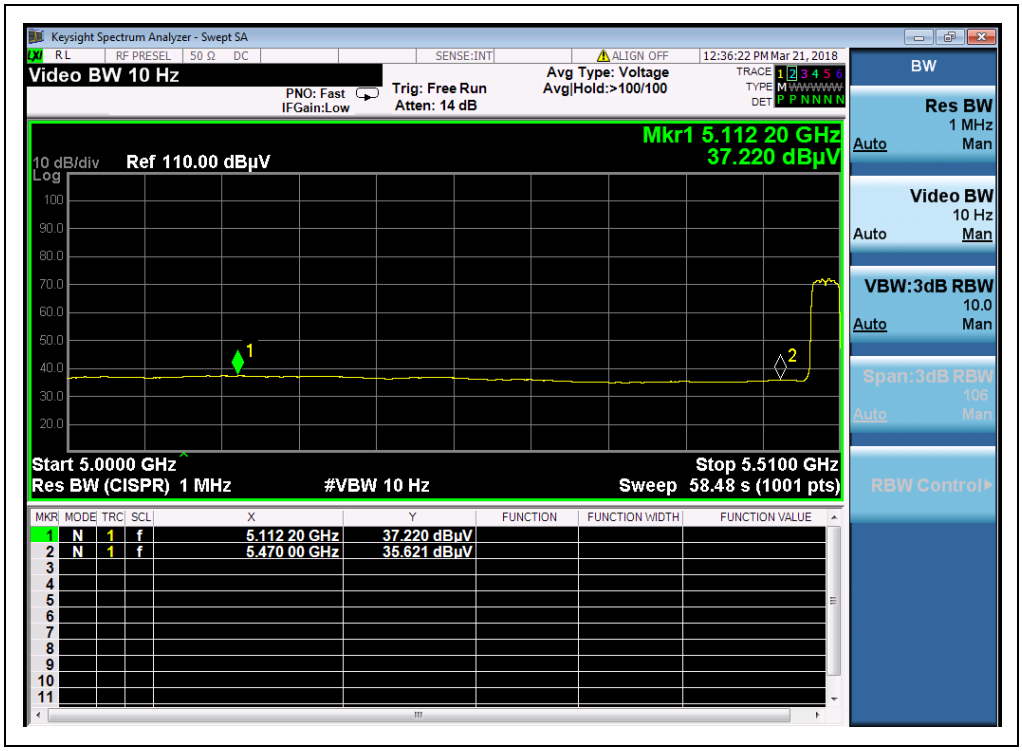
(Channel 64, PEAK, 802.11a)



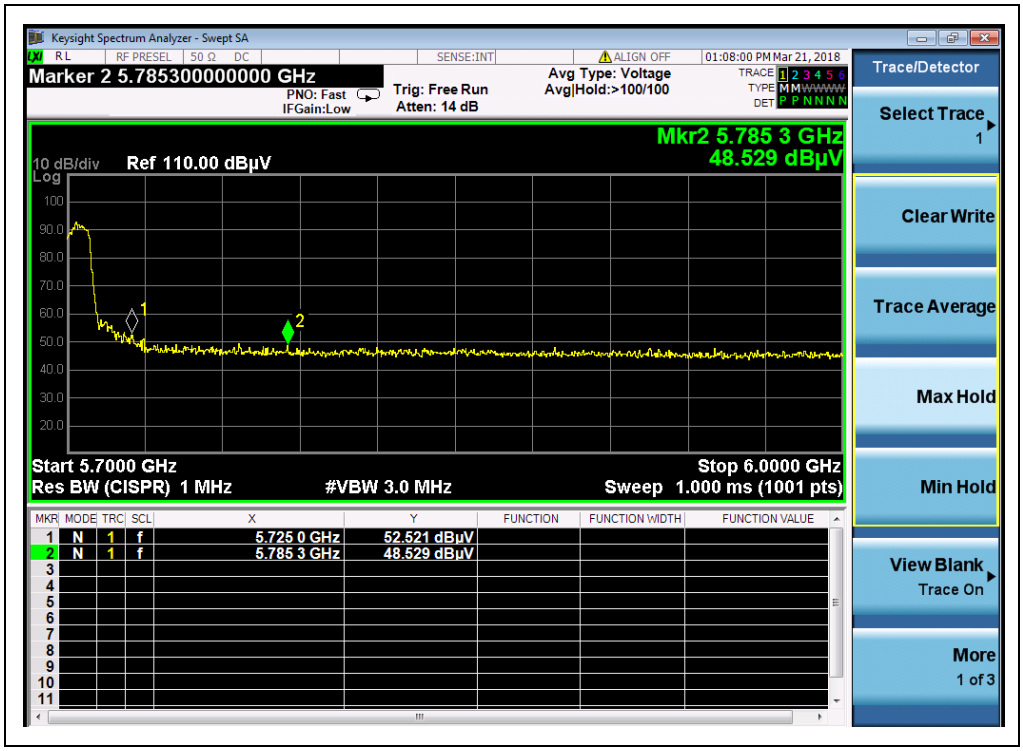
(Channel 64, AVG, 802.11a)



(Channel 100, PEAK, 802.11a)

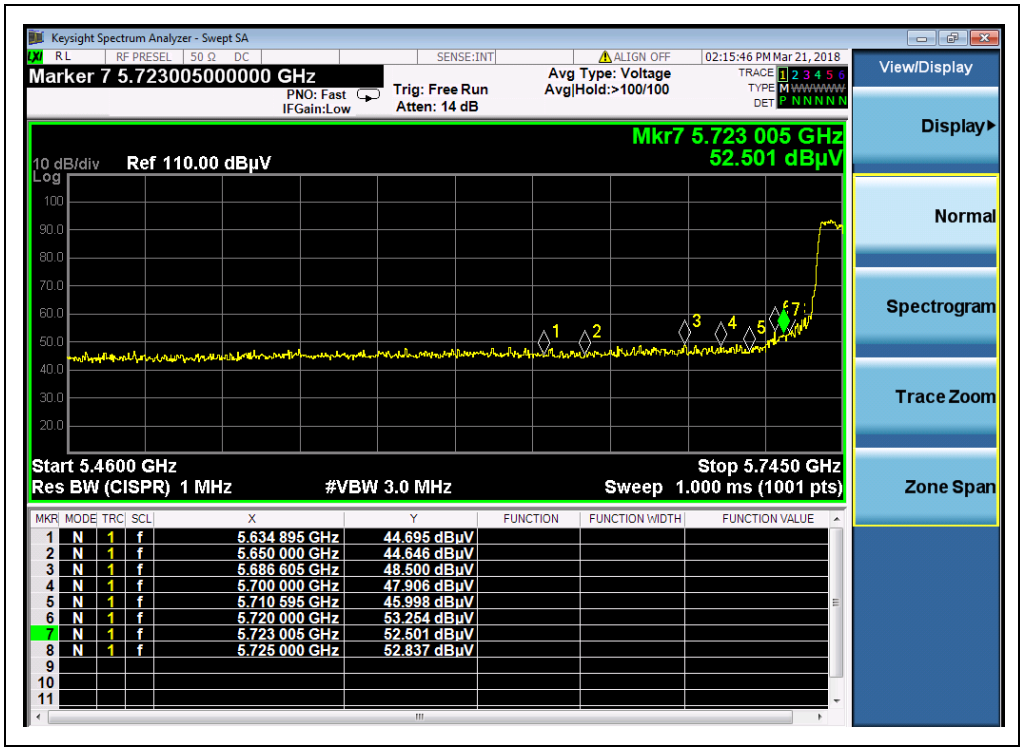


(Channel 100, AVG, 802.11a)

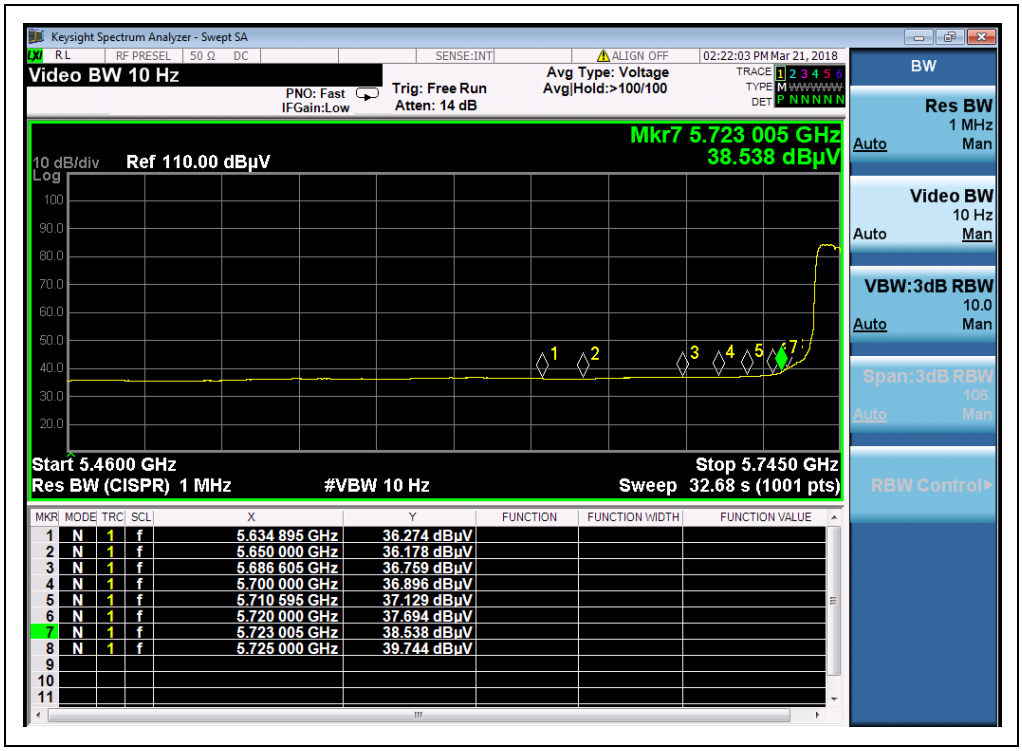


(Channel 144, PEAK, 802.11a)

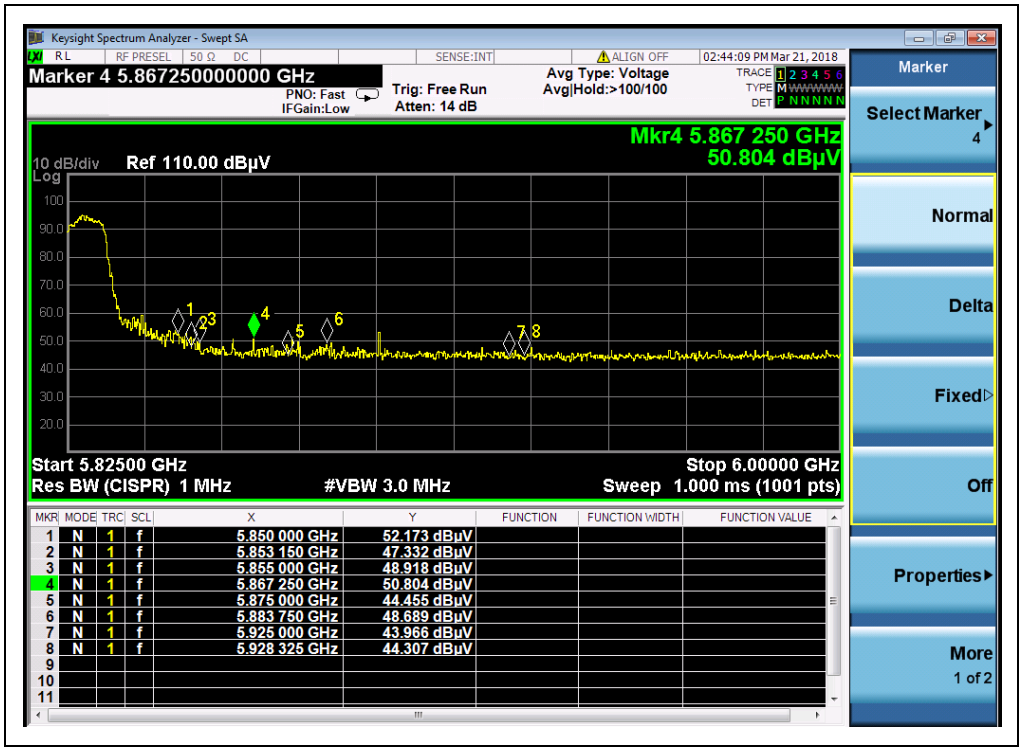
(Channel 144, AVG, 802.11a)



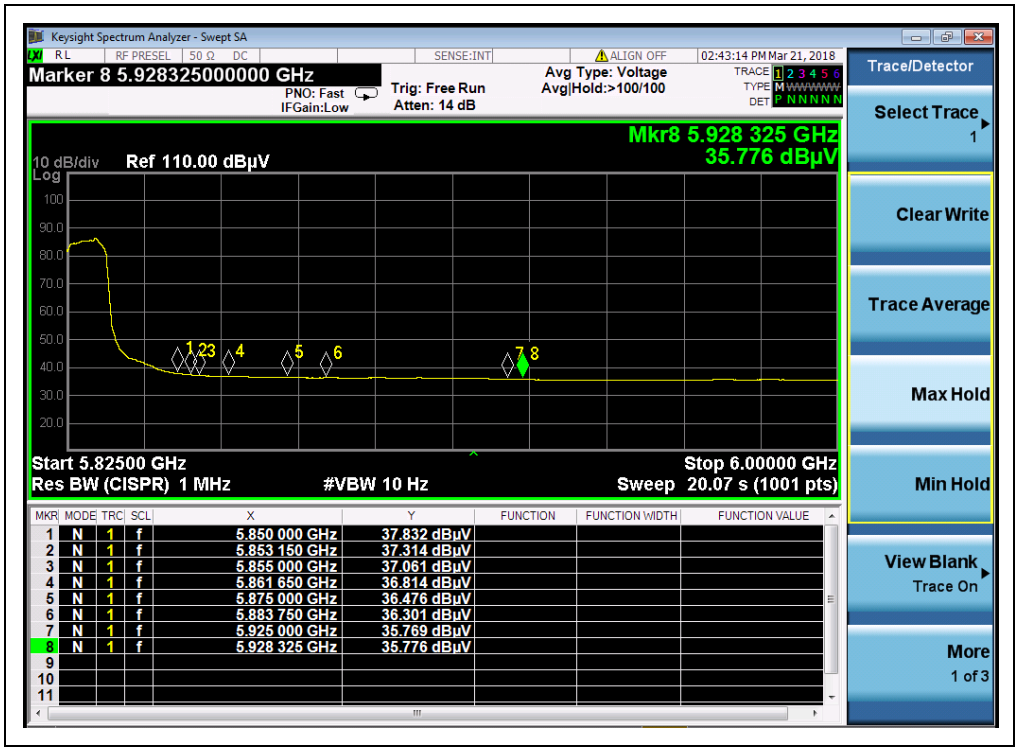
(Channel 149, PEAK, 802.11a)



(Channel 149, AVG, 802.11a)



(Channel 165, PEAK, 802.11a)



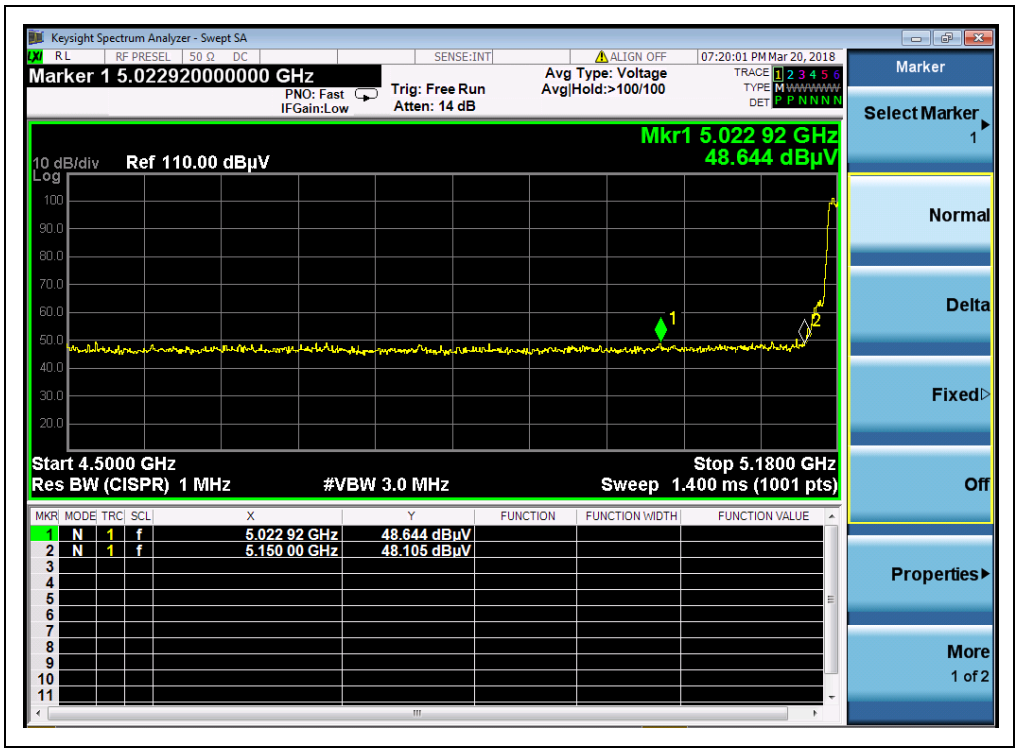
(Channel 165, AVG, 802.11a)

802.11n (HT20) Test mode

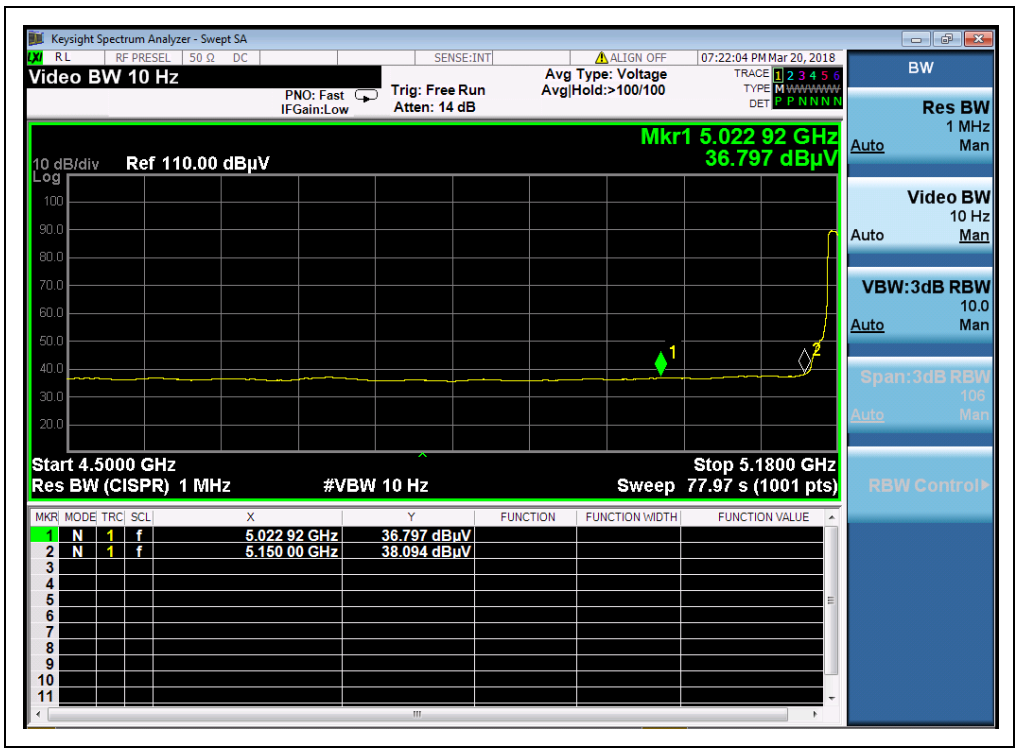
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
36	5022.92	PK	48.64	-50.65	32.11	30.10	74	PASS
36	5022.92	AV	36.80	-50.15	31.92	18.57	54	PASS
64	5356.30	PK	46.49	-52.24	31.57	25.82	74	PASS
64	5356.30	AV	35.28	-52.24	31.57	14.61	54	PASS
100	5349.86	PK	46.91	-51.67	31.86	27.10	74	PASS
100	5254.49	AV	36.61	-51.67	31.86	16.80	54	PASS
144	5896.30	PK	47.57	-53.17	32.98	27.38	68.23	PASS
144	5819.80	AV	36.31	-53.12	32.96	16.15	54	PASS
149	5720.00	PK	47.88	-53.37	33.28	27.79	110.83	PASS
149	5722.72	AV	38.38	-53.25	33.31	18.44	54	PASS
165	5851.58	PK	51.91	-53.53	33.46	31.84	118.63	PASS
165	5852.45	AV	37.44	-53.55	33.42	17.31	54	PASS

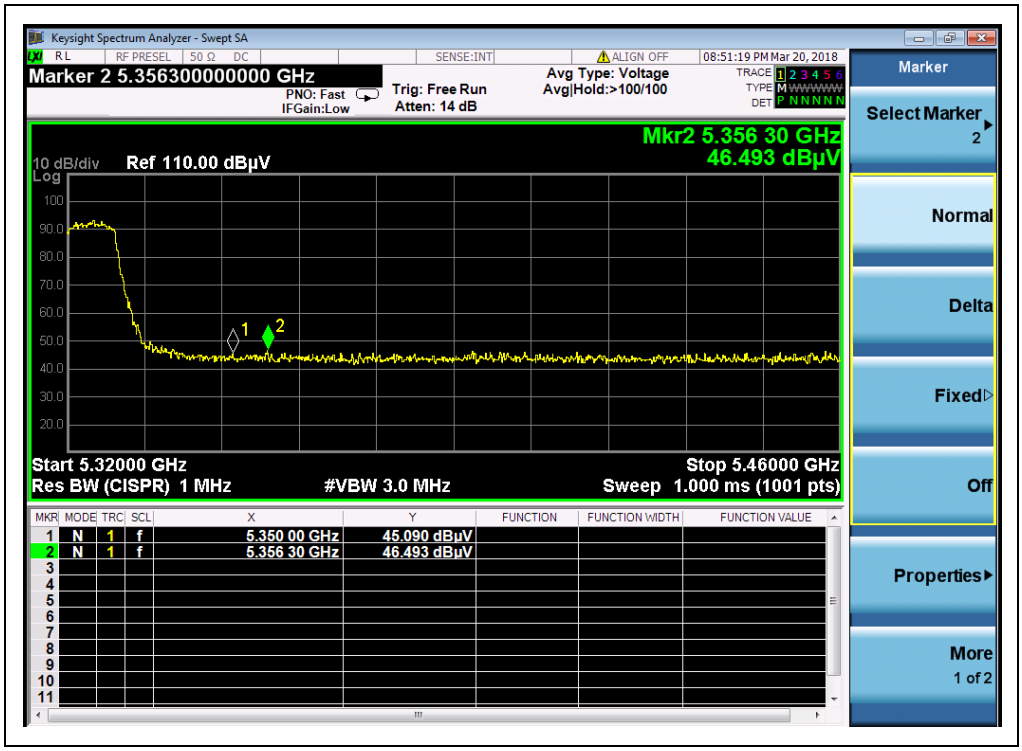
B. Test Plots:



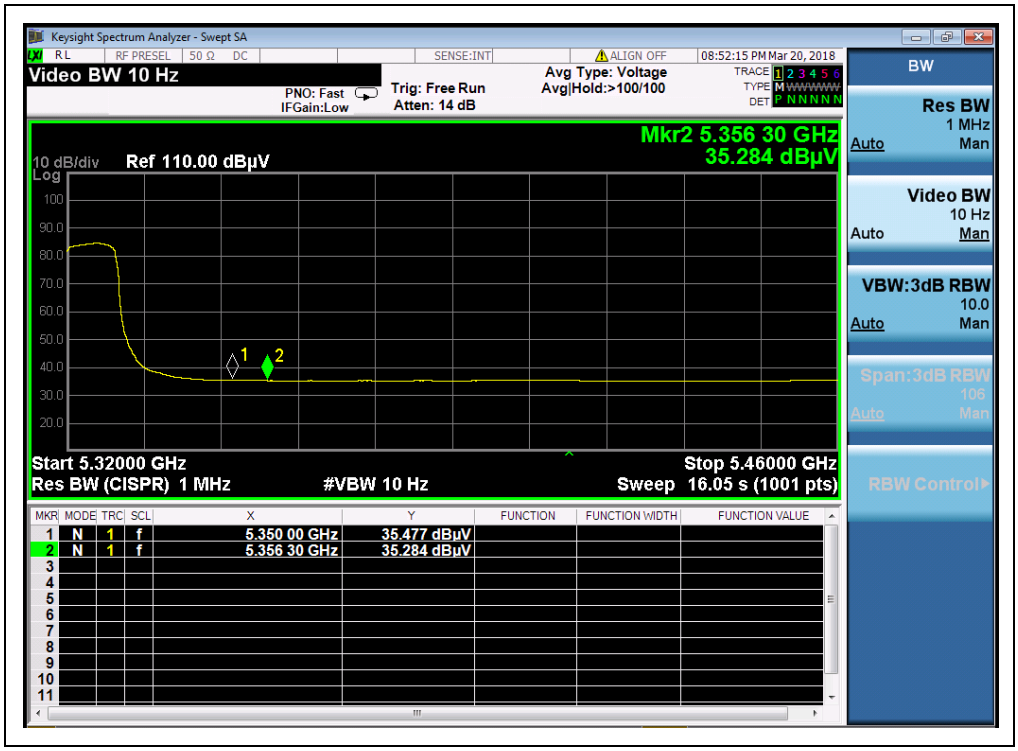
(Channel 36, PEAK, 802.11n (HT20))



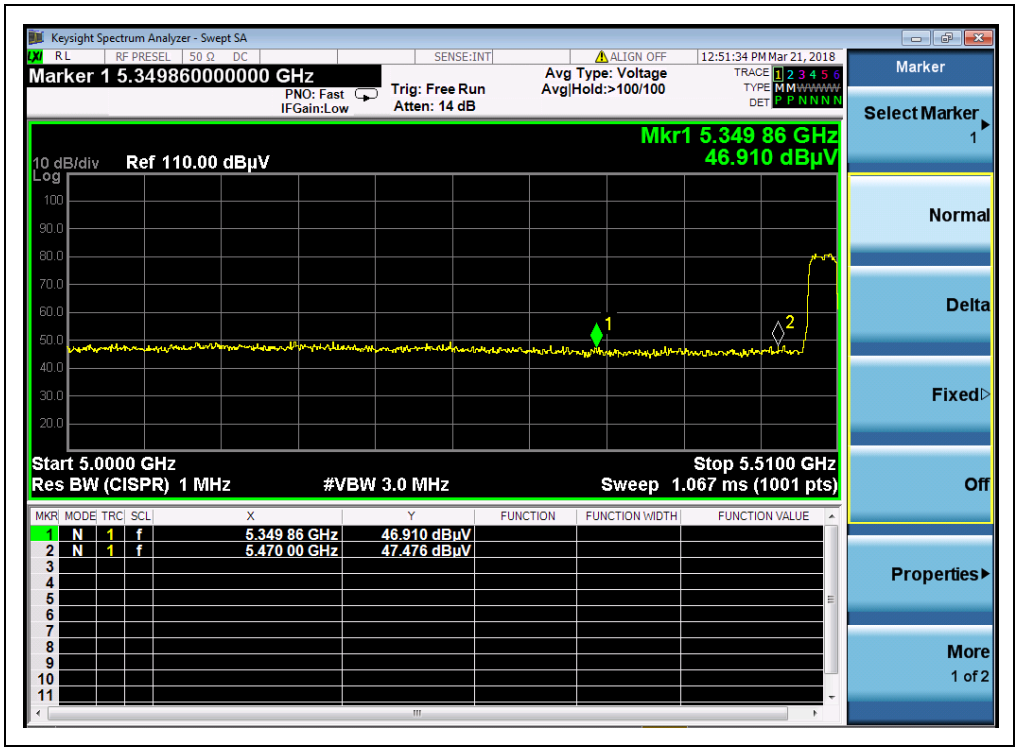
(Channel 36, AVG, 802.11 n (HT20))



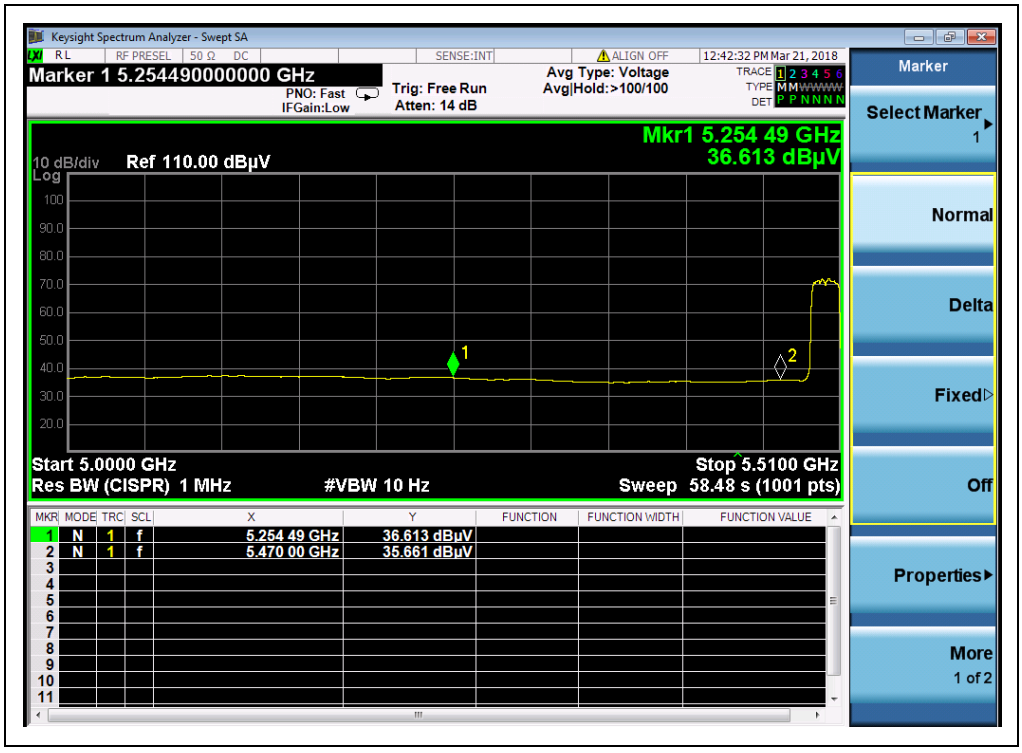
(Channel 64, PEAK, 802.11 n (HT20))



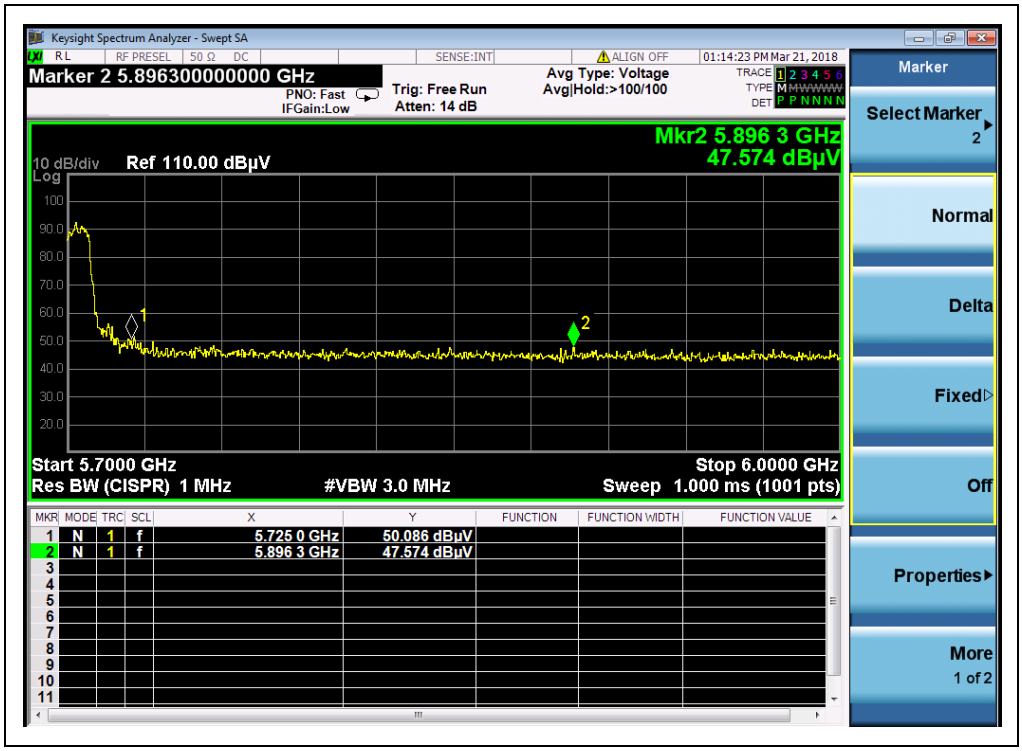
(Channel 64, AVG, 802.11n (HT20))



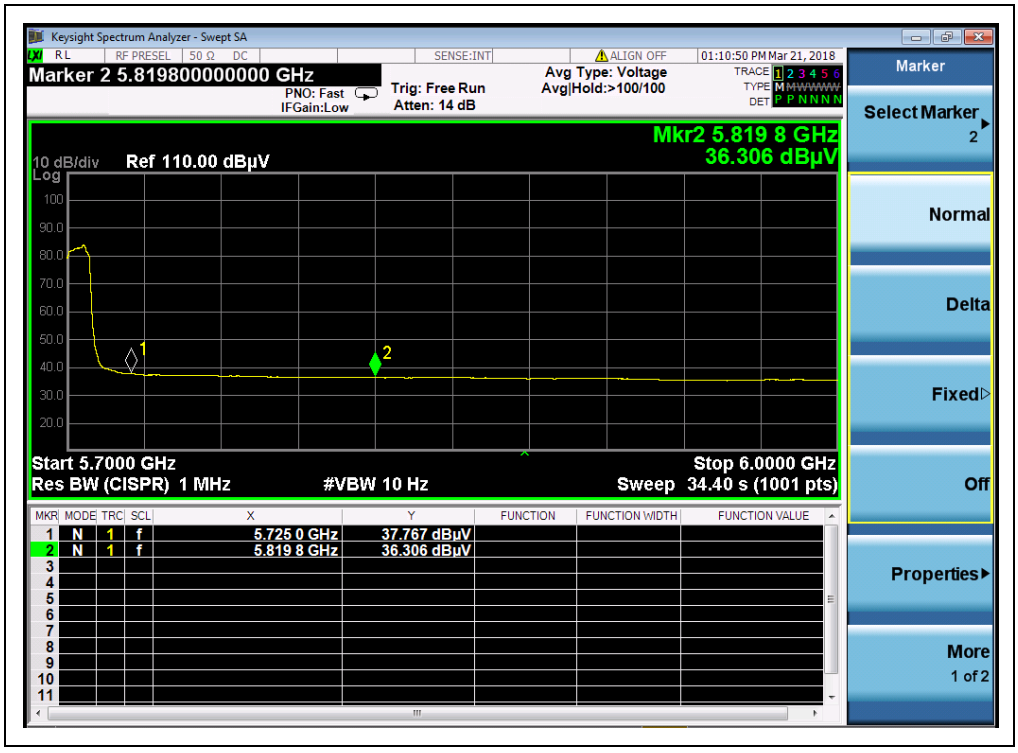
(Channel 100, PEAK, 802.11n (HT20))



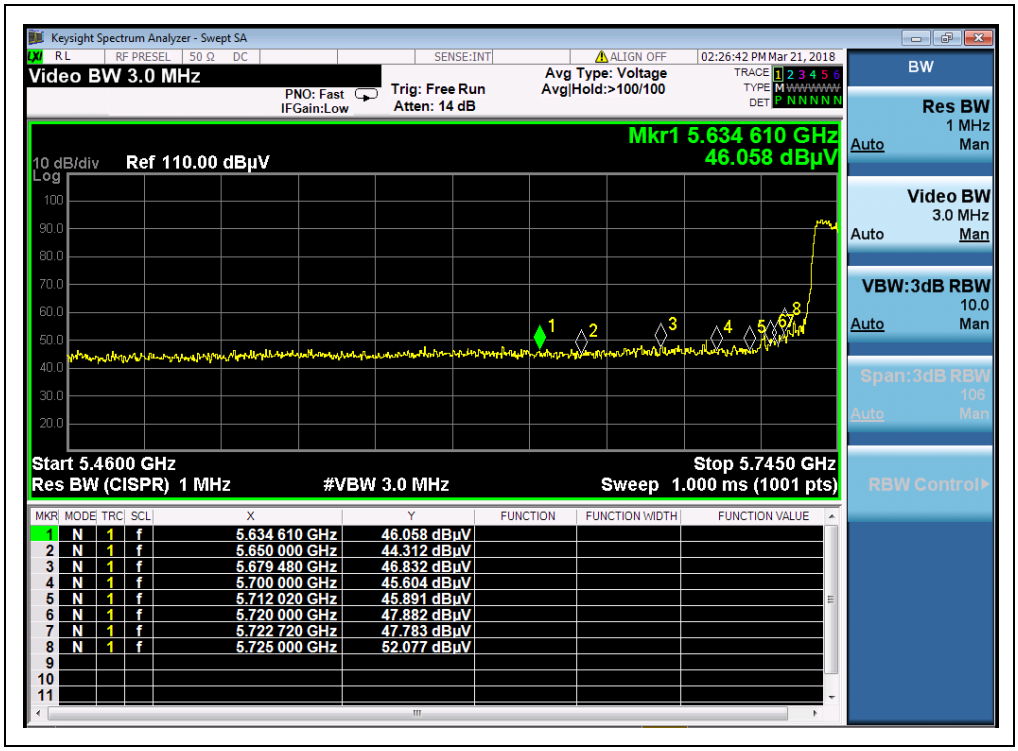
(Channel 100, AVG, 802.11 n (HT20))



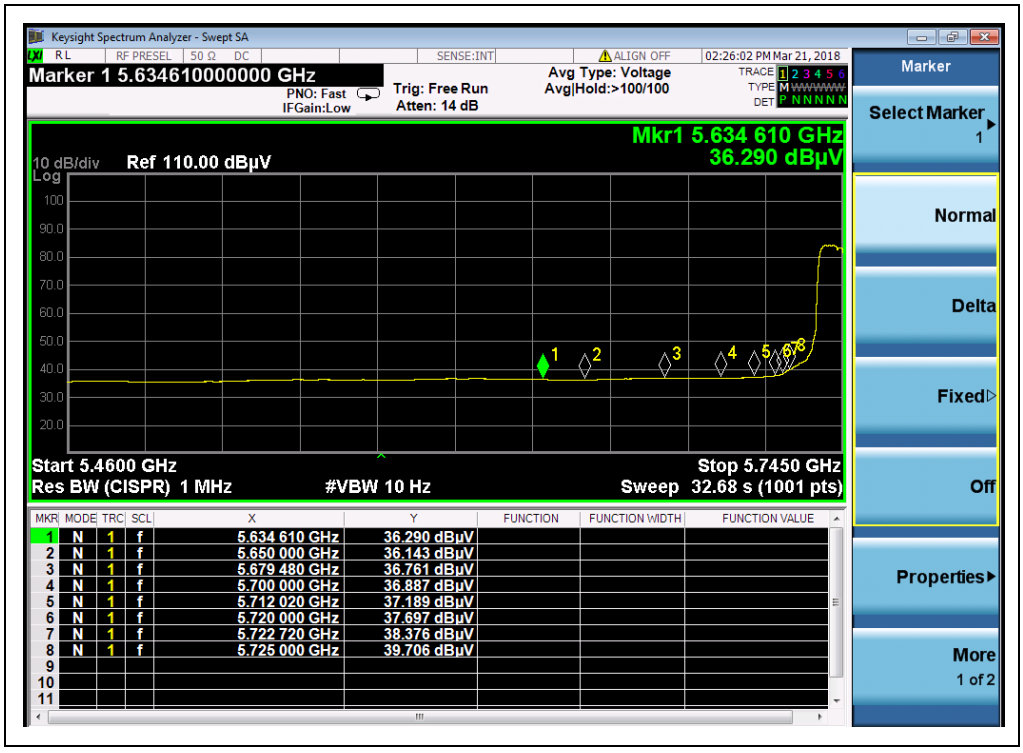
(Channel 144, PEAK, 802.11 n (HT20))



(Channel 144, AVG, 802.11n (HT20))



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



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