

8.SPURIOUS RF CONDUCTED EMISSIONS

8.1CONFORMANCE LIMIT

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum 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 e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band(i) 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..

8.2MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

8.3TEST SETUP

Please refer to Section 6.1 of this test report.

8.4TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.5TEST RESULTS

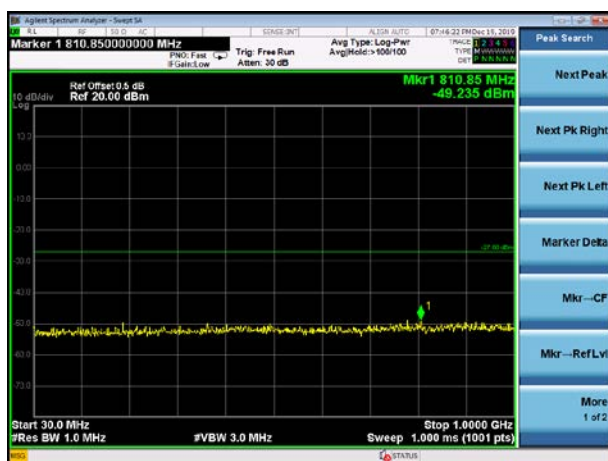
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandedge measurement data.

About:26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

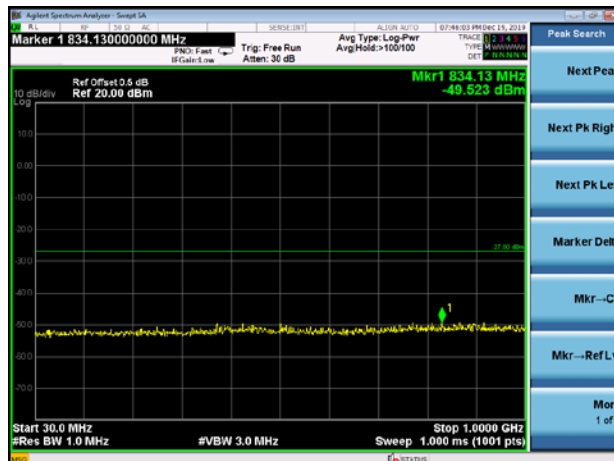
5.2G

Test Plot

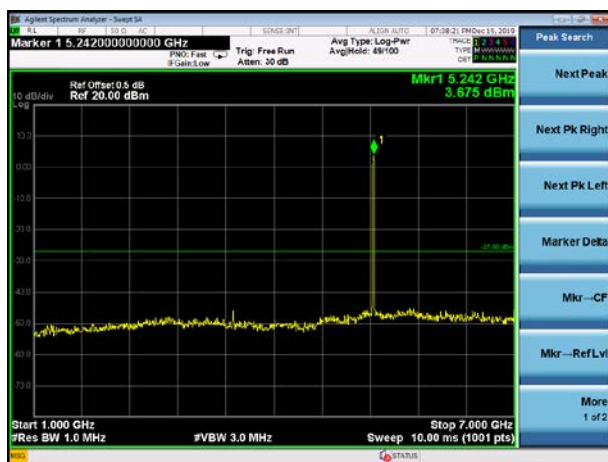
802.11a on channel 36



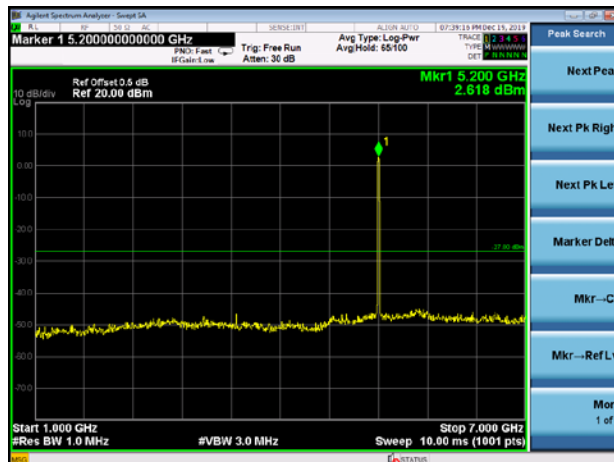
802.11a on channel 40



802.11a on channel 36



802.11a on channel 40



802.11a on channel 36

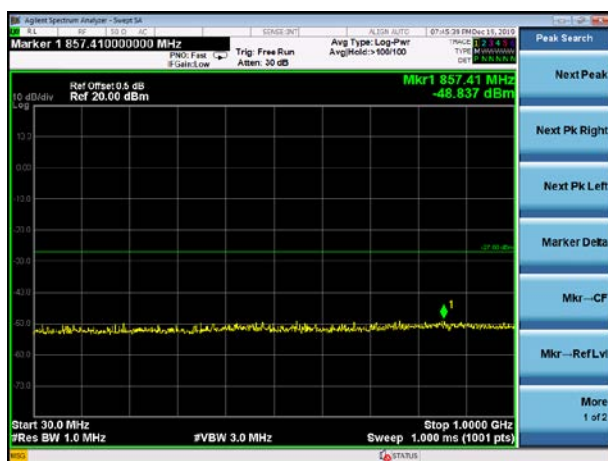


802.11a on channel 40

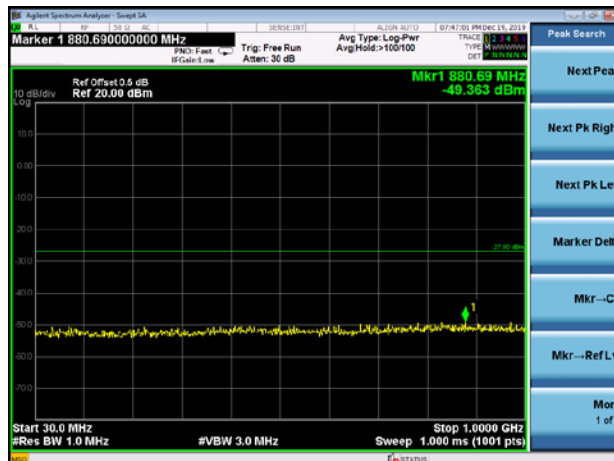


Test Plot

802.11a on channel 48



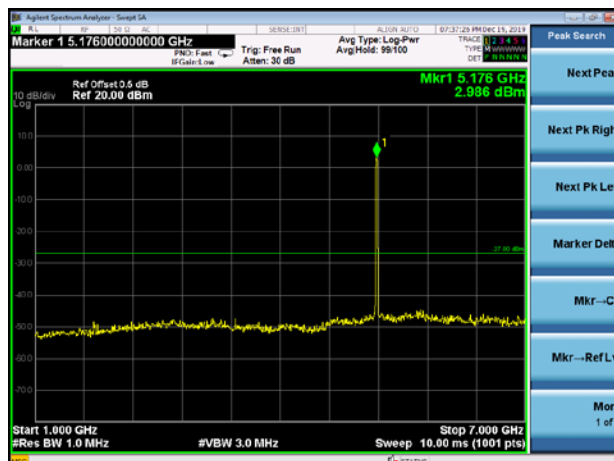
802.11n20 on channel 36



802.11a on channel 48



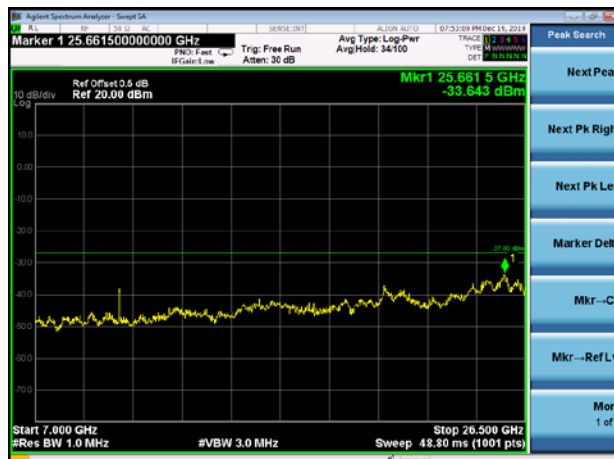
802.11n20 on channel 36



802.11a on channel 48

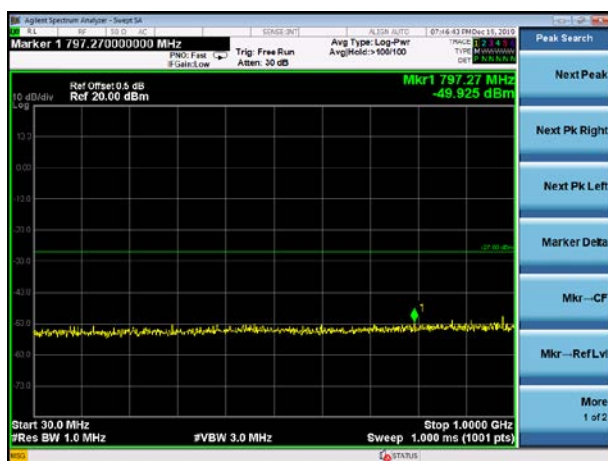


802.11n20 on channel 36

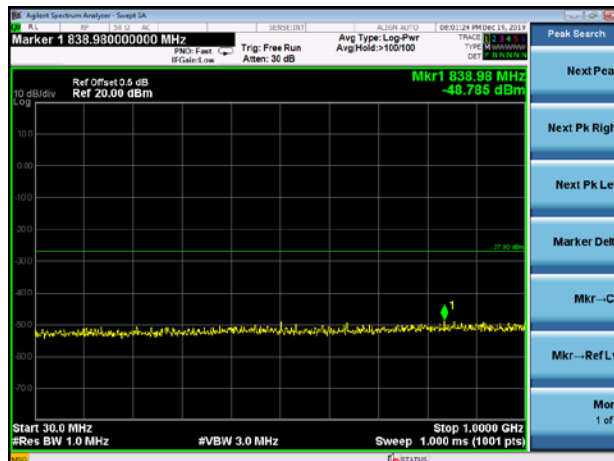


Test Plot

802.11n20 on channel 40



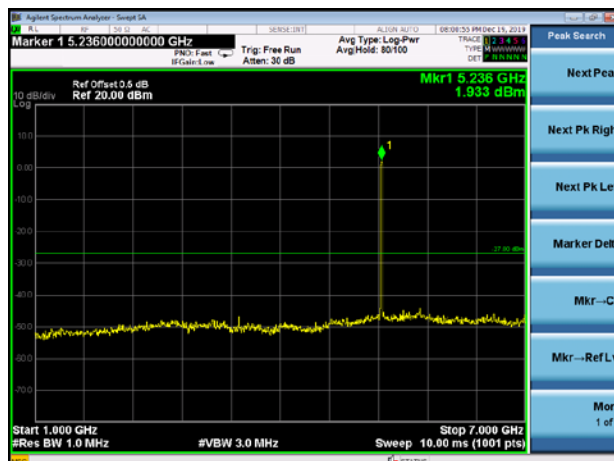
802.11n20 on channel 48



802.11n20 on channel 40



802.11n20 on channel 48



802.11n20 on channel 40

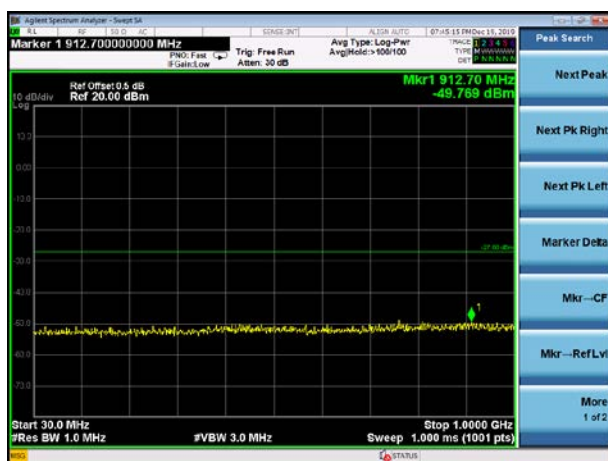


802.11n20 on channel 48

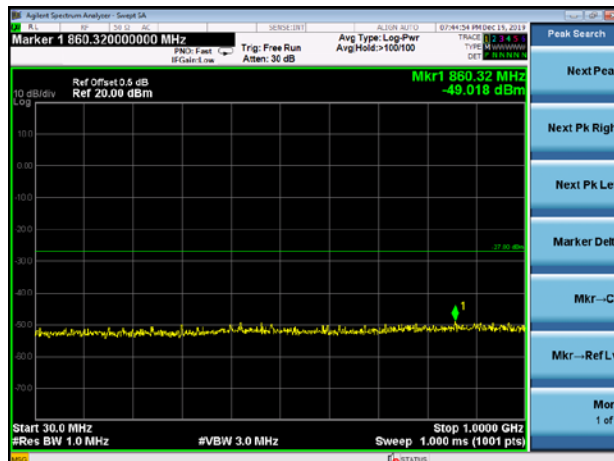


Test Plot

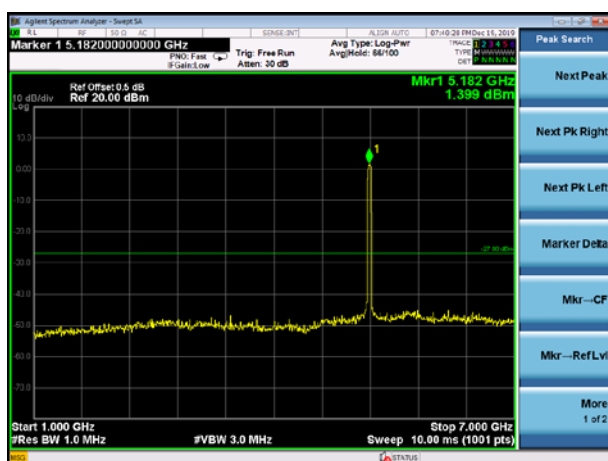
802.11n40 on channel 38



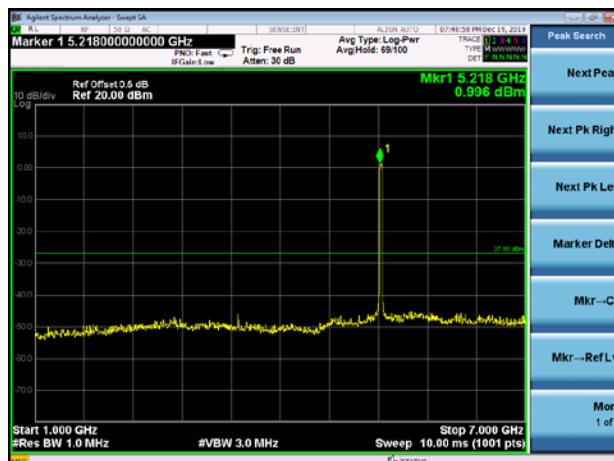
802.11n40 on channel 46



802.11n40 on channel 38



802.11n40 on channel 46



802.11n40 on channel 38



802.11n40 on channel 46

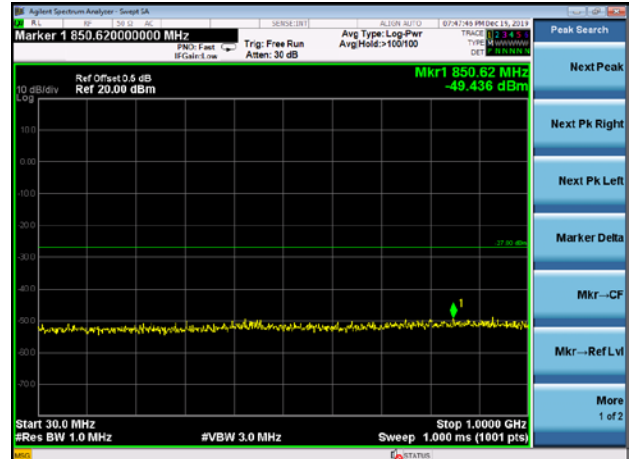


Test Plot

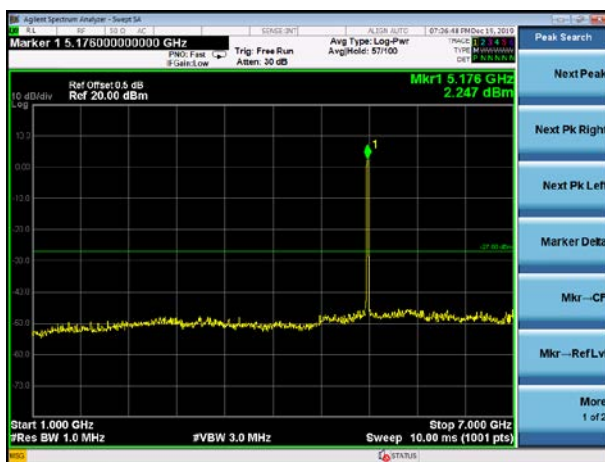
802.11ac20 on channel 36



802.11ac20 on channel 40



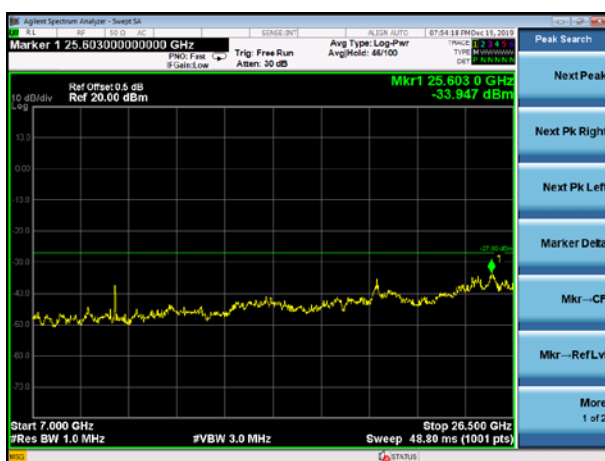
802.11ac20 on channel 36



802.11ac20 on channel 40



802.11ac20 on channel 36

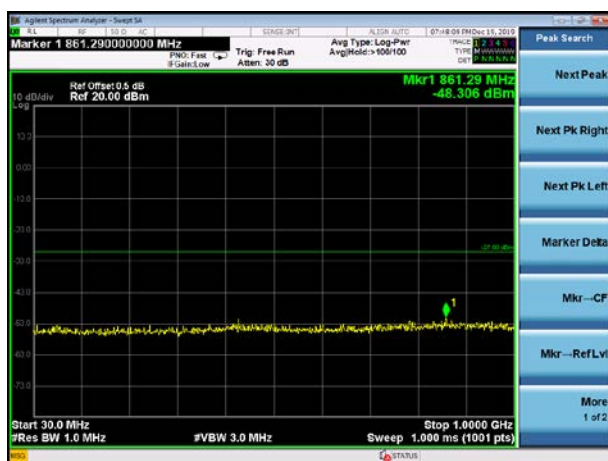


802.11ac20 on channel 40

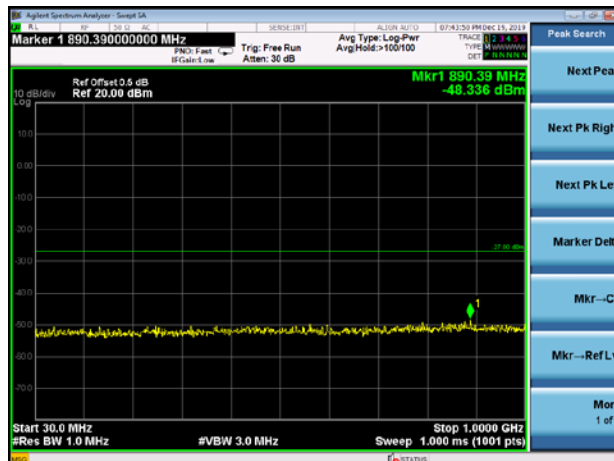


Test Plot

802.11ac20 on channel 48



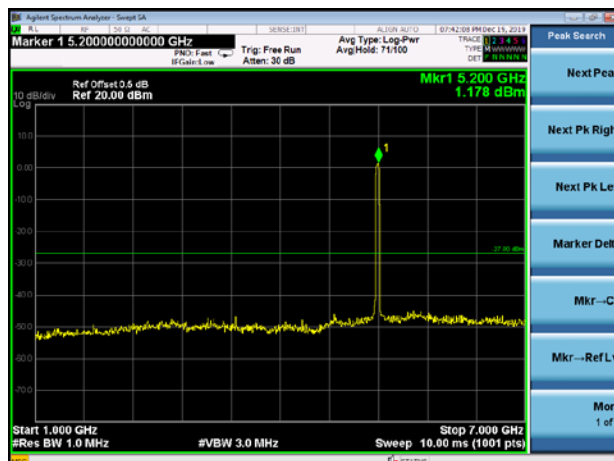
802.11ac40 on channel 38



802.11ac20 on channel 48



802.11ac40 on channel 38



802.11ac20 on channel 48

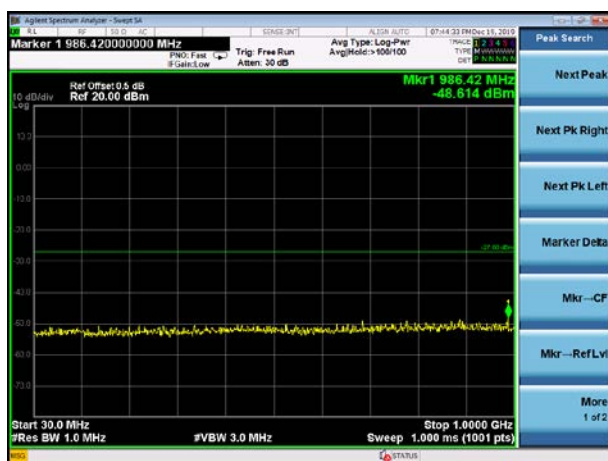


802.11ac40 on channel 38

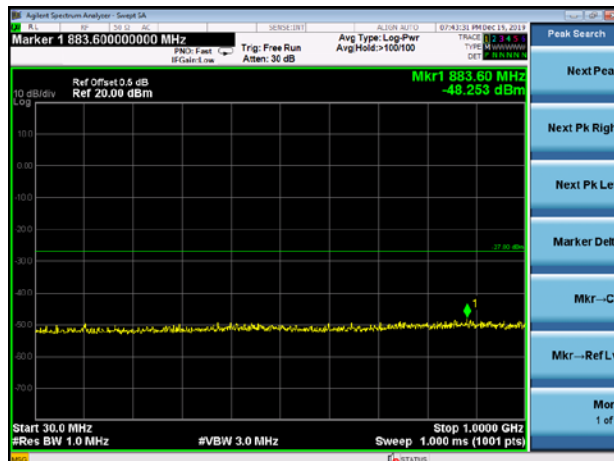


Test Plot

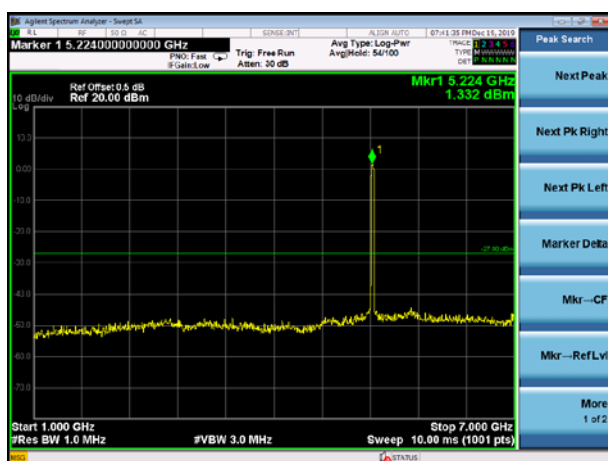
802.11ac40 on channel 46



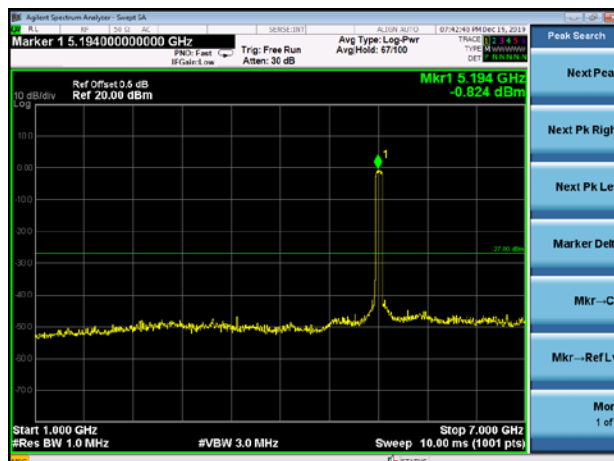
802.11ac80 on channel 42



802.11 ac40 on channel 46



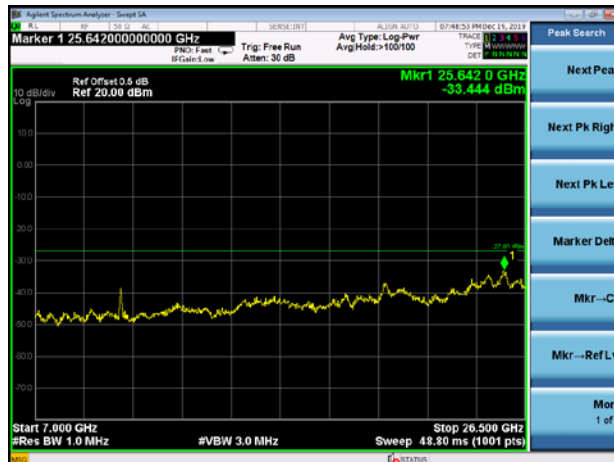
802.11 ac80 on channel 42



802.11 ac40 on channel 46



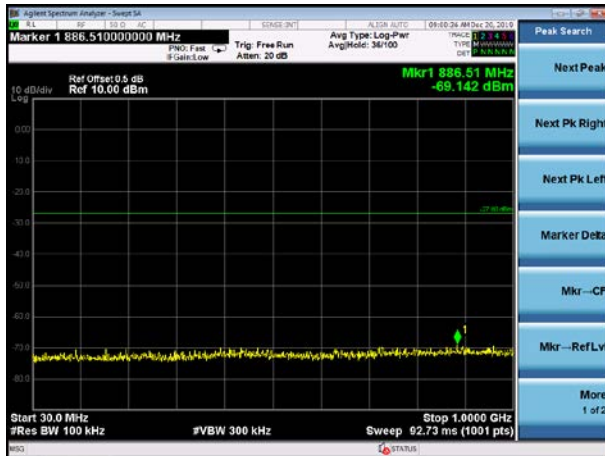
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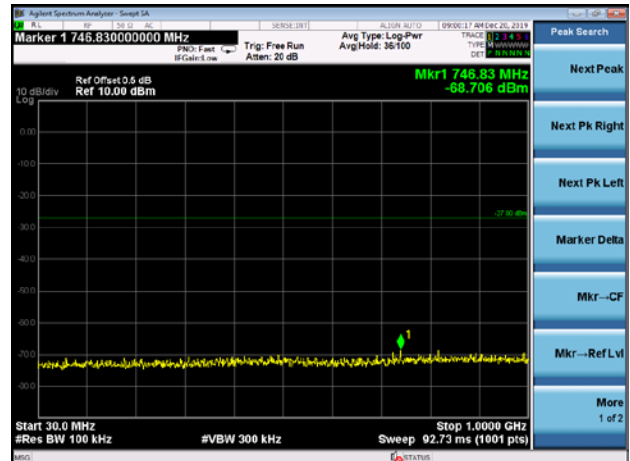
5.8G

Test Plot

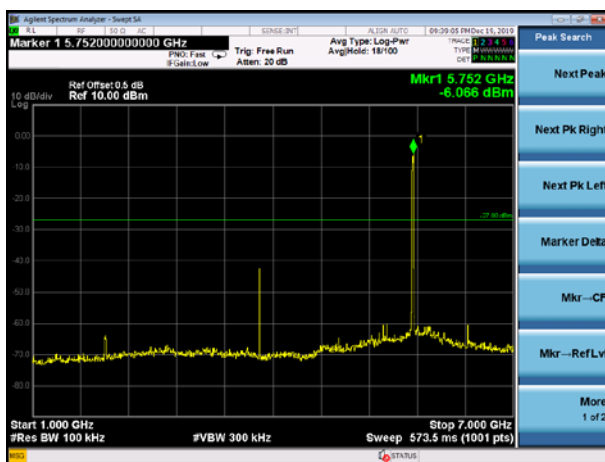
802.11a on channel 149



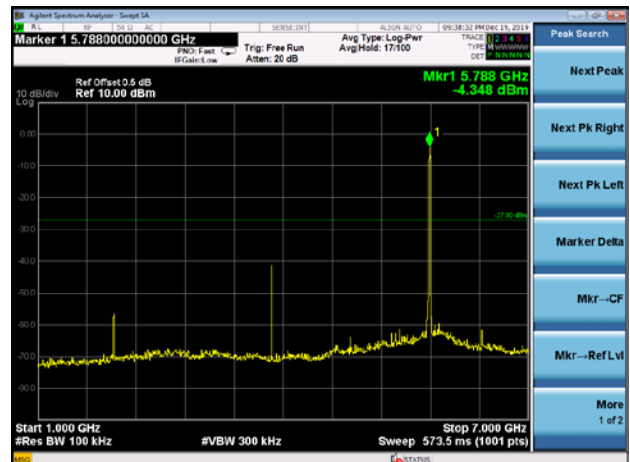
802.11a on channel 157



802.11a on channel 149



802.11a on channel 157



802.11a on channel 149

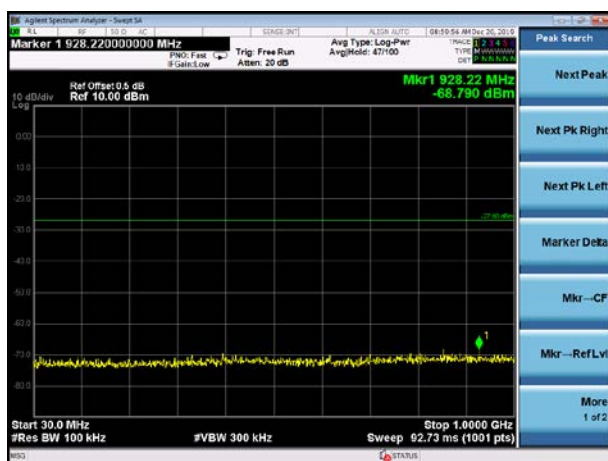


802.11a on channel 157

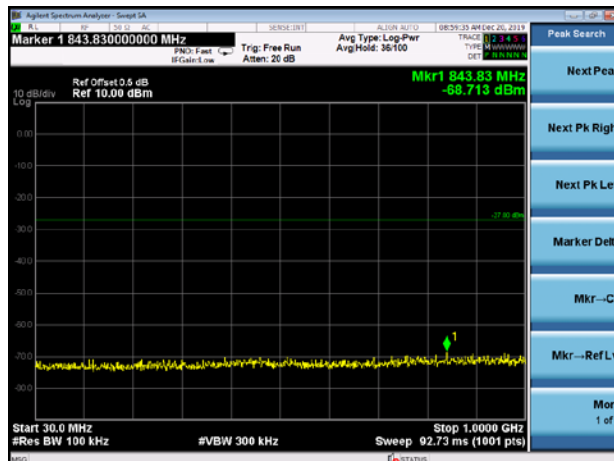


Test Plot

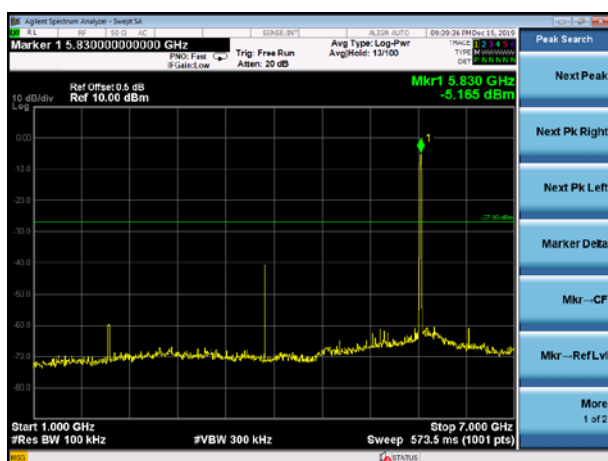
802.11a on channel 165



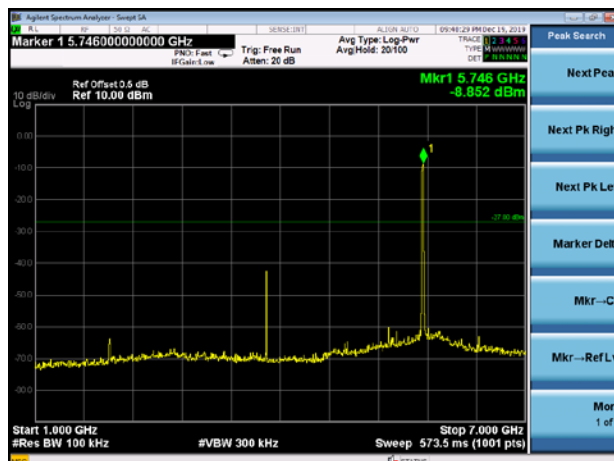
802.11n20 on channel 149



802.11a on channel 165



802.11n20 on channel 149



802.11a on channel 165

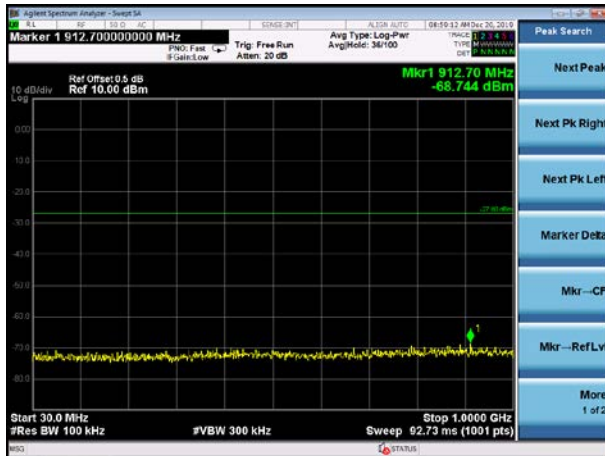


802.11n20 on channel 149

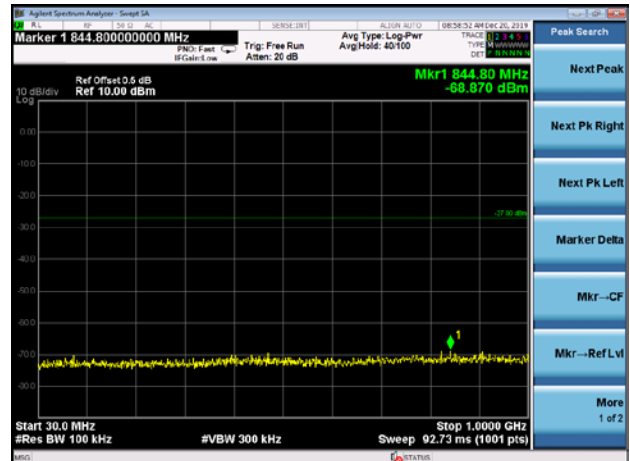


Test Plot

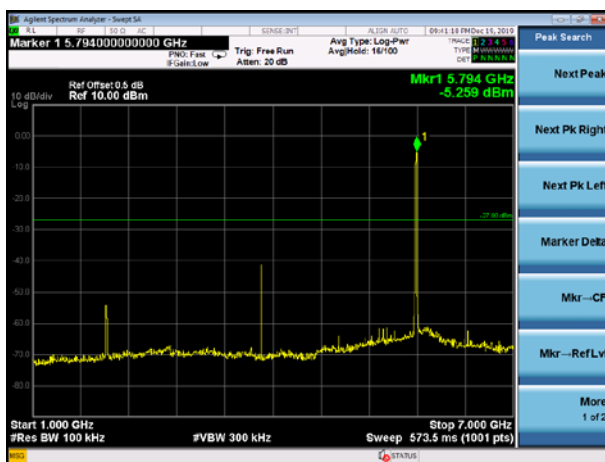
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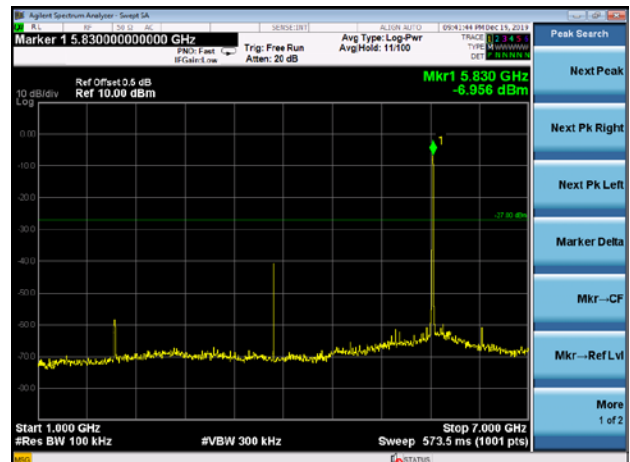
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802.11n20 on channel 157



802.11n20 on channel 165



802.11n20 on channel 157

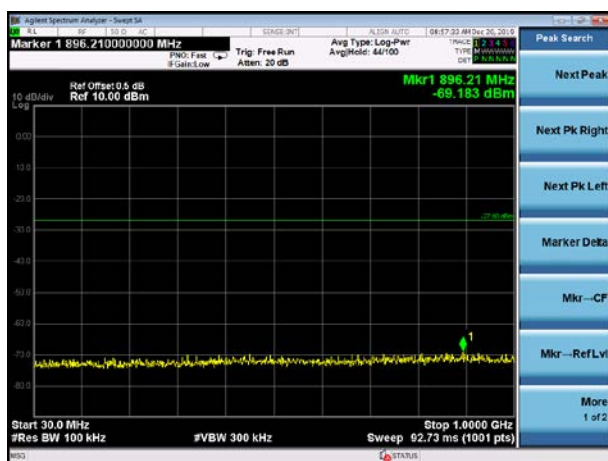


802.11n20 on channel 165

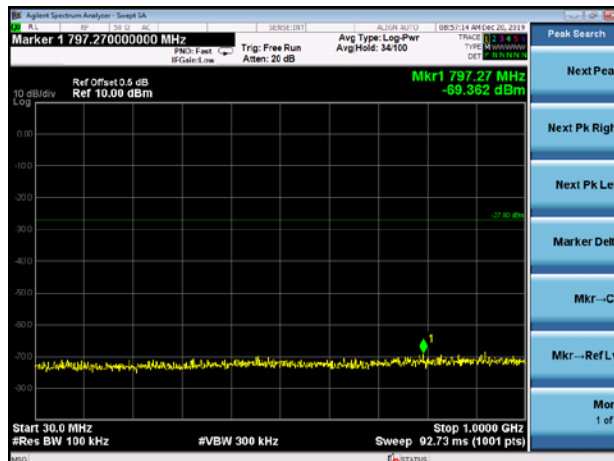


Test Plot

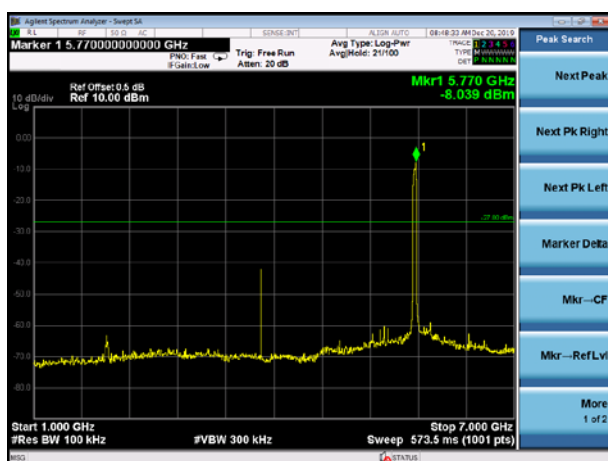
802.11n40 on channel 151



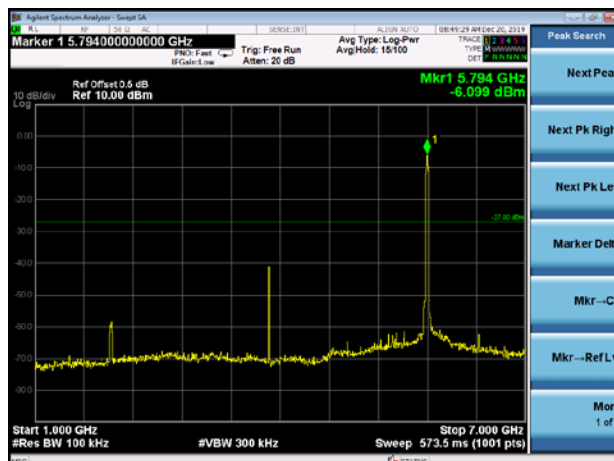
802.11n40 on channel 159



802.11n40 on channel 151



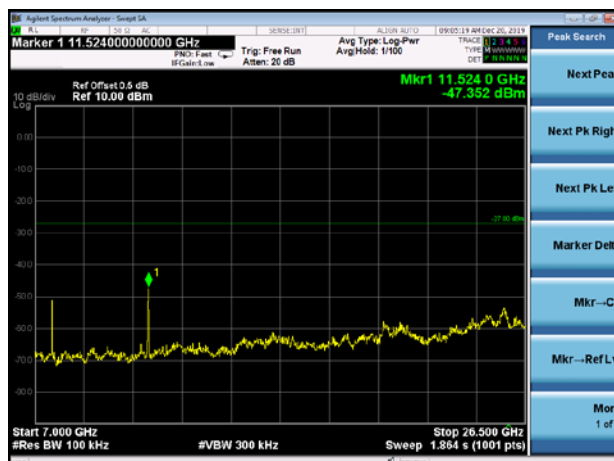
802.11n40 on channel 159



802.11n40 on channel 151

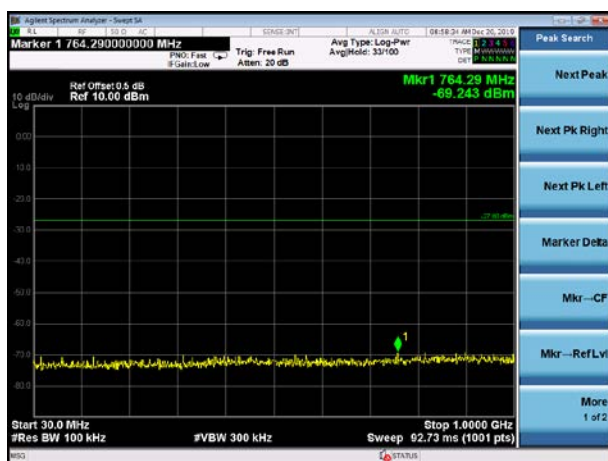


802.11n40 on channel 159

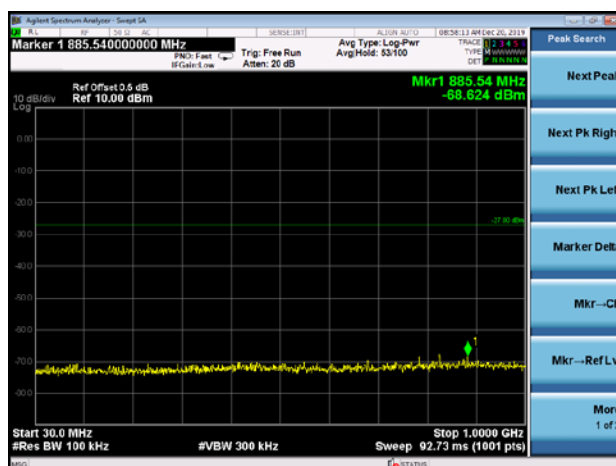


Test Plot

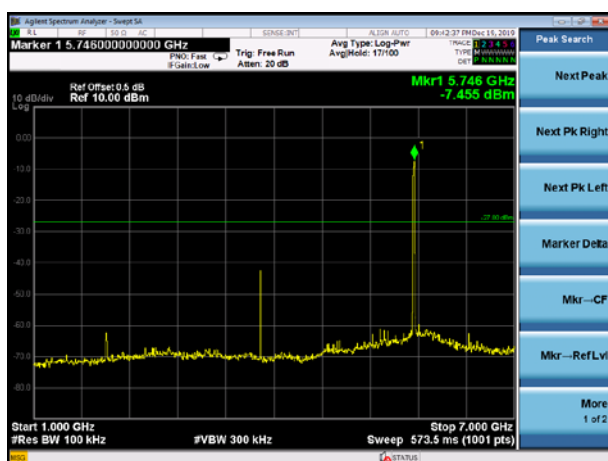
802.11ac20 on channel 149



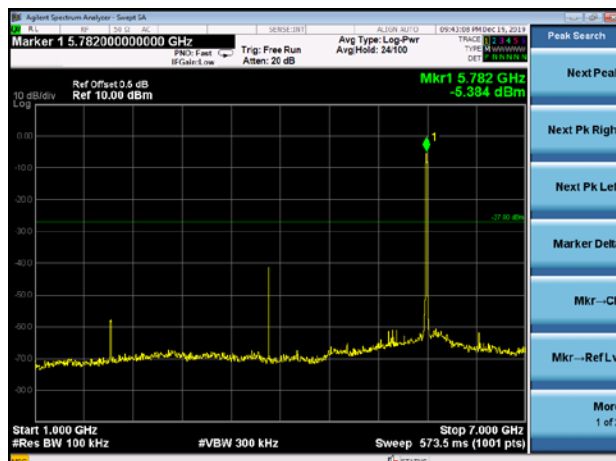
802.11ac20 on channel 157



802.11ac20 on channel 149



802.11ac20 on channel 157



802.11ac20 on channel 149

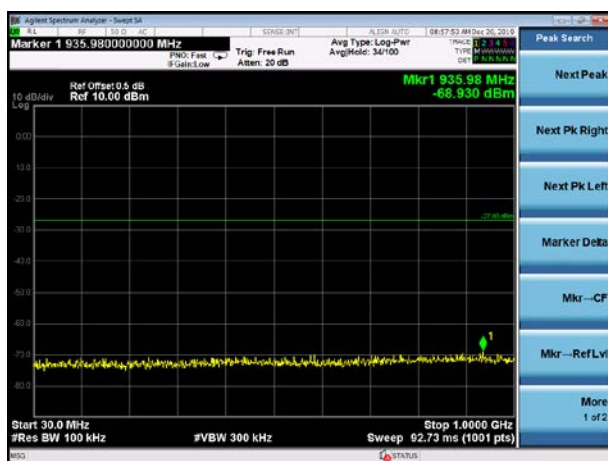


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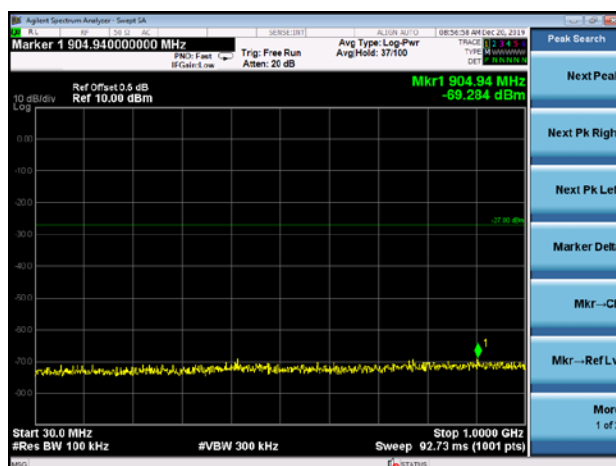


Test Plot

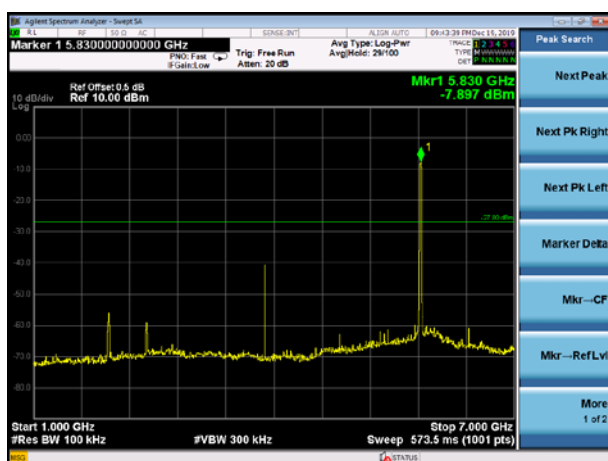
802.11ac20 on channel 165



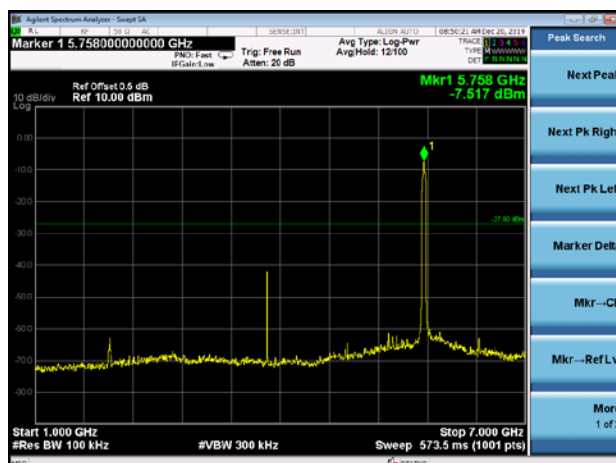
802.11ac40 on channel 151



802.11ac20 on channel 165



802.11ac40 on channel 151



802.11ac20 on channel 165

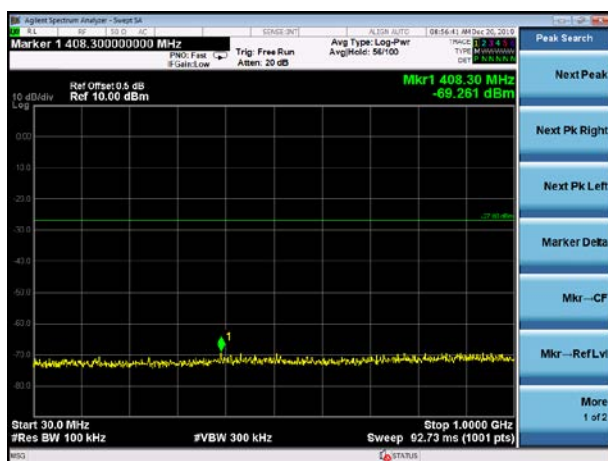


802.11ac40 on channel 151

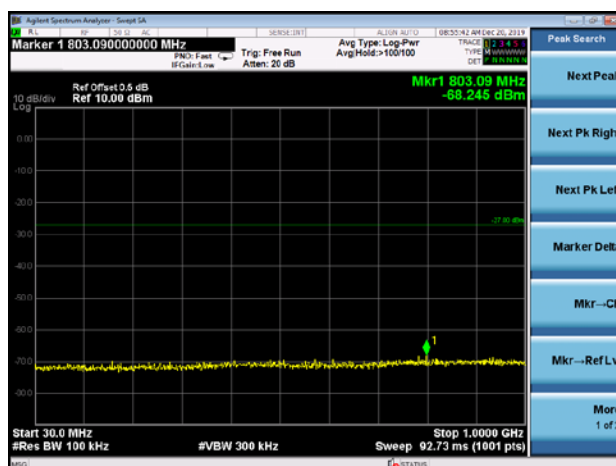


Test Plot

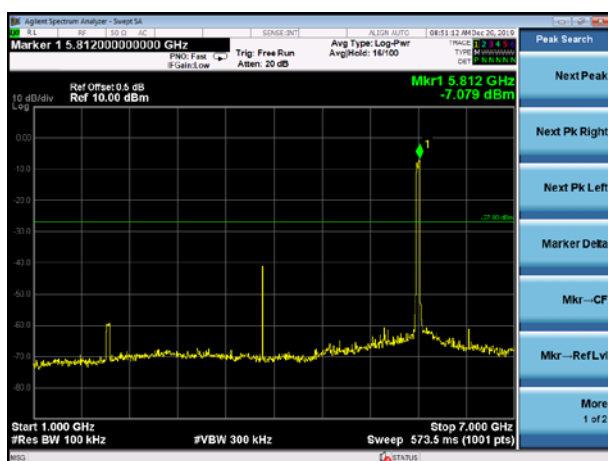
802.11ac40 on channel 159



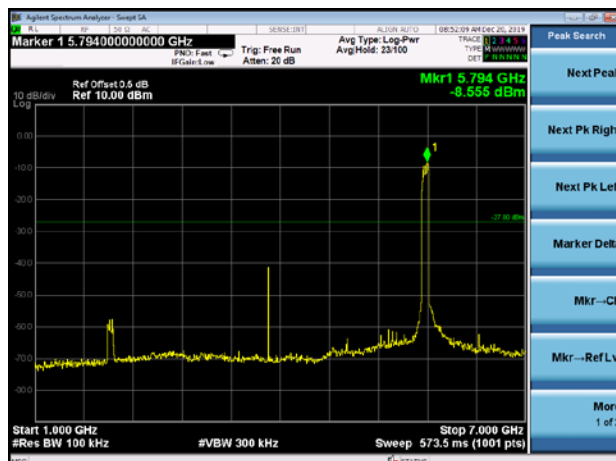
802.11ac80 on channel 155



802.11 ac40 on channel 159



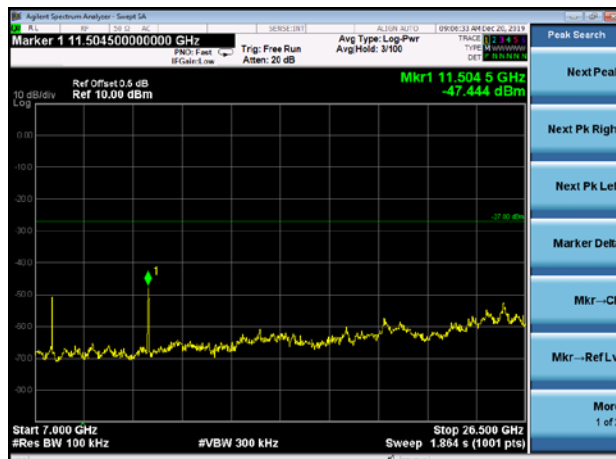
802.11 ac80 on channel 155



802.11 ac40 on channel 159



802.11 ac80 on channel 155



9. Frequency Stability Measurement

9.1 LIMIT

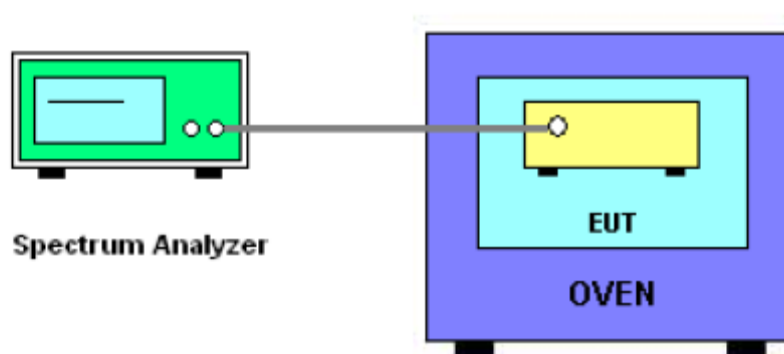
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

9.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C ~ 70°C .

9.3 TEST SETUP LAYOUT



9.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

9.5 TEST RESULTS

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC3.8V
Test Mode :	TX Frequency Band I (5180-5240MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5180.0524	5180	0.0524	10.1158
		V max (V)	4.37	5180.0325	5180	0.0325	6.2741
		V min (V)	3.23	5180.0247	5180	0.0247	4.7683
Limits				5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5180.0053	5180	0.0053	1.0232
		T (°C)	-10	5180.0107	5180	0.0107	2.0656
		T (°C)	0	5180.0323	5180	0.0323	6.2355
		T (°C)	10	5180.0386	5180	0.0386	7.4517
		T (°C)	20	5180.0293	5180	0.0293	5.6564
		T (°C)	30	5180.0217	5180	0.0217	4.1892
		T (°C)	40	5180.0123	5180	0.0123	2.3745
		T (°C)	50	5180.0097	5180	0.0097	1.8726
		T (°C)	60	5180.0413	5180	0.0413	7.9730
		T (°C)	70	5180.0696	5180	0.0696	13.4363
Limits				5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5200.0253	5200	0.0253	4.8654
		V max (V)	4.37	5200.0426	5200	0.0426	8.1923
		V min (V)	3.23	5200.0693	5200	0.0693	13.3269
Limits				5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5200.0633	5200	0.0633	12.1731
		T (°C)	-10	5200.0527	5200	0.0527	10.1346
		T (°C)	0	5200.0433	5200	0.0433	8.3269
		T (°C)	10	5200.0925	5200	0.0925	17.7885
		T (°C)	20	5200.0637	5200	0.0637	12.2500
		T (°C)	30	5200.0123	5200	0.0123	2.3654
		T (°C)	40	5200.0735	5200	0.0735	14.1346
		T (°C)	50	5200.0413	5200	0.0413	7.9423
		T (°C)	60	5200.0327	5200	0.0327	6.2885
		T (°C)	70	5200.0425	5200	0.0425	8.1731
Limits				5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5240.0133	5240	0.0133	2.5382
		V max (V)	4.37	5240.0416	5240	0.0416	7.9389
		V min (V)	3.23	5240.0096	5240	0.0096	1.8321
Limits				5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5240.0094	5240	0.0094	1.7939
		T (°C)	-10	5240.0036	5240	0.0036	0.6870
		T (°C)	0	5240.0145	5240	0.0145	2.7672
		T (°C)	10	5240.0856	5240	0.0856	16.3359
		T (°C)	20	5240.0113	5240	0.0113	2.1565
		T (°C)	30	5240.0127	5240	0.0127	2.4237
		T (°C)	40	5240.0063	5240	0.0063	1.2023
		T (°C)	50	5240.0076	5240	0.0076	1.4504
		T (°C)	60	5240.0056	5240	0.0056	1.0687
		T (°C)	70	5240.0105	5240	0.0105	2.0038
Limits				5150-5250MHz			
Result				Complies			

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC3.8V
Test Mode :	TX Frequency(5745-5825MHz)		

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5745.01252	5745	0.01252	2.1798
		V max (V)	4.37	5745.01191	5745	0.01191	2.0723
		V min (V)	3.23	5745.01269	5745	0.01269	2.2095
Limits				5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5745.01133	5745	0.01133	1.9726
		T (°C)	-10	5745.01053	5745	0.01053	1.8331
		T (°C)	0	5745.00917	5745	0.00917	1.5970
		T (°C)	10	5745.00802	5745	0.00802	1.3955
		T (°C)	20	5745.00349	5745	0.00349	0.6072
		T (°C)	30	5745.00084	5745	0.00084	0.1457
		T (°C)	40	5745.00237	5745	0.00237	0.4119
		T (°C)	50	5745.00355	5745	0.00355	0.6178
		T (°C)	60	5745.00027	5745	0.00027	0.0468
		T (°C)	70	5745.00963	5745	0.00963	1.6768
Limits				5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5785.00309	5785	0.00309	0.5348
		V max (V)	4.37	5785.01058	5785	0.01058	1.8296
		V min (V)	3.23	5785.00803	5785	0.00803	1.3879
Limits				5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5785.00450	5785	0.00450	0.7781
		T (°C)	-10	5785.00281	5785	0.00281	0.4861
		T (°C)	0	5785.01198	5785	0.01198	2.0709
		T (°C)	10	5785.01092	5785	0.01092	1.8877
		T (°C)	20	5785.00252	5785	0.00252	0.4356
		T (°C)	30	5785.00212	5785	0.00212	0.3671
		T (°C)	40	5785.00856	5785	0.00856	1.4795
		T (°C)	50	5785.00260	5785	0.00260	0.4494
		T (°C)	60	5785.00806	5785	0.00806	1.3936
		T (°C)	70	5785.00700	5785	0.00700	1.2092
Limits				5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.80	5825.01008	5825	0.01008	1.7310
		V max (V)	4.37	5825.00999	5825	0.00999	1.7151
		V min (V)	3.23	5825.00601	5825	0.00601	1.0310
Limits				5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5825.00971	5825	0.00971	1.6676
		T (°C)	-10	5825.00042	5825	0.00042	0.0713
		T (°C)	0	5825.00051	5825	0.00051	0.0879
		T (°C)	10	5825.00715	5825	0.00715	1.2267
		T (°C)	20	5825.00291	5825	0.00291	0.4992
		T (°C)	30	5825.01062	5825	0.01062	1.8231
		T (°C)	40	5825.01015	5825	0.01015	1.7421
		T (°C)	50	5825.00368	5825	0.00368	0.6326
		T (°C)	60	5825.00023	5825	0.00023	0.0391
		T (°C)	70	5825.01288	5825	0.01288	2.2120
Limits				5725-5850MHz			
Result				Complies			

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 EUT ANTENNA

The EUT antenna is FPCB Antenna (antenna gain:1dBi). It comply with the standard requirement.

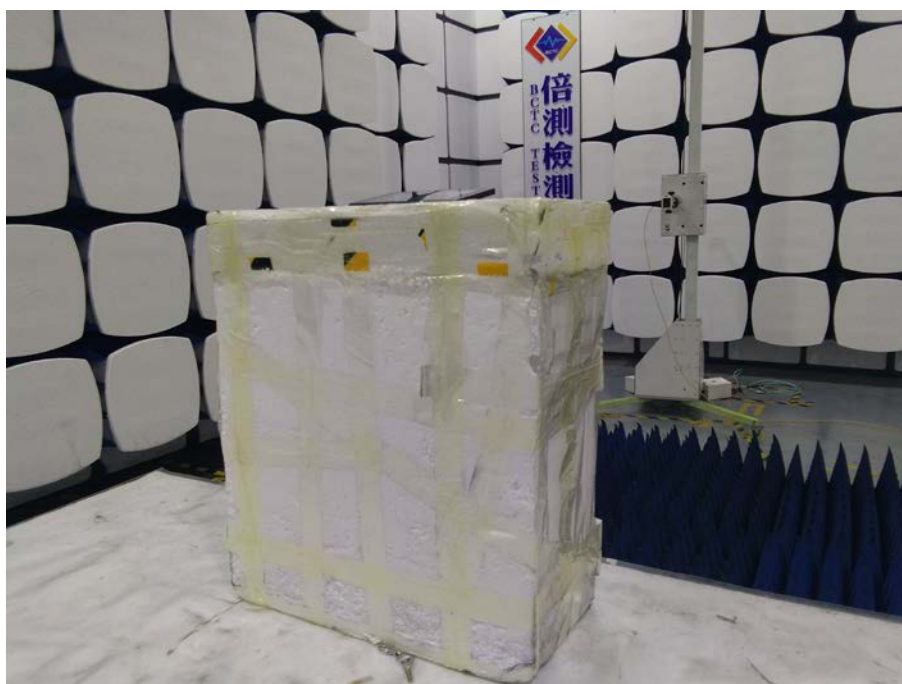
11. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos





12. EUT PHOTO

EUT Photo 1



EUT Photo 2



***** END OF REPORT *****