6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

The maximum e.i.r.p should not exceed:

Frequency Band(MHz)	Limit
5150~5250	200mW or 10dBm +10logB whichever is less
5725~5850	N/A

Note: Where “B” is the 99% emission bandwidth in MHz

6.2 TEST PROCEDURE

· Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

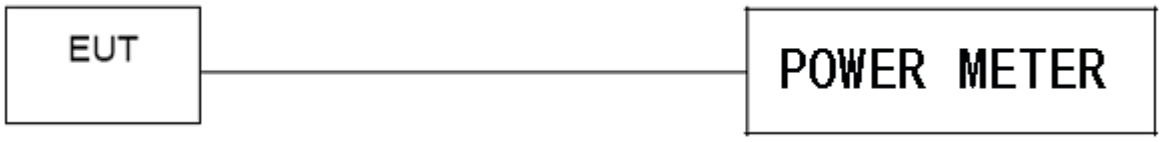
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 12V
Test Mode ：	TX (5G) Mode Frequency U-NII-3 (5745-5825MHz)		

Test Channel	Frequency	Maximum output power. Antenna port (AV)			LIMIT	Result
	(MHz)	ANT A(dBm)	ANT B(dBm)	Total(dBm)	dBm	
TX 802.11a Mode						
CH 149	5745	20.16	20.81	/	30	Pass
CH 157	5785	20.11	20.61	/	30	Pass
CH 165	5825	19.86	20.75	/	30	Pass
TX 802.11 n20M Mode						
CH 149	5745	20.53	20.37	23.46	30	Pass
CH 157	5785	20.26	20.30	23.29	30	Pass
CH 165	5825	20.12	20.15	23.15	30	Pass
TX 802.11 n40M Mode						
CH 151	5755	18.51	17.93	21.24	30	Pass
CH 159	5795	18.46	17.85	21.18	30	Pass
TX 802.11 AC20M Mode						
CH 149	5745	20.65	20.20	23.44	30	Pass
CH 157	5785	20.56	20.15	23.37	30	Pass
CH 165	5825	20.35	20.09	23.23	30	Pass
TX 802.11 AC40M Mode						
CH 151	5755	17.26	17.92	20.61	30	Pass
CH 159	5795	17.12	17.85	20.51	30	Pass
TX 802.11 AC80M Mode						
CH 155	5775	16.34	16.70	19.53	30	Pass

7. OUT OF BAND EMISSIONS

7.1 APPLICABLE STANDARD

According to FCC §15.407(b)

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:

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.

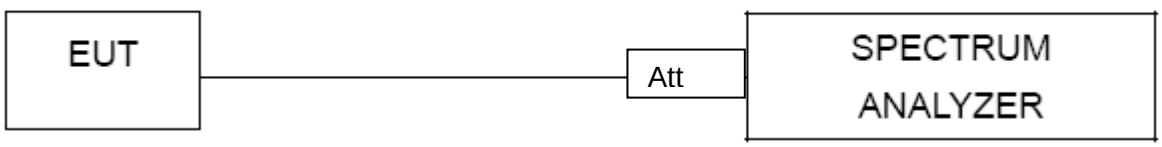
7.2 TEST PROCEDURE

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.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

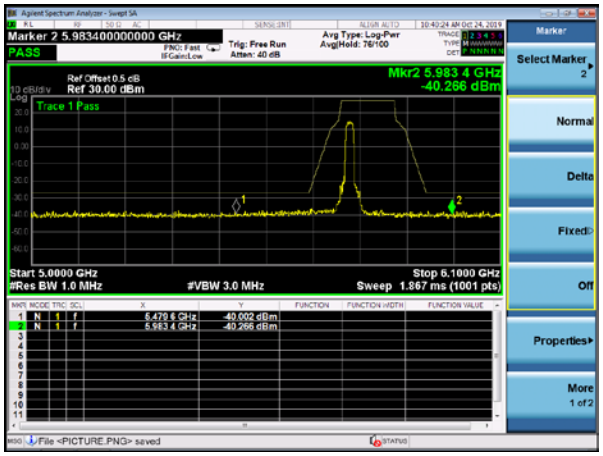
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	AC 120V/60Hz

NOTE: A(B) Represent the value of antenna A and B, The worst data is Antenna B ,only shown Antenna B Plot.

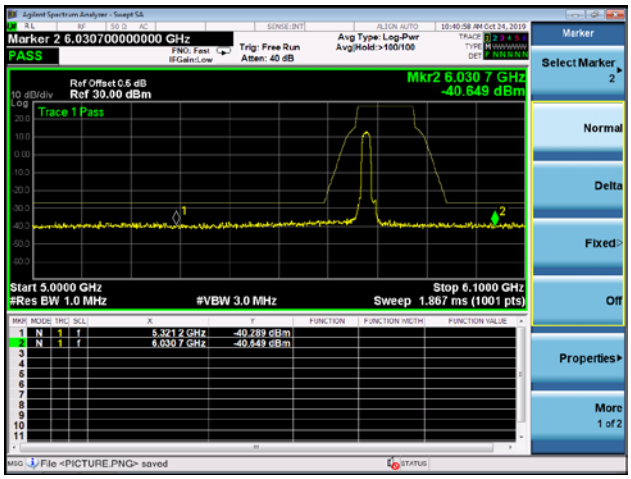
Antenna B: 5745-5825MHz

5.75~5.85 GHz

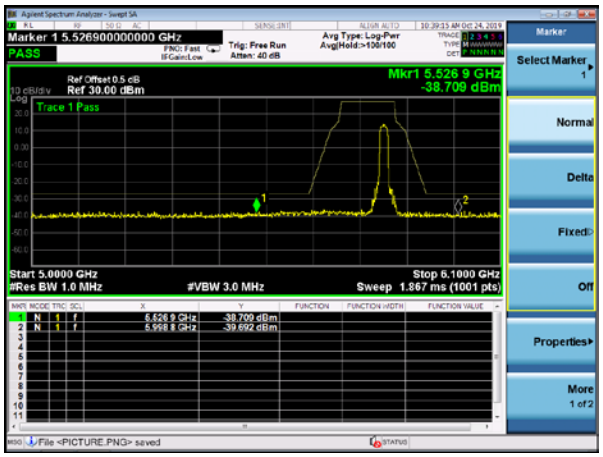
(802.11a) Band Edge, Left Side



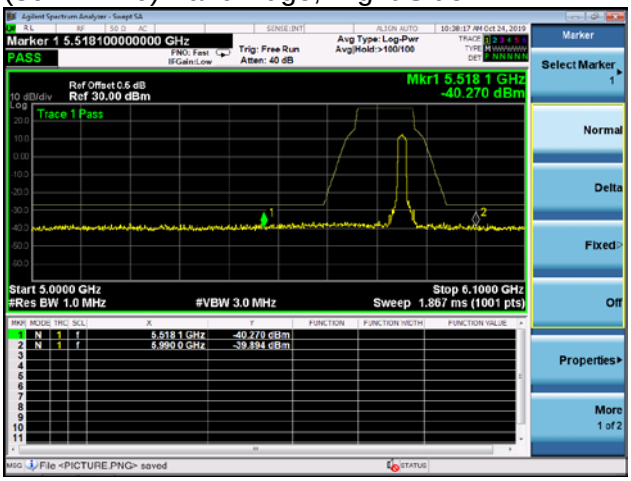
(802.11 n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

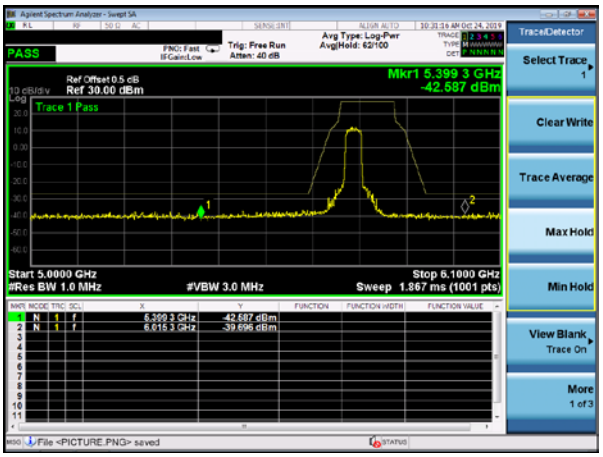


(802.11n20) Band Edge, Right Side

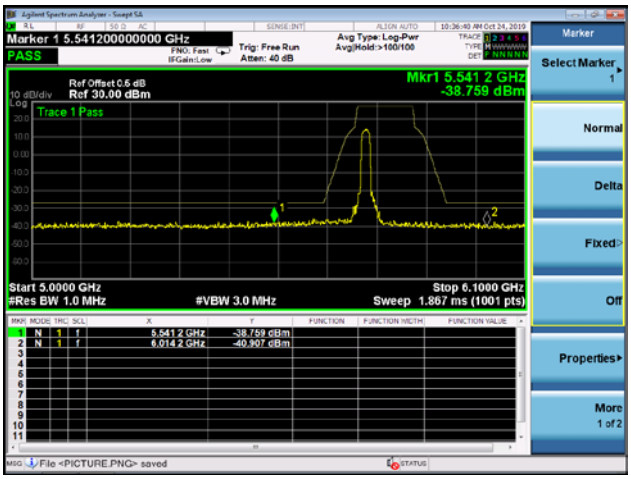


5.745~5.825 GHz

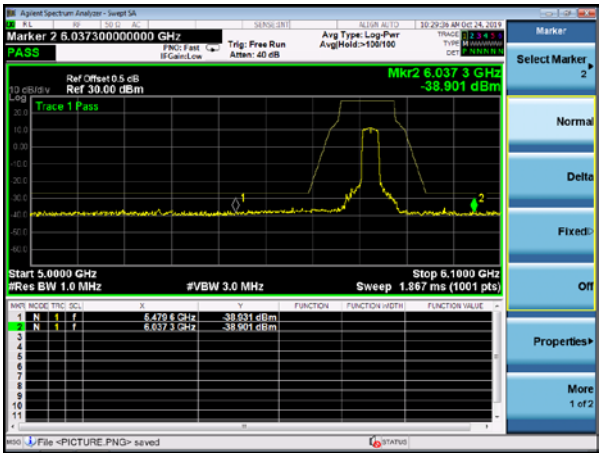
(802.11n40) Band Edge, Left Side



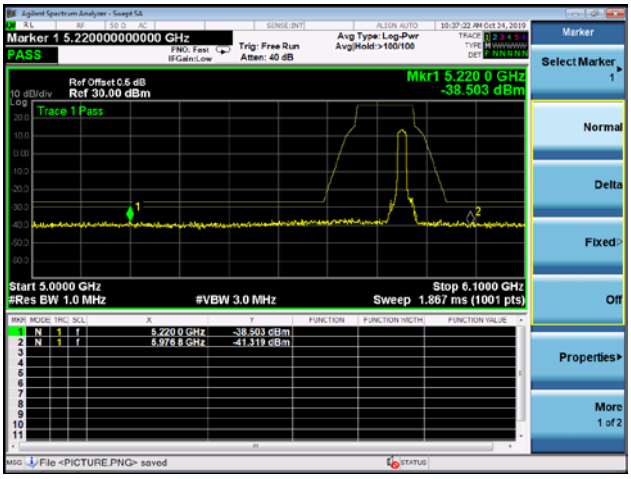
(802.11ac20) Band Edge, Left Side



(802.11n40) Band Edge, Right Side

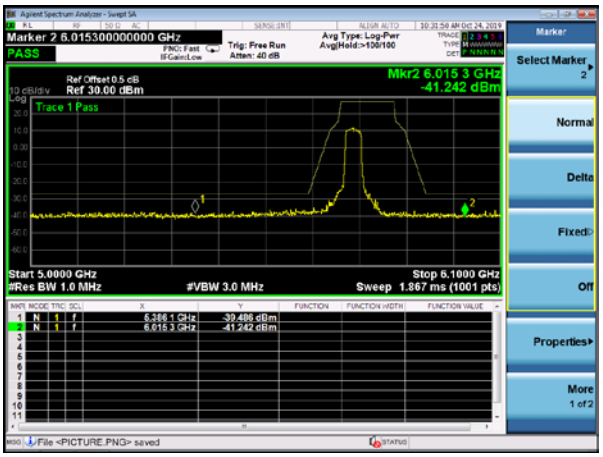


(802.11 ac20) Band Edge, Right Side

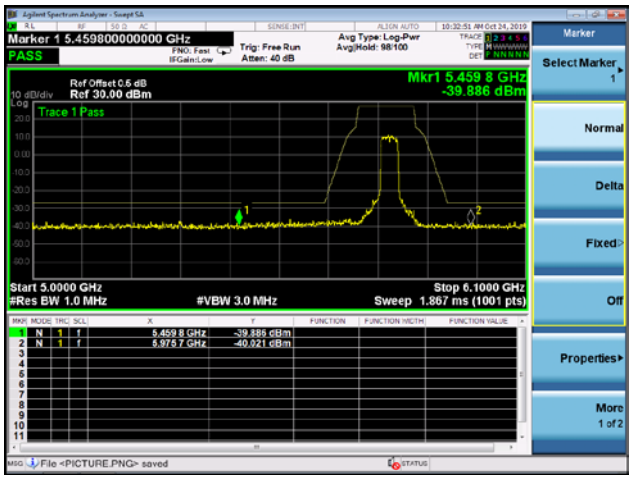


5.745~5.825 GHz

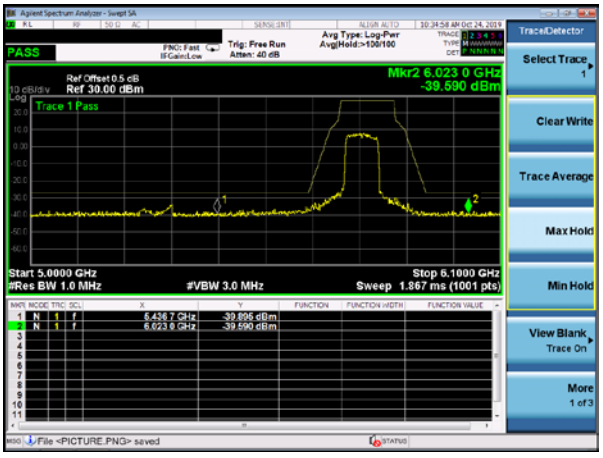
(802.11ac40) Band Edge, Left Side



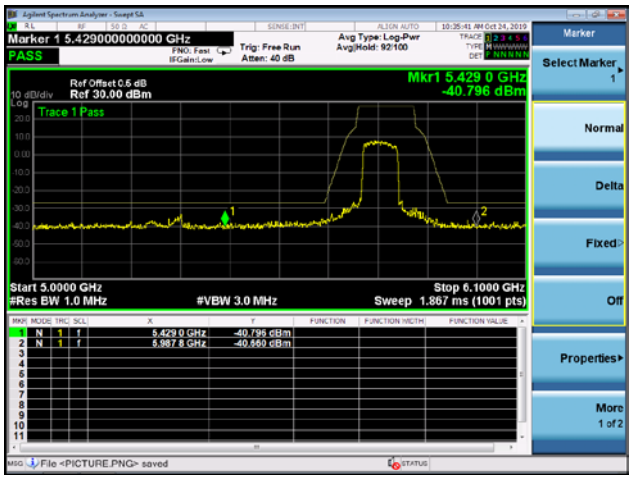
(802.11ac40) Band Edge, Right Side



(802.11ac80) Band Edge, Left Side



(802.11ac80) Band Edge, Right Side



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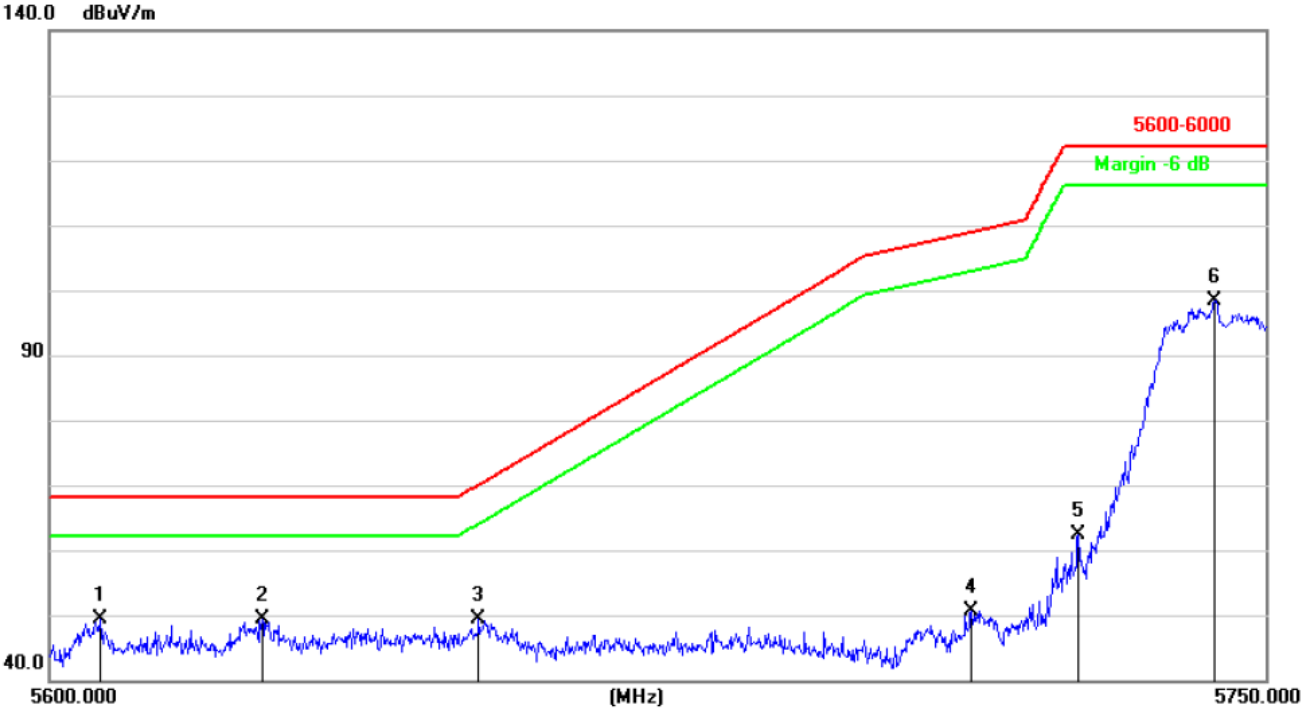
Radiated bandedge

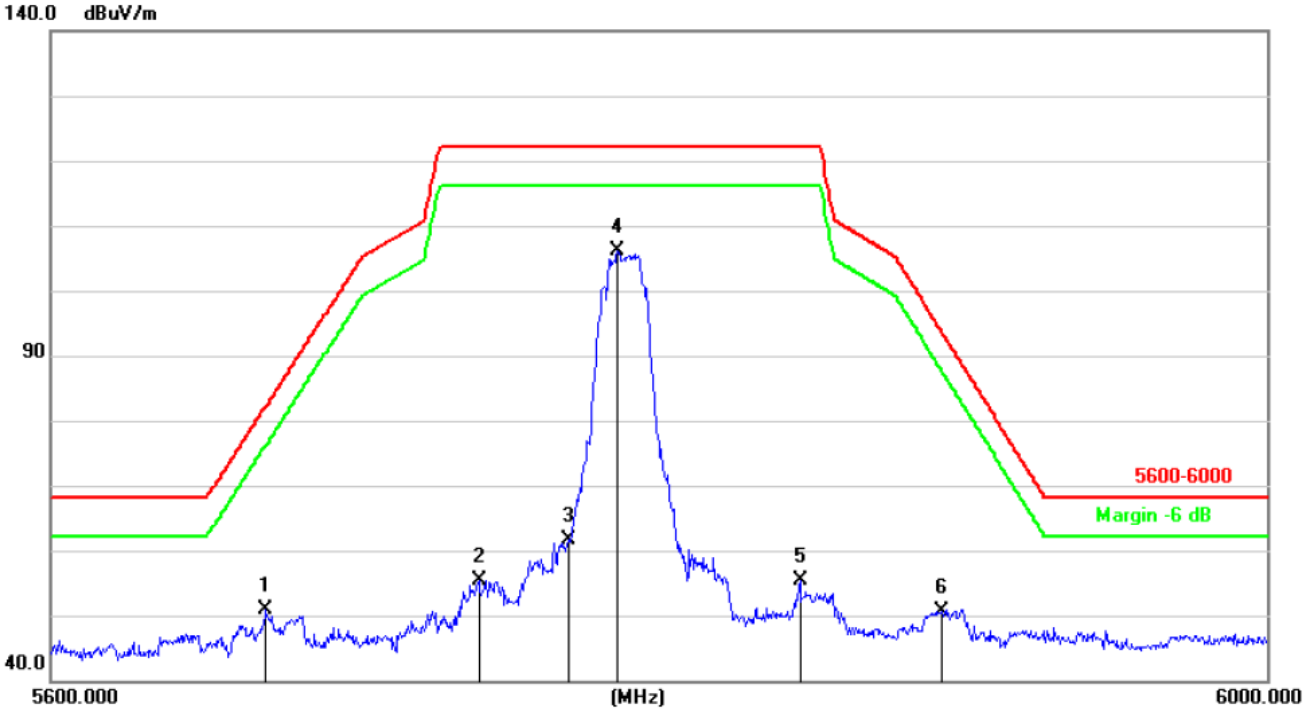
802.11n(HT20)
For the frequency band 5725-5850MHz

Low Channel



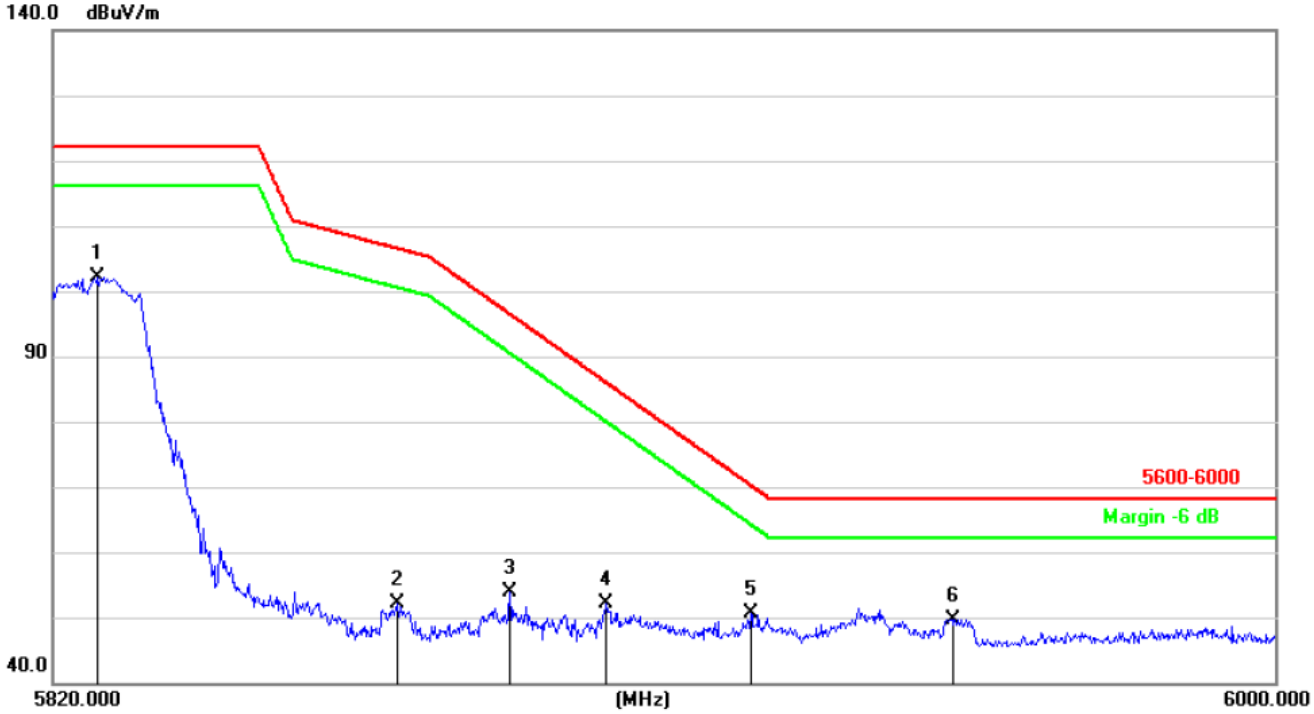
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5606.300	46.97	2.29	49.26	68.20	-18.94	peak
2	5626.100	47.11	2.37	49.48	68.20	-18.72	peak
3	5652.500	46.88	2.48	49.36	70.06	-20.70	peak
4	5713.400	47.98	2.74	50.72	108.95	-58.23	peak
5	5726.750	59.57	2.80	62.37	122.20	-59.83	peak
6	5743.700	95.55	2.87	98.42	122.20	-23.78	peak

Middle Channel



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5668.805	48.31	2.55	50.86	82.15	-31.29	peak
2	5738.000	52.64	2.85	55.49	122.20	-66.71	peak
3	5767.200	58.55	2.97	61.52	122.20	-60.68	peak
4	5783.200	103.17	3.04	106.21	122.20	-15.99	peak
5	5843.200	52.13	3.29	55.42	122.20	-66.78	peak
6	5890.400	47.25	3.49	50.74	93.77	-43.03	peak

High Channel



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5826.660	98.95	3.22	102.17	122.20	-20.03	peak
2	5870.220	48.61	3.41	52.02	106.54	-54.52	peak
3	5886.780	50.43	3.48	53.91	96.45	-42.54	peak
4	5901.000	48.52	3.54	52.06	85.92	-33.86	peak
5	5922.240	46.88	3.63	50.51	70.23	-19.72	peak
6	5952.120	45.99	3.76	49.75	68.20	-18.45	peak

Note:
1. This EUT was tested in 802.11a/n/ac(HT20), n/ac(HT40), ac(HT80) mode and 802.11n(HT20) the worst case position data was reported.

8.SPURIOUS RF CONDUCTED EMISSIONS

8.1CONFORMANCE LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

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

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and mwasure frequeny range from 9KHz to 26.5GHz.

8.5TEST RESULTS

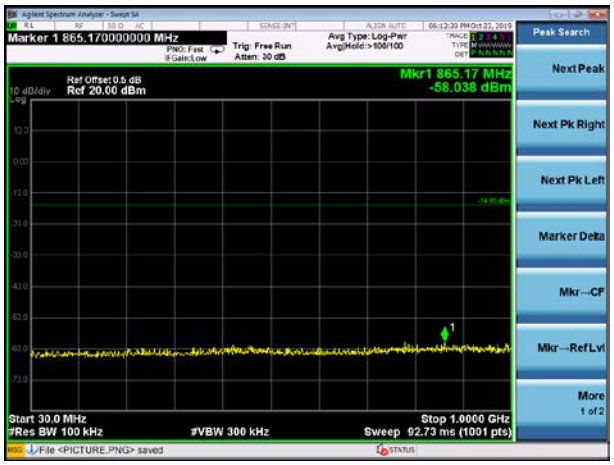
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna B ,only shown Antenna B Plot.

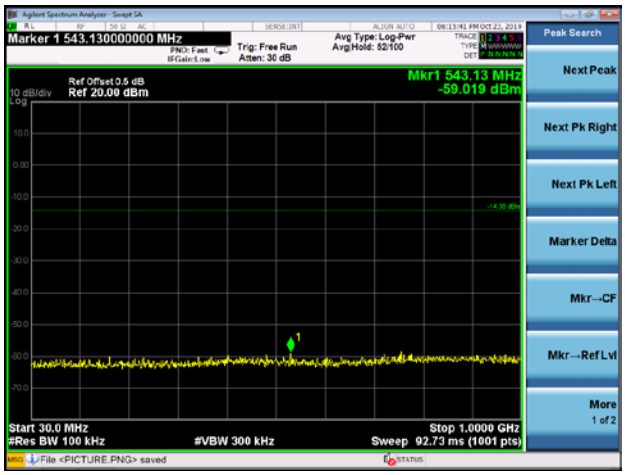
5.8G

Test Plot

802.11a on channel 149



802.11a on channel 157



802.11a on channel 149

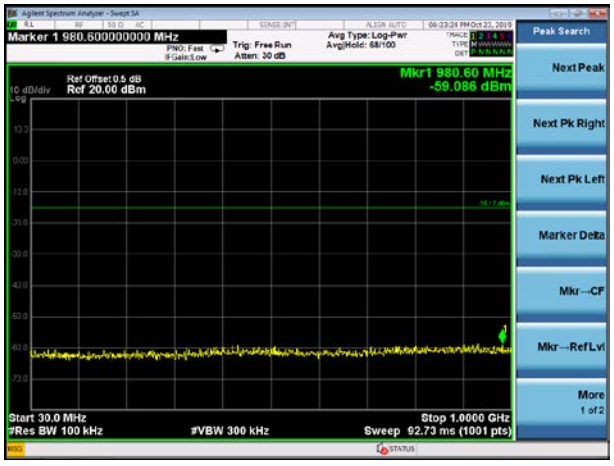
802.11a on channel 157

802.11a on channel 149

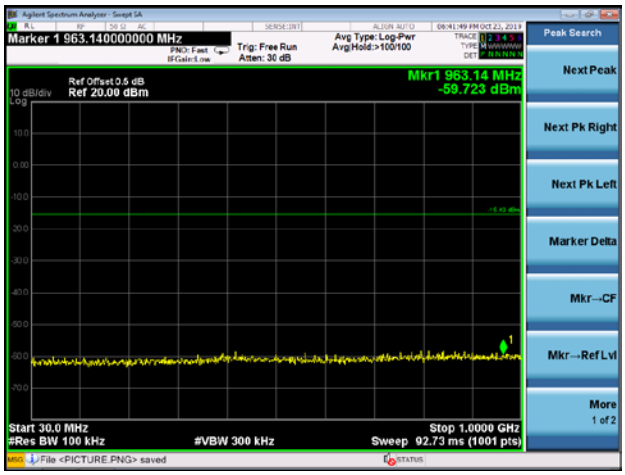
802.11a on channel 157

Test Plot

802.11a on channel 165



802.11n20 on channel 149



802.11a on channel 165

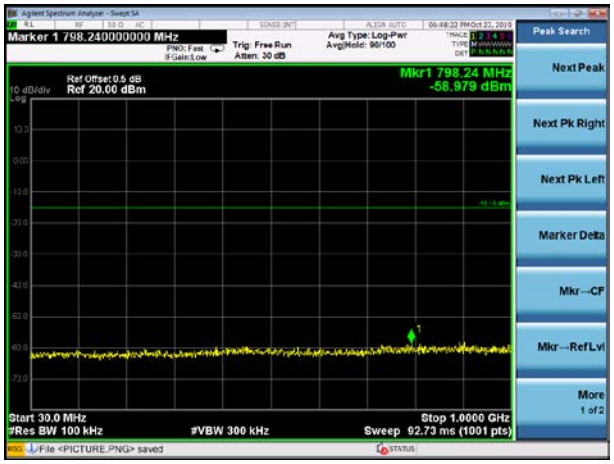
802.11n20 on channel 149

802.11a on channel 165

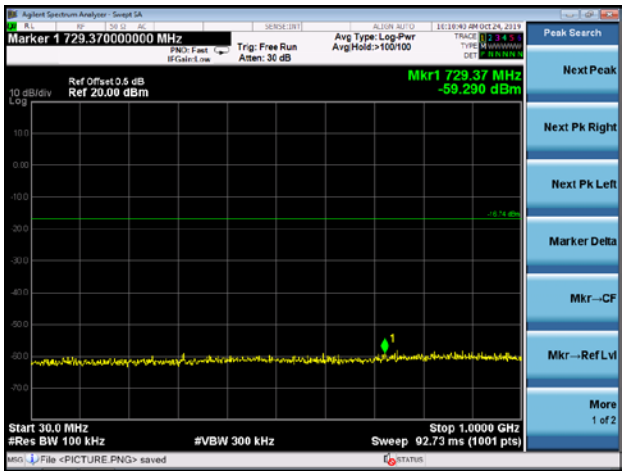
802.11n20 on channel 149

Test Plot

802.11n20 on channel 157



802.11n20 on channel 165



802.11n20 on channel 157

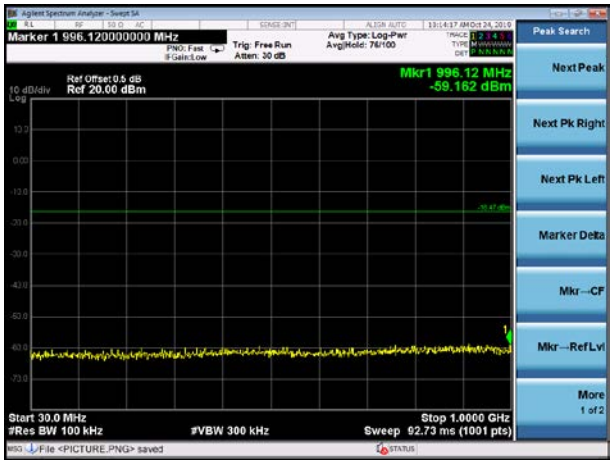
802.11n20 on channel 165

802.11n20 on channel 157

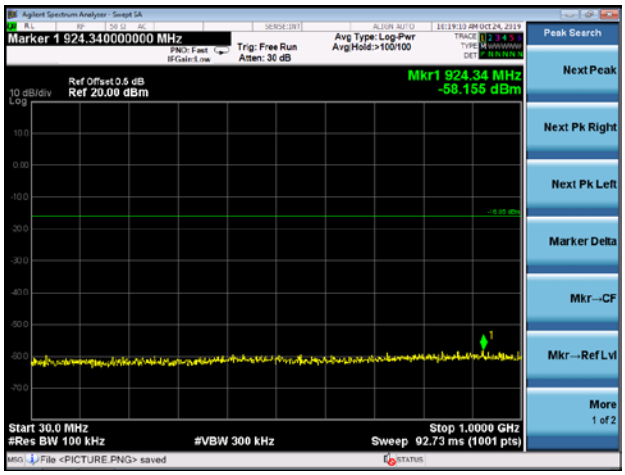
802.11n20 on channel 165

Test Plot

802.11n40 on channel 151

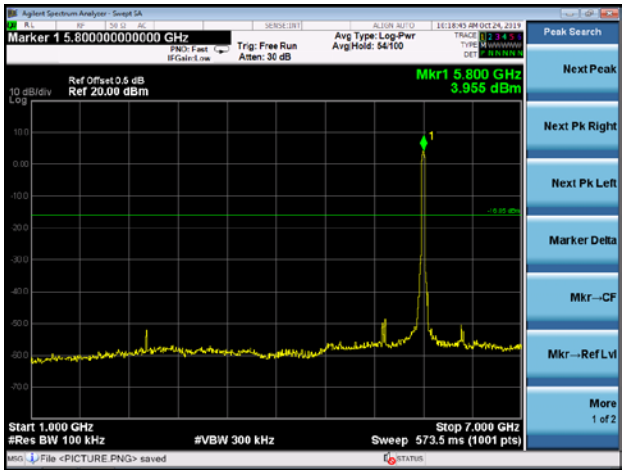


802.11n40 on channel 159



802.11n40 on channel 151

802.11n40 on channel 159

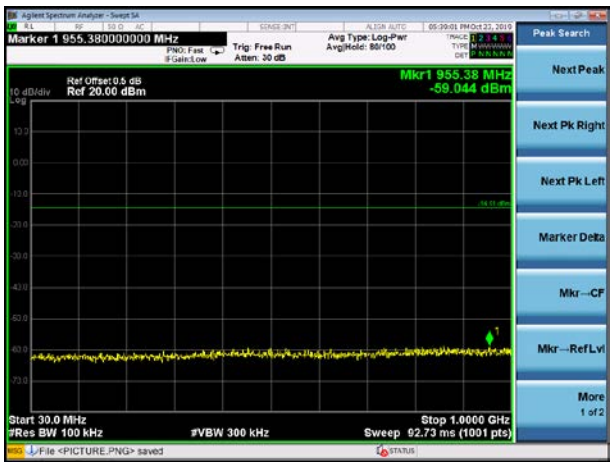


802.11n40 on channel 151

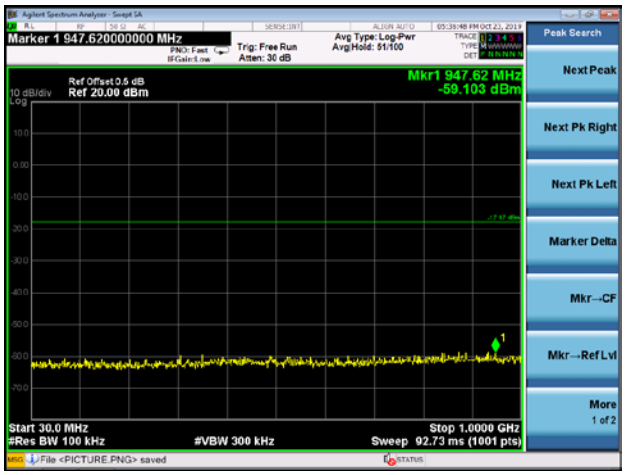
802.11n40 on channel 159

Test Plot

802.11ac20 on channel 149



802.11ac20 on channel 157



802.11ac20 on channel 149

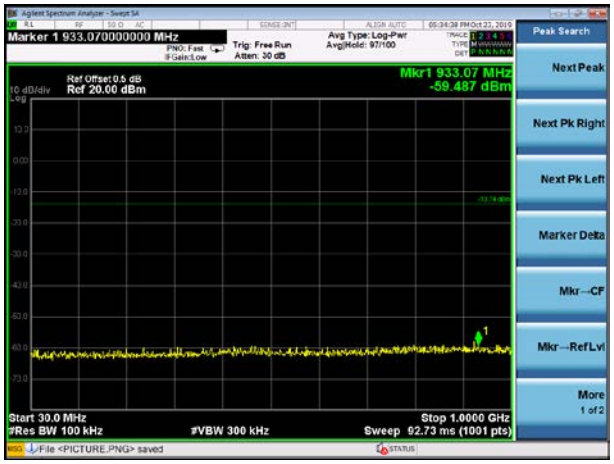
802.11ac20 on channel 157

802.11ac20 on channel 149

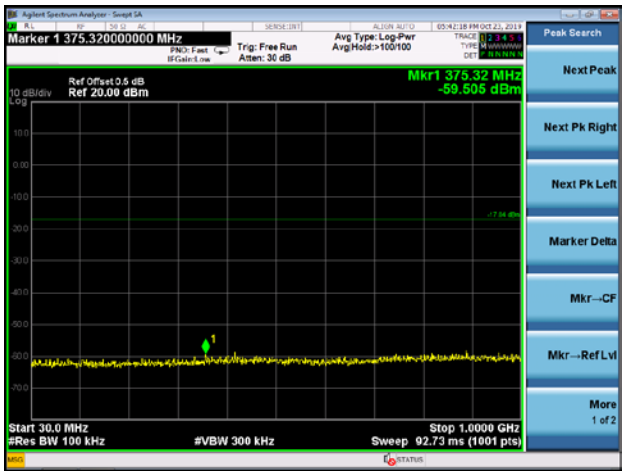
802.11ac20 on channel 157

Test Plot

802.11ac20 on channel 165



802.11ac40 on channel 151



802.11ac20 on channel 165

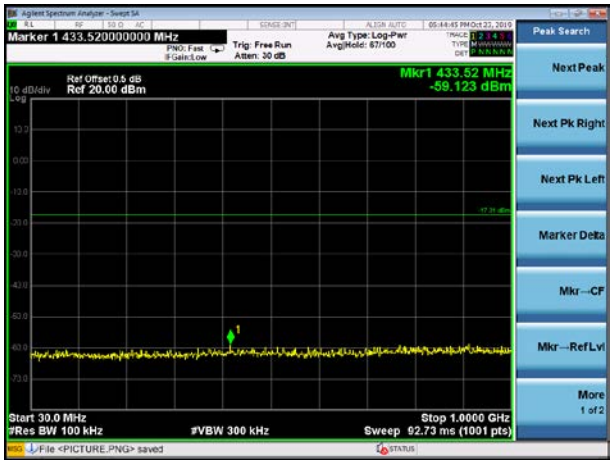
802.11ac40 on channel 151

802.11ac20 on channel 165

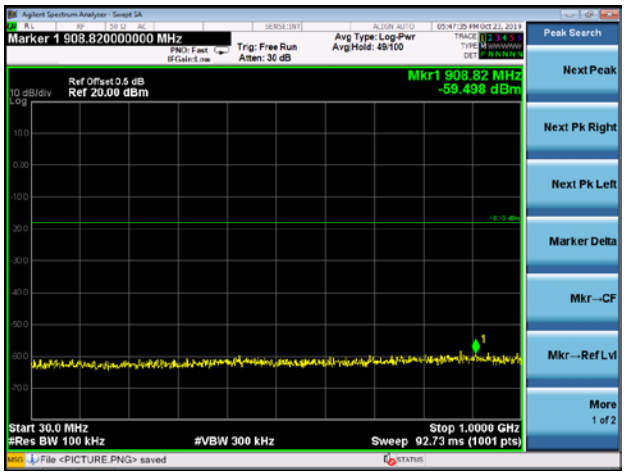
802.11ac40 on channel 151

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

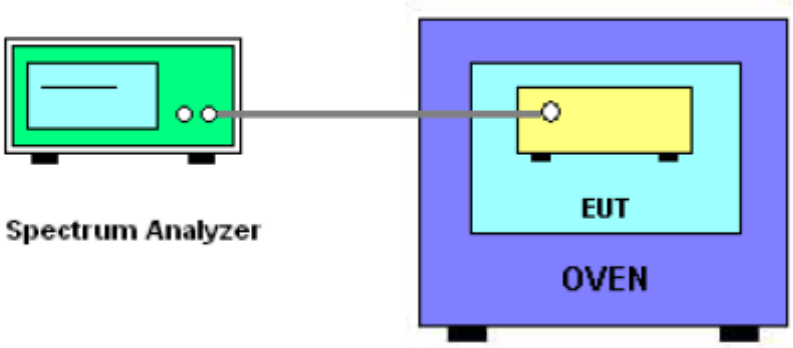
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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. fc is declaring of channel frequency. Then the frequency error formula is $(f - fc)/fc \times 10^6$ ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
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 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency(5745-5820MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5745.00225	5745	0.00225	0.3922
		V max (V)	13.80	5745.00393	5745	0.00393	0.6843
		V min (V)	10.20	5745.00794	5745	0.00794	1.3823
Limits				5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5745.00364	5745	0.00364	0.6338
		T (°C)	-10	5745.00733	5745	0.00733	1.2768
		T (°C)	0	5745.00494	5745	0.00494	0.8606
		T (°C)	10	5745.00870	5745	0.00870	1.5145
		T (°C)	20	5745.00602	5745	0.00602	1.0484
		T (°C)	30	5745.00290	5745	0.00290	0.5047
		T (°C)	40	5745.00692	5745	0.00692	1.2046
		T (°C)	50	5745.00198	5745	0.00198	0.3450
		T (°C)	60	5745.00813	5745	0.00813	1.4151
		T (°C)	70	5745.00107	5745	0.00107	0.1869
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)	12.00	5785.00644	5785	0.00644	1.1127
		V max (V)	13.80	5785.00912	5785	0.00912	1.5772
		V min (V)	10.20	5785.00599	5785	0.00599	1.0357
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)	12	T (°C)	-20	5785.00316	5785	0.00316	0.5468
		T (°C)	-10	5785.00563	5785	0.00563	0.9729
		T (°C)	0	5785.00087	5785	0.00087	0.1511
		T (°C)	10	5785.01212	5785	0.01212	2.0949
		T (°C)	20	5785.00727	5785	0.00727	1.2567
		T (°C)	30	5785.00143	5785	0.00143	0.2468
		T (°C)	40	5785.00804	5785	0.00804	1.3895
		T (°C)	50	5785.01108	5785	0.01108	1.9145
		T (°C)	60	5785.00250	5785	0.00250	0.4323
		T (°C)	70	5785.00153	5785	0.00153	0.2646
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)	12.00	5825.01016	5825	0.01016	1.7436
		V max (V)	13.80	5825.00883	5825	0.00883	1.5155
		V min (V)	10.20	5825.00930	5825	0.00930	1.5959
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)	12	T (°C)	-20	5825.01070	5825	0.01070	1.8377
		T (°C)	-10	5825.00031	5825	0.00031	0.0530
		T (°C)	0	5825.01353	5825	0.01353	2.3236
		T (°C)	10	5825.00047	5825	0.00047	0.0798
		T (°C)	20	5825.00864	5825	0.00864	1.4834
		T (°C)	30	5825.00706	5825	0.00706	1.2124
		T (°C)	40	5825.00312	5825	0.00312	0.5354
		T (°C)	50	5825.00653	5825	0.00653	1.1211
		T (°C)	60	5825.01233	5825	0.01233	2.1172
		T (°C)	70	5825.00554	5825	0.00554	0.9507
Limits				5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

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.

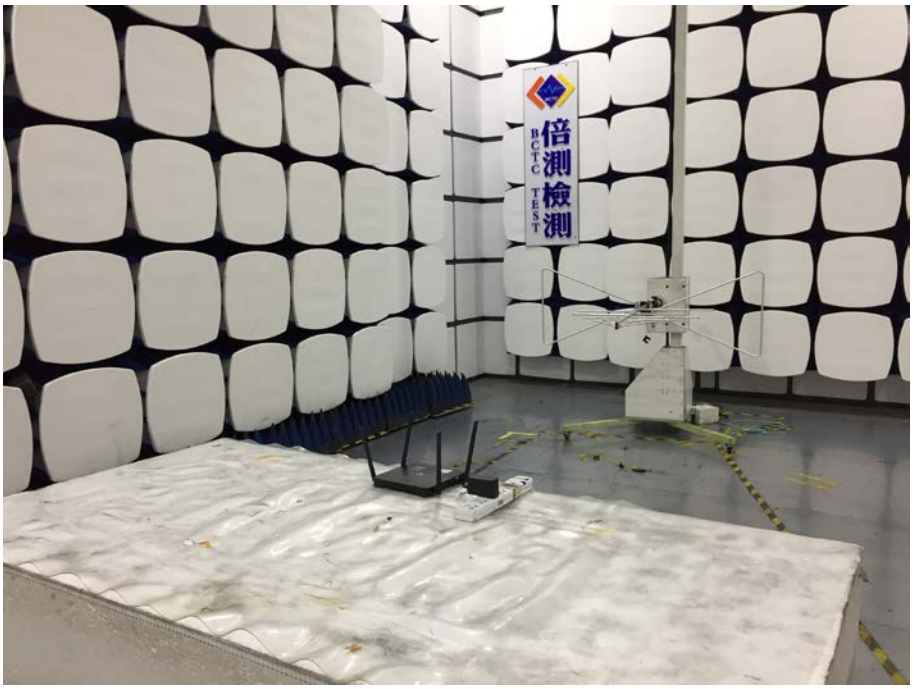
10.2 EUT ANTENNA

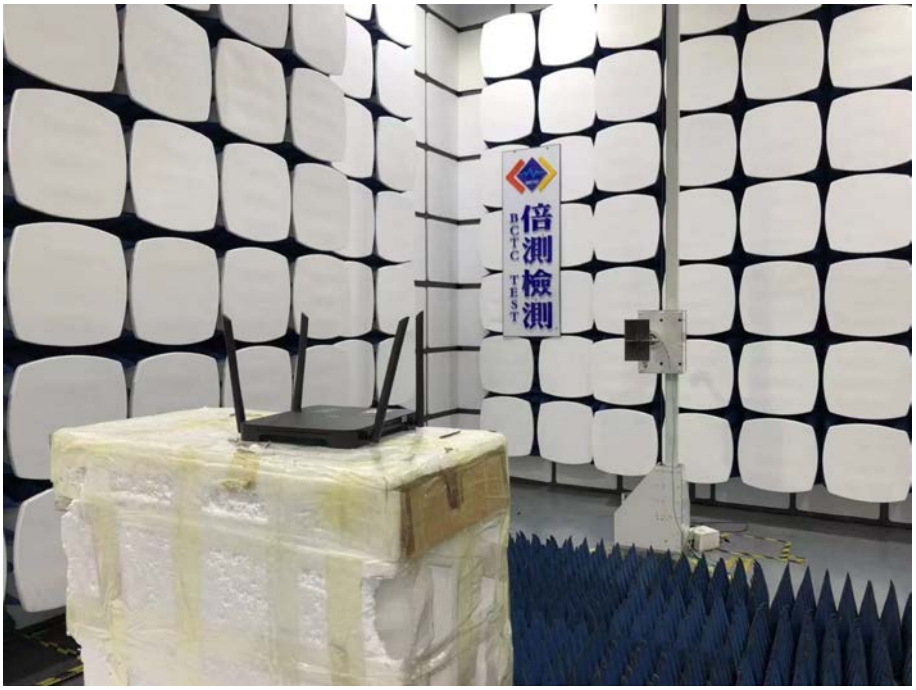
The EUT antenna is External antenna(antenna gain: 8.01dBi). It comply with the standard requirement.

11. EUT TEST PHOTO

Conducted Measurement Photos

Radiated Measurement Photos






倍测检测
BCTC TEST

12. EUT PHOTO

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