8.OUT OF BAND EMISSIONS

8.1 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:

(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)

(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.

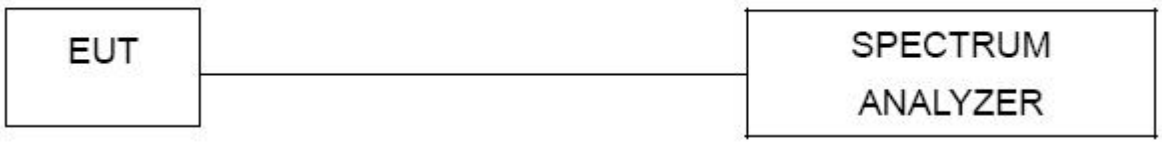
8.2 TEST PROCEDURE

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.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

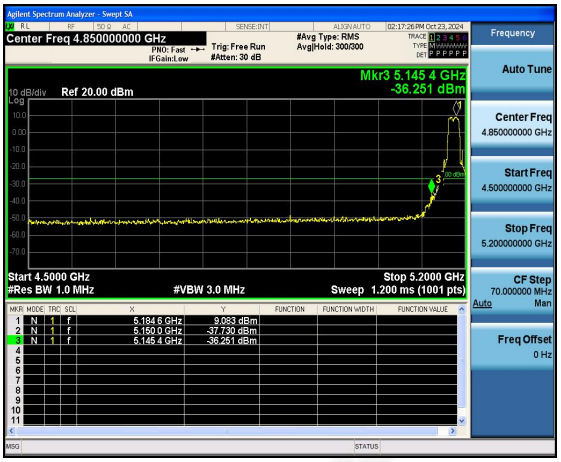
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	AC 120V/60Hz

5.180~5.240 GHz

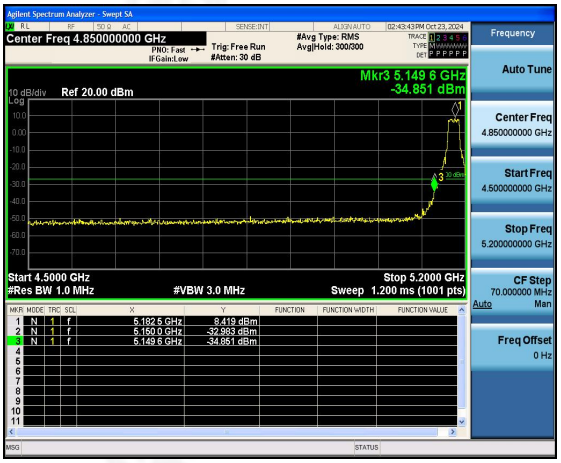
(802.11a) Band Edge, Left Side



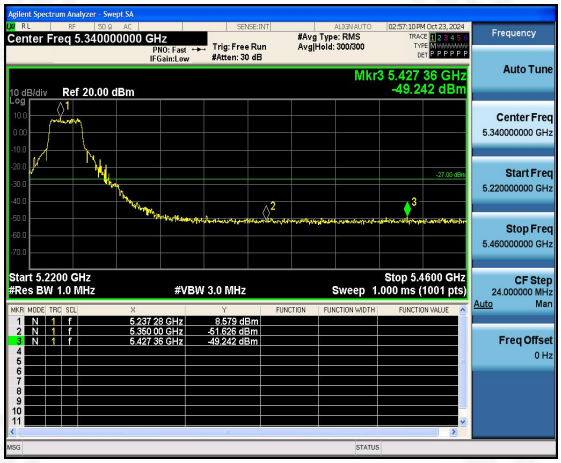
(802.11a) Band Edge, Right Side

5.180~5.240 GHz

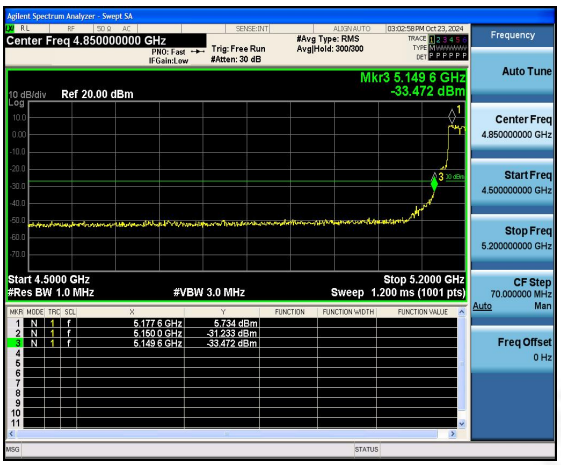
(802.11n20) Band Edge, Left Side



(802.11n40) Band Edge, Left Side



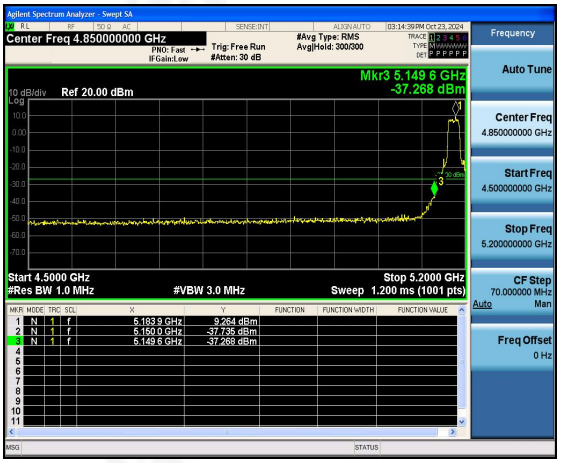
(802.11 n20) Band Edge, Right Side



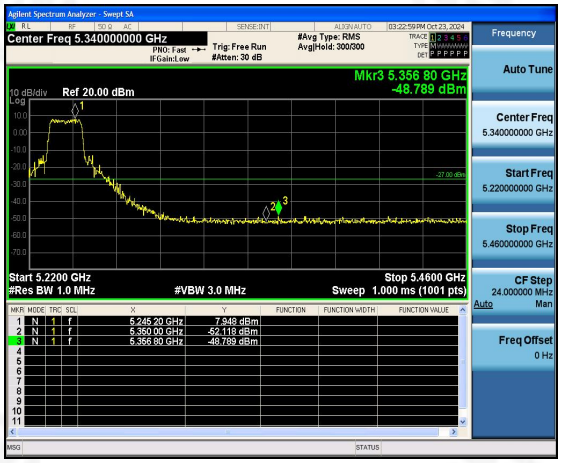
(802.11n40) Band Edge, Right Side

5.180~5.240 GHz

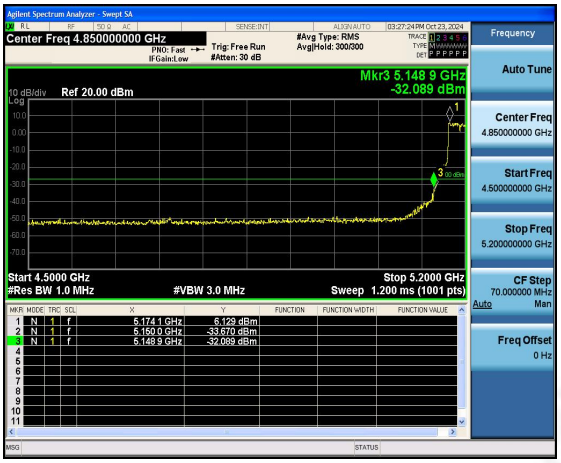
(802.1ac20) Band Edge, Left Side



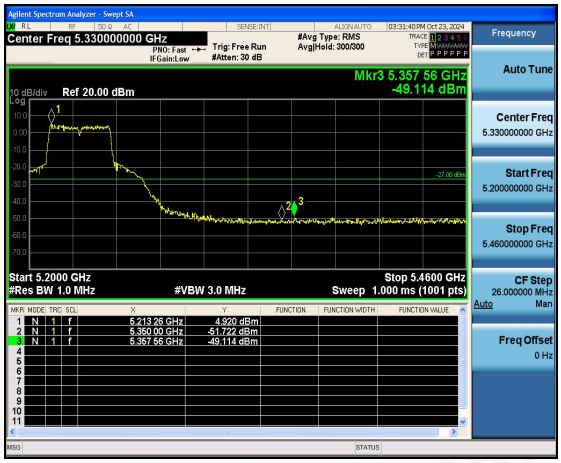
(802.11ac40) Band Edge, Left Side



(802.11ac20) Band Edge, Right Side

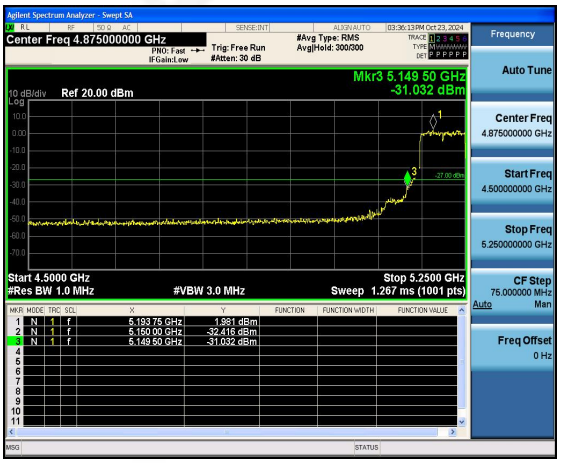


(802.11ac40) Band Edge, Right Side



(802.11ac80) Band Edge

(802.11ac80) Band Edge, Left Side



(802.11ac80) Band Edge, Right Side

9.SPURIOUS RF CONDUCTED EMISSIONS

9.1 CONFORMANCE LIMIT

Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	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.

9.2 MEASURING INSTRUMENTS

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

9.3 TEST SETUP

9.4 TEST PROCEDURE

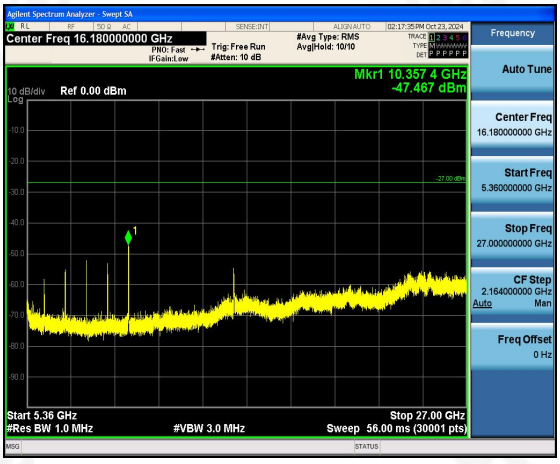
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=1MHz and VBW= 3MHz to measure the peak field strength, and measure frequency range from 30MHz to 26.5GHz.

9.5 TEST RESULTS

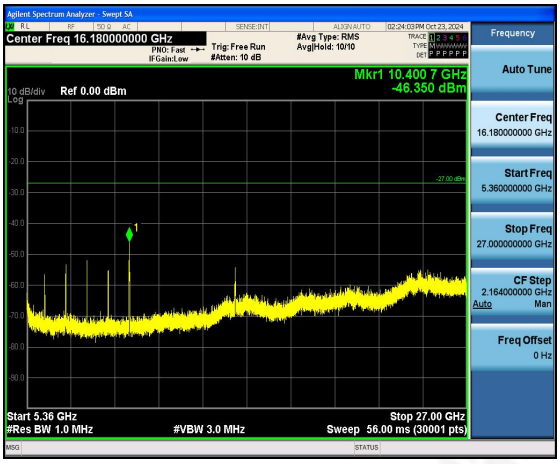
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. And above 26.5GHz of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

Test Plot

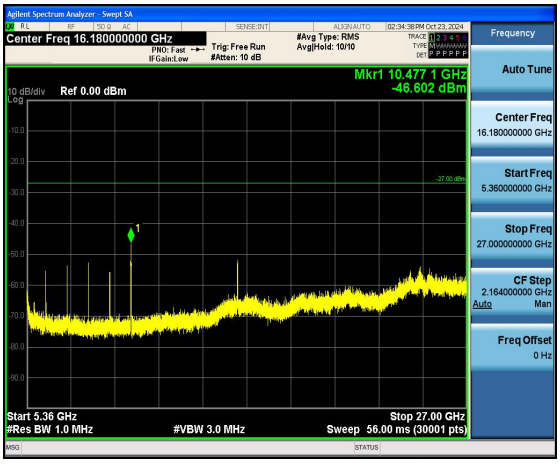
802.11a on channel 36



802.11a on channel 40

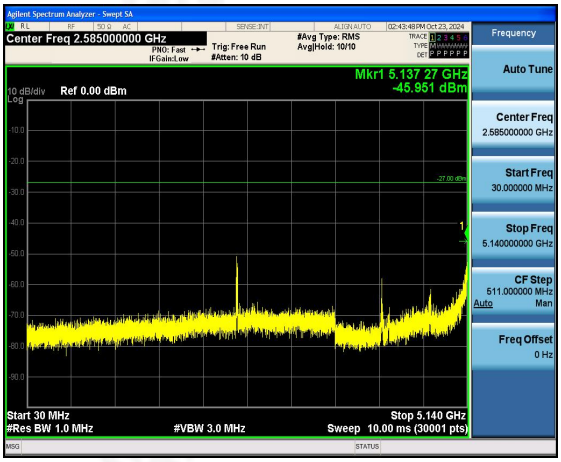


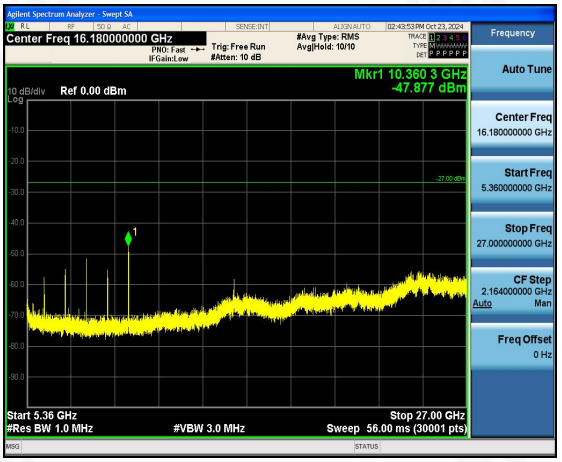
802.11a on channel 48



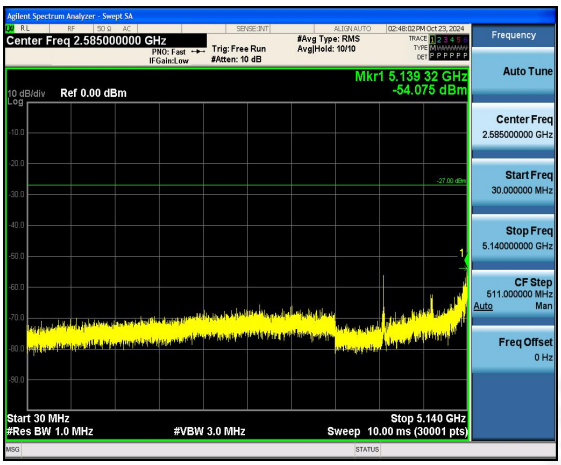
Test Plot

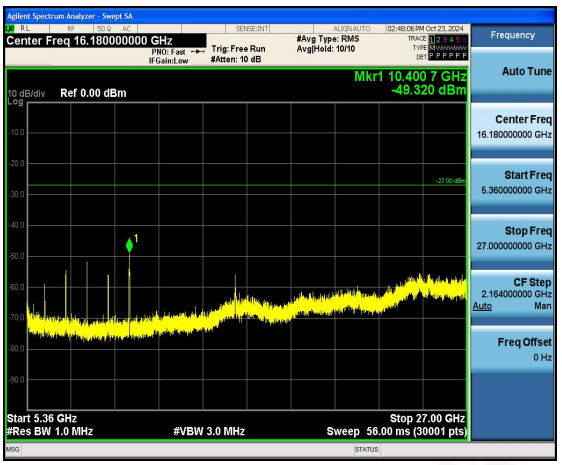
802.11n20 on channel 36



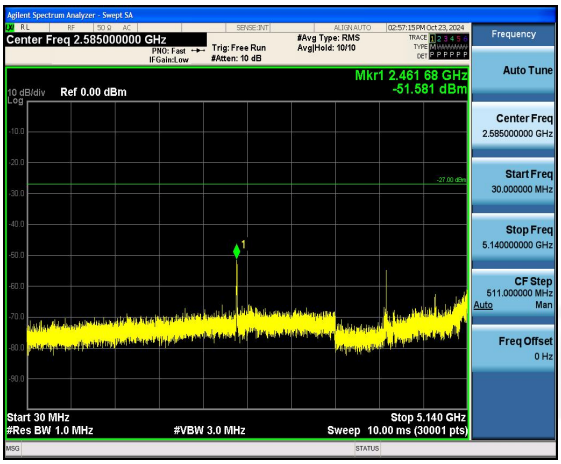


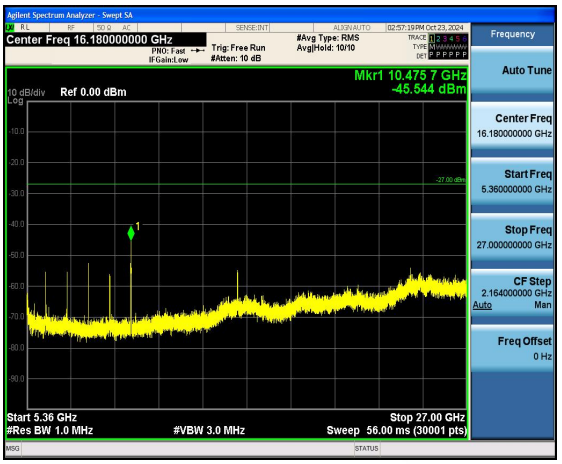
802.11n20 on channel 40





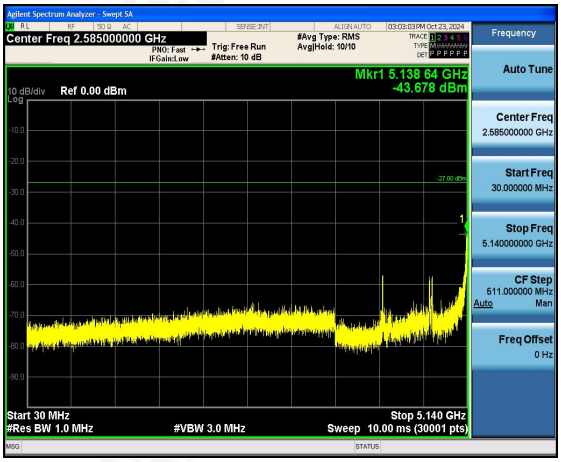
802.11n20 on channel 48

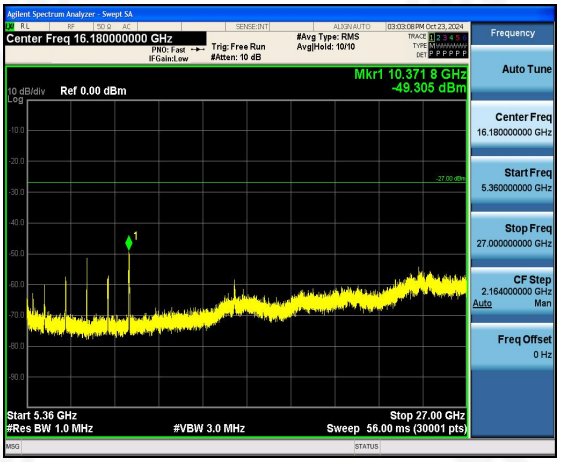




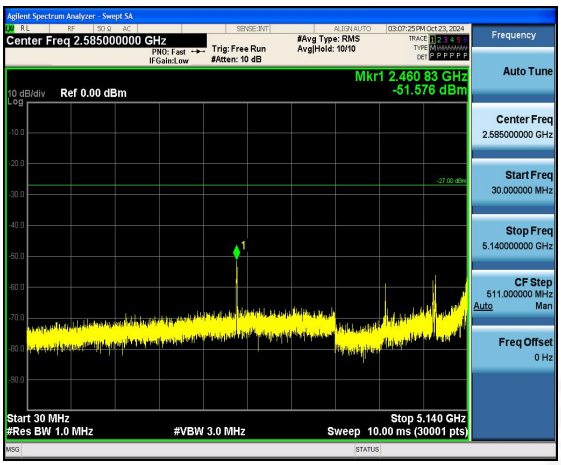
Test Plot

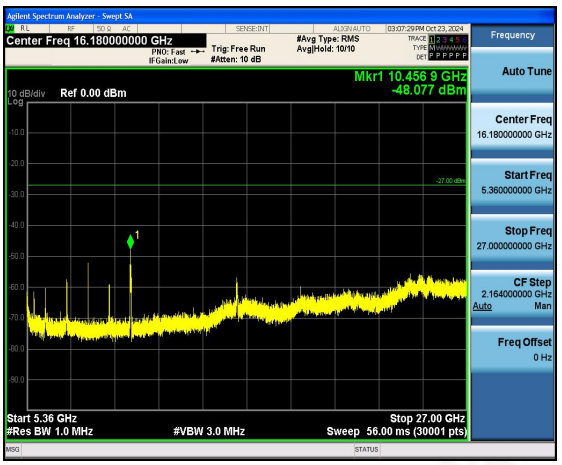
802.11n40 on channel 38





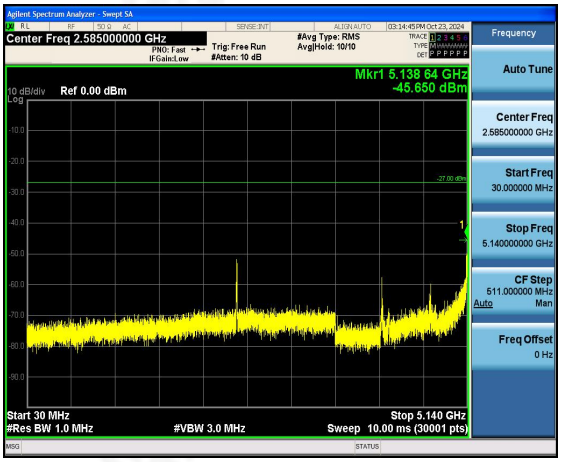
802.11n40 on channel 46

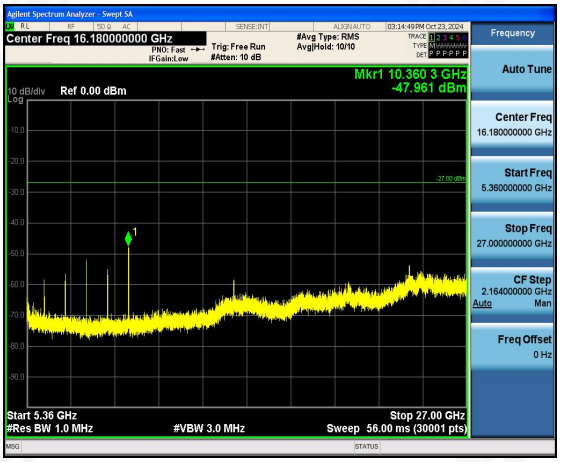




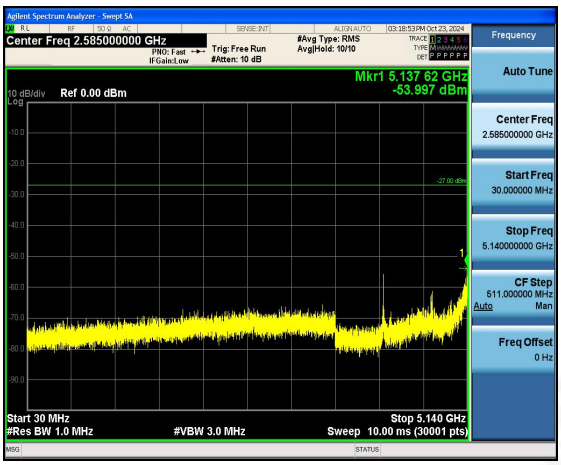
Test Plot

802.11ac20 on channel 36

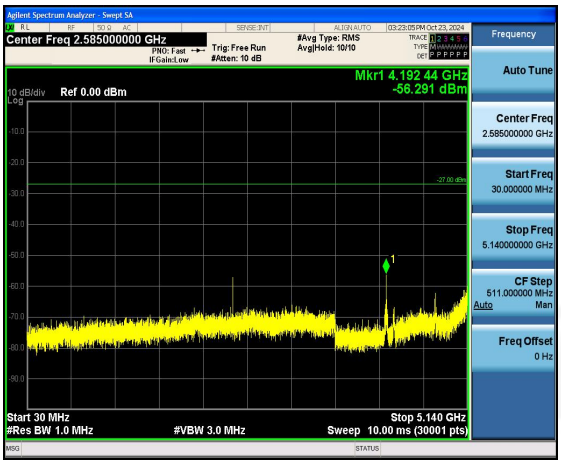


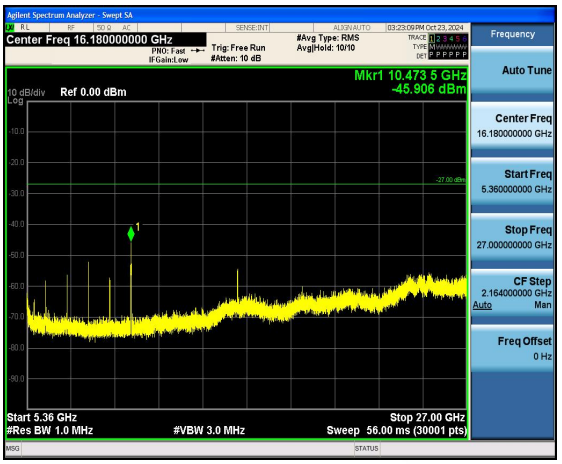


802.11ac20 on channel 40



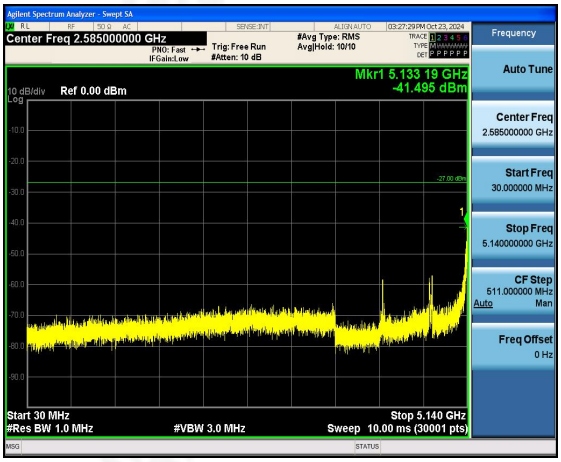
802.11ac20 on channel 48

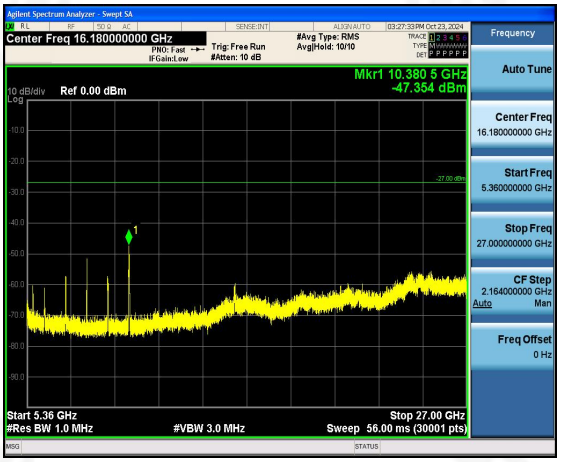




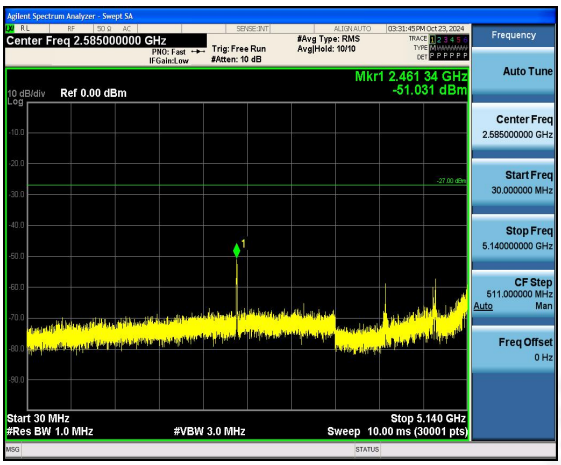
Test Plot

802.11ac40 on channel 38



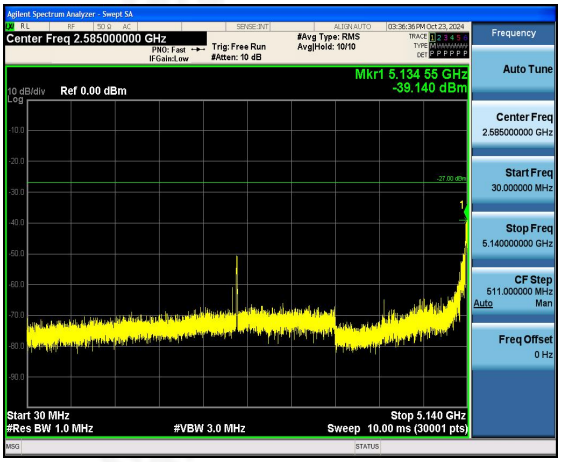


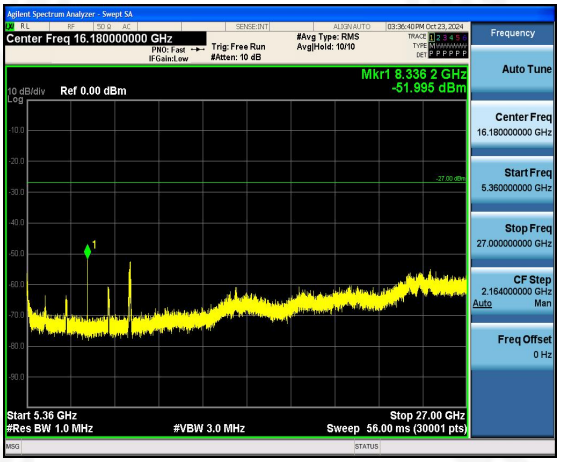
802.11ac40 on channel 46



Test Plot

802.11ac80 on channel 42





10.Frequency Stability Measurement

10.1 LIMIT

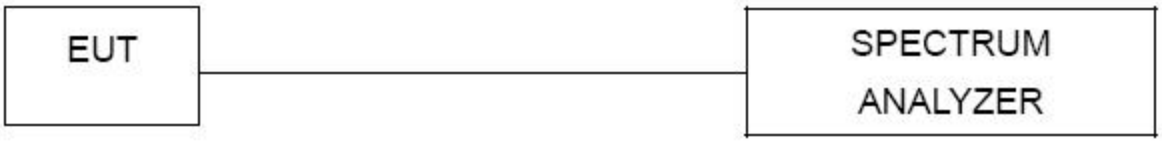
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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

10.2 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 (fc-f)/fc × 106 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.

10.3 TEST SETUP LAYOUT



10.4 EUT OPERATION DURING TEST

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

10.5 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	AC 120V/60Hz
Test Mode ：	TX		

802.11a

Reference Frequency(Middle Channel): 5200MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	0.06	11.538
40	120	0.04	7.692
30	120	0.05	9.615
20	120	0.06	11.538
10	120	0.05	9.615
0	120	0.07	13.462
-10	120	0.05	9.615
-20	120	0.04	7.692
-30	120	0.05	9.615

802.11n_HT20

Reference Frequency(Middle Channel): 5200MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	0.05	9.615
40	120	0.06	11.538
30	120	0.03	5.769
20	120	0.06	11.538
10	120	0.05	9.615
0	120	0.07	13.462
-10	120	0.06	11.538
-20	120	0.05	9.615
-30	120	0.04	7.692

802.11n_HT40

Reference Frequency(Middle Channel): 5190MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	0.06	11.561
40	120	0.05	9.634
30	120	0.05	9.634
20	120	0.07	13.487
10	120	0.05	9.634
0	120	0.06	11.561
-10	120	0.06	11.561
-20	120	0.06	11.561
-30	120	0.05	9.634

802.11 ac20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	0.05	9.615
40	120	0.06	11.538
30	120	0.07	13.462
20	120	0.06	11.538
10	120	0.05	9.615
0	120	0.05	9.615
-10	120	0.06	11.538
-20	120	0.06	11.538
-30	120	0.05	9.615

802.11ac40

Reference Frequency(Middle Channel): 5190MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	0.06	11.561
40	120	0.06	11.561
30	120	0.04	7.707
20	120	0.06	11.561
10	120	0.05	9.634
0	120	0.06	11.561
-10	120	0.05	9.634
-20	120	0.06	11.561
-30	120	0.05	9.634

802.11ac80

Reference Frequency(Middle Channel): 5210MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	0.06	11.516
40	120	0.07	13.436
30	120	0.05	9.597
20	120	0.06	11.516
10	120	0.06	11.516
0	120	0.05	9.597
-10	120	0.06	11.516
-20	120	0.04	7.678
-30	120	0.05	9.597

So, Frequency Stability Versus Input Voltage is:

802.11a

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	0.06	11.538
	120	0.05	9.615
	120	0.07	13.462

802.11n_HT20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	0.06	11.538
	120	0.07	13.462
	120	0.06	11.538

802.11n_HT40

Reference Frequency(Middle Channel): 5190 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	0.05	9.634
	120	0.05	9.634
	120	0.05	9.634

802.11ac20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	0.05	9.615
	120	0.07	13.462
	120	0.06	11.538

802.11ac40

Reference Frequency(Middle Channel): 5190 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	0.06	11.561
	120	0.05	9.634
	120	0.06	11.561

802.11ac80

Reference Frequency(Middle Channel): 5210 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	0.06	11.516
	120	0.07	13.436
	120	0.06	11.516

11.ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna:	
The antenna is FPCB Antenna, the best case gain of the antenna is 2.13dBi, reference to the appendix II for details	

12. TEST SETUP PHOTO

Reference to the appendix I for details.

13. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※