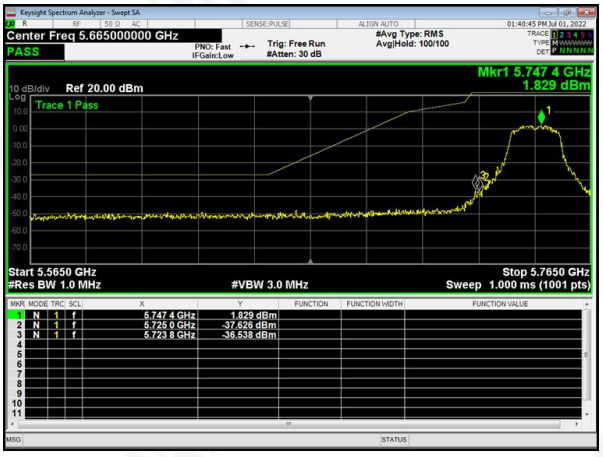
5.745~5.825 GHz

(802.11ac20) 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

Note:The test plot shows only the worst case ANT1.
Both of ANT 1&2 has been tested. The worst ANT1 has attenuated 3db below the limit. So the MIMO mode deemed to passed.

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.

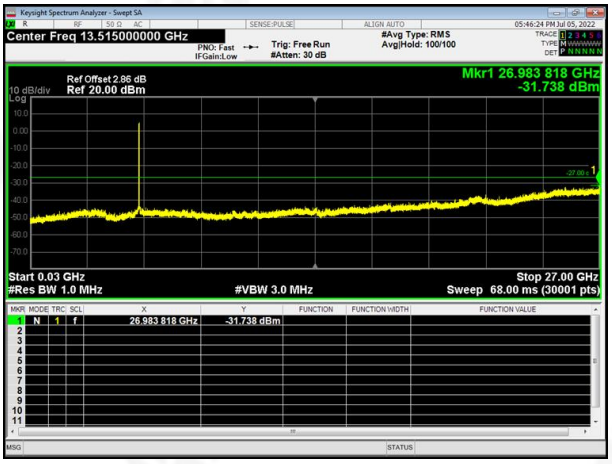
9.5 TEST RESULTS

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.

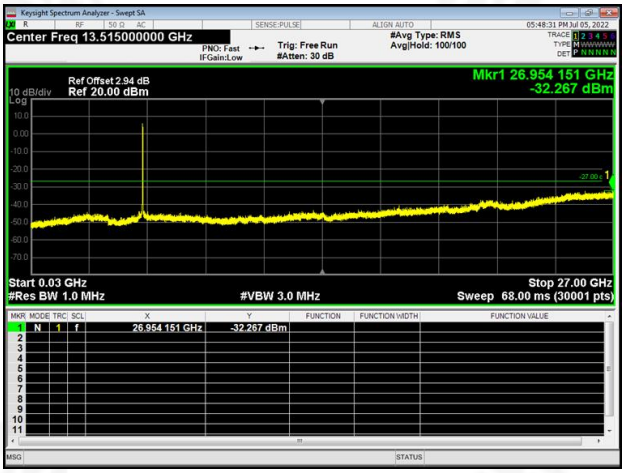
5.2G

Test Plot

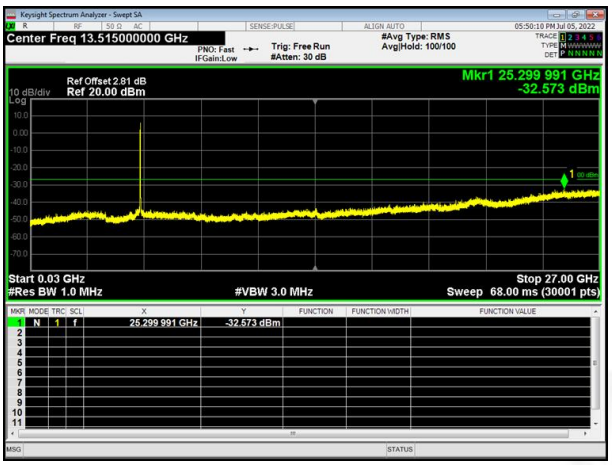
802.11a on channel 36



802.11n20 on channel 40

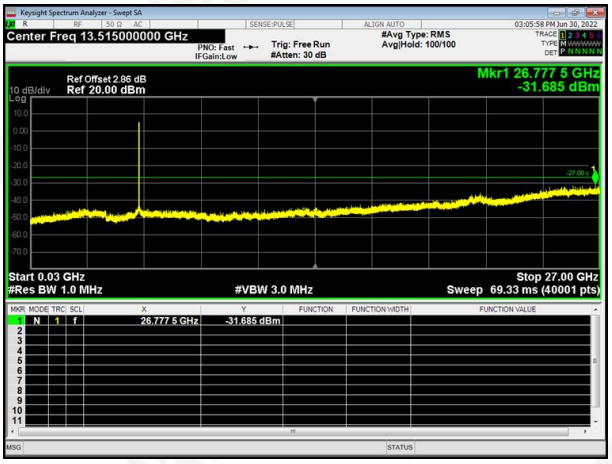


802.11a on channel 48

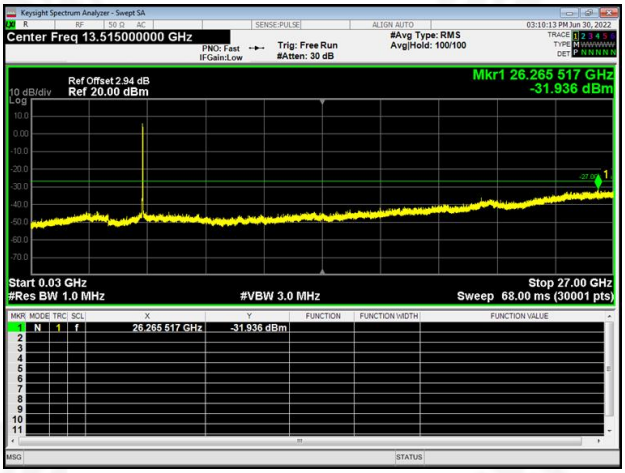


Test Plot

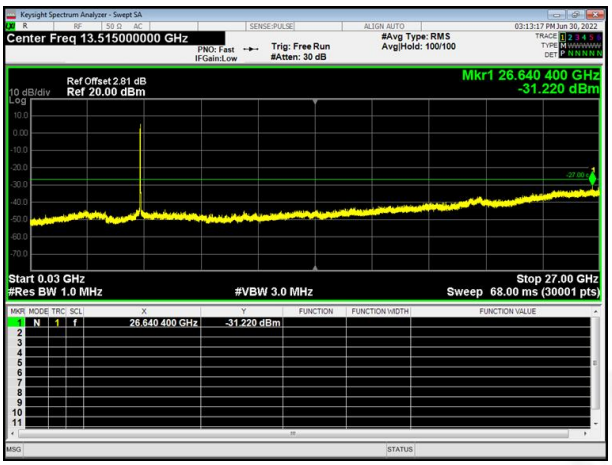
802.11n20 on channel 36



802.11n20 on channel 40

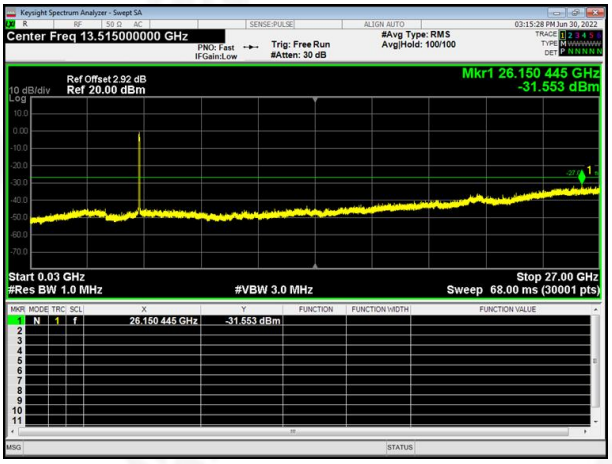


802.11n20 on channel 48

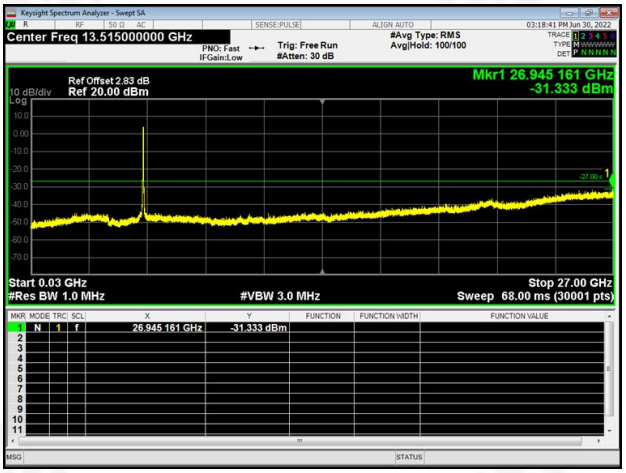


Test Plot

802.11n40 on channel 38

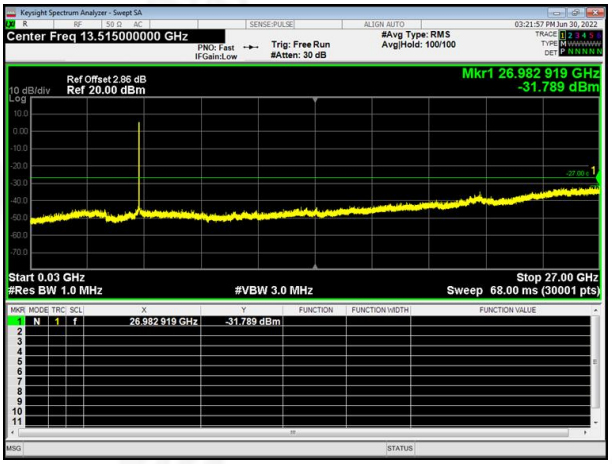


802.11n40 on channel 46

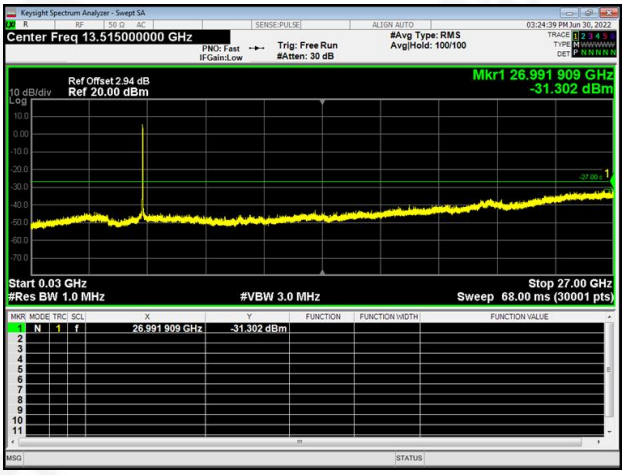


Test Plot

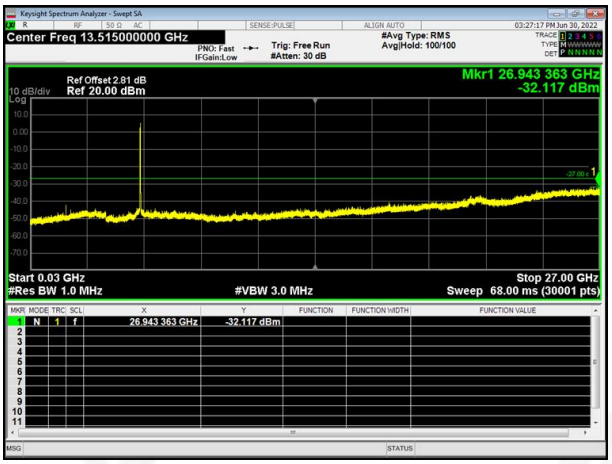
802.11ac20 on channel 36



802.11ac20 on channel 40

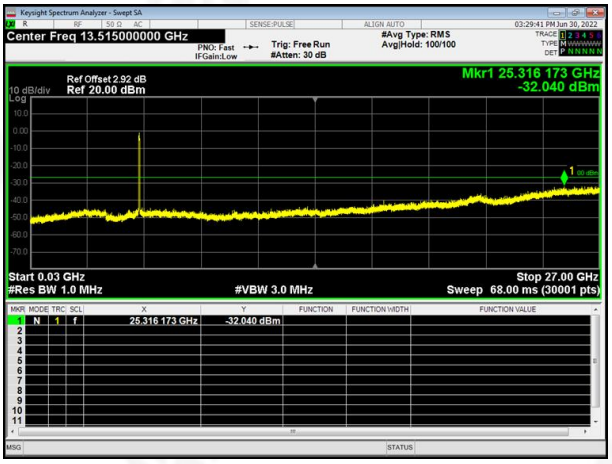


802.11ac20 on channel 48

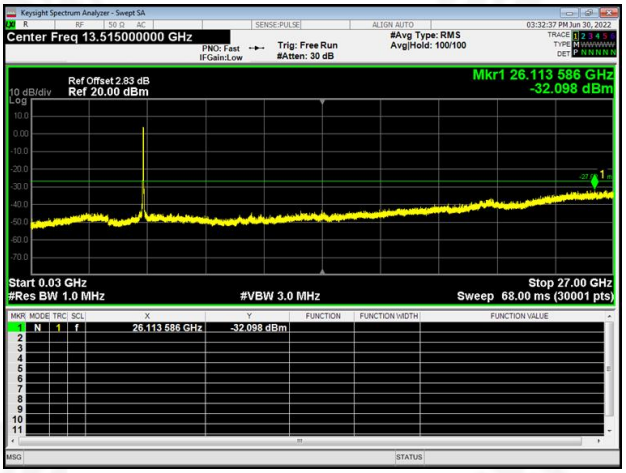


Test Plot

802.11ac40 on channel 38

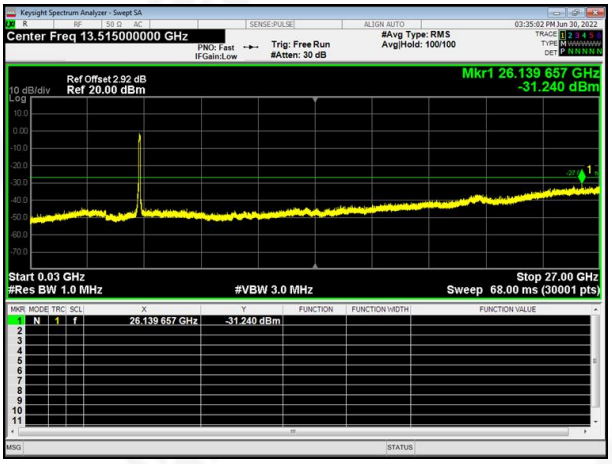


802.11ac40 on channel 46



Test Plot

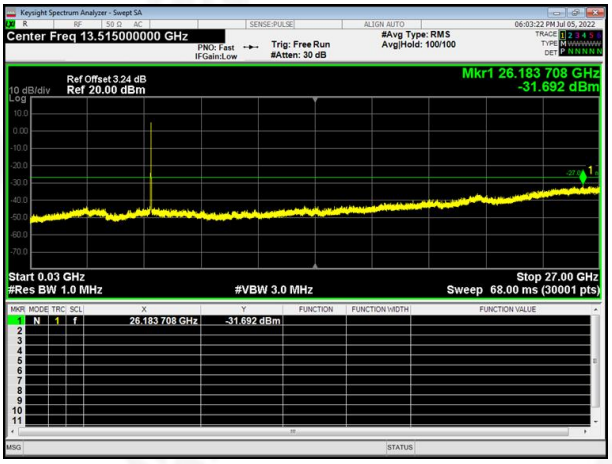
802.11ac80 on channel 42



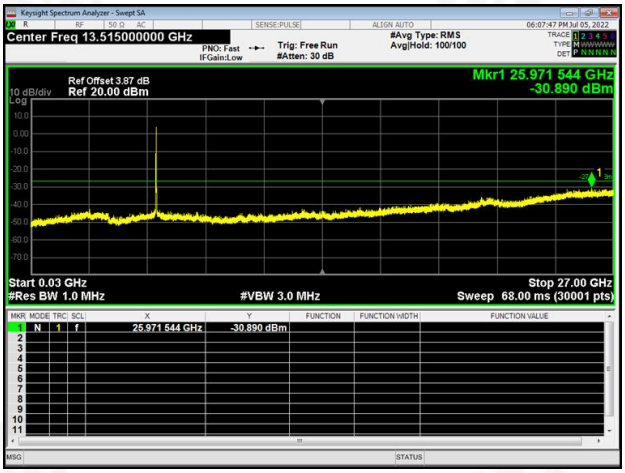
5.8G

Test Plot

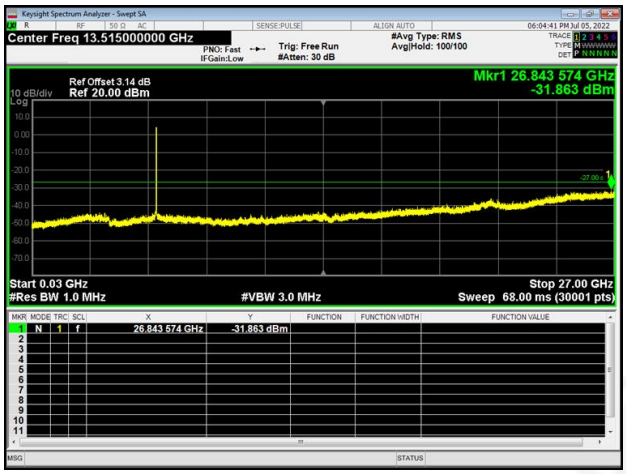
802.11a on channel 149



802.11a on channel 165

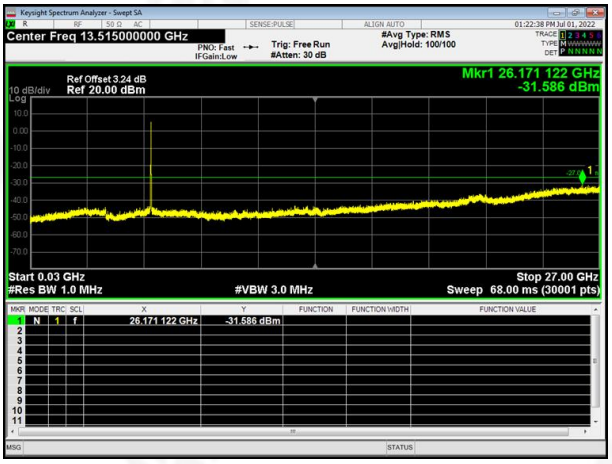


802.11a on channel 157

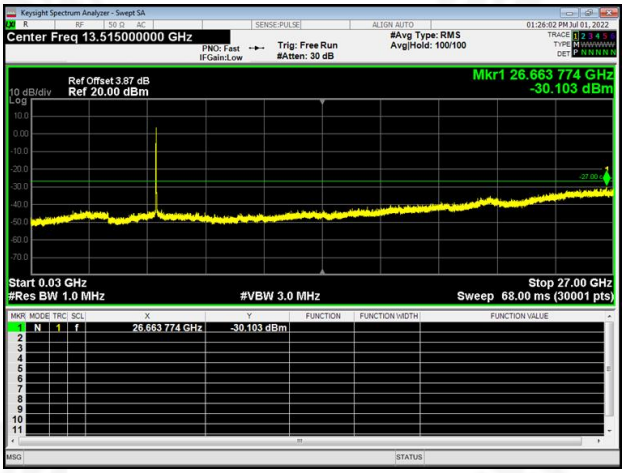


Test Plot

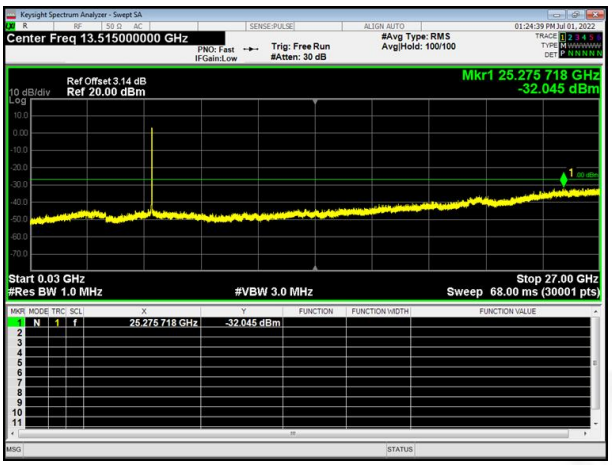
802.11n20 on channel 149



802.11n20 on channel 165

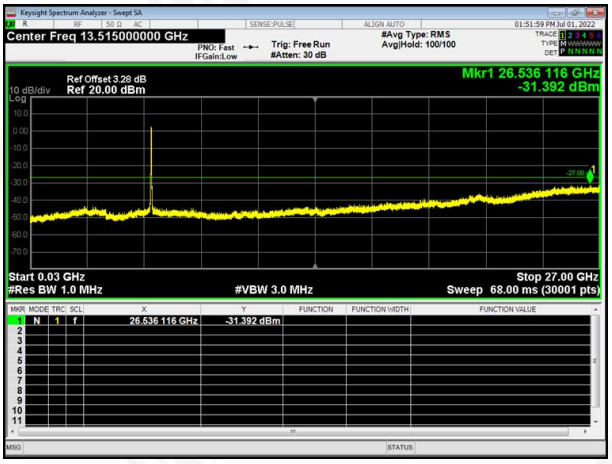


802.11n20 on channel 157

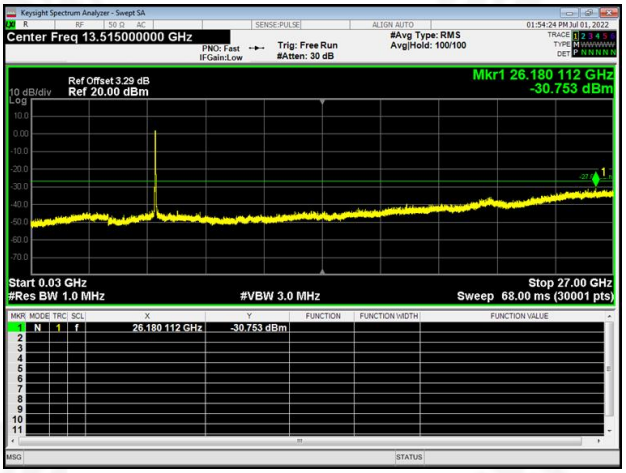


Test Plot

802.11n40 on channel 151

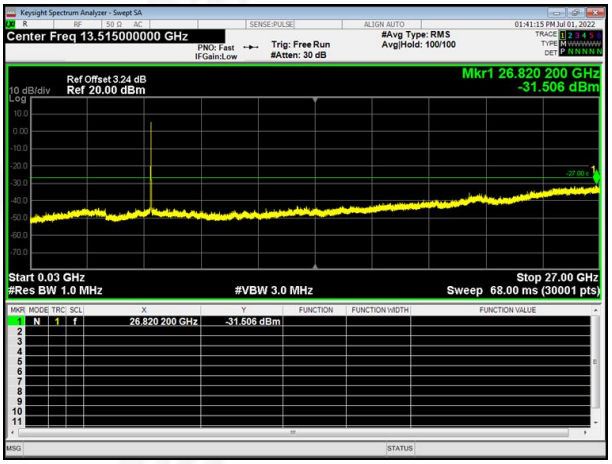


802.11n40 on channel 159

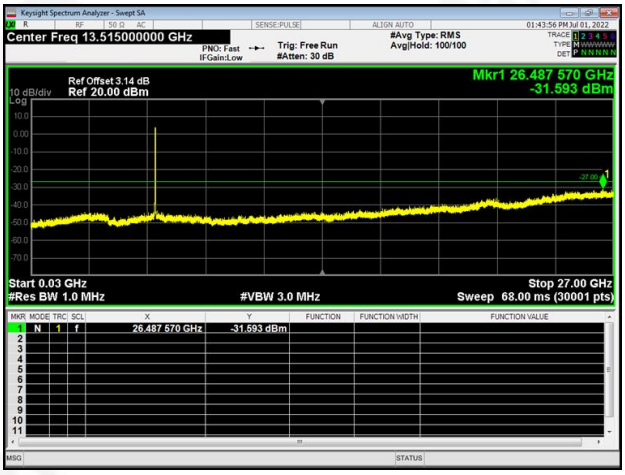


Test Plot

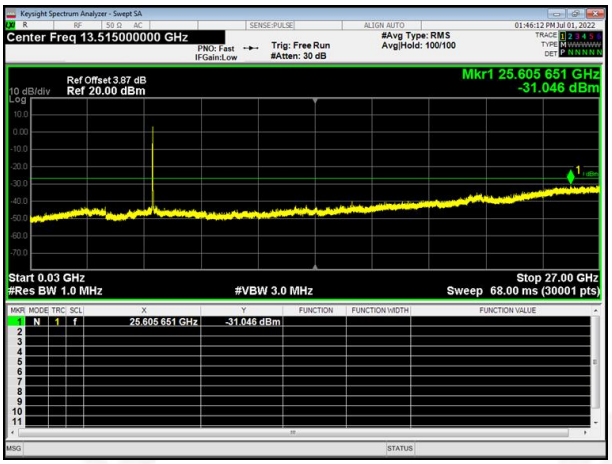
802.11ac20 on channel 149



802.11ac20 on channel 165

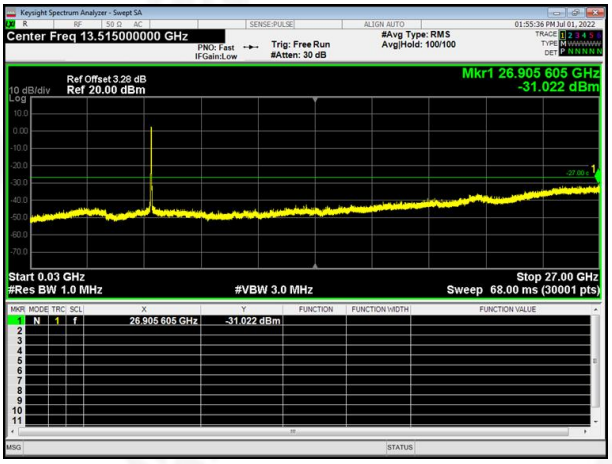


802.11ac20 on channel 157

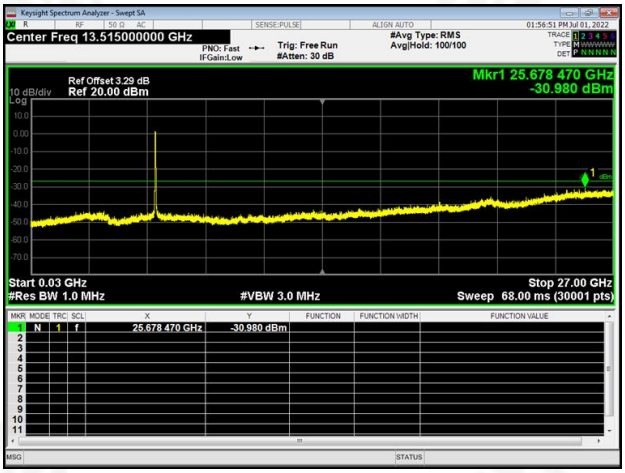


Test Plot

802.11ac40 on channel 151

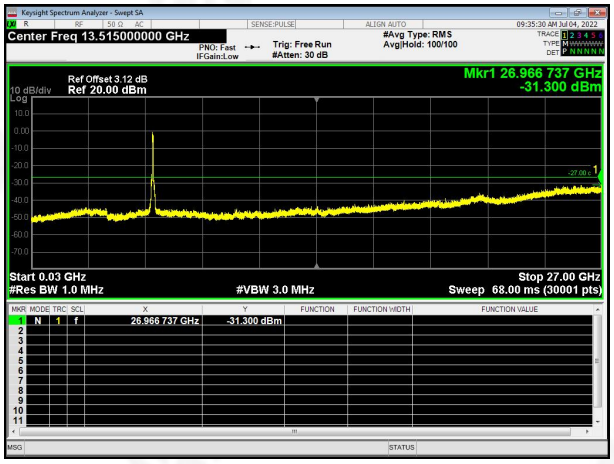


802.11ac40 on channel 159



Test Plot

802.11ac80 on channel 155



Note:
The test plot shows only the worst case ANT1.

10.Frequency Stability Measurement

10.1 LIMIT

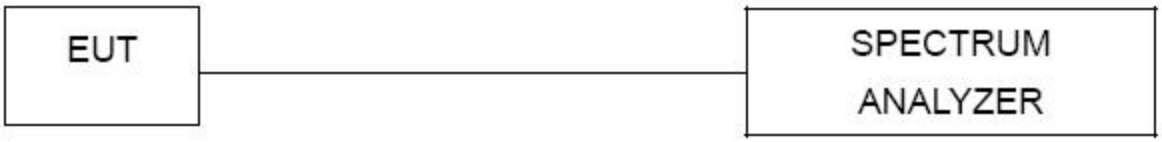
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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		

5.2G
802.11a

Reference Frequency(Middle Channel): 5200MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	56	0.00962
40	120	45	0.00730
30	120	35	0.00583
20	120	27	0.00426
10	120	23	0.00390
0	120	14	0.00243
-10	120	16	0.00235
-20	120	23	0.00375
-30	120	37	0.00590

802.11n_HT20

Reference Frequency(Middle Channel): 5200MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	55	0.00951
40	120	42	0.00726
30	120	32	0.00553
20	120	24	0.00415
10	120	22	0.00380
0	120	12	0.00207
-10	120	13	0.00225
-20	120	21	0.00363
-30	120	32	0.00553

802.11n_HT40

Reference Frequency(Middle Channel): 5190MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	61	0.01053
40	120	54	0.00932
30	120	42	0.00725
20	120	44	0.00759
10	120	34	0.00587
0	120	32	0.00552
-10	120	34	0.00587
-20	120	42	0.00725
-30	120	51	0.00880

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	63	0.01089
40	120	51	0.00882
30	120	43	0.00743
20	120	32	0.00553
10	120	23	0.00398
0	120	26	0.00449
-10	120	22	0.00380
-20	120	36	0.00622
-30	120	43	0.00743

802.11ac40

Reference Frequency(Middle Channel): 5190MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	61	0.01053
40	120	52	0.00900
30	120	43	0.00745
20	120	44	0.00759
10	120	34	0.00587
0	120	22	0.00380
-10	120	36	0.00622
-20	120	43	0.00743
-30	120	51	0.00880

802.11ac80

Reference Frequency(Middle Channel): 5210MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	63	0.01091
40	120	52	0.00900
30	120	43	0.00745
20	120	41	0.00710
10	120	36	0.00623
0	120	32	0.00554
-10	120	34	0.00589
-20	120	43	0.00745
-30	120	52	0.00900

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	56	0.00962
	120	45	0.00730
	120	37	0.00590

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	55	0.00951
	120	42	0.00726
	120	32	0.00553

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	42	0.00725
	120	44	0.00759
	120	42	0.00725

802.11ac20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	34	0.00588
	120	32	0.00553
	120	33	0.00570

802.11ac40

Reference Frequency(Middle Channel): 5190 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	42	0.00725
	120	32	0.00553
	120	42	0.00725

802.11ac80

Reference Frequency(Middle Channel): 5210 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	33	0.00570
	120	44	0.00762
	120	42	0.00727

5.8G

802.11a

Reference Frequency(Middle Channel): 5785MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	45	0.00757
40	120	26	0.00432
30	120	37	0.00575
20	120	22	0.00433
10	120	15	0.00256
0	120	14	0.00225
-10	120	16	0.00236
-20	120	24	0.00371
-30	120	37	0.00568

802.11n_HT20

Reference Frequency(Middle Channel): 5785MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	42	0.00726
40	120	24	0.00415
30	120	32	0.00553
20	120	24	0.00415
10	120	13	0.00225
0	120	12	0.00207
-10	120	13	0.00225
-20	120	21	0.00363
-30	120	32	0.00553

802.11n_HT40

Reference Frequency(Middle Channel): 5795MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	61	0.01053
40	120	54	0.00932
30	120	42	0.00725
20	120	44	0.00759
10	120	34	0.00587
0	120	32	0.00552
-10	120	34	0.00587
-20	120	42	0.00725
-30	120	51	0.00880

802.11ac20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	43	0.00743
40	120	51	0.00882
30	120	23	0.00398
20	120	26	0.00449
10	120	23	0.00398
0	120	26	0.00449
-10	120	22	0.00380
-20	120	36	0.00622
-30	120	26	0.00449

802.11ac40

Reference Frequency(Middle Channel): 5795MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	61	0.01053
40	120	24	0.00415
30	120	32	0.00553
20	120	24	0.00415
10	120	34	0.00587
0	120	32	0.00552
-10	120	34	0.00587
-20	120	34	0.00589
-30	120	32	0.00554

802.11ac80

Reference Frequency(Middle Channel): 5775MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF	Error (ppm)
50	120	52	0.00900
40	120	41	0.00710
30	120	43	0.00745
20	120	41	0.00710
10	120	36	0.00623
0	120	32	0.00554
-10	120	34	0.00589
-20	120	32	0.00554
-30	120	52	0.00900

So, Frequency Stability Versus Input Voltage is:

802.11a

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	37	0.00575
	120	24	0.00415
	120	32	0.00553

802.11n_HT20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	33	0.00570
	120	21	0.00363
	120	43	0.00743

802.11n_HT40

Reference Frequency(Middle Channel): 5795 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	42	0.00725
	120	44	0.00759
	120	43	0.00743

802.11ac20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	55	0.00951
	120	32	0.00553
	120	33	0.00570

802.11ac40

Reference Frequency(Middle Channel): 5795 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	32	0.00553
	120	33	0.00570
	120	43	0.00743

802.11ac80

Reference Frequency(Middle Channel): 5775 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency	Error (ppm)
20	120	43	0.00743
	120	44	0.00762
	120	42	0.00727

Note:
The test plot shows only the worst case ANT1.

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 External Antenna, the best case gain of the antenna is 0dBi, 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.

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