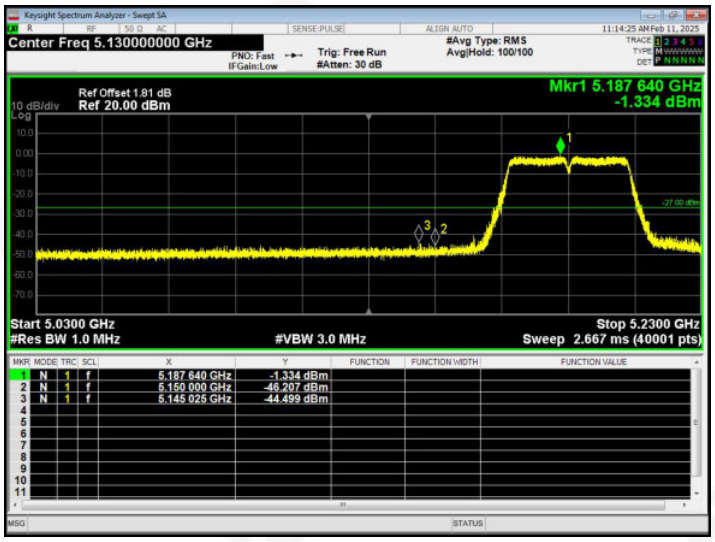
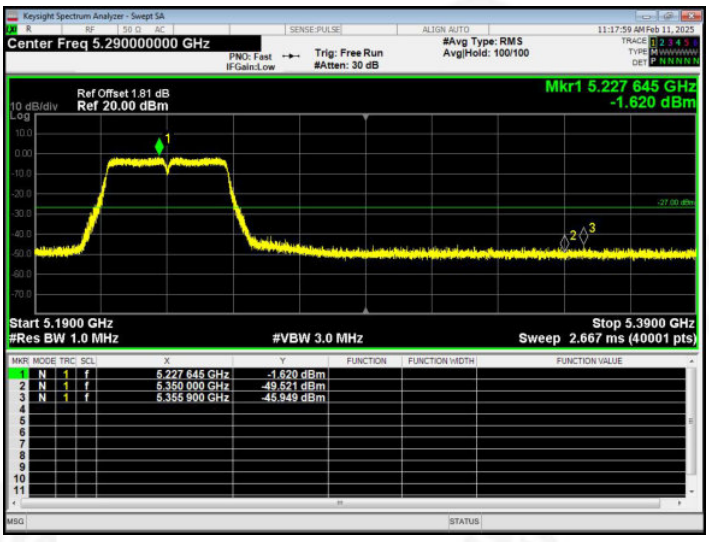
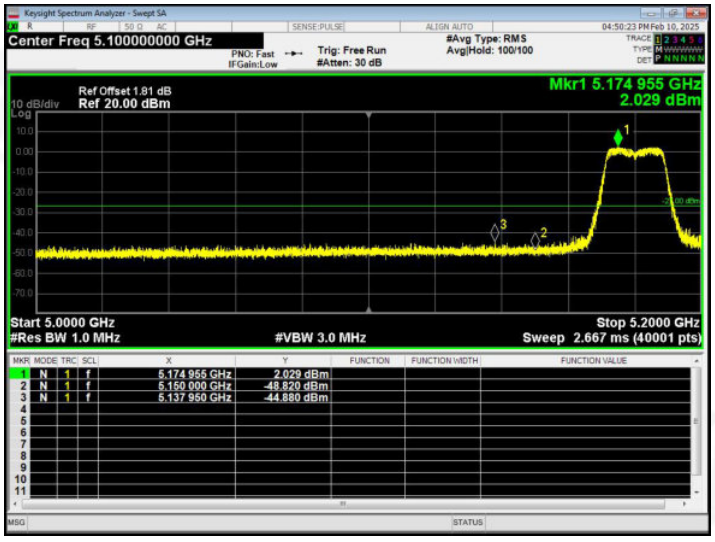
(802.11n40) Band Edge, Left Side



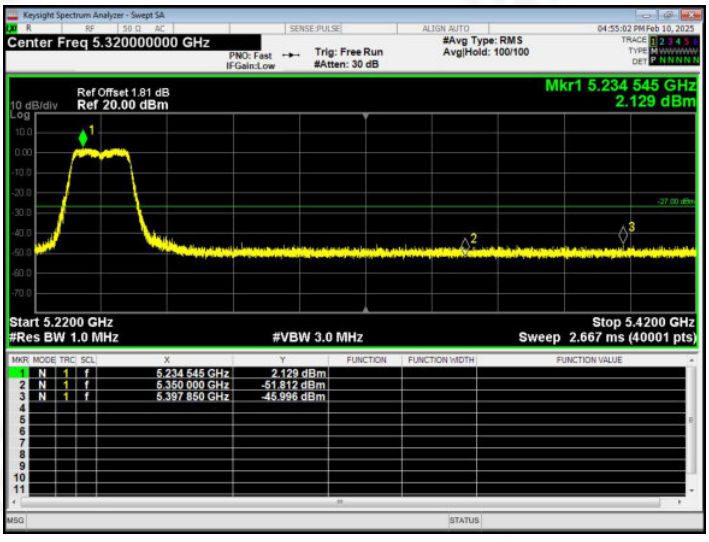
(802.11n40) Band Edge, Right Side



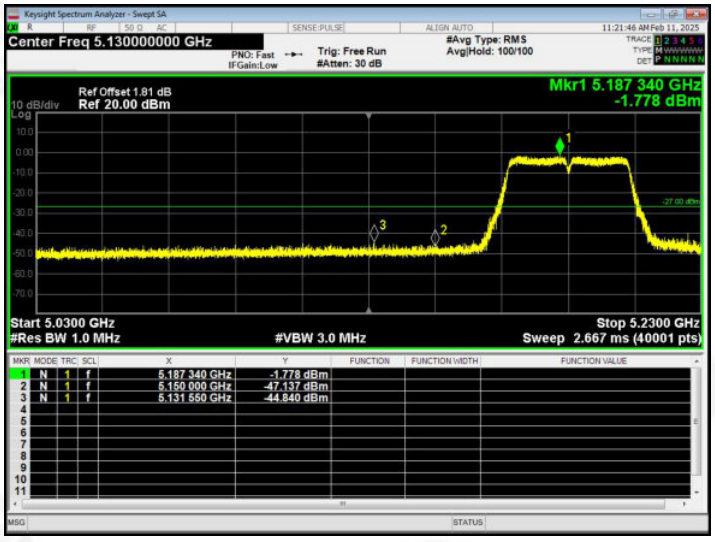
(802.11ac20) Band Edge, Left Side



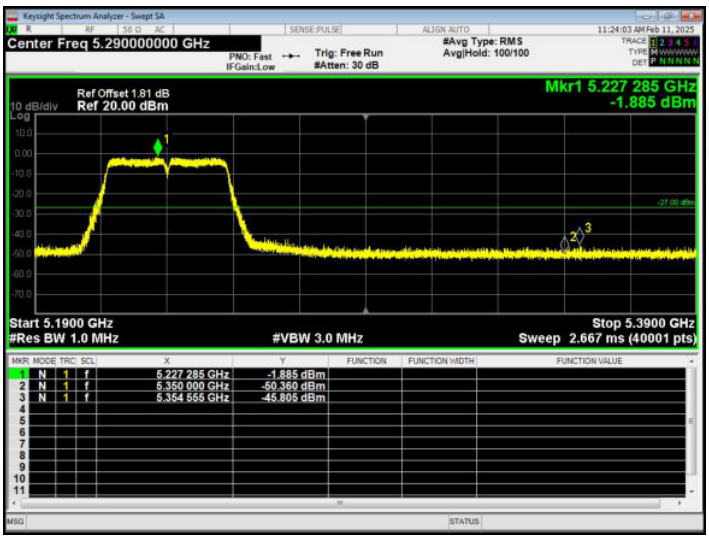
(802.11ac20) Band Edge, Right Side



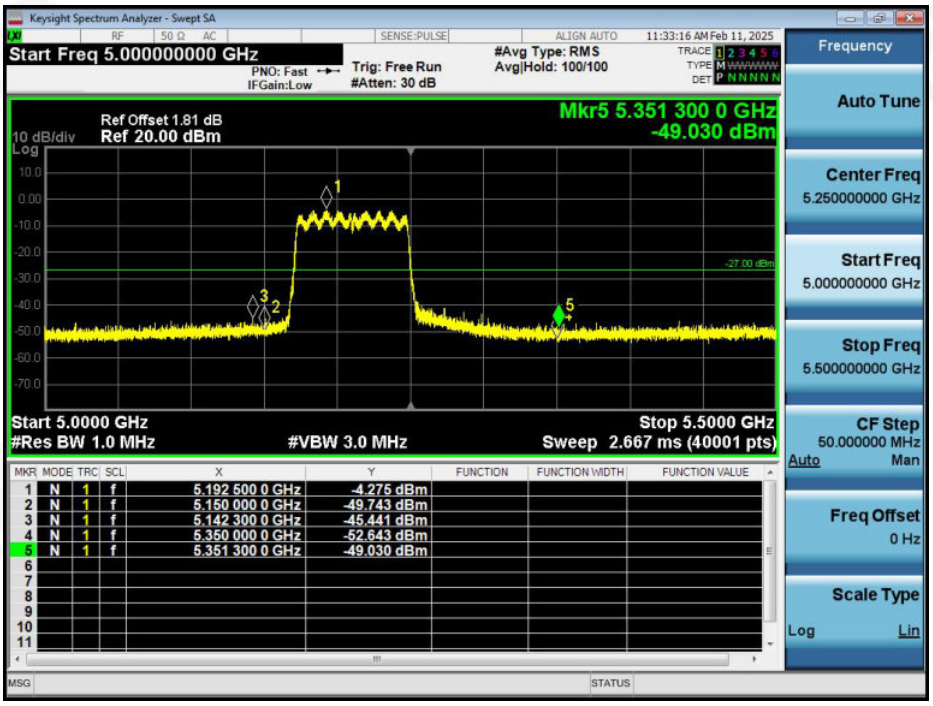
(802.11ac40) Band Edge, Left Side



(802.11ac40) Band Edge, Right Side



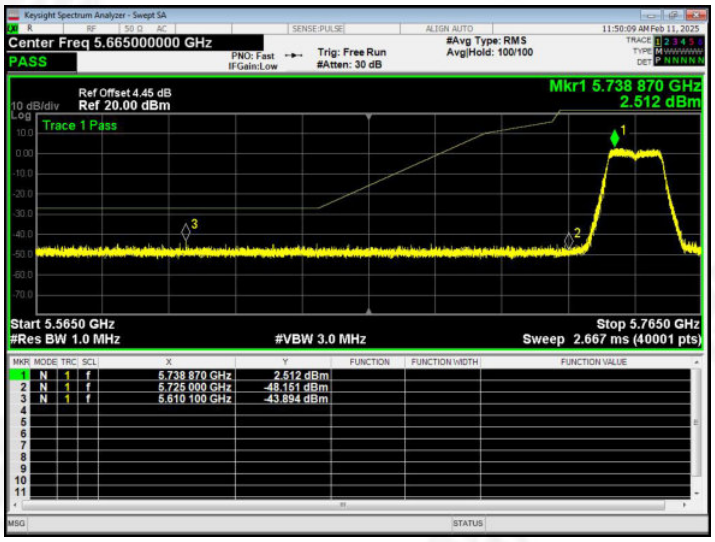
(802.11ac80) Band Edge - Channel 42



Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage：	DC 9V
Test band：	5.8G	Antenna gain：	4.45dBi

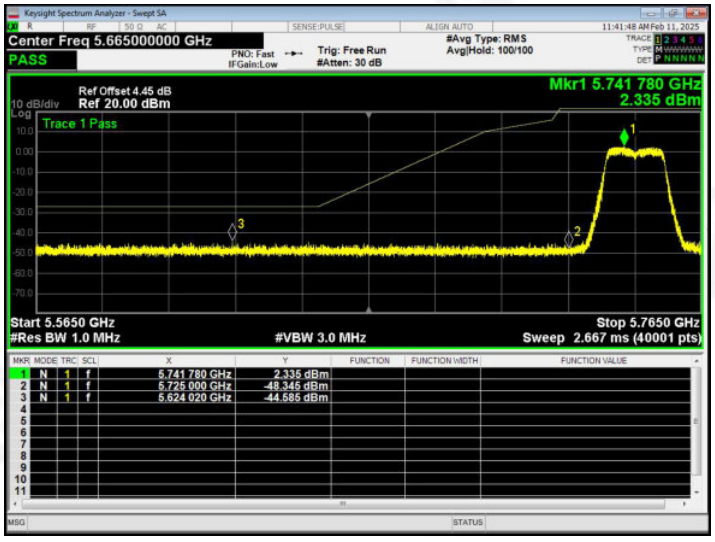
5.745~5.825 GHz

(802.11a) Band Edge, Left Side

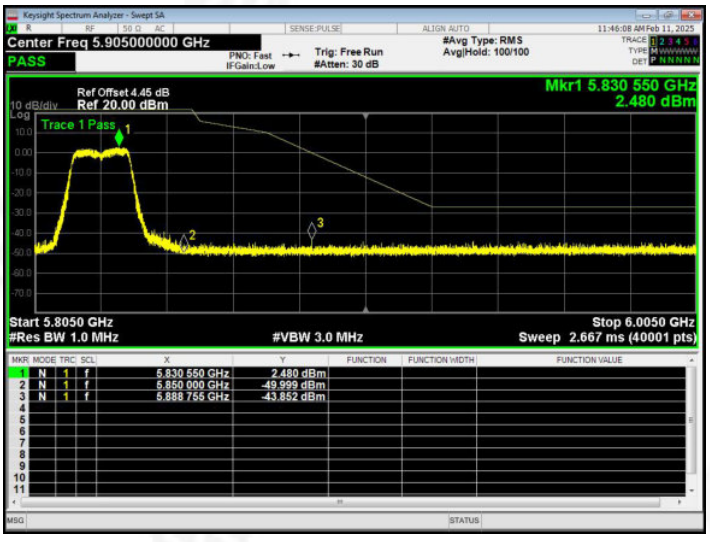


(802.11a) Band Edge, Right Side

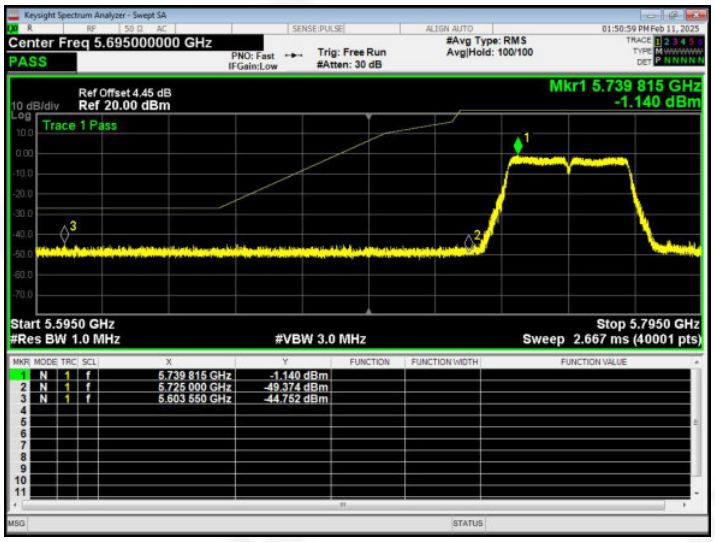
(802.11n20) Band Edge, Left Side



(802.11n20) Band Edge, Right Side

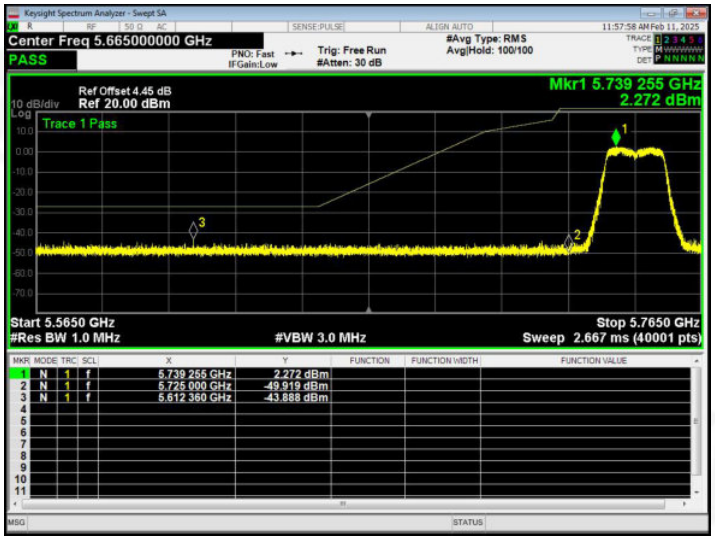


(802.11n40) Band Edge, Left Side

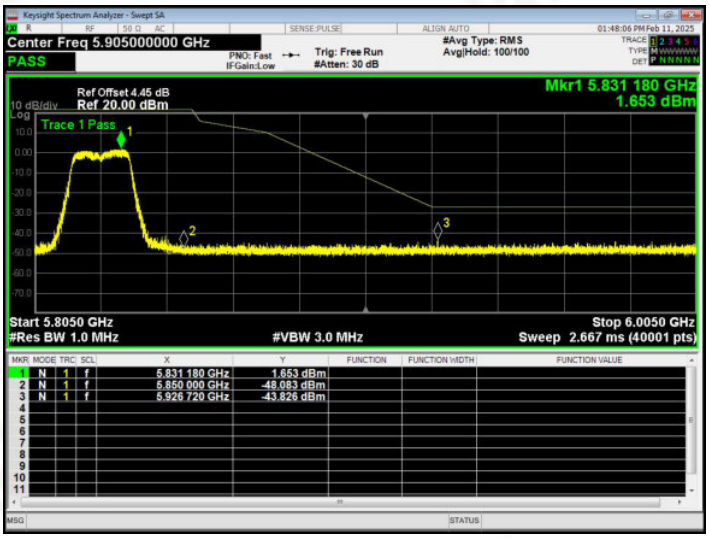


(802.11n40) Band Edge, Right Side

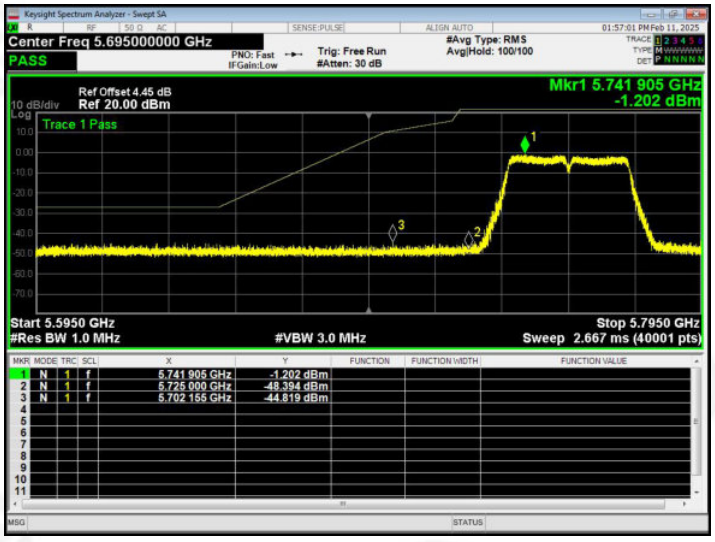
(802.11ac20) Band Edge, Left Side



(802.11ac20) Band Edge, Right Side

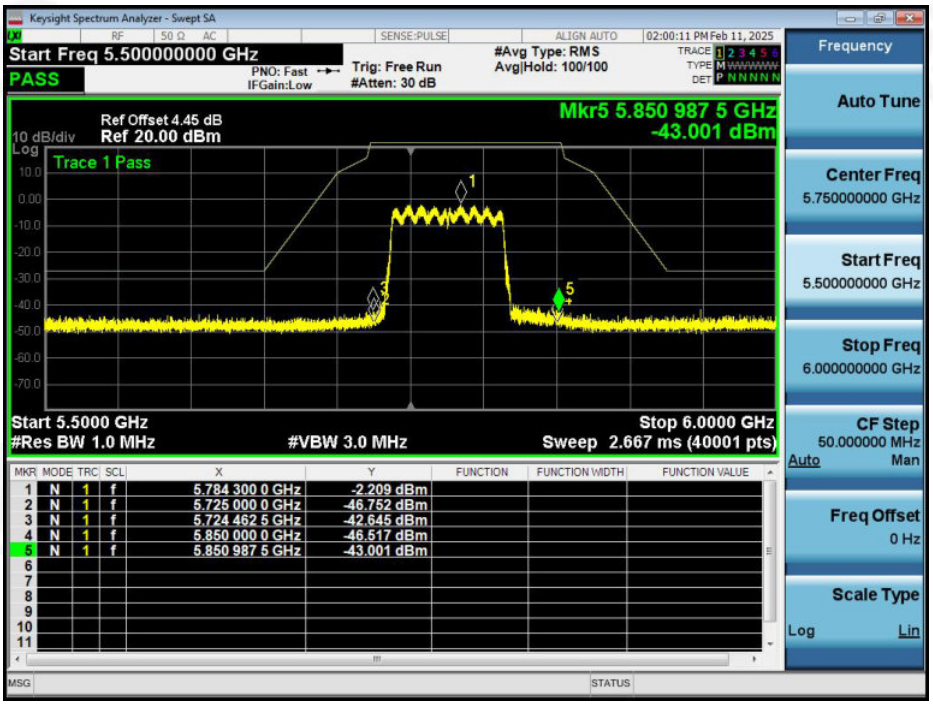


(802.11ac40) Band Edge, Left Side



(802.11ac40) Band Edge, Right Side

(802.11ac80) Band Edge - Channel 155



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

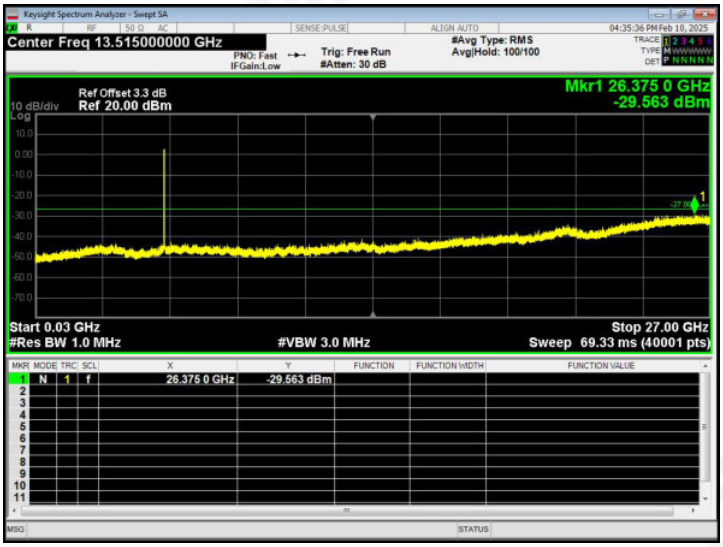
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting 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

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage：	DC 9V
Test band：	5.2G & 5.8G		
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.			

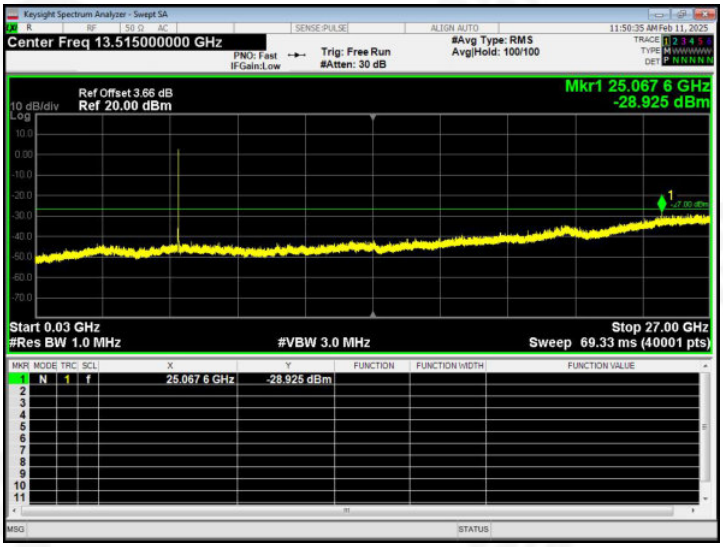
5.2G - 802.11a

CH36

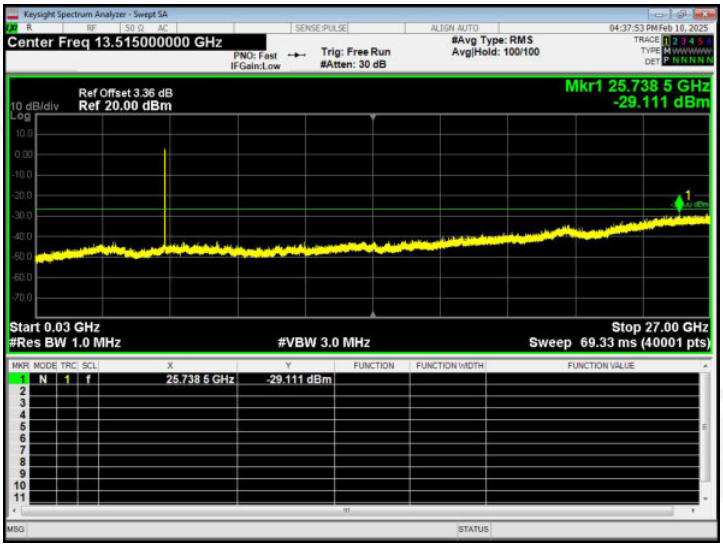


5.8G - 802.11a

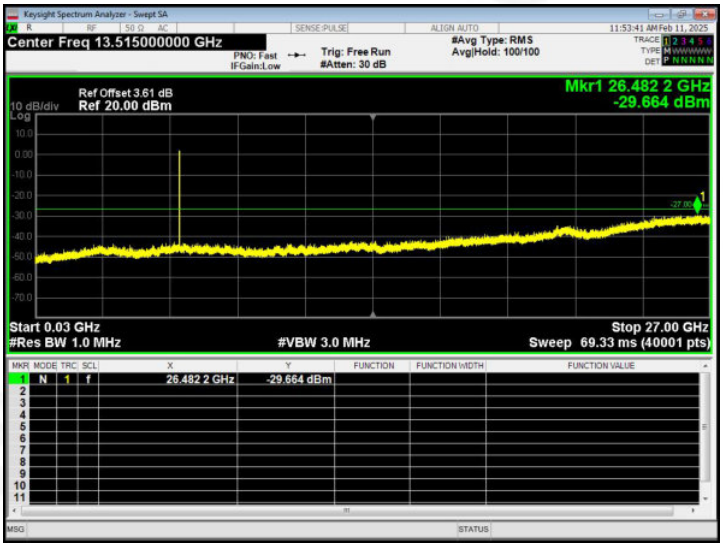
CH149



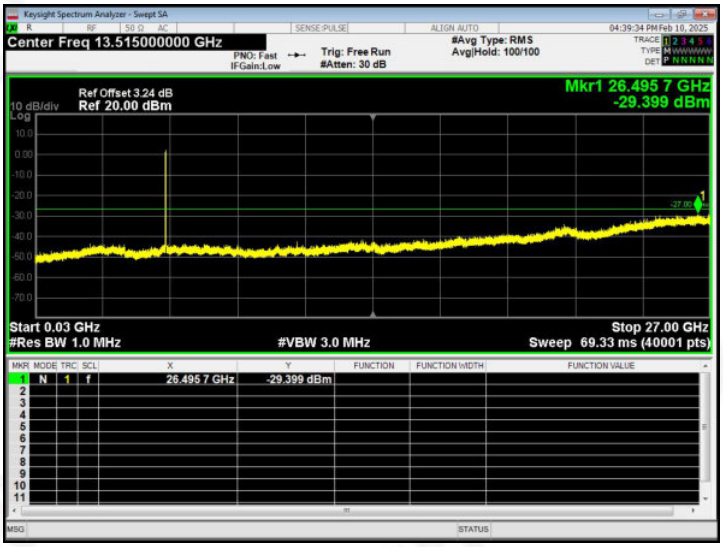
CH40



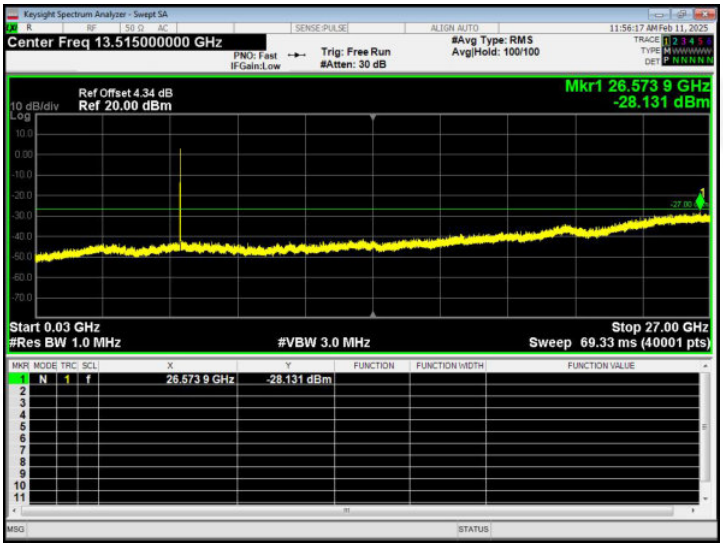
CH157



CH48

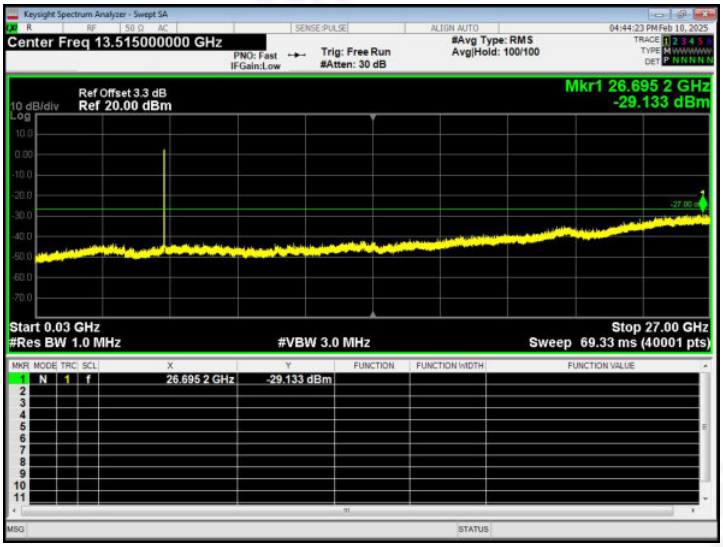


CH165

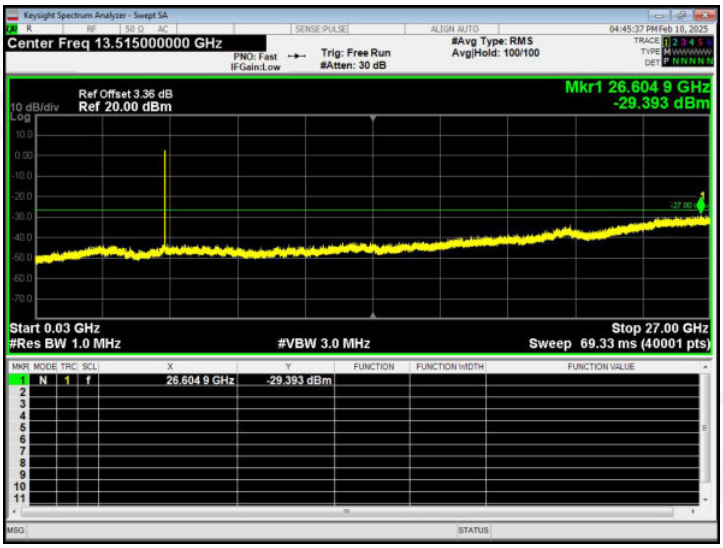


5.2G - 802.11n20

CH36



CH40



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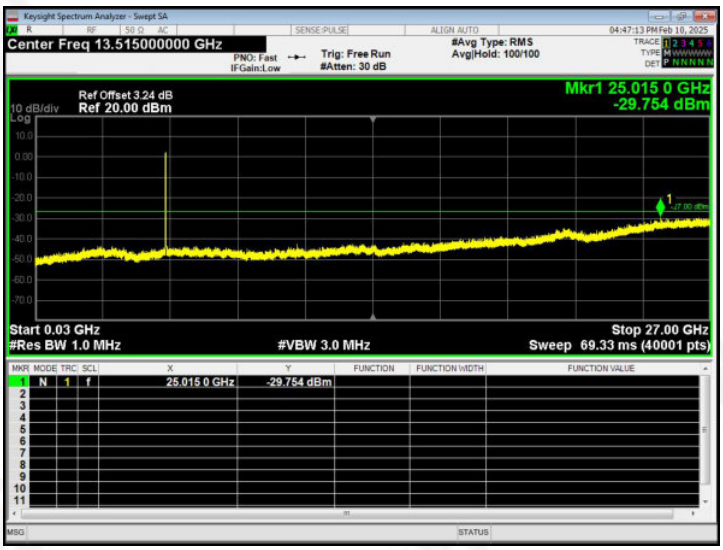
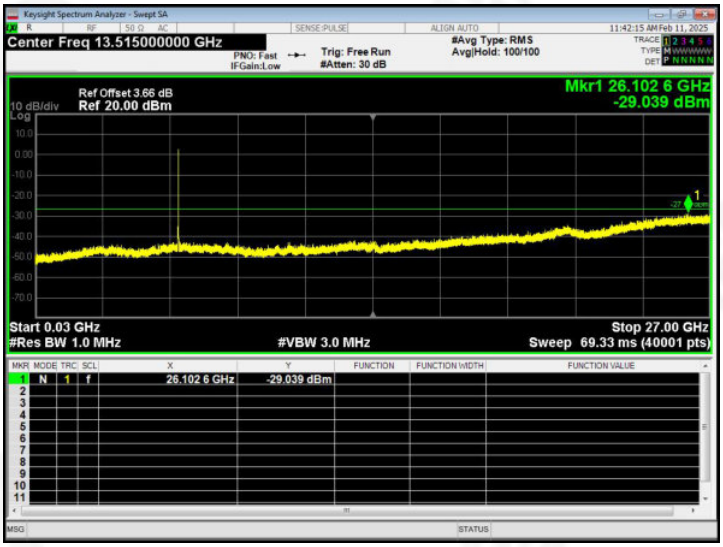
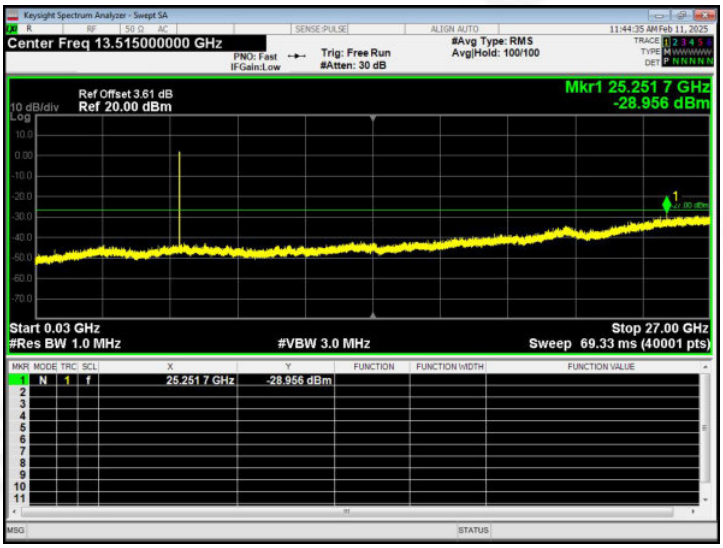


5.8G - 802.11n20

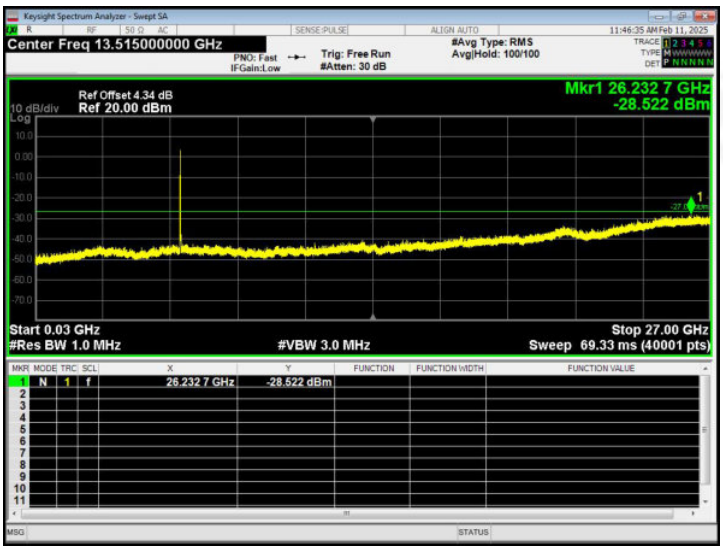
CH149



CH157

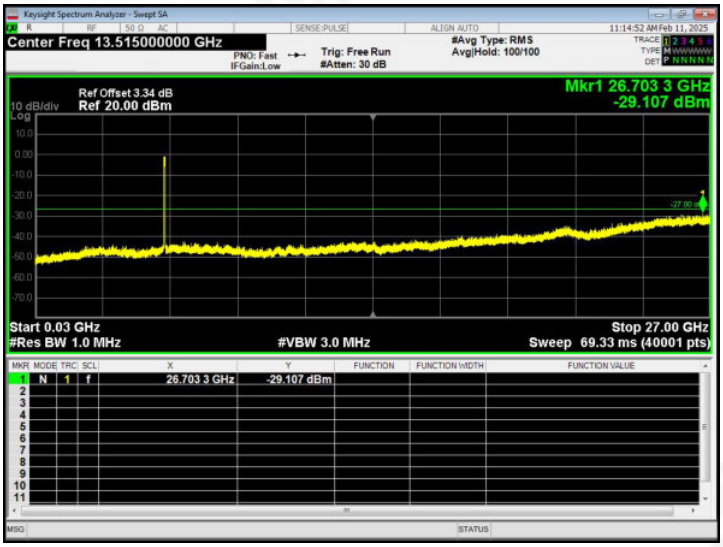


CH165



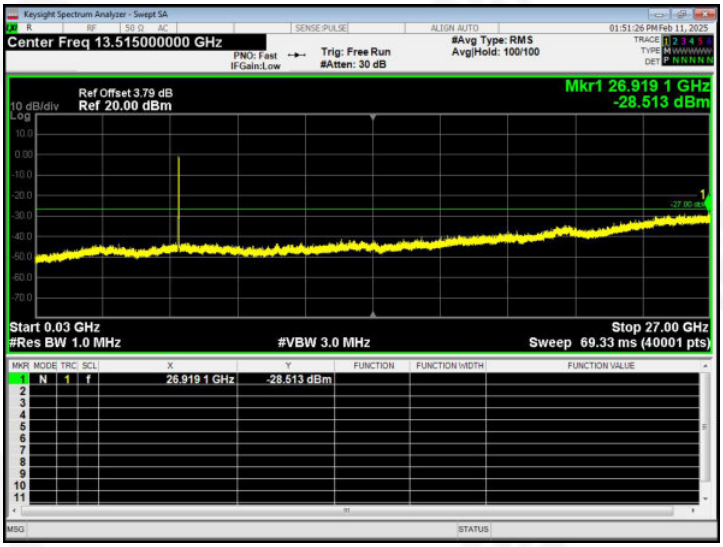
5.2G - 802.11n40

CH38

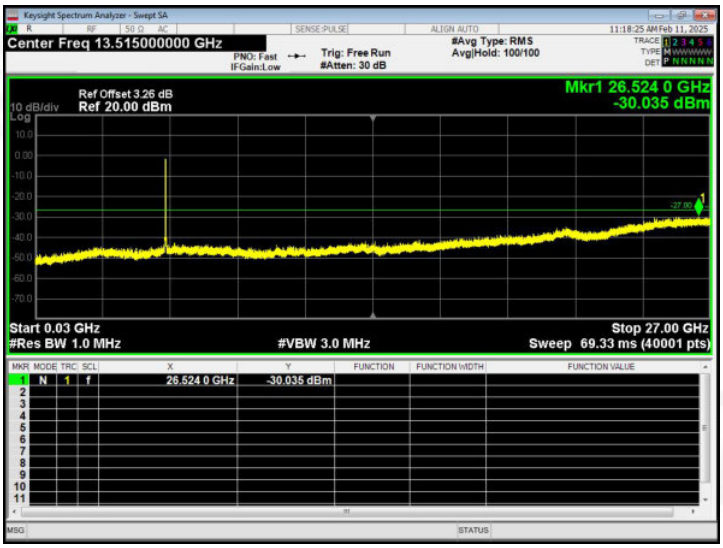


5.8G - 802.11n40

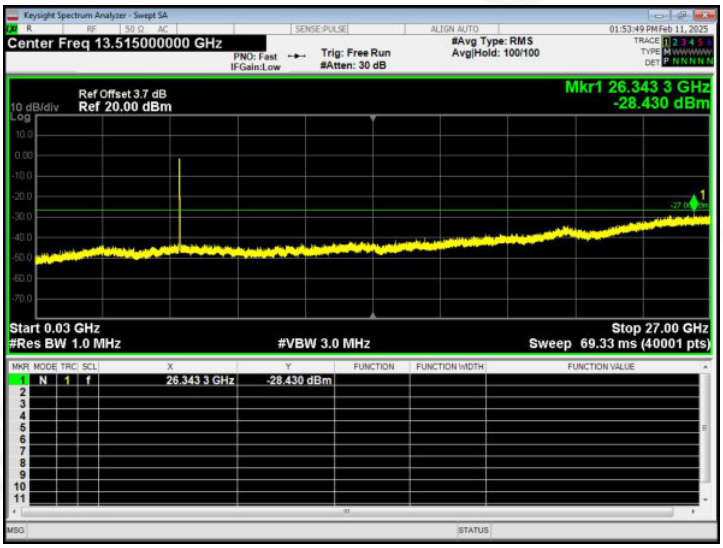
CH151



CH46

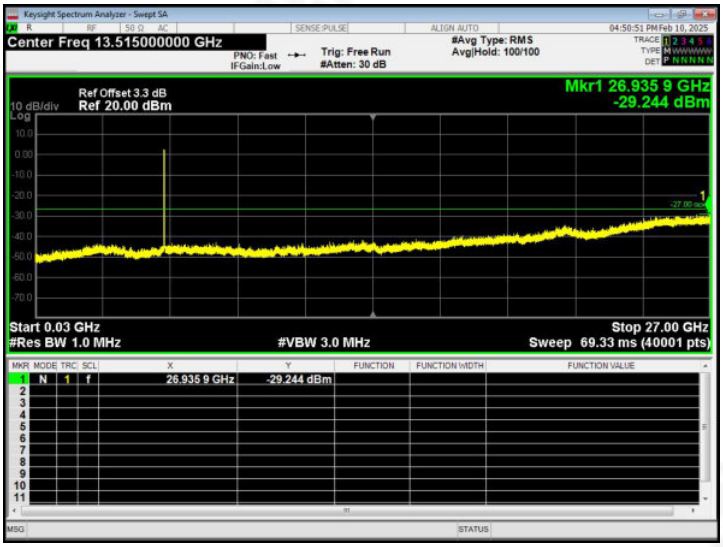


CH159

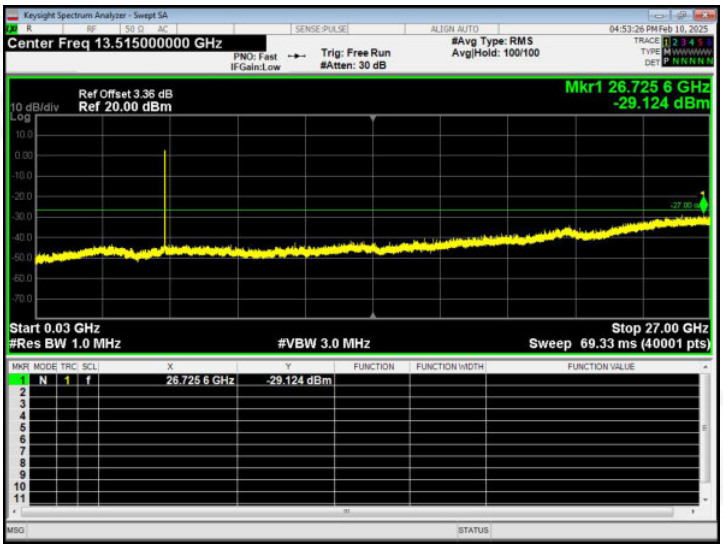


5.2G - 802.11ac20

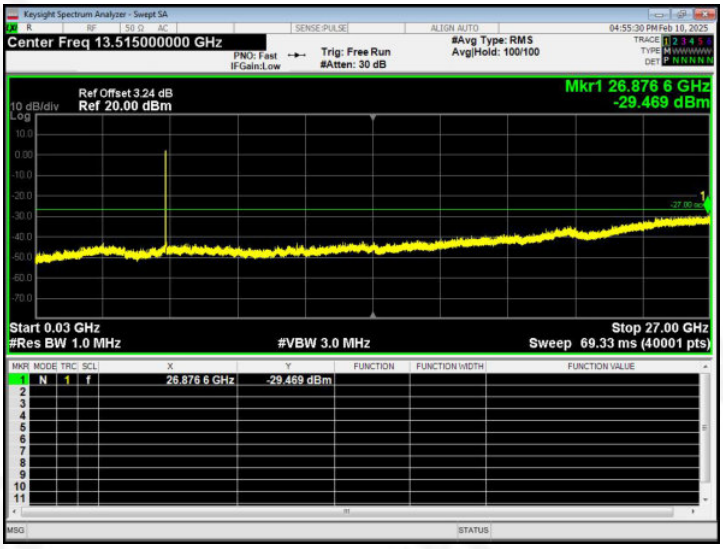
CH36



CH40

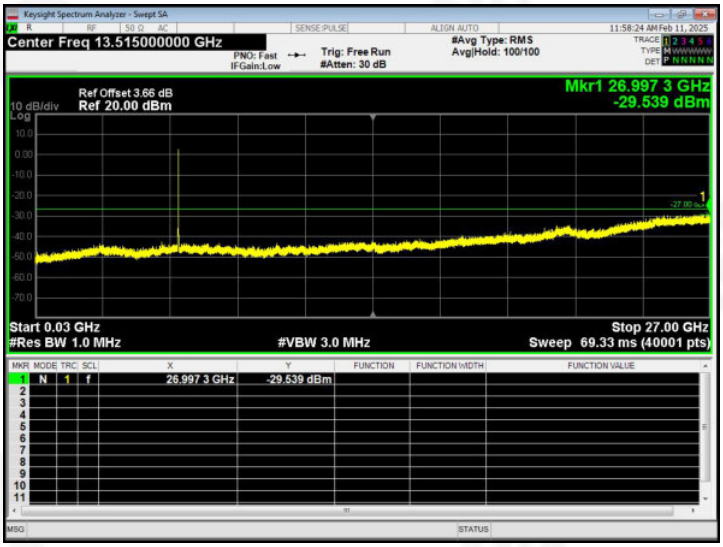


CH48

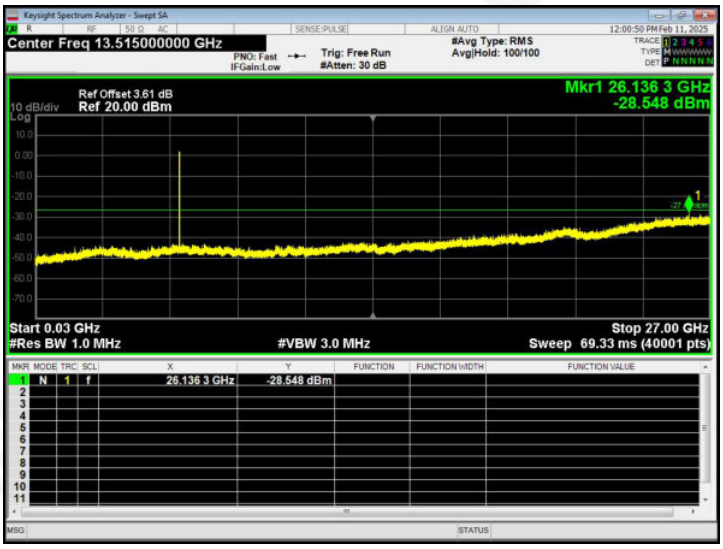


5.8G - 802.11ac20

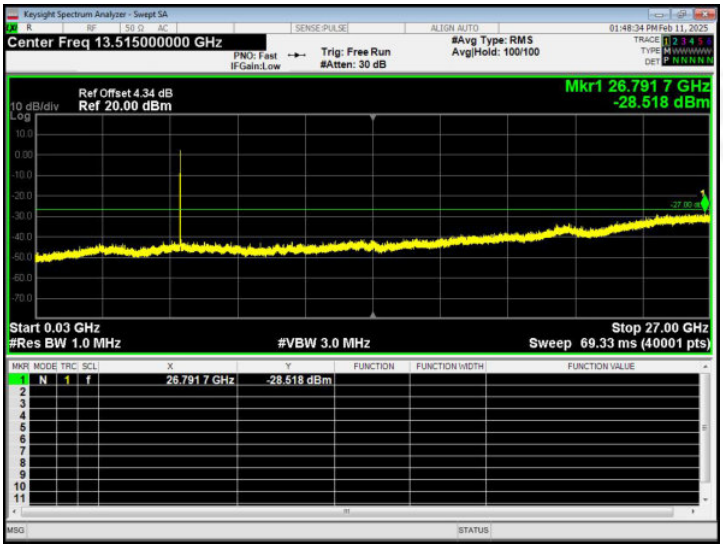
CH149



CH157

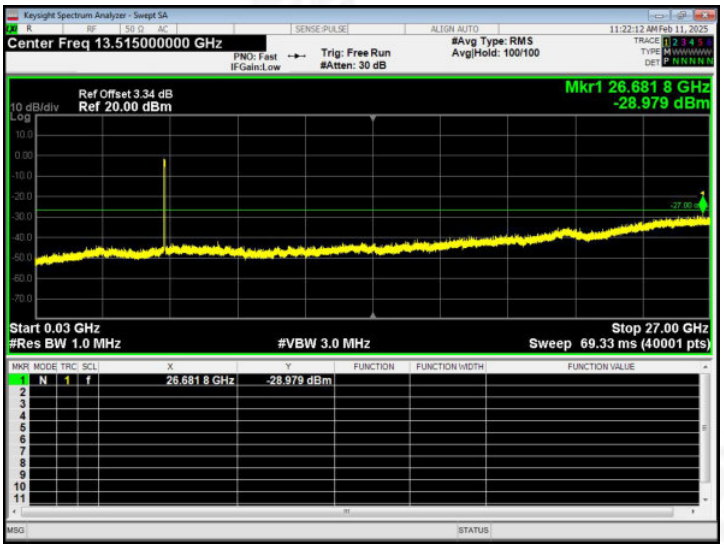


CH165



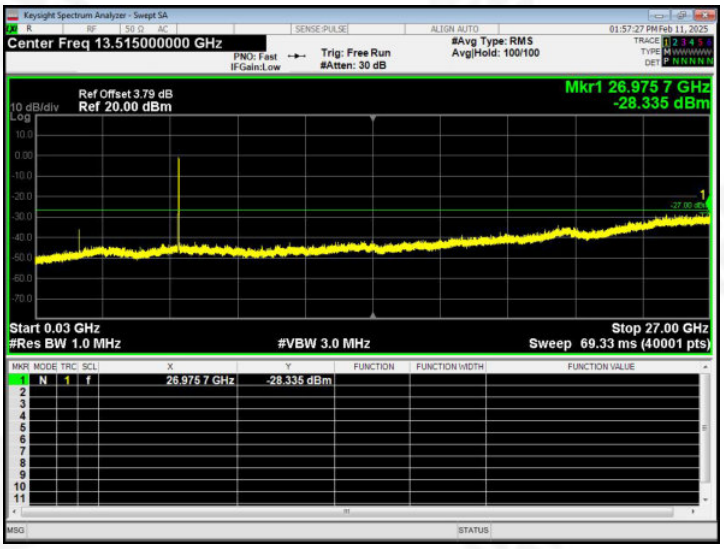
5.2G - 802.11ac40

CH38

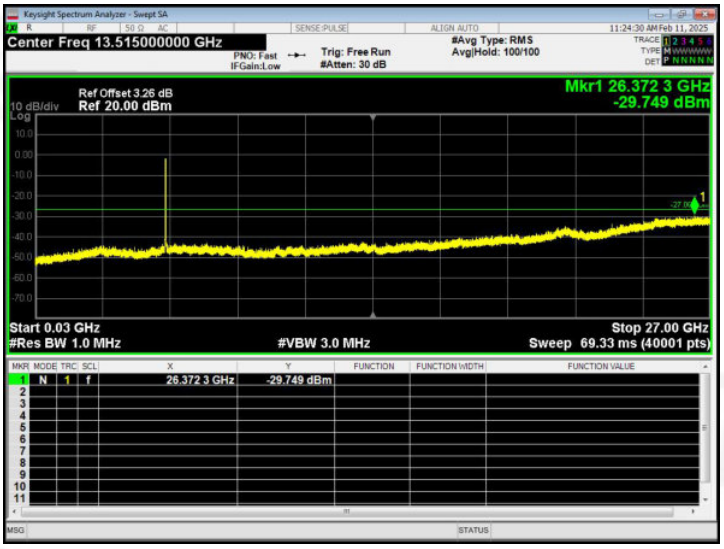


5.8G - 802.11ac40

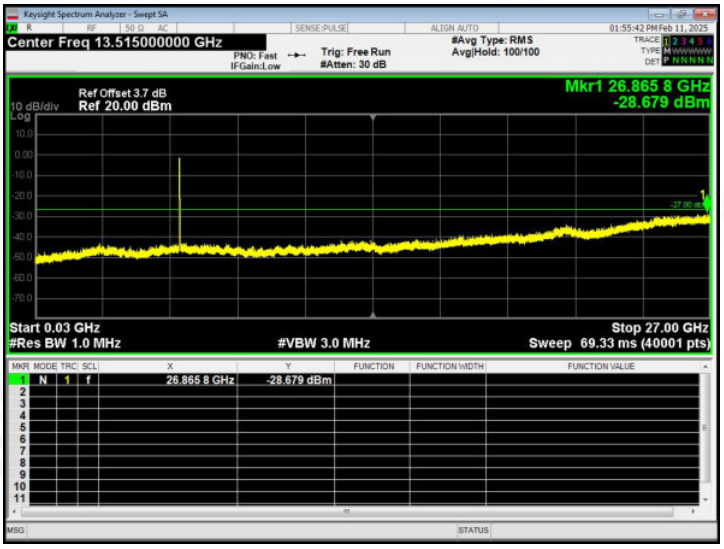
CH151



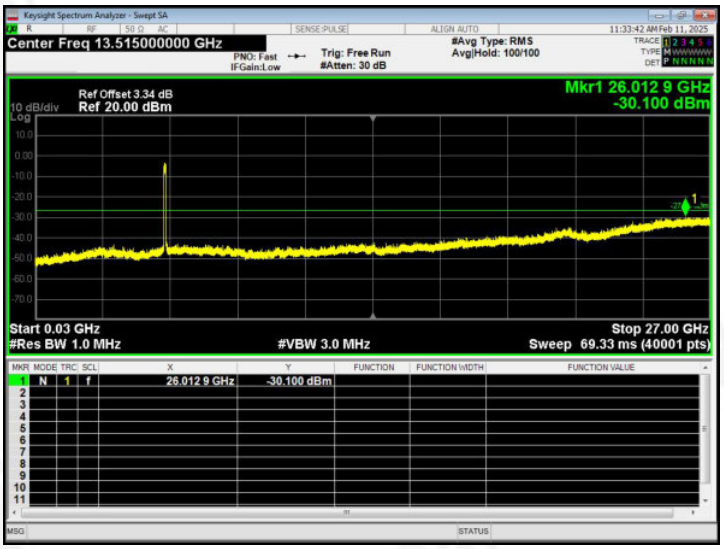
CH46



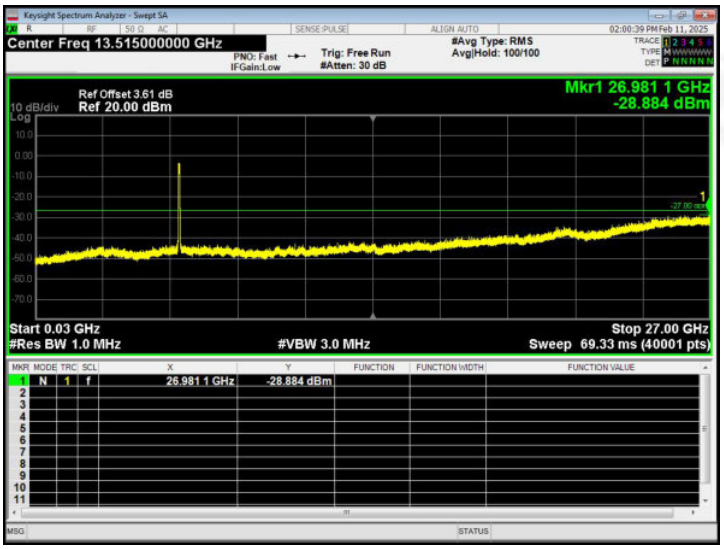
CH159



5.2G - 802.11ac80 - CH42



5.8G - 802.11ac80 - CH155



10.FREQUENCY STABILITY MEASUREMENT

10.1 LIMIT

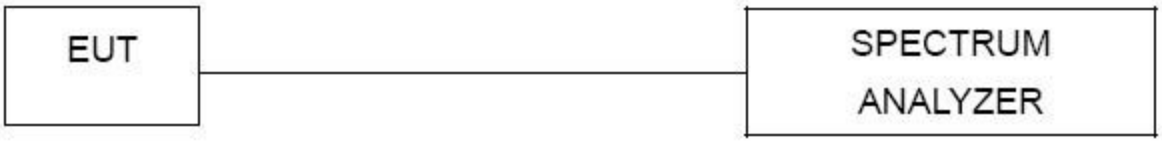
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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 ：	DC 9V
Test Band ：	5.2G		
Note: Note: All channels have been tested, and only the worst test data is recorded in this report.			

Reference Frequency: 802.11a - 5180MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5179.981	-3.629
40	9	5179.969	-5.965
30	9	5179.972	-5.425
25	9	5179.988	-2.280
10	9	5179.975	-4.793
0	9	5179.984	-3.101
-10	9	5179.977	-4.436
-20	9	5179.971	-5.542

Reference Frequency: 802.11n20 - 5180MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5179.973	-5.182
40	9	5179.976	-4.555
30	9	5179.983	-3.239
25	9	5179.981	-3.687
10	9	5179.985	-2.903
0	9	5179.989	-2.140
-10	9	5179.978	-4.210
-20	9	5179.975	-4.922

Reference Frequency: 802.11n40 - 5190MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5189.981	-3.638
40	9	5189.977	-4.390
30	9	5189.982	-3.374
25	9	5189.974	-5.045
10	9	5189.987	-2.543
0	9	5189.989	-2.114
-10	9	5189.989	-2.103
-20	9	5189.979	-4.020

Reference Frequency: 802.11ac20 - 5180MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5179.987	-2.542
40	9	5179.968	-6.084
30	9	5179.971	-5.646
25	9	5179.984	-3.109
10	9	5179.975	-4.751
0	9	5179.973	-5.231
-10	9	5179.988	-2.377
-20	9	5179.989	-2.106

Reference Frequency: 802.11ac40 - 5190MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5189.987	-2.443
40	9	5189.965	-6.826
30	9	5189.984	-3.000
25	9	5189.980	-3.866
10	9	5189.988	-2.365
0	9	5189.982	-3.432
-10	9	5189.975	-4.869
-20	9	5189.987	-2.444

Reference Frequency: 802.11ac80 - 5210MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5209.984	-3.128
40	9	5209.988	-2.305
30	9	5209.981	-3.625
25	9	5209.987	-2.516
10	9	5209.987	-2.516
0	9	5209.984	-3.033
-10	9	5209.989	-2.036
-20	9	5209.982	-3.529

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 9V
Test Band ：	5.8G		
Note: Note: All channels have been tested, and only the worst test data is recorded in this report.			

Reference Frequency: 802.11a - 5745MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5744.970	-5.202
40	9	5744.974	-4.552
30	9	5744.976	-4.211
25	9	5744.972	-4.810
10	9	5744.971	-4.969
0	9	5744.960	-6.931
-10	9	5744.964	-6.190
-20	9	5744.962	-6.622

Reference Frequency: 802.11n20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5744.980	-3.517
40	9	5744.967	-5.827
30	9	5744.970	-5.234
25	9	5744.954	-8.040
10	9	5744.963	-6.520
0	9	5744.954	-7.937
-10	9	5744.958	-7.362
-20	9	5744.964	-6.242

Reference Frequency: 802.11n40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5754.978	-3.846
40	9	5754.977	-3.929
30	9	5754.974	-4.516
25	9	5754.954	-8.040
10	9	5754.976	-4.170
0	9	5754.964	-6.310
-10	9	5754.974	-4.523
-20	9	5754.977	-4.054

Reference Frequency: 802.11ac20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5744.973	-4.615
40	9	5744.963	-6.383
30	9	5744.965	-6.102
25	9	5744.968	-5.572
10	9	5744.971	-5.083
0	9	5744.958	-7.294
-10	9	5744.970	-5.236
-20	9	5744.969	-5.391

Reference Frequency: 802.11ac40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5754.979	-3.674
40	9	5754.976	-4.091
30	9	5754.973	-4.700
25	9	5754.965	-6.004
10	9	5754.978	-3.822
0	9	5754.969	-5.432
-10	9	5754.978	-3.898
-20	9	5754.965	-6.125

Reference Frequency: 802.11ac80 - 5775MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	9	5774.981	-3.261
40	9	5774.982	-3.070
30	9	5774.980	-3.379
25	9	5774.978	-3.813
10	9	5774.976	-4.198
0	9	5774.978	-3.891
-10	9	5774.982	-3.135
-20	9	5774.984	-2.697

11. DUTY CYCLE

11.1 APPLIED PROCEDURES / LIMIT

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.

b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

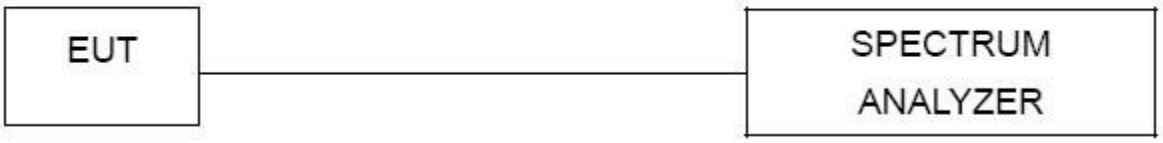
3) Set VBW ≥ RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T* and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7$ µs.)

11.2 DEVIATION FROM STANDARD

No deviation.

11.3 TEST SETUP



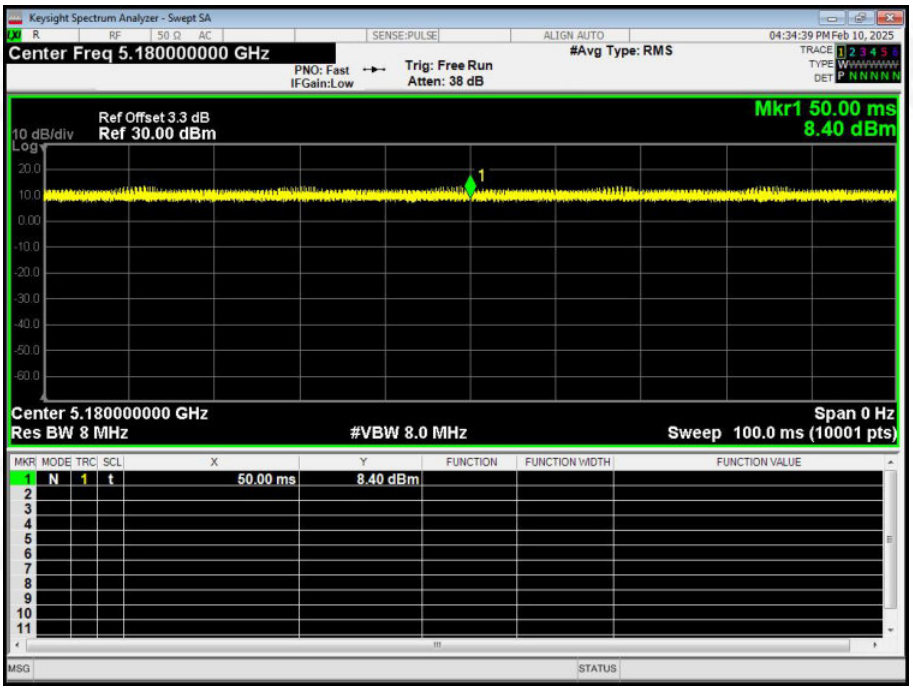
11.4 TEST RESULTS

Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 9V
Test Band :	5.2G & 5.8G		

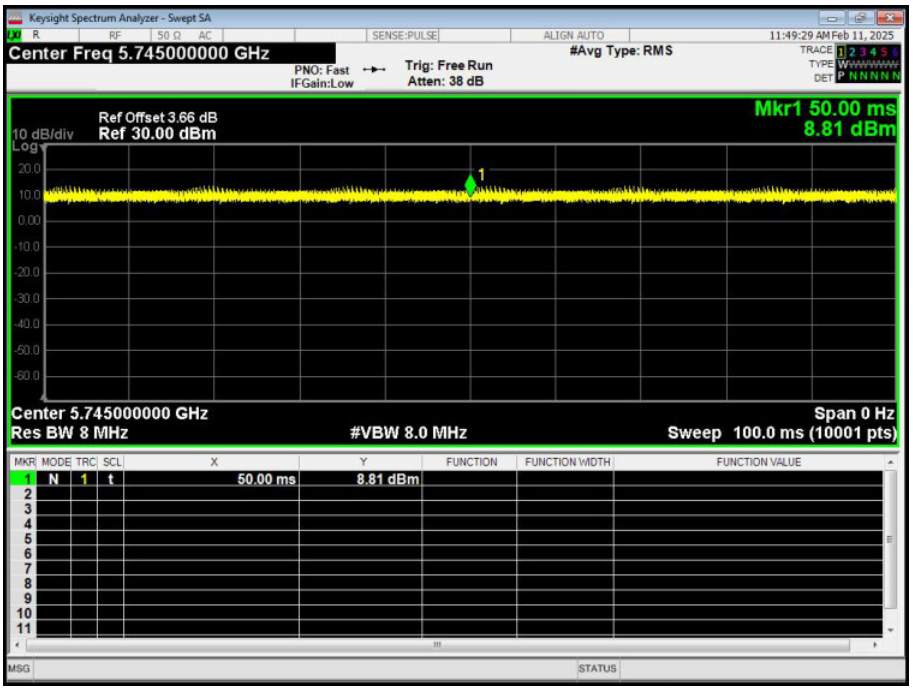
5.2G				
Test Mode	Frequency (MHz)	Duty Cycle (%)	Factor (dB)	Result
802.11a	5180	100	0	Pass
802.11n20	5180	100	0	Pass
802.11n40	5190	100	0	Pass
802.11ac20	5180	100	0	Pass
802.11ac40	5190	100	0	Pass
802.11ac80	5210	100	0	Pass
Note: Duty Cycle= Ton /Total*100% Duty Cycle Correction Factor = 10log (1/Duty Cycle)				

5.8G				
Test Mode	Frequency (MHz)	Duty Cycle (%)	Factor (dB)	Result
802.11a	5745	100	0	Pass
802.11n20	5745	100	0	Pass
802.11n40	5755	100	0	Pass
802.11ac20	5745	100	0	Pass
802.11ac40	5755	100	0	Pass
802.11ac80	5775	100	0	Pass
Note: Duty Cycle= Ton /Total*100% Duty Cycle Correction Factor = 10log (1/Duty Cycle)				

802.11a - 5180MHz

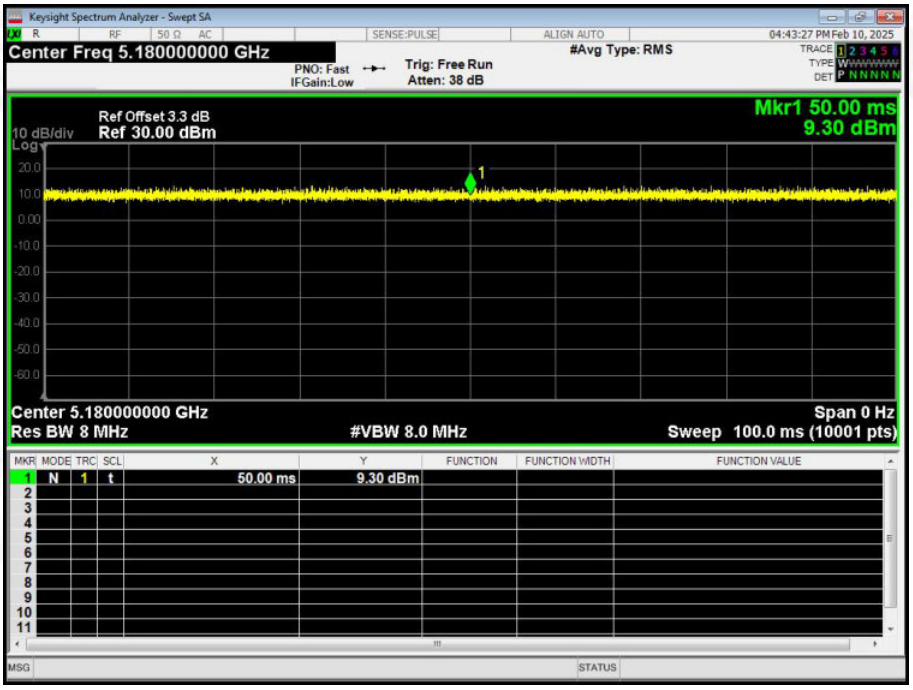


802.11a - 5745MHz

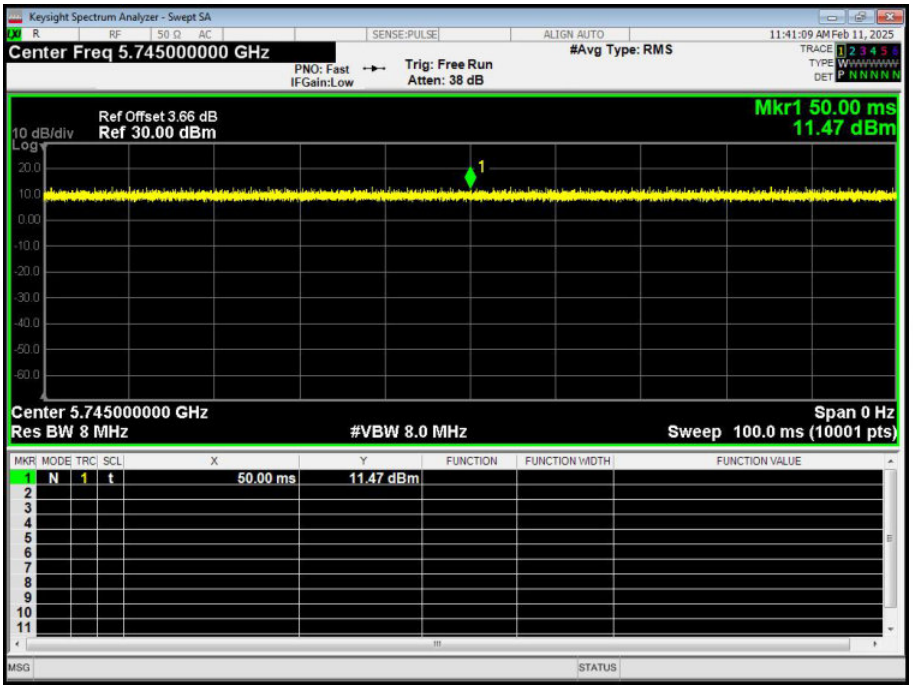


Note: All channel have been tested, and the report only reflects the worst case data.

802.11n20 - 5180MHz

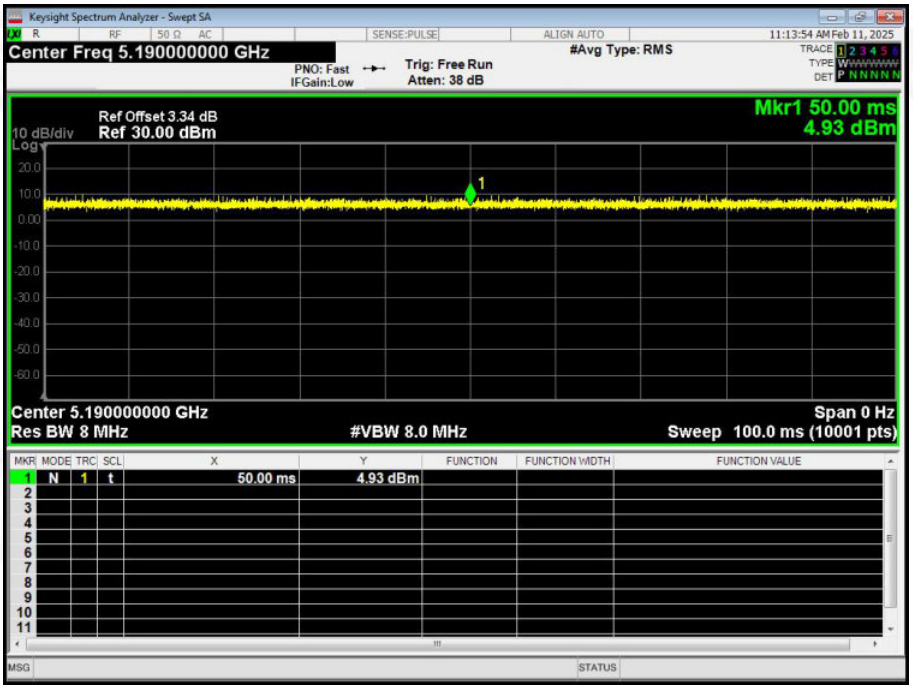


802.11n20 - 5745MHz

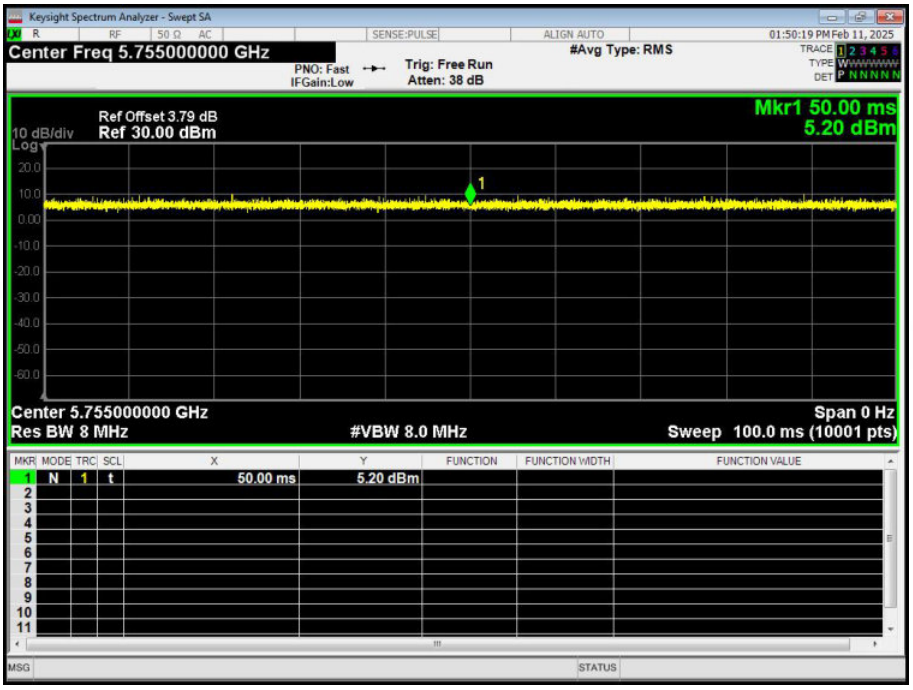


Note: All channel have been tested, and the report only reflects the worst case data.

802.11n40 - 5190MHz

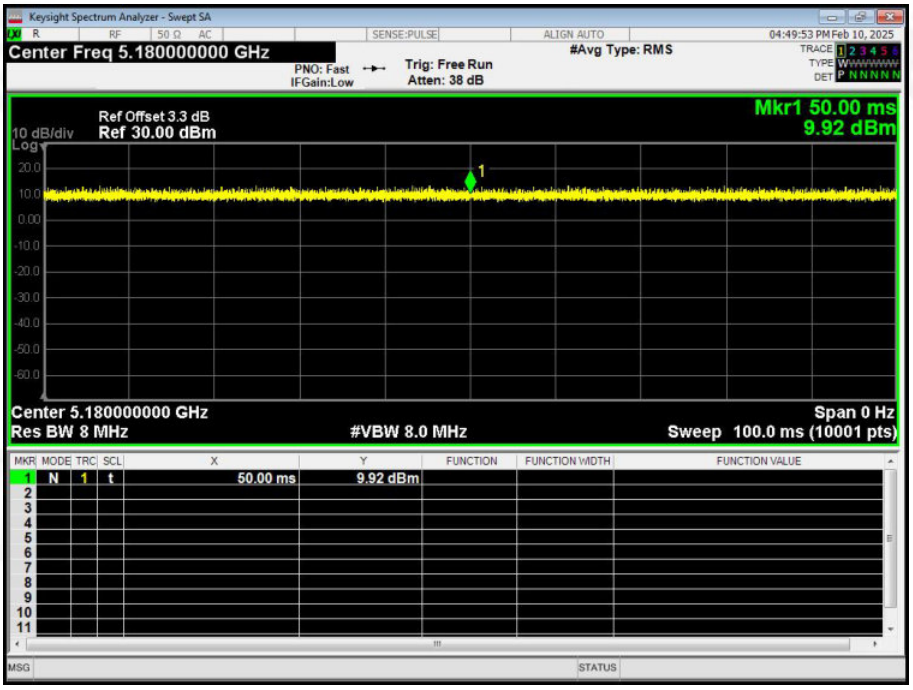


802.11n40 - 5755MHz

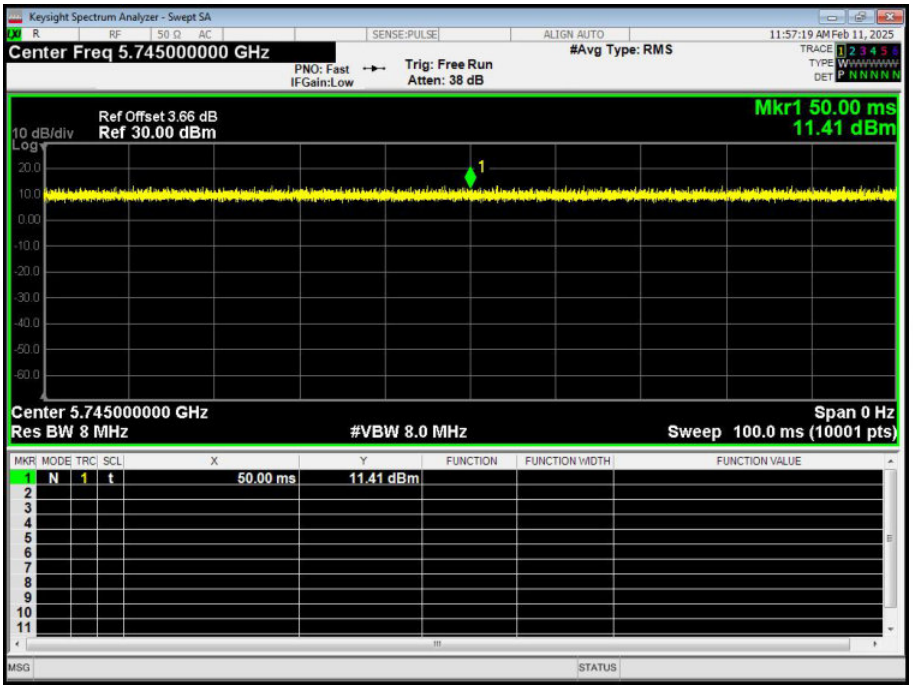


Note: All channel have been tested, and the report only reflects the worst case data.

802.11ac20 - 5180MHz

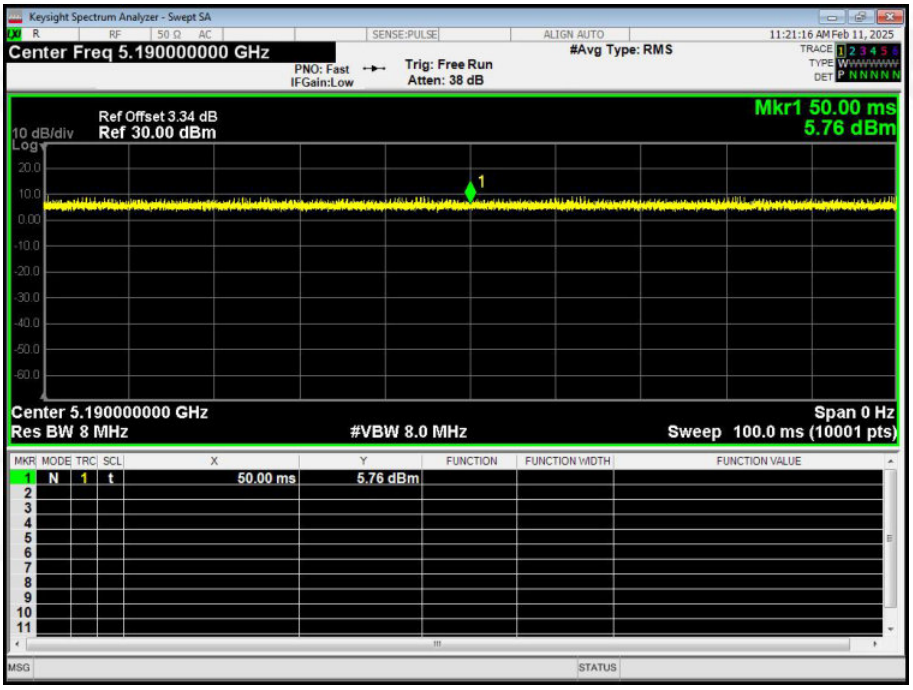


802.11ac20 - 5745MHz

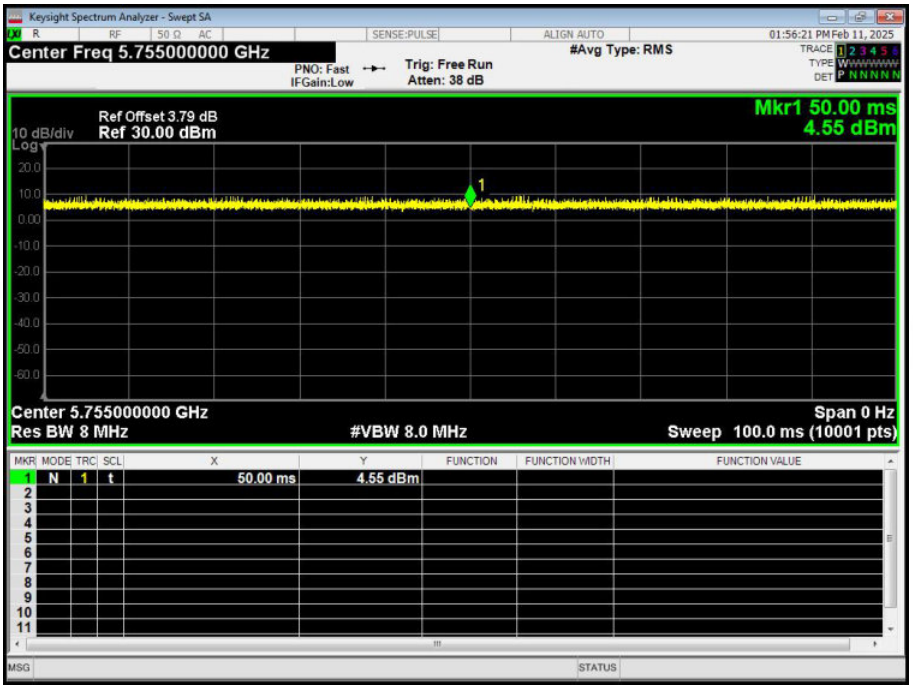


Note: All channel have been tested, and the report only reflects the worst case data.

802.11ac40 - 5190MHz

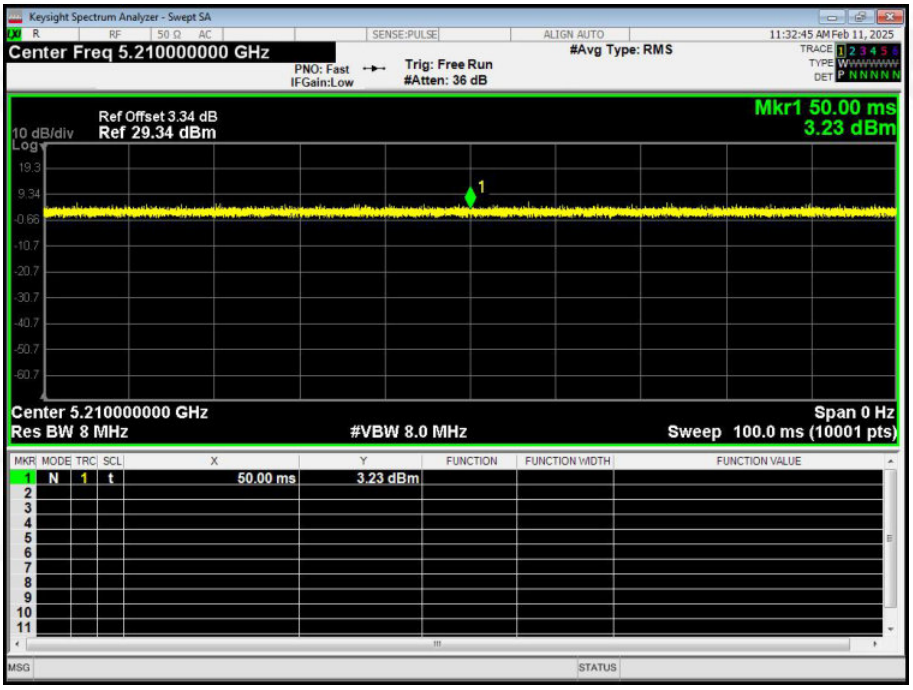


802.11ac40 - 5755MHz

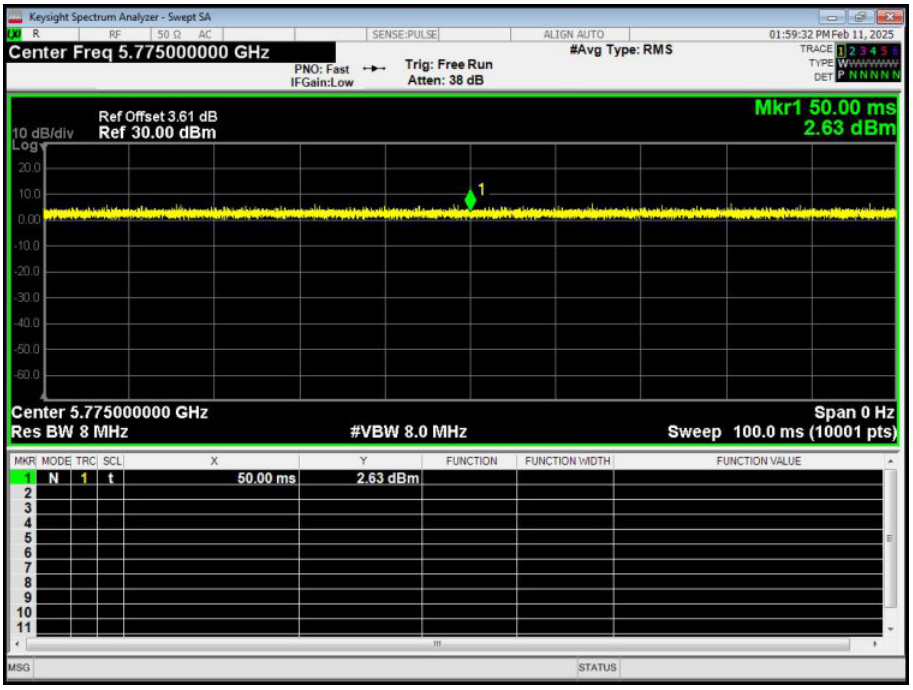


Note: All channel have been tested, and the report only reflects the worst case data.

802.11ac80 - 5210MHz



802.11ac80 - 5775MHz



Note: All channel have been tested, and the report only reflects the worst case data.

12.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 PCB antenna, the best case gain of the antenna is 5.2G is 1.81dBi / 5.8G is 4.45dBi, reference to the appendix II for details	

13. TEST SETUP PHOTO

Reference to the appendix I for details.

14. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※