



		5825	/	/	16.068		
802.11ac40	SISO ANT A	5755	12.112	0.207	12.319	30	Pass
		5795	12.014	0.207	12.221		
	SISO ANT B	5755	11.294	0.207	11.501	30	Pass
		5795	11.661	0.207	11.868		
	MIMO A+B	5755	/	/	14.940	30	Pass
		5795	/	/	15.058		
802.11ac80	SISO ANT A	5775	12.554	0.203	12.757	30	Pass
	SISO ANT B	5775	11.250	0.203	11.453	30	Pass
	MIMO A+B	5775	/	/	15.164	30	Pass
802.11ax20	SISO ANT A	5745	13.131	0.006	13.137	30	Pass
		5785	13.154	0.006	13.160		
		5825	13.094	0.006	13.100		
	SISO ANT B	5745	12.498	0.006	12.504	30	Pass
		5785	12.676	0.006	12.682		
		5825	12.529	0.006	12.535		
	MIMO A+B	5745	/	/	15.842	30	Pass
		5785	/	/	15.938		
		5825	/	/	15.837		
802.11ax40	SISO ANT A	5755	12.593	0.007	12.600	30	Pass
		5795	12.489	0.007	12.496		
	SISO ANT B	5755	11.145	0.006	11.151	30	Pass
		5795	11.436	0.006	11.442		
	MIMO A+B	5755	/	/	14.946	30	Pass
		5795	/	/	15.011		
802.11ax80	SISO ANT A	5775	12.482	0.006	12.488	30	Pass
	SISO ANT B	5775	11.970	0.006	11.976	30	Pass
	MIMO A+B	5775	/	/	15.250	30	Pass

Note: Total power = Output power + Duty cycle factor.



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.

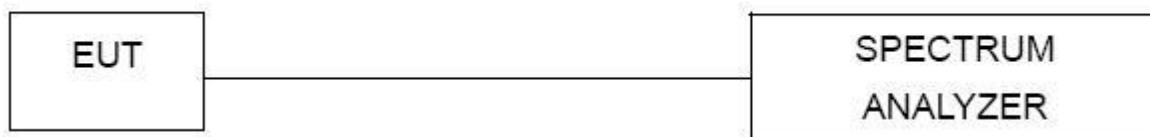
8.2 TEST PROCEDURE

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





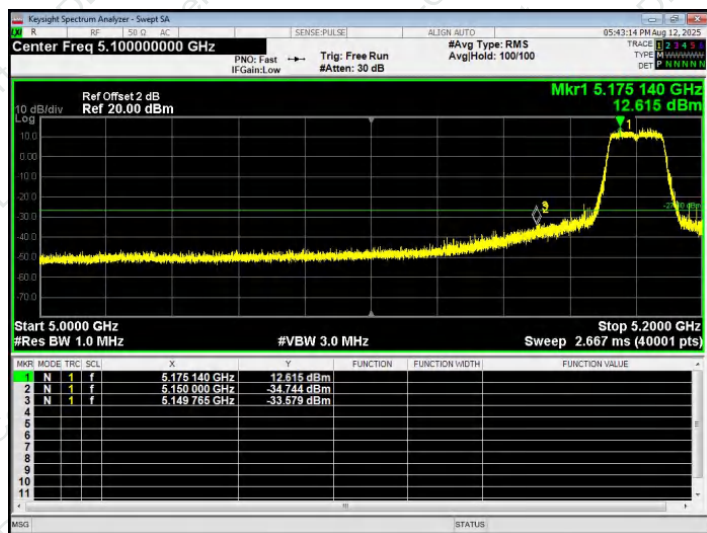
8.5 EUT OPERATION CONDITIONS

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.

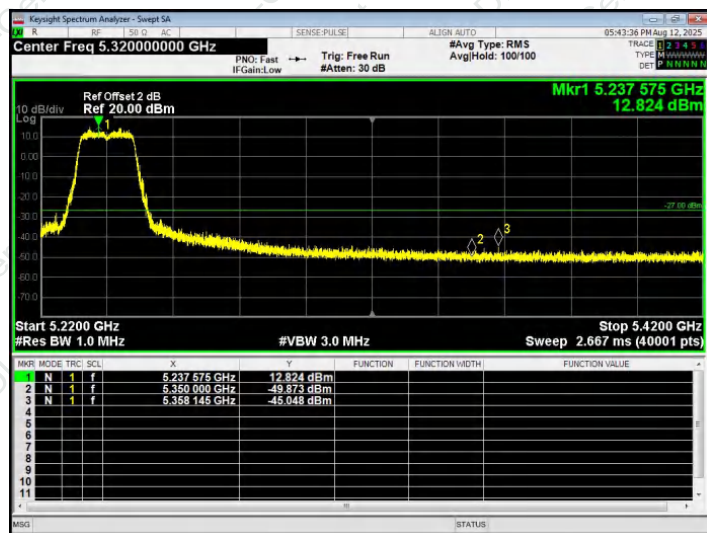
8.6 TEST RESULTS

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 3.85V
Test band :	5.2G	Antenna gain :	2.0dBi (The gain value of antenna A is tested uniformly)

SISO ANT A - 802.11a

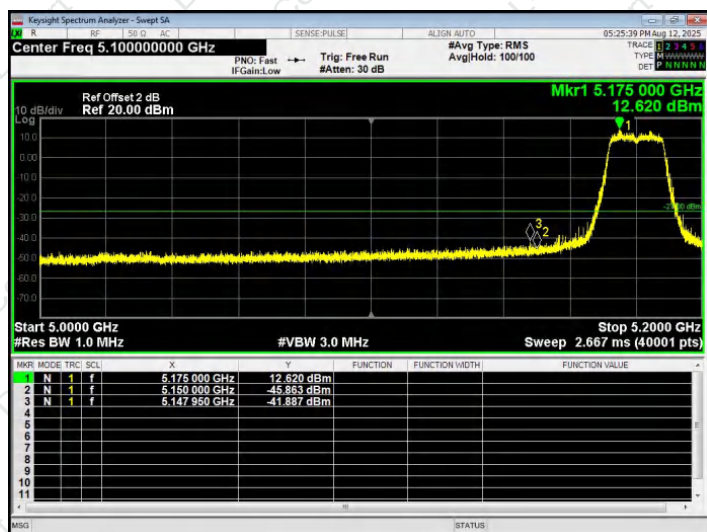


Channel 36

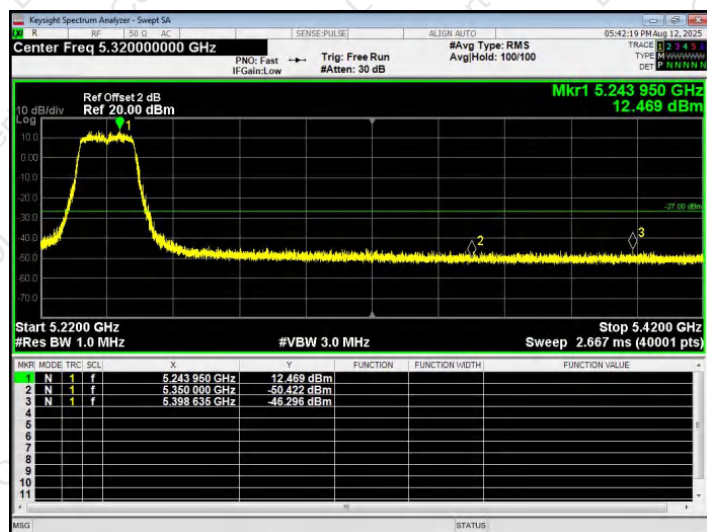


Channel 48

SISO ANT B - 802.11a



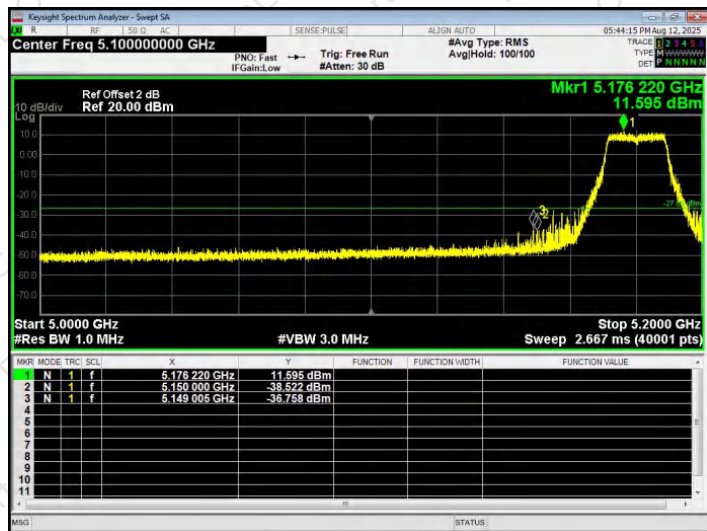
Channel 36



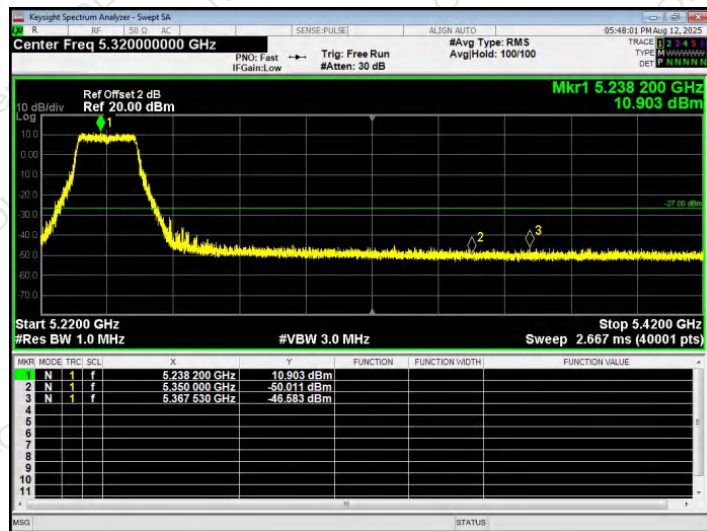
Channel 48



SISO ANT A - 802.11n20



Channel 36

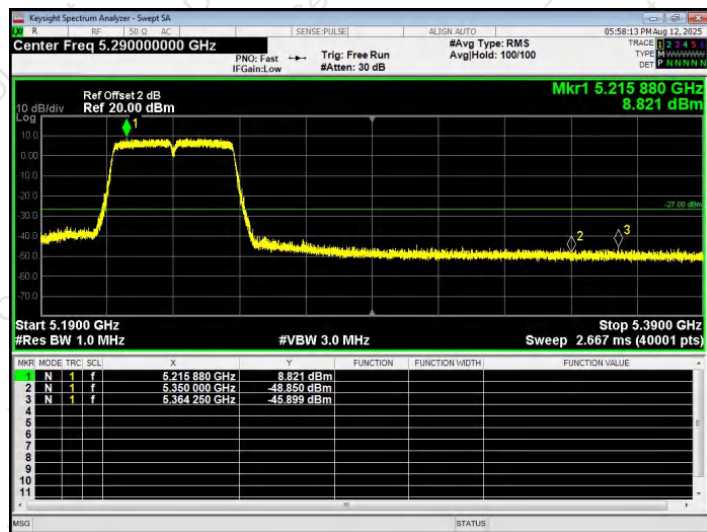


Channel 48

SISO ANT A - 802.11n40



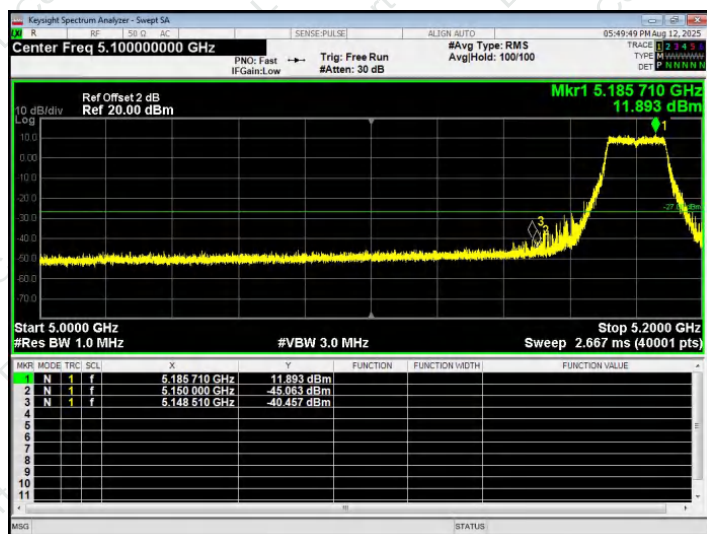
Channel 38



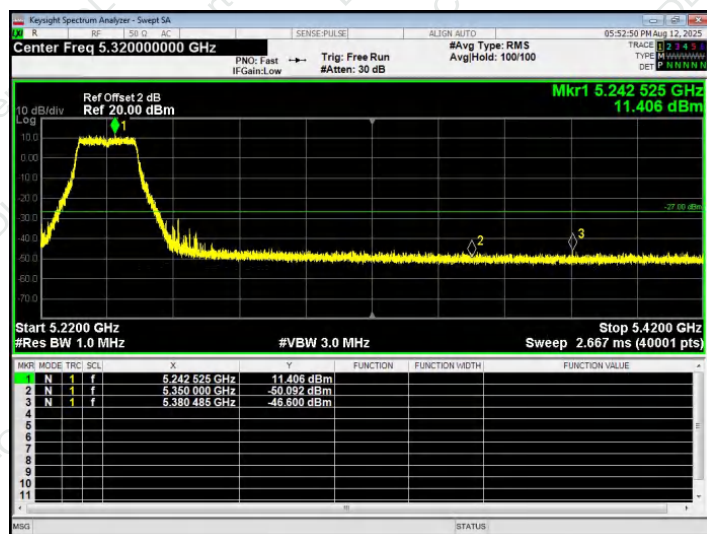
Channel 46



SISO ANT A - 802.11ac20

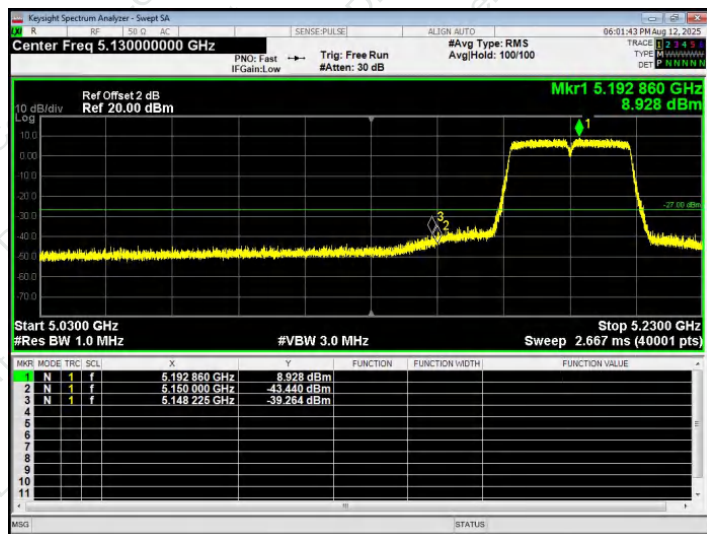


Channel 36



Channel 48

SISO ANT A - 802.11ac40



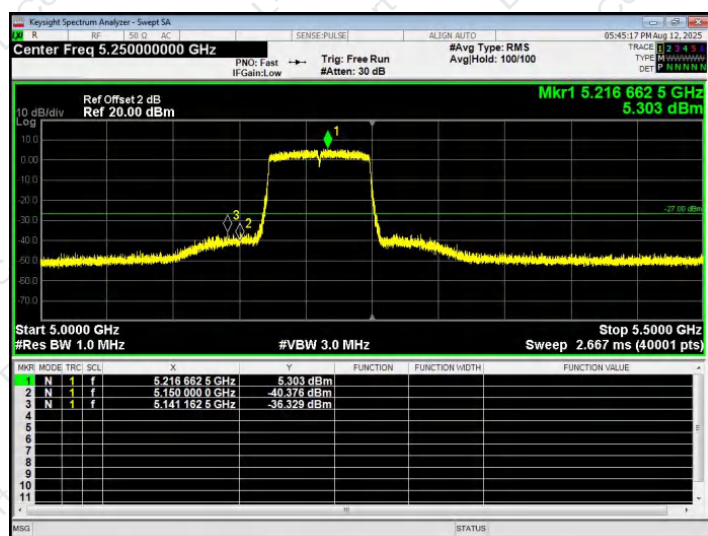
Channel 38



Channel 46



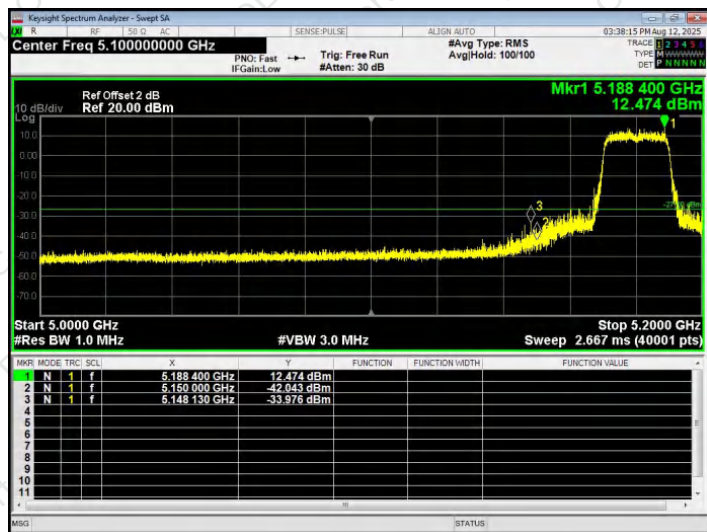
SISO ANT A - 802.11ac80



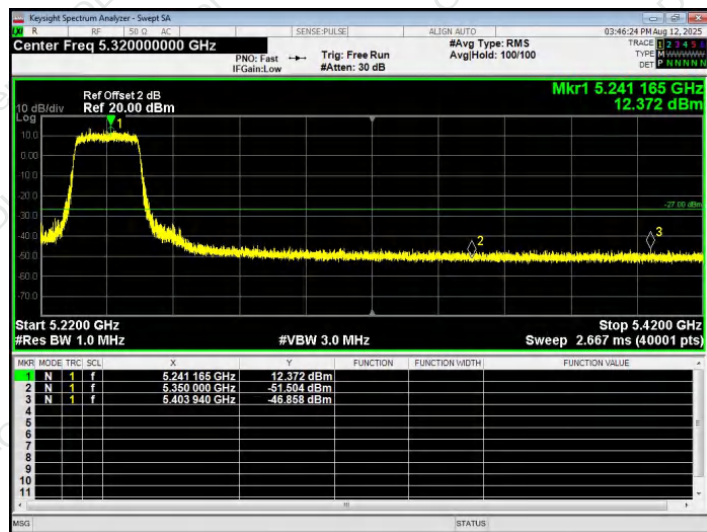
Channel 42



SISO ANT A - 802.11ax20

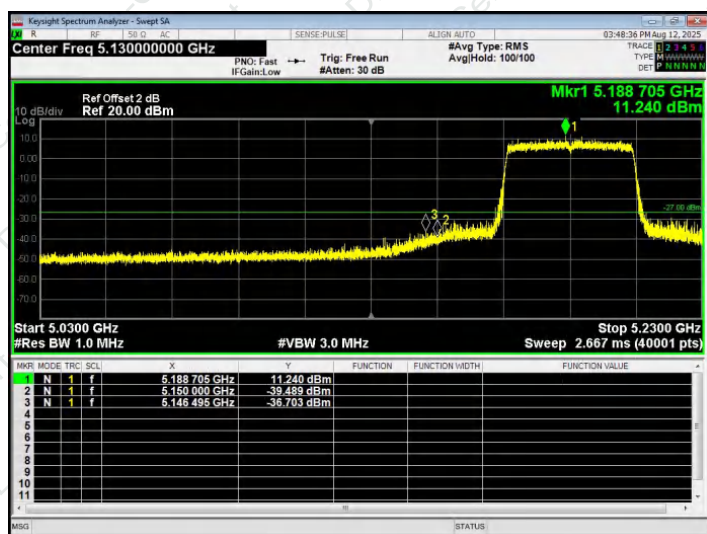


Channel 36

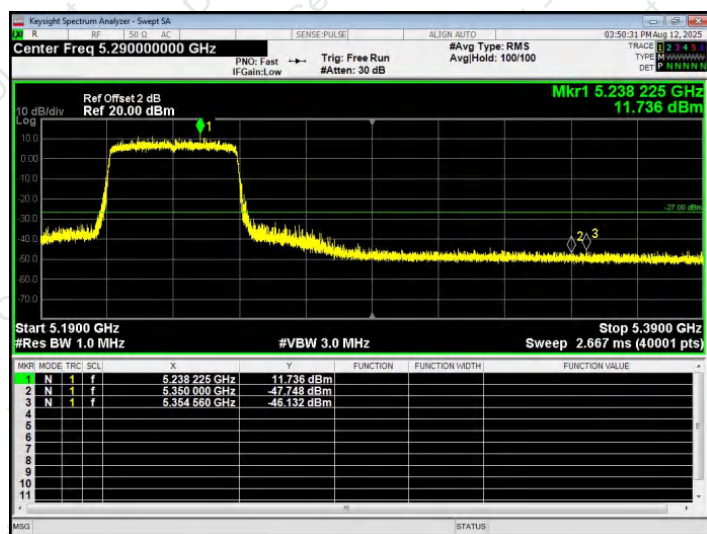


Channel 48

SISO ANT A - 802.11ax40



Channel 38

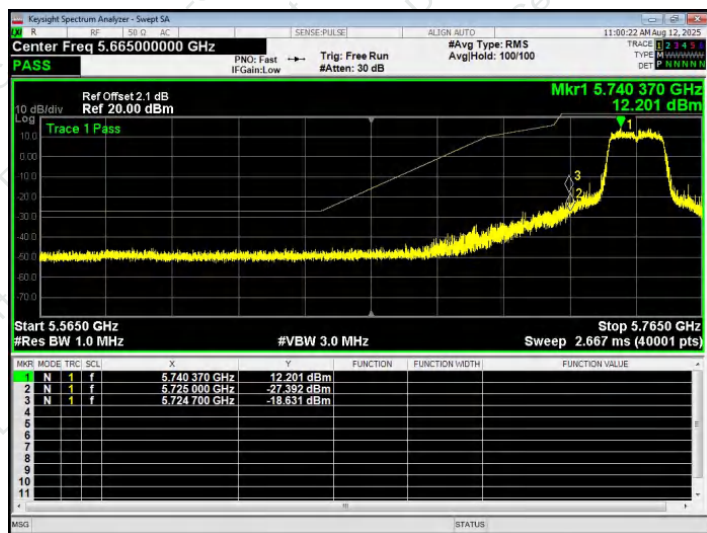


Channel 46

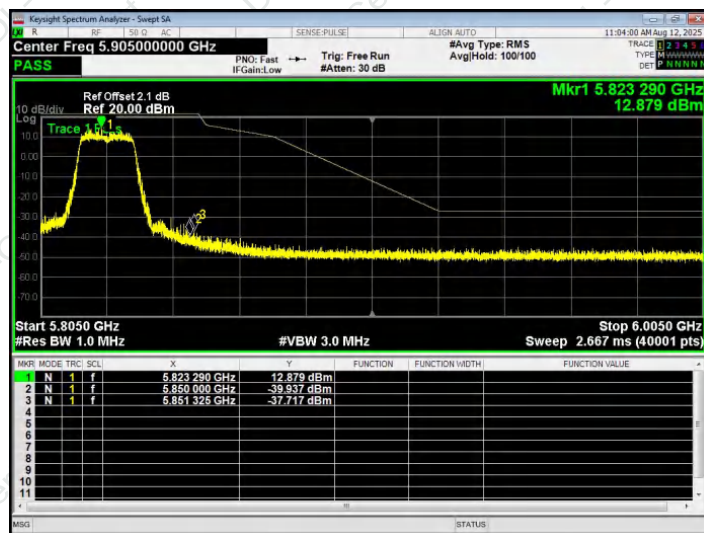


Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 3.85V
Test band :	5.8G	Antenna gain :	2.1dBi (The gain value of antenna A is tested uniformly)

SISO ANT A - 802.11a

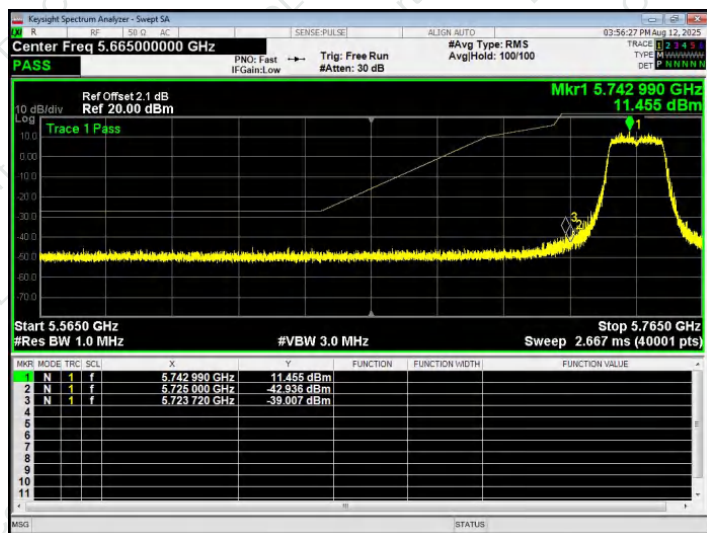


Channel 149



Channel 165

SISO ANT B - 802.11a



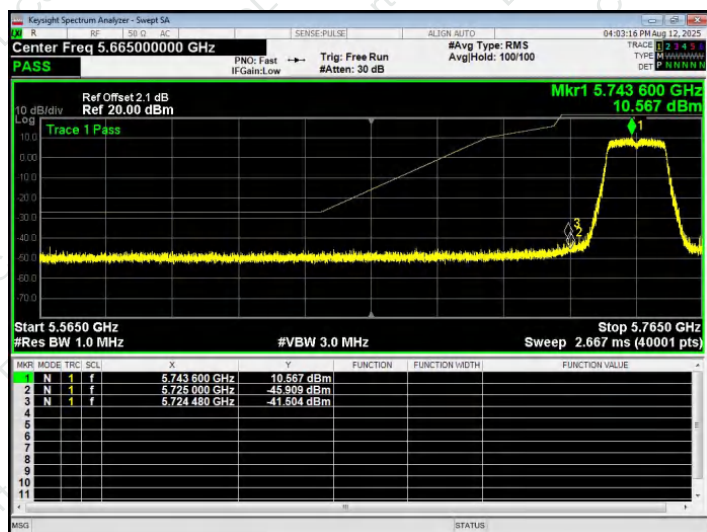
Channel 149



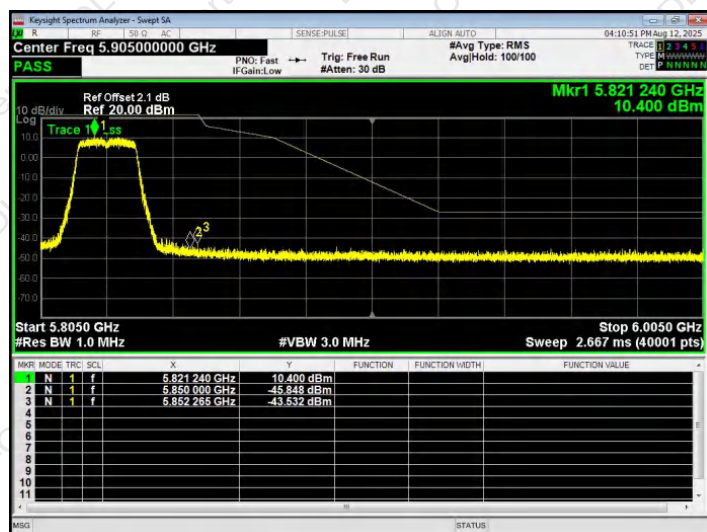
Channel 165



SISO ANT A - 802.11n20

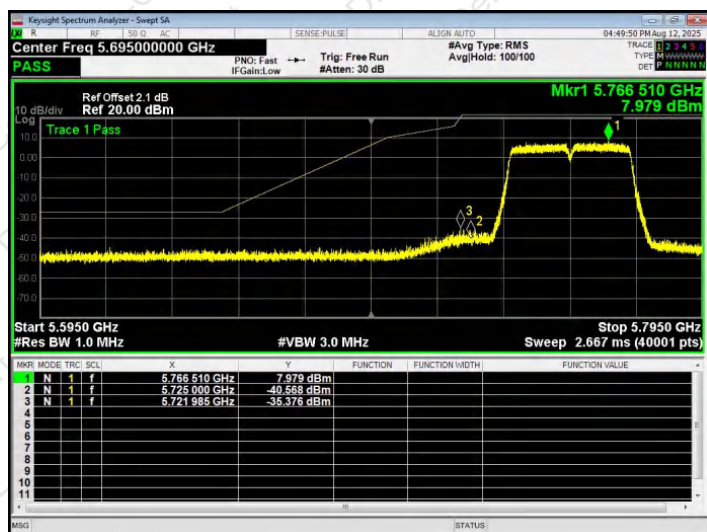


Channel 149

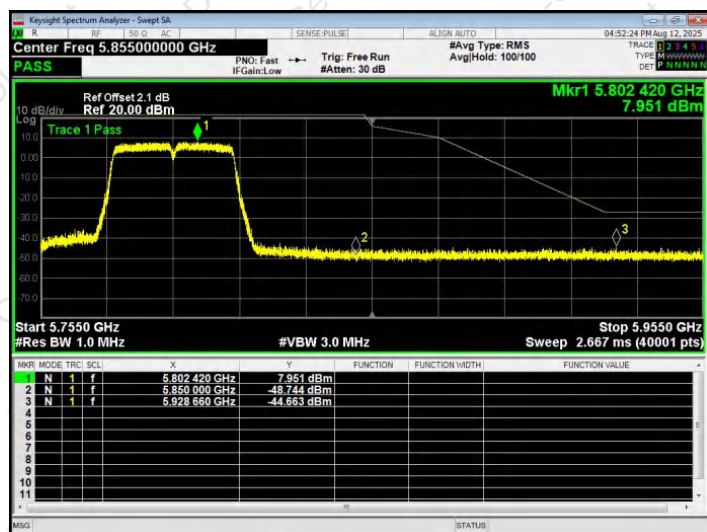


Channel 165

SISO ANT A - 802.11n40



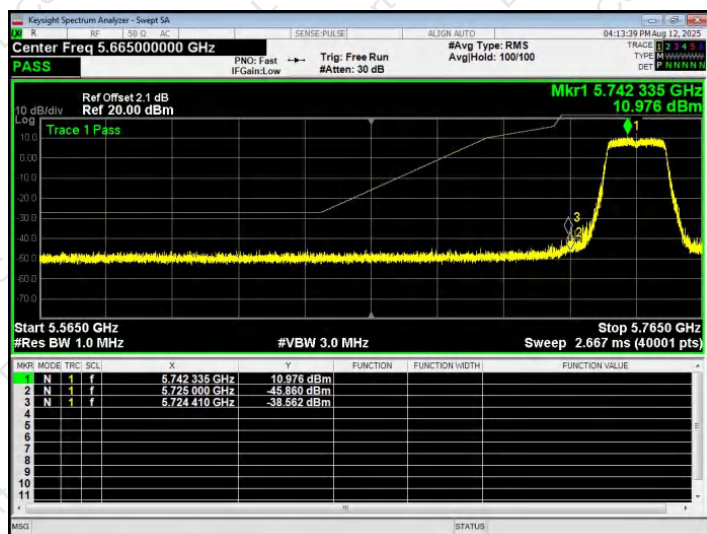
Channel 151



Channel 159



SISO ANT A - 802.11ac20

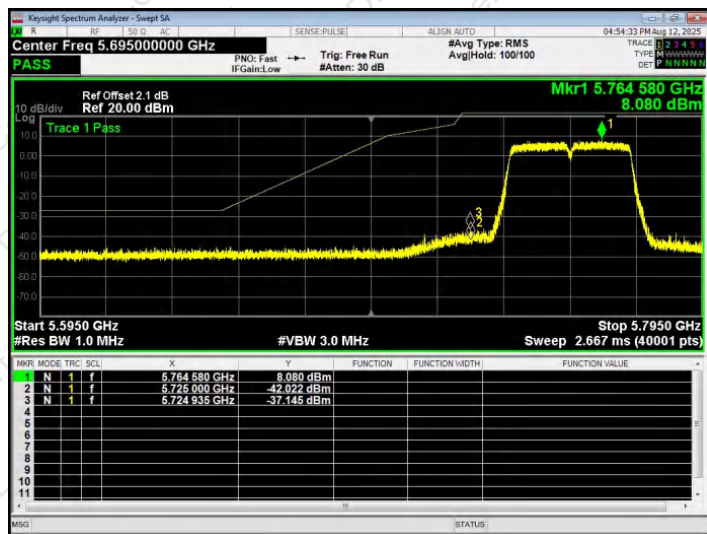


Channel 149



Channel 165

SISO ANT A - 802.11ac40



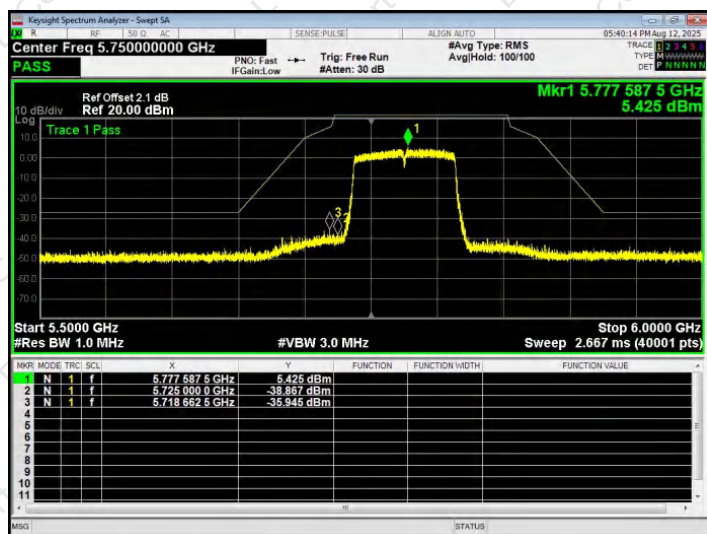
Channel 151



Channel 159



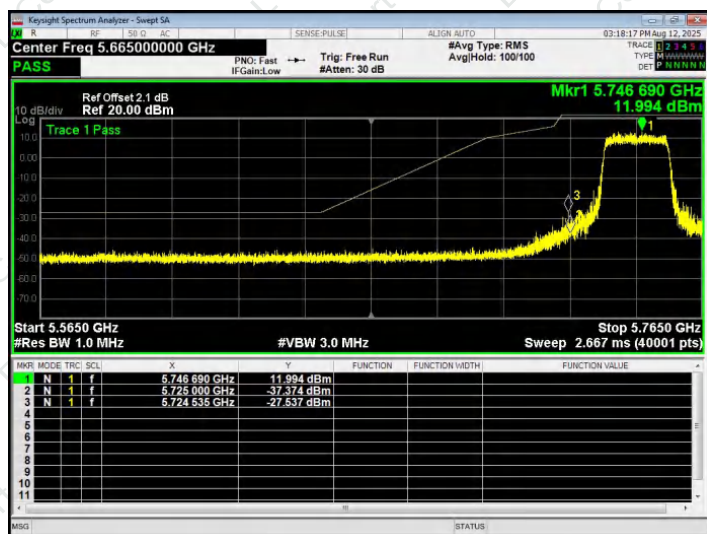
SISO ANT A - 802.11ac80



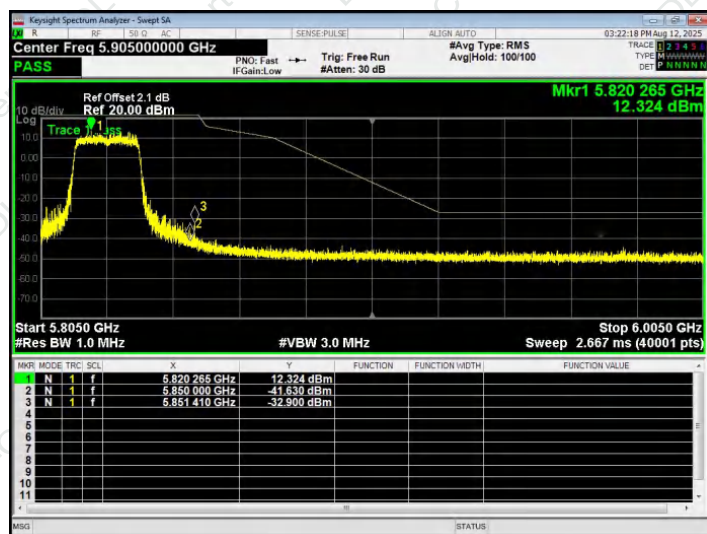
Channel 155



SISO ANT A - 802.11ax20

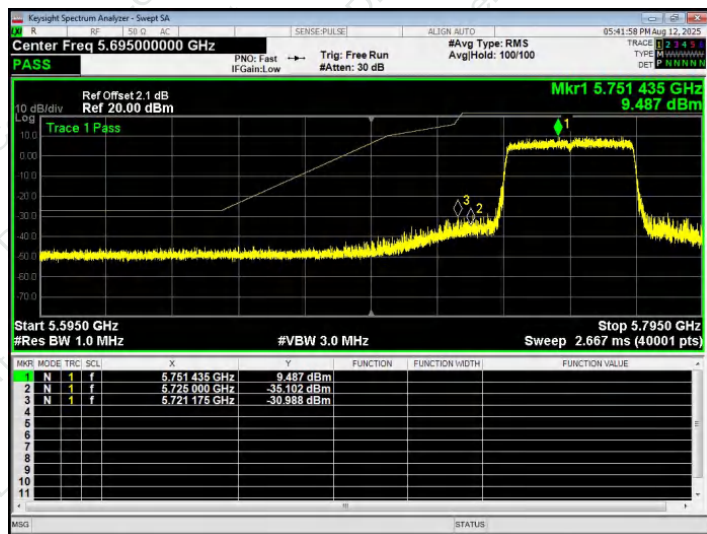


Channel 149

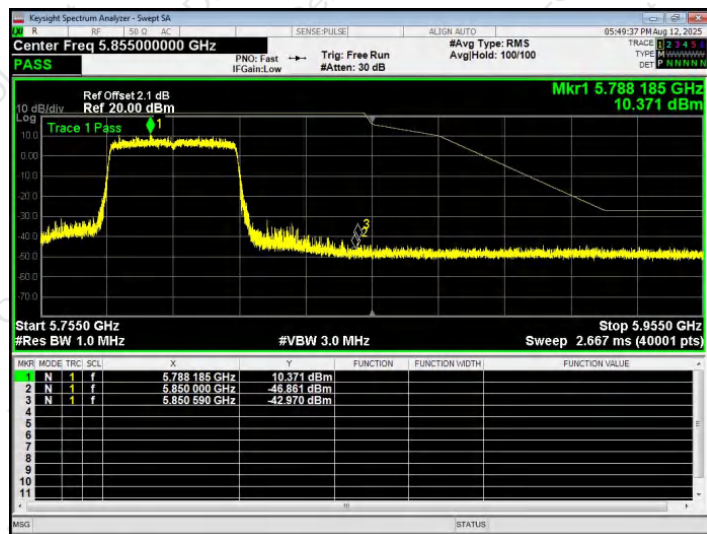


Channel 165

SISO ANT A - 802.11ax40



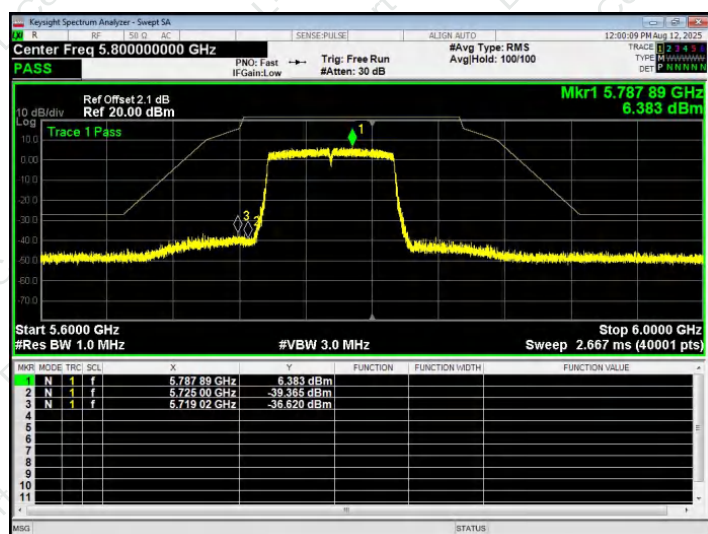
Channel 151



Channel 159



SISO ANT A - 802.11ax80



Channel 155

Note: The margin is greater than the value of 5.11 (Gain + 10 log(2)), and the test results meet the standard requirements



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 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 3.85V
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.			



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. 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 $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$.

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 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 3.85V
Test Band :	5.2G & 5.8G		
Note: All channels have been tested, and only the worst test data is recorded in this report. Both SISO ANT A&B and MIMO A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO A.			



Reference Frequency: 5180MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	3.85	5179.986	-2.691
40	3.85	5179.975	-4.904
30	3.85	5179.984	-3.060
25	3.85	5179.986	-2.643
10	3.85	5179.980	-3.811
0	3.85	5179.978	-4.214
-10	3.85	5179.980	-3.824
-20	3.85	5179.978	-4.301

Reference Frequency: 5190MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	3.85	5189.974	-5.060
40	3.85	5189.988	-2.400
30	3.85	5189.979	-3.983
25	3.85	5189.981	-3.600
10	3.85	5189.990	-1.940
0	3.85	5189.981	-3.657
-10	3.85	5189.971	-5.626
-20	3.85	5189.988	-2.236

Reference Frequency: 5210MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	3.85	5209.985	-2.952
40	3.85	5209.990	-2.014
30	3.85	5209.988	-2.298
25	3.85	5209.989	-2.016
10	3.85	5209.990	-1.976
0	3.85	5209.984	-3.133
-10	3.85	5209.986	-2.663
-20	3.85	5209.984	-3.001



Reference Frequency: 5745MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	3.85	5744.974	-4.587
40	3.85	5744.954	-7.998
30	3.85	5744.962	-6.606
25	3.85	5744.962	-6.541
10	3.85	5744.979	-3.731
0	3.85	5744.977	-3.954
-10	3.85	5744.969	-5.407
-20	3.85	5744.964	-6.185

Reference Frequency: 5755MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	3.85	5754.961	-6.816
40	3.85	5754.957	-7.467
30	3.85	5754.971	-5.008
25	3.85	5754.964	-6.317
10	3.85	5754.980	-3.511
0	3.85	5754.979	-3.705
-10	3.85	5754.964	-6.171
-20	3.85	5754.965	-6.059

Reference Frequency: 5775MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	3.85	5774.974	-4.581
40	3.85	5774.985	-2.563
30	3.85	5774.987	-2.244
25	3.85	5774.977	-3.995
10	3.85	5774.979	-3.665
0	3.85	5774.970	-5.151
-10	3.85	5774.983	-2.895
-20	3.85	5774.984	-2.741



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 $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.
 - 3) Set $VBW \geq RBW$. 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 $T \leq 16.7 \mu s$.)

11.2 DEVIATION FROM STANDARD

No deviation.

11.3 TEST SETUP





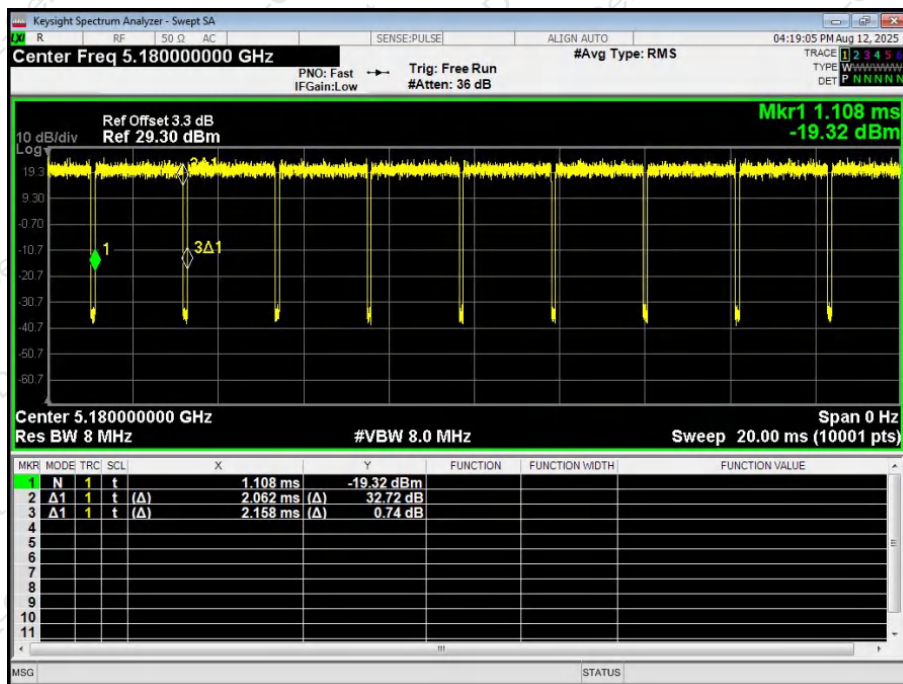
11.4 TEST RESULTS

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 3.85V
Note: All channels have been tested, and only the worst test data is recorded in this report.			

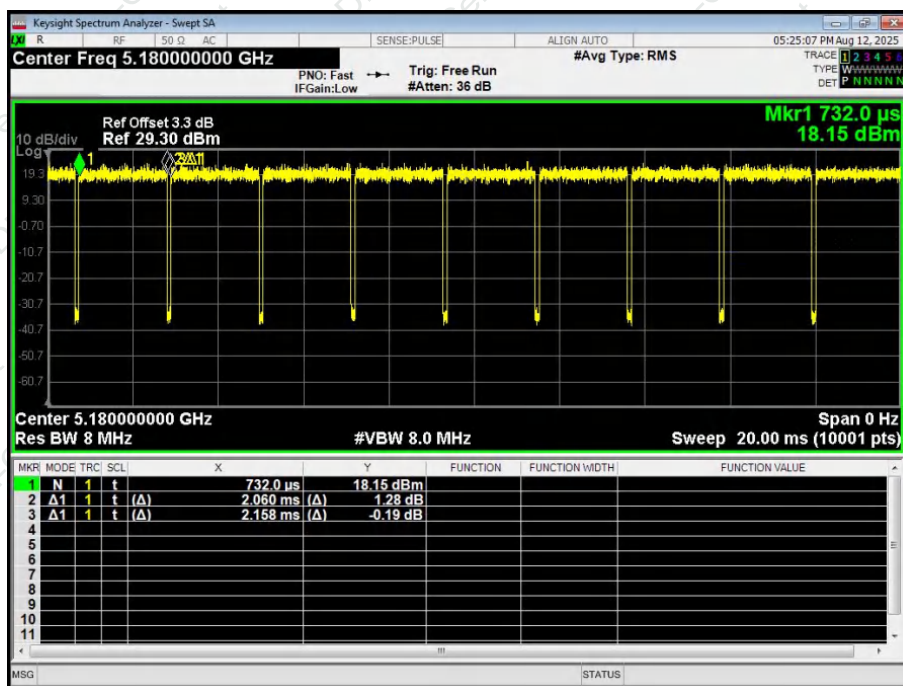
Test Mode	Antenna	Frequency (MHz)	Duty Cycle (%)	Factor (dB)	Result
802.11a	SISO ANT A	5180	95.55	0.198	Pass
	SISO ANT B	5180	95.46	0.202	Pass
802.11n20	SISO ANT A	5180	95.42	0.204	Pass
	SISO ANT B	5180	95.42	0.204	Pass
802.11n40	SISO ANT A	5190	95.38	0.205	Pass
	SISO ANT B	5190	95.38	0.206	Pass
802.11ac20	SISO ANT A	5180	95.42	0.203	Pass
	SISO ANT B	5180	95.42	0.204	Pass
802.11ac40	SISO ANT A	5190	95.34	0.207	Pass
	SISO ANT B	5190	95.29	0.209	Pass
802.11ax80	SISO ANT A	5210	95.39	0.205	Pass
	SISO ANT B	5210	95.39	0.205	Pass
802.11ax20	SISO ANT A	5180	99.85	0.006	Pass
	SISO ANT B	5180	99.90	0.004	Pass
802.11ax40	SISO ANT A	5190	99.85	0.006	Pass
	SISO ANT B	5190	99.86	0.006	Pass
802.11ax80	SISO ANT A	5210	99.90	0.004	Pass
	SISO ANT B	5210	99.90	0.004	Pass
Note: Duty Cycle= Ton /Total*100%					
Duty Cycle Correction Factor = 10log (1/Duty Cycle)					



SISO ANT A 802.11a - 5180MHz

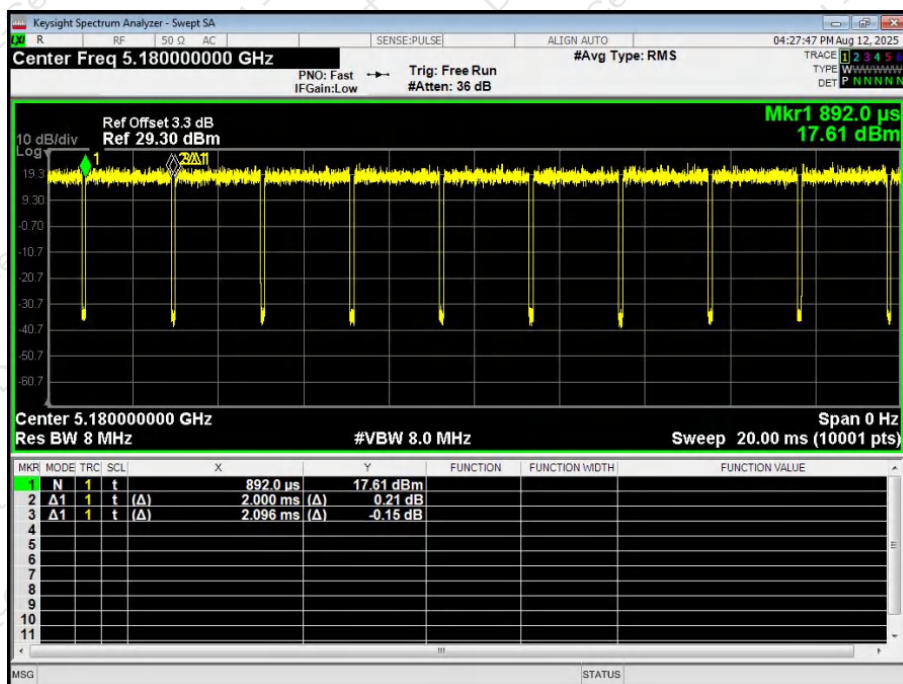


SISO ANT B 802.11a - 5180MHz

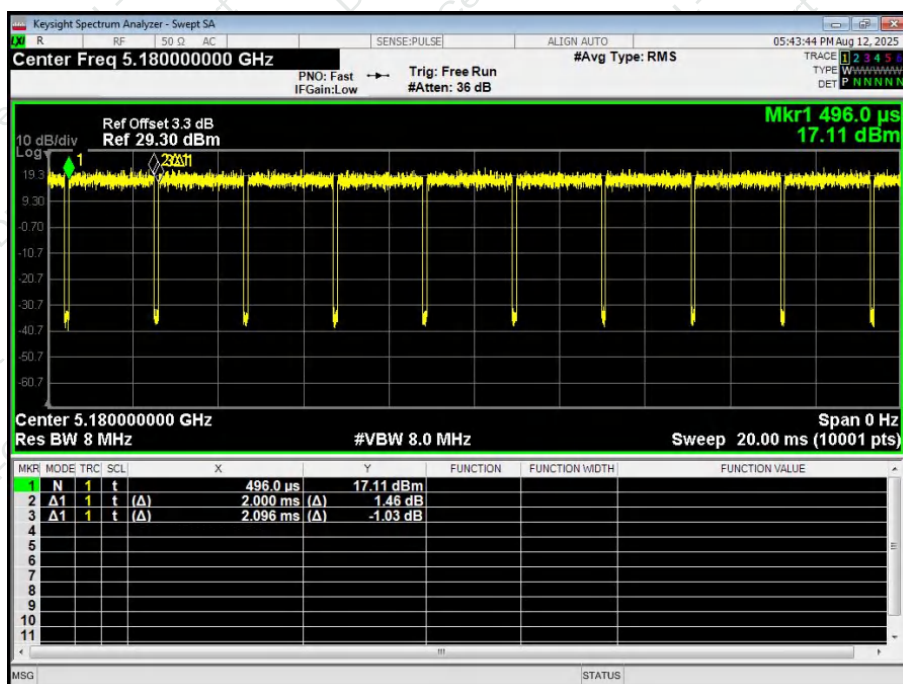




SISO ANT A 802.11n20 - 5180MHz

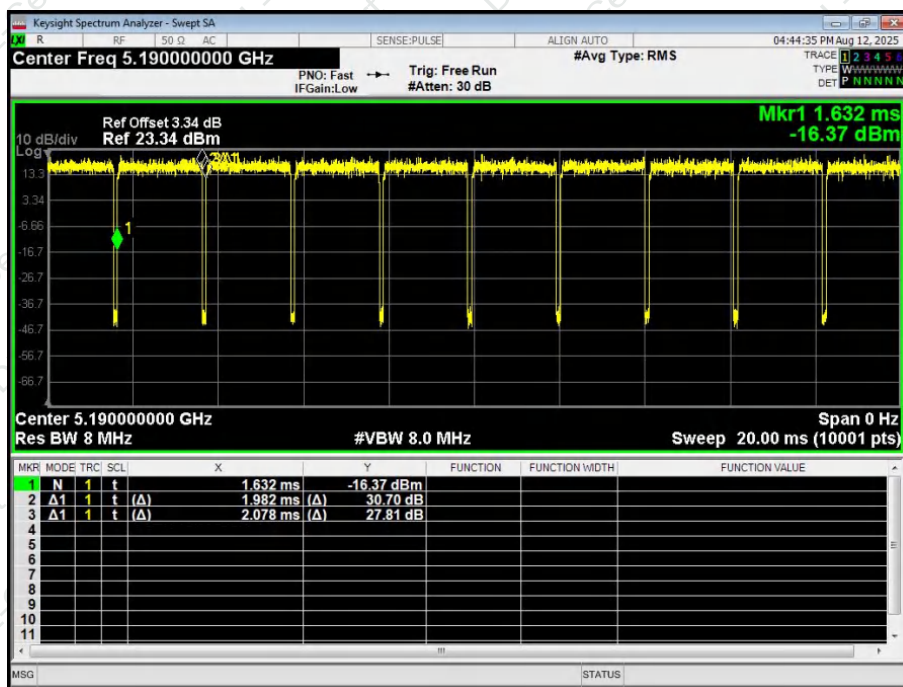


SISO ANT B 802.11n20 - 5180MHz

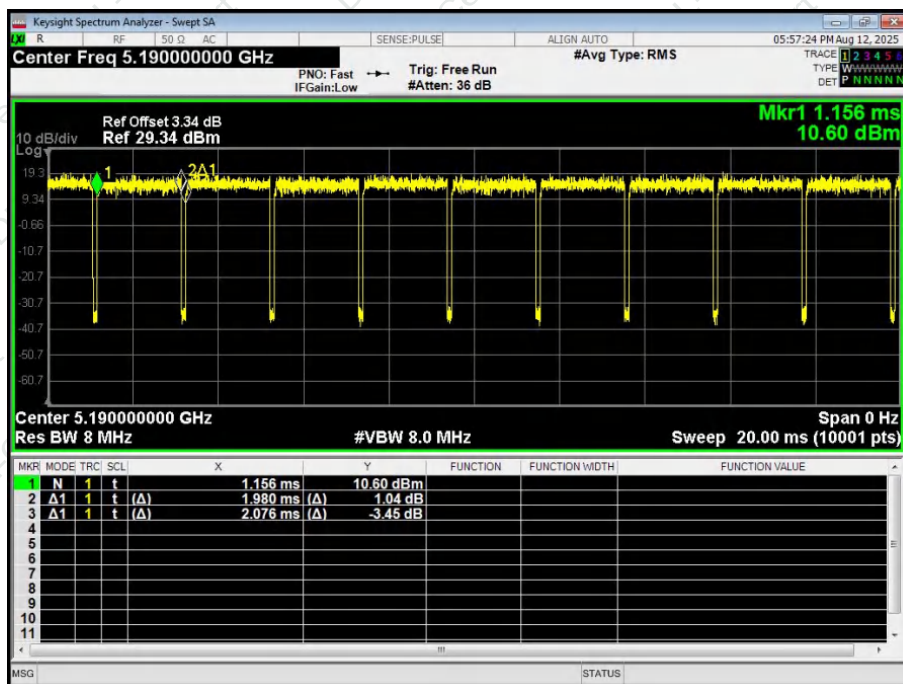




SISO ANT A 802.11n40 - 5190MHz

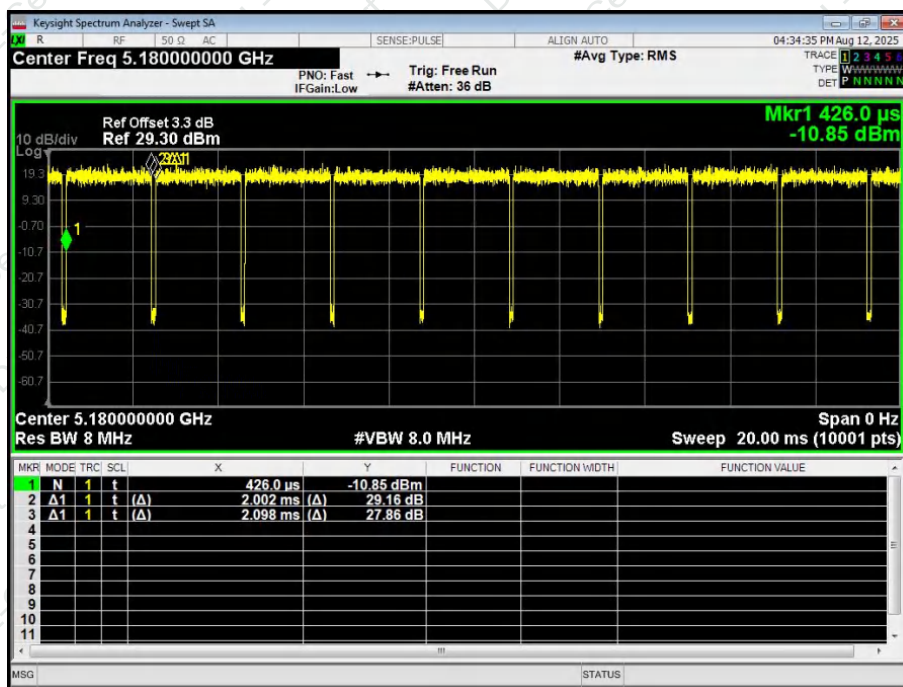


SISO ANT B 802.11n40 - 5190MHz

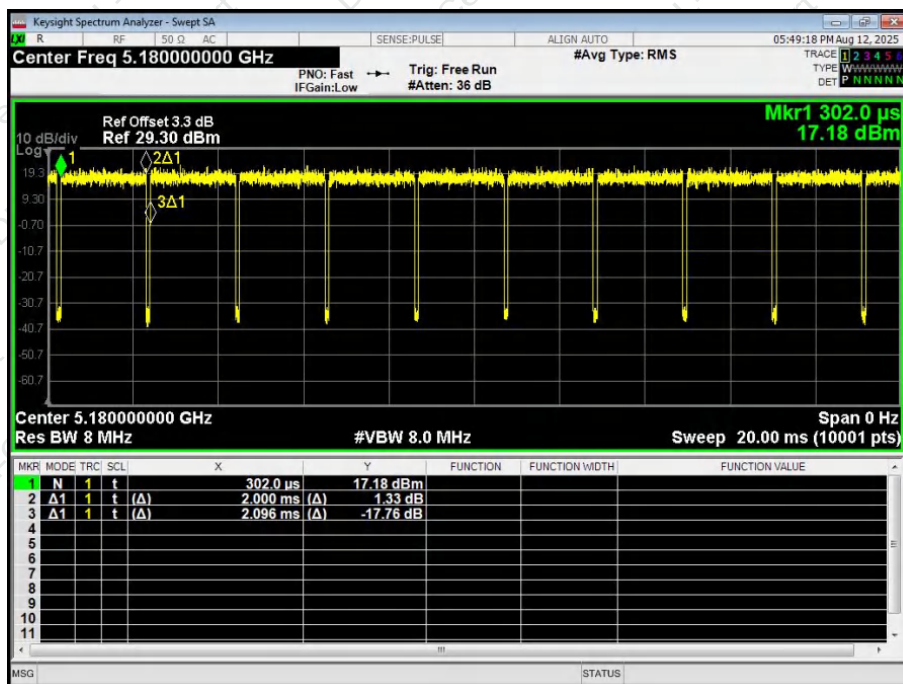




SISO ANT A 802.11ac20 - 5180MHz

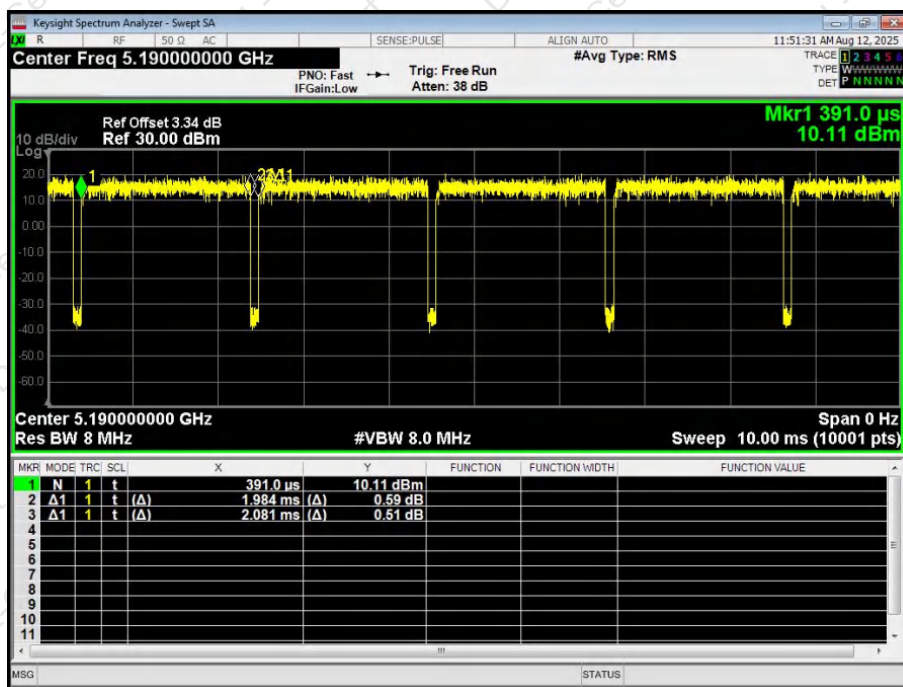


SISO ANT B 802.11ac20 - 5180MHz

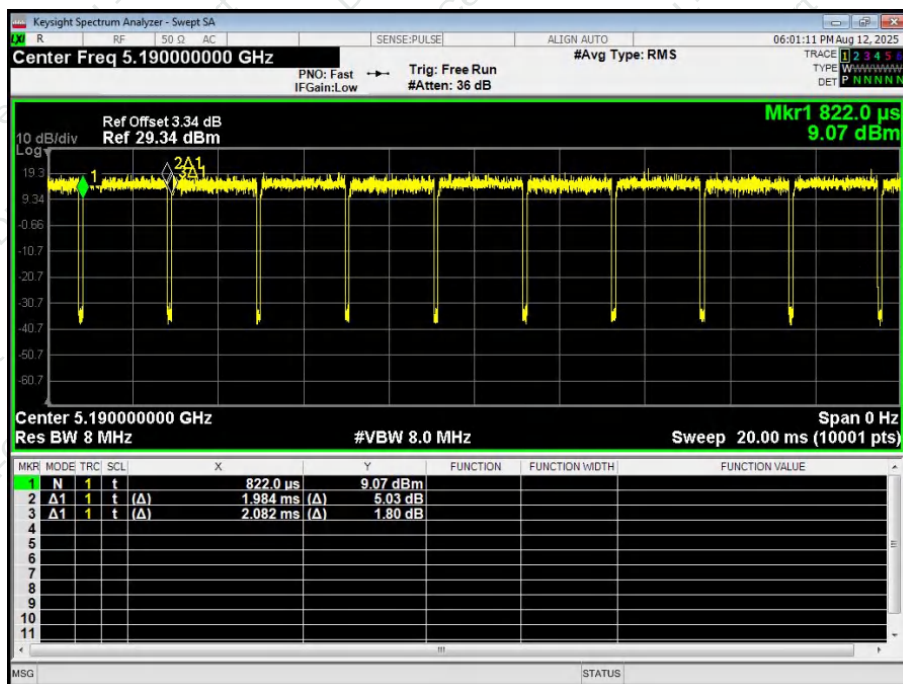




SISO ANT A 802.11ac40 - 5190MHz

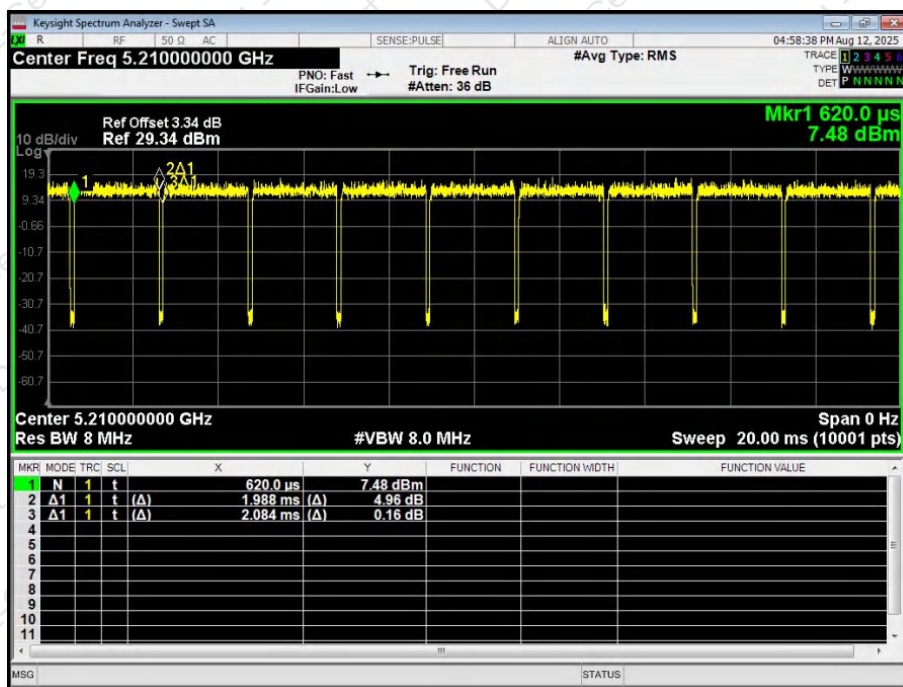


SISO ANT B 802.11ac40 - 5190MHz

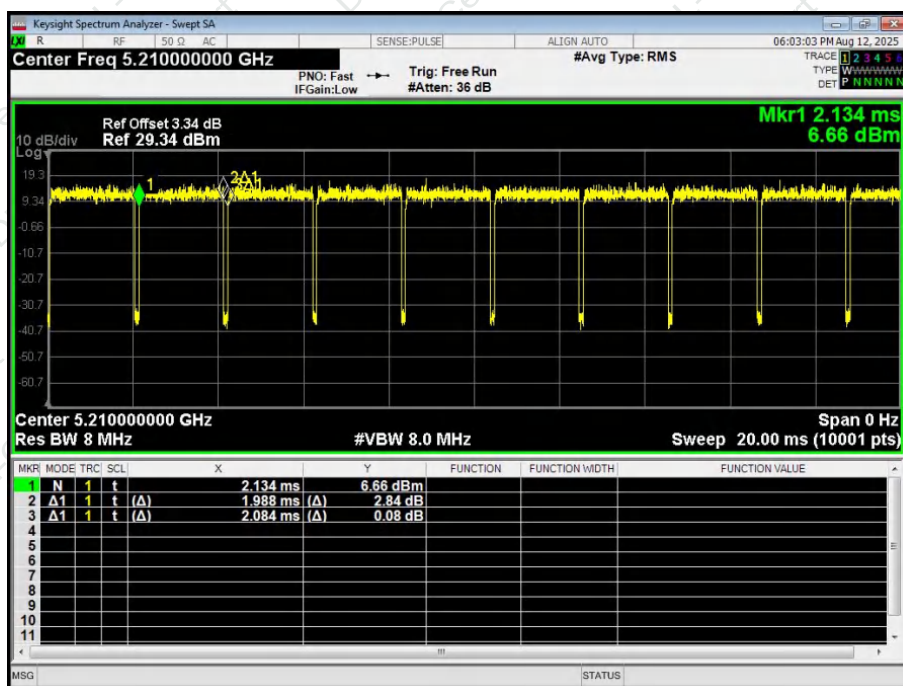




SISO ANT A 802.11ac80 - 5210MHz

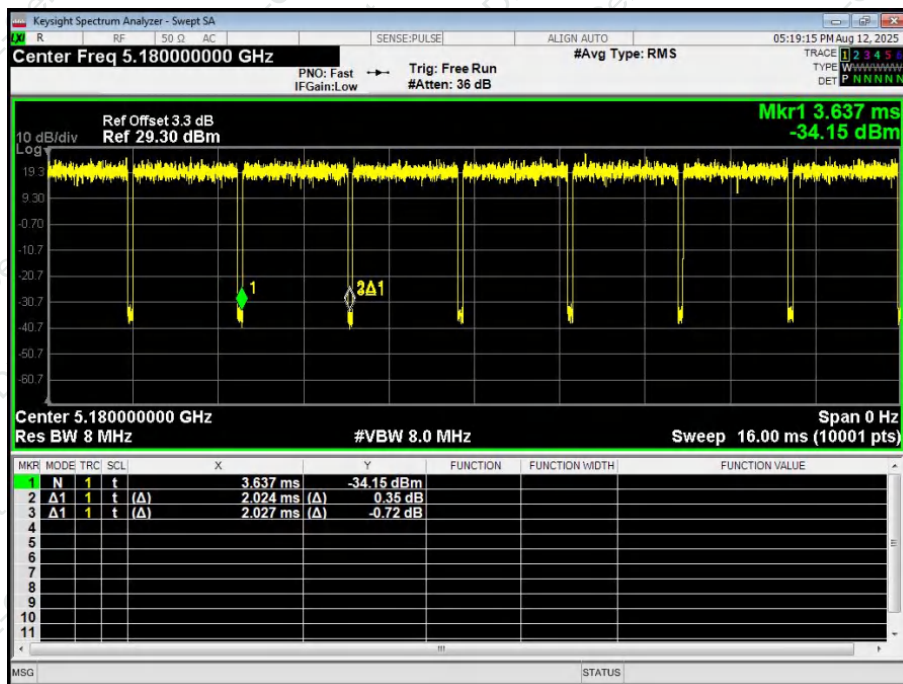


SISO ANT B 802.11ac80 - 5210MHz

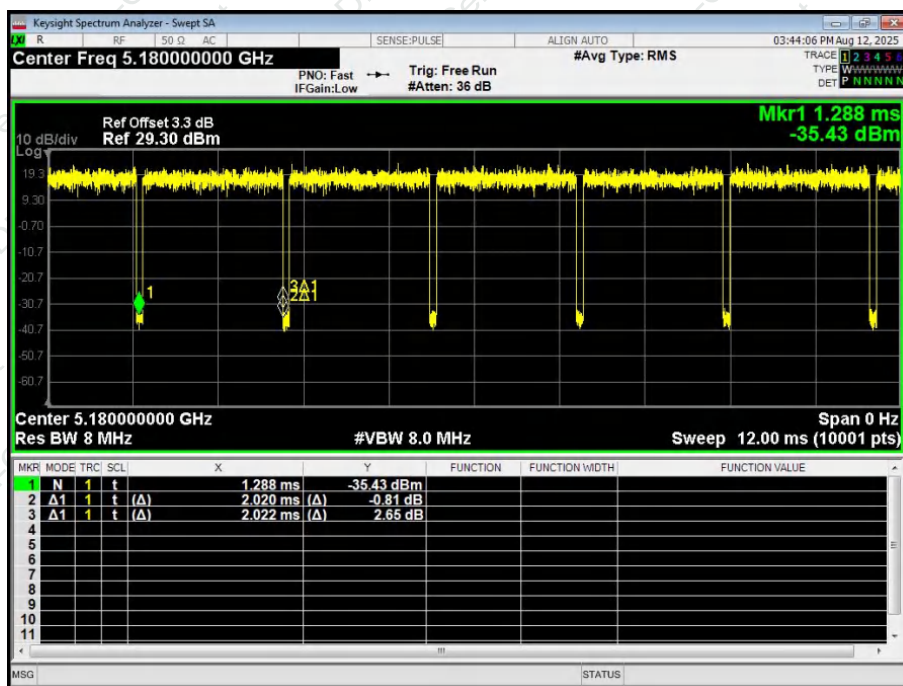




SISO ANT A 802.11ax20 - 5180MHz

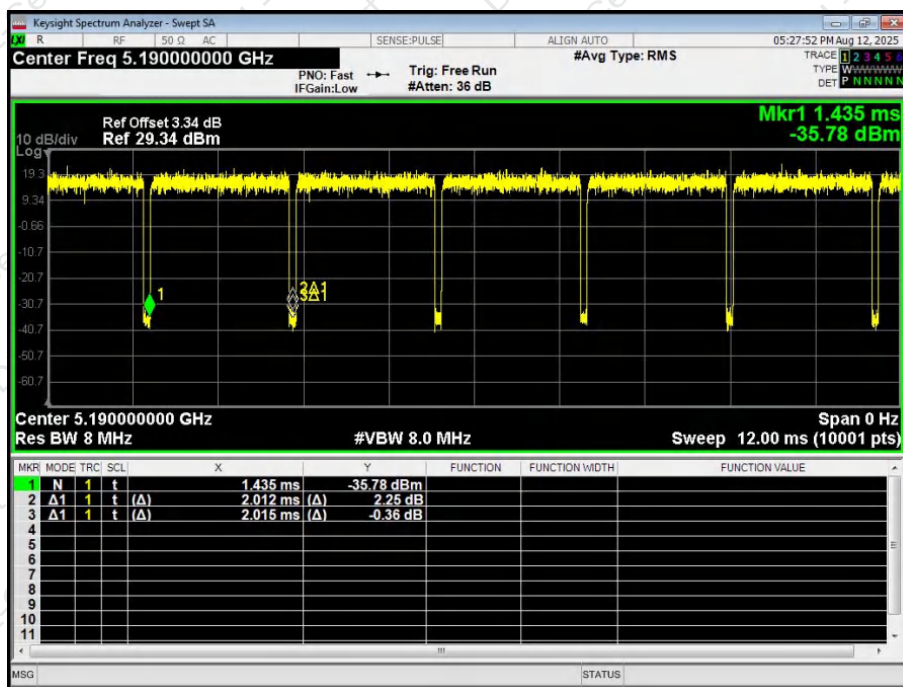


SISO ANT B 802.11ax20 - 5180MHz

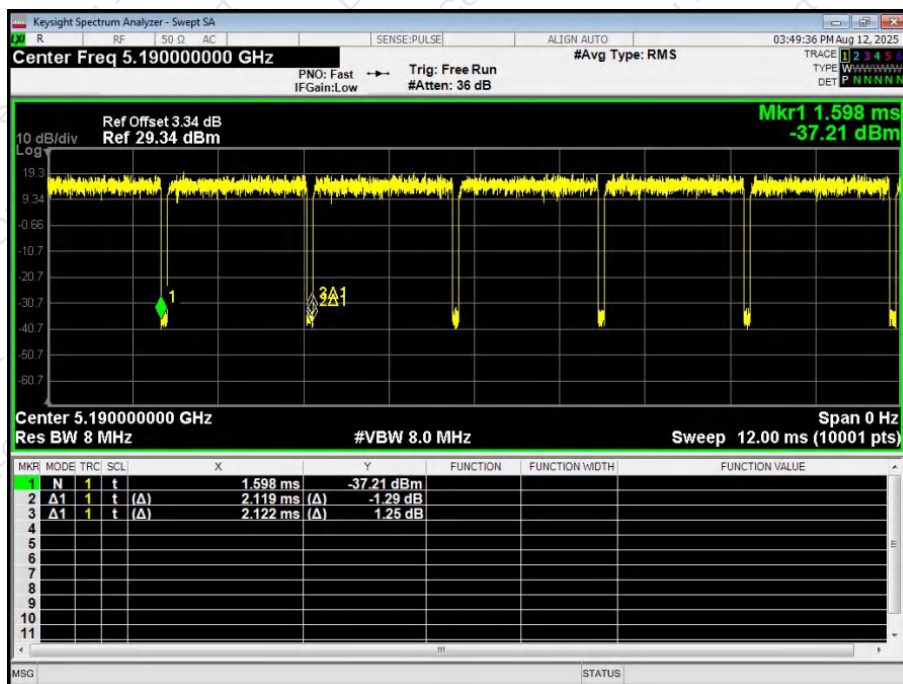




SISO ANT A 802.11ax40 - 5190MHz

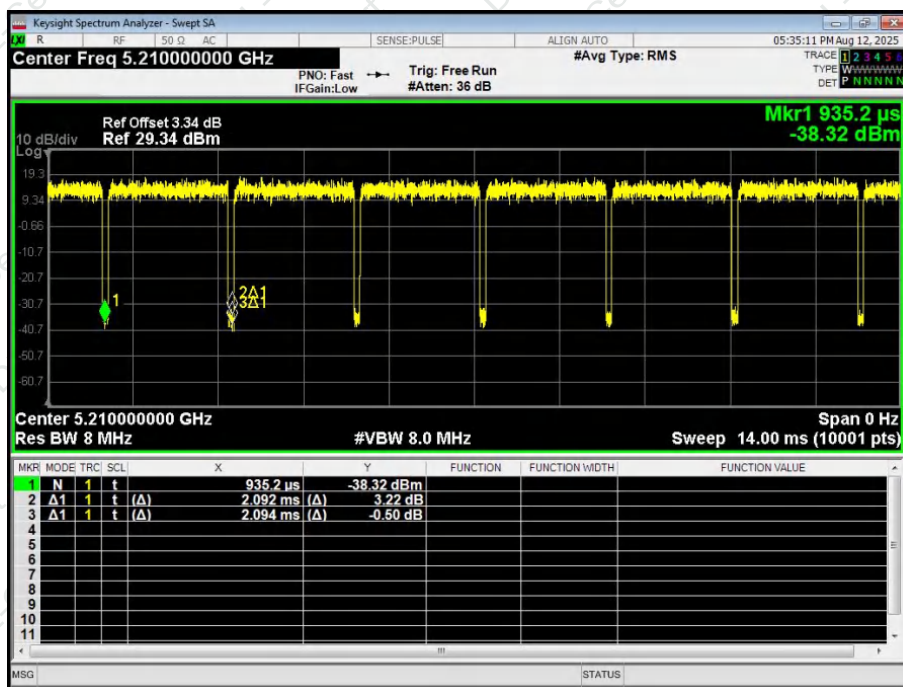


SISO ANT B 802.11ax40 - 5190MHz

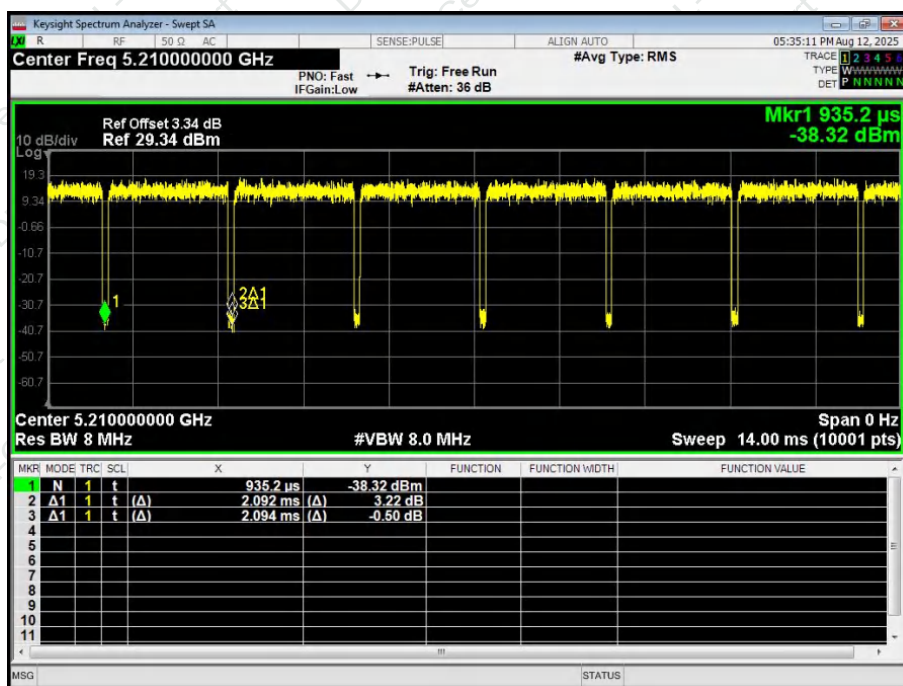




SISO ANT A 802.11ax80 - 5210MHz



SISO ANT B 802.11ax80 - 5210MHz



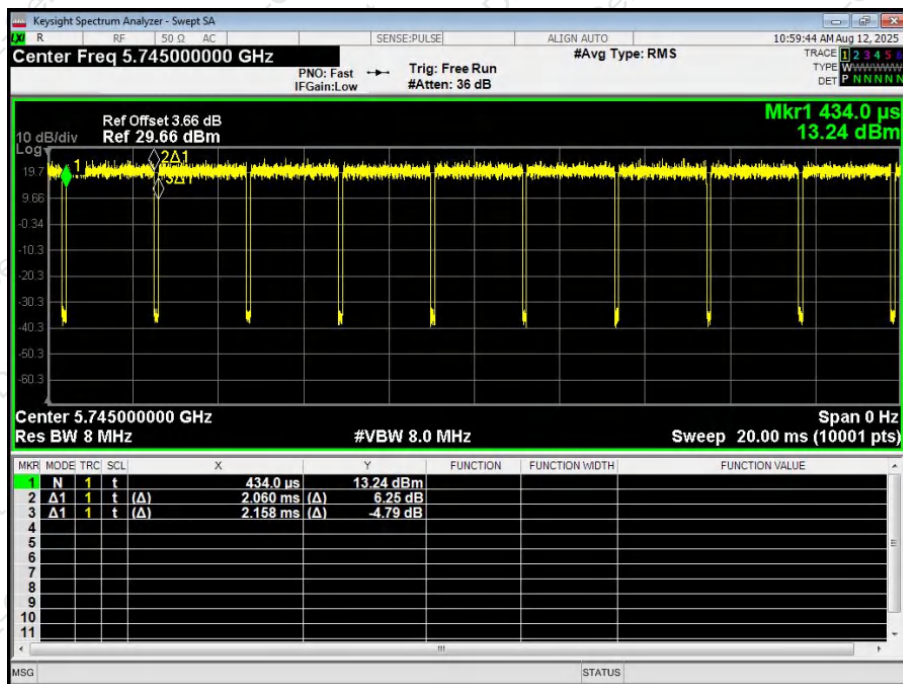


Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	DC 3.85V
Note: All channels have been tested, and only the worst test data is recorded in this report.			

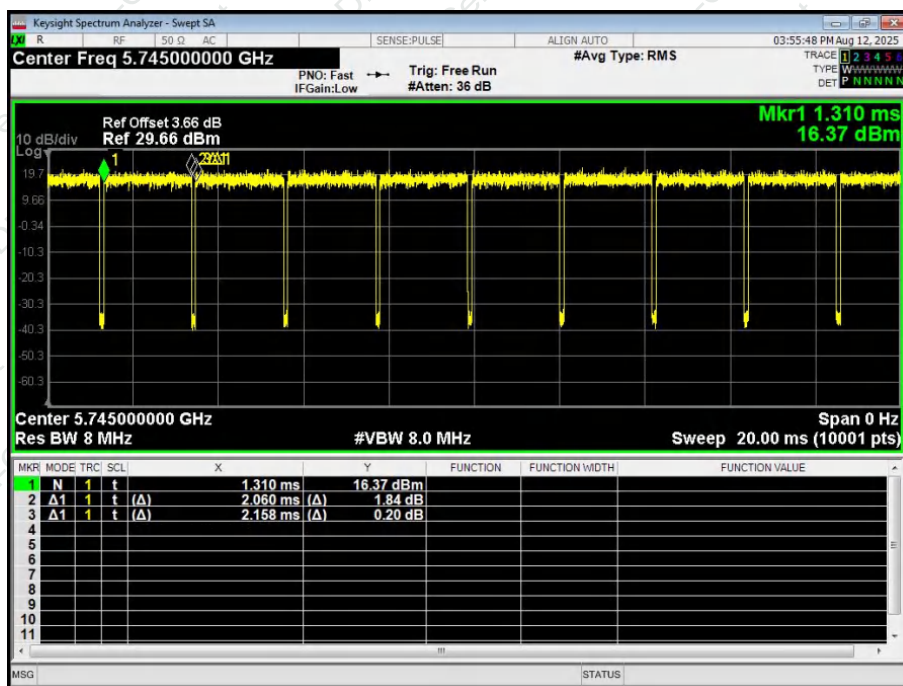
Test Mode	Antenna	Frequency (MHz)	Duty Cycle (%)	Factor (dB)	Result
802.11a	SISO ANT A	5745	95.46	0.202	Pass
	SISO ANT B	5745	95.46	0.202	Pass
802.11n20	SISO ANT A	5745	99.86	0.006	Pass
	SISO ANT B	5745	99.86	0.006	Pass
802.11n40	SISO ANT A	5755	95.38	0.206	Pass
	SISO ANT B	5755	95.33	0.208	Pass
802.11ac20	SISO ANT A	5745	99.85	0.006	Pass
	SISO ANT B	5745	99.85	0.006	Pass
802.11ac40	SISO ANT A	5755	95.34	0.207	Pass
	SISO ANT B	5755	95.34	0.207	Pass
802.11ax80	SISO ANT A	5775	95.44	0.203	Pass
	SISO ANT B	5775	95.44	0.203	Pass
802.11ax20	SISO ANT A	5745	99.86	0.006	Pass
	SISO ANT B	5745	99.85	0.006	Pass
802.11ax40	SISO ANT A	5755	99.85	0.007	Pass
	SISO ANT B	5755	99.85	0.006	Pass
802.11ax80	SISO ANT A	5775	99.86	0.006	Pass
	SISO ANT B	5775	99.86	0.006	Pass
Note: Duty Cycle= Ton /Total*100%					
Duty Cycle Correction Factor = 10log (1/Duty Cycle)					



SISO ANT A 802.11a - 5745MHz

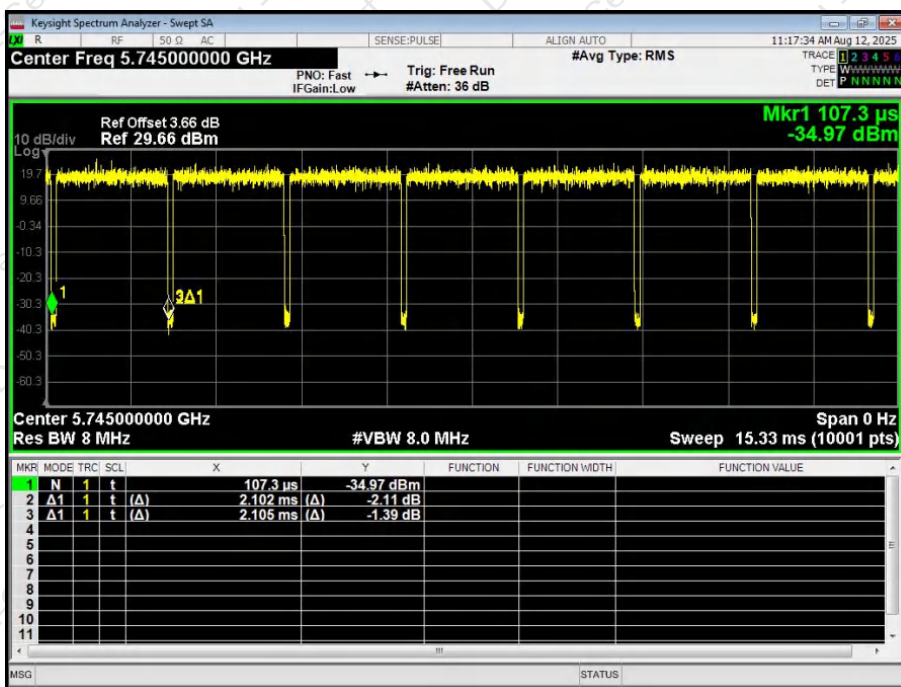


SISO ANT B 802.11a - 5745MHz

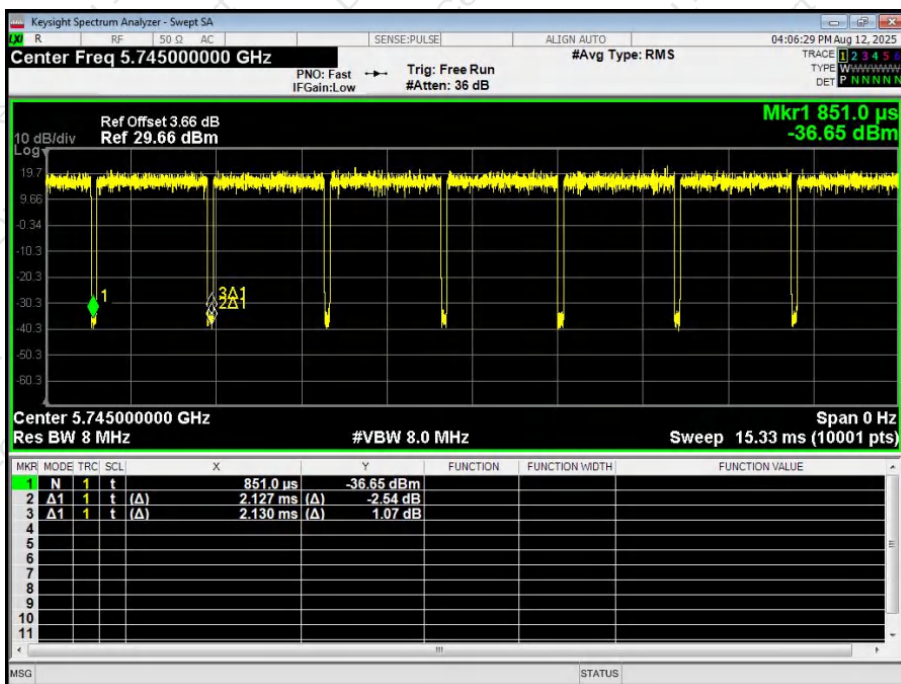




SISO ANT A 802.11n20 - 5745MHz

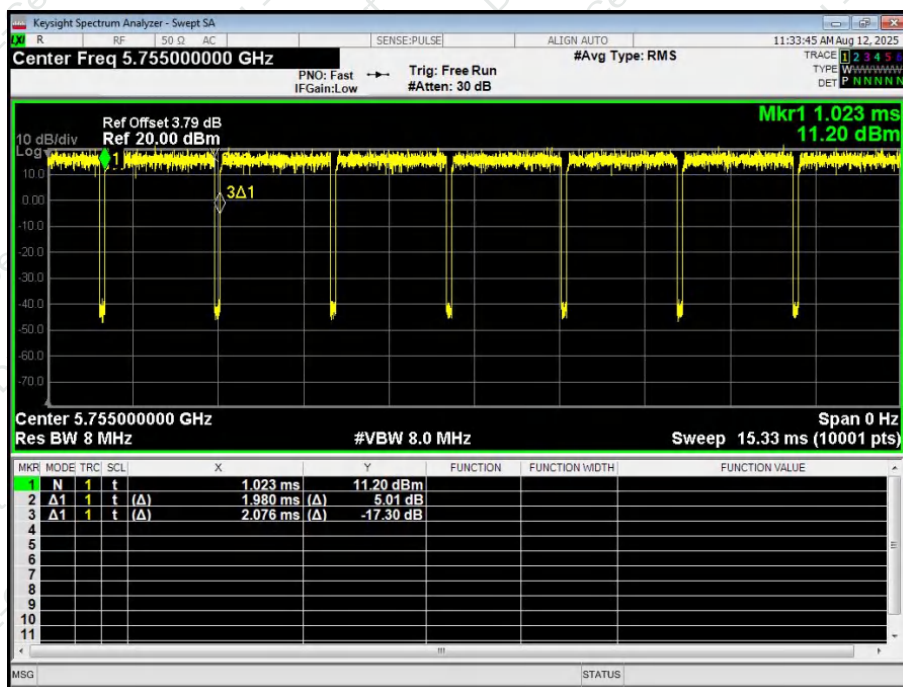


SISO ANT B 802.11n20 - 5745MHz

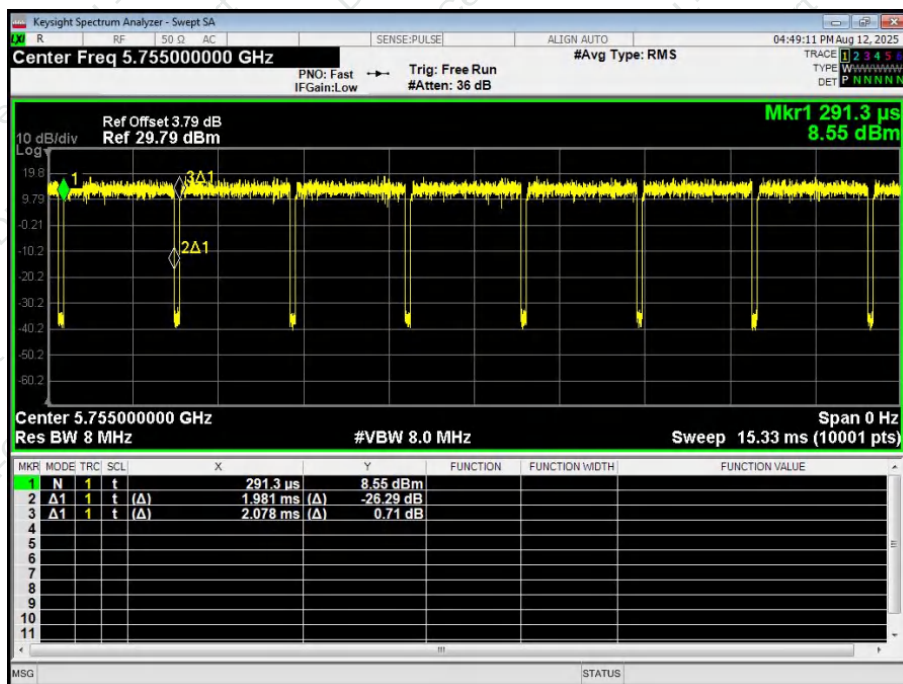




SISO ANT A 802.11n40 - 5755MHz

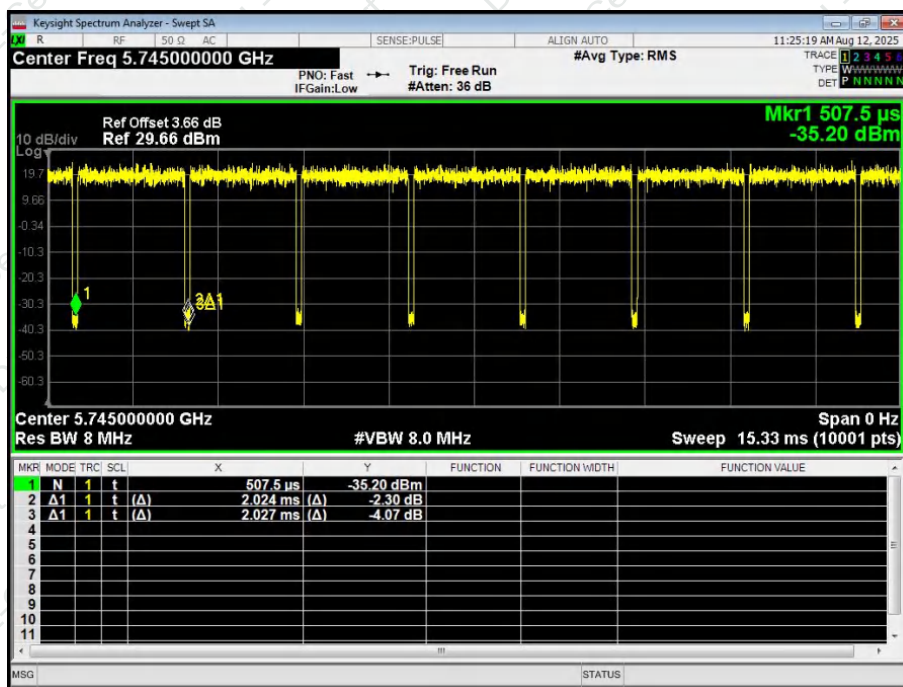


SISO ANT B 802.11n40 - 5755MHz

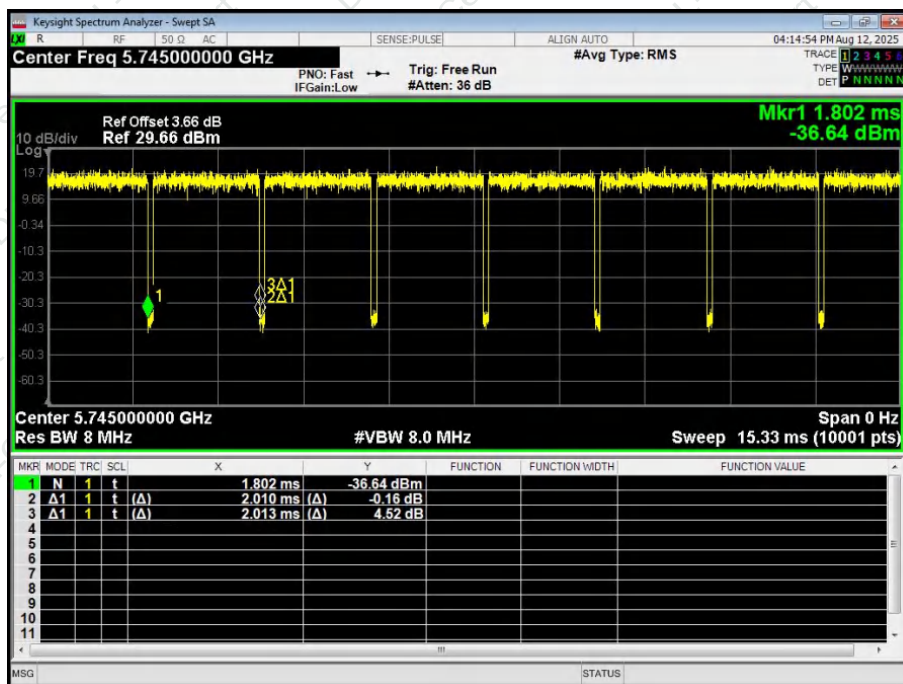




SISO ANT A 802.11ac20 - 5745MHz

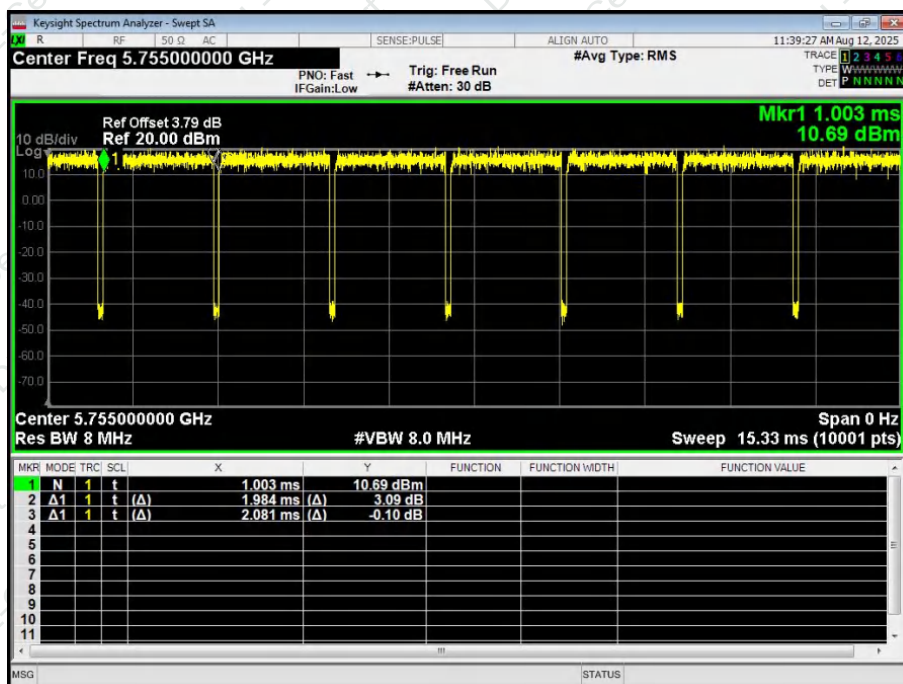


SISO ANT B 802.11ac20 - 5745MHz

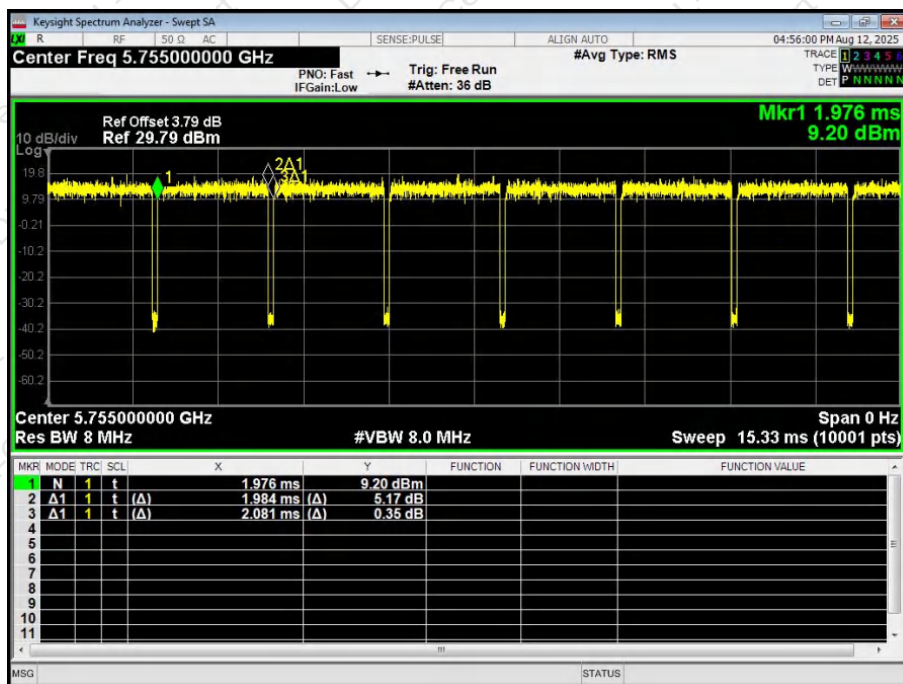




SISO ANT A 802.11ac40 - 5755MHz

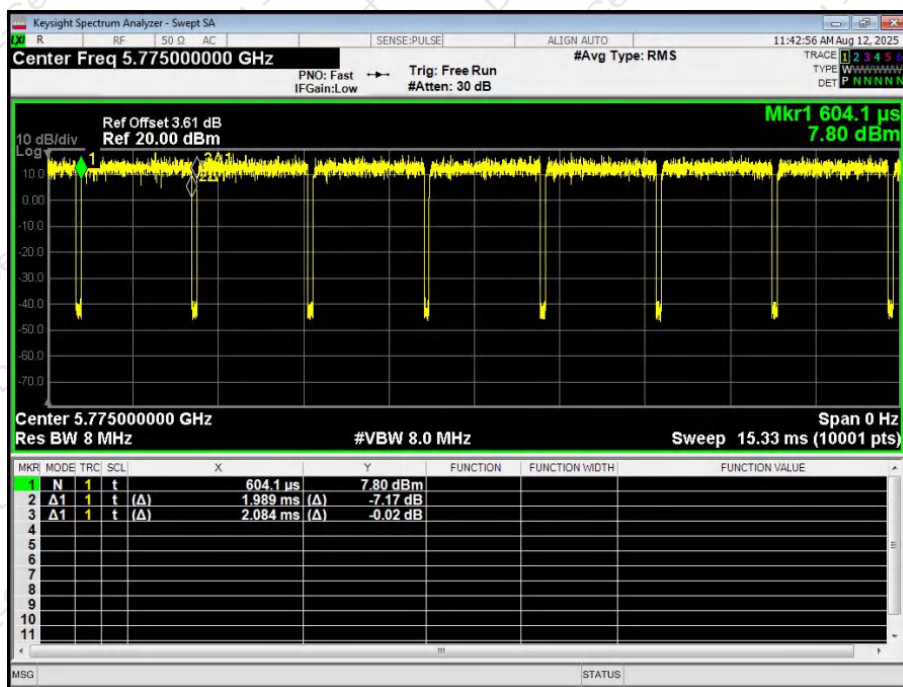


SISO ANT B 802.11ac40 - 5755MHz

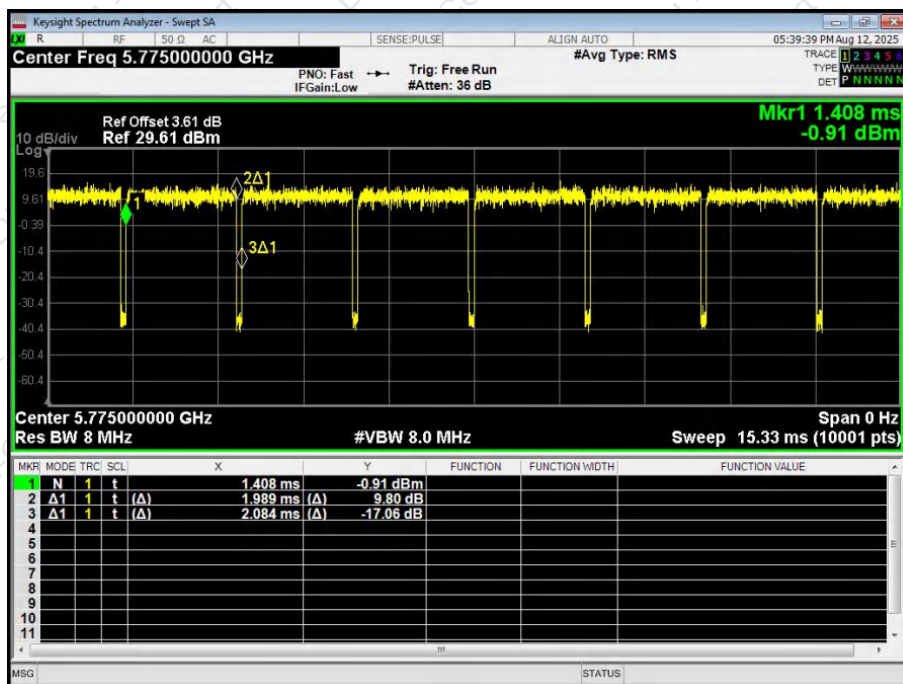




SISO ANT A 802.11ac80 - 5775MHz

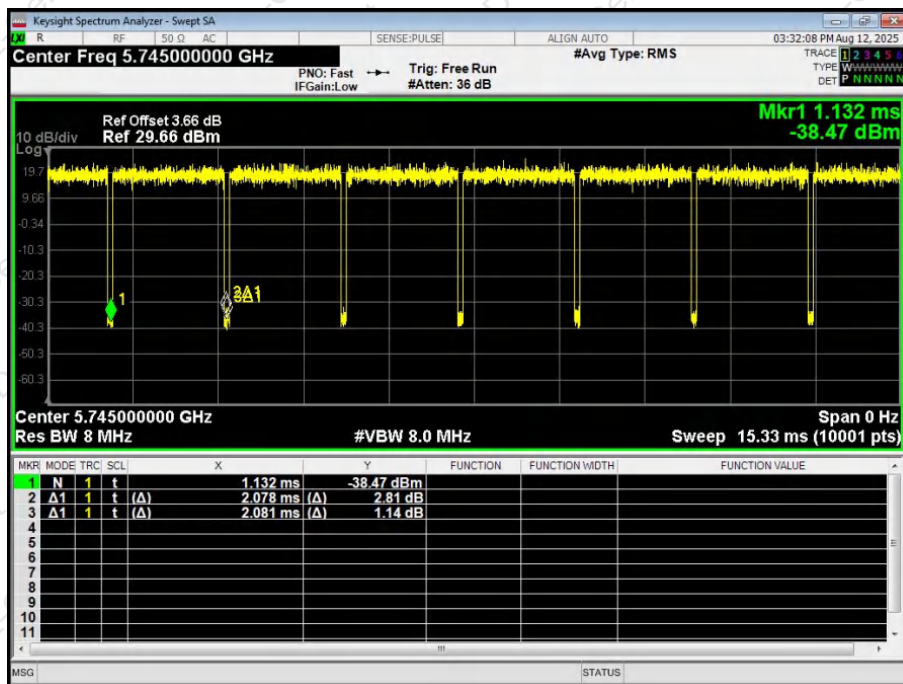


SISO ANT B 802.11ac80 - 5775MHz

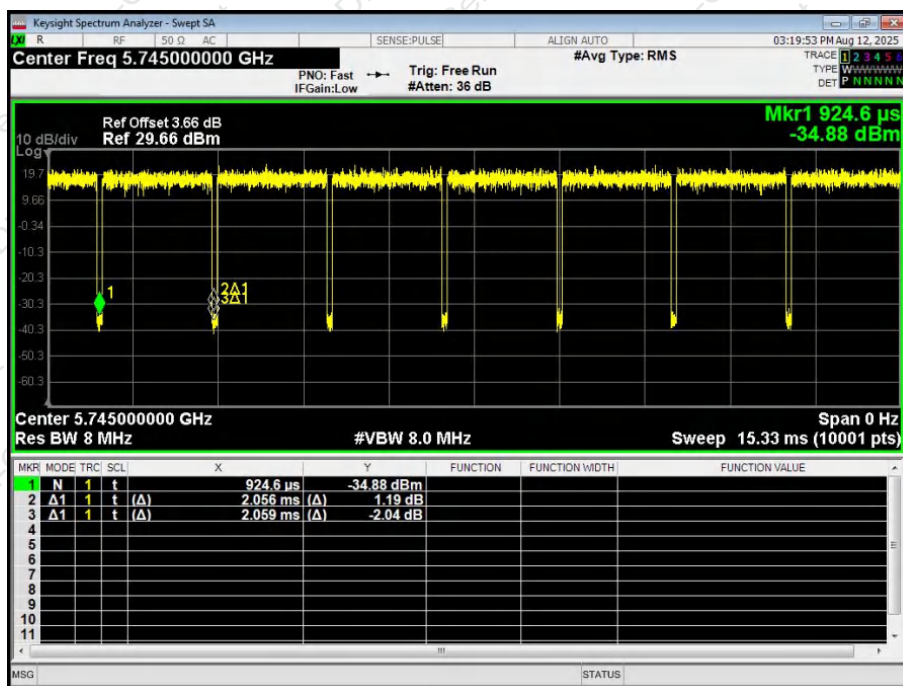




SISO ANT A 802.11ax20 - 5745MHz

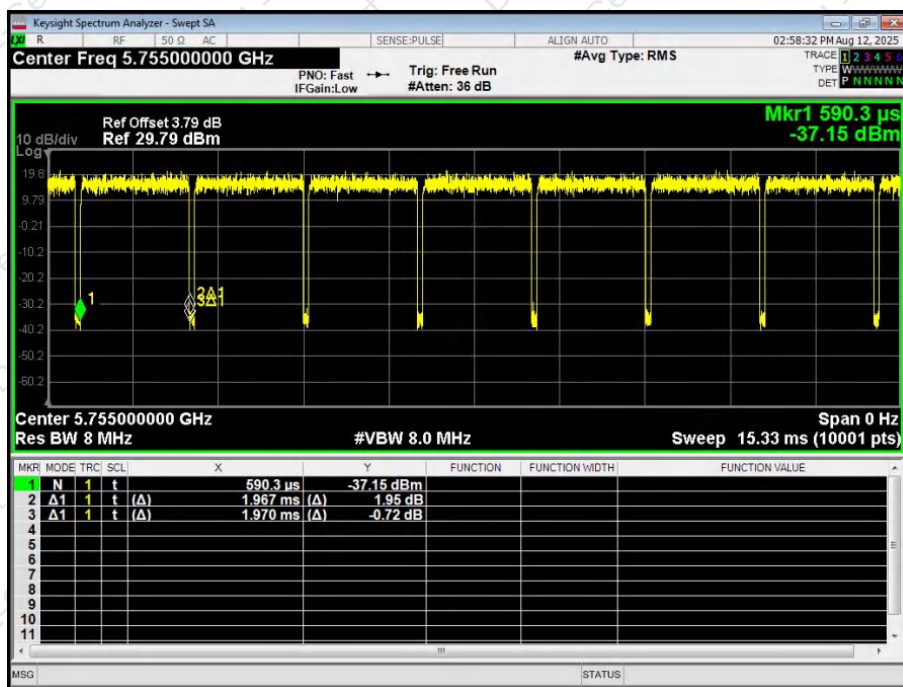


SISO ANT B 802.11ax20 - 5745MHz

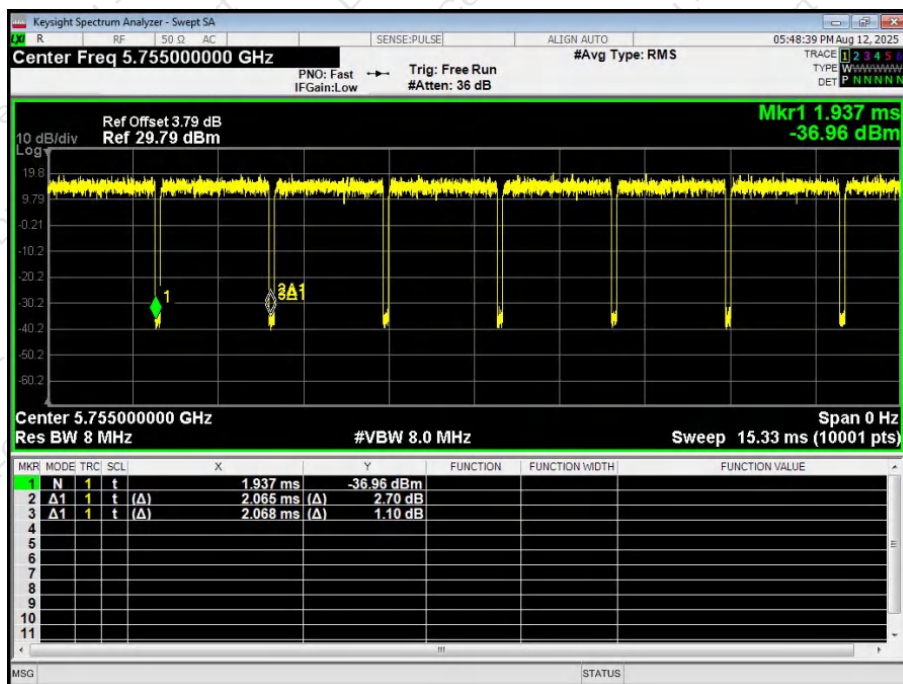




SISO ANT A 802.11ax40 - 5755MHz

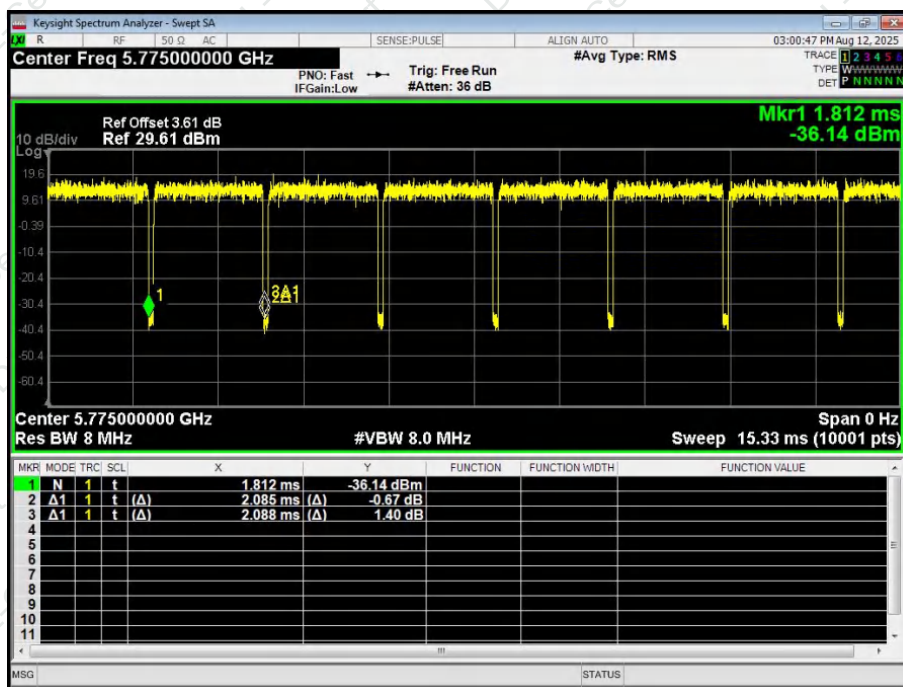


SISO ANT B 802.11ax40 - 5755MHz

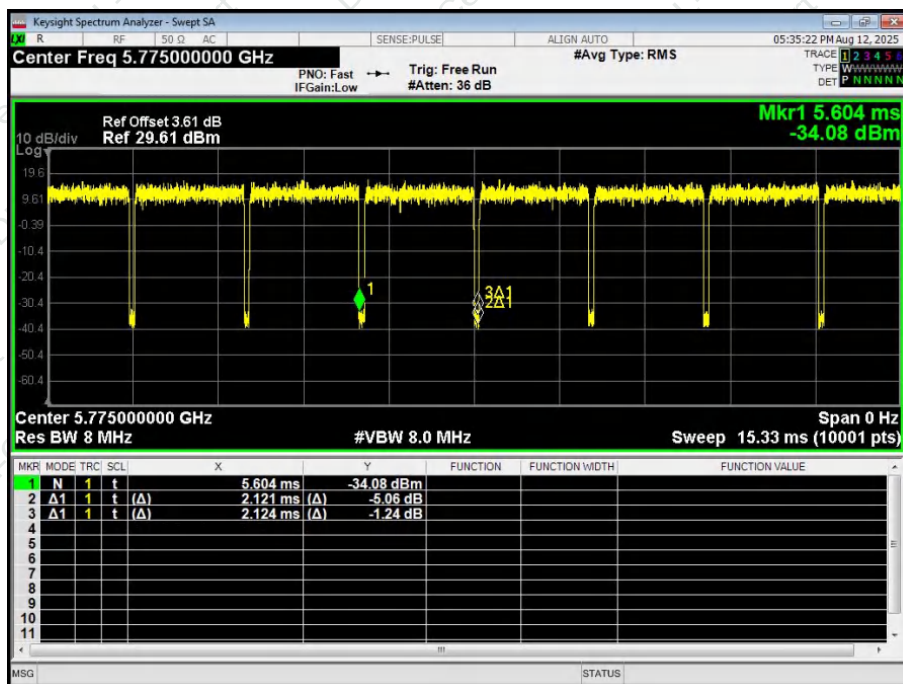




SISO ANT A 802.11ax80 - 5775MHz



SISO ANT B 802.11ax80 - 5775MHz





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 FPC Antenna A&B, the best case gain of the antenna is ANT A is 2dBi & 1.2dBi, ANT B is 2.1dBi & 2.2dBi, 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 *****