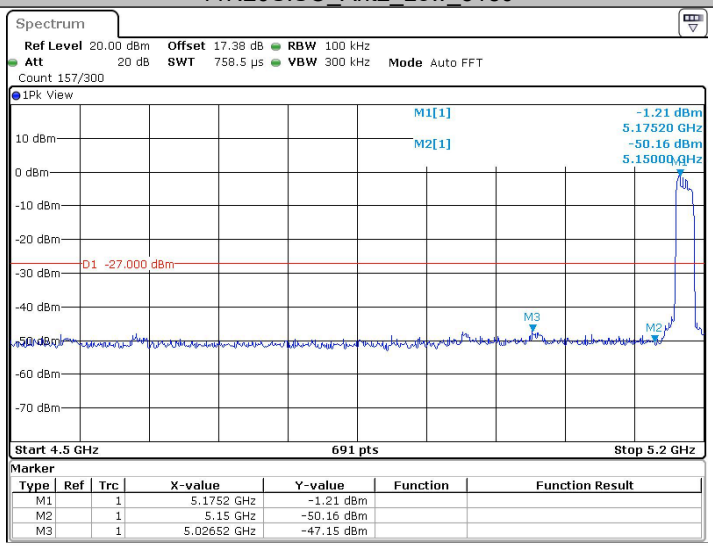
11N20SISO_Ant2_Low_5180

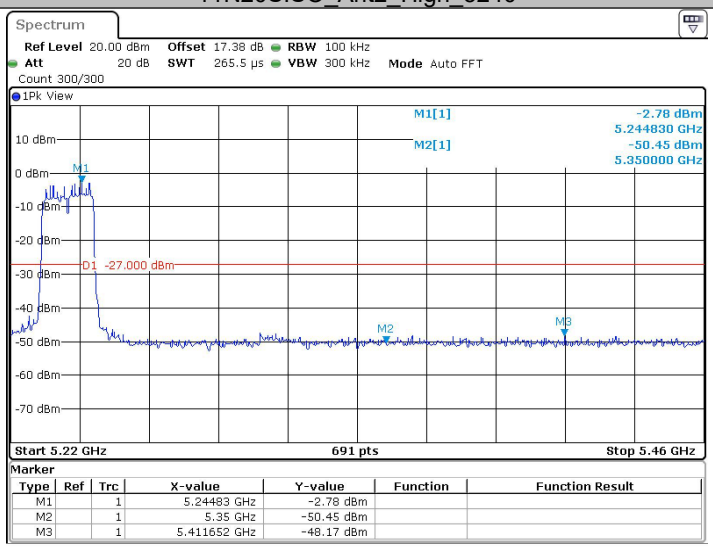


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.1752 GHz	-1.21 dBm		
M2		1	5.15 GHz	-50.16 dBm		
M3		1	5.02652 GHz	-47.15 dBm		

Date: 21.MAR.2024 15:33:02

11N20SISO_Ant2_High_5240

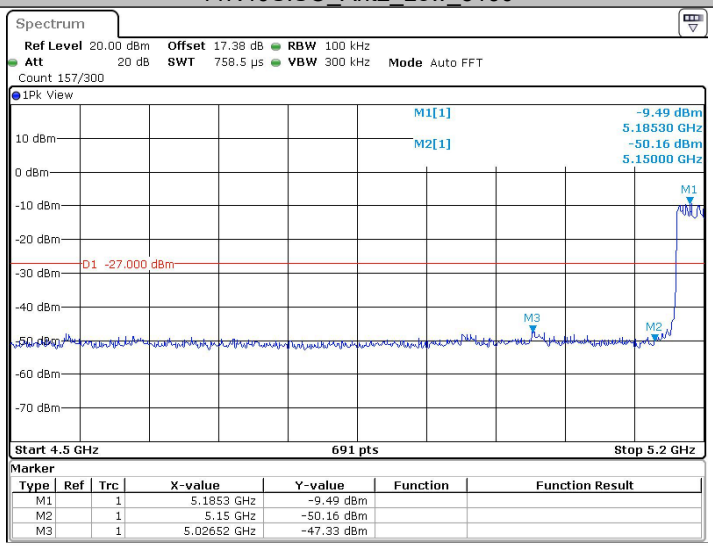


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.24483 GHz	-2.78 dBm		
M2		1	5.35 GHz	-50.45 dBm		
M3		1	5.411652 GHz	-48.17 dBm		

Date: 21.MAR.2024 15:38:51

11N40SISO_Ant2_Low_5190

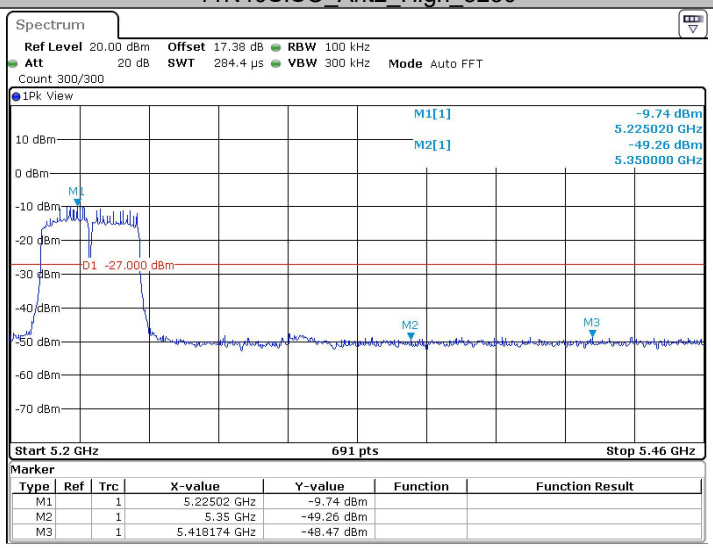


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.1853 GHz	-9.49 dBm		
M2		1	5.15 GHz	-50.16 dBm		
M3		1	5.02652 GHz	-47.33 dBm		

Date: 21.MAR.2024 15:57:09

11N40SISO_Ant2_High_5230

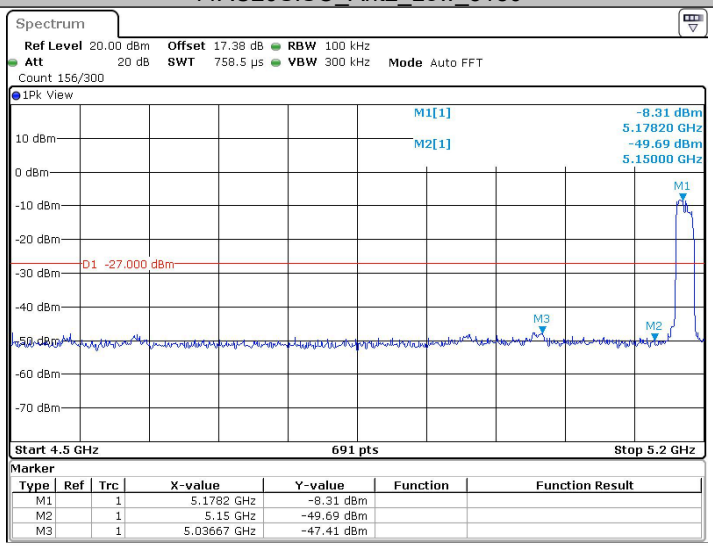


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.22502 GHz	-9.74 dBm		
M2		1	5.35 GHz	-49.26 dBm		
M3		1	5.418174 GHz	-48.47 dBm		

Date: 21.MAR.2024 16:01:07

11AC20SISO_Ant2_Low_5180

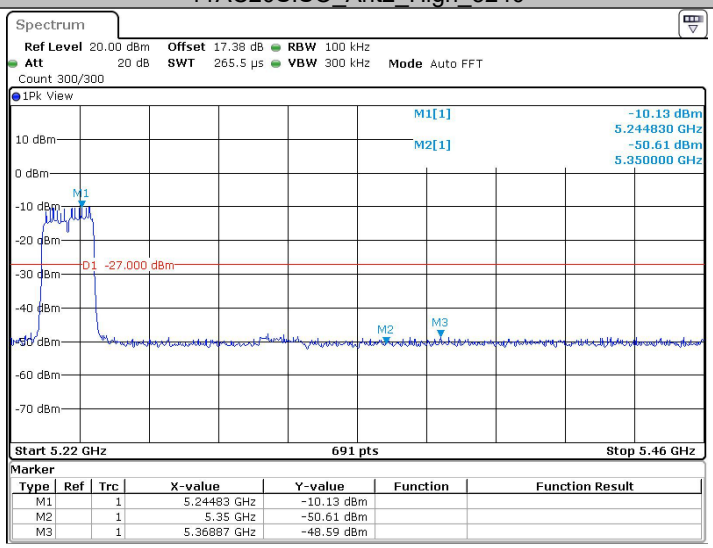


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.1782 GHz	-8.31 dBm		
M2		1	5.15 GHz	-49.69 dBm		
M3		1	5.03667 GHz	-47.41 dBm		

Date: 21.MAR.2024 16:22:09

11AC20SISO_Ant2_High_5240

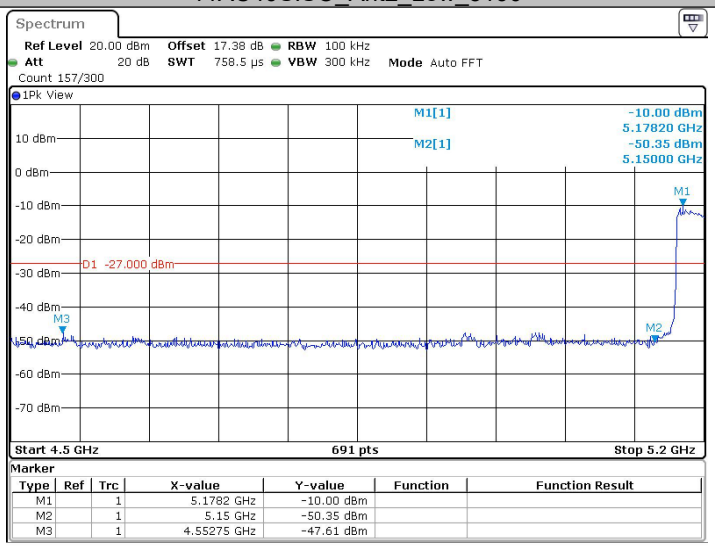


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.24483 GHz	-10.13 dBm		
M2		1	5.35 GHz	-50.61 dBm		
M3		1	5.36887 GHz	-48.59 dBm		

Date: 21.MAR.2024 16:31:16

11AC40SISO_Ant2_Low_5190

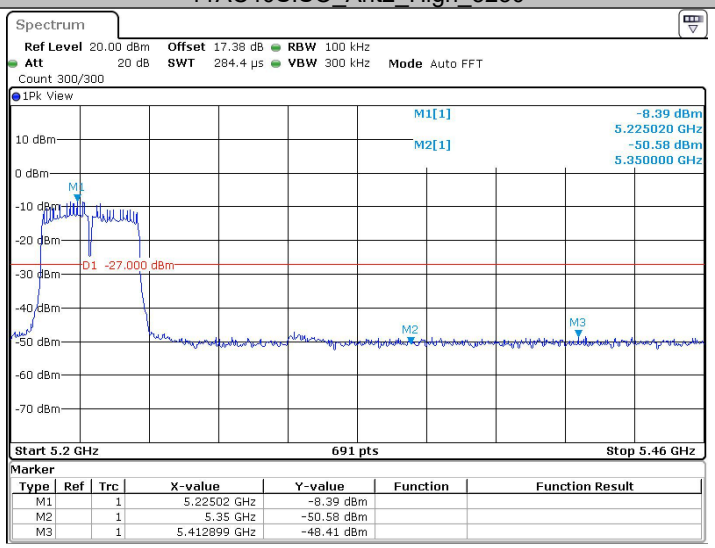


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.1782 GHz	-10.00 dBm		
M2		1	5.15 GHz	-50.35 dBm		
M3		1	4.55275 GHz	-47.61 dBm		

Date: 21.MAR.2024 17:30:12

11AC40SISO_Ant2_High_5230



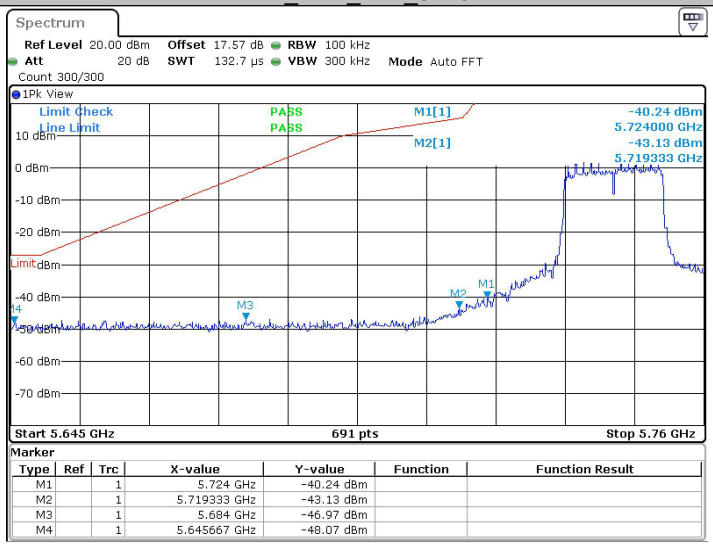
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.22502 GHz	-8.39 dBm		
M2		1	5.35 GHz	-50.58 dBm		
M3		1	5.412899 GHz	-48.41 dBm		

Date: 21.MAR.2024 17:33:40

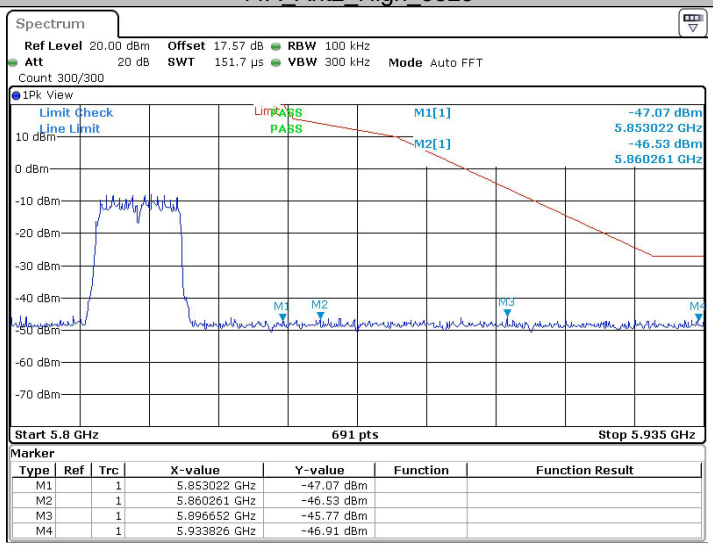
7.1.4 Test Graphs B4

11A_Ant2_Low_5745



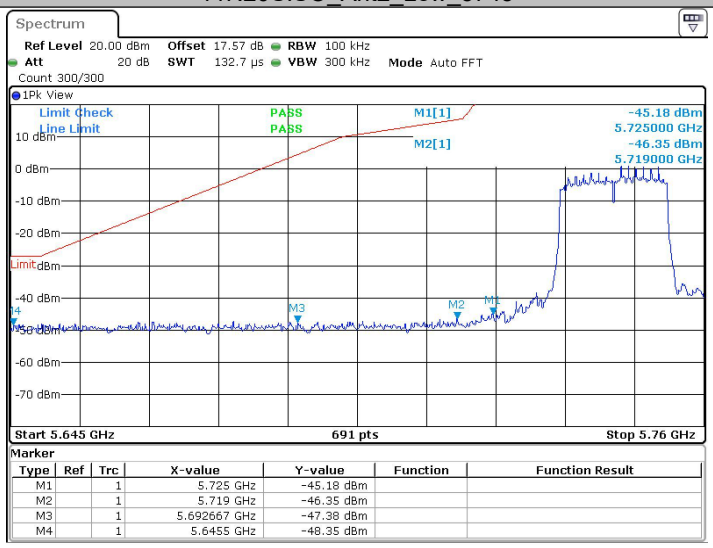
Date: 21.MAR.2024 15:24:59

11A_Ant2_High_5825



Date: 21.MAR.2024 15:29:46

11N20SISO_Ant2_Low_5745

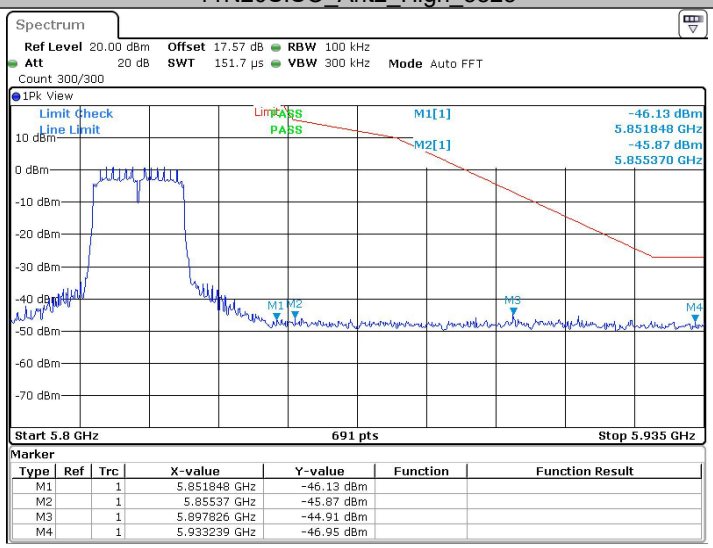


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-45.18 dBm		
M2		1	5.719 GHz	-46.35 dBm		
M3		1	5.692667 GHz	-47.38 dBm		
M4		1	5.6455 GHz	-48.35 dBm		

Date: 21.MAR.2024 15:42:33

11N20SISO_Ant2_High_5825

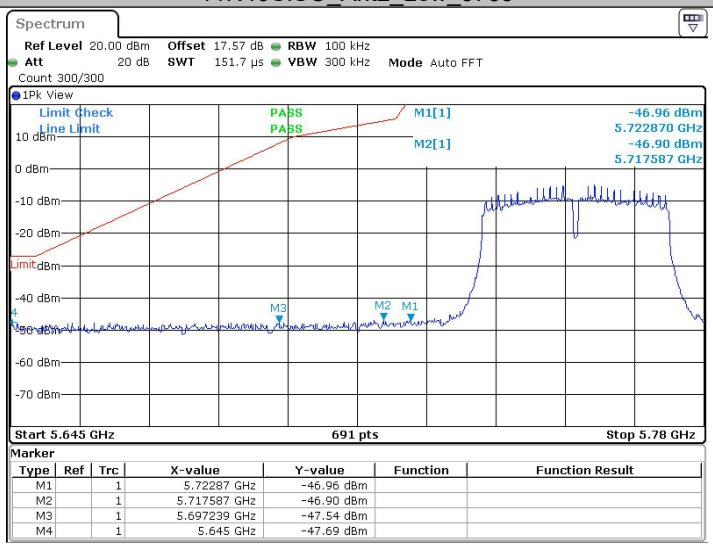


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.851848 GHz	-46.13 dBm		
M2		1	5.85537 GHz	-45.87 dBm		
M3		1	5.897826 GHz	-44.91 dBm		
M4		1	5.933239 GHz	-46.95 dBm		

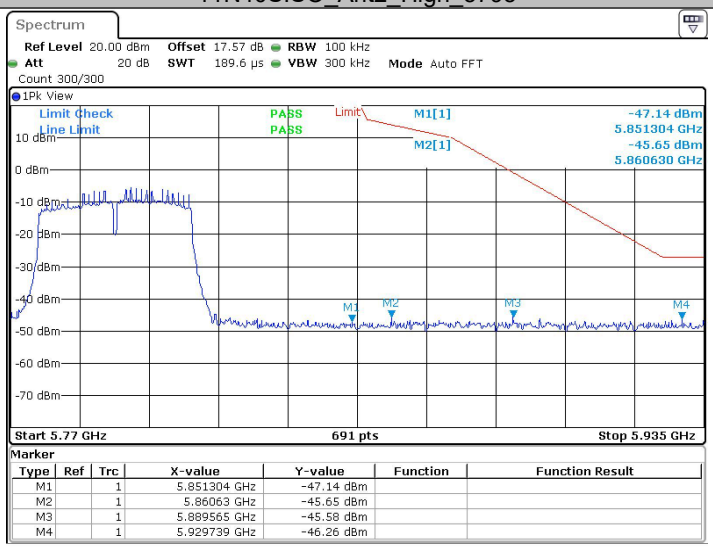
Date: 21.MAR.2024 15:50:51

11N40SISO_Ant2_Low_5755



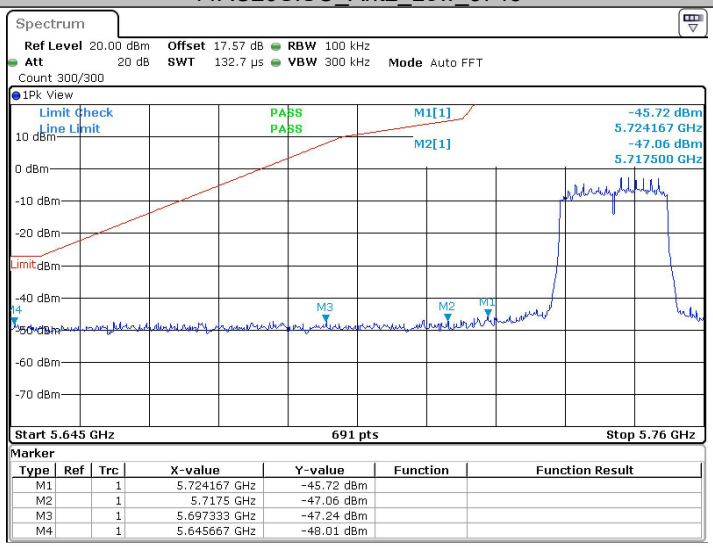
Date: 21.MAR.2024 16:13:27

11N40SISO_Ant2_High_5795



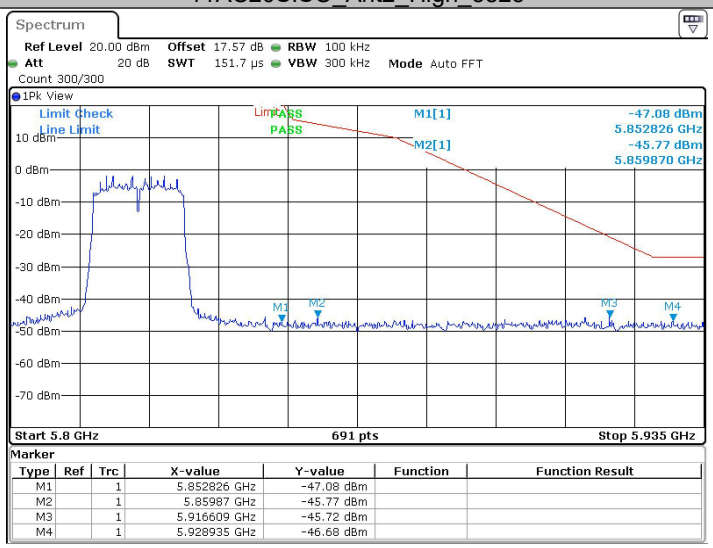
Date: 21.MAR.2024 16:19:35

11AC20SISO_Ant2_Low_5745



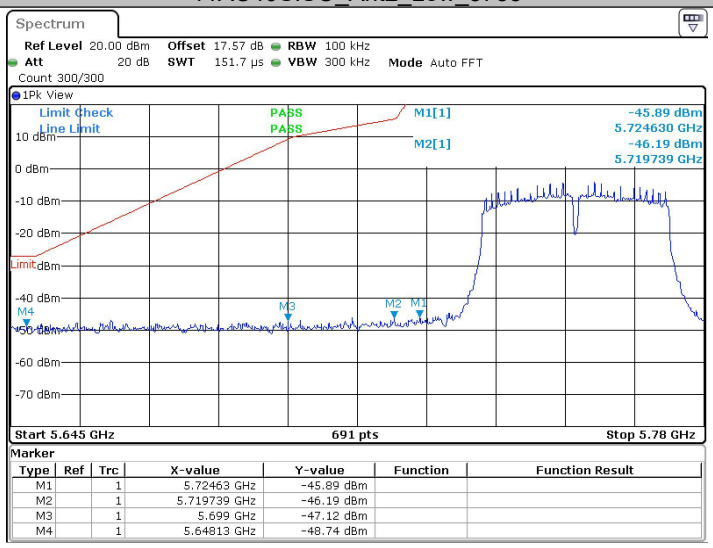
Date: 21.MAR.2024 16:34:48

11AC20SISO_Ant2_High_5825



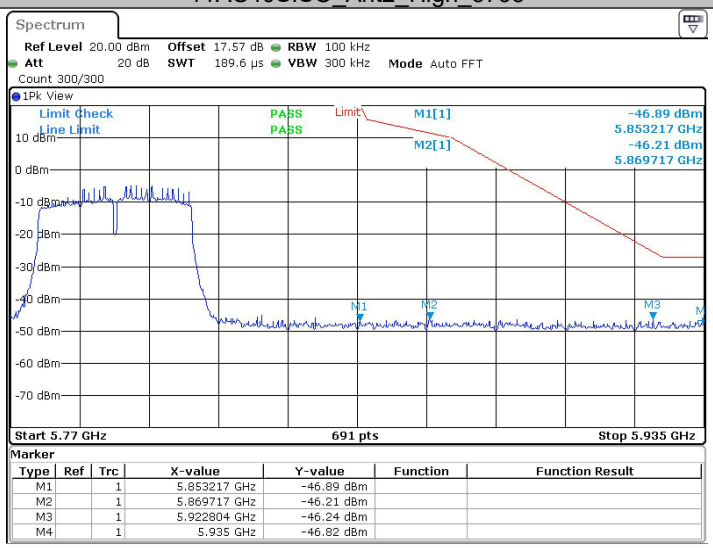
Date: 21.MAR.2024 16:42:44

11AC40SISO_Ant2_Low_5755



Date: 21.MAR.2024 17:36:39

11AC40SISO_Ant2_High_5795



Date: 21.MAR.2024 17:40:40

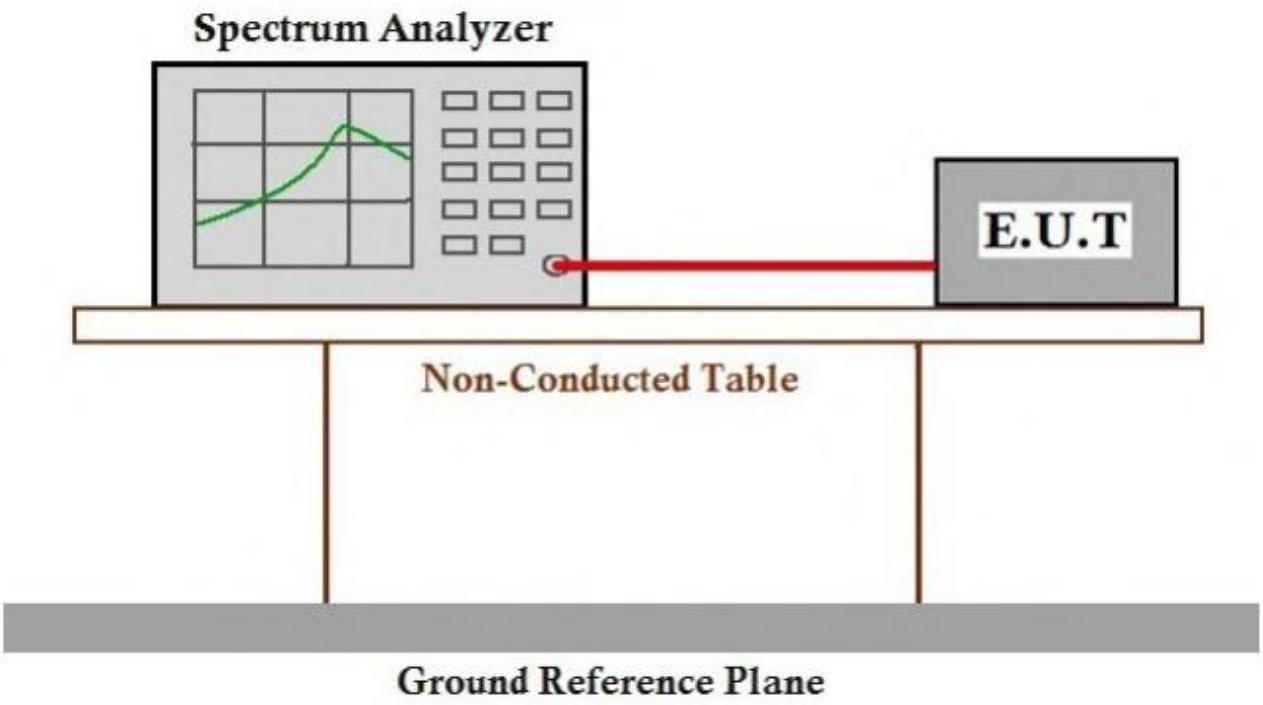
Appendix E): Frequency Stability

Test Requirement 47 CFR Part 15, Subpart C 15.407 (g)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit:The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 14.4 degrees to 17.6 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

Test Setup Diagram



Measurement Data

ANT1:

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp (℃)	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
45	VN	-48000.00	-9.160305
35		-48000.00	-9.160305
25		-48000.00	-9.160305
15		-48000.00	-9.160305
10		-48000.00	-9.160305
0		-48000.00	-9.160305
-10		-48000.00	-9.160305

Frequency Stability Versus Temp.			
Operating Frequency: 5180 MHz			
Temp.	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
TN	VL	-51900.00	-10.019305
	VN	-51900.00	-10.019305
	VH	-51900.00	-10.019305

Frequency Stability Versus Temp.			
Operating Frequency: 5745 MHz			
Temp (℃)	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
45	VN	-58900.00	-10.252393
35		-58900.00	-10.252393
25		-58900.00	-10.252393
15		-58900.00	-10.252393
10		-58900.00	-10.252393
0		-58900.00	-10.252393
-10		-58900.00	-10.252393

Frequency Stability Versus Temp.			
Operating Frequency: 5785 MHz			
Temp.	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
TN	VL	-58900.00	-10.181504
	VN	-58900.00	-10.181504
	VH	-58900.00	-10.181504

Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

ANT2:

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp (℃)	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
45	VN	-53900.00	-10.286260
35		-53900.00	-10.286260
25		-53900.00	-10.286260
15		-53900.00	-10.286260
10		-53900.00	-10.286260
0		-53900.00	-10.286260
-10		-53900.00	-10.286260

Frequency Stability Versus Temp.			
Operating Frequency: 5180 MHz			
Temp.	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
TN	VL	-53900.00	-10.405405
	VN	-53900.00	-10.405405
	VH	-53900.00	-10.405405

Frequency Stability Versus Temp.			
Operating Frequency: 5745 MHz			
Temp (℃)	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
45	VN	-53900.00	-10.385356
35		-53900.00	-10.385356
25		-53900.00	-10.385356
15		-53900.00	-10.385356
10		-53900.00	-10.385356
0		-53900.00	-10.385356
-10		-53900.00	-10.385356

Frequency Stability Versus Temp.			
Operating Frequency: 5785 MHz			
Temp.	Volta ge	Deviation (Hz)	Frequency Drift (ppm)
TN	VL	-59900.00	-10.354365
	VN	-59900.00	-10.354365
	VH	-59900.00	-10.354365

Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

Appendix F): Antenna Requirement

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.

15.407(a)(1) (2) requirement:

The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is internal antenna with ipex connector.The best case gain of the 5G WiFi antenna is 3.77dBi@Band 1, 3.32dBi@Band 4.

Appendix G): Operation in the absence of information to the transmit

15.407(c) requirement: The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.
Operation in the absence of information to the transmit
While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

Appendix H): AC Power Line Conducted Emission

Test Procedure:	Test frequency range :150KHz-30MHz 1)The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
Limit:	

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

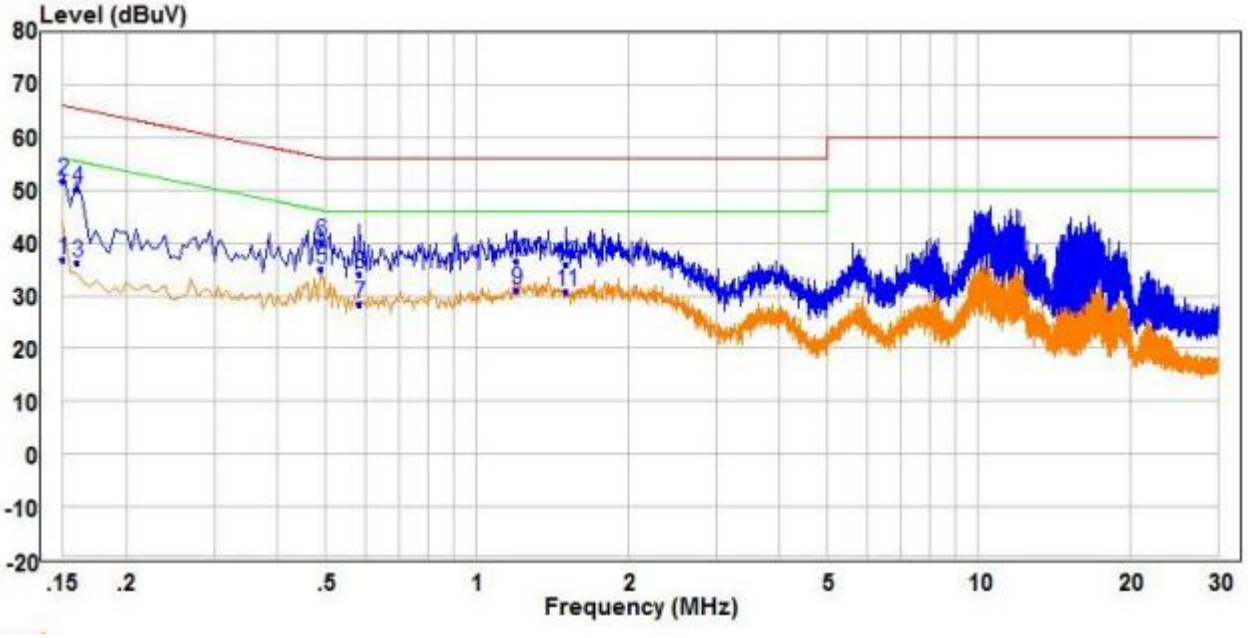
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
NOTE : The lower limit is applicable at the transition frequency

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

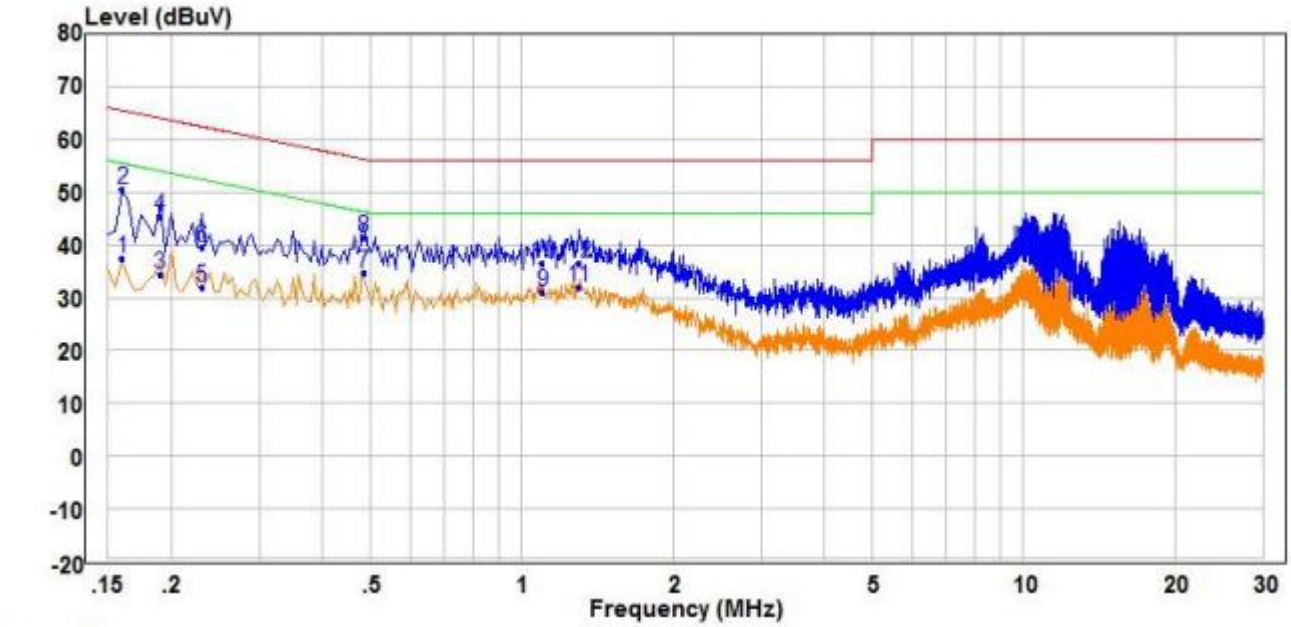
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.150	27.04	9.70	36.74	56.00	-19.26	Average	Line
2	QP	0.150	42.00	9.70	51.70	66.00	-14.30	QP	Line
3		0.160	26.70	9.68	36.38	55.46	-19.08	Average	Line
4		0.160	40.47	9.68	50.15	65.46	-15.31	QP	Line
5	PP	0.490	25.37	9.69	35.06	46.17	-11.11	Average	Line
6		0.490	30.37	9.69	40.06	56.17	-16.11	QP	Line
7		0.585	18.46	9.79	28.25	46.00	-17.75	Average	Line
8		0.585	24.42	9.79	34.21	56.00	-21.79	QP	Line
9		1.200	20.89	10.21	31.10	46.00	-14.90	Average	Line
10		1.200	26.32	10.21	36.53	56.00	-19.47	QP	Line
11		1.510	19.79	10.86	30.65	46.00	-15.35	Average	Line
12		1.510	25.20	10.86	36.06	56.00	-19.94	QP	Line

Neutral line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.160	27.63	9.68	37.31	55.46	-18.15	Average	Neutral
2		0.160	40.73	9.68	50.41	65.46	-15.05	QP	Neutral
3		0.190	24.74	9.62	34.36	54.04	-19.68	Average	Neutral
4		0.190	35.67	9.62	45.29	64.04	-18.75	QP	Neutral
5		0.230	22.40	9.56	31.96	52.45	-20.49	Average	Neutral
6		0.230	29.96	9.56	39.52	62.45	-22.93	QP	Neutral
7	PP	0.485	25.14	9.69	34.83	46.25	-11.42	Average	Neutral
8	QP	0.485	31.72	9.69	41.41	56.25	-14.84	QP	Neutral
9		1.100	21.45	9.71	31.16	46.00	-14.84	Average	Neutral
10		1.100	26.75	9.71	36.46	56.00	-19.54	QP	Neutral
11		1.300	22.19	9.72	31.91	46.00	-14.09	Average	Neutral
12		1.300	26.95	9.72	36.67	56.00	-19.33	QP	Neutral

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. The 6Mbps of rate of 802.11A_5240 is the worst case, only the worst data recorded in the report.

Appendix I): Restricted bands around fundamental frequency (Radiated Emission)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel , the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

Frequency	Limit (dBμV/m @3cm)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value