

FCC/ISED - TEST REPORT

Report Number	:	68.950.22.0676.01	Date of Issue:	<u>August 18, 2022</u>
Model	:	<u>MDZ-28-AA</u>		
Product Type	:	<u>Xiaomi Box 4K</u>		
Applicant	:	<u>Beijing Xiaomi Electronics Co., Ltd</u>		
Address	:	<u>Room 802, 8F, Building 5, No.15, Kechuang Ten Street, Beijing</u>		
	:	<u>Economic & Technological Development Zone Beijing China 100085</u>		
Manufacturers	:	<u>Beijing Xiaomi Electronics Co., Ltd</u>		
Address	:	<u>Room 802, 8F, Building 5, No.15, Kechuang Ten Street, Beijing</u>		
	:	<u>Economic & Technological Development Zone Beijing China 100085</u>		
Test Result	:	☒ Positive ☐ Negative		
Total pages including Appendices	:	<u>304</u>		

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint
Road 2, Nanshan District
Shenzhen 518052
P.R. China

Telephone: 86 755 8828 6998
Fax: 86 755 8288 5299

FCC Registration No.: 514049

ISED test site number: 10320A

3 Description of the Equipment Under Test

Description of the Equipment Under Test	
Product:	Xiaomi Box 4K
Model no/HVIN/PMN:	MDZ-28-AA
FVIN:	R104
FCC ID:	2AIMRMITVMDZ28AA
IC:	25940-MITVMDZ28AA
Options and accessories:	Adapter, HDMI Cable
Rating:	5.2VDC, 2.1A(Supplied by AC/DC Adapter) Adapter information: Model: AD-0100520210US-1 Input: 100-240V~50/60Hz, 0.3A Output: 5.2VDC, 2.1A, 10.92W
RF transmission frequency:	Bluetooth BR+EDR: 2402-2480MHz Bluetooth LE: 2402-2480MHz Wi-Fi 2.4G: 2412-2462MHz Wi-Fi 5G: 5150MHz~5350MHz; Wi-Fi 5G: 5470MHz – 5725MHz Wi-Fi 5G: 5725MHz – 5850MHz. Note: until further notice, device subject to this section shall not be capable of transmitting in the band 5600-5650MHz. This restriction is for the protection of Environment Canada's weather radars operating in this band.
Antenna Type:	Integrated Antenna
Antenna Gain:	Bluetooth: 0.5dBi Wi-Fi 2.4G Ant 1: 0.5dBi, Ant 2: 0.5dBi Wi-Fi 5G Ant 1: 2dBi, Ant 2: 2dBi
Description of the EUT	The EUT is a Xiaomi Box 4K with Bluetooth, 2.4GHz Wi-Fi and 5GHz Wi-Fi function. Bluetooth TX and RX range is 2402-2480MHz, Wi-Fi TX and RX is 2412-2462MHz, 5150MHz~5350MHz; 5470MHz – 5725MHz, 5725MHz – 5850MHz.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5, Amendment 2, February 2021	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

Test Method:

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices

5 Summary of Test Results

Test Condition	Test Result		
	Pass	Fail	N/A
RSS-Gen Clause 8.8 Conducted Emission AC Power Port	☒	☐	☐
RSS-247 Clause 6.2 Emission bandwidth	☒	☐	☐
RSS-247 Clause 6.2 Maximum Conducted Output Power	☒	☐	☐
RSS-247 Clause 6.2 Maximum Power Spectral Density	☒	☐	☐
RSS-247 Clause 6.2 RSS-Gen Clause 8.9 Unwanted Emissions	☒	☐	☐
RSS-247 Clause 6.2 RSS-Gen Clause 8.9 Band edge compliance	☒	☐	☐
RSS-Gen Clause 6.11 Frequencies Stability	☒	☐	☐
RSS-247 Clause 6.3 Dynamic Frequency Selection (DFS).	☒	☐	☐
RSS-GEN Clause 6.8 Antenna Requirement	☒ See note1	☐	☐

Note 1: The EUT uses an Integrated antenna, which gain is 2dBi for Ant1 and Ant2. It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AIMRMITVMDZ28AA, IC: 25940-MITVMDZ28AA complies with the FCC Part 15, Subpart and RSS-247 issue 2 and RSS-Gen issue 5 rules.

This report is for the 5GHz Wi-Fi.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch.

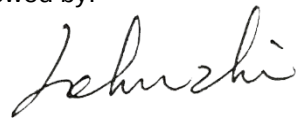
Sample Received Date: July 6, 2022

Testing Start Date: July 6, 2022

Testing End Date: August 5, 2022

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch.

Reviewed by:



John Zhi
EMC Project Manager

Prepared by:



Mark Chen
EMC Project Engineer

Tested by:

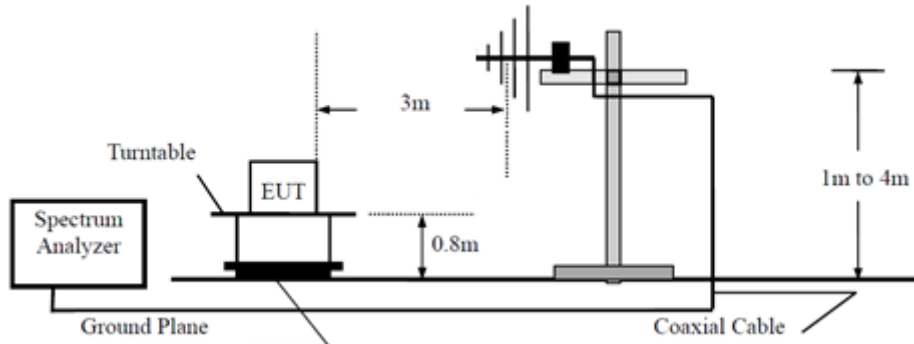


Carry Cai
EMC Test Engineer

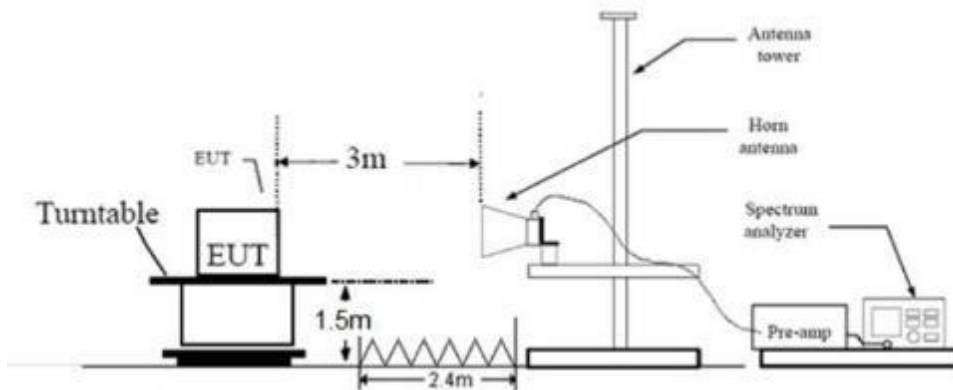
7 Test setups

7.1 Radiated test setups

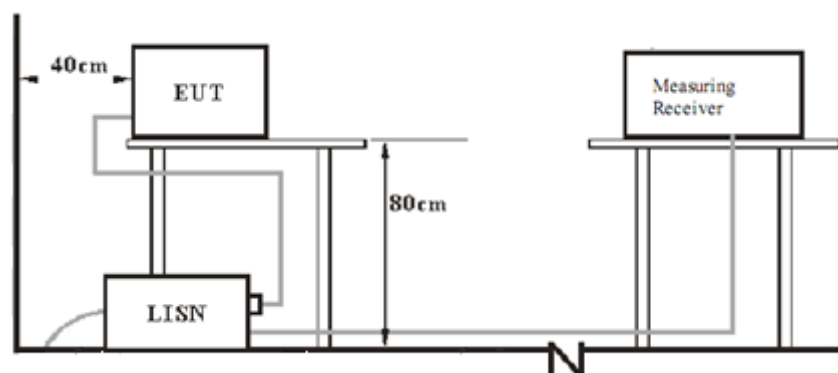
Below 1GHz



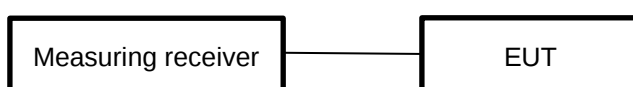
Above 1GHz



7.2 AC Power Line Conducted Emission test setups



7.3 Conducted RF test setups



8. Systems test configuration

Characteristics	Description
TX/RX Operating Band	5150 MHz to 5825 MHz
IEEE 802.11 WLAN Mode Supported	802.11a: Support 802.11n20: Support 802.11n40: Support 802.11ac20: Support 802.11ac40: Support 802.11ac80: Support
Channel Bandwidth	20MHz, 40MHz, 80MHz

The system was configured to channel:

Test Mode	Channel (MHz)		
802.11a, 802.11n20, 802.11ac20	5G WI-FI-Band 1		
	CH36 (5180MHz)	CH40 (5200MHz)	CH46 (5240MHz)
	5G WIFI-Band 2		
	CH52 (5260MHz)	CH56 (5280MHz)	CH64 (5320MHz)
	5G WIFI-Band 3		
	CH100 (5500MHz)	CH116 (5580MHz)	CH140 (5700MHz)
	5G WIFI-Band 4		
	CH149 (5745MHz),	CH157(5785MHz)	CH165 (5825MHz)

Test Mode	Channel (MHz)		
802.11n40, 802.11ac40	5G WI-FI-Band 1		
	CH38(5190MHz)	CH46 (5230MHz)	
	5G WIFI-Band 2		
	CH54(5270MHz)	CH62(5310MHz)	
	5G WIFI-Band 3		
	CH102(5510MHz)	CH110(5550MHz)	CH134(5670MHz)
	CH 142 (5710MHz)		
	5G WIFI-Band 4		
	CH151(5755MHz)	CH159(5795MHz)	

Test Mode	Channel (MHz)	
802.11ac80	5G WI-FI-Band 1	
	CH42(5210MHz)	
	5G WI-FI-Band 2	
	CH58(5290MHz)	
	5G WIFI-Band 3	
	CH106(5530MHz)	CH138(5690MHz)
	5G WIFI-Band 4	
	CH155(5775MHz)	

9 Technical Requirement

9.1 Conducted emission AC power port

Test Method

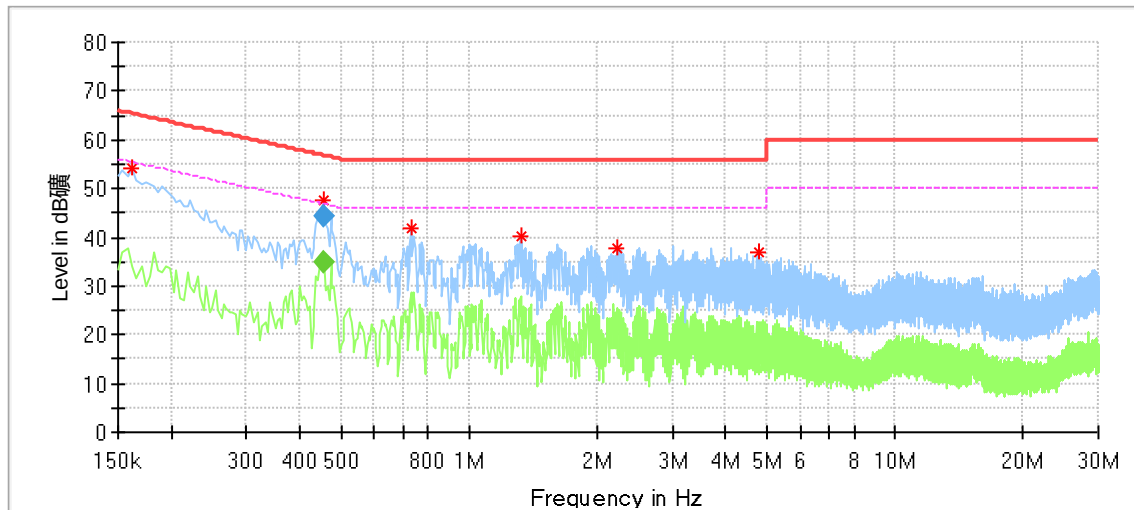
1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Remark: “*” Decreasing linearly with logarithm of the frequency

Product Type : Xiaomi Box 4K
 M/N : MDZ-28-AA
 Operating Condition : Normal working with transmitting
 Test specification : Live
 Comment : AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.162000	54.09	---	65.36	11.27	L1	9.26
0.453500	47.42	---	56.73	9.31	L1	9.20
0.730000	41.69	---	56.00	14.31	L1	9.20
1.322000	40.06	---	56.00	15.94	L1	9.21
2.230000	37.90	---	56.00	18.10	L1	9.23
4.798000	36.74	---	56.00	19.26	L1	9.30

Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.453500	---	34.77	46.81	12.04	L1	9.20
0.453500	44.51	---	56.81	12.30	L1	9.20

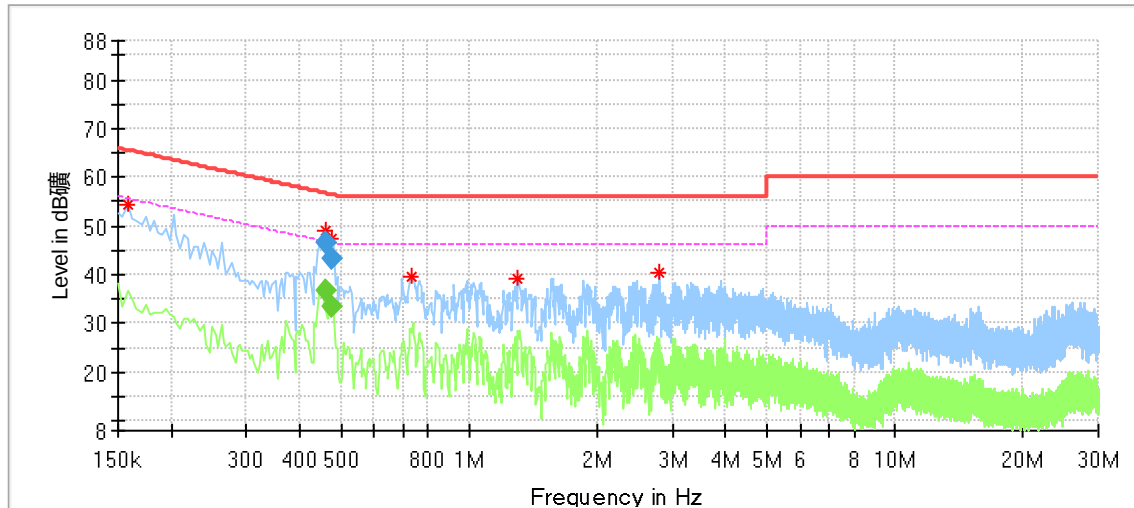
Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Product Type : Xiaomi Box 4K
 M/N : MDZ-28-AA
 Operating Condition : Normal working with transmitting
 Test specification : Neutral
 Comment : AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.158000	54.48	---	65.57	11.09	N	9.40
0.458500	48.96	---	56.80	7.84	N	9.39
0.473500	47.53	---	56.37	8.85	N	9.39
0.730000	39.66	---	56.00	16.34	N	9.39
1.302000	38.98	---	56.00	17.02	N	9.41
2.806000	40.45	---	56.00	15.55	N	9.44

Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.458500	---	36.85	46.72	9.87	N	9.39
0.458500	46.42	---	56.72	10.30	N	9.39
0.473500	---	33.50	46.45	12.95	N	9.39
0.473500	43.37	---	56.45	13.08	N	9.39

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

9.2 Emission bandwidth

The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.

1、 Test Method of 26dB Bandwidth

According to C63.10

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Limit: No limit

2、 Test Method of 6dB Bandwidth

According to C63.10

- a) Set RBW = 100KHz
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit: $\geq 500\text{KHz}$

3、 Test Method of 99% Bandwidth

According to C63.10

- a) Set center frequency to the nominal EUT channel center frequency
- b) Set span = 1.5 times to 5.0 times the OBW.
- c) Set RBW = 1 % to 5 % of the OBW
- d) Set VBW $\geq 3 \cdot$ RBW
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99 % power bandwidth function of the instrument (if available).
- g) If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

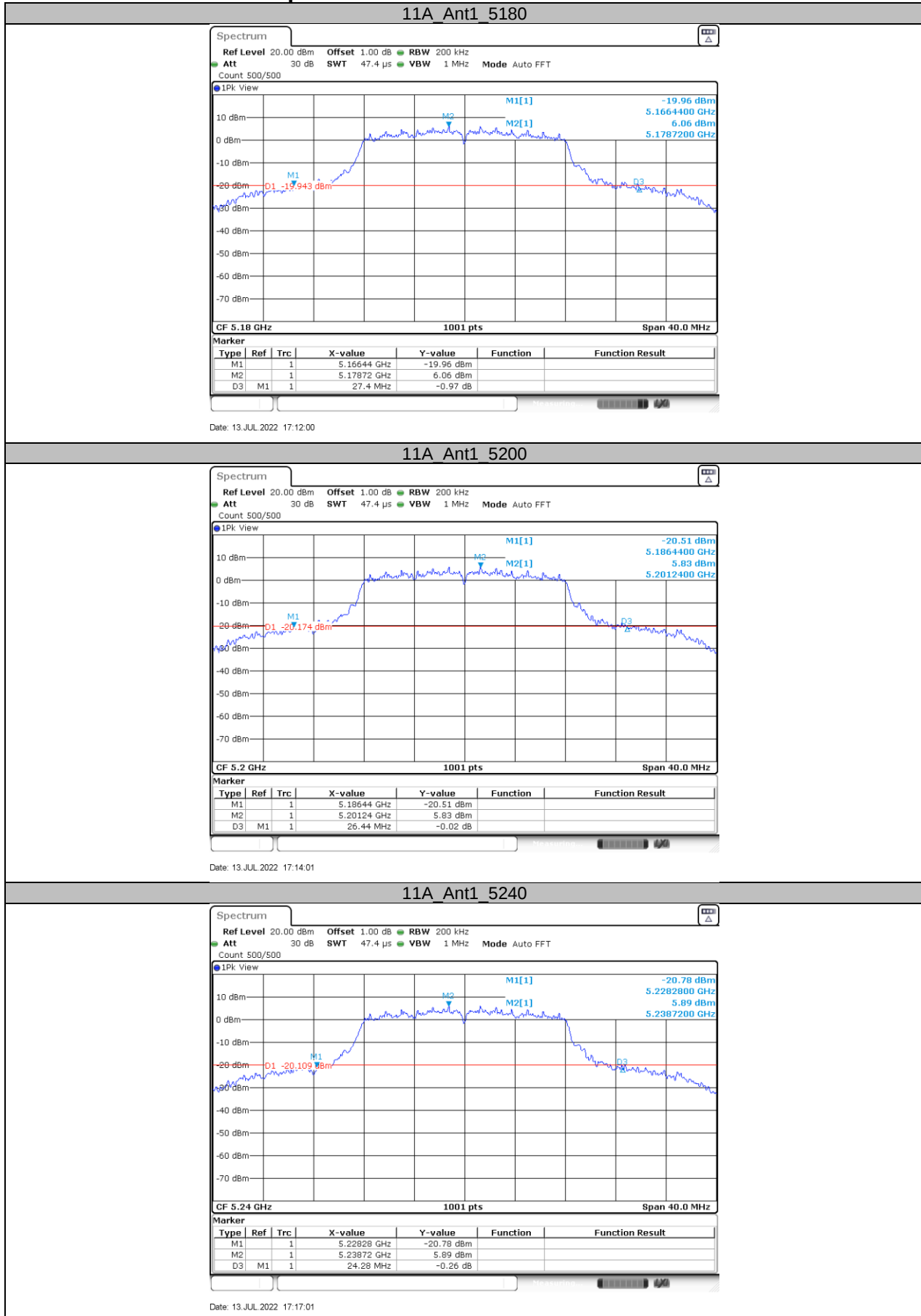
Limit: No limit

26dB Bandwidth Test result:

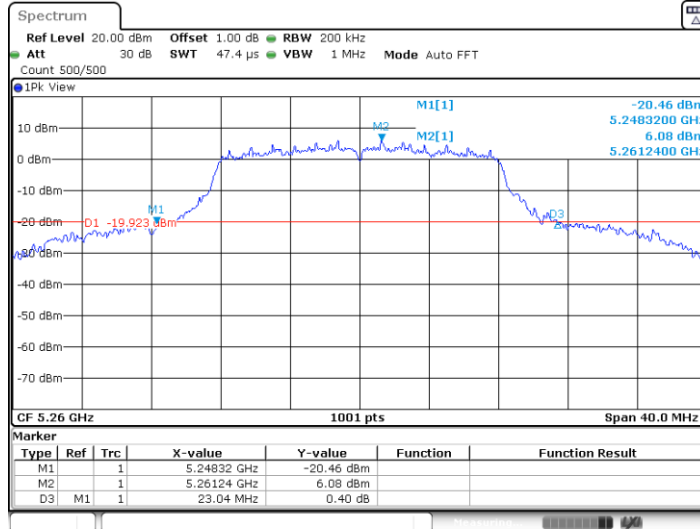
TestMode	Antenna	Channel[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	27.400	5166.440	5193.840	---	PASS
		5200	26.440	5186.440	5212.880	---	PASS
		5240	24.280	5228.280	5252.560	---	PASS
		5260	23.040	5248.320	5271.360	---	PASS
		5280	25.520	5268.280	5293.800	---	PASS
		5320	24.240	5308.280	5332.520	---	PASS
		5500	20.640	5489.600	5510.240	---	PASS
		5580	20.560	5569.680	5590.240	---	PASS
		5700	20.560	5689.680	5710.240	---	PASS
		5720	20.640	5709.600	5730.240	---	PASS
		5720_UNII-2C	15.4	5709.600	5725	---	PASS
		5720_UNII-3	5.24	5725	5730.240	---	PASS
		5745	20.520	5734.720	5755.240	---	PASS
		5785	20.440	5774.800	5795.240	---	PASS
		5825	20.520	5814.720	5835.240	---	PASS
11N20 SISO	Ant1	5180	26.480	5167.360	5193.840	---	PASS
		5200	27.400	5186.440	5213.840	---	PASS
		5240	23.080	5228.600	5251.680	---	PASS
		5260	25.800	5247.400	5273.200	---	PASS
		5280	25.880	5267.360	5293.240	---	PASS
		5320	24.000	5307.400	5331.400	---	PASS
		5500	21.640	5489.080	5510.720	---	PASS
		5580	20.560	5569.720	5590.280	---	PASS
		5700	20.800	5689.680	5710.480	---	PASS
		5720	20.400	5709.880	5730.280	---	PASS
		5720_UNII-2C	15.12	5709.880	5725	---	PASS
		5720_UNII-3	5.28	5725	5730.280	---	PASS
		5745	20.800	5734.680	5755.480	---	PASS
		5785	20.400	5774.760	5795.160	---	PASS
		5825	20.480	5814.760	5835.240	---	PASS
11N40 SISO	Ant1	5190	67.360	5156.240	5223.600	---	PASS
		5230	67.440	5196.240	5263.680	---	PASS
		5270	67.360	5236.240	5303.600	---	PASS
		5310	67.360	5276.320	5343.680	---	PASS
		5510	45.920	5485.920	5531.840	---	PASS
		5550	45.280	5525.920	5571.200	---	PASS
		5670	52.880	5645.840	5698.720	---	PASS
		5710	46.000	5685.840	5731.840	---	PASS
		5710_UNII-2C	39.16	5685.840	5725	---	PASS
		5710_UNII-3	6.84	5725	5731.840	---	PASS
		5755	45.120	5730.920	5776.040	---	PASS
		5795	45.040	5771.000	5816.040	---	PASS
11AC20 SISO	Ant1	5180	26.680	5167.160	5193.840	---	PASS
		5200	27.040	5187.120	5214.160	---	PASS
		5240	24.400	5227.360	5251.760	---	PASS
		5260	25.840	5247.360	5273.200	---	PASS

		5280	26.120	5267.120	5293.240	---	PASS
		5320	25.240	5307.360	5332.600	---	PASS
		5500	20.680	5489.760	5510.440	---	PASS
		5580	20.520	5569.680	5590.200	---	PASS
		5700	21.040	5689.640	5710.680	---	PASS
		5700	20.120	5689.880	5710.000	---	PASS
		5720	20.880	5709.760	5730.640	---	PASS
		5720_UNII-2C	15.24	5709.760	5725	---	PASS
		5720_UNII-3	5.64	5725	5730.640	---	PASS
		5745	20.760	5734.640	5755.400	---	PASS
		5785	20.560	5774.680	5795.240	---	PASS
		5825	20.600	5814.600	5835.200	---	PASS
11AC40 SISO	Ant1	5190	69.360	5154.640	5224.000	---	PASS
		5230	69.120	5194.640	5263.760	---	PASS
		5270	67.360	5236.320	5303.680	---	PASS
		5310	67.360	5276.320	5343.680	---	PASS
		5510	51.360	5484.400	5535.760	---	PASS
		5550	47.120	5527.760	5574.880	---	PASS
		5670	54.160	5644.400	5698.560	---	PASS
		5710	51.360	5684.400	5735.760	---	PASS
		5710_UNII-2C	40.6	5684.400	5725	---	PASS
		5710_UNII-3	10.76	5725	5735.760	---	PASS
		5755	47.120	5732.680	5779.800	---	PASS
		5795	44.400	5772.840	5817.240	---	PASS
11AC80 SISO	Ant1	5210	118.400	5149.520	5267.920	---	PASS
		5290	104.800	5235.600	5340.400	---	PASS
		5530	81.920	5489.200	5571.120	---	PASS
		5690	82.240	5649.040	5731.280	---	PASS
		5690_UNII-2C	75.96	5649.040	5725	---	PASS
		5690_UNII-3	6.28	5725	5731.280	---	PASS
		5775	82.240	5734.040	5816.280	---	PASS

26dB Bandwidth Test Graphs

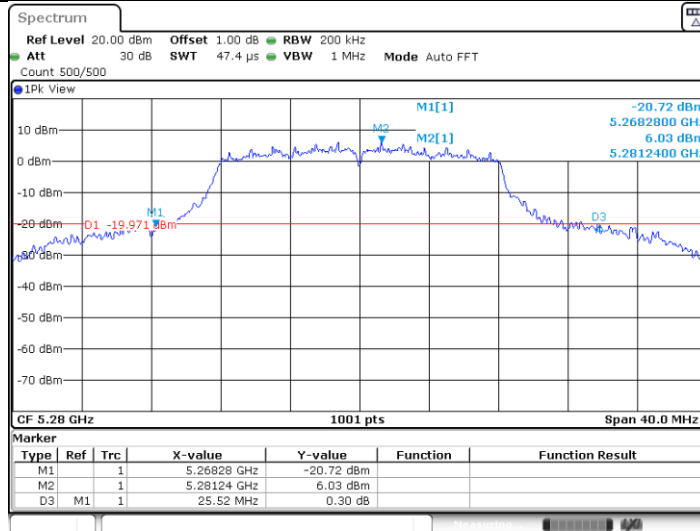


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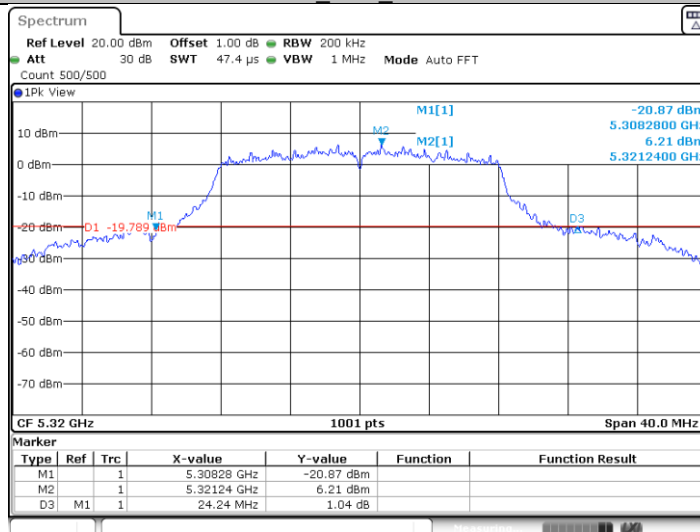
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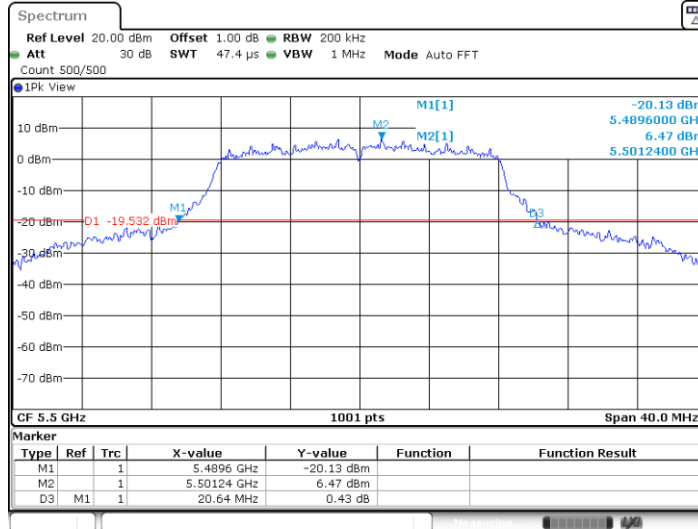
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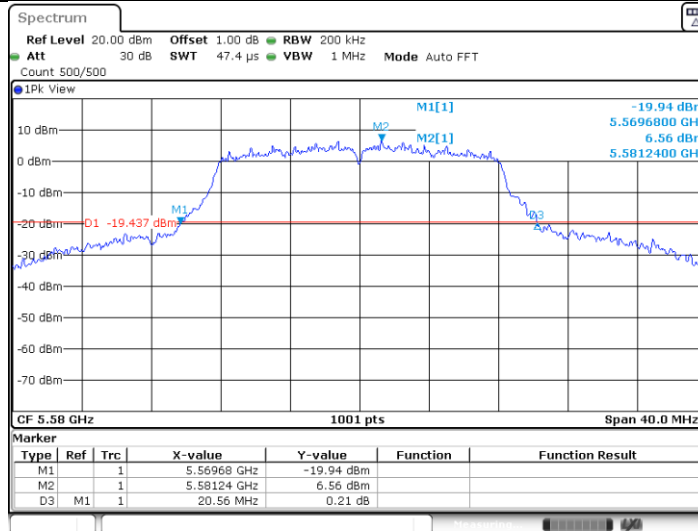
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11A_Ant1 5500



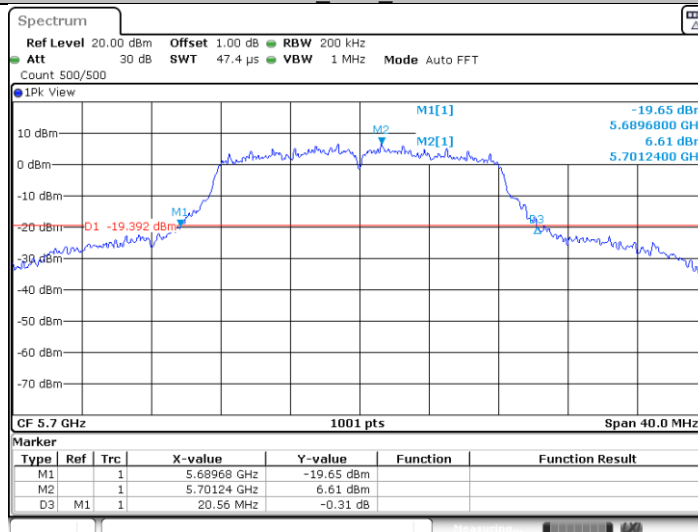
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11A_Ant1 5580



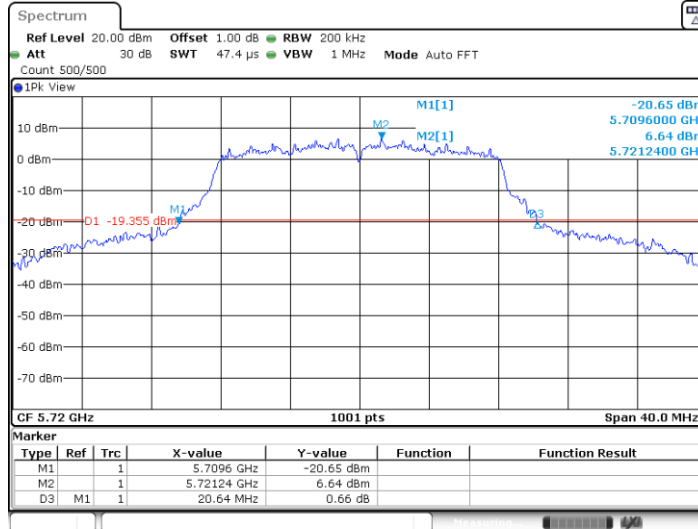
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11A_Ant1 5700



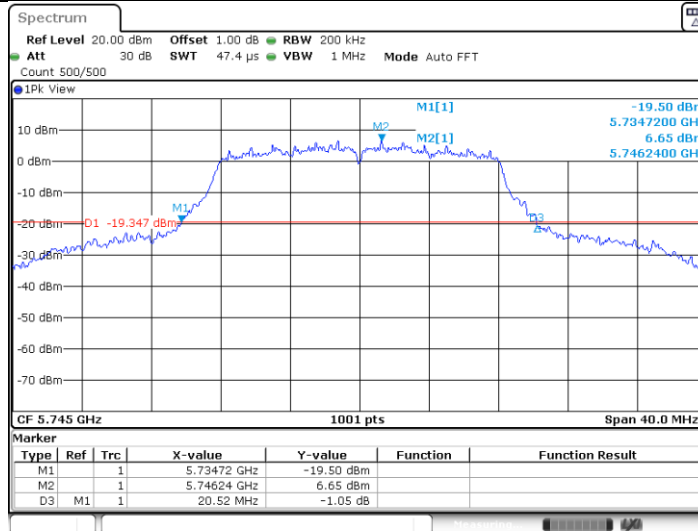
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11A_Ant1_5720



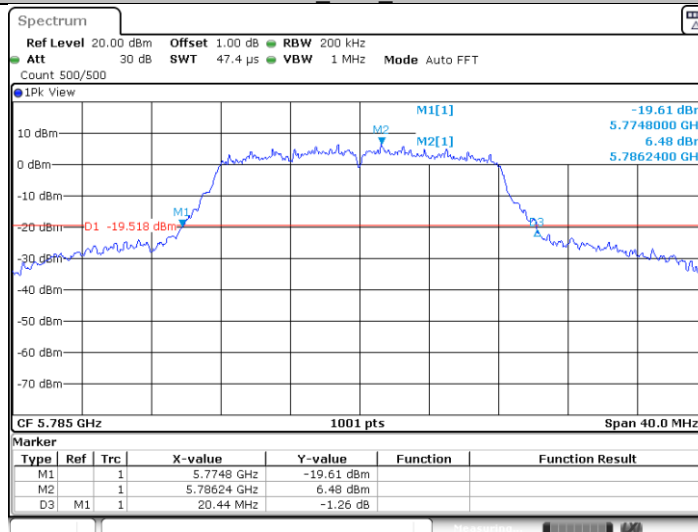
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11A_Ant1_5745



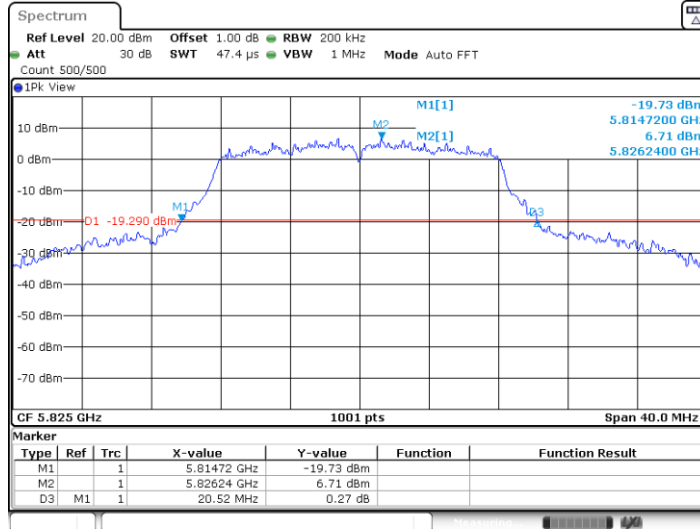
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11A_Ant1_5785



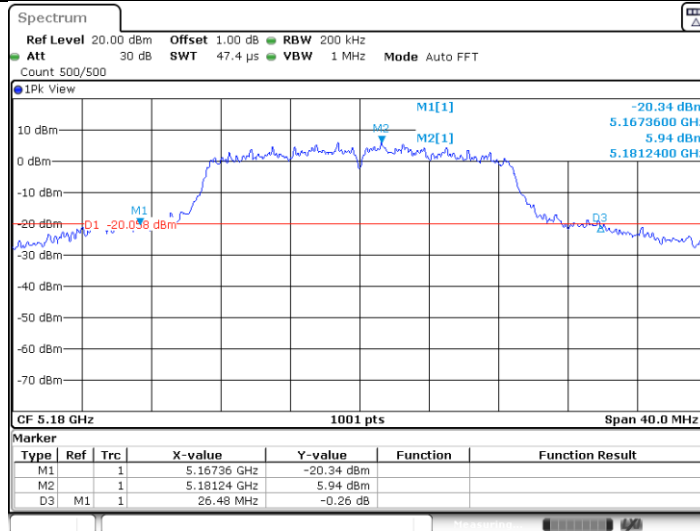
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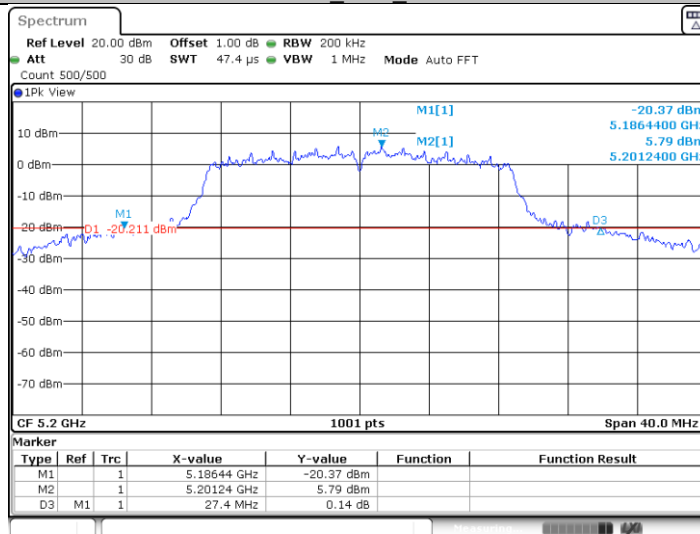
Date: 13 JUL 2022 17:45:40

11N20_Ant1_5180



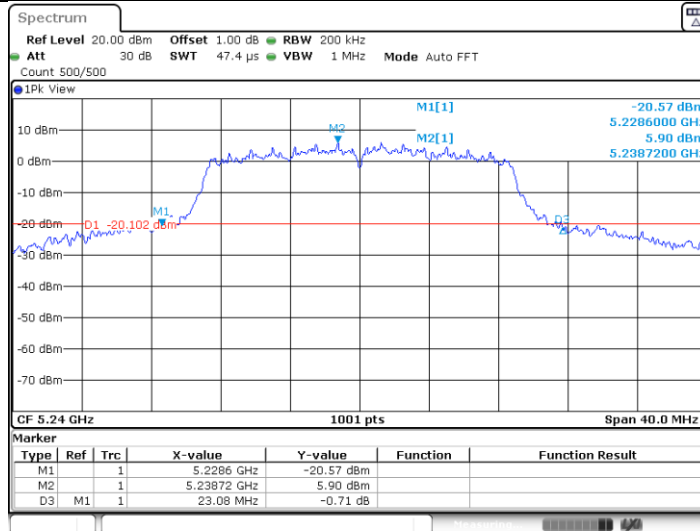
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11N20_Ant1_5200

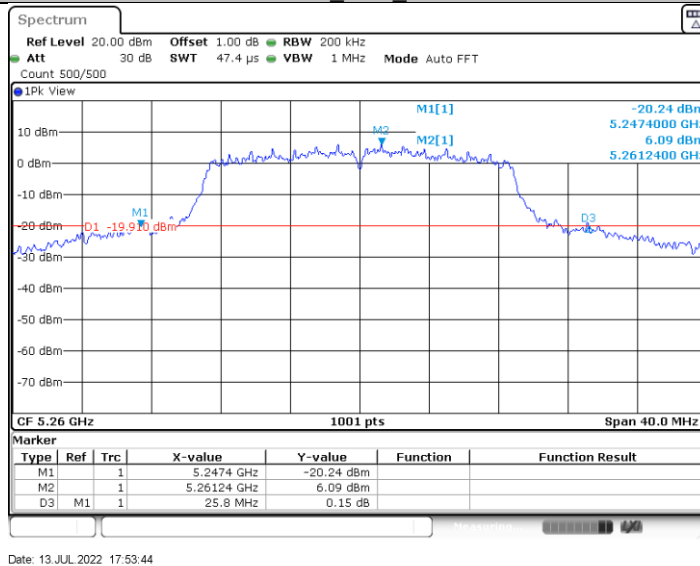


Date: 13 JUL 2022 17:50:03

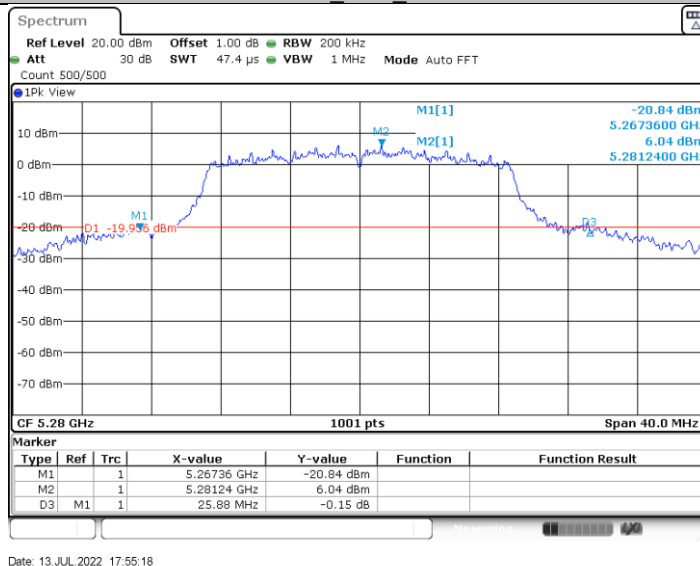
11N20_Ant1_5240



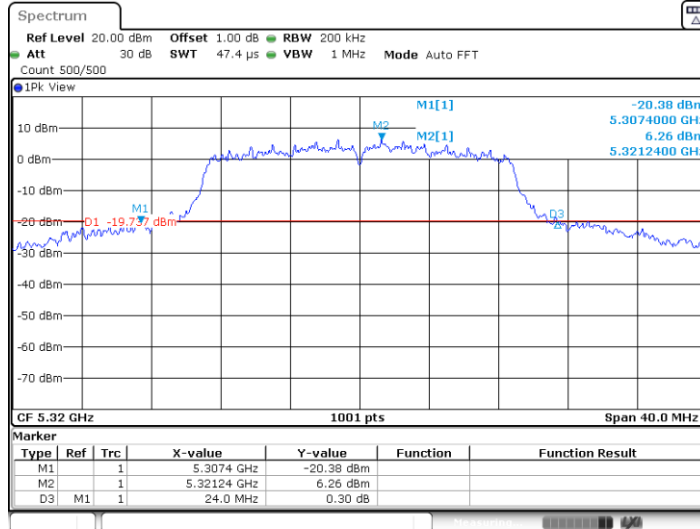
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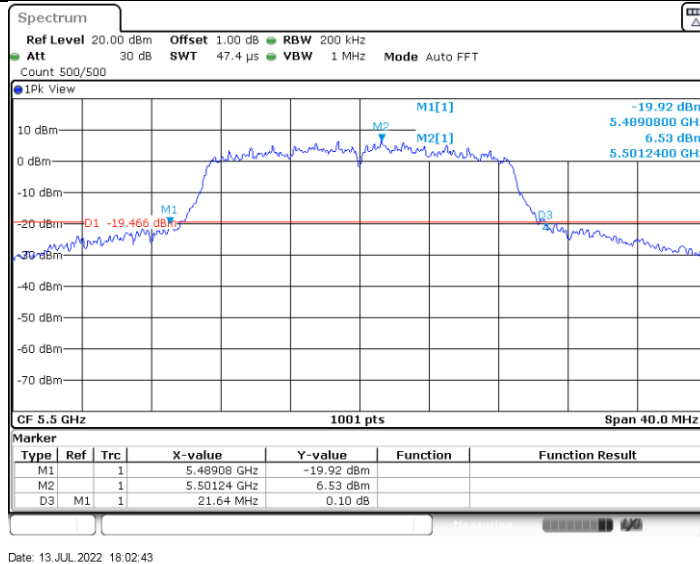
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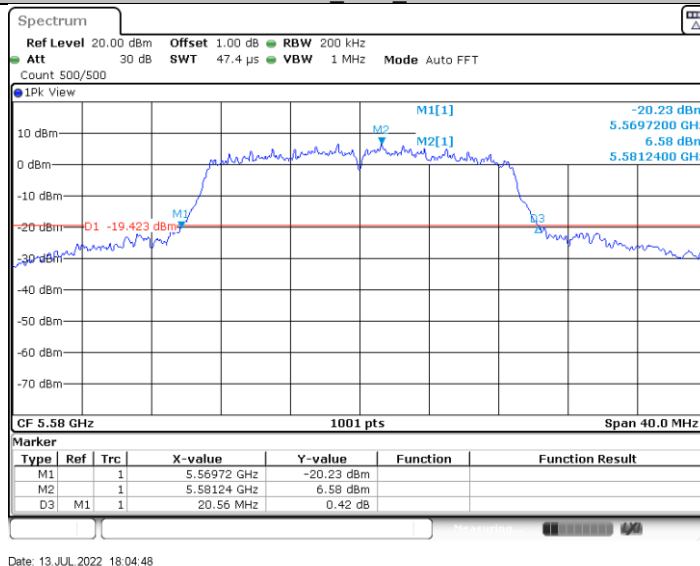
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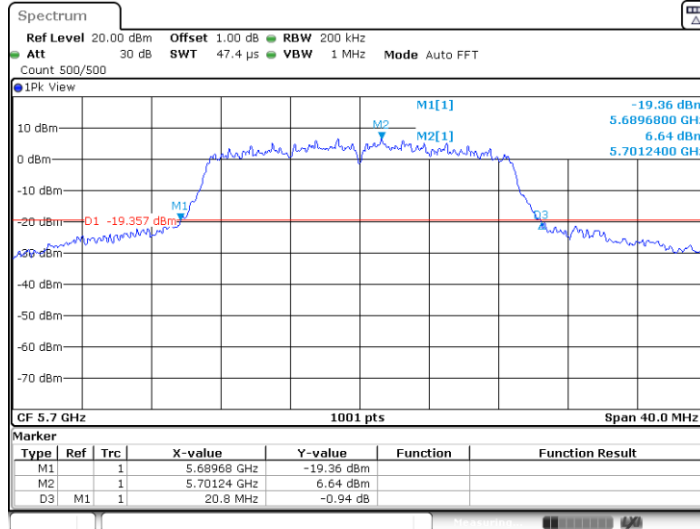
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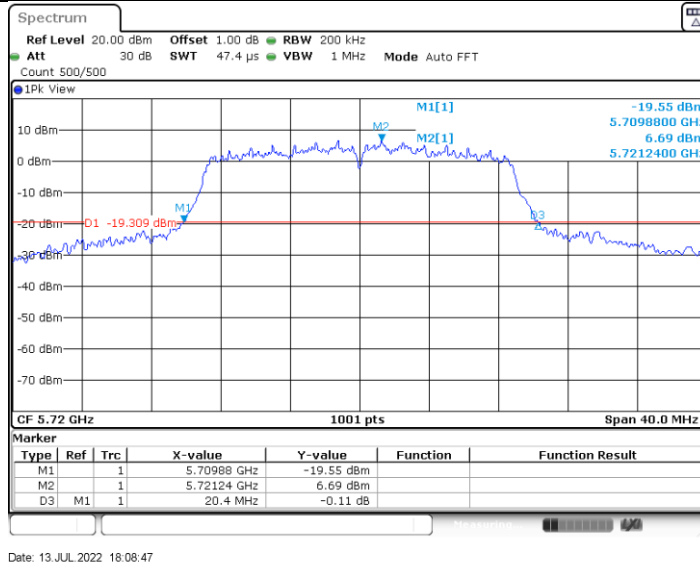
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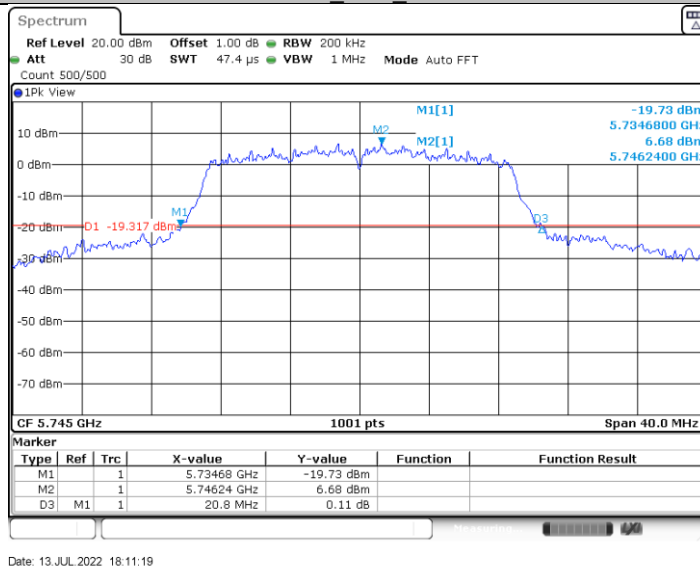
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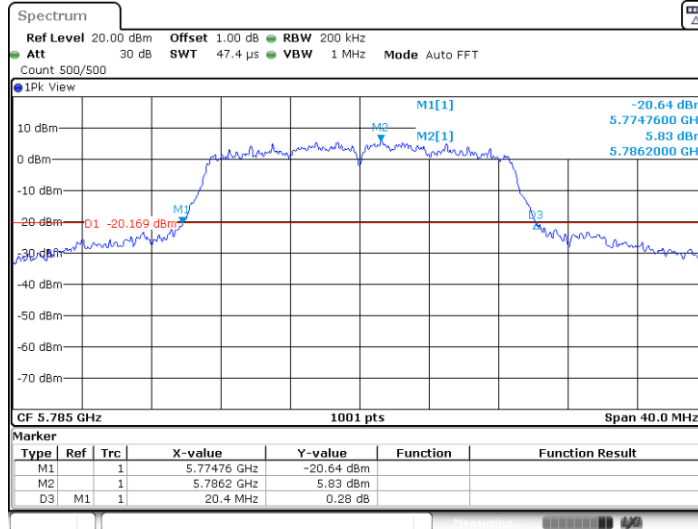
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11N20_Ant1_5745

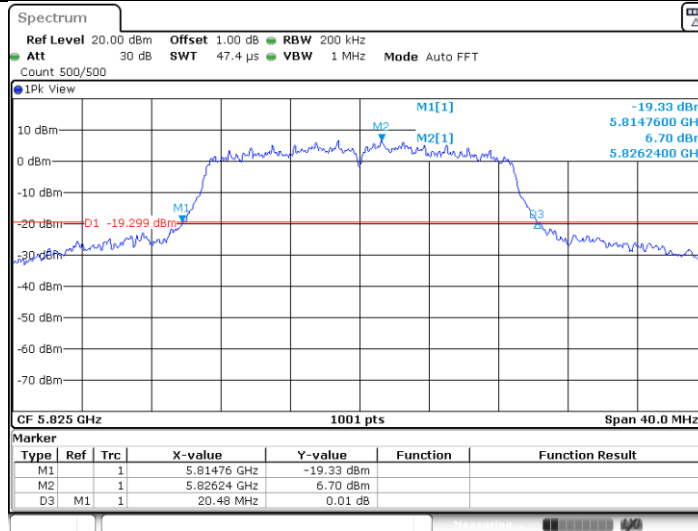


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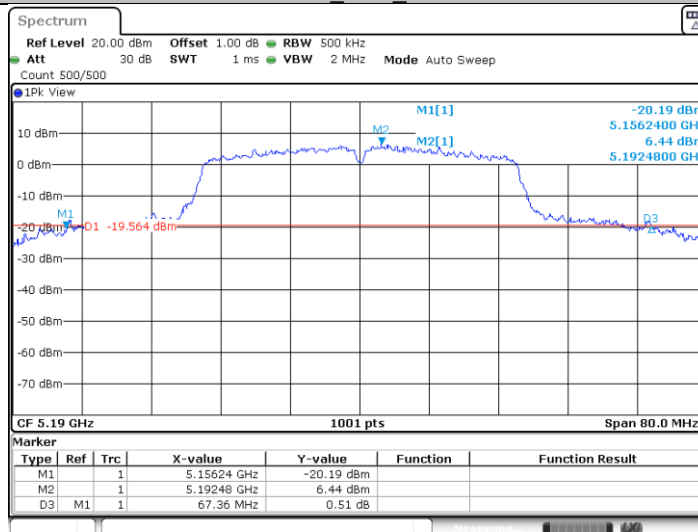
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11N20_Ant1_5825



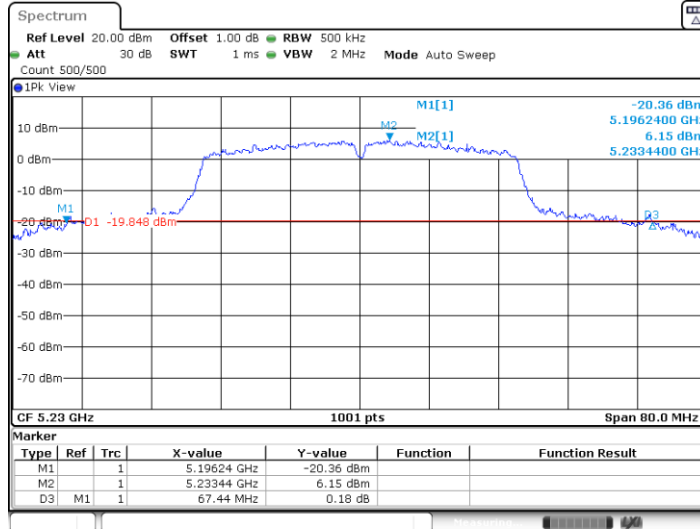
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11N40_Ant1_5190

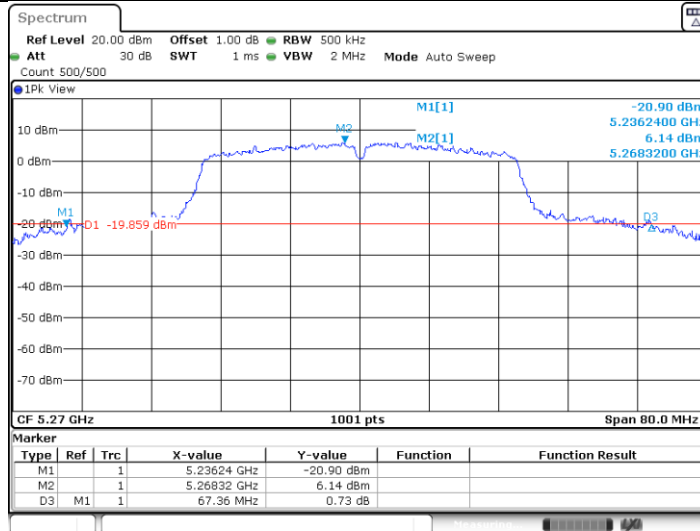


Date: 13 JUL 2022 18:19:02

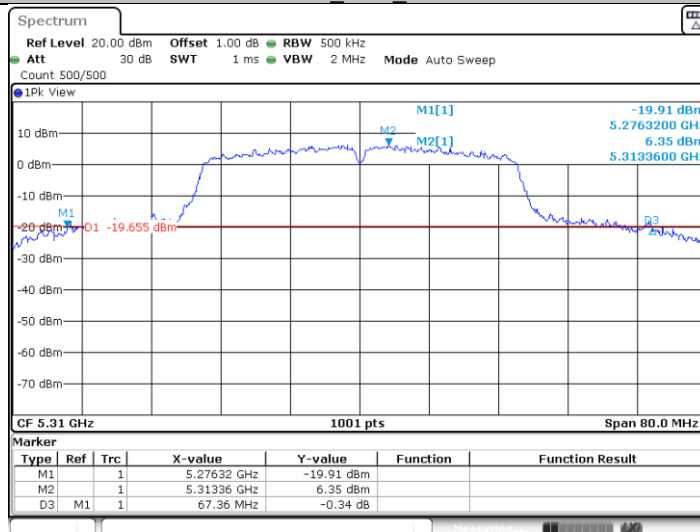
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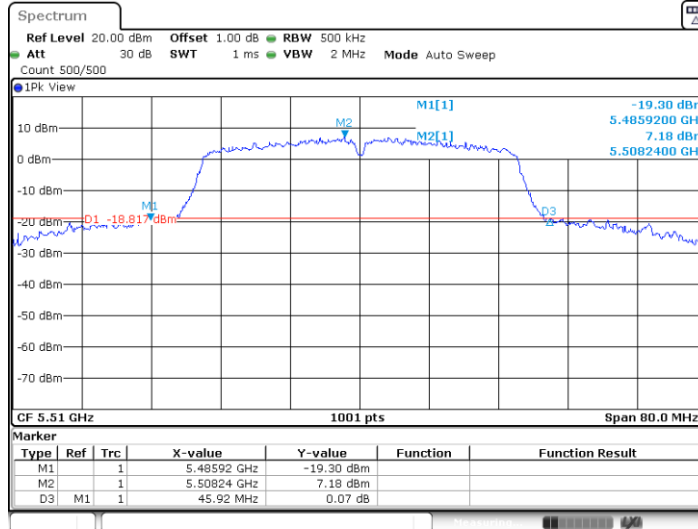
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11N40_Ant1_5310

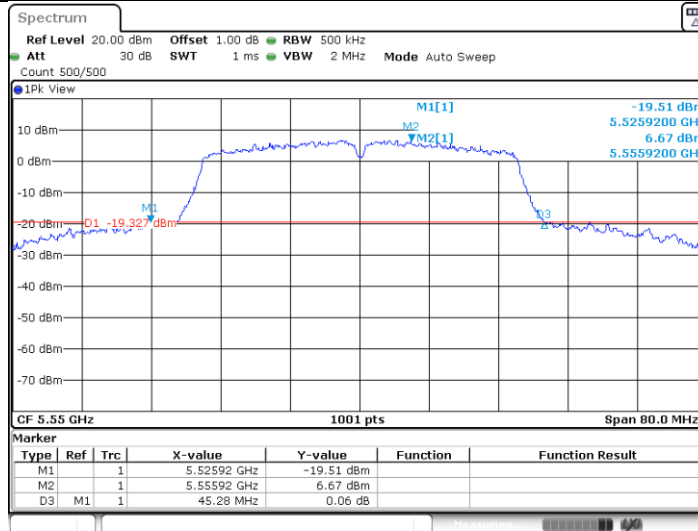


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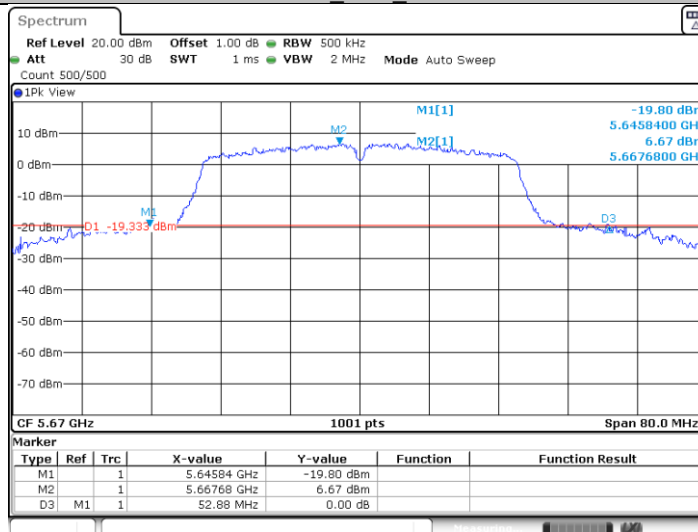
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11N40_Ant1_5550



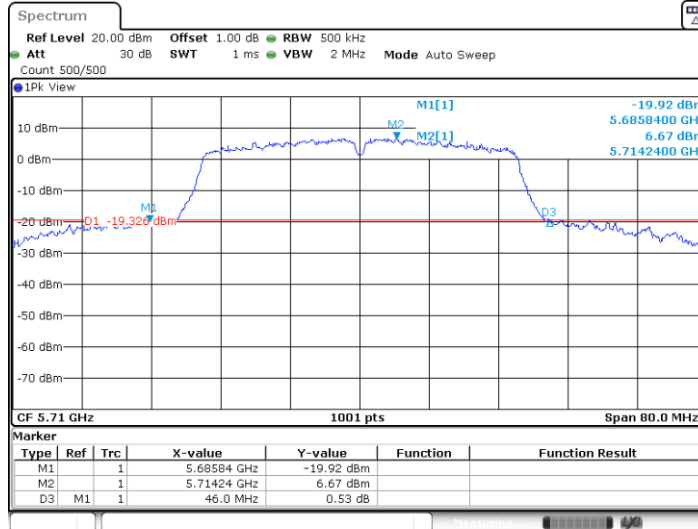
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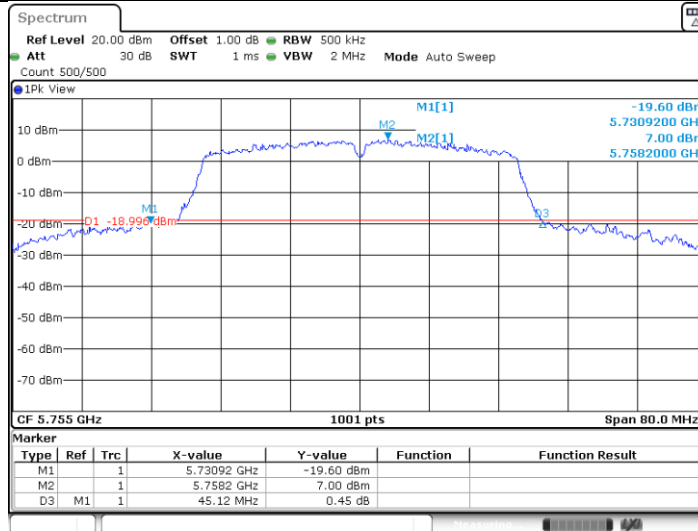


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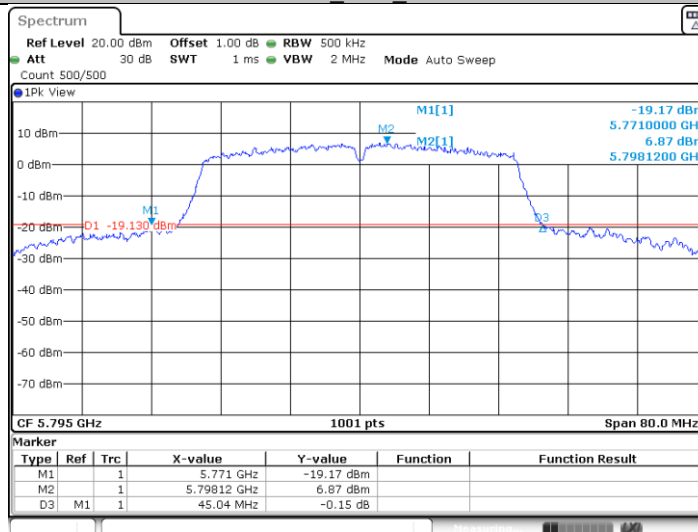
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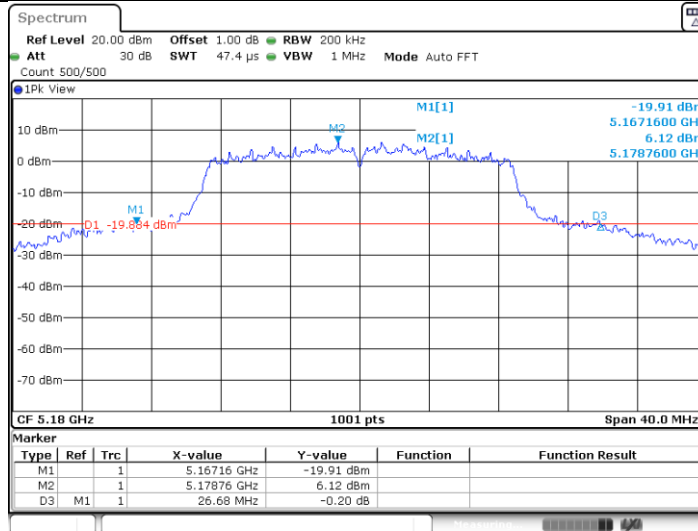
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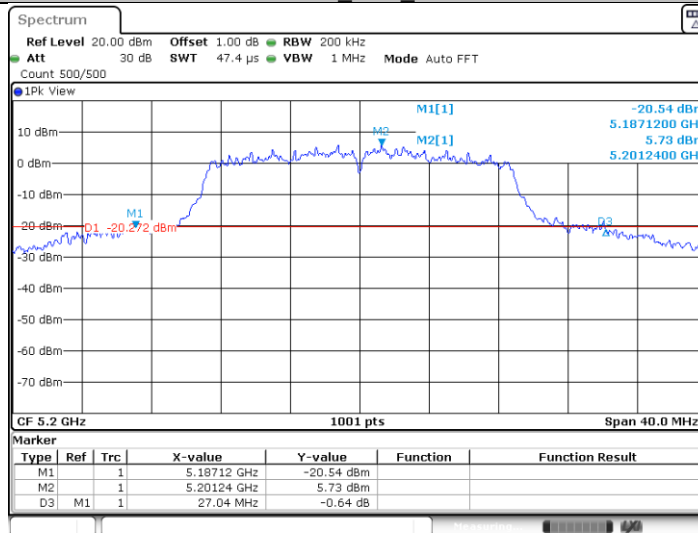
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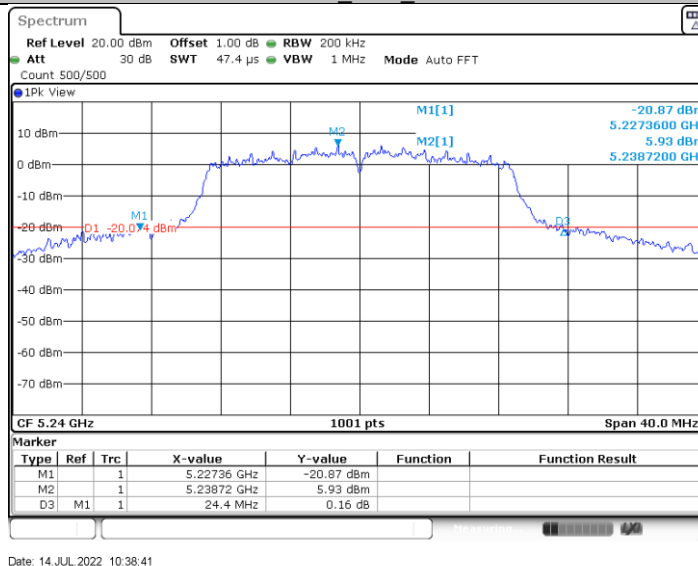
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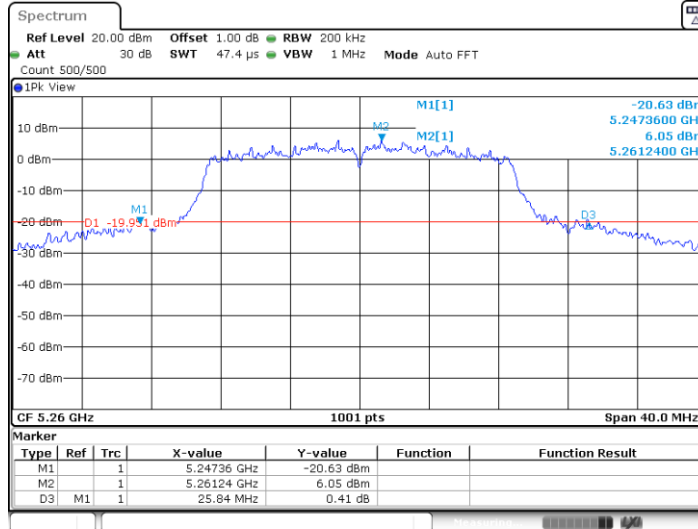
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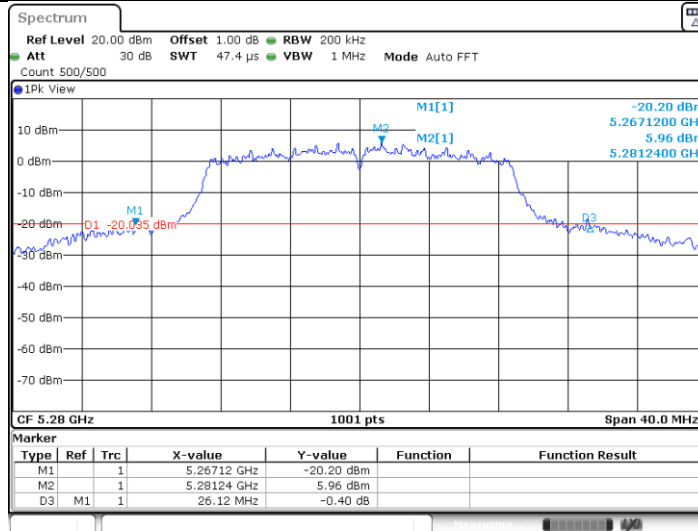
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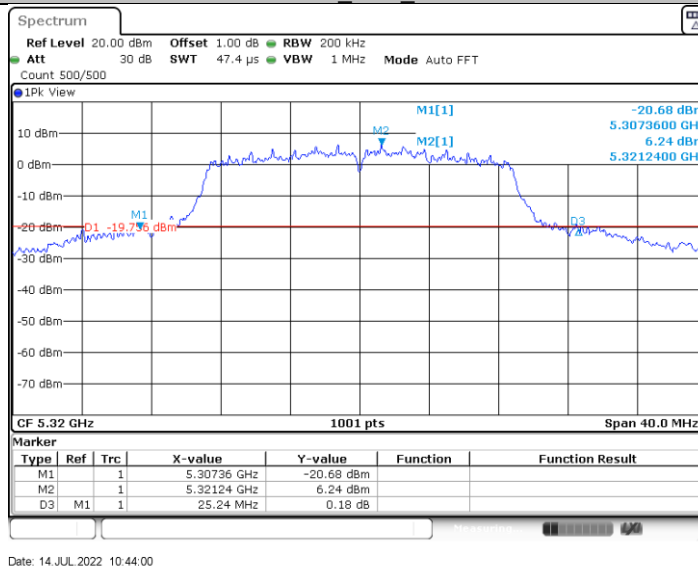
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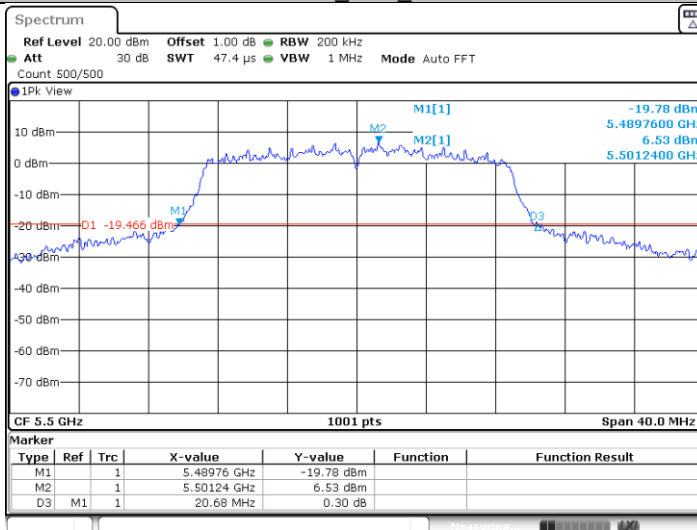
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11AC20_Ant1_5320

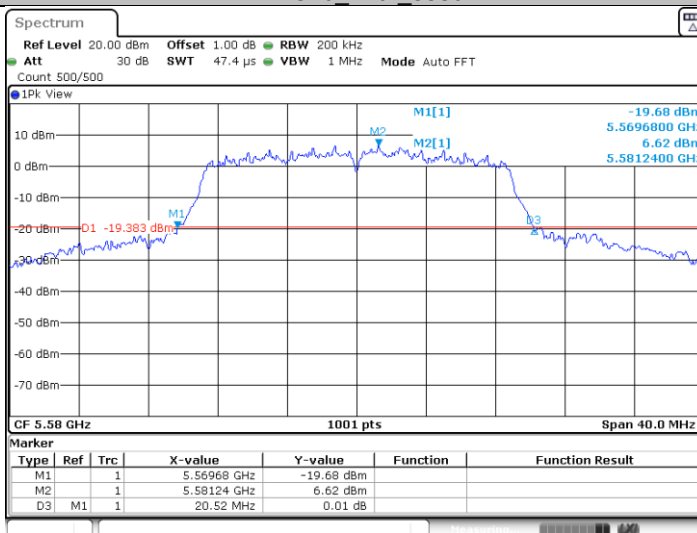


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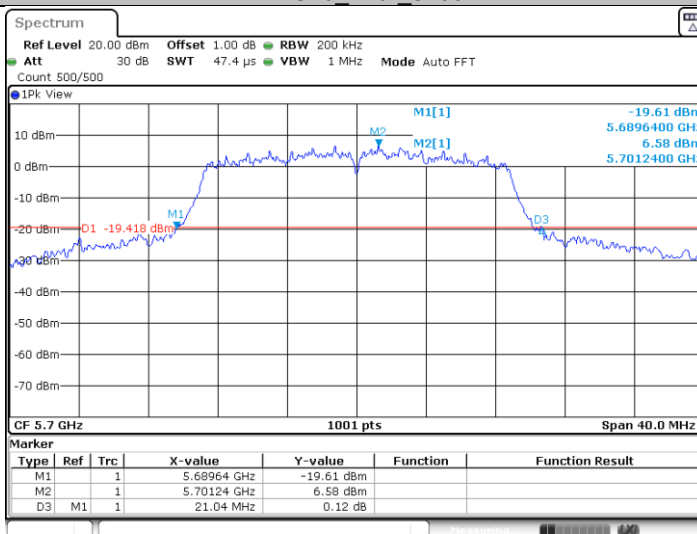
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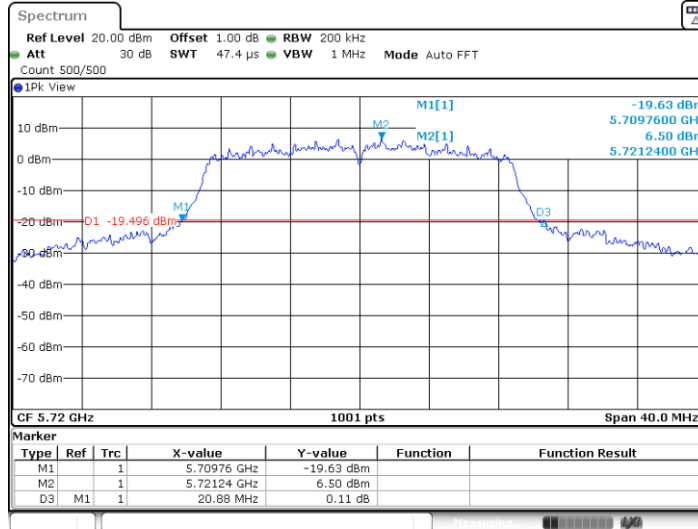
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11AC20_Ant1_5700



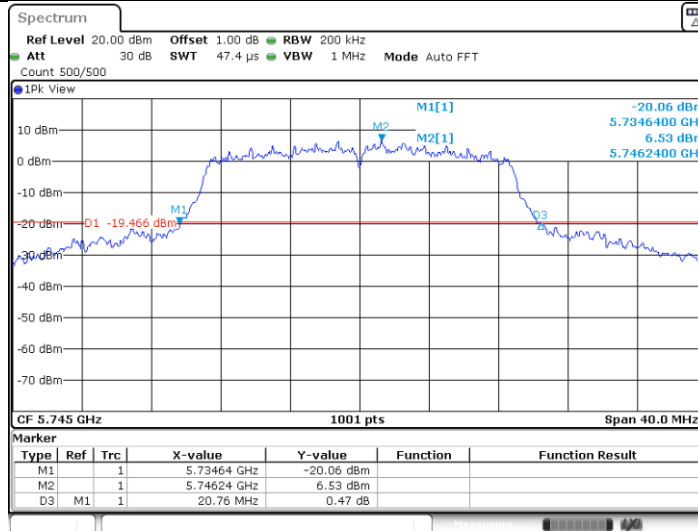
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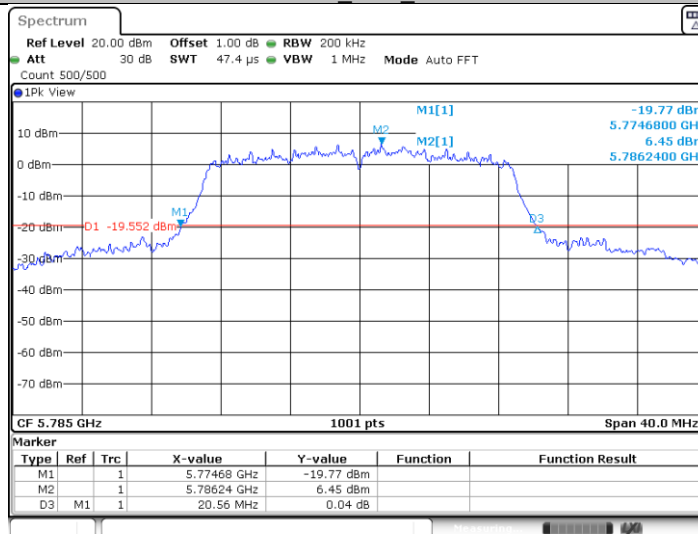
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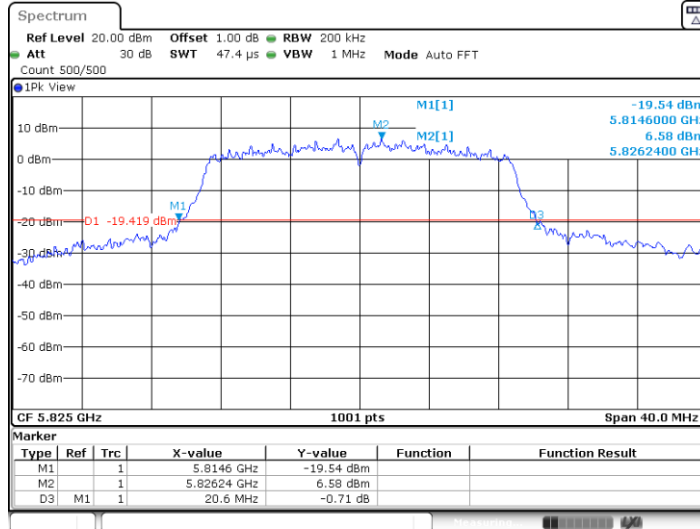
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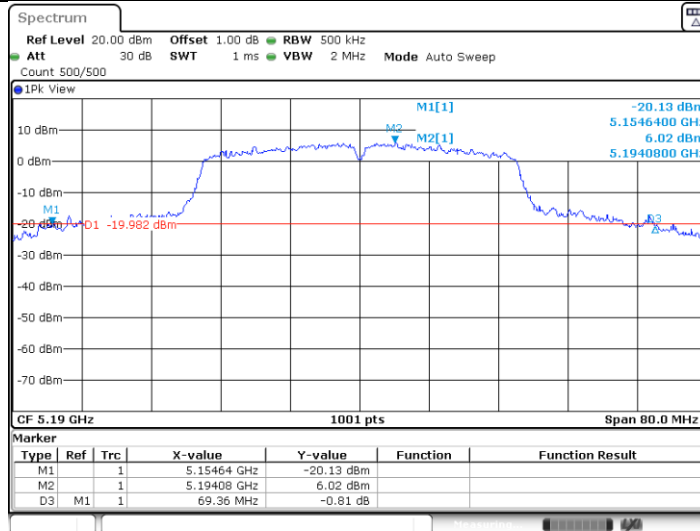
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11AC20_Ant1_5825



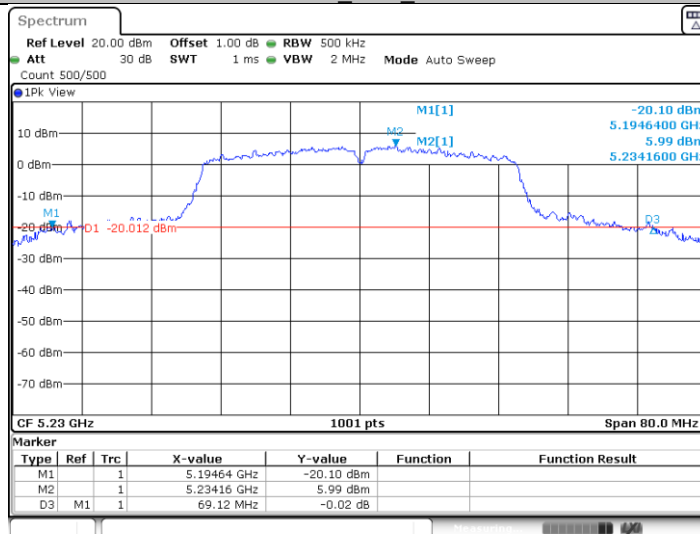
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11AC40_Ant1_5190



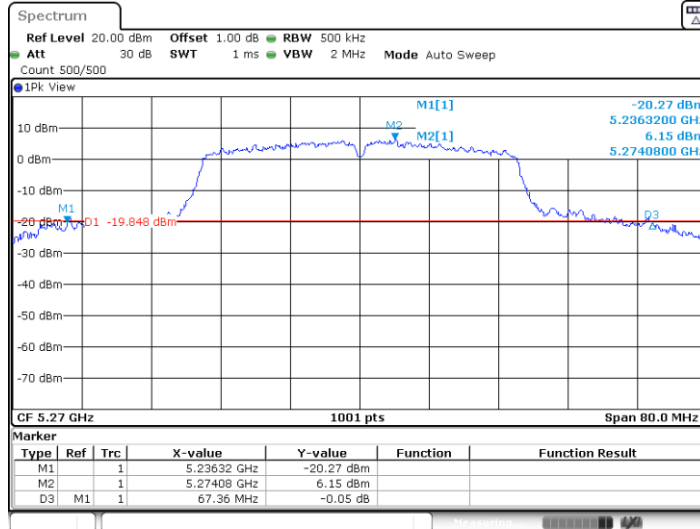
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11AC40_Ant1_5230



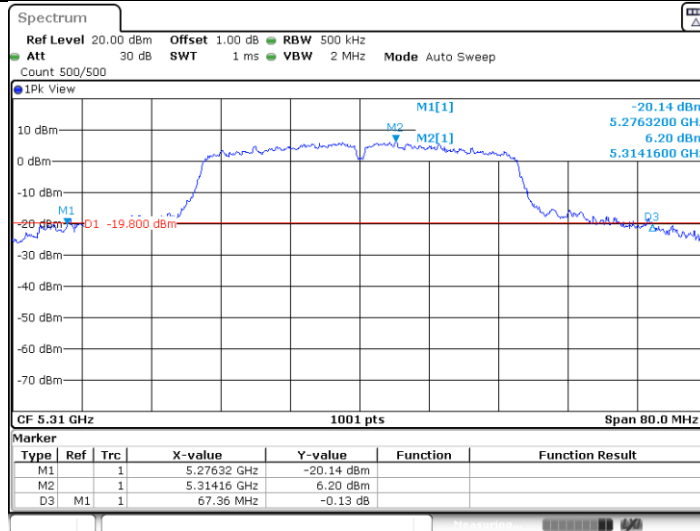
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11AC40_Ant1_5270



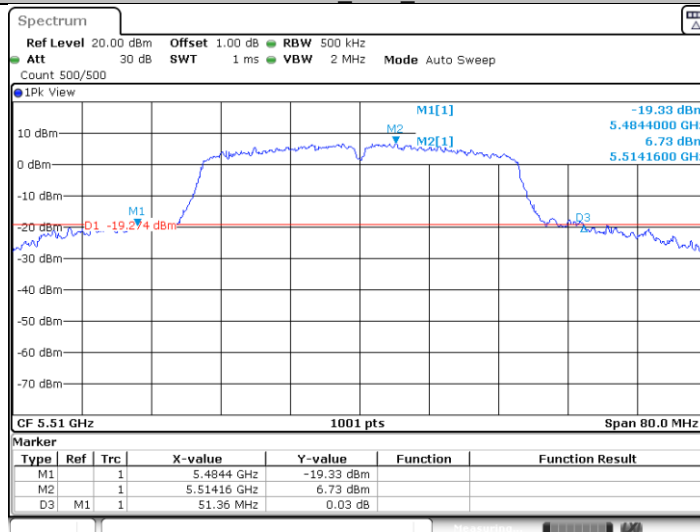
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11AC40_Ant1_5310



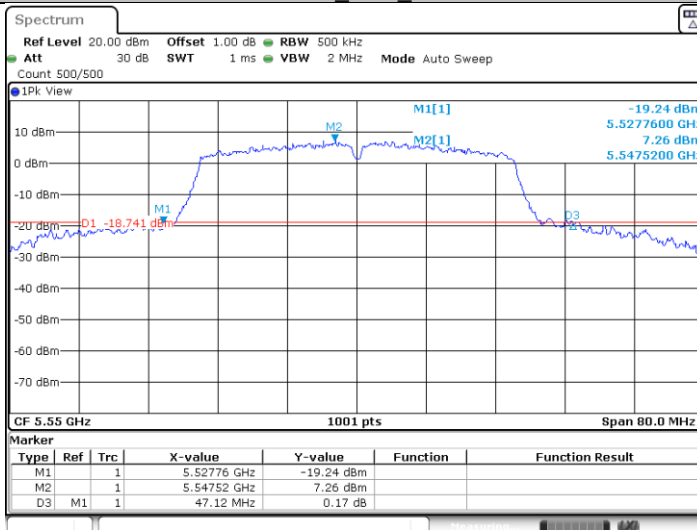
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11AC40_Ant1_5510



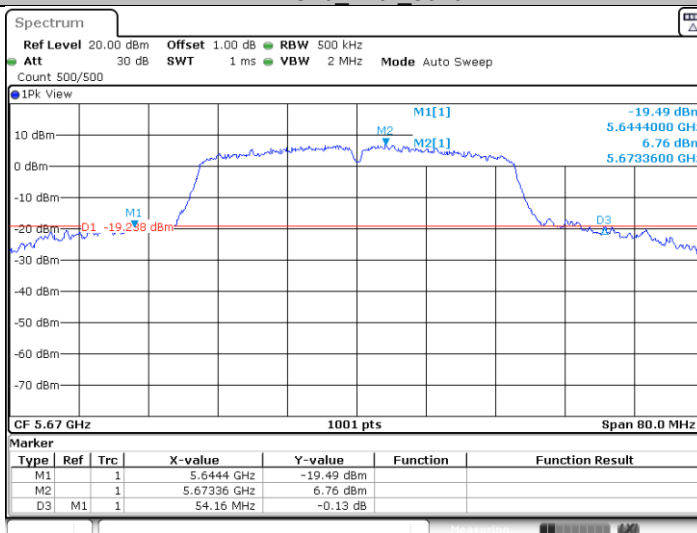
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11AC40_Ant1_5550



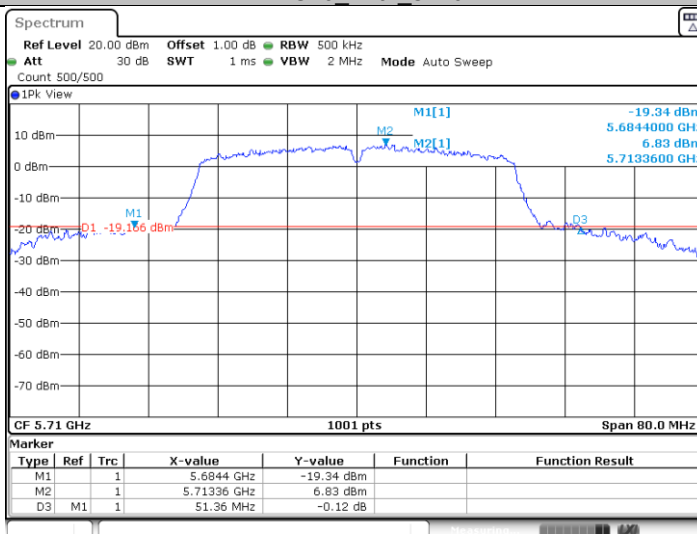
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11AC40_Ant1_5670



Date: 14.JUL.2022 11:15:21

11AC40_Ant1_5710



Date: 14.JUL.2022 11:17:46