

FCC - TEST REPORT

Report Number : **68.950.21.0591.01** Date of Issue: **2021-12-22**

Model : **AP-N505L**

Product Type : **Wireless AP**

Applicant : **FS.COM Inc.**

Address : **380 Centerpoint Blvd, New Castle, DE 19720, United States**

Production Facility : **FS.COM LIMITED**

Address : **24F, Infore Center, No.19, Haitian 2nd Rd, Binhai Community, Yuehai**
Street, Nanshan District, Shenzhen City

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : **117**

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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 City, 518052,
P. R. China

FCC Designation Number: CN5009

FCC Registration No.: 514049

Telephone: 86 755 8828 6998
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Report Version:

Revision	Release Date	History/Memo.
N/A	2021-12-22	Initial Release

3 Description of the Equipment under Test

Product:	Wireless AP
Model no.:	AP-N505L
Trade Mark:	
FCC ID:	2A2PW108705
Rating:	IEEE 802.3af PoE, DC 48V/0.3A
RF Transmission Frequency:	2412MHz-2462MHz
No. of Operated Channel:	11
Modulation:	802.11b: BPSK, QPSK, CCK 802.11g/802.11n HT20/40: BPSK, QPSK, 16-QAM, 64-QAM 802.11ax: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM
Antenna Type:	Internal antenna
Antenna number:	1 for 2.4GHz Bluetooth Low Energy 2 for 2.4GHzWIFI 2 for 5GHzWIFI ETH1 2 for 5GHzWIFI ETH2
Antenna Gain:	1dBi max for 2.4GHz Bluetooth Low Energy 3dBi max for 2.4GHzWIFI 3dBi Max for 5GHzWIFI
Directional gain:	For output power: Max. gain +array gain Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$ For power spectral density: $G_{ANT} + \text{Array Gain}$ Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.
Description of the EUT:	The equipment supports Bluetooth Low Energy/WIFI functions. The TX and RX range is 2402MHz-2480MHz for Bluetooth, 2412MHz – 2462MHz for 2.4GHzWIFI, 5180MHz – 5320MHz, 5500MHz – 5720MHz, 5745MHz – 5825MHz for 5GHzWIFI

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

All the test methods were according to KDB558074 D01 v05r02 DTS Measurement Guidance, KDB 662911 D01 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Test Site	Test Result
§15.207	Conducted emission AC power port	Site 1	PASS
§15.247 (b) (1)	Conducted peak output power	Site 1	PASS
§15.247(a)(1)	20dB bandwidth	---	N/A
§15.247(a)(1)	Carrier frequency separation	---	N/A
§15.247(a)(1)(iii)	Number of hopping frequencies	---	N/A
§15.247(a)(1)(iii)	Dwell Time	---	N/A
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	Site 1	PASS
§15.247(e)	Power spectral density	Site 1	PASS
§15.247(d)	Spurious RF conducted emissions	Site 1	PASS
§15.247(d)	Band edge	Site 1	PASS
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	Site 1	PASS
§15.203	Antenna requirement	See note 2	PASS

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an Internal antenna, which gain is 3dBi max for 2.4GHzWIFI. In accordance to §15.203, 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: 2A2PW108705, complies with Section 15.205, 15.209, 15.247 of the FCC Part 15, Subpart C.

The Equipment Under Test (EUT) is Wireless AP with Bluetooth Low Energy/WIFI functions.

This report is for the WIFI 2.4GHz part.

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.

Sample Received Date: 2021-09-17

Testing Start Date: 2021-09-17

Testing End Date: 2021-11-15

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

Reviewed by:

Prepared by:

Tested by:



John Zhi
Project Manager



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Project Engineer

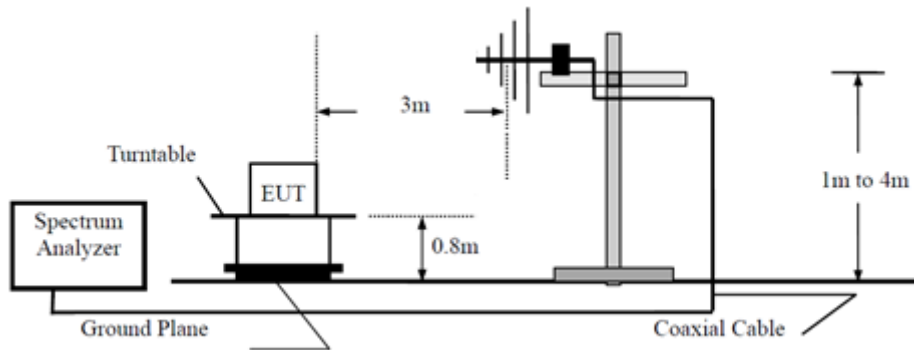


Carry Cai
Test Engineer

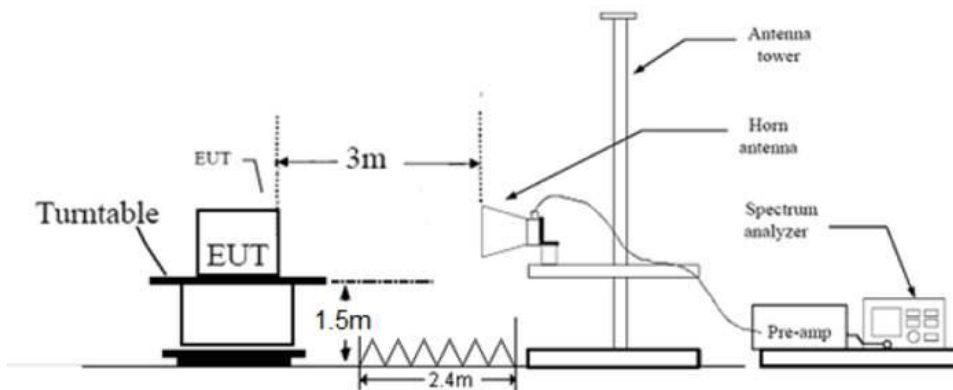
7 Test Setups

7.1 Radiated test setups

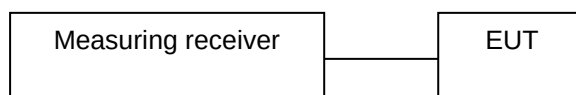
Below 1GHz



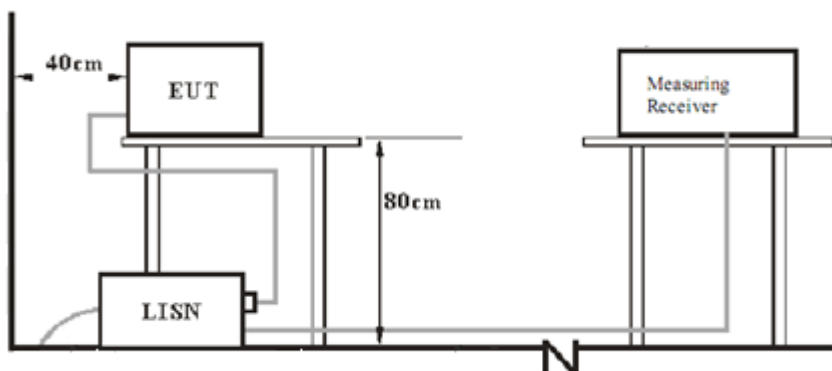
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

Name	Model	Manufacturer	S/N	Cal Due Date
Laptop	X200	Lenovo	--	--
Laptop	X240	Lenovo	--	--

Test Channel information:

Test Mode	Channel (MHz)		
802.11b	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11g	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11n HT20	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11n HT40	CH 3: 2422MHz	CH 6: 2437MHz	CH 9: 2452MHz
802.11ax HE20	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11ax HE40	CH 3: 2422MHz	CH 6: 2437MHz	CH 9: 2452MHz

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively

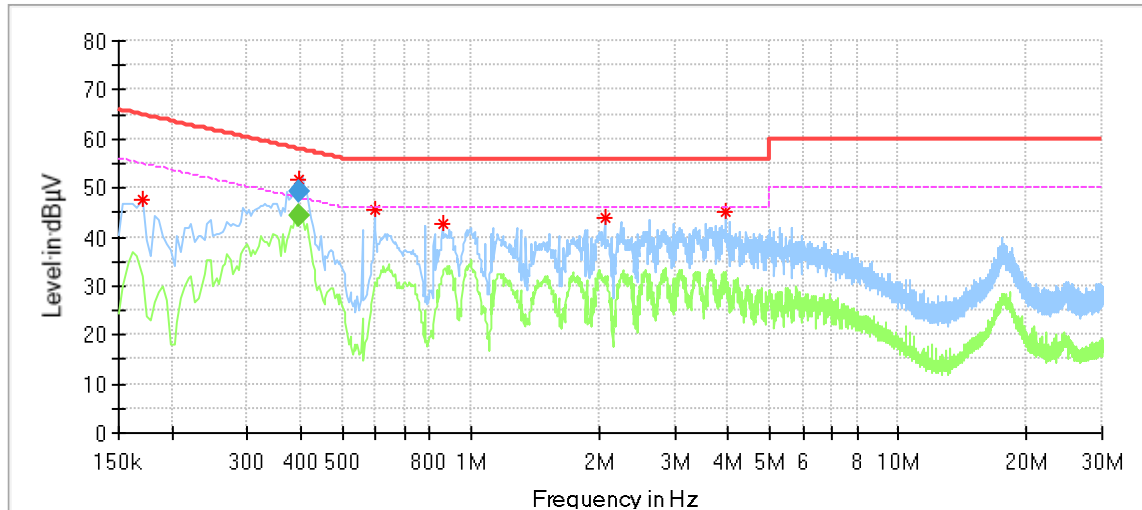
Limit According to §15.207, conducted emissions limit as below:

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

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : Wireless AP
 M/N : AP-N505L
 Operating Condition : Charging + Transmit
 Test Specification : Power Line, Live
 Comment : AC 120V/60Hz



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.170000	47.39	---	64.96	17.57	L1	9.25
0.398000	51.81	---	57.90	6.08	L1	9.21
0.594000	45.53	---	56.00	10.47	L1	9.20
0.858000	42.65	---	56.00	13.35	L1	9.20
2.054000	43.88	---	56.00	12.12	L1	9.23
3.930000	44.93	---	56.00	11.07	L1	9.28

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.398000	---	44.17	47.91	3.73	L1	9.21
0.398000	49.29	---	57.91	8.62	L1	9.21

Remark :

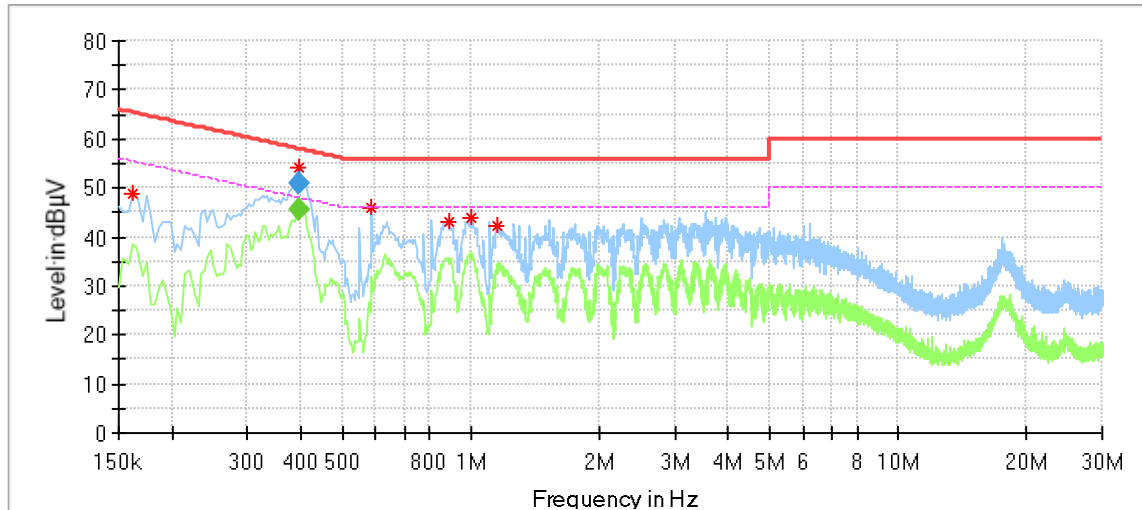
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

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

Conducted Emission

Product Type : Wireless AP
 M/N : AP-N505L
 Operating Condition : Charging + Transmit
 Test Specification : Power Line, Live
 Comment : AC 120V/60Hz



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.162000	48.63	---	65.36	16.73	N	9.41
0.398000	54.08	---	57.90	3.82	N	9.38
0.586000	45.84	---	56.00	10.16	N	9.39
0.886000	43.28	---	56.00	12.72	N	9.39
1.006000	43.71	---	56.00	12.29	N	9.39
1.154000	42.28	---	56.00	13.72	N	9.40

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.398000	---	44.70	47.80	3.10	N	9.38
0.398000	50.75	---	57.80	7.06	N	9.38

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 Conducted output power

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the power meter by RF cable. The path loss was compensated to the results for each measurement.
2. Setting the highest output power level of the EUT
3. Record the power value.

Limits

Conducted output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

802.11b SISO modulation Test Result

Frequency (MHz)	Conducted Output Power (dBm)		Result
	Ant 0	Ant 2	
Low channel 2412MHz	11.5	11.9	Pass
Middle channel 2437MHz	12.2	12.5	Pass
High channel 2462MHz	11.4	11.8	Pass

802.11g SISO modulation Test Result

Frequency (MHz)	Conducted Output Power (dBm)		Result
	Ant 0	Ant 2	
Low channel 2412MHz	10.8	11.1	Pass
Middle channel 2437MHz	12.1	12.4	Pass
High channel 2462MHz	11.5	11.8	Pass

802.11n20 MIMO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)			Result
	Ant 0	Ant 1	SUM	
Low channel 2412MHz	11.4	11.2	14.3	Pass
Middle channel 2437MHz	12.0	12.2	15.5	Pass
High channel 2462MHz	11.4	11.7	14.6	Pass

802.11n40 MIMO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)			Result
	Ant 0	Ant 1	SUM	
Low channel 2422MHz	11.5	12.2	14.9	Pass
Middle channel 2437MHz	11.6	12.0	14.8	Pass
High channel 2452MHz	11.2	11.6	14.1	Pass

802.11ax20 MIMO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)			Result
	Ant 0	Ant 1	SUM	
Low channel 2412MHz	11.7	11.9	14.8	Pass
Middle channel 2437MHz	12.3	12.6	15.1	Pass
High channel 2462MHz	11.7	12.0	14.9	Pass

802.11ax40 MIMO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)			Result
	Ant 0	Ant 1	SUM	
Low channel 2422MHz	11.8	12.2	15.0	Pass
Middle channel 2437MHz	11.8	12.0	14.9	Pass
High channel 2452MHz	11.5	11.6	14.6	Pass

9.3 6dB bandwidth

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Use the following spectrum analyzer settings:
RBW=100K, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq$ 6 dB.
4. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

≥ 500

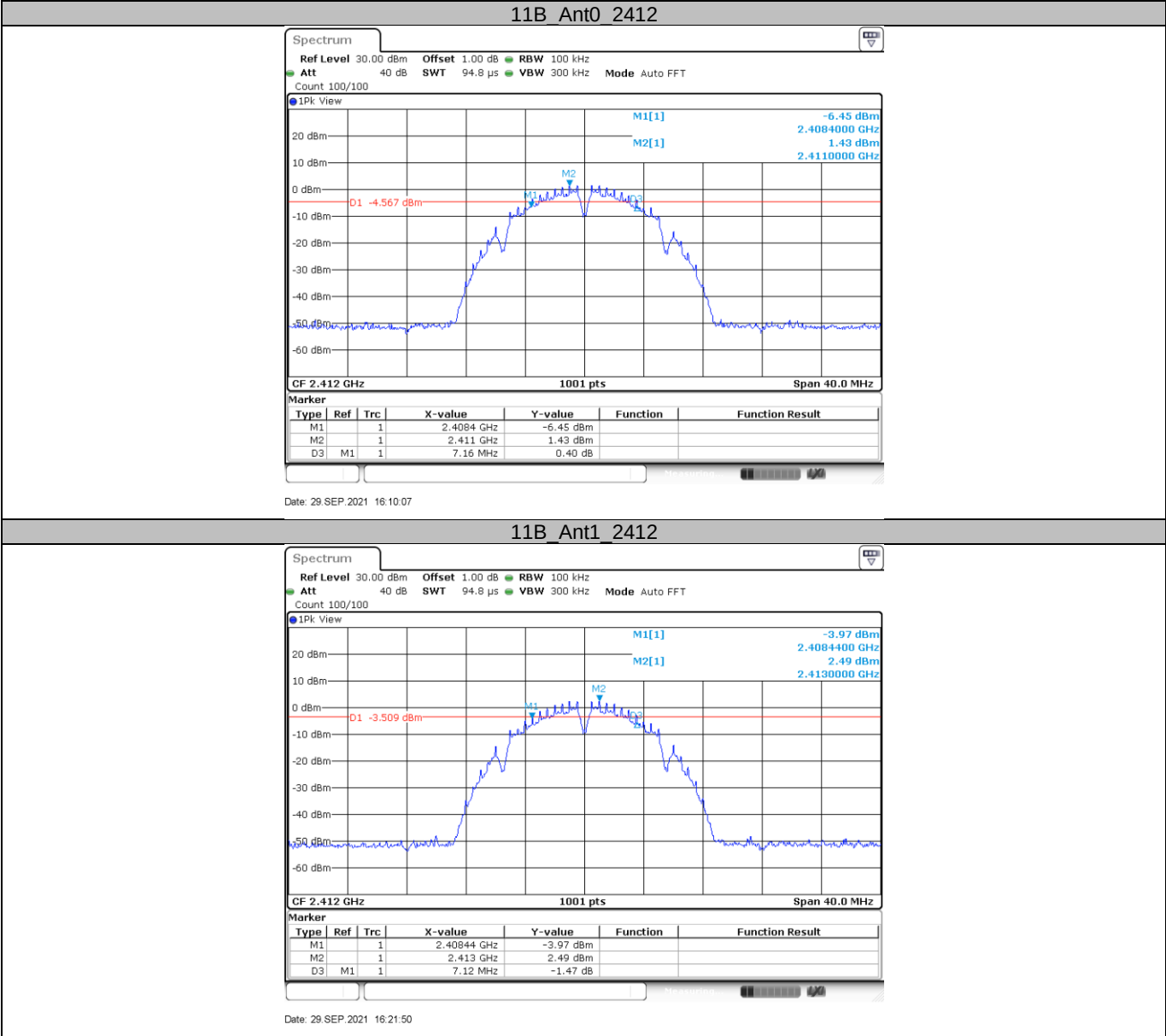
Test result

TestMode	Antenna	Channel[MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	Ant0	2412	7.160	0.5	PASS
	Ant1	2412	7.120	0.5	PASS
	Ant0	2437	7.160	0.5	PASS
	Ant1	2437	6.160	0.5	PASS
	Ant0	2462	7.120	0.5	PASS
	Ant1	2462	7.160	0.5	PASS
11G	Ant0	2412	16.440	0.5	PASS
	Ant1	2412	16.400	0.5	PASS
	Ant0	2437	16.440	0.5	PASS
	Ant1	2437	16.400	0.5	PASS
	Ant0	2462	16.440	0.5	PASS
	Ant1	2462	16.440	0.5	PASS
11N20MIMO	Ant0	2412	17.640	0.5	PASS
	Ant1	2412	17.400	0.5	PASS
	Ant0	2437	17.640	0.5	PASS
	Ant1	2437	17.440	0.5	PASS
	Ant0	2462	17.640	0.5	PASS
	Ant1	2462	17.640	0.5	PASS
11N40MIMO	Ant0	2422	33.920	0.5	PASS
	Ant1	2422	36.000	0.5	PASS
	Ant0	2437	35.840	0.5	PASS
	Ant1	2437	36.160	0.5	PASS
	Ant0	2452	36.560	0.5	PASS
	Ant1	2452	35.840	0.5	PASS
11AX20MIMO	Ant0	2412	19.040	0.5	Ant0
	Ant1	2412	18.720	0.5	Ant1
	Ant0	2437	19.040	0.5	Ant0
	Ant1	2437	18.880	0.5	Ant1
	Ant0	2462	15.200	0.5	Ant0
	Ant1	2462	19.120	0.5	Ant1
11AX40MIMO	Ant0	2422	37.680	0.5	PASS

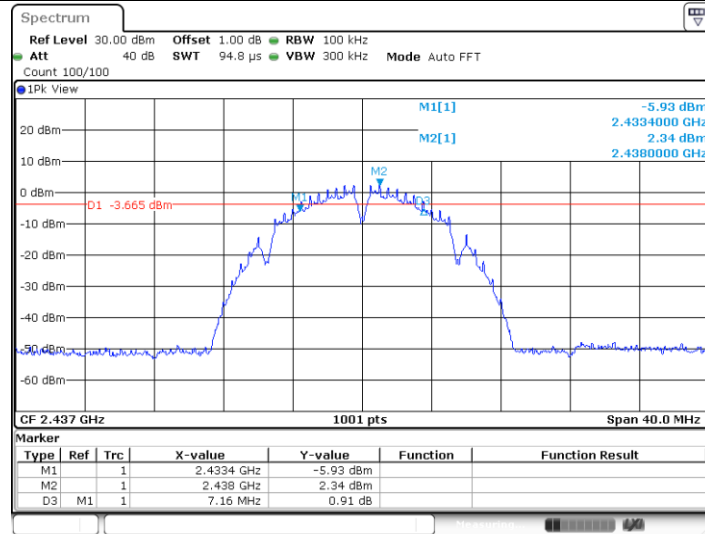
	Ant1	2422	37.840	0.5	PASS
	Ant0	2437	37.200	0.5	PASS
	Ant1	2437	37.680	0.5	PASS
	Ant0	2452	37.280	0.5	PASS
	Ant1	2452	37.280	0.5	PASS



Test Graphs

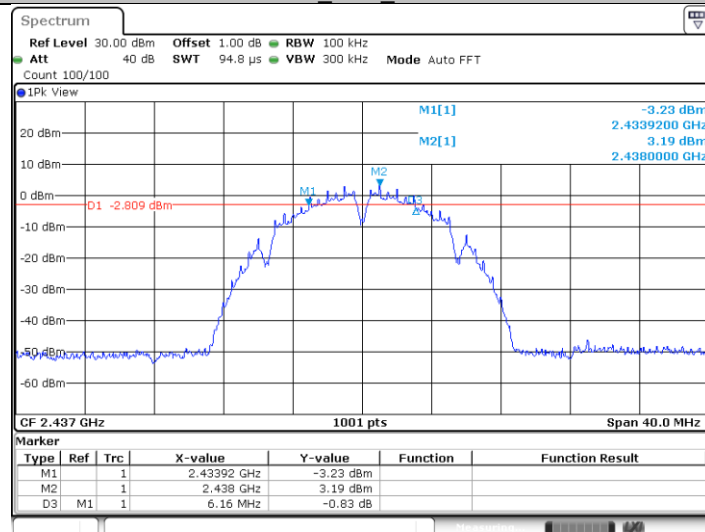


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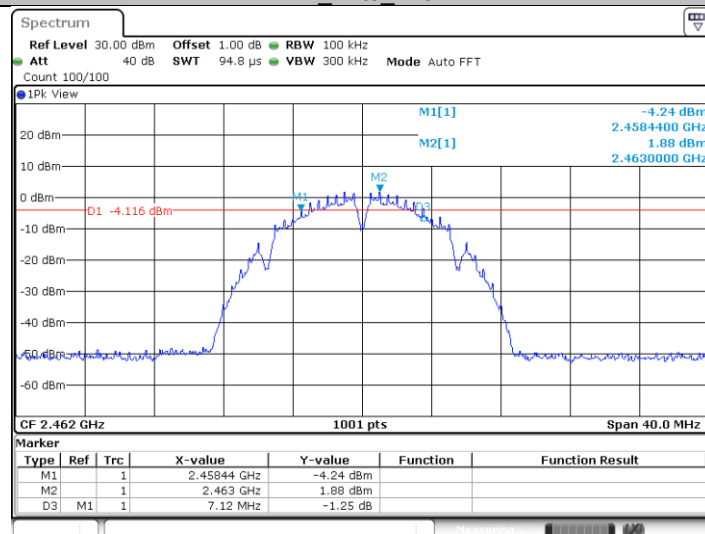
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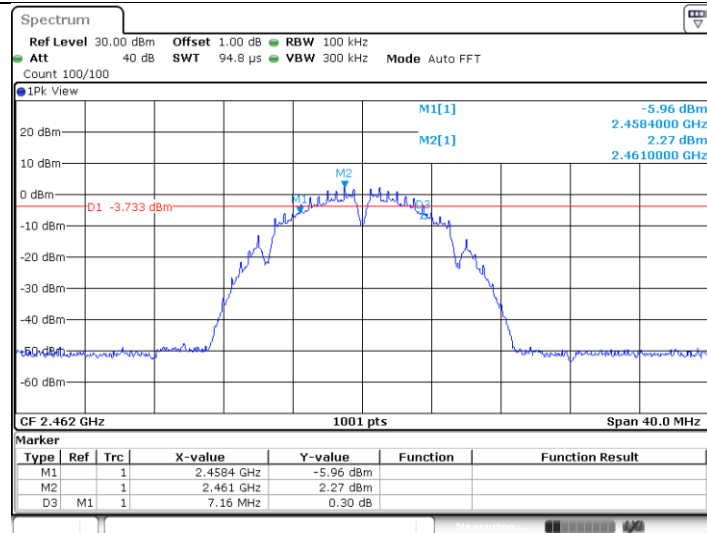
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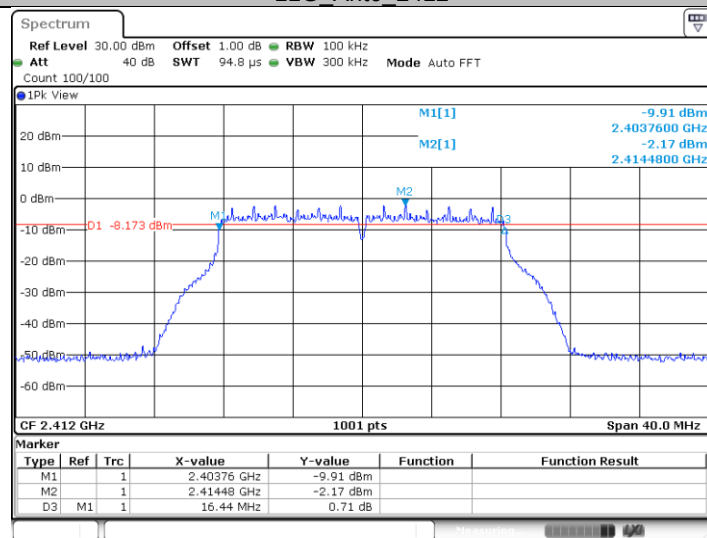
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11B_Ant1_2462



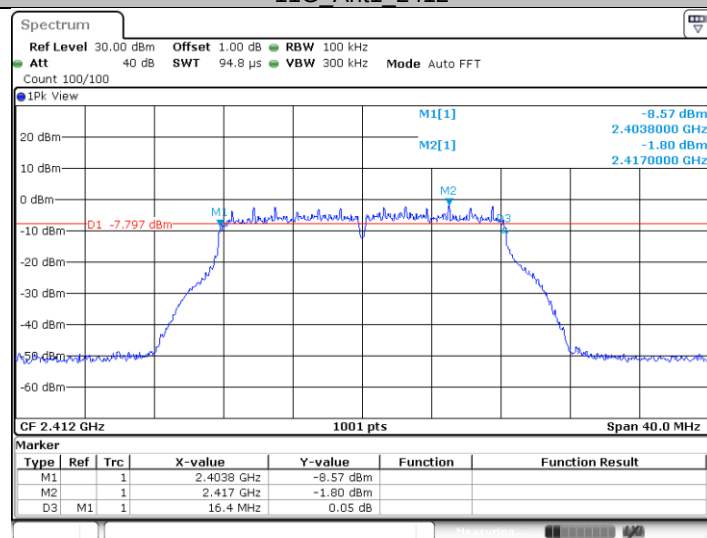
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11G_Ant0_2412



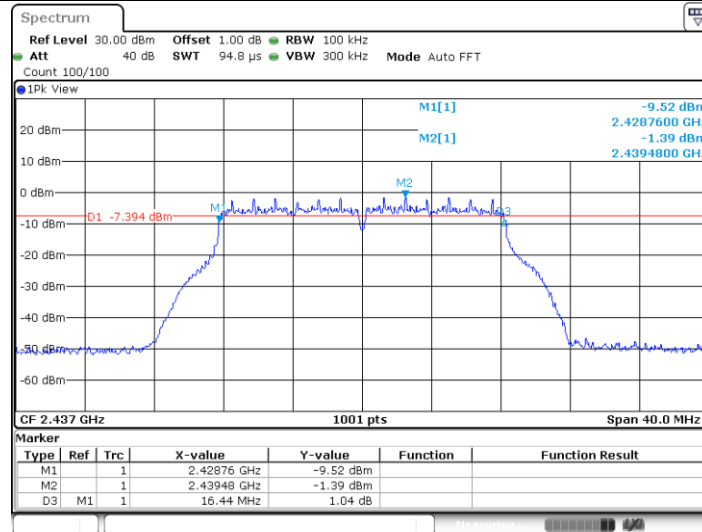
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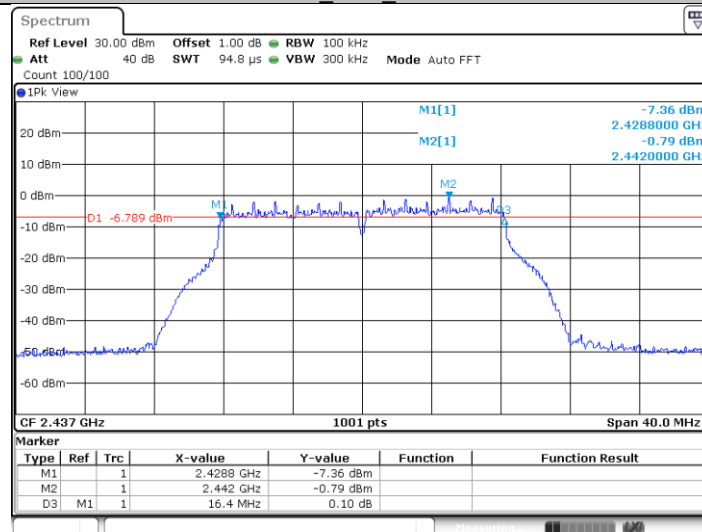
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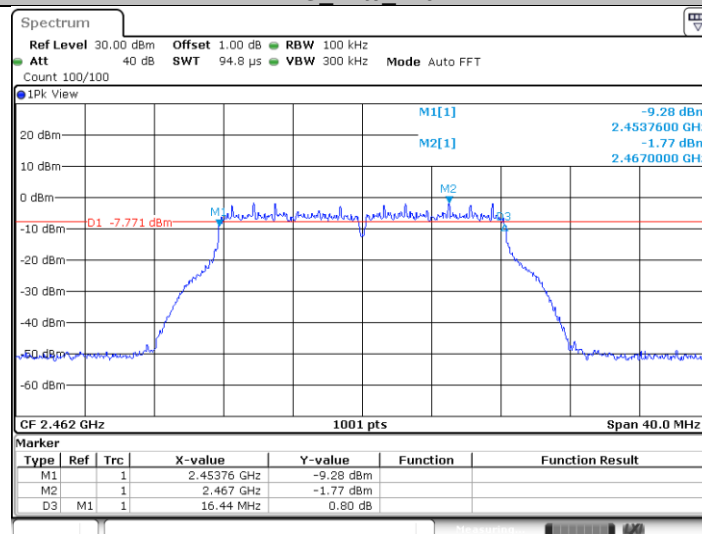
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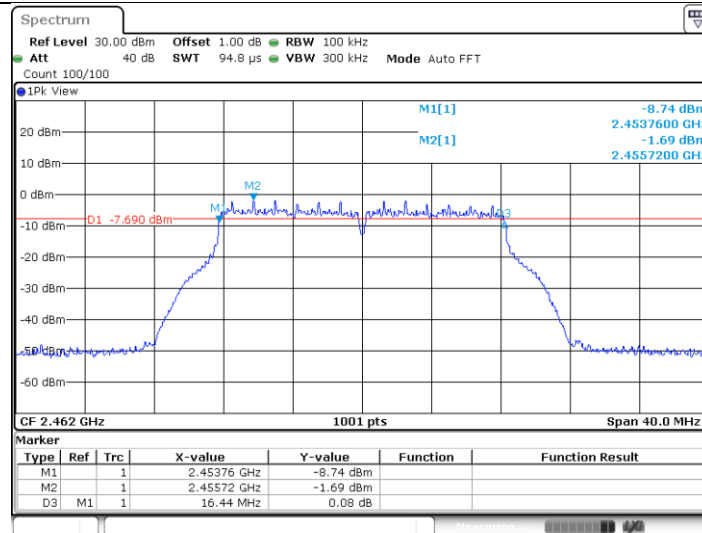
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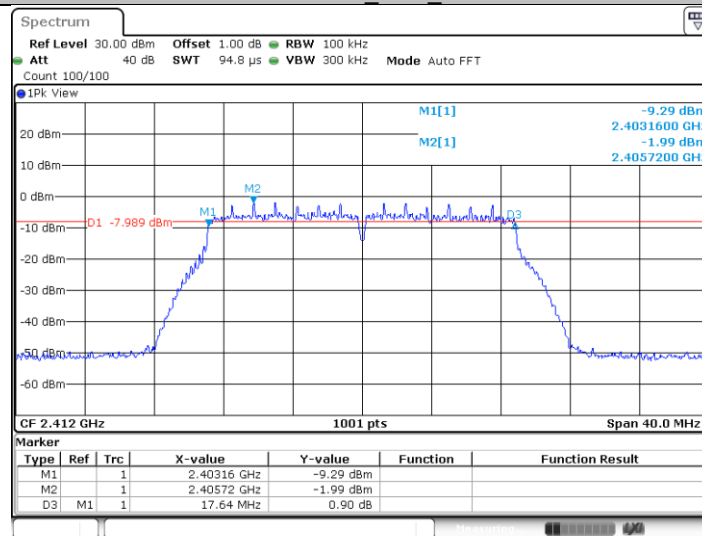
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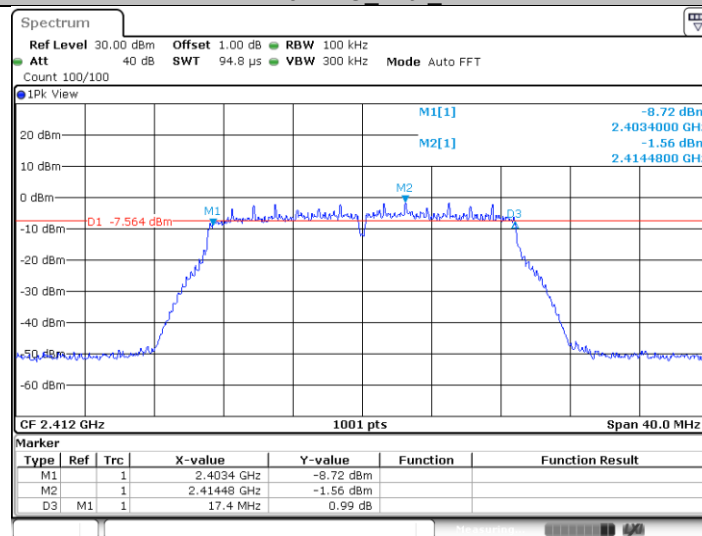
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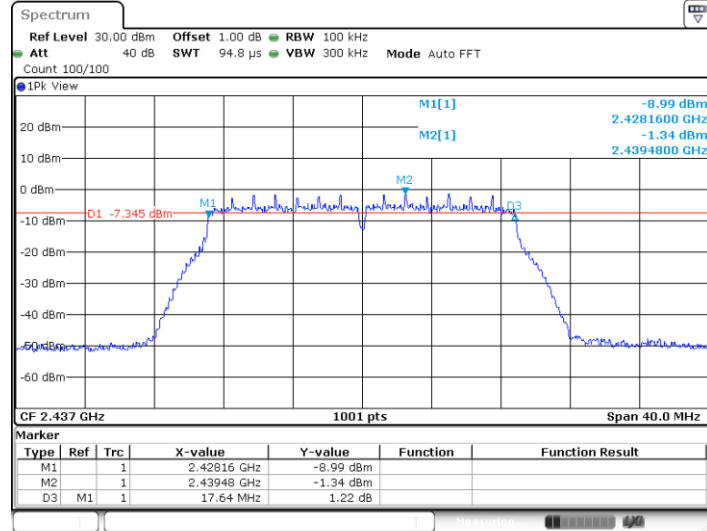
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11N20MIMO Ant1 2412



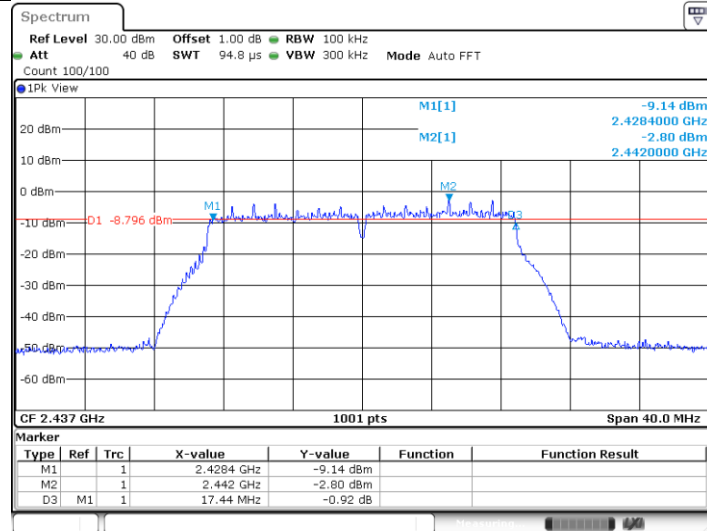
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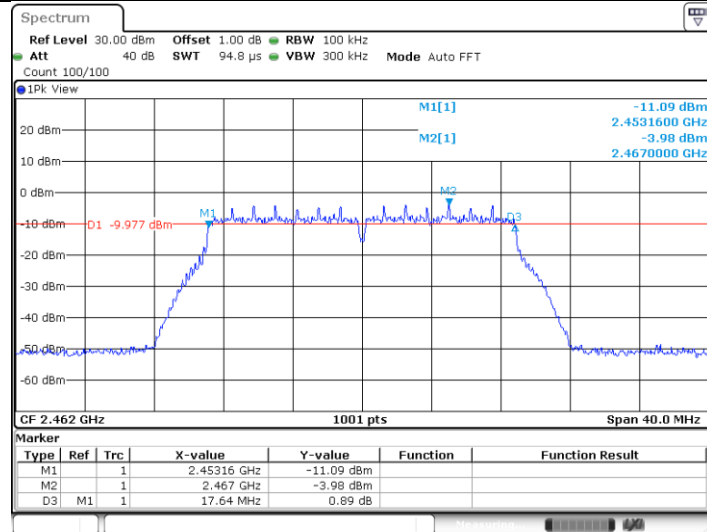
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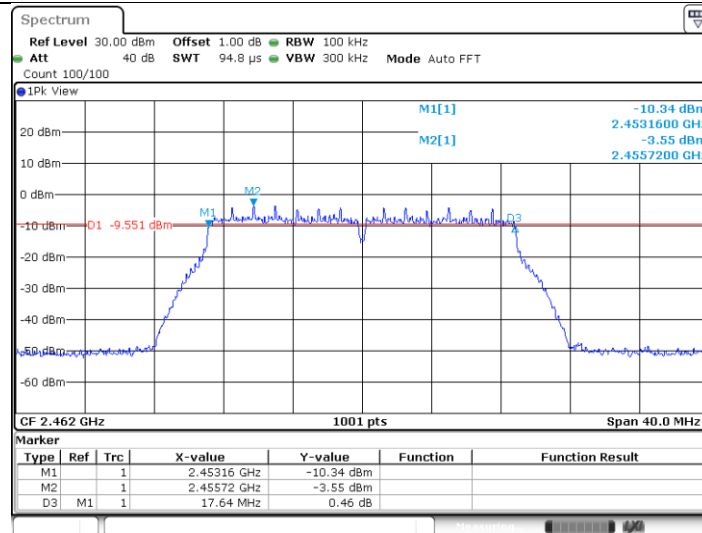
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11N20MIMO Ant0 2462



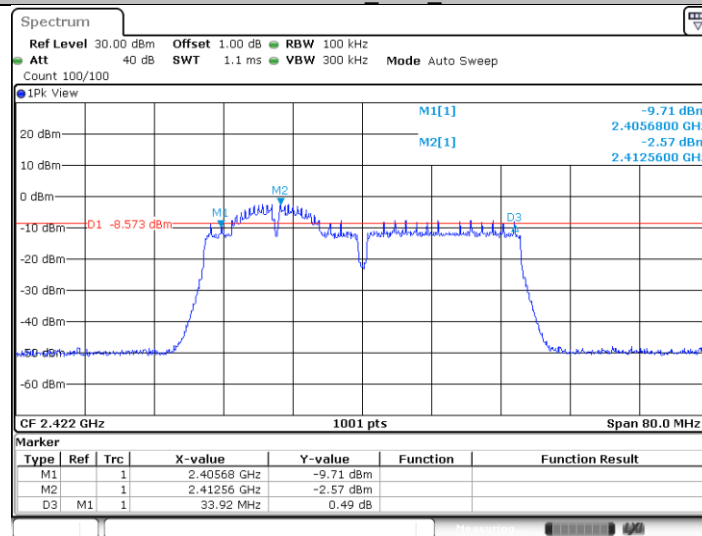
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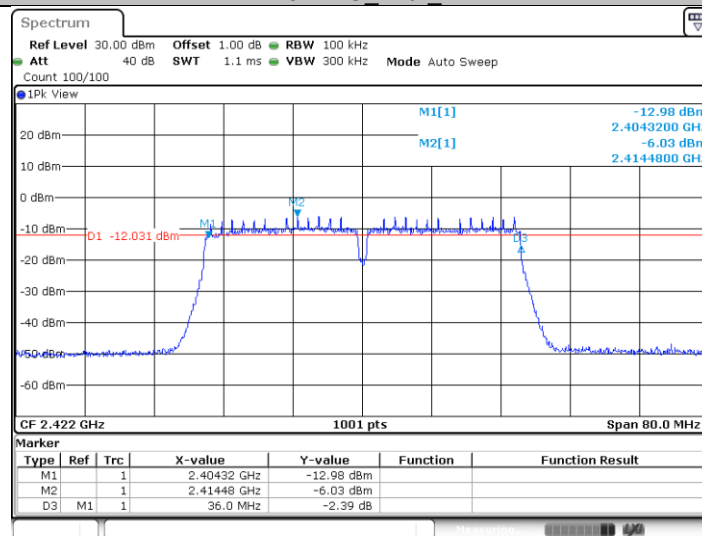
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11N40MIMO Ant0 2422



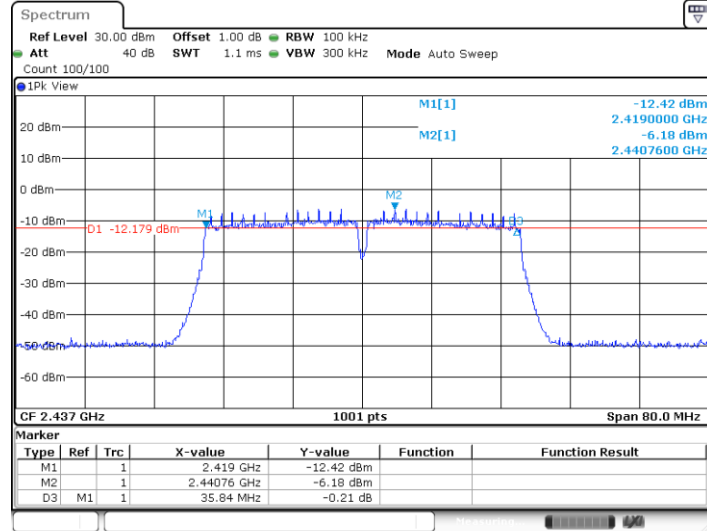
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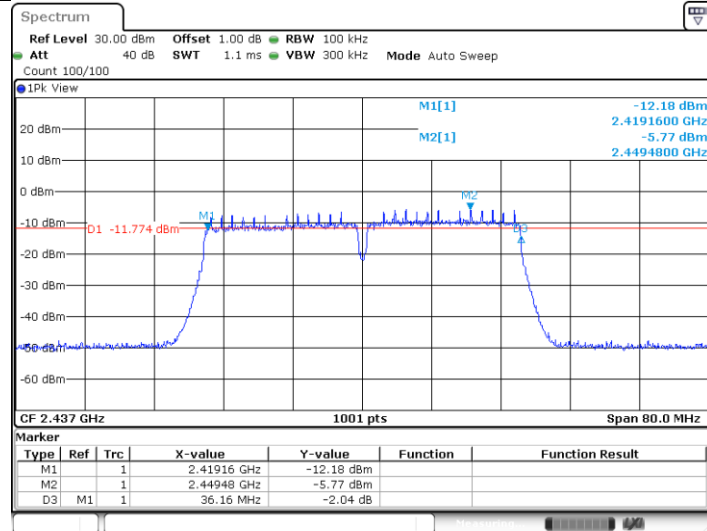
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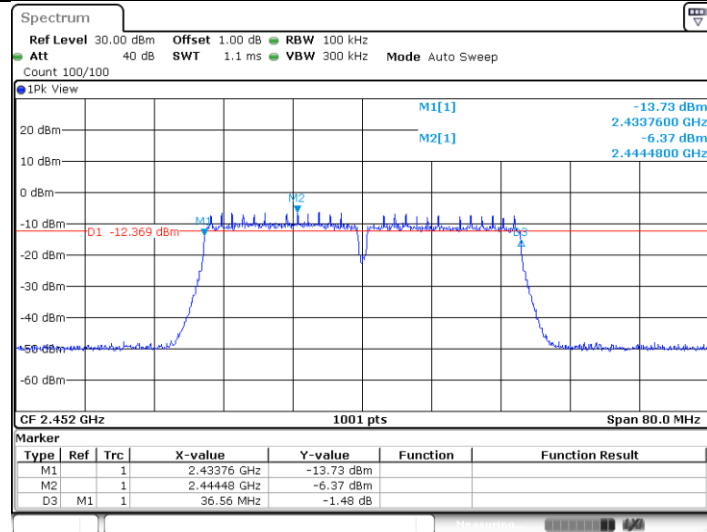
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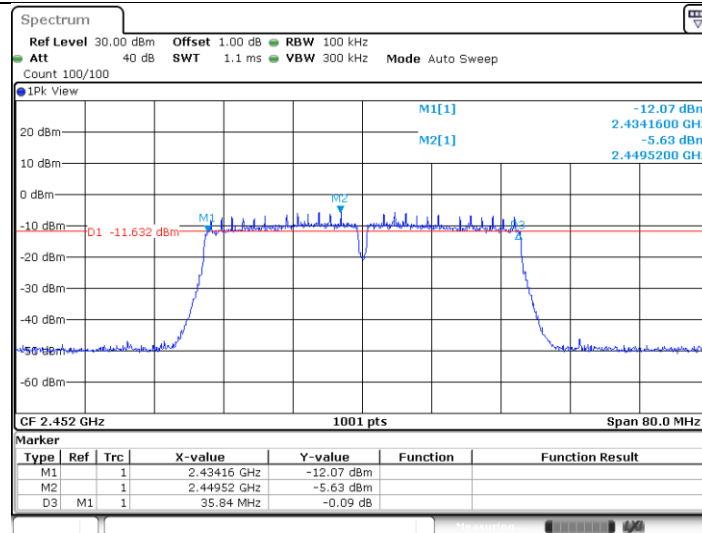
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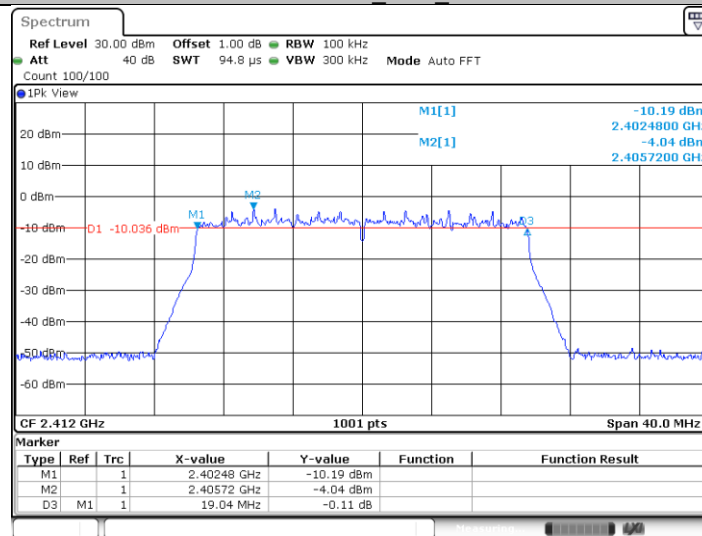
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11N40MIMO Ant1 2452



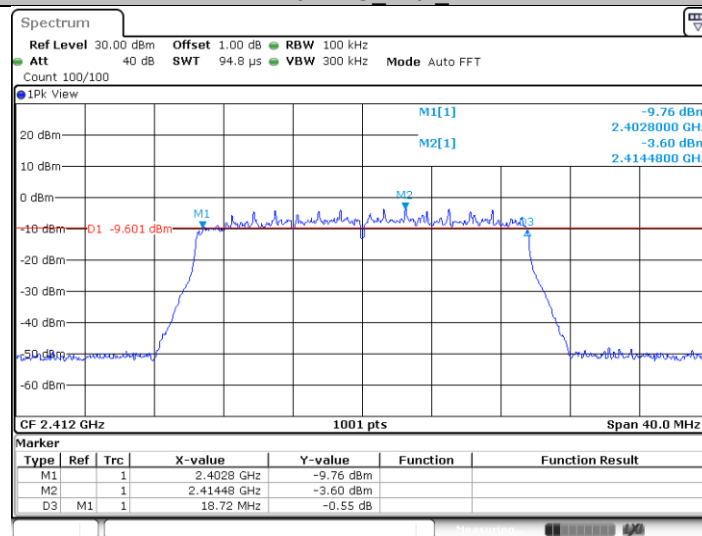
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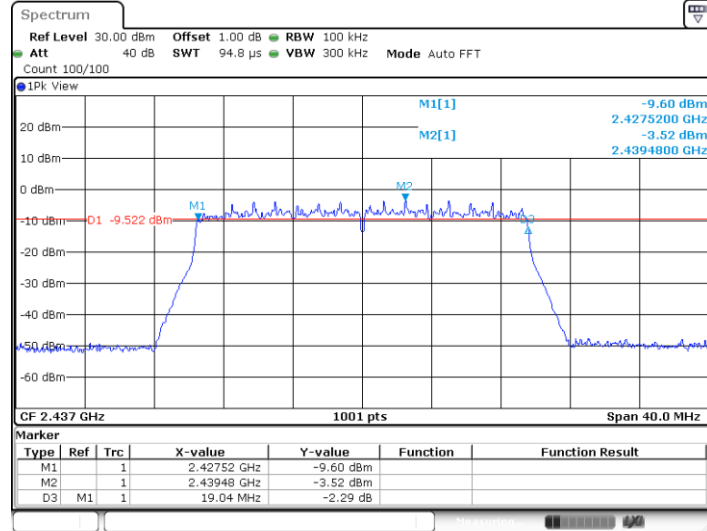
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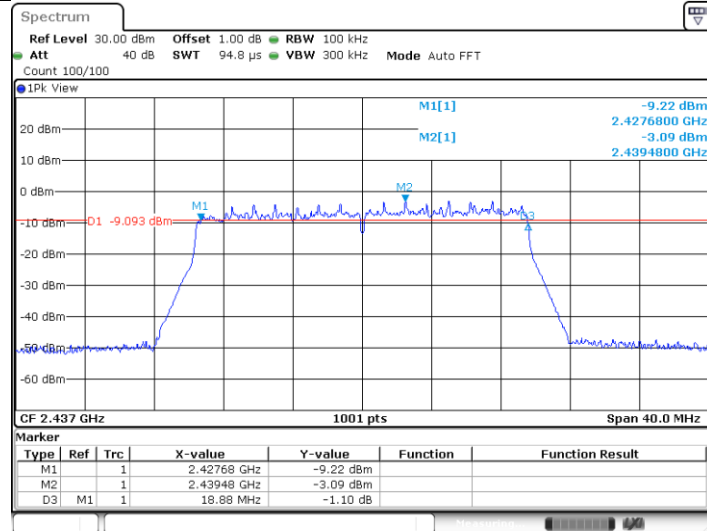
Date: 29 SEP 2021 17:36:24

11AX20MIMO_Ant0_2437



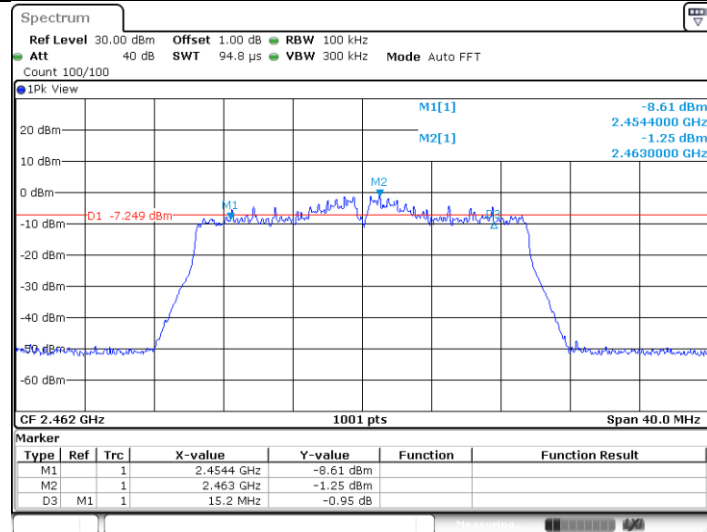
Date: 29 SEP 2021 17:41:37

11AX20MIMO_Ant1_2437



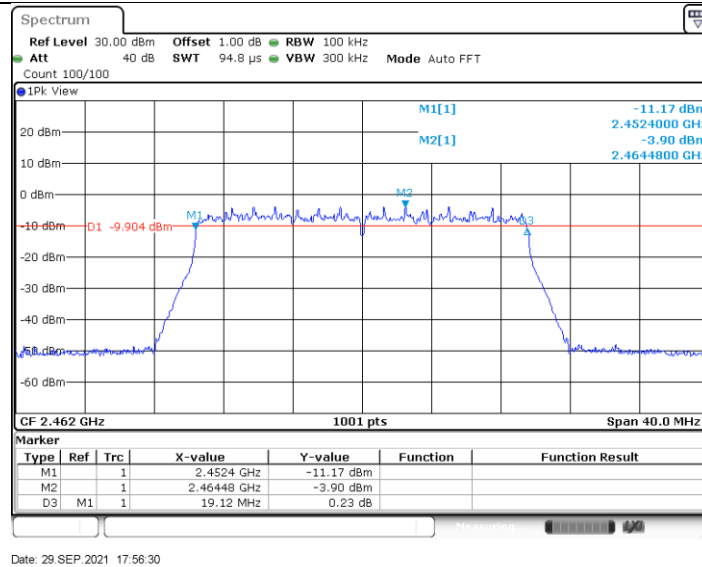
Date: 29 SEP 2021 17:43:35

11AX20MIMO_Ant0_2462

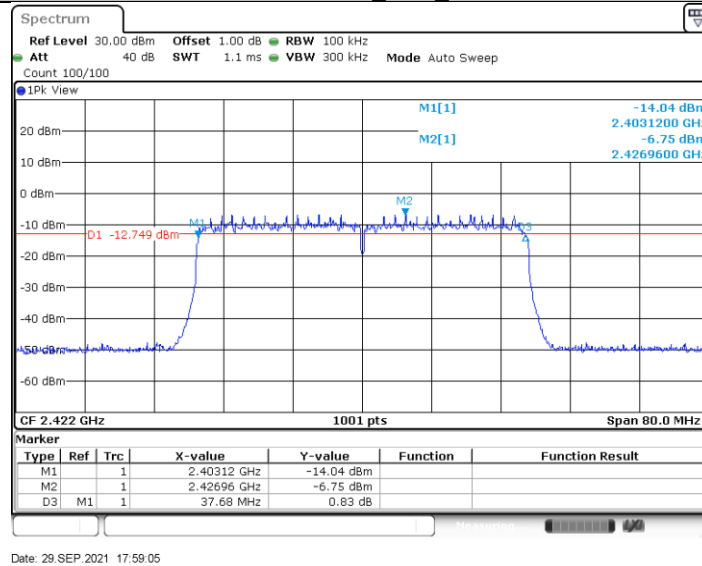


Date: 29 SEP 2021 17:45:22

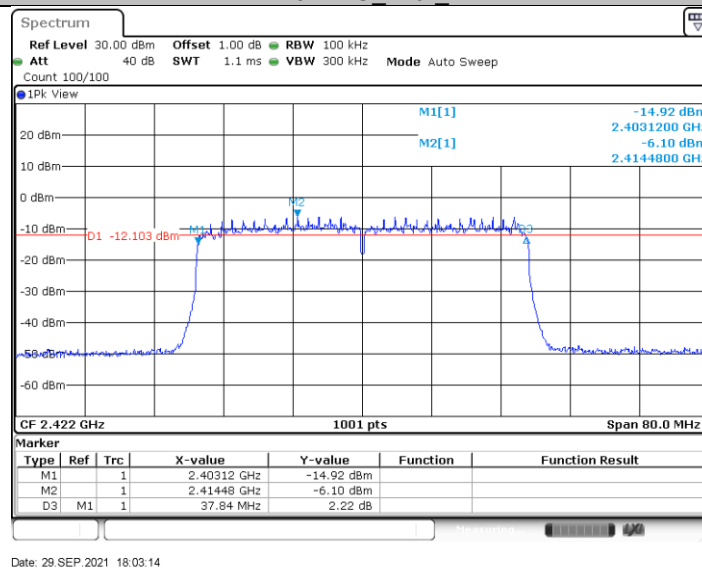
11AX20MIMO_Ant1_2462



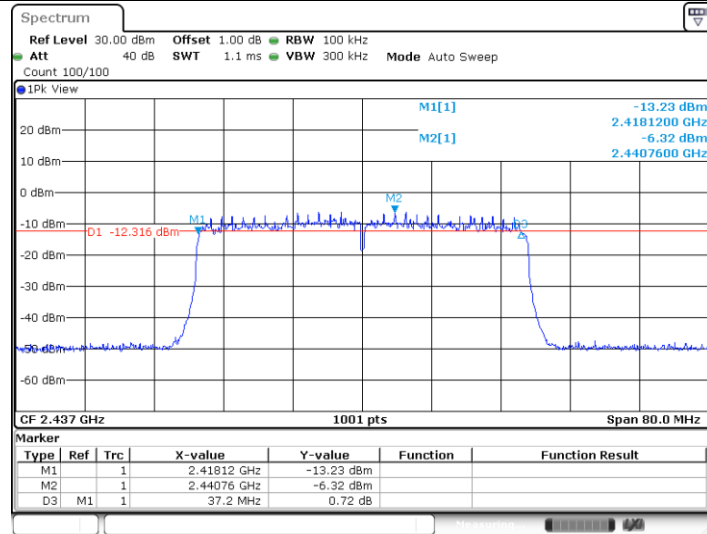
11AX40MIMO_Ant0_2422



11AX40MIMO_Ant1_2422

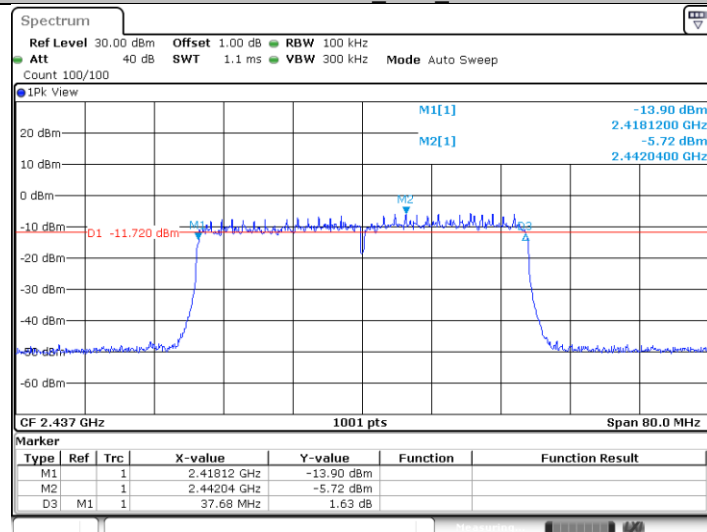


11AX40MIMO_Ant0_2437



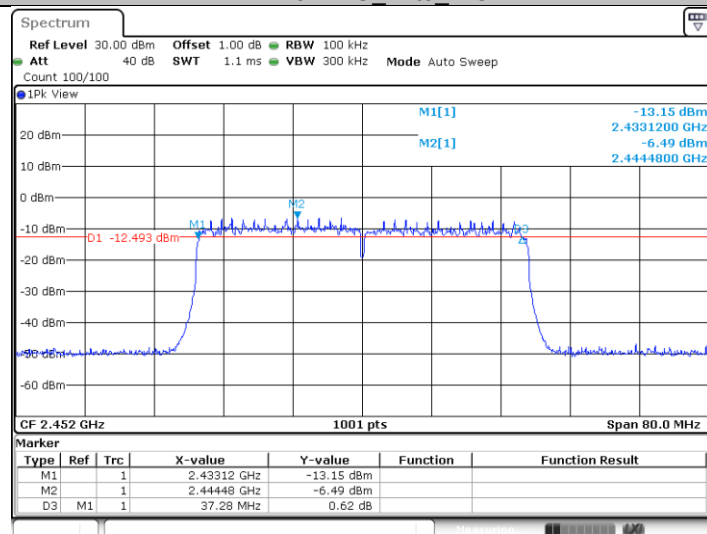
Date: 29 SEP 2021 18:05:22

11AX40MIMO_Ant1_2437



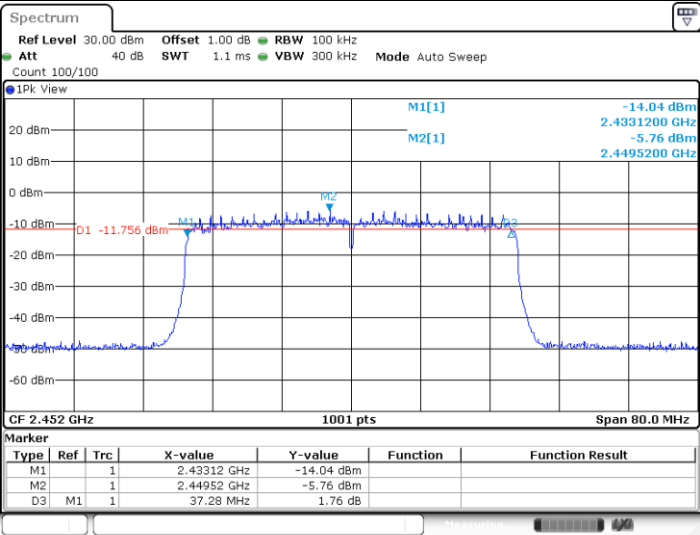
Date: 29 SEP 2021 18:06:49

11AX40MIMO_Ant0_2452



Date: 29 SEP 2021 18:08:37

11AX40MIMO_Ant1_2452



Date: 29 SEP 2021 18:10:56

9.4 99% bandwidth

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW $\geq$ 3RBW, Sweep = auto,
Detector function = peak, Trace = max hold
3. Use the automatic bandwidth measurement capability of an instrument, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
4. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

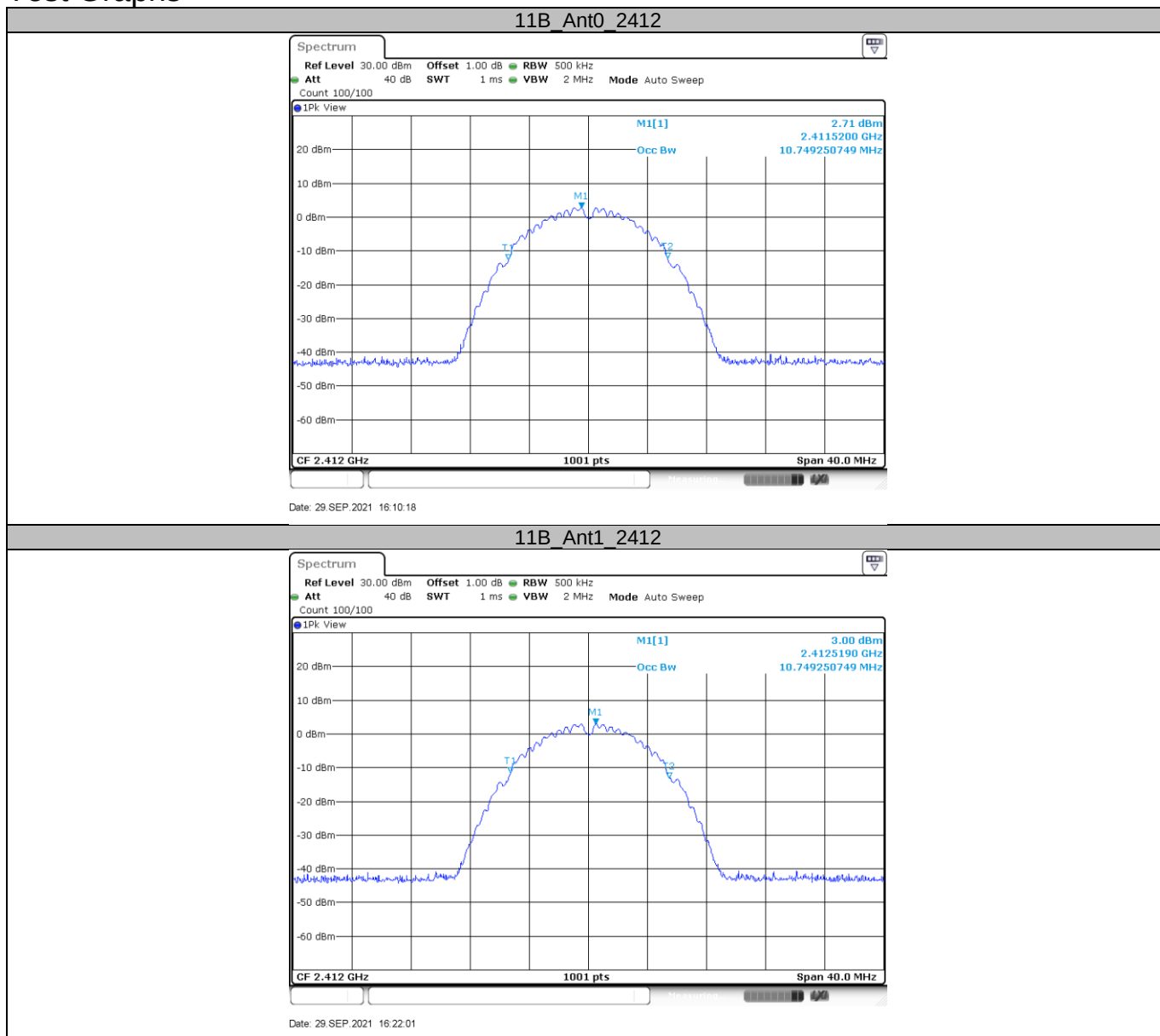
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Test Result

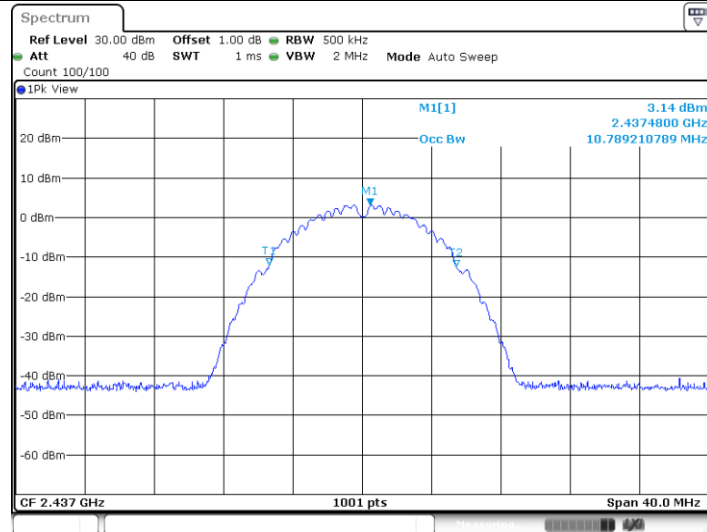
TestMode	Antenna	Channel [MHz]	OCB [MHz]	Limit [MHz]	Verdict
11B	Ant0	2412	10.749	---	PASS
	Ant1	2412	10.749	---	PASS
	Ant0	2437	10.789	---	PASS
	Ant1	2437	10.909	---	PASS
	Ant0	2462	10.949	---	PASS
	Ant1	2462	10.949	---	PASS
11G	Ant0	2412	17.662	---	PASS
	Ant1	2412	17.542	---	PASS
	Ant0	2437	17.702	---	PASS
	Ant1	2437	17.822	---	PASS
	Ant0	2462	17.822	---	PASS
	Ant1	2462	17.822	---	PASS
11N20MIMO	Ant0	2412	18.821	---	PASS
	Ant1	2412	18.741	---	PASS
	Ant0	2437	18.821	---	PASS
	Ant1	2437	18.941	---	PASS
	Ant0	2462	18.941	---	PASS
	Ant1	2462	18.981	---	PASS
11N40MIMO	Ant0	2422	36.683	---	PASS
	Ant1	2422	36.923	---	PASS
	Ant0	2437	36.923	---	PASS
	Ant1	2437	37.003	---	PASS
	Ant0	2452	37.003	---	PASS
	Ant1	2452	36.843	---	PASS
11AX20MIMO	Ant0	2412	19.141	---	PASS
	Ant1	2412	19.141	---	PASS
	Ant0	2437	19.141	---	PASS
	Ant1	2437	19.221	---	PASS
	Ant0	2462	19.181	---	PASS
	Ant1	2462	19.261	---	PASS
11AX40MIMO	Ant0	2422	37.722	---	PASS
	Ant1	2422	37.722	---	PASS
	Ant0	2437	37.562	---	PASS

	Ant1	2437	37.722	---	PASS
	Ant0	2452	37.642	---	PASS
	Ant1	2452	37.642	---	PASS

Test Graphs

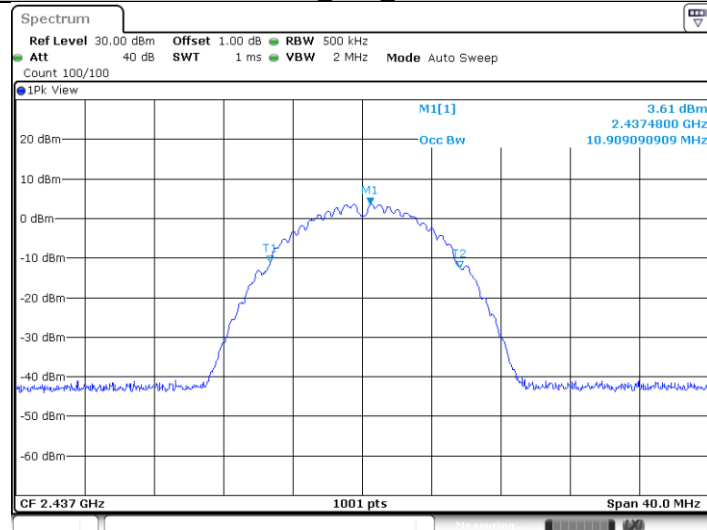


11B_Ant0_2437



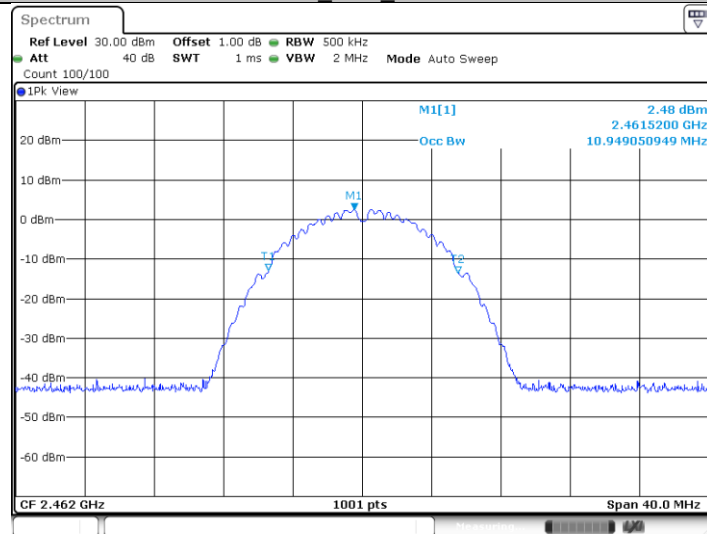
Date: 29 SEP 2021 16:12:00

11B_Ant1_2437



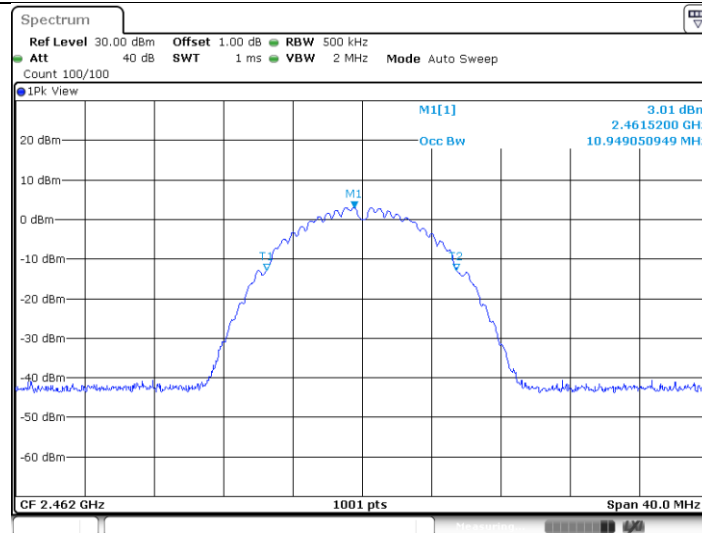
Date: 29 SEP 2021 16:24:08

11B_Ant0_2462



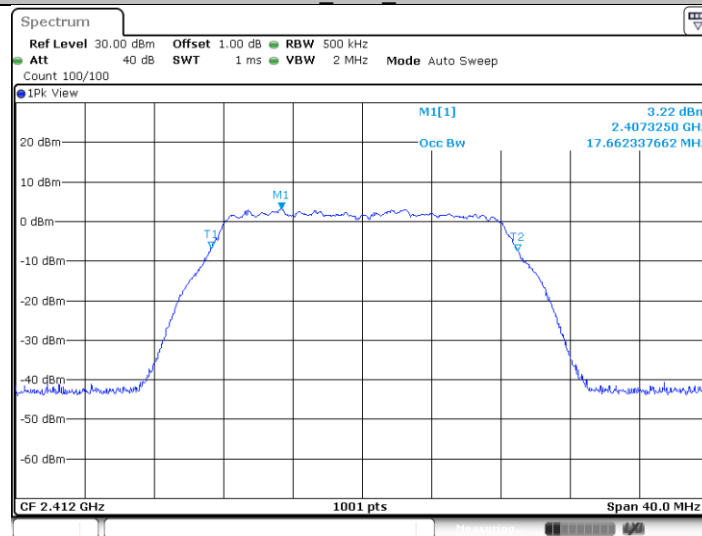
Date: 29 SEP 2021 16:13:47

11B_Ant1_2462



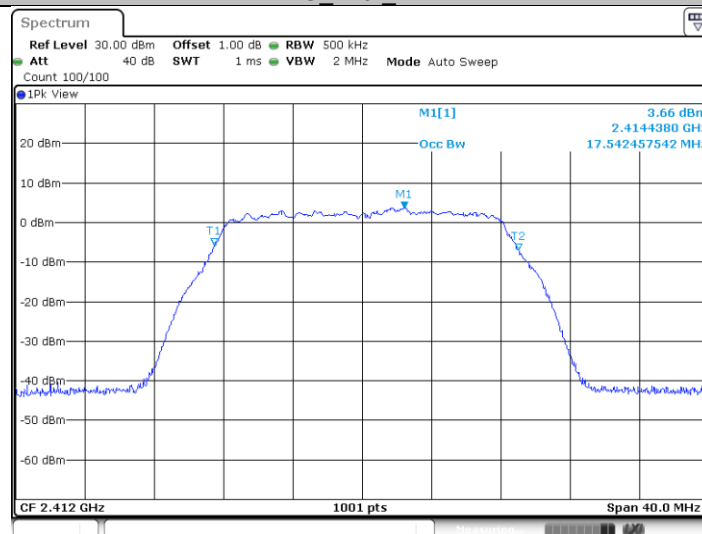
Date: 29 SEP 2021 16:25:44

11G_Ant0_2412



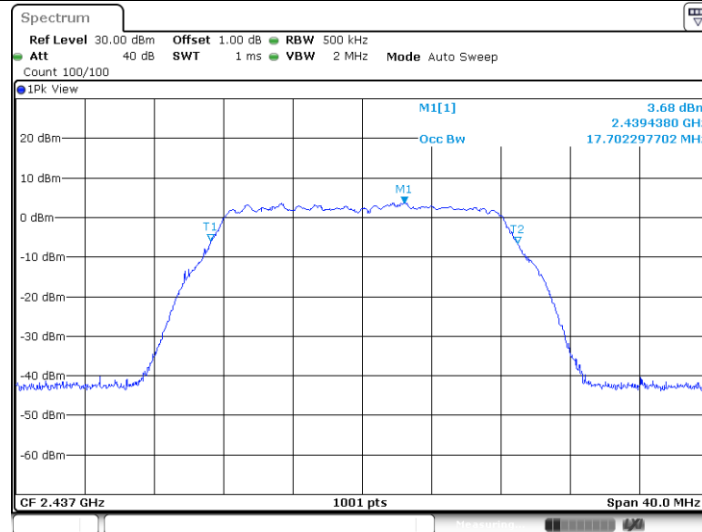
Date: 29 SEP 2021 16:15:36

11G_Ant1_2412



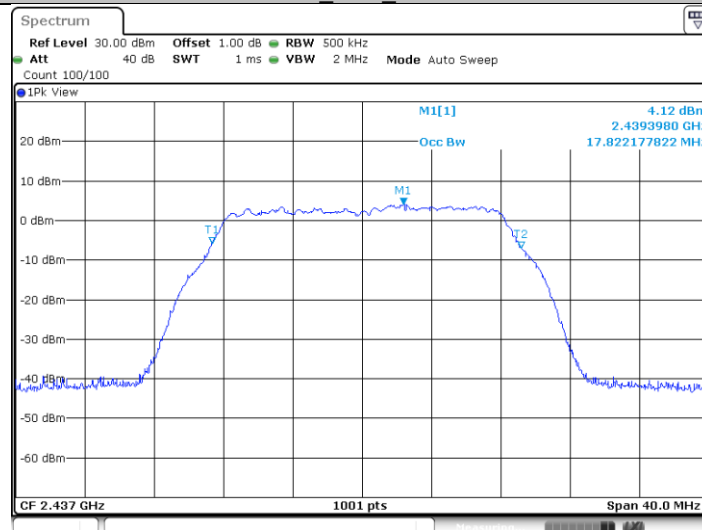
Date: 29 SEP 2021 16:27:49

11G_Ant0_2437



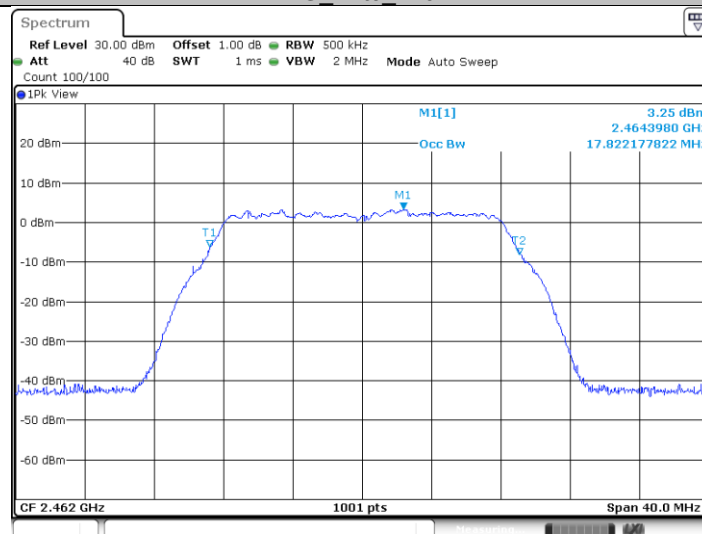
Date: 29 SEP 2021 16:17:20

11G_Ant1_2437



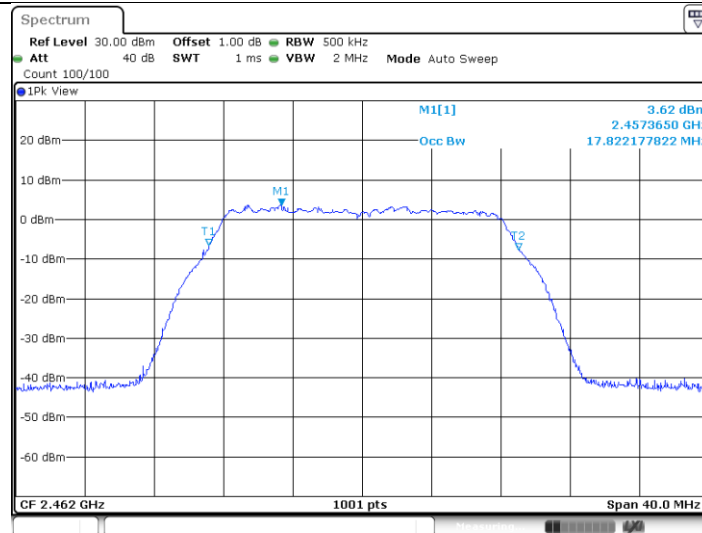
Date: 29 SEP 2021 16:29:46

11G_Ant0_2462



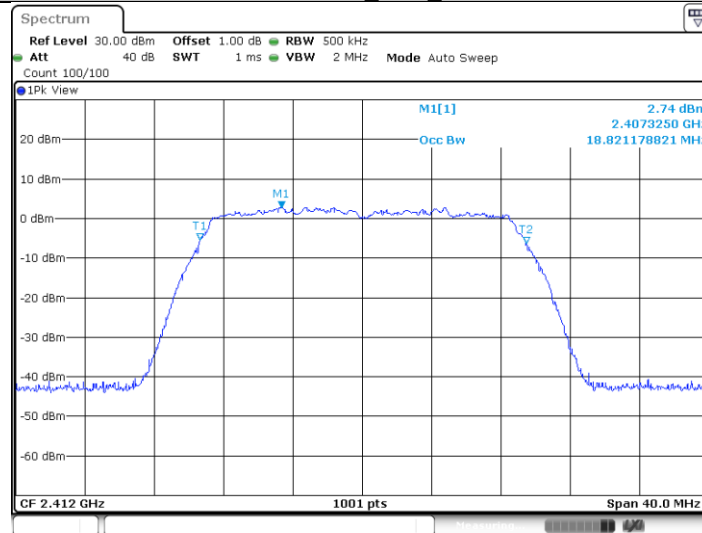
Date: 29 SEP 2021 16:18:55

11G_Ant1_2462



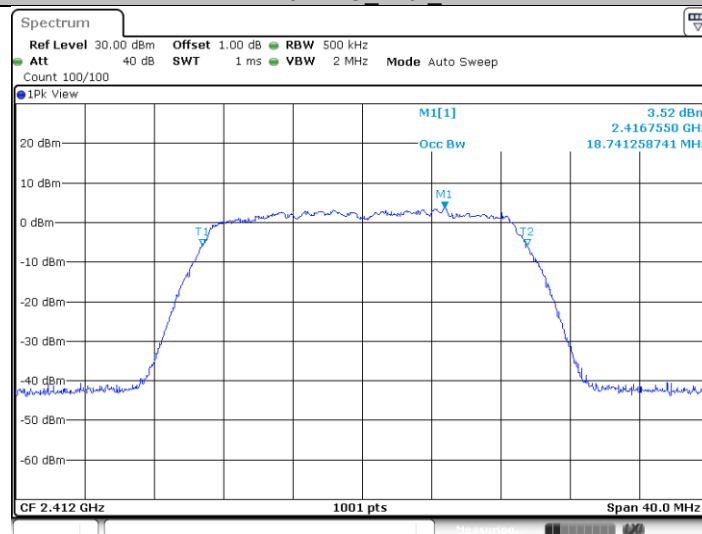
Date: 29 SEP 2021 16:32:41

11N20MIMO Ant0 2412



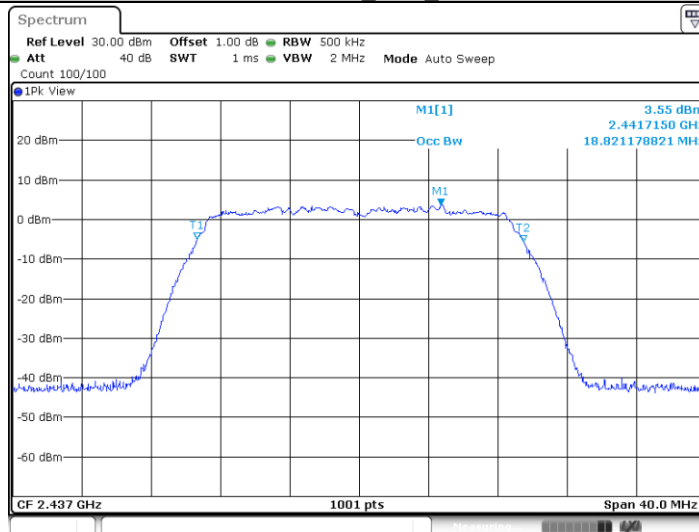
Date: 29 SEP 2021 16:36:01

11N20MIMO Ant1 2412



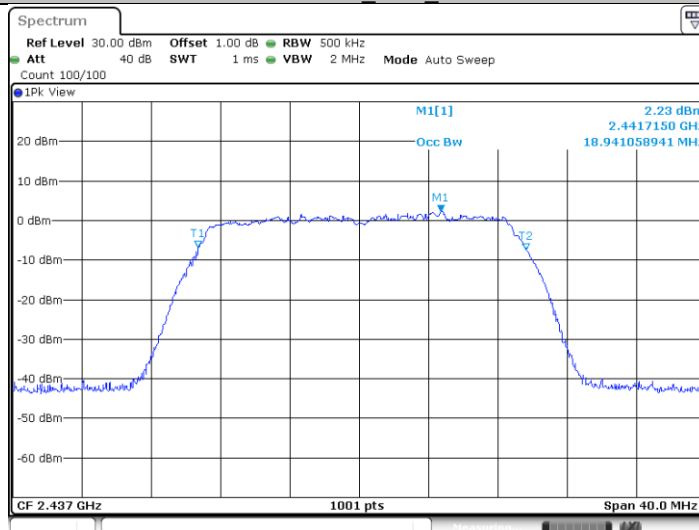
Date: 29 SEP 2021 16:46:03

11N20MIMO Ant0 2437



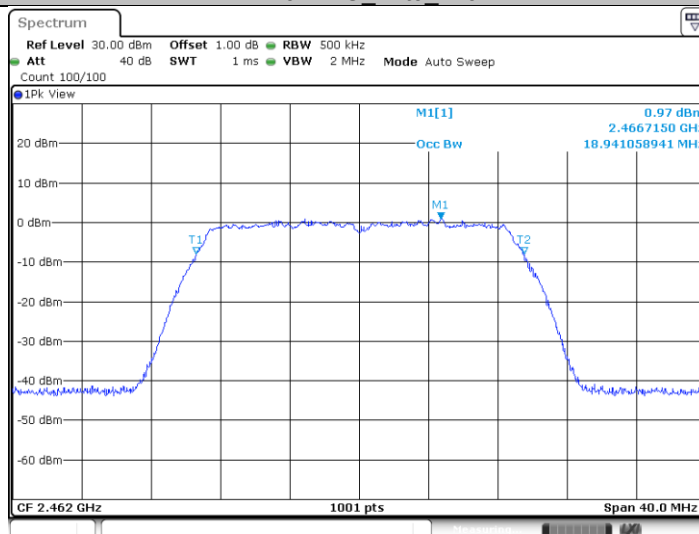
Date: 29 SEP 2021 16:50:11

11N20MIMO Ant1 2437



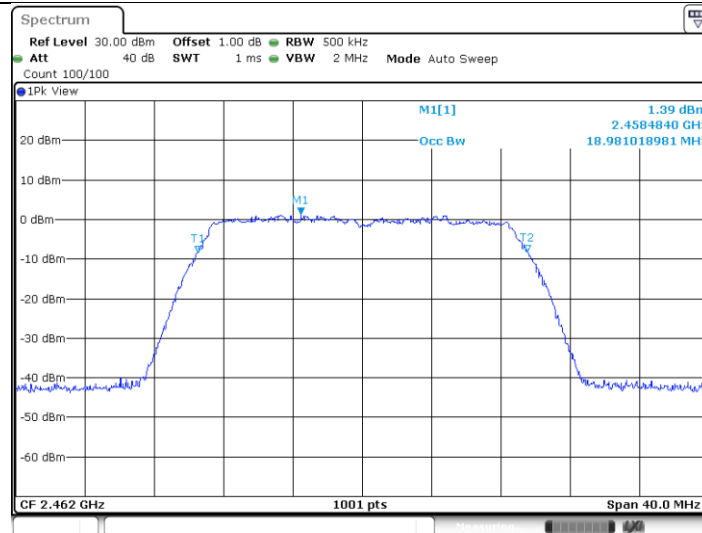
Date: 29 SEP 2021 16:53:20

11N20MIMO Ant0 2462



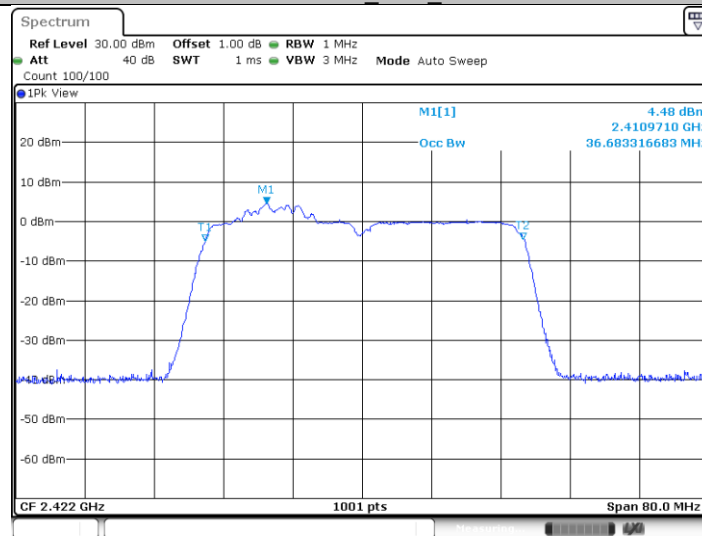
Date: 29 SEP 2021 16:59:49

11N20MIMO Ant1 2462



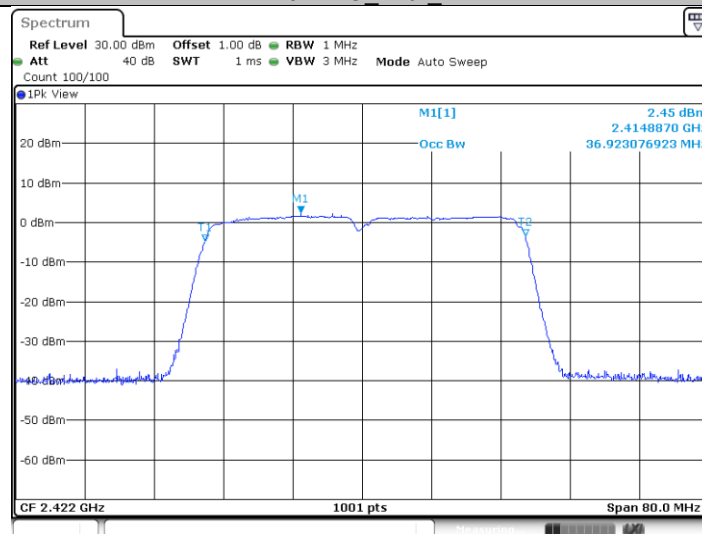
Date: 29 SEP 2021 17:01:47

11N40MIMO Ant0 2422



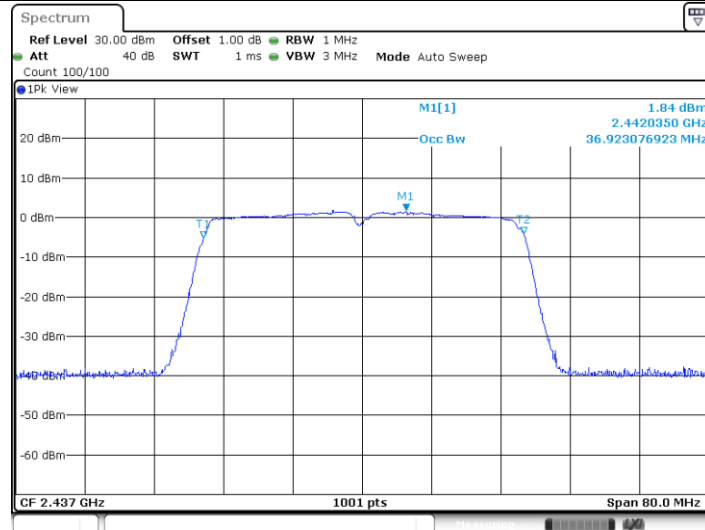
Date: 29 SEP 2021 17:11:21

11N40MIMO Ant1 2422



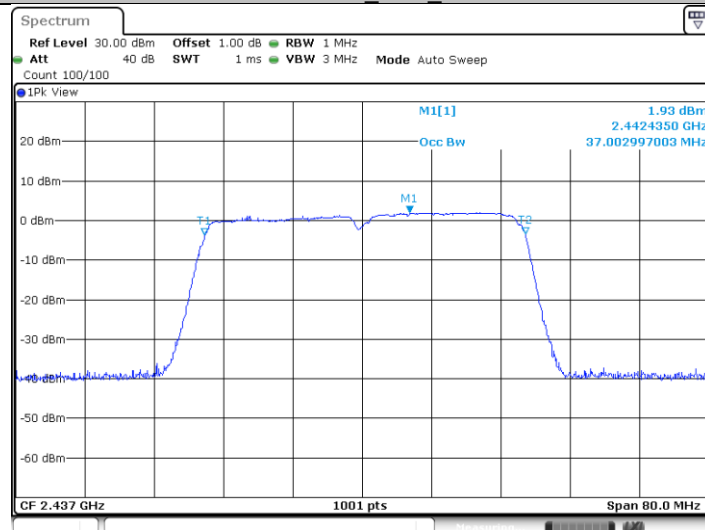
Date: 29 SEP 2021 17:20:55

11N40MIMO Ant0 2437



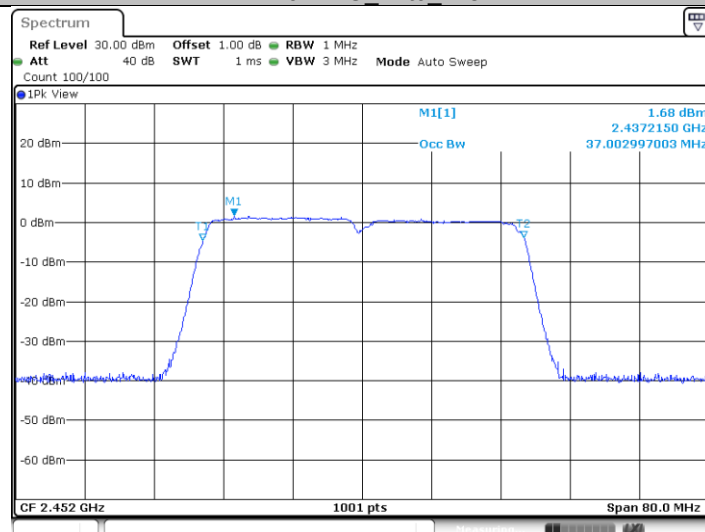
Date: 29 SEP 2021 17:25:11

11N40MIMO Ant1 2437



Date: 29 SEP 2021 17:27:13

11N40MIMO Ant0 2452



Date: 29 SEP 2021 17:30:19

11N40MIMO Ant1 2452