

Appendix

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1. Equipment List

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018/9/2	2019/9/2
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2018/4/2	2019/4/1
				2019/4/1	2020/3/31
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018/7/12	2019/7/11
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2019/2/11	2020/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019/3/2	2020/3/1
RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2018/9/15	2019/9/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/13	2019/7/12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27

2. Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Conduct emission test	±3.12 dB (9KHz- 30MHz)

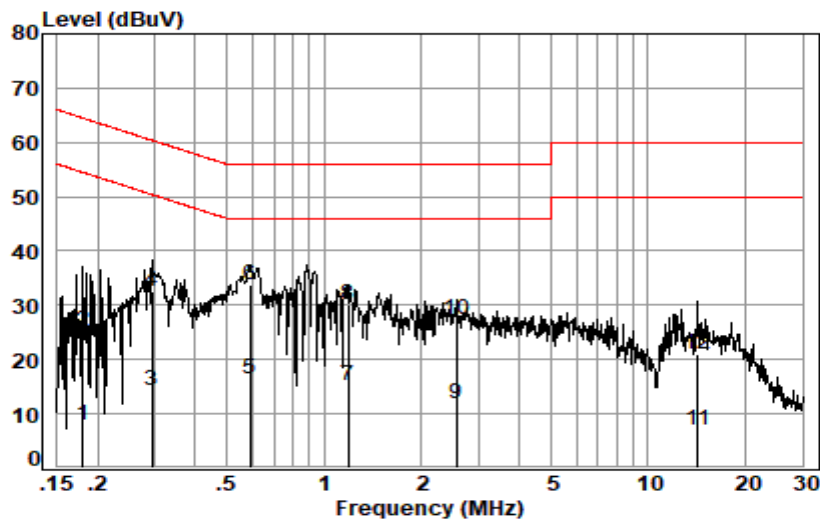
3. AC Power Line Conducted Emissions

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.

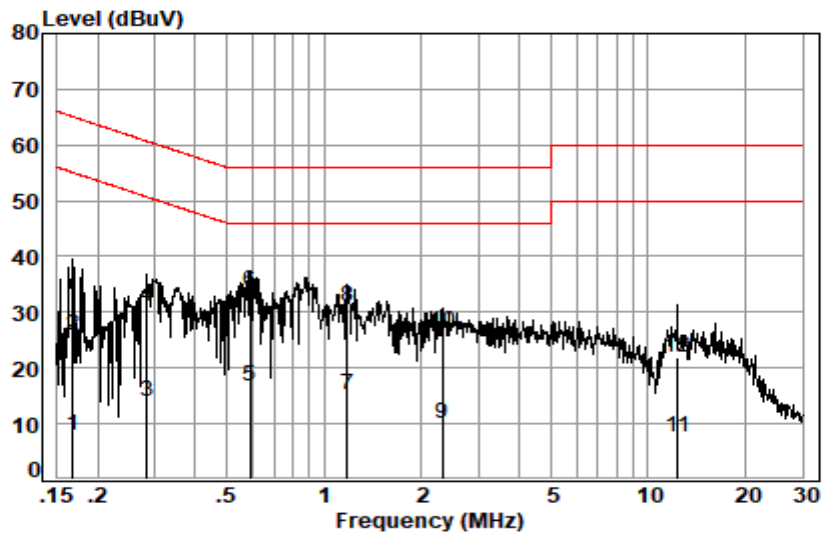
Live Line:



Site : Shielding Room
 Condition: Line
 Job No. : 15593CR
 Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1806	0.02	9.66	-1.71	7.97	54.46	-46.49	Average
2	0.1806	0.02	9.66	15.42	25.10	64.46	-39.36	QP
3	0.2940	0.04	9.67	4.53	14.24	50.41	-36.17	Average
4	0.2940	0.04	9.67	22.91	32.62	60.41	-27.79	QP
5	0.5916	0.07	9.67	6.80	16.54	46.00	-29.46	Average
6	0.5916	0.07	9.67	24.07	33.81	56.00	-22.19	QP
7	1.1907	0.11	9.73	5.41	15.25	46.00	-30.75	Average
8	1.1907	0.11	9.73	20.29	30.13	56.00	-25.87	QP
9	2.5671	0.16	9.71	1.96	11.83	46.00	-34.17	Average
10	2.5671	0.16	9.71	17.38	27.25	56.00	-28.75	QP
11	14.2882	0.21	10.29	-3.60	6.90	50.00	-43.10	Average
12	14.2882	0.21	10.29	10.52	21.02	60.00	-38.98	QP

Neutral Line:



Site : Shielding Room
Condition: Neutral
Job No. : 15593CR
Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1677	0.01	9.64	-1.88	7.77	55.08	-47.31	Average
2	0.1677	0.01	9.64	16.08	25.73	65.08	-39.35	QP
3	0.2848	0.04	9.64	4.24	13.92	50.68	-36.76	Average
4	0.2848	0.04	9.64	21.46	31.14	60.68	-29.54	QP
5	0.5916	0.07	9.64	7.05	16.76	46.00	-29.24	Average
6	0.5916	0.07	9.64	24.05	33.76	56.00	-22.24	QP
7	1.1781	0.11	9.70	5.38	15.19	46.00	-30.81	Average
8	1.1781	0.11	9.70	21.10	30.91	56.00	-25.09	QP
9	2.3213	0.16	9.68	0.28	10.12	46.00	-35.88	Average
10	2.3213	0.16	9.68	16.70	26.54	56.00	-29.46	QP
11	12.3182	0.19	10.12	-2.85	7.46	50.00	-42.54	Average
12	12.3182	0.19	10.12	11.64	21.95	60.00	-38.05	QP

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

4. Duty Cycle

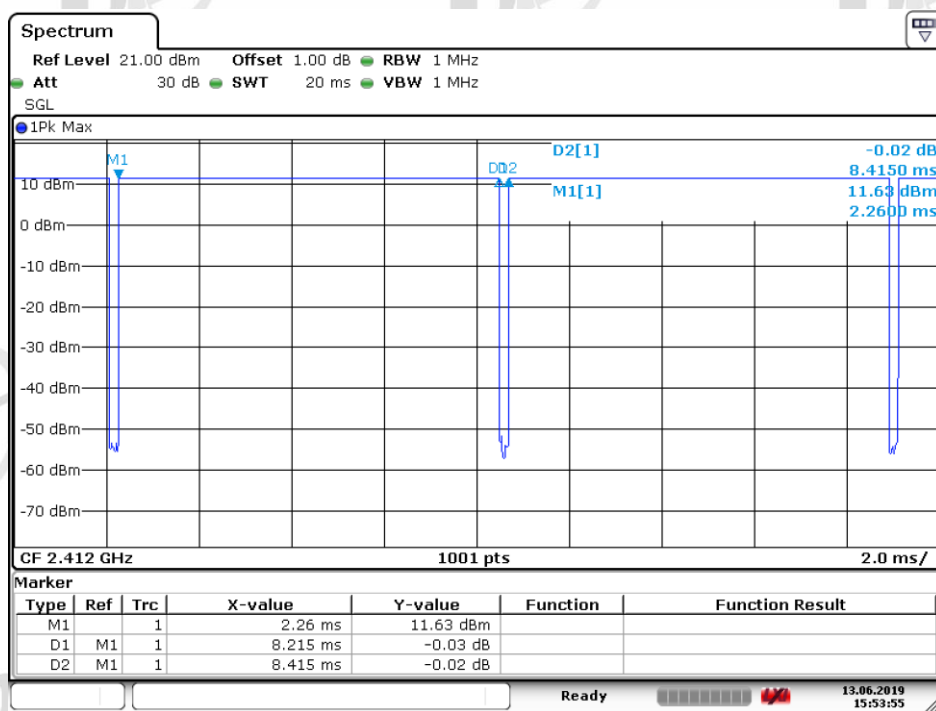
4.1. Test Results

Test Mode	TX Freq. [MHz]	Duty cycle [%]
11B	Ant 1: CH1	97.62
11G	Ant 1: CH1	85.99
11N20	Ant 1: CH1	85.81
11N40	Ant 1: CH3	71.26

4.2. Test Plots

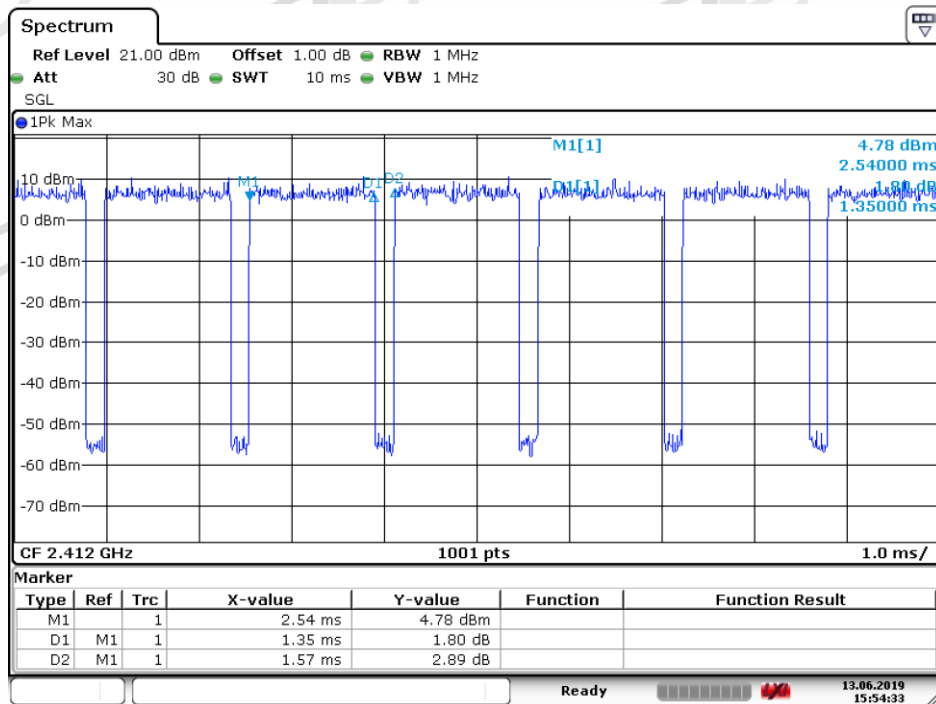
ANT1

11B



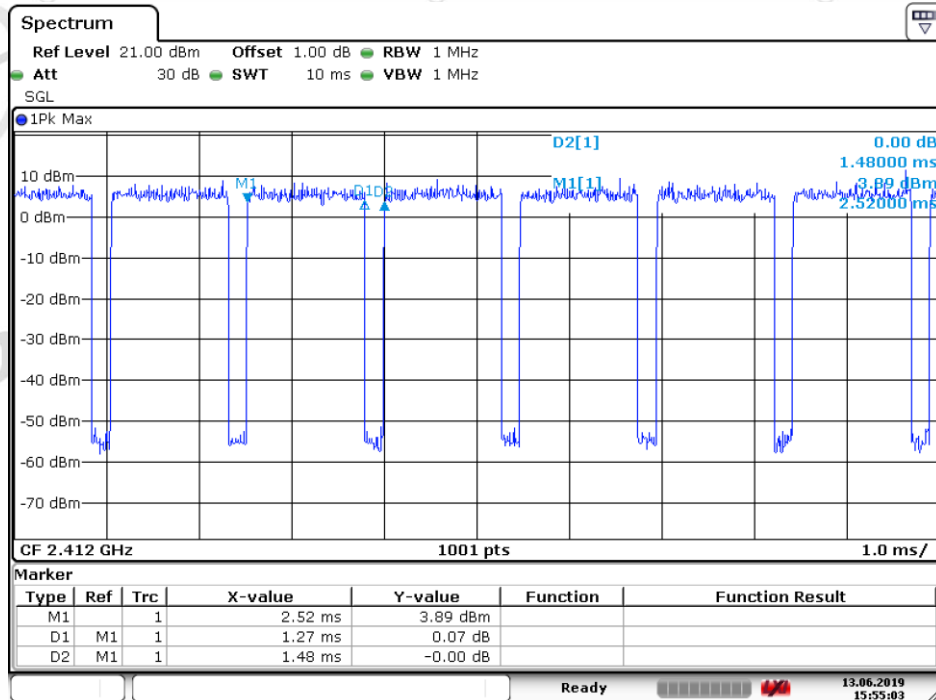
Date: 13 JUN.2019 15:53:55

11G



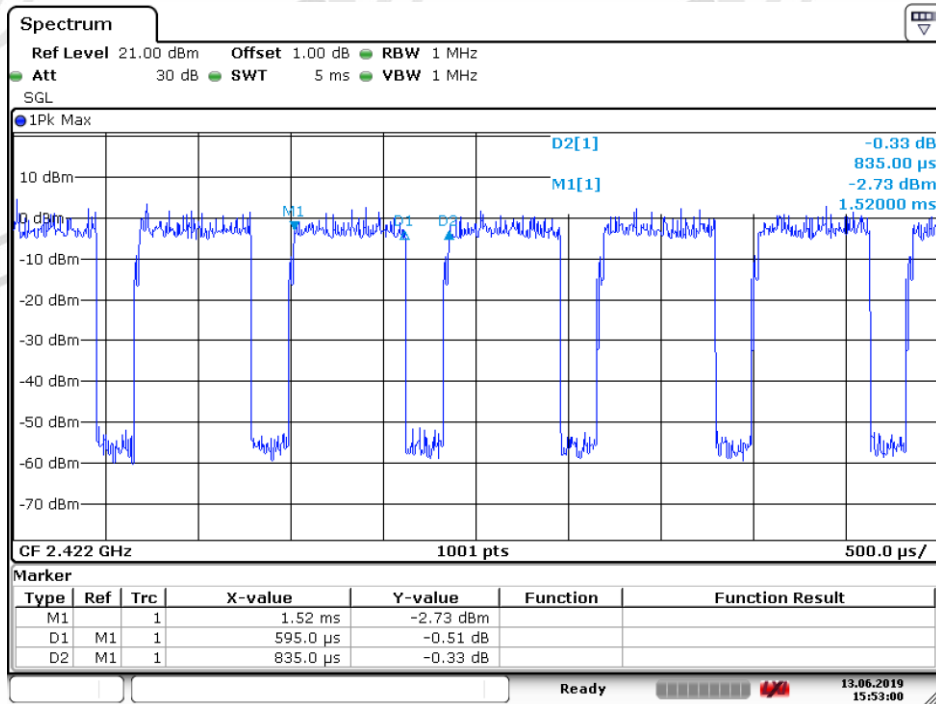
Date: 13.JUN.2019 15:54:33

11N20



Date: 13.JUN.2019 15:55:03

11N40



Date: 13. JUN.2019 15:53:01

5. Conducted Output Power

5.1. Test Results

Measurement Data of Peak Power:

Mode	Test Channel	Peak Output Power (dBm)	Limit (dBm)	Result
802.11B	Lowest	21.34	30.00	Pass
	Middle	20.55	30.00	Pass
	Highest	21.03	30.00	Pass
802.11G	Lowest	22.99	30.00	Pass
	Middle	22.09	30.00	Pass
	Highest	22.98	30.00	Pass
802.11N20	Lowest	22.07	30.00	Pass
	Middle	21.23	30.00	Pass
	Highest	21.55	30.00	Pass
802.11N40	Lowest	21.25	30.00	Pass
	Middle	21.39	30.00	Pass
	Highest	20.88	30.00	Pass

6. DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

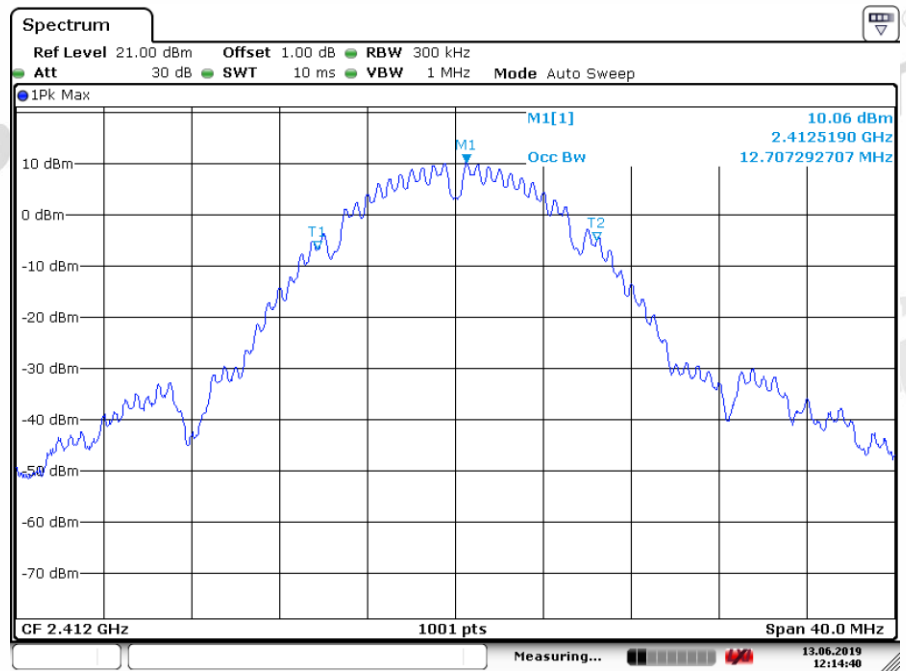
6.1. Test Results

Mode	Test Channel	Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
802.11B	Lowest	12.71	7.15	≥500	Pass
	Middle	12.55	7.59	≥500	Pass
	Highest	12.63	7.15	≥500	Pass
802.11G	Lowest	17.42	16.38	≥500	Pass
	Middle	17.42	16.42	≥500	Pass
	Highest	17.46	16.34	≥500	Pass
802.11N20	Lowest	18.18	17.58	≥500	Pass
	Middle	18.30	17.70	≥500	Pass
	Highest	18.26	17.62	≥500	Pass
802.11N40	Lowest	36.36	35.25	≥500	Pass
	Middle	36.60	35.25	≥500	Pass
	Highest	36.36	35.33	≥500	Pass

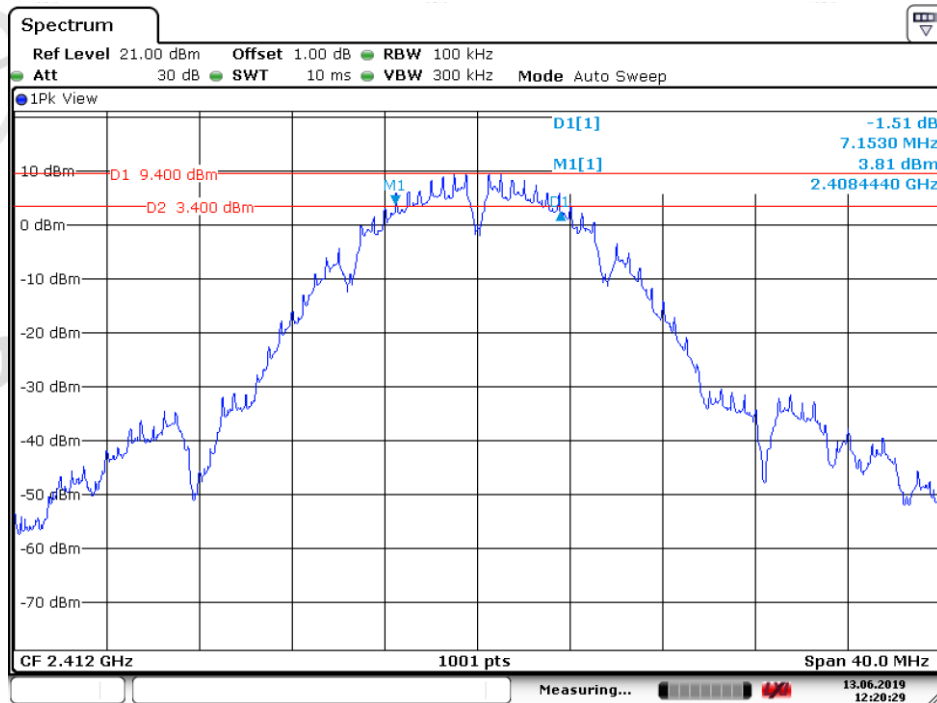
6.2. Test plots

ANT1

802.11B_Lowest Channel

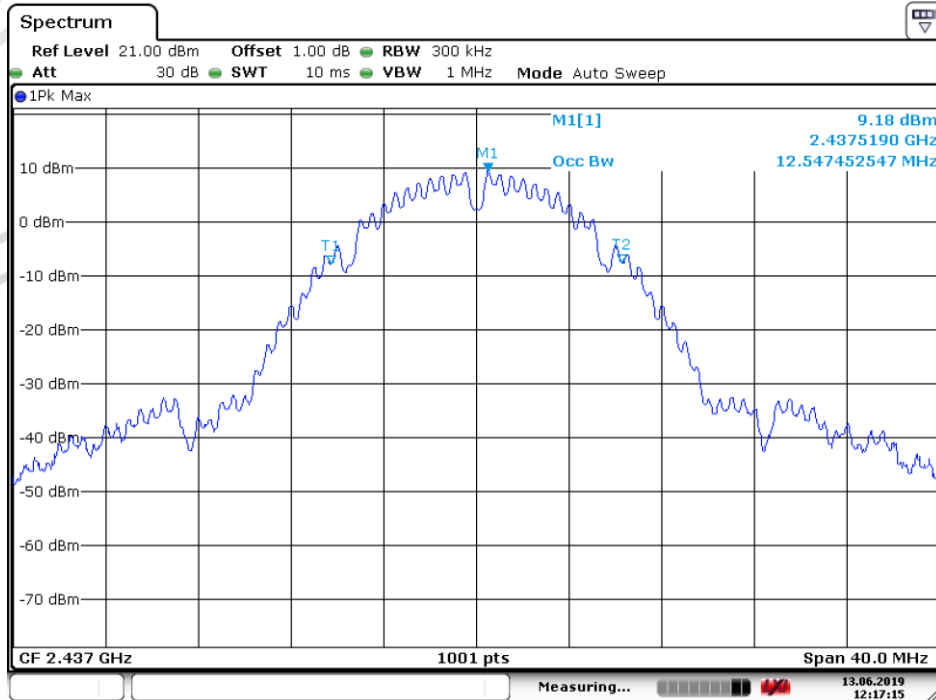


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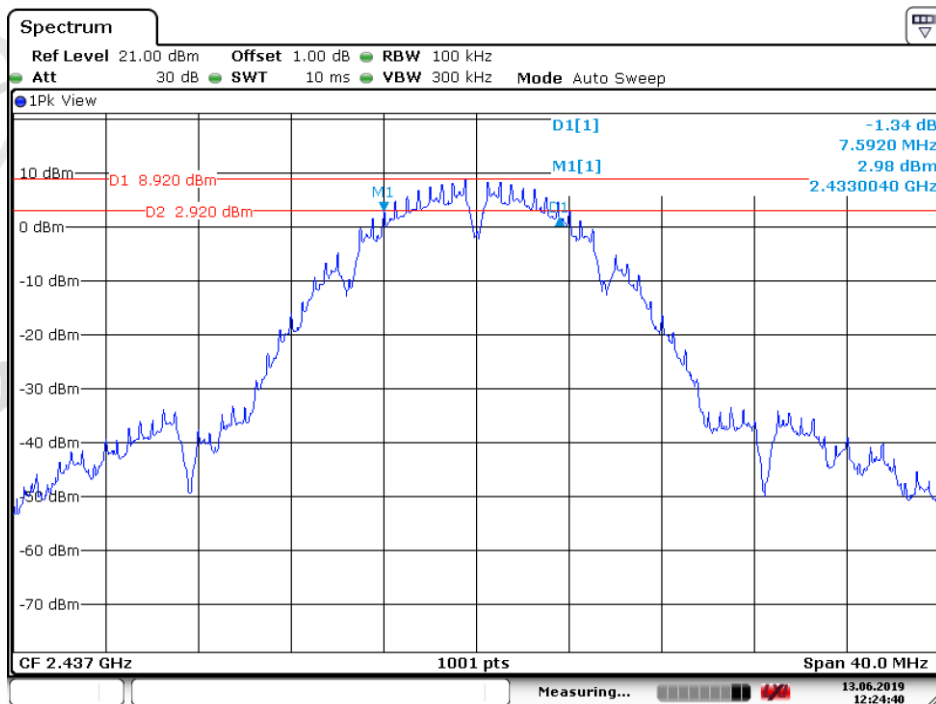


Date: 13 JUN.2019 12:20:29

802.11B_ Middle Channel

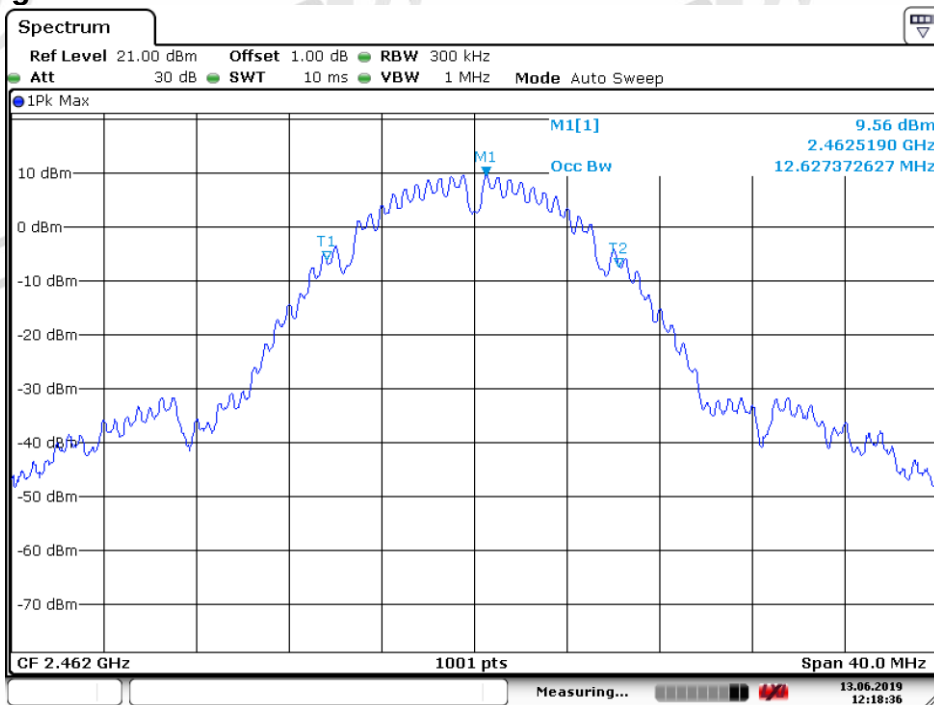


Date: 13. JUN.2019 12:17:15

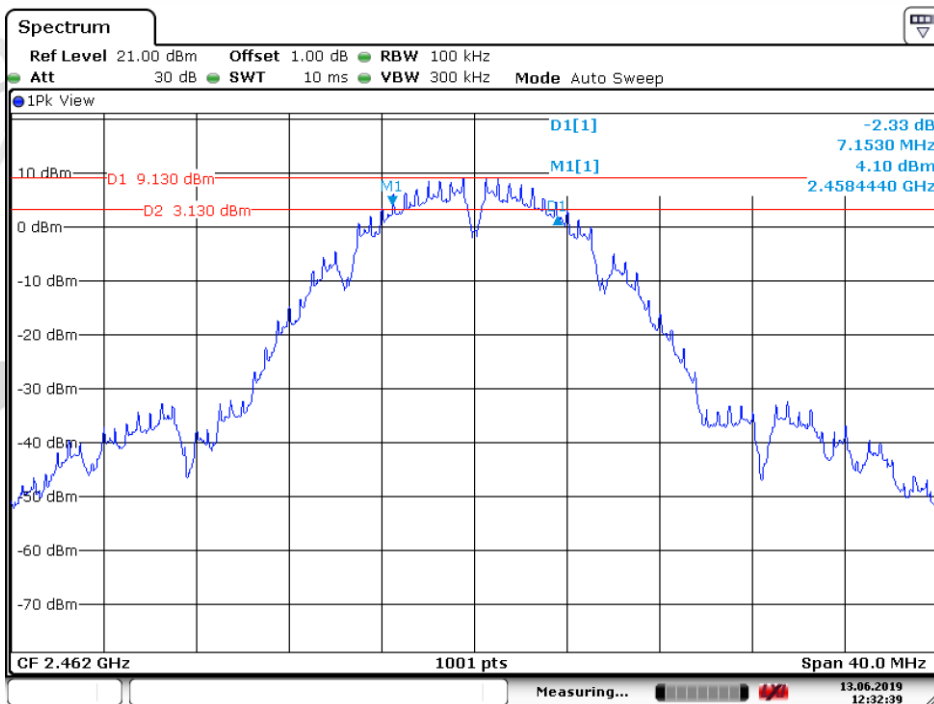


Date: 13. JUN.2019 12:24:40

802.11B_Highest Channel

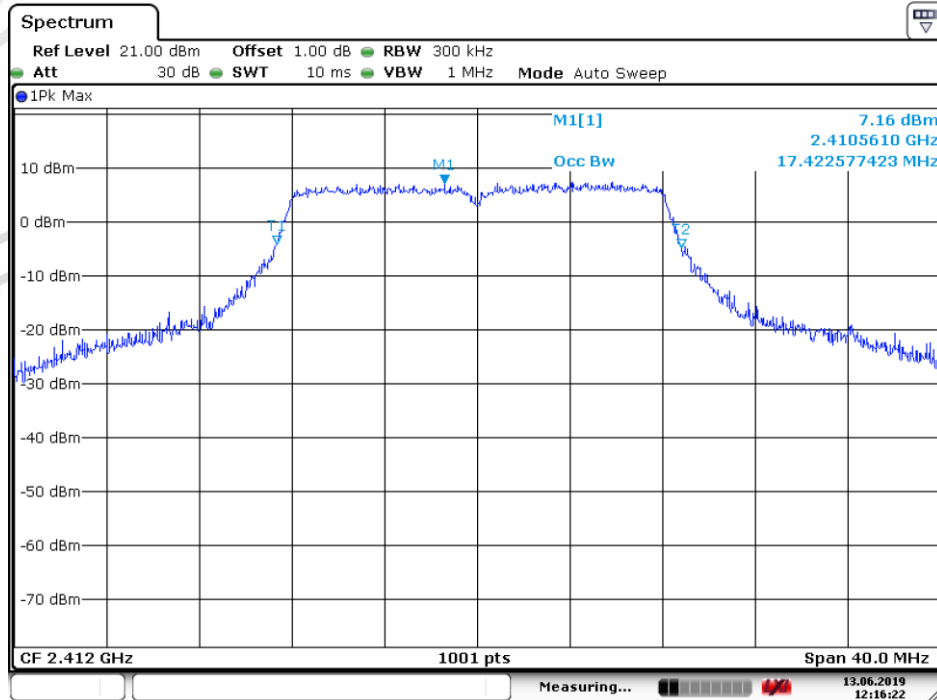


Date: 13. JUN.2019 12:18:36

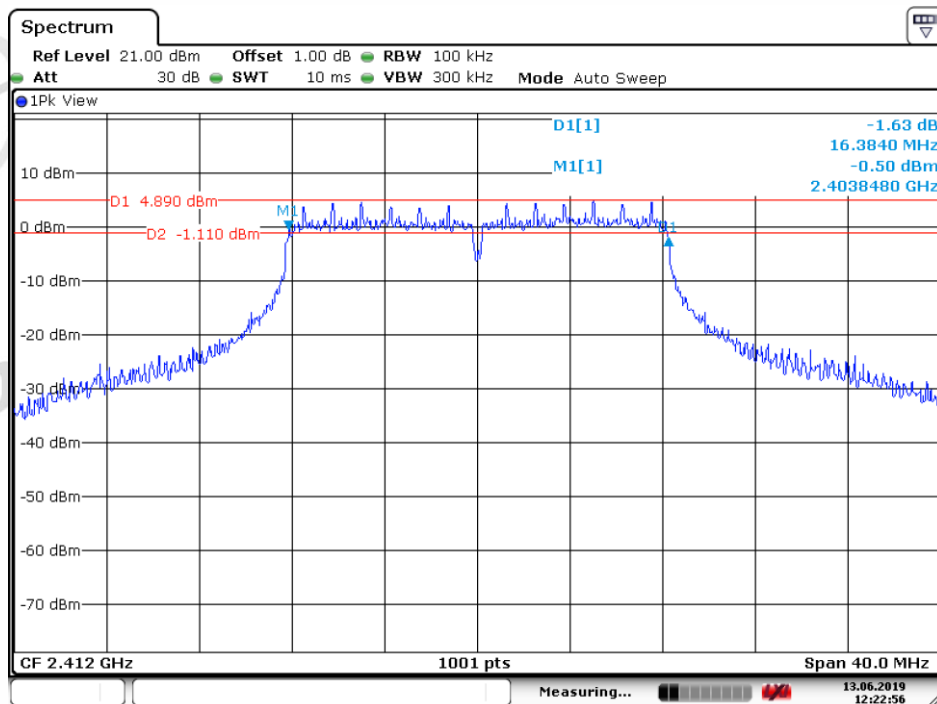


Date: 13. JUN.2019 12:32:39

802.11G_Lowest Channel

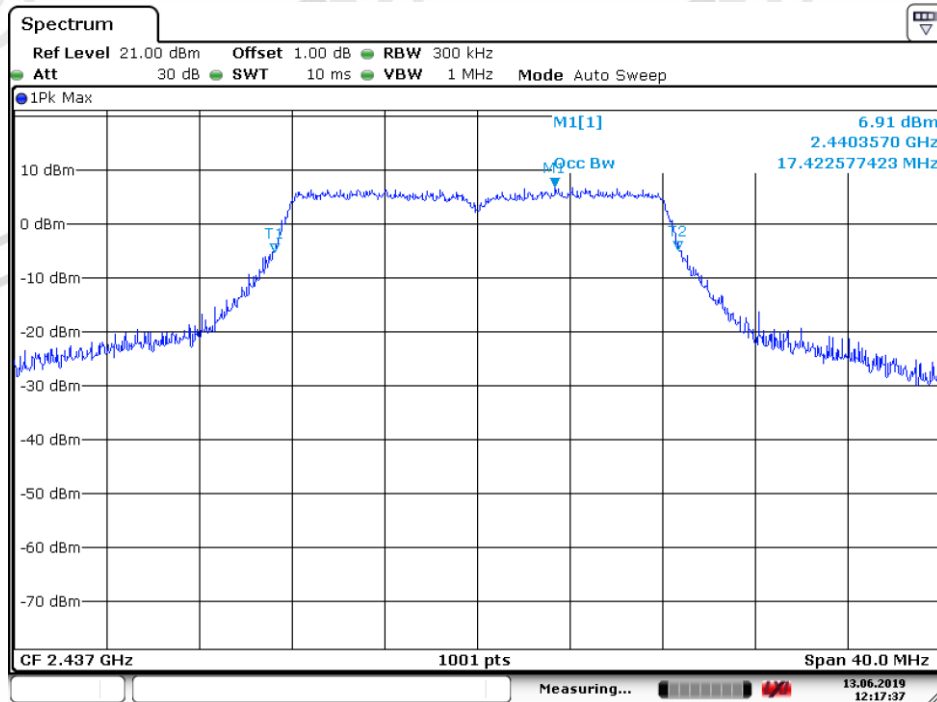


Date: 13. JUN.2019 12:16:23

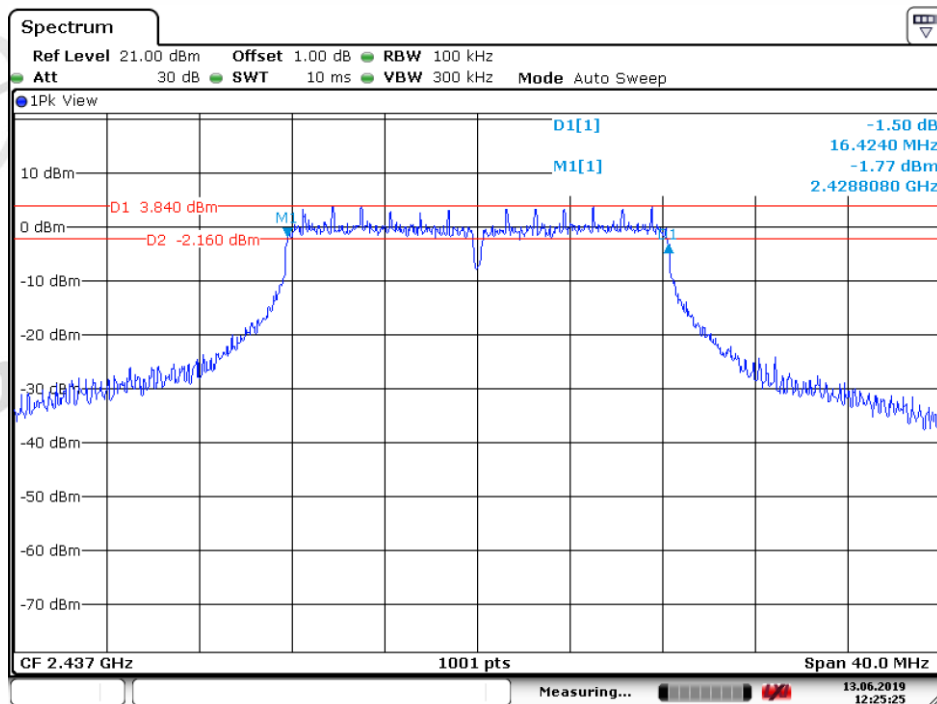


Date: 13. JUN.2019 12:22:56

802.11G_Middle Channel

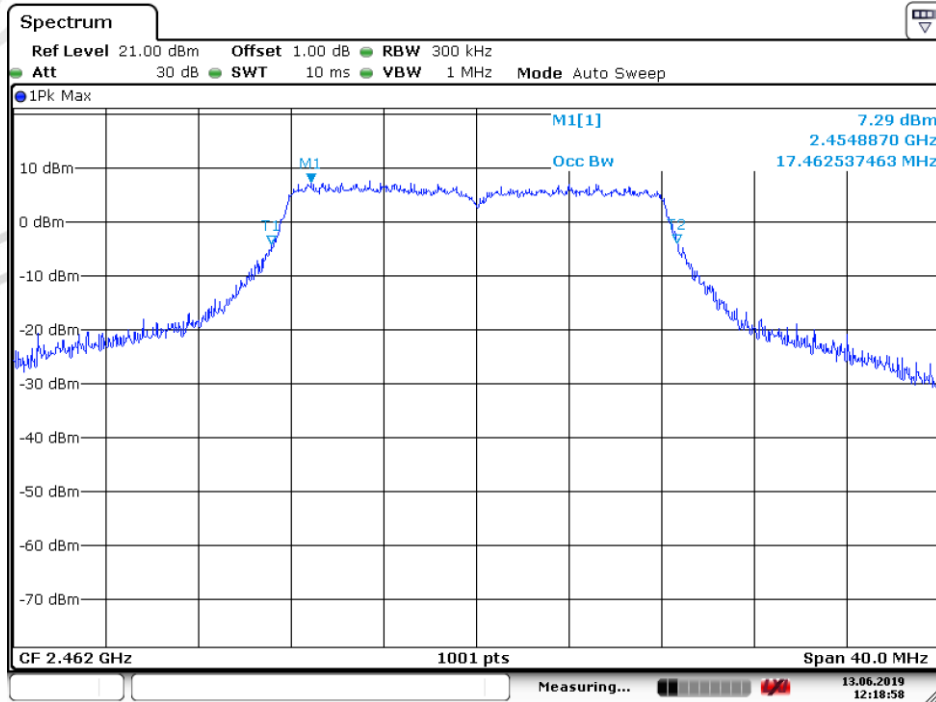


Date: 13. JUN.2019 12:17:38

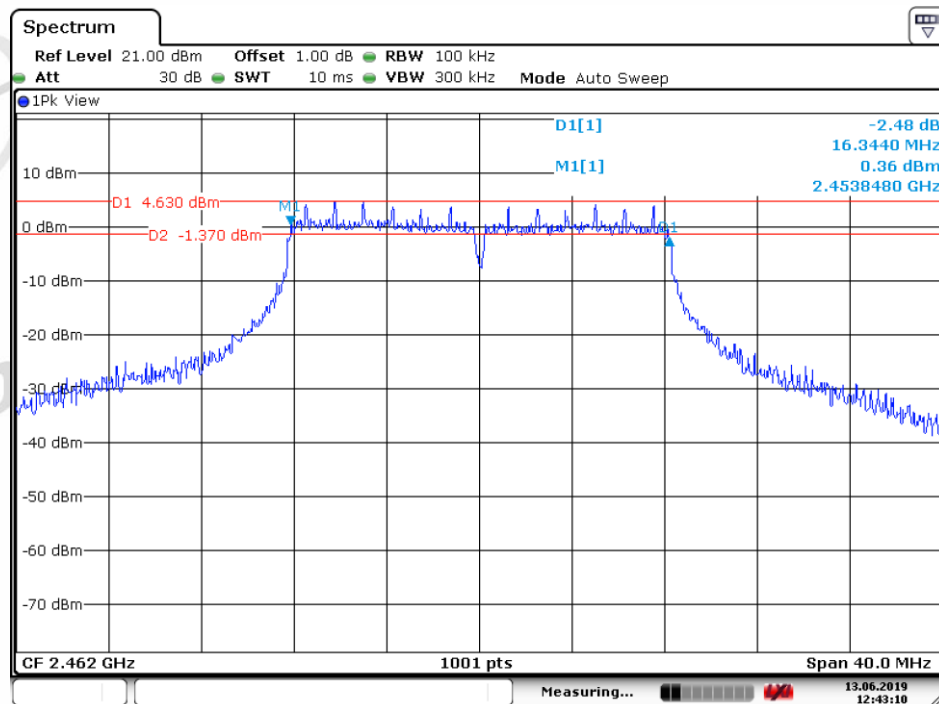


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802.11G_Highest Channel

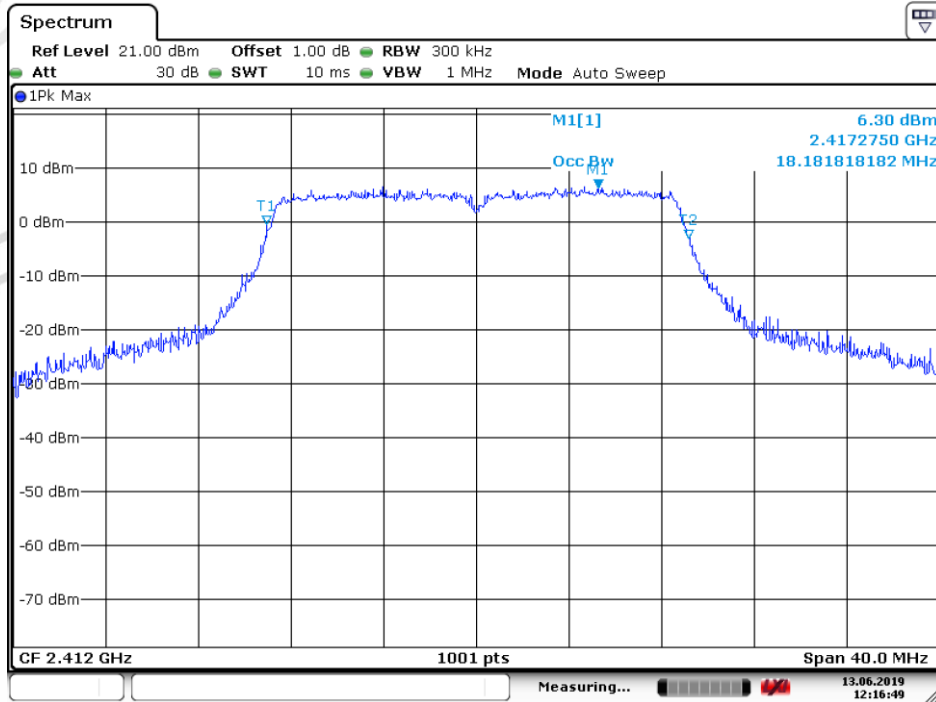


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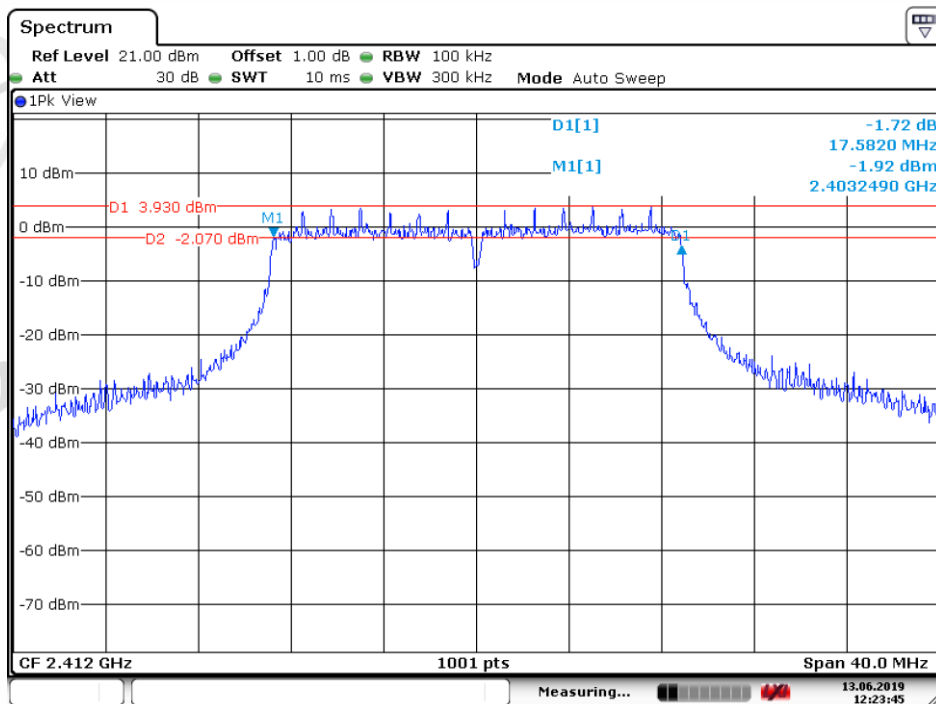


Date: 13.JUN.2019 12:43:11

802.11N20 Lowest Channel

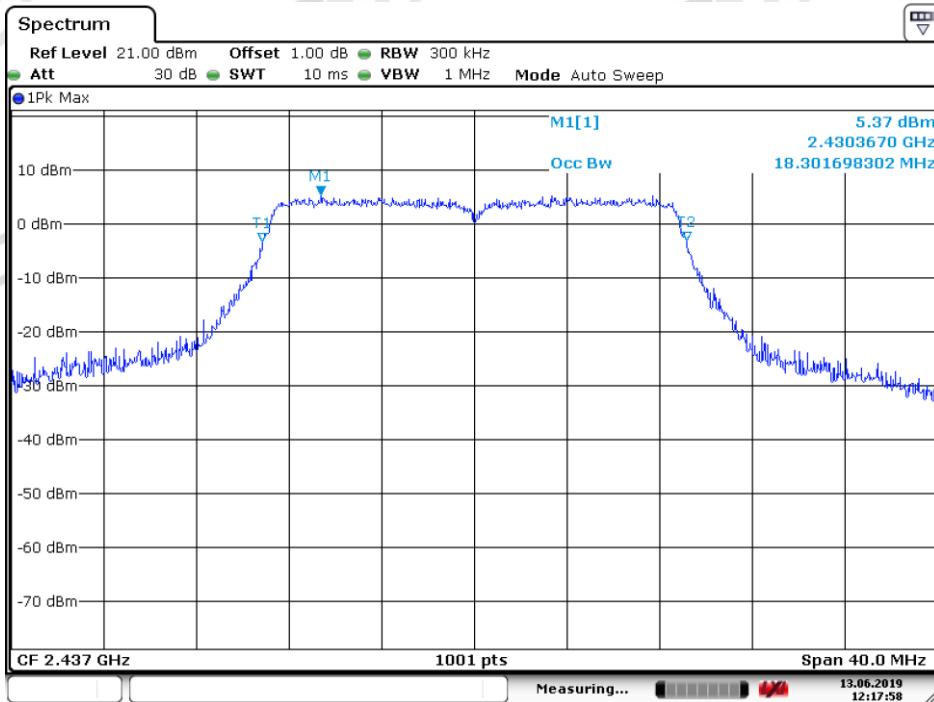


Date: 13. JUN.2019 12:16:49

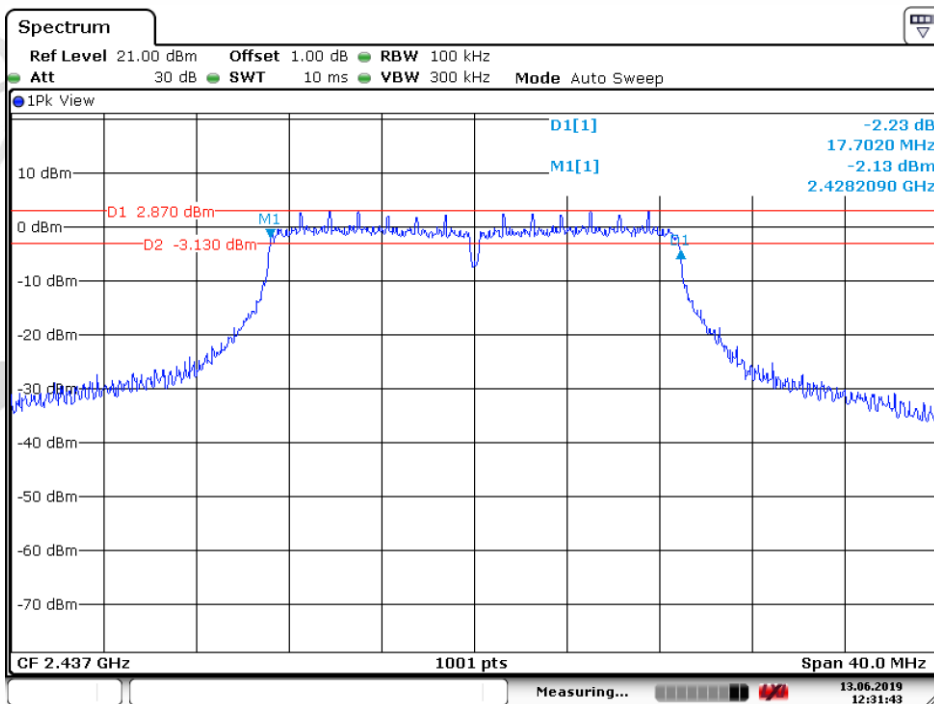


Date: 13. JUN.2019 12:23:45

802.11 N20 Middle Channel

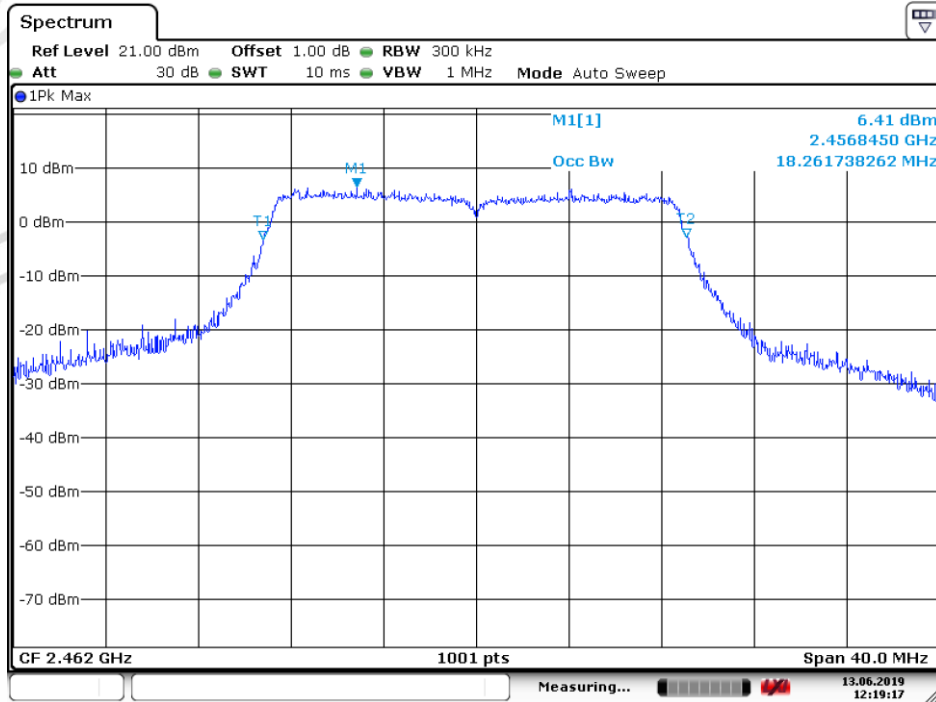


Date: 13. JUN.2019 12:17:59

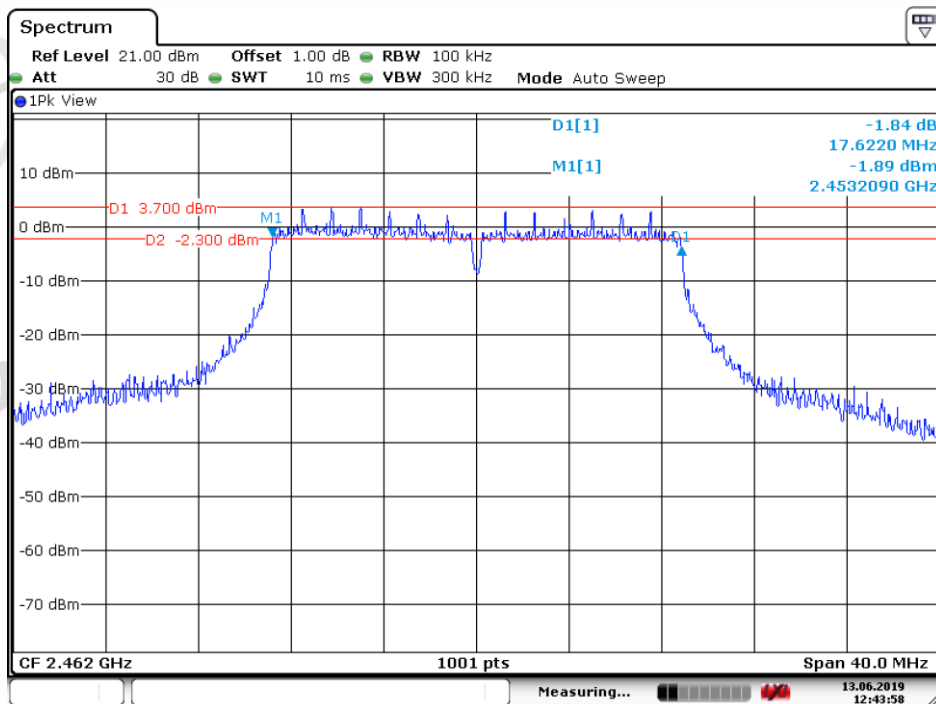


Date: 13. JUN.2019 12:31:44

802.11 N20_Highest Channel

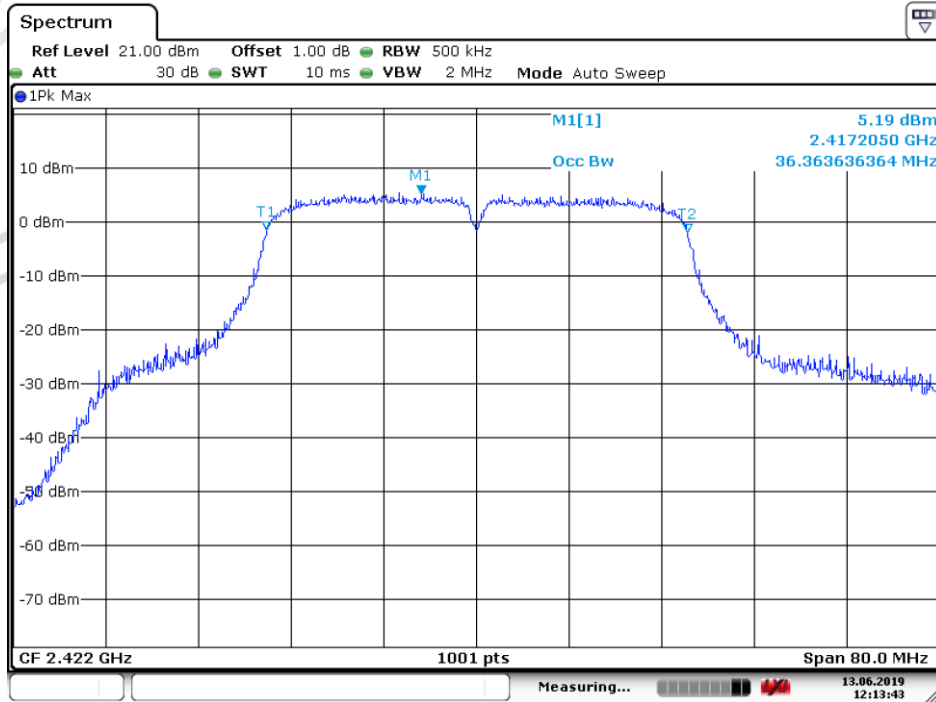


Date: 13. JUN.2019 12:19:16

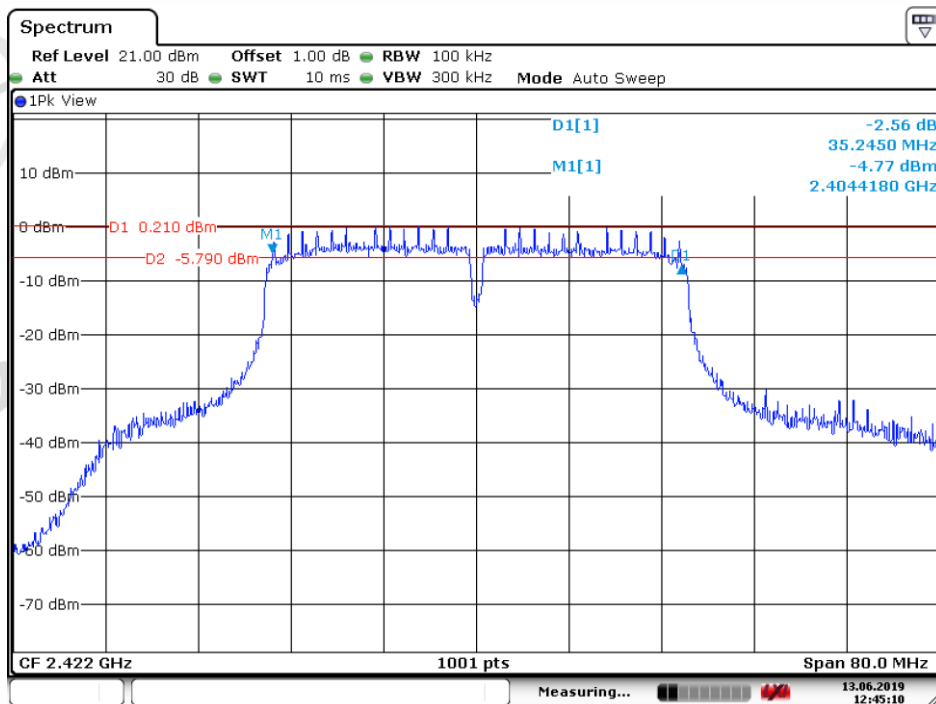


Date: 13. JUN.2019 12:43:58

802.11N40 Lowest Channel

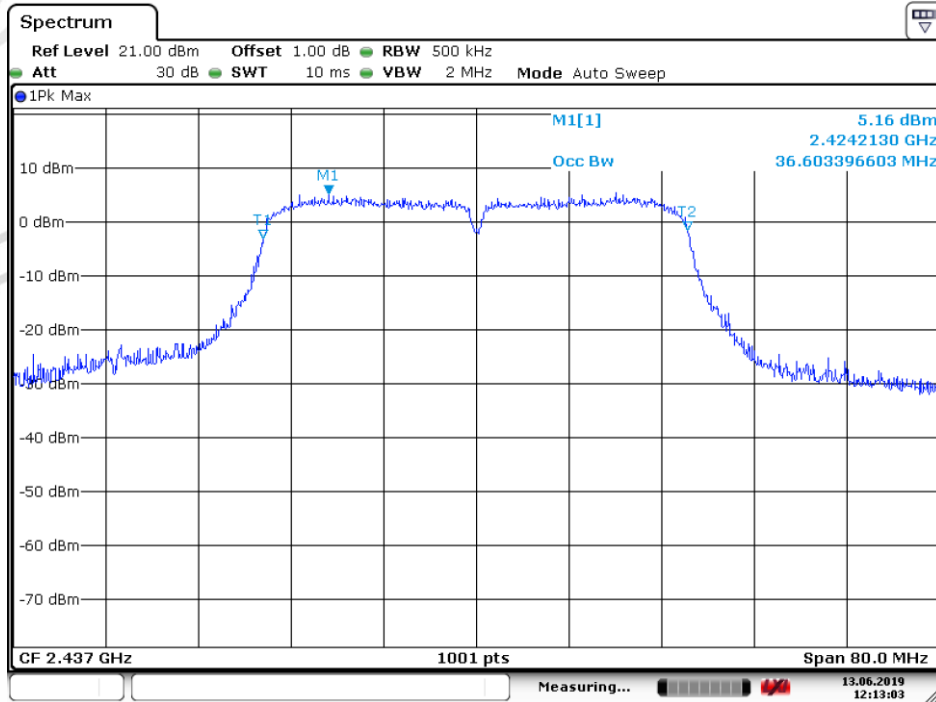


Date: 13. JUN.2019 12:13:43

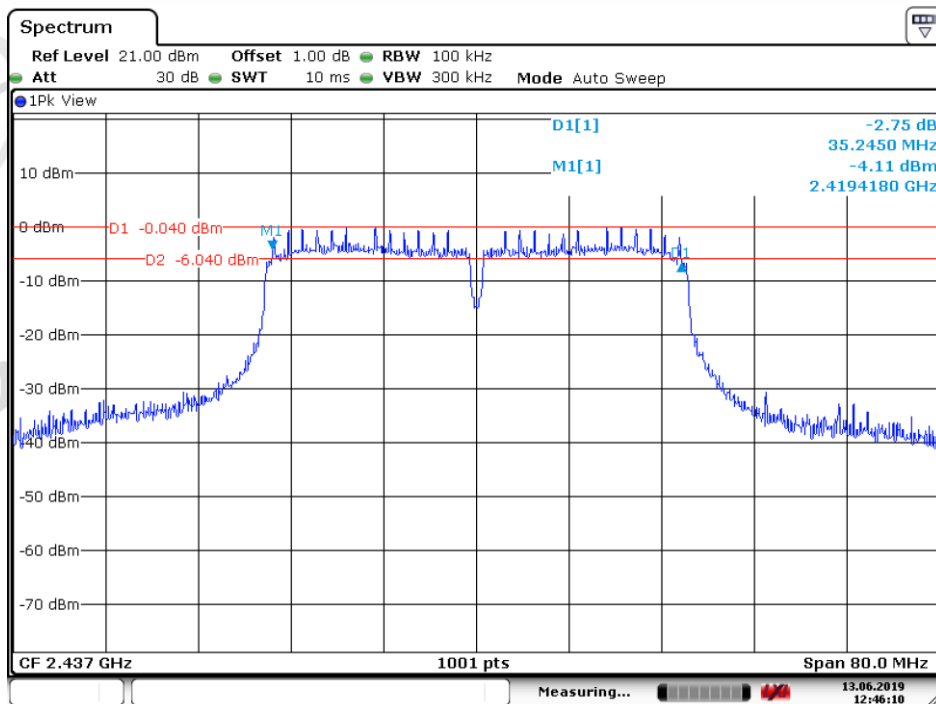


Date: 13. JUN.2019 12:45:10

802.11 N40 Middle Channel

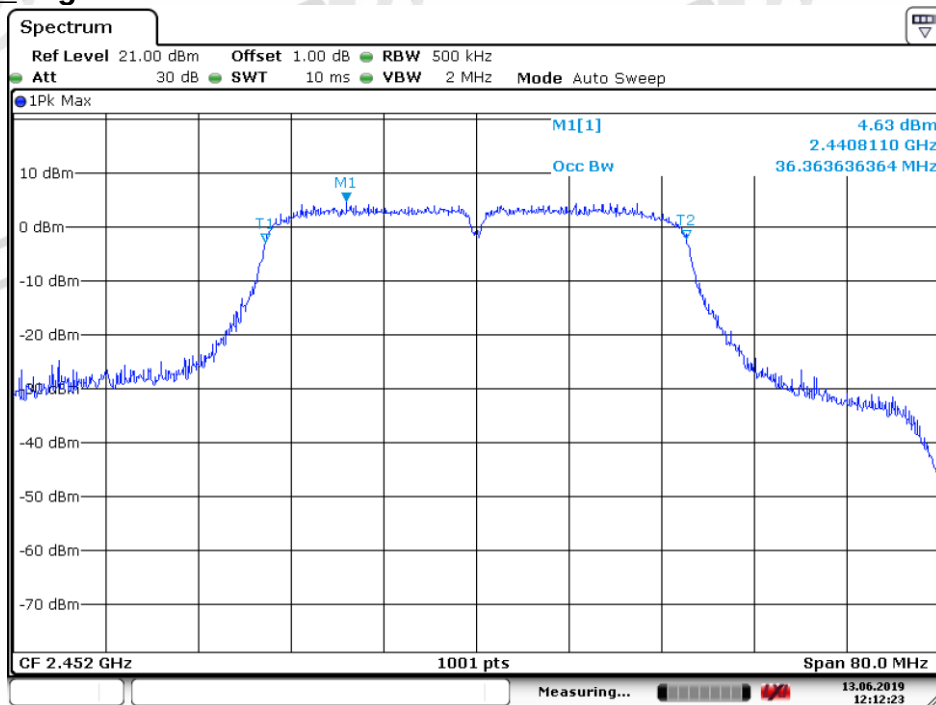


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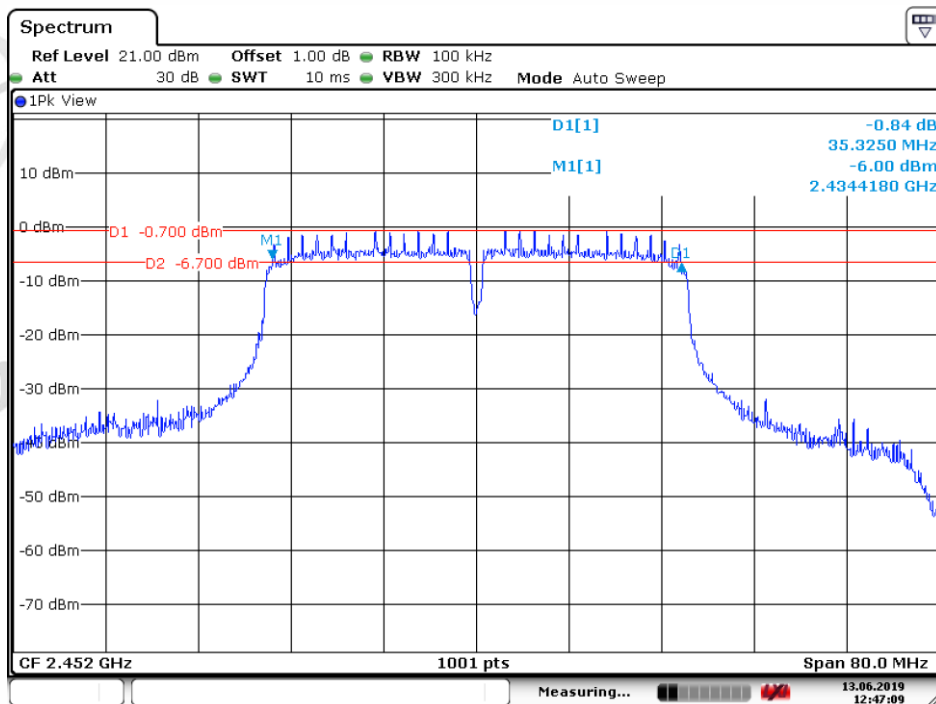


Date: 13. JUN.2019 12:46:10

802.11 N40_Highest Channel



Date: 13. JUN.2019 12:12:23



Date: 13. JUN.2019 12:47:09

7. Power Spectral Density

7.1. Test Results

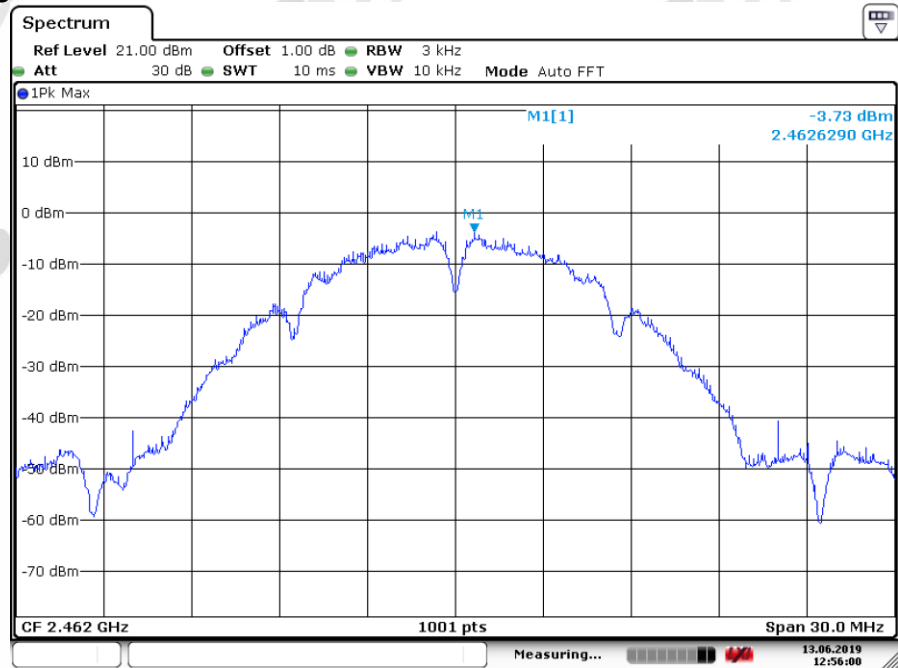
Mode	Test Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11B	Lowest	-3.27	≤8.00	Pass
	Middle	-4.41	≤8.00	Pass
	Highest	-3.73	≤8.00	Pass
802.11G	Lowest	-7.79	≤8.00	Pass
	Middle	-9.85	≤8.00	Pass
	Highest	-8.46	≤8.00	Pass
802.11N20	Lowest	-9.31	≤8.00	Pass
	Middle	-11.25	≤8.00	Pass
	Highest	-10.09	≤8.00	Pass
802.11N40	Lowest	-13.60	≤8.00	Pass
	Middle	-13.92	≤8.00	Pass
	Highest	-12.72	≤8.00	Pass

802.11B_Lowest Channel



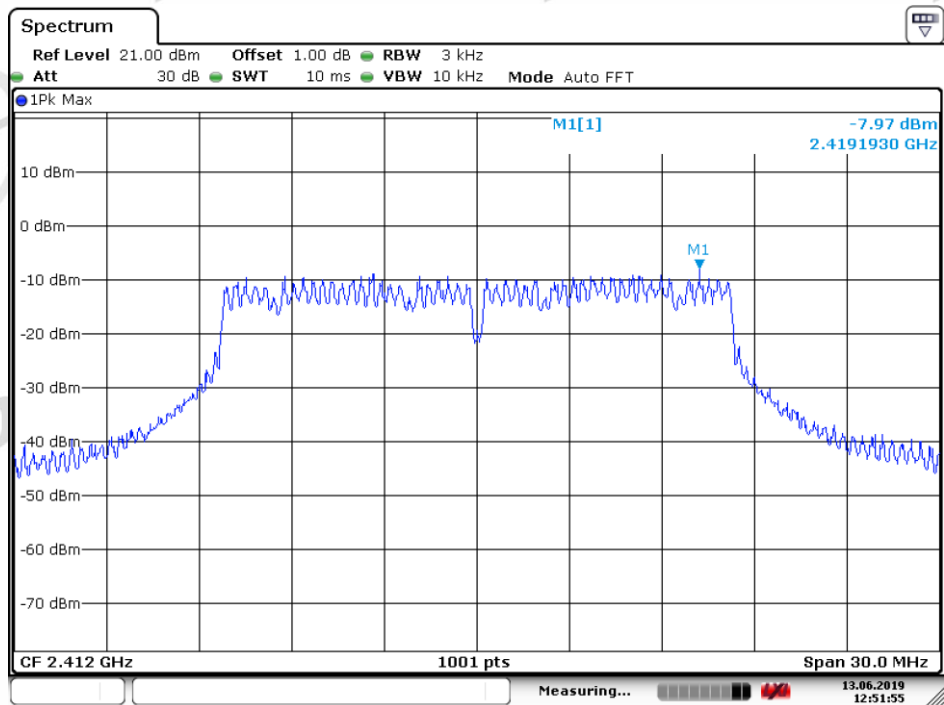
Date: 13.JUN.2019 12:53:31

802.11B_Highest Channel



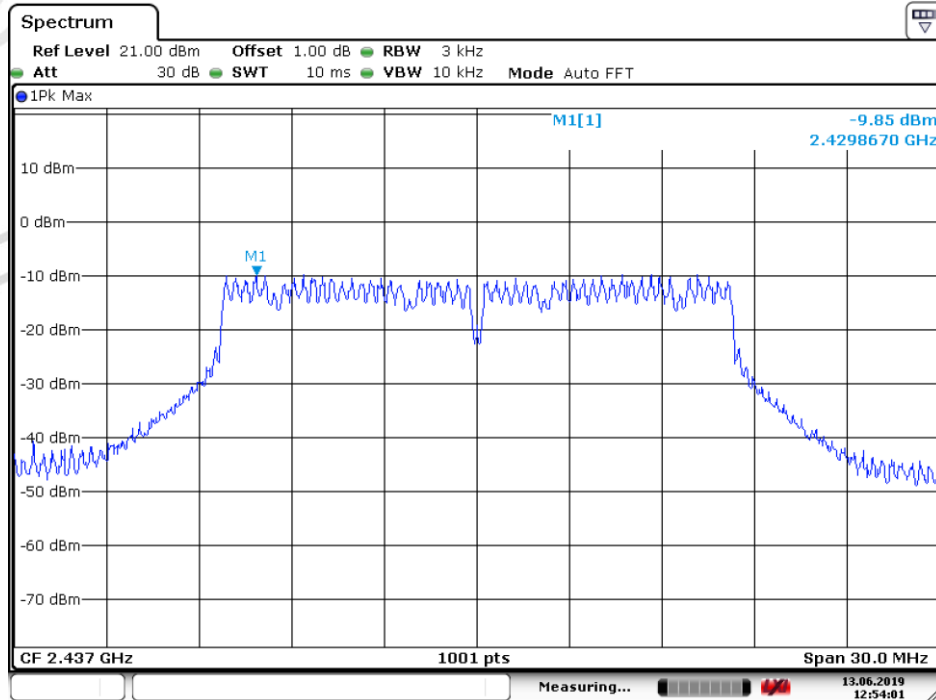
Date: 13 JUN 2019 12:56:00

802.11G_Lowest Channel



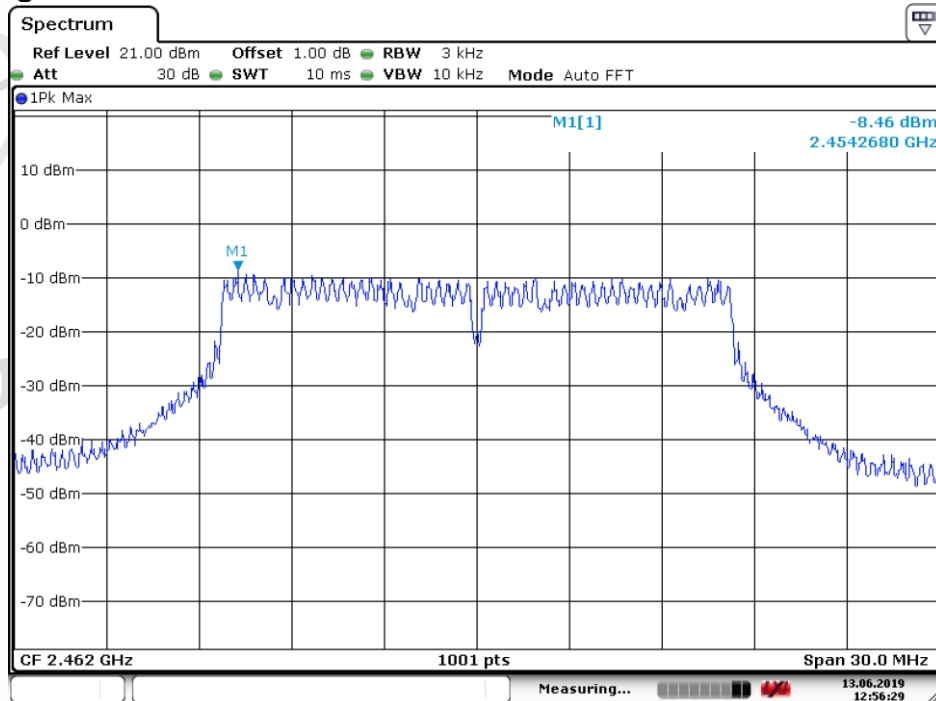
Date: 13 JUN 2019 12:51:55

802.11G_Middle Channel



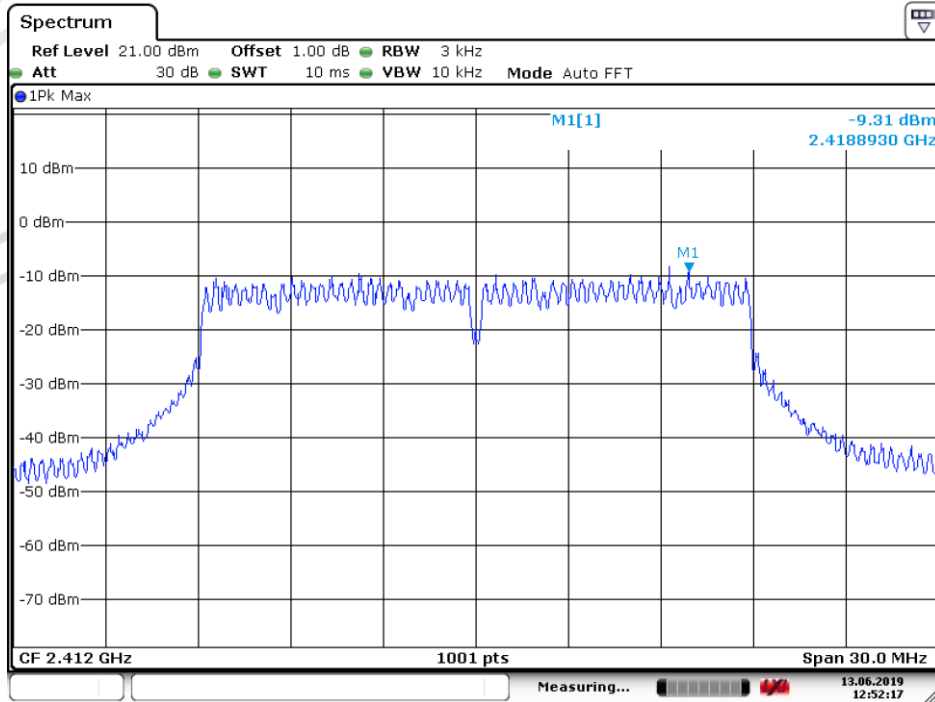
Date: 13. JUN.2019 12:54:02

802.11G_Highest Channel



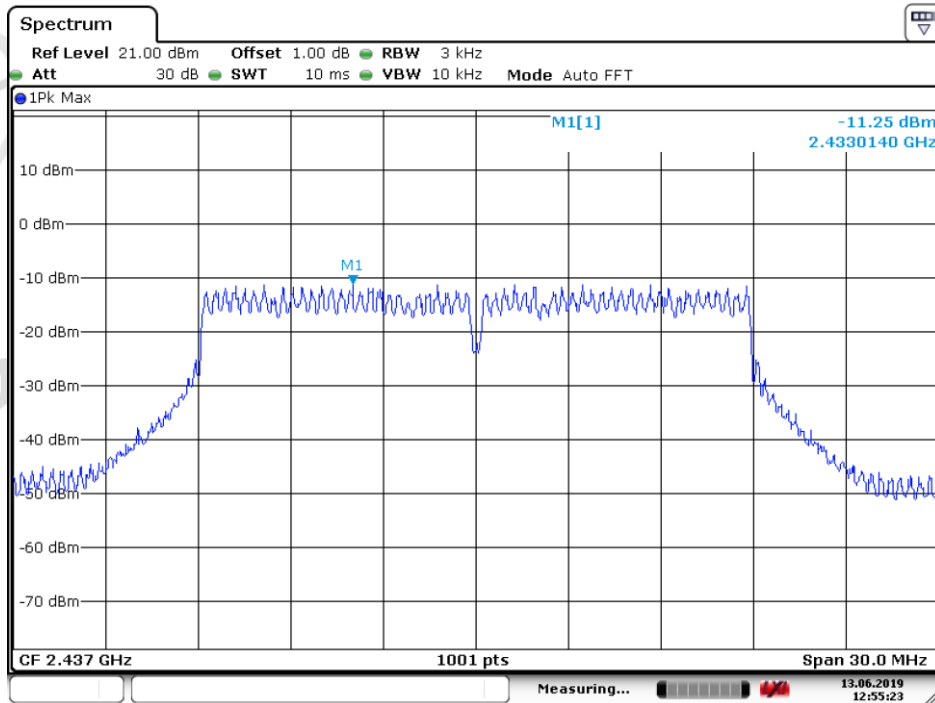
Date: 13. JUN.2019 12:56:30

802.11N20_Lowest Channel



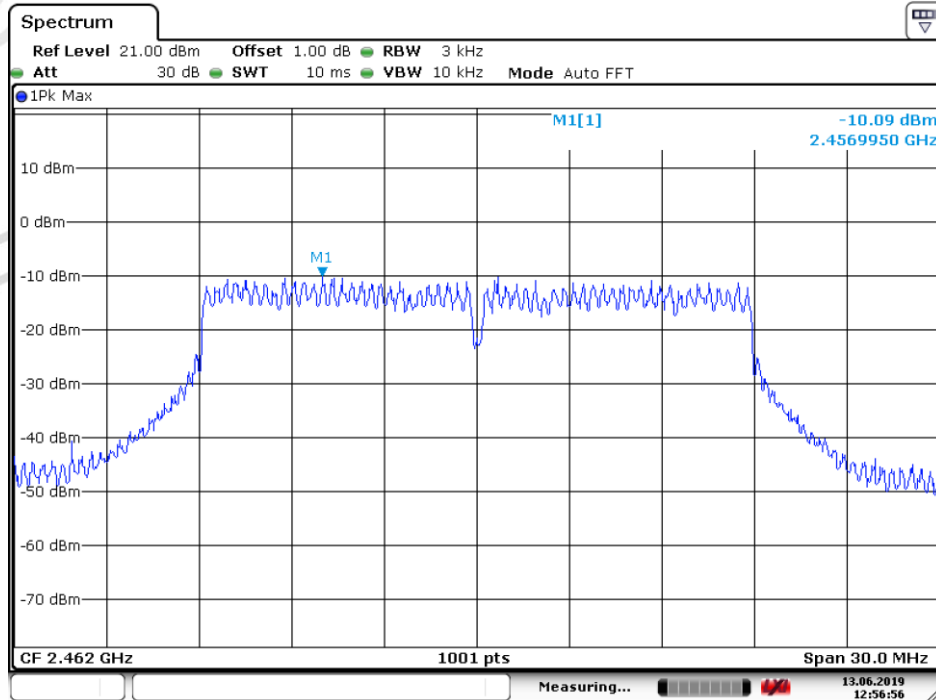
Date: 13. JUN.2019 12:52:18

802.11 N20_Middle Channel



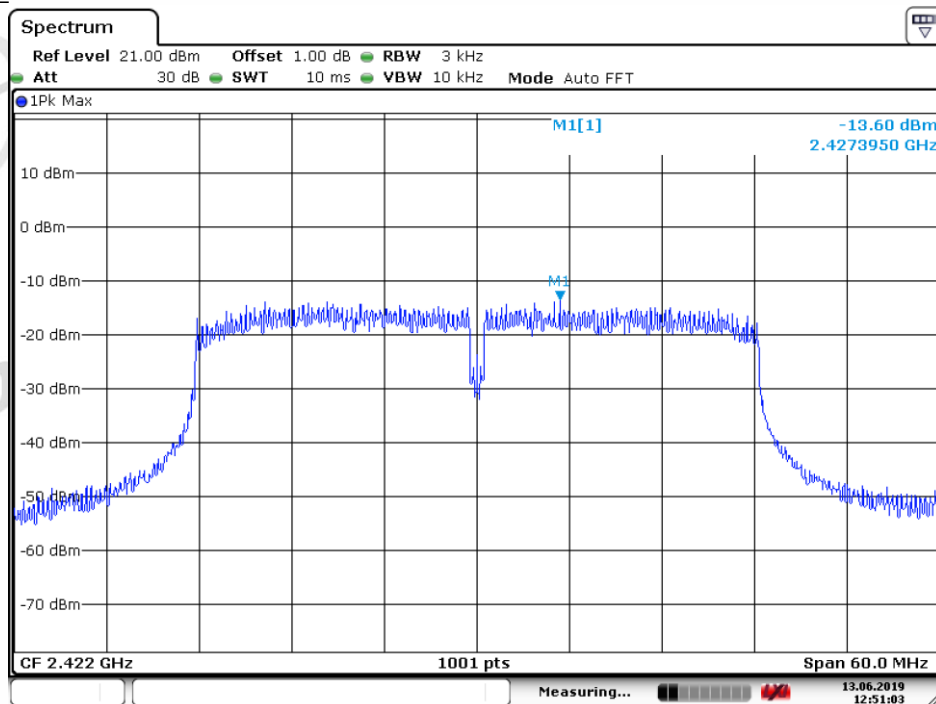
Date: 13. JUN.2019 12:55:24

802.11 N20_Highest Channel



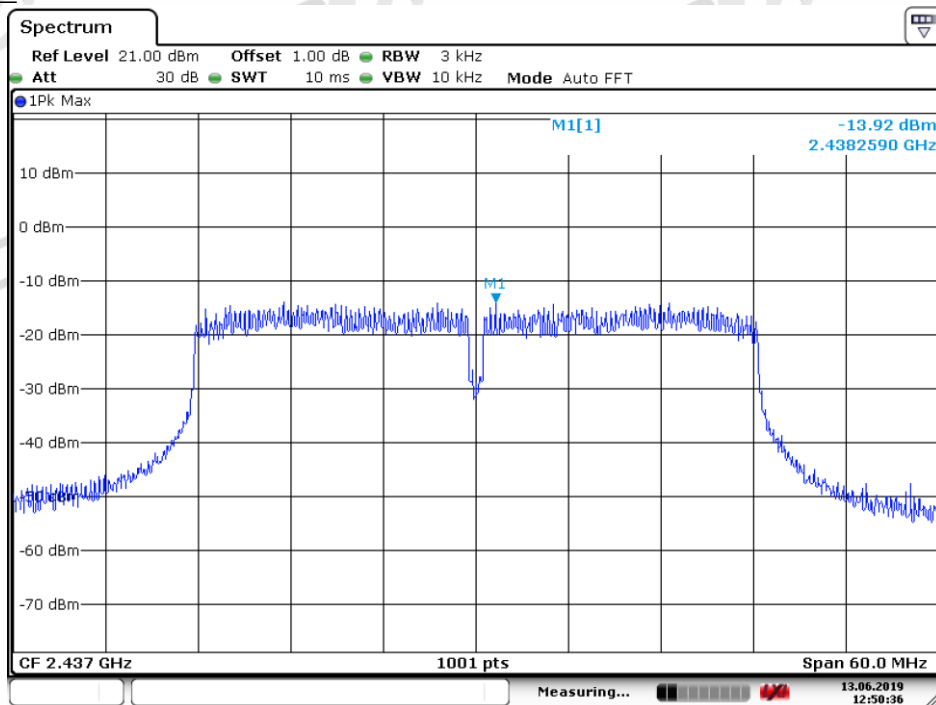
Date: 13. JUN.2019 12:56:56

802.11N40_Lowest Channel



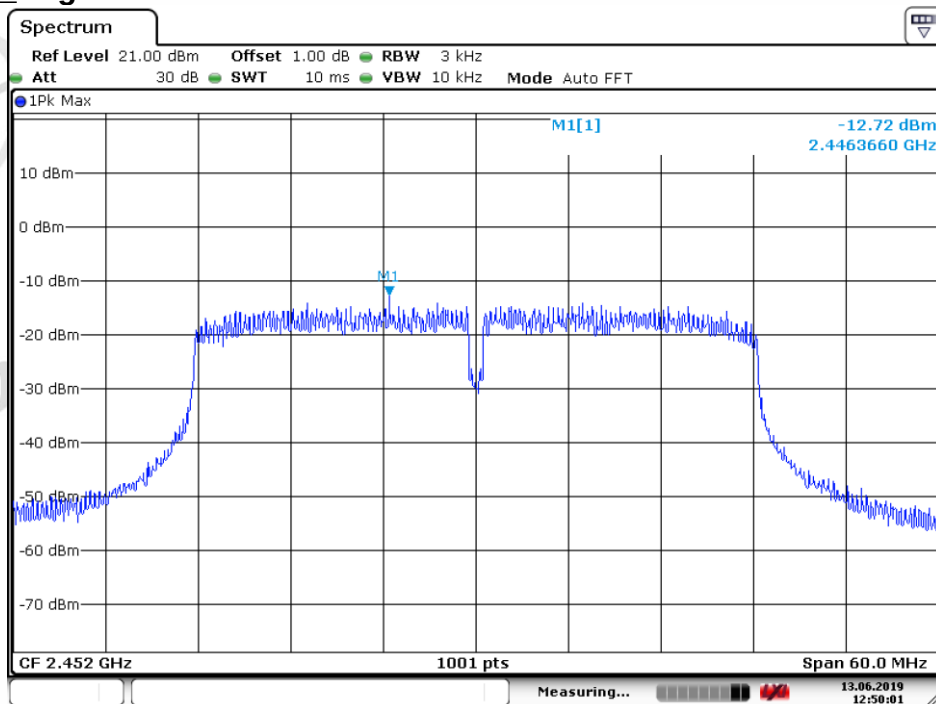
Date: 13. JUN.2019 12:51:03

802.11 N40 Middle Channel



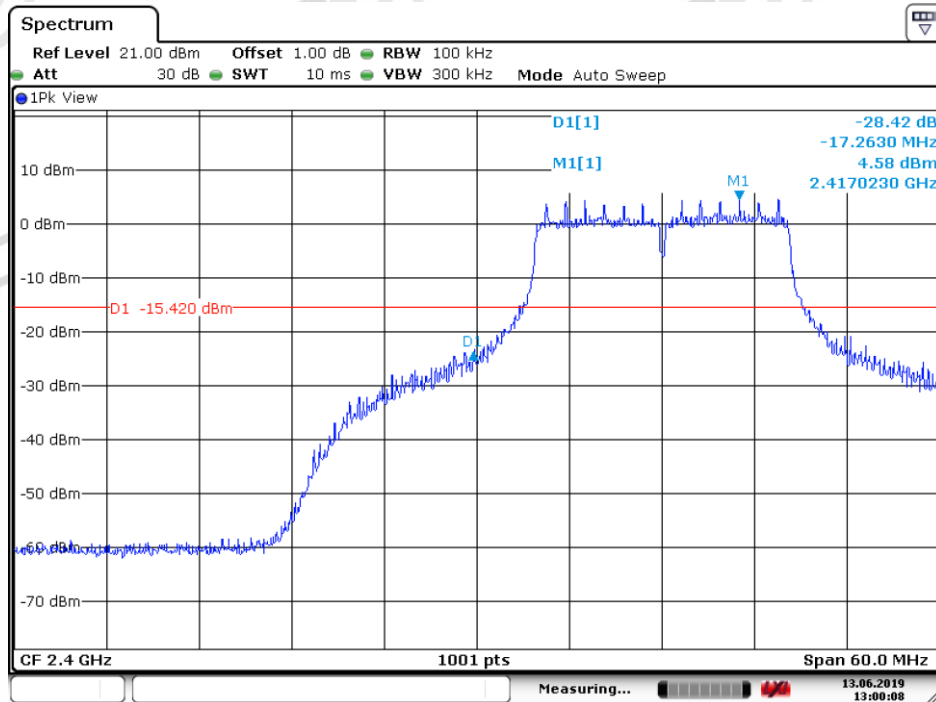
Date: 13. JUN.2019 12:50:36

802.11 N40 Highest Channel



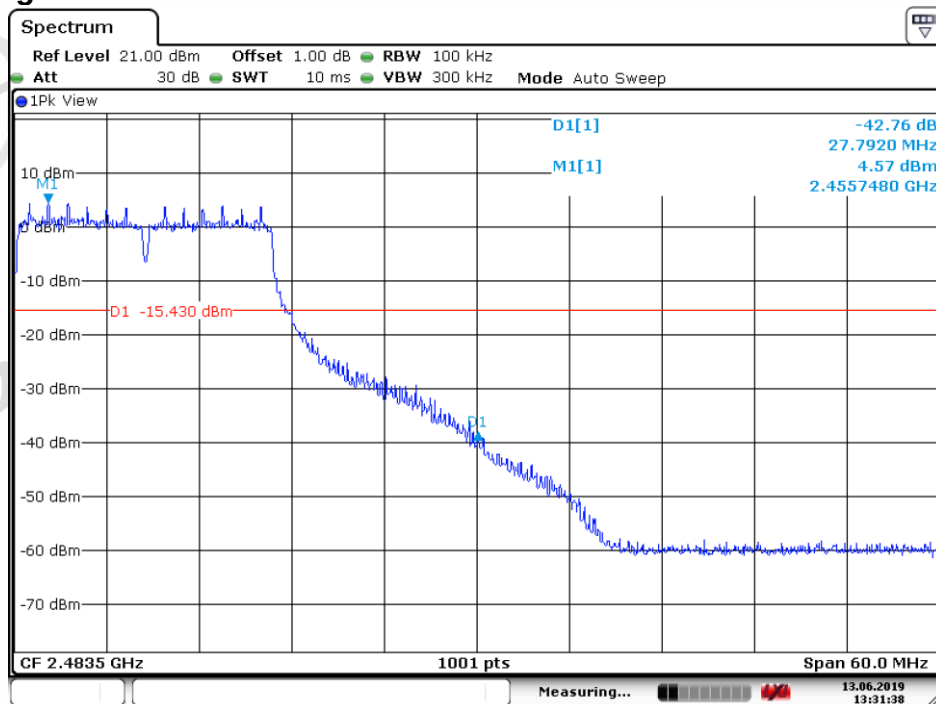
Date: 13. JUN.2019 12:50:01

802.11G_Lowest Channel



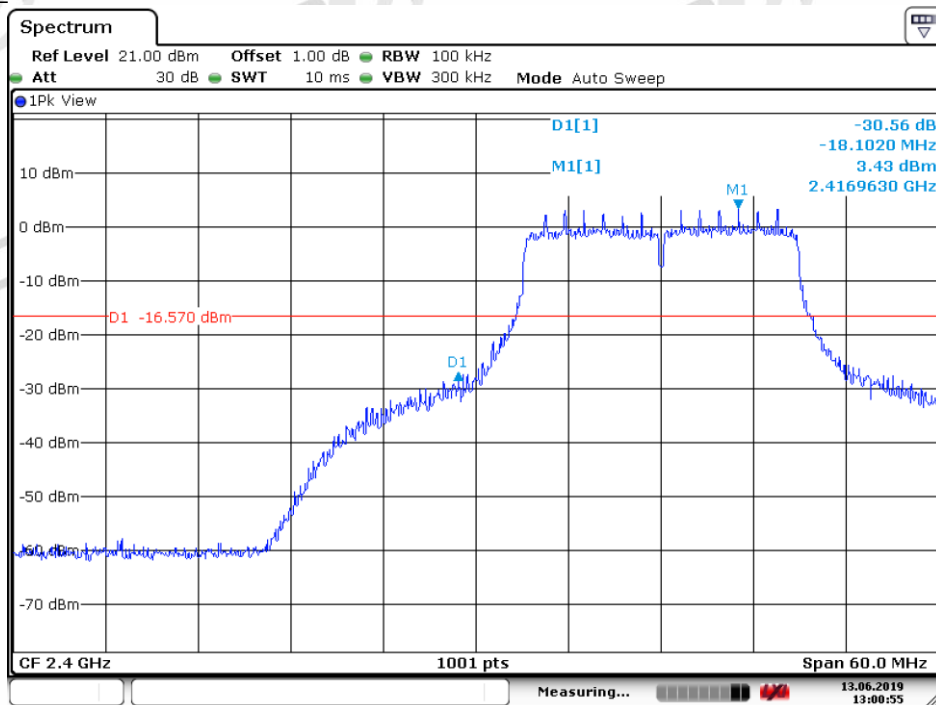
Date: 13. JUN.2019 13:00:09

802.11G_Highest Channel



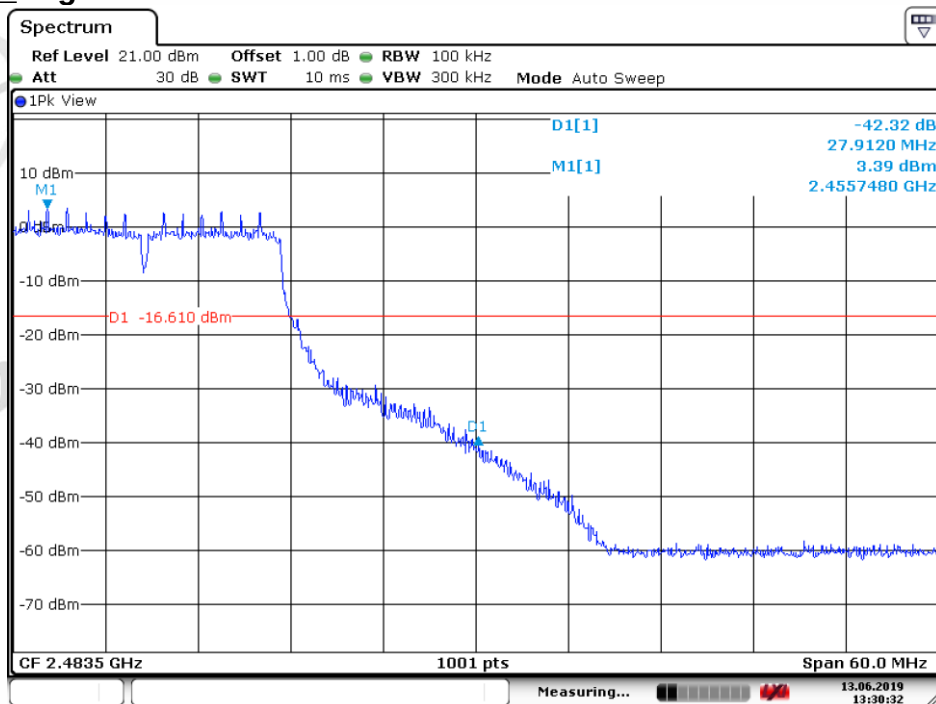
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802.11N20_Lowest Channel



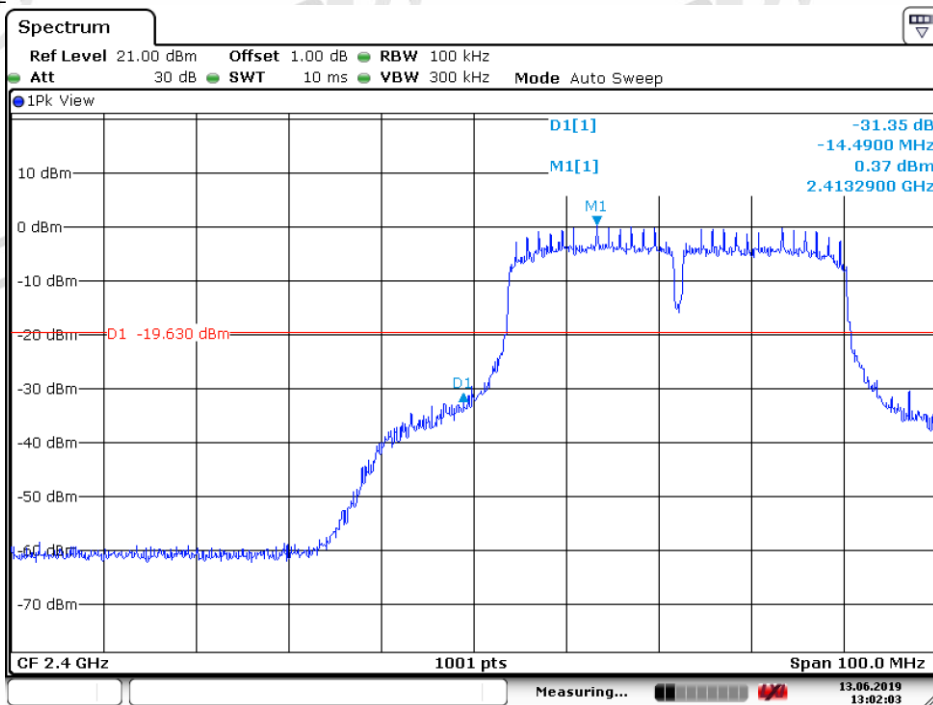
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802.11 N20_Highest Channel



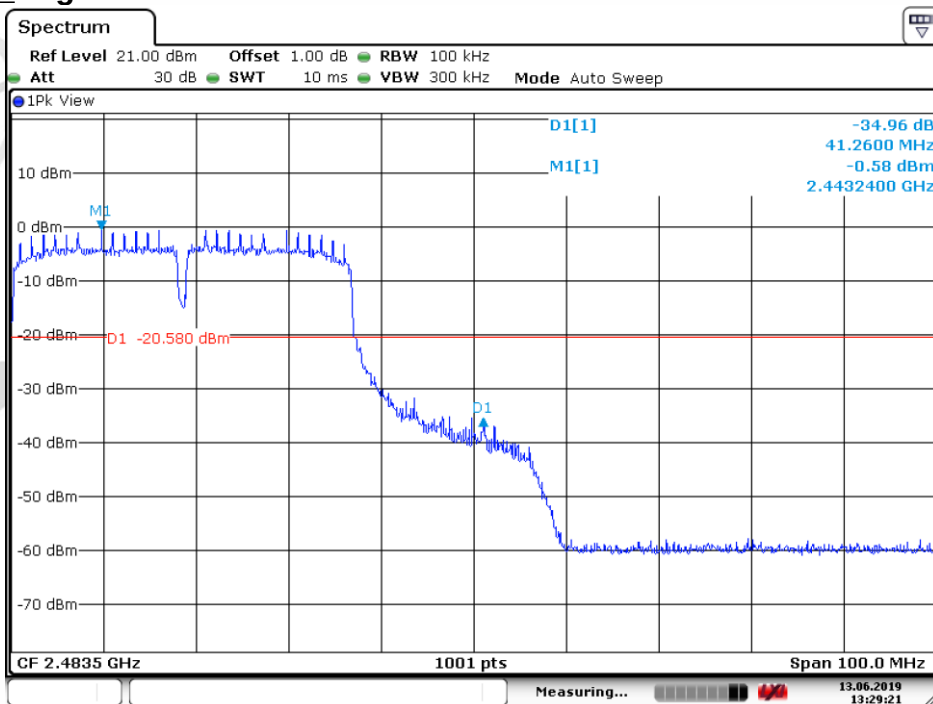
Date: 13. JUN.2019 13:30:32

802.11N40_Lowest Channel



Date: 13. JUN.2019 13:02:03

802.11 N40_Highest Channel



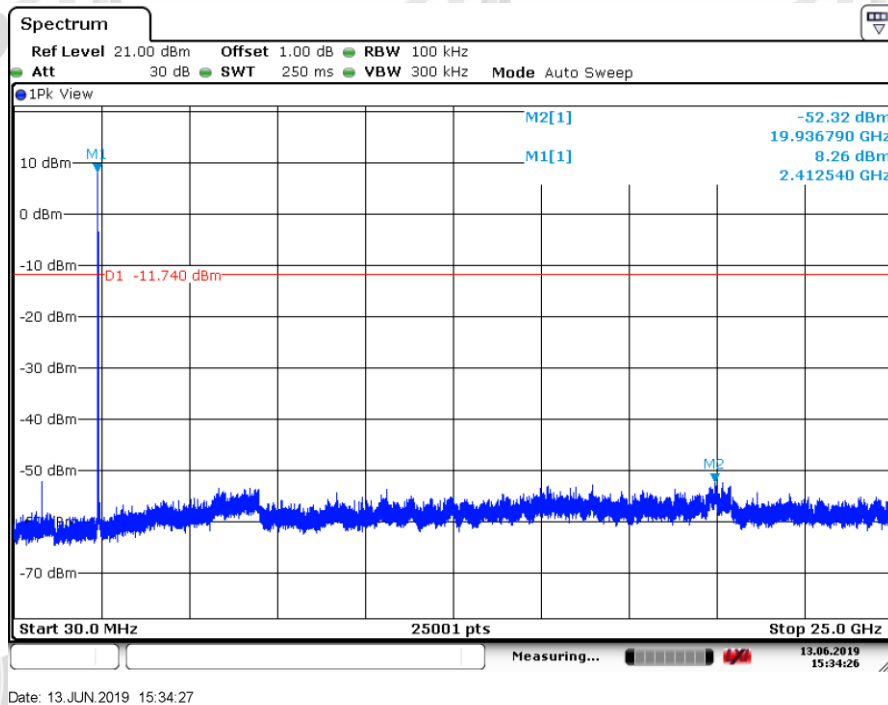
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9. RF Conducted Spurious Emissions

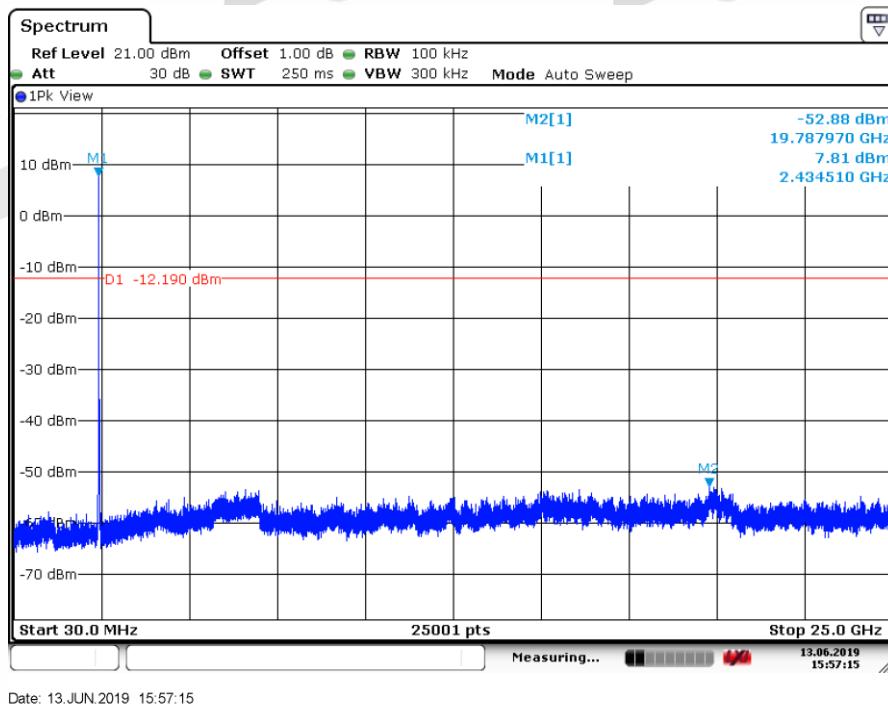
9.1. Test plots

ANT1

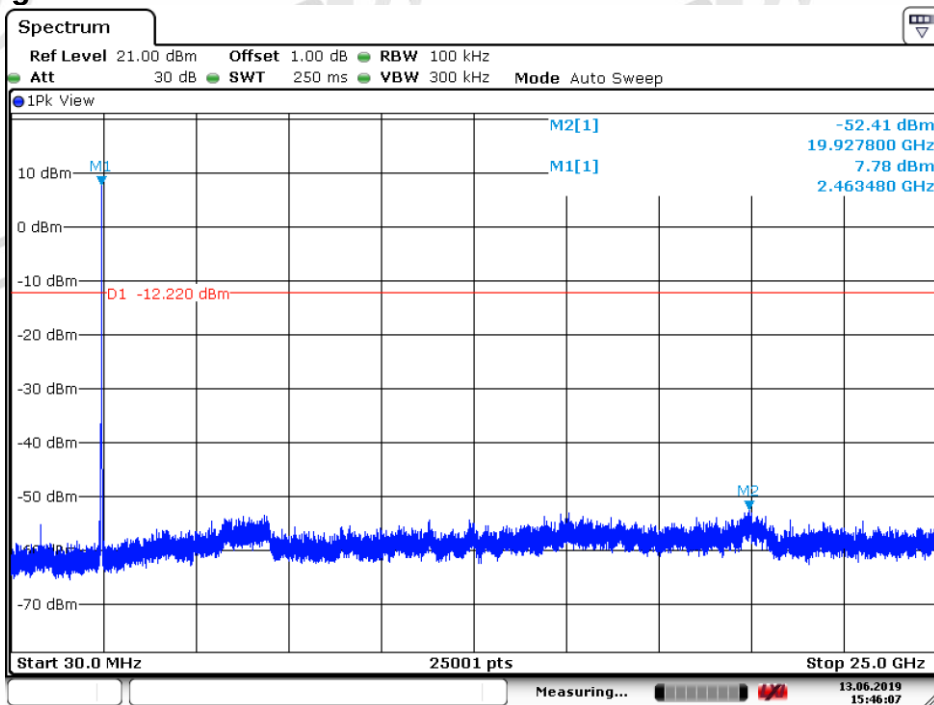
802.11B_Lowest Channel



802.11B_Middle Channel

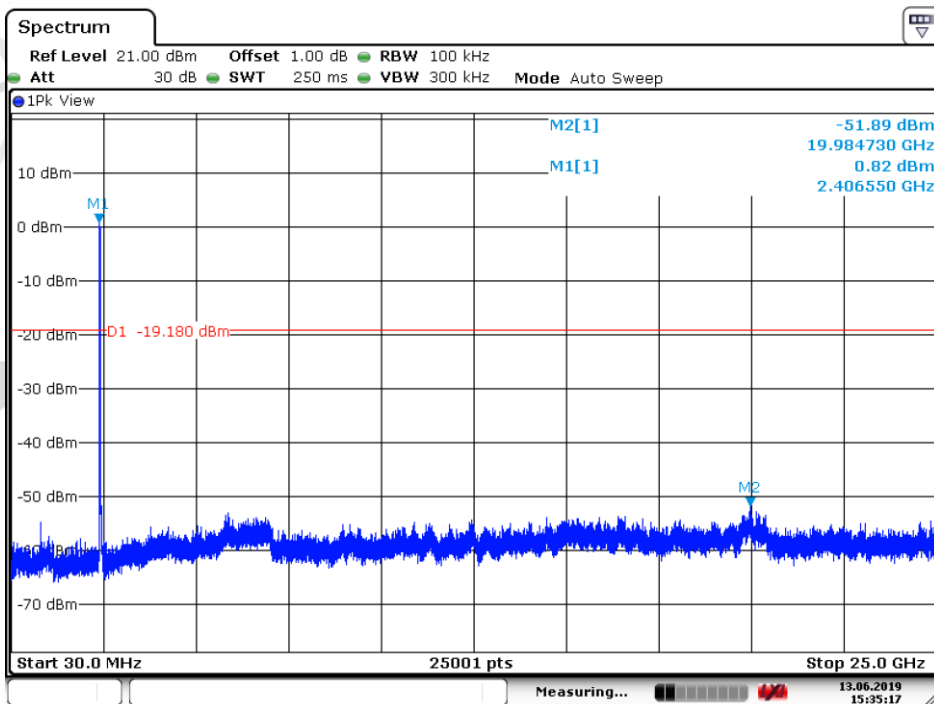


802.11B_Highest Channel



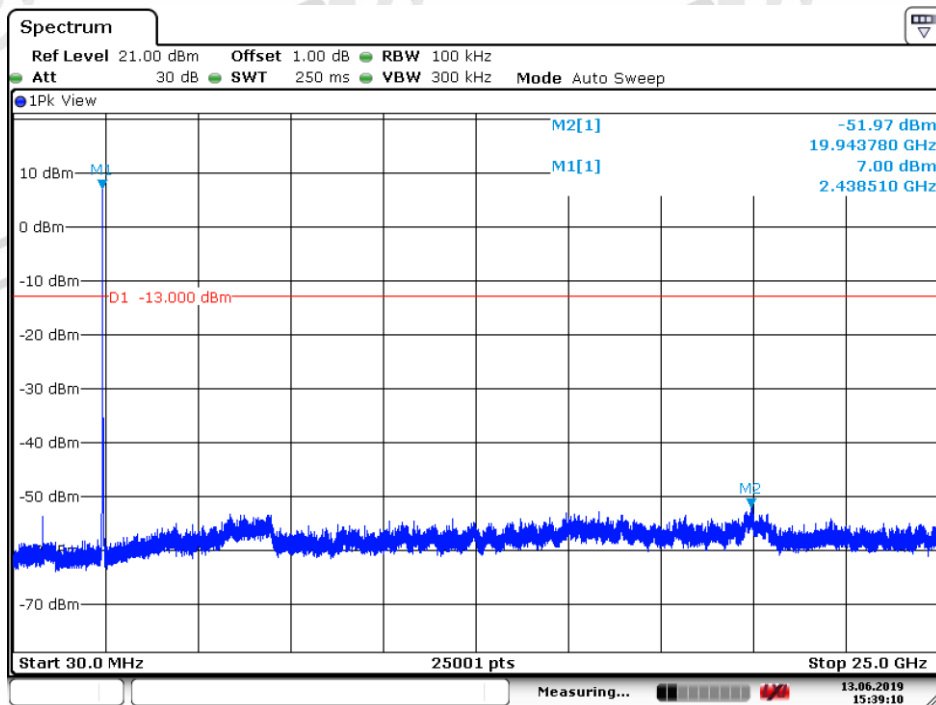
Date: 13. JUN.2019 15:46:08

802.11G_Lowest Channel



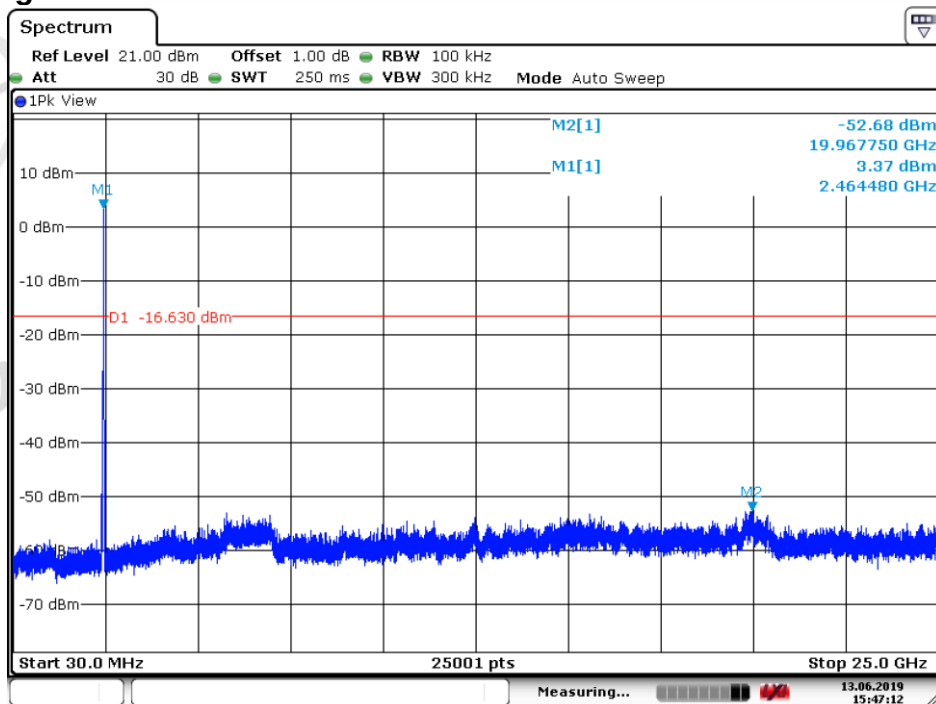
Date: 13. JUN.2019 15:35:18

802.11G_Middle Channel



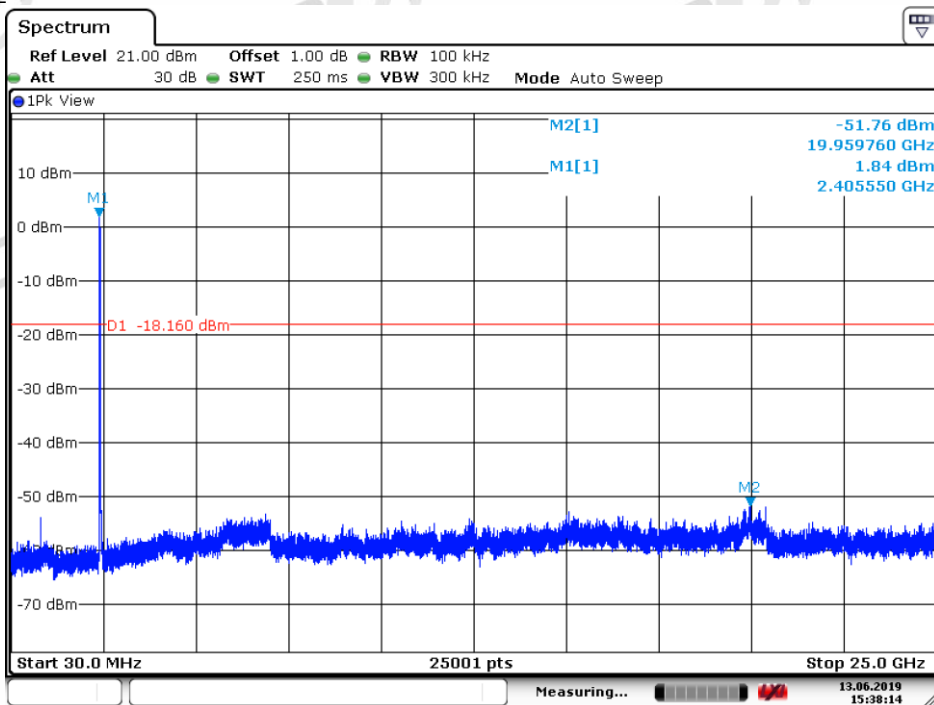
Date: 13. JUN.2019 15:39:10

802.11G_Highest Channel



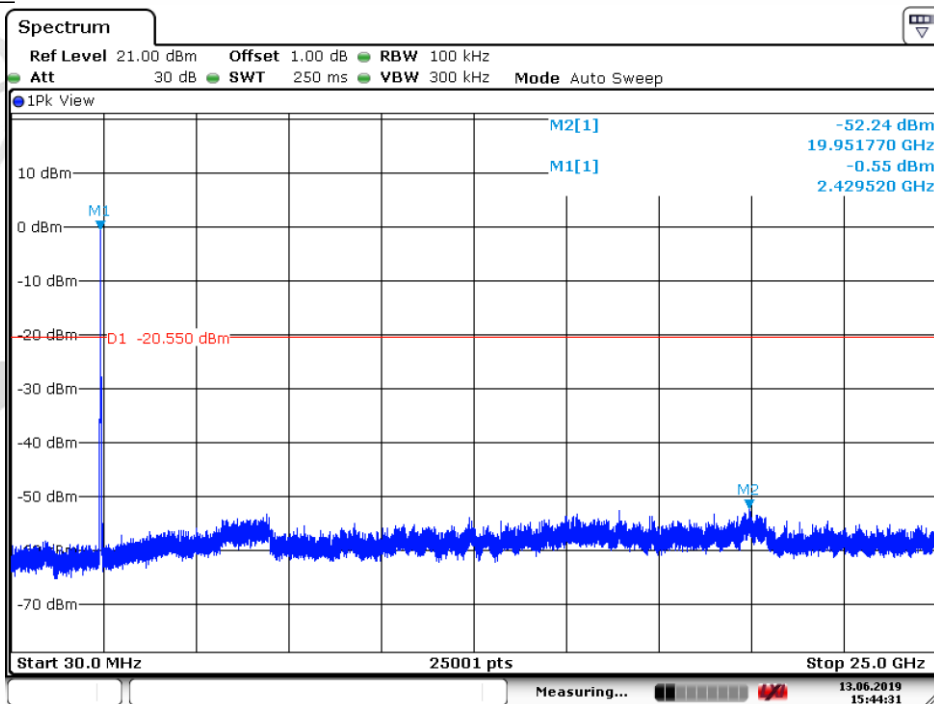
Date: 13. JUN.2019 15:47:13

802.11N20_Lowest Channel



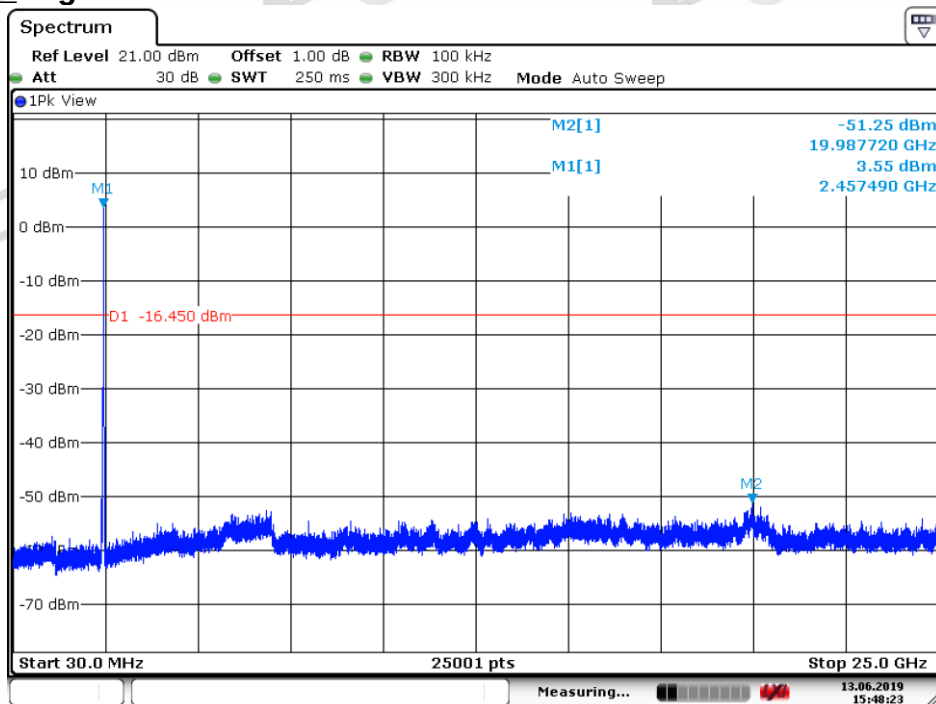
Date: 13. JUN.2019 15:38:14

802.11 N20_Middle Channel



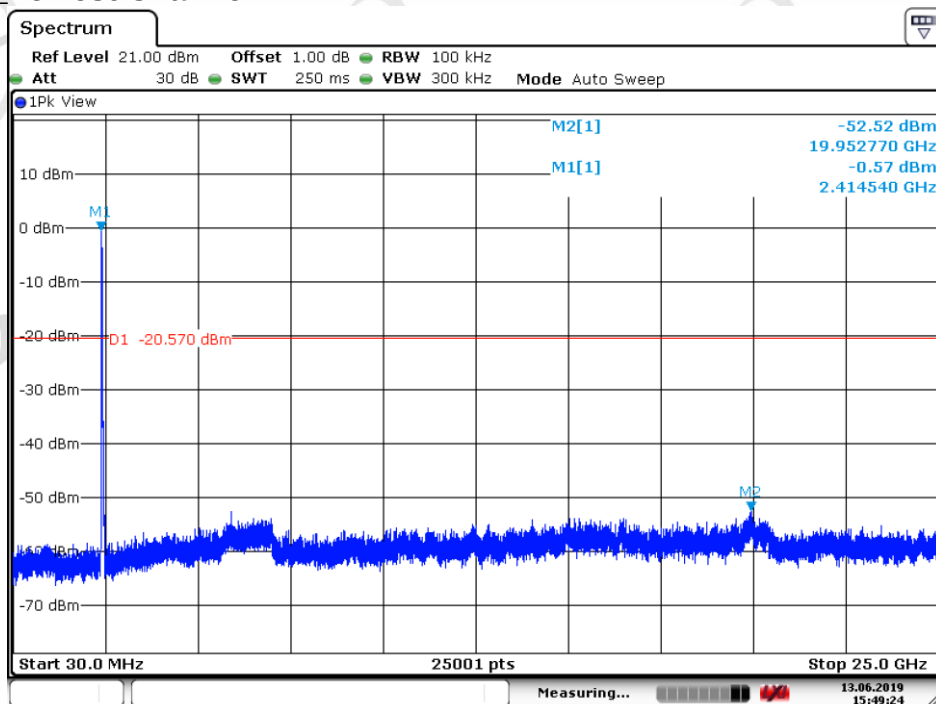
Date: 13. JUN.2019 15:44:31

802.11 N20_Highest Channel



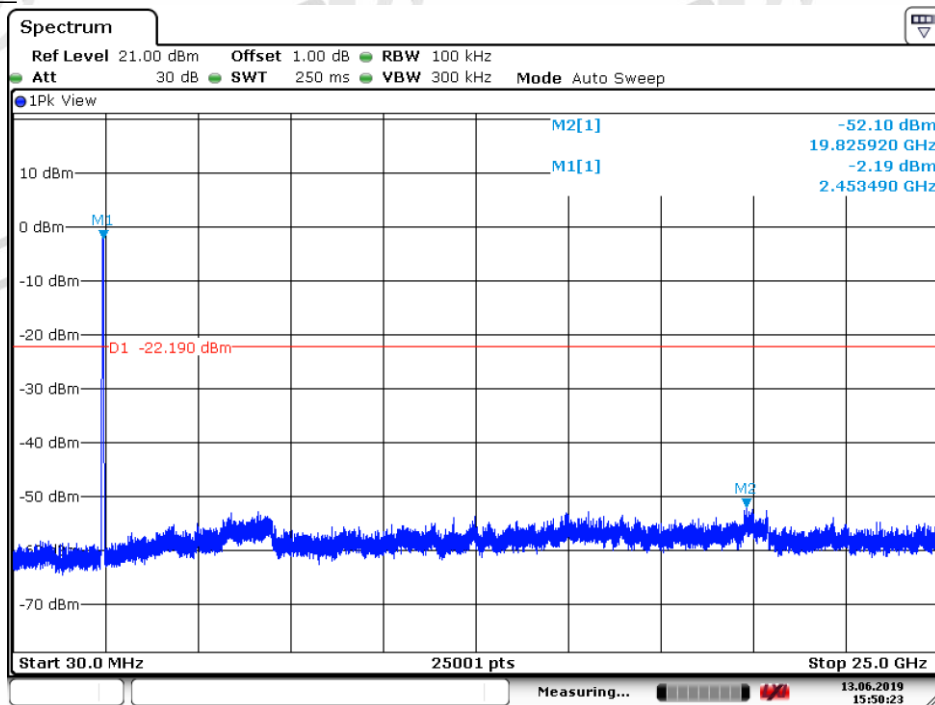
Date: 13. JUN.2019 15:48:24

802.11N40_Lowest Channel



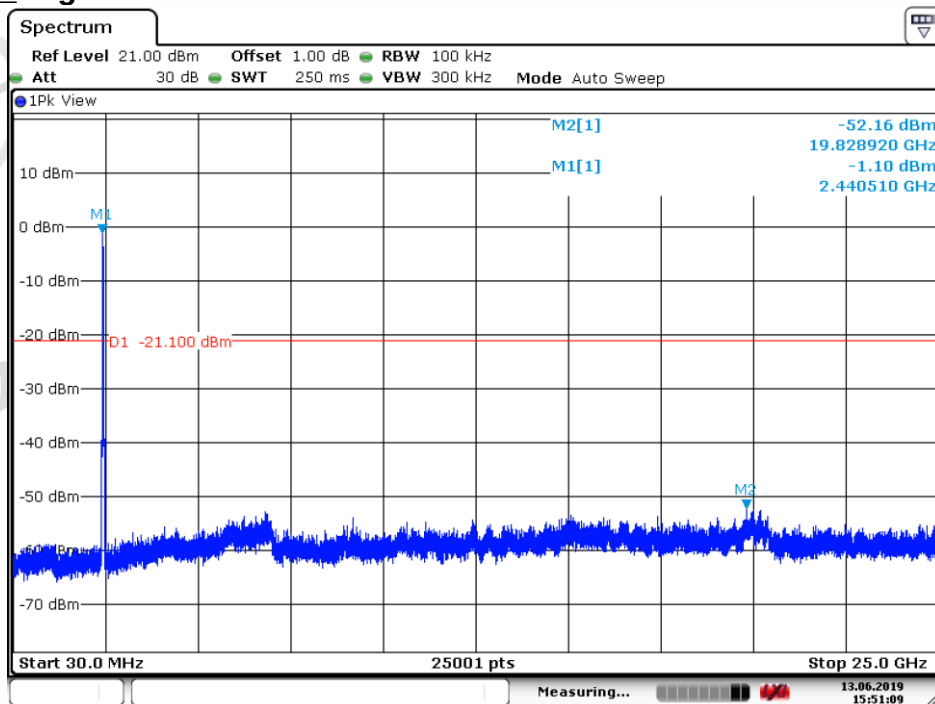
Date: 13. JUN.2019 15:49:24

802.11 N40 Middle Channel



Date: 13. JUN.2019 15:50:23

802.11 N40 Highest Channel



Date: 13. JUN.2019 15:51:10

Remark:

Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

The End