

MultiView Spectrum

Ref Level 30.00 dBm Offset 22.55 dB RBW 100 kHz

Alt 30 dB SWT 1.01 ms VBW 300 kHz Mode Auto Sweep

Count 10/11 1 Pk View

MT[1] 5.62 dBm 2.460711 GHz

1 Frequency Sweep

20 dBm

10 dBm

0 dBm

-10 dBm

-20 dBm

-30 dBm

-40 dBm

-50 dBm

-60 dBm

CF 2.462 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz

Measuring...

02:42:03 27.12.2022

02:42:03 27.12.2022

MultiView Spectrum

Ref Level 15.00 dBm Offset 22.55 dB RBW 100 kHz
 Att 20 dB SWT 30.1 ms VBW 300 kHz Mode Auto Sweep

Count 10/1
 1Pk View
 M1[1] -42.93 dBm
 34.4460 MW

1 Frequency Sweep

10 dBm
 0 dBm
 -10 dBm
 -20 dBm
 -30 dBm
 -40 dBm
 -50 dBm
 -60 dBm
 -70 dBm
 -80 dBm

H1 -24.380 dBm

30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz

Measuring...

02:42:15 27.12.2022

MultiView Spectrum

Ref Level 15.00 dBm Offset 22.55 dB RBW 100 kHz

Att 20 dB SWT 255 ms VBW 300 kHz Mode Auto Sweep

1 Frequency Sweep

Count 10/11

1Pk View

M1[1] 4.08 dBm

M2[1] -38.57 dBm

22,108,900 GHz

H1 -24.380 dBm

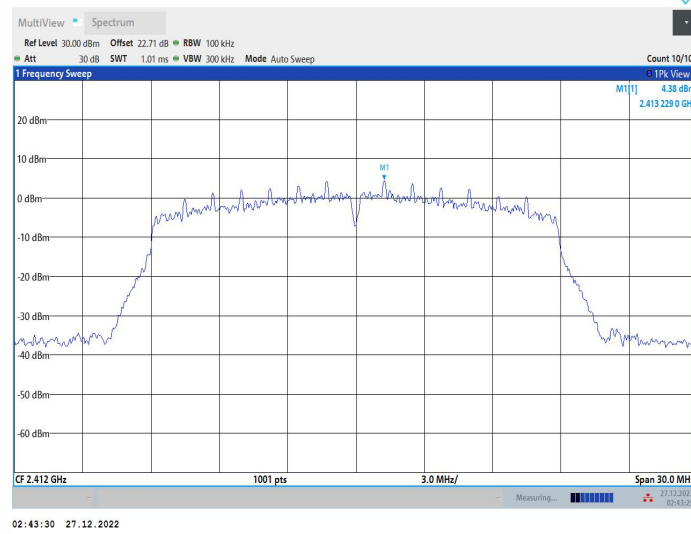
M2

1.0 GHz 30001 pts 2.55 GHz/ 26.5 GHz

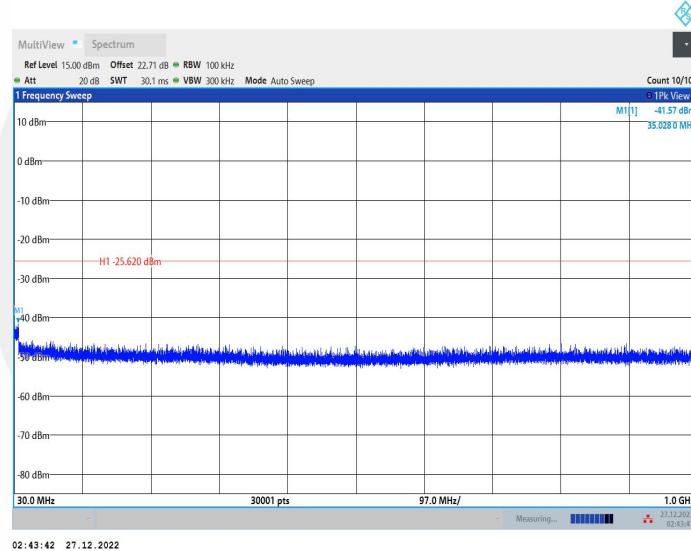
Measuring...

02:42:52 27.12.2022

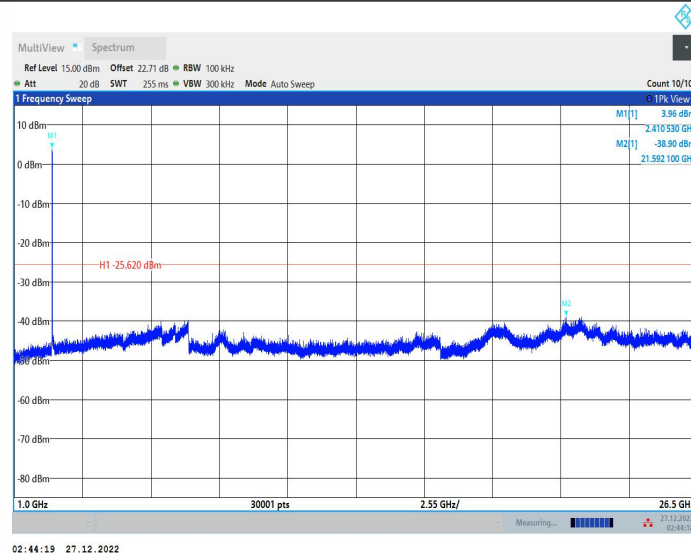
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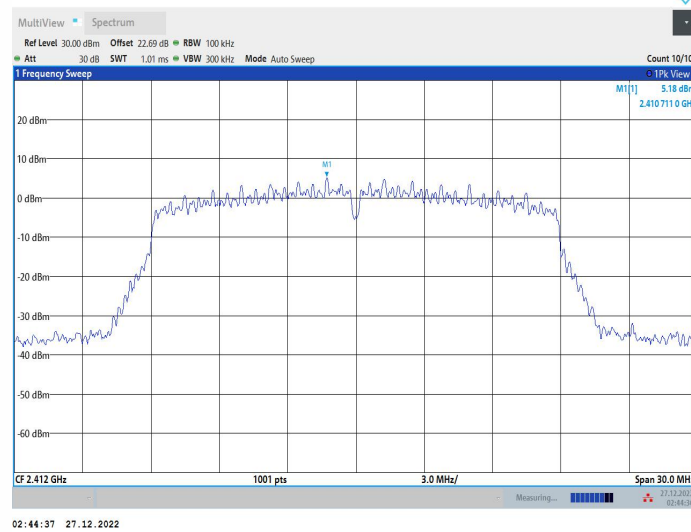
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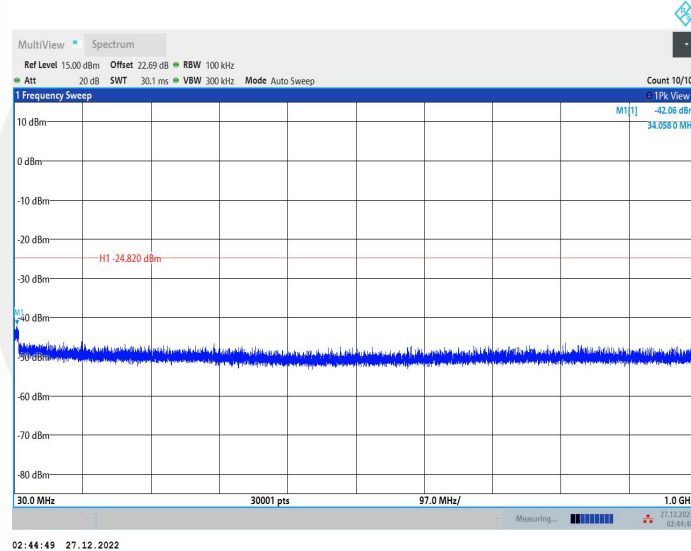
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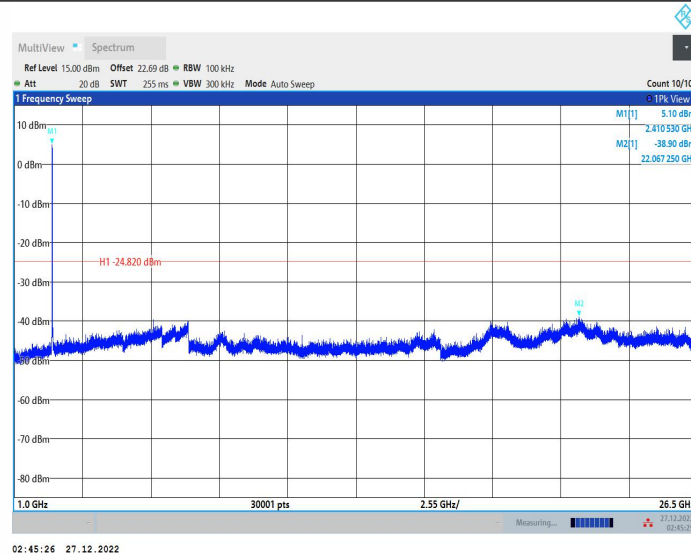
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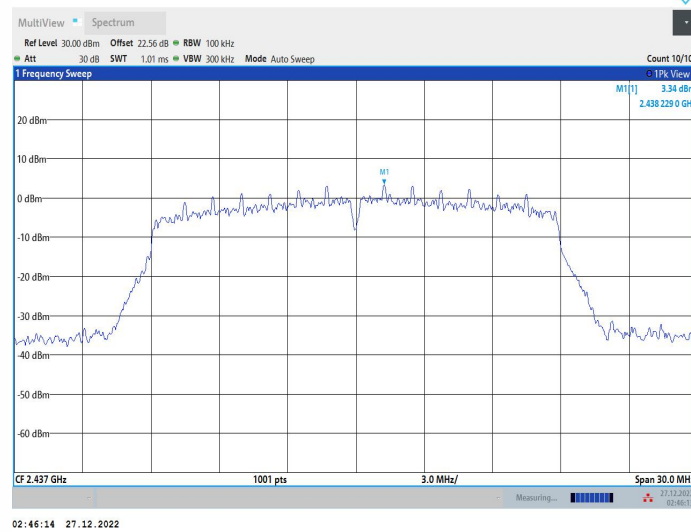
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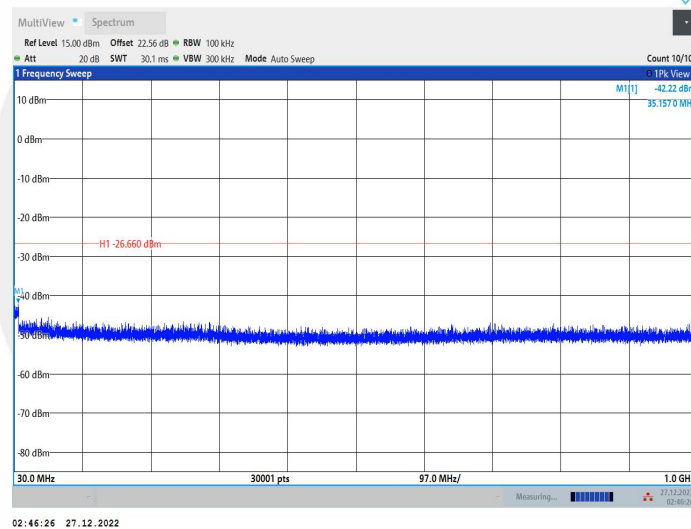
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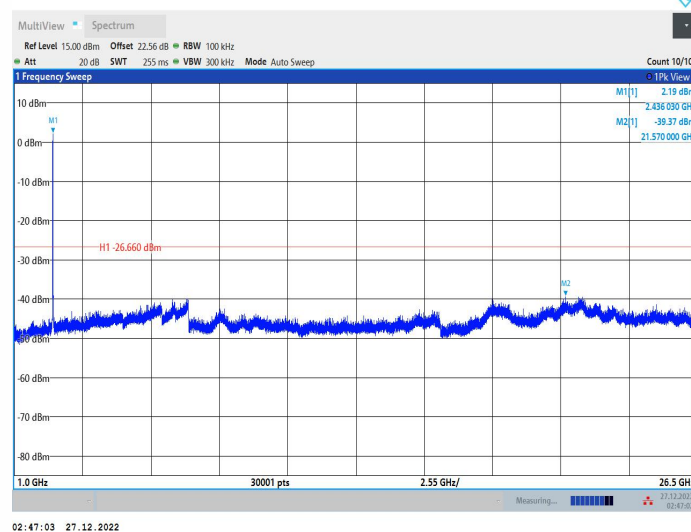
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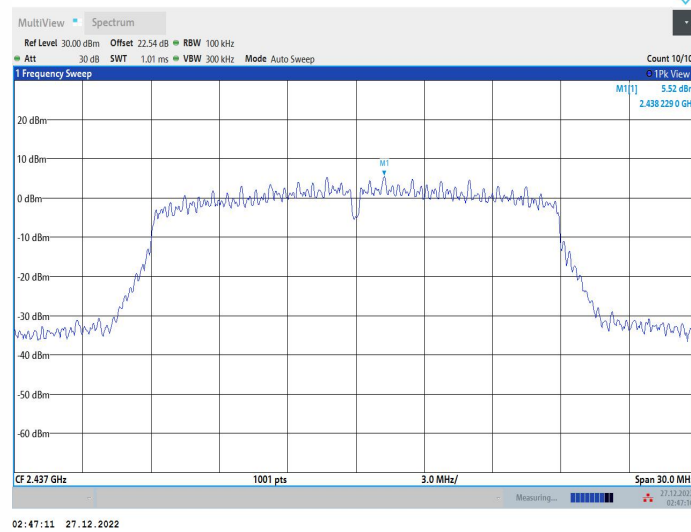
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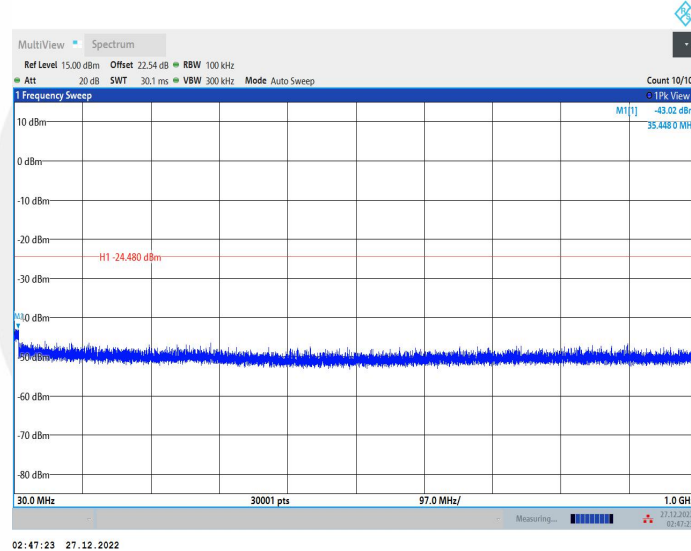
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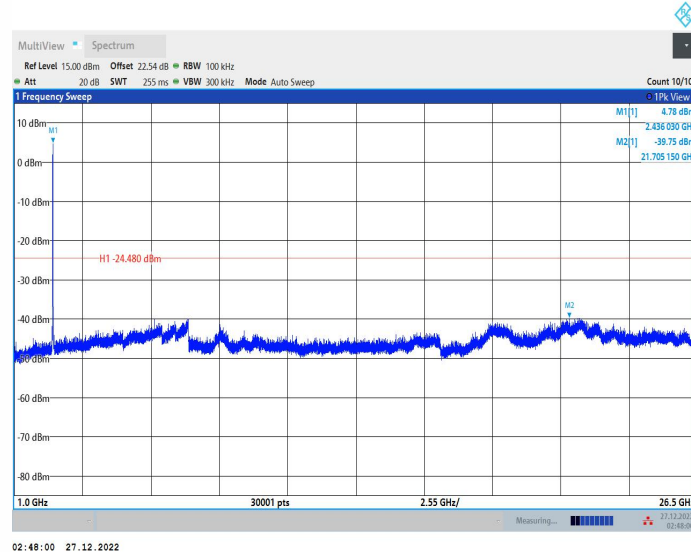
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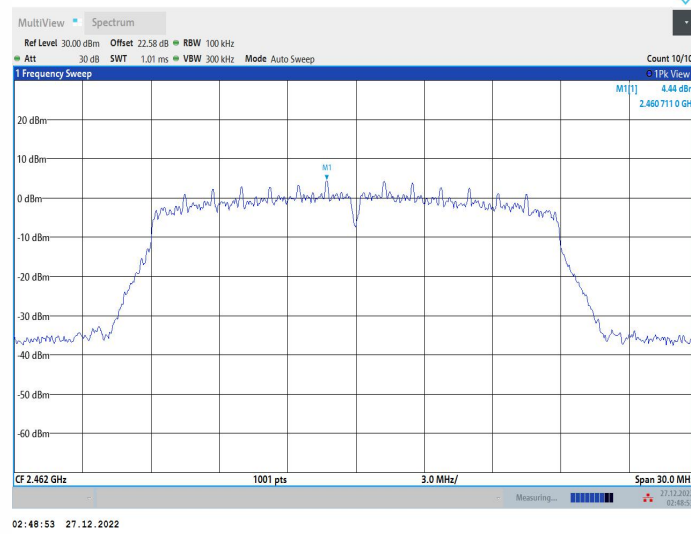
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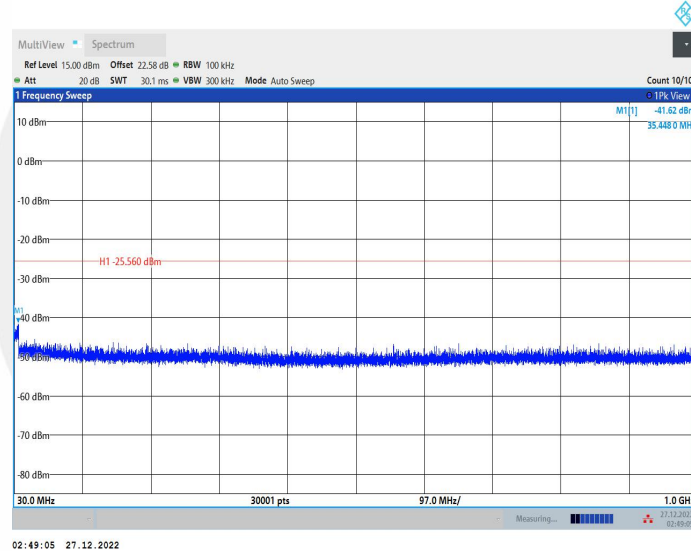
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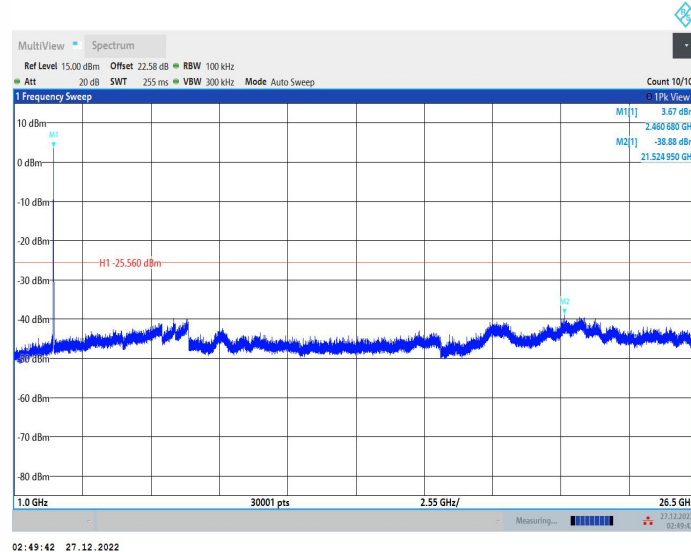
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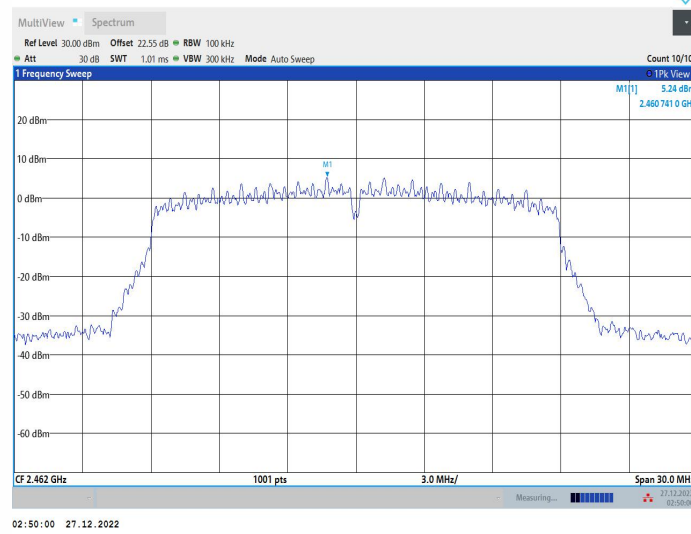
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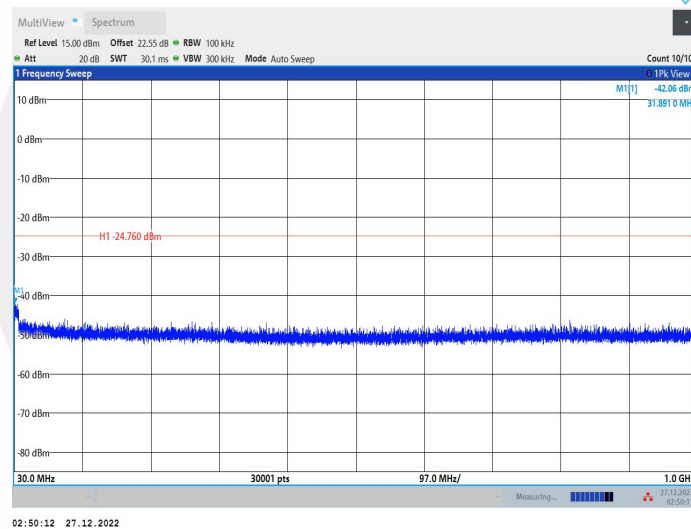
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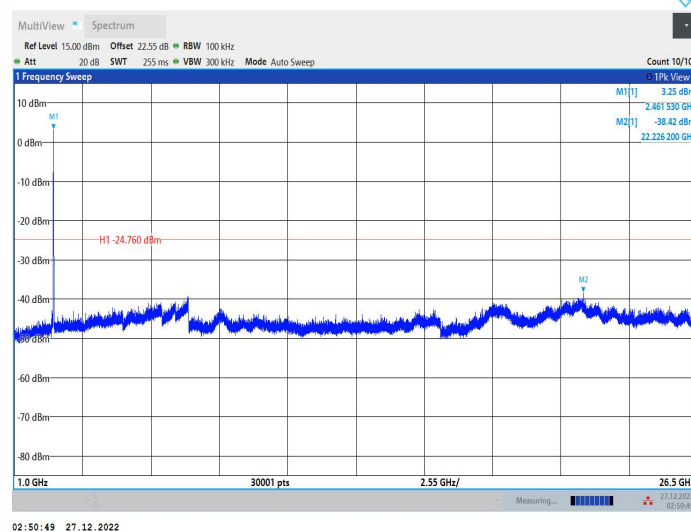
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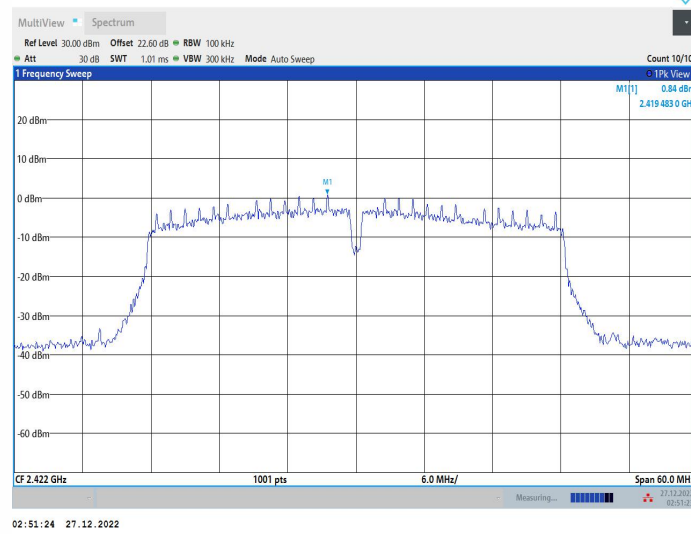
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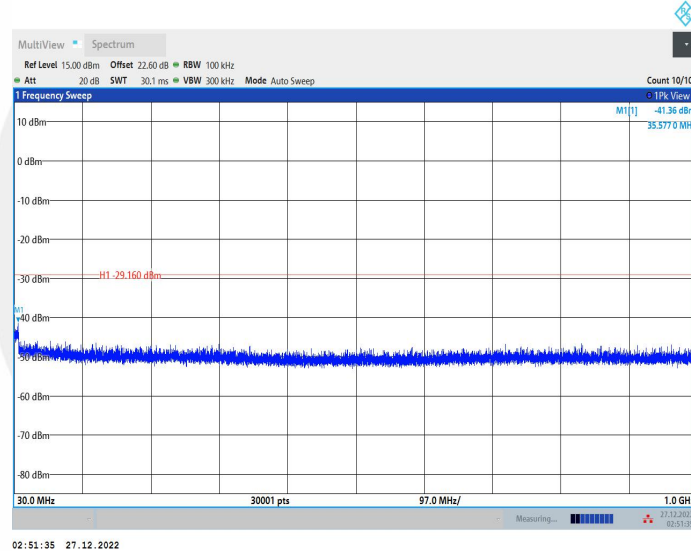
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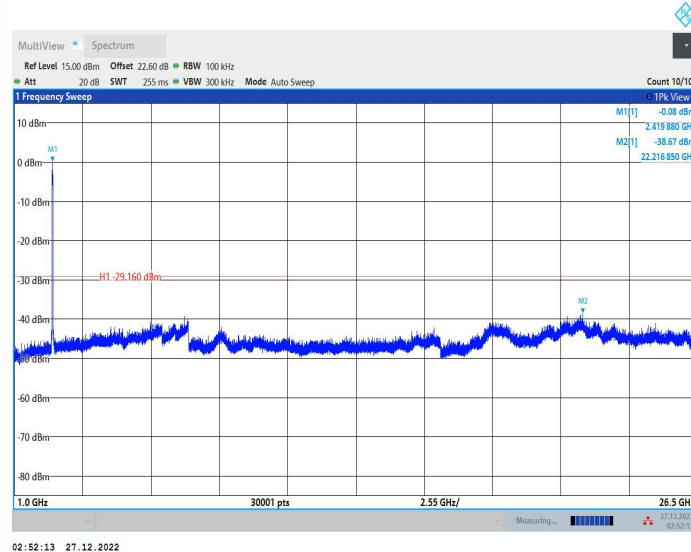
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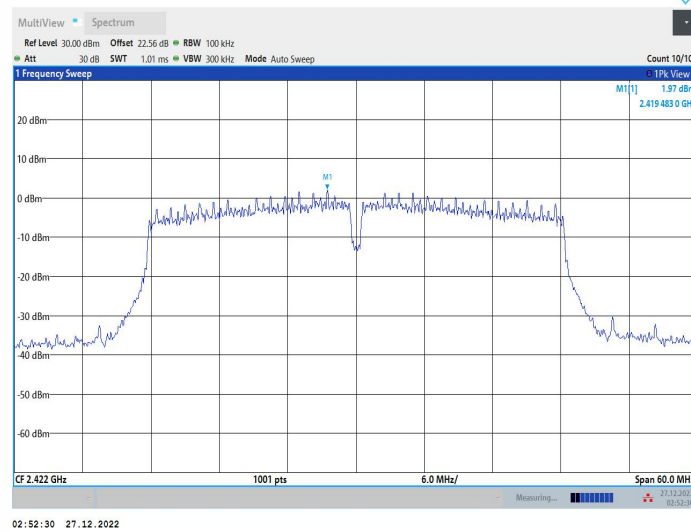
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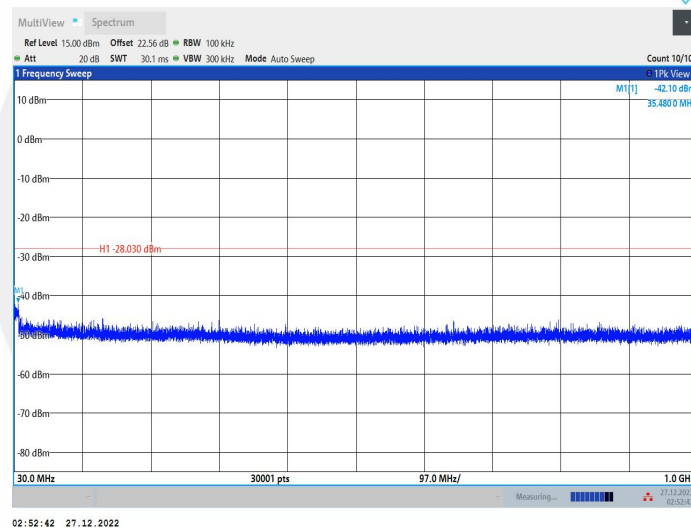
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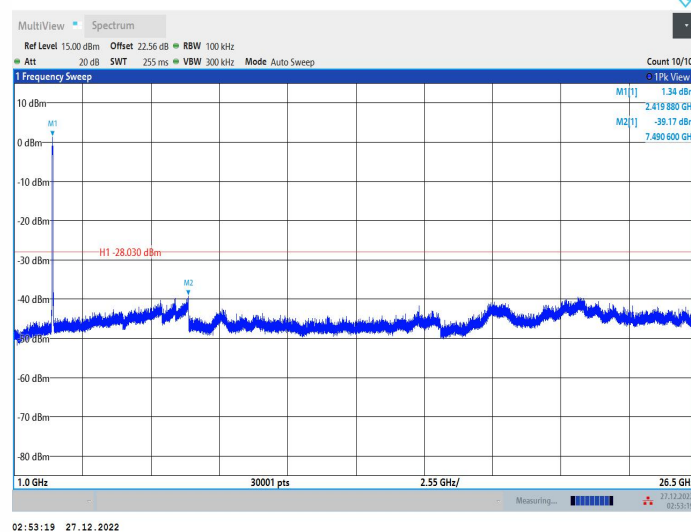
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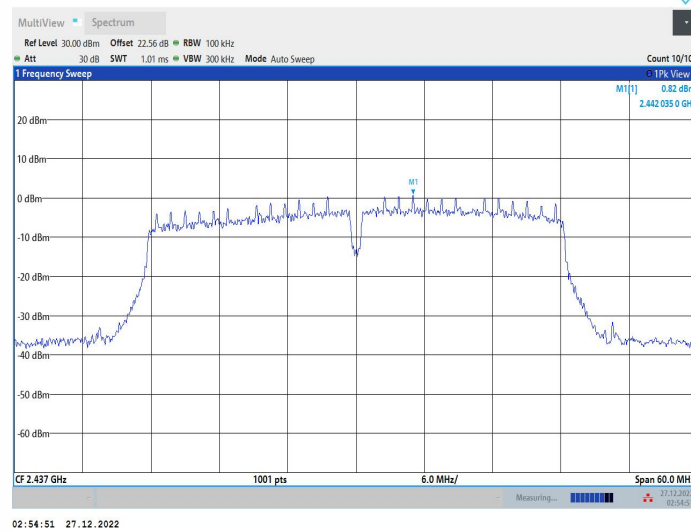
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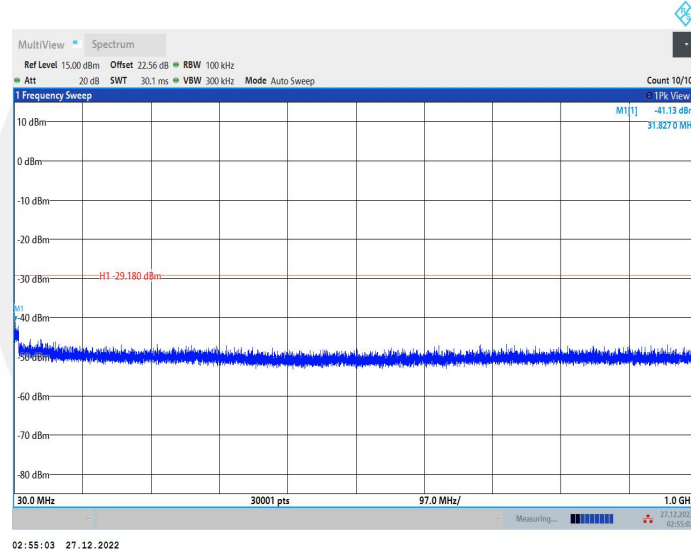
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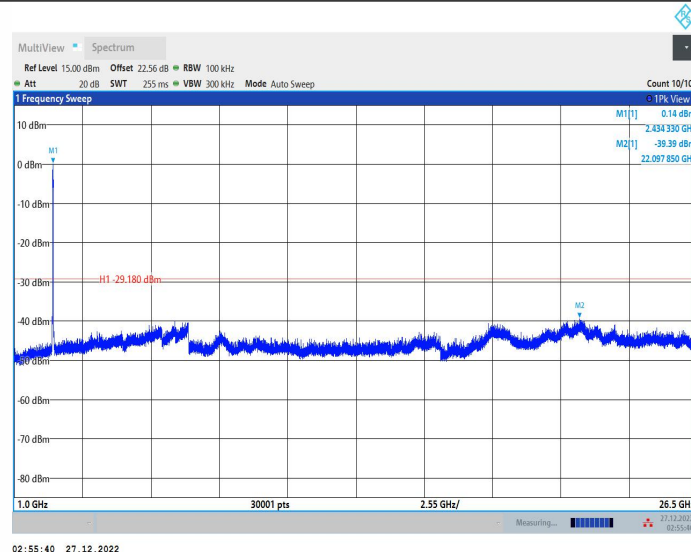
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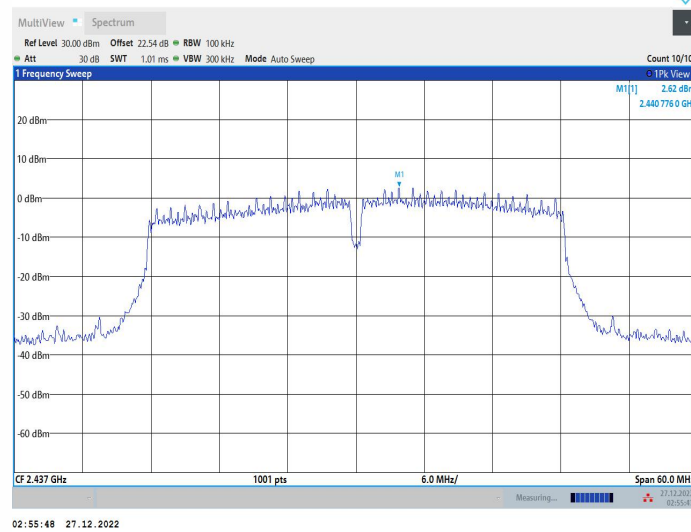
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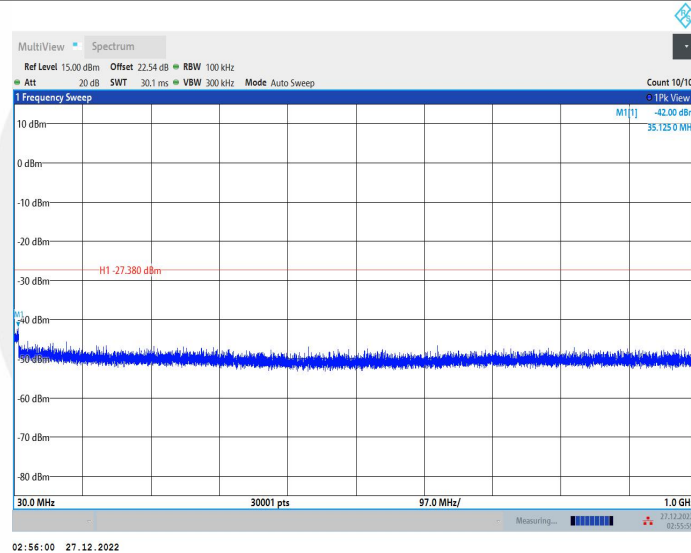
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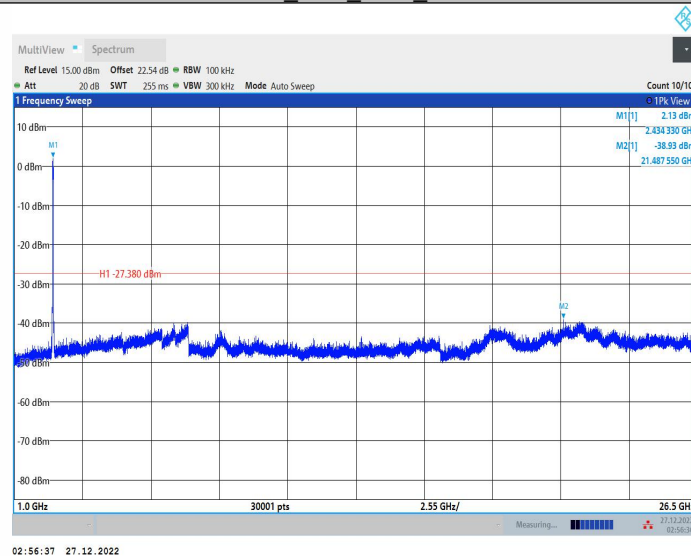
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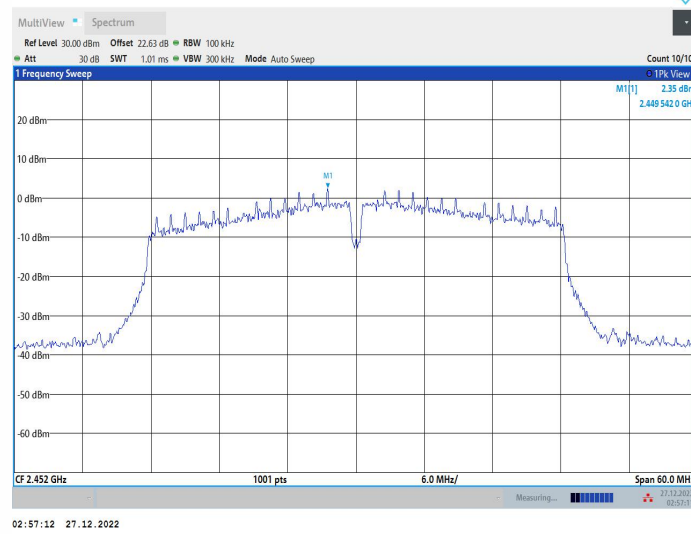
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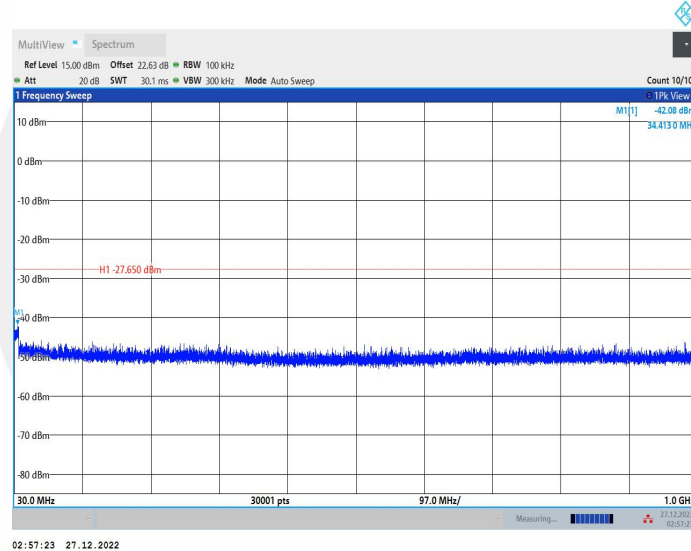
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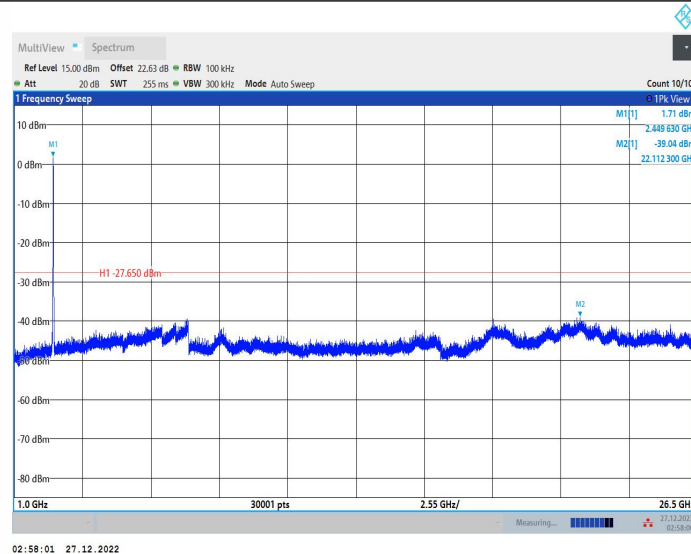
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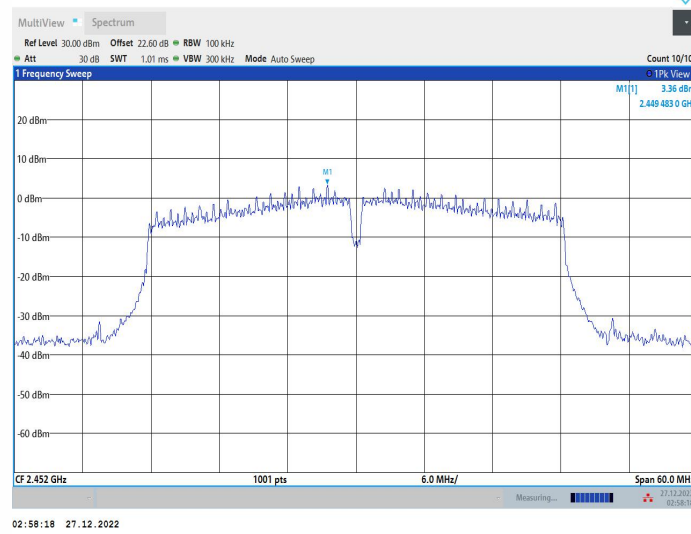
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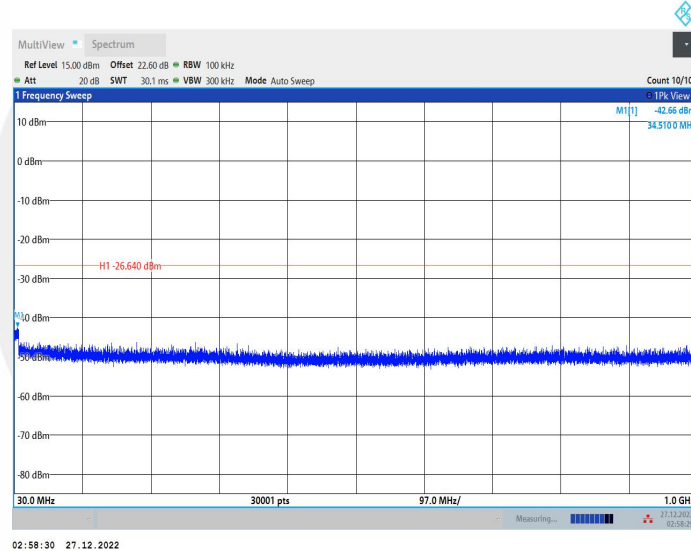
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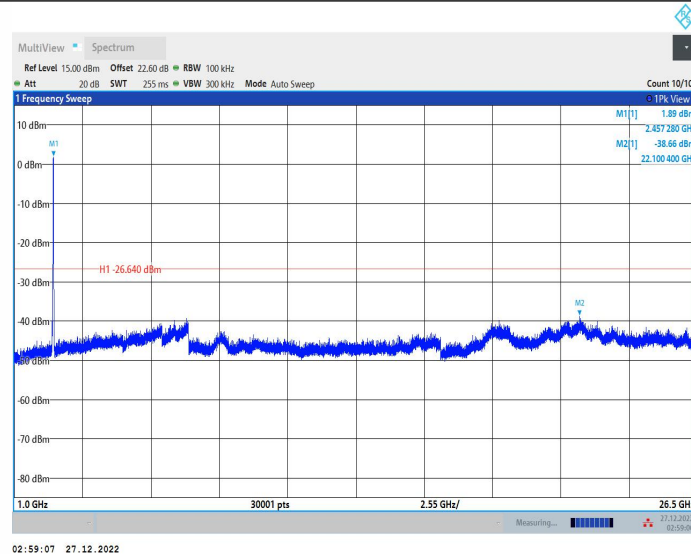
11N40MIMO_Ant2_2452_0~Reference



11N40MIMO_Ant2_2452_30~1000



11N40MIMO_Ant2_2452_1000~26500



7.5 RADIATED EMISSION

7.5.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074 D01 15.247 Meas Guidance v05r02.

7.5.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part 15.205, Restricted bands:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part 15.205 the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	24000/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

7.5.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2.

7.5.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

For Above 1GHz:

The EUT was placed on a turn table which is 1.5m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured.

RBW = 1 MHz.

VBW ≥ RBW.

Sweep = auto.

Detector function = peak.
Trace = max hold.

For Below 1GHz:

The EUT was placed on a turn table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Span = wide enough to fully capture the emission being measured.
RBW = 100 kHz.
VBW $\geq$ RBW.
Sweep = auto.
Detector function = peak.
Trace = max hold.

For Below 30MHz:

The EUT was placed on a turn table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Span = wide enough to fully capture the emission being measured.
RBW = 9kHz.
VBW $\geq$ RBW.
Sweep = auto.
Detector function = peak.
Trace = max hold.

For Below 150KHz:

The EUT was placed on a turn table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Span = wide enough to fully capture the emission being measured.
RBW = 200Hz.
VBW $\geq$ RBW.
Sweep = auto.
Detector function = peak.
Trace = max hold.

Follow the guidelines in ANSI C63.10 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. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit. Submit this data. Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the limit. Submit this data.
Repeat above procedures until all frequency measured was complete.

7.5.5 Test Results

Temperature:	28.1° C
Relative Humidity:	43%
ATM Pressure:	1011 mbar

■ Spurious Emission below 30MHz(9KHz to 30MHz)

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission Above 1GHz(1GHz to 25GHz)

All modes have been tested, and the worst result recorded was report as below:
Highest gain of each antenna and highest output power is ANT2 and MIMO as below:

ANT2:

Test mode: 802.11n(20) Frequency: Channel 1: 2412MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
4822.5	V	60.69	74.00	13.31	peak
11454.37	V	60.52	74.00	13.48	peak
17677.5	V	67.95	74.00	6.05	peak
4822.999	V	46.65	54.00	7.35	AVG
11454.37	V	46.92	54.00	7.08	AVG
17677.5	V	49.88	54.00	4.12	AVG
4822.5	H	56.32	74.00	17.68	peak
11467.5	H	60.52	74.00	13.48	peak
17971.87	H	70.08	74.00	3.92	peak
4822.998	H	41.95	54.00	12.05	AVG
11467.5	H	48.43	54.00	5.57	AVG
17971.87	H	50.48	54.00	3.52	AVG

Test mode: 802.11n(20) Frequency: Channel 6: 2437MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
4873.125	V	56.45	74.00	17.55	peak
7312.5	V	53.55	74.00	20.45	peak
17636.25	V	69.92	74.00	4.08	peak
4873.623	V	50.92	54.00	3.08	AVG
7312.081	V	46.09	54.00	7.91	AVG
17636.25	V	49.41	54.00	4.59	AVG
4873.125	H	52.08	74.00	21.92	peak
8634.375	H	56.62	74.00	17.38	peak
17971.87	H	69.85	74.00	4.15	peak
4873.623	H	47.76	54.00	6.24	AVG
8634.375	H	44.63	54.00	9.37	AVG
17971.87	H	50.95	54.00	3.05	AVG

Test mode: 802.11n(20) Frequency: Channel 11: 2462MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
4923.75	V	53.51	74.00	20.49	peak
9101.25	V	56.88	74.00	17.12	peak
17630.62	V	70.24	74.00	3.76	peak
4924.017	V	47.02	54.00	6.98	AVG
9101.25	V	48.38	54.00	5.62	AVG
17630.62	V	49.70	54.00	4.30	AVG
4923.75	H	49.56	74.00	24.44	peak
10076.25	H	58.19	74.00	15.81	peak
17643.75	H	69.94	74.00	4.06	peak
4923.75	H	45.24	54.00	8.76	AVG
10076.25	H	47.03	54.00	6.97	AVG
17643.75	H	50.27	54.00	3.73	AVG

MIMO:

Test mode: 802.11n(20) Frequency: Channel 1: 2412MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
4821.110	V	60.56	74.00	13.44	peak
11452.980	V	60.36	74.00	13.64	peak
17678.780	V	67.92	74.00	6.08	peak
4824.279	V	46.63	54.00	7.37	AVG
11452.120	V	46.66	54.00	7.34	AVG
17675.250	V	49.69	54.00	4.31	AVG
4834.190	H	56.24	74.00	17.76	peak
11479.190	H	60.31	74.00	13.69	peak
17983.560	H	69.92	74.00	4.08	peak
4834.688	H	41.81	54.00	12.19	AVG
11464.190	H	48.25	54.00	5.75	AVG
17968.560	H	50.35	54.00	3.65	AVG

Test mode: 802.11n(20) Frequency: Channel 6: 2437MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
4871.735	V	56.32	74.00	17.68	peak
7311.110	V	53.39	74.00	20.61	peak
17637.530	V	69.89	74.00	4.11	peak
4874.903	V	50.90	54.00	3.1	AVG
7309.831	V	45.83	54.00	8.17	AVG
17634.000	V	49.22	54.00	4.78	AVG
4884.815	H	52.00	74.00	22	peak
8646.065	H	56.41	74.00	17.59	peak
17983.560	H	69.69	74.00	4.31	peak
4885.313	H	47.62	54.00	6.38	AVG
8631.065	H	44.45	54.00	9.55	AVG
17968.560	H	50.82	54.00	3.18	AVG

Test mode: 802.11n(20) Frequency: Channel 11: 2462MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
4922.360	V	53.38	74.00	20.62	peak
9099.860	V	56.72	74.00	17.28	peak
17631.900	V	70.21	74.00	3.79	peak
4925.297	V	47.00	54.00	7	AVG
9099.000	V	48.12	54.00	5.88	AVG
17628.370	V	49.51	54.00	4.49	AVG
4935.440	H	49.48	74.00	24.52	peak
10087.940	H	57.98	74.00	16.02	peak
17655.440	H	69.78	74.00	4.22	peak
4935.440	H	45.10	54.00	8.9	AVG
10072.940	H	46.85	54.00	7.15	AVG
17640.440	H	50.14	54.00	3.86	AVG

- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
 (2) Emission Level= Reading Level+Correct Factor.
 (3) Correct Factor= Ant_F + Cab_L - Preamp
 (4) The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz
All modes have been tested, and the worst result recorded was report as below:

Test mode: 802.11n(20MHz) Frequency: Channel 1: 2412MHz

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
2389.84	V	65.83	74.00	8.17	peak
2389.940	V	45.64	54.00	8.36	AVG
2389.74	H	59.08	74.00	14.92	peak
2389.74	H	44.65	54.00	9.35	AVG

Test mode: 802.11n(20MHz) Frequency: Channel 11: 2462MHz

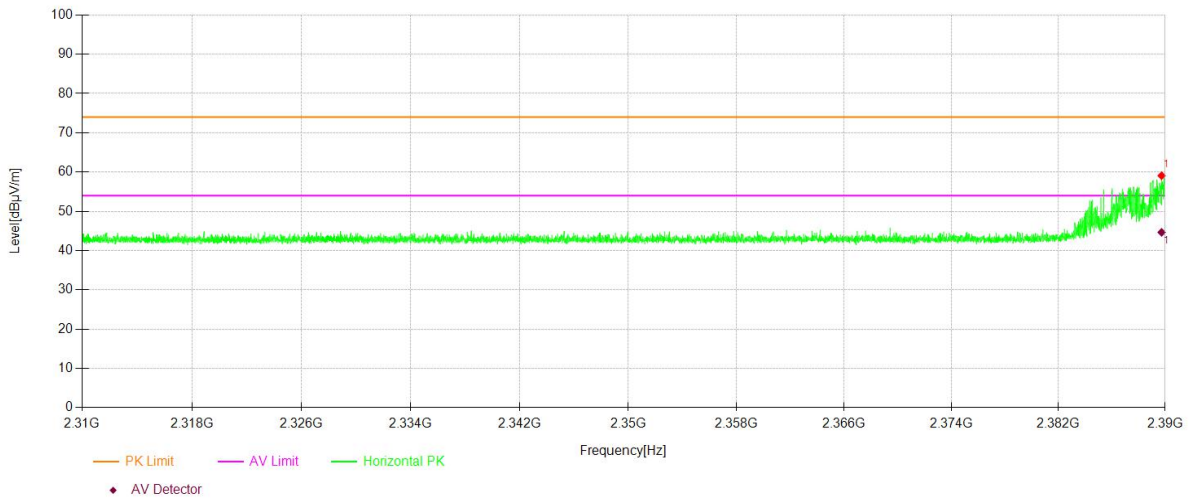
Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)	Detector
2484.910	V	67.04	74.00	6.96	peak
2484.910	V	46.70	54.00	7.30	AVG
2485.024	H	62.05	74.00	11.95	peak
2485.024	H	45.32	54.00	8.68	AVG

Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
(2) Emission Level= Reading Level+Correct Factor.
(3) Correct Factor= Ant_F + Cab_L - Preamp
(4) The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Spurious Emission in Restricted Band 2310-2390MHz

Test Model	☐ 802.11b	☐ 802.11g	☒ 802.11n(HT20)	☐ 802.11n(HT40)
	☒ Channel 1:2412MHz	☐ Channel 3: 2422MHz	Polarity: H	

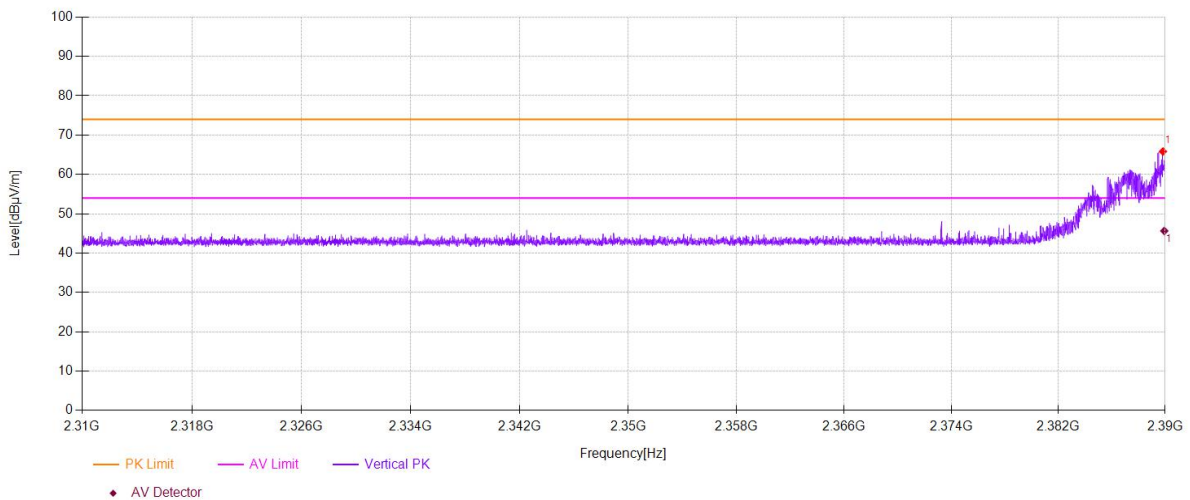
VBW=3MHz



Spurious Emission in Restricted Band 2310-2390MHz

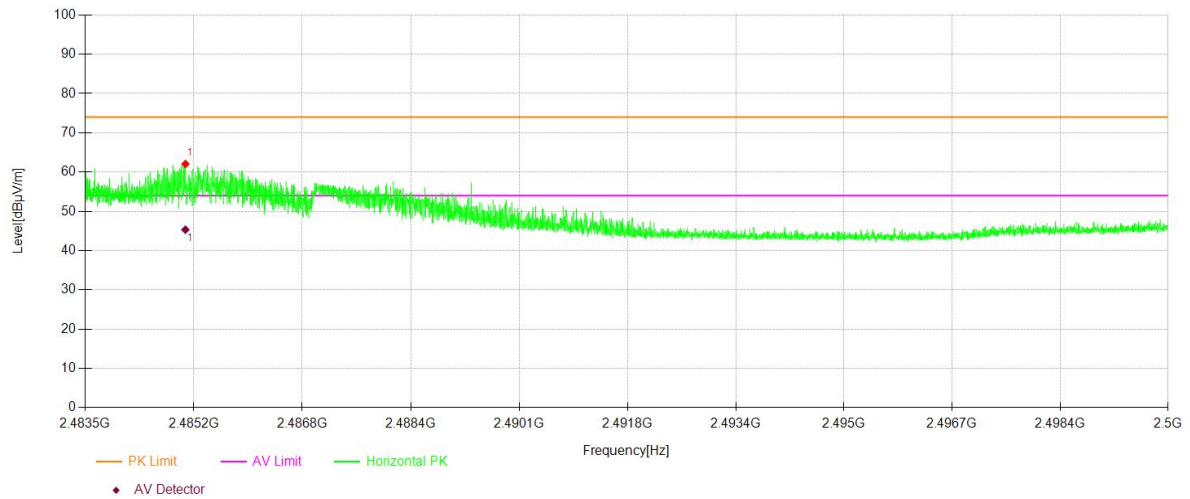
Test Model	☐ 802.11b	☐ 802.11g	☒ 802.11n(HT20)	☐ 802.11n(HT40)
	☒ Channel 1:2412MHz	☐ Channel 3: 2422MHz	Polarity: V	

VBW=3MHz



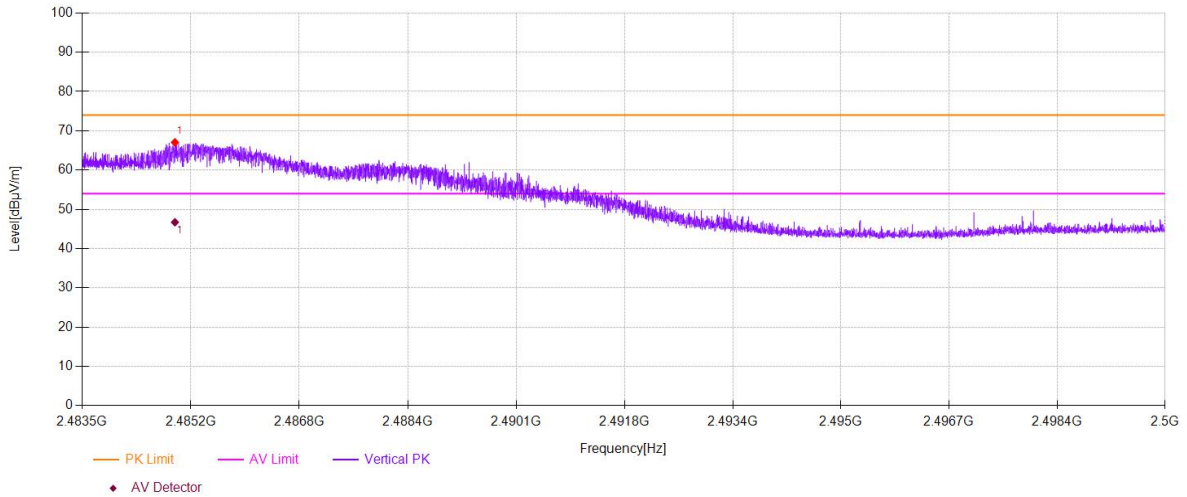
Spurious Emission in Restricted Band 2483.5-2500MHz

Test Model ☐ 802.11b ☐ 802.11g ☒ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz Polarity: H
 VBW=3MHz



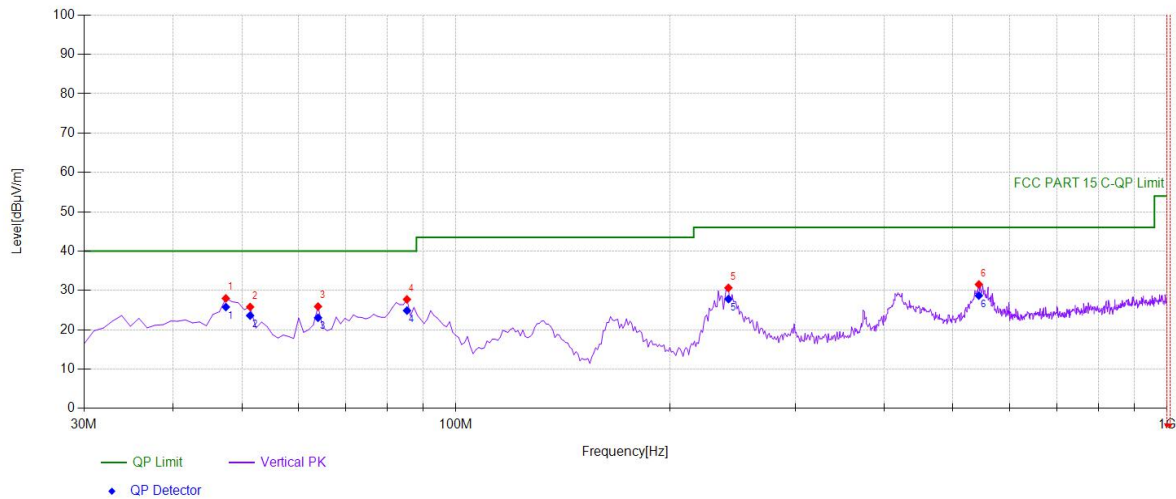
Spurious Emission in Restricted Band 2483.5-2500MHz

Test Model ☐ 802.11b ☐ 802.11g ☒ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz Polarity: V
 VBW=3MHz

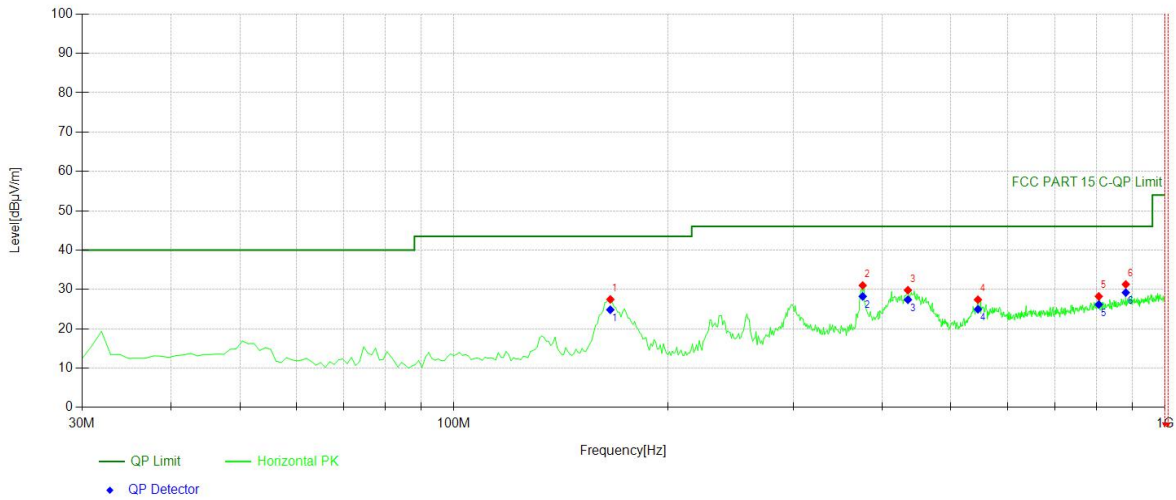


- Spurious Emission below 1GHz (30MHz to 1GHz)
All modes have been tested, and the worst result recorded was report as below:

Test mode: 802.11 b Frequency: Channel 1: 2412MHz

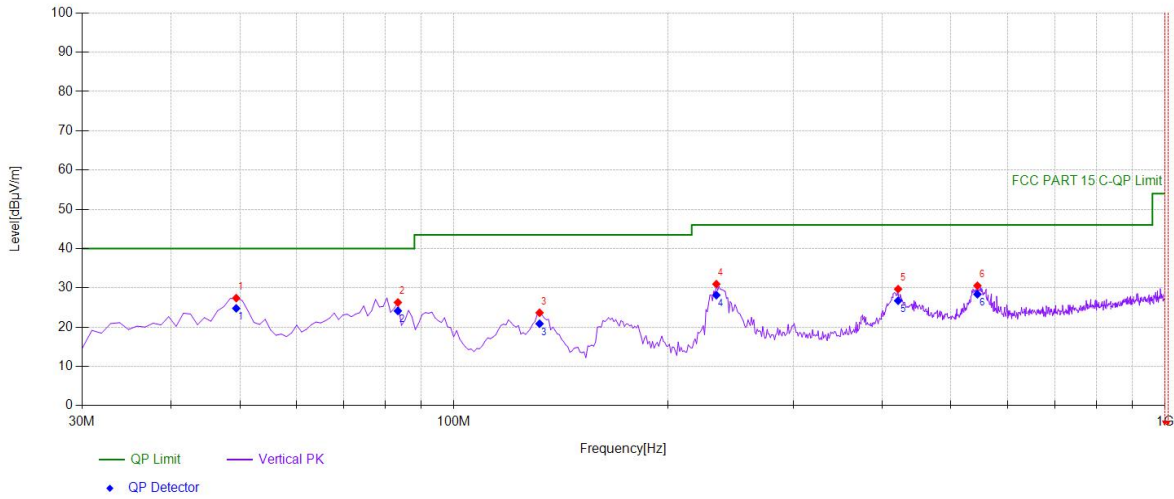


Suspected Data List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	47.4775	27.98	40.00	12.02	100	329	Vertical
2	51.3614	25.81	40.00	14.19	100	292	Vertical
3	63.984	25.91	40.00	14.09	100	0	Vertical
4	85.3453	27.73	40.00	12.27	100	150	Vertical
5	241.6717	30.66	46.00	15.34	100	45	Vertical
6	543.6436	31.54	46.00	14.46	100	64	Vertical



Suspected Data List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	165.9359	27.47	43.50	16.03	100	241	Horizontal
2	375.6657	31.02	46.00	14.98	100	300	Horizontal
3	434.8949	29.82	46.00	16.18	100	30	Horizontal
4	545.5856	27.40	46.00	18.60	100	122	Horizontal
5	806.7768	28.24	46.00	17.76	100	127	Horizontal
6	880.5706	31.29	46.00	14.71	100	136	Horizontal

Test mode: 802.11 b Frequency: Channel 6: 2437MHz



Suspected Data List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	49.4194	27.39	40.00	12.61	100	297	Vertical
2	83.4034	26.29	40.00	13.71	100	330	Vertical
3	131.952	23.67	43.50	19.83	100	22	Vertical
4	233.9039	30.96	46.00	15.04	100	1	Vertical
5	421.3013	29.69	46.00	16.31	100	330	Vertical
6	544.6146	30.54	46.00	15.46	100	81	Vertical