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Report On

Application for Grant of Equipment Authorization of the
Novatel Wireless Inc.

MiFi 7000 Wireless Hotspot Modem

FCC Part 15 Subpart E §15.407

RSS-247 Issue 2 February 2017

Report No. SD72118338-0716D Rev. 1 (Part 2 of 2)

August 2016

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2.7 UNWANTED EMISSIONS MEASUREMENT

2.7.1 Specification Reference

Part 15 Subpart E §15.407(b)(1),(4)(i) and (7) / 15.209 and RSS-247 6.2.1 (2) and 6.2.4 (2)

2.7.2 Standard Applicable

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

6.2.4 (2) For the band 5725-5850 MHz, emissions at frequencies from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p.

For emissions at frequencies more than 10 MHz above or below the band edges, the emissions power shall not exceed -27 dBm/MHz.

2.7.3 Test Methodology

Section II (G) Unwanted Emission Measurement of 789033 D02 General UNII Test Procedures v01r02

2.7.4 Equipment Under Test and Modification State

Serial No: SZ170616900012 / Test Configuration B

2.7.5 Date of Test/Initial of test personnel who performed the test

August 10, 12, 13, and 17, 2016/FSC and XYZ

2.7.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature 22-9 - 25.7 °C
 Relative Humidity 43.9 – 56.0 %
 ATM Pressure 98.7 - 98.9 kPa

2.7.8 Additional Observations

- This is an antenna-port conducted measurement test plus radiated cabinet spurious emissions measurements.
- Only the worst case data rate/modulation presented.
- Sweep time is set to auto.
- Transducer Factor (TDF) was added to compensate for the antenna gain, external attenuator and cable used.
- Additional 3dB offset was added for MIMO mode (verification performed on worst case antenna port).
- When measuring radiated cabinet spurious emissions, the field strength limit of 15.209 is first converted to dBm (EIRP) using the formula under Section G(2)(III) of 789033 D02 General UNII Test Procedures v01r02 for below 1GHz measurements, otherwise §15.407 limits applies. If Peak complies with the limit, no Average evaluation will be performed (above 1GHz measurements).
- Only worst case configuration (channel, data rate or MCS and BW) used for radiated cabinet spurious emissions test.
- Radiated measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.7.9 for sample computation.

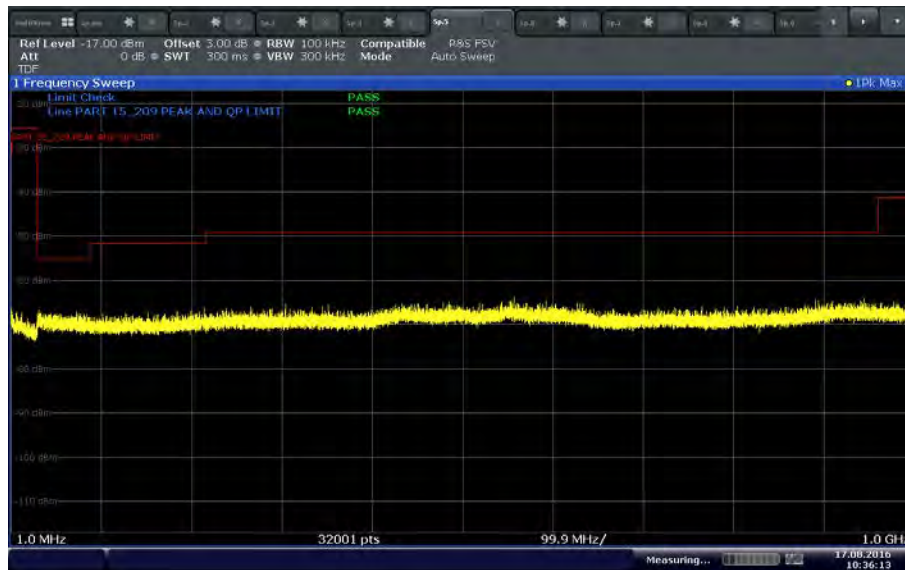
2.7.9 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbμV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbμV/m) @ 30MHz			11.8

2.7.10 Test Results

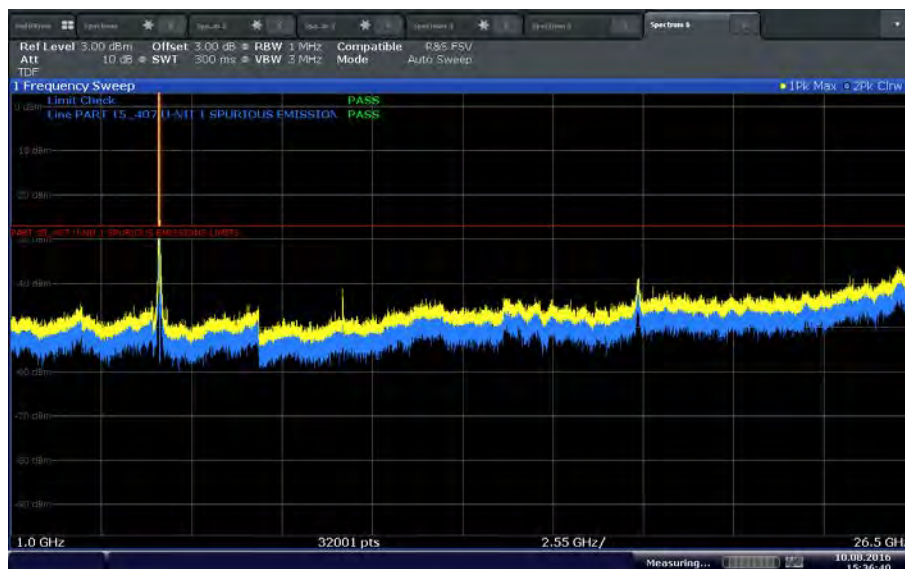
See attached plots.

2.7.11 Test Plots



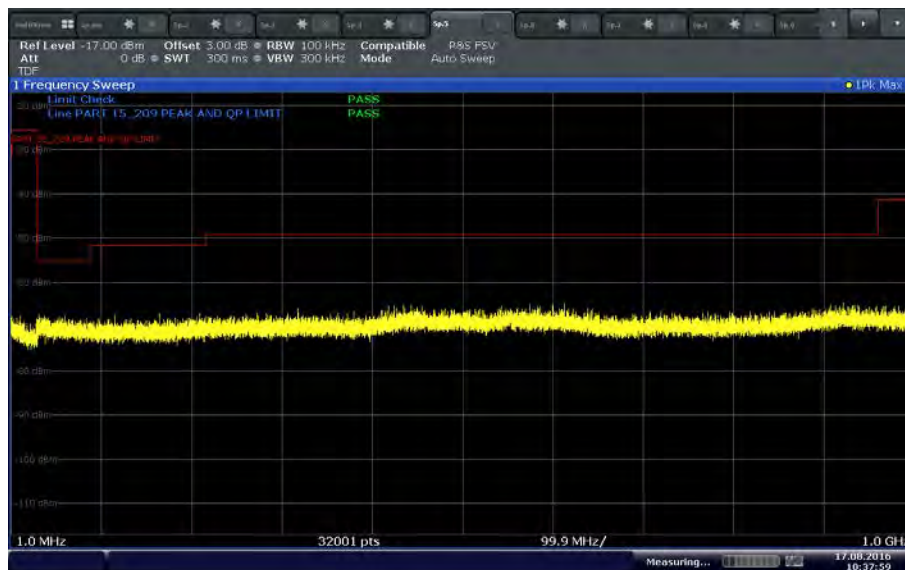
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802.11 a U-NII 1 Low Channel below 1GHz



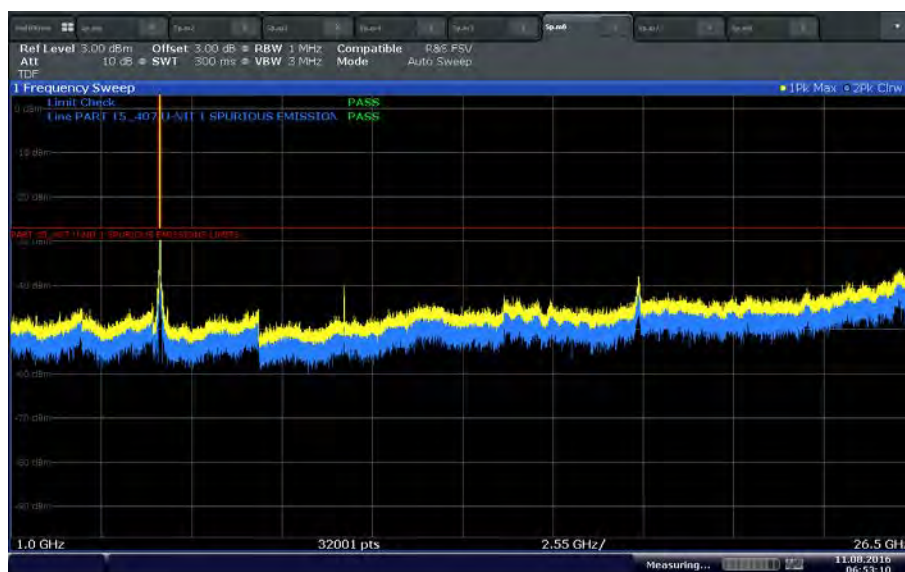
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802.11a U-NII 1 Low Channel above 1GHz



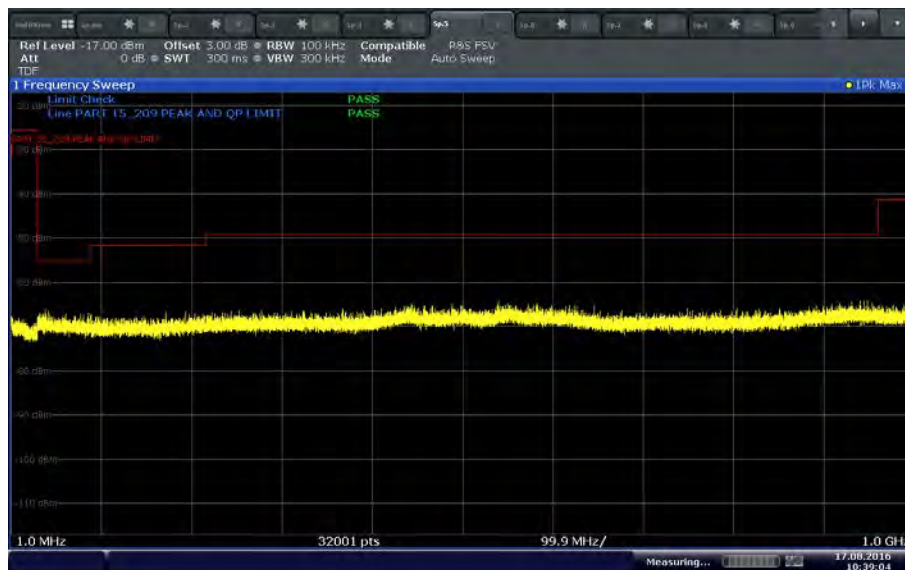
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802.11 a U-NII 1 Mid Channel below 1GHz



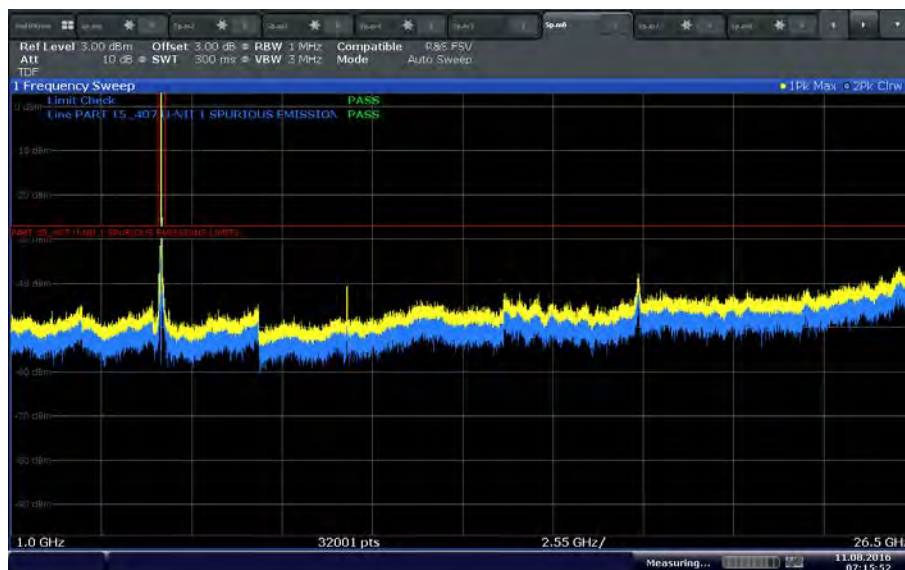
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802.11a U-NII 1 Mid Channel above 1GHz



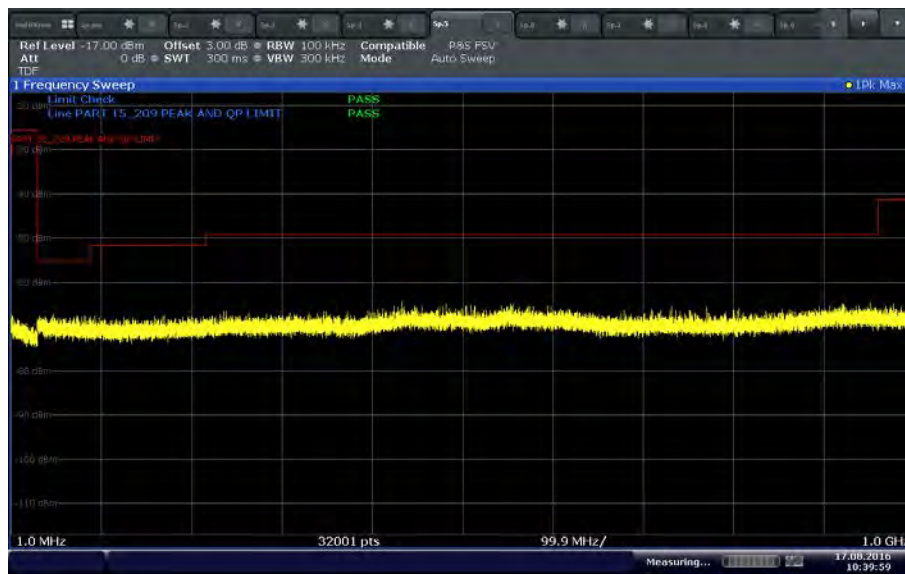
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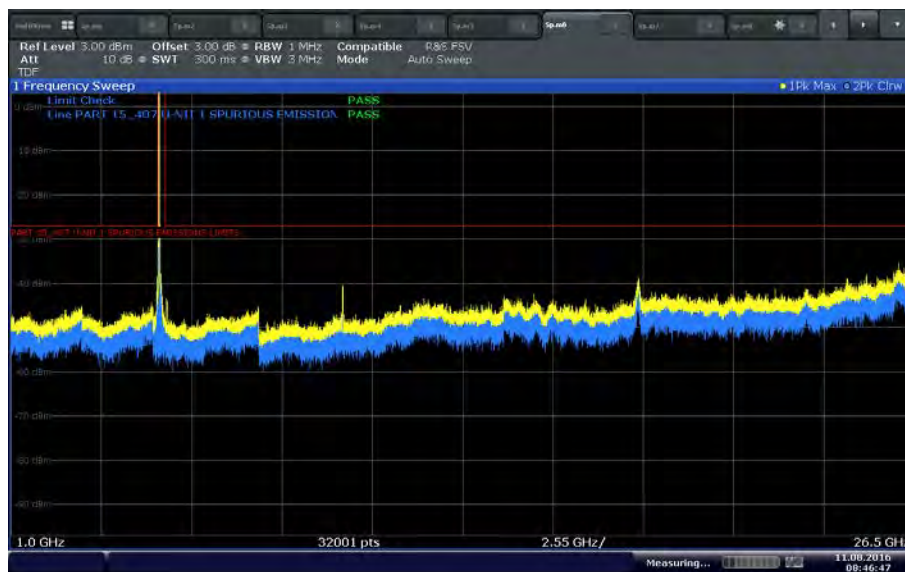
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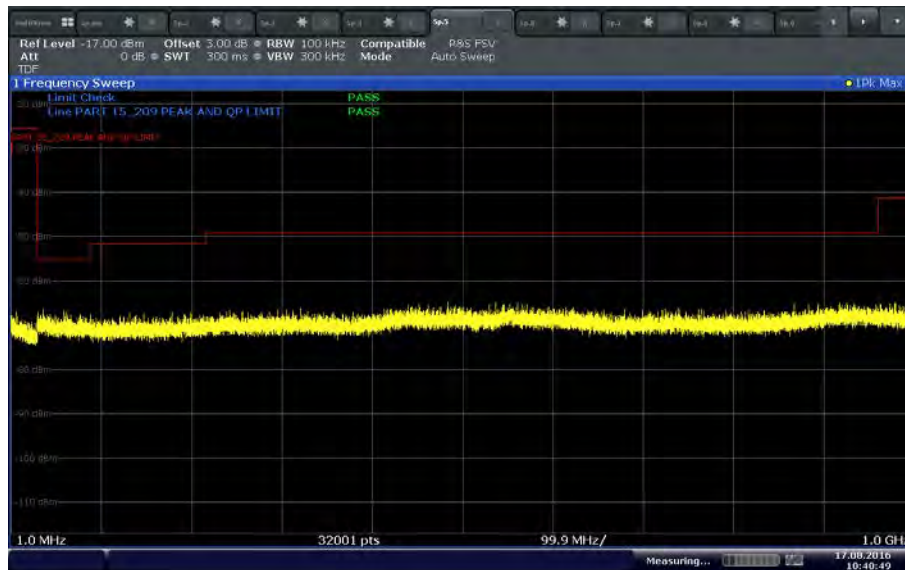
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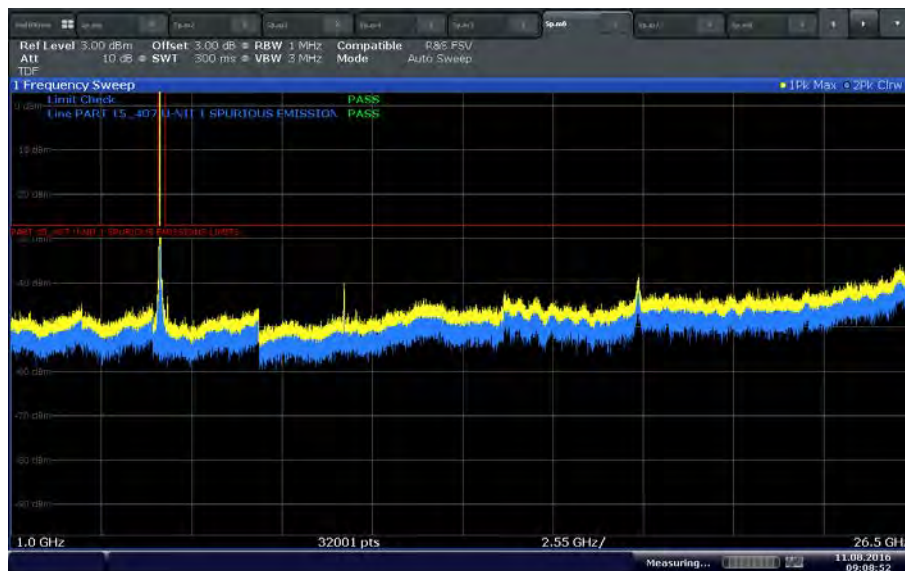
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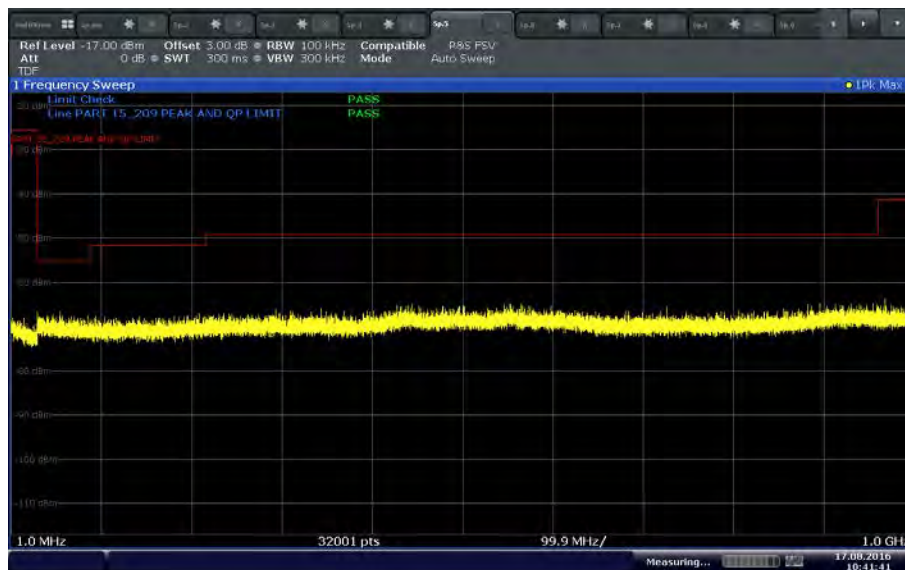
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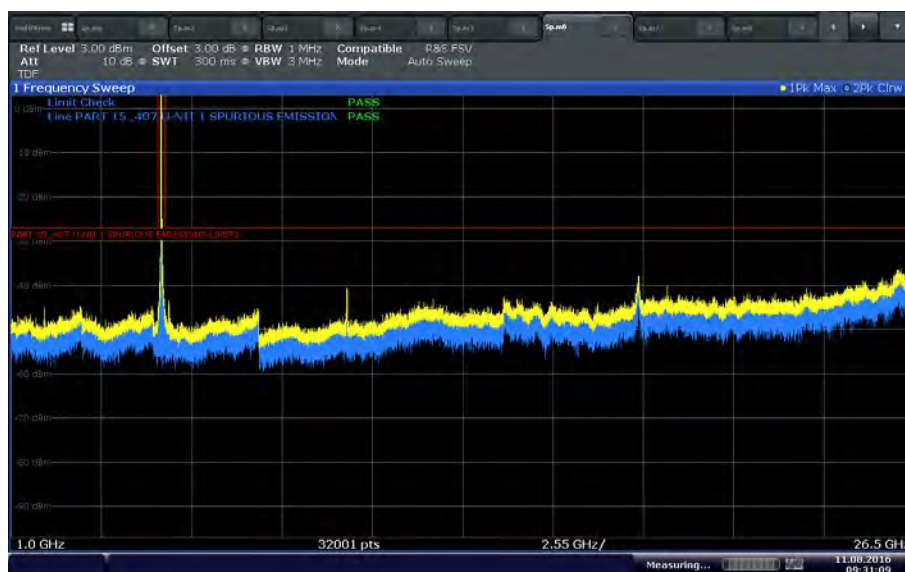
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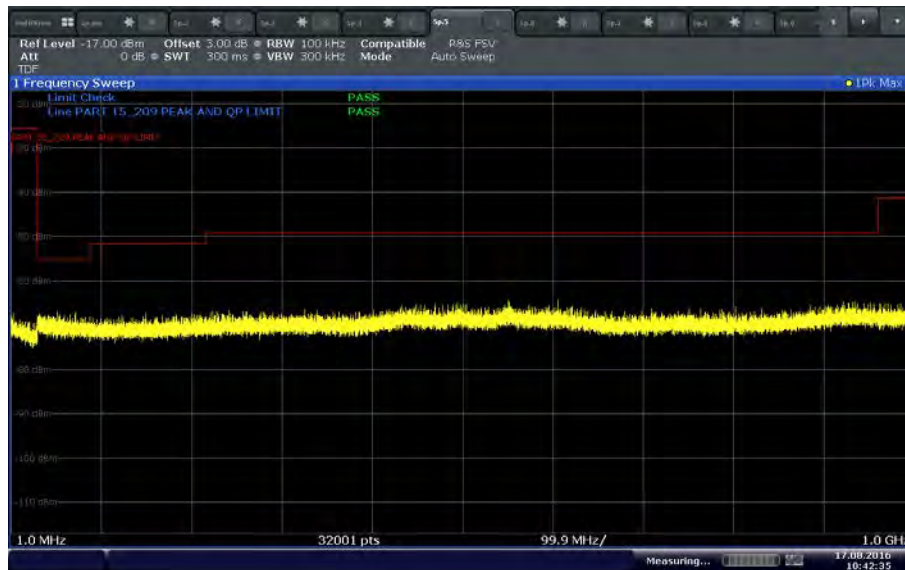
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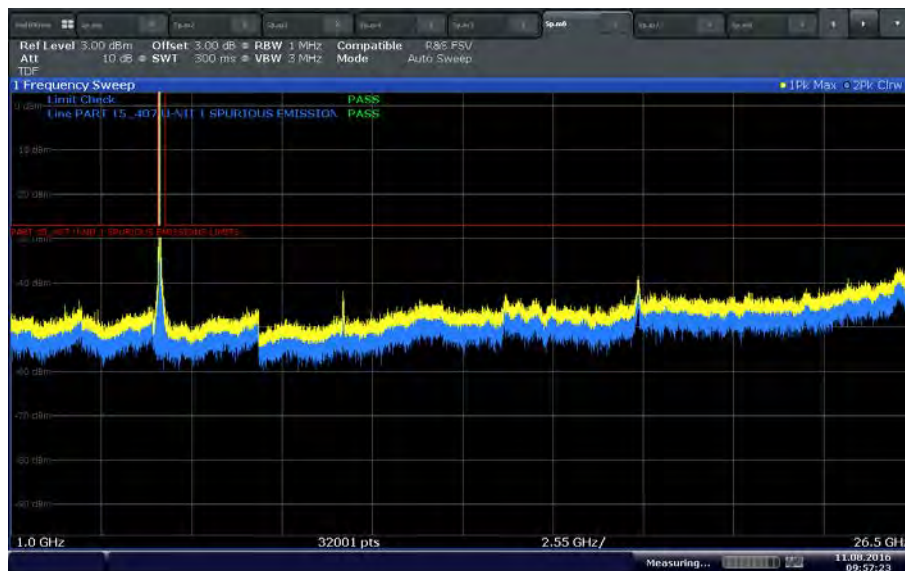
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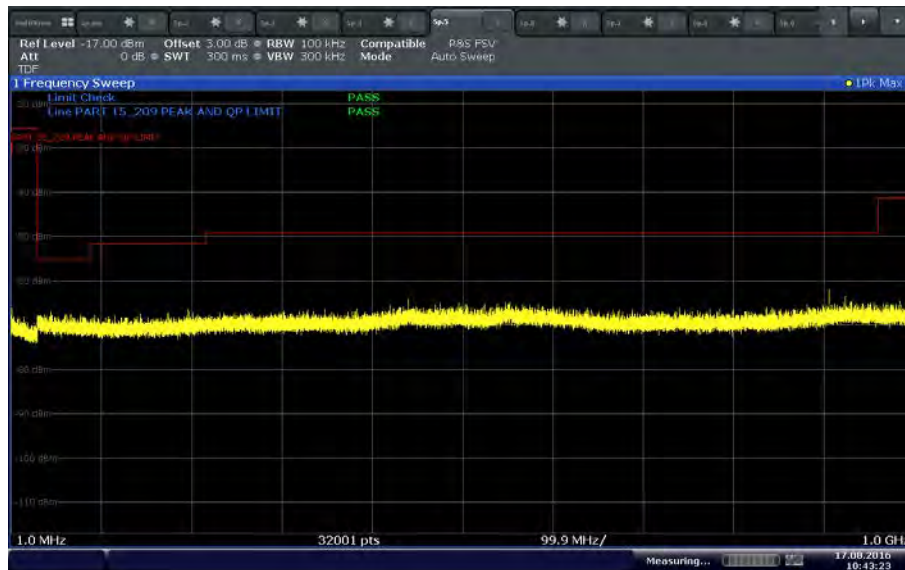
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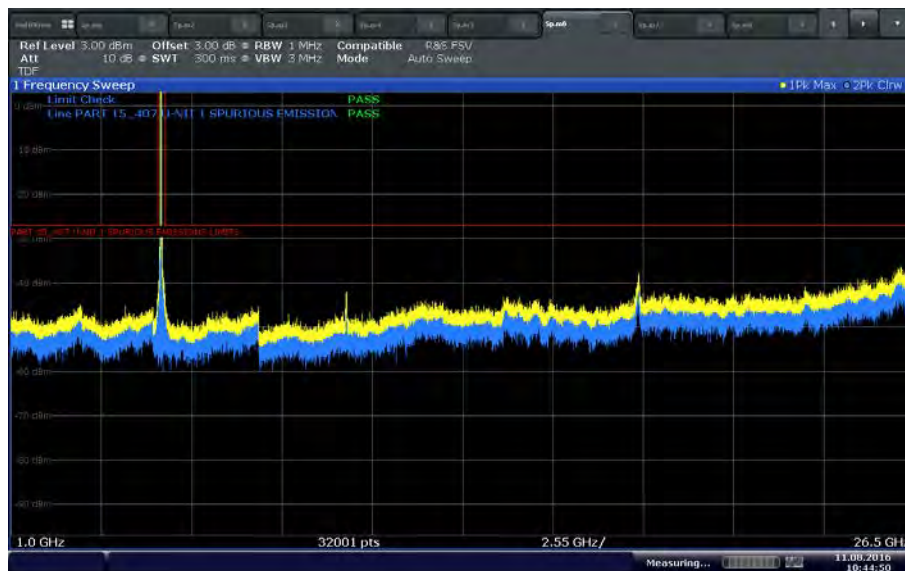
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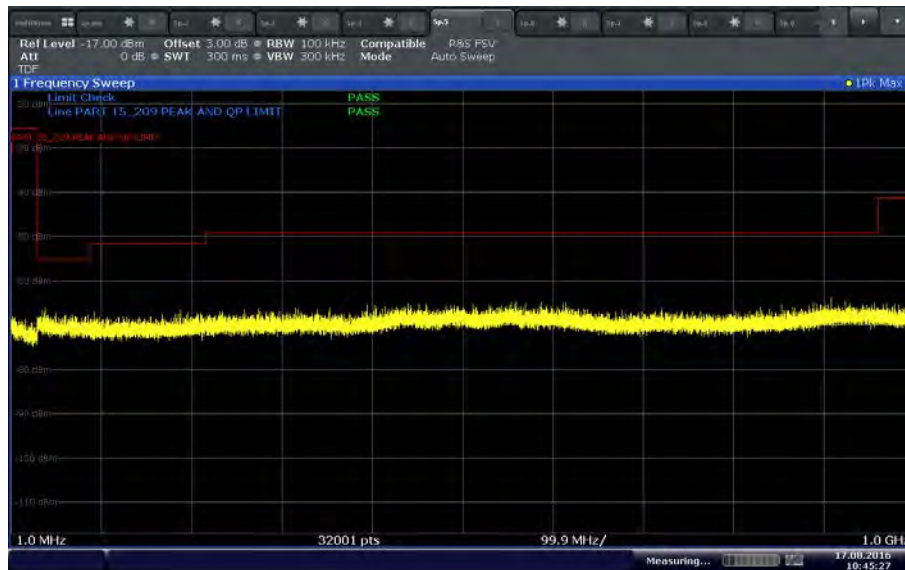
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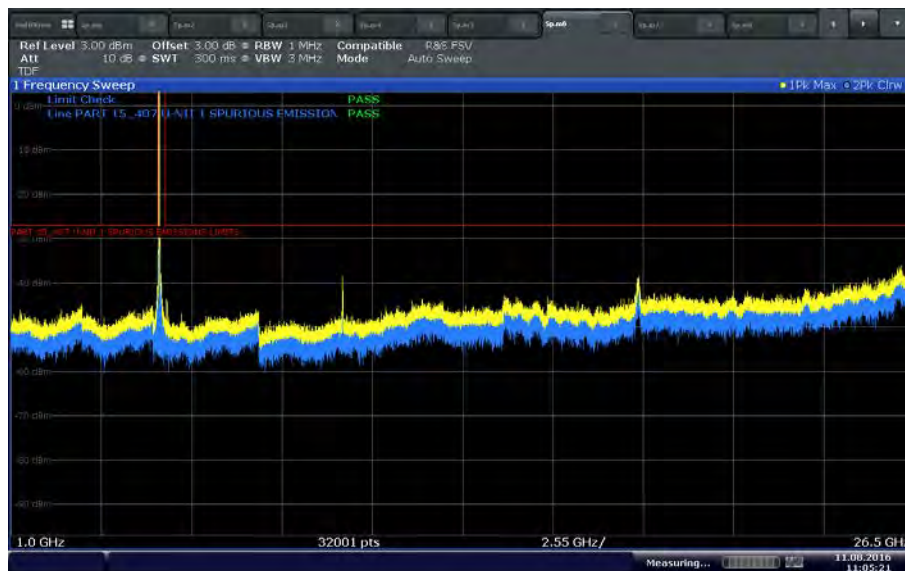
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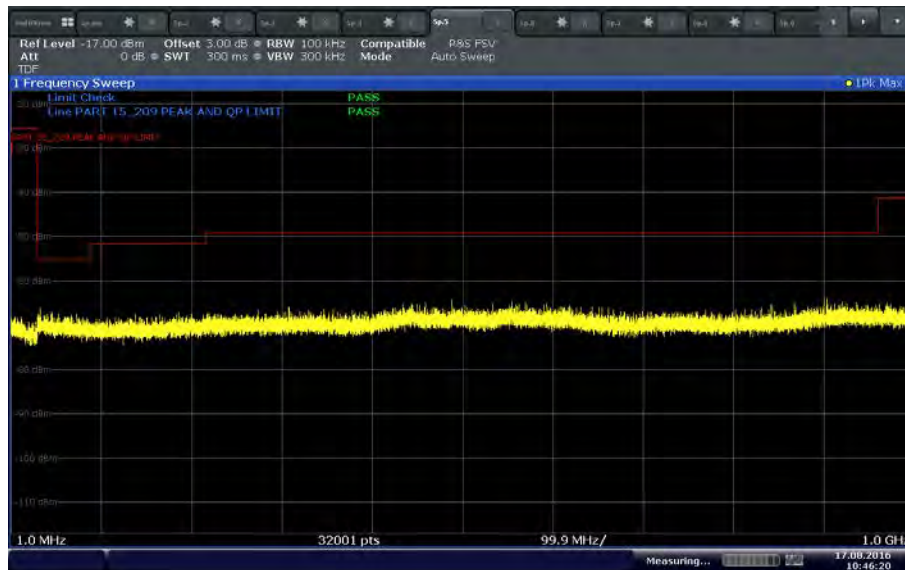
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802.11 ac (20 MHz) U-NII 1 Low Channel below 1GHz



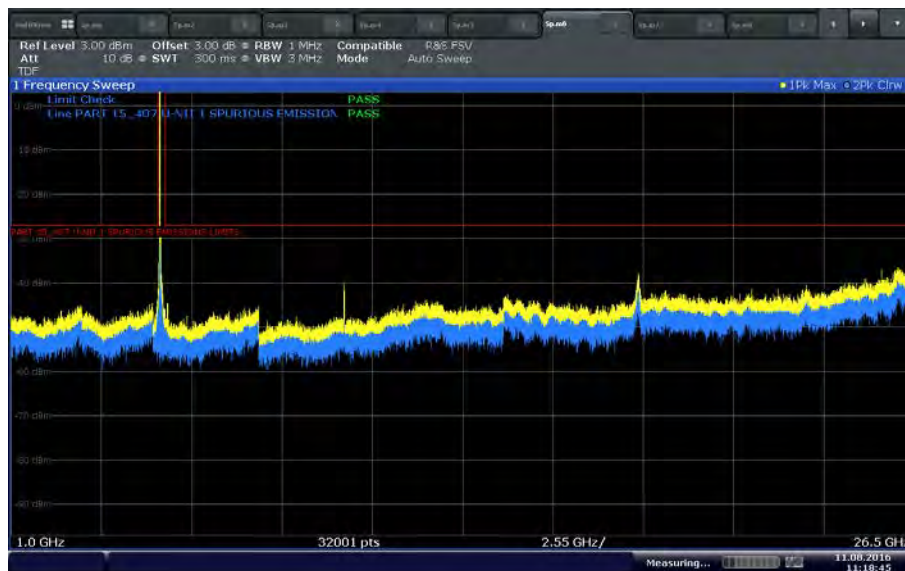
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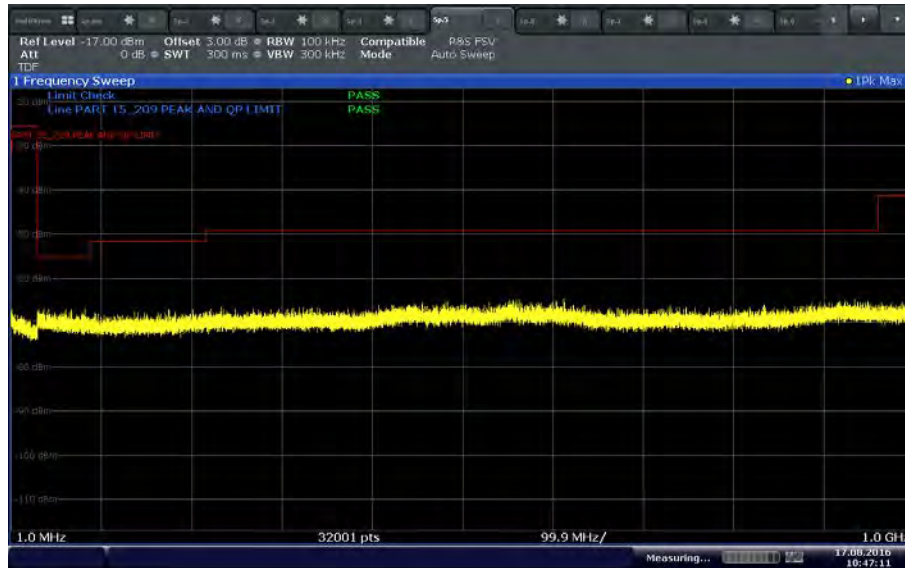
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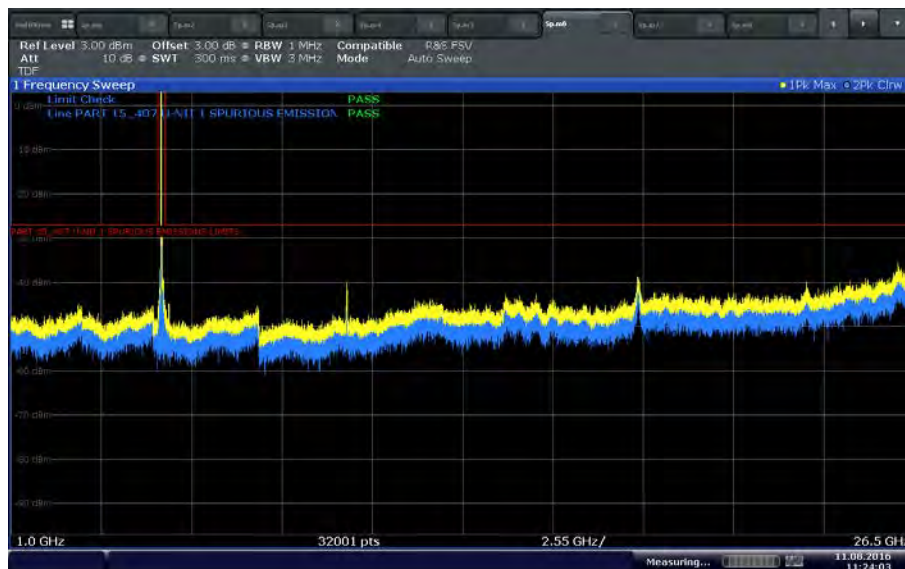
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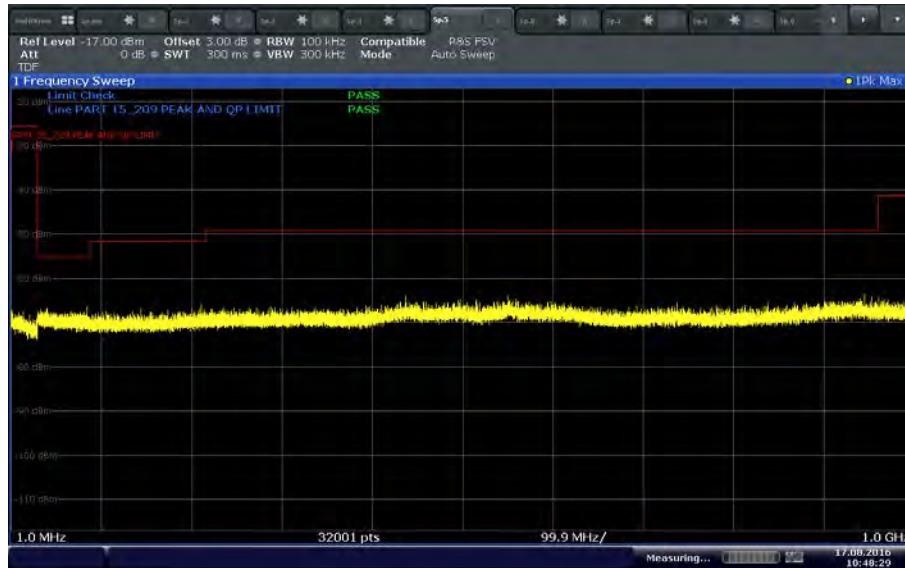
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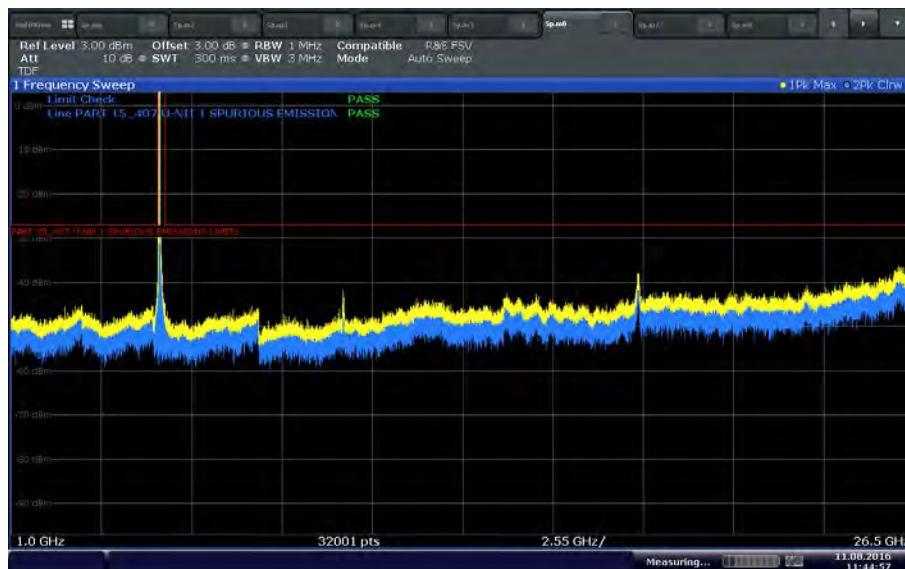
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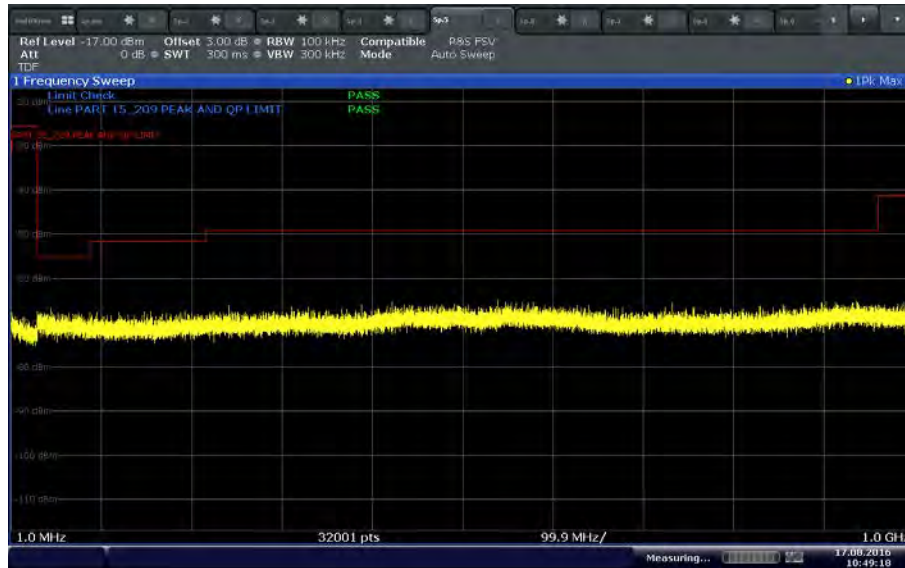
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802.11 ac (40 MHz) U-NII 1 Low Channel below 1GHz



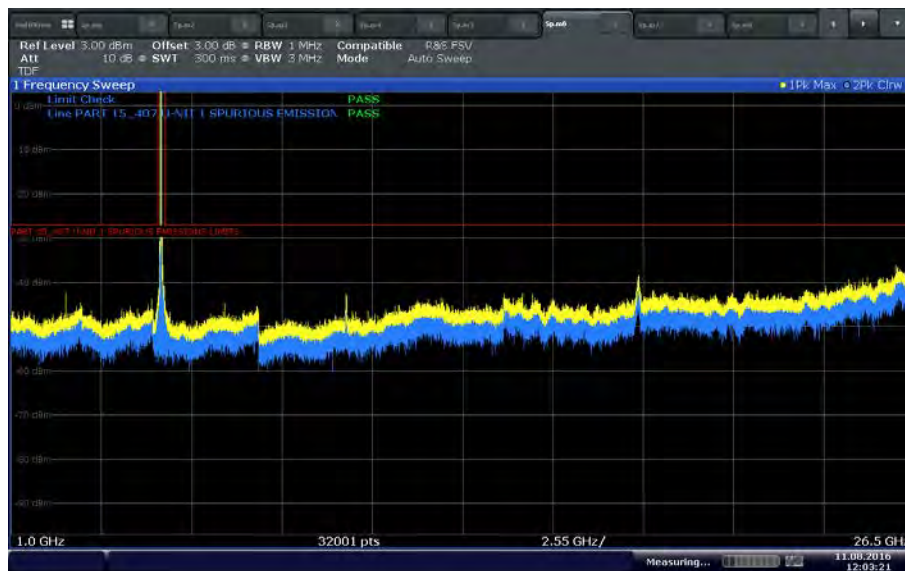
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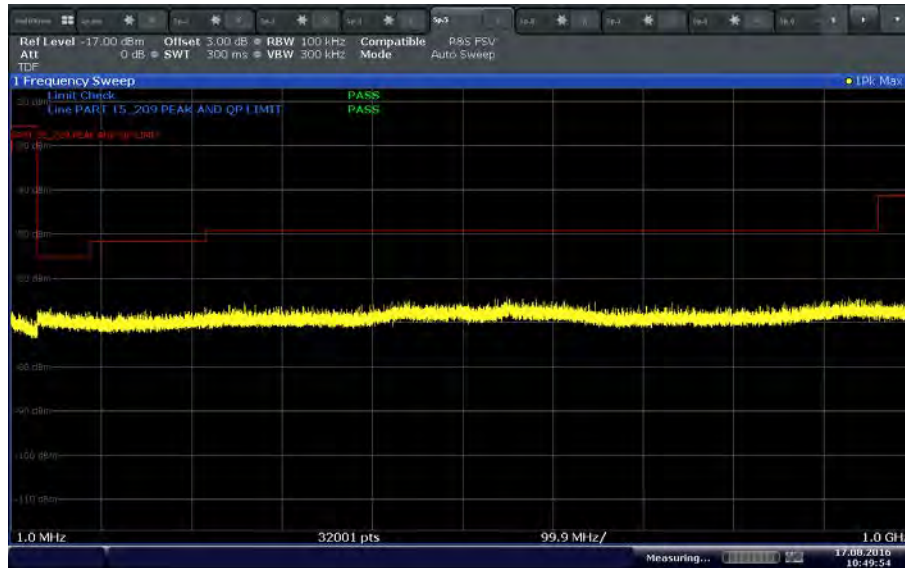
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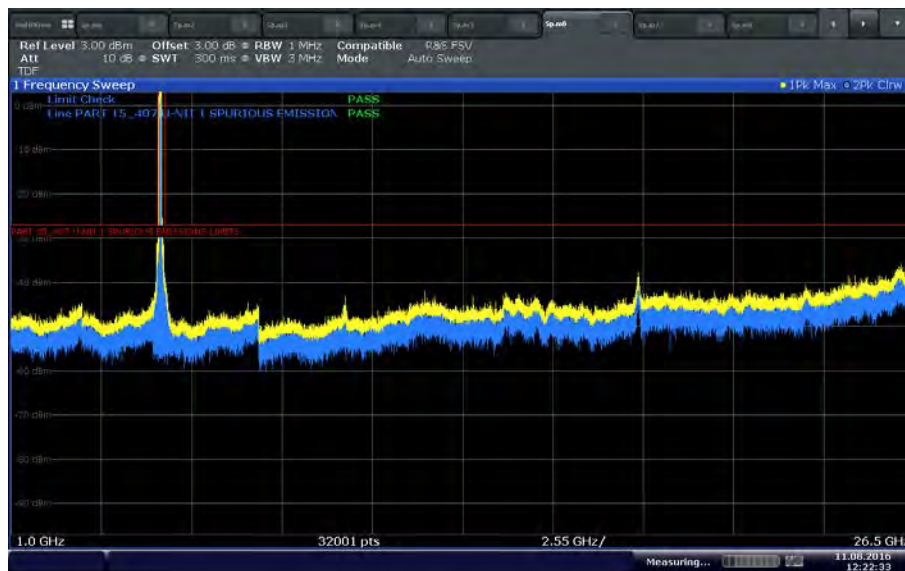
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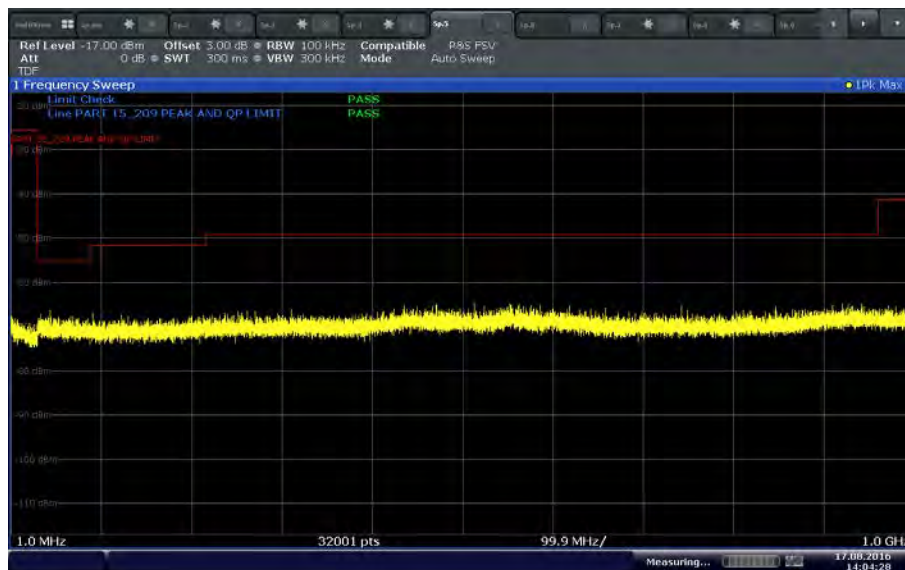
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802.11 ac (80 MHz) U-NII 1 Mid Channel below 1GHz



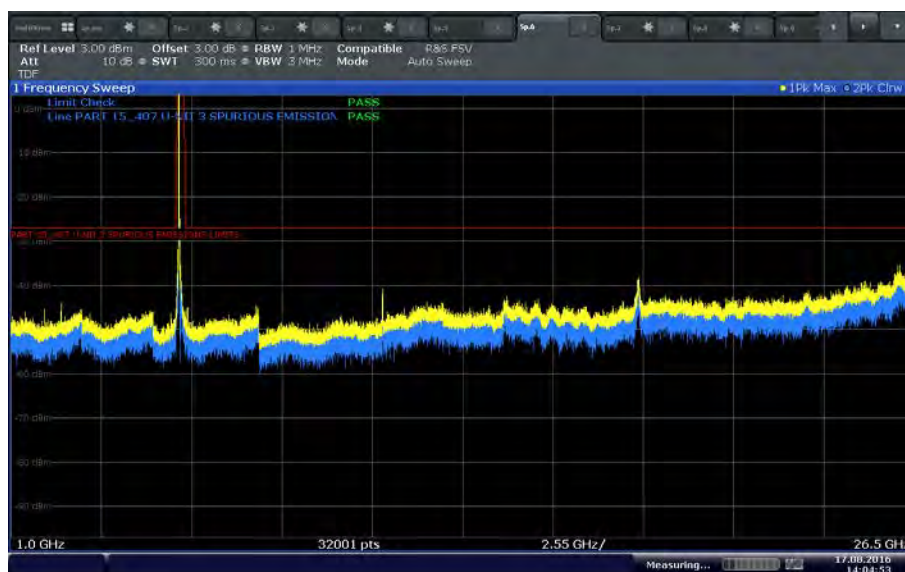
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802.11 ac (80 MHz) U-NII 1 Mid Channel above 1GHz



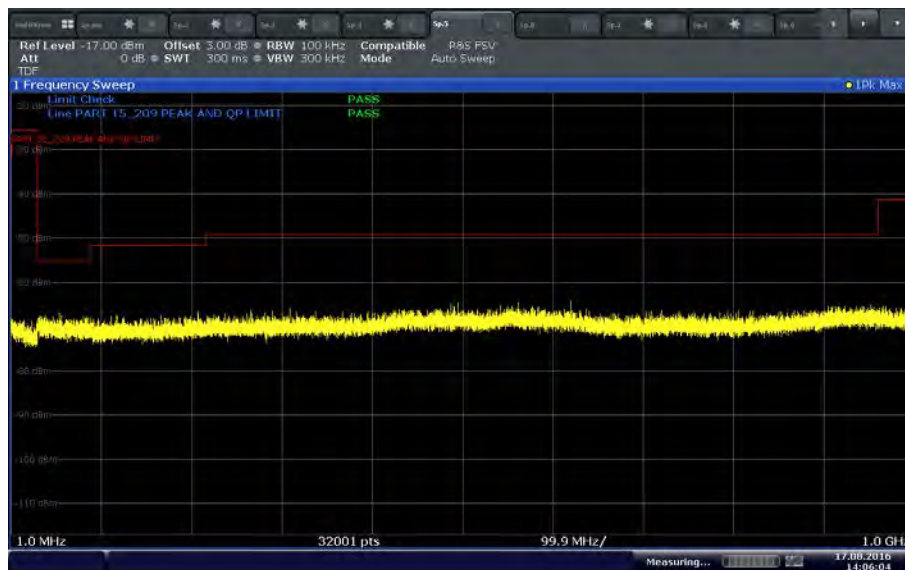
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802.11 a U-NII 3 Low Channel below 1GHz



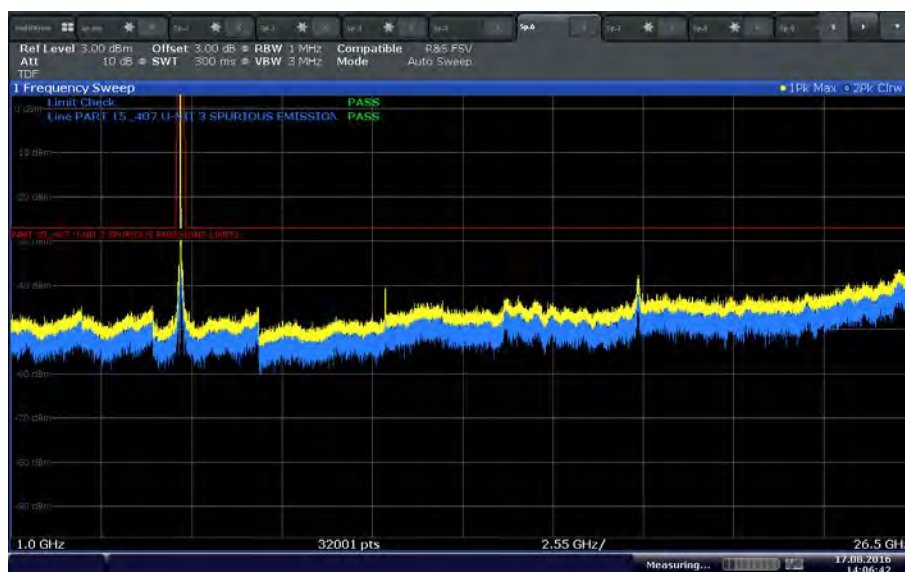
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802.11a U-NII 3 Low Channel above 1GHz



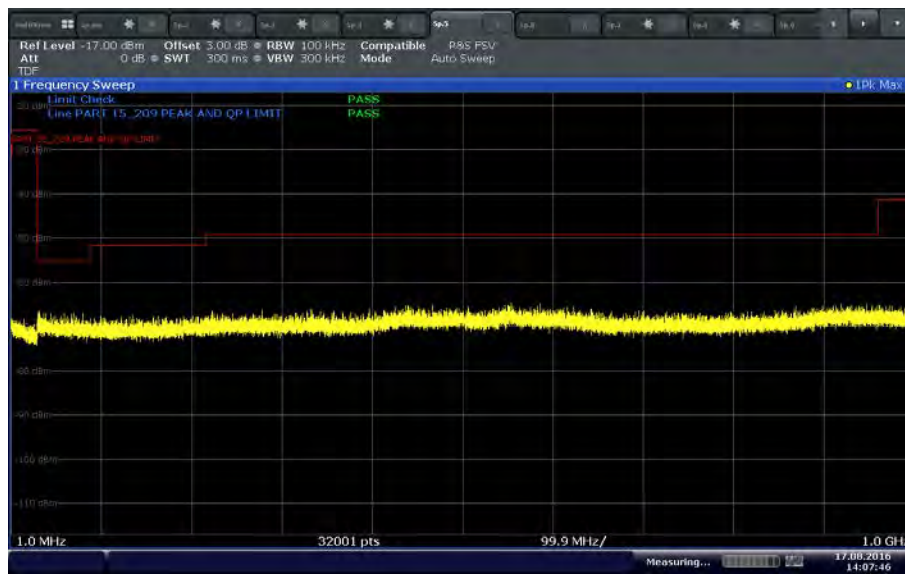
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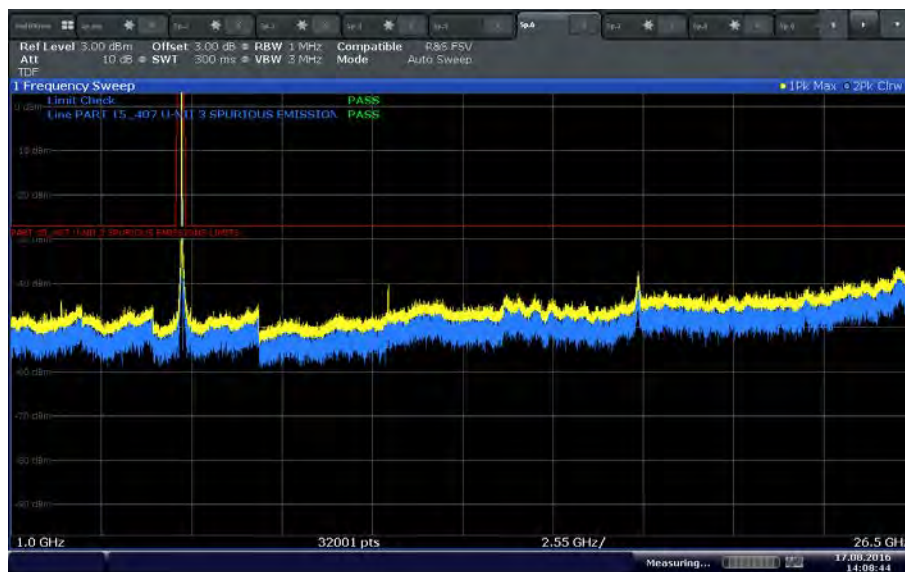
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802.11a U-NII 3 Mid Channel above 1GHz



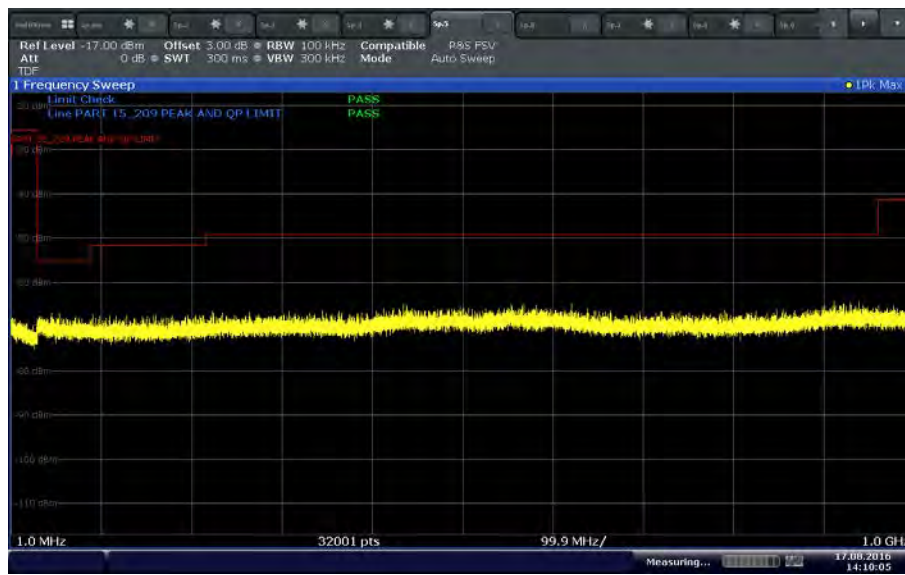
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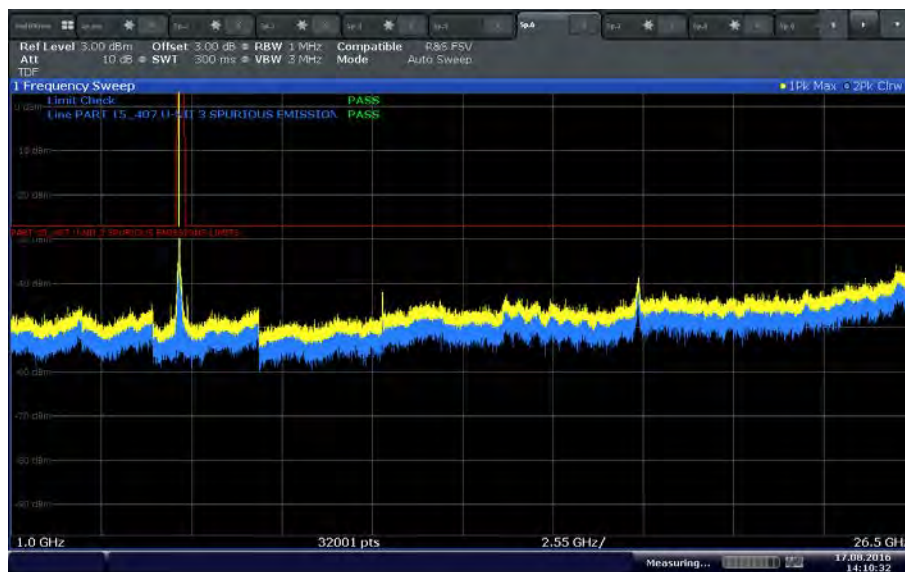
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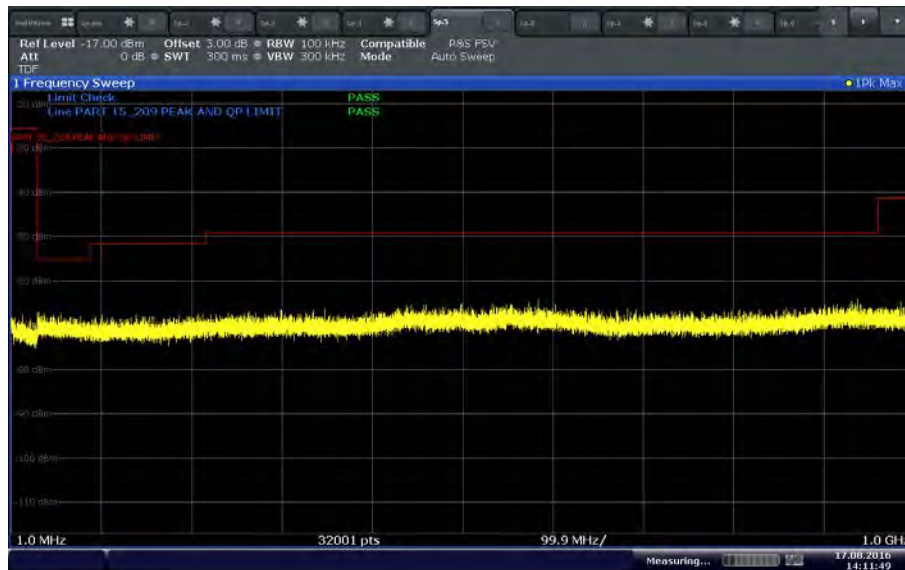
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802.11 n (20 MHz) U-NII 3 Low Channel below 1GHz



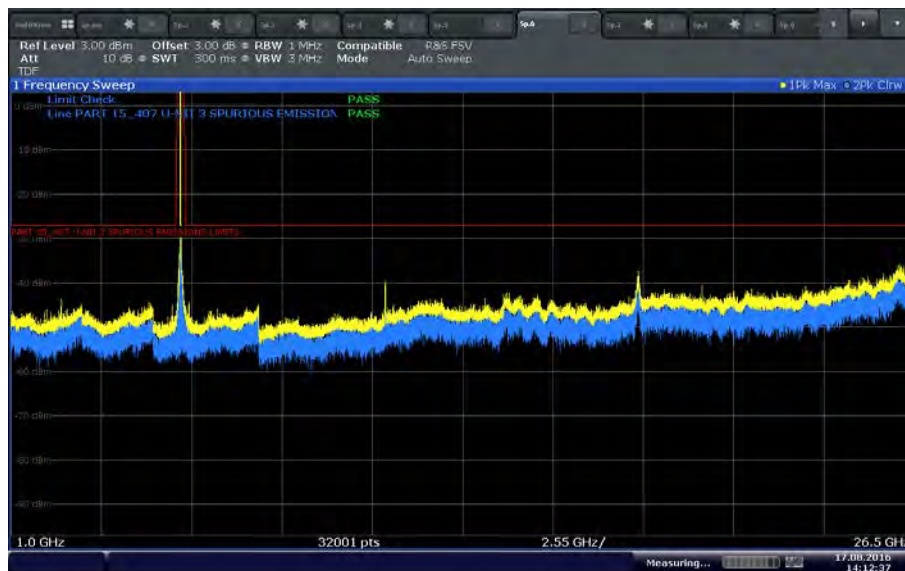
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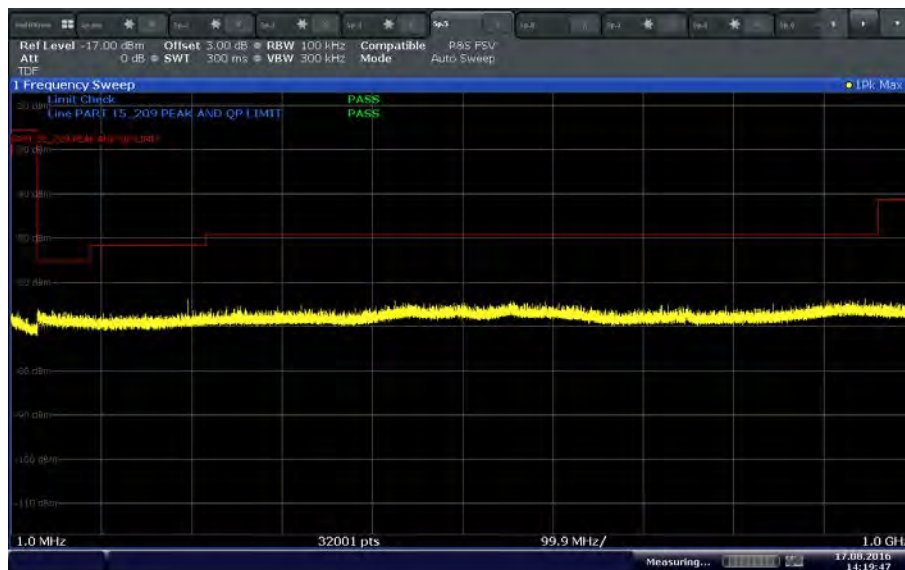
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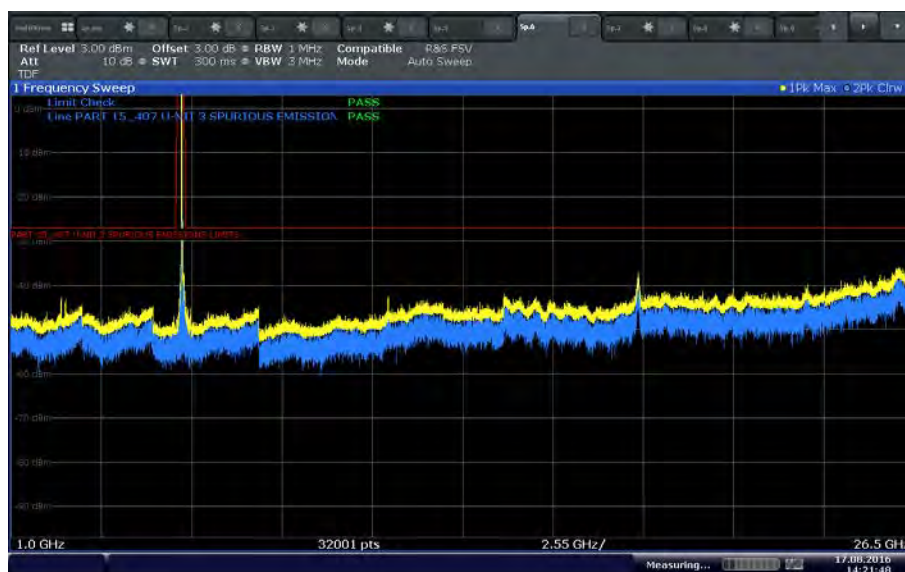
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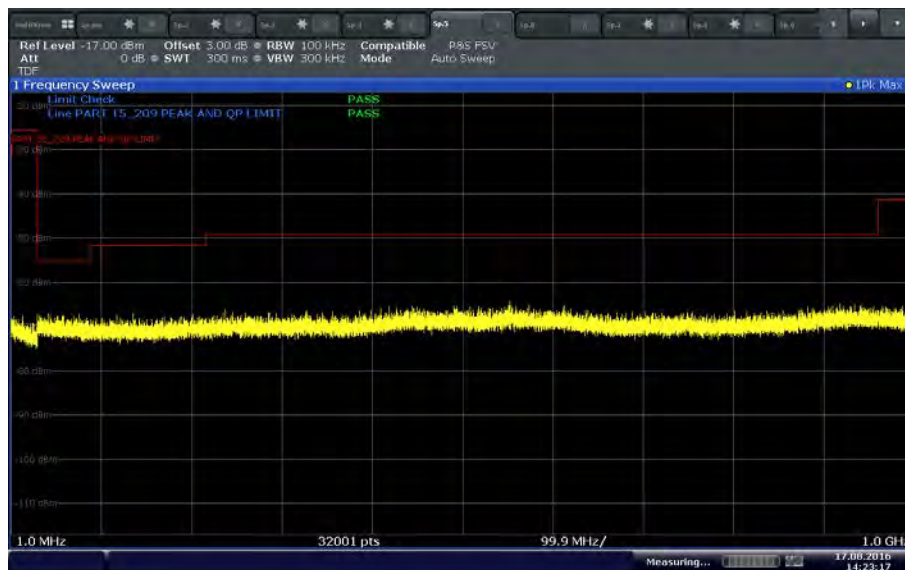
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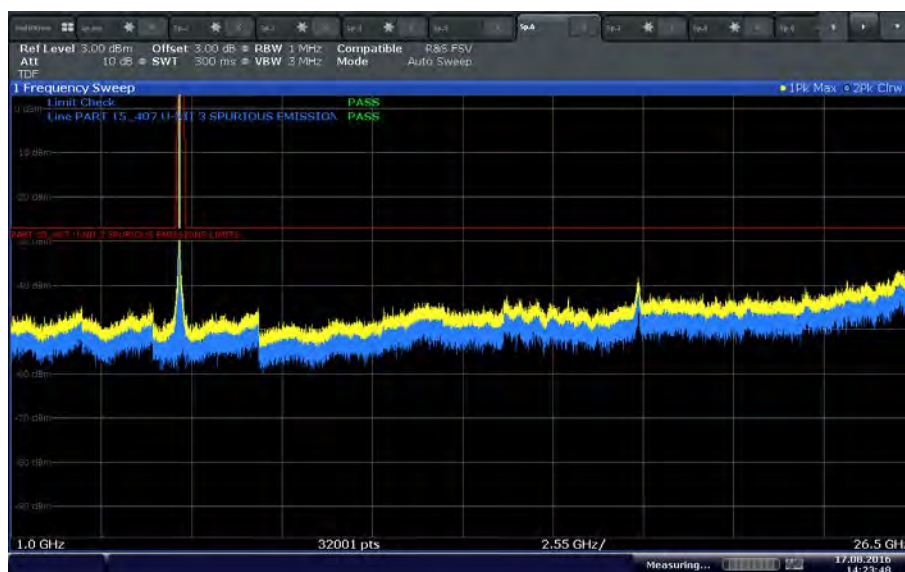
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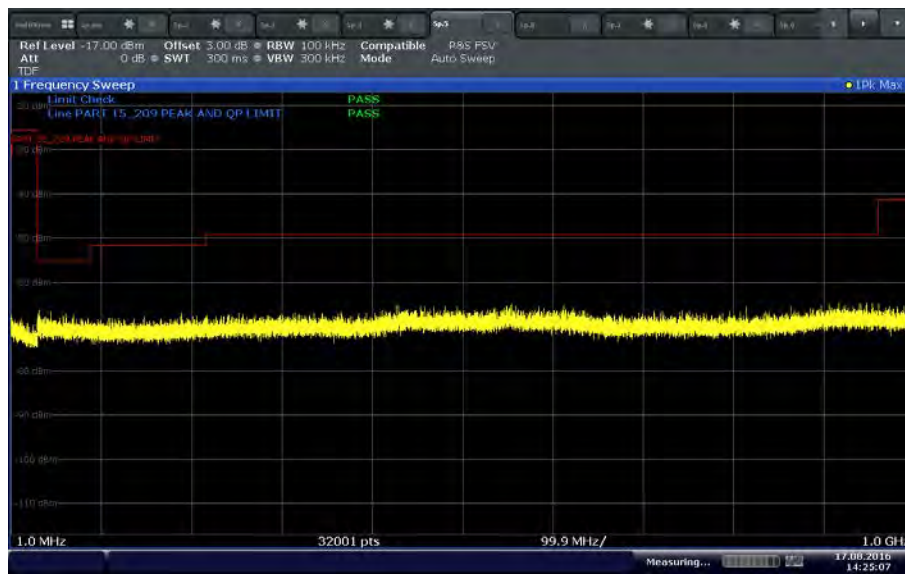
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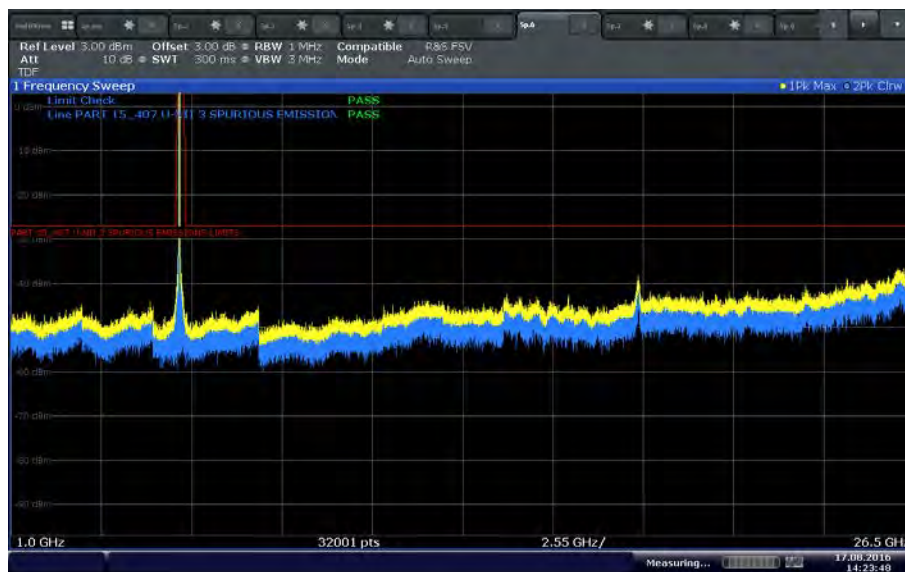
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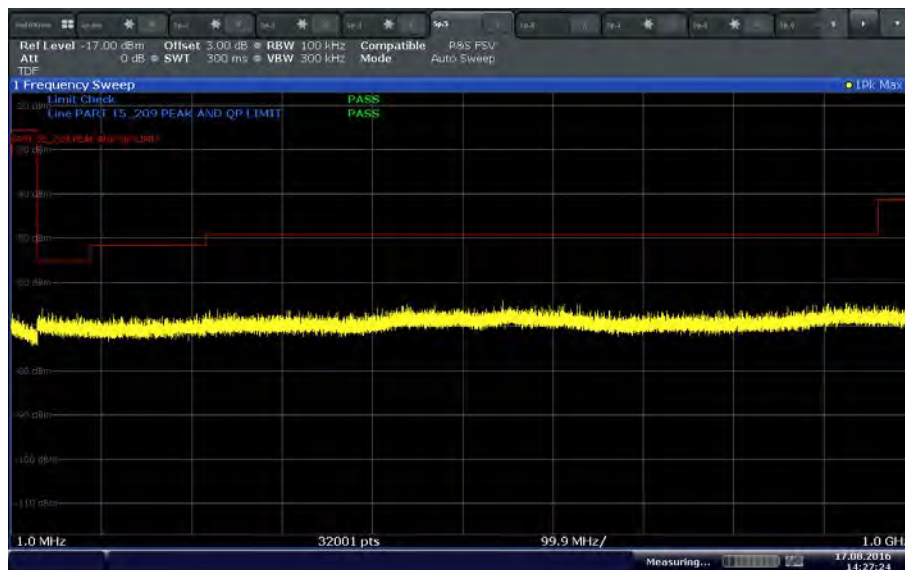
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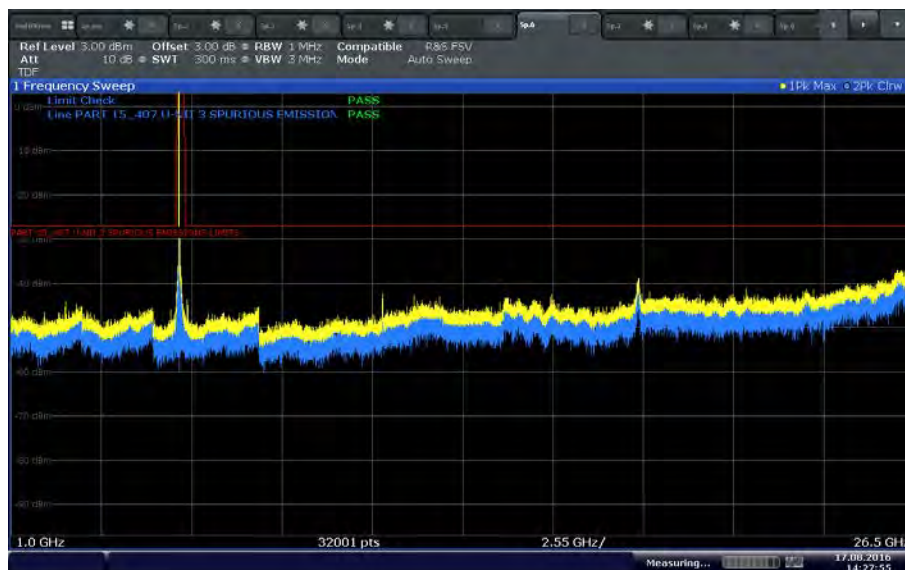
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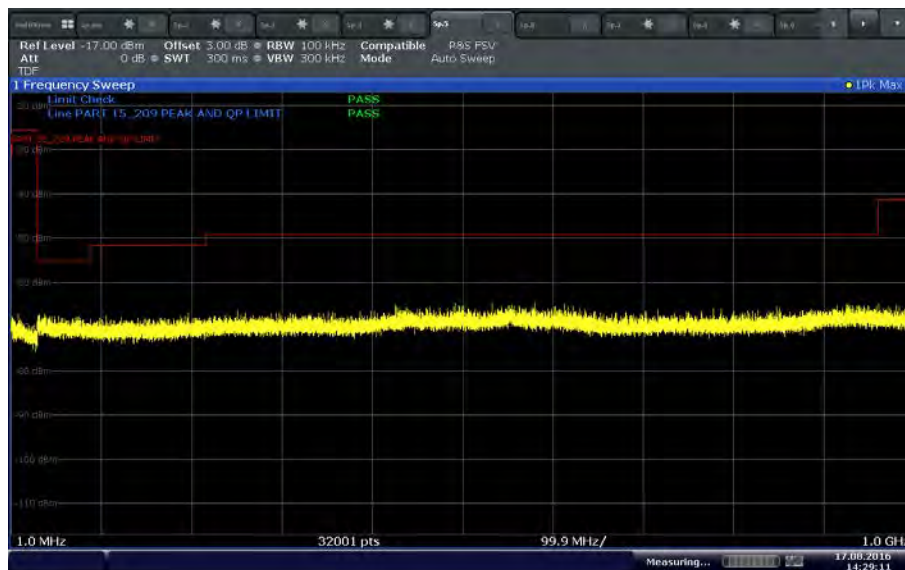
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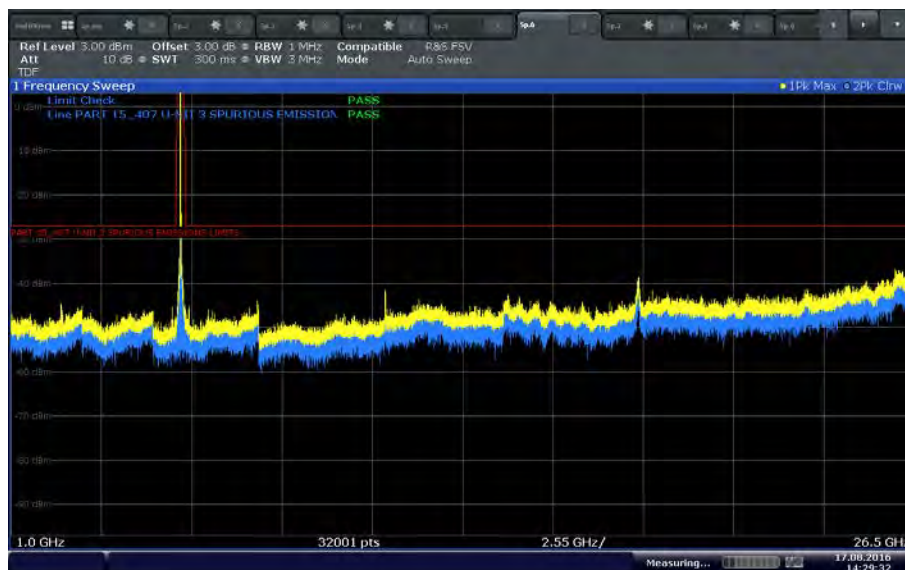
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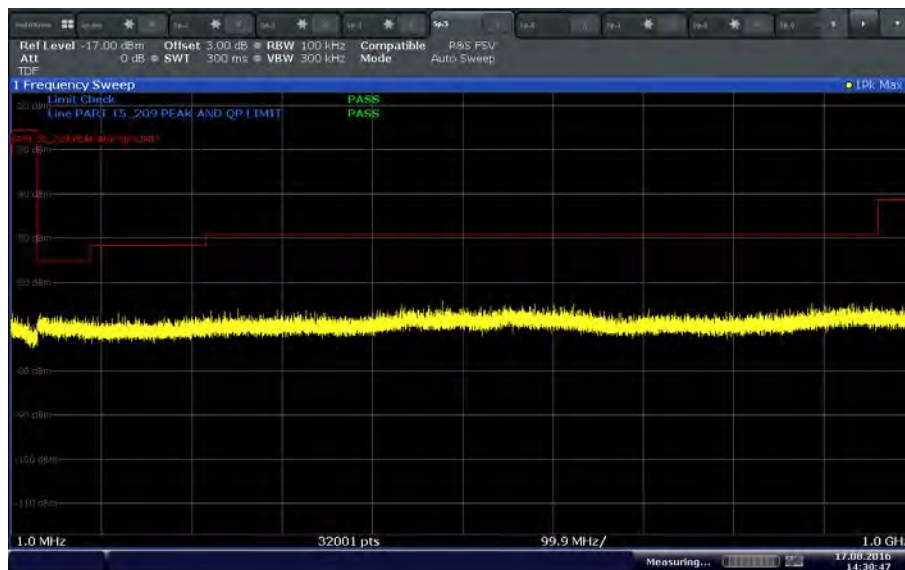
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802.11 ac (20 MHz) U-NII 3 Mid Channel below 1GHz



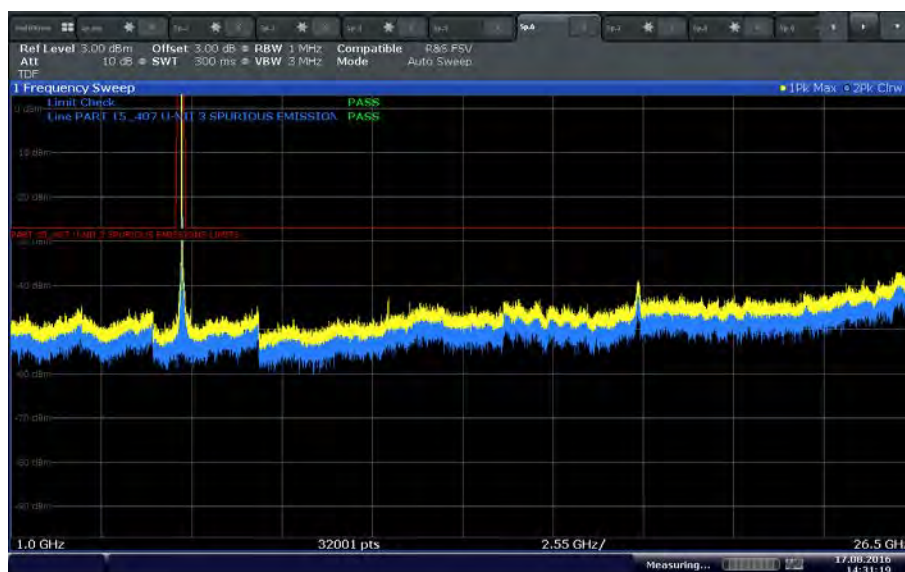
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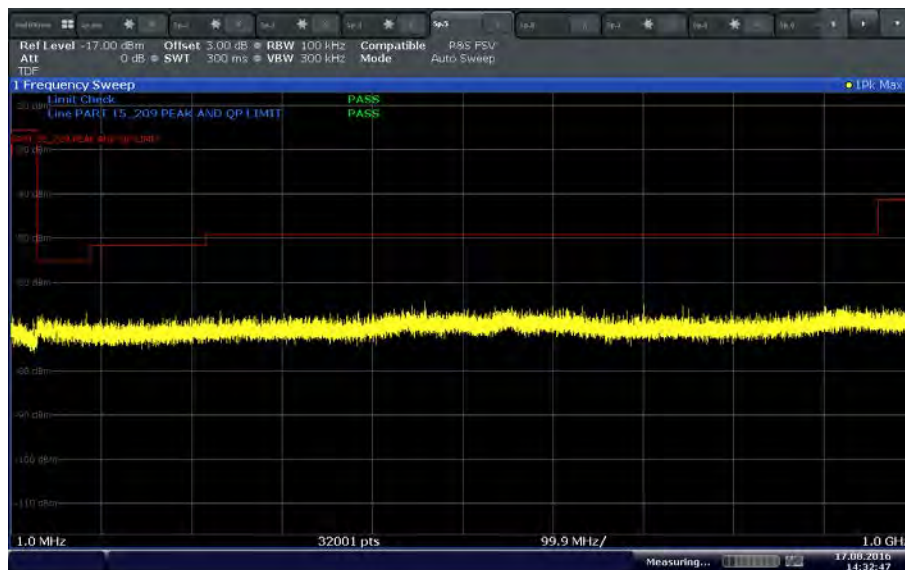
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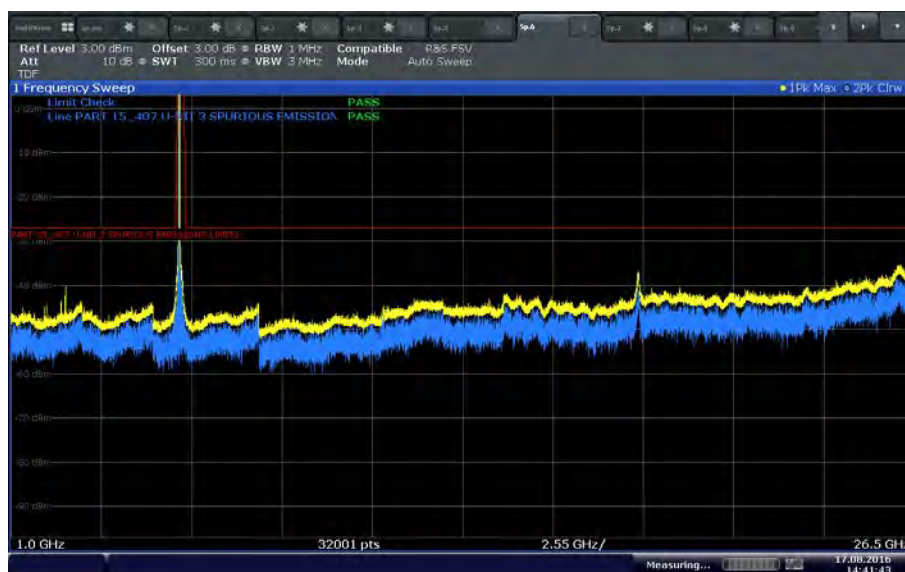
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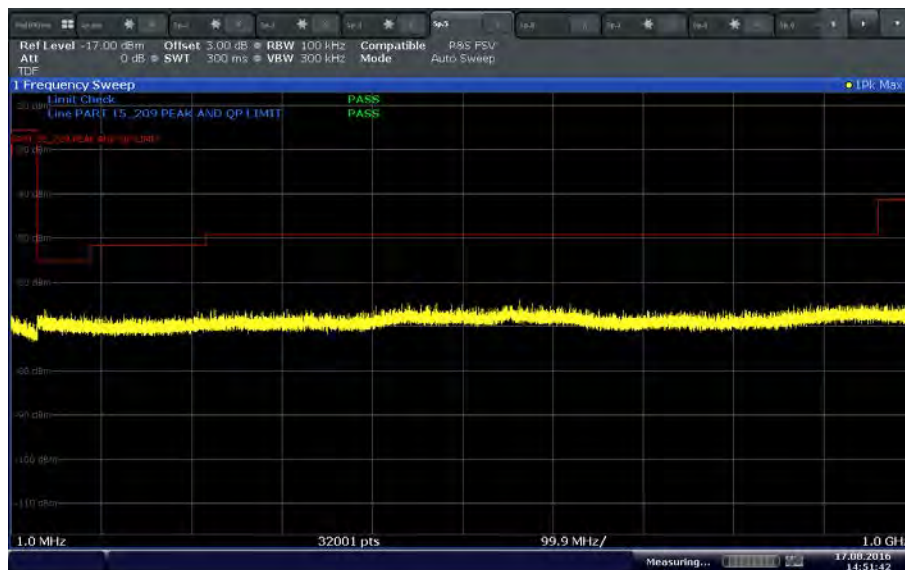
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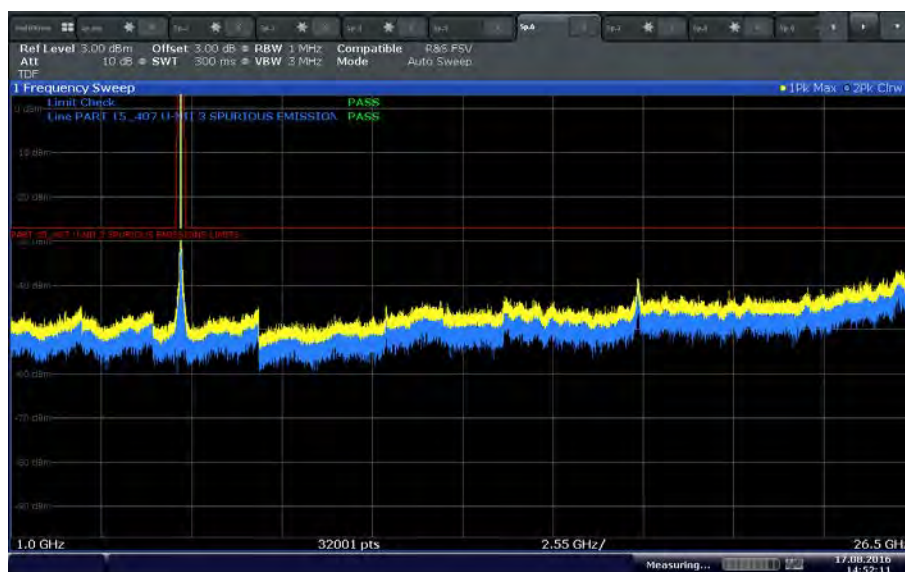
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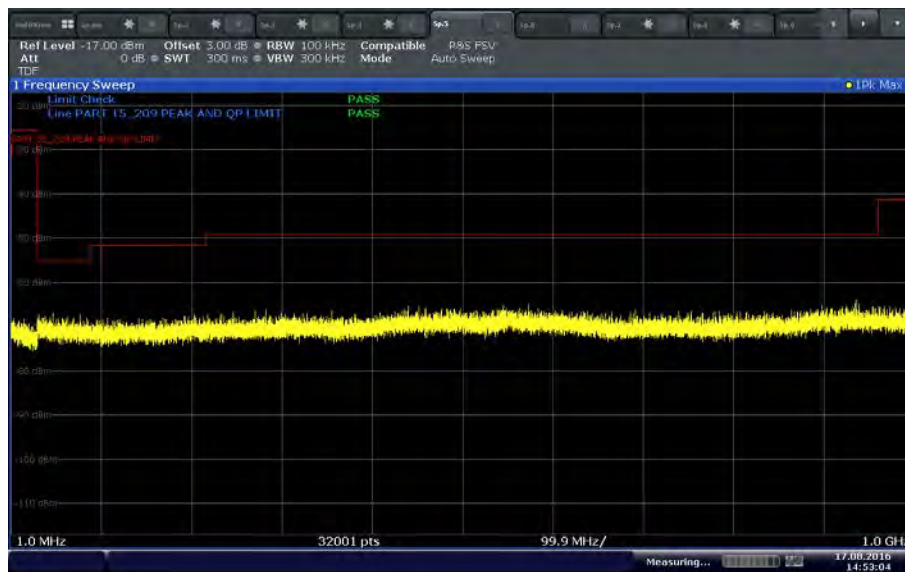
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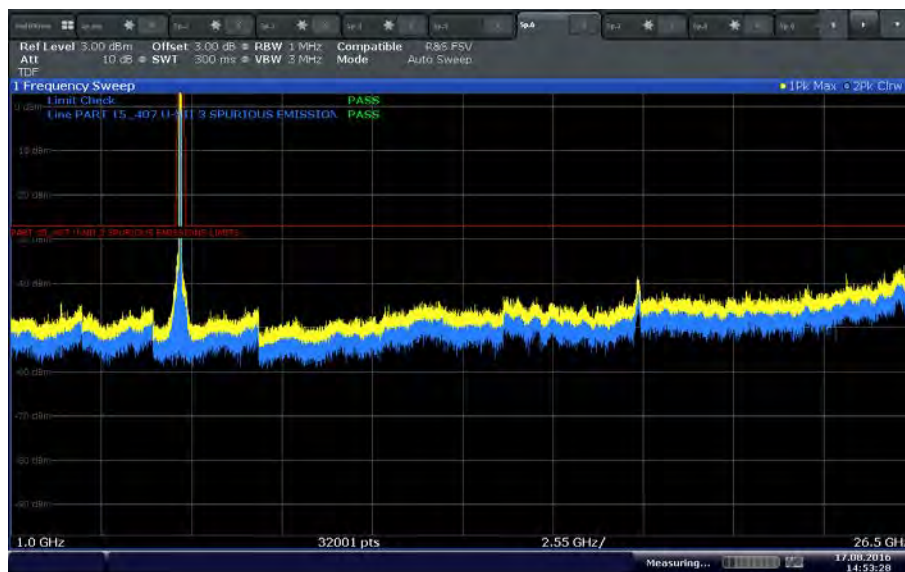
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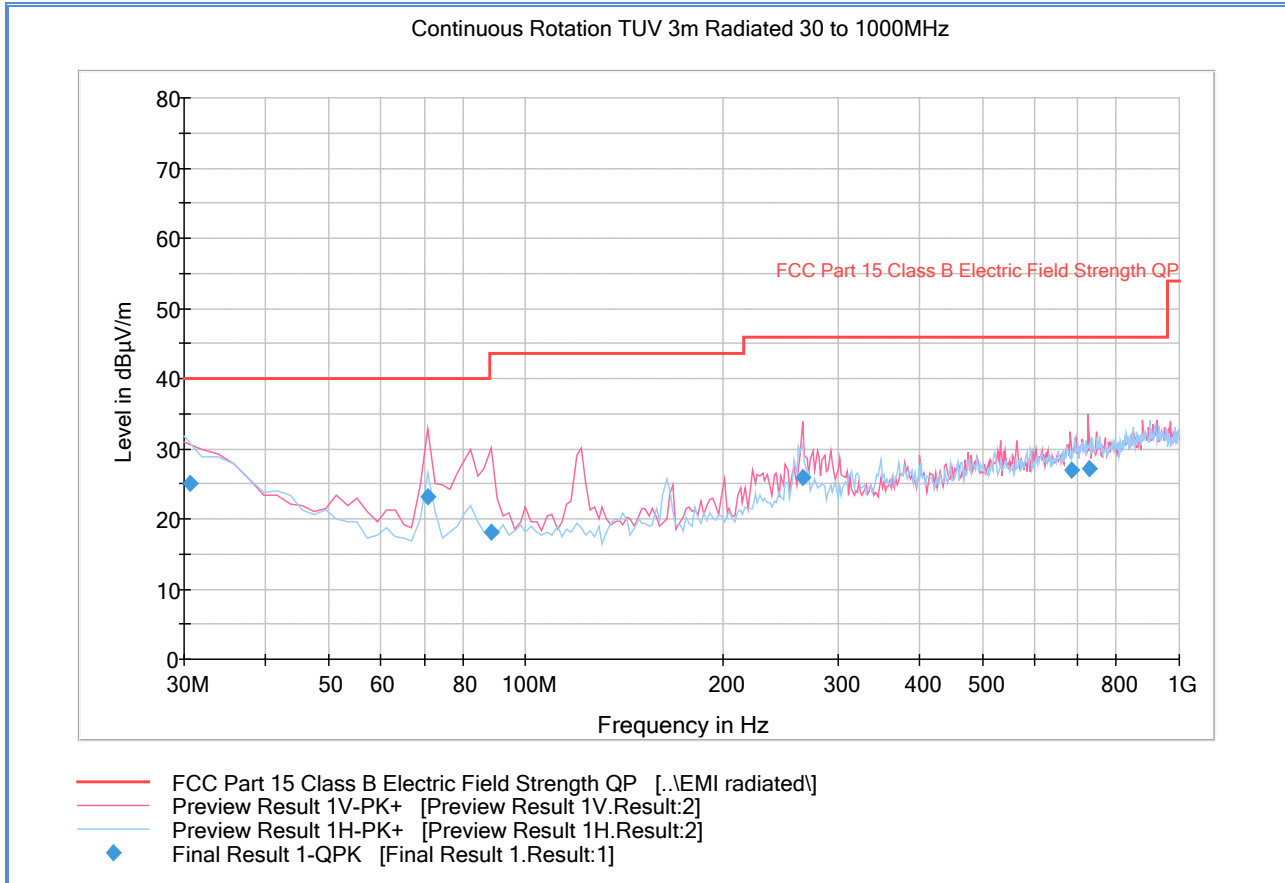
802.11 ac (80 MHz) U-NII 3 Mid Channel below 1GHz



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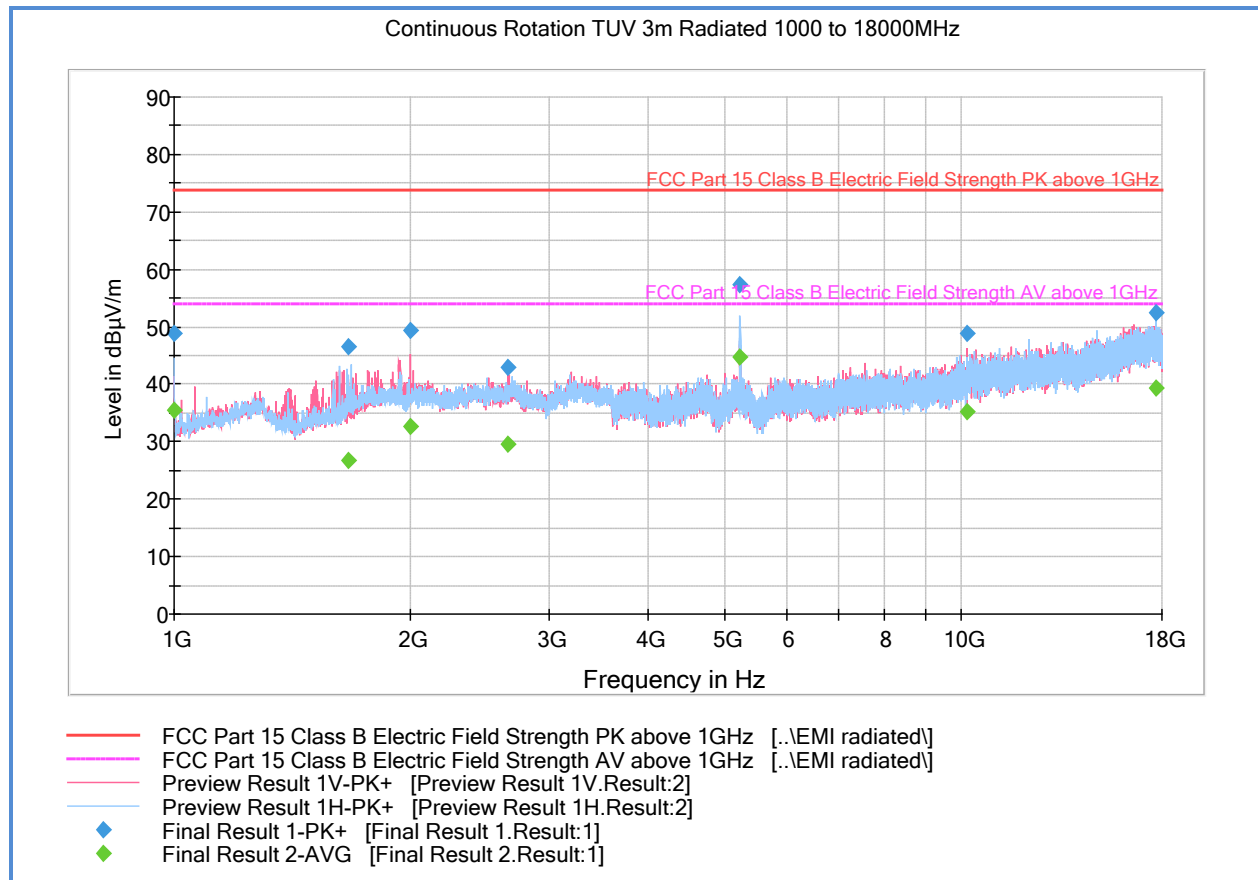
2.7.12 Test Results Below 1GHz (Cabinet Spurious Emissions 802.11a U-NII 1)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.680000	25.1	1000.0	120.000	259.0	H	15.0	-6.2	14.9	40.0
70.661643	23.1	1000.0	120.000	100.0	V	345.0	-16.8	16.9	40.0
88.532745	18.0	1000.0	120.000	109.0	V	352.0	-15.6	25.5	43.5
266.010421	25.9	1000.0	120.000	208.0	V	9.0	-8.4	20.1	46.0
682.882405	27.0	1000.0	120.000	150.0	V	15.0	2.3	19.0	46.0
727.511824	27.2	1000.0	120.000	100.0	V	352.0	2.9	18.8	46.0

2.7.13 Test Results Above 1GHz (Cabinet Spurious Emissions 802.11a U-NII 1)



Peak Data

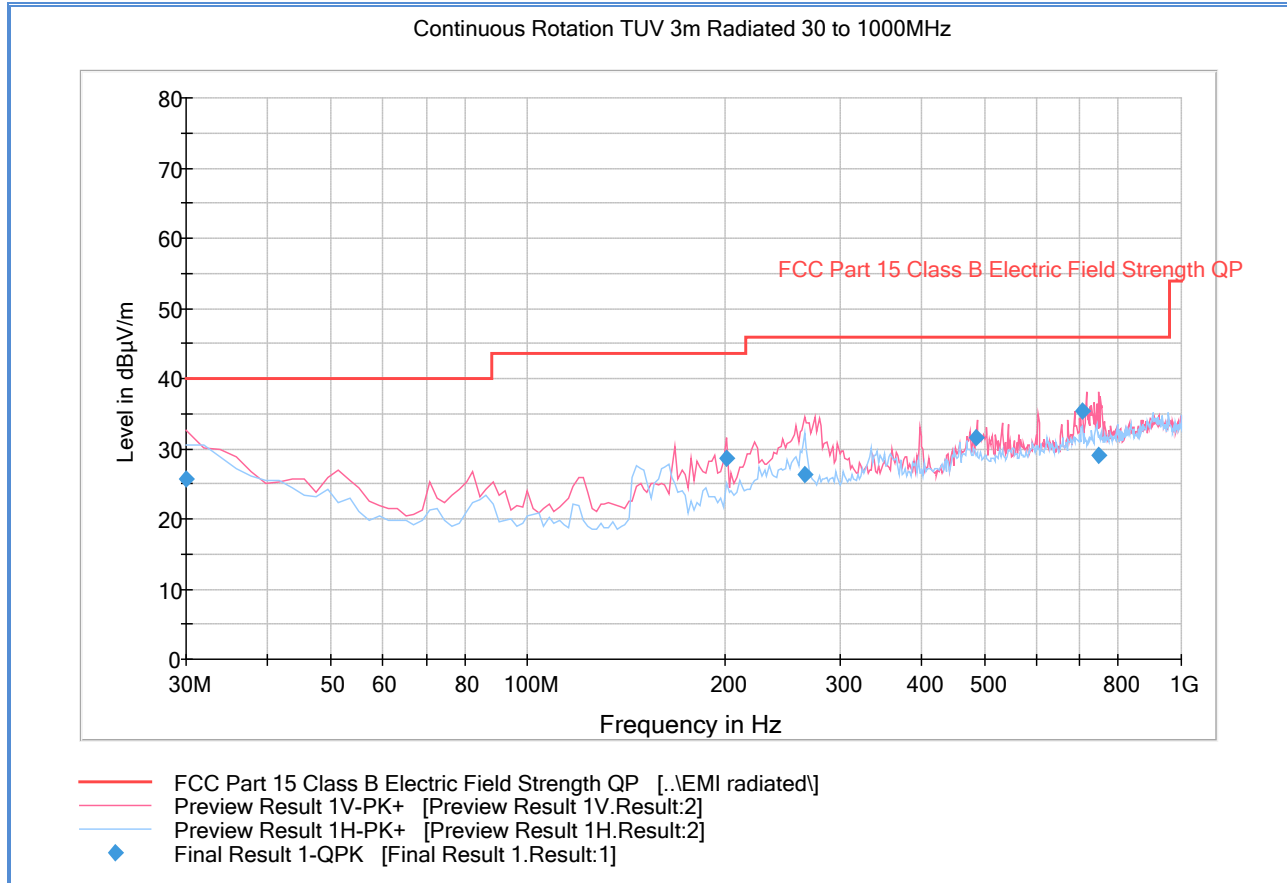
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	48.8	1000.0	1000.000	115.7	H	353.0	-7.7	25.1	73.9
1664.933333	46.5	1000.0	1000.000	204.5	V	11.0	-4.8	27.4	73.9
1993.366667	49.4	1000.0	1000.000	146.7	V	341.0	-0.2	24.5	73.9
2658.466667	42.9	1000.0	1000.000	195.5	V	359.0	-0.9	31.0	73.9
5242.633333	57.3	1000.0	1000.000	115.7	H	11.0	3.9	16.6	73.9
10185.466666	48.8	1000.0	1000.000	130.7	V	11.0	11.3	25.1	73.9
17710.800000	52.4	1000.0	1000.000	151.2	H	341.0	20.2	21.5	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.400000	35.4	1000.0	1000.000	115.7	H	353.0	-7.7	18.5	53.9
1664.933333	26.8	1000.0	1000.000	204.5	V	11.0	-4.8	27.1	53.9
1993.366667	32.7	1000.0	1000.000	146.7	V	341.0	-0.2	21.2	53.9
2658.466667	29.7	1000.0	1000.000	195.5	V	359.0	-0.9	24.2	53.9
5242.633333	44.9	1000.0	1000.000	115.7	H	11.0	3.9	9.0	53.9
10185.466666	35.1	1000.0	1000.000	130.7	V	11.0	11.3	18.8	53.9
17710.800000	39.4	1000.0	1000.000	151.2	H	341.0	20.2	14.5	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented. Duty Cycle correction factor not required since duty cycle is >98%.

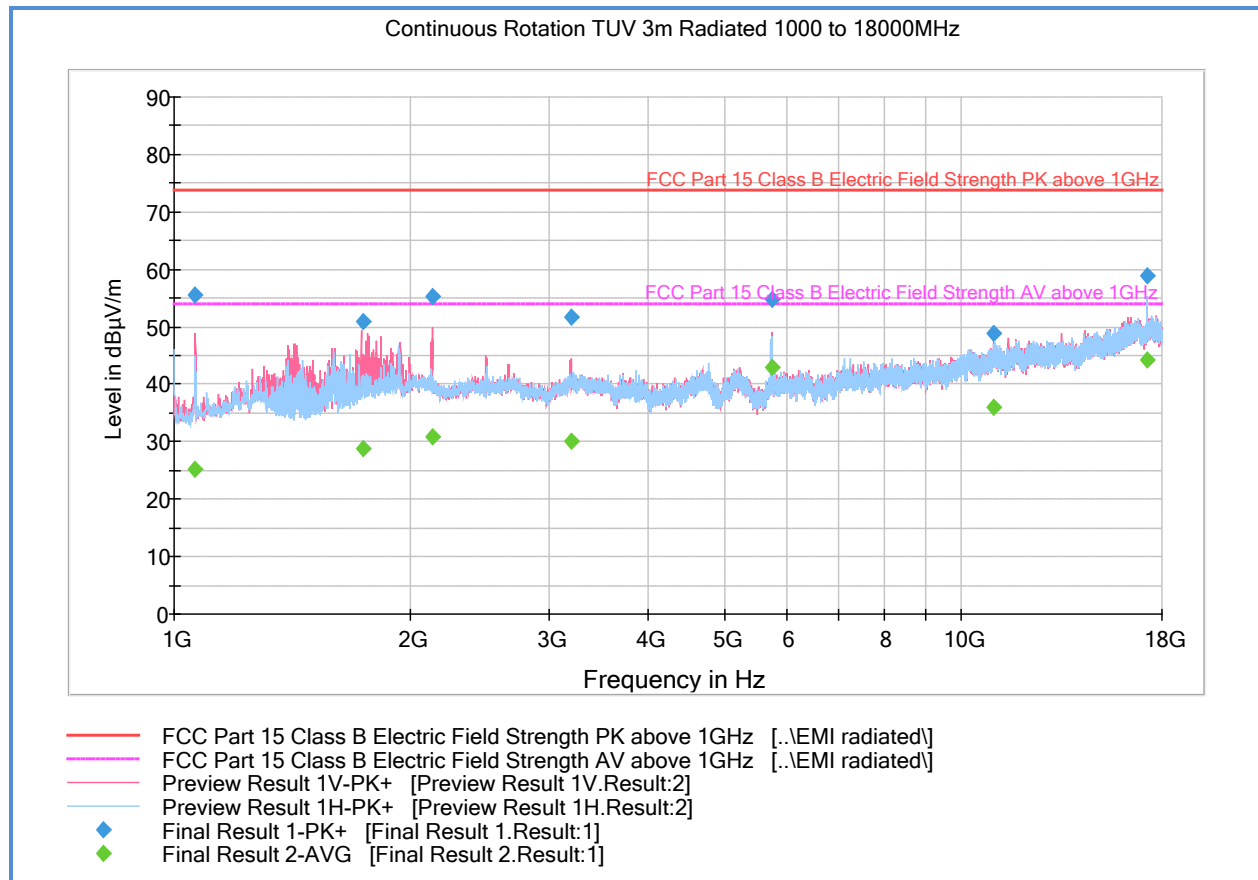
2.7.14 Test Results Below 1GHz (Cabinet Spurious Emissions 802.11a U-NII 3)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.040000	25.7	1000.0	120.000	109.0	V	-3.0	-5.8	14.3	40.0
201.342124	28.7	1000.0	120.000	100.0	V	176.0	-11.4	14.8	43.5
265.290421	26.3	1000.0	120.000	100.0	V	335.0	-8.4	19.7	46.0
485.573627	31.5	1000.0	120.000	115.0	V	71.0	-1.6	14.5	46.0
704.745170	35.3	1000.0	120.000	100.0	V	58.0	3.0	10.7	46.0
747.974589	29.1	1000.0	120.000	100.0	V	125.0	3.2	16.9	46.0

2.7.15 Test Results Above 1GHz (Cabinet Spurious Emissions 802.11a U-NII 3)



Peak Data

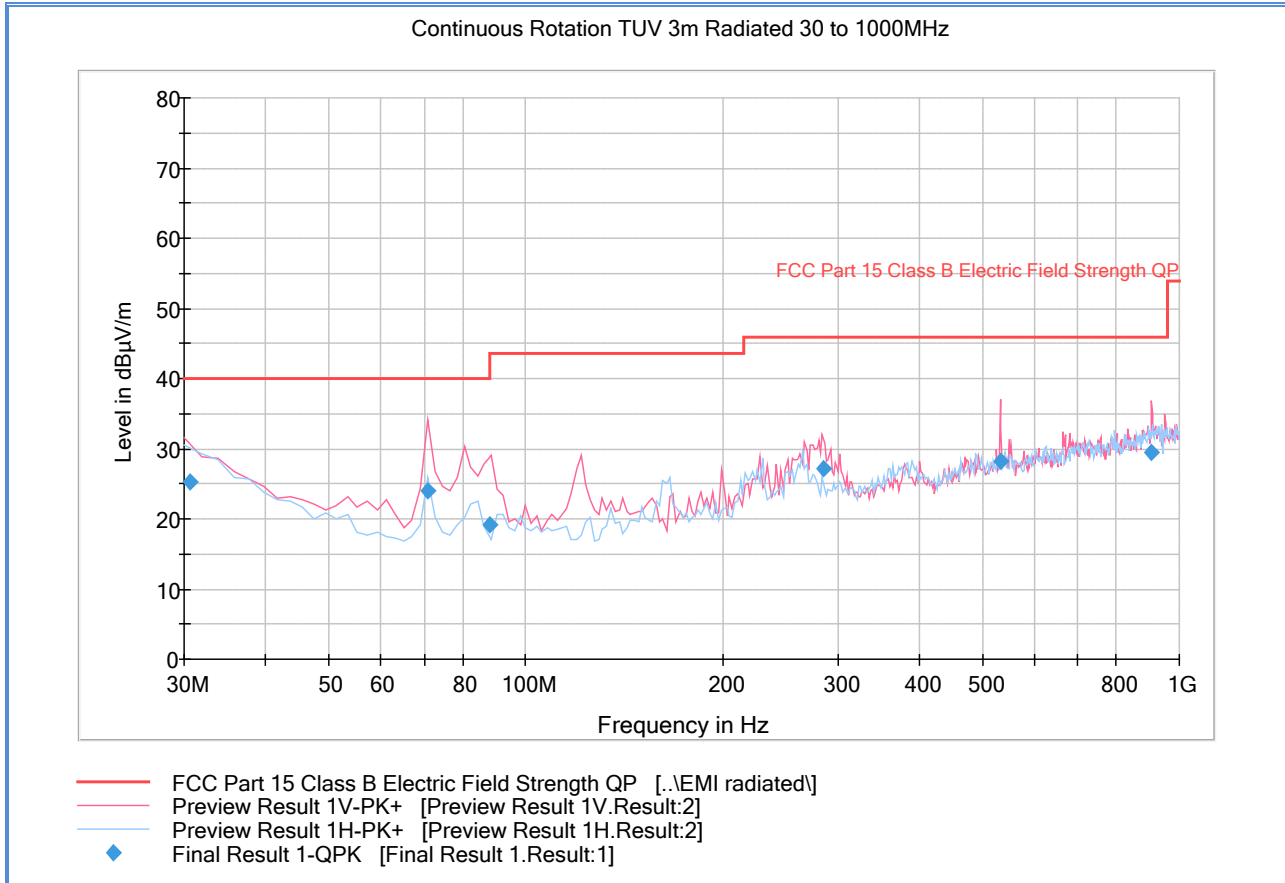
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1064.600000	55.6	1000.0	1000.000	126.7	V	279.0	-7.5	18.3	73.9
1742.000000	51.0	1000.0	1000.000	103.7	V	178.0	-3.8	22.9	73.9
2131.833333	55.2	1000.0	1000.000	100.7	V	235.0	-1.3	18.7	73.9
3195.633333	51.7	1000.0	1000.000	99.7	V	231.0	1.1	22.2	73.9
5747.966667	54.7	1000.0	1000.000	112.7	V	158.0	4.7	19.2	73.9
10985.03333	48.9	1000.0	1000.000	239.4	V	66.0	12.7	25.0	73.9
17237.23333	58.8	1000.0	1000.000	199.5	H	23.0	19.7	15.1	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1064.600000	25.2	1000.0	1000.000	126.7	V	279.0	-7.5	28.7	53.9
1742.000000	28.7	1000.0	1000.000	103.7	V	178.0	-3.8	25.2	53.9
2131.833333	30.9	1000.0	1000.000	100.7	V	235.0	-1.3	23.0	53.9
3195.633333	30.0	1000.0	1000.000	99.7	V	231.0	1.1	23.9	53.9
5747.966667	42.9	1000.0	1000.000	112.7	V	158.0	4.7	11.0	53.9
10985.03333	36.0	1000.0	1000.000	239.4	V	66.0	12.7	17.9	53.9
17237.23333	44.3	1000.0	1000.000	199.5	H	23.0	19.7	9.6	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented. Duty Cycle correction factor not required since duty cycle is >98%.

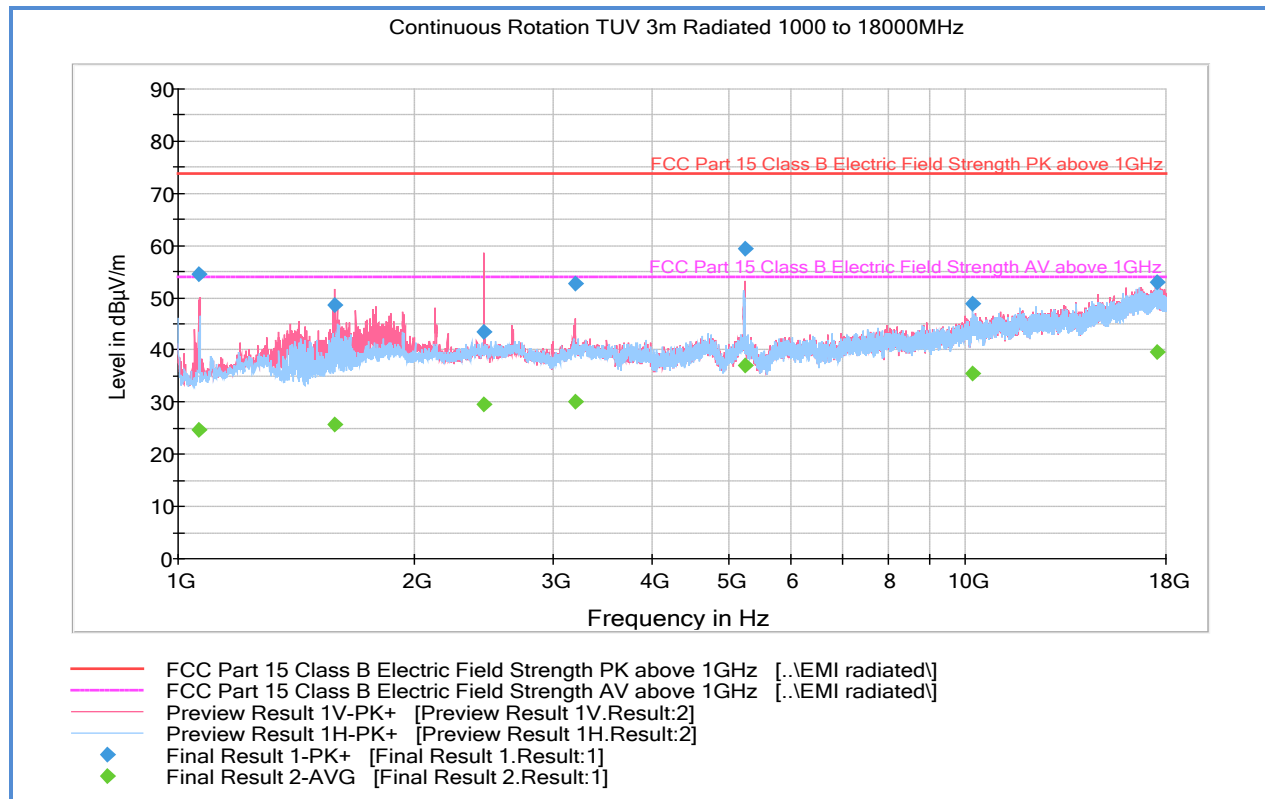
2.7.16 Test Results Below 1GHz (Cabinet Spurious Emissions 802.11n U-NII 1)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.560000	25.3	1000.0	120.000	100.0	V	15.0	-6.1	14.7	40.0
70.861643	24.0	1000.0	120.000	109.0	V	4.0	-16.8	16.0	40.0
87.932745	19.2	1000.0	120.000	100.0	V	15.0	-15.7	20.8	40.0
285.529299	27.1	1000.0	120.000	100.0	V	15.0	-7.9	18.9	46.0
532.643046	28.1	1000.0	120.000	129.0	V	347.0	-0.9	17.9	46.0
903.653387	29.5	1000.0	120.000	100.0	V	9.0	6.0	16.5	46.0

2.7.17 Test Results Above 1GHz (Cabinet Spurious Emissions 802.11n U-NII 1)



Peak Data

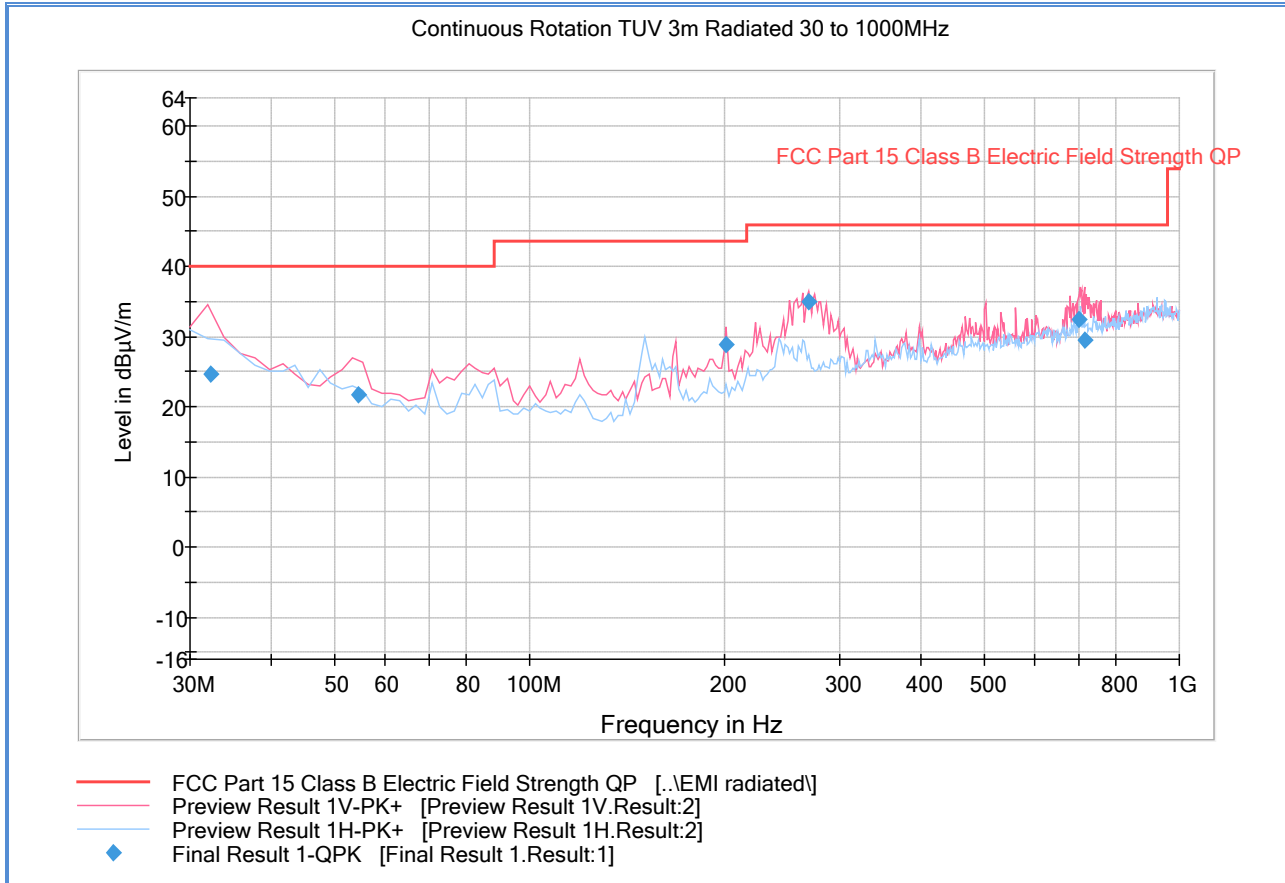
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1061.066667	54.6	1000.0	1000.000	102.7	V	142.0	-7.6	19.3	73.9
1583.333333	48.6	1000.0	1000.000	177.6	V	158.0	-5.8	25.3	73.9
2443.833333	43.5	1000.0	1000.000	165.6	V	-17.0	-1.0	30.4	73.9
3200.200000	52.8	1000.0	1000.000	102.7	V	7.0	1.1	21.1	73.9
5246.733333	59.4	1000.0	1000.000	200.5	V	298.0	3.9	14.5	73.9
10210.43333	48.8	1000.0	1000.000	222.4	H	333.0	11.4	25.1	73.9
17517.76666	53.0	1000.0	1000.000	204.5	H	311.0	20.1	20.9	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1061.066667	24.8	1000.0	1000.000	102.7	V	142.0	-7.6	29.1	53.9
1583.333333	25.7	1000.0	1000.000	177.6	V	158.0	-5.8	28.2	53.9
2443.833333	29.5	1000.0	1000.000	165.6	V	-17.0	-1.0	24.4	53.9
3200.200000	30.2	1000.0	1000.000	102.7	V	7.0	1.1	23.7	53.9
5246.733333	37.1	1000.0	1000.000	200.5	V	298.0	3.9	16.8	53.9
10210.43333	35.5	1000.0	1000.000	222.4	H	333.0	11.4	18.4	53.9
17517.76666	39.7	1000.0	1000.000	204.5	H	311.0	20.1	14.2	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented. Duty Cycle correction factor not applied on Average data (2.17 dB) since there is no spurious emission within 6 dB of the limit (DCCF has no impact on the presented test results).

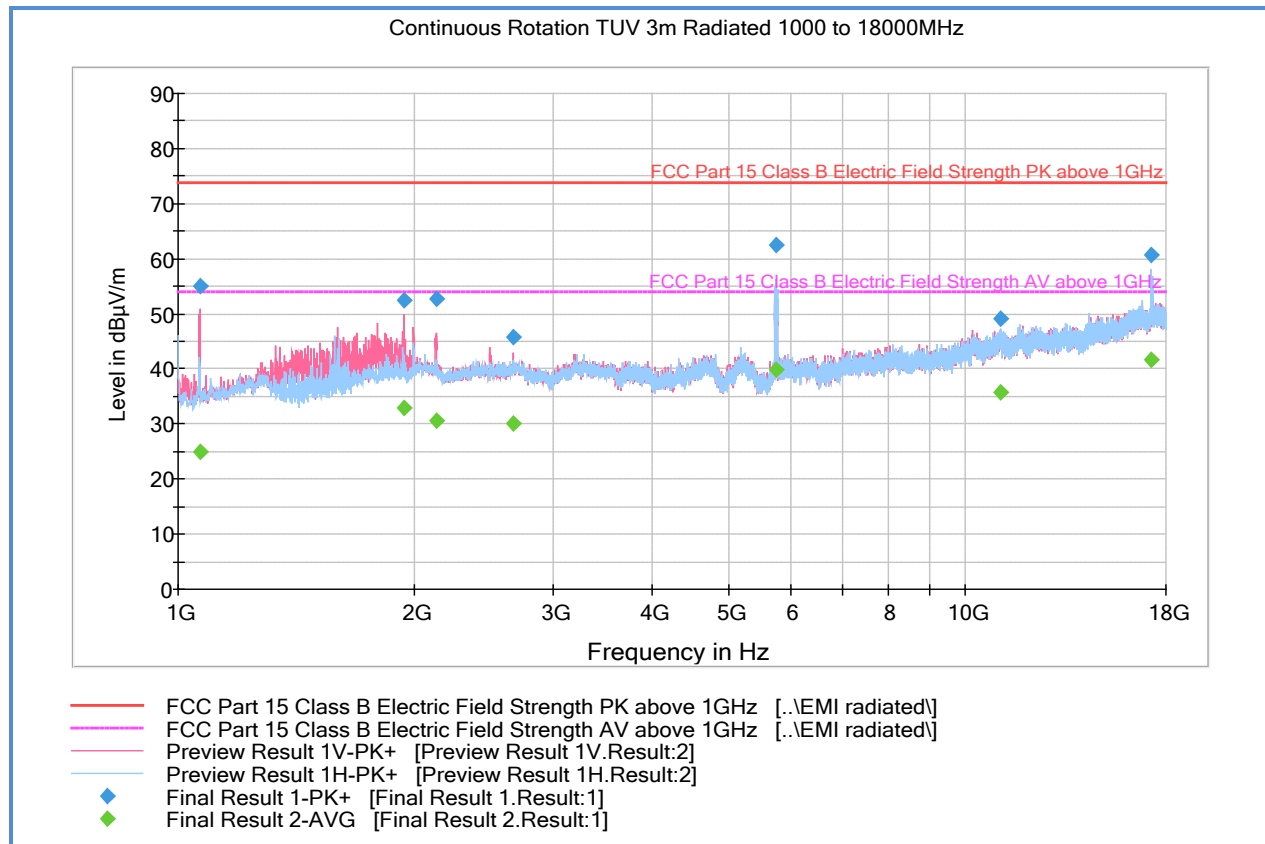
2.7.18 Test Results Below 1GHz (Cabinet Spurious Emissions 802.11n U-NII 3)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.280000	24.6	1000.0	120.000	106.0	V	338.0	-7.1	15.4	40.0
54.446653	21.6	1000.0	120.000	100.0	V	267.0	-15.3	18.4	40.0
200.622124	28.9	1000.0	120.000	100.0	V	173.0	-11.5	14.6	43.5
269.018196	34.9	1000.0	120.000	100.0	V	104.0	-8.1	11.1	46.0
701.865170	32.5	1000.0	120.000	100.0	V	146.0	2.9	13.5	46.0
715.168497	29.5	1000.0	120.000	100.0	V	147.0	3.2	16.5	46.0

2.7.19 Test Results Above 1GHz (Cabinet Spurious Emissions 802.11n U-NII 3)



Peak Data

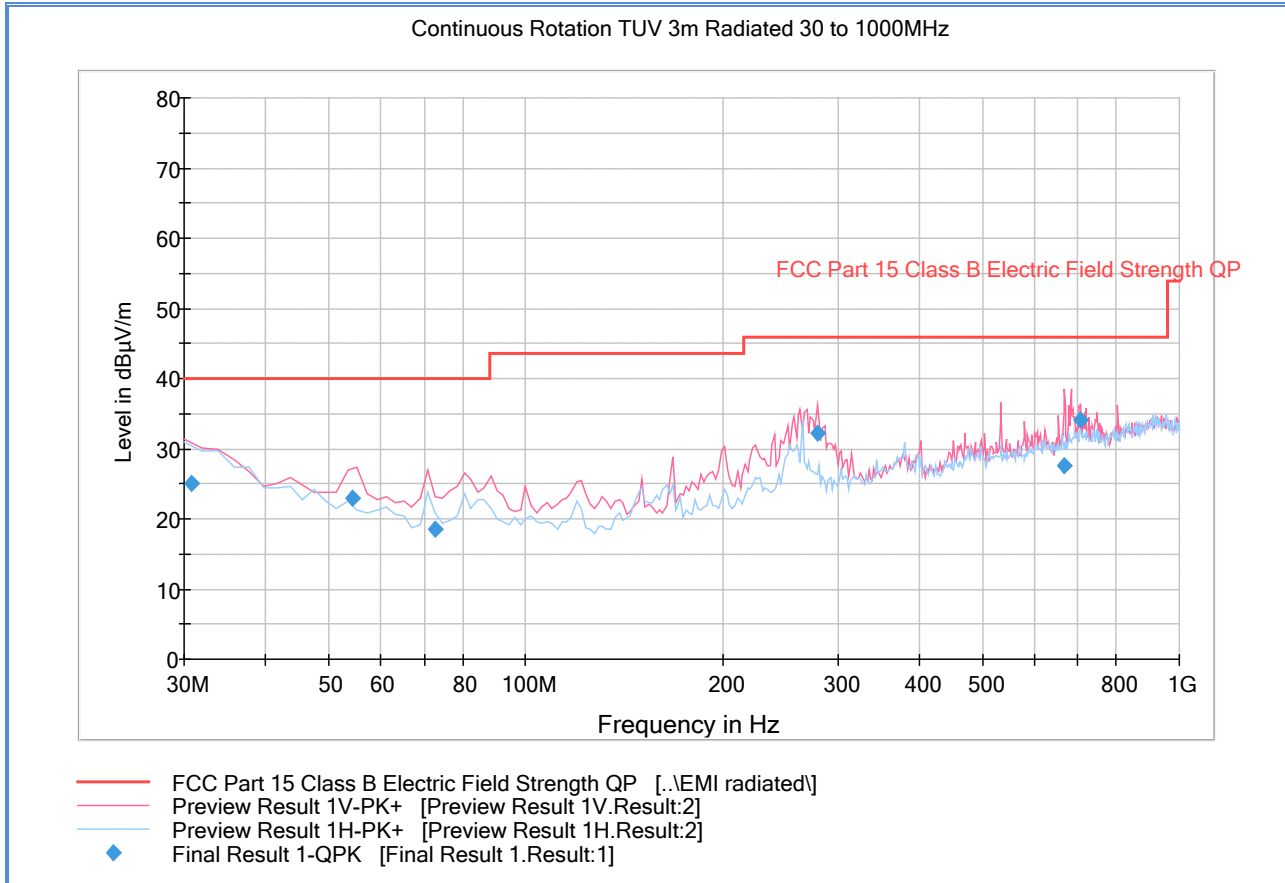
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1066.500000	54.9	1000.0	1000.000	103.7	V	134.0	-7.5	19.0	73.9
1937.066667	52.5	1000.0	1000.000	241.3	V	330.0	-0.7	21.4	73.9
2128.033333	52.7	1000.0	1000.000	103.7	V	71.0	-1.2	21.2	73.9
2667.166667	45.8	1000.0	1000.000	131.7	V	74.0	-0.8	28.1	73.9
5764.166667	62.4	1000.0	1000.000	199.5	H	-2.0	4.7	11.5	73.9
11073.600000	49.2	1000.0	1000.000	232.4	H	187.0	12.8	24.7	73.9
17253.733333	60.8	1000.0	1000.000	208.5	H	33.0	19.7	13.1	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1066.500000	25.1	1000.0	1000.000	103.7	V	134.0	-7.5	28.8	53.9
1937.066667	32.8	1000.0	1000.000	241.3	V	330.0	-0.7	21.1	53.9
2128.033333	30.7	1000.0	1000.000	103.7	V	71.0	-1.2	23.2	53.9
2667.166667	30.1	1000.0	1000.000	131.7	V	74.0	-0.8	23.8	53.9
5764.166667	39.9	1000.0	1000.000	199.5	H	-2.0	4.7	14.0	53.9
11073.600000	35.6	1000.0	1000.000	232.4	H	187.0	12.8	18.3	53.9
17253.733333	41.7	1000.0	1000.000	208.5	H	33.0	19.7	12.2	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented. Duty Cycle correction factor not applied on Average data (2.17 dB) since there is no spurious emission within 6 dB of the limit (DCCF has no impact on the presented test results).

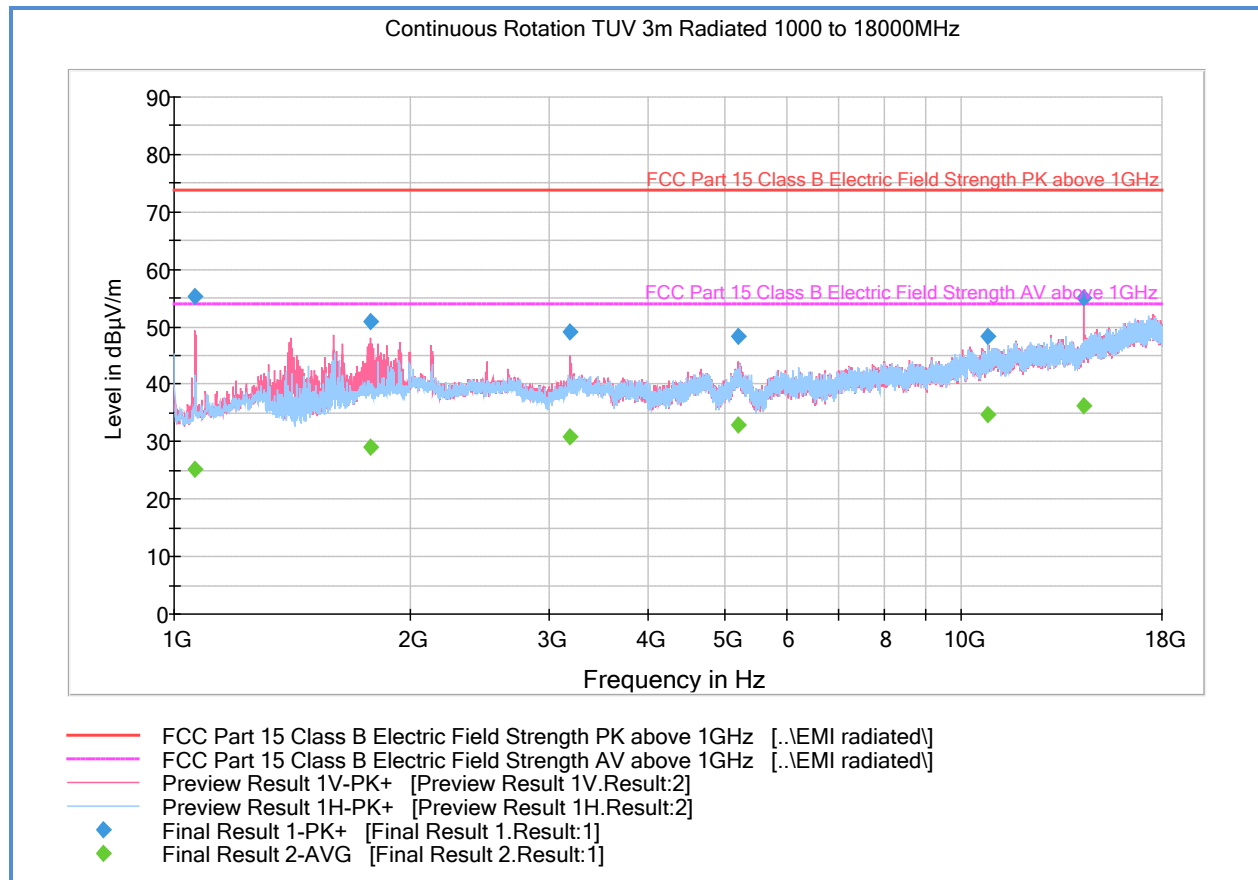
2.7.20 Test Results Below 1GHz (Cabinet Spurious Emissions 802.11ac U-NII 1)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.800000	25.2	1000.0	120.000	150.0	V	142.0	-6.2	14.8	40.0
54.350541	22.9	1000.0	120.000	105.0	V	117.0	-15.3	17.1	40.0
72.821643	18.4	1000.0	120.000	109.0	V	-8.0	-16.8	21.6	40.0
280.017635	32.2	1000.0	120.000	100.0	V	159.0	-7.8	13.8	46.0
665.915190	27.6	1000.0	120.000	100.0	V	208.0	1.5	18.4	46.0
704.712946	34.2	1000.0	120.000	109.0	V	197.0	3.0	11.8	46.0

2.7.21 Test Results Above 1GHz (Cabinet Spurious Emissions 802.11ac U-NII 1)



Peak Data

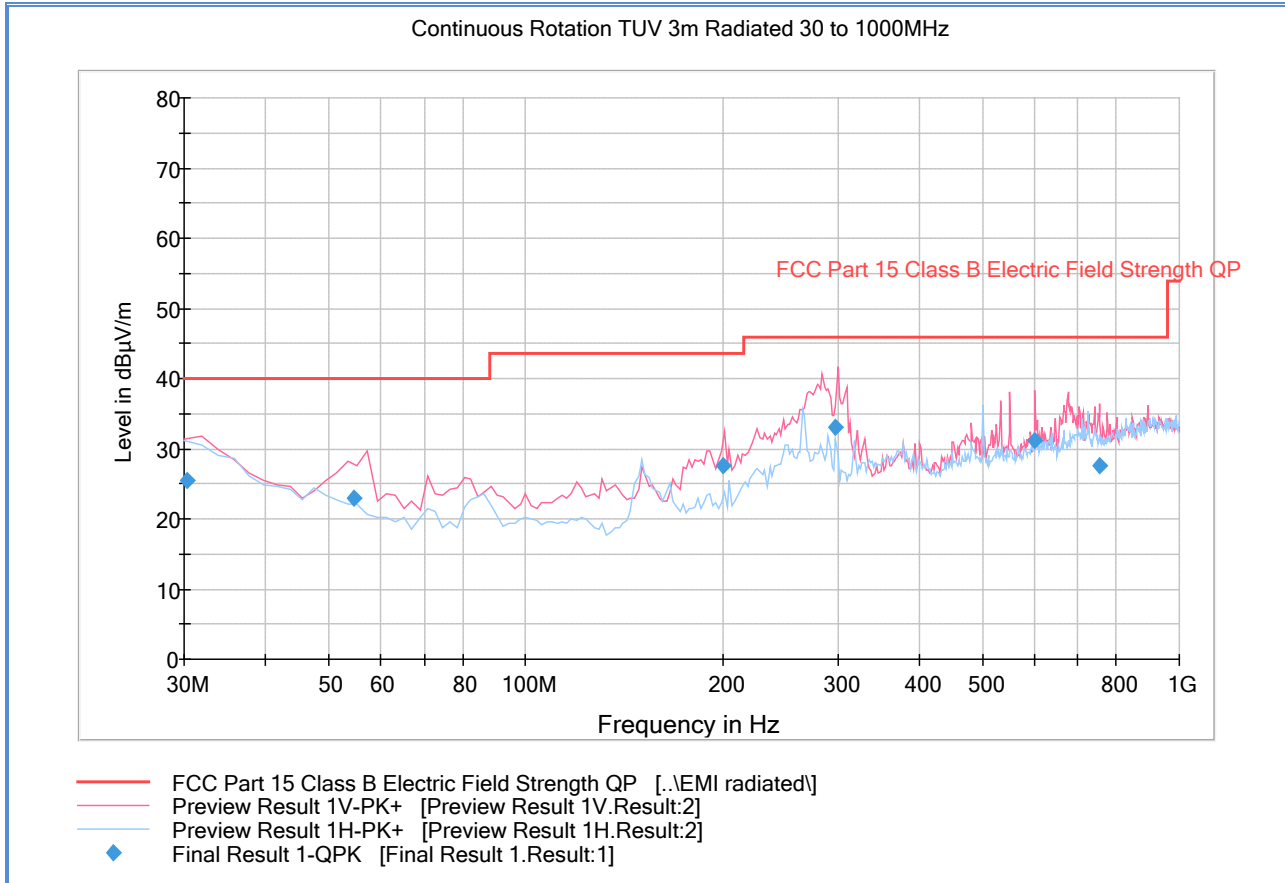
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1061.566667	55.3	1000.0	1000.000	112.7	V	116.0	-7.6	18.6	73.9
1775.433333	51.0	1000.0	1000.000	103.7	V	173.0	-3.6	22.9	73.9
3185.866667	49.1	1000.0	1000.000	112.7	V	67.0	1.1	24.8	73.9
5216.000000	48.4	1000.0	1000.000	200.5	V	143.0	3.8	25.5	73.9
10819.566666	48.2	1000.0	1000.000	102.7	H	200.0	12.7	25.7	73.9
14334.800000	55.1	1000.0	1000.000	199.5	V	27.0	15.5	18.8	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1061.566667	25.2	1000.0	1000.000	112.7	V	116.0	-7.6	28.7	53.9
1775.433333	29.1	1000.0	1000.000	103.7	V	173.0	-3.6	24.8	53.9
3185.866667	30.9	1000.0	1000.000	112.7	V	67.0	1.1	23.0	53.9
5216.000000	33.0	1000.0	1000.000	200.5	V	143.0	3.8	20.9	53.9
10819.566666	34.8	1000.0	1000.000	102.7	H	200.0	12.7	19.1	53.9
14334.800000	36.4	1000.0	1000.000	199.5	V	27.0	15.5	17.5	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented. Duty Cycle correction factor not applied on Average data (2.27 dB) since there is no spurious emission within 6 dB of the limit (DCCF has no impact on the presented test results).

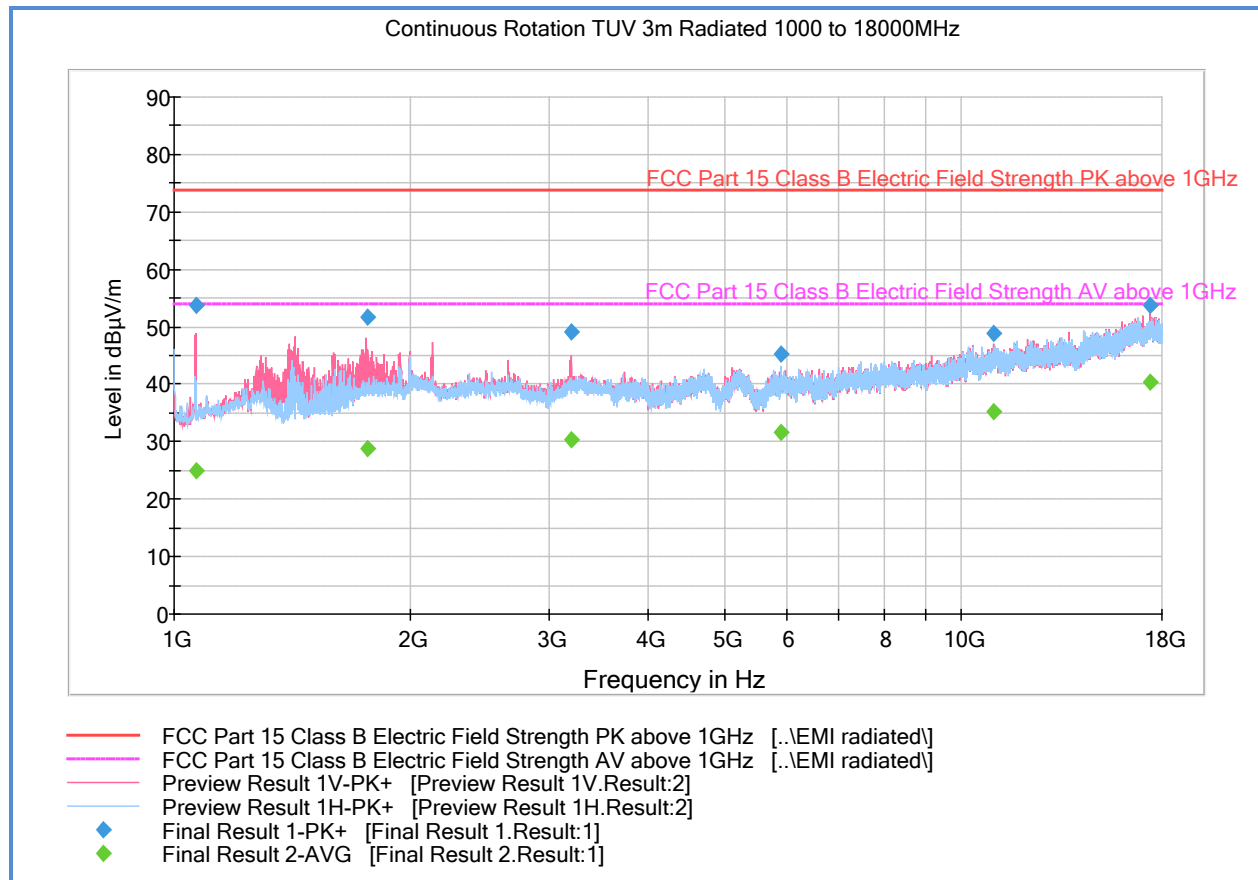
2.7.22 Test Results Below 1GHz (Cabinet Spurious Emissions 802.11ac U-NII 3)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.240000	25.5	1000.0	120.000	250.0	V	219.0	-5.9	14.5	40.0
54.454429	23.0	1000.0	120.000	100.0	V	81.0	-15.3	17.0	40.0
200.582124	27.6	1000.0	120.000	100.0	V	127.0	-11.5	15.9	43.5
296.800401	33.0	1000.0	120.000	106.0	V	134.0	-7.5	13.0	46.0
601.663006	31.1	1000.0	120.000	100.0	V	120.0	0.7	14.9	46.0
756.910140	27.6	1000.0	120.000	100.0	V	114.0	3.2	18.4	46.0

2.7.23 Test Results Above 1GHz (Cabinet Spurious Emissions 802.11ac U-NII 3)



Peak Data

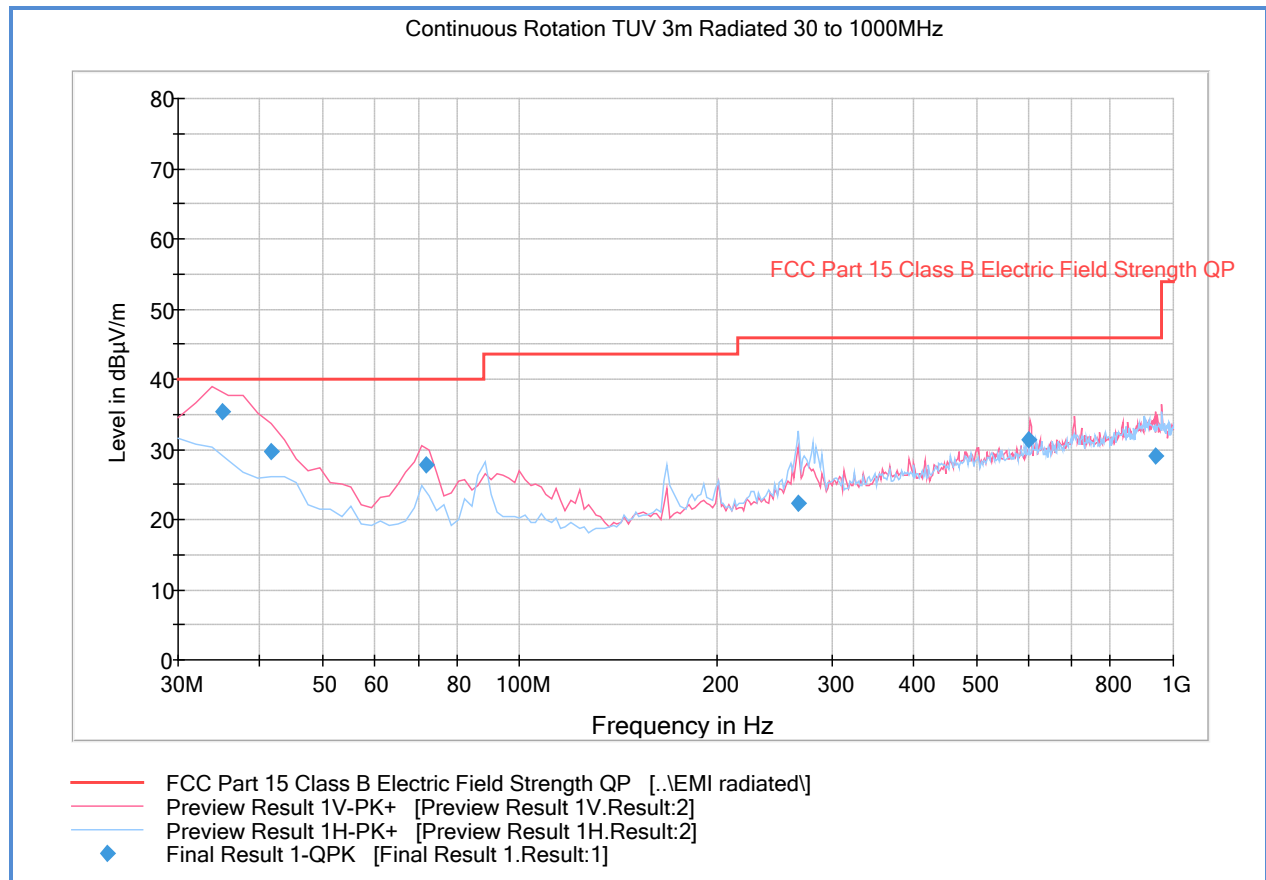
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1066.866667	53.8	1000.0	1000.000	109.7	V	282.0	-7.4	20.1	73.9
1758.066667	51.6	1000.0	1000.000	116.7	V	235.0	-3.7	22.3	73.9
3198.066667	49.2	1000.0	1000.000	111.7	V	58.0	1.1	24.7	73.9
5898.466667	45.3	1000.0	1000.000	124.7	H	7.0	4.9	28.6	73.9
11007.866666	48.8	1000.0	1000.000	131.7	V	182.0	12.7	25.1	73.9
17372.833333	53.8	1000.0	1000.000	222.4	V	60.0	20.0	20.1	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1066.866667	24.8	1000.0	1000.000	109.7	V	282.0	-7.4	29.1	53.9
1758.066667	28.8	1000.0	1000.000	116.7	V	235.0	-3.7	25.1	53.9
3198.066667	30.3	1000.0	1000.000	111.7	V	58.0	1.1	23.6	53.9
5898.466667	31.7	1000.0	1000.000	124.7	H	7.0	4.9	22.2	53.9
11007.866666	35.3	1000.0	1000.000	131.7	V	182.0	12.7	18.6	53.9
17372.833333	40.3	1000.0	1000.000	222.4	V	60.0	20.0	13.6	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented. Duty Cycle correction factor not applied on Average data (2.27 dB) since there is no spurious emission within 6 dB of the limit (DCCF has no impact on the presented test results).

2.7.24 Test Results Below 1GHz (Co-located TX, both WLAN and Cell radio are active)

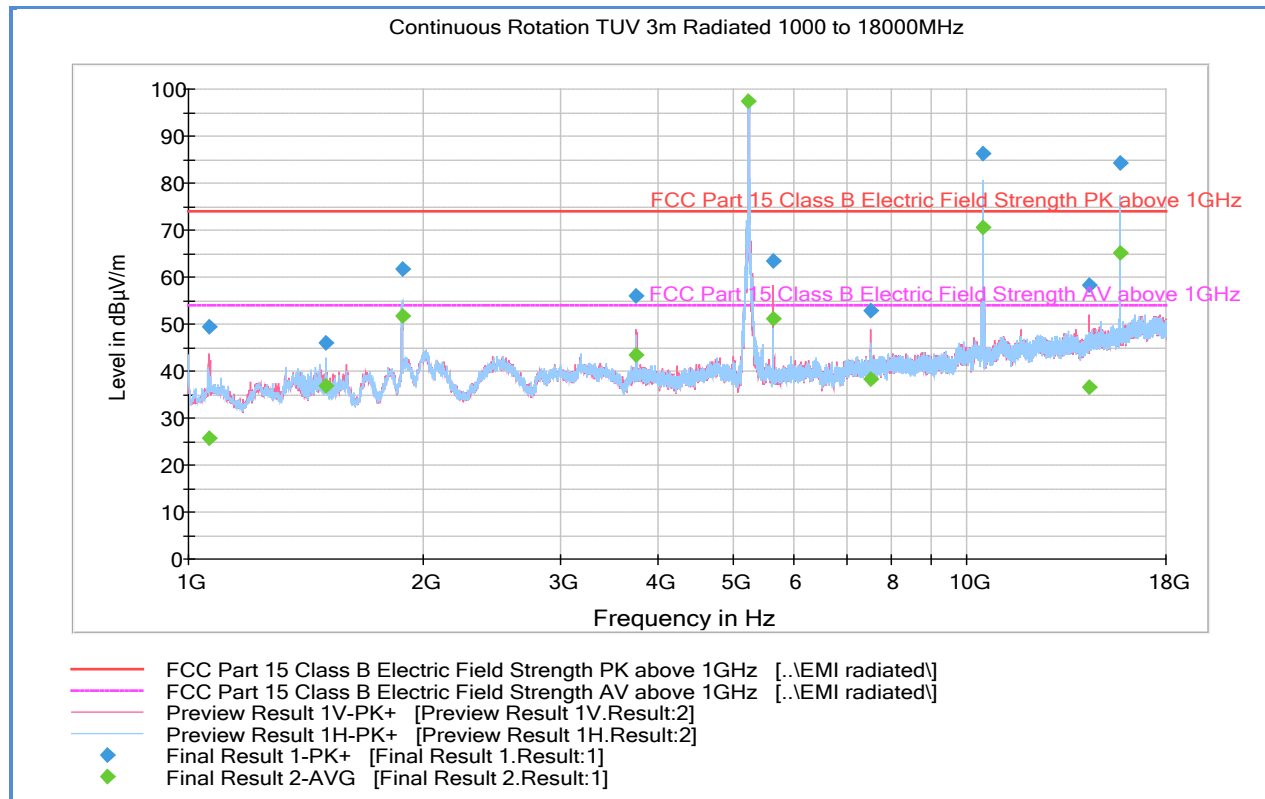


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.047776	35.3	1000.0	120.000	100.0	V	277.0	-8.5	4.7	40.0
41.647214	29.7	1000.0	120.000	100.0	V	154.0	-11.7	10.3	40.0
71.861643	27.8	1000.0	120.000	100.0	V	67.0	-16.8	12.2	40.0
266.354309	22.4	1000.0	120.000	100.0	H	114.0	-8.3	23.6	46.0
601.686894	31.3	1000.0	120.000	203.0	V	155.0	0.7	14.7	46.0
939.059479	29.0	1000.0	120.000	231.0	V	83.0	6.3	17.0	46.0

Test Notes: Only worst case WLAN and licensed test configuration presented.

2.7.25 Test Results Above 1GHz (Co-located TX, both WLAN and Cell radio are active)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1062.866667	49.5	1000.0	1000.000	103.7	V	270.0	-7.5	24.4	73.9
1500.000000	46.1	1000.0	1000.000	102.7	H	132.0	-6.2	27.8	73.9
1881.133333	61.6	1000.0	1000.000	111.7	H	73.0	-1.8	12.3	73.9
3762.133333	56.0	1000.0	1000.000	194.5	V	241.0	1.5	17.9	73.9
5237.933333	107.6	1000.0	1000.000	128.7	H	215.0	3.9	Downlink harmonic	
5640.000000	63.5	1000.0	1000.000	184.5	V	216.0	4.4	10.4	73.9
7520.300000	53.0	1000.0	1000.000	103.7	V	323.0	7.5	20.9	73.9
10478.666667	86.2	1000.0	1000.000	220.4	V	287.0	12.0	Downlink harmonic	
14327.433333	58.2	1000.0	1000.000	115.7	V	74.0	15.5	15.7	73.9
15721.966667	84.3	1000.0	1000.000	127.7	H	210.0	17.5	Downlink harmonic	

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1062.866667	25.8	1000.0	1000.000	103.7	V	270.0	-7.5	28.1	53.9
1500.000000	36.9	1000.0	1000.000	102.7	H	132.0	-6.2	17.0	53.9
1881.133333	51.8	1000.0	1000.000	111.7	H	73.0	-1.8	2.1	53.9
3762.133333	43.3	1000.0	1000.000	194.5	V	241.0	1.5	10.6	53.9
5237.933333	97.3	1000.0	1000.000	128.7	H	215.0	3.9	Downlink harmonic	
5640.000000	51.0	1000.0	1000.000	184.5	V	216.0	4.4	2.9	53.9
7520.300000	38.4	1000.0	1000.000	103.7	V	323.0	7.5	15.5	53.9
10478.666667	70.5	1000.0	1000.000	220.4	V	287.0	12.0	Downlink harmonic	
14327.433333	36.6	1000.0	1000.000	115.7	V	74.0	15.5	17.3	53.9
15721.966667	65.3	1000.0	1000.000	127.7	H	210.0	17.5	Downlink harmonic	

Test Notes: Only worst case WLAN and licensed test configuration presented.



2.8 BAND-EDGE MEASUREMENTS

2.8.1 Specification Reference

Part 15 Subpart E §15.407(b)(1),(4)(i) and (7); §15.407(h)(2) / 15.209 and RSS-247 6.2.1 (2) and 6.2.4 (2)

2.8.2 Standard Applicable

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

2.8.3 Test Methodology

Section II (G) Unwanted Emission Measurement of 789033 D02 General UNII Test Procedures v01r02

2.8.4 Equipment Under Test and Modification State

Serial No: SZ170616900012 / Test Configuration B

2.8.5 Date of Test/Initial of test personnel who performed the test

August 10, 2016/FSC

2.8.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.7 Environmental Conditions

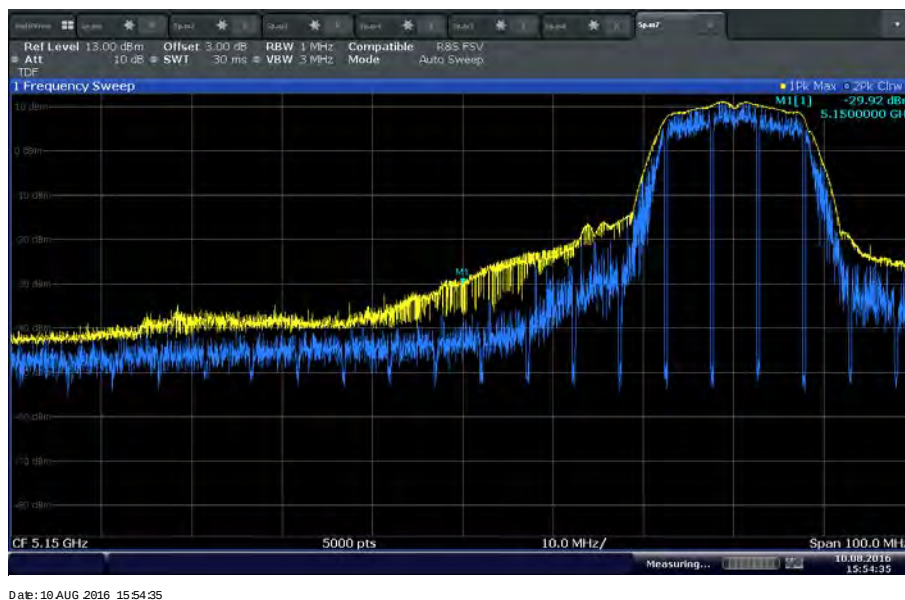
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature 25.7 °C
 Relative Humidity 43.9 %
 ATM Pressure 98.9 kPa

2.8.8 Additional Observations

- This is a conducted test using Integration Method as per Section II (GUNwanted Emission Measurement of 789033 D02 General UNII Test Procedures v01r02.
- Only the worst case data rate/modulation presented.
- Transducer Factor (TDF) was added to compensate for the antenna gain, external attenuator and cable used.
- Additional 3dB offset was added for MIMO mode (verification performed on worst case antenna port).

2.8.9 Test Results



802.11a U-NII 1 Lower Band Edge (Peak Measurement)

Lower band edge peak calculation:

- 5150 MHz (in the restricted band)
- Use the following formula as per Section Section G(1) of 789033 D02 General UNII Test Procedures v01r02:

$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-29.92 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 68.88 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 74 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



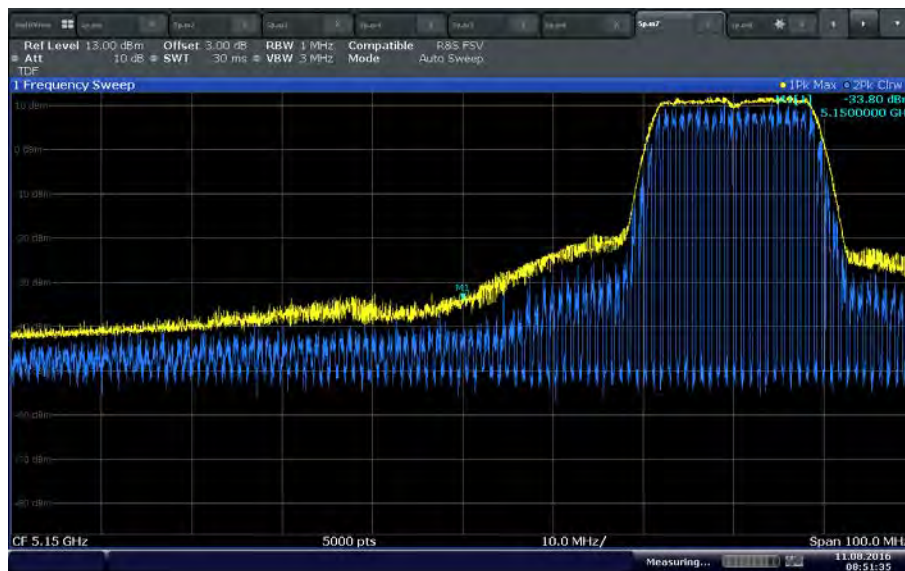
Date: 10 AUG 2016 16:05:46

802.11a U-NII 1 Lower Band Edge (Average Measurement)

Lower band edge average calculation:

- 5150 MHz (in the restricted band)
- Use the following formula as per Section G(1) of 789033 D02 General UNII Test Procedures v01r02:

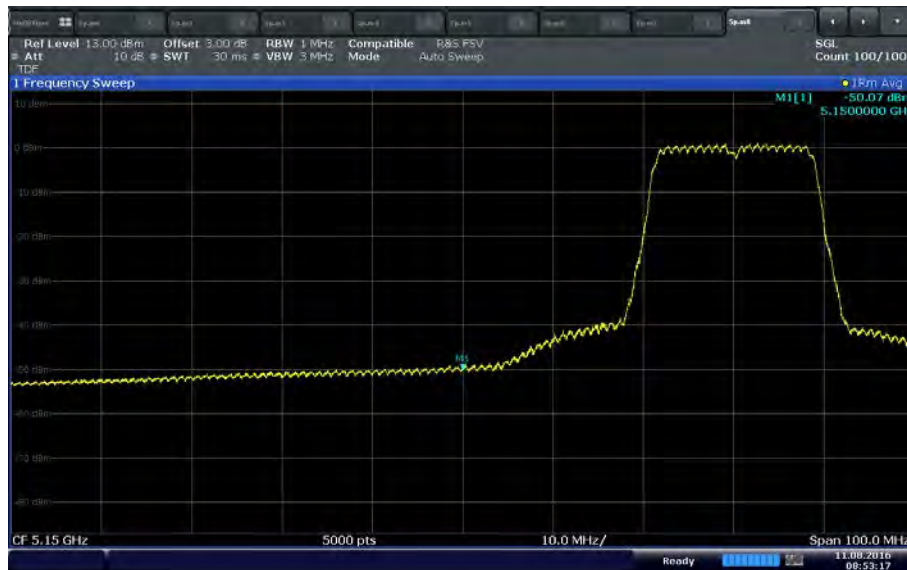
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-48.64 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 50.16 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 54 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 08:51:35

802.11n (20MHz BW) U-NII 1 Lower Band Edge (Peak Measurement)

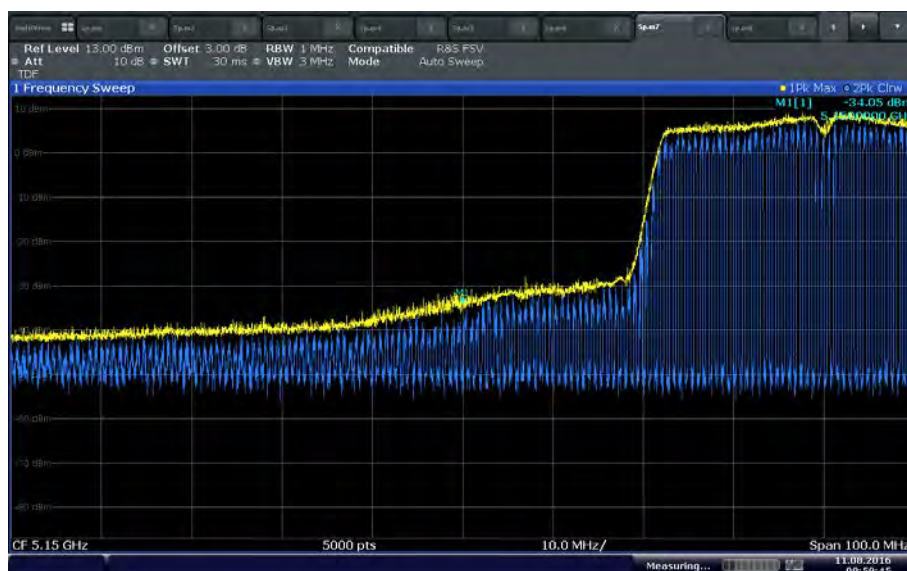
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-33.80 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 65 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 74 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 08:53:17

802.11n U-NII 1 (20 MHz BW) Lower Band Edge (Average Measurement)

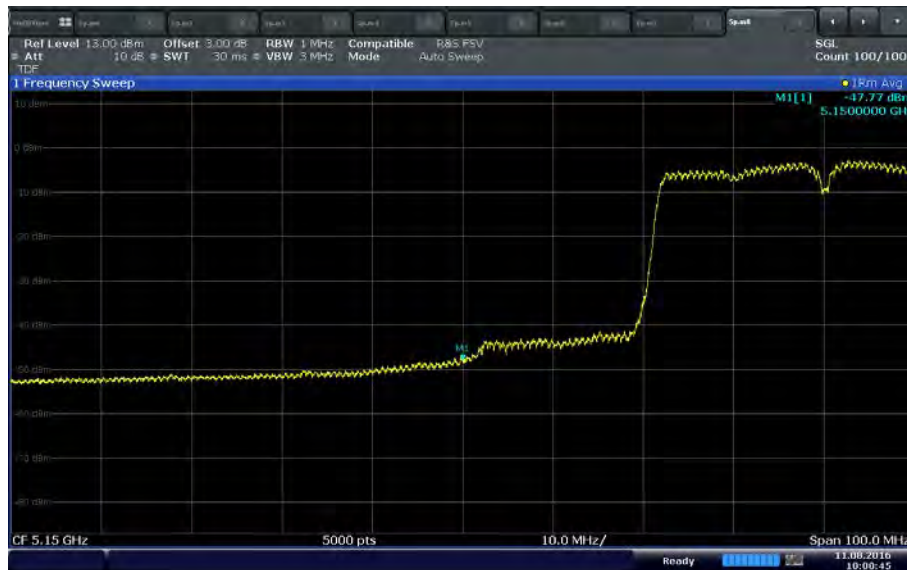
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 + \text{DCCF} \\
 &= (-50.07 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 + 2.17 \\
 &= 50.90 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 54 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 09:59:46

802.11n (40MHz BW) U-NII 1 Lower Band Edge (Peak Measurement)

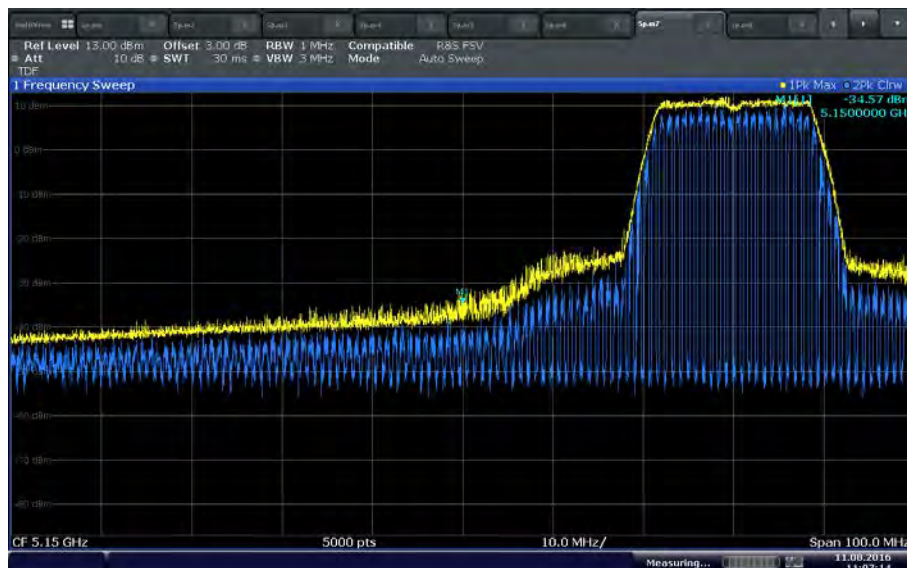
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-34.05 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 64.75 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 74 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 10:00:45

802.11n U-NII 1 (40 MHz BW) Lower Band Edge (Average Measurement)

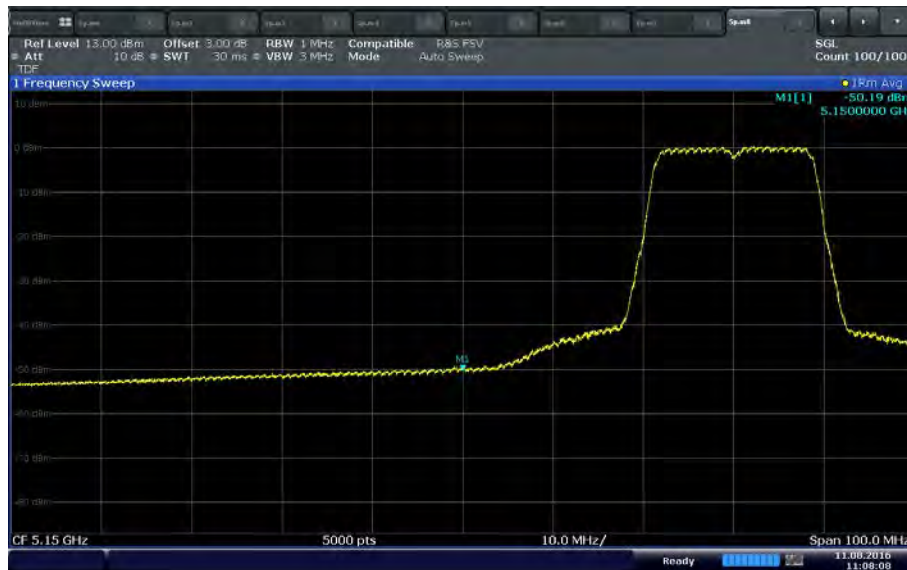
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 + \text{DCCF} \\
 &= (-47.77 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 + 2.17 \\
 &= 53.02 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 54 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 11:07:15

802.11ac (20MHz BW) U-NII 1 Lower Band Edge (Peak Measurement)

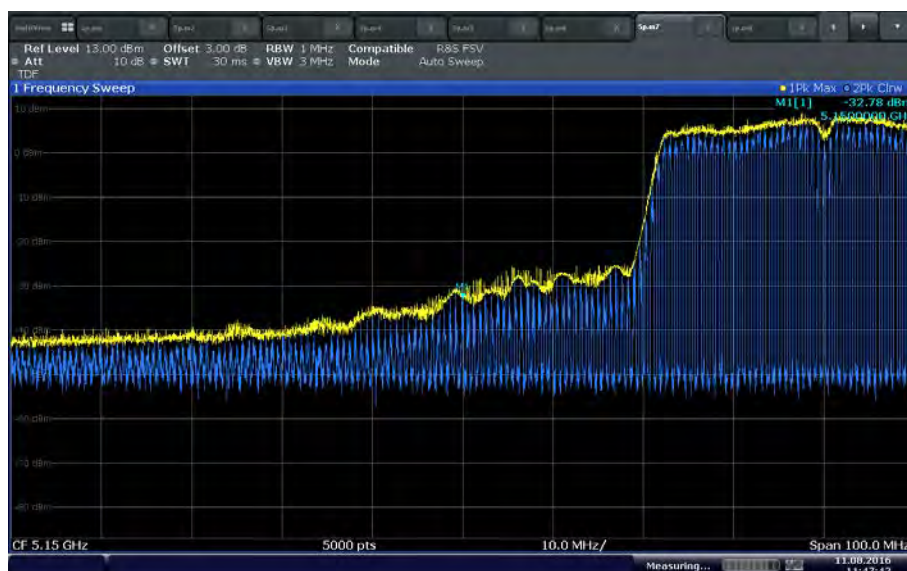
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-31.57 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 67.23 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 74 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 11:08:08

802.11ac U-NII 1 (20 MHz BW) Lower Band Edge (Average Measurement)

$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 + \text{DCCF} \\
 &= (-50.19 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 + 2.27 \\
 &= 50.88 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 54 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 11:47:42

802.11 ac (40MHz BW) U-NII 1 Lower Band Edge (Peak Measurement)

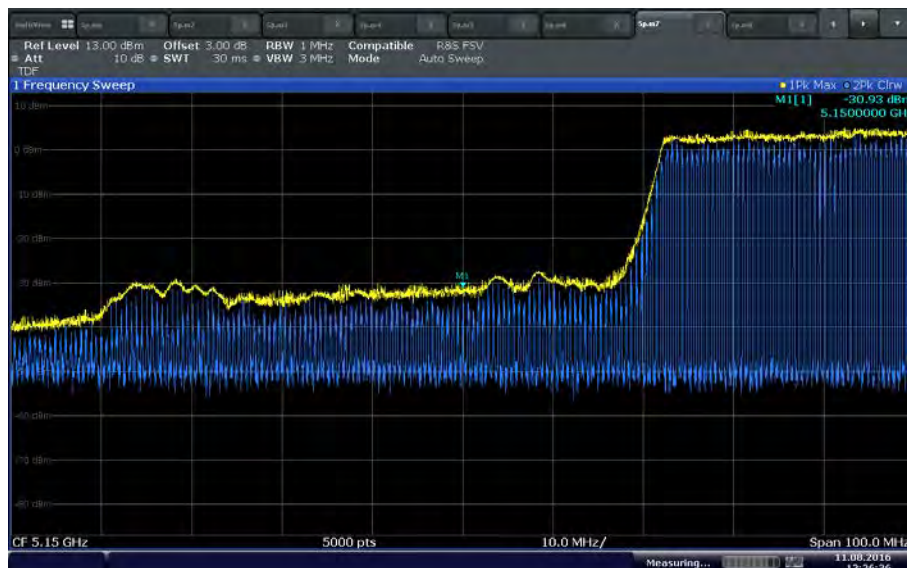
$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-32.78 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 66.02 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 74 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 11:48:08

802.11 ac U-NII 1 (40 MHz BW) Lower Band Edge (Average Measurement)

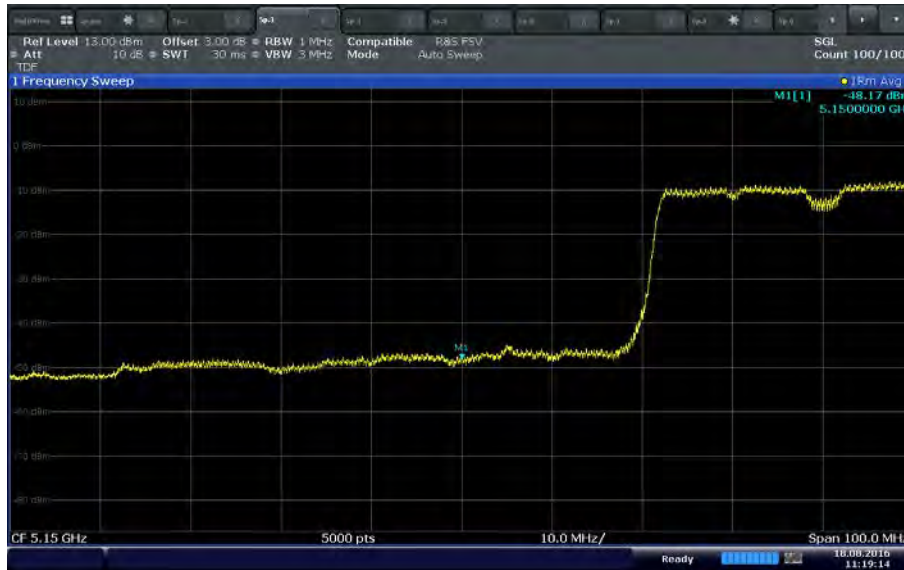
$$\begin{aligned}
 E(\text{dB}\mu\text{V/m}) &= \text{EIRP (dBm)} + 95.2 + \text{DCCF} \\
 &= (-47.72 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 + 2.27 \\
 &= 53.35 \text{ dB}\mu\text{V/m @ 3 meters (Complies with 54 dB}\mu\text{V/m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 12:26:36

802.11ac (80MHz BW) U-NII 1 Lower Band Edge (Peak Measurement)

$$\begin{aligned}
 E(\text{dB}\mu\text{V/m}) &= \text{EIRP (dBm)} + 95.2 \\
 &= (-30.93 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 \\
 &= 67.87 \text{ dB}\mu\text{V/m @ 3 meters (Complies with 74 dB}\mu\text{V/m limit)}
 \end{aligned}$$



Date: 18 AUG 2016 11:19:15

802.11 ac U-NII 1 (80 MHz BW) Lower Band Edge (Average Measurement)

$$\begin{aligned}
 E(\text{dB}\mu\text{V}/\text{m}) &= \text{EIRP (dBm)} + 95.2 + \text{DCCF} \\
 &= (-48.17 \text{ dBm} + 3.6 \text{ dBi antenna gain}) + 95.2 + 2.27 \\
 &= 52.90 \text{ dB}\mu\text{V}/\text{m} @ 3 \text{ meters (Complies with 54 dB}\mu\text{V}/\text{m limit)}
 \end{aligned}$$



Date: 11 AUG 2016 08:29:30

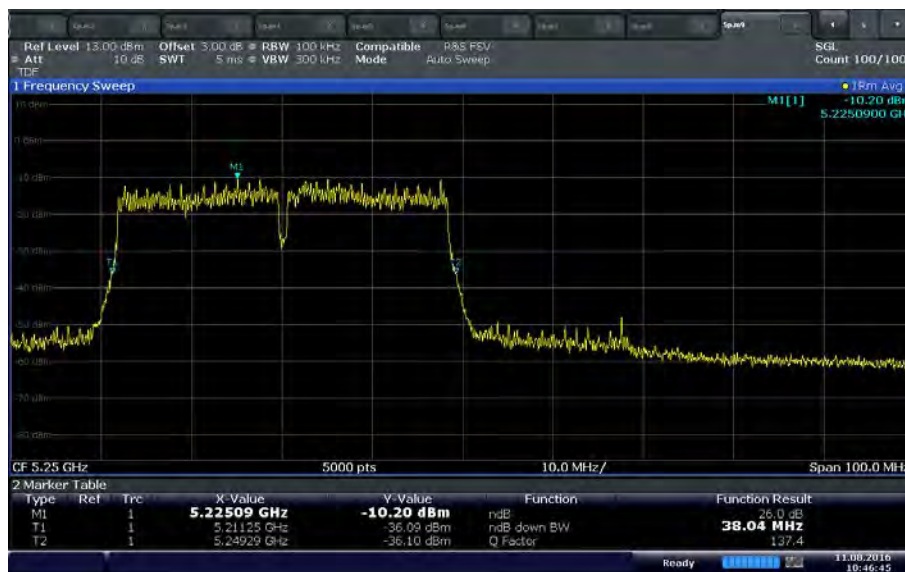
802.11a U-NII 1 Upper Band Edge Verification

Band edge requirement for U-NII 1 is from 5150 MHz to 5350 MHz (upper edge of U-NII 2A). However there is a requirement under §15.407 (h)(2) that U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. The plot presented was a verification that the 26 dB BW of 802.11a U-NII 1 high channel stays within the U-NII 1 band (T2 should be ≤ 5250 MHz).



Date: 11 AUG 2016 09:40:08

802.11n (20 MHz BW) U-NII 1 Upper Band Edge Verification



Date: 11 AUG 2016 10:46:46

802.11n (40 MHz BW) U-NII 1 Upper Band Edge Verification



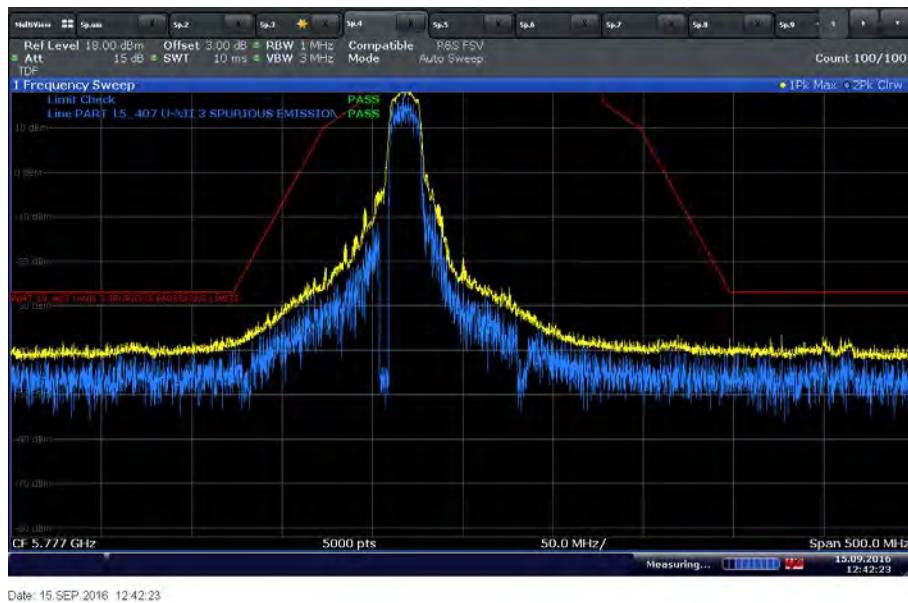
Date: 11 AUG 2016 11:34:30

802.11ac (20 MHz BW) U-NII 1 Upper Band Edge Verification

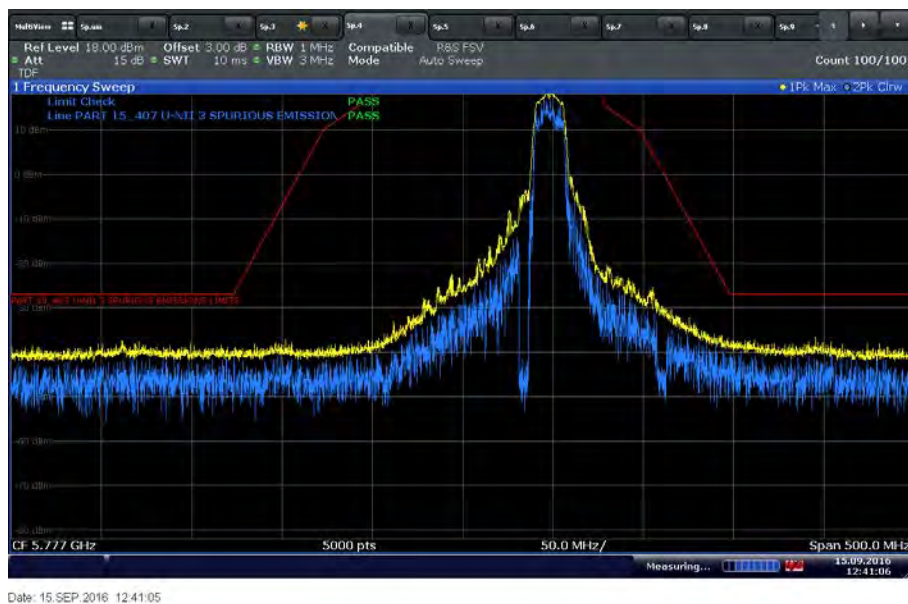


Date: 11 AUG 2016 12:04:46

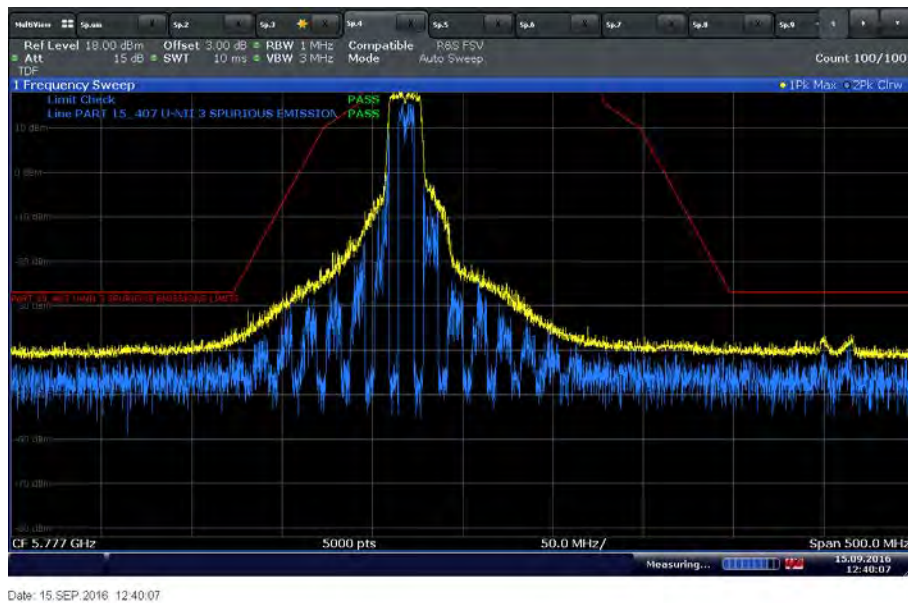
802.11n (20 MHz BW) U-NII 1 Upper Band Edge Verification



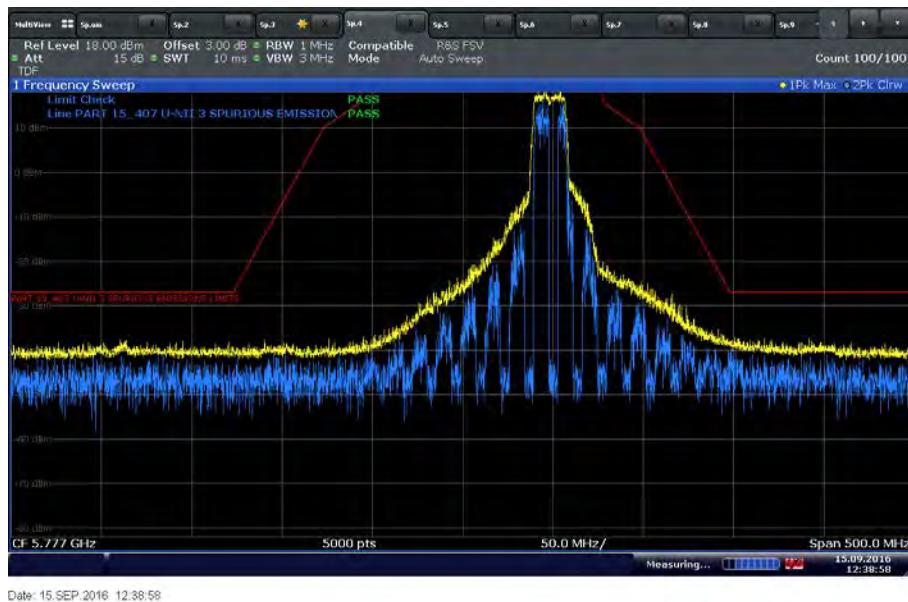
802.11a U-NII 3 Low Channel Emission Mask



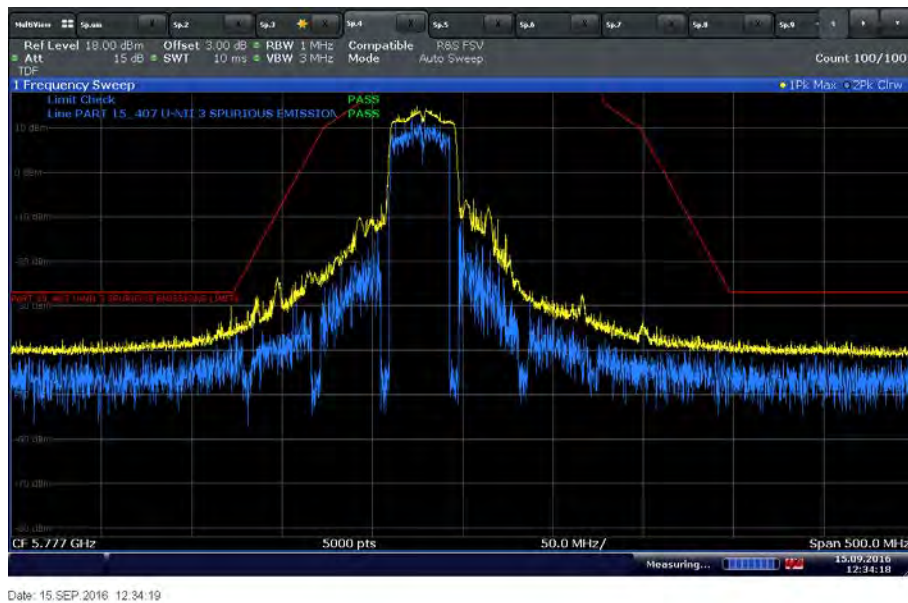
802.11a U-NII 3 High Channel Emission Mask



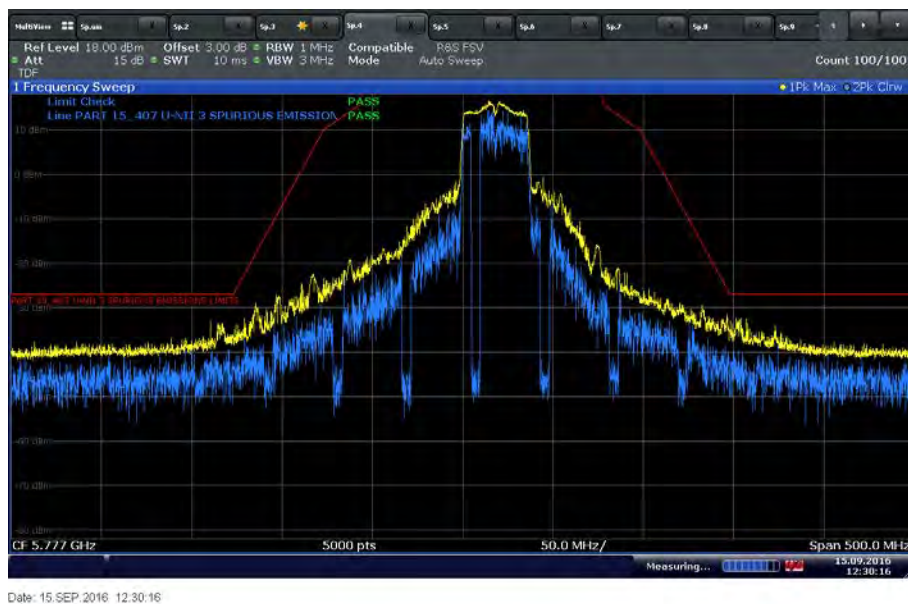
802.11n (20MHz BW) U-NII 3 Low Channel Emission Mask



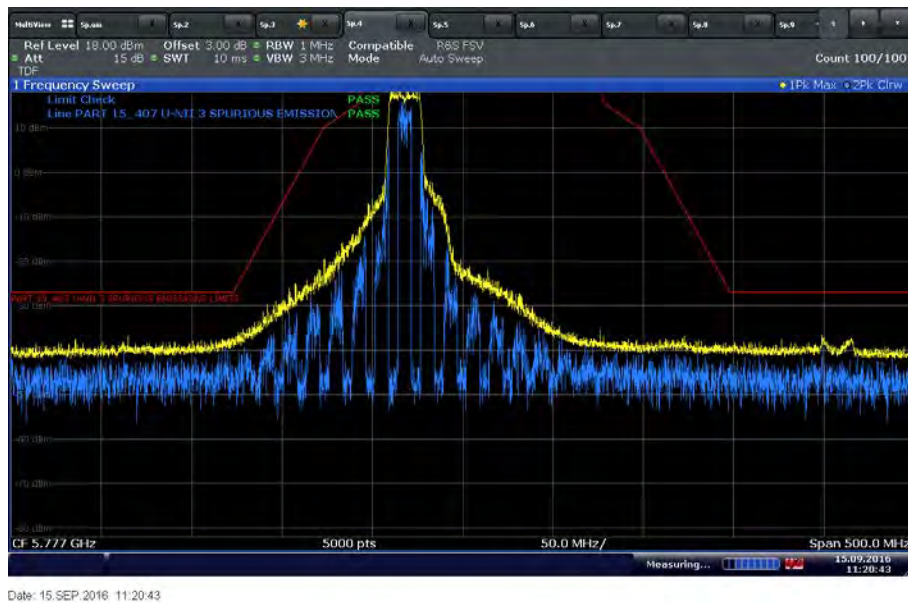
802.11n (20MHz BW) U-NII 3 High Channel Emission Mask



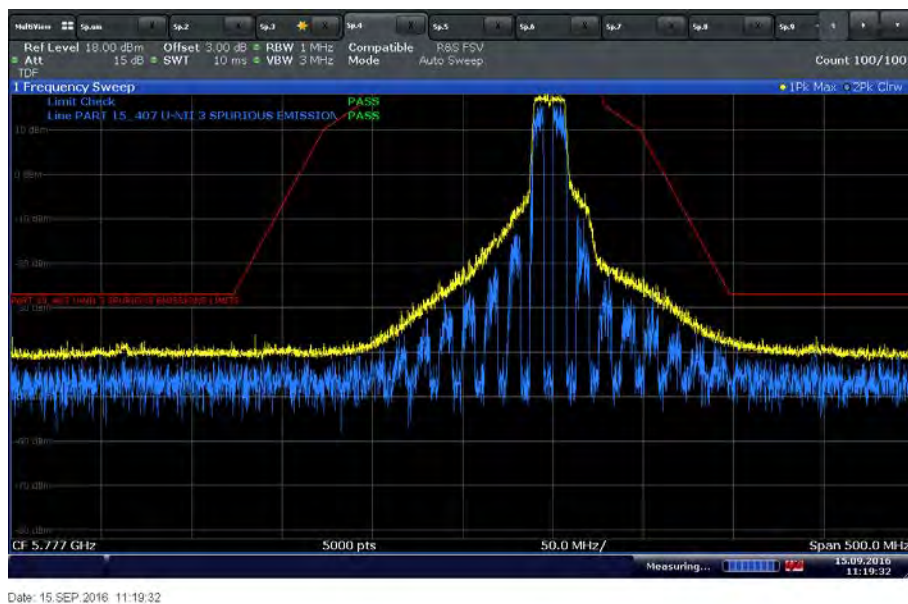
802.11n (40MHz BW) U-NII 3 Low Channel Emission Mask



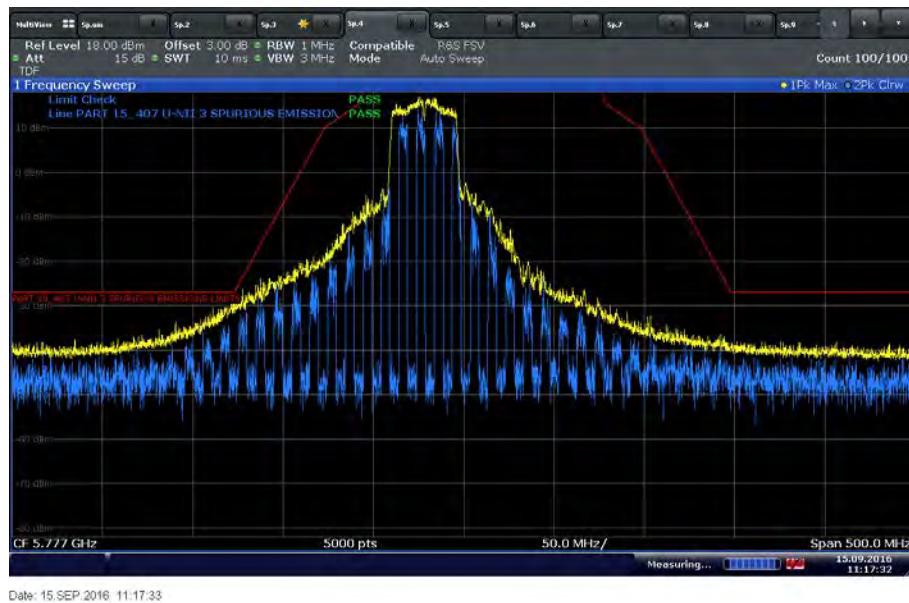
802.11n (40MHz BW) U-NII 3 High Channel Emission Mask



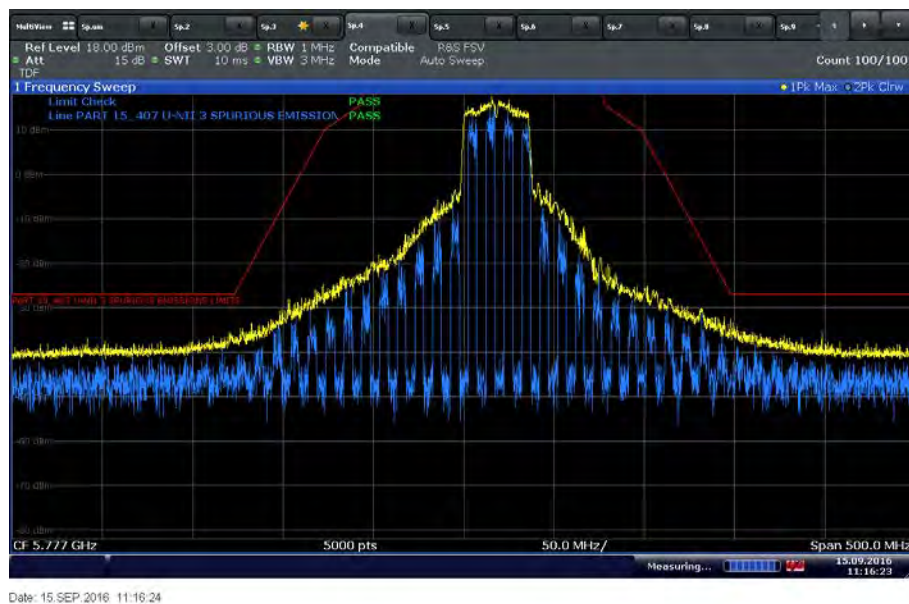
802.11ac (20MHz BW) U-NII 3 Low Channel Emission Mask



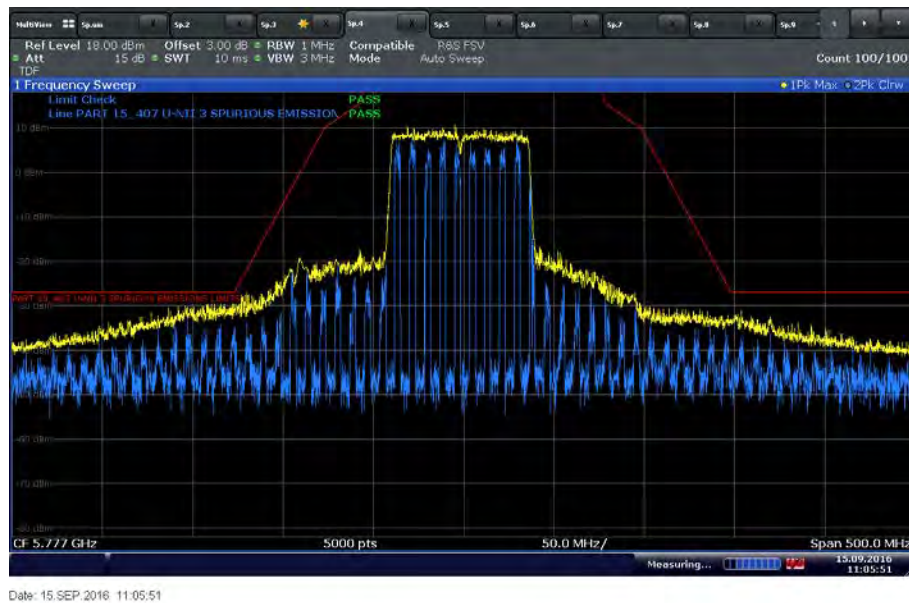
802.11ac (20MHz BW) U-NII 3 High Channel Emission Mask



802.11ac (40MHz BW) U-NII 3 Low Channel Emission Mask



802.11ac (40MHz BW) U-NII 3 High Channel Emission Mask



802.11ac (80MHz BW) U-NII 3 Mid Channel Emission Mask

2.9 FREQUENCY STABILITY

2.9.1 Specification Reference

§15.407 (g)

2.9.2 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

2.9.3 Equipment Under Test and Modification State

Serial No: SZ170616900012 / Test Configuration B

2.9.4 Date of Test/Initial of test personnel who performed the test

August 26, 2016/FSC

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.8 °C
Relative Humidity	51.8 %
ATM Pressure	99.0 kPa

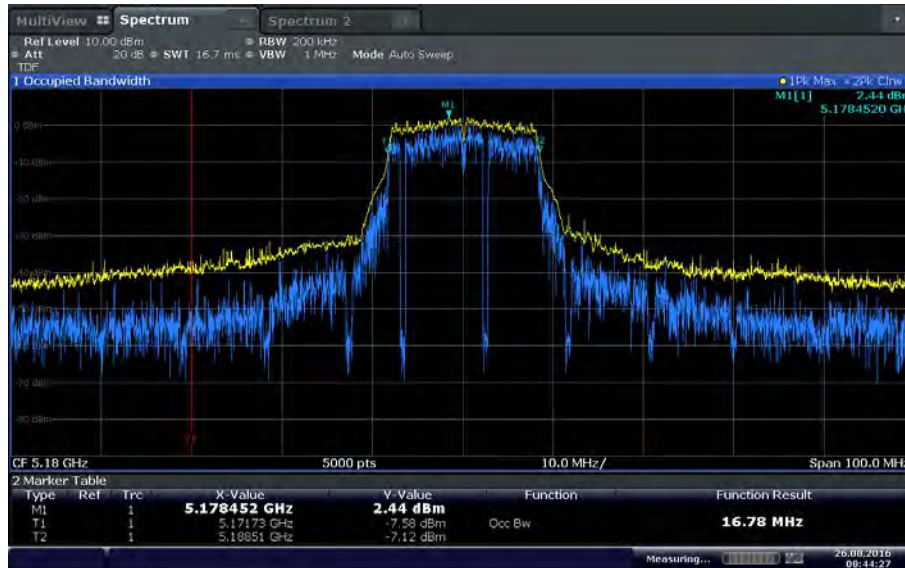
2.9.7 Additional Observations

- This is a verification tests of frequency stability that the EUT emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.
- Only the worst case channel, BW and data rate/modulation presented.
- Normal operation specification as provided by the manufacturer:

Voltage	3.3VDC (Min with 3.2VDC shutdown)
	3.8VDC Nominal
	4.3 VDC Max
Temperature	-10°C (Min)
	45°C (Max)

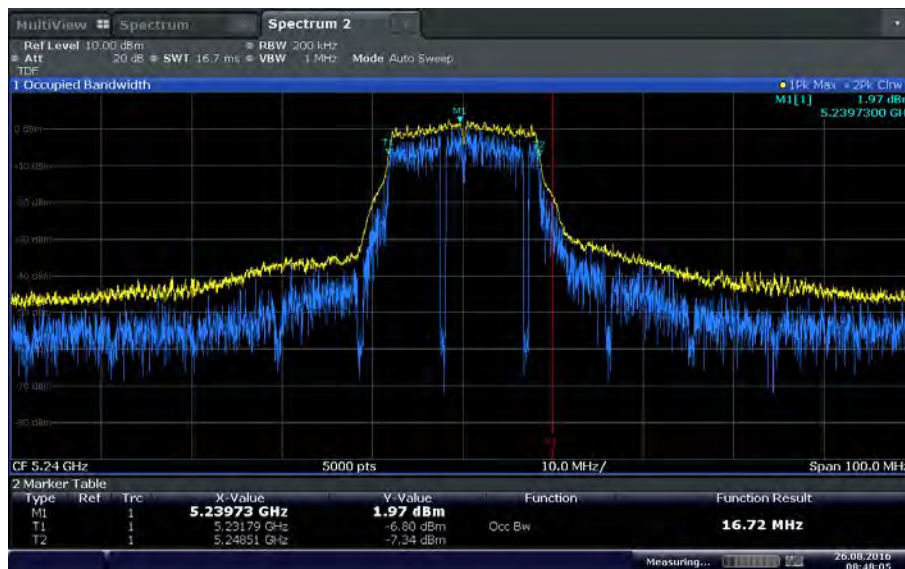
- Vertical line (V1) represents edge of band of operation (U-NII 1 or 3).
- EUT verified using 99% OBW test methodology.

2.9.8 Verification Plots



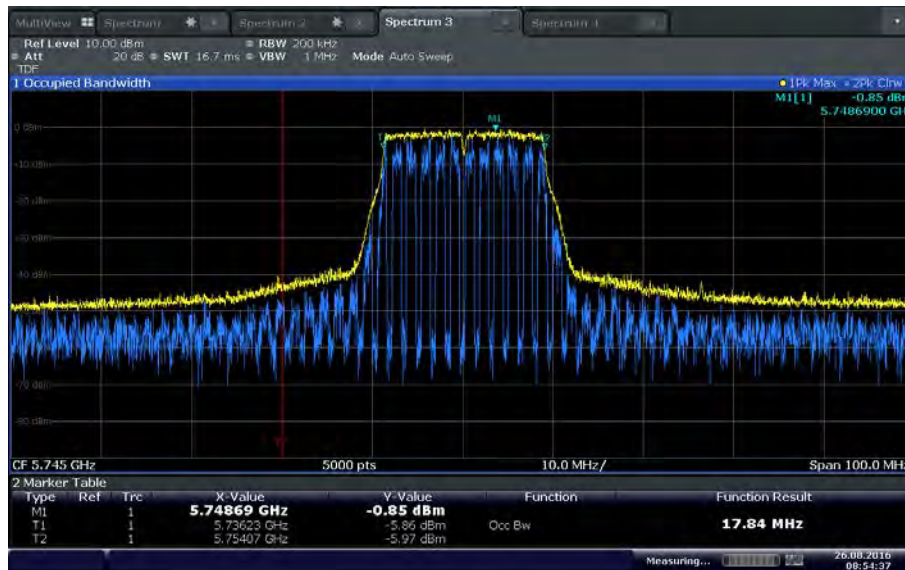
Date: 26 AUG 2016 08:44:27

802.11a Low Channel U-NII 1 @ -10°C



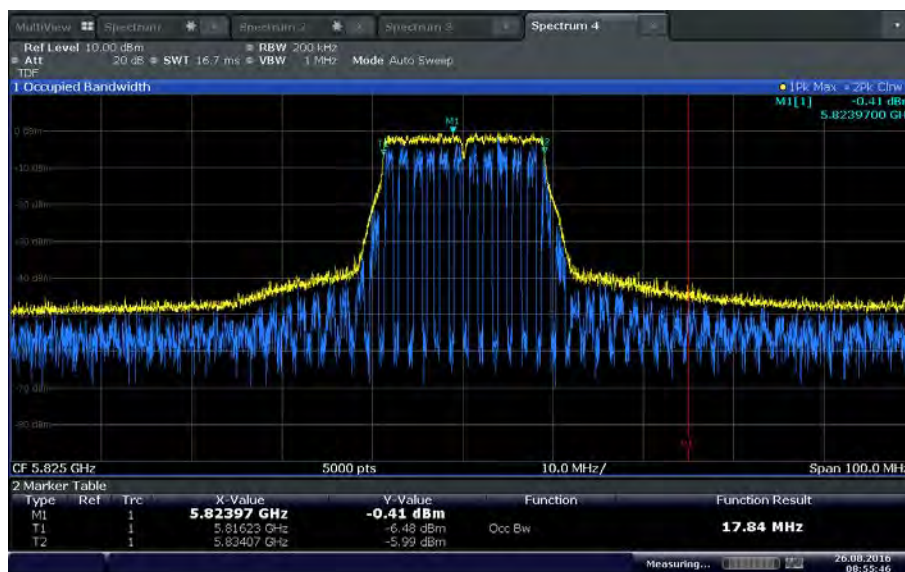
Date: 26 AUG 2016 08:48:05

802.11a High Channel U-NII 1 @ -10°C



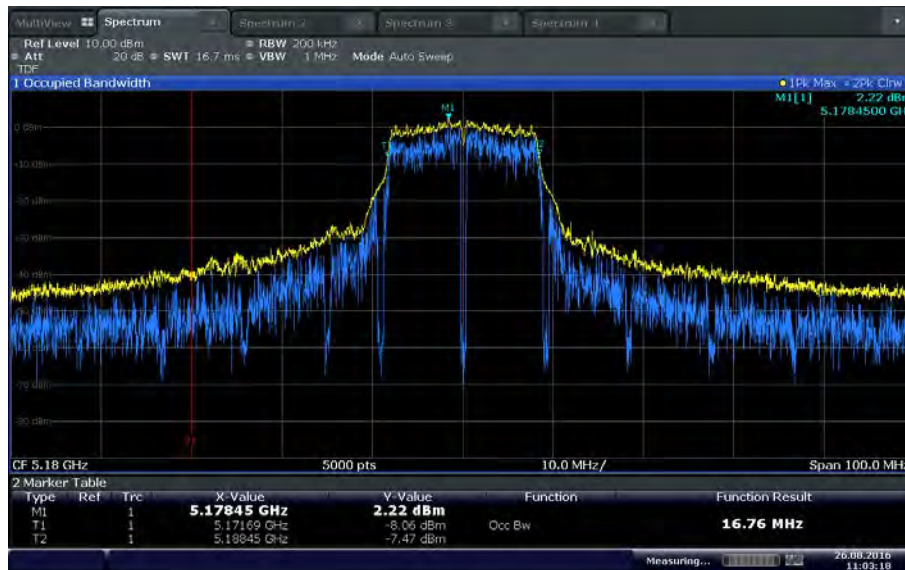
Date: 26 AUG 2016 08:54:37

802.11n Low Channel U-NII 3 @ -10°C



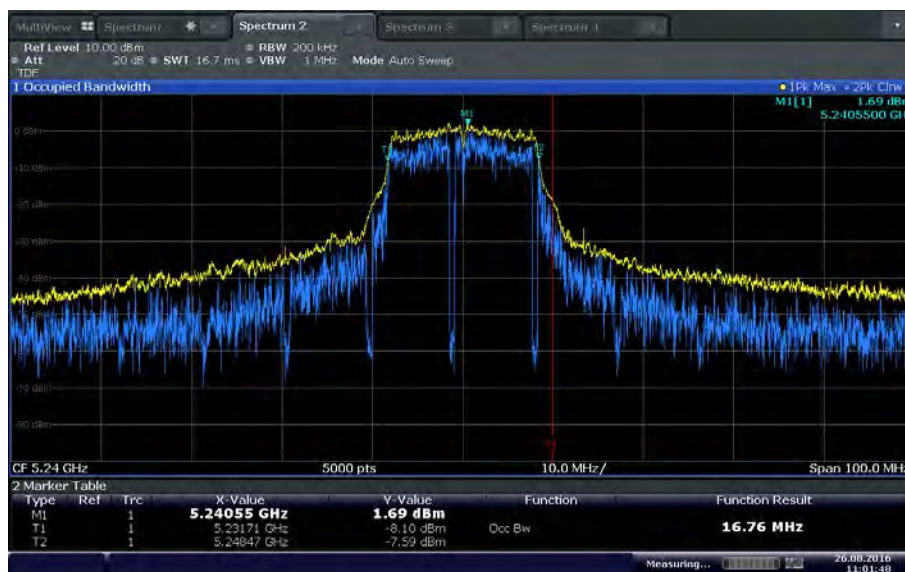
Date: 26 AUG 2016 08:55:47

802.11n High Channel U-NII 3 @ -10°C



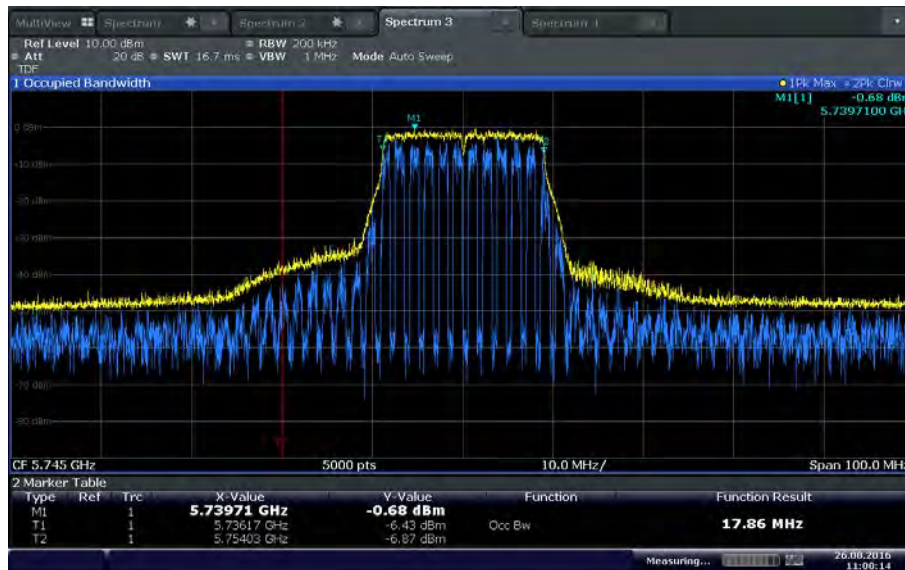
Date: 26 AUG 2016 11:03:18

802.11a Low Channel U-NII 1 @ 45°C



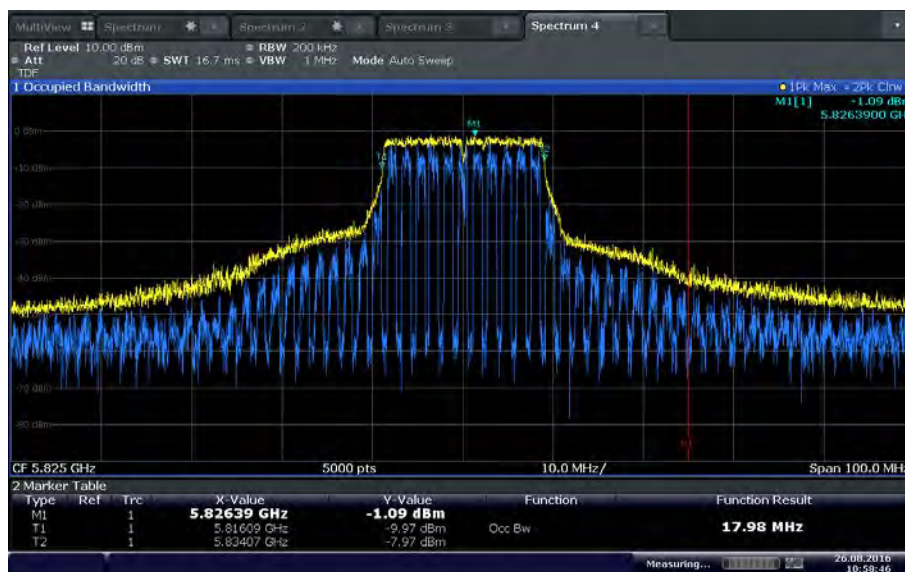
Date: 26 AUG 2016 11:01:48

802.11a High Channel U-NII 1 @ 45°C



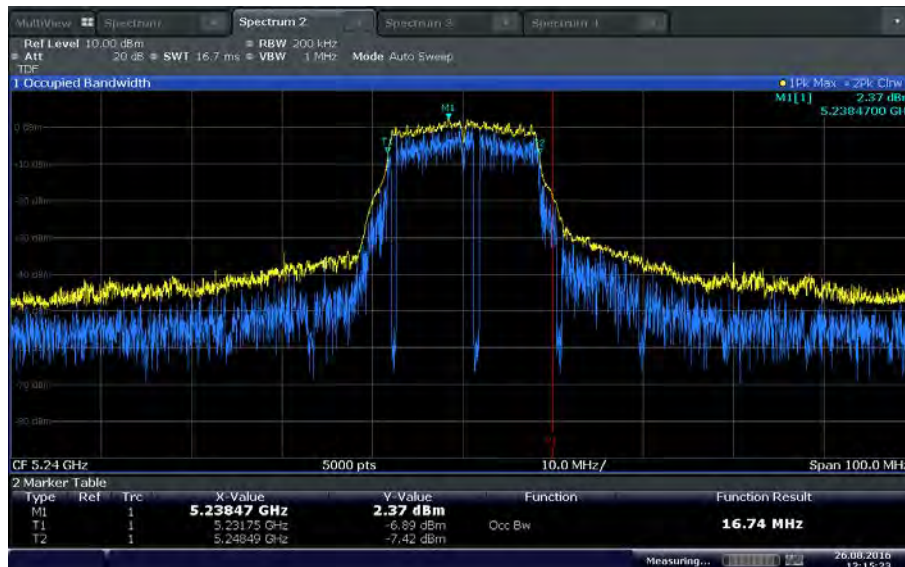
Date: 26 AUG 2016 11:00:15

802.11n Low Channel U-NII 3 @ 55°C



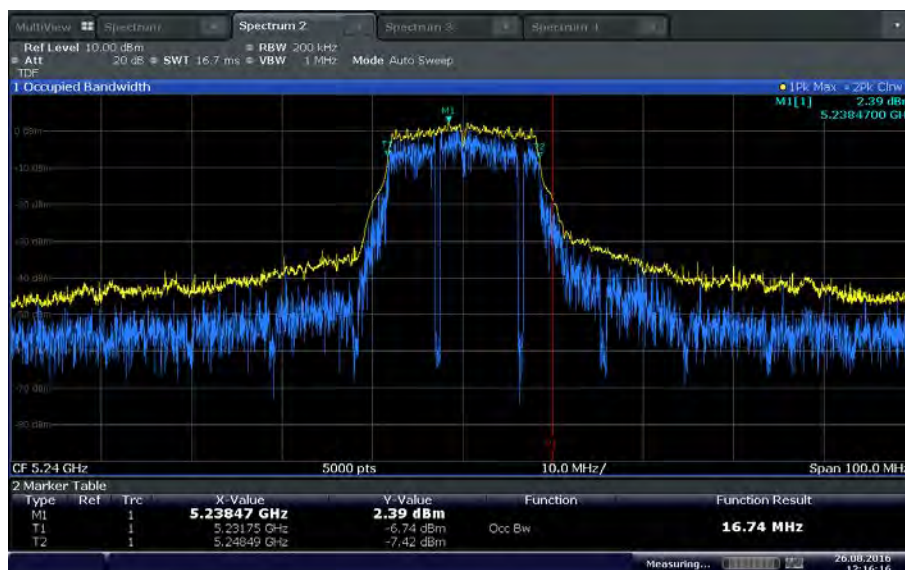
Date: 26 AUG 2016 10:58:47

802.11n High Channel U-NII 3 @ 45°C



Date: 26 AUG 2016 12:15:23

802.11a High Channel U-NII 1 @ 20°C/3.3VDC



Date: 26 AUG 2016 12:16:16

802.11a High Channel U-NII 1 @ 20°C/4.3VDC



2.10 INDOOR OPERATION ONLY

2.10.1 Specification Reference

RSS-247 6.2.1

2.10.2 Standard Applicable

LE-LAN devices are restricted to indoor operation only in the band 5150-5250 MHz.

2.10.3 Manufacturer Declaration

NOVATEL WIRELESS

Date: September 21, 2016

TUV SUD BABT FCB
Octagon House,
Segensworth Road,
Fareham,
Hampshire,
PO15 5RL

U-NII Band 1 Declaration Letter

IC Certification No: 3229A-MIFI7000

To Whom It May Concern:

Pursuant to RSS-247 Paragraph 6.2.1, we, Novatel Wireless declare use in the U-NII (Unlicensed National Information Infrastructure) Band 1 (5150-5250 MHz) is restricted to Indoor Use Only to reduce potential for harmful interference to Co-Channel Mobile Satellite Systems.

In Addition, the fundamental emission is maintained within the band of operation within its "normal" operating condition on product Model MIFI7000.

Sincerely,

A handwritten signature in black ink, appearing to read 'Roman Olmos', written over a horizontal line.

Roman Olmos
Sr. Regulatory Engineer
Novatel Wireless Inc.

NOVATEL WIRELESS, INC.
9645 Scranton Road Suite 205, San Diego CA 92121
Toll Free: 888.888.9231 • Main 858.812.3400 • Fax 858.812.3402
www.novatelwireless.com NASDAQ: MIFI



SECTION 3

TEST EQUIPMENT USED



3.7 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	09/25/14	09/25/16
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	09/29/15	09/29/16
1016	Pre-amplifier	PAM-0202	187	PAM	12/15/15	12/15/16
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	05/12/16	05/12/17
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/16	03/17/17
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	01/11/16	01/11/17
1054	Horn antenna (18-40 GHz)	3116	9407-2233	EMCO	12/22/15	12/22/17
8789	20dB Attenuator	HAT-20	YUU29001245	Mini Circuits	Verified by 1003 and 7611	
8792	20dB Attenuator	HAT-20	YUU29001245	Mini Circuits	Verified by 1003 and 7611	
	Pre-amplifier (18-40 GHz)	SLKka-30-6	15G27	Spacek Labs	Verified by 1003 and 7611	
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	05/16/16	05/16/17
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	02/01/16	02/01/17
8818	5.0GHz Band Notch Filter	BRM50716	015	Micro-Tronics	Verified by 1003 and 7611	
AC Conducted Emissions						
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	09/03/15	09/03/16
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	10/28/15	10/28/16
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/29/16	02/28/17
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/29/16	02/28/17
Antenna Conducted Port Test Setup						
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	02/01/16	02/01/17
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7611 and 7608	
7606	USB RF Power Sensor	RadiPower RPR3006W	14I00048SNO048	DARE!! Instruments	09/24/15	09/24/16
7607	USB RF Power Sensor	RadiPower RPR3006W	14I00048SNO047	DARE!! Instruments	11/18/15	11/18/16
7579	Temperature Chamber	115	151617	TestQuity	08/25/15	08/25/17
Miscellaneous						
1123	DC Power Supply	E3631A	N/A	Hewlett Packard	Verified by 6452	
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/14/15	08/14/16
7560	Barometer/Temperature/Humidity Transmitter	iBTHX-W	1240476	Omega	10/19/15	10/19/16
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.8 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.8.1 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.78
Coverage Factor (k):					2
Expanded Uncertainty:					3.57

3.8.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.78
Coverage Factor (k):					2
Expanded Uncertainty:					3.56

3.8.3 Conducted Antenna Port Measurement

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.34	0.20	0.04
2	Cables	Rectangular	0.30	0.17	0.03
3	EUT Setup	Rectangular	0.50	0.29	0.08
Combined Uncertainty (u_c):					0.39
Coverage Factor (k):					1.96
Expanded Uncertainty:					0.76

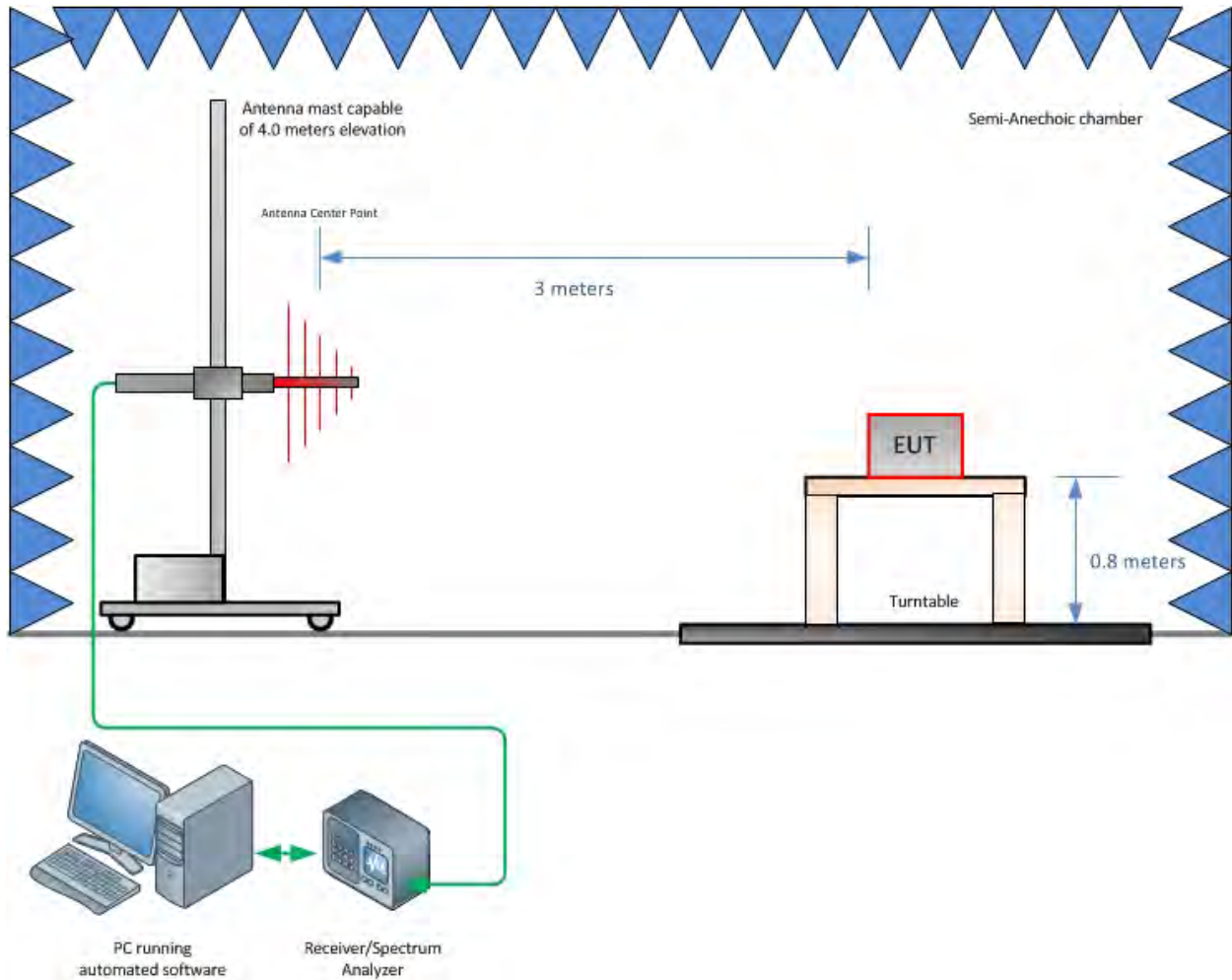
3.8.4 AC Conducted Emissions

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.80
Coverage Factor (k):					2
Expanded Uncertainty:					1.59

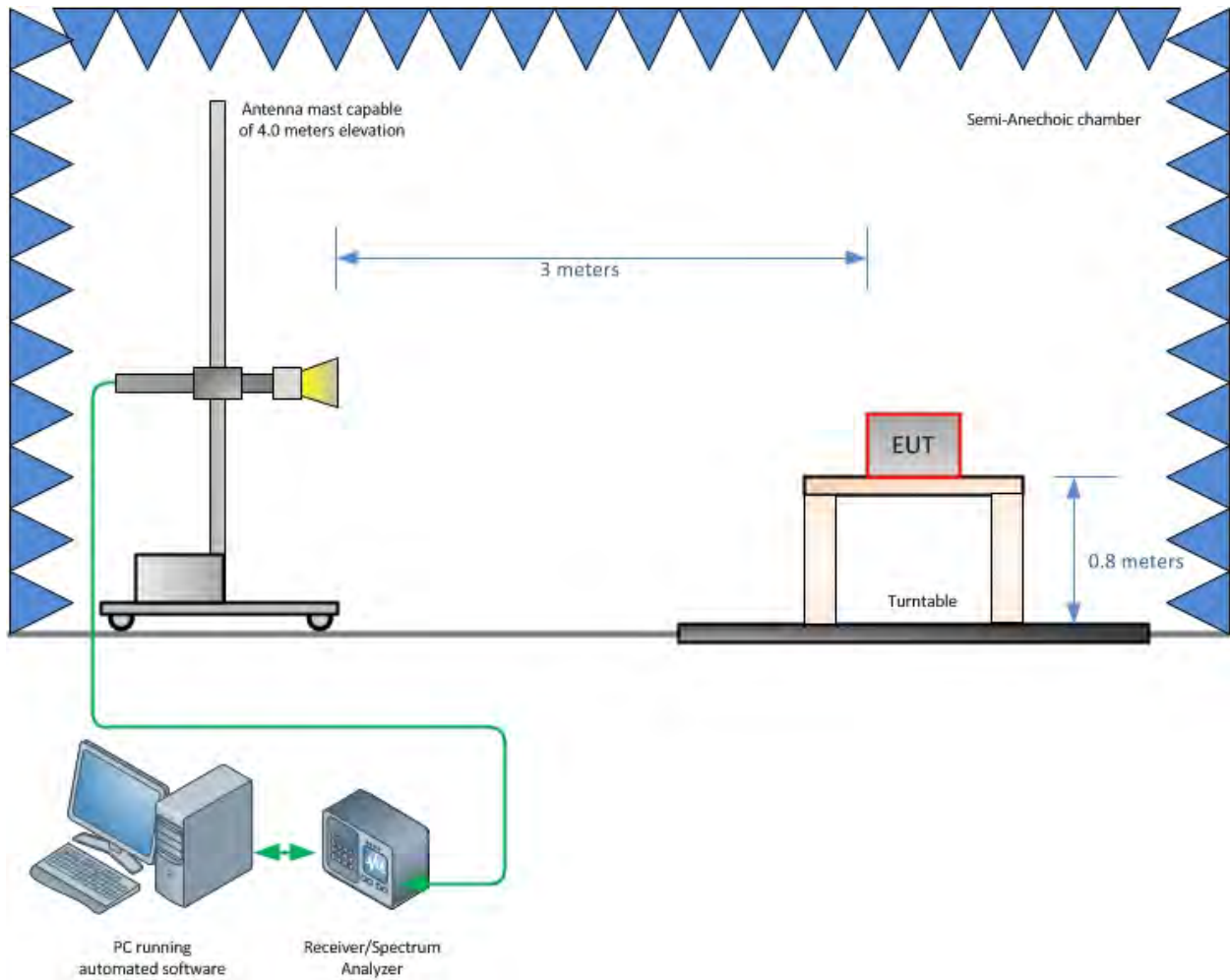
SECTION 4

DIAGRAM OF TEST SETUP

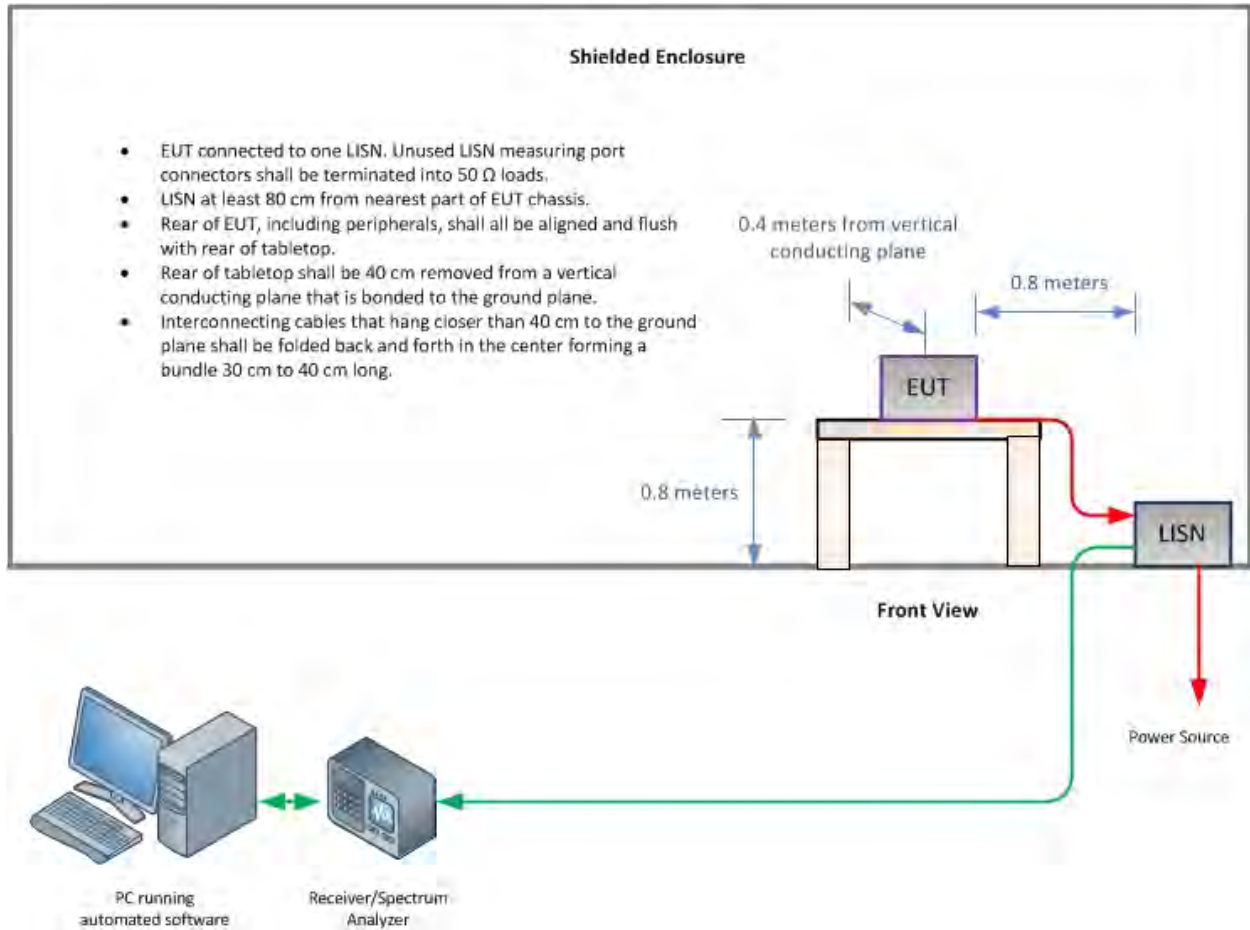
4.7 TEST SETUP DIAGRAM



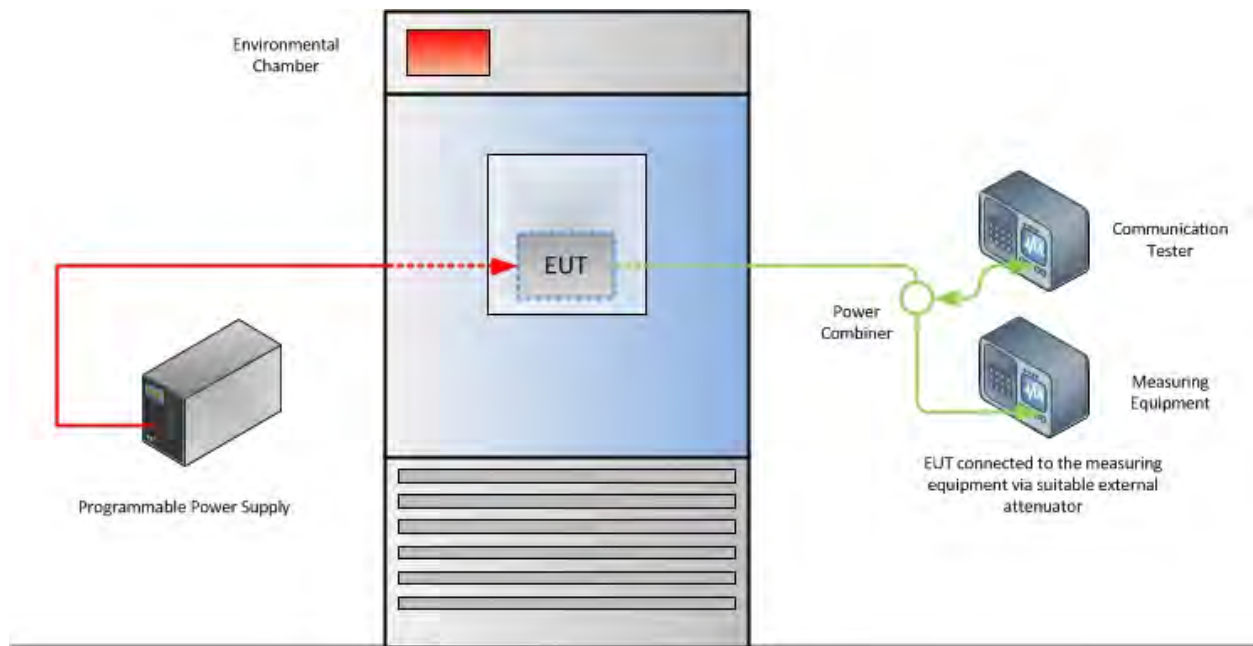
Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Conducted Emission Test Setup



Frequency Stability Test Configuration

** Diagram presented is for a typical licensed cellular test setup, the EUT on the other hand does not use a Communication tester instead it uses a direct connection to the support laptop (please see separate test setup photo for details).*



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.7 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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