

Fig. 53 Band Edges (802.11a, CH100 5500MHz)

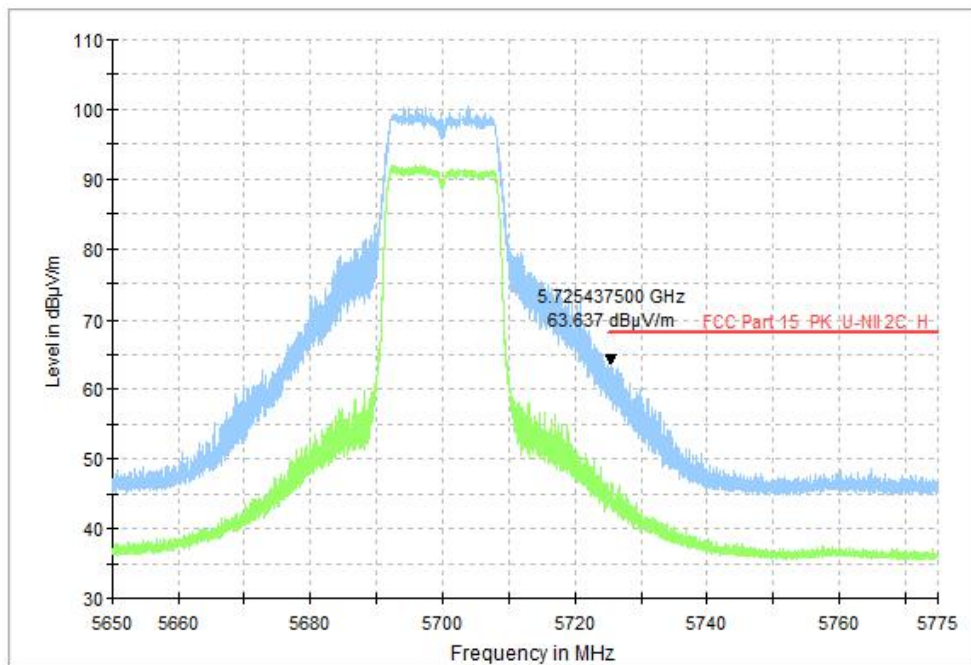


Fig. 54 Band Edges (802.11a, CH140 5700MHz)

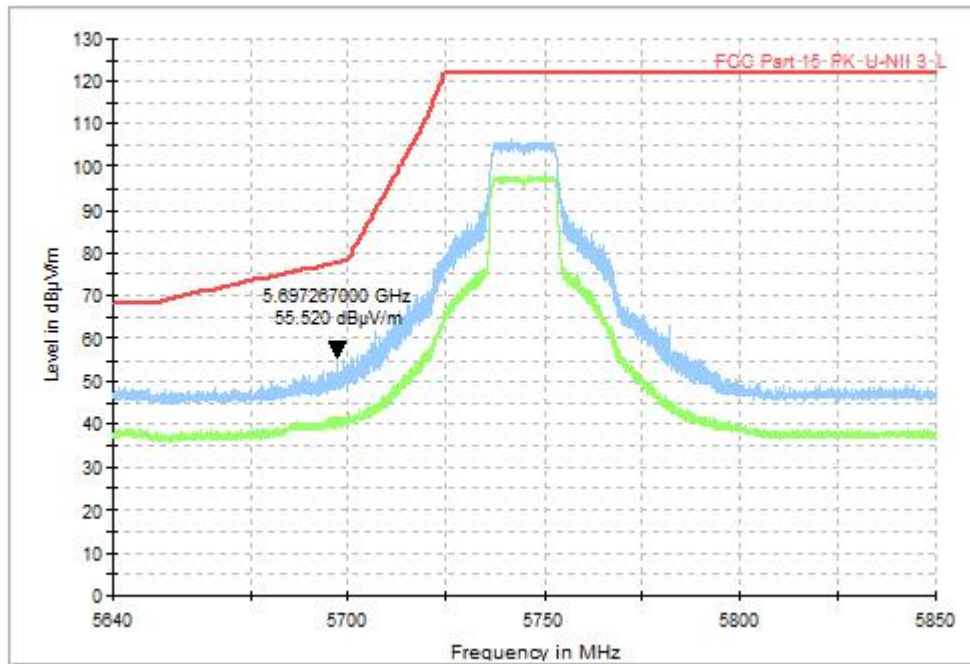


Fig. 55 Band Edges (802.11a, CH149 5745MHz)

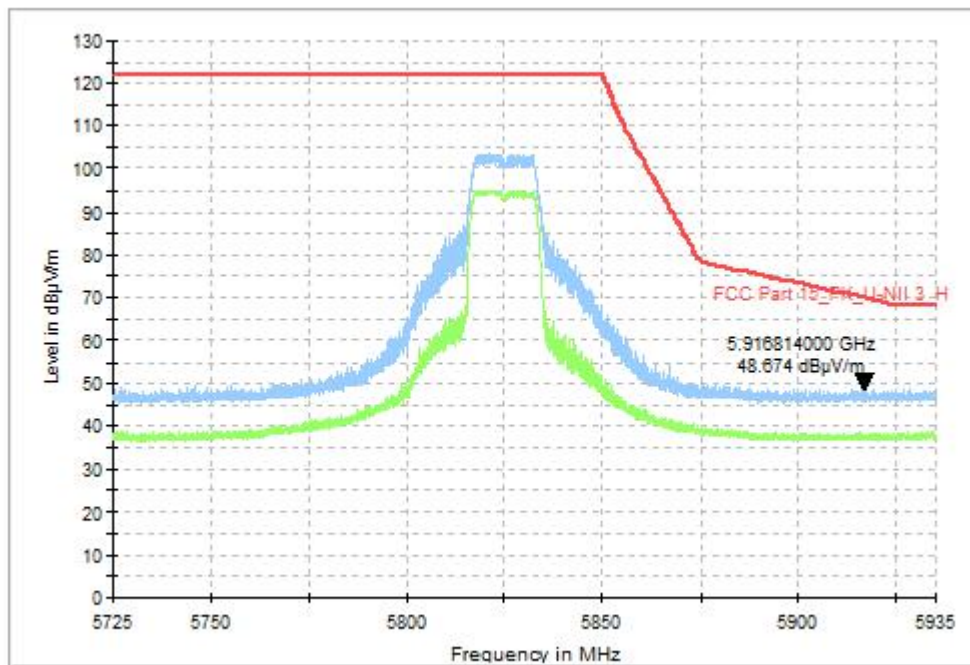


Fig. 56 Band Edges (802.11a, CH165 5825MHz)

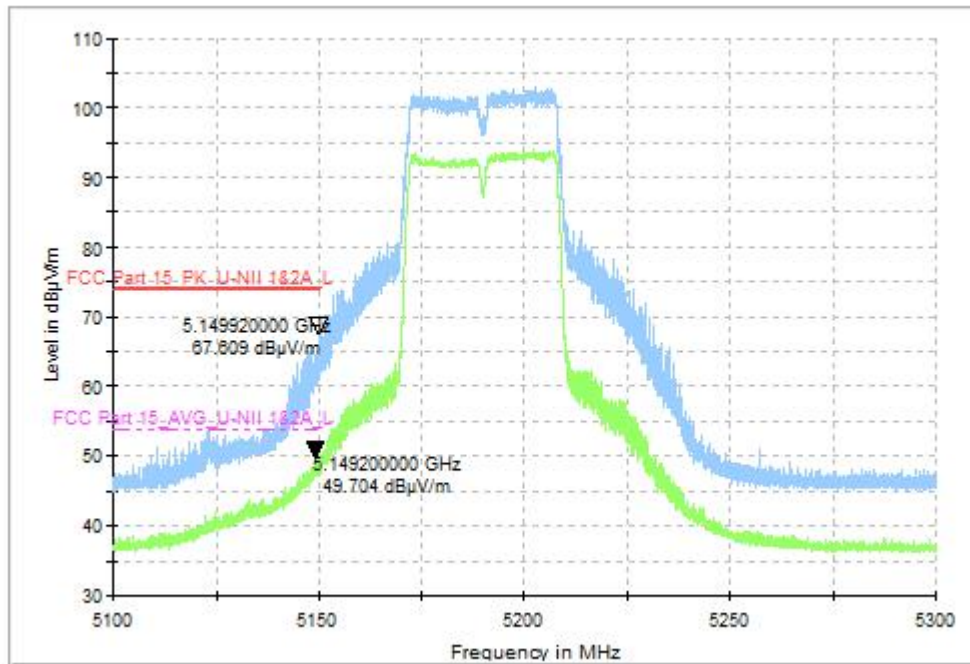


Fig. 57 Band Edges (802.11n-HT40, CH38 5190MHz)

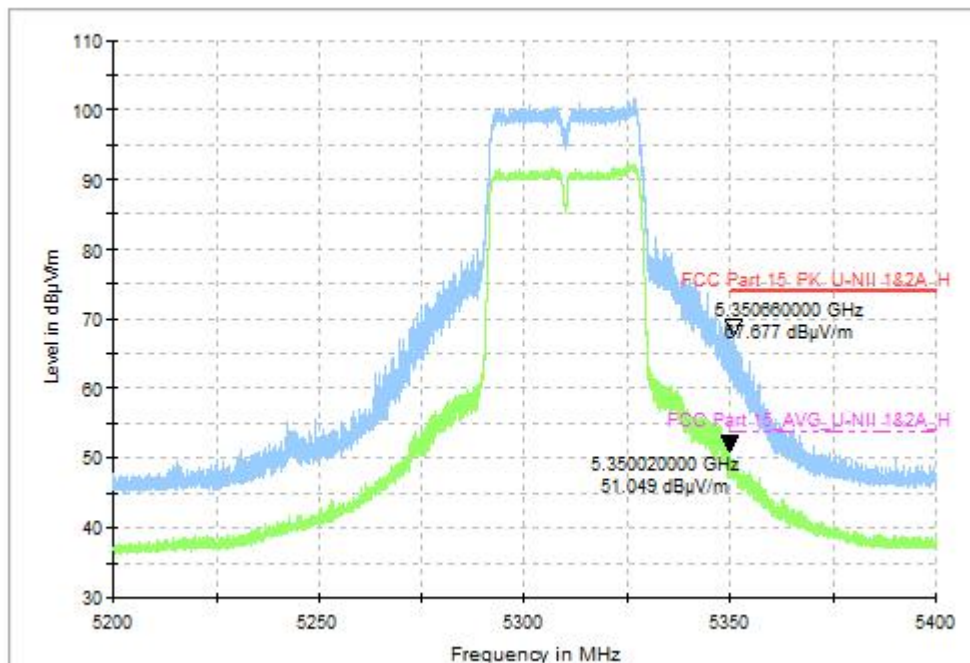


Fig. 58 Band Edges (802.11n-HT40, CH62 5310MHz)

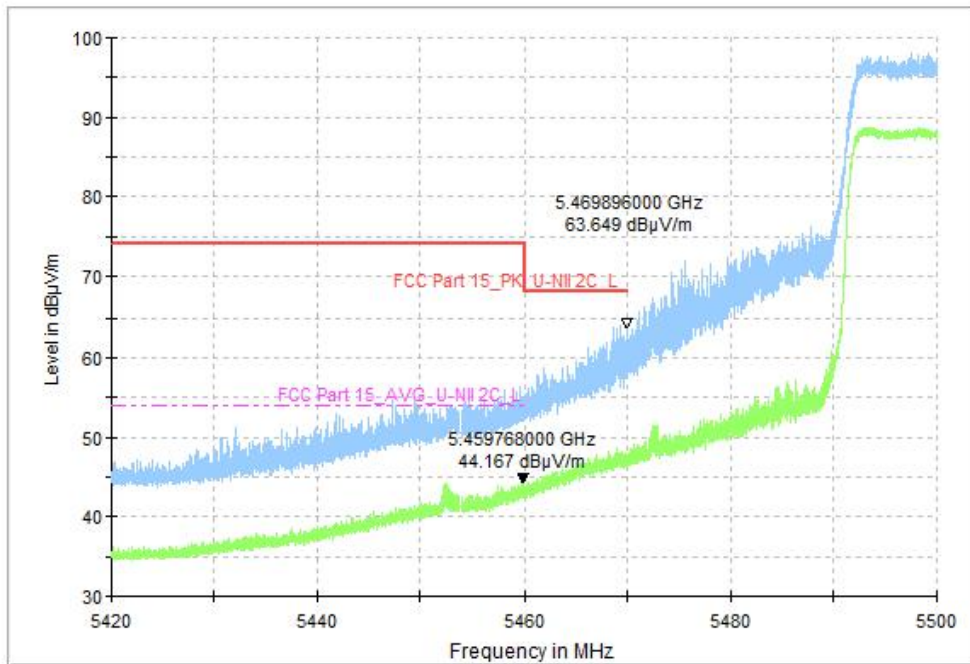


Fig. 59 Band Edges (802.11n-HT40, CH102 5510MHz)

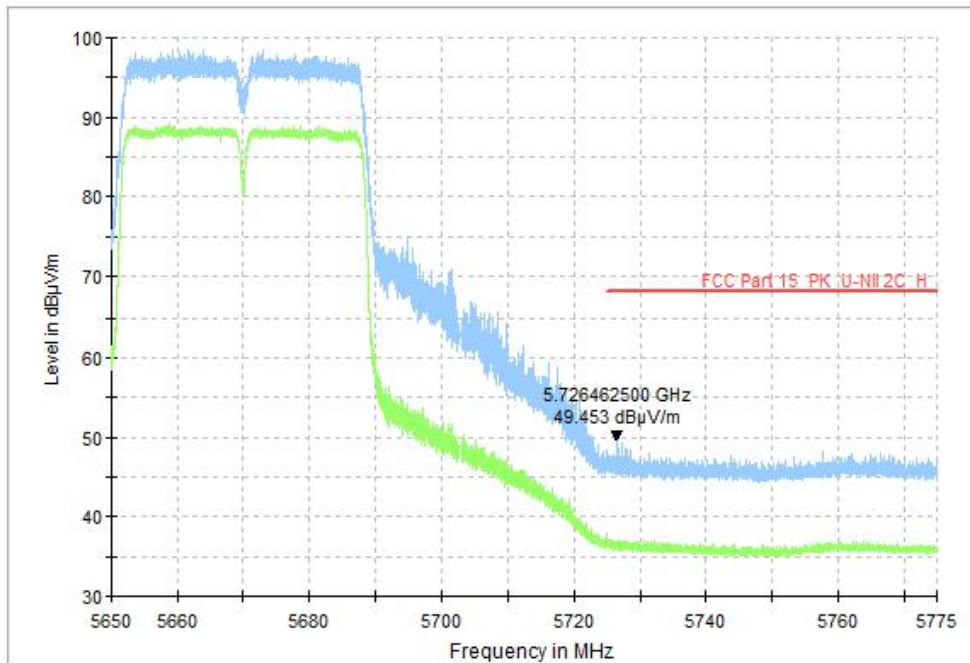


Fig. 60 Band Edges (802.11n-HT40, CH134 5670MHz)

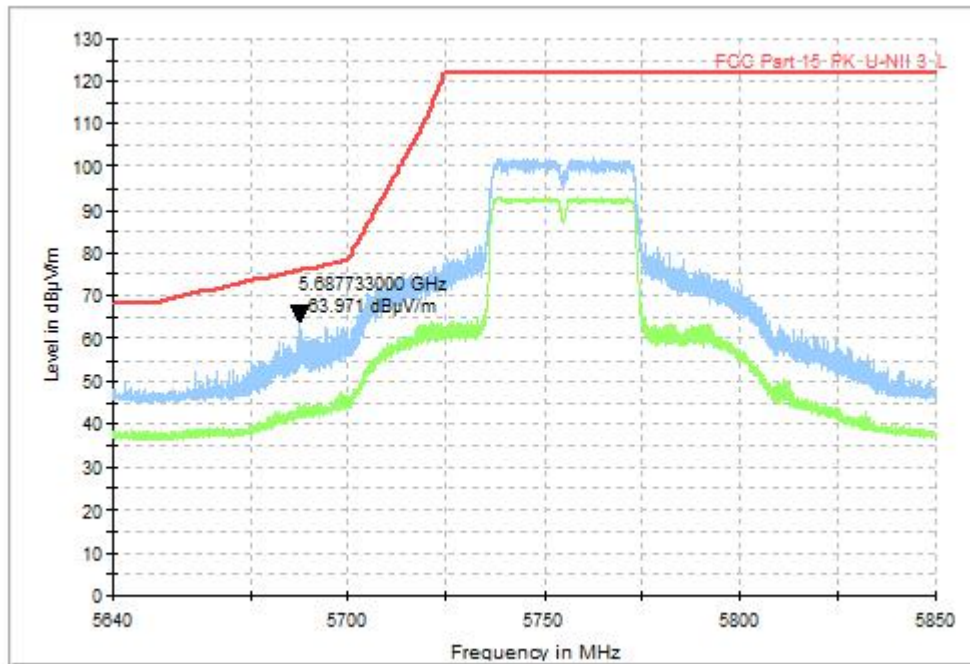


Fig. 61 Band Edges (802.11n-HT40, CH151 5755MHz)

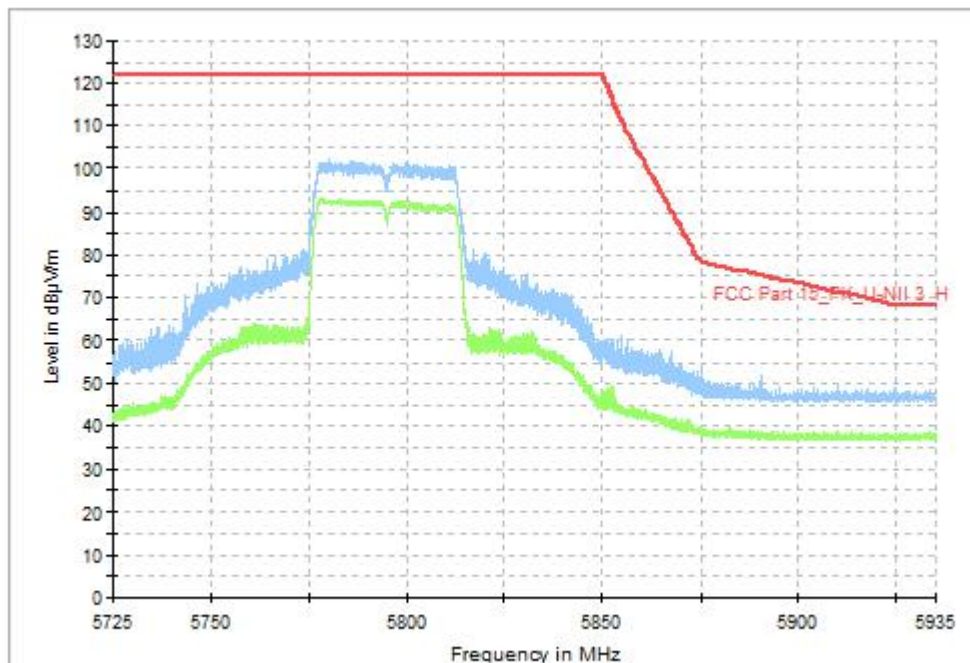


Fig. 62 Band Edges (802.11n-HT40, CH159 5795MHz)

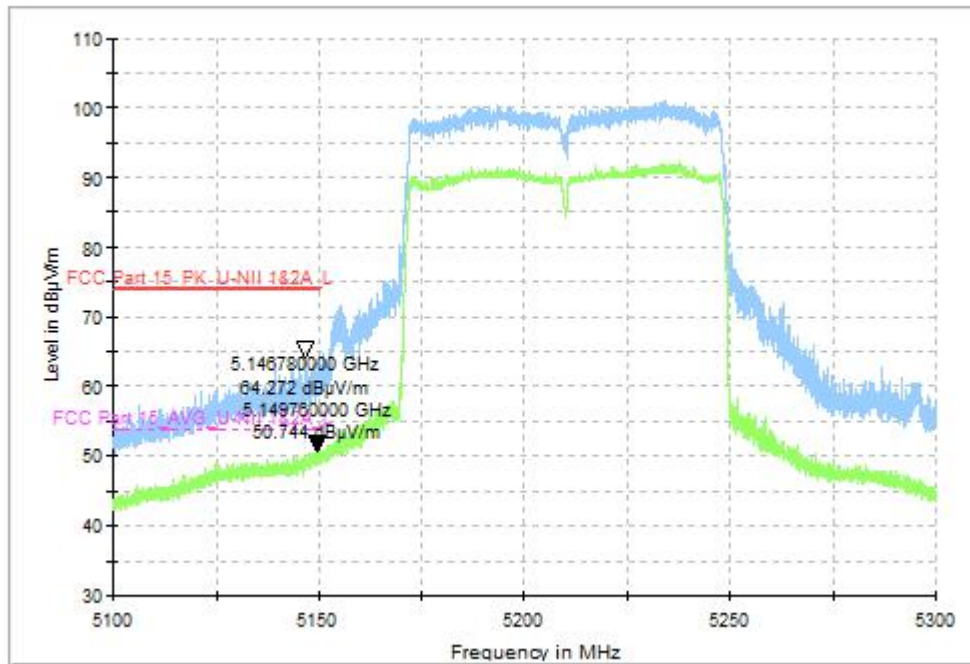


Fig. 63 Band Edges (802.11ac-VHT80, CH42 5210MHz)

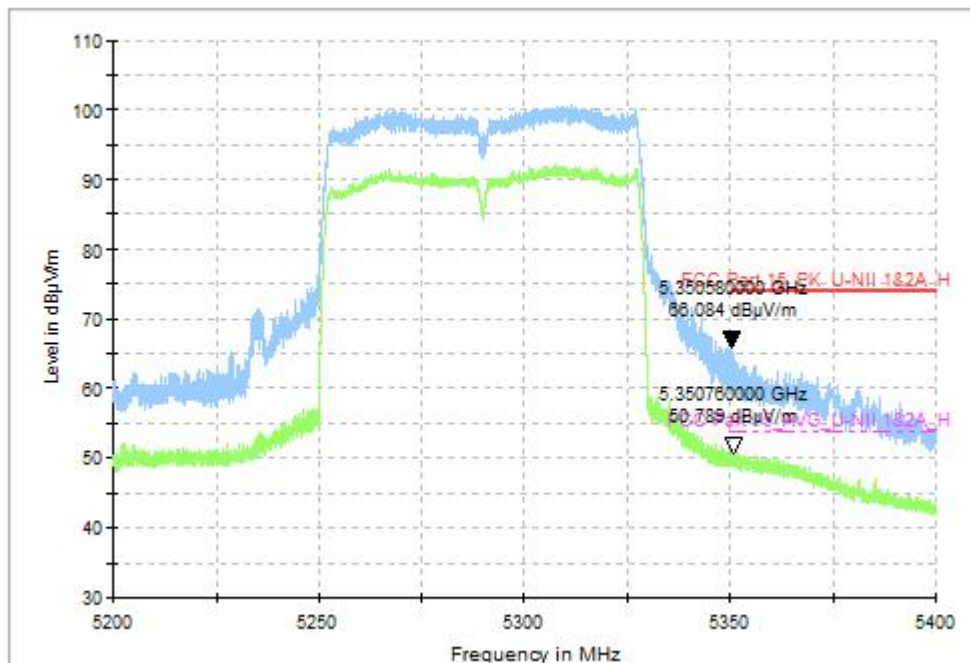


Fig. 64 Band Edges (802.11ac-VHT80, CH58 5290MHz)

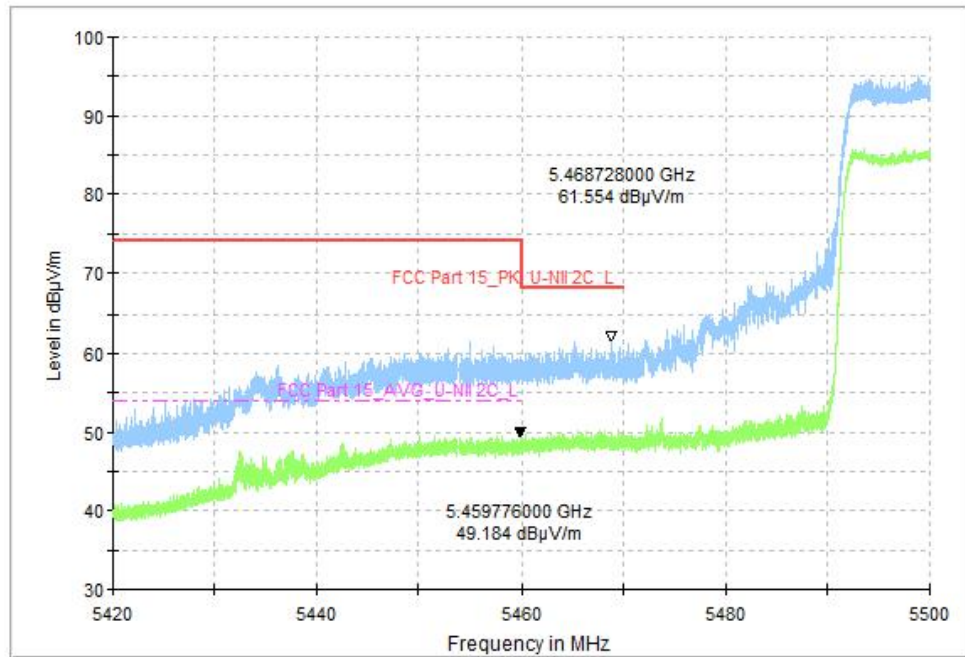


Fig. 65 Band Edges (802.11ac-VHT80, CH106 5530MHz)

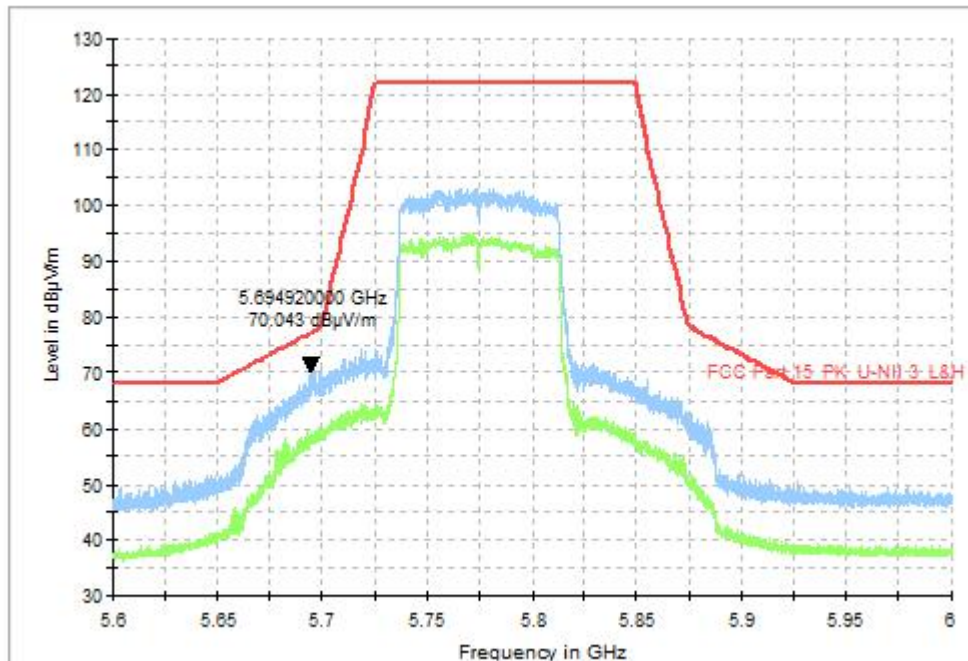


Fig. 66 Band Edges (802.11ac-VHT80, CH155 5775MHz)



A.9. Transmitter Spurious Emission

Measurement Limit:

Standard	Limit (dBuV/m)	
	Peak	74
FCC 47 CFR Part 15.209	Average	54

The measurement is made according to KDB 789033.

In addition, 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)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength (dB μ V/m)	Measurement distance (m)
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

Note: For frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m.

All modes have been evaluated and tested, the worst results of **11a**, **11n-HT40** and **11ac-VHT80** mode were selected and showed in this test case.

Measurement Result:

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	5180MHz(Ch36)	1 GHz ~18 GHz	Fig.67	P
	5200MHz(Ch40)	1 GHz ~18 GHz	Fig.68	P
	5240MHz(Ch48)	1 GHz ~18 GHz	Fig.69	P
	5260MHz(Ch52)	1 GHz ~18 GHz	Fig.70	P
	5280MHz(Ch56)	1 GHz ~18 GHz	Fig.71	P
	5320MHz(Ch64)	1 GHz ~18 GHz	Fig.72	P
	5500MHz(Ch100)	1 GHz ~18 GHz	Fig.73	P
	5600MHz(Ch120)	1 GHz ~18 GHz	Fig.74	P
	5700MHz(Ch140)	1 GHz ~18 GHz	Fig.75	P
	5745MHz(Ch149)	1 GHz ~18 GHz	Fig.76	P
	5785MHz(Ch157)	1 GHz ~18 GHz	Fig.77	P
5825MHz(Ch165)	1 GHz ~18 GHz	Fig.78	P	
802.11n- HT40	5190MHz(Ch38)	1 GHz ~18 GHz	Fig.79	P
	5230MHz(Ch46)	1 GHz ~18 GHz	Fig.80	P
	5270MHz(Ch54)	1 GHz ~18 GHz	Fig.81	P
	5310MHz(Ch62)	1 GHz ~18 GHz	Fig.82	P
	5510MHz(Ch102)	1 GHz ~18 GHz	Fig.83	P
	5580MHz(Ch118)	1 GHz ~18 GHz	Fig.84	P
	5670MHz(Ch134)	1 GHz ~18 GHz	Fig.85	P
	5755MHz(Ch151)	1 GHz ~18 GHz	Fig.86	P
5795MHz(Ch159)	1 GHz ~18 GHz	Fig.87	P	
802.11ac -VHT80	5210MHz(Ch42)	1 GHz ~18 GHz	Fig.88	P
	5290MHz(Ch58)	1 GHz ~18 GHz	Fig.89	P
	5530MHz(Ch106)	1 GHz ~18 GHz	Fig.90	P
	5610MHz(Ch122)	1 GHz ~18 GHz	Fig.91	P
	5775MHz(Ch155)	1 GHz ~18 GHz	Fig.92	P
All channels		30 MHz ~1 GHz	Fig.93	P
		18 GHz ~26.5 GHz	Fig.94	P
		26.5GHz~40GHz	Fig.95	P



802.11a CH40

Frequency (MHz)	Max Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
12949.533333	47.66	68.20	20.54	V	9.2
14186.300000	48.93	68.20	19.27	V	11.6
15208.566667	49.28	68.20	18.92	H	11.6
16880.933333	52.04	68.20	16.16	V	16.1
17454.033333	51.40	68.20	16.80	H	16.0
17978.733333	51.75	74.00	22.25	V	16.9

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
10979.066667	34.49	54.00	19.51	V	6.4
11849.533333	35.68	54.00	18.32	V	8.0
12498.166667	36.01	54.00	17.99	V	8.6
13331.233333	36.02	54.00	17.98	V	9.6
15901.200000	38.52	54.00	15.48	H	14.2
17949.766667	40.20	54.00	13.80	V	17.2

802.11n-HT40 CH54

Frequency (MHz)	Max Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
13126.633333	48.22	68.20	19.98	V	9.8
14239.100000	49.41	68.20	18.79	V	11.7
15281.900000	49.36	68.20	18.84	V	12.0
16907.700000	51.48	68.20	16.72	V	15.9
17503.533333	51.49	68.20	16.71	H	16.2
17995.966667	51.30	74.00	22.70	V	16.9

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
10790.966667	34.55	54.00	19.45	V	6.4
11525.400000	35.26	54.00	18.74	V	6.9
12194.566667	35.88	54.00	18.12	V	8.4
13311.800000	36.08	54.00	17.92	H	9.7
15930.533333	38.43	54.00	15.57	H	14.5
17950.500000	40.18	54.00	13.82	H	17.2

**802.11ac-VHT80 CH155**

Frequency (MHz)	Max Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
13124.066667	48.38	68.20	19.82	H	9.8
14211.966667	49.38	68.20	18.82	V	11.6
15318.566667	48.70	68.20	19.50	H	12.1
16869.200000	51.86	68.20	16.34	V	15.8
17311.033333	52.12	68.20	16.08	H	15.8
17957.466667	51.44	74.00	22.56	H	17.0

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
10785.833333	34.70	54.00	19.30	V	6.3
11552.166667	35.19	54.00	18.81	H	7.1
12214.000000	35.72	54.00	18.28	V	8.6
13319.133333	35.66	54.00	18.34	H	9.5
15891.666667	38.28	54.00	15.72	V	13.8
17984.600000	40.06	54.00	13.94	V	16.9

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss. P_{Mea} is the field strength recorded from the instrument. The measurement results are obtained as described below:

$$\text{Result} = P_{Mea} + A_{Rpl} = P_{Mea} + \text{Cable Loss} + \text{Antenna Factor}$$

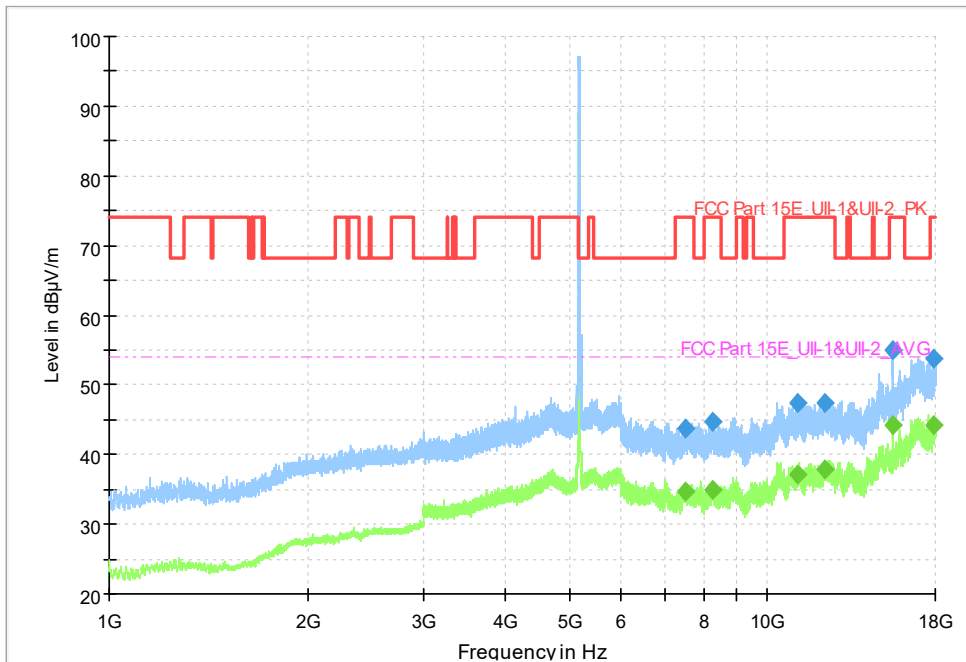


Fig. 67 Transmitter Spurious Emission (802.11a, CH36 5180MHz, 1 GHz ~18 GHz)

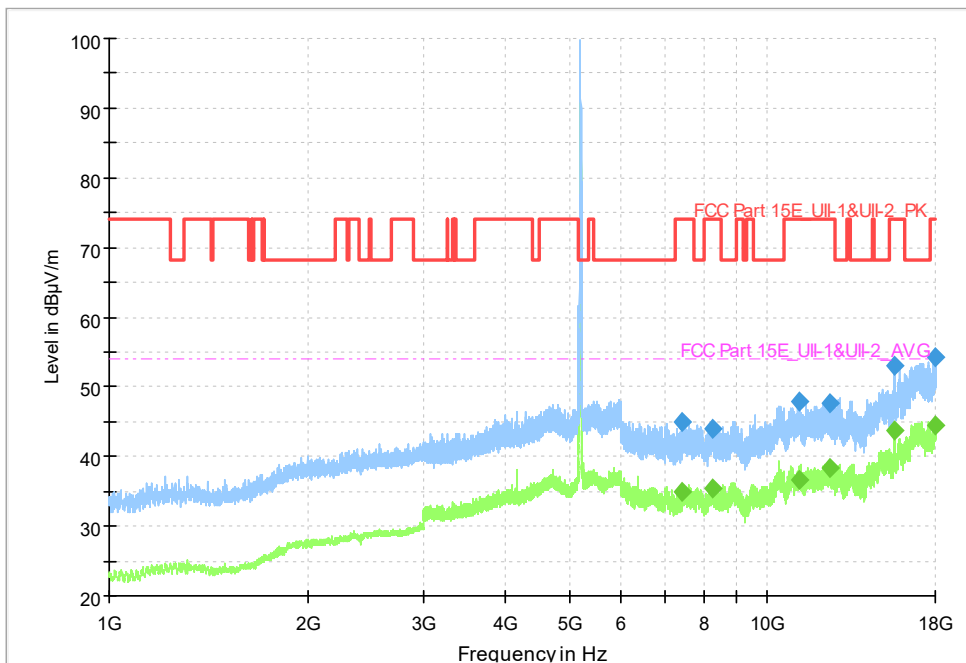


Fig. 68 Transmitter Spurious Emission (802.11a, CH40 5200MHz, 1 GHz ~18 GHz)

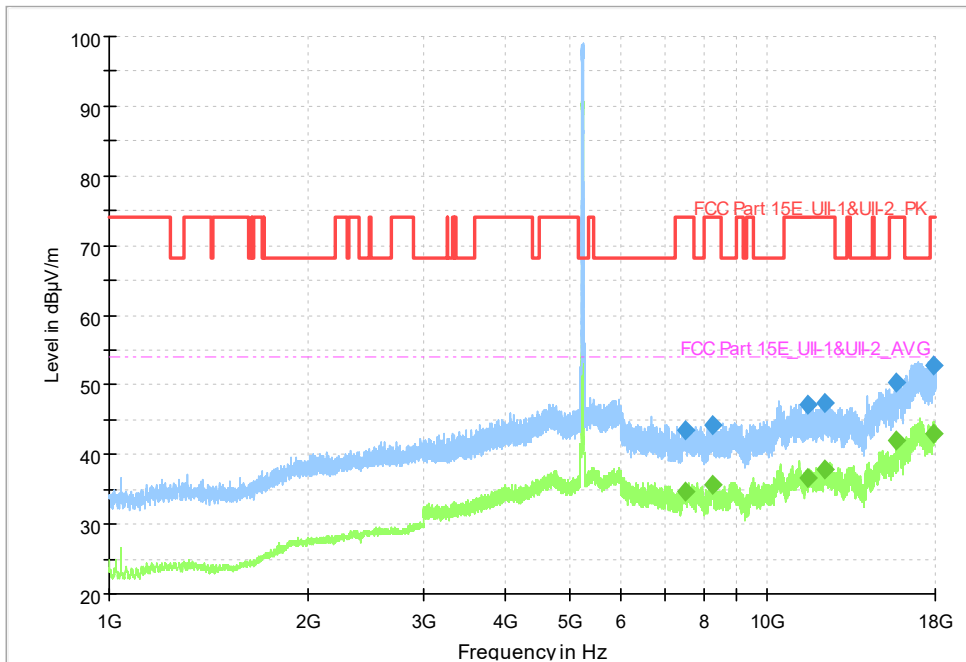


Fig. 69 Transmitter Spurious Emission (802.11a, CH48 5240MHz, 1 GHz ~18 GHz)

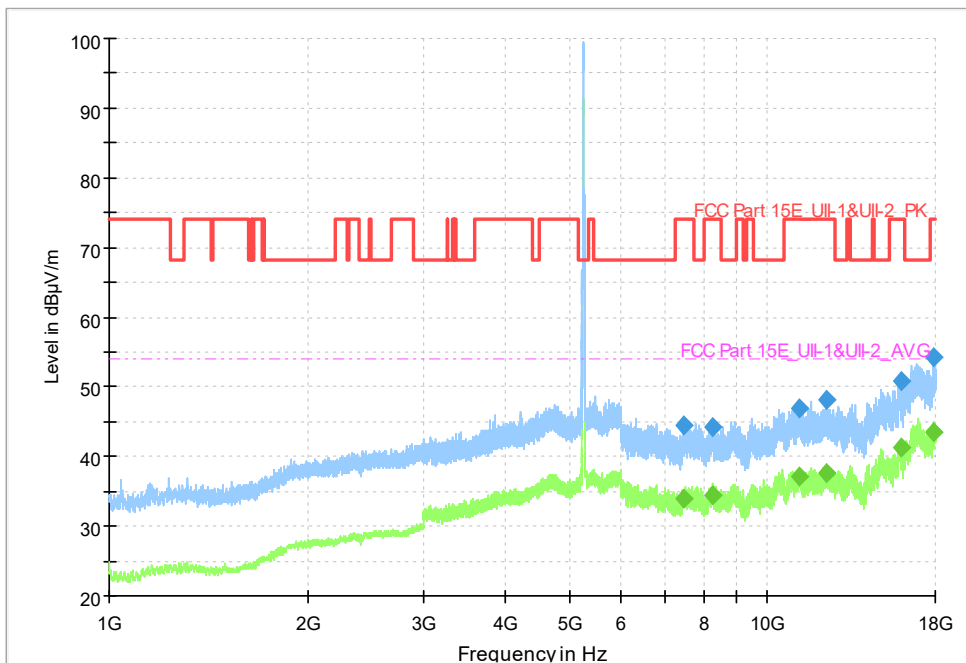


Fig. 70 Transmitter Spurious Emission (802.11a, CH52 5260MHz, 1 GHz ~18 GHz)

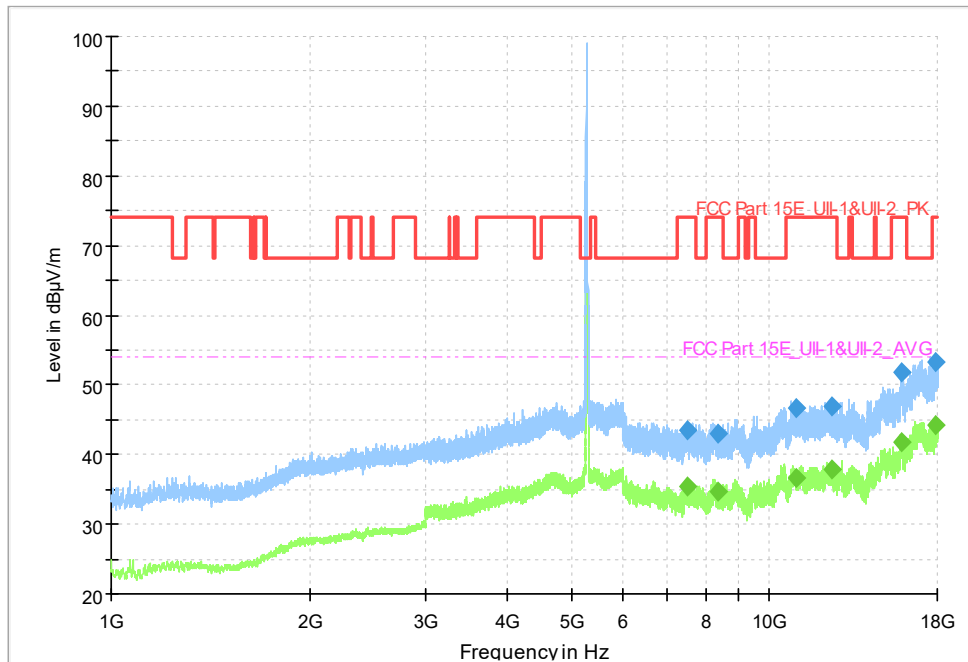


Fig. 71 Transmitter Spurious Emission (802.11a, CH56 5280MHz, 1 GHz ~18 GHz)

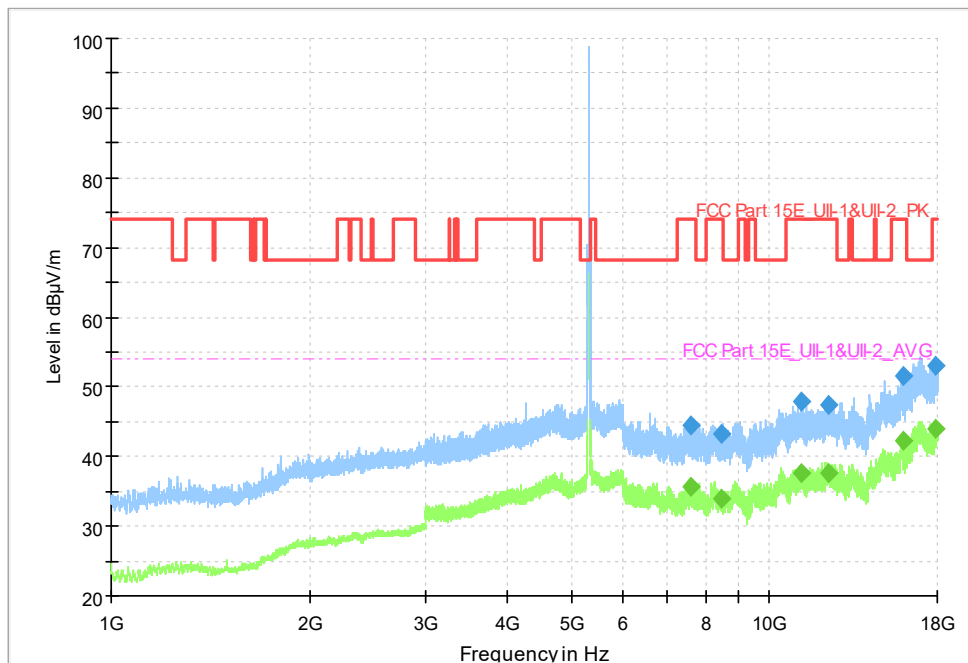


Fig. 72 Transmitter Spurious Emission (802.11a, CH64 5320MHz, 1 GHz ~18 GHz)

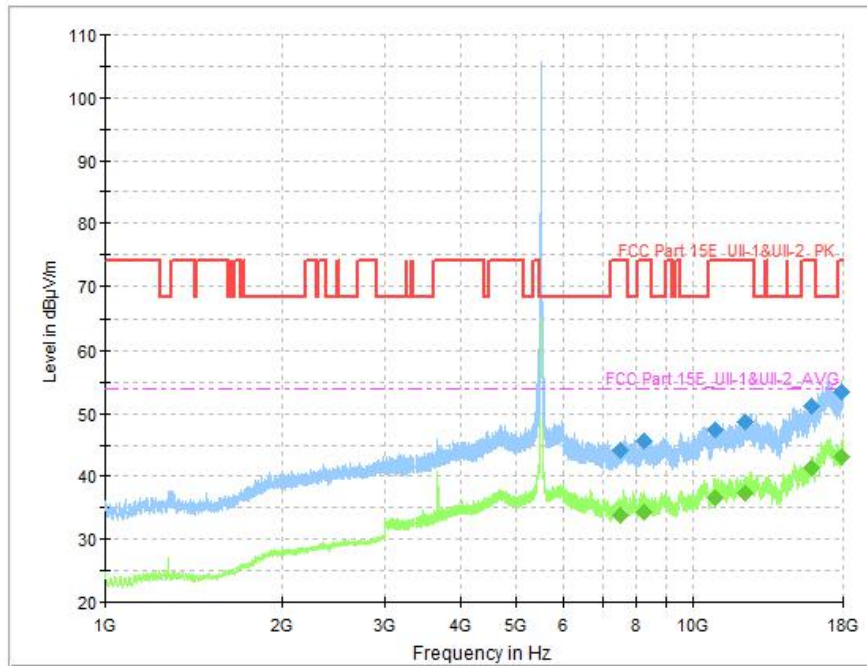


Fig. 73 Transmitter Spurious Emission (802.11a, CH100 5500MHz, 1 GHz ~18 GHz)

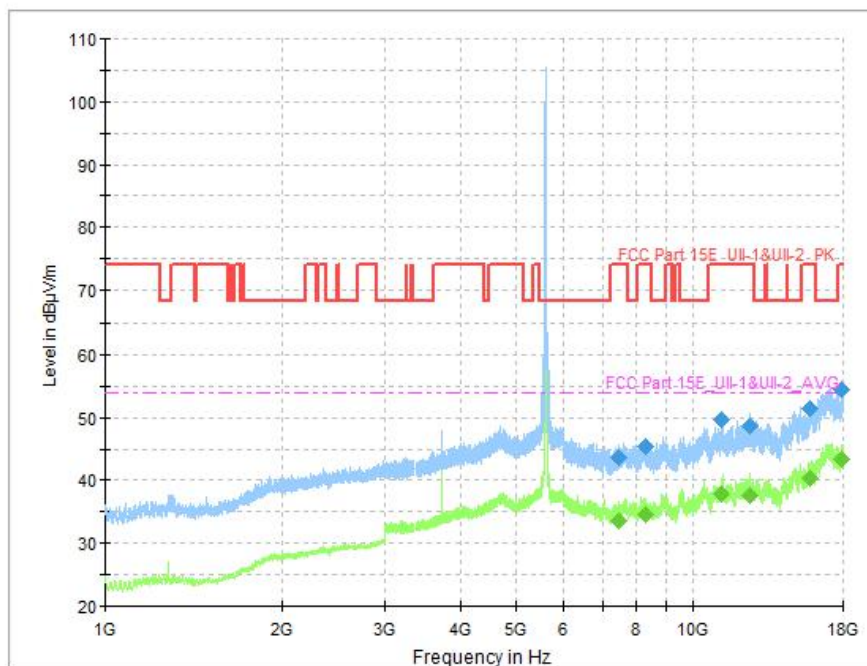


Fig. 74 Transmitter Spurious Emission (802.11a, CH120 5600MHz, 1 GHz ~18 GHz)

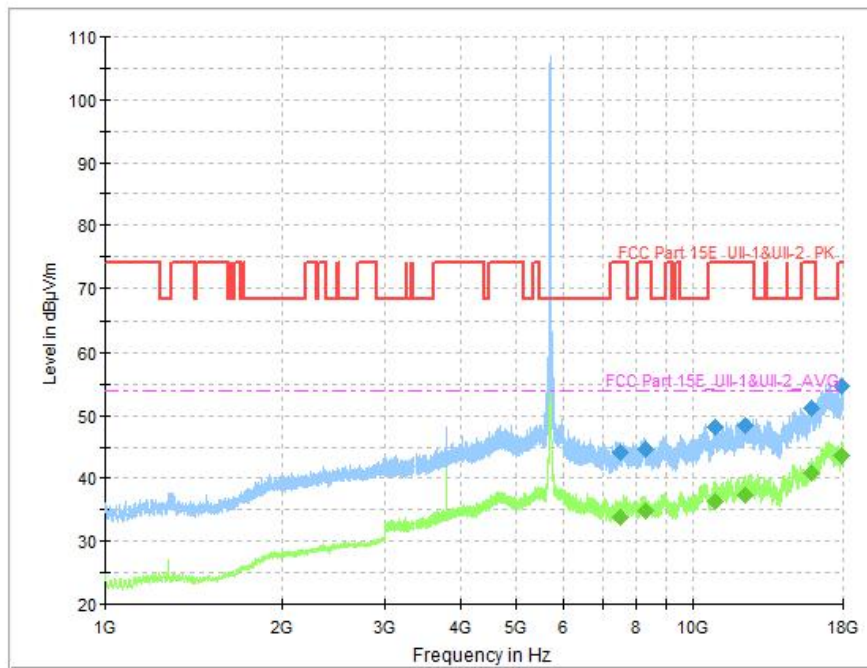


Fig. 75 Transmitter Spurious Emission (802.11a, CH140 5700MHz, 1 GHz ~18 GHz)

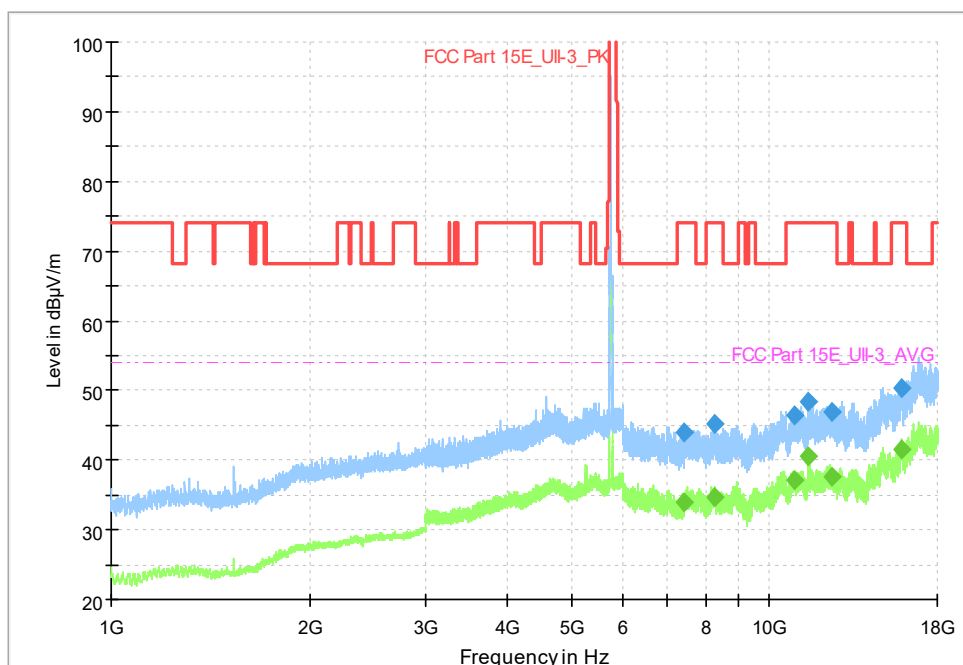


Fig. 76 Transmitter Spurious Emission (802.11a, CH149 5745MHz, 1 GHz ~18 GHz)

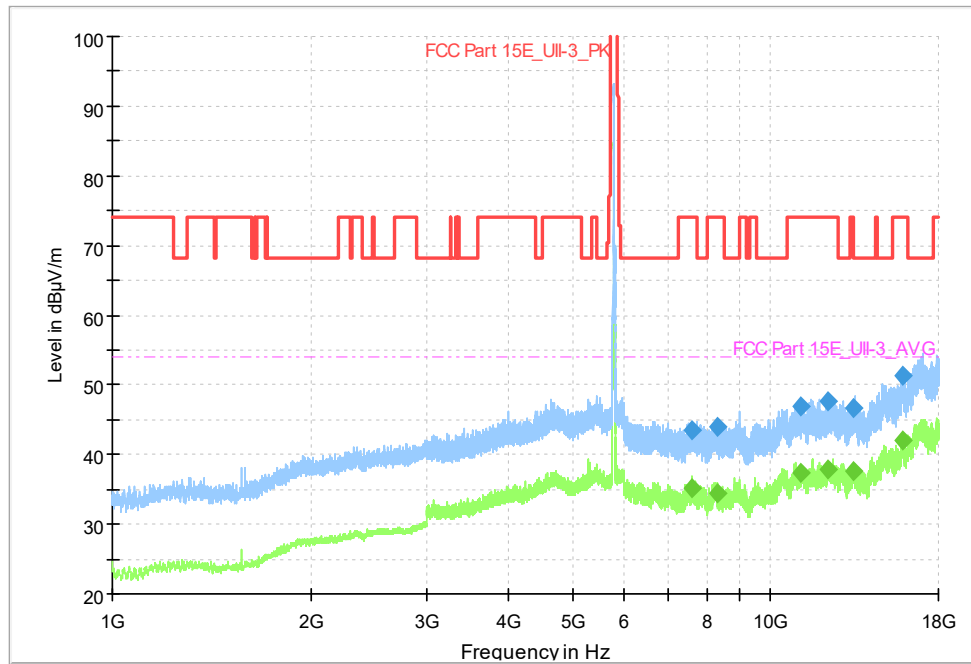


Fig. 77 Transmitter Spurious Emission (802.11a, CH157 5785MHz, 1 GHz ~18 GHz)

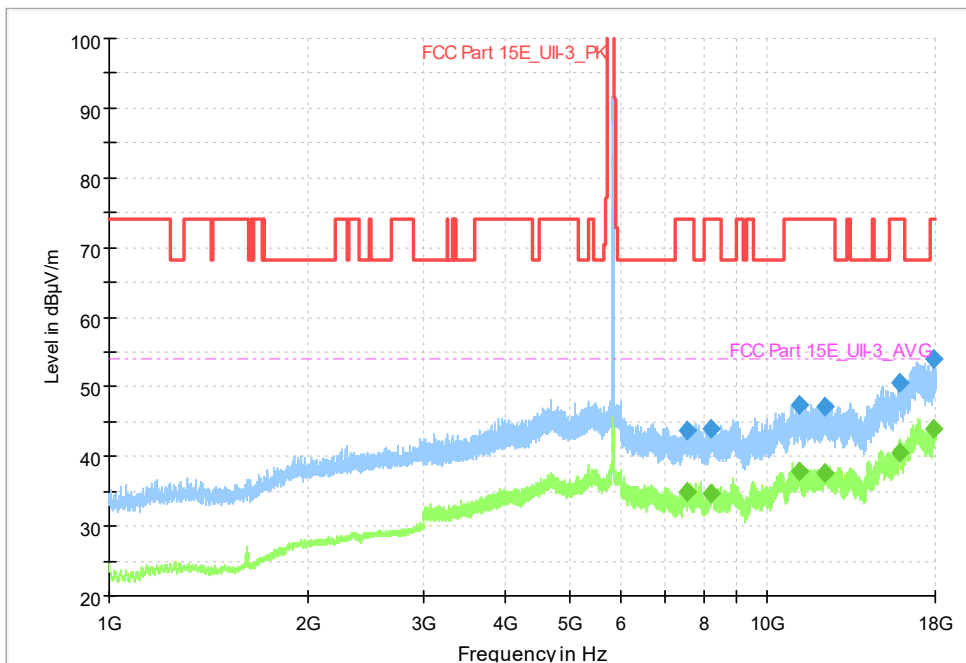


Fig. 78 Transmitter Spurious Emission (802.11a, CH165 5825MHz, 1 GHz ~18 GHz)

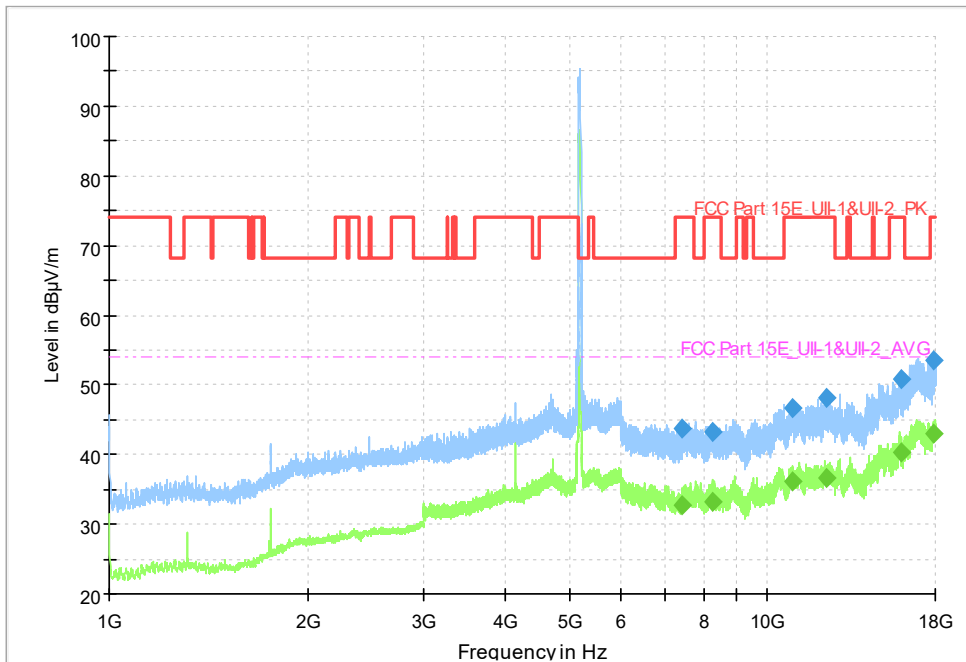


Fig. 79 Transmitter Spurious Emission (802.11n-HT40, CH38 5190MHz, 1 GHz ~18 GHz)

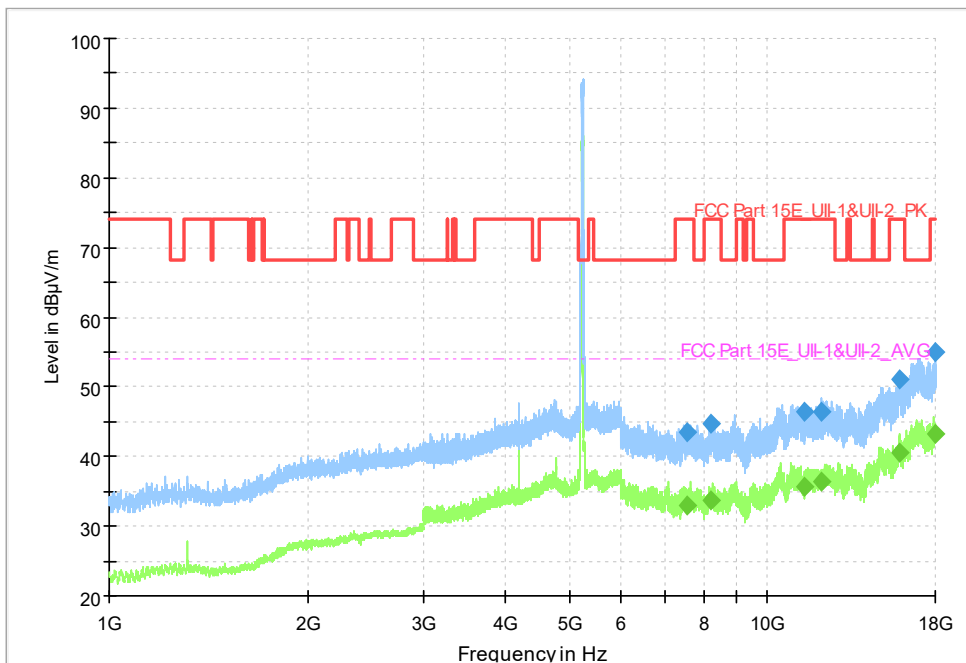


Fig. 80 Transmitter Spurious Emission (802.11n-HT40, CH46 5230MHz, 1 GHz ~18 GHz)

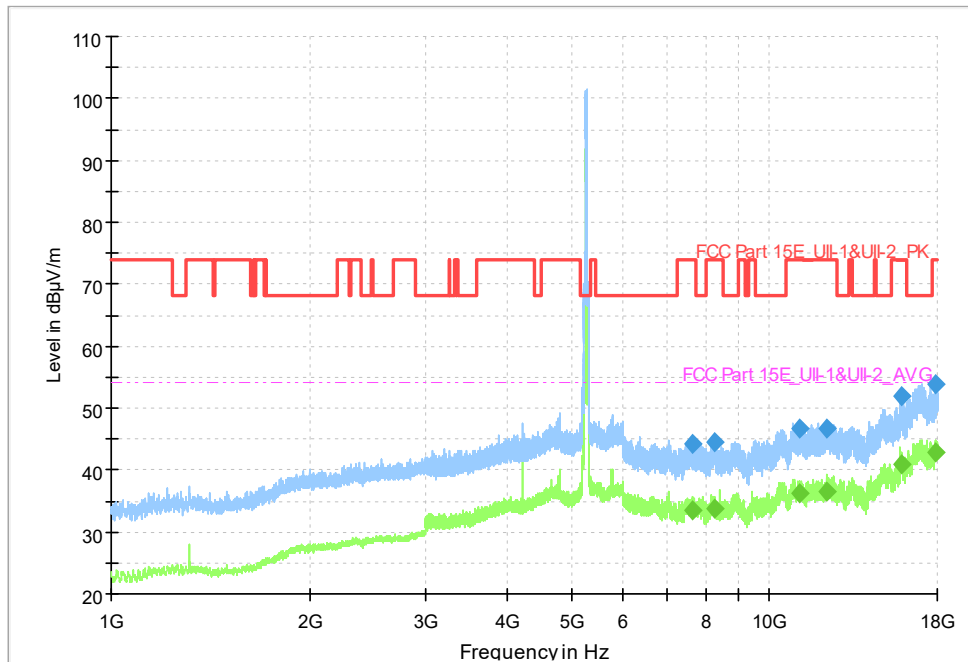


Fig. 81 Transmitter Spurious Emission (802.11n-HT40, CH54 5270MHz, 1 GHz ~18 GHz)

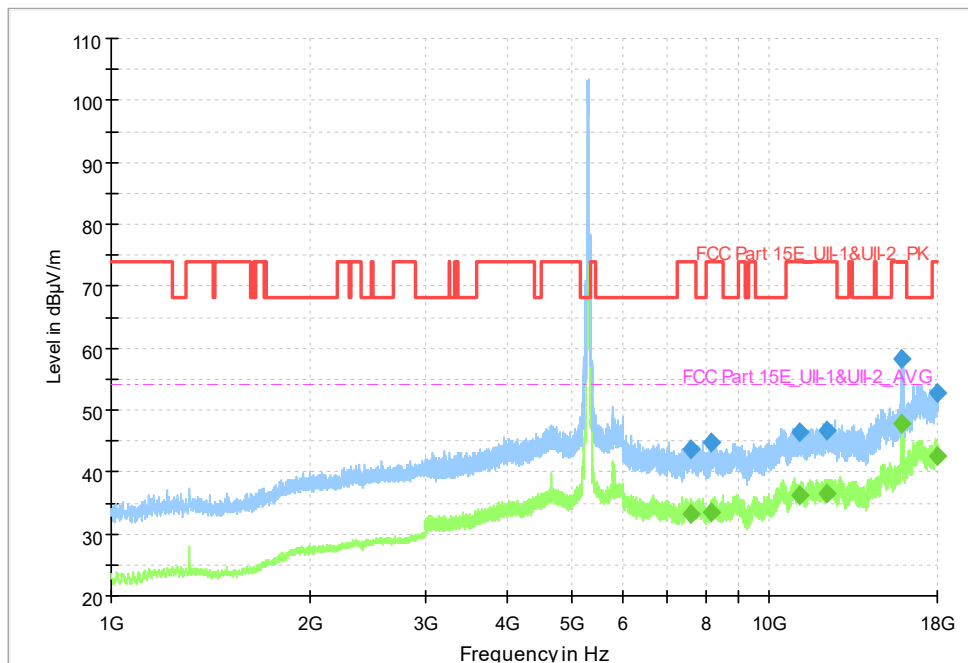


Fig. 82 Transmitter Spurious Emission (802.11n-HT40, CH62 5310MHz, 1 GHz ~18 GHz)

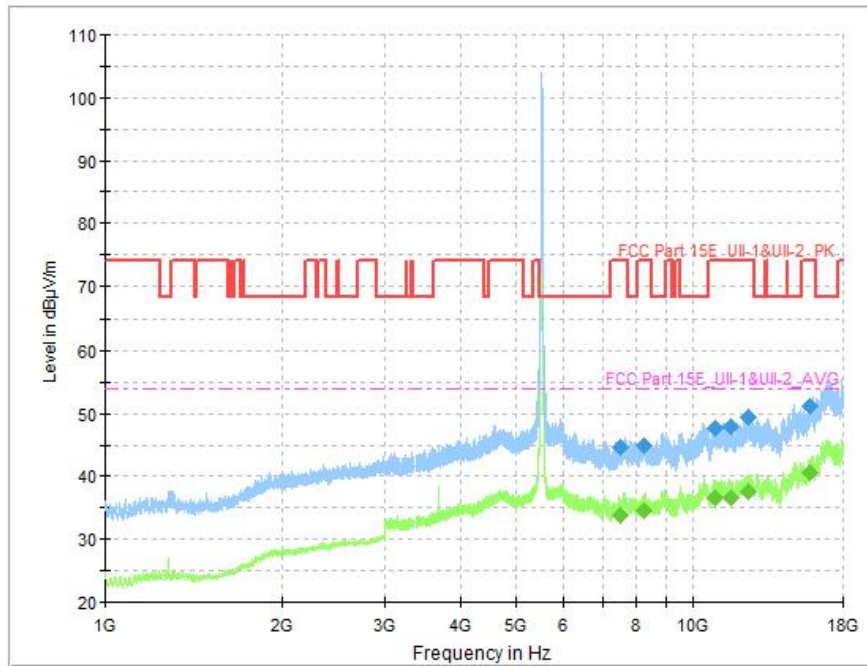


Fig. 83 Transmitter Spurious Emission (802.11n-HT40, CH102 5510MHz, 1 GHz ~18 GHz)

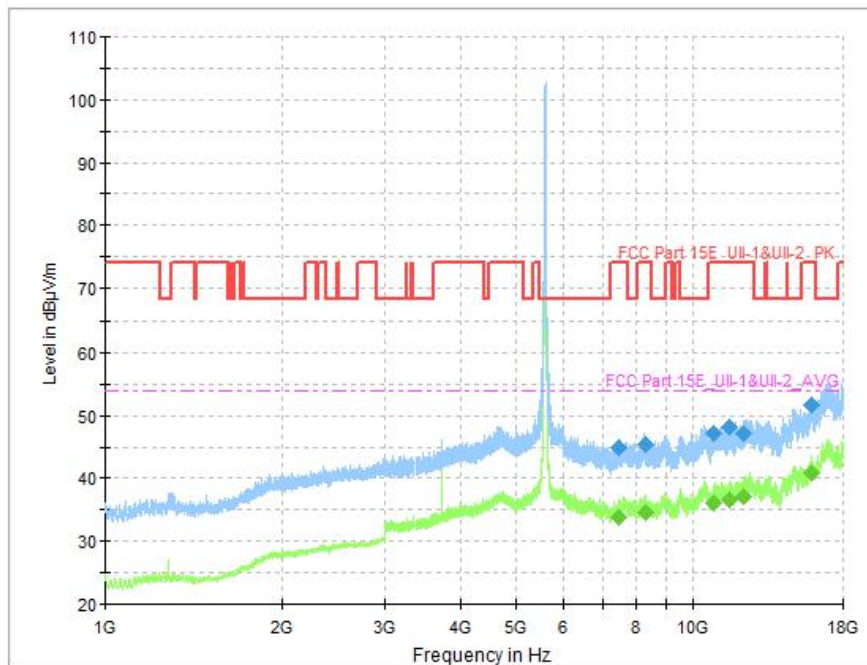


Fig. 84 Transmitter Spurious Emission (802.11n-HT40, CH118 5580MHz, 1 GHz ~18 GHz)

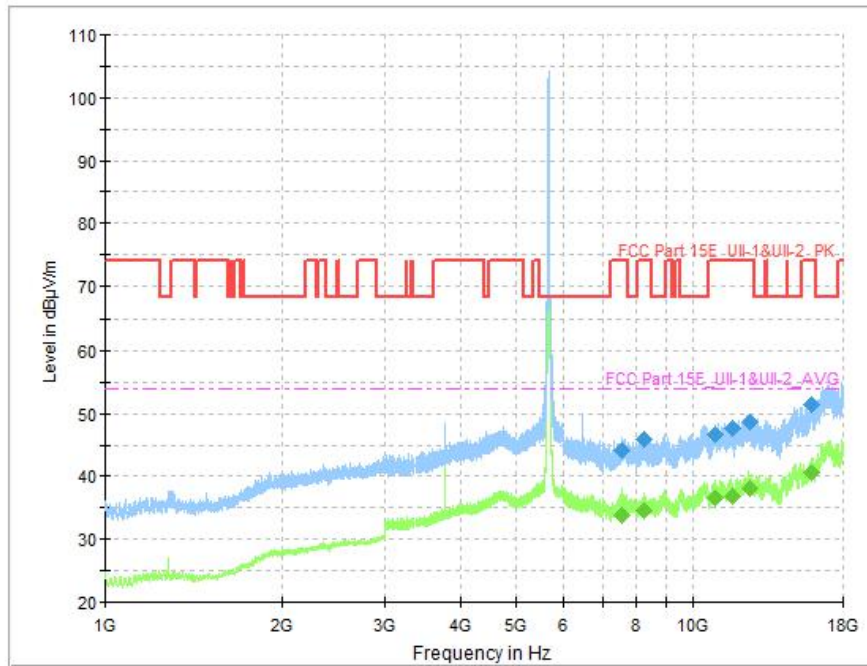


Fig. 85 Transmitter Spurious Emission (802.11n-HT40, CH134 5670MHz, 1 GHz ~18 GHz)

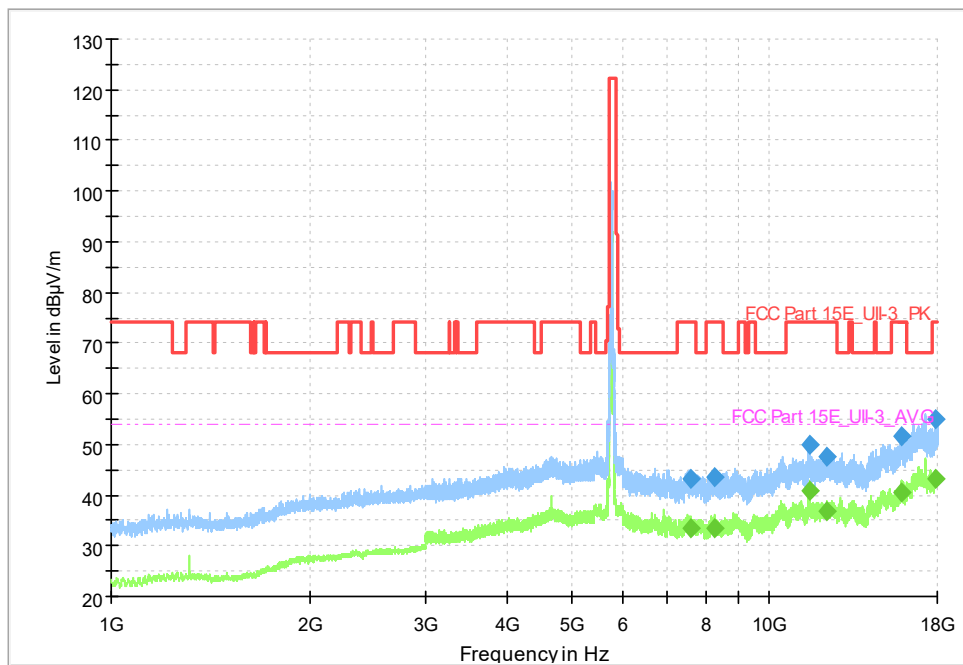


Fig. 86 Transmitter Spurious Emission (802.11n-HT40, CH151 5755MHz, 1 GHz ~18 GHz)

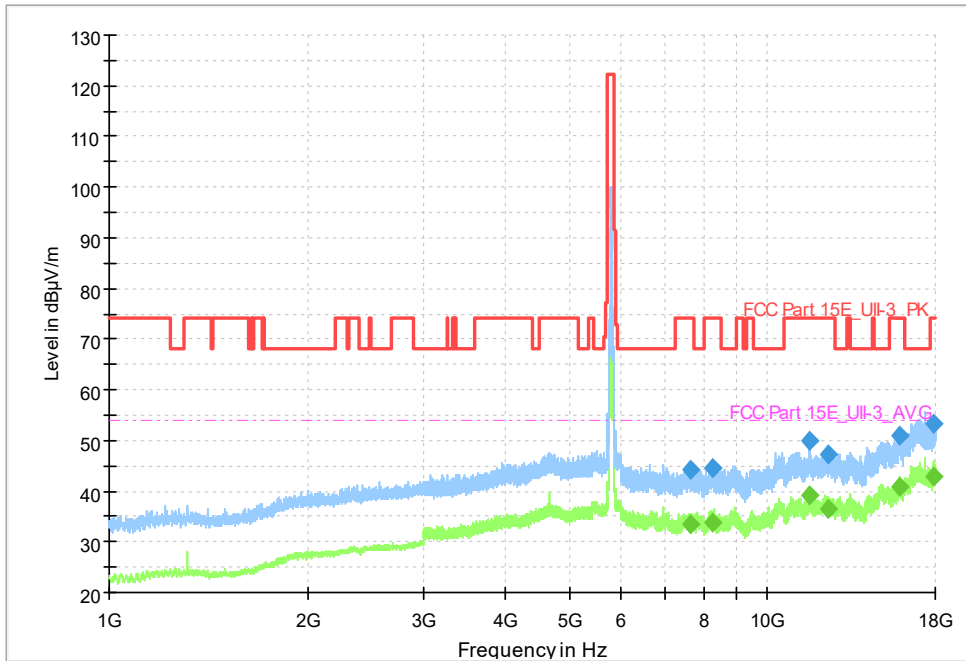


Fig. 87 Transmitter Spurious Emission (802.11n-HT40, CH159 5795MHz, 1 GHz ~18 GHz)

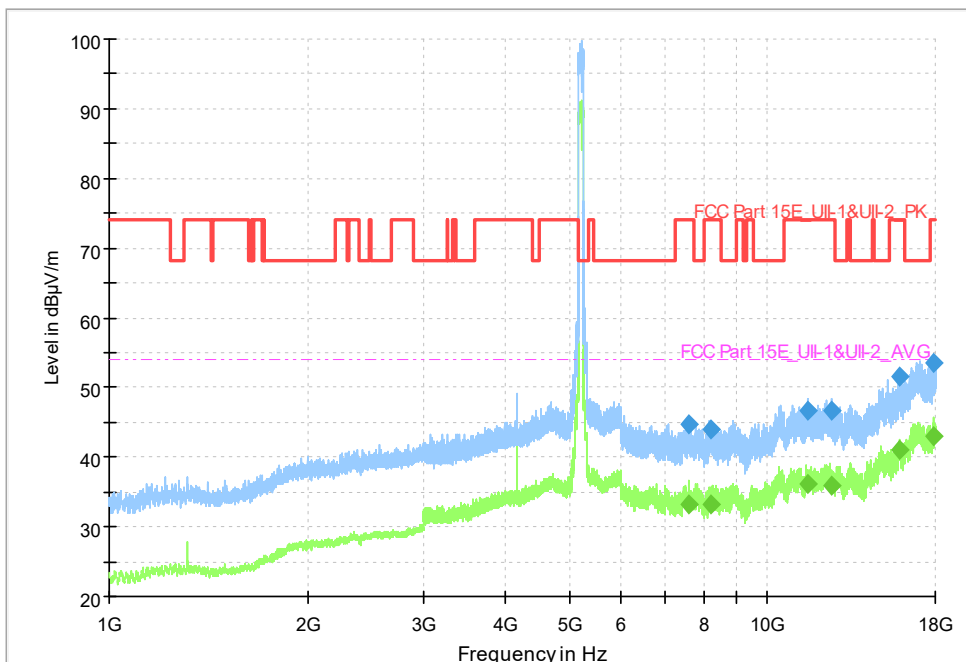


Fig. 88 Transmitter Spurious Emission (802.11ac-VHT80, CH42 5210MHz, 1 GHz ~18 GHz)

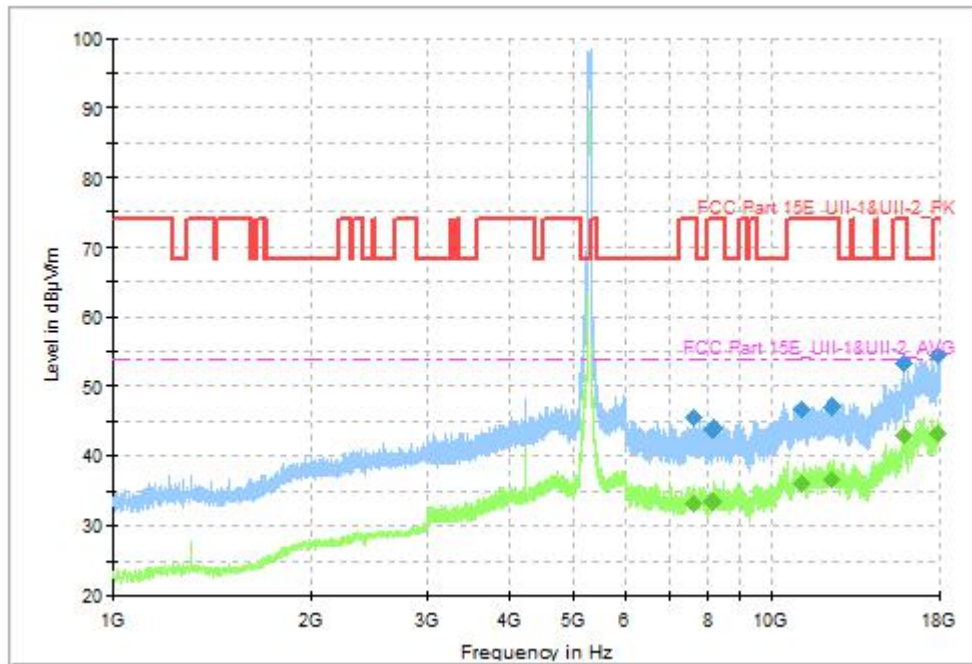


Fig. 89 Transmitter Spurious Emission (802.11ac-VHT80, CH58 5290MHz, 1 GHz ~18 GHz)

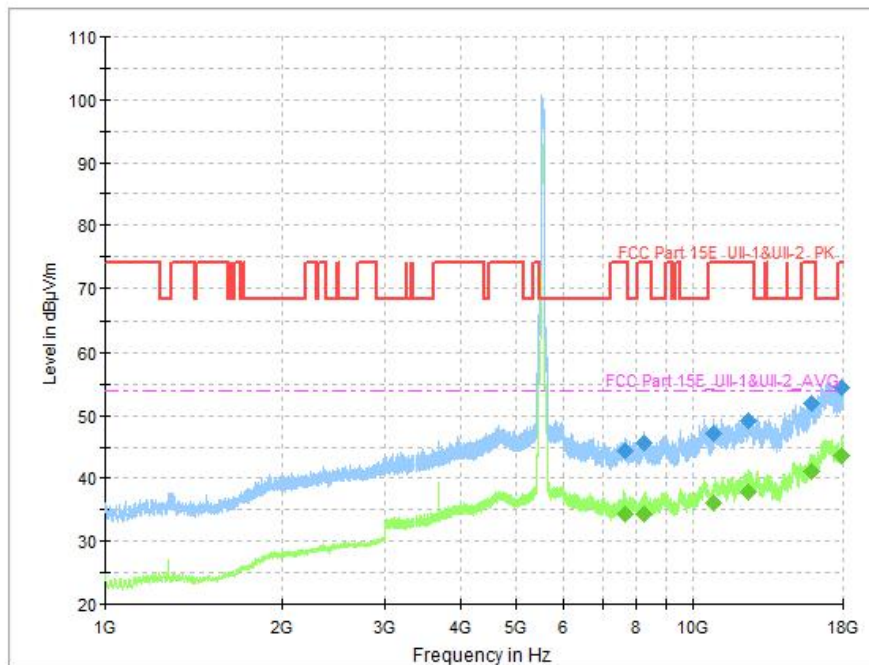


Fig. 90 Transmitter Spurious Emission (802.11ac-VHT80, CH106 5530MHz, 1 GHz ~18 GHz)

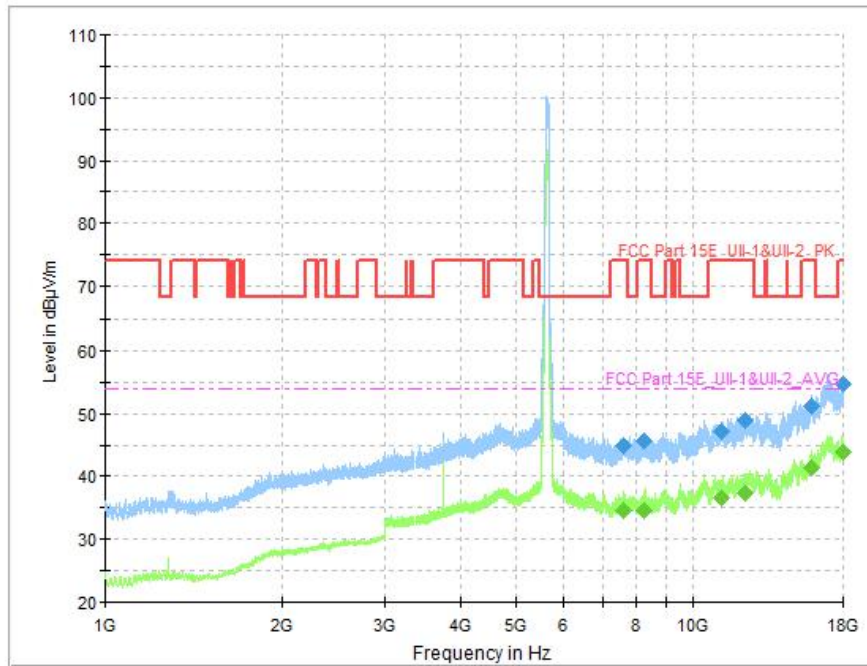


Fig. 91 Transmitter Spurious Emission (802.11ac-VHT80, CH122 5610MHz, 1 GHz ~18 GHz)

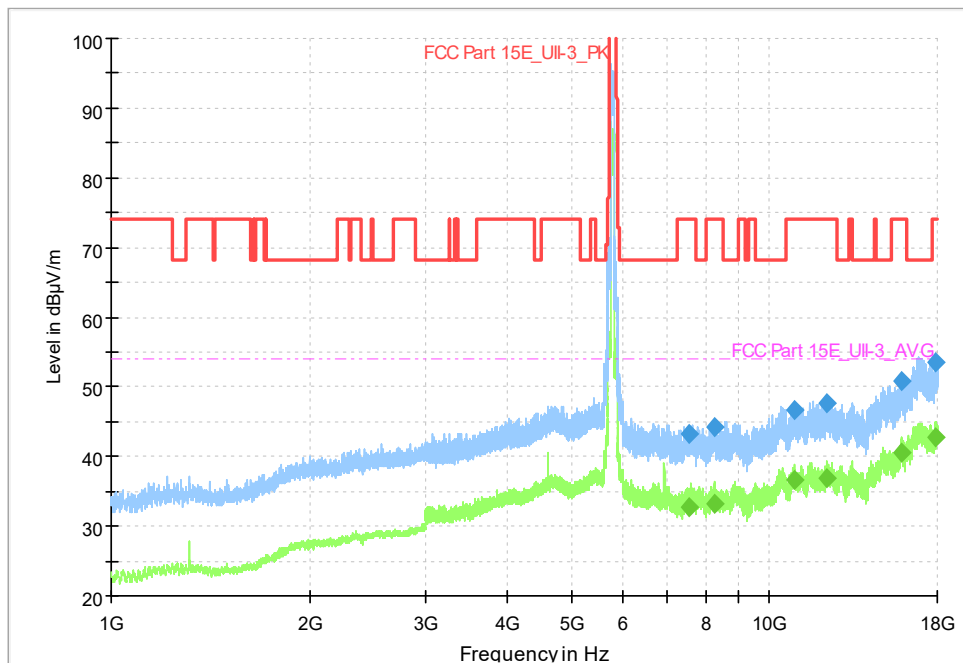


Fig. 92 Transmitter Spurious Emission (802.11ac-VHT80, CH155 5775MHz, 1 GHz ~18 GHz)

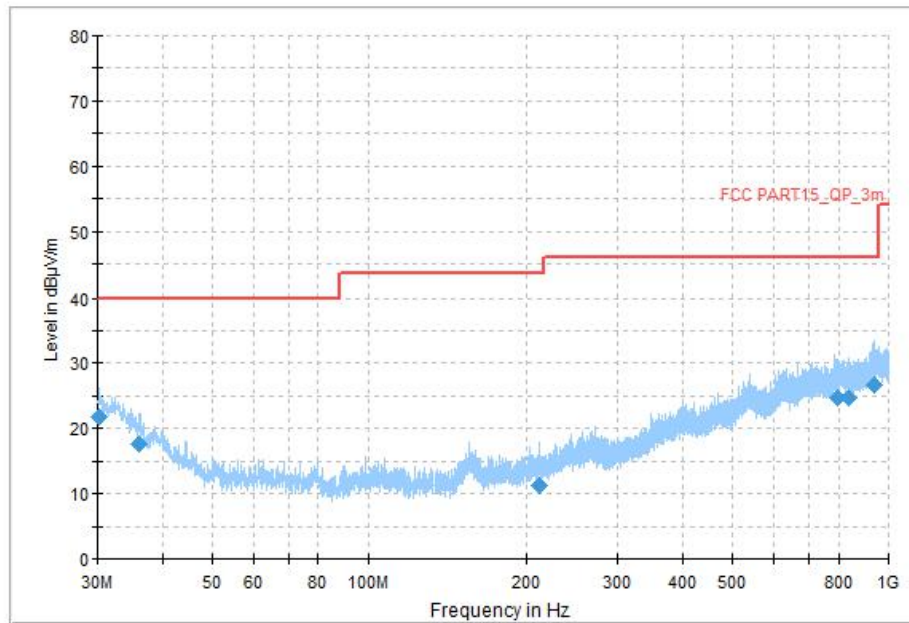


Fig. 93 Transmitter Spurious Emission (All channel, 30MHz~1GHz)

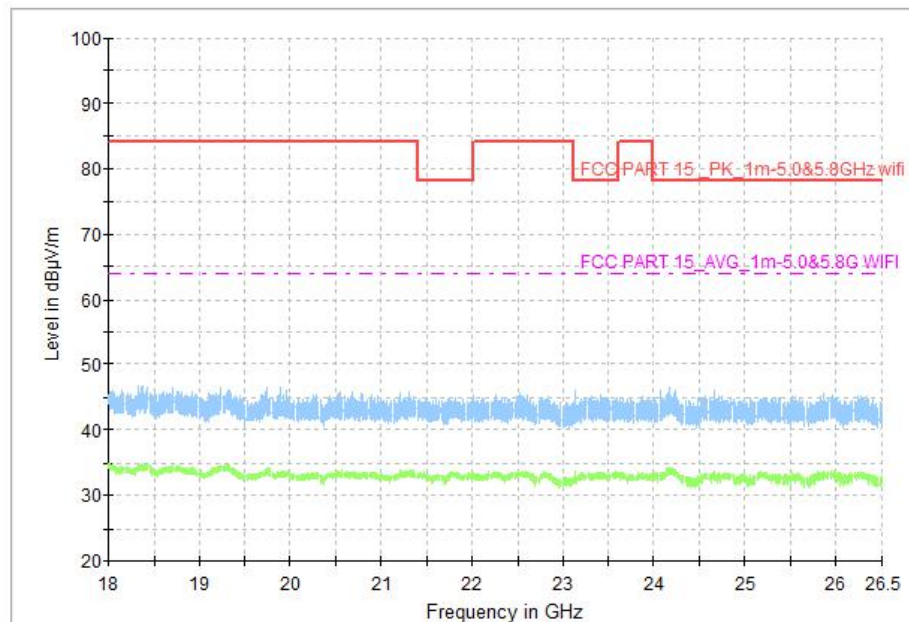


Fig. 94 Transmitter Spurious Emission (All channel, 18GHz~26.5GHz)

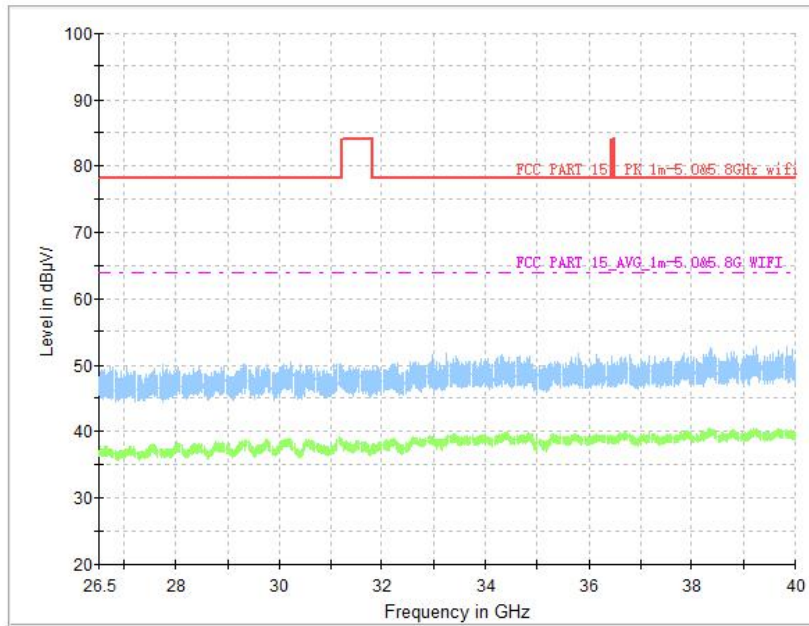


Fig. 95 Transmitter Spurious Emission (All channel, 26.5GHz~40GHz)

A.10. Radiated Spurious Emissions < 30MHz

Measurement Limit (15.209, 9 kHz-30MHz):

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

The measurement is made according to KDB 789033.

Note: The measurement distance during the test is 3m. The limit used in plots recalculated based on the extrapolation factor of 40 dB/decade.

Measurement Result (Worst case):

Mode	Frequency Range	Test Results	Conclusion
All Channel	9 kHz ~30 MHz	Fig.96	P

See below for test graphs.

Conclusion: PASS

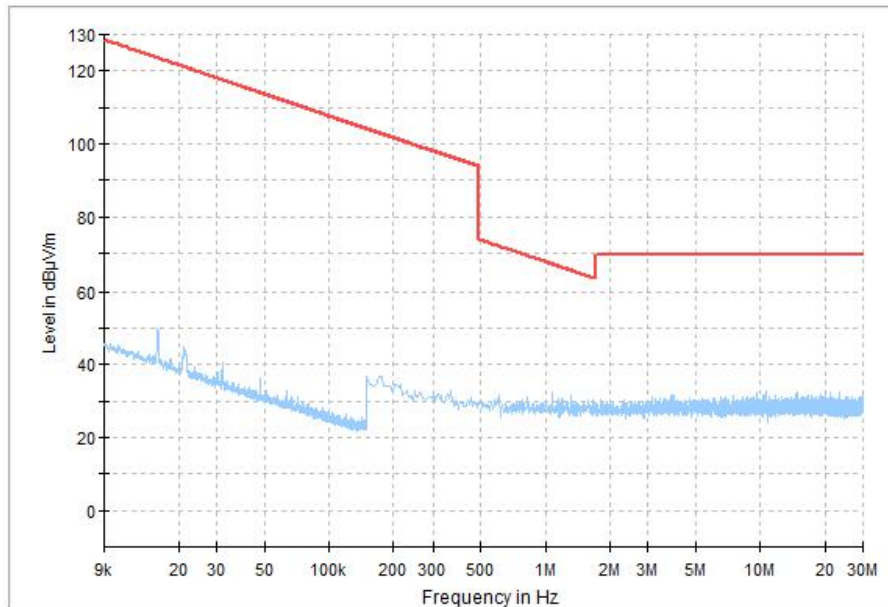


Fig. 96 Radiated Spurious Emission (All Channel, 9 kHz ~30 MHz)

**A.11. AC Power Line Conducted Emission****Test Condition:**

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:**RLAN- A1,A2**

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
			Traffic	Idle	
0.15 to 0.5	66 to 56	56 to 46	Fig.97	Fig.98	P
0.5 to 5	56	46			
5 to 30	60	50			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note: The measurement results include the L1 and N measurements.

See below for test graphs.

Conclusion: PASS

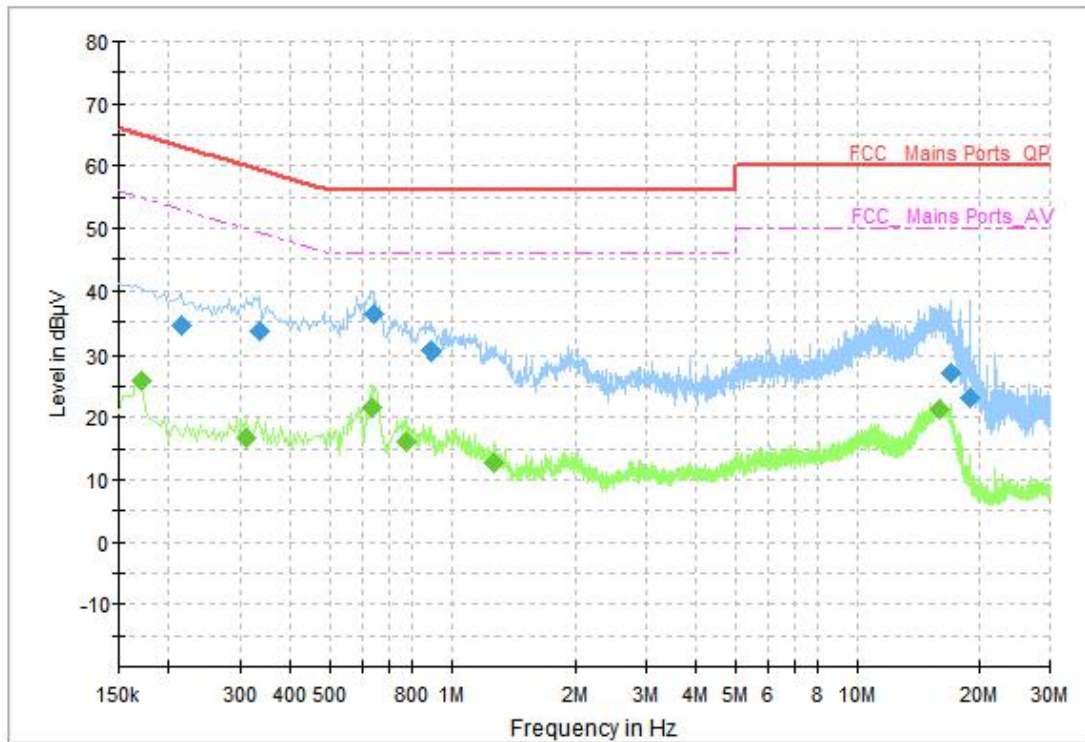


Fig. 97 AC Power line Conducted Emission (Traffic)

Measurement Result: Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.214000	34.40	63.05	28.64	N	ON	10
0.334000	33.61	59.35	25.74	L1	ON	10
0.642000	36.30	56.00	19.70	N	ON	10
0.894000	30.46	56.00	25.54	N	ON	10
17.118000	27.10	60.00	32.90	N	ON	11
19.074000	23.08	60.00	36.92	N	ON	10

Measurement Result: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170000	25.74	54.96	29.22	N	ON	10
0.310000	16.76	49.97	33.21	L1	ON	10
0.634000	21.73	46.00	24.27	N	ON	10
0.770000	16.11	46.00	29.89	L1	ON	10
1.278000	12.75	46.00	33.25	N	ON	10
15.938000	21.42	50.00	28.58	N	ON	11

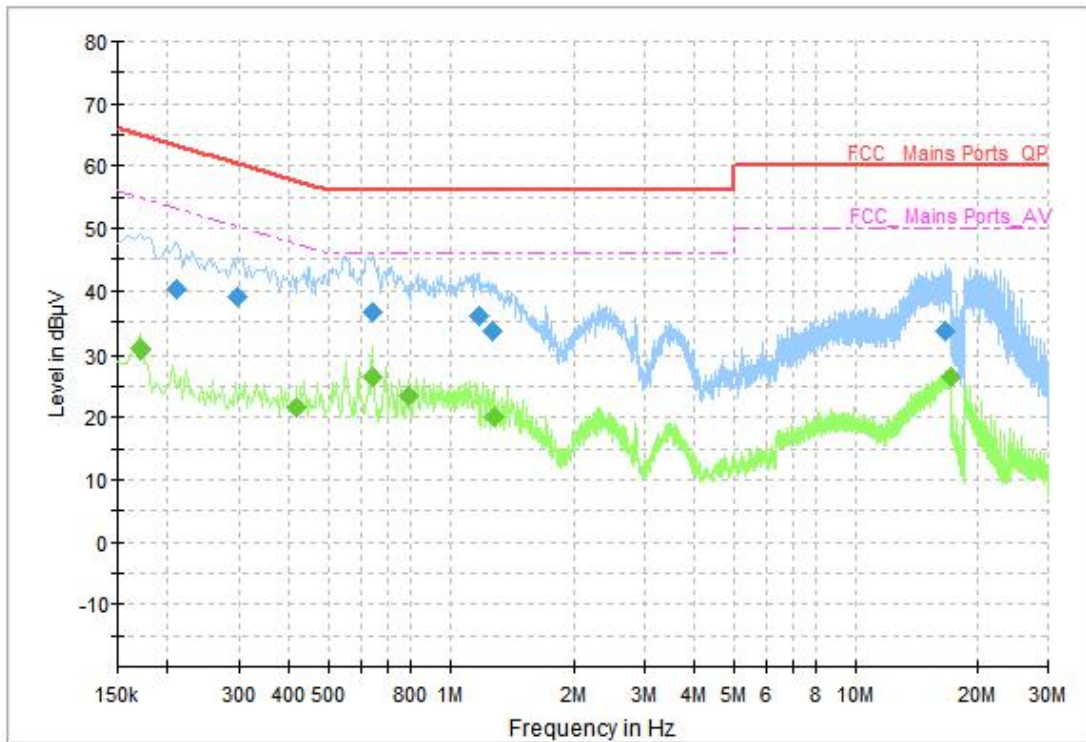


Fig. 98 AC Power line Conducted Emission (Idle)

Measurement Result: Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.210000	40.13	63.21	23.07	N	ON	10
0.298000	38.96	60.30	21.33	N	ON	10
0.646000	36.53	56.00	19.49	N	ON	10
1.174000	35.95	56.00	20.05	N	ON	10
1.274000	33.40	56.00	22.60	N	ON	10
16.726000	33.58	60.00	26.42	N	ON	11

Measurement Result: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170000	30.91	54.96	24.05	L1	ON	10
0.418000	21.69	47.49	25.80	N	ON	10
0.646000	26.51	46.00	19.49	L1	ON	10
0.786000	23.34	46.00	22.66	L1	ON	10
1.282000	20.04	46.00	30.96	L1	ON	10
17.230000	26.47	50.00	23.53	N	ON	10



A.12. Power control

A Transmission Power Control mechanism is not required for systems with an e.i.r.p. of less than 27dBm (500mW).

*****END OF REPORT*****



ANNEX- Spot Check of Output Power

Company Name: HMD Global Oy

Product Name: Smart Phone

Model Name: TA-1413 (FCC ID:2AJOTTA-1413); TA-1429 (FCC ID:2AJOTTA-1429)

Differences between models

TA-1429 is the variant of the initial certified product TA-1413, TA-1413 supports 2 SIM slots and TA-1429 supports 1 SIM slot.

Spot Check of Different Mode

Model	Mode	Frequency (MHz)	Conducted Output Power (dBm)
TA-1413	LE 1M	2440(CH19)	7.66
	EDR(8DPSK)	2441(CH39)	10.23
	802.11b	2412 (CH1)	15.67
	802.11a	5320 (CH64)	14.65
TA-1429	LE 1M	2440(CH19)	7.69
	EDR(8DPSK)	2441(CH39)	10.15
	802.11b	2412 (CH1)	15.52
	802.11a	5320 (CH64)	14.59

Note: Spot check test data included for the variants based on worst-case results reported in the original.

From the above data, it can be concluded that the conducted output power of the variant is less than or near to the original. And the variant conducted test data can refer to the original report (**I22N00716**).

This condition applies to the reports **I22N00718**.