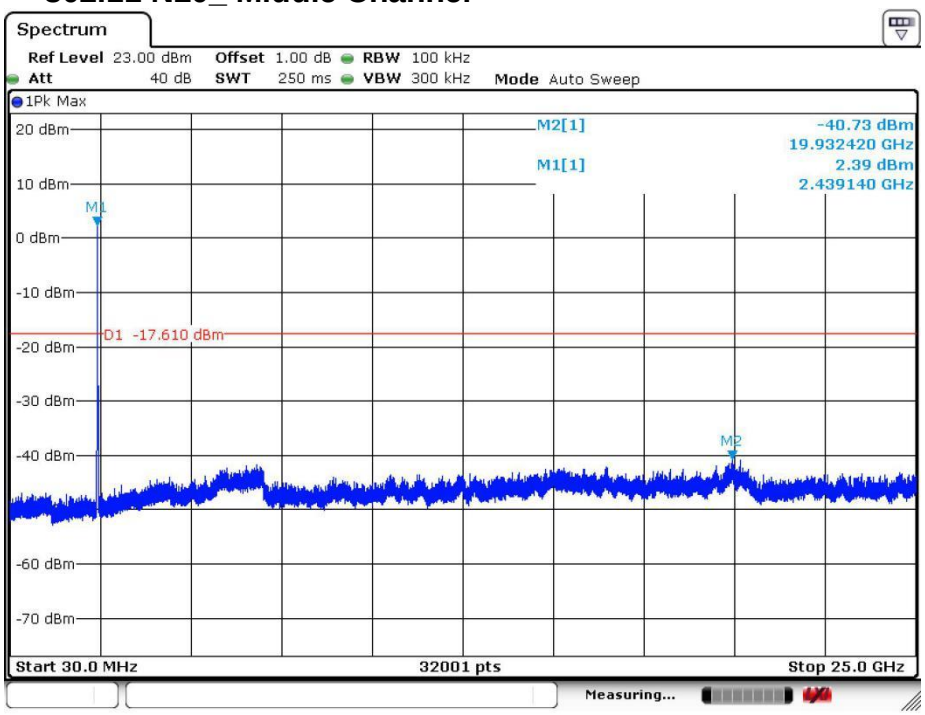
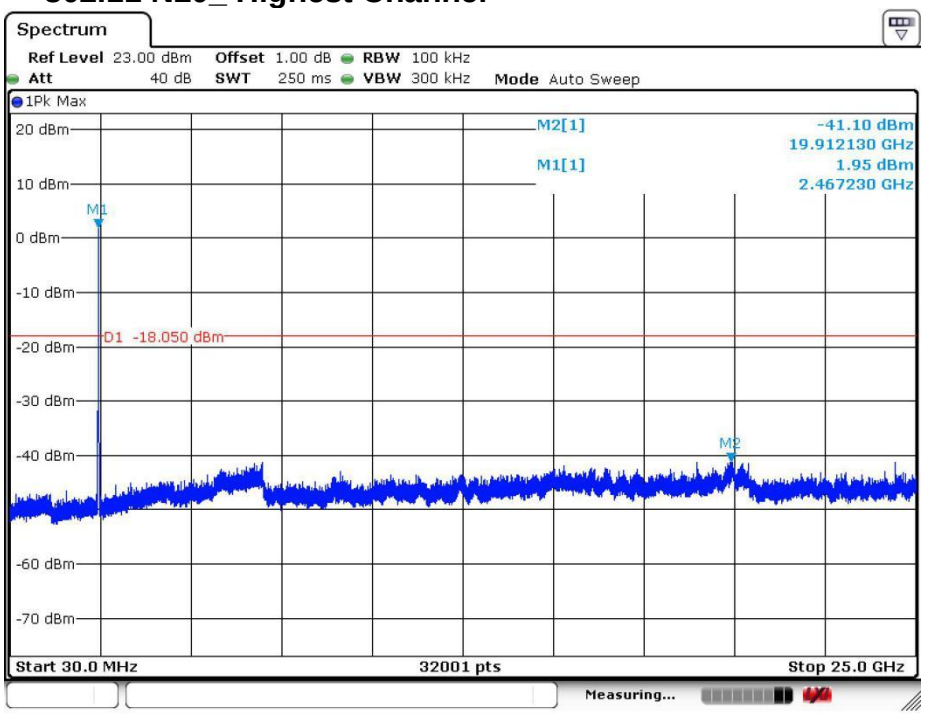
4.8.1.1.8 802.11 N20_ Middle Channel



Date: 15.MAY.2020 12:47:57

4.8.1.1.9 802.11 N20_ Highest Channel



Date: 15.MAY.2020 12:46:27

Remark:

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

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4.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 :2013 Section 11.12				
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

Test Setup:	

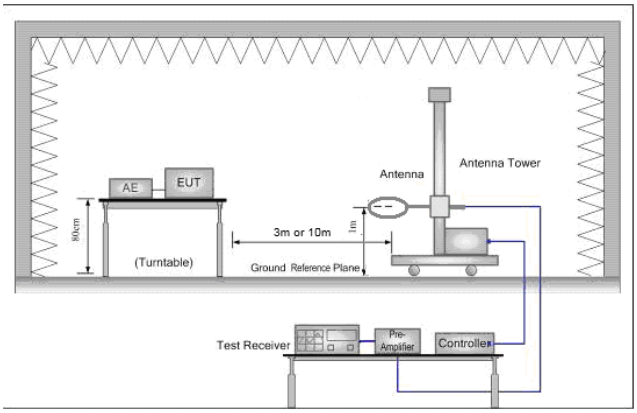


Figure 1. Below 30MHz

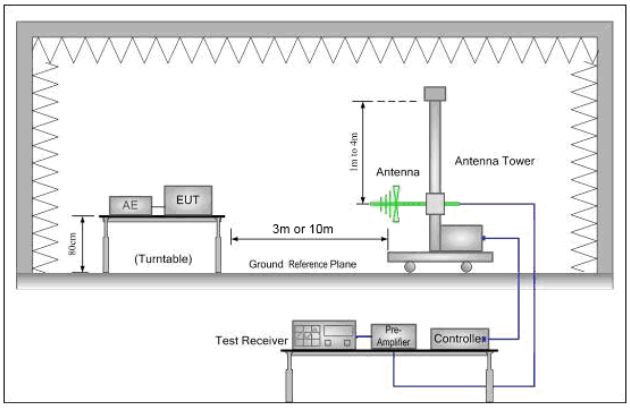


Figure 2. 30MHz to 1GHz

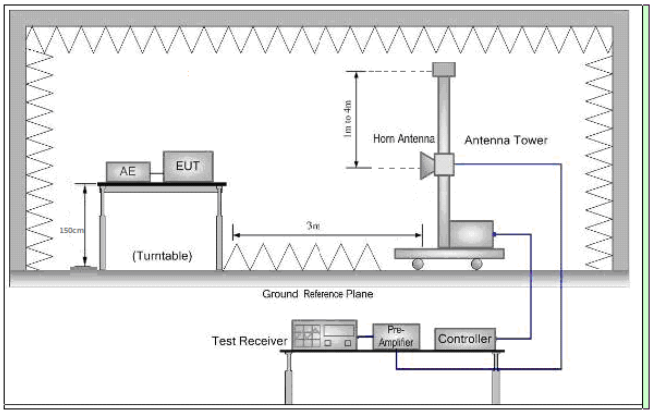


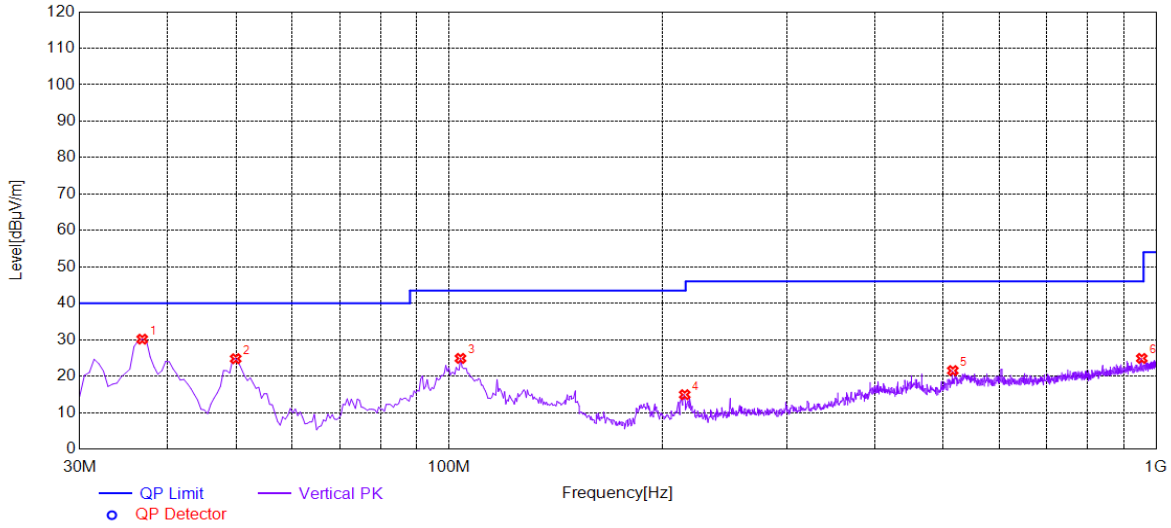
Figure 3. Above 1 GHz

Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. e. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ⩾ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds

	On time = N 1 *L 1 +N 2 *L 2 +...+N n-1 *LN n-1 +N n *L n Where N 1 is number of type 1 pulses, L 1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycl f. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. g. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. i. Test the EUT in the lowest channel, the middle channel ,the Highest channel j. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. k. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G; 6.5Mbps of rate is the worst case of 802.11N(HT20); For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

4.9.1 Radiated emission below 1GHz

4.9.1.1 Charge + Transmitting, Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7934	30.16	-32.19	40.00	9.84	150	26	Vertical
2	49.8949	24.79	-30.18	40.00	15.21	150	335	Vertical
3	103.756	24.88	-31.68	43.50	18.62	150	88	Vertical
4	215.362	14.92	-30.46	43.50	28.58	150	326	Vertical
5	515.727	21.52	-22.29	46.00	24.48	150	179	Vertical
6	954.387	24.88	-14.42	46.00	21.12	150	257	Vertical

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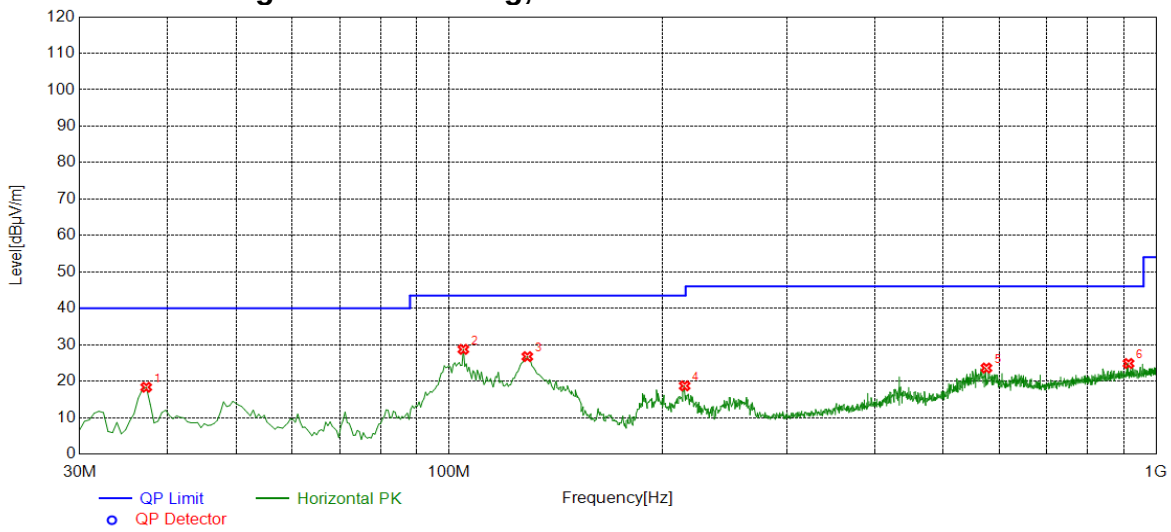
4.9.1.2 Charge + Transmitting, Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.2786	18.33	-32.03	40.00	21.67	150	242	Horizontal
2	104.727	28.73	-31.68	43.50	14.77	150	263	Horizontal
3	128.989	26.74	-34.63	43.50	16.76	150	16	Horizontal
4	215.362	18.71	-30.46	43.50	24.79	150	236	Horizontal
5	575.412	23.61	-20.75	46.00	22.39	150	16	Horizontal
6	914.112	24.85	-15.02	46.00	21.15	150	109	Horizontal

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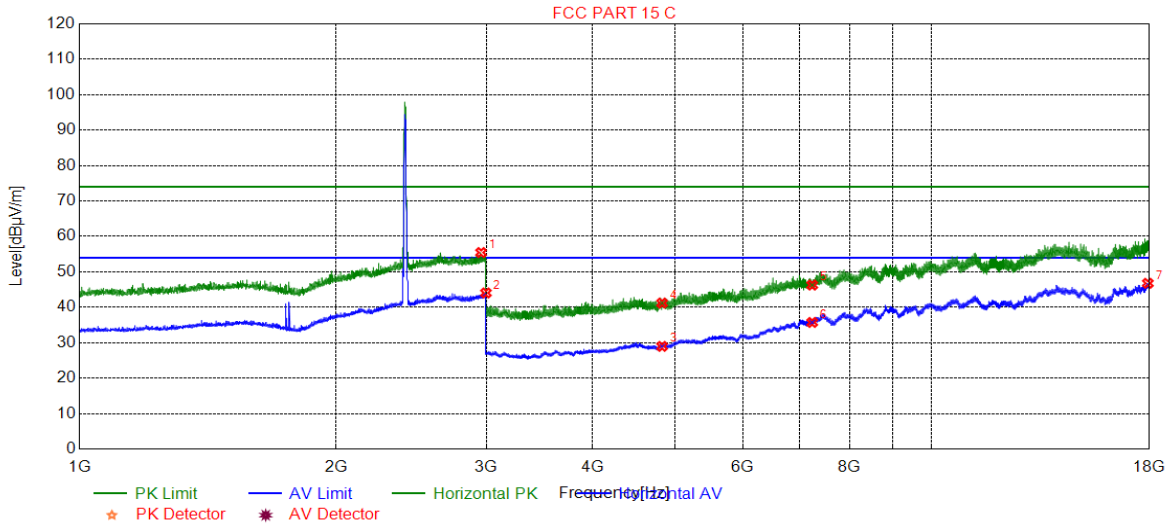
4.9.2 Transmitter emission above 1GHz

4.9.2.1 ANT1

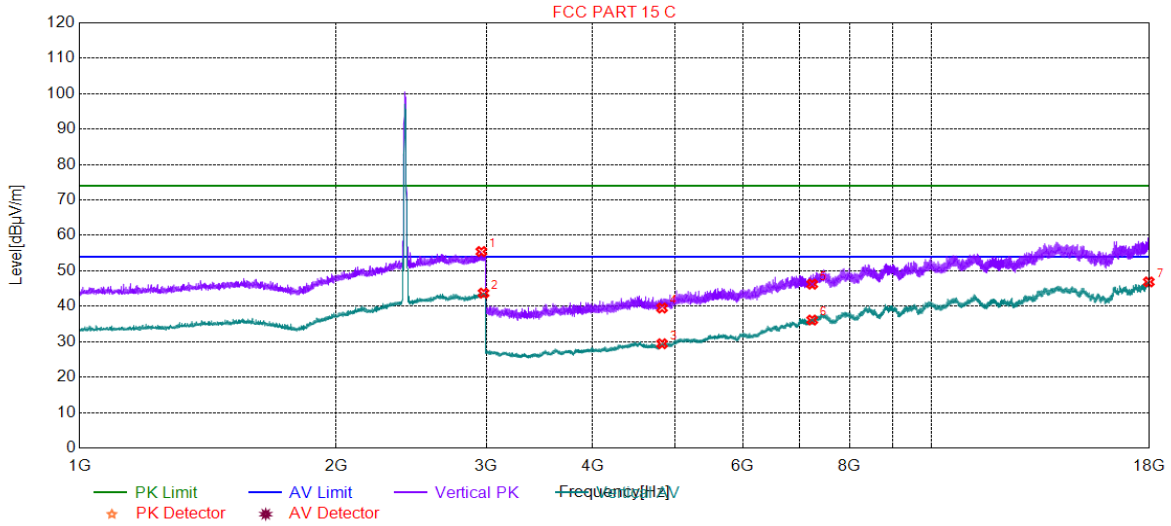
4.9.2.1.1 802.11B_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2958.48	55.45	9.64	74.00	18.55	150	193	Horizontal
2	2997.99	44.05	9.46	54.00	9.95	150	110	Horizontal
3	4824.00	28.97	-18.21	54.00	25.03	150	0	Horizontal
4	4824.00	41.19	-18.21	74.00	32.81	150	43	Horizontal
5	7236.00	46.28	-9.99	74.00	27.72	150	168	Horizontal
6	7236.00	35.73	-9.99	54.00	18.27	150	360	Horizontal
7	17919.6	46.78	0.70	54.00	7.22	150	18	Horizontal

4.9.2.1.2 802.11B_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2960.99	55.45	9.63	74.00	18.55	150	113	Vertical
2	2978.49	43.71	9.55	54.00	10.29	150	154	Vertical
3	4824.00	29.43	-18.21	54.00	24.57	150	316	Vertical
4	4824.00	39.51	-18.21	74.00	34.49	150	0	Vertical
5	7236.00	46.24	-9.99	74.00	27.76	150	269	Vertical
6	7236.00	36.12	-9.99	54.00	17.88	150	269	Vertical
7	17963.6	46.88	0.71	54.00	7.12	150	318	Vertical

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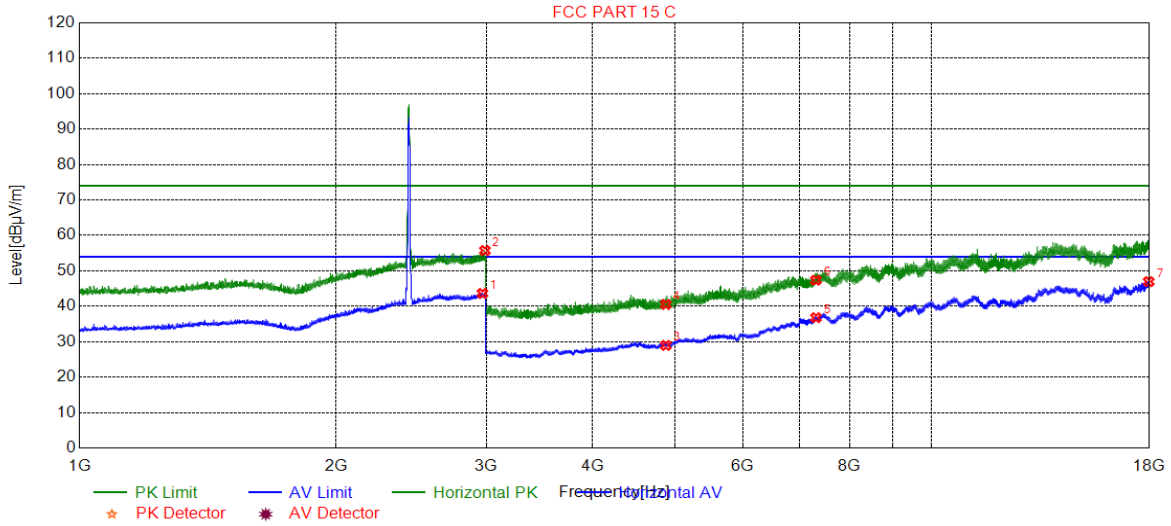
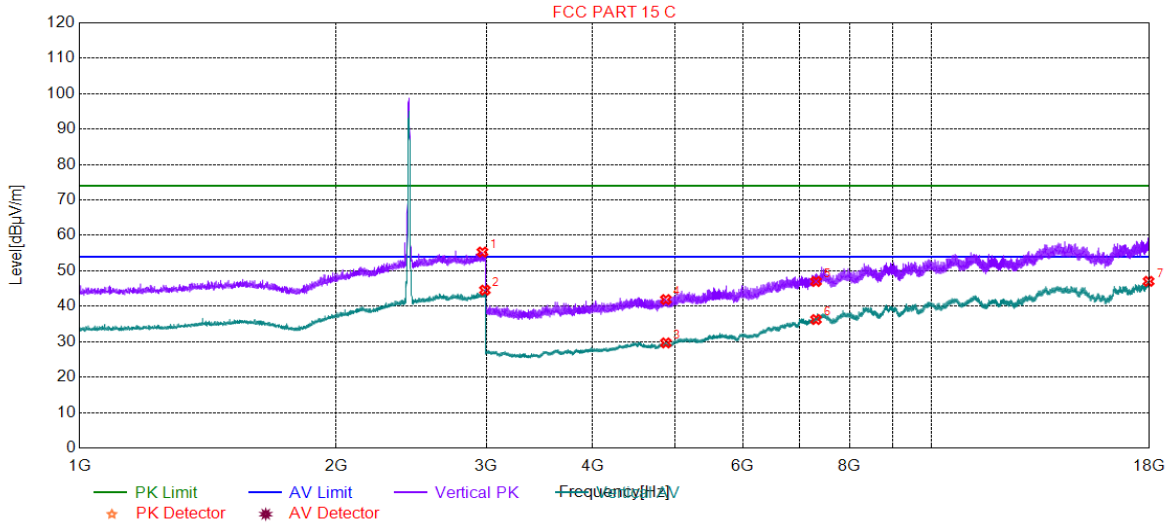
4.9.2.1.3 802.11B_ Middle Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2969.49	43.64	9.59	54.00	10.36	150	163	Horizontal
2	2989.49	55.74	9.50	74.00	18.26	150	273	Horizontal
3	4874.00	28.97	-17.99	54.00	25.03	150	14	Horizontal
4	4874.00	40.53	-17.99	74.00	33.47	150	178	Horizontal
5	7311.00	36.79	-9.74	54.00	17.21	150	317	Horizontal
6	7311.00	47.36	-9.74	74.00	26.64	150	118	Horizontal
7	17959.2	46.96	0.71	54.00	7.04	150	360	Horizontal

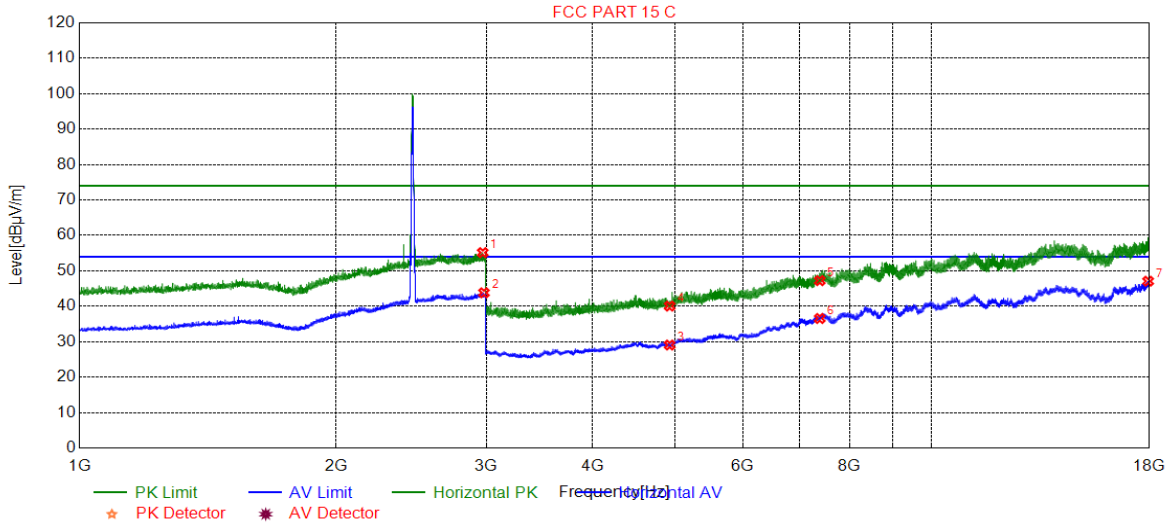
4.9.2.1.4 802.11B_ Middle Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2969.49	55.31	9.59	74.00	18.69	150	102	Vertical
2	2989.49	44.56	9.50	54.00	9.44	150	319	Vertical
3	4874.00	29.66	-17.99	54.00	24.34	150	179	Vertical
4	4874.00	41.90	-17.99	74.00	32.10	150	342	Vertical
5	7311.00	47.00	-9.74	74.00	27.00	150	68	Vertical
6	7311.00	36.27	-9.74	54.00	17.73	150	267	Vertical
7	17956.5	47.04	0.71	54.00	6.96	150	317	Vertical

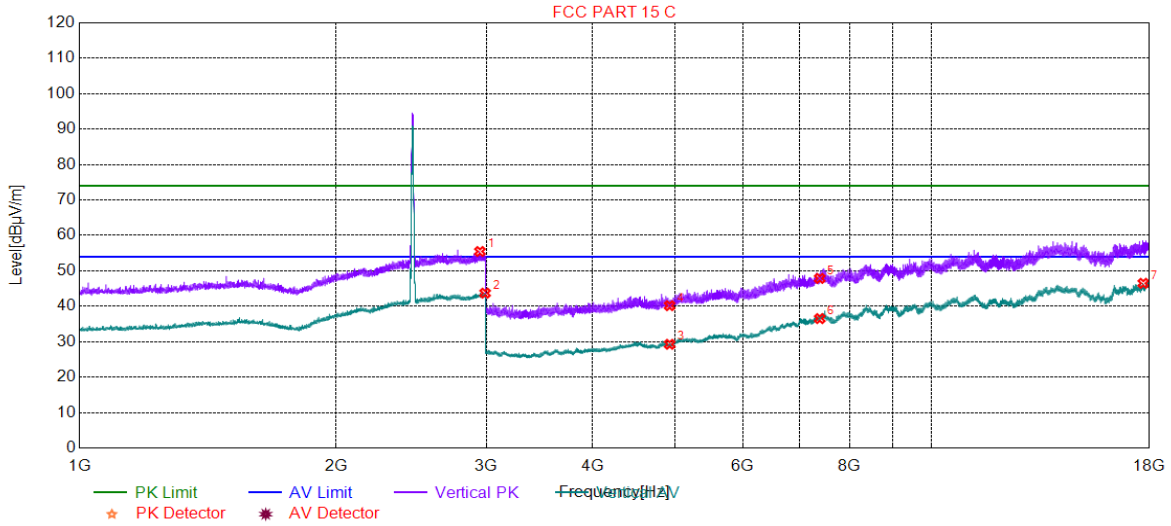
4.9.2.1.5 802.11B_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2971.99	55.15	9.58	74.00	18.85	150	0	Horizontal
2	2981.49	43.82	9.54	54.00	10.18	150	192	Horizontal
3	4924.00	29.06	-17.72	54.00	24.94	150	68	Horizontal
4	4924.00	40.06	-17.72	74.00	33.94	150	68	Horizontal
5	7386.00	47.24	-9.55	74.00	26.76	150	216	Horizontal
6	7386.00	36.56	-9.55	54.00	17.44	150	68	Horizontal
7	17932.3	47.08	0.70	54.00	6.92	150	316	Horizontal

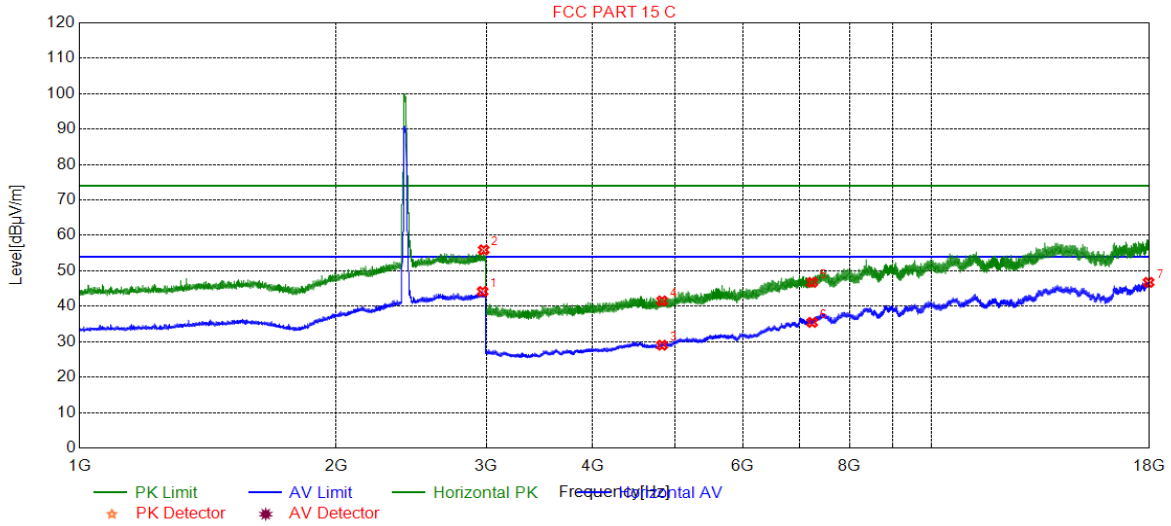
4.9.2.1.6 802.11B_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2949.48	55.47	9.67	74.00	18.53	150	181	Vertical
2	2990.99	43.72	9.49	54.00	10.28	150	304	Vertical
3	4924.00	29.28	-17.72	54.00	24.72	150	41	Vertical
4	4924.00	40.17	-17.72	74.00	33.83	150	232	Vertical
5	7386.00	47.87	-9.55	74.00	26.13	150	118	Vertical
6	7386.00	36.53	-9.55	54.00	17.47	150	18	Vertical
7	17701.3	46.49	1.33	54.00	7.51	150	218	Vertical

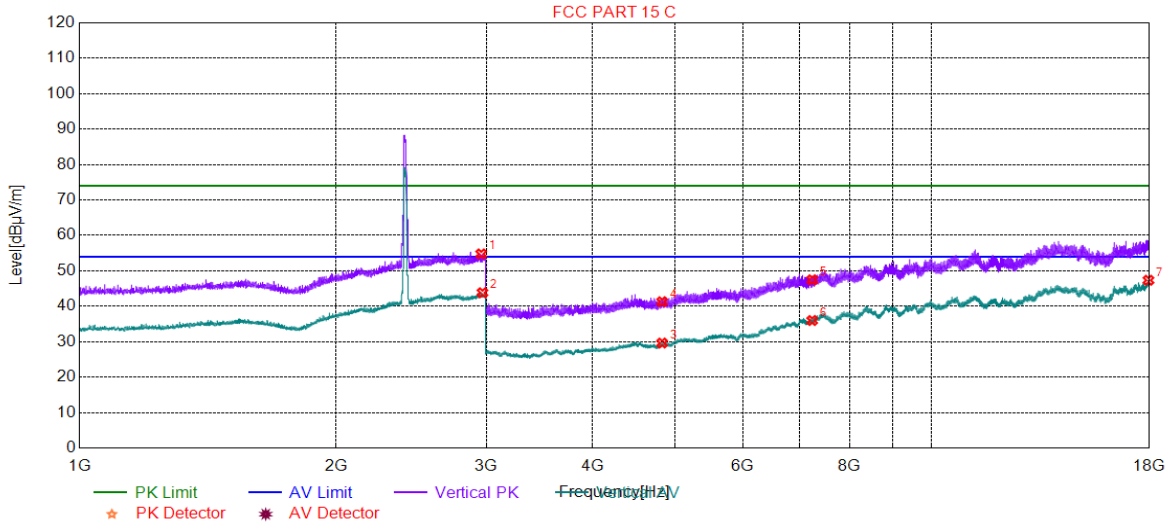
4.9.2.1.7 802.11G_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2970.99	44.18	9.58	54.00	9.82	150	342	Horizontal
2	2979.49	55.92	9.54	74.00	18.08	150	247	Horizontal
3	4824.00	29.03	-18.21	54.00	24.97	150	315	Horizontal
4	4824.00	41.51	-18.21	74.00	32.49	150	0	Horizontal
5	7236.00	46.75	-9.99	74.00	27.25	150	317	Horizontal
6	7236.00	35.45	-9.99	54.00	18.55	150	67	Horizontal
7	17955.4	46.75	0.71	54.00	7.25	150	18	Horizontal

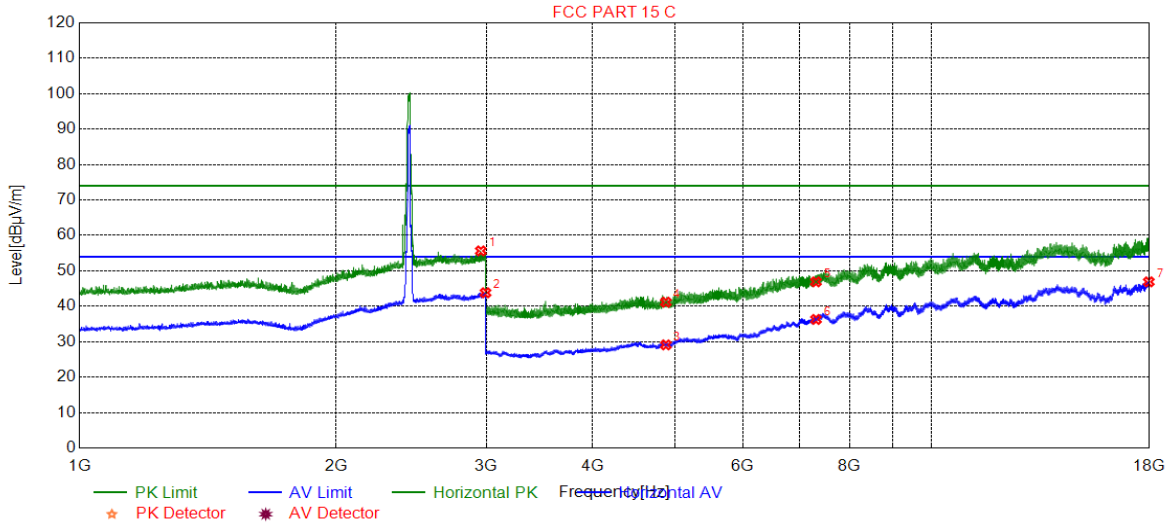
4.9.2.1.8 802.11G_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2959.48	54.78	9.64	74.00	19.22	150	99	Vertical
2	2969.49	43.83	9.59	54.00	10.17	150	236	Vertical
3	4824.00	29.63	-18.21	54.00	24.37	150	179	Vertical
4	4824.00	41.30	-18.21	74.00	32.70	150	15	Vertical
5	7236.00	47.48	-9.99	74.00	26.52	150	18	Vertical
6	7236.00	35.99	-9.99	54.00	18.01	150	218	Vertical
7	17949.3	47.35	0.70	54.00	6.65	150	360	Vertical

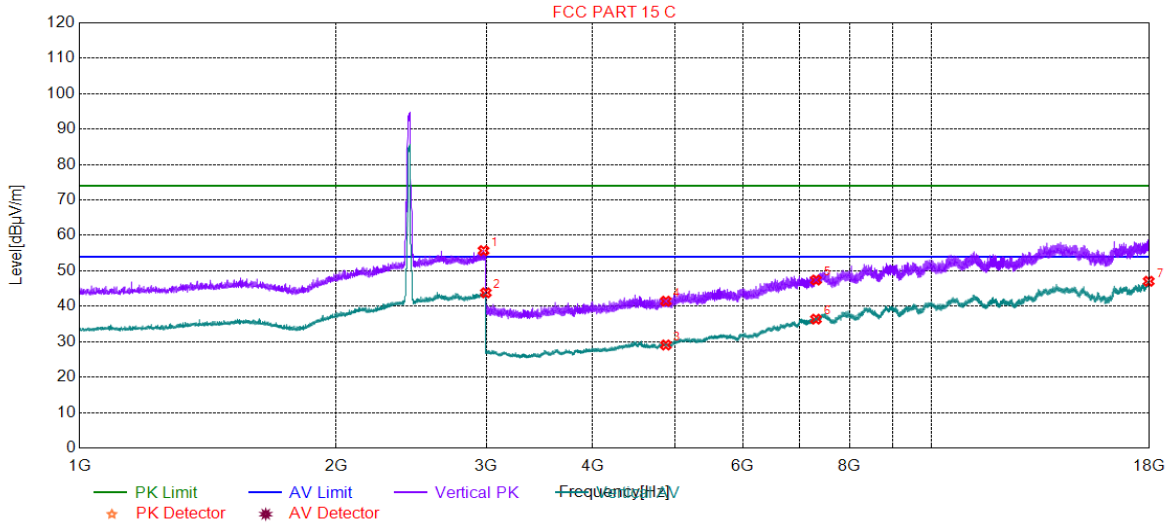
4.9.2.1.9 802.11G_ Middle Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2956.48	55.63	9.65	74.00	18.37	150	72	Horizontal
2	2994.49	43.82	9.48	54.00	10.18	150	58	Horizontal
3	4874.00	29.11	-17.99	54.00	24.89	150	206	Horizontal
4	4874.00	41.16	-17.99	74.00	32.84	150	206	Horizontal
5	7311.00	46.90	-9.74	74.00	27.10	150	267	Horizontal
6	7311.00	36.29	-9.74	54.00	17.71	150	267	Horizontal
7	17965.3	46.90	0.71	54.00	7.10	150	217	Horizontal

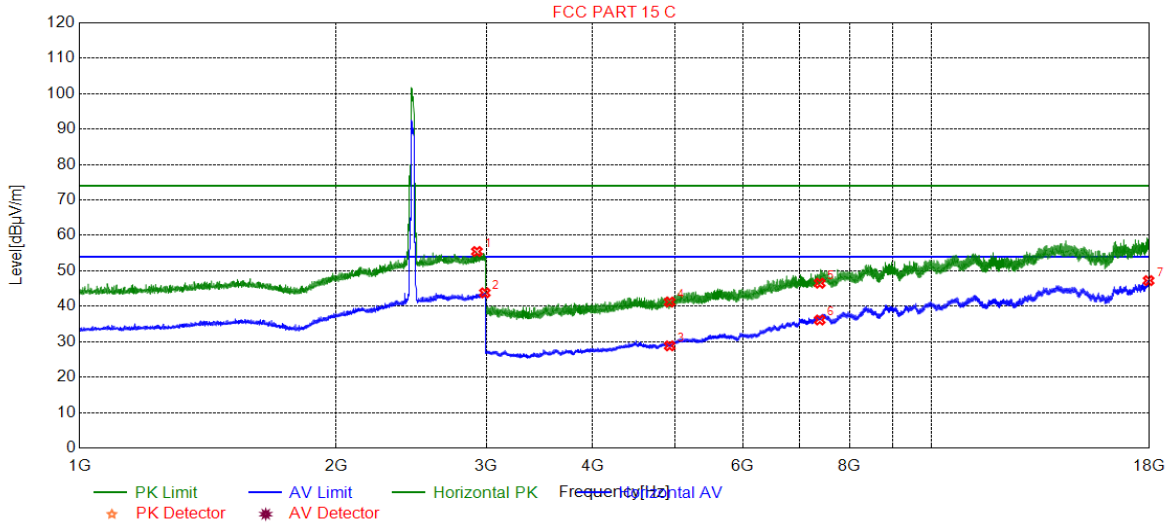
4.9.2.1.10 802.11G_ Middle Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2978.49	55.71	9.55	74.00	18.29	150	27	Vertical
2	2996.99	43.81	9.46	54.00	10.19	150	27	Vertical
3	4874.00	29.08	-17.99	54.00	24.92	150	0	Vertical
4	4874.00	41.45	-17.99	74.00	32.55	150	41	Vertical
5	7311.00	47.40	-9.74	74.00	26.60	150	68	Vertical
6	7311.00	36.38	-9.74	54.00	17.62	150	118	Vertical
7	17962.0	47.06	0.71	54.00	6.94	150	360	Vertical

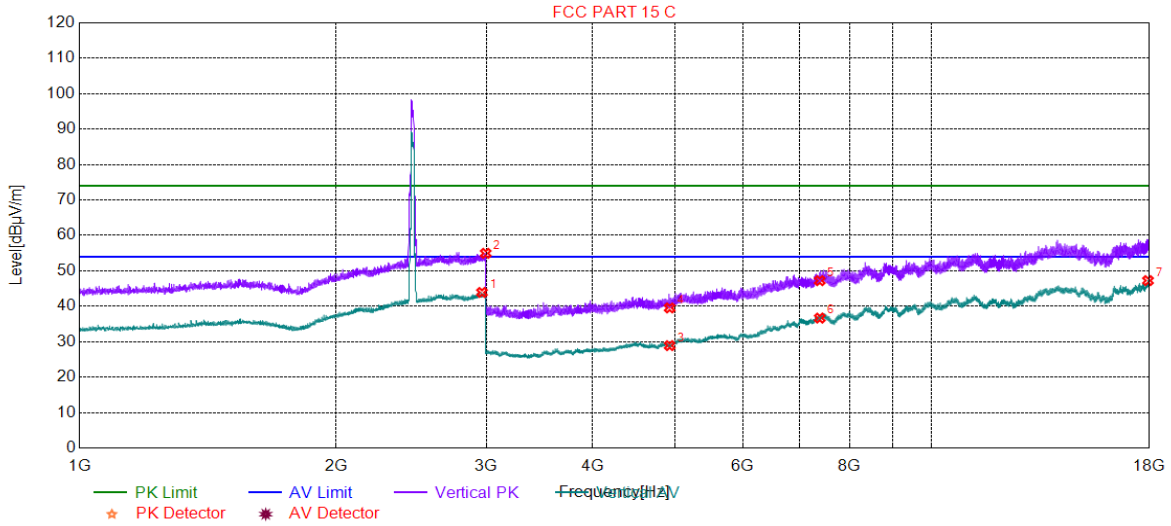
4.9.2.1.11 802.11G_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2925.48	55.46	9.42	74.00	18.54	150	18	Horizontal
2	2988.99	43.79	9.50	54.00	10.21	150	155	Horizontal
3	4924.00	28.83	-17.72	54.00	25.17	150	124	Horizontal
4	4924.00	41.21	-17.72	74.00	32.79	150	287	Horizontal
5	7386.00	46.52	-9.55	74.00	27.48	150	317	Horizontal
6	7386.00	36.14	-9.55	54.00	17.86	150	118	Horizontal
7	17954.8	47.25	0.71	54.00	6.75	150	118	Horizontal

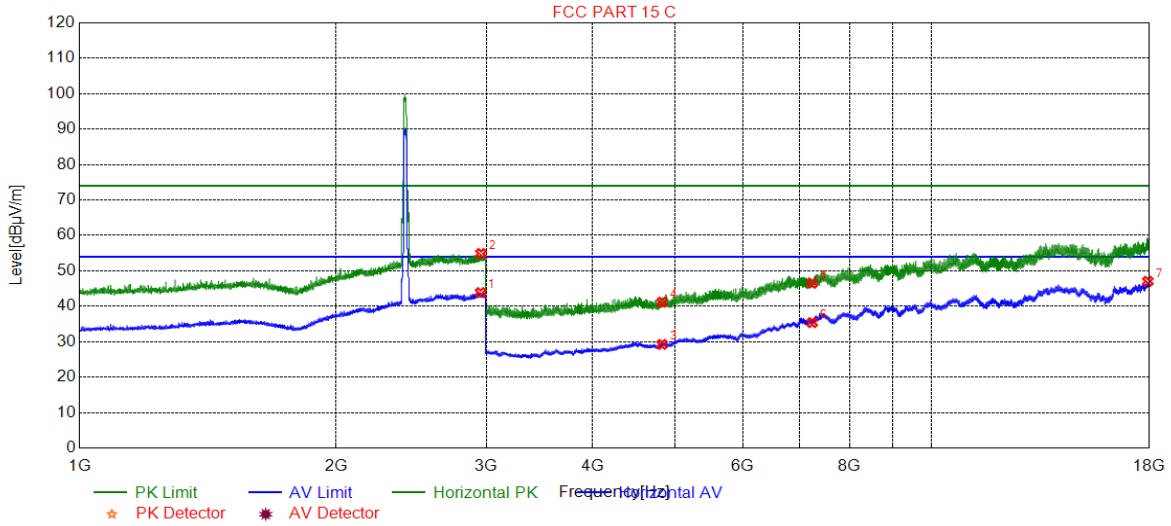
4.9.2.1.12 802.11G_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2965.49	43.91	9.61	54.00	10.09	150	28	Vertical
2	2995.99	54.95	9.47	74.00	19.05	150	261	Vertical
3	4924.00	28.91	-17.72	54.00	25.09	150	16	Vertical
4	4924.00	39.54	-17.72	74.00	34.46	150	260	Vertical
5	7386.00	47.23	-9.55	74.00	26.77	150	318	Vertical
6	7386.00	36.67	-9.55	54.00	17.33	150	219	Vertical
7	17927.9	47.25	0.70	54.00	6.75	150	18	Vertical

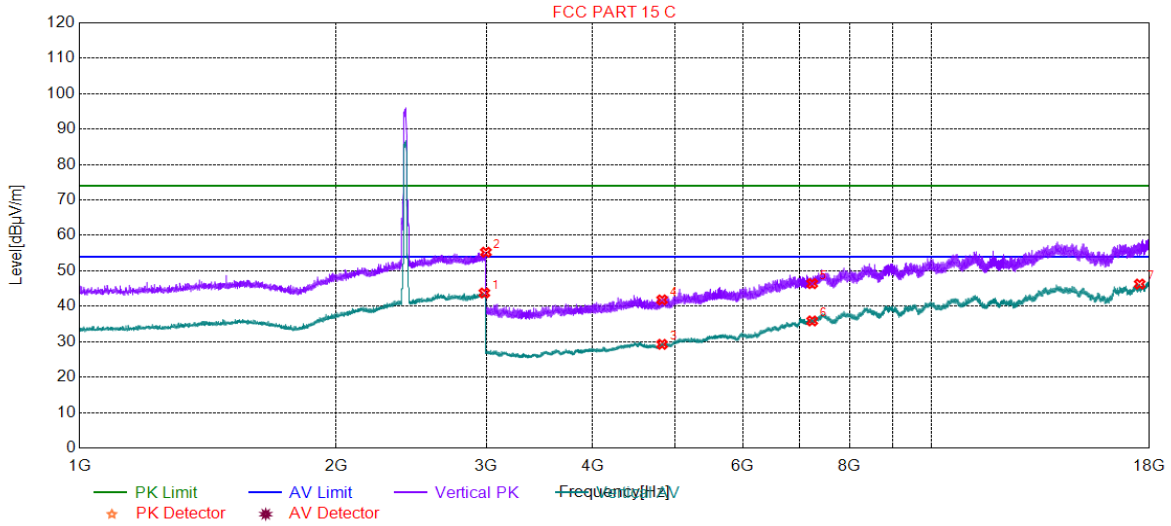
4.9.2.1.13 802.11N20_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2954.98	43.86	9.66	54.00	10.14	150	179	Horizontal
2	2957.48	54.90	9.65	74.00	19.10	150	125	Horizontal
3	4824.00	29.25	-18.21	54.00	24.75	150	260	Horizontal
4	4824.00	41.18	-18.21	74.00	32.82	150	124	Horizontal
5	7236.00	46.52	-9.99	74.00	27.48	150	269	Horizontal
6	7236.00	35.40	-9.99	54.00	18.60	150	118	Horizontal
7	17921.3	47.05	0.70	54.00	6.95	150	118	Horizontal

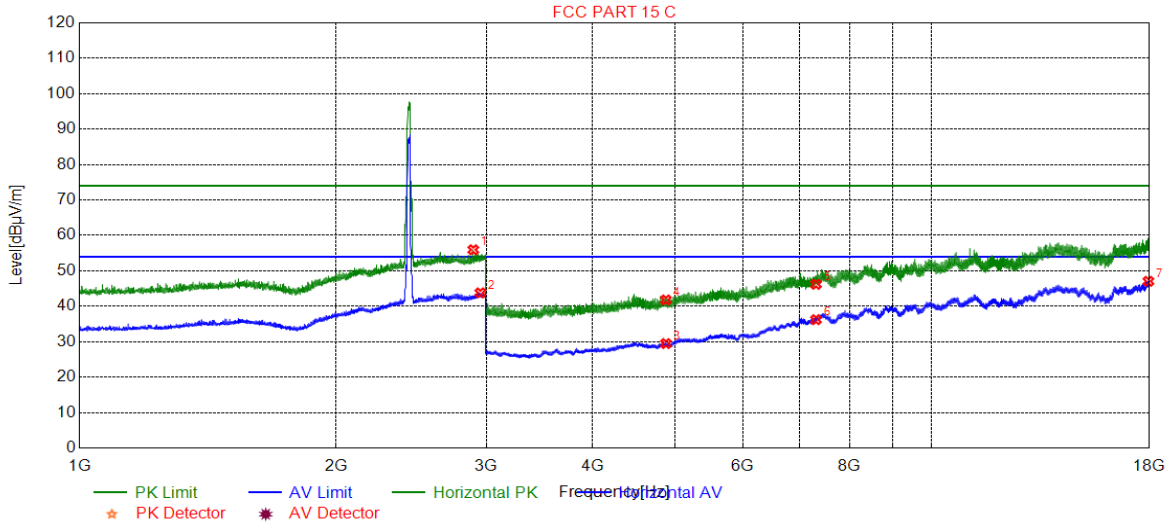
4.9.2.1.14 802.11N20_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2984.99	43.76	9.52	54.00	10.24	150	342	Vertical
2	2997.49	55.26	9.46	74.00	18.74	150	84	Vertical
3	4824.00	29.27	-18.21	54.00	24.73	150	206	Vertical
4	4824.00	41.81	-18.21	74.00	32.19	150	0	Vertical
5	7236.00	46.39	-9.99	74.00	27.61	150	319	Vertical
6	7236.00	35.87	-9.99	54.00	18.13	150	268	Vertical
7	17529.1	46.28	1.03	54.00	7.72	150	319	Vertical

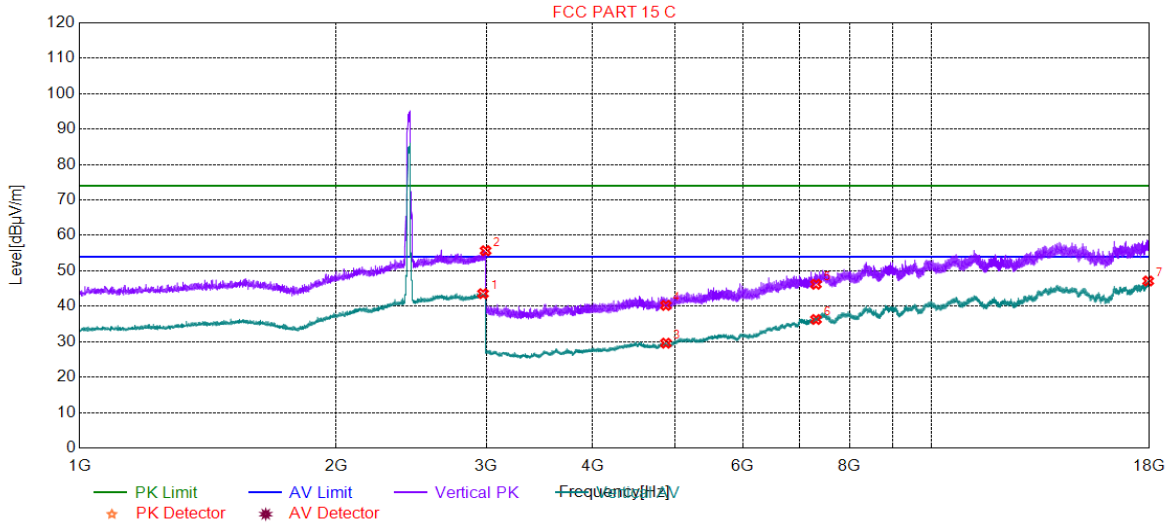
4.9.2.1.15 802.11N20_ Middle Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2896.97	55.95	9.15	74.00	18.05	150	168	Horizontal
2	2952.48	43.79	9.67	54.00	10.21	150	250	Horizontal
3	4874.00	29.48	-17.99	54.00	24.52	150	42	Horizontal
4	4874.00	41.80	-17.99	74.00	32.20	150	69	Horizontal
5	7311.00	46.21	-9.74	74.00	27.79	150	359	Horizontal
6	7311.00	36.23	-9.74	54.00	17.77	150	167	Horizontal
7	17946.6	47.05	0.70	54.00	6.95	150	316	Horizontal

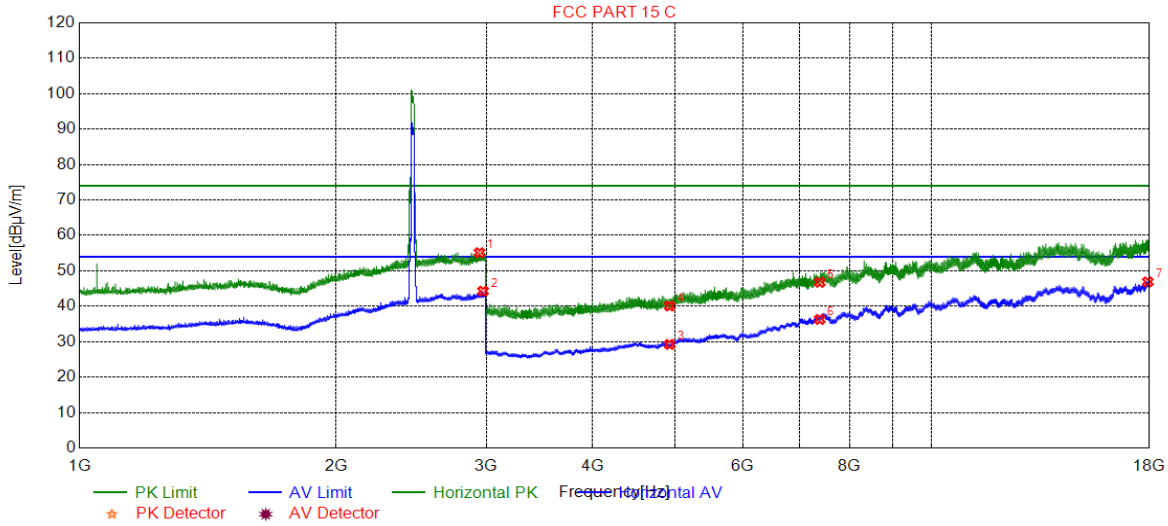
4.9.2.1.16 802.11N20_ Middle Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2973.99	43.58	9.57	54.00	10.42	150	193	Vertical
2	2994.99	55.68	9.47	74.00	18.32	150	138	Vertical
3	4874.00	29.59	-17.99	54.00	24.41	150	98	Vertical
4	4874.00	40.26	-17.99	74.00	33.74	150	288	Vertical
5	7311.00	46.22	-9.74	74.00	27.78	150	268	Vertical
6	7311.00	36.28	-9.74	54.00	17.72	150	168	Vertical
7	17935.6	47.14	0.70	54.00	6.86	150	360	Vertical

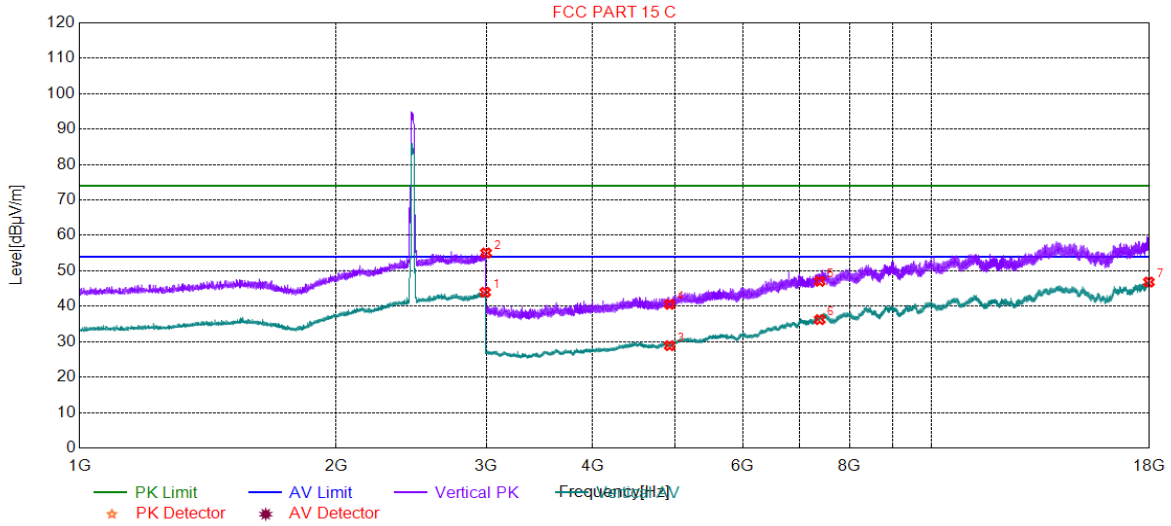
4.9.2.1.17 802.11N20_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2945.98	55.13	9.64	74.00	18.87	150	31	Horizontal
2	2974.49	44.28	9.57	54.00	9.72	150	333	Horizontal
3	4924.00	29.25	-17.72	54.00	24.75	150	261	Horizontal
4	4924.00	40.07	-17.72	74.00	33.93	150	342	Horizontal
5	7386.00	46.76	-9.55	74.00	27.24	150	318	Horizontal
6	7386.00	36.30	-9.55	54.00	17.70	150	360	Horizontal
7	17918.0	46.90	0.70	54.00	7.10	150	218	Horizontal

4.9.2.1.18 802.11N20_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2991.49	43.96	9.49	54.00	10.04	150	302	Vertical
2	2998.99	55.04	9.45	74.00	18.96	150	137	Vertical
3	4924.00	28.89	-17.72	54.00	25.11	150	41	Vertical
4	4924.00	40.57	-17.72	74.00	33.43	150	151	Vertical
5	7386.00	47.05	-9.55	74.00	26.95	150	168	Vertical
6	7386.00	36.25	-9.55	54.00	17.75	150	118	Vertical
7	17969.7	46.84	0.71	54.00	7.16	150	68	Vertical

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz and 18GHz to 25GHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3）As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

4）All Modes have been tested, but only the worst case data displayed in this report.

4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			

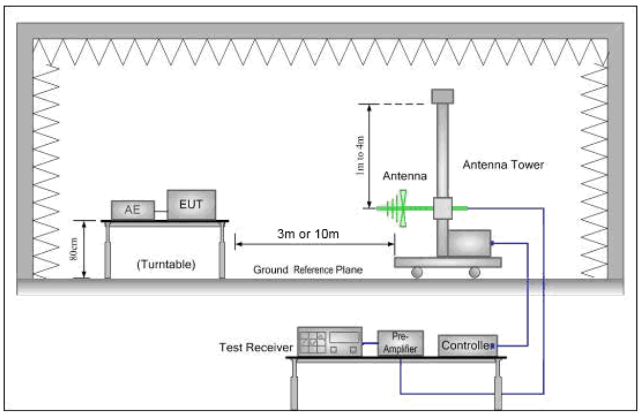


Figure 1. 30MHz to 1GHz

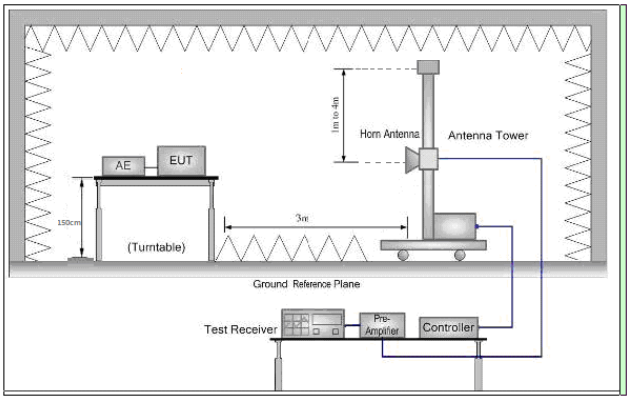


Figure 2. Above 1 GHz

Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel h. Test the EUT in the lowest channel , the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at Charge +Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G ; 6.5Mbps of rate is the worst case of 802.11N(HT20); Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

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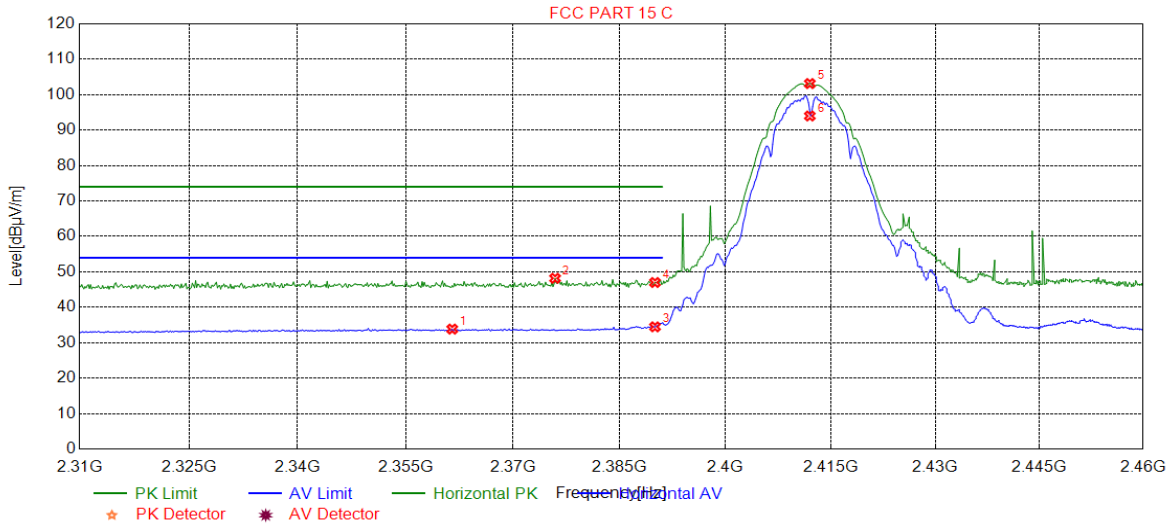
Test plot as follows:

4.10.1 ANT1

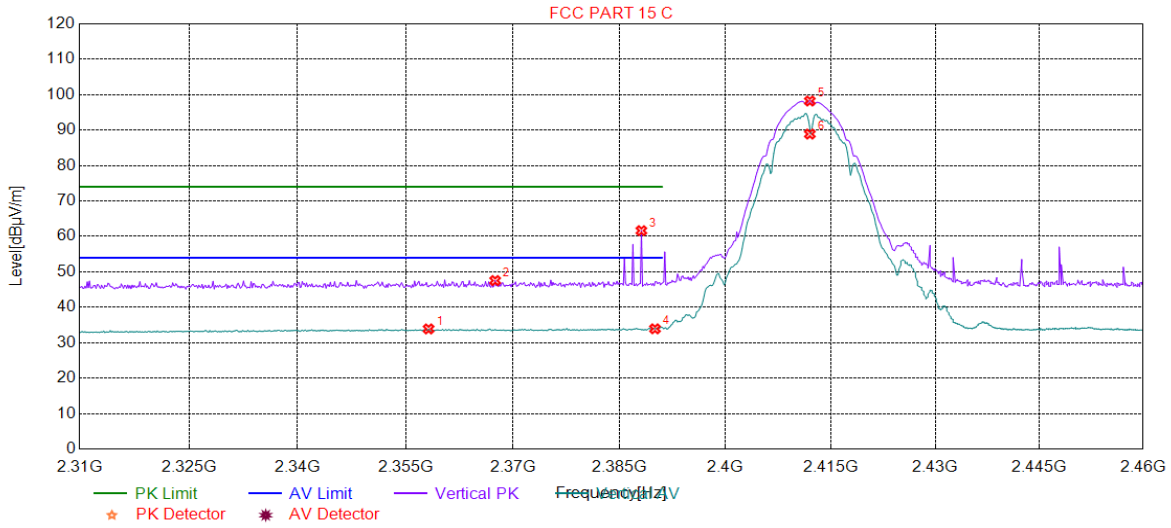
4.10.1.1 802.11B_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2361.50	33.85	7.80	54.00	20.15	150	26	Horizontal
2	2375.91	48.18	7.78	74.00	25.82	150	337	Horizontal
3	2390.00	34.48	7.77	54.00	19.52	150	187	Horizontal
4	2390.00	47.00	7.77	74.00	27.00	150	191	Horizontal
5	2412.00	103.15	7.81	0.00	-103.15	150	191	Horizontal
6	2412.00	94.00	7.81	0.00	-94.00	150	187	Horizontal

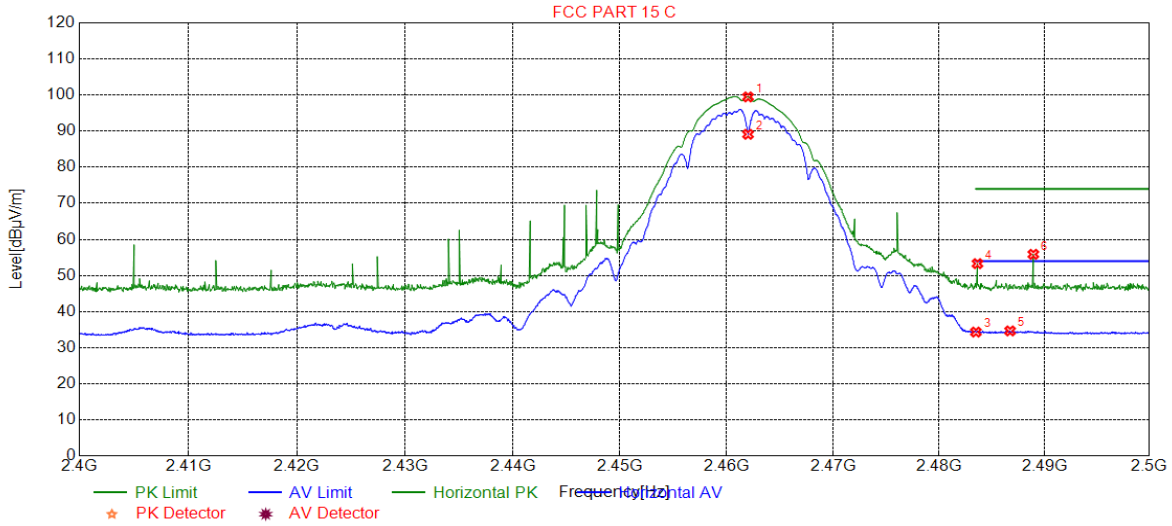
4.10.1.2 802.11B_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2358.19	33.90	7.80	54.00	20.10	150	240	Vertical
2	2367.50	47.54	7.79	74.00	26.46	150	210	Vertical
3	2388.07	61.63	7.77	74.00	12.37	150	346	Vertical
4	2390.00	33.93	7.77	54.00	20.07	150	236	Vertical
5	2412.00	98.22	7.81	0.00	-98.22	150	84	Vertical
6	2412.00	88.89	7.81	0.00	-88.89	150	88	Vertical

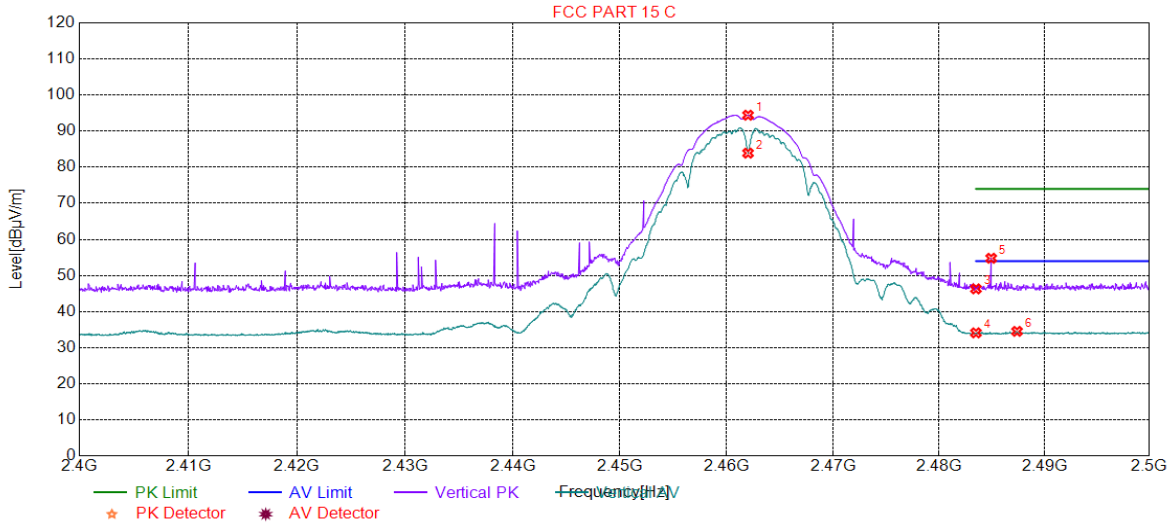
4.10.1.3 802.11B_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	99.47	7.98	0.00	-99.47	150	52	Horizontal
2	2462.00	89.11	7.98	0.00	-89.11	150	52	Horizontal
3	2483.50	34.32	8.01	54.00	19.68	150	58	Horizontal
4	2483.64	53.29	8.01	74.00	20.71	150	330	Horizontal
5	2486.74	34.64	8.01	54.00	19.36	150	48	Horizontal
6	2488.94	55.87	8.02	74.00	18.13	150	314	Horizontal

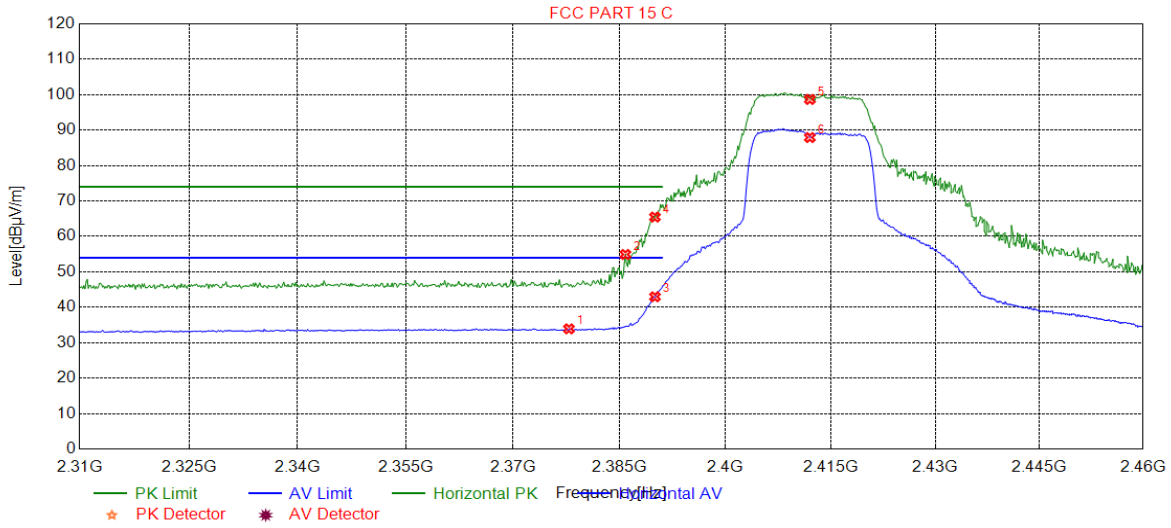
4.10.1.4 802.11B_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	94.41	7.98	0.00	-94.41	150	318	Vertical
2	2462.00	83.89	7.98	0.00	-83.89	150	312	Vertical
3	2483.50	46.29	8.01	74.00	27.71	150	224	Vertical
4	2483.50	34.11	8.01	54.00	19.89	150	153	Vertical
5	2484.94	54.77	8.01	74.00	19.23	150	306	Vertical
6	2487.39	34.52	8.01	54.00	19.48	150	323	Vertical

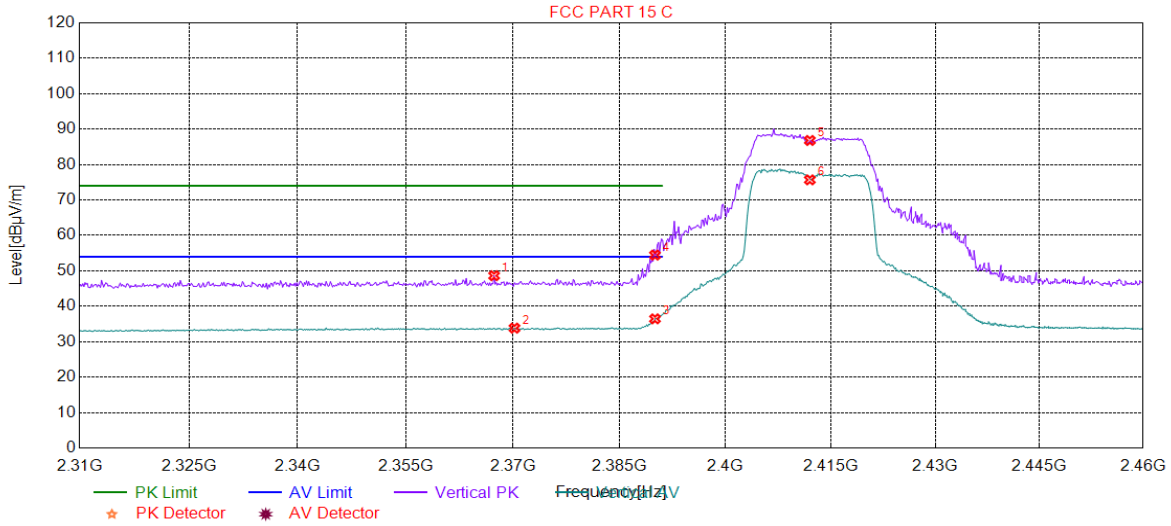
4.10.1.5 802.11G_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2377.86	33.92	7.78	54.00	20.08	150	187	Horizontal
2	2385.82	54.92	7.77	74.00	19.08	150	60	Horizontal
3	2390.00	42.97	7.77	54.00	11.03	150	60	Horizontal
4	2390.00	65.46	7.77	74.00	8.54	150	38	Horizontal
5	2412.00	98.67	7.81	0.00	-98.67	150	51	Horizontal
6	2412.00	87.91	7.81	0.00	-87.91	150	46	Horizontal

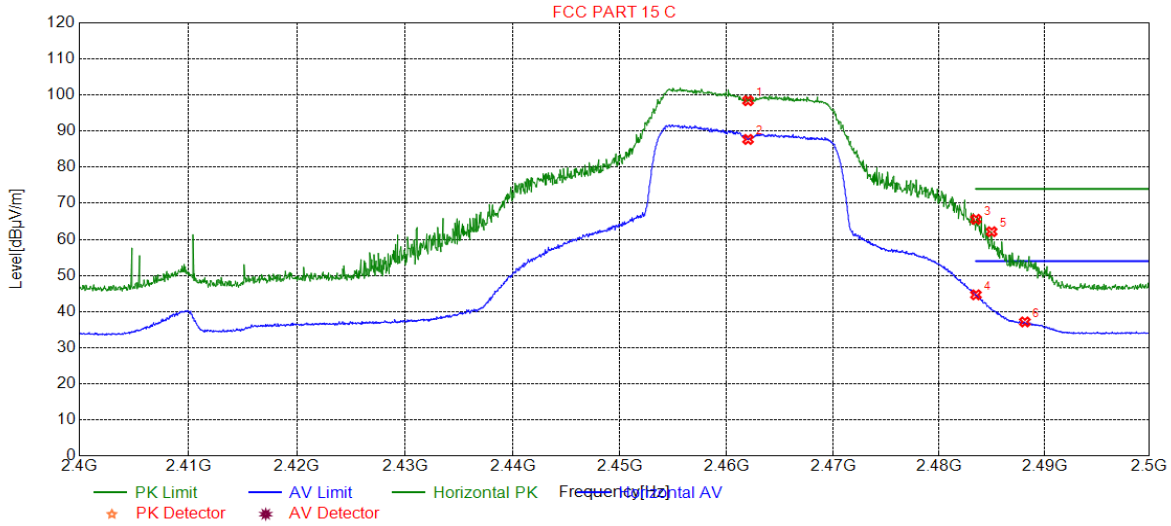
4.10.1.6 802.11G_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2367.35	48.63	7.79	74.00	25.37	150	58	Vertical
2	2370.21	33.84	7.79	54.00	20.16	150	313	Vertical
3	2390.00	36.46	7.77	54.00	17.54	150	235	Vertical
4	2390.00	54.46	7.77	74.00	19.54	150	235	Vertical
5	2412.00	86.80	7.81	0.00	-86.80	150	235	Vertical
6	2412.00	75.69	7.81	0.00	-75.69	150	235	Vertical

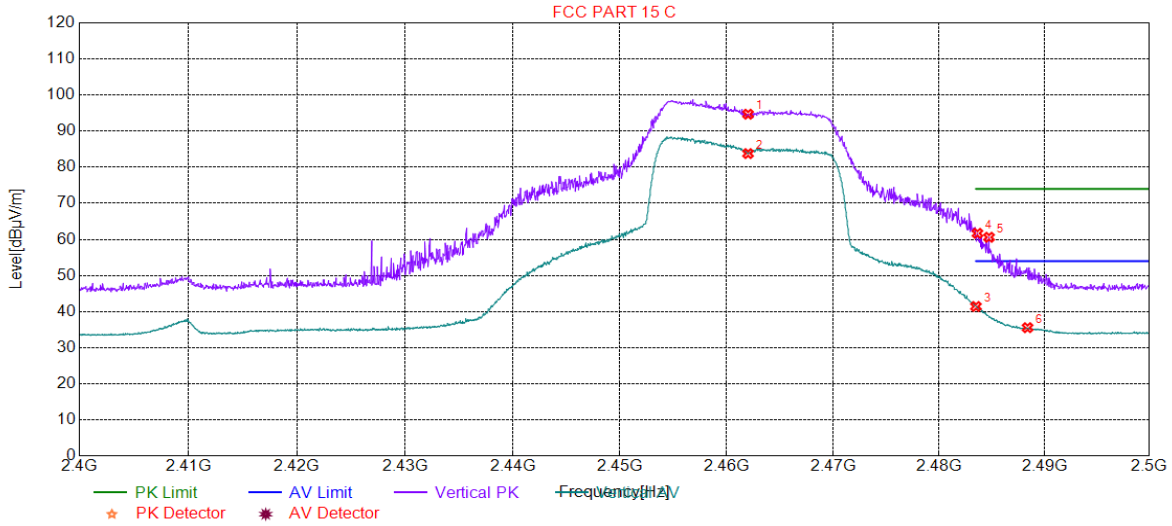
4.10.1.7 802.11G_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	98.42	7.98	0.00	-98.42	150	196	Horizontal
2	2462.00	87.69	7.98	0.00	-87.69	150	191	Horizontal
3	2483.50	65.57	8.01	74.00	8.43	150	359	Horizontal
4	2483.50	44.64	8.01	54.00	9.36	150	191	Horizontal
5	2484.99	62.13	8.01	74.00	11.87	150	356	Horizontal
6	2488.14	37.13	8.02	54.00	16.87	150	191	Horizontal

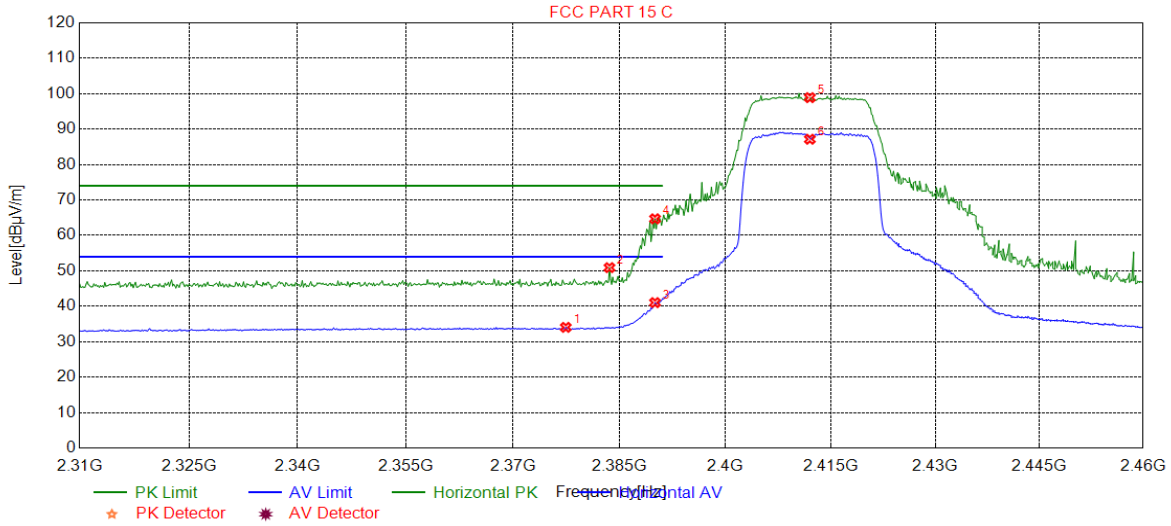
4.10.1.8 802.11G_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	94.69	7.98	0.00	-94.69	150	199	Vertical
2	2462.00	83.77	7.98	0.00	-83.77	150	204	Vertical
3	2483.50	41.41	8.01	54.00	12.59	150	177	Vertical
4	2483.64	61.67	8.01	74.00	12.33	150	199	Vertical
5	2484.74	60.59	8.01	74.00	13.41	150	182	Vertical
6	2488.39	35.54	8.02	54.00	18.46	150	171	Vertical

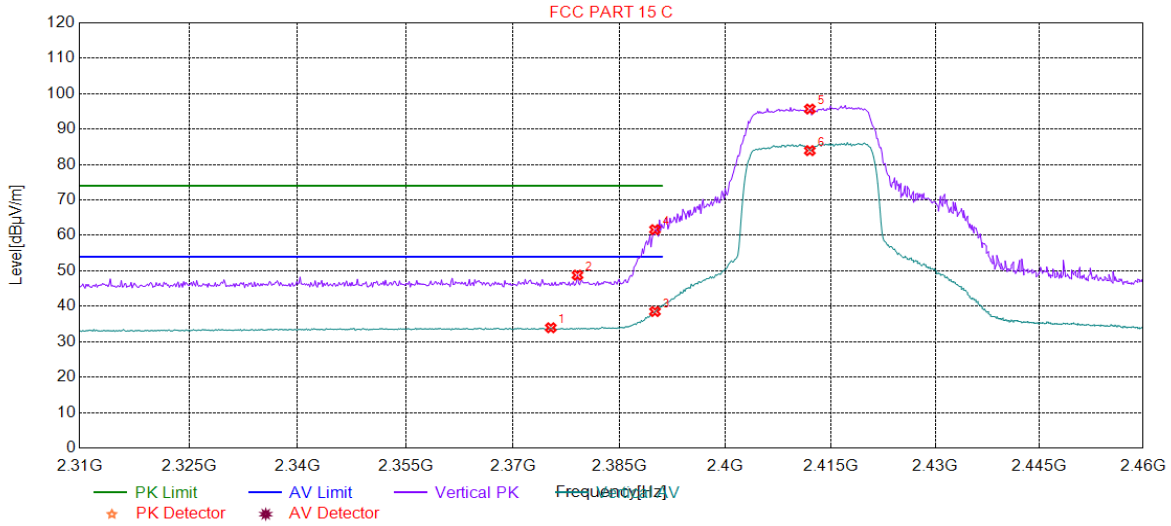
4.10.1.9 802.11N20_ Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2377.41	34.06	7.78	54.00	19.94	150	225	Horizontal
2	2383.57	50.91	7.78	74.00	23.09	150	329	Horizontal
3	2390.00	41.04	7.77	54.00	12.96	150	14	Horizontal
4	2390.00	64.69	7.77	74.00	9.31	150	176	Horizontal
5	2412.00	98.89	7.81	0.00	-98.89	150	14	Horizontal
6	2412.00	87.15	7.81	0.00	-87.15	150	14	Horizontal

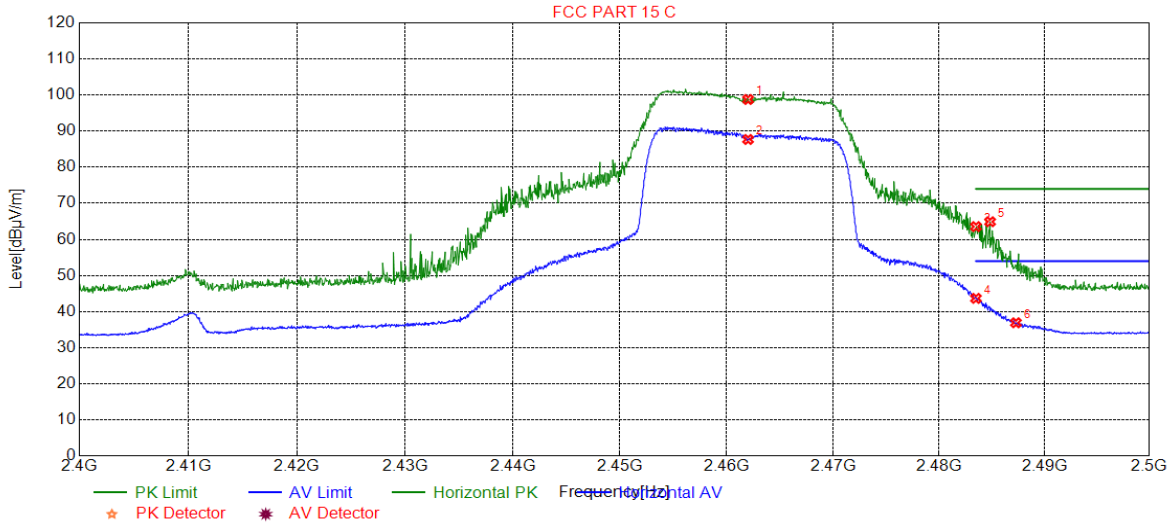
4.10.1.10 802.11N20_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2375.31	33.94	7.78	54.00	20.06	150	14	Vertical
2	2379.06	48.79	7.78	74.00	25.21	150	0	Vertical
3	2390.00	38.52	7.77	54.00	15.48	150	148	Vertical
4	2390.00	61.64	7.77	74.00	12.36	150	190	Vertical
5	2412.00	95.68	7.81	0.00	-95.68	150	186	Vertical
6	2412.00	83.93	7.81	0.00	-83.93	150	190	Vertical

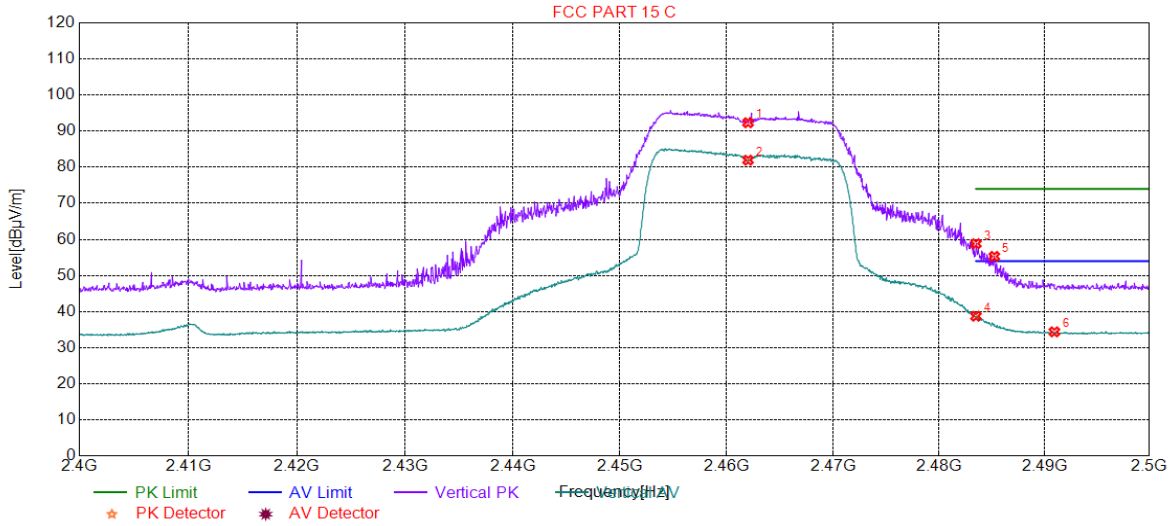
4.10.1.11 802.11N20_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	98.77	7.98	0.00	-98.77	150	182	Horizontal
2	2462.00	87.68	7.98	0.00	-87.68	150	177	Horizontal
3	2483.50	63.54	8.01	74.00	10.46	150	182	Horizontal
4	2483.50	43.66	8.01	54.00	10.34	150	182	Horizontal
5	2484.84	64.89	8.01	74.00	9.11	150	182	Horizontal
6	2487.29	36.90	8.01	54.00	17.10	150	182	Horizontal

4.10.1.12 802.11N20_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	92.32	7.98	0.00	-92.32	150	336	Vertical
2	2462.00	81.95	7.98	0.00	-81.95	150	341	Vertical
3	2483.50	58.81	8.01	74.00	15.19	150	171	Vertical
4	2483.50	38.72	8.01	54.00	15.28	150	336	Vertical
5	2485.24	55.29	8.01	74.00	18.71	150	325	Vertical
6	2490.94	34.38	8.02	54.00	19.62	150	331	Vertical

Remark:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

All Modes have been tested, but only the worst case data displayed in this report.

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

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Radiated Spurious emission test	±4.5dB (30MHz-1GHz)
		±4.8dB (1GHz-25GHz)
5	Conduct emission test	±3.12 dB (9KHz- 30MHz)
6	Temperature test	±1°C
7	Humidity test	±3%
8	DC and low frequency voltages	±0.5%

6 Equipment List

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2020/5/10	2023/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019/7/14	2020/7/14
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2020/4/1	2021/3/31
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019/6/12	2020/6/11
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2020/2/11	2021/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2020/3/2	2021/3/1

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2019/7/15	2020/7/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2020/1/3	2021/1/2
Coaxial Cable	SGS	N/A	SEM031-01	2019/6/12	2020/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019/7/14	2020/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2019/10/27	2020/10/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019/7/14	2020/7/14

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018/3/13	2021/3/12
Measurement Software	AUDIX	e3V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019/6/12	2020/6/11
EXA Signal Analyzer (10Hz-26.5GHz)	Agilent Technologies Inc	N9010A	SEM004-09	2020/3/12	2021/3/11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017/6/27	2020/6/26
Horn Antenna (0.8-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/4/13	2021/4/12
Pre-amplifier(0.1-1.3GHz)	HP	8447D	SEM005-02	2019/7/14	2020/7/14
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2019/9/3	2020/9/2
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017/10/17	2020/10/16
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2020/3/2	2021/3/1
Band filter	N/A	N/A	SEM023-01	N/A	N/A

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017/8/5	2020/8/4
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019/6/12	2020/6/11
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019/7/14	2020/7/14
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017/6/27	2020/6/26
Pre-amplifier (0.1-1.3GHz)	Agilent Technologies	8447D	SEM005-01	2020/3/2	2021/3/1

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018/3/31	2021/3/30
EMI Test Receiver (9k-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2020/3/2	2021/3/1
Trilog-Broadband Antenna(25M-2GHz)	Schwarzbeck	VULB9168	SEM003-18	2020/3/15	2022/3/14
Pre-amplifier (9k-1GHz)	Sonoma	310N	SEM005-03	2020/3/12	2021/3/11
Loop Antenna (9kHz-30MHz)	ETS-Lindgren	6502	SEM003-08	2017/8/22	2020/8/21
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019/6/12	2020/6/11

7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of Set-Up for ZR/2020/40028.

The End

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