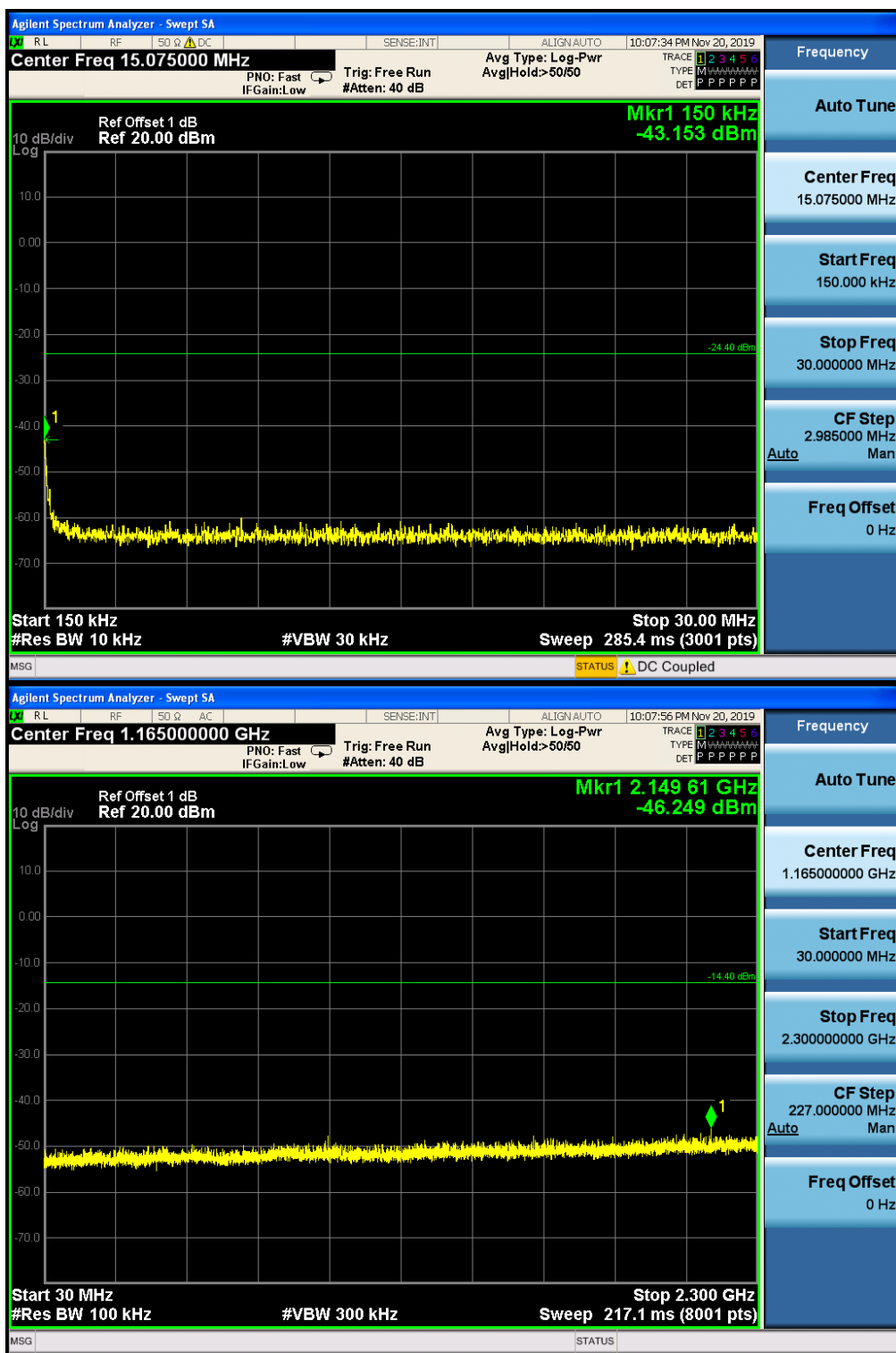




4.8.1.1.5 802.11G_Middle Channel





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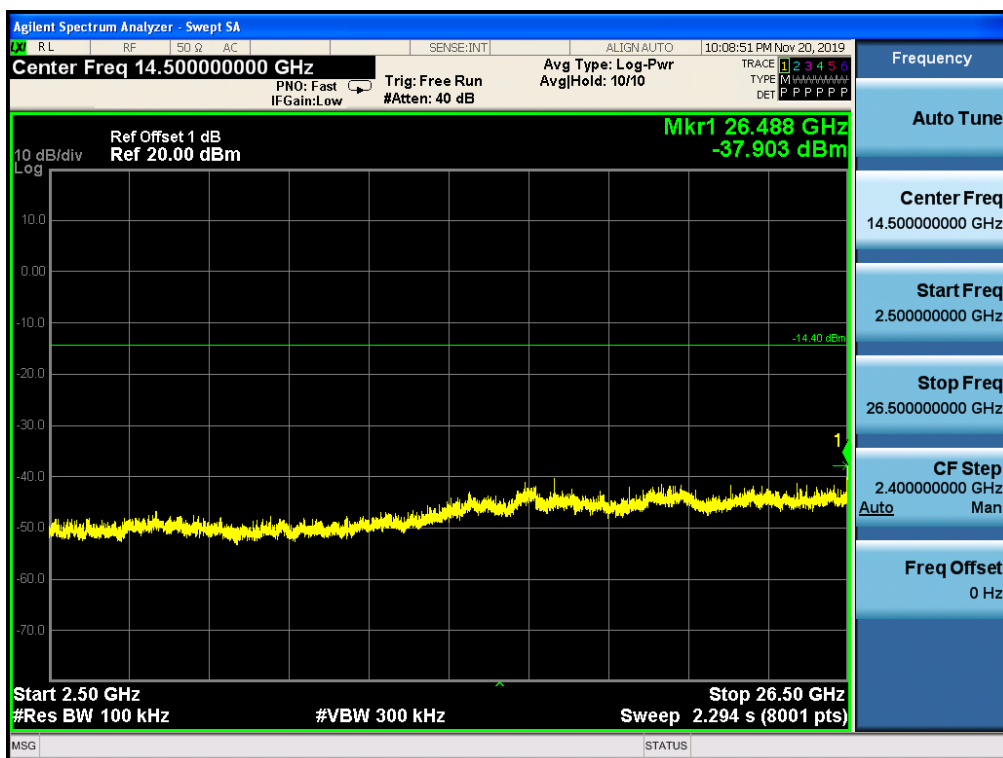
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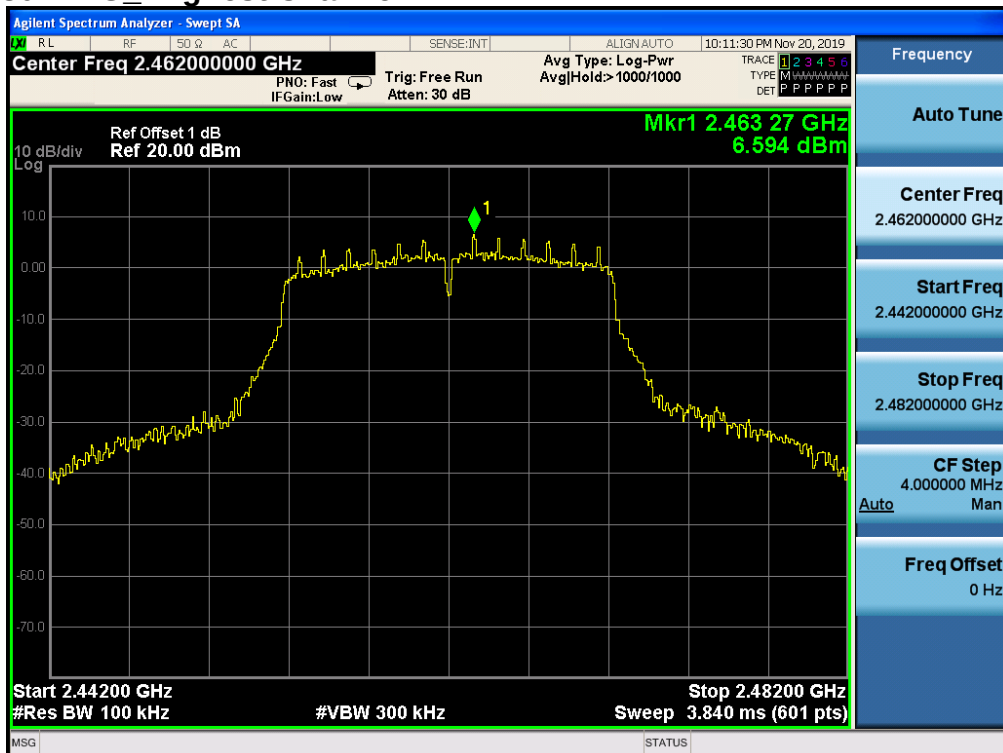
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4.8.1.1.6 802.11G_Highest Channel





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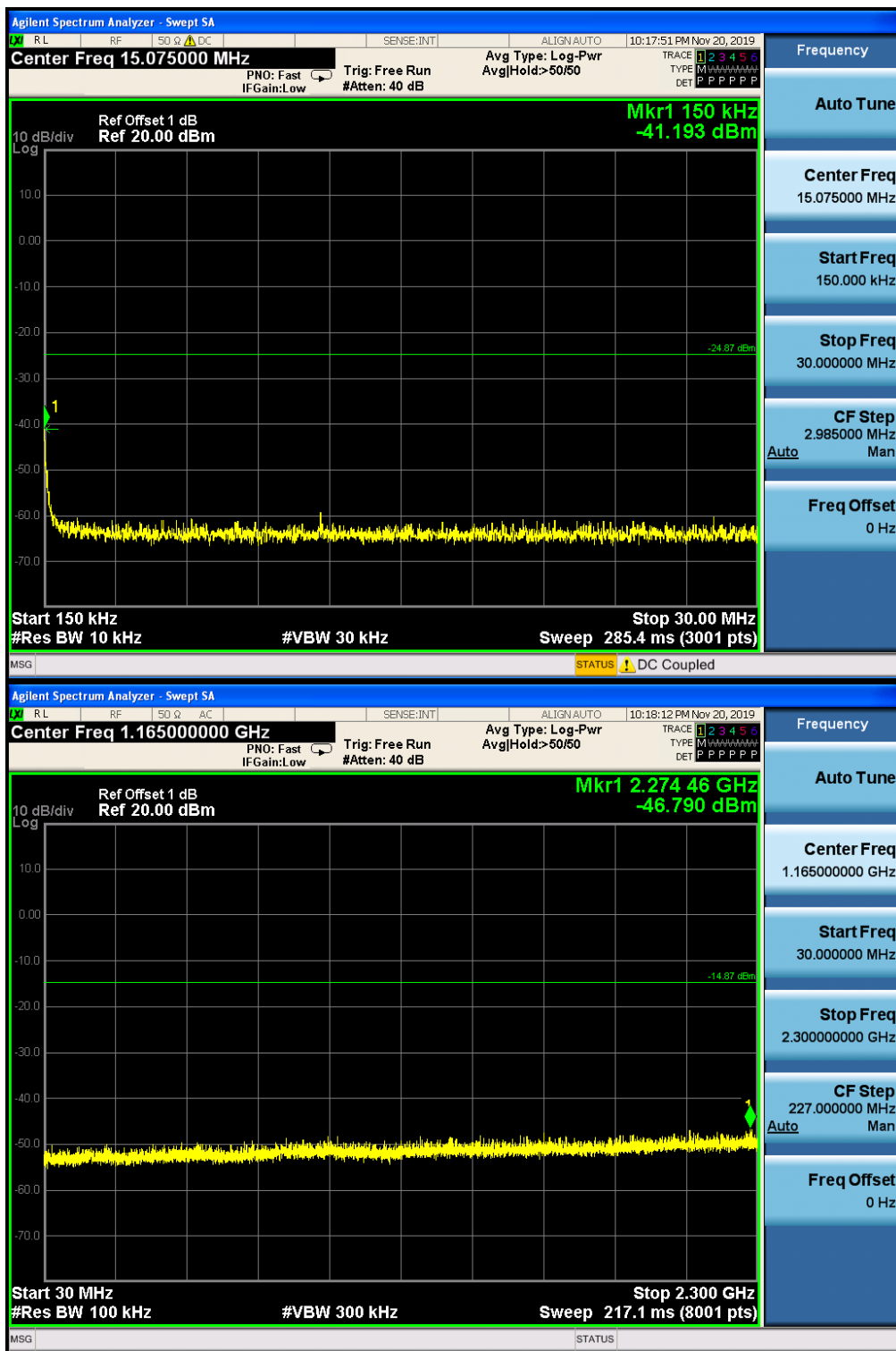


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4.8.1.1.7 802.11N20 Lowest Channel





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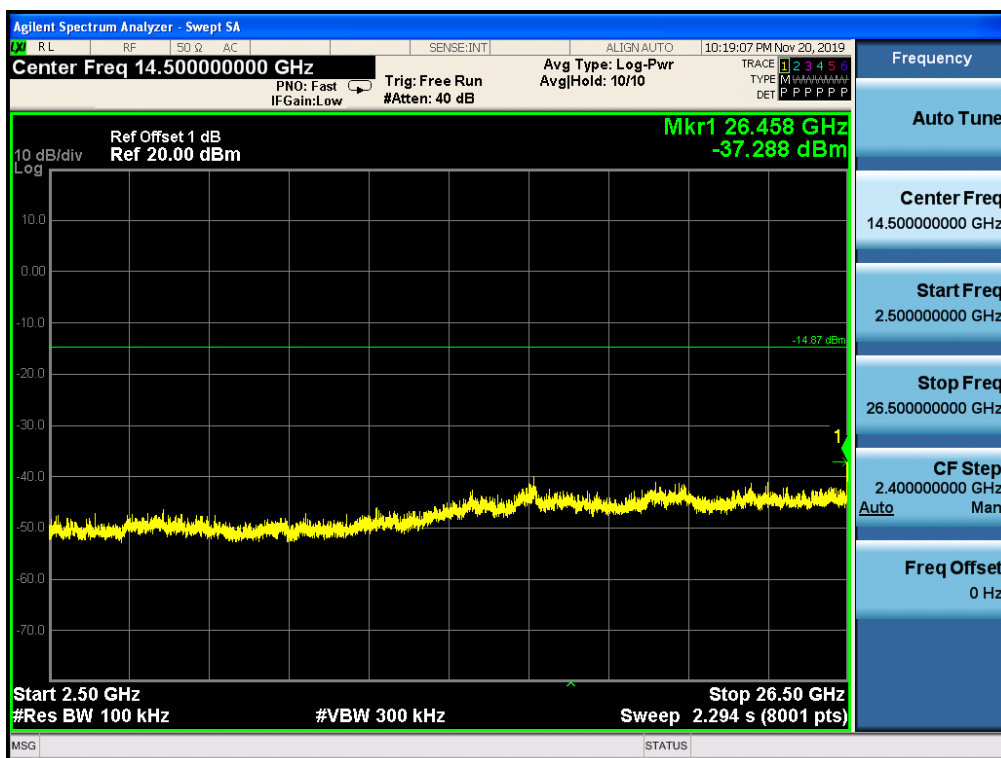
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4.8.1.1.8 802.11 N20_ Middle Channel



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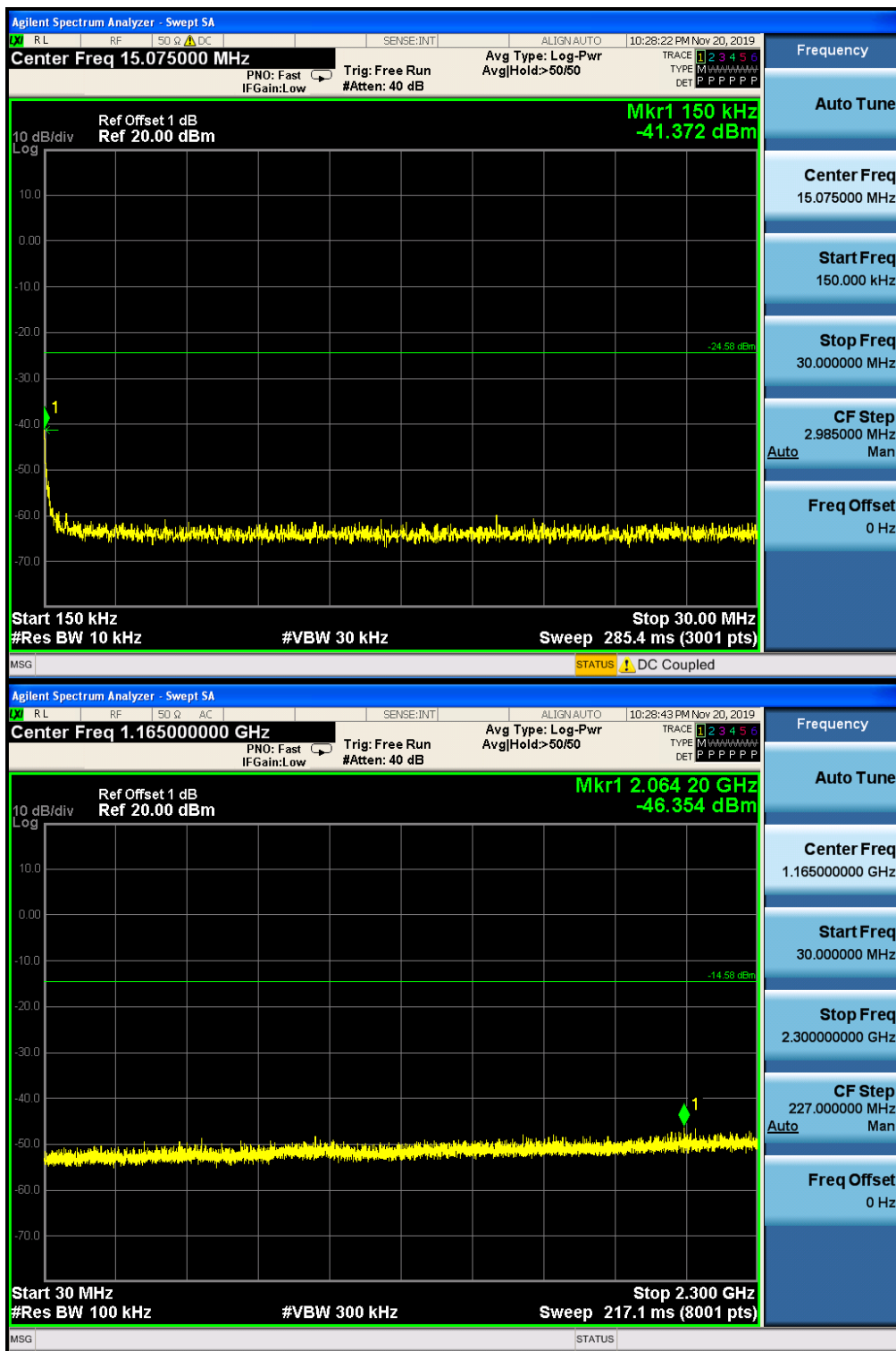
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4.8.1.1.9 802.11 N20_ Highest Channel





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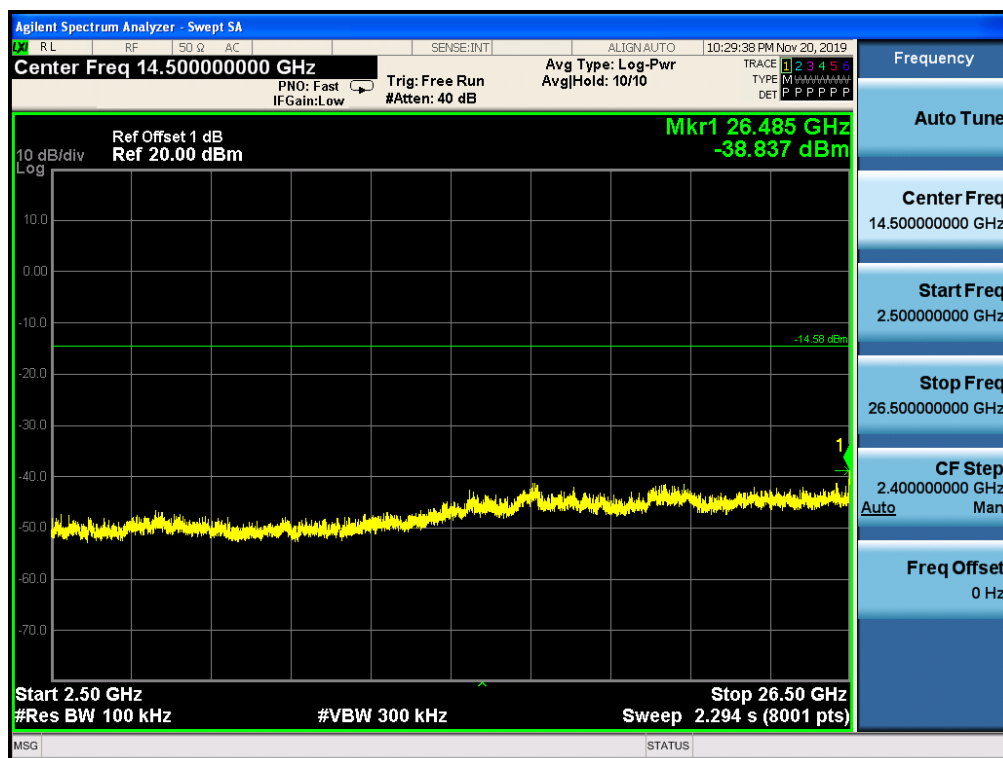
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Remark:

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:	
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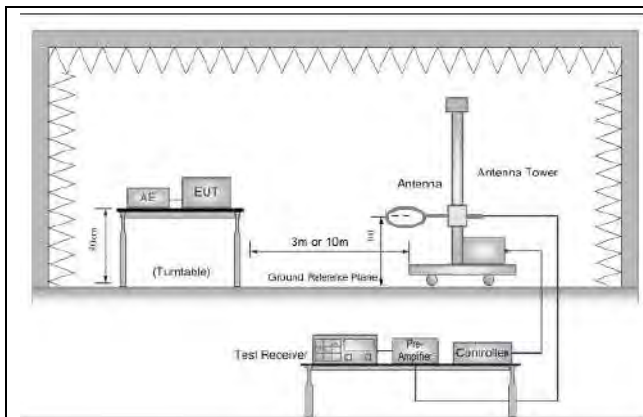


Figure 1. Below 30MHz

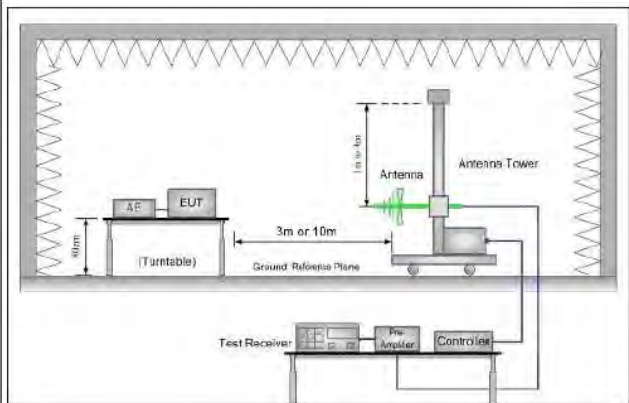


Figure 2. 30MHz to 1GHz

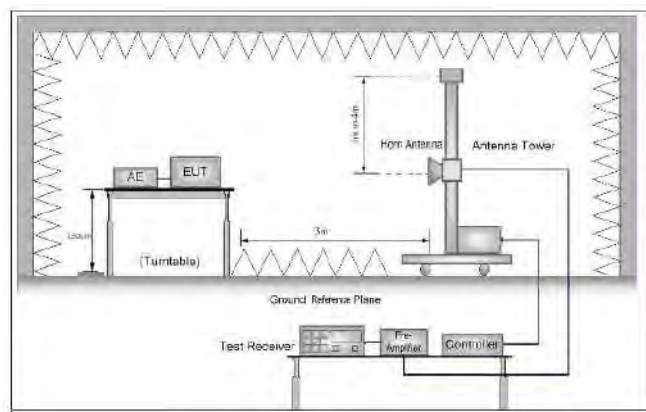


Figure 3. Above 1 GHz

Test Procedure:

- 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.
- 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
- 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.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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. h. Test the EUT in the lowest channel, the middle 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); 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



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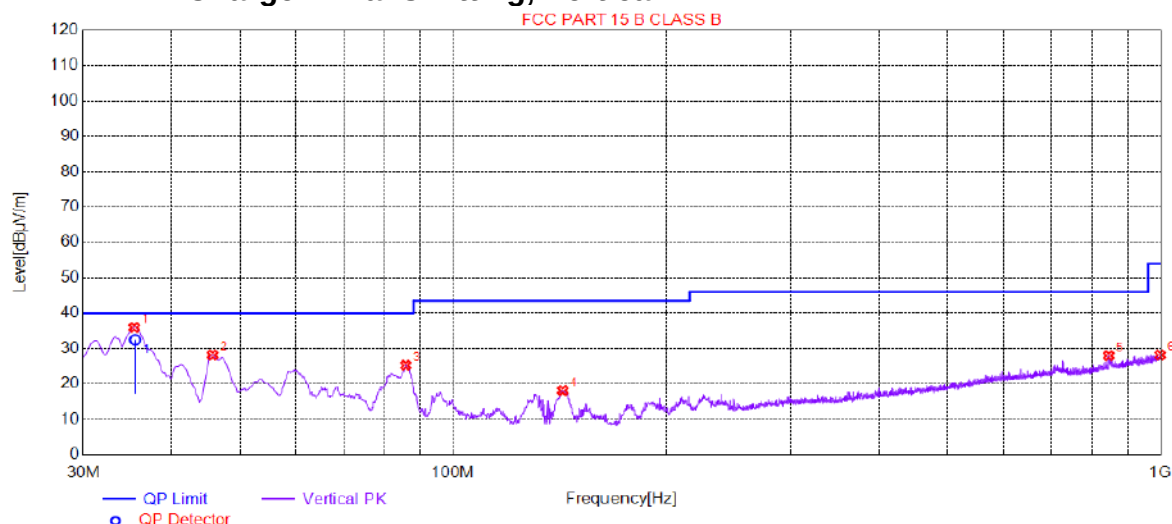
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4.9.1 Radiated emission below 1GHz

4.9.1.1 Charge + Transmitting, Vertical



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.4331	35.94	-29.82	40.00	4.06	271	360	Vertical
2	45.7171	28.15	-30.42	40.00	11.85	236	58	Vertical
3	85.6891	25.30	-34.77	40.00	14.70	166	220	Vertical
4	142.9306	18.13	-35.41	43.50	25.37	169	49	Vertical
5	844.9630	27.99	-16.97	46.00	18.01	163	119	Vertical
6	998.4477	28.15	-14.81	54.00	25.85	237	314	Vertical



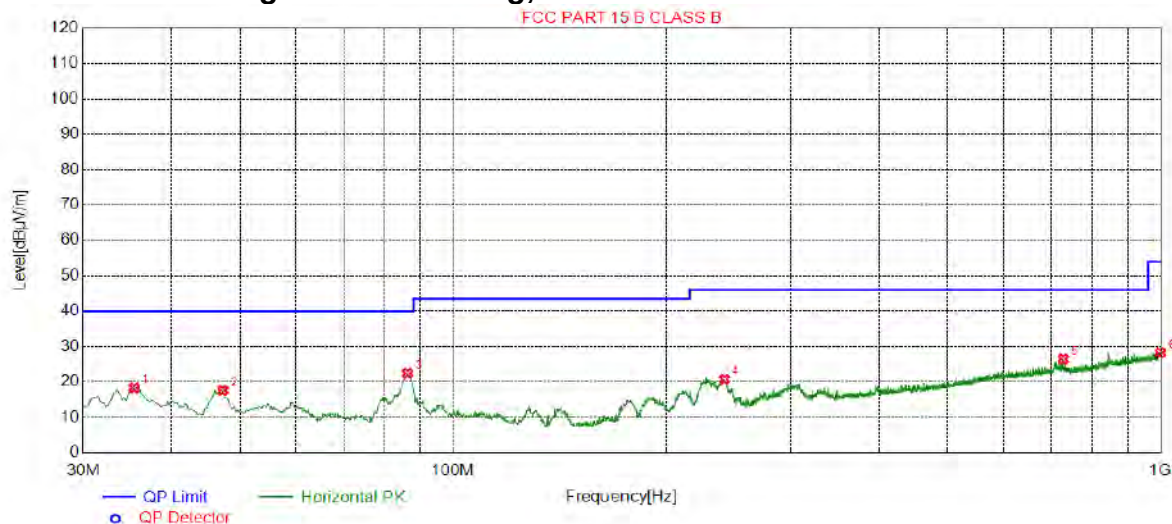
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4.9.1.2 Charge + Transmitting, Horizontal

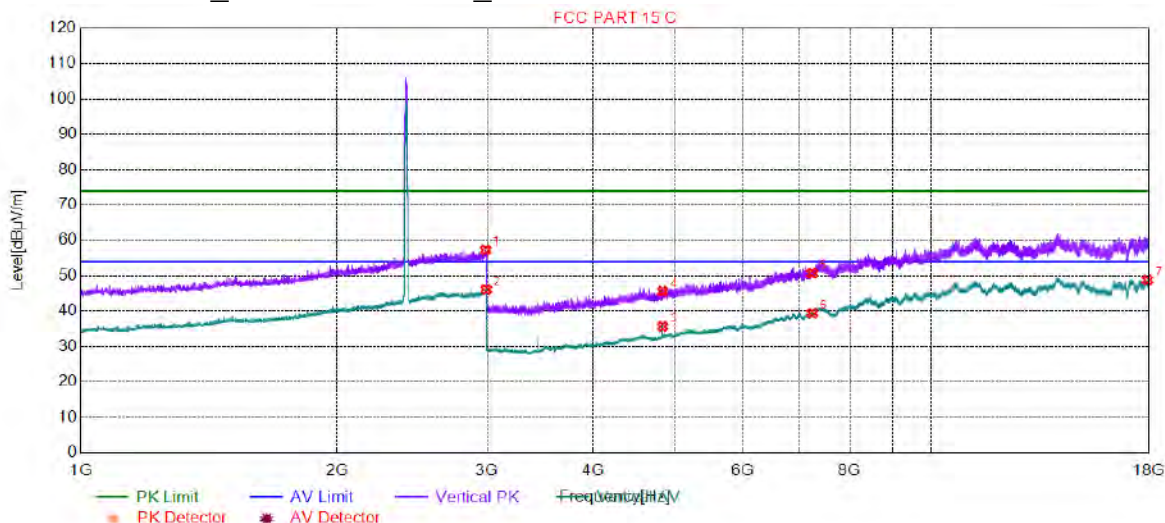


Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.4331	18.30	-29.82	40.00	21.70	212	276	Horizontal
2	47.2695	17.60	-30.40	40.00	22.40	113	329	Horizontal
3	86.2713	22.45	-34.63	40.00	17.55	208	309	Horizontal
4	241.8904	20.74	-29.99	46.00	25.26	172	267	Horizontal
5	728.5397	26.48	-18.84	46.00	19.52	137	204	Horizontal
6	999.6119	28.25	-14.80	54.00	25.75	248	28	Horizontal

4.9.2 Transmitter emission above 1GHz

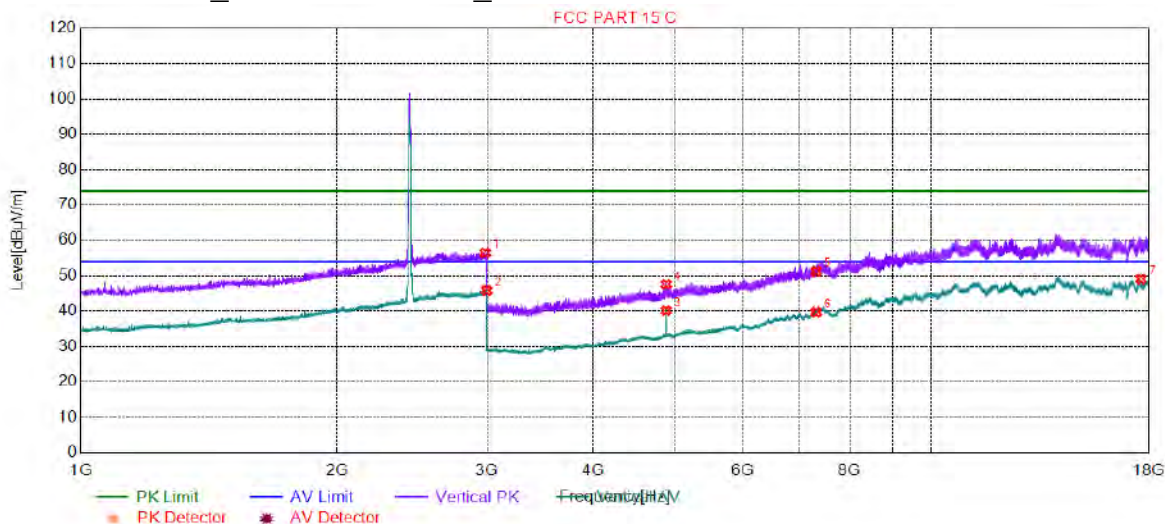
4.9.2.1 ANT1

4.9.2.1.1 802.11B_Lowest Channel_Vertical



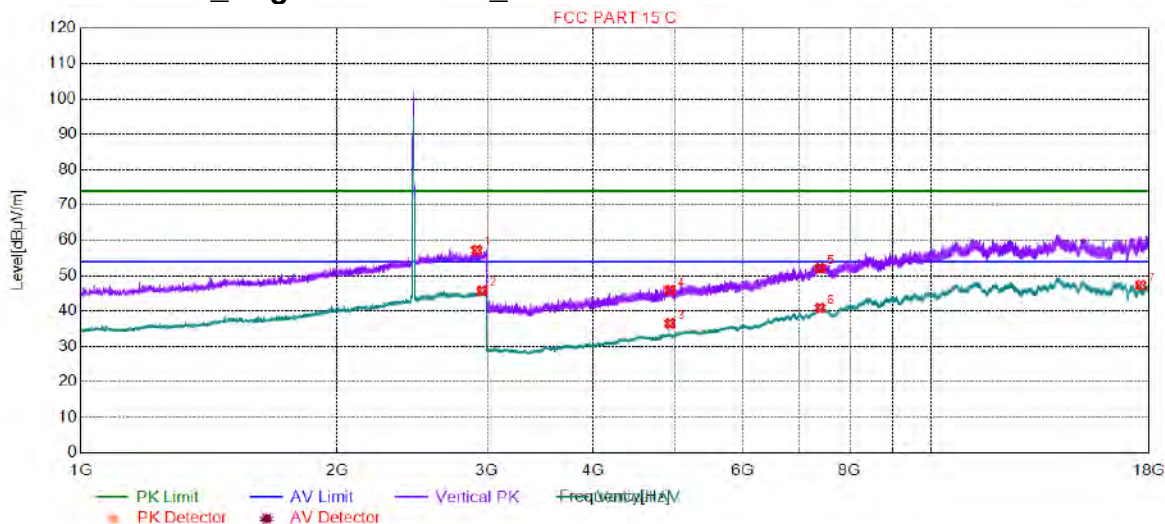
Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2988.9972	57.35	11.78	74.00	16.65	187	237	Vertical
2	2993.9985	46.12	11.80	54.00	7.88	230	333	Vertical
3	4824.0000	35.64	-14.90	54.00	18.36	218	45	Vertical
4	4824.0000	45.65	-14.90	74.00	28.35	250	99	Vertical
5	7236.0000	50.76	-6.82	74.00	23.24	245	153	Vertical
6	7236.0000	39.45	-6.82	54.00	14.55	279	289	Vertical
7	17919.4960	48.83	2.50	54.00	5.17	191	88	Vertical

4.9.2.1.2 802.11B_ Middle Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2986.4966	56.50	11.77	74.00	17.50	230	222	Vertical
2	2998.4996	45.83	11.81	54.00	8.17	244	346	Vertical
3	4874.0000	40.21	-14.68	54.00	13.79	203	18	Vertical
4	4874.0000	47.63	-14.68	74.00	26.37	165	49	Vertical
5	7311.0000	51.27	-6.24	74.00	22.73	247	333	Vertical
6	7311.0000	39.72	-6.24	54.00	14.28	221	248	Vertical
7	17609.9805	49.12	4.12	54.00	4.88	199	243	Vertical

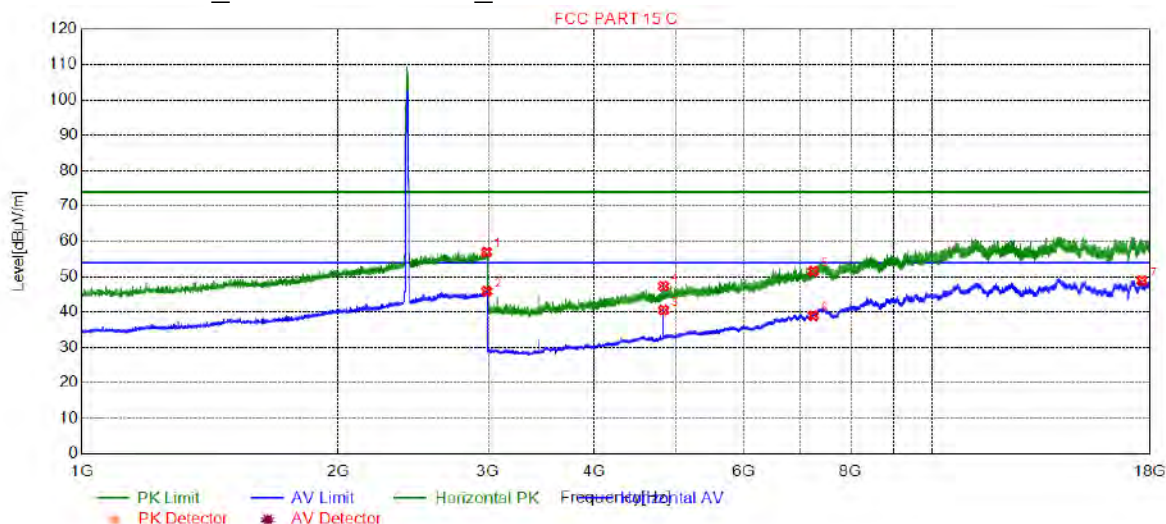
4.9.2.1.3 802.11B_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2920.4801	57.26	11.50	74.00	16.74	212	319	Vertical
2	2960.9902	45.73	11.66	54.00	8.27	230	18	Vertical
3	4924.0000	36.53	-14.43	54.00	17.47	156	18	Vertical
4	4924.0000	45.94	-14.43	74.00	28.06	208	127	Vertical
5	7386.0000	52.21	-5.71	74.00	21.79	263	99	Vertical
6	7386.0000	40.96	-5.71	54.00	13.04	271	316	Vertical
7	17601.4801	47.32	4.28	54.00	6.68	276	144	Vertical



4.9.2.1.4 802.11B_Lowest Channel_Horizontal



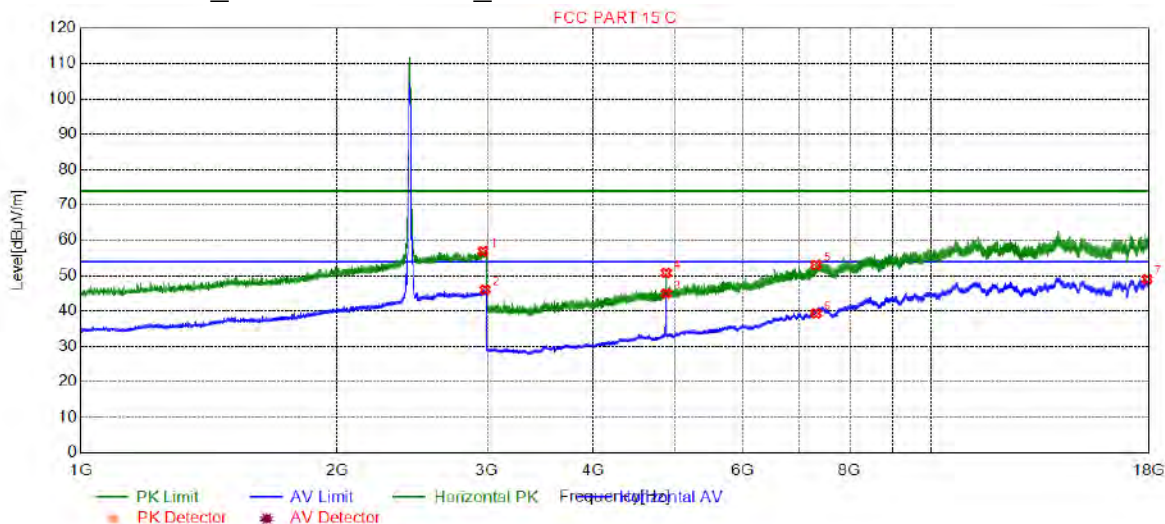
Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2988.4971	57.02	11.77	74.00	16.98	183	2	Horizontal
2	2989.9975	45.91	11.78	54.00	8.09	179	342	Horizontal
3	4824.0000	40.62	-14.90	54.00	13.38	233	46	Horizontal
4	4824.0000	47.36	-14.90	74.00	26.64	195	73	Horizontal
5	7236.0000	51.56	-6.82	74.00	22.44	122	263	Horizontal
6	7236.0000	39.00	-6.82	54.00	15.00	114	289	Horizontal
7	17608.9804	48.96	4.13	54.00	5.04	135	243	Horizontal



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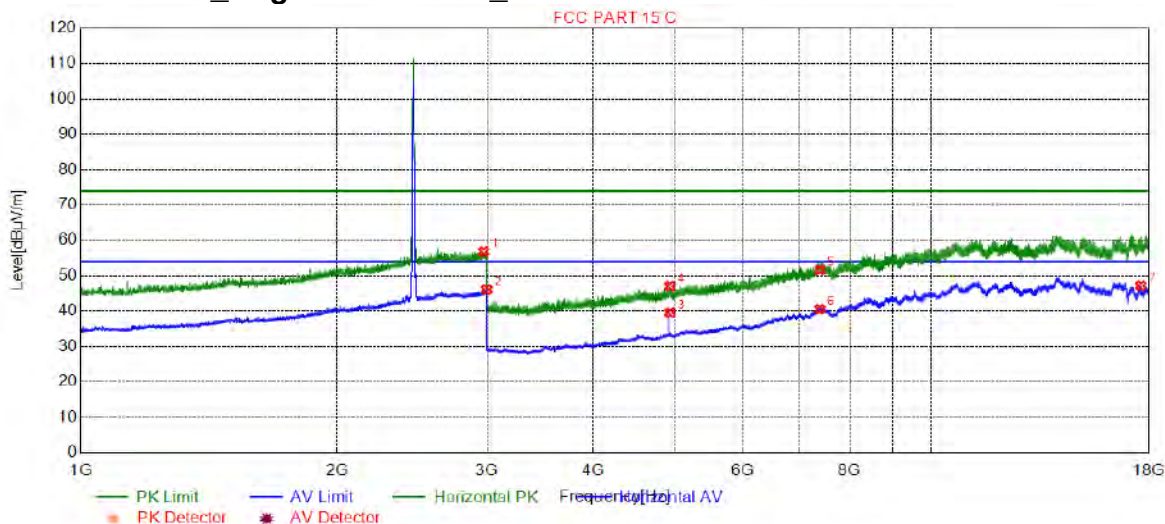
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4.9.2.1.5 802.11B_ Middle Channel_ Horizontal



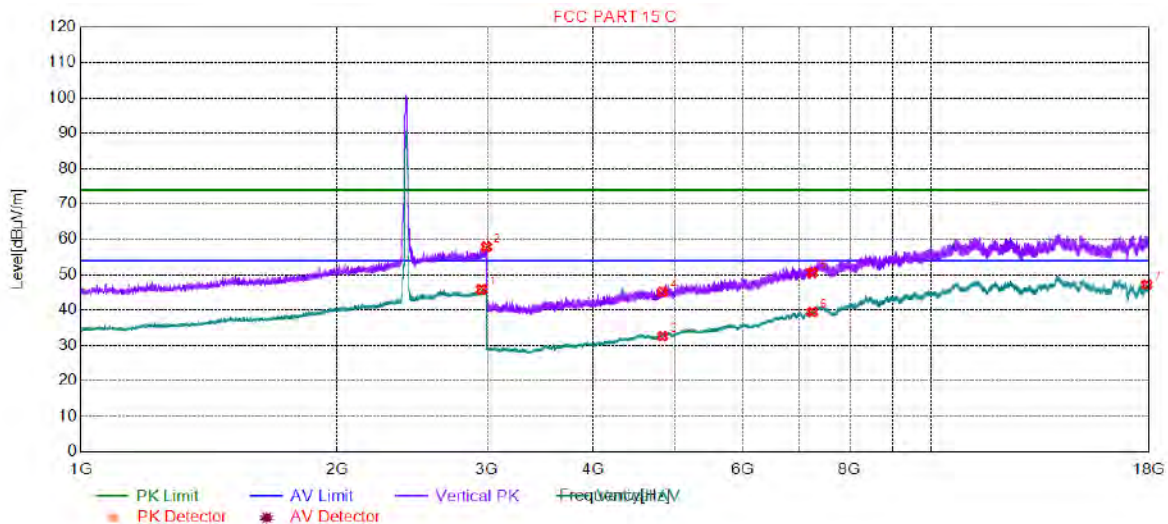
Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2968.9922	56.96	11.70	74.00	17.04	244	14	Horizontal
2	2984.9962	46.05	11.76	54.00	7.95	203	342	Horizontal
3	4874.0000	45.01	-14.68	54.00	8.99	176	126	Horizontal
4	4874.0000	50.83	-14.68	74.00	23.17	176	126	Horizontal
5	7311.0000	53.05	-6.24	74.00	20.95	174	126	Horizontal
6	7311.0000	39.37	-6.24	54.00	14.63	227	99	Horizontal
7	17901.4951	49.06	2.68	54.00	4.94	247	44	Horizontal

4.9.2.1.6 802.11B_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2973.4934	56.86	11.71	74.00	17.14	149	123	Horizontal
2	2998.4996	46.14	11.81	54.00	7.86	100	246	Horizontal
3	4924.0000	39.61	-14.43	54.00	14.39	228	45	Horizontal
4	4924.0000	47.08	-14.43	74.00	26.92	240	98	Horizontal
5	7386.0000	51.68	-5.71	74.00	22.32	120	316	Horizontal
6	7386.0000	40.61	-5.71	54.00	13.39	162	360	Horizontal
7	17603.4802	47.19	4.24	54.00	6.81	225	342	Horizontal

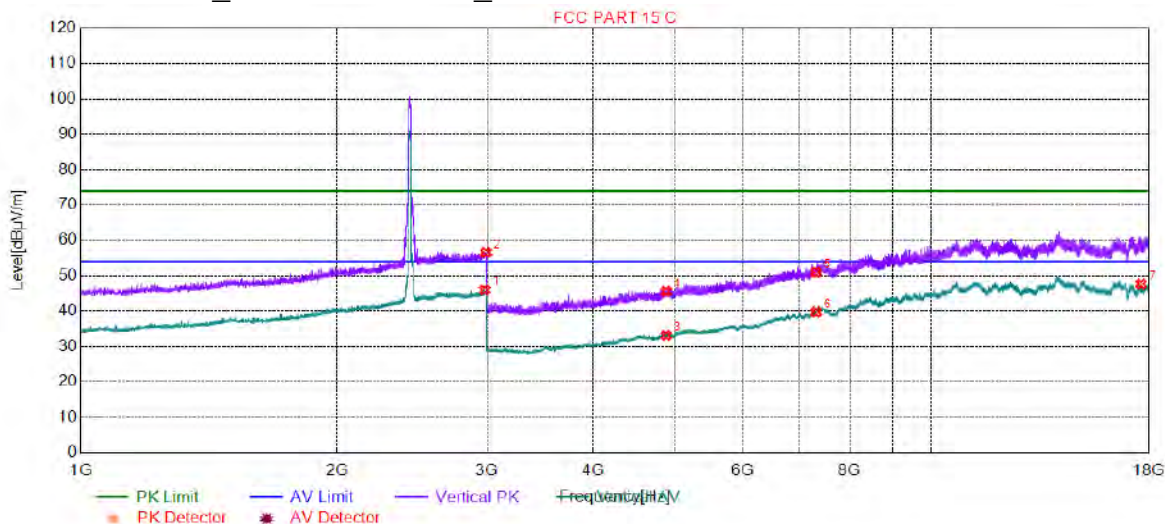
4.9.2.1.7 802.11G_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2956.4891	45.86	11.65	54.00	8.14	202	360	Vertical
2	2995.4989	57.95	11.80	74.00	16.05	230	235	Vertical
3	4824.0000	32.71	-14.90	54.00	21.29	261	236	Vertical
4	4824.0000	45.14	-14.90	74.00	28.86	251	155	Vertical
5	7236.0000	50.58	-6.82	74.00	23.42	247	209	Vertical
6	7236.0000	39.51	-6.82	54.00	14.49	274	74	Vertical
7	17888.9945	47.22	2.54	54.00	6.78	226	342	Vertical



4.9.2.1.8 802.11G_ Middle Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2982.4956	46.00	11.75	54.00	8.00	168	18	Vertical
2	2991.9980	56.64	11.79	74.00	17.36	155	333	Vertical
3	4874.0000	33.13	-14.68	54.00	20.87	194	45	Vertical
4	4874.0000	45.64	-14.68	74.00	28.36	195	18	Vertical
5	7311.0000	51.02	-6.24	74.00	22.98	214	18	Vertical
6	7311.0000	39.75	-6.24	54.00	14.25	201	207	Vertical
7	17615.9808	47.68	4.00	54.00	6.32	173	342	Vertical

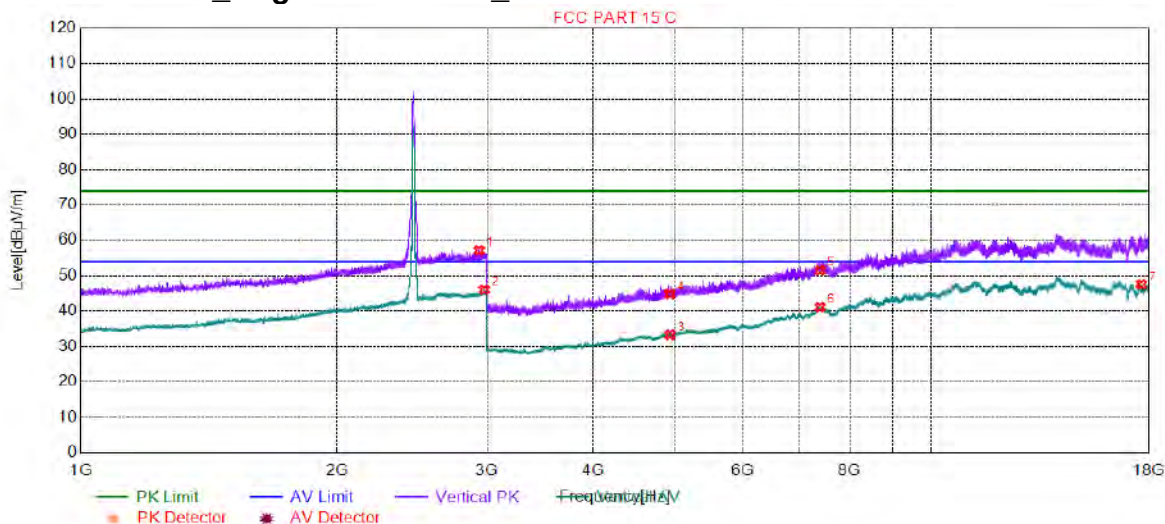


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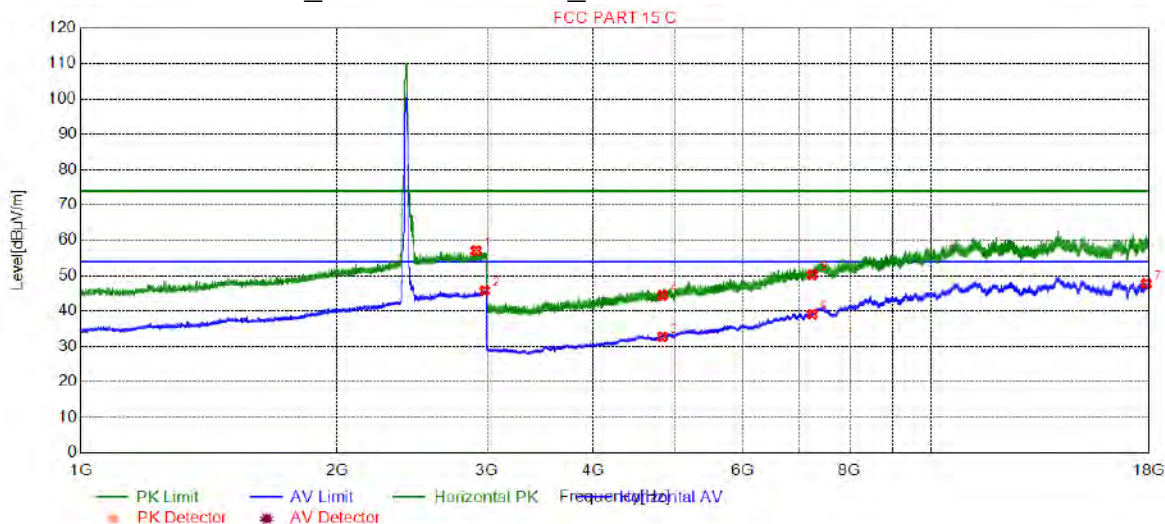
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4.9.2.1.9 802.11G_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2937.9845	57.22	11.57	74.00	16.78	177	86	Vertical
2	2979.4949	46.07	11.74	54.00	7.93	230	357	Vertical
3	4924.0000	33.34	-14.43	54.00	20.66	296	234	Vertical
4	4924.0000	44.85	-14.43	74.00	29.15	258	288	Vertical
5	7386.0000	51.54	-5.71	74.00	22.46	193	45	Vertical
6	7386.0000	41.17	-5.71	54.00	12.83	275	72	Vertical
7	17634.4817	47.59	3.64	54.00	6.41	197	44	Vertical

4.9.2.1.10 802.11G_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2914.9787	57.10	11.48	74.00	16.90	133	54	Horizontal
2	2981.4954	45.82	11.75	54.00	8.18	157	81	Horizontal
3	4824.0000	32.80	-14.90	54.00	21.20	178	18	Horizontal
4	4824.0000	44.48	-14.90	74.00	29.52	189	100	Horizontal
5	7236.0000	50.29	-6.82	74.00	23.71	197	100	Horizontal
6	7236.0000	39.16	-6.82	54.00	14.84	158	315	Horizontal
7	17866.9934	47.83	2.25	54.00	6.17	235	292	Horizontal

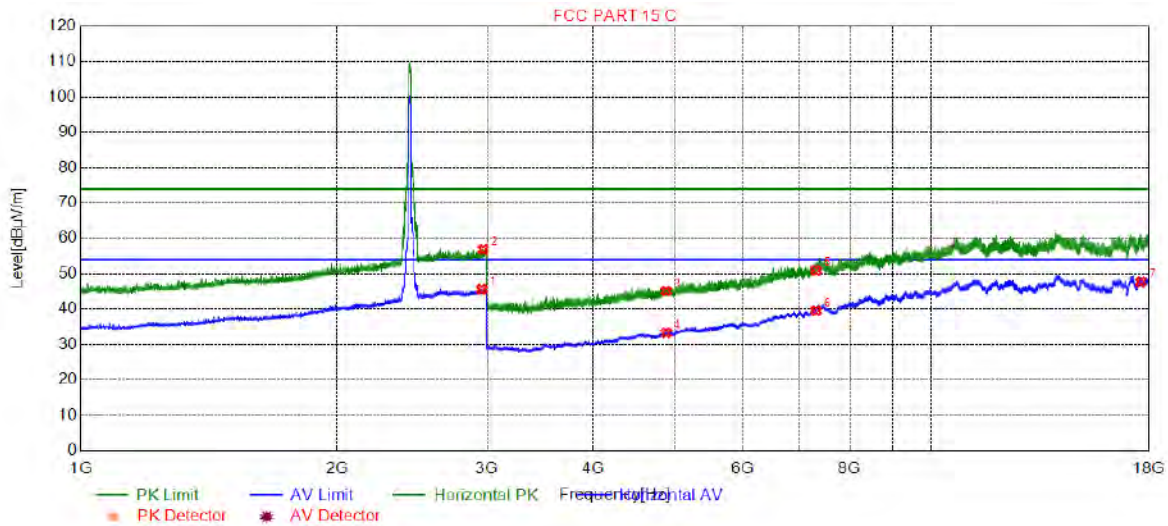


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4.9.2.1.11 802.11G_ Middle Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2958.4896	45.61	11.65	54.00	8.39	198	68	Horizontal
2	2969.9925	56.92	11.70	74.00	17.08	104	2	Horizontal
3	4874.0000	45.13	-14.68	74.00	28.87	179	179	Horizontal
4	4874.0000	33.33	-14.68	54.00	20.67	124	18	Horizontal
5	7311.0000	50.93	-6.24	74.00	23.07	244	152	Horizontal
6	7311.0000	39.58	-6.24	54.00	14.42	126	314	Horizontal
7	17607.4804	47.67	4.16	54.00	6.33	117	93	Horizontal

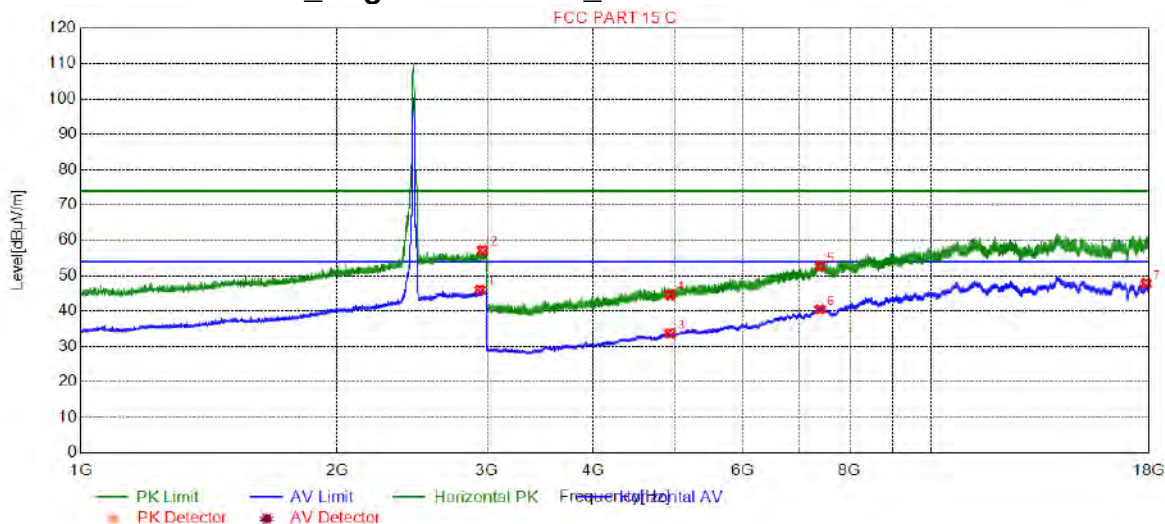


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4.9.2.1.12 802.11G_ Highest Channel_ Horizontal



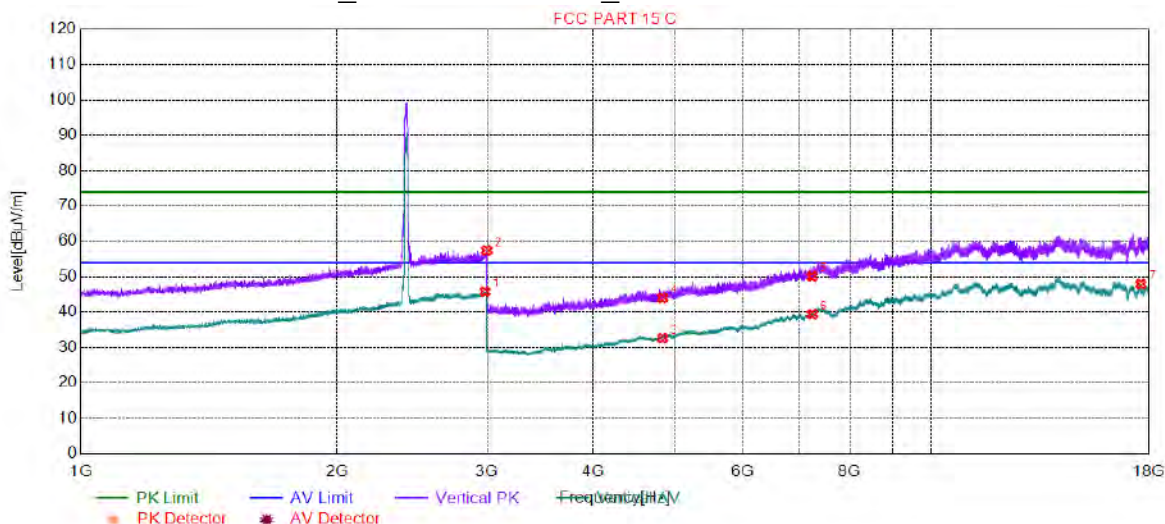
Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2942.4856	46.07	11.59	54.00	7.93	140	190	Horizontal
2	2965.9915	57.25	11.68	74.00	16.75	224	259	Horizontal
3	4924.0000	33.72	-14.43	54.00	20.28	189	360	Horizontal
4	4924.0000	44.62	-14.43	74.00	29.38	173	208	Horizontal
5	7386.0000	52.68	-5.71	74.00	21.32	202	46	Horizontal
6	7386.0000	40.56	-5.71	54.00	13.44	100	289	Horizontal
7	17849.4925	47.86	2.02	54.00	6.14	220	146	Horizontal



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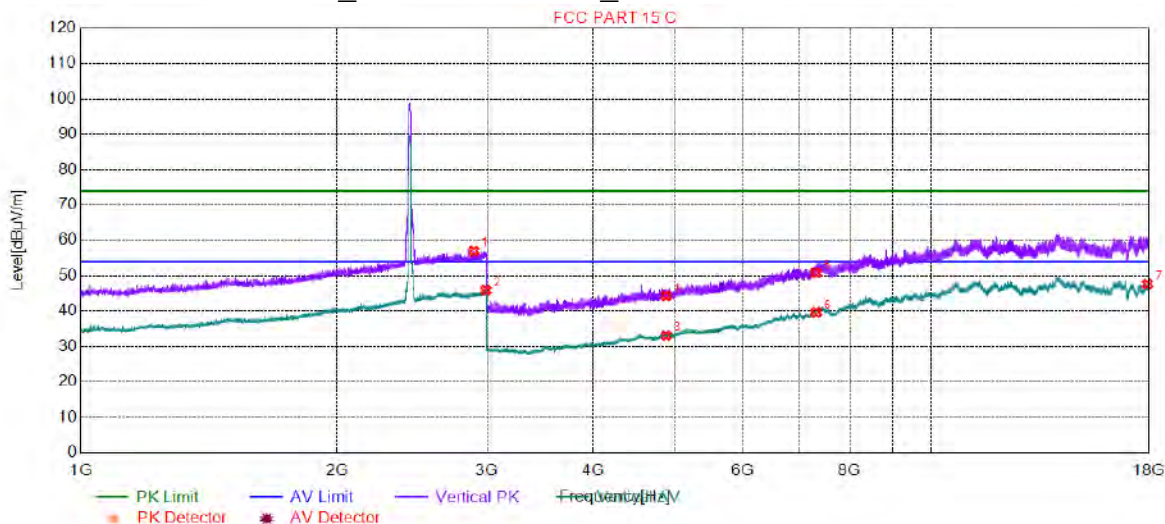
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4.9.2.1.13 802.11N20_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2983.9960	45.79	11.76	54.00	8.21	257	278	Vertical
2	2999.4999	57.48	11.82	74.00	16.52	160	141	Vertical
3	4824.0000	32.72	-14.90	54.00	21.28	150	211	Vertical
4	4824.0000	44.08	-14.90	74.00	29.92	170	73	Vertical
5	7236.0000	50.13	-6.82	74.00	23.87	184	292	Vertical
6	7236.0000	39.45	-6.82	54.00	14.55	293	292	Vertical
7	17607.4804	47.99	4.16	54.00	6.01	255	44	Vertical

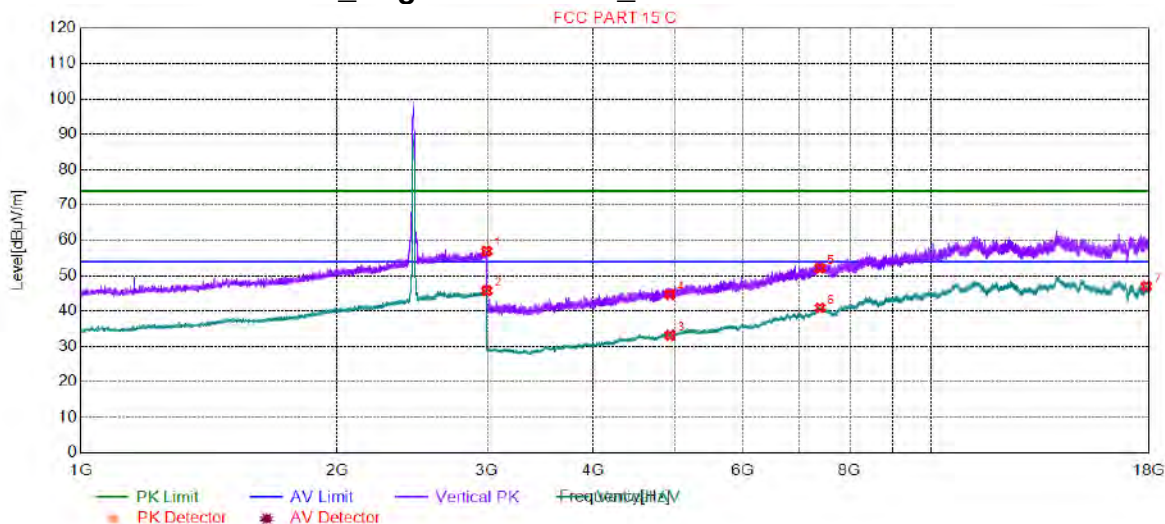
4.9.2.1.14 802.11N20_ Middle Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2895.9740	57.02	11.42	74.00	16.98	262	183	Vertical
2	2991.4979	45.91	11.79	54.00	8.09	289	266	Vertical
3	4874.0000	33.12	-14.68	54.00	20.88	220	187	Vertical
4	4874.0000	44.34	-14.68	74.00	29.66	192	348	Vertical
5	7311.0000	50.85	-6.24	74.00	23.15	162	133	Vertical
6	7311.0000	39.66	-6.24	54.00	14.34	270	18	Vertical
7	17920.4960	47.69	2.49	54.00	6.31	274	1	Vertical



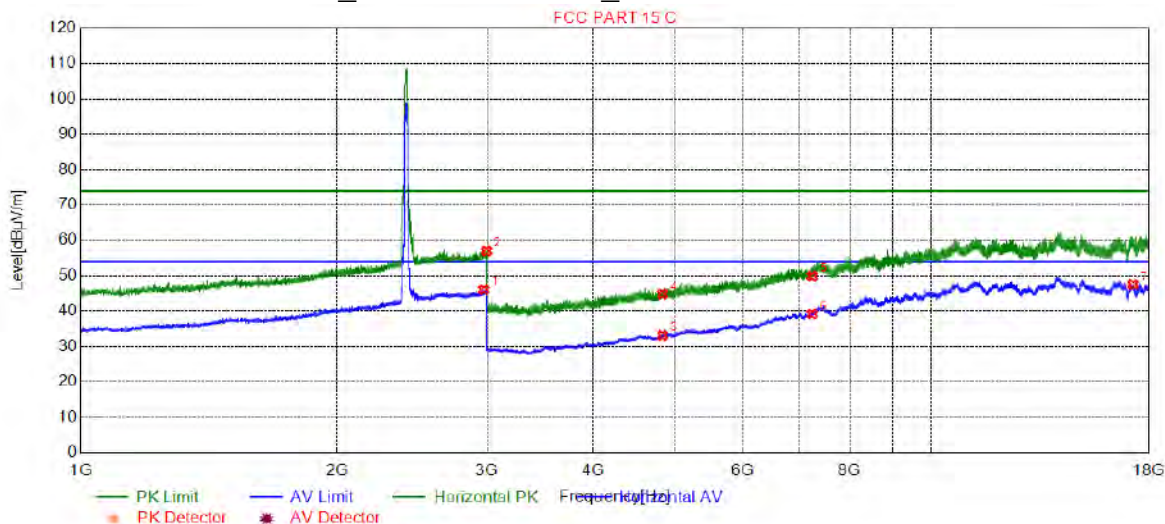
4.9.2.1.15 802.11N20_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2997.9995	56.98	11.81	74.00	17.02	178	196	Vertical
2	2998.9998	45.78	11.82	54.00	8.22	189	18	Vertical
3	4924.0000	33.18	-14.43	54.00	20.82	193	18	Vertical
4	4924.0000	44.70	-14.43	74.00	29.30	233	233	Vertical
5	7386.0000	52.17	-5.71	74.00	21.83	242	71	Vertical
6	7386.0000	40.99	-5.71	54.00	13.01	241	314	Vertical
7	17868.9935	47.04	2.28	54.00	6.96	192	44	Vertical



4.9.2.1.16 802.11N20_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2974.4936	46.08	11.72	54.00	7.92	220	302	Horizontal
2	2996.9993	57.02	11.81	74.00	16.98	172	14	Horizontal
3	4824.0000	33.16	-14.90	54.00	20.84	247	72	Horizontal
4	4824.0000	44.85	-14.90	74.00	29.15	230	219	Horizontal
5	7236.0000	49.91	-6.82	74.00	24.09	239	160	Horizontal
6	7236.0000	39.22	-6.82	54.00	14.78	143	105	Horizontal
7	17226.9613	47.59	2.51	54.00	6.41	217	243	Horizontal

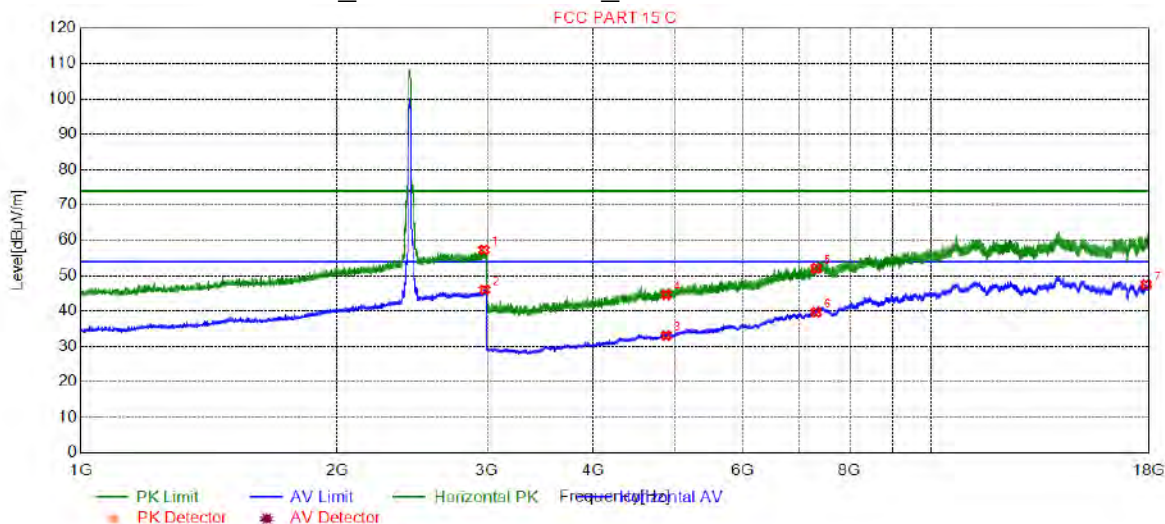


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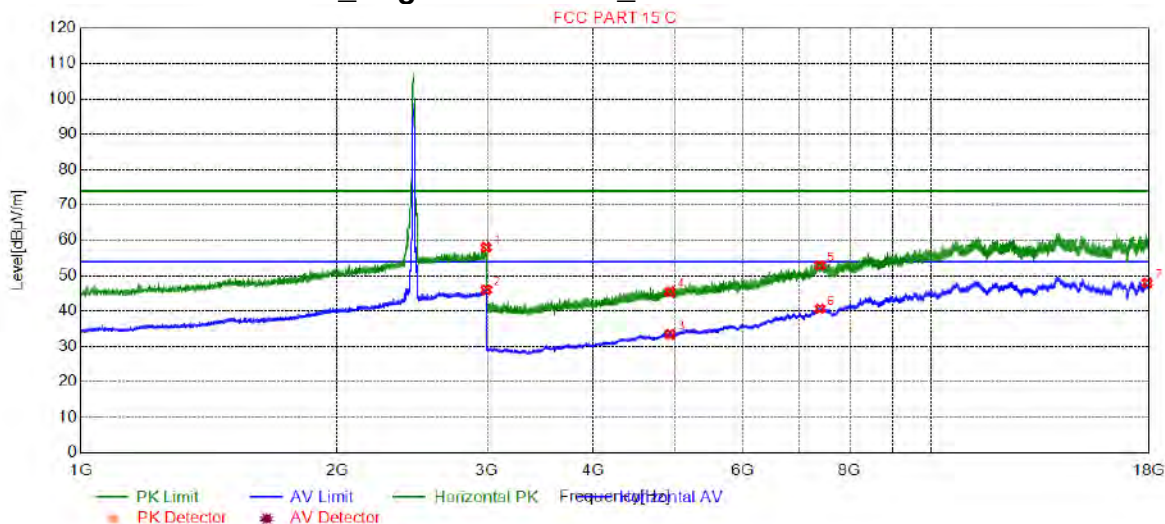
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4.9.2.1.17 802.11N20_ Middle Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2975.9940	57.36	11.72	74.00	16.64	235	204	Horizontal
2	2981.9955	46.07	11.75	54.00	7.93	158	3	Horizontal
3	4874.0000	33.11	-14.68	54.00	20.89	181	154	Horizontal
4	4874.0000	44.63	-14.68	74.00	29.37	185	126	Horizontal
5	7311.0000	52.14	-6.24	74.00	21.86	155	99	Horizontal
6	7311.0000	39.70	-6.24	54.00	14.30	231	342	Horizontal
7	17858.4929	47.55	2.14	54.00	6.45	247	342	Horizontal

4.9.2.1.18 802.11N20_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2992.4981	58.06	11.79	74.00	15.94	153	273	Horizontal
2	2994.4986	46.05	11.80	54.00	7.95	215	68	Horizontal
3	4924.0000	33.43	-14.43	54.00	20.57	169	341	Horizontal
4	4924.0000	45.47	-14.43	74.00	28.53	223	287	Horizontal
5	7386.0000	52.96	-5.71	74.00	21.04	100	260	Horizontal
6	7386.0000	40.74	-5.71	54.00	13.26	170	18	Horizontal
7	17904.4952	48.00	2.65	54.00	6.00	228	45	Horizontal

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:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

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.



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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:			

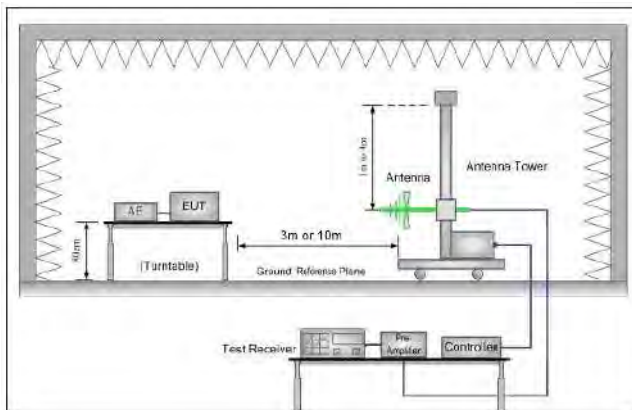


Figure 1. 30MHz to 1GHz

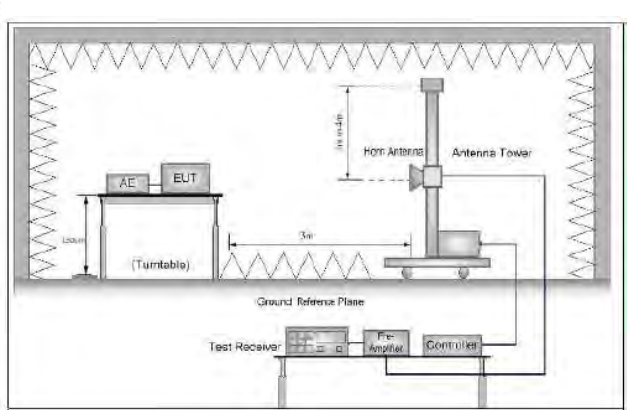


Figure 2. Above 1 GHz



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 chamber. 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 chamber. 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. k. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for $f < 1 \text{ GHz}$, RBW=1MHz for $f > 1 \text{ GHz}$; VBW$\geq$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 = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$ Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + $20 * \log(\text{Duty cycle})$ 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.



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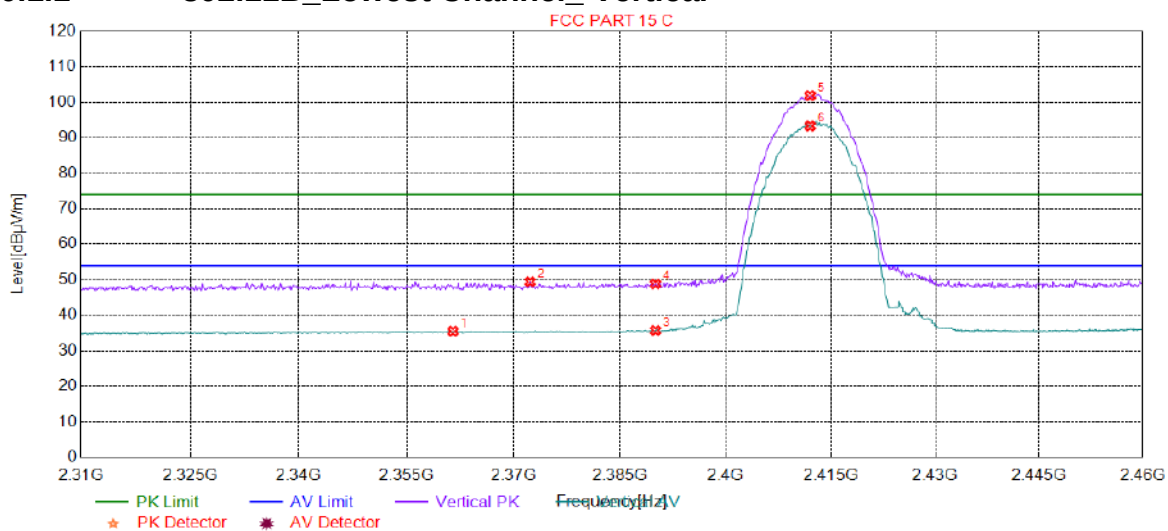
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	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G ; 6.5Mbps of rate is the worst case of 802.11N(HT20); Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

4.10.1 ANT1

4.10.1.1 802.11B_Lowest Channel_ Vertical

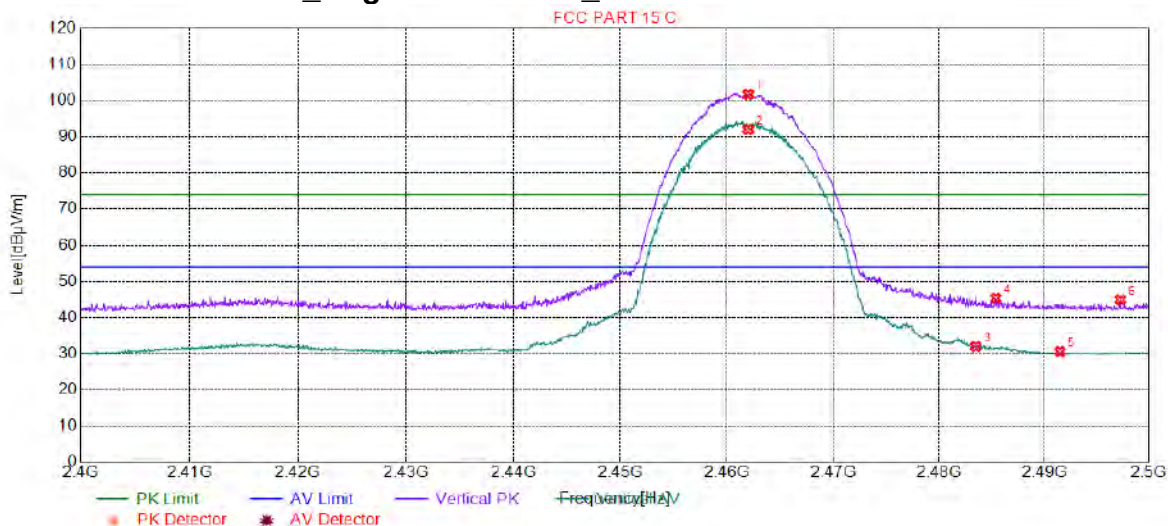


Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2361.5015	35.52	9.61	54.00	18.48	266	326	Vertical
2	2372.3123	49.46	9.62	74.00	24.54	185	140	Vertical
3	2390.0000	35.74	9.65	54.00	18.26	231	305	Vertical
4	2390.0000	48.86	9.65	74.00	25.14	289	318	Vertical
5	2412.0000	101.87	9.74	74.00	-27.87	290	322	Vertical
6	2412.0000	93.33	9.74	54.00	-39.33	249	318	Vertical





4.10.1.2 802.11B_Highest Channel_Vertical



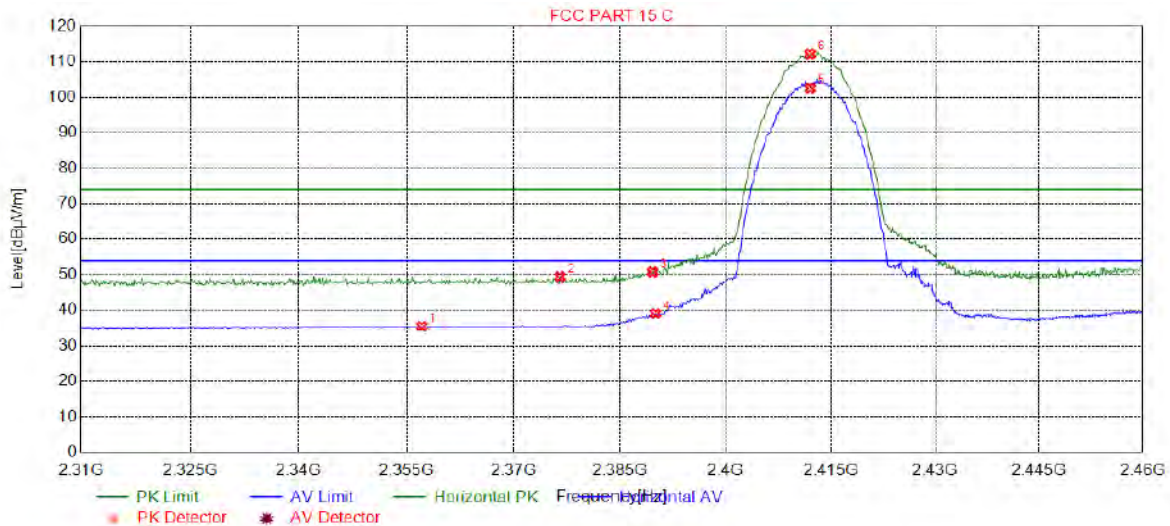
Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	101.74	10.03	74.00	-27.74	237	322	Vertical
2	2462.0000	92.05	10.03	54.00	-38.05	233	284	Vertical
3	2483.5000	32.02	10.10	54.00	21.98	208	316	Vertical
4	2485.3927	45.39	10.10	74.00	28.61	234	289	Vertical
5	2491.4957	30.64	10.12	54.00	23.36	185	316	Vertical
6	2497.2486	44.95	10.14	74.00	29.05	296	289	Vertical



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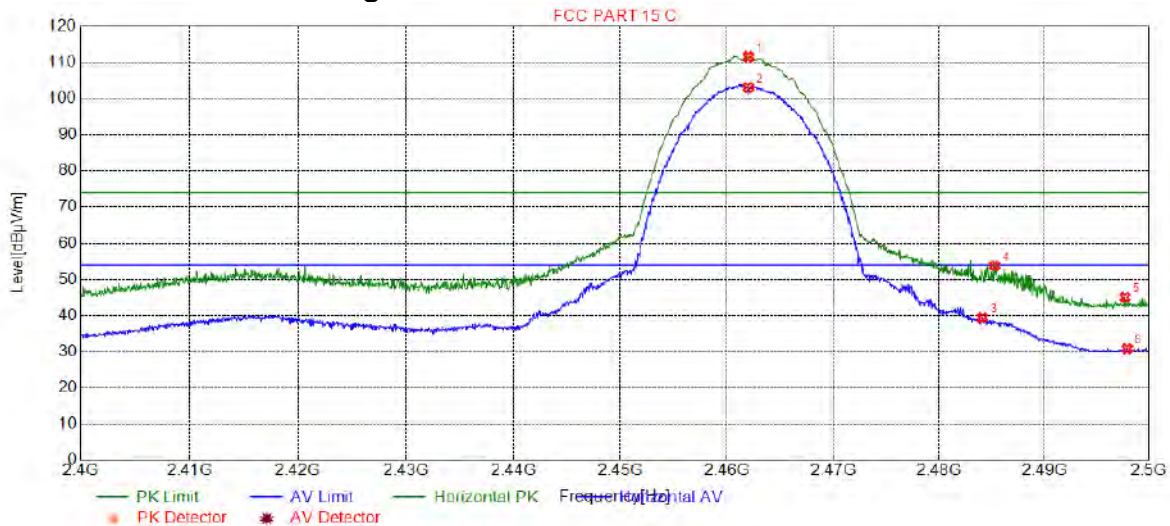
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4.10.1.3 802.11B_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2357.1471	35.53	9.60	54.00	18.47	200	128	Horizontal
2	2376.5165	49.48	9.63	74.00	24.52	150	0	Horizontal
3	2389.5796	50.80	9.65	74.00	23.20	164	207	Horizontal
4	2390.0000	39.09	9.65	54.00	14.91	190	207	Horizontal
5	2412.0000	102.56	9.74	54.00	-48.56	156	203	Horizontal
6	2412.0000	112.19	9.74	74.00	-38.19	138	207	Horizontal

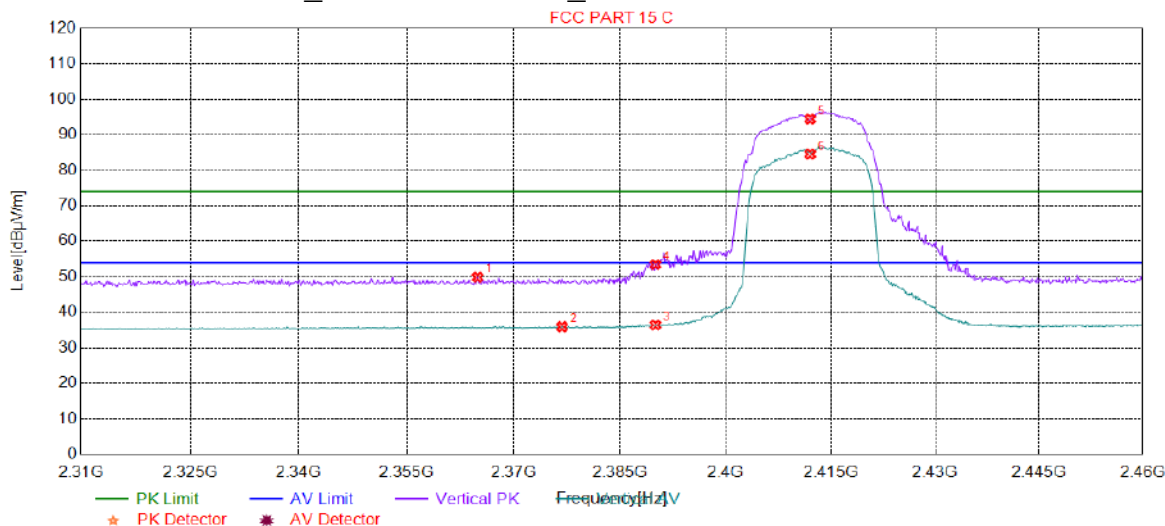
4.10.1.4 802.11B_Highest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	111.56	10.03	74.00	-37.56	154	199	Horizontal
2	2462.0000	103.09	10.03	54.00	-49.09	183	194	Horizontal
3	2484.1421	39.44	10.10	54.00	14.56	153	204	Horizontal
4	2485.2926	53.78	10.10	74.00	20.22	117	199	Horizontal
5	2497.6988	45.12	10.14	74.00	28.88	171	23	Horizontal
6	2497.8989	30.83	10.14	54.00	23.17	171	194	Horizontal



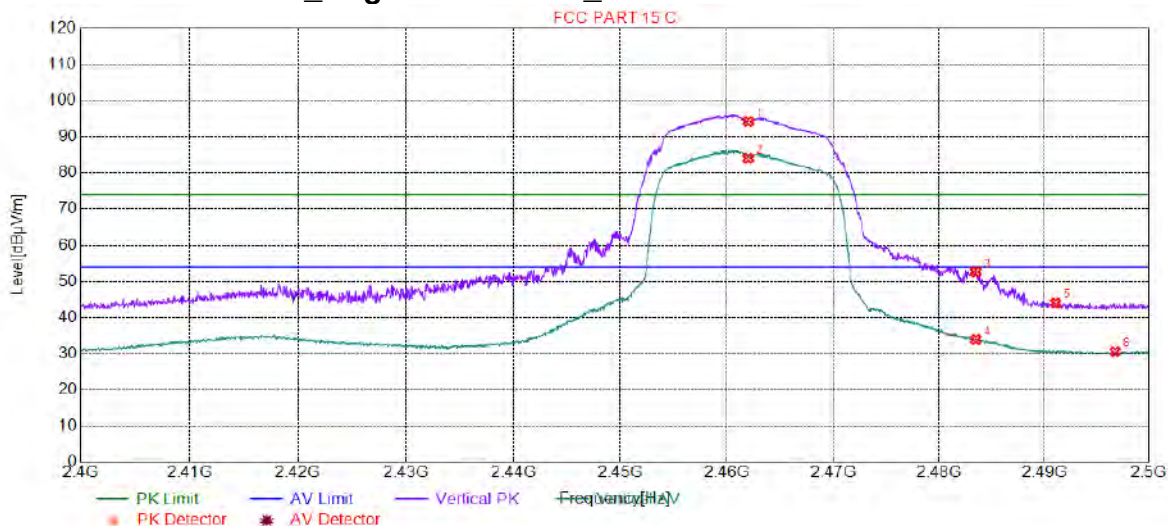
4.10.1.5 802.11G_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2364.9550	49.89	9.61	74.00	24.11	193	316	Vertical
2	2376.8168	35.93	9.63	54.00	18.07	225	354	Vertical
3	2390.0000	36.43	9.65	54.00	17.57	248	190	Vertical
4	2390.0000	53.45	9.65	74.00	20.55	153	91	Vertical
5	2412.0000	94.43	9.74	74.00	-20.43	298	91	Vertical
6	2412.0000	84.58	9.74	54.00	-30.58	287	91	Vertical

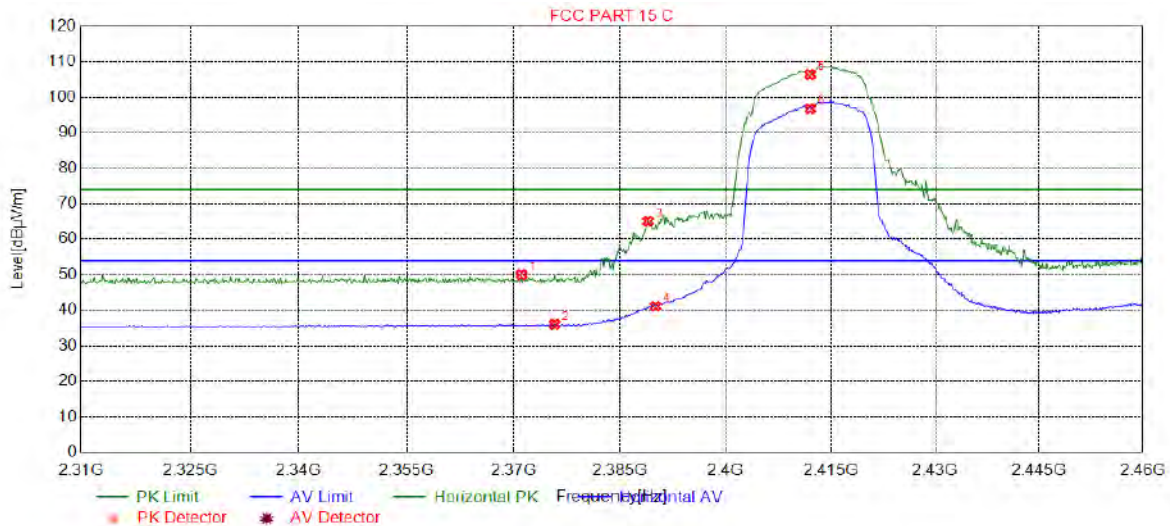


4.10.1.6 802.11G_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	94.20	10.03	74.00	-20.20	237	321	Vertical
2	2462.0000	84.09	10.03	54.00	-30.09	267	321	Vertical
3	2483.5000	52.62	10.10	74.00	21.38	225	67	Vertical
4	2483.5000	33.93	10.10	54.00	20.07	257	277	Vertical
5	2491.0955	44.07	10.12	74.00	29.93	196	354	Vertical
6	2496.7484	30.64	10.14	54.00	23.36	261	57	Vertical

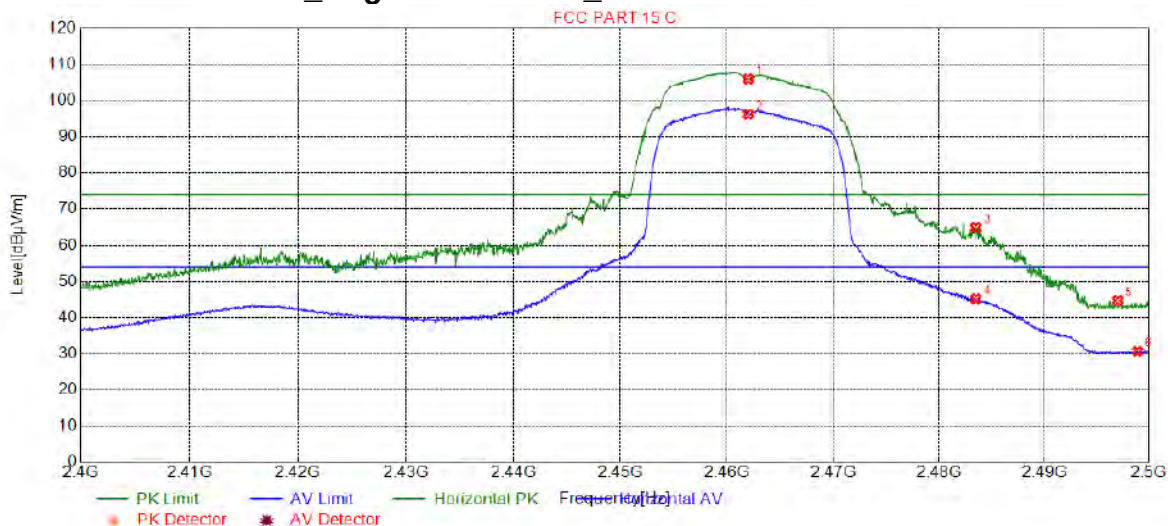
4.10.1.7 802.11G_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2371.1111	50.01	9.62	74.00	23.99	178	219	Horizontal
2	2375.7658	36.07	9.63	54.00	17.93	248	257	Horizontal
3	2388.9790	65.11	9.64	74.00	8.89	228	199	Horizontal
4	2390.0000	41.15	9.65	54.00	12.85	154	203	Horizontal
5	2412.0000	106.43	9.74	74.00	-32.43	101	203	Horizontal
6	2412.0000	96.79	9.74	54.00	-42.79	206	199	Horizontal



4.10.1.8 802.11G_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	105.99	10.03	74.00	-31.99	177	244	Horizontal
2	2462.0000	96.26	10.03	54.00	-42.26	153	200	Horizontal
3	2483.5000	64.90	10.10	74.00	9.10	205	244	Horizontal
4	2483.5000	45.20	10.10	54.00	8.80	189	244	Horizontal
5	2496.9985	44.72	10.14	74.00	29.28	156	140	Horizontal
6	2498.8995	30.71	10.15	54.00	23.29	171	310	Horizontal



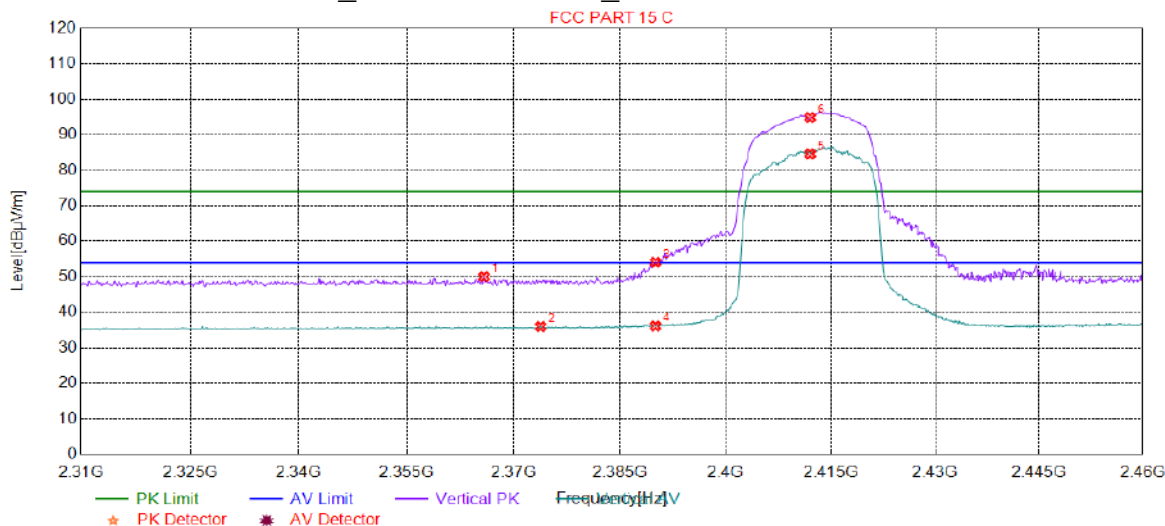
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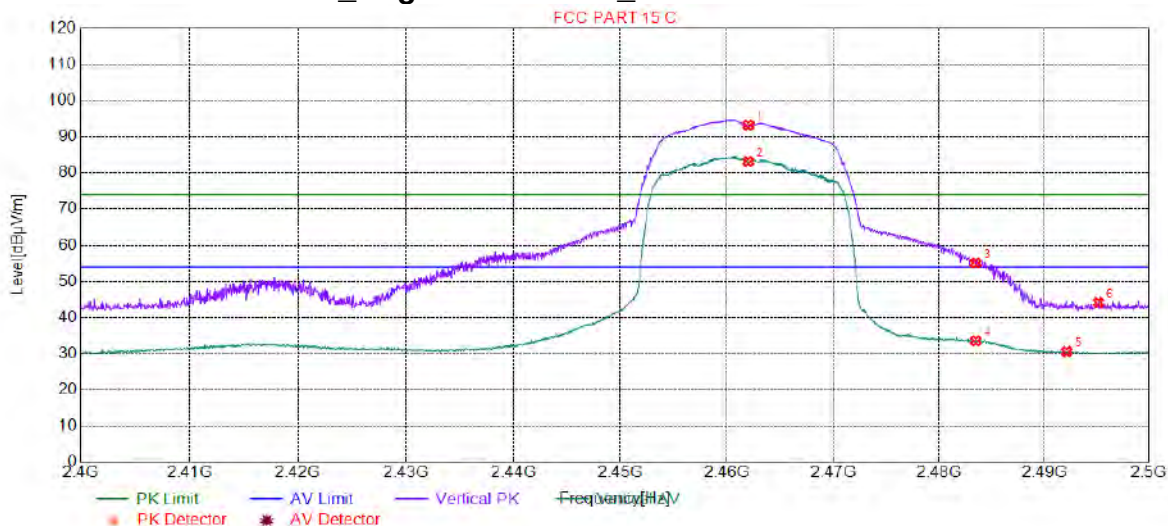
4.10.1.9 802.11N20_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2365.8559	50.04	9.61	74.00	23.96	180	287	Vertical
2	2373.8138	35.99	9.62	54.00	18.01	271	115	Vertical
3	2390.0000	54.10	9.65	74.00	19.90	285	99	Vertical
4	2390.0000	36.14	9.65	54.00	17.86	281	66	Vertical
5	2412.0000	84.62	9.74	54.00	-30.62	228	99	Vertical
6	2412.0000	94.86	9.74	74.00	-20.86	286	102	Vertical

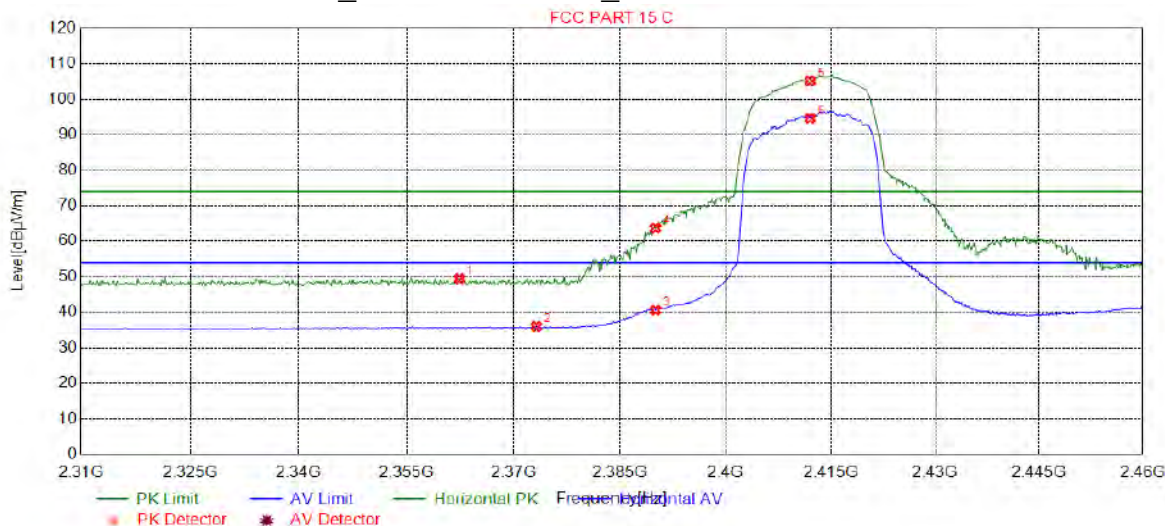


4.10.1.10 802.11N20_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	93.22	10.03	74.00	-19.22	282	143	Vertical
2	2462.0000	83.17	10.03	54.00	-29.17	191	137	Vertical
3	2483.5000	55.09	10.10	74.00	18.91	187	236	Vertical
4	2483.5000	33.57	10.10	54.00	20.43	191	148	Vertical
5	2492.1461	30.62	10.12	54.00	23.38	287	148	Vertical
6	2495.1476	44.19	10.13	74.00	29.81	282	40	Vertical

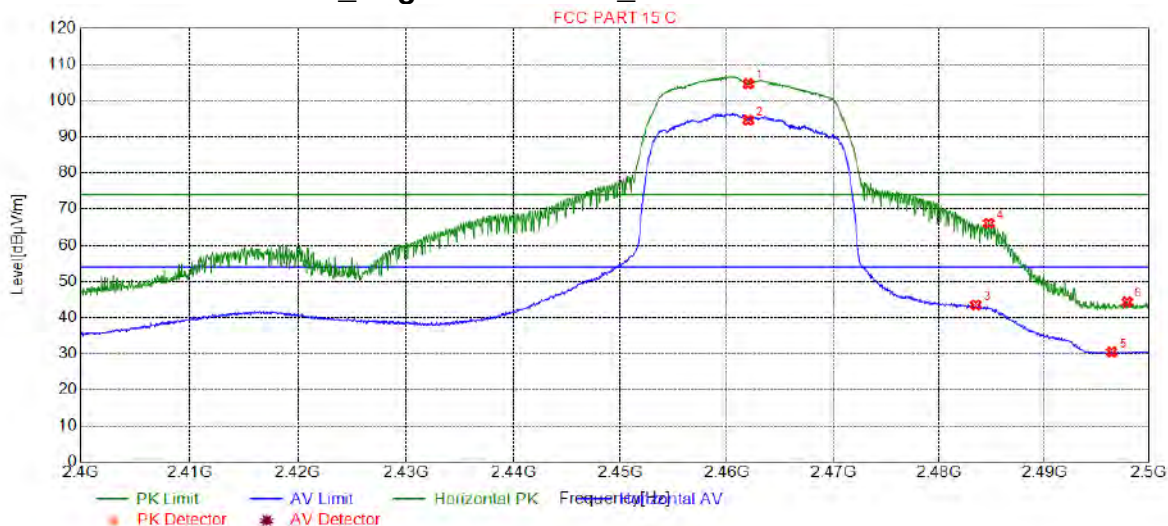
4.10.1.11 802.11N20_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2362.4024	49.50	9.61	74.00	24.50	159	13	Horizontal
2	2373.2132	36.02	9.62	54.00	17.98	170	25	Horizontal
3	2390.0000	40.61	9.65	54.00	13.39	108	195	Horizontal
4	2390.0000	63.71	9.65	74.00	10.29	182	204	Horizontal
5	2412.0000	105.15	9.74	74.00	-31.15	213	245	Horizontal
6	2412.0000	94.63	9.74	54.00	-40.63	204	195	Horizontal



4.10.1.12 802.11N20_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	104.68	10.03	74.00	-30.68	222	245	Horizontal
2	2462.0000	94.56	10.03	54.00	-40.56	188	245	Horizontal
3	2483.5000	43.53	10.10	54.00	10.47	183	245	Horizontal
4	2484.7424	66.10	10.10	74.00	7.90	248	206	Horizontal
5	2496.4482	30.53	10.14	54.00	23.47	136	195	Horizontal
6	2497.8989	44.32	10.14	74.00	29.68	184	212	Horizontal

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)

Lab A:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	$\pm 0.75\text{dB}$
2	RF power density, conducted	$\pm 2.84\text{dB}$
3	Spurious emissions, conducted	$\pm 0.75\text{dB}$
4	Temperature test	$\pm 1^{\circ}\text{C}$
5	Humidity test	$\pm 3\%$
6	DC and low frequency voltages	$\pm 0.5\%$

Lab B:

No.	Item	Measurement Uncertainty
1	Conduction Emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
2	Radiated Emission	$\pm 4.8\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (1GHz to 6GHz)
		$\pm 4.5\text{dB}$ (6GHz to 18GHz)
		$\pm 5.02\text{dB}$ (Above 18GHz)



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6 Equipment List

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy-mm-dd)	(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	2019/1/13	2020/1/12
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

CE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2019-09-07	2020-09-06
Artificial network	ROHDE&SCHWARZ	ENV216	XAW01-04-01	2019-07-16	2020-07-15
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2018-12-16	2019-12-15
				2019-12-06	2020-12-05
Measurement Software	Tonscend	TS+ CE V2.5	XAW02-05-02	NCR	NCR



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RSE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2019-06-27	2020-06-26
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2019-09-07	2020-09-06
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz-18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2019-11-18	2020-11-17
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2019-11-18	2020-11-17
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2018-12-10	2019-12-09
				2019-12-03	2020-12-02
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2019-11-18	2020-11-17
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2018-12-16	2019-12-15
				2019-12-06	2020-12-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR

7 Photographs

Refer to Appendix A - Photographs of Set-up for ZR/2019/B0024.

The End



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