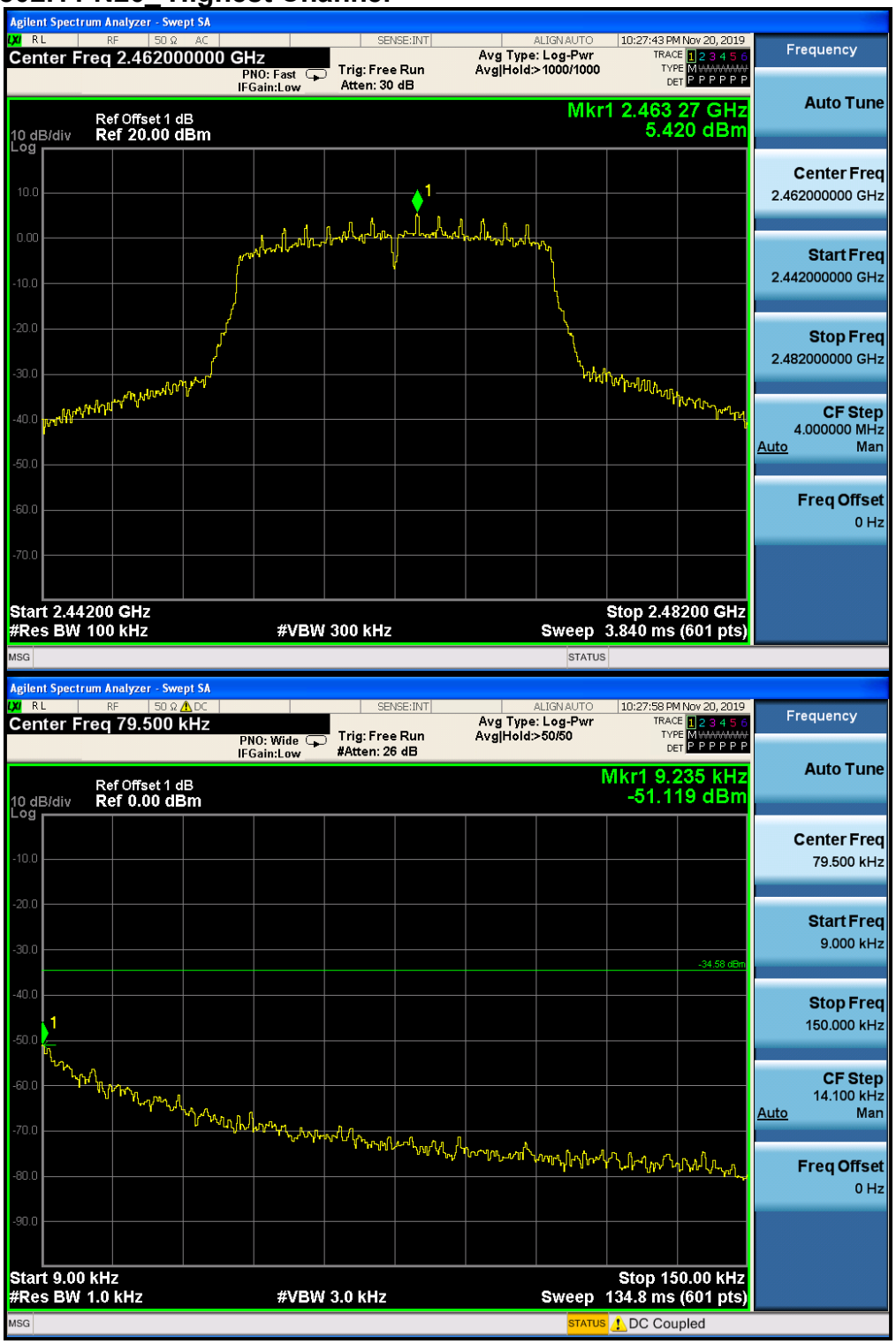
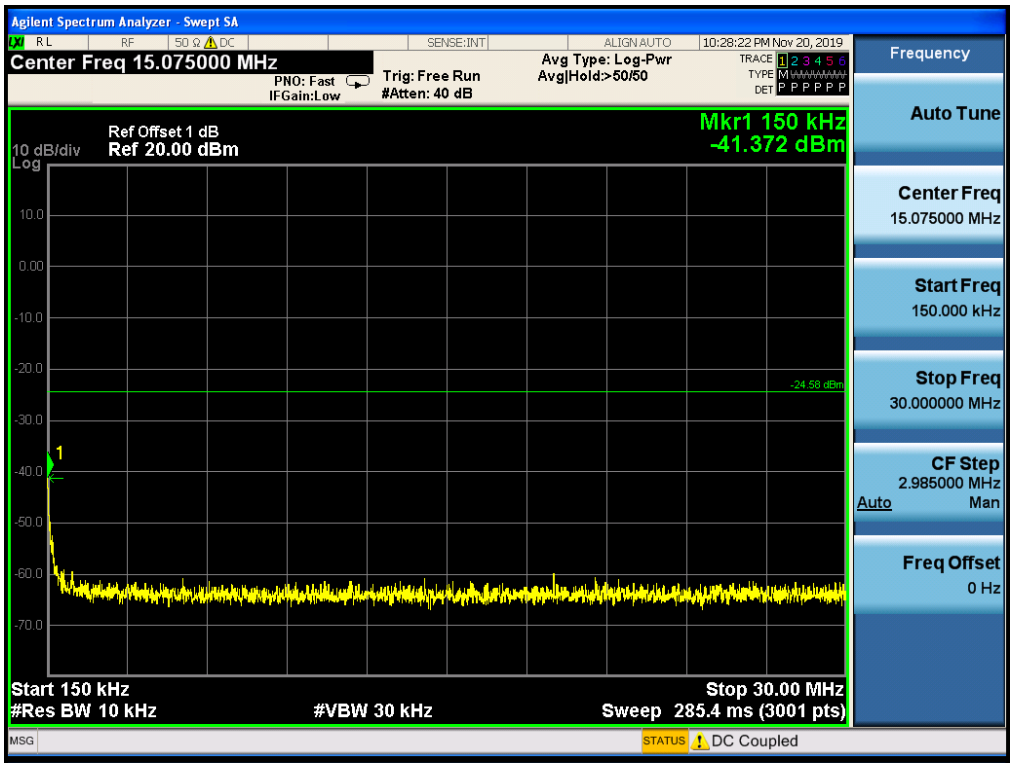
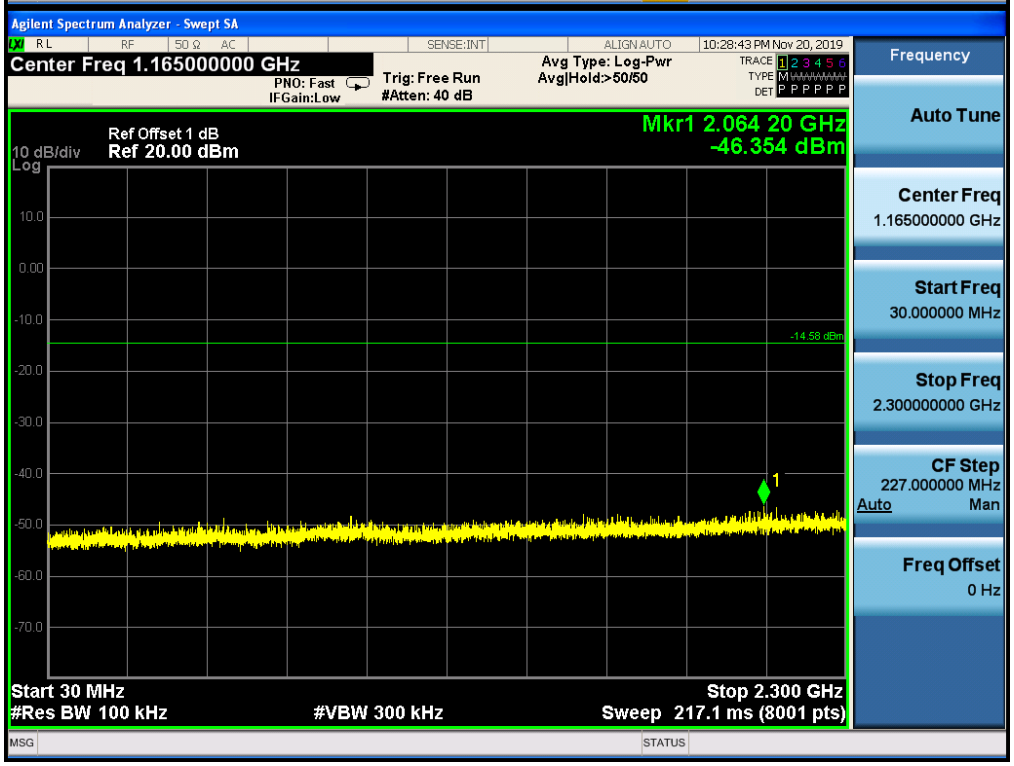
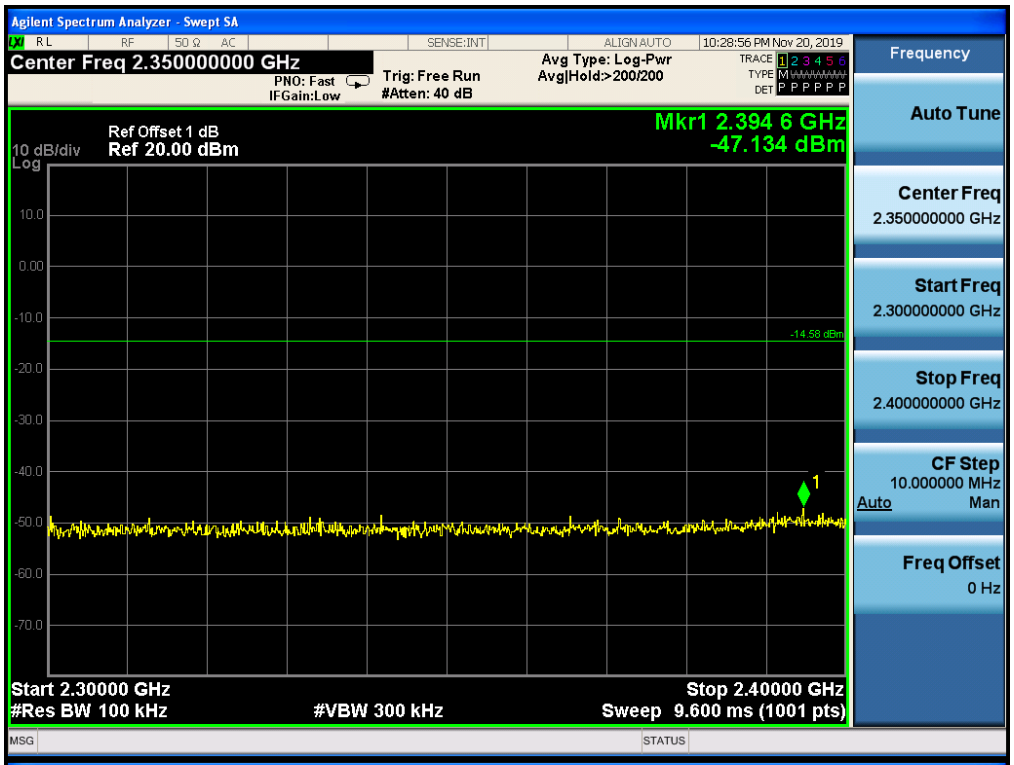
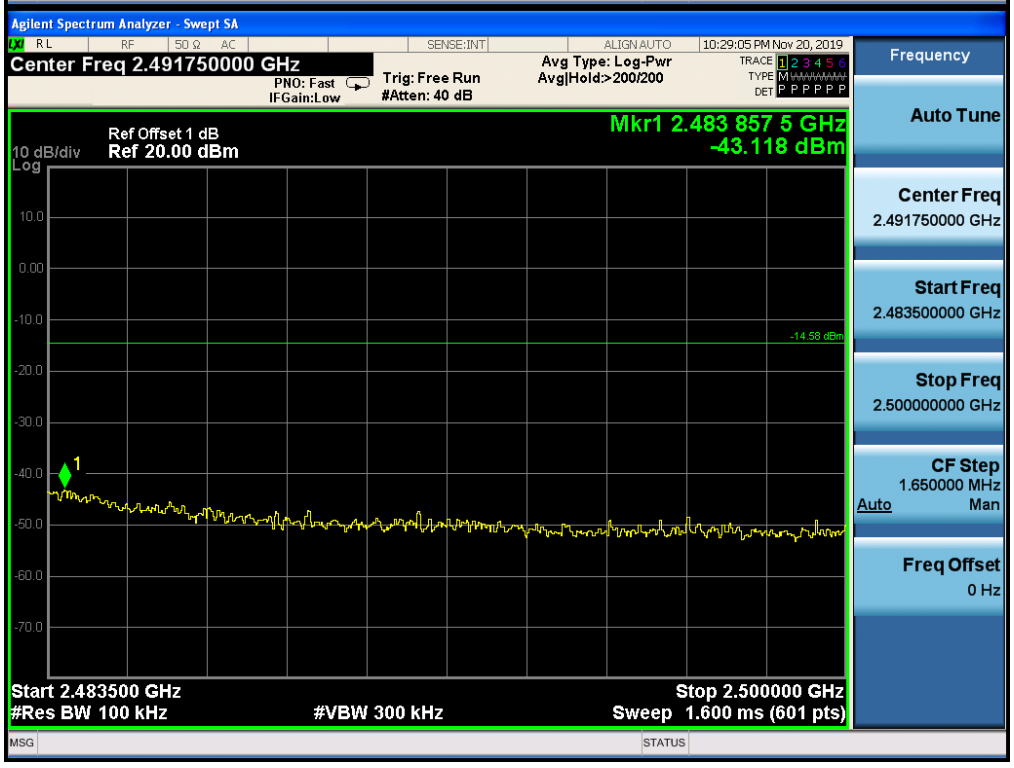
4.8.1.1.9 802.11 N20_ Highest Channel

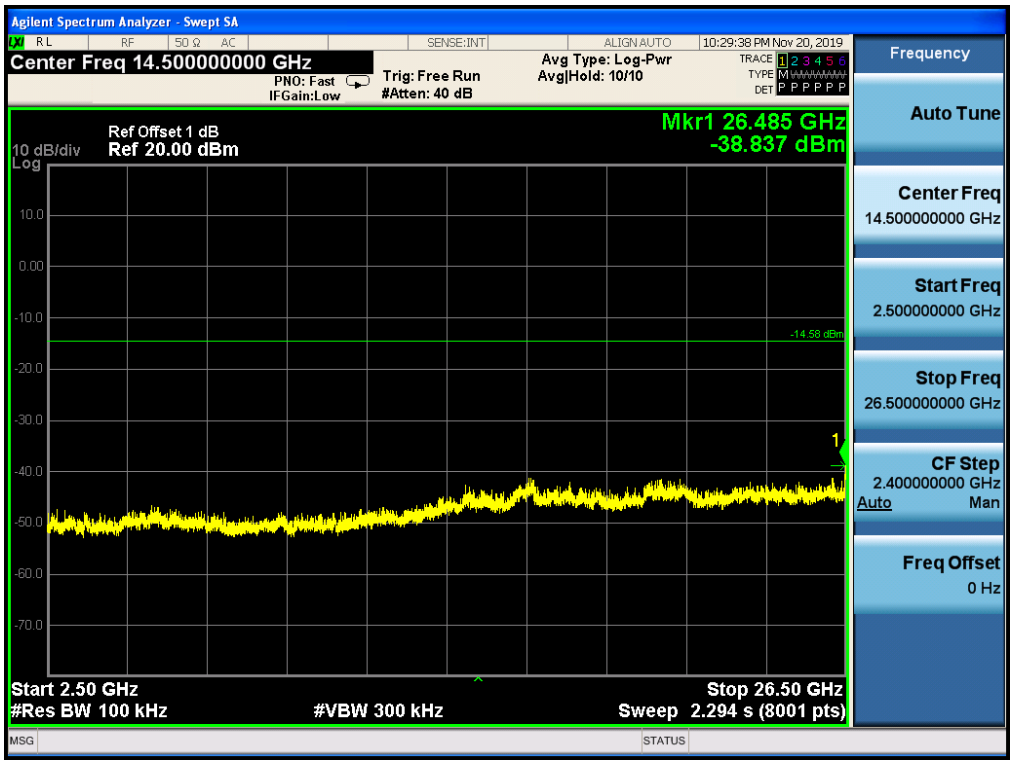












Remark:

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.

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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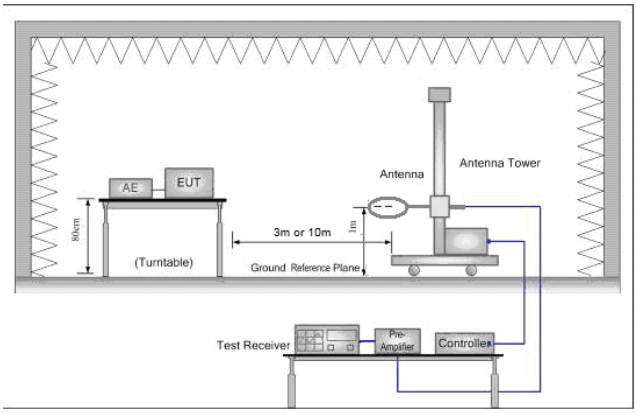


Figure 1. Below 30MHz

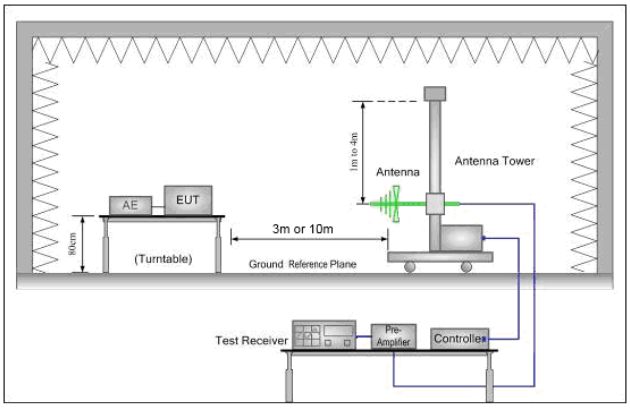


Figure 2. 30MHz to 1GHz

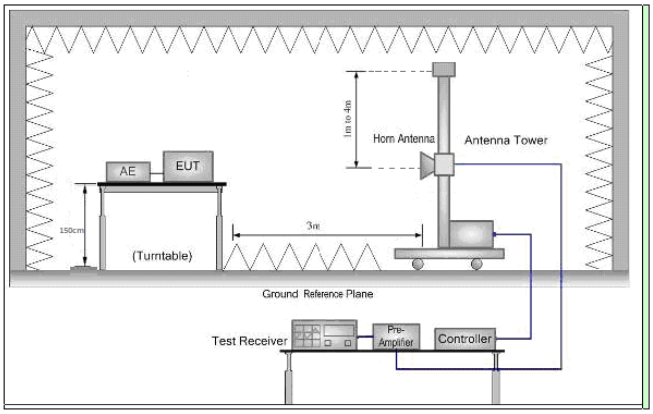


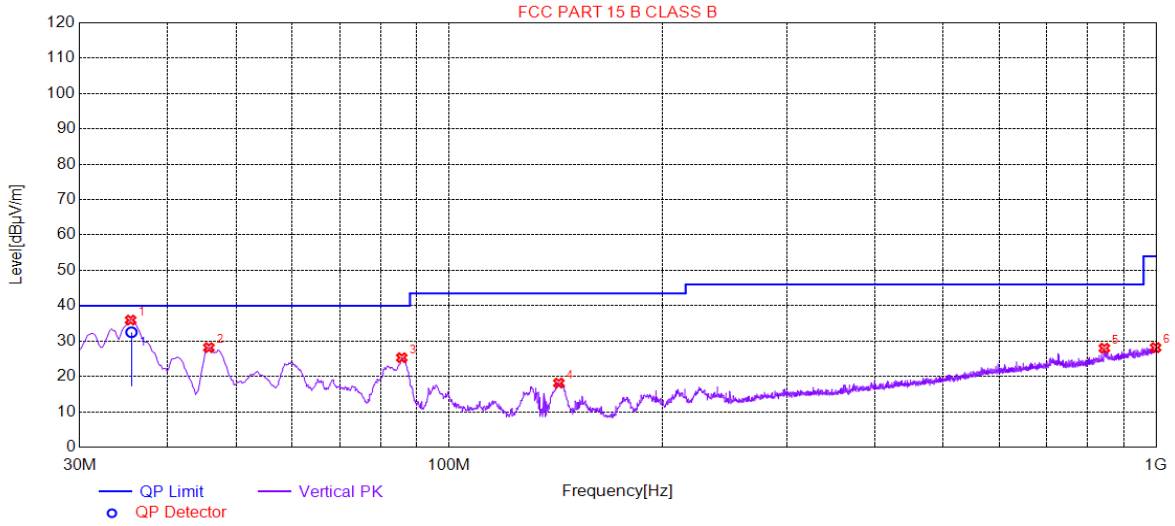
Figure 3. Above 1 GHz

Test Procedure:	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(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. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. 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

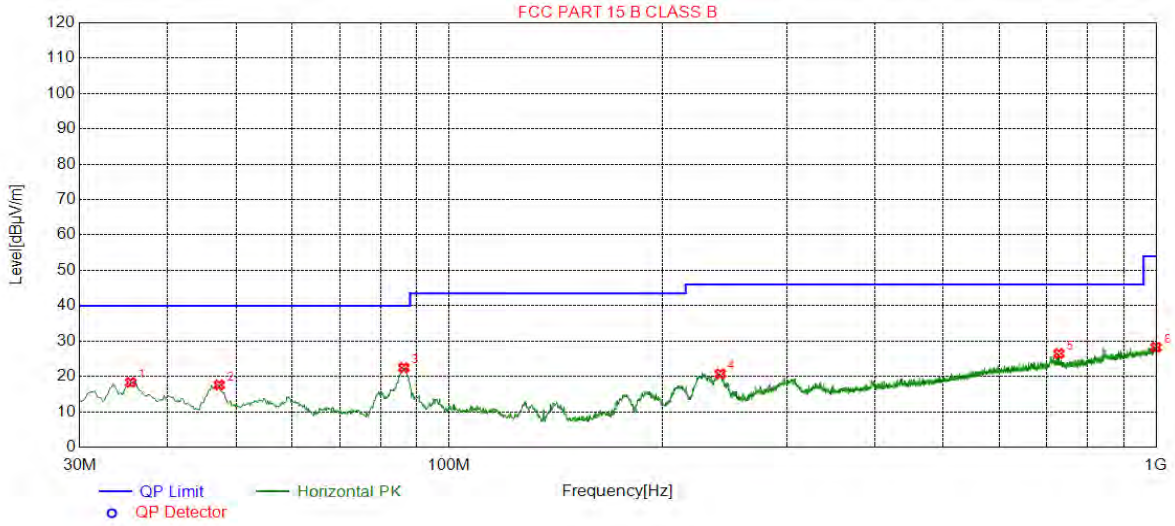
4.9.1 Radiated emission below 1GHz

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	100	360	Vertical
2	45.7171	28.15	-30.42	40.00	11.85	100	58	Vertical
3	85.6891	25.30	-34.77	40.00	14.70	100	220	Vertical
4	142.9306	18.13	-35.41	43.50	25.37	100	49	Vertical
5	844.9630	27.99	-16.97	46.00	18.01	200	119	Vertical
6	998.4477	28.15	-14.81	54.00	25.85	200	314	Vertical

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	100	276	Horizontal
2	47.2695	17.60	-30.40	40.00	22.40	200	329	Horizontal
3	86.2713	22.45	-34.63	40.00	17.55	200	309	Horizontal
4	241.8904	20.74	-29.99	46.00	25.26	100	267	Horizontal
5	728.5397	26.48	-18.84	46.00	19.52	200	204	Horizontal
6	999.6119	28.25	-14.80	54.00	25.75	100	28	Horizontal

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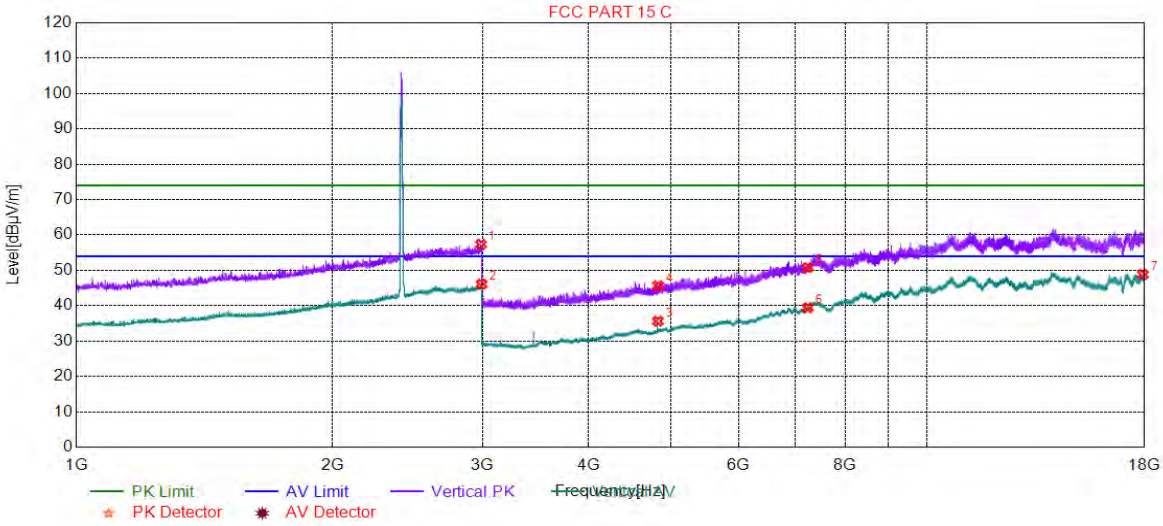
4.9.2 Transmitter emission above 1GHz

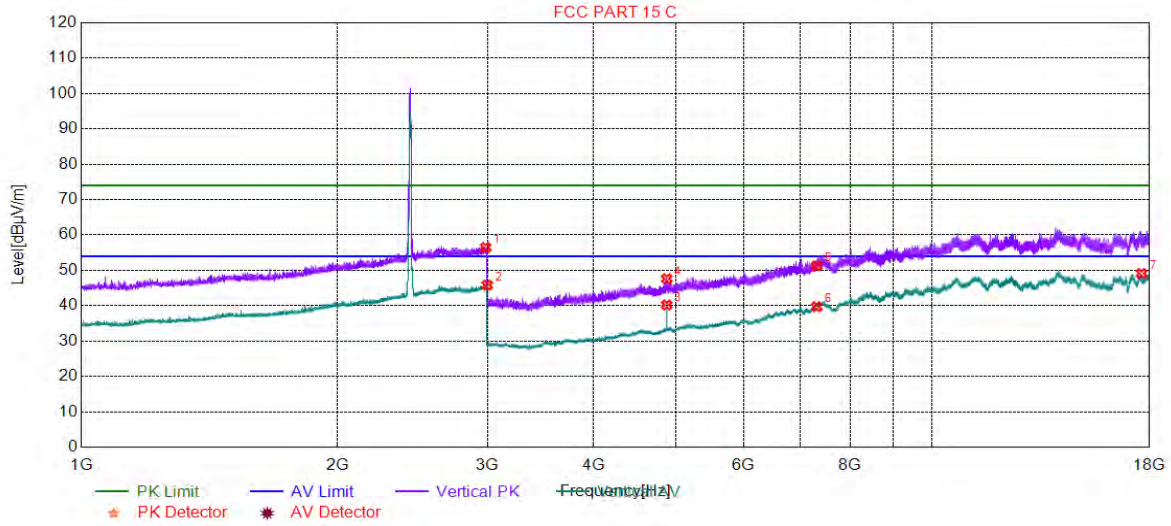
4.9.2.1 ANT1

4.9.2.1.1 802.11B_Lowest Channel_ Vertical



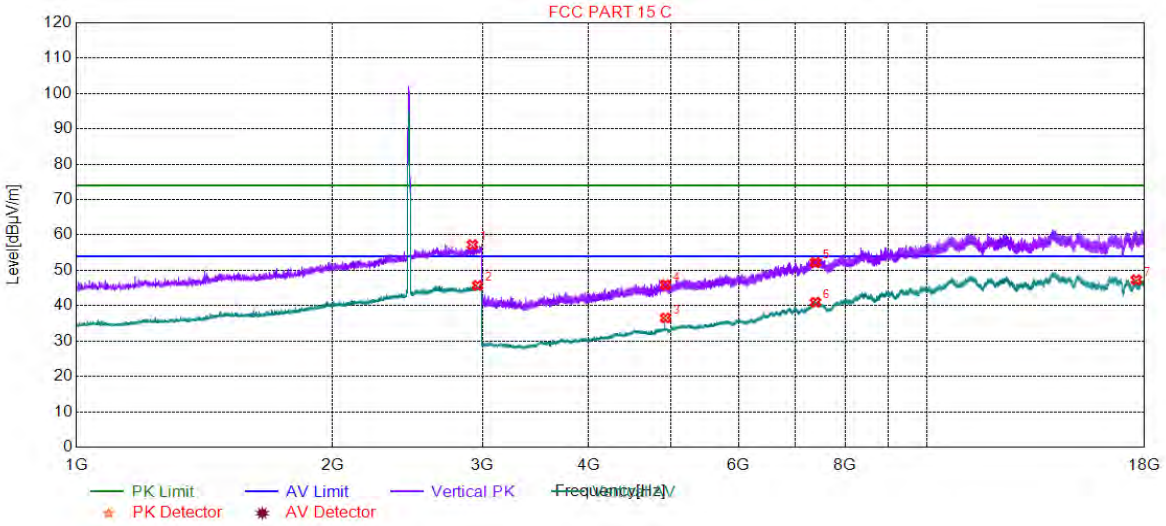
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2988.9972	57.35	11.78	74.00	16.65	150	237	Vertical
2	2993.9985	46.12	11.80	54.00	7.88	150	333	Vertical
3	4824.0000	35.64	-14.90	54.00	18.36	150	45	Vertical
4	4824.0000	45.65	-14.90	74.00	28.35	150	99	Vertical
5	7236.0000	50.76	-6.82	74.00	23.24	150	153	Vertical
6	7236.0000	39.45	-6.82	54.00	14.55	150	289	Vertical
7	17919.4960	48.83	2.50	54.00	5.17	150	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	150	222	Vertical
2	2998.4996	45.83	11.81	54.00	8.17	150	346	Vertical
3	4874.0000	40.21	-14.68	54.00	13.79	150	18	Vertical
4	4874.0000	47.63	-14.68	74.00	26.37	150	49	Vertical
5	7311.0000	51.27	-6.24	74.00	22.73	150	333	Vertical
6	7311.0000	39.72	-6.24	54.00	14.28	150	248	Vertical
7	17609.9805	49.12	4.12	54.00	4.88	150	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	150	319	Vertical
2	2960.9902	45.73	11.66	54.00	8.27	150	18	Vertical
3	4924.0000	36.53	-14.43	54.00	17.47	150	18	Vertical
4	4924.0000	45.94	-14.43	74.00	28.06	150	127	Vertical
5	7386.0000	52.21	-5.71	74.00	21.79	150	99	Vertical
6	7386.0000	40.96	-5.71	54.00	13.04	150	316	Vertical
7	17601.4801	47.32	4.28	54.00	6.68	150	144	Vertical

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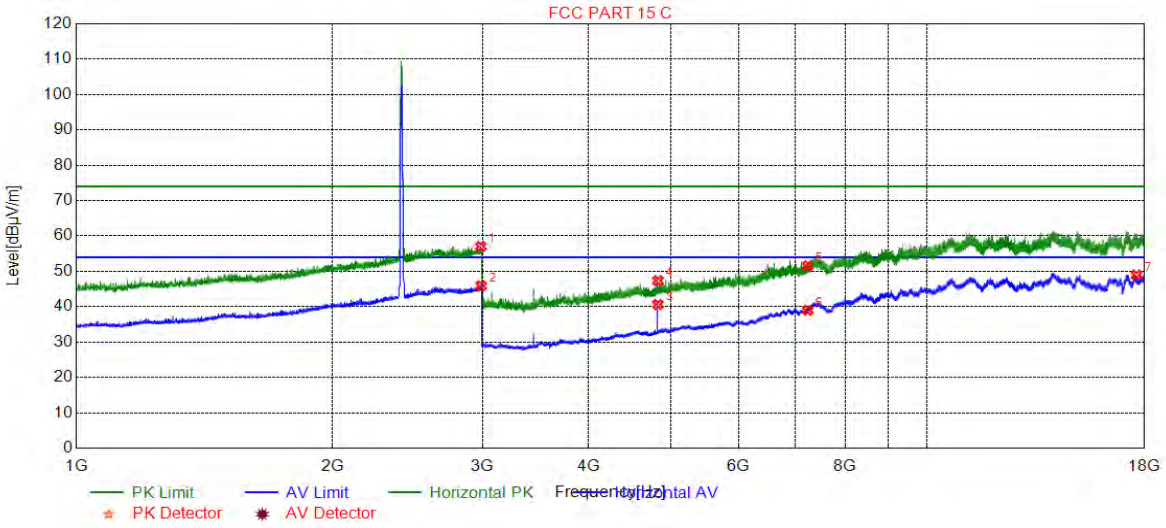
4.9.2.1.4 802.11B_Lowest Channel_ Horizontal



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	150	2	Horizontal
2	2989.9975	45.91	11.78	54.00	8.09	150	342	Horizontal
3	4824.0000	40.62	-14.90	54.00	13.38	150	46	Horizontal
4	4824.0000	47.36	-14.90	74.00	26.64	150	73	Horizontal
5	7236.0000	51.56	-6.82	74.00	22.44	150	263	Horizontal
6	7236.0000	39.00	-6.82	54.00	15.00	150	289	Horizontal
7	17608.9804	48.96	4.13	54.00	5.04	150	243	Horizontal

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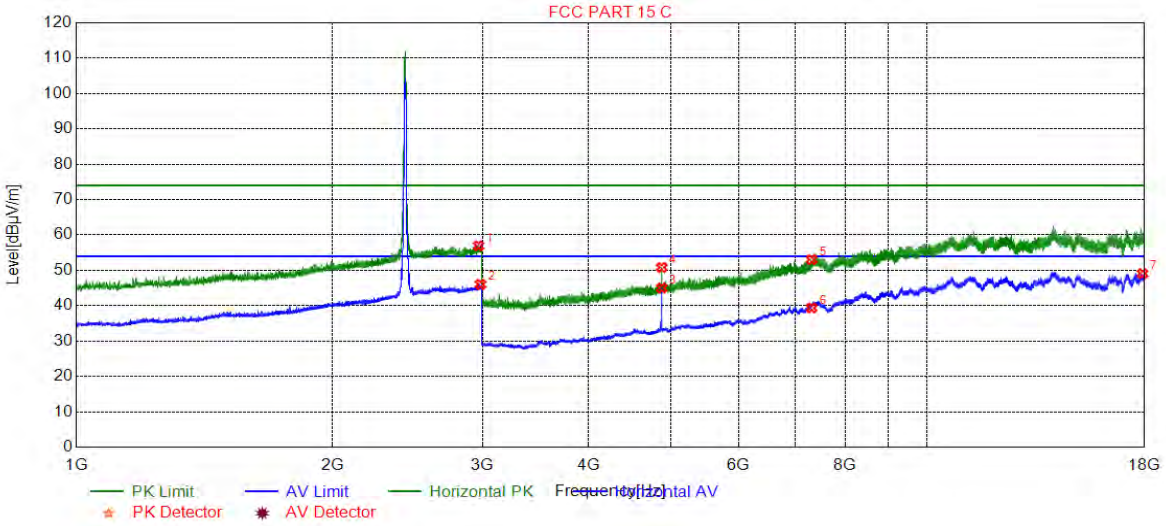
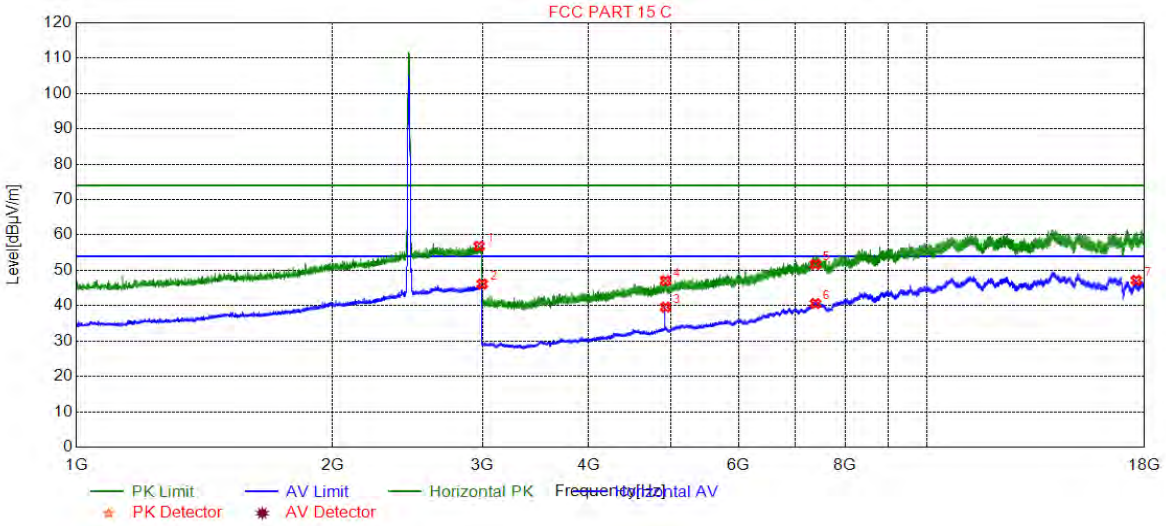
4.9.2.1.5 802.11B_ Middle Channel_ Horizontal



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	150	14	Horizontal
2	2984.9962	46.05	11.76	54.00	7.95	150	342	Horizontal
3	4874.0000	45.01	-14.68	54.00	8.99	150	126	Horizontal
4	4874.0000	50.83	-14.68	74.00	23.17	150	126	Horizontal
5	7311.0000	53.05	-6.24	74.00	20.95	150	126	Horizontal
6	7311.0000	39.37	-6.24	54.00	14.63	150	99	Horizontal
7	17901.4951	49.06	2.68	54.00	4.94	150	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	150	123	Horizontal
2	2998.4996	46.14	11.81	54.00	7.86	150	246	Horizontal
3	4924.0000	39.61	-14.43	54.00	14.39	150	45	Horizontal
4	4924.0000	47.08	-14.43	74.00	26.92	150	98	Horizontal
5	7386.0000	51.68	-5.71	74.00	22.32	150	316	Horizontal
6	7386.0000	40.61	-5.71	54.00	13.39	150	360	Horizontal
7	17603.4802	47.19	4.24	54.00	6.81	150	342	Horizontal

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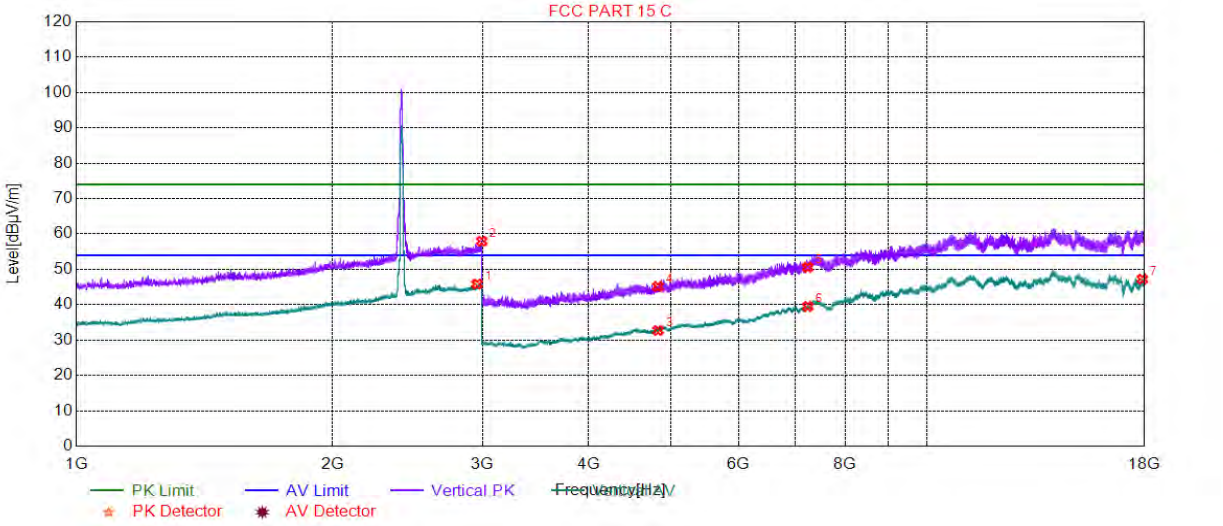
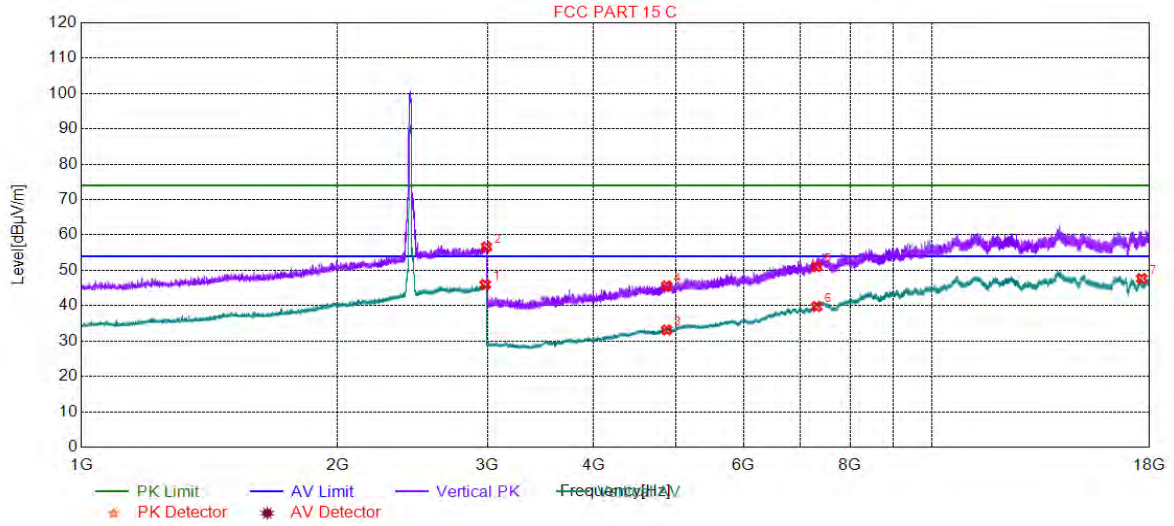
4.9.2.1.7 802.11G_Lowest Channel_ Vertical



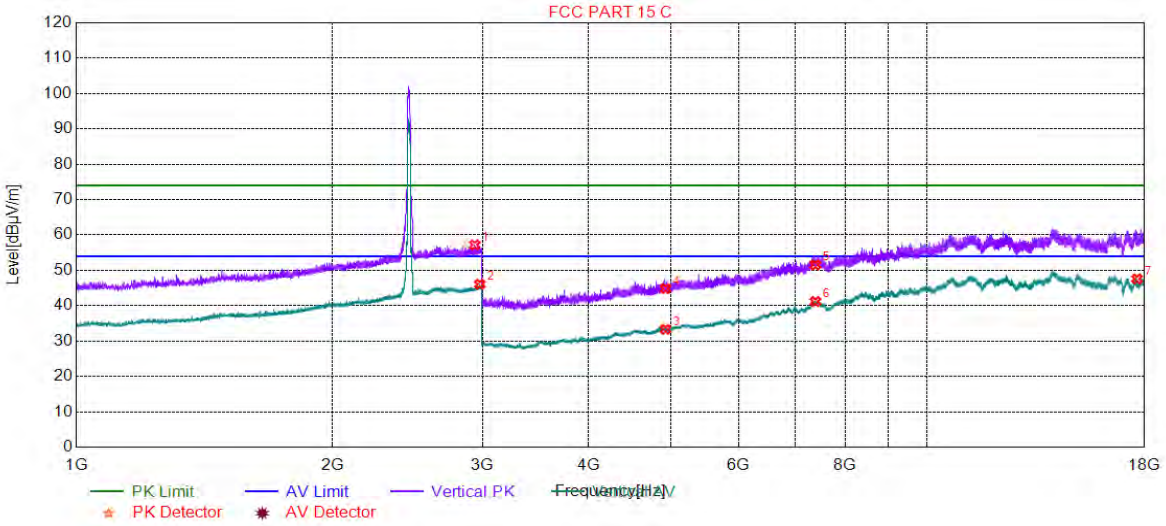
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2956.4891	45.86	11.65	54.00	8.14	150	360	Vertical
2	2995.4989	57.95	11.80	74.00	16.05	150	235	Vertical
3	4824.0000	32.71	-14.90	54.00	21.29	150	236	Vertical
4	4824.0000	45.14	-14.90	74.00	28.86	150	155	Vertical
5	7236.0000	50.58	-6.82	74.00	23.42	150	209	Vertical
6	7236.0000	39.51	-6.82	54.00	14.49	150	74	Vertical
7	17888.9945	47.22	2.54	54.00	6.78	150	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	150	18	Vertical
2	2991.9980	56.64	11.79	74.00	17.36	150	333	Vertical
3	4874.0000	33.13	-14.68	54.00	20.87	150	45	Vertical
4	4874.0000	45.64	-14.68	74.00	28.36	150	18	Vertical
5	7311.0000	51.02	-6.24	74.00	22.98	150	18	Vertical
6	7311.0000	39.75	-6.24	54.00	14.25	150	207	Vertical
7	17615.9808	47.68	4.00	54.00	6.32	150	342	Vertical

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	150	86	Vertical
2	2979.4949	46.07	11.74	54.00	7.93	150	357	Vertical
3	4924.0000	33.34	-14.43	54.00	20.66	150	234	Vertical
4	4924.0000	44.85	-14.43	74.00	29.15	150	288	Vertical
5	7386.0000	51.54	-5.71	74.00	22.46	150	45	Vertical
6	7386.0000	41.17	-5.71	54.00	12.83	150	72	Vertical
7	17634.4817	47.59	3.64	54.00	6.41	150	44	Vertical

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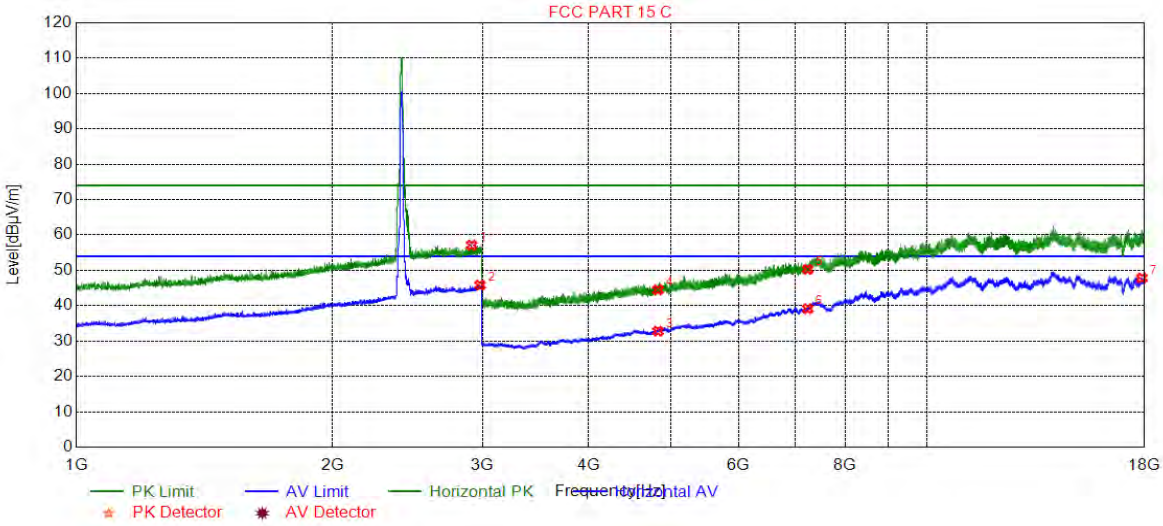
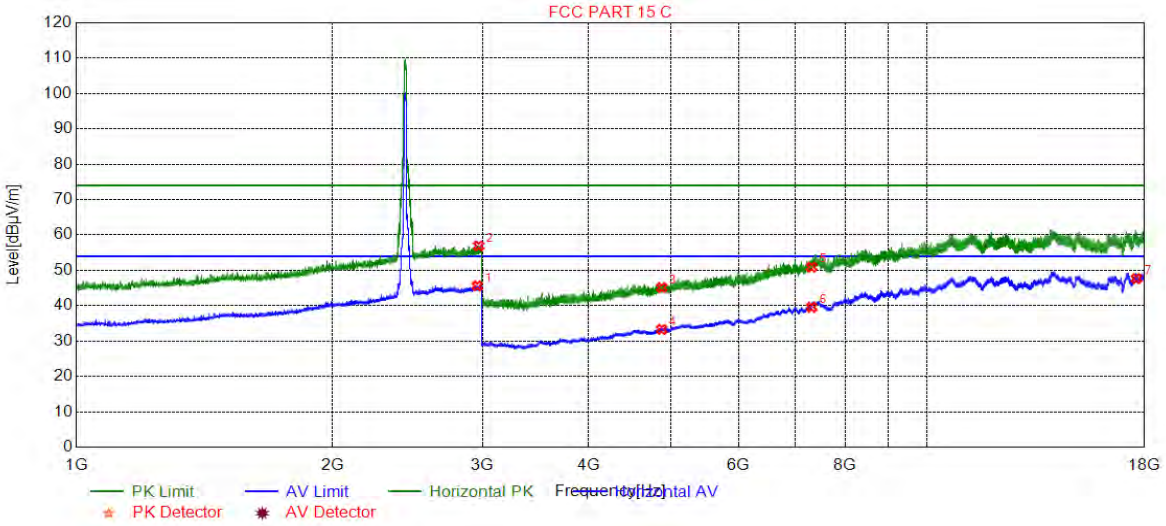
4.9.2.1.10 802.11G_Lowest Channel_ Horizontal



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	150	54	Horizontal
2	2981.4954	45.82	11.75	54.00	8.18	150	81	Horizontal
3	4824.0000	32.80	-14.90	54.00	21.20	150	18	Horizontal
4	4824.0000	44.48	-14.90	74.00	29.52	150	100	Horizontal
5	7236.0000	50.29	-6.82	74.00	23.71	150	100	Horizontal
6	7236.0000	39.16	-6.82	54.00	14.84	150	315	Horizontal
7	17866.9934	47.83	2.25	54.00	6.17	150	292	Horizontal

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	150	68	Horizontal
2	2969.9925	56.92	11.70	74.00	17.08	150	2	Horizontal
3	4874.0000	45.13	-14.68	74.00	28.87	150	179	Horizontal
4	4874.0000	33.33	-14.68	54.00	20.67	150	18	Horizontal
5	7311.0000	50.93	-6.24	74.00	23.07	150	152	Horizontal
6	7311.0000	39.58	-6.24	54.00	14.42	150	314	Horizontal
7	17607.4804	47.67	4.16	54.00	6.33	150	93	Horizontal

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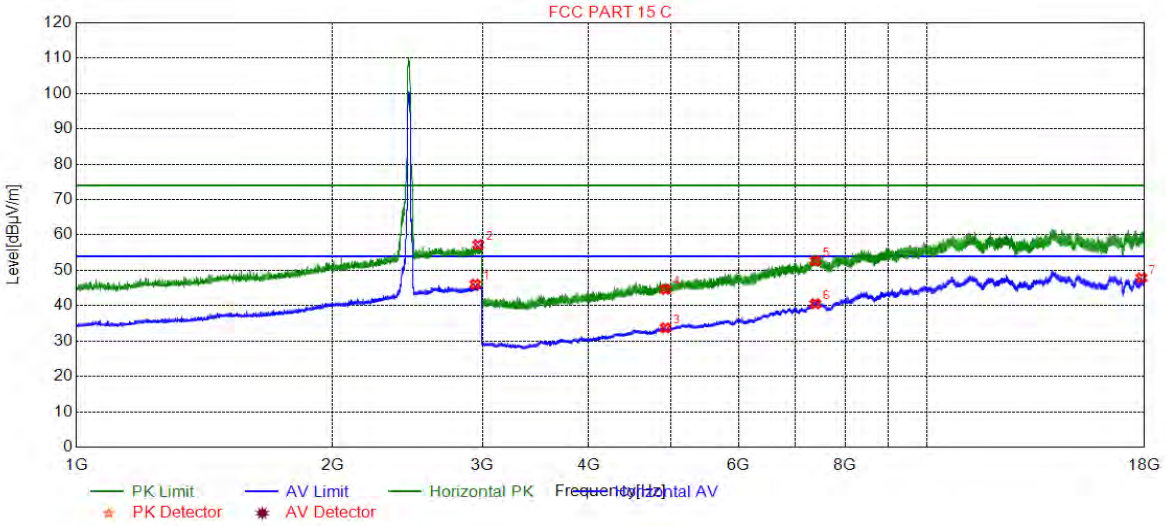
4.9.2.1.12 802.11G_ Highest Channel_ Horizontal



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	150	190	Horizontal
2	2965.9915	57.25	11.68	74.00	16.75	150	259	Horizontal
3	4924.0000	33.72	-14.43	54.00	20.28	150	360	Horizontal
4	4924.0000	44.62	-14.43	74.00	29.38	150	208	Horizontal
5	7386.0000	52.68	-5.71	74.00	21.32	150	46	Horizontal
6	7386.0000	40.56	-5.71	54.00	13.44	150	289	Horizontal
7	17849.4925	47.86	2.02	54.00	6.14	150	146	Horizontal

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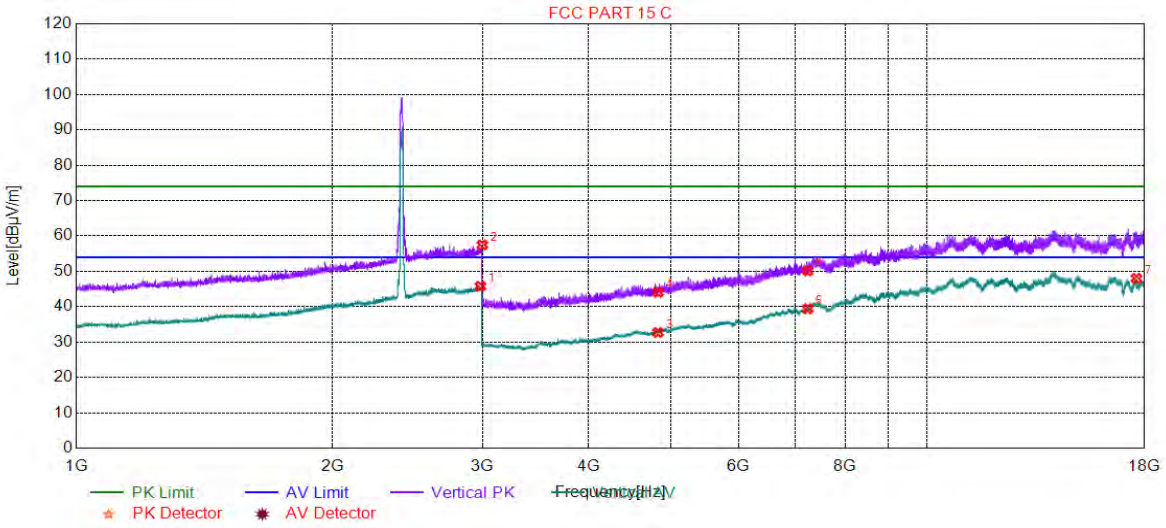
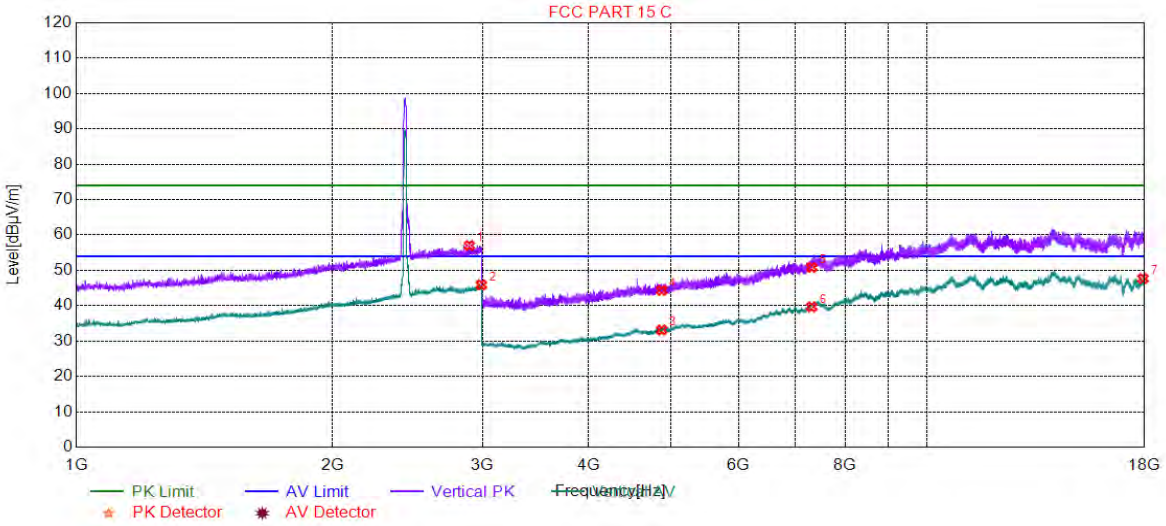
4.9.2.1.13 802.11N20_Lowest Channel_ Vertical



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	150	278	Vertical
2	2999.4999	57.48	11.82	74.00	16.52	150	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	150	73	Vertical
5	7236.0000	50.13	-6.82	74.00	23.87	150	292	Vertical
6	7236.0000	39.45	-6.82	54.00	14.55	150	292	Vertical
7	17607.4804	47.99	4.16	54.00	6.01	150	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	150	183	Vertical
2	2991.4979	45.91	11.79	54.00	8.09	150	266	Vertical
3	4874.0000	33.12	-14.68	54.00	20.88	150	187	Vertical
4	4874.0000	44.34	-14.68	74.00	29.66	150	348	Vertical
5	7311.0000	50.85	-6.24	74.00	23.15	150	133	Vertical
6	7311.0000	39.66	-6.24	54.00	14.34	150	18	Vertical
7	17920.4960	47.69	2.49	54.00	6.31	150	1	Vertical

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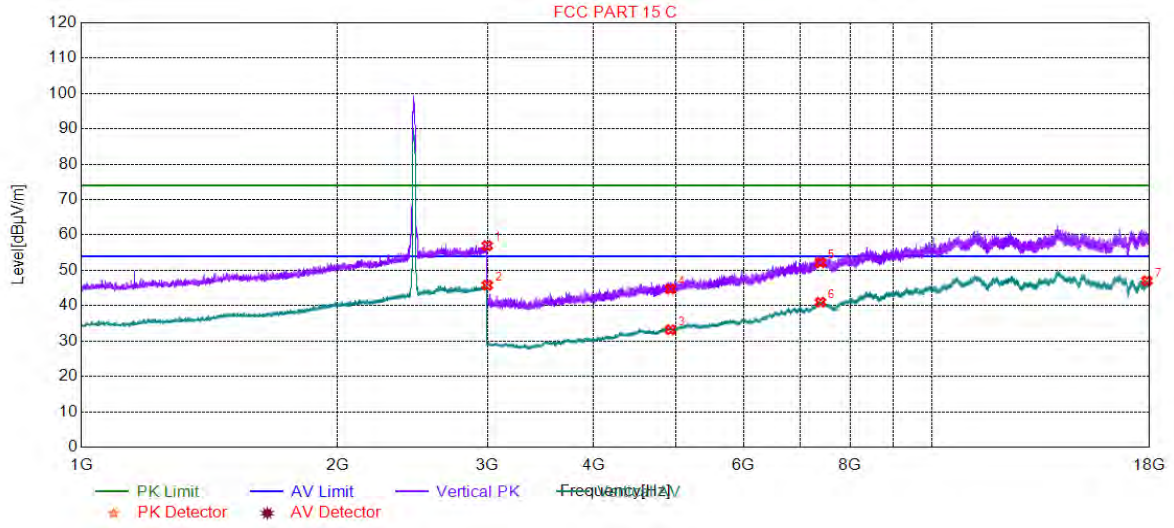
4.9.2.1.15 802.11N20_ Highest Channel_ Vertical



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	150	196	Vertical
2	2998.9998	45.78	11.82	54.00	8.22	150	18	Vertical
3	4924.0000	33.18	-14.43	54.00	20.82	150	18	Vertical
4	4924.0000	44.70	-14.43	74.00	29.30	150	233	Vertical
5	7386.0000	52.17	-5.71	74.00	21.83	150	71	Vertical
6	7386.0000	40.99	-5.71	54.00	13.01	150	314	Vertical
7	17868.9935	47.04	2.28	54.00	6.96	150	44	Vertical

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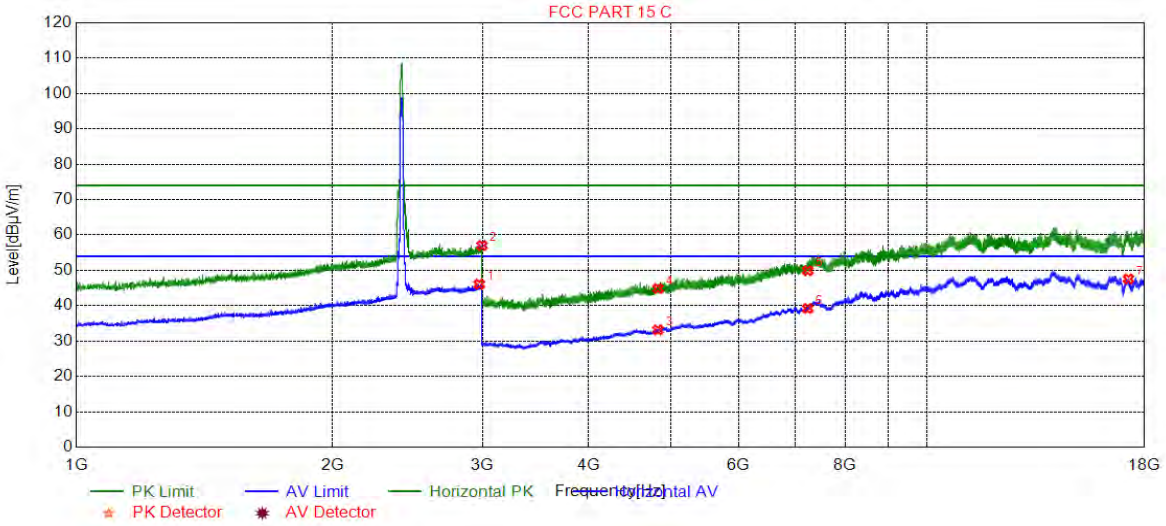
4.9.2.1.16 802.11N20_Lowest Channel_ Horizontal



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	150	302	Horizontal
2	2996.9993	57.02	11.81	74.00	16.98	150	14	Horizontal
3	4824.0000	33.16	-14.90	54.00	20.84	150	72	Horizontal
4	4824.0000	44.85	-14.90	74.00	29.15	150	219	Horizontal
5	7236.0000	49.91	-6.82	74.00	24.09	150	160	Horizontal
6	7236.0000	39.22	-6.82	54.00	14.78	150	105	Horizontal
7	17226.9613	47.59	2.51	54.00	6.41	150	243	Horizontal

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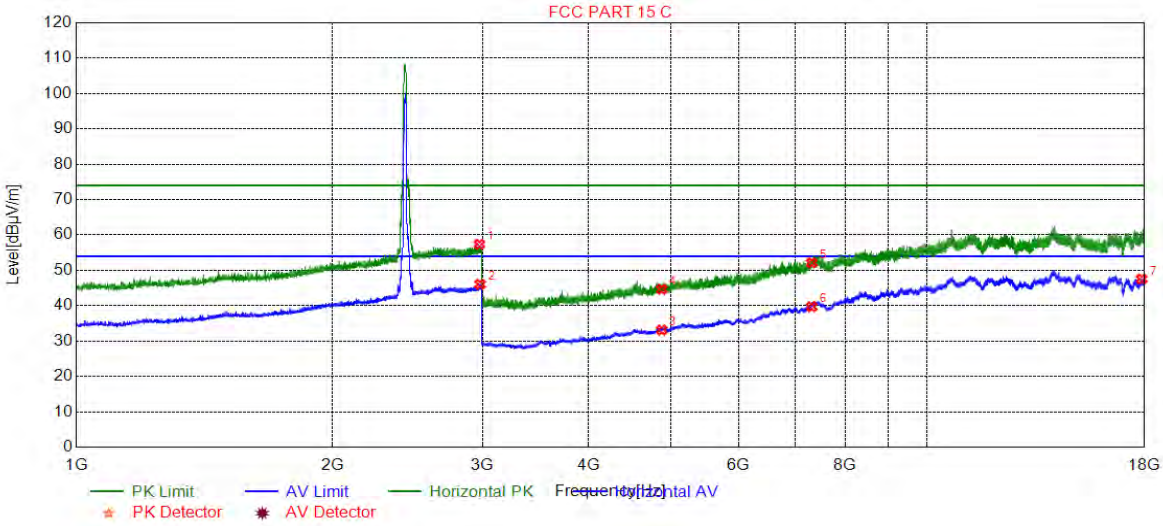
4.9.2.1.17 802.11N20_ Middle Channel_ Horizontal



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	150	204	Horizontal
2	2981.9955	46.07	11.75	54.00	7.93	150	3	Horizontal
3	4874.0000	33.11	-14.68	54.00	20.89	150	154	Horizontal
4	4874.0000	44.63	-14.68	74.00	29.37	150	126	Horizontal
5	7311.0000	52.14	-6.24	74.00	21.86	150	99	Horizontal
6	7311.0000	39.70	-6.24	54.00	14.30	150	342	Horizontal
7	17858.4929	47.55	2.14	54.00	6.45	150	342	Horizontal

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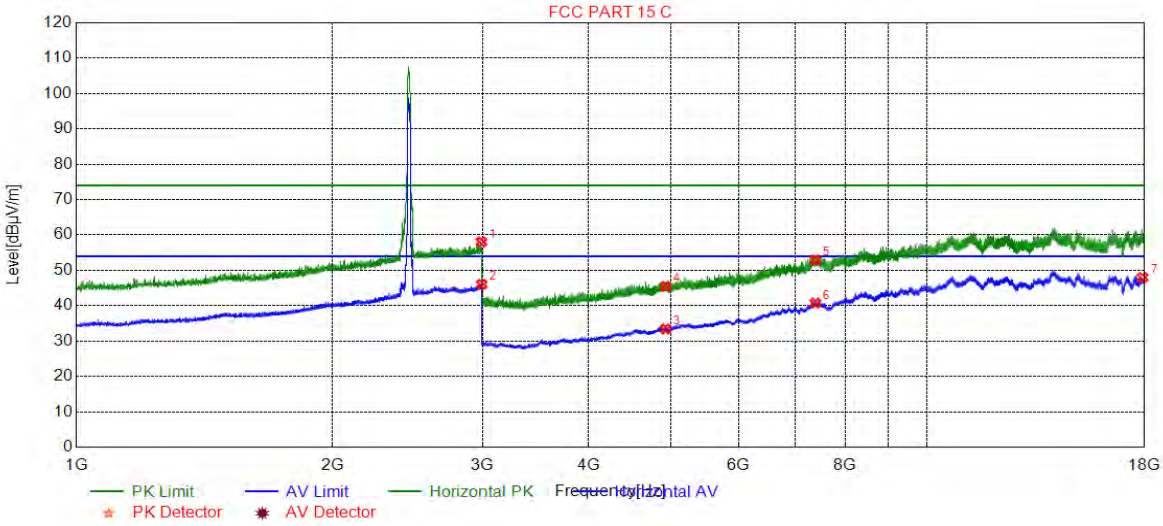
4.9.2.1.18 802.11N20_ Highest Channel_ Horizontal



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	150	273	Horizontal
2	2994.4986	46.05	11.80	54.00	7.95	150	68	Horizontal
3	4924.0000	33.43	-14.43	54.00	20.57	150	341	Horizontal
4	4924.0000	45.47	-14.43	74.00	28.53	150	287	Horizontal
5	7386.0000	52.96	-5.71	74.00	21.04	150	260	Horizontal
6	7386.0000	40.74	-5.71	54.00	13.26	150	18	Horizontal
7	17904.4952	48.00	2.65	54.00	6.00	150	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:

   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:			

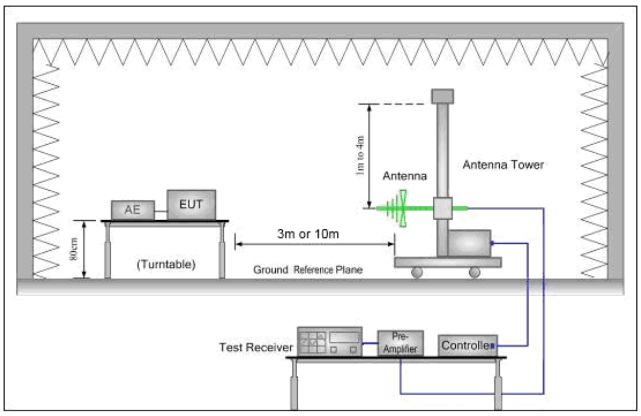


Figure 1. 30MHz to 1GHz

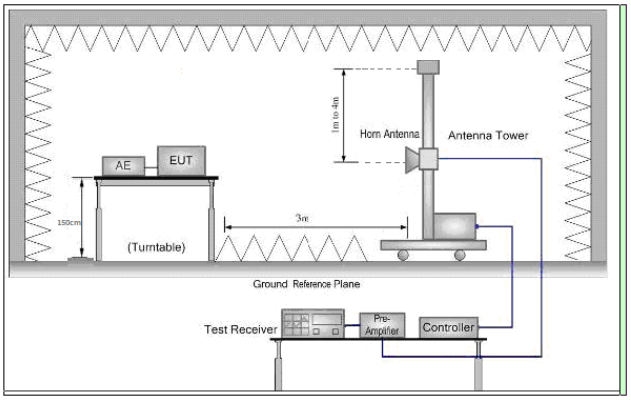


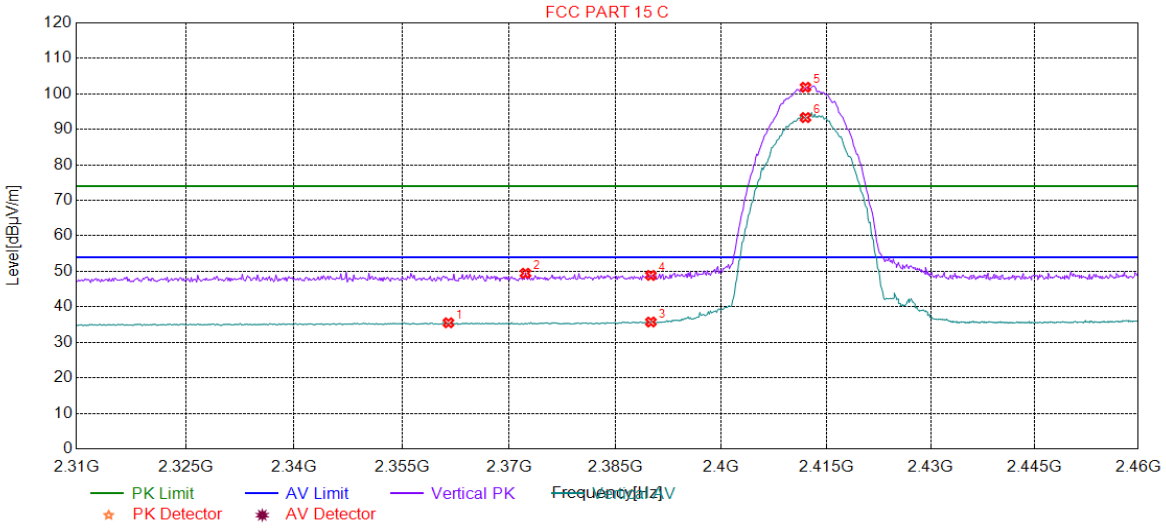
Figure 2. Above 1 GHz

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. 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 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 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.

	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

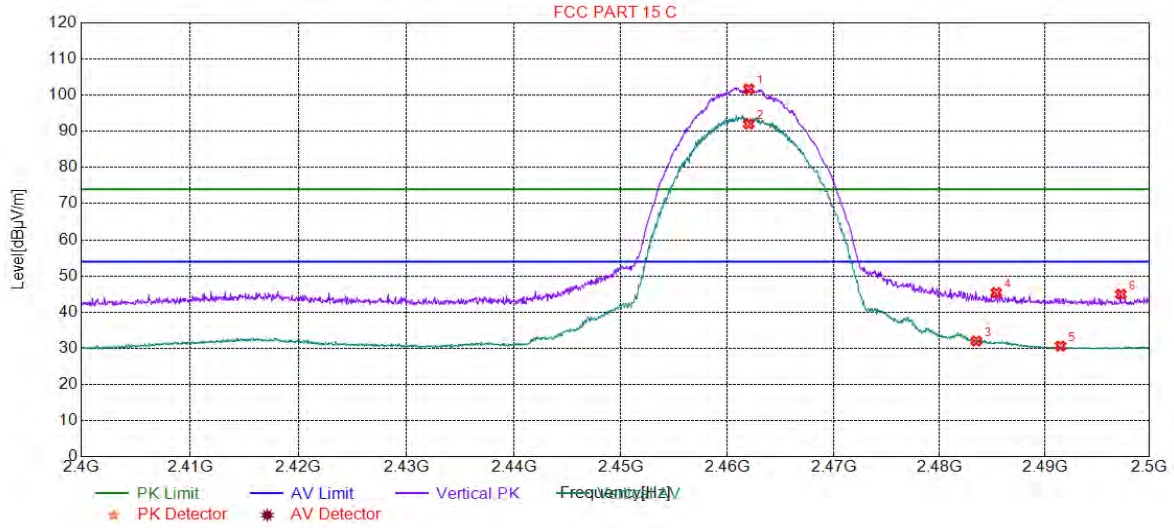
4.10.1.1 802.11B_Lowest Channel_ Vertical



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	150	326	Vertical
2	2372.3123	49.46	9.62	74.00	24.54	150	140	Vertical
3	2390.0000	35.74	9.65	54.00	18.26	150	305	Vertical
4	2390.0000	48.86	9.65	74.00	25.14	150	318	Vertical
5	2412.0000	101.87	9.74	74.00	-27.87	150	322	Vertical
6	2412.0000	93.33	9.74	54.00	-39.33	150	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	150	322	Vertical
2	2462.0000	92.05	10.03	54.00	-38.05	150	284	Vertical
3	2483.5000	32.02	10.10	54.00	21.98	150	316	Vertical
4	2485.3927	45.39	10.10	74.00	28.61	150	289	Vertical
5	2491.4957	30.64	10.12	54.00	23.36	150	316	Vertical
6	2497.2486	44.95	10.14	74.00	29.05	150	289	Vertical

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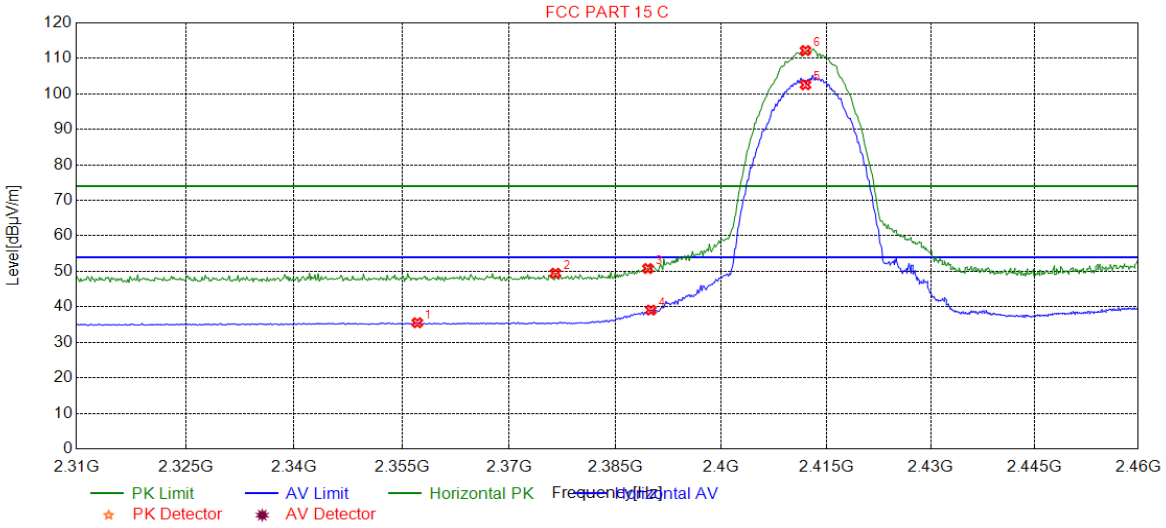
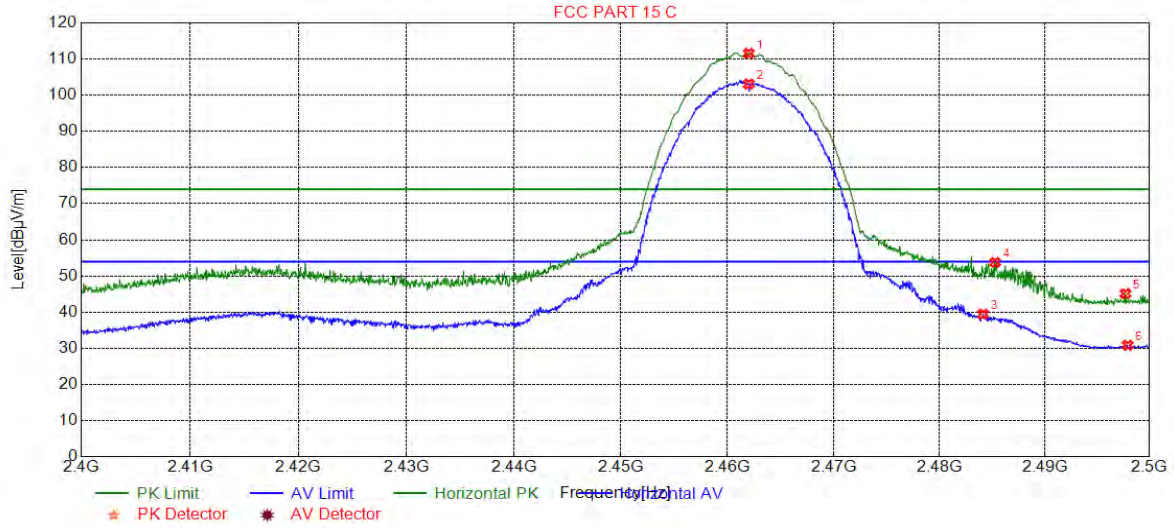
4.10.1.3 802.11B_Lowest Channel_ Horizontal



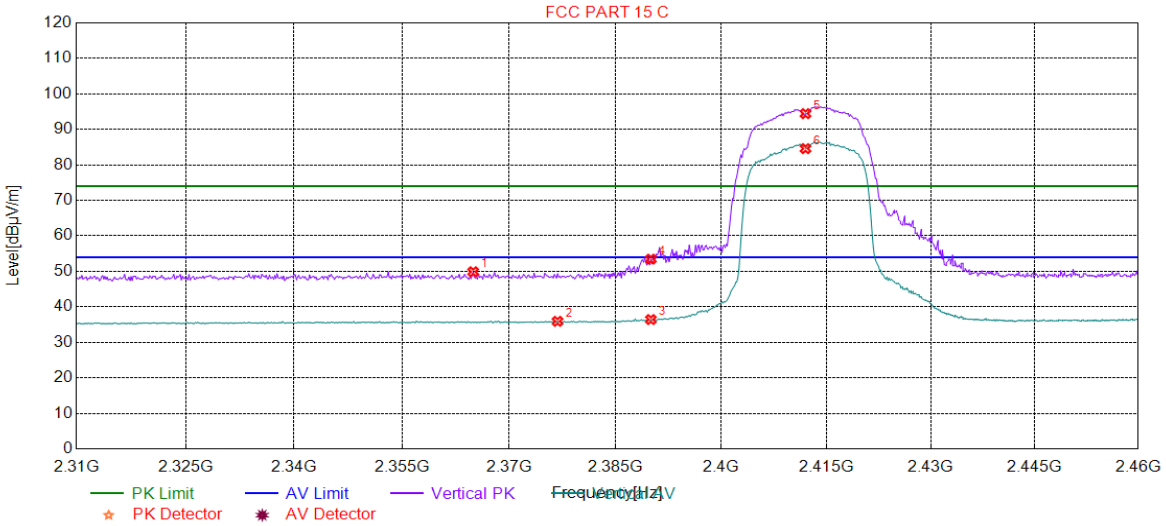
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2357.1471	35.53	9.60	54.00	18.47	150	128	Horizontal
2	2376.5165	49.48	9.63	74.00	24.52	150	0	Horizontal
3	2389.5796	50.80	9.65	74.00	23.20	150	207	Horizontal
4	2390.0000	39.09	9.65	54.00	14.91	150	207	Horizontal
5	2412.0000	102.56	9.74	54.00	-48.56	150	203	Horizontal
6	2412.0000	112.19	9.74	74.00	-38.19	150	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	150	199	Horizontal
2	2462.0000	103.09	10.03	54.00	-49.09	150	194	Horizontal
3	2484.1421	39.44	10.10	54.00	14.56	150	204	Horizontal
4	2485.2926	53.78	10.10	74.00	20.22	150	199	Horizontal
5	2497.6988	45.12	10.14	74.00	28.88	150	23	Horizontal
6	2497.8989	30.83	10.14	54.00	23.17	150	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	150	316	Vertical
2	2376.8168	35.93	9.63	54.00	18.07	150	354	Vertical
3	2390.0000	36.43	9.65	54.00	17.57	150	190	Vertical
4	2390.0000	53.45	9.65	74.00	20.55	150	91	Vertical
5	2412.0000	94.43	9.74	74.00	-20.43	150	91	Vertical
6	2412.0000	84.58	9.74	54.00	-30.58	150	91	Vertical

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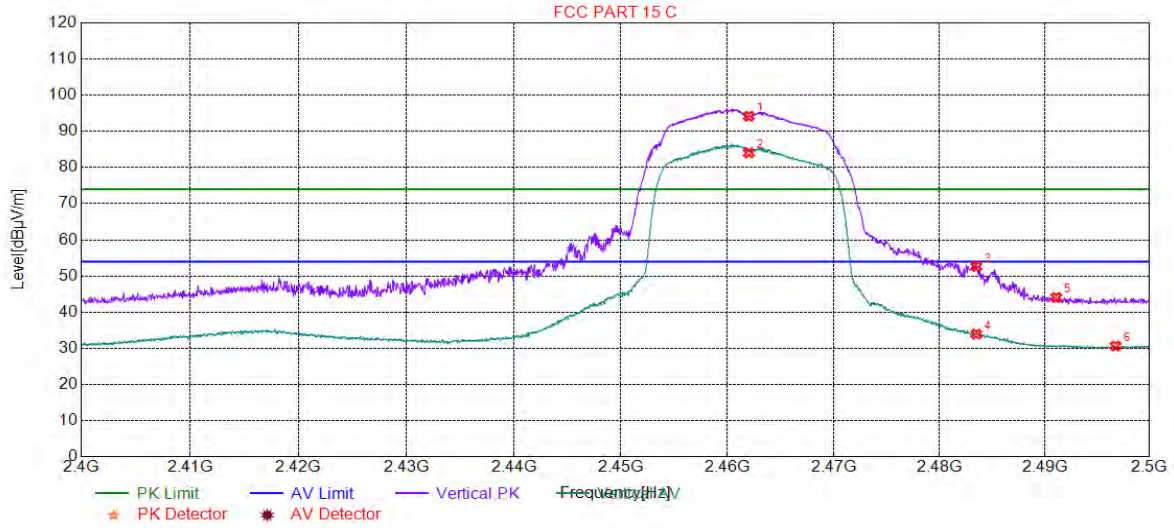
4.10.1.6 802.11G_ Highest Channel_ Vertical



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	150	321	Vertical
2	2462.0000	84.09	10.03	54.00	-30.09	150	321	Vertical
3	2483.5000	52.62	10.10	74.00	21.38	150	67	Vertical
4	2483.5000	33.93	10.10	54.00	20.07	150	277	Vertical
5	2491.0955	44.07	10.12	74.00	29.93	150	354	Vertical
6	2496.7484	30.64	10.14	54.00	23.36	150	57	Vertical

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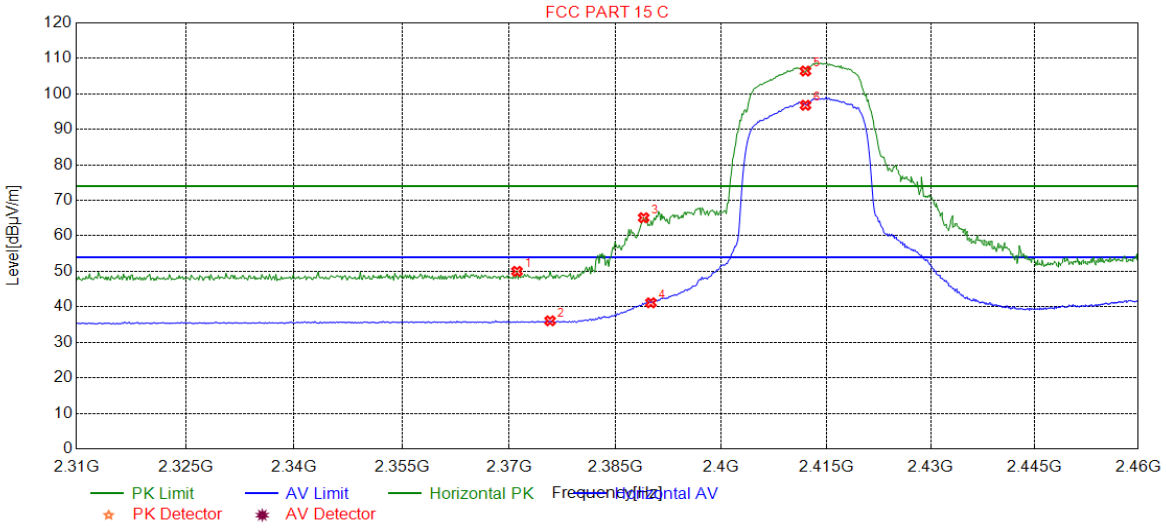
4.10.1.7 802.11G_Lowest Channel_ Horizontal



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	150	219	Horizontal
2	2375.7658	36.07	9.63	54.00	17.93	150	257	Horizontal
3	2388.9790	65.11	9.64	74.00	8.89	150	199	Horizontal
4	2390.0000	41.15	9.65	54.00	12.85	150	203	Horizontal
5	2412.0000	106.43	9.74	74.00	-32.43	150	203	Horizontal
6	2412.0000	96.79	9.74	54.00	-42.79	150	199	Horizontal

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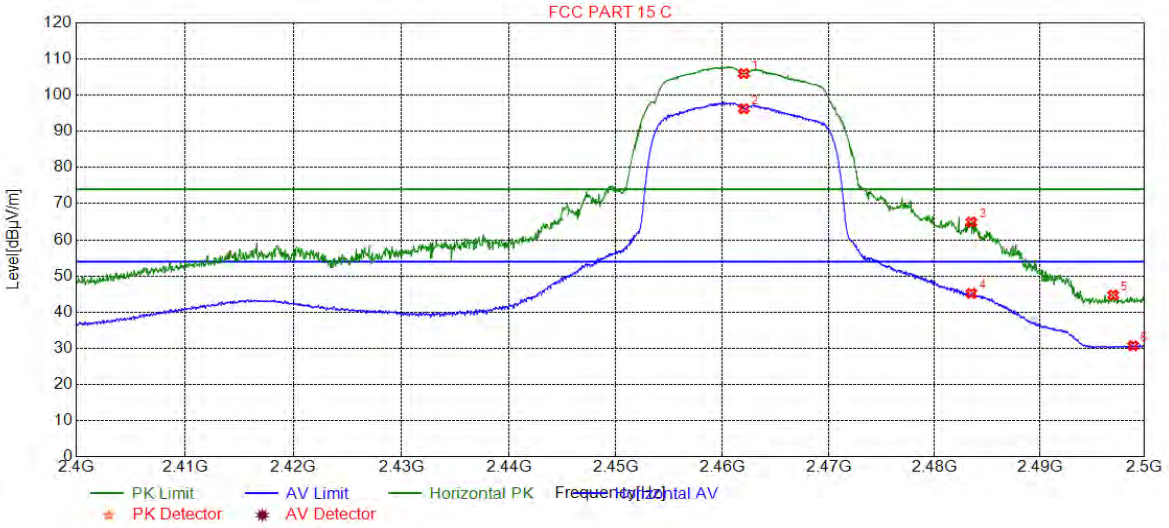
4.10.1.8 802.11G_ Highest Channel_ Horizontal



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	150	244	Horizontal
2	2462.0000	96.26	10.03	54.00	-42.26	150	200	Horizontal
3	2483.5000	64.90	10.10	74.00	9.10	150	244	Horizontal
4	2483.5000	45.20	10.10	54.00	8.80	150	244	Horizontal
5	2496.9985	44.72	10.14	74.00	29.28	150	140	Horizontal
6	2498.8995	30.71	10.15	54.00	23.29	150	310	Horizontal

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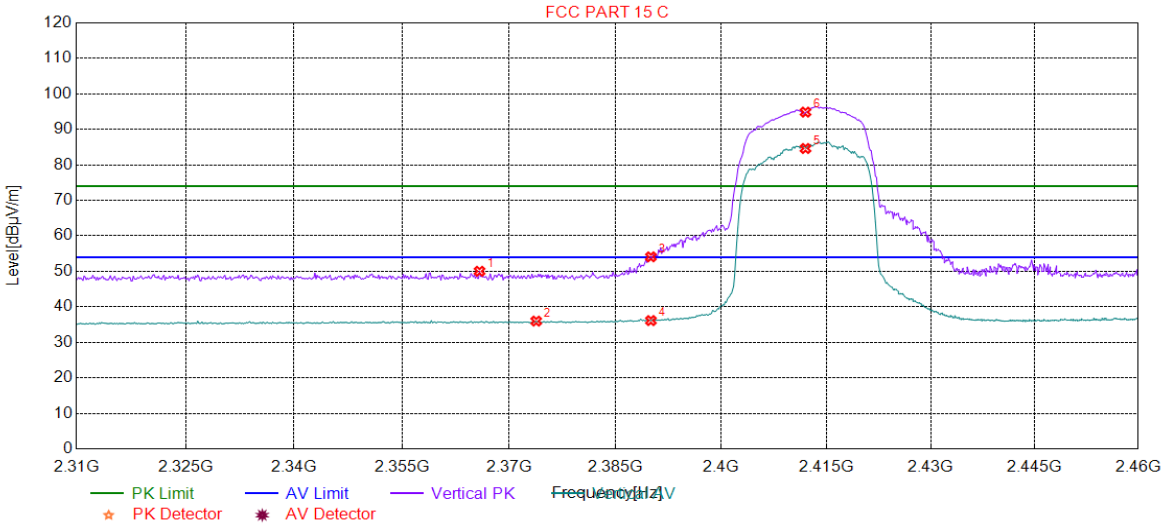
4.10.1.9 802.11N20_Lowest Channel_ Vertical



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	150	287	Vertical
2	2373.8138	35.99	9.62	54.00	18.01	150	115	Vertical
3	2390.0000	54.10	9.65	74.00	19.90	150	99	Vertical
4	2390.0000	36.14	9.65	54.00	17.86	150	66	Vertical
5	2412.0000	84.62	9.74	54.00	-30.62	150	99	Vertical
6	2412.0000	94.86	9.74	74.00	-20.86	150	102	Vertical

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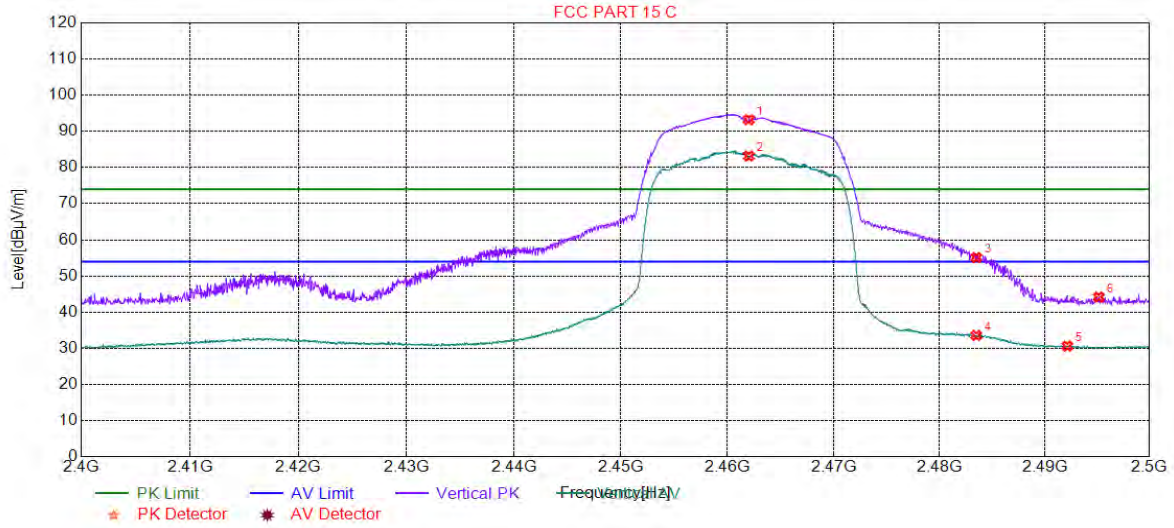
4.10.1.10 802.11N20_ Highest Channel_ Vertical



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	150	143	Vertical
2	2462.0000	83.17	10.03	54.00	-29.17	150	137	Vertical
3	2483.5000	55.09	10.10	74.00	18.91	150	236	Vertical
4	2483.5000	33.57	10.10	54.00	20.43	150	148	Vertical
5	2492.1461	30.62	10.12	54.00	23.38	150	148	Vertical
6	2495.1476	44.19	10.13	74.00	29.81	150	40	Vertical

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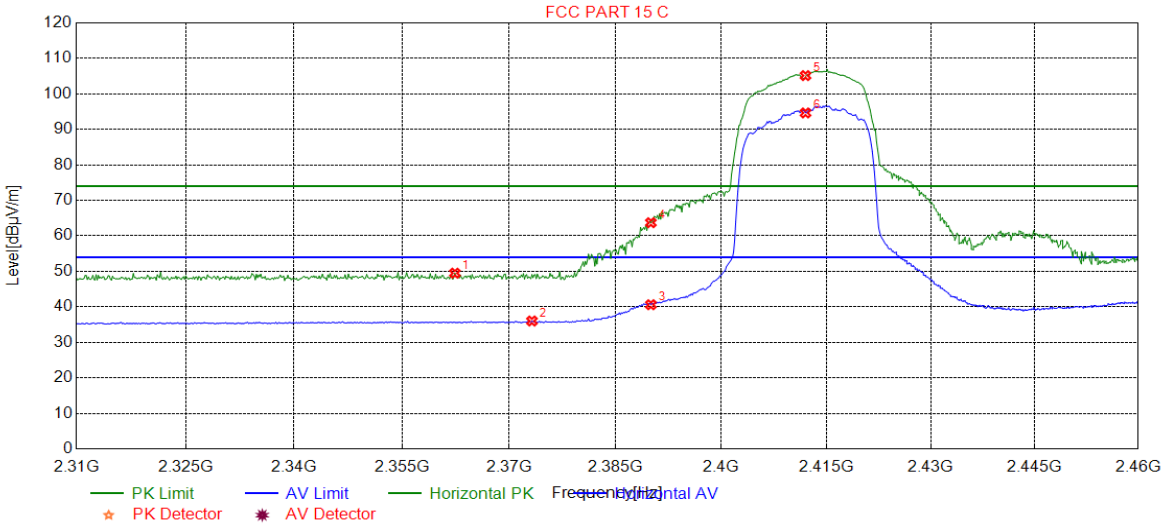
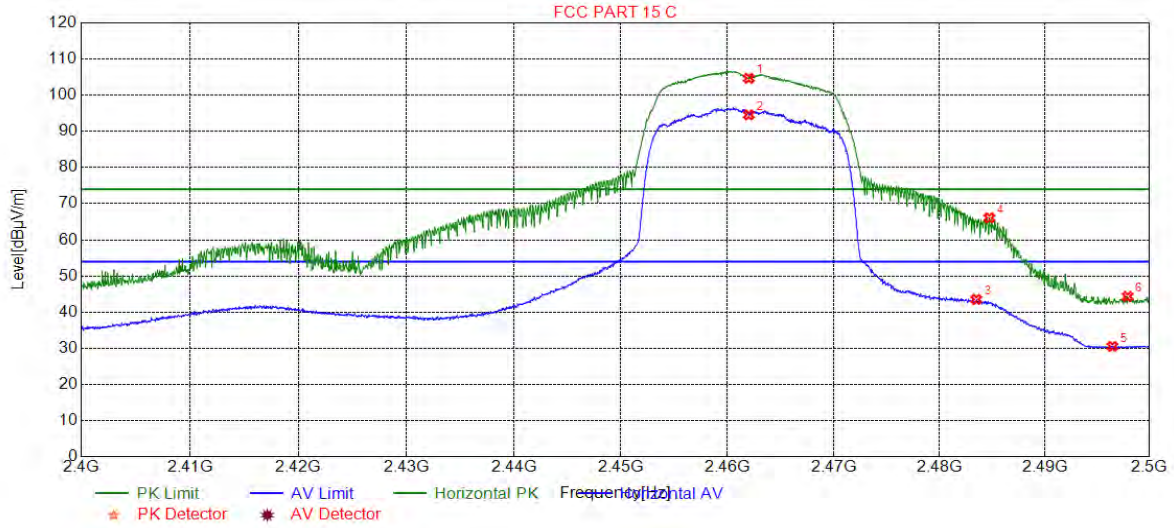
4.10.1.11 802.11N20_Lowest Channel_ Horizontal



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	150	13	Horizontal
2	2373.2132	36.02	9.62	54.00	17.98	150	25	Horizontal
3	2390.0000	40.61	9.65	54.00	13.39	150	195	Horizontal
4	2390.0000	63.71	9.65	74.00	10.29	150	204	Horizontal
5	2412.0000	105.15	9.74	74.00	-31.15	150	245	Horizontal
6	2412.0000	94.63	9.74	54.00	-40.63	150	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	150	245	Horizontal
2	2462.0000	94.56	10.03	54.00	-40.56	150	245	Horizontal
3	2483.5000	43.53	10.10	54.00	10.47	150	245	Horizontal
4	2484.7424	66.10	10.10	74.00	7.90	150	206	Horizontal
5	2496.4482	30.53	10.14	54.00	23.47	150	195	Horizontal
6	2497.8989	44.32	10.14	74.00	29.68	150	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)

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	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019/7/14	2020/7/14
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2019/4/1	2020/3/31
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	2019/2/11	2020/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019/3/2	2020/3/1

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	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

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	2019/3/2	2020/3/1

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	2019/3/12	2020/3/11
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	2019/3/2	2020/3/1
Band filter	N/A	N/A	SEM023-01	N/A	N/A

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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	2019/3/2	2020/3/1
Trilog-Broadband Antenna(25M-2GHz)	Schwarzbeck	VULB9168	SEM003-18	2018/3/15	2020/3/14
Pre-amplifier (9k-1GHz)	Sonoma	310N	SEM005-03	2019/3/12	2020/3/11
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

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

The End

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