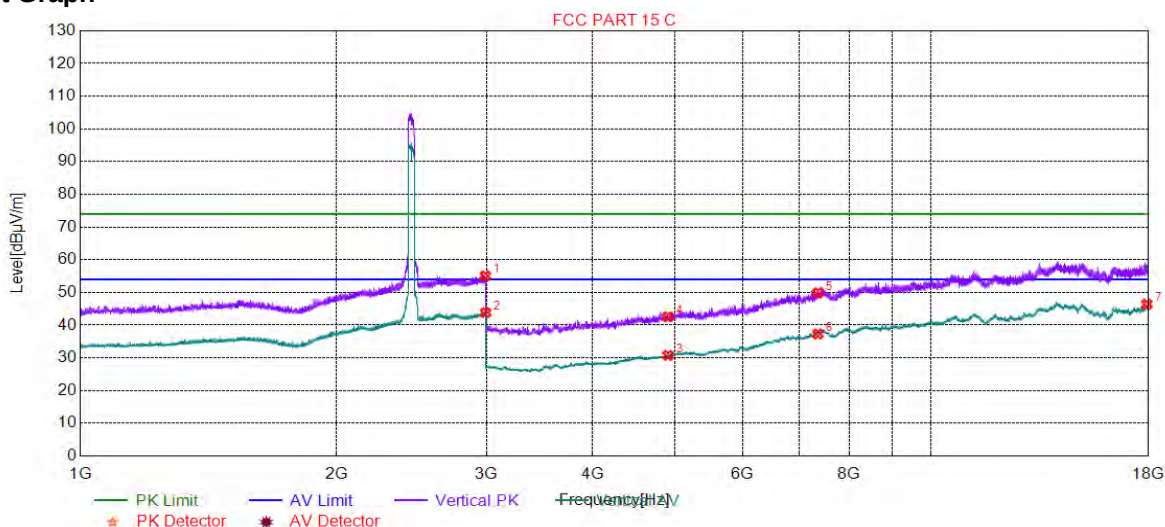




4.9.2.24 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2991.49	55.09	9.49	74.00	18.91	280	124	Vertical
2	2993.99	43.87	9.48	54.00	10.13	169	83	Vertical
3	4904.00	30.80	-17.84	54.00	23.20	151	127	Vertical
4	4904.00	42.59	-17.84	74.00	31.41	204	44	Vertical
5	7356.00	49.90	-9.36	74.00	24.10	260	180	Vertical
6	7356.00	37.32	-9.36	54.00	16.68	155	344	Vertical
7	17914.4	46.42	-1.31	54.00	7.58	254	290	Vertical

Final Data List

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.



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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:			

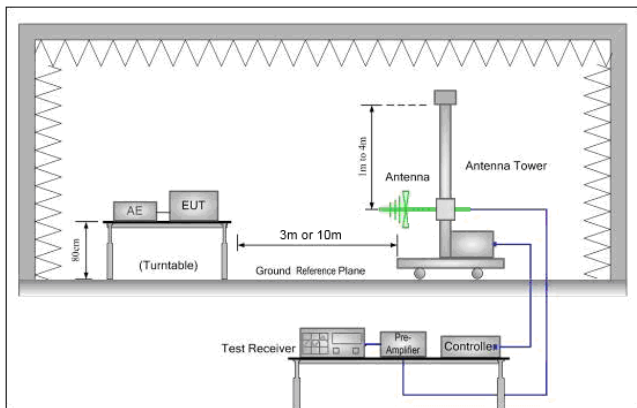


Figure 1. 30MHz to 1GHz

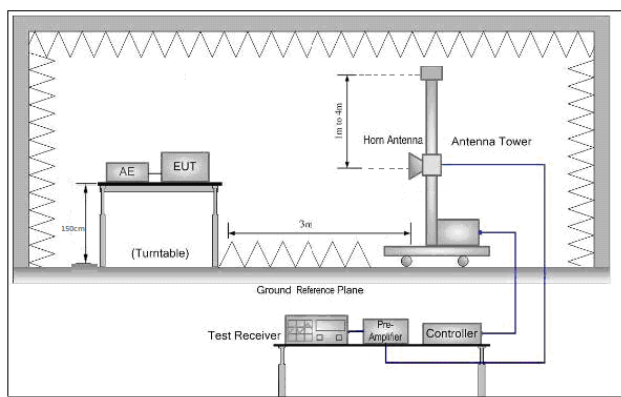


Figure 2. Above 1 GHz

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 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); 13.5Mbps of rate is the worst case of 802.11N(HT40). 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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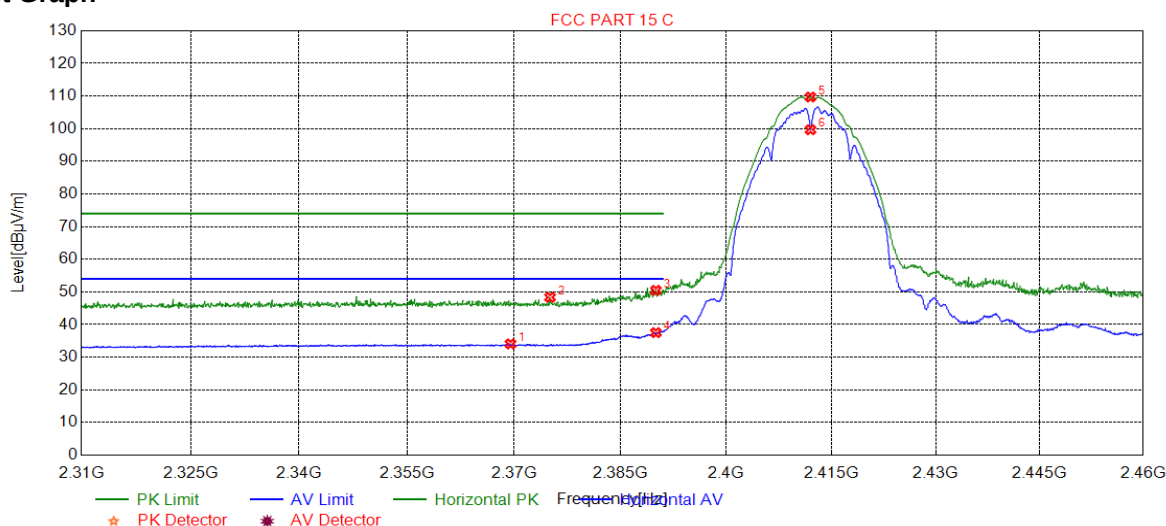


Test plot as follows:

4.10.1 Restricted bands around fundamental frequency

4.10.1.1 802.11B_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2369.50	34.09	7.79	54.00	19.91	193	178	Horizontal
2	2375.05	48.36	7.78	74.00	25.64	154	281	Horizontal
3	2390.00	50.50	7.77	74.00	23.50	115	200	Horizontal
4	2390.00	37.55	7.77	54.00	16.45	199	63	Horizontal
5	2412.00	109.71	7.81	0.00	-109.71	135	46	Horizontal
6	2412.00	99.70	7.81	0.00	-99.70	125	41	Horizontal

Final Data List



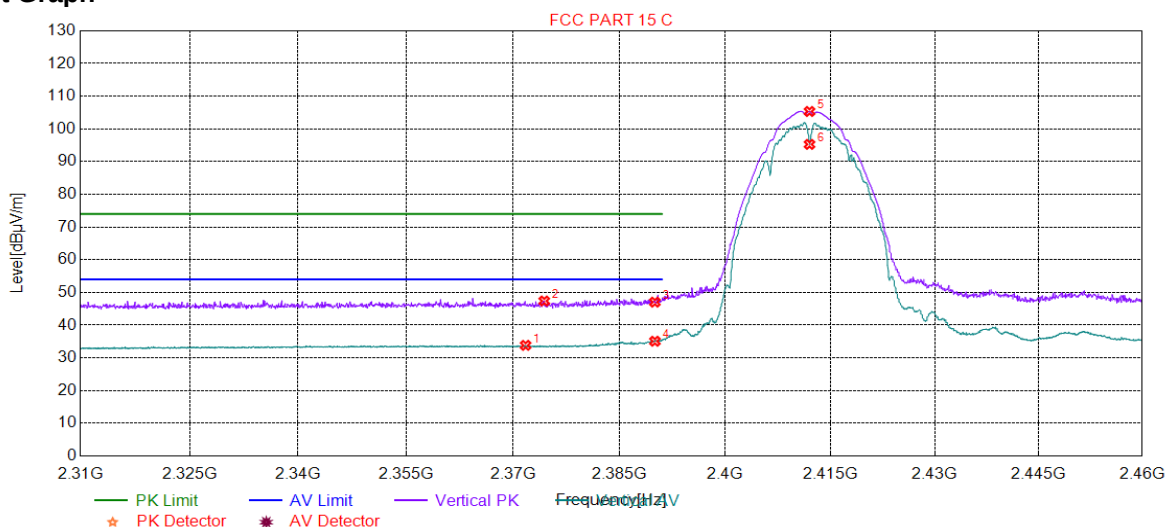
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4.10.1.2 802.11B_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2371.75	33.84	7.79	54.00	20.16	237	204	Vertical
2	2374.38	47.40	7.79	74.00	26.60	232	67	Vertical
3	2390.00	47.05	7.77	74.00	26.95	295	111	Vertical
4	2390.00	35.10	7.77	54.00	18.90	206	111	Vertical
5	2412.00	105.35	7.81	0.00	-105.35	160	111	Vertical
6	2412.00	95.28	7.81	0.00	-95.28	210	111	Vertical

Final Data List



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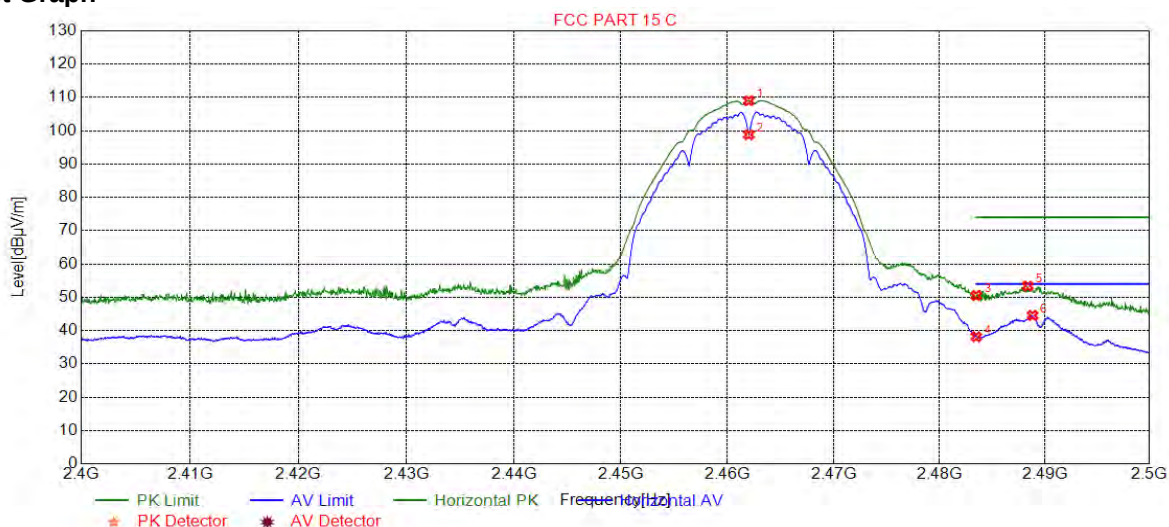
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4.10.1.3 802.11B_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	109.02	7.98	0.00	-109.02	215	63	Horizontal
2	2462.00	98.82	7.98	0.00	-98.82	213	63	Horizontal
3	2483.50	50.55	8.01	74.00	23.45	153	63	Horizontal
4	2483.50	38.17	8.01	54.00	15.83	204	63	Horizontal
5	2488.39	53.40	8.02	74.00	20.60	199	52	Horizontal
6	2488.84	44.59	8.02	54.00	9.41	100	57	Horizontal

Final Data List

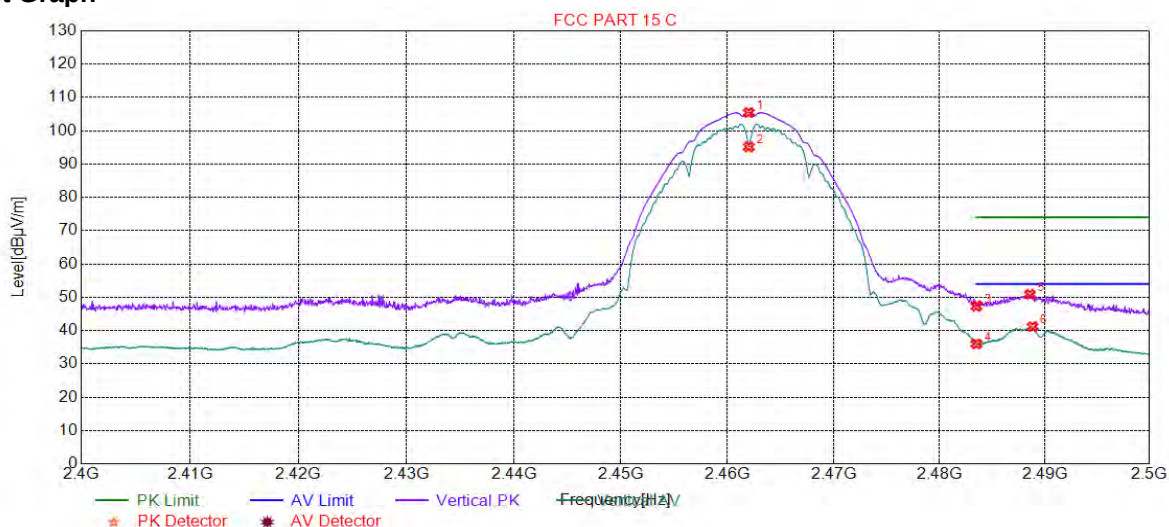


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4.10.1.4 802.11B_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	105.46	7.98	0.00	-105.46	222	122	Vertical
2	2462.00	95.17	7.98	0.00	-95.17	212	122	Vertical
3	2483.50	47.34	8.01	74.00	26.66	297	72	Vertical
4	2483.50	36.01	8.01	54.00	17.99	168	94	Vertical
5	2488.59	50.92	8.02	74.00	23.08	256	133	Vertical
6	2488.84	41.22	8.02	54.00	12.78	217	128	Vertical

Final Data List



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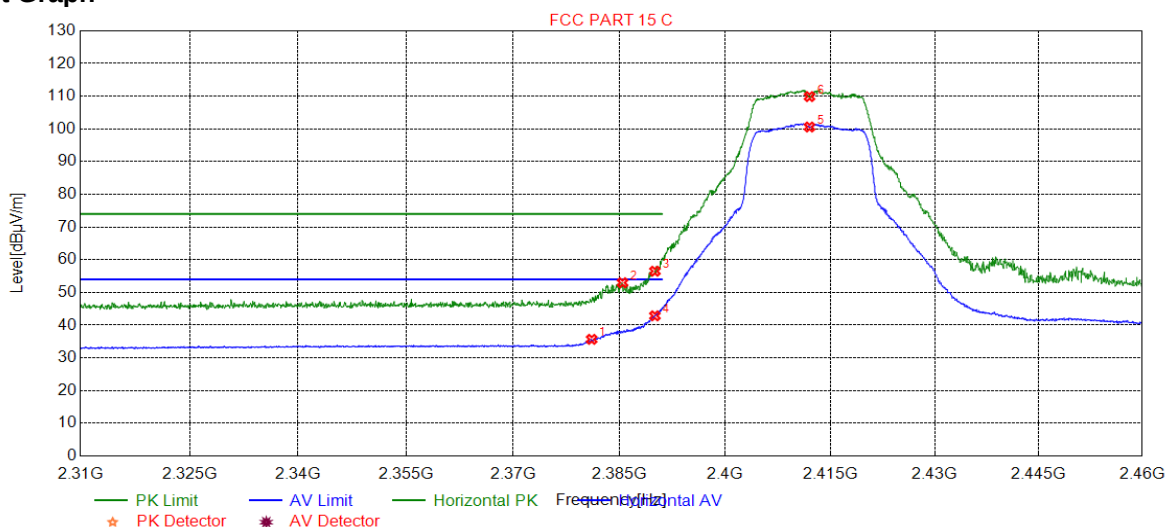
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4.10.1.5 802.11G_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2381.06	35.68	7.78	54.00	18.32	183	63	Horizontal
2	2385.41	52.98	7.77	74.00	21.02	186	68	Horizontal
3	2390.00	56.51	7.77	74.00	17.49	135	63	Horizontal
4	2390.00	42.86	7.77	54.00	11.14	179	63	Horizontal
5	2412.00	100.60	7.81	0.00	-100.60	119	63	Horizontal
6	2412.00	109.89	7.81	0.00	-109.89	209	57	Horizontal

Final Data List



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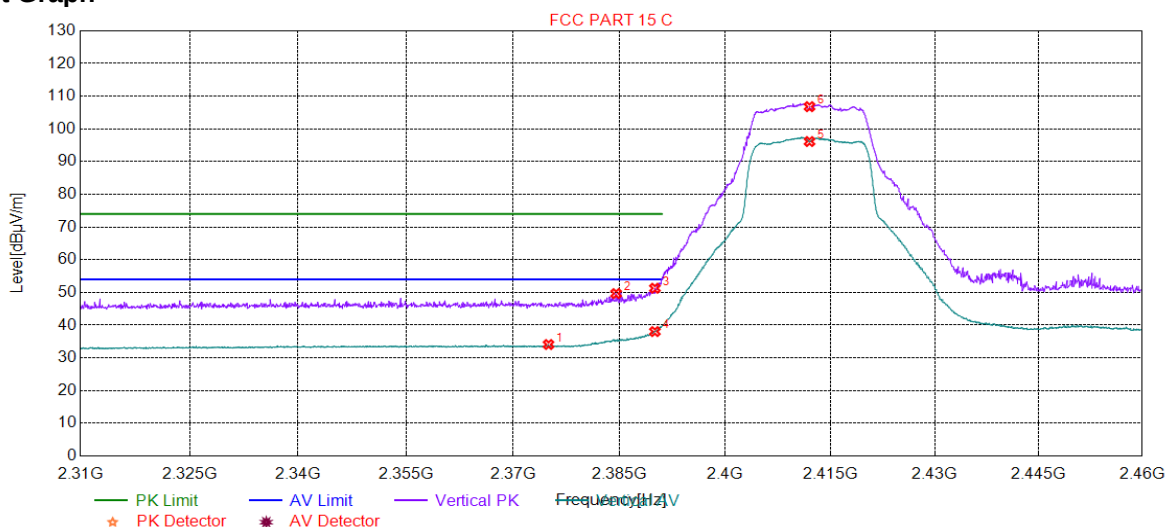
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4.10.1.6 802.11G_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2374.98	34.10	7.79	54.00	19.90	198	98	Vertical
2	2384.51	49.67	7.78	74.00	24.33	253	104	Vertical
3	2390.00	51.30	7.77	74.00	22.70	197	115	Vertical
4	2390.00	38.05	7.77	54.00	15.95	163	115	Vertical
5	2412.00	96.16	7.81	0.00	-96.16	243	98	Vertical
6	2412.00	106.82	7.81	0.00	-106.82	250	93	Vertical

Final Data List



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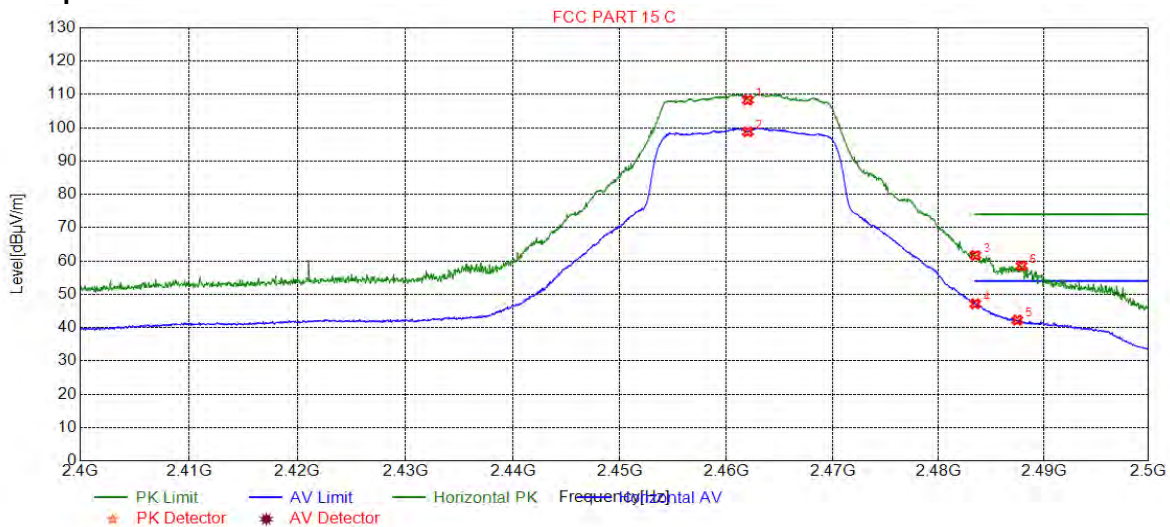
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4.10.1.7 802.11G_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	108.31	7.98	0.00	-108.31	207	73	Horizontal
2	2462.00	98.80	7.98	0.00	-98.80	201	68	Horizontal
3	2483.50	61.71	8.01	74.00	12.29	123	171	Horizontal
4	2483.50	47.16	8.01	54.00	6.84	248	171	Horizontal
5	2487.49	42.27	8.01	54.00	11.73	243	73	Horizontal
6	2487.89	58.56	8.02	74.00	15.44	108	73	Horizontal

Final Data List



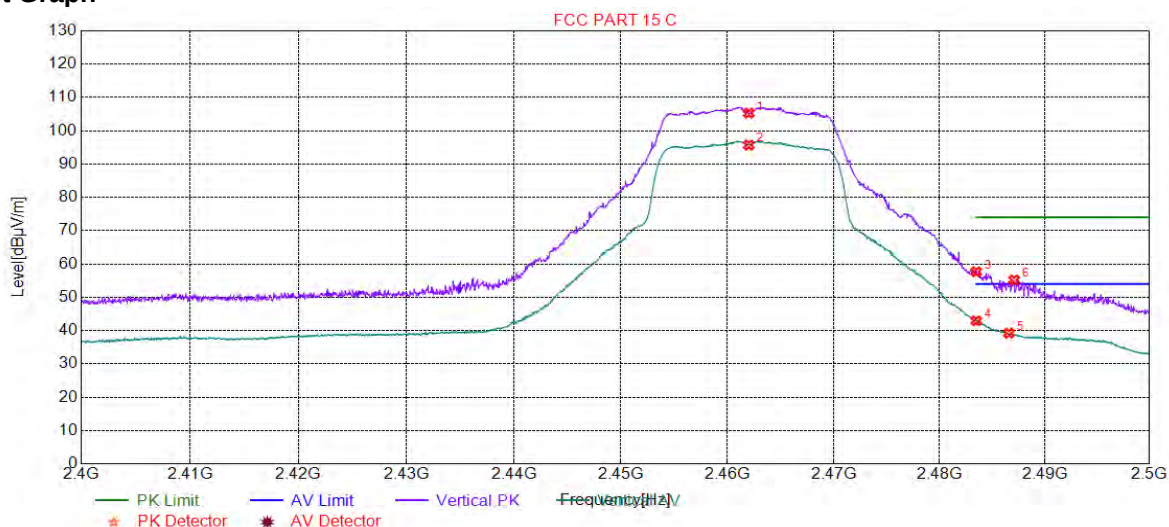
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4.10.1.8 802.11G_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	105.30	7.98	0.00	-105.30	234	120	Vertical
2	2462.00	95.73	7.98	0.00	-95.73	290	120	Vertical
3	2483.50	57.69	8.01	74.00	16.31	179	97	Vertical
4	2483.50	42.95	8.01	54.00	11.05	210	125	Vertical
5	2486.59	39.24	8.01	54.00	14.76	252	92	Vertical
6	2487.09	55.25	8.01	74.00	18.75	254	130	Vertical

Final Data List



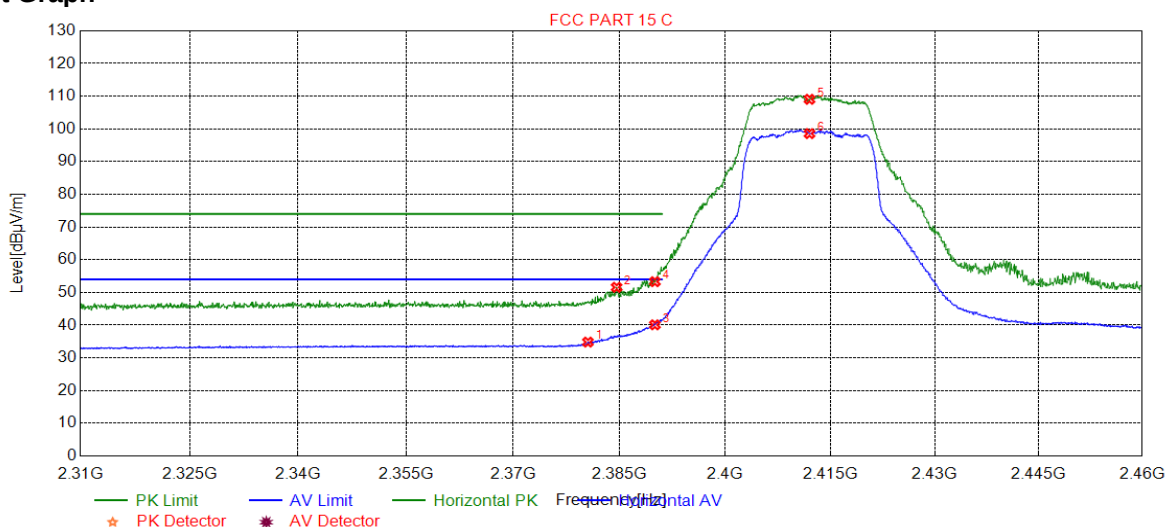
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4.10.1.9 802.11N20_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2380.53	34.84	7.78	54.00	19.16	169	193	Horizontal
2	2384.58	51.59	7.78	74.00	22.41	132	187	Horizontal
3	2390.00	40.11	7.77	54.00	13.89	145	187	Horizontal
4	2390.00	53.31	7.77	74.00	20.69	202	68	Horizontal
5	2412.00	109.07	7.81	0.00	-109.07	197	182	Horizontal
6	2412.00	98.58	7.81	0.00	-98.58	243	182	Horizontal

Final Data List



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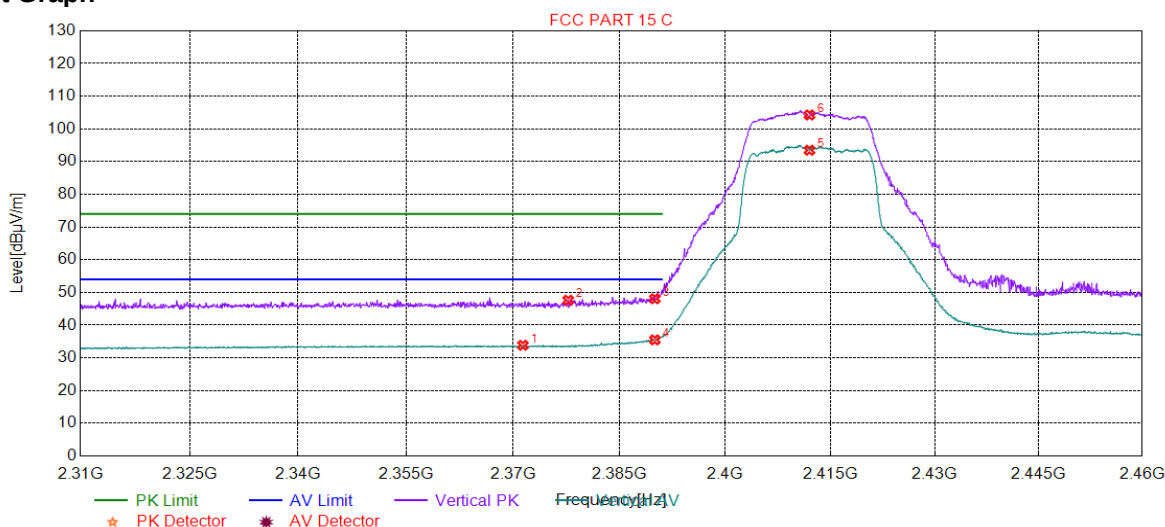
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4.10.1.10 802.11N20_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2371.38	33.87	7.79	54.00	20.13	232	149	Vertical
2	2377.75	47.64	7.78	74.00	26.36	293	226	Vertical
3	2390.00	48.08	7.77	74.00	25.92	224	68	Vertical
4	2390.00	35.52	7.77	54.00	18.48	267	128	Vertical
5	2412.00	93.49	7.81	0.00	-93.49	231	118	Vertical
6	2412.00	104.27	7.81	0.00	-104.27	152	118	Vertical

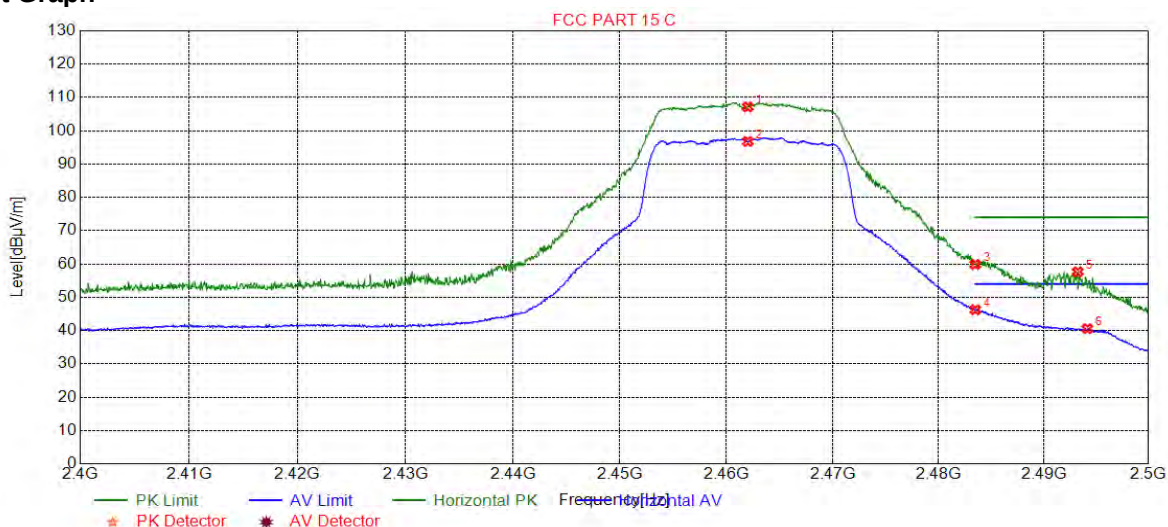
Final Data List





4.10.1.11 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	107.19	7.98	0.00	-107.19	149	172	Horizontal
2	2462.00	96.79	7.98	0.00	-96.79	155	178	Horizontal
3	2483.50	59.86	8.01	74.00	14.14	167	183	Horizontal
4	2483.50	46.29	8.01	54.00	7.71	107	183	Horizontal
5	2493.24	57.67	8.02	74.00	16.33	153	194	Horizontal
6	2494.14	40.60	8.02	54.00	13.40	160	188	Horizontal

Final Data List

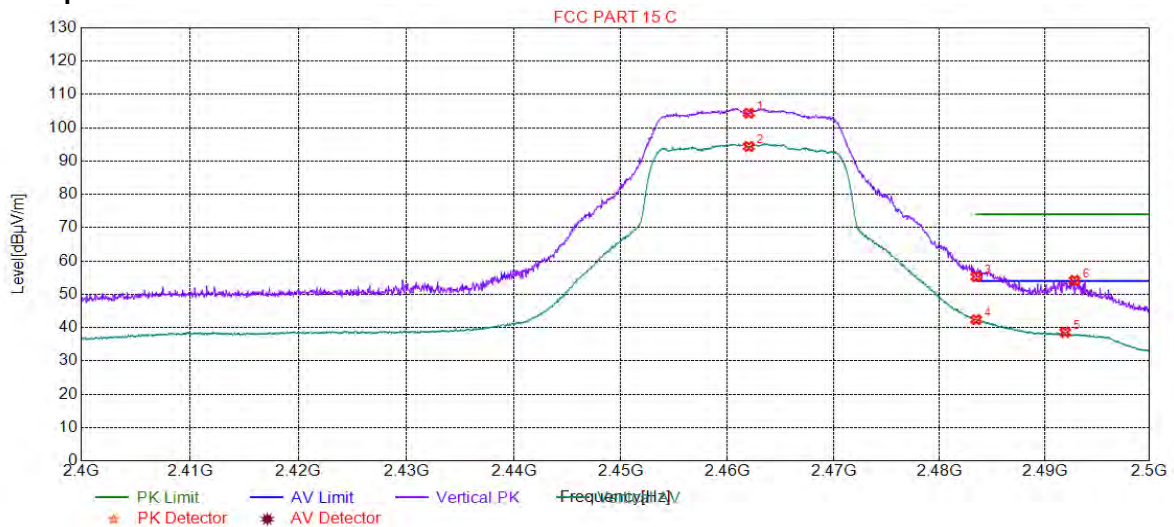


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4.10.1.12 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	104.39	7.98	0.00	-104.39	198	106	Vertical
2	2462.00	94.38	7.98	0.00	-94.38	272	106	Vertical
3	2483.50	55.29	8.01	74.00	18.71	194	112	Vertical
4	2483.50	42.40	8.01	54.00	11.60	153	85	Vertical
5	2491.94	38.65	8.02	54.00	15.35	259	79	Vertical
6	2492.84	54.20	8.02	74.00	19.80	175	85	Vertical

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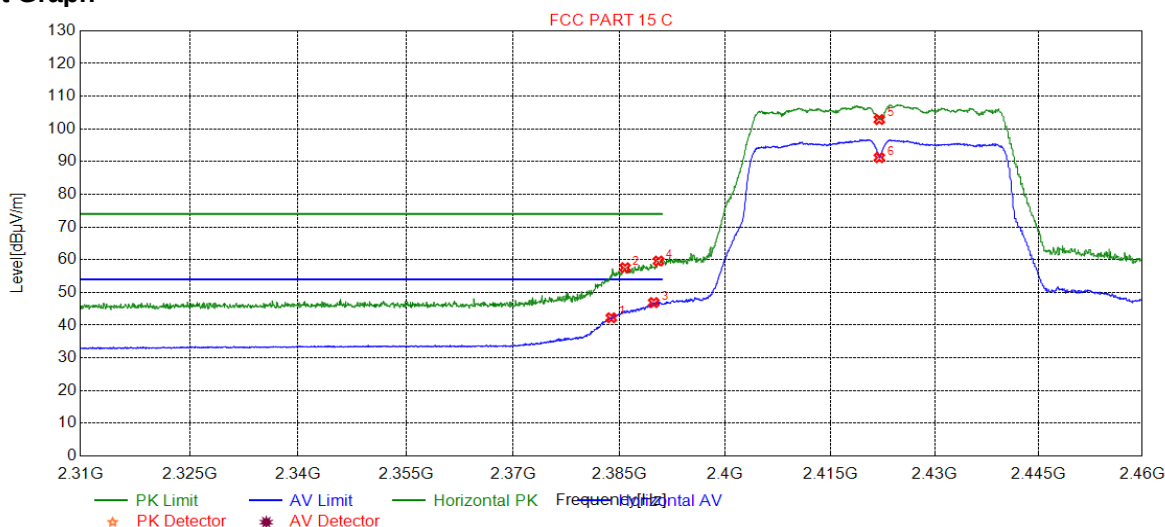
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4.10.1.13 802.11N40_Channel 3

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2383.83	42.27	7.78	54.00	11.73	244	178	Horizontal
2	2385.78	57.57	7.77	74.00	16.43	161	79	Horizontal
3	2389.83	46.91	7.77	54.00	7.09	225	178	Horizontal
4	2390.51	59.61	7.77	74.00	14.39	229	173	Horizontal
5	2422.00	102.88	7.85	0.00	-102.88	140	195	Horizontal
6	2422.00	91.23	7.85	0.00	-91.23	242	173	Horizontal

Final Data List



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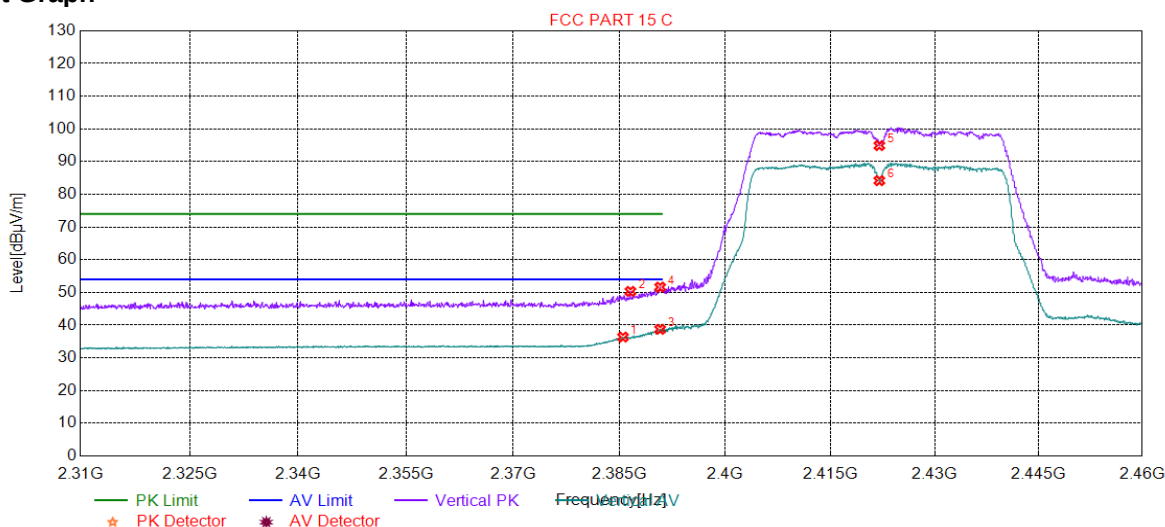
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4.10.1.14 802.11N40_Channel 3

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2385.48	36.38	7.77	54.00	17.62	279	149	Vertical
2	2386.53	50.33	7.77	74.00	23.67	299	144	Vertical
3	2390.74	38.75	7.77	54.00	15.25	277	149	Vertical
4	2390.74	51.65	7.77	74.00	22.35	219	149	Vertical
5	2422.00	94.91	7.85	0.00	-94.91	238	149	Vertical
6	2422.00	84.20	7.85	0.00	-84.20	202	144	Vertical

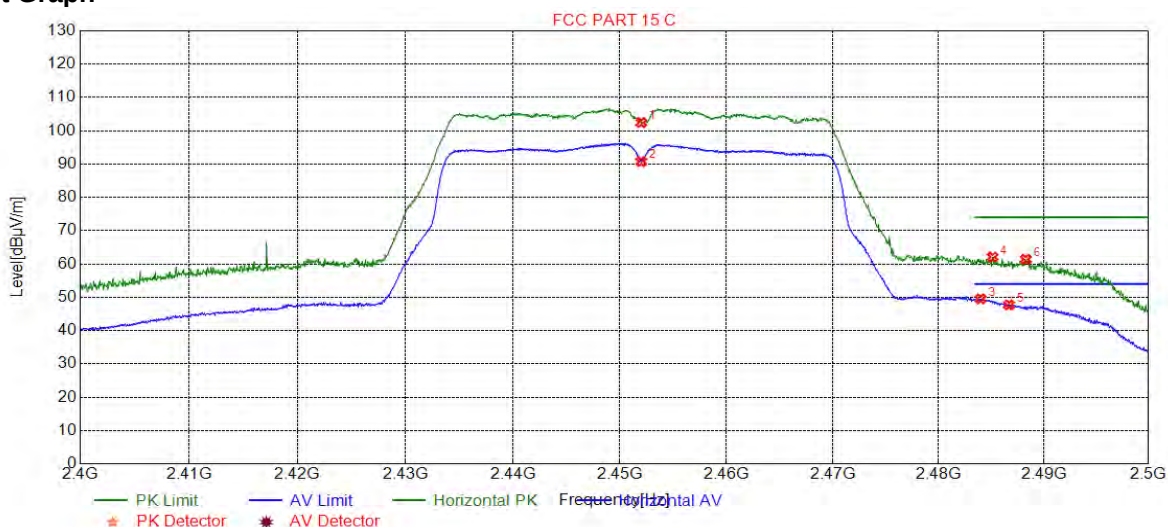
Final Data List





4.10.1.15 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.00	102.47	7.97	0.00	-102.47	194	188	Horizontal
2	2452.00	90.75	7.97	0.00	-90.75	143	67	Horizontal
3	2483.99	49.55	8.01	54.00	4.45	243	73	Horizontal
4	2485.14	62.11	8.01	74.00	11.89	227	84	Horizontal
5	2486.69	47.74	8.01	54.00	6.26	135	182	Horizontal
6	2488.29	61.42	8.02	74.00	12.58	104	182	Horizontal

Final Data List



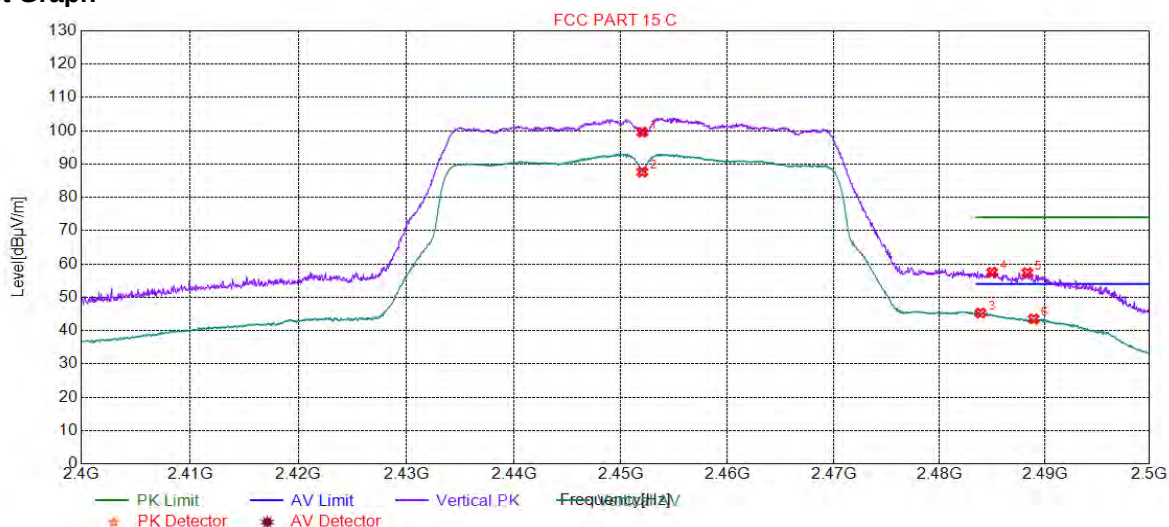
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4.10.1.16 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.00	99.59	7.97	0.00	-99.59	253	94	Vertical
2	2452.00	87.64	7.97	0.00	-87.64	157	106	Vertical
3	2483.89	45.28	8.01	54.00	8.72	258	106	Vertical
4	2484.99	57.52	8.01	74.00	16.48	245	117	Vertical
5	2488.34	57.41	8.02	74.00	16.59	162	100	Vertical
6	2488.94	43.52	8.02	54.00	10.48	173	94	Vertical

Final Data List

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.





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.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2020/7/15	2021/7/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2020/1/3	2021/1/2
Coaxial Cable	SGS	N/A	SEM031-01	2020/6/12	2021/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020/7/14	2021/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2019/10/27	2020/10/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020/7/14	2021/7/14

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	2020-08-04	2021-08-03
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	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	2020-04-02	2021-04-01
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-05	2020-04-12	2021-04-11
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	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	2019-12-06	2020-12-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR

7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of Set-Up for ZR/2020/70008.

The End



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 No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
 中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com