

FCC TEST REPORT

Application No: HR/2019/20008
Applicant: Huawei Technologies Co., Ltd.
Address of Applicant: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer: Huawei Technologies Co., Ltd.
Address of Manufacturer: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
EUT Description: Smart Phone
Model No.: MAR-LX1A
Trade Mark: Huawei
FCC ID: QISMAR-LX1A
Standards: 47 CFR FCC Part 2, Subpart J
47 CFR Part 15, Subpart C
Test Method: KDB558074 D01 15.247 Meas Guidance v05
ANSI C63.10 (2013)
Date of Receipt: 2019/3/5
Date of Test: 2019/3/5 to 2019/3/15
Date of Issue: 2019/3/15

Test Result:	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.

Derek Yang

Wireless Laboratory Manager



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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2019/3/15		Original

Authorized for issue by:			
Tested By	<i>Mike Hu</i>	2019/3/15	
	_____ (Mike Hu) /Project Engineer	_____ Date	
Checked By	<i>David Chen</i>	2019/3/15	
	_____ (David Chen) /Reviewer	_____ Date	



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2 Test Summary

Test Item	Test Requirement	Test method	Test Result	Result
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Clause 4.2	PASS
Radiated Spurious Emissions	15.247(d);15.205/15.209	ANSI C63.10 2013	Clause 4.3	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d);15.205/15.209	ANSI C63.10 2013	Clause 4.4	PASS



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3 General Information

3.1 Client Information

Applicant:	Huawei Technologies Co., Ltd.
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Manufacturer:	Huawei Technologies Co., Ltd.
Address of Manufacturer:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
E-mail:	ee.shenzhen@sgs.com

3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.



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3.4 General Description of EUT

EUT Description::	Smart Phone
Model No.:	MAR-LX1A
Trade Mark:	Huawei
Hardware Version:	HL3MARLM
Software Version:	9.0.1.118(SP1C900E118R1P6)
IEEE 802.11 WLAN Mode Supported	<input checked="" type="checkbox"/> 802.11B (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11G (20 MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11N (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11N (40 MHz channel bandwidth)
Operation Frequency:	2400 MHz -2483.5MHz $f_c = 2407 \text{ MHz} + N * 5 \text{ MHz}$, where: - f_c = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 1 to 11 for the 20 MHz channel bandwidth, or 3 to 9 for the 40 MHz channel bandwidth.
Type of Modulation:	IEEE for 802.11B: DSSS IEEE for 802.11G : OFDM IEEE for 802.11N(HT20 and HT20) : OFDM IEEE for 802.11N(HT20 and HT40) : OFDM
Sample Type:	<input checked="" type="checkbox"/> Portable Device, <input type="checkbox"/> Module
Antenna Type:	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated
Antenna Ports	<input checked="" type="checkbox"/> Ant 1, <input type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3
Smart System	<input checked="" type="checkbox"/> SISO (for 802.11B/G/N), <input type="checkbox"/> MIMO (for 802.11N): 2 Tx & 2 Rx, <input type="checkbox"/> Diversity (for 802.11B/G) : Tx & Rx
Antenna Gain:	-2.4dBi
Power Supply	<input checked="" type="checkbox"/> AC/DC Adapter; <input type="checkbox"/> Battery <input type="checkbox"/> PoE;; <input type="checkbox"/> Other:
Adapter	Model: HW-090200EH0 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-090200BH0 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-090200UH0 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-059200EHQ



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	<p>Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V 2A OR 9V 2A Model: HW-090200UH1 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V 2A OR 9V 2A</p>
Rechargeable Li-ion	<p>Battery Model: HB356687ECW Rated capacity: 3240mAh Nominal Voltage: +3.82V Charging Voltage: +4.40V</p>

Operation Frequency of each channel (802.11B/G/N HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		
Operation Frequency of each channel (802.11N HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency		
3	2422MHz	6	2437MHz	9	2452MHz		
4	2427MHz	7	2442MHz				
5	2432MHz	8	2447MHz				

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency for 802.11B/G/N (HT20)	Frequency for 802.11N (HT40)
The Lowest channel	2412MHz	2422MHz
The Middle channel	2437MHz	2437MHz
The Highest channel	2462MHz	2452MHz



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3.5 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	101.30 KPa
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

3.6 Description of Support Units

The EUT has been tested independent unit.



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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -2.4dBi.</p>	



4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	<ol style="list-style-type: none"> 1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. 		



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<p>Test Setup:</p>	
<p>Exploratory Test Mode:</p>	<p>Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.</p>
<p>Final Test Mode:</p>	<p>Through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Charge + Transmitting mode. Only the worst case is recorded in the report.</p>
<p>Instruments Used:</p>	<p>Refer to section 5.10 for details</p>
<p>Test Results:</p>	<p>Pass</p>

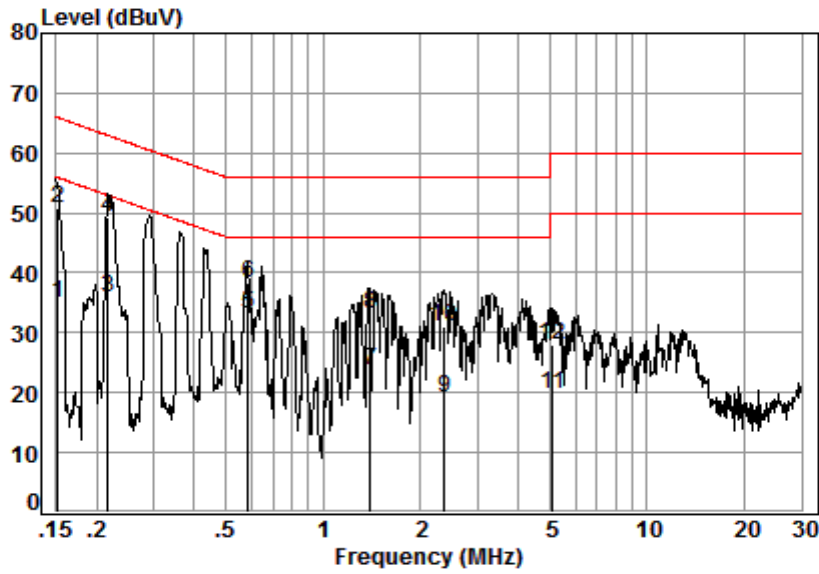


Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



Site : Shielding Room
 Condition: Line
 Job No. : 11310CR
 Test mode: a

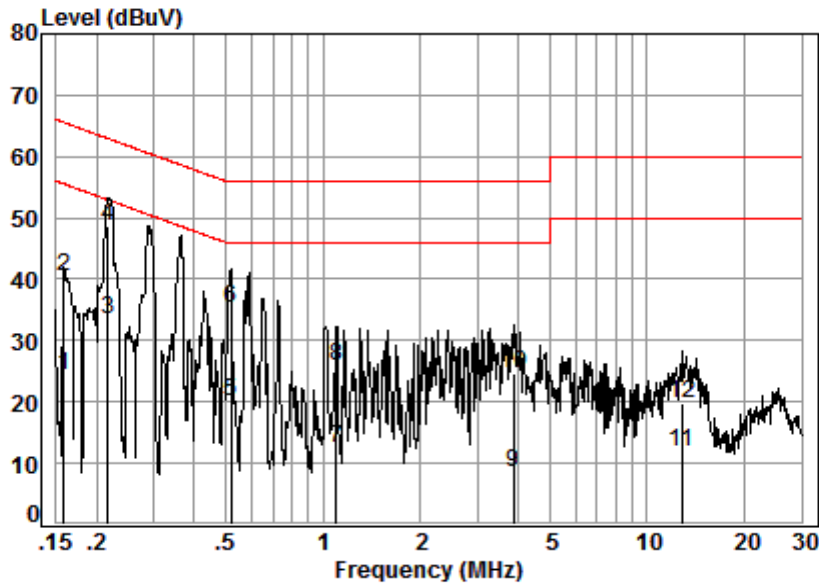
	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.66	25.37	35.04	55.91	-20.87	Average
2	0.15	0.01	9.66	40.99	50.66	65.91	-15.25	QP
3	0.22	0.03	9.66	26.13	35.82	52.92	-17.10	Average
4	0.22	0.03	9.66	39.67	49.36	62.92	-13.56	QP
5	0.59	0.07	9.67	23.53	33.27	46.00	-12.73	Average
6	0.59	0.07	9.67	28.48	38.22	56.00	-17.78	QP
7	1.40	0.12	9.73	13.80	23.65	46.00	-22.35	Average
8	1.40	0.12	9.73	23.45	33.30	56.00	-22.70	QP
9	2.37	0.16	9.71	9.19	19.06	46.00	-26.94	Average
10	2.37	0.16	9.71	21.30	31.17	56.00	-24.83	QP
11	5.11	0.17	9.74	9.80	19.71	50.00	-30.29	Average
12	5.11	0.17	9.74	18.11	28.02	60.00	-31.98	QP



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Neutral Line:



Site : Shielding Room
 Condition: Neutral
 Job No. : 11310CR
 Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.63	14.68	24.32	55.56	-31.24	Average
2	0.16	0.01	9.63	30.67	40.31	65.56	-25.25	QP
3	0.22	0.03	9.64	23.92	33.59	52.92	-19.33	Average
4	0.22	0.03	9.64	39.08	48.75	62.92	-14.17	QP
5	0.52	0.06	9.64	10.22	19.92	46.00	-26.08	Average
6	0.52	0.06	9.64	25.45	35.15	56.00	-20.85	QP
7	1.10	0.10	9.70	2.81	12.61	46.00	-33.39	Average
8	1.10	0.10	9.70	16.02	25.82	56.00	-30.18	QP
9	3.88	0.16	9.69	-1.20	8.65	46.00	-37.35	Average
10	3.88	0.16	9.69	14.84	24.69	56.00	-31.31	QP
11	12.78	0.19	10.17	1.38	11.74	50.00	-38.26	Average
12	12.78	0.19	10.17	9.43	19.79	60.00	-40.21	QP

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss



4.3 Radiated Spurious Emissions

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

Test Setup:	
-------------	--



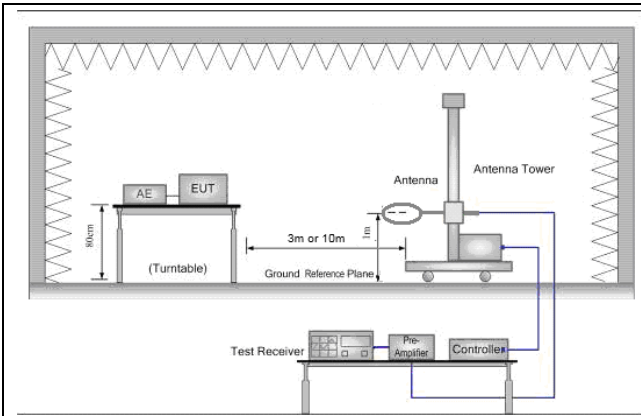


Figure 1. Below 30MHz

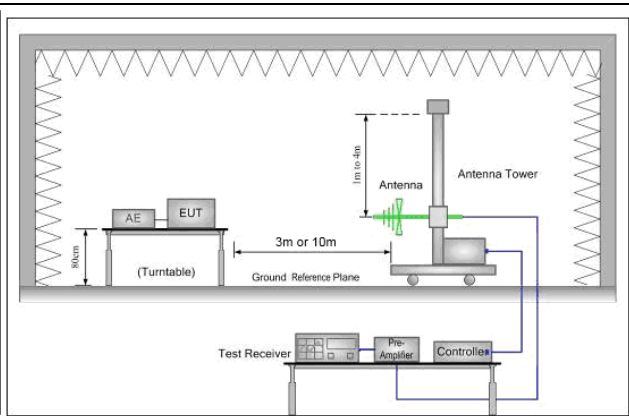


Figure 2. 30MHz to 1GHz

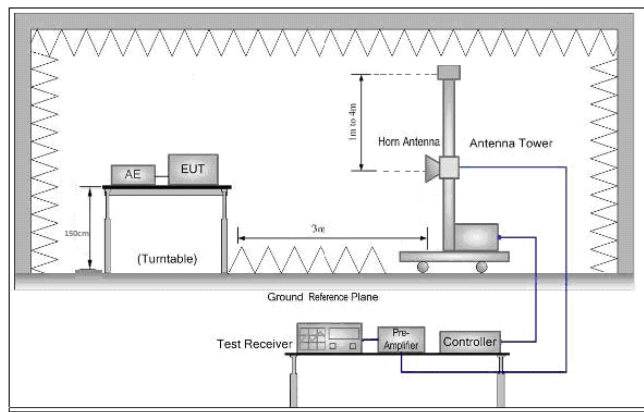


Figure 3. Above 1 GHz

Test Procedure:

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic 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.
- 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





	<p>re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>h. Test the EUT in the lowest channel, the middle channel ,the Highest channel</p> <p>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.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates.</p> <p>Charge + Transmitting mode.</p>
Final Test Mode:	<p>Pretest the EUT at Charge + Transmitting mode.</p> <p>Through Pre-scan, find the</p> <p>1Mbps of rate is the worst case of 802.11B;</p> <p>6Mbps of rate is the worst case of 802.11G;</p> <p>6.5Mbps of rate is the worst case of 802.11N(HT20);</p> <p>13.5Mbps of rate is the worst case of 802.11N(HT40)</p> <p>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.</p>
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

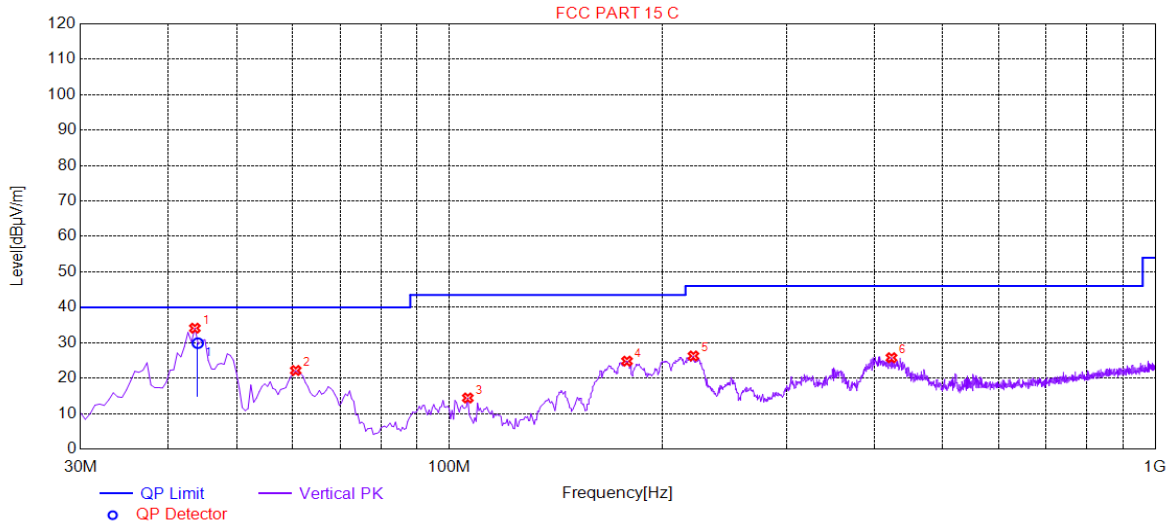


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4.3.1 Radiated emission below 1GHz

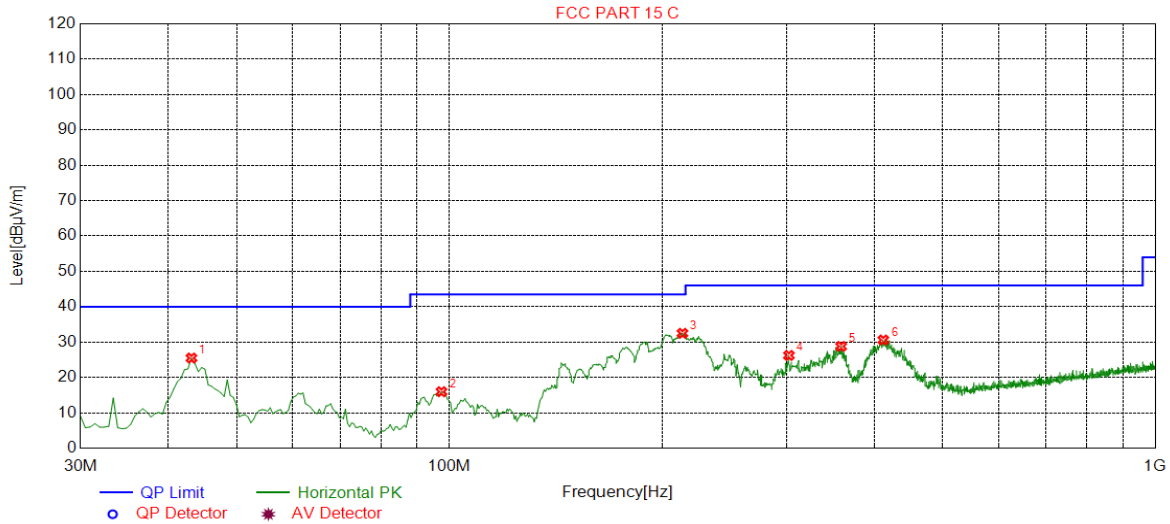
4.3.1.1 Charge + Transmitting, Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	43.5868	34.11	-30.48	40.00	5.89	100	59	Vertical
2	60.5703	22.16	-31.79	40.00	17.84	100	202	Vertical
3	106.183	14.41	-31.69	43.50	29.09	200	270	Vertical
4	178.484	24.80	-33.02	43.50	18.70	100	358	Vertical
5	221.670	26.26	-30.26	46.00	19.74	100	16	Vertical
6	423.046	25.77	-24.38	46.00	20.23	200	149	Vertical



4.3.1.2 Charge + Transmitting, Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	43.1016	25.49	-30.57	40.00	14.51	200	199	Horizontal
2	97.4487	15.97	-32.13	43.50	27.53	200	147	Horizontal
3	213.907	32.48	-30.50	43.50	11.02	100	123	Horizontal
4	302.706	26.23	-27.78	46.00	19.77	100	99	Horizontal
5	358.994	28.78	-26.04	46.00	17.22	100	198	Horizontal
6	411.885	30.60	-24.65	46.00	15.40	100	207	Horizontal



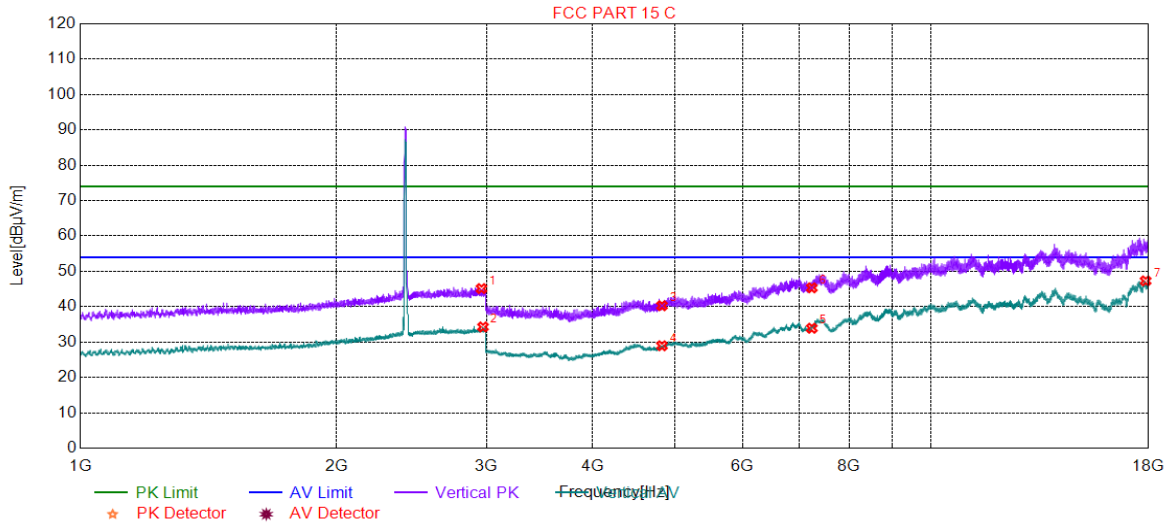
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4.3.2 Transmitter emission above 1GHz

4.3.2.1 ANT1

4.3.2.1.1 802.11B_Lowest Channel_Vertical



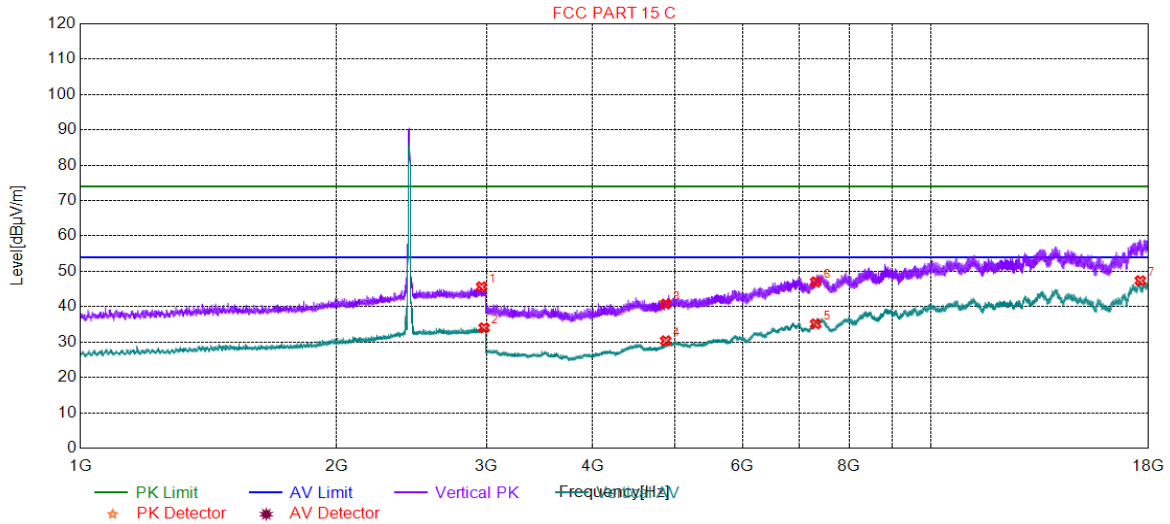
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2960.49	45.13	2.30	74.00	28.87	150	130	Vertical
2	2972.49	34.29	2.31	54.00	19.71	150	5	Vertical
3	4824.00	40.28	-20.09	74.00	33.72	150	177	Vertical
4	4824.00	28.96	-20.09	54.00	25.04	150	177	Vertical
5	7236.00	33.92	-12.40	54.00	20.08	150	45	Vertical
6	7236.00	45.35	-12.40	74.00	28.65	150	111	Vertical
7	17854.9	47.30	-0.96	54.00	6.70	150	249	Vertical



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4.3.2.1.2 802.11B_ Middle Channel_ Vertical



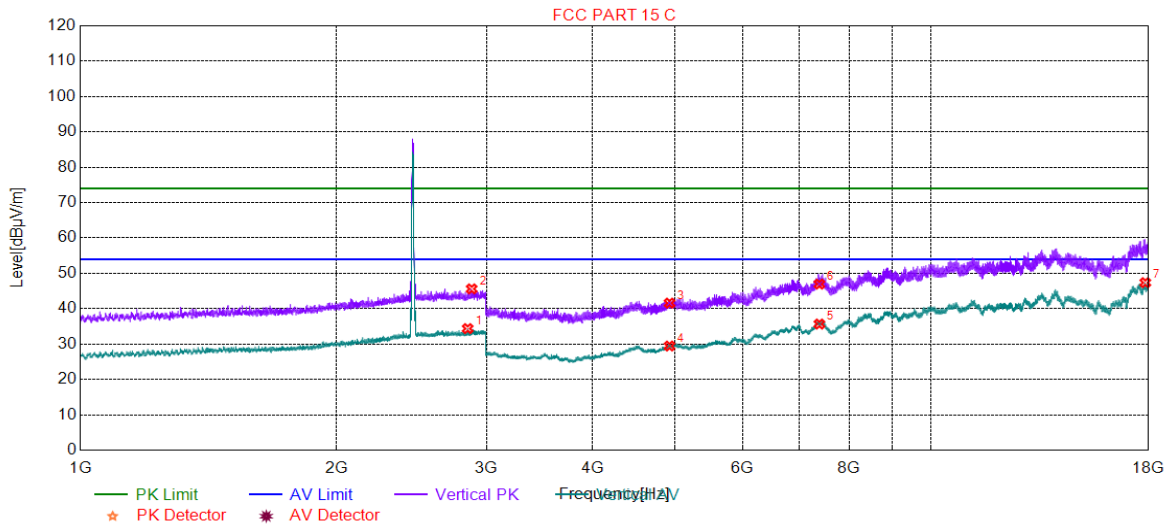
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2960.99	45.65	2.30	74.00	28.35	150	10	Vertical
2	2980.99	34.05	2.32	54.00	19.95	150	27	Vertical
3	4874.00	40.76	-19.37	74.00	33.24	150	163	Vertical
4	4874.00	30.37	-19.37	54.00	23.63	150	163	Vertical
5	7311.00	35.15	-11.50	54.00	18.85	150	65	Vertical
6	7311.00	47.00	-11.50	74.00	27.00	150	49	Vertical
7	17602.4	47.37	1.57	54.00	6.63	150	105	Vertical



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4.3.2.1.3 802.11B_ Highest Channel_ Vertical



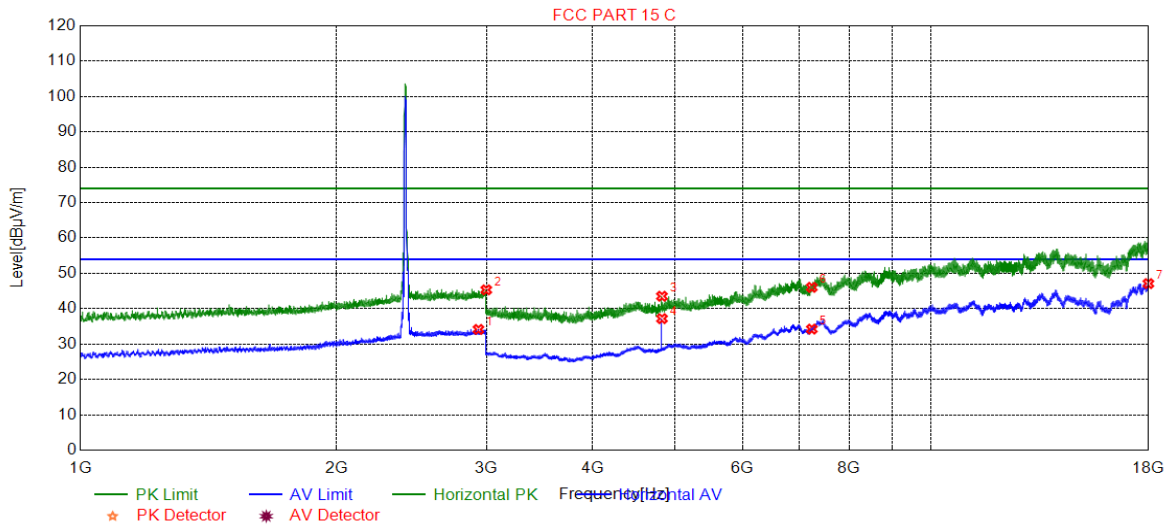
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2851.96	34.38	2.20	54.00	19.62	150	98	Vertical
2	2882.97	45.61	2.24	74.00	28.39	150	298	Vertical
3	4924.00	41.59	-18.87	74.00	32.41	150	64	Vertical
4	4924.00	29.46	-18.87	54.00	24.54	150	64	Vertical
5	7386.00	35.67	-10.72	54.00	18.33	150	178	Vertical
6	7386.00	46.97	-10.72	74.00	27.03	150	227	Vertical
7	17838.9	47.37	-0.90	54.00	6.63	150	137	Vertical



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4.3.2.1.4 802.11B_Lowest Channel_ Horizontal



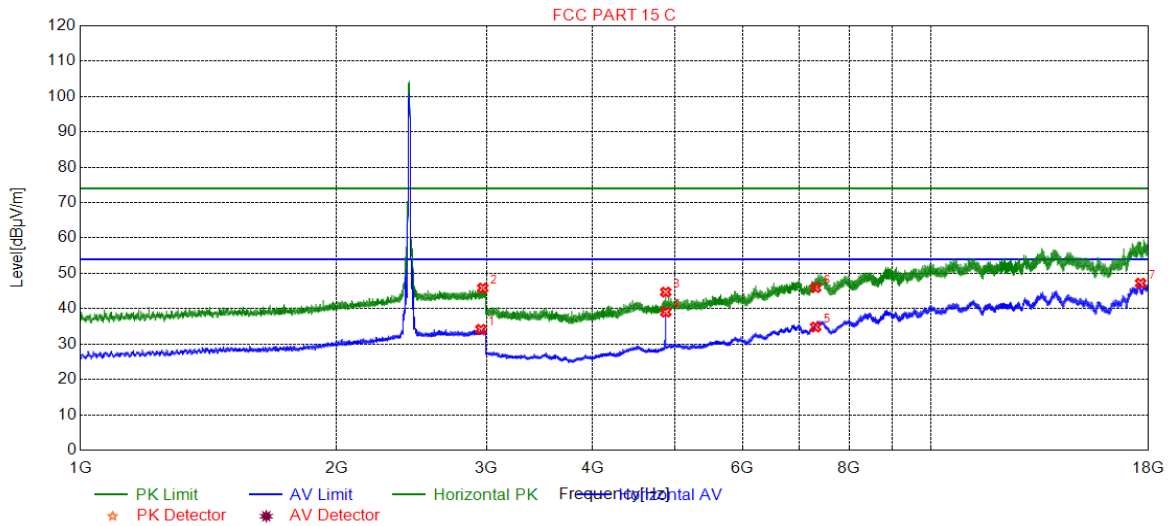
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2935.98	34.15	2.29	54.00	19.85	150	355	Horizontal
2	2998.99	45.33	2.33	74.00	28.67	150	61	Horizontal
3	4823.68	43.53	-20.10	74.00	30.47	150	227	Horizontal
4	4824.68	37.19	-20.08	54.00	16.81	150	227	Horizontal
5	7236.00	34.24	-12.40	54.00	19.76	150	145	Horizontal
6	7236.00	46.05	-12.40	74.00	27.95	150	46	Horizontal
7	17988.4	47.10	-0.44	54.00	6.90	150	278	Horizontal



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4.3.2.1.5 802.11B_ Middle Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2955.48	34.17	2.30	54.00	19.83	150	200	Horizontal
2	2970.99	45.85	2.31	74.00	28.15	150	182	Horizontal
3	4873.68	44.69	-19.38	74.00	29.31	150	210	Horizontal
4	4874.68	39.03	-19.36	54.00	14.97	150	210	Horizontal
5	7311.00	34.82	-11.50	54.00	19.18	150	194	Horizontal
6	7311.00	45.95	-11.50	74.00	28.05	150	2	Horizontal
7	17613.9	47.22	1.27	54.00	6.78	150	278	Horizontal

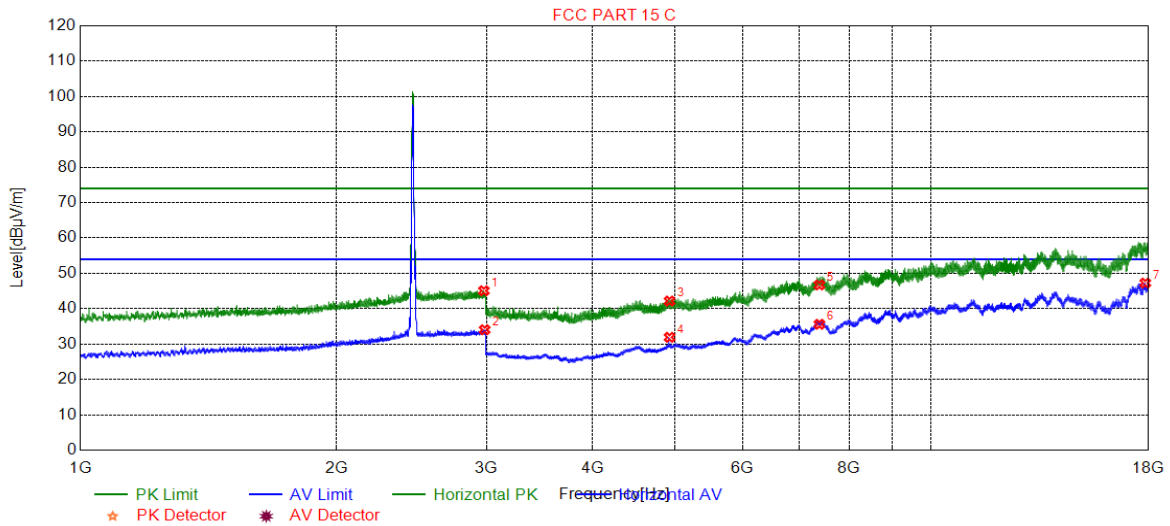


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4.3.2.1.6 802.11B_ Highest Channel_ Horizontal



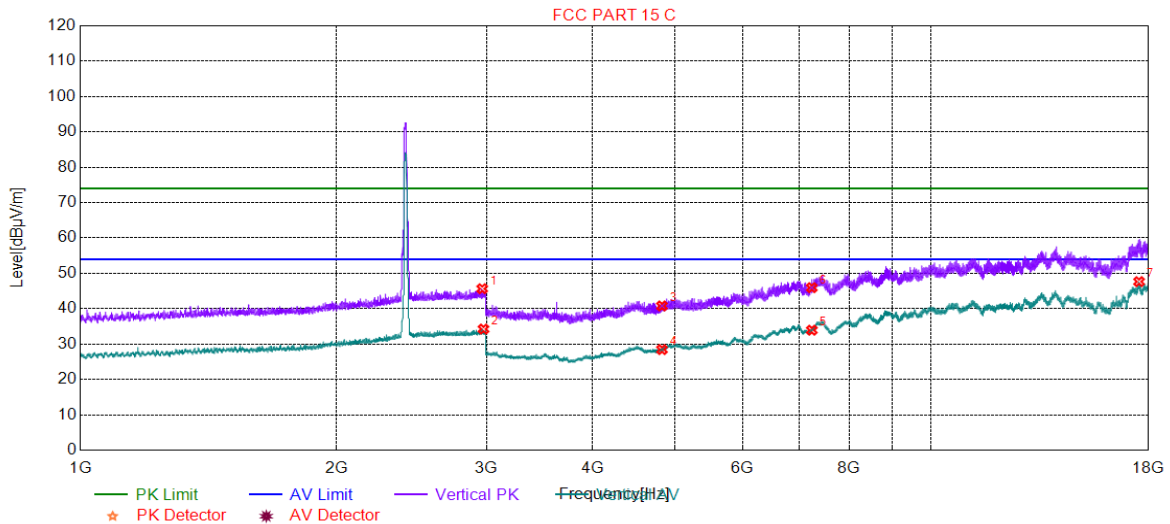
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2979.49	45.08	2.32	74.00	28.92	150	321	Horizontal
2	2985.99	34.05	2.32	54.00	19.95	150	251	Horizontal
3	4924.00	42.18	-18.87	74.00	31.82	150	178	Horizontal
4	4924.19	31.92	-18.87	54.00	22.08	150	217	Horizontal
5	7386.00	46.73	-10.72	74.00	27.27	150	30	Horizontal
6	7386.00	35.61	-10.72	54.00	18.39	150	342	Horizontal
7	17838.9	47.26	-0.90	54.00	6.74	150	359	Horizontal



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4.3.2.1.7 802.11G_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2965.99	45.65	2.31	74.00	28.35	150	24	Vertical
2	2976.49	34.25	2.31	54.00	19.75	150	33	Vertical
3	4824.00	40.79	-20.09	74.00	33.21	150	195	Vertical
4	4824.00	28.45	-20.09	54.00	25.55	150	292	Vertical
5	7236.00	33.93	-12.40	54.00	20.07	150	342	Vertical
6	7236.00	45.95	-12.40	74.00	28.05	150	276	Vertical
7	17540.4	47.66	0.87	54.00	6.34	150	18	Vertical

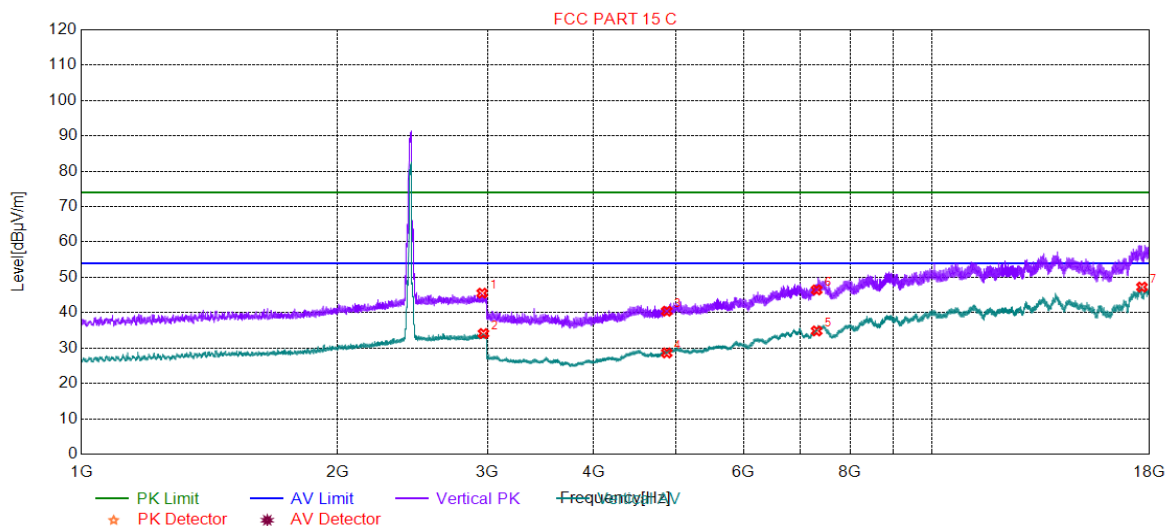


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4.3.2.1.8 802.11G_ Middle Channel_ Vertical



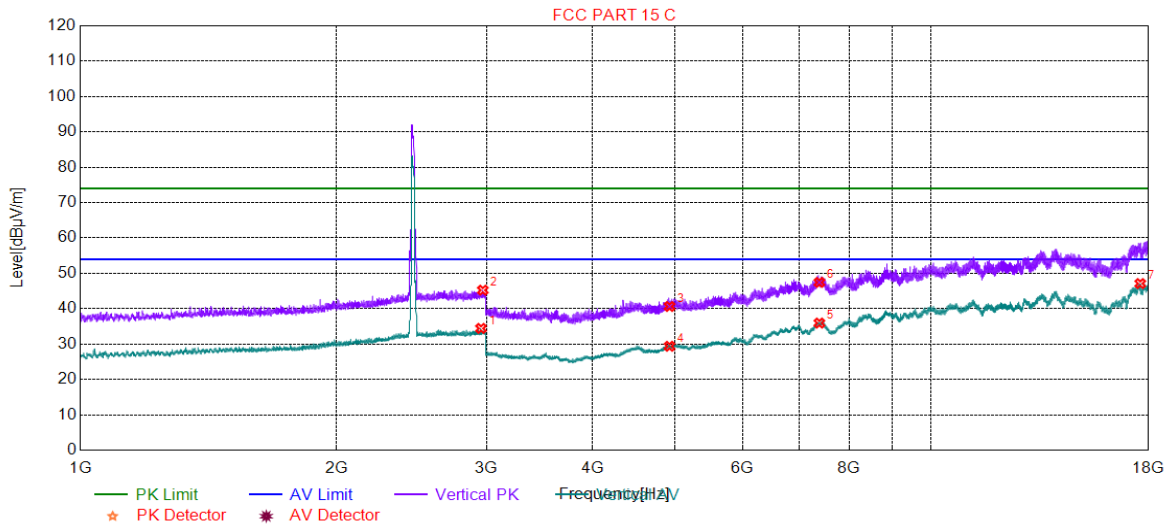
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2957.98	45.53	2.30	74.00	28.47	150	228	Vertical
2	2967.99	34.11	2.31	54.00	19.89	150	123	Vertical
3	4874.00	40.43	-19.37	74.00	33.57	150	260	Vertical
4	4874.00	28.63	-19.37	54.00	25.37	150	145	Vertical
5	7311.00	34.84	-11.50	54.00	19.16	150	260	Vertical
6	7311.00	46.45	-11.50	74.00	27.55	150	244	Vertical
7	17630.9	47.25	0.82	54.00	6.75	150	249	Vertical



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4.3.2.1.9 802.11G_ Highest Channel_ Vertical



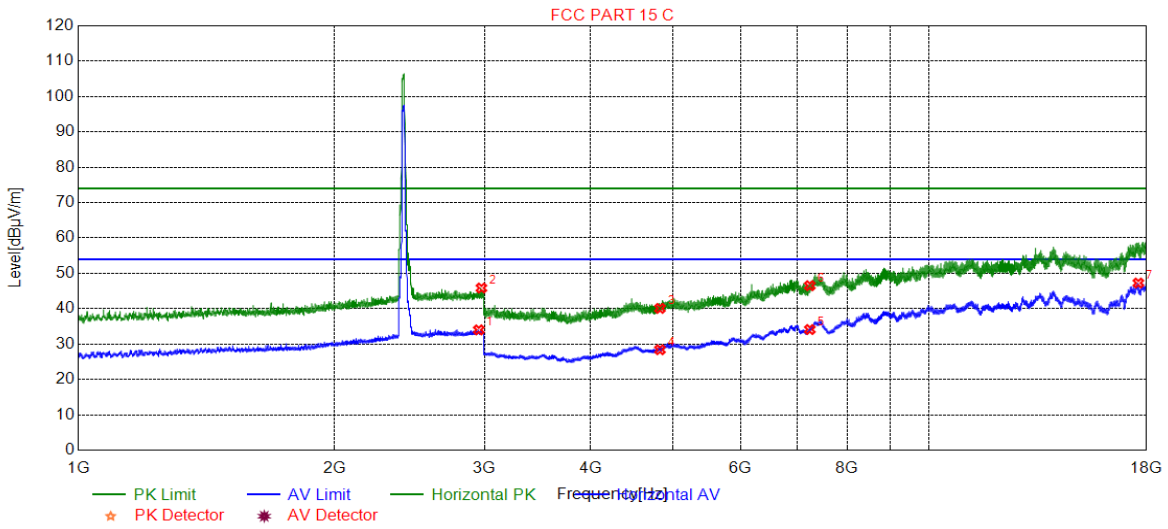
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2956.48	34.43	2.30	54.00	19.57	150	202	Vertical
2	2970.99	45.24	2.31	74.00	28.76	150	10	Vertical
3	4924.00	40.64	-18.87	74.00	33.36	150	342	Vertical
4	4924.00	29.39	-18.87	54.00	24.61	150	79	Vertical
5	7386.00	35.94	-10.72	54.00	18.06	150	195	Vertical
6	7386.00	47.45	-10.72	74.00	26.55	150	145	Vertical
7	17596.9	47.11	1.59	54.00	6.89	150	163	Vertical



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4.3.2.1.10 802.11G_Lowest Channel_Horizontal



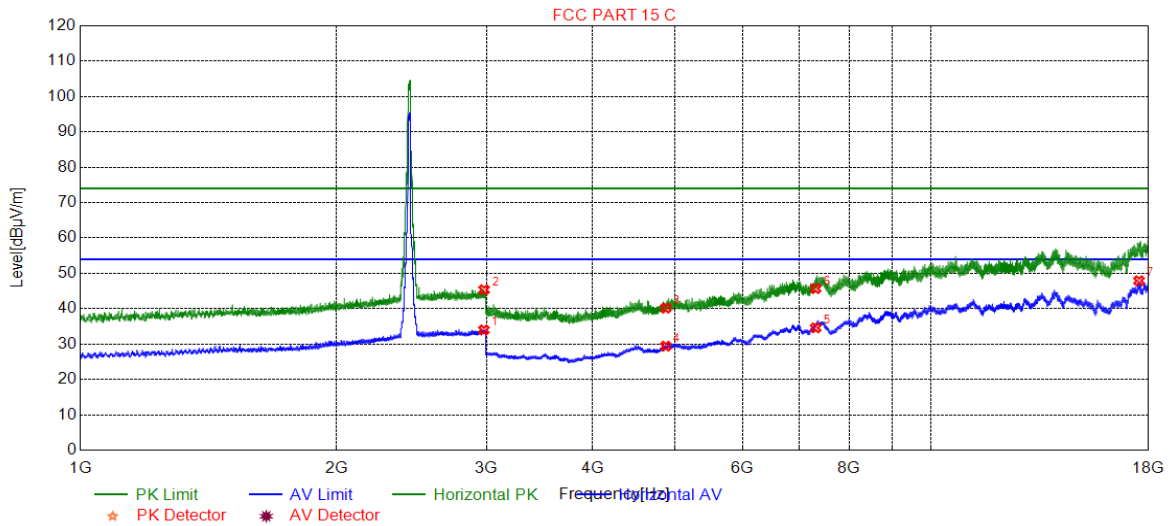
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2954.48	34.01	2.30	54.00	19.99	150	344	Horizontal
2	2975.99	45.85	2.31	74.00	28.15	150	53	Horizontal
3	4824.00	40.09	-20.09	74.00	33.91	150	228	Horizontal
4	4824.00	28.41	-20.09	54.00	25.59	150	228	Horizontal
5	7236.00	34.12	-12.40	54.00	19.88	150	17	Horizontal
6	7236.00	46.52	-12.40	74.00	27.48	150	276	Horizontal
7	17602.4	47.26	1.57	54.00	6.74	150	307	Horizontal



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4.3.2.1.11 802.11G_ Middle Channel_ Horizontal



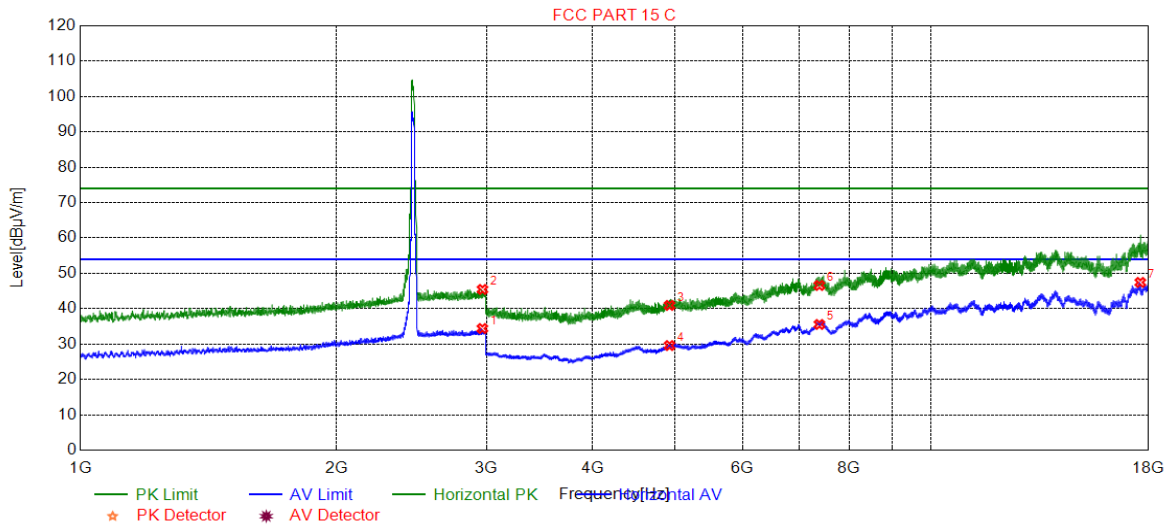
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2979.99	33.99	2.32	54.00	20.01	150	307	Horizontal
2	2981.49	45.37	2.32	74.00	28.63	150	167	Horizontal
3	4874.00	40.18	-19.37	74.00	33.82	150	113	Horizontal
4	4874.00	29.41	-19.37	54.00	24.59	150	211	Horizontal
5	7311.00	34.58	-11.50	54.00	19.42	150	2	Horizontal
6	7311.00	45.70	-11.50	74.00	28.30	150	342	Horizontal
7	17540.9	47.91	0.87	54.00	6.09	150	248	Horizontal



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4.3.2.1.12 802.11G_ Highest Channel_ Horizontal



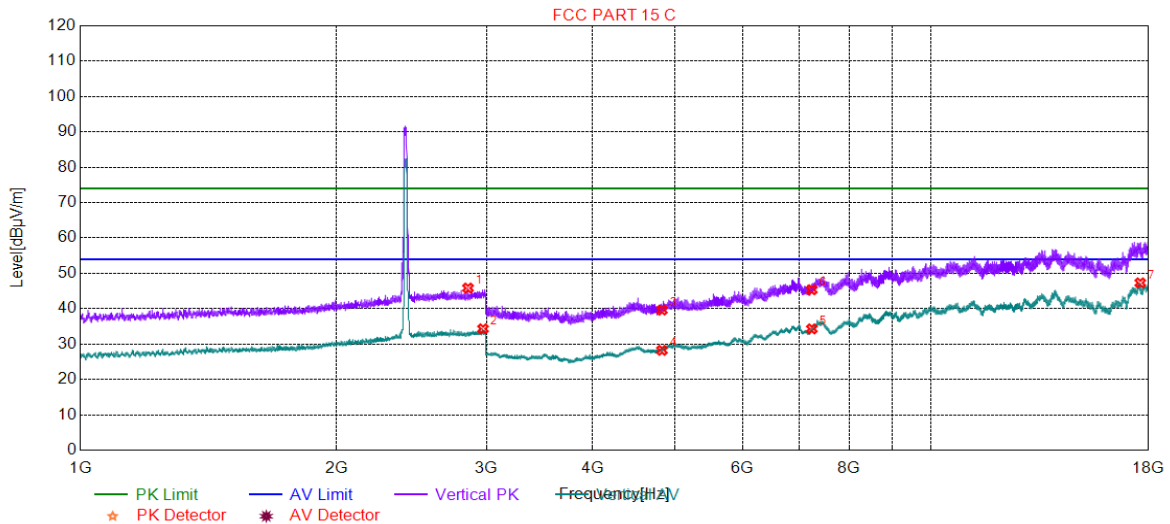
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2967.49	34.40	2.31	54.00	19.60	150	97	Horizontal
2	2968.49	45.45	2.31	74.00	28.55	150	359	Horizontal
3	4924.00	40.94	-18.87	74.00	33.06	150	139	Horizontal
4	4924.00	29.59	-18.87	54.00	24.41	150	139	Horizontal
5	7386.00	35.56	-10.72	54.00	18.44	150	9	Horizontal
6	7386.00	46.58	-10.72	74.00	27.42	150	246	Horizontal
7	17600.4	47.44	1.62	54.00	6.56	150	250	Horizontal



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4.3.2.1.13 802.11N20_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2854.46	45.84	2.21	74.00	28.16	150	324	Vertical
2	2972.99	34.32	2.31	54.00	19.68	150	132	Vertical
3	4824.00	39.61	-20.09	74.00	34.39	150	276	Vertical
4	4824.00	28.24	-20.09	54.00	25.76	150	113	Vertical
5	7236.00	34.30	-12.40	54.00	19.70	150	226	Vertical
6	7236.00	45.36	-12.40	74.00	28.64	150	96	Vertical
7	17598.4	47.31	1.61	54.00	6.69	150	221	Vertical

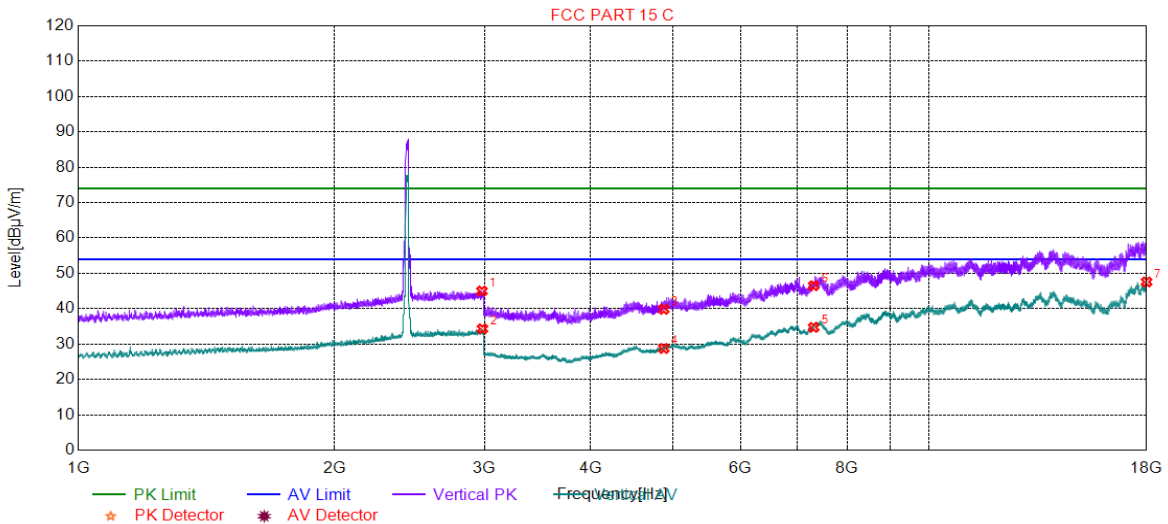


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4.3.2.1.14 802.11N20_ Middle Channel_ Vertical

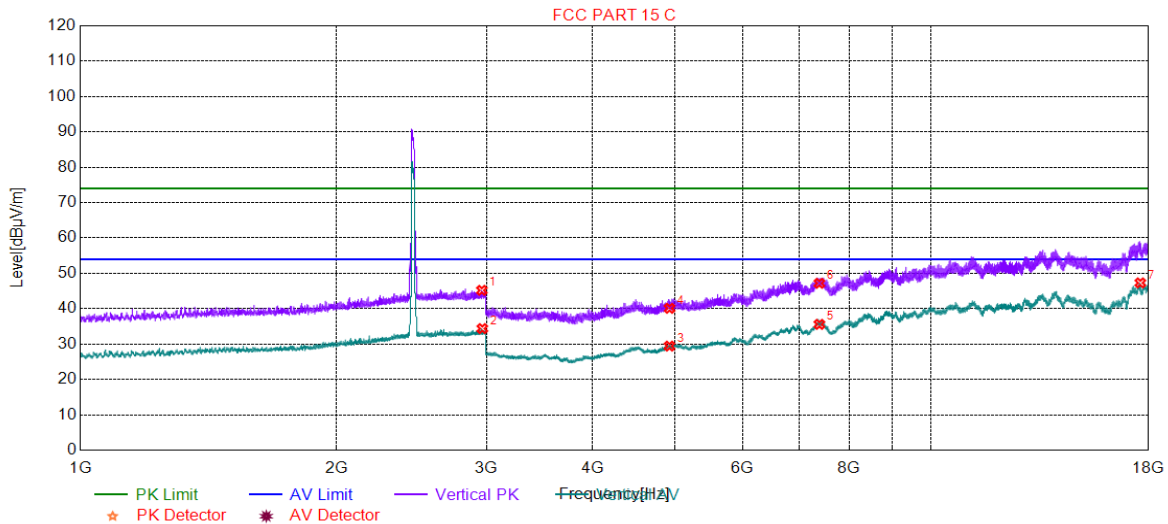


Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2979.99	45.00	2.32	74.00	29.00	150	46	Vertical
2	2983.99	34.32	2.32	54.00	19.68	150	142	Vertical
3	4874.00	39.83	-19.37	74.00	34.17	150	342	Vertical
4	4874.00	28.76	-19.37	54.00	25.24	150	196	Vertical
5	7311.00	34.73	-11.50	54.00	19.27	150	326	Vertical
6	7311.00	46.50	-11.50	74.00	27.50	150	114	Vertical
7	17997.4	47.57	-0.37	54.00	6.43	150	314	Vertical



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4.3.2.1.15 802.11N20_ Highest Channel_ Vertical



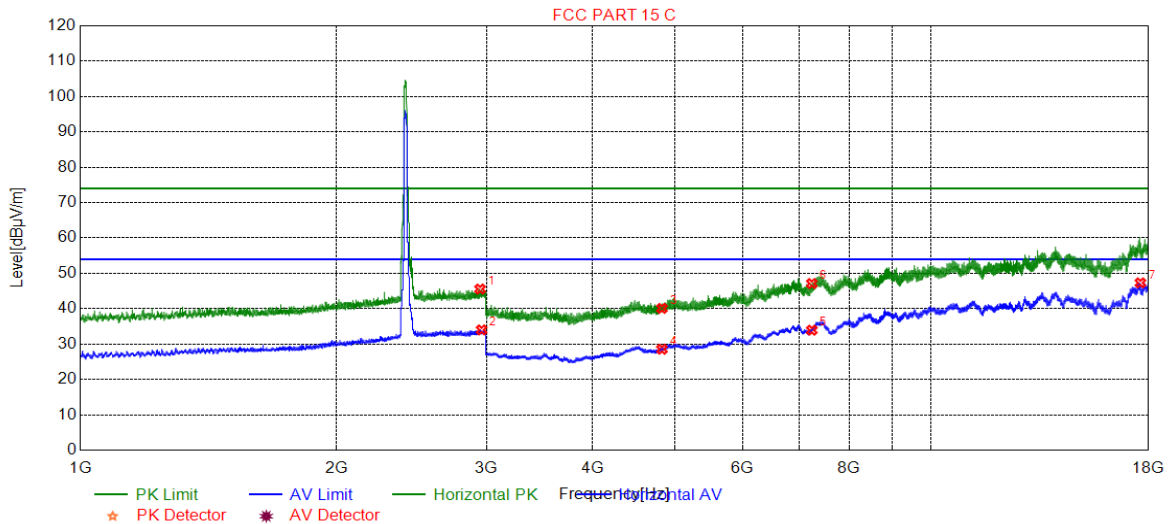
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2962.99	45.20	2.30	74.00	28.80	150	35	Vertical
2	2966.99	34.38	2.31	54.00	19.62	150	254	Vertical
3	4924.00	29.43	-18.87	54.00	24.57	150	15	Vertical
4	4924.00	40.11	-18.87	74.00	33.89	150	97	Vertical
5	7386.00	35.58	-10.72	54.00	18.42	150	114	Vertical
6	7386.00	47.19	-10.72	74.00	26.81	150	212	Vertical
7	17600.4	47.30	1.62	54.00	6.70	150	270	Vertical



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4.3.2.1.16 802.11N20_Lowest Channel_Horizontal



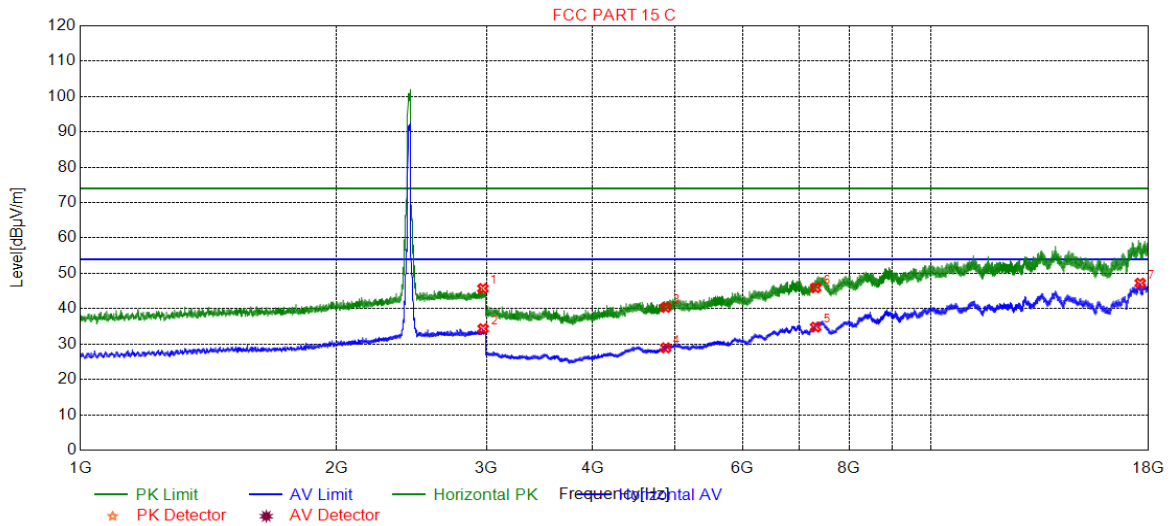
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2948.98	45.57	2.29	74.00	28.43	150	333	Horizontal
2	2960.99	34.01	2.30	54.00	19.99	150	184	Horizontal
3	4824.00	40.10	-20.09	74.00	33.90	150	194	Horizontal
4	4824.00	28.55	-20.09	54.00	25.45	150	210	Horizontal
5	7236.00	33.93	-12.40	54.00	20.07	150	5	Horizontal
6	7236.00	47.12	-12.40	74.00	26.88	150	276	Horizontal
7	17604.4	47.31	1.51	54.00	6.69	150	135	Horizontal



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4.3.2.1.17 802.11N20_ Middle Channel_ Horizontal



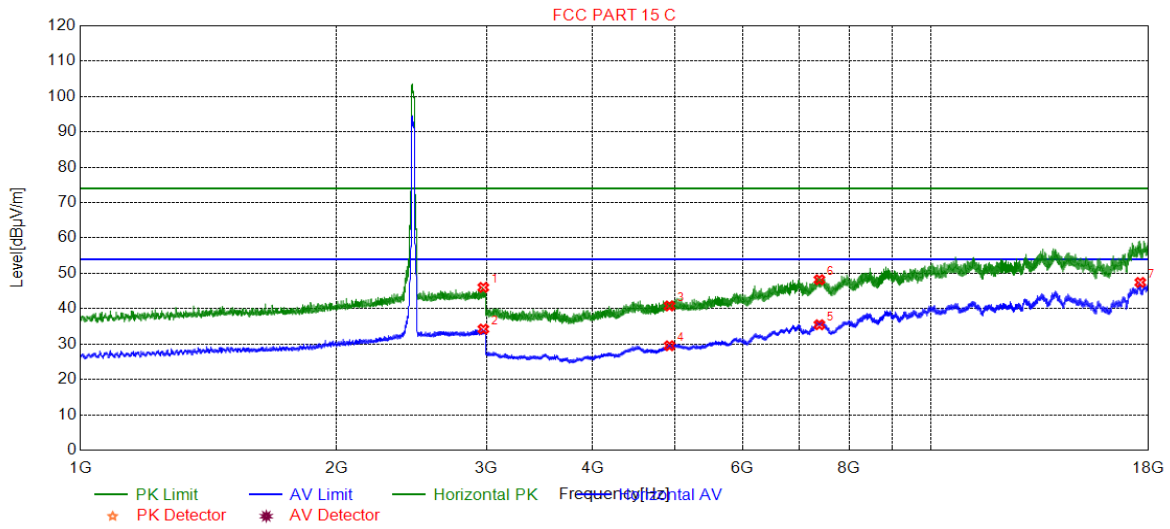
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2971.99	45.74	2.31	74.00	28.26	150	168	Horizontal
2	2973.49	34.37	2.31	54.00	19.63	150	98	Horizontal
3	4874.00	40.40	-19.37	74.00	33.60	150	243	Horizontal
4	4874.00	28.94	-19.37	54.00	25.06	150	211	Horizontal
5	7311.00	34.80	-11.50	54.00	19.20	150	2	Horizontal
6	7311.00	45.91	-11.50	74.00	28.09	150	146	Horizontal
7	17596.4	47.25	1.58	54.00	6.75	150	47	Horizontal



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4.3.2.1.18 802.11N20_ Highest Channel_ Horizontal



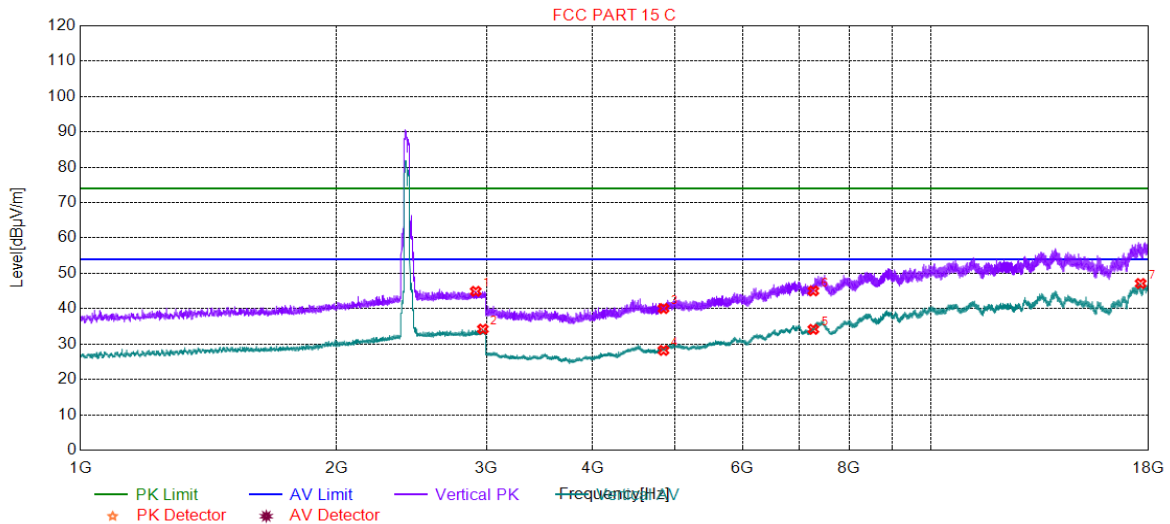
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2974.99	46.02	2.31	74.00	27.98	150	70	Horizontal
2	2975.49	34.25	2.31	54.00	19.75	150	290	Horizontal
3	4924.00	40.79	-18.87	74.00	33.21	150	194	Horizontal
4	4924.00	29.53	-18.87	54.00	24.47	150	47	Horizontal
5	7386.00	35.47	-10.72	54.00	18.53	150	292	Horizontal
6	7386.00	48.20	-10.72	74.00	25.80	150	162	Horizontal
7	17598.9	47.44	1.62	54.00	6.56	150	278	Horizontal



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4.3.2.1.19 802.11N40_Lowest Channel_Vertical

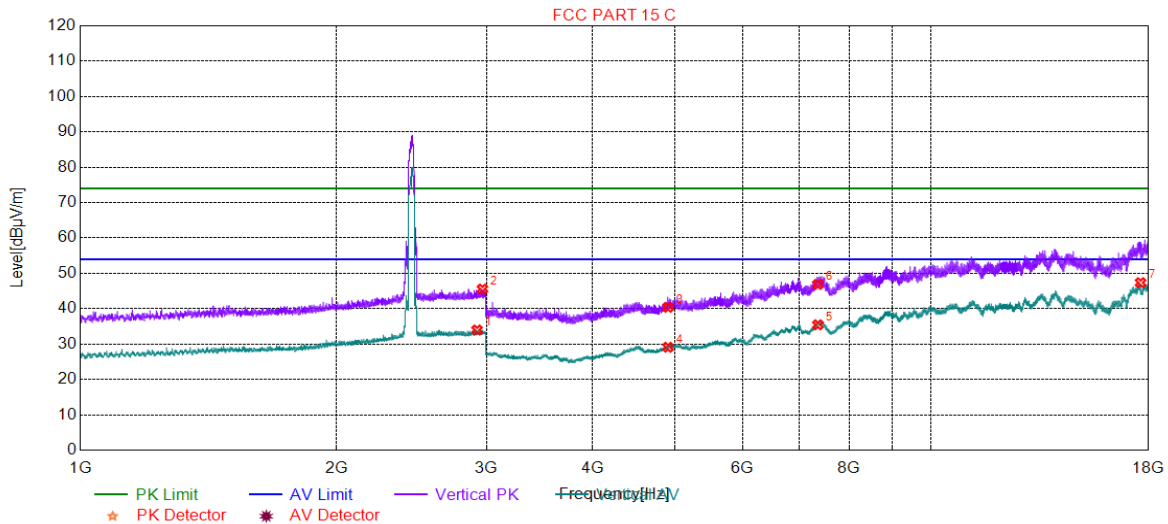


Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2914.47	44.92	2.27	74.00	29.08	150	220	Vertical
2	2971.49	34.24	2.31	54.00	19.76	150	54	Vertical
3	4844.00	40.06	-19.80	74.00	33.94	150	260	Vertical
4	4844.00	28.22	-19.80	54.00	25.78	150	113	Vertical
5	7266.00	34.17	-12.03	54.00	19.83	150	276	Vertical
6	7266.00	45.04	-12.03	74.00	28.96	150	243	Vertical
7	17616.9	47.13	1.19	54.00	6.87	150	191	Vertical



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4.3.2.1.20 802.11N40_ Middle Channel_ Vertical



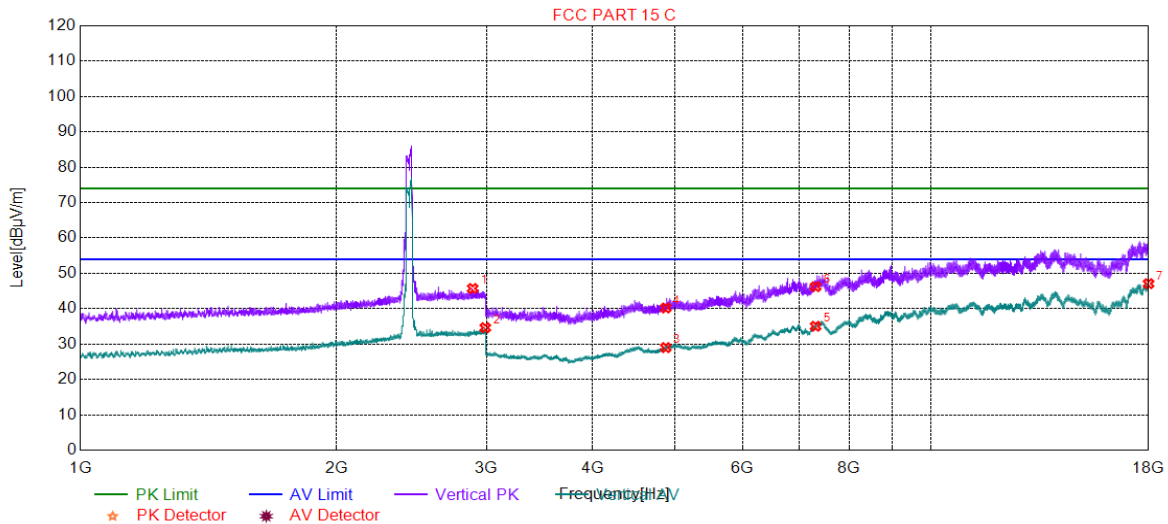
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2924.98	33.99	2.28	54.00	20.01	150	97	Vertical
2	2967.99	45.57	2.31	74.00	28.43	150	257	Vertical
3	4904.00	40.42	-18.98	74.00	33.58	150	66	Vertical
4	4904.00	29.11	-18.98	54.00	24.89	150	212	Vertical
5	7356.00	35.46	-11.03	54.00	18.54	150	3	Vertical
6	7356.00	46.88	-11.03	74.00	27.12	150	277	Vertical
7	17612.4	47.37	1.31	54.00	6.63	150	47	Vertical



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4.3.2.1.21 802.11N40_ Highest Channel_ Vertical



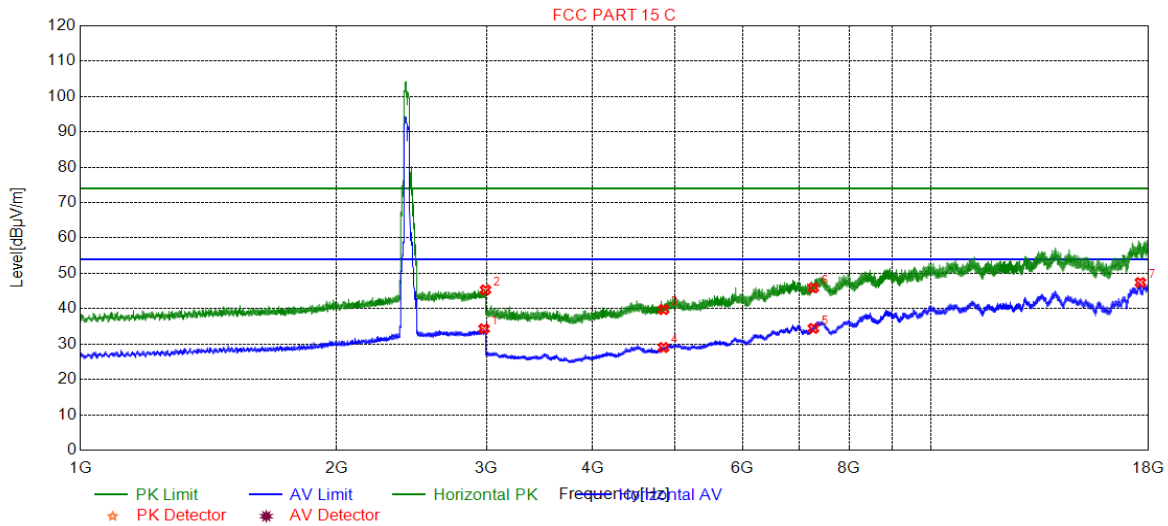
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2890.97	45.72	2.25	74.00	28.28	150	338	Vertical
2	2990.99	34.64	2.32	54.00	19.36	150	347	Vertical
3	4874.00	29.01	-19.37	54.00	24.99	150	342	Vertical
4	4874.00	40.21	-19.37	74.00	33.79	150	309	Vertical
5	7311.00	35.04	-11.50	54.00	18.96	150	65	Vertical
6	7311.00	46.23	-11.50	74.00	27.77	150	342	Vertical
7	17997.9	47.08	-0.37	54.00	6.92	150	220	Vertical



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4.3.2.1.22 802.11N40_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2980.99	34.34	2.32	54.00	19.66	150	296	Horizontal
2	2992.49	45.34	2.32	74.00	28.66	150	122	Horizontal
3	4844.00	39.77	-19.80	74.00	34.23	150	260	Horizontal
4	4844.00	29.03	-19.80	54.00	24.97	150	342	Horizontal
5	7266.00	34.45	-12.03	54.00	19.55	150	130	Horizontal
6	7266.00	45.89	-12.03	74.00	28.11	150	2	Horizontal
7	17602.9	47.41	1.55	54.00	6.59	150	337	Horizontal

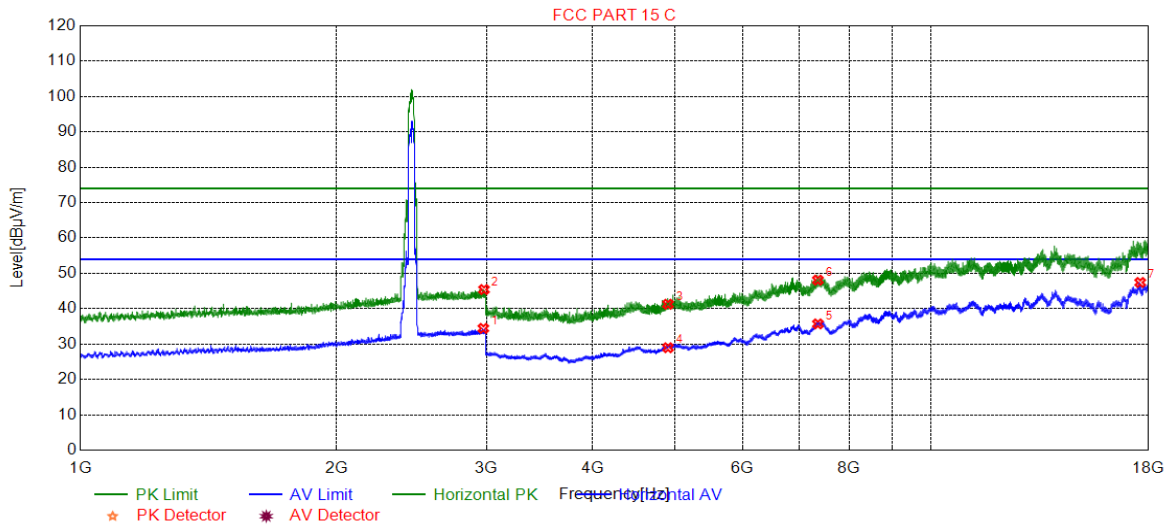


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4.3.2.1.23 802.11N40_ Middle Channel_ Horizontal



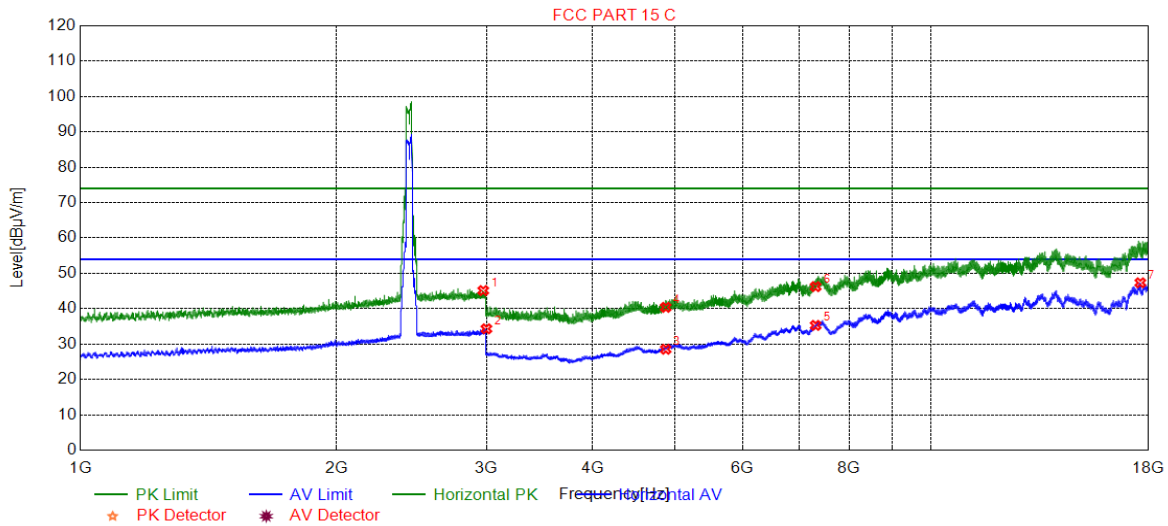
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2975.49	34.44	2.31	54.00	19.56	150	150	Horizontal
2	2980.99	45.42	2.32	74.00	28.58	150	308	Horizontal
3	4904.00	41.28	-18.98	74.00	32.72	150	163	Horizontal
4	4904.00	28.97	-18.98	54.00	25.03	150	114	Horizontal
5	7356.00	35.71	-11.03	54.00	18.29	150	82	Horizontal
6	7356.00	48.09	-11.03	74.00	25.91	150	163	Horizontal
7	17595.4	47.42	1.57	54.00	6.58	150	334	Horizontal



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4.3.2.1.24 802.11N40_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2974.49	45.13	2.31	74.00	28.87	150	69	Horizontal
2	3000.00	34.31	2.33	54.00	19.69	150	188	Horizontal
3	4874.00	28.54	-19.37	54.00	25.46	150	166	Horizontal
4	4874.00	40.39	-19.37	74.00	33.61	150	130	Horizontal
5	7311.00	35.29	-11.50	54.00	18.71	150	182	Horizontal
6	7311.00	46.24	-11.50	74.00	27.76	150	199	Horizontal
7	17601.4	47.33	1.59	54.00	6.67	150	48	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.



4.4 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:			

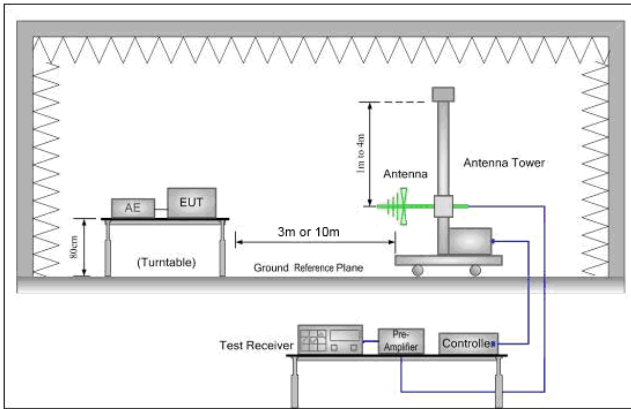


Figure 1. 30MHz to 1GHz

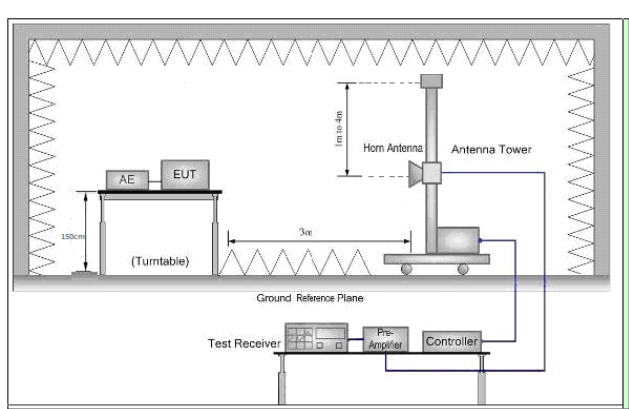


Figure 2. Above 1 GHz



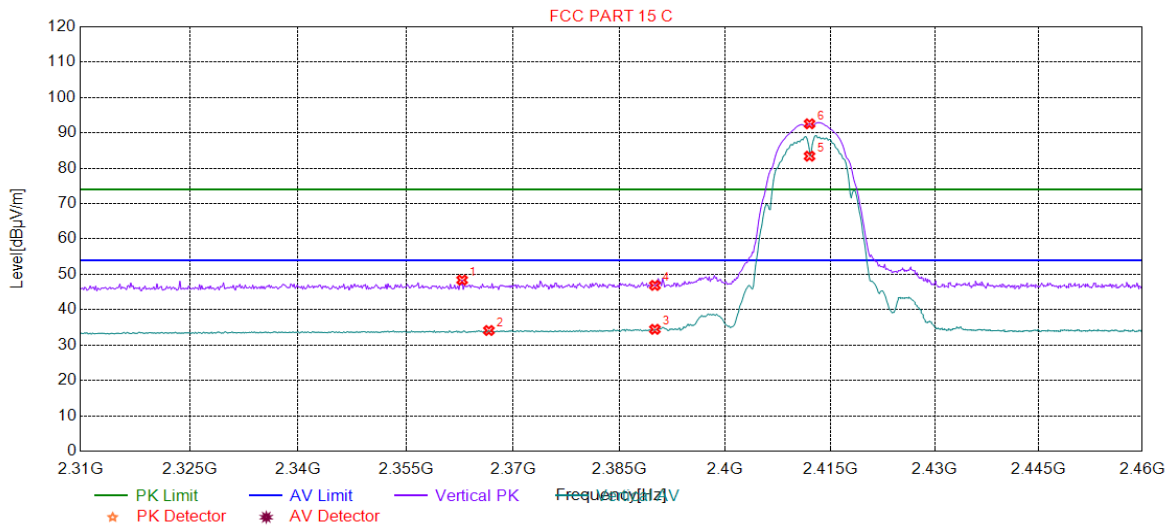
<p>Test Procedure:</p>	<ol style="list-style-type: none"> a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, 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.
<p>Exploratory Test Mode:</p>	<p>Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.</p>
<p>Final Test Mode:</p>	<p>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.</p>
<p>Instruments Used:</p>	<p>Refer to section 5.10 for details</p>
<p>Test Results:</p>	<p>Pass</p>



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4.4.1 ANT1

4.4.1.1 802.11B_Lowest Channel _ Vertical



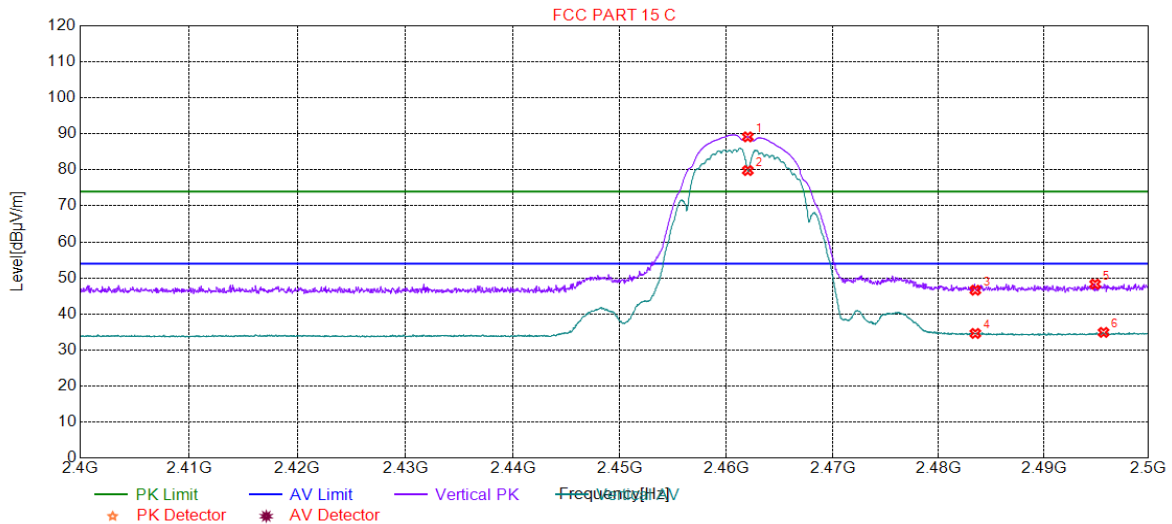
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2362.85	48.39	1.13	74.00	25.61	150	36	Vertical
2	2366.60	34.13	1.14	54.00	19.87	150	18	Vertical
3	2390.00	34.46	1.25	54.00	19.54	150	188	Vertical
4	2390.00	46.87	1.25	74.00	27.13	150	292	Vertical
5	2412.00	83.41	1.32	54.00	-29.41	150	191	Vertical
6	2412.00	92.57	1.32	74.00	-18.57	150	185	Vertical



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4.4.1.2 802.11B_ Highest Channel _ Vertical



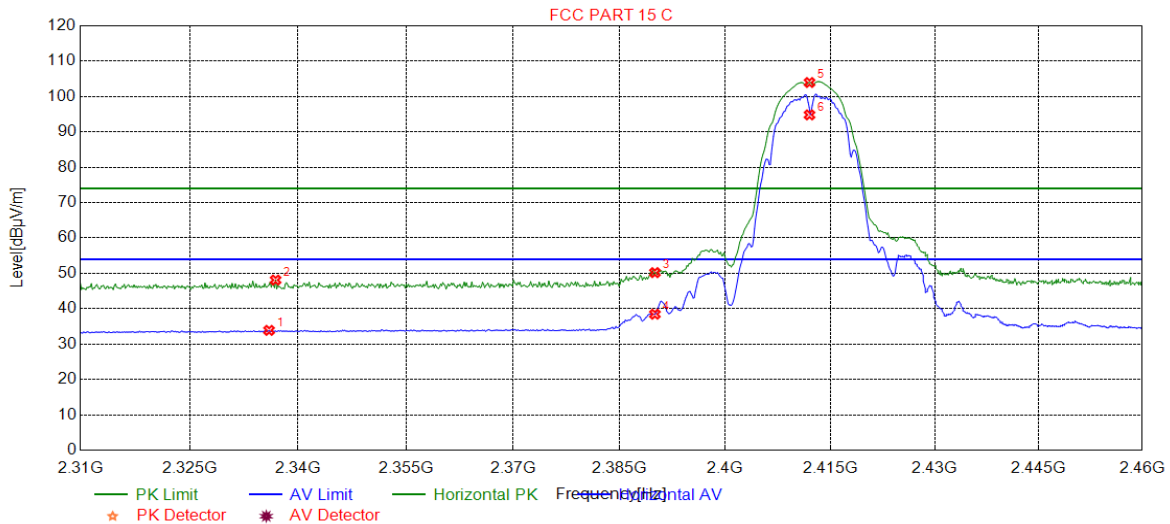
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	89.17	1.46	74.00	-15.17	150	190	Vertical
2	2462.00	79.82	1.46	54.00	-25.82	150	190	Vertical
3	2483.50	46.60	1.52	74.00	27.40	150	254	Vertical
4	2483.50	34.60	1.52	54.00	19.40	150	170	Vertical
5	2494.89	48.30	1.56	74.00	25.70	150	23	Vertical
6	2495.69	34.89	1.56	54.00	19.11	150	105	Vertical



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4.4.1.3 802.11B_Lowest Channel _ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2335.97	33.88	1.01	54.00	20.12	150	182	Horizontal
2	2336.87	48.12	1.01	74.00	25.88	150	163	Horizontal
3	2390.00	50.21	1.25	74.00	23.79	150	233	Horizontal
4	2390.00	38.45	1.25	54.00	15.55	150	224	Horizontal
5	2412.00	103.96	1.32	74.00	-29.96	150	230	Horizontal
6	2412.00	94.81	1.32	54.00	-40.81	150	224	Horizontal

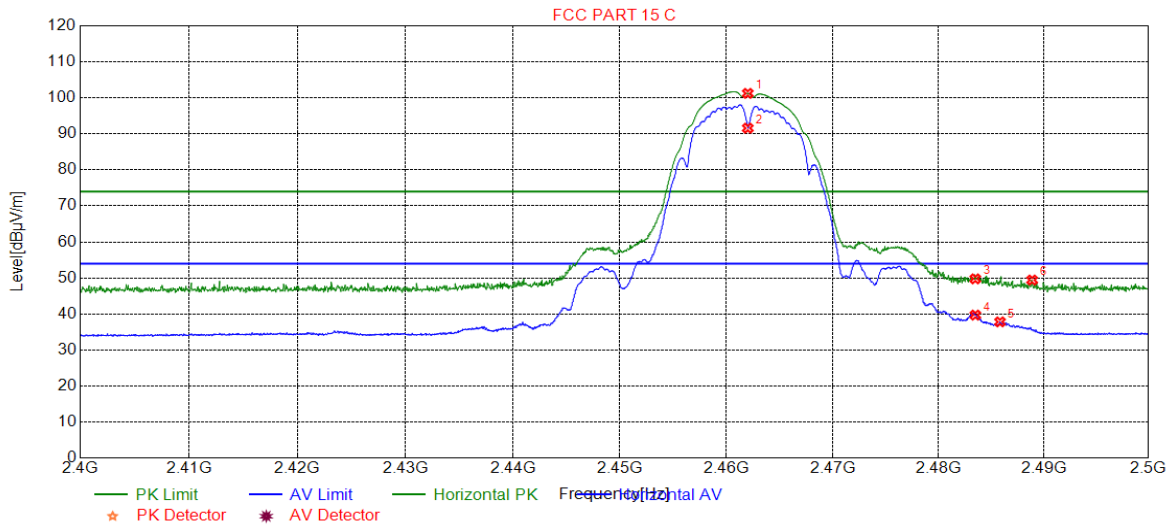


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4.4.1.4 802.11B_ Highest Channel _ Horizontal



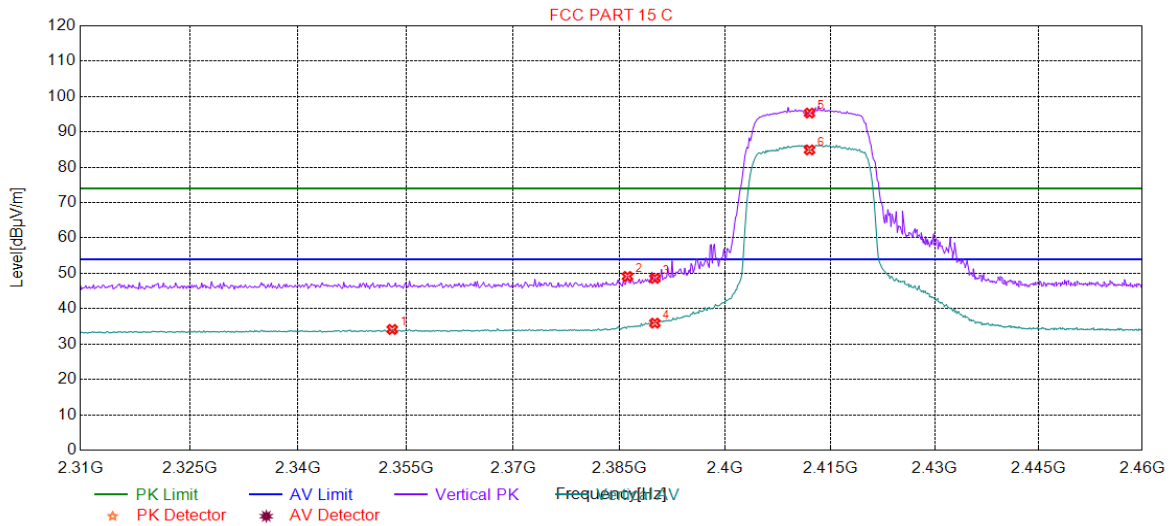
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	101.24	1.46	74.00	-27.24	150	227	Horizontal
2	2462.00	91.58	1.46	54.00	-37.58	150	224	Horizontal
3	2483.50	49.75	1.52	74.00	24.25	150	224	Horizontal
4	2483.50	39.69	1.52	54.00	14.31	150	227	Horizontal
5	2485.84	37.81	1.53	54.00	16.19	150	227	Horizontal
6	2488.89	49.42	1.54	74.00	24.58	150	67	Horizontal



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4.4.1.5 802.11G_Lowest Channel _ Vertical



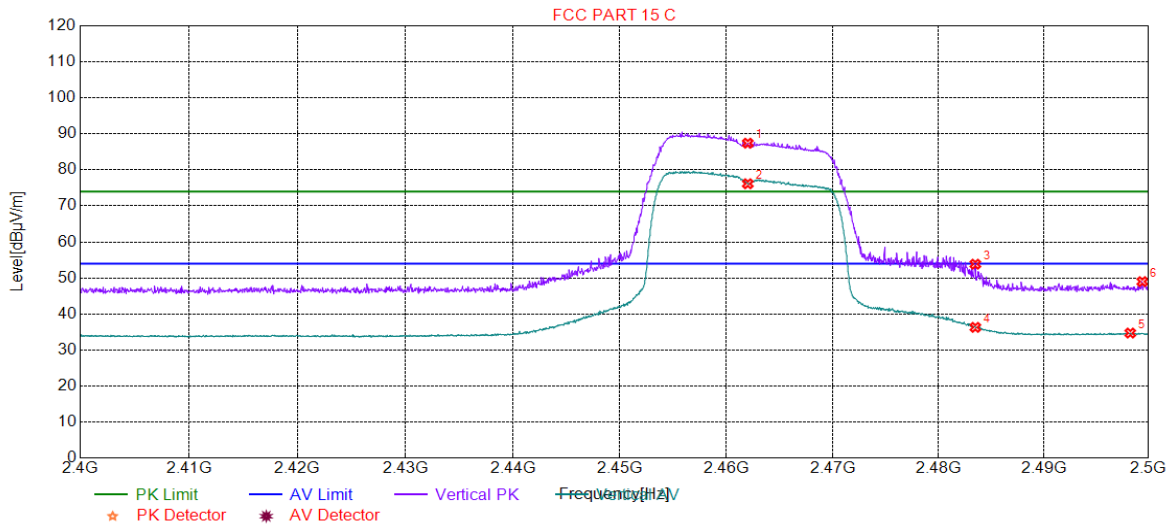
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2353.09	34.15	1.08	54.00	19.85	150	181	Vertical
2	2386.12	49.14	1.23	74.00	24.86	150	171	Vertical
3	2390.00	48.58	1.25	74.00	25.42	150	168	Vertical
4	2390.00	35.93	1.25	54.00	18.07	150	165	Vertical
5	2412.00	95.33	1.32	74.00	-21.33	150	162	Vertical
6	2412.00	84.91	1.32	54.00	-30.91	150	168	Vertical



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4.4.1.6 802.11G_ Highest Channel _ Vertical



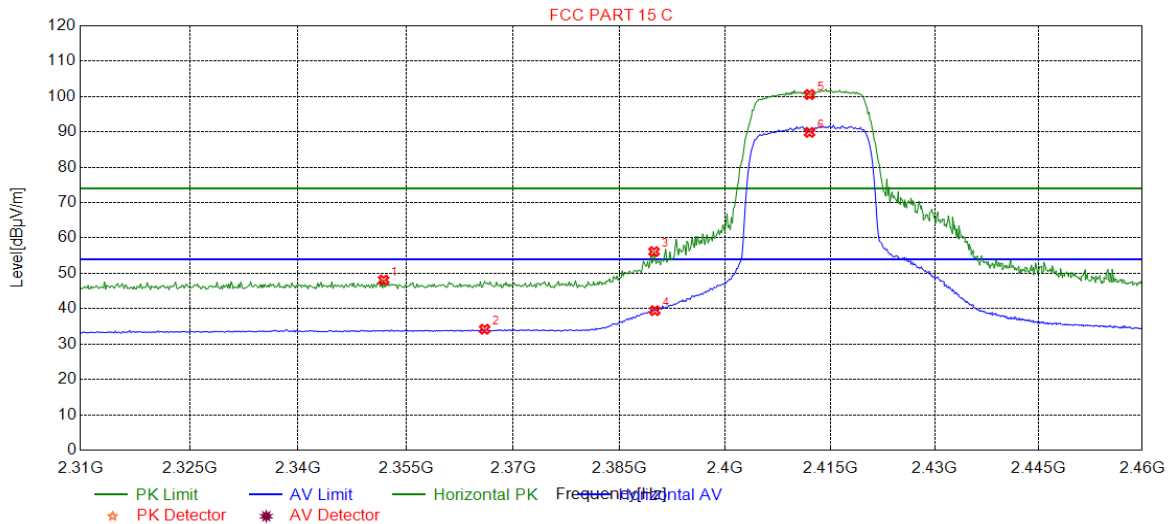
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	87.41	1.46	74.00	-13.41	150	155	Vertical
2	2462.00	76.15	1.46	54.00	-22.15	150	182	Vertical
3	2483.50	53.83	1.52	74.00	20.17	150	189	Vertical
4	2483.50	36.29	1.52	54.00	17.71	150	178	Vertical
5	2498.24	34.71	1.57	54.00	19.29	150	232	Vertical
6	2499.39	48.99	1.57	74.00	25.01	150	81	Vertical



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4.4.1.7 802.11G_Lowest Channel_Horizontal



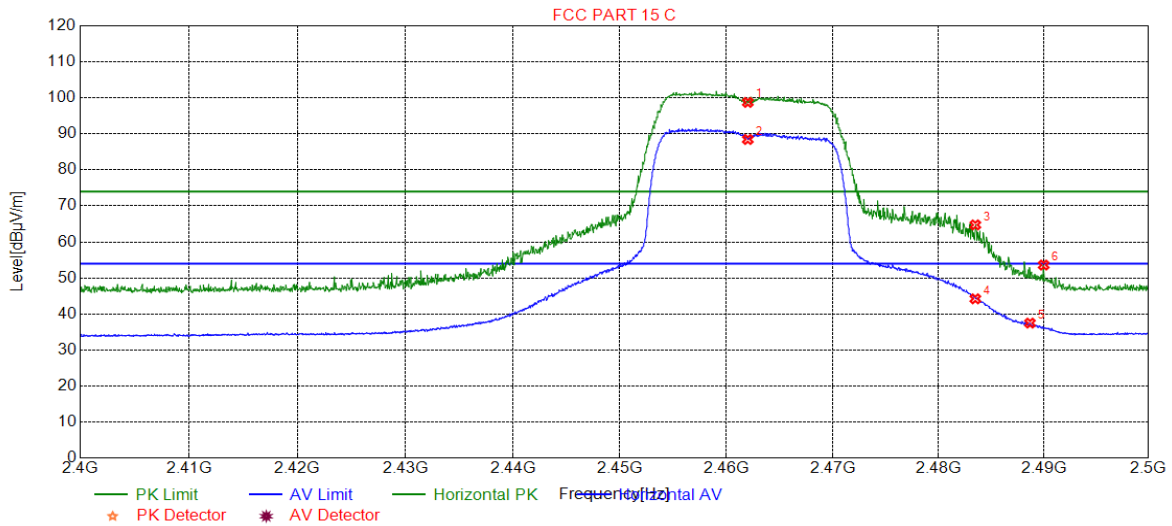
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2351.89	48.13	1.08	74.00	25.87	150	233	Horizontal
2	2366.00	34.21	1.14	54.00	19.79	150	51	Horizontal
3	2389.87	56.15	1.25	74.00	17.85	150	252	Horizontal
4	2390.00	39.45	1.25	54.00	14.55	150	245	Horizontal
5	2412.00	100.57	1.32	74.00	-26.57	150	245	Horizontal
6	2412.00	89.85	1.32	54.00	-35.85	150	248	Horizontal



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4.4.1.8 802.11G_ Highest Channel _ Horizontal



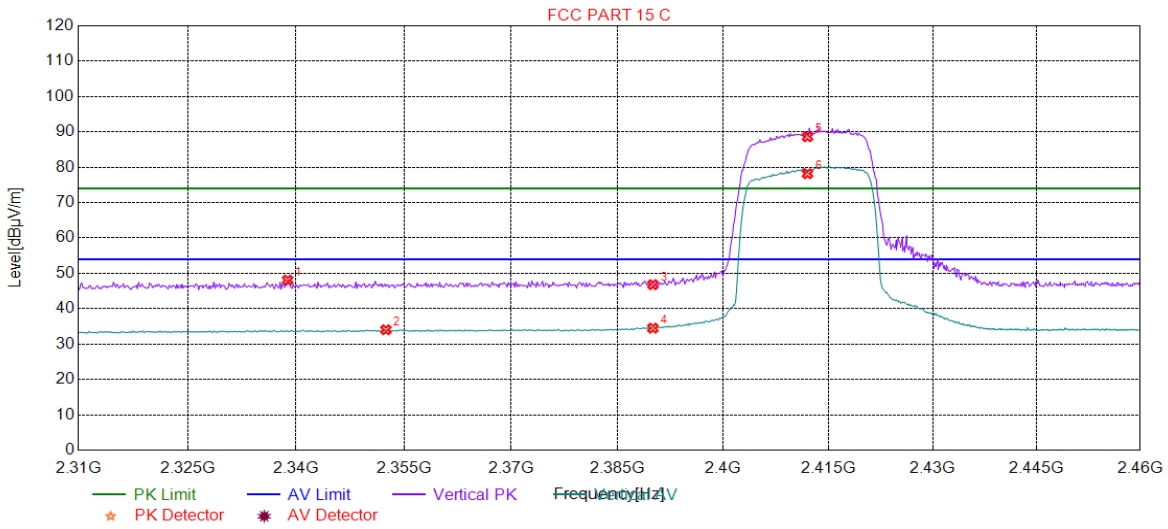
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	98.73	1.46	74.00	-24.73	150	225	Horizontal
2	2462.00	88.45	1.46	54.00	-34.45	150	213	Horizontal
3	2483.50	64.73	1.52	74.00	9.27	150	213	Horizontal
4	2483.50	44.22	1.52	54.00	9.78	150	220	Horizontal
5	2488.69	37.47	1.54	54.00	16.53	150	220	Horizontal
6	2489.99	53.58	1.54	74.00	20.42	150	225	Horizontal



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4.4.1.9 802.11N20_Lowest Channel _ Vertical



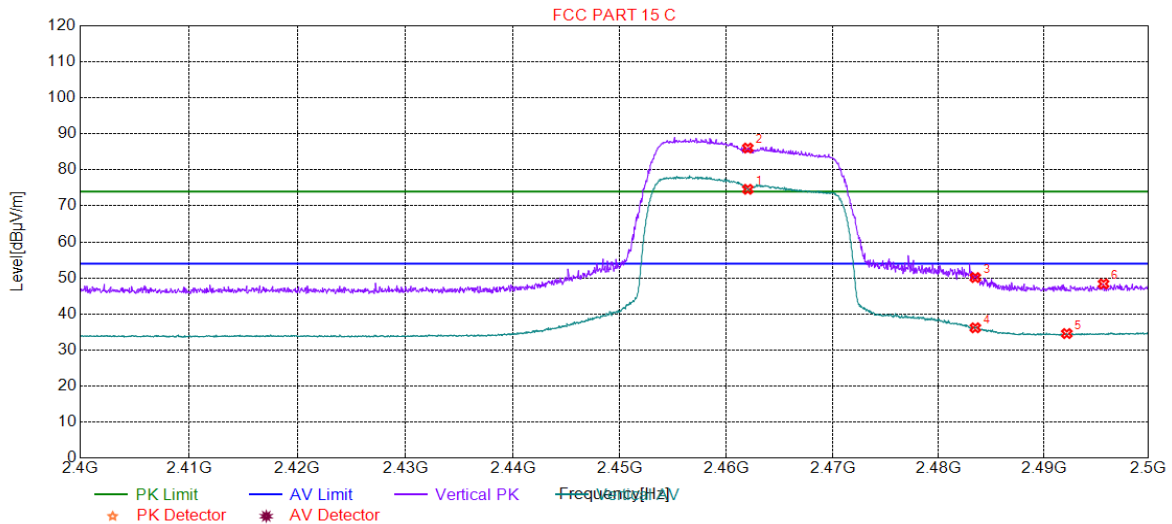
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2338.82	48.10	1.02	74.00	25.90	150	334	Vertical
2	2352.49	34.05	1.08	54.00	19.95	150	337	Vertical
3	2390.00	46.81	1.25	74.00	27.19	150	21	Vertical
4	2390.00	34.51	1.25	54.00	19.49	150	228	Vertical
5	2412.00	88.62	1.32	74.00	-14.62	150	202	Vertical
6	2412.00	78.18	1.32	54.00	-24.18	150	193	Vertical



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4.4.1.10 802.11N20_ Highest Channel _ Vertical



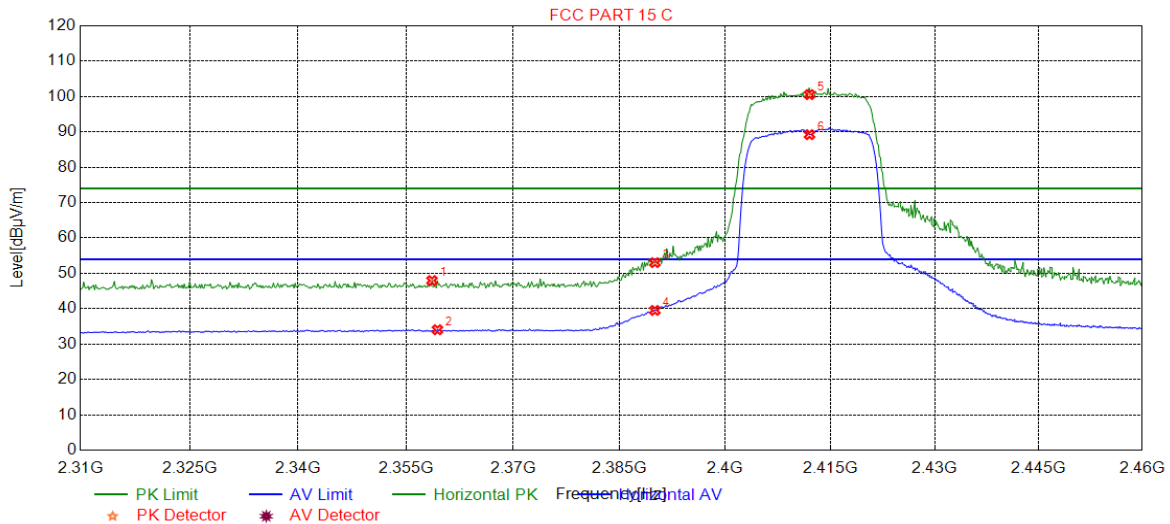
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	74.61	1.46	54.00	-20.61	150	188	Vertical
2	2462.00	86.06	1.46	74.00	-12.06	150	188	Vertical
3	2483.50	50.12	1.52	74.00	23.88	150	162	Vertical
4	2483.50	36.17	1.52	54.00	17.83	150	183	Vertical
5	2492.19	34.57	1.55	54.00	19.43	150	107	Vertical
6	2495.69	48.36	1.56	74.00	25.64	150	242	Vertical



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4.4.1.11 802.11N20_Lowest Channel _ Horizontal



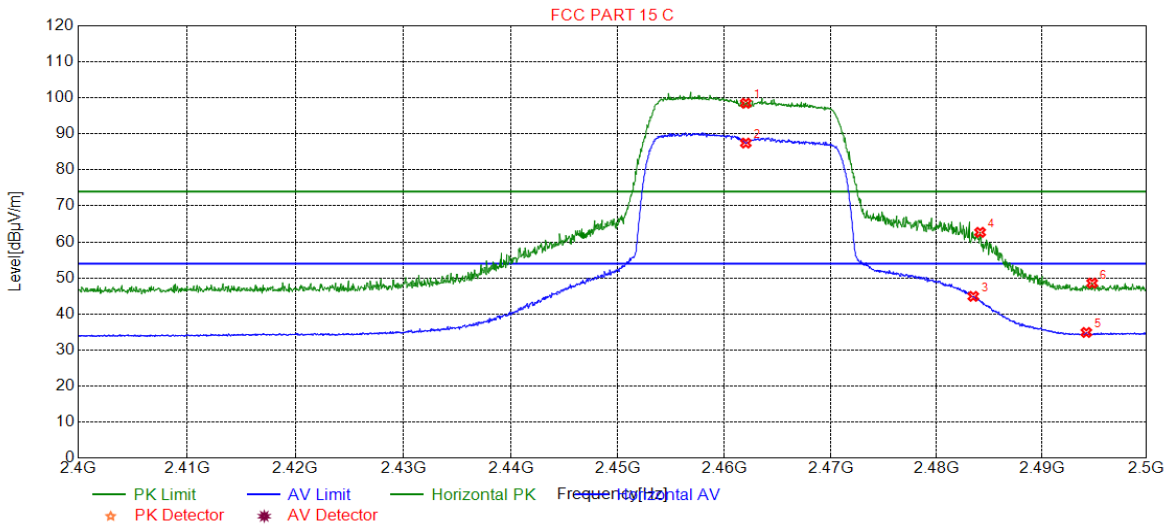
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2358.64	47.96	1.11	74.00	26.04	150	225	Horizontal
2	2359.39	34.06	1.11	54.00	19.94	150	93	Horizontal
3	2390.00	53.04	1.25	74.00	20.96	150	257	Horizontal
4	2390.00	39.52	1.25	54.00	14.48	150	257	Horizontal
5	2412.00	100.55	1.32	74.00	-26.55	150	257	Horizontal
6	2412.00	89.23	1.32	54.00	-35.23	150	257	Horizontal



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4.4.1.12 802.11N20_ Highest Channel _ Horizontal



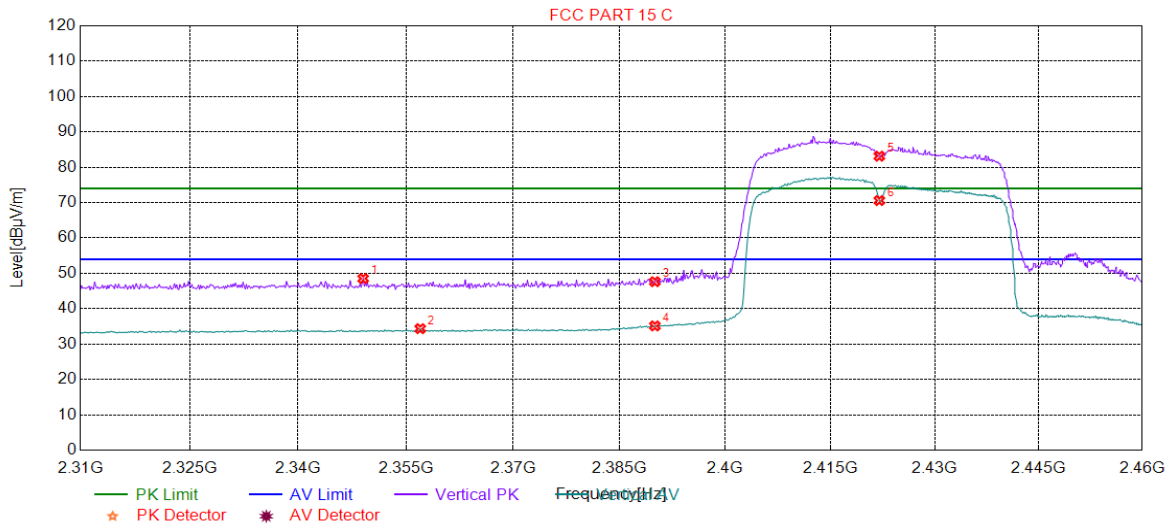
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	98.50	1.46	74.00	-24.50	150	244	Horizontal
2	2462.00	87.45	1.46	54.00	-33.45	150	244	Horizontal
3	2483.50	44.90	1.52	54.00	9.10	150	232	Horizontal
4	2484.14	62.67	1.53	74.00	11.33	150	222	Horizontal
5	2494.24	34.88	1.55	54.00	19.12	150	134	Horizontal
6	2494.79	48.57	1.56	74.00	25.43	150	14	Horizontal



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4.4.1.13 802.11N40_Lowest Channel _ Vertical



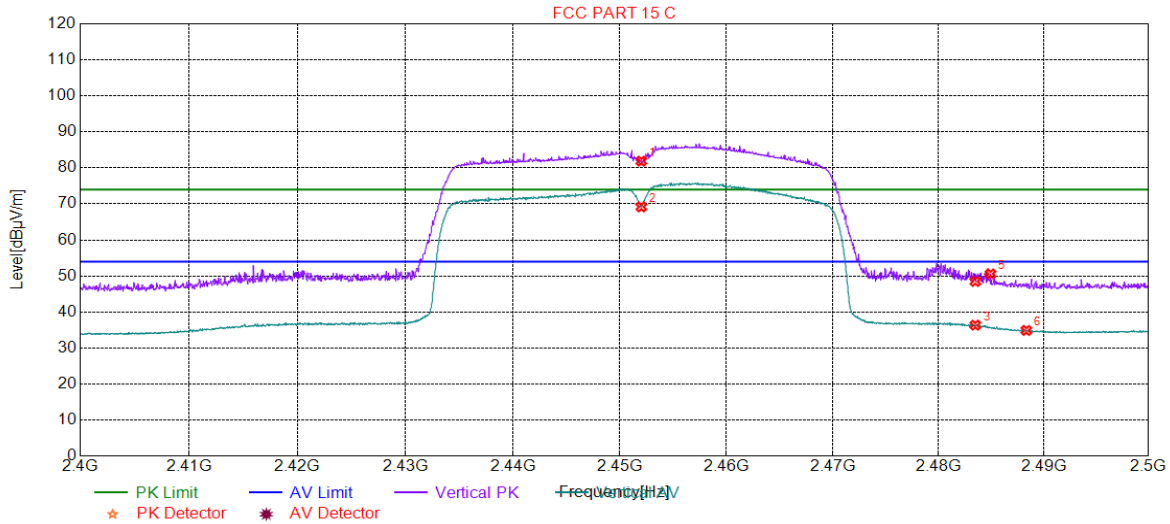
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2349.03	48.53	1.07	74.00	25.47	150	233	Vertical
2	2356.99	34.36	1.10	54.00	19.64	150	93	Vertical
3	2390.00	47.65	1.25	74.00	26.35	150	190	Vertical
4	2390.00	35.14	1.25	54.00	18.86	150	184	Vertical
5	2422.00	83.14	1.35	74.00	-9.14	150	178	Vertical
6	2422.00	70.59	1.35	54.00	-16.59	150	180	Vertical



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4.4.1.14 802.11N40_ Highest Channel _ Vertical



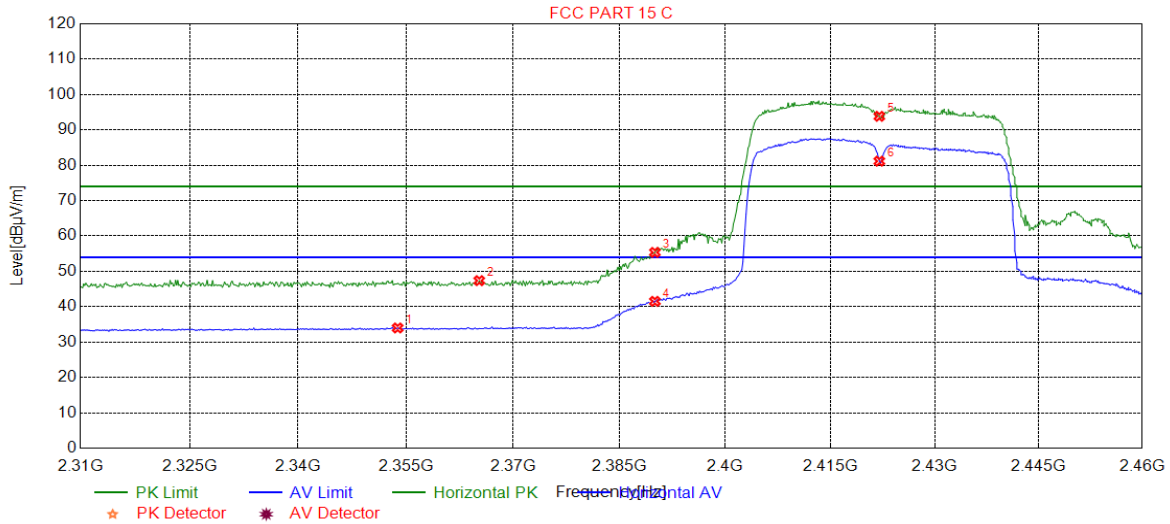
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.00	81.88	1.44	74.00	-7.88	150	182	Vertical
2	2452.00	69.18	1.44	54.00	-15.18	150	170	Vertical
3	2483.50	36.35	1.52	54.00	17.65	150	189	Vertical
4	2483.50	48.48	1.52	74.00	25.52	150	178	Vertical
5	2484.94	50.57	1.53	74.00	23.43	150	182	Vertical
6	2488.34	34.89	1.54	54.00	19.11	150	186	Vertical



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4.4.1.15 802.11N40_Lowest Channel _ Horizontal



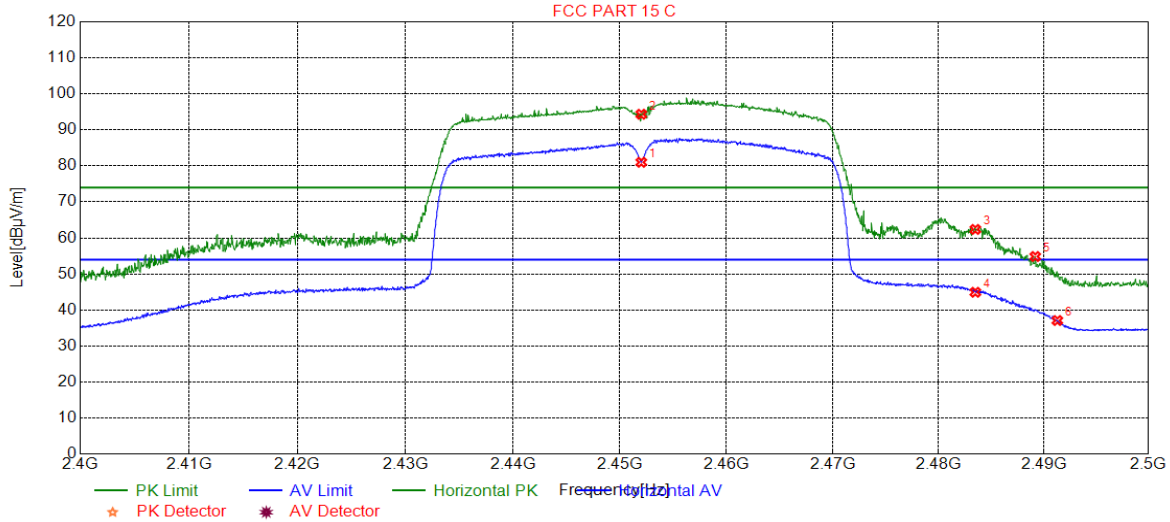
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2353.84	33.99	1.09	54.00	20.01	150	65	Horizontal
2	2365.25	47.37	1.14	74.00	26.63	150	20	Horizontal
3	2390.00	55.36	1.25	74.00	18.64	150	237	Horizontal
4	2390.00	41.52	1.25	54.00	12.48	150	222	Horizontal
5	2422.00	93.84	1.35	74.00	-19.84	150	228	Horizontal
6	2422.00	81.15	1.35	54.00	-27.15	150	222	Horizontal



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4.4.1.16 802.11N40_ Highest Channel _ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.00	81.00	1.44	54.00	-27.00	150	227	Horizontal
2	2452.00	94.34	1.44	74.00	-20.34	150	227	Horizontal
3	2483.50	62.37	1.52	74.00	11.63	150	231	Horizontal
4	2483.50	44.92	1.52	54.00	9.08	150	231	Horizontal
5	2489.19	54.85	1.54	74.00	19.15	150	231	Horizontal
6	2491.29	37.08	1.55	54.00	16.92	150	231	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	Cal. Due date
				(yyyy-mm-dd)	(yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018/9/2	2019/9/2
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2018/4/2	2019/4/1
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018/7/12	2019/7/11
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	2018/4/2	2019/4/1
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	2018/9/15	2019/9/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/13	2019/7/12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2



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RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy-mm-dd)	(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	2018/7/12	2019/7/11
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2018/9/2	2019/9/2
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	2018/4/2	2019/4/1

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy-mm-dd)	(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	2018/7/12	2019/7/11
EXA Signal Analyzer (10Hz-26.5GHz)	Agilent Technologies Inc	N9010A	SEM004-09	2018/4/13	2019/4/12
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	2018/9/2	2019/9/2
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2018/9/27	2019/9/27
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	2018/4/2	2019/4/1
Band filter	N/A	N/A	SEM023-01	N/A	N/A

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
				(yyyy-mm-dd)	(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	2018/4/2	2019/4/1
Trilog-Broadband Antenna(25M-2GHz)	Schwarzbeck	VULB9168	SEM003-18	2016/6/29	2019/6/28
Pre-amplifier (9k-1GHz)	Sonoma	310N	SEM005-03	2018/4/13	2019/4/12
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	2018/7/12	2019/7/11

7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for ZR/2019/20008.

The End



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