SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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FCC TEST REPORT

Application No:	HR/2019/10005
Applicant:	Unimax communications
Address of Applicant	18201 McDurmott St.West Suite E,Irvine,CA 92614.
Manufacturer:	Unimax communications
Address of Manufacturer	18201 McDurmott St.West Suite E,Irvine,CA 92614.
Factory:	Unimax communications
Address of Factory	18201 McDurmott St.West Suite E,Irvine,CA 92614.
EUT Description:	Smartphone
Model No.:	U683CL
Trade Mark:	UMX
FCC ID:	P46-U683CL
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C KDB558074 D01 15.247 Meas Guidance v05
Test Method	ANSI C63.4(2014) ANSI C63.10 (2013)
Date of Receipt:	2019/1/10
Date of Test:	2019/1/10 to 2019/1/24
Date of Issue:	2019/1/24
Test Result:	**PASS ***

. * In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Derek Yang

Derek Yang
Wireless Laboratory Manager

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1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2019/1/24		Original

Authorized for issue by:				
Tested By		Mike Hu **(Mike Hu) /Project Engineer**		2019/1/24 **Date**
Checked By		David Chen **(David Chen) /Reviewer**		2019/1/24 **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
Duty Cycle	--	--	Clause 4.3	PASS
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013	Clause 4.4	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013	Clause 4.5	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013	Clause 4.6	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.7	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.8	PASS
Radiated Spurious Emissions	15.247(d) ;15.205/15.209	ANSI C63.10 2013	Clause 4.9	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d) ;15.205/15.209	ANSI C63.10 2013	Clause 4.10	PASS

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3 General Information

3.1 Client Information

Applicant:	Unimax communications
Address of Applicant:	18201 McDurmott St.West Suite E,Irvine,CA 92614.
Manufacturer:	Unimax communications
Address of Manufacturer:	18201 McDurmott St.West Suite E,Irvine,CA 92614.
Factory:	Unimax communications
Address of Factory:	18201 McDurmott St.West Suite E,Irvine,CA 92614.

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

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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::	Smartphone
Model No.:	U683CL
Trade Mark:	UMX
Hardware Version:	Q5007-MB-V1.0
Software Version:	U683CL_01.01.01.111634
IEEE 802.11 WLAN Mode Supported	☒ 802.11B (20 MHz channel bandwidth), ☒ 802.11G (20 MHz channel bandwidth) ☒ 802.11N (20 MHz channel bandwidth), ☐ 802.11N (40 MHz channel bandwidth)
Operation Frequency:	2400 MHz -2483.5MHz fc = 2407 MHz + N * 5 MHz, where: -fc = "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) : OFDM
Sample Type:	☒ Portable Device, ☐Module
Antenna Type:	☐ External, ☒ Integrated
Antenna Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3
Smart System	☒ SISO (for 802.11B/G/N), ☐ MIMO (for 802.11N): 2 Tx & 2 Rx, ☐ Diversity (for 802.11B/G) : Tx & Rx
Antenna Gain:	1.2dBi
Power Supply	☒ AC/DC Adapter; ☐ Battery ☐ PoE:; ☐ Other:

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		

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)
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

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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)
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. 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.	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.2dBi.	

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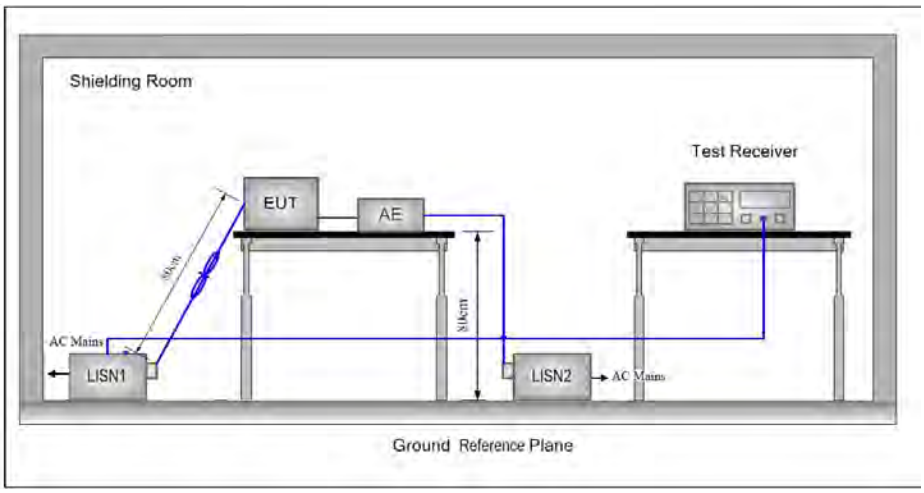
4.2 AC Power Line Conducted Emissions

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:	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.		
Test Setup:			

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Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.
Final Test Mode:	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.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

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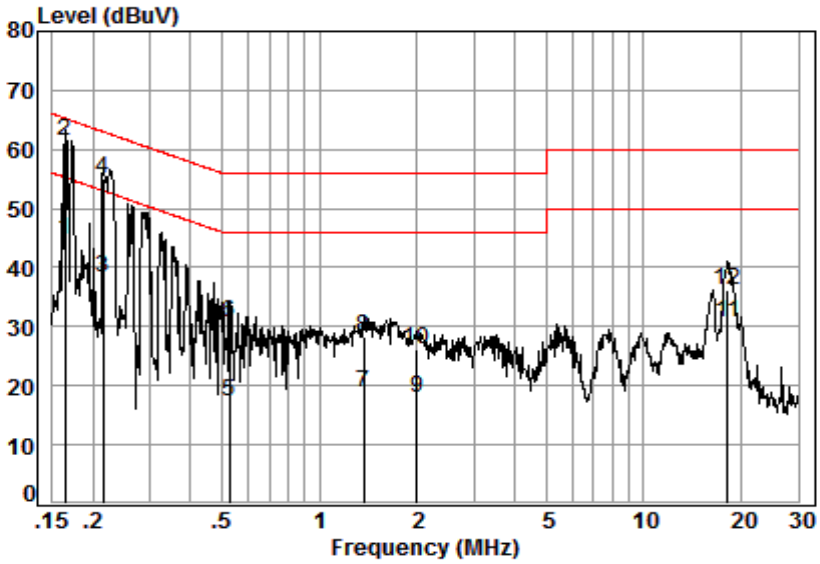
Measurement Data

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. : 10005
Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.66	35.02	44.69	55.25	-10.56	Average
2	0.16	0.01	9.66	51.68	61.35	65.25	-3.90	QP
3	0.22	0.03	9.66	28.56	38.25	53.01	-14.76	Average
4	0.22	0.03	9.66	45.28	54.97	63.01	-8.04	QP
5	0.53	0.06	9.67	7.51	17.24	46.00	-28.76	Average
6	0.53	0.06	9.67	20.85	30.58	56.00	-25.42	QP
7	1.37	0.12	9.73	9.12	18.97	46.00	-27.03	Average
8	1.37	0.12	9.73	18.56	28.41	56.00	-27.59	QP
9	1.99	0.16	9.72	7.97	17.85	46.00	-28.15	Average
10	1.99	0.16	9.72	16.21	26.09	56.00	-29.91	QP
11	18.14	0.23	10.16	20.36	30.75	50.00	-19.25	Average
12	18.14	0.23	10.16	25.76	36.15	60.00	-23.85	QP

Neutral Line:

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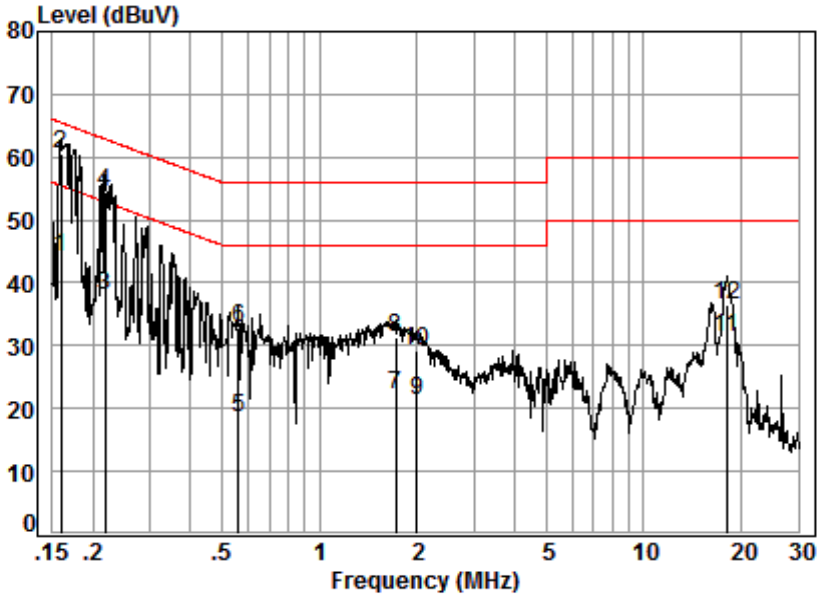

Site : Shielding Room
Condition: Neutral
Job No. : 10005
Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.63	34.44	44.08	55.52	-11.44	Average
2	0.16	0.01	9.63	50.87	60.51	65.52	-5.01	QP
3	0.22	0.03	9.64	28.33	38.00	52.88	-14.88	Average
4	0.22	0.03	9.64	44.89	54.56	62.88	-8.32	QP
5	0.56	0.07	9.64	8.88	18.59	46.00	-27.41	Average
6	0.56	0.07	9.64	23.28	32.99	56.00	-23.01	QP
7	1.72	0.14	9.70	12.52	22.36	46.00	-23.64	Average
8	1.72	0.14	9.70	21.61	31.45	56.00	-24.55	QP
9	2.00	0.16	9.69	11.41	21.26	46.00	-24.74	Average
10	2.00	0.16	9.69	19.29	29.14	56.00	-26.86	QP
11	18.04	0.23	10.20	20.82	31.25	50.00	-18.75	Average
12	18.04	0.23	10.20	26.02	36.45	60.00	-23.55	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.

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4.3 Duty Cycle

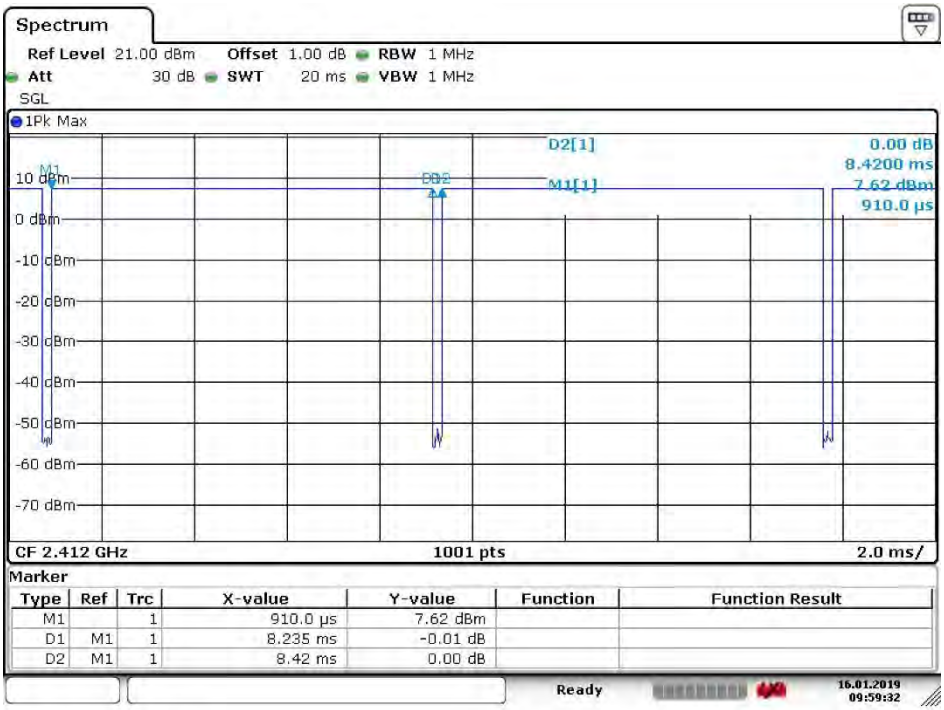
4.3.1 Test Results

Test Mode	TX Freq. [MHz]	Duty cycle [%]
11B	Ant 1: CH1,CH6,CH11	97.80
11G	Ant 1: CH1,CH6,CH11	86.86
11N20	Ant 1: CH1,CH6,CH11	86.10

4.3.1 Test Plots

4.3.1.1 ANT1

4.3.1.1.1 11B



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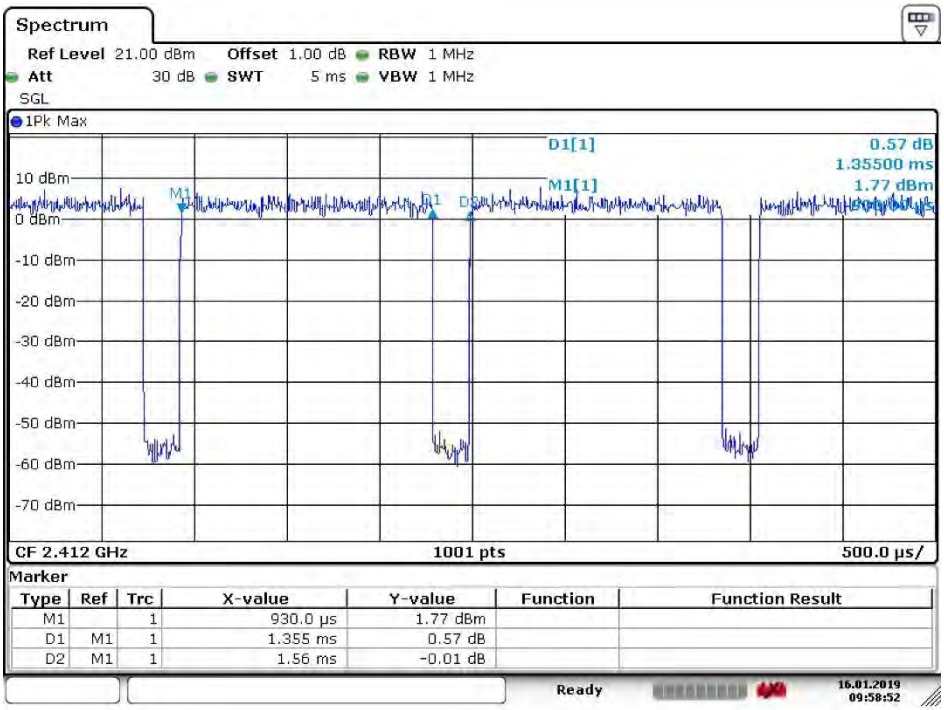
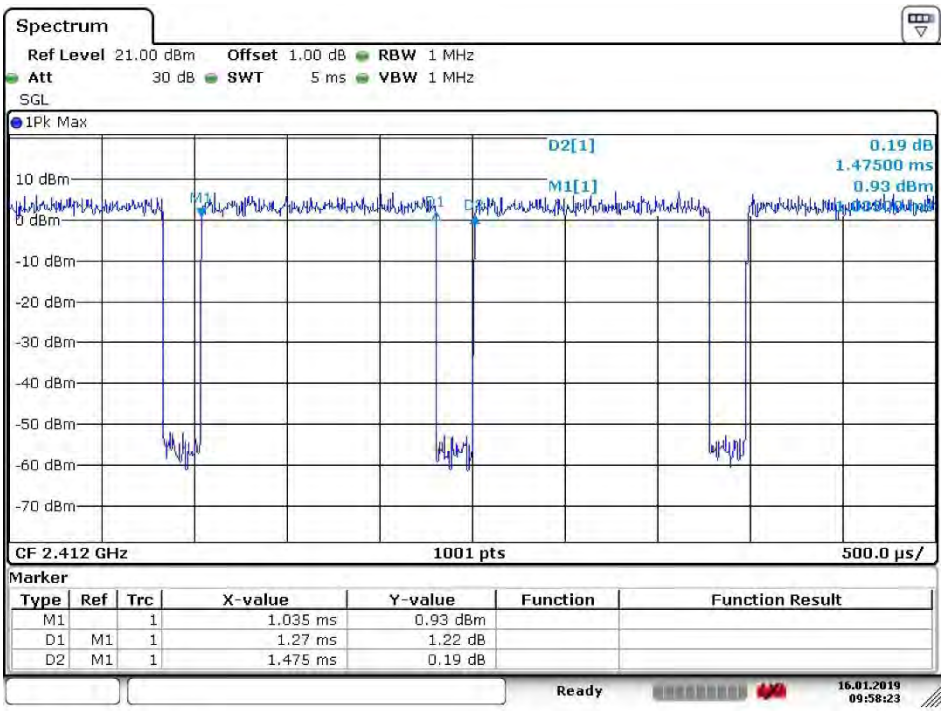
4.3.1.1.2 11G



Date: 16.JAN.2019 09:58:53

4.3.1.1.3 11N20



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4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)

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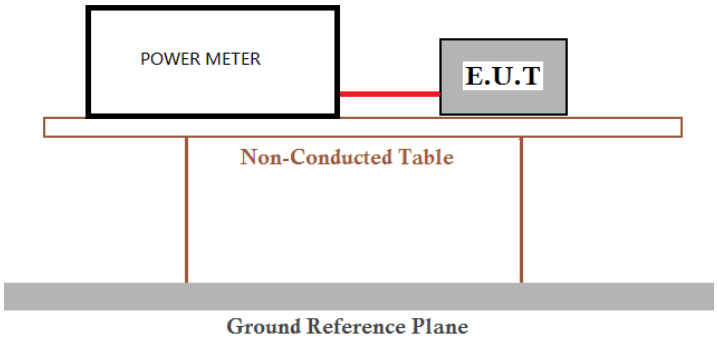
Test Method:	ANSI C63.10 :2013 Section 11.9.1.3
Test Setup:	
Test Instruments:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G ; 6.5Mbps of rate is the worst case of 802.11N(HT20);
Limit:	30dBm
Test Results:	Pass

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4.4.1 Test Results

Measurement Data of Average Power:

Mode	Test Channel	Average Output Power (dBm)	Result
802.11B	Lowest	12.36	Report purpose only
	Middle	13.43	Report purpose only
	Highest	13.52	Report purpose only
802.11G	Lowest	11.69	Report purpose only
	Middle	12.57	Report purpose only
	Highest	12.83	Report purpose only
802.11N20	Lowest	11.50	Report purpose only
	Middle	12.42	Report purpose only
	Highest	12.34	Report purpose only

Measurement Data of Peak Power:

Mode	Test Channel	Peak Output Power (dBm)	Limit (dBm)	Result
802.11B	Lowest	17.56	30.00	Pass
	Middle	19.08	30.00	Pass
	Highest	18.37	30.00	Pass
802.11G	Lowest	21.18	30.00	Pass
	Middle	22.32	30.00	Pass
	Highest	21.86	30.00	Pass
802.11N20	Lowest	21.25	30.00	Pass
	Middle	22.62	30.00	Pass
	Highest	22.27	30.00	Pass

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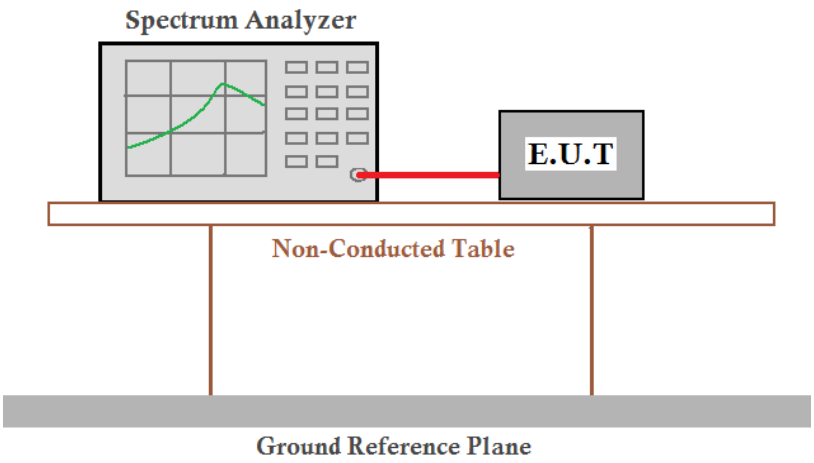
4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013 Section 11.8.1 Option 1
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test 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);
Limit:	≥ 500 kHz
Test Results:	Pass

4.5.1 Test Results

Mode	Test Channel	Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
802.11B	Lowest	13.277	8.092	≥500	Pass
	Middle	13.157	8.092	≥500	Pass
	Highest	13.247	9.051	≥500	Pass
802.11G	Lowest	16.843	16.244	≥500	Pass
	Middle	16.873	16.454	≥500	Pass
	Highest	16.843	16.394	≥500	Pass
802.11N20	Lowest	17.952	17.383	≥500	Pass
	Middle	17.952	17.682	≥500	Pass
	Highest	17.922	17.592	≥500	Pass

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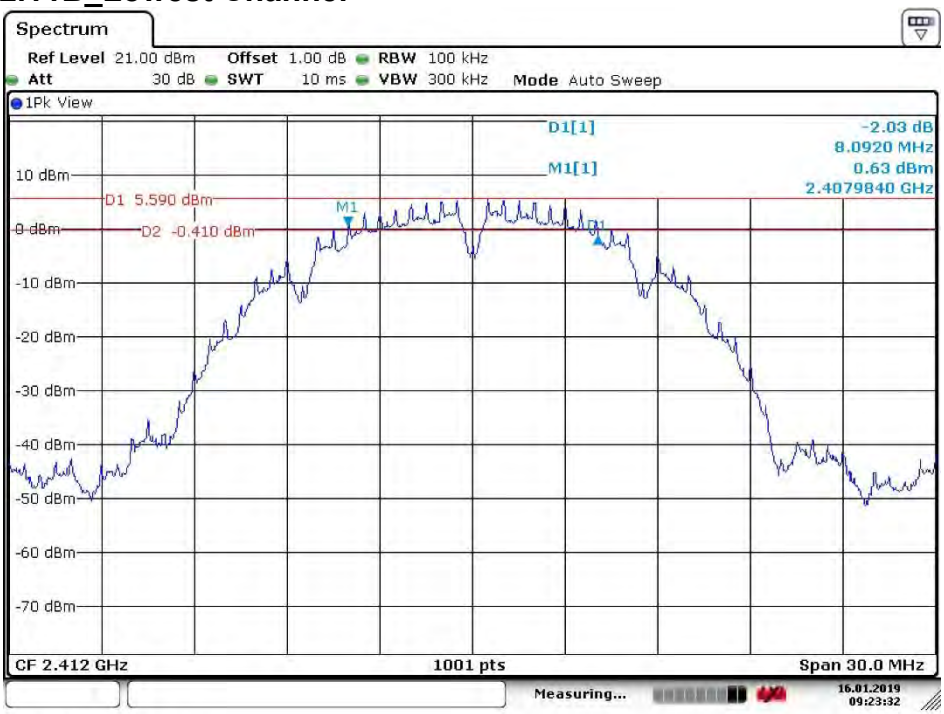
4.5.2 Test plots

4.5.2.1 ANT1

4.5.2.1.1 802.11B_Lowest Channel



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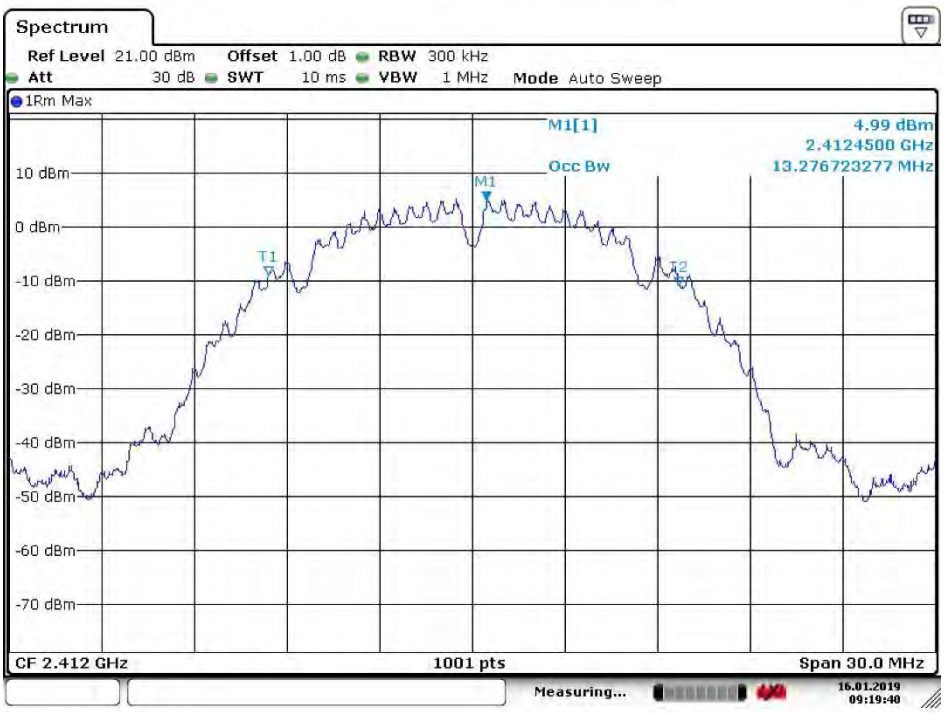

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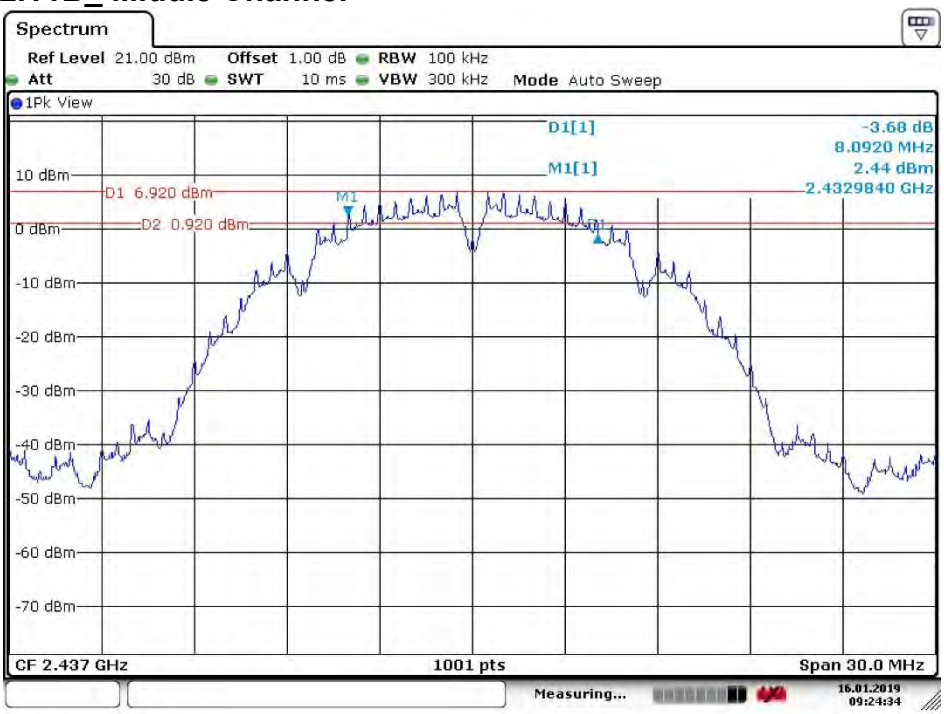
4.5.2.1.2 802.11B_ Middle Channel



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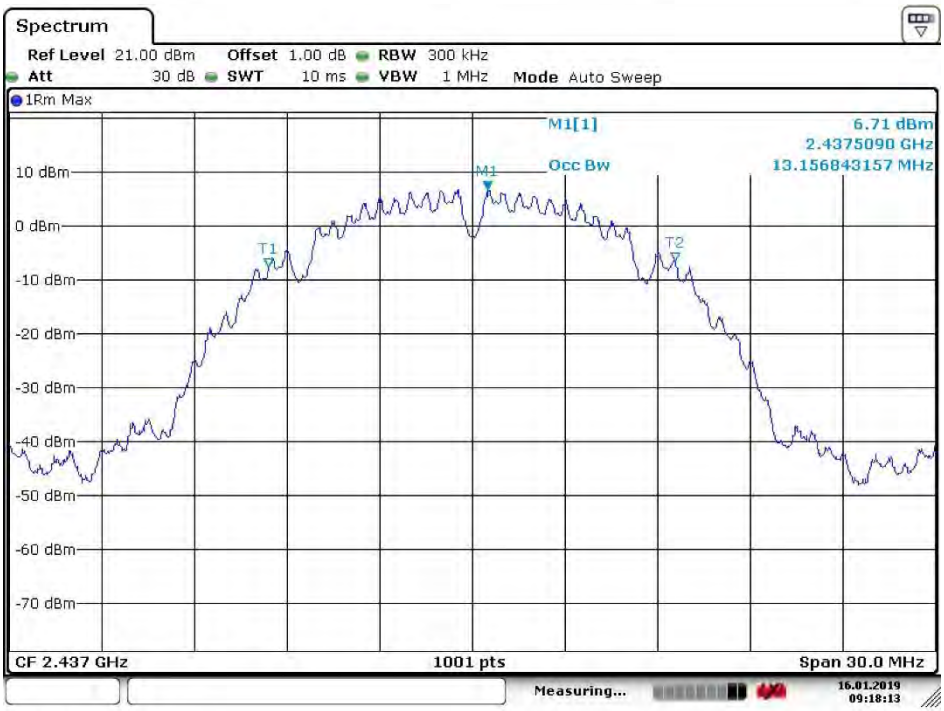

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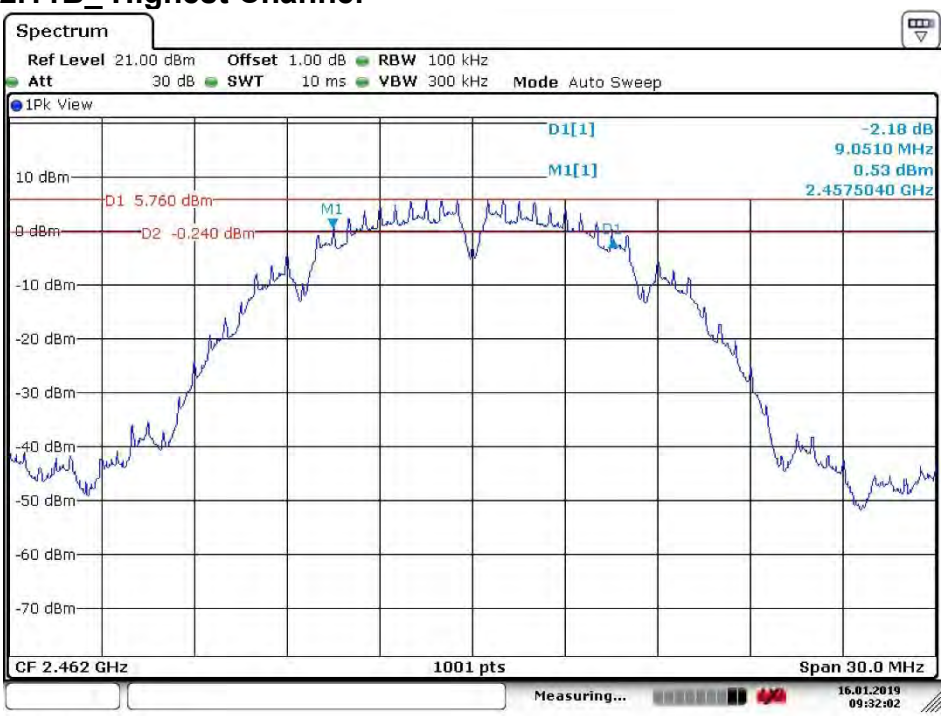
4.5.2.1.3 802.11B_ Highest Channel



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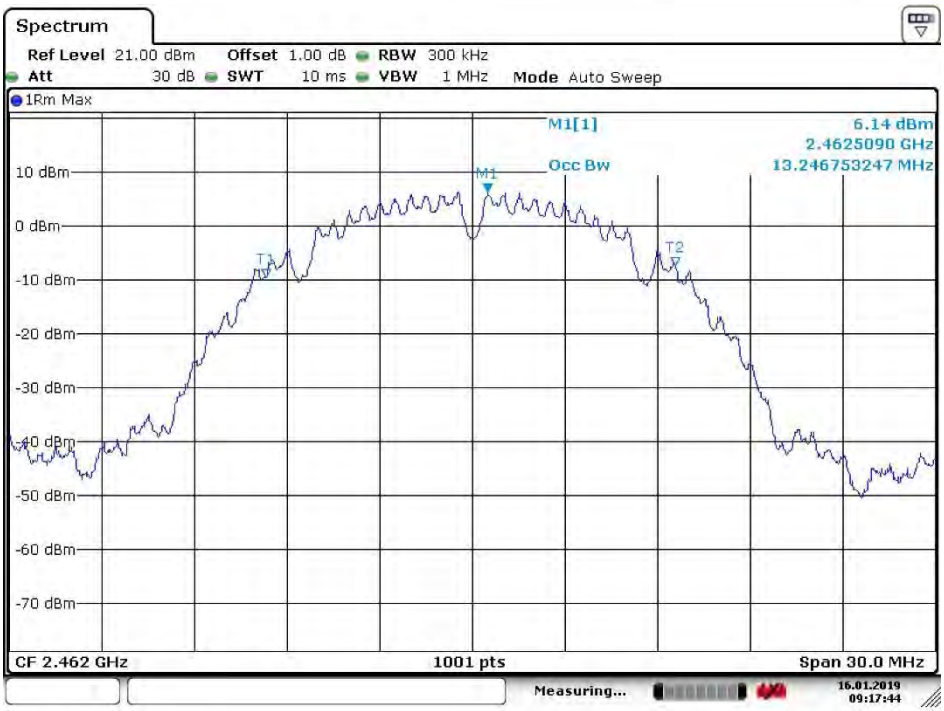

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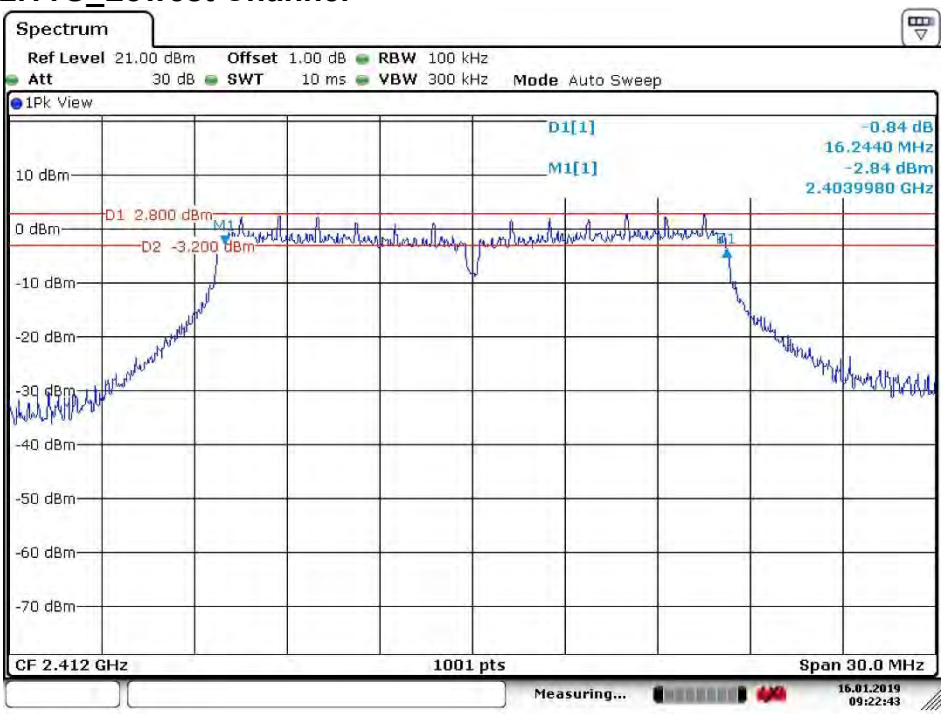
4.5.2.1.4 802.11G_Lowest Channel



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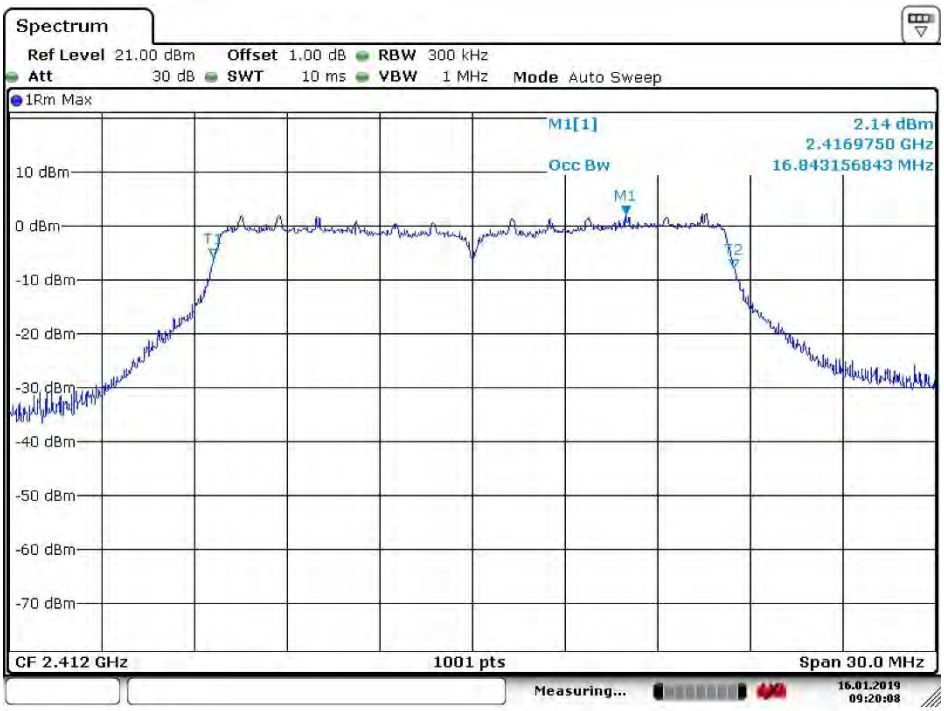

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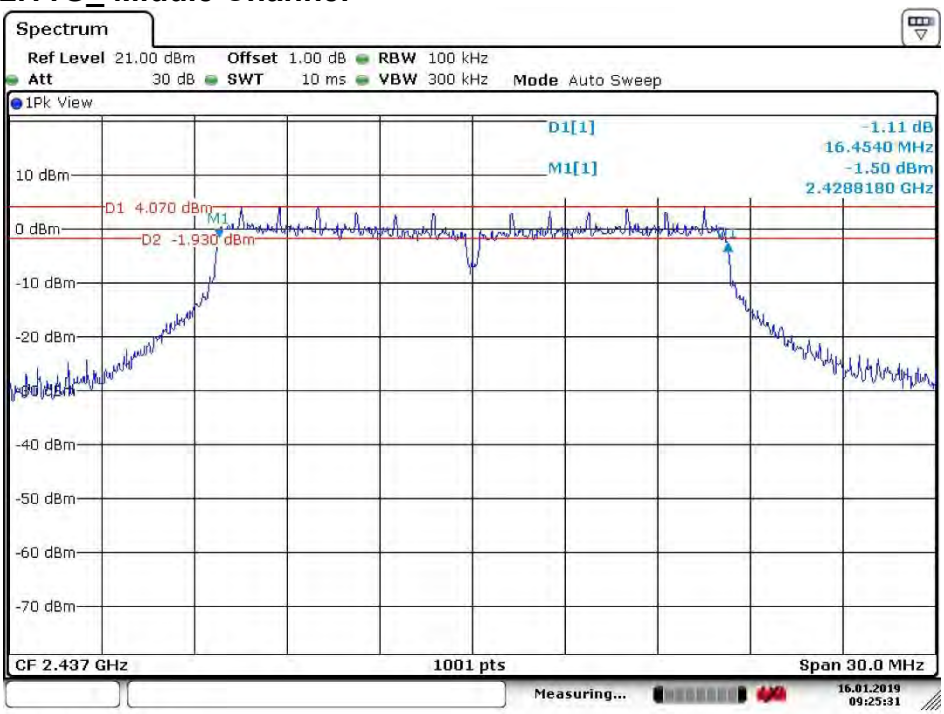
4.5.2.1.5 802.11G_ Middle Channel



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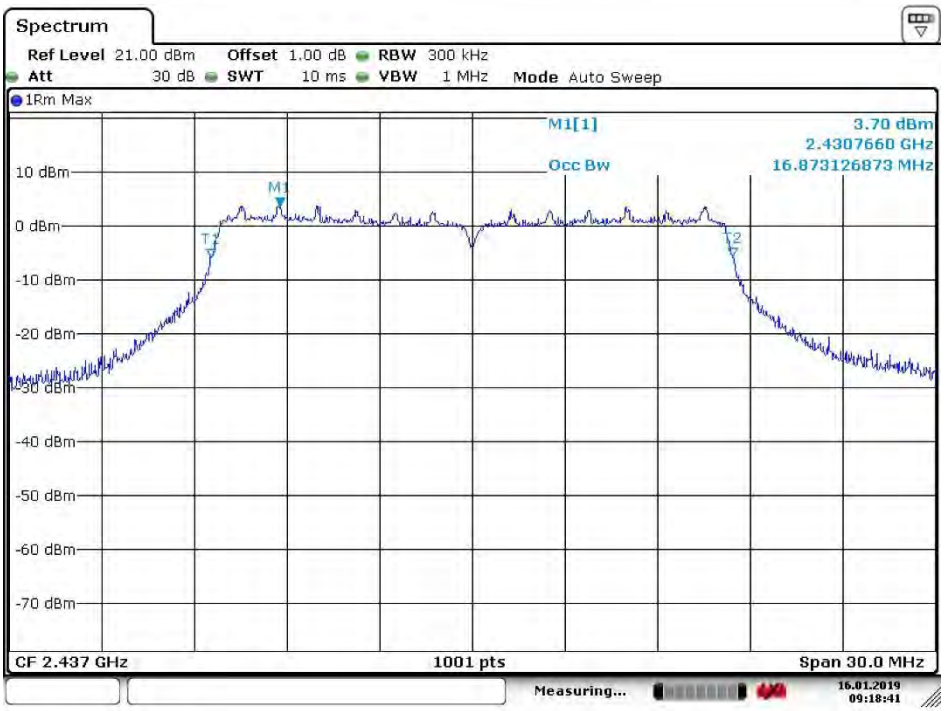

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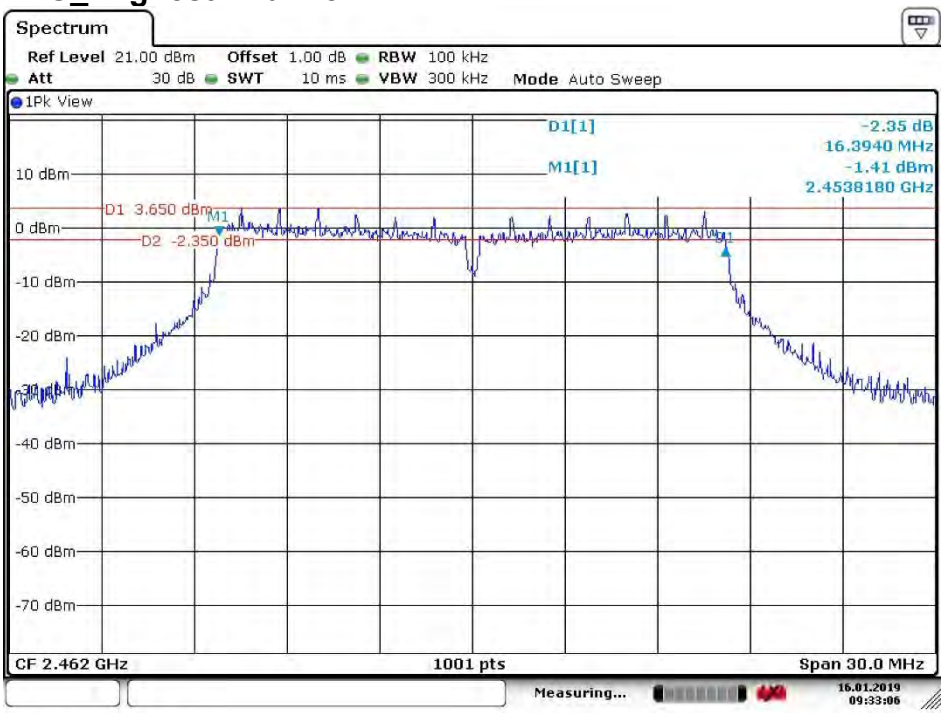
4.5.2.1.6 802.11G_ Highest Channel



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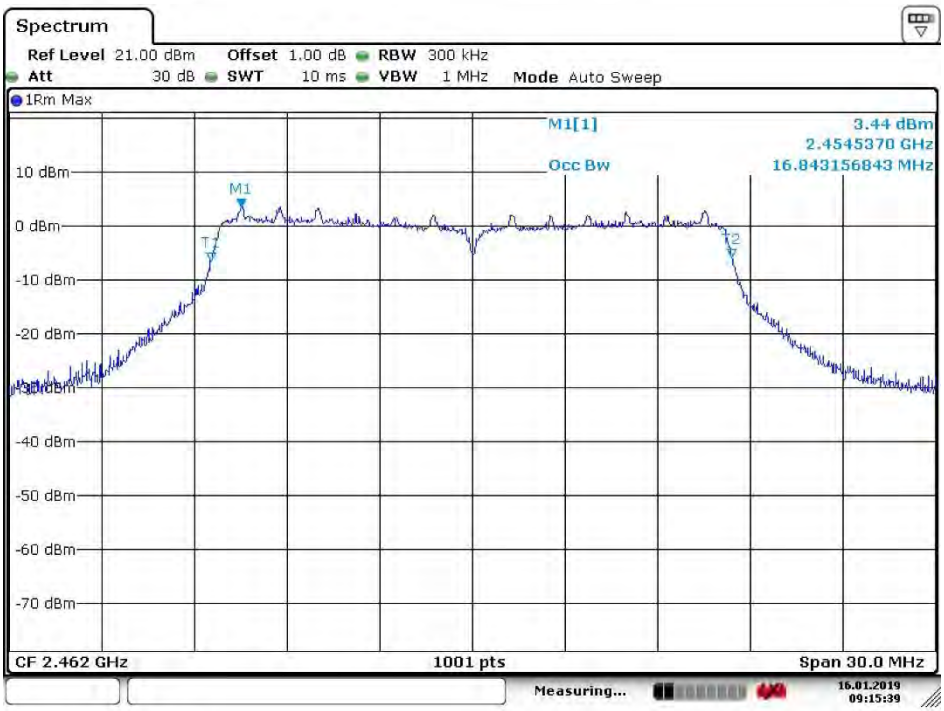

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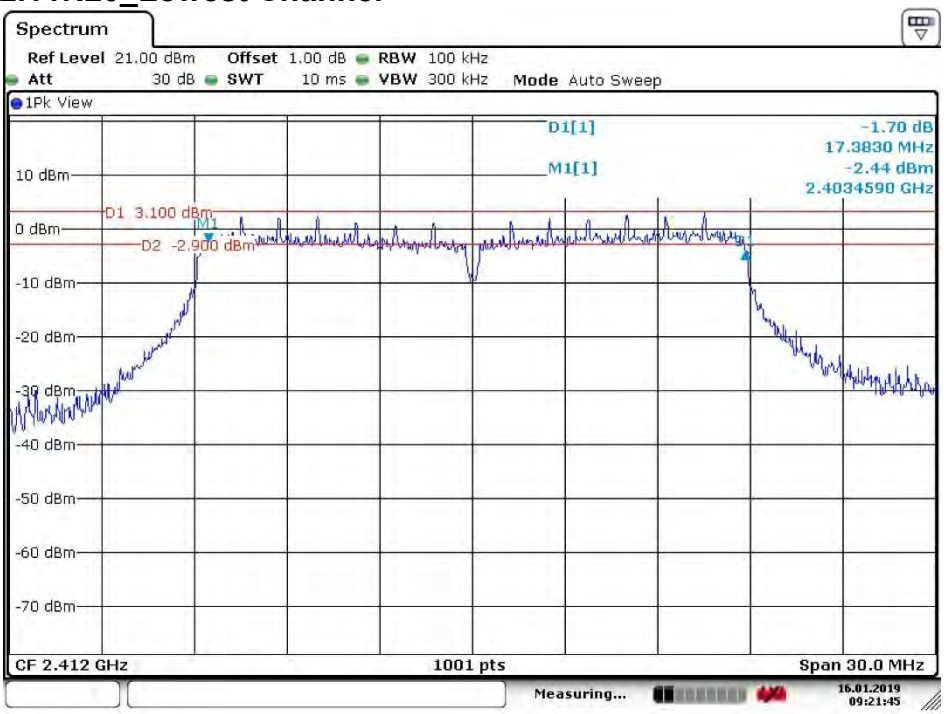
4.5.2.1.7 802.11N20_Lowest Channel



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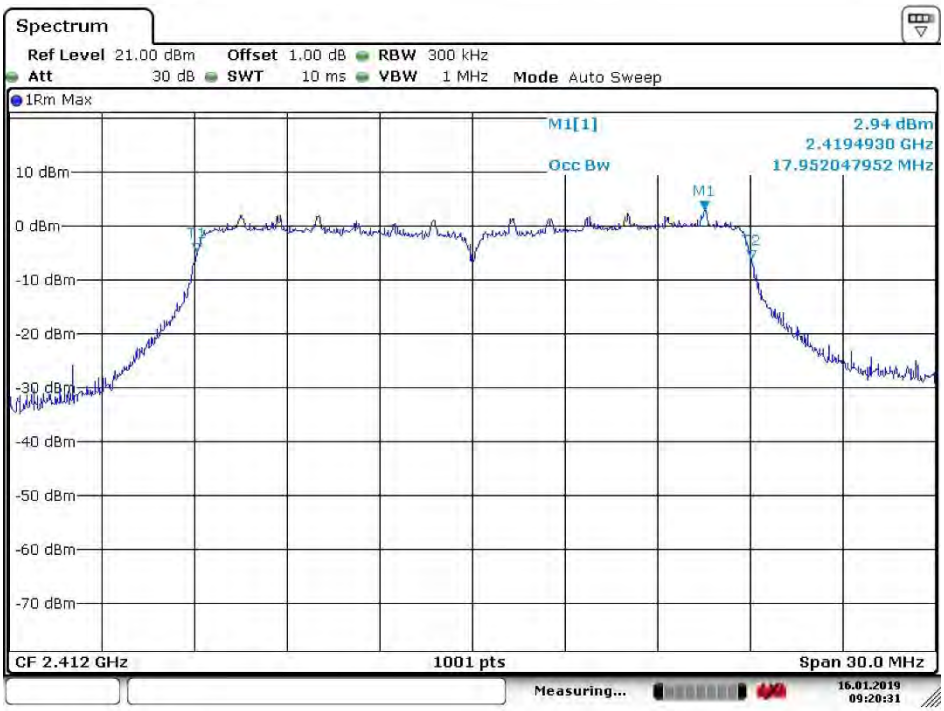

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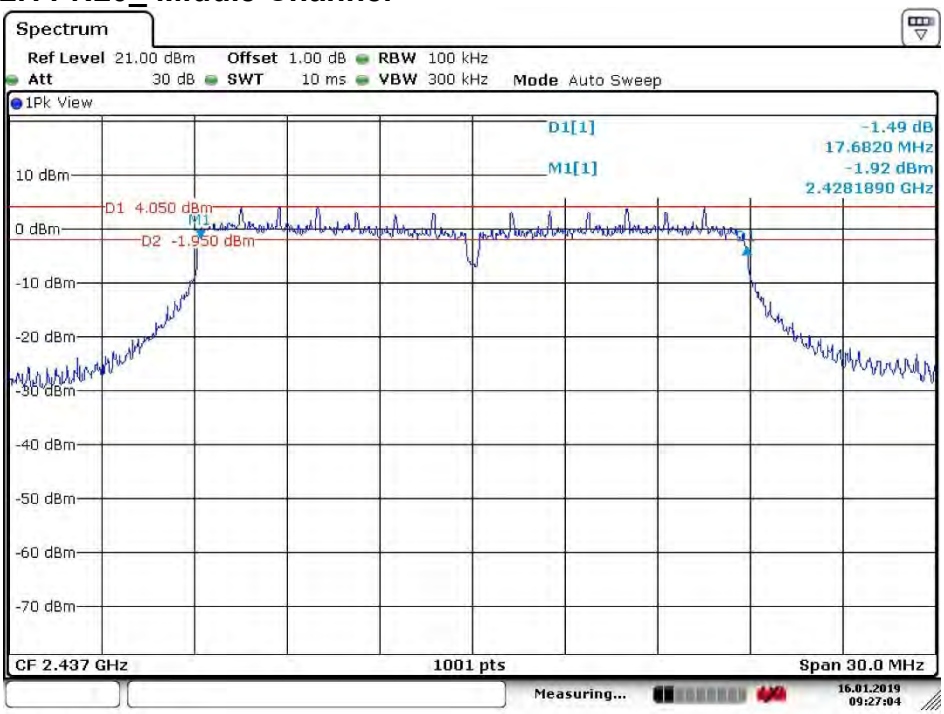
4.5.2.1.8 802.11 N20_ Middle Channel



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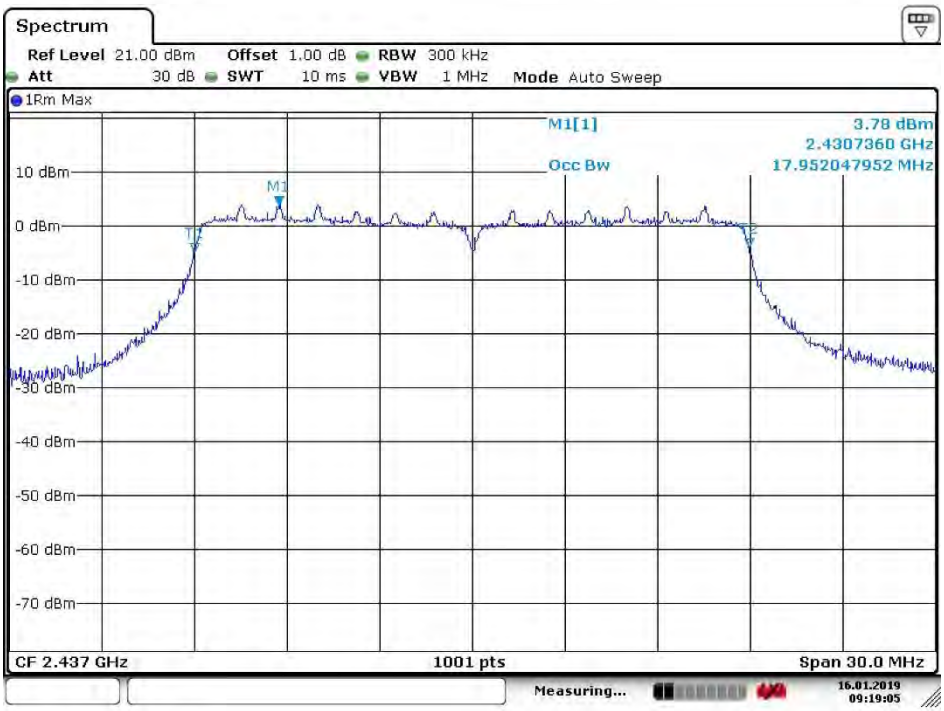

Date: 16.JAN.2019 09:19:06

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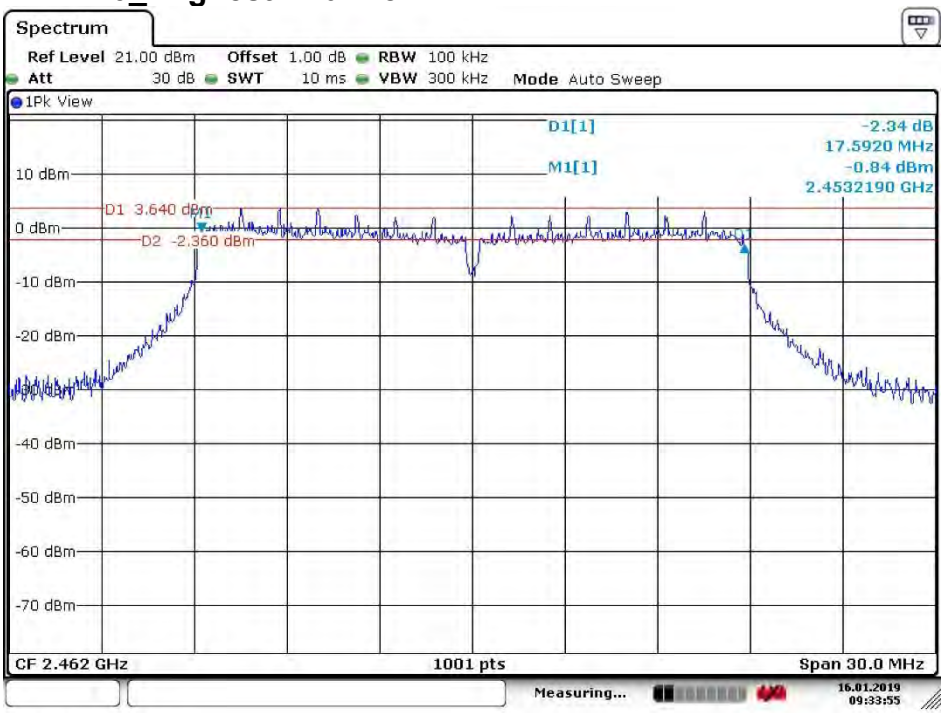
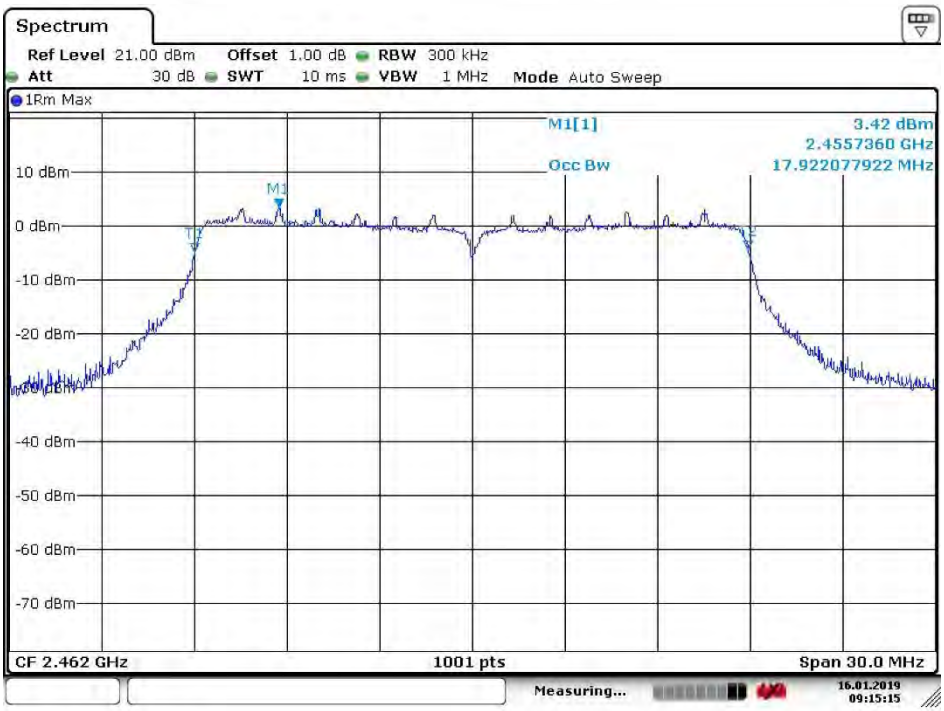
4.5.2.1.9 802.11 N20_ Highest Channel



Date: 16.JAN.2019 09:33:55



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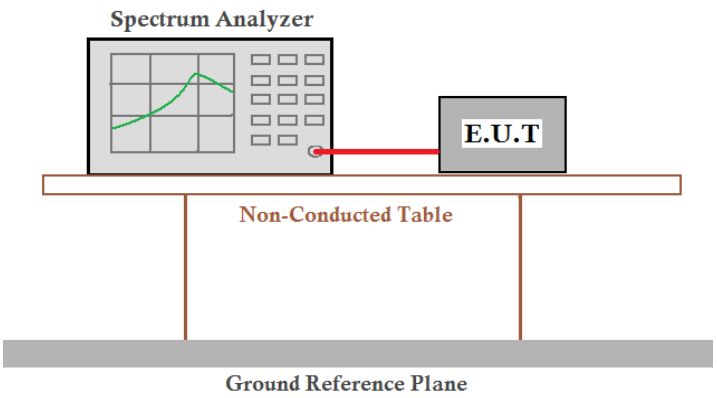
4.6 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10 :2013 Section 11.10.2
Test Setup:	
Test Instruments:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test 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);
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

4.6.1 Test Results

Mode	Test Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11B	Lowest	-7.96	≤8.00	Pass
	Middle	-6.51	≤8.00	Pass
	Highest	-7.02	≤8.00	Pass
802.11G	Lowest	-9.71	≤8.00	Pass
	Middle	-9.24	≤8.00	Pass
	Highest	-9.22	≤8.00	Pass
802.11N20	Lowest	-10.30	≤8.00	Pass
	Middle	-8.58	≤8.00	Pass
	Highest	-9.02	≤8.00	Pass

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4.6.2 Test plots

4.6.2.1 ANT1

4.6.2.1.1 802.11B_Lowest Channel

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4.6.2.1.2 802.11B_ Middle Channel

Date: 16.JAN.2019 09:36:06

4.6.2.1.3 802.11B_ Highest Channel

Date: 16.JAN.2019 09:35:38

4.6.2.1.4 802.11G_Lowest Channel

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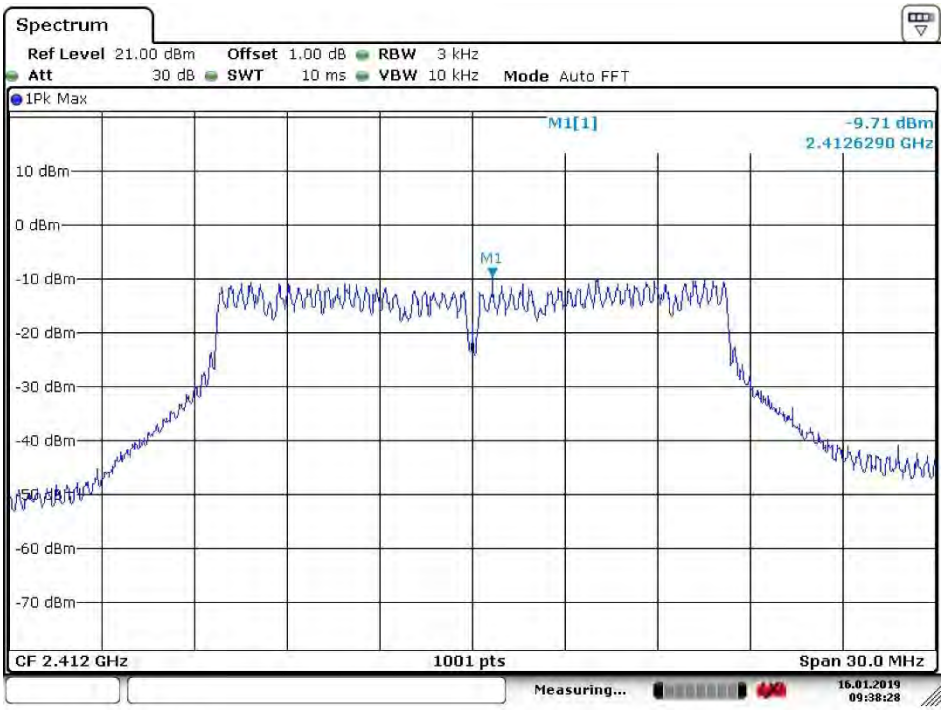
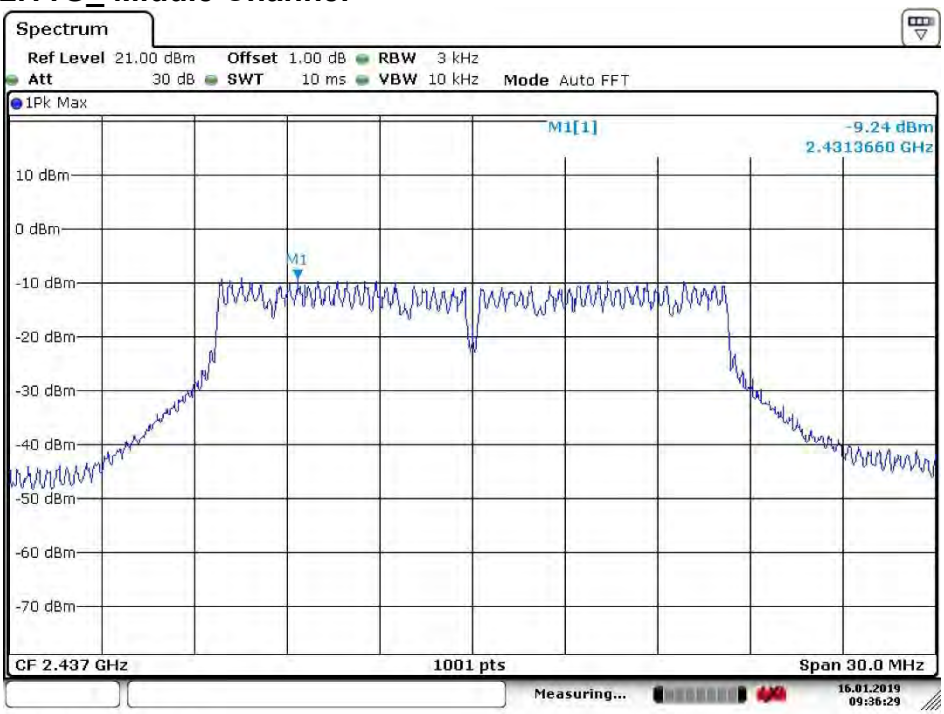


Date: 16.JAN.2019 09:38:29

4.6.2.1.5 802.11G_ Middle Channel



Date: 16.JAN.2019 09:36:29

4.6.2.1.6 802.11G_ Highest Channel

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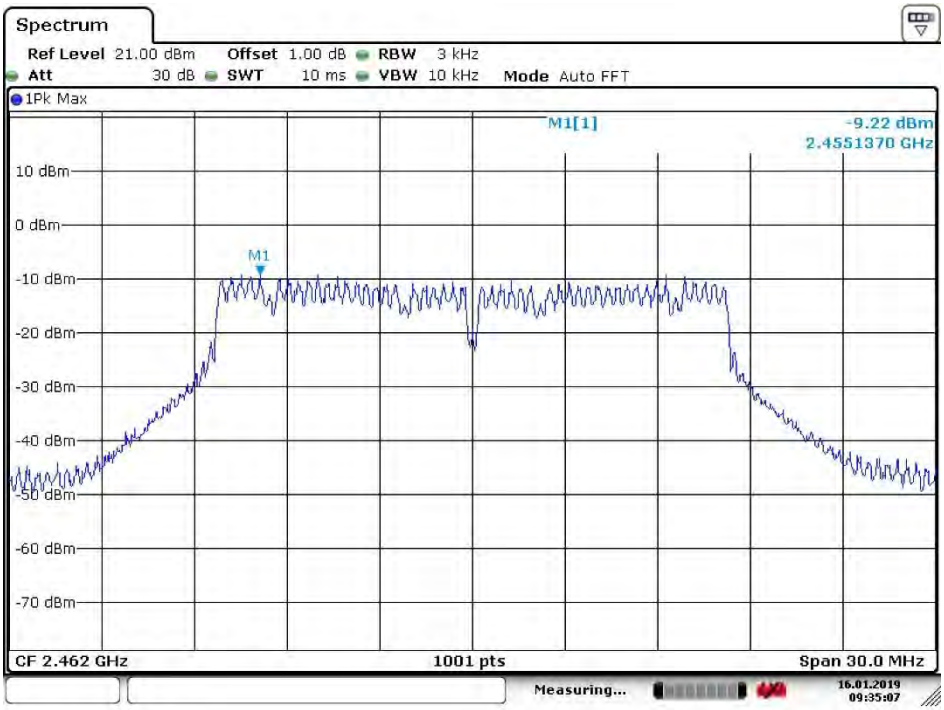
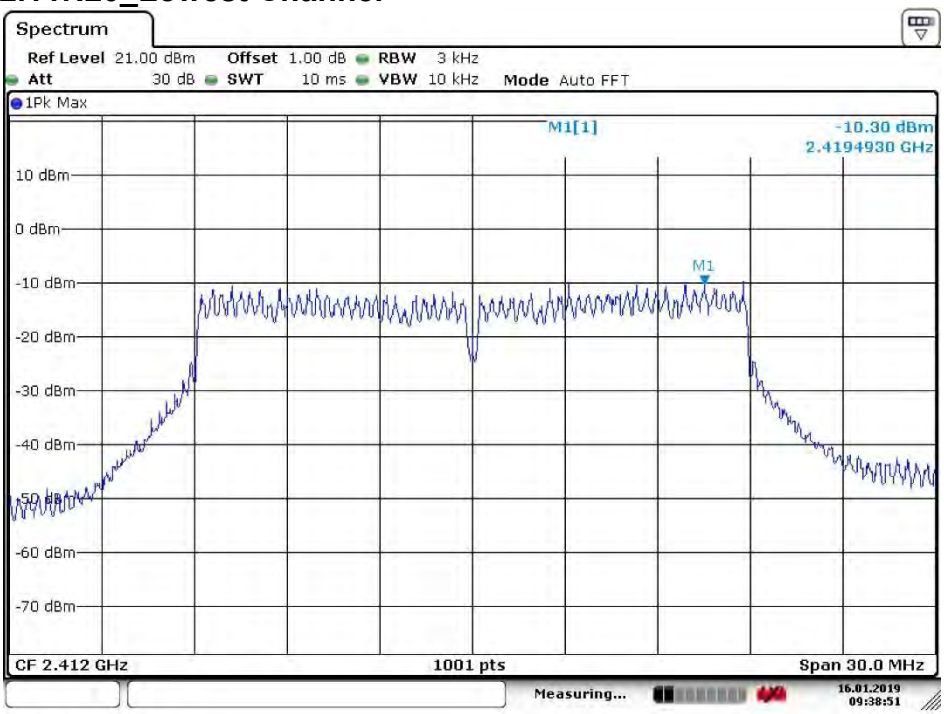


Date: 16.JAN.2019 09:35:08

4.6.2.1.7 802.11N20_Lowest Channel



Date: 16.JAN.2019 09:38:52

4.6.2.1.8 802.11 N20_ Middle Channel

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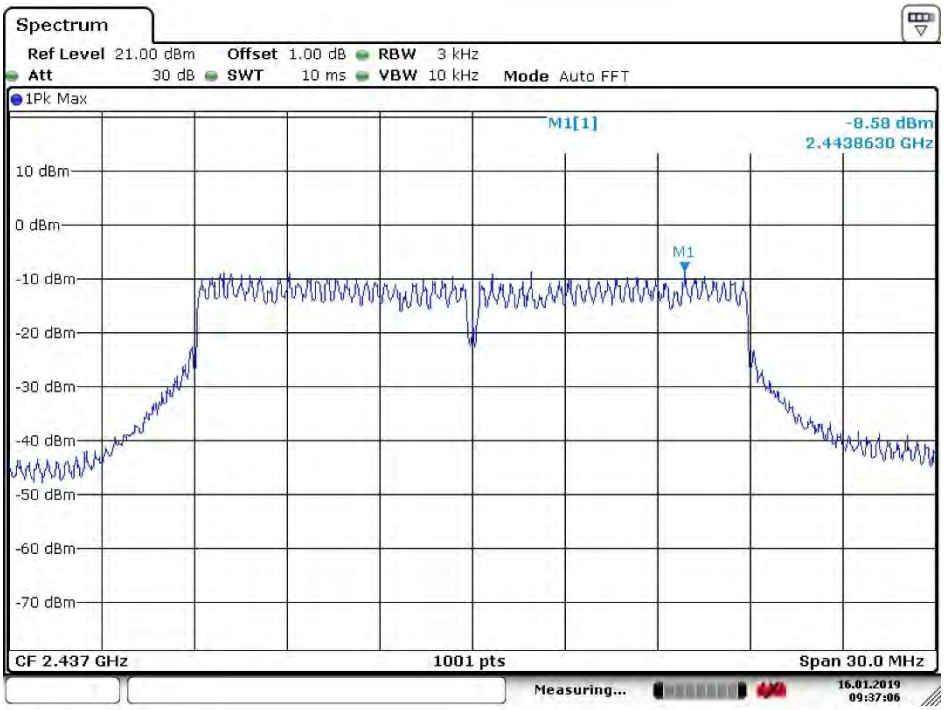
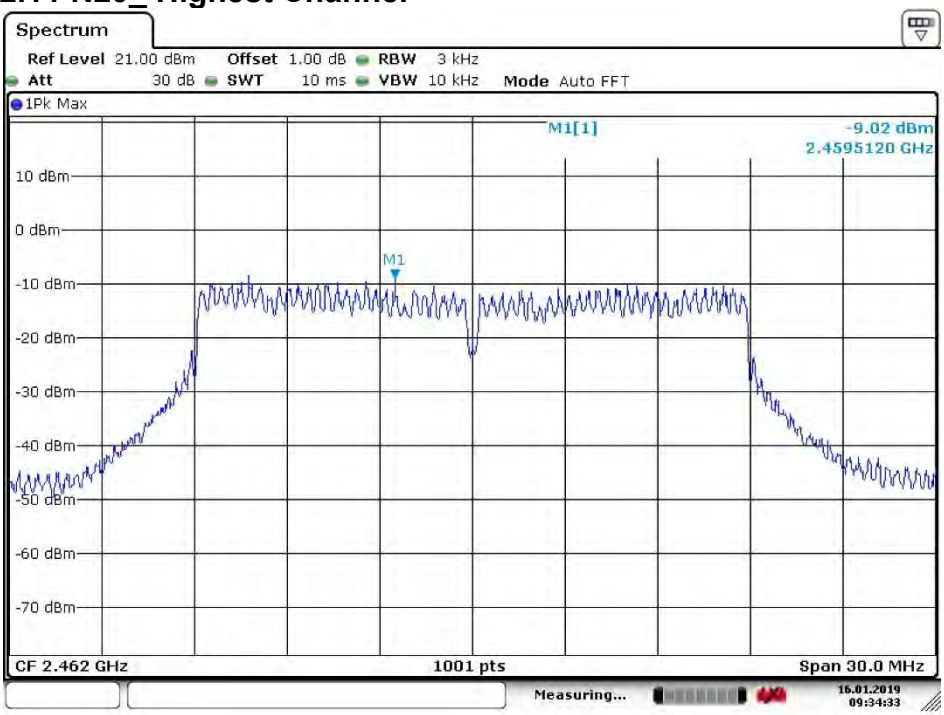


Date: 16.JAN.2019 09:37:06

4.6.2.1.9 802.11 N20_ Highest Channel



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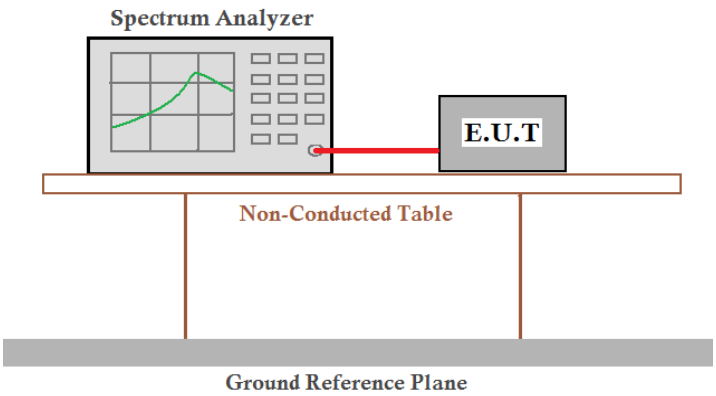
4.7 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.13
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test 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) ;
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

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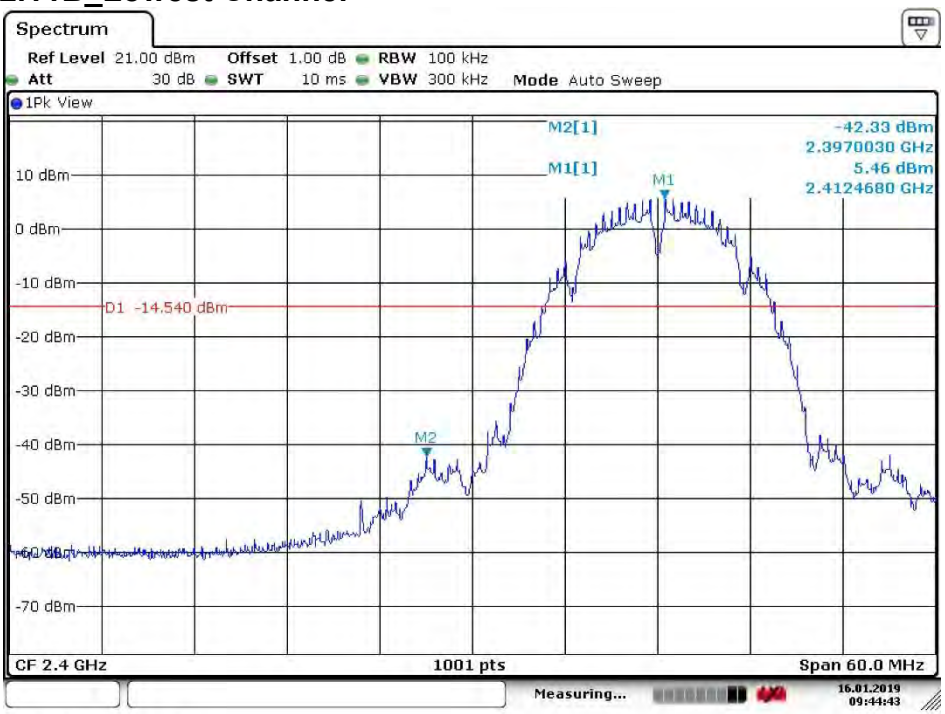
4.7.1 Test plots

4.7.1.1 ANT1

4.7.1.1.1 802.11B_Lowest Channel



Date: 16.JAN.2019 09:44:44

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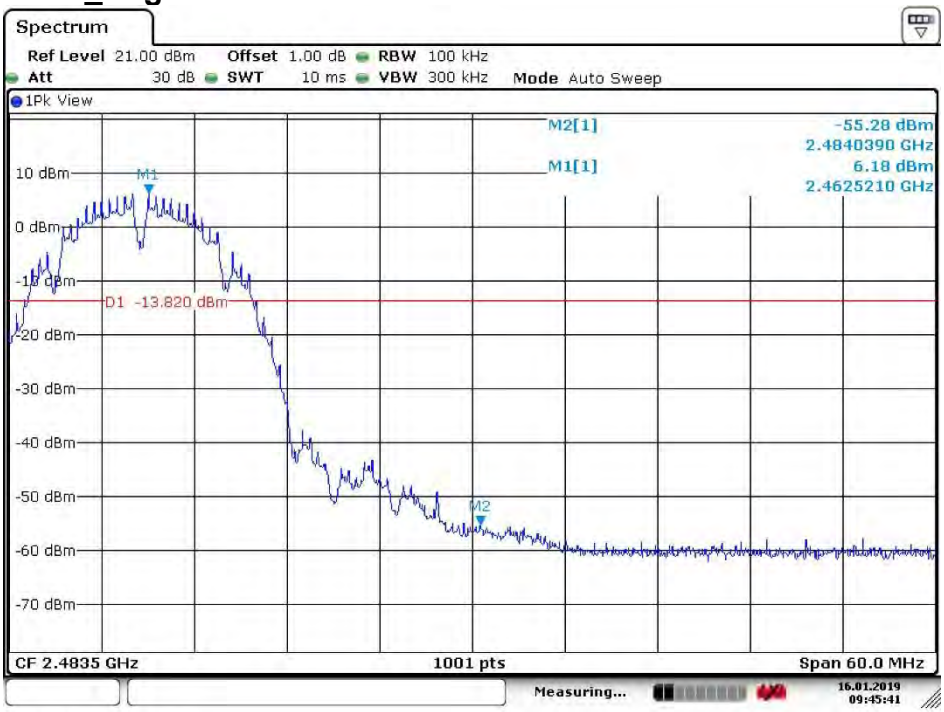
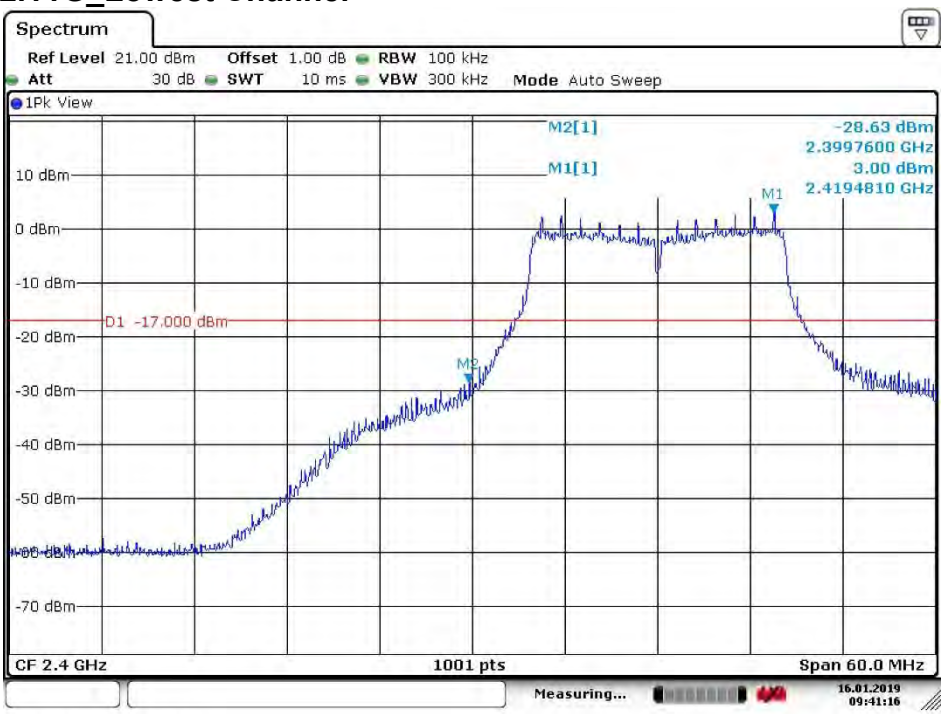
4.7.1.1.2 802.11B_ Highest Channel



Date: 16.JAN.2019 09:45:41

4.7.1.1.3 802.11G_Lowest Channel



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4.7.1.1.4 802.11G_ Highest Channel

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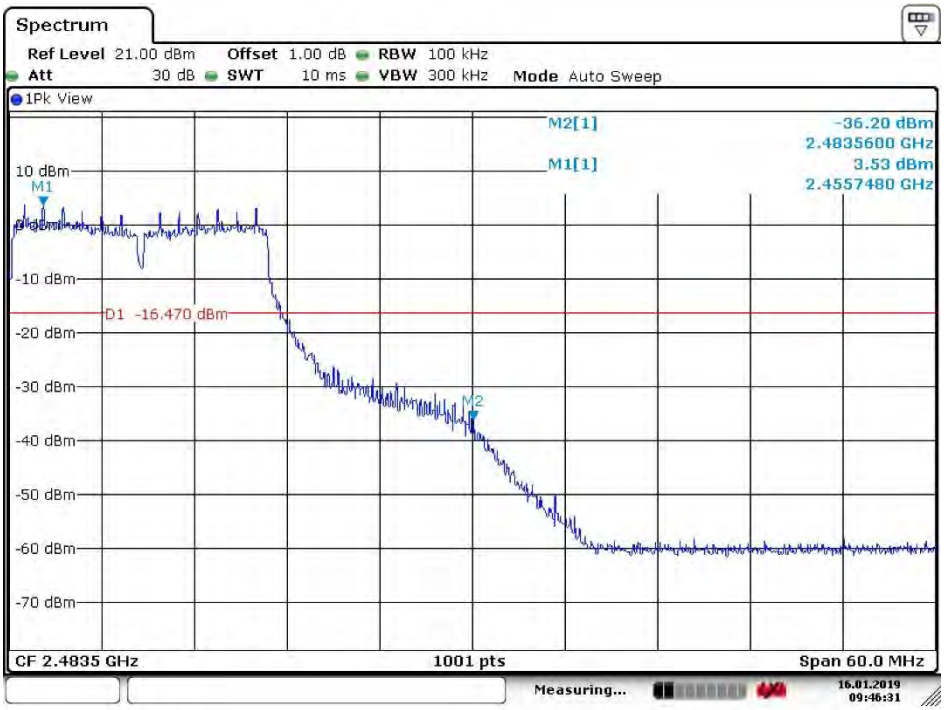
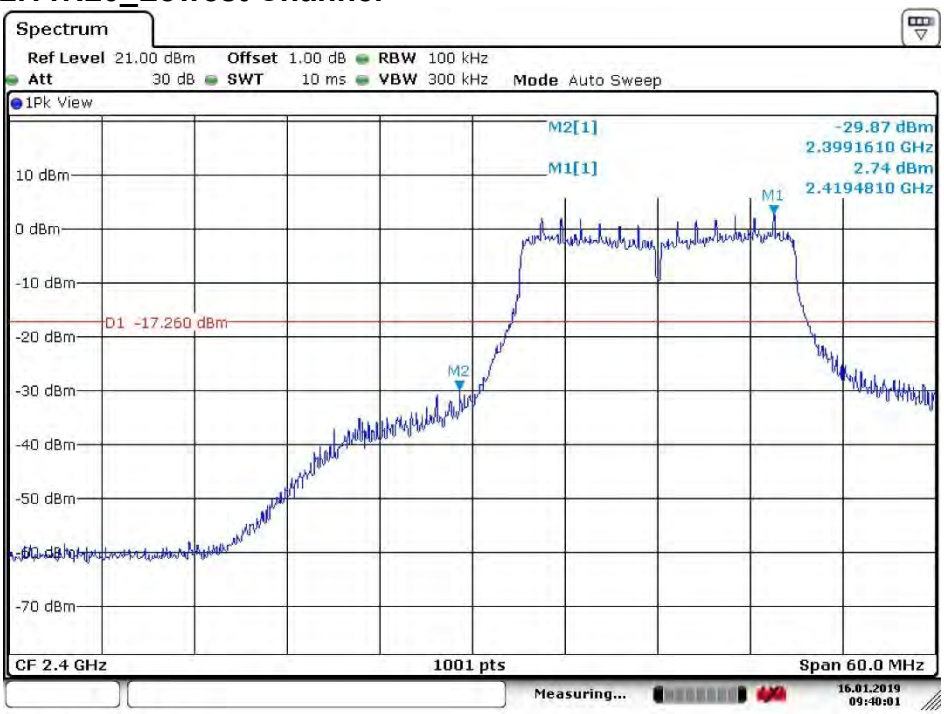


Date: 16.JAN.2019 09:46:31

4.7.1.1.5 802.11N20_Lowest Channel



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4.7.1.1.6 802.11 N20_ Highest Channel

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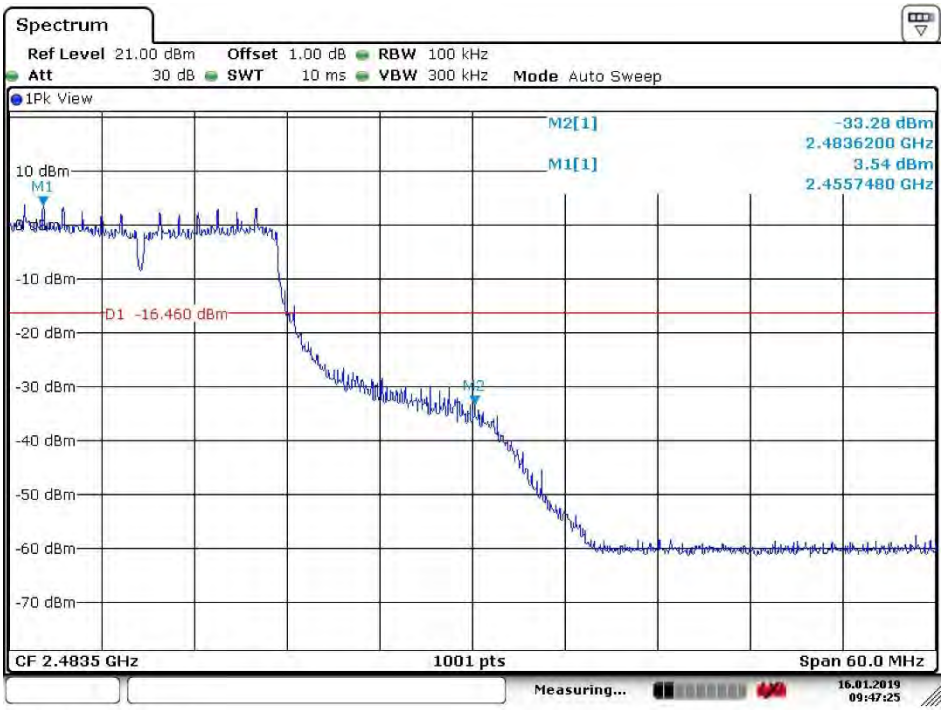

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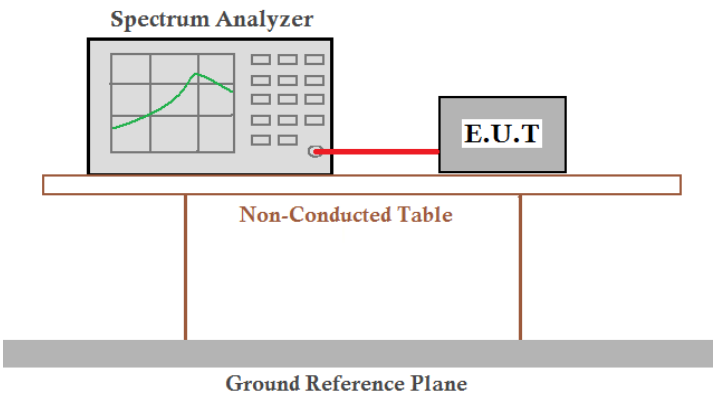
4.8 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test 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);
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

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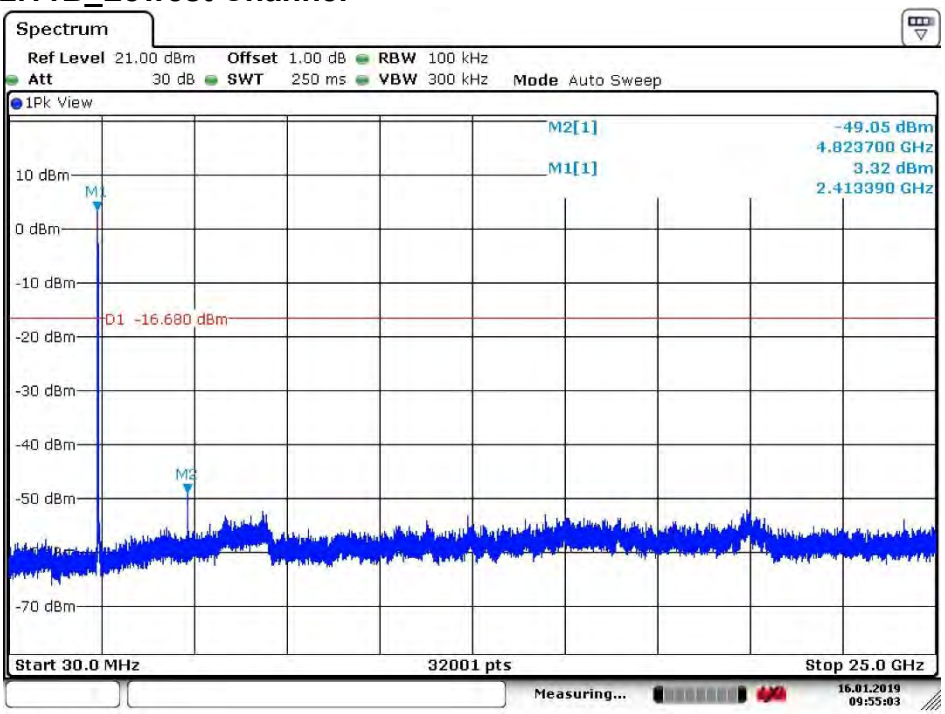
4.8.1 Test plots

4.8.1.1 ANT1

4.8.1.1.1 802.11B_Lowest Channel



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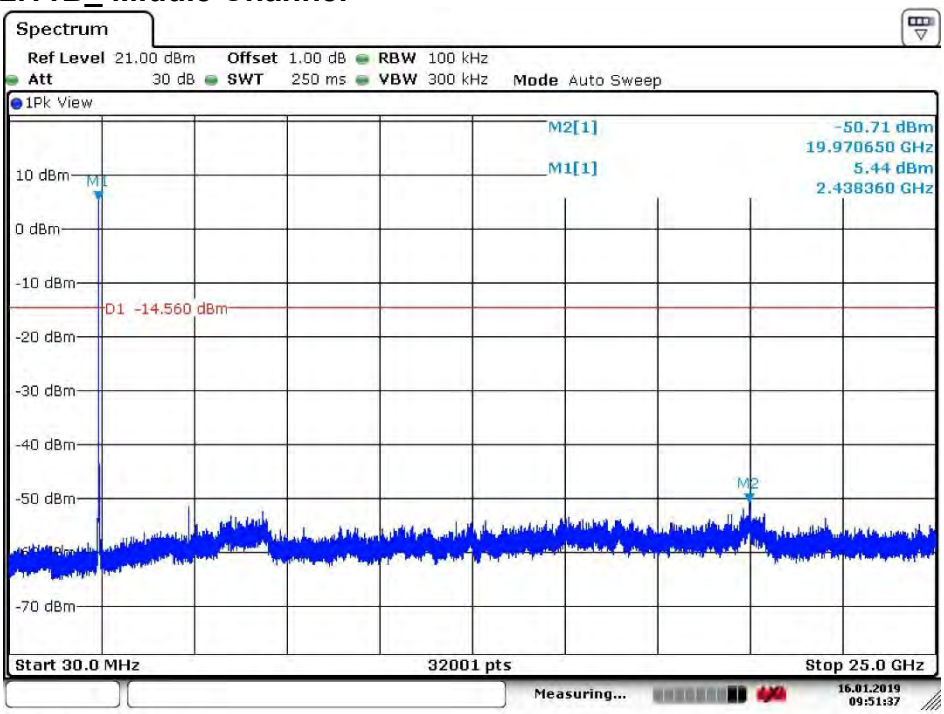
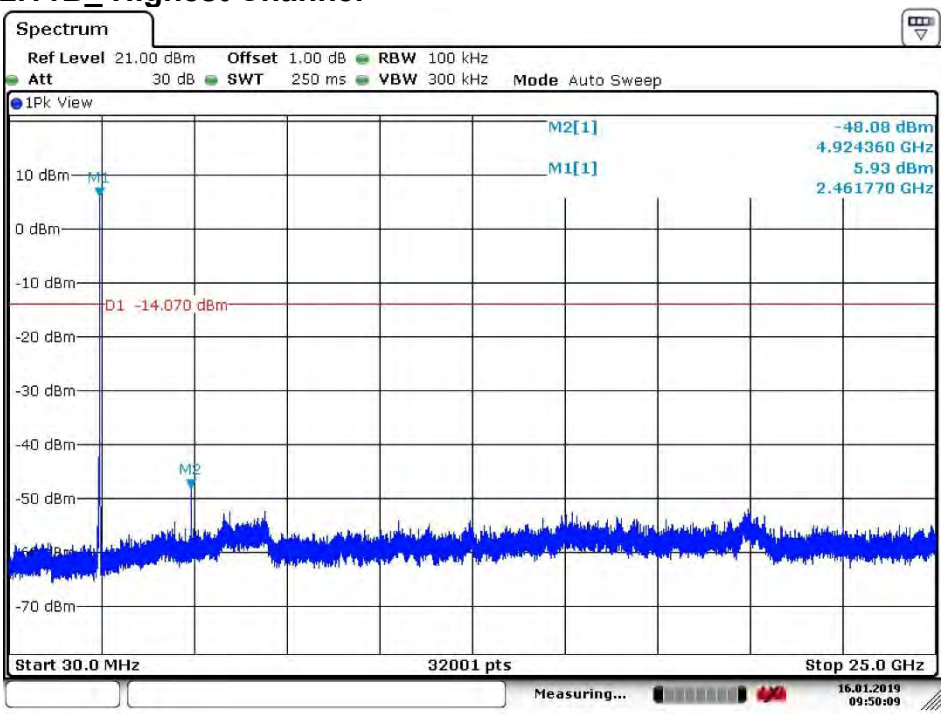
4.8.1.1.2 802.11B_ Middle Channel



Date: 16.JAN.2019 09:51:37

4.8.1.1.3 802.11B_ Highest Channel



Date: 16.JAN.2019 09:50:09

4.8.1.1.4 802.11G_Lowest Channel

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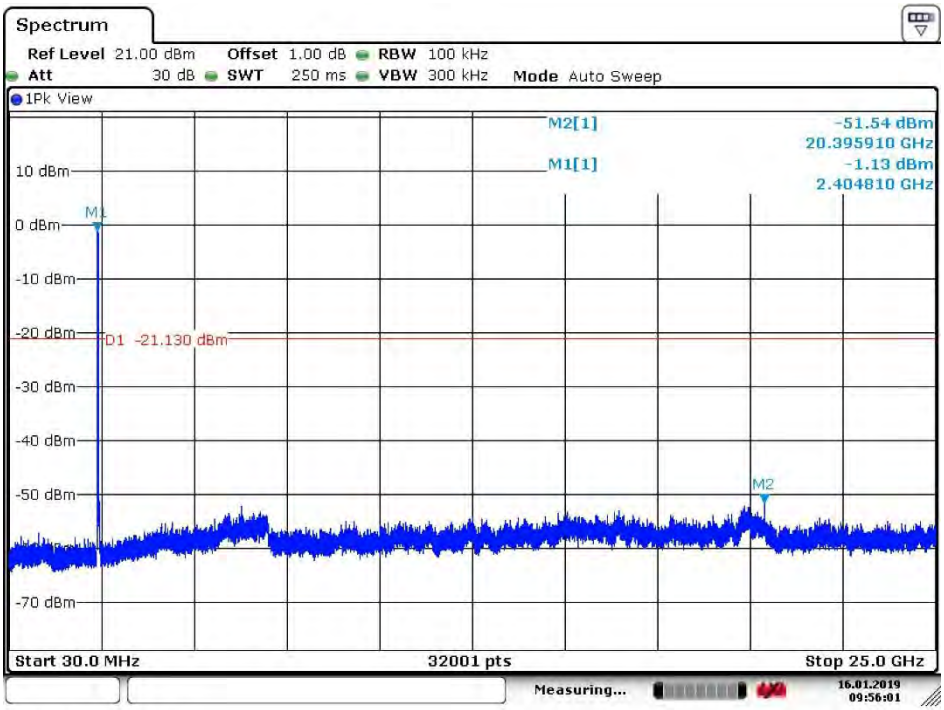
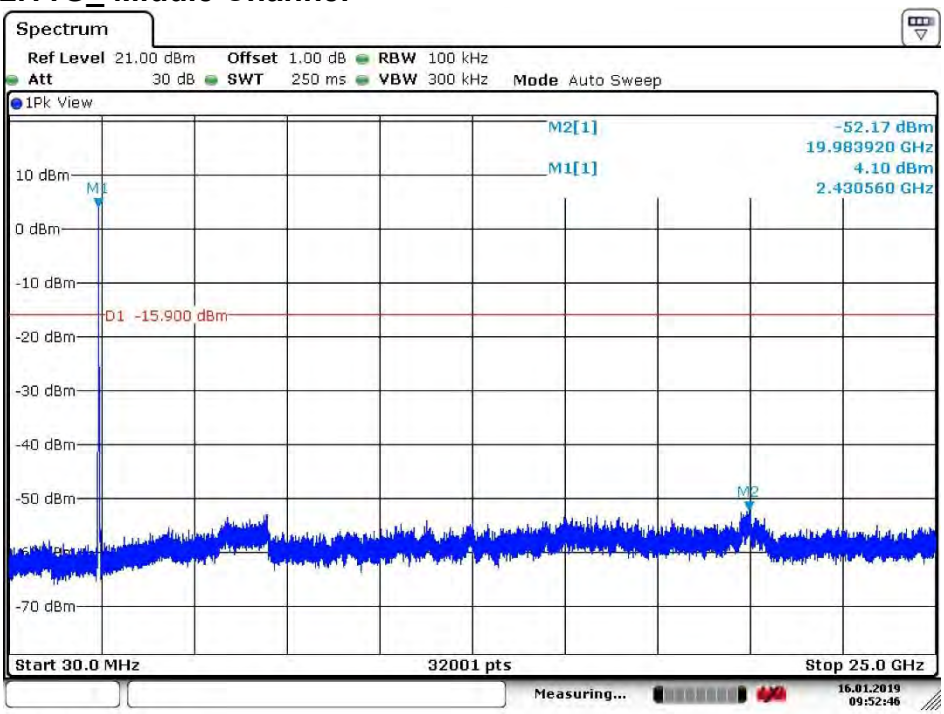


Date: 16.JAN.2019 09:56:01

4.8.1.1.5 802.11G_ Middle Channel



Date: 16.JAN.2019 09:52:47

4.8.1.1.6 802.11G_ Highest Channel

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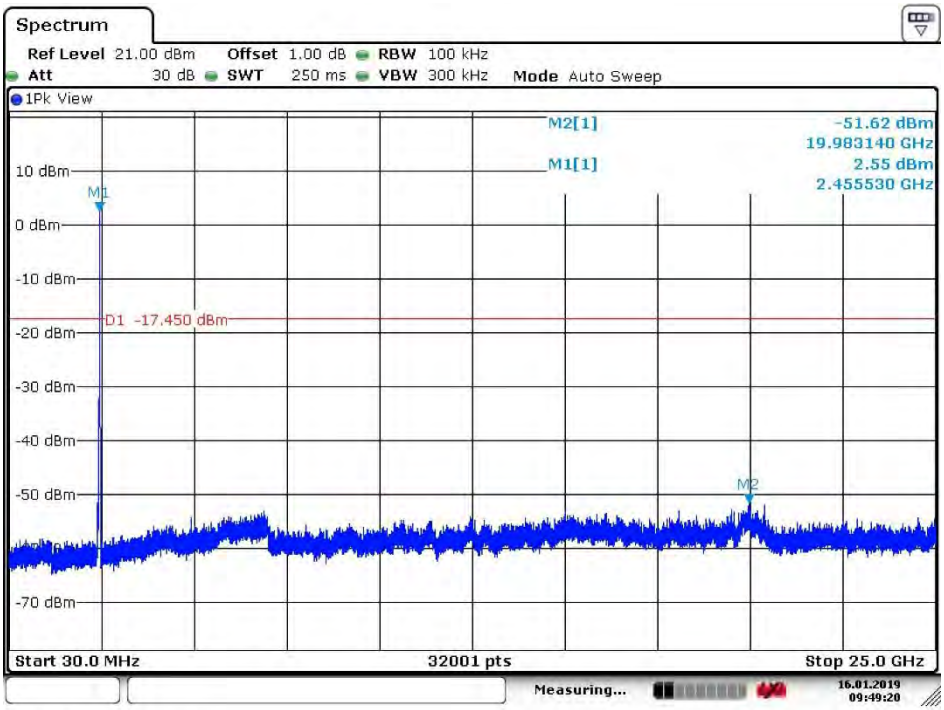
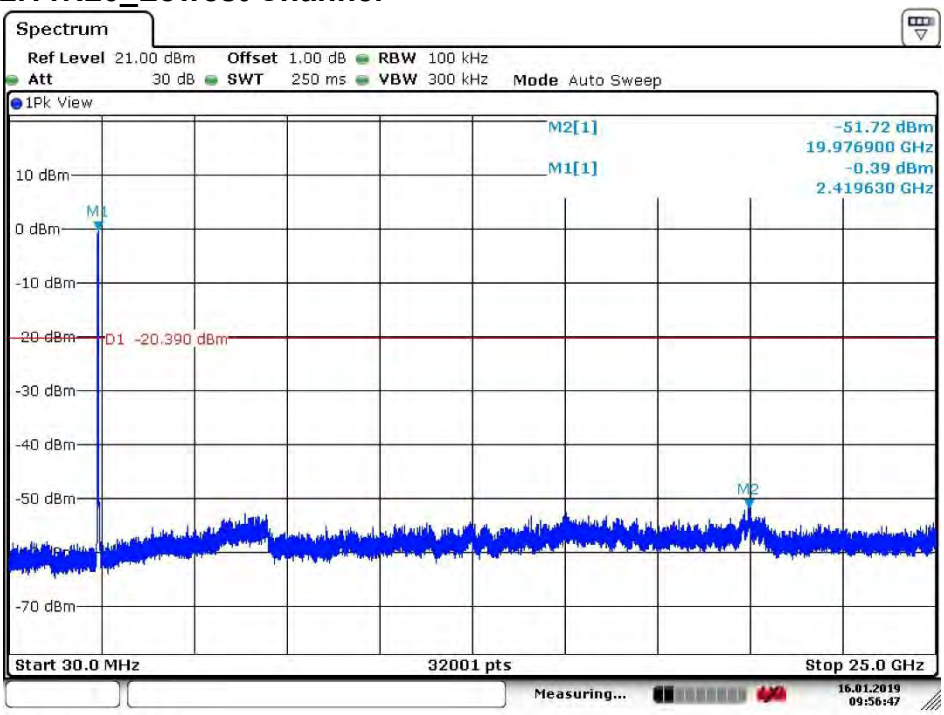


Date: 16.JAN.2019 09:49:21

4.8.1.1.7 802.11N20_Lowest Channel



Date: 16.JAN.2019 09:56:48

4.8.1.1.8 802.11 N20_ Middle Channel

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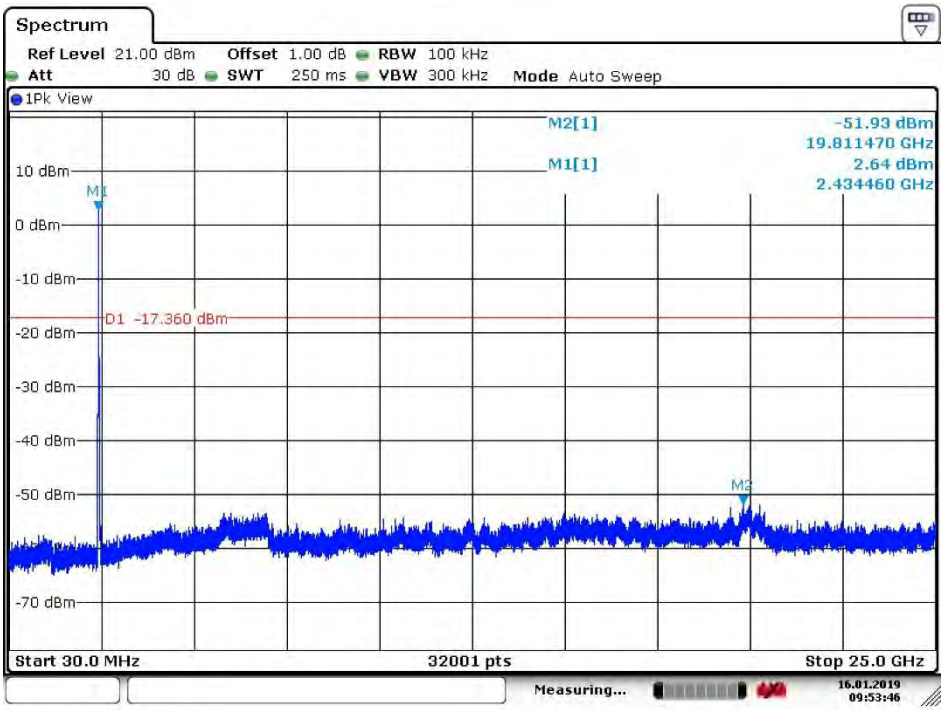
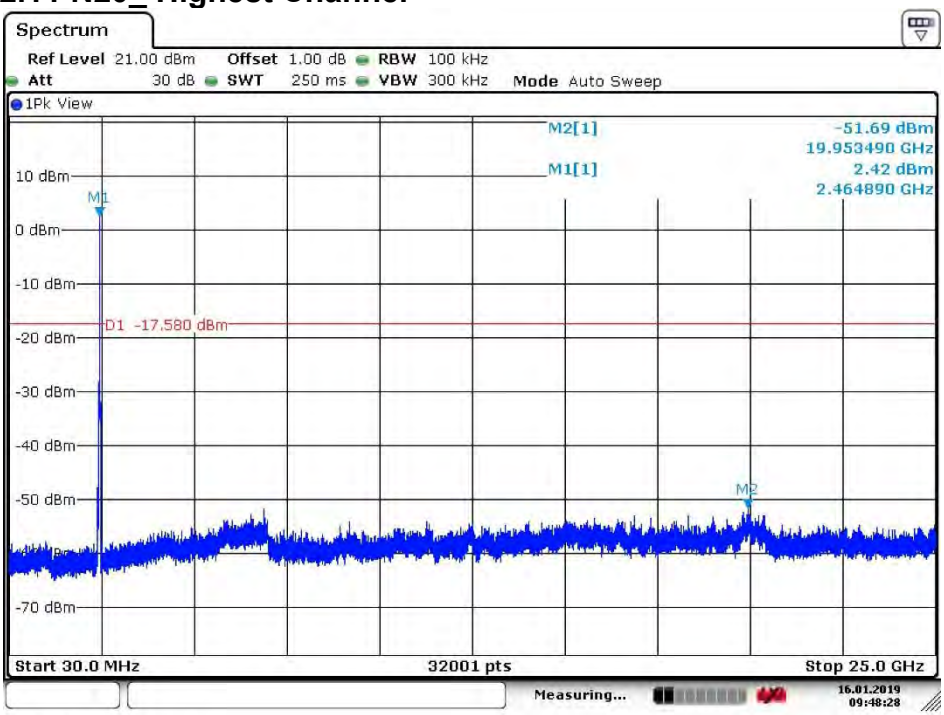


Date: 16.JAN.2019 09:53:46

4.8.1.1.9 802.11 N20_ Highest Channel



Date: 16.JAN.2019 09:48:28

Remark:

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

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4.9 Radiated Spurious Emissions

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

Test Setup:

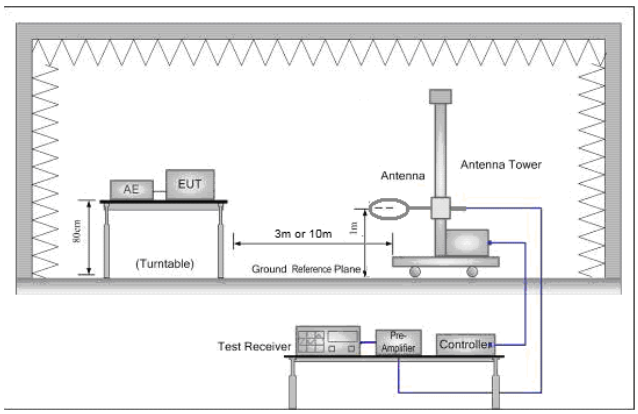

Figure 1. Below 30MHz

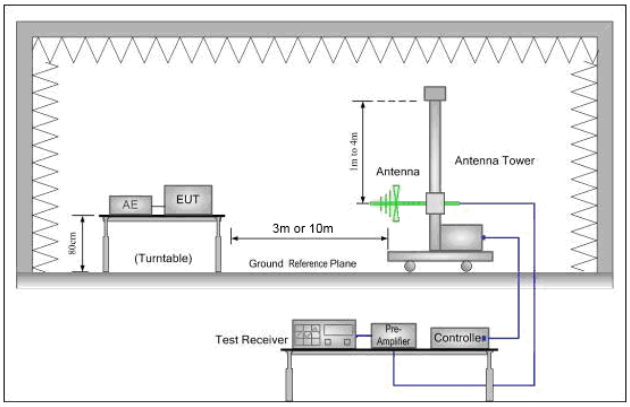

Figure 2. 30MHz to 1GHz

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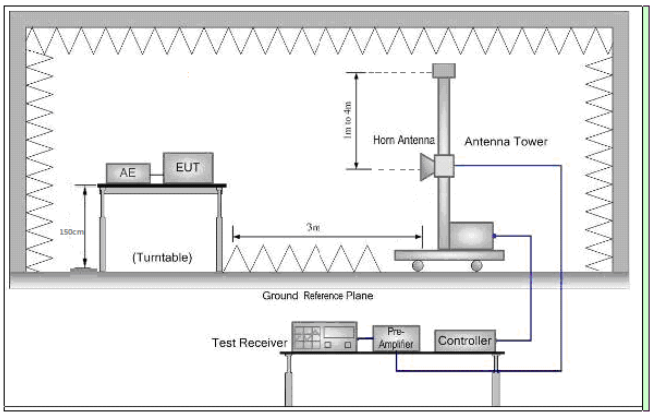

Figure 3. Above 1 GHz

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.

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Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

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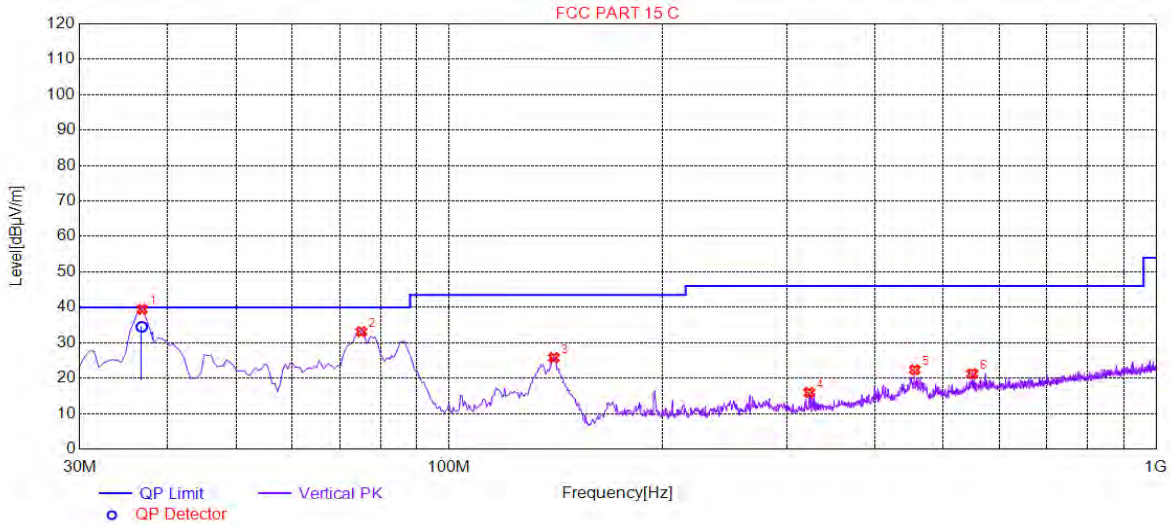
4.9.1 Radiated emission below 1GHz

4.9.1.1 Charge + Transmitting, Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7934	39.43	-32.19	40.00	0.57	100	94	Vertical
2	75.1276	33.13	-35.04	40.00	6.87	100	109	Vertical
3	140.6353	25.80	-35.18	43.50	17.70	100	87	Vertical
4	323.0865	15.97	-27.18	46.00	30.03	100	248	Vertical
5	455.5578	22.38	-23.72	46.00	23.62	100	157	Vertical
6	549.6948	21.29	-21.46	46.00	24.71	100	31	Vertical

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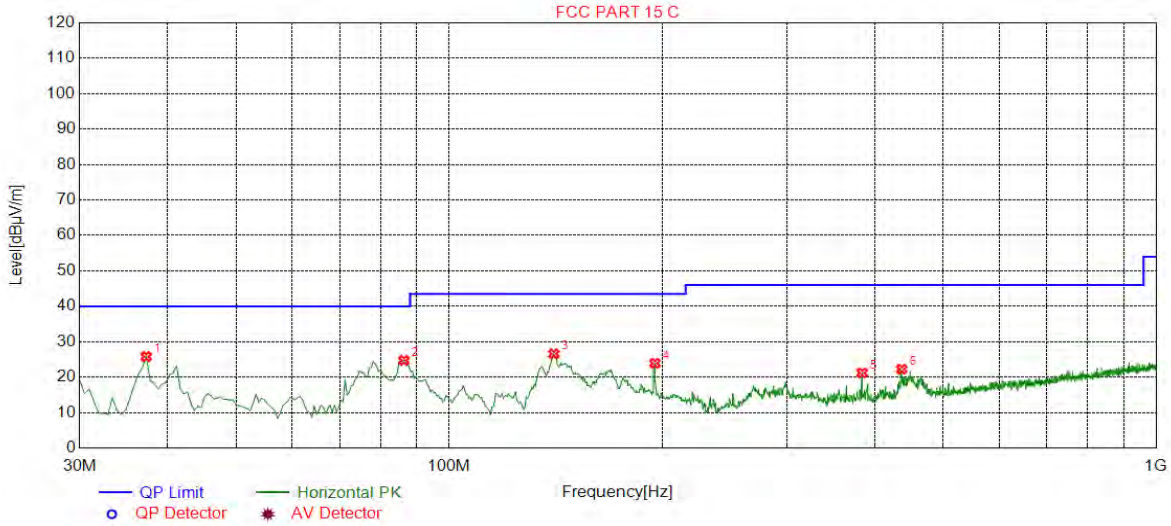
4.9.1.2 Charge + Transmitting, Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.2786	25.80	-32.03	40.00	14.20	200	344	Horizontal
2	86.2881	24.72	-34.32	40.00	15.28	200	177	Horizontal
3	140.6353	26.58	-35.18	43.50	16.92	200	240	Horizontal
4	195.4677	23.93	-31.29	43.50	19.57	100	302	Horizontal
5	383.7419	21.23	-25.41	46.00	24.77	100	309	Horizontal
6	436.6333	22.24	-24.12	46.00	23.76	200	240	Horizontal

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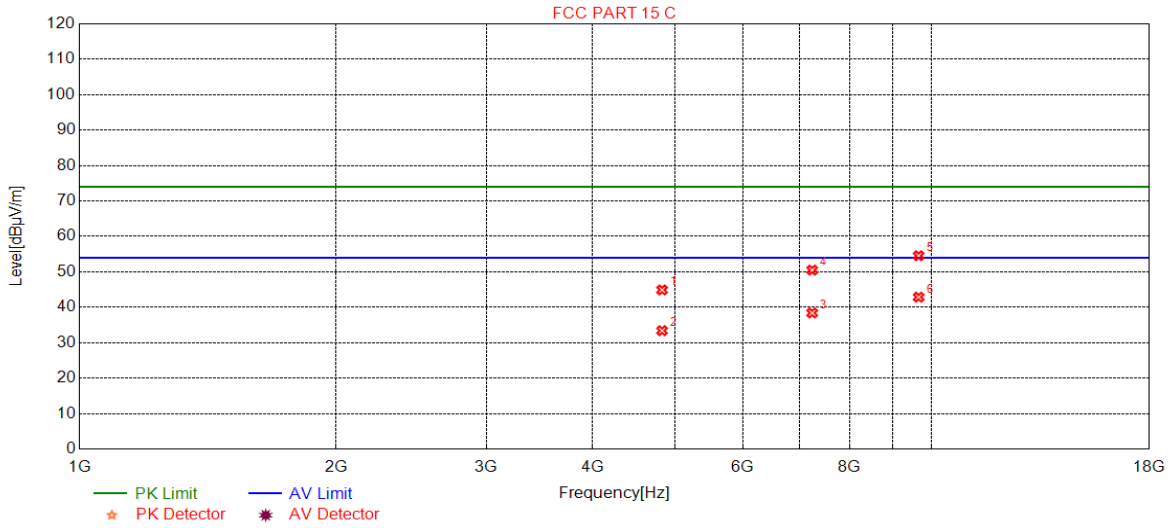
4.9.2 Transmitter emission above 1GHz

4.9.2.1 ANT1

4.9.2.1.1 802.11B_Lowest Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4824.0000	44.90	7.37	74.00	29.10	150	350	Vertical
2	4824.0000	33.40	7.37	54.00	20.60	150	138	Vertical
3	7236.0000	38.40	14.07	54.00	15.60	150	254	Vertical
4	7236.0000	50.50	14.07	74.00	23.50	150	148	Vertical
5	9648.0000	54.55	17.97	74.00	19.45	150	5	Vertical
6	9648.0000	42.87	17.97	54.00	11.13	150	142	Vertical

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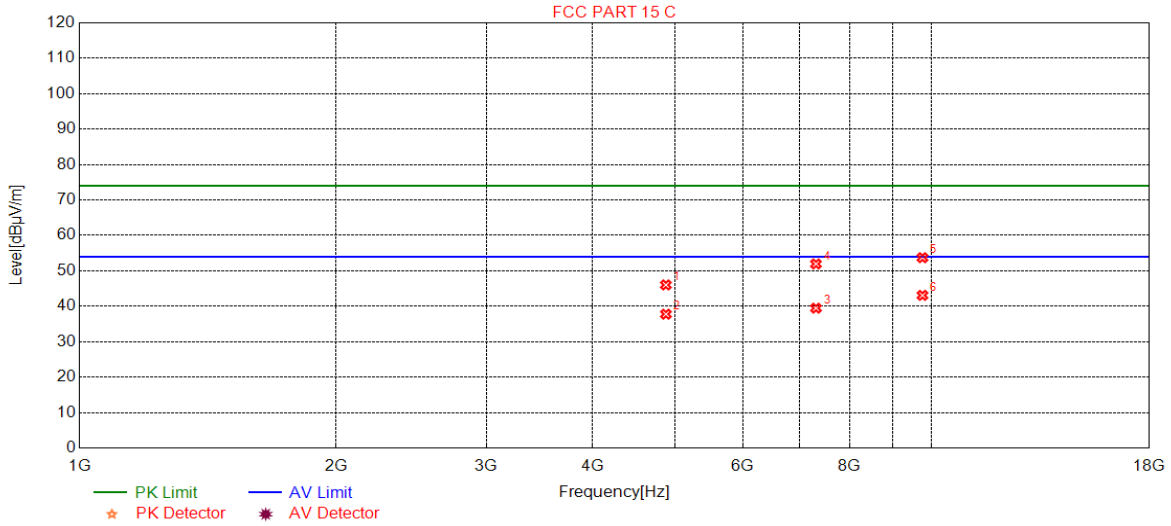
4.9.2.1.2 802.11B_ Middle Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4874.0000	46.03	7.50	74.00	27.97	150	148	Vertical
2	4874.6875	37.78	7.50	54.00	16.22	150	148	Vertical
3	7311.0000	39.47	14.29	54.00	14.53	150	244	Vertical
4	7311.0000	51.96	14.29	74.00	22.04	150	341	Vertical
5	9748.0000	53.72	18.25	74.00	20.28	150	176	Vertical
6	9748.0000	43.09	18.25	54.00	10.91	150	176	Vertical

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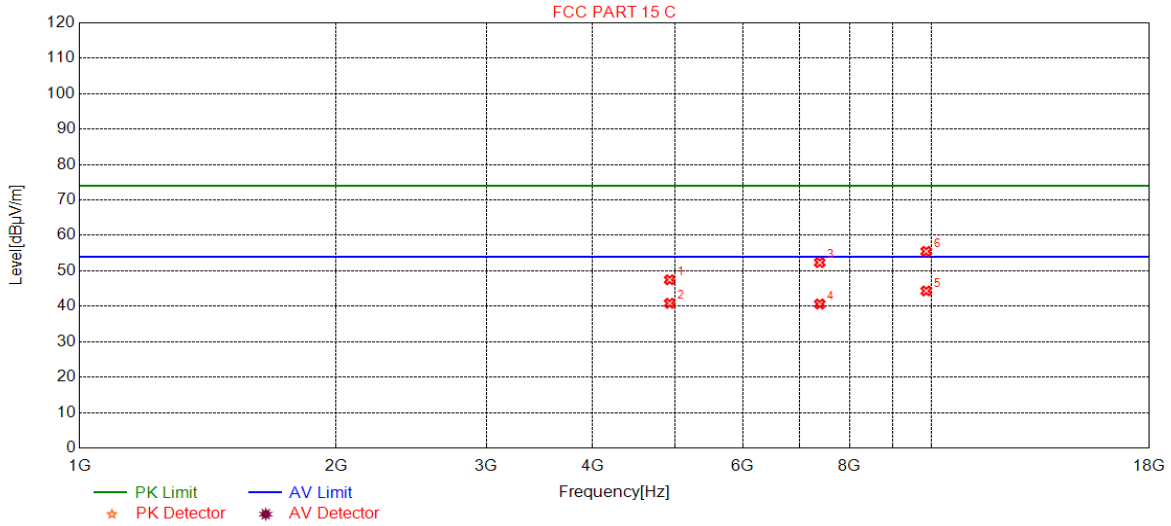
4.9.2.1.3 802.11B_ Highest Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4924.1924	47.48	7.64	74.00	26.52	150	129	Vertical
2	4924.6925	40.85	7.64	54.00	13.15	150	148	Vertical
3	7386.0000	52.34	14.54	74.00	21.66	150	292	Vertical
4	7386.0000	40.65	14.54	54.00	13.35	150	186	Vertical
5	9848.0000	44.34	18.80	54.00	9.66	150	209	Vertical
6	9848.0000	55.50	18.80	74.00	18.50	150	346	Vertical

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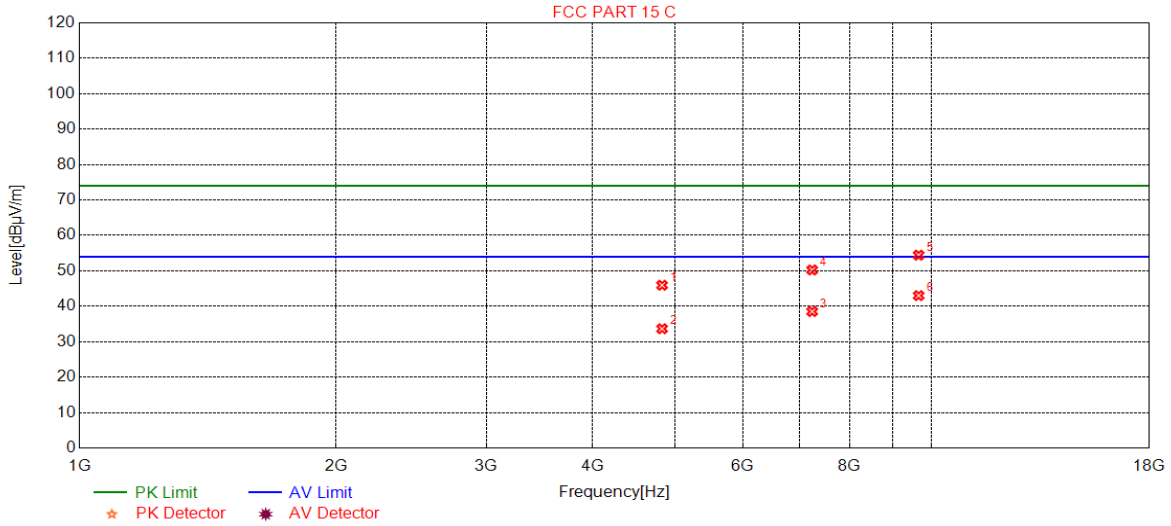
4.9.2.1.4 802.11B_Lowest Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4824.0000	45.95	7.37	74.00	28.05	150	183	Horizontal
2	4824.0000	33.67	7.37	54.00	20.33	150	241	Horizontal
3	7236.0000	38.53	14.07	54.00	15.47	150	327	Horizontal
4	7236.0000	50.26	14.07	74.00	23.74	150	299	Horizontal
5	9648.0000	54.44	17.97	74.00	19.56	150	269	Horizontal
6	9648.0000	43.02	17.97	54.00	10.98	150	286	Horizontal

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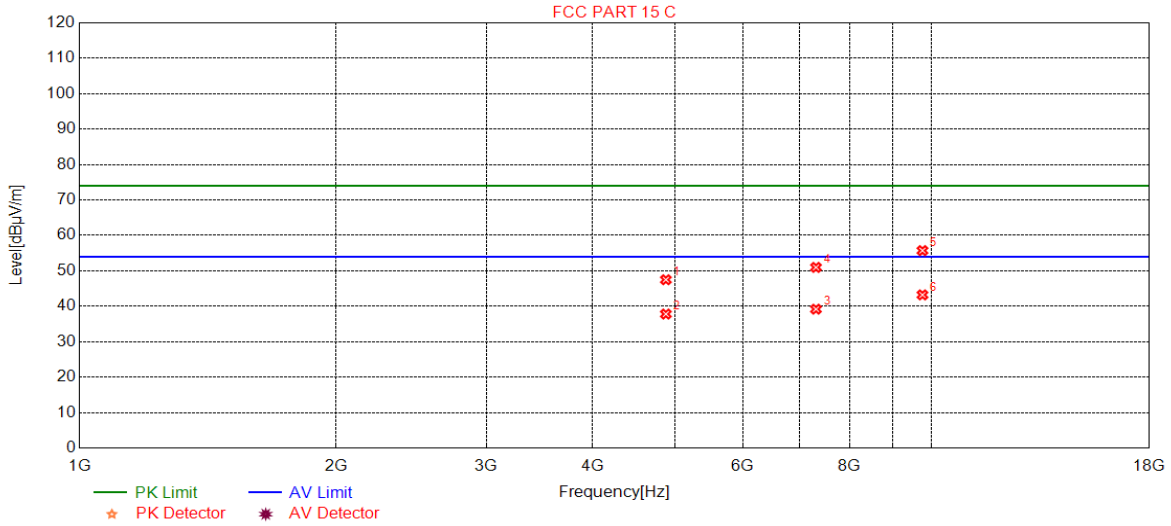
4.9.2.1.5 802.11B_ Middle Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4874.0000	47.50	7.50	74.00	26.50	150	240	Horizontal
2	4874.0000	37.81	7.50	54.00	16.19	150	164	Horizontal
3	7311.0000	39.19	14.29	54.00	14.81	150	183	Horizontal
4	7311.0000	50.98	14.29	74.00	23.02	150	164	Horizontal
5	9748.0000	55.72	18.25	74.00	18.28	150	337	Horizontal
6	9748.0000	43.22	18.25	54.00	10.78	150	14	Horizontal

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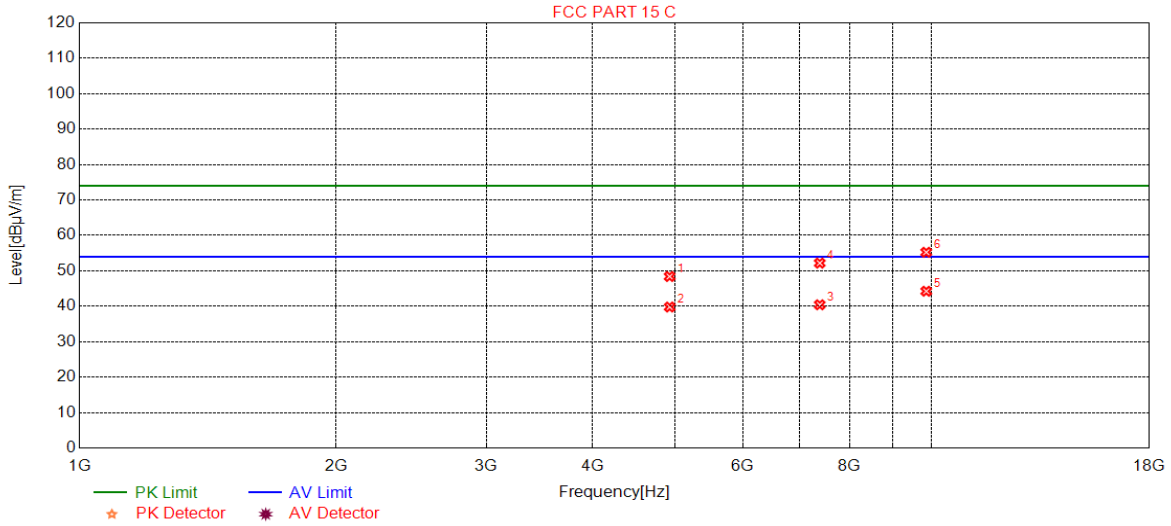
4.9.2.1.6 802.11B_ Highest Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4923.6924	48.41	7.64	74.00	25.59	150	154	Horizontal
2	4924.6925	39.80	7.64	54.00	14.20	150	164	Horizontal
3	7386.0000	40.43	14.54	54.00	13.57	150	193	Horizontal
4	7386.0000	52.19	14.54	74.00	21.81	150	58	Horizontal
5	9848.0000	44.25	18.80	54.00	9.75	150	133	Horizontal
6	9848.0000	55.25	18.80	74.00	18.75	150	82	Horizontal

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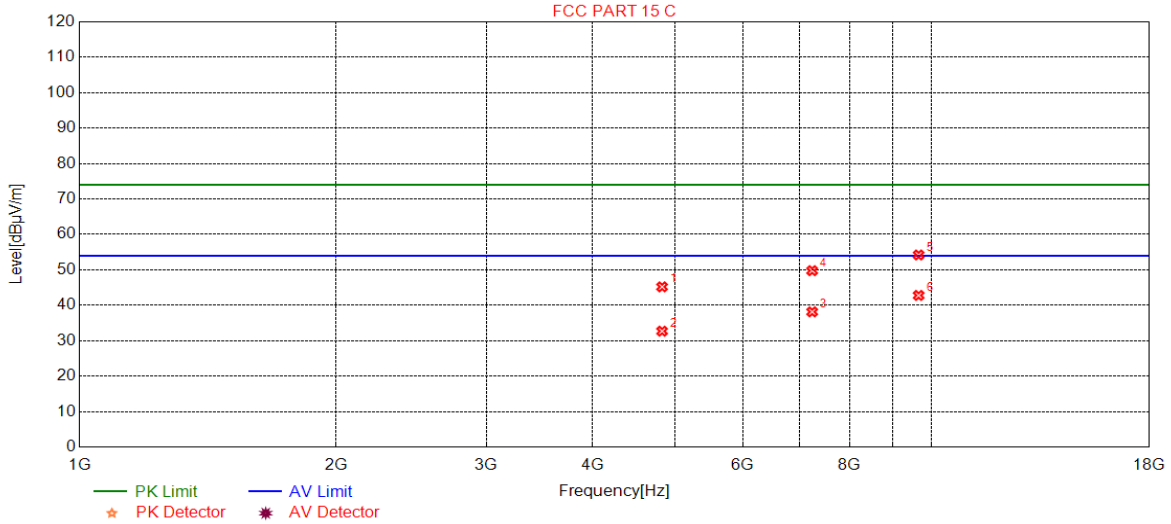
4.9.2.1.7 802.11G_Lowest Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4824.0000	45.21	7.37	74.00	28.79	150	81	Vertical
2	4824.0000	32.70	7.37	54.00	21.30	150	52	Vertical
3	7236.0000	38.15	14.07	54.00	15.85	150	206	Vertical
4	7236.0000	49.77	14.07	74.00	24.23	150	42	Vertical
5	9648.0000	54.21	17.97	74.00	19.79	150	91	Vertical
6	9648.0000	42.79	17.97	54.00	11.21	150	278	Vertical

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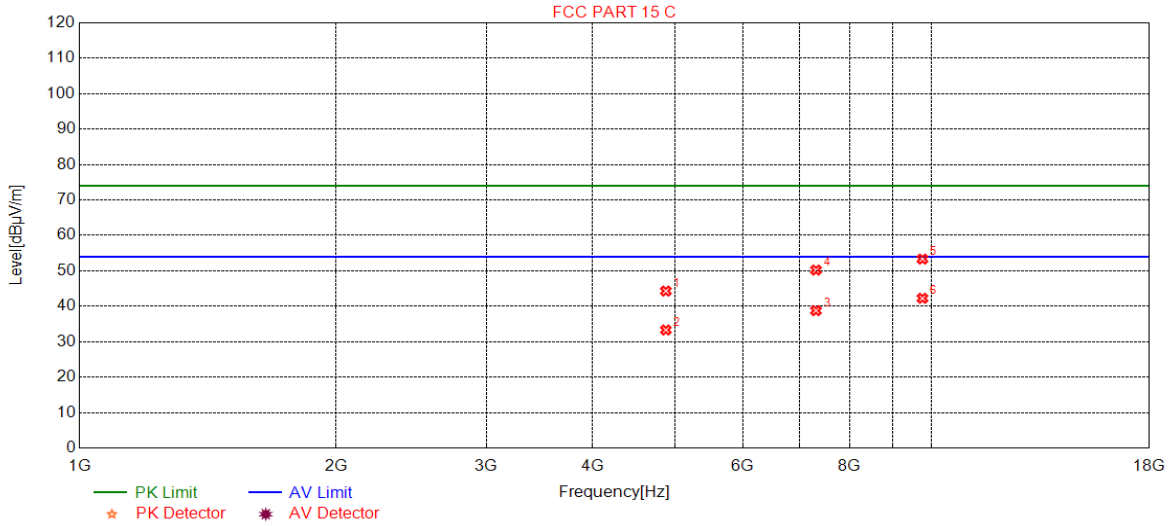
4.9.2.1.8 802.11G_ Middle Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4874.0000	44.30	7.50	74.00	29.70	150	219	Vertical
2	4874.0000	33.31	7.50	54.00	20.69	150	36	Vertical
3	7311.0000	38.77	14.29	54.00	15.23	150	14	Vertical
4	7311.0000	50.23	14.29	74.00	23.77	150	36	Vertical
5	9748.0000	53.32	18.25	74.00	20.68	150	107	Vertical
6	9748.0000	42.26	18.25	54.00	11.74	150	210	Vertical

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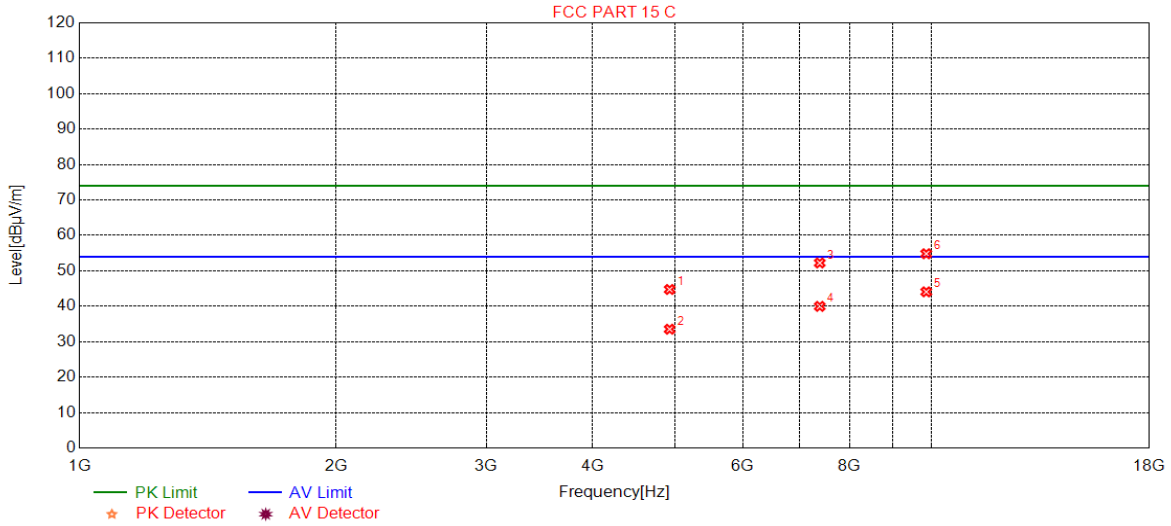
4.9.2.1.9 802.11G_ Highest Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4924.0000	44.75	7.64	74.00	29.25	150	71	Vertical
2	4924.0000	33.54	7.64	54.00	20.46	150	148	Vertical
3	7386.0000	52.23	14.54	74.00	21.77	150	215	Vertical
4	7386.0000	39.98	14.54	54.00	14.02	150	321	Vertical
5	9848.0000	44.08	18.80	54.00	9.92	150	141	Vertical
6	9848.0000	54.83	18.80	74.00	19.17	150	35	Vertical

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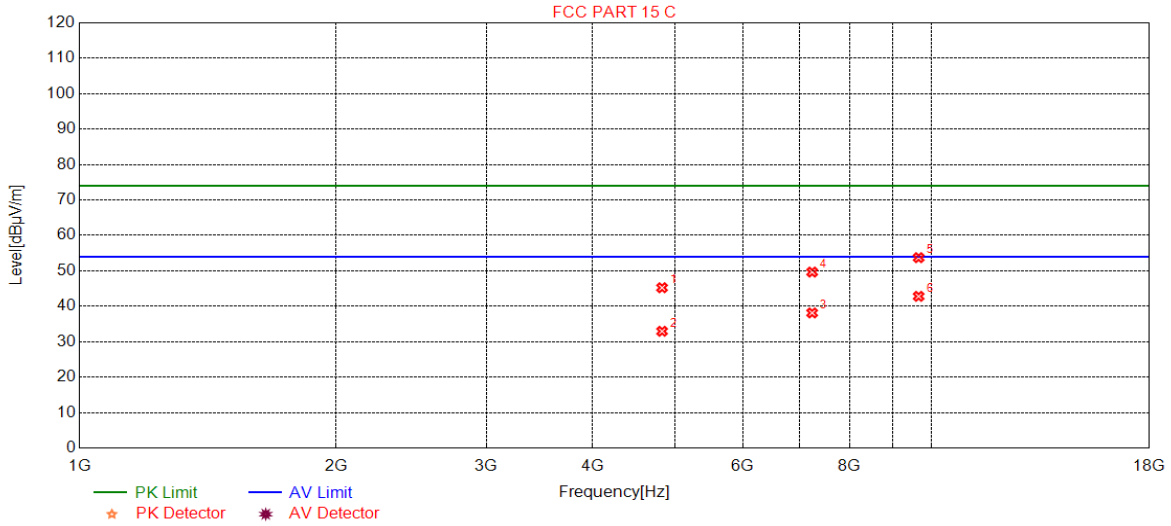
4.9.2.1.10 802.11G_Lowest Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4824.0000	45.24	7.37	74.00	28.76	150	106	Horizontal
2	4824.0000	32.95	7.37	54.00	21.05	150	144	Horizontal
3	7236.0000	38.13	14.07	54.00	15.87	150	106	Horizontal
4	7236.0000	49.66	14.07	74.00	24.34	150	87	Horizontal
5	9648.0000	53.73	17.97	74.00	20.27	150	337	Horizontal
6	9648.0000	42.81	17.97	54.00	11.19	150	132	Horizontal

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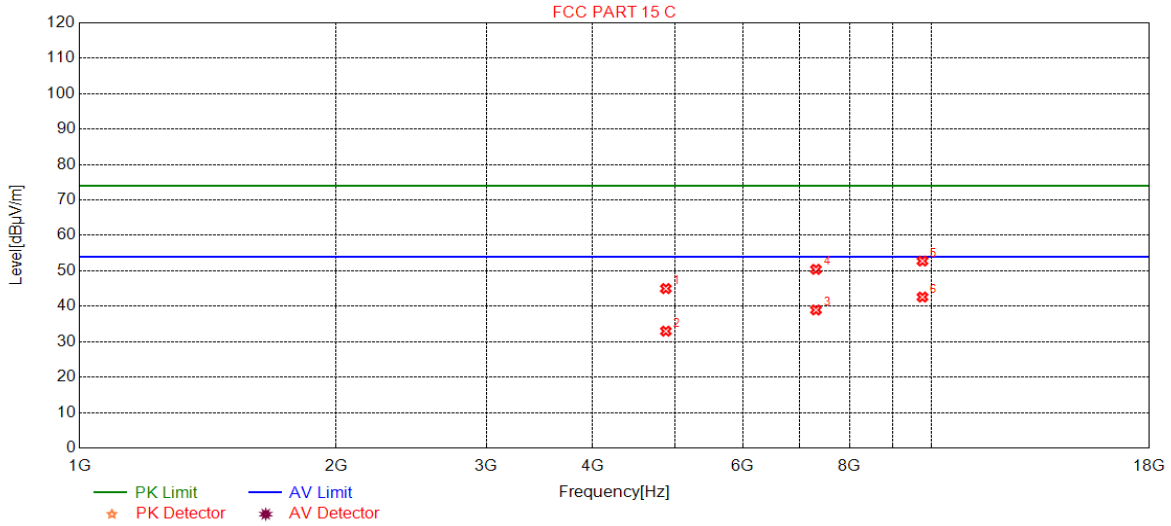
4.9.2.1.11 802.11G_ Middle Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4874.0000	45.00	7.50	74.00	29.00	150	29	Horizontal
2	4874.0000	32.98	7.50	54.00	21.02	150	38	Horizontal
3	7311.0000	38.96	14.29	54.00	15.04	150	115	Horizontal
4	7311.0000	50.42	14.29	74.00	23.58	150	19	Horizontal
5	9748.0000	52.77	18.25	74.00	21.23	150	14	Horizontal
6	9748.0000	42.61	18.25	54.00	11.39	150	166	Horizontal

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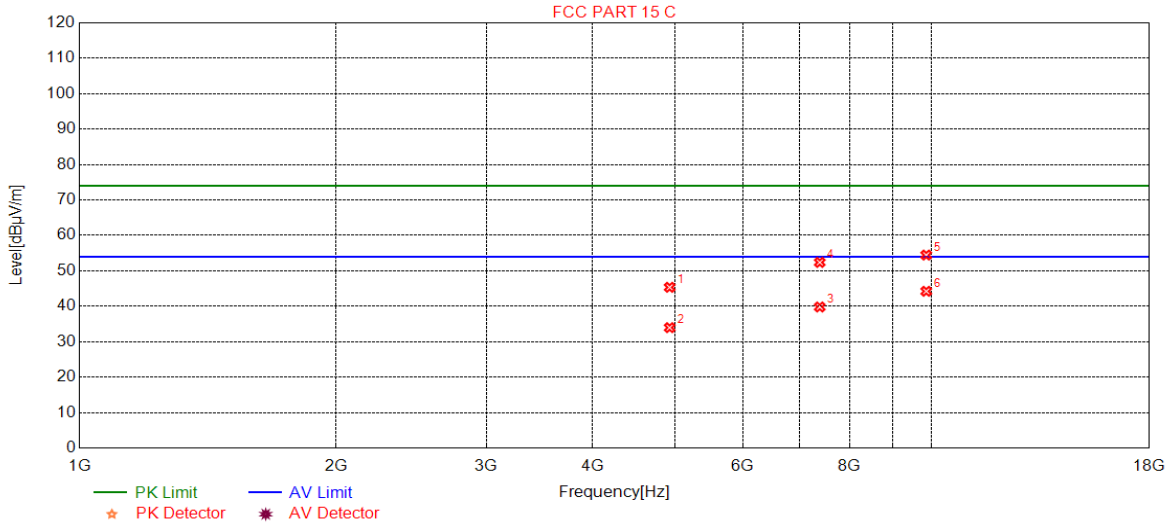
4.9.2.1.12 802.11G_ Highest Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4924.0000	45.36	7.64	74.00	28.64	150	194	Horizontal
2	4924.0000	33.98	7.64	54.00	20.02	150	204	Horizontal
3	7386.0000	39.81	14.54	54.00	14.19	150	279	Horizontal
4	7386.0000	52.39	14.54	74.00	21.61	150	279	Horizontal
5	9848.0000	54.46	18.80	74.00	19.54	150	304	Horizontal
6	9848.0000	44.24	18.80	54.00	9.76	150	14	Horizontal

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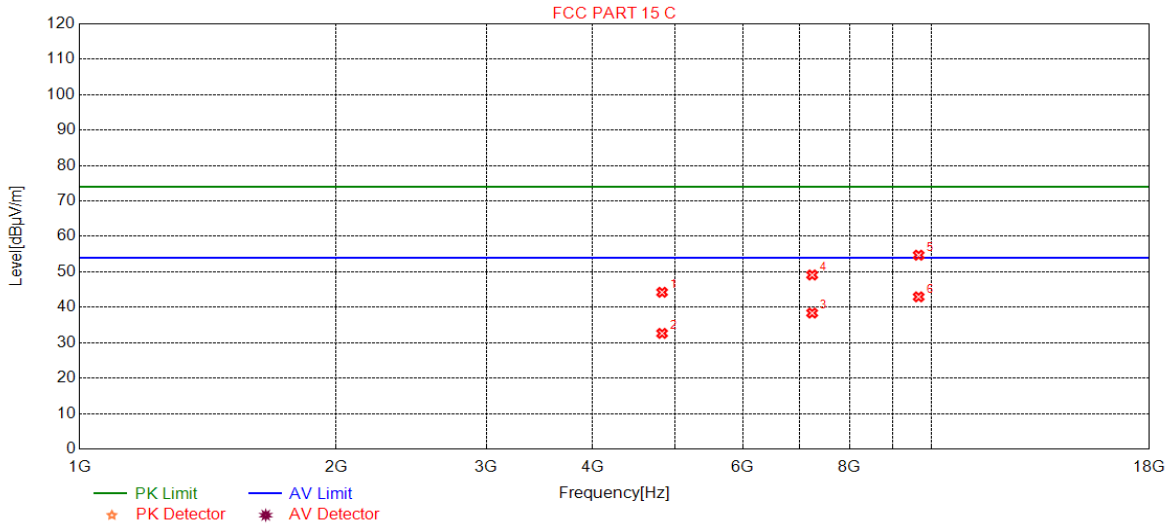
4.9.2.1.13 802.11N20_Lowest Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4824.0000	44.24	7.37	74.00	29.76	150	81	Vertical
2	4824.0000	32.64	7.37	54.00	21.36	150	245	Vertical
3	7236.0000	38.38	14.07	54.00	15.62	150	14	Vertical
4	7236.0000	49.12	14.07	74.00	24.88	150	158	Vertical
5	9648.0000	54.71	17.97	74.00	19.29	150	244	Vertical
6	9648.0000	42.95	17.97	54.00	11.05	150	312	Vertical

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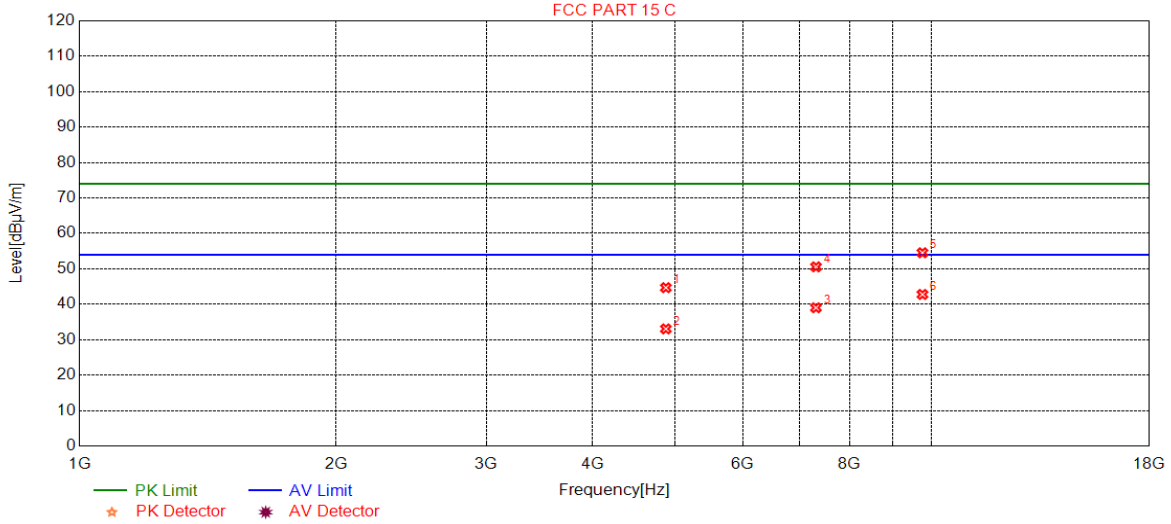
4.9.2.1.14 802.11N20_ Middle Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4874.0000	44.69	7.50	74.00	29.31	150	91	Vertical
2	4874.0000	33.06	7.50	54.00	20.94	150	351	Vertical
3	7311.0000	39.02	14.29	54.00	14.98	150	211	Vertical
4	7311.0000	50.57	14.29	74.00	23.43	150	177	Vertical
5	9748.0000	54.54	18.25	74.00	19.46	150	278	Vertical
6	9748.0000	42.79	18.25	54.00	11.21	150	278	Vertical

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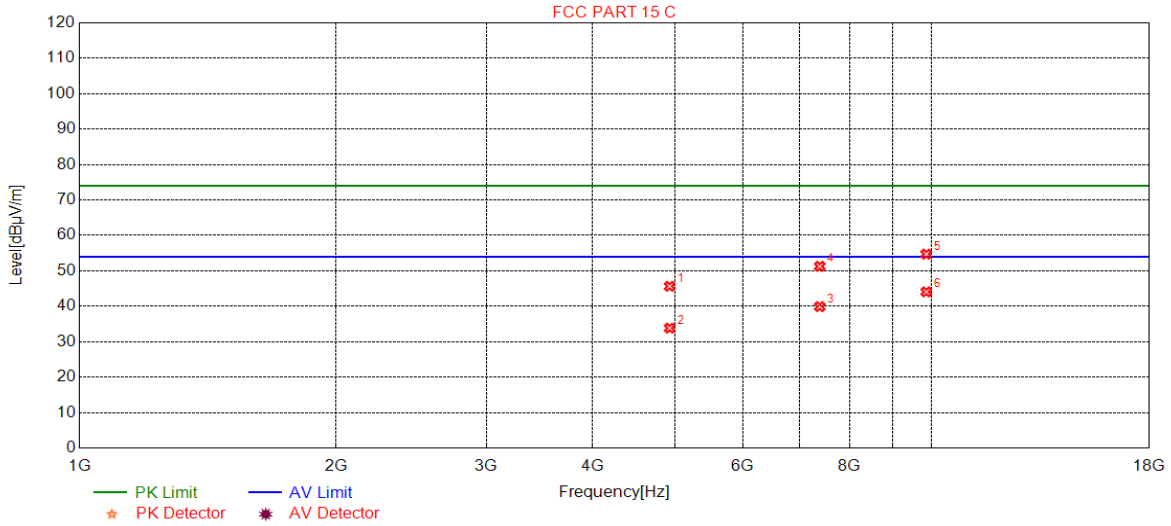
4.9.2.1.15 802.11N20_ Highest Channel_ Peak_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4924.0000	45.64	7.64	74.00	28.36	150	14	Vertical
2	4924.0000	33.84	7.64	54.00	20.16	150	143	Vertical
3	7386.0000	39.91	14.54	54.00	14.09	150	105	Vertical
4	7386.0000	51.29	14.54	74.00	22.71	150	206	Vertical
5	9848.0000	54.73	18.80	74.00	19.27	150	240	Vertical
6	9848.0000	44.08	18.80	54.00	9.92	150	18	Vertical

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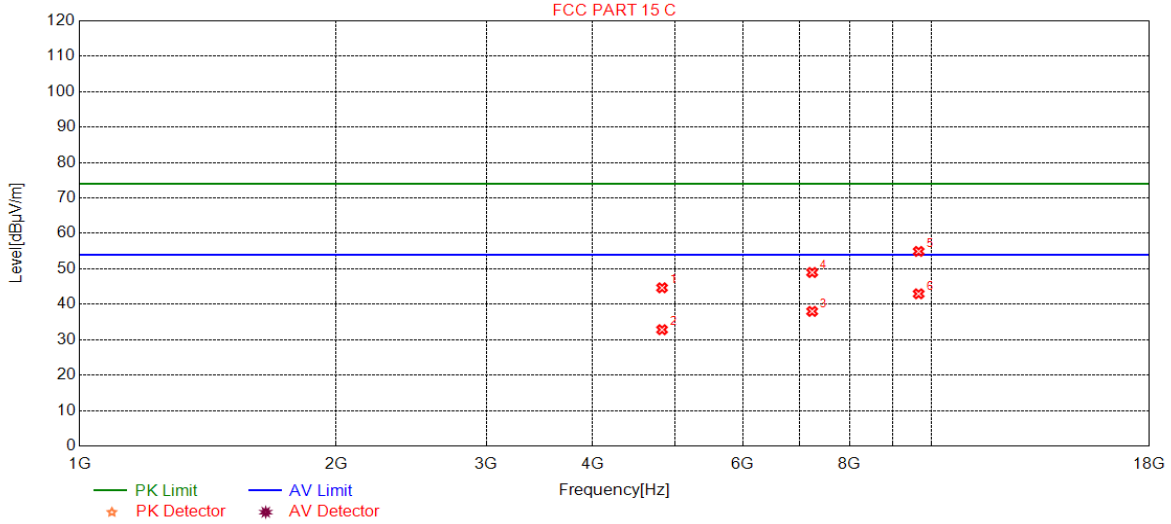
4.9.2.1.16 802.11N20_Lowest Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4824.0000	44.66	7.37	74.00	29.34	150	24	Horizontal
2	4824.0000	32.84	7.37	54.00	21.16	150	53	Horizontal
3	7236.0000	38.00	14.07	54.00	16.00	150	279	Horizontal
4	7236.0000	48.98	14.07	74.00	25.02	150	318	Horizontal
5	9648.0000	54.93	17.97	74.00	19.07	150	286	Horizontal
6	9648.0000	42.96	17.97	54.00	11.04	150	166	Horizontal

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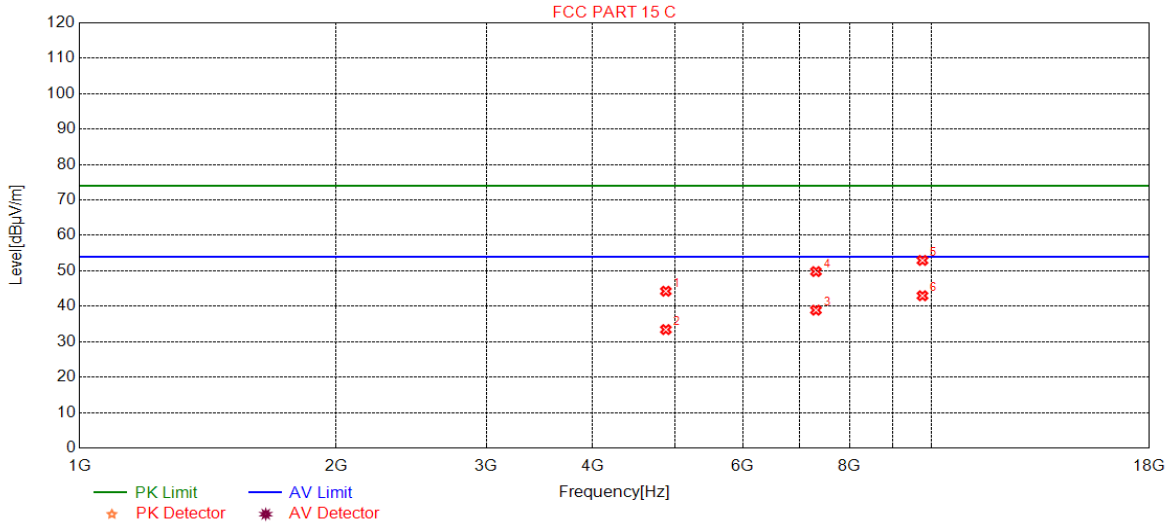
4.9.2.1.17 802.11N20_ Middle Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4874.0000	44.25	7.50	74.00	29.75	150	155	Horizontal
2	4874.0000	33.43	7.50	54.00	20.57	150	19	Horizontal
3	7311.0000	38.91	14.29	54.00	15.09	150	184	Horizontal
4	7311.0000	49.80	14.29	74.00	24.20	150	97	Horizontal
5	9748.0000	52.95	18.25	74.00	21.05	150	65	Horizontal
6	9748.0000	42.98	18.25	54.00	11.02	150	134	Horizontal

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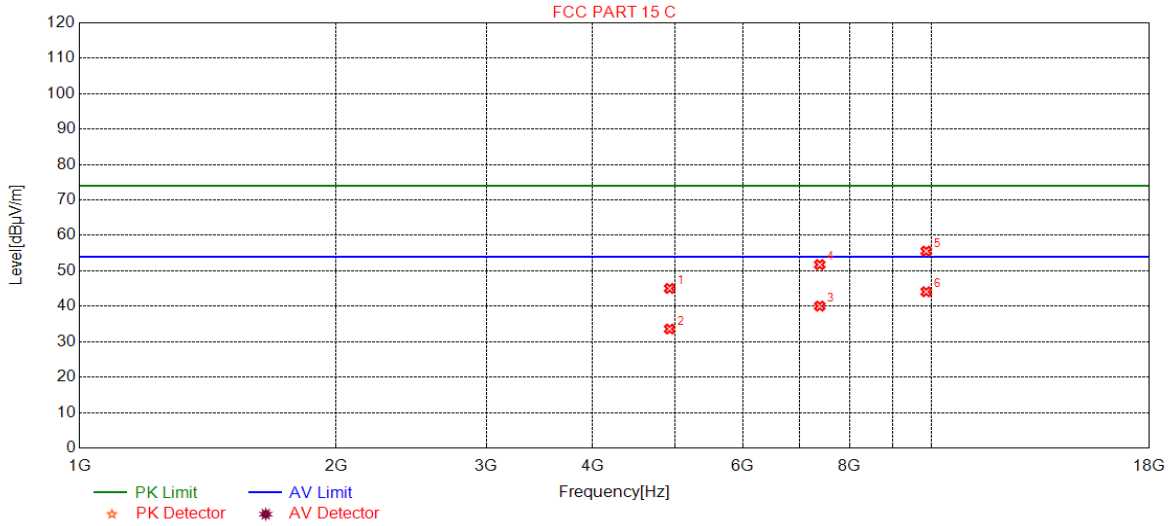
4.9.2.1.18 802.11N20_ Highest Channel_ Peak_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4924.0000	45.04	7.64	74.00	28.96	150	163	Horizontal
2	4924.0000	33.60	7.64	54.00	20.40	150	163	Horizontal
3	7386.0000	40.06	14.54	54.00	13.94	150	1	Horizontal
4	7386.0000	51.76	14.54	74.00	22.24	150	76	Horizontal
5	9848.0000	55.57	18.80	74.00	18.43	150	64	Horizontal
6	9848.0000	44.10	18.80	54.00	9.90	150	167	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.

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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:			

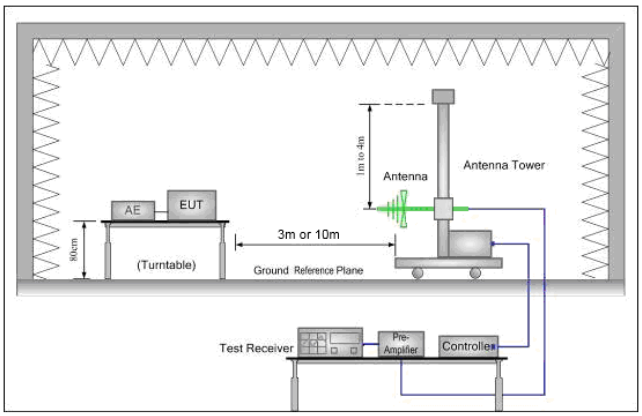

Figure 1. 30MHz to 1GHz

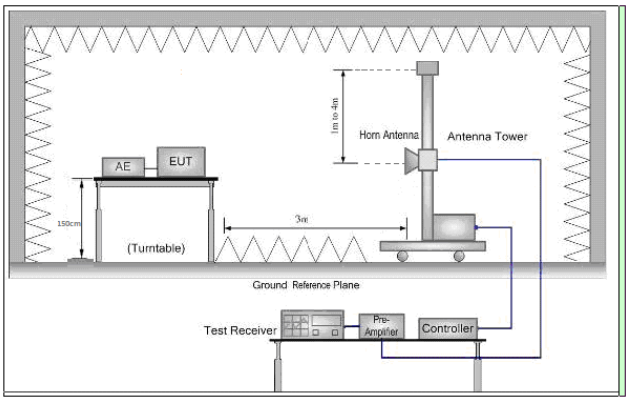

Figure 2. Above 1 GHz

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

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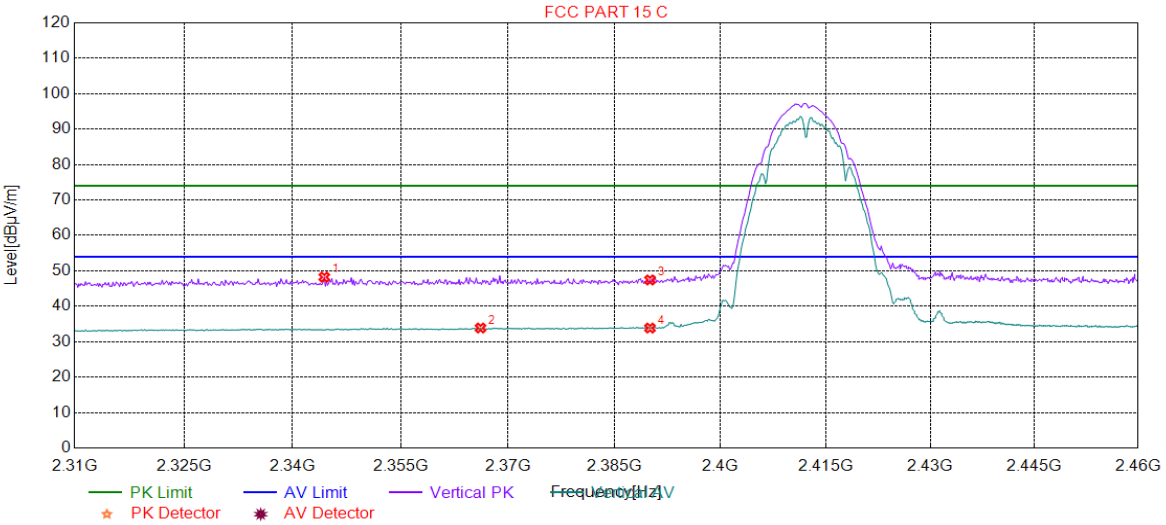
Test plot as follows:

4.10.1 ANT1

4.10.1.1 802.11B_Lowest Channel_Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2344.3844	48.24	1.05	74.00	25.76	150	336	Vertical
2	2366.1562	33.87	1.14	54.00	20.13	150	28	Vertical
3	2390.0000	47.43	1.25	74.00	26.57	150	304	Vertical
4	2390.0000	33.86	1.25	54.00	20.14	150	293	Vertical

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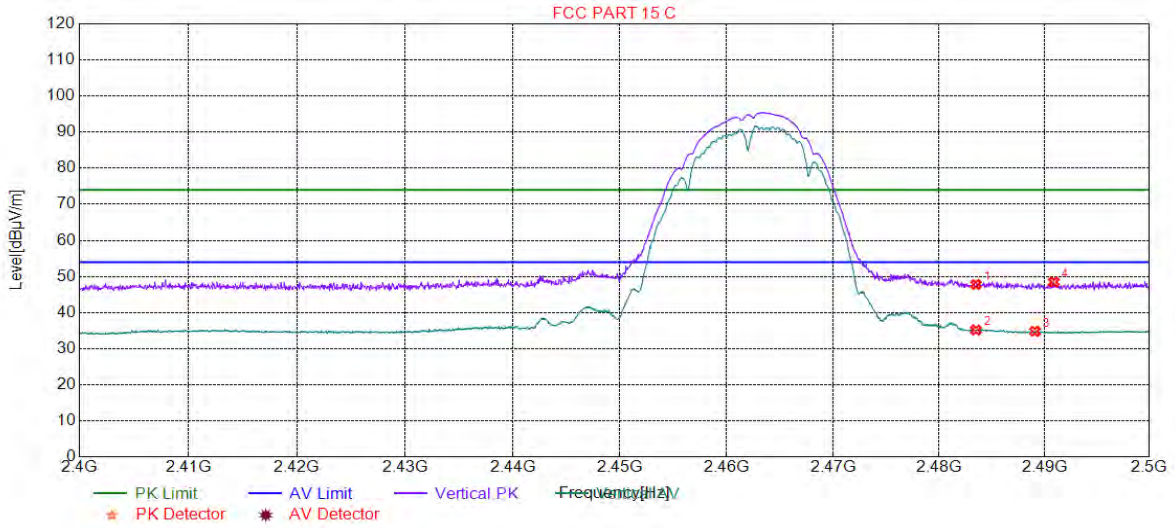
4.10.1.2 802.11B_ Highest Channel_Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2483.5000	47.78	1.52	74.00	26.22	150	154	Vertical
2	2483.5000	35.16	1.52	54.00	18.84	150	41	Vertical
3	2489.0945	34.82	1.54	54.00	19.18	150	166	Vertical
4	2490.8954	48.49	1.54	74.00	25.51	150	275	Vertical

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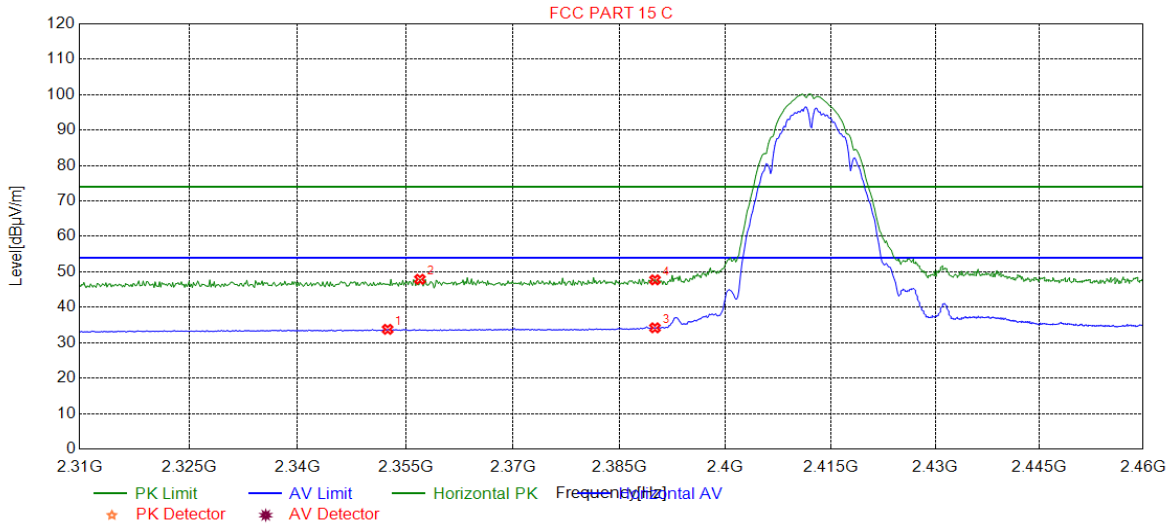
4.10.1.3 802.11B_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2352.4925	33.78	1.08	54.00	20.22	150	345	Horizontal
2	2356.9970	47.91	1.10	74.00	26.09	150	318	Horizontal
3	2390.0000	34.21	1.25	54.00	19.79	150	255	Horizontal
4	2390.0000	47.74	1.25	74.00	26.26	150	360	Horizontal

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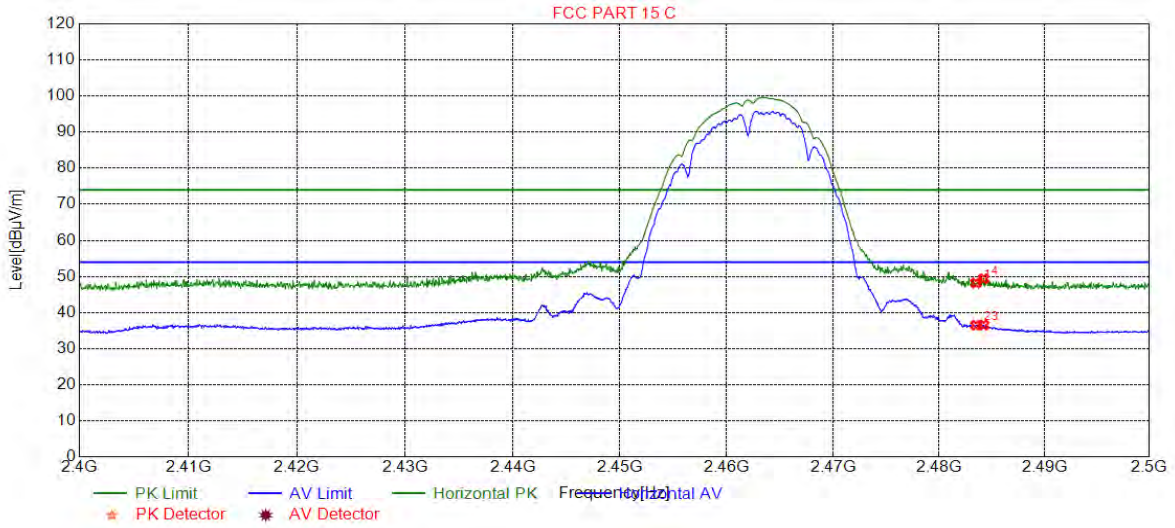
4.10.1.4 802.11B_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2483.5000	48.18	1.52	74.00	25.82	150	257	Horizontal
2	2483.5000	36.48	1.52	54.00	17.52	150	257	Horizontal
3	2484.2421	36.55	1.53	54.00	17.45	150	257	Horizontal
4	2484.2421	49.38	1.53	74.00	24.62	150	257	Horizontal

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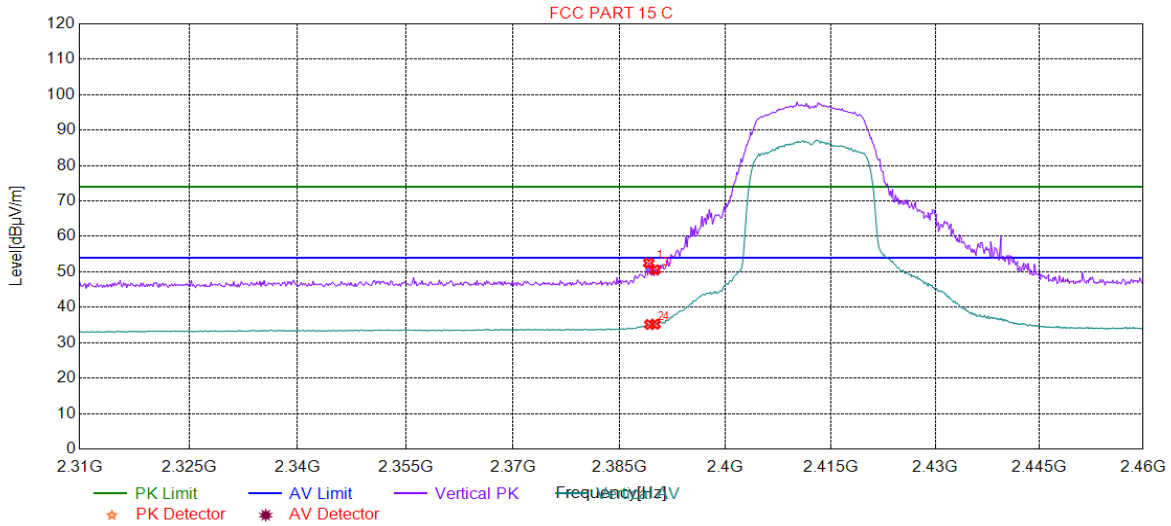
4.10.1.5 802.11G_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2389.1291	52.50	1.24	74.00	21.50	150	167	Vertical
2	2389.2793	35.13	1.24	54.00	18.87	150	161	Vertical
3	2390.0000	50.57	1.25	74.00	23.43	150	171	Vertical
4	2390.0000	35.24	1.25	54.00	18.76	150	167	Vertical

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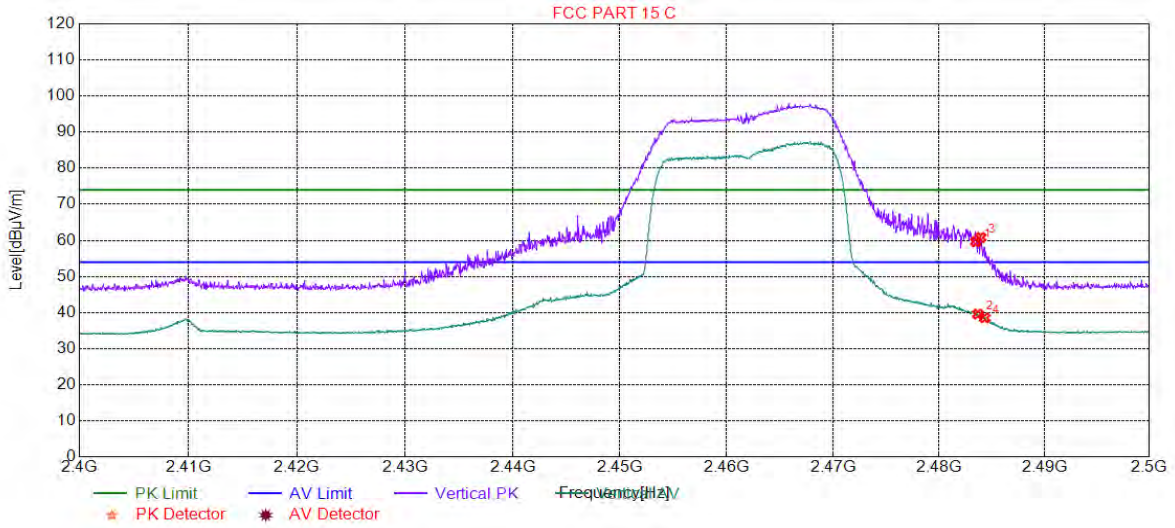
4.10.1.6 802.11G_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2483.5000	59.63	1.52	74.00	14.37	150	1	Vertical
2	2483.6918	39.56	1.52	54.00	14.44	150	38	Vertical
3	2483.9420	60.82	1.53	74.00	13.18	150	34	Vertical
4	2484.3422	38.53	1.53	54.00	15.47	150	42	Vertical

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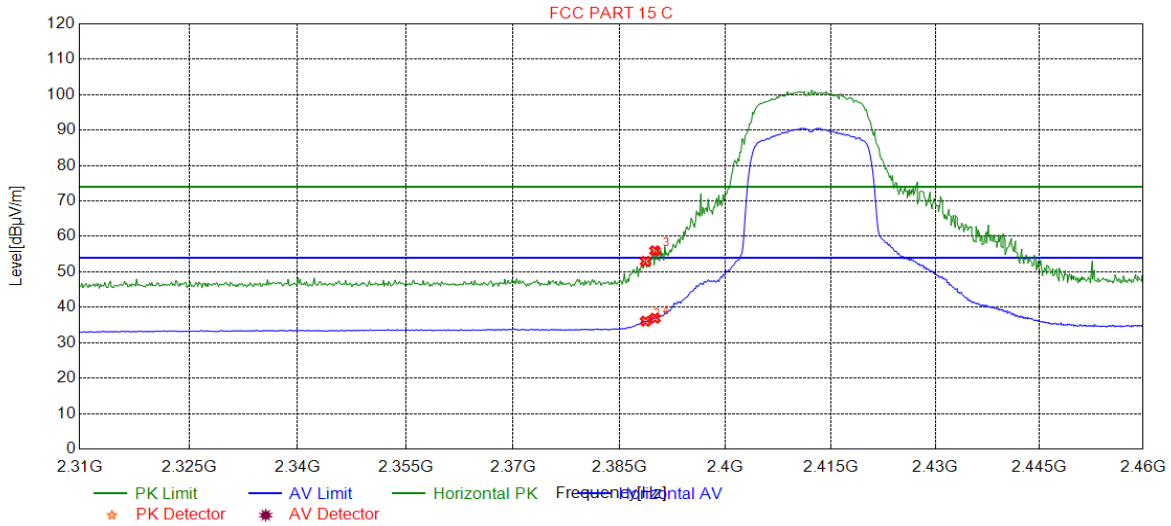
4.10.1.7 802.11G_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2388.6787	52.98	1.24	74.00	21.02	150	325	Horizontal
2	2388.6787	36.08	1.24	54.00	17.92	150	250	Horizontal
3	2390.0000	55.96	1.25	74.00	18.04	150	319	Horizontal
4	2390.0000	36.92	1.25	54.00	17.08	150	250	Horizontal

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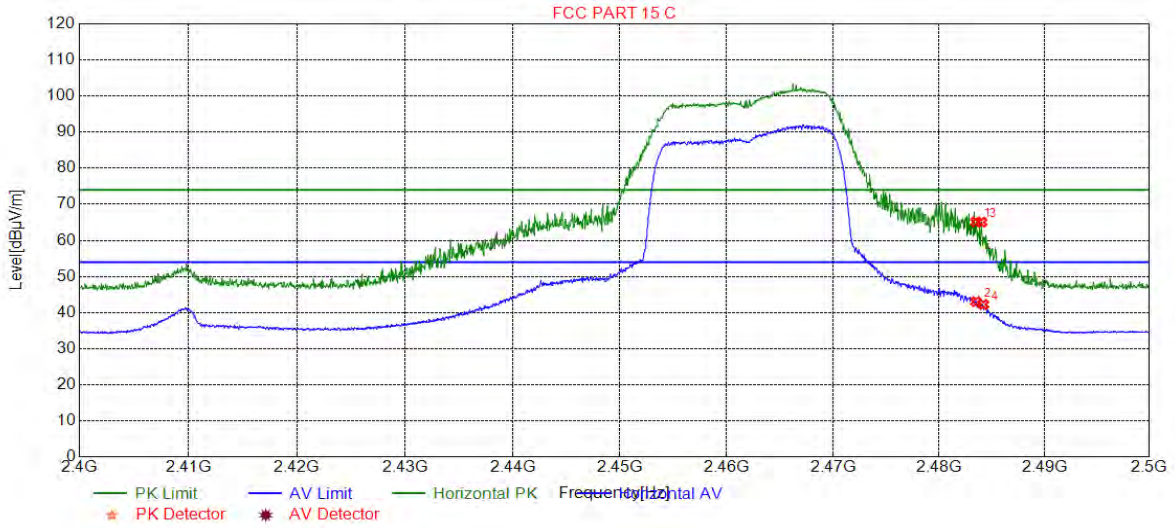
4.10.1.8 802.11G_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2483.5000	65.12	1.52	74.00	8.88	150	244	Horizontal
2	2483.5000	43.02	1.52	54.00	10.98	150	314	Horizontal
3	2484.0420	65.06	1.53	74.00	8.94	150	314	Horizontal
4	2484.1921	42.24	1.53	54.00	11.76	150	314	Horizontal

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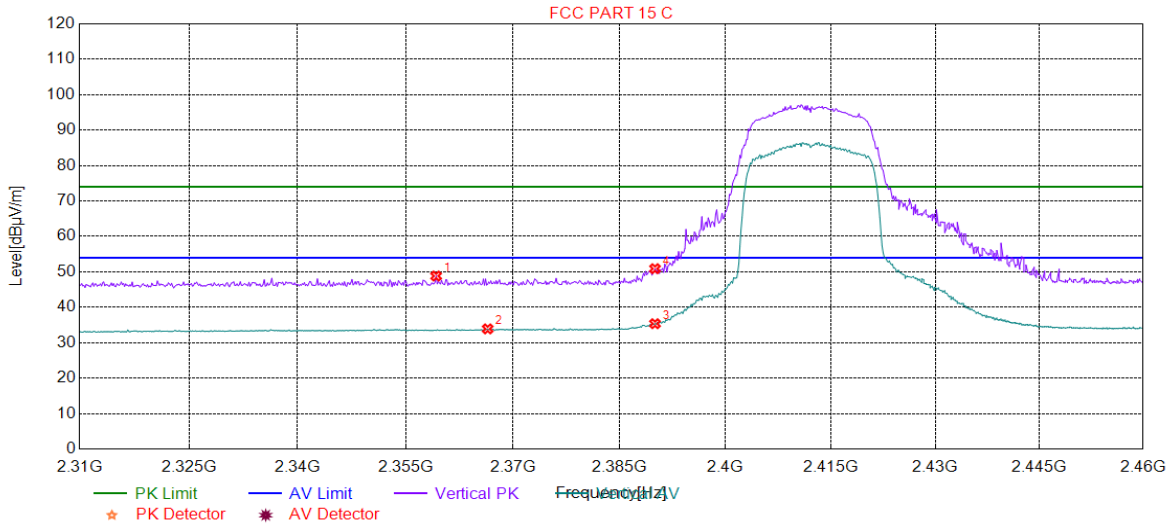
4.10.1.9 802.11N20_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2359.2492	48.83	1.11	74.00	25.17	150	95	Vertical
2	2366.4565	33.91	1.14	54.00	20.09	150	0	Vertical
3	2390.0000	35.37	1.25	54.00	18.63	150	162	Vertical
4	2390.0000	50.90	1.25	74.00	23.10	150	158	Vertical

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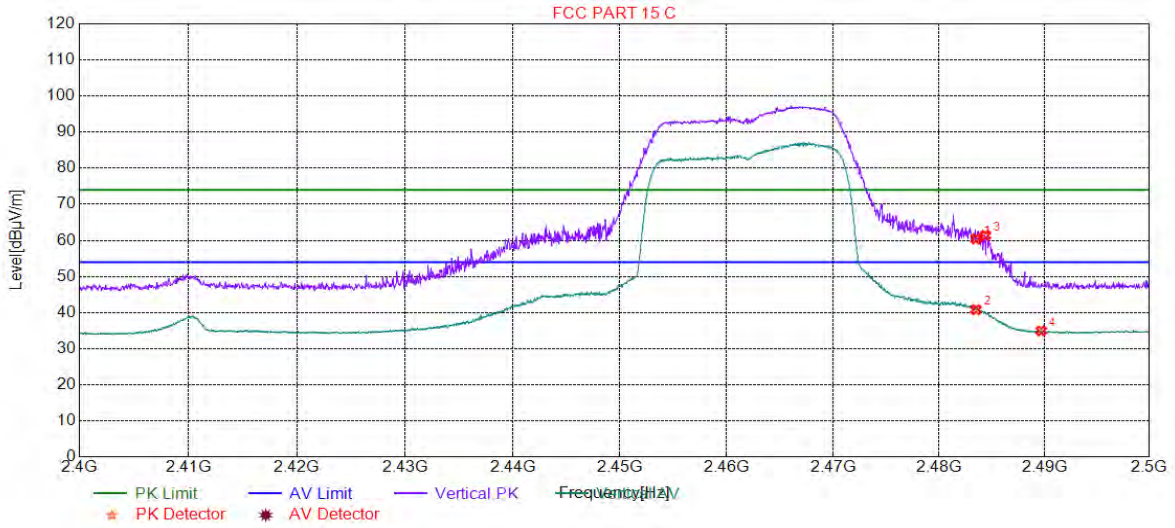
4.10.1.10 802.11N20_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2483.5000	60.41	1.52	74.00	13.59	150	22	Vertical
2	2483.5000	40.81	1.52	54.00	13.19	150	158	Vertical
3	2484.3922	61.38	1.53	74.00	12.62	150	34	Vertical
4	2489.6948	34.96	1.54	54.00	19.04	150	166	Vertical

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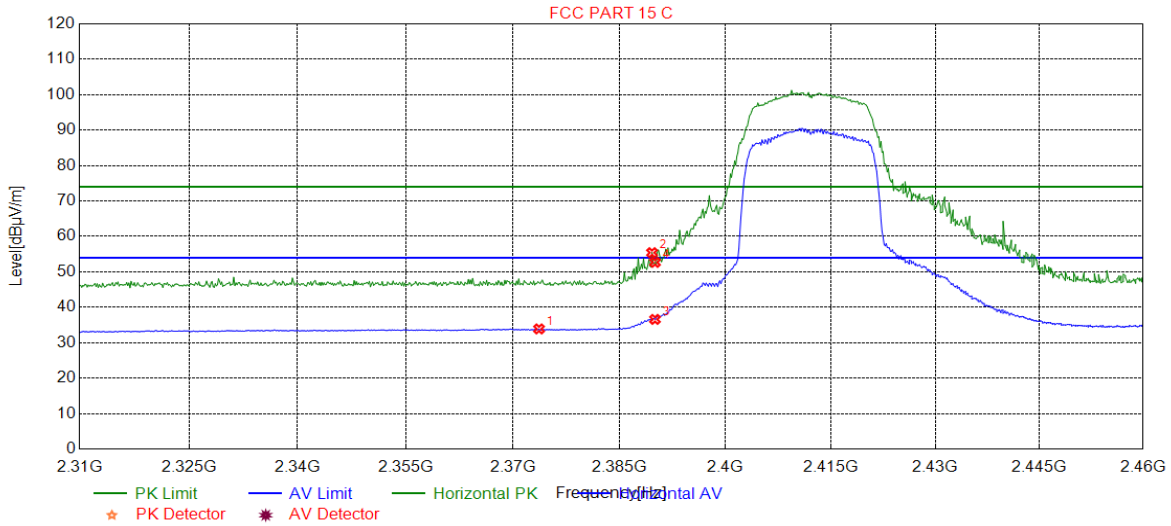
4.10.1.11 802.11N20_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2373.6637	33.90	1.17	54.00	20.10	150	141	Horizontal
2	2389.5796	55.42	1.24	74.00	18.58	150	316	Horizontal
3	2390.0000	36.59	1.25	54.00	17.41	150	256	Horizontal
4	2390.0000	52.68	1.25	74.00	21.32	150	250	Horizontal

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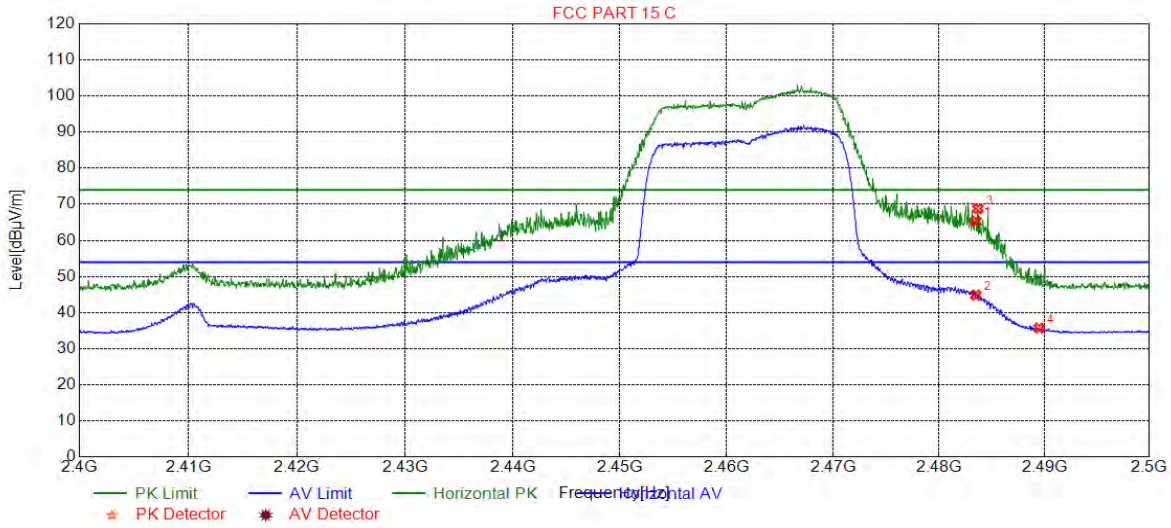
4.10.1.12 802.11N20_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2483.5000	65.34	1.52	74.00	8.66	150	318	Horizontal
2	2483.5000	44.84	1.52	54.00	9.16	150	314	Horizontal
3	2483.6918	68.80	1.52	74.00	5.20	150	255	Horizontal
4	2489.4947	35.70	1.54	54.00	18.30	150	311	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%

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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	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	2018/2/14	2019/2/13
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 (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018/9/2	2019/9/2
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2018/3/13	2019/3/12
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
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2

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	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 (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	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 HR/2019/10005.

The End

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