FCC TEST REPORT

Application No.:	ZR/2021/10049
Applicant:	HMD Global Oy
Address of Applicant	Bertel Jungin aukio 9, 02600 Espoo, Finland
Manufacturer:	HMD Global Oy
Address of Manufacturer	Bertel Jungin aukio 9, 02600 Espoo, Finland
EUT Description:	smart phone
Model No.:	TA-1344
Trade Mark:	Nokia
FCC ID:	2AJOTTA-1344
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C
Date of Receipt:	2021/1/29(for original report ZR/2021/1004904)
Date of Test:	2021/1/29 to 2021/3/3(for original report ZR/2021/1004904)
Date of Issue:	2021/3/9(for original report ZR/2021/1004904) 2021/3/18(for new report ZR/2021/1004913)
Test Result :	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Remark: TA-1341 has the Dual SIM tray, TA-1344 has the single SIM tray;

Authorized Signature:

Derek Yang
Wireless Laboratory Manager

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1 Version

Revision Record				
Version	***Chapter***	***Date***	***Modifier***	***Remark***
01		2021-03-18		Original

Authorized for issue by:			
Prepared By		Dee.Zheng **(Dee Zheng) / Engineer**	
Checked By		Daniel Wang **(Daniel Wang) / Reviewer**	

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2 Test Summary

Test Item	Test Requirement	Test Method	Test Result	Result	Test Lab*
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Clause 4.2	PASS	B
Duty Cycle	--	--	Clause 4.3	PASS	A
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013	Clause 4.4	PASS	A
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013	Clause 4.5	PASS	A
Power Spectral Density	15.247 (e)	ANSI C63.10 2013	Clause 4.6	PASS	A
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.7	PASS	A
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.8	PASS	A
Radiated Spurious Emissions	15.247(d);15.205/15.209	ANSI C63.10 2013	Clause 4.9	PASS	B
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d);15.205/15.209	ANSI C63.10 2013	Clause 4.10	PASS	B

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Remark:
This test report (Report No.: ZR/2021/1004913) is base on the original test report (Report No.: ZR/2021/1004904) issued on 2021-03-09.
Review this report and original report, this report just changing the parts according to the declaration letter from client.
According to the declaration from the applicant, the models: **TA-1341** and **TA-1344** are identical in specifications, only different according to the declaration letter from client.
Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.
Therefore in this report all items do not need to retest and all test data in this report are base on the previous report with report number ZR/2021/1004904.

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3 General Information

3.1 Details of Client

Applicant:	HMD Global Oy
Address of Applicant	Bertel Jungin aukio 9, 02600 Espoo, Finland
Manufacturer:	HMD Global Oy
Address of Manufacturer	Bertel Jungin aukio 9, 02600 Espoo, Finland

3.2 Test Location

Lab A:

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

Lab B:

Company:	SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.
Address:	1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China
Post code:	710086

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3.3 Test Facility

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

Lab A:

• 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.

• Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

Lab B:

A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

Designation Number: CN1271.

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3.4 General Description of EUT

EUT Description:	smart phone
Model No.:	TA-1344
Trade Mark:	Nokia
Hardware Version:	V1.0
Software Version:	00WW_0_226
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 IEEE for 802.11N(HT40) : 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:	-1.28dBi

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**	**Channel**	**Frequency**
3	2422MHz	6	2437MHz	9	2452MHz		
4	2427MHz	7	2442MHz				
5	2432MHz	8	2447MHz				

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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

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 -1.28dBi.	

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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. 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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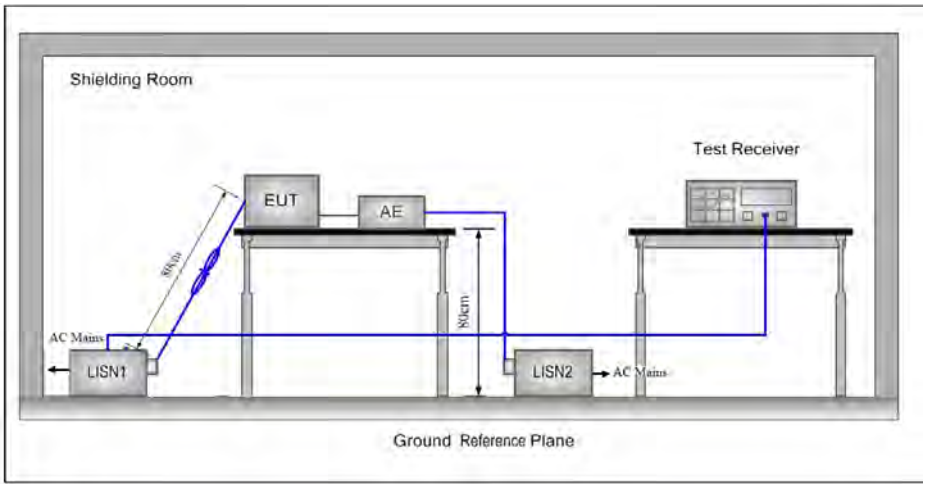
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Charge + Transmitting mode. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
Remark:	The Emission Test data were reused from the report no:XZR/2021/1004901

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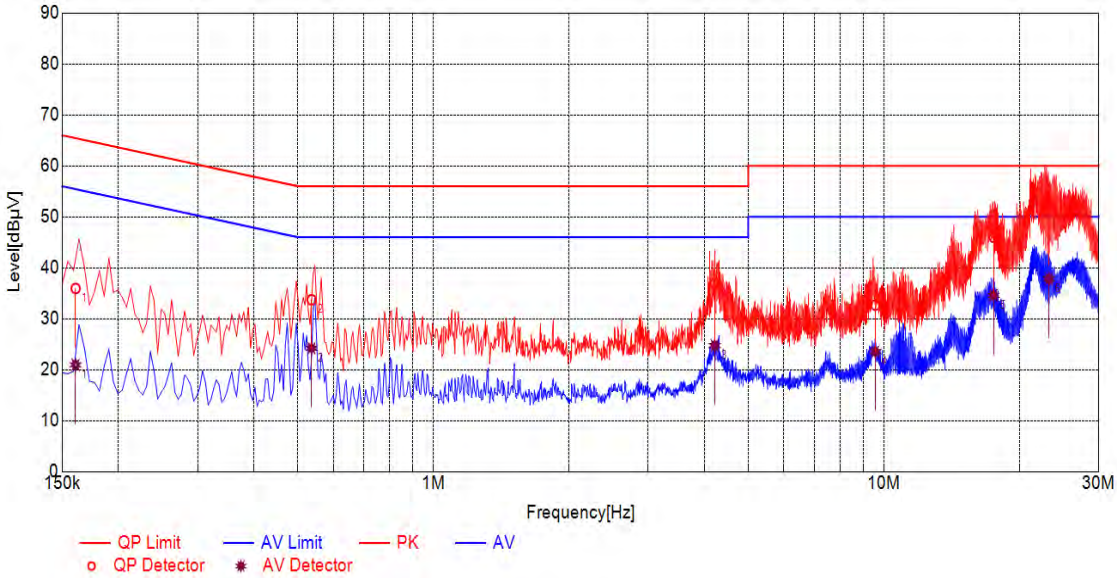
Measurement Data

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:



Test Graph

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.1607	10.10	35.94	65.43	29.49	20.96	55.43	34.47
2	0.5367	10.10	33.72	56.00	22.28	24.21	46.00	21.79
3	4.2122	10.10	36.91	56.00	19.09	24.75	46.00	21.25
4	9.5731	10.10	32.68	60.00	27.32	23.53	50.00	26.47
5	17.5220	10.11	45.99	60.00	14.01	34.60	50.00	15.40
6	23.2658	10.11	52.01	60.00	7.99	37.81	50.00	12.19

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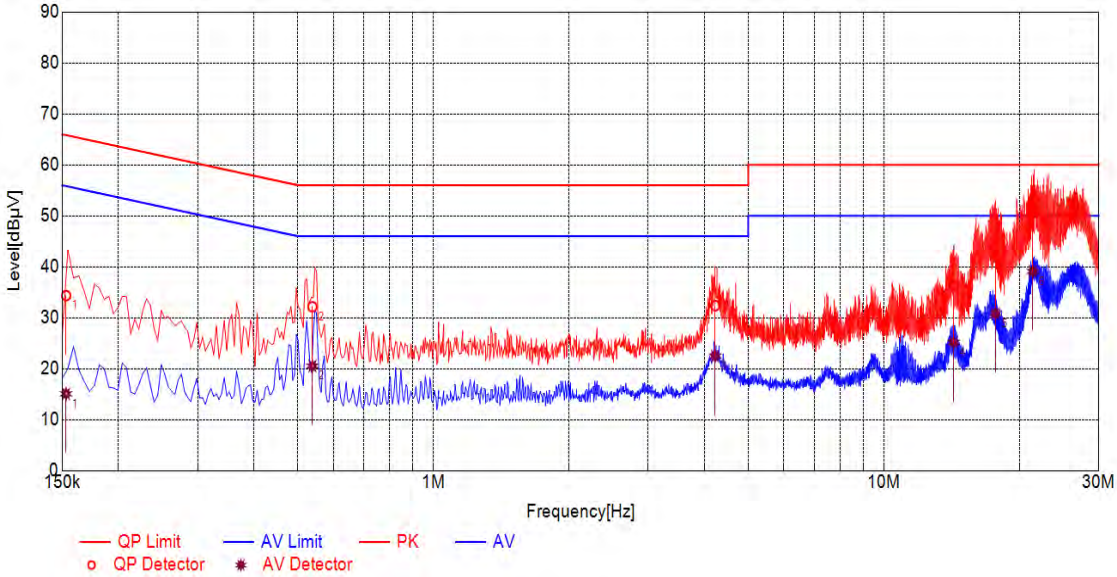
Neutral Line:



Test Graph

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.1531	10.10	34.35	65.83	31.48	15.06	55.83	40.77
2	0.5391	10.10	32.14	56.00	23.86	20.52	46.00	25.48
3	4.2227	10.10	32.38	56.00	23.62	22.47	46.00	23.53
4	14.2877	10.11	36.20	60.00	23.80	25.15	50.00	24.85
5	17.6892	10.11	43.80	60.00	16.20	30.82	50.00	19.18
6	21.4133	10.11	50.55	60.00	9.45	39.10	50.00	10.90

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

The detailed test data see: **Appendix**

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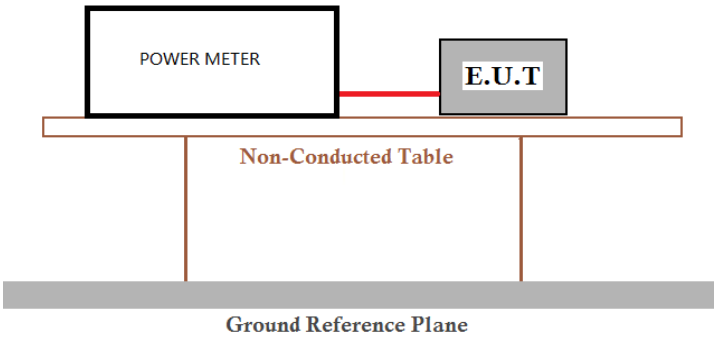
4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10 :2013 Section 11.9.1.3
Test Setup:	
Test Instruments:	Refer to section 6 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); 13.5Mbps of rate is the worst case of 802.11N(HT40).
Limit:	30dBm
Test Results:	Pass

The detailed test data see: **Appendix**

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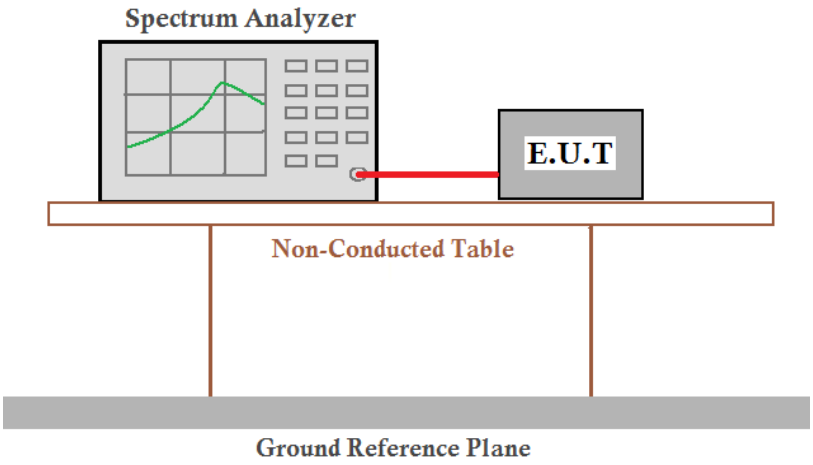
4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

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 6 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); 13.5Mbps of rate is the worst case of 802.11N(HT40).
Limit:	≥ 500 kHz
Test Results:	Pass

The detailed test data see: **Appendix**

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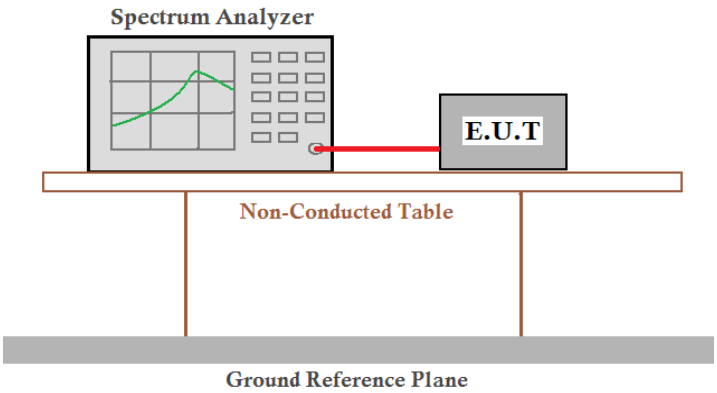
4.6 Power Spectral Density

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 6 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); 13.5Mbps of rate is the worst case of 802.11N(HT40).
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

The detailed test data see: **Appendix**

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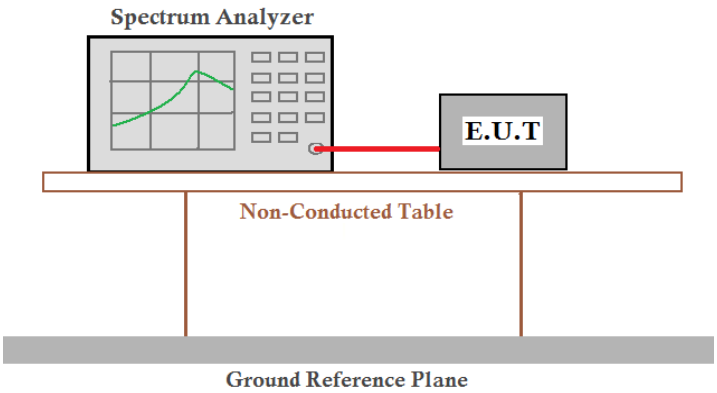
4.7 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.13
Test Setup:	
Instruments Used:	Refer to section 6 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); 13.5Mbps of rate is the worst case of 802.11N(HT40).
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.
Test Results:	Pass

The detailed test data see: **Appendix**

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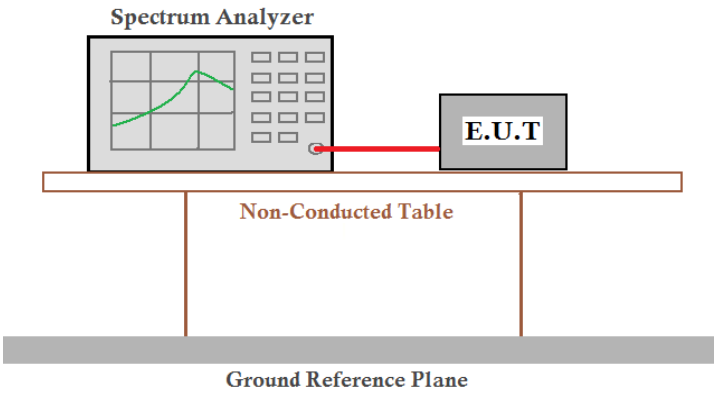
4.8 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Instruments Used:	Refer to section 6 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); 13.5Mbps of rate is the worst case of 802.11N(HT40).
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.
Test Results:	Pass

The detailed test data see: **Appendix**

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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	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz (DC⩾0.98) ⩾1/T (DC<0.98)	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.				

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Test Setup:

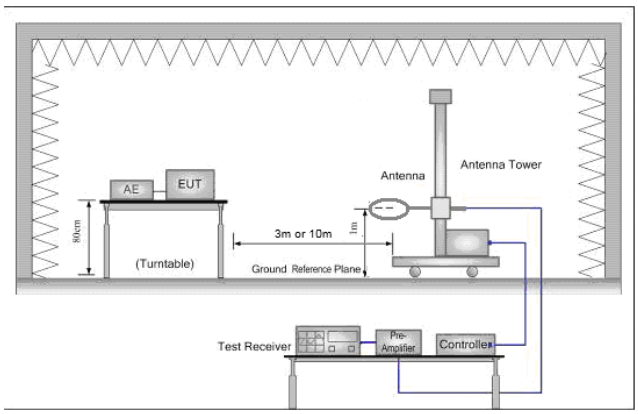

Figure 1. Below 30MHz

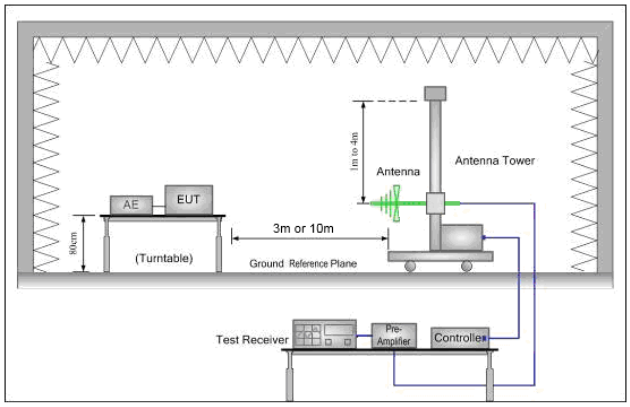

Figure 2. 30MHz to 1GHz

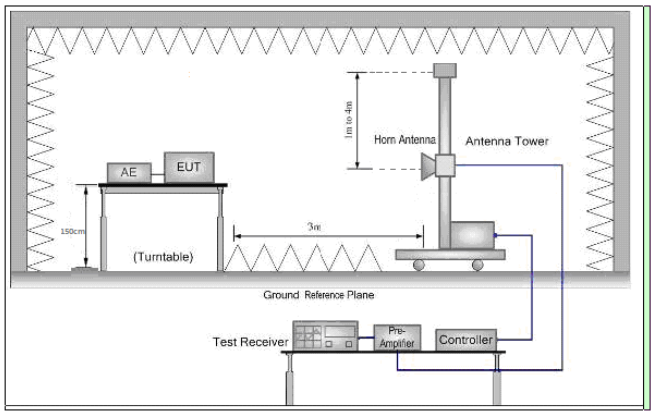

Figure 3. Above 1 GHz

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 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. Use the following spectrum analyzer settings:

(1) Span shall wide enough to fully capture the emission being measured;

(2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ⩾ RBW; Sweep = auto;

Detector function = peak; Trace = max hold for peak

(3) For average measurement: use duty cycle correction factor method per 15.35(c).

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	Duty cycle = On time/100 milliseconds On time = N 1 *L 1 +N 2 *L 2 +...+N n-1 *LN n-1 +N n *L n Where N 1 is number of type 1 pulses, L 1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycle) f. 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. g. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. h. 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. i. Test the EUT in the lowest channel, the middle channel ,the Highest channel. j. 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. k. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Test Configuration:	Peak Measurements Above 1000 MHz • RBW = 1 MHz • VBW ⩾ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold Average Measurements Above 1000MHz • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G; 6.5Mbps of rate is the worst case of 802.11N(HT20); 13.5Mbps of rate is the worst case of 802.11N(HT40); For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass

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Remark:	The Emission Test data were reused from the report no:XZR/2021/1004901

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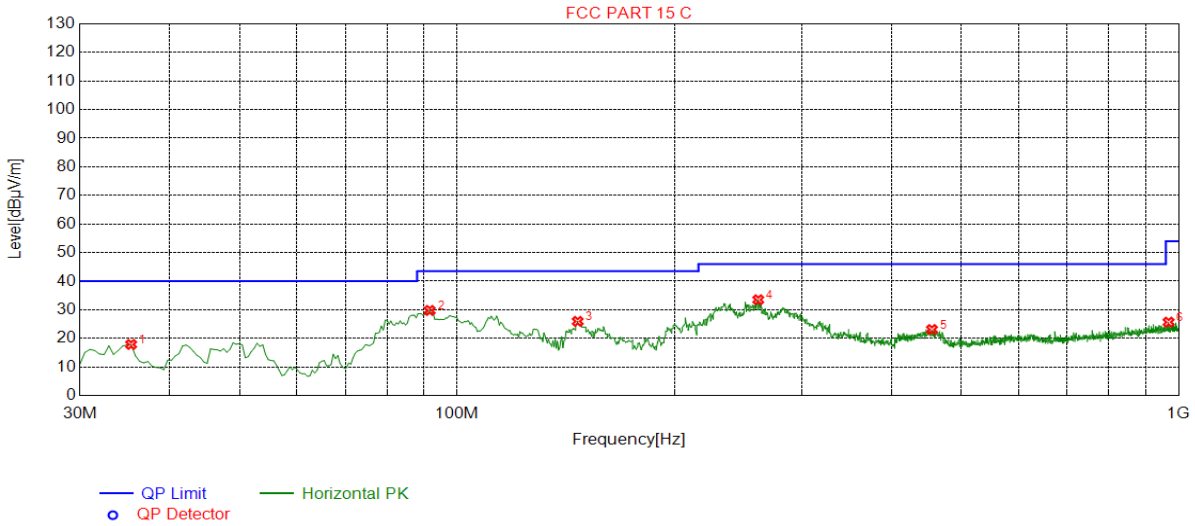
4.9.1 Radiated emission below 1GHz

4.9.1.1 Charge + Transmitting

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.3377	17.90	-32.65	40.00	22.10	136	286	Horizontal
2	91.6258	29.79	-33.15	43.50	13.71	175	264	Horizontal
3	146.943	25.97	-34.91	43.50	17.53	113	236	Horizontal
4	261.460	33.52	-28.91	46.00	12.48	204	110	Horizontal
5	455.072	23.12	-23.73	46.00	22.88	387	292	Horizontal
6	968.459	25.69	-14.25	54.00	28.31	311	196	Horizontal

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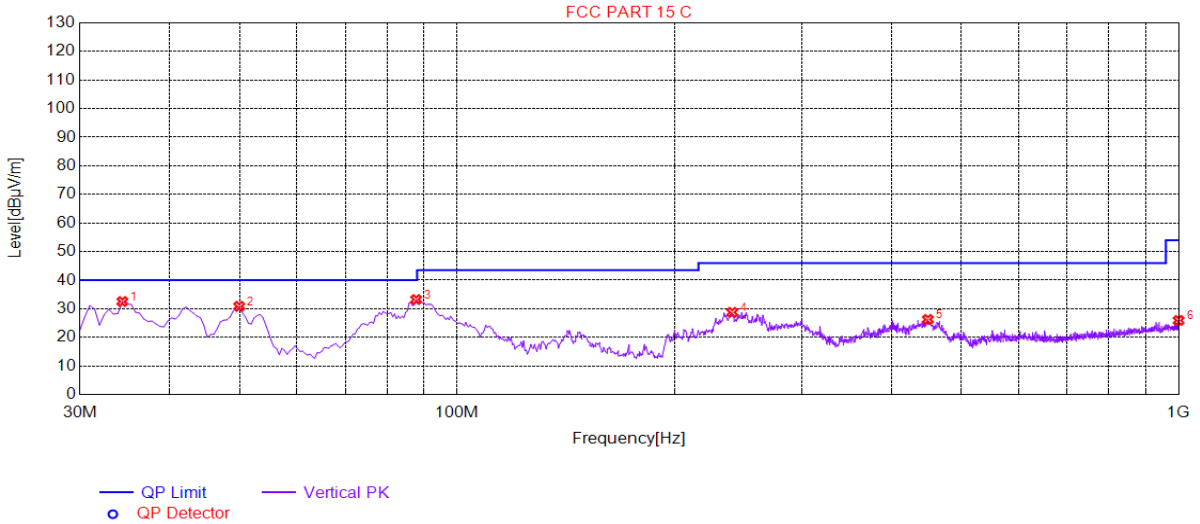
Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.3672	32.56	-32.77	40.00	7.44	238	43	Vertical
2	49.8949	30.87	-30.18	40.00	9.13	241	16	Vertical
3	87.7439	33.25	-33.97	40.00	6.75	307	74	Vertical
4	240.595	28.77	-29.58	46.00	17.23	196	19	Vertical
5	449.249	26.29	-23.86	46.00	19.71	188	71	Vertical
6	1000.00	25.95	-13.87	54.00	28.05	150	281	Vertical

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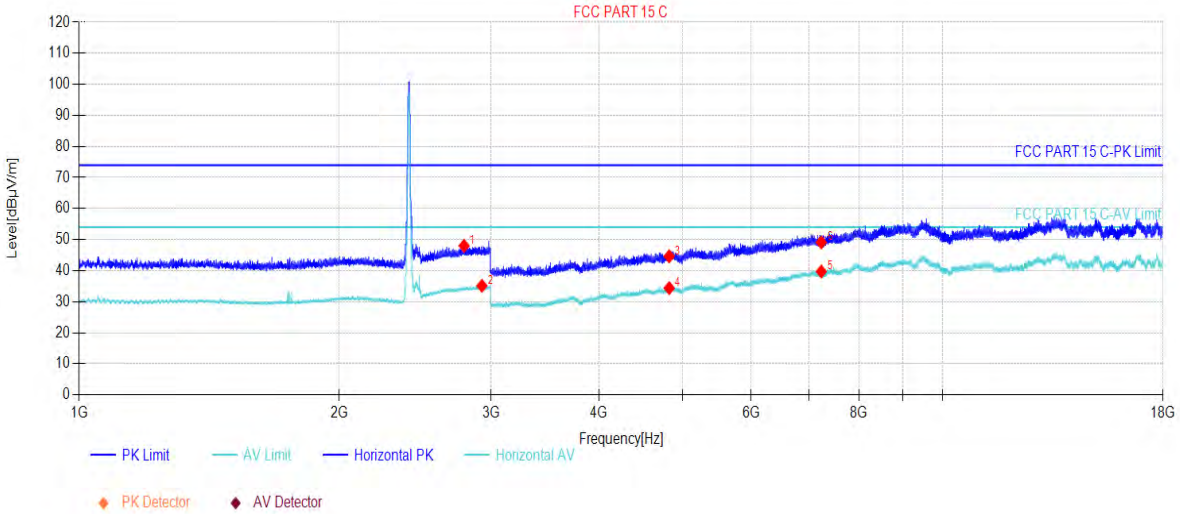
4.9.2 Transmitter emission above 1GHz

4.9.2.1 802.11B_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2791.17	48.01	6.64	74.00	25.99	145	25	Horizontal
2	2927.39	35.12	7.08	54.00	18.88	154	3	Horizontal
3	4824.00	44.62	-10.56	74.00	29.38	125	4	Horizontal
4	4824.00	34.38	-10.56	54.00	19.62	161	334	Horizontal
5	7236.00	39.73	-2.59	54.00	14.27	124	334	Horizontal
6	7236.00	49.14	-2.59	74.00	24.86	146	192	Horizontal

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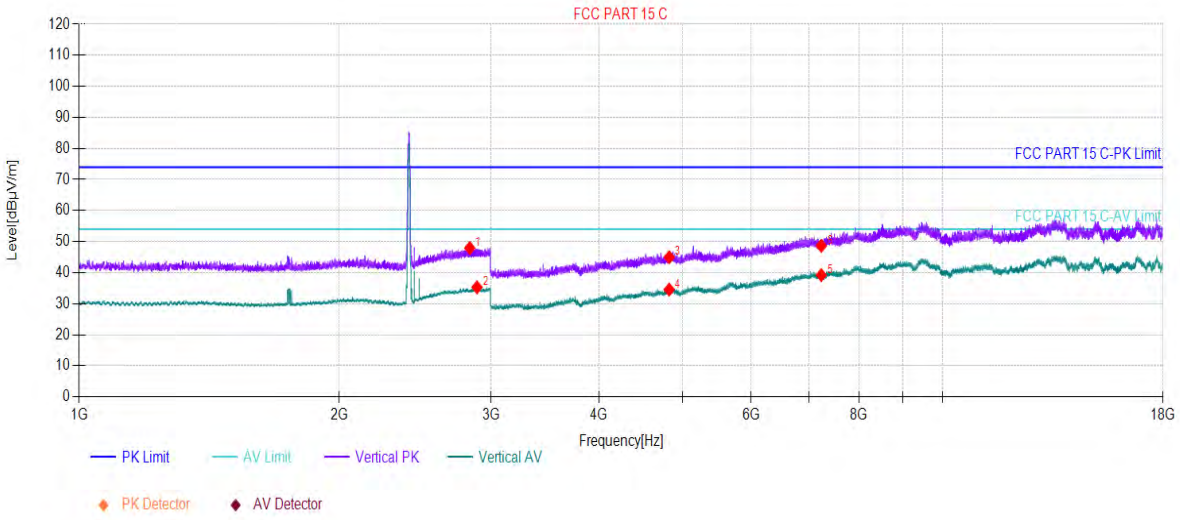
4.9.2.2 802.11B_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2833.98	47.94	6.80	74.00	26.06	245	299	Vertical
2	2889.38	35.28	6.93	54.00	18.72	261	277	Vertical
3	4824.00	44.97	-10.56	74.00	29.03	248	148	Vertical
4	4824.00	34.55	-10.56	54.00	19.45	287	258	Vertical
5	7236.00	39.21	-2.59	54.00	14.79	264	336	Vertical
6	7236.00	48.66	-2.59	74.00	25.34	254	280	Vertical

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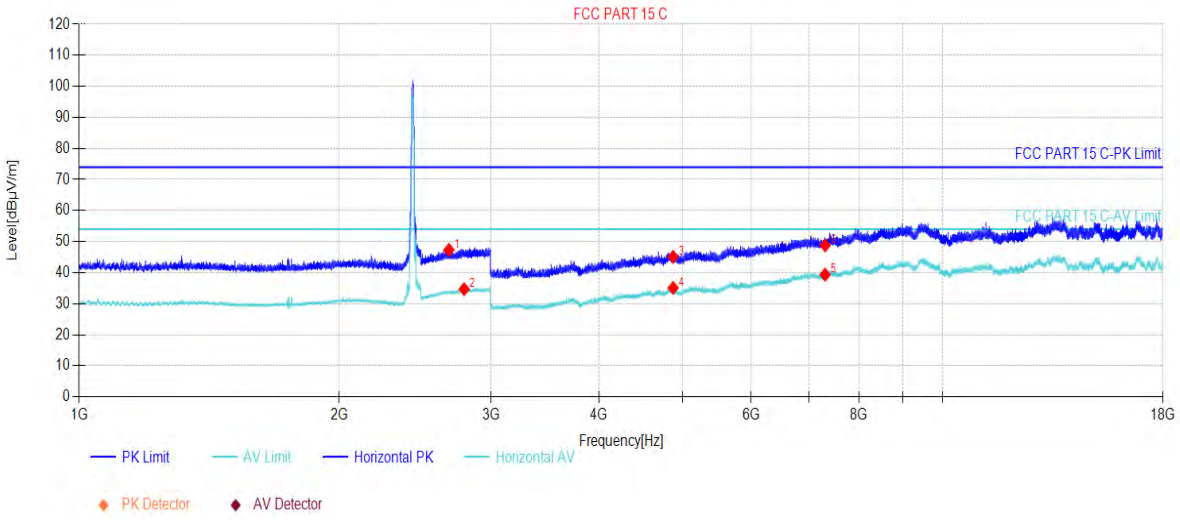
4.9.2.3 802.11B_Channel 6

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2680.96	47.33	5.62	74.00	26.67	154	228	Horizontal
2	2791.77	34.70	6.65	54.00	19.30	165	120	Horizontal
3	4874.00	45.09	-10.40	74.00	28.91	178	126	Horizontal
4	4874.00	35.10	-10.40	54.00	18.90	162	93	Horizontal
5	7311.00	39.35	-2.58	54.00	14.65	142	226	Horizontal
6	7311.00	48.82	-2.58	74.00	25.18	161	215	Horizontal

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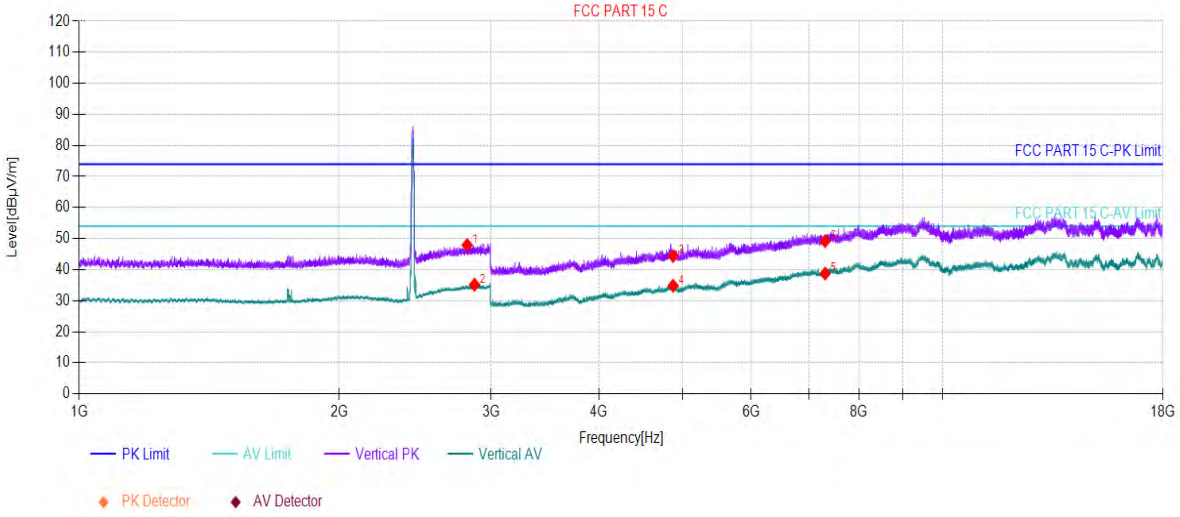
4.9.2.4 802.11B_Channel 6

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2814.78	47.94	6.76	74.00	26.06	265	148	Vertical
2	2870.38	35.17	6.88	54.00	18.83	248	305	Vertical
3	4874.00	44.44	-10.40	74.00	29.56	262	291	Vertical
4	4874.00	34.82	-10.40	54.00	19.18	274	15	Vertical
5	7311.00	38.74	-2.58	54.00	15.26	263	126	Vertical
6	7311.00	49.19	-2.58	74.00	24.81	251	37	Vertical

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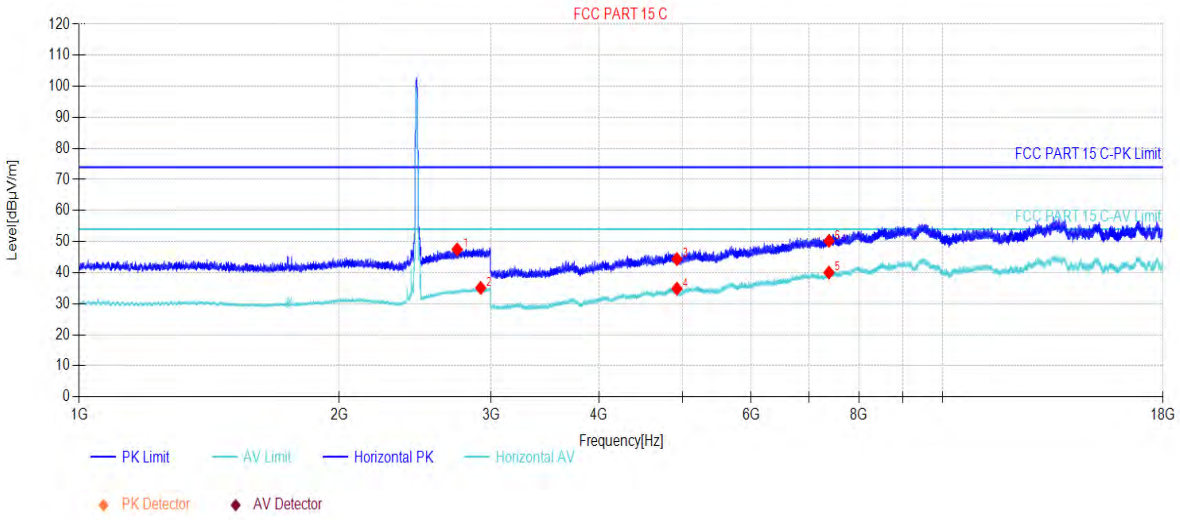
4.9.2.5 802.11B_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2740.37	47.48	6.12	74.00	26.52	162	42	Horizontal
2	2917.59	35.08	7.03	54.00	18.92	167	221	Horizontal
3	4924.00	44.37	-10.22	74.00	29.63	155	236	Horizontal
4	4924.00	34.85	-10.22	54.00	19.15	154	269	Horizontal
5	7386.00	40.03	-2.06	54.00	13.97	135	347	Horizontal
6	7386.00	50.24	-2.06	74.00	23.76	141	324	Horizontal

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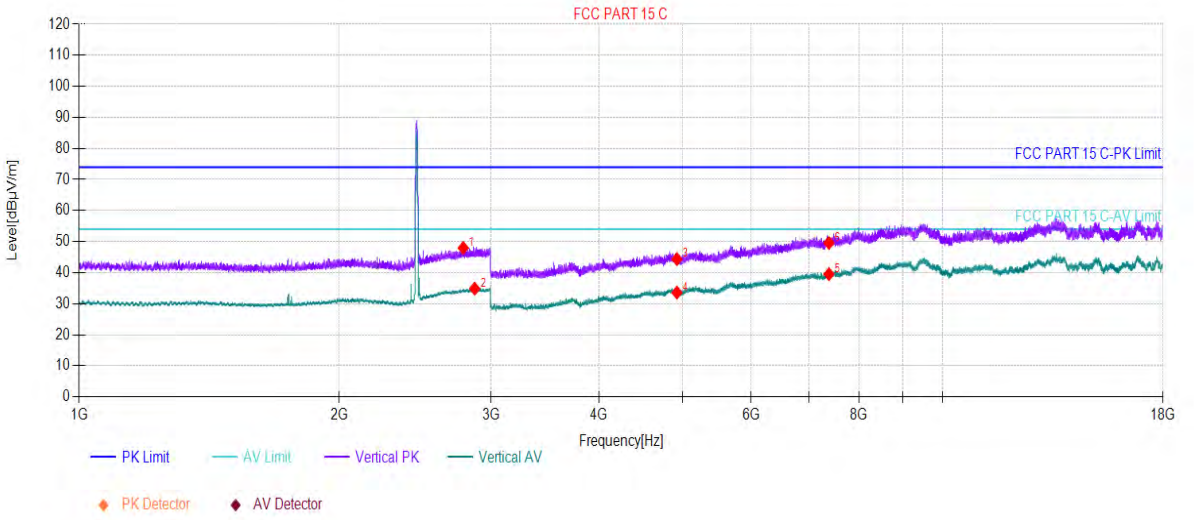
4.9.2.6 802.11B_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2784.77	47.96	6.57	74.00	26.04	241	19	Vertical
2	2871.18	34.87	6.89	54.00	19.13	235	75	Vertical
3	4924.00	44.37	-10.22	74.00	29.63	274	153	Vertical
4	4924.00	33.59	-10.22	54.00	20.41	264	86	Vertical
5	7386.00	39.53	-2.06	54.00	14.47	241	187	Vertical
6	7386.00	49.56	-2.06	74.00	24.44	284	264	Vertical

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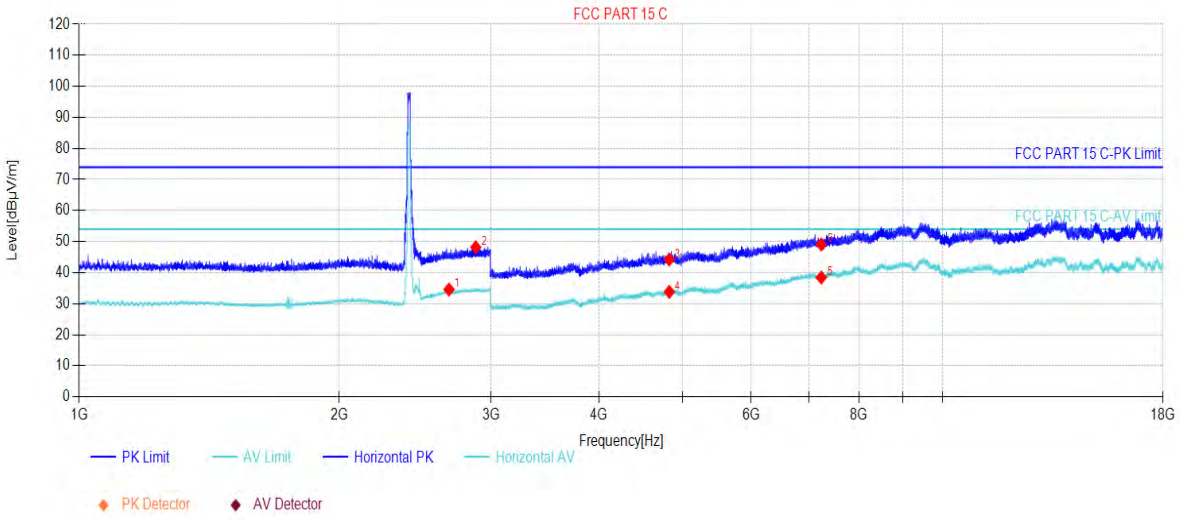
4.9.2.7 802.11G_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2681.36	34.58	5.62	54.00	19.42	154	132	Horizontal
2	2879.58	48.18	6.91	74.00	25.82	161	104	Horizontal
3	4824.00	44.24	-10.56	74.00	29.76	154	257	Horizontal
4	4824.00	33.83	-10.56	54.00	20.17	163	324	Horizontal
5	7236.00	38.45	-2.59	54.00	15.55	174	91	Horizontal
6	7236.00	49.08	-2.59	74.00	24.92	162	324	Horizontal

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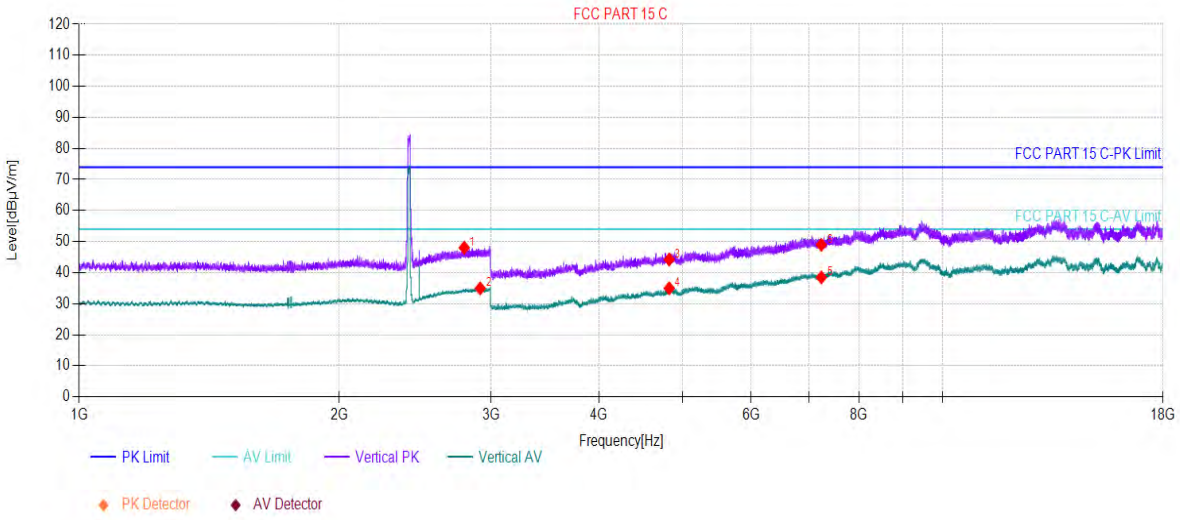
4.9.2.8 802.11G_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2792.37	48.05	6.65	74.00	25.95	241	42	Vertical
2	2913.79	34.93	7.01	54.00	19.07	261	132	Vertical
3	4824.00	44.26	-10.56	74.00	29.74	245	192	Vertical
4	4824.00	34.97	-10.56	54.00	19.03	278	357	Vertical
5	7236.00	38.47	-2.59	54.00	15.53	264	69	Vertical
6	7236.00	48.97	-2.59	74.00	25.03	248	325	Vertical

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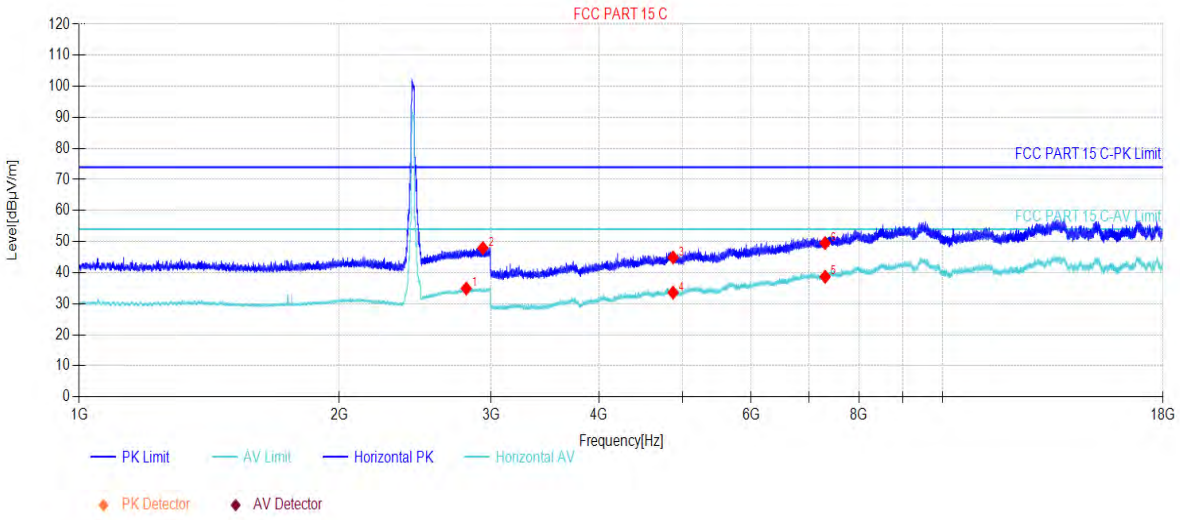
4.9.2.9 802.11G_Channel 6

Test Graph



Suspected List

Suspected List								
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1	2807.78	34.90	6.75	54.00	19.10	241	283	Horizontal
2	2934.99	47.93	7.11	74.00	26.07	268	47	Horizontal
3	4874.00	44.91	-10.40	74.00	29.09	274	126	Horizontal
4	4874.00	33.56	-10.40	54.00	20.44	241	27	Horizontal
5	7311.00	38.68	-2.58	54.00	15.32	261	0	Horizontal
6	7311.00	49.53	-2.58	74.00	24.47	278	93	Horizontal

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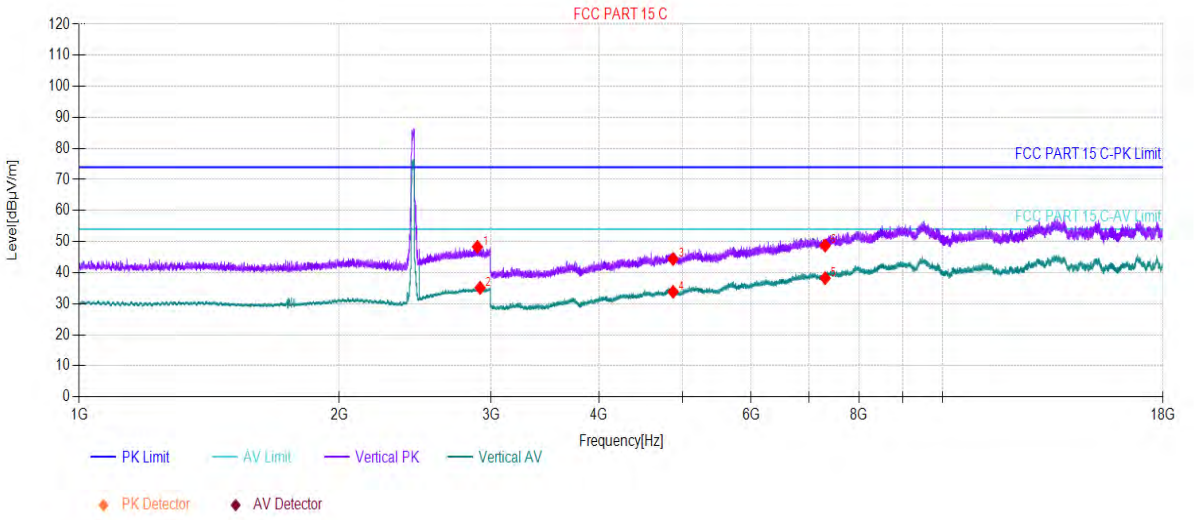
4.9.2.10 802.11G_Channel 6

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2892.18	48.32	6.93	74.00	25.68	241	86	Vertical
2	2913.19	35.09	7.01	54.00	18.91	268	92	Vertical
3	4874.00	44.40	-10.40	74.00	29.60	248	272	Vertical
4	4874.00	33.82	-10.40	54.00	20.18	269	85	Vertical
5	7311.00	38.23	-2.58	54.00	15.77	246	357	Vertical
6	7311.00	48.75	-2.58	74.00	25.25	247	0	Vertical

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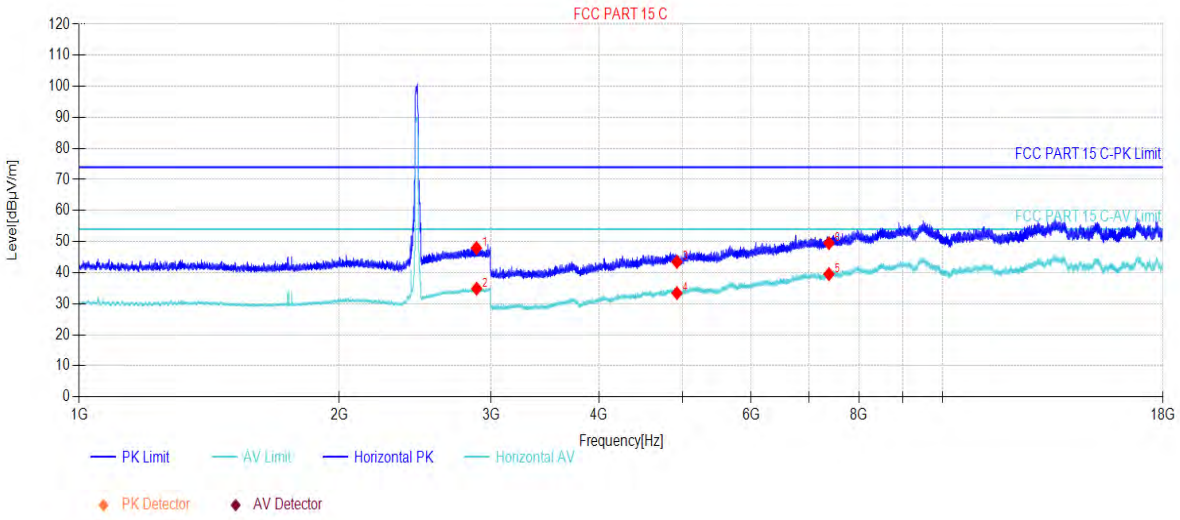
4.9.2.11 802.11G_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2884.58	47.95	6.92	74.00	26.05	165	103	Horizontal
2	2886.58	34.86	6.92	54.00	19.14	148	316	Horizontal
3	4924.00	43.46	-10.22	74.00	30.54	168	136	Horizontal
4	4924.00	33.41	-10.22	54.00	20.59	174	236	Horizontal
5	7386.00	39.54	-2.06	54.00	14.46	168	136	Horizontal
6	7386.00	49.52	-2.06	74.00	24.48	191	291	Horizontal

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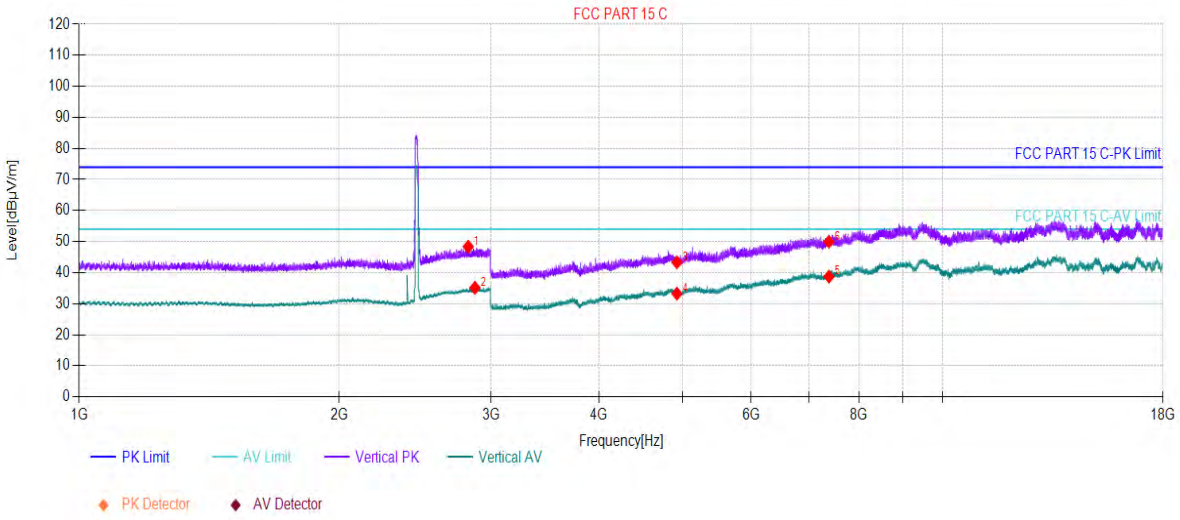
4.9.2.12 802.11G_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2821.98	48.38	6.78	74.00	25.62	241	193	Vertical
2	2873.18	35.13	6.89	54.00	18.87	261	86	Vertical
3	4924.00	43.33	-10.22	74.00	30.67	248	203	Vertical
4	4924.00	33.26	-10.22	54.00	20.74	264	114	Vertical
5	7386.00	38.73	-2.06	54.00	15.27	274	80	Vertical
6	7386.00	49.96	-2.06	74.00	24.04	214	357	Vertical

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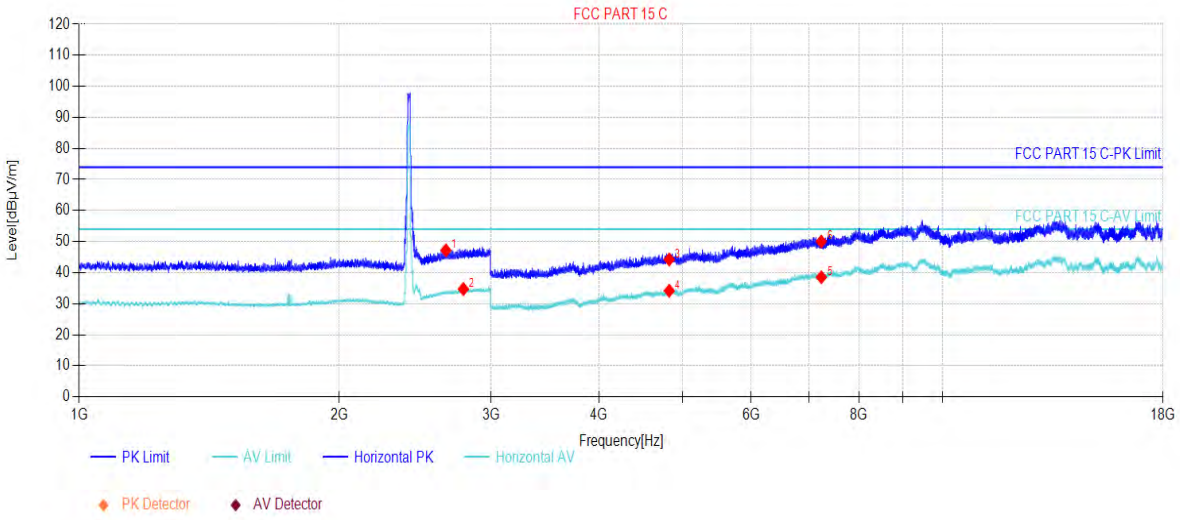
4.9.2.13 802.11N20_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2658.96	47.20	5.53	74.00	26.80	164	278	Horizontal
2	2785.97	34.72	6.59	54.00	19.28	150	99	Horizontal
3	4824.00	44.25	-10.56	74.00	29.75	174	313	Horizontal
4	4824.00	34.17	-10.56	54.00	19.83	135	148	Horizontal
5	7236.00	38.55	-2.59	54.00	15.45	218	26	Horizontal
6	7236.00	50.03	-2.59	74.00	23.97	188	148	Horizontal

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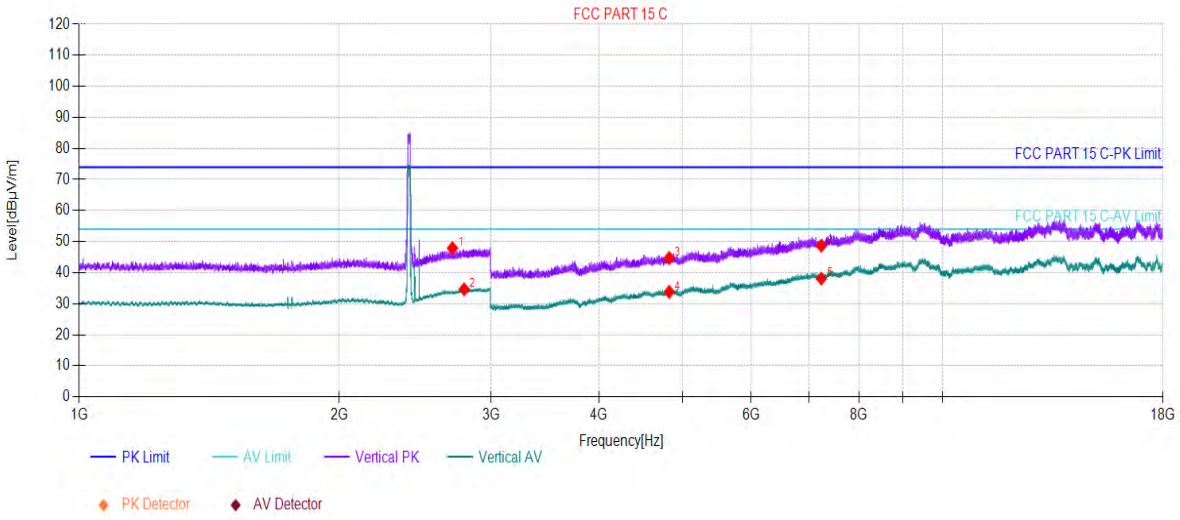
4.9.2.14 802.11N20_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2706.17	47.90	5.76	74.00	26.10	246	170	Vertical
2	2791.97	34.65	6.65	54.00	19.35	248	350	Vertical
3	4824.00	44.70	-10.56	74.00	29.30	241	301	Vertical
4	4824.00	33.81	-10.56	54.00	20.19	263	70	Vertical
5	7236.00	38.07	-2.59	54.00	15.93	244	336	Vertical
6	7236.00	48.67	-2.59	74.00	25.33	271	313	Vertical

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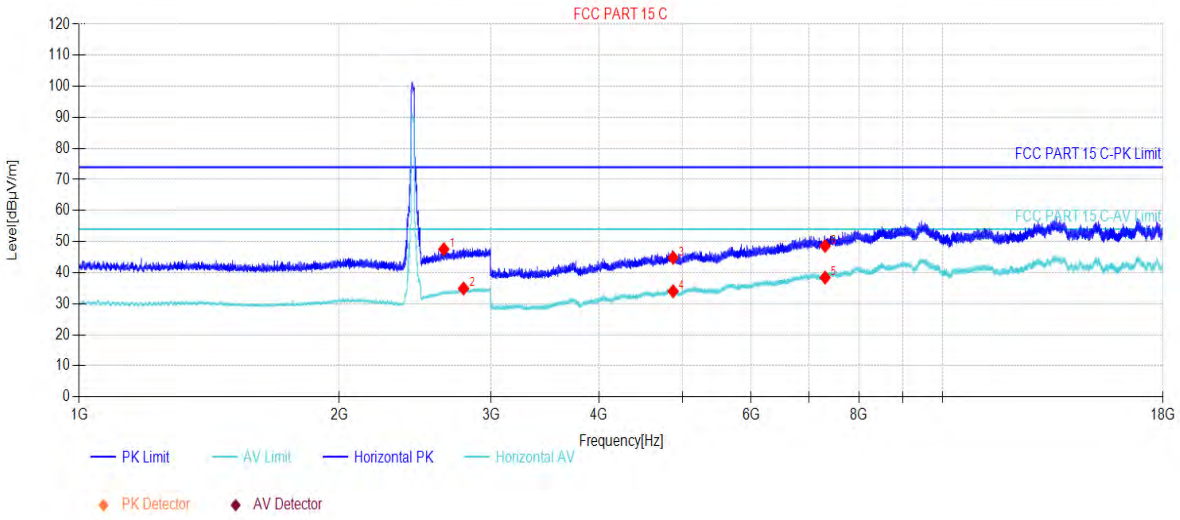
4.9.2.15 802.11N20_Channel 6

Test Graph



Suspected List

Suspected List								
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1	2644.56	47.54	5.47	74.00	26.46	241	36	Horizontal
2	2787.57	34.90	6.60	54.00	19.10	261	356	Horizontal
3	4874.00	44.81	-10.40	74.00	29.19	248	5	Horizontal
4	4874.00	34.00	-10.40	54.00	20.00	278	5	Horizontal
5	7311.00	38.42	-2.58	54.00	15.58	264	248	Horizontal
6	7311.00	48.63	-2.58	74.00	25.37	248	203	Horizontal

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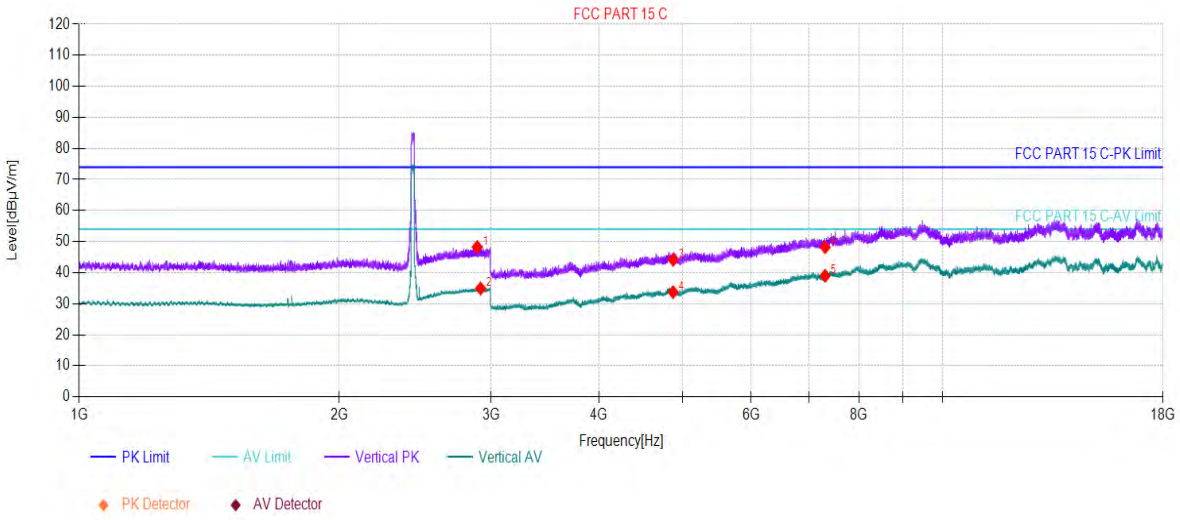
4.9.2.16 802.11N20_Channel 6

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2890.78	48.25	6.93	74.00	25.75	248	170	Vertical
2	2916.59	34.91	7.03	54.00	19.09	245	164	Vertical
3	4874.00	44.17	-10.40	74.00	29.83	268	114	Vertical
4	4874.00	33.73	-10.40	54.00	20.27	281	347	Vertical
5	7311.00	39.01	-2.58	54.00	14.99	249	169	Vertical
6	7311.00	48.21	-2.58	74.00	25.79	234	242	Vertical

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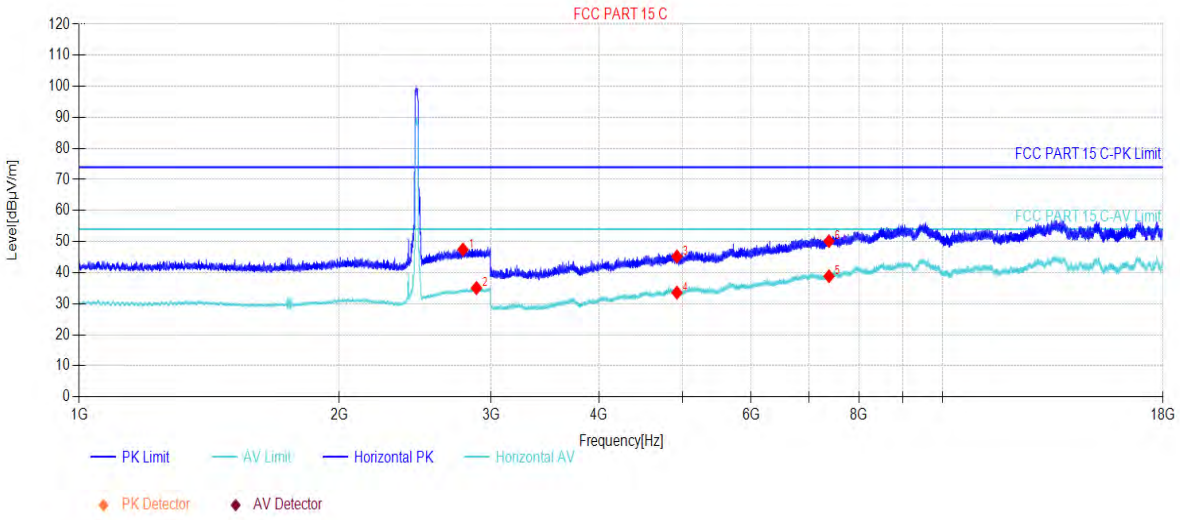
4.9.2.17 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
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1	2783.17	47.46	6.56	74.00	26.54	154	228	Horizontal
2	2885.18	35.04	6.92	54.00	18.96	163	149	Horizontal
3	4924.00	45.21	-10.22	74.00	28.79	148	36	Horizontal
4	4924.00	33.56	-10.22	54.00	20.44	163	346	Horizontal
5	7386.00	38.85	-2.06	54.00	15.15	135	91	Horizontal
6	7386.00	50.17	-2.06	74.00	23.83	148	268	Horizontal

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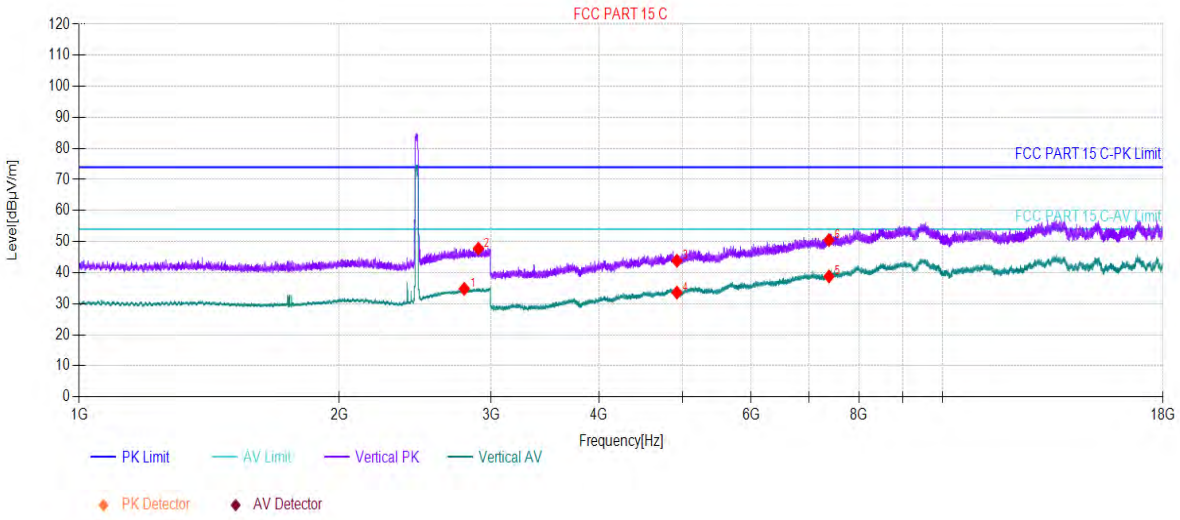
4.9.2.18 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2792.57	34.79	6.65	54.00	19.21	241	109	Vertical
2	2900.39	47.78	6.95	74.00	26.22	236	126	Vertical
3	4924.00	43.82	-10.22	74.00	30.18	278	192	Vertical
4	4924.00	33.60	-10.22	54.00	20.40	274	148	Vertical
5	7386.00	38.76	-2.06	54.00	15.24	264	16	Vertical
6	7386.00	50.52	-2.06	74.00	23.48	248	214	Vertical

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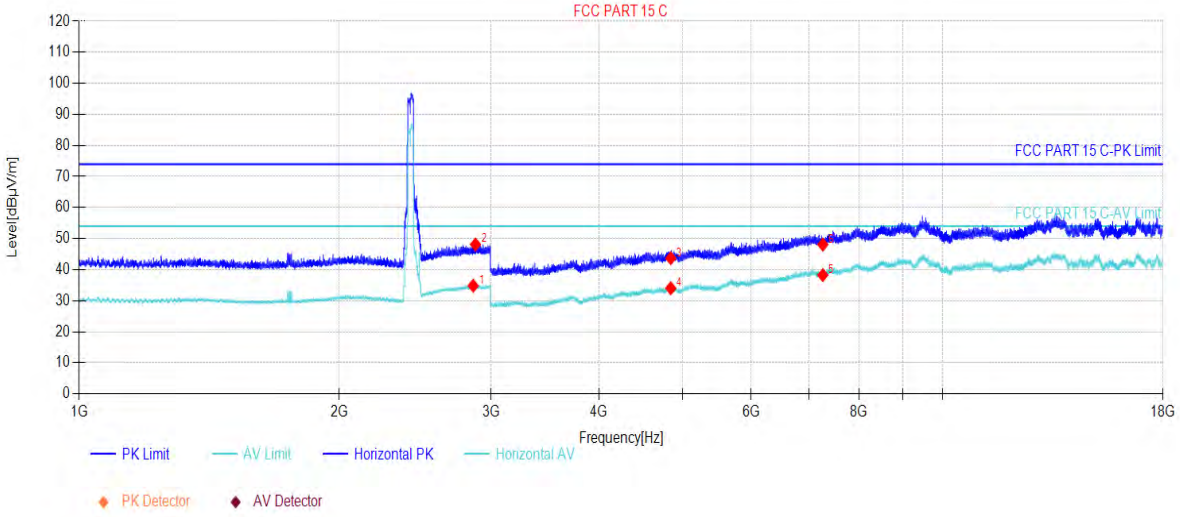
4.9.2.19 802.11N40_Channel 3

Test Graph



Suspected List

Suspected List								
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1	2859.78	34.82	6.86	54.00	19.18	164	193	Horizontal
2	2877.18	48.11	6.90	74.00	25.89	246	299	Horizontal
3	4844.00	43.67	-10.50	74.00	30.33	248	335	Horizontal
4	4844.00	34.00	-10.50	54.00	20.00	268	301	Horizontal
5	7266.00	38.26	-2.62	54.00	15.74	249	335	Horizontal
6	7266.00	48.09	-2.62	74.00	25.91	241	301	Horizontal

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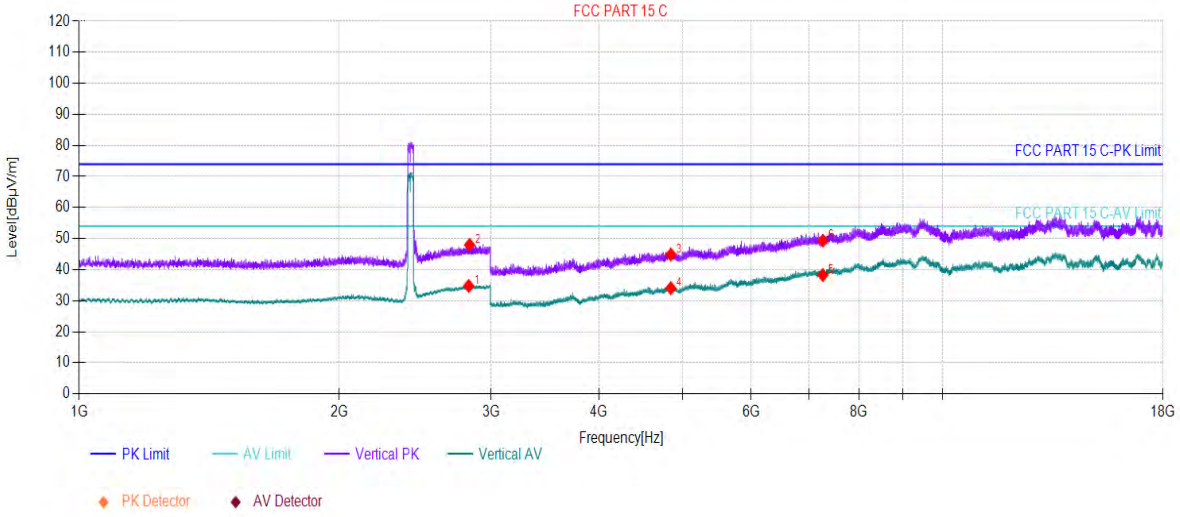
4.9.2.20 802.11N40_Channel 3

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2826.38	34.76	6.79	54.00	19.24	215	339	Vertical
2	2832.78	47.99	6.80	74.00	26.01	261	350	Vertical
3	4844.00	44.86	-10.50	74.00	29.14	248	27	Vertical
4	4844.00	34.04	-10.50	54.00	19.96	294	70	Vertical
5	7266.00	38.28	-2.62	54.00	15.72	248	214	Vertical
6	7266.00	49.37	-2.62	74.00	24.63	263	336	Vertical

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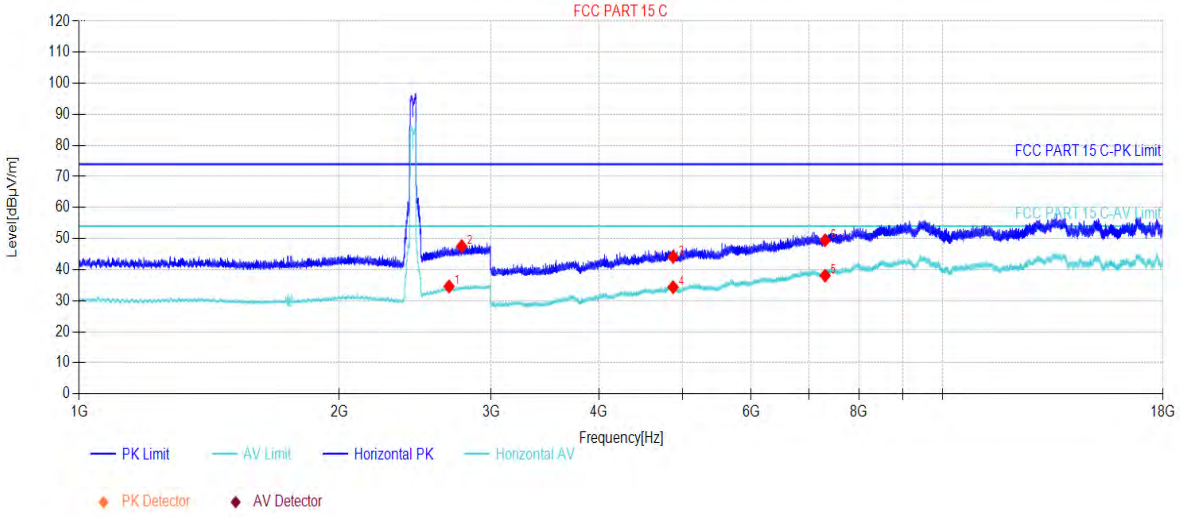
4.9.2.21 802.11N40_Channel 6

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2681.36	34.60	5.62	54.00	19.40	135	19	Horizontal
2	2773.97	47.56	6.46	74.00	26.44	145	182	Horizontal
3	4874.00	44.13	-10.40	74.00	29.87	151	225	Horizontal
4	4874.00	34.37	-10.40	54.00	19.63	115	14	Horizontal
5	7311.00	38.07	-2.58	54.00	15.93	167	81	Horizontal
6	7311.00	49.48	-2.58	74.00	24.52	168	269	Horizontal

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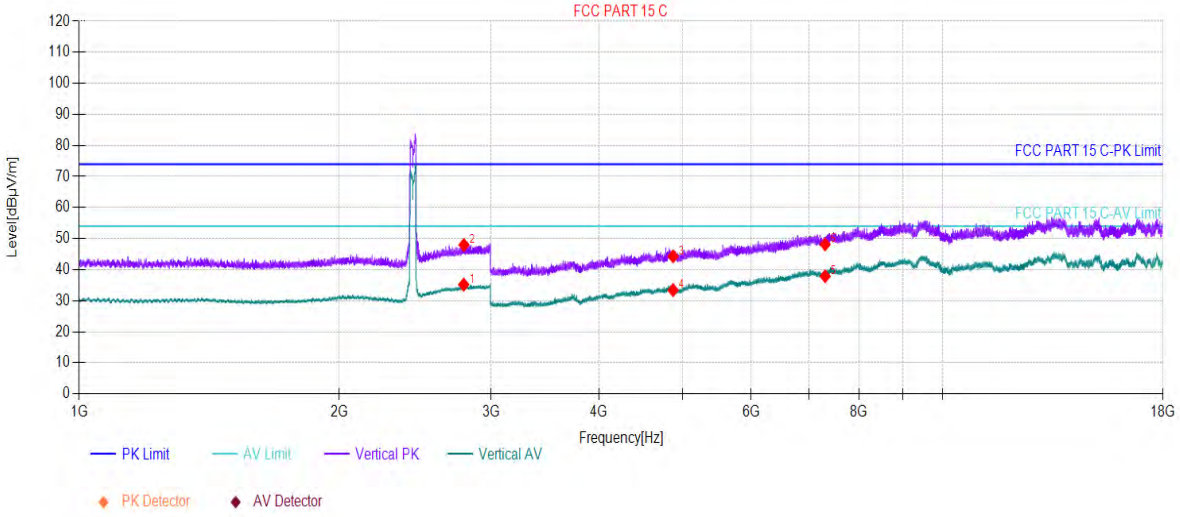
4.9.2.22 802.11N40_Channel 6

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2788.77	35.17	6.61	54.00	18.83	164	256	Vertical
2	2790.37	47.98	6.63	74.00	26.02	148	149	Vertical
3	4874.00	44.31	-10.40	74.00	29.69	163	36	Vertical
4	4874.00	33.42	-10.40	54.00	20.58	214	146	Vertical
5	7311.00	37.89	-2.58	54.00	16.11	147	158	Vertical
6	7311.00	48.14	-2.58	74.00	25.86	168	135	Vertical

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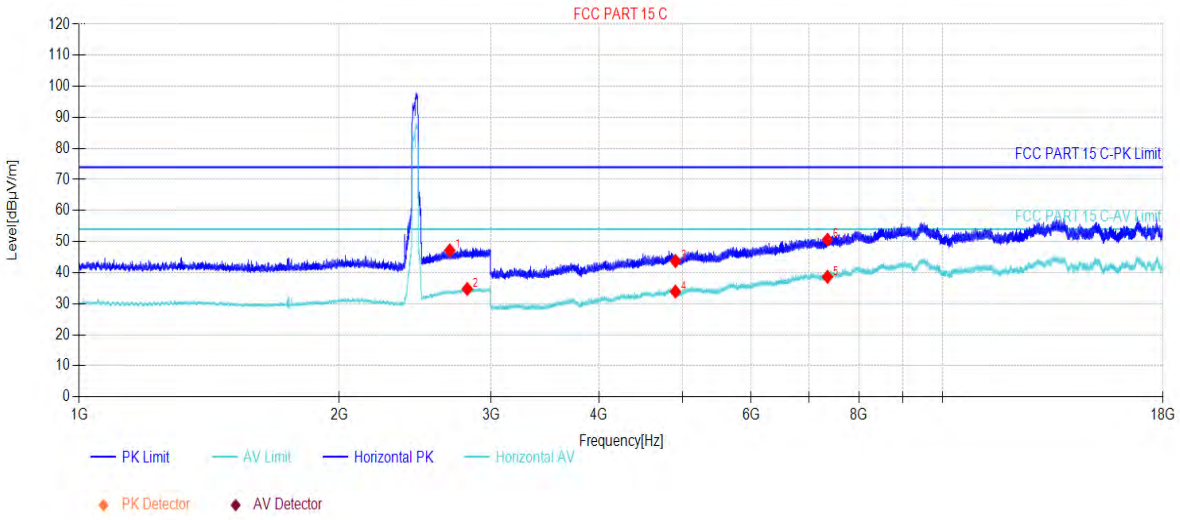
4.9.2.23 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2687.36	47.18	5.65	74.00	26.82	168	266	Horizontal
2	2814.78	34.76	6.76	54.00	19.24	148	271	Horizontal
3	4904.00	43.74	-10.30	74.00	30.26	164	69	Horizontal
4	4904.00	33.92	-10.30	54.00	20.08	148	3	Horizontal
5	7356.00	38.65	-2.27	54.00	15.35	162	347	Horizontal
6	7356.00	50.62	-2.27	74.00	23.38	178	269	Horizontal

Final Data List

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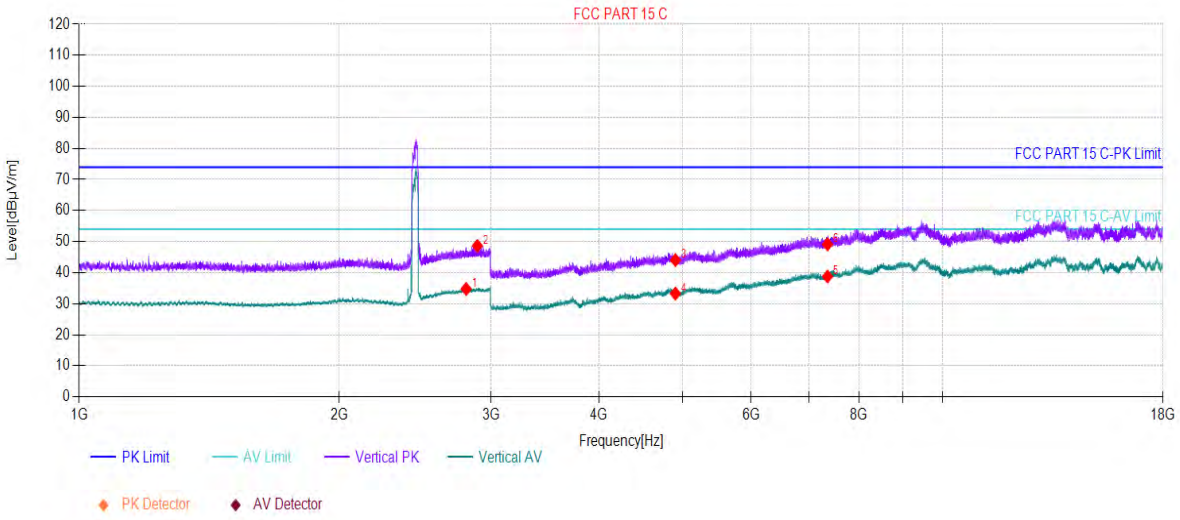
4.9.2.24 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2807.18	34.74	6.75	54.00	19.26	164	227	Vertical
2	2891.98	48.64	6.93	74.00	25.36	148	255	Vertical
3	4904.00	44.06	-10.30	74.00	29.94	169	26	Vertical
4	4904.00	33.26	-10.30	54.00	20.74	148	169	Vertical
5	7356.00	38.76	-2.27	54.00	15.24	178	81	Vertical
6	7356.00	49.11	-2.27	74.00	24.89	168	213	Vertical

Final Data List

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz and 18GHz to 25GHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
4) All Modes have been tested, but only the worst case data displayed in this report.

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4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			

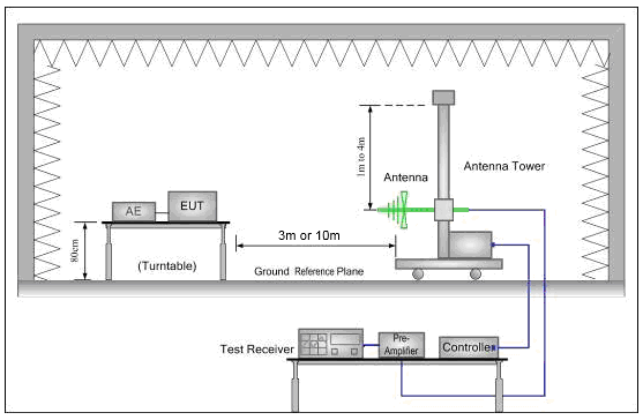

Figure 1. 30MHz to 1GHz

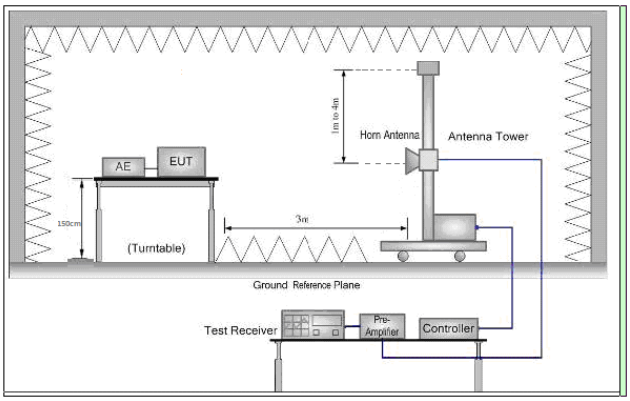

Figure 2. Above 1 GHz

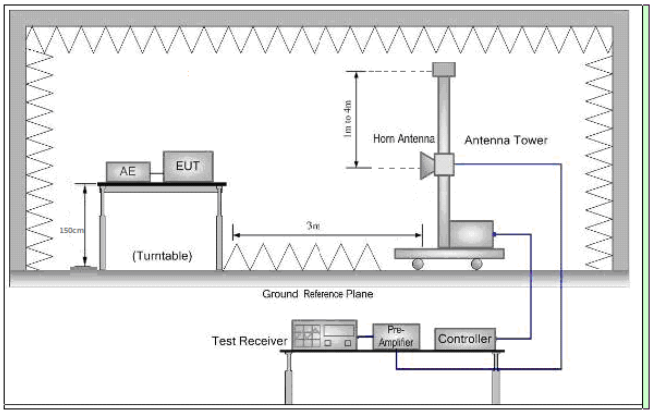

Figure 3. Above 1 GHz

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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.
Test Configuration:	Peak Measurements Above 1000 MHz • RBW = 1 MHz • VBW ⩾ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold Average Measurements Above 1000MHz • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G; 6.5Mbps of rate is the worst case of 802.11N(HT20); 13.5Mbps of rate is the worst case of 802.11N(HT40);

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	Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
Remark:	The Emission Test data were reused from the report no:XZR/2021/1004901

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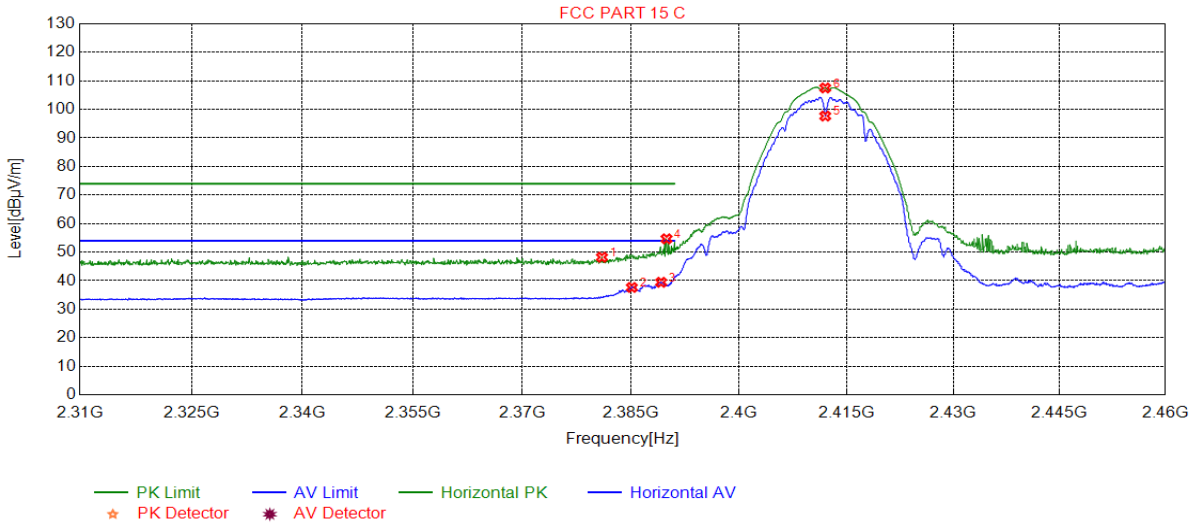
4.10.1 Test Plots

4.10.1.1 802.11B_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2380.985	48.22	7.96	74.00	25.78	224	62	Horizontal
2	2385.112	37.64	7.83	54.00	16.36	147	59	Horizontal
3	2389.164	39.44	7.96	54.00	14.56	210	59	Horizontal
4	2389.915	54.66	7.98	74.00	19.34	187	62	Horizontal
5	2412.000	97.67	8.16	0.00	-97.67	155	62	Horizontal
6	2412.000	107.52	8.16	0.00	-107.52	204	59	Horizontal

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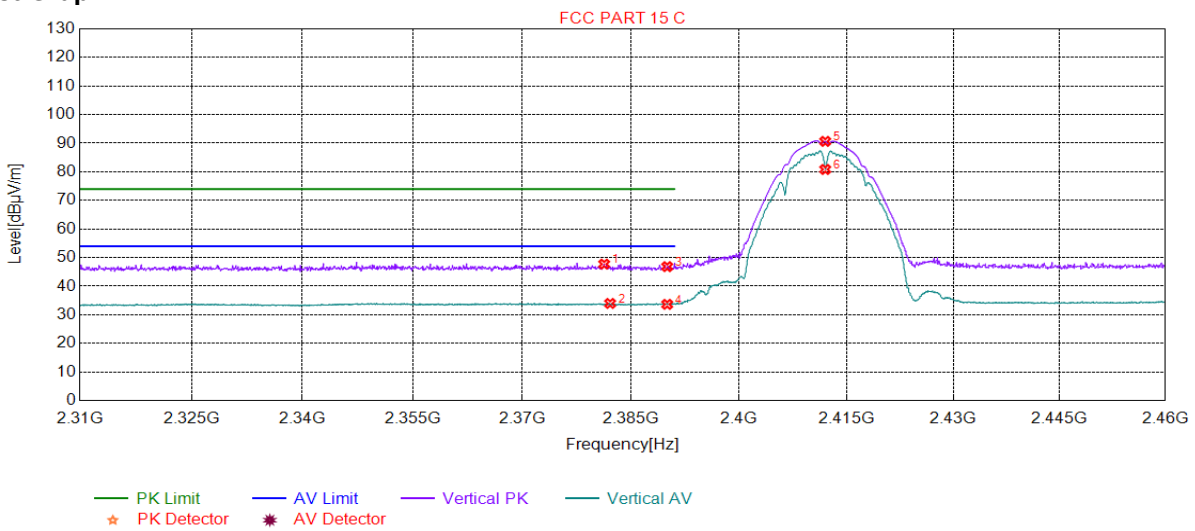
4.10.1.2 802.11B_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2381.285	47.74	7.95	74.00	26.26	164	282	Vertical
2	2382.111	33.99	7.93	54.00	20.01	135	346	Vertical
3	2390.000	46.85	7.98	74.00	27.15	264	203	Vertical
4	2390.000	33.67	7.98	54.00	20.33	137	259	Vertical
5	2412.000	90.65	8.16	0.00	-90.65	201	274	Vertical
6	2412.000	80.83	8.16	0.00	-80.83	248	274	Vertical

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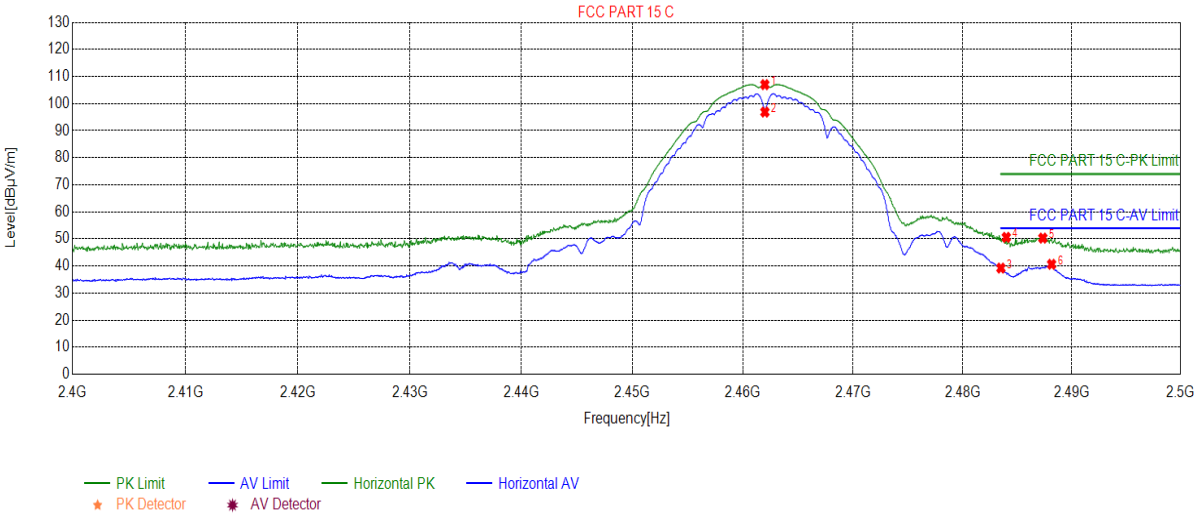
4.10.1.3 802.11B_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.000	107.00	8.75	0.00	-107.00	152	66	Horizontal
2	2462.000	96.87	8.75	0.00	-96.87	133	63	Horizontal
3	2483.500	39.24	8.50	54.00	14.76	124	66	Horizontal
4	2483.992	50.60	8.50	74.00	23.40	148	66	Horizontal
5	2487.343	50.32	8.55	74.00	23.68	156	66	Horizontal
6	2488.144	40.63	8.57	54.00	13.37	162	63	Horizontal

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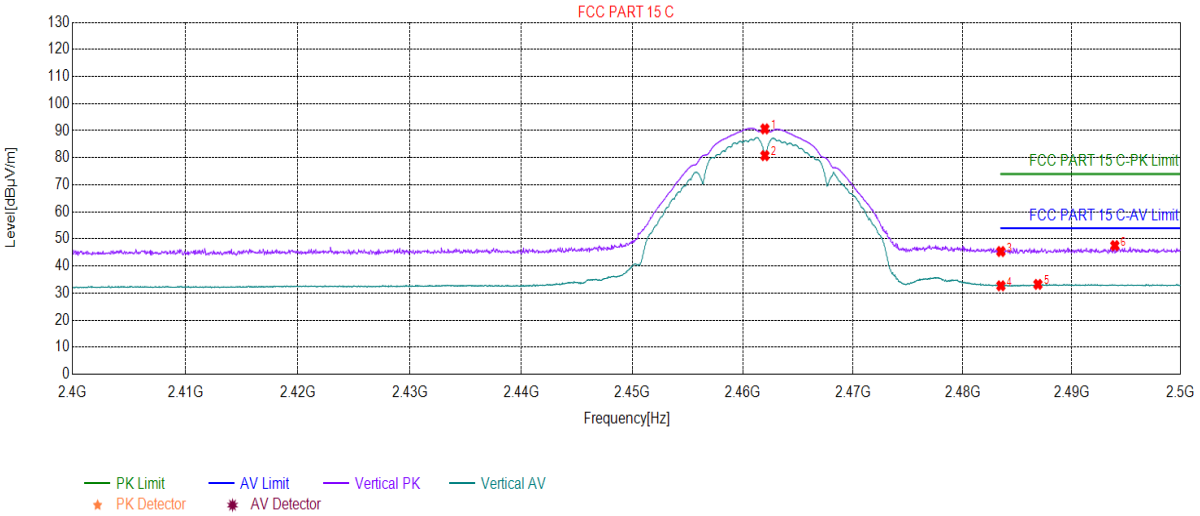
4.10.1.4 802.11B_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.000	90.66	8.75	0.00	-90.66	238	158	Vertical
2	2462.000	80.78	8.75	0.00	-80.78	211	158	Vertical
3	2483.500	45.36	8.50	74.00	28.64	263	63	Vertical
4	2483.500	32.70	8.50	54.00	21.30	308	346	Vertical
5	2486.893	33.22	8.54	54.00	20.78	285	158	Vertical
6	2493.947	47.55	8.59	74.00	26.45	391	346	Vertical

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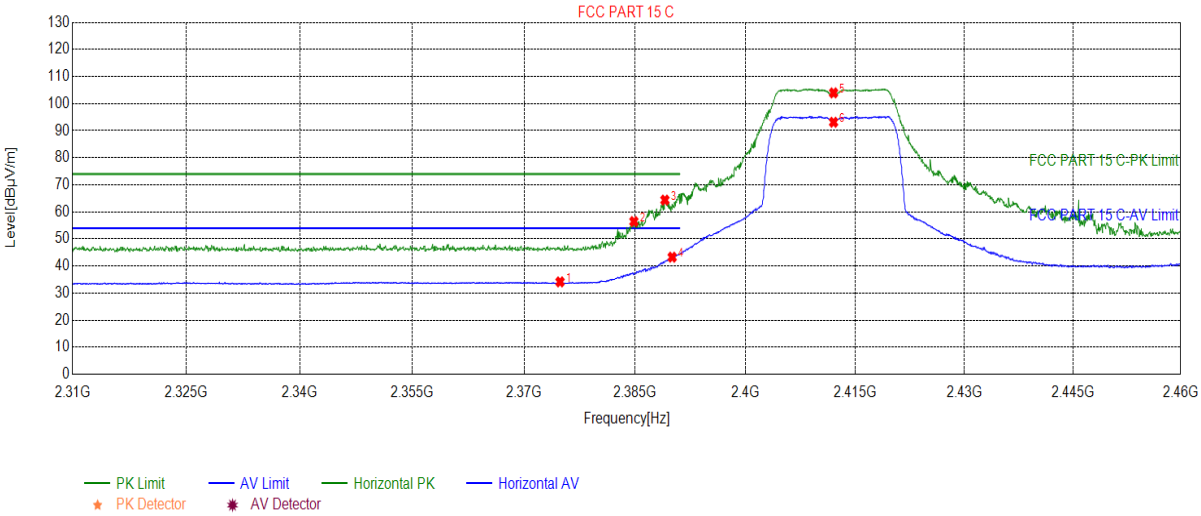
4.10.1.5 802.11G_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2374.832	34.15	7.95	54.00	19.85	126	138	Horizontal
2	2384.812	56.44	7.84	74.00	17.56	174	59	Horizontal
3	2389.014	64.37	7.95	74.00	9.63	146	59	Horizontal
4	2390.000	43.27	7.98	54.00	10.73	151	59	Horizontal
5	2412.000	103.96	8.16	0.00	-103.96	177	66	Horizontal
6	2412.000	93.11	8.16	0.00	-93.11	174	59	Horizontal

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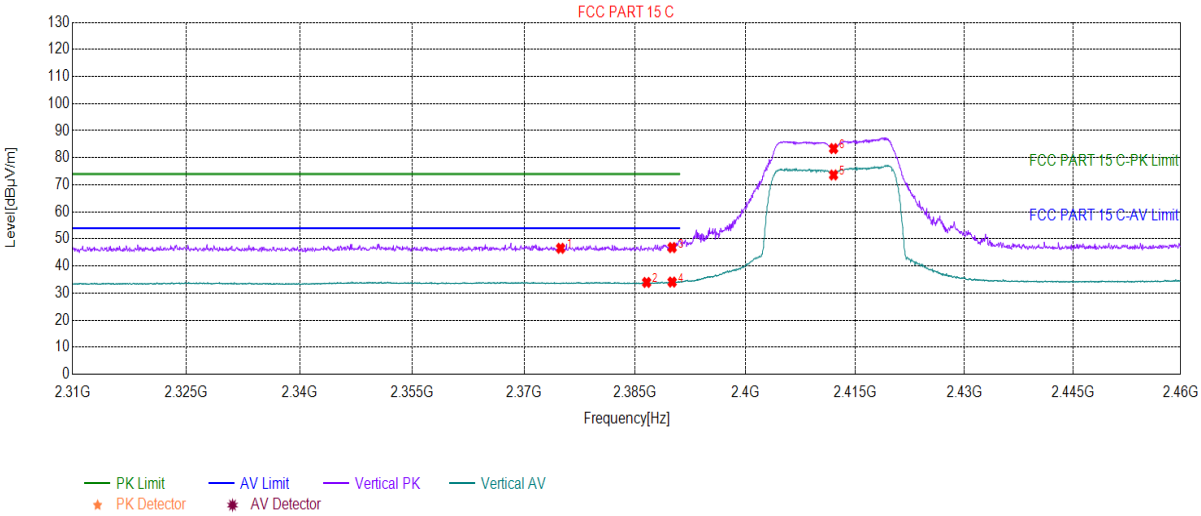
4.10.1.6 802.11G_Channel 1

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2374.907	46.55	7.95	74.00	27.45	211	145	Vertical
2	2386.538	33.94	7.88	54.00	20.06	251	217	Vertical
3	2390.000	46.82	7.98	74.00	27.18	239	286	Vertical
4	2390.000	34.09	7.98	54.00	19.91	306	187	Vertical
5	2412.000	73.63	8.16	0.00	-73.63	311	187	Vertical
6	2412.000	83.38	8.16	0.00	-83.38	236	187	Vertical

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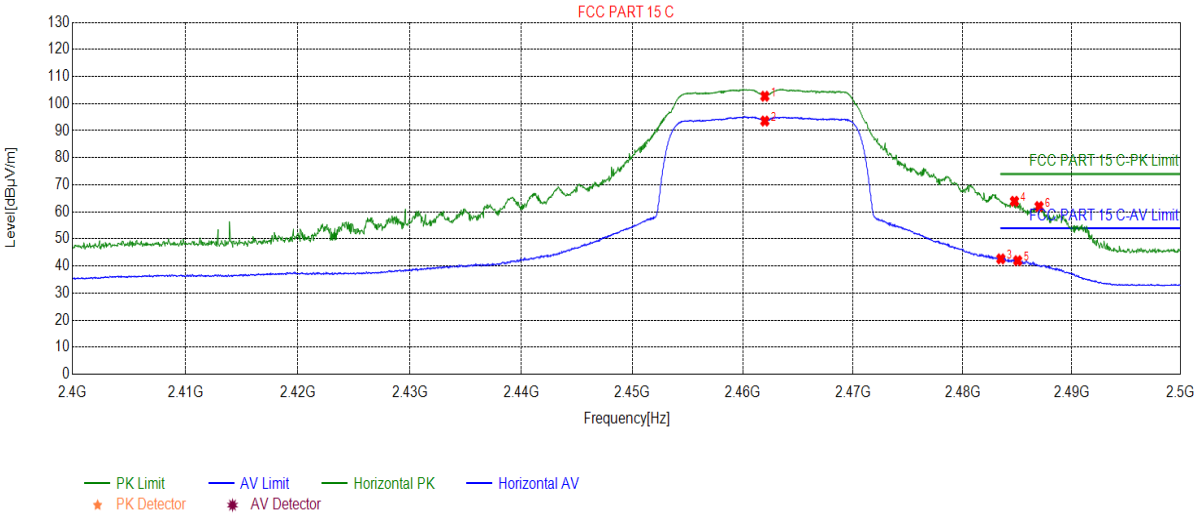
4.10.1.7 802.11G_Channel 11

Test Graph



Suspected List

Suspected List								
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1	2462.000	102.71	8.75	0.00	-102.71	116	66	Horizontal
2	2462.000	93.56	8.75	0.00	-93.56	127	63	Horizontal
3	2483.500	42.64	8.50	54.00	11.36	132	70	Horizontal
4	2484.742	63.91	8.49	74.00	10.09	151	70	Horizontal
5	2485.042	41.98	8.49	54.00	12.02	168	66	Horizontal
6	2486.993	61.98	8.54	74.00	12.02	174	63	Horizontal

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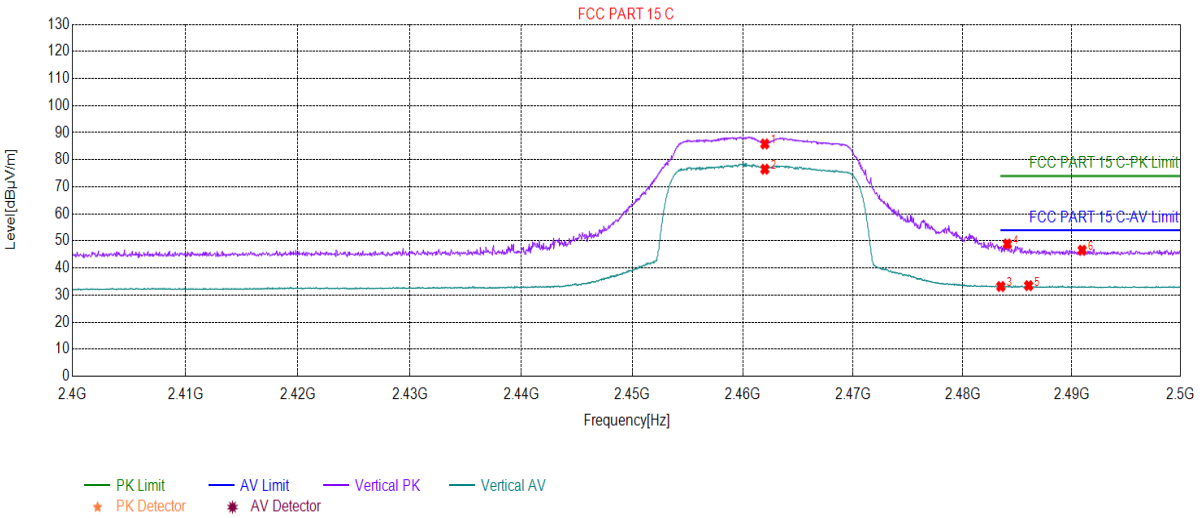
4.10.1.8 802.11G_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.000	85.84	8.75	0.00	-85.84	237	156	Vertical
2	2462.000	76.50	8.75	0.00	-76.50	251	152	Vertical
3	2483.500	33.18	8.50	54.00	20.82	206	267	Vertical
4	2484.092	48.89	8.50	74.00	25.11	209	171	Vertical
5	2486.043	33.48	8.52	54.00	20.52	310	149	Vertical
6	2490.945	46.57	8.62	74.00	27.43	266	190	Vertical

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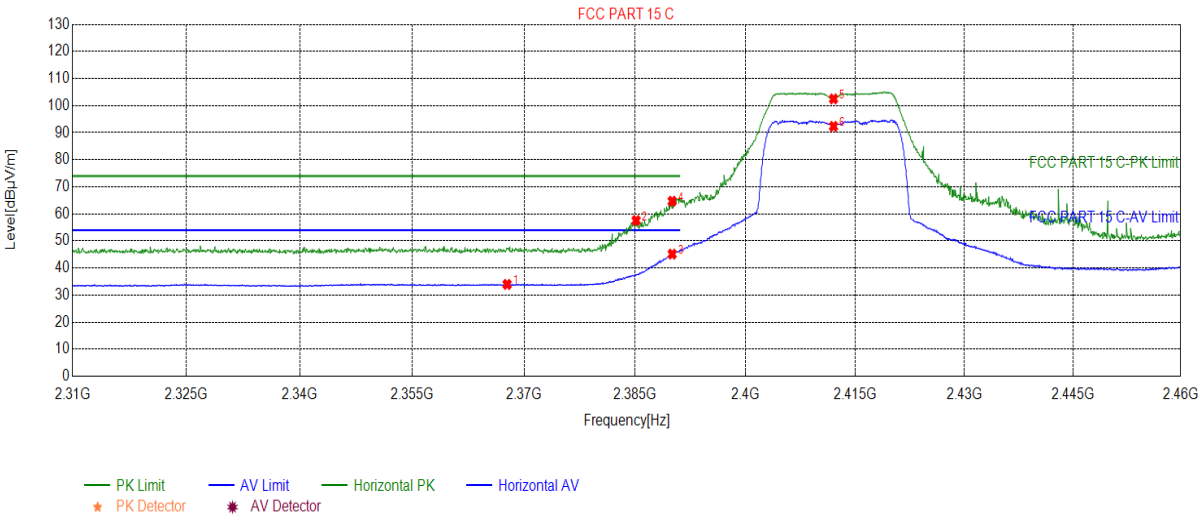
4.10.1.9 802.11N20_Channel 1

Test Graph



Suspected List

Suspected List								
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1	2367.703	33.96	8.07	54.00	20.04	120	243	Horizontal
2	2385.112	57.55	7.83	74.00	16.45	182	59	Horizontal
3	2390.000	45.14	7.98	54.00	8.86	138	59	Horizontal
4	2390.000	64.69	7.98	74.00	9.31	182	62	Horizontal
5	2412.000	102.48	8.16	0.00	-102.48	155	59	Horizontal
6	2412.000	92.33	8.16	0.00	-92.33	174	55	Horizontal

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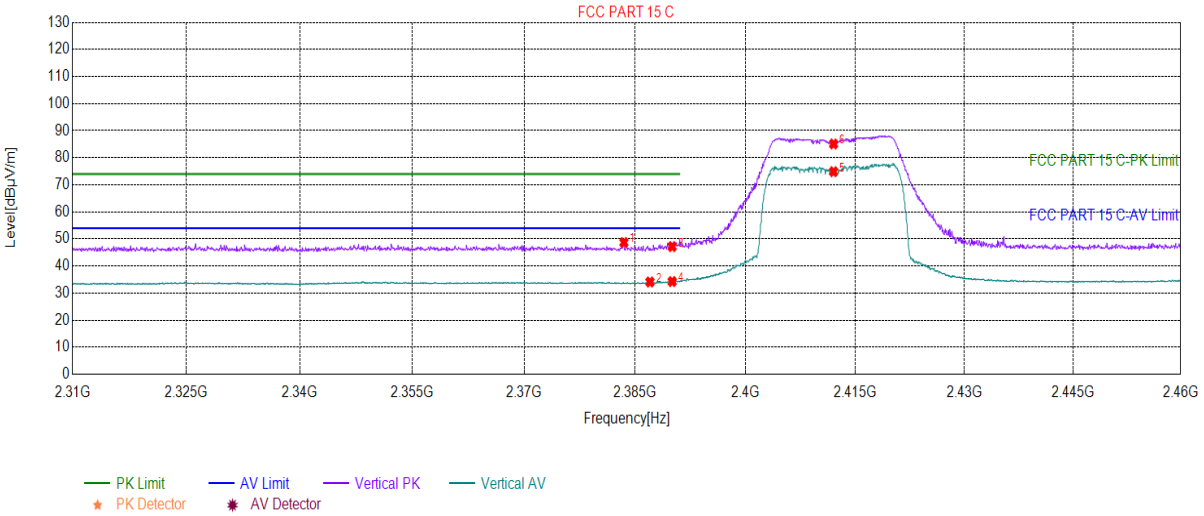
4.10.1.10 802.11N20_Channel 1

Test Graph



Suspected List

Suspected List								
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1	2383.461	48.70	7.88	74.00	25.30	254	214	Vertical
2	2386.988	34.11	7.89	54.00	19.89	236	36	Vertical
3	2390.000	47.18	7.98	74.00	26.82	220	175	Vertical
4	2390.000	34.26	7.98	54.00	19.74	212	190	Vertical
5	2412.000	74.86	8.16	0.00	-74.86	301	175	Vertical
6	2412.000	85.10	8.16	0.00	-85.10	254	175	Vertical

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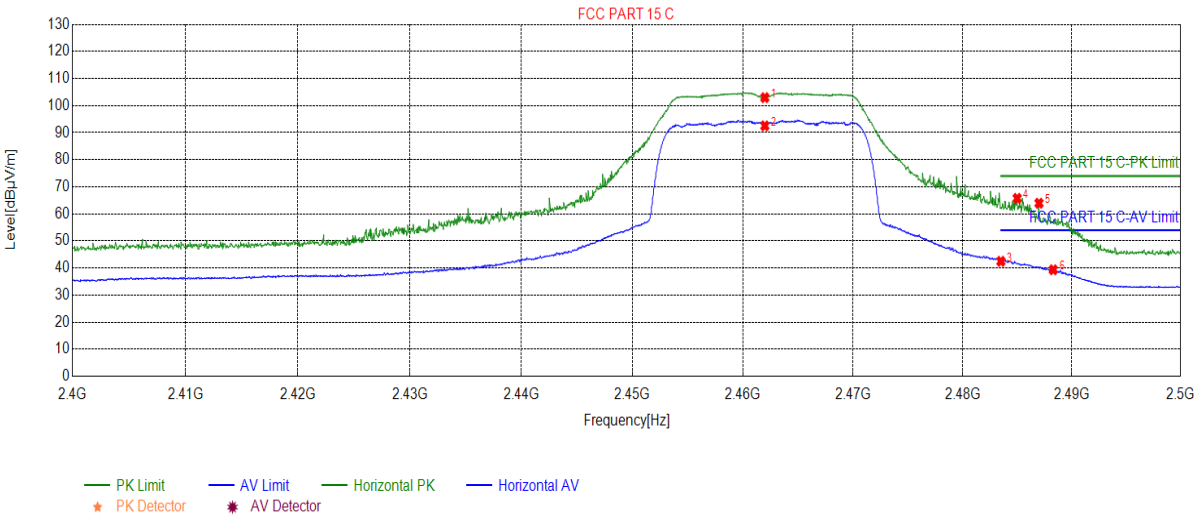
4.10.1.11 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
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1	2462.000	102.93	8.75	0.00	-102.93	146	59	Horizontal
2	2462.000	92.52	8.75	0.00	-92.52	152	63	Horizontal
3	2483.500	42.48	8.50	54.00	11.52	159	66	Horizontal
4	2484.992	65.75	8.49	74.00	8.25	162	66	Horizontal
5	2486.993	63.94	8.54	74.00	10.06	162	66	Horizontal
6	2488.294	39.35	8.58	54.00	14.65	175	66	Horizontal

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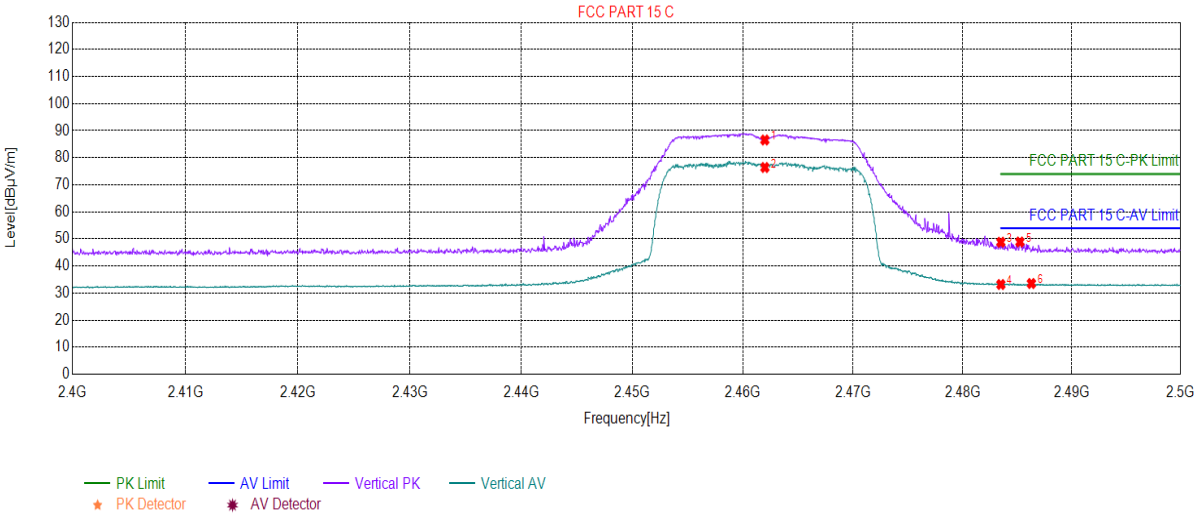
4.10.1.12 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
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1	2462.000	86.56	8.75	0.00	-86.56	288	149	Vertical
2	2462.000	76.40	8.75	0.00	-76.40	261	149	Vertical
3	2483.500	48.81	8.50	74.00	25.19	203	153	Vertical
4	2483.500	33.18	8.50	54.00	20.82	210	153	Vertical
5	2485.242	48.89	8.49	74.00	25.11	274	153	Vertical
6	2486.293	33.55	8.52	54.00	20.45	241	153	Vertical

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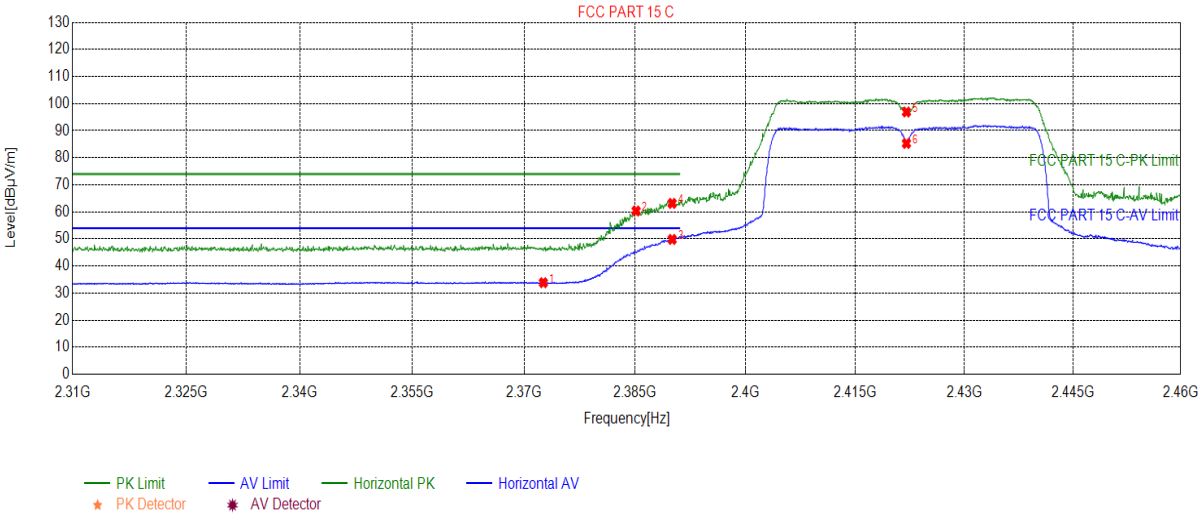
4.10.1.13 802.11N40_Channel 3

Test Graph



Suspected List

Suspected List								
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1	2372.581	33.84	8.01	54.00	20.16	166	108	Horizontal
2	2385.112	60.35	7.83	74.00	13.65	152	59	Horizontal
3	2390.000	49.83	7.98	54.00	4.17	147	59	Horizontal
4	2390.000	63.14	7.98	74.00	10.86	162	63	Horizontal
5	2422.000	96.90	8.45	0.00	-96.90	177	67	Horizontal
6	2422.000	85.28	8.45	0.00	-85.28	162	55	Horizontal

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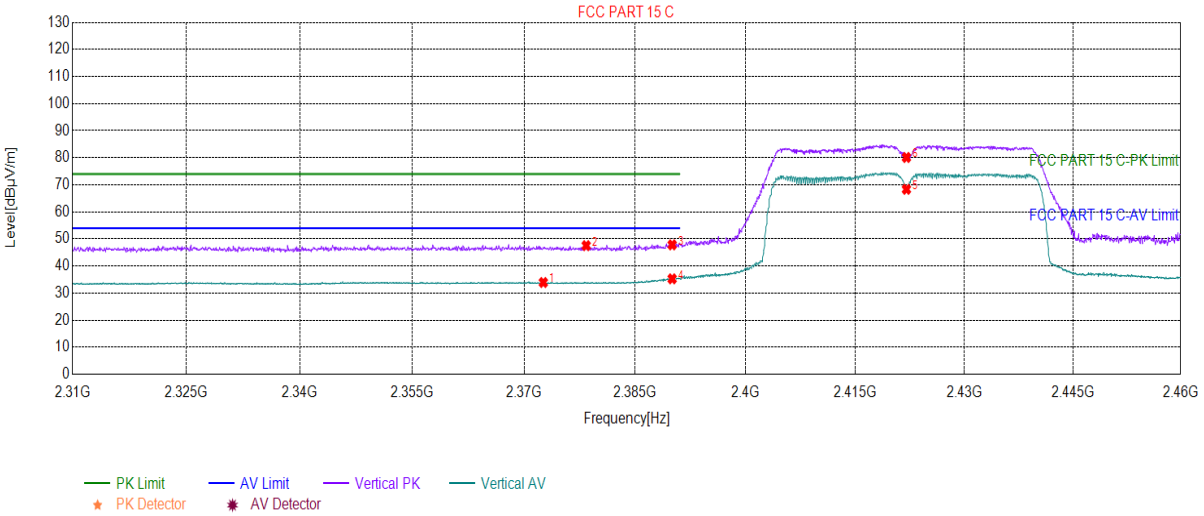
4.10.1.14 802.11N40_Channel 3

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2372.581	33.92	8.01	54.00	20.08	231	129	Vertical
2	2378.359	47.54	7.98	74.00	26.46	285	87	Vertical
3	2390.000	47.83	7.98	74.00	26.17	222	175	Vertical
4	2390.000	35.27	7.98	54.00	18.73	199	244	Vertical
5	2422.000	68.33	8.45	0.00	-68.33	203	148	Vertical
6	2422.000	80.11	8.45	0.00	-80.11	355	148	Vertical

Final Data List

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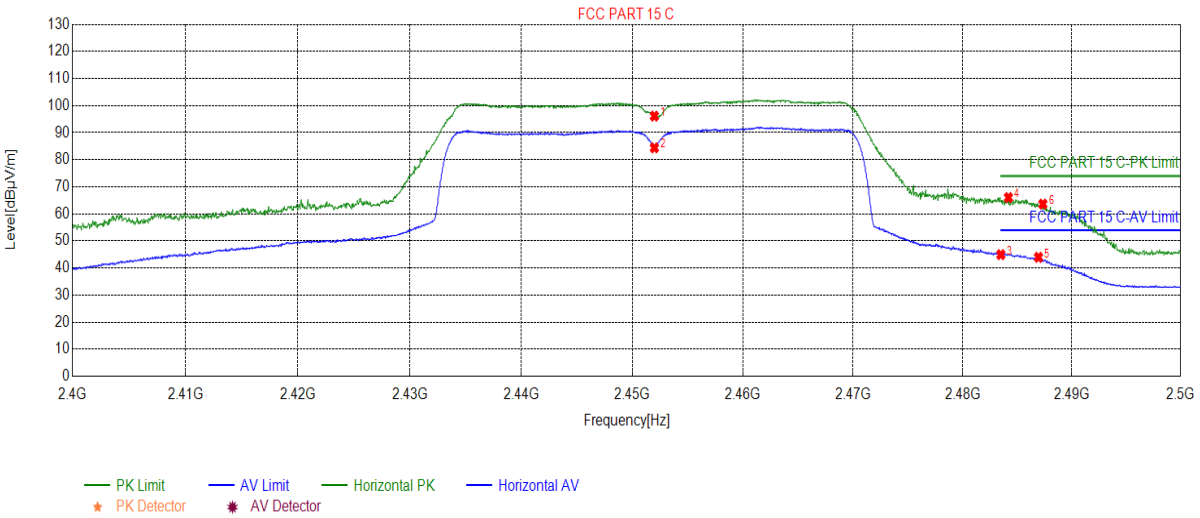
4.10.1.15 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.000	96.12	8.65	0.00	-96.12	152	63	Horizontal
2	2452.000	84.40	8.65	0.00	-84.40	132	59	Horizontal
3	2483.500	44.94	8.50	54.00	9.06	122	63	Horizontal
4	2484.192	66.03	8.50	74.00	7.97	156	63	Horizontal
5	2486.943	43.96	8.54	54.00	10.04	159	67	Horizontal
6	2487.343	63.62	8.55	74.00	10.38	171	105	Horizontal

Final Data List

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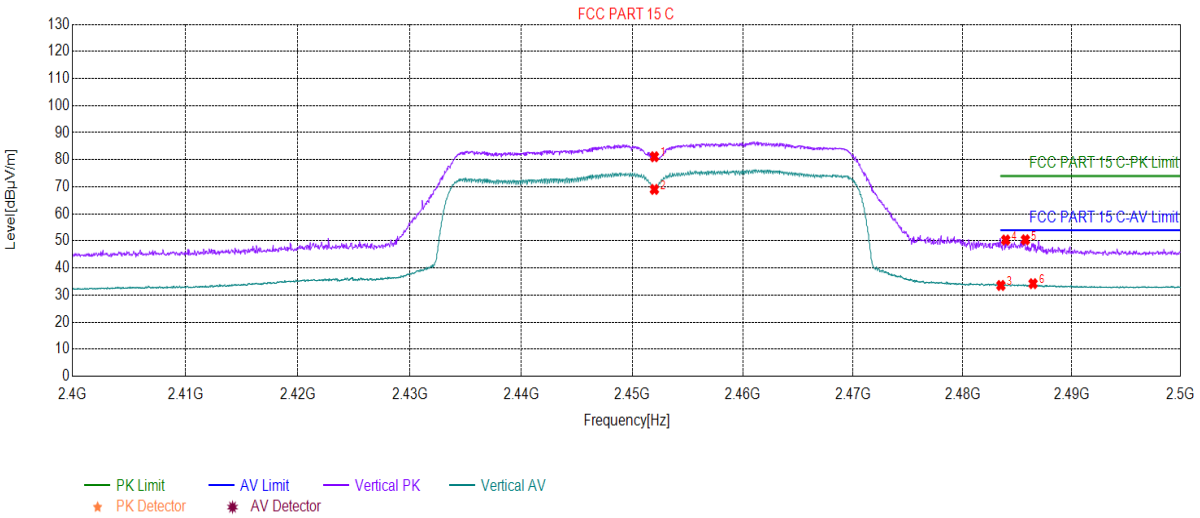
4.10.1.16 802.11N40_Channel 9

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.000	81.11	8.65	0.00	-81.11	261	150	Vertical
2	2452.000	69.04	8.65	0.00	-69.04	285	150	Vertical
3	2483.500	33.57	8.50	54.00	20.43	205	168	Vertical
4	2483.942	50.36	8.50	74.00	23.64	241	180	Vertical
5	2485.742	50.43	8.51	74.00	23.57	325	150	Vertical
6	2486.443	34.23	8.53	54.00	19.77	245	150	Vertical

Final Data List

Remark:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
All Modes have been tested, but only the worst case data displayed in this report.

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5 Measurement Uncertainty (95% confidence levels, k=2)

Lab A:

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	Temperature test	±1°C
5	Humidity test	±3%
6	DC and low frequency voltages	±0.5%

Lab B:

No.	Item	Measurement Uncertainty
1	Radiated Spurious emission test	±4.8dB (30MHz-1GHz)
		±5.2dB (1GHz-6GHz)
		±5.5dB (6GHz-18GHz)
		±5.02dB (18GHz-40GHz)
2	Conduct emission test	±3.4 dB (9KHz- 30MHz)

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6 Equipment List

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2020/7/15	2021/7/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2021/1/3	2022/1/2
				2020/1/4	2021/1/3
Coaxial Cable	SGS	N/A	SEM031-01	2020/6/12	2021/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020/7/14	2021/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2020/10/27	2021/10/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020/7/14	2021/7/14

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RSE&RE&CE Test System					
Equipment	**Manufacturer**	**Model No.**	**Cal Date**	**Cal Due Date**	**Inventory No.**
Semi-Anechoic Chamber	Brilliant-emc	966	NCR	NCR	XAW03-35-01
MXA signal analyzer	Keysight	N9020A	2020-04-02	2021-04-02	XAW01-06-01
Radio communication analyzer	ROHDE&SCHWARZ	CMW 500	2020-04-02	2021-04-02	XAW01-03-02
Test receiver	ROHDE&SCHWARZ	ESR	2020-09-11	2021-09-10	XAW01-08-01
Receiving antenna	Rosenberger	VULB 9163	2019-10-13	2021-10-12	XAW01-09-01
Receiving antenna	Rosenberger	BBHA 9120D	2019-10-13	2021-10-12	XAW01-09-02
Receiving antenna	Rosenberger	BBHA 9170	2019-10-13	2021-10-12	XAW01-09-03
Directional antenna rack controller	Max-Full	MF-7802BS	NCR	NCR	XAW03-03-01
High-speed antenna rack controller	Max-Full	MF-7802	NCR	NCR	XAW03-04-01
Filter bank	Tonscend	JS0806-F	NCR	NCR	XAW03-05-01
Filter bank	Tonscend	JS0806s	NCR	NCR	XAW03-05-02
Amplifier	Tonscend	TAP00903040	2020-10-26	2021-10-25	XAW01-41-01
Amplifier	Tonscend	TAP01018048	2020-10-26	2021-10-25	XAW01-41-02
Amplifier	Tonscend	TAP18040048	2020-10-26	2021-10-25	XAW01-41-03
Amplifier	Shanghai Steed	YX28980930	2020-10-26	2021-10-25	XAW01-41-06
Artificial network	ROHDE&SCHWARZ	ENV216	2020-08-04	2021-08-03	XAW01-19-02
Temperature and humidity meter	MingGao	TH101B	2020-06-11	2021-05-11	XAW01-01-01
Measurement Software	Tonscend	TS+ RSE&RE	NCR	NCR	XAW02-05-01
Measurement Software	Tonscend	TS+ CE	NCR	NCR	XAW02-05-02

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7 Photographs - EUT Constructional Details

Refer to Appendix A PCE&DSS&DTS&NII Setup Photos.

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DTS Bandwidth

Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.160	2407.920	2416.080	0.5	PASS
		2437	8.130	2432.920	2441.050	0.5	PASS
		2462	8.130	2457.920	2466.050	0.5	PASS
11G	Ant1	2412	16.110	2404.080	2420.190	0.5	PASS
		2437	16.410	2428.780	2445.190	0.5	PASS
		2462	16.380	2453.810	2470.190	0.5	PASS
11N20SISO	Ant1	2412	17.250	2403.570	2420.820	0.5	PASS
		2437	17.670	2428.150	2445.820	0.5	PASS
		2462	17.370	2453.450	2470.820	0.5	PASS
11N40SISO	Ant1	2422	35.880	2404.360	2440.240	0.5	PASS
		2437	36.480	2418.760	2455.240	0.5	PASS
		2452	35.880	2434.360	2470.240	0.5	PASS

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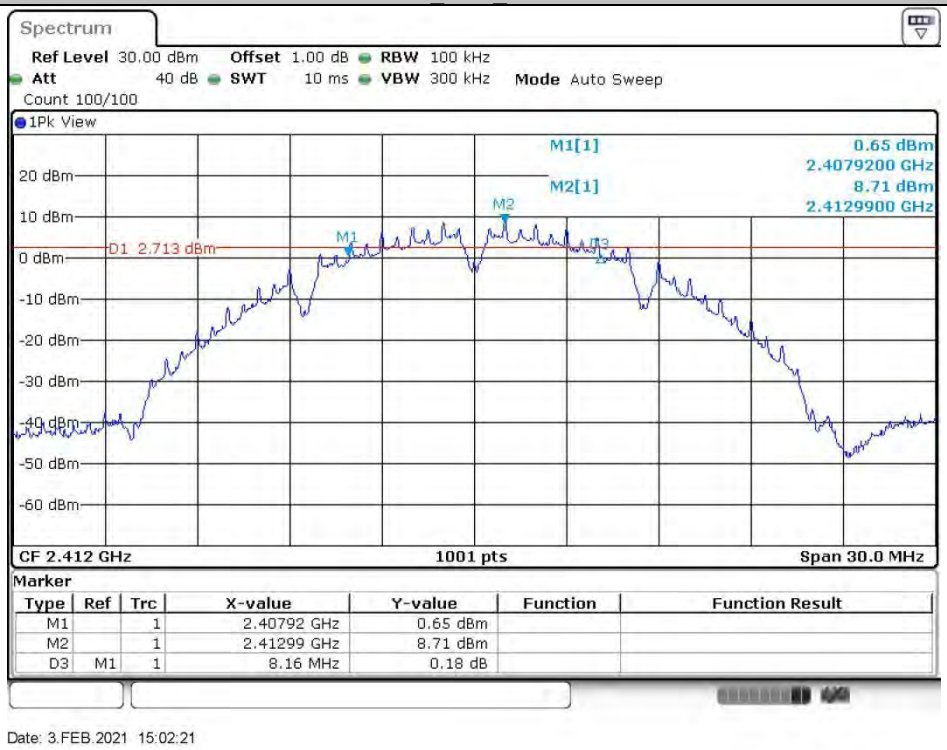
Test Graphs

11B_Ant1_2412



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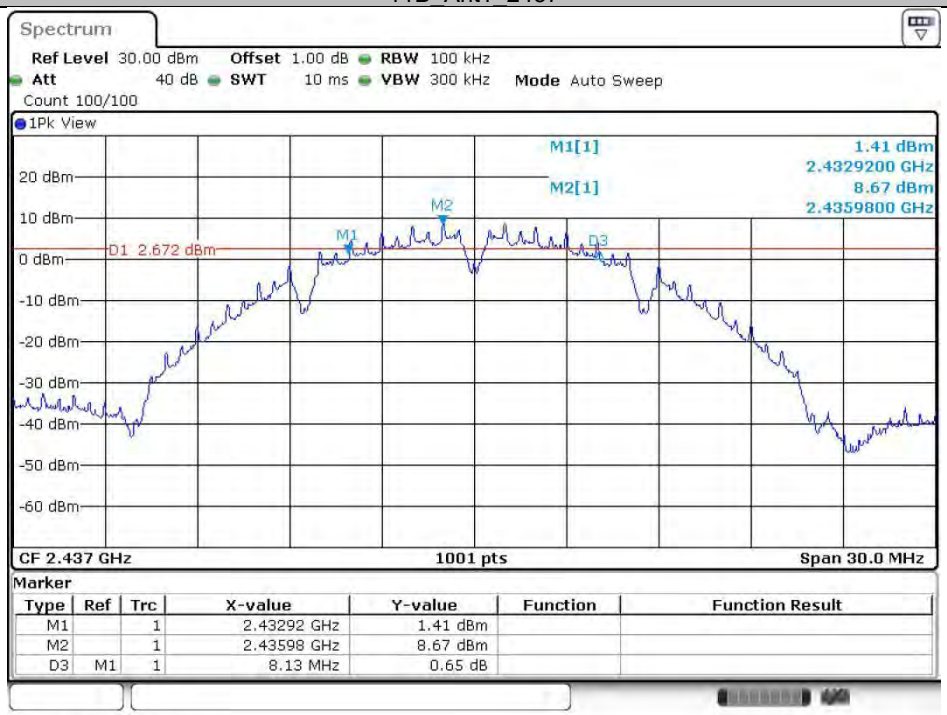
11B_Ant1_2437



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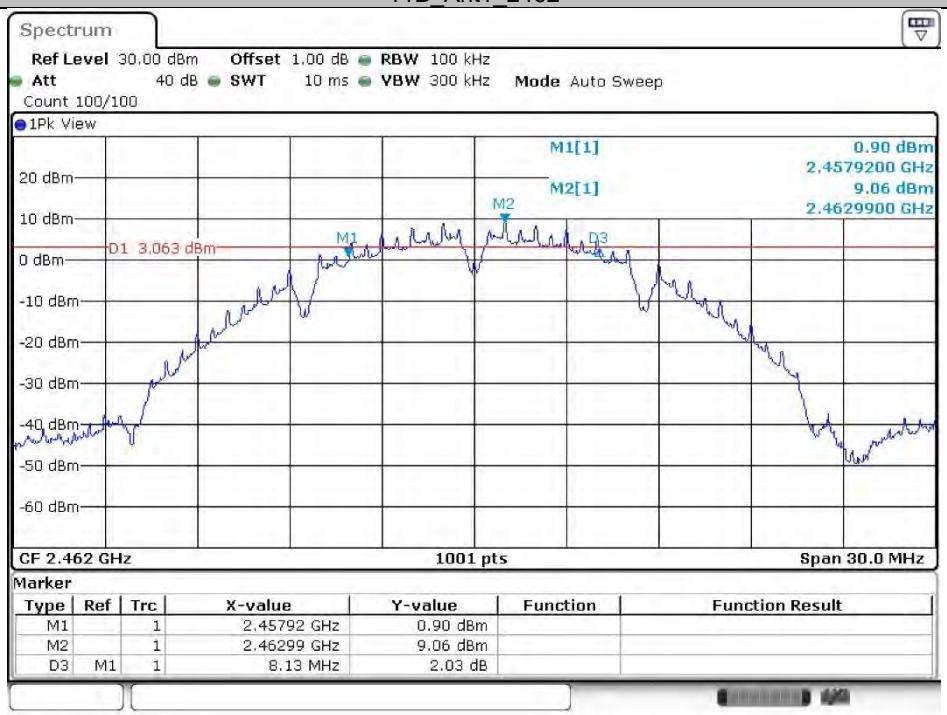

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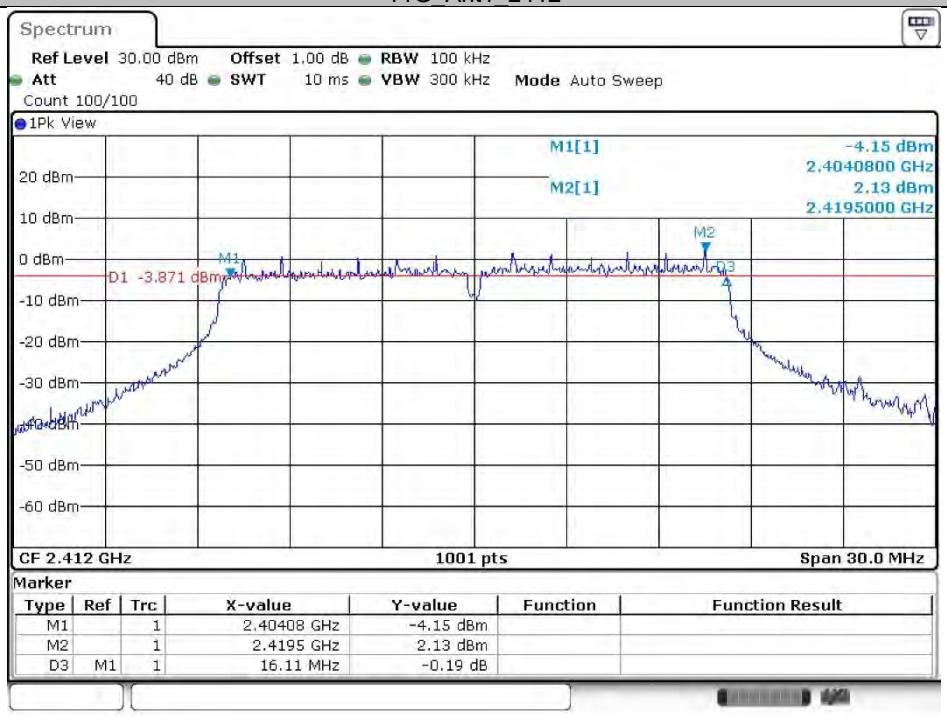
11G_Ant1_2412



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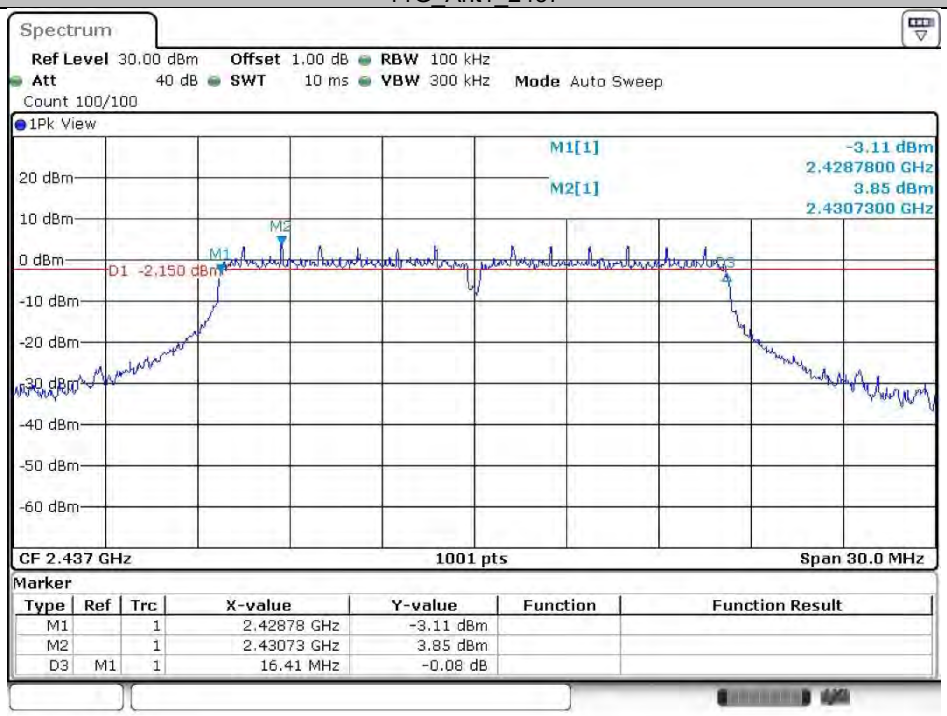

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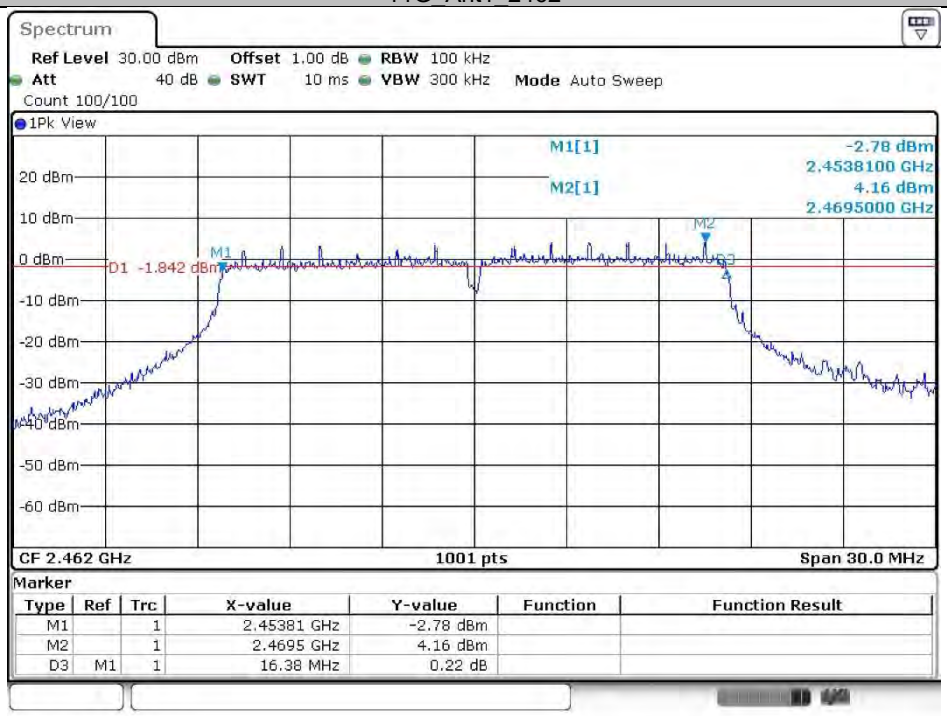

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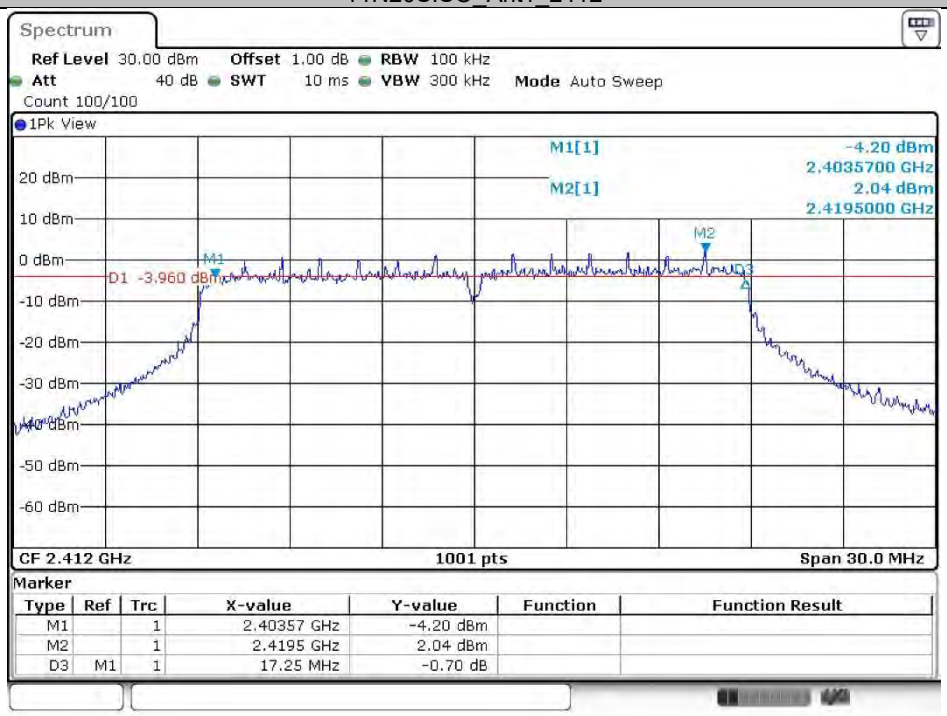

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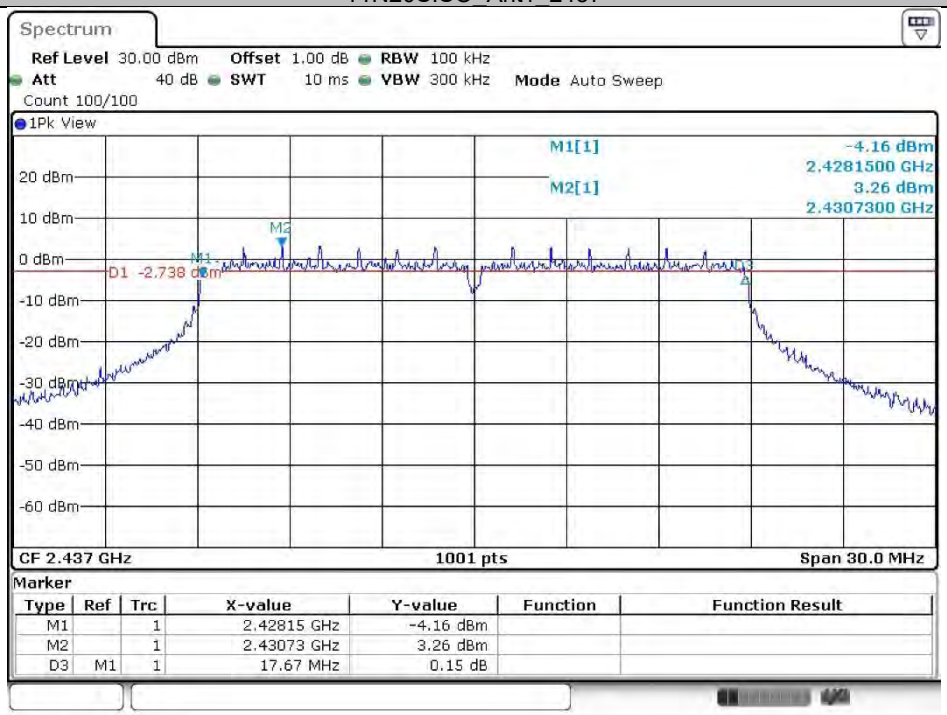

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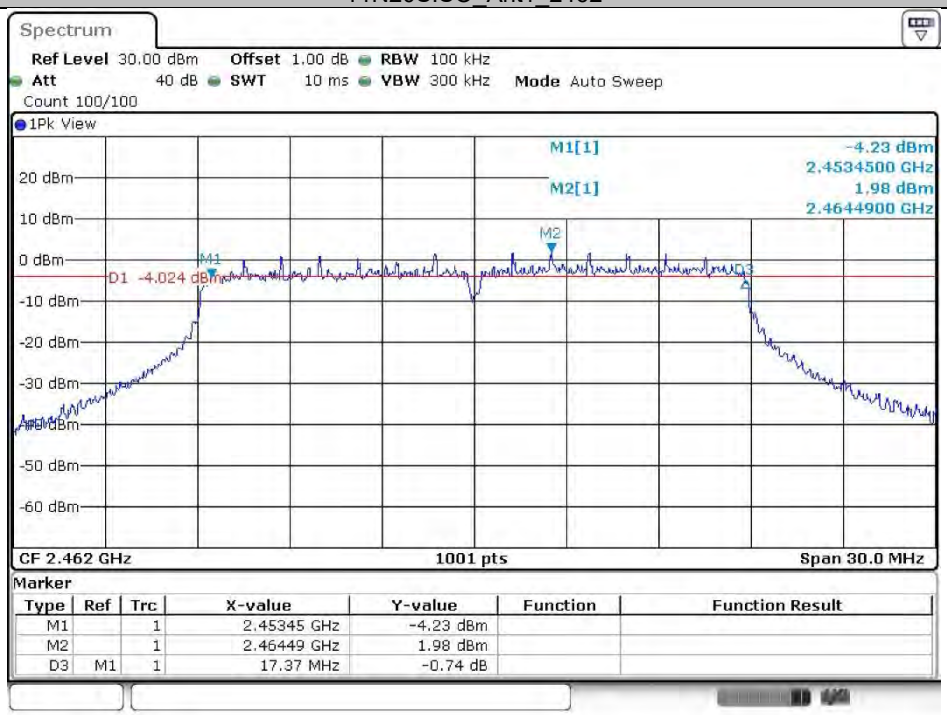

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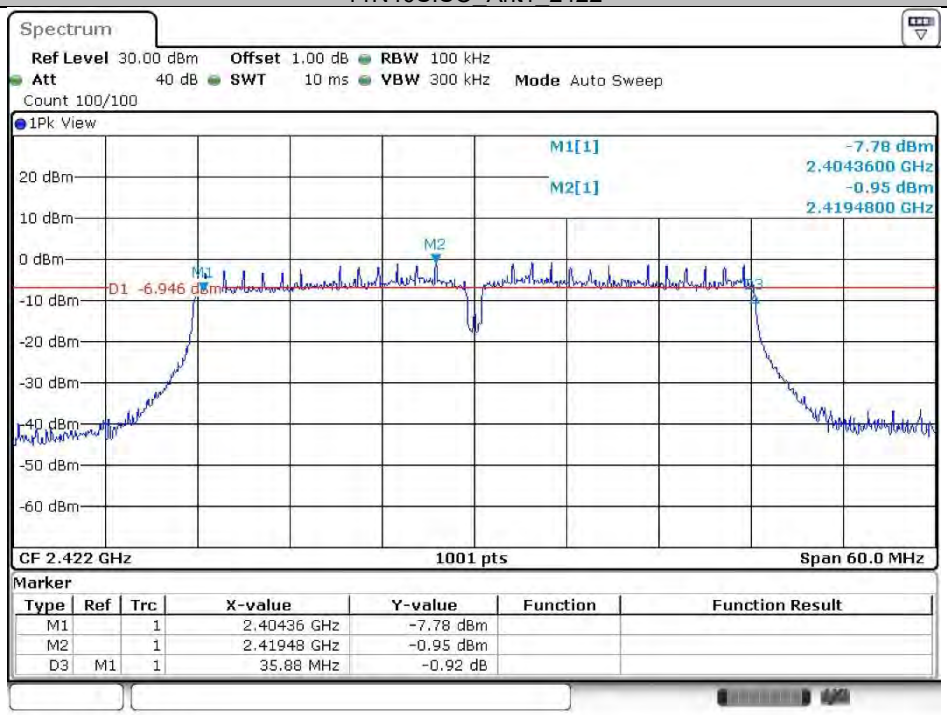

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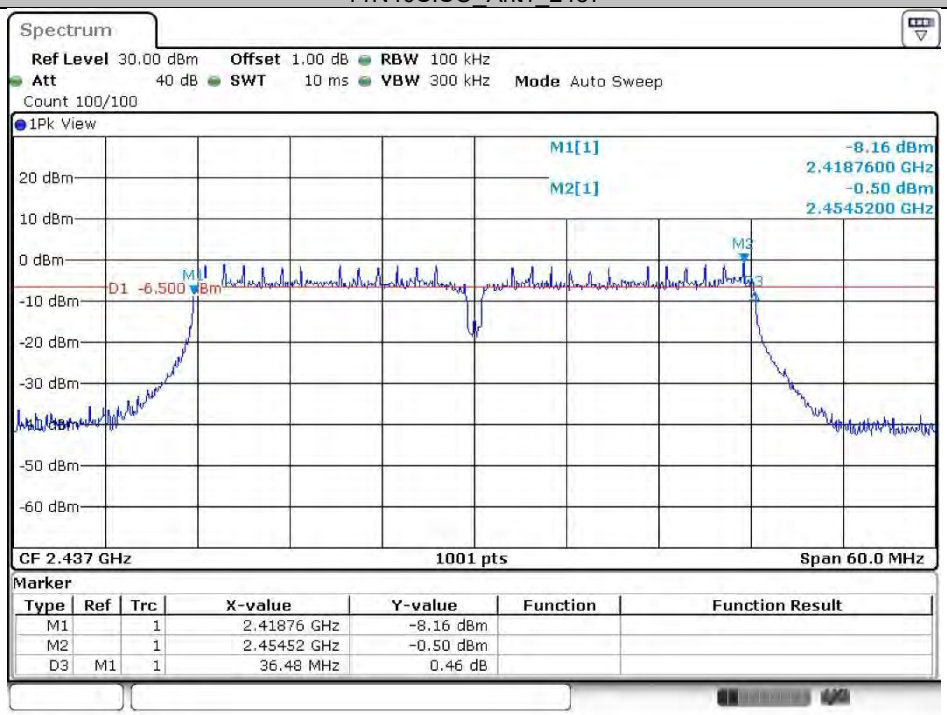

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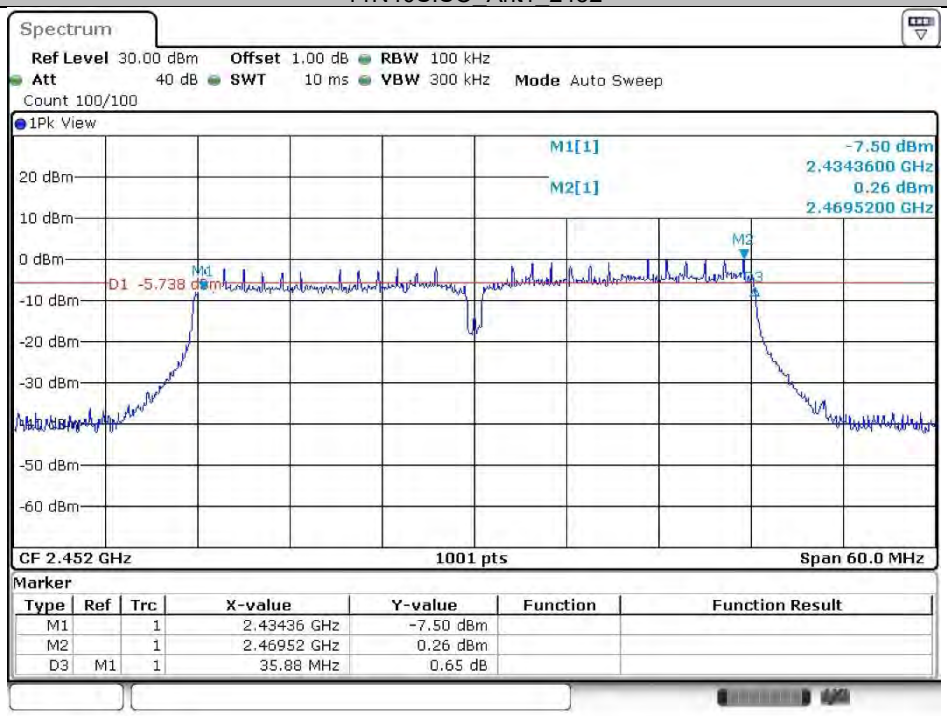

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Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.696	2405.377	2419.073	---	PASS
		2437	13.876	2430.047	2443.923	---	PASS
		2462	13.576	2455.407	2468.983	---	PASS
11G	Ant1	2412	16.873	2403.578	2420.452	---	PASS
		2437	16.933	2428.429	2445.362	---	PASS
		2462	16.843	2453.578	2470.422	---	PASS
11N20SISO	Ant1	2412	17.982	2403.099	2421.081	---	PASS
		2437	18.072	2427.919	2445.991	---	PASS
		2462	17.922	2453.099	2471.021	---	PASS
11N40SISO	Ant1	2422	37.043	2403.598	2440.641	---	PASS
		2437	37.403	2418.359	2455.761	---	PASS
		2452	37.283	2433.538	2470.821	---	PASS

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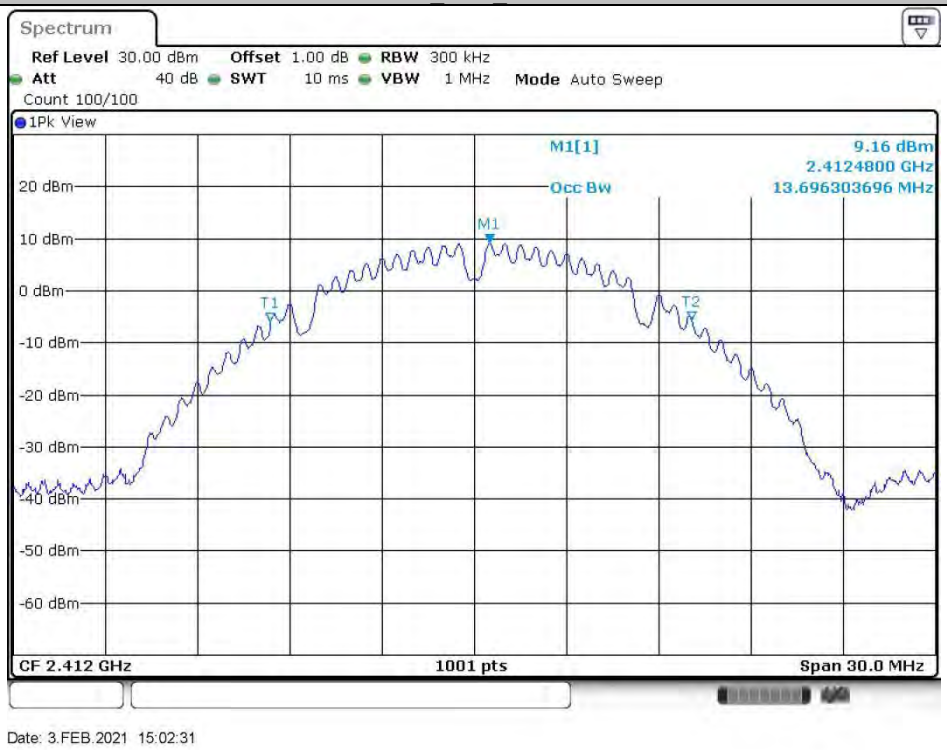
Test Graphs

11B_Ant1_2412



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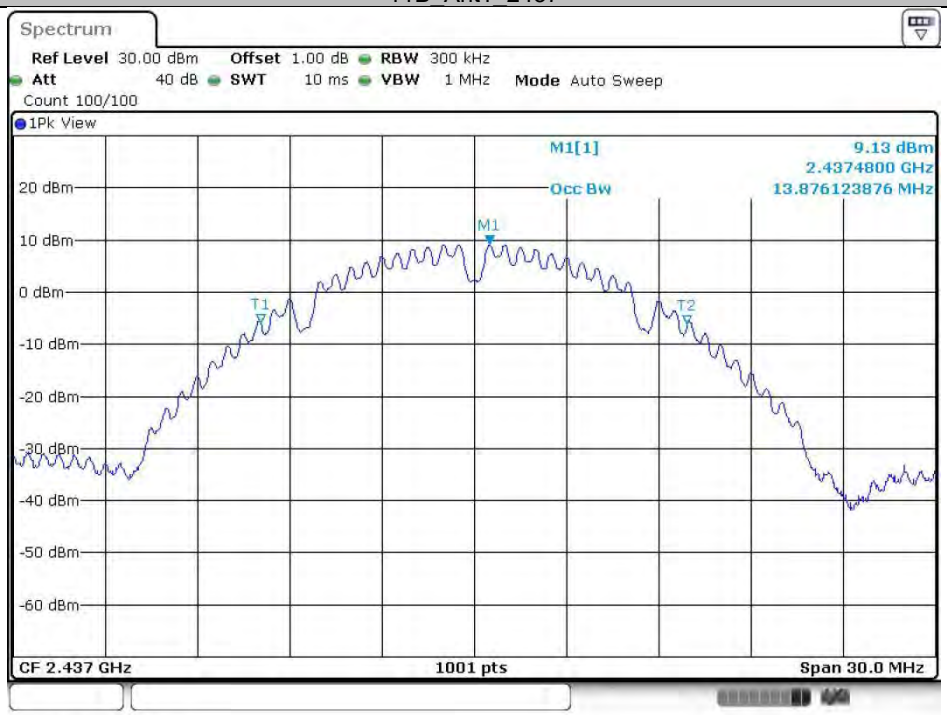

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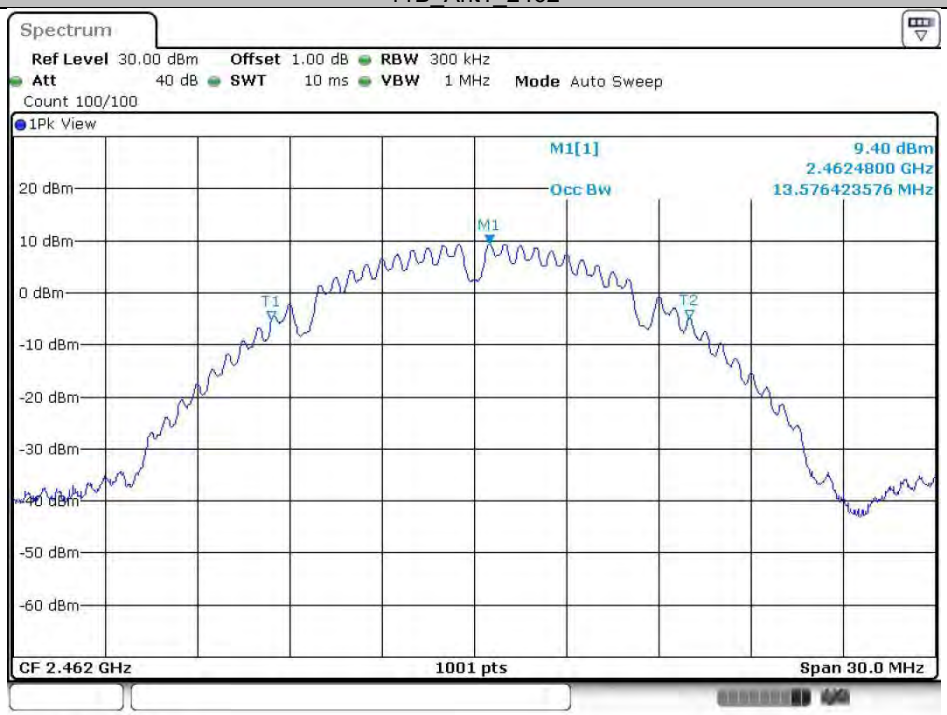

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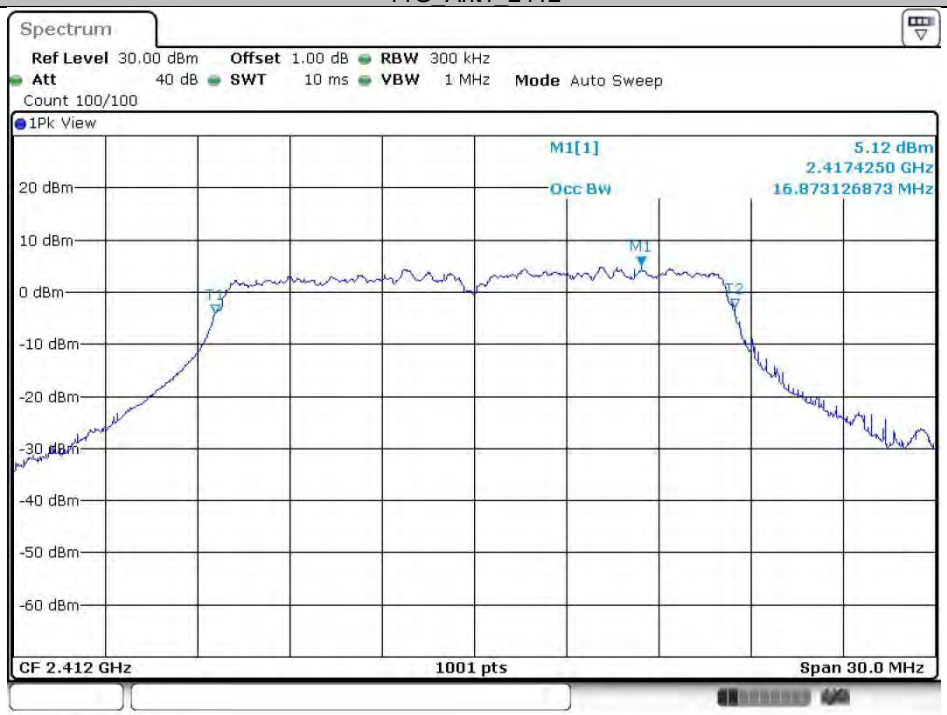

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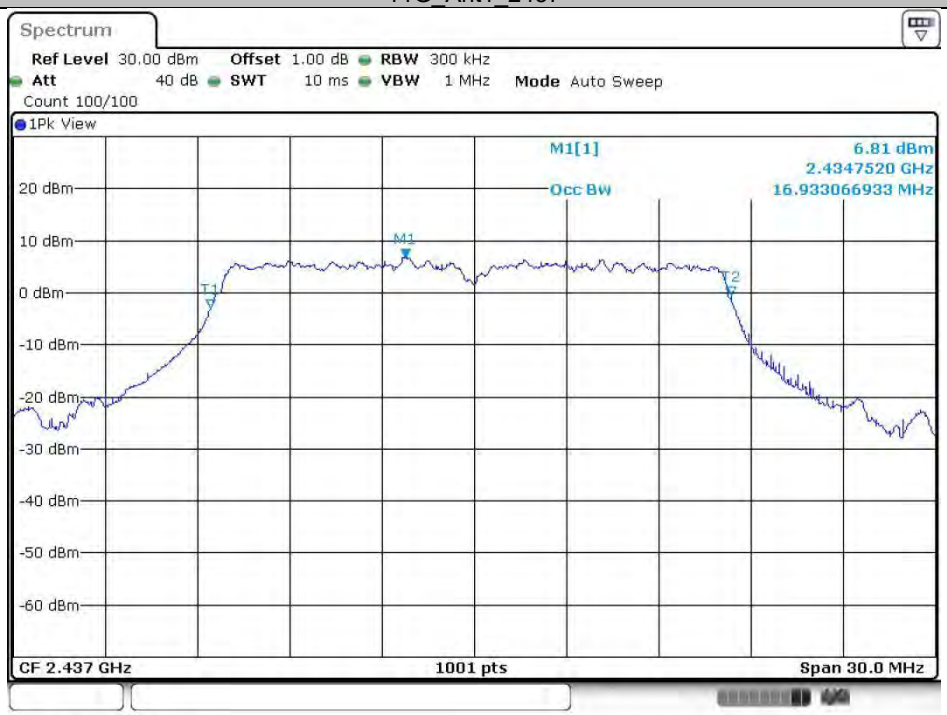

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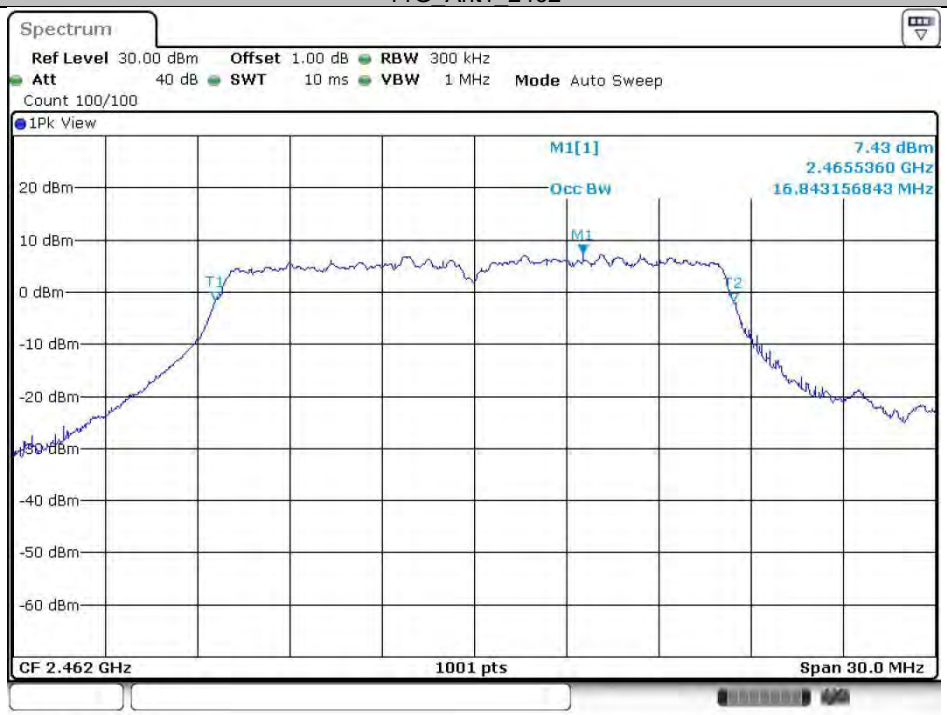

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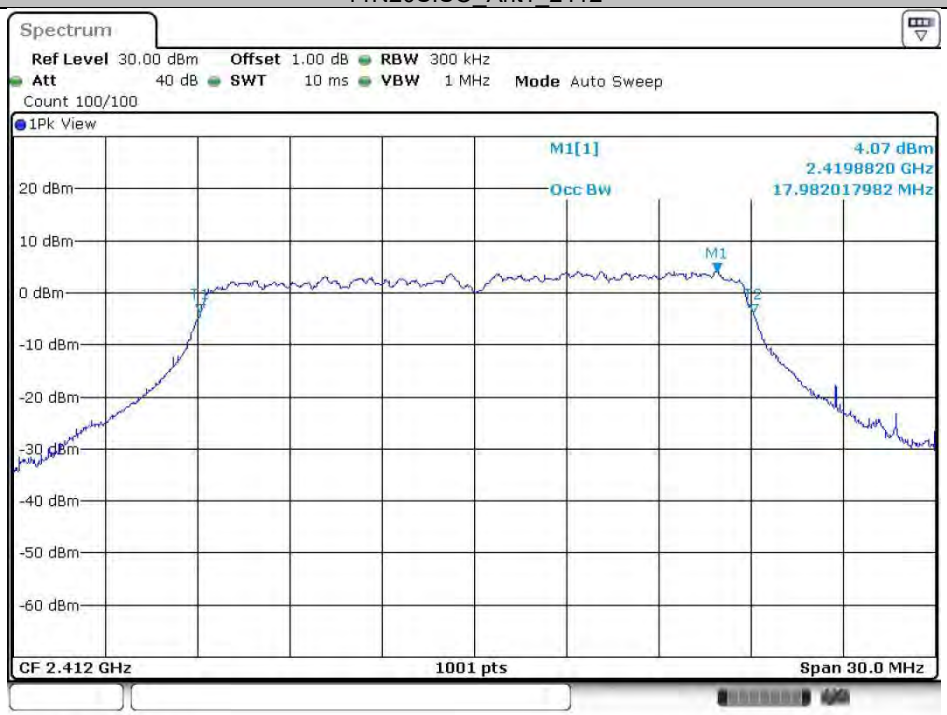

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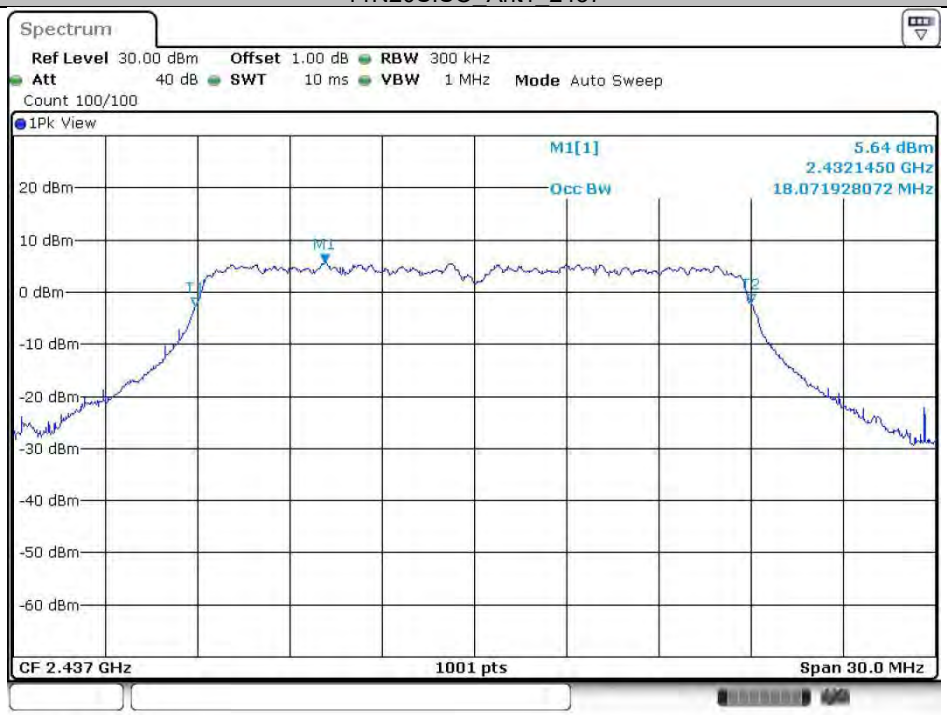

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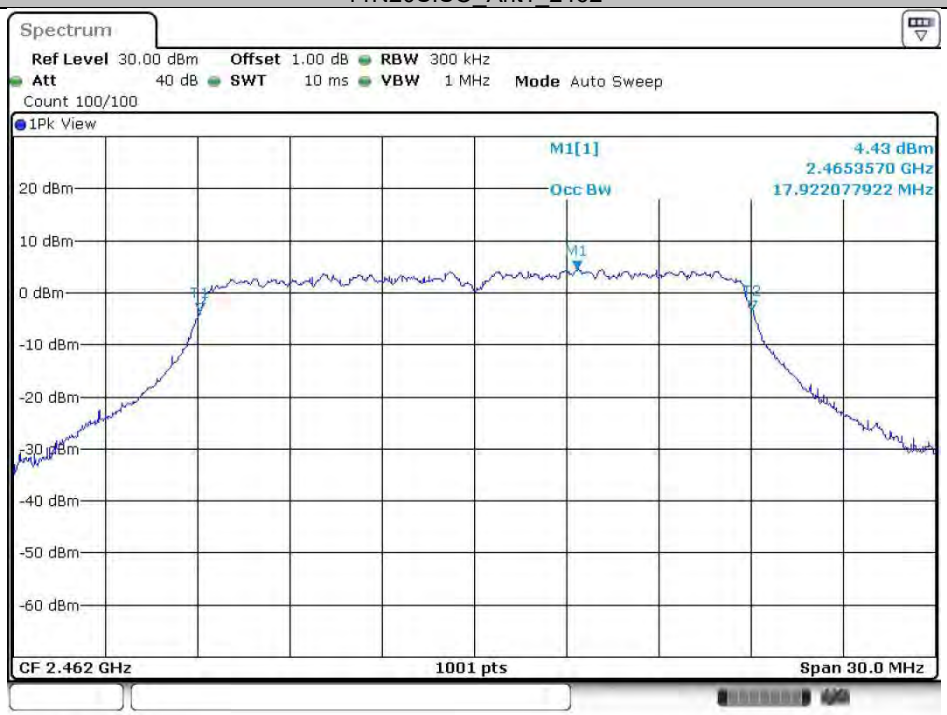

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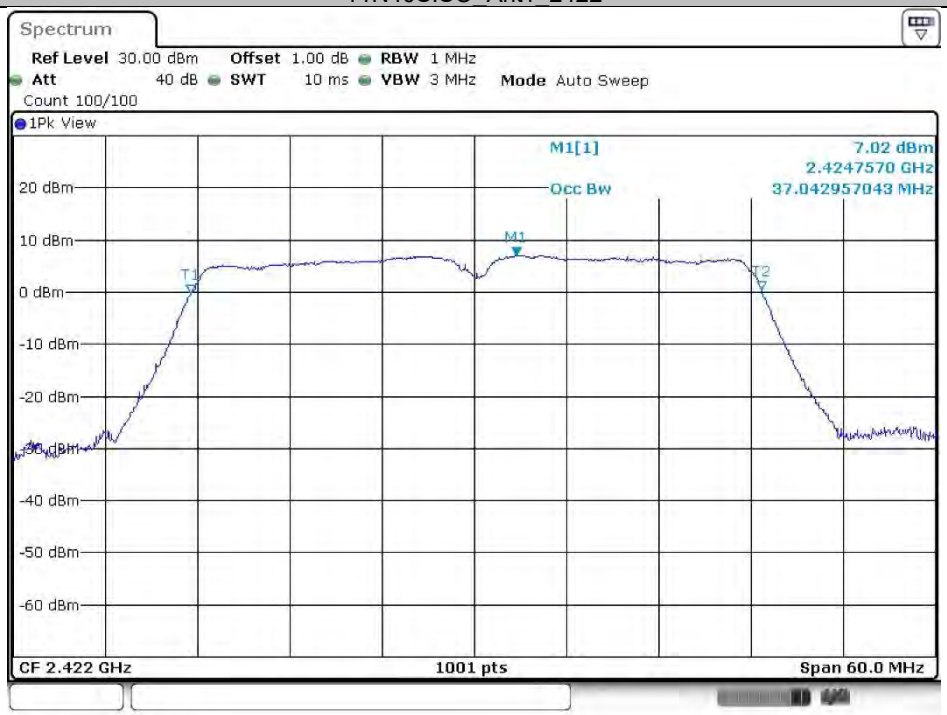

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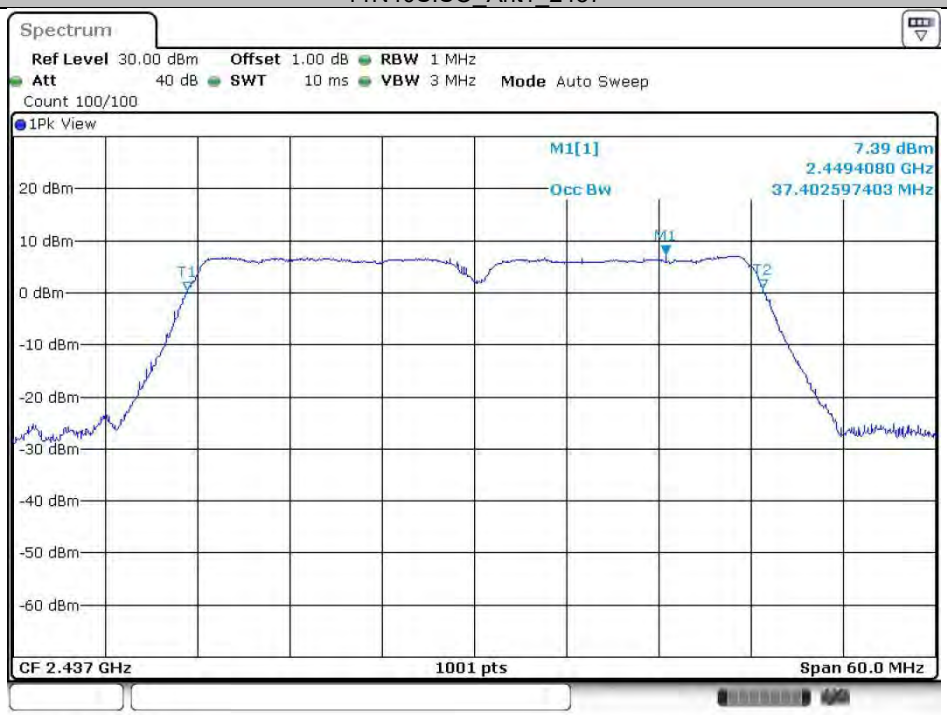

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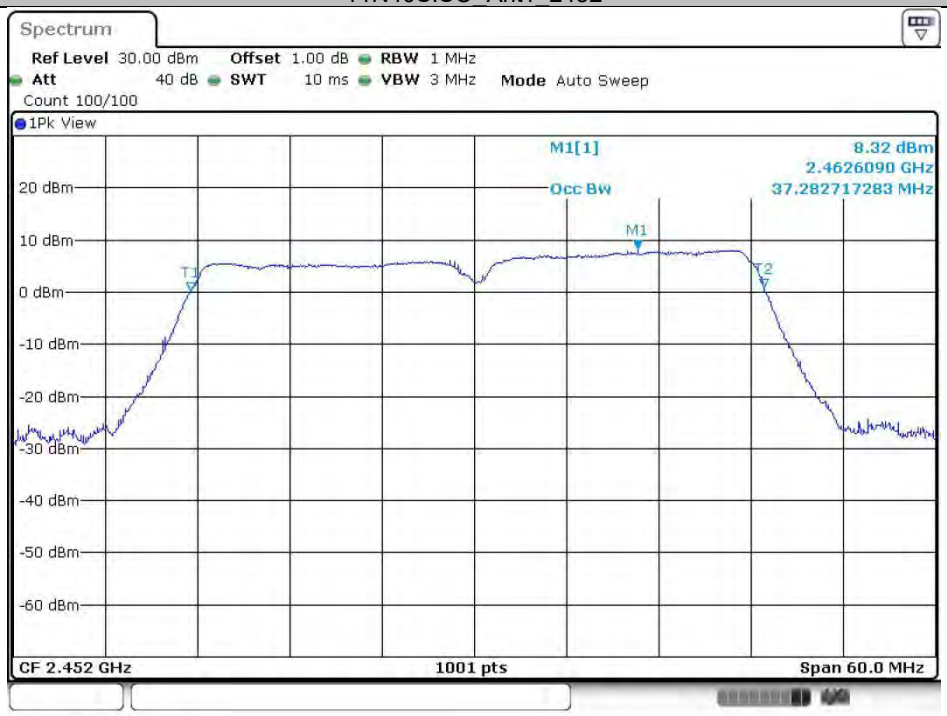

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Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Verdict
11B	Ant1	2412	19.84	PASS
		2437	19.70	PASS
		2462	19.91	PASS
11G	Ant1	2412	21.13	PASS
		2437	23.13	PASS
		2462	21.25	PASS
11N20SISO	Ant1	2412	21.23	PASS
		2437	22.93	PASS
		2462	21.39	PASS
11N40SISO	Ant1	2422	21.30	PASS
		2437	21.48	PASS
		2452	21.42	PASS

For average power:

TestMode	Antenna	Channel	Result[dBm]	Verdict
11B	Ant1	2412	17.30	PASS
		2437	17.01	PASS
		2462	17.12	PASS
11G	Ant1	2412	13.12	PASS
		2437	15.01	PASS
		2462	13.15	PASS
11N20SISO	Ant1	2412	13.09	PASS
		2437	15.01	PASS
		2462	13.10	PASS
11N40SISO	Ant1	2422	13.00	PASS
		2437	12.99	PASS
		2452	12.98	PASS

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Maximum power spectral density

Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-7.1	<=8	PASS
		2437	-7.55	<=8	PASS
		2462	-6.72	<=8	PASS
11G	Ant1	2412	-11.76	<=8	PASS
		2437	-11.17	<=8	PASS
		2462	-12.49	<=8	PASS
11N20SISO	Ant1	2412	-12.24	<=8	PASS
		2437	-10.5	<=8	PASS
		2462	-12.36	<=8	PASS
11N40SISO	Ant1	2422	-14.43	<=8	PASS
		2437	-14.54	<=8	PASS
		2452	-13.37	<=8	PASS

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Test Graphs

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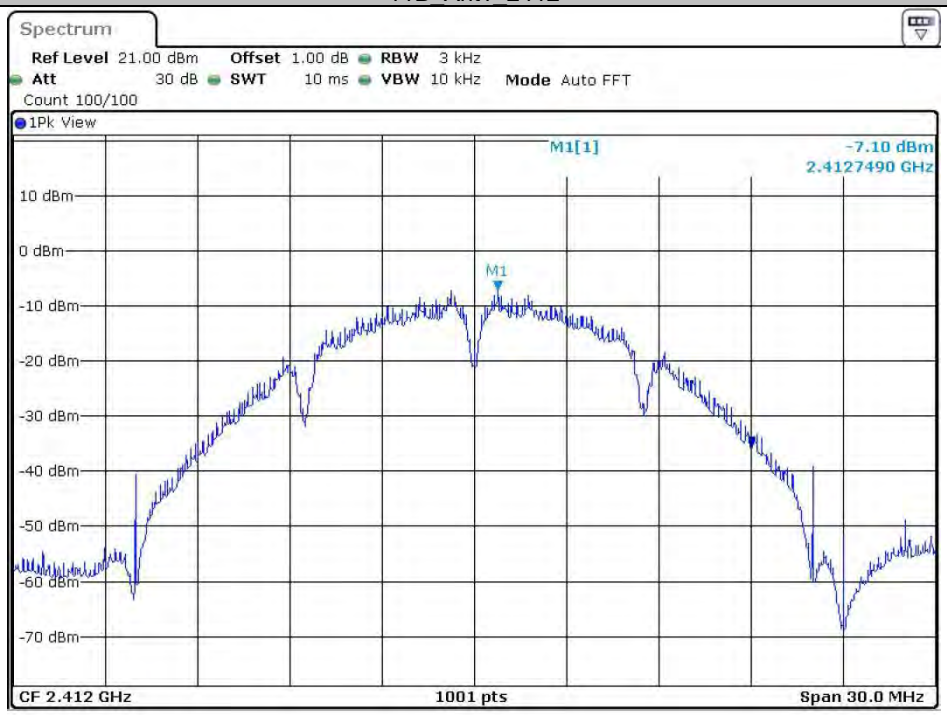

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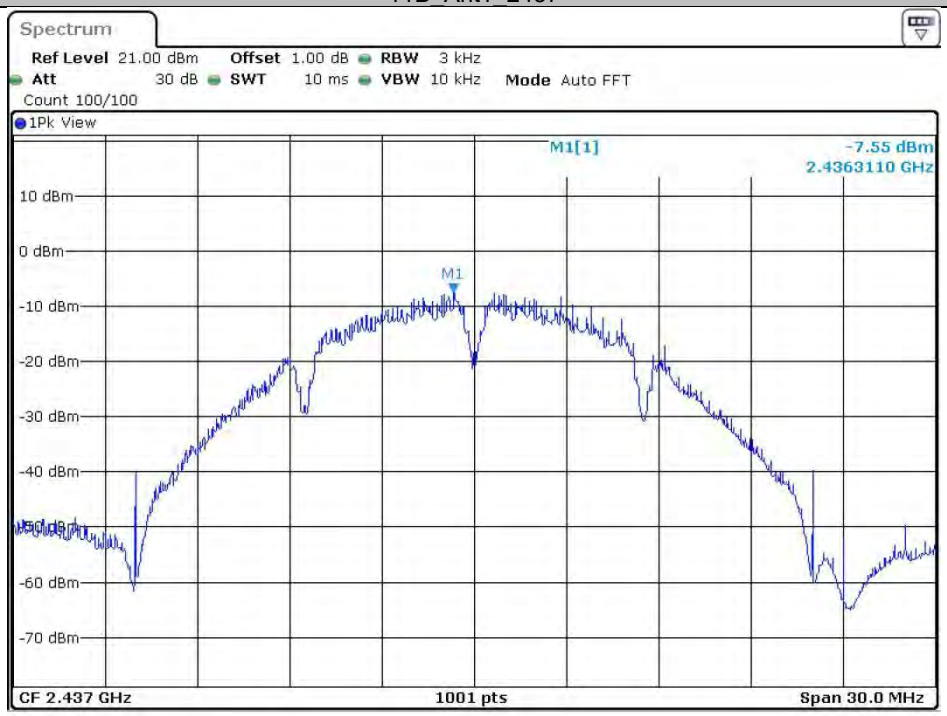

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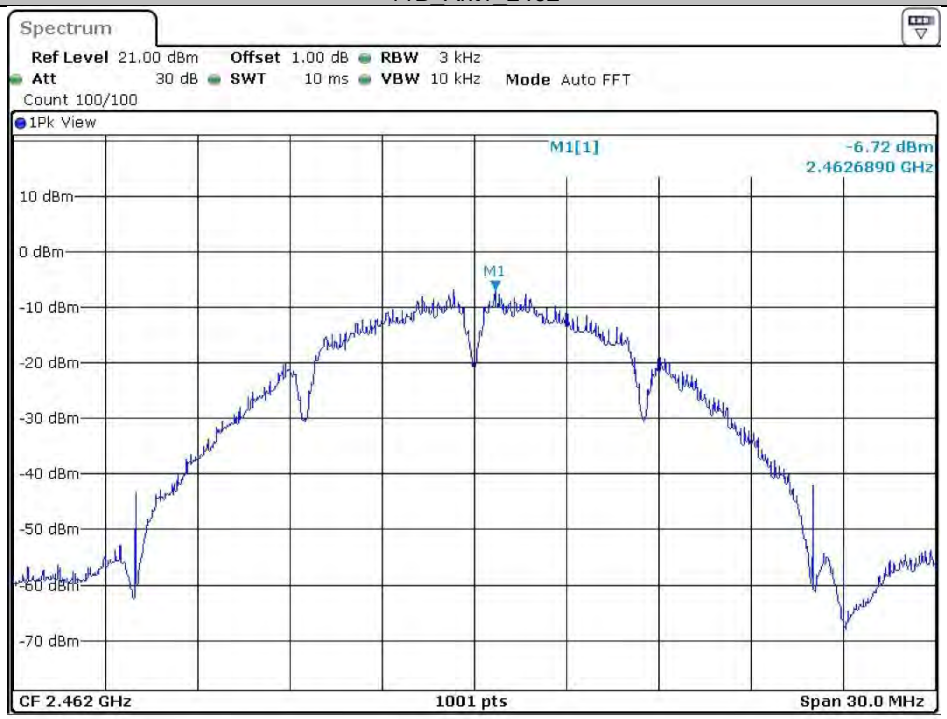

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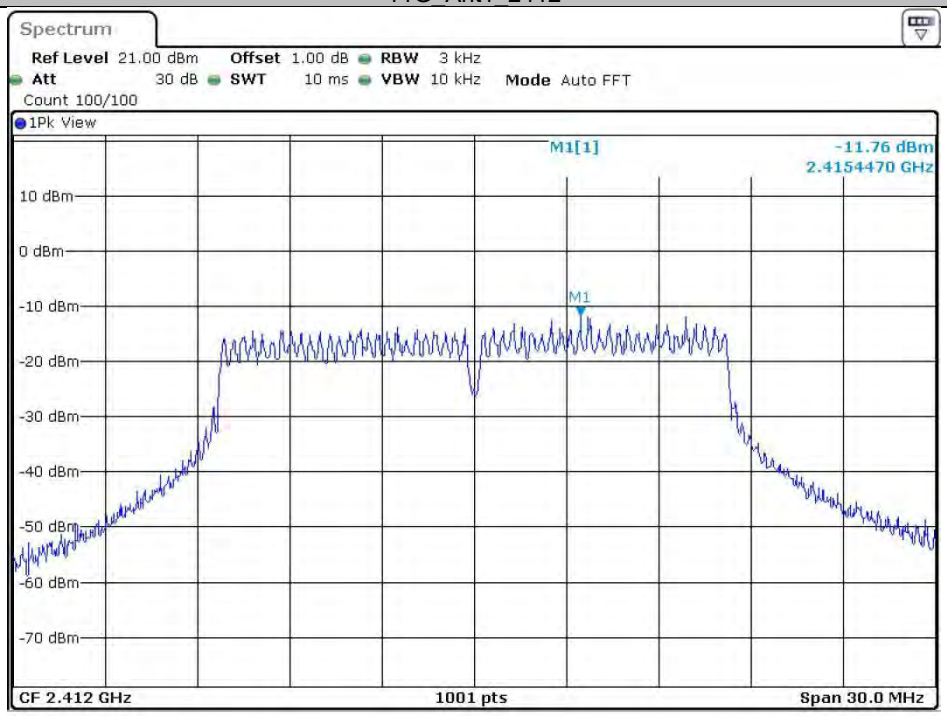
11G_Ant1_2412



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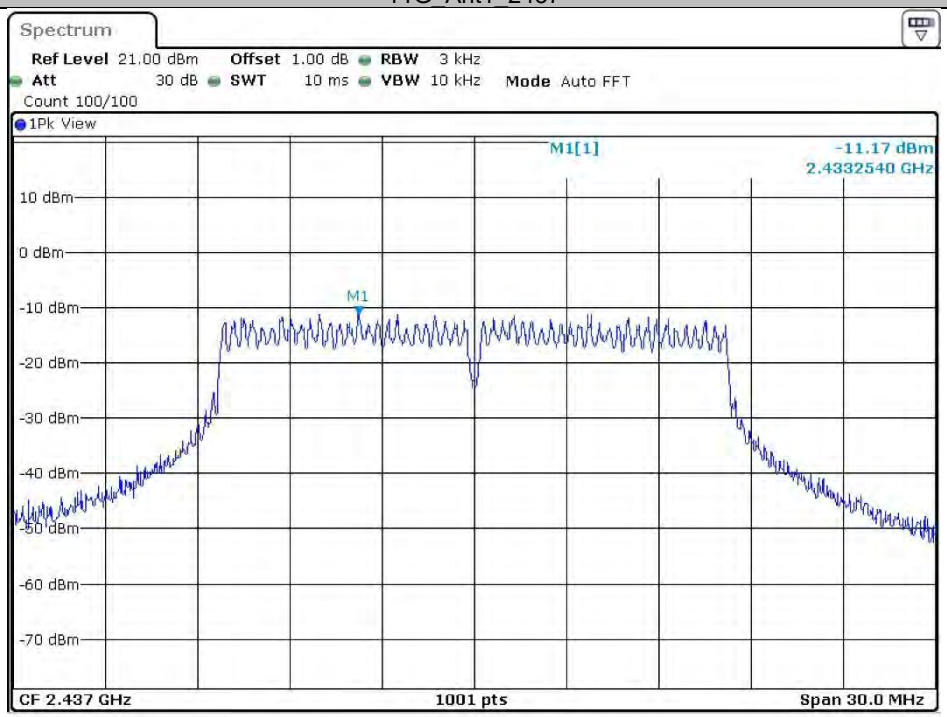

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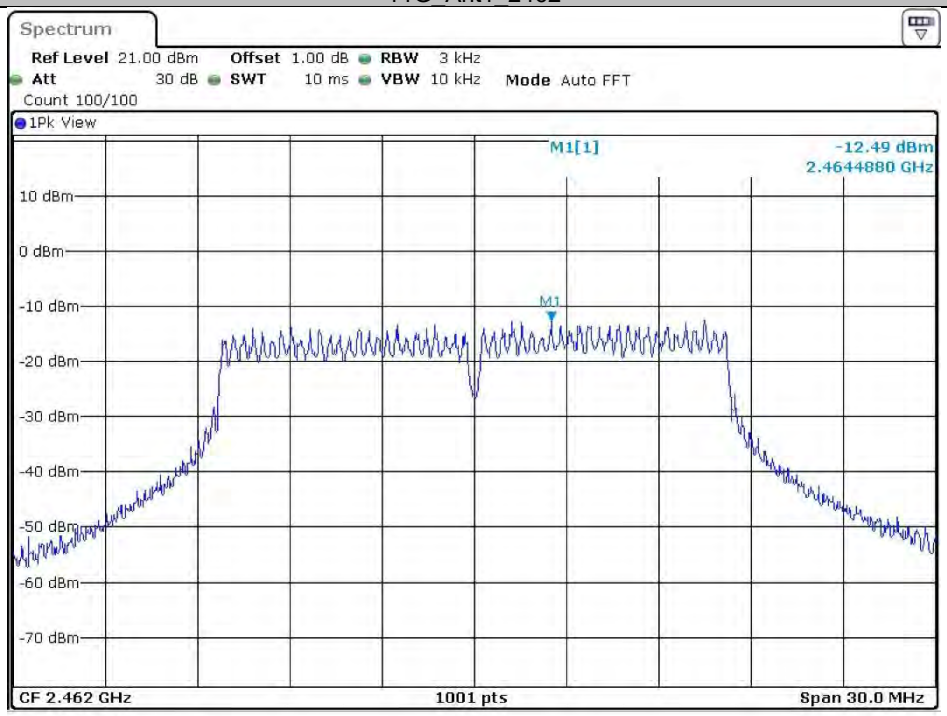

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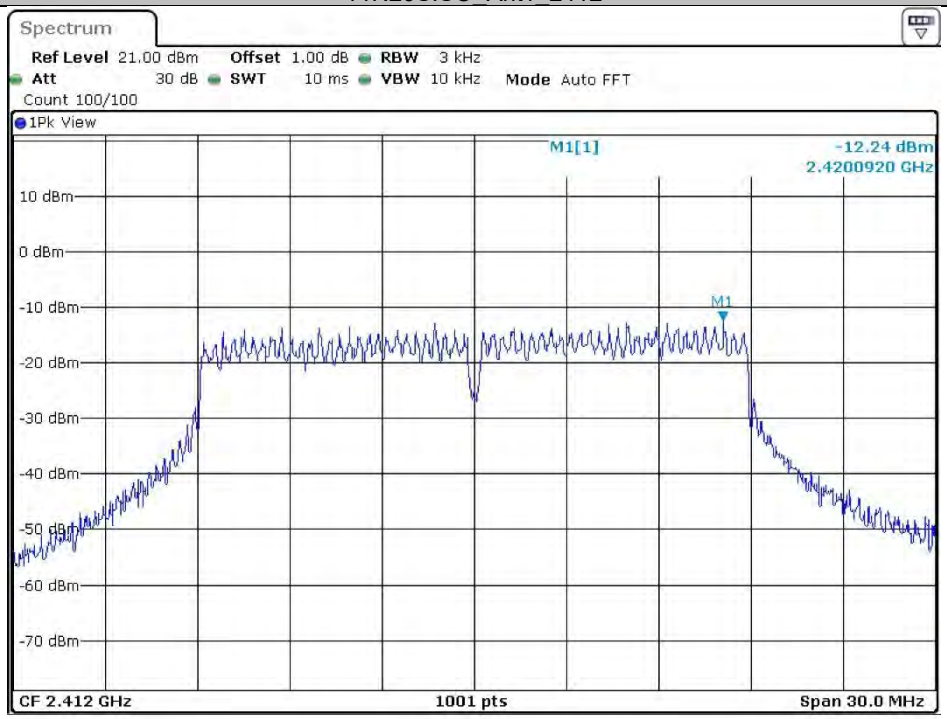

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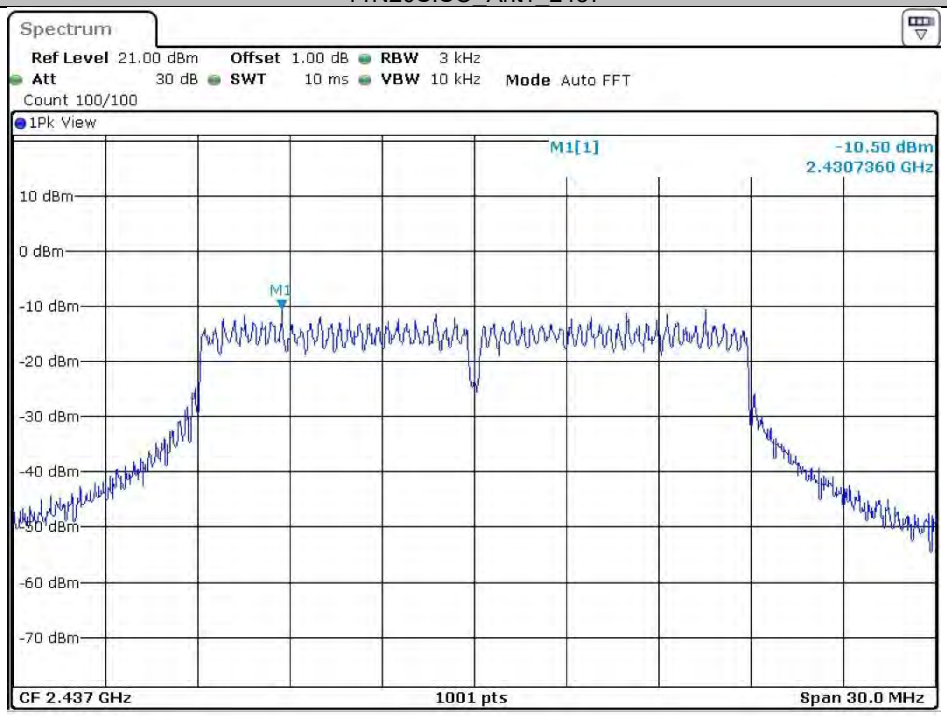

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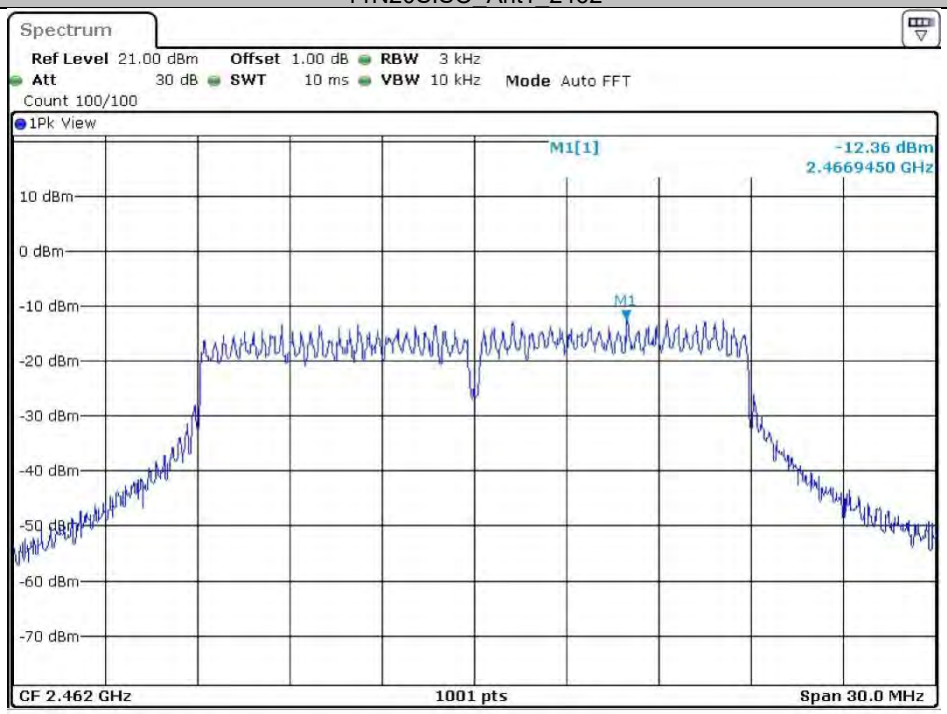

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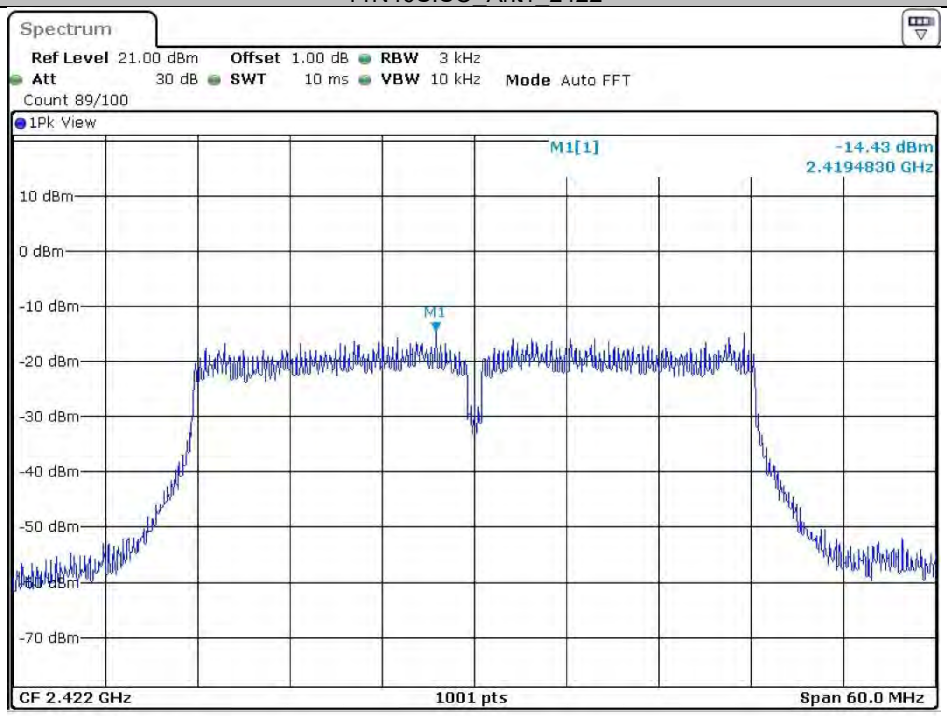

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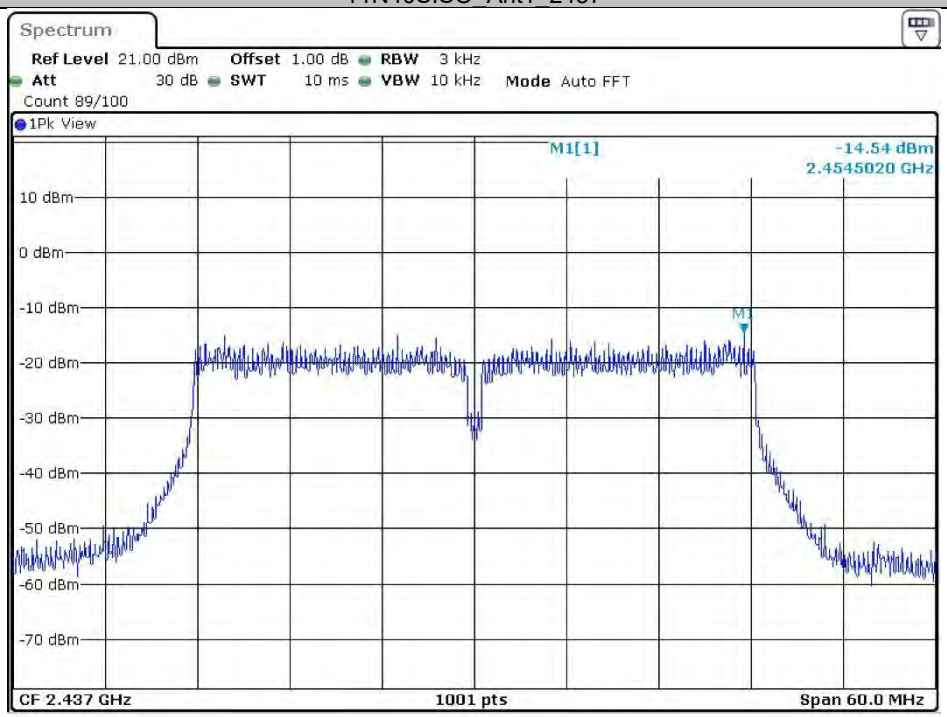

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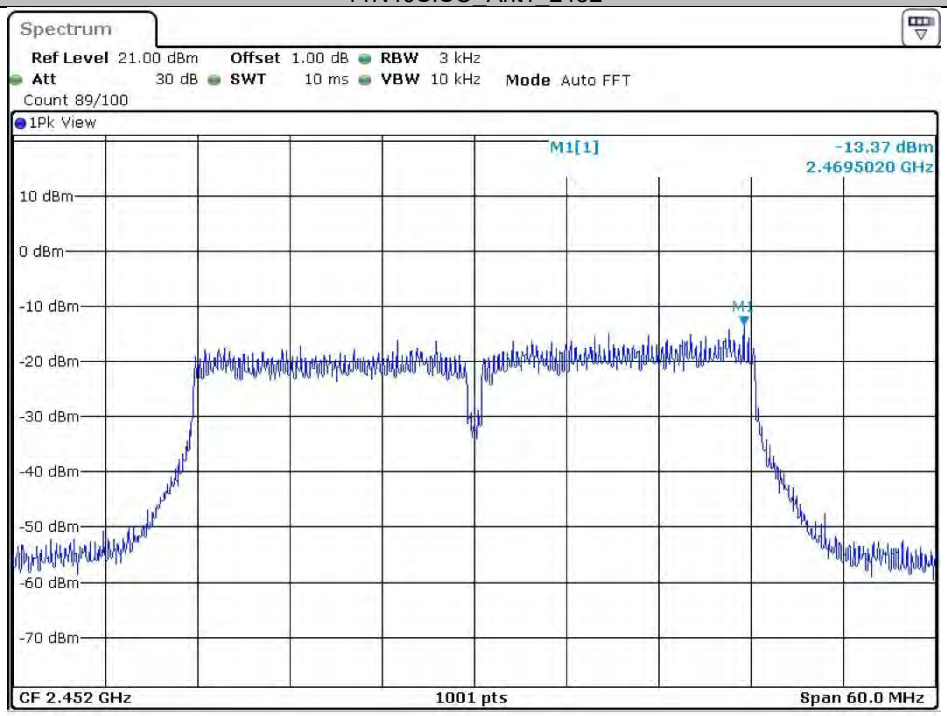

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