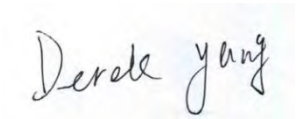
FCC TEST REPORT

Application No.:	ZR/2021/30014
Applicant:	vivo Mobile Communication Co., Ltd.
Address of Applicant	No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong，China
Manufacturer:	vivo Mobile Communication Co., Ltd.
Address of Manufacturer	No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong，China
EUT Description:	Mobile Phone
Model No.:	V2066
Trade Mark:	vivo
FCC ID:	2AUCY-V2066
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C
Date of Receipt:	2021/3/29
Date of Test:	2021/3/29 to 2021/4/28
Date of Issue:	2021/4/30
Test Result :	**PASS ***

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

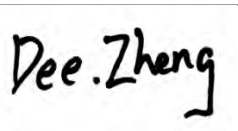
Authorized Signature:



Derek Yang
Wireless Laboratory Manager

1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2021-04-30		Original

Authorized for issue by:		
Prepared By		 **(Dee Zheng) / Engineer**
Checked By		 **(Jim Huang) / Reviewer**

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

Remark：All test were performed by Lab A and B.
Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Lab B SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
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Contents

3 General Information

3.1 Details of Client

Applicant:	vivo Mobile Communication Co., Ltd.
Address of Applicant	No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong，China
Manufacturer:	vivo Mobile Communication Co., Ltd.
Address of Manufacturer	No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong，China

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
Test engineer:	Dee Zheng,Swing Hu,Habit Zeng

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
Test engineer:	Leah Chen,Ken Liu,Andy Yao

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.

• FCC-Designation Number: CN1271.

3.4 General Description of EUT

EUT Description:	Mobile Phone
Model No.:	V2066
Trade Mark:	vivo
Hardware Version:	MP_0.1
Software Version:	PD2083CF_EX_A_3.6.2
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:	-3.1dBi

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

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.

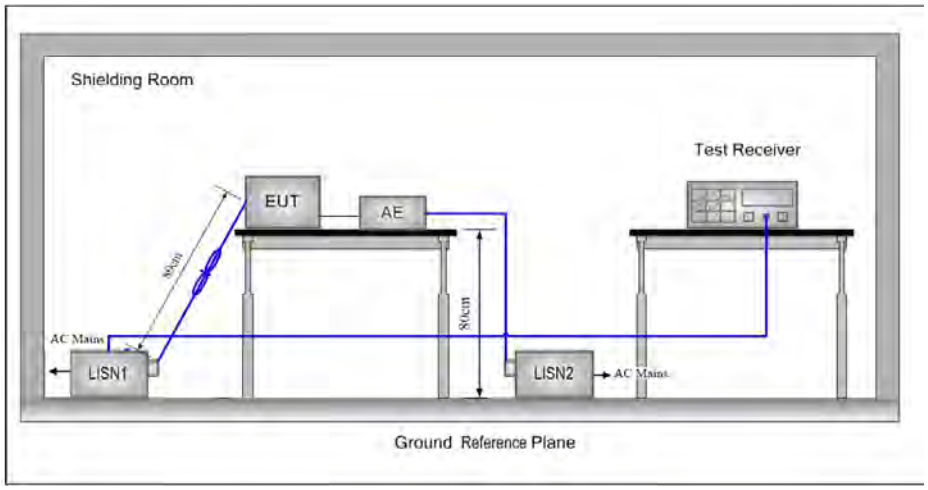
4 Test results and Measurement Data

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 -3.1dBi.	

4.2 AC Power Line Conducted Emissions

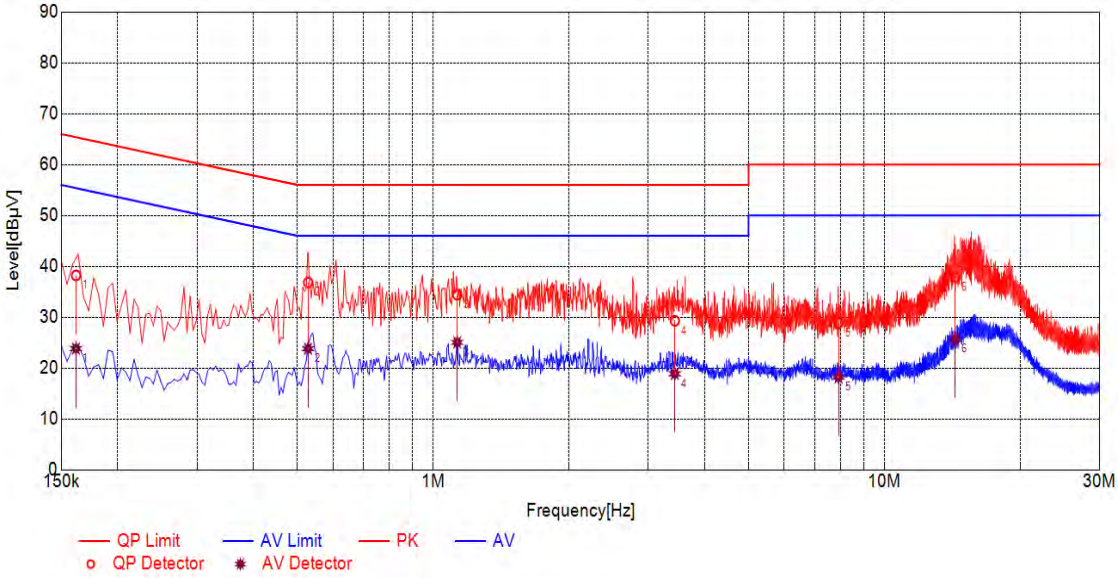
Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	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.		

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

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.

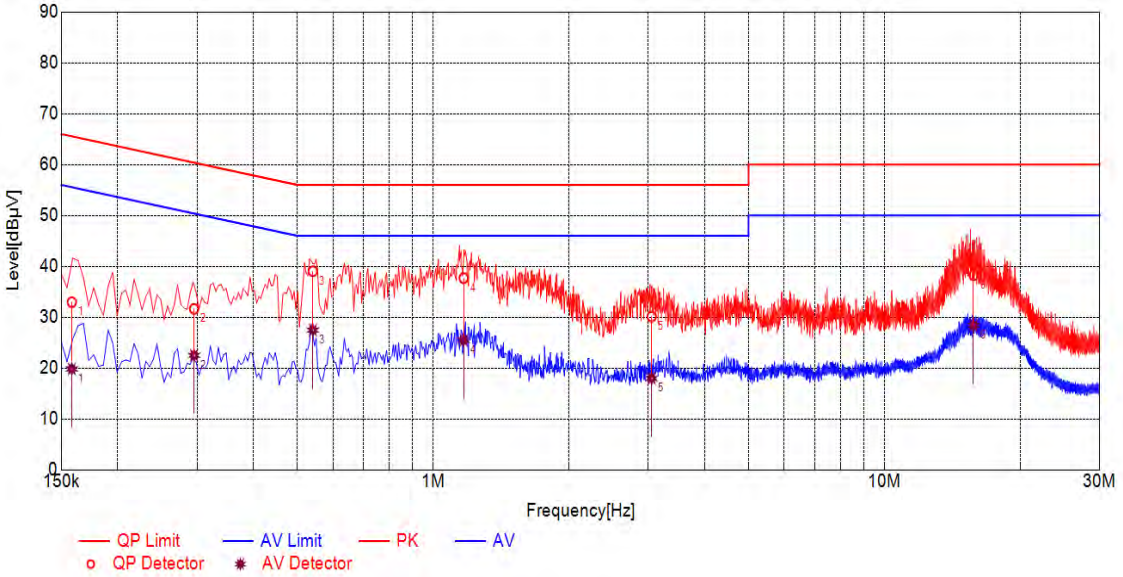
Live Line:



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	0.1617	10.10	38.22	65.37	27.15	23.83	55.37	31.54
2	0.5284	10.10	36.82	56.00	19.18	23.82	46.00	22.18
3	1.1311	10.10	34.43	56.00	21.57	25.05	46.00	20.95
4	3.4331	10.10	29.29	56.00	26.71	18.87	46.00	27.13
5	7.9159	10.10	28.82	60.00	31.18	18.18	50.00	31.82
6	14.3719	10.11	37.84	60.00	22.16	25.65	50.00	24.35

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	0.1583	10.10	32.96	65.55	32.59	19.83	55.55	35.72
2	0.2954	10.10	31.63	60.37	28.74	22.51	50.37	27.86
3	0.5415	10.10	39.04	56.00	16.96	27.46	46.00	18.54
4	1.1687	10.10	37.69	56.00	18.31	25.46	46.00	20.54
5	3.0500	10.10	30.11	56.00	25.89	17.97	46.00	28.03
6	15.7628	10.11	38.24	60.00	21.76	28.39	50.00	21.61

Remark1:

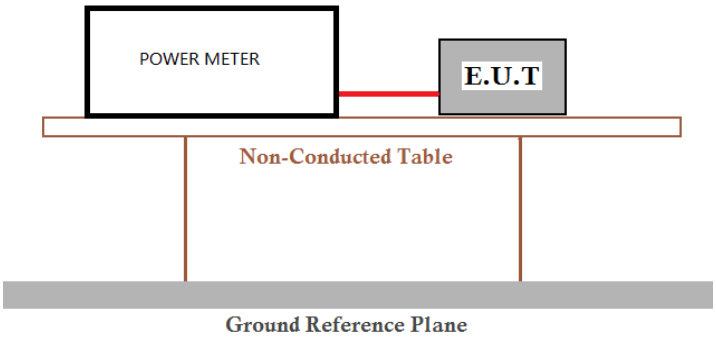
1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

4.3 Duty Cycle

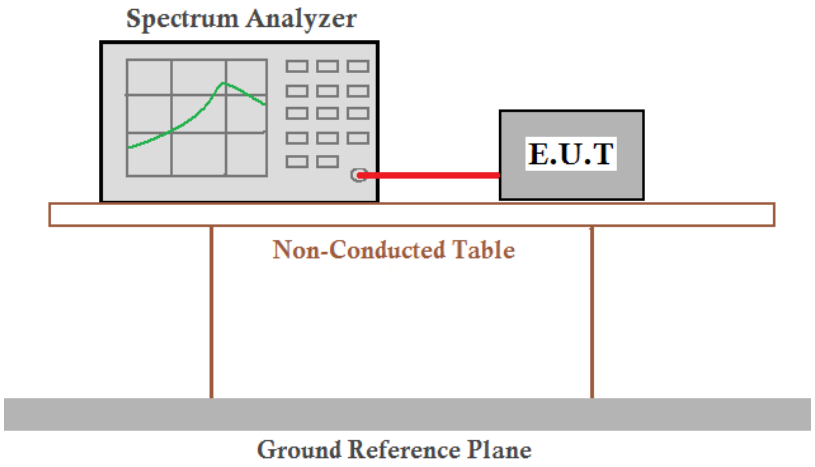
The detailed test data see: **Appendix**

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);
Limit:	30dBm
Test Results:	Pass

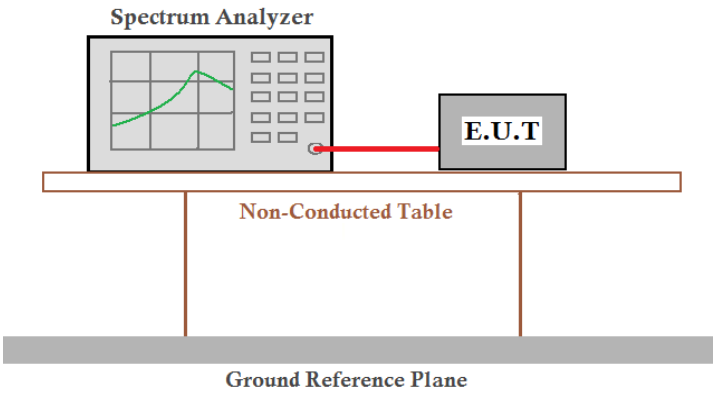
The detailed test data see: **Appendix**

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);
Limit:	≥ 500 kHz
Test Results:	Pass

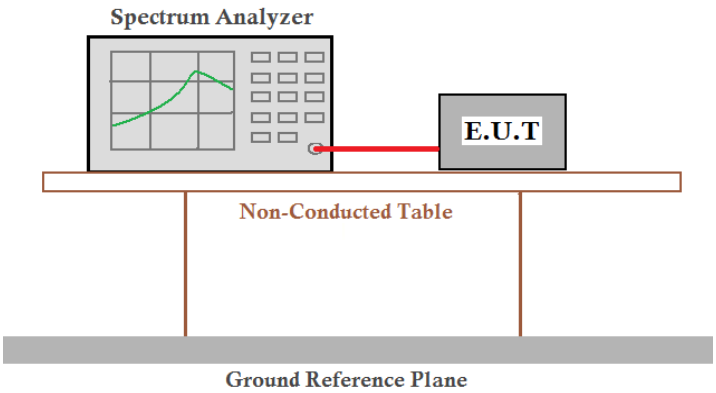
The detailed test data see: **Appendix**

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);
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

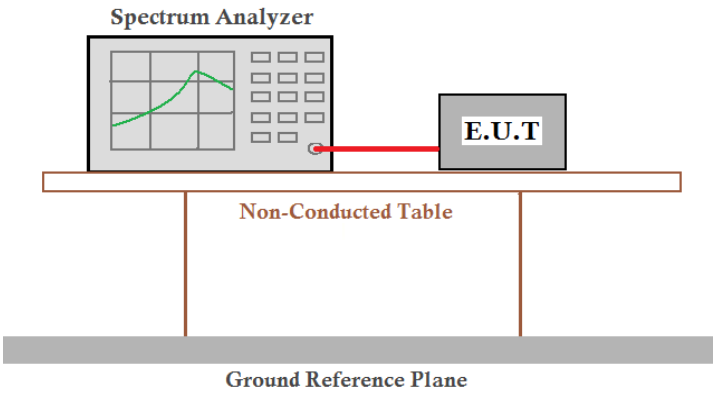
The detailed test data see: **Appendix**

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);
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**

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);
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**

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.				

Test Setup:	

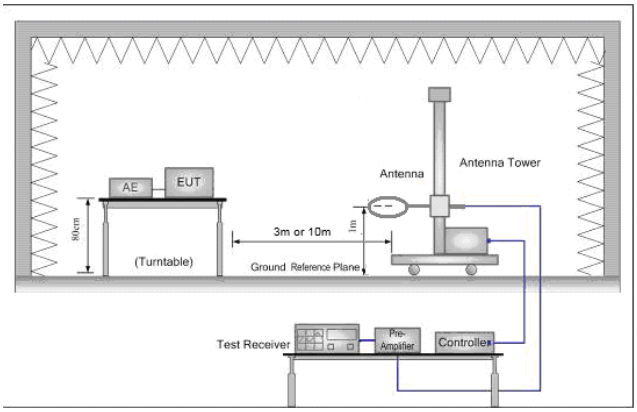


Figure 1. Below 30MHz

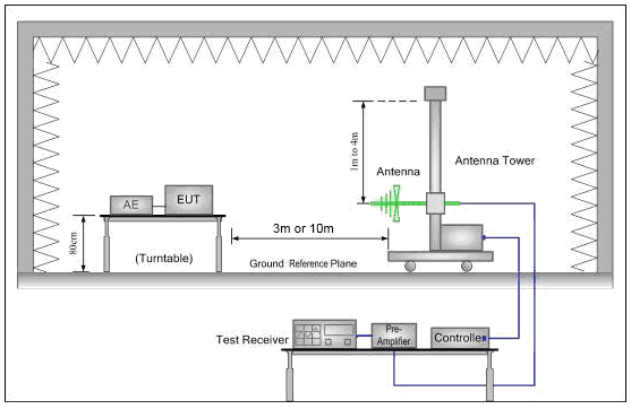


Figure 2. 30MHz to 1GHz

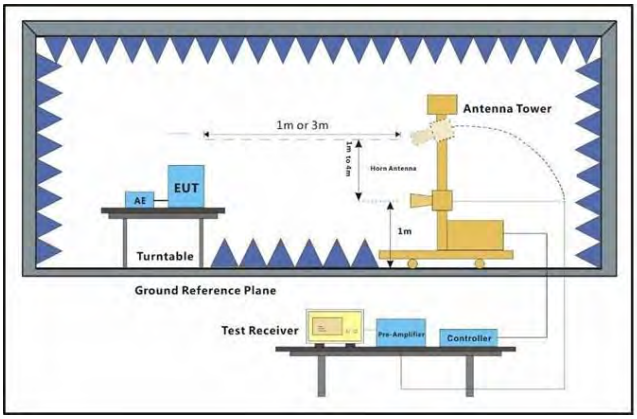


Figure 3. Above 1 GHz

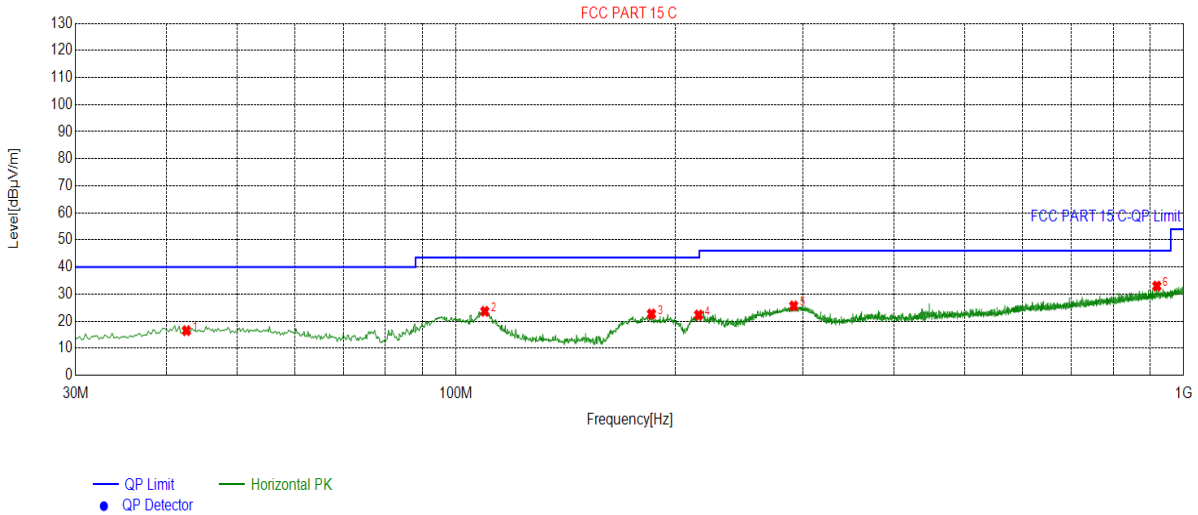
Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating 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). 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.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G; 6.5Mbps of rate is the worst case of 802.11N(HT20); For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass

4.9.1 Radiated emission below 1GHz

4.9.1.1 Charge + Transmitting

Test Graph

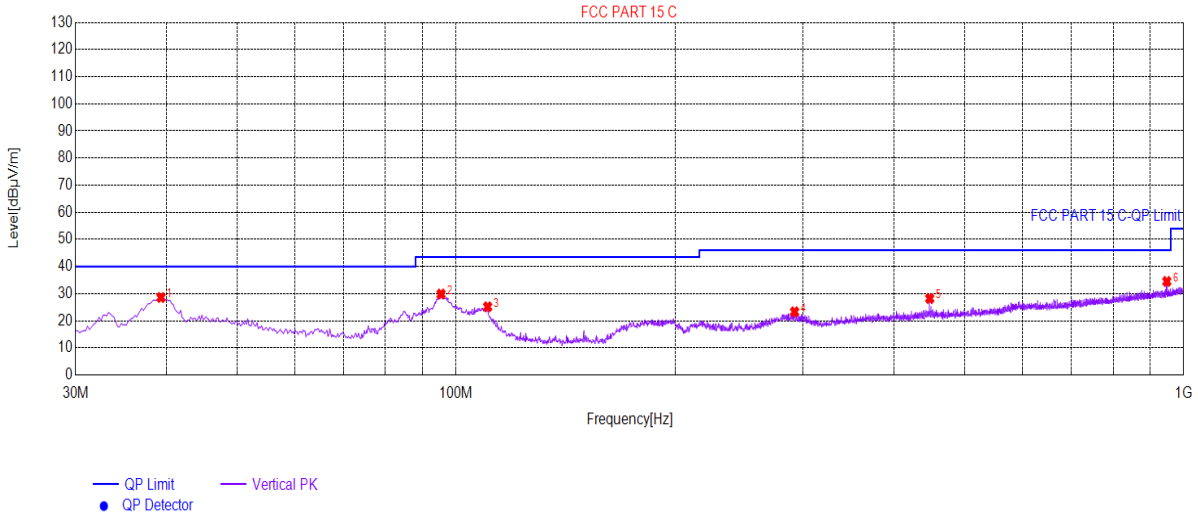


Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	42.6125	16.49	-26.96	40.00	23.51	205	114	Horizontal
2	109.555	23.62	-28.12	43.50	19.88	390	86	Horizontal
3	185.619	22.65	-29.25	43.50	20.85	264	207	Horizontal
4	215.501	22.27	-27.63	43.50	21.23	194	284	Horizontal
5	291.176	25.62	-26.05	46.00	20.38	105	44	Horizontal
6	918.697	32.94	-14.14	46.00	13.06	200	358	Horizontal

Final Data List

Test Graph



Suspected List

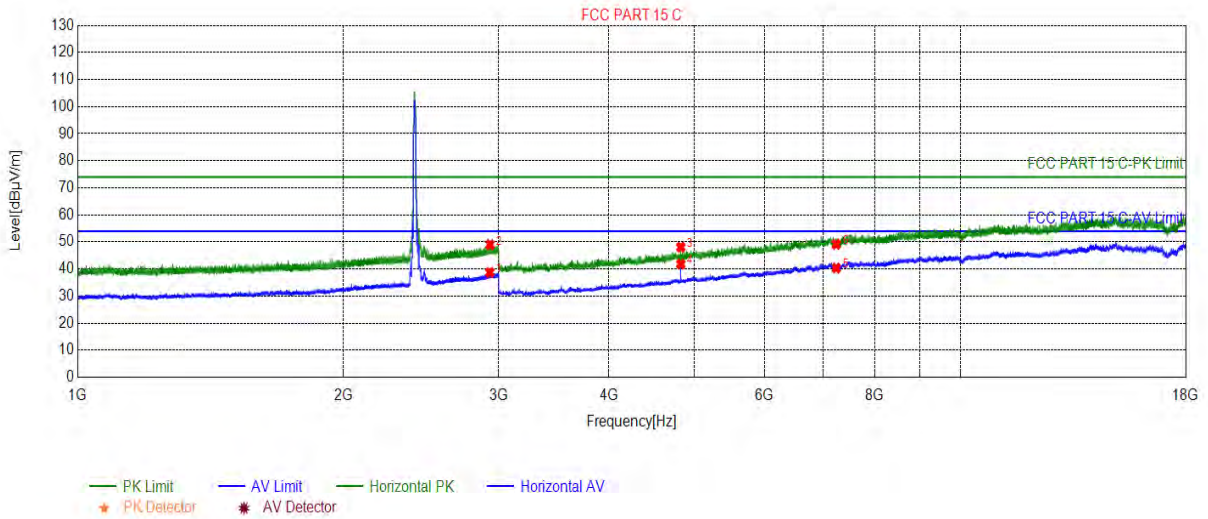
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	39.3139	28.59	-27.70	40.00	11.41	164	299	Vertical
2	95.3911	29.86	-28.92	43.50	13.64	289	263	Vertical
3	110.526	25.15	-28.20	43.50	18.35	341	121	Vertical
4	291.952	23.31	-26.04	46.00	22.69	265	360	Vertical
5	447.765	28.21	-22.05	46.00	17.79	102	40	Vertical
6	948.191	34.51	-13.89	46.00	11.49	100	111	Vertical

Final Data List

4.9.2 Transmitter emission above 1GHz

4.9.2.1 802.11B_Channel 1

Test Graph



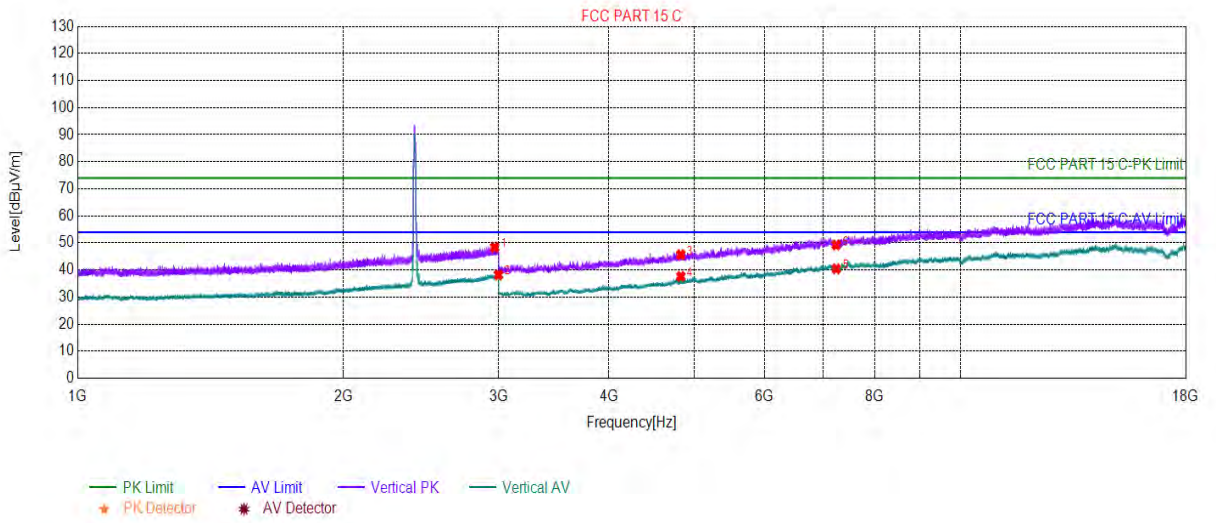
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2930.99	38.74	10.55	54.00	15.26	184	254	Horizontal
2	2933.09	49.01	10.54	74.00	24.99	196	48	Horizontal
3	4824.00	48.07	-15.31	74.00	25.93	196	314	Horizontal
4	4824.00	41.81	-15.31	54.00	12.19	187	359	Horizontal
5	7236.00	40.37	-8.82	54.00	13.63	168	57	Horizontal
6	7236.00	49.15	-8.82	74.00	24.85	188	102	Horizontal

Final Data List

4.9.2.2 802.11B_Channel 1

Test Graph



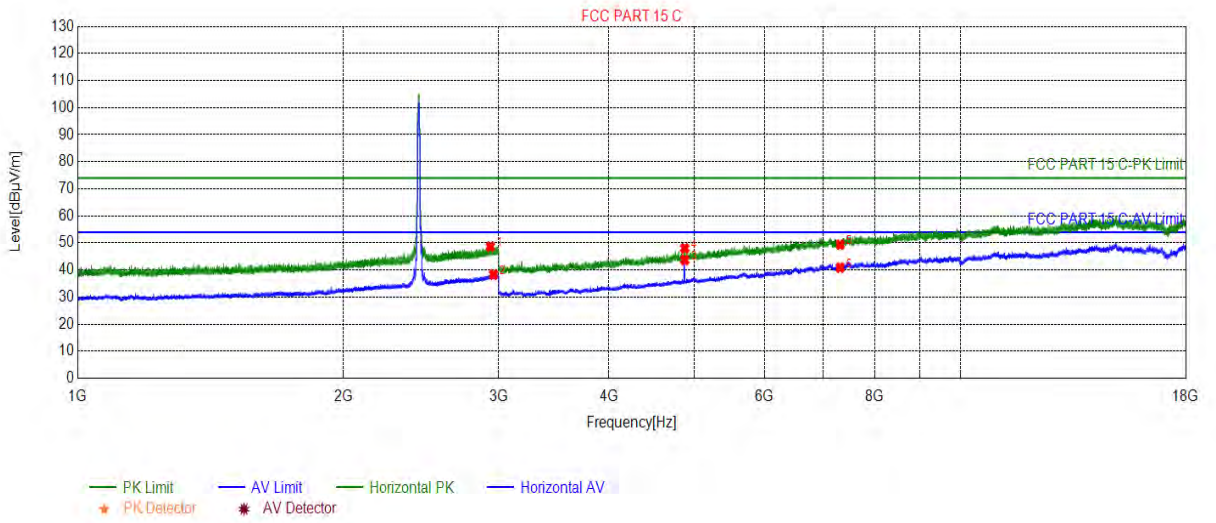
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2968.29	48.36	10.36	74.00	25.64	225	269	Vertical
2	2998.09	38.21	10.75	54.00	15.79	224	125	Vertical
3	4824.00	45.67	-15.31	74.00	28.33	248	34	Vertical
4	4824.00	37.62	-15.31	54.00	16.38	197	188	Vertical
5	7236.00	40.46	-8.82	54.00	13.54	187	304	Vertical
6	7236.00	49.29	-8.82	74.00	24.71	224	199	Vertical

Final Data List

4.9.2.3 802.11B_Channel 6

Test Graph



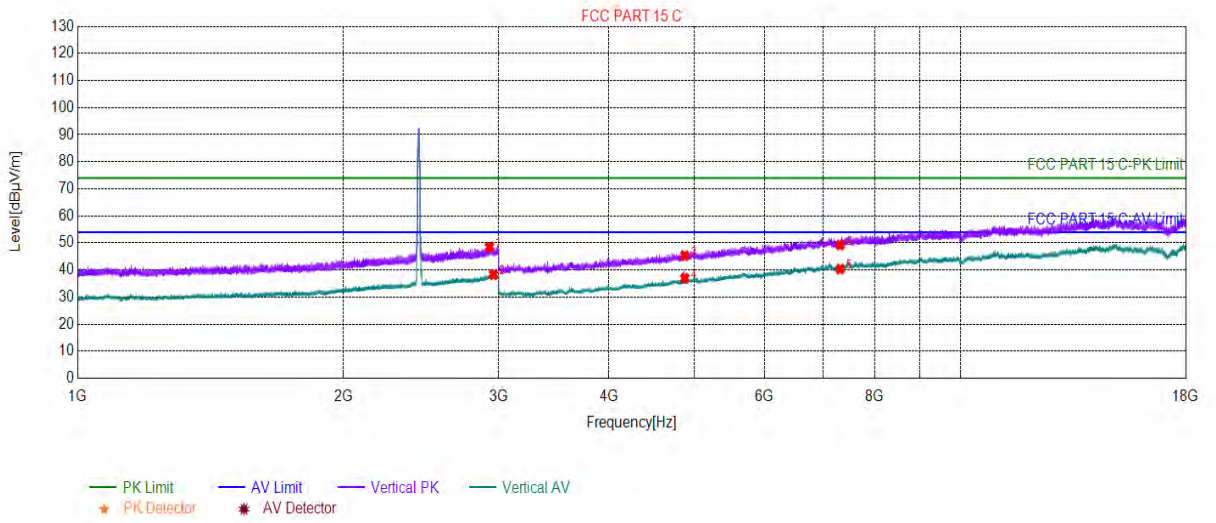
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2935.39	48.68	10.53	74.00	25.32	155	98	Horizontal
2	2959.69	38.34	10.52	54.00	15.66	174	308	Horizontal
3	4873.87	43.71	-15.09	54.00	10.29	198	299	Horizontal
4	4874.00	48.00	-15.09	74.00	26.00	165	345	Horizontal
5	7311.00	49.39	-8.93	74.00	24.61	174	140	Horizontal
6	7311.00	40.91	-8.93	54.00	13.09	228	157	Horizontal

Final Data List

4.9.2.4 802.11B_Channel 6

Test Graph



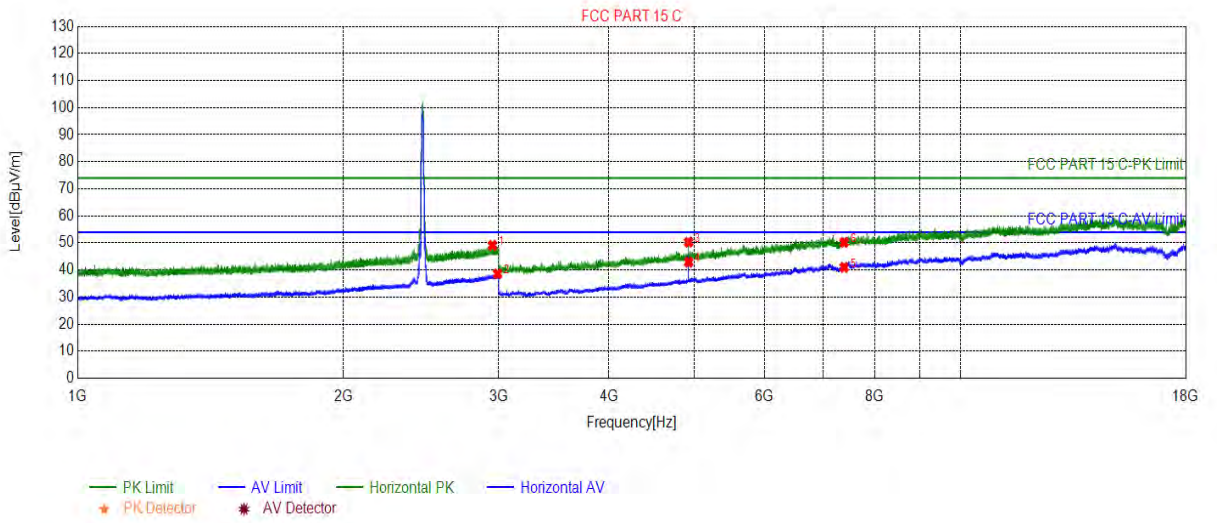
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2927.99	48.48	10.52	74.00	25.52	189	311	Vertical
2	2958.79	38.32	10.52	54.00	15.68	188	184	Vertical
3	4874.00	45.33	-15.09	74.00	28.67	174	35	Vertical
4	4874.00	36.96	-15.09	54.00	17.04	165	18	Vertical
5	7311.00	40.36	-8.93	54.00	13.64	174	57	Vertical
6	7311.00	49.24	-8.93	74.00	24.76	198	126	Vertical

Final Data List

4.9.2.5 802.11B_Channel 11

Test Graph



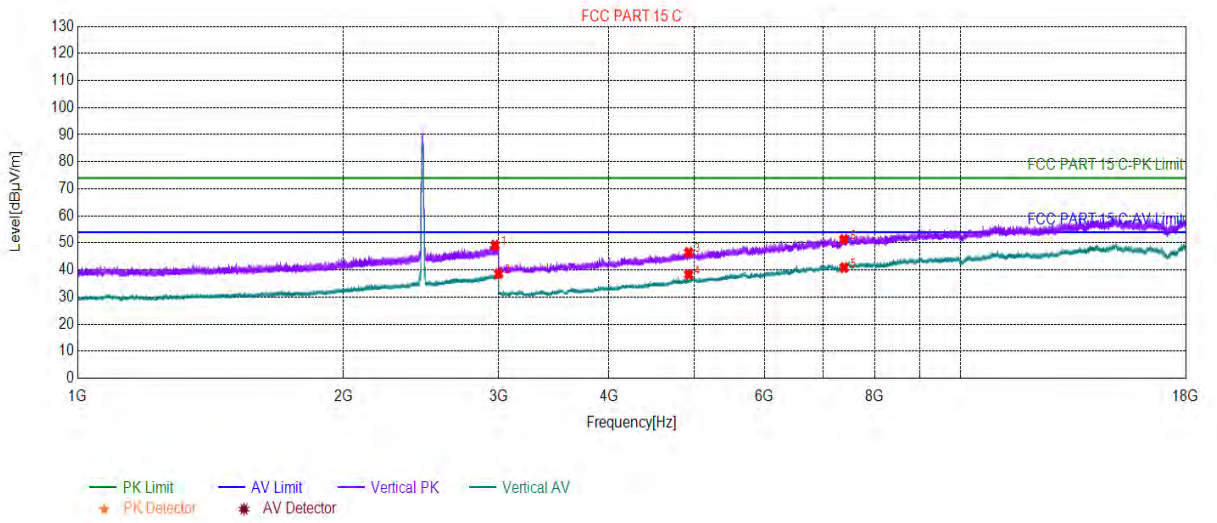
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2951.49	49.11	10.56	74.00	24.89	184	199	Horizontal
2	2991.89	38.59	10.55	54.00	15.41	194	189	Horizontal
3	4924.00	50.32	-14.74	74.00	23.68	178	327	Horizontal
4	4924.00	42.90	-14.74	54.00	11.10	168	309	Horizontal
5	7386.00	40.99	-7.78	54.00	13.01	184	152	Horizontal
6	7386.00	50.20	-7.78	74.00	23.80	189	344	Horizontal

Final Data List

4.9.2.6 802.11B_Channel 11

Test Graph



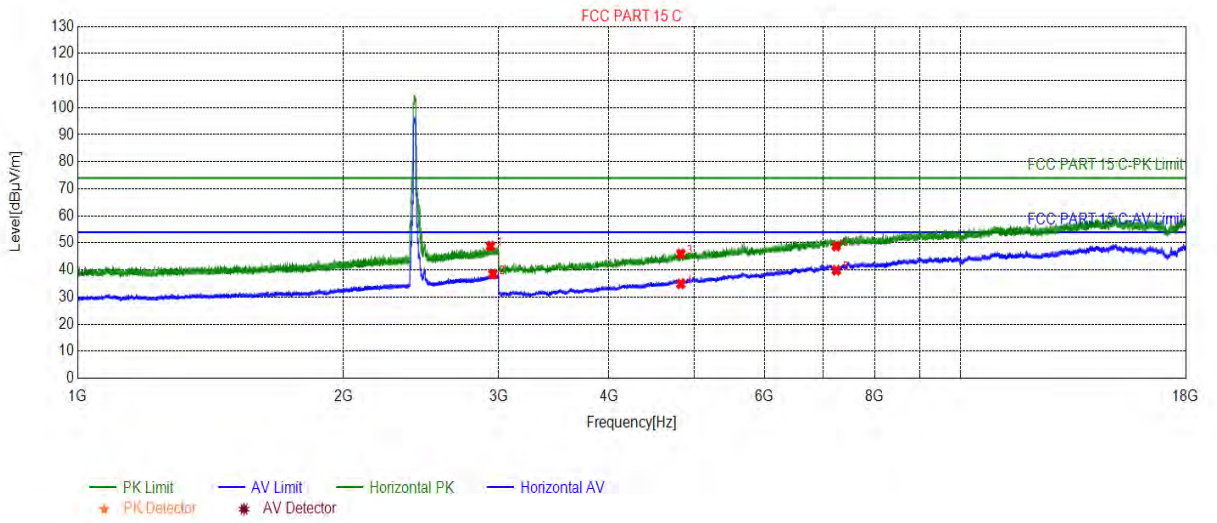
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2971.39	49.12	10.36	74.00	24.88	225	201	Vertical
2	2998.19	38.64	10.75	54.00	15.36	241	106	Vertical
3	4924.00	46.50	-14.74	74.00	27.50	262	270	Vertical
4	4924.00	38.31	-14.74	54.00	15.69	241	12	Vertical
5	7386.00	40.89	-7.78	54.00	13.11	212	292	Vertical
6	7386.00	51.29	-7.78	74.00	22.71	210	252	Vertical

Final Data List

4.9.2.7 802.11G_Channel 1

Test Graph



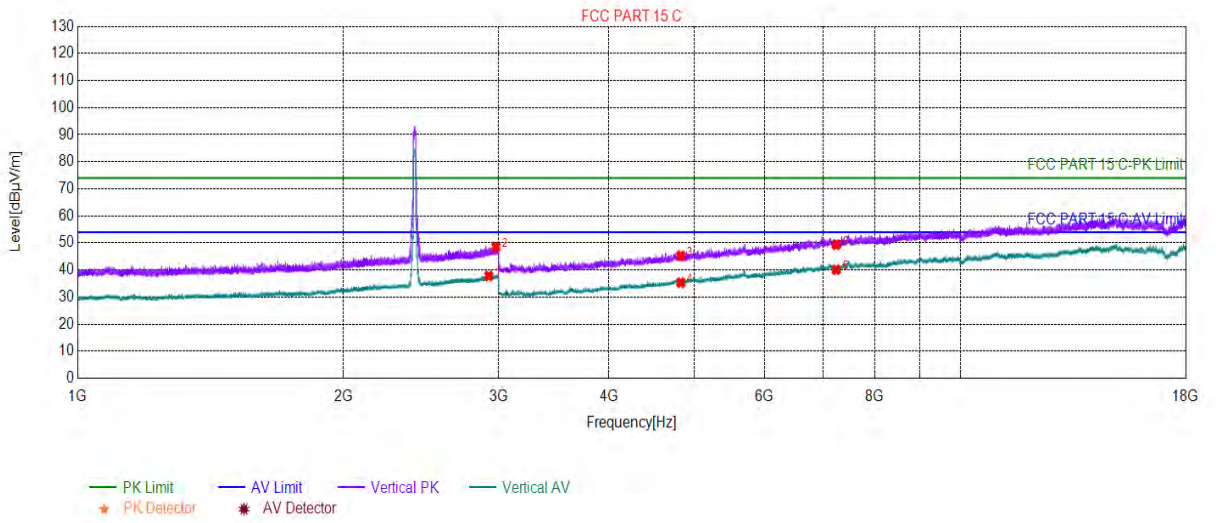
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2936.39	48.85	10.52	74.00	25.15	188	349	Horizontal
2	2955.29	38.52	10.54	54.00	15.48	174	4	Horizontal
3	4824.00	45.96	-15.31	74.00	28.04	165	255	Horizontal
4	4824.00	34.88	-15.31	54.00	19.12	149	17	Horizontal
5	7236.00	39.89	-8.82	54.00	14.11	198	324	Horizontal
6	7236.00	48.87	-8.82	74.00	25.13	156	301	Horizontal

Final Data List

4.9.2.8 802.11G_Channel 1

Test Graph



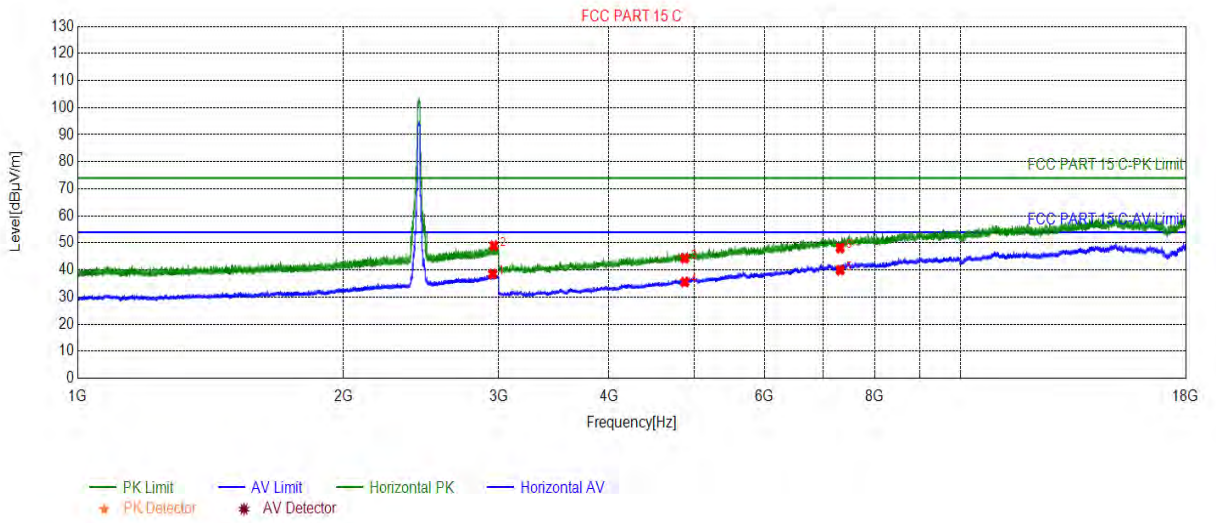
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2923.09	37.82	10.43	54.00	16.18	225	180	Vertical
2	2977.89	48.54	10.50	74.00	25.46	211	201	Vertical
3	4824.00	45.27	-15.31	74.00	28.73	219	111	Vertical
4	4824.00	35.36	-15.31	54.00	18.64	210	111	Vertical
5	7236.00	40.10	-8.82	54.00	13.90	198	141	Vertical
6	7236.00	49.37	-8.82	74.00	24.63	187	320	Vertical

Final Data List

4.9.2.9 802.11G_Channel 6

Test Graph



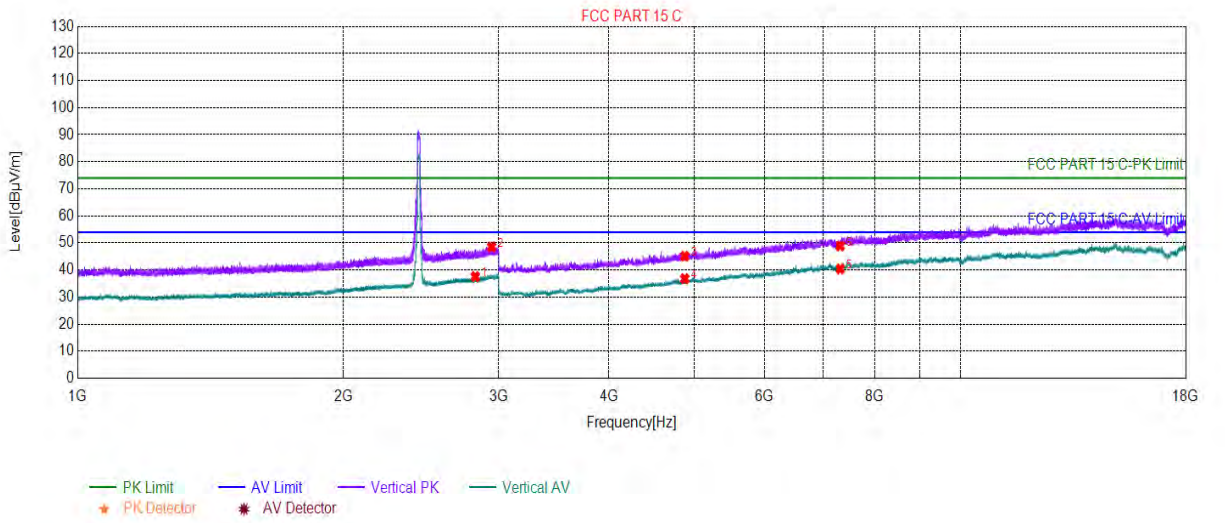
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2953.19	38.52	10.55	54.00	15.48	151	34	Horizontal
2	2961.79	49.01	10.48	74.00	24.99	197	334	Horizontal
3	4874.00	44.32	-15.09	74.00	29.68	187	310	Horizontal
4	4874.00	35.55	-15.09	54.00	18.45	199	332	Horizontal
5	7311.00	39.93	-8.93	54.00	14.07	176	320	Horizontal
6	7311.00	48.11	-8.93	74.00	25.89	159	19	Horizontal

Final Data List

4.9.2.10 802.11G_Channel 6

Test Graph



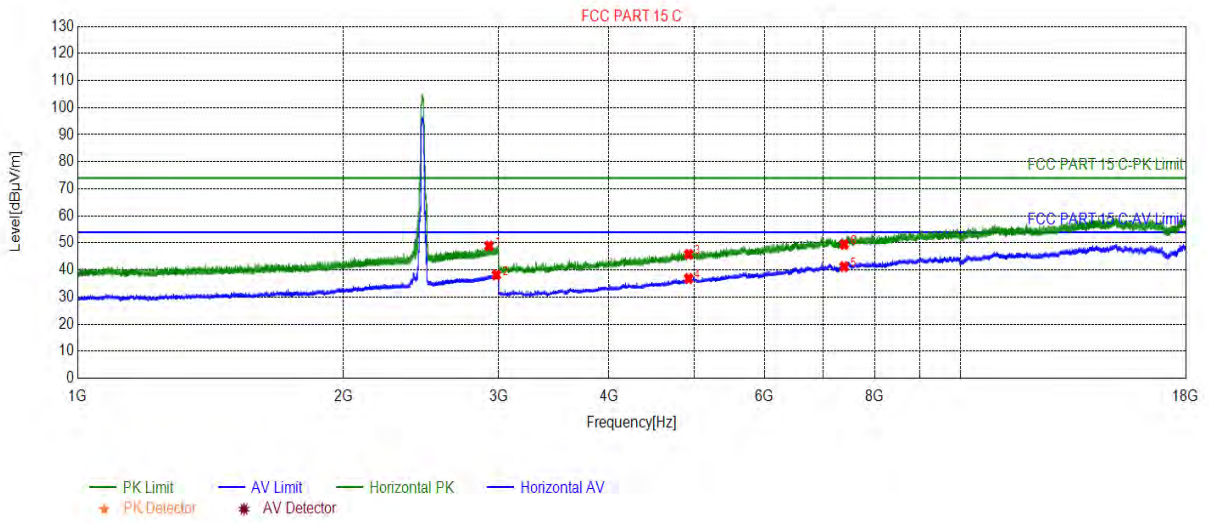
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2822.39	37.56	9.71	54.00	16.44	296	3	Vertical
2	2945.29	48.53	10.54	74.00	25.47	235	276	Vertical
3	4874.00	45.07	-15.09	74.00	28.93	213	283	Vertical
4	4874.00	36.78	-15.09	54.00	17.22	201	98	Vertical
5	7311.00	40.41	-8.93	54.00	13.59	245	317	Vertical
6	7311.00	48.92	-8.93	74.00	25.08	222	185	Vertical

Final Data List

4.9.2.11 802.11G_Channel 11

Test Graph



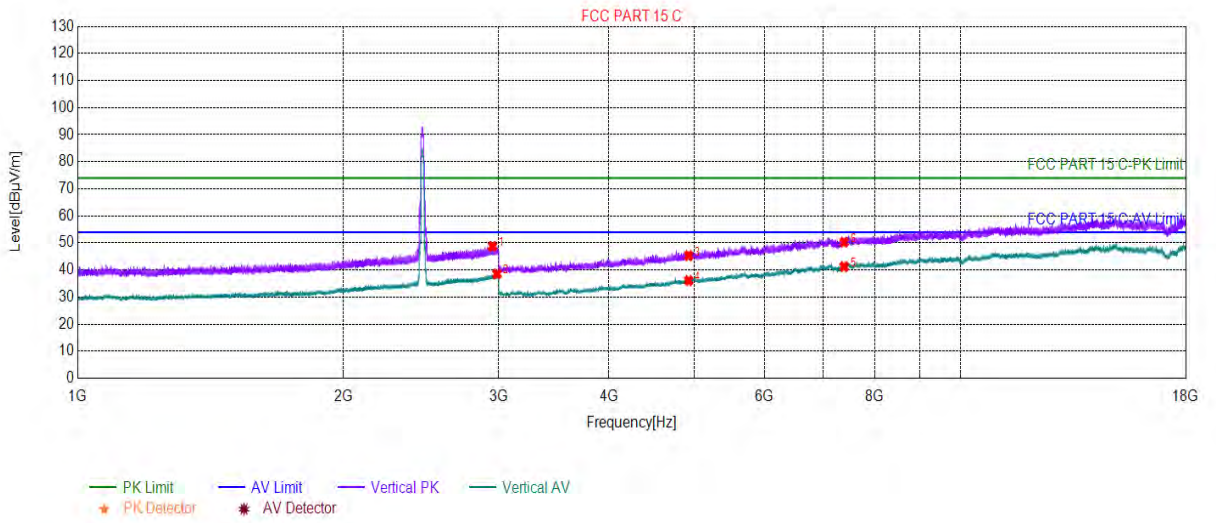
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2925.39	48.92	10.47	74.00	25.08	174	75	Horizontal
2	2981.59	38.18	10.54	54.00	15.82	165	291	Horizontal
3	4924.00	45.81	-14.74	74.00	28.19	174	360	Horizontal
4	4924.00	36.84	-14.74	54.00	17.16	195	353	Horizontal
5	7386.00	41.23	-7.78	54.00	12.77	184	110	Horizontal
6	7386.00	49.42	-7.78	74.00	24.58	165	196	Horizontal

Final Data List

4.9.2.12 802.11G_Channel 11

Test Graph



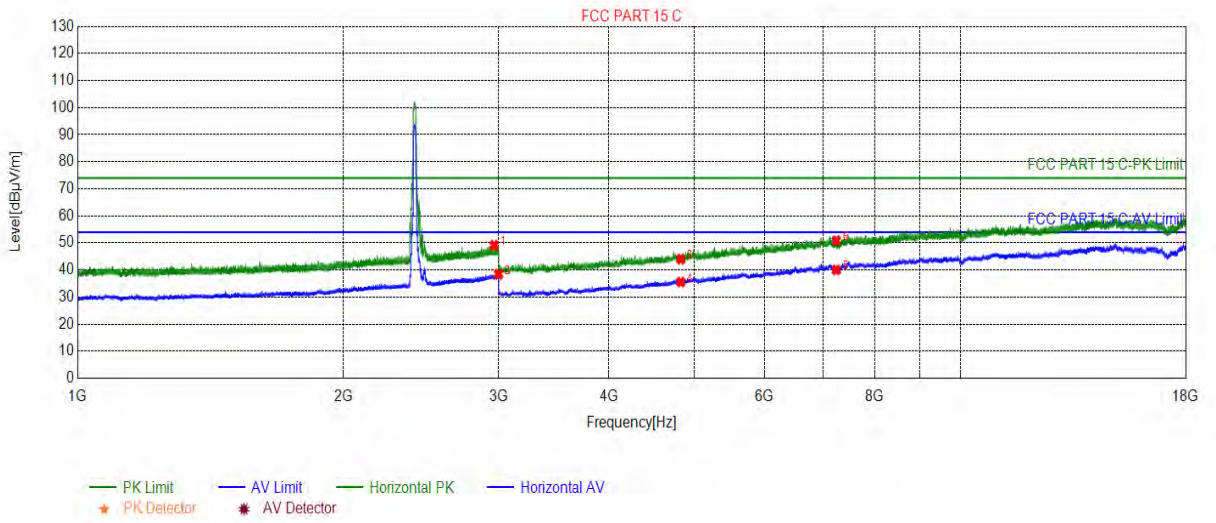
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2952.09	48.78	10.55	74.00	25.22	199	103	Vertical
2	2986.49	38.57	10.51	54.00	15.43	220	236	Vertical
3	4924.00	45.32	-14.74	74.00	28.68	241	360	Vertical
4	4924.00	36.11	-14.74	54.00	17.89	216	360	Vertical
5	7386.00	41.23	-7.78	54.00	12.77	211	110	Vertical
6	7386.00	50.30	-7.78	74.00	23.70	231	59	Vertical

Final Data List

4.9.2.13 802.11N20_Channel 1

Test Graph



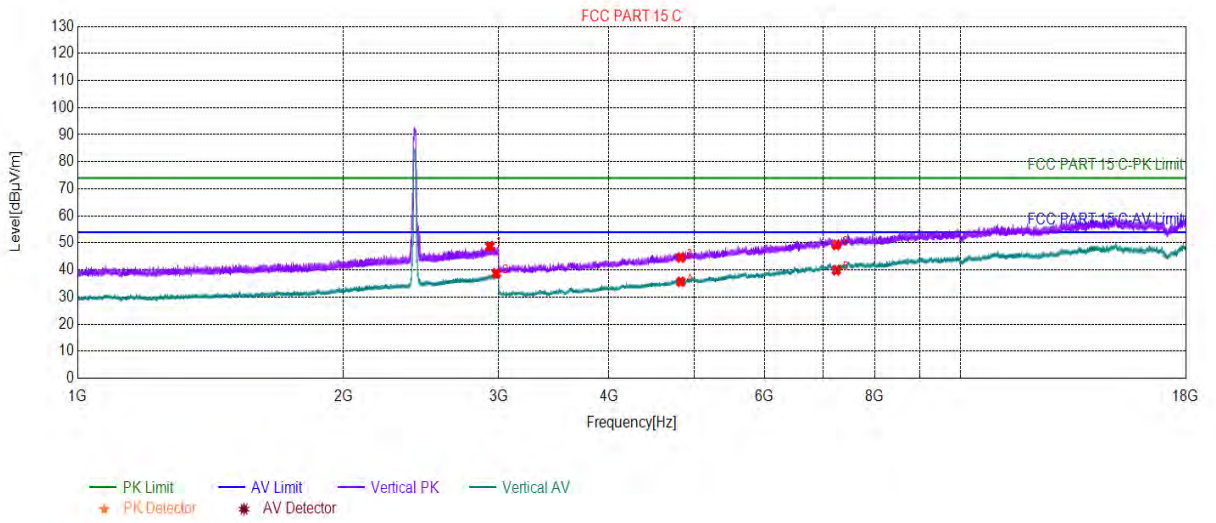
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2964.19	49.17	10.44	74.00	24.83	199	296	Horizontal
2	2999.10	38.46	10.78	54.00	15.54	178	108	Horizontal
3	4824.00	44.01	-15.31	74.00	29.99	165	230	Horizontal
4	4824.00	35.56	-15.31	54.00	18.44	174	291	Horizontal
5	7236.00	40.03	-8.82	54.00	13.97	168	279	Horizontal
6	7236.00	50.88	-8.82	74.00	23.12	194	126	Horizontal

Final Data List

4.9.2.14 802.11N20_Channel 1

Test Graph



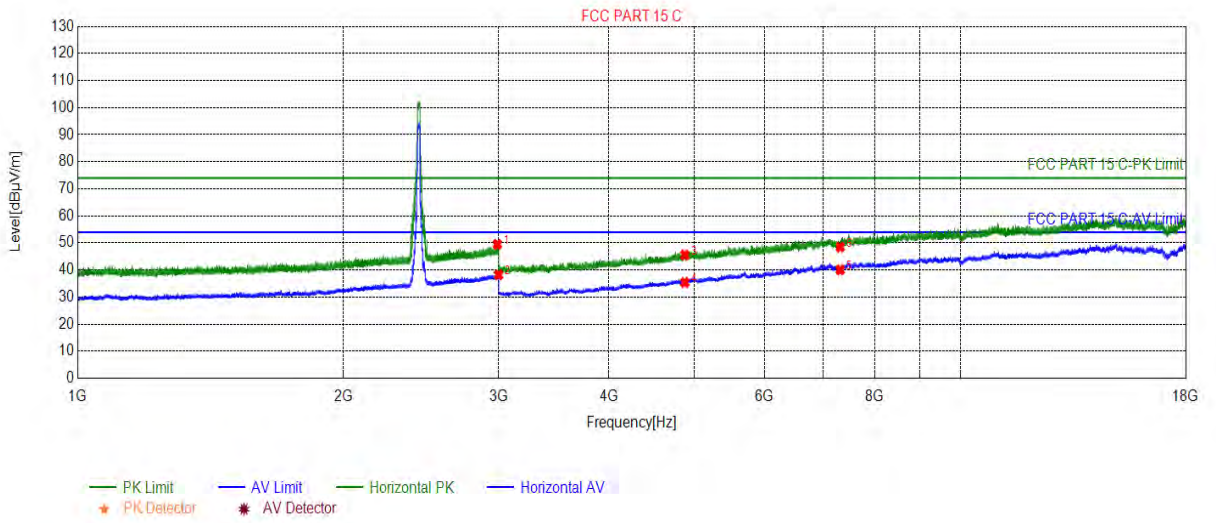
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2931.29	48.75	10.55	74.00	25.25	225	332	Vertical
2	2981.09	38.73	10.54	54.00	15.27	221	8	Vertical
3	4824.00	44.64	-15.31	74.00	29.36	231	341	Vertical
4	4824.00	35.65	-15.31	54.00	18.35	241	265	Vertical
5	7236.00	39.90	-8.82	54.00	14.10	226	276	Vertical
6	7236.00	49.30	-8.82	74.00	24.70	241	341	Vertical

Final Data List

4.9.2.15 802.11N20_Channel 6

Test Graph



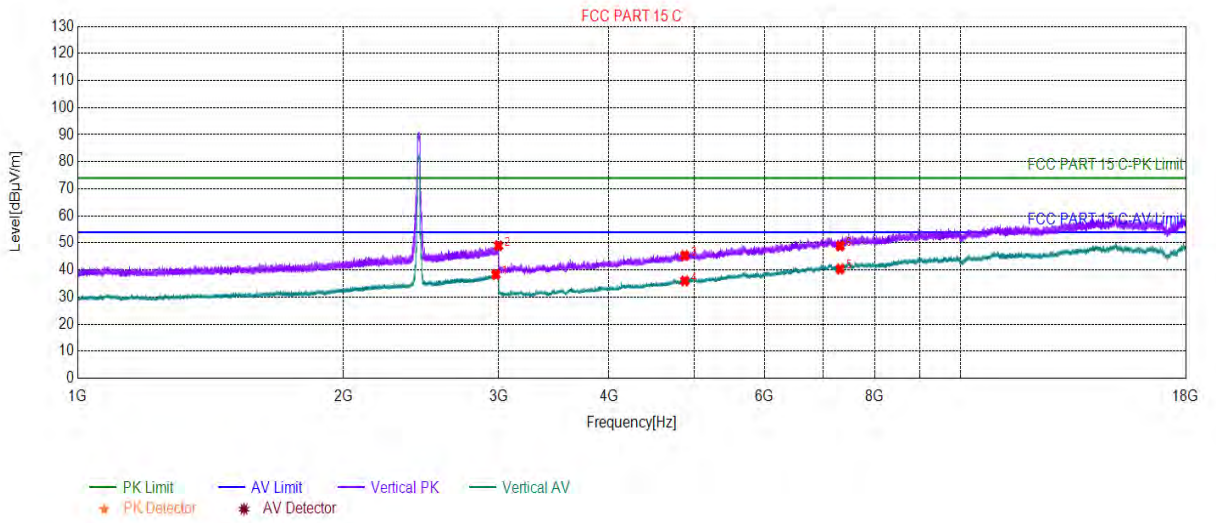
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2989.19	49.48	10.49	74.00	24.52	184	34	Horizontal
2	2998.69	38.25	10.77	54.00	15.75	197	305	Horizontal
3	4874.00	45.52	-15.09	74.00	28.48	184	67	Horizontal
4	4874.00	35.39	-15.09	54.00	18.61	195	56	Horizontal
5	7311.00	40.06	-8.93	54.00	13.94	184	181	Horizontal
6	7311.00	48.46	-8.93	74.00	25.54	175	323	Horizontal

Final Data List

4.9.2.16 802.11N20_Channel 6

Test Graph



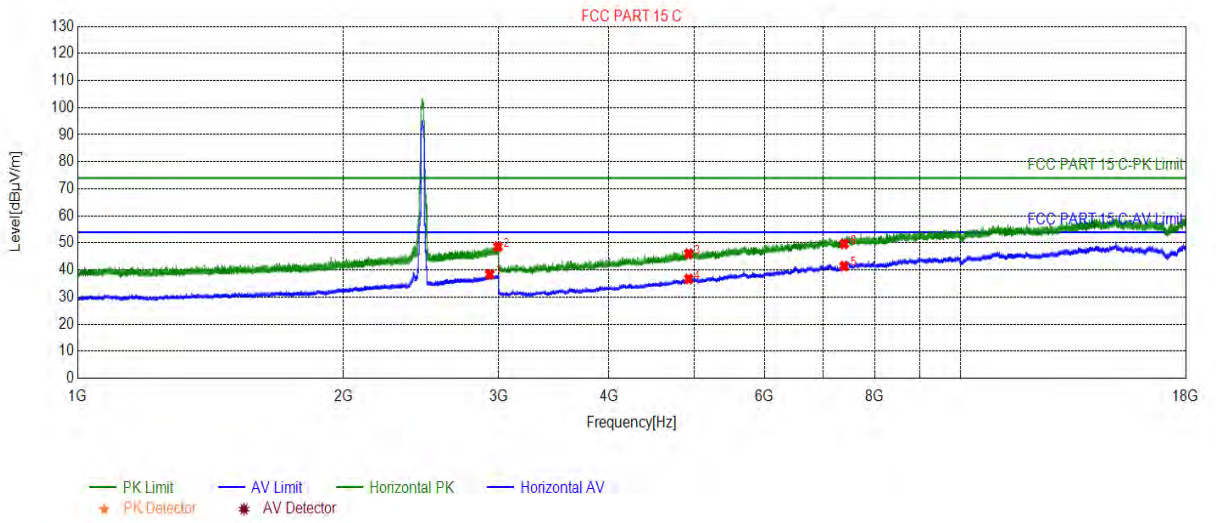
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2977.89	38.35	10.50	54.00	15.65	225	186	Vertical
2	2998.09	48.99	10.75	74.00	25.01	241	311	Vertical
3	4874.00	45.34	-15.09	74.00	28.66	236	49	Vertical
4	4874.00	35.98	-15.09	54.00	18.02	221	104	Vertical
5	7311.00	40.38	-8.93	54.00	13.62	224	187	Vertical
6	7311.00	48.89	-8.93	74.00	25.11	222	12	Vertical

Final Data List

4.9.2.17 802.11N20_Channel 11

Test Graph



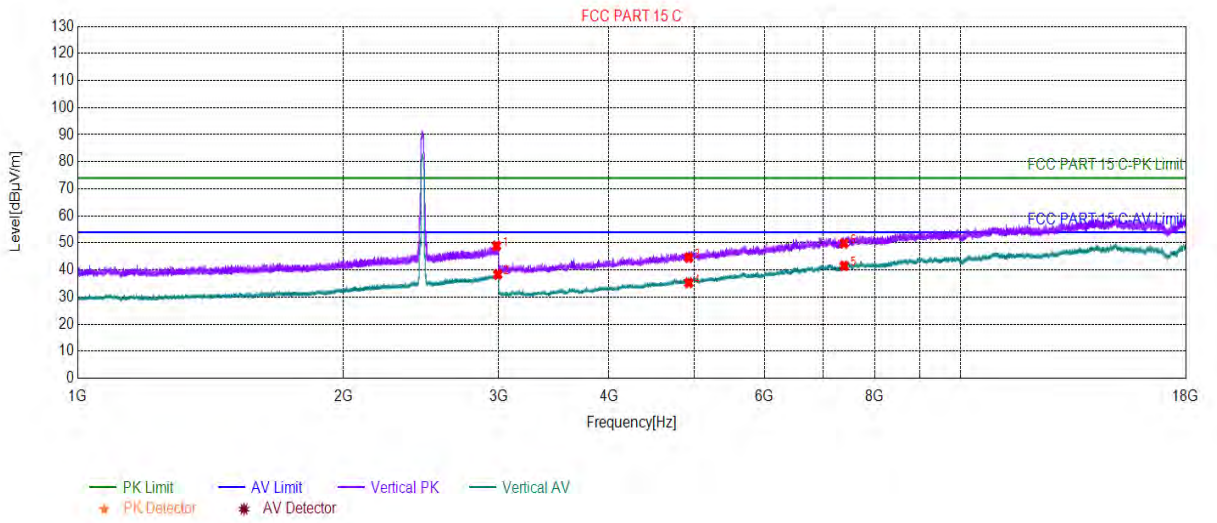
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2930.89	38.39	10.55	54.00	15.61	188	265	Horizontal
2	2993.59	48.61	10.60	74.00	25.39	174	178	Horizontal
3	4924.00	46.04	-14.74	74.00	27.96	196	2	Horizontal
4	4924.00	36.69	-14.74	54.00	17.31	194	339	Horizontal
5	7386.00	41.45	-7.78	54.00	12.55	175	328	Horizontal
6	7386.00	49.70	-7.78	74.00	24.30	163	125	Horizontal

Final Data List

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	2982.99	48.92	10.53	74.00	25.08	225	85	Vertical
2	2992.69	38.34	10.58	54.00	15.66	241	316	Vertical
3	4924.00	44.58	-14.74	74.00	29.42	263	324	Vertical
4	4924.00	35.26	-14.74	54.00	18.74	241	317	Vertical
5	7386.00	41.56	-7.78	54.00	12.44	242	2	Vertical
6	7386.00	49.88	-7.78	74.00	24.12	227	73	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.

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)	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:			

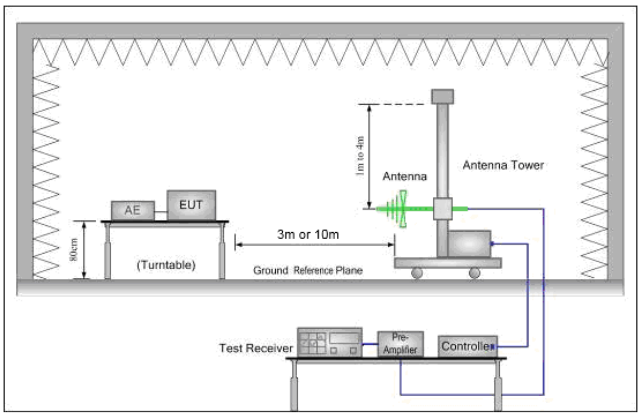


Figure 1. 30MHz to 1GHz

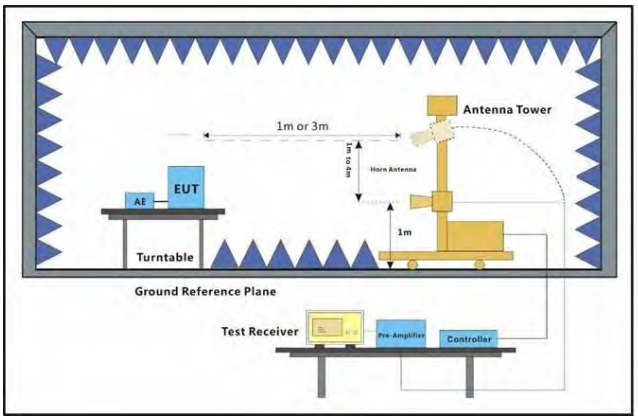


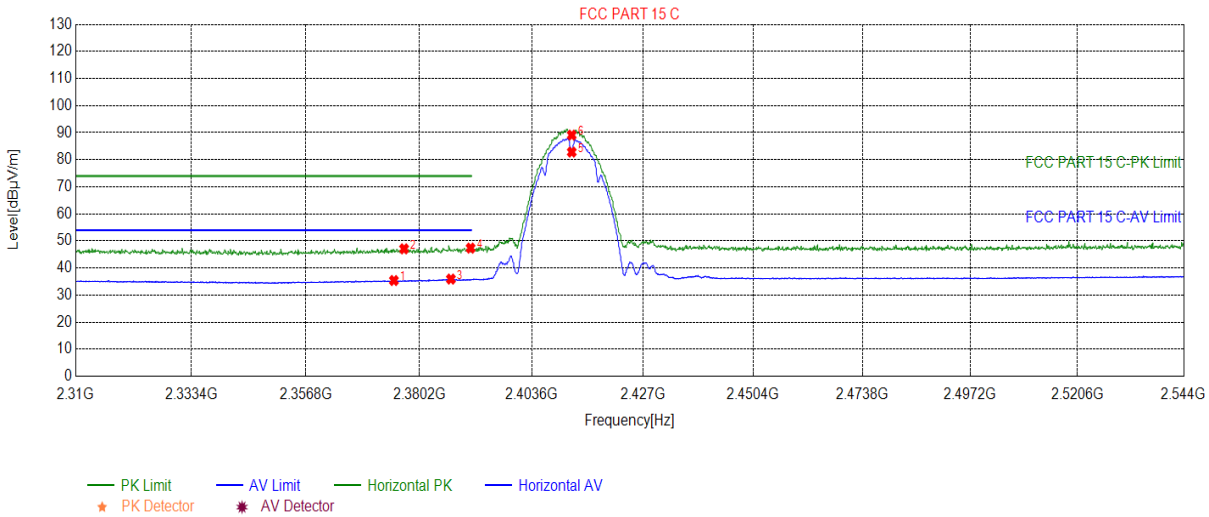
Figure 2. Above 1 GHz

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 6 for details
Test Results:	Pass

4.10.1 Test Plots

4.10.1.1 802.11B_Channel 1

Test Graph



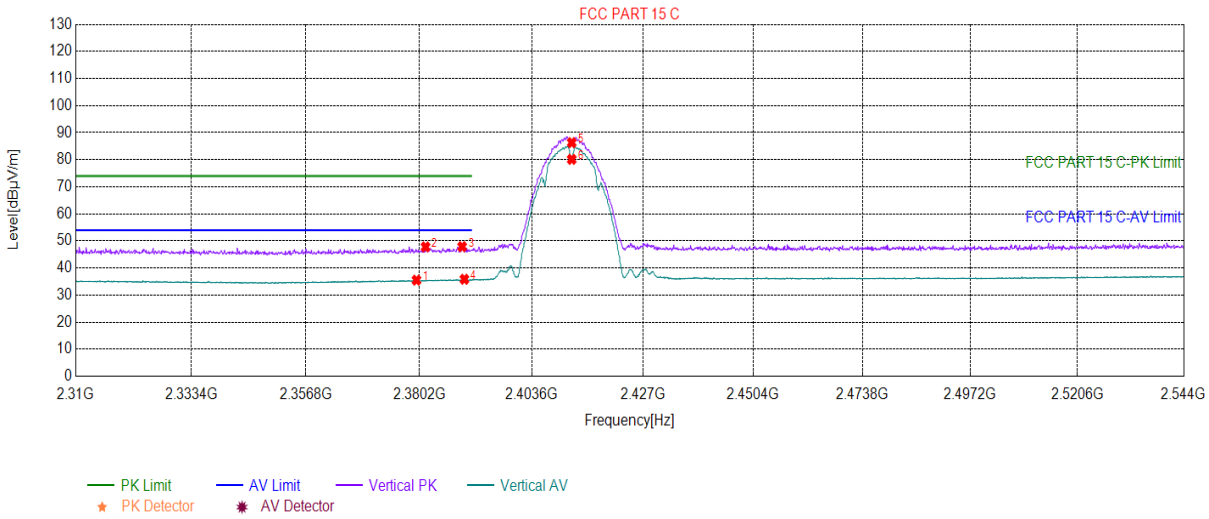
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2374.93	35.39	9.20	54.00	18.61	165	199	Horizontal
2	2377.04	47.09	9.25	74.00	26.91	135	184	Horizontal
3	2386.75	35.91	9.51	54.00	18.09	142	39	Horizontal
4	2390.84	47.37	9.63	74.00	26.63	168	146	Horizontal
5	2412.00	82.83	9.85	0.00	-82.83	148	54	Horizontal
6	2412.00	89.09	9.85	0.00	-89.09	150	54	Horizontal

Final Data List

4.10.1.2 802.11B_Channel 1

Test Graph



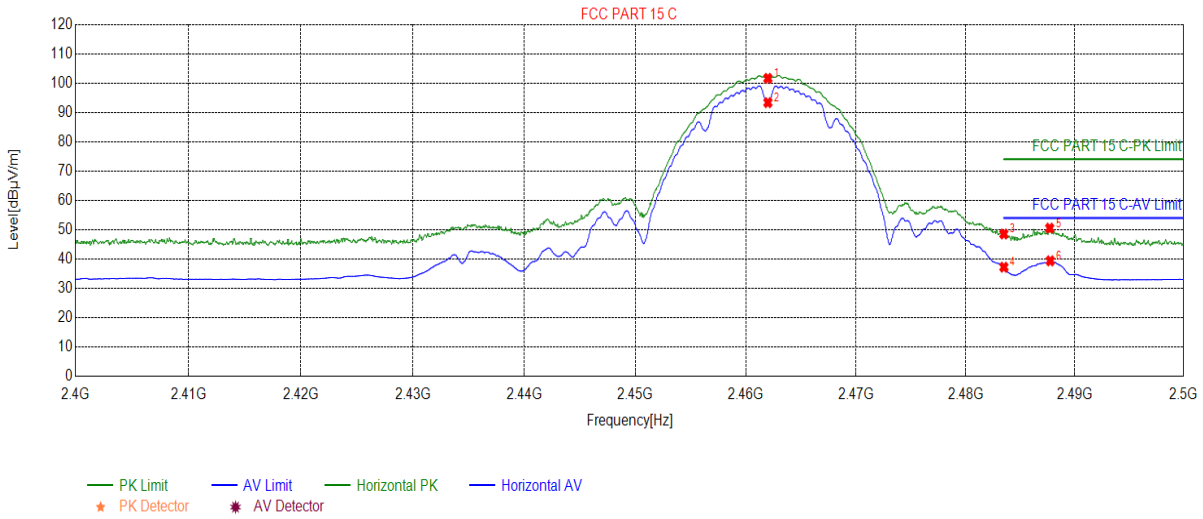
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2379.61	35.52	9.32	54.00	18.48	256	31	Vertical
2	2381.48	47.80	9.37	74.00	26.20	247	199	Vertical
3	2389.09	47.90	9.58	74.00	26.10	268	108	Vertical
4	2389.56	35.85	9.59	54.00	18.15	234	344	Vertical
5	2412.00	86.31	9.85	0.00	-86.31	278	153	Vertical
6	2412.00	80.14	9.85	0.00	-80.14	245	153	Vertical

Final Data List

4.10.1.3 802.11B_Channel 11

Test Graph



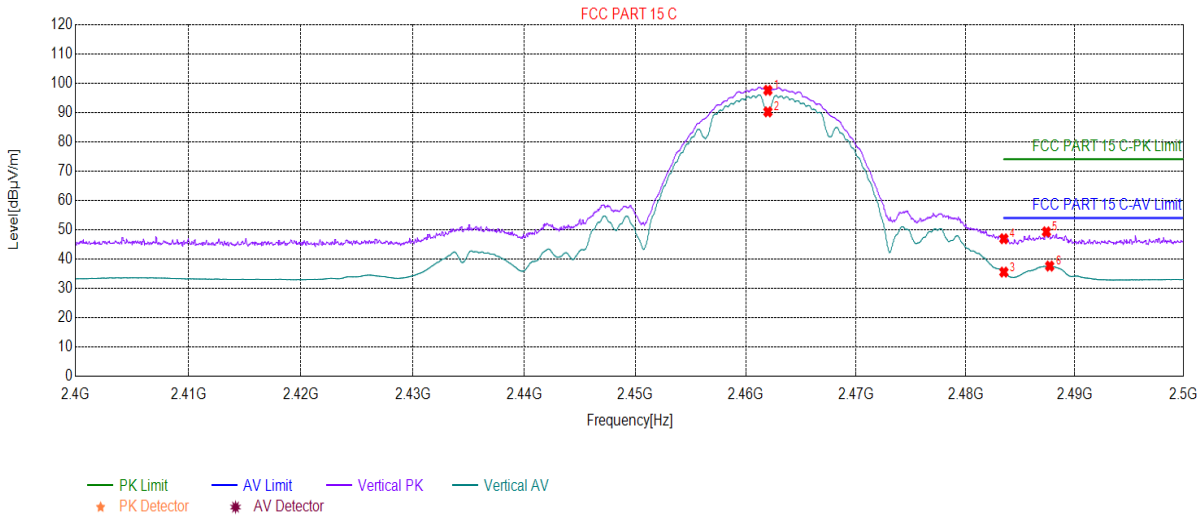
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	101.60	8.25	0.00	-101.60	187	3	Horizontal
2	2462.00	93.33	8.25	0.00	-93.33	198	250	Horizontal
3	2483.50	48.52	8.48	74.00	25.48	187	187	Horizontal
4	2483.50	37.20	8.48	54.00	16.80	168	198	Horizontal
5	2487.69	50.51	8.50	74.00	23.49	195	260	Horizontal
6	2487.74	39.37	8.50	54.00	14.63	177	177	Horizontal

Final Data List

4.10.1.4 802.11B_Channel 11

Test Graph



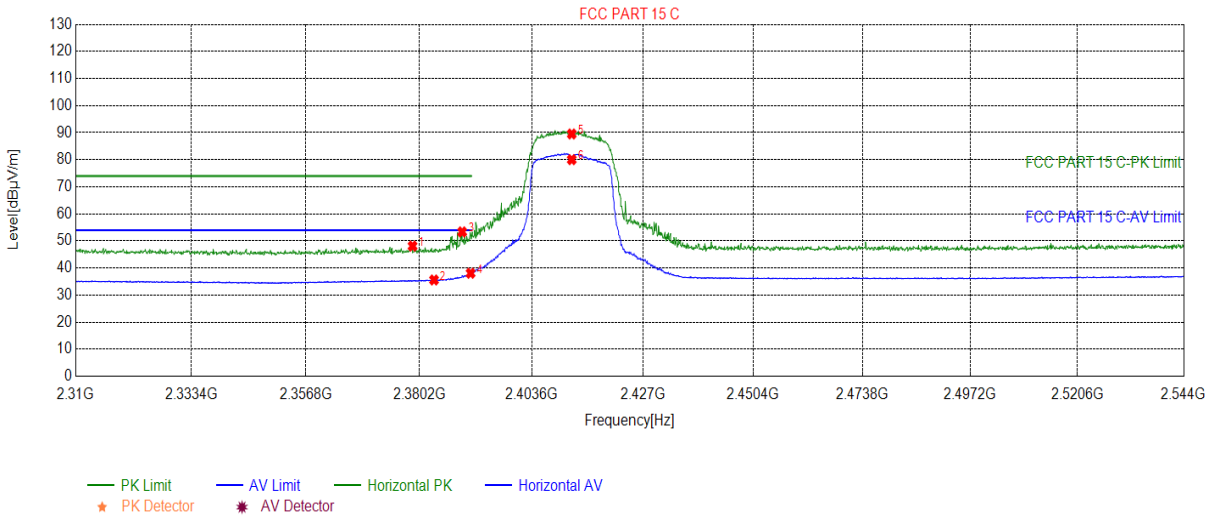
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	97.53	8.25	0.00	-97.53	258	258	Vertical
2	2462.00	90.17	8.25	0.00	-90.17	296	36	Vertical
3	2483.50	35.53	8.48	54.00	18.47	274	78	Vertical
4	2483.50	46.90	8.48	74.00	27.10	289	154	Vertical
5	2487.39	49.25	8.49	74.00	24.75	300	187	Vertical
6	2487.69	37.59	8.50	54.00	16.41	265	265	Vertical

Final Data List

4.10.1.5 802.11B_Channel 1

Test Graph



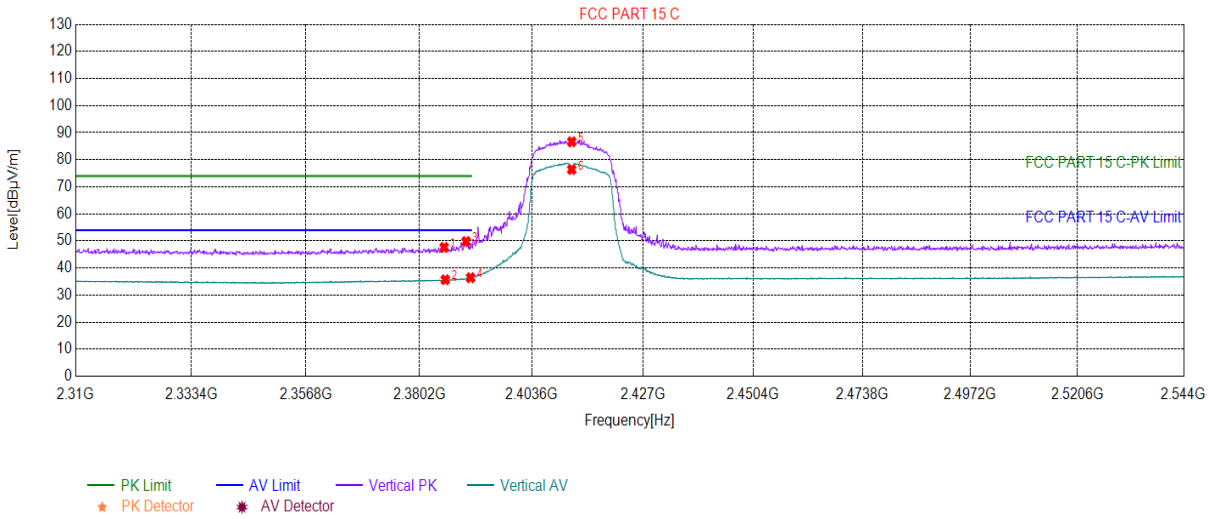
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2378.79	48.11	9.30	74.00	25.89	159	328	Horizontal
2	2383.24	35.59	9.42	54.00	18.41	160	275	Horizontal
3	2389.09	53.34	9.58	74.00	20.66	165	55	Horizontal
4	2390.84	38.07	9.63	54.00	15.93	160	55	Horizontal
5	2412.00	89.52	9.85	0.00	-89.52	151	47	Horizontal
6	2412.00	80.03	9.85	0.00	-80.03	134	55	Horizontal

Final Data List

4.10.1.6 802.11G_Channel 1

Test Graph



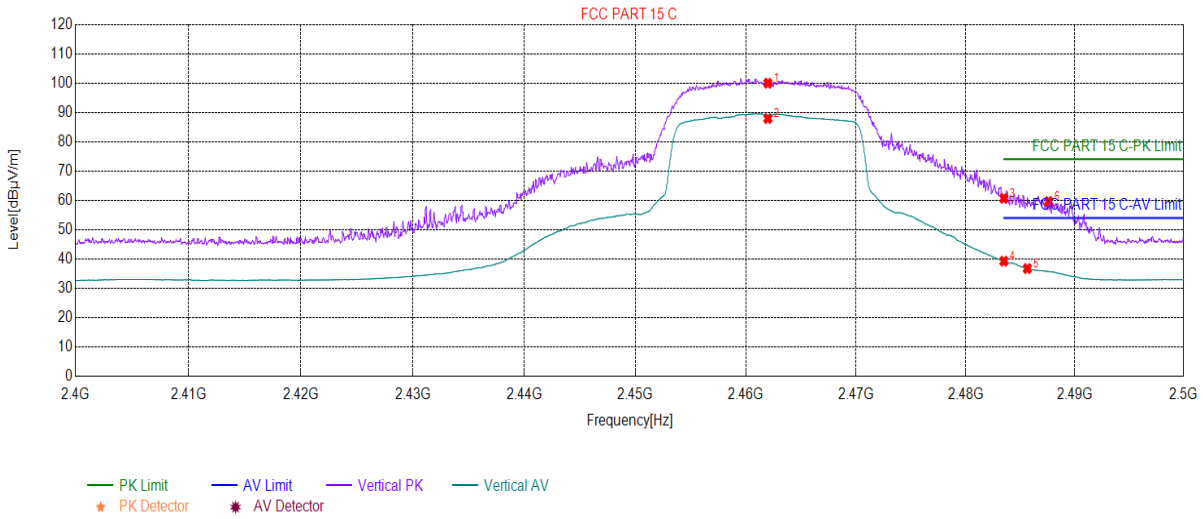
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2385.34	47.62	9.48	74.00	26.38	230	282	Vertical
2	2385.58	35.67	9.48	54.00	18.33	235	31	Vertical
3	2389.91	49.79	9.60	74.00	24.21	230	131	Vertical
4	2390.84	36.41	9.63	54.00	17.59	210	131	Vertical
5	2412.00	86.64	9.85	0.00	-86.64	265	124	Vertical
6	2412.00	76.38	9.85	0.00	-76.38	275	154	Vertical

Final Data List

4.10.1.7 802.11G_Channel 11

Test Graph



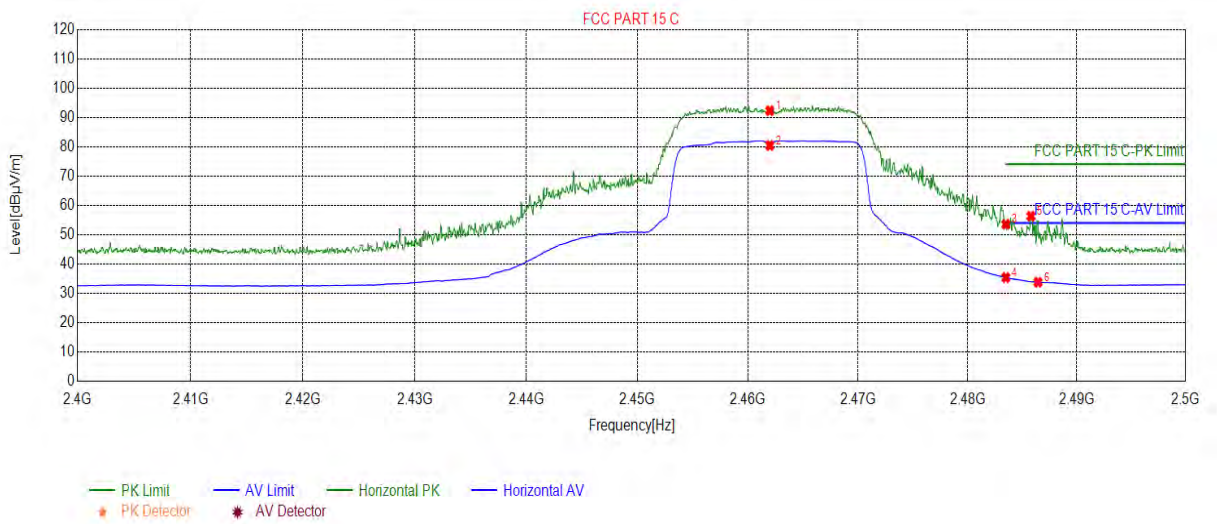
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	99.94	8.25	0.00	-99.94	369	58	Vertical
2	2462.00	87.90	8.25	0.00	-87.90	256	147	Vertical
3	2483.50	60.67	8.48	74.00	13.33	263	158	Vertical
4	2483.50	39.25	8.48	54.00	14.75	247	256	Vertical
5	2485.64	36.74	8.49	54.00	17.26	256	285	Vertical
6	2487.59	59.61	8.50	74.00	14.39	258	142	Vertical

Final Data List

4.10.1.8 802.11G_Channel 11

Test Graph



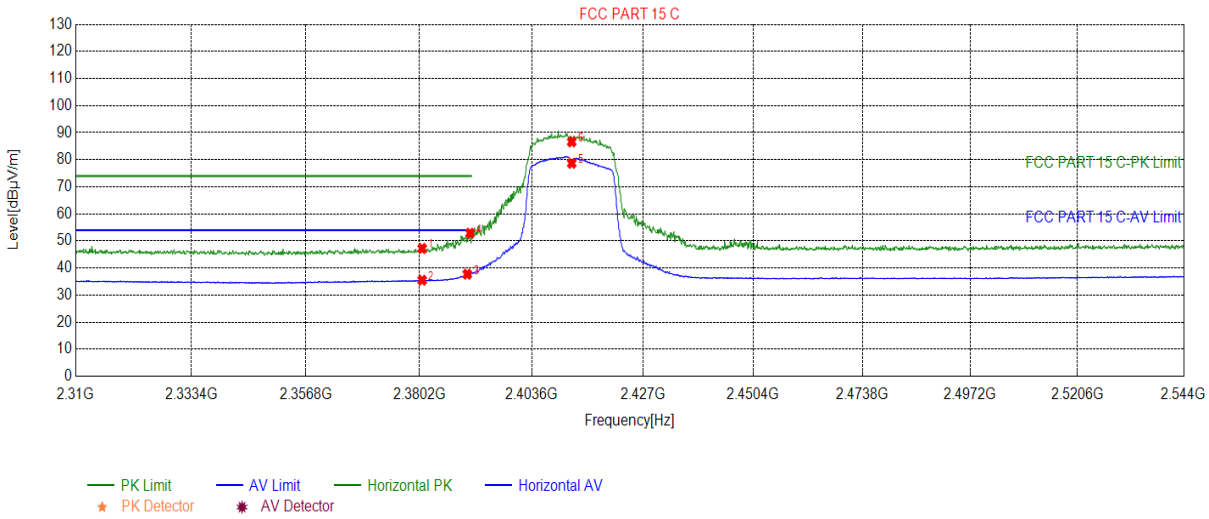
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	92.27	8.25	0.00	-92.27	256	26	Horizontal
2	2462.00	80.40	8.25	0.00	-80.40	247	158	Horizontal
3	2483.50	53.53	8.48	74.00	20.47	278	169	Horizontal
4	2483.50	35.37	8.48	54.00	18.63	289	254	Horizontal
5	2485.79	56.31	8.49	74.00	17.69	256	256	Horizontal
6	2486.44	33.77	8.49	54.00	20.23	247	188	Horizontal

Final Data List

4.10.1.9 802.11N20_Channel 1

Test Graph



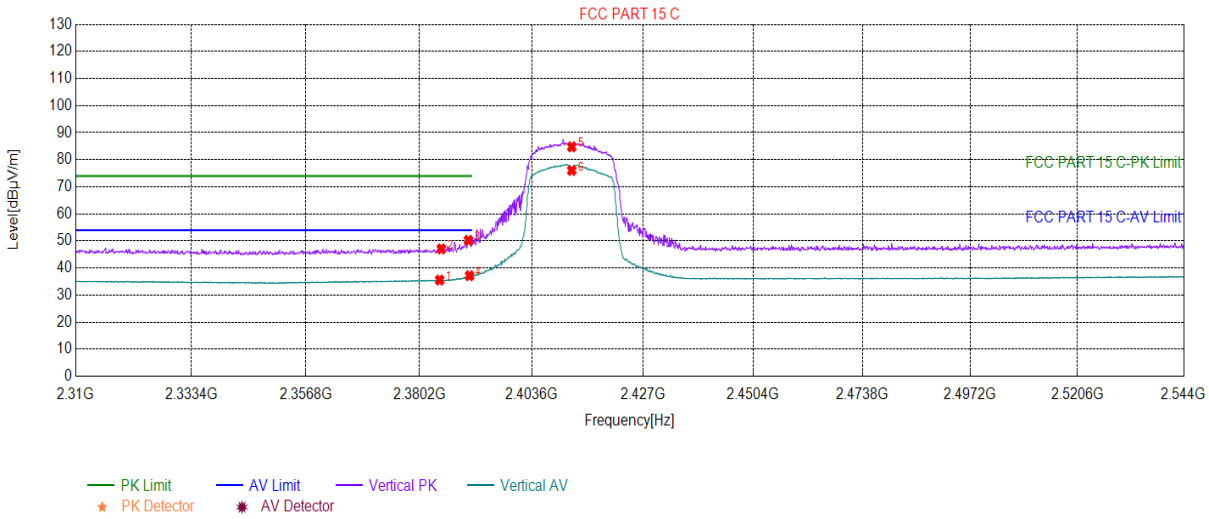
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2380.78	47.24	9.35	74.00	26.76	156	255	Horizontal
2	2380.78	35.50	9.35	54.00	18.50	143	162	Horizontal
3	2390.14	37.73	9.61	54.00	16.27	168	54	Horizontal
4	2390.73	52.88	9.62	74.00	21.12	134	195	Horizontal
5	2412.00	78.69	9.85	0.00	-78.69	185	54	Horizontal
6	2412.00	86.60	9.85	0.00	-86.60	169	25	Horizontal

Final Data List

4.10.1.10 802.11N20_Channel 1

Test Graph



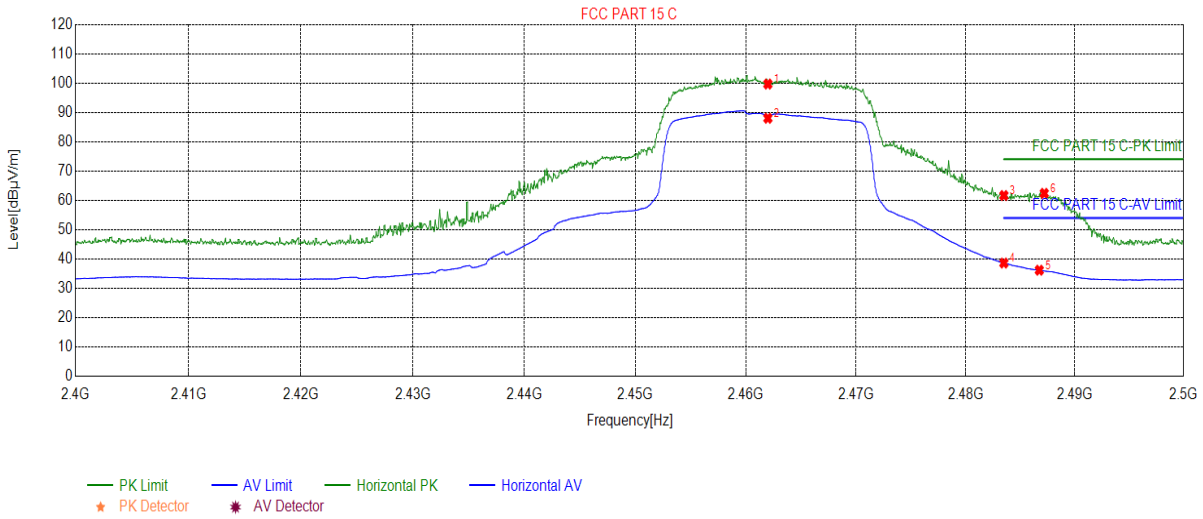
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2384.41	35.55	9.45	54.00	18.45	248	206	Vertical
2	2384.76	47.07	9.46	74.00	26.93	236	138	Vertical
3	2390.37	50.24	9.61	74.00	23.76	254	131	Vertical
4	2390.61	37.15	9.62	54.00	16.85	278	123	Vertical
5	2412.00	84.78	9.85	0.00	-84.78	245	161	Vertical
6	2412.00	76.05	9.85	0.00	-76.05	214	154	Vertical

Final Data List

4.10.1.11 802.11N20_Channel 11

Test Graph



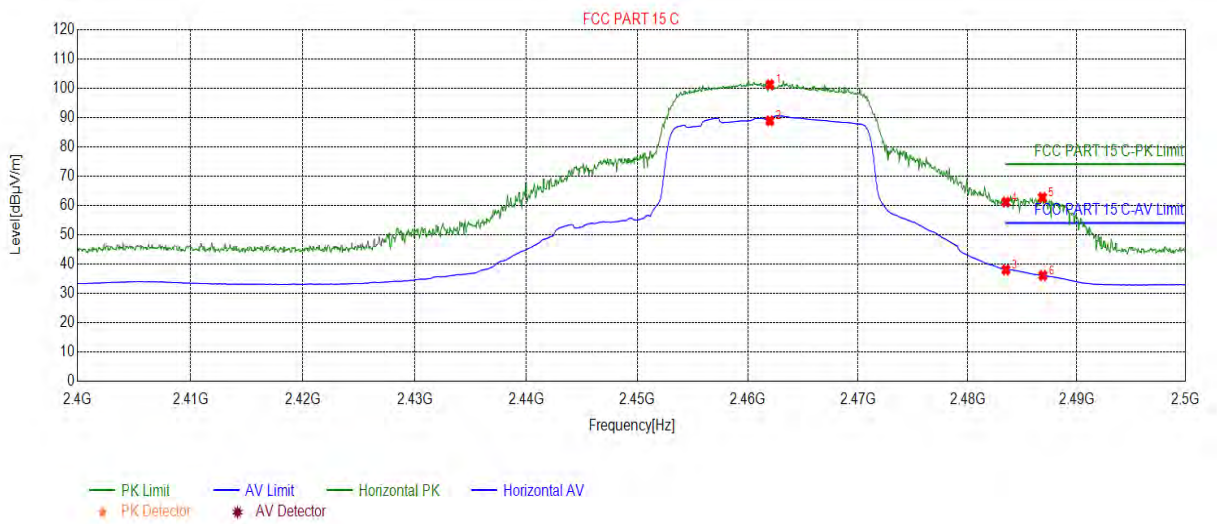
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	99.67	8.25	0.00	-99.67	265	36	Horizontal
2	2462.00	88.00	8.25	0.00	-88.00	285	39	Horizontal
3	2483.50	61.65	8.48	74.00	12.35	296	152	Horizontal
4	2483.50	38.61	8.48	54.00	15.39	287	256	Horizontal
5	2486.74	36.18	8.49	54.00	17.82	235	65	Horizontal
6	2487.19	62.39	8.49	74.00	11.61	245	147	Horizontal

Final Data List

4.10.1.12 802.11N20_Channel 11

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	101.15	8.25	0.00	-101.15	265	59	Horizontal
2	2462.00	88.81	8.25	0.00	-88.81	289	265	Horizontal
3	2483.50	38.01	8.48	54.00	15.99	298	123	Horizontal
4	2483.50	61.11	8.48	74.00	12.89	247	254	Horizontal
5	2486.84	62.68	8.49	74.00	11.32	256	147	Horizontal
6	2486.89	36.07	8.49	54.00	17.93	298	189	Horizontal

Final Data List

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

All Modes have been tested, but only the worst case data displayed in this report.

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

Lab A:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.41dB
2	RF power density, conducted	±1.96dB
3	Spurious emissions, conducted	±0.41dB
4	Radio Frequency	$\pm 7.10 \times 10^{-8}$
5	Duty Cycle	±0.49%
6	Occupied Bandwidth	±0.2%

Lab B:

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)
2	Radiated Emission	± 4.8dB (Below 1GHz)
		± 4.8dB (1GHz to 6GHz)
		± 4.5dB (6GHz to 18GHz)
		± 5.02dB (Above 18GHz)

6 Equipment List

RF conducted					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2020/4/16	2021/4/15
				2021/4/14	2022/4/13
DC Power Supply	Rohde & Schwarz	HMP2020	W009-08	2020/7/15	2021/7/15
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020/7/14	2021/7/13
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2020/4/21	2021/4/20
				2021/4/14	2022/4/13

CE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Shielding Room	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Artificial network	ROHDE&SCHWARZ	ENV216	XAW01-04-01	2020-08-04	2021-08-03
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ CE V2.5	XAW02-05-02	NCR	NCR

RSE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2021-04-01	2022-03-31
				2020-04-02	2021-04-01
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2020-10-27	2021-10-26
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2020-10-26	2021-10-25
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR

7 Photographs - EUT Constructional Details

Refer to Appendix A Setup Photos.

Appendix

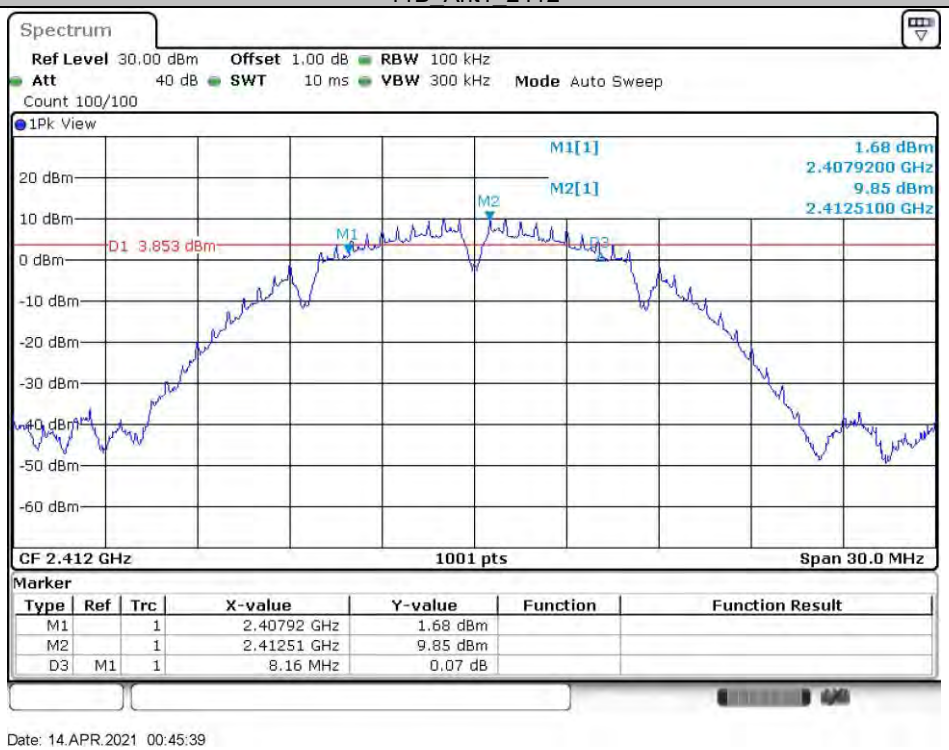
DTS Bandwidth

Test Result

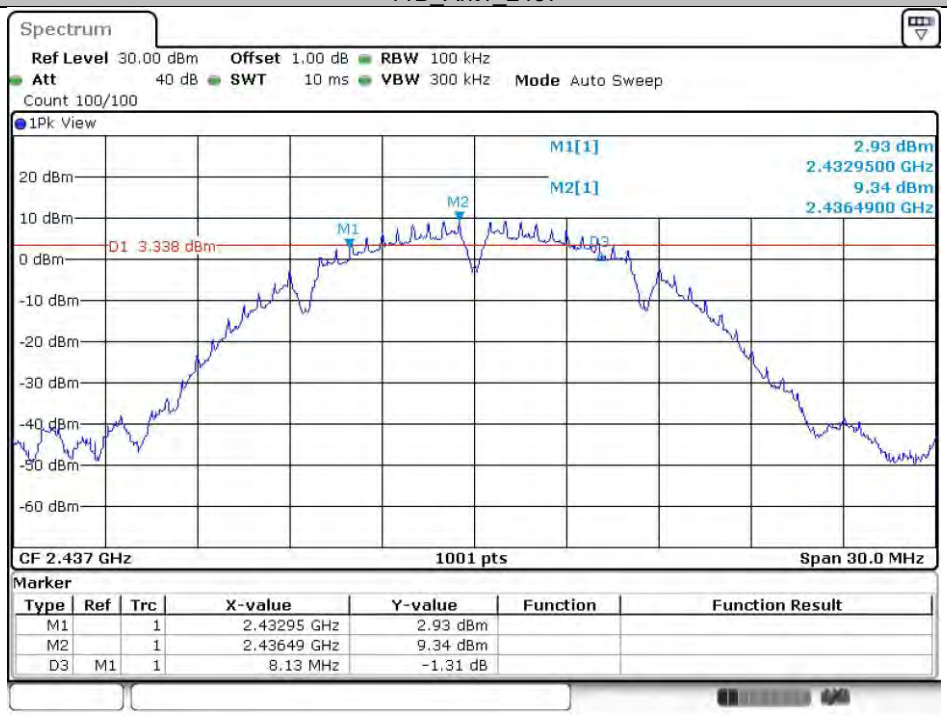
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.160	2407.920	2416.080	0.5	PASS
		2437	8.130	2432.950	2441.080	0.5	PASS
		2462	8.130	2457.920	2466.050	0.5	PASS
11G	Ant1	2412	15.180	2404.410	2419.590	0.5	PASS
		2437	15.180	2429.410	2444.590	0.5	PASS
		2462	15.510	2454.080	2469.590	0.5	PASS
11N20SISO	Ant1	2412	15.180	2404.410	2419.590	0.5	PASS
		2437	15.180	2429.410	2444.590	0.5	PASS
		2462	15.750	2453.840	2469.590	0.5	PASS

Test Graphs

11B_Ant1_2412

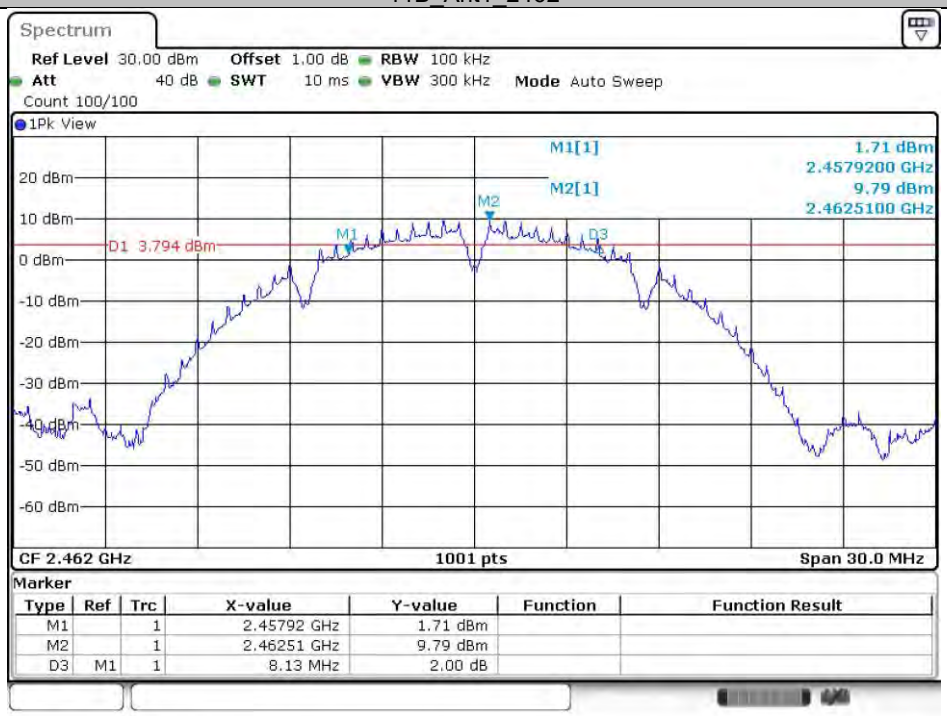


11B_Ant1_2437



Date: 14.APR.2021 00:47:19

11B_Ant1_2462



Date: 14.APR.2021 00:48:46

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
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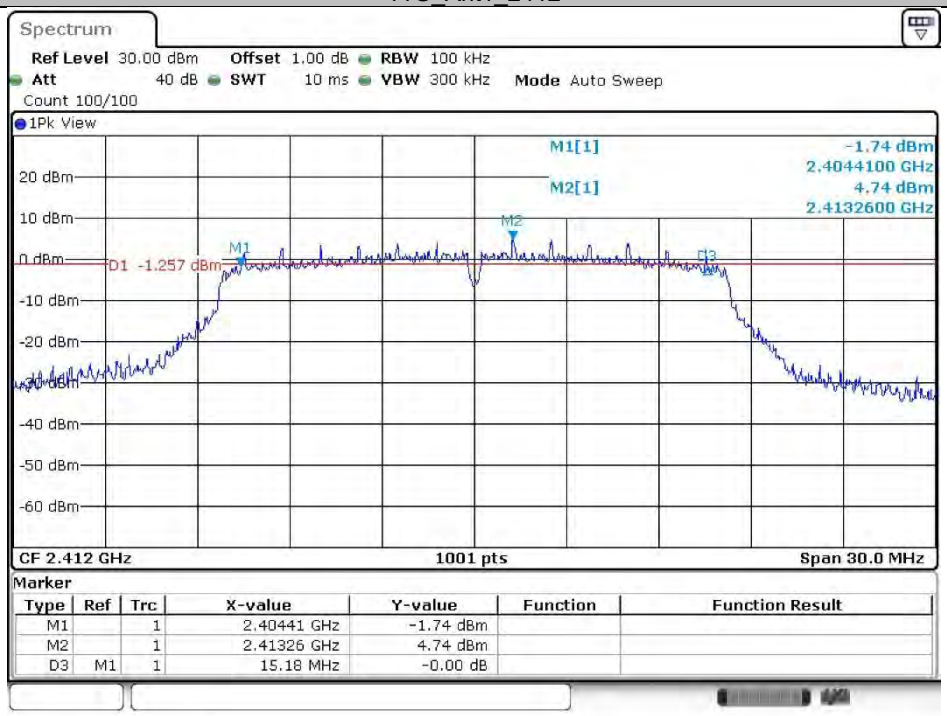
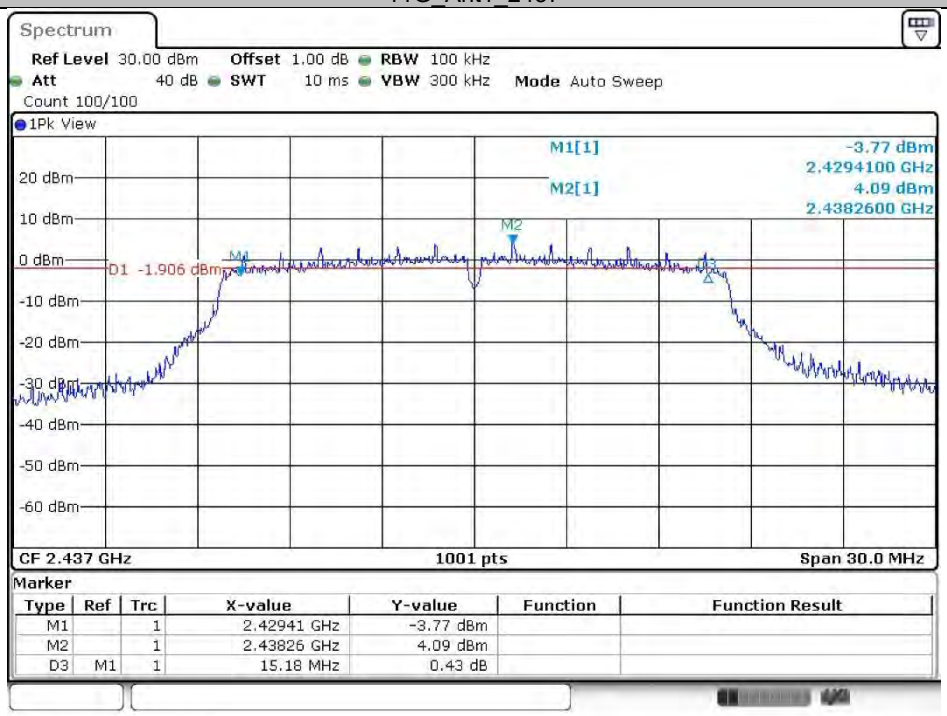
11G_Ant1_2412



Date: 14.APR.2021 00:50:33

11G_Ant1_2437



Date: 14.APR.2021 00:52:06

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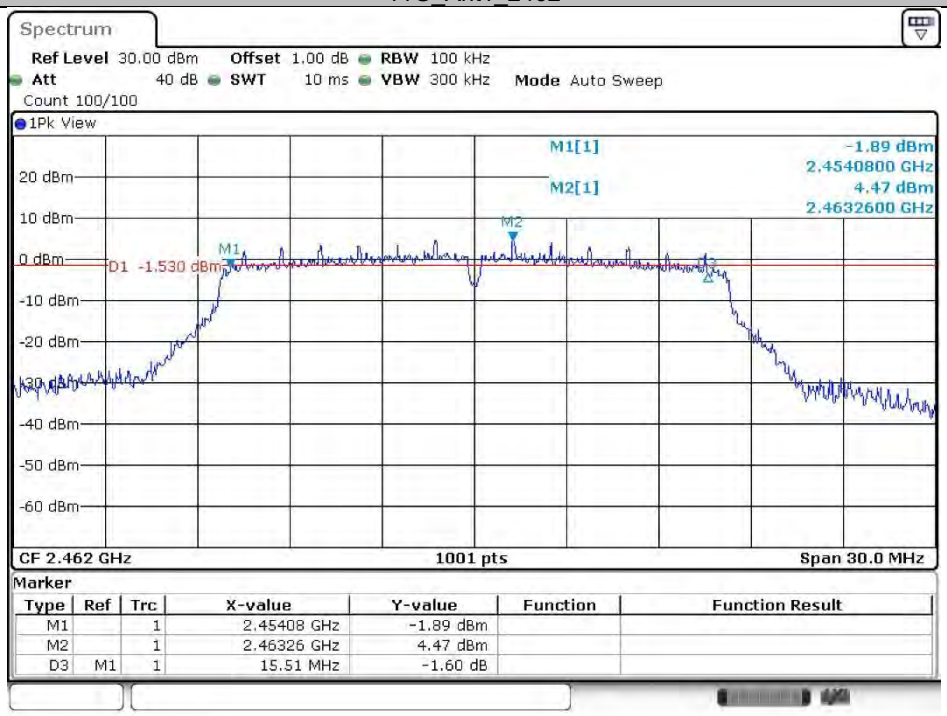
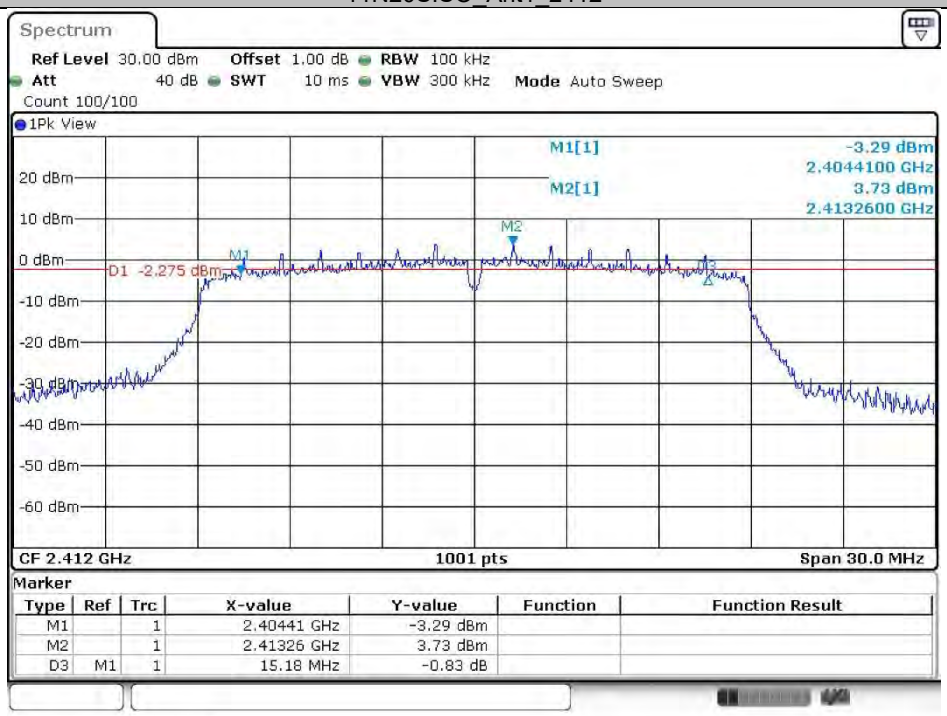
11G_Ant1_2462



Date: 14.APR.2021 00:53:31

11N20SISO_Ant1_2412



Date: 14.APR.2021 00:55:12

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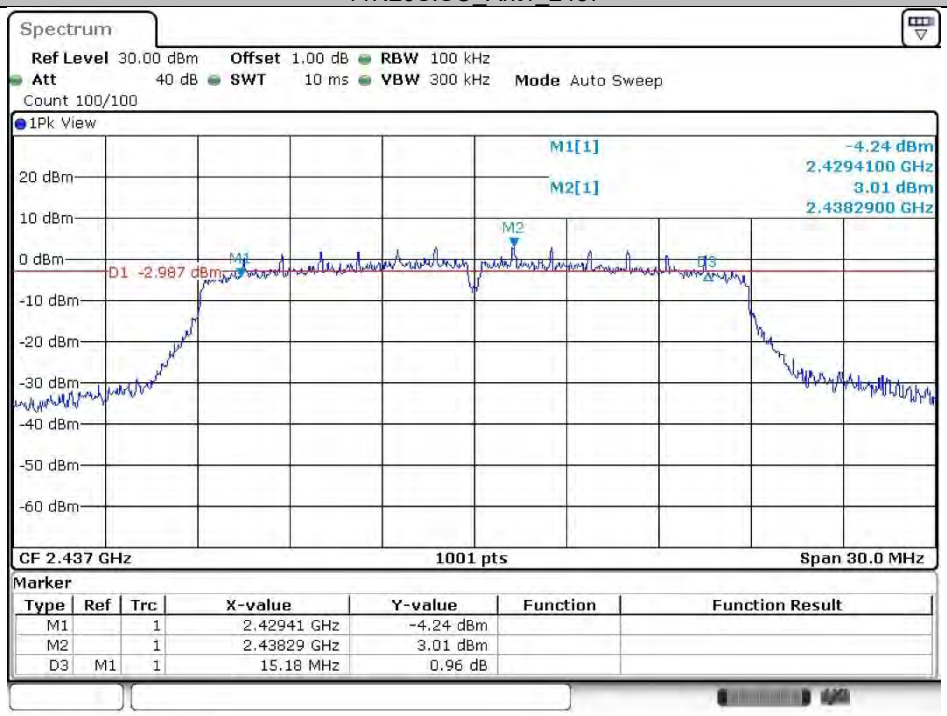
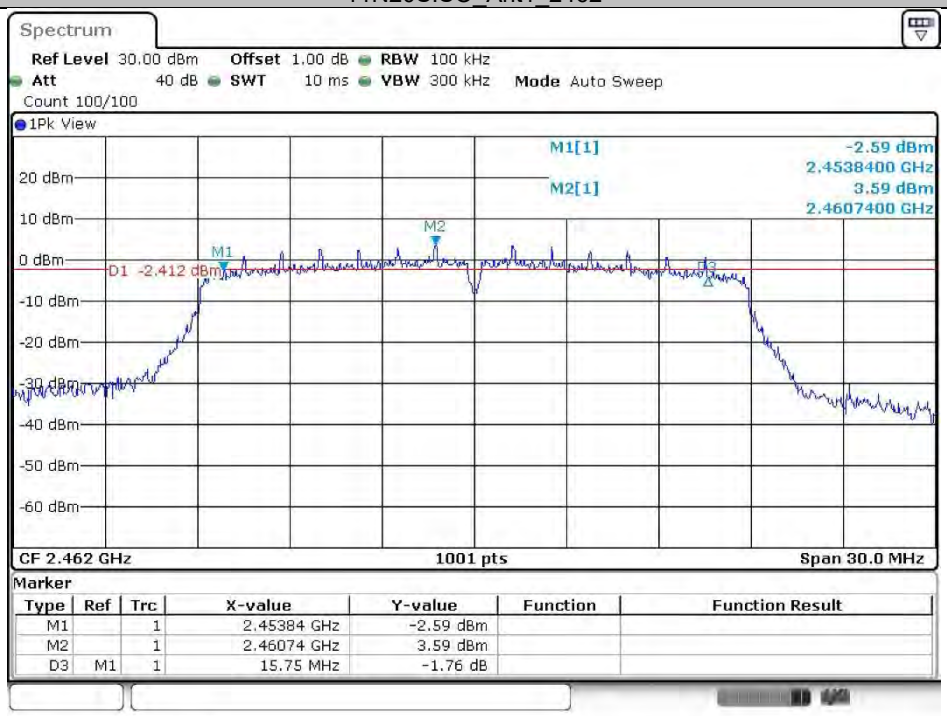
11N20SISO_Ant1_2437



Date: 14.APR.2021 00:56:49

11N20SISO_Ant1_2462



Date: 14.APR.2021 00:58:19

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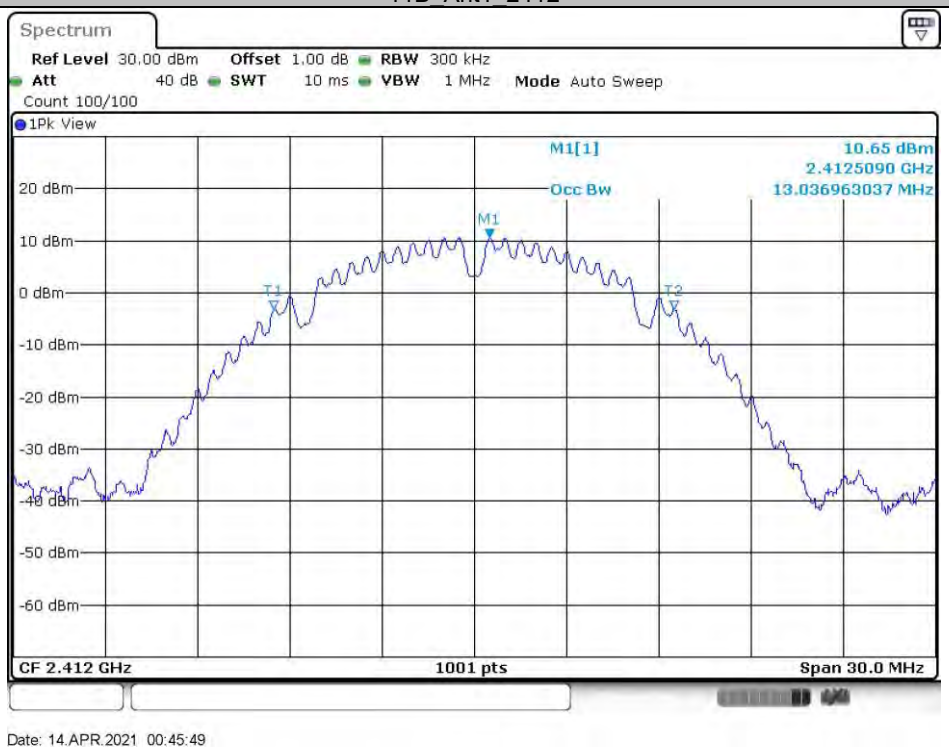
Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.037	2405.467	2418.503	---	PASS
		2437	12.827	2430.706	2443.533	---	PASS
		2462	13.157	2455.377	2468.533	---	PASS
11G	Ant1	2412	16.843	2403.578	2420.422	---	PASS
		2437	16.903	2428.578	2445.482	---	PASS
		2462	16.843	2453.518	2470.362	---	PASS
11N20SISO	Ant1	2412	17.802	2403.099	2420.901	---	PASS
		2437	17.862	2428.099	2445.961	---	PASS
		2462	17.862	2453.039	2470.901	---	PASS

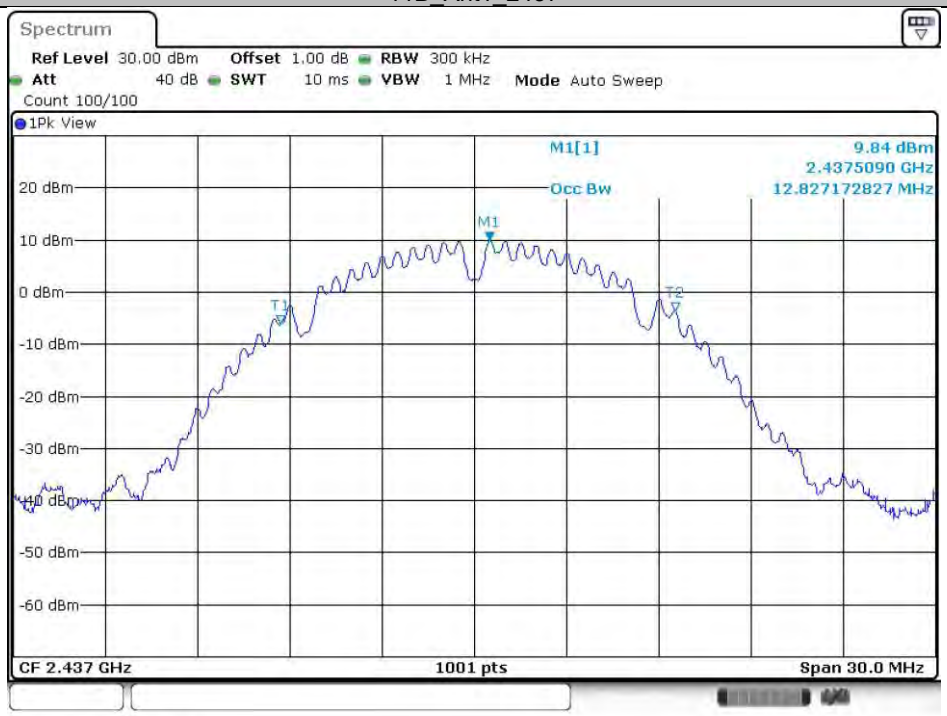
Test Graphs

11B_Ant1_2412



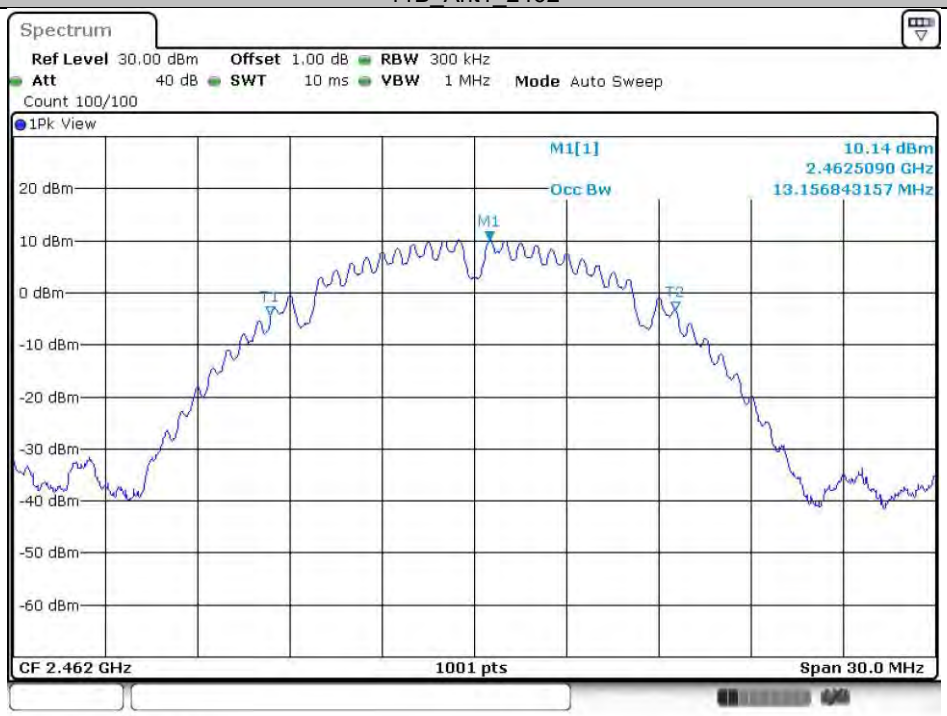
Date: 14.APR.2021 00:45:49

11B_Ant1_2437



Date: 14.APR.2021 00:47:29

11B_Ant1_2462



Date: 14.APR.2021 00:48:56

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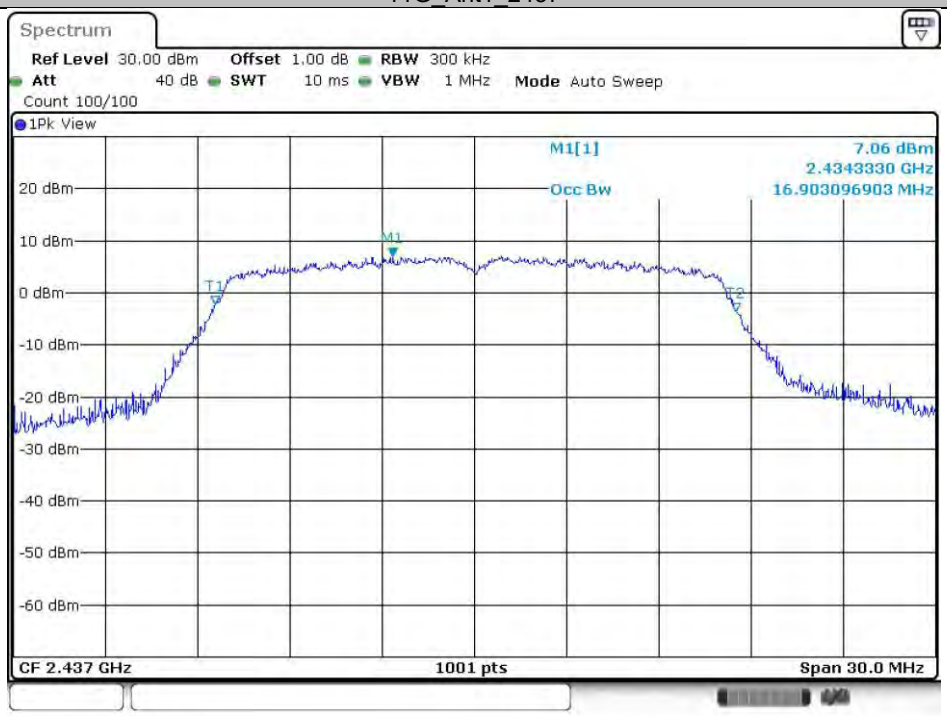
11G_Ant1_2412

Date: 14.APR.2021 00:50:43

11G_Ant1_2437



Date: 14.APR.2021 00:52:15

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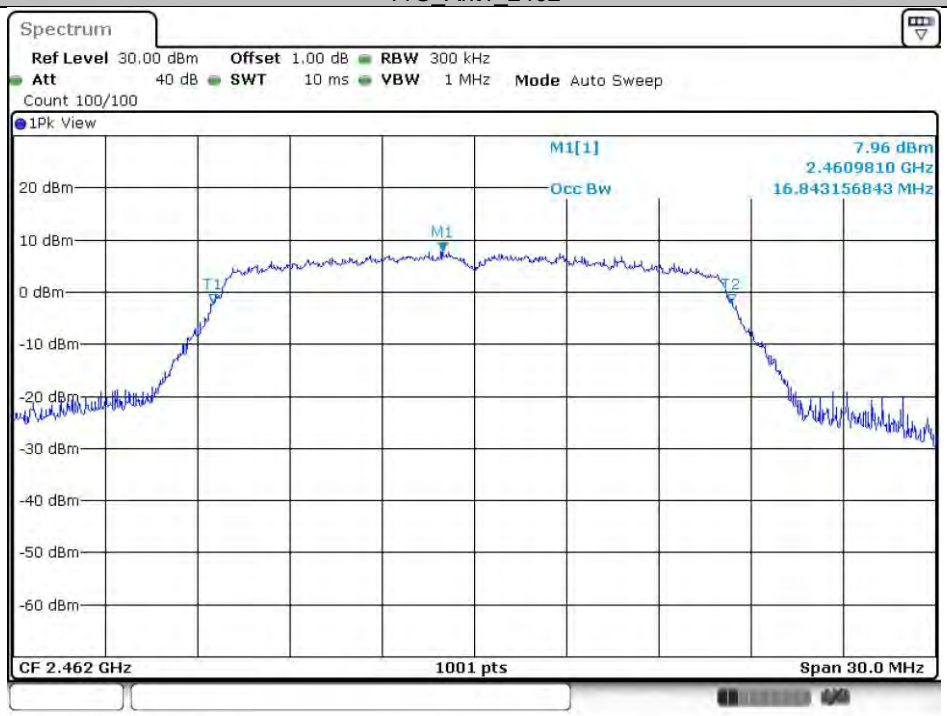
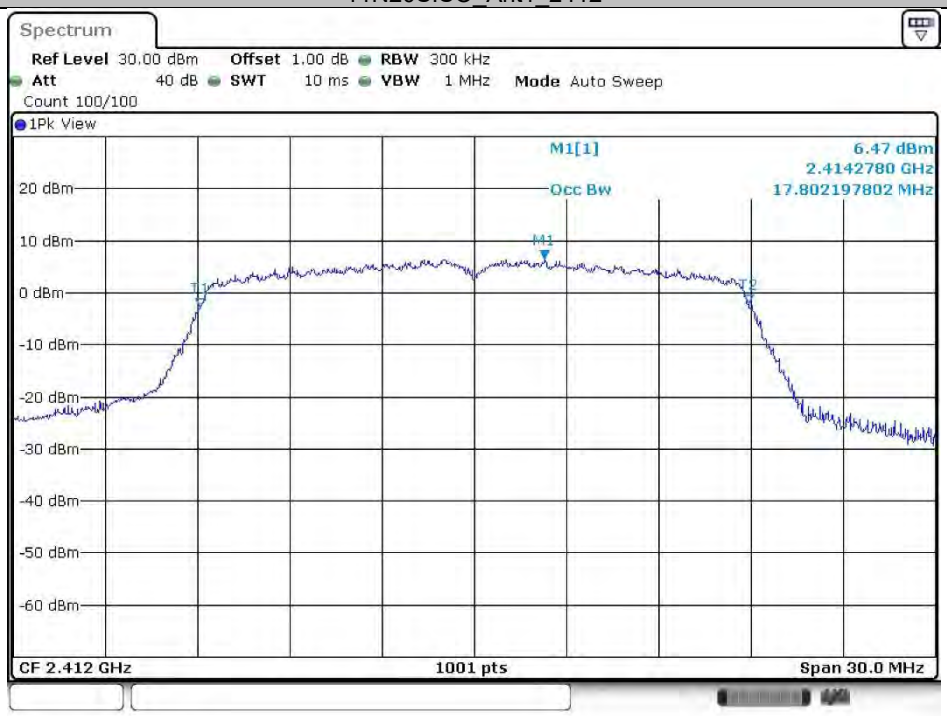
11G_Ant1_2462



Date: 14.APR.2021 00:53:40

11N20SISO_Ant1_2412



Date: 14.APR.2021 00:55:22

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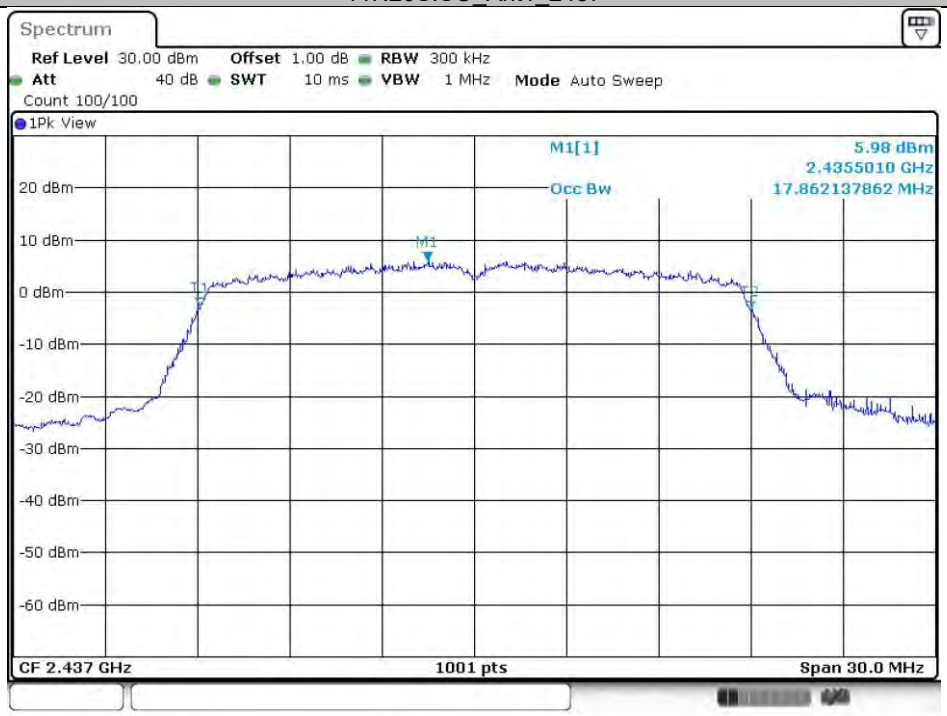
11N20SISO_Ant1_2437



Date: 14.APR.2021 00:56:59

11N20SISO_Ant1_2462

Date: 14.APR.2021 00:58:29

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Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	20.69	<=30	PASS
		2437	20.07	<=30	PASS
		2462	20.49	<=30	PASS
11G	Ant1	2412	23.10	<=30	PASS
		2437	22.67	<=30	PASS
		2462	23.01	<=30	PASS
11N20SISO	Ant1	2412	21.90	<=30	PASS
		2437	21.41	<=30	PASS
		2462	21.87	<=30	PASS

Measurement Data of Average Power:

Mode	Test Channel	Average Output Power (dBm) [Duty Cycle Considered]	Result
		ANT1	
802.11B	2412	18.77	Report purpose only
	2437	18.59	Report purpose only
	2462	18.78	Report purpose only
802.11G	2412	15.80	Report purpose only
	2437	15.56	Report purpose only
	2462	15.73	Report purpose only
802.11N20	2412	14.68	Report purpose only
	2437	14.54	Report purpose only
	2462	14.64	Report purpose only

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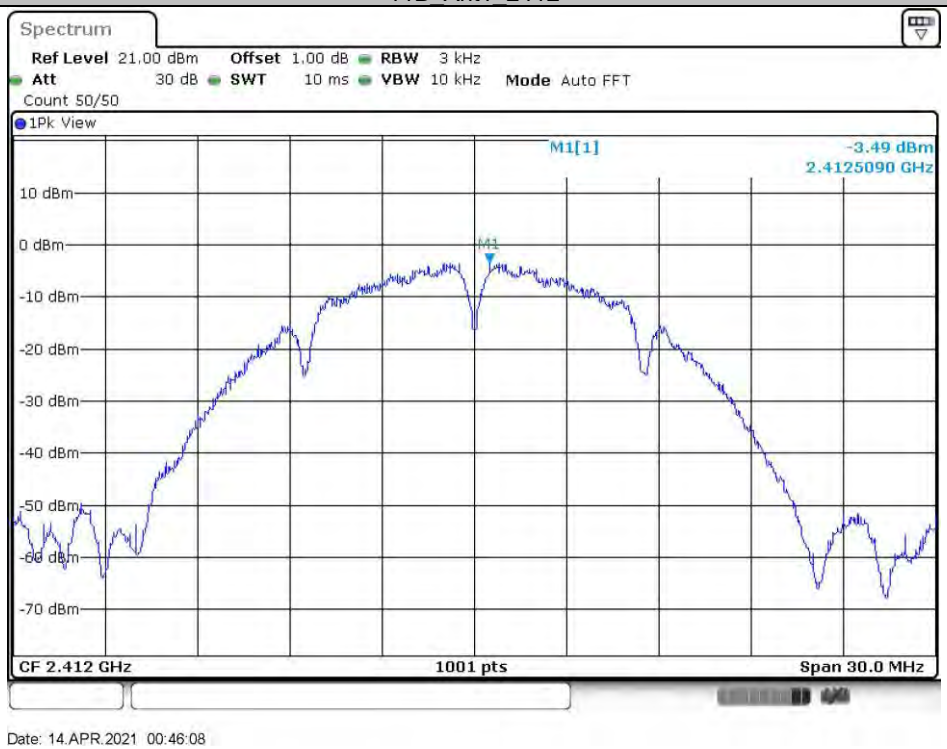
Maximum power spectral density

Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-3.49	<=8	PASS
		2437	-3.81	<=8	PASS
		2462	-3.66	<=8	PASS
11G	Ant1	2412	-7.86	<=8	PASS
		2437	-8.06	<=8	PASS
		2462	-8.46	<=8	PASS
11N20SISO	Ant1	2412	-9.18	<=8	PASS
		2437	-10.13	<=8	PASS
		2462	-9.37	<=8	PASS

Test Graphs

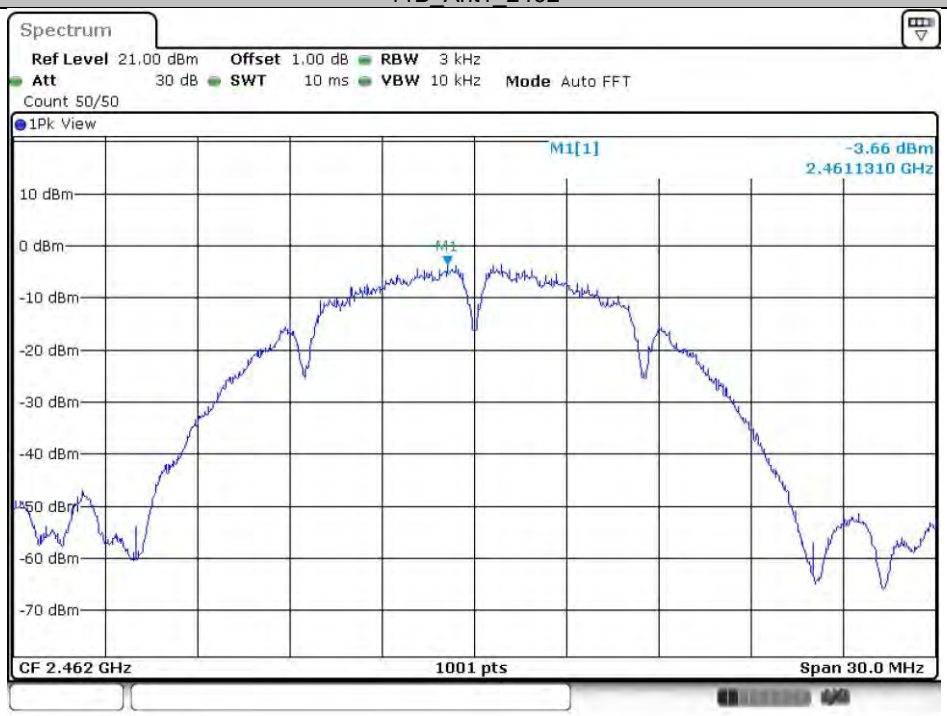
11B_Ant1_2412



11B_Ant1_2437

Date: 14.APR.2021 00:47:48

11B_Ant1_2462



Date: 14.APR.2021 00:49:15

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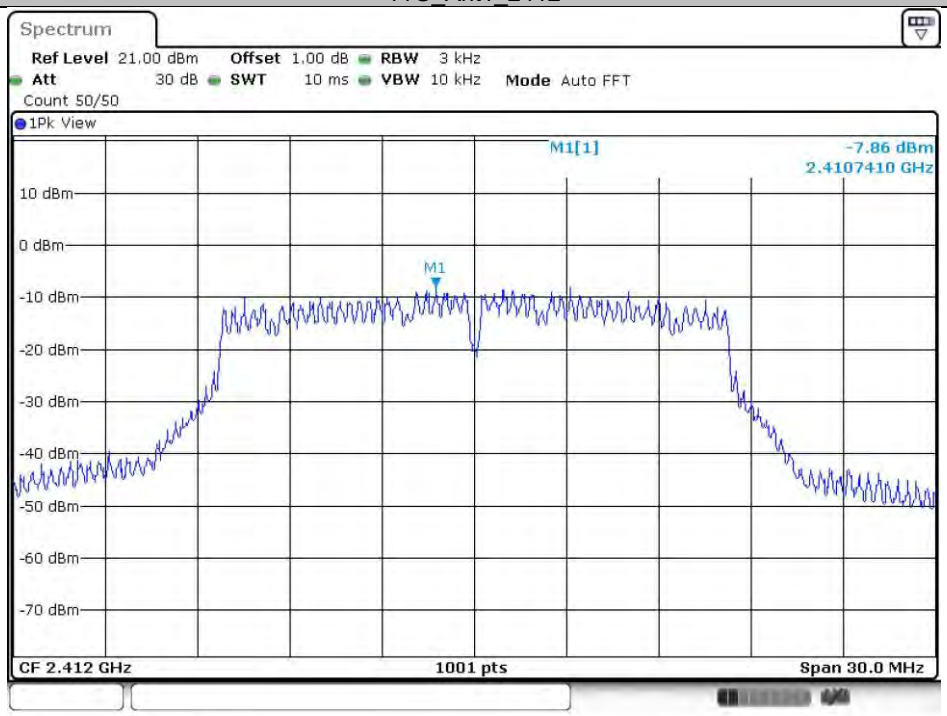
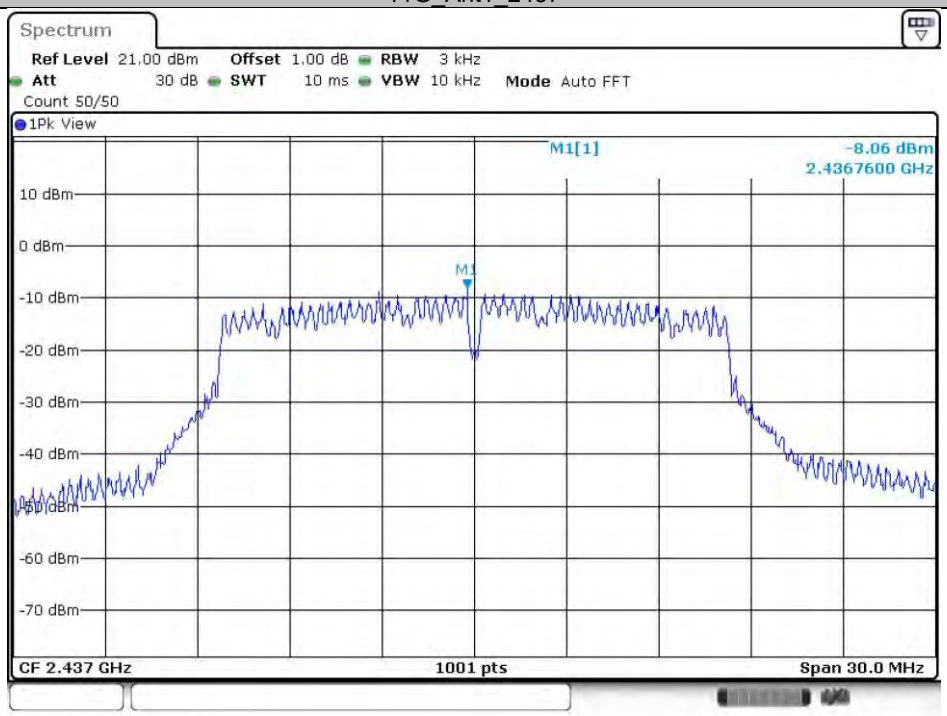
11G_Ant1_2412



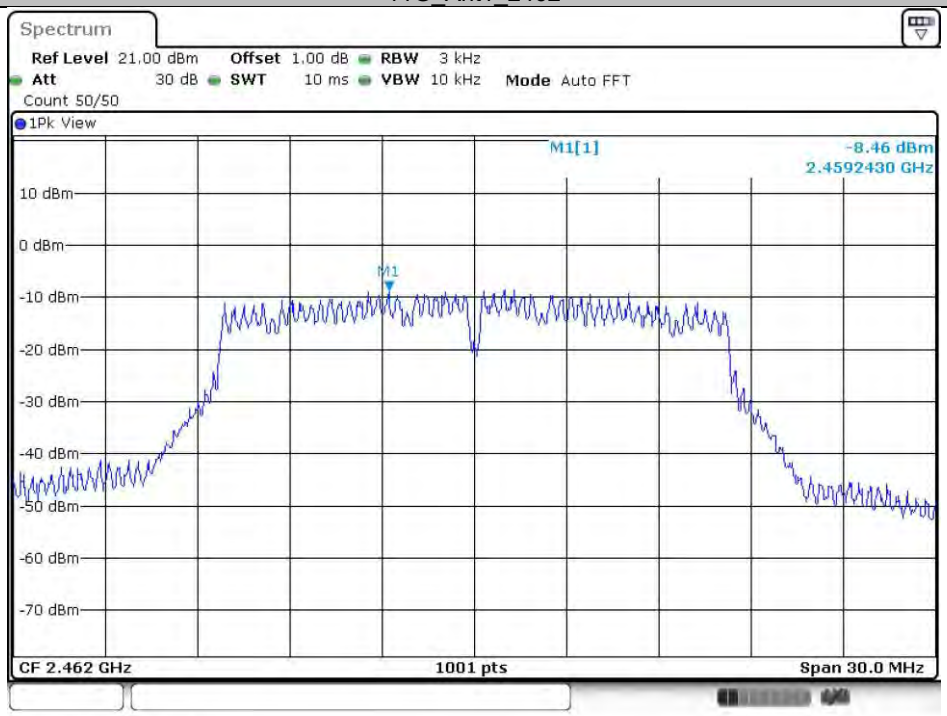
Date: 14.APR.2021 00:51:02

11G_Ant1_2437



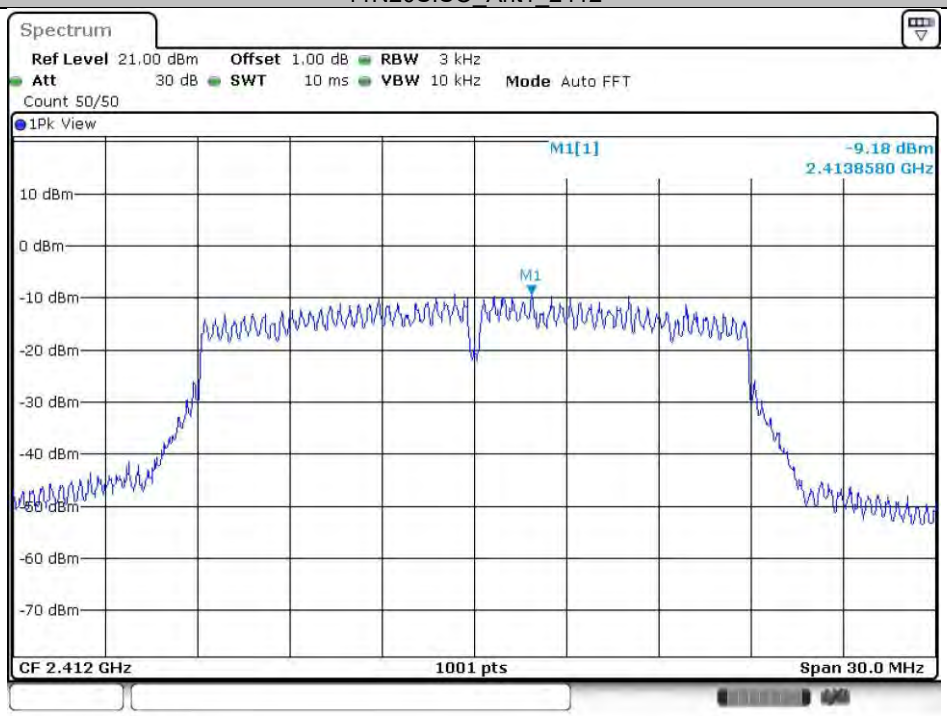
Date: 14.APR.2021 00:52:35

11G_Ant1_2462



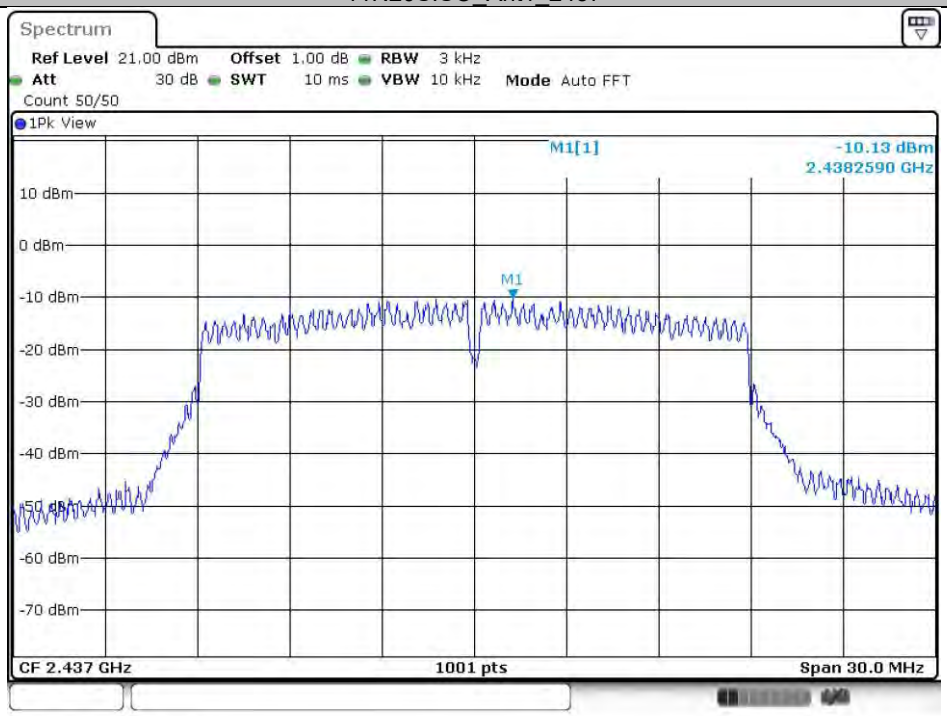
Date: 14.APR.2021 00:54:00

11N20SISO_Ant1_2412



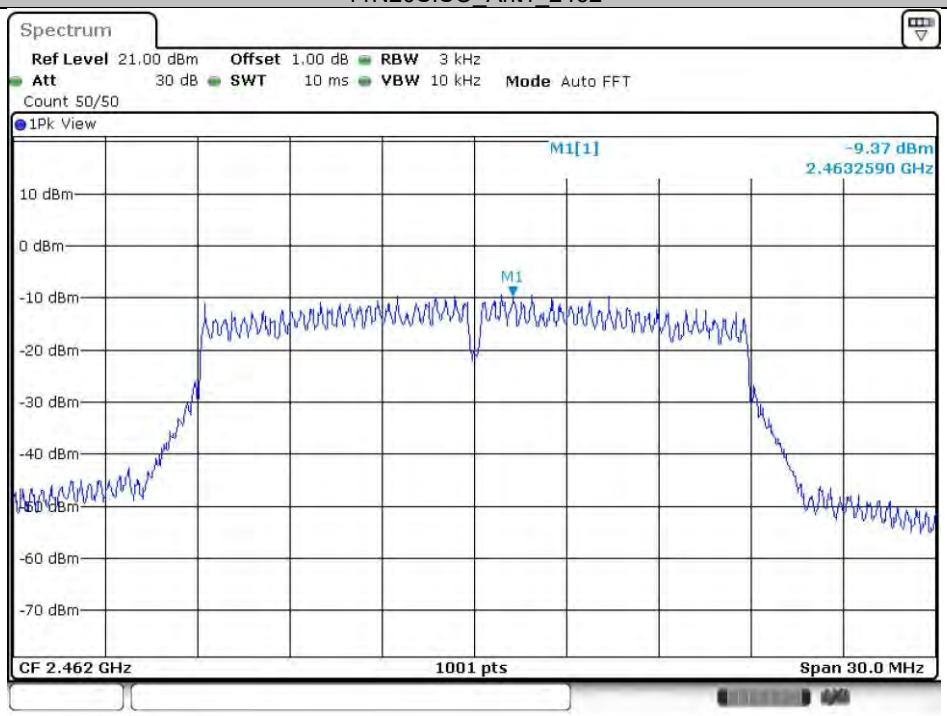
Date: 14.APR.2021 00:55:41

11N20SISO_Ant1_2437



Date: 14.APR.2021 00:57:18

11N20SISO_Ant1_2462



Date: 14.APR.2021 00:58:48

Band edge measurements

Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	10.06	-37.5	<=-9.94	PASS
		High	2462	10.09	-49.63	<=-9.91	PASS
11G	Ant1	Low	2412	4.67	-26.26	<=-15.33	PASS
		High	2462	4.51	-45.2	<=-15.49	PASS
11N20SISO	Ant1	Low	2412	3.77	-29.6	<=-16.23	PASS
		High	2462	3.59	-46.31	<=-16.41	PASS

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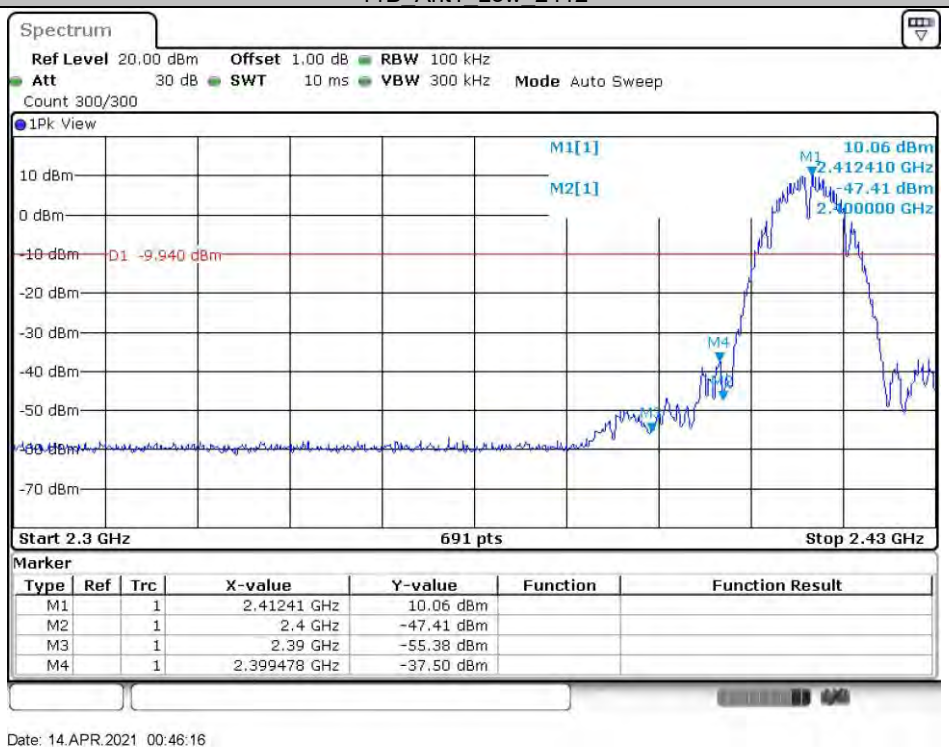
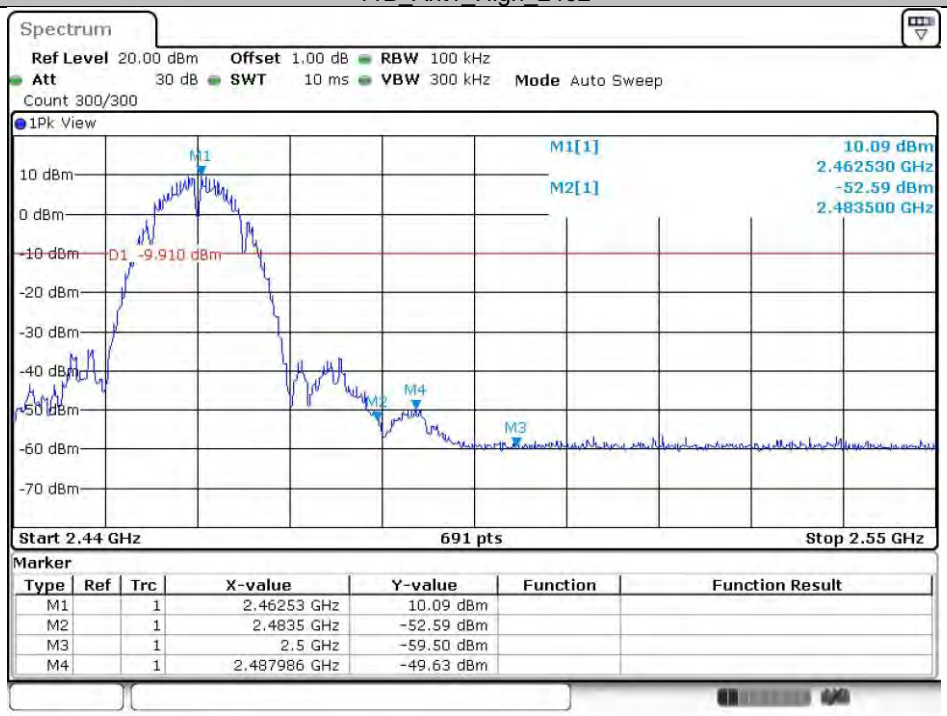
Test Graphs

11B_Ant1_Low_2412

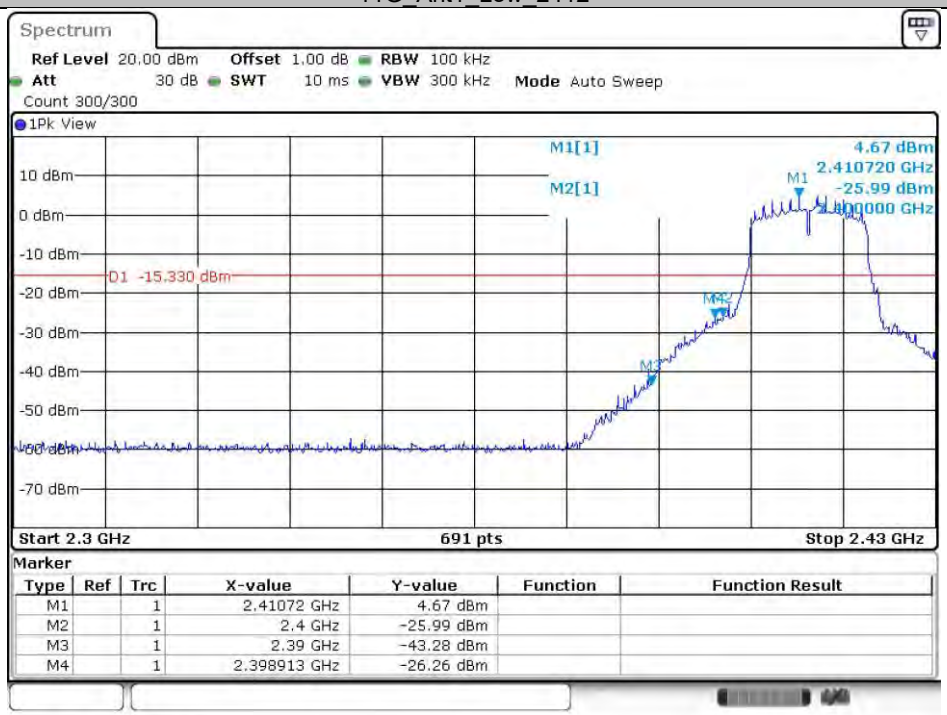


11B_Ant1_High_2462



Date: 14.APR.2021 00:49:23

11G_Ant1_Low_2412



Date: 14.APR.2021 00:51:10

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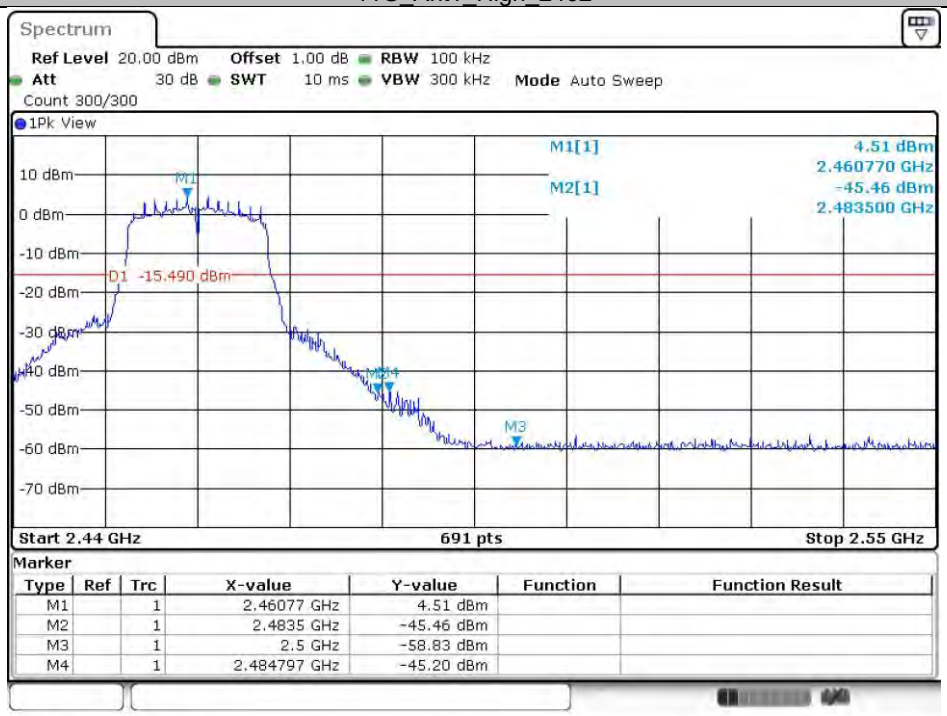
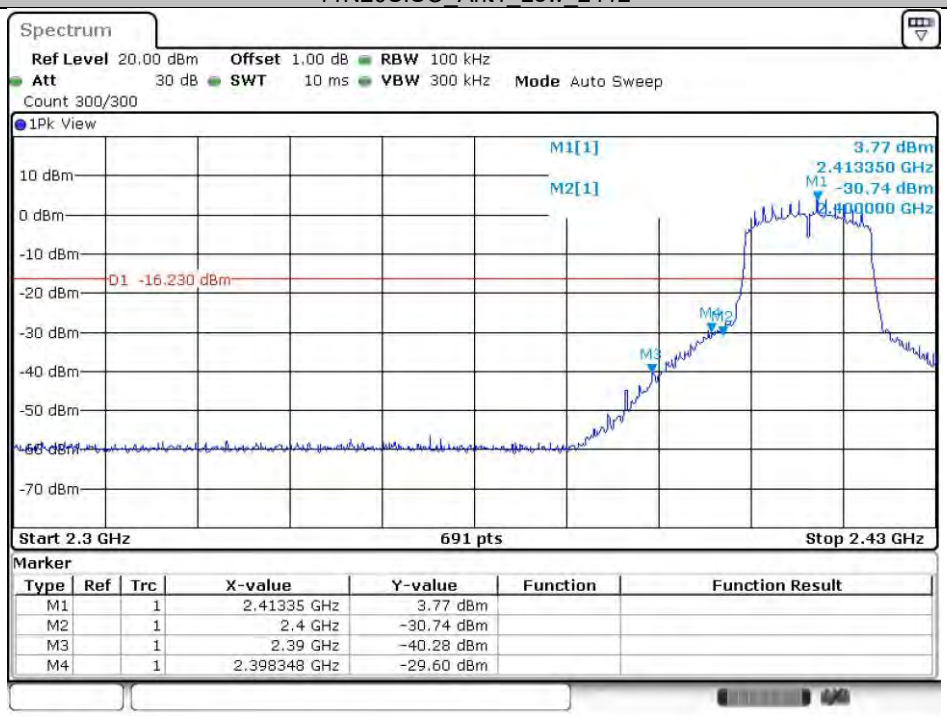
11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412



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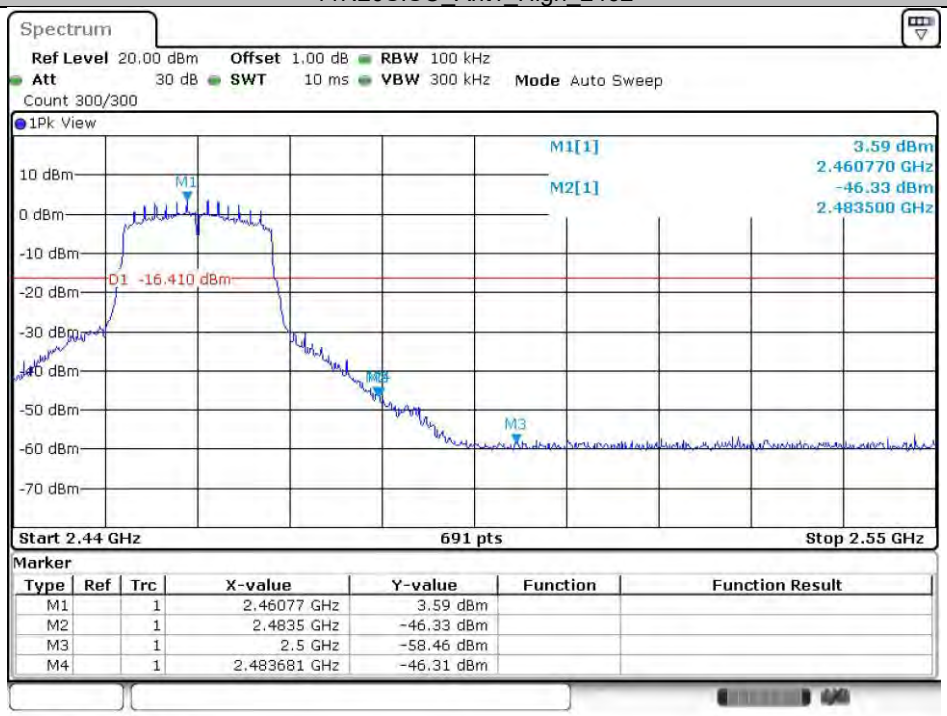
11N20SISO_Ant1_High_2462



Conducted Spurious Emission

Test Result

TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	9.95	9.95	---	PASS
			30~1000	9.95	-46.15	<=-10.05	PASS
			1000~26500	9.95	-31.06	<=-10.05	PASS
		2437	Reference	9.13	9.13	---	PASS
			30~1000	9.13	-46.48	<=-10.87	PASS
			1000~26500	9.13	-31.16	<=-10.87	PASS
		2462	Reference	9.68	9.68	---	PASS
			30~1000	9.68	-44.92	<=-10.32	PASS
			1000~26500	9.68	-30.57	<=-10.32	PASS
11G	Ant1	2412	Reference	4.70	4.70	---	PASS
			30~1000	4.70	-46.05	<=-15.3	PASS
			1000~26500	4.70	-30.71	<=-15.3	PASS
		2437	Reference	4.21	4.21	---	PASS
			30~1000	4.21	-45.93	<=-15.79	PASS
			1000~26500	4.21	-31	<=-15.79	PASS
		2462	Reference	4.64	4.64	---	PASS
			30~1000	4.64	-46.14	<=-15.36	PASS
			1000~26500	4.64	-31.07	<=-15.36	PASS
11N20SISO	Ant1	2412	Reference	3.54	3.54	---	PASS
			30~1000	3.54	-44.84	<=-16.46	PASS
			1000~26500	3.54	-30.6	<=-16.46	PASS
		2437	Reference	3.23	3.23	---	PASS
			30~1000	3.23	-45.75	<=-16.77	PASS
			1000~26500	3.23	-30.79	<=-16.77	PASS
		2462	Reference	3.68	3.68	---	PASS
			30~1000	3.68	-44.23	<=-16.32	PASS
			1000~26500	3.68	-31.13	<=-16.32	PASS

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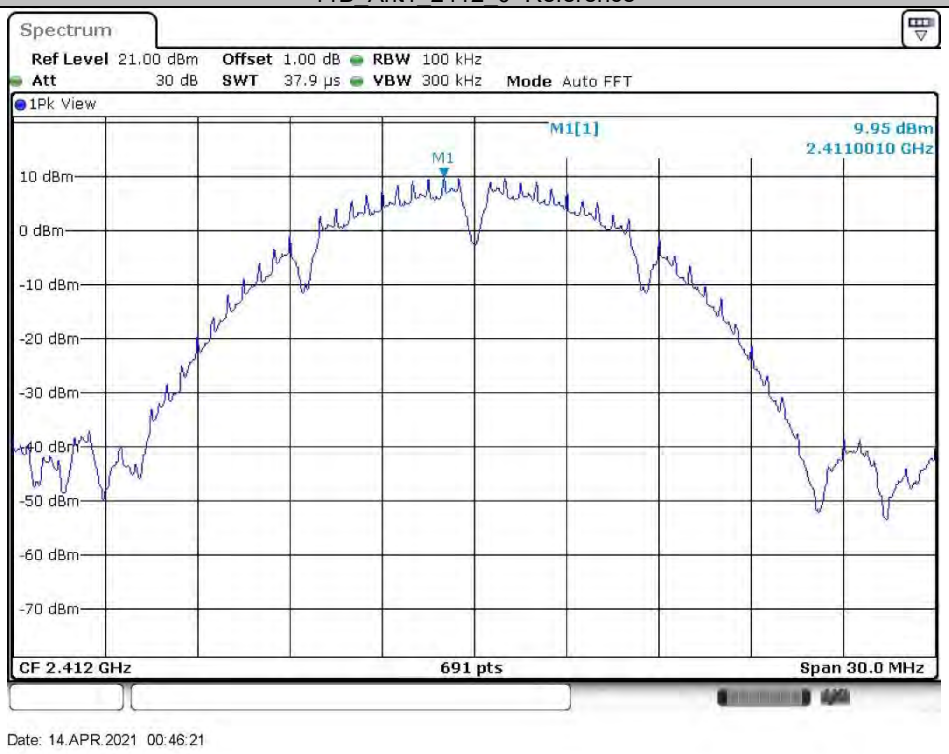
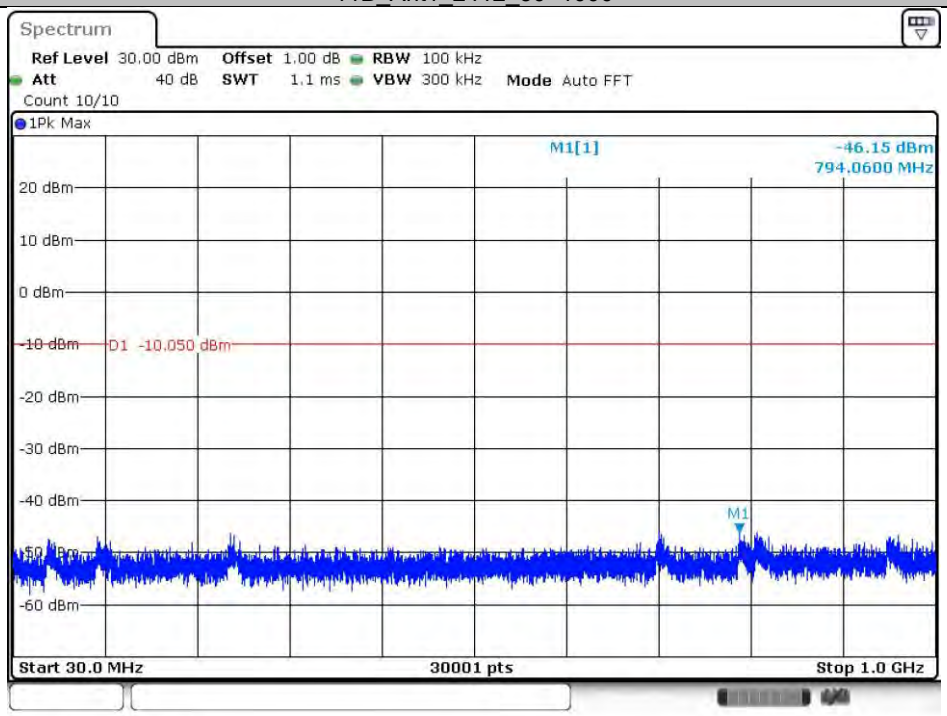
Test Graphs

11B_Ant1_2412_0~Reference



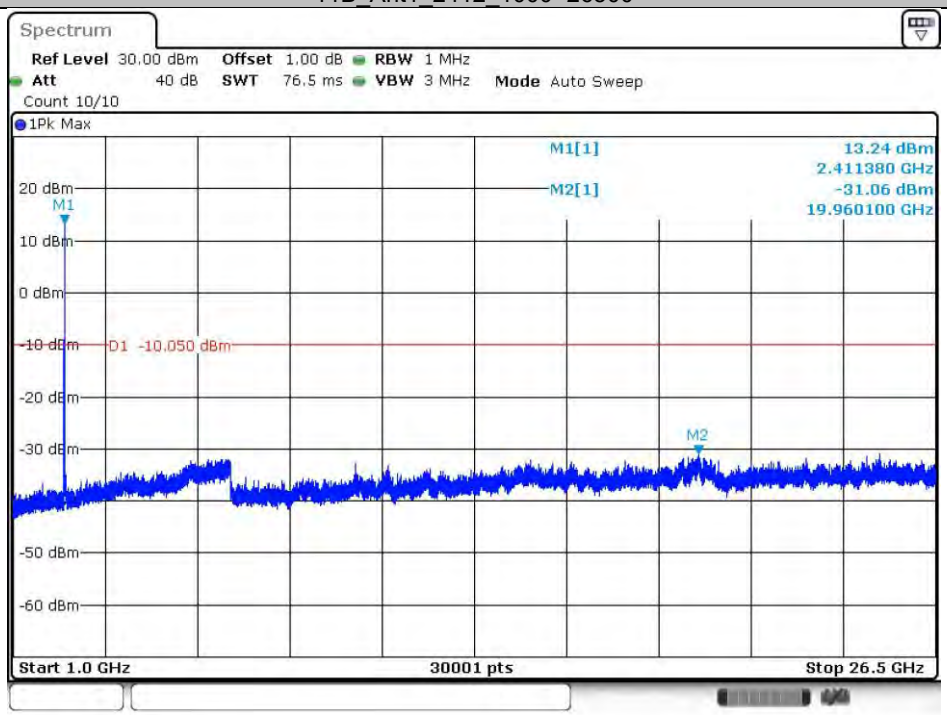
Date: 14.APR.2021 00:46:21

11B_Ant1_2412_30~1000



Date: 14.APR.2021 00:46:25

11B_Ant1_2412_1000~26500



Date: 14.APR.2021 00:46:47

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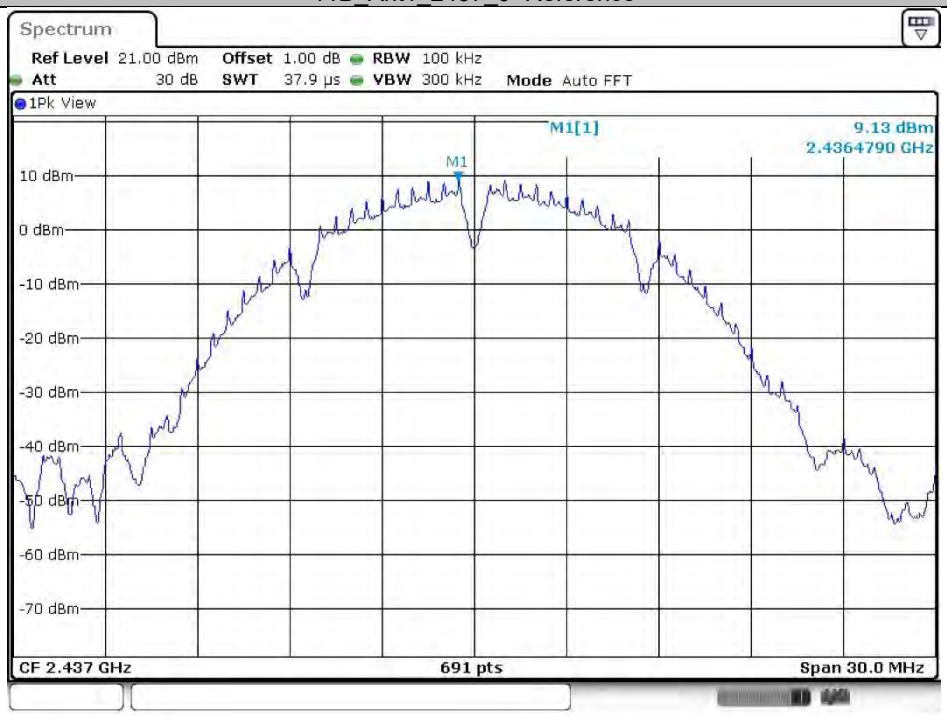
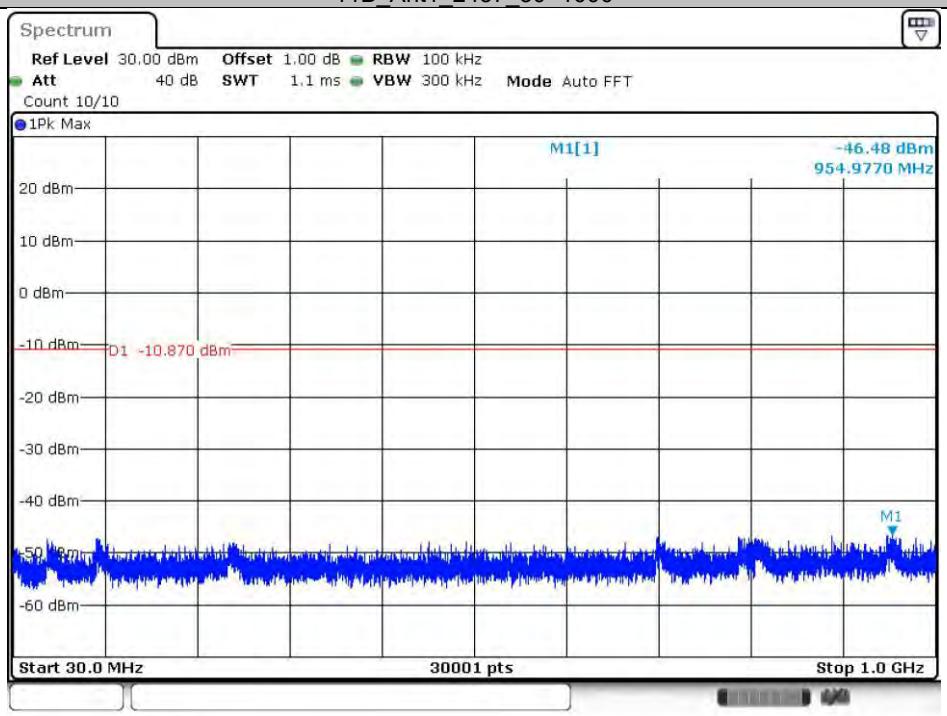
11B_Ant1_2437_0~Reference



11B_Ant1_2437_30~1000



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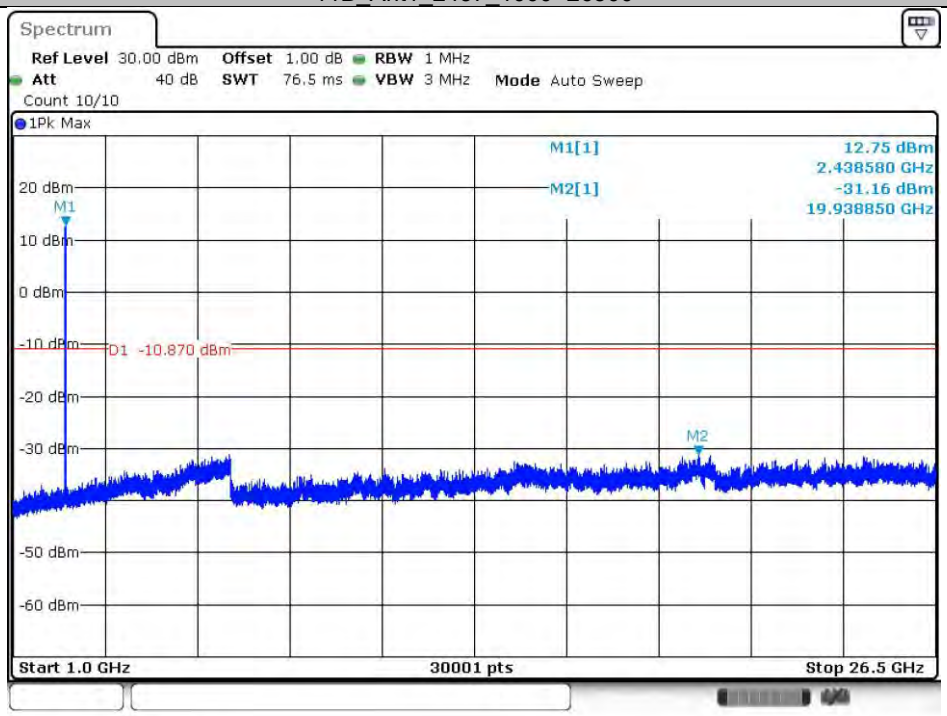
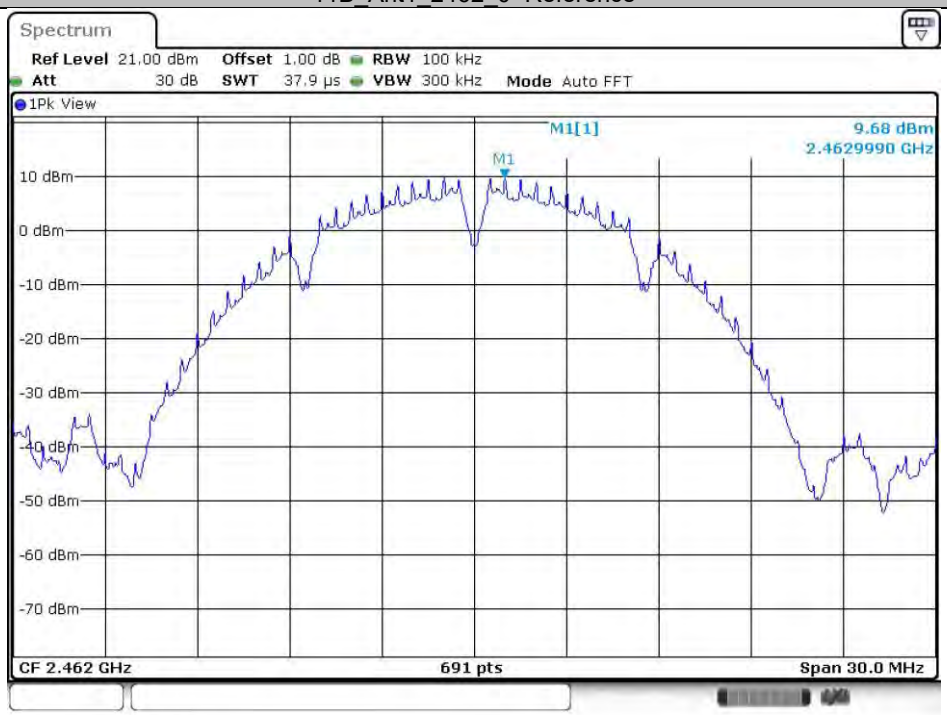
11B_Ant1_2437_1000~26500



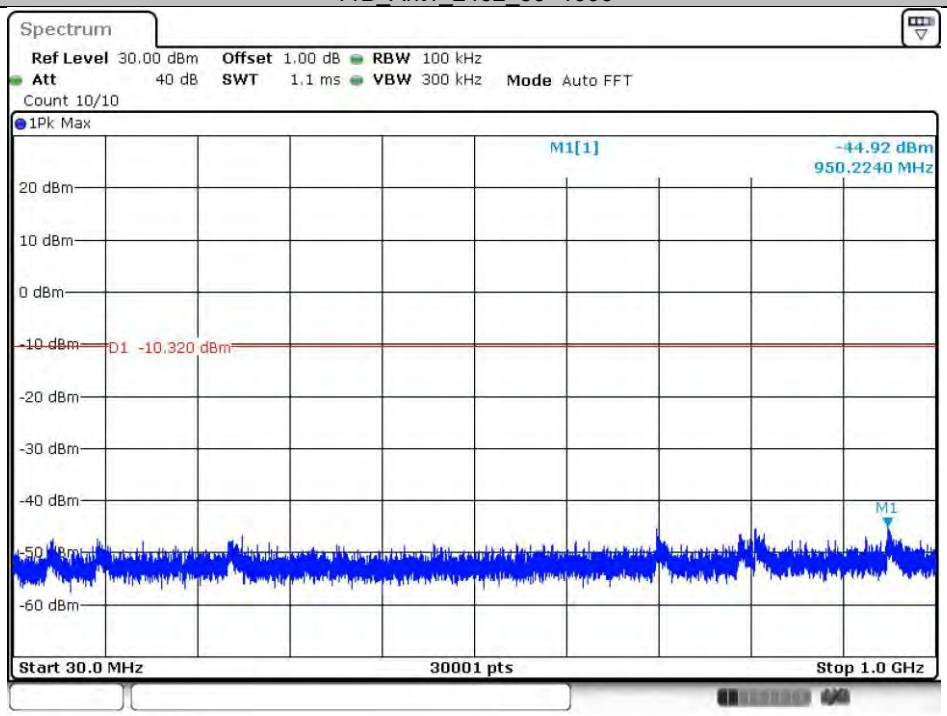
Date: 14.APR.2021 00:48:19

11B_Ant1_2462_0~Reference



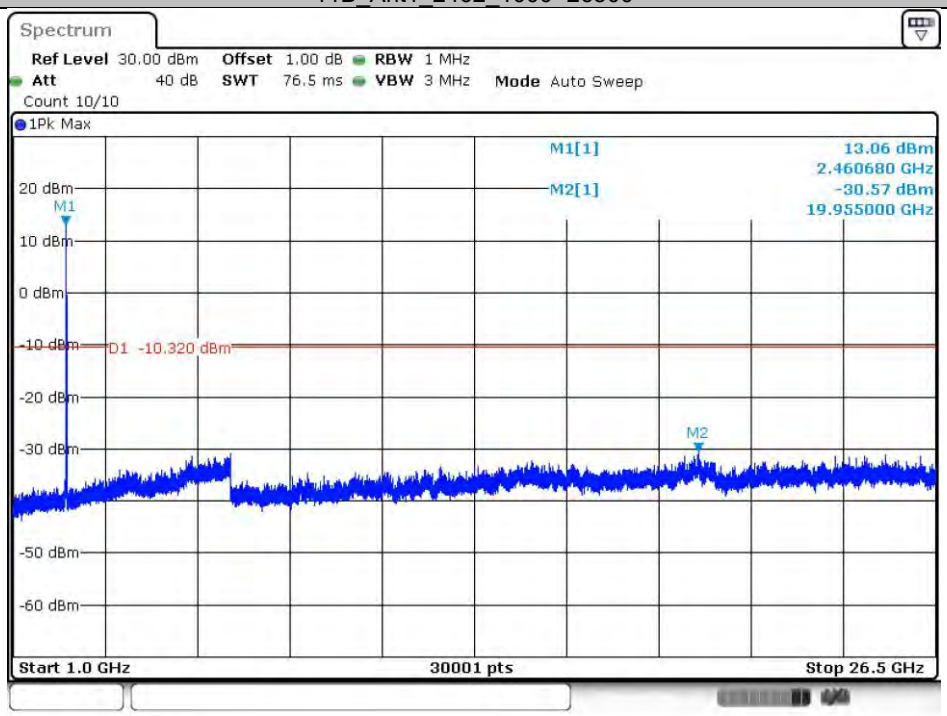
Date: 14.APR.2021 00:49:28

11B_Ant1_2462_30~1000



Date: 14.APR.2021 00:49:33

11B_Ant1_2462_1000~26500



Date: 14.APR.2021 00:49:55

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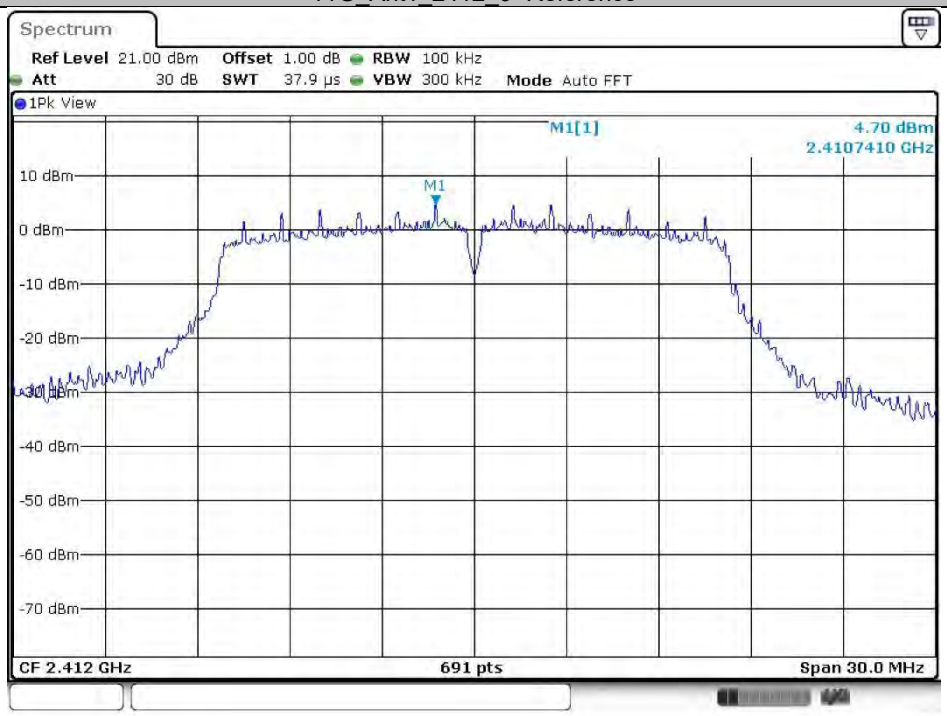
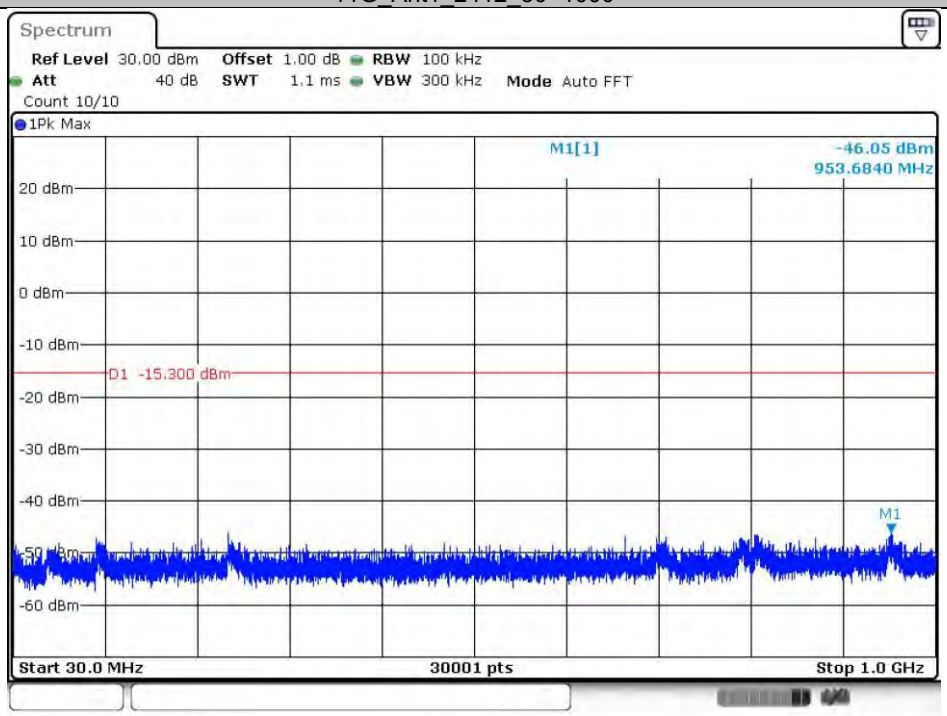
11G_Ant1_2412_0~Reference



Date: 14.APR.2021 00:51:15

11G_Ant1_2412_30~1000



Date: 14.APR.2021 00:51:19

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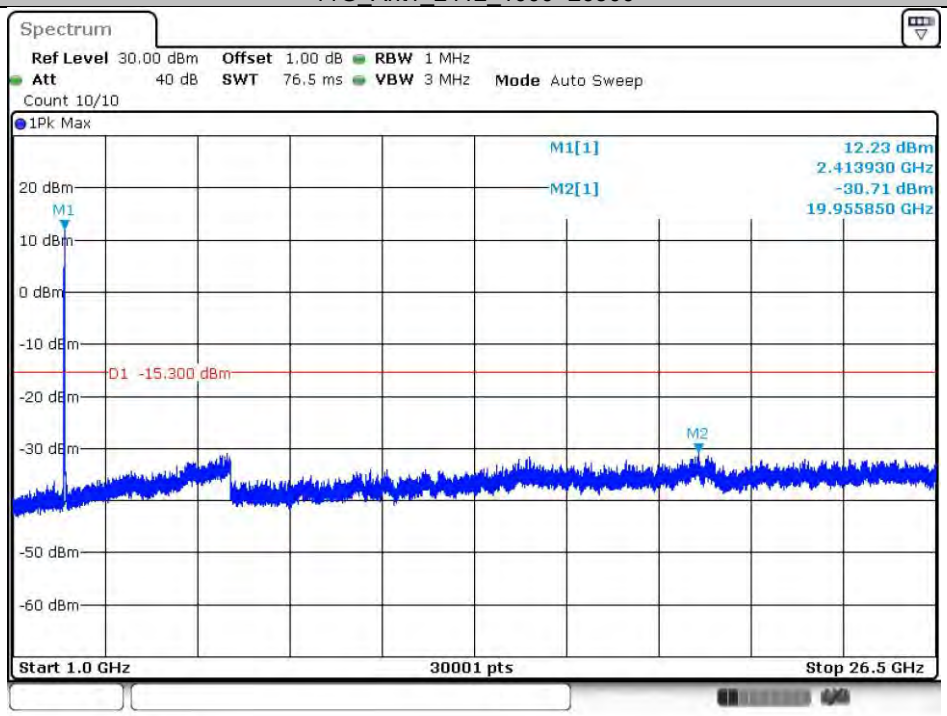
11G_Ant1_2412_1000~26500



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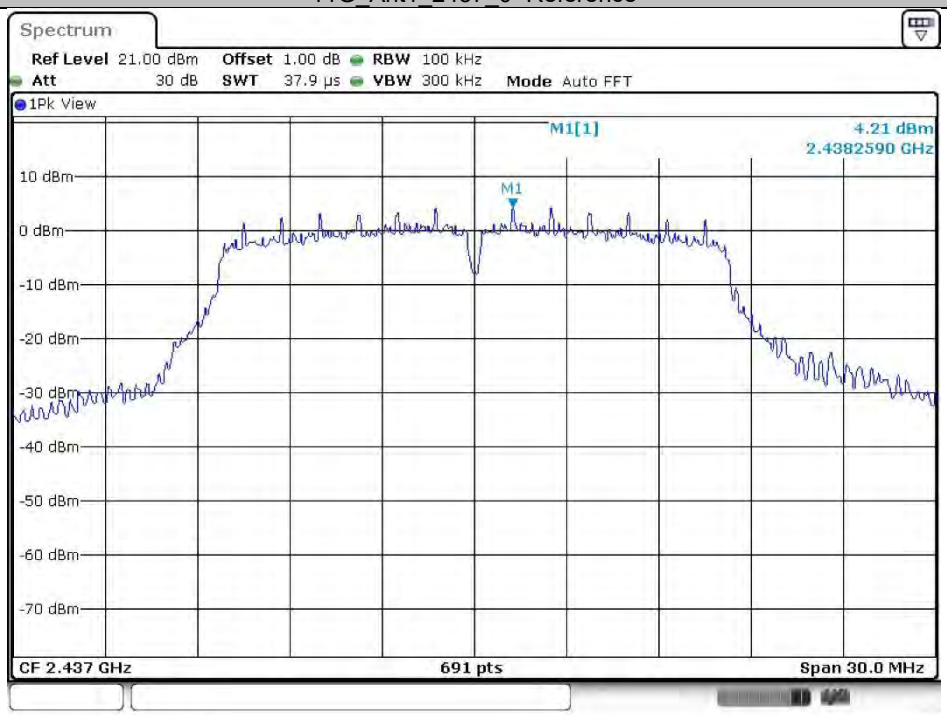
11G_Ant1_2437_0~Reference



Date: 14.APR.2021 00:52:39

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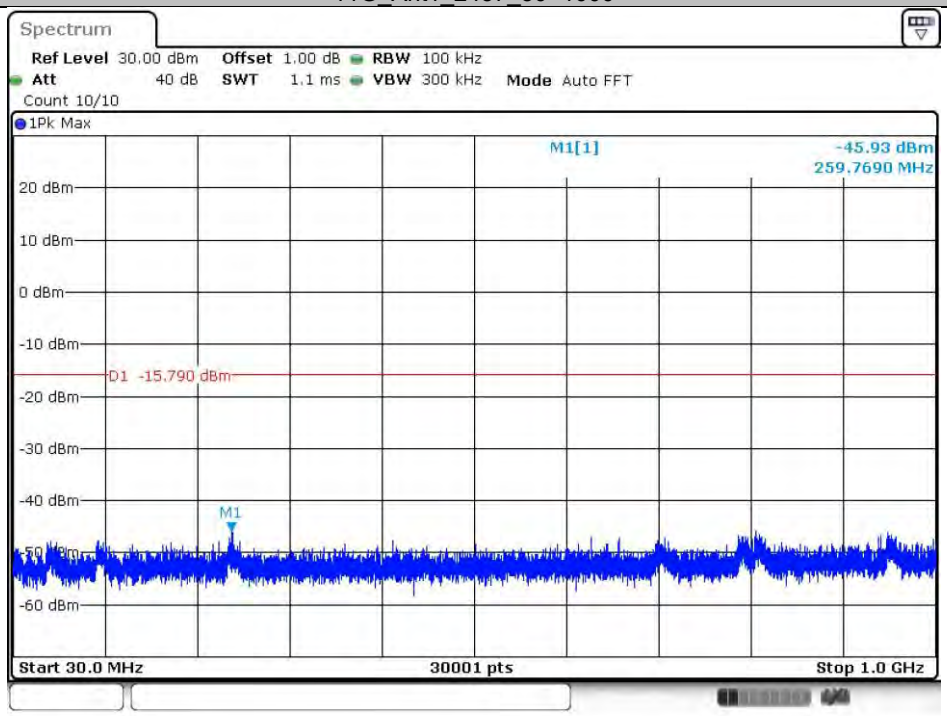
11G_Ant1_2437_30~1000



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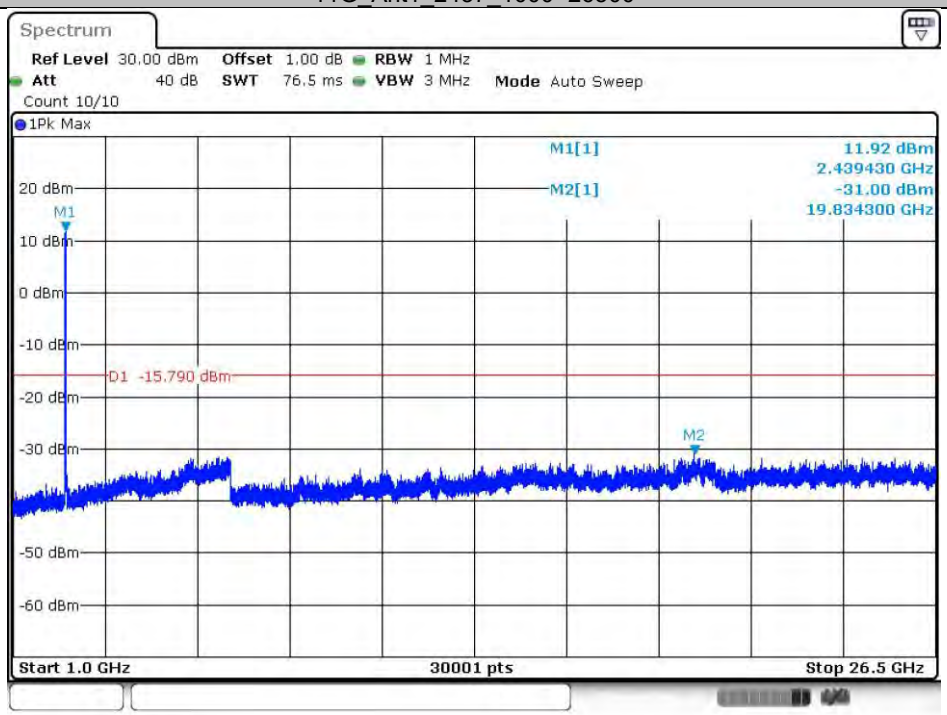
11G_Ant1_2437_1000~26500



Date: 14.APR.2021 00:53:05

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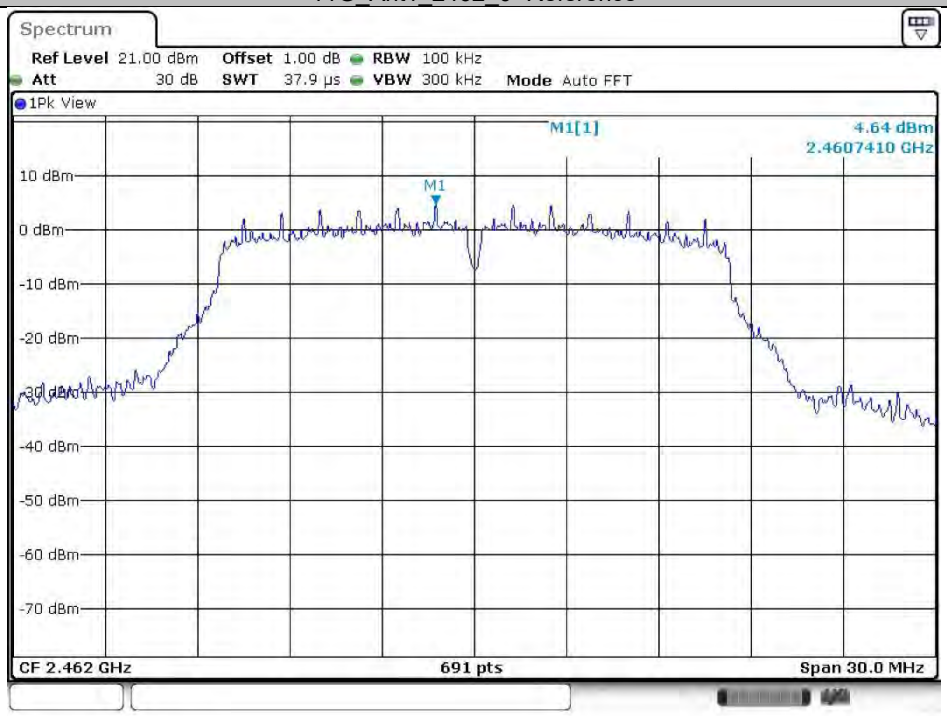
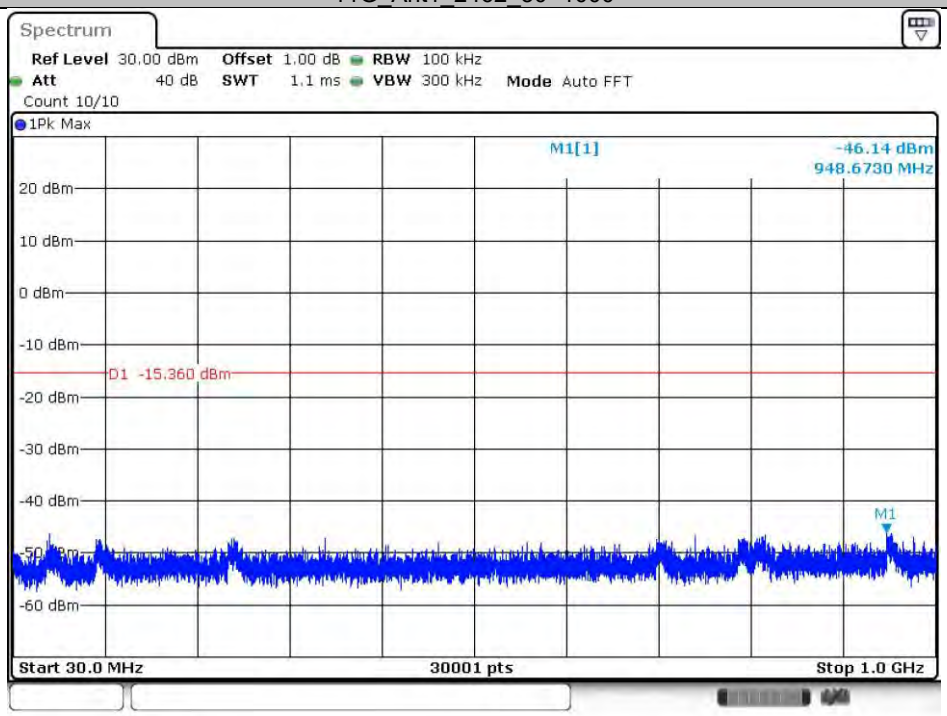
11G_Ant1_2462_0~Reference



11G_Ant1_2462_30~1000



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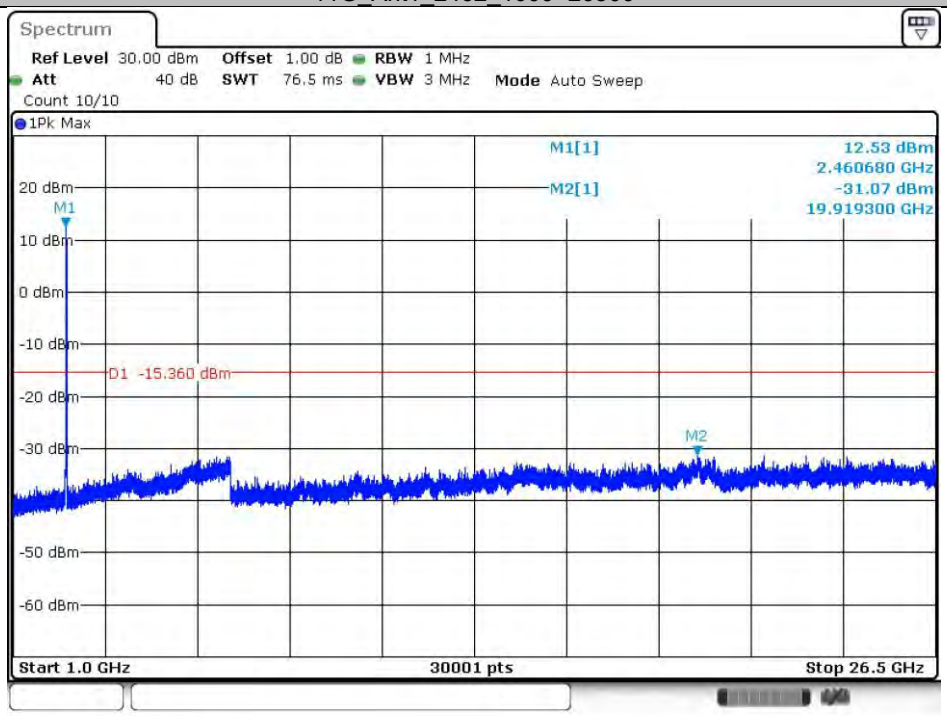
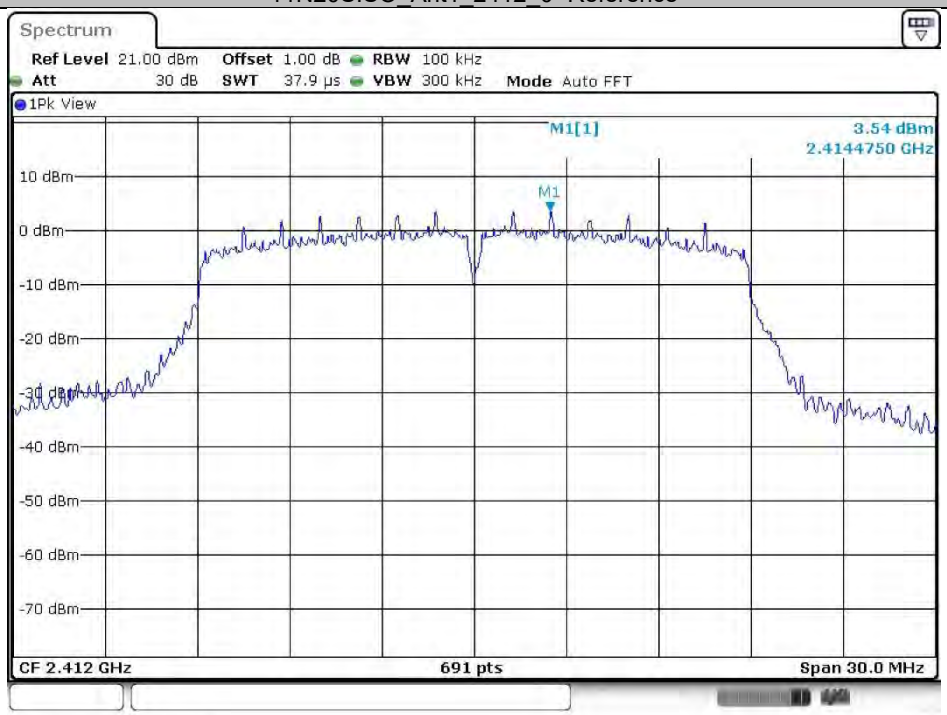
11G_Ant1_2462_1000~26500



Date: 14.APR.2021 00:54:39

11N20SISO_Ant1_2412_0~Reference



Date: 14.APR.2021 00:55:54

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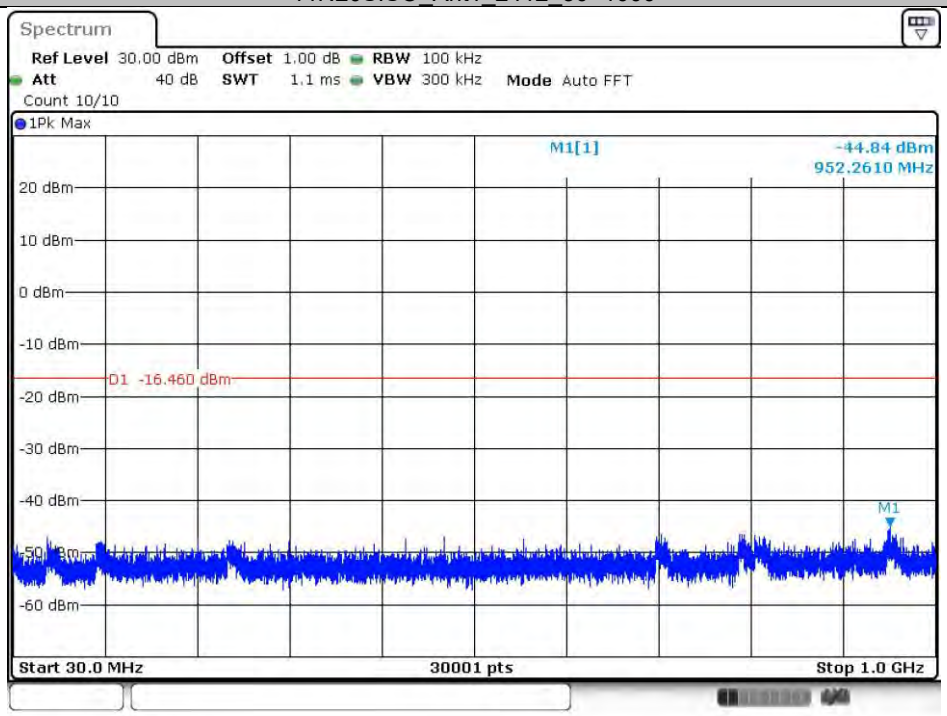
11N20SISO_Ant1_2412_30~1000



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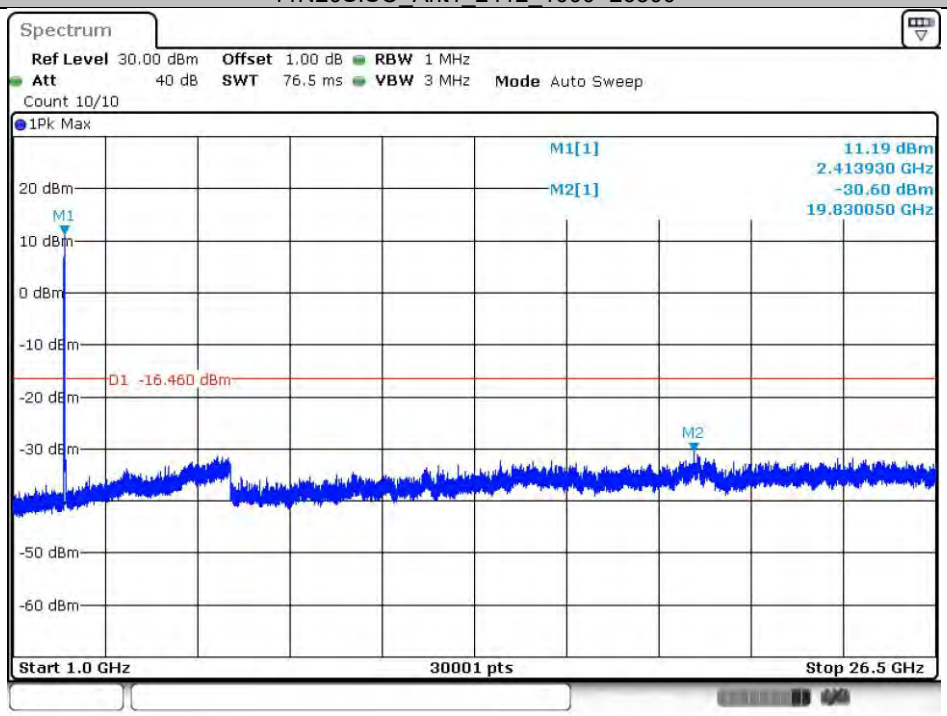
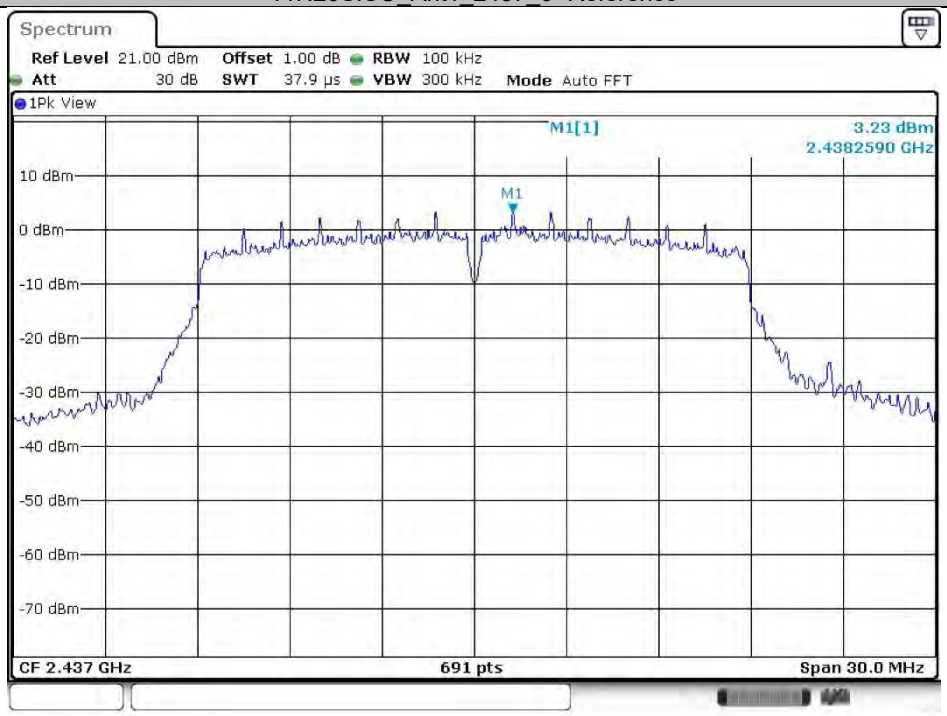


Date: 14.APR.2021 00:56:20

11N20SISO_Ant1_2437_0~Reference



Date: 14.APR.2021 00:57:23

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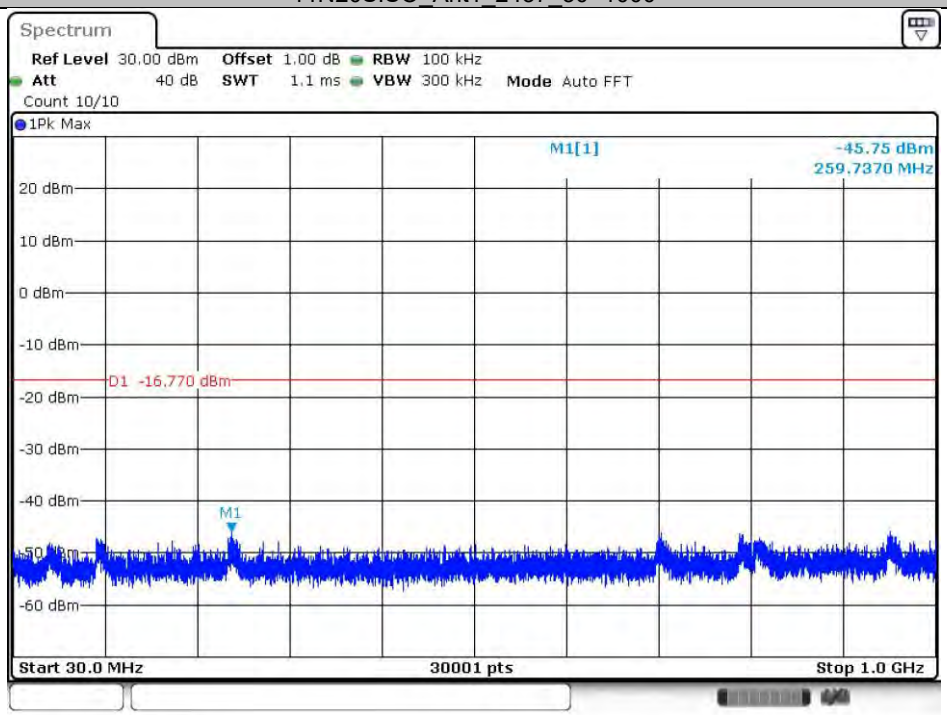

Date: 14.APR.2021 00:57:27

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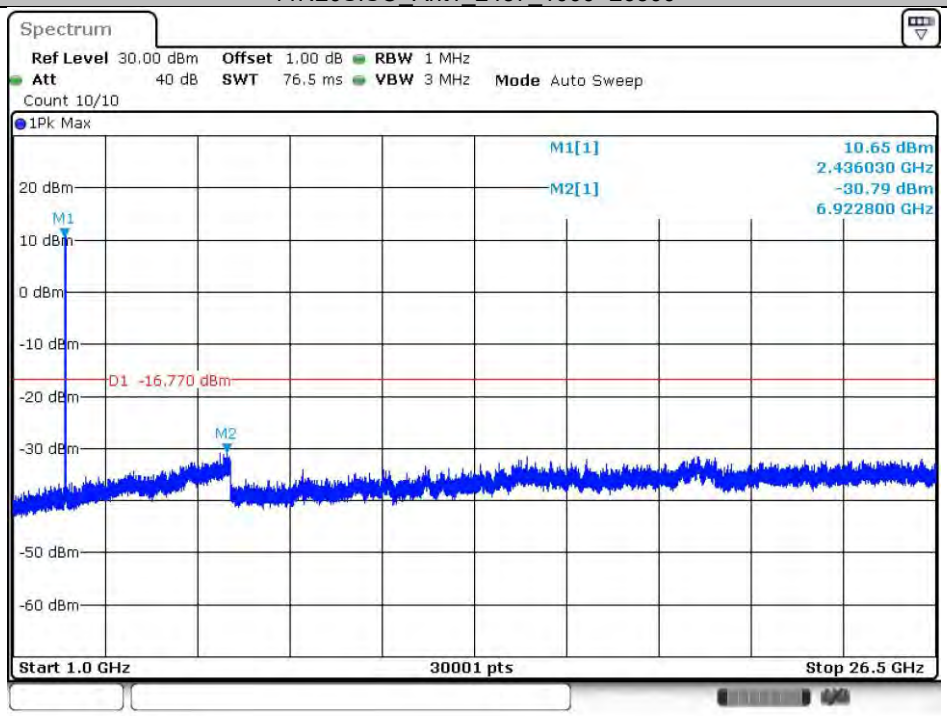
11N20SISO_Ant1_2437_1000~26500



Date: 14.APR.2021 00:57:49

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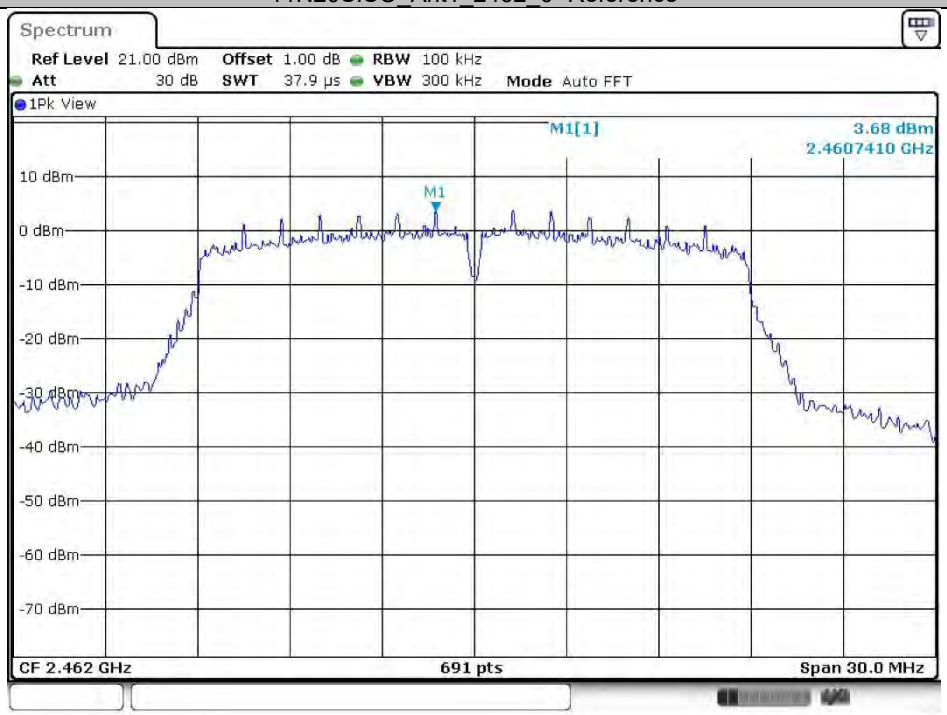

Date: 14.APR.2021 00:59:01

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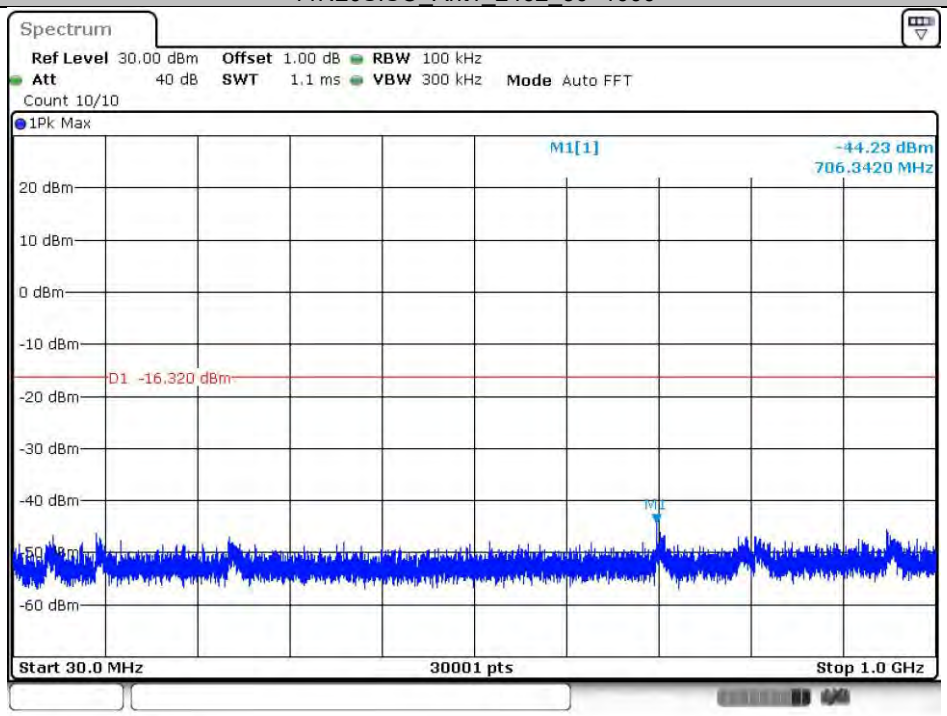

Date: 14.APR.2021 00:59:05

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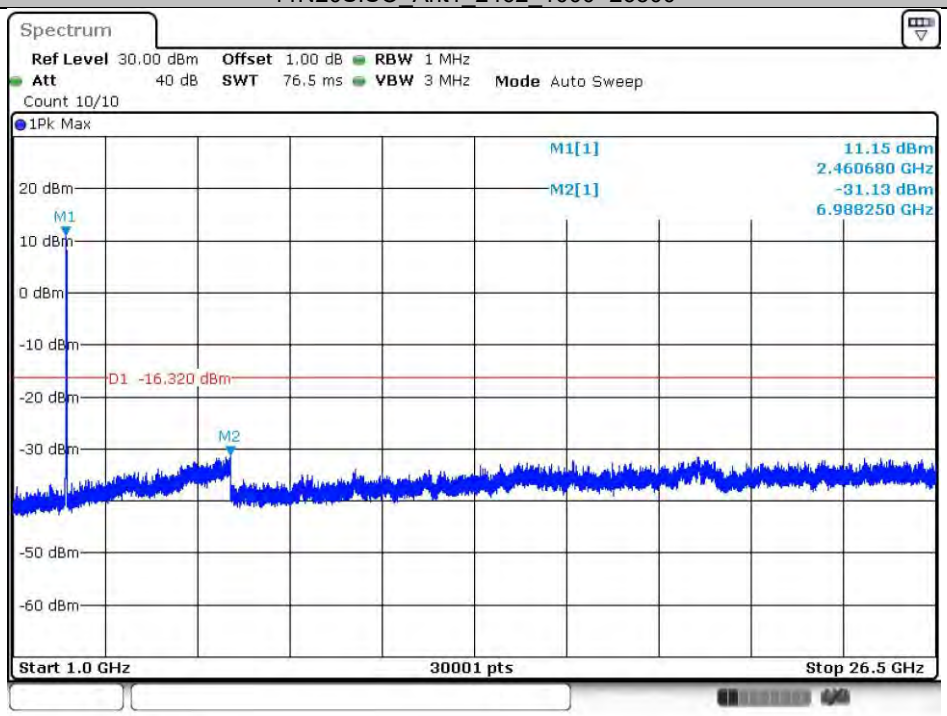


Date: 14.APR.2021 00:59:27

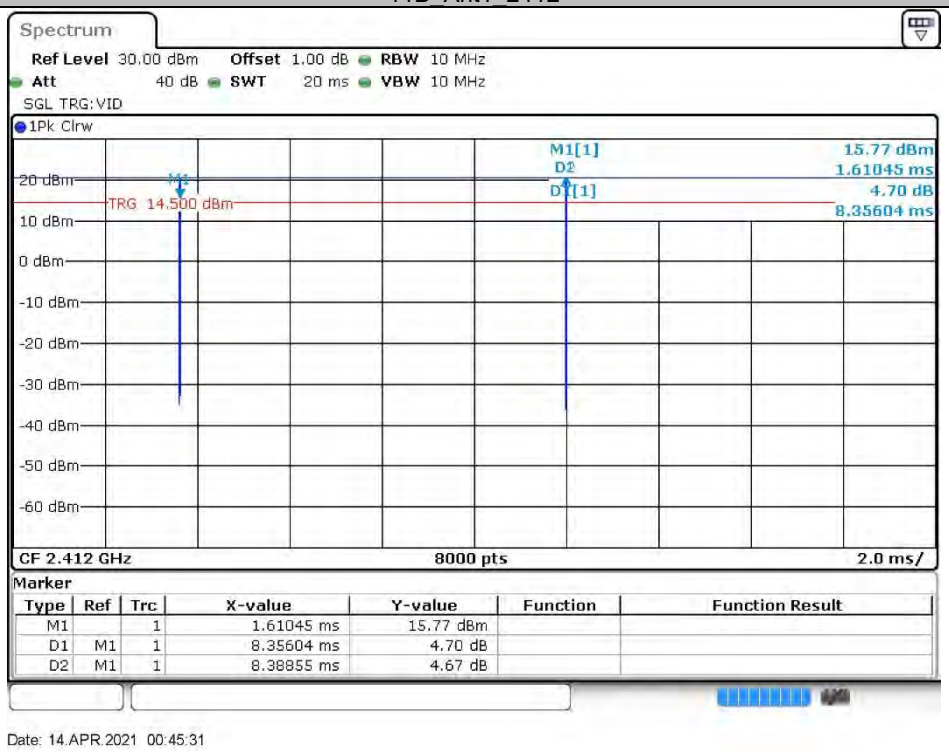
Duty Cycle

Test Result

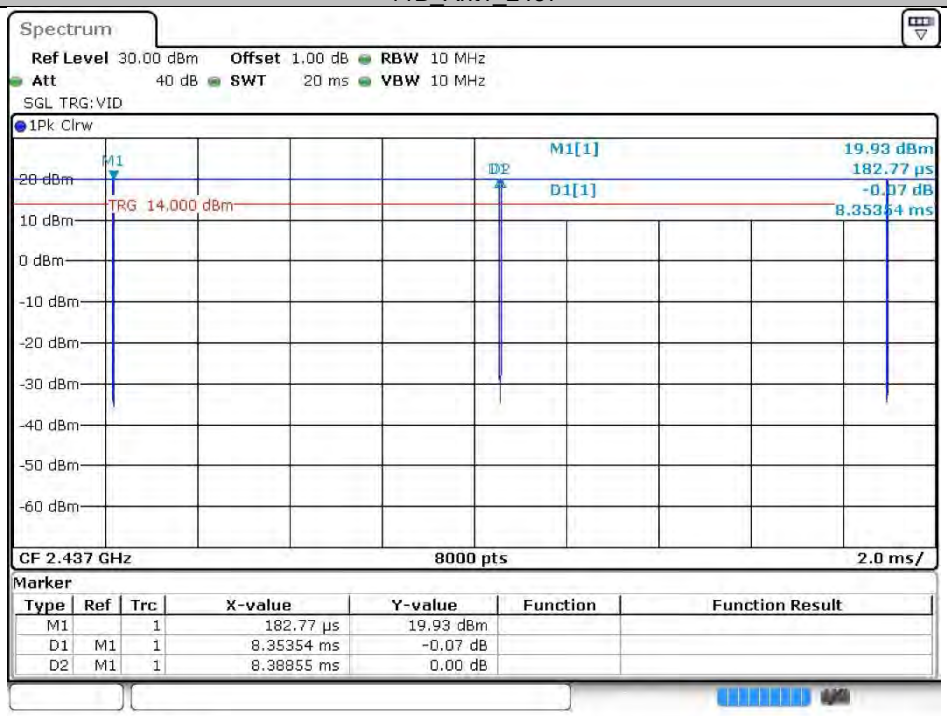
TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
11B	Ant1	2412	8.36	8.39	99.64	---	PASS
		2437	8.35	8.39	99.52	---	PASS
		2462	8.36	8.39	99.64	---	PASS
11G	Ant1	2412	1.38	1.42	97.18	---	PASS
		2437	1.38	1.42	97.18	---	PASS
		2462	1.38	1.42	97.18	---	PASS
11N20SISO	Ant1	2412	1.29	1.33	96.99	---	PASS
		2437	1.29	1.33	96.99	---	PASS
		2462	1.29	1.33	96.99	---	PASS

Test Graphs

11B_Ant1_2412

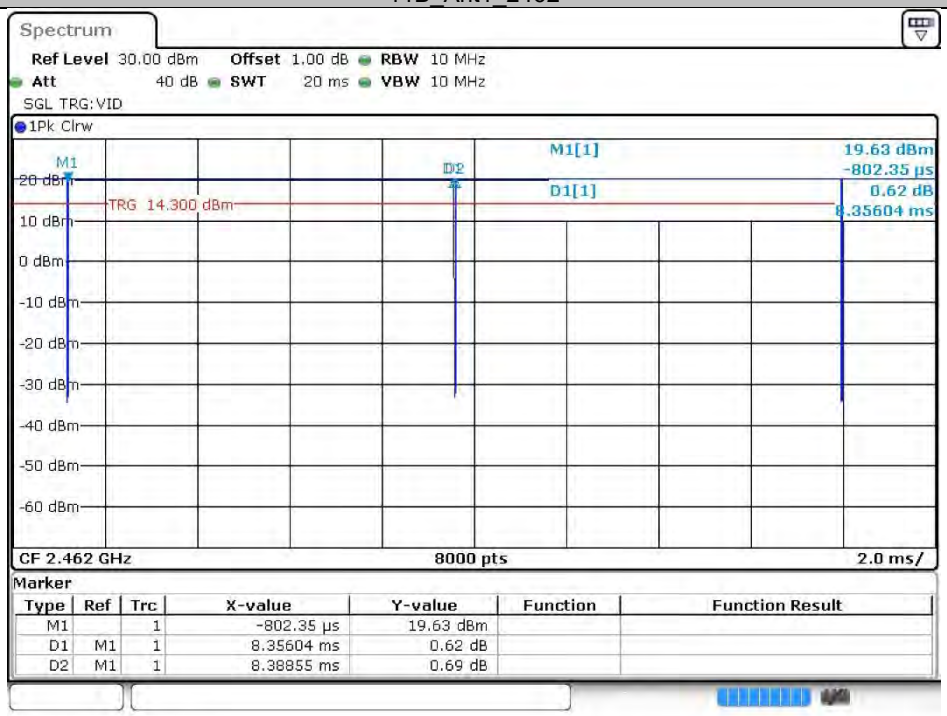


11B_Ant1_2437



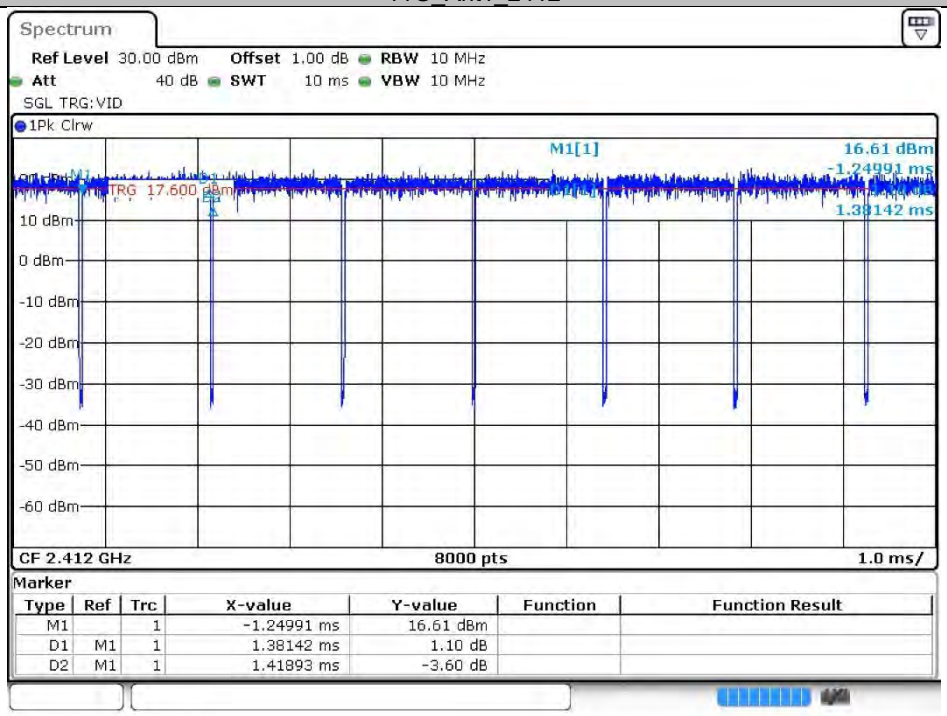
Date: 14.APR.2021 00:47:11

11B_Ant1_2462



Date: 14.APR.2021 00:48:38

11G_Ant1_2412



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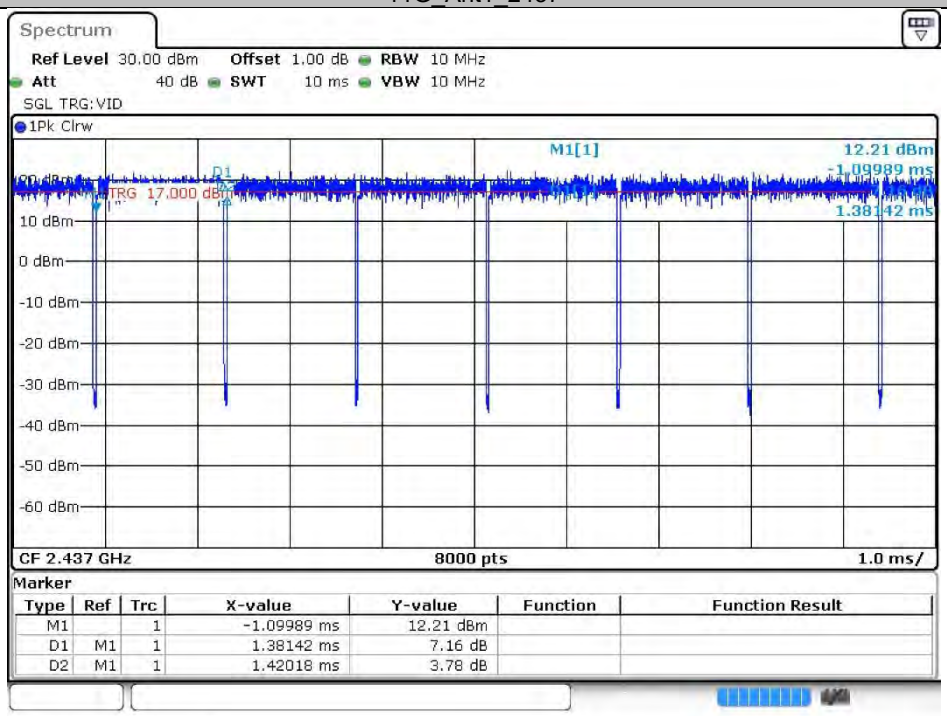

Date: 14.APR.2021 00:51:58

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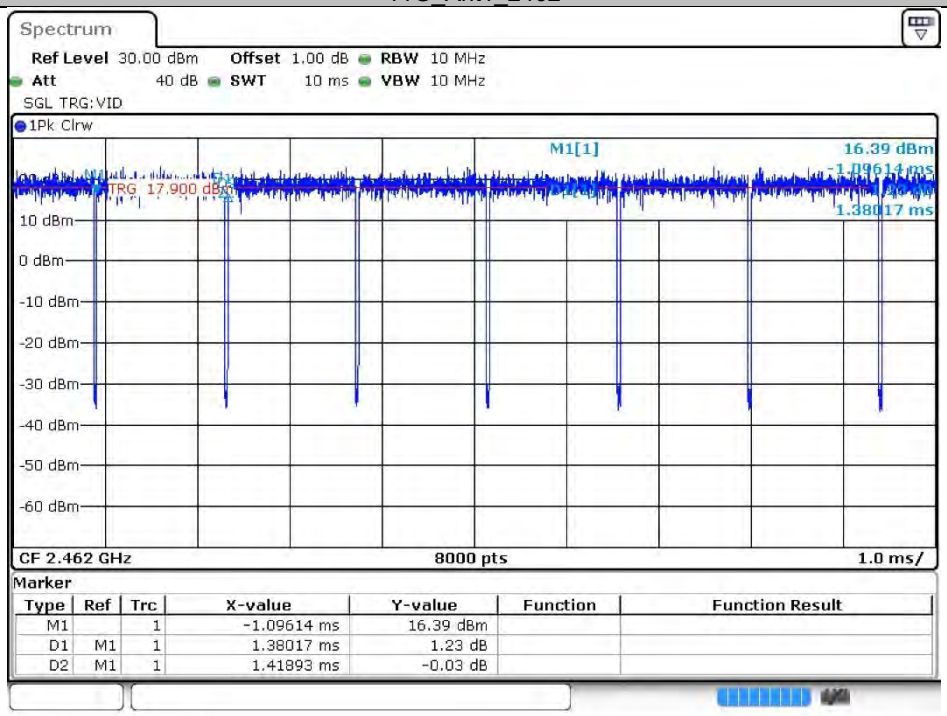

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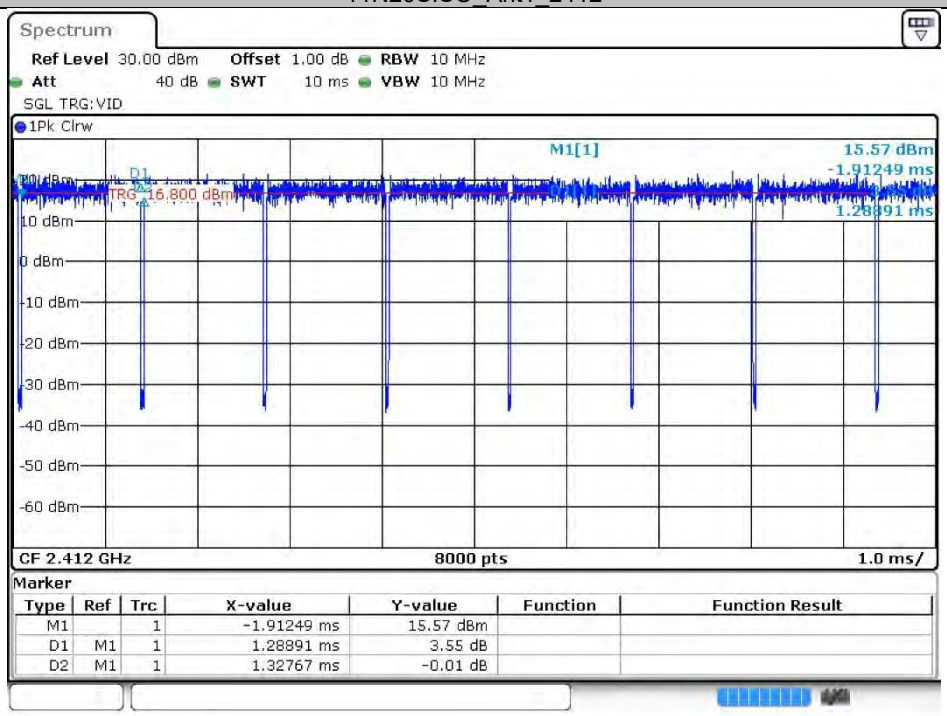

Date: 14.APR.2021 00:55:04

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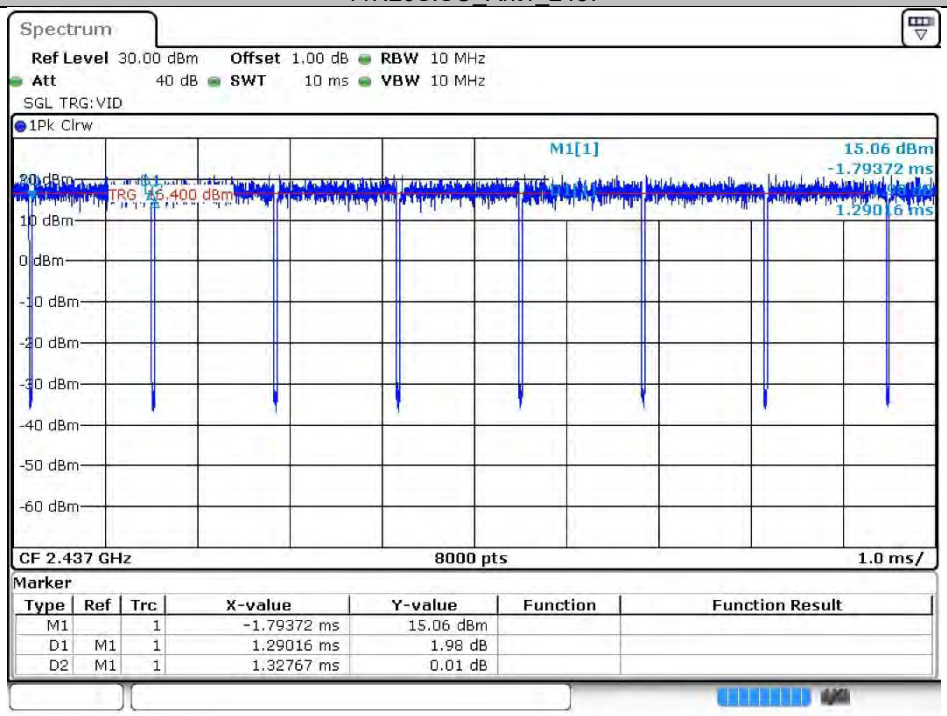

Date: 14.APR.2021 00:56:41

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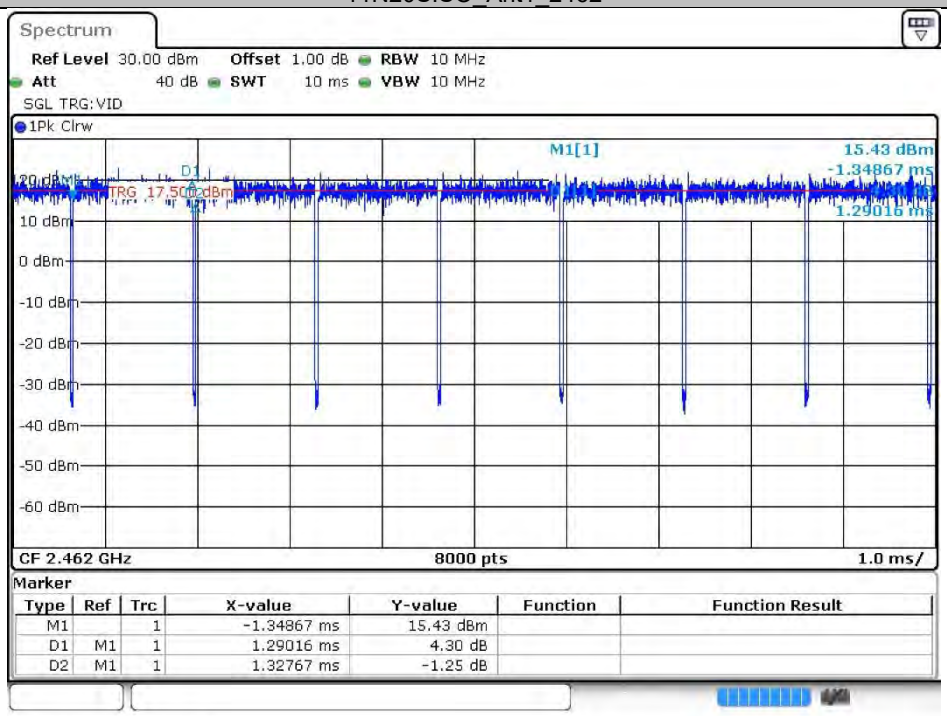

Date: 14.APR.2021 00:58:10

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The End

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