FCC Test Report

Application No.:	DNT2505130240R4963-06161
Applicant:	ShenZhen V-Link Technology Co., LTD
Address of Applicant:	Room 1803, BaiRuiDa Building, Bantian Sub-district, LongGang District, Shenzhen, China
EUT Description:	WiFi Module
Model No.:	H353-NS, H353-WS, H353S-NS, H353S-WS
FCC ID:	2AXX8-H353-NS
Power Supply	DC 3.3V
Trade Mark:	N/A
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C ANSI C63.10: 2013
Date of Receipt:	2025/05/13
Date of Test:	2025/05/14 to 2025/05/28
Date of Issue:	2025/05/28
Test Result:	**PASS**

Prepared By: Wayne.Lin (Testing Engineer)

Reviewed By: Pencils.Chen (Project Engineer)

Approved By: Moise Zhan (Manager)

Note: If there is any objection to the results in this report, please submit a written inquiry to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp, and is issued by the company in accordance with the requirements of the "Conditions of Issuance of Test Reports" printed in the attached page. Unless otherwise stated, the results presented in this report only apply to the samples tested this time. Partial reproduction of this report is not allowed unless approved by the company in writing.

Report Revise Record

Dongguan DN Testing Co., Ltd.
Add: No. 1, West Fourth Street, Xingfa South Road, Wusha Community, Chang 'an Town, Dongguan City, Guangdong P.R.China
Web: www.dn-testing.com Tel:+86-769-88087383 E-mail: service@dn-testing.com

Report Version	Revise Time	Issued Date	Valid Version	Notes
V2.0	/	May 28, 2025	Valid	Original Report

1 Test Summary

Test Item	Test Requirement	Test Method	Test Result	Result
Antenna Requirement	15.203/247(b)	--	Clause 3.1	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10: 2013	Clause 3.2	NA
Duty Cycle	--	--	Clause 3.3	PASS
DTS (6 dB) Bandwidth	15.247 (a)(2)	ANSI C63.10: 2013	Clause 3.4	PASS
Conducted Output Power	15.247 (b)(3)	ANSI C63.10: 2013	Clause 3.5	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10: 2013	Clause 3.6	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10: 2013	Clause 3.7	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10: 2013	Clause 3.8	PASS
Radiated Spurious Emissions	15.247(d);15.205/15.209	ANSI C63.10: 2013	Clause 3.9	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d);15.205/15.209	ANSI C63.10: 2013	Clause 3.10	PASS

Note:
1. “N/A” denotes test is not applicable in this test report.

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2 General Information

2.1 Test Location

Company:	Dongguan DN Testing Co., Ltd
Address:	No. 1, West Fourth Street, South Xinfa Road, Wusha Liwu, Chang ' an Town, Dongguan City, Guangdong P.R.China
Test engineer:	Wayne Lin

2.2 General Description of EUT

Manufacturer:	ShenZhen V-Link Technology Co., LTD
Address of Manufacturer:	1803, Block A, Xintianxia Bairuida Building, Vanke City Community, Bantian Street, Longgang District, Shenzhen City, Guangdong Province
EUT Description:	WiFi Module
Test Model No.:	H353-NS
Additional Model(s):	H353-WS, H353S-NS, H353S-WS
Power Supply:	DC 3.3V
Trade Mark:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Chip Type:	Q353233N1100
Serial number	PR2505130240R4963
IEEE 802.11 WLAN Mode Supported	☒ 802.11b (20 MHz channel bandwidth), ☒ 802.11g (20 MHz channel bandwidth) ☒ 802.11n HT(20 MHz channel bandwidth), ☒ 802.11 n HT(40 MHz channel bandwidth) ☒ 802.11 ax HE(20 MHz channel bandwidth) ☐ 802.11 ax HE(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 IEEE for 802.11ax(HE20) : OFDMA
Sample Type:	☐ Portable Device, ☒ Module,☒ Mobile Device
Antenna Type:	☐ External, ☒ Integrated
Antenna Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3
Smart System	☒ SISO (for 802.11b/g/n/ax), ☐ MIMO (for 802.11 b/g/n): 2 Tx & 2 Rx, ☐ Diversity (for 802.11b/g) : Tx & Rx
Antenna Gain*:	☒ Provided by applicant
	4.55dBi
RF Cable*:	☒ Provided by applicant
	0.5dB(0.6~1GHz); 0.8dB(1.4~2GHz); 1.0dB(2.1~2.7GHz); 1.5dB(3~4GHz); 1.8dB(4.4~6GHz);

Remark:

*All models are just name differences, motherboard, PCB circuit board, chip, electronic components, appearance is all the same.

*Since the above data and/or information is provided by the applicant relevant results or conclusions of this report are only made for these data and/or information , DNT is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

2.3 Channel List

Operation Frequency of each channel (802.11b/g/n HT20/ax HE20)							
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				

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 802.11 b/g/n (HT20/ax HE20))	Frequency for 802.11n (HT40)
The Lowest channel	2412MHz	2422MHz
The Middle channel	2437MHz	2437MHz
The Highest channel	2462MHz	2452MHz

2.4 Test Environment and Mode

Operating Environment:	
Temperature:	20~25.0 ℃
Humidity:	45~56 % RH
Atmospheric Pressure:	101.0~101.30 KPa
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

Test Item	Mode	Date Rate	Test Channel	Remark
DTS Bandwidth	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Maximum Peak Output Power	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Power Spectral Density	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Conducted Band Edge	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Conducted Spurious Emissions	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Radiated Spurious Emissions(Below 1GHz)	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-

	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Radiated Spurious Emissions(Above 1GHz)	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU
Radiated Band Edge	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU

AC Power Line Conducted Emissions	IEEE 802.11b	1Mbps	Low/Middle/High	-
	IEEE 802.11g	6Mbps	Low/Middle/High	-
	IEEE 802.11n HT20	MCS0	Low/Middle/High	-
	IEEE 802.11n HT40	MCS0	Low/Middle/High	-
	IEEE 802.11ax HE20	MCS0	Low/Middle/High	Full RU

Note: Only full RU is supported.

2.5 Power Setting of Test Software

Software Name	SSCOM V5.13.1		
Frequency(MHz)	2412	2437	2462
11b Setting	20	20	20
11g Setting	20	20	20
11n20 Setting	20	20	20
11ax20 Setting	20	20	20
Frequency(MHz)	2422	2437	2452
11n40 Setting	20	20	20

2.6 Description of Support Units

The EUT has been tested independent unit.

2.7 Test Facility

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

Lab A:

• FCC, USA

Designation Number: CN1348

• A2LA (Certificate No. 7050.01)

DONGGUAN DN TESTING CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 7050.01.

• Innovation, Science and Economic Development Canada

DONGGUAN DN TESTING CO., LTD. EMC Laboratory has been recognized by ISED as an accredited testing laboratory. CAB identifier is CN0149.

IC#: 30755.

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

No.	Item	Measurement Uncertainty
1	DTS Bandwidth	±0.0196%
2	Maximum Conducted Output Power	±0.686 dB
3	Maximum Power Spectral Density Level	±0.743 dB
4	Band-edge Compliance	±1.328 dB
5	Unwanted Emissions In Non-restricted Freq Bands	9KHz-1GHz:±0.746dB 1GHz-26GHz: ±1.328dB

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)

2.9 Equipment List

For Connect EUT Antenna Terminal Test					
Description	Manufacturer	Model	Serial Number	Cal date	Due date
Signal Generator	Keysight	N5181A-6G	MY48180415	2024-10-23	2025-10-22
Signal Generator	Keysight	N5182B	MY57300617	2024-10-23	2025-10-22
Power supply	Keysight	E3640A	ZB2022656	2024-10-23	2025-10-22
Radio Communication Tester	R&S	CMW500	105082	2024-10-23	2025-10-22
Spectrum Analyzer	Aglient	N9010A	MY52221458	2024-10-23	2025-10-22
BT/WIFI Test Software	Tonscend	JS1120-3 V3.6.16	NA	NA	NA
RF Control Unit	Tonscend	JS0806-2	22F8060581	NA	NA
Power Sensor	Anritsu	ML2495A	2129005	2024-10-23	2025-10-22
Pulse Power Sensor	Anritsu	MA2411B	1911397	2024-10-23	2025-10-22
temperature and humidity box	SCOTEK	SCD-C40-80PRO	6866682020008	2024-10-23	2025-10-22

Test Equipment for Conducted Emission					
Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Receiver	R&S	ESCI3	101152	2024-10-23	2025-10-22
LISN	R&S	ENV216	102874	2024-10-23	2025-10-22
ISN	R&S	ENY81-CA6	1309.8590.03	2024-10-23	2025-10-22

Test Equipment for Radiated Emission(30MHz-1000MHz)					
Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Receiver	R&S	ESR7	102497	2024-10-23	2025-10-22
Test Software	ETS-LINDGREN	TiLE-FULL	NA	NA	NA
RF Cable	ETS-LINDGREN	RFC-NMS-100-NMS-350-IN	NA	2024-10-23	2025-10-22
Log periodic antenna	ETS-LINDGREN	VULB 9168	01475	2022-11-28	2025-11-27
Pre-amplifier	Schwarzbeck	BBV9743B	00423	2024-10-23	2025-10-22

Test Equipment for Radiated Emission(Above 1000MHz)					
Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Frequency analyser	Keysight	N9010A	MY52221458	2024-10-23	2025-10-22
RF Cable	ETS-LINDGREN	RFC-NMS-100-NMS-350-IN	NA	2024-10-23	2025-10-22
Horn Antenna	ETS-LINDGREN	3117	00252567	2022-11-28	2025-11-27
Double ridged waveguide antenna	ETS-LINDGREN	3116C	00251780	2022-11-28	2025-11-27
Test Software	ETS-LINDGREN	TiLE-FULL	NA	NA	NA
Pre-amplifier	ETS-LINDGREN	3117-PA	252567	2024-10-23	2025-10-22
Pre-amplifier	ETS-LINDGREN	3116C-PA	251780	2024-10-23	2025-10-22

2.10Assistant equipment used for test

Code	Equipment	Manufacturer	Model No.	Equipment No.
1	Computer	acer	N22C8	EMC notebook01
2	Test Board	ShenZhen V-Link Technology Co., LTD	H161 & H181	/
3	Antenna	Netgear Incorporated	AN2400-92158BRS-01	/

3 Test results and Measurement Data

3.1 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 FPC antenna is externally connected to the motherboard, The best case gain of the antenna is 4.55dBi.	

3.2 Duty Cycle

Refer to section : **Appendix A**

Note:

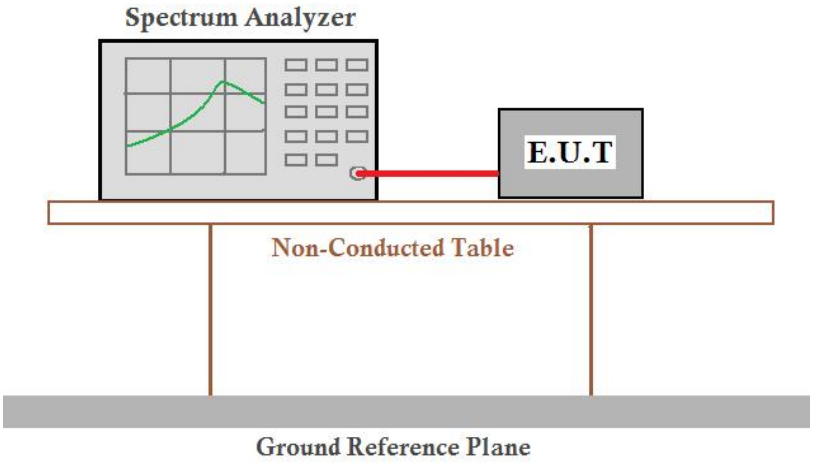
1.If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.

2.If duty cycle ⩾98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor(consider to be zero).

3.The conducted peak output power and peak power spectral density no need to consider duty factor.

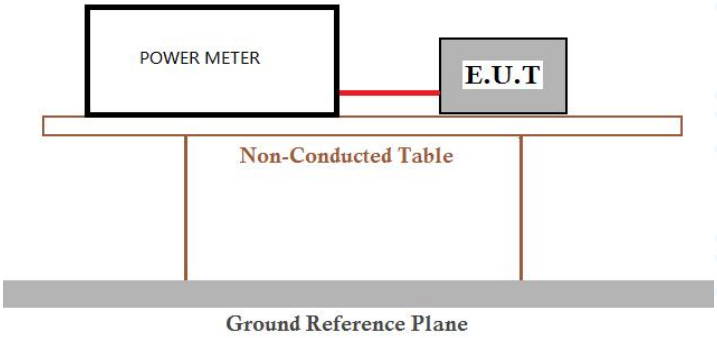
4.The on-time time is transmission duration(T).

3.3 DTS (6 dB) 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 2.9 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). 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40).
Limit:	≥ 500 kHz
Test Results:	Pass

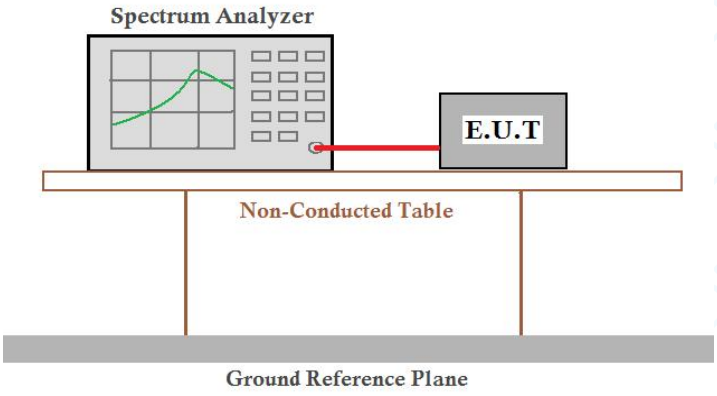
The detailed test data see: **Appendix B**

3.4 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 2.9 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); 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40).
Limit:	30dBm
Test Results:	Pass

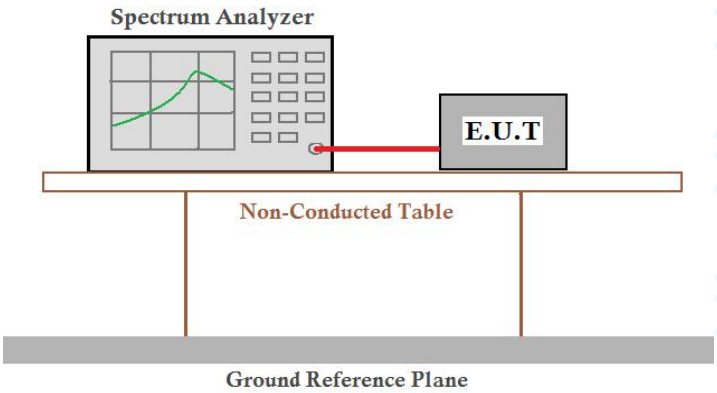
The detailed test data see: **Appendix C**

3.5 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 2.9 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); 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40).
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

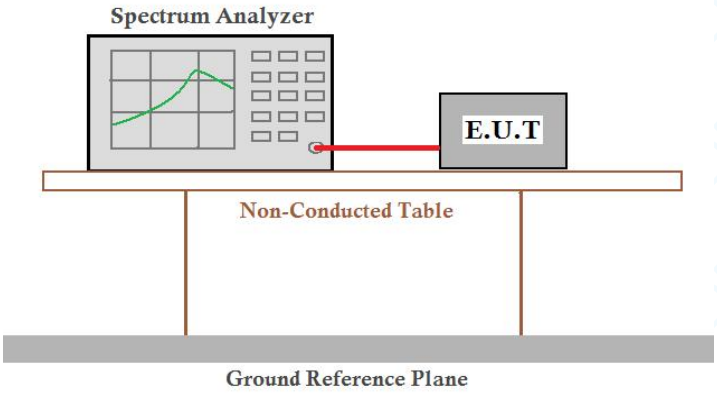
The detailed test data see: **Appendix D**

3.6 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 2.9 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); 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40).
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 E**

3.7 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 2.9 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); 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40).
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 F**

3.8 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:	

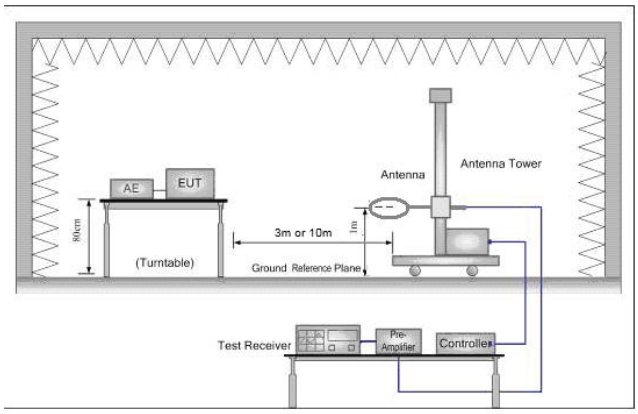


Figure 1. Below 30MHz

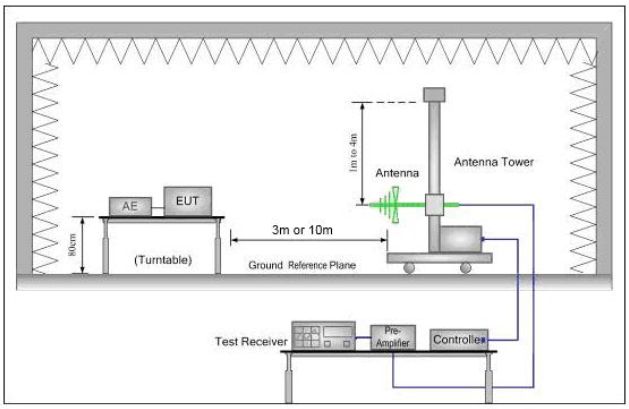


Figure 2. 30MHz to 1GHz

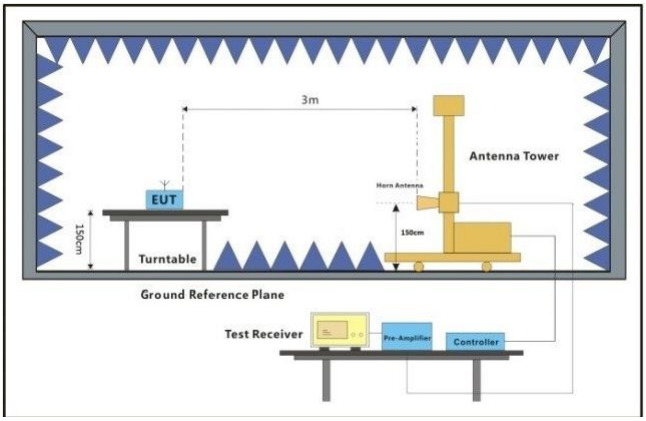


Figure 3. Above 1 GHz

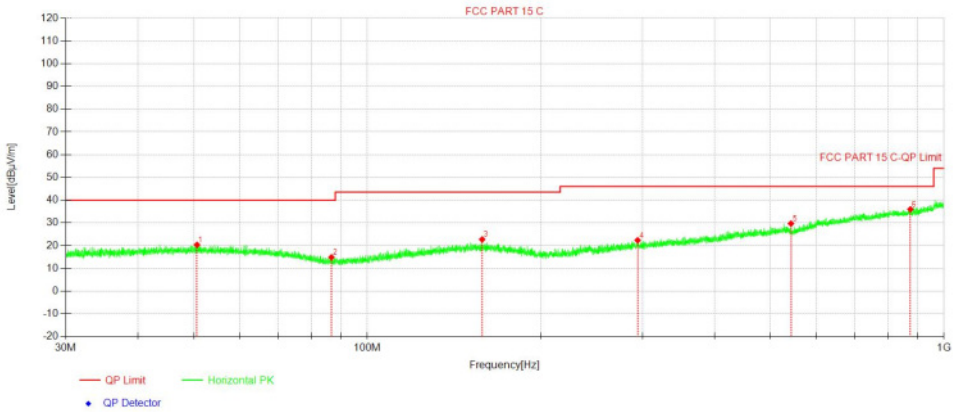
Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating 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. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. h. Test the EUT in the lowest channel, the middle channel ,the Highest channel. i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	Measurements Below 1000MHz

	• RBW = 120 kHz • VBW = 300 kHz • Detector = Peak • Trace mode = max hold 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.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at 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); 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40). For below 1GHz, through Pre-scan, Only the worst case is recorded in the report.
Instruments Used:	Refer to section 2.9 for details
Test Results:	Pass

Test data

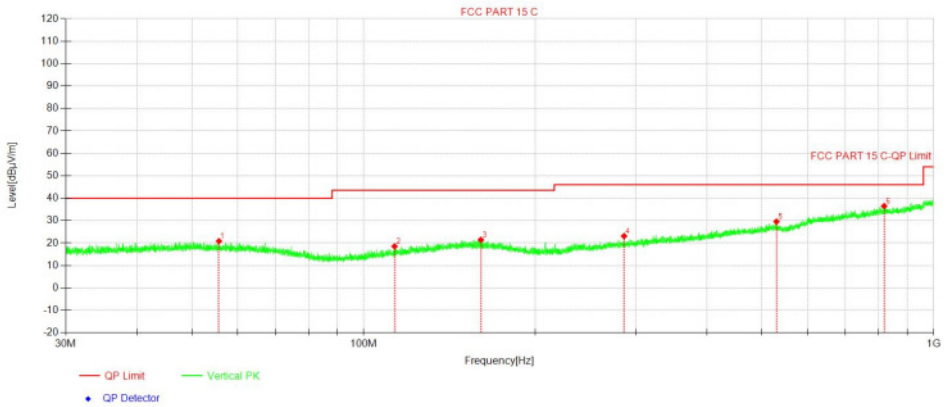
For 30-1000MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	50.66	28.43	-8.08	20.35	40.00	19.65	100	244	QP
2	86.65	28.66	-13.79	14.87	40.00	25.13	100	0	QP
3	158.17	30.52	-7.79	22.73	43.50	20.77	100	360	QP
4	294.32	29.48	-7.14	22.34	46.00	23.66	100	136	QP
5	542.89	31.62	-1.93	29.69	46.00	16.31	100	57	QP
6	874.63	31.45	4.53	35.98	46.00	10.02	100	0	QP

Vertical :

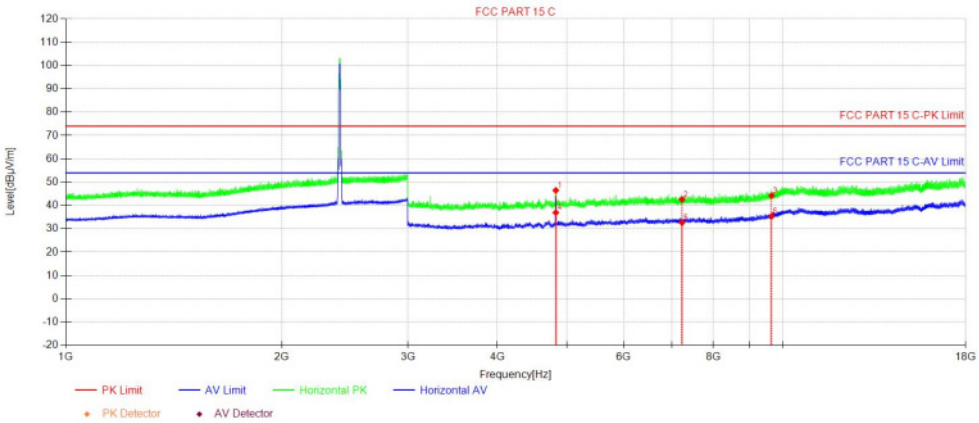


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	55.71	29.14	-8.32	20.82	40.00	19.18	100	304	QP
2	113.28	29.37	-10.85	18.52	43.50	24.98	100	359	QP
3	160.51	29.24	-7.80	21.44	43.50	22.06	100	192	QP
4	286.28	30.44	-7.34	23.10	46.00	22.90	100	342	QP
5	530.10	30.73	-1.16	29.57	46.00	16.43	100	342	QP
6	819.12	31.72	4.77	36.49	46.00	9.51	100	298	QP

For above 1GHz

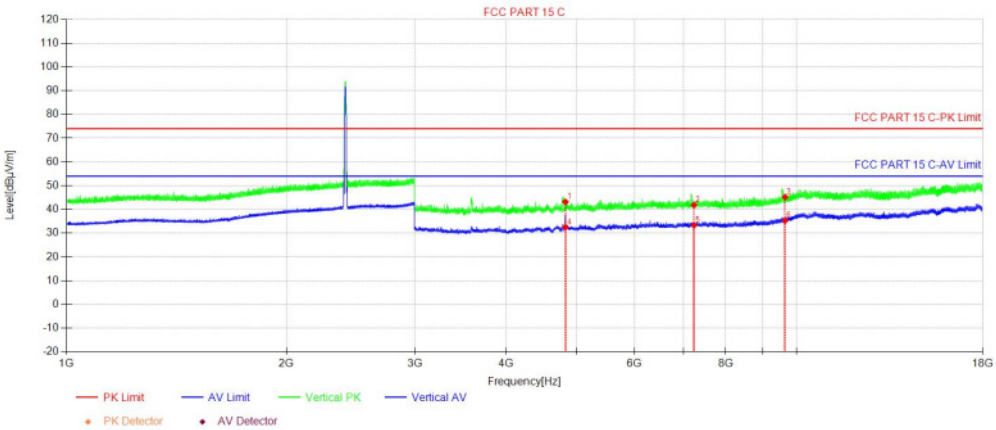
11B 2412MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4824.09	51.11	-4.63	46.48	74.00	27.52	150	214	PK
2	7236.21	44.27	-1.70	42.57	74.00	31.43	150	249	PK
3	9648.33	43.21	1.07	44.28	74.00	29.72	150	357	PK
4	4824.09	41.59	-4.63	36.96	54.00	17.04	150	71	AV
5	7236.21	34.35	-1.70	32.65	54.00	21.35	150	2	AV
6	9648.33	34.32	1.07	35.39	54.00	18.61	150	338	AV

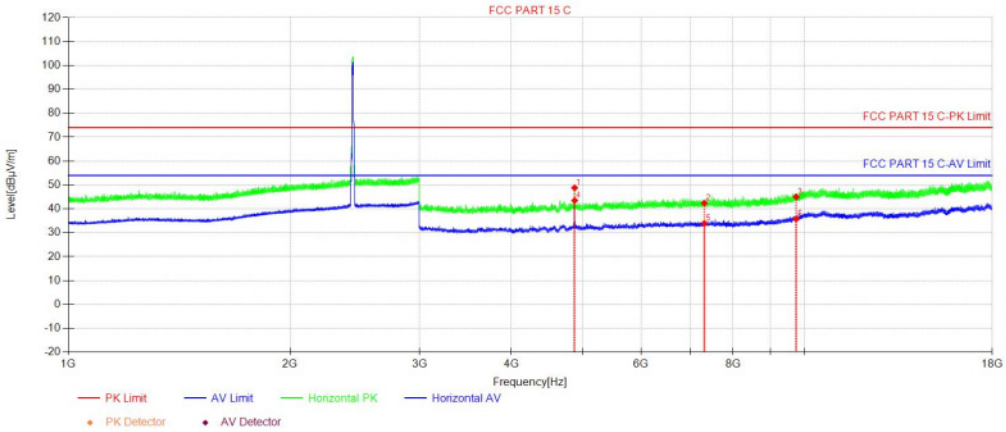
Vertical:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	AV Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4824.09	47.82	-4.63	43.19	74.00	30.81	150	70	PK
2	7236.21	43.52	-1.70	41.82	74.00	32.18	150	322	PK
3	9648.33	44.12	1.07	45.19	74.00	28.81	150	355	PK
4	4824.09	37.12	-4.63	32.49	54.00	21.51	150	70	AV
5	7236.21	35.00	-1.70	33.30	54.00	20.70	150	268	AV
6	9648.33	34.21	1.07	35.28	54.00	18.72	150	88	AV

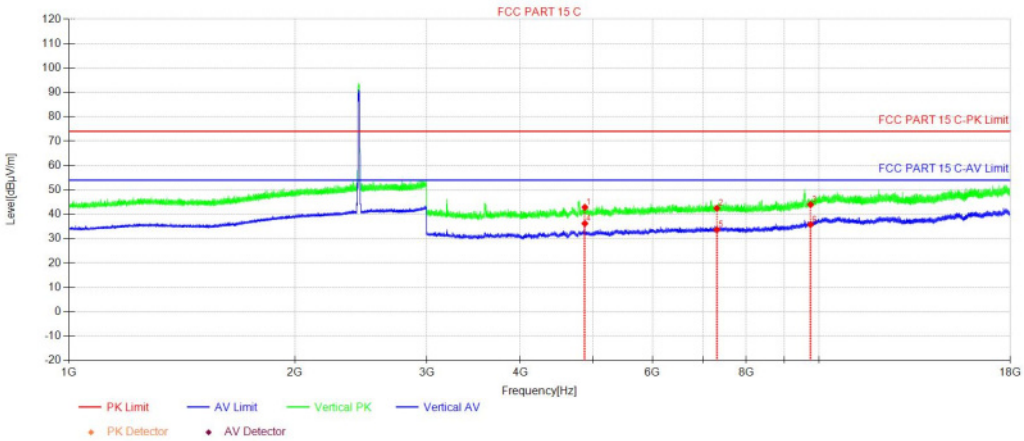
11B 2437MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4873.59	53.50	-4.70	48.80	74.00	25.20	150	92	PK
2	7311.22	43.89	-1.53	42.36	74.00	31.64	150	56	PK
3	9748.09	43.45	1.56	45.01	74.00	28.99	150	109	PK
4	4874.34	48.19	-4.70	43.49	54.00	10.51	150	74	AV
5	7311.22	35.40	-1.53	33.87	54.00	20.13	150	180	AV
6	9748.09	34.27	1.56	35.83	54.00	18.17	150	271	AV

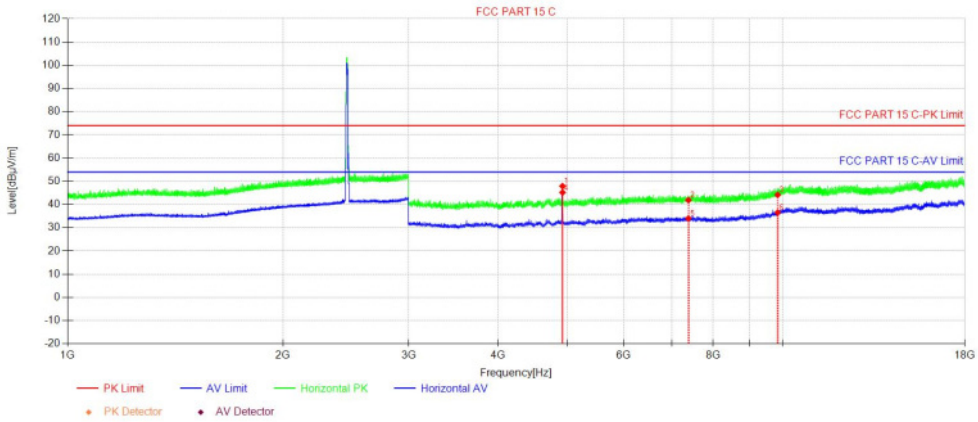
Vertical:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4874.34	47.54	-4.70	42.84	74.00	31.16	150	179	PK
2	7311.22	43.98	-1.53	42.45	74.00	31.55	150	236	PK
3	9748.09	42.42	1.56	43.98	74.00	30.02	150	37	PK
4	4874.34	40.90	-4.70	36.20	54.00	17.80	150	72	AV
5	7311.22	35.16	-1.53	33.63	54.00	20.37	150	53	AV
6	9748.09	34.23	1.56	35.79	54.00	18.21	150	90	AV

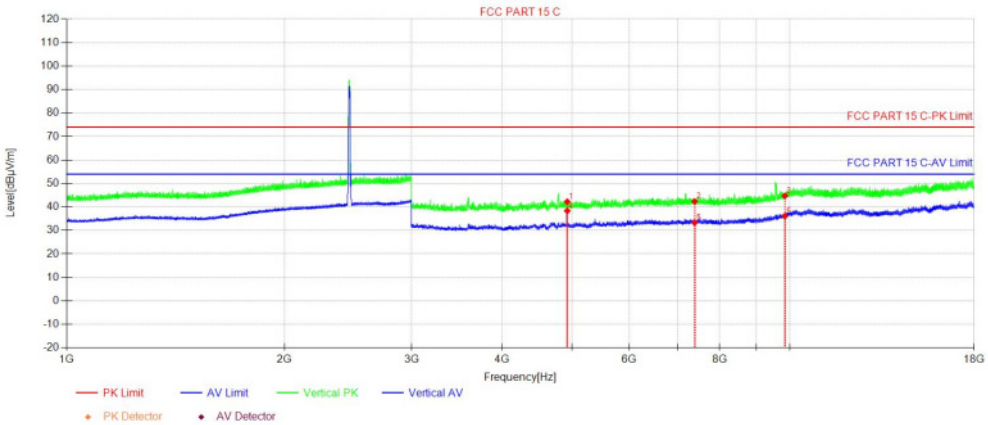
11B 2462MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4923.85	52.73	-4.79	47.94	74.00	26.06	150	89	PK
2	7386.22	43.21	-1.32	41.89	74.00	32.11	150	357	PK
3	9848.59	42.17	2.00	44.17	74.00	29.83	150	161	PK
4	4924.60	49.96	-4.79	45.17	54.00	8.83	150	72	AV
5	7386.22	35.34	-1.32	34.02	54.00	19.98	150	324	AV
6	9848.59	34.56	2.00	36.56	54.00	17.44	150	360	AV

Vertical:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4924.60	47.00	-4.79	42.21	74.00	31.79	150	88	PK
2	7386.22	43.66	-1.32	42.34	74.00	31.66	150	52	PK
3	9848.59	42.75	2.00	44.75	74.00	29.25	150	176	PK
4	4924.60	43.12	-4.79	38.33	54.00	15.67	150	88	AV
5	7386.22	34.63	-1.32	33.31	54.00	20.69	150	52	AV
6	9848.59	34.11	2.00	36.11	54.00	17.89	150	263	AV

Note:

1. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:

   Result Level= Reading Level + Correct Factor(including Ant.Factor, Cable Factor etc.)

2. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

3. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be report.

4. All channels had been pre-test,only the worst case was reported.

3.9 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:			

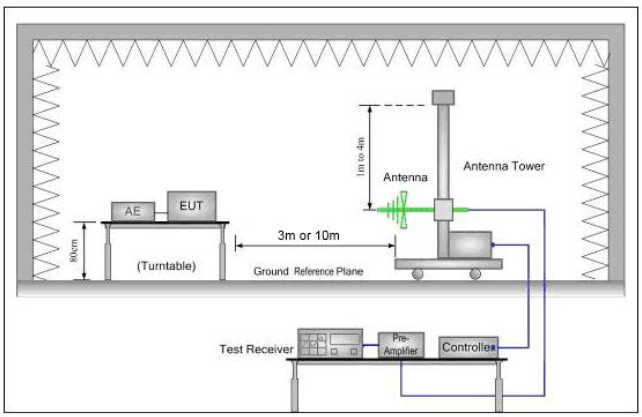


Figure 1. 30MHz to 1GHz

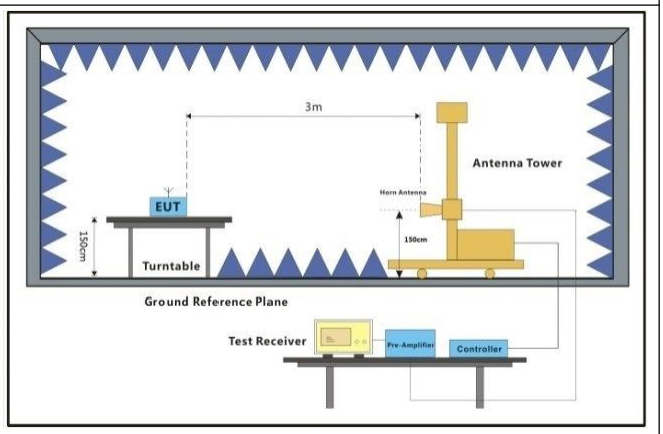


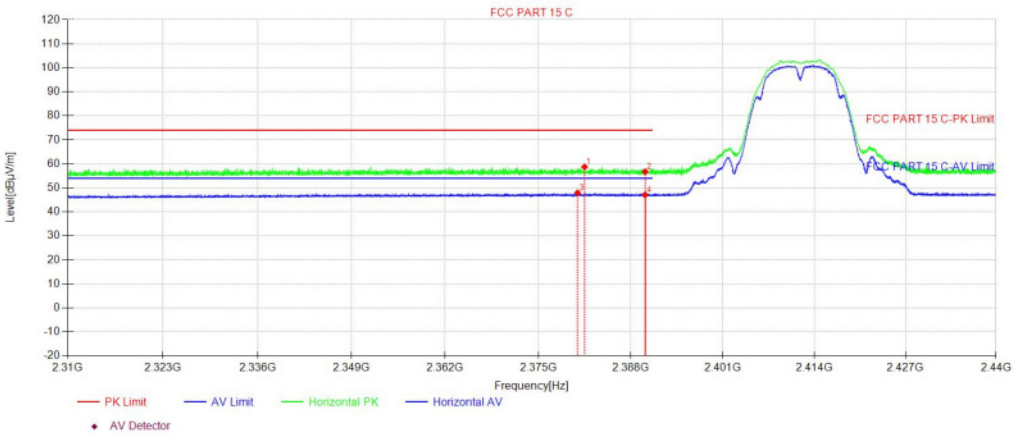
Figure 2. Above 1 GHz

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.
Test Configuration:	Measurements Below 1000MHz • RBW = 120 kHz • VBW = 300 kHz • Detector = Peak • Trace mode = max hold 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.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40); 8Mbps of rate is the worst case of 802.11ax(HE20); 16Mbps of rate is the worst case of 802.11ax(HE40). Only the worst case is recorded in the report.

Instruments Used:	Refer to section 2.9 for details
Test Results:	Pass

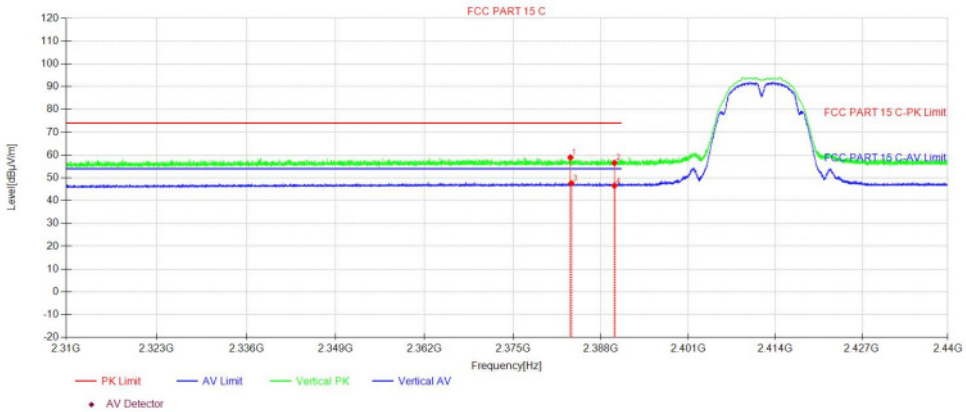
Test Date
11B 2412MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2381.49	59.54	-0.83	58.71	74.00	15.29	150	136	PK
2	2390.01	57.48	-0.80	56.68	74.00	17.32	150	91	PK
3	2380.51	48.72	-0.83	47.89	54.00	6.11	150	192	AV
4	2390.01	47.83	-0.80	47.03	54.00	6.97	150	136	AV

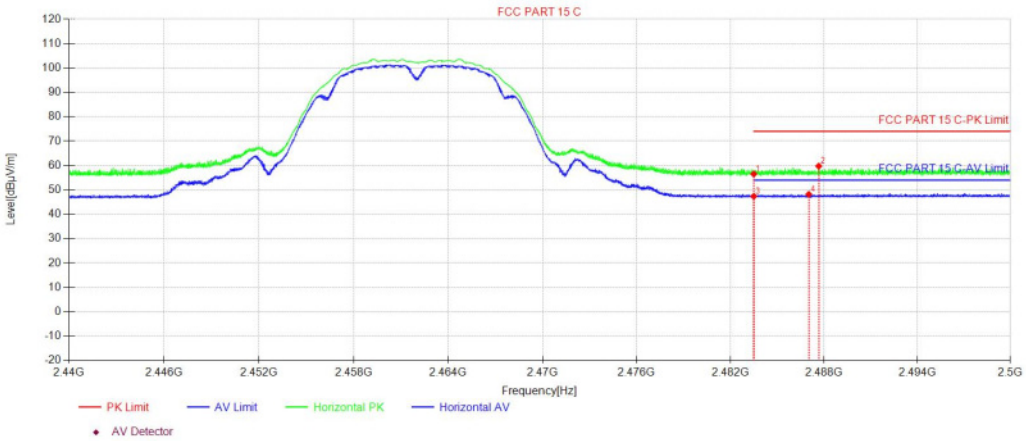
Vertical:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2383.50	59.72	-0.82	58.90	74.00	15.10	150	314	PK
2	2390.01	57.35	-0.80	56.55	74.00	17.45	150	346	PK
3	2383.63	48.43	-0.82	47.61	54.00	6.39	150	176	AV
4	2390.01	47.37	-0.80	46.57	54.00	7.43	150	324	AV

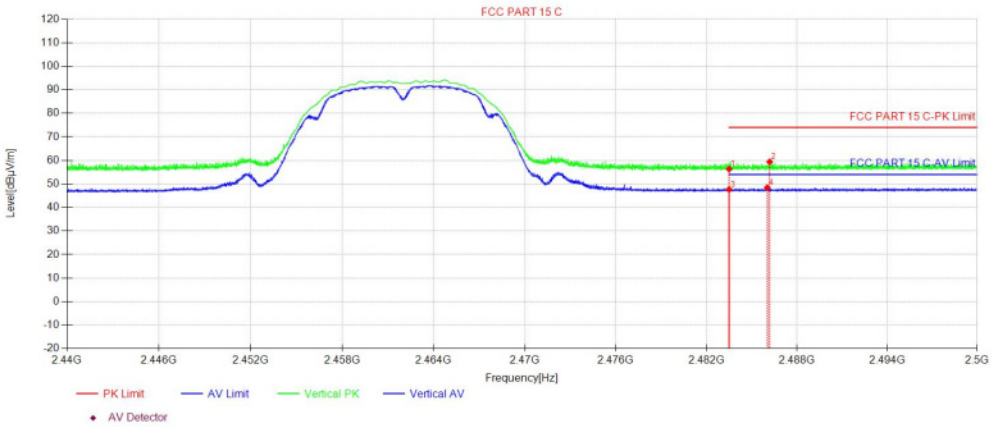
11B 2462MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2483.50	56.81	-0.29	56.52	74.00	17.48	150	321	PK
2	2487.67	60.00	-0.26	59.74	74.00	14.26	150	33	PK
3	2483.50	47.65	-0.29	47.36	54.00	6.64	150	127	AV
4	2487.03	48.42	-0.26	48.16	54.00	5.84	150	33	AV

Vertical:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	AV Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2483.50	56.59	-0.29	56.30	74.00	17.70	150	263	PK
2	2486.20	59.65	-0.27	59.38	74.00	14.62	150	321	PK
3	2483.50	47.94	-0.29	47.65	54.00	6.35	150	28	AV
4	2486.04	48.68	-0.27	48.41	54.00	5.59	150	192	AV

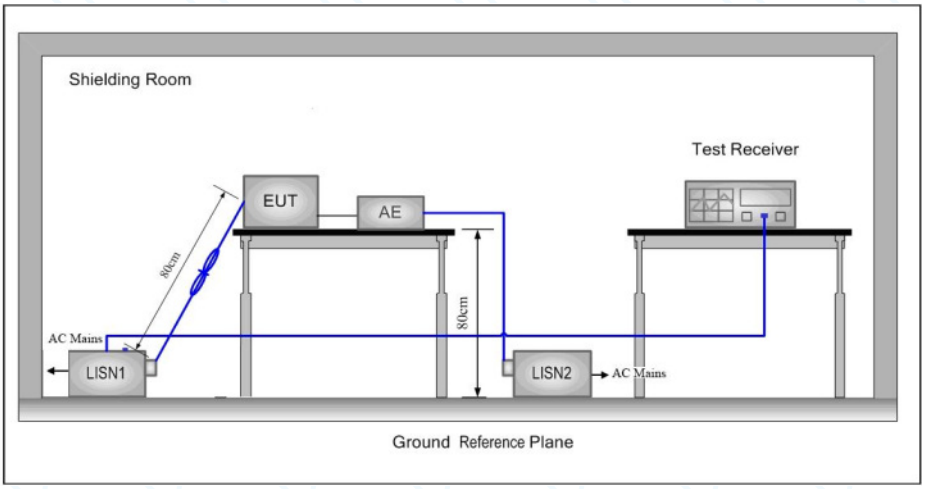
Note:

1. The 802.11b is the worse case.

2. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:

Result Level= Reading Level + Correct Factor(including Ant.Factor ,Cable Factor etc.)

3.10AC 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 6.5Mbps of rate of 802.11n(HT20) at lowest channel is the worst case. Charge + Transmitting mode. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 2.9 for details
Test Results:	Na

4 Appendix

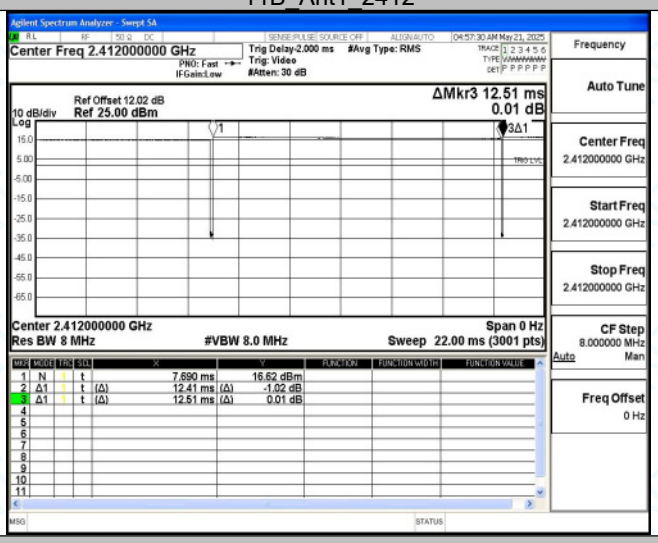
Appendix A: Duty Cycle

Test Result

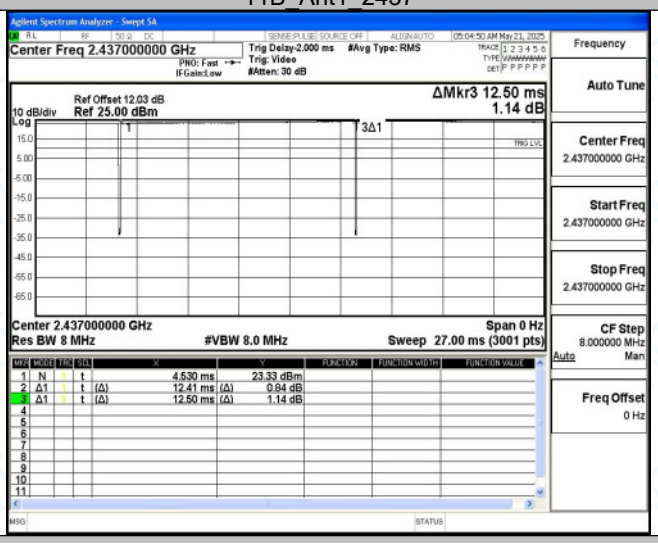
TestMode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	12.41	12.51	99.20
		2437	12.41	12.50	99.28
		2462	12.42	12.52	99.20
11G	Ant1	2412	2.07	2.19	94.52
		2437	2.06	2.18	94.50
		2462	2.06	2.18	94.50
11N20SISO	Ant1	2412	1.92	2.04	94.12
		2437	1.92	2.05	93.66
		2462	1.92	2.06	93.20
11N40SISO	Ant1	2422	0.94	1.04	90.38
		2437	0.95	1.07	88.79
		2452	0.94	1.04	90.38
11AX20SISO	Ant1	2412	1.74	1.86	93.55
		2437	1.74	1.84	94.57
		2462	1.74	1.86	93.55

Test Graphs

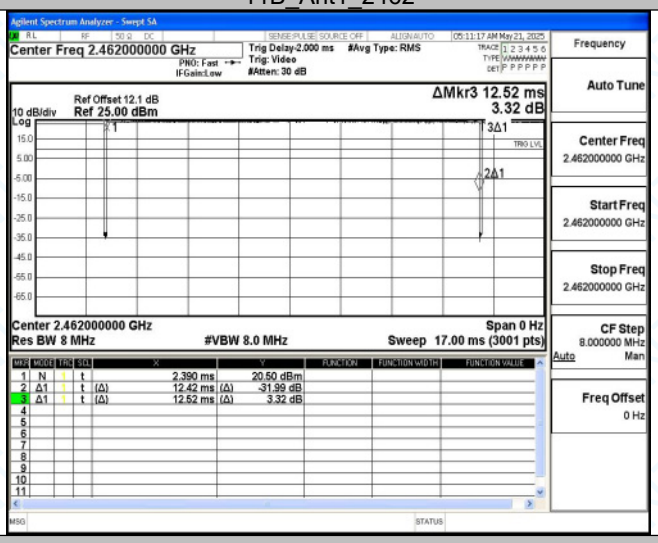
11B_Ant1_2412



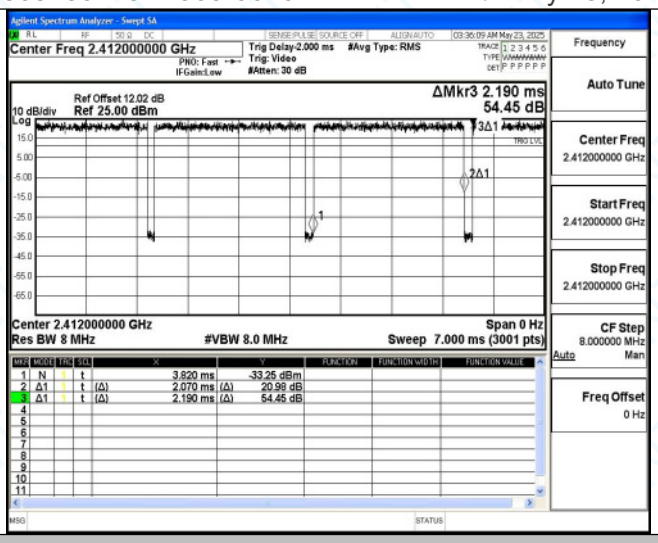
11B_Ant1_2437



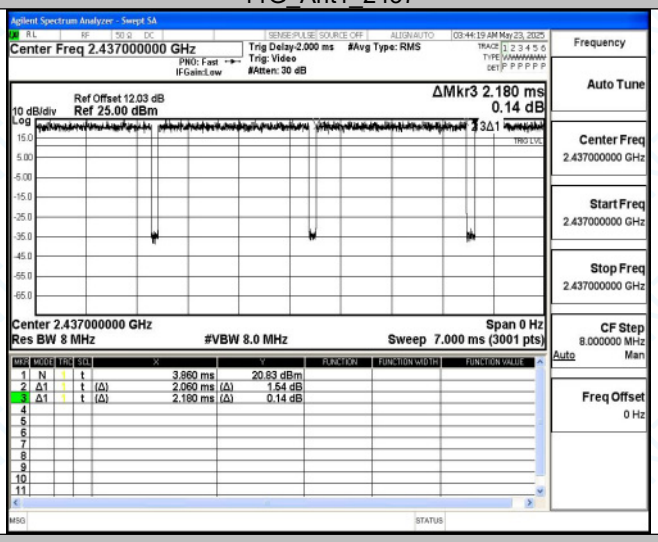
11B_Ant1_2462



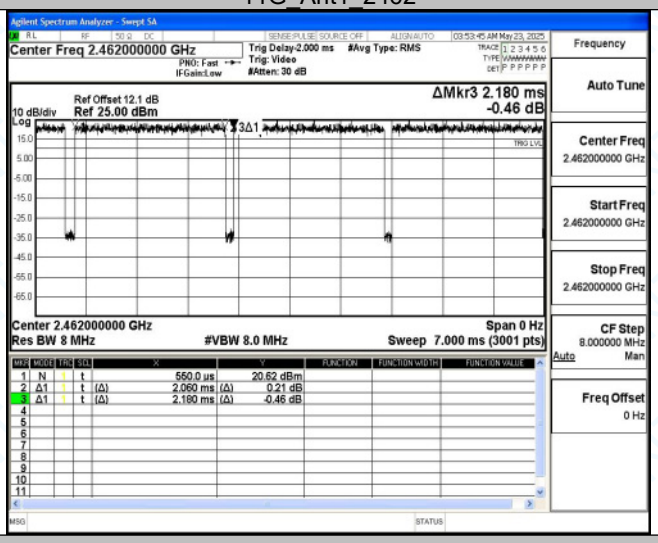
11G_Ant1_2412



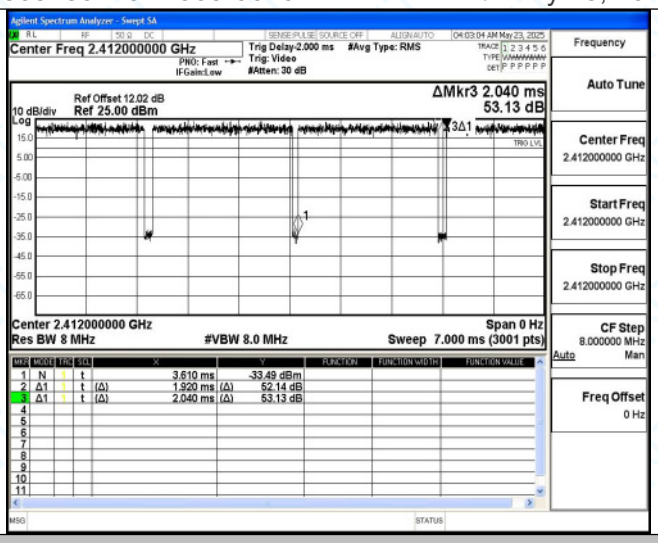
11G_Ant1_2437



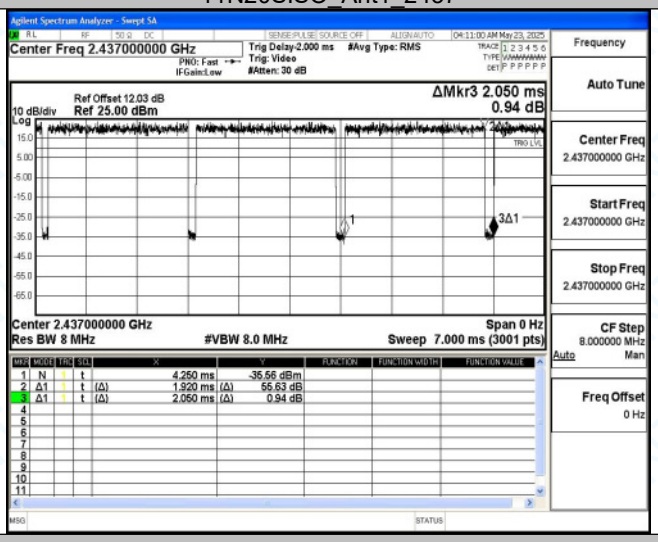
11G_Ant1_2462



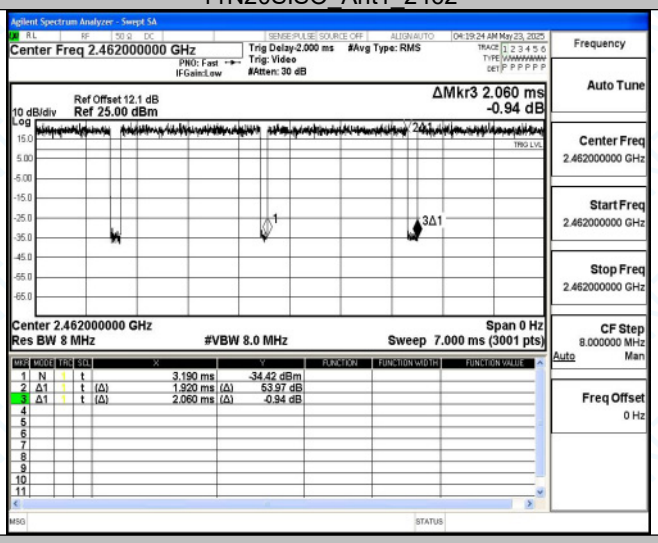
11N20SISO_Ant1_2412



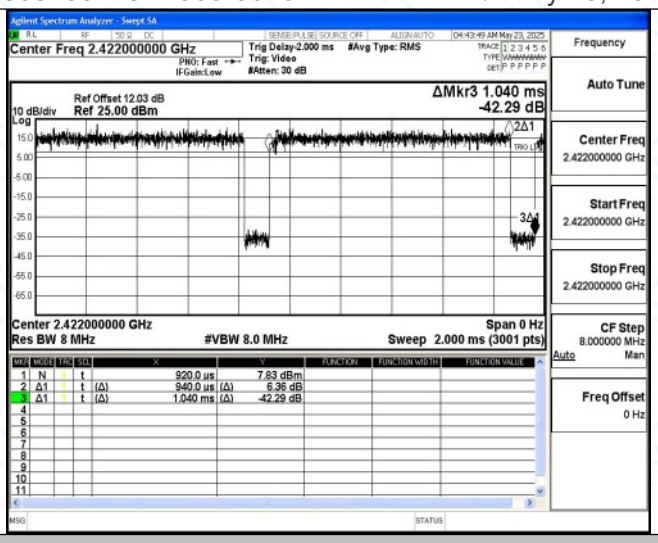
11N20SISO_Ant1_2437



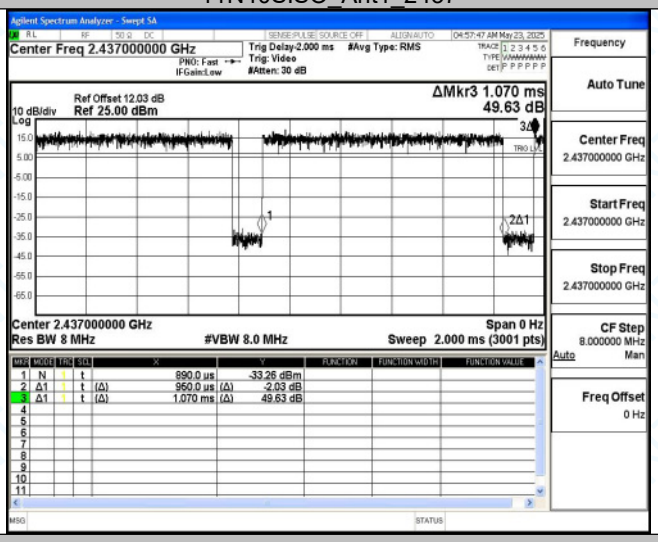
11N20SISO_Ant1_2462



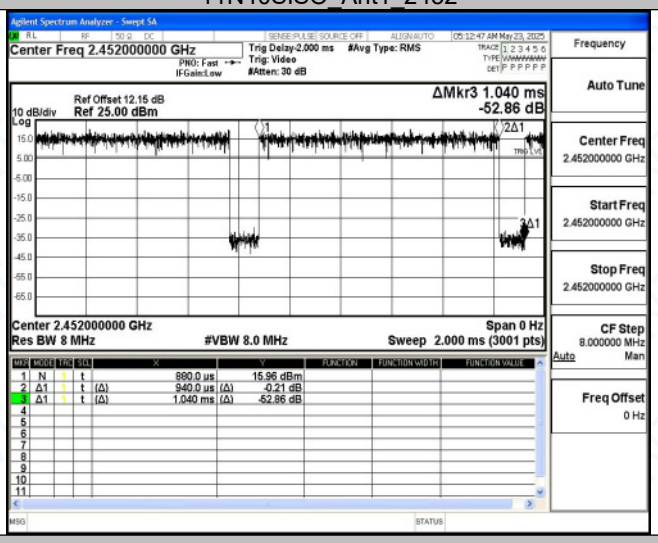
11N40SISO_Ant1_2422



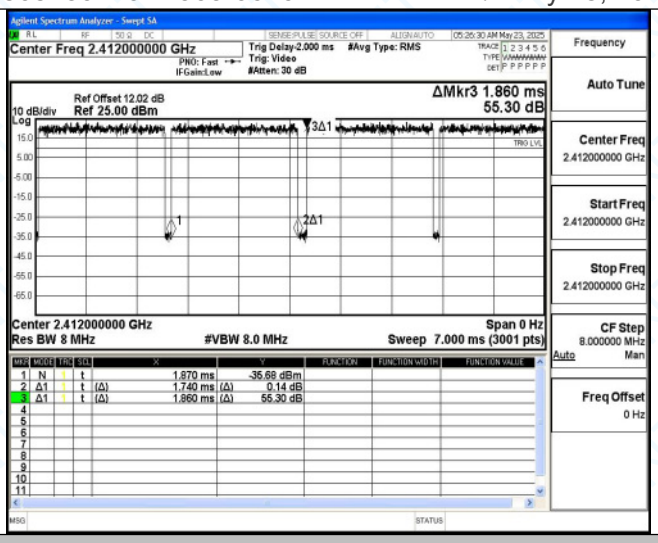
11N40SISO_Ant1_2437



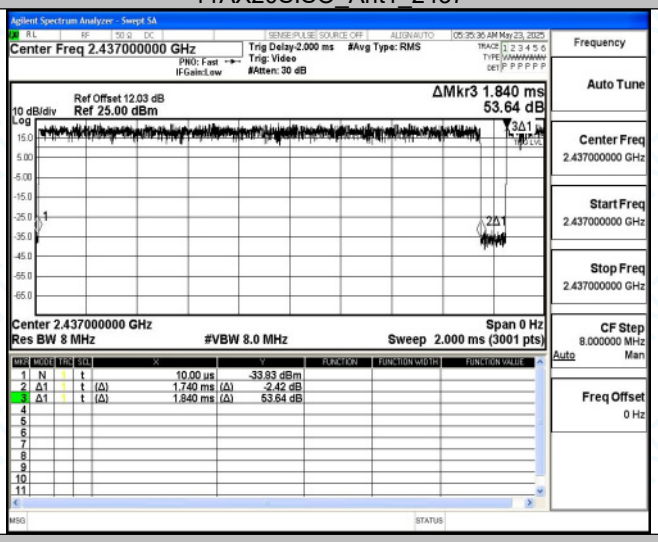
11N40SISO_Ant1_2452



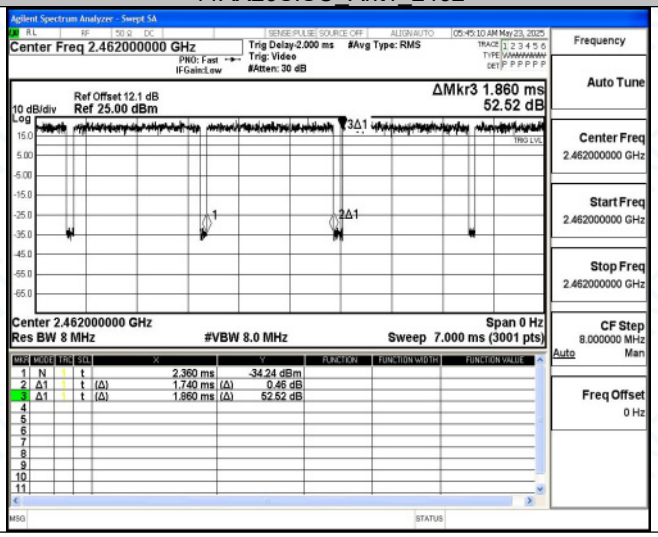
11AX20SISO_Ant1_2412



11AX20SISO_Ant1_2437



11AX20SISO_Ant1_2462



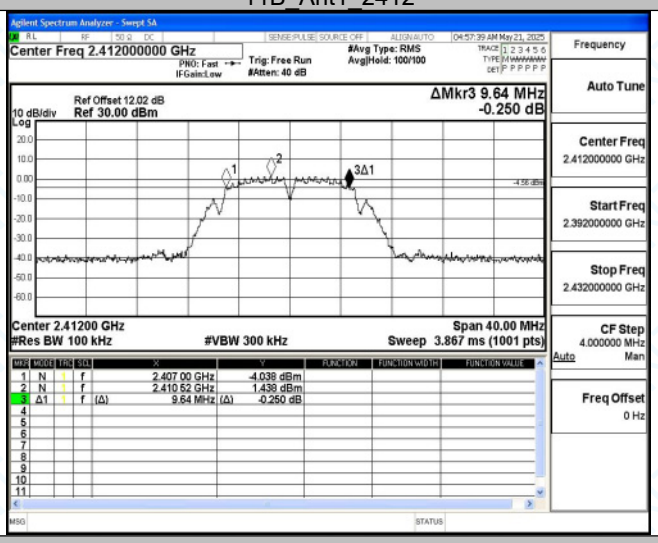
Appendix B: DTS Bandwidth

Test Result

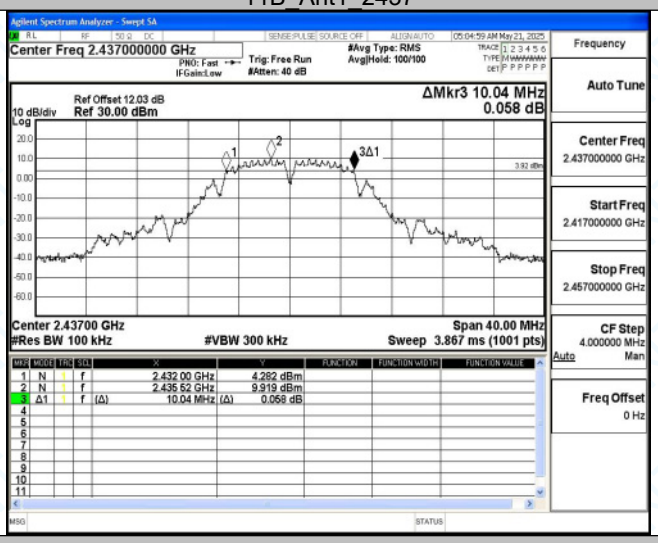
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.640	2407.000	2416.640	0.5	PASS
		2437	10.040	2432.000	2442.040	0.5	PASS
		2462	9.720	2457.000	2466.720	0.5	PASS
11G	Ant1	2412	15.480	2404.240	2419.720	0.5	PASS
		2437	14.640	2429.560	2444.200	0.5	PASS
		2462	16.280	2453.880	2470.160	0.5	PASS
11N20SISO	Ant1	2412	16.320	2404.120	2420.440	0.5	PASS
		2437	16.760	2428.640	2445.400	0.5	PASS
		2462	16.880	2453.880	2470.760	0.5	PASS
11N40SISO	Ant1	2422	35.040	2404.480	2439.520	0.5	PASS
		2437	35.040	2419.480	2454.520	0.5	PASS
		2452	34.960	2434.560	2469.520	0.5	PASS
11AX20SISO	Ant1	2412	18.840	2402.600	2421.440	0.5	PASS
		2437	18.560	2427.880	2446.440	0.5	PASS
		2462	18.720	2452.720	2471.440	0.5	PASS

Test Graphs

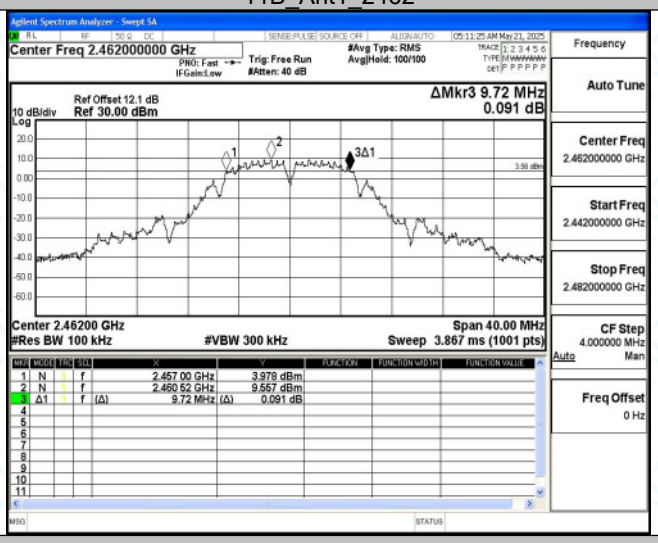
11B_Ant1_2412



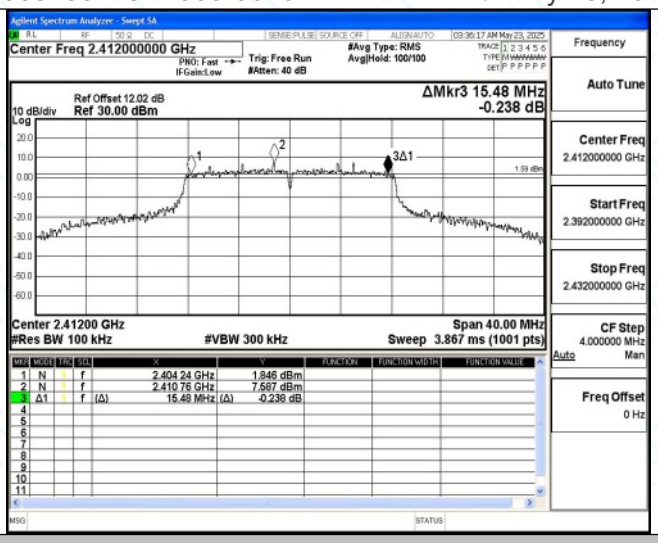
11B_Ant1_2437



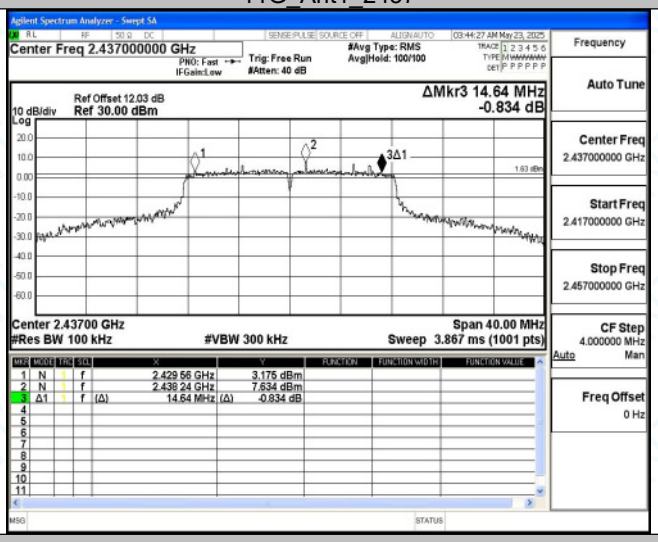
11B_Ant1_2462



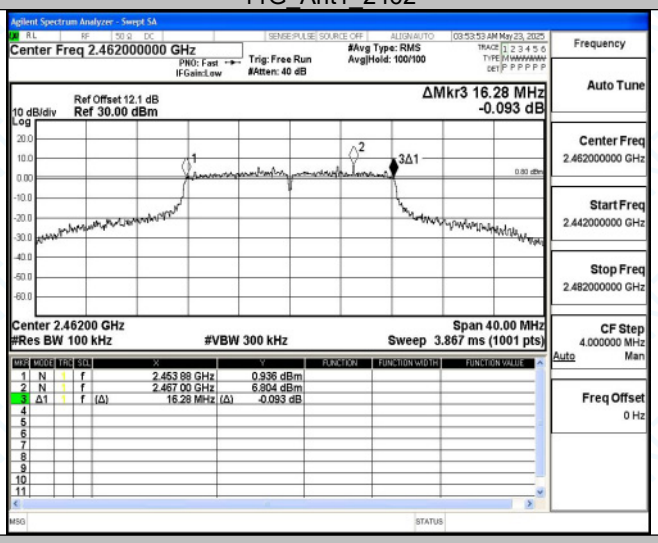
11G_Ant1_2412



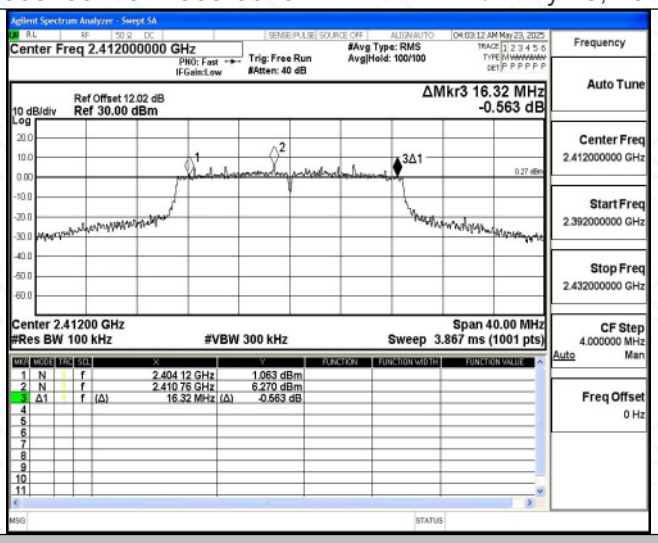
11G_Ant1_2437



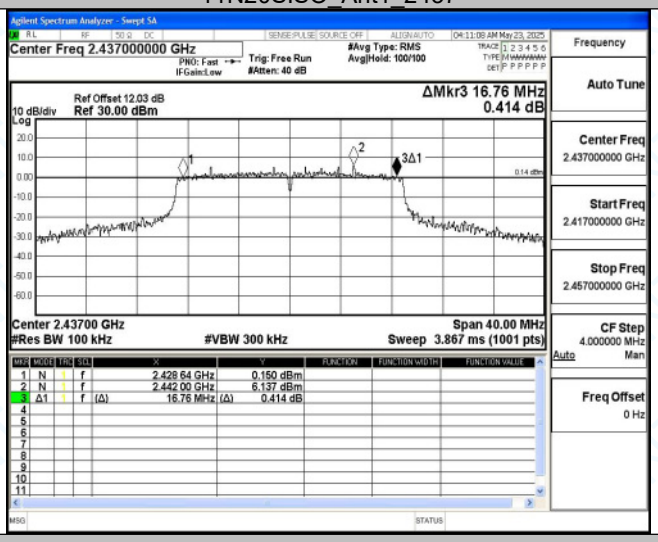
11G_Ant1_2462



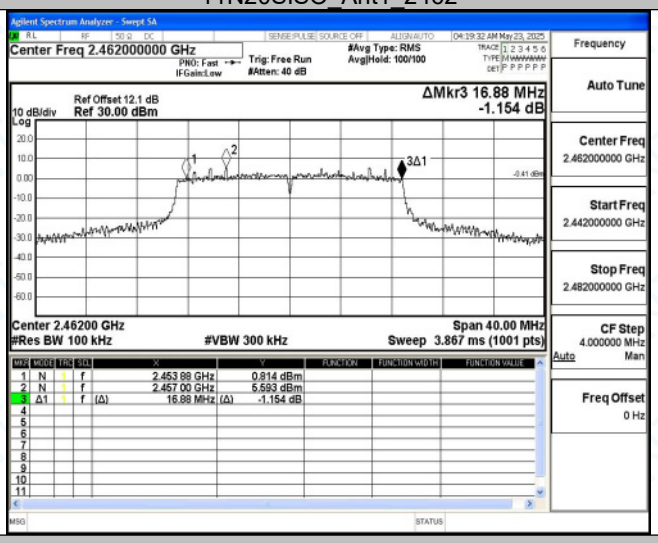
11N20SISO_Ant1_2412



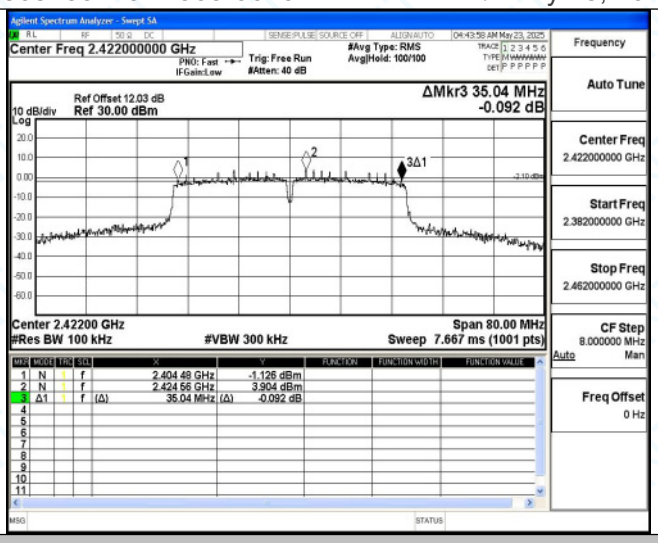
11N20SISO_Ant1_2437



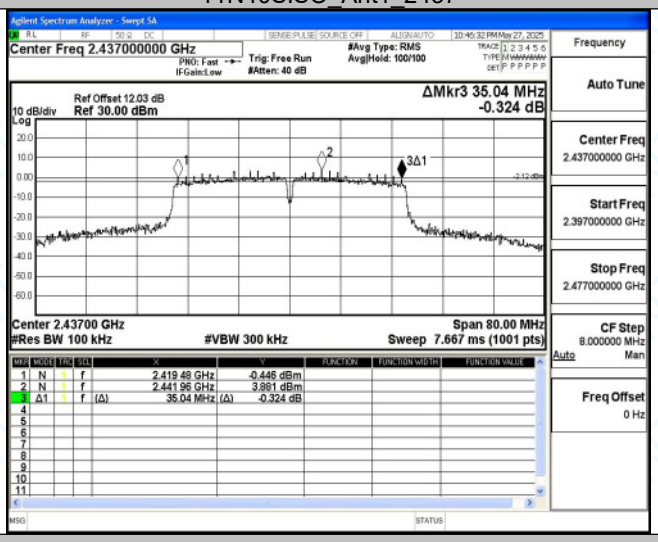
11N20SISO_Ant1_2462



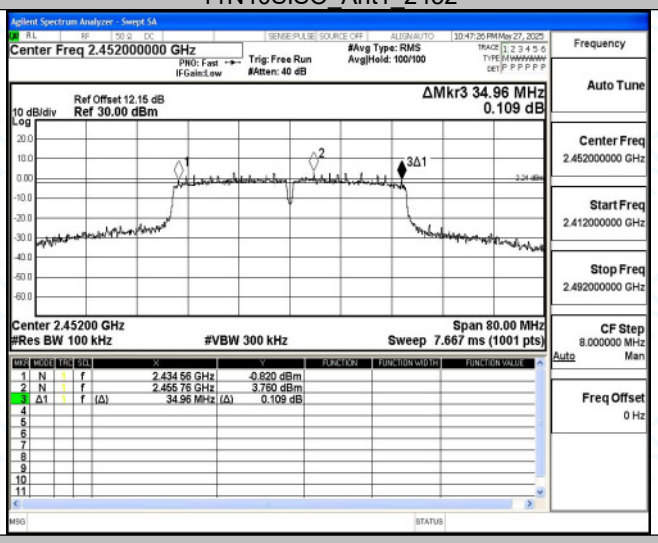
11N40SISO_Ant1_2422



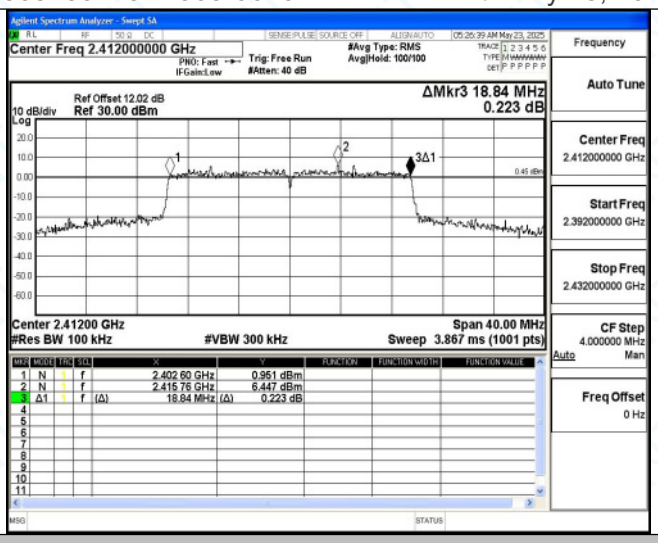
11N40SISO_Ant1_2437



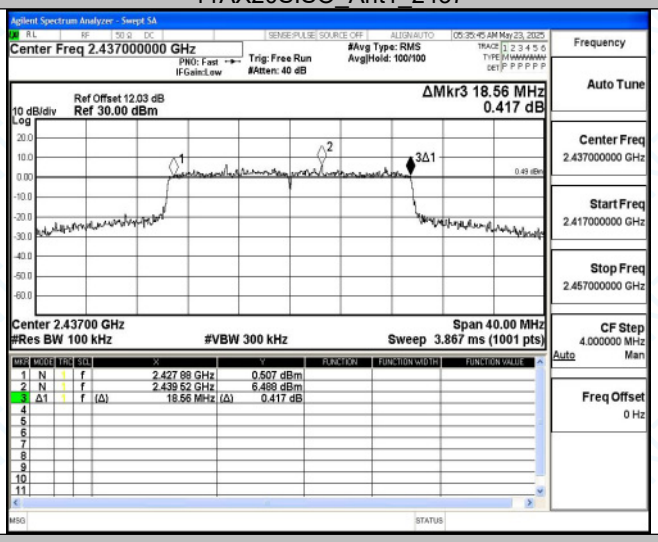
11N40SISO_Ant1_2452



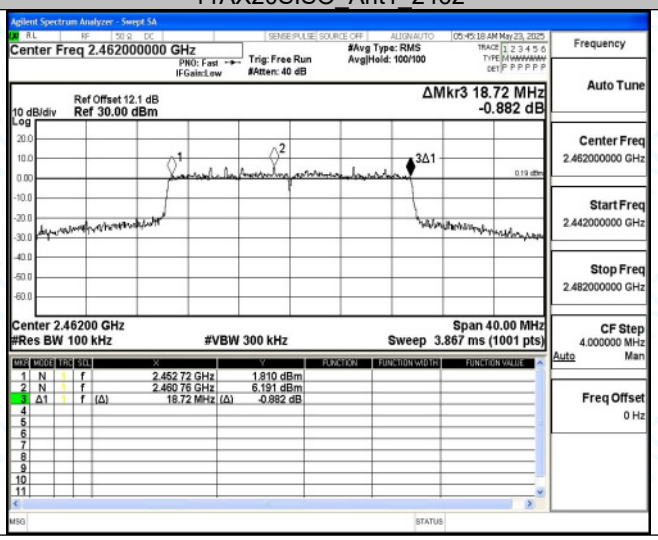
11AX20SISO_Ant1_2412



11AX20SISO_Ant1_2437



11AX20SISO_Ant1_2462



Appendix C: Maximum conducted output power

Test Result

Test Mode	Antenna	Frequency [MHz]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	17.76	≤30.00	PASS
		2437	17.98	≤30.00	PASS
		2462	17.40	≤30.00	PASS
11G	Ant1	2412	17.40	≤30.00	PASS
		2437	17.37	≤30.00	PASS
		2462	17.12	≤30.00	PASS
11N20SISO	Ant1	2412	17.48	≤30.00	PASS
		2437	17.55	≤30.00	PASS
		2462	17.30	≤30.00	PASS
11N40SISO	Ant1	2422	17.70	≤30.00	PASS
		2437	17.47	≤30.00	PASS
		2452	17.42	≤30.00	PASS
11AX20SISO	Ant1	2412	18.31	≤30.00	PASS
		2437	18.24	≤30.00	PASS
		2462	18.10	≤30.00	PASS

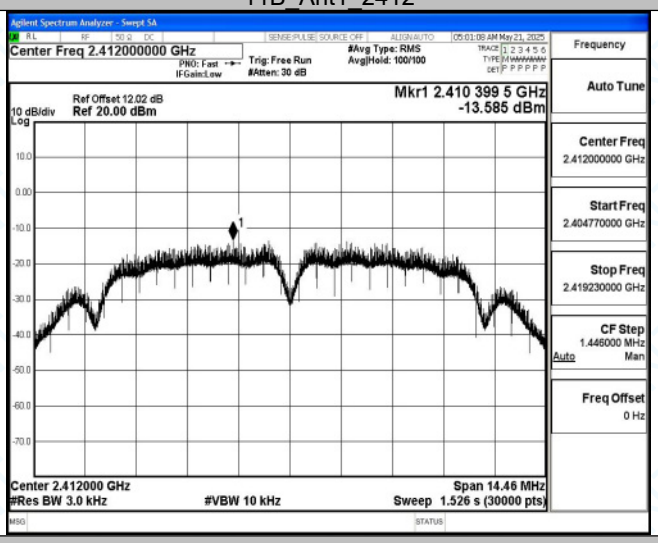
Appendix D: Maximum power spectral density

Test Result

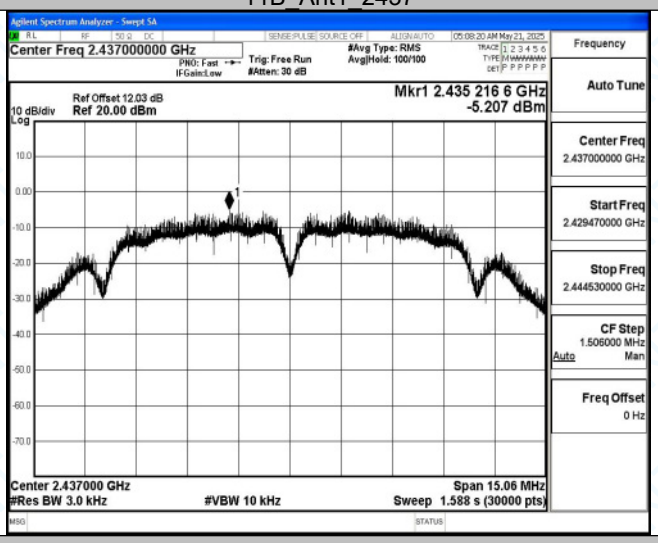
TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-13.59	≤8.00	PASS
		2437	-5.21	≤8.00	PASS
		2462	-5.74	≤8.00	PASS
11G	Ant1	2412	-7.44	≤8.00	PASS
		2437	-7.14	≤8.00	PASS
		2462	-8.10	≤8.00	PASS
11N20SISO	Ant1	2412	-8.59	≤8.00	PASS
		2437	-8.66	≤8.00	PASS
		2462	-8.32	≤8.00	PASS
11N40SISO	Ant1	2422	-17.47	≤8.00	PASS
		2437	-18.05	≤8.00	PASS
		2452	-18.01	≤8.00	PASS
11AX20SISO	Ant1	2412	-7.23	≤8.00	PASS
		2437	-6.87	≤8.00	PASS
		2462	-7.26	≤8.00	PASS

Test Graphs

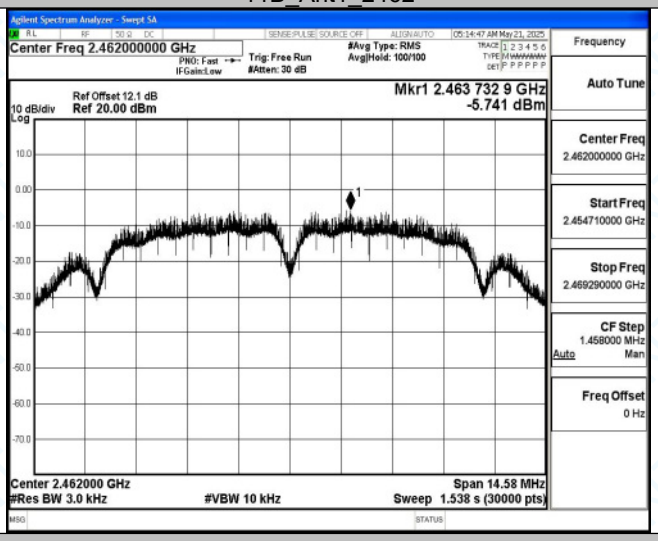
11B_Ant1_2412



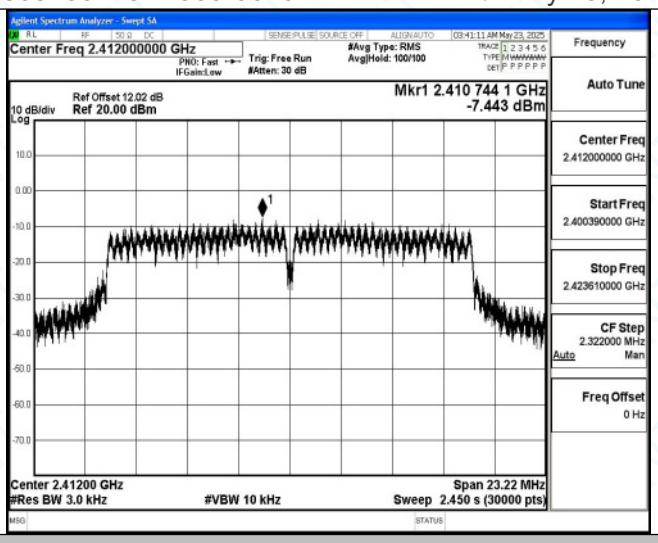
11B_Ant1_2437



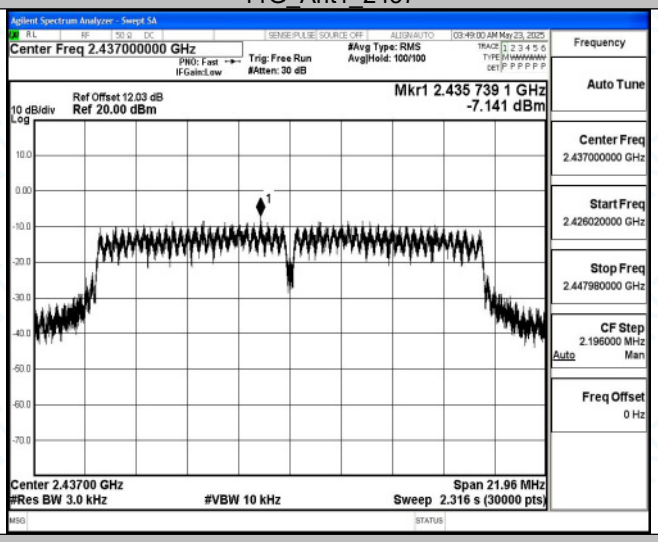
11B_Ant1_2462



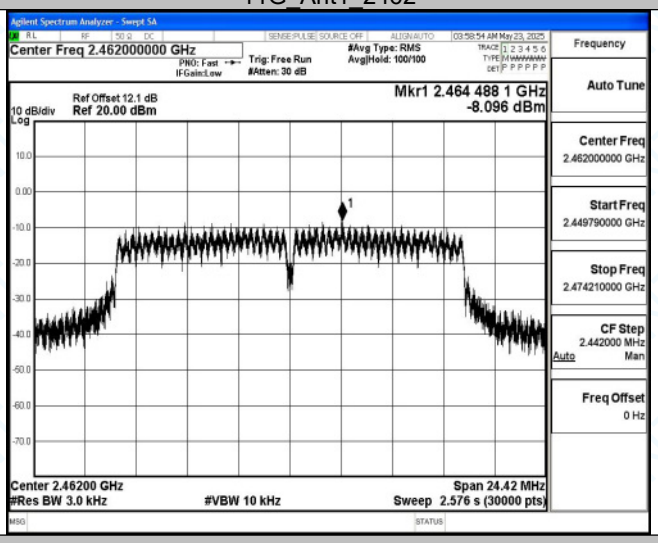
11G_Ant1_2412



11G_Ant1_2437



11G_Ant1_2462



11N20SISO_Ant1_2412