

TEST REPORT
On behalf of

Mettler Toledo (Changzhou) Measurement Technology Co., Ltd

Product Name: Wireless Module

Model No.: MTxP250303ANT1

FCC ID: 2ALAI24MT106

Prepared For: Mettler Toledo (Changzhou) Measurement Technology Co., Ltd
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Date of Test : 2023.11.06-2024.05.27
Date of Report : 2024.06.17

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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TEST REPORT

Applicant : Mettler Toledo (Changzhou) Measurement Technology Co., Ltd
EUT Description : Wireless Module
(A) Model No. : Refer to Sec.2.1
(B) Power Supply : DC 3.15-3.45V
(C) Test Voltage : DC 3.2V (From Li-ion Battery)

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C
AND ANSI C63.10-2013*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.

This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

The test results for EUT's WIFI (5G)/DFS function are contained in No.ACI-F24101, ACI-F24102 report.

Date of Test : 2023.11.06-2024.05.27 Date of Report : 2024.06.17

Producer :

Mindy Wang

MINDY WANG / Assistant

Review :

Lvy - W

Lvy_Ly / Deputy Assistant Manager



For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

Signatory :

Kamp Chen

Authorized Signature(s) KAMP CHEN / Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The result is determined according to the decision rules of customer selection in the ASC-403 application service form.

1. According to IEC GUIDE 115 Procedure 2 and ILAC-G8, the uncertainties value is not used in determining the PASS/FAIL results.

2. If the required specification or standard already contains the decision rules, it will be carried out in accordance with the regulations or standard documents or the requirements of the competent units. If the required specification or standard does not contain a decision rule, the same paragraph 1.

3. If your company has a required decision rule, it will be implemented in accordance with the requirements and ISO/IEC Guide 98-4 specifications.

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(a)(2)
Maximum Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(e)
Antenna Requirement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.203
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : Wireless Module

Type of EUT : ☒ Production ☐ Pre-product ☐ Pro-type

Model Number : MTxP250303ANT1

Radio Tech : IEEE 802.11 a/b/g/n.

Channel Freq. : IEEE 802.11a:
5180MHz—5240MHz; 5260MHz—5320MHz
5500MHz—5700MHz; 5745MHz—5825MHz
IEEE 802.11b: 2412MHz—2462MHz
IEEE 802.11g: 2412MHz—2462MHz
IEEE802.11nHT20:
2412MHz—2462MHz;
5180MHz—5240MHz; 5260MHz—5320MHz
5500MHz—5700MHz; 5745MHz—5825MHz
IEEE802.11nHT40:
5190MHz—5230MHz; 5270MHz—5310MHz
5510MHz—5670MHz; 5755MHz—5795MHz

Modulation : 802.11b: DSSS (CCK, DQPSK, DBPSK);
802.11a/g/n: OFDM (64QAM, 16QAM, QPSK, BPSK).

Antenna Info. : Transmit Type: 1T1X;
RF Module shipped with two ANT ports, and the use
details in EUT list as below:

ANT Port:	ANT1	ANT2
Connector:	IPEX	N/A
Condition:	In use	No use

Note : The EUT shipped with one of Antennas provided as below:

No.	Model	Antenna Type	Range (MHz)	Peak Gain(dBi)
1.	AC-Q24-50ZDB	Dipole	2400-2483.5	2.7
			5150-5250	-1.3
			5250-5350	-1.1
			5500-5700	1.3
			5700-5825	0.8
2.	AC-Q58-50ZDB	Dipole	2400-2483.5	1.3
			5150-5250	4.8
			5250-5350	5.0
			5500-5700	5.4
			5700-5825	5.1

As the Gain showed as above, we select Antenna #1 for the test of Band 2400-2483.5MHz, Antenna #2 for the test of Band UNII-1&2-A&2-C&3.

Applicant : Mettler Toledo (Changzhou) Measurement Technology Co., Ltd
No.111 Taihu West Road Changzhou City,
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Manufacturer : Mettler Toledo (Changzhou) Measurement Technology Co., Ltd
No.111 Taihu West Road Changzhou City,
Jiangsu Province, China.

Factory#1 : Mettler Toledo (Changzhou) Measurement Technology Co., Ltd
No.111 Taihu West Road Changzhou City,
Jiangsu Province, China.

Factory#2 : Mettler-Toledo (Albstadt) GmbH
Unter dem Malesfelsen 34 D – 72458 Albstadt
Germany

Factory#3 : Mettler-Toledo, LLC
1150 Dearborn Drive Worthington, OH 43085-4766
United States of America

2.2 EUT Specifications Assessed in Current Report

Mode	Modulation	Data Rate(Mbps)
802.11b	DS (DQPSK, DBPSK, CCK)	Up to 11
802.11g	OFDM (64-QAM, 16-QAM, QPSK, BPSK)	Up to 54
802.11n-HT 20	OFDM (64-QAM, 16-QAM, QPSK, BPSK)	Up to 72.2

Channel List			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

2.3 Test Information

The test software “Teraterm.exe” was used to control EUT work in TX mode, Power Index and select test channel.

Mode	data rate (Mbps)	txpwr1 Setting	Test Channel		Frequency (MHz)
802.11b	11	12	Low:	1	2412
		12	Middle:	6	2437
		12	High:	11	2462
802.11g	6	12	Low:	1	2412
		12	Middle:	6	2437
		12	High:	11	2462
802.11n20	MCS0	12	Low:	1	2412
		12	Middle:	6	2437
		12	High:	11	2462

2.4 Duty Cycle Check

Mode	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)	Duty Cycle Correct Factor
802.11b	0.8613	0.8765	98.27	N/A
802.11g	1.43	1.45	98.62	N/A
802.11n20	1.336	1.359	98.31	N/A



2.5 Sample Description

Test Item	Model Number	Sample Number	Date of receipted
Conducted Emission	--	--	--
Radiated Emission	MTxP250303ANT1	E20231121274a-01/01	2023.10.08
Conducted RF Test	MTxP250303ANT1	E20231121274a-01/01	2023.10.08

2.6 Supported equipment

Brand : Acer
Product Name: : Notebook PC
Model Name : TravelMate P238 series
Model Number : N15W8

Product Name : Test Fixture
Product Function : USB to TTL

2.7 Description of Test Facility

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F, Building 34, No. 680 Guiping Rd.,
Caohejing, Hi-Tech Park,
Shanghai 200233, China

Accredited by NVLAP, Lab Code : 200371-0

FCC Designation Number : CN5027

Test Firm Registration Number : 954668

3 RADIATED EMISSION TEST

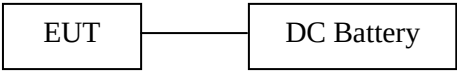
3.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

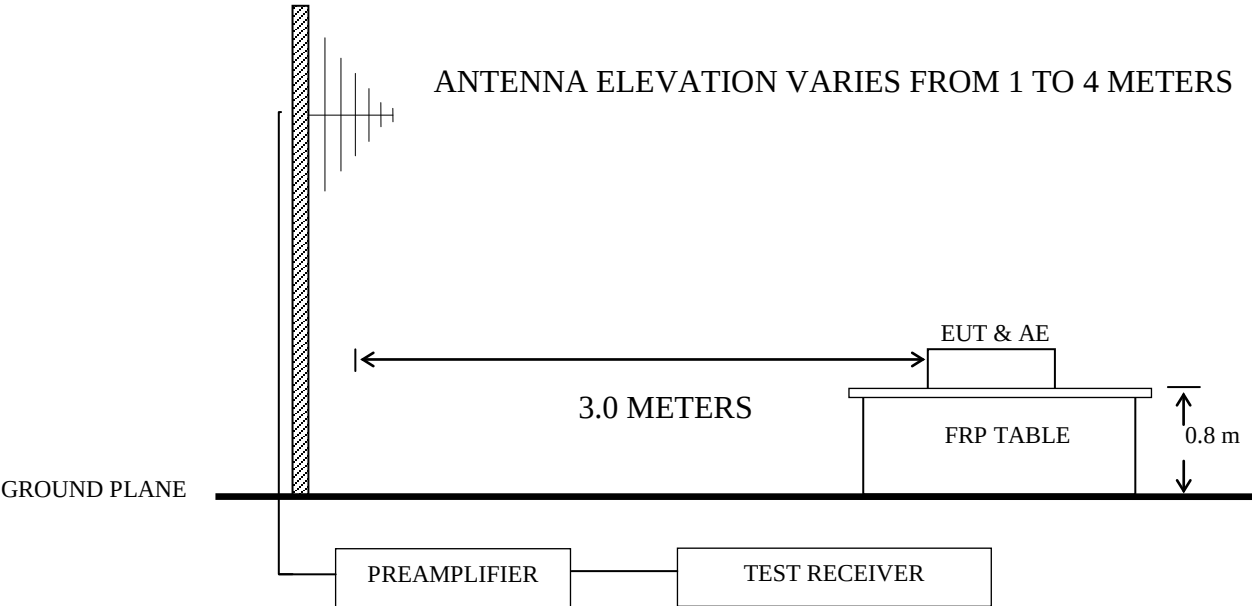
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Preamplifier	Agilent	8447D	2944A10548	2024.02.22	1 Year
2.	Preamplifier	HP	8449B	3008A00864	2024.02.22	1 Year
3.	EXA Signal Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
4.	Test Receiver	R&S	ESCI	101303	2024.02.22	1 Year
5.	Bilog Antenna+ 6dB Attenuator	Schwarzbeck	VULB 9168+ EMCI-N-6-06	708+AT-N0638	2024.03.08	1 Year
6.	Horn Antenna	EMCO	3115	96074878	2023.08.02	1 Year
7.	Horn Antenna	EMCO	3116	00062643	2024.01.30	2 Year
8.	Cavity Band Rejection Filter	Microwave	WT-A3882-R10	WT200312-1-1	2024.02.22	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6200655086	2024.02.22	1 Year
10.	Coaxial Cable	SCHAFFNER	RG 212U-MIL C 17+N1K50-EW06 30-N1K50-15m-1	RE-10m-001/ RE-15m-002	2024.02.22	1 Year
11.	Software	Audix	e3	e3.v9.210616	--	--

3.2 Block Diagram of Test Setup

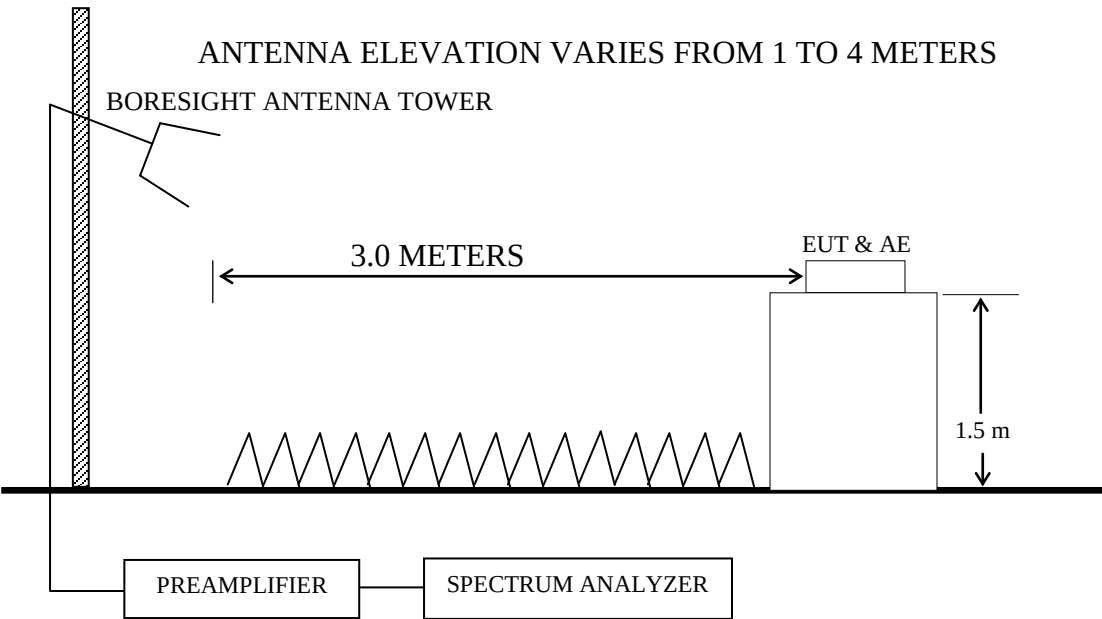
3.2.1 EUT & Peripherals



3.2.2 Below 1GHz



3.2.3 Above 1GHz



3.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
NOTE 1 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m) NOTE 2 - The tighter limit applies at the band edges. NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system. NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz. NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT			

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 4.2.

3.5.2 Connect the EUT and the TTL terminal of Test Fixture through three HCI cables of EUT, as follows (TX to RXD, RX to TXD, GND to GND, CTS to CTS, RTS to RTS). Plug the USB terminal of Test Fixture to the USB port of Notebook PC.

3.5.3 Run the software as section 2.3 and turn on the EUT to upload test firmware, use the test command to select the test mode, then disconnect the Test Fixture from EUT, remove the Test Fixture and Notebook PC, then test.

3.5.4 Repeat step 4.5.3 and 4.5.4, until the test of all modes finished.

3.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna,

which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of Agilent N9010A was set at 1MHz for above 1GHz.

The frequency range from 30 MHz to 25 GHz (Up to 10th harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

3.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

No any emissions were found from 18GHz to 40GHz. So the Radiated emission from 18GHz to 40GHz were not record.

Frequency range: below 1GHz (Worst case emission)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P16-17

Frequency range: above 1GHz

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P18-19
2.			6	2437 MHz	P20-21
3.			11	2462 MHz	P22-23
4.		802.11g	1	2412 MHz	P24-25
5.		802.11n20	1	2412 MHz	P26-27

Band-Edge and Restricted bands:

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P28-29
2.			11	2462 MHz	P30-31
3.		802.11g	1	2412 MHz	P32-33
4.			11	2462 MHz	P34-35
5.		802.11n20	1	2412 MHz	P36-37
6.			11	2462 MHz	P38-39

NOTE 1 – Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin = Limits - Emission Level.

NOTE 2 – “QP” means “Quasi-Peak” values

NOTE 3 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – The emission levels which not reported are too low against the official limit.

NOTE 5 – The emission levels recorded below is data of EUT configured in Lying direction, for this direction was the maximum emission direction during the test. The data of Side & Standing direction are too low against the official limit to be reported.

NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.

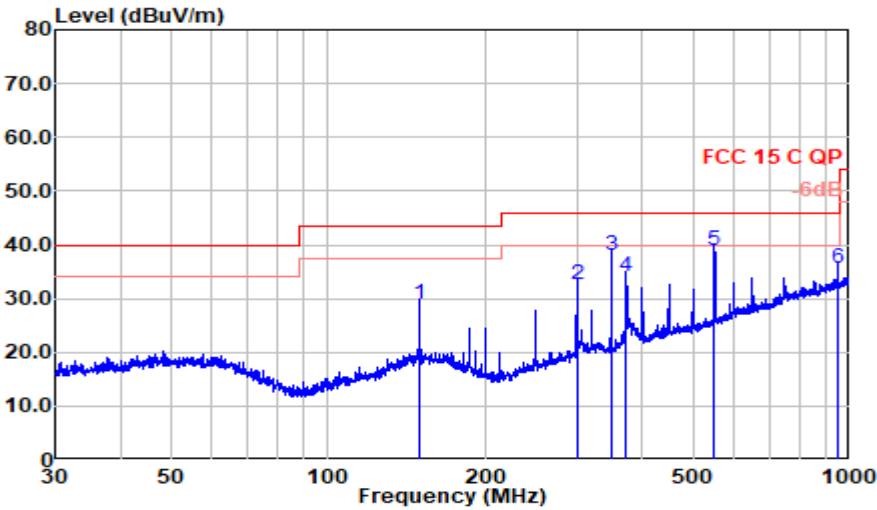
For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

NOTE 7 – The frequency range 2310-2390MHz & 2483.5-2500MHz were tested for Restricted bands.

Radiated emission < 1GHz

Test Date:	2024.05.26	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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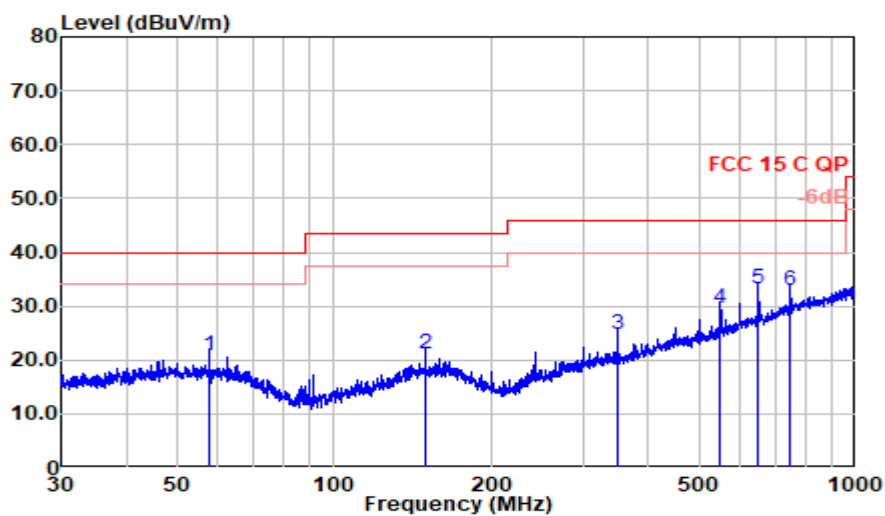
Mode: 802.11b CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
150.011	37.85	19.10	1.34	29.40	28.89	43.50	14.61	QP
299.841	40.37	19.10	1.93	28.70	32.69	46.00	13.31	QP
350.477	44.95	20.02	2.00	28.90	38.07	46.00	7.93	QP
373.311	40.17	20.83	2.10	29.00	34.11	46.00	11.89	QP
549.983	41.47	24.20	2.60	29.20	39.07	46.00	6.93	QP
950.426	30.20	29.40	3.33	27.40	35.54	46.00	10.46	QP

Mode: 802.11b CH2412MHz



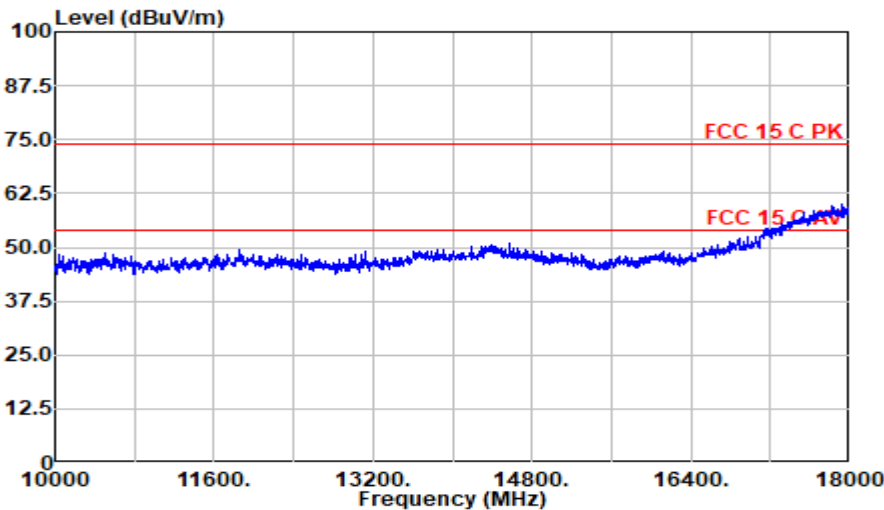
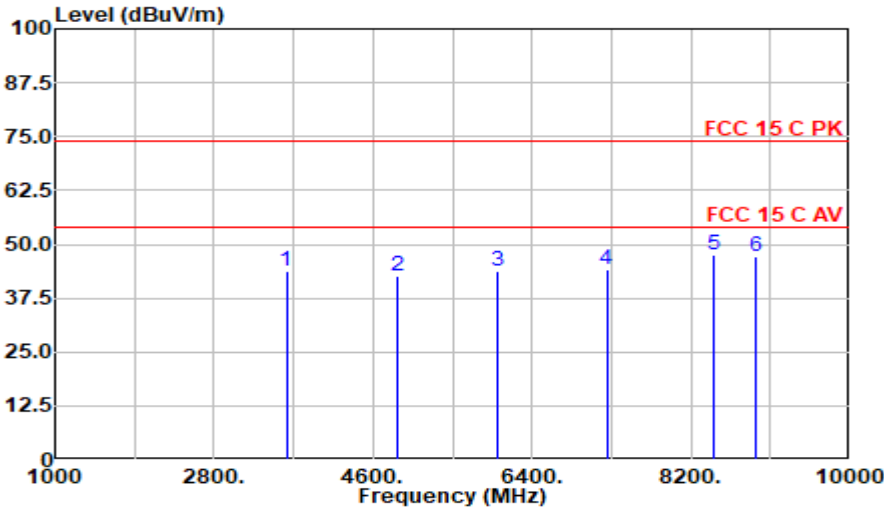
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
57.796	30.75	19.22	0.83	29.87	20.93	40.00	19.07	QP
150.011	30.06	19.10	1.34	29.40	21.10	43.50	22.40	QP
350.477	31.76	20.02	2.00	28.90	24.88	46.00	21.12	QP
549.983	32.09	24.20	2.60	29.20	29.69	46.00	16.31	QP
650.800	32.94	26.10	2.86	28.80	33.11	46.00	12.89	QP
750.108	30.51	27.70	3.00	28.30	32.91	46.00	13.09	QP

Radiated Emission > 1GHz

Test Date:	2024.05.27	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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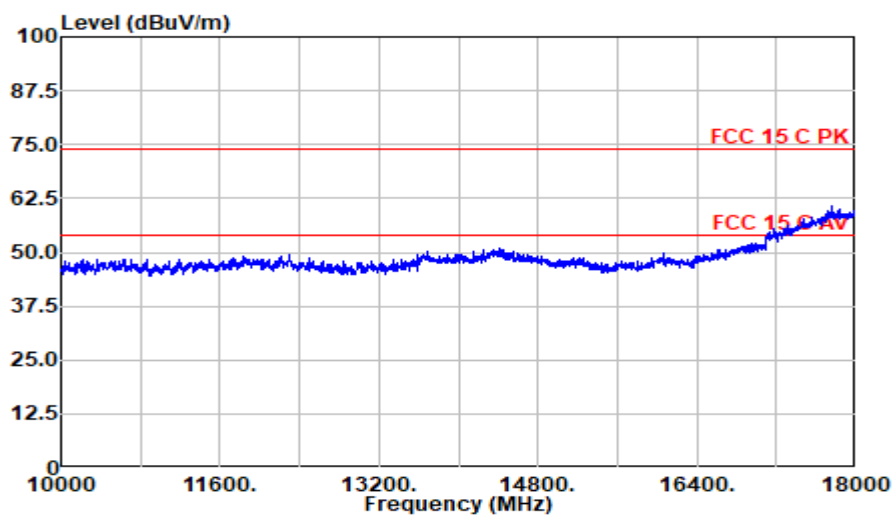
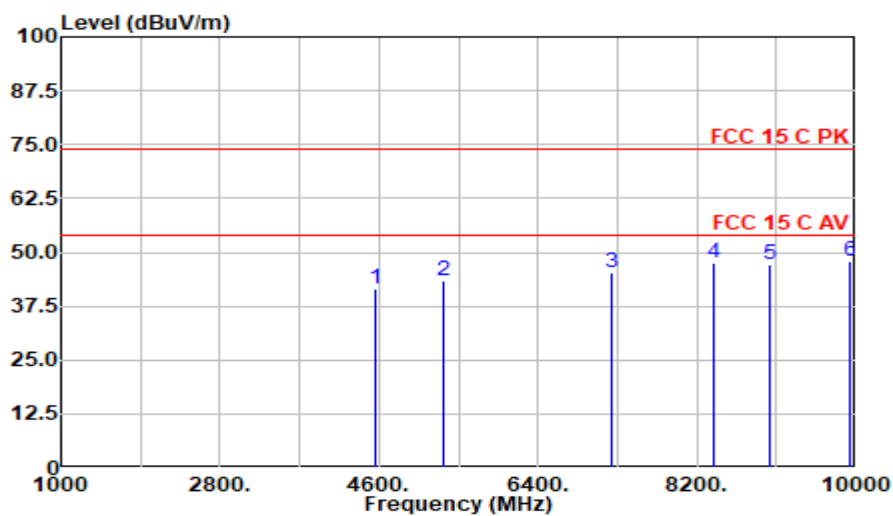
Mode: 802.11b CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3619.000	41.72	31.54	6.44	36.04	43.67	74.00	30.33	Peak
4879.000	37.01	33.37	7.69	35.37	42.71	74.00	31.29	Peak
6008.500	36.57	34.23	8.43	35.30	43.93	74.00	30.07	Peak
7246.000	33.52	36.56	9.52	35.53	44.08	74.00	29.92	Peak
8452.000	34.30	38.20	10.46	35.60	47.36	74.00	26.64	Peak
8942.500	34.00	38.01	10.61	35.60	47.02	74.00	26.98	Peak

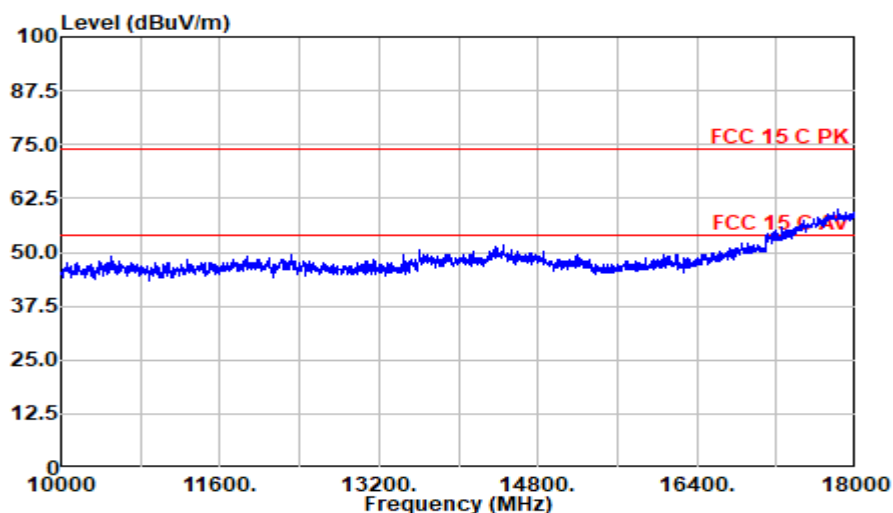
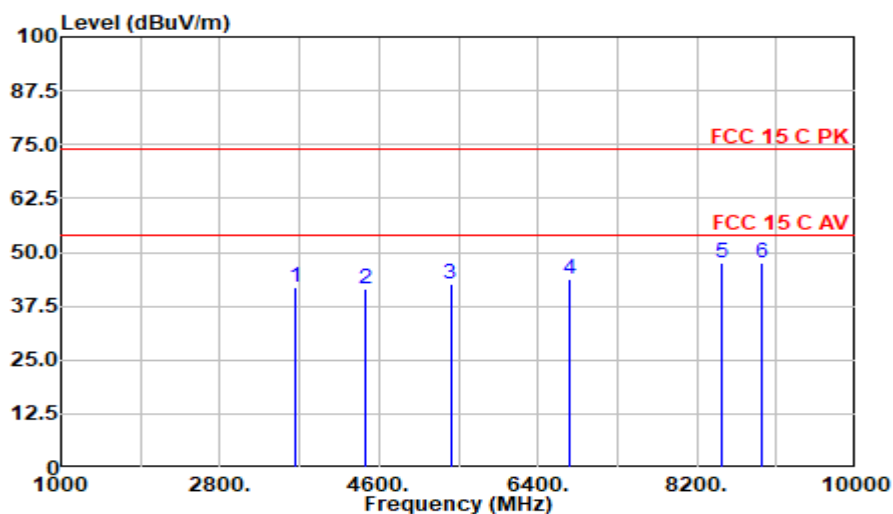
Mode: 802.11b CH2412MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
4559.500	37.19	32.38	7.37	35.55	41.39	74.00	32.61	Peak
5324.500	36.69	34.00	8.02	35.30	43.41	74.00	30.59	Peak
7237.000	34.89	36.47	9.51	35.52	45.35	74.00	28.65	Peak
8393.500	34.44	38.10	10.44	35.60	47.38	74.00	26.62	Peak
9019.000	33.76	38.24	10.65	35.59	47.05	74.00	26.95	Peak
9937.000	33.55	38.40	11.40	35.32	48.03	74.00	25.97	Peak

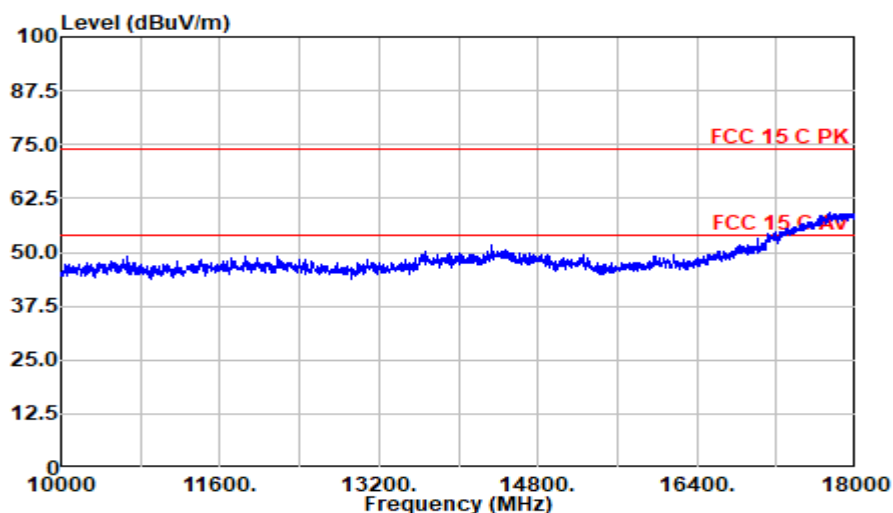
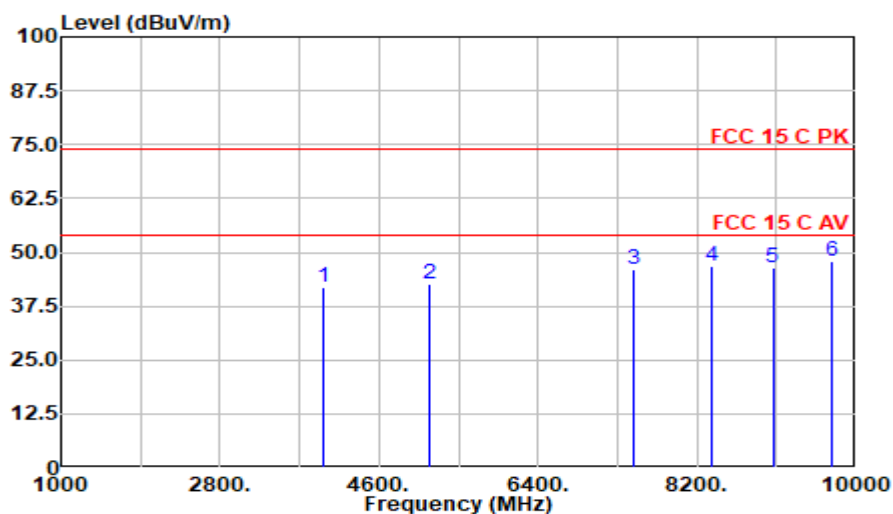
Mode: 802.11b CH2437MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3655.000	39.72	31.63	6.47	36.03	41.80	74.00	32.20	Peak
4442.500	37.49	32.57	7.25	35.62	41.69	74.00	32.31	Peak
5410.000	35.72	34.04	8.07	35.30	42.53	74.00	31.47	Peak
6769.000	34.77	35.36	9.07	35.46	43.74	74.00	30.26	Peak
8488.000	34.34	38.20	10.47	35.60	47.41	74.00	26.59	Peak
8933.500	34.42	38.03	10.61	35.60	47.46	74.00	26.54	Peak

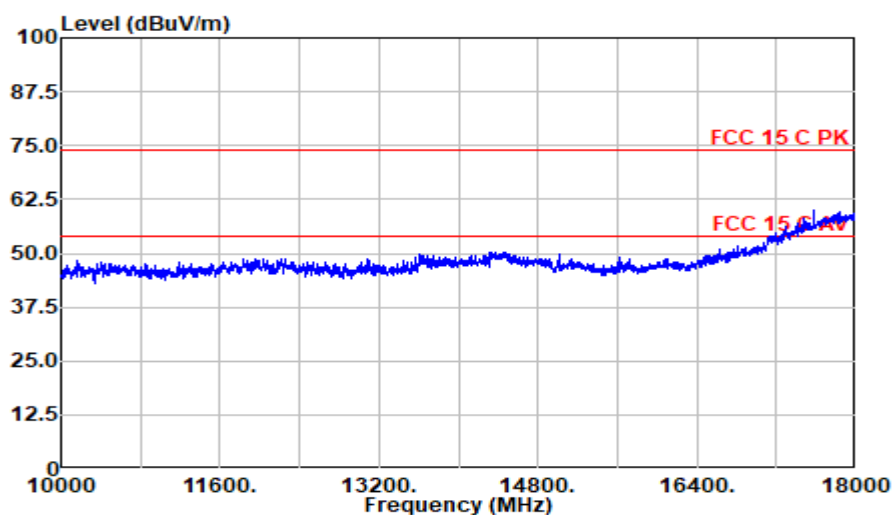
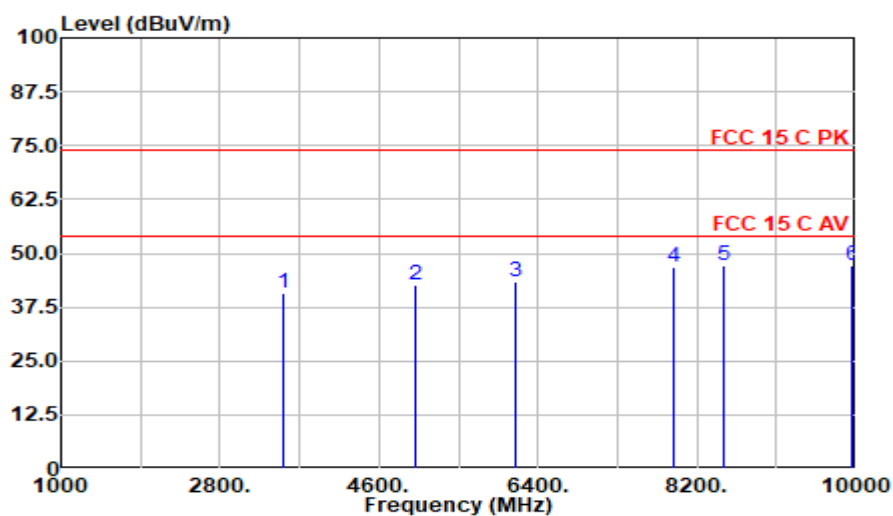
Mode: 802.11b CH2437MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3961.000	38.43	32.78	6.72	35.91	42.02	74.00	31.98	Peak
5176.000	36.19	33.95	7.93	35.30	42.76	74.00	31.24	Peak
7480.000	34.92	36.84	9.78	35.55	45.98	74.00	28.02	Peak
8357.500	33.94	38.10	10.43	35.60	46.87	74.00	27.13	Peak
9059.500	33.13	38.30	10.68	35.58	46.53	74.00	27.47	Peak
9739.000	34.11	38.10	11.24	35.38	48.08	74.00	25.92	Peak

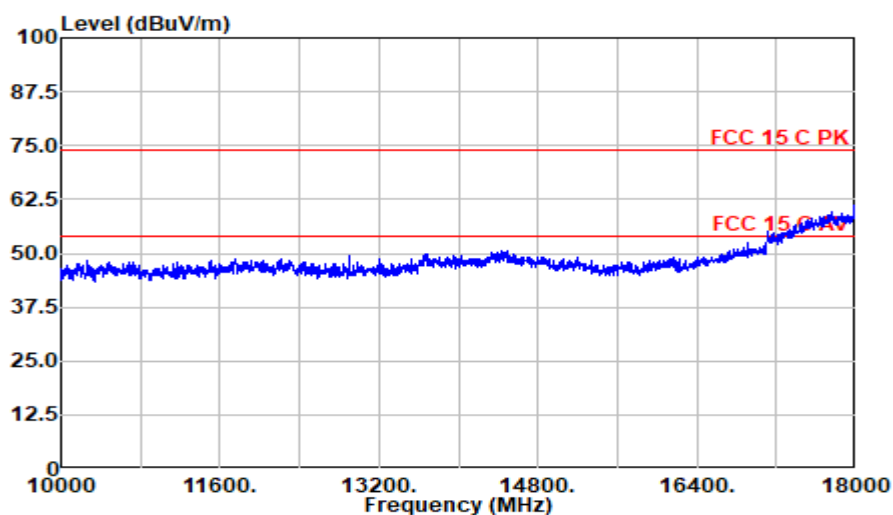
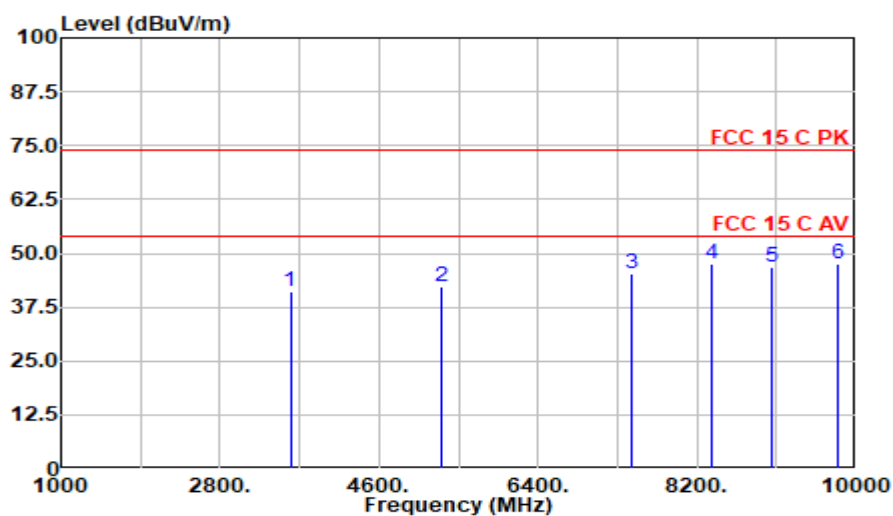
Mode: 802.11b CH2462MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3506.500	39.07	31.59	6.35	36.08	40.92	74.00	33.08	Peak
5018.500	36.59	33.44	7.82	35.30	42.54	74.00	31.46	Peak
6139.000	35.82	34.42	8.54	35.33	43.46	74.00	30.54	Peak
7939.000	34.65	37.32	10.25	35.59	46.63	74.00	27.37	Peak
8515.000	34.00	38.20	10.48	35.60	47.08	74.00	26.92	Peak
9955.000	32.76	38.39	11.41	35.31	47.25	74.00	26.75	Peak

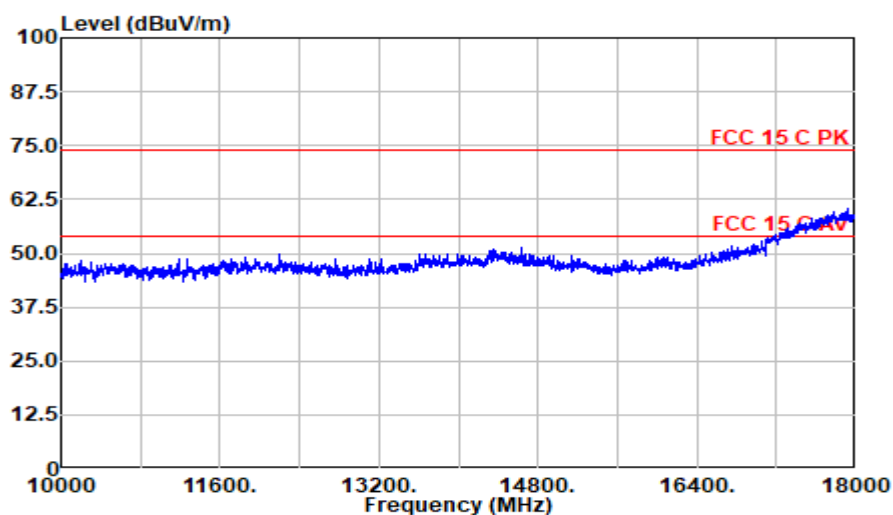
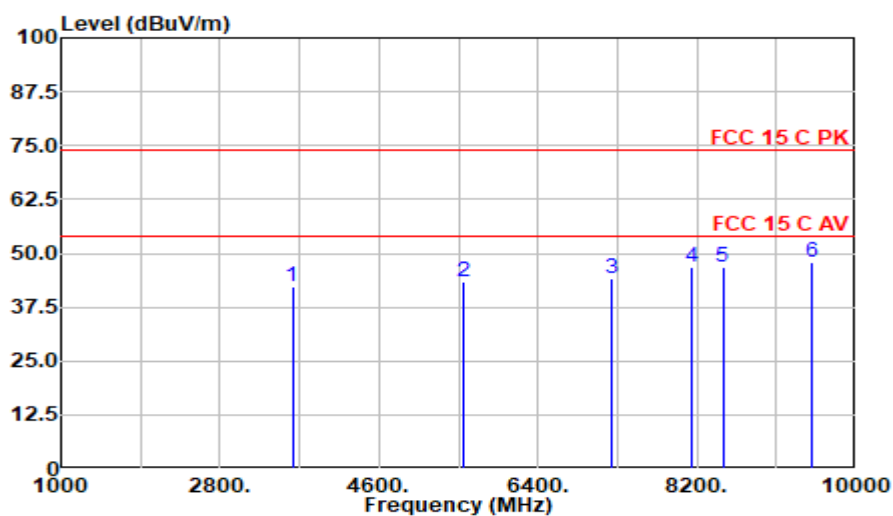
Mode: 802.11b CH2462MHz



Polarization at Vertical

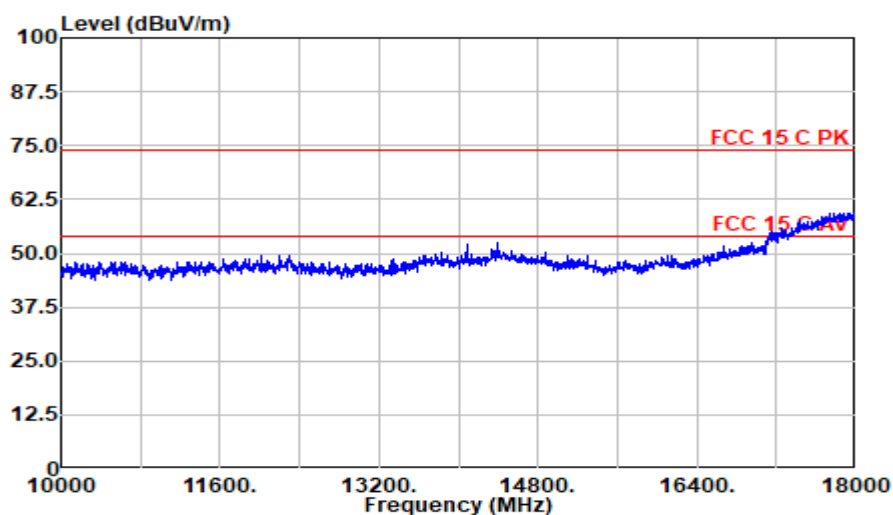
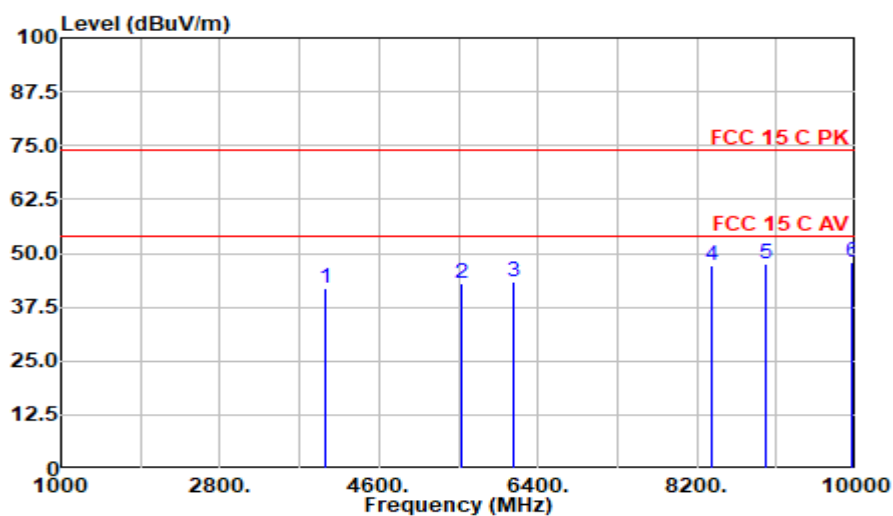
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3596.500	39.39	31.50	6.42	36.05	41.27	74.00	32.73	Peak
5311.000	35.63	33.94	8.01	35.30	42.29	74.00	31.71	Peak
7453.000	34.32	36.89	9.75	35.55	45.42	74.00	28.58	Peak
8375.500	34.55	38.10	10.43	35.60	47.48	74.00	26.52	Peak
9041.500	33.34	38.28	10.67	35.59	46.70	74.00	27.30	Peak
9797.500	33.33	38.10	11.29	35.36	47.36	74.00	26.64	Peak

Mode: 802.11g CH2412MHz



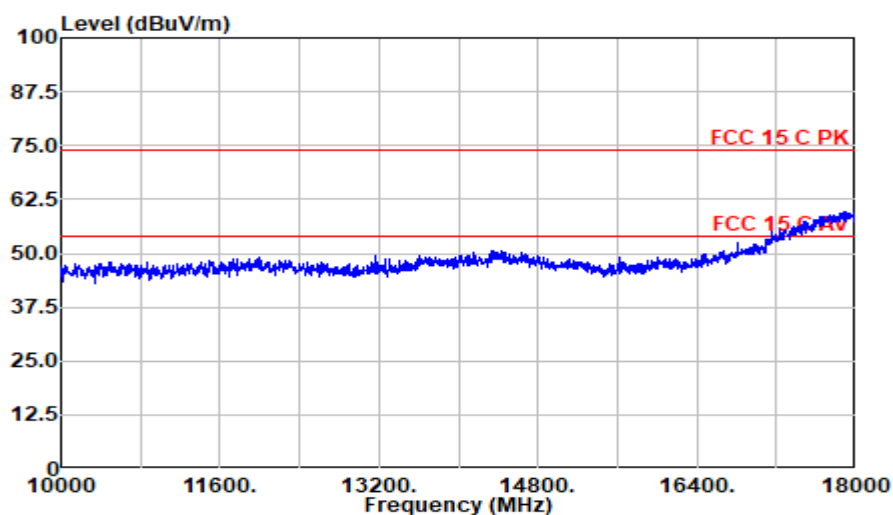
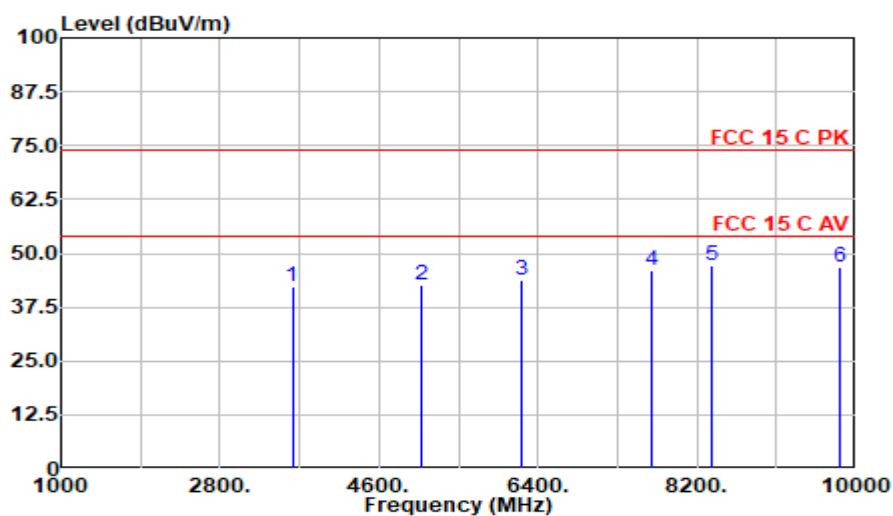
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3619.000	40.19	31.54	6.44	36.04	42.13	74.00	31.87	Peak
5549.500	36.35	34.10	8.16	35.30	43.31	74.00	30.69	Peak
7228.000	33.93	36.38	9.50	35.52	44.29	74.00	29.71	Peak
8141.500	34.54	37.47	10.36	35.60	46.77	74.00	27.23	Peak
8492.500	33.74	38.20	10.47	35.60	46.81	74.00	27.19	Peak
9500.500	33.88	38.40	11.05	35.45	47.89	74.00	26.11	Peak

Mode: 802.11g CH2412MHz**Polarization at Vertical**

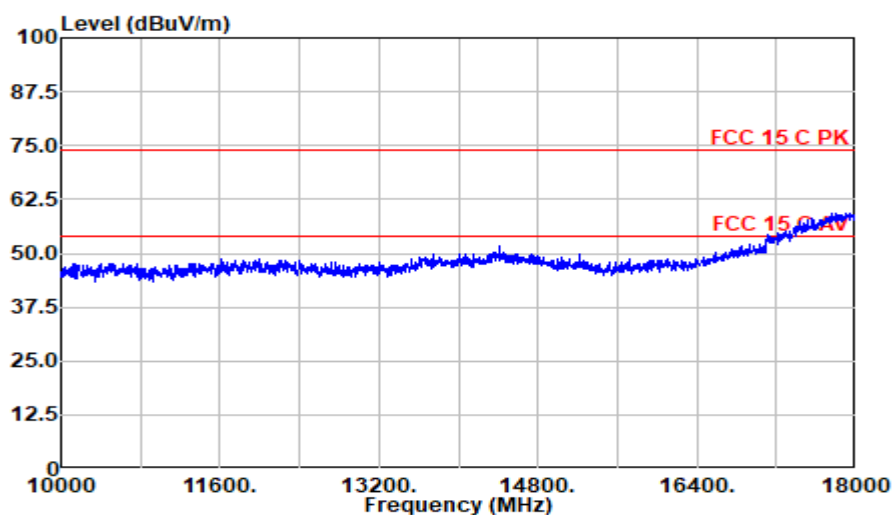
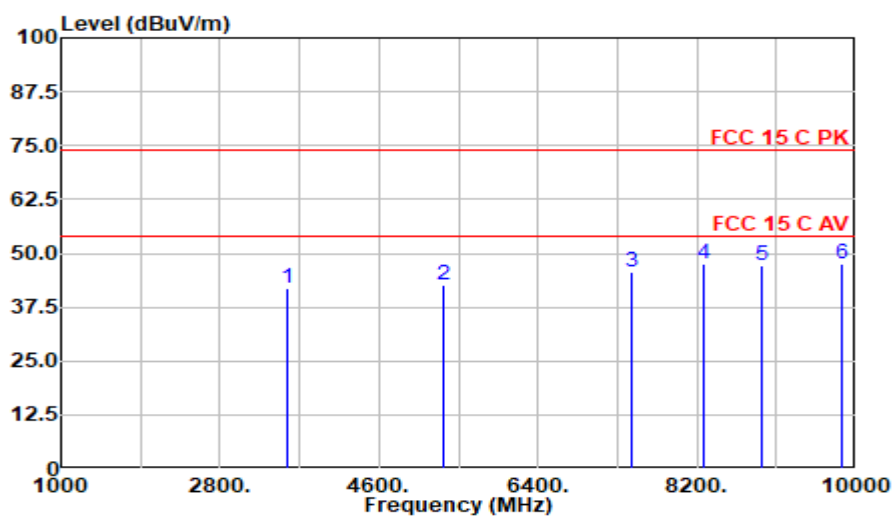
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3983.500	38.20	32.73	6.74	35.91	41.77	74.00	32.23	Peak
5545.000	36.13	34.11	8.16	35.30	43.10	74.00	30.90	Peak
6121.000	35.57	34.46	8.53	35.33	43.23	74.00	30.77	Peak
8366.500	34.07	38.10	10.43	35.60	47.00	74.00	27.00	Peak
8969.500	34.30	38.08	10.62	35.60	47.40	74.00	26.60	Peak
9950.500	33.51	38.40	11.41	35.31	48.00	74.00	26.00	Peak

Mode: 802.11n CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3619.000	40.39	31.54	6.44	36.04	42.33	74.00	31.67	Peak
5090.500	36.57	33.58	7.87	35.30	42.72	74.00	31.28	Peak
6215.500	35.84	34.63	8.61	35.35	43.73	74.00	30.27	Peak
7682.500	34.71	36.80	9.99	35.57	45.93	74.00	28.07	Peak
8366.500	34.06	38.10	10.43	35.60	46.99	74.00	27.01	Peak
9820.000	32.76	38.14	11.31	35.35	46.85	74.00	27.15	Peak

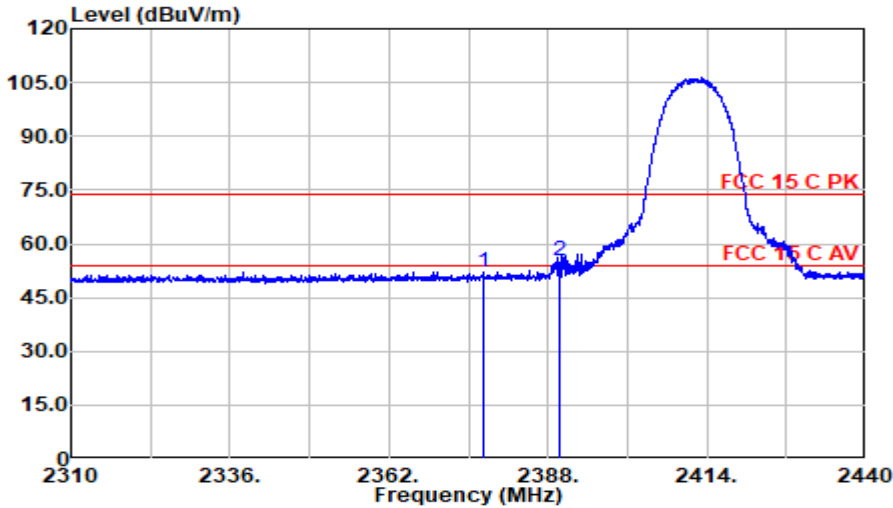
Mode: 802.11n CH2412MHz**Polarization at Vertical**

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3569.500	39.94	31.50	6.40	36.06	41.78	74.00	32.22	Peak
5329.000	36.05	34.02	8.02	35.30	42.79	74.00	31.21	Peak
7462.000	34.75	36.88	9.76	35.55	45.84	74.00	28.16	Peak
8276.500	35.02	37.85	10.40	35.60	47.68	74.00	26.32	Peak
8942.500	34.02	38.01	10.61	35.60	47.05	74.00	26.95	Peak
9838.000	33.54	38.18	11.32	35.35	47.69	74.00	26.31	Peak

Band-Edge and Restricted bands:

Test Date:	2024.05.25	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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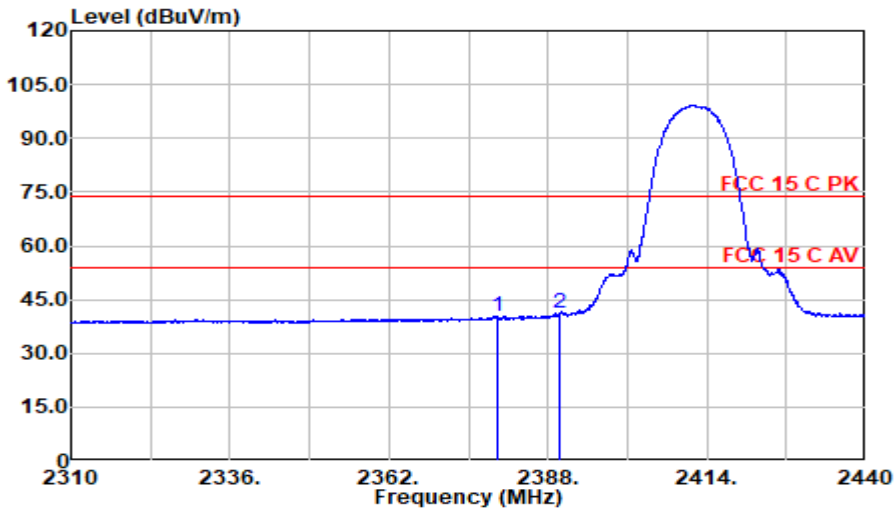
Mode: 802.11b CH2412MHz



Polarization at Horizontal

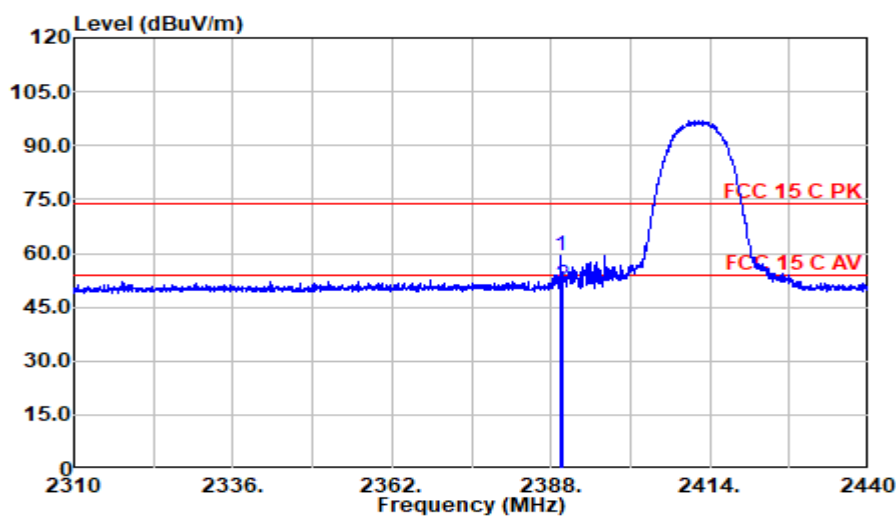
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2377.535	55.14	28.51	5.38	36.87	52.15	74.00	21.85	Peak
2390.000	58.10	28.56	5.39	36.86	55.18	74.00	18.82	Peak

Mode: 802.11b CH2412MHz



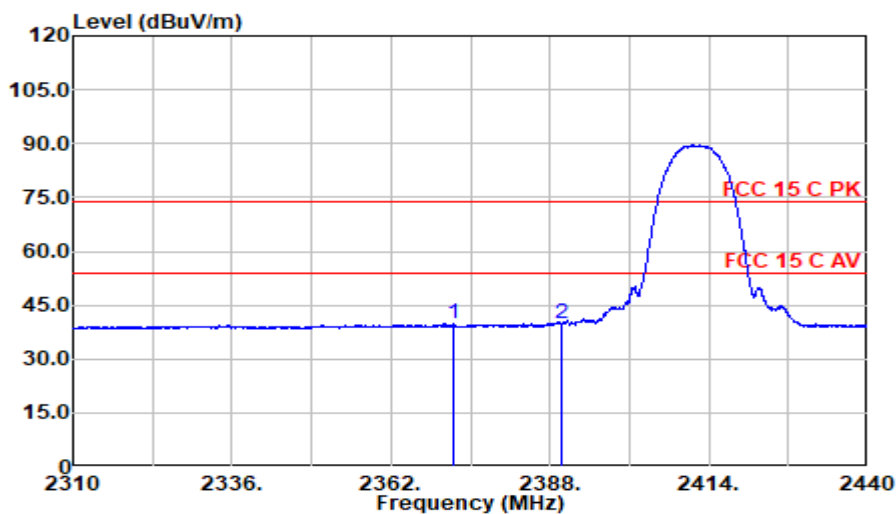
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2379.745	43.13	28.52	5.38	36.87	40.16	54.00	13.84	Average
2390.000	44.05	28.56	5.39	36.86	41.13	54.00	12.87	Average

Mode: 802.11b CH2412MHz


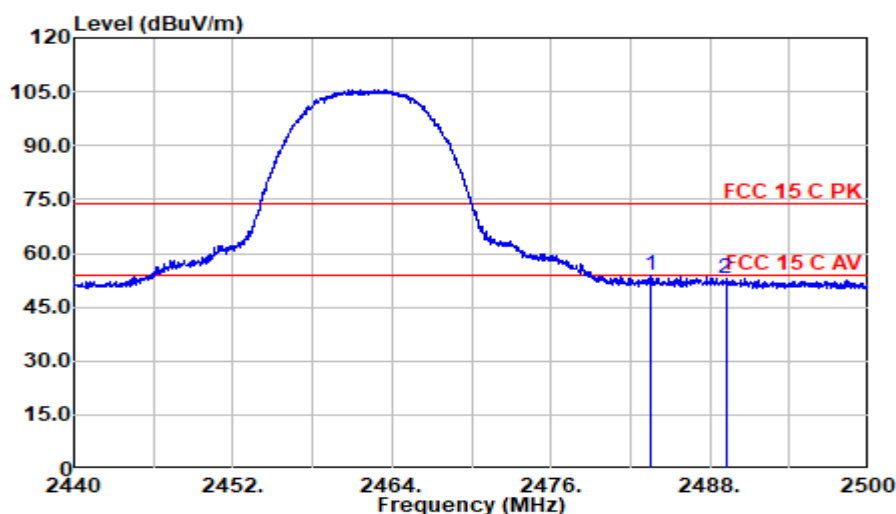
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2389.560	62.18	28.56	5.39	36.86	59.26	74.00	14.74	Peak
2390.000	54.26	28.56	5.39	36.86	51.35	74.00	22.65	Peak

Mode: 802.11b CH2412MHz


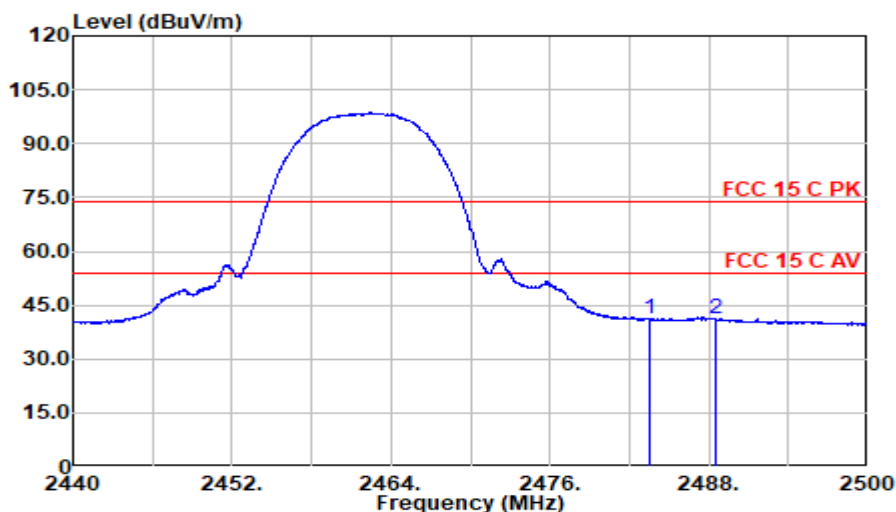
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2372.270	42.77	28.49	5.37	36.88	39.76	54.00	14.24	Average
2390.000	42.87	28.56	5.39	36.86	39.96	54.00	14.04	Average

Mode: 802.11b CH2462MHz


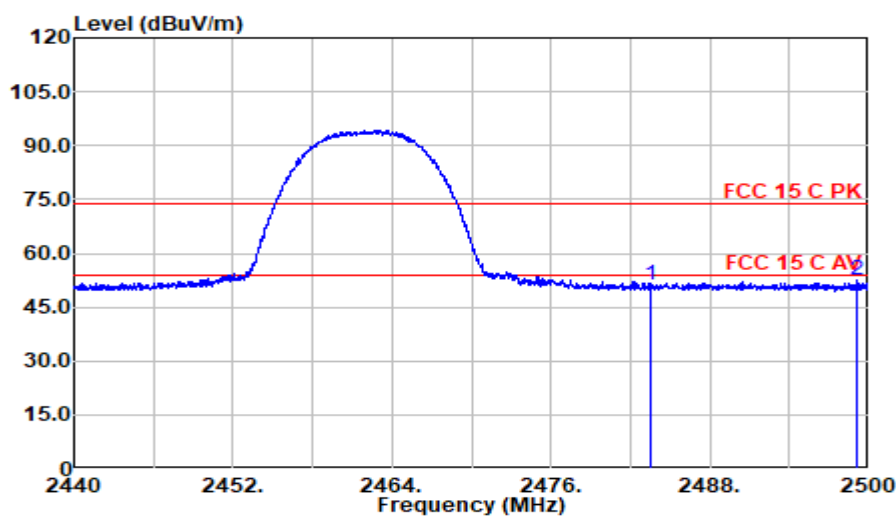
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	56.45	28.63	5.47	36.77	53.79	74.00	20.21	Peak
2489.200	55.68	28.66	5.47	36.76	53.05	74.00	20.95	Peak

Mode: 802.11b CH2462MHz


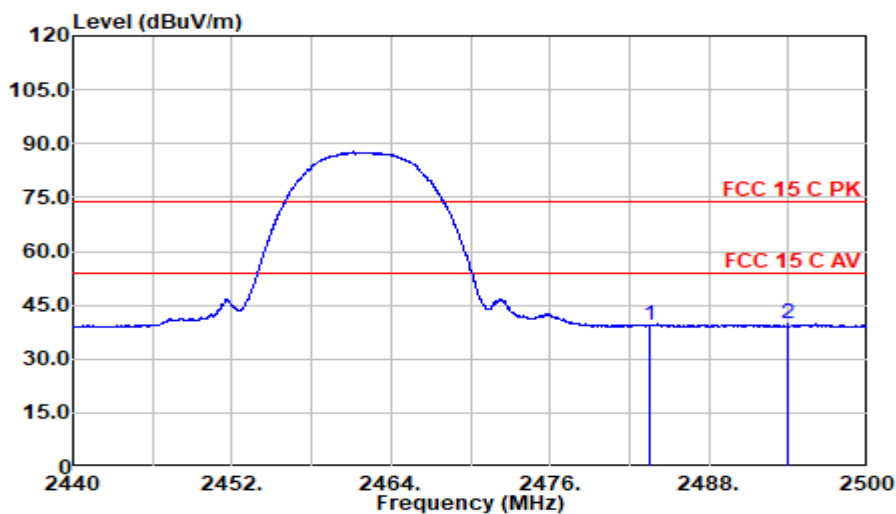
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	43.69	28.63	5.47	36.77	41.03	54.00	12.97	Average
2488.480	43.91	28.65	5.47	36.76	41.28	54.00	12.72	Average

Mode: 802.11b CH2462MHz


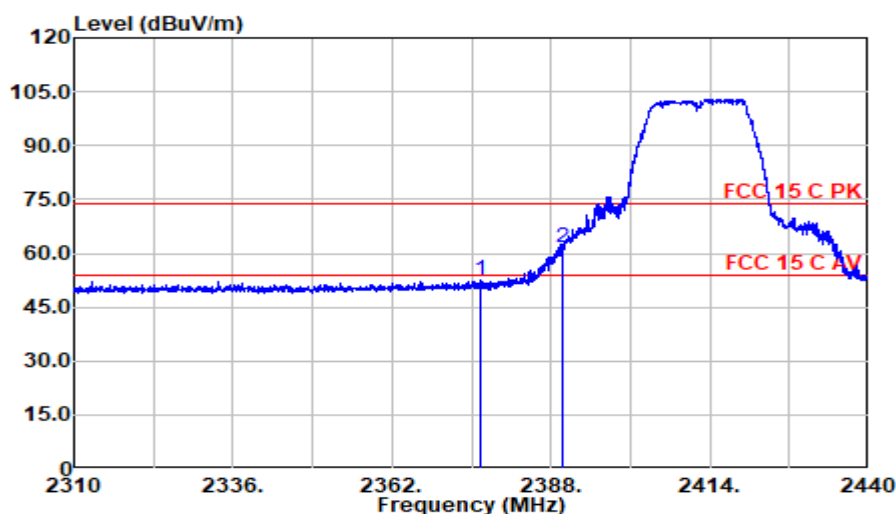
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	53.91	28.63	5.47	36.77	51.24	74.00	22.76	Peak
2499.160	54.90	28.70	5.48	36.75	52.33	74.00	21.67	Peak

Mode: 802.11b CH2462MHz


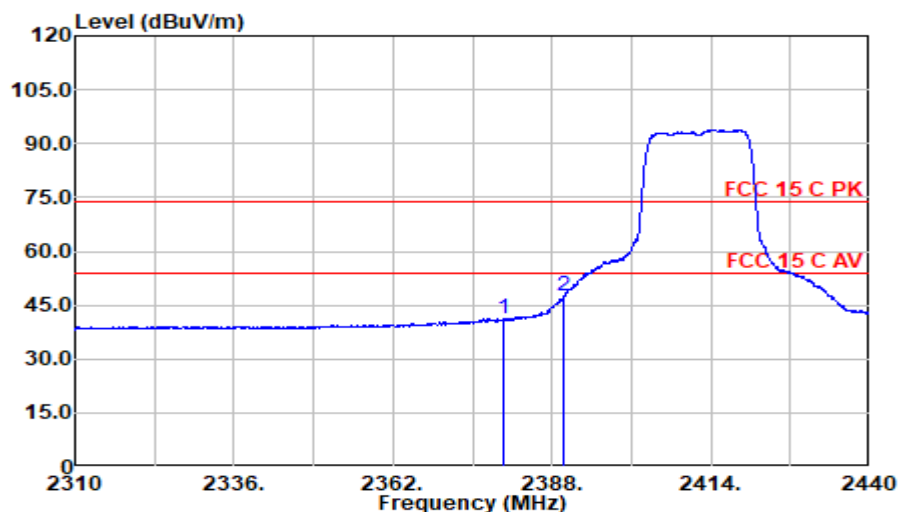
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	42.14	28.63	5.47	36.77	39.48	54.00	14.52	Average
2493.940	42.40	28.68	5.48	36.76	39.80	54.00	14.20	Average

Mode: 802.11g CH2412MHz


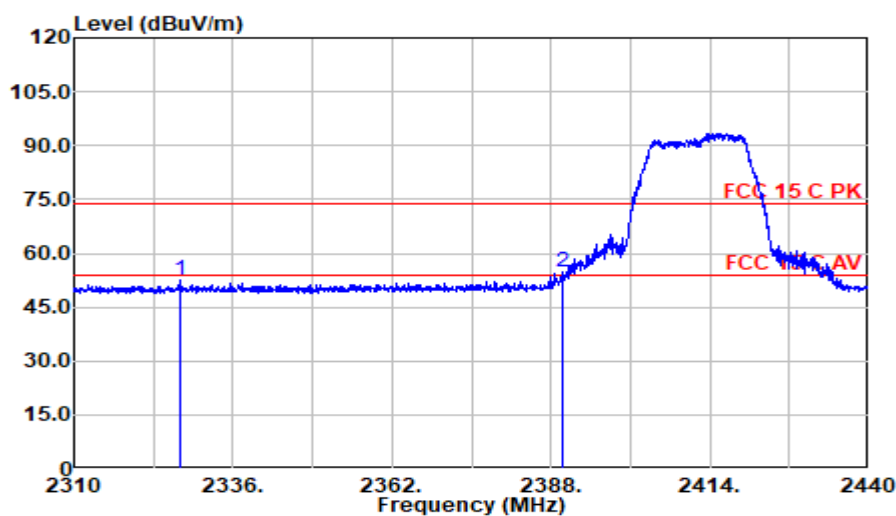
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2376.430	55.40	28.51	5.38	36.87	52.40	74.00	21.60	Peak
2390.000	64.29	28.56	5.39	36.86	61.38	74.00	12.62	Peak

Mode: 802.11g CH2412MHz


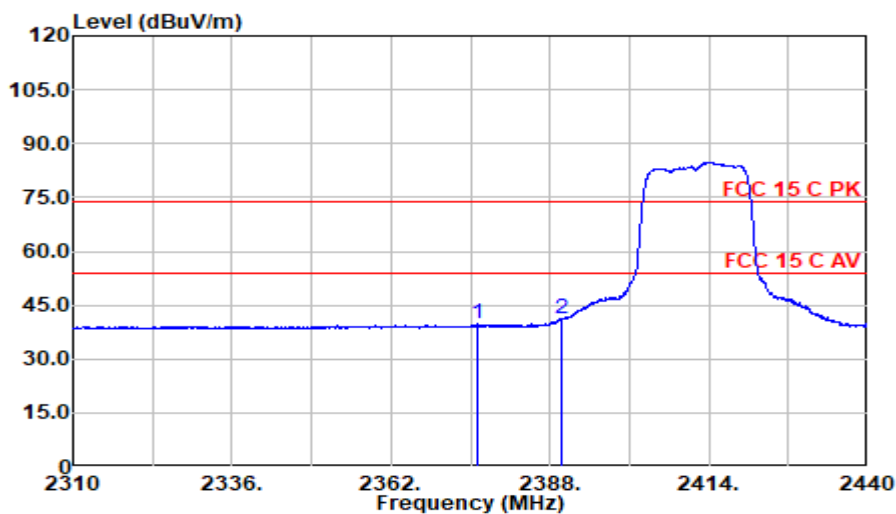
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2379.940	44.09	28.52	5.38	36.87	41.11	54.00	12.89	Average
2390.000	50.56	28.56	5.39	36.86	47.64	54.00	6.36	Average

Mode: 802.11g CH2412MHz


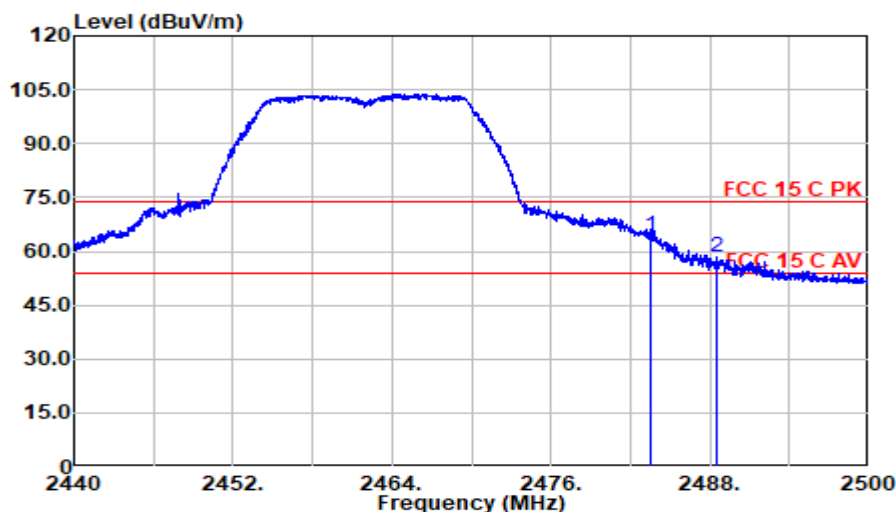
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2327.225	55.74	28.22	5.33	36.93	52.37	74.00	21.63	Peak
2390.000	57.56	28.56	5.39	36.86	54.65	74.00	19.35	Peak

Mode: 802.11g CH2412MHz


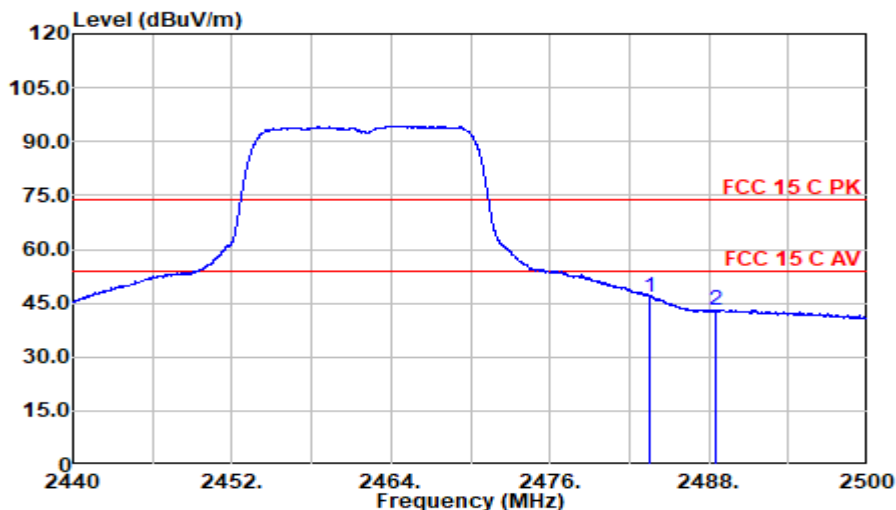
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2376.170	42.68	28.51	5.38	36.87	39.69	54.00	14.31	Average
2390.000	44.14	28.56	5.39	36.86	41.22	54.00	12.78	Average

Mode: 802.11g CH2462MHz


Polarization at Horizontal

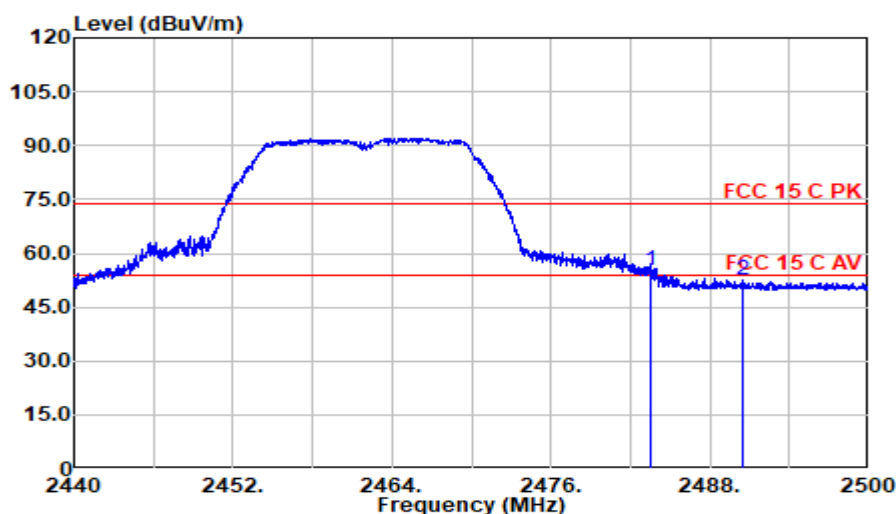
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	67.14	28.63	5.47	36.77	64.48	74.00	9.52	Peak
2488.510	61.18	28.65	5.47	36.76	58.55	74.00	15.45	Peak

Mode: 802.11g CH2462MHz


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	49.41	28.63	5.47	36.77	46.74	54.00	7.26	Average
2488.570	45.77	28.65	5.47	36.76	43.14	54.00	10.86	Average

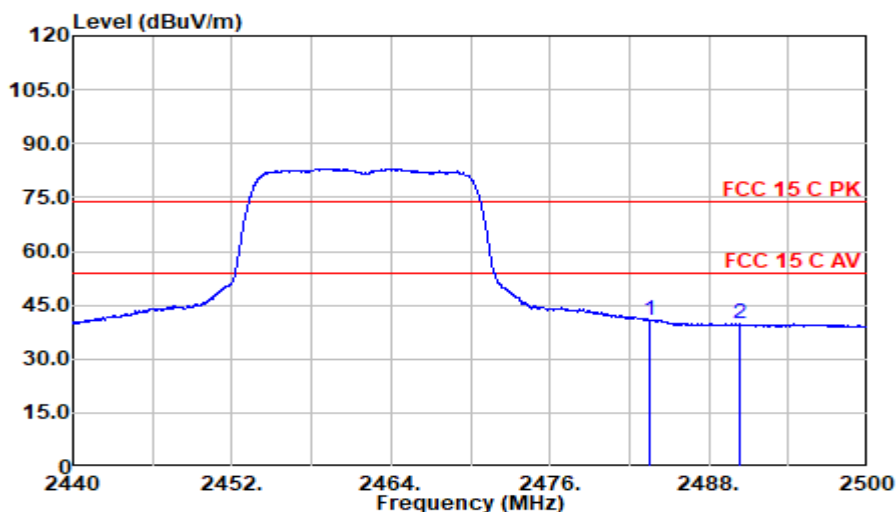
Mode: 802.11g CH2462MHz



Polarization at Vertical

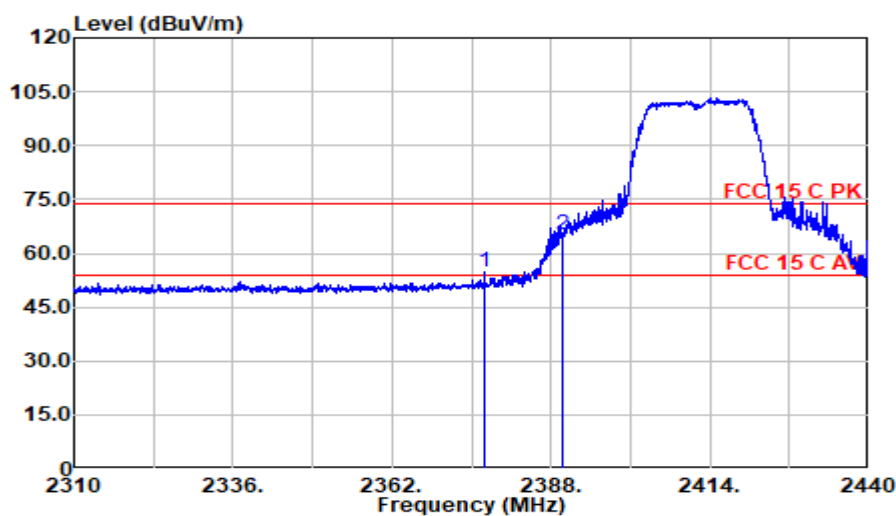
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	57.88	28.63	5.47	36.77	55.22	74.00	18.78	Peak
2490.430	55.38	28.66	5.48	36.76	52.75	74.00	21.25	Peak

Mode: 802.11g CH2462MHz



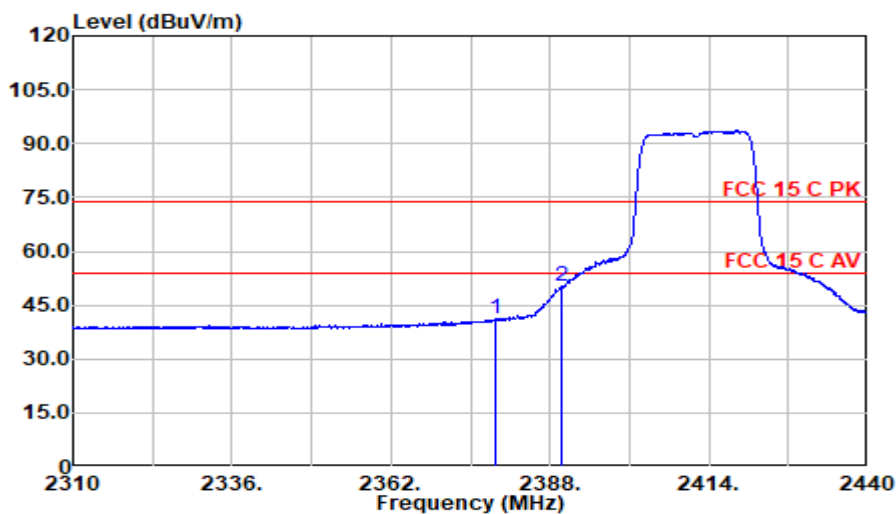
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	43.45	28.63	5.47	36.77	40.79	54.00	13.21	Average
2490.400	42.43	28.66	5.48	36.76	39.81	54.00	14.19	Average

Mode: 802.11n CH2412MHz


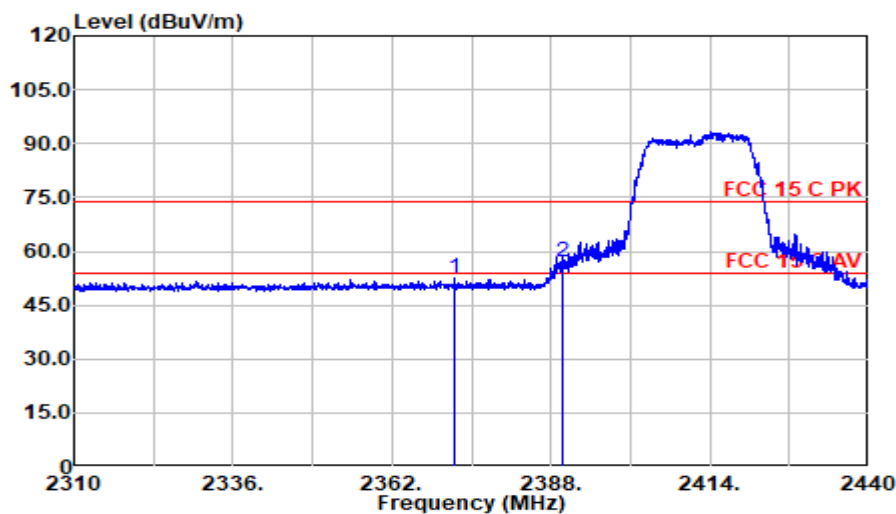
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2377.210	57.67	28.51	5.38	36.87	54.68	74.00	19.32	Peak
2390.000	68.30	28.56	5.39	36.86	65.39	74.00	8.61	Peak

Mode: 802.11n CH2412MHz


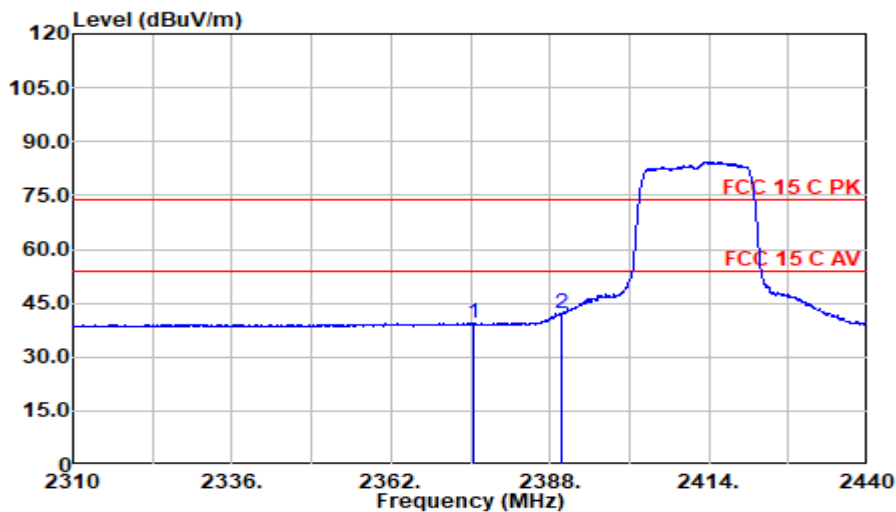
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2379.160	44.19	28.52	5.38	36.87	41.21	54.00	12.79	Average
2390.000	53.02	28.56	5.39	36.86	50.11	54.00	3.89	Average

Mode: 802.11n CH2412MHz


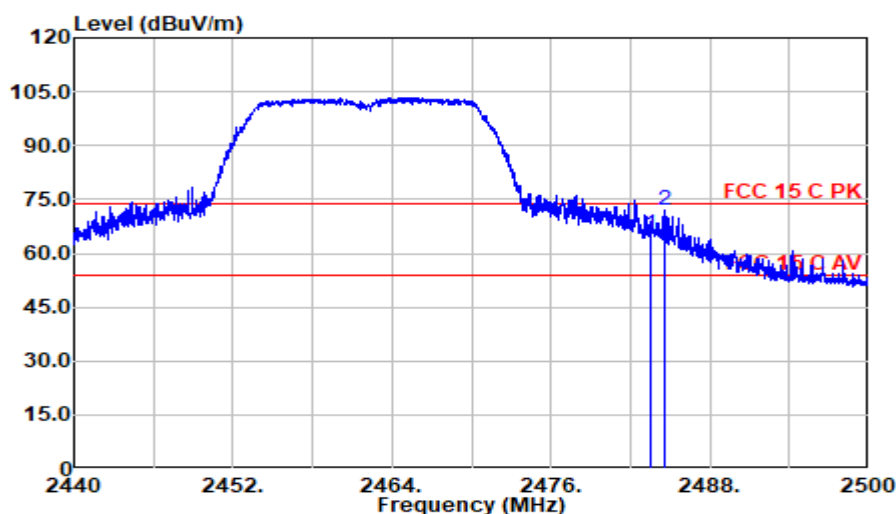
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2372.270	55.48	28.49	5.37	36.88	52.46	74.00	21.54	Peak
2390.000	60.15	28.56	5.39	36.86	57.24	74.00	16.76	Peak

Mode: 802.11n CH2412MHz


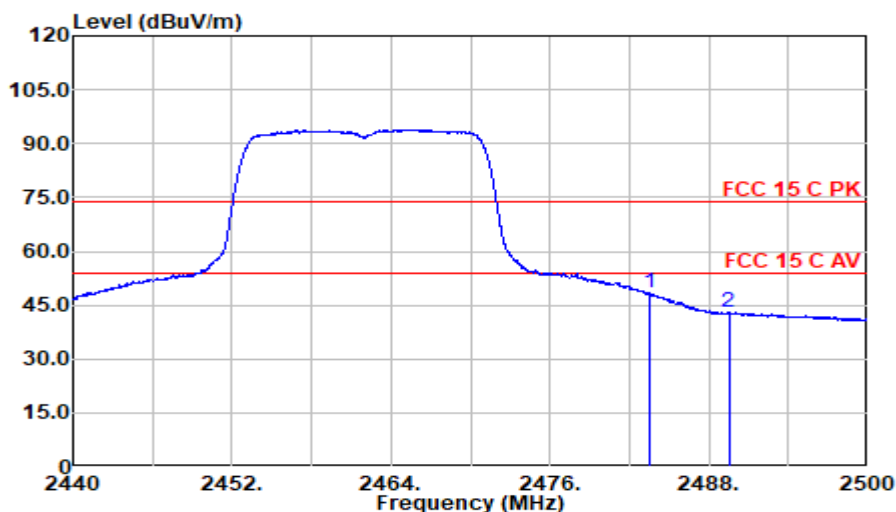
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2375.390	42.35	28.50	5.37	36.88	39.35	54.00	14.65	Average
2390.000	45.11	28.56	5.39	36.86	42.20	54.00	11.80	Average

Mode: 802.11n CH2462MHz


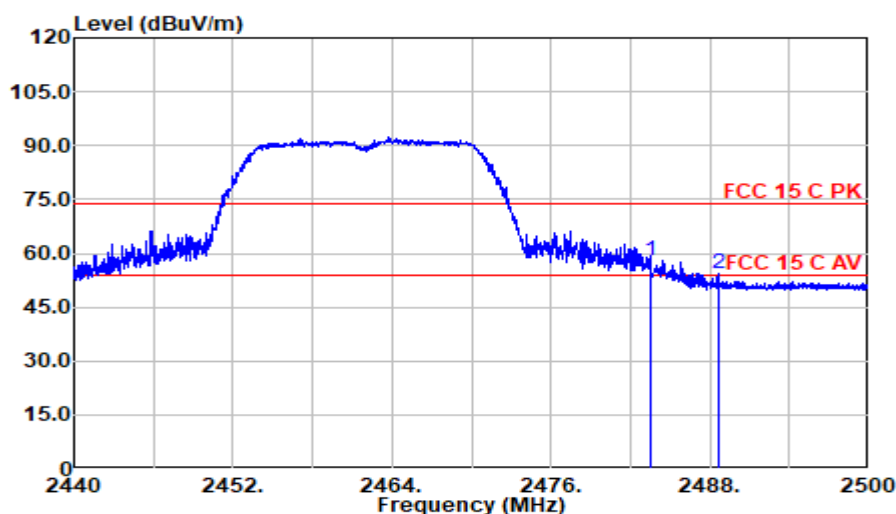
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	67.98	28.63	5.47	36.77	65.32	74.00	8.68	Peak
2484.520	74.85	28.64	5.47	36.76	72.19	74.00	1.81	Peak

Mode: 802.11n CH2462MHz


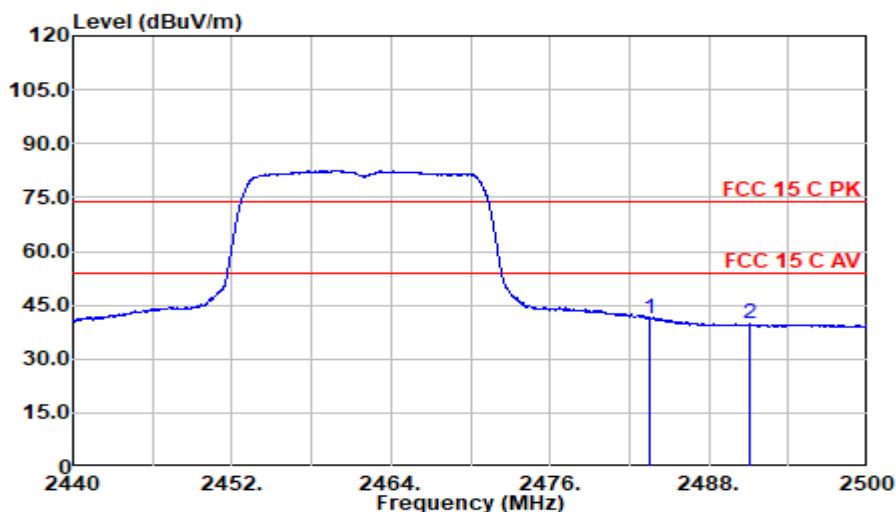
Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	51.15	28.63	5.47	36.77	48.49	54.00	5.51	Average
2489.500	45.85	28.66	5.47	36.76	43.23	54.00	10.77	Average

Mode: 802.11n CH2462MHz


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	60.56	28.63	5.47	36.77	57.90	74.00	16.10	Peak
2488.660	56.81	28.65	5.47	36.76	54.17	74.00	19.83	Peak

Mode: 802.11n CH2462MHz


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	44.08	28.63	5.47	36.77	41.42	54.00	12.58	Average
2491.060	42.38	28.66	5.48	36.76	39.76	54.00	14.24	Average

4 99% OCCUPIED BANDWIDTH MEASUREMENT

4.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	20 dB Attenuator	Mini-Circuits	BW-S20W2+	001	2023.09.21	1 Year

4.2 Block Diagram of Test Setup



4.3 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

4.4 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of 99% power bandwidth was measure by spectrum analyzer with settings: Span = between 1.5 times and 5.0 times of the OBW, RBW = 1% to 5% of the OBW, VBW $\geq 3 \times$ RBW, Detector = Peak, Trace = Max Hold.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

The test procedure is defined in ANSI C63.10-2013 (the 6.9.3 Measurement Procedure “Occupied bandwidth—power bandwidth (99%) measurement procedure” was used).

4.5 Test Results

PASSED.

All the test results are attached in next pages.

(Test Date: 2023.11.06-12.05 Temperature: 23°C Humidity: 51 %)

Mode	Channel	Frequency (MHz)	99% Bandwidth (MHz)
802.11b	1	2412	11.501
	6	2437	11.5
	11	2462	11.497
802.11g	1	2412	17.498
	6	2437	17.495
	11	2462	17.493
802.11n20	1	2412	18.511
	6	2437	18.507
	11	2462	18.507

802.11b

CH2412



CH2437



CH2462



802.11g

CH2412



CH2437



CH2462



802.11n20

CH2412



CH2437



CH2462



5 6 dB BANDWIDTH MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	20 dB Attenuator	Mini-Circuits	BW-S20W2+	001	2023.09.21	1 Year

5.2 Block Diagram of Test Setup

The Same as Section. 5.2.

5.3 Specification Limits (§15.247(a)(2))

The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 100kHz, VBW $\geq 3 \times$ RBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 6 dB .

The test procedure is defined in ANSI C63.10-2013 (the 11.8.2 Measurement Procedure “Option 2” was used).

5.6 Test Results

PASSED.

All the test results are attached in next pages.

(Test Date: 2023.11.06-12.05 Temperature: 23°C Humidity: 51 %)

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit
802.11b	1	2412	8.879	500 kHz
	6	2437	8.863	500 kHz
	11	2462	8.866	500 kHz
802.11g	1	2412	16.4	500 kHz
	6	2437	16.39	500 kHz
	11	2462	16.4	500 kHz
802.11n20	1	2412	17.63	500 kHz
	6	2437	17.63	500 kHz
	11	2462	17.63	500 kHz

802.11b

CH2412



CH2437



CH2462



802.11g

CH2412



CH2437

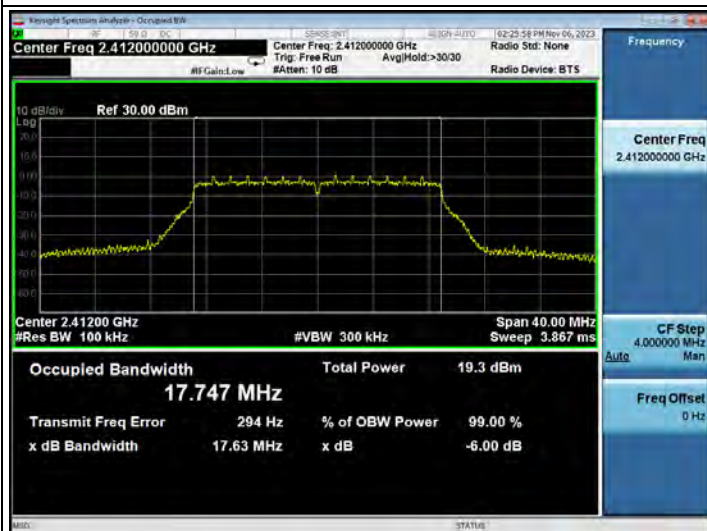


CH2462



802.11n20

CH2412



CH2437



CH2462



6 MAXIMUM OUTPUT POWER MEASUREMENT

6.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	20 dB Attenuator	Mini-Circuits	BW-S20W2+	001	2023.09.21	1 Year

6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

6.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

6.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

6.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Method AVGSA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep.

The procedure for this method is as follows:

- Set span to at least 1.5 times the OBW.
- Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- Set VBW $\geq [3 \times \text{RBW}]$.
- Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- If transmit duty cycle $< 98\%$, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
- Trace average at least 100 traces in power averaging (rms) mode.
- Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power

function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The test procedure is defined in ANSI C63.10-2013 (11.9.2.2.2 Measurement Procedure “ Method AVGSA-1” was used).

6.6 Test Results

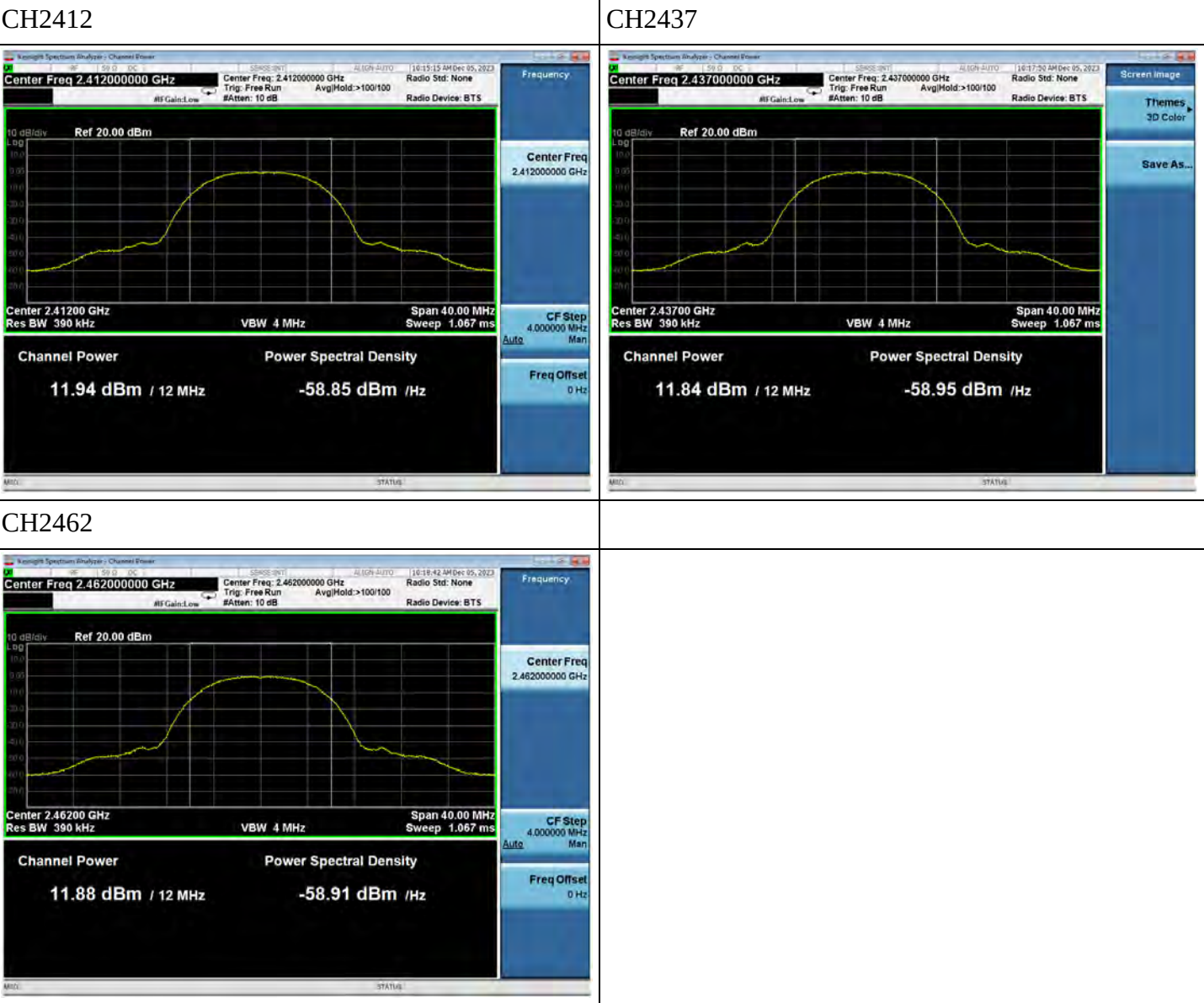
PASSED.

All the test results are listed below.

(Test Date: 2023.11.06-12.05 Temperature: 23°C Humidity: 51 %)

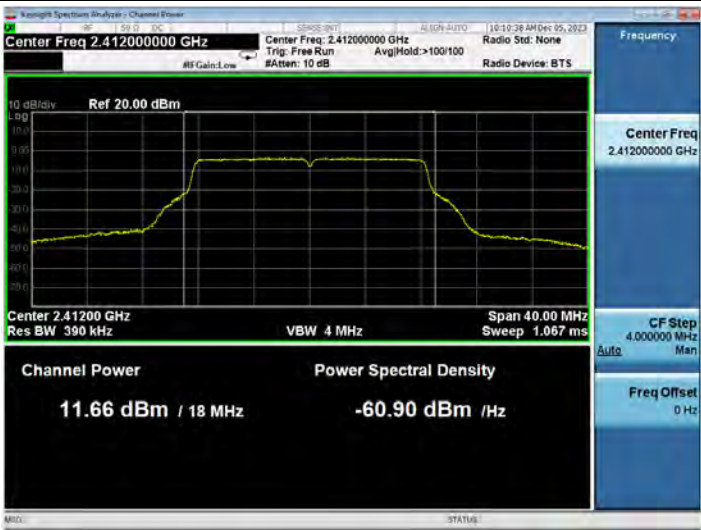
Mode	Channel	Frequency (MHz)	Maximum conducted (average) Output Power (dBm)	Limit
802.11b	1	2412	11.94	30 dBm
	6	2437	11.84	30 dBm
	11	2462	11.88	30 dBm
802.11g	1	2412	11.66	30 dBm
	6	2437	11.6	30 dBm
	11	2462	11.65	30 dBm
802.11n20	1	2412	11.65	30 dBm
	6	2437	11.66	30 dBm
	11	2462	11.67	30 dBm

802.11b

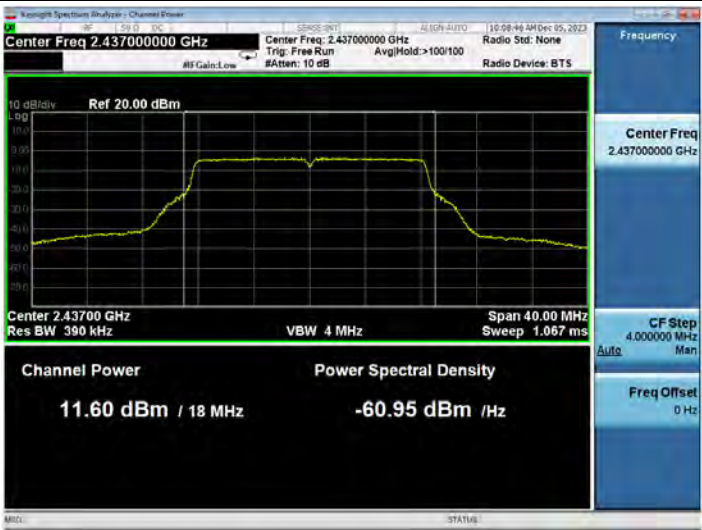


802.11g

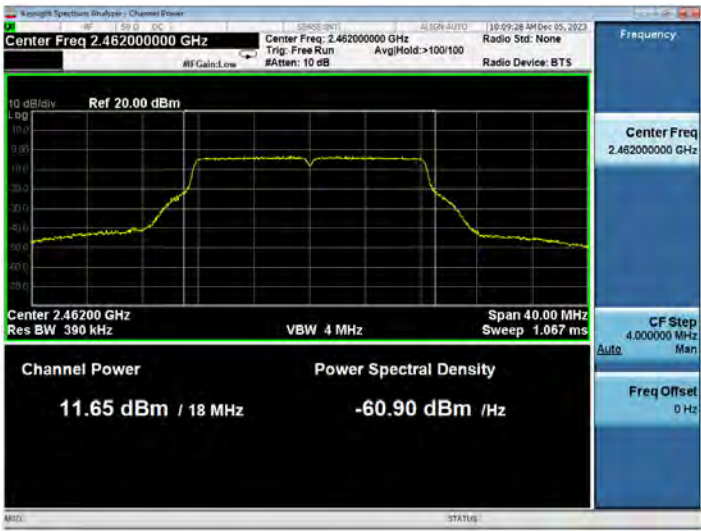
CH2412



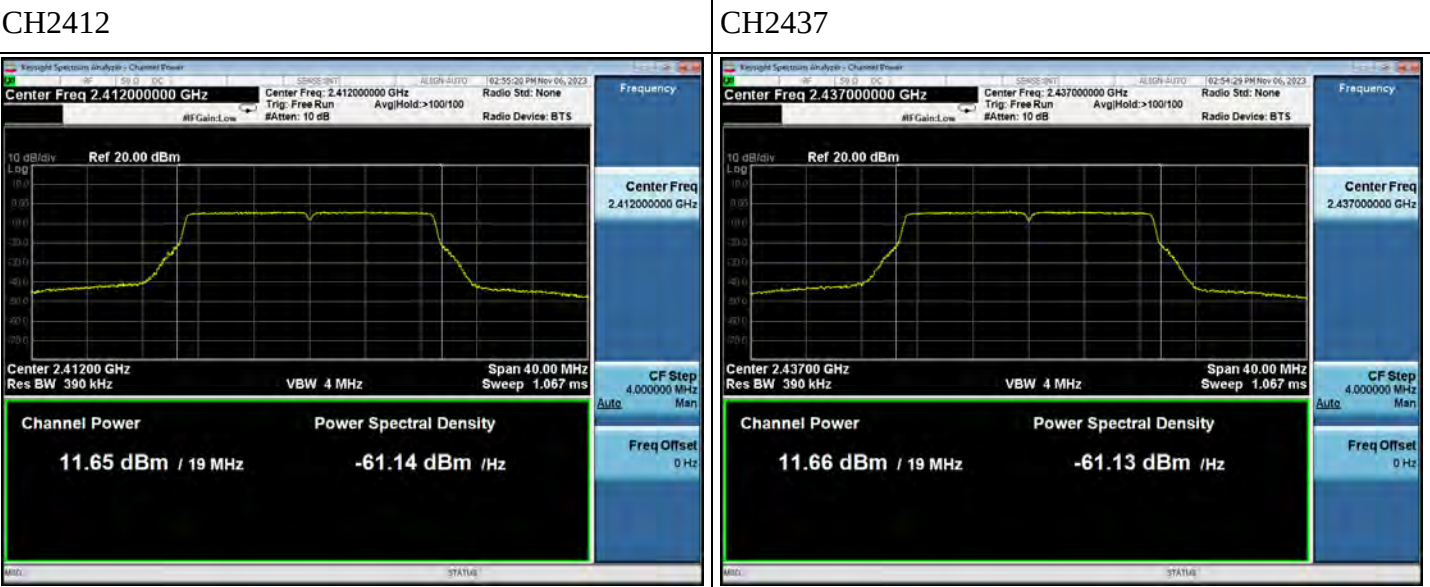
CH2437



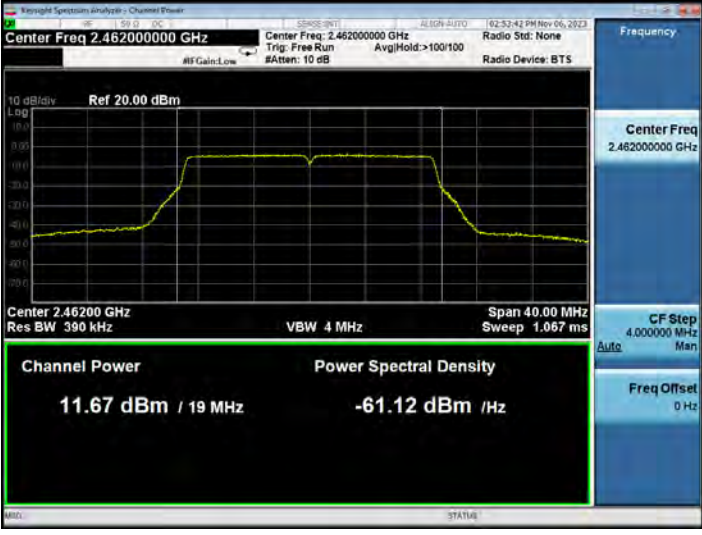
CH2462



802.11n20



CH2462



7 EMISSION LIMITATIONS MEASUREMENT

7.1 Test Equipment

The following test equipment was used during the emission limitations test:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	20 dB Attenuator	Mini-Circuits	BW-S20W2+	001	2023.09.21	1 Year

7.2 Block Diagram of Test Setup

The Same as Section. 5.2.

7.3 Specification Limits (§15.247(d))

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). (※ This test result attaching to Section. 4.7)

7.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:

- Set instrument center frequency to DTS channel center frequency.
- Set the span to ≥ 1.5 times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to

establish the reference level.

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Scan up through 10th harmonic.

The test procedure is defined in ANSI C63.10-2013 (11.11.2 Reference level measurement and 11.11.3 Emission level measurement was used).

7.6 Test Results

PASSED.

The test data was attached in the next pages.

(Test Date: 2023.11.06-12.05 Temperature: 23°C Humidity: 51 %)

Mode	Channel	Frequency (MHz)	Data Page
802.11b	1	2412	P59
	6	2437	P60
	11	2462	P61
802.11g	1	2412	P62
	6	2437	P63
	11	2462	P64
802.11n20	1	2412	P65
	6	2437	P66
	11	2462	P67

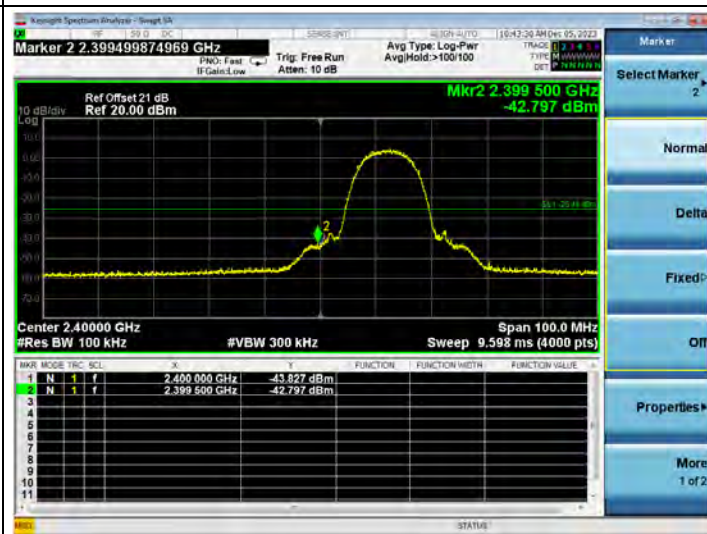
802.11b

CH2412

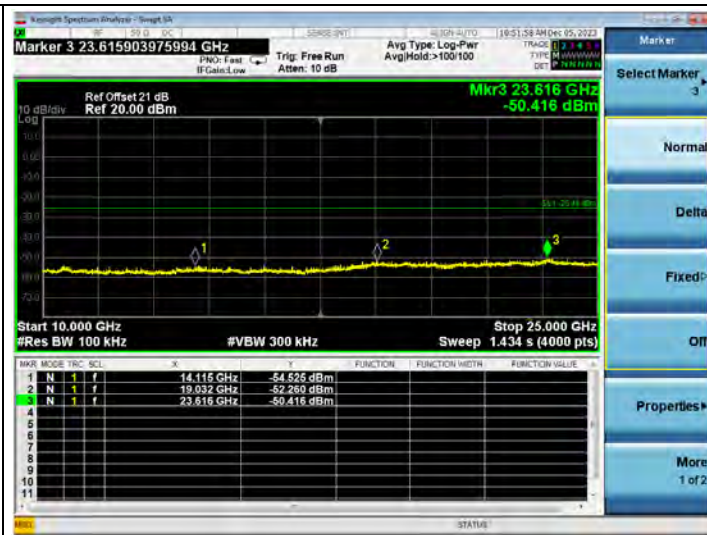
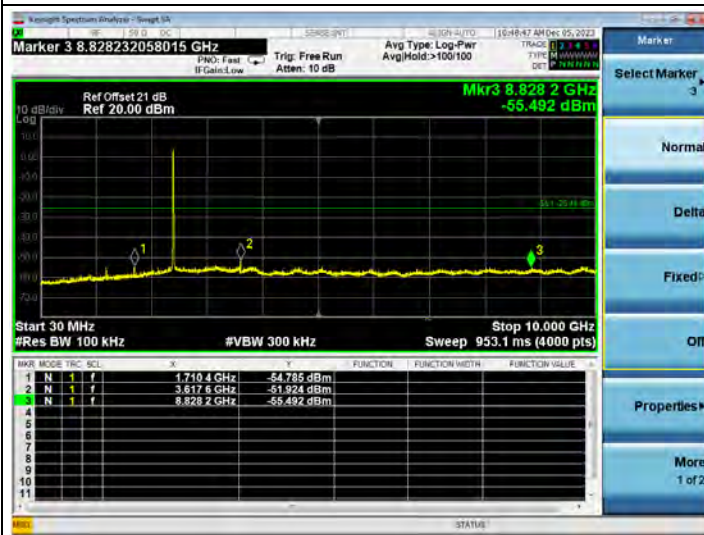
Reference Level



Lower Edge



Emission Level



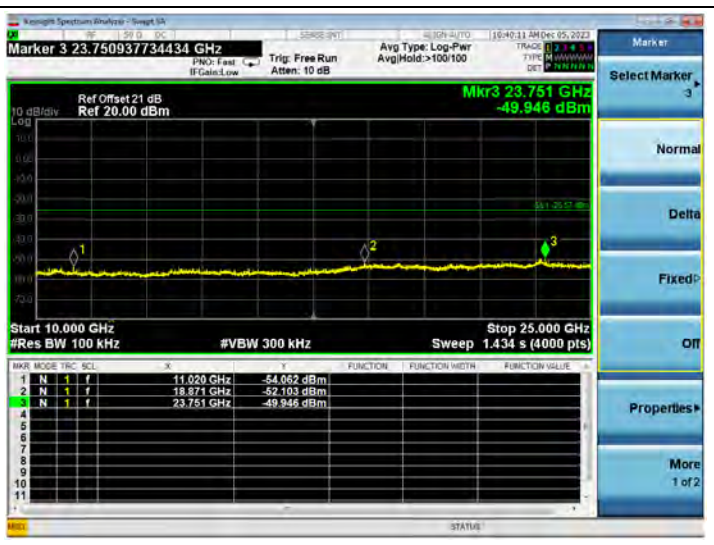
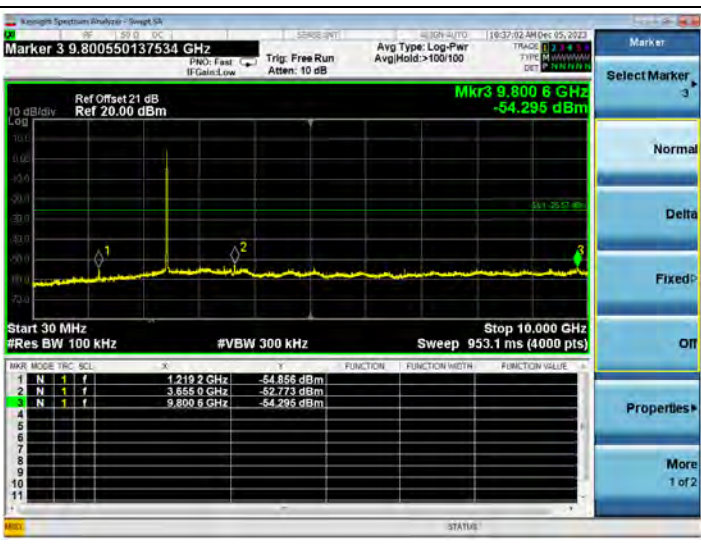
802.11b

CH2437

Reference Level



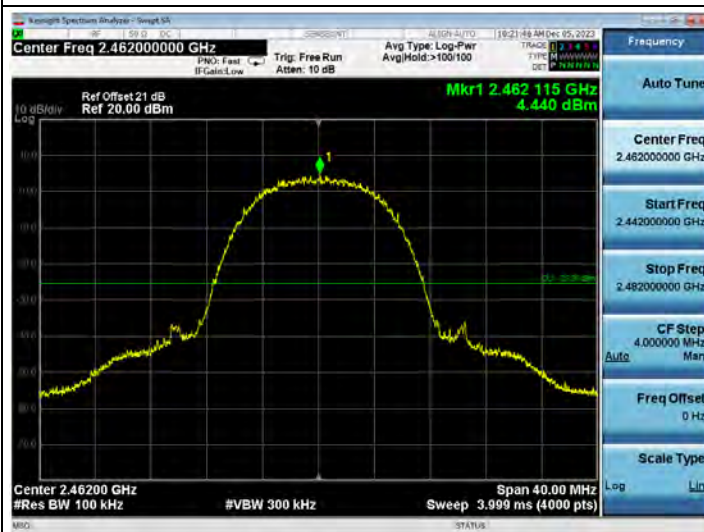
Emission Level



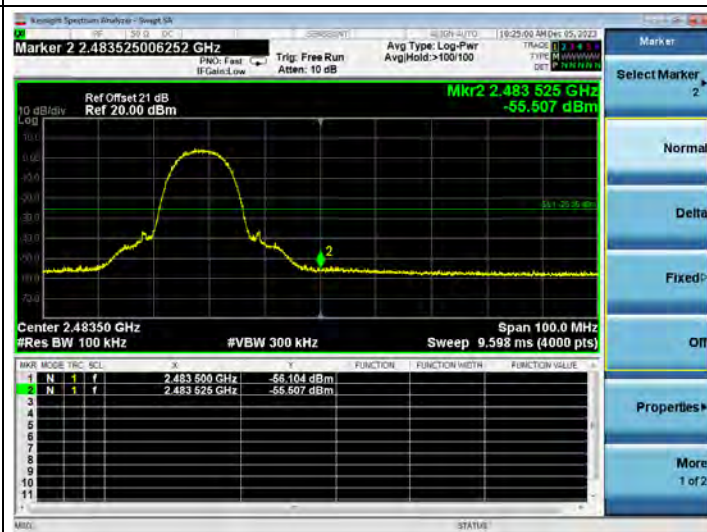
802.11b

CH2462

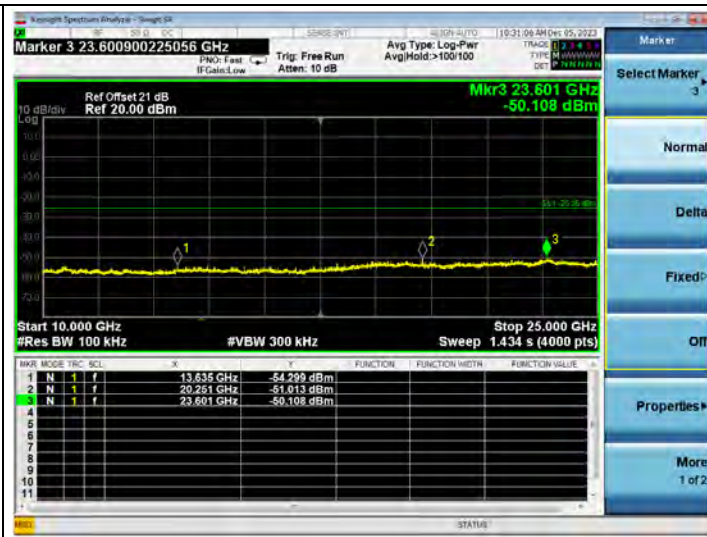
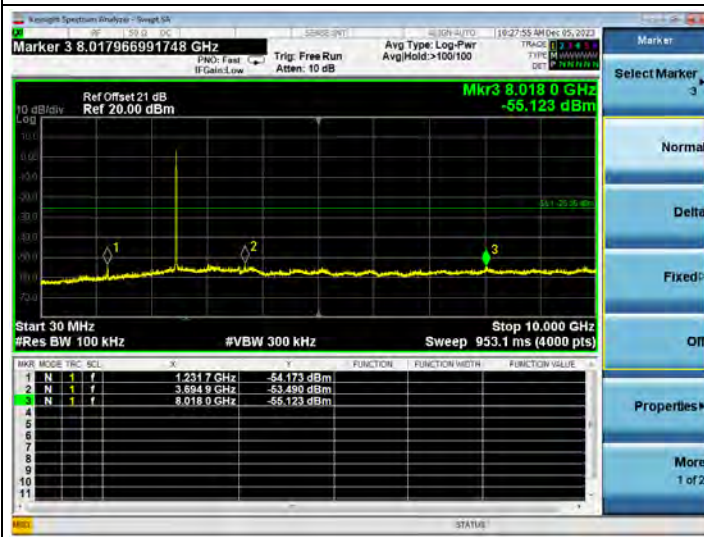
Reference Level



Higher Edge



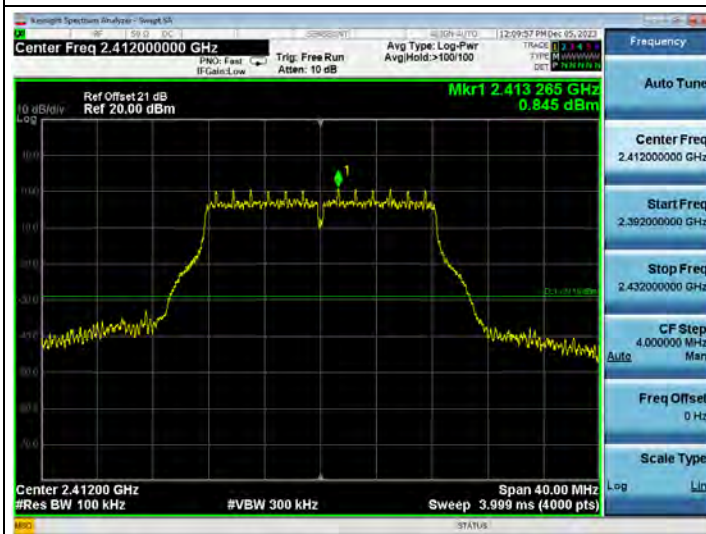
Emission Level



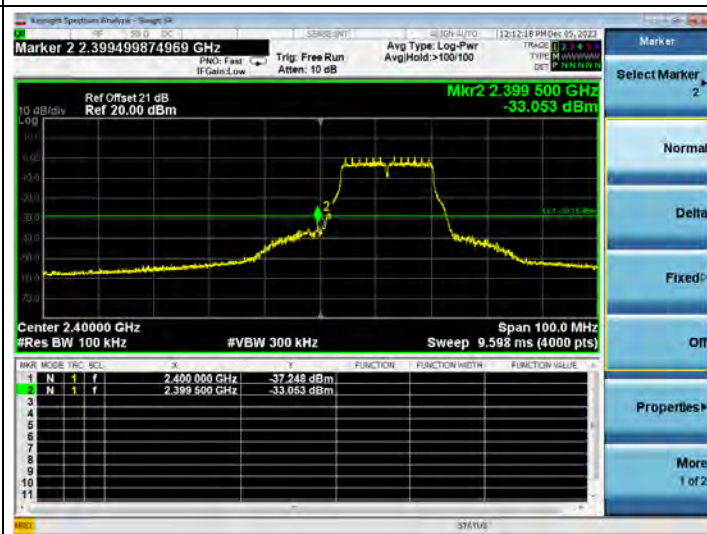
802.11g

CH2412

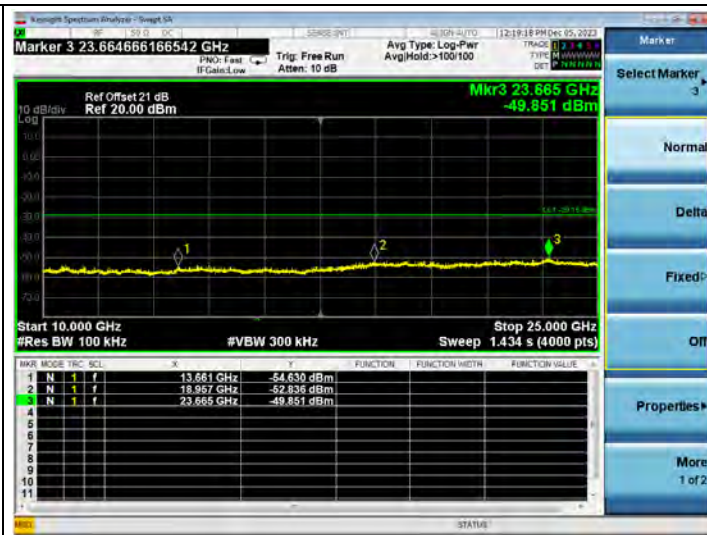
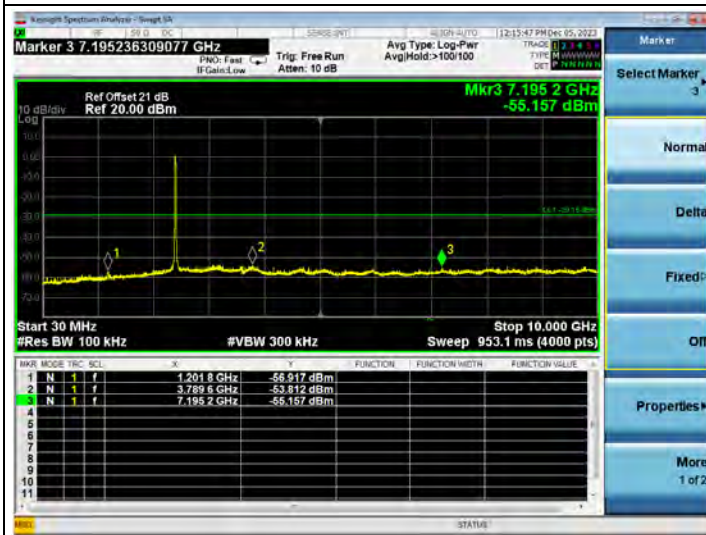
Reference Level



Lower Edge



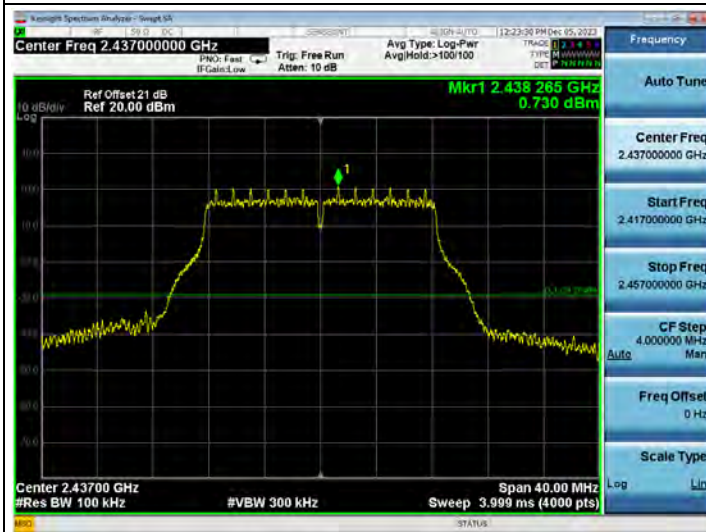
Emission Level



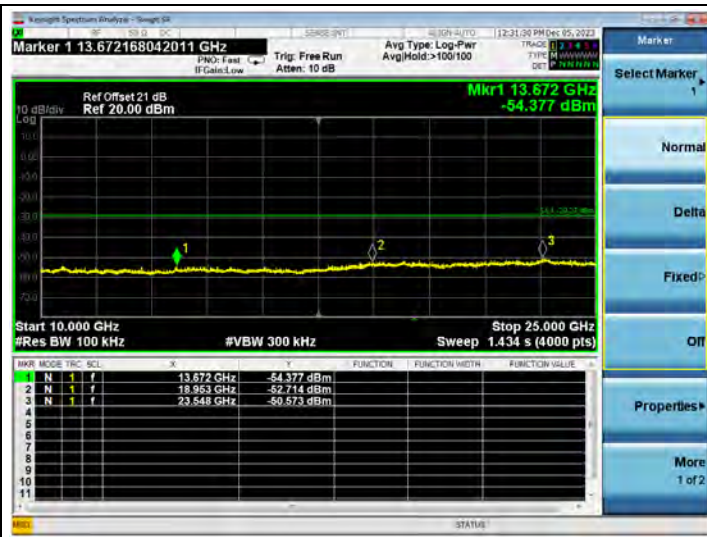
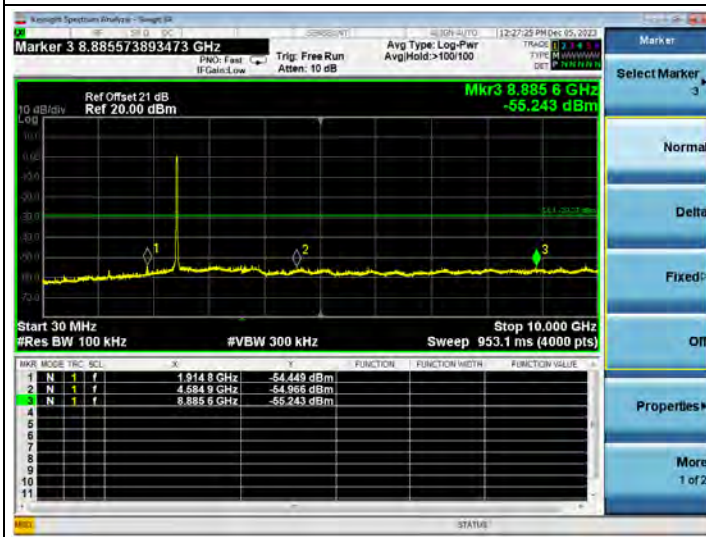
802.11g

CH2437

Reference Level



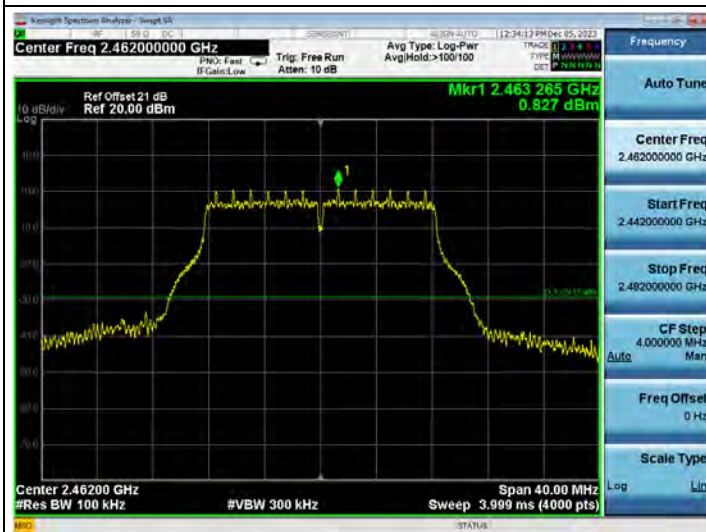
Emission Level



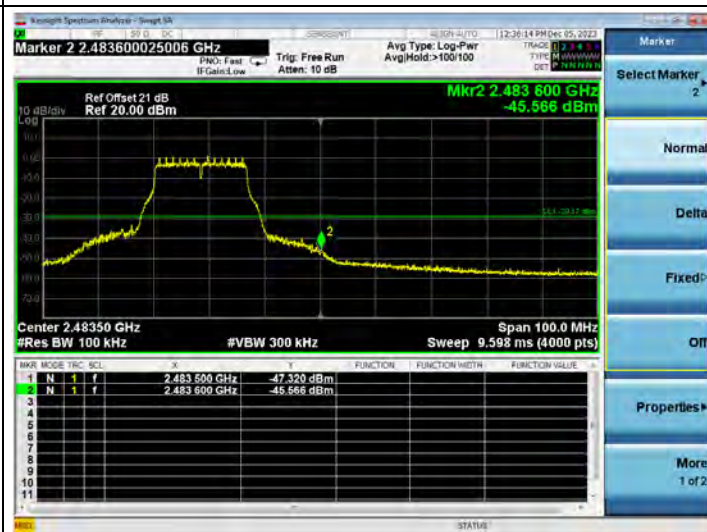
802.11g

CH2462

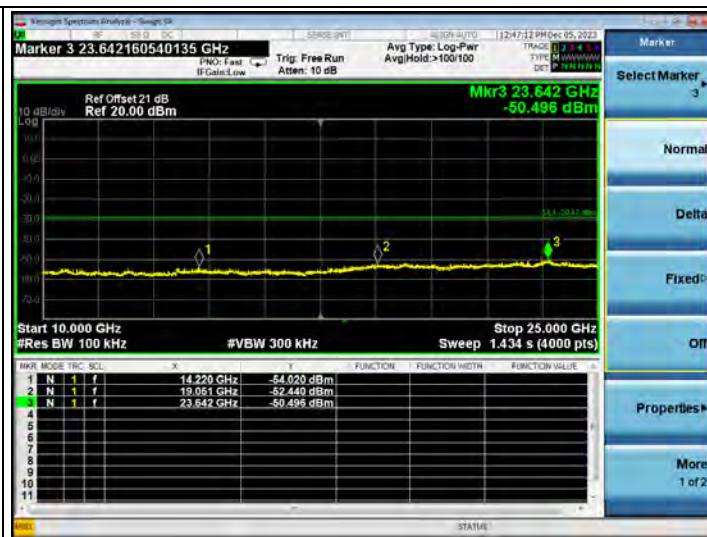
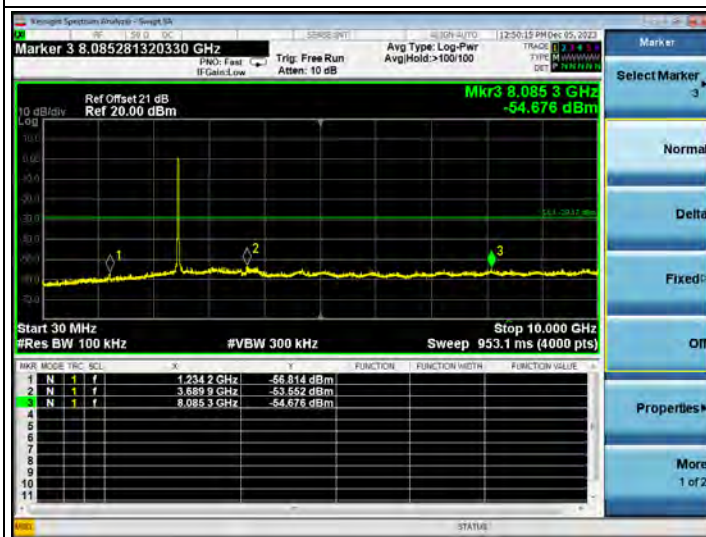
Reference Level



Higher Edge



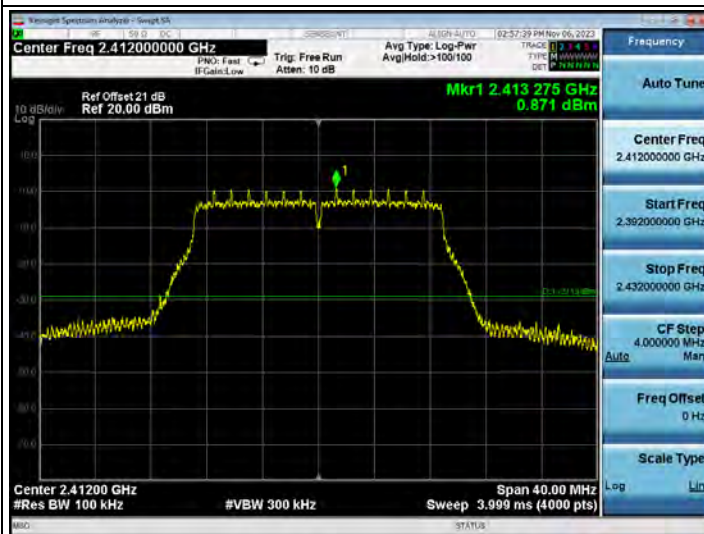
Emission Level



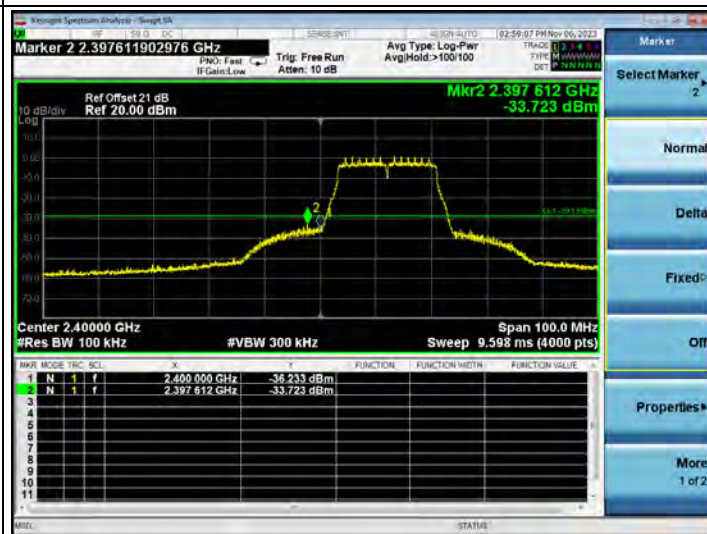
802.11n20

CH2412

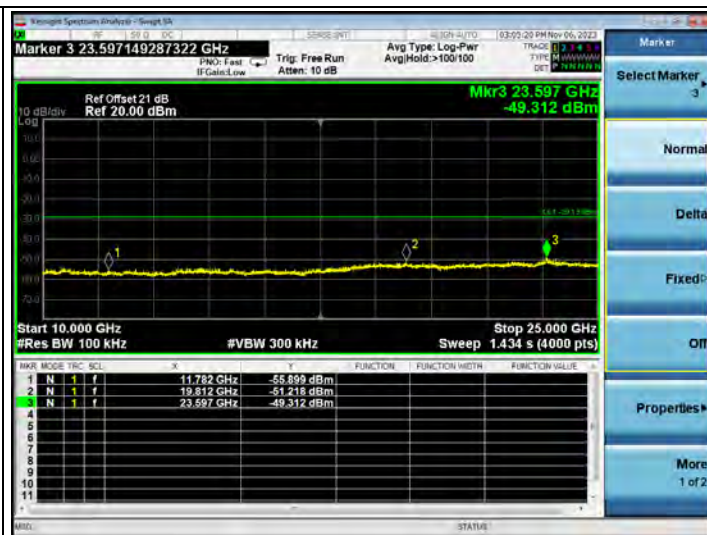
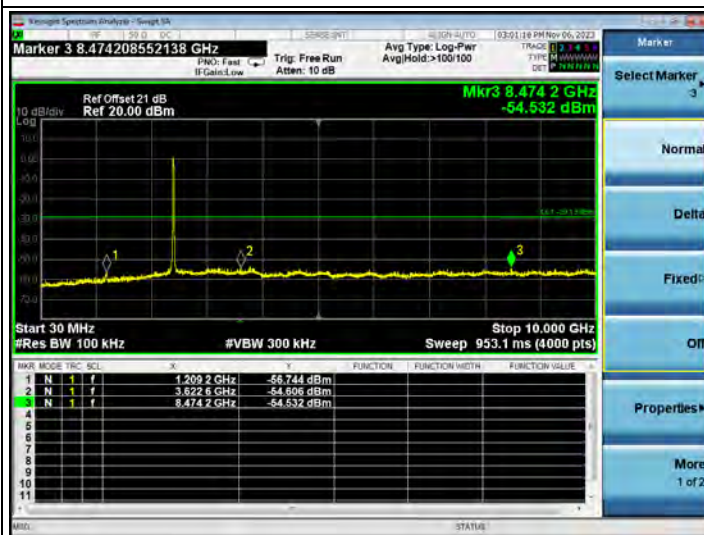
Reference Level



Lower Edge



Emission Level



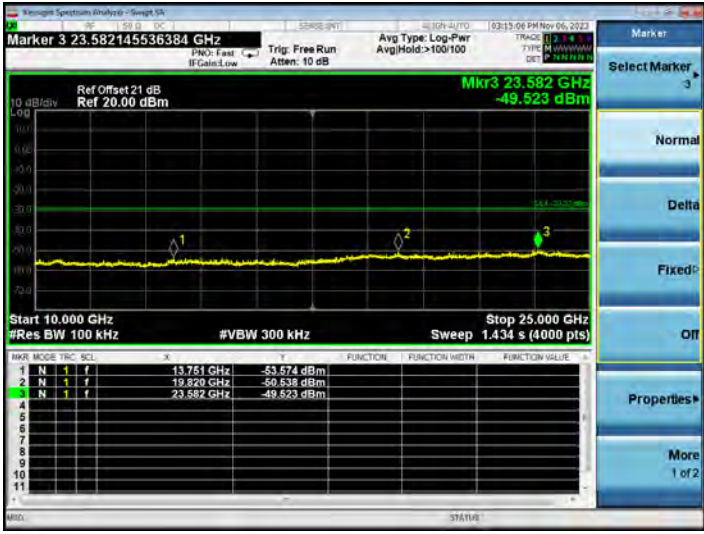
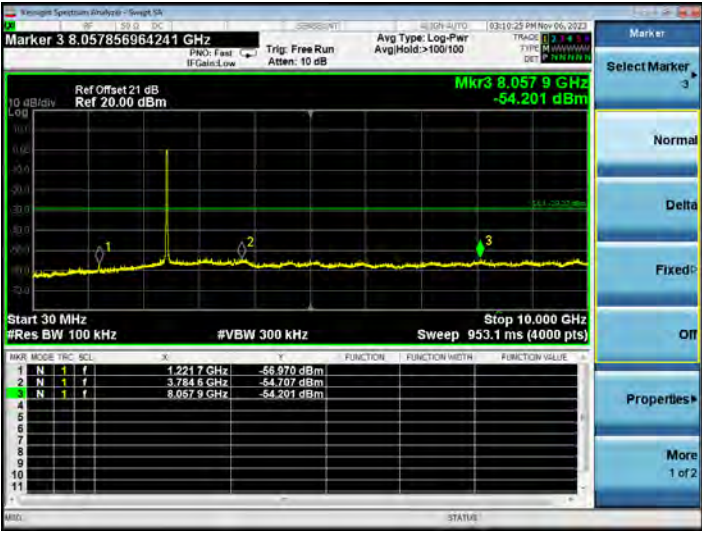
802.11n20

CH2437

Reference Level



Emission Level



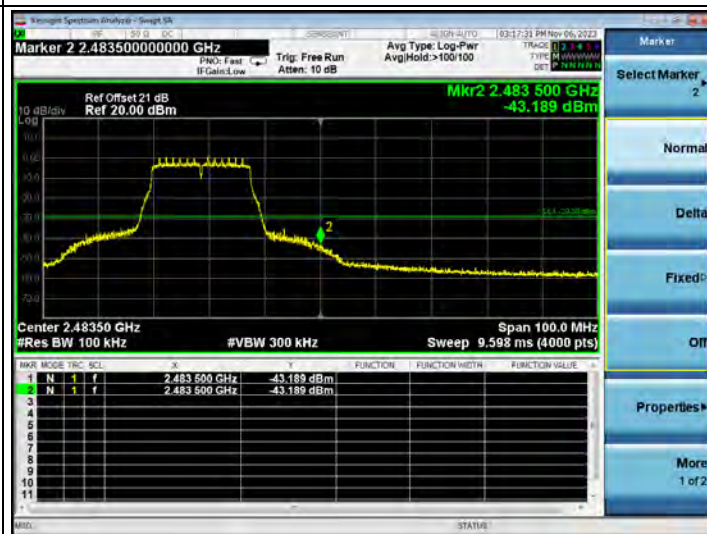
802.11n20

CH2462

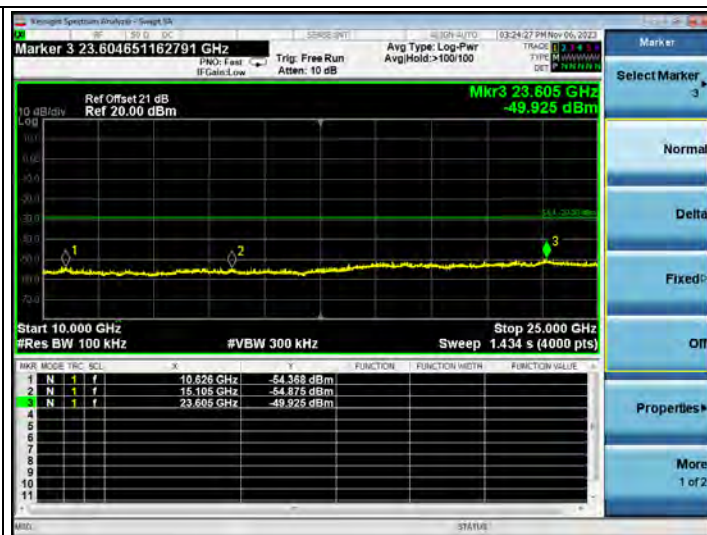
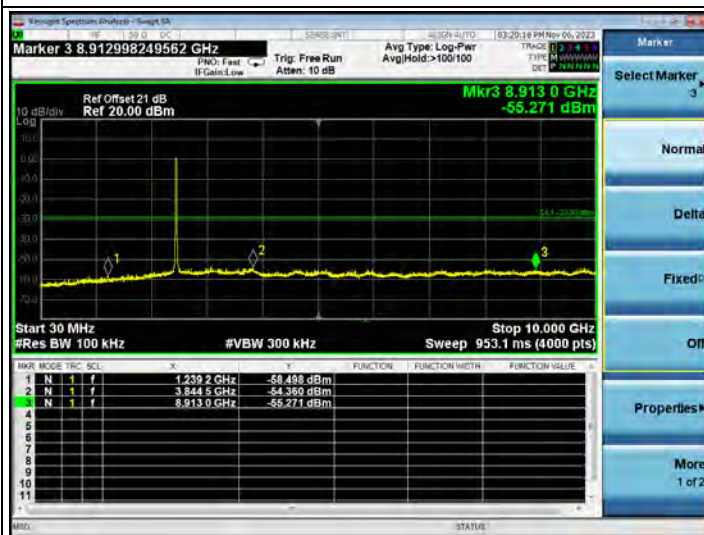
Reference Level



Higher Edge



Emission Level



8 POWER SPECTRAL DENSITY MEASUREMENT

8.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	20 dB Attenuator	Mini-Circuits	BW-S20W2+	001	2023.09.21	1 Year

8.2 Block Diagram of Test Setup

The Same as section 5.2.

8.3 Specification Limits (§15.247(e))

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band. The same method of determining the conducted output power shall be used to determine the power spectral density.

8.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

8.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Method AVGPS-1 uses trace averaging with EUT transmitting at full power throughout each sweep.

The following procedure may be used when the maximum (average) conducted output power was used to determine compliance to the fundamental output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has a power averaging (rms) detector, then it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously ($D \geq 98\%$), or else sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter OFF time to be considered):

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to at least 1.5 times the OBW.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = power averaging (rms) or sample detector (when rms not available).
- Ensure that the number of measurement points in the sweep $\geq [2 \times \text{span} / \text{RBW}]$.
- Sweep time = auto couple.
- Employ trace averaging (rms) mode over a minimum of 100 traces.

- i) Use the peak marker function to determine the maximum amplitude level.
- j) If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

The test procedure is defined in ANSI C63.10-2013 (11.10.5 Measurement Procedure “Method AVGPSD-1” was used).

8.6 Test Results

PASSED.

All the test results are attached in next pages.

(Test Date: 2023.11.06-12.05 Temperature: 23°C Humidity: 51 %)

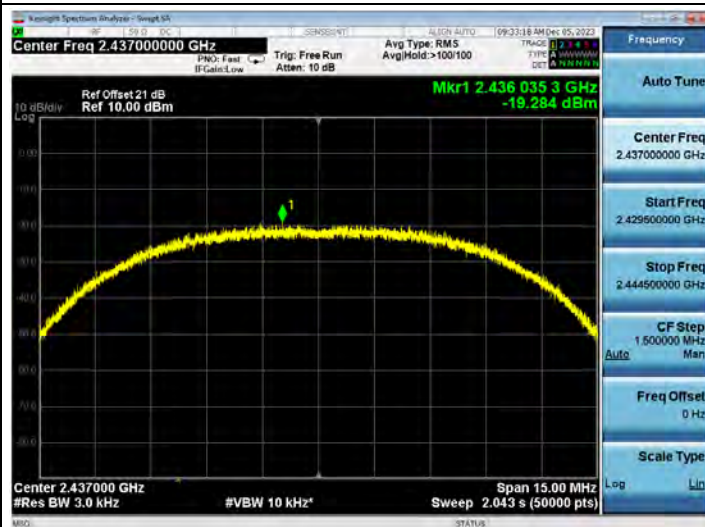
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit
802.11b	1	2412	-19.302	8 dBm
	6	2437	-19.284	8 dBm
	11	2462	-18.804	8 dBm
802.11g	1	2412	-18.736	8 dBm
	6	2437	-19.377	8 dBm
	11	2462	-19.074	8 dBm
802.11n20	1	2412	-22.196	8 dBm
	6	2437	-22.452	8 dBm
	11	2462	-22.443	8 dBm

802.11b

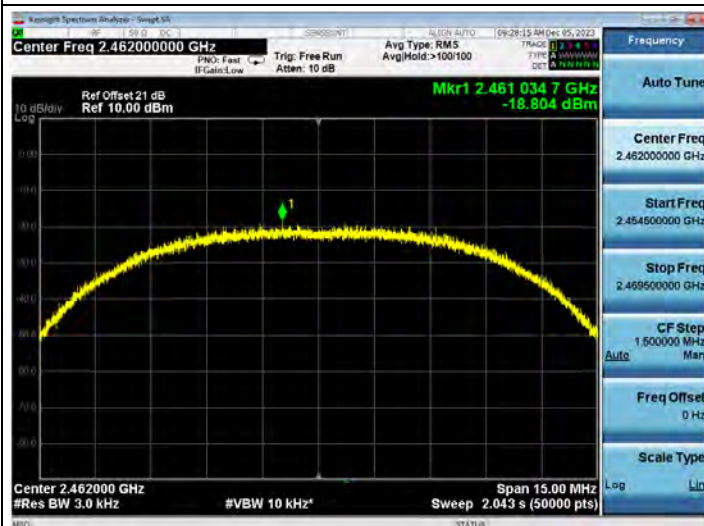
CH2412



CH2437

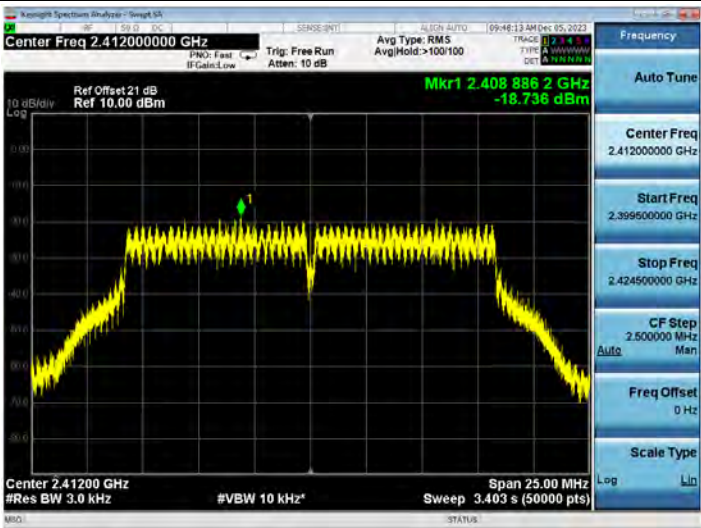


CH2462

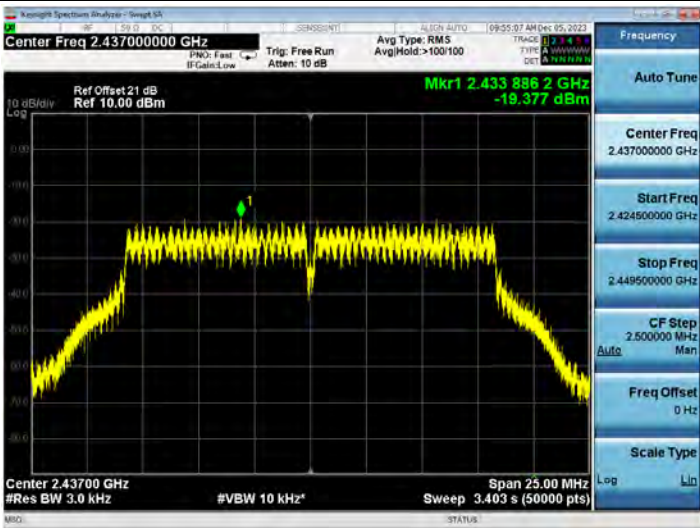


802.11g

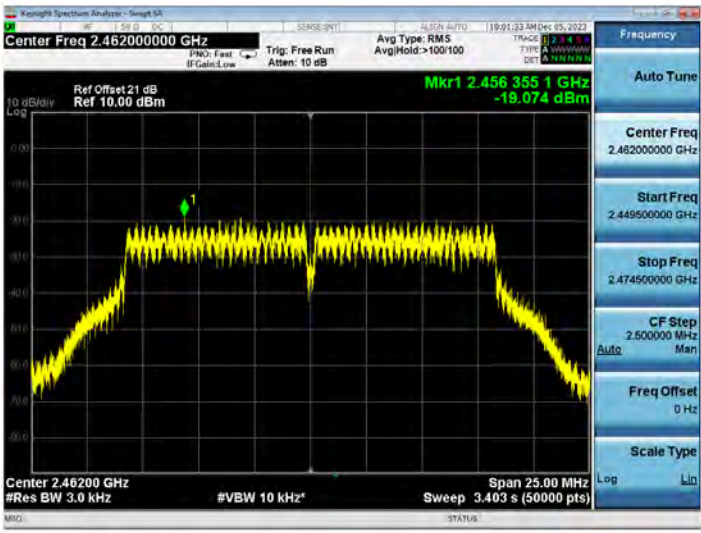
CH2412



CH2437

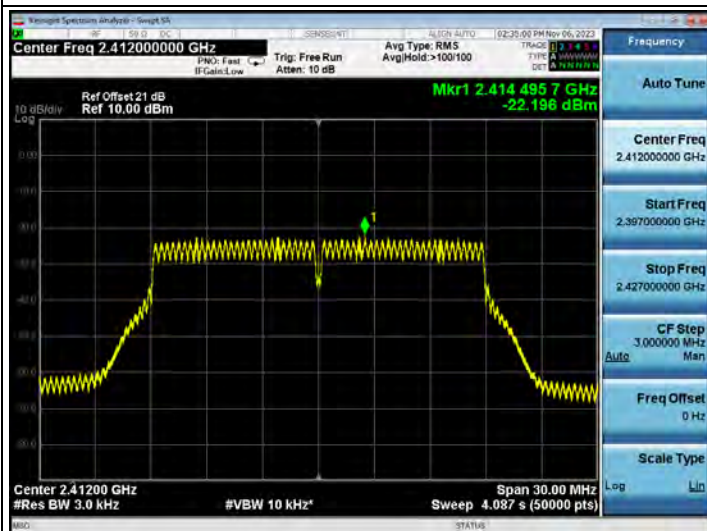


CH2462

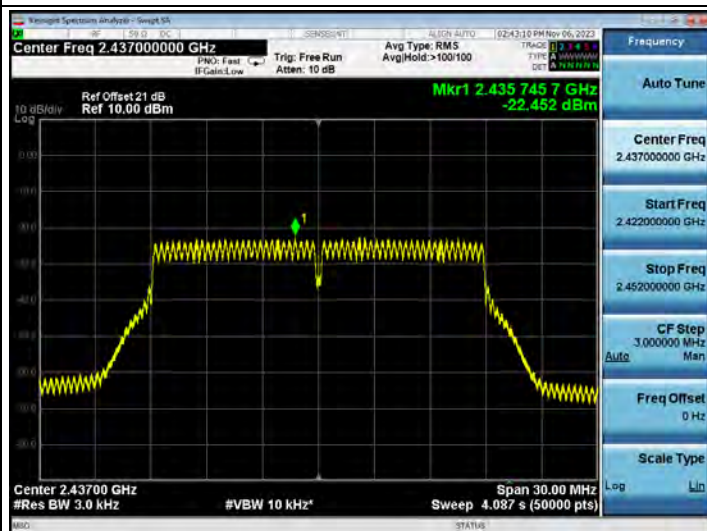


802.11n20

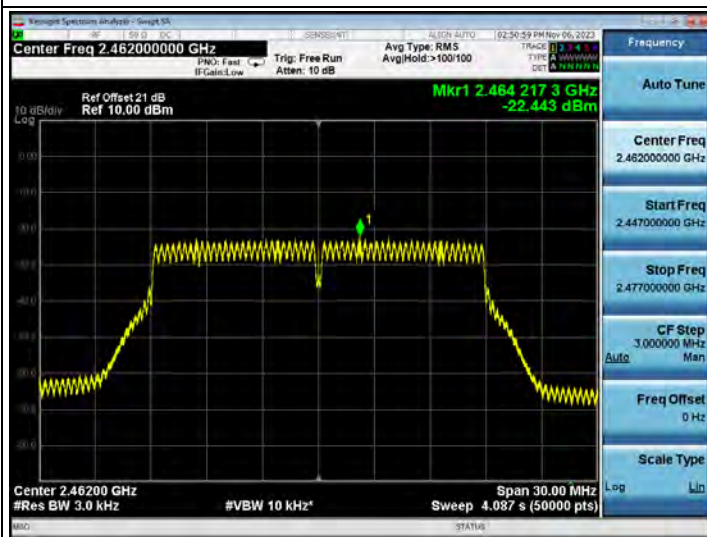
CH2412



CH2437



CH2462



9 ANTENNA REQUIREMENT

9.1 Specification Limits (§15.203)

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.

9.2 Result

According to KDB 353028 D1, the following describes the three ways that can be used to demonstrate compliance to Section 15.203:

- a) Antenna permanently attached.
- b) Unique (non-standard) antenna connector.
- c) Professional installation.

For this product, the antenna is:

- ☐ Antenna permanently attached
- ☒ Unique (non-standard) antenna connector
- ☐ Professional installation
- ☐ not meet any of ways list above

that

- ☒ compliant
- ☐ not compliant

with the requirement of Section 15.203.

10 MEASUREMENT UNCERTAINTY LIST

The measurement uncertainty was estimated for test on the EUT according to CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage of K=2.

The uncertainties value is not used in determining the PASS/FAIL results.

Test Items/Facilities	Frequency/Equipment/Unit	Uncertainty
Conducted Emission No.1 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Conducted Emission No.3 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Radiated Emission	30MHz~200MHz, Horizontal	±3.8 dB
	30MHz~200MHz, Vertical	±4.1 dB
	200MHz~1000MHz, Horizontal	±3.6 dB
	200MHz~1000MHz, Vertical	±5.1 dB
	1GHz~6GHz	±5.3 dB
	6GHz~18GHz	±5.3 dB
	18GHz~40GHz	±3.5 dB
Output Power Test	50MHz~18GHz	0.77 dB
Power Density Test	9kHz~6GHz	1.08 dB
RF Frequency Test	9kHz~40GHz	6×10^{-4}
Bandwidth Test	9kHz~6GHz	1.5×10^{-3}
RF Radiated Power Test	30MHz~1000MHz	3.06 dB
Conducted Output Power Test	50MHz~18GHz	0.83 dB
AC Voltage(<10kHz) Test	120V~230V	0.04 %
DC Power Test	0V~30V	0.4 %
Temperature	-40°C~+100°C	0.52 °C
Humidity	30%~95%	2.6 %