

**TEST REPORT**  
On behalf of

Mettler Toledo (Changzhou) Measurement Technology Co., Ltd

Product Name: IND400

Model No.: IND400

FCC ID: 2ALAI23MT104

Prepared For: Mettler Toledo (Changzhou) Measurement Technology Co., Ltd  
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File No. : C1D2312035  
Report No. : ACI-F23236  
Date of Test : 2023.11.06-12.10  
Date of Report : 2023.12.30

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 : IND400  
(A) Model No. : Refer to Sec.2.1  
(B) Power Supply : 120V AC 60Hz  
(C) Test Voltage : 120V/60Hz

### Test Procedure Used:

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

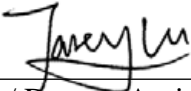
The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

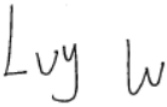
The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.

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-F23237, ACI-F23238 report.***

Date of Test : 2023.11.06-12.10 Date of Report : 2023.12.30

Producer :   
JAREY LU / Deputy Assistant Manager

Review :   
LVY LV / Deputy Assistant Manager

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

Signatory :   
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
<b>EMISSION</b>			
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.			



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
2.	AC-Q58-50ZDB	Dipole	5700-5825	0.8
			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  
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 Jiangsu Province, China.

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	IND400	E20231121274a-01/01	2023.10.08
Radiated Emission	IND400	E20231121274a-01/01	2023.10.08
Conducted RF Test	IND400	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 CONDUCTED EMISSION TEST

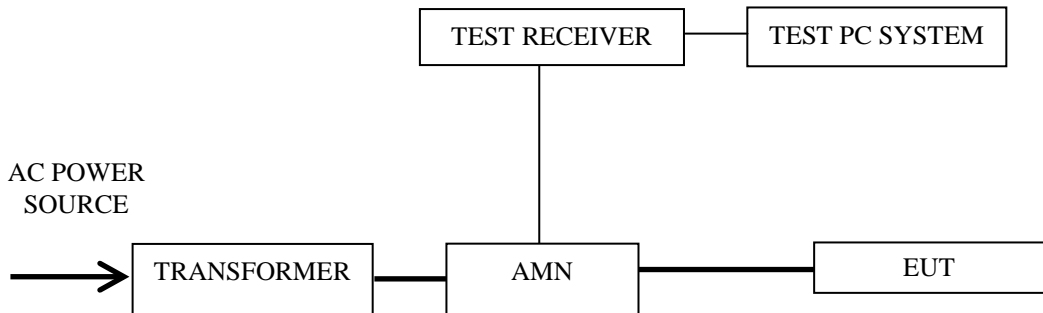
#### 3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101302	2023.02.22	1 Year
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	2023.02.22	1 Year
3.	Fixed Attenuator	SHYL	TTS-1	001	2023.02.22	1 Year
4.	50Ω Coaxial Switch	ANRITSU	MP59B	6200655086	2023.02.22	1 Year
5.	Coaxial Cable	HANWEI	RG223/U	KJ09052	2023.02.22	1 Year
6.	Software	Audix	e3	210616	--	--

#### 3.2 Block Diagram of Test Setup

##### 3.2.1 Conducted Disturbance Test Setup



— : Signal Line  
 — : Power Line

### 3.3 Conducted Emission Limits (§15.207)

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE 1 – The lower limit shall apply at the transition frequencies. NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz		

### 3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner which 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. 3.2.
- 3.5.2 Turn on the power of all equipment.
- 3.5.3 Turn the EUT on the test mode, and then test.

### 3.6 Test Procedures

The EUT was placed upon a non-metallic table, which is 0.8 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50 Ω coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15 Subpart C and ANSI C63.10: 2013 requirements during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

Test with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. (According to KDB 174176 D01 Line Conducted FAQ)

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7

### 3.7 Test Results

< **PASS** >

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

Worst case emission:

No.	Operation	Mode	Channel	Frequency (MHz)	Data Page
1.	Transmitting	802.11b	1	2412	P15-16

NOTE 1 – Emission Level = Read Level + AMN Factor + Aux Factor + Cable Loss  
Margin = Limits - Emission Level

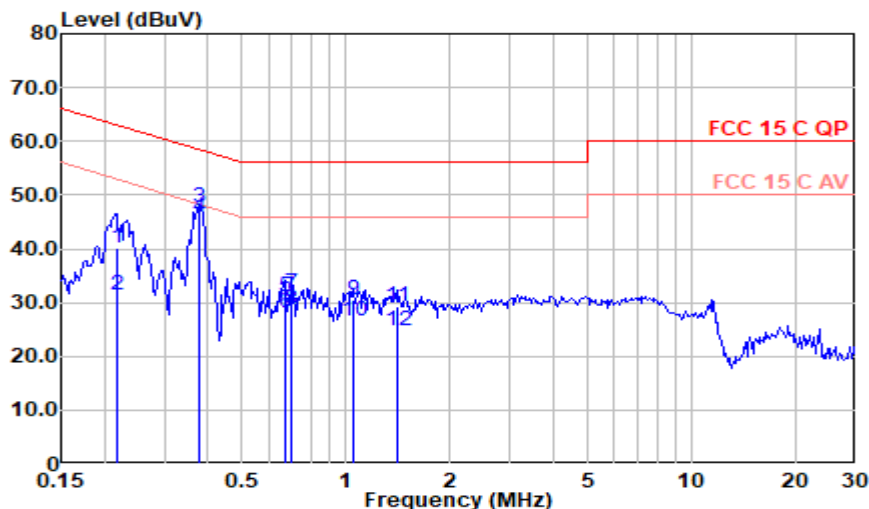
NOTE 2 – “QP” means “Quasi-Peak” values

NOTE 3 – The emission levels which not reported are too low against the official limit.

### Worst case emission

Test Date:	2023.12.10	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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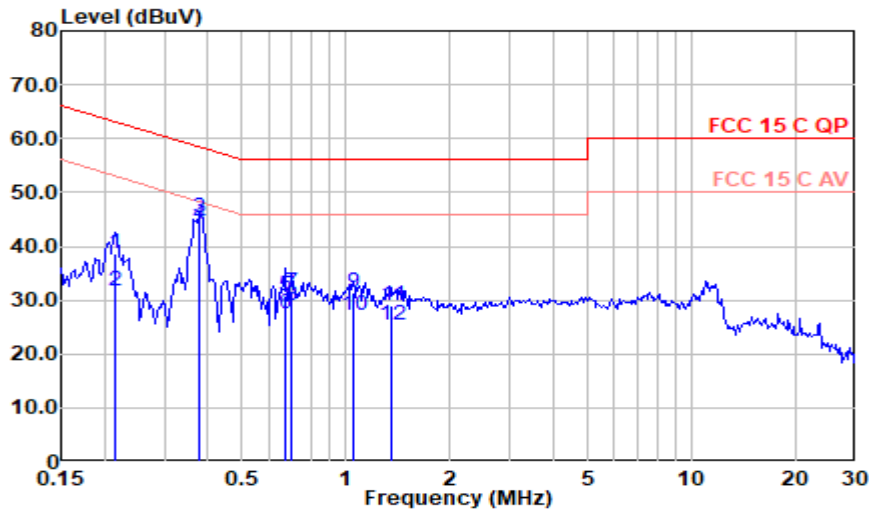
Mode: 802.11b CH2412MHz



#### Polarization at Line

Frequency (MHz)	Meter Reading dB (mV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (mV)	Limits dB (mV)	Margin (dB)	Remark
0.217	30.48	0.10	9.49	0.10	40.17	62.95	22.78	QP
0.217	21.68	0.10	9.49	0.10	31.37	52.95	21.58	Average
0.378	37.98	0.10	9.49	0.10	47.67	58.32	10.65	QP
0.378	36.21	0.10	9.49	0.10	45.90	48.32	2.43	Average
0.666	21.40	0.20	9.49	0.10	31.19	56.00	24.81	QP
0.666	18.15	0.20	9.49	0.10	27.94	46.00	18.06	Average
0.700	21.90	0.20	9.49	0.10	31.69	56.00	24.31	QP
0.700	19.03	0.20	9.49	0.10	28.82	46.00	17.18	Average
1.053	20.81	0.20	9.49	0.10	30.60	56.00	25.40	QP
1.053	16.77	0.20	9.49	0.10	26.56	46.00	19.44	Average
1.404	19.59	0.20	9.49	0.10	29.38	56.00	26.62	QP
1.404	14.95	0.20	9.49	0.10	24.74	46.00	21.26	Average

**Mode: 802.11b CH2412MHz**



**Polarization at Neutral**

Frequency (MHz)	Meter Reading dB (mV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (mV)	Limits dB (mV)	Margin (dB)	Remark
0.215	28.94	0.10	9.49	0.10	38.63	63.03	24.40	QP
0.215	22.05	0.10	9.49	0.10	31.74	53.03	21.29	Average
0.378	35.50	0.10	9.49	0.10	45.19	58.32	13.13	QP
0.378	34.34	0.10	9.49	0.10	44.03	48.32	4.29	Average
0.666	21.06	0.10	9.49	0.10	30.75	56.00	25.25	QP
0.666	17.89	0.10	9.49	0.10	27.58	46.00	18.42	Average
0.700	21.72	0.10	9.49	0.10	31.41	56.00	24.59	QP
0.700	19.24	0.10	9.49	0.10	28.93	46.00	17.07	Average
1.053	21.55	0.20	9.49	0.10	31.34	56.00	24.66	QP
1.053	17.34	0.20	9.49	0.10	27.13	46.00	18.87	Average
1.363	19.14	0.20	9.49	0.10	28.93	56.00	27.07	QP
1.363	15.56	0.20	9.49	0.10	25.35	46.00	20.65	Average



## 4 RADIATED EMISSION TEST

### 4.1 Test Equipment

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

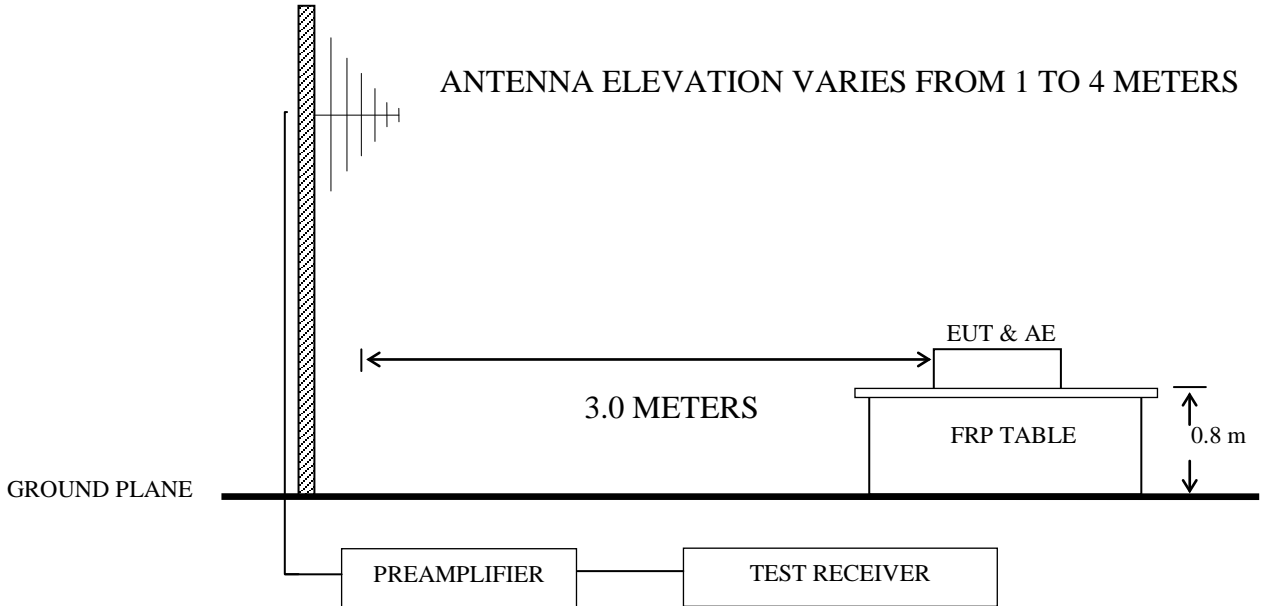
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Preamplifier	Agilent	8447D	2944A10548	2023.02.22	1 Year
2.	Preamplifier	HP	8449B	3008A00864	2023.02.22	1 Year
3.	EXA Signal Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
4.	Test Receiver	R&S	ESCI	101303	2023.02.22	1 Year
5.	Bilog Antenna+6dB Attenuator	Schwarzbeck	VULB 9168+EMCI-N-6-06	708+AT-N0638	2023.02.07	1 Year
6.	Horn Antenna	EMCO	3115	96074878	2023.08.02	1 Year
7.	Horn Antenna	EMCO	3116	00062643	2023.01.30	2 Year
8.	Cavity Band Rejection Filter	Microwave	WT-A3882-R10	WT200312-1-1	2023.02.22	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6200655086	2023.02.22	1 Year
10.	Coaxial Cable	SCHAFFNER	RG 212U-MIL C 17+N1K50-E W0630-N1K50-15m-1	RE-10m-001/ RE-15m-002	2023.02.22	1 Year
11.	Software	Audix	e3	210616	--	--

## 4.2 Block Diagram of Test Setup

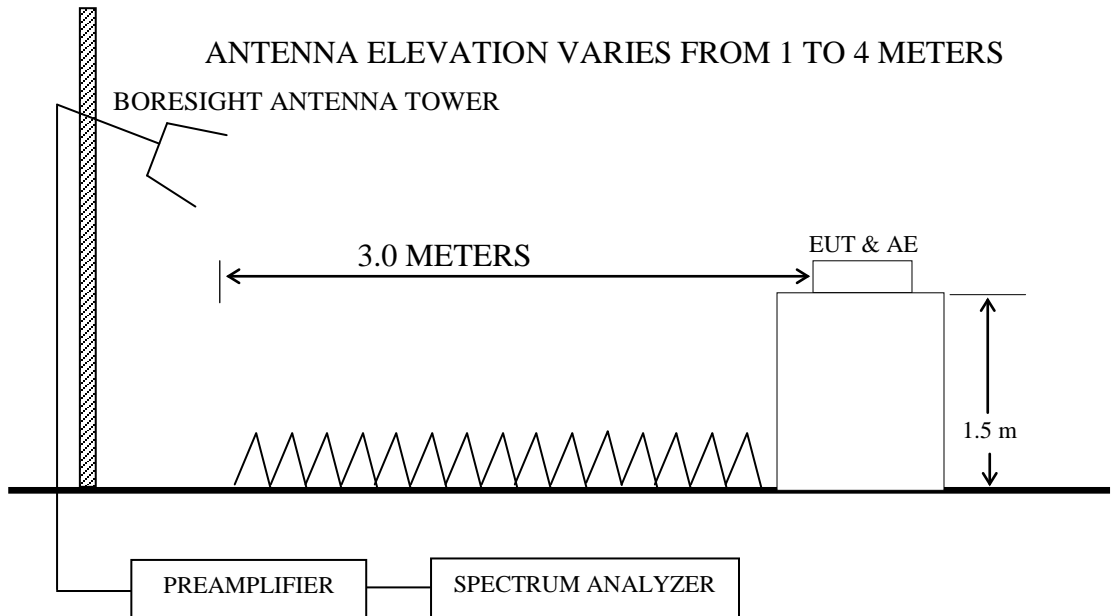
### 4.2.1 EUT & Peripherals



### 4.2.2 Below 1GHz



### 4.2.3 Above 1GHz



### 4.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (nV/m)	
		(nV/m)	(nV/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 (nV/m) = 20 log Emission Level (nV/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

### 4.4 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.

### 4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 4.2.

4.5.2 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.

4.5.3 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.

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

### 4.6 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 10<sup>th</sup> harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

## 4.7 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	P22-23

Frequency range: above 1GHz

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P24-25
2.			6	2437 MHz	P26-27
3.			11	2462 MHz	P28-29
4.		802.11g	1	2412 MHz	P30-31
5.		802.11n20	1	2412 MHz	P32-33

Band-Edge and Restricted bands:

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P34-35
2.			11	2462 MHz	P36-37
3.		802.11g	1	2412 MHz	P38-39
4.			11	2462 MHz	P40-41
5.		802.11n20	1	2412 MHz	P42-43
6.			11	2462 MHz	P44-45

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 Standing direction, for this direction was the maximum emission direction during the test. The data of Side & Lying 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.

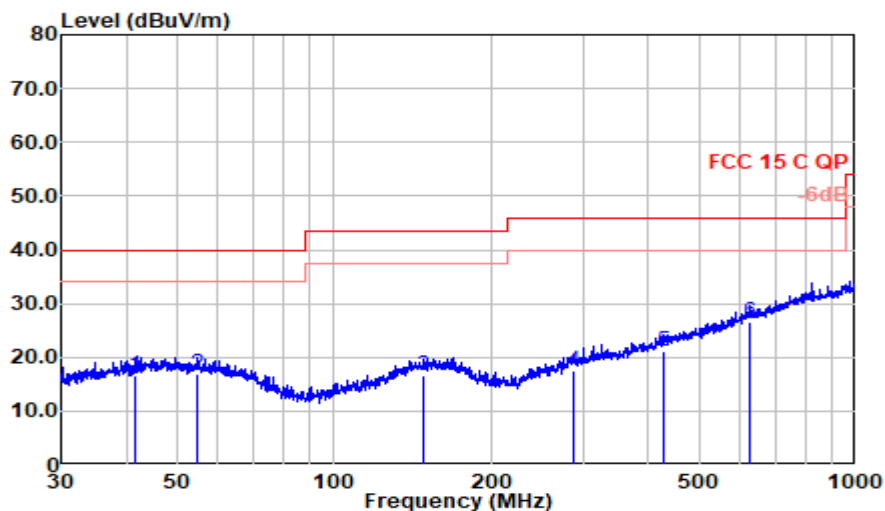
For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

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

### Radiated emission < 1GHz

Test Date:	2023.11.05-12.10	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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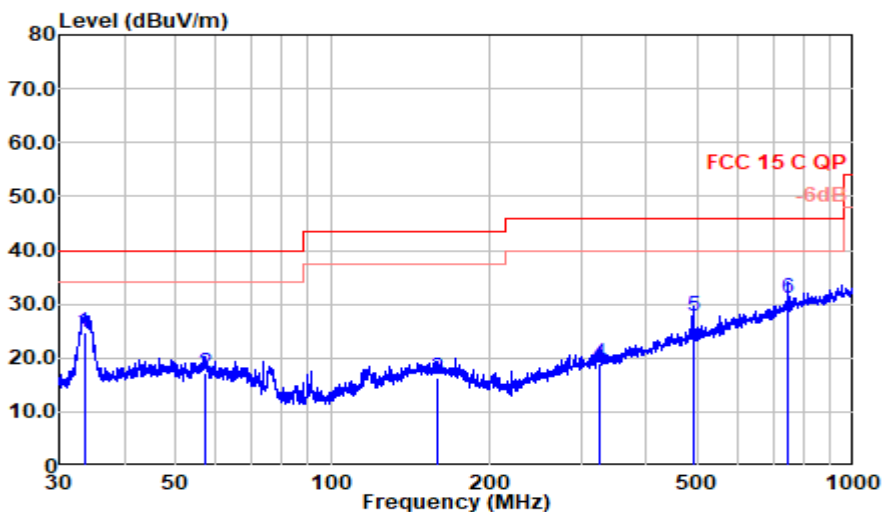
Mode: 802.11b CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
41.640	25.98	19.73	0.71	29.90	16.52	40.00	23.48	QP
54.835	26.41	19.68	0.81	29.88	17.02	40.00	22.98	QP
148.441	25.55	19.20	1.33	29.41	16.68	43.50	26.82	QP
286.982	25.36	18.94	1.90	28.76	17.43	46.00	28.57	QP
429.523	25.77	22.38	2.28	29.22	21.22	46.00	24.78	QP
627.274	26.46	26.10	2.85	28.89	26.52	46.00	19.48	QP

**Mode: 802.11b CH2412MHz**



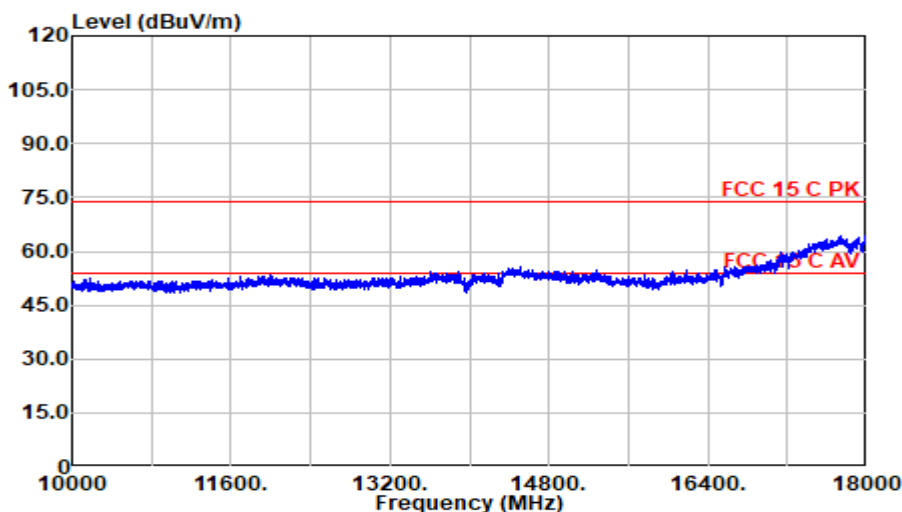
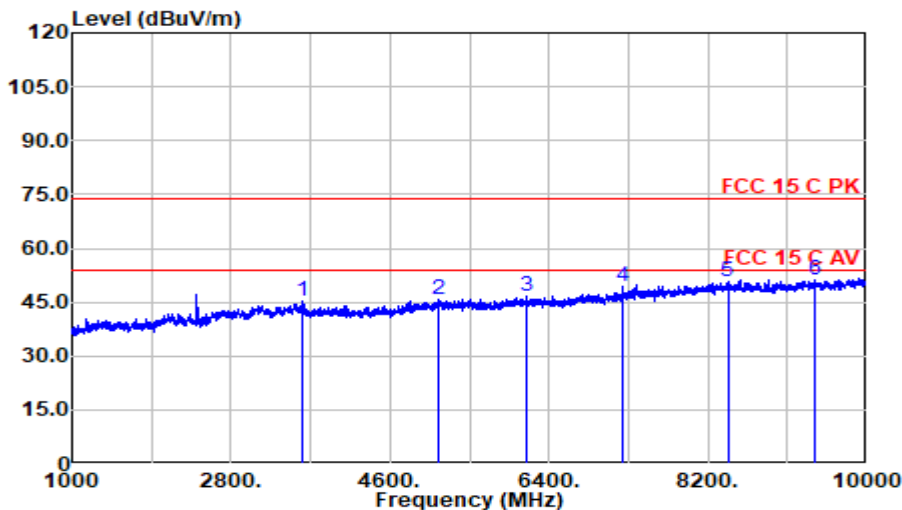
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
33.504	35.47	18.55	0.63	29.90	24.75	40.00	15.25	QP
57.292	27.01	19.37	0.83	29.87	17.34	40.00	22.66	QP
158.668	25.04	19.30	1.39	29.37	16.36	43.50	27.14	QP
326.167	25.53	20.20	1.97	28.81	18.89	46.00	27.11	QP
492.469	31.24	23.45	2.48	29.47	27.69	46.00	18.31	QP
750.108	28.48	28.00	3.00	28.30	31.18	46.00	14.82	QP

### Radiated Emission > 1GHz

Test Date:	2023.11.05-12.10	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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Mode: 802.11b CH2412MHz

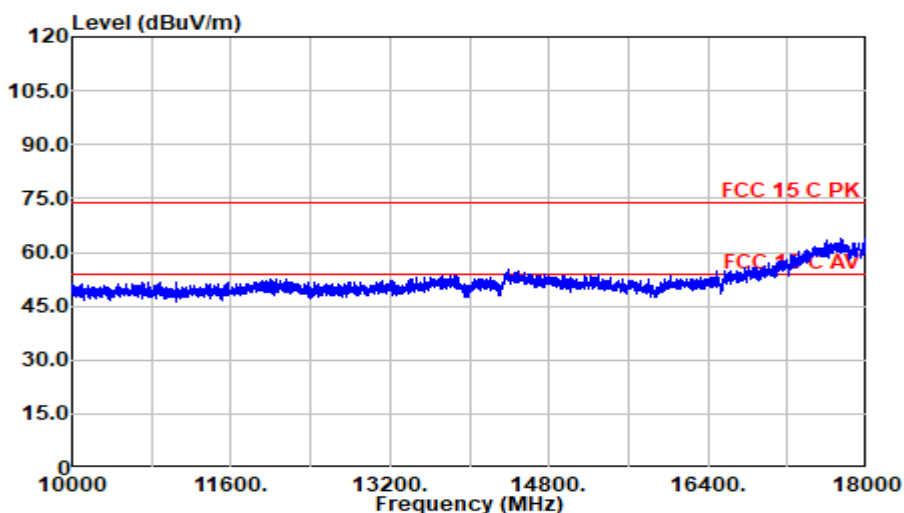
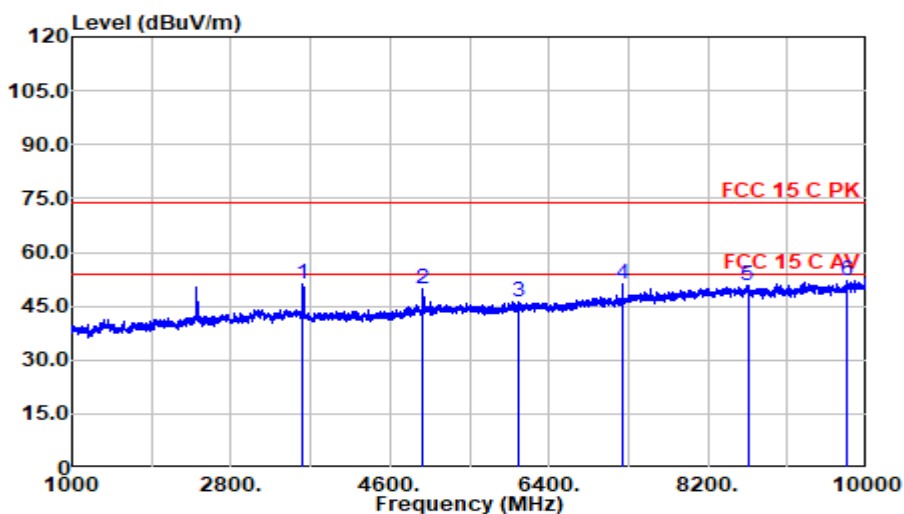


#### Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3617.404	42.65	31.53	6.44	35.14	45.49	74.00	28.51	Peak
5138.785	38.74	33.91	7.90	34.60	45.95	74.00	28.05	Peak
6156.039	38.05	34.42	8.56	34.60	46.43	74.00	27.57	Peak
7240.810	37.91	36.51	9.52	34.68	49.27	74.00	24.73	Peak
8424.606	37.07	38.15	10.45	34.81	50.86	74.00	23.14	Peak
9408.102	36.88	38.20	10.98	34.66	51.39	74.00	22.61	Peak



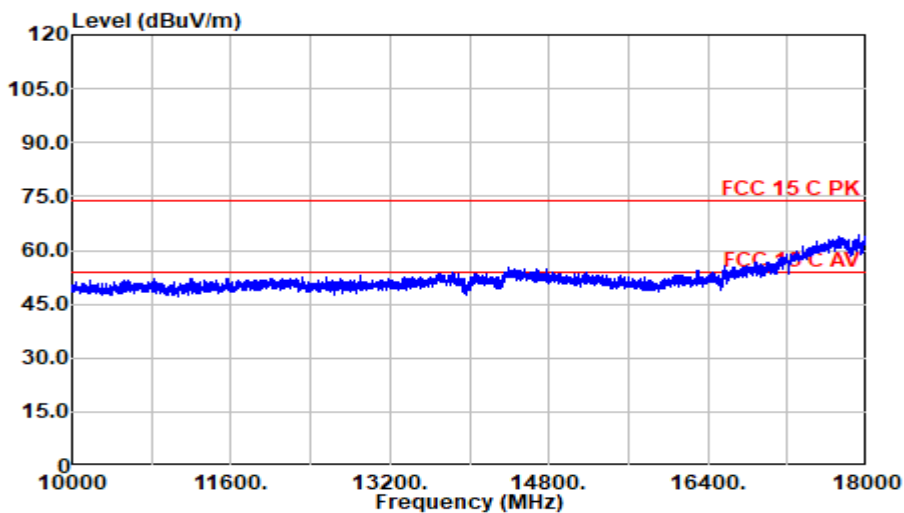
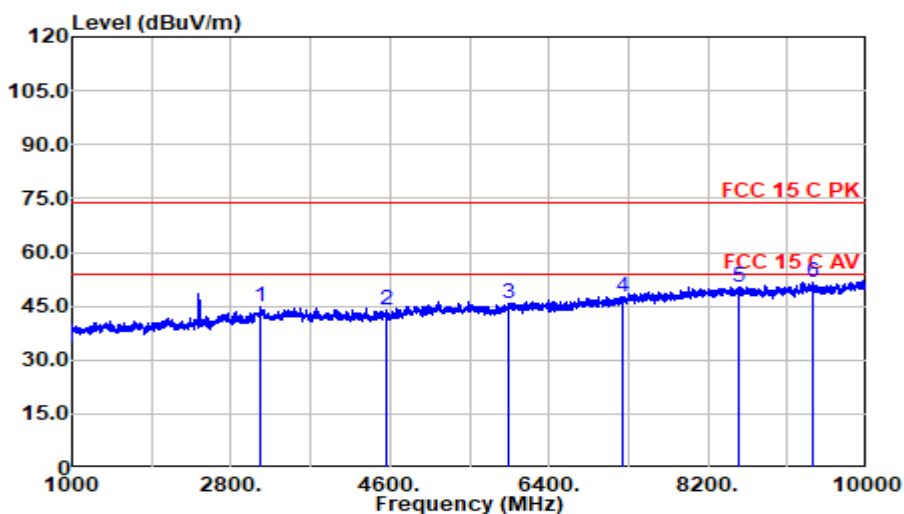
Mode: 802.11b CH2412MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3617.404	48.25	31.53	6.44	35.14	51.09	74.00	22.91	Peak
4976.744	43.18	33.31	7.79	34.61	49.66	74.00	24.34	Peak
6050.263	37.73	34.40	8.46	34.60	45.99	74.00	28.01	Peak
7238.560	39.73	36.49	9.52	34.68	51.06	74.00	22.94	Peak
8651.913	36.68	38.09	10.52	34.77	50.53	74.00	23.47	Peak
9770.442	37.23	38.10	11.27	34.62	51.98	74.00	22.02	Peak

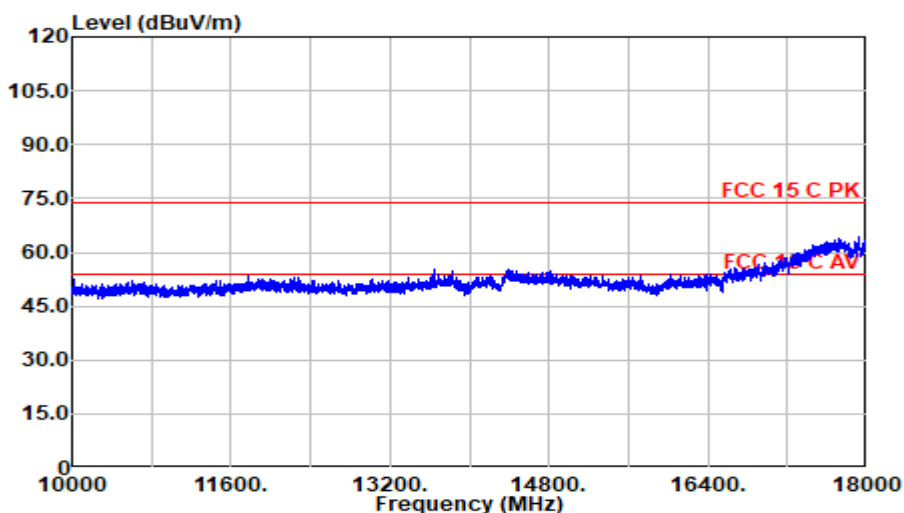
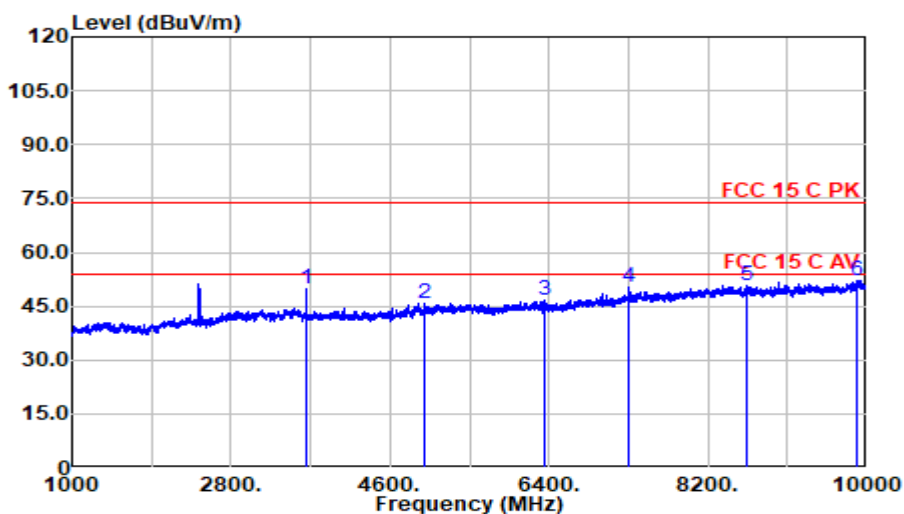
Mode: 802.11b CH2437MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3131.283	43.13	30.86	6.00	35.34	44.65	74.00	29.35	Peak
4558.140	38.79	32.38	7.37	34.77	43.78	74.00	30.22	Peak
5933.233	38.06	34.10	8.38	34.60	45.94	74.00	28.06	Peak
7238.560	36.32	36.49	9.52	34.68	47.64	74.00	26.36	Peak
8541.636	36.55	38.20	10.49	34.79	50.45	74.00	23.55	Peak
9378.845	37.32	38.12	10.95	34.66	51.73	74.00	22.27	Peak

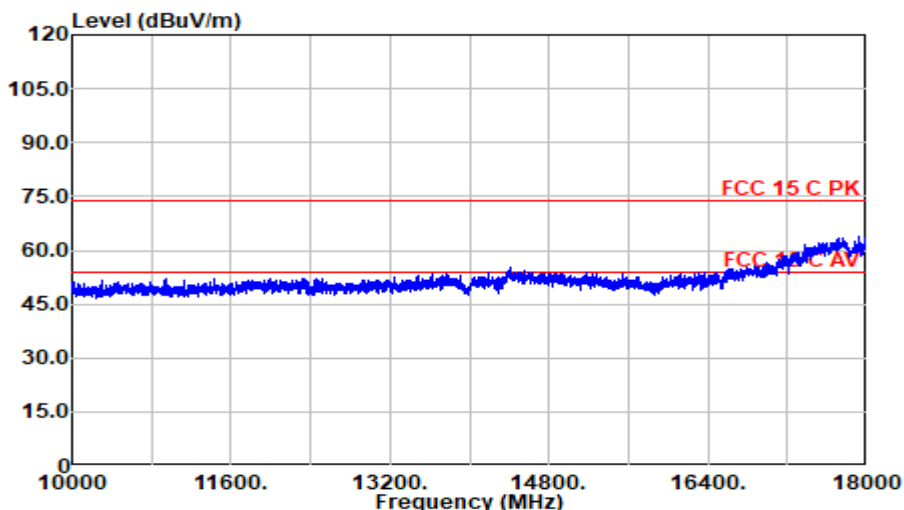
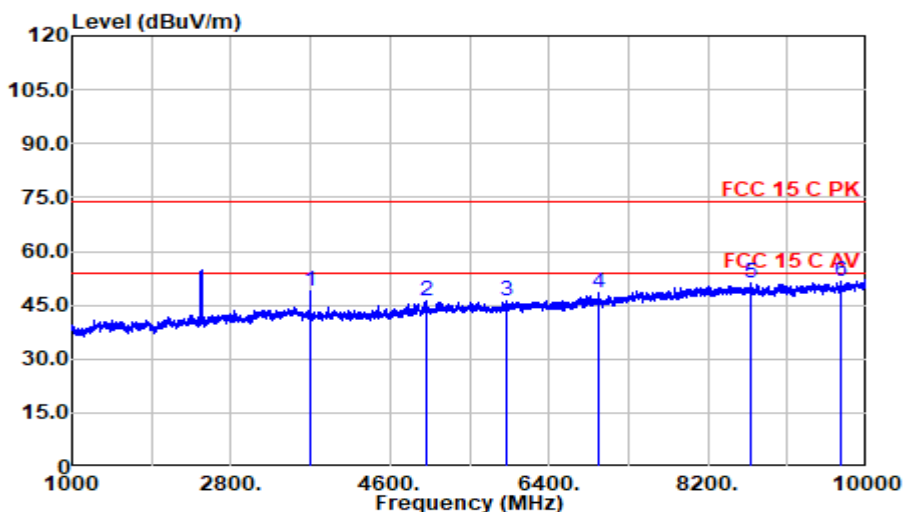
Mode: 802.11b CH2437MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3655.664	46.73	31.63	6.47	35.13	49.71	74.00	24.29	Peak
4996.999	39.20	33.39	7.81	34.60	45.80	74.00	28.20	Peak
6345.086	37.86	34.70	8.72	34.60	46.68	74.00	27.32	Peak
7308.327	38.67	36.65	9.59	34.70	50.21	74.00	23.79	Peak
8636.159	36.96	38.10	10.52	34.77	50.80	74.00	23.20	Peak
9896.474	36.87	38.39	11.37	34.61	52.01	74.00	21.99	Peak

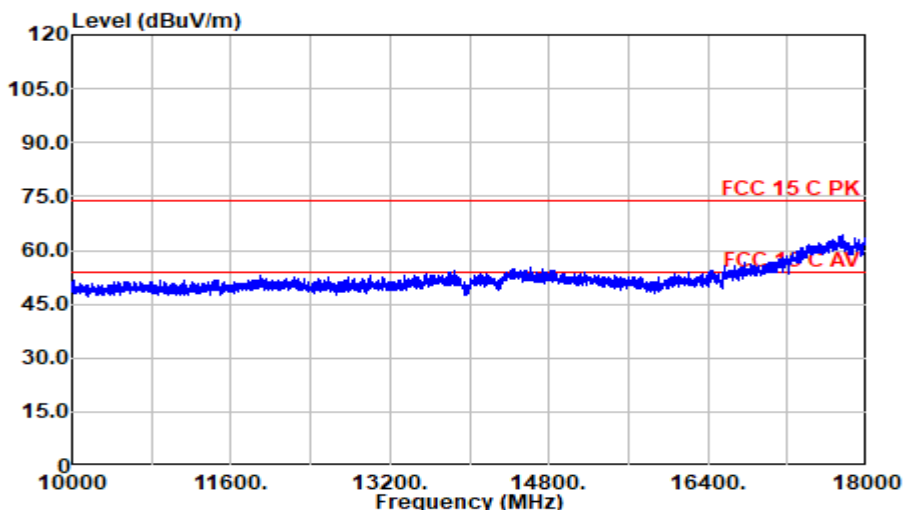
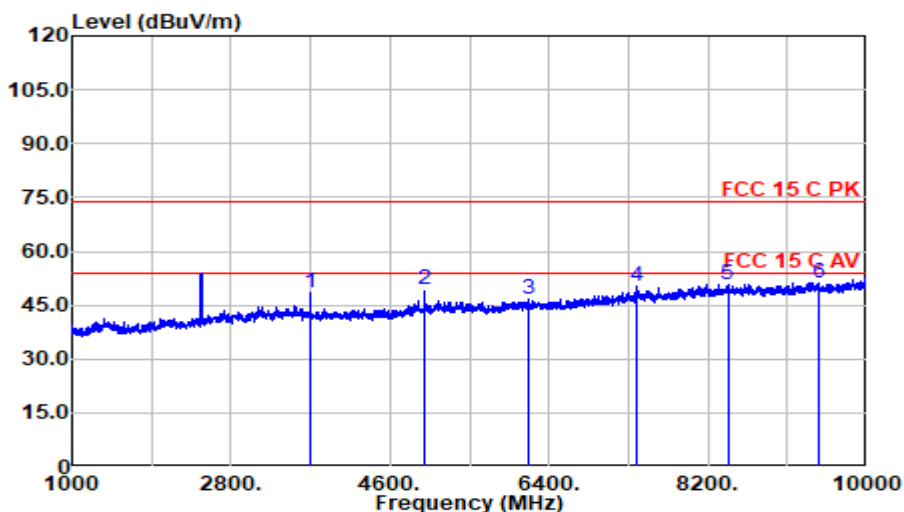
Mode: 802.11b CH2462MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3691.673	45.88	31.85	6.50	35.11	49.12	74.00	24.88	Peak
5008.252	39.35	33.42	7.82	34.60	45.99	74.00	28.01	Peak
5921.980	38.45	34.10	8.38	34.60	46.32	74.00	27.68	Peak
6970.743	38.14	35.60	9.23	34.60	48.37	74.00	25.63	Peak
8676.669	37.54	37.99	10.53	34.76	51.31	74.00	22.69	Peak
9711.928	36.78	38.10	11.22	34.63	51.48	74.00	22.52	Peak

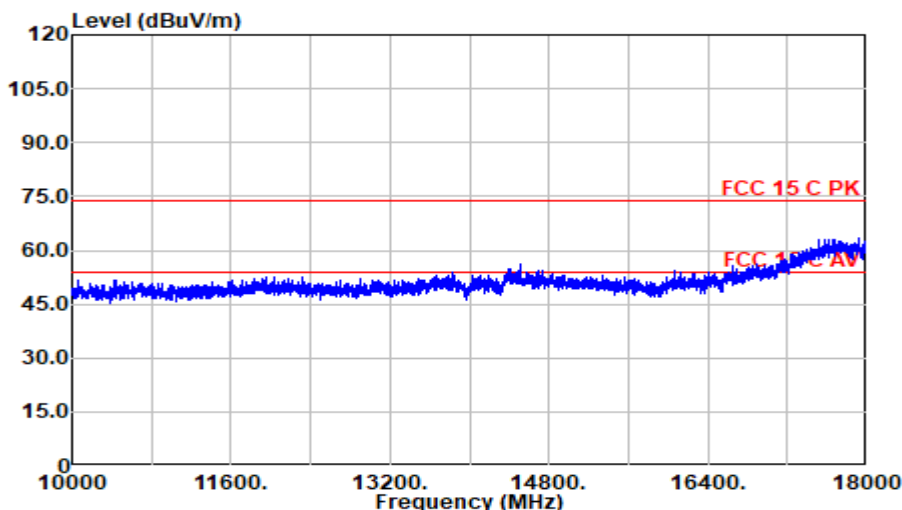
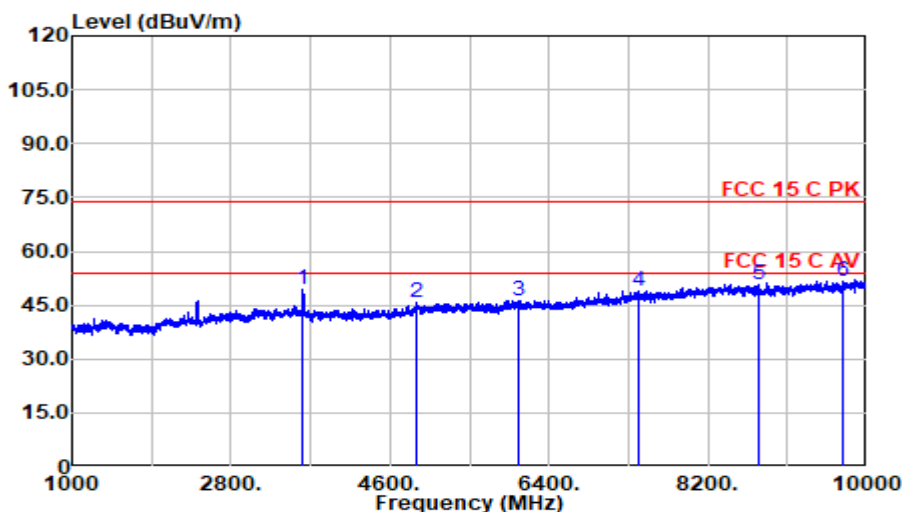
Mode: 802.11b CH2462MHz



Polarization at Vertical

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
3693.924	45.06	31.86	6.51	35.11	48.32	74.00	25.68	Peak
4985.747	42.96	33.34	7.80	34.61	49.49	74.00	24.51	Peak
6169.542	38.03	34.48	8.57	34.60	46.48	74.00	27.52	Peak
7387.097	38.31	36.90	9.68	34.72	50.17	74.00	23.83	Peak
8424.606	36.76	38.15	10.45	34.81	50.54	74.00	23.46	Peak
9453.113	36.37	38.21	11.01	34.65	50.95	74.00	23.05	Peak

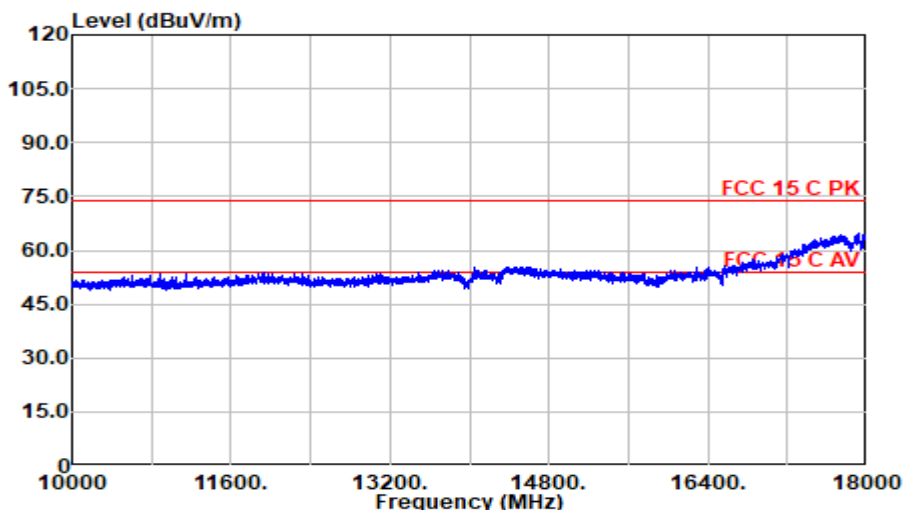
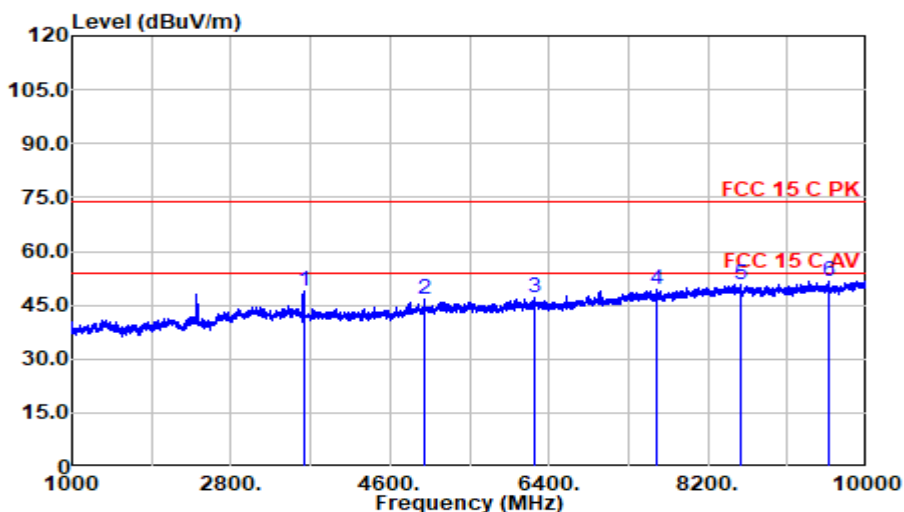
Mode: 802.11g CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3615.154	46.38	31.53	6.44	35.14	49.21	74.00	24.79	Peak
4909.228	39.15	33.44	7.72	34.63	45.68	74.00	28.32	Peak
6057.014	38.01	34.41	8.47	34.60	46.30	74.00	27.70	Peak
7407.352	37.11	36.90	9.70	34.73	48.98	74.00	25.02	Peak
8775.694	37.14	37.90	10.56	34.74	50.86	74.00	23.14	Peak
9738.935	36.72	38.10	11.24	34.63	51.44	74.00	22.56	Peak

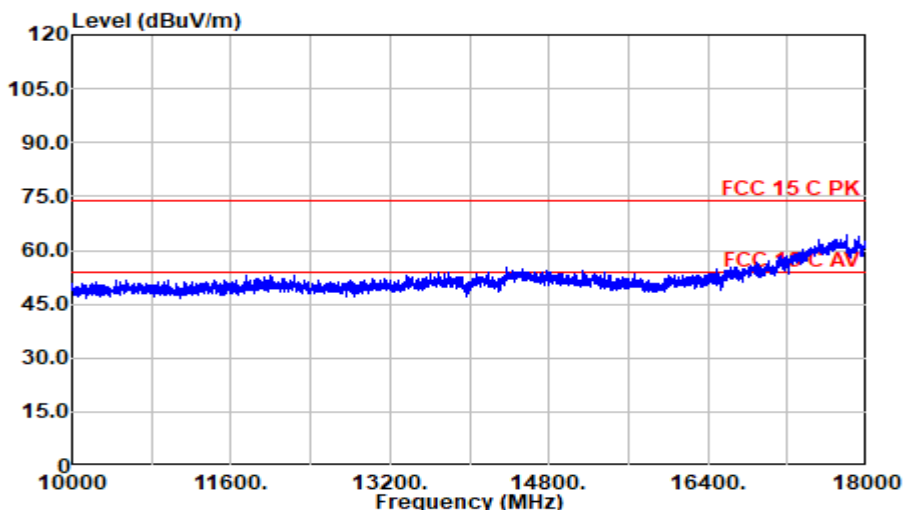
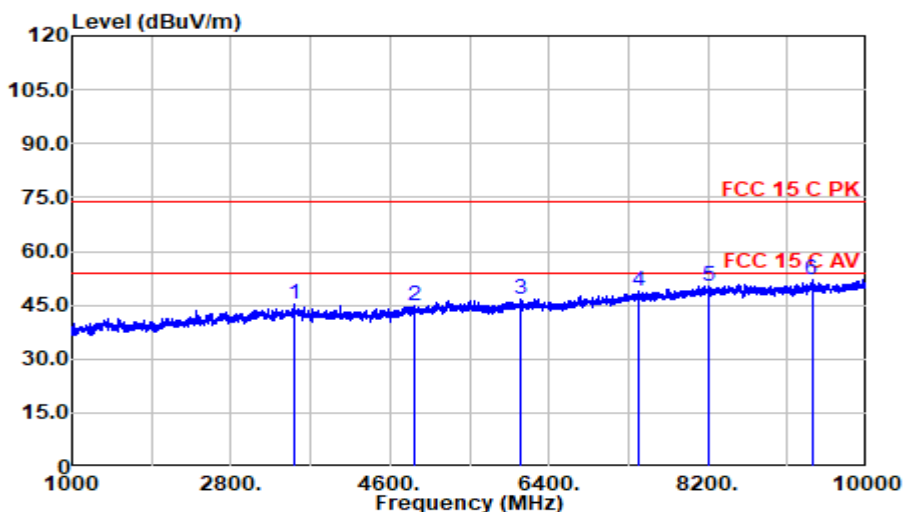
Mode: 802.11g CH2412MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3619.655	45.98	31.54	6.44	35.14	48.83	74.00	25.17	Peak
4992.498	40.13	33.37	7.80	34.60	46.70	74.00	27.30	Peak
6239.310	38.16	34.68	8.63	34.60	46.87	74.00	27.13	Peak
7625.656	37.40	36.75	9.93	34.79	49.29	74.00	24.71	Peak
8564.141	36.62	38.17	10.50	34.78	50.50	74.00	23.50	Peak
9563.391	36.98	38.20	11.10	34.64	51.64	74.00	22.36	Peak

Mode: 802.11n CH2412MHz

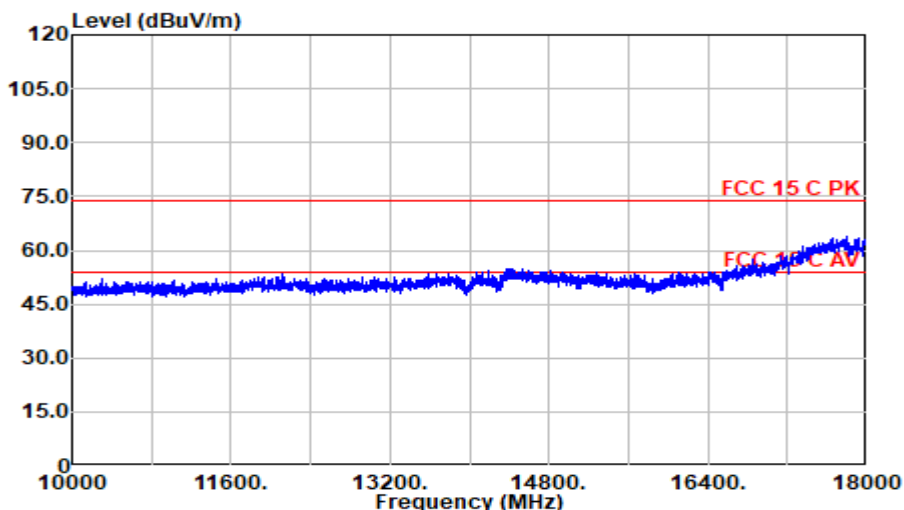
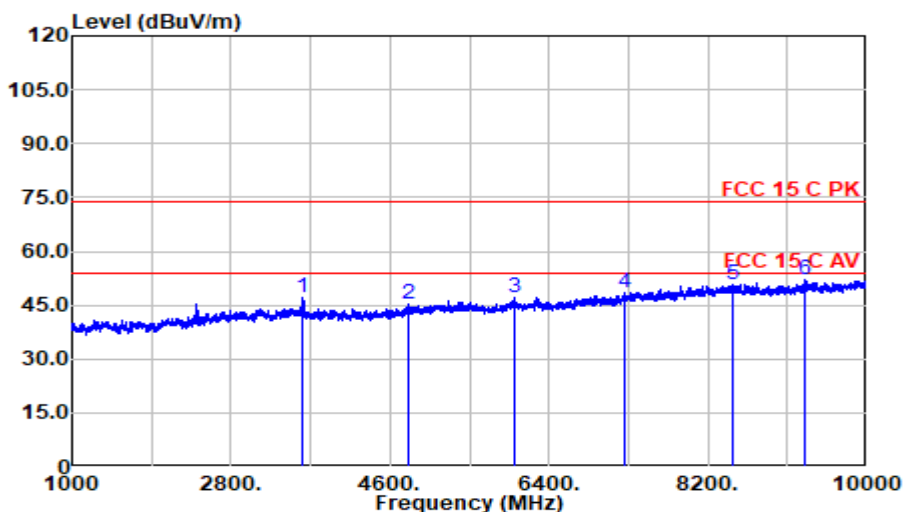


Polarization at Horizontal

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
3522.881	42.33	31.55	6.36	35.18	45.07	74.00	28.93	Peak
4875.469	38.41	33.35	7.69	34.65	44.81	74.00	29.19	Peak
6075.019	38.31	34.45	8.49	34.60	46.65	74.00	27.35	Peak
7423.106	36.89	36.90	9.72	34.73	48.77	74.00	25.23	Peak
8210.803	37.24	37.72	10.38	34.86	50.48	74.00	23.52	Peak
9376.594	37.67	38.11	10.95	34.66	52.06	74.00	21.94	Peak



Mode: 802.11n CH2412MHz



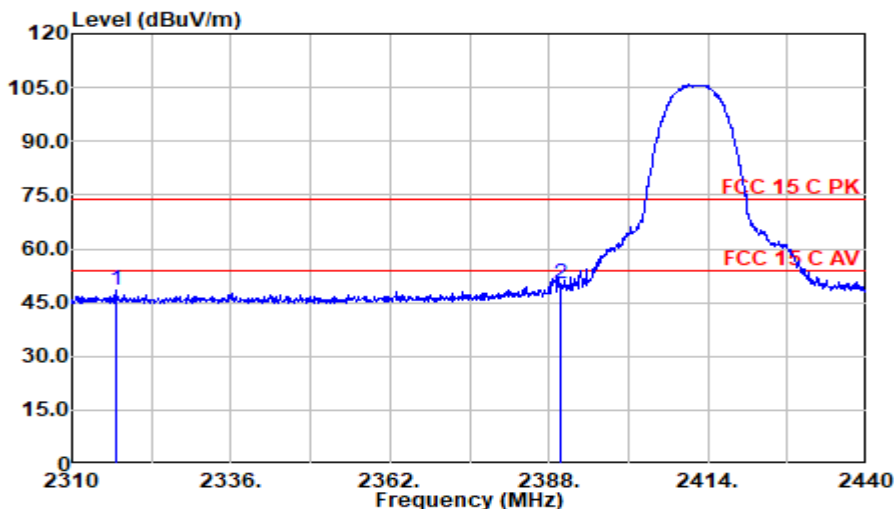
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
3617.404	44.21	31.53	6.44	35.14	47.05	74.00	26.95	Peak
4801.200	39.25	32.91	7.62	34.67	45.10	74.00	28.90	Peak
6016.504	38.99	34.27	8.43	34.60	47.09	74.00	26.91	Peak
7261.065	36.91	36.60	9.54	34.68	48.37	74.00	25.63	Peak
8485.371	36.94	38.20	10.47	34.80	50.81	74.00	23.19	Peak
9300.075	37.79	38.10	10.89	34.67	52.11	74.00	21.89	Peak

### Band-Edge and Restricted bands:

Test Date:	2023.11.05-12.10	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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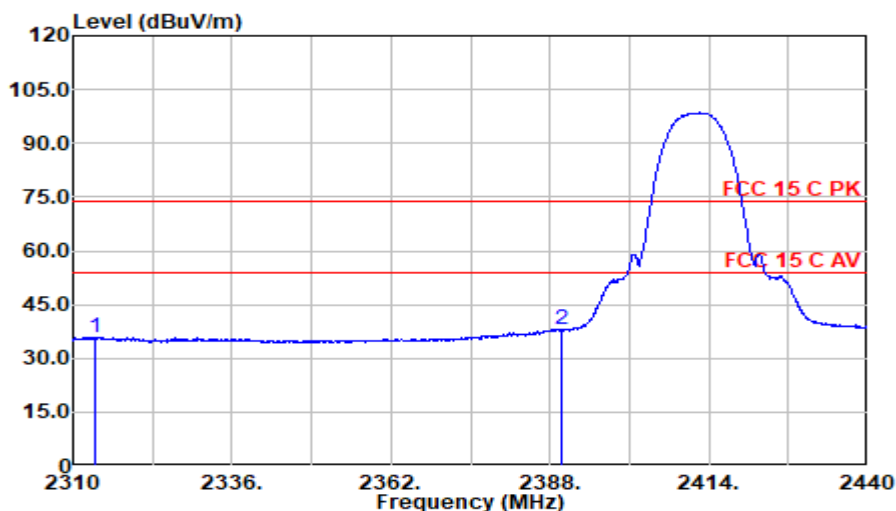
Mode: 802.11b CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2317.100	51.02	28.14	5.32	36.10	48.38	74.00	25.62	Peak
2390.000	52.50	28.56	5.39	36.02	50.44	74.00	23.56	Peak

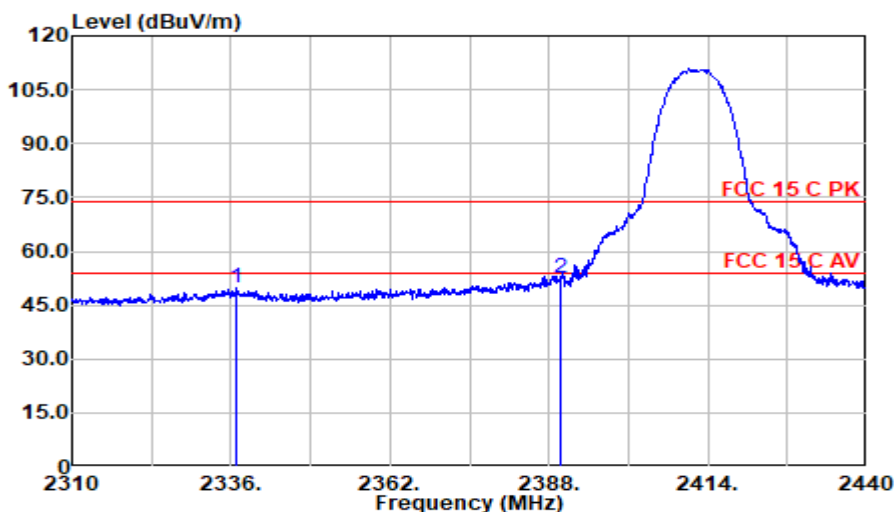
Mode: 802.11b CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2313.500	38.64	28.11	5.32	36.10	35.96	54.00	18.04	Average
2390.000	40.04	28.56	5.39	36.02	37.97	54.00	16.03	Average

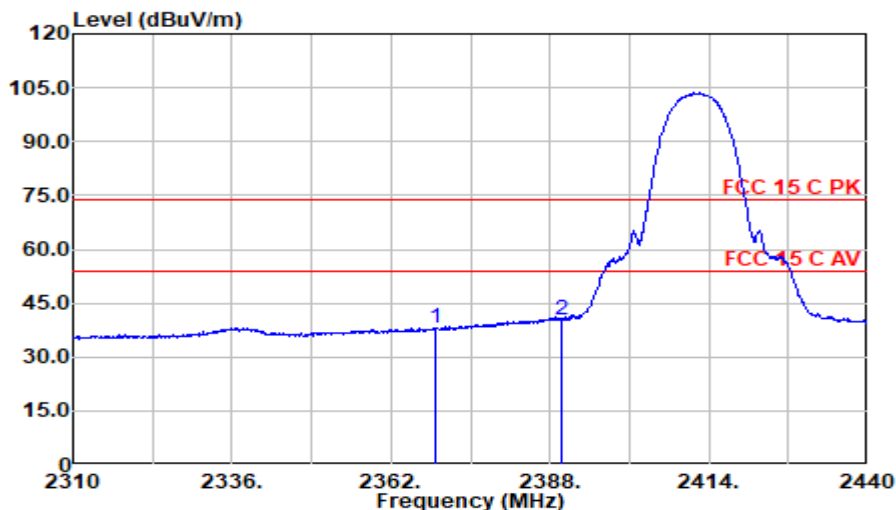
**Mode: 802.11b CH2412MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2336.900	52.06	28.30	5.34	36.08	49.61	74.00	24.39	Peak
2390.000	54.60	28.56	5.39	36.02	52.53	74.00	21.47	Peak

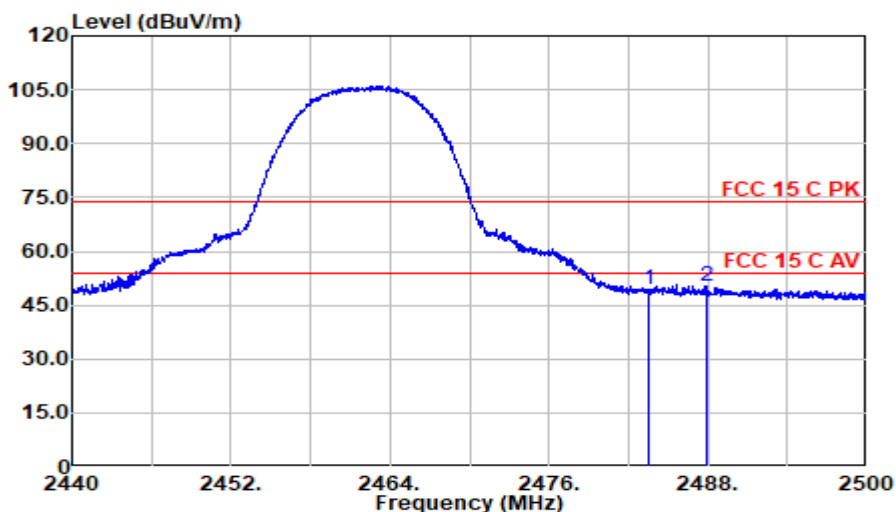
**Mode: 802.11b CH2412MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2369.400	40.41	28.48	5.37	36.04	38.22	54.00	15.78	Average
2390.000	42.57	28.56	5.39	36.02	40.50	54.00	13.50	Average

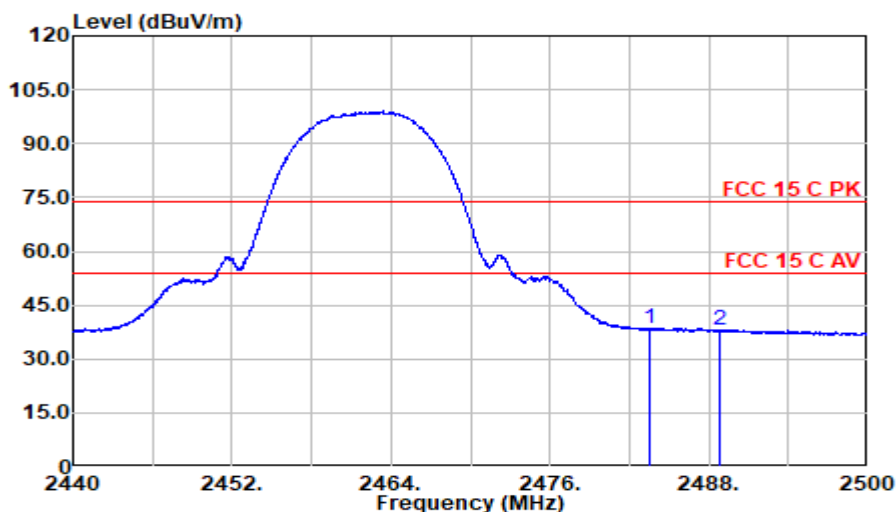
**Mode: 802.11b CH2462MHz**



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	50.96	28.63	5.47	35.91	49.16	74.00	24.84	Peak
2487.880	52.25	28.65	5.47	35.91	50.47	74.00	23.53	Peak

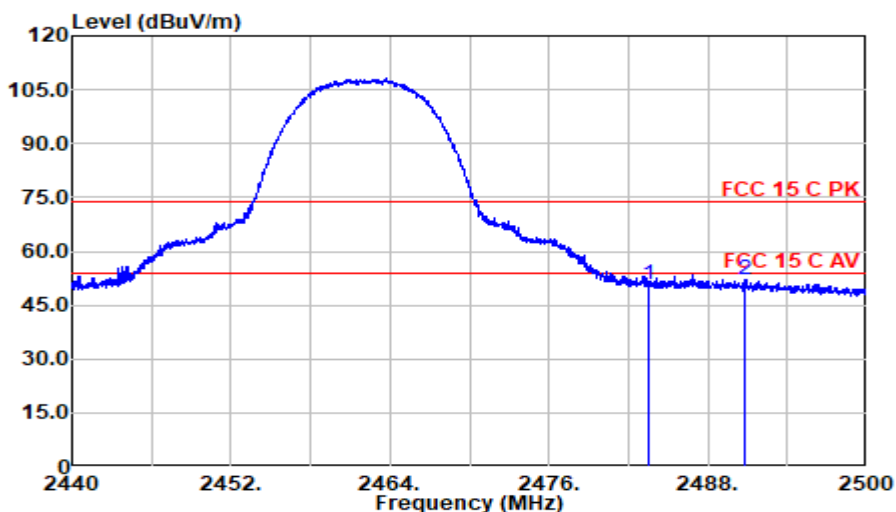
**Mode: 802.11b CH2462MHz**



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	40.38	28.63	5.47	35.91	38.58	54.00	15.42	Average
2488.780	39.98	28.66	5.47	35.91	38.20	54.00	15.80	Average

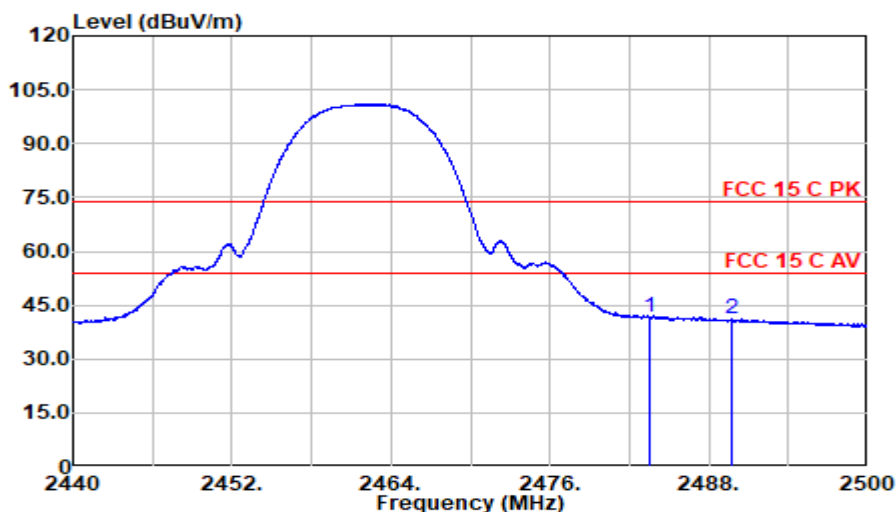
**Mode: 802.11b CH2462MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	52.40	28.63	5.47	35.91	50.59	74.00	23.41	Peak
2490.850	53.90	28.66	5.48	35.90	52.14	74.00	21.86	Peak

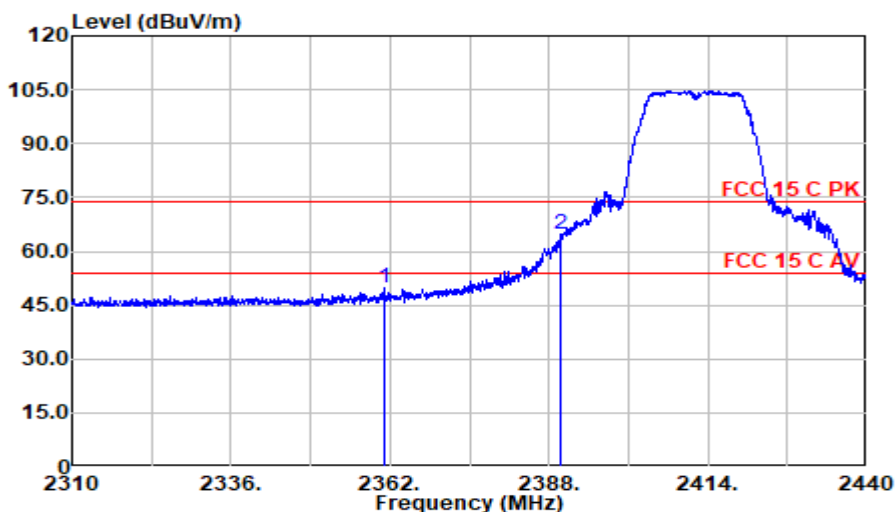
**Mode: 802.11b CH2462MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	43.60	28.63	5.47	35.91	41.80	54.00	12.20	Average
2489.770	43.03	28.66	5.47	35.91	41.25	54.00	12.75	Average

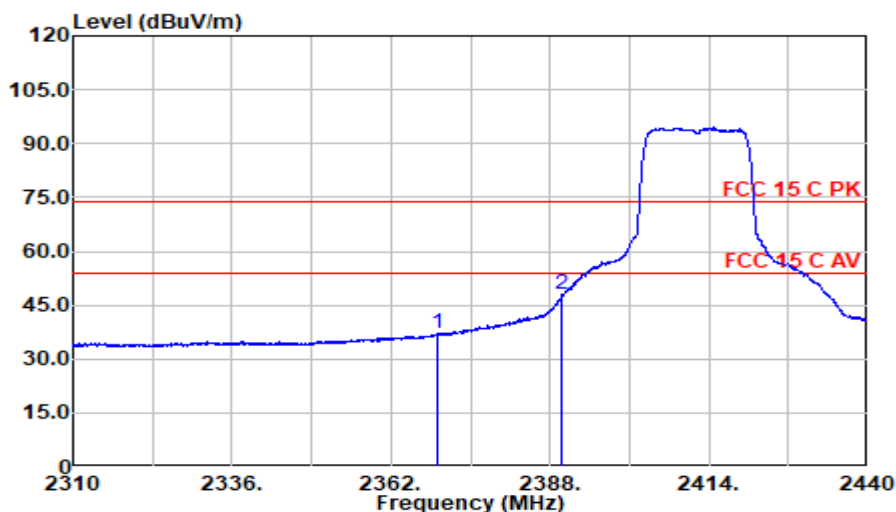
Mode: 802.11g CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2360.960	52.00	28.44	5.36	36.05	49.75	74.00	24.25	Peak
2390.000	66.99	28.56	5.39	36.02	64.92	74.00	9.08	Peak

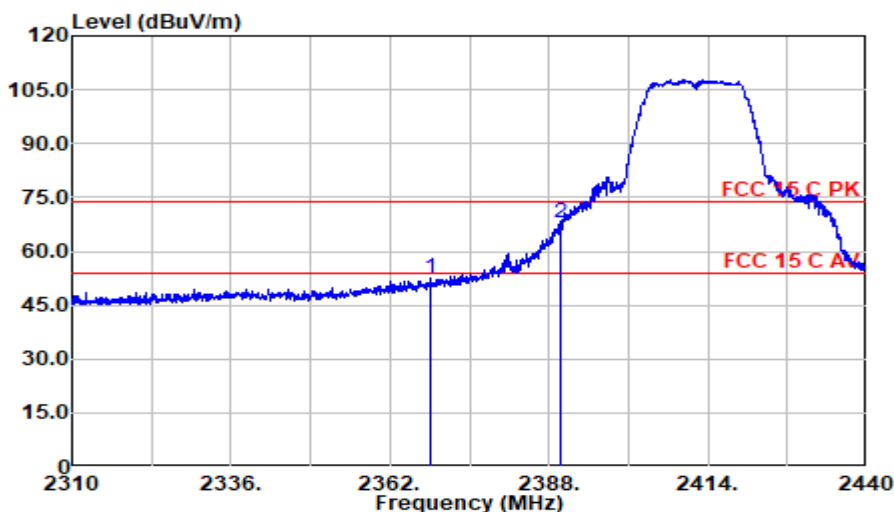
Mode: 802.11g CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2369.605	39.17	28.48	5.37	36.04	36.98	54.00	17.02	Average
2390.000	50.01	28.56	5.39	36.02	47.94	54.00	6.06	Average

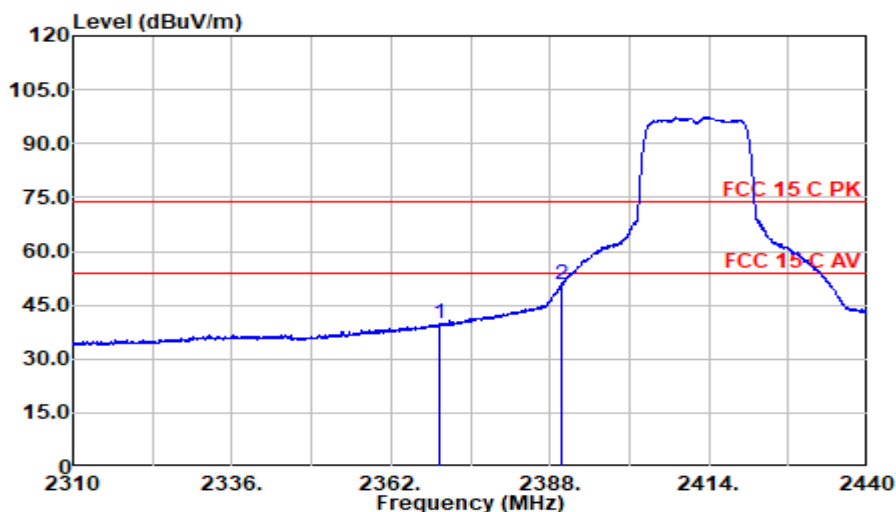
Mode: 802.11g CH2412MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2368.565	54.68	28.47	5.37	36.04	52.48	74.00	21.52	Peak
2390.000	70.08	28.56	5.39	36.02	68.01	74.00	5.99	Peak

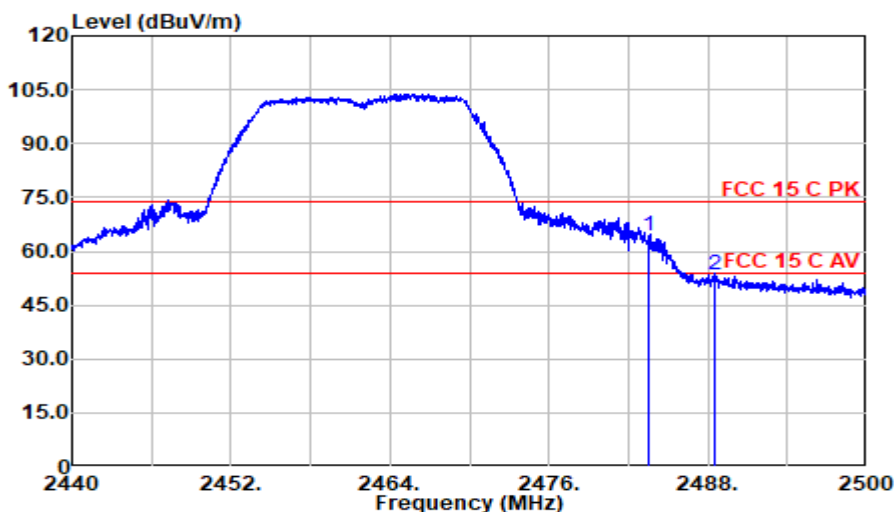
Mode: 802.11g CH2412MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2369.930	41.93	28.48	5.37	36.04	39.74	54.00	14.26	Average
2390.000	52.79	28.56	5.39	36.02	50.72	54.00	3.28	Average

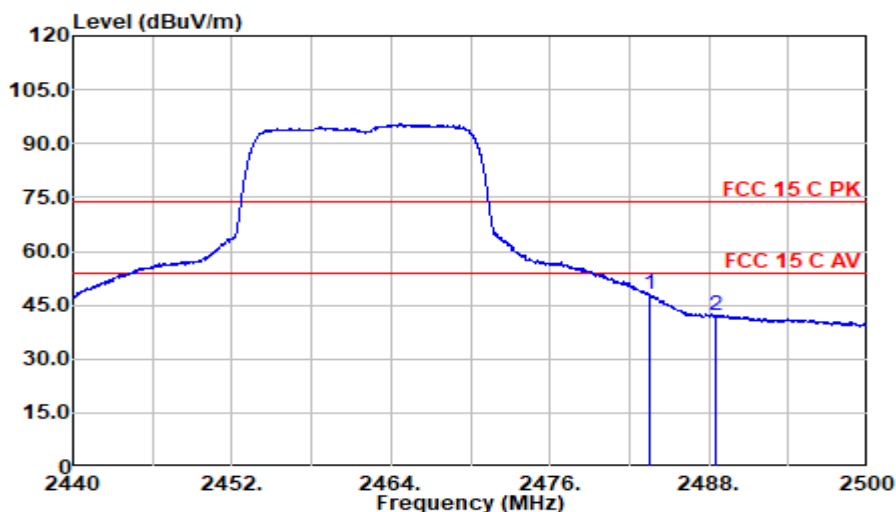
Mode: 802.11g CH2462MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	66.06	28.63	5.47	35.91	64.25	74.00	9.75	Peak
2488.480	55.04	28.65	5.47	35.91	53.26	74.00	20.74	Peak

Mode: 802.11g CH2462MHz

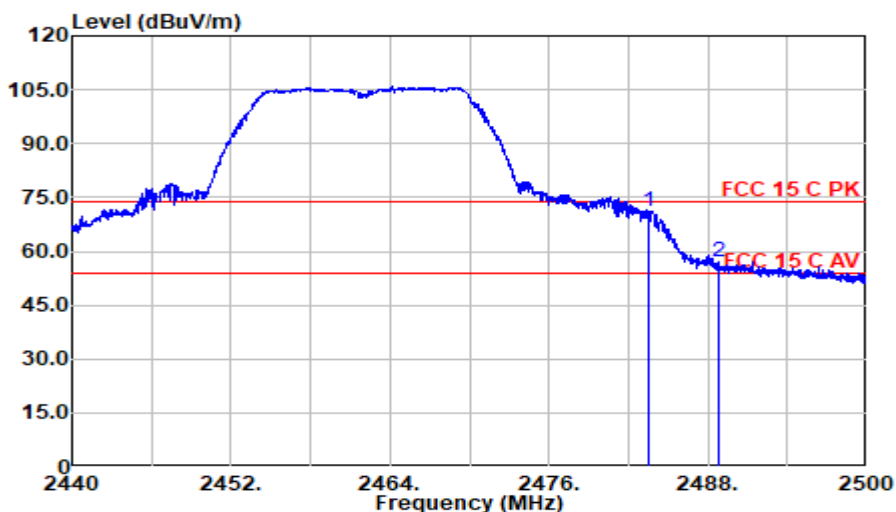


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	49.62	28.63	5.47	35.91	47.81	54.00	6.19	Average
2488.480	43.97	28.65	5.47	35.91	42.19	54.00	11.81	Average



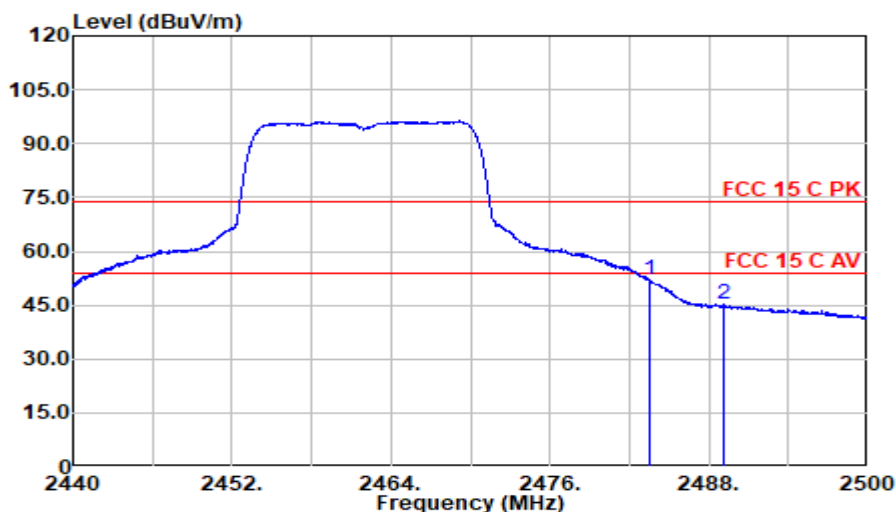
Mode: 802.11g CH2462MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	73.00	28.63	5.47	35.91	71.19	74.00	2.81	Peak
2488.780	58.89	28.66	5.47	35.91	57.12	74.00	16.88	Peak

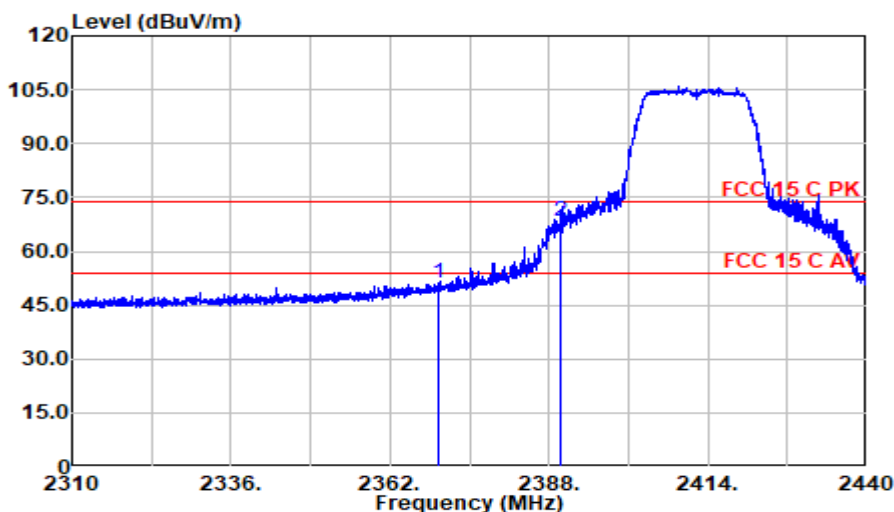
Mode: 802.11g CH2462MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	53.95	28.63	5.47	35.91	52.15	54.00	1.85	Average
2489.080	47.03	28.66	5.47	35.91	45.26	54.00	8.74	Average

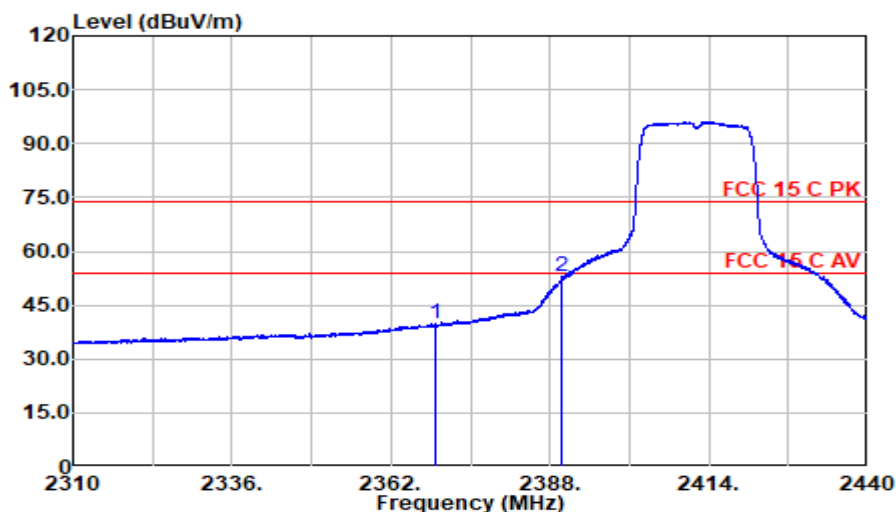
Mode: 802.11n CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2369.913	53.52	28.48	5.37	36.04	51.33	74.00	22.67	Peak
2390.000	70.26	28.56	5.39	36.02	68.20	74.00	5.80	Peak

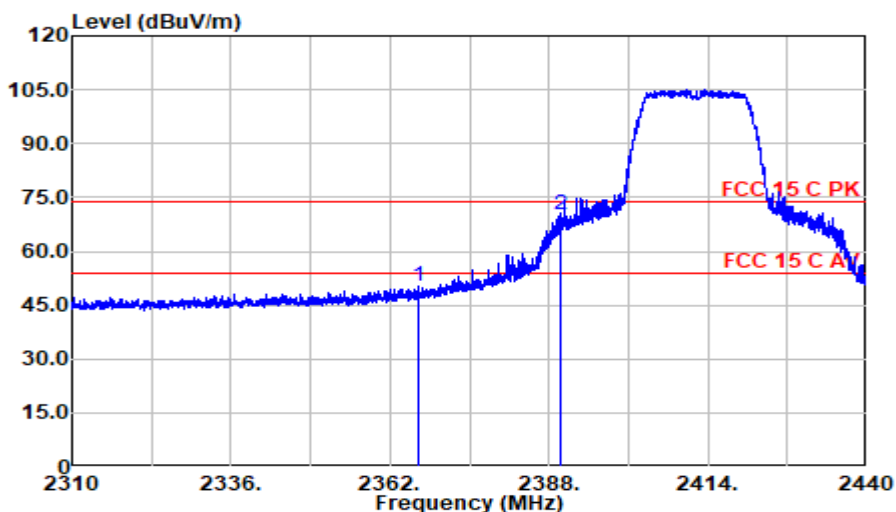
Mode: 802.11n CH2412MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2369.230	42.12	28.48	5.37	36.04	39.92	54.00	14.08	Average
2390.000	54.93	28.56	5.39	36.02	52.86	54.00	1.14	Average

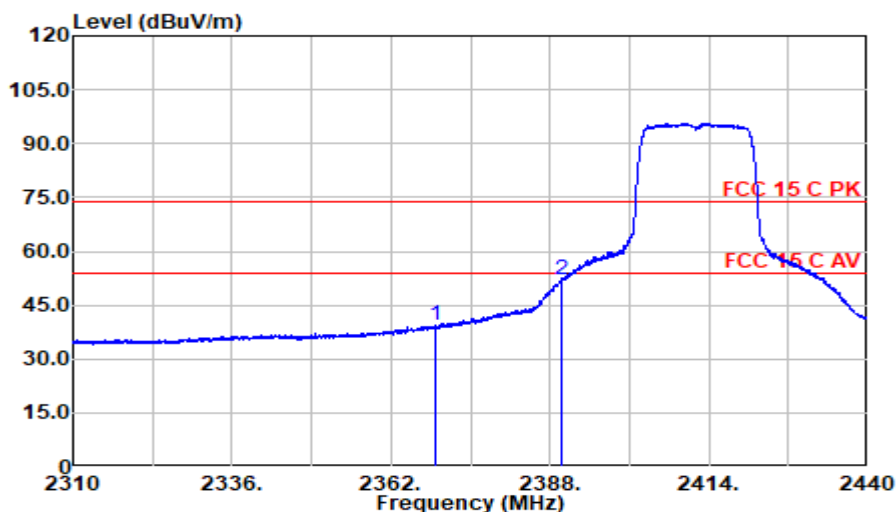
**Mode: 802.11n CH2412MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2366.532	52.28	28.47	5.37	36.04	50.07	74.00	23.93	Peak
2390.000	72.37	28.56	5.39	36.02	70.30	74.00	3.70	Peak

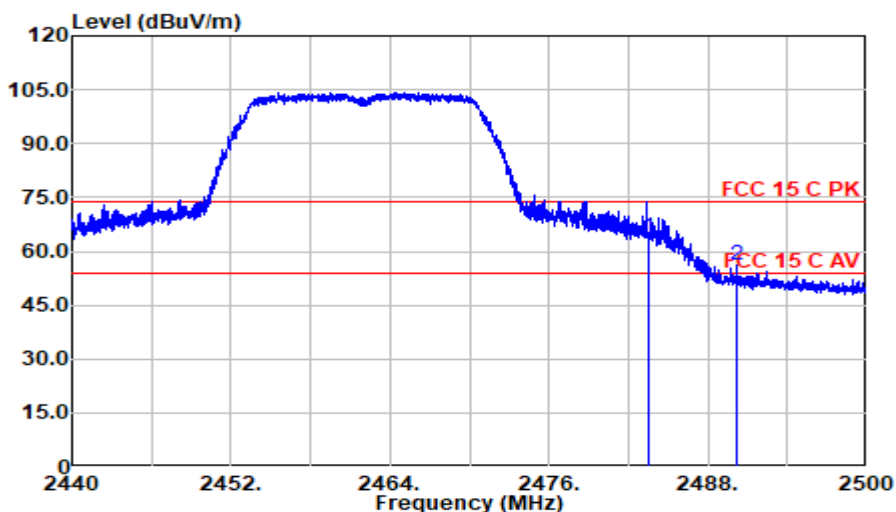
**Mode: 802.11n CH2412MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2369.360	41.76	28.48	5.37	36.04	39.57	54.00	14.43	Average
2390.000	54.32	28.56	5.39	36.02	52.25	54.00	1.75	Average

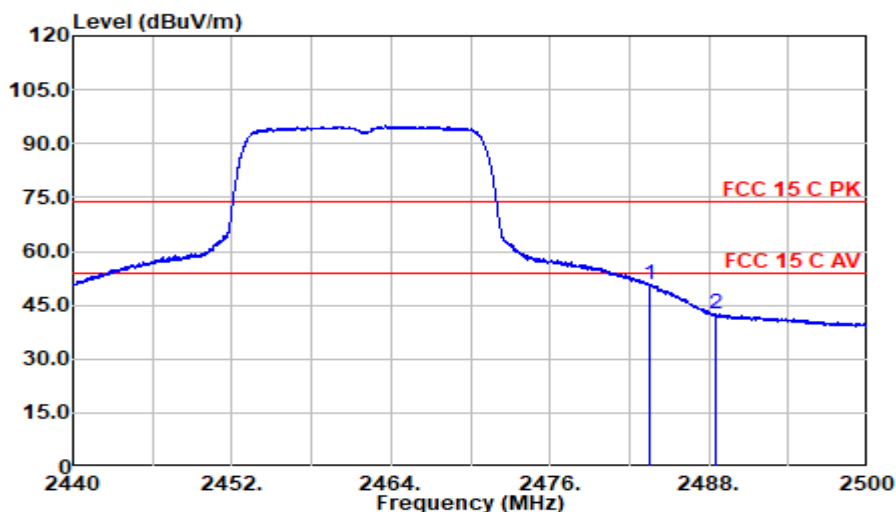
Mode: 802.11n CH2462MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	65.47	28.63	5.47	35.91	63.66	74.00	10.34	Peak
2490.218	57.83	28.66	5.47	35.91	56.06	74.00	17.94	Peak

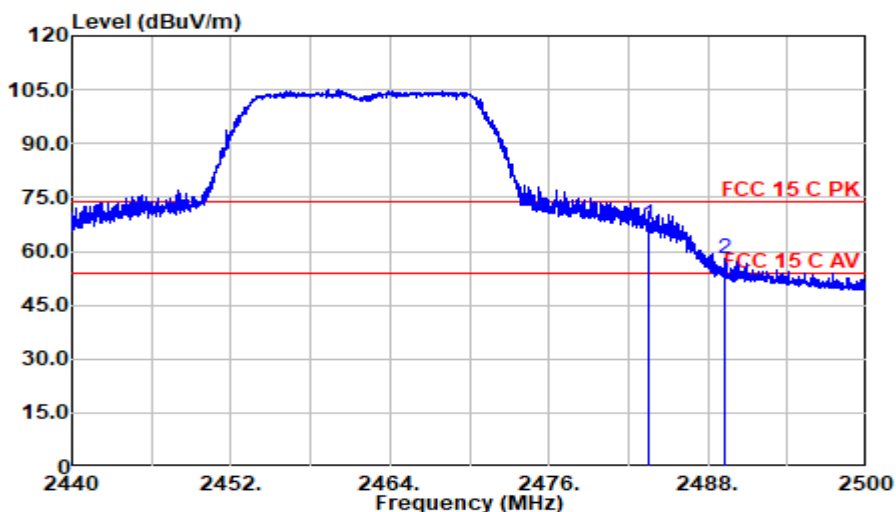
Mode: 802.11n CH2462MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	52.66	28.63	5.47	35.91	50.85	54.00	3.15	Average
2488.582	44.28	28.65	5.47	35.91	42.50	54.00	11.50	Average

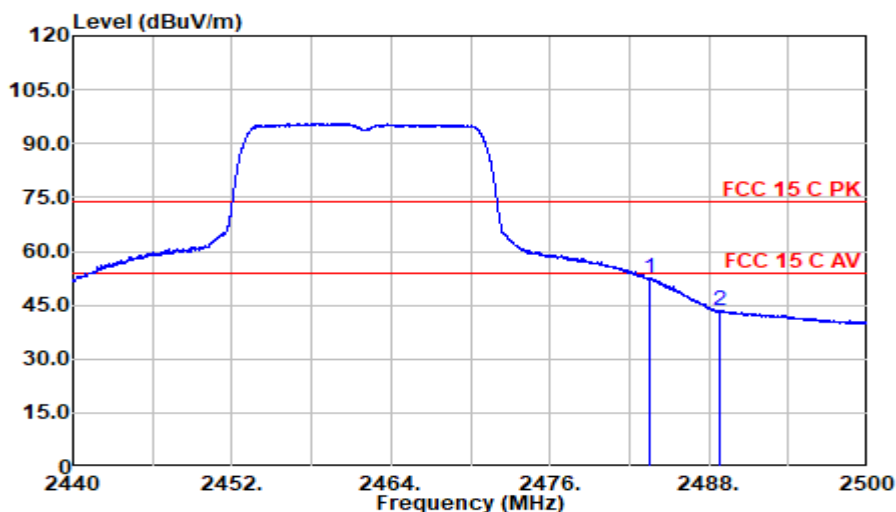
**Mode: 802.11n CH2462MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	69.05	28.63	5.47	35.91	67.25	74.00	6.75	Peak
2489.332	59.67	28.66	5.47	35.91	57.89	74.00	16.11	Peak

**Mode: 802.11n CH2462MHz**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (mV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (mV/m)	Limits dB (mV/m)	Margin (dB)	Remark
2483.500	54.21	28.63	5.47	35.91	52.40	54.00	1.60	Average
2488.762	45.33	28.66	5.47	35.91	43.55	54.00	10.45	Average

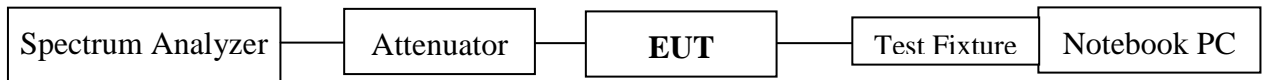
## 5 99% OCCUPIED BANDWIDTH MEASUREMENT

### 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



### 5.3 Operating Condition of EUT

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

### 5.4 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 = 3 to 3 × 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).

## 5.5 Test Results

### **PASSED.**

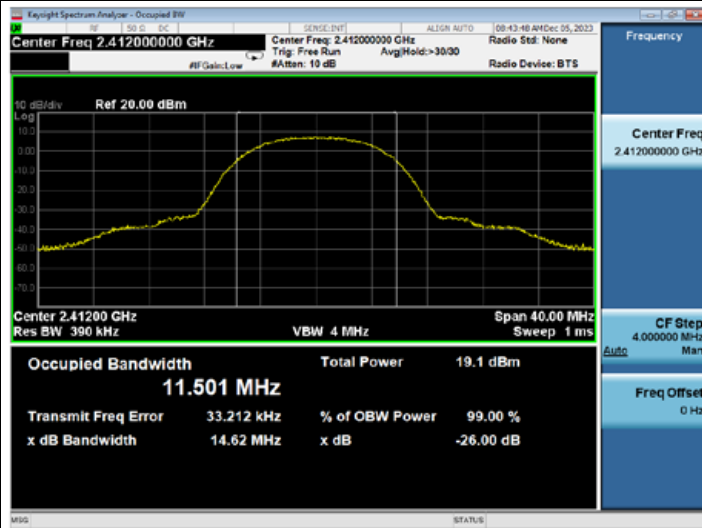
All the test results are attached in next pages.

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

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

802.11b

CH2412



CH2437



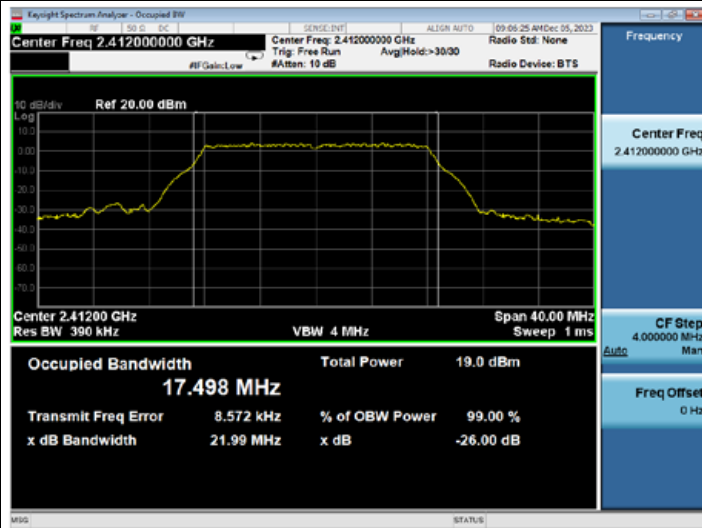
CH2462



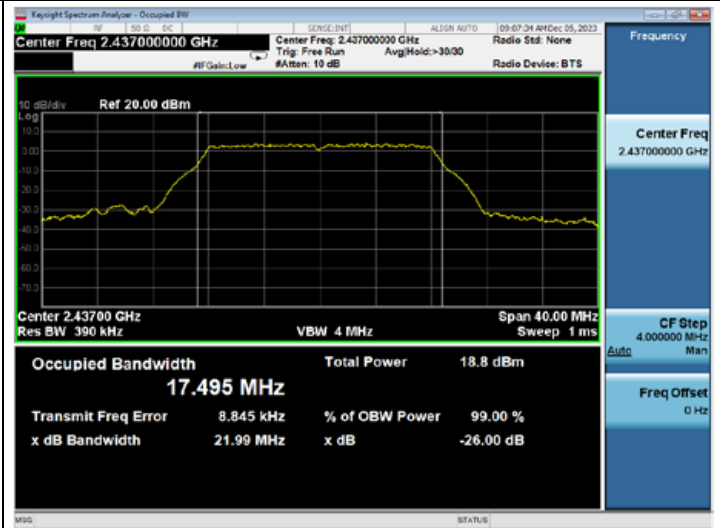


802.11g

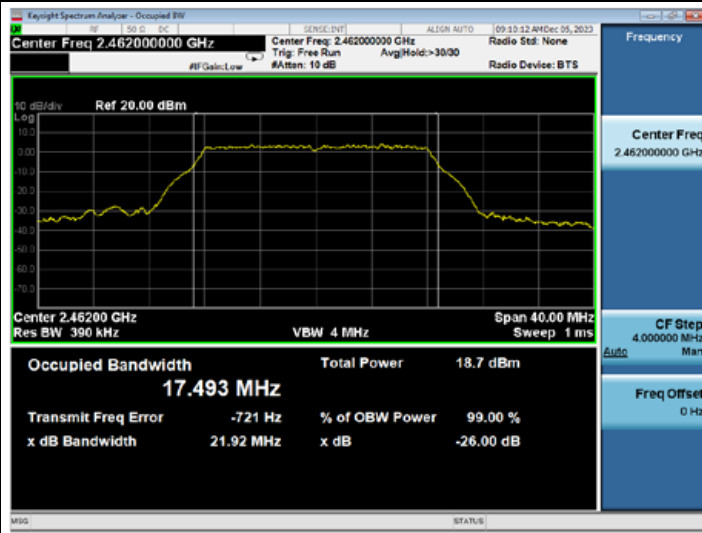
CH2412



CH2437

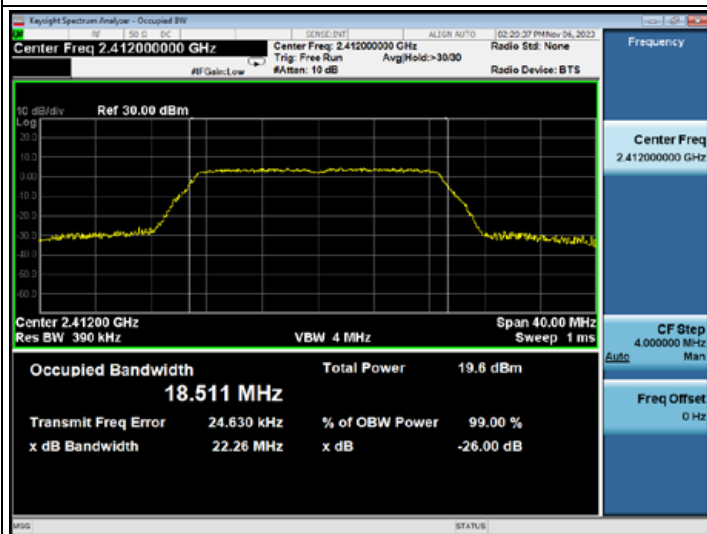


CH2462

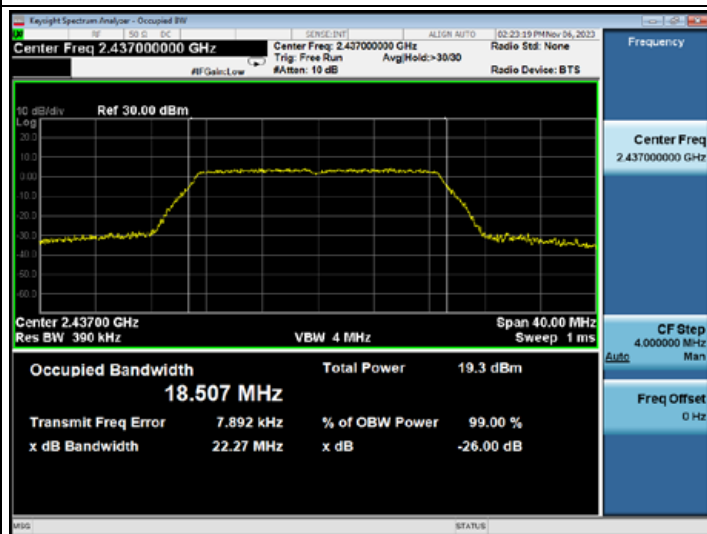


802.11n20

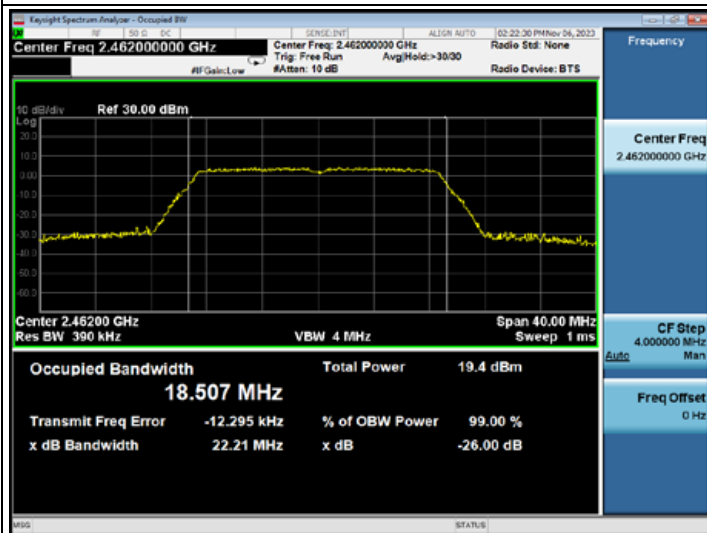
CH2412



CH2437



CH2462



## 6 6 dB BANDWIDTH MEASUREMENT

### 6.1 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

### 6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

### 6.3 Specification Limits (§15.247(a)(2))

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

### 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. 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).

## 6.6 Test Results

### **PASSED.**

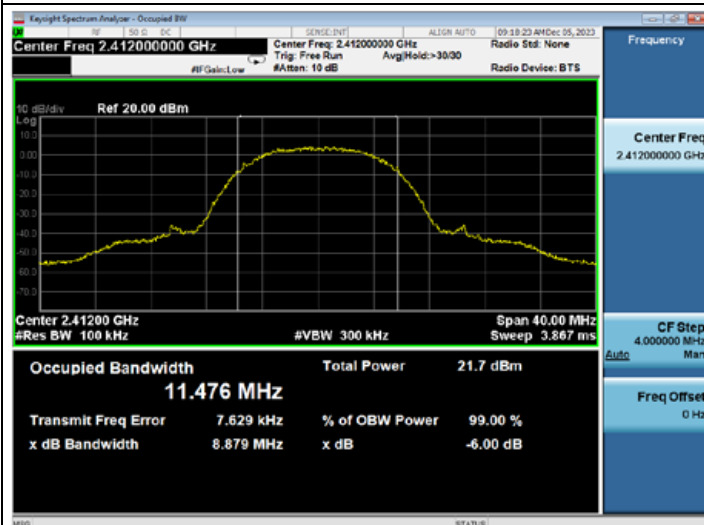
All the test results are attached in next pages.

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

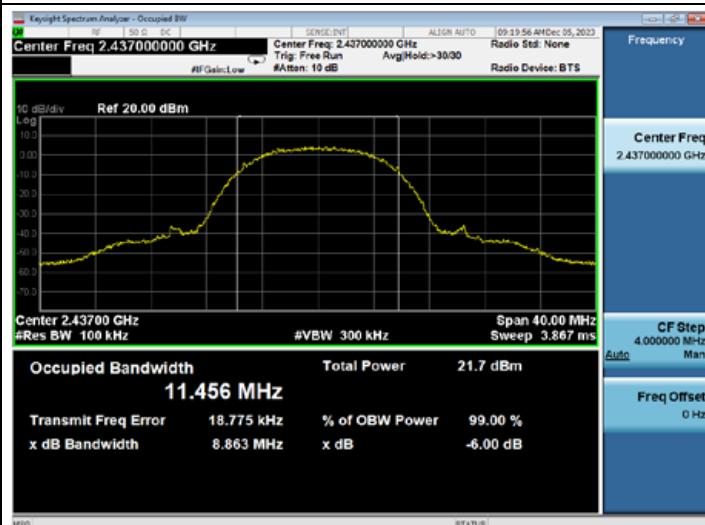
Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit
802.11b	1	2412	<b>8.879</b>	500 kHz
	6	2437	<b>8.863</b>	500 kHz
	11	2462	<b>8.866</b>	500 kHz
802.11g	1	2412	<b>16.4</b>	500 kHz
	6	2437	<b>16.39</b>	500 kHz
	11	2462	<b>16.4</b>	500 kHz
802.11n20	1	2412	<b>17.63</b>	500 kHz
	6	2437	<b>17.63</b>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

802.11b

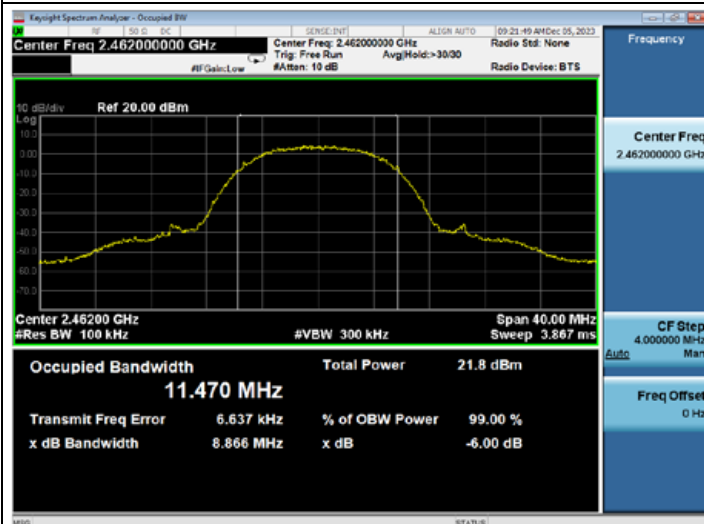
CH2412



CH2437



CH2462

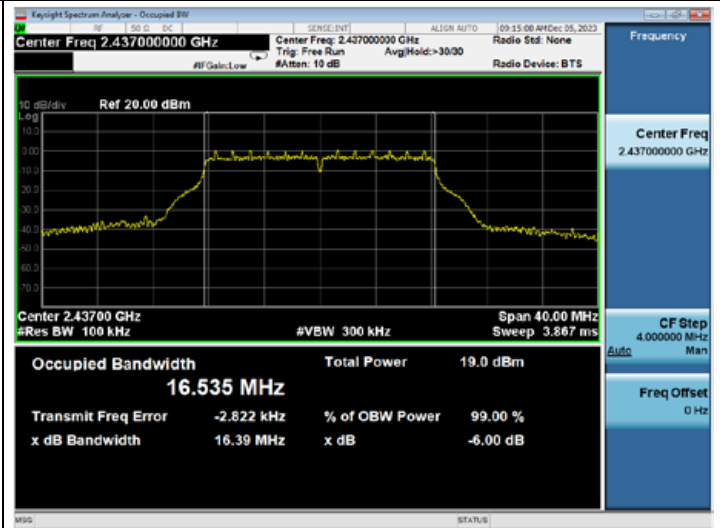


802.11g

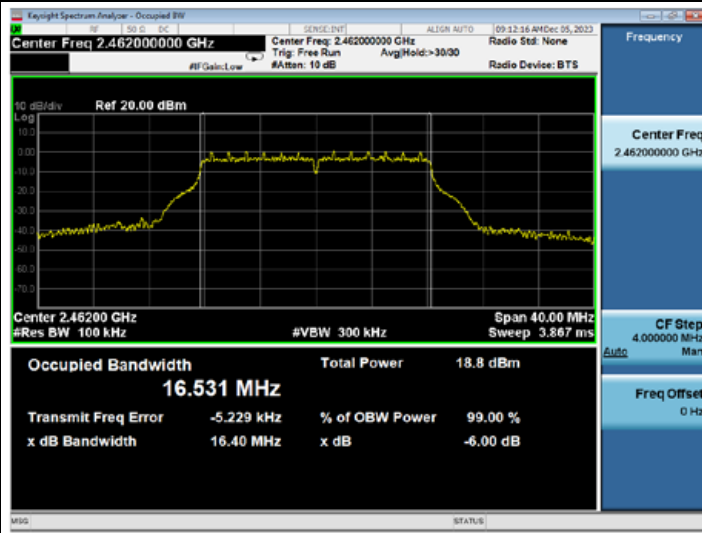
CH2412



CH2437

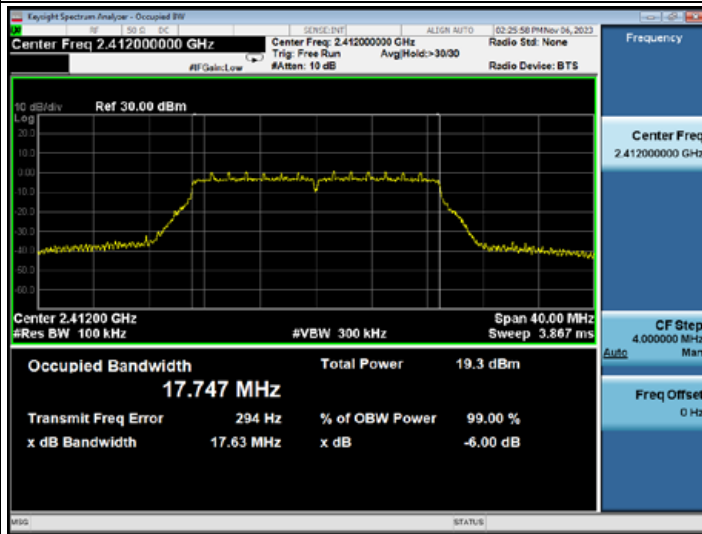


CH2462

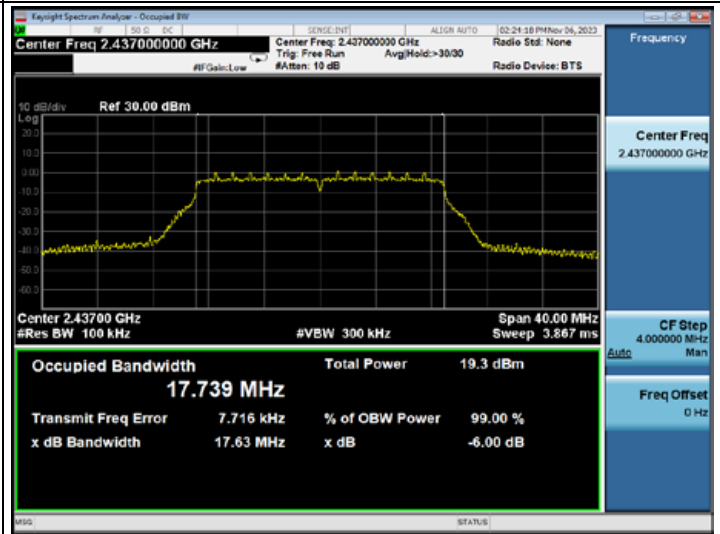


802.11n20

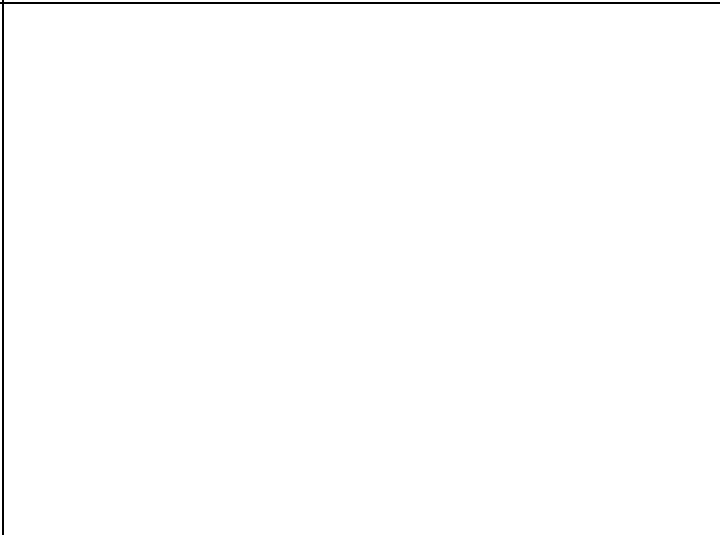
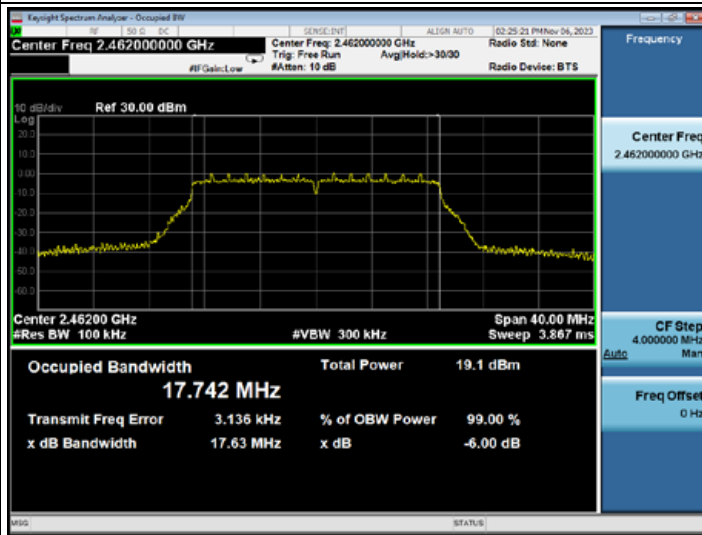
CH2412



CH2437



CH2462



## 7 MAXIMUM OUTPUT POWER MEASUREMENT

### 7.1 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

### 7.2 Block Diagram of Test Setup

The Same as Section. 5.2.

### 7.3 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)

### 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.

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

The procedure for this method is as follows:

- a) Set span to at least 1.5 times the OBW.
- b) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- c) Set VBW  $\geq [3 \times \text{RBW}]$ .
- d) 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.)
- e) Sweep time = auto.
- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- g) 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.”
- h) Trace average at least 100 traces in power averaging (rms) mode.
- i) 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).

## 7.6 Test Results

### **PASSED.**

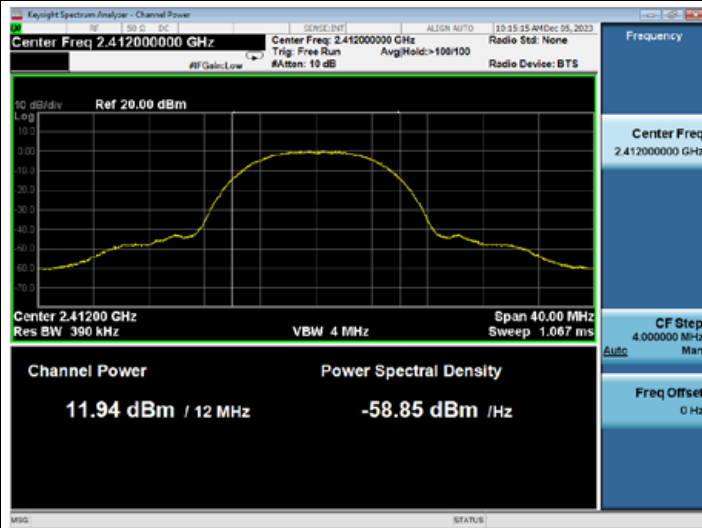
All the test results are listed below.

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

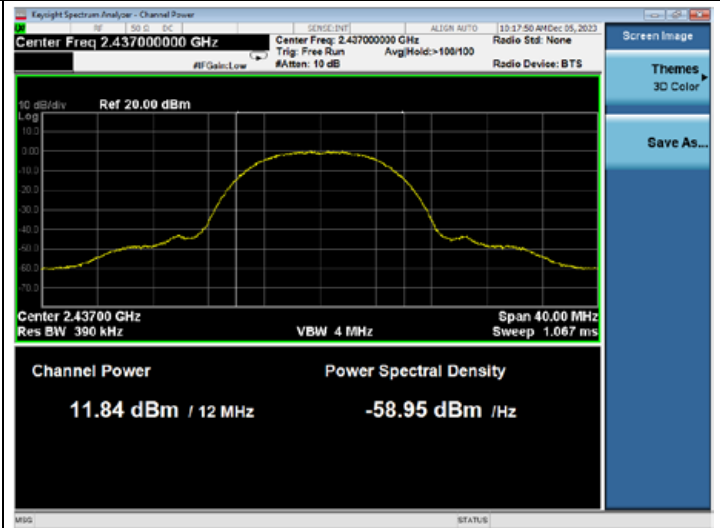
Mode	Channel	Frequency (MHz)	Maximum conducted (average) Output Power (dBm)	Limit
802.11b	1	2412	<b>11.94</b>	30 dBm
	6	2437	<b>11.84</b>	30 dBm
	11	2462	<b>11.88</b>	30 dBm
802.11g	1	2412	<b>11.66</b>	30 dBm
	6	2437	<b>11.6</b>	30 dBm
	11	2462	<b>11.65</b>	30 dBm
802.11n20	1	2412	<b>11.65</b>	30 dBm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

802.11b

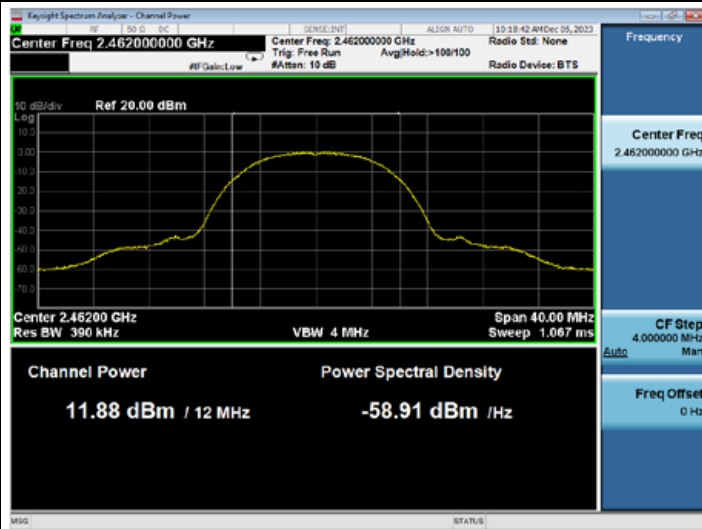
CH2412



CH2437

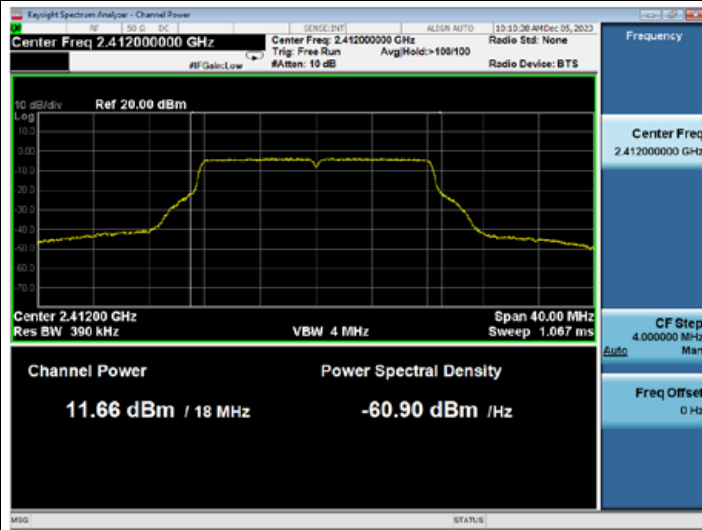


CH2462

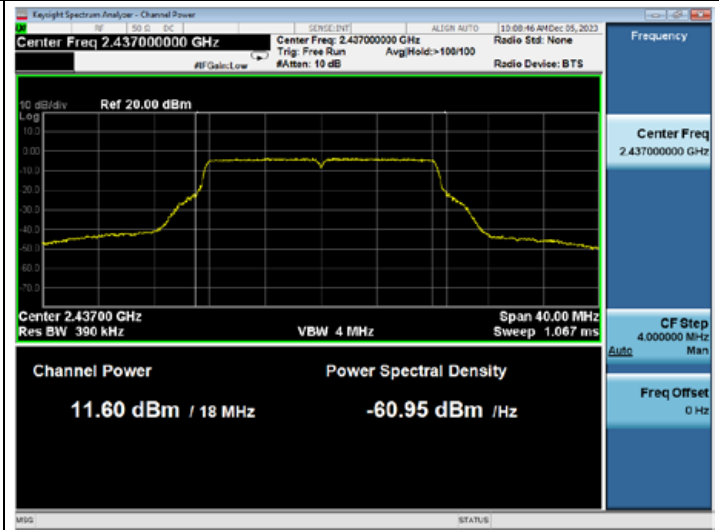


802.11g

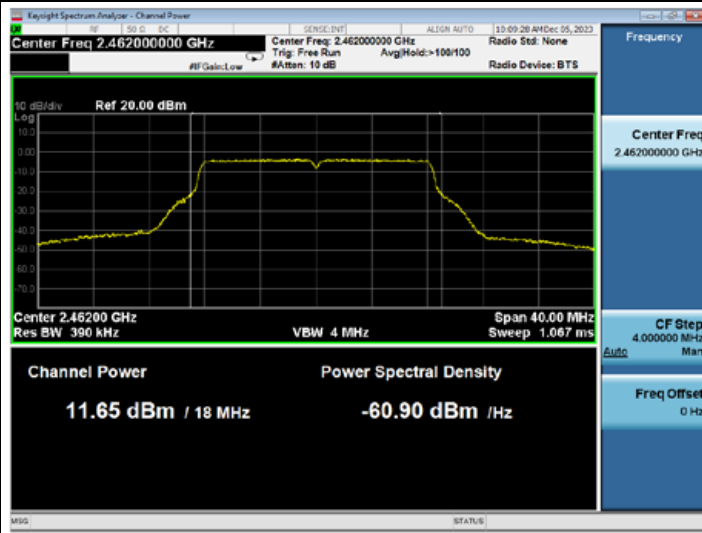
CH2412



CH2437

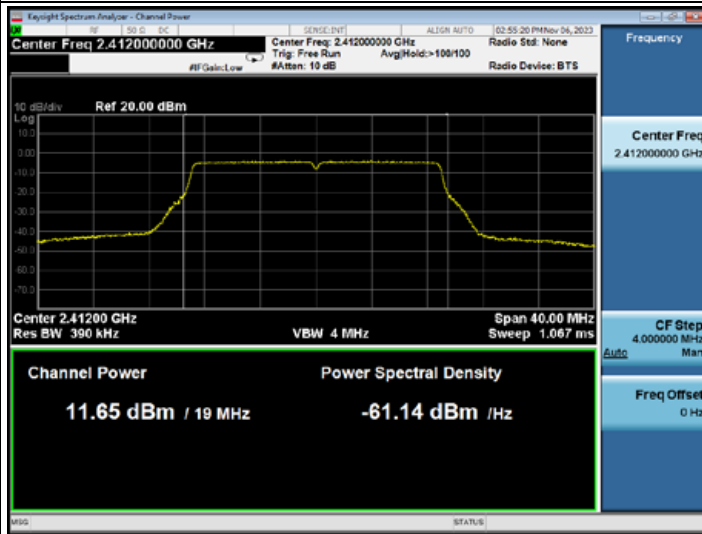


CH2462

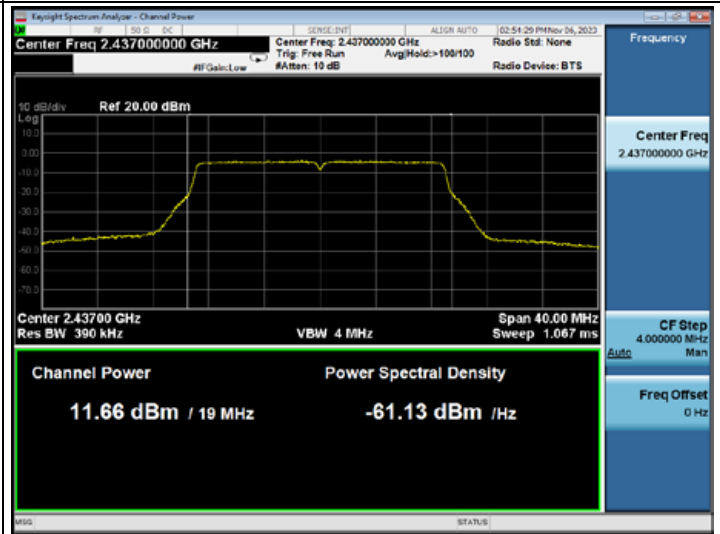


802.11n20

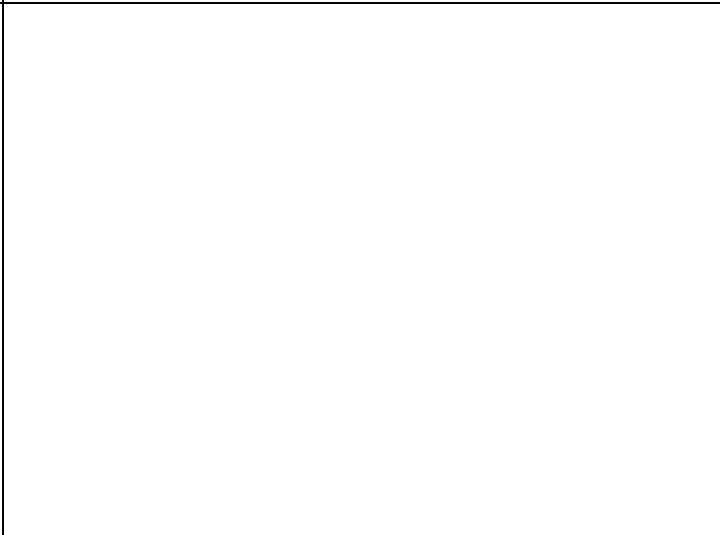
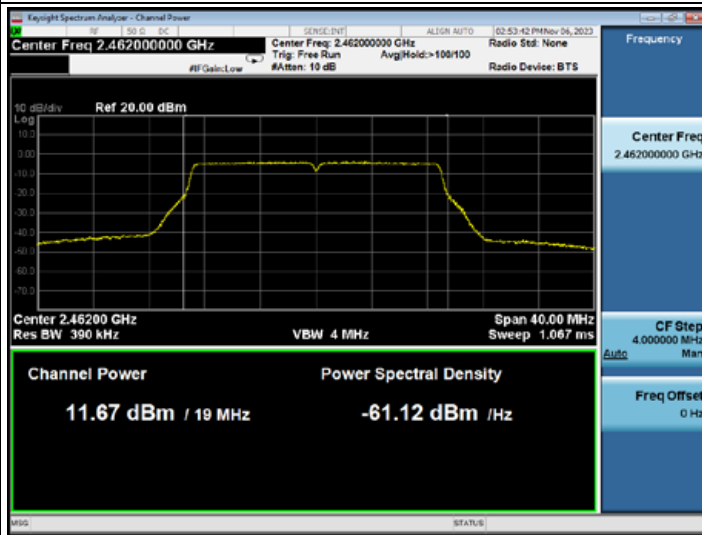
CH2412



CH2437



CH2462



## 8 EMISSION LIMITATIONS MEASUREMENT

### 8.1 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

### 8.2 Block Diagram of Test Setup

The Same as Section. 5.2.

### 8.3 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)

### 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.

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to <sup>3</sup> 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW <sup>3</sup> [3 ´ RBW].
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) 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 <sup>3</sup> [3 ´ 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 10<sup>th</sup> 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).

## 8.6 Test Results

### **PASSED.**

The test data was attached in the next pages.

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

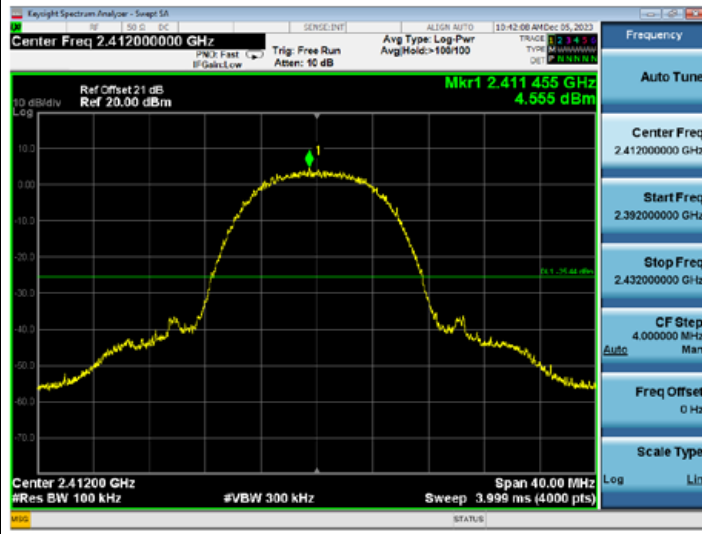
Mode	Channel	Frequency (MHz)	Data Page
802.11b	1	2412	P65
	6	2437	P66
	11	2462	P67
802.11g	1	2412	P68
	6	2437	P69
	11	2462	P70
802.11n20	1	2412	P71
	6	2437	P72
	11	2462	P73



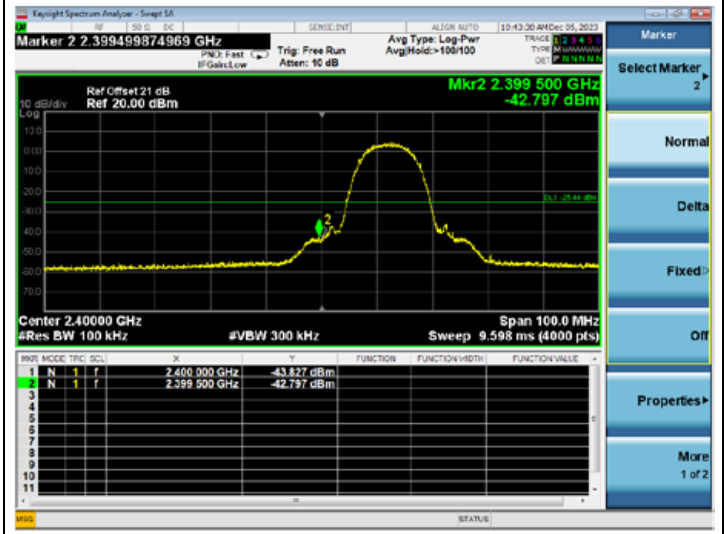
802.11b

CH2412

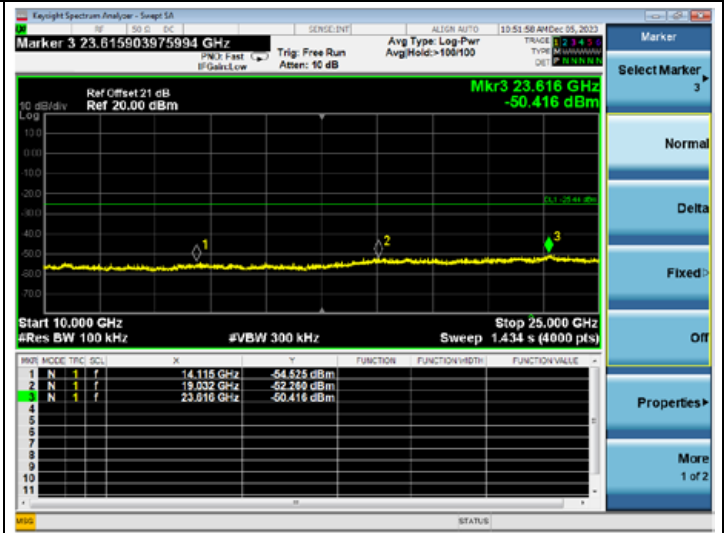
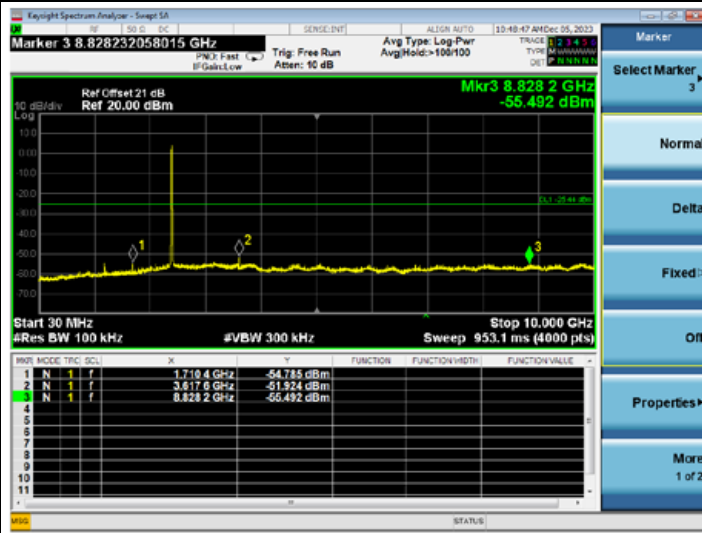
Reference Level



Lower Edge



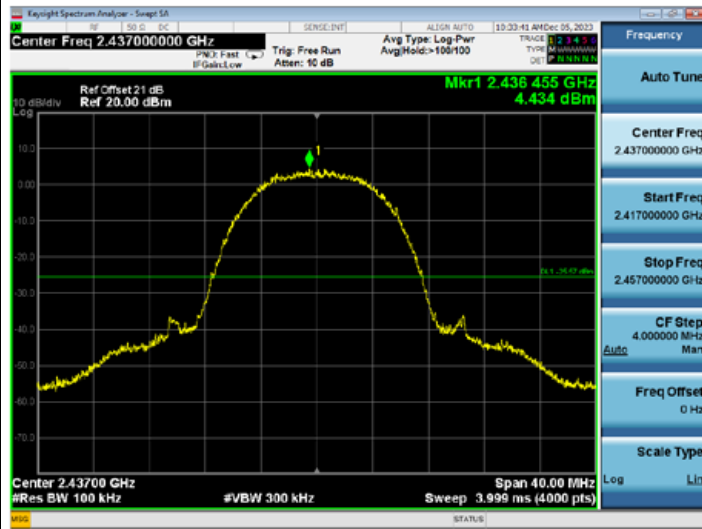
Emission Level



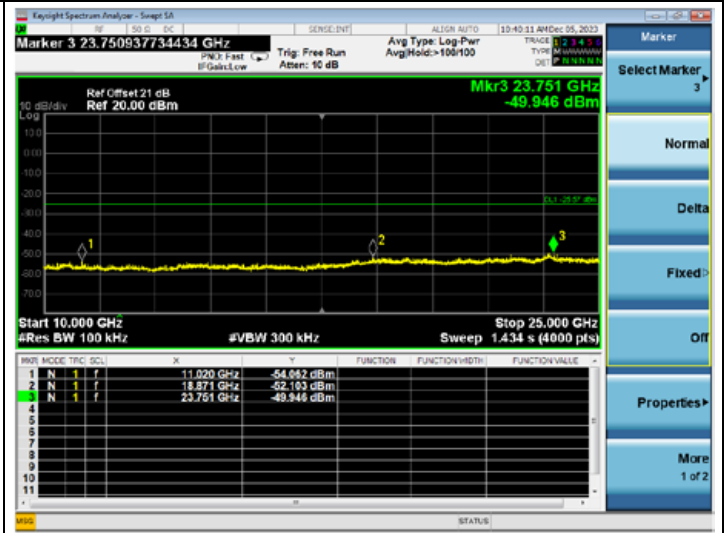
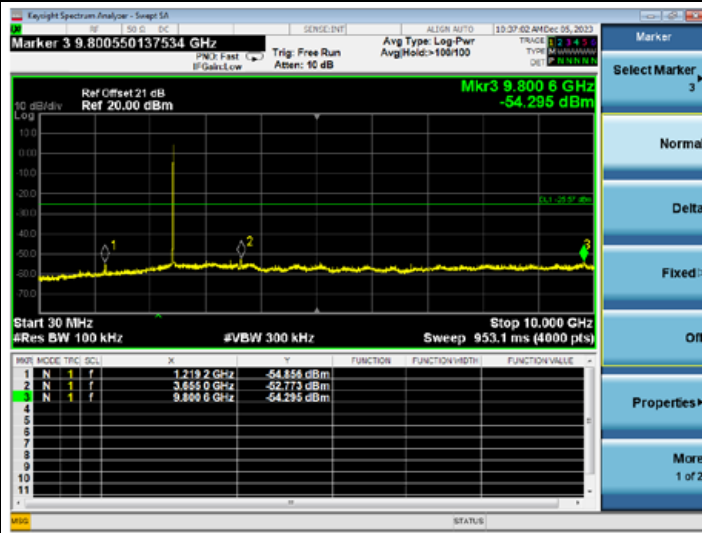
802.11b

CH2437

Reference Level



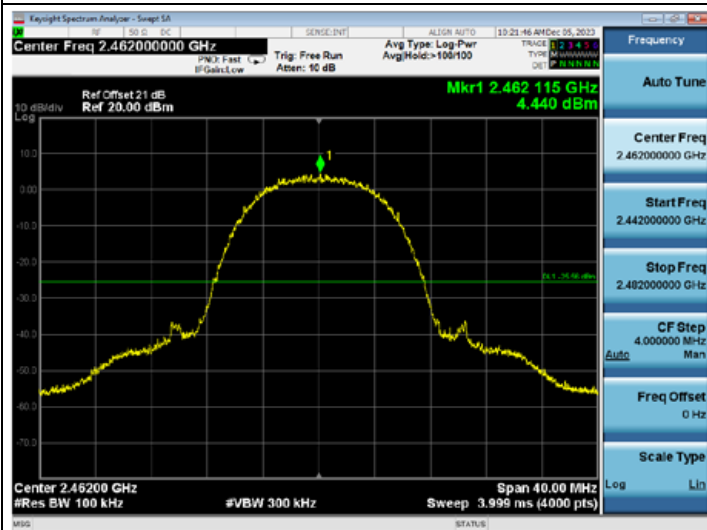
Emission Level



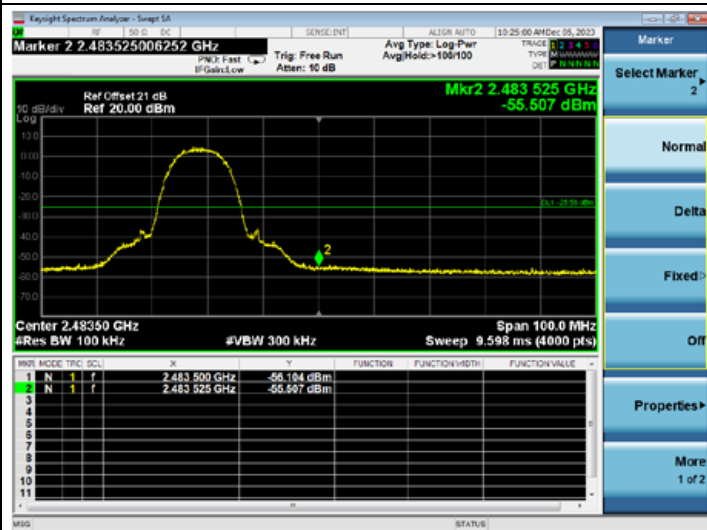
802.11b

CH2462

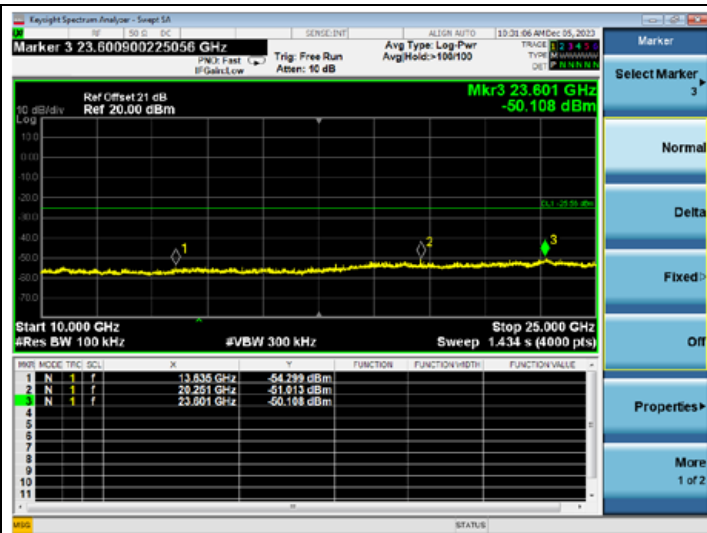
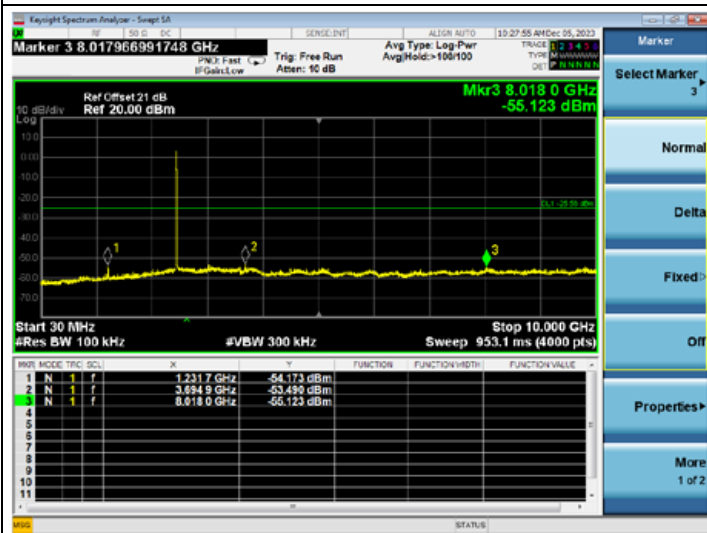
Reference Level



Higher Edge



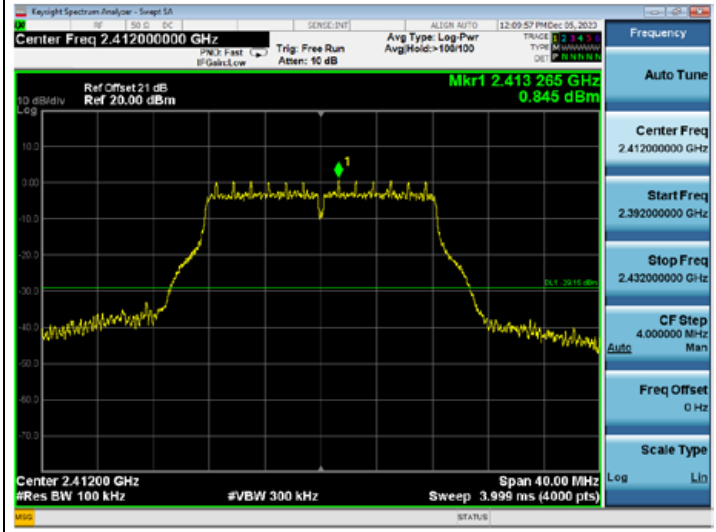
Emission Level



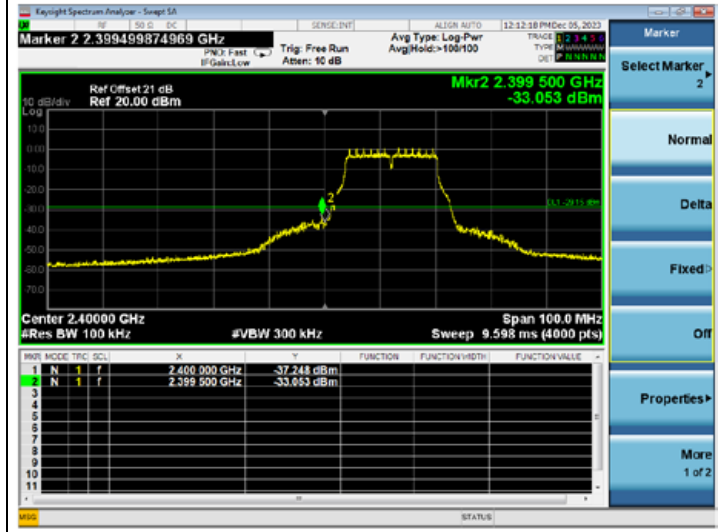
802.11g

CH2412

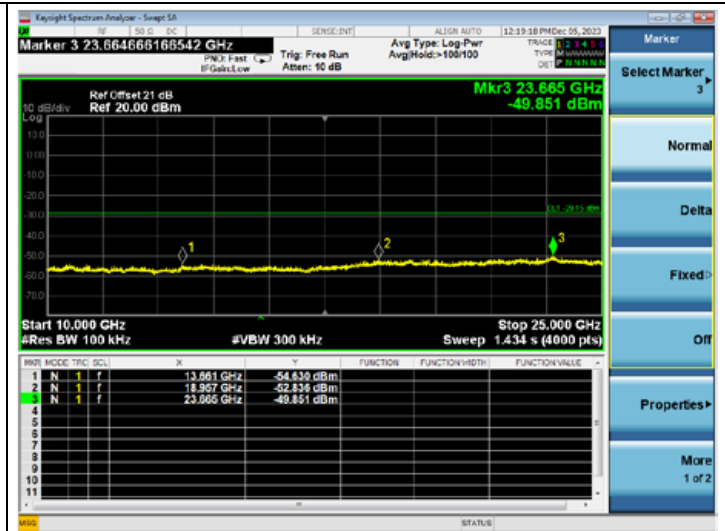
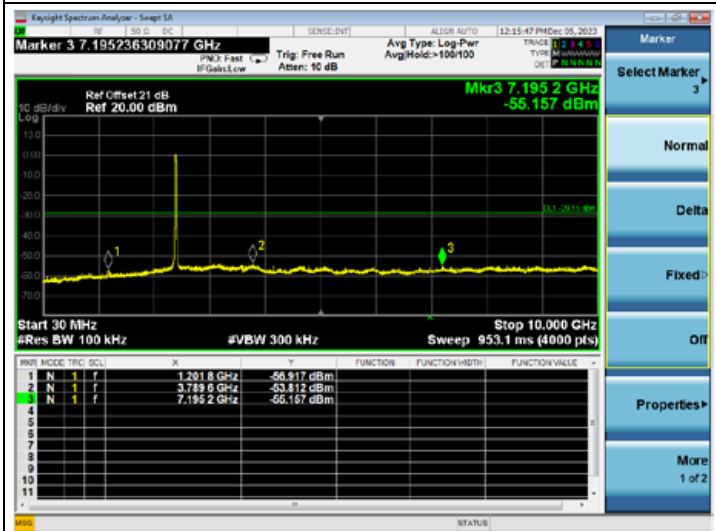
Reference Level



Lower Edge



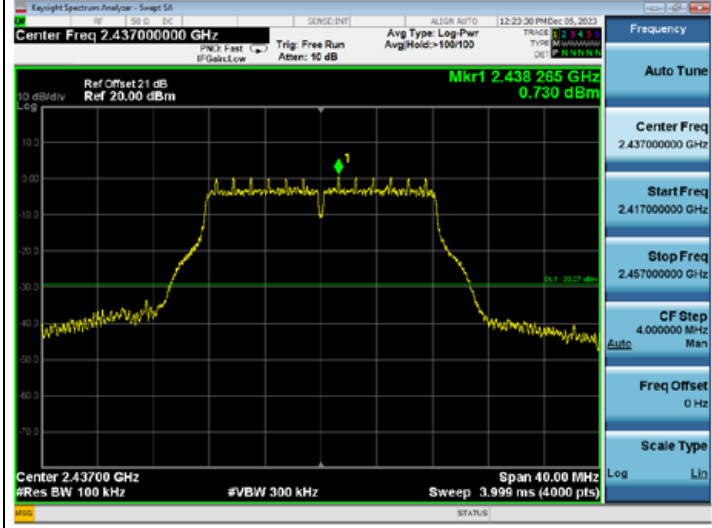
Emission Level



802.11g

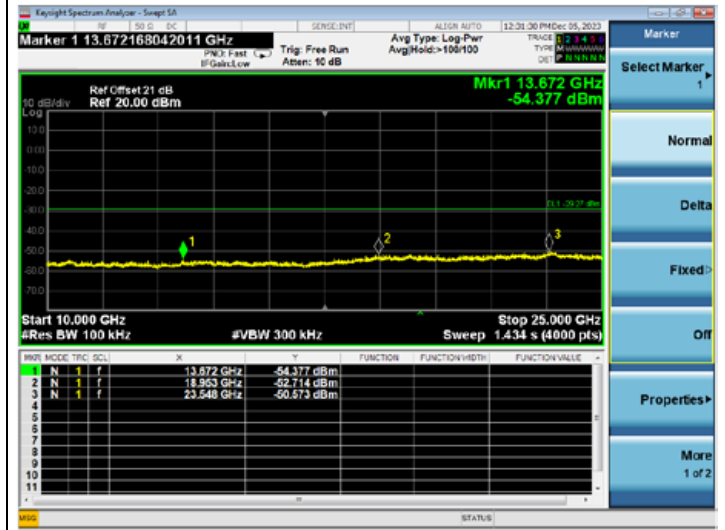
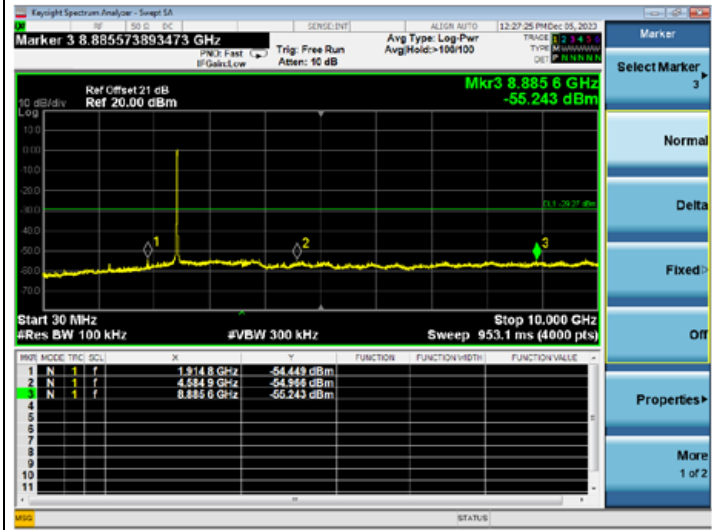
CH2437

Reference Level



Parameter	Value
Center Freq	2.437000000 GHz
Start Freq	2.417000000 GHz
Stop Freq	2.457000000 GHz
CF Step	4.000000 MHz
Freq Offset	0 Hz
Scale Type	Log

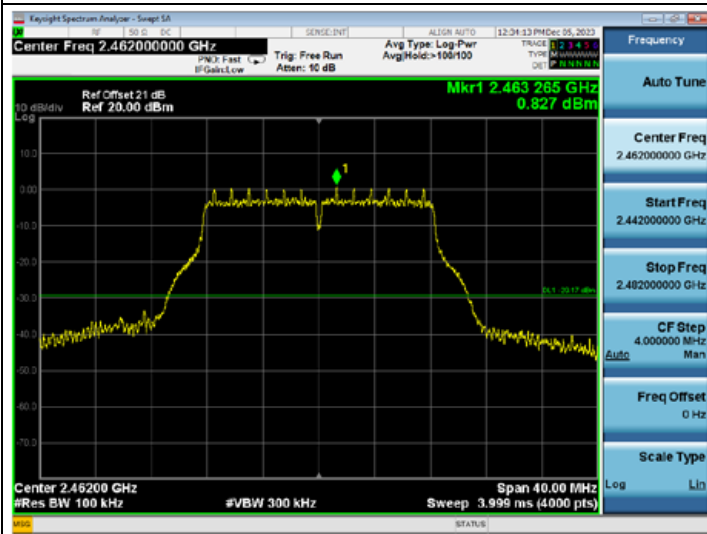
Emission Level



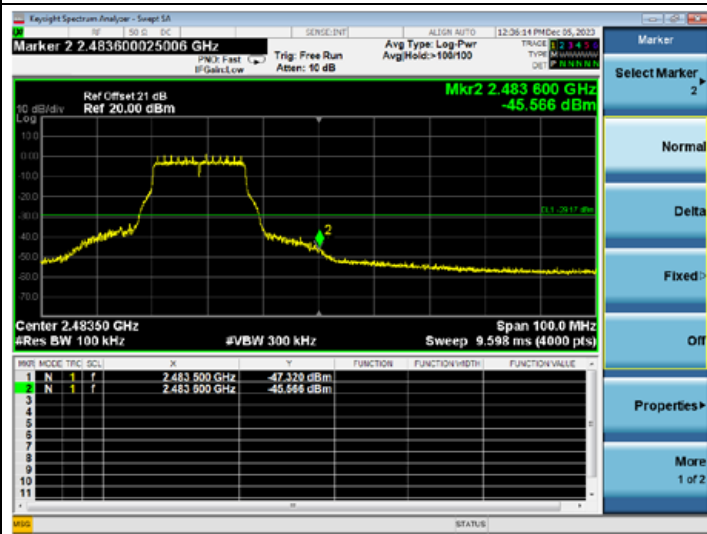
802.11g

CH2462

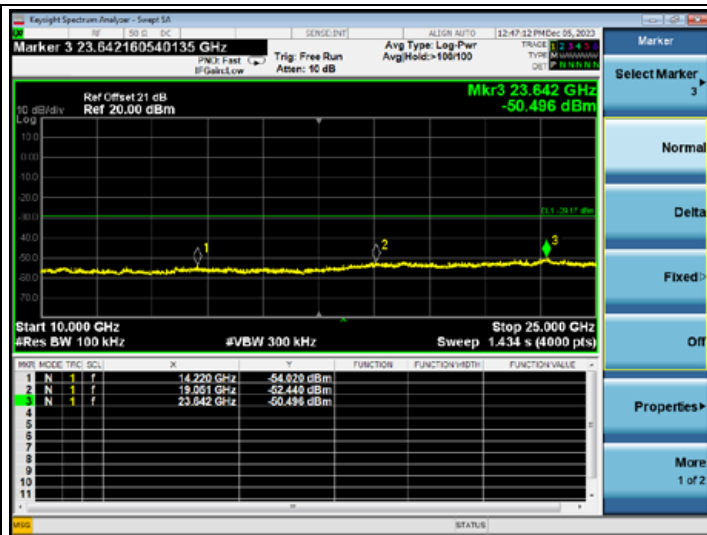
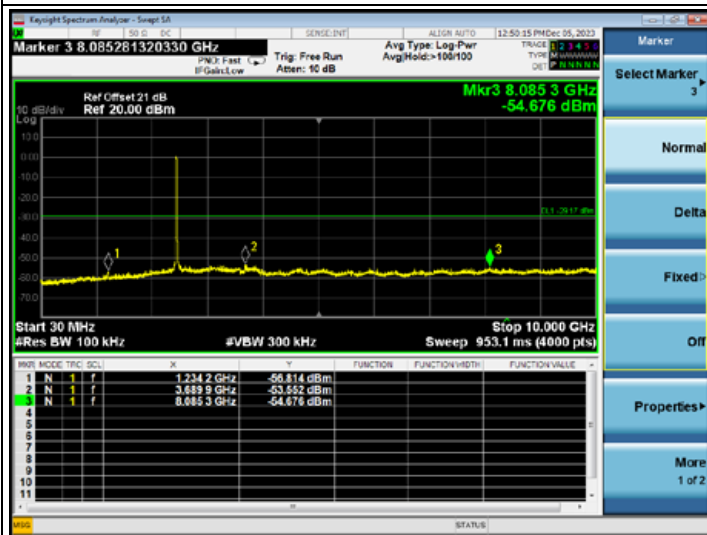
Reference Level



Higher Edge



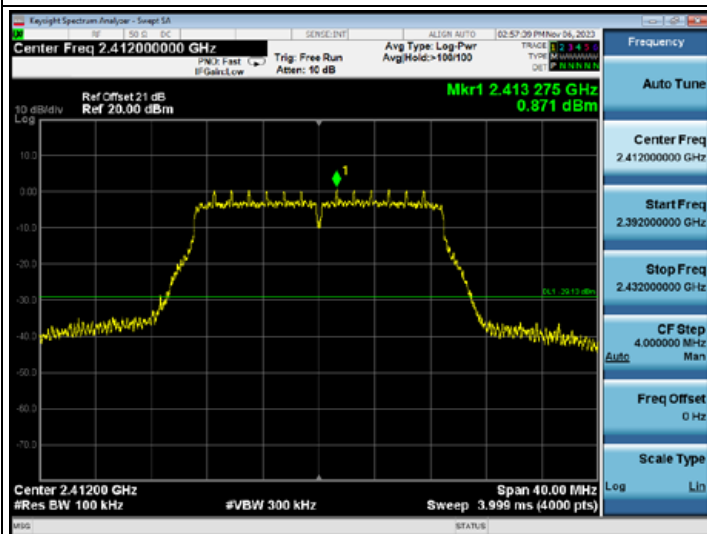
Emission Level



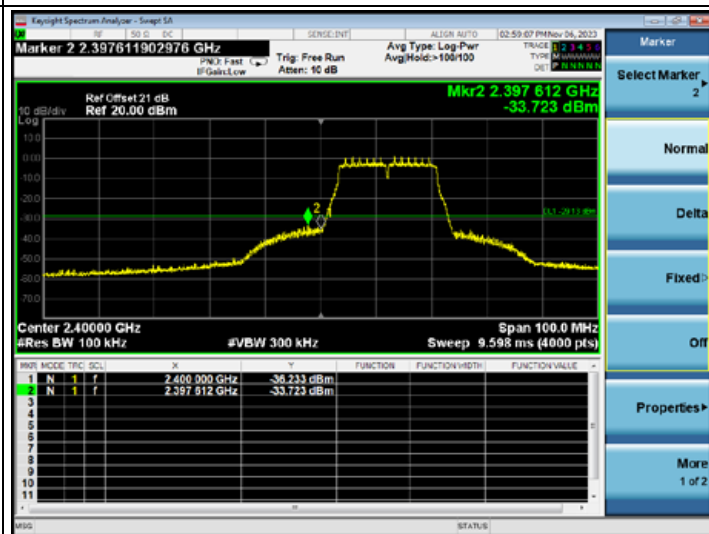
802.11n20

CH2412

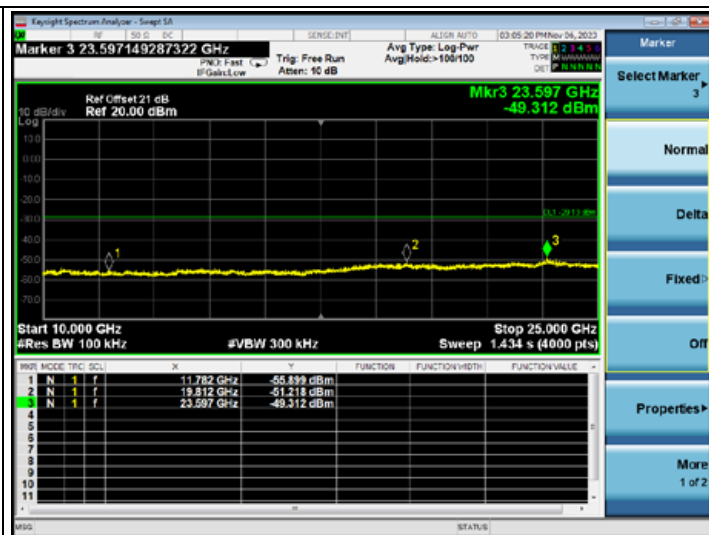
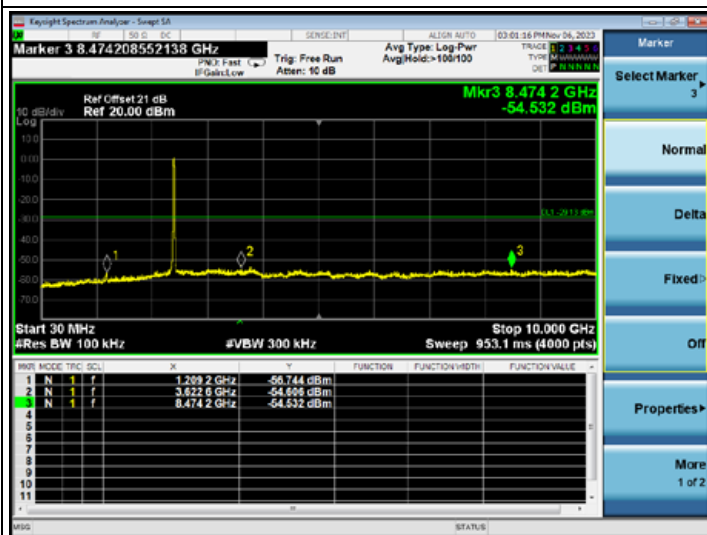
Reference Level



Lower Edge



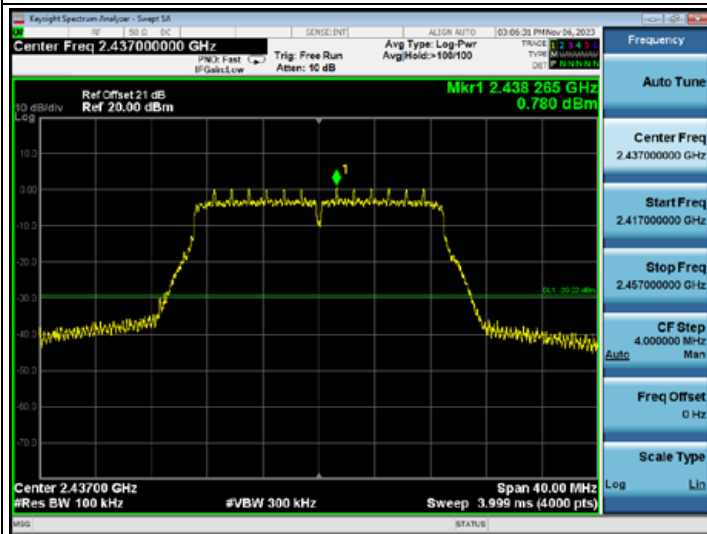
Emission Level



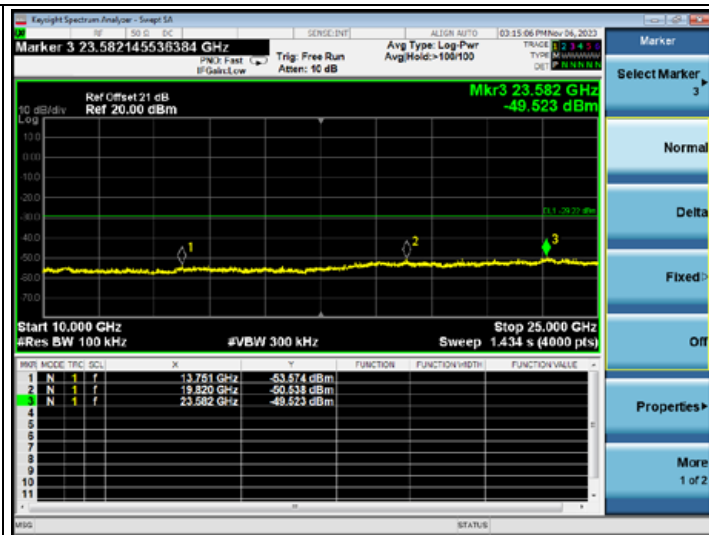
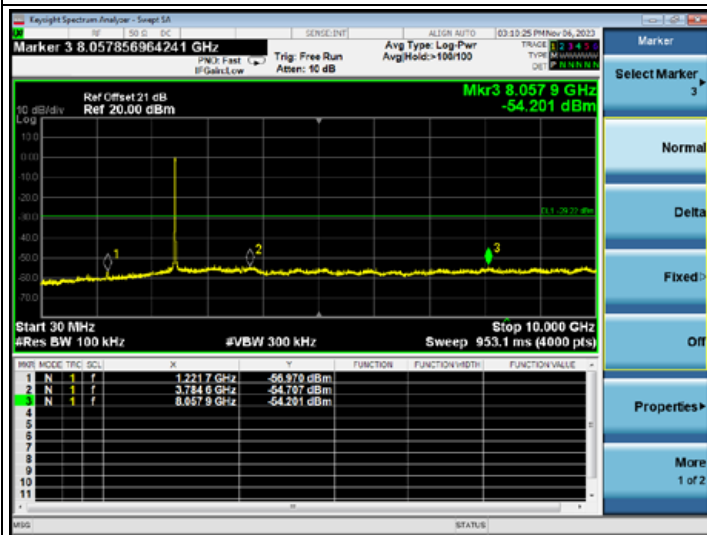
802.11n20

CH2437

Reference Level



Emission Level

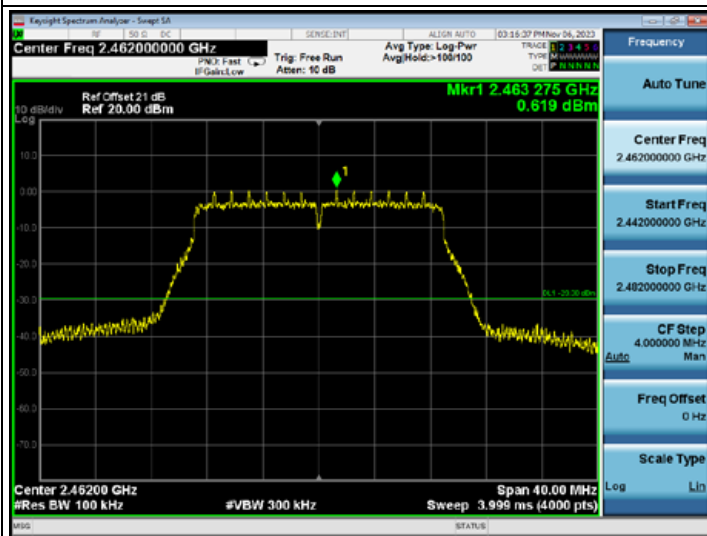




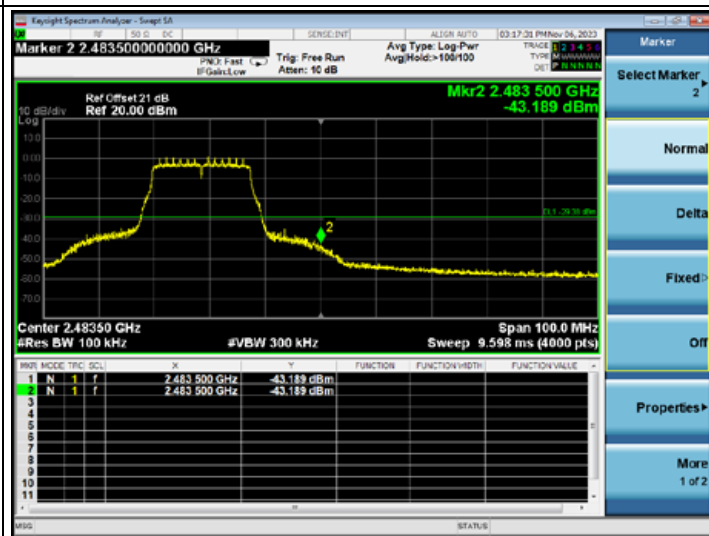
802.11n20

CH2462

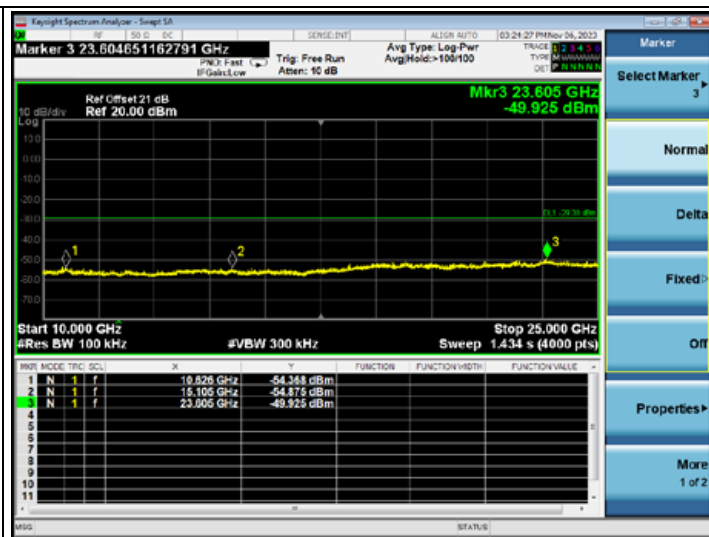
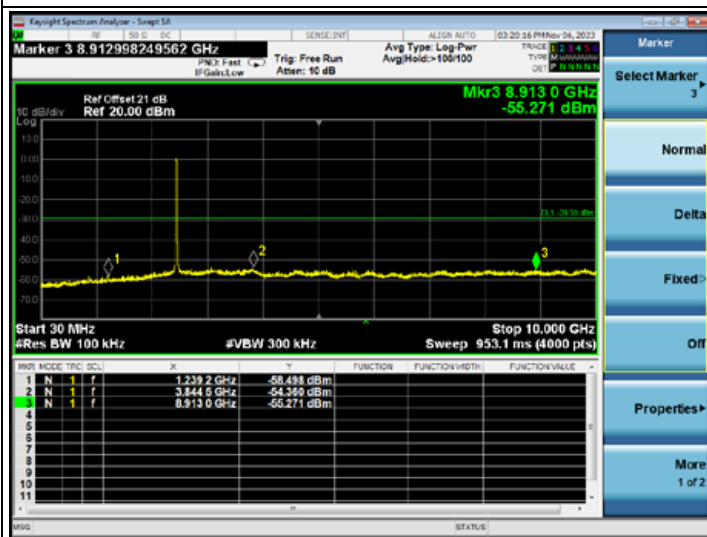
Reference Level



Higher Edge



Emission Level



## 9 POWER SPECTRAL DENSITY MEASUREMENT

### 9.1 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

### 9.2 Block Diagram of Test Setup

The Same as section 5.2.

### 9.3 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.

### 9.4 Operating Condition of EUT

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

### 9.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Method AVGPSD-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):

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

## 9.6 Test Results

### **PASSED.**

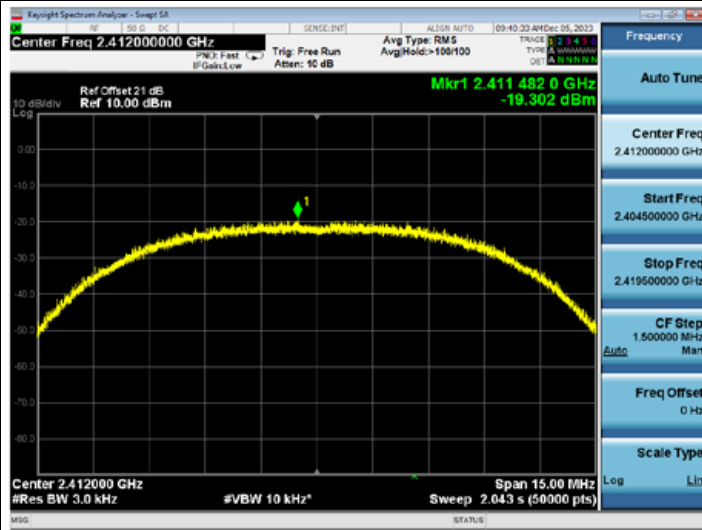
All the test results are attached in next pages.

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

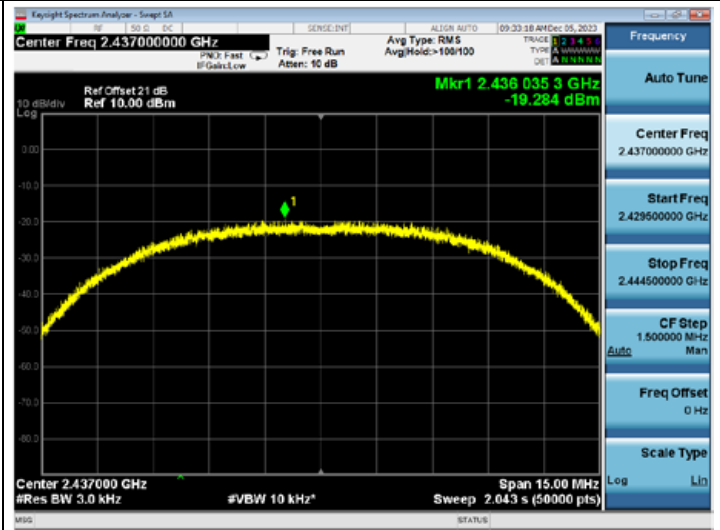
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit
802.11b	1	2412	<b>-19.302</b>	8 dBm
	6	2437	<b>-19.284</b>	8 dBm
	11	2462	<b>-18.804</b>	8 dBm
802.11g	1	2412	<b>-18.736</b>	8 dBm
	6	2437	<b>-19.377</b>	8 dBm
	11	2462	<b>-19.074</b>	8 dBm
802.11n20	1	2412	<b>-22.196</b>	8 dBm
	6	2437	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

802.11b

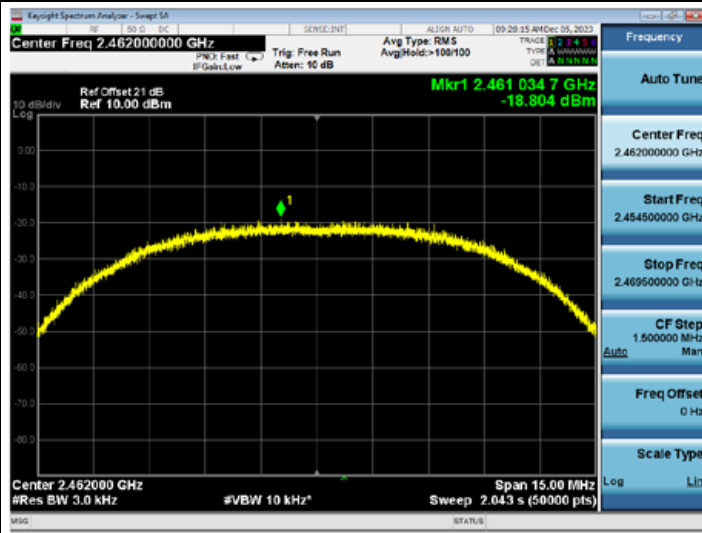
CH2412



CH2437

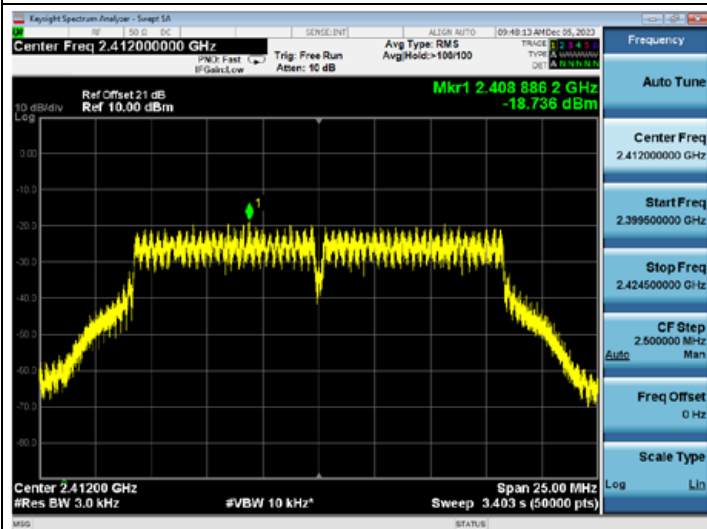


CH2462

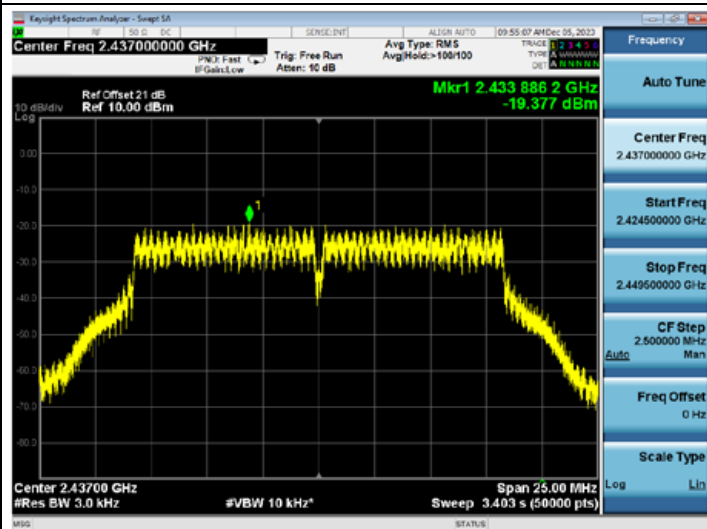


802.11g

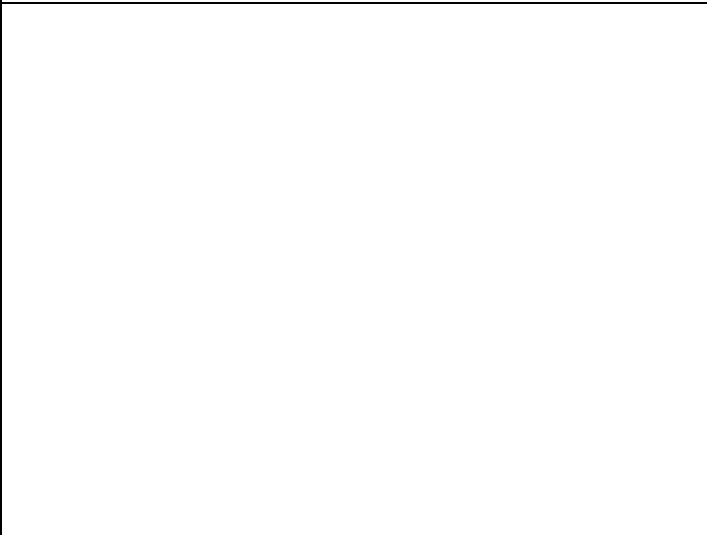
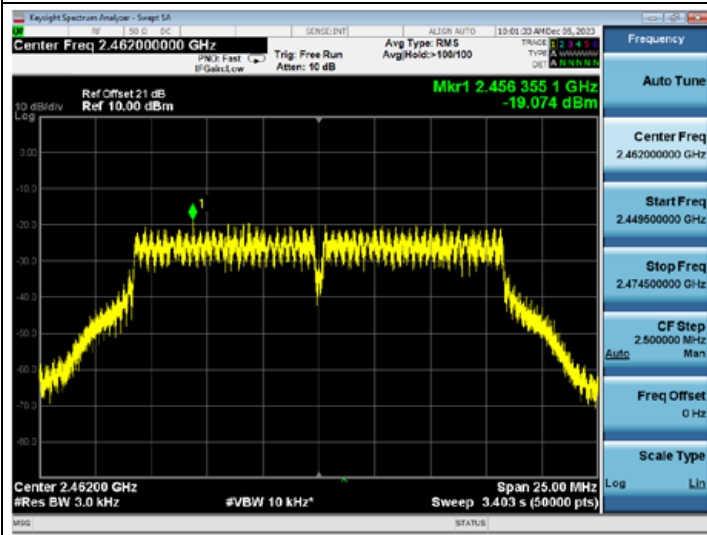
CH2412



CH2437

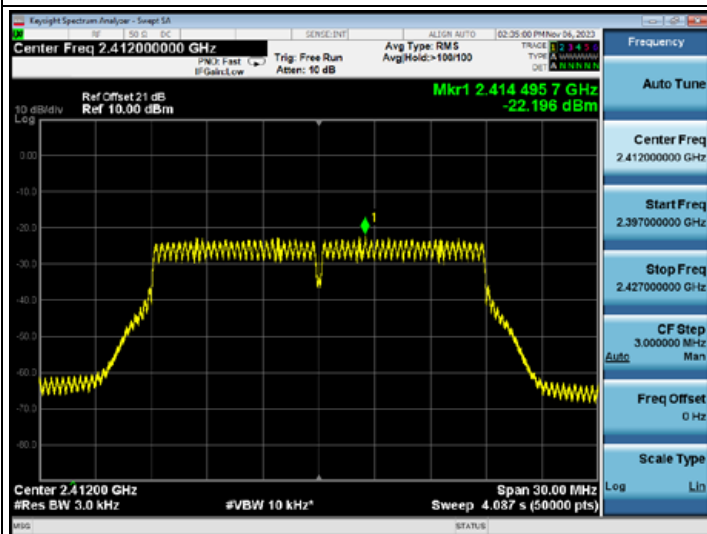


CH2462

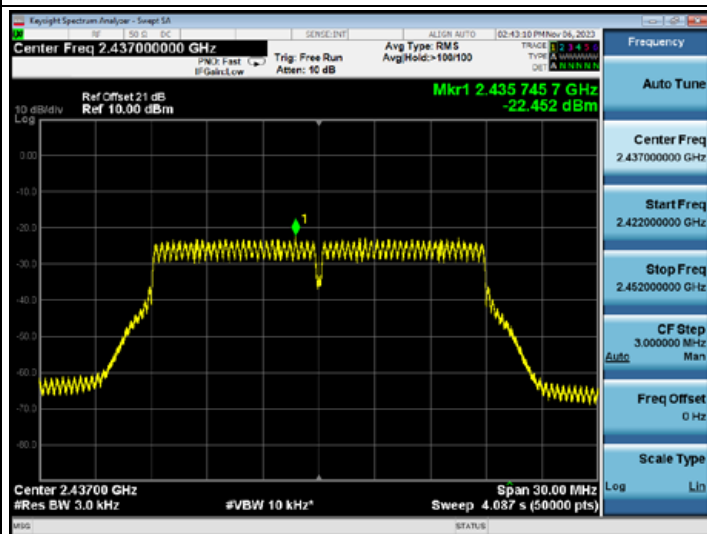


802.11n20

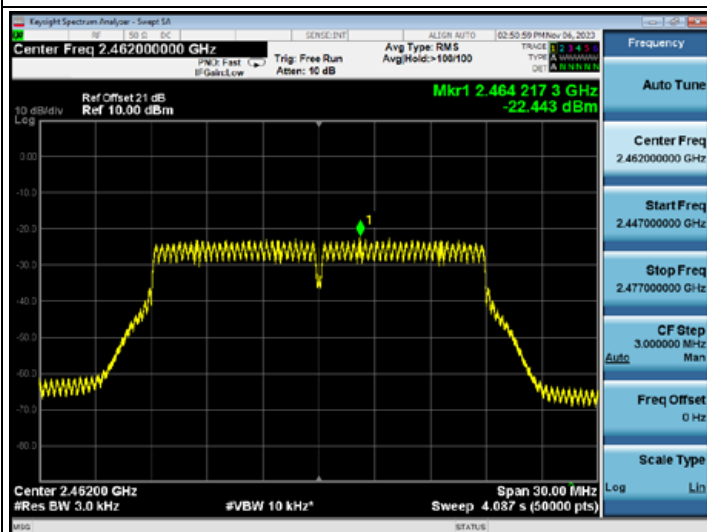
CH2412



CH2437



CH2462



## 10 ANTENNA REQUIREMENT

### 10.1 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.

### 10.2 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.



## 11 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	$6 \times 10^{-4}$
Bandwidth Test	9kHz~6GHz	$1.5 \times 10^{-3}$
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 %