

# TEST REPORT

Product Name : Embedded Wi-Fi Module  
Model Number : EMW3090V2-P, EMW3090V2-E  
FCC ID : P53-EMW3090V2

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Shanghai, China

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## TABLE OF CONTENTS

<b>1</b>	<b>TEST RESULT CERTIFICATION</b> .....	<b>3</b>
<b>2</b>	<b>EUT TECHNICAL DESCRIPTION</b> .....	<b>4</b>
<b>3</b>	<b>SUMMARY OF TEST RESULT</b> .....	<b>5</b>
<b>4</b>	<b>TEST METHODOLOGY</b> .....	<b>6</b>
4.1	GENERAL DESCRIPTION OF APPLIED STANDARDS .....	6
4.2	MEASUREMENT EQUIPMENT USED .....	6
4.3	DESCRIPTION OF TEST MODES .....	7
4.4	TEST SOFTWARE .....	8
<b>5</b>	<b>FACILITIES AND ACCREDITATIONS</b> .....	<b>9</b>
5.1	FACILITIES .....	9
5.2	LABORATORY ACCREDITATIONS AND LISTINGS .....	9
<b>6</b>	<b>TEST SYSTEM UNCERTAINTY</b> .....	<b>10</b>
<b>7</b>	<b>SETUP OF EQUIPMENT UNDER TEST</b> .....	<b>11</b>
7.1	RADIO FREQUENCY TEST SETUP 1 .....	11
7.2	RADIO FREQUENCY TEST SETUP 2 .....	11
7.3	CONDUCTED EMISSION TEST SETUP .....	12
7.4	BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM .....	13
7.5	SUPPORT EQUIPMENT .....	13
<b>8</b>	<b>TEST REQUIREMENTS</b> .....	<b>14</b>
8.1	DTS (6DB) BANDWIDTH .....	14
8.2	MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER .....	20
8.3	MAXIMUM POWER SPECTRAL DENSITY .....	28
8.4	UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS .....	34
8.5	RADIATED SPURIOUS EMISSION .....	40
8.6	CONDUCTED EMISSIONS TEST .....	61
8.7	ANTENNA APPLICATION .....	64

# 1 TEST RESULT CERTIFICATION

Applicant : Shanghai MXCHIP Information Technology Co., Ltd.  
 Address : 9F, Building B, Lane 2145, Jinshajiang Road, Putuo District, Shanghai, China  
 Manufacturer : Shanghai MXCHIP Information Technology Co., Ltd.  
 Address : 9F, Building B, Lane 2145, Jinshajiang Road, Putuo District, Shanghai, China  
 EUT : Embedded Wi-Fi Module  
 Model Name : EMW3090V2-P, EMW3090V2-E  
 Trademark : 

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	PASS

The above equipment was tested by EMTEK (DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247

The test results of this report relate only to the tested sample identified in this report.

Date of Test : March 07, 2023 to March 28, 2023

Prepared by : Warren Deng  
 Warren deng /Engineer

Reviewer : Tim Dong  
 Tim Dong /Supervisor

Approved & Authorized Signer : Sam Lv  
 Sam Lv /Manager



## 2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
<b>Product</b>	Embedded Wi-Fi Module
<b>Model Number</b>	EMW3090V2-P, EMW3090V2-E Note: EMW3090V2-P is the PCB antenna, and EMW3090V2-E is the IPEX antenna. These two models belong to the same series of products, the only difference is the antenna type. We chose EMW3090V2-P for testing, and conducted the difference test of radiation spurious between the two models.
<b>Sample Number</b>	1#
<b>IEEE 802.11 WLAN Mode Supported</b>	<input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth)
<b>Data Rate</b>	802.11 b:1,2,5.5,11Mbps; 802.11 g:6,9,12,18,24,36,48,54Mbps; 802.11 n: MCS0~7, up to 150Mbps;
<b>Modulation</b>	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/ CCK /16QAM/64QAM for 802.11g/n20;
<b>Operating Frequency Range</b>	<input checked="" type="checkbox"/> 2412-2462MHz for 802.11b/g/n(HT20);
<b>Number of Channels</b>	<input checked="" type="checkbox"/> 11 channels for 802.11b/g n(HT20);
<b>Transmit Power Max</b>	17.00 dBm
<b>Smart system</b>	<input checked="" type="checkbox"/> SISO for802.11 b/g/n(HT20) <input type="checkbox"/> MIMO for802.11n(HT20);
<b>Antenna Type</b>	EMW3090V2-P: PCB Antenna EMW3090V2-E: IPEX Antenna
<b>Antenna Gain</b>	EMW3090V2-P: -1.0 dBi EMW3090V2-E: 2.0 dBi
<b>Power supply</b>	DC 3.3V
<b>Temperature Range</b>	-20℃~+85℃
<b>Date of Received</b>	March 07, 2023

**Note:** for more details, please refer to the User's manual of the EUT.

### 3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(2)	DTS (6dB) Bandwidth	PASS	
15.247(b)(3)	Maximum Peak Conducted Output Power	PASS	
15.247(e)	Maximum Power Spectral Density Level	PASS	
15.247(d)	Unwanted Emission Into Non-Restricted Frequency Bands	PASS	
15.247(d) 15.209	Unwanted Emission Into Restricted Frequency Bands (conducted)	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.207	Conducted Emission Test	PASS	
15.247(b)	Antenna Application	PASS	
	NOTE1:N/A (Not Applicable) NOTE2: According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.		

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: P53-EMW3090V2 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 4 TEST METHODOLOGY

### 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

### 4.2 MEASUREMENT EQUIPMENT USED

#### 4.2.1 Conducted Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Test Receiver	Rohde& Schwarz	ESCI	100137	2022/05/19	1Year
L.I.S.N.	Rohde& Schwarz	ENV216	101209	2022/05/19	1Year
RF Switching Unit	CDS	RSU-M2	38401	2022/05/19	1Year

#### 4.2.2 Radiated Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESCI	101415	2022/05/19	1Year
Power Amplifier	HP	8447F	OPH64	2022/05/19	1Year
Bilog Antenna	Schwarzbeck	VULB9163	141	2022/05/22	1Year
Horn antenna	Schwarzbeck	BBHA9120D	1272	2022/05/22	1Year
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	2022/05/19	1Year
Loop Antenna	Schwarzbeck	FMZB1513	1513-60	2022/05/22	2 Year
Signal Analyzer	R&S	FSV30	103039	2022/05/19	1Year
Bilog Antenna	Schwarzbeck	VULB9163	141	2022/05/22	1Year
Band reject Filter(50dB)	WI/DE	WRCGV-2400(2400-2485MHz)	2	2022/05/20	1 Year

#### 4.2.3 Radio Frequency Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Wireless Connectivity Tester	R&S	CMW270	102543	2022/06/21	1Year
Automatic Control Unit	Tonscend	JS0806-2	2118060480	2022/06/21	1Year
Signal Analyzer	KEYSIGHT	N9010B	MY60242456	2022/06/21	1Year
Analog Signal Generator	KEYSIGHT	N5173B	MY61252625	2022/06/21	1Year
UP/DOWN-Converter	R&S	CMW-Z800A	100274	2022/06/21	1Year
Vector Signal Generator	KEYSIGHT	N5182B	MY61252674	2022/06/21	1Year
Frequency Extender	KEYSIGHT	N5182BX07	MY59362541	2022/06/21	1Year
Temperature&Humidity test chamber	ESPEC	EL-02KA	12107166	2022/06/21	1 Year

### 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b:1 Mbps;802.11g: 6 Mbps;802.11n(HT20): MCS0;802.11n(HT40): MCS0) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11b/g/n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462
2	2417	7	2442		
3	2422	8	2447		
4	2427	9	2452		
5	2432	10	2457		

Frequency and Channel list for 802.11n (HT40):

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

Test Frequency and Channel for 802.11b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462

Test Frequency and Channel for 802.11n (HT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	6	2437	9	2452

**4.4 TEST SOFTWARE**

Item	Software
Radiated Emission:	AmebaD_mptool (Ver. 2.0)
Conducted Emission	AmebaD_mptool (Ver. 2.0)





## 5 FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at  
EMTEK (DONGGUAN) CO., LTD.

-1&2F., Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No. 9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 32.

### 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

#### Site Description

EMC Lab. : Accredited by CNAS, 2020.08.27  
The certificate is valid until 2024.07.05  
The Laboratory has been assessed and proved to be in compliance with  
CNAS/CL01:2018  
The Certificate Registration Number is L3150

Designation by FCC  
Designation Number: CN1300  
Test Firm Registration Number: 945551

Accredited by A2LA, April 05, 2021  
The Certificate Registration Number is 4321.02

Designation by Industry Canada  
The Certificate Registration Number is CN0113

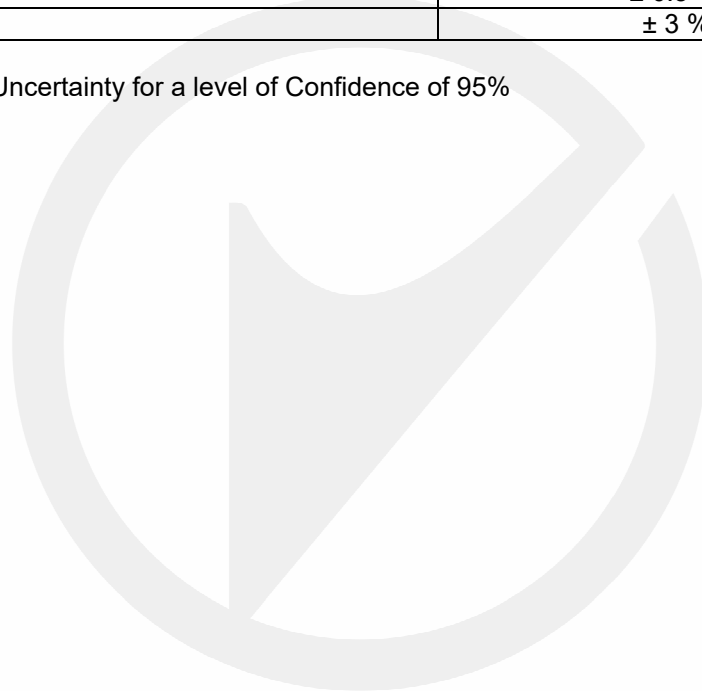
Name of Firm : EMTEK (Dongguan) Co., Ltd.  
Site Location : -1&2/F., Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No. 9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

## 6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0$ dB
Conducted Emissions Test	$\pm 2.0$ dB
Radiated Emission Test	$\pm 2.0$ dB
Power Density	$\pm 2.0$ dB
Occupied Bandwidth Test	$\pm 1.0$ dB
Band Edge Test	$\pm 3$ dB
All emission, radiated	$\pm 3$ dB
Antenna Port Emission	$\pm 3$ dB
Temperature	$\pm 0.5$ °C
Humidity	$\pm 3$ %

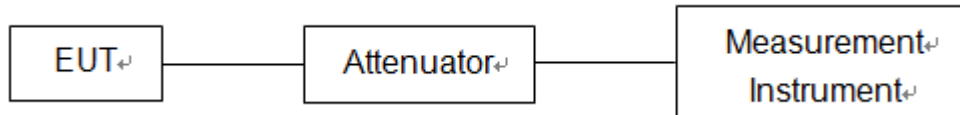
Measurement Uncertainty for a level of Confidence of 95%



## 7 SETUP OF EQUIPMENT UNDER TEST

### 7.1 RADIO FREQUENCY TEST SETUP 1

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

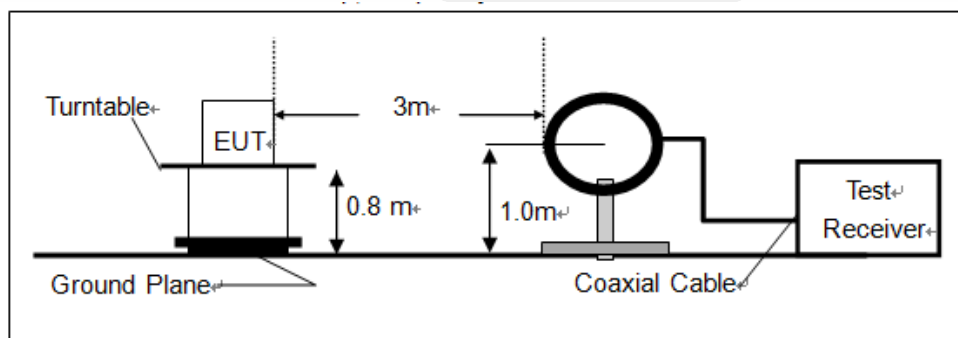
30MHz-1GHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

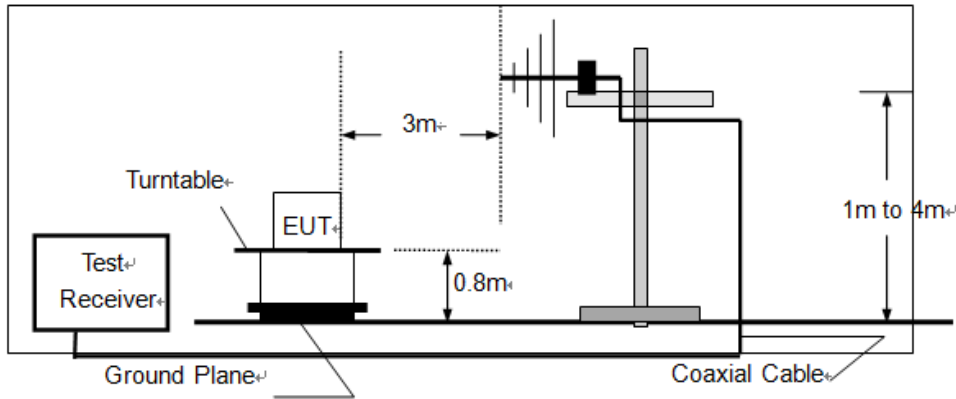
Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

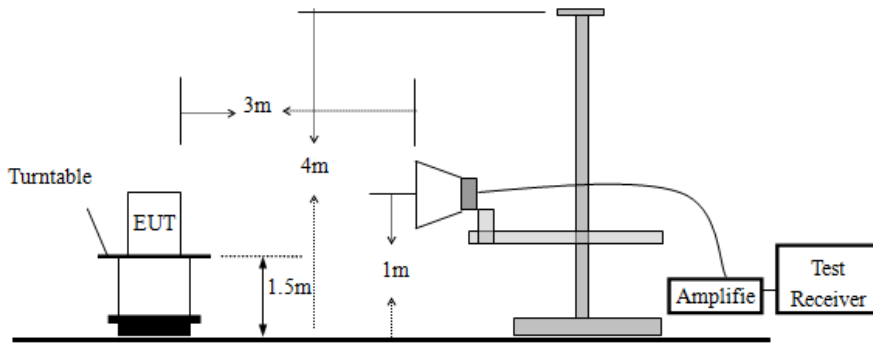
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

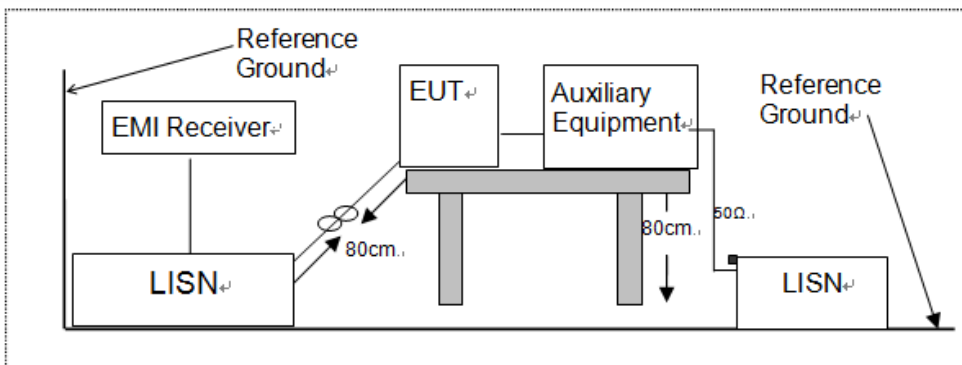


### 7.3 CONDUCTED EMISSION TEST SETUP

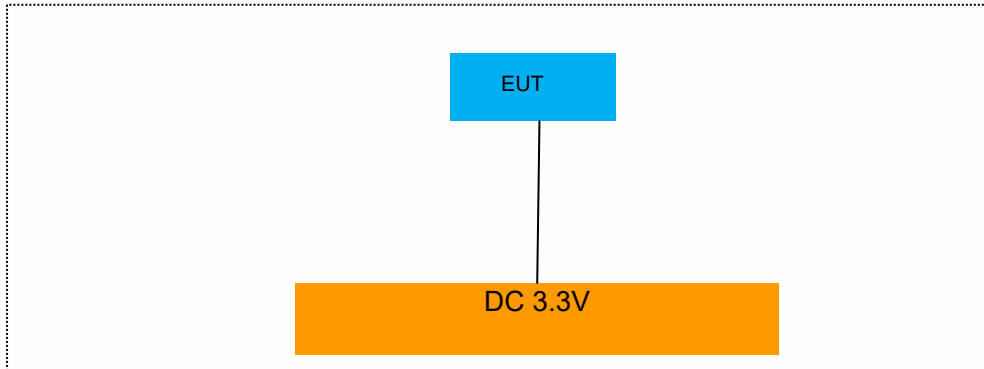
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



### 7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



### 7.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

**Notes:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.
3. Unless otherwise denoted as EUT in [Remark] column , device(s) used in tested system is a support equipment

## 8 TEST REQUIREMENTS

### 8.1 DTS (6DB) BANDWIDTH

#### 8.1.1 Applicable Standard

According to FCC Part15.247 (a)(2) and KDB 558074 D01 15.247 Meas Guidance v05r02

#### 8.1.2 Conformance Limit

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

#### 8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

#### 8.1.4 Test Procedure

The EUT was operating in IEEE 802.11b/g/n mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 100 kHz.

Set the video bandwidth (VBW) =300kHz.

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

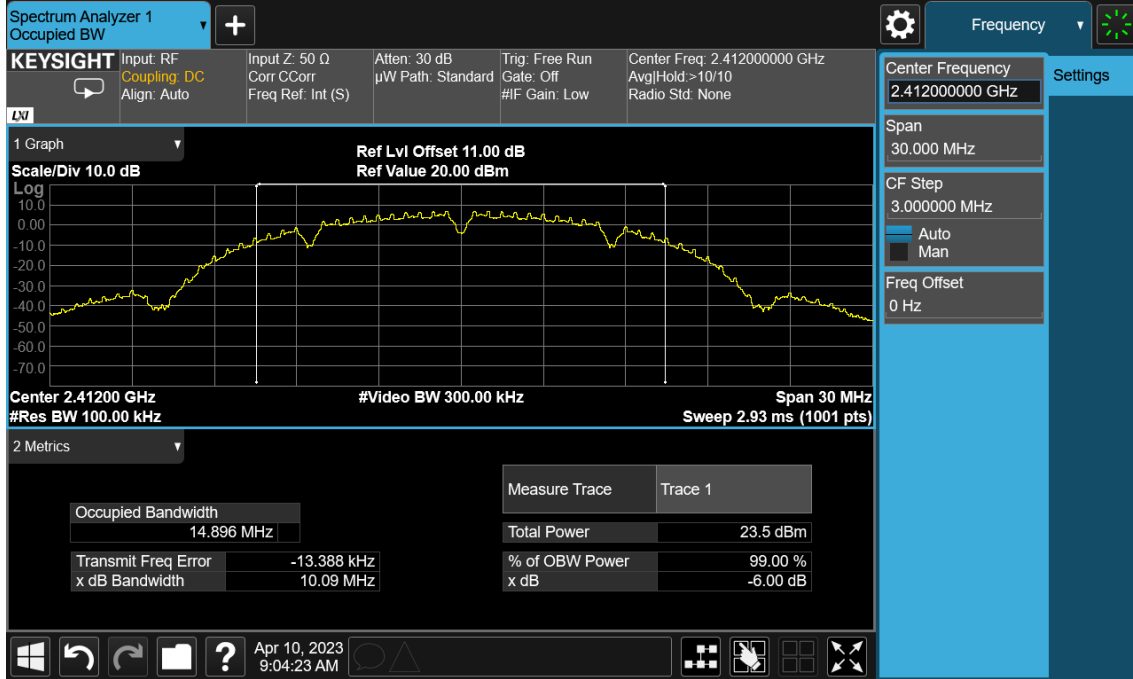
Measure and record the results in the test report.

#### 8.1.5 Test Results

Temperature:	18°C
Relative Humidity:	58%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Limit (kHz)	Verdict
802.11b	1	2412	10.090	>500	PASS
	6	2437	10.080	>500	PASS
	11	2462	10.070	>500	PASS
802.11g	1	2412	16.360	>500	PASS
	6	2437	16.350	>500	PASS
	11	2462	16.350	>500	PASS
802.11n (HT20)	1	2412	17.320	>500	PASS
	6	2437	17.300	>500	PASS
	11	2462	17.350	>500	PASS

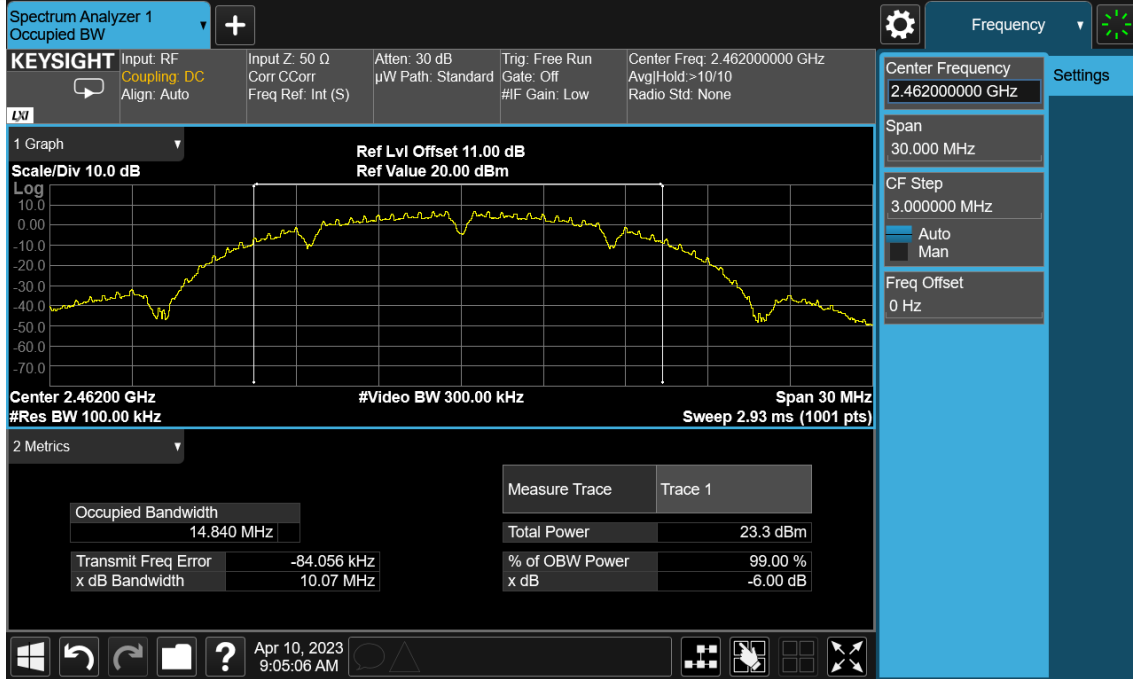
Test Model DTS (6dB) Bandwidth  
802.11b  
Channel 1: 2412MHz



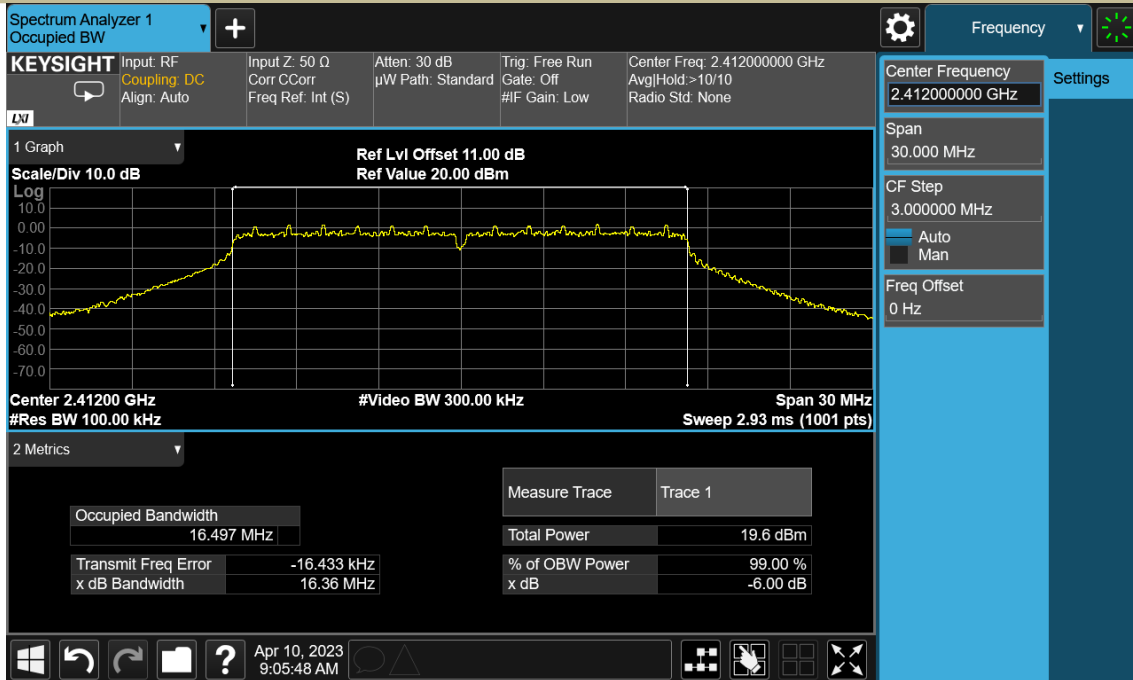
Test Model DTS (6dB) Bandwidth  
802.11b  
Channel 6: 2437MHz



Test Model DTS (6dB) Bandwidth 802.11b Channel 11: 2462MHz

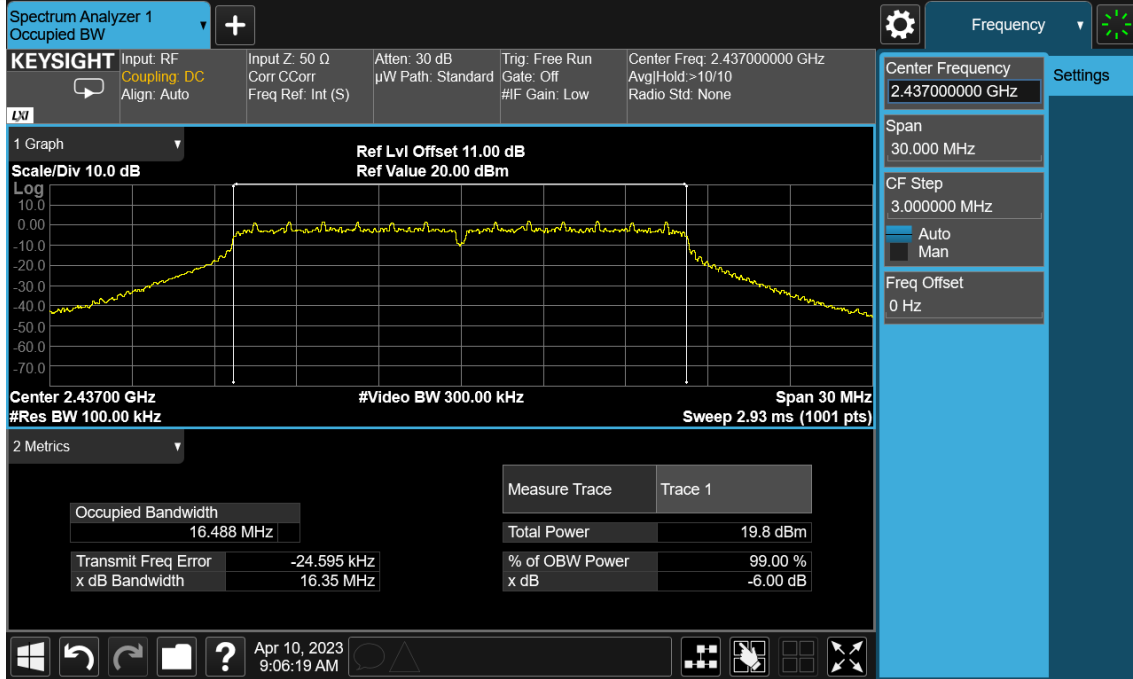


Test Model DTS (6dB) Bandwidth 802.11g Channel 1: 2412MHz

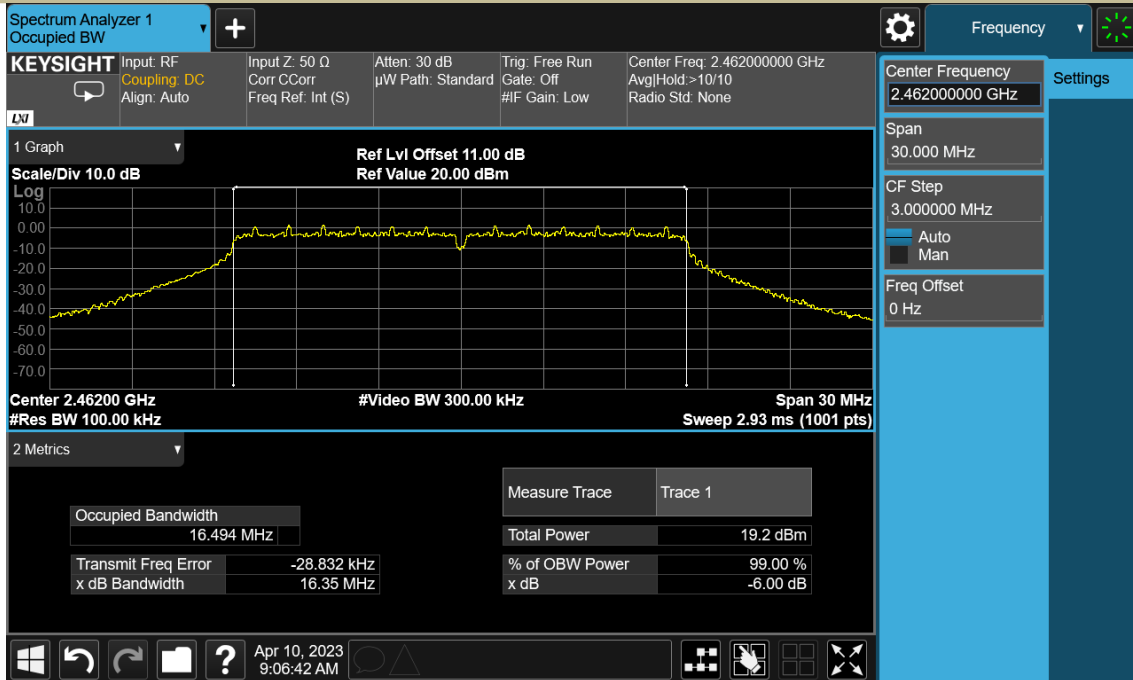




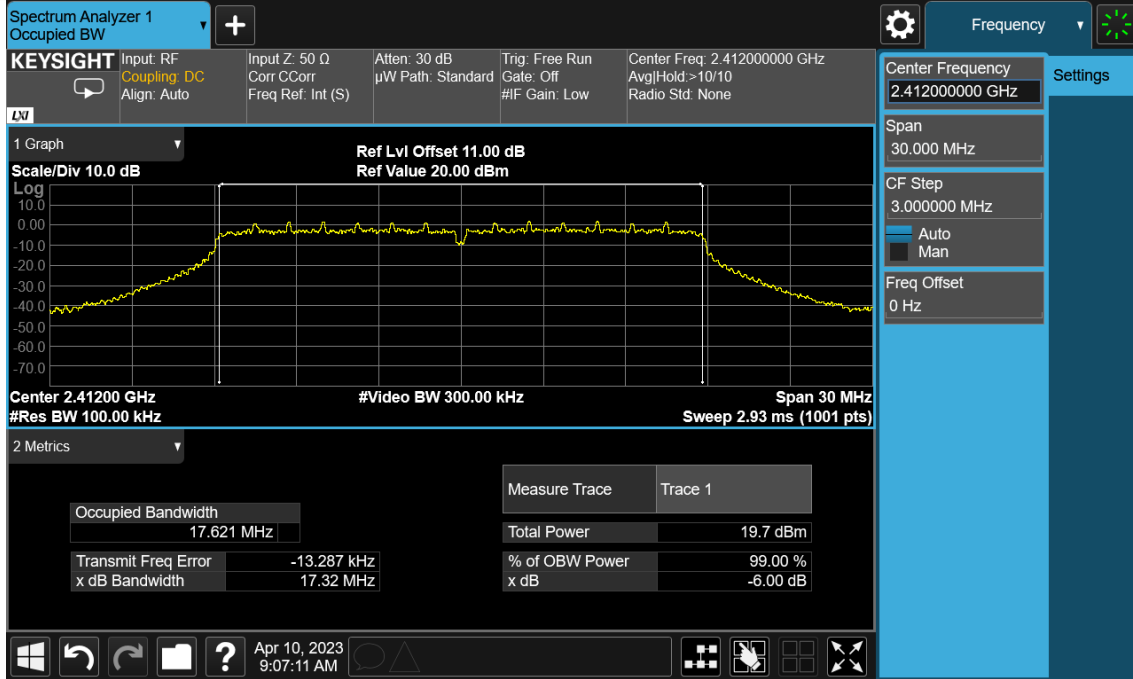
Test Model DTS (6dB) Bandwidth  
802.11g  
Channel 6: 2437MHz



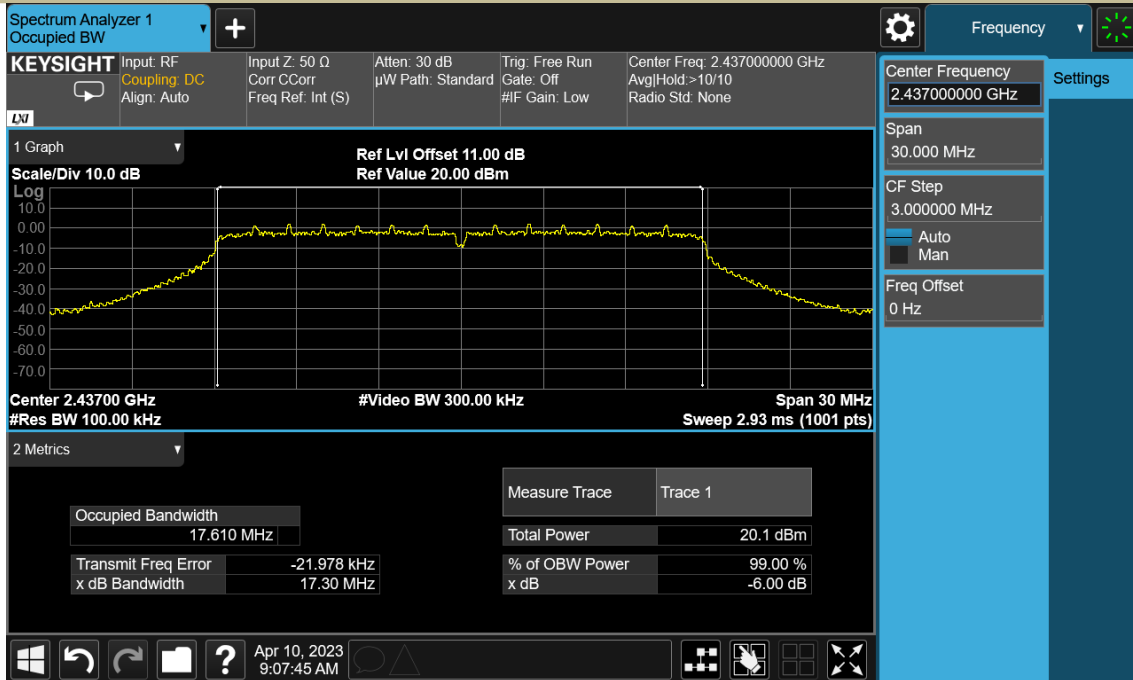
Test Model DTS (6dB) Bandwidth  
802.11g  
Channel 11: 2462MHz



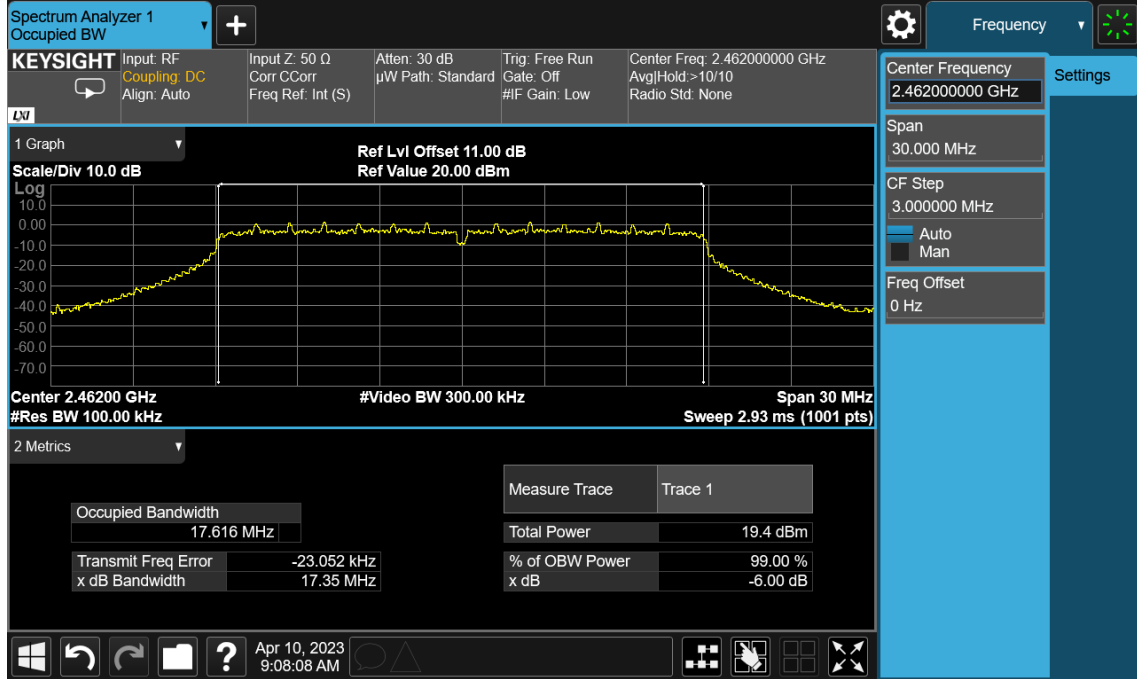
Test Model DTS (6dB) Bandwidth  
802.11n (HT20)  
Channel 1: 2412MHz



Test Model DTS (6dB) Bandwidth  
802.11n (HT20)  
Channel 6: 2437MHz



Test Model DTS (6dB) Bandwidth  
802.11n (HT20)  
Channel 11: 2462MHz



## 8.2 MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

### 8.2.1 Applicable Standard

According to FCC Part15.247 (b)(3) and KDB 558074 D01 15.247 Meas Guidance v05r02

### 8.2.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

### 8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

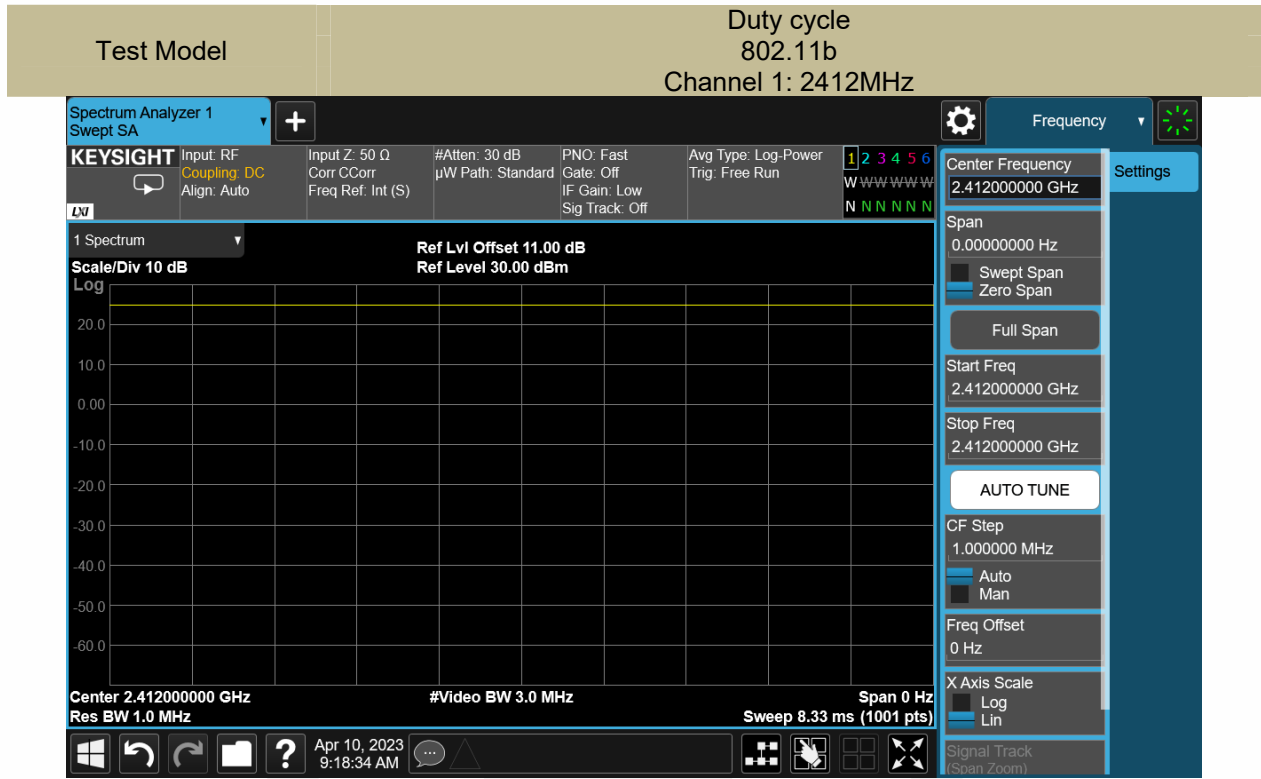
### 8.2.4 Test Procedure

- a) Set span to at least 1.5 times the OBW.
- b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
- c) Set VBW  $\geq 3 \times$  RBW.
- d) Number of points in sweep  $\geq 2 \times$  span / RBW. (This gives bin-to-bin spacing  $\leq$  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 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 (i.e., 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.

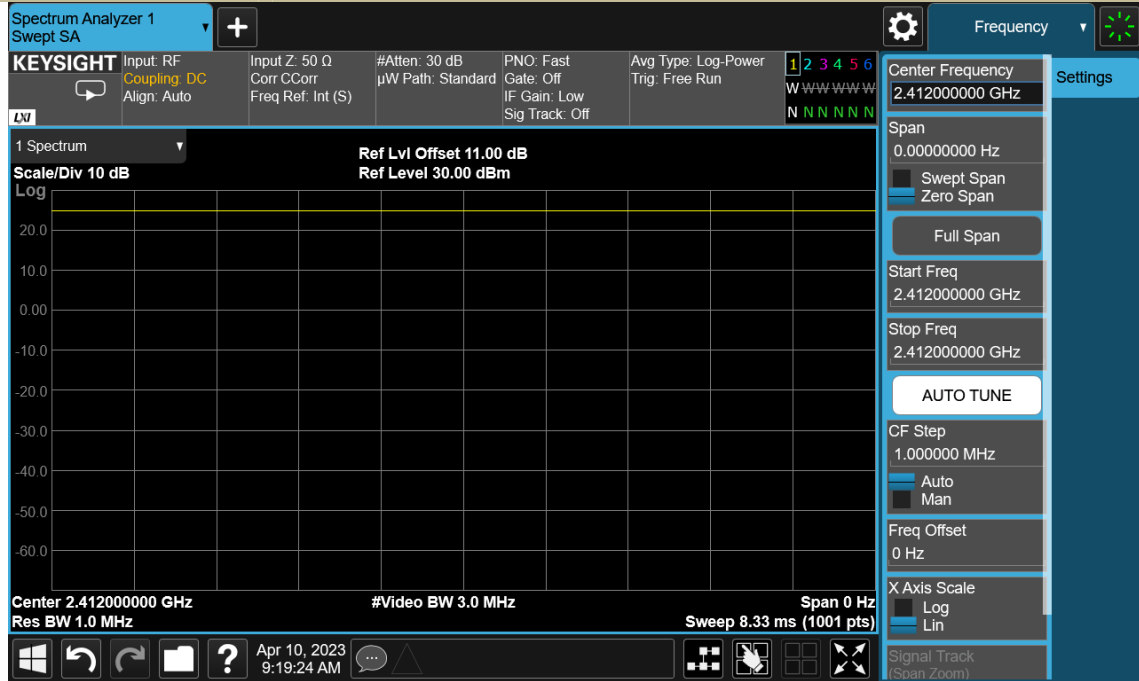
### 8.2.5 Test Results

Temperature:	18°C
Relative Humidity:	58%
ATM Pressure:	1011 mbar

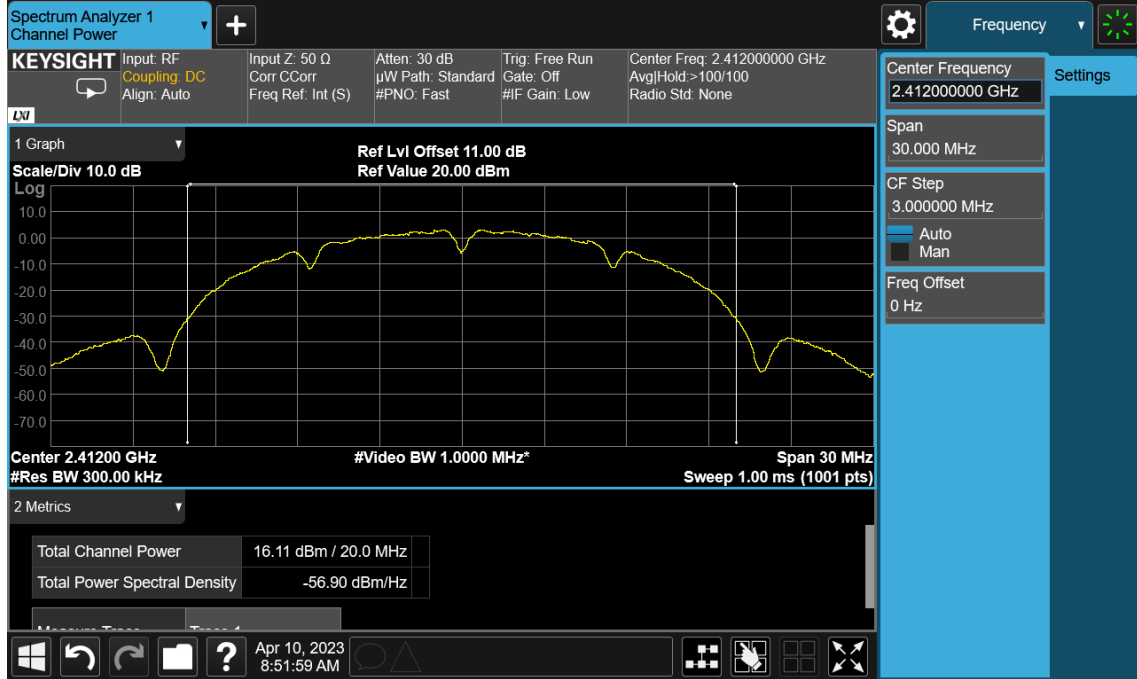
Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
802.11b	1	2412	16.11	30	PASS
	6	2437	17.00	30	PASS
	11	2462	16.54	30	PASS
802.11g	1	2412	12.29	30	PASS
	6	2437	13.03	30	PASS
	11	2462	12.60	30	PASS
802.11n (HT20)	1	2412	12.93	30	PASS
	6	2437	13.15	30	PASS
	11	2462	12.39	30	PASS



Test Model Duty cycle  
802.11n(HT20)  
Channel 1: 2412MHz



**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
802.11b  
Channel 1: 2412MHz



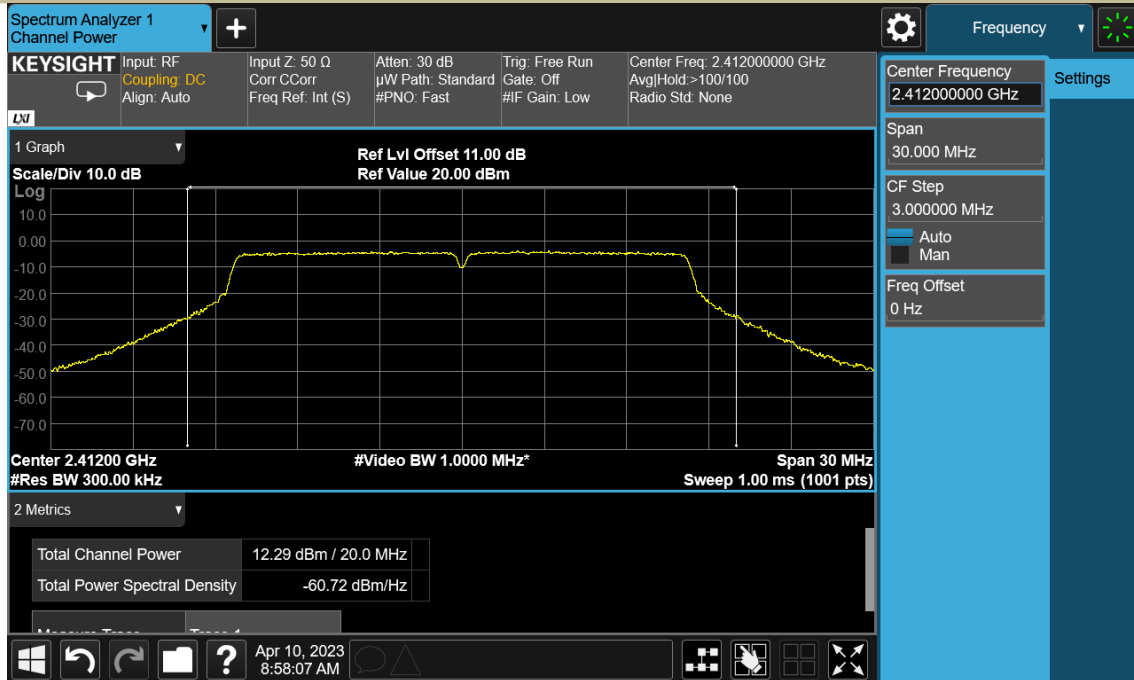
**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
802.11b  
Channel 6: 2437MHz



**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
**802.11b**  
**Channel 11: 2462MHz**

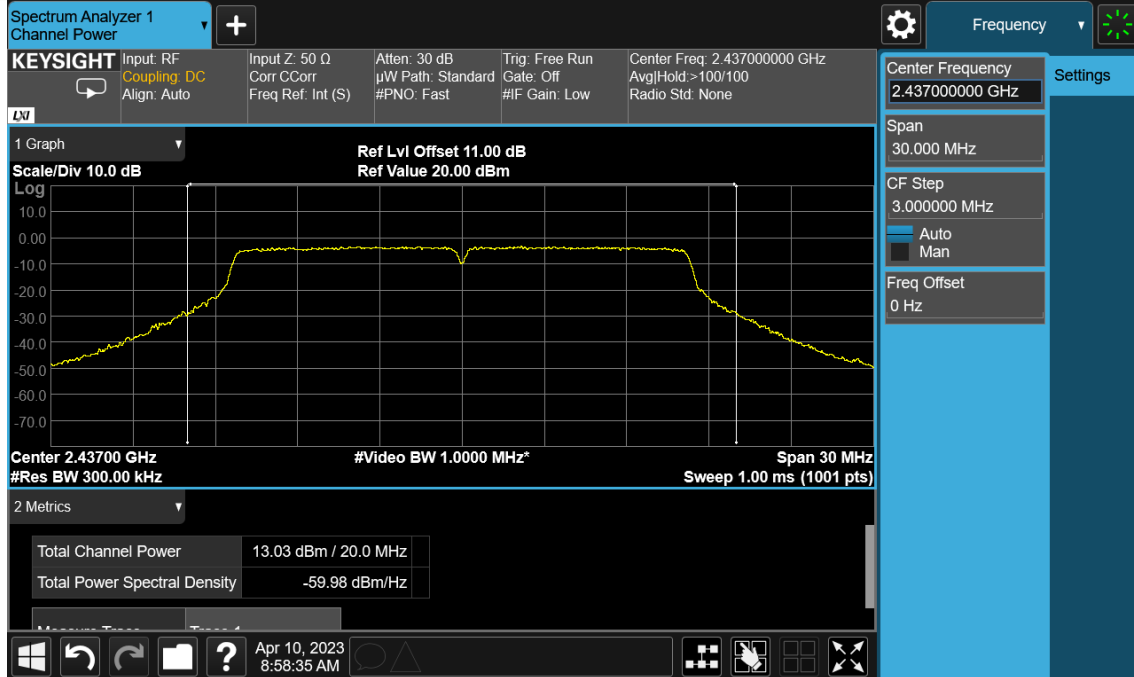


**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
**802.11g**  
**Channel 1: 2412MHz**





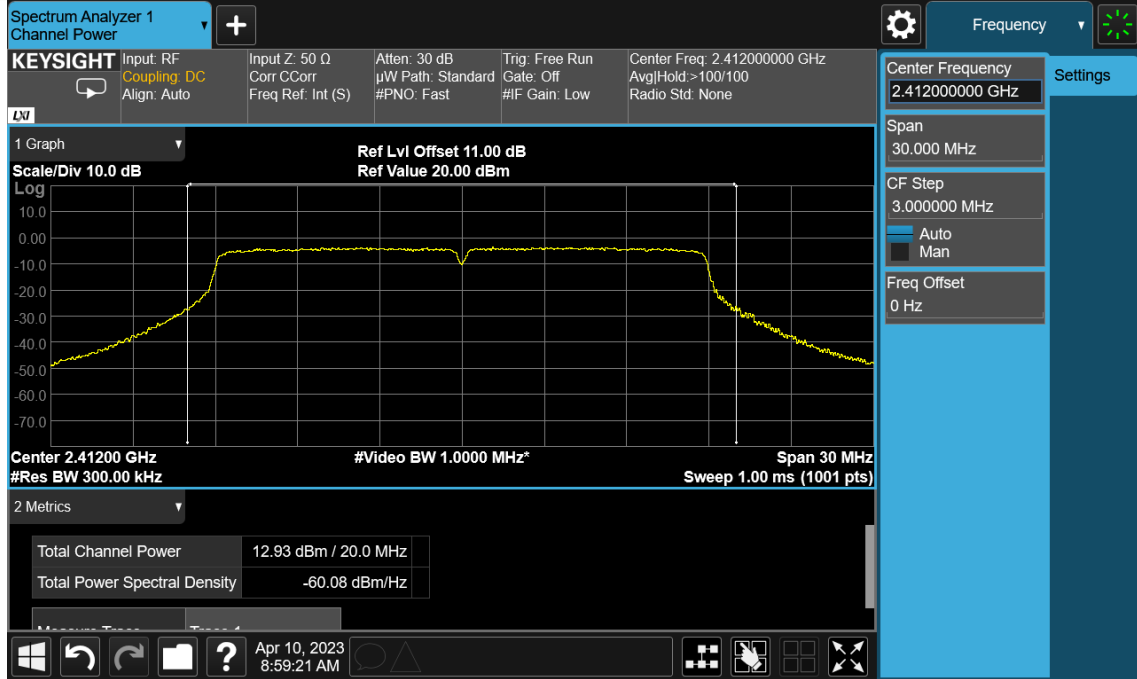
**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
 802.11g  
 Channel 6: 2437MHz



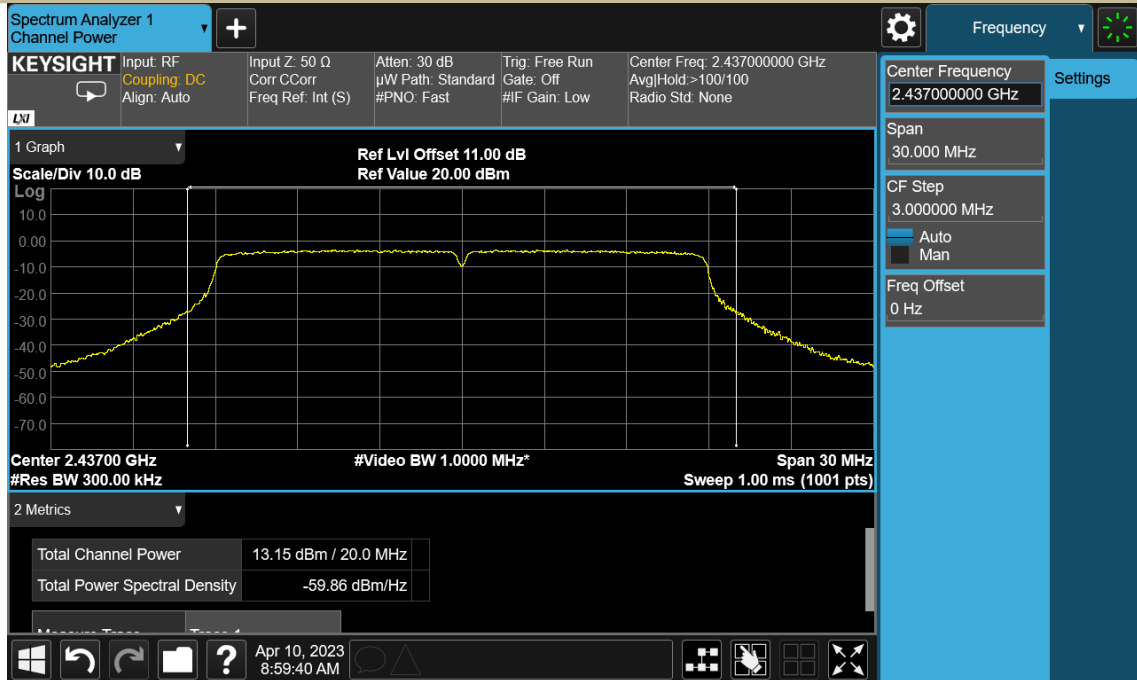
**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
 802.11g  
 Channel 11: 2462MHz



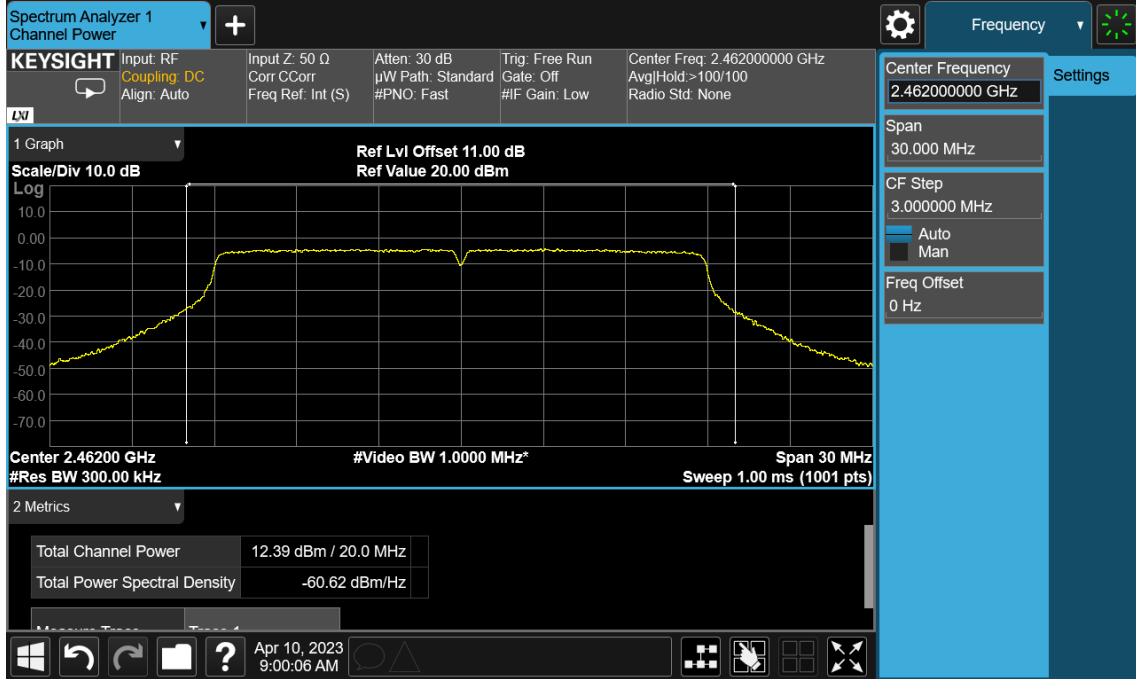
Test Model      **MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
 802.11n(HT20)  
 Channel 1: 2412MHz



Test Model      **MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
 802.11n(HT20)  
 Channel 6: 2437MHz



**MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER**  
**802.11n(HT20)**  
**Channel 11: 2462MHz**



### 8.3 MAXIMUM POWER SPECTRAL DENSITY

#### 8.3.1 Applicable Standard

According to FCC Part15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02

#### 8.3.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### 8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

#### 8.3.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to:10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

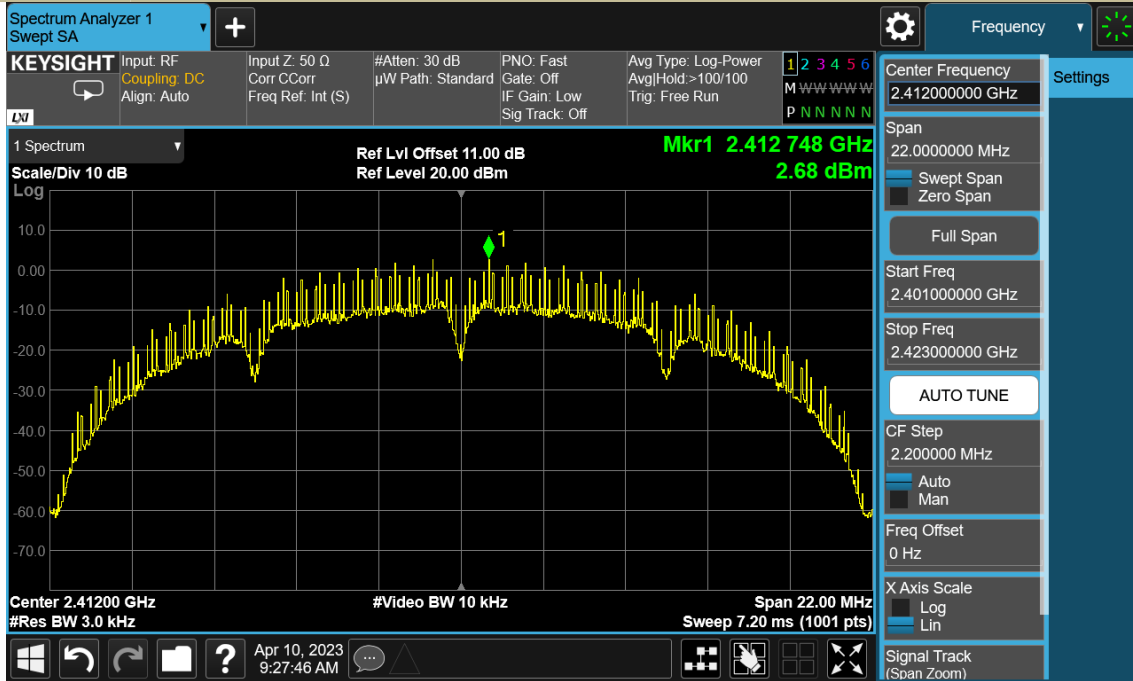
Note: If antenna Gain exceeds 6 dBi, then PSD Limit=8-(Gain- 6)

#### 8.3.5 Test Results

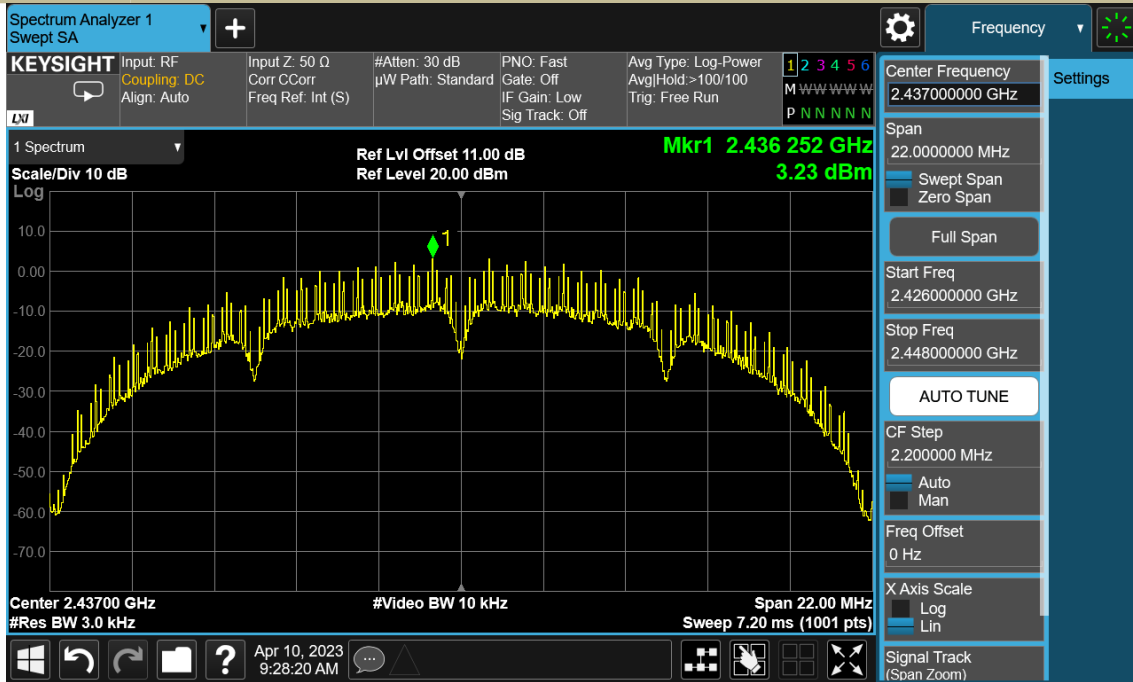
Temperature:	18°C
Relative Humidity:	68%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
802.11b	1	2412	2.68	8	PASS
	6	2437	3.23	8	PASS
	11	2462	2.77	8	PASS
802.11g	1	2412	-13.90	8	PASS
	6	2437	-13.47	8	PASS
	11	2462	-13.97	8	PASS
802.11n (HT20)	1	2412	-13.26	8	PASS
	6	2437	-12.88	8	PASS
	11	2462	-13.35	8	PASS

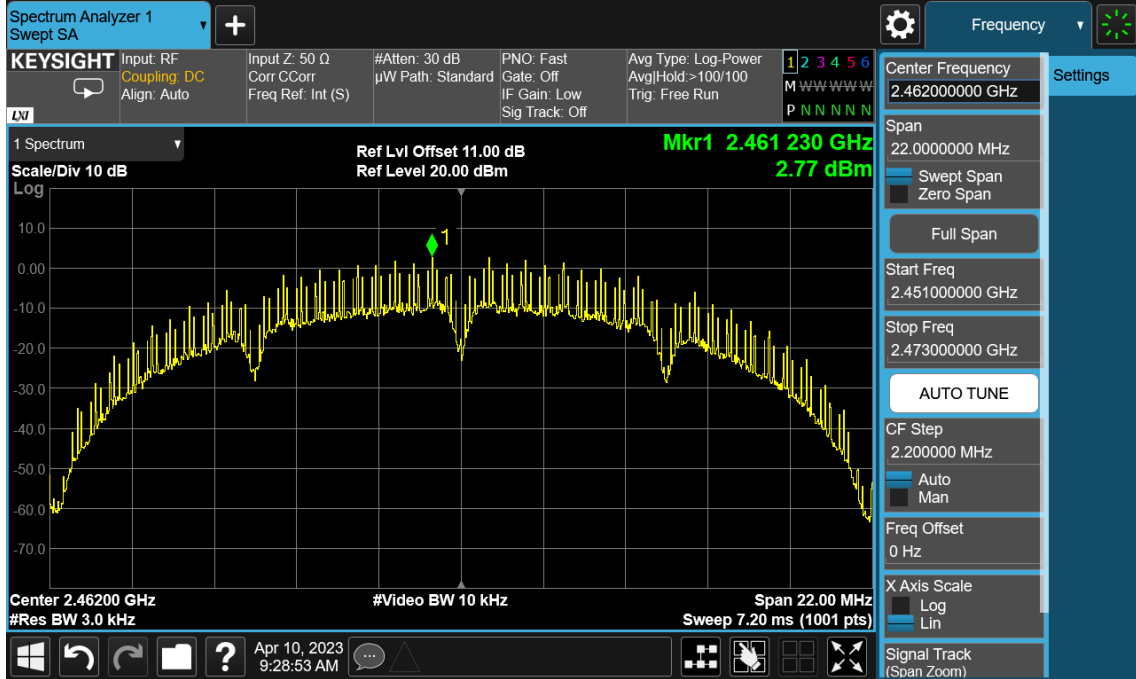
Test Model Power Spectral Density 802.11b Channel 1: 2412MHz



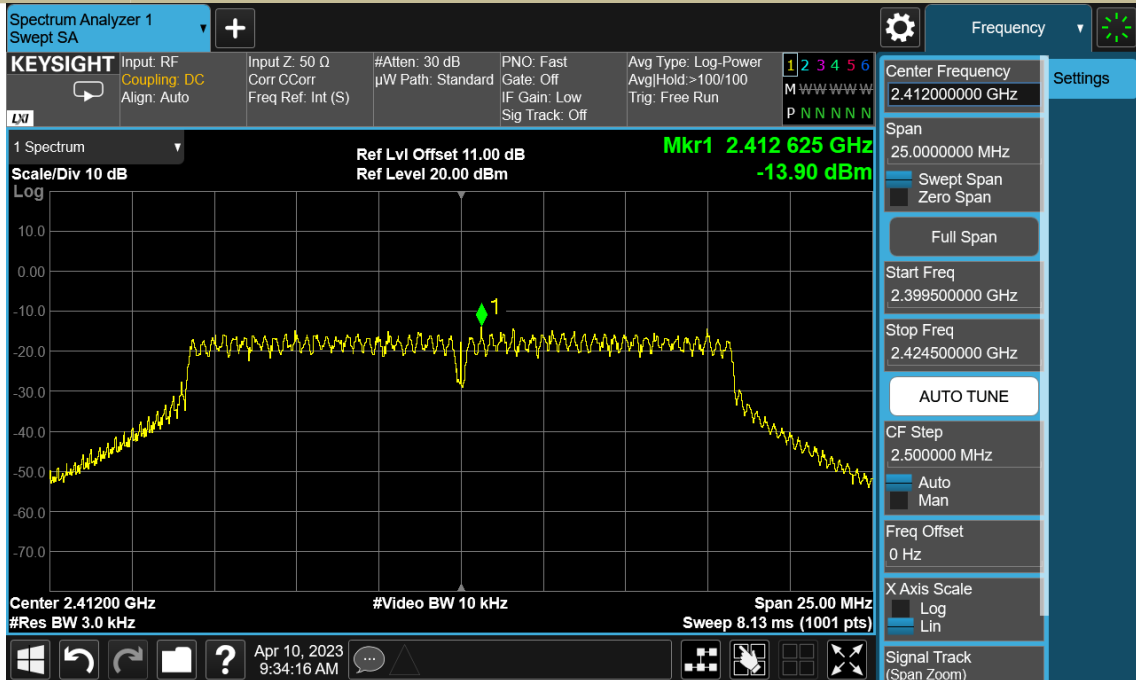
Test Model Power Spectral Density 802.11b Channel 6: 2437MHz



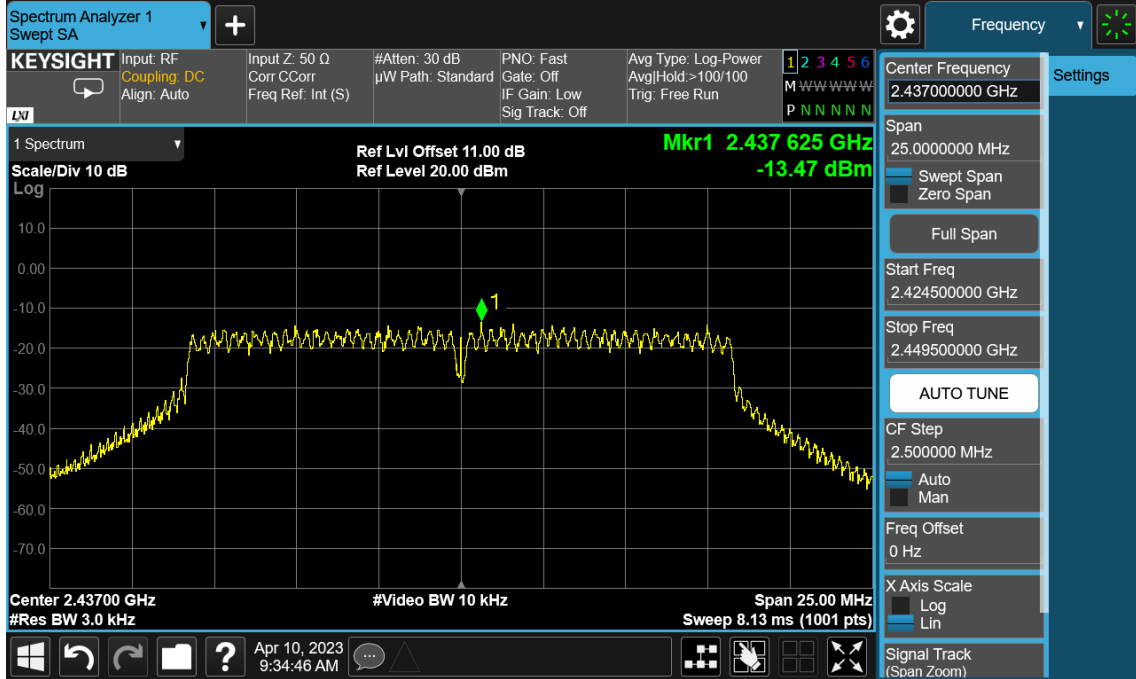
Test Model Power Spectral Density 802.11b Channel 11: 2462MHz



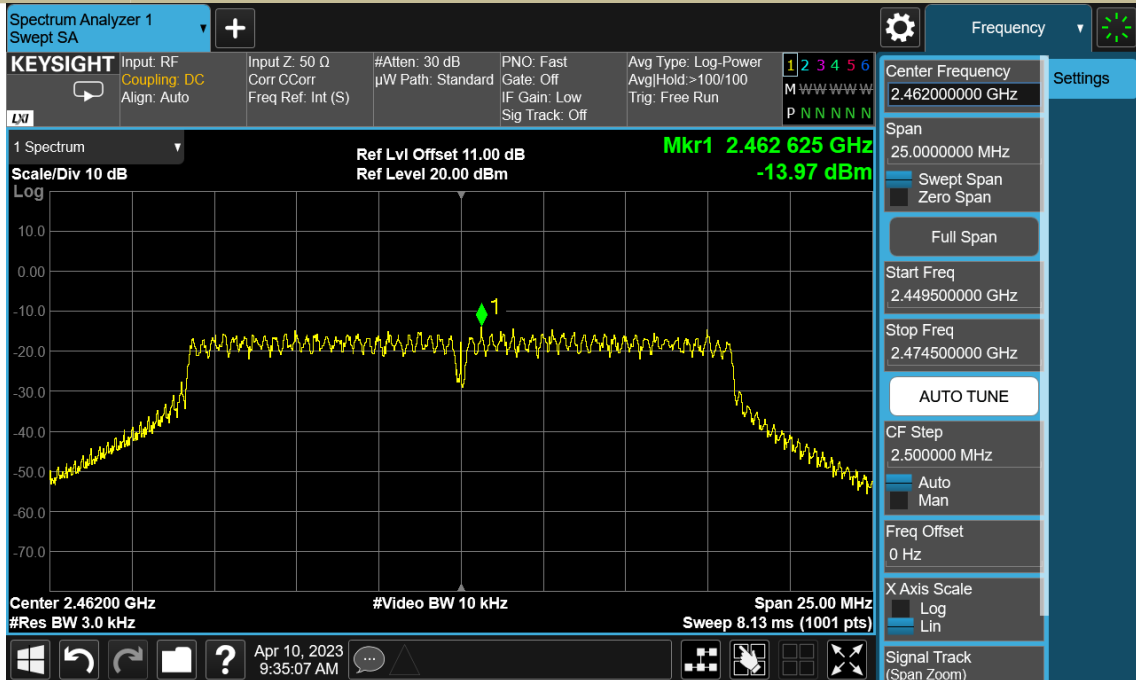
Test Model Power Spectral Density 802.11g Channel 1: 2412MHz



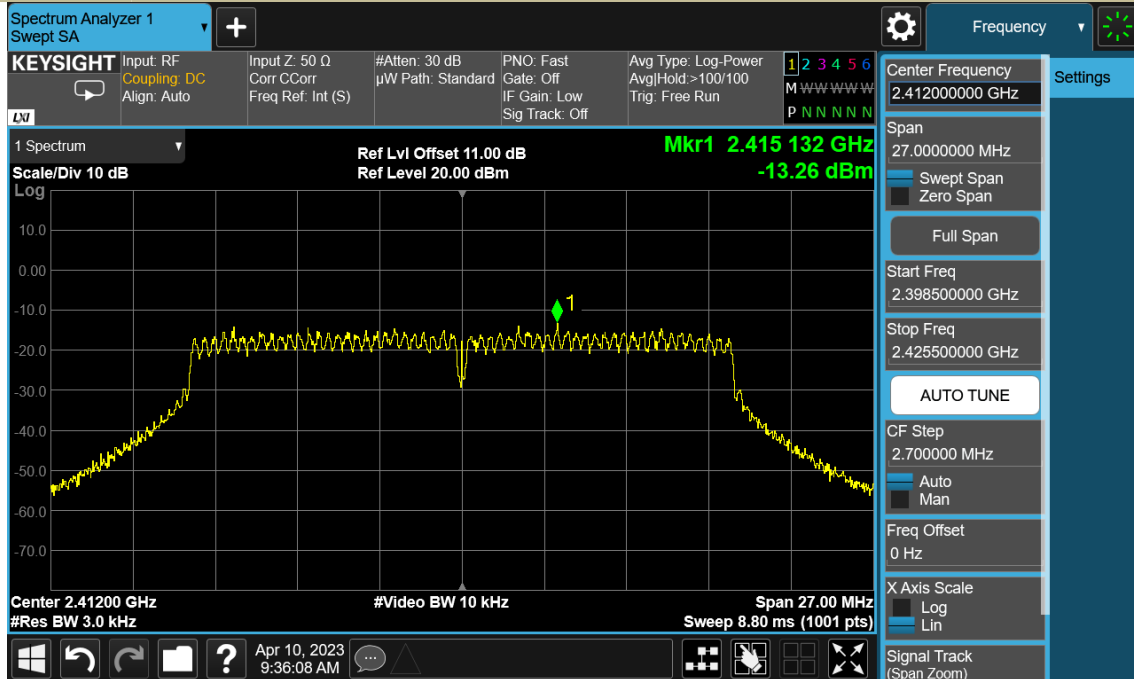
Test Model Power Spectral Density  
802.11g  
Channel 6: 2437MHz



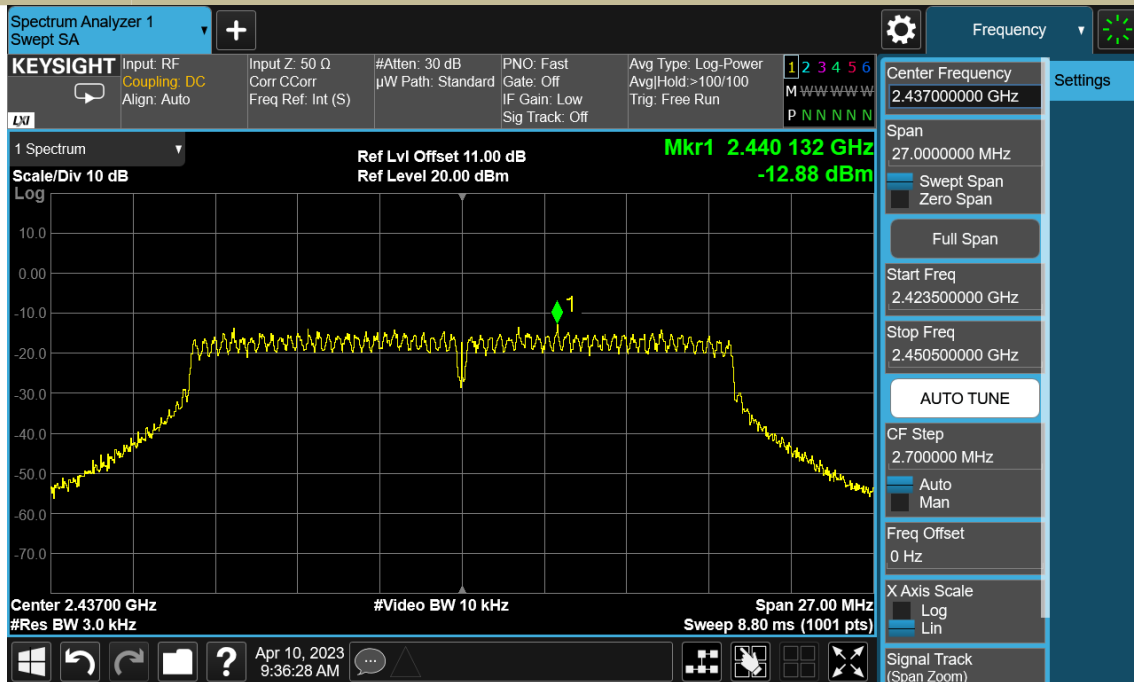
Test Model Power Spectral Density  
802.11g  
Channel 11: 2462MHz



Test Model Power Spectral Density  
802.11n (HT20)  
Channel 1: 2412MHz

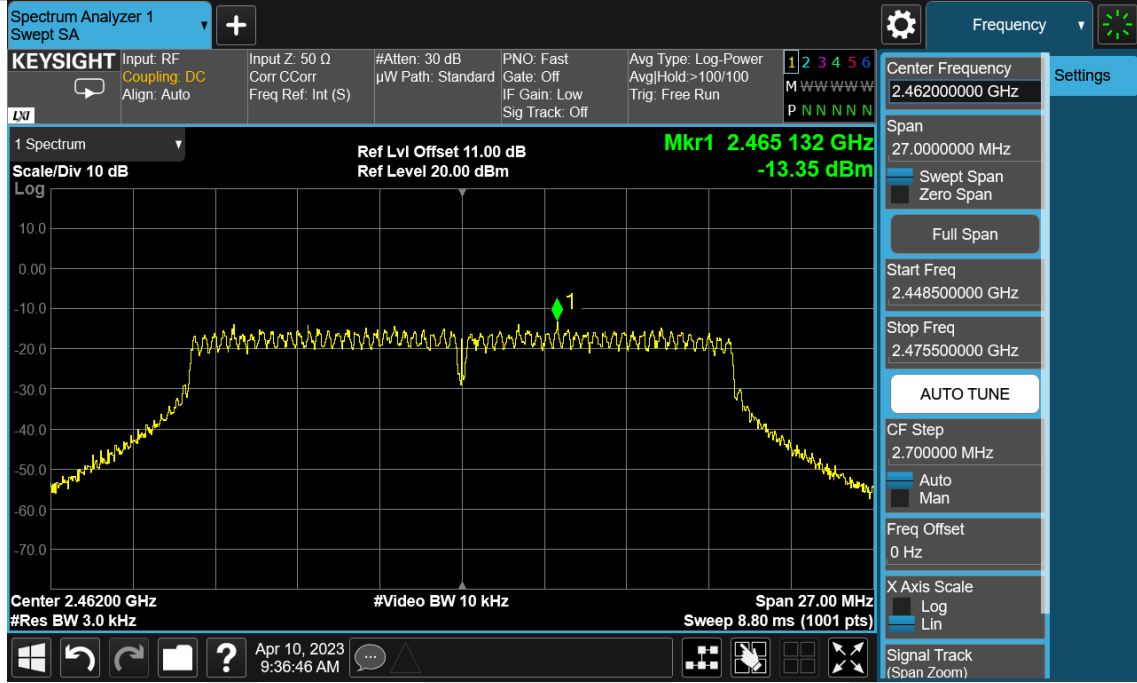


Test Model Power Spectral Density  
802.11n (HT20)  
Channel 6: 2437MHz





Test Model Power Spectral Density  
802.11n (HT20)  
Channel 11: 2462MHz



## 8.4 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

### 8.4.1 Applicable Standard

According to FCC Part15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02

### 8.4.2 Conformance Limit

According to FCC Part 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.

### 8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

### 8.4.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

#### ■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to  $\geq 1.5$  times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW  $\geq 3 \times$  RBW.

Set Detector = peak.

Set Sweep time = auto couple.

Set 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.

#### ■ Emission level measurement

Set the center frequency and span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW =300 kHz.

Set Detector = peak

Sweep time = auto couple.

Trace mode = max hold.

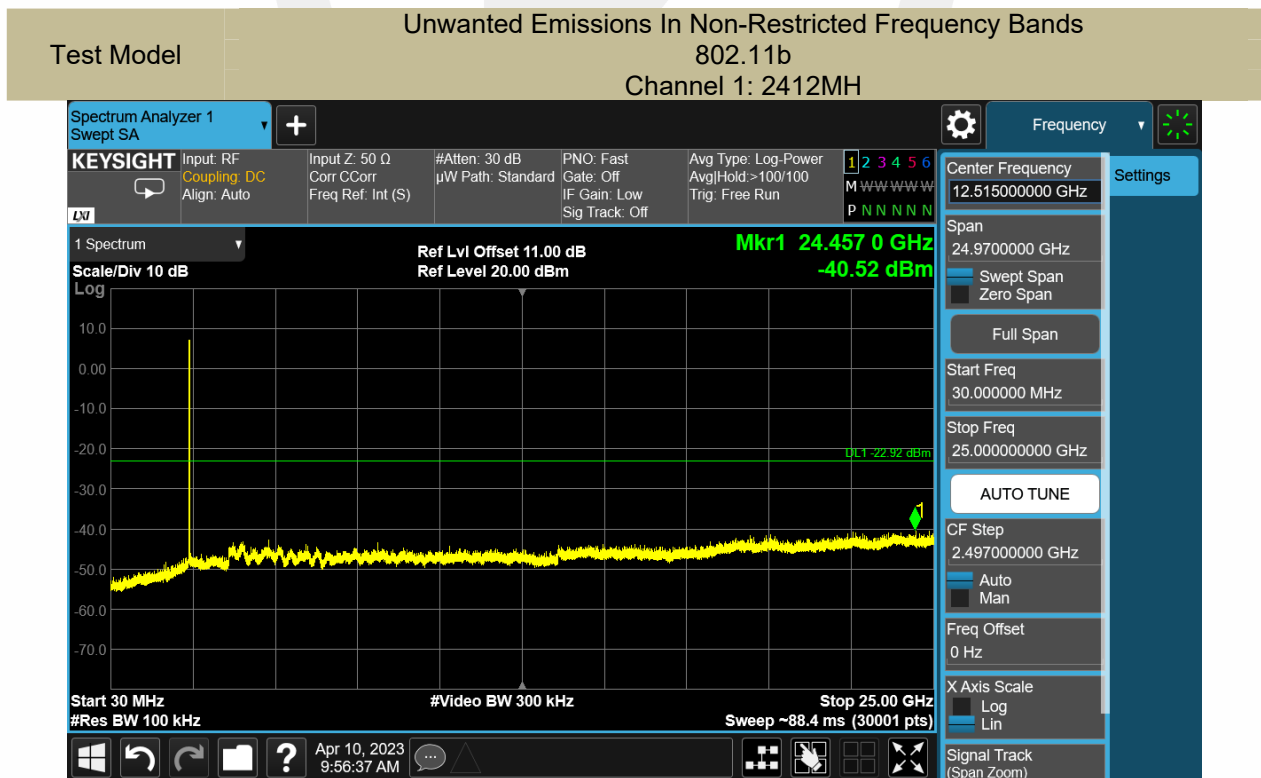
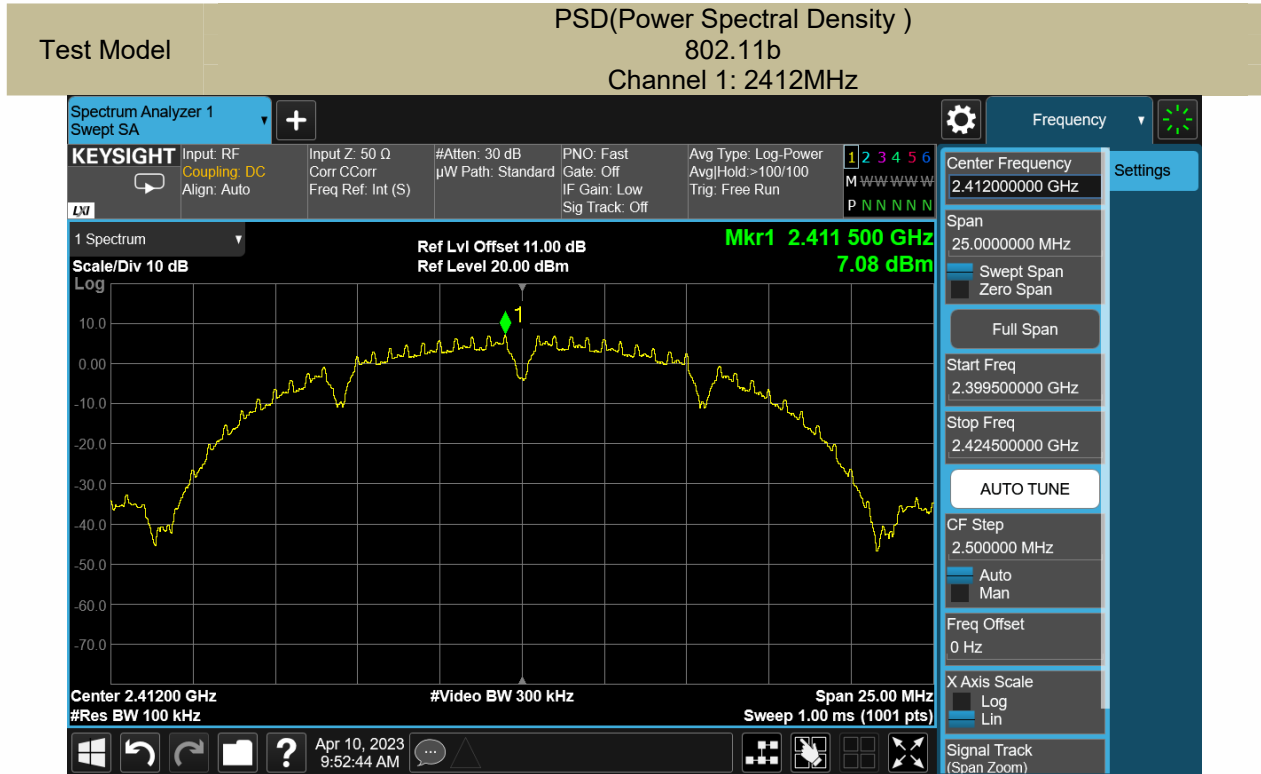
Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

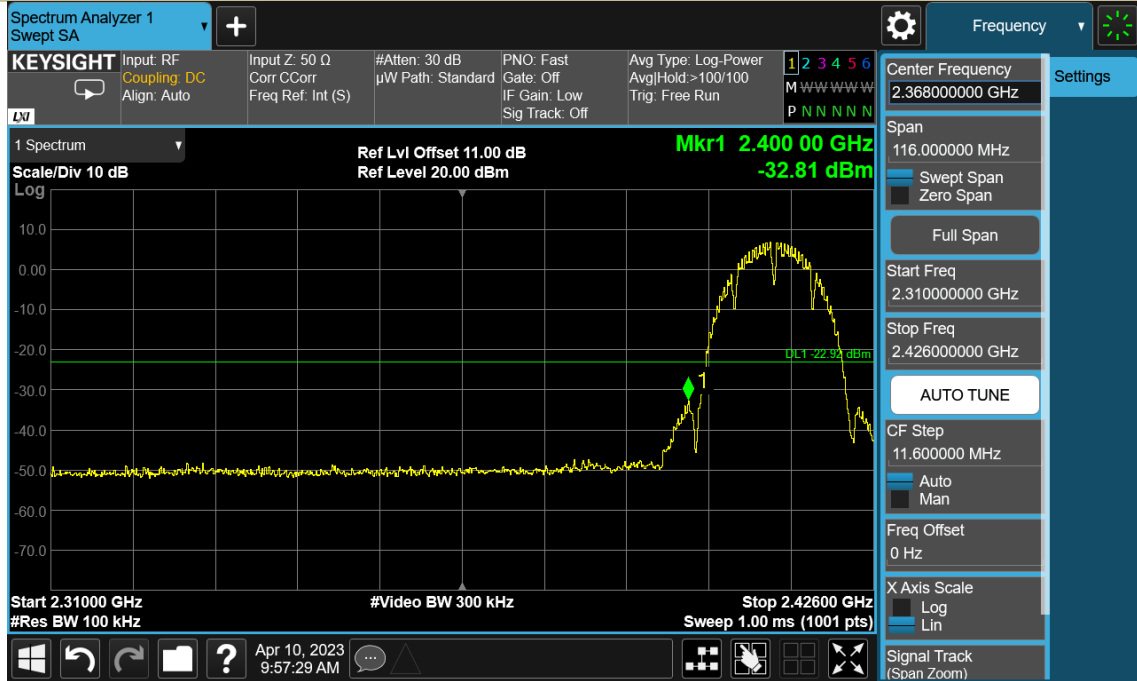
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements . Report the three highest emissions relative to the limit.

### 8.4.5 Test Results

All modes 2.4G 802.11b/g/n have been tested, and the worst result 802.11b recorded was report as below:



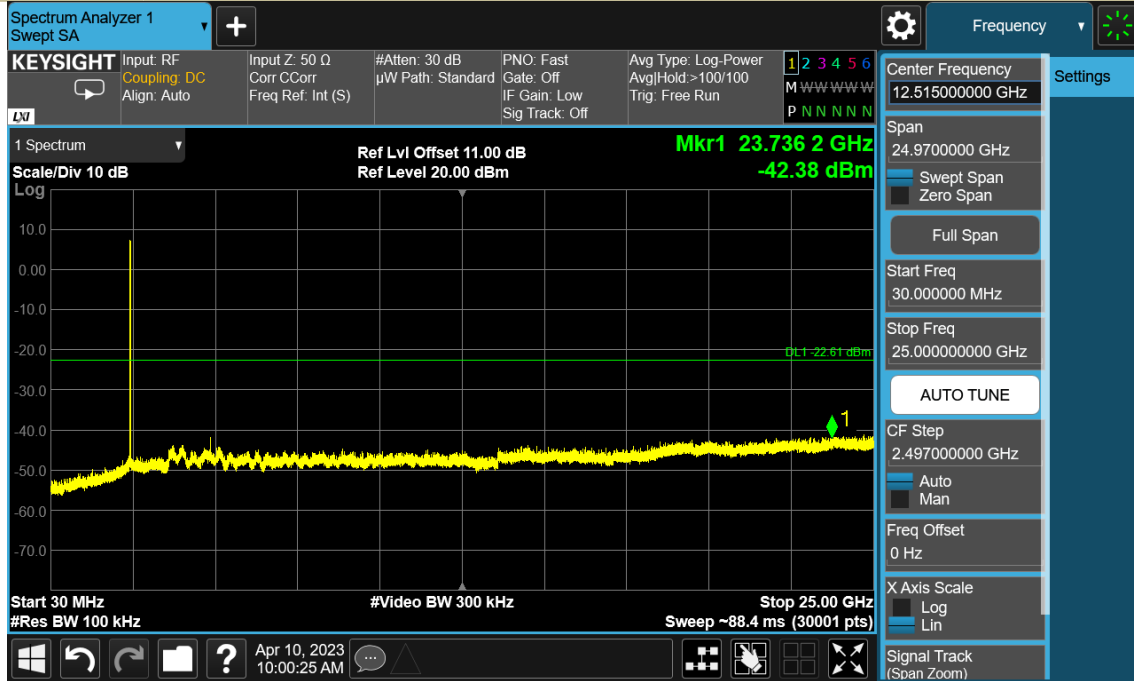
Test Model Band edge  
802.11b  
Channel 1: 2412MH



Test Model PSD(Power Spectral Density)  
802.11b  
Channel 6: 2437MHz



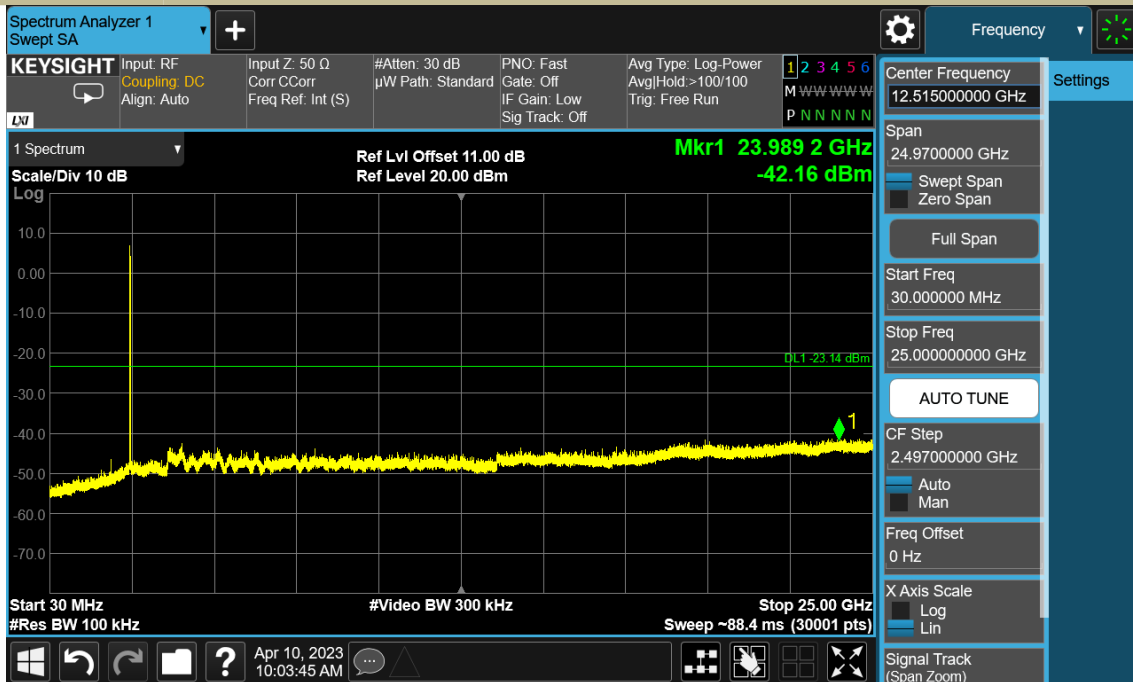
Test Model: Unwanted Emissions In Non-Restricted Frequency Bands  
802.11b  
Channel 11: 2437MH



Test Model PSD(Power Spectral Density)  
802.11b  
Channel 1: 2462MHz



Test Model Unwanted Emissions In Non-Restricted Frequency Bands  
802.11b  
Channel 1: 2462MH



Test Model Band edge  
802.11b  
Channel 1: 2462MH

