



# FCC Test Report

Test Report  
On Behalf of  
NimbleTech Digital Inc.

For

QuattroPod Lite 2 Rx

Model No.: ELMOCast D15, Lite 2 Rx, CastGo LR10, GK Cast Rx,  
EZCast Pro D15

FCC ID: 2BDGSLITE2RX

Prepared For:

NimbleTech Digital Inc.

13F-9, No. 738, Zhong Jiang Rd. , Zhong He Dist. , New Taipei City, Taiwan

Prepared By:

Shenzhen HUAKE Testing Technology Co., Ltd.

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Date of Test:

Dec. 06, 2024 ~ Dec. 17, 2024

Date of Report:

Dec. 17, 2024

Report Number:

HK2412097554-1E



## Test Result Certification

**Applicant's Name**.....: NimbleTech Digital Inc.  
**Address** .....: 13F-9, No. 738, Jhong Jiang Rd. , Jhong He Dist. , New Taipei City,  
Taiwan  
**Manufacturer's Name** .....: NimbleTech Digital Inc.  
**Address** .....: 13F-9, No. 738, Jhong Jiang Rd. , Jhong He Dist. , New Taipei City,  
Taiwan

### Product Description

**Trade Mark**.....: QuattroPod, EZCast Pro, CastGo  
**Product Name**.....: QuattroPod Lite 2 Rx  
**Model and/or Type Reference** : ELMOCast D15, Lite 2 Rx, CastGo LR10, GK Cast Rx, EZCast Pro D15  
**Standards** .....: FCC Rules and Regulations Part 15 Subpart C Section 15.247  
ANSI C63.10: 2013

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**Date of Test**.....:  
**Date (s) of Performance of Tests** .....: Dec. 06, 2024 ~ Dec. 17, 2024  
**Date of Issue**.....: Dec. 17, 2024  
**Test Result**.....: Pass

Testing Engineer :

(Len Liao)

Technical Manager :

(Sliver Wan)

Authorized Signatory :

(Jason Zhou)



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**\*\* Modified History \*\***

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Dec. 17, 2024	Jason Zhou





## 1. Test Result Summary

### 1.1 Test Procedures and Results

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203/§15.247(b)(4)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247(b)(3)	PASS
6dB Emission Bandwidth	§15.247(a)(2)	PASS
Power Spectral Density	§15.247(e)	PASS
Band Edge	§15.247(d)	PASS
Spurious Emission	§15.205/§15.209	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 1.2 Information of the Test Laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.

Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01.

FCC Designation Number is CN1229.

Canada IC CAB identifier is CN0045.

CNAS Registration Number is L9589.



### 1.3 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	$\pm 0.37\text{dB}$
2	RF Power, Conducted	$\pm 3.35\text{dB}$
3	Spurious Emissions, Conducted	$\pm 2.20\text{dB}$
4	All Emissions, Radiated(<1G)	$\pm 3.90\text{dB}$
5	All Emissions, Radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^{\circ}\text{C}$
7	Humidity	$\pm 1.0\%$



## 2. EUT Description

### 2.1 General Description of EUT

Equipment:	QuattroPod Lite 2 Rx
Model Name:	ELMOCast D15
Series Model:	Lite 2 Rx, CastGo LR10, GK Cast Rx, EZCast Pro D15
Model Difference:	All model's the function, software and electric circuit are the same, only with product model named different. Test sample model: ELMOCast D15.
Trade Mark:	QuattroPod, EZCast Pro, CastGo
FCC ID:	2BDGSLITE2RX
Antenna Type:	PCB antenna
Antenna Gain:	Antenna 1: 1.0dBi Antenna 2: 1.0dBi MIMO: 4.01dBi
Operation Frequency:	802.11b/g/n(HT20): 2412~2462MHz 802.11n(HT40): 2422~2452MHz
Number of Channels:	802.11b/g/n(HT20): 11CH 802.11n(HT40): 7CH
Modulation Type:	DSSS, OFDM
Power Source:	DC5V from adapter with AC100-240V, 50/60Hz, 0.3A
Power Rating:	DC5V from adapter with AC100-240V, 50/60Hz, 0.3A
Hardware Version	V4.0
Software Version:	V4.0

**Note:**

1. The EUT incorporates a MIMO function. Physically, it provides two completed transmitters and receivers(2T2R), two transmit signals are completely correlated, then, Direction gain=GANT + Array Gain(Array Gain=10 log(2) dB for power spectral density; A rray Gain=0 for power measurement)
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. Antenna gain Refer to the antenna specifications.
4. The cable loss data is obtained from the supplier.
5. The test results in the report only apply to the tested sample.



## 2.2 Carrier Frequency of Channels

Channel List for 802.11b/ 802.11g/ 802.11n (HT20)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List for 802.11n (HT40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
--	--	04	2427	07	2442	--	--
--	--	05	2432	08	2447	--	--
03	2422	06	2437	09	2452		

### Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

## 2.3 Operation of EUT during Testing

### Operating Mode

**The mode is used: Transmitting mode for 802.11b/802.11g/802.11n(HT20)**

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

**The mode is used: Transmitting mode for 802.11n (HT40)**

Low Channel: 2422MHz

Middle Channel: 2437MHz

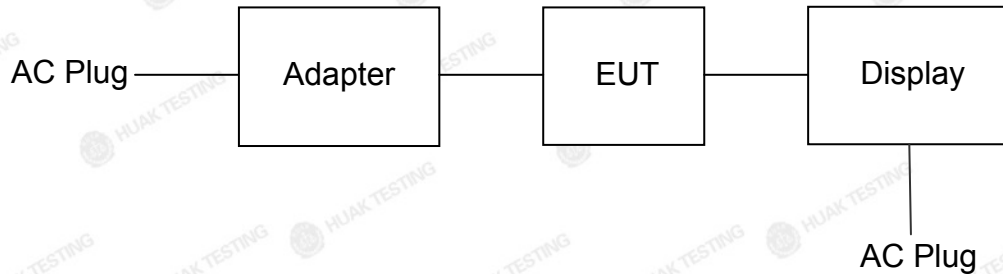
High Channel: 2452MHz





## 2.4 Description of Test Setup

Operation of EUT during Conducted and Radiation testing:



The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position.



## 2.5 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Trade Mark	Model/Type No.	Specification	Remark
1	QuattroPod Lite 2 Rx	QuattroPod, EZCast Pro, CastGo	ELMOCast D15	N/A	EUT
2	Adapter	N/A	ICP12-050-2000B	Input: AC100-240V, 50/60Hz, 0.3A Output: DC5.0V, 2.0A 10.0W	Accessory
3	USB Cable	N/A	N/A	Length: 100cm	Accessory
4	HDMI Cable	N/A	N/A	Length: 20cm	Accessory
5	Display	PHILIPS	N/A	N/A	Peripheral

### Note:

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. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.



### 3. General Information

#### 3.1 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering Mode:	Keep the EUT in continuous transmitting by select channel and modulations
<p>The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. For the full battery state and The output power to the maximum state.</p>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

**Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.**

Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(HT20)/ax (HT20)	6.5Mbps
802.11n(HT40)/ax (HT40)	13.5Mbps

#### Final Test Mode:

Operation Mode:	Keep the EUT in continuous transmitting with modulation
-----------------	---

1. For WIFI function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

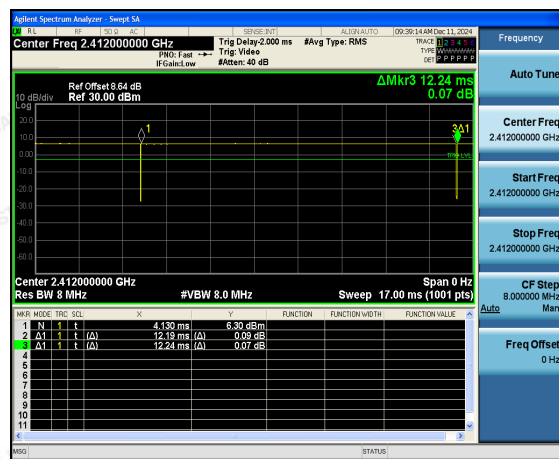
2. According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup” 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(HT20)/ax (HT20), 13.5Mbps for 802.11n(HT40)/ax (HT40).

### 3. Mode Test Duty Cycle

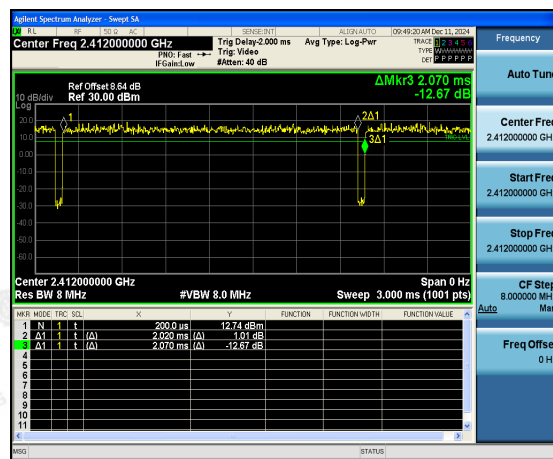
ANT.1:

Mode	Duty Cycle	Duty Cycle Factor (dB)
802.11b	0.996	-0.018
802.11g	0.976	-0.106
802.11n(HT20)	0.974	-0.113
802.11n(HT40)	0.949	-0.227

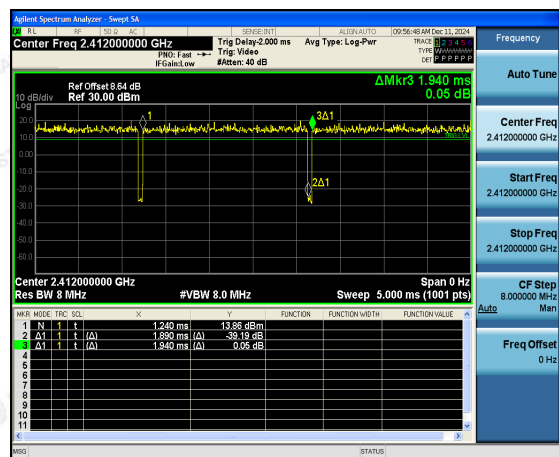
## 802.11b



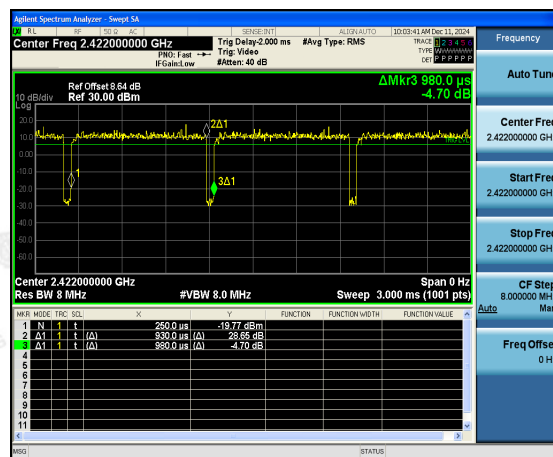
**802.11g**



## 802.11n(HT20)



## 802.11n(HT40)



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

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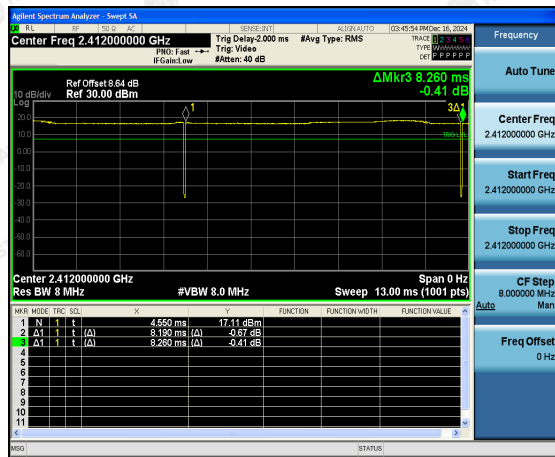




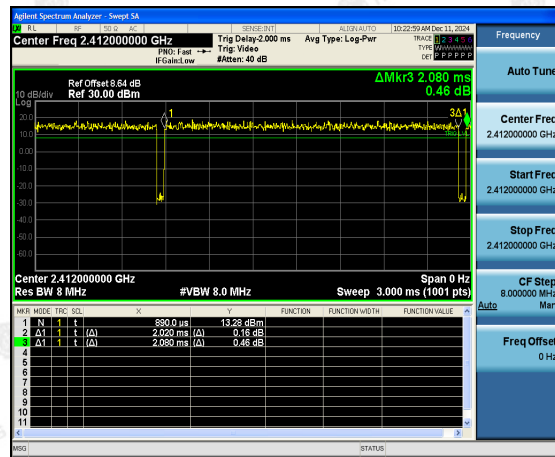
## ANT.2:

Mode	Duty Cycle	Duty Cycle Factor (dB)
802.11b	0.992	-0.037
802.11g	0.971	-0.127
802.11n(HT20)	0.974	-0.113
802.11n(HT40)	0.949	-0.227

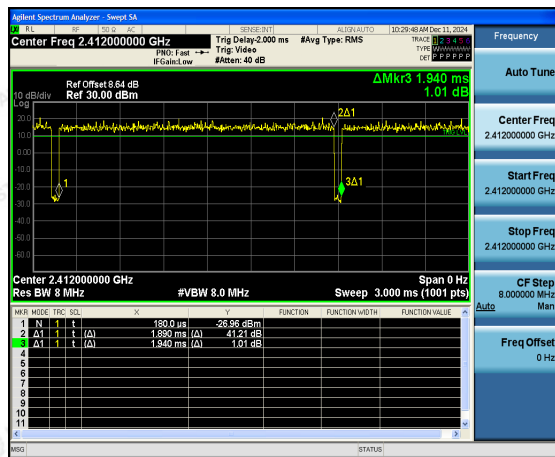
## 802.11b



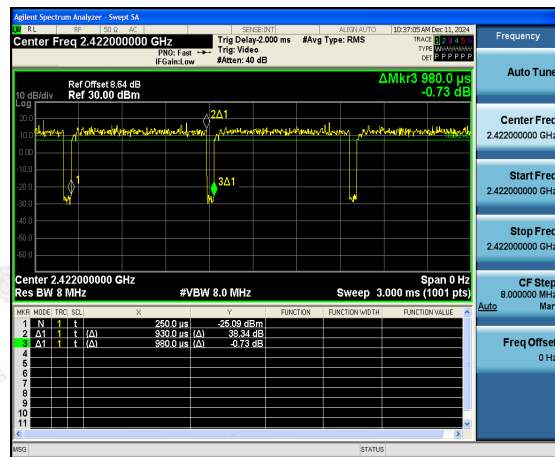
## 802.11g



## 802.11n(HT20)



## 802.11n(HT40)





## 4. Test Results and Measurement Data

### 4.1 Conducted Emission

#### 4.1.1 Test Specification

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver Setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test Setup:	<div><p>Reference Plane</p><p>40cm</p><p>80cm</p><p>E.U.T</p><p>AC power</p><p>LISN</p><p>Filter</p><p>AC power</p><p>EMI Receiver</p><p>Test table/Insulation plane</p><p>Remark E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p></div>														
Test Mode:	Charging + transmitting with modulation														
Test Procedure:	<div><div>1. The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</div></div>														
Test Result:	PASS														



#### 4.1.2 Test Instruments

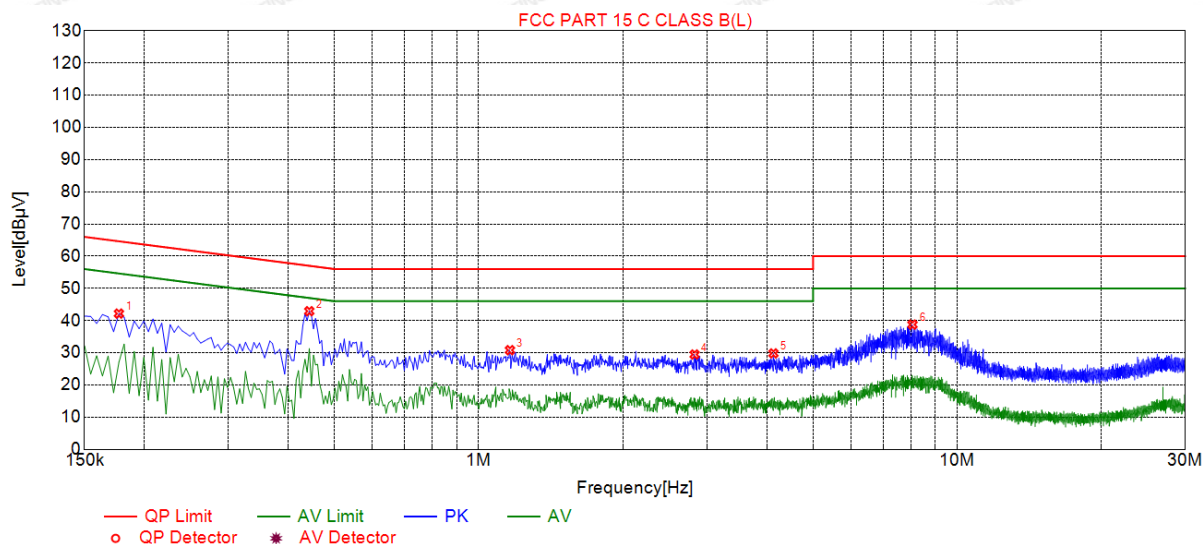
Conducted Emission Shielding Room Test Site (843)					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	R&S	ESR	HKE-005	Feb. 20, 2024	Feb. 19, 2025
LISN	R&S	ENV216	HKE-002	Feb. 20, 2024	Feb. 19, 2025
LISN	R&S	ENV216	HKE-059	Feb. 20, 2024	Feb. 19, 2025
Coax cable (9KHz-30MHz)	Times	381806-0 02	N/A	Feb. 20, 2024	Feb. 19, 2025
EMI Test Software	Tonscend	JS32-CE 2.5.0.6	HKE-081	N/A	N/A
10dB Attenuator	Schwarzbeck	VTSD956 1F	HKE-153	Feb. 20, 2024	Feb. 19, 2025

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### 4.1.3 Test data

Test Specification: Line



### Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1770	42.17	19.85	64.63	22.46	22.32	PK	L
2	0.4425	42.92	19.85	57.01	14.09	23.07	PK	L
3	1.1625	30.81	19.90	56.00	25.19	10.91	PK	L
4	2.8275	29.47	20.04	56.00	26.53	9.43	PK	L
5	4.1325	29.81	20.09	56.00	26.19	9.72	PK	L
6	8.0700	38.75	20.02	60.00	21.25	18.73	PK	L

Remark: Margin = Limit – Level

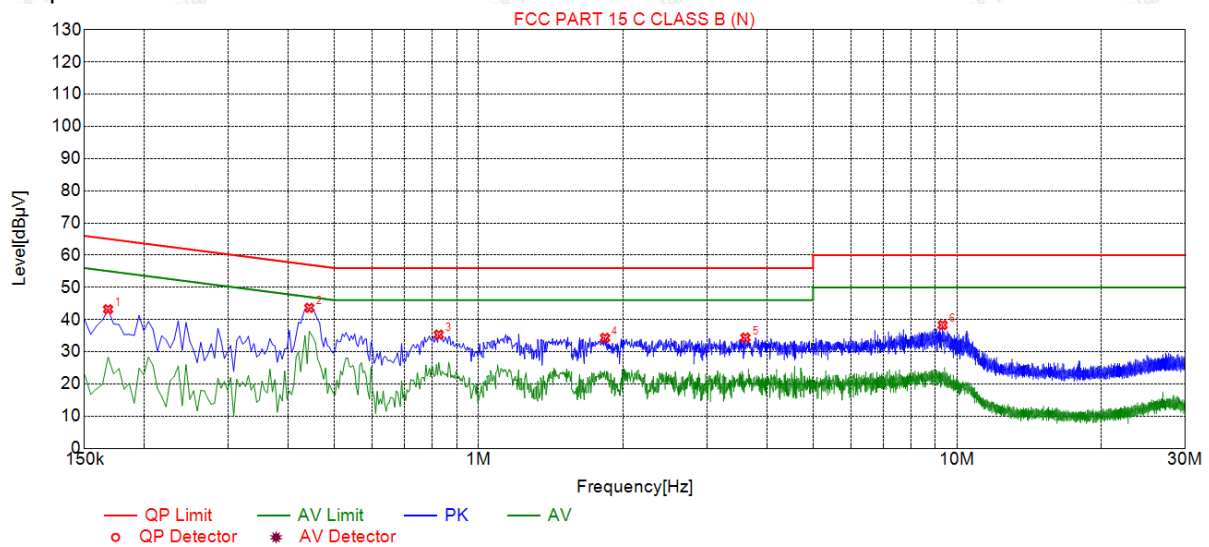
Correction factor = Cable lose + ISN insertion loss

Level=Test receiver reading + correction factor





## Test Specification: Neutral



## Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1680	43.19	19.71	65.06	21.87	23.48	PK	N
2	0.4425	43.64	19.74	57.01	13.37	23.90	PK	N
3	0.8250	35.31	19.74	56.00	20.69	15.57	PK	N
4	1.8375	34.31	19.83	56.00	21.69	14.48	PK	N
5	3.6105	34.38	19.97	56.00	21.62	14.41	PK	N
6	9.3300	38.29	19.90	60.00	21.71	18.39	PK	N

Remark:  $\text{Margin} = \text{Limit} - \text{Level}$ 

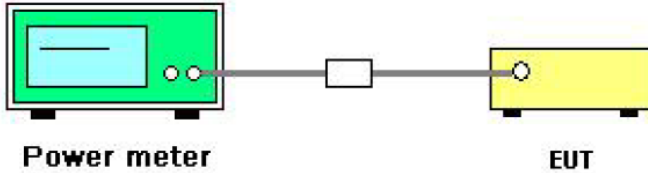
Correction factor = Cable lose + ISN insertion loss

Level = Test receiver reading + correction factor



## 4.2 Maximum Conducted Output Power

### 4.2.1 Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02
Limit:	30dBm
Test Setup:	 <p>The diagram illustrates the test setup. On the left is a green box labeled 'Power meter'. A cable connects it to a small white box labeled 'Attenuator'. Another cable connects the attenuator to a yellow box labeled 'EUT' (Equipment Under Test).</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"><li>1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 15.247 Meas Guidance v05r02.</li><li>2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li><li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>4. Measure the Peak output power and record the results in the test report.</li></ol>
Test Result:	PASS

### 4.2.2 Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
Power meter	Agilent	E4419B	HKE-085	Feb. 20, 2024	Feb. 19, 2025
Power Sensor	Agilent	E9300A	HKE-086	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### 4.2.3 Test Data


Mode	Test channel	Frequency (MHz)	Reading Conducted Output Power (dBm)			Limit (dBm)	Result
			Antenna port 1	Antenna port 2	MIMO		
802.11b	CH01	2412	12.73	14.24		30	PASS
802.11b	CH06	2437	13.28	13.35		30	PASS
802.11b	CH11	2462	13.46	13.78		30	PASS
802.11g	CH01	2412	12.20	13.33		30	PASS
802.11g	CH06	2437	12.57	13.27		30	PASS
802.11g	CH11	2462	12.82	13.53		30	PASS
802.11n(HT20)	CH01	2412	12.07	14.66	16.57	30	PASS
802.11n(HT20)	CH06	2437	13.48	13.03	16.27	30	PASS
802.11n(HT20)	CH11	2462	13.13	13.45	16.30	30	PASS
802.11n(HT40)	CH03	2422	11.74	13.06	15.46	30	PASS
802.11n(HT40)	CH06	2437	11.86	13.20	15.59	30	PASS
802.11n(HT40)	CH09	2452	11.96	13.40	15.75	30	PASS

Note: 1.The test results including the cable lose.  
2. This product supports antenna 1 and antenna 2 launch, but only support 802.11n for MIMO mode, not support 802.11 b and 802.11 g for MIMO mode.



### 4.3 Emission Bandwidth

#### 4.3.1 Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02
Limit:	>500kHz
Test Setup:	 <p>Spectrum Analyzer                      EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"><li>1. The testing follows FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02.</li><li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.</li><li>4. Measure and record the results in the test report.</li></ol>
Test Result:	PASS

#### 4.3.2 Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).





### 4.3.3 Test Data

#### For antenna port 1

Test channel	6dB Emission Bandwidth (MHz)			
	802.11b	802.11g	802.11n (HT20)	802.11n (HT40)
Lowest	9.560	16.360	17.280	35.680
Middle	8.600	16.280	17.560	35.840
Highest	8.560	16.360	16.960	35.840
Limit:	>500KHz			
Test Result:	PASS			

Test plots as follows:

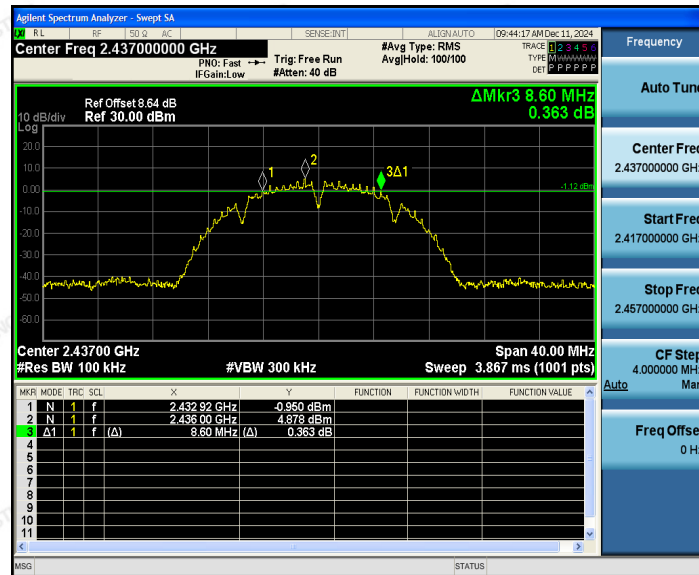


## 802.11b Modulation

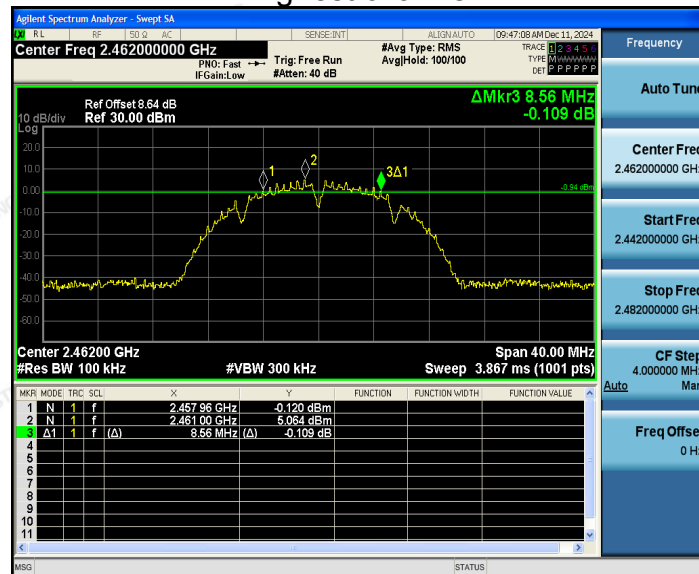
## Lowest channel



## Middle channel



## Highest channel



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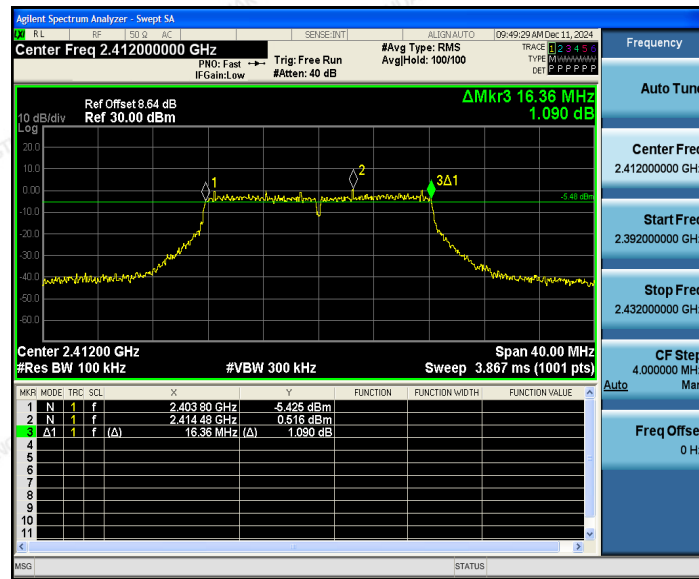
TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : [service@cer-mark.com](mailto:service@cer-mark.com)

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

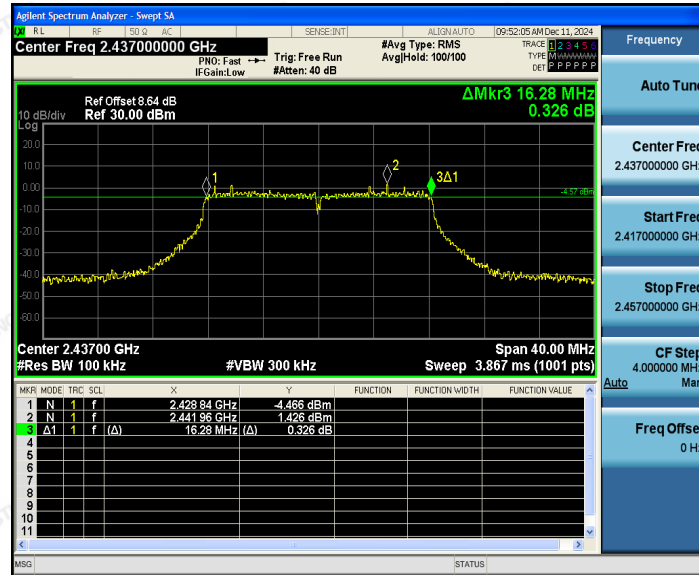


## 802.11g Modulation

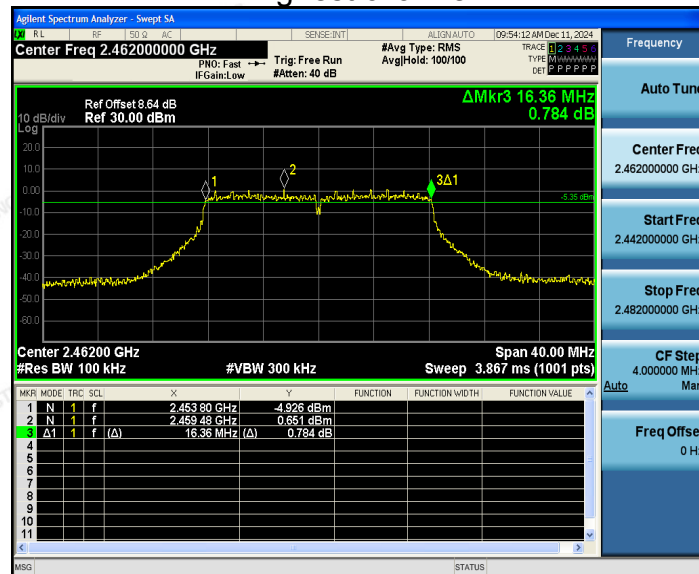
## Lowest channel



## Middle channel



## Highest channel



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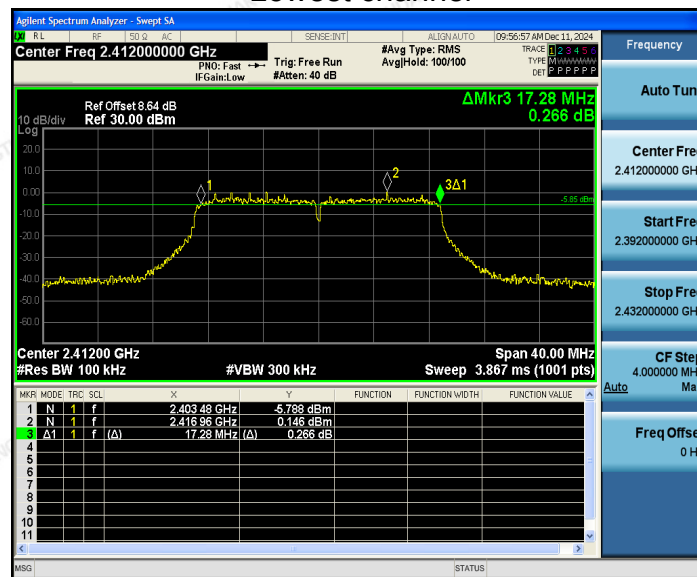
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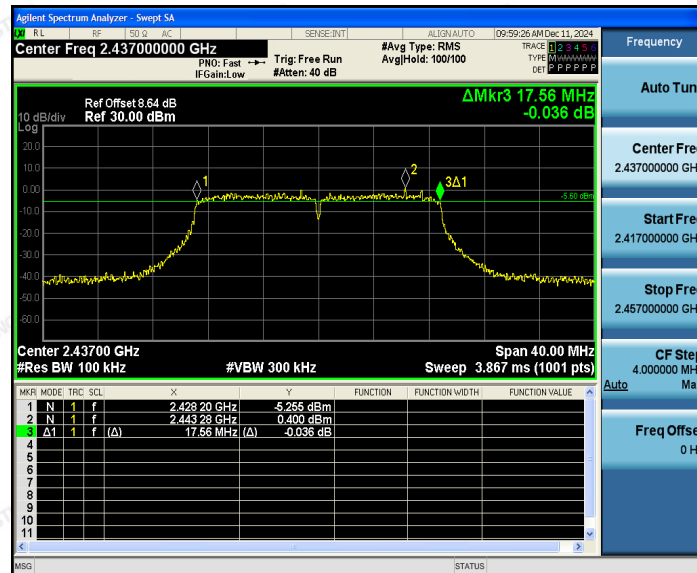


## 802.11n (HT20) Modulation

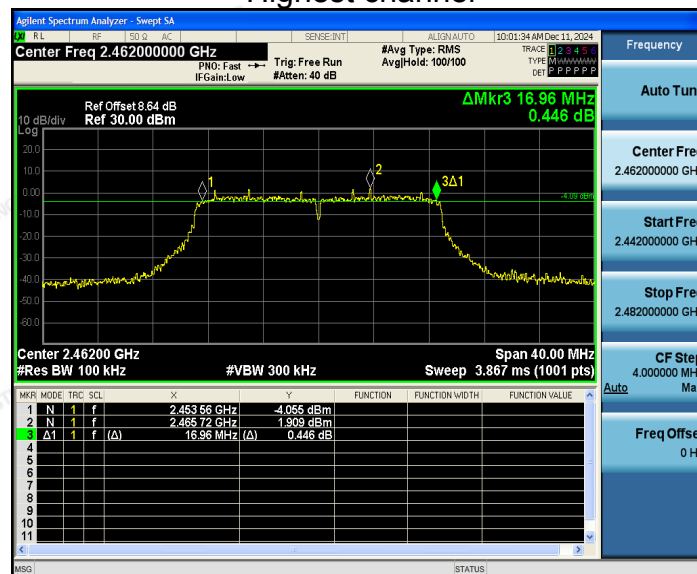
## Lowest channel



## Middle channel



## Highest channel



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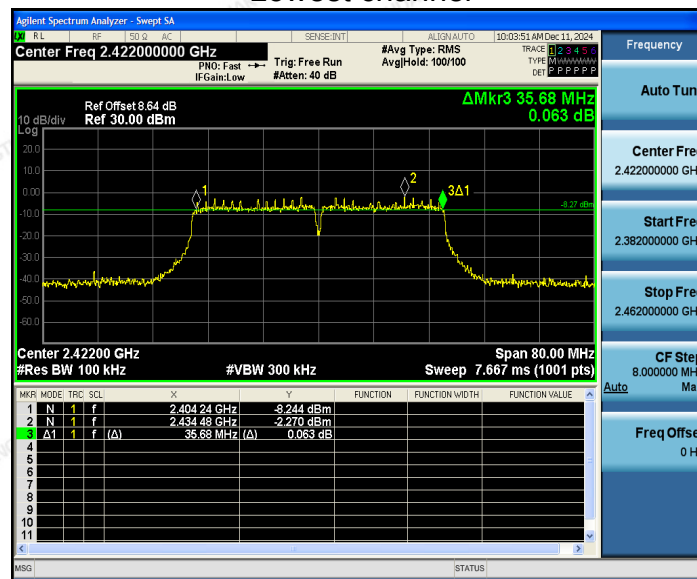
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



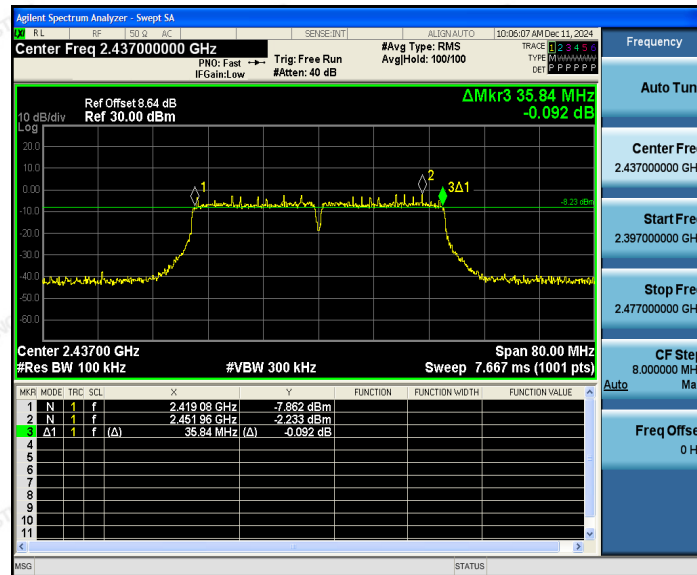


## 802.11n (HT40) Modulation

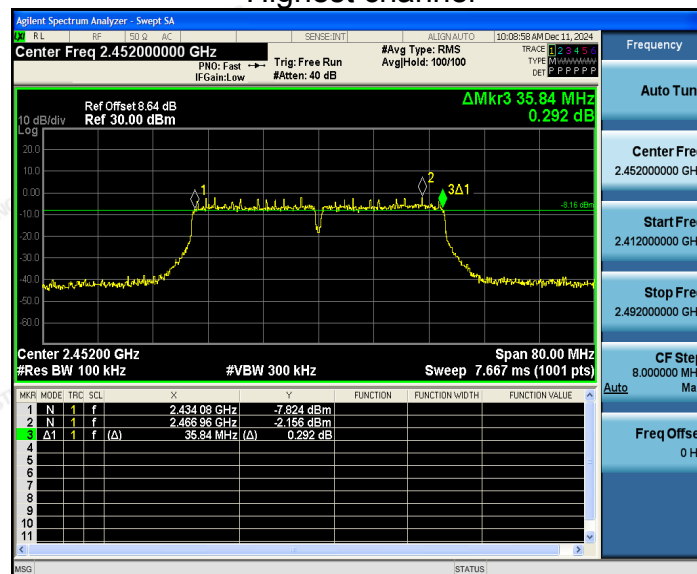
## Lowest channel



## Middle channel



## Highest channel



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**For antenna port 2**

Test channel	6dB Emission Bandwidth (MHz)			
	802.11b	802.11g	802.11n (HT20)	802.11n (HT40)
Lowest	9.080	16.320	17.280	35.520
Middle	8.520	16.360	17.080	35.760
Highest	9.040	16.320	17.520	36.000
Limit:	>500KHz			
Test Result:	PASS			

**Test plots as follows:**

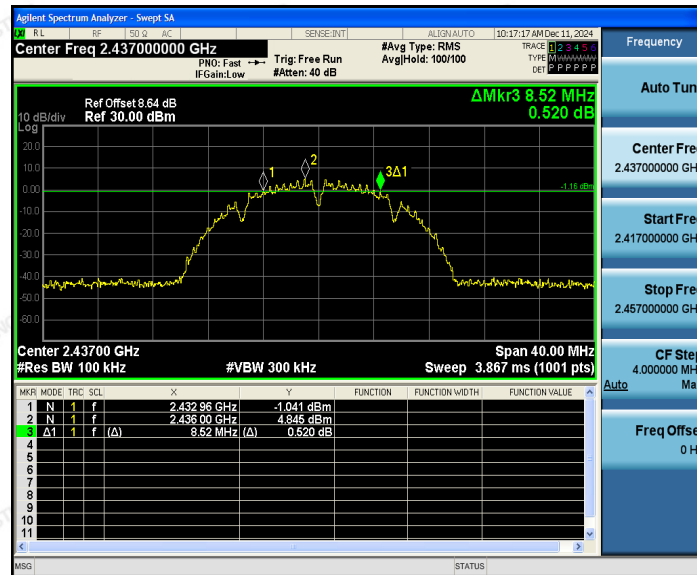


## 802.11b Modulation

## Lowest channel



## Middle channel



## Highest channel



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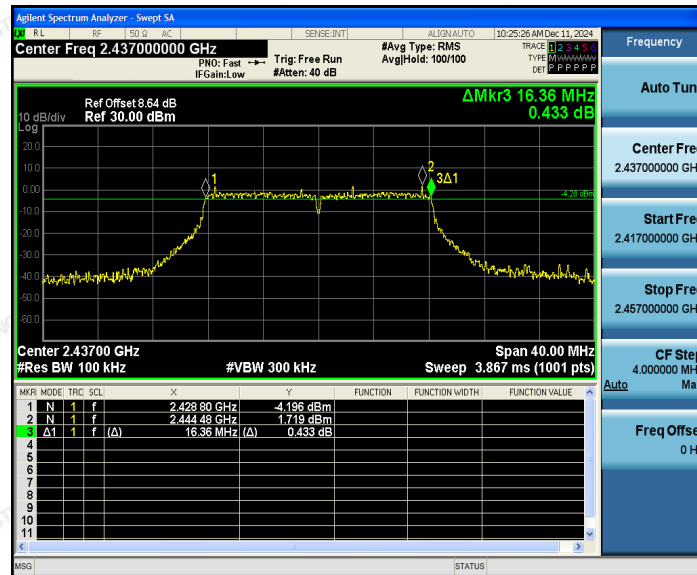


## 802.11g Modulation

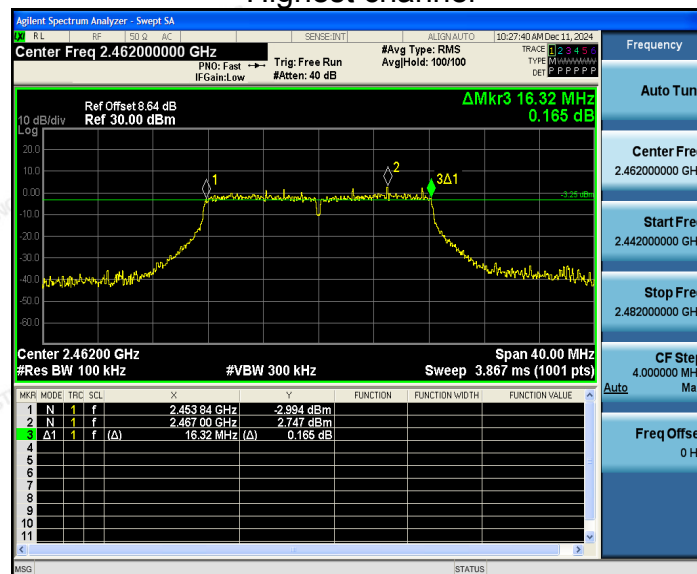
## Lowest channel



## Middle channel



## Highest channel



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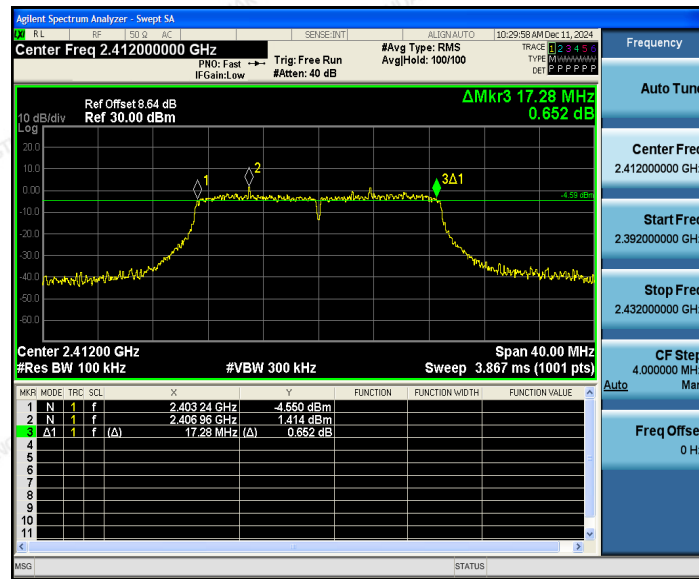
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



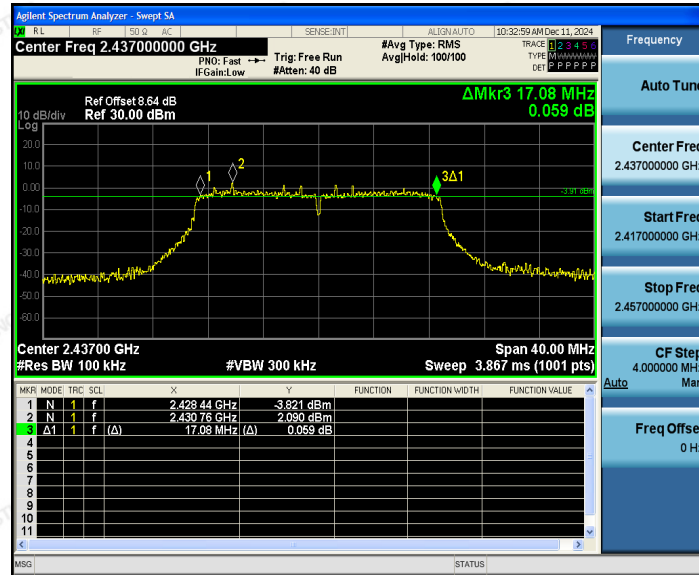


## 802.11n (HT20) Modulation

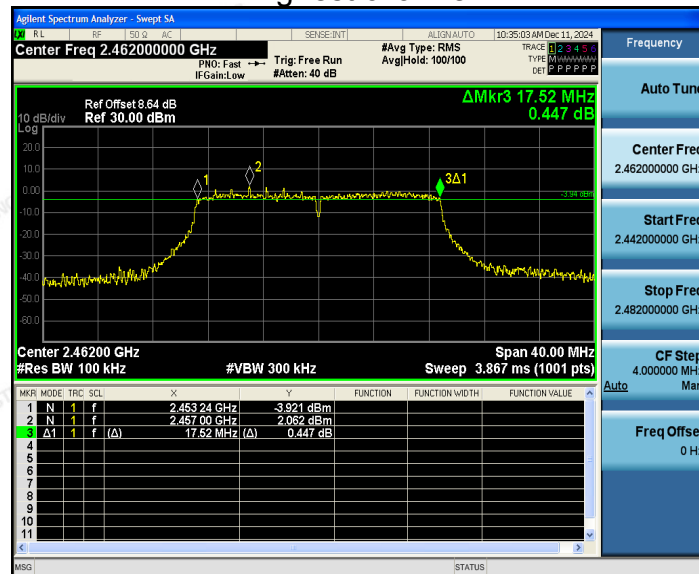
## Lowest channel



## Middle channel



## Highest channel



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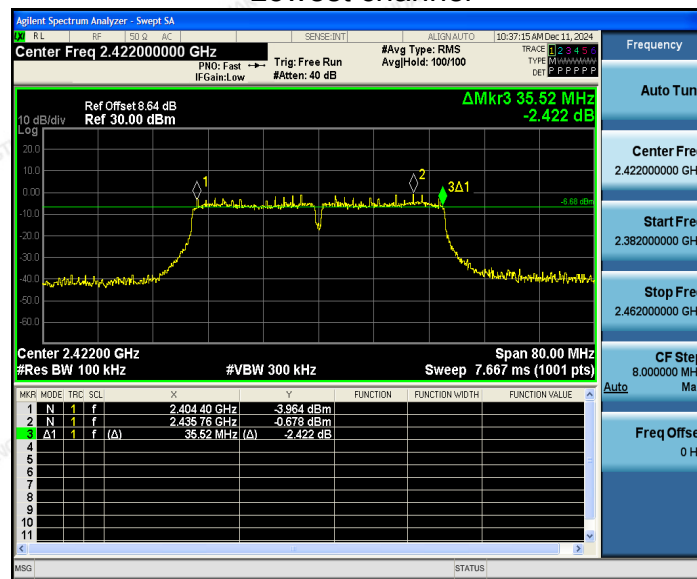
TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : [service@cer-mark.com](mailto:service@cer-mark.com)

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

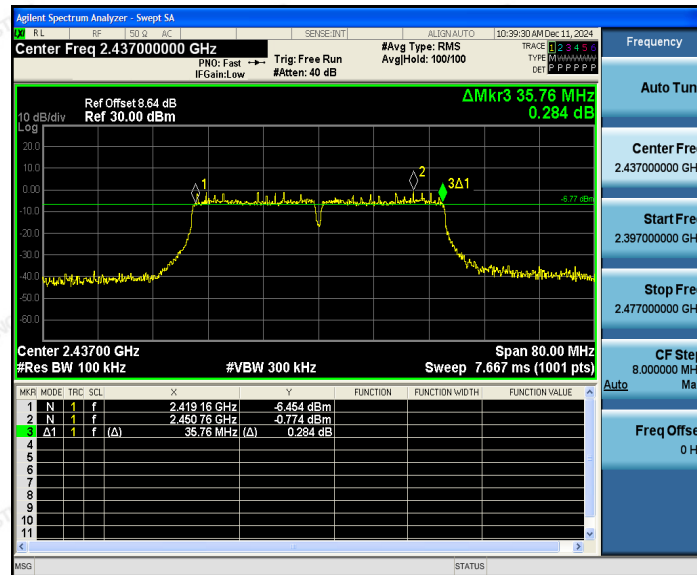


## 802.11n (HT40) Modulation

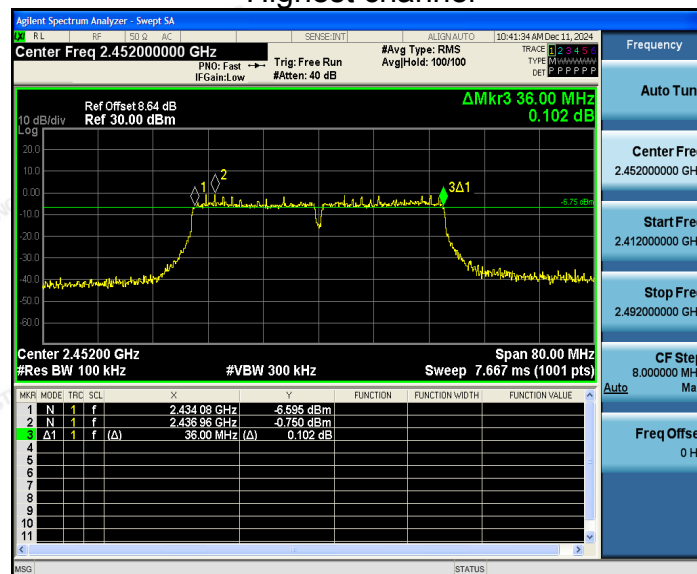
## Lowest channel



## Middle channel



## Highest channel



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## 4.4 Power Spectral Density

### 4.4.1 Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (e)
<b>Test Method:</b>	KDB 558074 D01 15.247 Meas Guidance v05r02
<b>Limit:</b>	The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
<b>Test Setup:</b>	<div><p>The diagram illustrates the test setup. On the left is a green Spectrum Analyzer. A cable connects it to a small white rectangular attenuator. Another cable connects the attenuator to a yellow rectangular Equipment Under Test (EUT) on the right.</p></div>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"><li>1. The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02.</li><li>2. 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.</li><li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): <math>3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}</math>. Video bandwidth <math>\text{VBW} \geq 3 \times \text{RBW}</math>. Set the span to at least 1.5 times the OBW.</li><li>5. Detector = Peak, Sweep time = auto couple.</li><li>6. Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.</li><li>7. Measure and record the results in the test report.</li></ol>
<b>Test Result:</b>	PASS



#### 4.4.2 Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).





#### 4.4.3 Test Data

##### For antenna port 1

EUT Set Mode	Channel	Test Result (dBm/30kHz)	Result (dBm/3kHz)
802.11b	Lowest	3.73	-6.27
	Middle	1.34	-8.66
	Highest	3.72	-6.28
802.11g	Lowest	-3.72	-13.72
	Middle	-3.69	-13.69
	Highest	-2.55	-12.55
802.11n(HT20)	Lowest	-3.49	-13.49
	Middle	-3.27	-13.27
	Highest	-2.69	-12.69
802.11n(HT40)	Lowest	-5.34	-15.34
	Middle	-5.10	-15.10
	Highest	-5.43	-15.43
PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10			
Limit: 8dBm/3kHz			
Test Result:	PASS		

Test plots as follows:



## 802.11b Modulation

## Lowest channel



## Middle channel



## Highest channel



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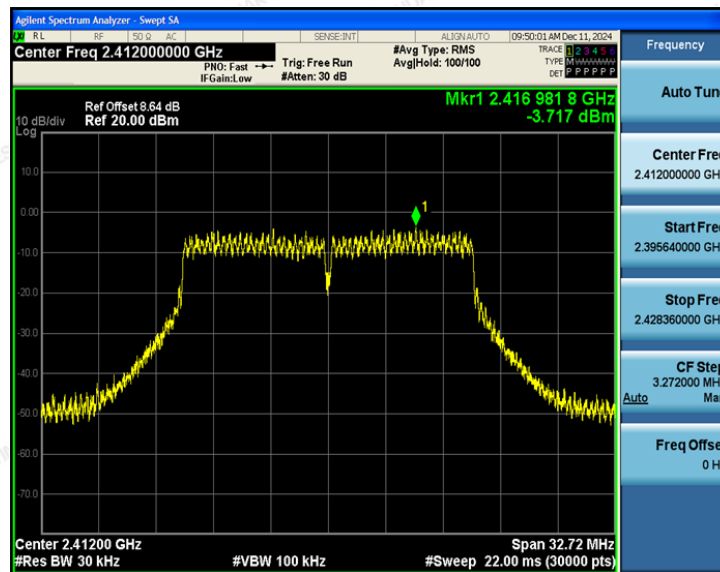
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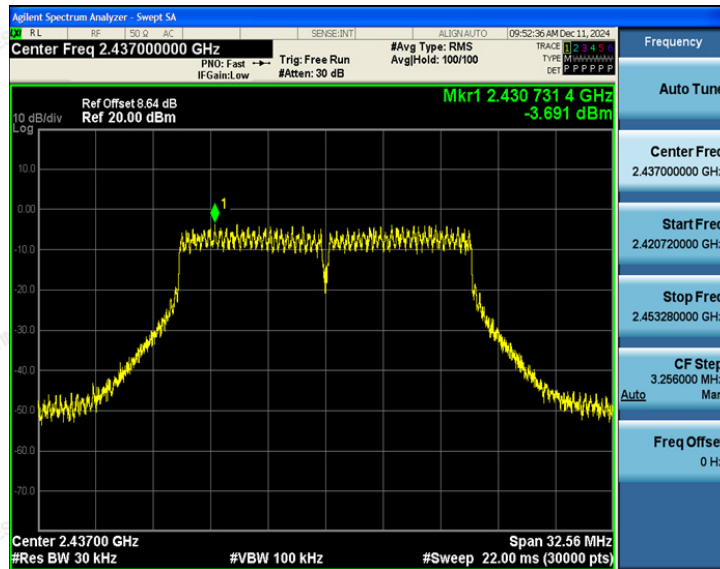


## 802.11g Modulation

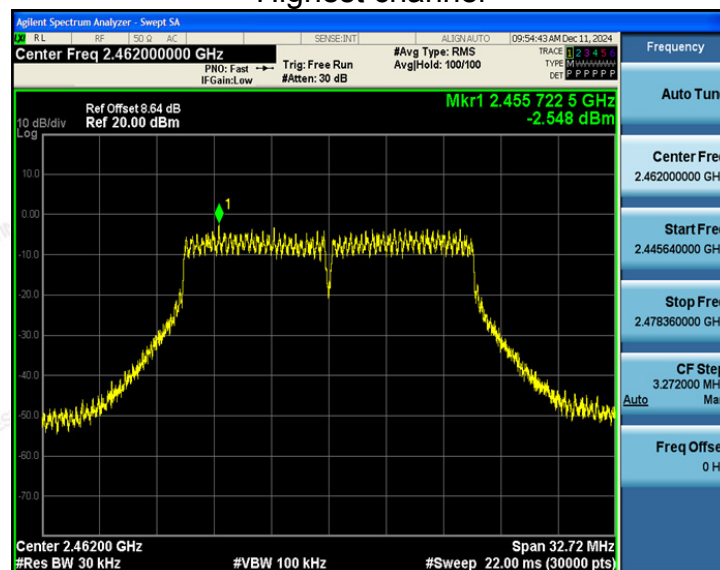
## Lowest channel



## Middle channel



## Highest channel



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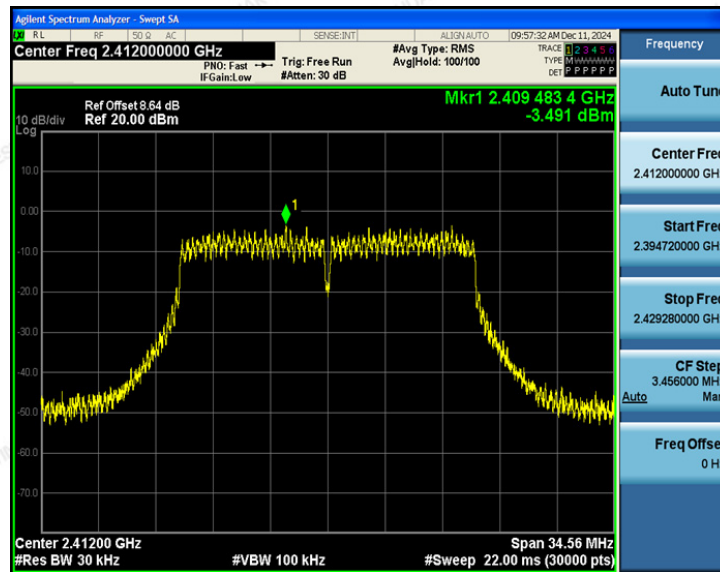
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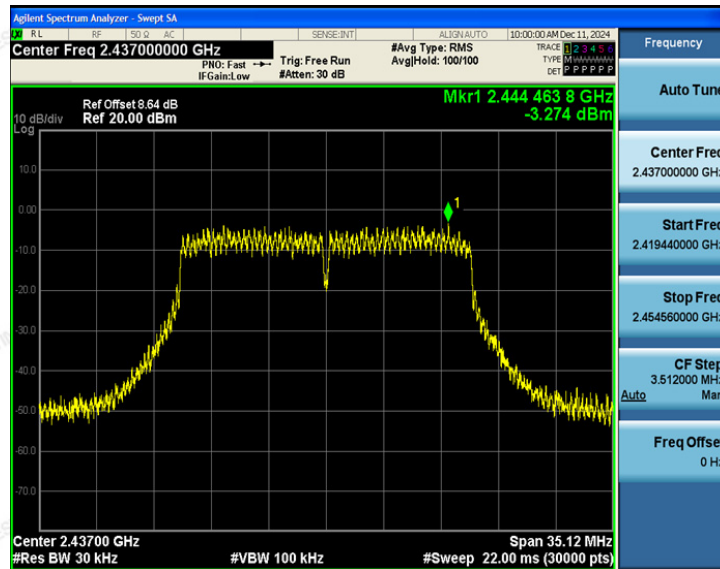


## 802.11n (HT20) Modulation

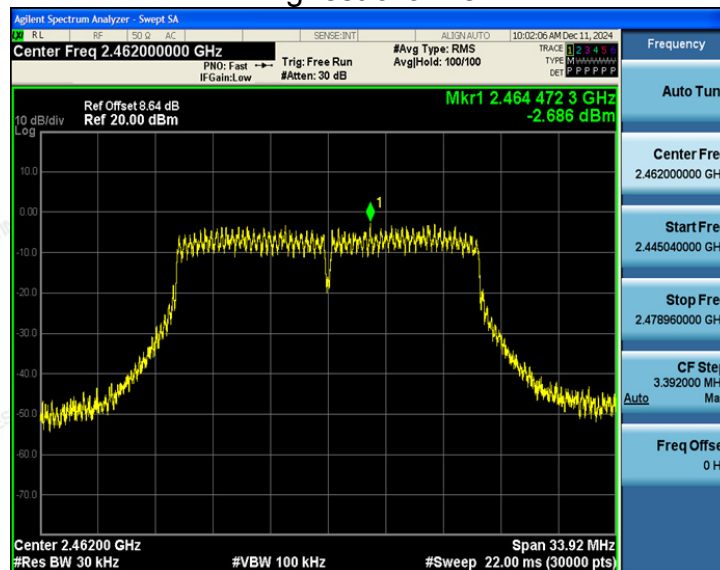
## Lowest channel



## Middle channel



## Highest channel



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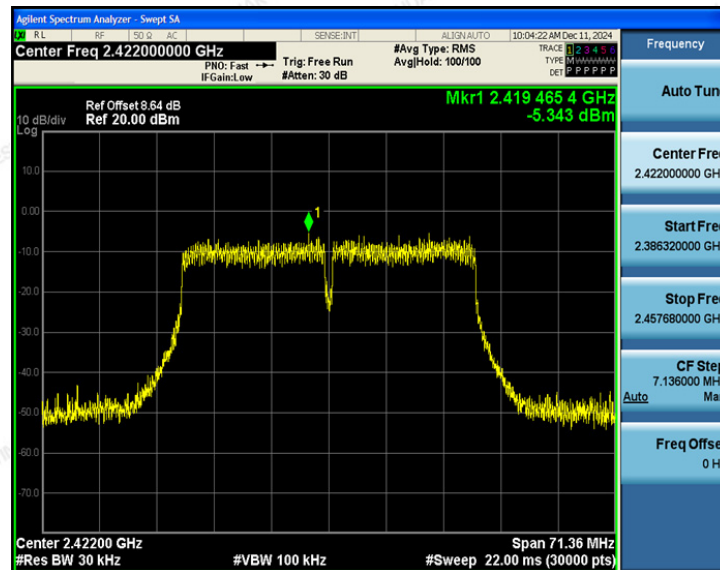
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



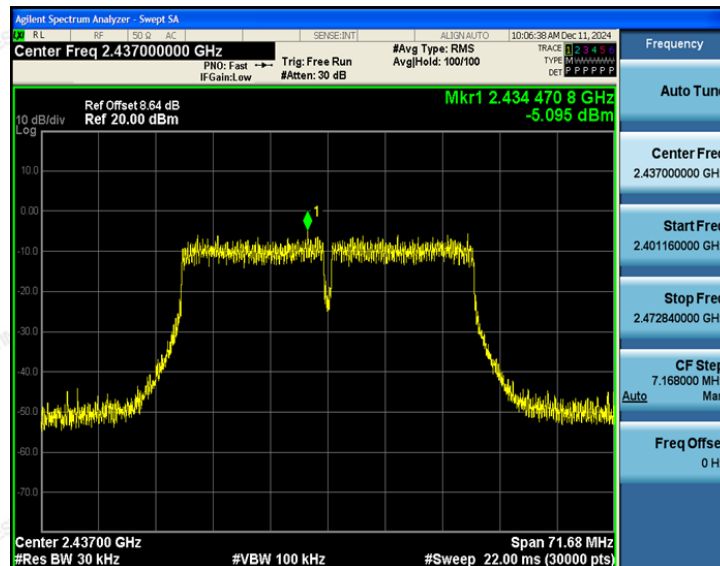


## 802.11n (HT40) Modulation

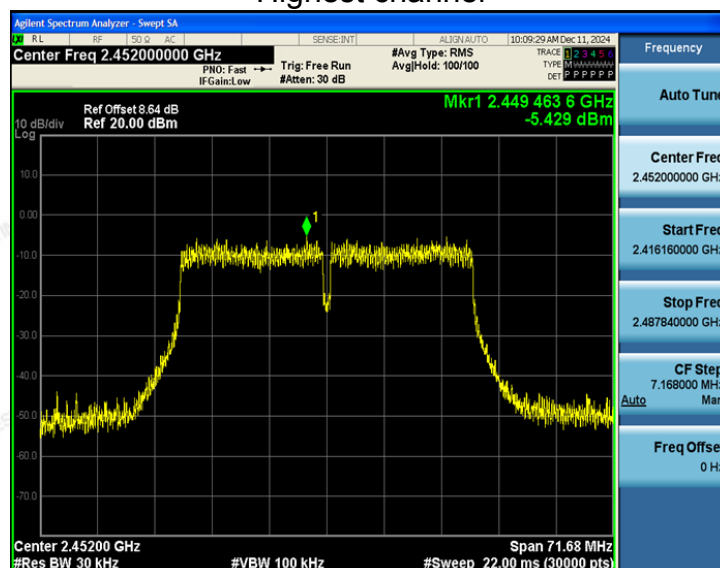
### Lowest channel



### Middle channel



### Highest channel



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**For antenna port 2**

EUT Set Mode	Channel	Test Result (dBm/30kHz)	Result (dBm/3kHz)
802.11b	Lowest	3.74	-6.26
	Middle	3.75	-6.25
	Highest	1.09	-8.91
802.11g	Lowest	-3.10	-13.10
	Middle	-1.93	-11.93
	Highest	-2.10	-12.10
802.11n(HT20)	Lowest	-3.10	-13.10
	Middle	-2.91	-12.91
	Highest	-1.95	-11.95
802.11n(HT40)	Lowest	-4.38	-14.38
	Middle	-4.39	-14.39
	Highest	-3.51	-13.51
PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10			
Limit: 8dBm/3kHz			
Test Result:	PASS		

**Test plots as follows:**



## 802.11b Modulation

## Lowest channel



## Middle channel



## Highest channel



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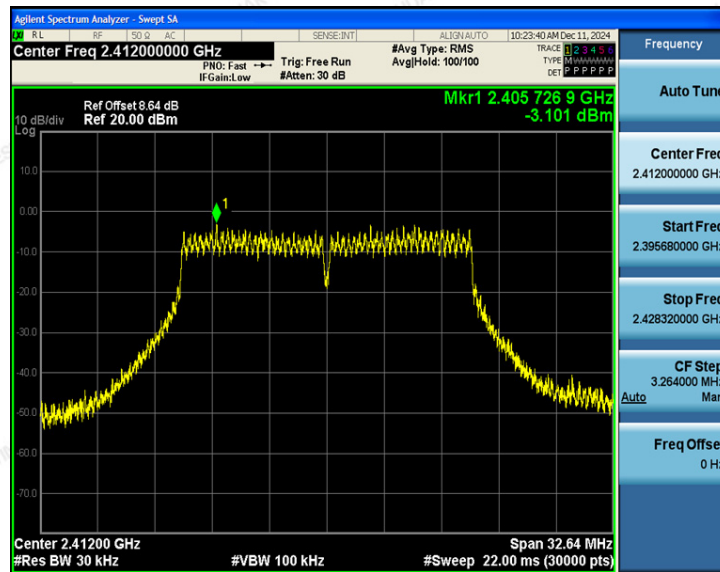
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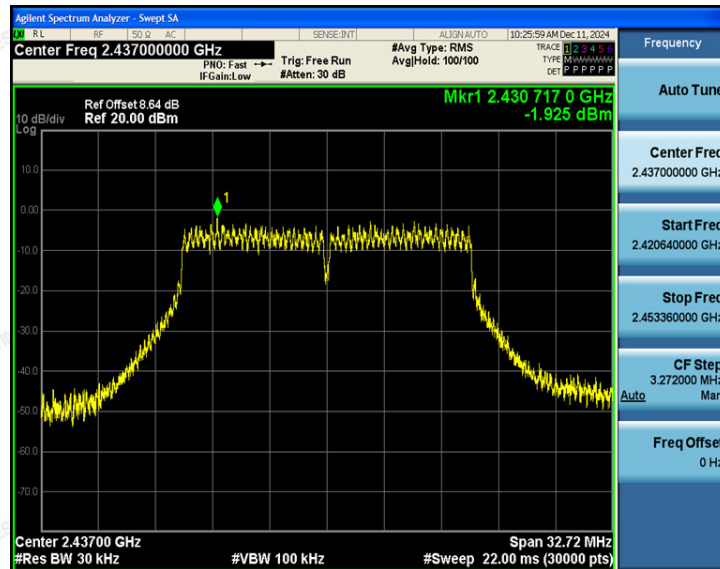


802.11g Modulation

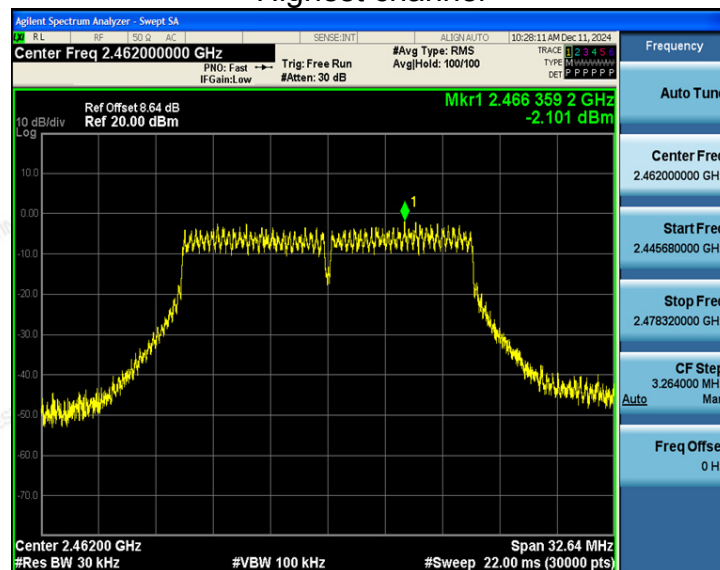
Lowest channel



Middle channel



Highest channel



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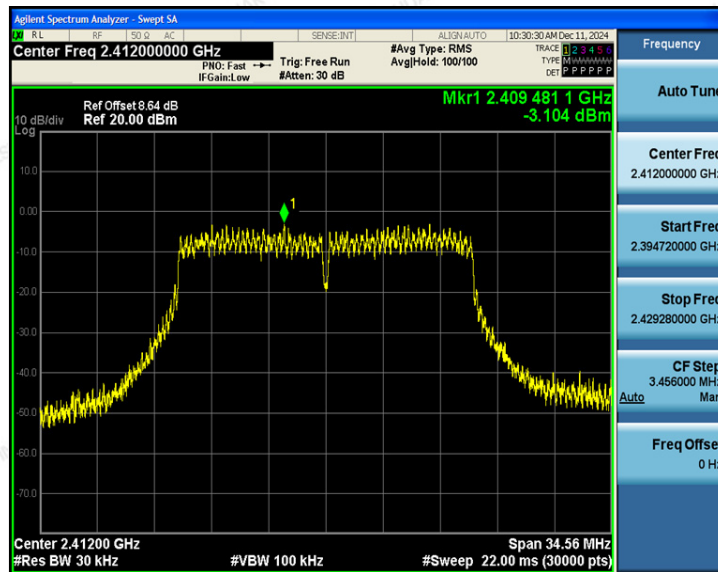
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



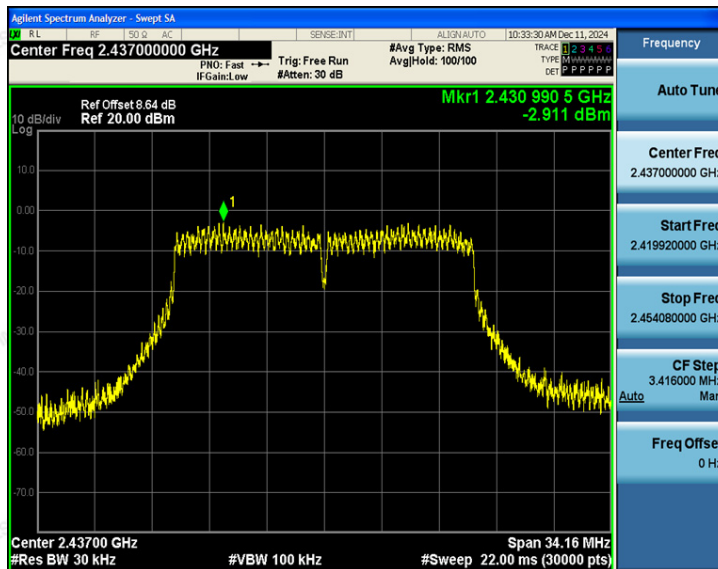


802.11n (HT20) Modulation

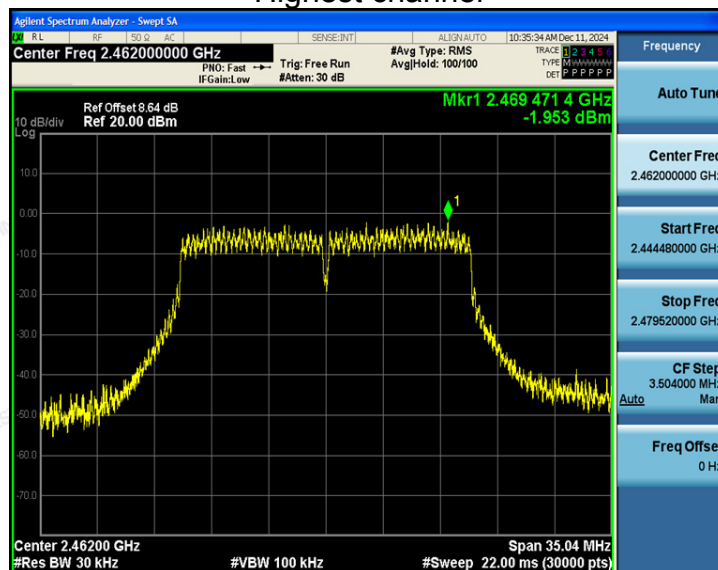
Lowest channel



Middle channel



Highest channel



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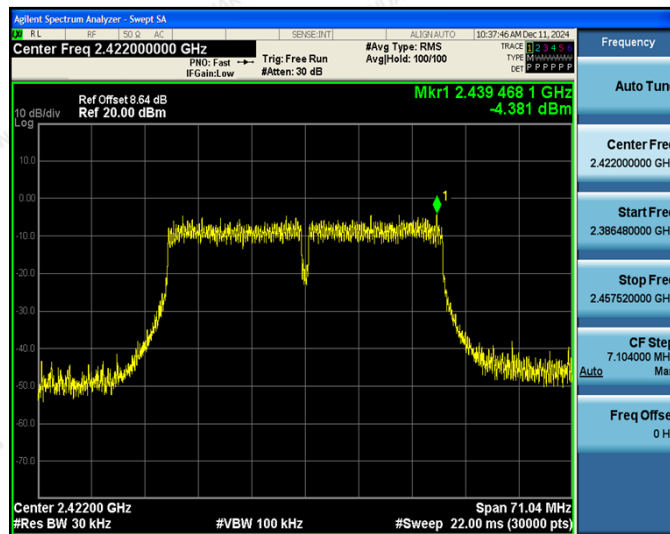
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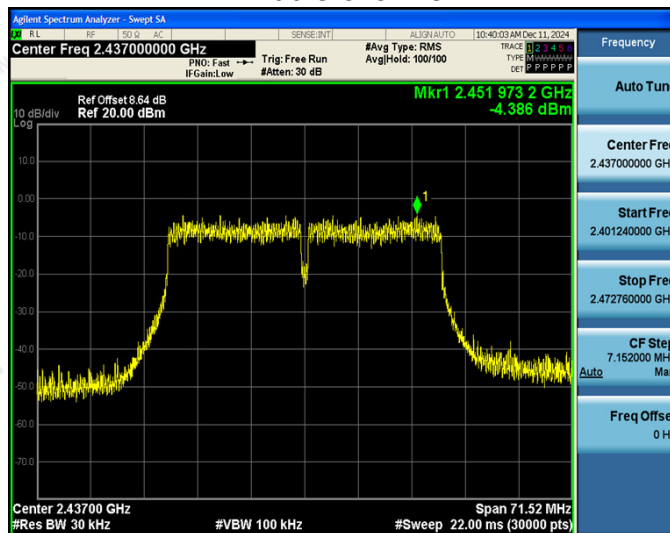


802.11n (HT40) Modulation

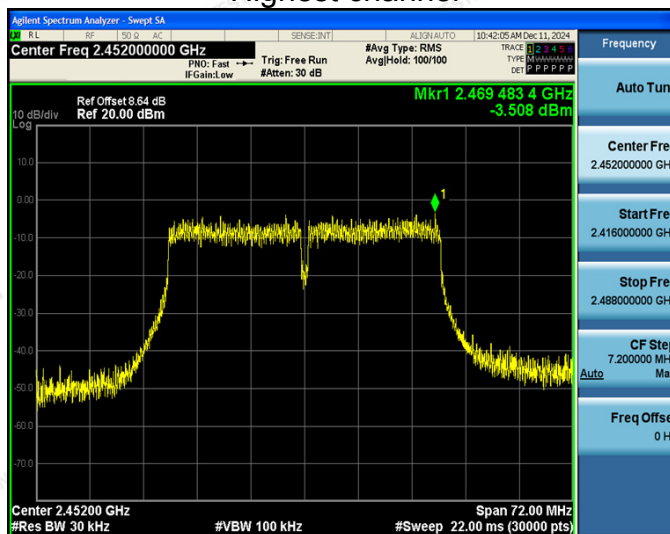
Lowest channel



Middle channel



Highest channel





For MIMO antenna port 1+antenna port 2			
Frequency	Power Density (dBm)	Limit (dBm)	Result
TX 802.11n/HT20 Mode			
2412 MHz	-10.28	8.00	PASS
2437 MHz	-10.08	8.00	PASS
2462 MHz	-9.29	8.00	PASS
TX 802.11n/HT40 Mode			
2422 MHz	-11.82	8.00	PASS
2437 MHz	-11.72	8.00	PASS
2452 MHz	-11.35	8.00	PASS
Note: 1 According to KDB 662911, Result power = $10\log(10^{(ant1/10)} + 10^{(ant2/10)})$ . 2 Result unit: W, The end result is converted to units of dBm. limit=8dBm-(direction gain-6dBi)= 8dBm			

Note: This product supports antenna 1, and antenna 2 launch, but only support 802.11 n/802.11ax for MIMO mode, not support 802.11 b and 802.11 g for MIMO mode.