FCC TEST REPORT

Test report
On Behalf of
Shenzhenshi Jiujiadianzishangwuyouxiangongsi
For
USB WIFI ADAPTER
Model No.: N21, N36, N35, N34, N33, N32, N30, M32, M21, M33, M34, M35, M36, M37, M39, L21, L20, L23, L32, L33, L35

FCC ID: 2AYQ6-N21

Prepared for :	**Shenzhenshi Jiujiadianzishangwuyouxiangongsi** **Longgangqu Bujijiedao Jihualu,393 Hao Haifadasha 220, shenzhen Guangdong, China**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**

Date of Test:	**Jun. 06, 2023 ~ Jun. 14, 2023**
Date of Report:	**Jun. 14, 2023**
Report Number:	**HK2306062322-1E**

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.

TEST RESULT CERTIFICATION

Applicant's name ..... :	Shenzhenshi Jiujiadianzishangwuyouxiangongsi
Address ..... :	Longgangqu Bujijiedao Jihualu,393 Hao Haifadasha 220, shenzhen Guangdong, China
Manufacture's Name ..... :	Shenzhenshi Jiujiadianzishangwuyouxiangongsi
Address ..... :	Longgangqu Bujijiedao Jihualu,393 Hao Haifadasha 220, shenzhen Guangdong, China
Product description	
Trade Mark:	Nineplus, livingthing, mobelly
Product name..... :	USB WIFI ADAPTER
Model and/or type reference .:	N21, N36, N35, N34, N33, N32, N30, M32, M21, M33, M34, M35, M36, M37, M39, L21, L20, L23, L32, L33, L35
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test ..... :	
Date (s) of performance of tests ..... :	**Jun. 06, 2023 ~ Jun. 14, 2023**
Date of Issue..... :	**Jun. 14, 2023**
Test Result..... :	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

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.

TABLE OF CONTENTS

1. Test Result Summary 5
   1.1. TEST PROCEDURES AND RESULTS 5
   1.2. INFORMATION OF THE TEST LABORATORY 5
   1.3. MEASUREMENT UNCERTAINTY 6
2. EUT Description 7
   2.1. GENERAL DESCRIPTION OF EUT 7
   2.2. CARRIER FREQUENCY OF CHANNELS 8
   2.3. OPERATION OF EUT DURING TESTING 8
   2.4. DESCRIPTION OF TEST SETUP 9
3. Genera Information 10
   3.1. TEST ENVIRONMENT AND MODE 10
   3.2. DESCRIPTION OF SUPPORT UNITS 11
4. Test Results and Measurement Data 12
   4.1. CONDUCTED EMISSION 12
   4.2. MAXIMUM CONDUCTED OUTPUT POWER 16
   4.3. EMISSION BANDWIDTH 19
   4.4. POWER SPECTRAL DENSITY 34
   4.5. CONDUCTED BAND EDGE AND SPURIOUS EMISSION MEASUREMENT 50
   4.6. RADIATED SPURIOUS EMISSION MEASUREMENT 76
   4.7. ANTENNA REQUIREMENT 108
   4.8. PHOTOS OF THE EUT 111

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.

** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jun. 14, 2023	Jason Zhou

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.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

1. Test Result Summary

1.1. TEST PROCEDURES AND RESULTS

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247 (c)	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	1§5.247(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 HUAK 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.

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.

1.3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended 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	±0.37dB
2	RF power, conducted	±3.35dB
3	Spurious emissions, conducted	±2.20dB
4	All emissions, radiated(<1G)	±3.90dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

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.

2. EUT Description

2.1. GENERAL DESCRIPTION OF EUT

Equipment	USB WIFI ADAPTER
Model Name	N21
Serial Model	N36, N35, N34, N33, N32, N30, M32, M21, M33, M34, M35, M36, M37, M39, L21, L20, L23, L32, L33, L35
Model Difference	All model's the function, software and electric circuit are the same, only with the shape of the shell, the color and model named different. Test sample model: N21.
Trade Mark	Nineplus, livingthing, mobelly
FCC ID	2AYQ6-N21
Antenna Type	Shrapnel antenna
Antenna Gain	Antenna 1:2.22dBi Antenna 2:2.22dBi MIMO: 5.230dBi
Operation frequency	802.11b/g/n/ax 20:2412~2462 MHz 802.11n/ax 40: 2422~2452MHz
Number of Channels	802.11b/g/n/ax20: 11CH 802.11n/ax 40: 7CH
Modulation Type	CCK/OFDM/DBPSK/DAPSK
Power Source	DC 5V
Power Rating	DC 5V
Hardware Version:	V1.0
Software Version:	V1.0
Note: The EUT incorporates a MIMO function. Physically, it provides two completed tran smitters and receivers(2T2R), two transmit signals are completely correlated, then, Dire ction gain=GANT + Array Gain(Array Gain=10 log(2) dB for power spectral density; Arra y Gain=0 for power measurement)	

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.

2.2. Carrier Frequency of Channels

Channel List for 802.11b/802.11g/802.11n (HT20)/802.11ax (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)/802.11ax (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)/802.11ax (HT20)**

Low Channel: 2412MHz
Middle Channel: 2437MHz
High Channel: 2462MHz

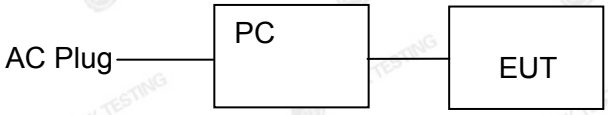
The mode is used: Transmitting mode for 802.11n (HT40)/802.11ax (HT40)

Low Channel: 2422MHz
Middle Channel: 2437MHz
High Channel: 2452MHz

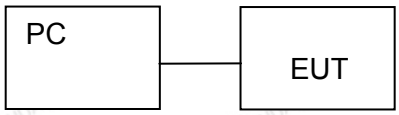
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

2.4. DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and below 1GHz Radiation testing:



Operation of EUT during Above1GHz Radiation testing:



PC information
Model: TP00067A
Input: DC 20V, 2.25-30.25A
Output: 5VDC, 0.5A

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.

3. Genera 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 (The value of duty cycle is 98.46%)
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. For the full battery state and The output power to the maximum state.	

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(H20)/802.11ax(H20)	6.5Mbps
802.11n(H40)/802.11ax(H40)	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(H20)/802.11ax(H20), 13.5Mbps for 802.11(H40)/802.11ax(H40). Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.	

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.

3.2. 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.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

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.

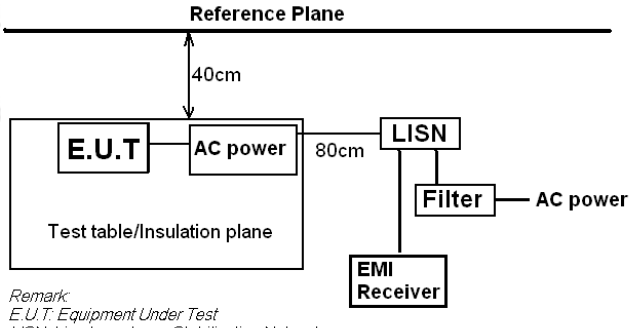
3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is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

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.

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:	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:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Mode:	Charging + transmitting with modulation
Test Procedure:	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. 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). 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.
Test Result:	Pass

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.

4.1.2. Test Instruments

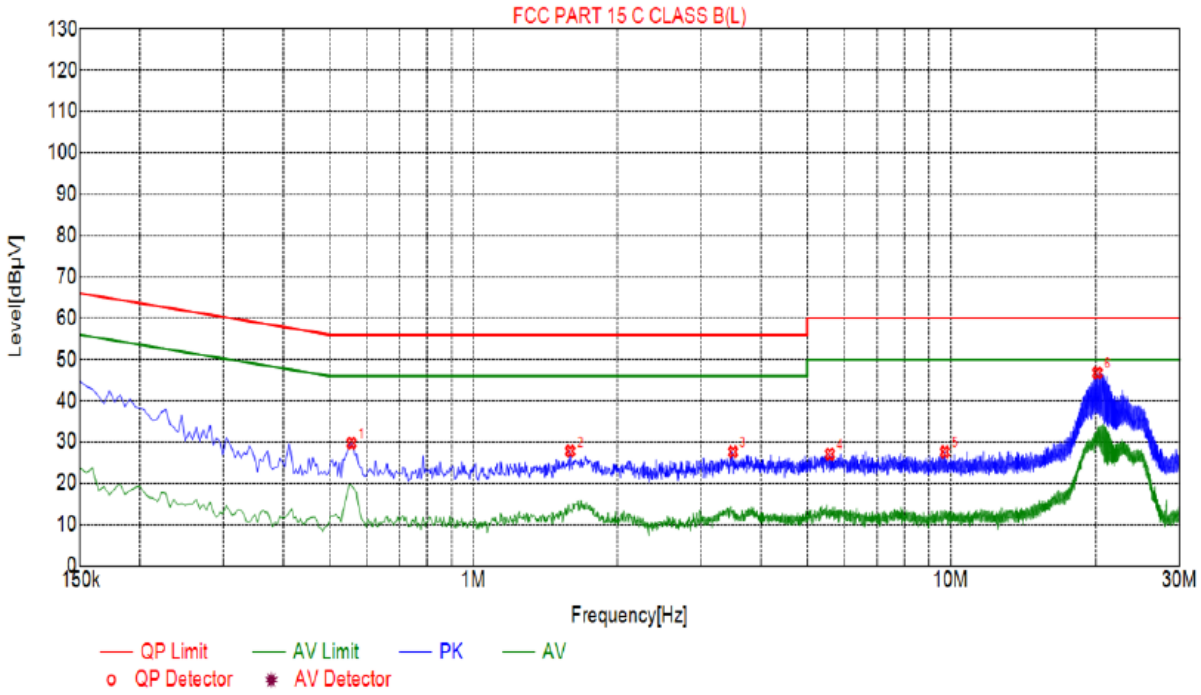
Conducted Emission Shielding Room Test Site (843)					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Receiver	R&S	ESR-7	HKE-010	Feb. 17, 2023	Feb. 16, 2024
LISN	R&S	ENV216	HKE-002	Feb. 17, 2023	Feb. 16, 2024
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	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).*

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.

4.1.3 Test data

Test Specification: Line

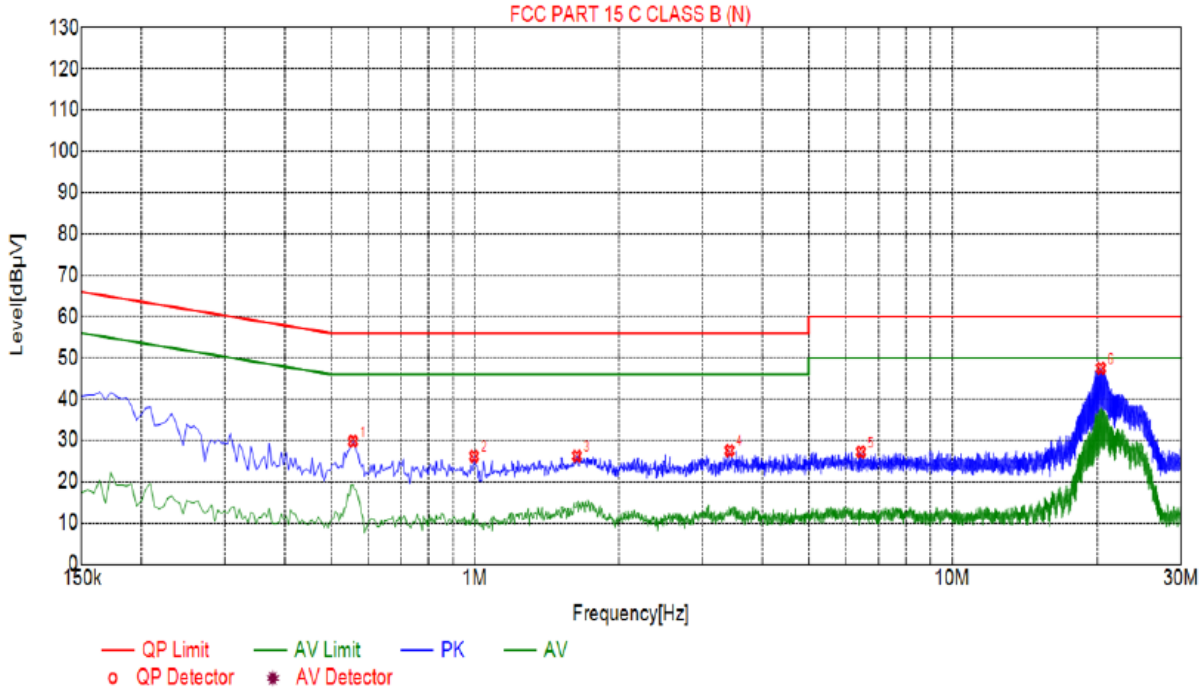


Suspected List								
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.5550	29.74	20.06	56.00	26.26	9.68	PK	L
2	1.5945	27.79	20.11	56.00	28.21	7.68	PK	L
3	3.4980	27.61	20.25	56.00	28.39	7.36	PK	L
4	5.5860	27.06	20.25	60.00	32.94	6.81	PK	L
5	9.7305	27.59	20.08	60.00	32.41	7.51	PK	L
6	20.1750	46.77	20.11	60.00	13.23	26.66	PK	L

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

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.

Test Specification: Neutral



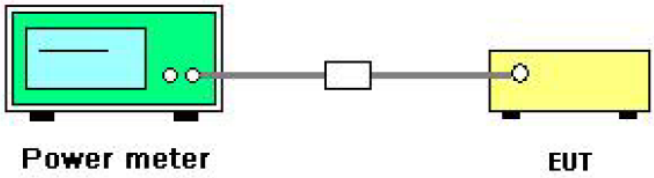
Suspected List								
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.5550	29.78	20.06	56.00	26.22	9.72	PK	N
2	0.9960	26.12	20.06	56.00	29.88	6.06	PK	N
3	1.6350	26.18	20.12	56.00	29.82	6.06	PK	N
4	3.4170	27.51	20.24	56.00	28.49	7.27	PK	N
5	6.4410	27.19	20.22	60.00	32.81	6.97	PK	N
6	20.3640	47.49	20.12	60.00	12.51	27.37	PK	N

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

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.

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
Limit:	30dBm
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 15.247 Meas Guidance v05r02. 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. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Measure the Peak output power and record the results in the test report.
Test Result:	PASS

4.2.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Power meter	Agilent	E4419B	HKE-085	Feb. 17, 2023	Feb. 16, 2024
Power Sensor	Agilent	E9300A	HKE-086	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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

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.

4.2.3. Test Data

Test Channel	Frequency	Reading Conducted Output Power (dBm)		Cable loss	Maximum Peak Conducted Output Power (dBm)		LIMIT
	(MHz)	Antenna port 1	Antenna port 2		Antenna port 1	Antenna port 2	dBm
TX 802.11b Mode							
CH01	2412	4.22	4.35	0.8	5.02	5.15	30
CH06	2437	4.26	4.84	0.8	5.06	5.64	30
CH11	2462	4.53	5.09	0.8	5.33	5.89	30
TX 802.11g Mode							
CH01	2412	4.36	4.19	0.8	5.16	4.99	30
CH06	2437	4.27	3.80	0.8	5.07	4.60	30
CH11	2462	4.35	3.61	0.8	5.15	4.41	30
TX 802.11n20 Mode							
CH01	2412	4.28	4.19	0.8	5.08	4.99	30
CH06	2437	3.48	3.30	0.8	4.28	4.10	30
CH11	2462	3.49	3.32	0.8	4.29	4.12	30
TX 802.11n40 Mode							
CH03	2422	4.01	3.73	0.8	4.81	4.53	30
CH06	2437	3.74	3.25	0.8	4.54	4.05	30
CH09	2452	3.28	3.55	0.8	4.08	4.35	30
TX 802.11ax20 Mode							
CH01	2412	3.97	3.71	0.8	4.77	4.51	30
CH06	2437	3.86	3.76	0.8	4.66	4.56	30
CH11	2462	3.29	2.21	0.8	4.09	3.01	30
TX 802.11ax40 Mode							
CH03	2422	2.73	2.65	0.8	3.53	3.45	30
CH06	2437	2.84	2.80	0.8	3.64	3.60	30
CH09	2452	3.13	2.64	0.8	3.93	3.44	30

Note: Maximum Peak Conducted Output Power(dBm)= Reading Conducted Output Power(dBm)+ Cable loss

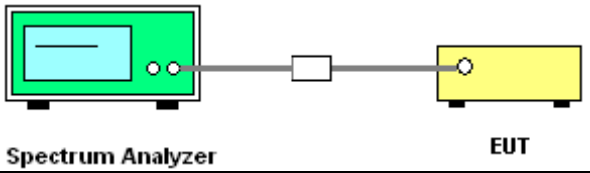
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

Test Channel	Frequency	Maximum Peak Conducted Output Power (dBm)			LIMIT
	(MHz)	Antenna port 1	Antenna port 2	MIMO	dBm
TX 802.11n20 Mode					
CH01	2412	5.08	4.99	8.05	30
CH06	2437	4.28	4.10	7.20	30
CH11	2462	4.29	4.12	7.22	30
TX 802.11n40 Mode					
CH03	2422	4.81	4.53	7.68	30
CH06	2437	4.54	4.05	7.31	30
CH09	2452	4.08	4.35	7.23	30
TX 802.11ax20 Mode					
CH01	2412	4.77	4.51	7.65	30
CH06	2437	4.66	4.56	7.62	30
CH11	2462	4.09	3.01	6.59	30
TX 802.11ax40 Mode					
CH03	2422	3.53	3.45	6.50	30
CH06	2437	3.64	3.60	6.63	30
CH09	2452	3.93	3.44	6.70	30
Note: This product supports antenna 1 and antenna 2 launch, but only support 802.11 n/ax for MIMO mode, not support 802.11 b and 802.11 g for MIMO mode.					

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.

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:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows FCC KDB 558074 D01 15.247 Meas Guidance v05r02. 2. Set to the maximum power setting and enable the EUT transmit continuously. 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. 4. Measure and record the results in the test report.
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-048	Feb. 17, 2023	Feb. 16, 2024
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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

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.

4.3.3. Test data

For antenna port 1

Test channel	6dB Emission Bandwidth (MHz)					
	802.11b	802.11g	802.11n(H20)	802.11n(H40)	802.11ax(H20)	802.11ax(H40)
Lowest	7.560	16.320	17.040	33.840	16.440	35.440
Middle	8.040	13.160	16.640	35.120	17.080	34.960
Highest	8.080	15.280	14.680	35.040	17.600	36.400
Limit:	>500k					
Test Result:	PASS					

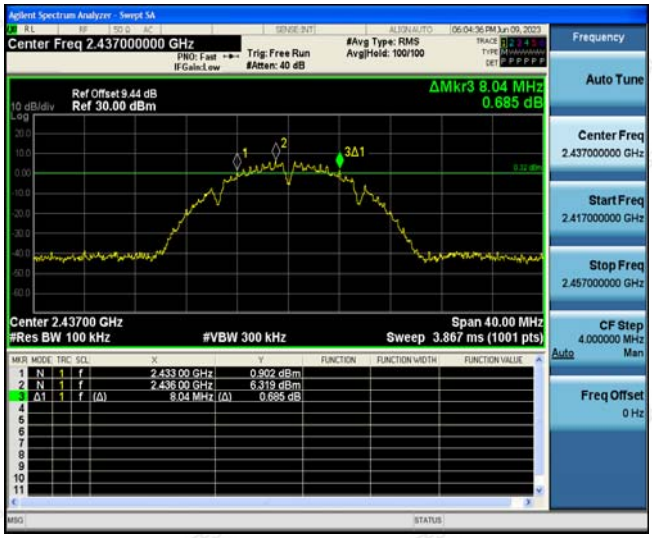
Test plots as follows:

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.

802.11b Modulation

Lowest channel

Middle channel



Highest channel

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.

802.11g Modulation

Lowest channel

Middle channel

Highest channel

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.

802.11n (HT20) Modulation

Lowest channel

Middle channel

Highest channel

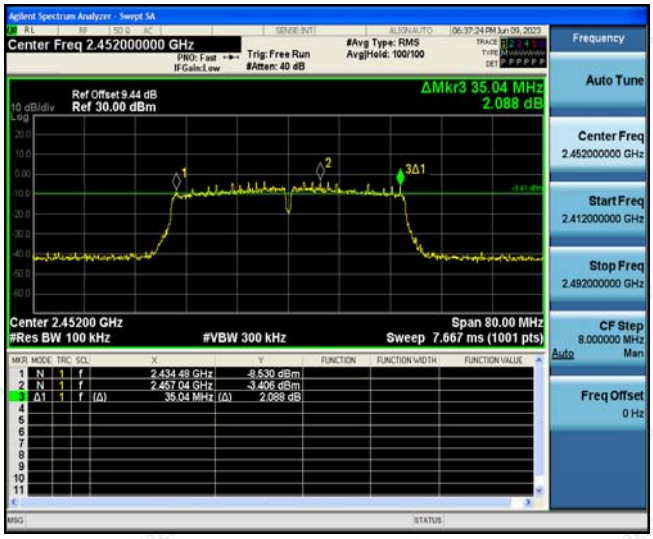
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11n (HT40) Modulation

Lowest channel

Middle channel

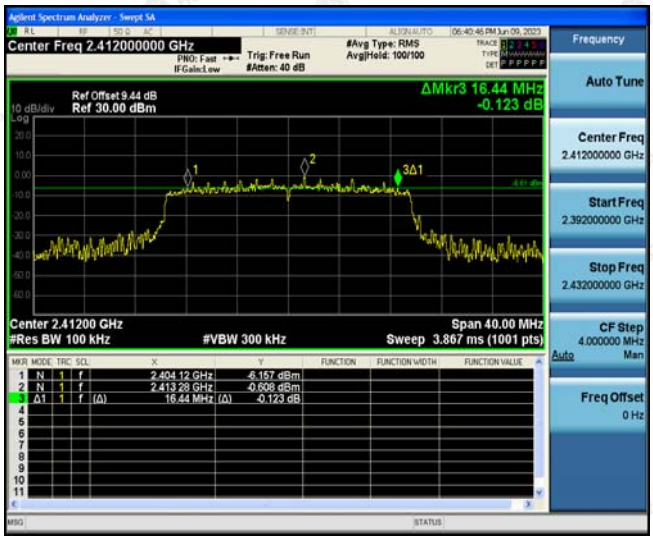
Highest channel



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.

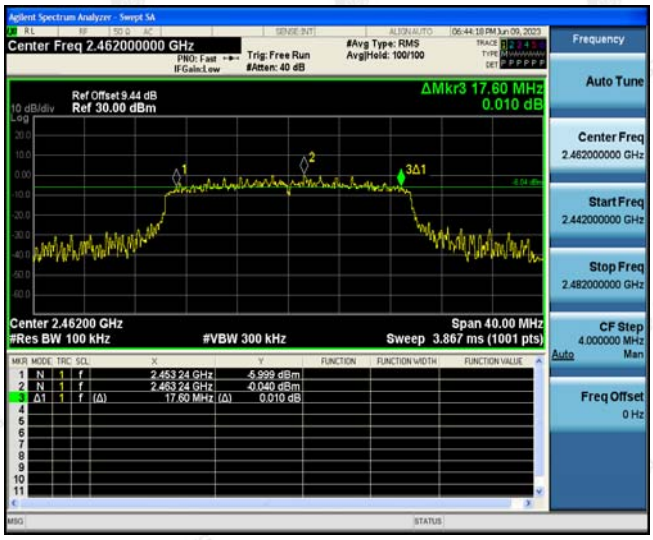
802.11ax (HT20) Modulation

Lowest channel



Middle channel

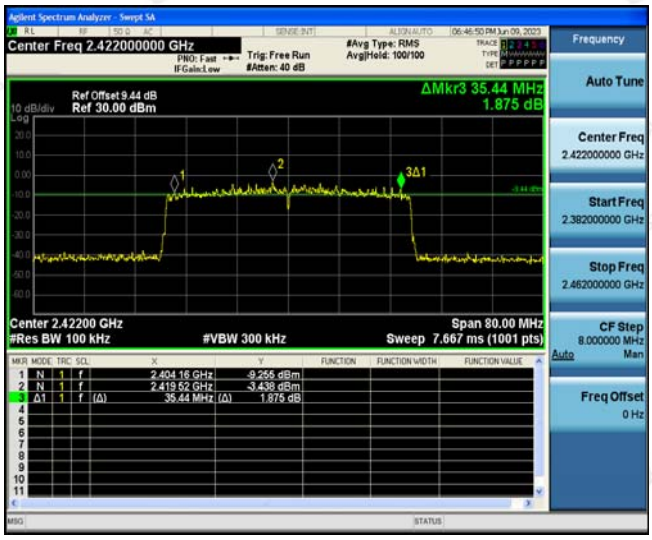
Highest channel



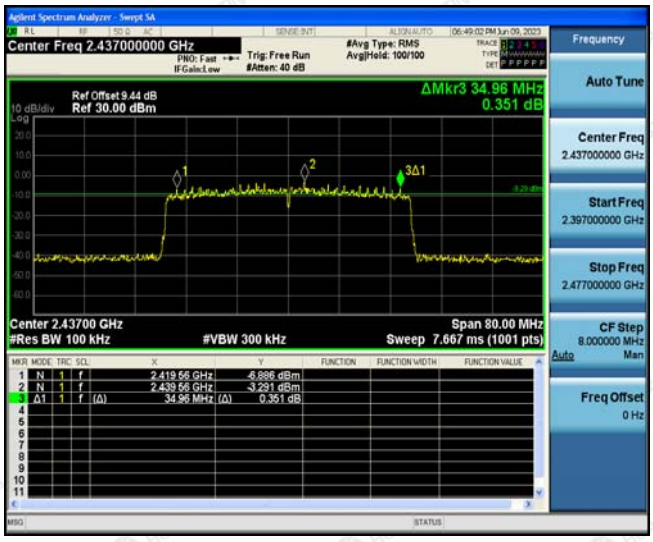
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11ax (HT40) Modulation

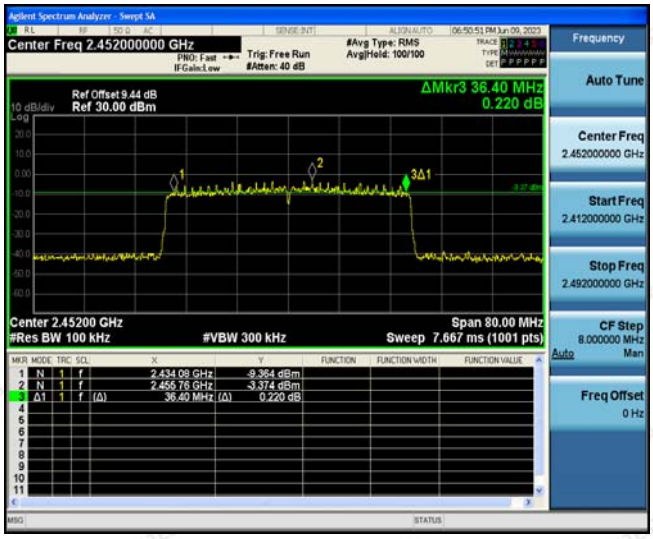
Lowest channel



Middle channel



Highest channel



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.

For antenna port 2

Test channel	6dB Emission Bandwidth (MHz)					
	802.11b	802.11g	802.11n(H20)	802.11n(H40)	802.11ax(H20)	802.11ax(H40)
Lowest	7.560	13.400	13.840	33.840	16.840	35.600
Middle	8.040	16.320	15.040	33.760	15.800	35.600
Highest	8.000	15.040	15.080	35.120	16.280	34.320
Limit:	>500k					
Test Result:	PASS					

Test plots as follows:

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.

802.11b Modulation

Lowest channel

Middle channel

Highest channel

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.

802.11g Modulation

Lowest channel

Middle channel

Highest channel

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.

802.11n (HT20) Modulation

Lowest channel

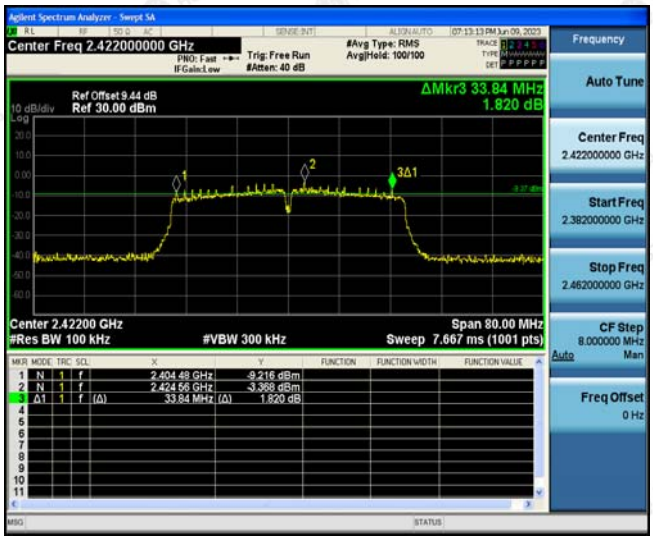
Middle channel

Highest channel

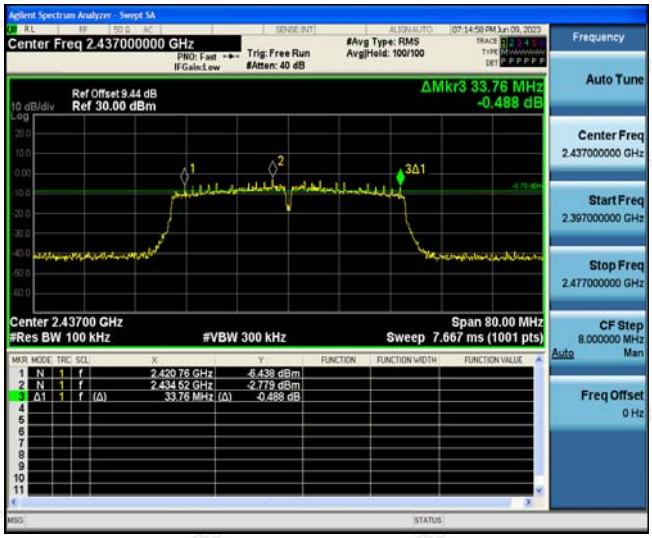
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11n (HT40) Modulation

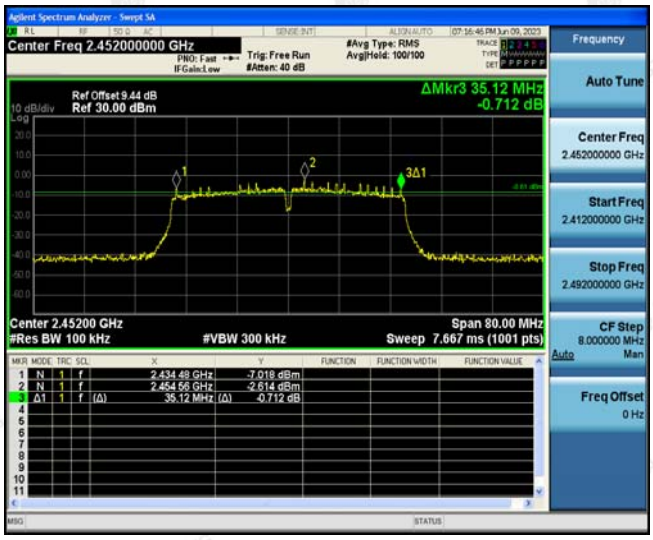
Lowest channel



Middle channel



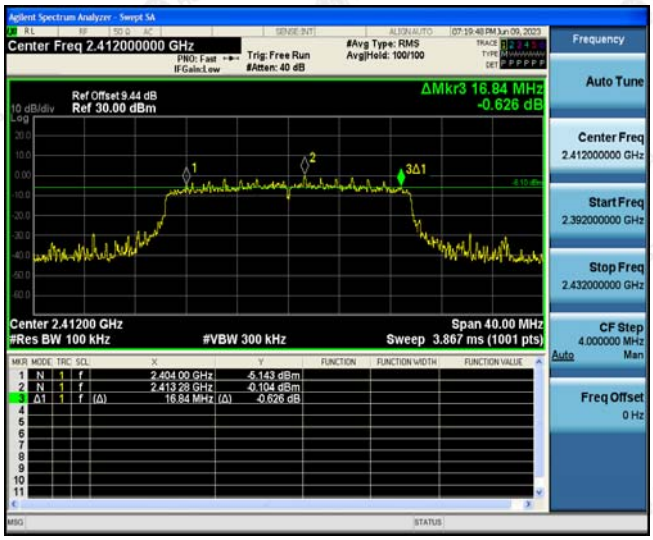
Highest channel



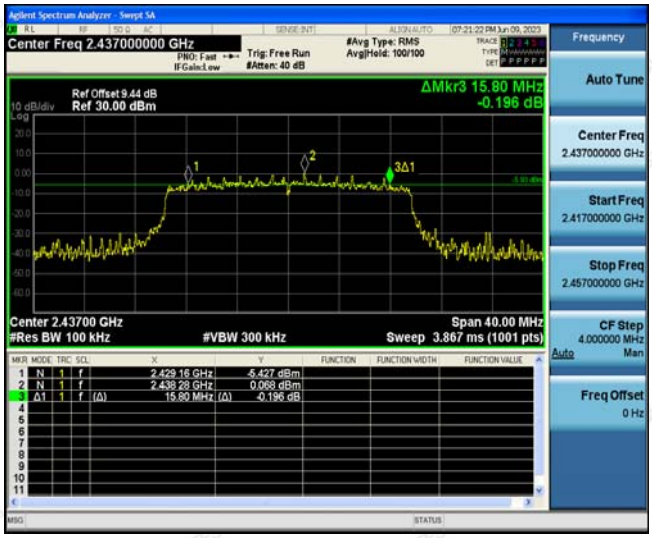
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11ax (HT20) Modulation

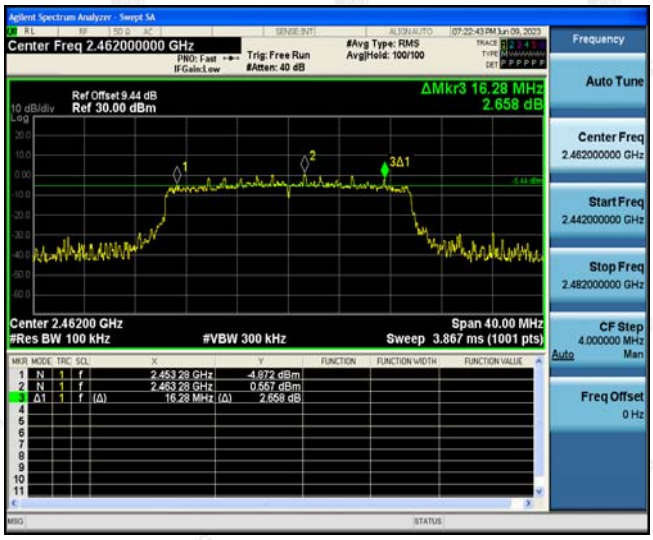
Lowest channel



Middle channel



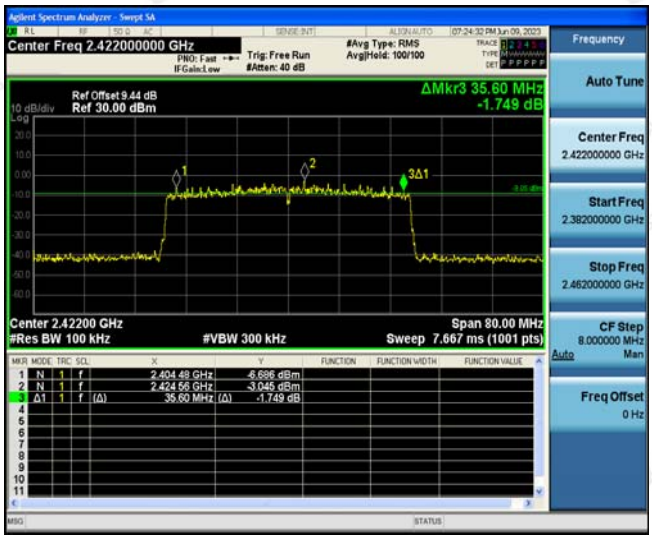
Highest channel



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.

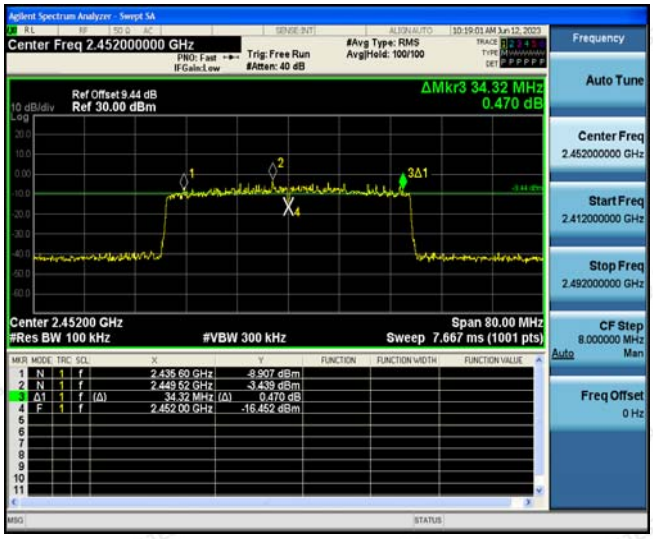
802.11ax (HT40) Modulation

Lowest channel



Middle channel

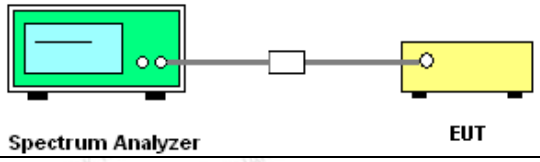
Highest channel



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.

4.4. Power Spectral Density

4.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB 558074 D01 15.247 MEAS GUIDANCE V05R02
Limit:	The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB 558074 D01 15.247 Meas Guidance v05r02. 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. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW. 5. Detector = Peak, Sweep time = auto couple. 6. Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level. 6. Measure and record the results in the test report.
Test Result:	PASS

4.4.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024
RF test software	Tonscend	JS1120-B Version 2.6	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).*

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.

4.4.3. Test data

For antenna port 1

EUT Set Mode	Channel	Result (dBm/30kHz)	Offset	Result (dBm/30kHz)	Result (dBm/3kHz)
802.11b	Lowest	-6.01	9.44	3.43	-6.57
	Middle	-7.05	9.44	2.39	-7.61
	Highest	-7.55	9.44	1.89	-8.11
802.11g	Lowest	-14.6	9.44	-5.16	-15.16
	Middle	-13.72	9.44	-4.28	-14.28
	Highest	-13.98	9.44	-4.54	-14.54
802.11n(H20)	Lowest	-12.76	9.44	-3.32	-13.32
	Middle	-12.6	9.44	-3.16	-13.16
	Highest	-14.54	9.44	-5.1	-15.1
802.11n(H40)	Lowest	-18.27	9.44	-8.83	-18.83
	Middle	-17.54	9.44	-8.1	-18.1
	Highest	-17.87	9.44	-8.43	-18.43
802.11ax(H20)	Lowest	-14.84	9.44	-5.4	-15.4
	Middle	-14.14	9.44	-4.7	-14.7
	Highest	-13.88	9.44	-4.44	-14.44
802.11ax(H40)	Lowest	-17.82	9.44	-8.38	-18.38
	Middle	-18.48	9.44	-9.04	-19.04
	Highest	-18.26	9.44	-8.82	-18.82
PSDTest Result (dBm/30kHz)= Result +Offset Offset= Instrument attenuation +cable loss=8.64 dB +0.8 dB =9.44dB PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10					
Limit: 8dBm/3kHz					
Test Result:	PASS				

Test plots as follows:

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.

802.11b Modulation

Lowest channel

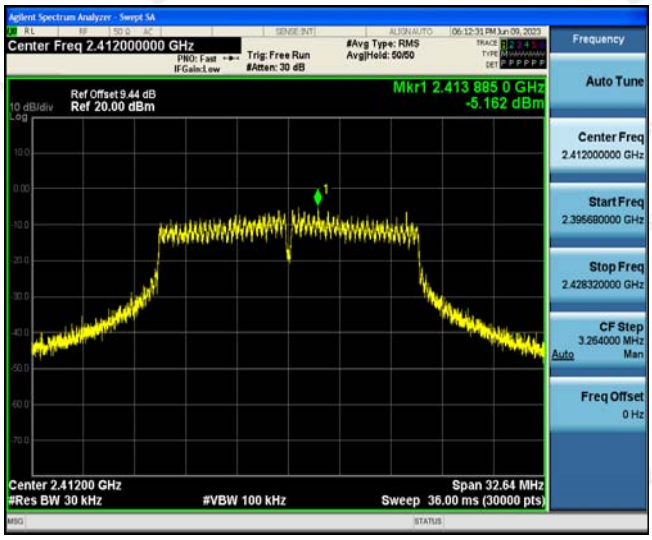
Middle channel

Highest channel

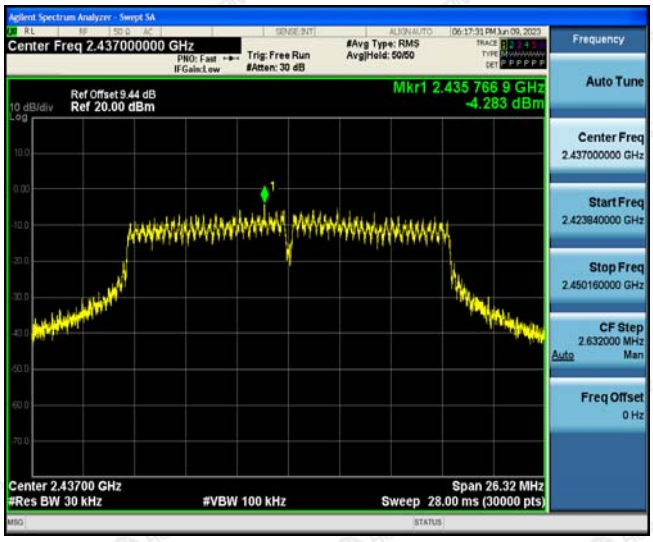
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11g Modulation

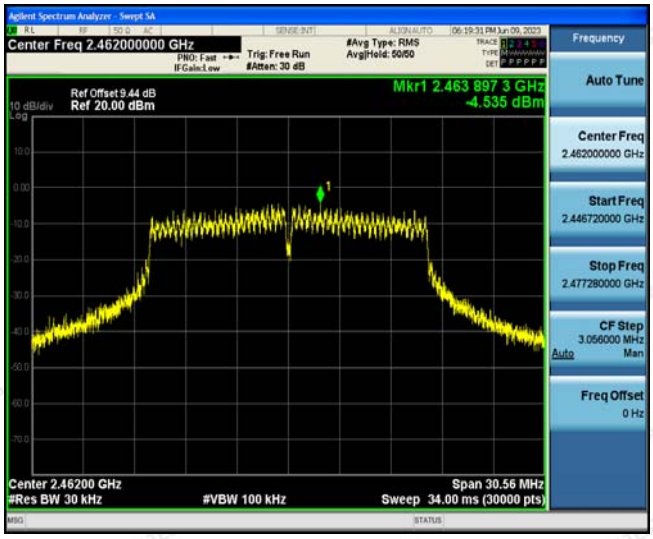
Lowest channel



Middle channel



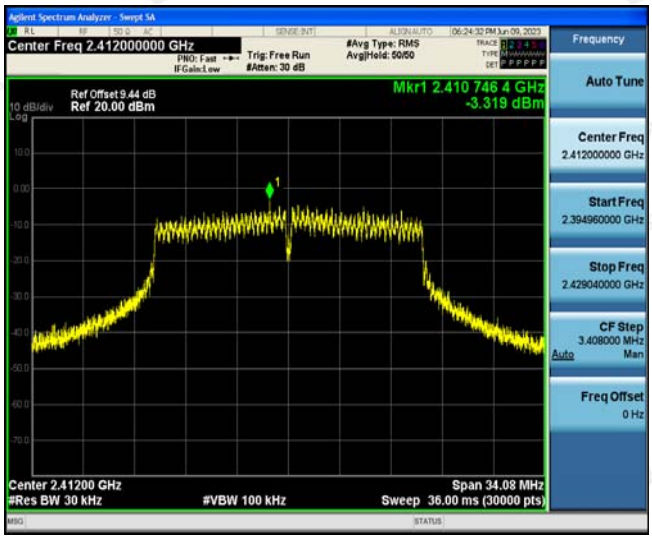
Highest channel



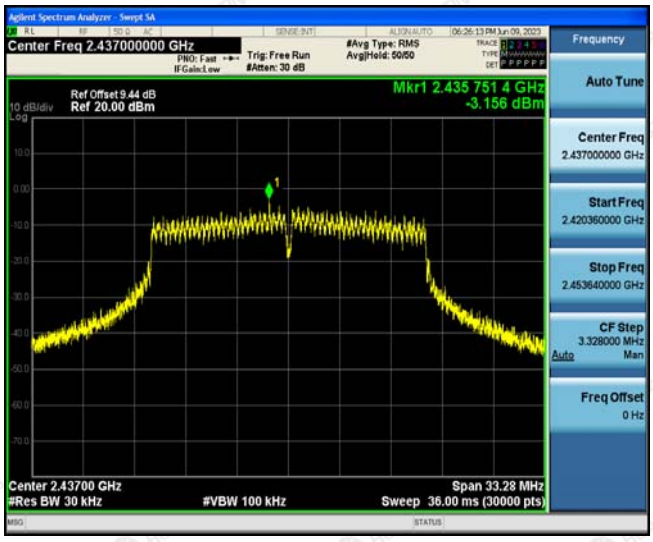
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11n (HT20) Modulation

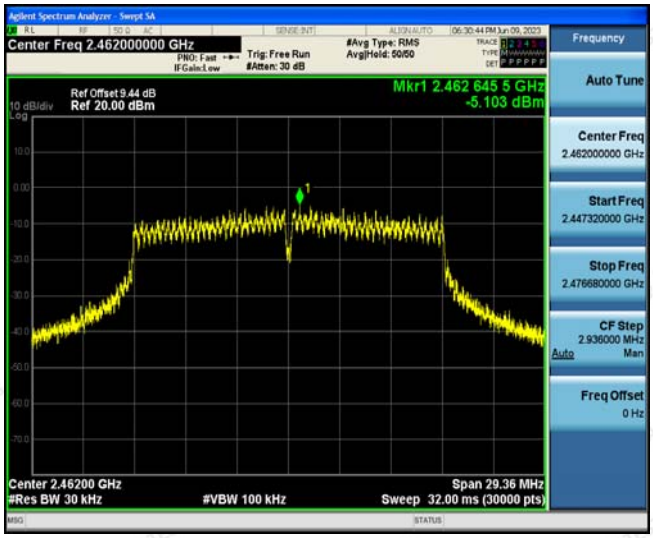
Lowest channel



Middle channel



Highest channel

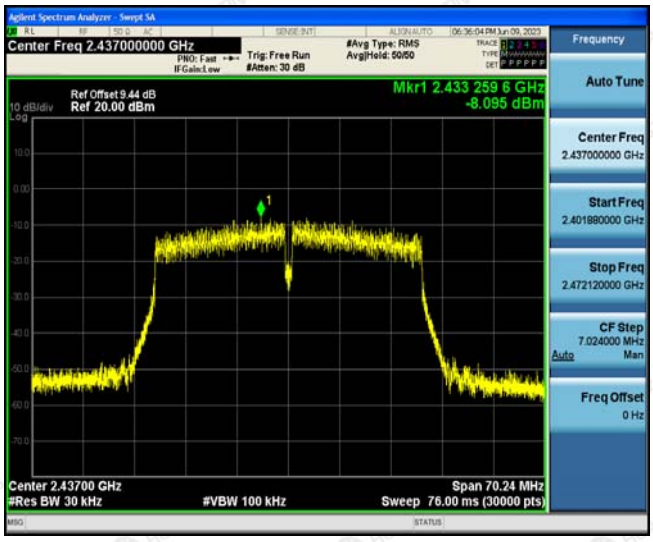


The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11n (HT40) Modulation

Lowest channel

Middle channel

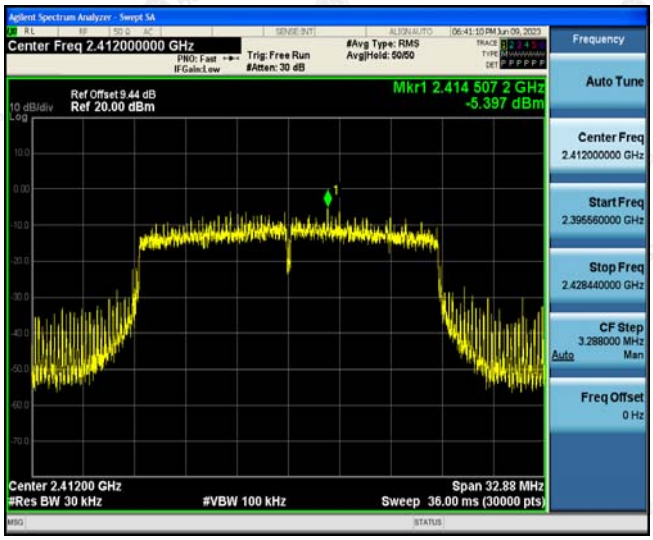


Highest channel

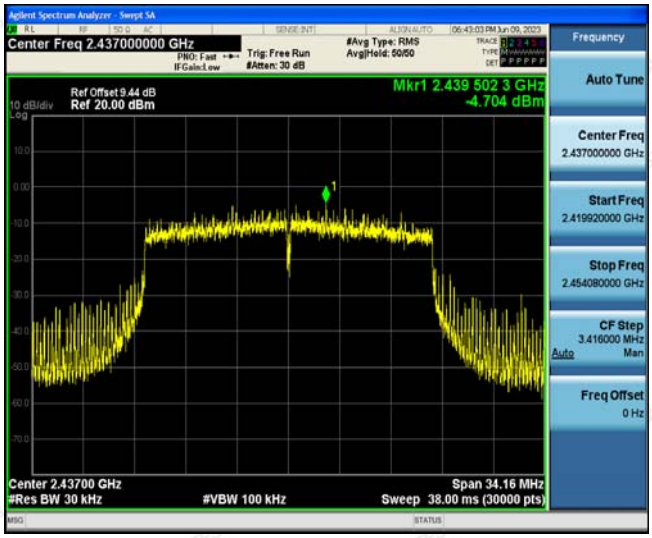
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11ax (HT20) Modulation

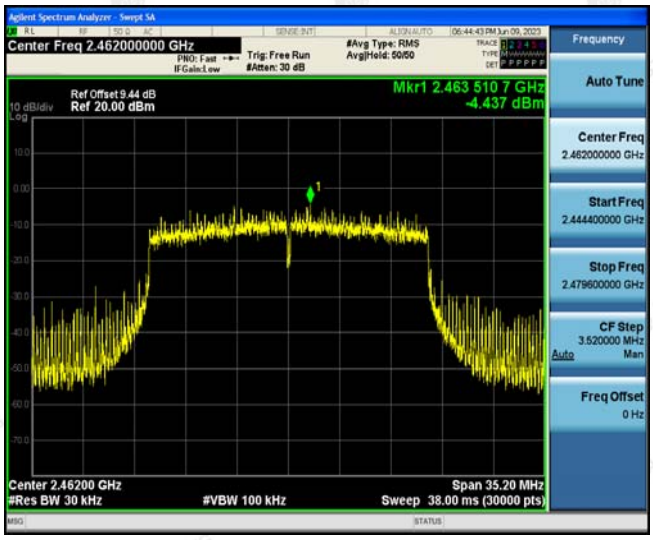
Lowest channel



Middle channel



Highest channel



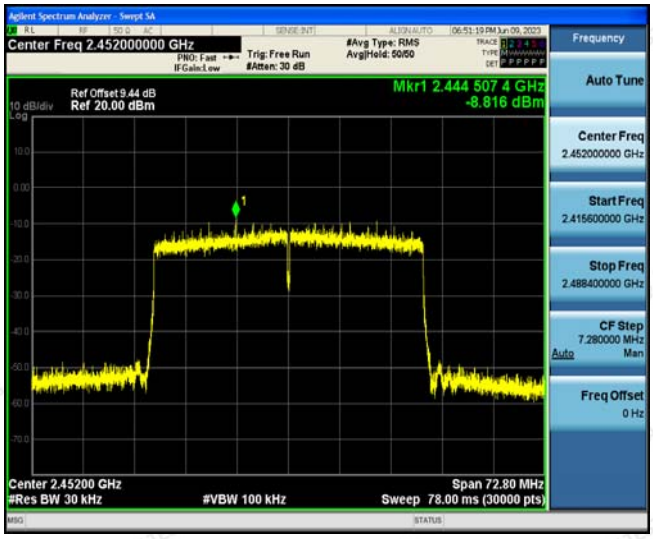
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11ax(HT40) Modulation

Lowest channel

Middle channel

Highest channel



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.

For antenna port 2

EUT Set Mode	Channel	Result (dBm/30kHz)	Offset	Result (dBm/30kHz)	Result (dBm/3kHz)
802.11b	Lowest	-7.78	9.44	1.66	-8.34
	Middle	-7.29	9.44	2.15	-7.85
	Highest	-6.58	9.44	2.86	-7.14
802.11g	Lowest	-13.57	9.44	-4.13	-14.13
	Middle	-13.15	9.44	-3.71	-13.71
	Highest	-12.61	9.44	-3.17	-13.17
802.11n(H20)	Lowest	-13.37	9.44	-3.93	-13.93
	Middle	-12.48	9.44	-3.04	-13.04
	Highest	-13.94	9.44	-4.5	-14.5
802.11n(H40)	Lowest	-18.14	9.44	-8.7	-18.7
	Middle	-17.08	9.44	-7.64	-17.64
	Highest	-17.47	9.44	-8.03	-18.03
802.11ax(H20)	Lowest	-14.49	9.44	-5.05	-15.05
	Middle	-14.43	9.44	-4.99	-14.99
	Highest	-14.31	9.44	-4.87	-14.87
802.11ax(H40)	Lowest	-17.56	9.44	-8.12	-18.12
	Middle	-16.69	9.44	-7.25	-17.25
	Highest	-18.83	9.44	-9.39	-19.39
PSDTest Result (dBm/30kHz)= Result +Offset Offset= Instrument attenuation +cable loss=8.64 dB +0.8 dB =9.44dB PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10					
Limit: 8dBm/3kHz					
Test Result:	PASS				

Test plots as follows:

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.

802.11b Modulation

Lowest channel

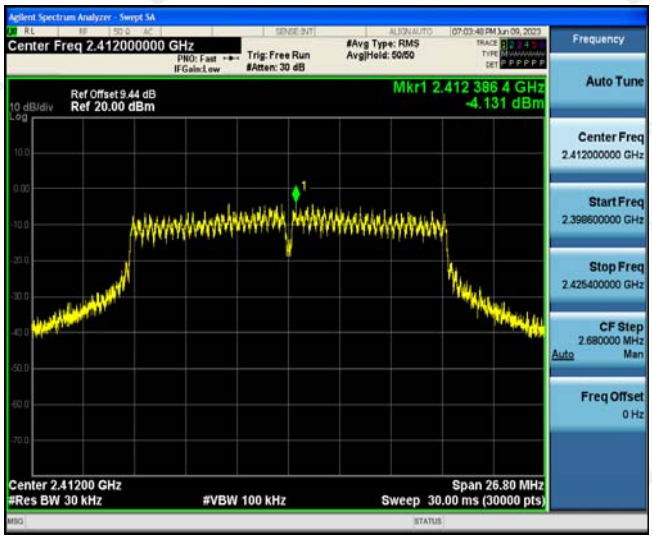
Middle channel

Highest channel

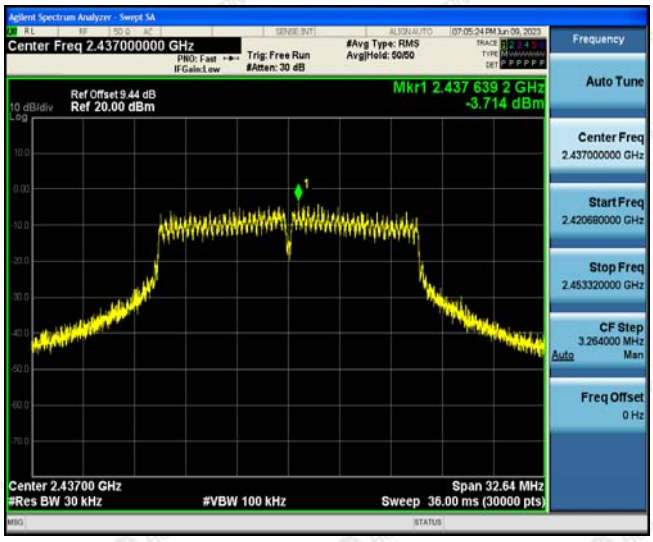
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11g Modulation

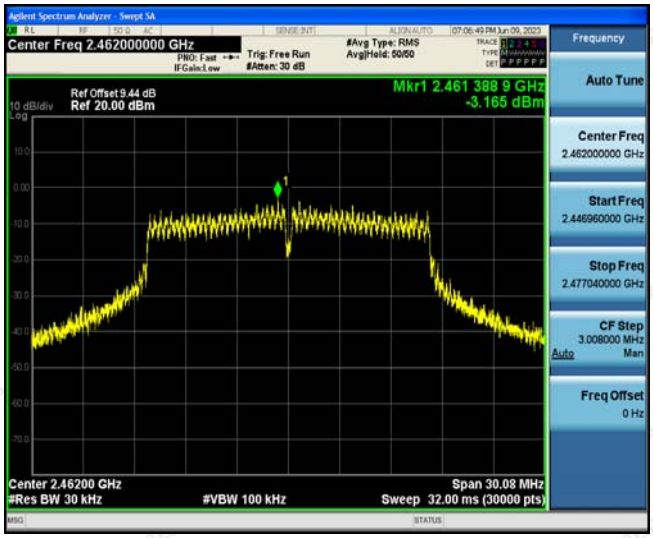
Lowest channel



Middle channel



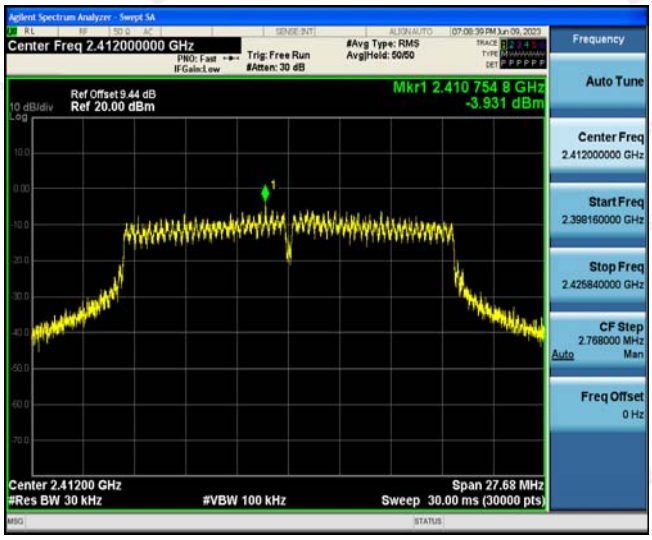
Highest channel



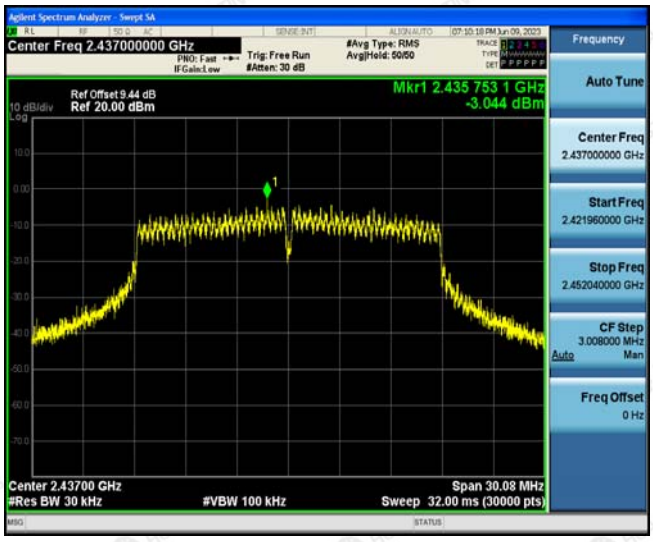
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11n (HT20) Modulation

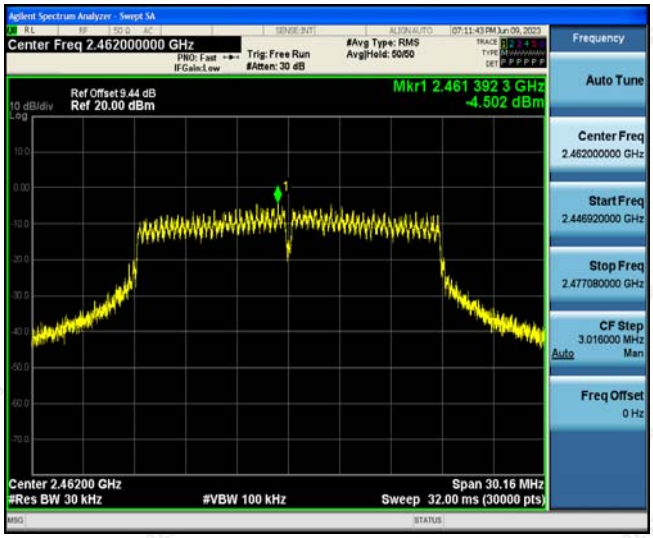
Lowest channel



Middle channel



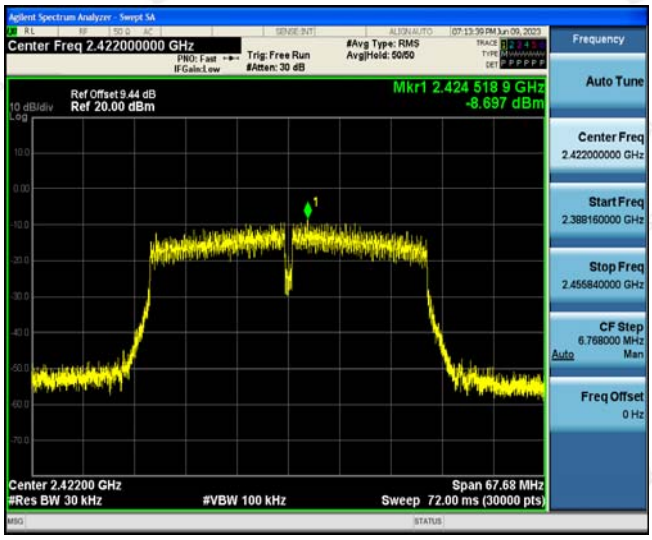
Highest channel



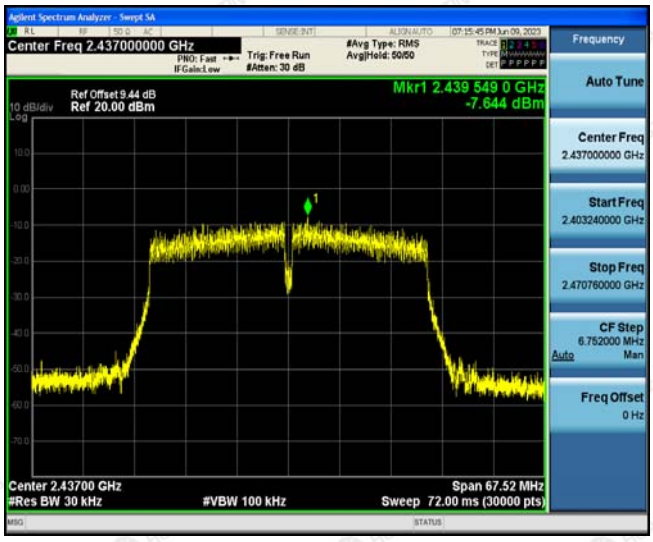
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11n (HT40) Modulation

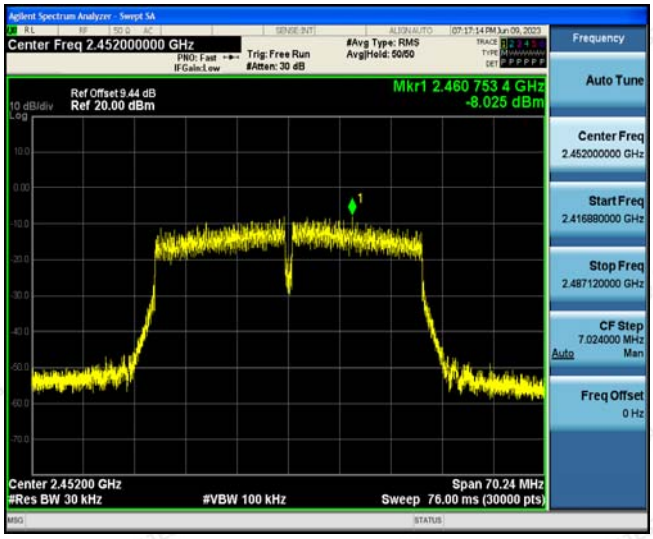
Lowest channel



Middle channel



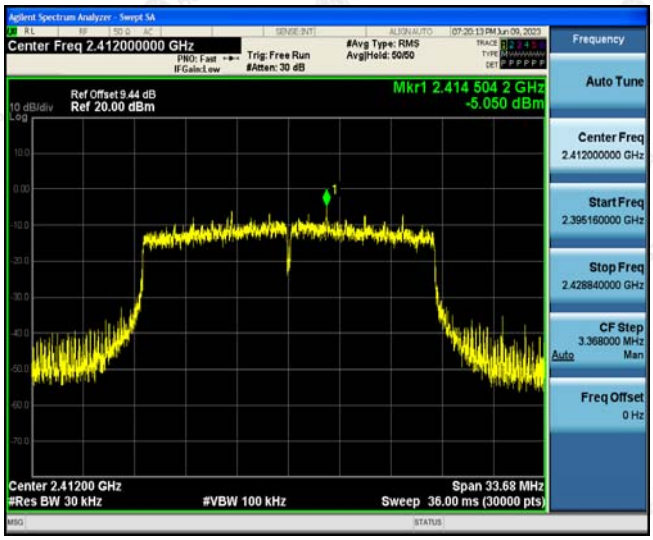
Highest channel



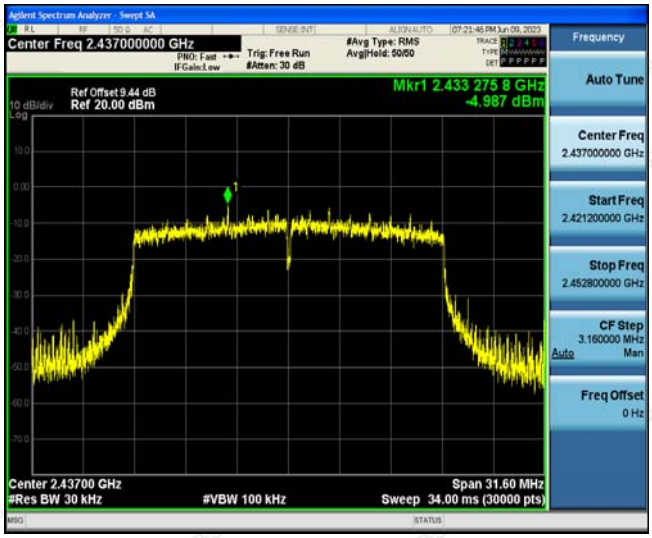
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11ax(HT20) Modulation

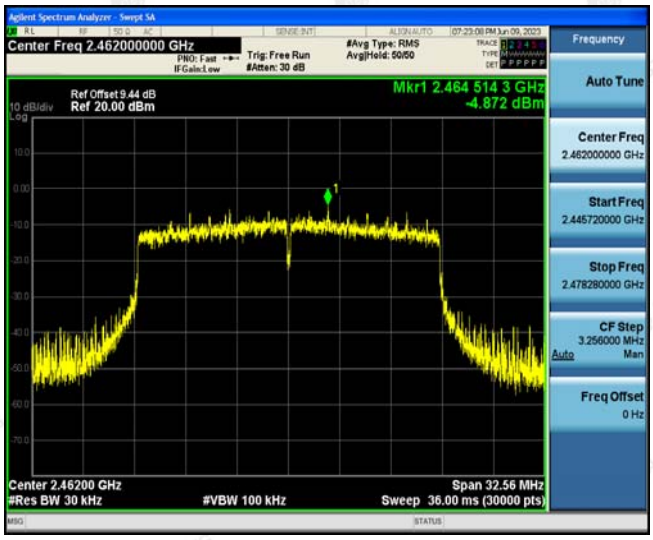
Lowest channel



Middle channel



Highest channel



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.