

Report No.: HK2201060061-1E

FCC TEST REPORT

Test report On Behalf of CE Labs, LLC. For Media Players Model No.: CE440, CE640, CE420, CE220

FCC ID: 2AO9Q-2GCA6B

Prepared for :

CE Labs, LLC.

3209 Wood Drive Garland TX US 75041

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:
 Jan. 04, 2022 ~ Jan. 10, 2022

 Date of Report:
 Jan. 10, 2022

 Report Number:
 HK2201060061-1E

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 cannont 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



Page 2 of 88

Report No.: HK2201060061-1E

TEST RESULT CERTIFICATION

Applicant's name	CE Labs, LLC.
Address:	3209 Wood Drive Garland TX US 75041
Manufacture's Name:	CE Labs, LLC.
Address	3209 Wood Drive Garland TX US 75041
Product description	
Trade Mark:	N/A MARTIN O MARTIN
Product name:	Media Players
Model and/or type reference .:	CE440, CE640, CE420, CE220
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	Jan. 04, 2022 ~ Jan. 10, 2022
Date of Issue	Jan. 10, 2022
Test Result	Pass

Testing Engineer

Jan

(Gary Qian)

Technical Manager

Authorized Signatory :

<u>en</u>

(Eden Hu)

ason 1

(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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com



NG

¦К

TABLE OF CONTENTS

1.	Test Result Summary	5
	1.1. TEST PROCEDURES AND RESULTS	
	1.2. INFORMATION OF THE TEST LABORATORY	5
	1.3. MEASUREMENT UNCERTAINTY	
2.	EUT Description	7
	2.1. GENERAL DESCRIPTION OF EUT	7
	2.2. CARRIER FREQUENCY OF CHANNELS	
	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	
4.	Test Results and Measurement Data	12
	⁶ 4.1. Conducted Emission	12
	4.2. MAXIMUM CONDUCTED OUTPUT POWER	
	4.3. Emission Bandwidth	18
	4.4. Power Spectral Density	29
	4.5. CONDUCTED BAND EDGE AND SPURIOUS EMISSION MEASUREMENT	41
	4.6. RADIATED SPURIOUS EMISSION MEASUREMENT	59
	4.7. ANTENNA REQUIREMENT	85
	4.8. PHOTOS OF THE EUT	88

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 cannont 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.



T 591

** Modified History **

Revision	Description		Issued Data	Remark	
Revision 1.0	Initial Test Report Release		Jan. 10, 2022	Jason Zhou	
WAKTES	MAKTES	JK TES	WAK TES	ILAK TES	
··· 0.	00		0.	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 cannont 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. Test Result Summary

1.1. TEST PROCEDURES AND RESULTS

CFR 47 Section	Result
§15.203/§15.247 (c)	PASS
§15.207	PASS
§15.247 (b)(3)	PASS
§15.247 (a)(2)	PASS
§15.247 (e)	PASS
1§5.247(d)	PASS
§15.205/§15.209	PASS
	§15.203/§15.247 (c) §15.207 §15.247 (b)(3) §15.247 (a)(2) §15.247 (e) 1§5.247(d)

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 cannont 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

FICATION



1.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, 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
75TING	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 cannont 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

HUAK TESTING

2.1. GENERAL DESCRIPTION OF EUT

Equipment	Media Players	HUAKTESTIN
Model Name	CE440	
Serial Model	CE640, CE420, CE220	ESTING
Model Difference	All model's the function, software and electric circuit same, only with a product color and model named d Test sample model: CE440	
Trade Mark	N/A	- An
FCC ID	2AO9Q-2GCA6B	
Antenna Type	External Antenna	HUAKTES
Antenna Gain	Antenna 1:3dBi Antenna 2:3dBi MIMO: 6.010dBi	ESTING
Operation frequency	802.11b/g/n 20:2412~2462 MHz 802.11n 40: 2422~2452MHz	
Number of Channels	802.11b/g/n20: 11CH 802.11n 40: 7CH	UAKTESTING
Modulation Type	CCK/OFDM/DBPSK/DAPSK	
Power Source	DC 12V from adapter	TESTIN
Power Rating	DC 12V from adapter	HUAN
Hardware Version:	V1.0	STING
Software Version:	V1.0	

Note:

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 cannont 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

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com





2.2. Carrier Frequency of Channels

	Ch	annel List	t for 802.11b	/802.11g/8	02.11n (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	STING	

Channel List For 802.11n (HT40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
ESTING	KTESTING C	04	2427	07	2442	TESTIN	WTES
@ ⁴⁰		05	2432	08	2447	HUAN	CO-HOM
03	2422	06	2437	09	2452	I.	

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

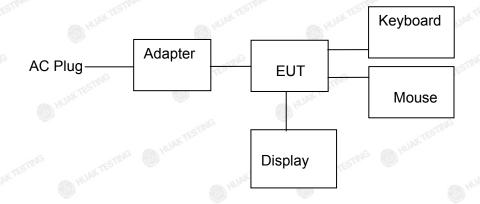
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com



K

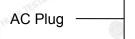
2.4. DESCRIPTION OF TEST SETUP

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



EUT

Operation of EUT during Above1GHz Radiation testing:



Display information Model: 24PFF3661/T3 Input: AC 120V/60Hz

Adapter information Model: FJ-SW126G1201500N Input: 100-240V ~ 50/60Hz 0.6A Max Output: 12V 1.5A, 18.0W

Mouse information Model: OP-300 Input: DC 5V

Keyboard information Model: KB-202 Input: DC 5V

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 cannont 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

Engineering mode:	Keep the EUT in continuous transmitting
UNCTESTING UNACTESTING	by select channel and modulations (The value of duty cycle is 98.46%)
ur hur	value of duty cycle is 50.4070)

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 foun	d the follow list	which it
was worst case.				

	Mode	HUNK TES	Data rate	
	802.11b		1Mbps	w.
	802.11g	TING	6Mbps	TAIG
HUA	802.11n(H20)	HUAKTES	6.5Mbps	HUAKTES
w.	802.11n(H40)		13.5Mbps	W

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), 13.5Mbps for 802.11(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 cannont 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.co

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



HUAK TESTING

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
1	IG I HUNKTEST	is I	I HUAK TESTIN	3 /

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 cannont 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.

VCATIO,



4. Test Results and Measurement Data

4.1. Conducted Emission

4.1.1. Test Specification

-mls	Thomas Thomas	NO	INC TEST				
Test Requirement:	FCC Part15 C Section	15.207	HUAN				
Test Method:	ANSI C63.10:2013	ANSI C63.10:2013					
Frequency Range:	150 kHz to 30 MHz	O HUAN IL	14K TESTING				
Receiver setup:	RBW=9 kHz, VBW=30) kHz, Sweep time	=auto				
	Frequency range	Limit (dBuV)				
	(MHz)	Quasi-peak	Áverage				
Limits:	0.15-0.5	66 to 56*	56 to 46*				
	0.5-5	56	46				
	5-30	60	50				
	Reference	e Plane	- CJI				
Test Setup:	E.U.T AC powe Test table/Insulation plane Remark: E.U.T. Equipment Under Test LISN: Line Impedence Stabilization Ne Test table height=0.8m	EMI Receiver	— AC power				
Test Mode:	Charging + transmitting	g with modulation					
Test Procedure:	 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. 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). 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	No.	1000				

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@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	Dec. 09, 2021	Dec. 08, 2022		
LISN	R&S	ENV216	HKE-002	Dec. 09, 2021	Dec. 08, 2022		
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).

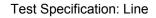
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

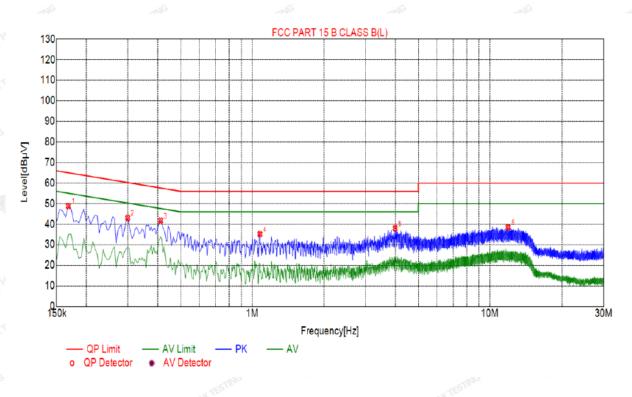


Page 14 of 88

ΑF

4.1.3 Test data





Sus	Suspected List									
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре		
1	0.1680	48.85	20.01	65.06	16.21	28.84	PK	L		
2	0.2985	43.04	20.04	60.28	17.24	23.00	PK	L		
3	0.4110	41.74	20.03	57.63	15.89	21.71	PK	L		
4	1.0770	35.15	20.07	56.00	20.85	15.08	PK	L		
5	3.9885	37.98	20.25	56.00	18.02	17.73	PK	L		
6	11.9310	38.54	19.99	60.00	21.46	18.55	PK	L		

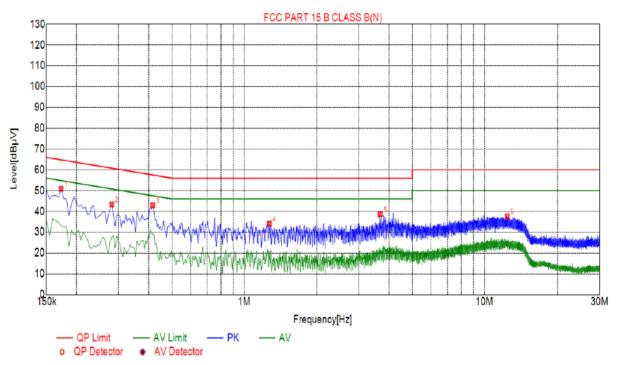
Remark: Margin = Limit – Level Correction factor = Cable lose + LISN insertion loss Level=Test receiver reading + correction factor

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Test Specification: Neutral



Sus	Suspected List									
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре		
1	0.1725	50.81	20.04	64.84	14.03	30.77	PK	N		
2	0.2805	43.38	20.04	60.80	17.42	23.34	PK	N		
3	0.4155	42.93	20.03	57.54	14.61	22.90	PK	N		
4	1.2705	34.10	20.09	56.00	21.90	14.01	РК	N		
5	3.6780	38.66	20.25	56.00	17.34	18.41	РК	N		
6	12.4395	37.55	19.98	60.00	22.45	17.57	РК	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 cannont 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.

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

HUAK TESTING

4.2. Maximum Conducted Output Power

4.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.24	17 (b)(3)
Test Method:	KDB 558074	HUNKIN OHUAKIN
Limit:	30dBm	TESTING
Test Setup:	Power meter	EUT
Test Mode:	Transmitting mode with mod	lulation
Test Procedure:	compensated to the resu 3. Set to the maximum powe EUT transmit continuous	5.247 Meas Guidance s connected to the power ttenuator. The path loss was lts for each measurement. er setting and enable the
Test Result:	PASS	AKTESTING PLAKTESTING

4.2.2. Test Instruments

RF Test Room						
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Power meter	Agilent	E4419B	HKE-085	Dec. 09, 2021	Dec. 08, 2022	
Power Sensor	Agilent	E9300A	HKE-086	Dec. 09, 2021	Dec. 08, 2022	
RF cable	Times	1-40G	HKE-034	Dec. 09, 2021	Dec. 08, 2022	
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022	

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



4.2.3. Test Data

Test	Frequency	Maximum Pea	k Conducted Output	Power (dBm)	LIMIT
Channel	(MHz)	Antenna port 1	Antenna port 2	MIMO	dBm
	O HO.	O HO.	TX 802.11b Mode	O HU.	O HO.
CH01	2412	16.19	13.33	/ TESTIN	30
CH06	2437	13.79	14.47	C HUAN	30
CH11	2462	14.49	14.58	I	30
	.G. (HUAKTEST	TX 802.11g Mode	HUAKTEST	
CH01	2412	14.54	13.87	1	30
CH06	2437	15.98	14.77	1 0 **	30
CH11	2462	15.59	15.11	/	30
TESTING	AK TESTING	WTEST	X 802.11n20 Mode	ak T	ESTING AK TESTIN
CH01	2412	15.71	13.96	17.93	30
CH06	2437	15.99	14.83	18.46	30
CH11	2462	16.07	14.46	18.35	30
0	Ho.	T.	X 802.11n40 Mode	-MG	O m
CH03	2422	14.33	14.91	17.64	30
CH06	2437	15.09	14.18	17.67	30
CH09	2452	15.09	15.04	18.08	30

Note: This product supports antenna 1 and antenna 2 launch, but only support 802.11 n 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 cannont 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



CATION

4.3. Emission Bandwidth

4.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)					
Test Method:	KDB 558074	O HOM	O HOM			
Limit:	>500kHz	AKTESTING	G			
Test Setup:	Spectrum Analyzer	EUT	MG TESTING			
Test Mode:	Transmitting mode with modulation					
Test Procedure:	 Transmitting mode with modulation 1. The testing follows FCC KDB Publication No. 55807 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' resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to mak an accurate measurement. The 6dB bandwidth mu be greater than 500 kHz. 4. Measure and record the results in the test report. 					
Test Result:	PASS	C HUAN	NG STING			

4.3.2. Test Instruments

RF Test Room						
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022	
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 09, 2021	Dec. 08, 2022	
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022	

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 cannont 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

HUAK Testing Lab TEL: +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail: service@cer-mark.com



4.3.3. Test data

O HUM O H	For a	antenna port 1	C HUM	O H
Test channel		6dB Emission	Bandwidth (MHz)	
rest channel	802.11b	802.11g	802.11n(H20)	802.11n(H40)
Lowest	9.560	16.360	17.600	35.680
Middle	9.960	16.320	17.600	35.760
Highest	10.040	16.360	17.600	36.000
Limit:	D HUNK IL	nic testing >	500k	G TESTING
Test Result:	O HUAK TI	PHONE F	PASS	O HUAN

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 cannont 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.



Page 20 of 88

Report No.: HK2201060061-1E

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 cannont 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.



Page 21 of 88

Report No.: HK2201060061-1E

NG

¦К

802.11g Modulation

Lowest channel



Middle channel



Highest channel

 Action
 Mader
 Served
 Action
 Action</

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



802.11n (HT20) Modulation

Lowest channel



Middle channel



Highest channel

 Algent Southan Audyms
 See 14 MB and 7.000
 Prequency

 Algent Southan Audyms
 1900 Ac1
 1900 Ac1

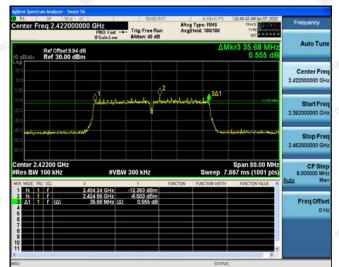
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

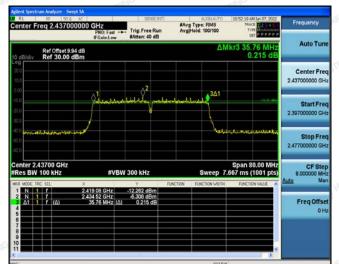


802.11n (HT40) Modulation

Lowest channel



Middle channel



Highest channel

 Ref
 Store
 S

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



FICATION

AKTEST	or antenna por	t 2	- WAKTED	
6dB Emission Bandwidth (MHz)				
802.11b	802.11g	802.11n(H20)	802.11n(H40)	
10.080	16.320	17.600	36.080	
10.080	16.360	17.600	35.760	
9.600	16.320	17.600	36.160	
≥500 (kHz)				
AU.	NG PARTESTING	ASS	STING	
	802.11b 10.080 10.080	6dB Emission 802.11b 802.11g 10.080 16.320 10.080 16.360 9.600 16.320 ≥50	802.11b 802.11g 802.11n(H20) 10.080 16.320 17.600 10.080 16.360 17.600 9.600 16.320 17.600	

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail: service@cer-mark.com



Page 25 of 88

Report No.: HK2201060061-1E

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 cannont 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.



Page 26 of 88

Report No.: HK2201060061-1E

802.11g Modulation

Lowest channel



Middle channel



Highest channel

 Agent Byochus Multyrn - Snyt XA
 Biol Sci All
 Biol Sci All
 All Staturo
 Biol Sci All
 Frequency

 Center Freq 2.452000000 GHz IFGalact and Biol Sci All
 Inter Freq 2.452000000 GHz IFGSalct and IfGalact and IfGalact

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Page 27 of 88

Report No.: HK2201060061-1E

NG

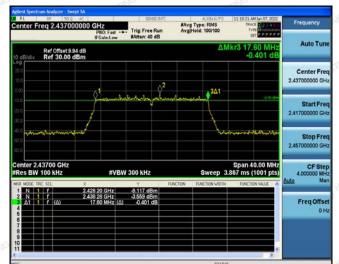
IК °PB

802.11n (HT20) Modulation

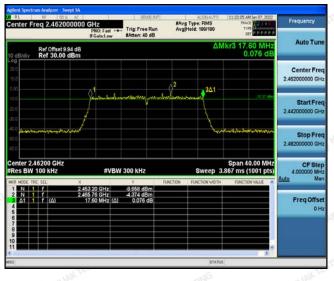
Lowest channel



Middle channel



Highest channel

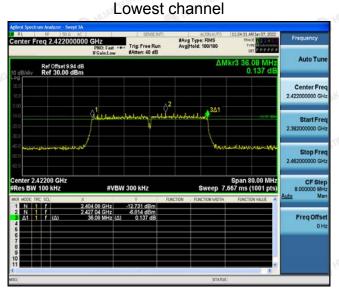


The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

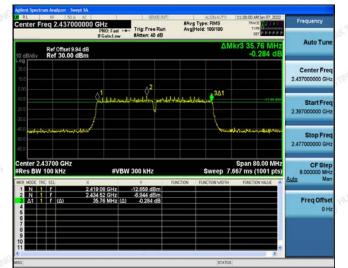
HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com



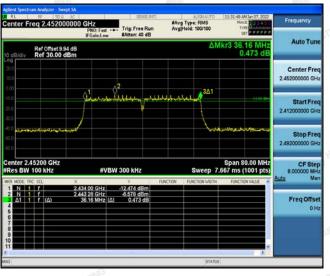
802.11n (HT40) Modulation



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 cannont 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			
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:	Spectrum Analyzer			
Test Mode:	Transmitting mode with modulation			
Test Procedure:	 The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02. 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. 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. Detector = Peak, Sweep time = auto couple. Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level. 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	Dec. 09, 2021	Dec. 08, 2022
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 09, 2021	Dec. 08, 2022
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022

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 cannont 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

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



For antenna port 1

FICATION

4.4.3. Test data

EUT Set Mode	Channel	Result (dBm/30kHz)	Result (dBm/3kHz)		
	Lowest	-0.51	-10.51		
802.11b	Middle	-2.31	-12.31		
	Highest	-2.05	-12.05		
	Lowest	-8.95	-18.95		
802.11g	Middle	-7.39	-17.39		
	Highest	-7.68	-17.68		
	Lowest	-7.52	-17.52		
802.11n(H20)	Middle	-7.51	-17.51		
	Highest	-7.51	-17.51		
	Lowest	-11.54	-21.54		
802.11n(H40)	Middle	-11.3	-21.3		
	Highest	-11.52	-21.52		
PSD test result (dBm/3	3kHz)= PSD test	t result (dBm/30kHz)-10			
Limit: 8dBm/3kHz					
Test Result:	Test Result: PASS				

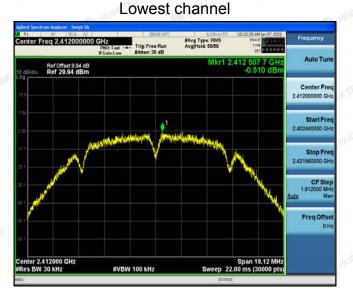
Test plots as follows:

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 cannont 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.



Report No.: HK2201060061-1E

802.11b Modulation



Middle channel



Highest channel



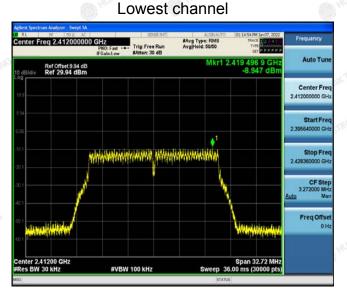
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.



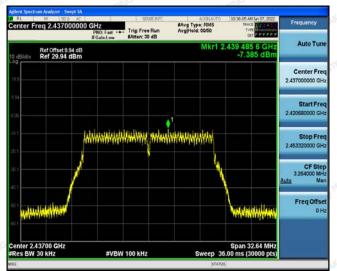
Page 32 of 88

Report No.: HK2201060061-1E

802.11g Modulation



Middle channel



Highest channel

Adjent Sexturn Analyzer, Sang SA Center Freq 2.462000000 GHz Bio Fait → Trig: Free Run Center Freq 2.45200000 GHz Center Freq 2.4520000 GHz Center Freq 2.4552000 GHz Center Sext Advector Se

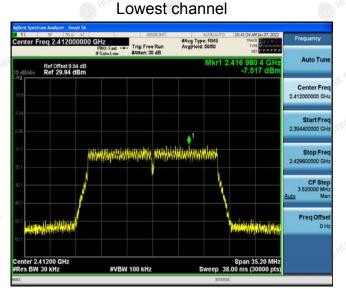
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.



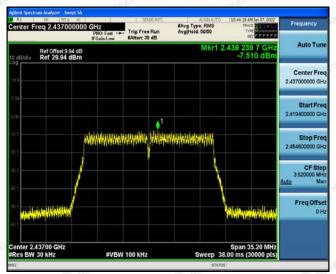
NG

¦К

802.11n (HT20) Modulation



Middle channel



Highest channel

Adjent Sexterna Audyor, Sang SA Center Freq 2.462000000 GHz Bit Side (Center Freq 2.46200000 GHz Center Sexterna Side (Center Freq 2.462000000 GHz Center Sexterna Side (Center Freq 2.46200000 GHz Center Sexterna Side (Center Freq 2.46400000 GHz Center Sexterna Side (Center Sexterna Side (Center Freq 2.4640000 GHz Center Sexterna Side (Center Freq 2.4640000 GHz Center Sexterna Side (Center Sexterna Side

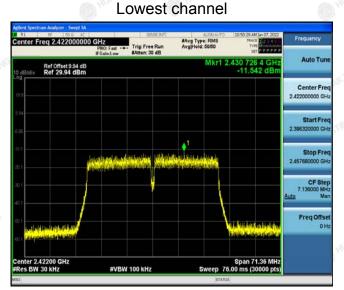
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

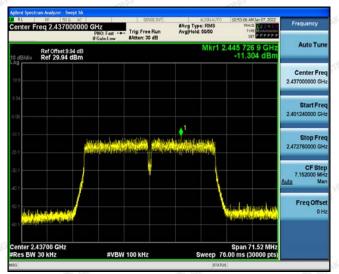


T ovi

802.11n (HT40) Modulation



Middle channel



Highest channel

 Center Section Address - Sept 34
 Users part 34
 Users part 34
 Frequency

 Center Freq 2.452000000 GHz BitC Feet -BitC Feet -B

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



		MAR	
EUT Set Mode	Channel	Result (dBm/30kHz)	Result (dBm/3kHz)
	Lowest	-2.56	-12.56
802.11b	Middle	-1.03	-11.03
	Highest	-1.9	-11.9
	Lowest	-9.65	-19.65
802.11g	Middle	-8.29	-18.29
	Highest	-8.18	-18.18
	Lowest	-9.08	-19.08
802.11n(H20)	Middle	-8.32	-18.32
	Highest	-8.5	-18.5
	Lowest	-11.32	-21.32
802.11n(H40)	Middle	-12.26	-22.26
	Highest	-11.3	-21.3
PSD test result (dBm/	/3kHz)= PSD test	result (dBm/30kHz)-10	
Limit: 8dBm/3kHz			
Test Result:	anne	PASS	nic Or

For antenna port 2

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 cannont 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.

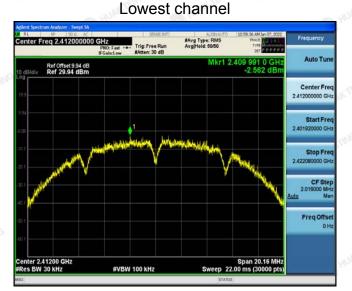


Page 36 of 88

Report No.: HK2201060061-1E

TEICATION

802.11b Modulation



Middle channel



Highest channel



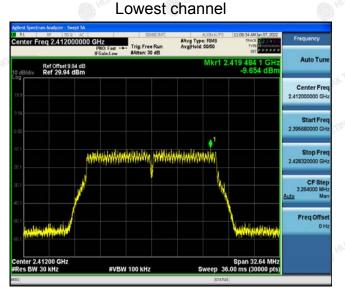
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.



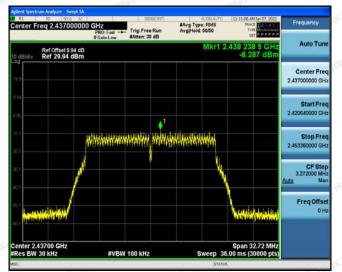
Page 37 of 88

Report No.: HK2201060061-1E

802.11g Modulation



Middle channel



Highest channel

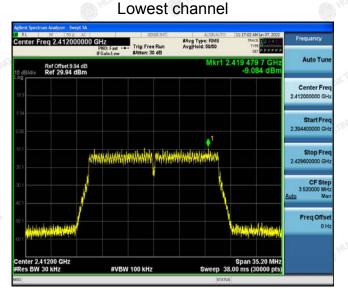
#Avg Type: RMS Avg|Held: 50/50 Trig: Free Run #Atten: 30 dB Auto Tur 8 863 9 G -8.178 dB Ref Offset 9.94 dB Ref 29.94 dBm Center Fr Start Fi Newinghill wither with top F CFS Freq Offs enter 2.46200 G Res BW 30 kHz #VBW 100 kHz

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 cannont 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.

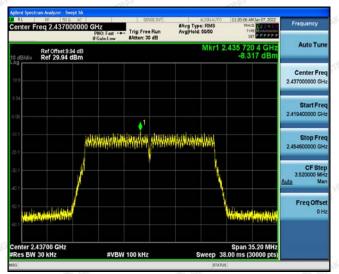
HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



802.11n (HT20) Modulation



Middle channel



Highest channel

 Algent System
 Augent System
 Augent System
 Augent System
 Augent System
 Augent System
 Frequency
 Frequency

 Center Freq 2.452000000 GHz Broket System
 Ingr. Free Run Broket System
 Augent System
 Ingr. Free Run Broket System
 Mkr1 2.460 735 7 GHz -85.004 dBm
 Auto Tune

 10 dilide/ Conter Freq 2.45200000 GHz
 Ingr. Free Run Broket System
 Mkr1 2.460 735 7 GHz -85.004 dBm
 Center Freq 2.46200000 GHz
 Center Freq 2.46200000 GHz
 Center Freq 2.46200000 GHz
 Center Freq 2.46200000 GHz
 Center Freq 2.4620000 GHz
 Center Freq 2.4620000 GHz
 Center Freq 2.4620000 GHz
 Stop Freq 3.5200 MHz
 Stop Freq 3.5200 MHz
 Stop Freq 3.5200 MHz
 Center Freq 2.4620000 GHz
 Center Freq 2.4620000 GHz
 Center Freq 2.4620000 GHz
 Center Freq 2.4620000 GHz
 Center Freq 2.4640000 GHz
 Center Freq 3.5200 MHz
 Center

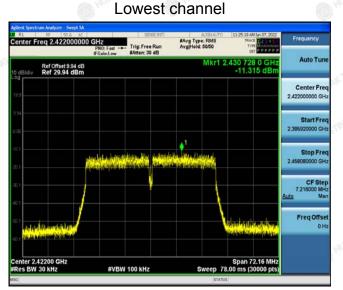
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.



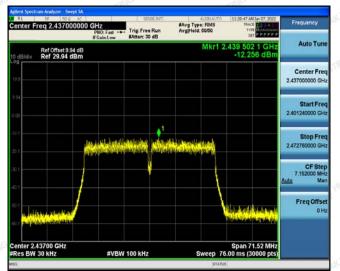
TI

-HE

802.11n (HT40) Modulation



Middle channel



Highest channel

 Algent Systems Adapter. Suppl 30
 File USD Fail
 Algent Type: RMS
 Mark Black Black
 Frequency

 Center Freq 2.452000000 GHz
 Bit Fail
 Mit 1 2.460 7329 GHz
 Auto Tune

 Bit Black B

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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



For	MIMO	antenna	port [·]	1+antenna	port 2
-----	------	---------	-------------------	-----------	--------

	TX 802.11b Mode		
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz		8	P
2437 MHz	THAT TESTING /	8 105 1045	1
2462 MHz	HUAKTES	8	HUN TES
	TX 802.11g Mode	AK TESTING	
2412 MHz	TESTING ACTESTING	8	ESTING /
2437 MHz	Martin I O Home	8	A HORE
2462 MHz	/	8	1
TING	TX 802.11n/HT20 Mode	WTES	TING
2412 MHz	-5.22	7.99	PASS
2437 MHz	-4.89	7.99	PASS
2462 MHz	-4.97	7.99	PASS
	TX 802.11n/HT40 Mode	TESTING	
2422 MHz	-8.42	7.99	PASS
2437 MHz	-8.74	7.99	PASS
2452 MHz	-8.40	7.99	PASS

Note: This product supports antenna 1 and antenna 2 launch, but only support 802.11 n 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 cannont 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.

Page 41 of 88

HUAK TESTING

4.5. Conducted Band Edge and Spurious Emission Measurement

4.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.2	47 (d)	-10
Test Method:	KDB558074	HUAKTES	HUAKTES
Limit:	In any 100 kHz bandwidt frequency band, the em non-restricted bands shall b 30dB relative to the maxim RF conducted measureme which fall in the restricted 15.205(a), must also comp limits specified in Section 15	nissions which be attenuated at le um PSD level in ent and radiated bands, as defined by with the radiated	fall in the east 20 dB / 100 kHz by d emissions d in Section
Test Setup:	Spectrum Analyzer	EUT	- HUAKTESTIN
Test Mode:	Transmitting mode with mod	dulation	
Test Procedure:	 The testing follows FCC I D01 15.247 Meas Guida The RF output of EUT wa analyzer by RF cable an was compensated to the measurement. Set to the maximum pow EUT transmit continuous Set RBW = 100 kHz, VBV Unwanted Emissions me bandwidth outside of the shall be attenuated by a maximum in-band peak maximum peak conduct used. If the transmitter of power limits based on th a time interval, the atten paragraph shall be 30 dl 15.247(d). Measure and record the re against the limit line in th 	ance v05r02. as connected to the d attenuator. The e results for each er setting and ena- sly. <i>N</i> =300 kHz, Peak easured in any 10 e authorized frequent t least 20 dB relate PSD level in 100 ed output power prophies with the e use of RMS avecuation required u B instead of 20 dB results in the test uency should be	able the c Detector. 00 kHz ency band tive to the kHz when procedure is conducted eraging over nder this B per report. excluded
	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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com



AL

4.5.2. Test Instruments

RF Test Room						
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022	
Signal generator	Agilent	N5183A	HKE-071	Dec. 09, 2021	Dec. 08, 2022	
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 09, 2021	Dec. 08, 2022	
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022	

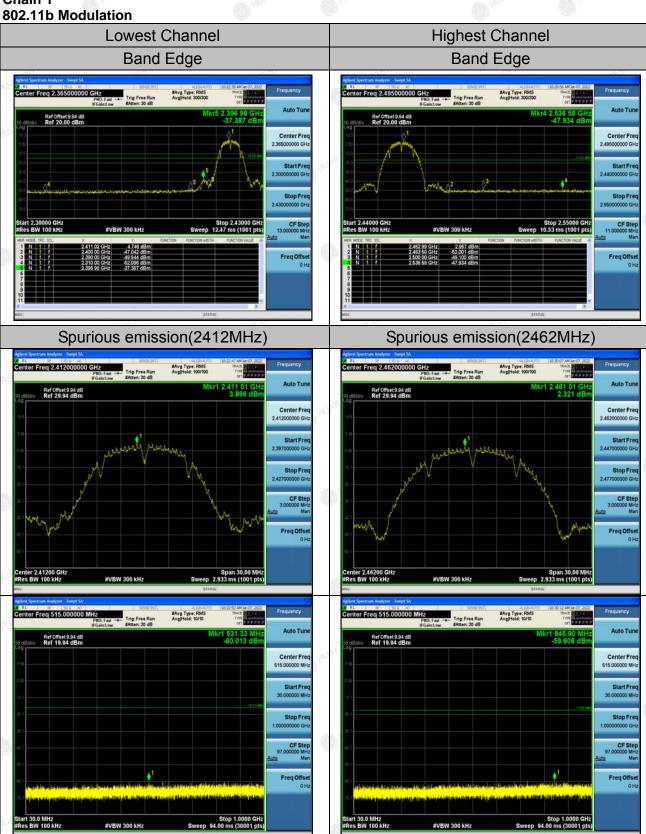
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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 cannont 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



Page 43 of 88

4.5.3. Test Data Chain 1



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 cannont 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.

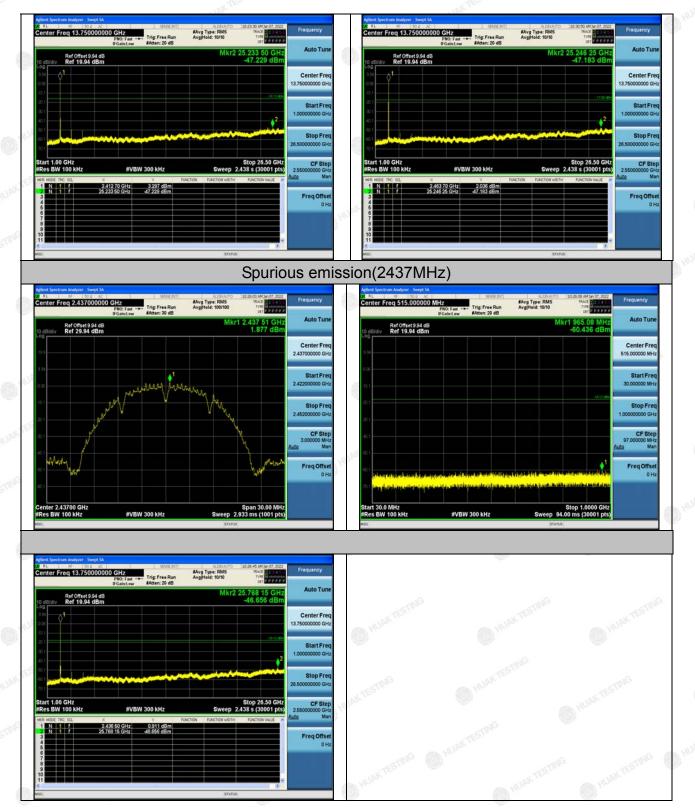
HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com



Page 44 of 88

Report No.: HK2201060061-1E

ACATA



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 cannont 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.

HUAK Testing Lab TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com