

FCC Test Report

Test Report
On Behalf of
Magic Brands LLC
For
The Magic Box

Model No.: TMB-S2, TMB-S1, TMB-S3

FCC ID: 2BELP-TMB-S2

Prepared For: Magic Brands LLC

Unit A, 10911 Wheatlands Ave, Santee, CA 92071, United States

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. 02, 2024 ~ Jan. 15, 2024

Date of Report: Jan. 15, 2024

Report Number: HK2401020027-2E

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



Test Result Certification

Applicant's Name.....: Magic Brands LLC

Address Unit A, 10911 Wheatlands Ave, Santee, CA 92071, United States

Manufacturer's Name Magic Brands LLC

Address Unit A, 10911 Wheatlands Ave, Santee, CA 92071, United States

Product Description

Trade Mark The Magic Brand

Product Name...... The Magic Box

Model and/or Type Reference: TMB-S2, TMB-S1, TMB-S3

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. 02, 2024 ~ Jan. 15, 2024

Date of Issue...... Jan. 15, 2024

Test Result...... Pass

Testing Engineer

len lian

Len Liao

Technical Manager

Wan

Sliver Wan

Authorized Signatory

Jason Whou

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



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	
2.		7
	2.1. General Description of EUT	
	2.2. Carrier Frequency of Channels	8
	2.3. Operation of EUT during Testing	
	2.4. Description of Test Setup	9
3.	General Information	10
	3.1. Test Environment and Mode	10
	3.2. Description of Support Units	13
4.	Test Results and Measurement Data	14
	4.1. Conducted Emission	14
	4.2. Test Result	
	4.3. Maximum Conducted Output Power	18
	4.4. Emission Bandwidth	20
	4.5. Power Spectral Density	
	4.6. Conducted Band Edge and Spurious Emission Measurement	33
	4.7. Radiated Spurious Emission Measurement	43
	4.8. Antenna Requirement	69
5.	Photographs of Test	70
C	Photos of the ELIT	70

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.





** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jan. 15, 2024	Jason Zhou
	(a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c		(a)
-6			

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 cannon 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

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

Note:

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

1.2. Information of the Test Laboratory

Shenzhen 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.

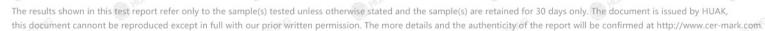
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reporduced except in full with our prior written permission. The more details and the authenticity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



1.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, 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.	ltem	MU
⁶ 1	Conducted Emission	±2.71dB
2	RF power, conducted	±0.37dB
3	Spurious emissions, conducted	±0.11dB
4,,,,,	All emissions, radiated(<1G)	±3.90dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
EST Y	Humidity	±1.0%







2. EUT Description

2.1. General Description of EUT

200	20.	2019
Equipment:	The Magic Box	
Model Name:	TMB-S2	
Series Model:	TMB-S1, TMB-S3	TESTING
Model Difference:	All model's the function, software and elect same, only with product model named different sample model: TMB-S2.	
FCC ID:	2BELP-TMB-S2	
Antenna Type:	FPC Antenna	
Antenna Gain:	2.0dBi	G TSTIN
Operation Frequency:	802.11b/g/n 20:2412~2462 MHz 802.11n 40: 2422~2452MHz	WHITE .
Number of Channels:	802.11b/g/n20: 11CH 802.11n 40: 7CH	TESTING
Modulation Type:	CCK/OFDM/DBPSK/DAPSK	HUAN
Power Source:	DC 5V from Type-C or DC5V from micro U	JSB
Power Rating:	DC 5V from Type-C or DC5V from micro U	JSB Phillips

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 cannon 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)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	^{AUP 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	N TESTI	04	2427	07	2442	TESTINI	akTES
(D) HI		05	2432	08	2447	HUAR	Mary Home
03	2422	06	2437	09	2452		

Note:

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

2.3. Operation of EUT during Testing

Operating Mode

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

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

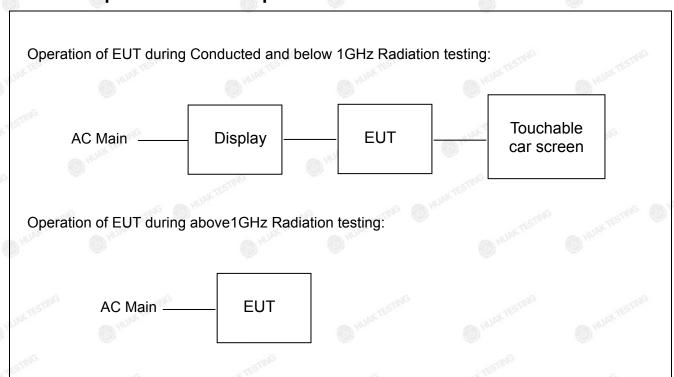
The mode is used: Transmitting mode for 802.11n (HT40)

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

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

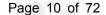


2.4. Description of Test Setup



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

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. General Information

3.1. Test Environment and Mode

perating Environment:			
Temperature:	25.0 °C	WAKTESIN	THUAK!
Humidity:	56 % RH		(1)
Atmospheric Pressure:	1010 mbar	OKTESTING	-NG
est Mode:			
Engineering Mode:	Keep the EUT i		

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.

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



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.

Data rate
1Mbps
6Mbps
6.5Mbps
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), 13.5Mbps for 802.11n(H40).

3. Mode Test Duty Cycle

Mode	Duty Cycle	Duty Cycle Factor (dB)		
802.11b	0.996	-0.016		
802.11g	0.972	-0.122		
802.11n(H20)	0.970	-0.132		
802.11n(H40)	0.929	-0.322		

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 cannon 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



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.





3.2. 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.

		and the second s		- All The Control of	
Item	Equipment	Trade Mark	Model/Type No.	Specification	Remark
-STI	The Magic Box	The Magic Brand	TMB-S2	N/A	EUT
2	Display	AOC	N/A	N/A	Peripheral
3	Touchable car screen	N/A	N/A	N/A	Peripheral
		HUAY TES		WIAKTES!	H
HUAK TES	TING HUAN TESTING	HUAN TEST	HUAKTESTING	HUANTESTING	HUAKTESTING
9		-			

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



4. Test Results and Measurement Data

4.1. Conducted Emission

Test Specification

TING	-TING	TING	TINE	m			
Test Requirement:	FCC Part15 C Section	n 15.207	NY TES	HUAKTES			
Test Method:	ANSI C63.10:2013	ANSI C63.10:2013					
Frequency Range:	150 kHz to 30 MHz	150 kHz to 30 MHz					
Receiver Setup:	RBW=9 kHz, VBW=3	80 kHz, Sweep	time=auto				
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5 5-30	Limit (c Quasi-peak 66 to 56* 56 60	Average 56 to 46* 46 50	AKTESTING			
Test Setup:	Test table/Insulation pla	E.U.T AC power 80cm Filter AC power Test table/Insulation plane Remark E.U.T. Equipment Under Test LISN: Line impedence Stabilization Network					
Test Mode:	Transmitting with mo	dulation	AK TESTING	WAK TESTIN			
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	JAKTES	STING	-NG			
25	50 To	NEW APPLY		261			

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 cannon 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 Instruments

Conducted Emission Shielding Room Test Site (843)								
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due			
Receiver	R&S	ESR-7	HKE-005	Feb. 17, 2023	Feb. 16, 2024			
LISN	R&S	ENV216	HKE-002	Feb. 17, 2023	Feb. 16, 2024			
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Feb. 17, 2023	Feb. 16, 2024			
10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	Feb. 17, 2023	Feb. 16, 2024			
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A			

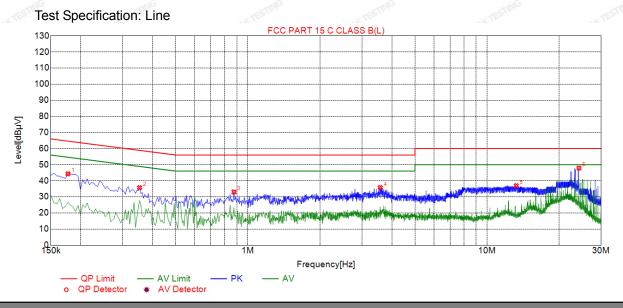
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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 cannon 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.

HANTED HUNNTED

4.2. Test Result

All modes have been tested. Only the worst result was reported as below:



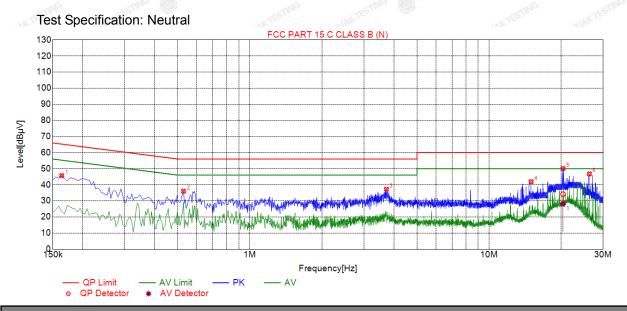
Sus	Suspected List										
NO.	Freq. [MHz]	Level [dBµ∀]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµ∀]	Detector	Туре			
1	0.1770	44.32	20.05	64.63	20.31	24.27	PK	L			
2	0.3525	35.72	20.03	58.90	23.18	15.69	PK	L			
3	0.8745	33.06	20.06	56.00	22.94	13.00	PK	L			
4	3.5790	35.77	20.25	56.00	20.23	15.52	PK	L			
5	13.2585	36.94	19.96	60.00	23.06	16.98	PK	L			
6	24.2295	47.88	20.23	60.00	12.12	27.65	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.



Sus	Suspected List										
NO.	Freq. [MHz]	Level [dBµ∀]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµ∀]	Detector	Туре			
1	0.1635	45.70	19.98	65.28	19.58	25.72	PK	N			
2	0.5280	36.03	20.04	56.00	19.97	15.99	PK	N			
3	3.7230	37.21	20.25	56.00	18.79	16.96	PK	N			
4	15.0045	41.95	19.96	60.00	18.05	21.99	PK	N			
5	20.3730	50.10	20.12	60.00	9.90	29.98	PK	N			
6	26.2905	46.76	20.26	60.00	13.24	26.50	PK	N			

3	Final Data List											
	NO.	Freq. [MHz]	Correction factor[dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	QP Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	AV Reading [dBµV]	Туре
<	1	20.3911	20.12	34.19	60.00	25.81	14.07	28.06	50.00	21.94	7.94	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.



4.3. Maximum Conducted Output Power

Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)						
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02						
Limit:	30dBm						
Test Setup:	RF automatic control unit EUT HUMATESTING HUMATESTING						
Test Mode:	Transmitting mode with modulation						
Test Procedure:	 The testing follows the Measurement Procedure of FCC KDB 558074 D01 15.247 Meas Guidance v05r02. The RF output of EUT was connected to the RF automatic control unit 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. Measure the Peak output power and record the results in the test report. 						
Test Result:	PASS						

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			
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 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.: HK2401020027-2E





Test Data

TEST	NG.	TX 802.11b Mode	G
Test Channel	Frequency	Maximum Peak Conducted Output Power	LIMIT
rest Gridinier	(MHz)	(dBm)	dBm
CH01	2412	14.10	30
CH06	2437	14.70	30
CH11	2462	14.34	30
0	0	TX 802.11g Mode	0
CH01	2412	13.55	30
CH06	2437	14.18	30
CH11	2462	13.63	30
ESTING	HUAKT	TX 802.11n20 Mode	ESTI
CH01	2412	13.70	30
CH06	2437	15.52	30
CH11	2462	13.71 HIM TO	30
	0	TX 802.11n40 Mode	9
CH03	2422	14.61	30
CH06	2437	14.43	30
CH09	2452	13.96	30

Note: The test results including the 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 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. Emission Bandwidth

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:	Spectrum Analyzer EUT						
Test Mode:	Transmitting mode with modulation						
Test Procedure:	 The testing follows FCC KDB Publication 558074 D01 15.247 Meas Guidance v05r02. Set to the maximum power setting and enable the EUT transmit continuously. 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. Measure and record the results in the test report. 						
Test Result:	PASS						

Test Instruments

ATTAL YOU	HO.	or MO.	ALL HO	ALC: NO.	ALL HO.			
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	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 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.



Test data

Took ahannal	6dB Emission Bandwidth (MHz)						
Test channel	802.11b	802.11g	802.11n(H20)	802.11n(H40)			
Lowest	8.080	14.960	14.440	34.000			
Middle	7.560	13.880	16.120	35.040			
Highest	7.560	15.480	15.120	35.040			
Limit:	>500kHz						
Test Result:	PASS METERING TESTING						

Test plots as follows:

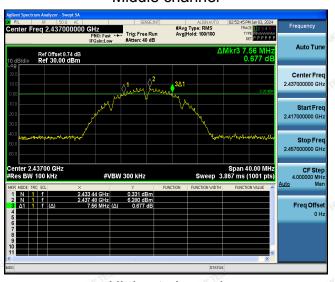
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11b Modulation

Lowest channel



Middle channel



Highest channel



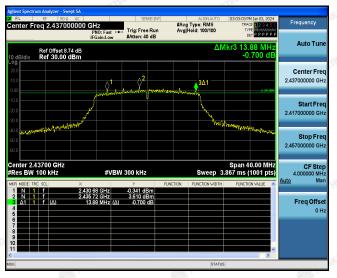
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannon be reproduced except in full with our prior written permission. The more details and the authenticity 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 cannon 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

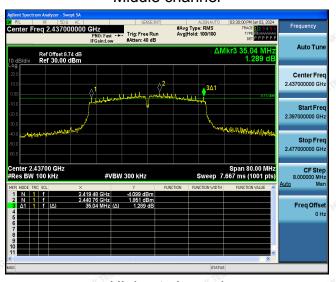


802.11n (HT40) Modulation

Lowest channel



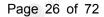
Middle channel



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 cannon 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.





4.5. Power Spectral Density

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 greated than 8dBm in any 3kHz band at any time interval continuous transmission.						
Test Setup:	Spectrum Analyzer EUT						
Test Mode:	Transmitting mode with modulation						
Test Procedure:	 The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication 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						

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.



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 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.



Test data

_						
EUT Set Mode	Channel	Result (dBm/30KHz)	Result (dBm/3kHz)			
802.11b	Lowest	2.11	-7.89			
	Middle	2.03	-7.97			
	Highest	1.80	-8.20			
802.11g	Lowest	-1.05	-11.05			
	Middle	-0.65	-10.65			
	Highest	-1.79	-11.79			
802.11n(H20)	Lowest	-1.20	-11.20			
	Middle	0.90	-9.10			
	Highest	-0.56	-10.56			
802.11n(H40)	Lowest	-2.28	-12.28			
	Middle	-1.39	-11.39			
	Highest	-2.23	-12.23			
PSD Test Resul	t (dBm/3kHz)= PS	SD Test Result (dBm/30kl	Hz)-10			
Limit: 8dBm/3kl						
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 cannon 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



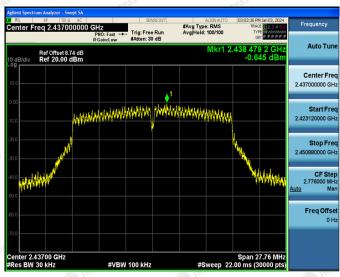
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

802.11g Modulation

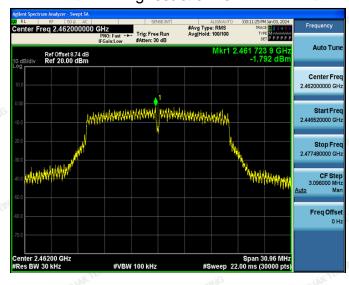
Lowest channel



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 cannon 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



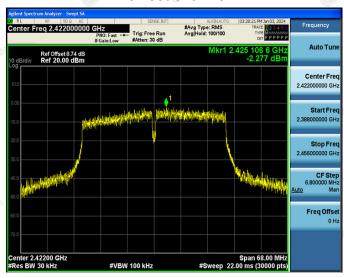
Highest channel



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 cannon 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

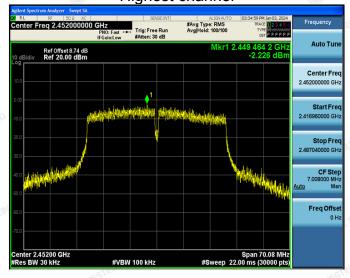
Lowest channel



Middle channel







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.



4.6. Conducted Band Edge and Spurious Emission Measurement

Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)			
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02			
Limit:	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).			
Test Setup:	Spectrum Analyzer EUT			
Test Mode:	Transmitting mode with modulation			
	 The testing follows FCC KDB Publication 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. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d). Measure and record the results in the test report. The RF fundamental frequency should be excluded 			
Test Procedure:	maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d). 5. Measure and record the results in the test report.			

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 cannon 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 Instruments

200		Alle VV	Diction.		District.		
RF Test Room							
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due		
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024		
High pass filter unit	Tonscend	JS0806-F	HKE-055	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		

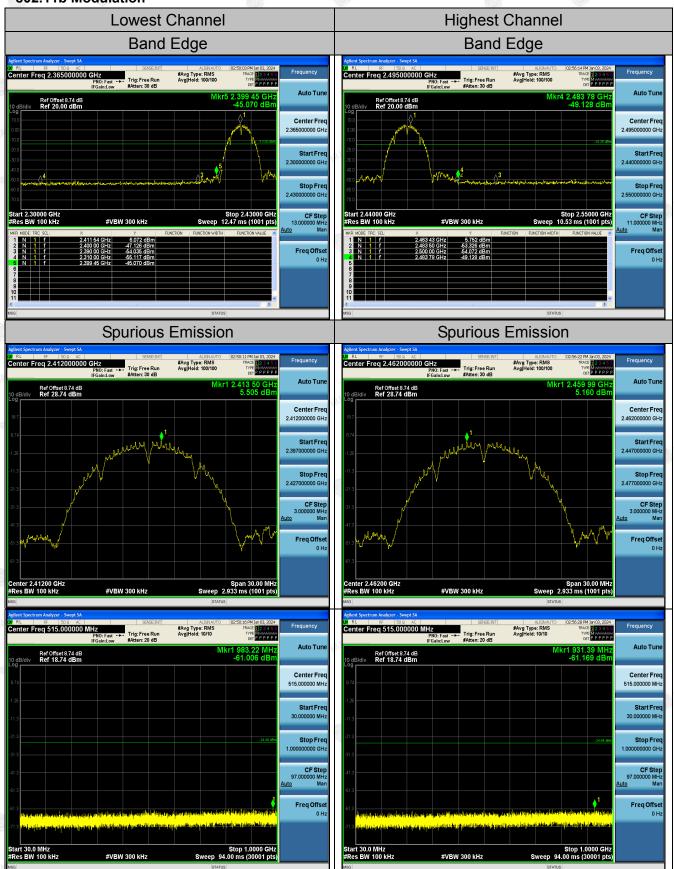
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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 cannon 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.



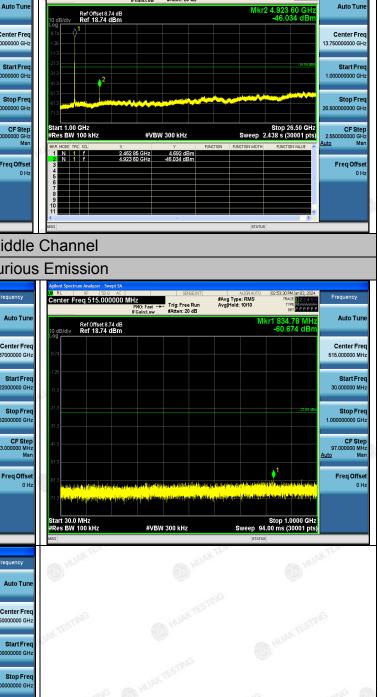
Test Data

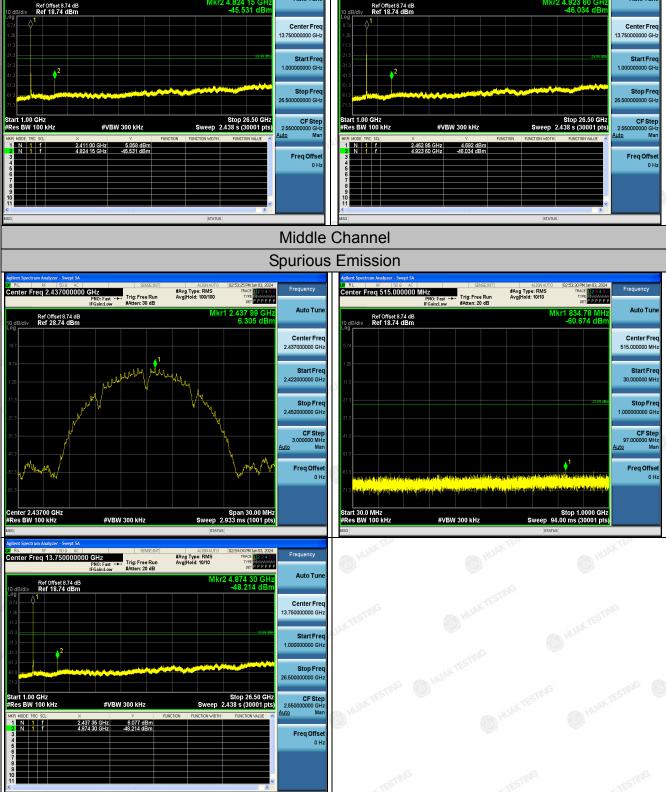
802.11b Modulation



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.

#Avg Type: RM: Avg|Hold: 10/10





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.