

FCC RF Exposure Exemption report

for

Bar Display

Model No.: Bar Display

FCC ID: 2BFMW-20240220

of

Applicant: Made Studio Design Ltd.

Address: 10F., No. 169, Sec. 4, Zhongxiao E. Rd., Da-an Dist.,
Taipei City 10690, Taiwan

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

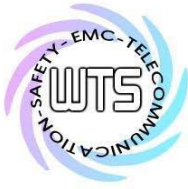
FCC Registration No.: TW1477, TW1072

Industry Canada filed test laboratory Reg. No.: 20037, 5107A



Report No.: W6M22301-22424-EE

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
TEL: 886-2-66068877 FAX: 886-2-66068879 E-mail: wts@wts-lab.com



Registration number: W6M22301-22424-EE
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Worldwide Testing Services(Taiwan) Co., Ltd.

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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

Laboratory disclaimer-

1. The test results of this test report relate exclusively to the item tested as specified in 1.5.
2. The test report may only be reproduced or published in full.
3. Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.
4. Antenna gain is provided by applicant and laboratory issue relevant data and results.

Tester:

April 11, 2024

Brian NG

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

April 11, 2024

Kevin Wang

Date

WTS

Name

Signature



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M22301-22424-EE

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1.2 Testing laboratory

1.2.1 Location

10m OATS

No.5-1, Lishui, Shuang Sing Village, Wanli Dist.,
New Taipei City 207, Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist.,
Taipei City 114, Taiwan (R.O.C.)
Tel: 886-2-6613-0228

Worldwide Testing Services (Taiwan) Co., Ltd.

6F., No. 58, Ln. 188, Ruiguang Rd., Neihu Dist.,
Taipei City 114, Taiwan (R.O.C.)
Tel: 886-2-6606-8877

1.2.2 Details of accreditation status

Accredited testing laboratory

FCC filed test laboratory Reg. No.: TW1477, TW1072

Industry Canada filed test laboratory Reg. No.: 20037, 5107A

Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :

Name: ./.

Accredited no.: ./.

Street: ./.

Town: ./.

Country: ./.

1.3 Application details

Approval holder

Name: Made Studio Design Ltd.

Street: 10F., No. 169, Sec. 4, Zhongxiao E. Rd., Da-an Dist.,

Town: Taipei City 10690,

Country: Taiwan

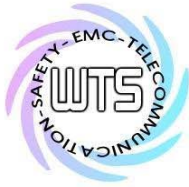
Manufacturer: (if applicable)

Name: ./.

Street: ./.

Town: ./.

Country: ./.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M22301-22424-EE

FCC ID: 2BFMW-20240220

Date of receipt of test item: September 19, 2023

Date of test: from September 20, 2023 to November 28, 2023

1.4 General information of Test item

Type of test item: Bar Display

Model no.: Bar Display

Multi-listing model no.: ./.

Brand name: Waev

Power supply: Battery 11.1Vd.c., 7800mAh, 86.58Wh
Battery Charger (I/P: 100-240V 50/60Hz, O/P: 12.6V=2A)

Type of antenna: Chip Antenna

Antenna gain: 2.29 dBi

Technical data

WLAN		
Mode	Channel	Conducted Power (dBm)
802.11b	Ch 1 : 2412 MHz	15.05
	Ch 6 : 2437 MHz	15.33
	Ch 11 : 2462 MHz	15.49
802.11g	Ch 1 : 2412 MHz	13.25
	Ch 6 : 2437 MHz	13.44
	Ch 11 : 2462 MHz	13.68
802.11n20MHz	Ch 1 : 2412 MHz	12.58
	Ch 6 : 2437 MHz	12.84
	Ch 11 : 2462 MHz	13.05

Operation modes: Duplex

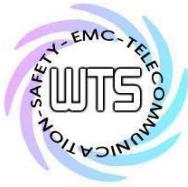
Modulation type: DSSS, OFDM

Sample no.: #01

Special statement: ./.

Classification:

Fixed Device	☐
Mobile Device (Human Body distance > 20cm)	☒
Portable Device (Human Body distance < 20cm)	☐



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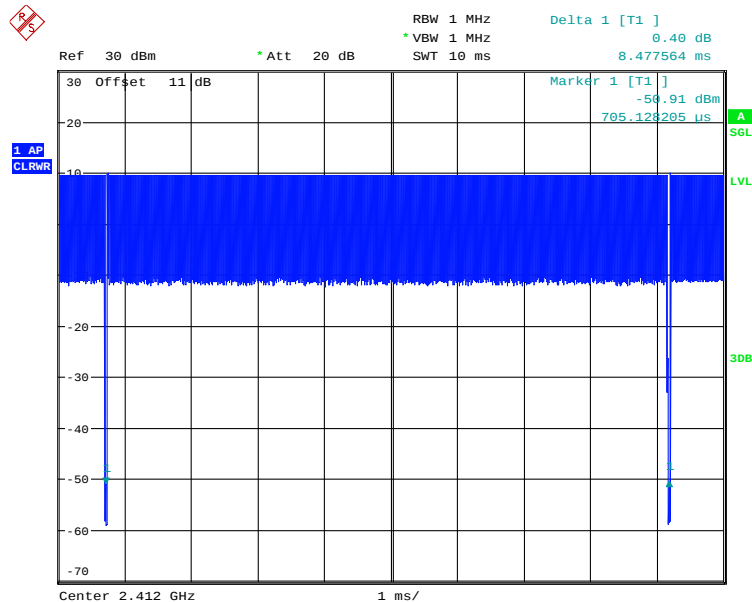
FCC ID: 2BFMW-20240220

1.5 Duty cycle and factor

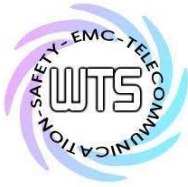
The duty factor is computed as $[10 \log (1 / D)]$, where D is the duty cycle.

Mode	Ton (ms)	Ton+Toff (ms)	Duty cycle (%)	Duty Factor (dB)	1/T - VBW (KHz)
802.11b	8.461538	8.477564	99.81%	0.01	0.12
802.11g	1.423077	1.448718	98.23%	0.08	0.70
802.11n (20MHz)	1.326923	1.352564	98.10%	0.08	0.75

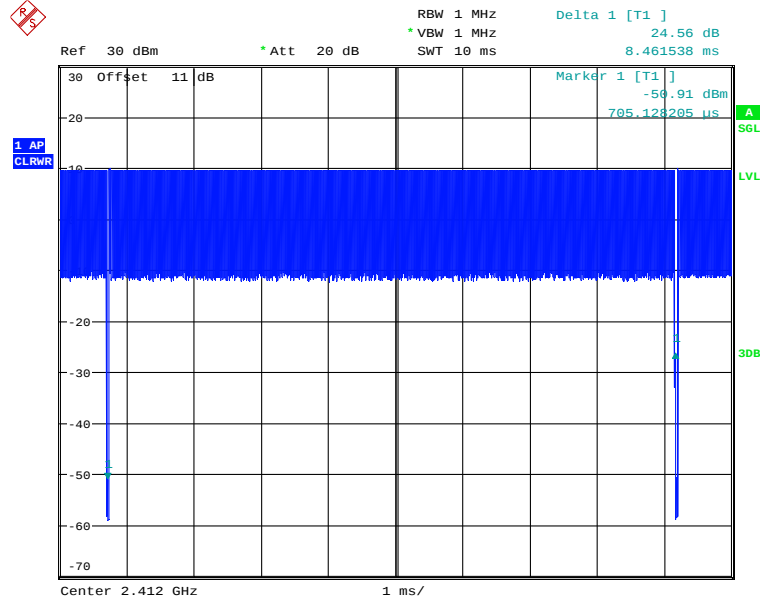
Duty cycle plot



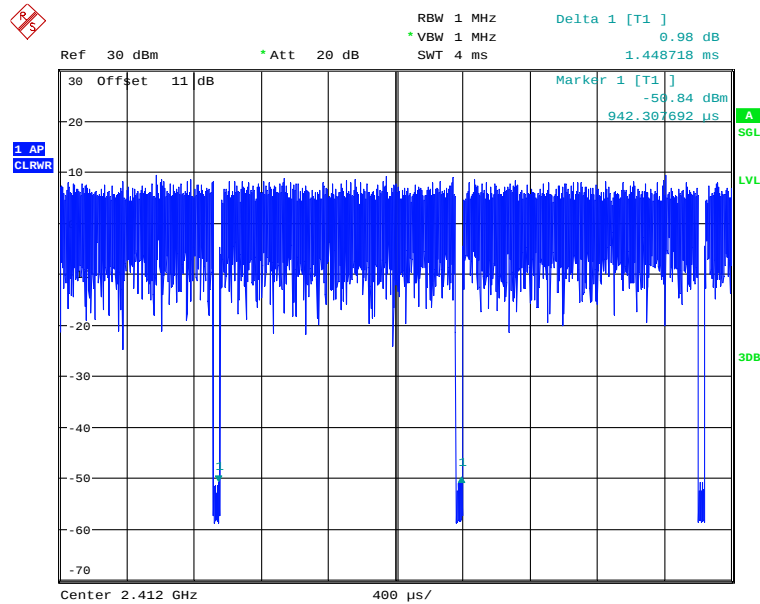
DUTY 802.11B
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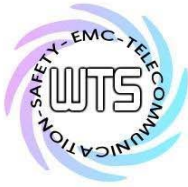
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FCC ID: 2BFMW-20240220



DUTY 802.11B
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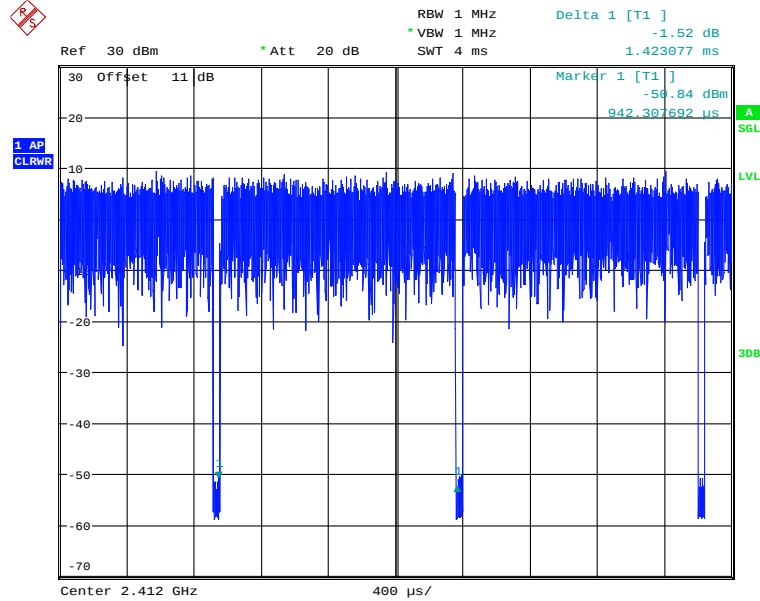


DUTY 802.11G
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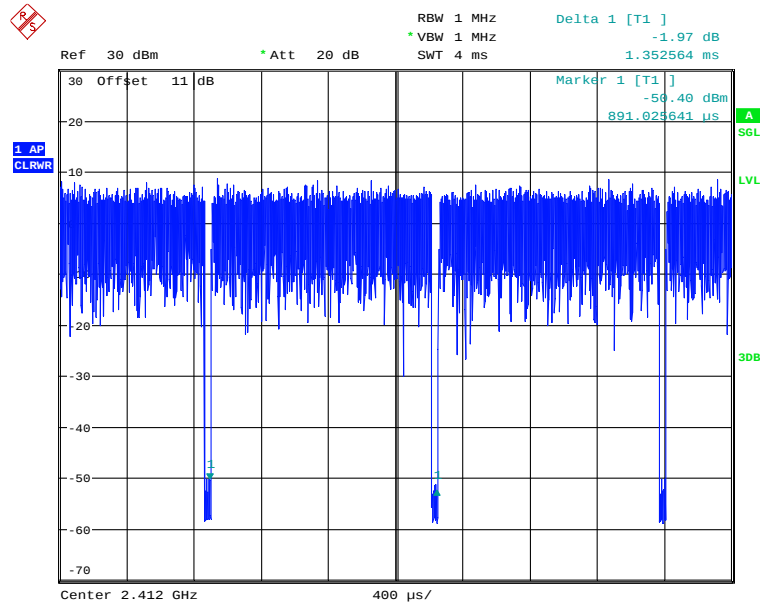


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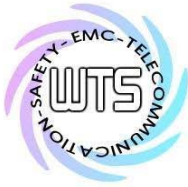
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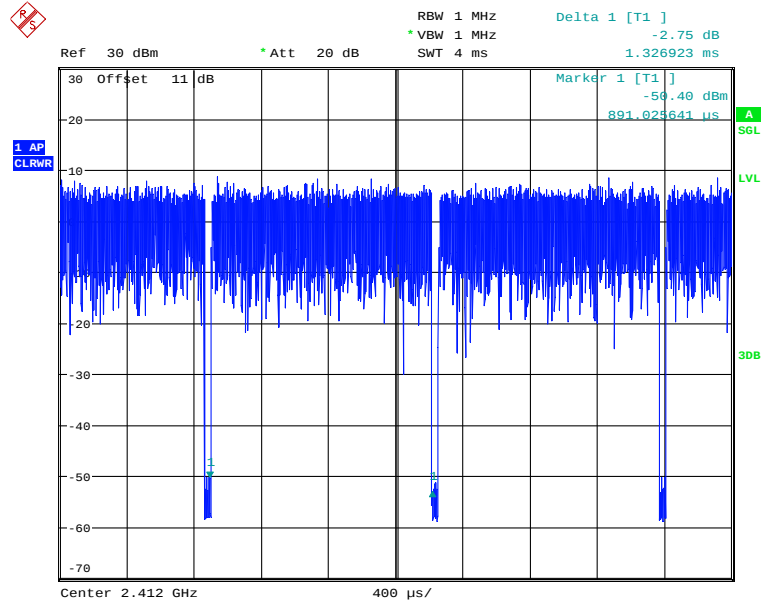
DUTY 802.11G
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DUTY 802.11N20
Date: 19.SEP.2023 16:53:50



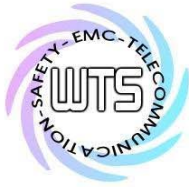
Registration number: W6M22301-22424-EE
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DUTY 802.11N20
Date: 19.SEP.2023 16:54:00

1.6 Test standards

47 CFR PART 15 SUBPART C § 15.247 (2021-10)



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2 Test configuration

2.1 Test environment

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Extreme conditions parameters: ./.

2.2 Measurement uncertainty

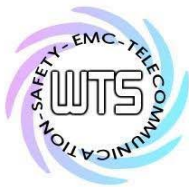
Test item Name	Uncertainty
Estimation Result of Uncertainty of Conducted Output Power Measurement (Peak Output Power (transmitter))	Expanded Uncertainty : 1.48 dB

The decision rule is: Measurement uncertainty is not included in the calculation of test results.

2.3 Test Equipment List

RF Conducted

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2023/7/24	2024/7/23
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2023/2/17	2024/2/16
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2023/2/17	2024/2/16
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2023/2/17	2024/2/16
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2023/3/22	2024/3/21
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2023/2/17	2024/2/16
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2023/2/17	2024/2/16
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2023/2/17	2024/2/16
ETSTW-RE 153	Signal Analyzer	FSV40	101929	R&S	2023/9/20	2024/9/19
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2023/8/28	2024/8/27
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2023/4/27	2024/4/26
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9) (S_Cable 9)	279067	HUBER+SUHNER	2023/02/17	2024/2/16
ETSTW-Cable 045	Microwave Cable	SUCOFLEX 104	325536	HUBER+SUHNER	2023/10/20	2024/10/19
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2023/5/26	2024/5/25
WTSTW-SW 008	Signal studio	Agilent	None	AUDIX	Version 2.0.0.1	



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3 Exemption Limits for Routine Evaluation according to 47 CFR FCC Part 2 Subpart

J, section 2.1091

FCC OET Bulletin 65 Edition 97.01 determines the equations for predicting RF fields and applicable limits.

The prediction for power density in the far-field but will over-predict power density in the near field, where it could be used for walking a “worst case” or conservative prediction.

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20 cm normally can be maintained between the user and the device.

MPE Calculation Method

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

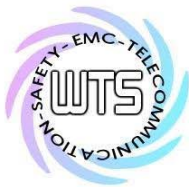
*Plane-wave equivalent power density

E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2} \text{ mW/cm}^2.$$



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Band	Mode	Channel	Conducted power with DF	Antenna gain (dBi)	Power density (mW/cm ²)	Limit	Ratio
			Antenna (dBm)				
2.4GHz	802.11b	Ch 1 : 2412 MHz	15.05	2.29	-	-	-
		Ch 6 : 2437 MHz	15.33		-	-	-
		Ch 11 : 2462 MHz	15.49		0.0119	1	0.0119
	802.11g	Ch 1 : 2412 MHz	13.25		-	-	-
		Ch 6 : 2437 MHz	13.44		-	-	-
		Ch 11 : 2462 MHz	13.68		0.0079	1	0.0079
	802.11n 20MHz	Ch 1 : 2412 MHz	12.58		-	-	-
		Ch 6 : 2437 MHz	12.84		-	-	-
		Ch 11 : 2462 MHz	13.05		0.0068	1	0.0068

From the peak EUT RF output power, the minimum mobile separation distance, $d = 20$ cm, as well as the gain of the used antenna, the RF power density can be obtained.