TEST REPORT

Applicant:	Changzhou Jianwei Electric Appliance Co.,Ltd.
Address:	No.806, Furong West Liutang Industrial Park, Hengshanqiao Town, Wujin District Changzhou, Jiangsu province 213118 China
Equipment Type:	Bluetooth Module
Model Name:	JWBT-02(refer to section 2.4)
Brand Name:	JIANWEI
FCC ID:	2A4MI-JWBT-02
Test Standard:	47 CFR Part 2.1091 KDB 447498 D04 v01
Sample Arrival Date:	Jul. 07, 2023
Test Date:	Aug. 04, 2023 - Aug. 17, 2023
Date of Issue:	Aug. 29, 2023

ISSUED BY:

Kunshan Balun Communications Technology Co., Ltd.

Tested by: Li Yupeng **Checked by:** Ye Feng **Approved by:** Luo Biao

(General Manager)

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Aug. 29, 2023	Initial Issue

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Kunshan Balun Communications Technology Co., Ltd.
Address	Room 101, Building 5, No. 1689, Zizhu Road, Yushan, Kunshan, Jiangsu, China

1.2 Test Location

Name	Kunshan Balun Communications Technology Co., Ltd.
Location	Room 101, Building 5, No. 1689, Zizhu Road, Yushan, Kunshan, Jiangsu, China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as an accredited testing laboratory. The designation number is CN1352.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Changzhou Jianwei Electric Appliance Co.,Ltd.
Address	No.806, Furong West Liutang Industrial Park, Hengshanqiao Town, Wujin District Changzhou, Jiangsu province 213118 China

2.2 Manufacturer Information

Manufacturer	Changzhou Jianwei Electric Appliance Co.,Ltd.
Address	No.806, Furong West Liutang Industrial Park, Hengshanqiao Town, Wujin District Changzhou, Jiangsu province 213118 China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Bluetooth Module
Model Name Under Test	JWBT-02
Series Model Name	JWBT-02A, JWBT-02B
Description of Model name differentiation	Only differences are model names for trading purpose(this information provided by the customer)
Sample No.	SC-EC2350895-S01
Hardware Version	JW569V01
Software Version	K1C02V01

2.5 Ancillary Equipment

N/A

Technical Information

All Network and Wireless connectivity for EUT	Bluetooth (BR+BLE)

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth	
Frequency Range	Bluetooth	2400 ~ 2483.5 MHz
Antenna Type	Bluetooth	PCB Antenna
Exposure Category	General Population/Uncontrolled Exposure	
EUT Type	Mobile Device	

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices
2	KDB 447498 D04 v01	447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Device:

CFR Title 47 §2.1091(b)

(b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

For 300MHz to 6000Mhz

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP20cm in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{\text{th}}\,(\text{mW}) = ERP_{20\,\text{cm}}\,(\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \qquad \text{(B.1)}$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold Pth (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula (B.2).

$$P_{\text{th}}\,(\text{mW}) = \begin{cases} ERP_{20\,\text{cm}}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,\text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases} \qquad \text{(B.2)}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,\text{cm}}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1).
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

For 6000MHz to 10000Mhz

Frequencies above 300 kHz but at distances R＞λ/2π, R is the antenna-person separation distance.
λ=wavelength of transmitted signal.
Can calculate from the frequency of operation using v=f*λ
v=speed of light=3*108 m/s
f=frequency(Hz)
Primarily an MPE-based exclusion but also SAR-based where λ/2π is＜20cm.

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES
SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R^2
1.34	–	30	35.6 m	–	1.6 m	3,450 R^2/f^2
30	–	300	1.6 m	–	159 mm	3.83 R^2
300	–	1,500	159 mm	–	31.8 mm	0.0128 $R^2 f$
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R^2
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

5 ASSESSMENT RESULT

5.1 Output Power

Mode	Bluetooth
Conducted Power (dBm)	1.72
Antenna Gain (dBi)	-0.93
EIRP	0.79
Note: This report listed the worst case conducted power value, please refer to BL-EC2370261-601, and BL-EC2370261-602 report for more details.	

5.2 Turn-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)
Bluetooth	[0.00,2.00]	[-1.00,1.00]
Note: According KDB 447498 D04, used the greater of maximun conducted power and ERP to compare with the threshold value Pth.		

5.3 RF Exposure Evaluation Result

Evolution mode	Maximum power (dBm)	Maximum power (mw)	Distance (mm)	Threshold Power (mW)	Verdict
Bluetooth	2.00	1.58	200	3060.00	Pass

5.4 Conclusion

This EUT is deemed to comply with the reference level limits , therefore the basic restrictions are compliant with human exposure limits.

Statement

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