

TEST REPORT

Applicant: Botslab Inc.
Address: 919 North Market Street, Suite 950, Wilmington,
New Castle, Delaware, USA
Equipment Type: HomeBase
Model Name: HB-BD07-C8 (refer to section 2.3)
Brand Name: Botslab
FCC ID: 2A22Z-H200
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: Jan. 07, 2025
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ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☐ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☒ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Botslab Inc.
Address	919 North Market Street, Suite 950, Wilmington, New Castle, Delaware, USA

2.2 Manufacturer Information

Manufacturer	Botslab Inc.
Address	919 North Market Street, Suite 950, Wilmington, New Castle, Delaware, USA

2.3 General Description for Equipment under Test (EUT)

EUT Name	HomeBase
Model Name Under Test	HB-BD07-C8
Series Model Name	HB-BD07-C8-V0, HB-BD07-C8-V1, HB-BD07-C8-V2, HB-BD07-C8-V3, HB-BD07-C8-V4, HB-BD07-C8-V5, HB-BD07-C8-V6, HB-BD07-C8-V7, HB-BD07-C8-V8, HB-BD07-C8-V9
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in shell color and model name. (this information provided by the applicant).
Hardware Version	V1.0
Hardware Version	V1.0
Software Version	N/A
Dimensions (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	Bluetooth (BLE) WIFI 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac and 802.11ax
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	WIFI; Bluetooth	
Frequency Range	802.11b/g	2412 ~ 2462 MHz
	802.11n(HT20/HT40)	2412 ~ 2462 MHz
	802.11ax(HE20/HE40)	2412 ~ 2462 MHz
	802.11a	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
	802.11n(HT20/HT40)	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
	802.11ac (VHT20/VHT40/VHT80)	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
	802.11ax (HE20/HE40/HE80)	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
	Bluetooth	2402 ~ 2480 MHz
Antenna Type	WIFI	FPC Antenna
	Bluetooth	FPC Antenna
Exposure Category	General Population/Uncontrolled Exposure	
Product Type	Mobile Device	

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	KDB 447498 D04 v01	447498 D04 Interim General RF Exposure Guidance v01

3.2 Limit Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Devices:

CFR Title 47 §2.1091(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

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

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

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 $\lambda/4$ 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 P_{th} (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). P_{th} is given by Formula (B.2).

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

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

5 ASSESSMENT RESULT

5.1 Output Power

Mode	Bluetooth	/	/	/	/
Conducted Power (dBm)	18.64	/	/	/	/
Antenna Gain (dBi)	3.86	/	/	/	/
EIRP (dBm)	22.50	/	/	/	/
Mode	2.4G WIFI-SISO-Main Antenna	2.4G WIFI-SISO-Aux. Antenna	2.4G WIFI-MIMO-Main Antenna	2.4G WIFI-MIMO-Aux. Antenna	2.4G WIFI-MIMO
Conducted Power (dBm)	10.55	10.82	7.45	7.66	10.53
Antenna Gain (dBi)	4.4	3.86	4.4	3.86	4.14
EIRP (dBm)	14.95	14.68	11.85	11.52	14.67
Mode	5.2G WIFI-SISO-Main Antenna	5.2G WIFI-SISO-Aux. Antenna	5.2G WIFI-MIMO-Main Antenna	5.2G WIFI-MIMO-Aux. Antenna	5.2G WIFI-MIMO
Conducted Power (dBm)	6.24	6.23	3.01	3.03	6.03
Antenna Gain (dBi)	4.43	3.7	4.43	3.7	4.08
EIRP (dBm)	10.67	9.93	7.44	6.73	10.11
Mode	5.8G WIFI-SISO-Main Antenna	5.8G WIFI-SISO-Aux. Antenna	5.8G WIFI-MIMO-Main Antenna	5.8G WIFI-MIMO-Aux. Antenna	5.8G WIFI-MIMO
Conducted Power (dBm)	8.91	8.76	5.87	5.55	8.72
Antenna Gain (dBi)	6.1	6.26	6.1	6.26	6.18
EIRP (dBm)	15.01	15.02	11.97	11.81	14.90
Note: This report listed the worst case conducted power value, please refer to BL-SZ24C0578-601, BL-SZ24C0578-602, BL-SZ24C0578-603 report for more details.					

5.2 Tune-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
Bluetooth	[17.00, 19.00]	[20.86, 22.86]	[18.71, 20.71]
2.4G WIFI-SISO-Main Antenna	[9.00, 11.00]	[13.40, 15.40]	[11.25, 13.25]
2.4G WIFI-SISO-Aux. Antenna	[9.00, 11.00]	[12.86, 14.86]	[10.71, 12.71]
2.4G WIFI-MIMO-Main Antenna	[5.50, 7.50]	[9.90, 11.90]	[7.75, 9.75]
2.4G WIFI-MIMO-Aux. Antenna	[6.00, 8.00]	[9.86, 11.86]	[7.71, 9.71]
2.4G WIFI-MIMO	[9.00, 11.00]	[13.14, 15.14]	[10.99, 12.99]
5.2G WIFI-SISO-Main Antenna	[4.50, 6.50]	[8.93, 10.93]	[6.78, 8.78]
5.2G WIFI-SISO-Aux. Antenna	[4.50, 6.50]	[8.20, 10.20]	[6.05, 8.05]
5.2G WIFI-MIMO-Main Antenna	[1.50, 3.50]	[5.93, 7.93]	[3.78, 5.78]
5.2G WIFI-MIMO-Aux. Antenna	[1.50, 3.50]	[5.20, 7.20]	[3.05, 5.05]
5.2G WIFI-MIMO	[4.50, 6.50]	[8.58, 10.58]	[6.43, 8.43]
5.8G WIFI-SISO-Main Antenna	[7.00, 9.00]	[13.10, 15.10]	[10.95, 12.95]
5.8G WIFI-SISO-Aux. Antenna	[7.00, 9.00]	[13.26, 15.26]	[11.11, 13.11]
5.8G WIFI-MIMO-Main Antenna	[4.00, 6.00]	[10.10, 12.10]	[7.95, 9.95]
5.8G WIFI-MIMO-Aux. Antenna	[4.00, 6.00]	[10.26, 12.26]	[8.11, 10.11]
5.8G WIFI-MIMO	[7.00, 9.00]	[13.18, 15.18]	[11.03, 13.03]
Note1: ERP= EIRP -2.15dB.			
Note2: According KDB 447498 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.			

5.3 RF Exposure Evaluation Result

Evolution Mode	Frequency (MHz)	Maximum power (dBm)	Maximum power (mw)	Distance (mm)	Threshold Power (mW)	Power / Limit	Verdict
Bluetooth	2402	20.71	117.76	200	3060.00	0.038	Pass
2.4G WIFI-SISO-Main Antenna	2412	13.25	21.13	200	3060.00	0.007	Pass
2.4G WIFI-SISO-Aux. Antenna	2412	12.71	18.66	200	3060.00	0.006	Pass
2.4G WIFI-MIMO-Main Antenna	2412	9.75	9.44	200	3060.00	0.003	Pass
2.4G WIFI-MIMO-Aux. Antenna	2412	9.71	9.35	200	3060.00	0.003	Pass
2.4G WIFI-MIMO	2412	12.99	19.91	200	3060.00	0.007	Pass
5.2G WIFI-SISO-Main Antenna	5150	8.78	7.55	200	3060.00	0.002	Pass
5.2G WIFI-SISO-Aux. Antenna	5150	8.05	6.38	200	3060.00	0.002	Pass
5.2G WIFI-MIMO-Main Antenna	5150	5.78	3.78	200	3060.00	0.001	Pass
5.2G WIFI-MIMO-Aux. Antenna	5150	5.05	3.20	200	3060.00	0.001	Pass
5.2G WIFI-MIMO	5150	8.43	6.97	200	3060.00	0.002	Pass
5.8G WIFI-SISO-Main Antenna	5725	12.95	19.72	200	3060.00	0.006	Pass
5.8G WIFI-SISO-Aux. Antenna	5725	13.11	20.46	200	3060.00	0.007	Pass
5.8G WIFI-MIMO-Main Antenna	5725	9.95	9.89	200	3060.00	0.003	Pass
5.8G WIFI-MIMO-Aux. Antenna	5725	10.11	10.26	200	3060.00	0.003	Pass
5.8G WIFI-MIMO	5725	13.03	20.09	200	3060.00	0.007	Pass

5.4 Collocated Power Calculation

Evolution Mode	Frequency (MHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$ of Bluetooth + 5.8G WIFI	Verdict
Bluetooth	2402	0.038	0.045	Pass
5.8G WIFI	5725	0.007		
Evolution Mode	Frequency (MHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$ of 2.4G WIFI + 5.8G WIFI	Verdict
2.4G WIFI	2412	0.007	0.014	Pass
5.8G WIFI	5725	0.007		

Note:

1. $\Sigma(\text{Power} / \text{Limit})$: This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for Bluetooth + 5.8G WIFI.
2. Both of the 2.4GHz/5.8GHz can transmit simultaneously, the formula of calculated the Power is $CP1 / LP1 + CP2 / LP2 + \dots \text{etc.} < 1$
 CP = Calculation power
 LP = Limit of power
3. The worst-case situation is 0.045, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
4. The DUT work frequency range used is 2402 MHz ~ 2480 MHz and 5725 MHz ~ 5850 MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.

5.5 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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