

TEST REPORT

Applicant: CenTrak Inc.
Address: 826 Newtown-Yardley Rd, Newtown, Pennsylvania
18940, United States
Equipment Type: BLE MultiMode Badge
Model Name: CTH-SB760
Brand Name: Centrak
FCC ID: ST2-CTHSB760
Test Standard: 47 CFR Part 2.1093
(refer to section 3.1)
Sample Arrival Date: Nov. 01, 2023
Test Date: Nov. 08, 2023 - Jan. 30, 2024
Date of Issue: Mar. 18, 2024

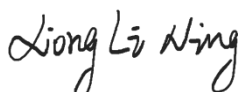
ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Lining

Checked by: Xu Rui

Approved by: Tolan Tu
(Testing Director)



Revision History		
Version	Issue Date	Revisions Content
Rev. 01	Jan. 05, 2024	Initial Issue
Rev. 02	Mar. 18, 2024	1. Corrected the antenna type in Section 2.4. 2. Updated the Section 5.1&5.2&5.3&5.4.

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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	<input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	<input type="checkbox"/> 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	CenTrak Inc.
Address	826 Newtown-Yardley Rd, Newtown, Pennsylvania 18940, United States

2.2 Manufacturer Information

Manufacturer	CenTrak Inc.
Address	826 Newtown-Yardley Rd, Newtown, Pennsylvania 18940, United States

2.3 General Description for Equipment under Test (EUT)

EUT Name	BLE MultiMode Badge
Model Name Under Test	CTH-SB760
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	Rev B
Software Version	V1.0
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	Bluetooth (BLE), RFID
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth, RFID	
Frequency Range	Bluetooth	2400 ~ 2483.5 MHz
	RFID	904 ~ 926 MHz
Antenna Type	Bluetooth	Chip Ceramic Antenna
	RFID	SMD Chip Antenna
Exposure Category	General Population/Uncontrolled Exposure	
Product Type	Portable Device	

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices
2	KDB 447498 D04 v01	KDB 447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Portable Devices:

CFR Title 47 §2.1093(b)

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

FCC KDB 447498 Devices:

According with FCC KDB 447498 D04, Appendix B, The SAR-based exemption formula 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). The following table shows the power threshold from 5mm to 50mm.

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

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power including tune-up tolerance among production units
2. Per KDB 447498 D04, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D04, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D04, for separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive), the threshold Pth (mW) is given by Following:

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

where

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

- a. f(GHz) is the RF channel transmit frequency in GHz
- b. d is the separation distance (cm), The result is rounded to one decimal place for comparison
- c. ERP_{20cm} are determined by:

$$ERP_{20cm} (mW) = f(x) = \begin{cases} 2040f & 0.3GHz \leq f < 1.5GHz \\ 3060 & 1.5GHz \leq f \leq 6GHz \end{cases}$$

5 ASSESSMENT RESULT

5.1 Output Power

Mode	Bluetooth
Conducted Power (dBm)	-1.08
Antenna Gain (dBi)	0
EIRP (dBm)	-1.08

Note: This report listed the worst case power value, please refer to BL-SZ23B0232-601 report for more details.

Mode	RFID
E(dBuV/m)	76.30
ERP (dBm)	-14.50
Antenna Gain (dBm)	-0.5
Conducted Power (dBm)	-11.85

Note: This report listed the worst case power value, please refer to BL-SZ23B0232-602 report for more details.

5.2 Tune-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
Bluetooth	[-3.00, -1.00]	[-3.00, -1.00]	[-5.15, -3.15]
RFID	[-13.00, -11.00]	/	[-15.65, -13.65]

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

Mode	Distance (mm)	Calculation Frequency (MHz)	Tune-up limit power (dBm)	Tune-up limit power (mW)	Threshold Value(mW)	Power / Limit	Verdict
Bluetooth	5.00	2480	-1.00	0.79	2.72	0.29	Compliance
RFID	5.00	926	-11.00	0.08	8.00	0.01	Compliance

5.4 Collocated Power Calculation

Evolution mode	Frequency (MHz)	Power / Limit	$\Sigma(\text{Power} / \text{Limit})$ of Bluetooth + RFID	Verdict
Bluetooth	2480	0.29	0.30	Pass
RFID	926	0.01		

Note:

- $\Sigma(\text{Power} / \text{Limit})$: This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for Bluetooth + RFID.
- Both of the Bluetooth/RFID 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
- The worst-case situation is 0.30, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
- The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz and 904 MHz ~ 926 MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
- More power list please refer to RF test report.

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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--END OF REPORT--