

TEST REPORT

Applicant: Tianjin keepsens Information Technology Co., Ltd
Address: Building 9, Xin'an Chuangye Plaza, No. 399,
Huixiang Road, Binhai high tech Zone, Tianjin
Equipment Type: Wide area locator
Model Name: KP-CCXG700
Brand Name: KEEPESENS
FCC ID: 2A64JCCXG700
Test Standard: 47 CFR Part 2.1091
KDB 447498 D01 v06
Test Date: Jun. 02, 2022 - Jun. 20, 2022
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ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jul. 06, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

1.3 Test Environment Condition

Ambient Temperature	20 to 23 °C
Ambient Relative Humidity	30 to 60 %
Ambient Pressure	100 to 102 KPa

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Tianjin keepsens Information Technology Co., Ltd
Address	building 9, Xin'an Chuangye Plaza, No. 399, Huixiang Road, Binhai high tech Zone, tianjin

2.2 Manufacturer Information

Manufacturer	Tianjin keepsens Information Technology Co., Ltd
Address	building 9, Xin'an Chuangye Plaza, No. 399, Huixiang Road, Binhai high tech Zone, tianjin

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Wide area locator
Model Name Under Test	KP-CCXG700
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V1.1
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	LONGSING
	Model No.	HPC1550
	Serial No.	N/A
	Capacitance	400mAh
	Rated Voltage	4V
	Limit Charge Voltage	N/A

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/1900 MHz 3G Network WCDMA Band 2/4/5 4G Network FDD LTE Band 2/4/5/7/12/13/25/26 TDD LTE Band 38/41 Bluetooth BLE, GPS, GLONASS, BDS, Galileo
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth, GSM, WCDMA, LTE		
Frequency Range	Bluetooth	2400 ~ 2483.5 MHz	
	GSM 850	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	GSM 1900	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	WCDMA 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	WCDMA 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	WCDMA 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE Band 7	TX: 2500 ~ 2570 MHz	RX: 2620 ~ 2690 MHz
	LTE Band 12	TX: 699 ~ 716 MHz	RX: 729 ~ 746 MHz
	LTE Band 13	TX: 777 ~ 787 MHz	RX: 746 ~ 756 MHz
	LTE Band 25	TX: 1850 ~ 1915 MHz	RX: 1930 ~ 1995 MHz
	LTE Band 26	TX: 814 ~ 849 MHz	RX: 859 ~ 894 MHz
	LTE Band 38	TX: 2570 ~ 2620 MHz	RX: 2570 ~ 2620 MHz
	LTE Band 41	TX: 2535 ~ 2655 MHz	RX: 2535 ~ 2655MHz
Antenna Type	Bluetooth	PCB Antenna	
	WWAN	PCB Antenna	
Exposure Category	General Population/Uncontrolled Exposure		
EUT Stage	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 D01 v06	447498 D01 General RF Exposure Guidance D01 v06

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Derives:

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 D01 General RF Exposure Guidance v06 Limit

Devices operating in standalone mobile exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When the categorical exclusion provision of § 2.1091(c) applies, the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to FCC Part 1.1307, 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 level in excess of the commission's guidelines.

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)
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f ²)*
30-300	27.5	0.073	0.2
300-1500			f/1500
1500-100,000			1.0

MPE calculation formula

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density

P = output power (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Separation distance between radiator and human body (cm)

5 ASSESSMENT RESULT

5.1 Output Power

GSM		
Mode	GSM 850	GSM 1900
ERP/EIRP (dBm)	27.41	26.92

Note: This report listed the worst case ERP/EIRP value, please refer to RF test report for more details.

WCDMA			
Mode	Band 2	Band 4	Band 5
ERP/EIRP (dBm)	20.01	19.09	18.11

Note: This report listed the worst case ERP/EIRP value, please refer to RF test report for more details.

LTE						
Mode	Band 2	Band 4	Band 5	Band 7	Band 12	Band 13
ERP/EIRP (dBm)	20.52	19.34	17.85	20.40	24.57	25.18
Mode	Band 25	Band 26 (part22)	Band 26 (part90)	Band 38	Band 41	--
ERP/EIRP (dBm)	20.71	17.91	17.54	20.46	20.61	--

Note: This report listed the worst case ERP/EIRP value, please refer to RF test report for more details.

Bluetooth		
Mode	GFSK (BLE 1Mbps)	GFSK (BLE 2Mbps)
Peak Power (dBm)	-0.73	-0.77
Antenna Gain (dBi)	2.02	
EIRP/ERP	1.29	1.25

Note: This report listed the maximal case power value, please refer to RF test report for more details.

5.2 Tune-up power

Mode		Range
GFSK (BLE 1Mbps)		(-3.50) - 2.00
GFSK (BLE 2Mbps)		(-3.50) - 1.50
GSM 850		26.00-28.00
GSM 1900		26.00-27.50
WCDMA	Band 2	19.00-21.00
	Band 4	19.00-20.00
	Band 5	17.00-19.00
LTE	Band 2	19.00-21.00
	Band 4	18.00-20.50
	Band 5	16.00-18.00
	Band 7	19.00-21.00
	Band 12	23.00-25.00
	Band 13	24.00-26.00
	Band 25	19.00-21.00
	Band 26 (part22)	16.00-18.50
	Band 26 (part90)	16.00-18.50
	Band 38	19.00-21.00
	Band 41	19.00-21.50

5.3 RF Exposure Evaluation Result

Evolution mode		Maximum ERP/EIRP (dBm)	Antenna Gain (typical) (dBi):	Total Power (mw)	Distance (cm)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Power Density / Limit	Verdict
GFSK (BLE 1Mbps)		2.00	2.02	1.585	20	0.0003	1	0.0003	Pass
GFSK (BLE 2Mbps)		1.50	2.02	1.413	20	0.0003	1	0.0003	Pass
GSM 850		28.00	-2.8	630.957	20	0.1255	0.549	0.2286	Pass
GSM 1900		27.50	-2.1	562.341	20	0.1119	1	0.1119	Pass
WCDMA	Band 2	21.00	-2.1	125.893	20	0.0250	1	0.0250	Pass
	Band 4	20.00	-3.5	100.000	20	0.0199	1	0.0199	Pass
	Band 5	19.00	-2.8	79.433	20	0.0158	0.549	0.0288	Pass
LTE	Band 2	21.00	-2.1	125.893	20	0.0250	1	0.0250	Pass
	Band 4	20.50	-3.5	112.202	20	0.0223	1	0.0223	Pass
	Band 5	18.00	-2.8	63.096	20	0.0126	0.549	0.0230	Pass
	Band 7	21.00	-2.3	125.893	20	0.0250	1	0.0250	Pass
	Band 12	25.00	3.26	316.228	20	0.0629	0.466	0.1350	Pass
	Band 13	26.00	4.45	398.107	20	0.0792	0.518	0.1529	Pass
	Band 25	21.00	-2.6	125.893	20	0.0250	1	0.0250	Pass
	Band 26 (part22)	18.50	-2.8	70.795	20	0.0141	0.543	0.0260	Pass
	Band 26 (part90)	18.00	-3.6	63.096	20	0.0126	0.543	0.0232	Pass
	Band 38	21.00	-2.7	125.893	20	0.0250	1	0.0250	Pass
	Band 41	21.50	-2.3	141.254	20	0.0281	1	0.0281	Pass

5.4 Collocated Power Density Calculation

Evolution mode	Frequency(MHz)	Power Density/Limit	$\Sigma(\text{Power Density / Limit})$ of WWAN + Bluetooth	Verdict
GSM 850	824MHz ~ 849MHz	0.2286	0.2289	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.0003		

Note:

1. $\Sigma(\text{Power Density / Limit})$: This is a summation of [(power density for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for Bluetooth +WWAN
2. Both of the WWAN can transmit simultaneously, the formula of calculated the MPE is

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density
LPD = Limit of power density
3. The worst-case situation is 0.2289, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.
4. The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz, 824MHz ~ 849MHz, the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
5. 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--