

RF Exposure evaluation

Product Name : BOX

Brand Name : N/A

Model : Z88

Series Model : Z76, Z76 II, Z88, Z88 II, Z68, Z68 II, Z928, Z928 II, Z66, Z66 II, Z328, Z328 II, ZY4, ZY4 II, ZY5, ZY5 II, ZX4, ZX4 II, Z972, Z972 II, Z982, Z982 II, CZ2000, CZ2100, CZ2200, CZ2300, CZ2500, CZ2600

FCC ID : 2BD2F-Z88

Applicant : **Shenzhen Canzone Technology Co.,Ltd.**

Address : East of 5th Floor, 7 Bld , Lijincheng Industry Park, Yousong Community, Longhua Street, Longhua district, Shenzhen

Manufacturer : **Shenzhen Canzone Technology Co.,Ltd.**

Address : East of 5th Floor, 7 Bld , Lijincheng Industry Park, Yousong Community, Longhua Street, Longhua district, Shenzhen

Standard(s) : 47CFR §1.1310, 47CFR §2.1091
KDB447498 D01 General RF Exposure Guidance v06

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Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Guangdong Asia Hongke Test Technology Limited. If there is a need to alter or revise this document, the right belongs to Guangdong Asia Hongke Test Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.

Guangdong Asia Hongke Test Technology Limited

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Report Revise Record

Report Version	Issued Date	Notes
M1	Apr. 21, 2025	Initial Release

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1 GENERAL INFORMATION

1.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

1.2 General Description of EUT

Product Name:	BOX
Model/Type reference:	Z88
Serial Model:	Z76, Z76 II, Z88, Z88 II, Z68, Z68 II, Z928, Z928 II, Z66, Z66 II, Z328, Z328 II, ZY4, ZY4 II, ZY5, ZY5 II, ZX4, ZX4 II, Z972, Z972 II, Z982, Z982 II, CZ2000, CZ2100, CZ2200, CZ2300, CZ2500, CZ2600
Power Supply:	DC 12V from adapter
Adapter Information:	Model: OLD120200AUS5D Input: 100-240V~50/60Hz 0.75A max Output: 12.0V=2.0A 24.0W
Hardware Version:	N/A
Software Version:	N/A
Sample(s) Status:	AiTSZ-250328062-1(Normal sample) AiTSZ-250328062-2(Engineer sample)
2.4G WIFI:	
Supported type:	802.11b/g/n(HT20)/n(HT40)
Modulation:	802.11b: DSSS 802.11g/n(HT20)/(HT40):OFDM
Operation frequency:	802.11b/g/n(HT20): 2412MHz~2472MHz 802.11n(HT40):2422MHz~2462MHz
Channel number:	802.11b/g/n(HT20): 13 802.11n(HT40):9
Channel separation:	5MHz
Antenna type:	External antenna MIMO2*2
Antenna gain:	Antenna 1: 5.10 dBi Antenna 2: 5.10 dBi
Directional gain:	8.11dBi
Bluetooth :	
Supported type:	Bluetooth BR/EDR
Modulation:	GFSK, π /4DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	External antenna
Antenna gain:	5.10 dBi
Remark: The above DUT's information was declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.	

1.3 Test Facility

Test Laboratory:

Guangdong Asia Hongke Test Technology Limited

B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified or accredited by the following organizations:

FCC-Registration No.: 251906 Designation Number: CN1376

Guangdong Asia Hongke Test Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 31737 CAB identifier: CN0165

The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737

A2LA-Lab Cert. No.: 7133.01

Guangdong Asia Hongke Test Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Guangdong Asia Hongke Test Technology Limited's quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Asia Hongke laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	150KHz~30MHz ± 1.20 dB	(1)
Radiated Emission	9KHz~30Hz ± 3.10 dB	(1)
Radiated Emission	9KHz~1GHz ± 3.75 dB	(1)
Radiated Emission	1GHz~18GHz ± 3.88 dB	(1)
Radiated Emission	18GHz~40GHz ± 3.88 dB	(1)
RF power, conducted	30MHz~6GHz ± 0.16 dB	(1)
RF power density, conducted	± 0.24 dB	(1)
Spurious emissions, conducted	± 0.21 dB	(1)
Temperature	$\pm 1^{\circ}\text{C}$	(1)
Humidity	$\pm 3\%$	(1)
DC and low frequency voltages	$\pm 1.5\%$	(1)
Time	$\pm 2\%$	(1)
Duty cycle	$\pm 2\%$	(1)
Bandwidth	$\pm 1.5 \times 10^{-6}$	(1)

The report uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

2 Method of measurement

2.1 Applicable Standard

According to §1.1307(b)(1), 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.

According to §1.1310 and §2.1091 RF exposure is calculated.

FCC KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures

2.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f)*	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

2.3 MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

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

R=distance to the center of radiation of the antenna

2.4 Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

Antenna	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
Antenna 1	2.4G Wifi Chain 1 Bluetooth	External antenna	5.11 dBi	2.4GHz – 2.5 GHz
Antenna 2	2.4G Wifi Chain 2	External antenna	5.11 dBi	2.4GHz – 2.5 GHz

2.5 Manufacturing Tolerance

Bluetooth

GFSK (Peak)

Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	0.0	0.0	0.0
Tolerance ±(dB)	1.0	1.0	1.0

π/4DQPSK (Peak)

Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	0.0	0.0	0.0
Tolerance ±(dB)	1.0	1.0	1.0

8-DPSK (Peak)

Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	0.0	0.0	0.0
Tolerance ±(dB)	1.0	1.0	1.0

2.4GHz WLAN

IEEE 802.11b (Peak)

Frequency (MHz)	Antenna 1			Antenna 2		
	2412	2437	2462	2412	2437	2462
Target (dBm)	12.0	12.0	12.0	13.0	13.0	13.0
Tolerance ± (dB)	1.0	1.0	1.0	1.0	1.0	1.0

IEEE 802.11g (Peak)

Frequency (MHz)	Antenna 1			Antenna 2		
	2412	2437	2462	2412	2437	2462
Target (dBm)	12.0	12.0	12.0	13.0	13.0	13.0
Tolerance ± (dB)	1.0	1.0	1.0	1.0	1.0	1.0

IEEE 802.11n HT20 (Peak)

Frequency (MHz)	Antenna 1			Antenna 2		
	2412	2437	2462	2412	2437	2462
Target (dBm)	16.0	16.0	16.0	17.0	18.0	17.0
Tolerance ± (dB)	1.0	1.0	1.0	1.0	1.0	1.0

IEEE 802.11n HT40 (Peak)

Frequency (MHz)	Antenna 1			Antenna 2		
	2422	2437	2452	2422	2437	2452
Target (dBm)	16.0	16.0	16.0	17.0	18.0	17.0
Tolerance ± (dB)	1.0	1.0	1.0	1.0	1.0	1.0

2.6 Standalone MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna is refer to section 2.4, the RF power density can be obtained.

Bluetooth

Modulation Type	Output power with Tune-up		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	1.00	1.2589	5.11	3.2434	0.00081	1.0000
$\pi/4$ DQPSK	1.00	1.2589	5.11	3.2434	0.00081	1.0000
8-DPSK	1.00	1.2589	5.11	3.2434	0.00081	1.0000

2.4GHz WLAN

Antenna 1

Modulation Type	Output power with Tune-up		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11b	13.00	19.9526	5.11	3.2434	0.01287	1.0000
IEEE 802.11g	13.00	19.9526	5.11	3.2434	0.01287	1.0000
IEEE 802.11n HT20	17.00	50.1187	5.11	3.2434	0.03234	1.0000
IEEE 802.11n HT40	17.00	50.1187	5.11	3.2434	0.03234	1.0000

Antenna 2

Modulation Type	Output power with Tune-up		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11b	14.00	25.1189	5.11	3.2434	0.01621	1.0000
IEEE 802.11g	14.00	25.1189	5.11	3.2434	0.01621	1.0000
IEEE 802.11n HT20	19.00	79.4328	5.11	3.2434	0.05125	1.0000
IEEE 802.11n HT40	19.00	79.4328	5.11	3.2434	0.05125	1.0000

Remark:

1. Output power (Peak) including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

2.7 Summary simultaneous transmission information

Modulation Type	Work Frequency Band	Transmit Antenna		Antenna 1 Antenna 2 Synchronization transmit
		Antenna 1	Antenna 2	
Bluetooth	2.4GHz	Yes	No	No
IEEE 802.11b	2.4GHz	Yes	Yes	No
IEEE 802.11g	2.4GHz	Yes	Yes	No
IEEE 802.11n HT20	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT40	2.4GHz	Yes	Yes	Yes

2.8 Summary simultaneous transmission results

Antenna 1 and Antenna 2 for 2.4GWLAN

Modulation Type	MPE _{Antenna0} (mW/cm ²)	MPE _{Antenna1} (mW/cm ²)	ΣMPE ratios	Limit	Results
IEEE 802.11n HT20	0.03234	0.05125	0.08359	1.0	PASS
IEEE 802.11n HT40	0.03234	0.05125	0.08359	1.0	PASS

BT Antenna 1 and WIFI Antenna 2

Modulation Type	Max MPE _{BT} (mW/cm ²)	Max MPE _{WIFI} (mW/cm ²)	ΣMPE ratios	Limit	Results
WIFI+BT	0.00081	0.05125	0.05206	1.0	PASS

2.9 Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

***** End of Report *****