



Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

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RF Exposure Evaluation Report

Report No.: CQASZ20210600780E-02
Applicant: SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant: Unit 2801-2802A, Building F, Xinghe WORLD, Yabao Road, Bantian Street, Longgang District, Shenzhen, China.
Equipment Under Test (EUT):
EUT Name: ZINO MINI PRO & ZINO MINI SE&ZINO MINI & ZINO MINI+
Model No.: ZINO MINI PRO & ZINO MINI SE&ZINO MINI & ZINO MINI+
Test Model No.: ZINO MINI PRO
Brand Name: HUBSAN
FCC ID: 2AN75-ZINOMINIPRORX
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2021-6-1
Date of Test: 2021-6-1 to 2021-7-6
Date of Issue: 2021-7-6
Test Result: **PASS***

*In the configuration tested, the EUT complied with the standards specified above

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Jun Li

(Jun Li)

Approved By:

Sheek Luo

(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210600780E-02	Rev.01	Initial report	2021-7-6

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3 General Information

3.1 Client Information

Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant:	Unit 2801-2802A, Building F, Xinghe WORLD , Yabao Road, Bantian Street, Longgang District, Shenzhen,China.
Manufacturer:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Manufacturer:	Unit 2801-2802A, Building F, Xinghe WORLD , Yabao Road, Bantian Street, Longgang District, Shenzhen,China.
Factory:	Dongguan Tengsheng Industrial Co., Ltd.
Address of Factory:	A22# Luyi Street, Tianxin Village, Tangxia Town, Dongguan, China.

3.2 General Description of EUT

Product Name:	ZINO MINI PRO & ZINO MINI SE&ZINO MINI & ZINO MINI+
Model No.:	ZINO MINI PRO & ZINO MINI SE&ZINO MINI & ZINO MINI+
Test Model No.:	ZINO MINI PRO
Trade Mark:	HUBSAN
Hardware Version:	V1.0
Software Version:	V1.0
Frequency Range:	2406MHz ~ 2470MHz
Modulation Type:	OFDM
Number of Channels:	9 (declared by the client)
Sample Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	RF test
Antenna Type:	sheet metal
Antenna Gain:	2dBi
Power Supply:	Battery: 8.4V 3000 mAh Li-Po

Note:

Model No.: ZINO MINI PRO & ZINO MINI SE&ZINO MINI & ZINO MINI+

Only the model ZINO MINI PRO was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limitst

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	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

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.2 EUT RF Exposure Evaluation

$$e_{irp} = p_t \times g_t = (E \times d)^2 / 30$$

where:

p_t = transmitter output power in watts,

g_t = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, $10^{((dB_{\mu V/m})/20)/10^6}$,

d = measurement distance in meters (m)---3m,

$$\text{So } p_t = (E \times d)^2 / 30 / g_t$$

The worst case (refer to report CQASZ20210500679E-04) is below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
2438	90.09	Peak
2438	88.78	Average

For 916MHz wireless:

Field strength = 77.58dB μ V/m @3m

Ant. gain 0dBi; so Ant numeric gain=1

$$\text{So } p_t = \{ [10^{(89.16/20)} / 10^6 \times 3]^2 / 30 / 1 \} \times 1000 \text{mW} = 0.306 \text{mW}$$

$$\text{So } (0.247 \text{mW} / 5 \text{mm}) \times \sqrt{0.916 \text{GHz}} = 0.096$$

$$0.096 < 1.0 \text{ for 1-g SAR}$$

So the SAR report is not required.