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RF Exposure Evaluation Report

Report No. : CQASZ20191201313E-02
Applicant: SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant: 13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Equipment Under Test (EUT):
Product: HUBSAN ZINO 2
Model No.: ZINO 2
Brand Name: HUBSAN
FCC ID: 2AN75-ZINO2RX
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2019-12-16
Date of Test: 2019-12-16 to 2019-12-26
Date of Issue: 2019-12-26
Test Result : **PASS***

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

Tested By: Tom Chen
(Tom Chen)
Reviewed By: Aaron Ma
(Aaron Ma)
Approved By: Jack Ai
(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20191201313E-02	Rev.01	Initial report	2019-12-26

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3 General Information

3.1 Client Information

Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Manufacturer:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Manufacturer:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054

3.2 General Description of EUT

Product Name:	HUBSAN ZINO 2
Model No.:	ZINO 2
Trade Mark:	HUBSAN
Hardware Version:	EA04058086-02
Software Version:	V0.1.1
Operation Frequency:	IEEE 802.11a: 5150MHz ~5250 MHz IEEE 802.11a: 5725MHz ~5850 MHz
Channel Numbers:	IEEE 802.11a: 5150MHz ~5250MHz/ 4 channel IEEE 802.11a: 5725MHz ~5850MHz/ 5 channel
Channel Separation:	IEEE 802.11a: 20 MHz
Transmitter Operating channel width(OCW)	≤20MHz (provider declaration)
Type of Modulation:	OFDM(BPSK\QPSK\16QAM\64QAM)
Sample Type:	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Test Software of EUT:	Atheros Radio Test 2 (manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	ANT1:3dBi ANT2:3dBi
Power Supply:	Battery: 15.2 V 3800 mAh Li-Po Power Supply: MODEL: P173D3000 INPUT: 100-240V~50/60Hz 1.2A OUTPUT: 17.3V===3000mA

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

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 1.1.3 EUT RF Exposure Evaluation

For 5G WIFI

Antenna Gain: ANT1: 3.0dBi , ANT2: 3.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11a mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
5180	Ant1	15.86	15±1.0	16.0	39.811
5180	Ant2	15.99	15±1.0	16.0	39.811
5200	Ant1	15.93	15±1.0	16.0	39.811
5200	Ant2	15.74	15±1.0	16.0	39.811
5240	Ant1	14.76	14±1.0	15.0	31.623
5240	Ant2	15.42	14.5±1.0	15.5	35.481
5745	Ant1	15.54	16±1.0	16.0	39.811
5745	Ant2	15.51	15±1.0	16.0	39.811
5785	Ant1	15.17	14.5±1.0	15.5	35.481
5785	Ant2	15.34	14.5±1.0	15.5	35.481
5825	Ant1	15.89	15±1.0	16.0	39.811
5825	Ant2	15.79	15±1.0	16.0	39.811

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
39.811	3	0.0126	1.0	PASS

Note: 1) Refer to report No. CQASZ20191201313E-01 for EUT test Max Conducted average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (39.811 * 2.0) / (4 * 3.1416 * 20^2) = 0.0126$$