



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. : CQASZ20200600558E-02
Applicant: XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD.
Address of Applicant: (5/F) NO.168, QIANPU ROAD, SIMING DISTRICT, XIAMEN, CHINA.
Equipment Under Test (EUT):
EUT Name: Massage Chair
Model No.: EI-8502A, Maxim 3D LE
Test Model No.: EI-8502A
Brand Name: N/A
FCC ID: YMX-EI8502A
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-06-17
Date of Test: 2020-06-17 to 2020-06-28
Date of Issue: 2020-06-28
Test Result : PASS*

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

Tested By:

Tom Chen

(Tom Chen)

Reviewed By:

Sheek Luo

(Sheek Luo)

Approved By:

Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20200600558E-02	Rev.01	Initial report	2020-06-28

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3 General Information

3.1 Client Information

Applicant:	XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD.
Address of Applicant:	(5/F) NO.168, QIANPU ROAD, SIMING DISTRICT, XIAMEN, CHINA.
Manufacturer:	Xiamen Healthcare Electronic Co., Ltd.
Address of Manufacturer:	65-66#, 62-63#Building, Siming Zone, Tongan Industrial District, Xiamen City, Fujian Province, P.R. China
Factory:	Xiamen Healthcare Electronic Co., Ltd.
Address of Factory:	65-66#, 62-63#Building, Siming Zone, Tongan Industrial District, Xiamen City, Fujian Province, P.R. China

3.2 General Description of EUT

Product Name:	Massage Chair
Model No.:	EI-8502A, Maxim 3D LE
Test Model No.:	EI-8502A
Trade Mark:	N/A
Hardware Version:	V1.2
Software Version:	M27_V28.7.6
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V2.1
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Transfer Rate:	1Mbps/2Mbps/3Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	☐ Mobile ☐ Portable ☒ Fix Location
Test Software of EUT:	RDA ToolKit 8.03.03 (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	2.0dBi
Power Supply:	120V 60Hz

Model No.: EI-8502A, Maxim 3D LE

Only the model EI-8502A 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, pack 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.

4.1.3 EUT RF Exposure

1) For BT

Antenna Gain: 2.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-1.710	-1.5±1	-0.5	0.891
Middle(2441MHz)	-1.080	-1.0±1	0	1.000
Highest(2480MHz)	-0.060	0±1	1	1.259
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.920	1±1	2.0	1.585
Middle(2441MHz)	1.490	1.5±1	2.5	1.778
Highest(2480MHz)	2.420	2.0±1	3.0	1.995
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	1.540	1.0±1	2.0	1.585
Middle(2441MHz)	2.040	1.5±1	2.5	1.778
Highest(2480MHz)	3.010	2.5±1	3.5	2.239

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm²)	Limit	Result
2.239	2	0.0007	1.0	PASS

Note: 1) Refer to report No. CQASZ20200600558E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (2.239 \cdot 1.58) / (4 \cdot 3.1416 \cdot 20^2) = 0.0007$

3) EUT's Bluetooth module is more than 20cm away from the human body.