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RF Exposure Evaluation Report

Report No. :	CQASZ20210701186E-03
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):

Product:	Massage Chair
Model No.:	EC-7507B, BK-650
Test Model No.	EC-7507B
Brand Name:	N/A
FCC ID:	YMX-EC7507B
Standards:	47 CFR Part 1.1307
	47 CFR Part 1.1310
	KDB447498D01 General RF Exposure Guidance v06
Date of Receipt:	2021-07-20
Date of Test:	2021-07-20 to 2021-08-18
Date of Issue:	2021-09-13
Test Result :	**PASS***

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

Tested By: _lewis zhou_

(Lewis Zhou)

Reviewed By: _Rock Huang_

(Rock Huang)

Approved By: _Jack ai_

(Jack ai)

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1   Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210701186E-03	Rev.01	Initial report	2021-09-13

Note:There are BT module, BLE module, WiFi module in the product. The WiFi module has been certified by FCC ID (2AC7Z-ESPWROOM02). The operating distance of the BT module, BLE module and WiFi module is greater than 20cm.

2   Contents

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	
All Model No.:	EC-7507B, BK-650	
Test Model No.:	EC-7507B	
Trade Mark:	N/A	
EUT Supports Radios application	2402-2480MHz	
Hardware Version:	1.0	
Software Version:	1.0	
Power Supply:	Rating: 110-120V~ 60Hz Rated current:2.5A	
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location	
Test Software of EUT:	FCCAssist 1.0.0.2	
Antenna Type:	PCB antenna	
Antenna Gain:	BLE	-1.39dBi
	BT	-1.39dBi

Note:

Model No.: EC-7507B, BK-650
Only the model EC-7507B 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 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/cm²)	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/f²)	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/f²)	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: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd id 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 Evaluation standalone operations

1) For BT Classic (for CSR chip)

Antenna Gain: -1.93dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.73 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)	-0.540	-1.5±1	-0.5	0.891
Middle(2441MHz)	0.550	0±1	1	1.259
Highest(2480MHz)	2.040	1.5±1	2.5	1.778
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.130	-0.5±1	0.5	1.122
Middle(2441MHz)	1.170	0.5±1	1.5	1.413
Highest(2480MHz)	2.580	2±1	3	1.995

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
1.995	-1.39	0.0003	1.0	PASS

Note: 1) Refer to report No. CQASZ20210701186E-01E for EUT test Max Conducted Peak Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2) = (1.995*0.73)/(4*3.1416*20^2) = 0.0003$

2) For BLE

Antenna Gain: -1.96 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.73 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)	-0.41	-1.3±1	0	1
Middle(2440MHz)	0.11	-0.5±1	0.5	1.122
Highest(2480MHz)	-0.19	-1.1±1	0	1

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
1.122	-1.39	0.0002	1.0	PASS

Note: 1) Refer to report No. CQASZ20210701186E-02 for EUT test Max Conducted Peak Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2)=(1.122*0.73)/(4*3.1416*20^2)=0.0002$