

12.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

12.3.Restricted bands of operation

12.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

12.4.Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.1 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 0.1 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

12.6.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	48.69	-13.35	35.34	46	-10.66	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

12.7.The Field Strength of Radiation Emission Measurement Results

Note: 1.We tested GFSK mode, $\Pi/4$ -DQPSK Mode, 8DPSK mode and recorded the worst case data (GFSK mode) for all test mode.

2.The radiation emissions from 9kHz-30MHz and 18-25GHz are not reported, because the test values lower than the limits of 20dB.

The spectrum analyzer plots are attached as below.

30MHz-1000MHz test data(Worse case)



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019 #615

Standard: FCC 15.247 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2402MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Horizontal

Power Source: AC 120V/60Hz

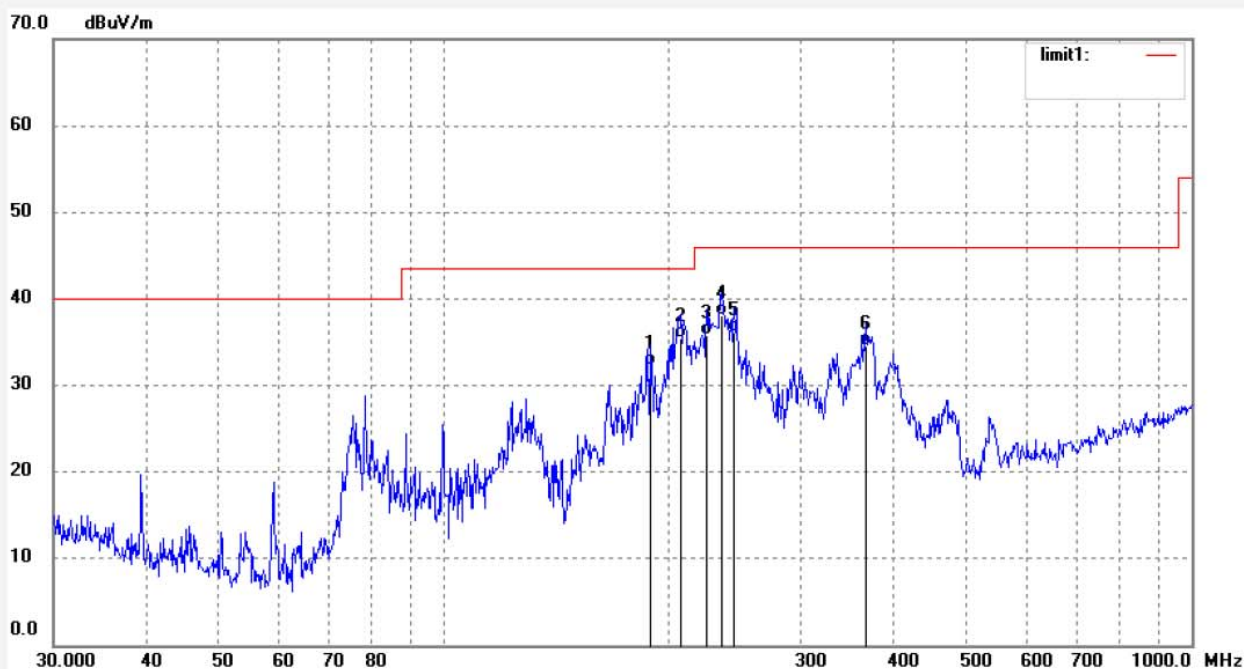
Date: 19/03/26/

Time: 9/07/20

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	188.4442	57.45	-25.25	32.20	43.50	-11.30	QP	200	103	
2	207.1967	59.65	-24.14	35.51	43.50	-7.99	QP	200	99	
3	224.6360	59.64	-23.94	35.70	46.00	-10.30	QP	200	54	
4	235.1346	61.78	-23.79	37.99	46.00	-8.01	QP	200	113	
5	244.4003	59.87	-23.68	36.19	46.00	-9.81	QP	200	201	
6	366.0865	53.45	-18.83	34.62	46.00	-11.38	QP	200	139	

Job No.: FRANK2019 #616

Standard: FCC 15.247 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2402MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Vertical

Power Source: AC 120V/60Hz

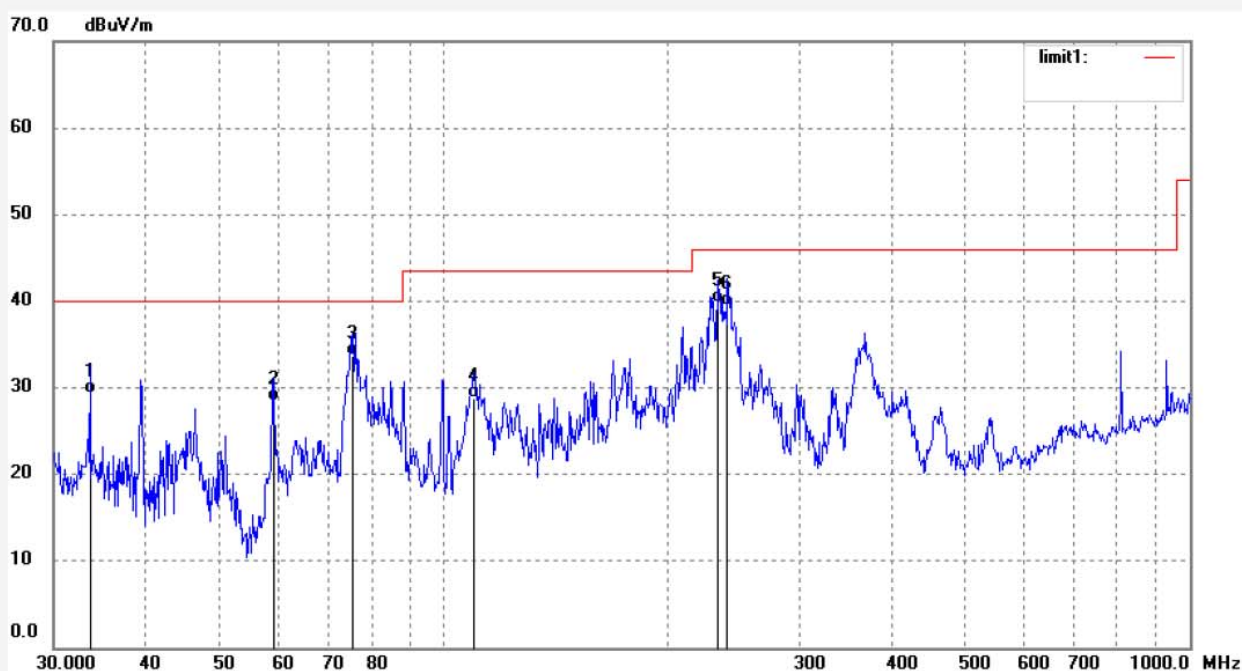
Date: 19/03/26/

Time: 9/12/23

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.5700	50.38	-21.09	29.29	40.00	-10.71	QP	100	103	
2	59.1052	55.65	-27.17	28.48	40.00	-11.52	QP	100	92	
3	75.5858	61.37	-27.67	33.70	40.00	-6.30	QP	100	213	
4	109.6957	56.10	-27.32	28.78	43.50	-14.72	QP	100	32	
5	232.6690	63.67	-23.82	39.85	46.00	-6.15	QP	100	120	
6	240.1442	63.18	-23.72	39.46	46.00	-6.54	QP	100	165	

Job No.: FRANK2019 #618

Polarization: Horizontal

Standard: FCC 15.247 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 19/03/26/

Temp.(C)/Hum.(%) 25 C / 55 %

Time: 9/13/23

EUT: Massage Chair

Engineer Signature:

Mode: TX 2441MHz

Distance: 3m

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	206.4701	62.67	-24.14	38.53	43.50	-4.97	QP	200	103	
2	221.5010	62.38	-23.99	38.39	46.00	-7.61	QP	200	221	
3	230.2295	63.81	-23.86	39.95	46.00	-6.05	QP	200	102	
4	234.3098	64.35	-23.81	40.54	46.00	-5.46	QP	200	330	
5	240.9894	65.48	-23.72	41.76	46.00	-4.24	QP	200	192	
6	359.7114	56.94	-18.92	38.02	46.00	-7.98	QP	200	63	

Job No.: FRANK2019 #617

Standard: FCC 15.247 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2441MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Vertical

Power Source: AC 120V/60Hz

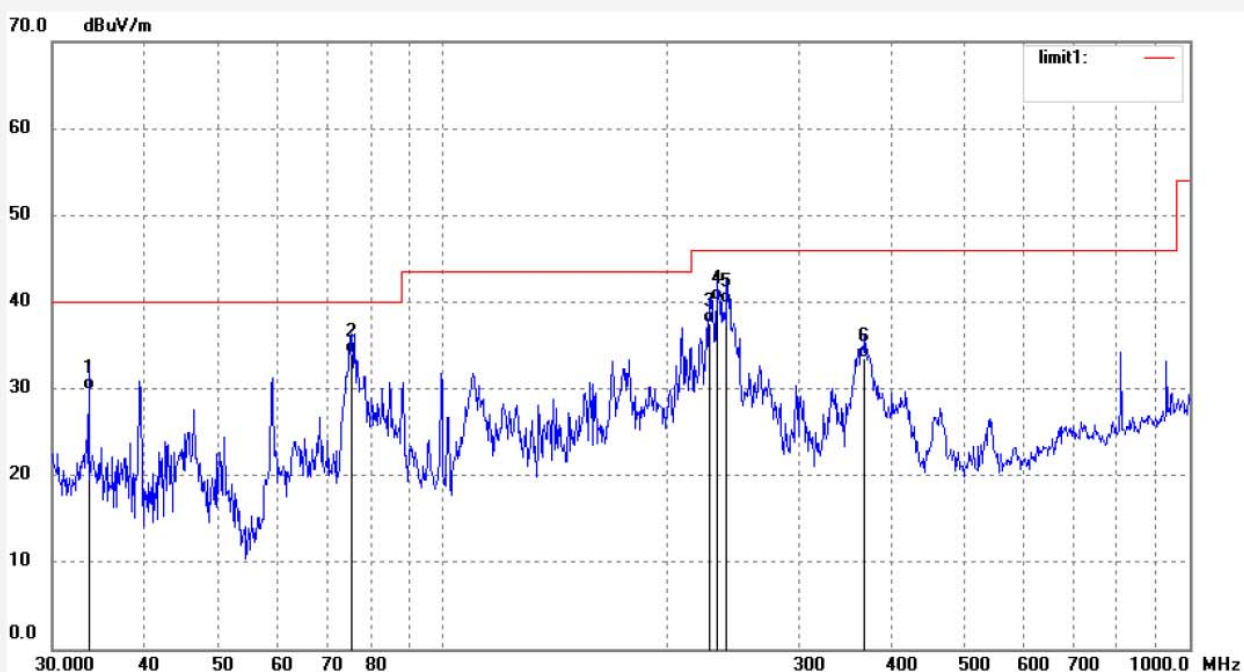
Date: 19/03/26/

Time: 9/12/35

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.5700	50.94	-21.09	29.85	40.00	-10.15	QP	100	210	
2	75.5858	61.78	-27.67	34.11	40.00	-5.89	QP	100	192	
3	227.8154	61.35	-23.89	37.46	46.00	-8.54	QP	100	311	
4	232.6690	63.92	-23.82	40.10	46.00	-5.90	QP	100	201	
5	240.1442	63.54	-23.72	39.82	46.00	-6.18	QP	100	92	
6	367.3752	52.38	-18.81	33.57	46.00	-12.43	QP	100	113	

Job No.: FRANK2019 #619

Standard: FCC 15.247 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2480MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 19/03/26/

Time: 9/14/20

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	75.5858	51.45	-27.67	23.78	40.00	-16.22	QP	200	103	
2	124.4868	52.32	-27.58	24.74	43.50	-18.76	QP	200	211	
3	129.3923	55.39	-27.70	27.69	43.50	-15.81	QP	200	92	
4	220.7240	60.97	-24.02	36.95	46.00	-9.05	QP	200	321	
5	231.8531	62.78	-23.85	38.93	46.00	-7.07	QP	200	210	
6	373.8861	53.55	-18.71	34.84	46.00	-11.16	QP	200	101	

Job No.: FRANK2019 #620

Polarization: Vertical

Standard: FCC 15.247 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 19/03/26/

Temp.(C)/Hum.(%) 25 C / 55 %

Time: 9/15/26

EUT: Massage Chair

Engineer Signature:

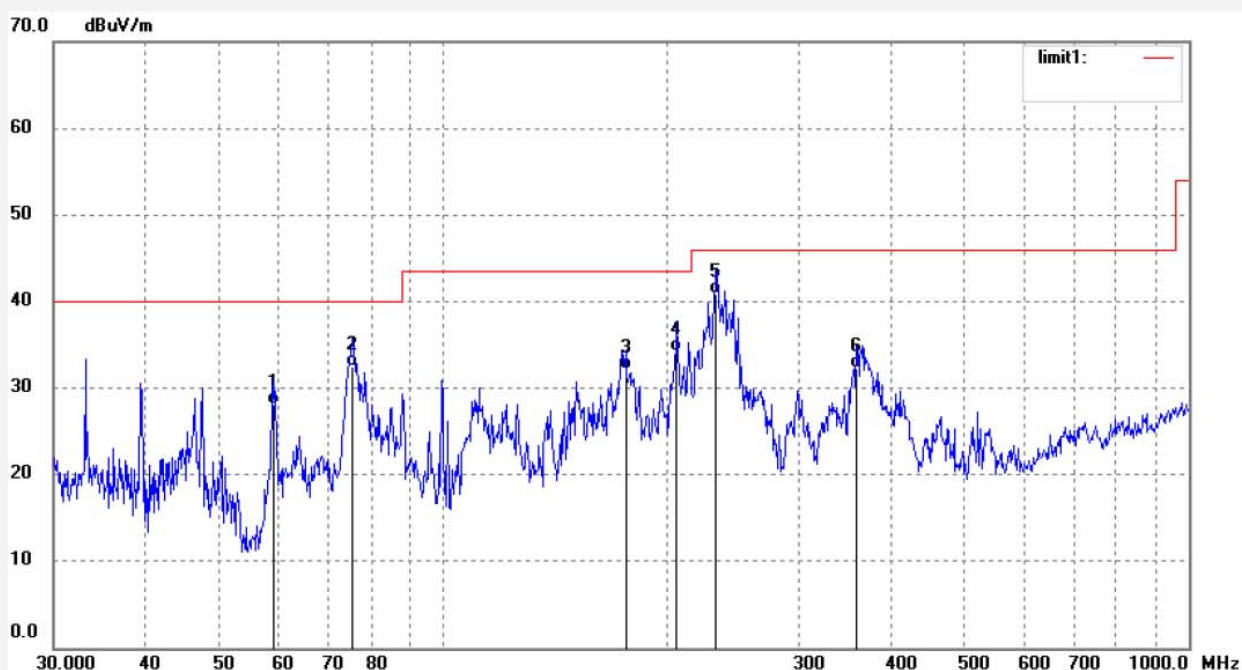
Mode: TX 2480MHz

Distance: 3m

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	59.1052	55.30	-27.17	28.13	40.00	-11.87	QP	100	196	
2	75.5858	60.12	-27.67	32.45	40.00	-7.55	QP	100	33	
3	175.6565	58.60	-26.44	32.16	43.50	-11.34	QP	100	201	
4	205.7458	58.35	-24.16	34.19	43.50	-9.31	QP	100	84	
5	231.8531	64.75	-23.85	40.90	46.00	-5.10	QP	100	115	
6	358.4497	51.30	-18.98	32.32	46.00	-13.68	QP	100	201	

1GHz-18GHz test data(Worse case)



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019 #631

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2402MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Horizontal

Power Source: AC 120V/60Hz

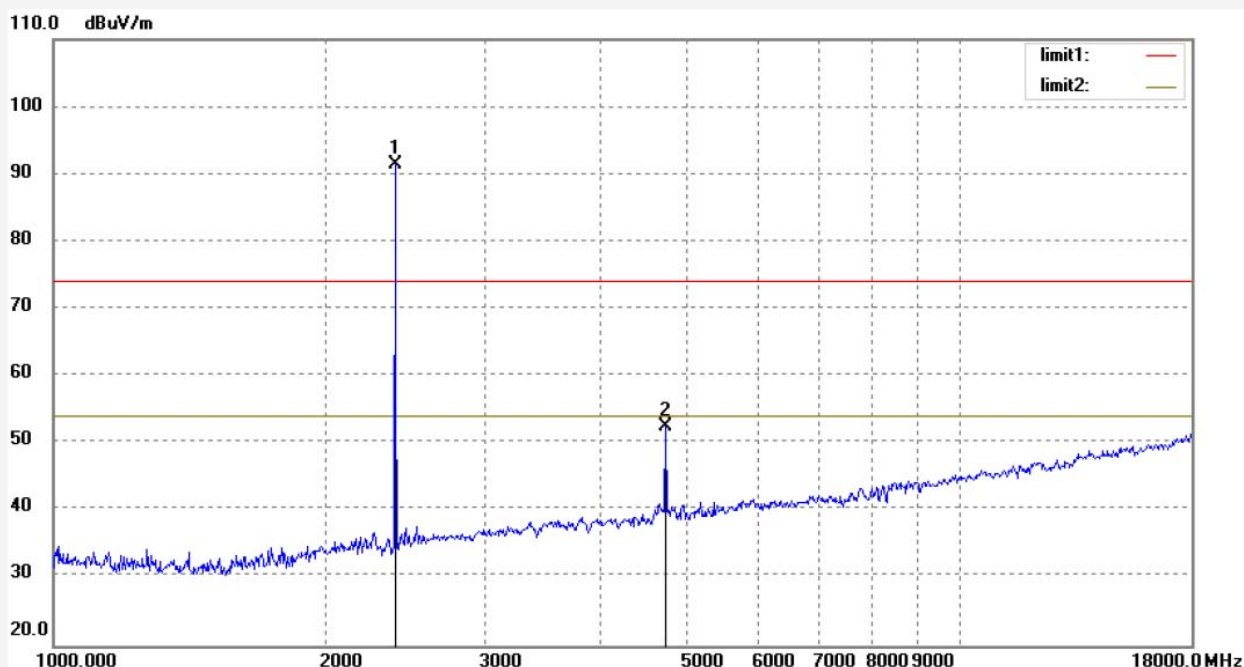
Date: 2019/03/27

Time: 17:04:33

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.219	97.71	-6.37	91.34			peak	250	221	
2	4804.457	51.92	0.70	52.62	74.00	-21.38	peak	250	103	

Job No.: FRANK2019 #632

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2402MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGYGROUP CO., LTD

Polarization: Vertical

Power Source: AC 120V/60Hz

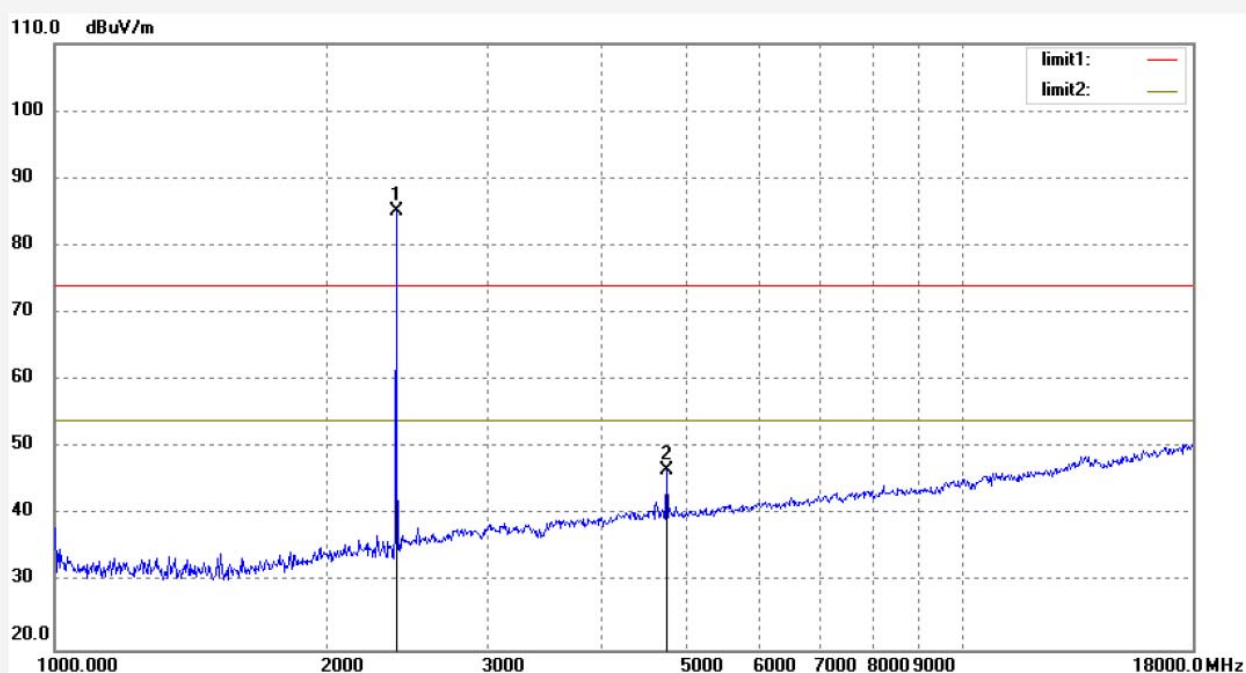
Date: 2019/03/27

Time: 17:05:39

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.219	91.51	-6.37	85.14			peak	150	110	
2	4804.457	45.88	0.70	46.58	74.00	-27.42	peak	150	166	

Job No.: FRANK2019 #634

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2441MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Horizontal

Power Source: AC 120V/60Hz

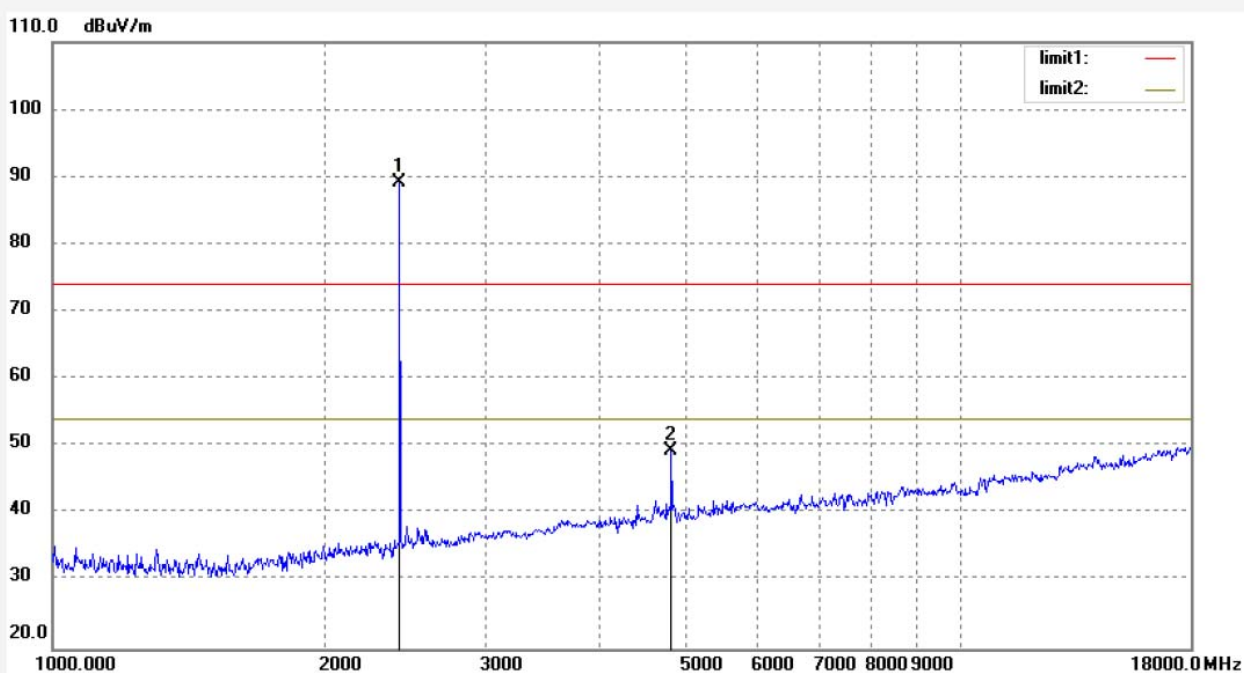
Date: 2019/03/27

Time: 17:09:41

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.221	95.42	-6.20	89.22			peak	200	221	
2	4882.424	48.22	1.07	49.29	74.00	-24.71	peak	250	103	

Job No.: FRANK2019 #633

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2441MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Vertical

Power Source: AC 120V/60Hz

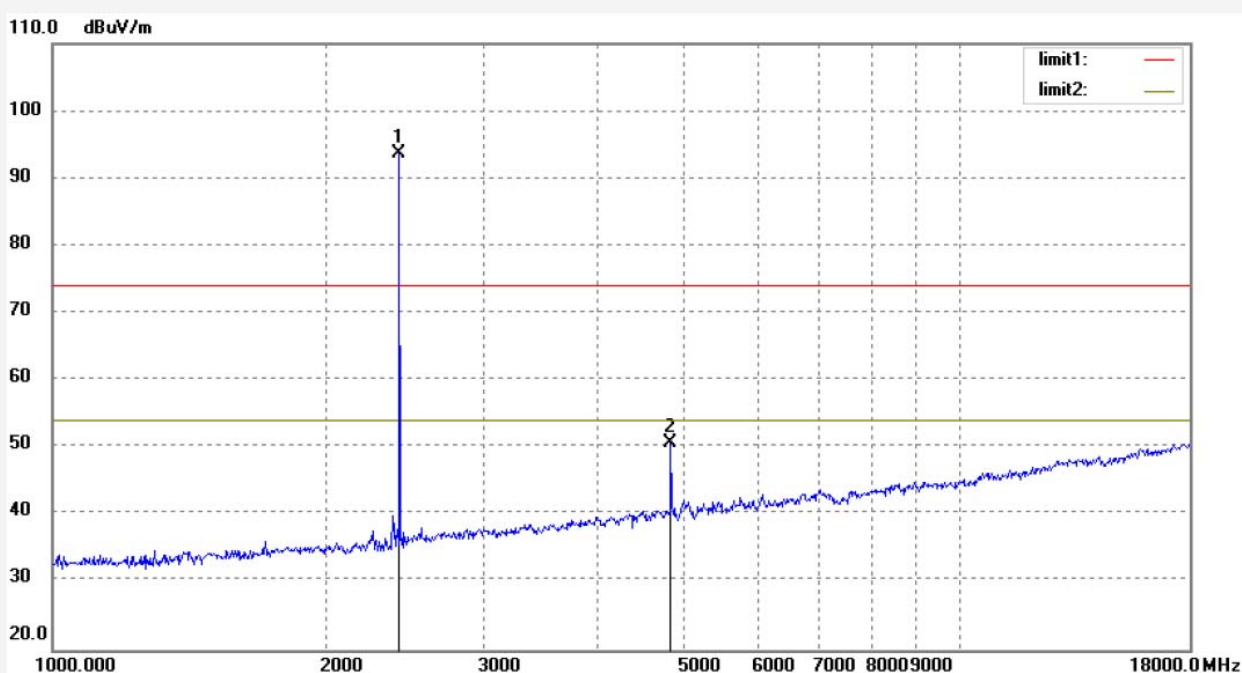
Date: 2019/03/27

Time: 17:08:29

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.221	99.80	-6.20	93.60			peak	150	54	
2	4882.424	49.59	1.07	50.66	74.00	-23.34	peak	150	119	

Job No.: FRANK2019 #635

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2480MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Horizontal

Power Source: AC 120V/60Hz

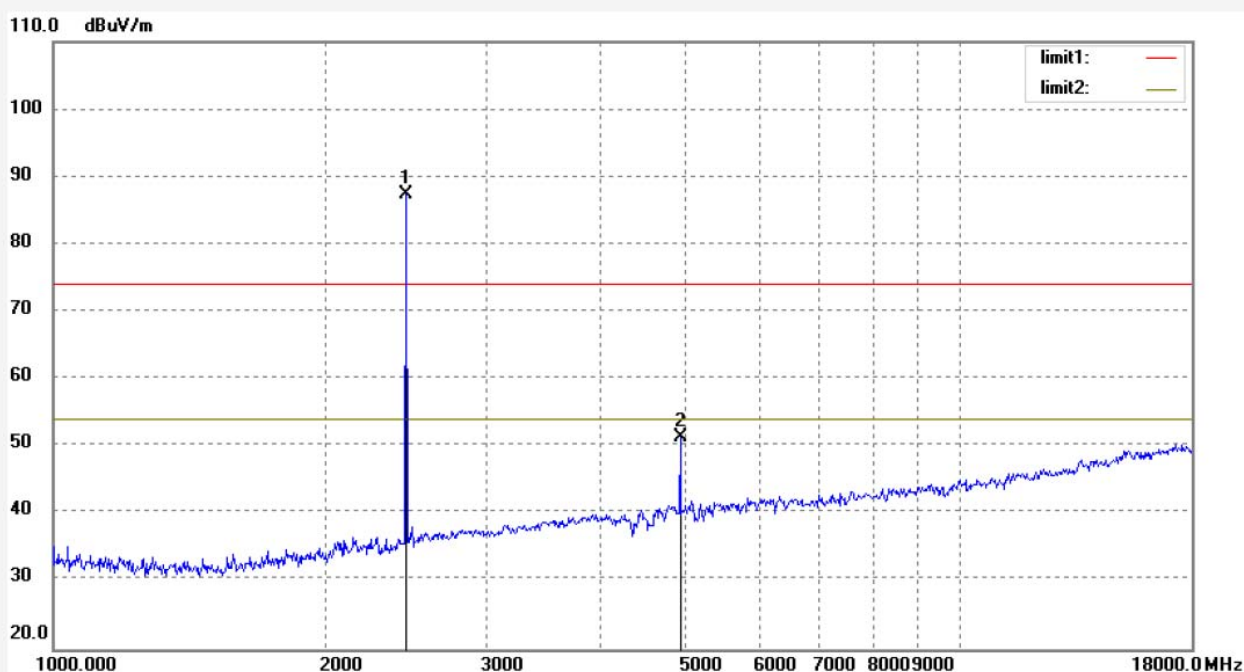
Date: 2019/03/27

Time: 17:11:19

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.034	93.37	-6.04	87.33			peak	200	332	
2	4960.444	49.89	1.50	51.39	74.00	-22.61	peak	200	106	

Job No.: FRANK2019 #636

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Massage Chair

Mode: TX 2480MHz

Model: HUGCHAIR-2000US

Manufacturer: XIAMEN COMFORT SCIENCE&TECHNOLOGY GROUP CO., LTD

Polarization: Vertical

Power Source: AC 120V/60Hz

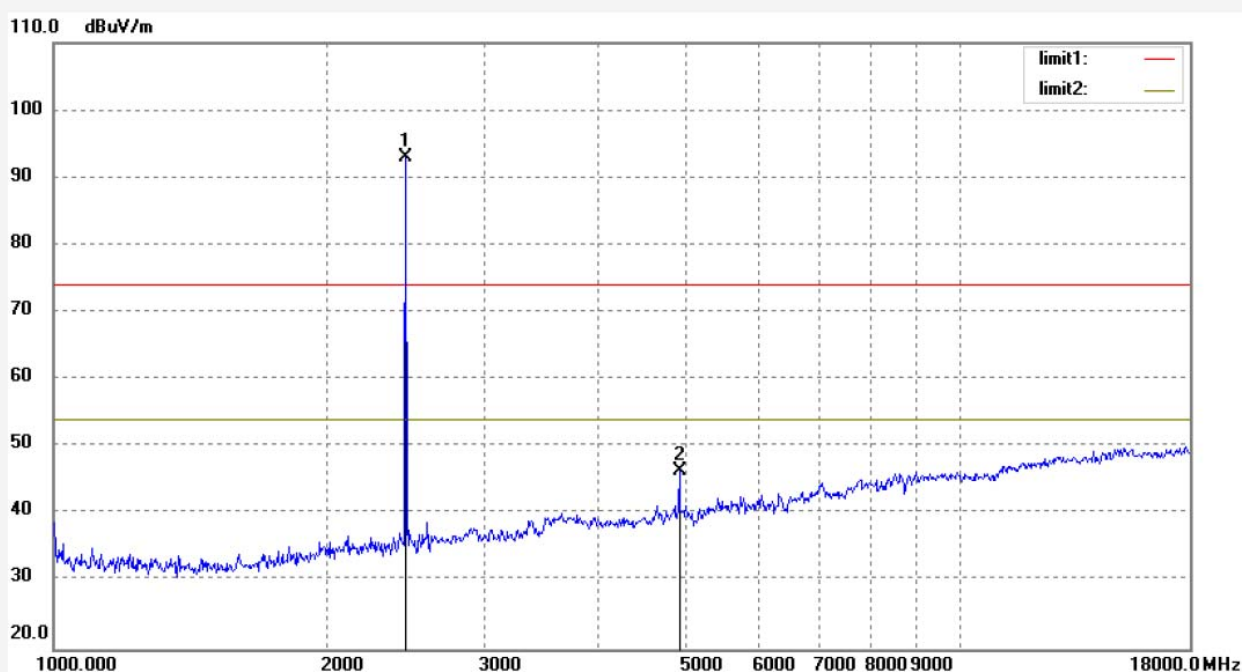
Date: 2019/03/27

Time: 17:13:03

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190291



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.034	99.12	-6.04	93.08			peak	150	295	
2	4960.444	45.04	1.50	46.54	74.00	-27.46	peak	150	103	

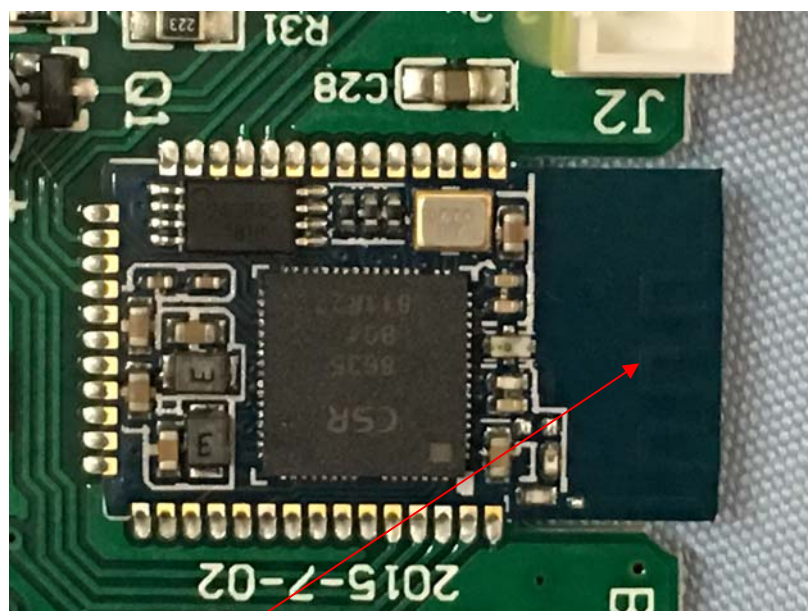
13.ANTENNA REQUIREMENT

13.1.The Requirement

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

13.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna