

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD

Massage Chair
Model No.: Otamic-2X, OGI-2213B

FCC ID: YMX-2213B

Prepared for : XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO.,
LTD
Address : (5/F) NO.168, QIANPU ROAD, SIMING DISTRICT, XIAMEN,
CHINA

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Date of Test : July 6-July 11, 2019
Date of Report : July 15, 2019

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Test Report Certification

Applicant : XIAMEN COMFORT SCIENCE & TECHNOLOGY GROUP CO., LTD
Address : (5/F) NO.168, QIANPU ROAD, SIMING DISTRICT, XIAMEN, CHINA
Manufacturer : XIAMEN OGAWA INTELLIGENT HEALTH EQUIPMENT CO.,LTD
Address : THREE FLOOR NO 38-40, TIANYANG ROAD, JIMEI ZONE, XIAMEN T:3521880
Product : Massage Chair
Model No. : Otamic-2X, OGI-2213B

Measurement Procedure Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013**

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test :

July 6-July 11, 2019

Date of Report :

July 15, 2019

Prepared by :

Star Yang
(Star Yang, Engineer)


Approved & Authorized Signer :


(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Model Number	: Otamic-2X, OGI-2213B (Note: We hereby state that these models are identical in interior structure, electrical circuits and components, just model name is different. Therefore only model Otamic-2X is for tests.)
Bluetooth version	: V5.0 classic mode for single mode
Frequency Range	: 2402MHz-2480MHz
Number of Channels	: 79
Antenna Gain(Max)	: 0dBi
Antenna type	: Plate loaded antenna
Modulation mode	: GFSK, $\pi/4$ DQPSK, 8DPSK
Power supply	: AC 110-120V~ 60Hz

1.2. Accessory and Auxiliary Equipment

N/A

1.3. Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.4. Measurement Uncertainty

Radiated Emission Expanded Uncertainty (9kHz-30MHz)	:	U=2.66dB, k=2
Radiated Emission Expanded Uncertainty (30MHz-1000MHz)	:	U=4.28dB, k=2
Radiated Emission Expanded Uncertainty (1G-18GHz)	:	U=4.98dB, k=2
Radiated Emission Expanded Uncertainty (18G-26.5GHz)	:	U=5.06dB, k=2
Conduction Emission Expanded Uncertainty (Mains ports, 9kHz-30MHz)	:	U=2.72dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 05, 2019	One Year
EMI Test Receiver	Rohde&Schwarz	ESR	101817	Jan. 05, 2019	One Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 05, 2019	One Year
Pre-Amplifier (Radiated Emission)	Compliance Direction	RSU-M2	38322	Jan. 05, 2019	One Year
Pre-Amplifier (Radiated Emission)	Agilent	8447D	294A10619	Jan. 05, 2019	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 05, 2019	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 05, 2019	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 05, 2019	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 05, 2019	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 05, 2019	One Year
RF Coaxial Cable (Conducted Emission)	SUHNER	N-2m	No.2	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-12m	No.11	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-0.5m	No.12	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.13	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-0.5m	No.15	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.16	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-6m	No.17	Jan. 05, 2019	One Year
Conducted Emission Measurement Software: ES-K1 V1.71					
Radiated Emission Measurement Software: EZ_EMV V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1. Operating Mode

The mode is used: Transmitting mode

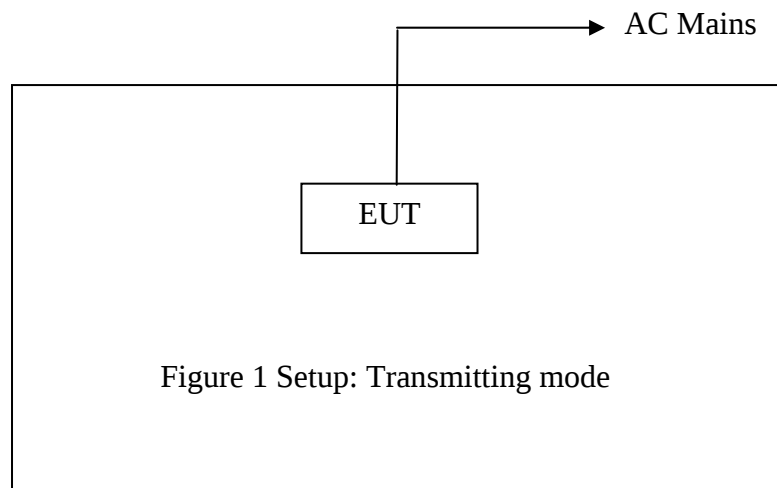
Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Hopping

3.2. Configuration and peripherals

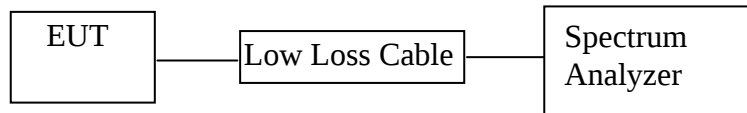


4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.207	AC Power Line Conducted Emissions Limits Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.247(a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.3. EUT Configuration on Test

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

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

5.5.2. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

5.5.3. RBW shall be in the range of 1% to 5% of the OBW and VBW shall be approximately three times RBW.

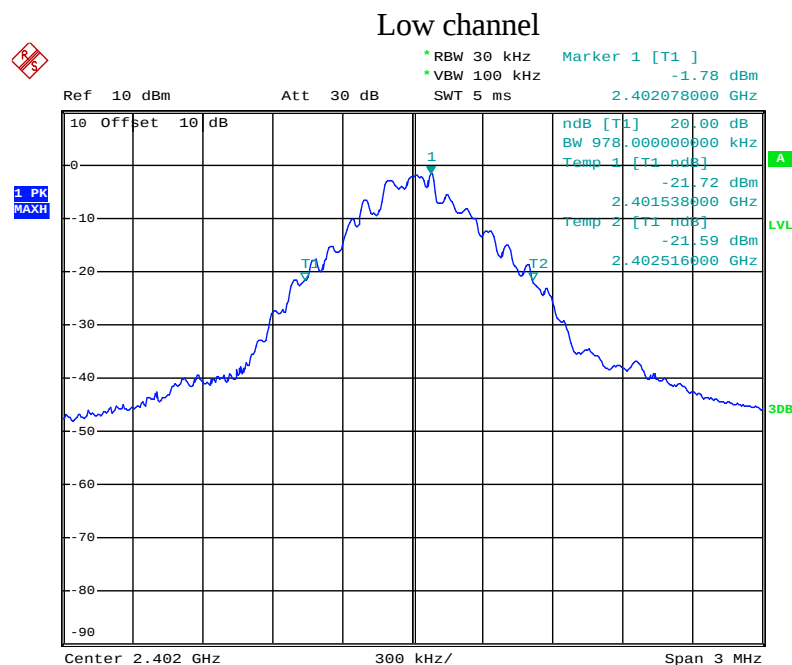
5.5.4. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.6.Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	$\Pi/4$ -DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	0.978	1.356	1.350	Pass
Middle	2441	0.972	1.350	1.356	Pass
High	2480	0.978	1.362	1.350	Pass

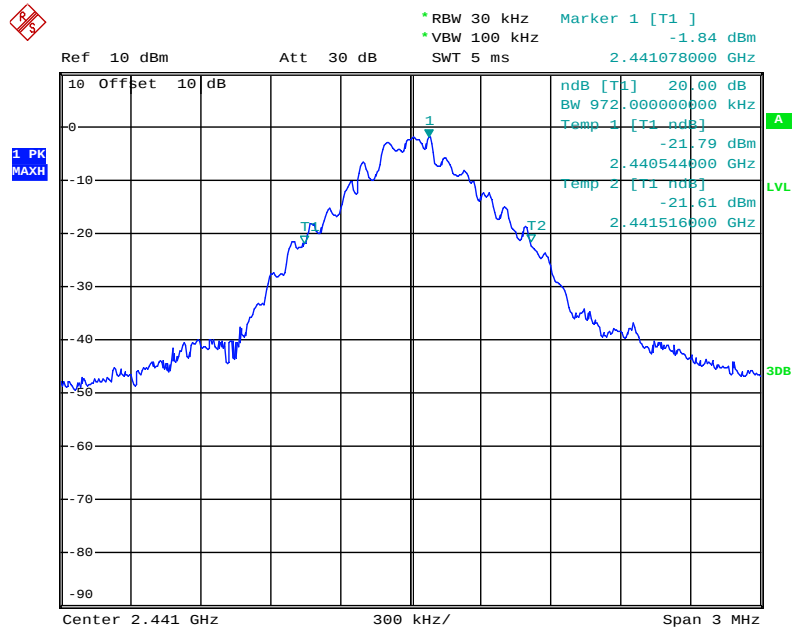
The spectrum analyzer plots are attached as below.

GFSK Mode



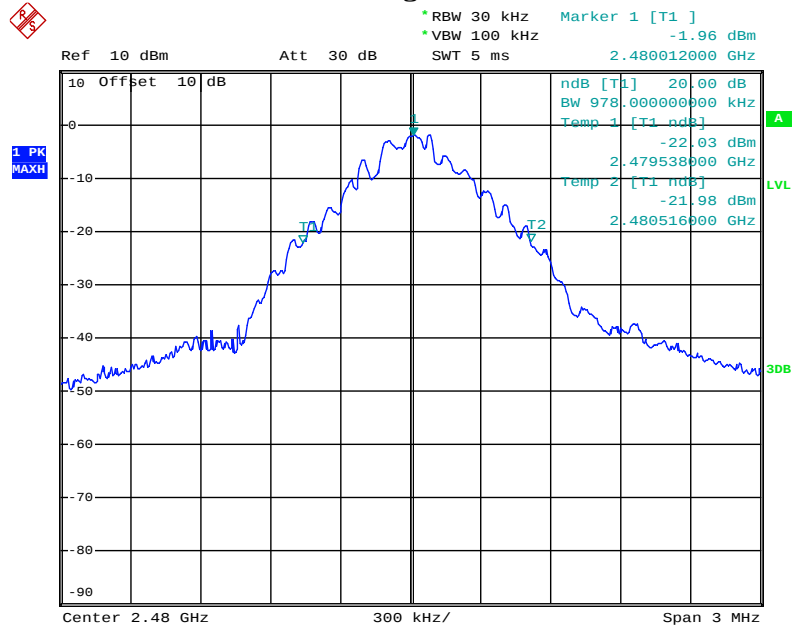
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Middle channel



Date: 11.JUL.2019 16:08:16

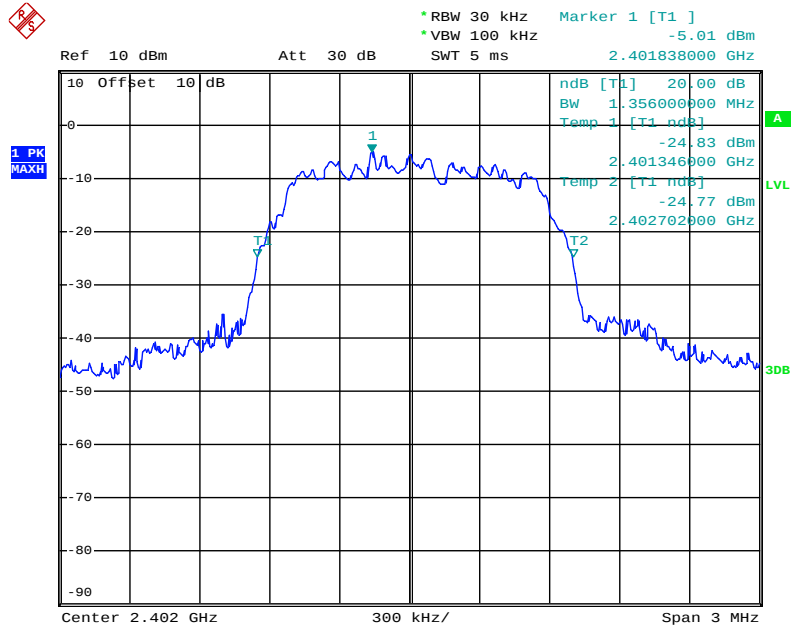
High channel



Date: 11.JUL.2019 16:08:42

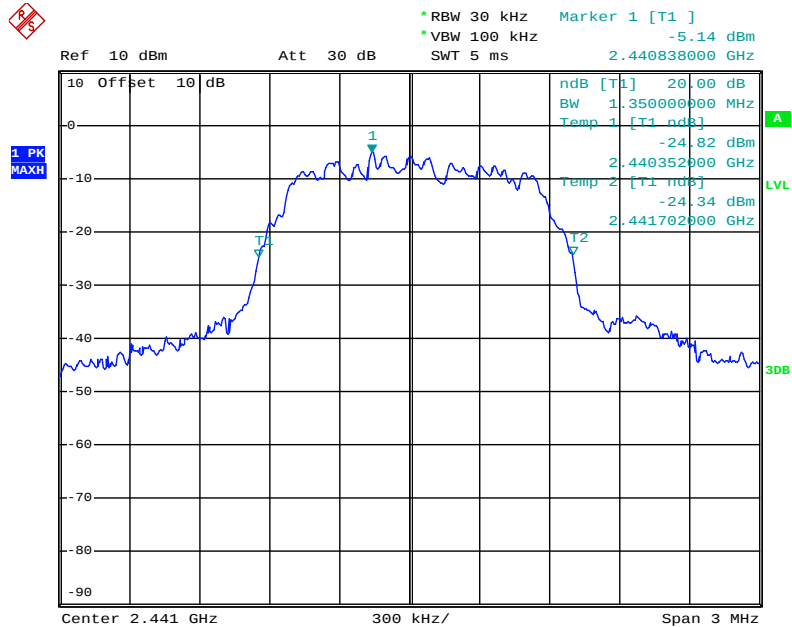
$\Pi/4$ -DQPSK Mode

Low channel

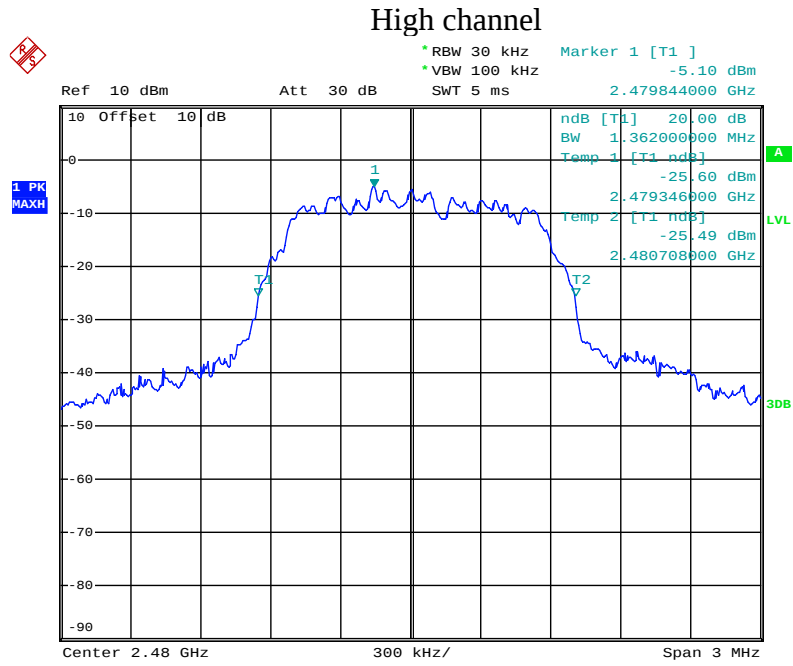


Date: 11.JUL.2019 16:10:02

Middle channel

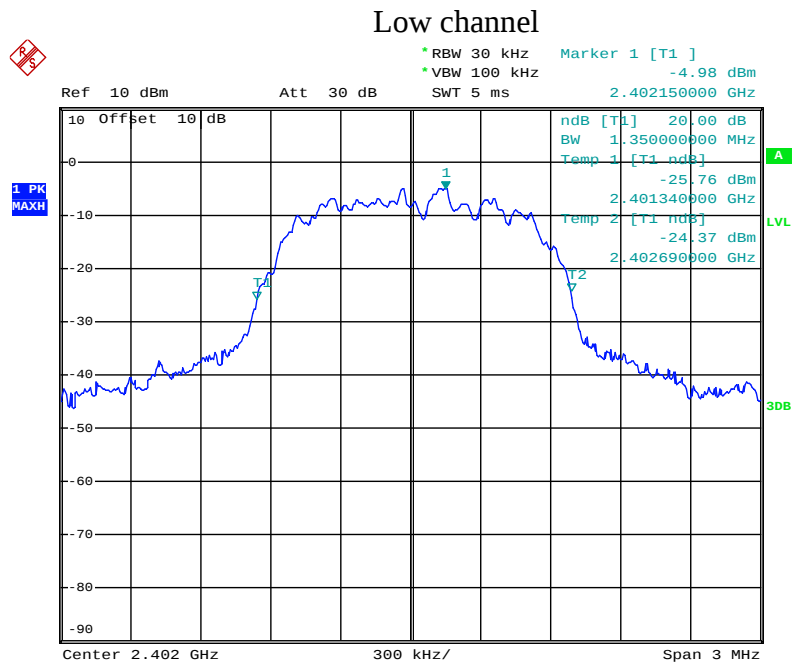


Date: 11.JUL.2019 16:09:36

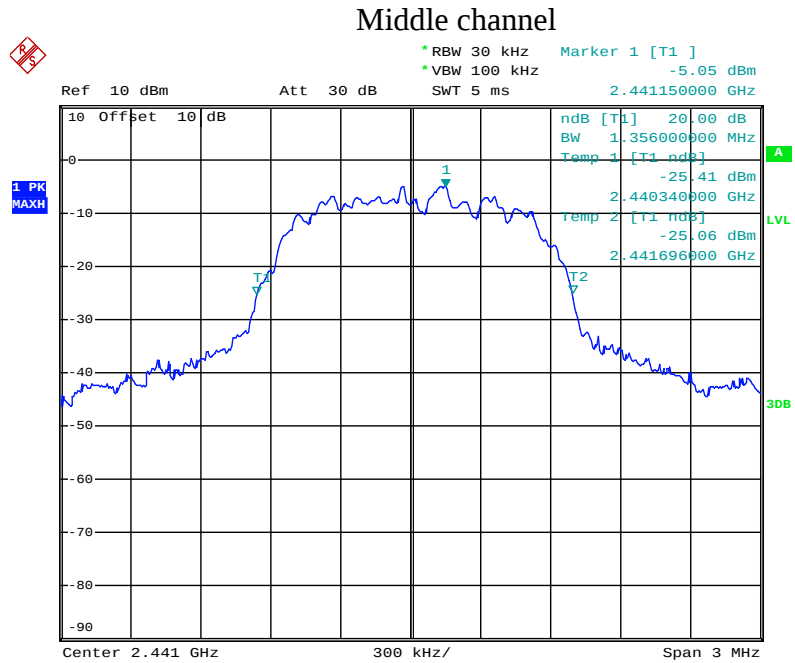


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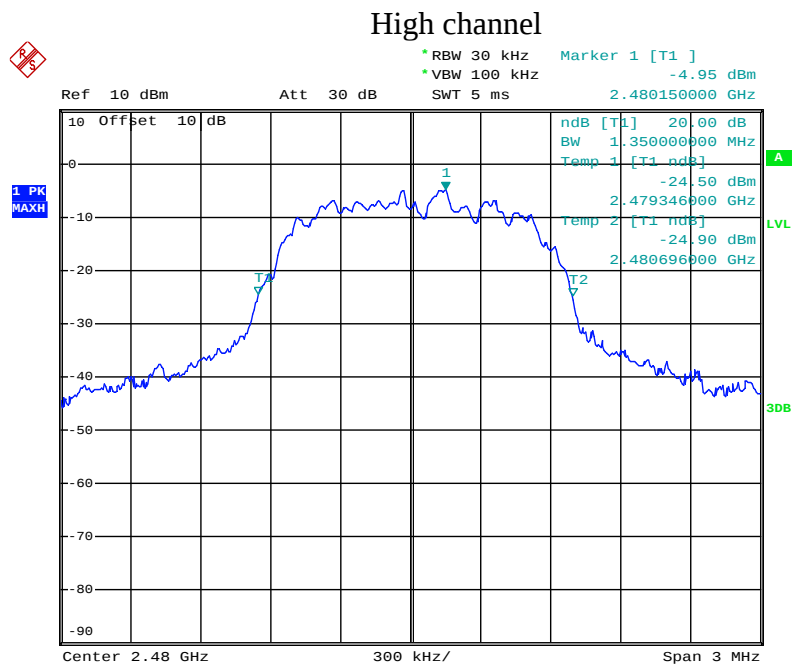
8DPSK Mode



Date: 11.JUL.2019 16:10:50



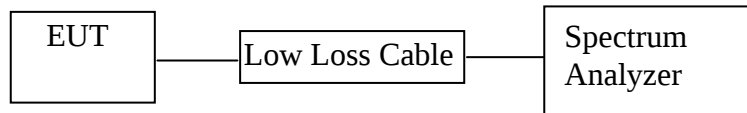
Date: 11.JUL.2019 16:11:22



Date: 11.JUL.2019 16:12:08

6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.3. EUT Configuration on Test

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

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 3MHz.

6.5.3. Set the adjacent channel of the EUT Maxhold another trace.

6.5.4. Measurement the channel separation

6.6. Test Result

GFSK Mode

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2403			
Middle	2440	0.996	25KHz or 2/3*20dB bandwidth	Pass
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2480			

Π/4-DQPSK Mode

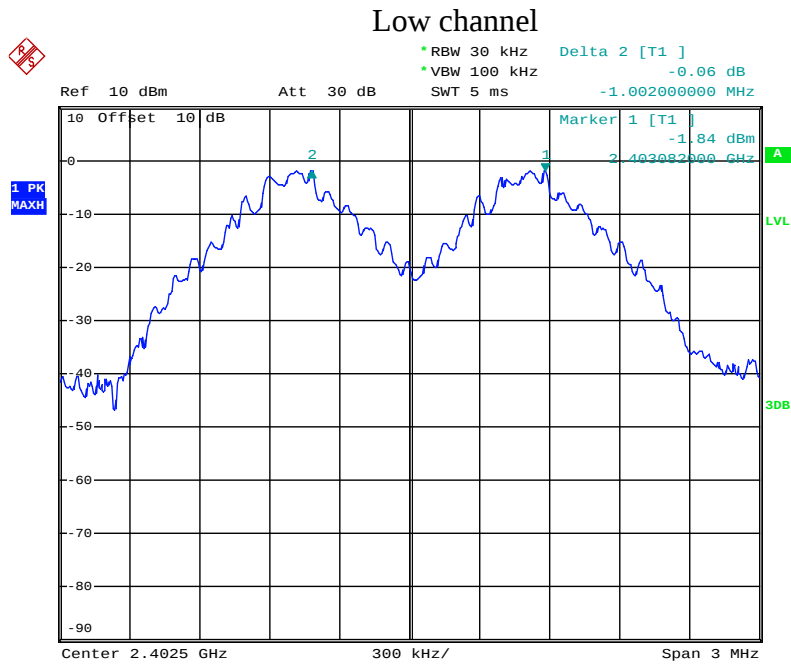
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.164	25KHz or 2/3*20dB bandwidth	Pass
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2480			

8DPSK Mode

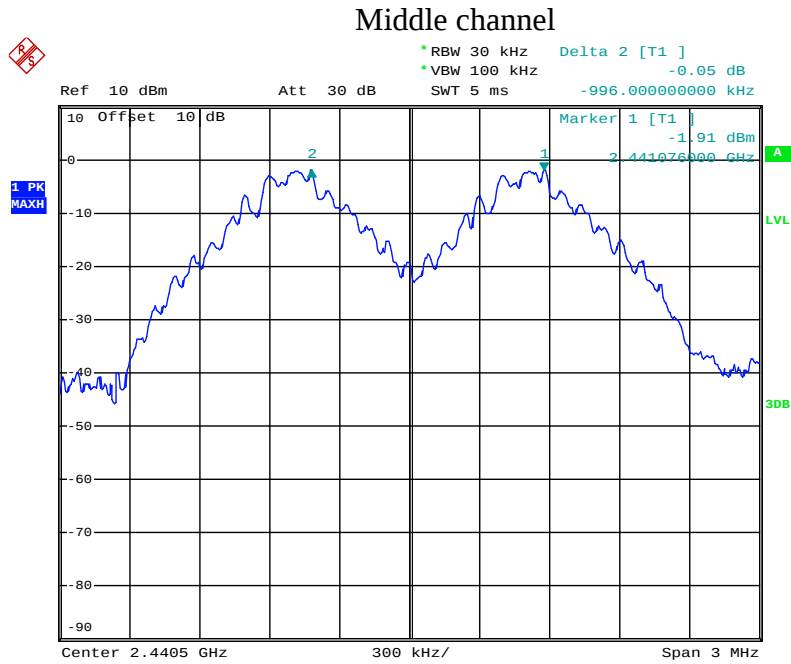
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.020	25KHz or 2/3*20dB bandwidth	Pass
	2403			
Middle	2440	1.020	25KHz or 2/3*20dB bandwidth	Pass
	2441			
High	2479	1.182	25KHz or 2/3*20dB bandwidth	Pass
	2480			

The spectrum analyzer plots are attached as below.

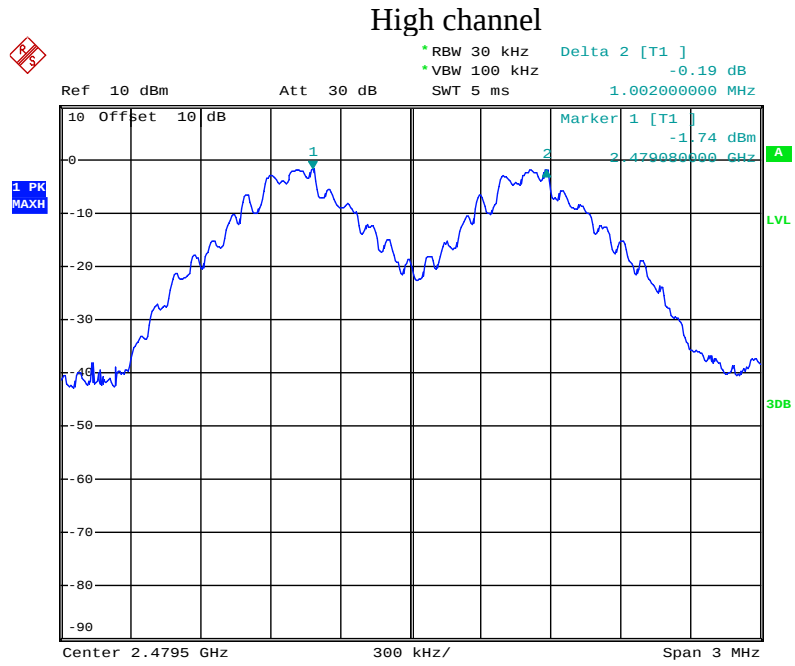
GFSK Mode



Date: 11.JUL.2019 16:37:18

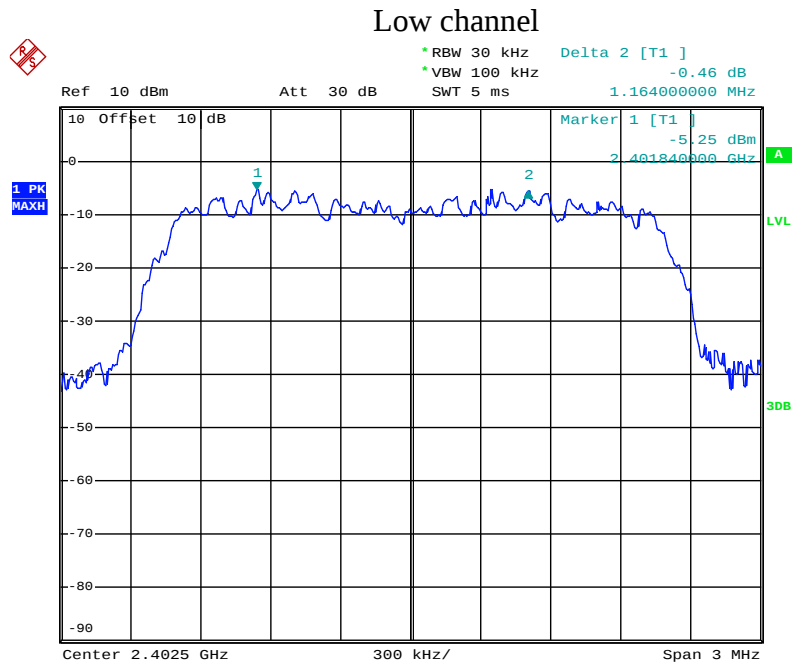


Date: 11.JUL.2019 16:36:49



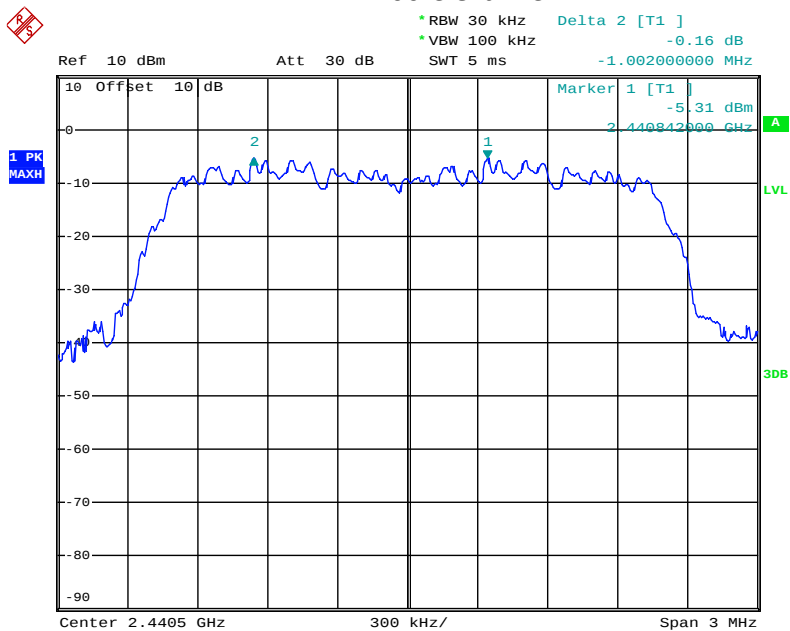
Date: 11.JUL.2019 16:36:13

Π/4-DQPSK Mode



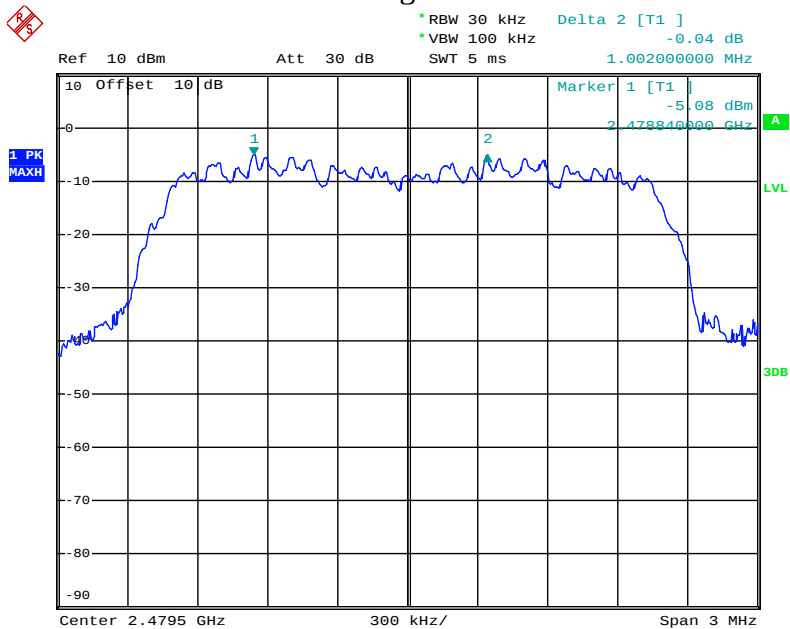
Date: 11.JUL.2019 16:37:49

Middle channel



Date: 11.JUL.2019 16:38:28

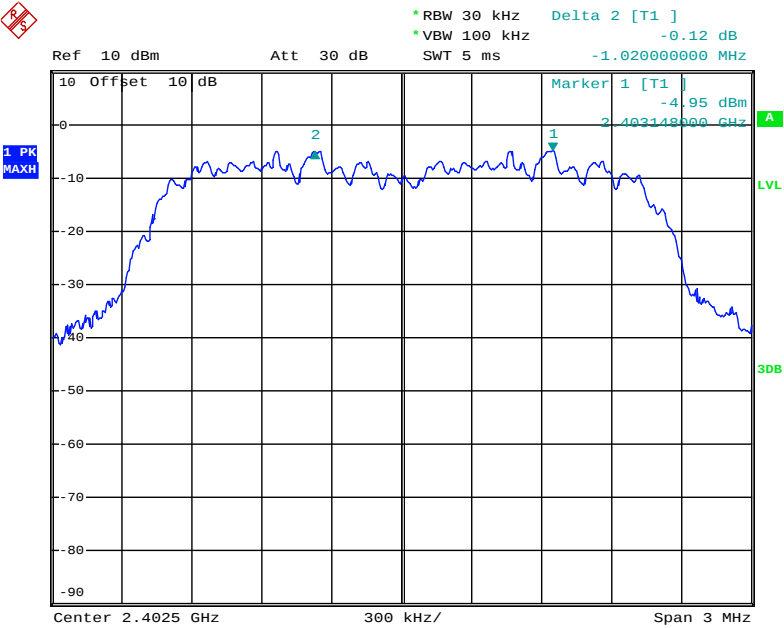
High channel



Date: 11.JUL.2019 16:39:00

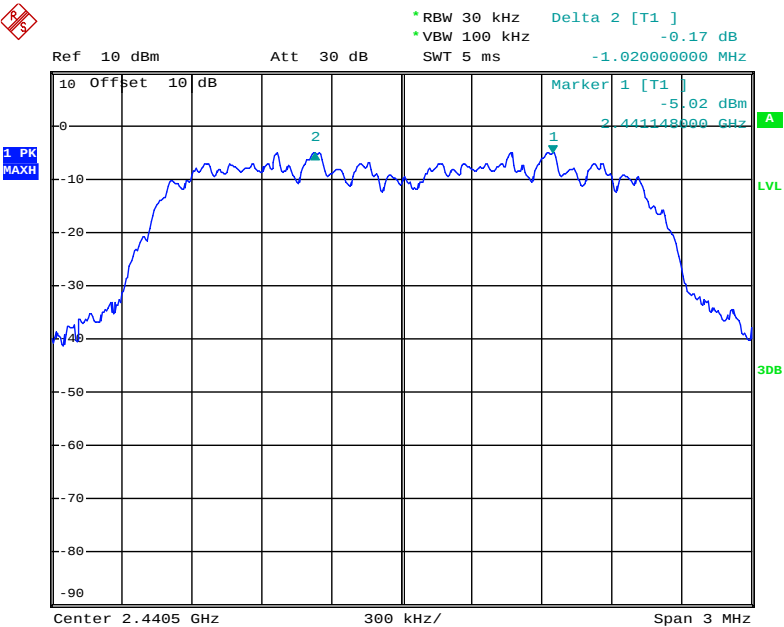
8DPSK Mode

Low channel

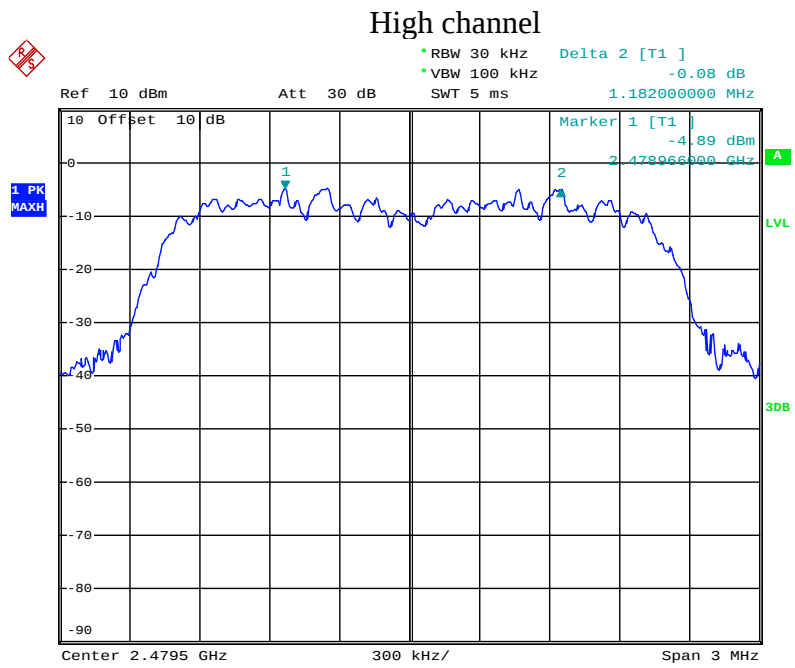


Date: 11.JUL.2019 16:40:58

Middle channel



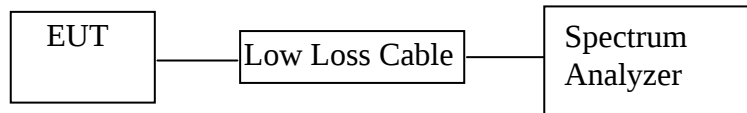
Date: 11.JUL.2019 16:40:17



Date: 11.JUL.2019 16:39:38

7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(a)(1)(iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3. EUT Configuration on Test

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

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

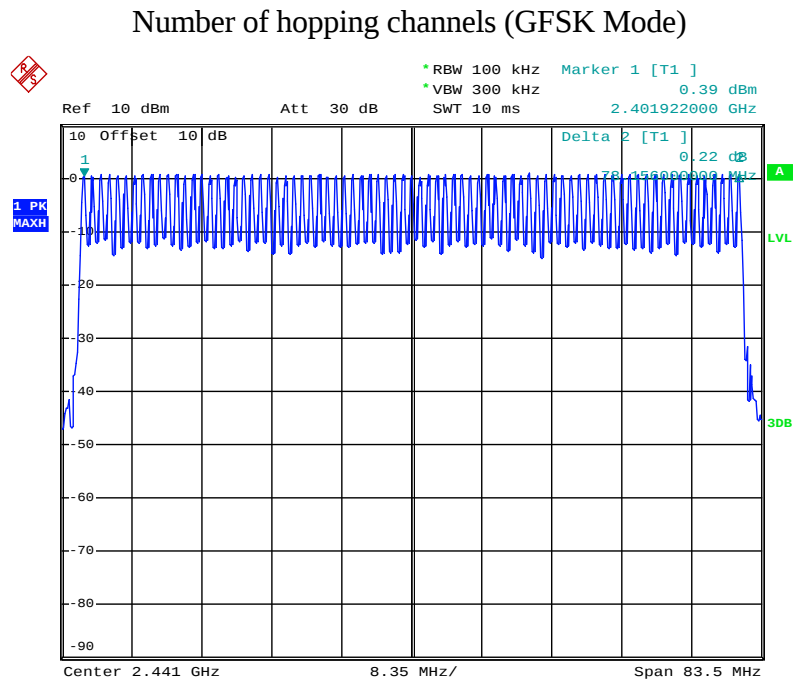
7.5.2. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz.

7.5.3. Max hold, view and count how many channel in the band.

7.6.Test Result

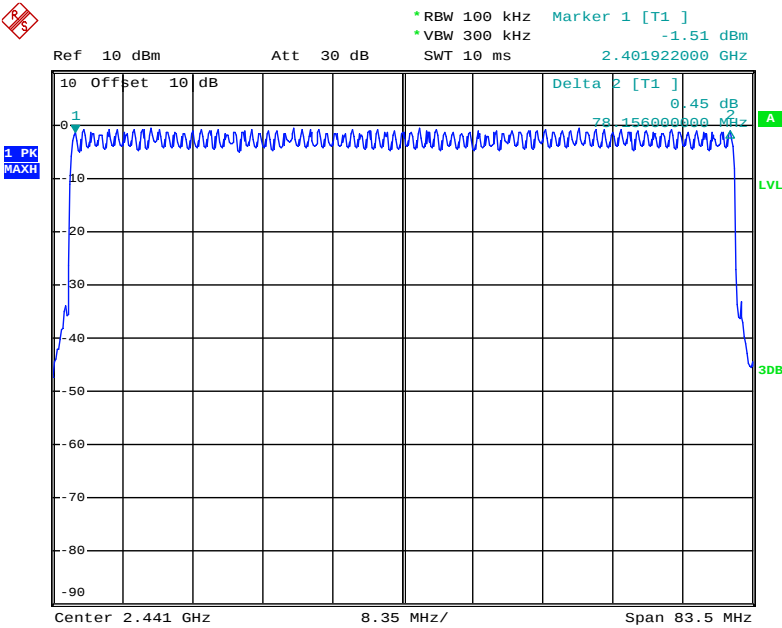
Total number of hopping channel	Measurement result(CH)	Limit(CH)	Result
	79	≥ 15	Pass

The spectrum analyzer plots are attached as below.



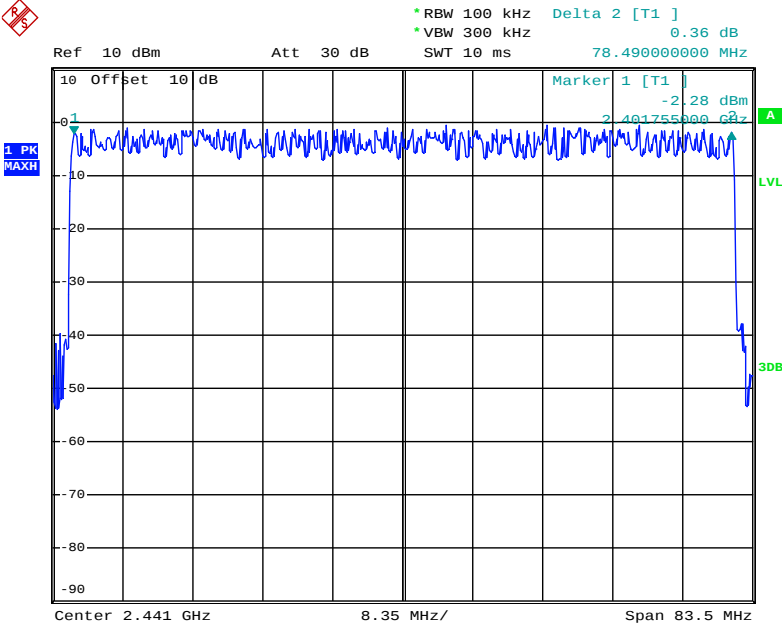
Date: 11.JUL.2019 16:35:20

Number of hopping channels ($\Pi/4$ -DQPSK Mode)



Date: 11.JUL.2019 16:29:34

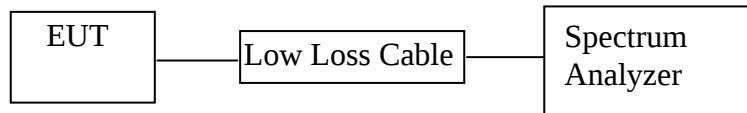
Number of hopping channels (8DPSK Mode)



Date: 11.JUL.2019 16:22:17

8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(a)(1)(iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.3. EUT Configuration on Test

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

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set center frequency of spectrum analyzer = operating frequency.

8.5.3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Adjust Sweep=5ms, 10ms, 15ms. Get the pulse time.

8.5.4. Repeat above procedures until all frequency measured were complete.

8.6. Test Result

Pass.

GFSK Mode (Worse case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.400	128.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2441	1.690	270.4	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2441	3.010	321.07	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

$\Pi/4$ -DQPSK Mode (Worse case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.420	134.4	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2441	1.700	272.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2441	3.020	322.13	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

8DPSK Mode (Worse case)

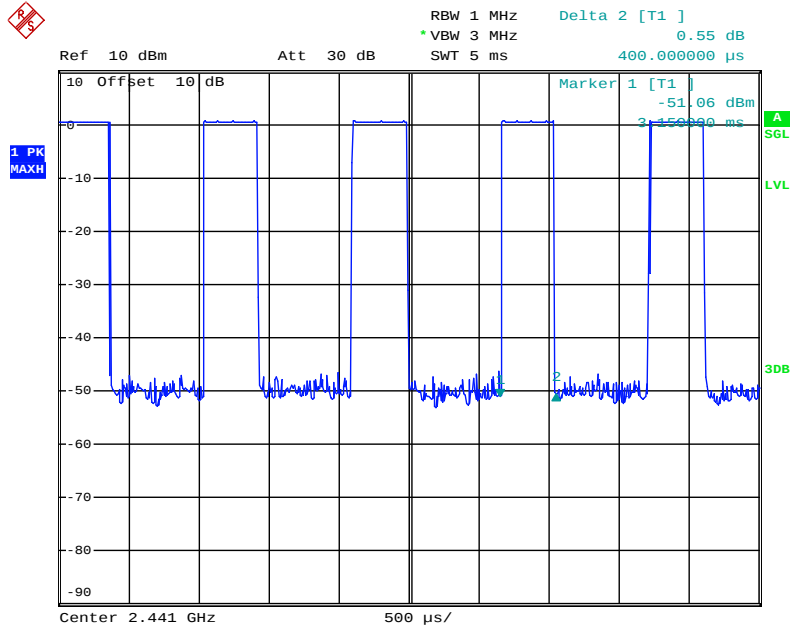
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.400	128.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2441	1.700	272.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2441	3.000	320.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

Note: We tested GFSK mode and $\Pi/4$ -DQPSK & 8DPSK mode the low, middle and high channel and recorded the worse case data for all test mode.

The spectrum analyzer plots are attached as below.

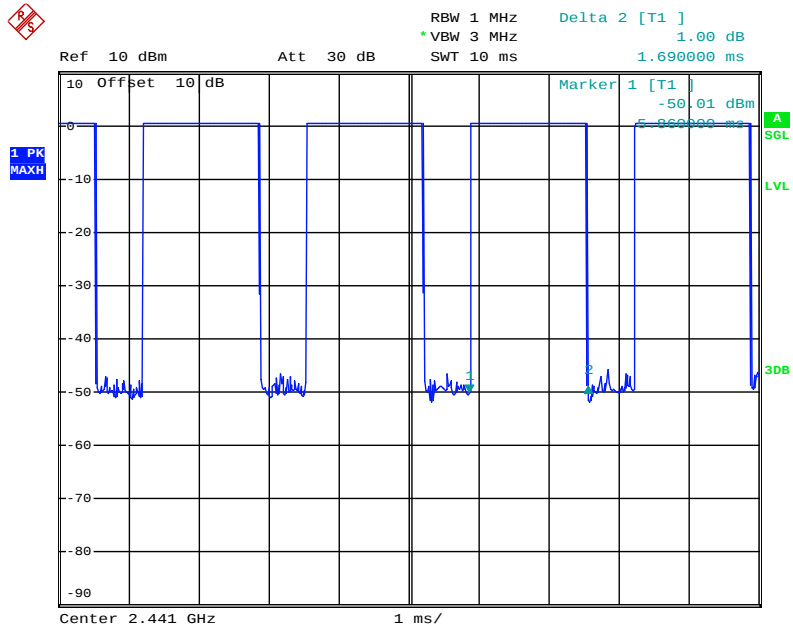
GFSK Mode

DH1 Middle channel

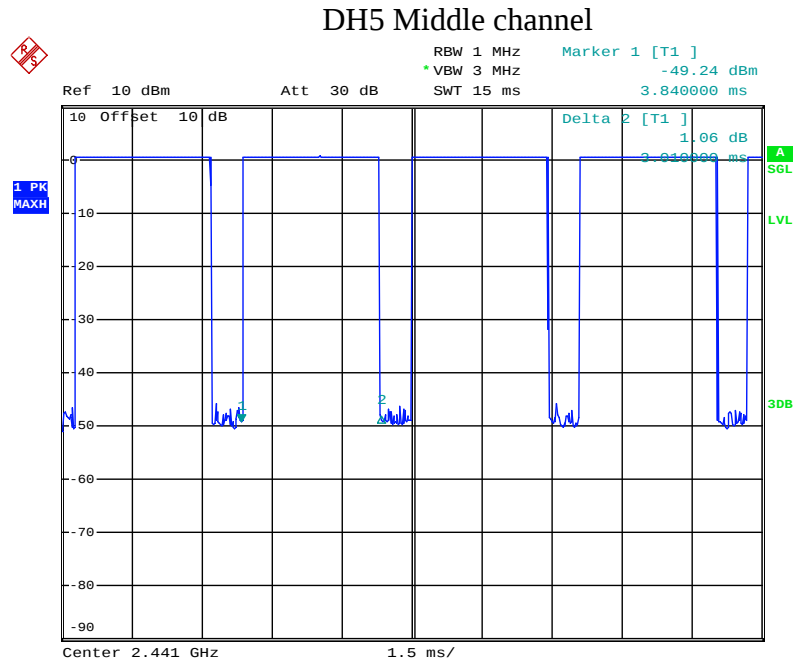


Date: 11.JUL.2019 16:50:12

DH3 Middle channel

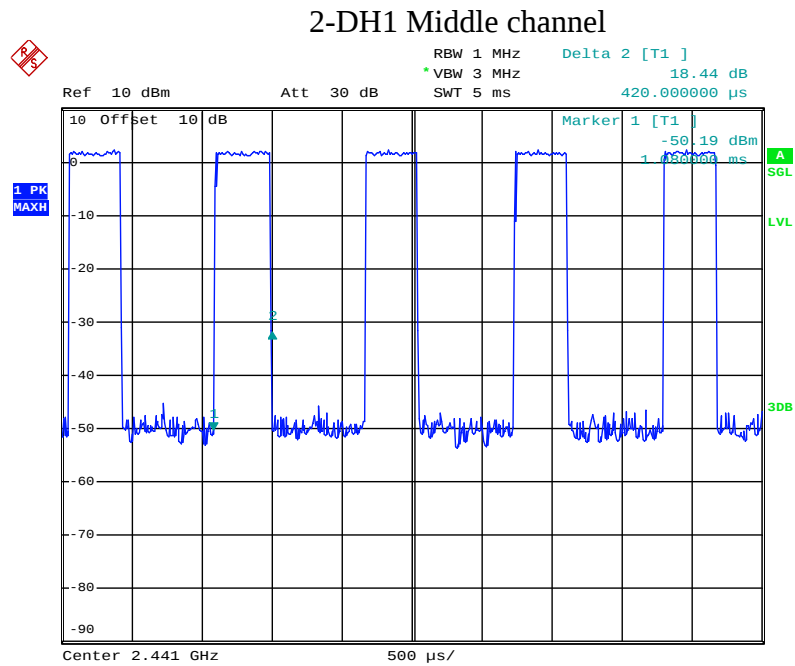


Date: 11.JUL.2019 16:49:33



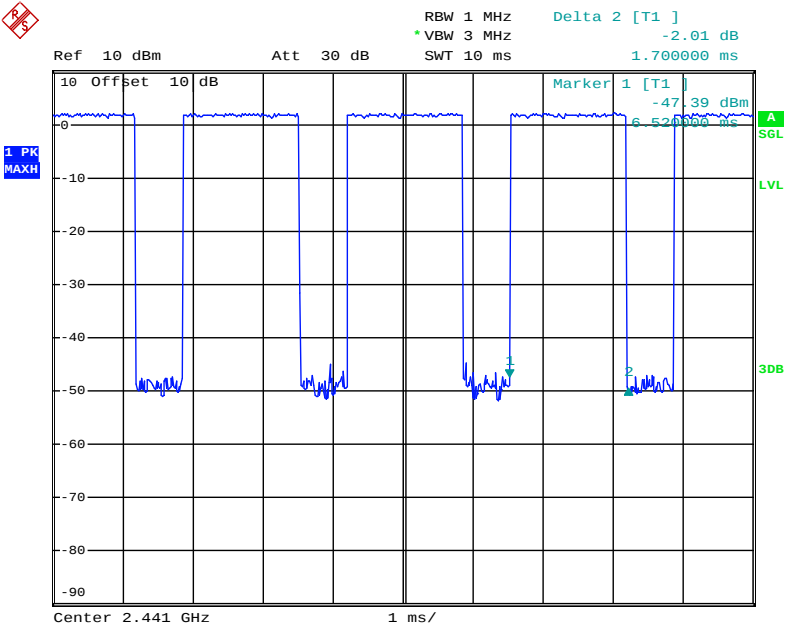
Date: 11.JUL.2019 16:49:04

Π/4-DQPSK Mode



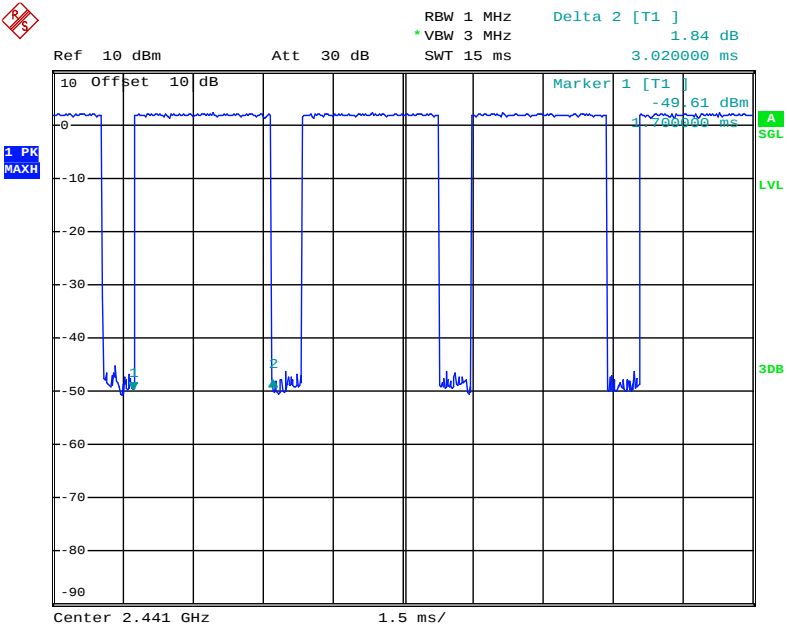
Date: 11.JUL.2019 16:54:55

2-DH3 Middle channel



Date: 11.JUL.2019 16:54:14

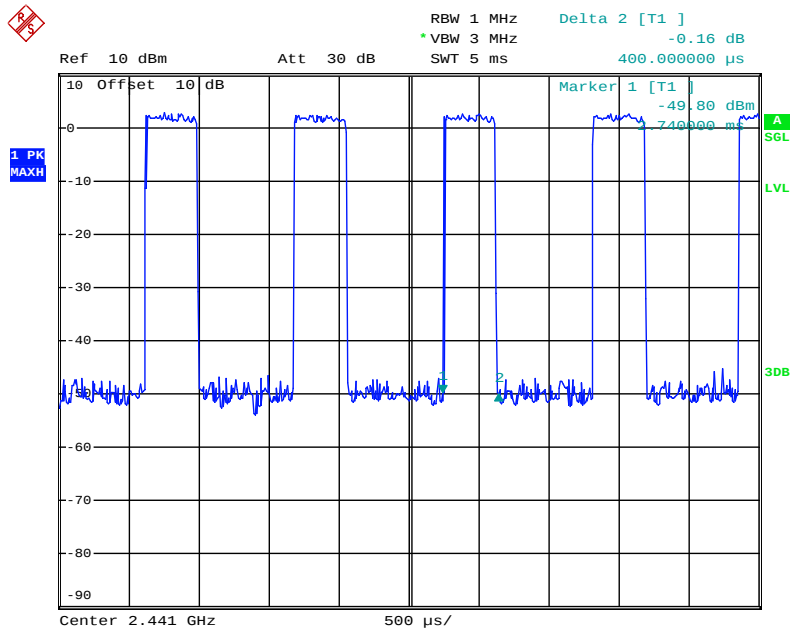
2-DH5 Middle channel



Date: 11.JUL.2019 16:53:44

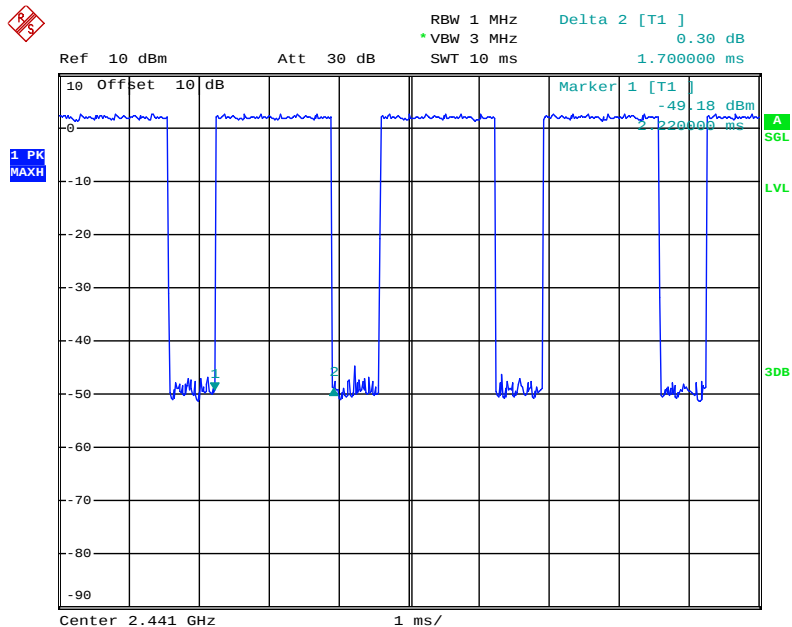
8DPSK Mode

3-DH1 Middle channel

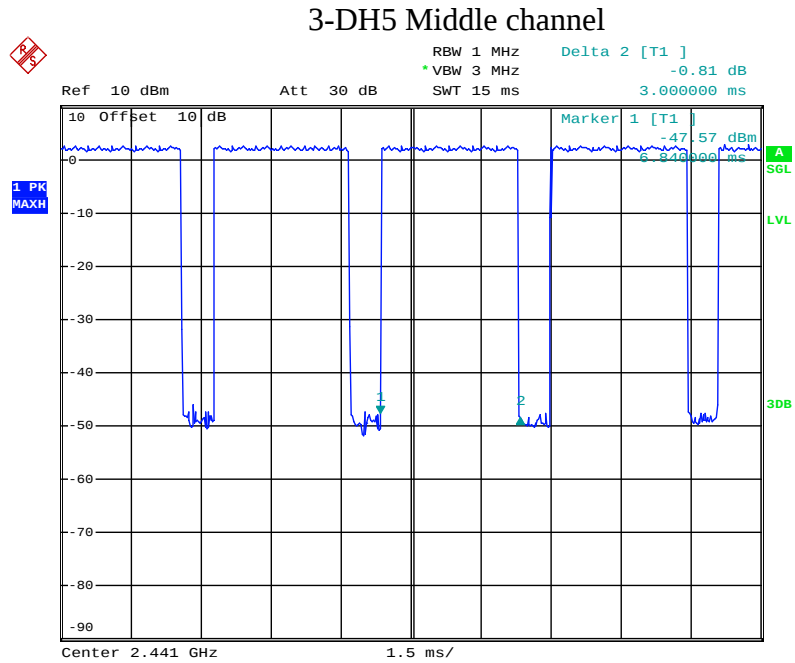


Date: 11.JUL.2019 16:59:01

3-DH3 Middle channel



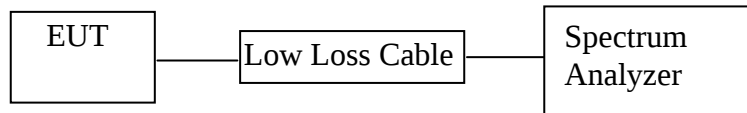
Date: 11.JUL.2019 16:59:46



Date: 11.JUL.2019 17:00:29

9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



9.2. The Requirement For Section 15.247(b)(1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.3. EUT Configuration on Test

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

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz, for GFSK mode.
Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz, for other mode.

9.5.3. Measurement the maximum peak output power.

9.6.Test Result

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits (dBm/W)	Result
Low	2402	0.74/0.0012	21 / 0.125	Pass
Middle	2441	0.64/0.0012	21 / 0.125	Pass
High	2480	0.68/0.0012	21 / 0.125	Pass

Π/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm / W)	Limits (dBm / W)	Result
Low	2402	2.98/0.0020	21 / 0.125	Pass
Middle	2441	2.88/0.0019	21 / 0.125	Pass
High	2480	2.92/0.0020	21 / 0.125	Pass

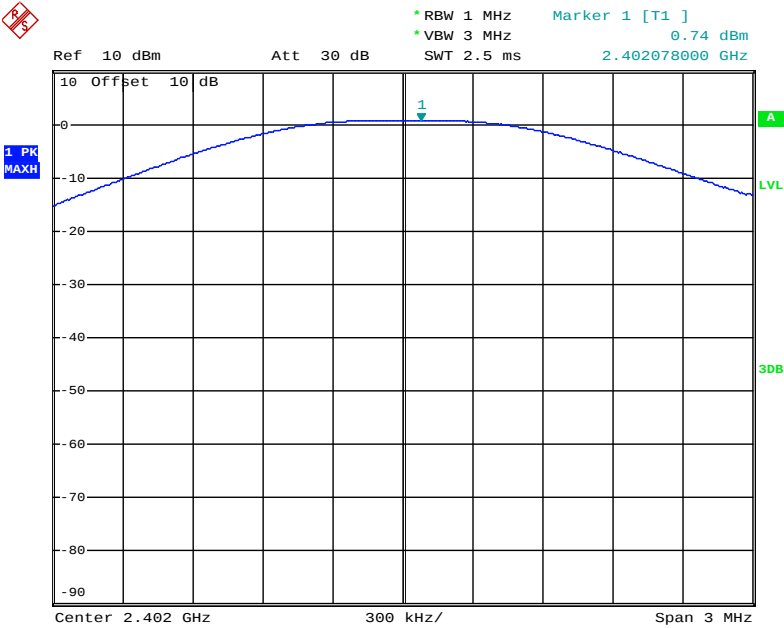
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm / W)	Limits (dBm / W)	Result
Low	2402	3.49/0.0022	21 / 0.125	Pass
Middle	2441	3.34/0.0022	21 / 0.125	Pass
High	2480	3.34/0.0022	21 / 0.125	Pass

The spectrum analyzer plots are attached as below.

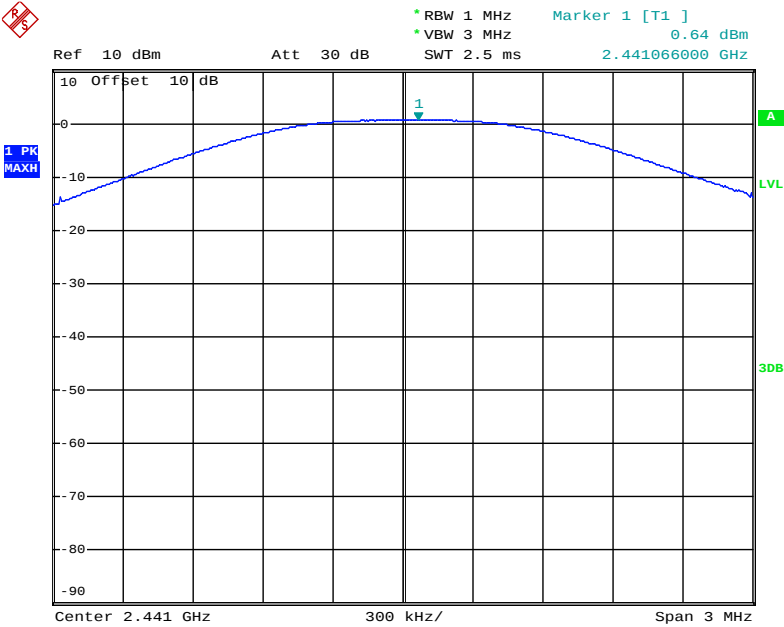
GFSK Mode

Low channel

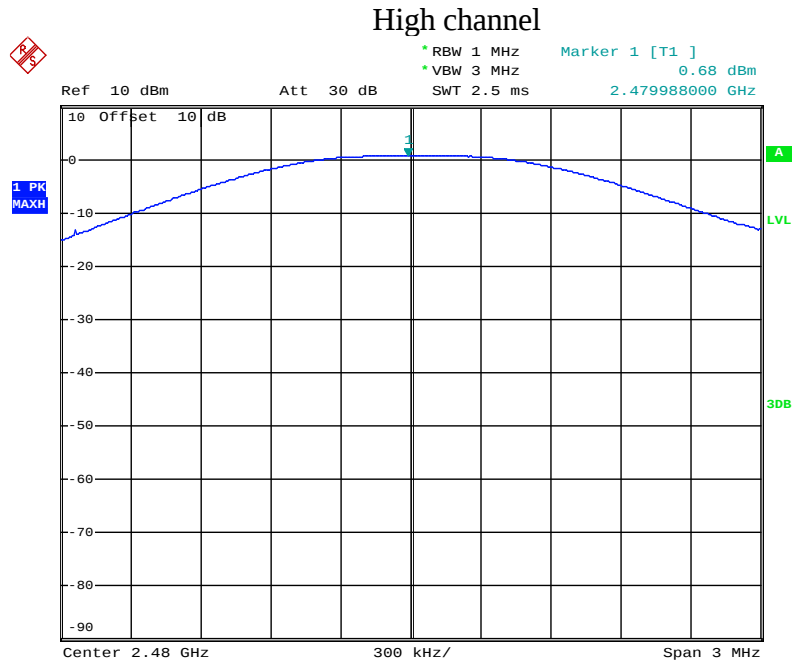


Date: 11.JUL.2019 16:17:40

Middle channel

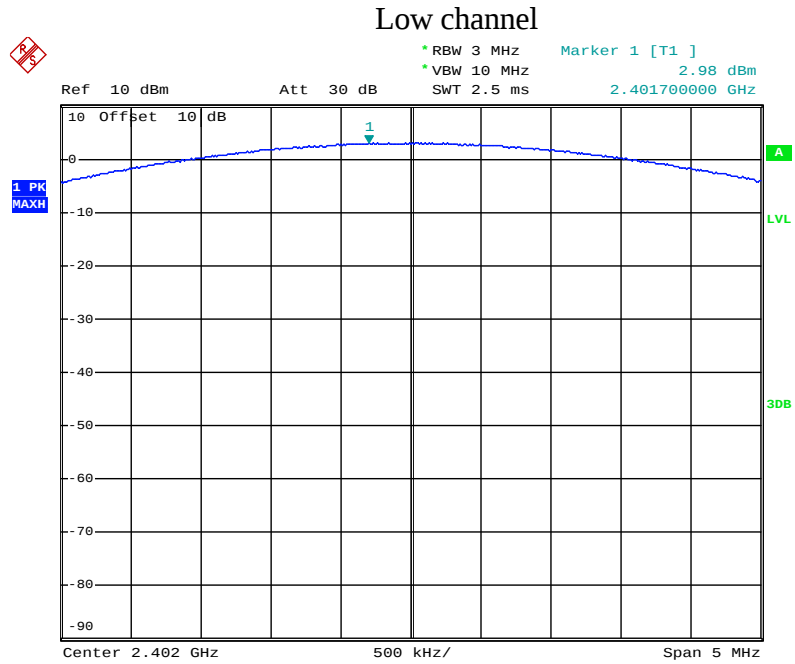


Date: 11.JUL.2019 16:18:03



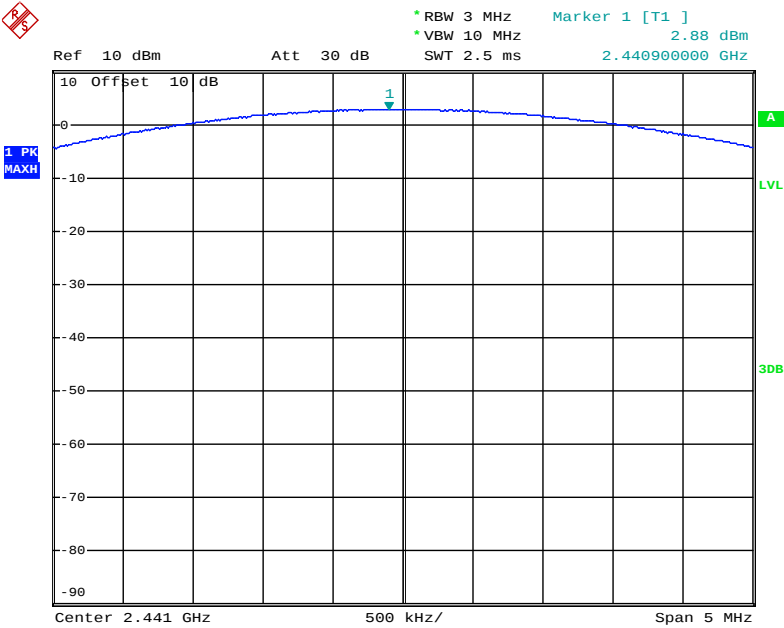
Date: 11.JUL.2019 16:18:25

$\Pi/4$ -DQPSK Mode



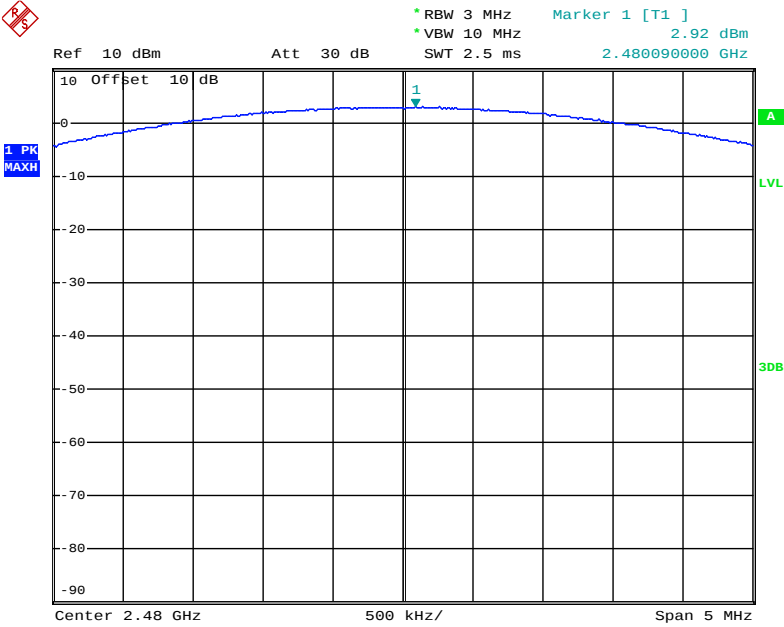
Date: 11.JUL.2019 16:19:40

Middle channel



Date: 11.JUL.2019 16:19:23

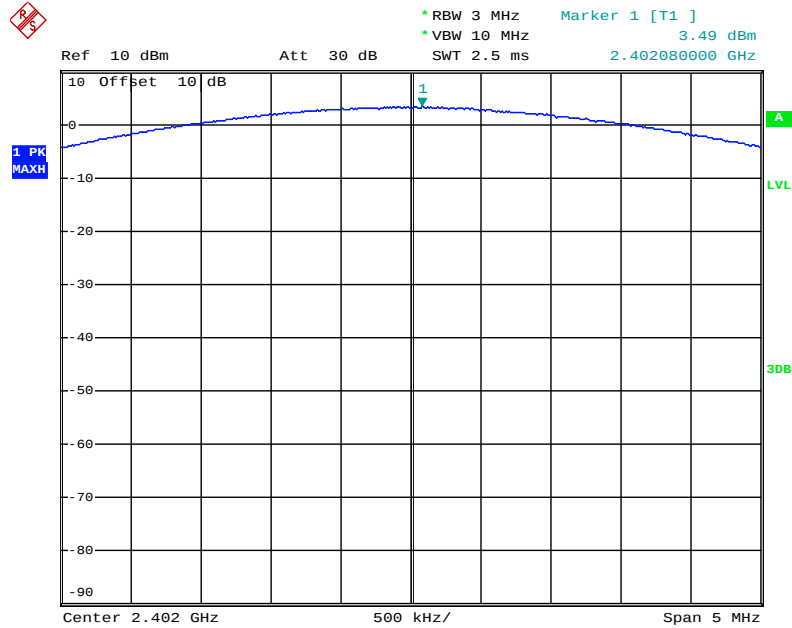
High channel



Date: 11.JUL.2019 16:19:02

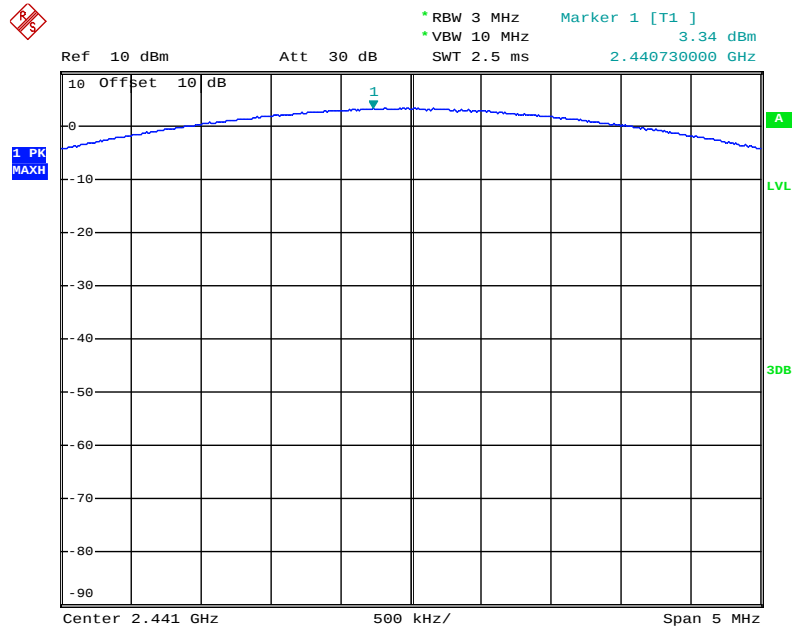
8DPSK Mode

Low channel

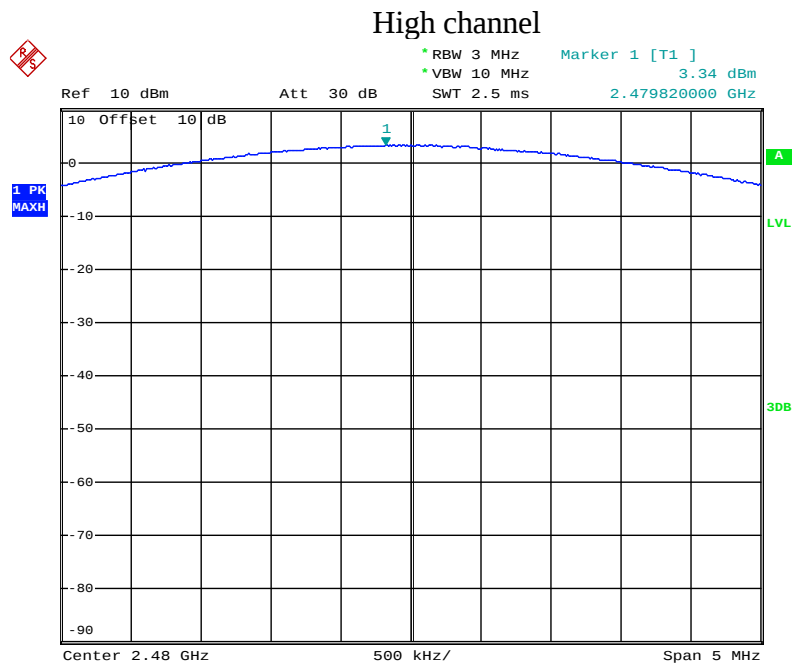


Date: 11.JUL.2019 16:19:57

Middle channel



Date: 11.JUL.2019 16:20:14

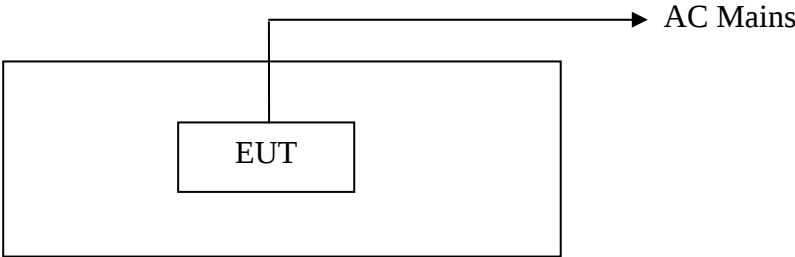


Date: 11.JUL.2019 16:20:31

10.RADIATED EMISSION TEST

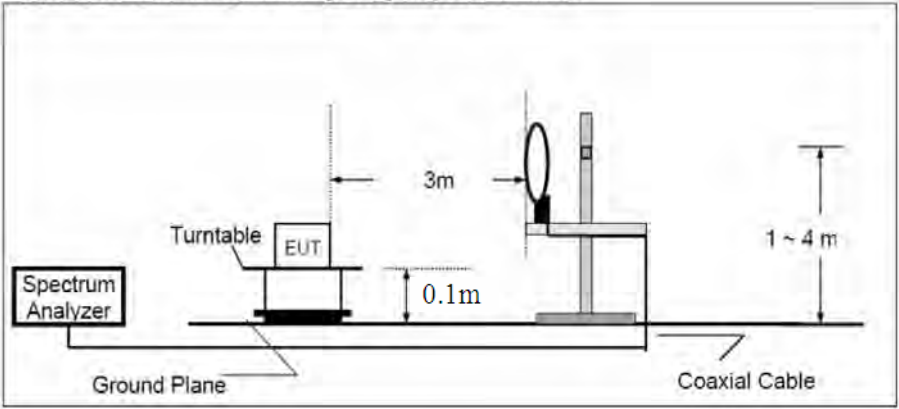
10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

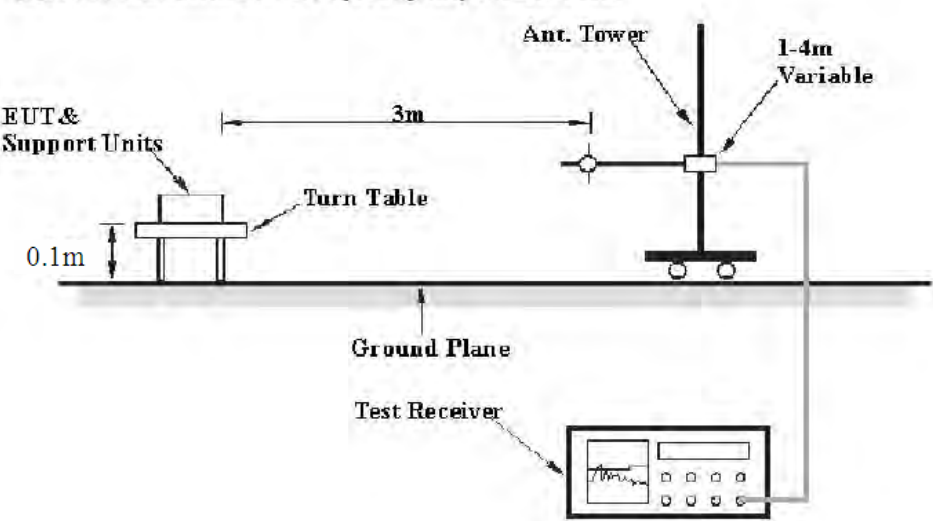


10.1.2.Semi-Anechoic Chamber Test Setup Diagram

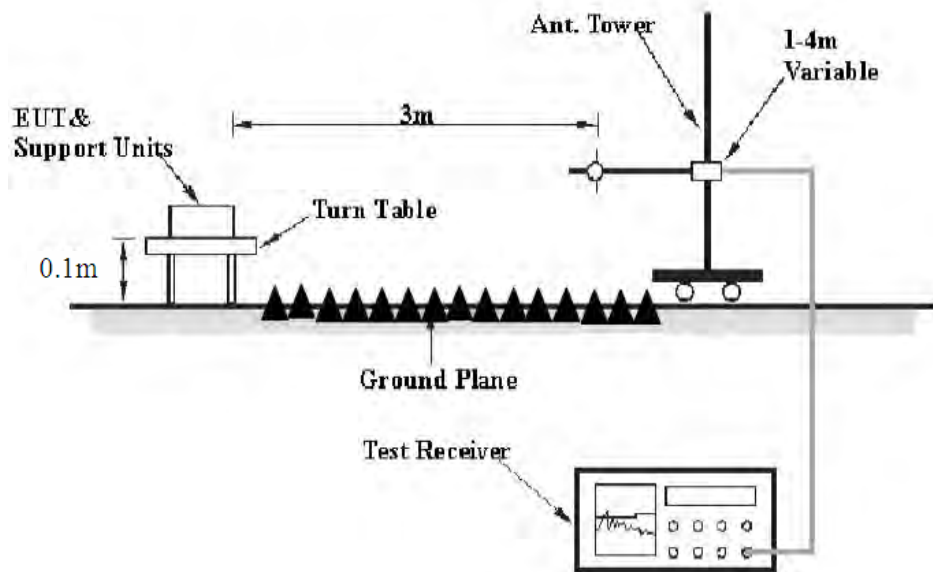
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



10.2.The Limit For 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).

10.3.Restricted bands of operation

10.3.1.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 Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.EUT Configuration on Test

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.

10.5. Operating Condition of EUT

10.5.1. Setup the EUT and simulator as shown as Section 10.1.

10.5.2. Turn on the power of all equipment.

10.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

10.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.1 meter high above ground. 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 Worse 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 worse case emissions are reported.

10.7.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.

10.8.Test Results

Pass.

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

2. Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz and 18 to 26.5GHz.

The spectrum analyzer plots are attached as below.

Below 1GHz



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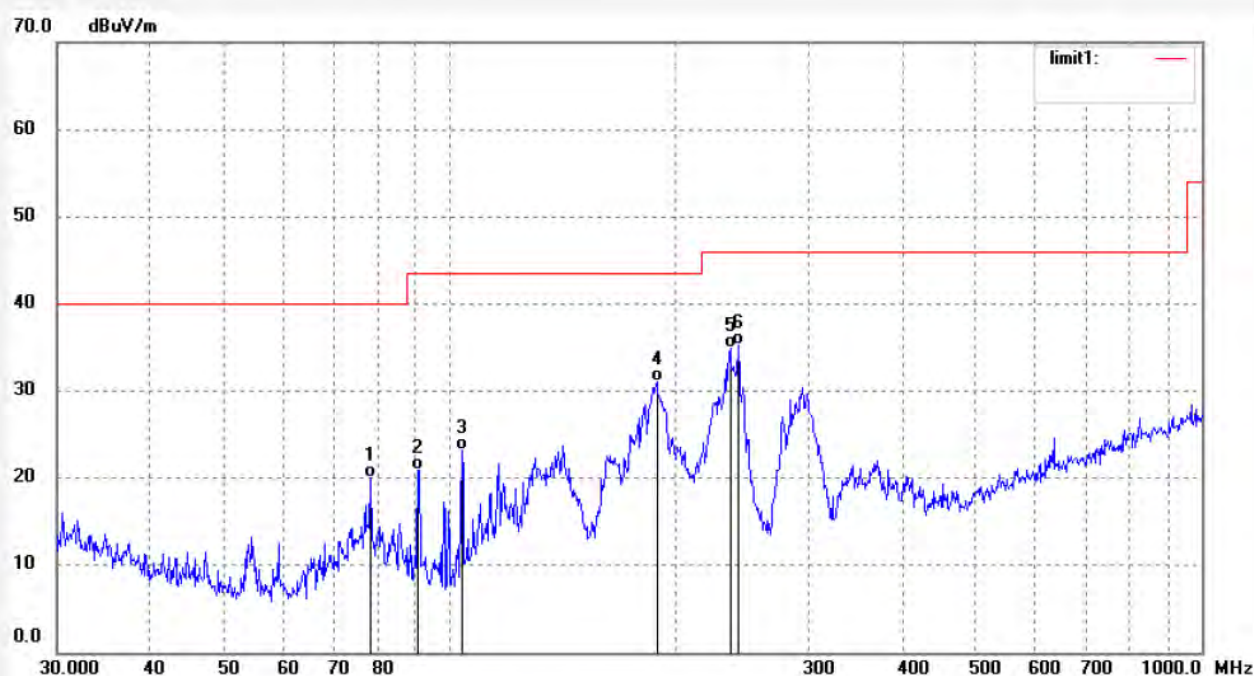
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019-BT #157
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX2402MHz
Model: Otamic-2X

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 2019/07/10
Time: 17:24:49
Engineer Signature:
Distance: 3m

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	78.2888	47.51	-27.50	20.01	40.00	-19.99	QP	200	55	
2	90.7379	48.39	-27.41	20.98	43.50	-22.52	QP	200	321	
3	103.6989	51.38	-28.11	23.27	43.50	-20.23	QP	200	119	
4	188.4442	56.27	-25.25	31.02	43.50	-12.48	QP	200	220	
5	235.9621	58.66	-23.79	34.87	46.00	-11.13	QP	200	215	
6	241.8377	59.04	-23.71	35.33	46.00	-10.67	QP	200	163	



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Site: 1# Chamber

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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #156

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2402MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

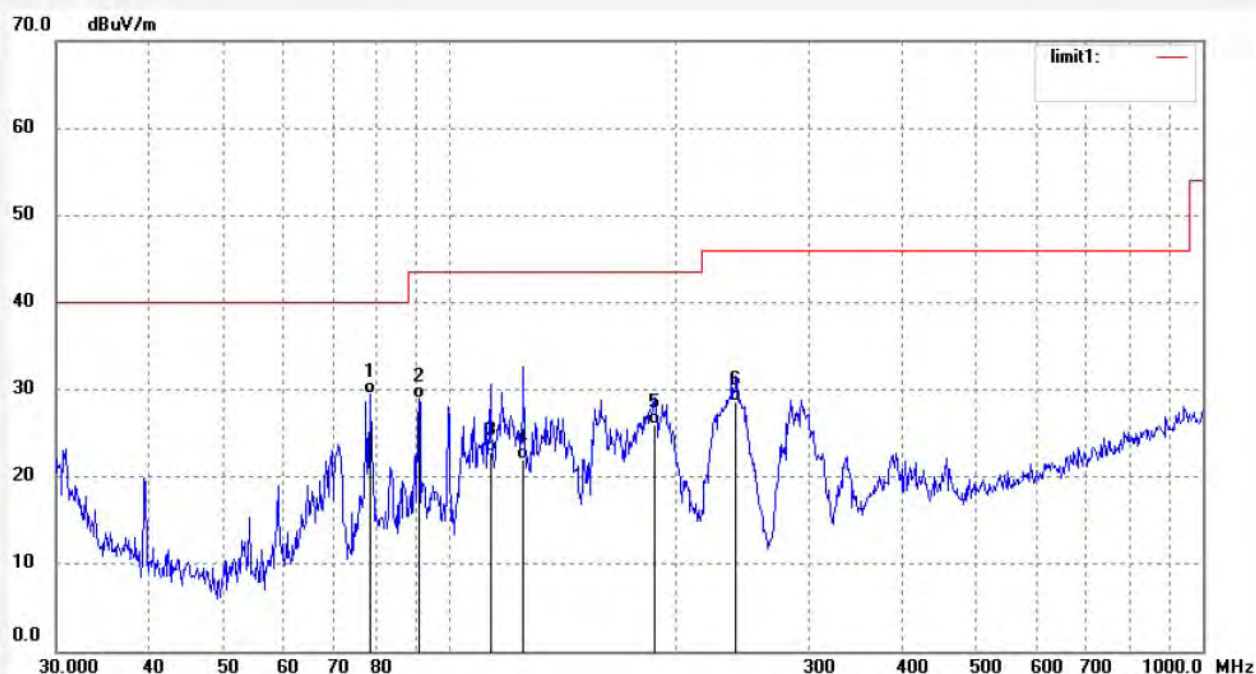
Date: 2019/07/10

Time: 17:23:51

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	78.5644	56.93	-27.49	29.44	40.00	-10.56	QP	100	63	
2	91.0574	56.41	-27.41	29.00	43.50	-14.50	QP	100	99	
3	113.2199	50.15	-27.32	22.83	43.50	-20.67	QP	100	21	
4	125.3645	49.49	-27.59	21.90	43.50	-21.60	QP	100	331	
5	187.1246	51.31	-25.35	25.96	43.50	-17.54	QP	100	63	
6	240.1442	52.42	-23.72	28.70	46.00	-17.30	QP	100	106	



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Site: 1# Chamber
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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #158

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2441MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Horizontal

Power Source: AC 120V/60Hz

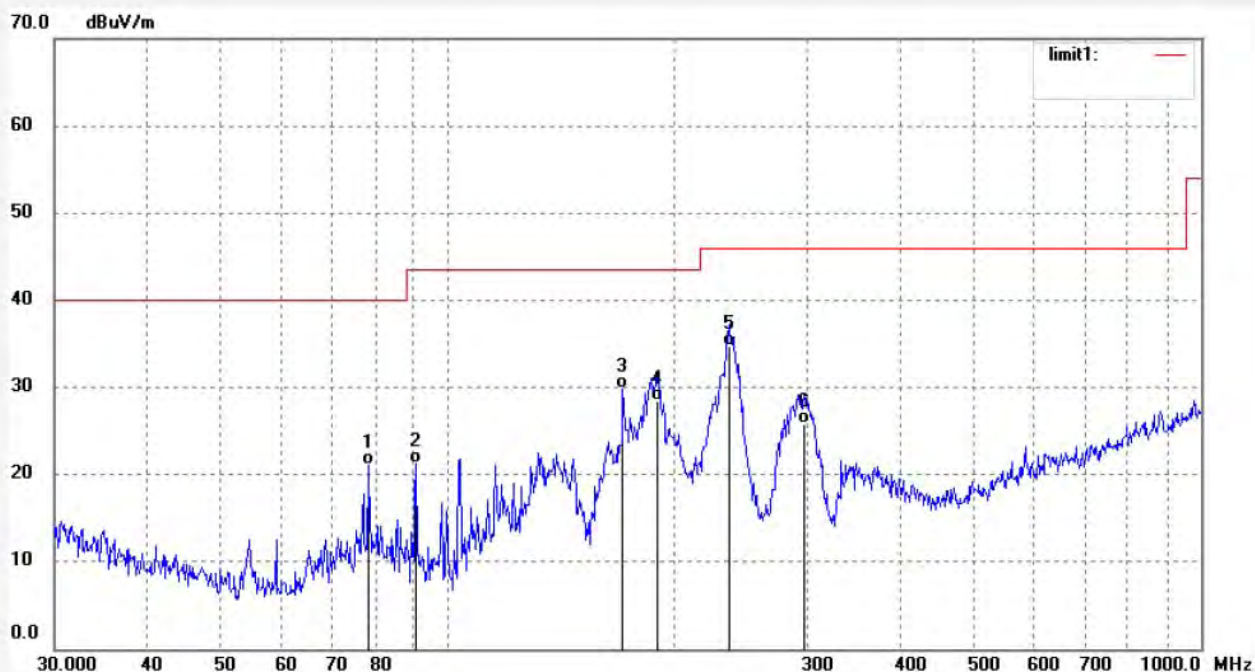
Date: 2019/07/10

Time: 17:25:41

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	78.2888	48.61	-27.50	21.11	40.00	-18.89	QP	200	55	
2	90.7379	48.74	-27.41	21.33	43.50	-22.17	QP	200	331	
3	170.7878	55.87	-26.08	29.79	43.50	-13.71	QP	200	96	
4	189.7732	53.64	-25.14	28.50	43.50	-15.00	QP	200	205	
5	235.9621	58.46	-23.79	34.67	46.00	-11.33	QP	200	221	
6	297.5459	47.15	-21.32	25.83	46.00	-20.17	QP	200	193	



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019-BT #159

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2441MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

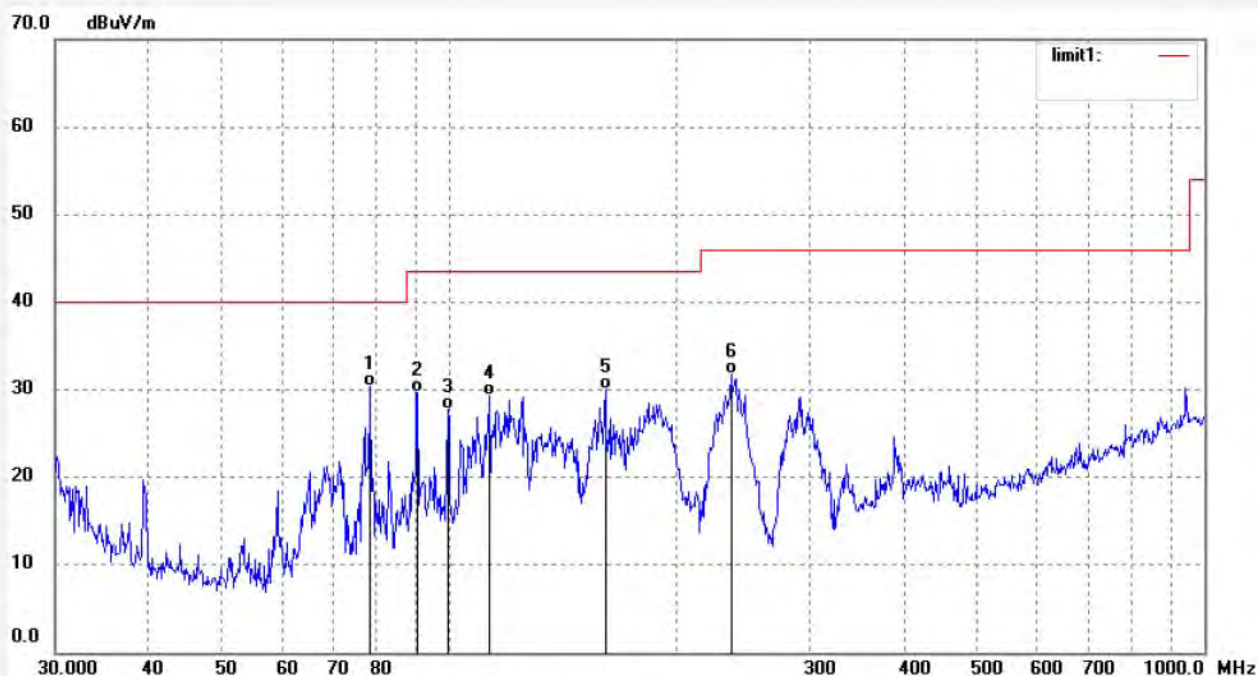
Date: 2019/07/10

Time: 17:26:36

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	78.5644	57.78	-27.49	30.29	40.00	-9.71	QP	100	331	
2	90.7379	57.07	-27.41	29.66	43.50	-13.84	QP	100	99	
3	99.4176	55.79	-27.97	27.82	43.50	-15.68	QP	100	246	
4	112.8229	56.64	-27.32	29.32	43.50	-14.18	QP	100	112	
5	160.8851	57.02	-26.98	30.04	43.50	-13.46	QP	100	62	
6	235.9621	55.50	-23.79	31.71	46.00	-14.29	QP	100	103	



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019-BT #161

Polarization: Horizontal

Standard: FCC Part 15C 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 2019/07/10

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

Time: 17:27:35

EUT: Massage Chair

Engineer Signature:

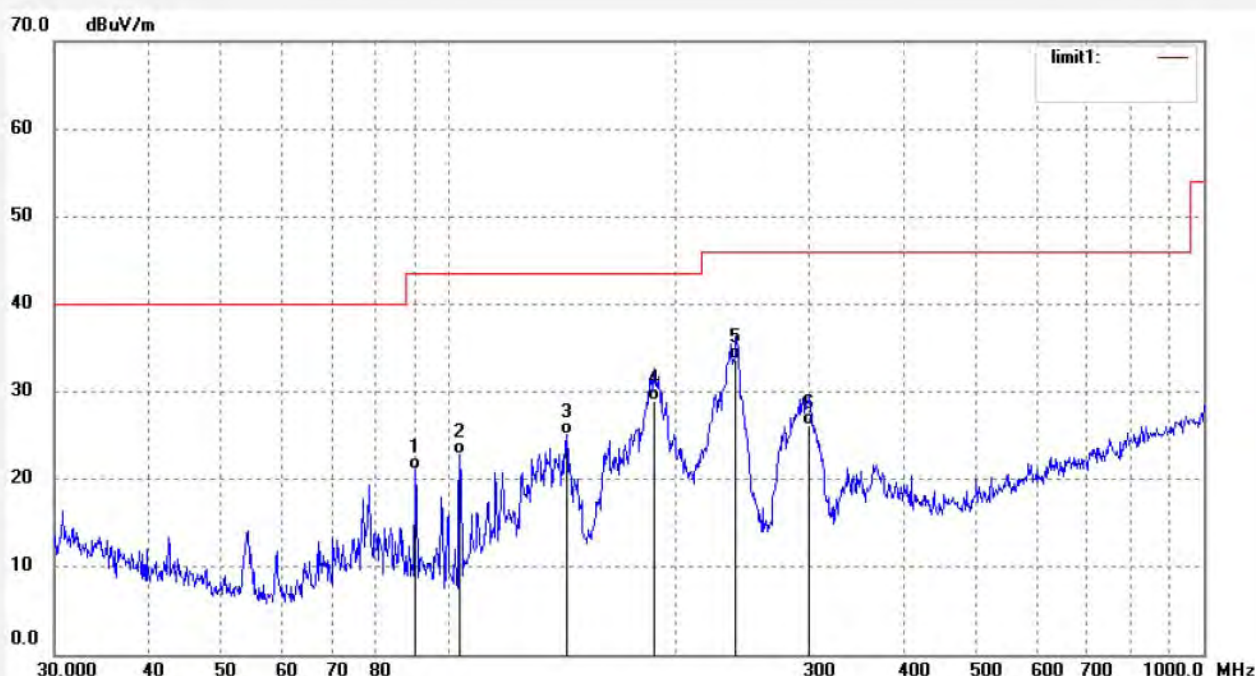
Mode: TX2480MHz

Distance: 3m

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	90.4196	48.48	-27.42	21.06	43.50	-22.44	QP	200	193	
2	103.3353	50.90	-28.10	22.80	43.50	-20.70	QP	200	221	
3	143.2717	53.11	-28.00	25.11	43.50	-18.39	QP	200	201	
4	187.1246	54.32	-25.35	28.97	43.50	-14.53	QP	200	96	
5	240.1442	57.49	-23.72	33.77	46.00	-12.23	QP	200	156	
6	300.6988	47.31	-21.20	26.11	46.00	-19.89	QP	200	320	



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019-BT #160

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2480MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

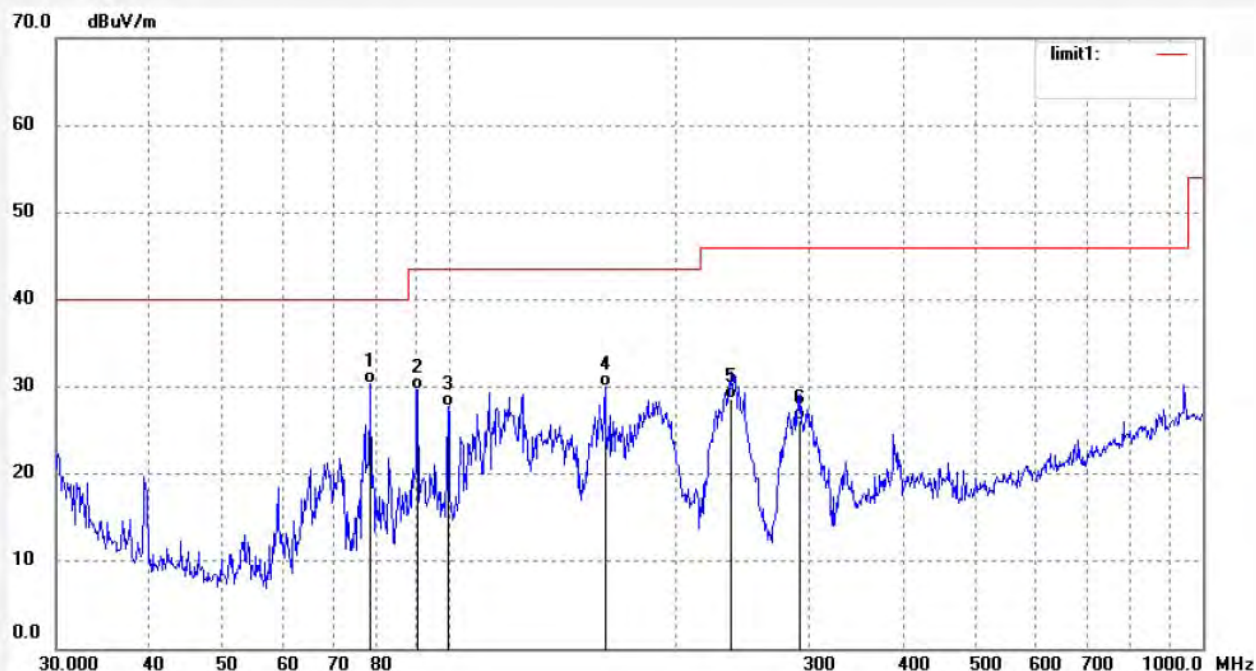
Date: 2019/07/10

Time: 17:26:46

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	78.5644	57.78	-27.49	30.29	40.00	-9.71	QP	100	332	
2	90.7379	57.07	-27.41	29.66	43.50	-13.84	QP	100	129	
3	99.4176	55.79	-27.97	27.82	43.50	-15.68	QP	100	98	
4	160.8851	57.02	-26.98	30.04	43.50	-13.46	QP	100	201	
5	235.9621	52.34	-23.79	28.55	46.00	-17.45	QP	100	33	
6	292.3643	47.65	-21.56	26.09	46.00	-19.91	QP	100	116	

Above 1GHz



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Site: 1# Chamber
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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #164

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2402MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Horizontal

Power Source: AC 120V/60Hz

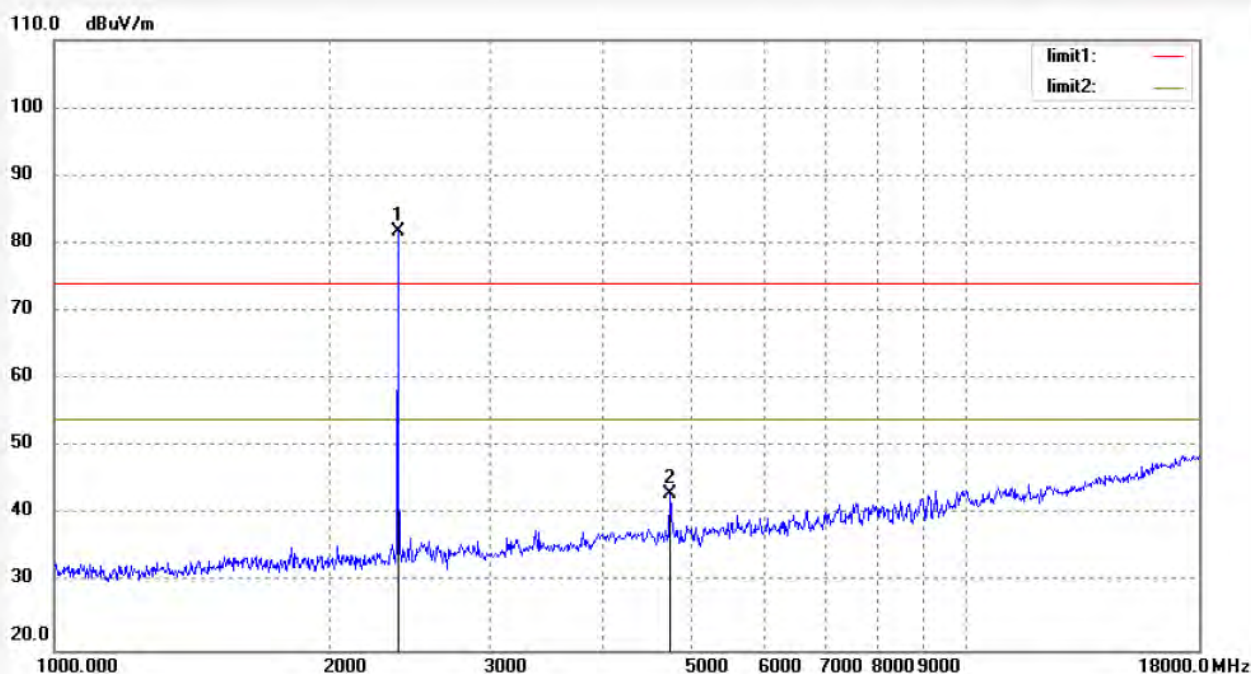
Date: 2019/07/11

Time: 14:31:56

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.019	88.17	-6.37	81.80	/	/	peak	200	96	
2	4804.057	42.39	0.70	43.09	74.00	-30.91	peak	200	106	



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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #165

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2402MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

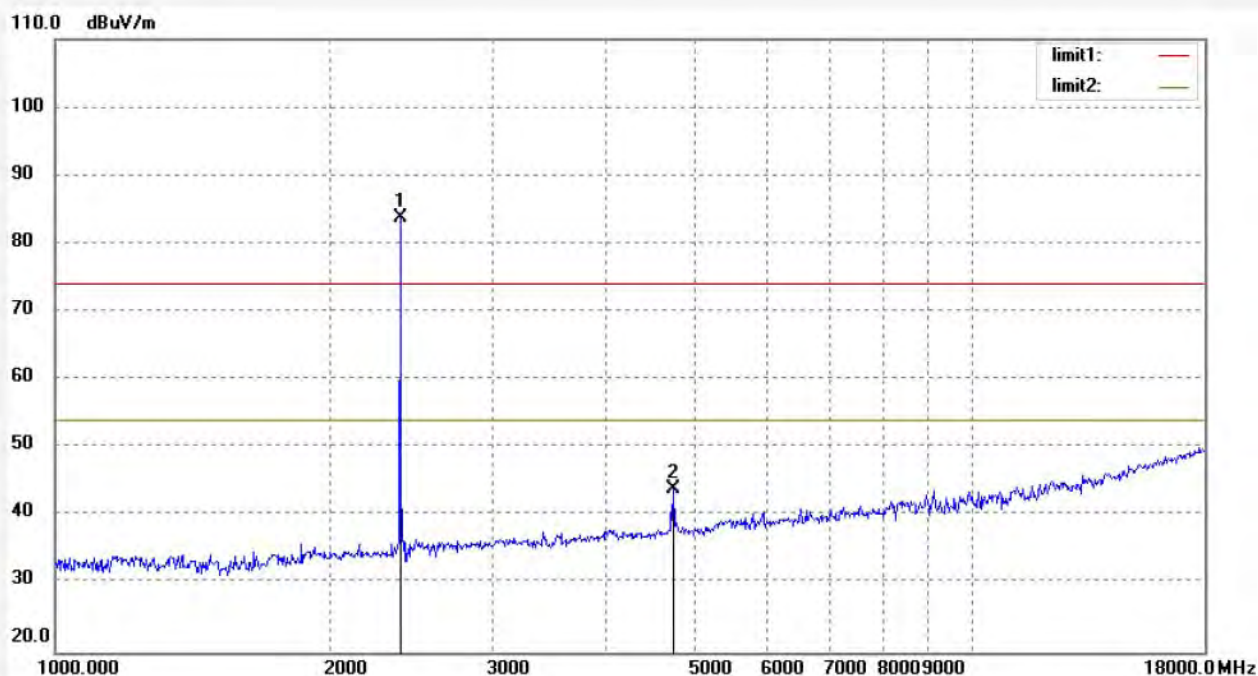
Date: 2019/07/11

Time: 14:33:18

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.019	90.22	-6.37	83.85	/	/	peak	150	66	
2	4804.157	43.35	0.70	44.05	74.00	-29.95	peak	150	119	



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Site: 1# Chamber
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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #167

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2441MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Horizontal

Power Source: AC 120V/60Hz

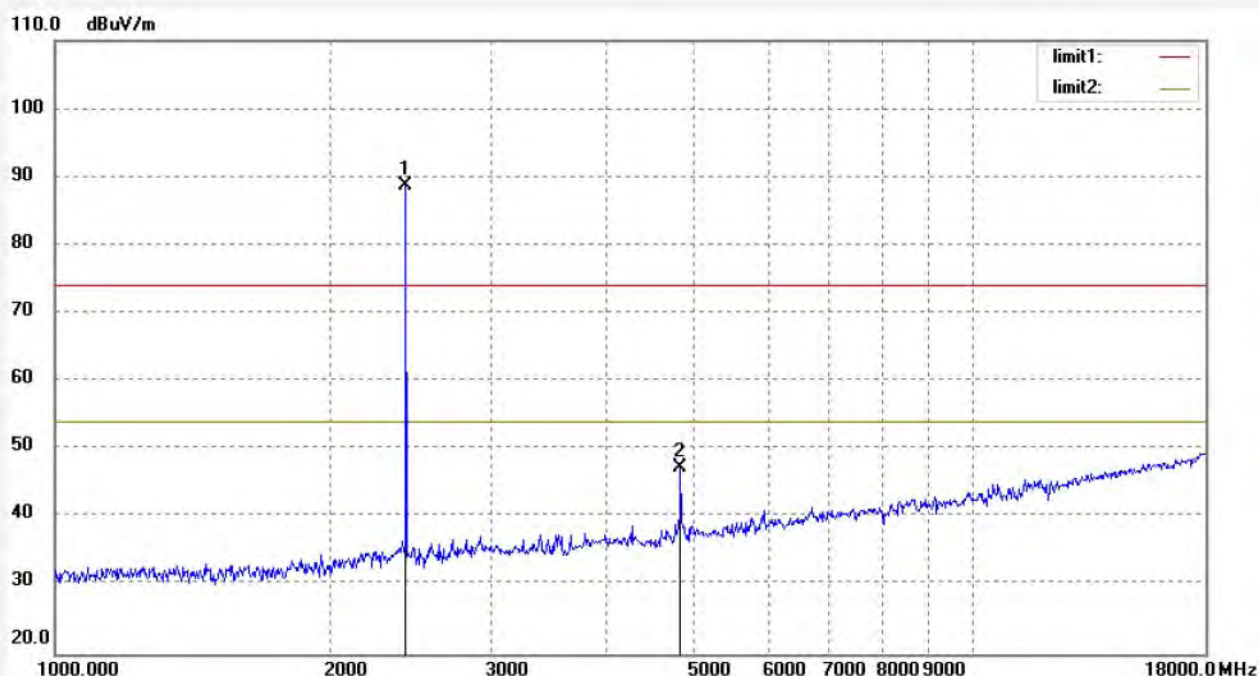
Date: 2019/07/11

Time: 14:35:52

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.021	94.87	-6.20	88.67	/	/	peak	200	331	
2	4882.024	46.37	1.07	47.44	74.00	-26.56	peak	200	196	



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Site: 1# Chamber
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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #166

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2441MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

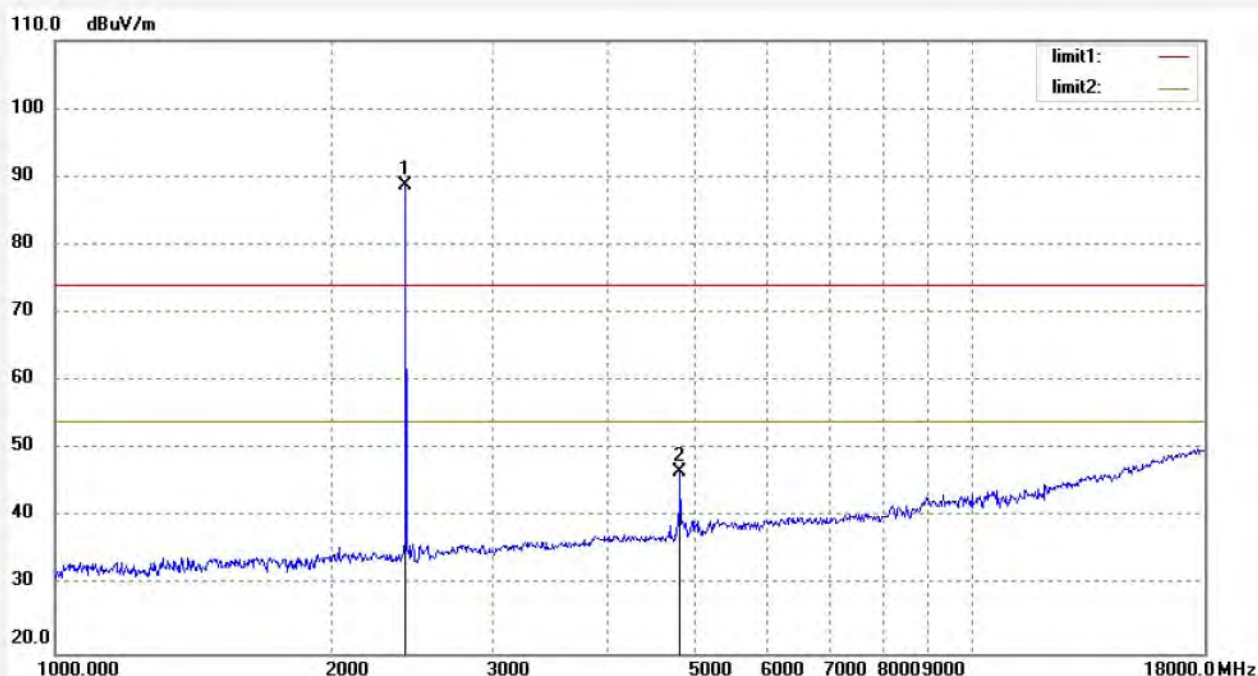
Date: 2019/07/11

Time: 14:34:46

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.021	94.91	-6.20	88.71	/	/	peak	150	109	
2	4882.024	45.56	1.07	46.63	74.00	-27.37	peak	150	33	

Job No.: FRANK2019-BT #168

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2480MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Horizontal

Power Source: AC 120V/60Hz

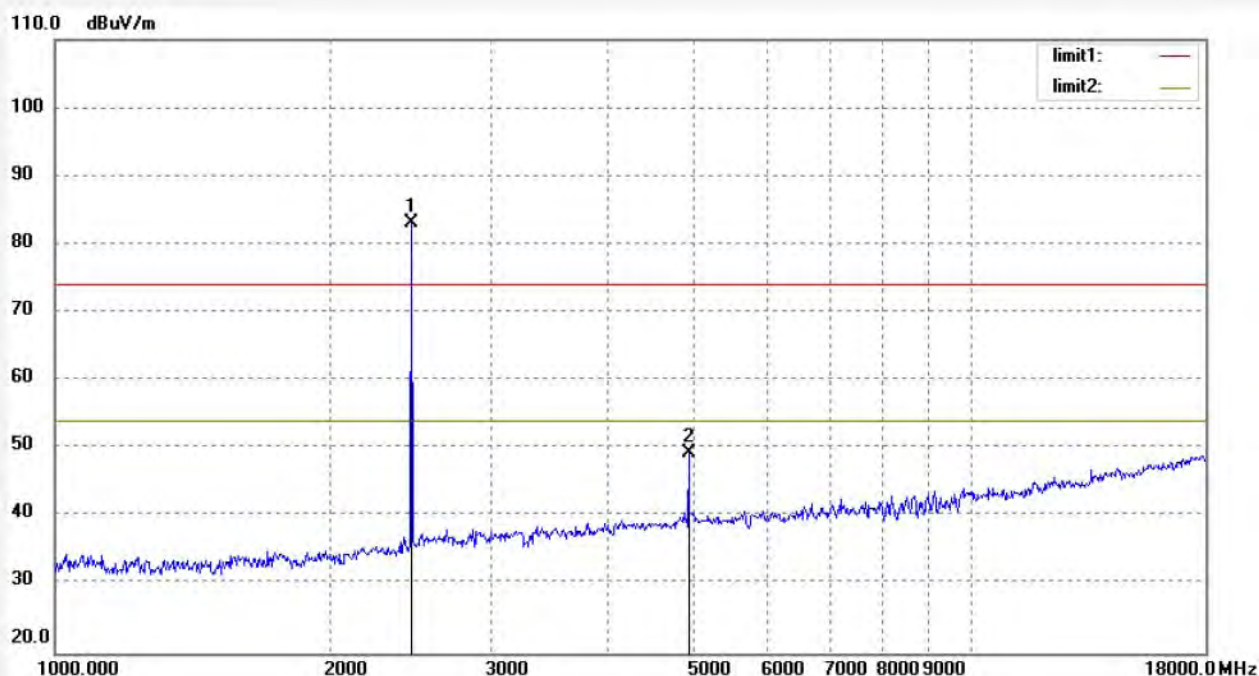
Date: 2019/07/11

Time: 14:37:50

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



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	89.12	-6.04	83.08	/	/	peak	200	109	
2	4960.044	47.77	1.50	49.27	74.00	-24.73	peak	200	332	

Job No.: FRANK2019-BT #170

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2480MHz

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

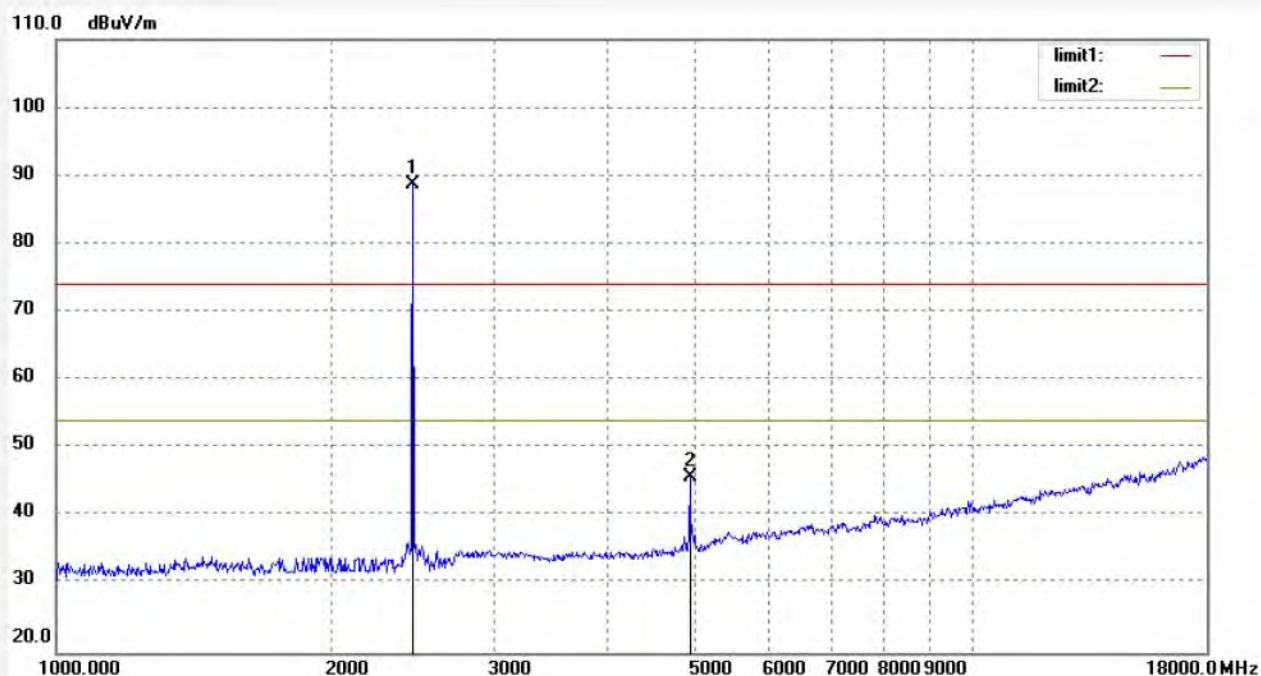
Date: 2019/07/11

Time: 14:39:50

Engineer Signature:

Distance: 3m

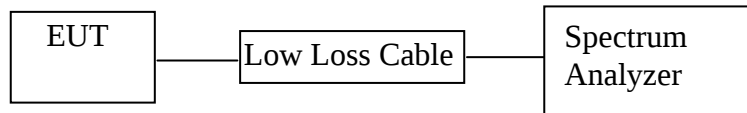
Note: Report NO.:ATE20190997



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	94.67	-6.04	88.63	/	/	peak	150	109	
2	4960.014	44.29	1.50	45.79	74.00	-28.21	peak	150	66	

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



11.2.The Requirement For 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).

11.3.EUT Configuration on Test

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

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

11.5.Test Procedure

11.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

11.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3.The band edges was measured and recorded.

11.6.Test Result

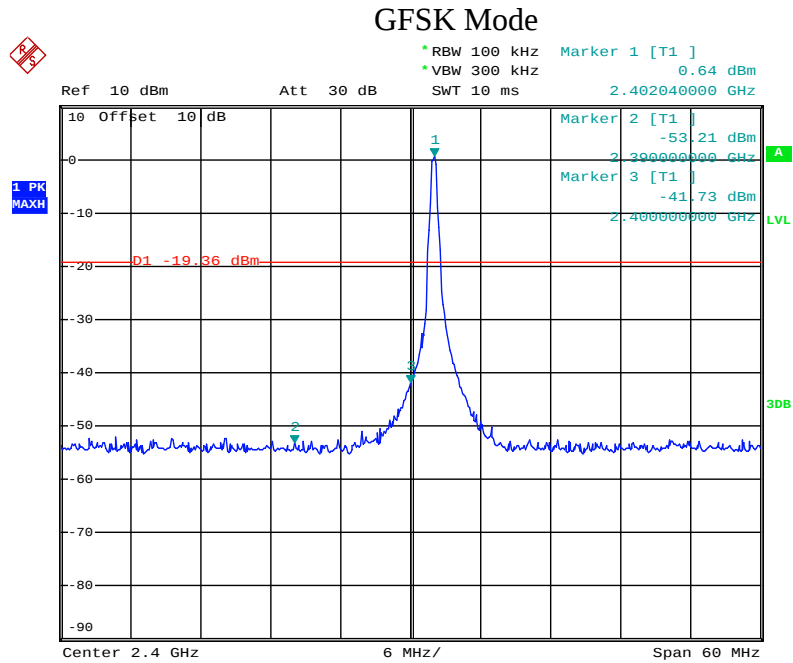
Note: Both hopping-on mode and hopping-off mode had been pre-tested, and only the Worse case was recorded in the test report.

Conducted Band Edge Result

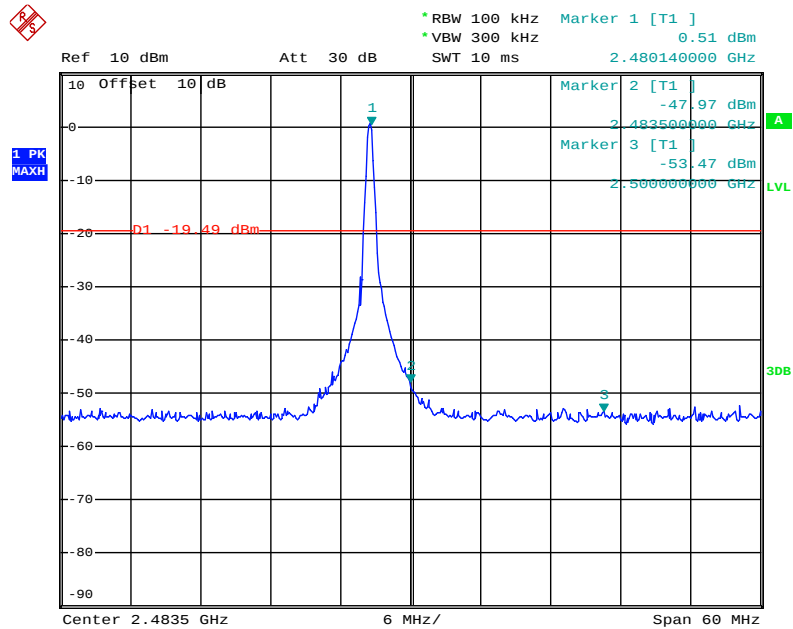
Non-hopping mode

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK Mode			
2402.0	41.09	> 20dBc	Pass
2480.0	47.46	> 20dBc	Pass
Π/4-DQPSK Mode			
2402.0	40.03	> 20dBc	Pass
2480.0	47.39	> 20dBc	Pass
8DPSK Mode			
2402.0	38.9	> 20dBc	Pass
2480.0	46.36	> 20dBc	Pass

The spectrum analyzer plots are attached as below.

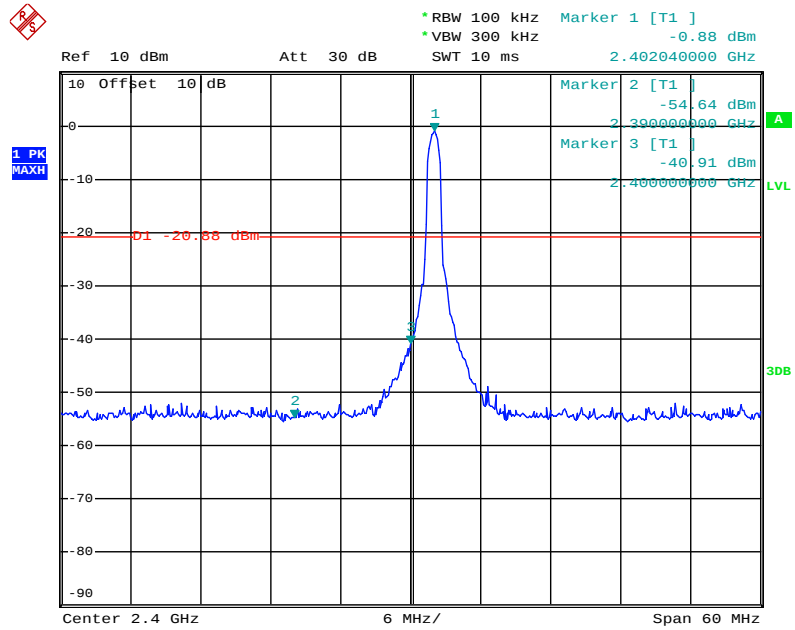


Date: 11.JUL.2019 16:42:30

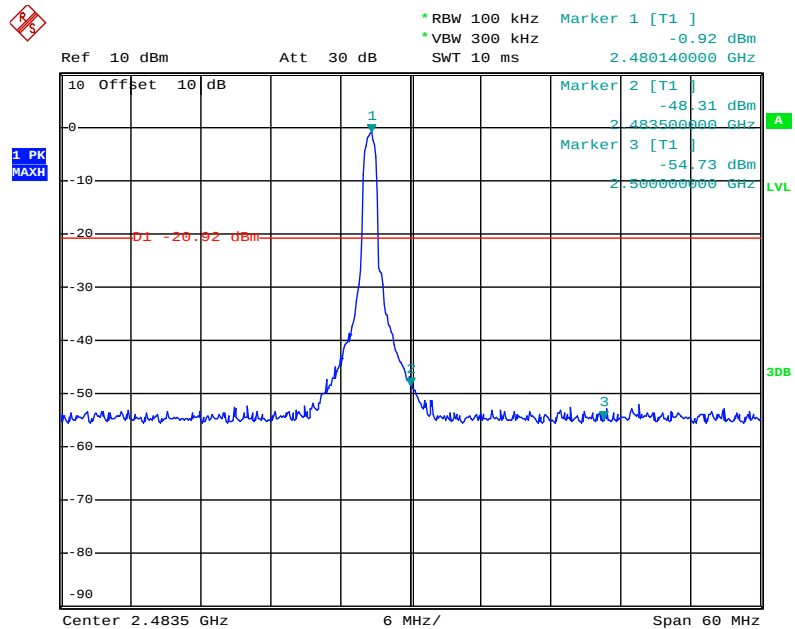


Date: 11.JUL.2019 16:46:30

$\Pi/4$ -DQPSK Mode

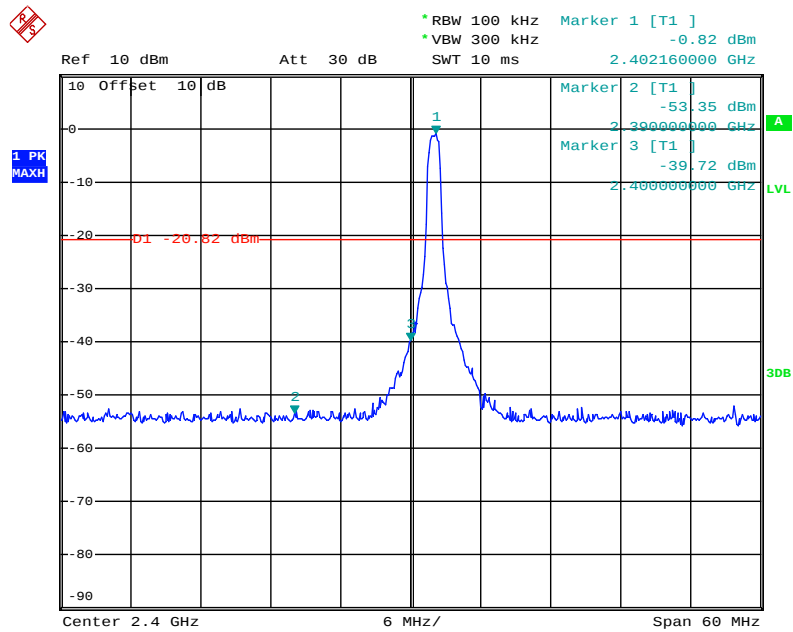


Date: 11.JUL.2019 16:43:24

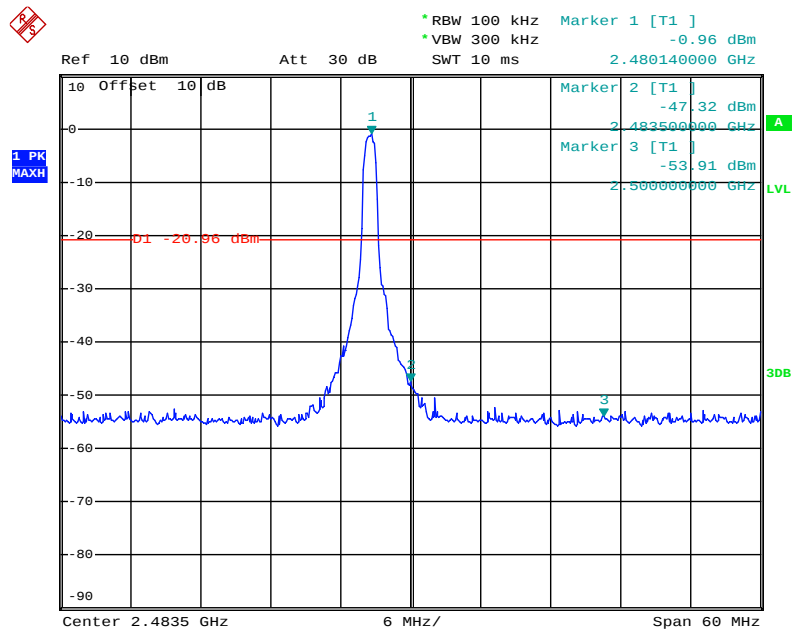


Date: 11.JUL.2019 16:45:22

8DPSK Mode



Date: 11.JUL.2019 16:44:07



Date: 11.JUL.2019 16:44:44

Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 0.1 meter high above ground. 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 Worse case position data was reported.

Let the EUT work in TX (Hopping off, Hopping on) modes measure it.
We select 2402MHz, 2480MHz TX frequency to transmit(Hopping off mode).
We select 2402-2480MHz TX frequency to transmit(Hopping on mode).

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

- 1.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.
- 2.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.
- 3.All modes of operation were investigated and the worse case (8DPSK mode) emissions are reported.

The spectrum analyzer plots are attached as below.



Non-hopping mode ACCURATE TECHNOLOGY CO., LTD.

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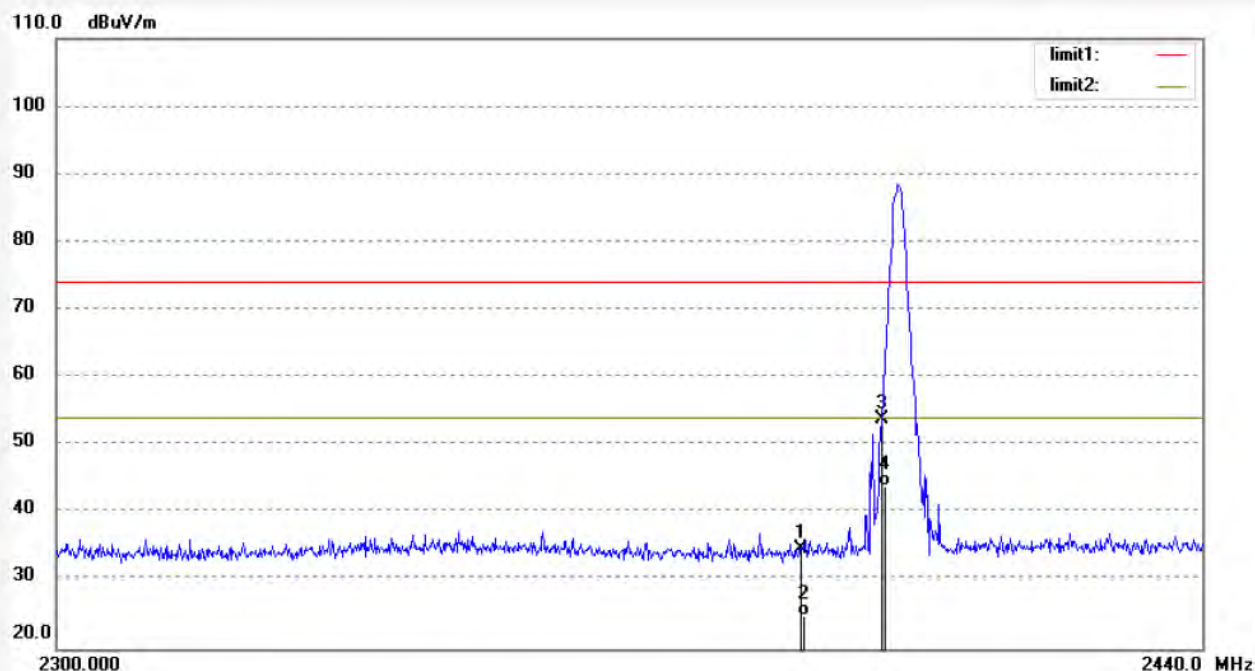
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019-BT #177
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX2402MHz(8DPSK)
Model: Otamic-2X

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 2019/07/11
Time: 14:52:46
Engineer Signature:
Distance: 3m

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.06	-6.32	34.74	74.00	-39.26	peak	200	96	
2	2390.000	31.15	-6.32	24.83	54.00	-29.17	AVG	200	108	
3	2400.000	60.05	-6.27	53.78	74.00	-20.22	peak	200	332	
4	2400.000	50.16	-6.27	43.89	54.00	-10.11	AVG	200	106	

Note: Average measurement with peak detection at No.2&4



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Site: 1# Chamber
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Fax:+86-0755-26503396

Job No.: FRANK2019-BT #178

Polarization: Vertical

Standard: FCC Part 15C 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 2019/07/11

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

Time: 14:54:26

EUT: Massage Chair

Engineer Signature:

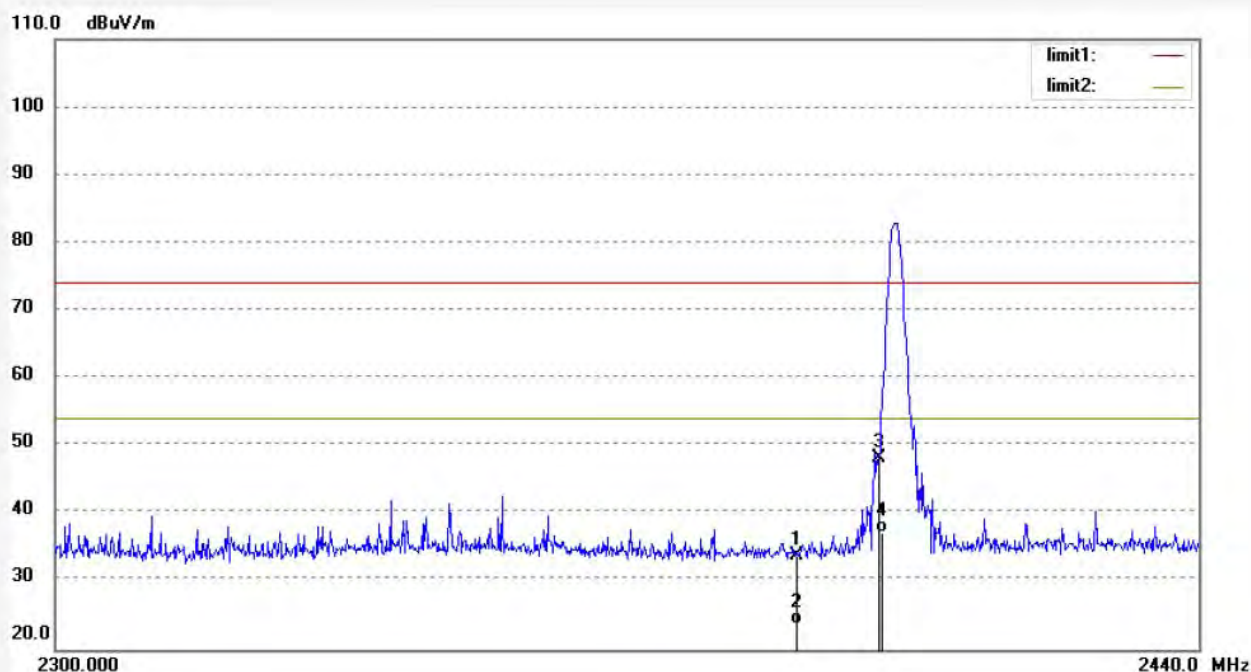
Mode: TX2402MHz(8DPSK)

Distance: 3m

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	40.12	-6.32	33.80	74.00	-40.20	peak	150	92	
2	2390.000	30.12	-6.32	23.80	54.00	-30.20	AVG	150	33	
3	2400.000	54.54	-6.27	48.27	74.00	-25.73	peak	150	156	
4	2400.000	43.42	-6.27	37.15	54.00	-16.85	AVG	150	116	

Note: Average measurement with peak detection at No.2&4



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019-BT #176

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2480MHz(8DPSK)

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Horizontal

Power Source: AC 120V/60Hz

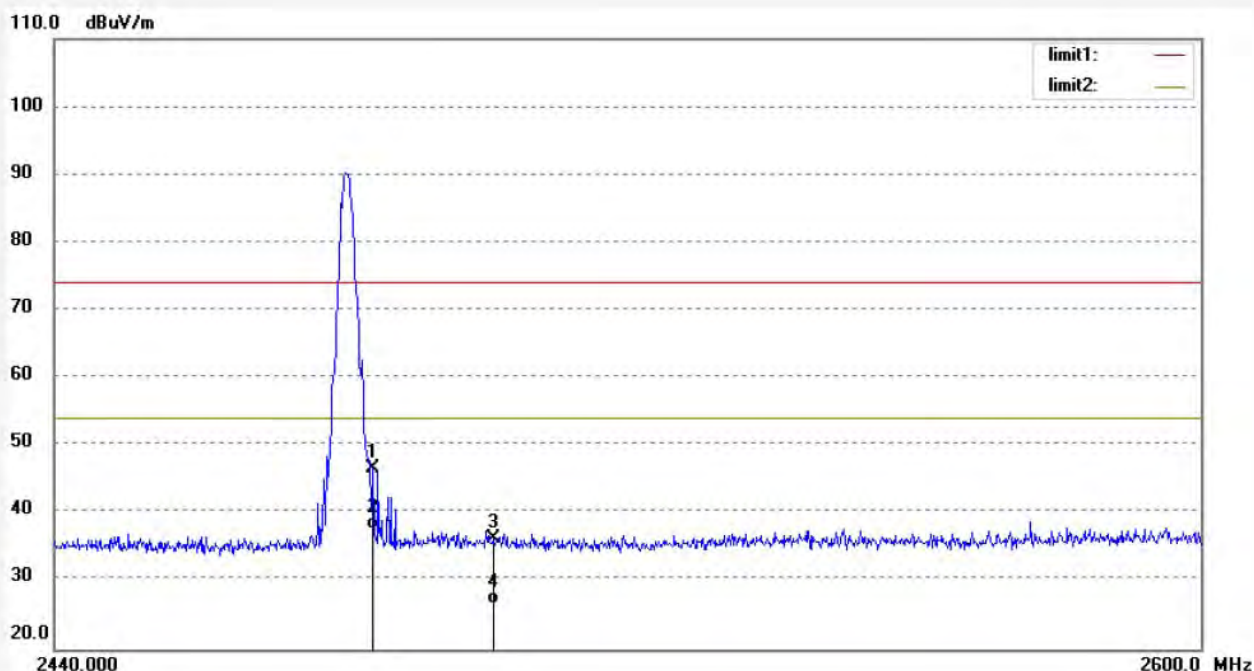
Date: 2019/07/11

Time: 14:51:06

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	52.64	-5.89	46.75	74.00	-27.25	peak	250	63	
2	2483.500	43.45	-5.89	37.56	54.00	-16.44	AVG	200	115	
3	2500.000	42.08	-5.81	36.27	74.00	-37.73	peak	250	92	
4	2500.000	32.45	-5.81	26.64	54.00	-27.36	AVG	200	109	

Note: Average measurement with peak detection at No.2&4



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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019-BT #175

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: TX2480MHz(8DPSK)

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

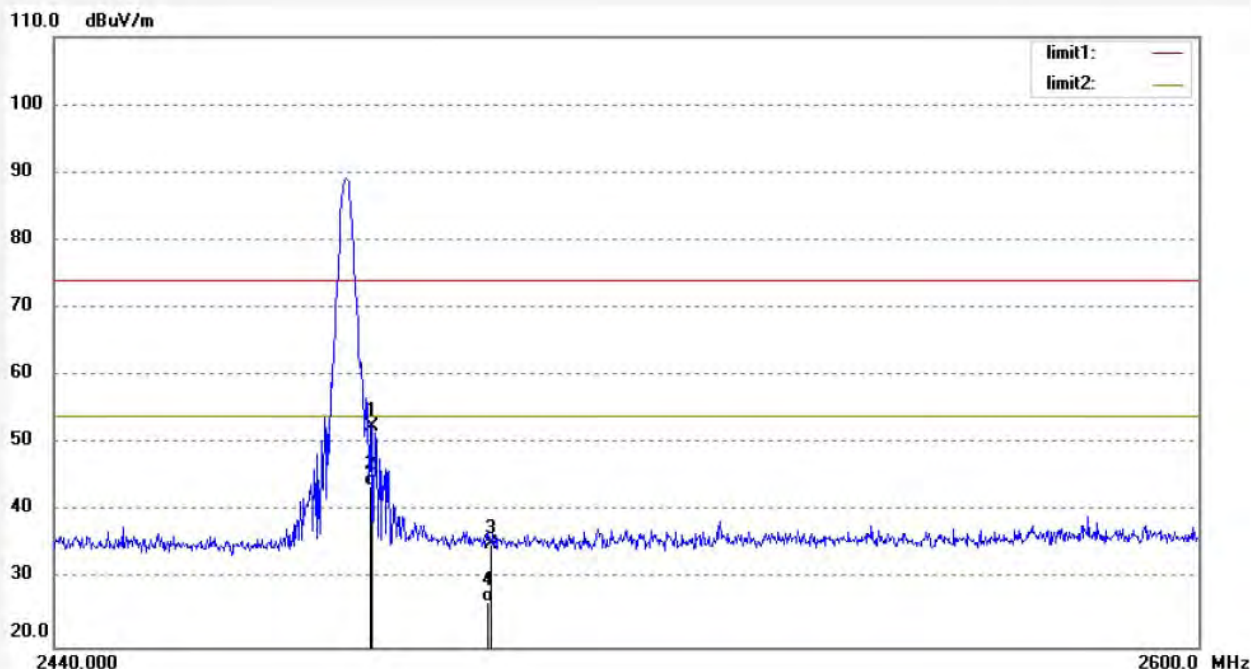
Date: 2019/07/11

Time: 14:49:14

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	58.37	-5.89	52.48	74.00	-21.52	peak	150	155	
2	2483.500	49.64	-5.89	43.75	54.00	-10.25	AVG	150	96	
3	2500.000	41.11	-5.81	35.30	74.00	-38.70	peak	150	221	
4	2500.000	32.45	-5.81	26.64	54.00	-27.36	AVG	150	103	

Note: Average measurement with peak detection at No.2&4



Hopping mode ACCURATE TECHNOLOGY CO., LTD.

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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019-BT #188

Polarization: Horizontal

Standard: FCC Part 15C 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 2019/07/11

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

Time: 15:24:09

EUT: Massage Chair

Engineer Signature:

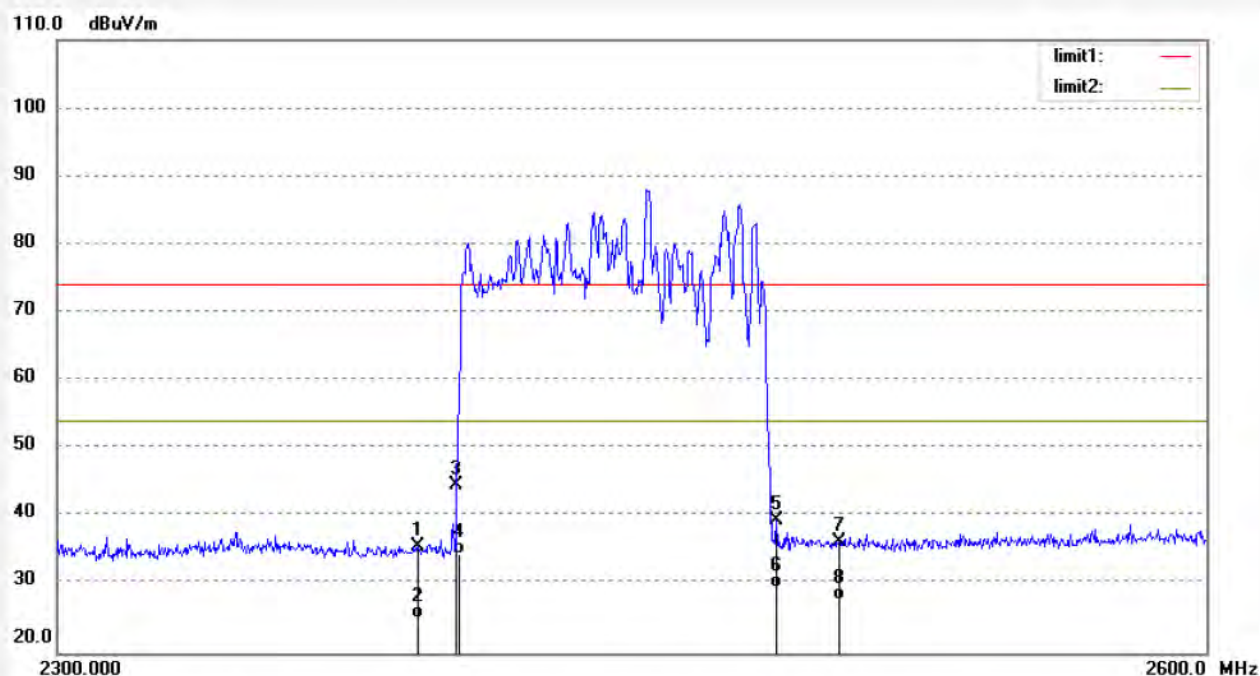
Mode: HOPPING(8DPSK)

Distance: 3m

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Note: Report NO.:ATE20190997



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	42.02	-6.32	35.70	74.00	-38.30	peak	200	196	
2	2390.000	31.48	-6.32	25.16	54.00	-28.84	AVG	200	331	
3	2400.000	50.86	-6.27	44.59	74.00	-29.41	peak	200	201	
4	2400.000	40.78	-6.27	34.51	54.00	-19.49	AVG	200	11	
5	2483.500	45.45	-5.89	39.56	74.00	-34.44	peak	200	82	
6	2483.500	35.48	-5.89	29.59	54.00	-24.41	AVG	200	223	
7	2500.000	42.21	-5.81	36.40	74.00	-37.60	peak	200	301	
8	2500.000	33.50	-5.81	27.69	54.00	-26.31	AVG	200	110	

Note: Average measurement with peak detection at No.2&4&6&8



ACCURATE TECHNOLOGY CO., LTD.

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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019-BT #187

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

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

EUT: Massage Chair

Mode: HOPPING(8DPSK)

Model: Otamic-2X

Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTH

Polarization: Vertical

Power Source: AC 120V/60Hz

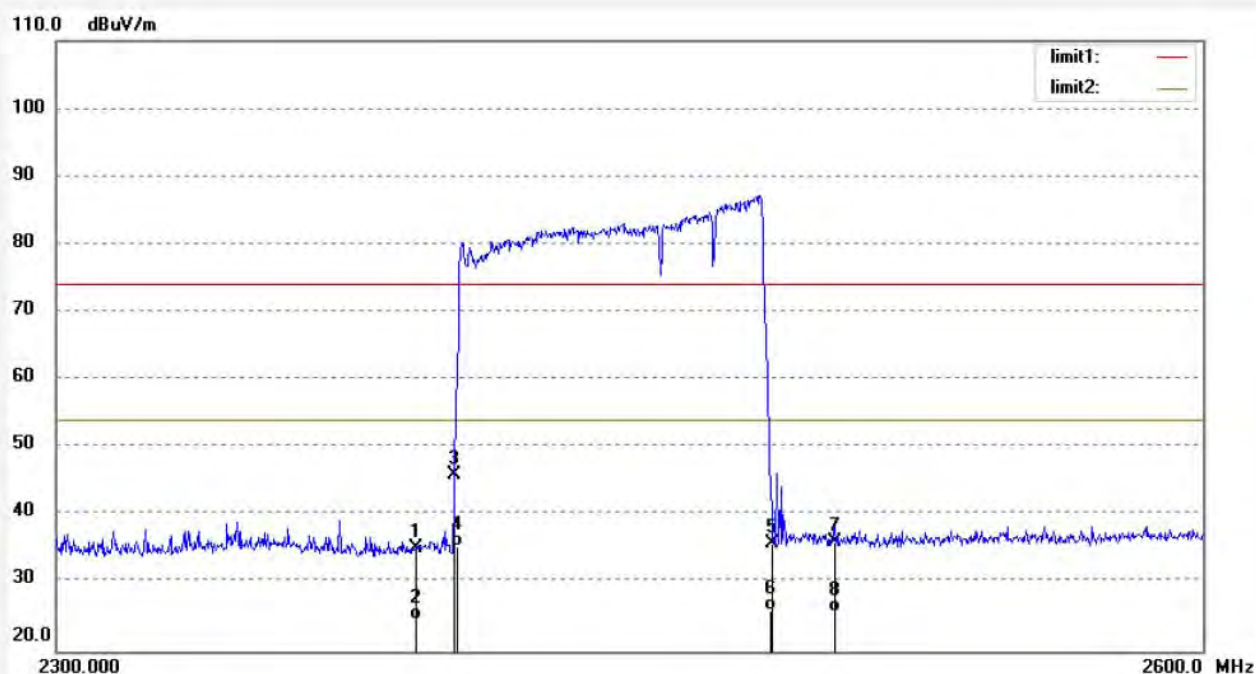
Date: 2019/07/11

Time: 15:19:57

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190997



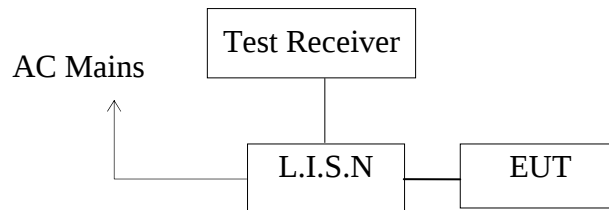
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.42	-6.32	35.10	74.00	-38.90	peak	150	114	
2	2390.000	30.87	-6.32	24.55	54.00	-29.45	AVG	150	96	
3	2400.000	52.36	-6.27	46.09	74.00	-27.91	peak	150	221	
4	2400.000	41.64	-6.27	35.37	54.00	-18.63	AVG	150	33	
5	2483.500	41.83	-5.89	35.94	74.00	-38.06	peak	150	201	
6	2483.500	31.75	-5.89	25.86	54.00	-28.14	AVG	150	85	
7	2500.000	41.86	-5.81	36.05	74.00	-37.95	peak	150	141	
8	2500.000	31.48	-5.81	25.67	54.00	-28.33	AVG	150	112	

Note: Average measurement with peak detection at No.2&4&6&8

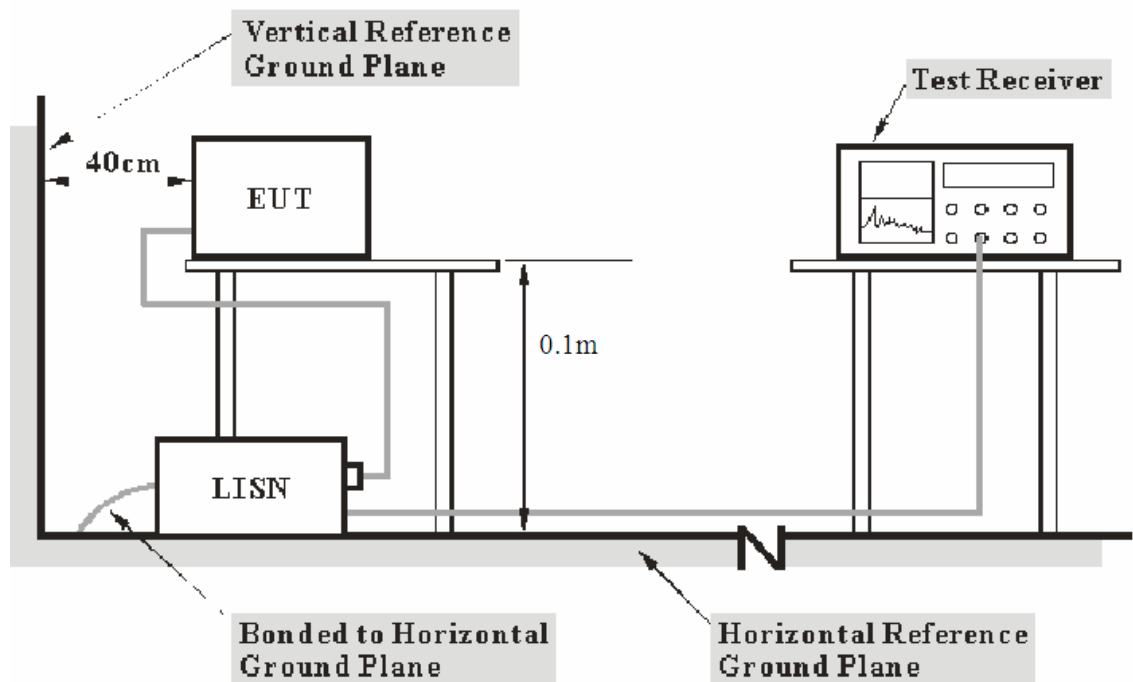
12.AC POWER LINE CONDUCTED EMISSION TEST

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators



12.1.2.Test System Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 0.1m from other units and other metal planes support units.

12.2.Test Limits

Frequency (MHz)	Conducted Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies.		
NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

12.3.EUT Configuration on Test

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

12.4.Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 12.1.

12.4.2.Turn on the power of all equipment.

12.4.3.Let the EUT work in test mode and measure it.

12.5.Test Procedure

The EUT is put on the plane 0.1m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

12.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

12.7.Test Results

Pass.

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.
Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

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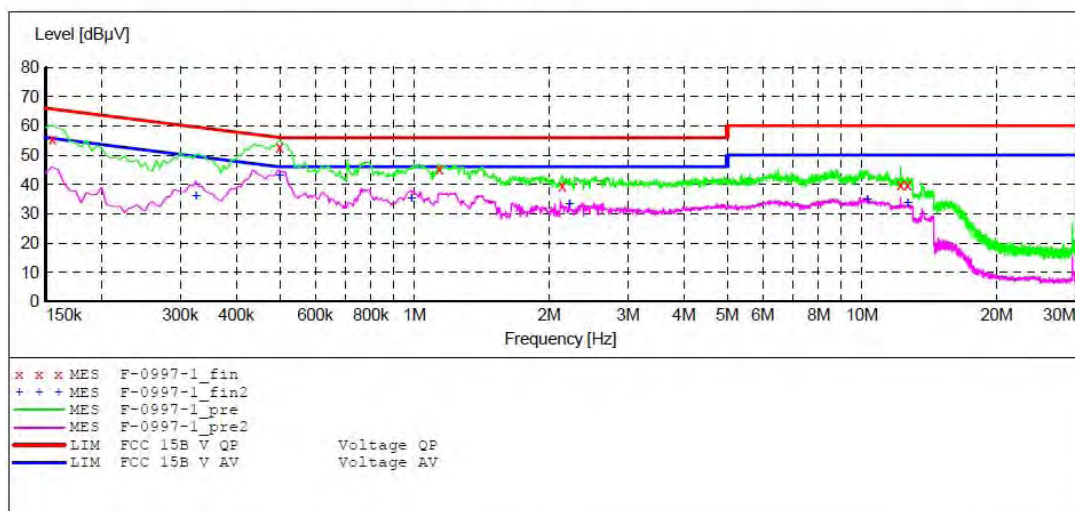
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Massage Chair M/N:Otamic-2X
 Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTG EQUIPMENT CO.,LTD
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20190997
 Start of Test: 7/6/2019 / 10:55:47AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB_STD_VTERM2 1.70

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
Average						
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



MEASUREMENT RESULT: "F-0997-1_fin"

7/6/2019 10:59AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.155000	55.50	10.5	66	10.2	QP	L1	GND
0.500000	52.50	10.6	56	3.5	QP	L1	GND
1.135000	45.40	10.7	56	10.6	QP	L1	GND
2.140000	39.30	10.7	56	16.7	QP	L1	GND
12.190000	40.00	10.9	60	20.0	QP	L1	GND
12.625000	40.00	10.9	60	20.0	QP	L1	GND

MEASUREMENT RESULT: "F-0997-1_fin2"

7/6/2019 10:59AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.325000	35.90	10.6	50	13.7	AV	L1	GND
0.500000	43.00	10.6	46	3.0	AV	L1	GND
0.985000	35.30	10.7	46	10.7	AV	L1	GND
2.220000	33.30	10.7	46	12.7	AV	L1	GND
10.285000	34.80	10.9	50	15.2	AV	L1	GND
12.655000	33.70	10.9	50	16.3	AV	L1	GND

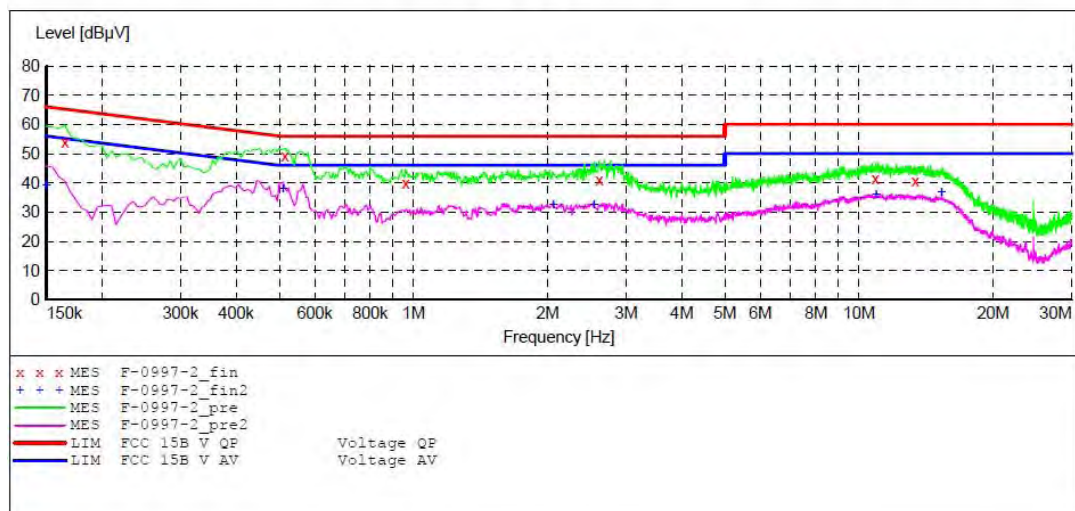
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Massage Chair M/N:Otamic-2X
 Manufacturer: XIAMEN OGAWA INTELLIGENT HEALTG EQUIPMENT CO.,LTD
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20190997
 Start of Test: 7/6/2019 / 10:59:55AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0997-2_fin"

7/6/2019 11:03AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.165000	53.70	10.5	65	11.5	QP	N	GND
0.515000	49.30	10.6	56	6.7	QP	N	GND
0.960000	39.80	10.7	56	16.2	QP	N	GND
2.610000	41.10	10.8	56	14.9	QP	N	GND
10.885000	41.30	10.9	60	18.7	QP	N	GND
13.360000	40.70	10.9	60	19.3	QP	N	GND

MEASUREMENT RESULT: "F-0997-2_fin2"

7/6/2019 11:03AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	39.00	10.5	56	17.0	AV	N	GND
0.510000	38.00	10.6	46	8.0	AV	N	GND
2.060000	32.30	10.7	46	13.7	AV	N	GND
2.540000	32.50	10.8	46	13.5	AV	N	GND
10.930000	35.90	10.9	50	14.1	AV	N	GND
15.325000	36.70	10.9	50	13.3	AV	N	GND

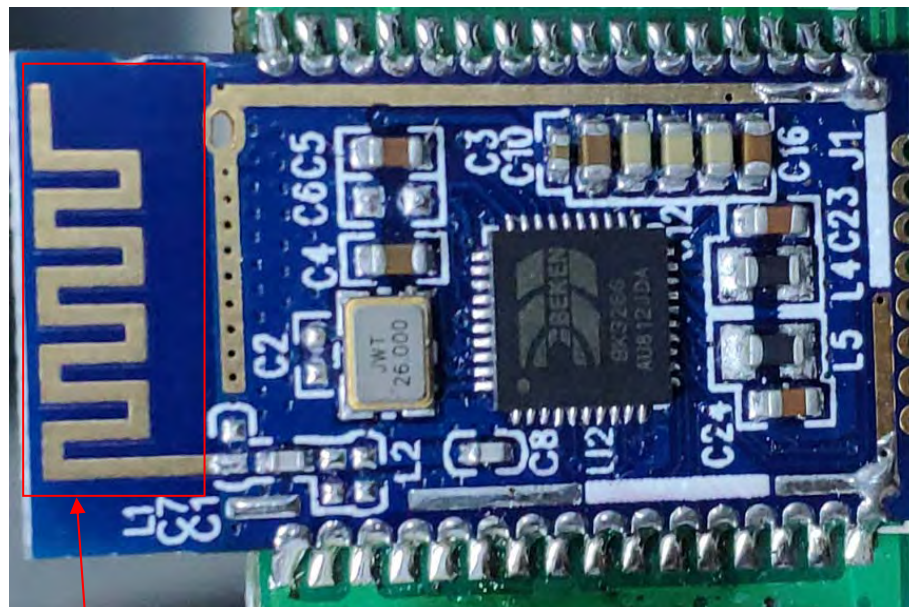
13.ANTENNA REQUIREMENT

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 Max Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna

***** End of Test Report *****