APPLICATION CERTIFICATION FCC Part 15C
On Behalf of

COZZIA USA, LLC

Massage Chair

Model No.: EC-528H, FJL50/KUMO

FCC ID: 2AHZV-EC528H

Prepared for	:	COZZIA USA, LLC
Address	:	861 S. OAK PARK ROAD, COVINA, California 91724, United States
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
Address	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China Tel: (0755) 26503290 Fax: (0755) 26503396

Report No.	:	ATE20172091
Date of Test	:	March 5-16, 2018
Date of Report	:	March 25, 2018

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Description Page

Test Report Certification

Applicant	:	COZZIA USA, LLC
Manufacturer	:	MARUTAKATECHNO CO., LTD
EUT Description	:	Massage Chair
Model No.	:	EC-528H, FJL50/KUMO
Trade Name	:	JPMEDICS

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247:2017
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 :	March 5-16, 2018
Date of Report:	March 25, 2018

Prepared by : _____
(Bob Wang, Engineer)

Approved & Authorized Signer : _____
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	Massage Chair
Model Number	:	EC-528H, FJL50/KUMO (Note: We hereby state that these models are identical in interior structure, electrical circuits and components, Except for the appearance different. So we prepare the EC-528H for test.)
Bluetooth version	:	BT V4.0
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain	:	2.5 dBi
Modulation mode	:	GFSK, π /4 DQPSK, 8DPSK
Antenna type	:	PCB Antenna
Power Supply	:	AC 100-120V; 60Hz
Applicant	:	COZZIA USA, LLC
Address	:	861 S. OAK PARK ROAD, COVINA, California 91724, United States
Manufacturer	:	MARUTAKATECHNO CO., LTD
Address	:	550-1 HIRODORI YAWATA FUJIEDA-SHI SHIZUOKA, JAPAN
Date of sample receiver	:	December 29, 2017
Date of Test	:	March 5-16, 2018
Sample No.	:	1701662

1.2.Carrier Frequency of Channels

Channel	Frequceny (MHz)	Channel	Frequceny (MHz)	Channel	Frequceny (MHz)	Channe l	Frequceny (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

1.3.Accessory and Auxiliary Equipment

N/A

1.4.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 (ISEDC) 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

1.5.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, 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	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 06, 2018	1 Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 06, 2018	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 06, 2018	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 06, 2018	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 12, 2018	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 12, 2018	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 12, 2018	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 12, 2018	1 Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 06, 2018	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 06, 2018	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 06, 2018	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 06, 2018	1 Year

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

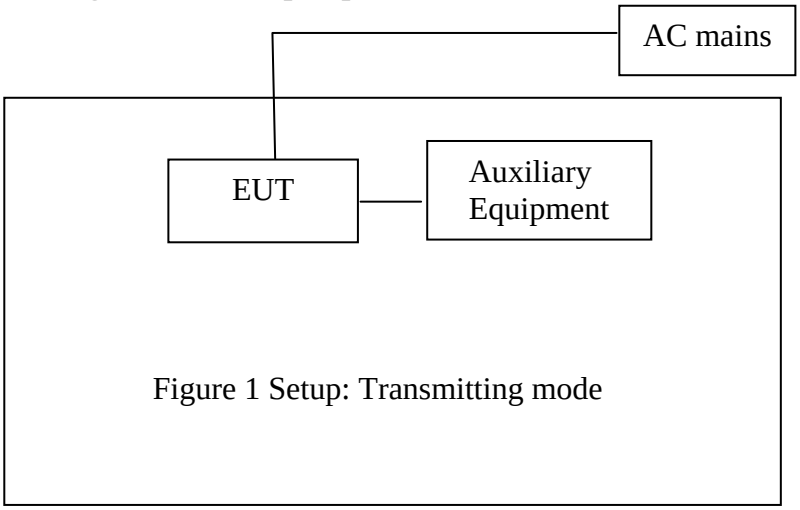


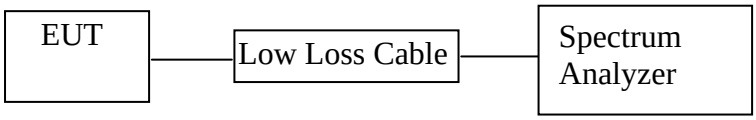
Figure 1 Setup: Transmitting mode

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
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 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1.Block Diagram of Test Setup



(EUT: Massage Chair)

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

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 Measurement

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

5.5.2.Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.

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

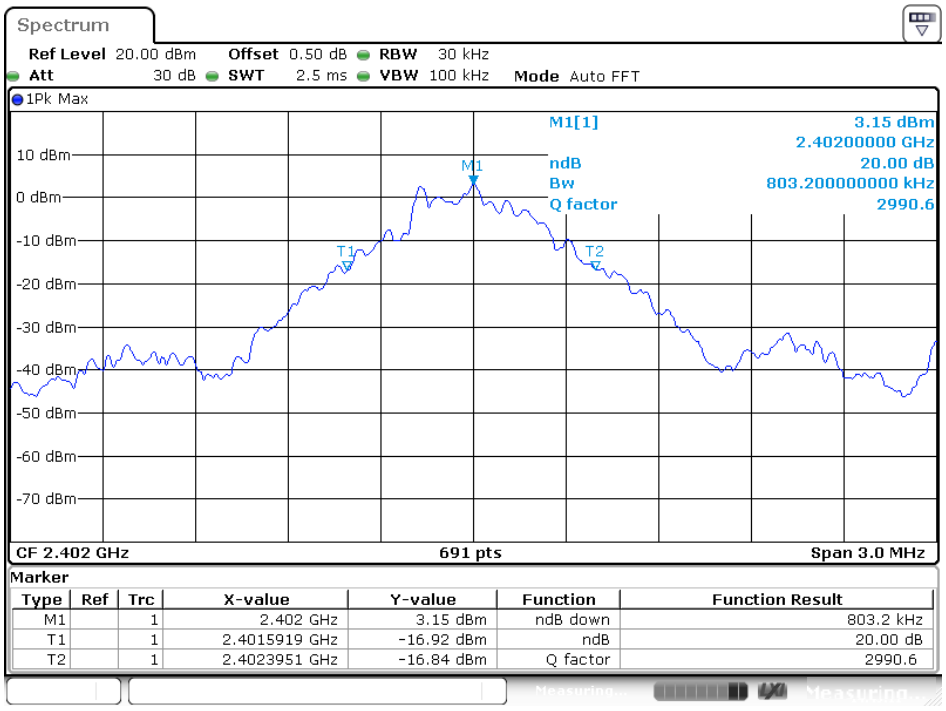
5.6.Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	Π/4-DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	0.803	1.220	1.207	Pass
Middle	2441	0.803	1.220	1.207	Pass
High	2480	0.803	1.224	1.211	Pass

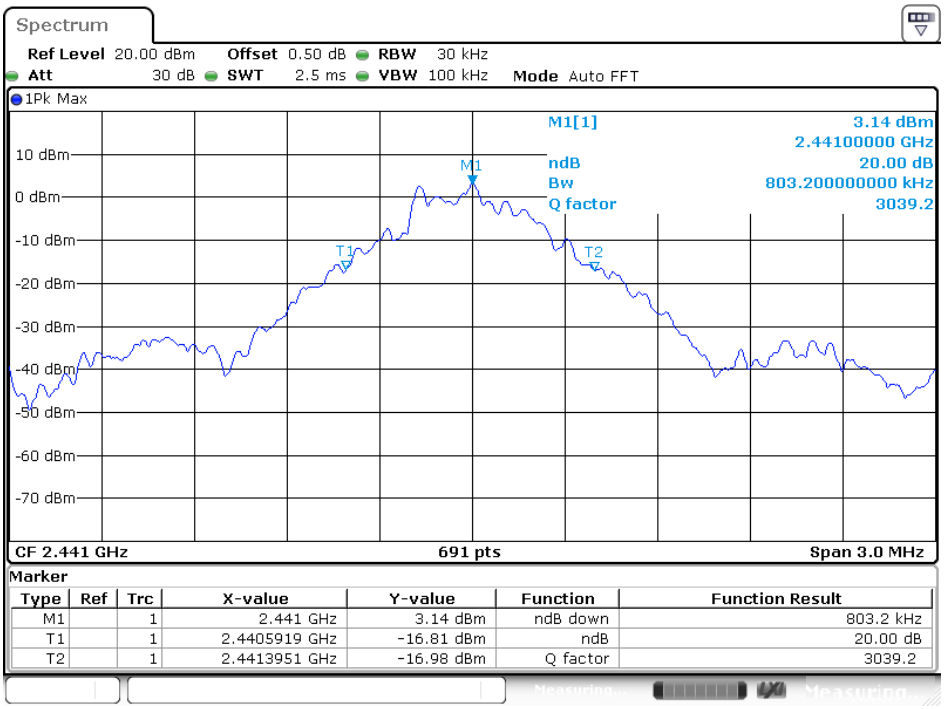
The spectrum analyzer plots are attached as below.

GFSK Mode

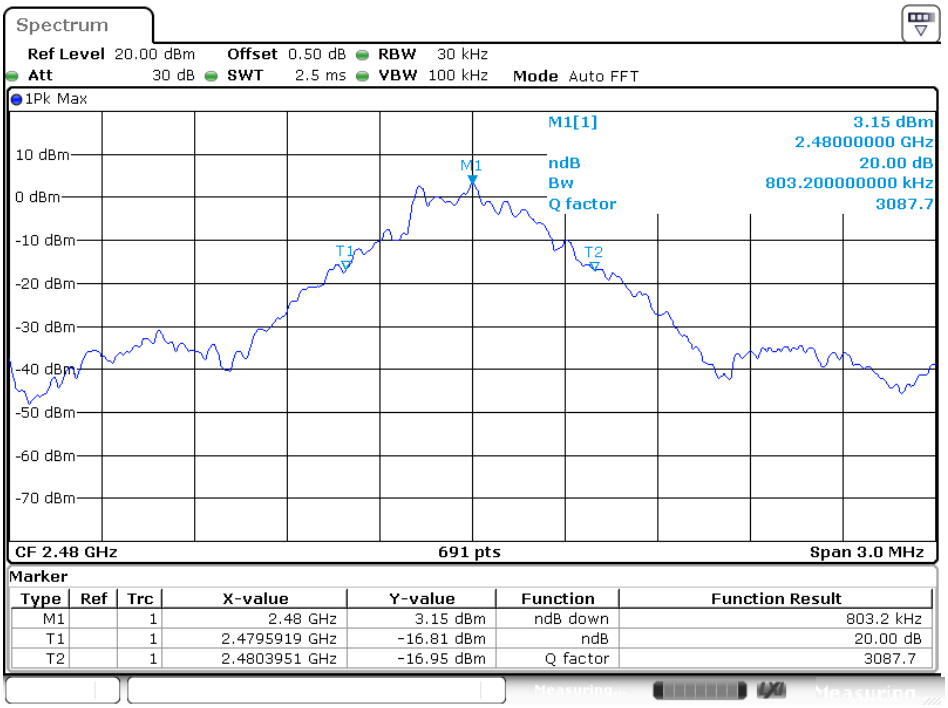
Low channel



Middle channel

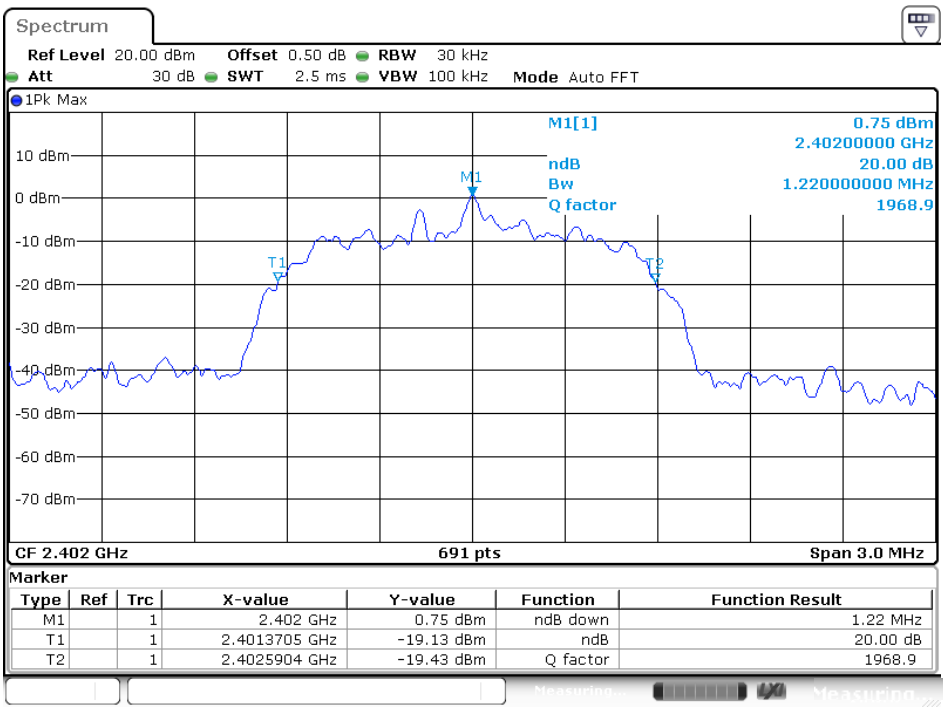


High channel

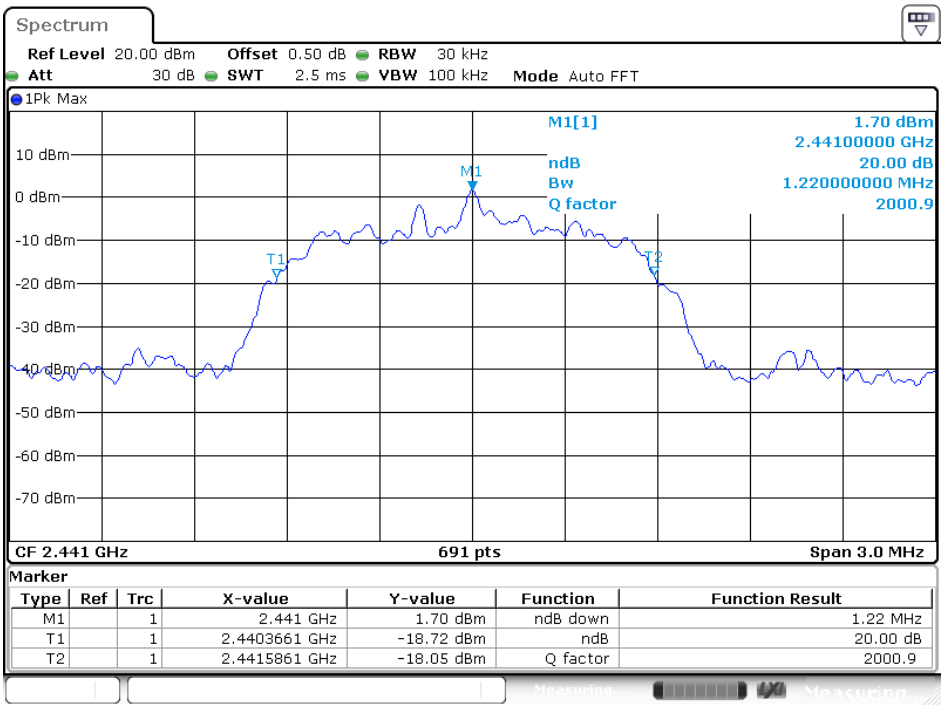


Π/4-DQPSK Mode

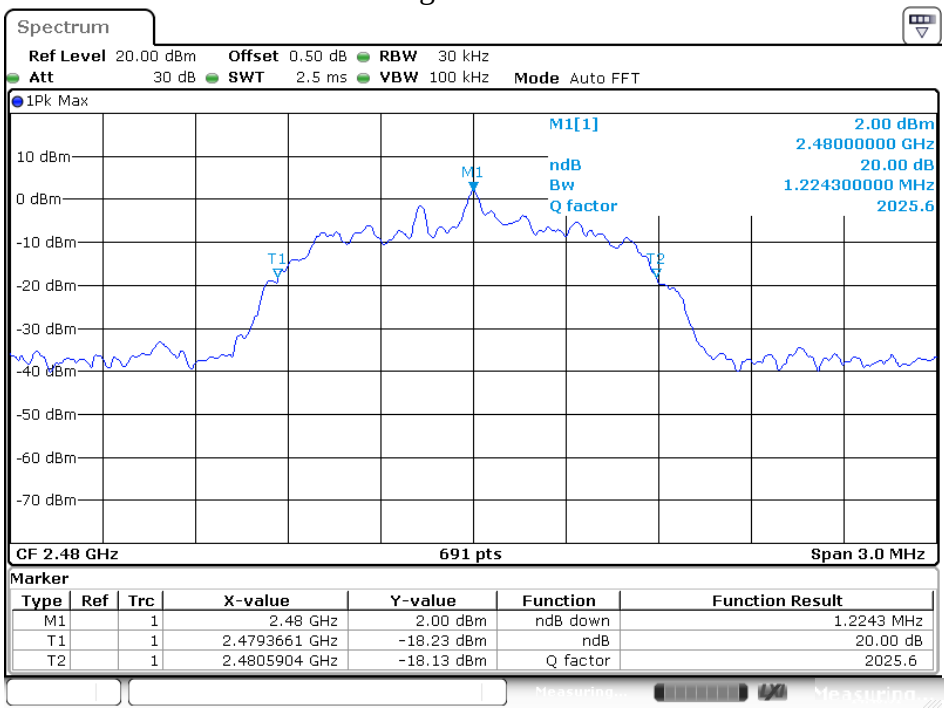
Low channel



Middle channel

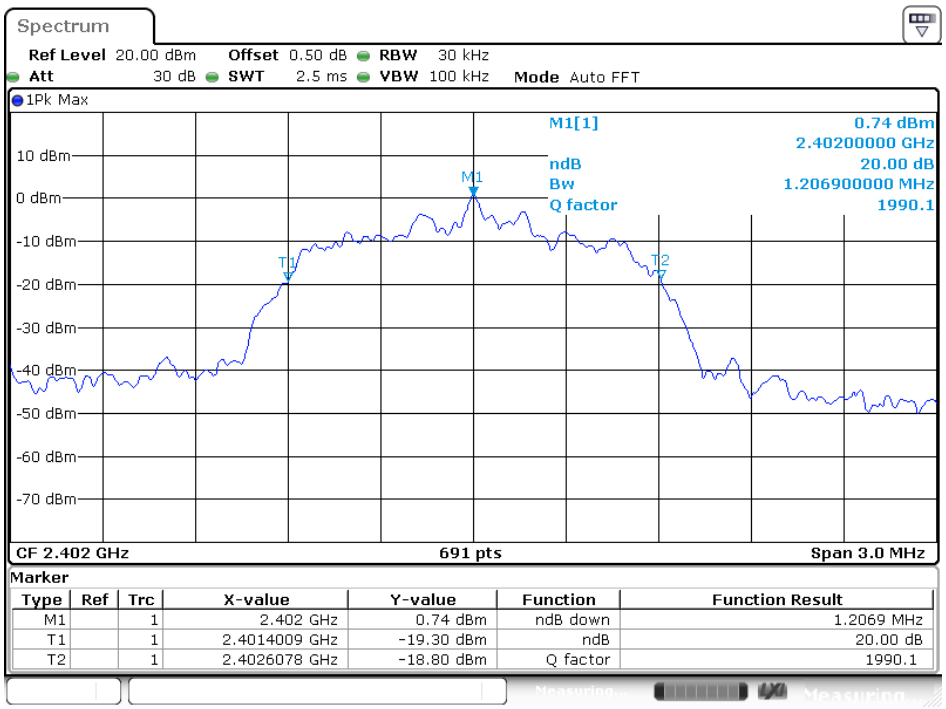


High channel

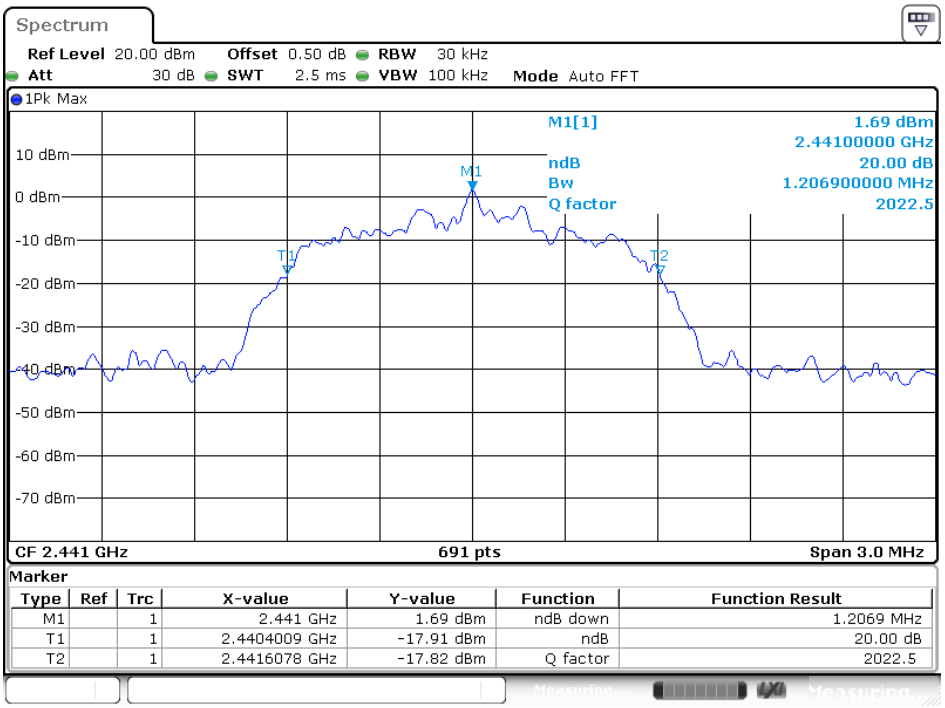


8DPSK Mode

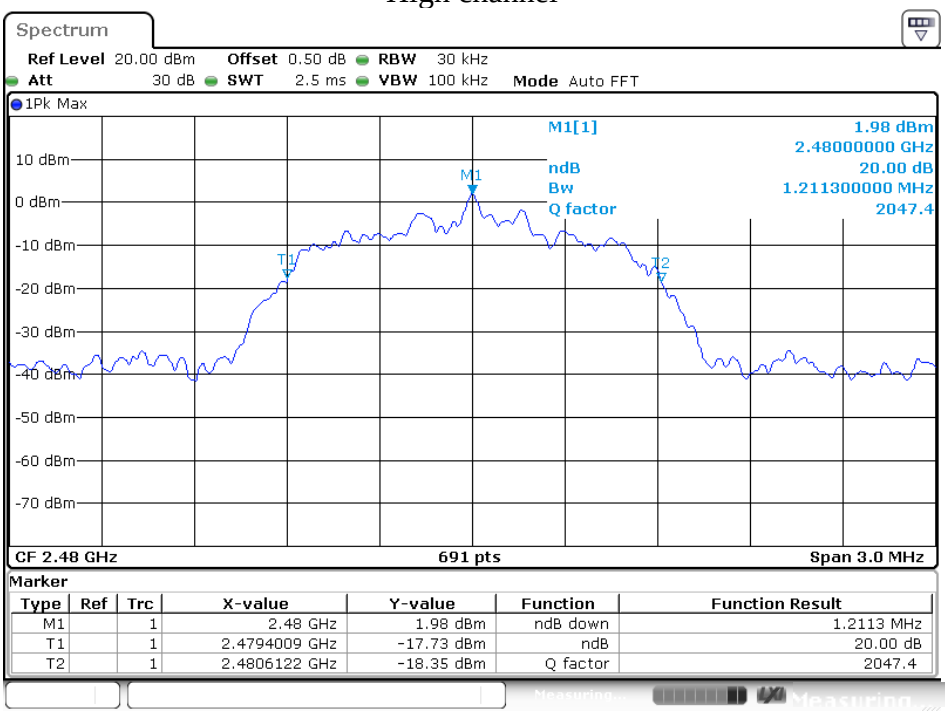
Low channel



Middle channel

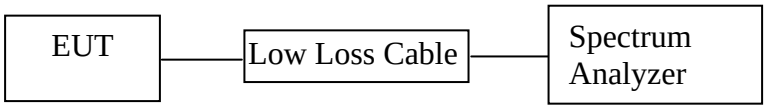


High channel



6. CARRIER FREQUENCY SEPARATION TEST

6.1.Block Diagram of Test Setup



(EUT: Massage Chair)

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

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 pseudorandomly 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 Measurement

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 2MHz.

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

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.0014	25KHz or 20dB bandwidth	PASS
	2403			
Middle	2440	1.0014	25KHz or20dB bandwidth	PASS
	2441			
High	2479	1.0014	25KHz or 20dB bandwidth	PASS
	2480			

Π/4-DQPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2480			

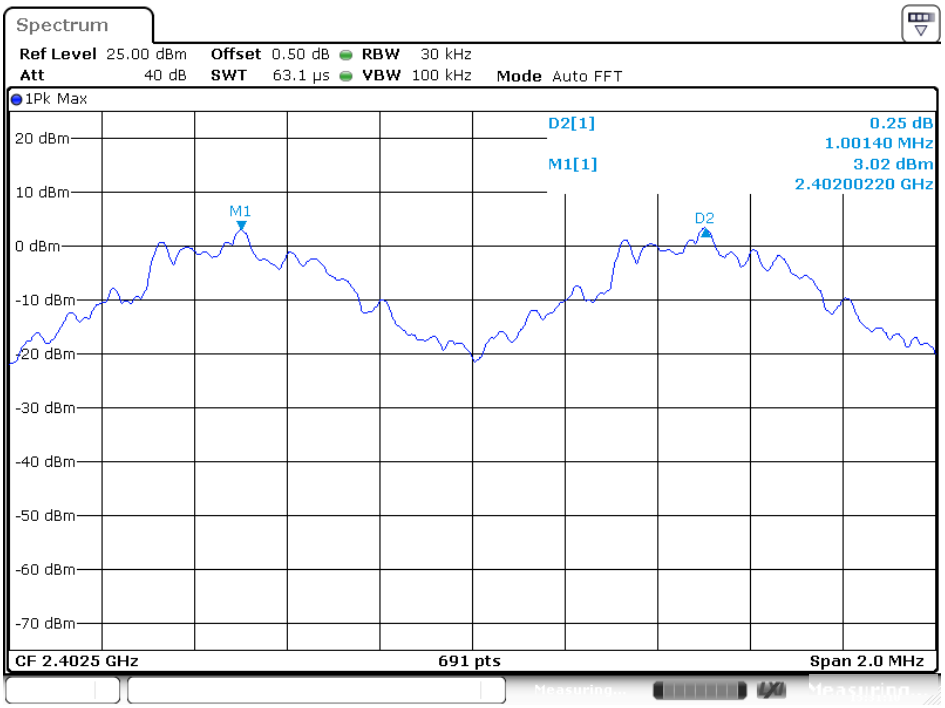
8DPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.0029	25KHz or 2/3*20dB bandwidth	PASS

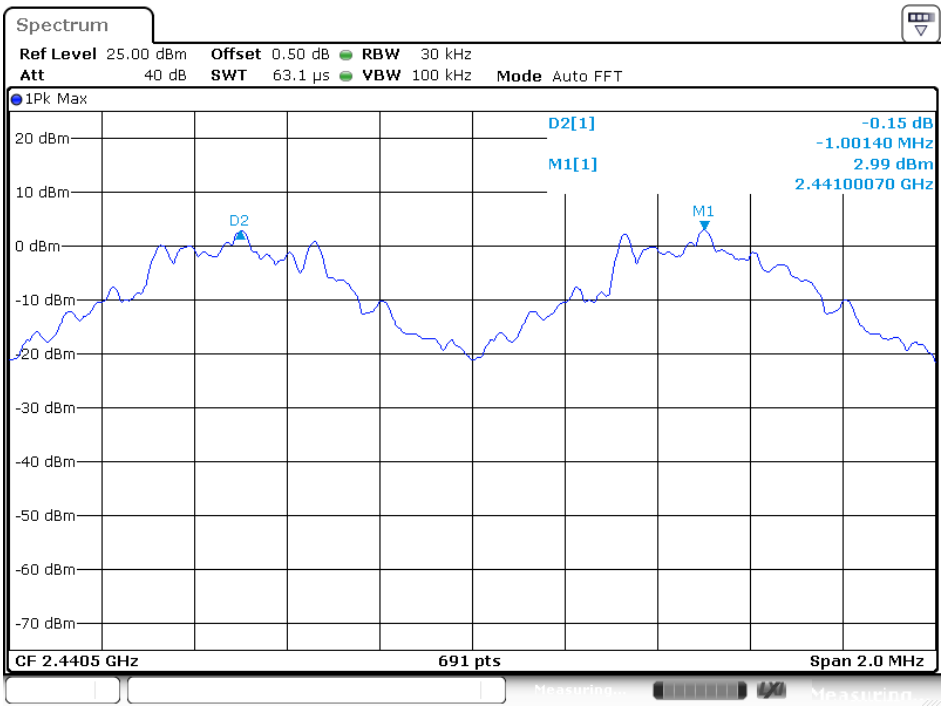
The spectrum analyzer plots are attached as below.

GFSK Mode

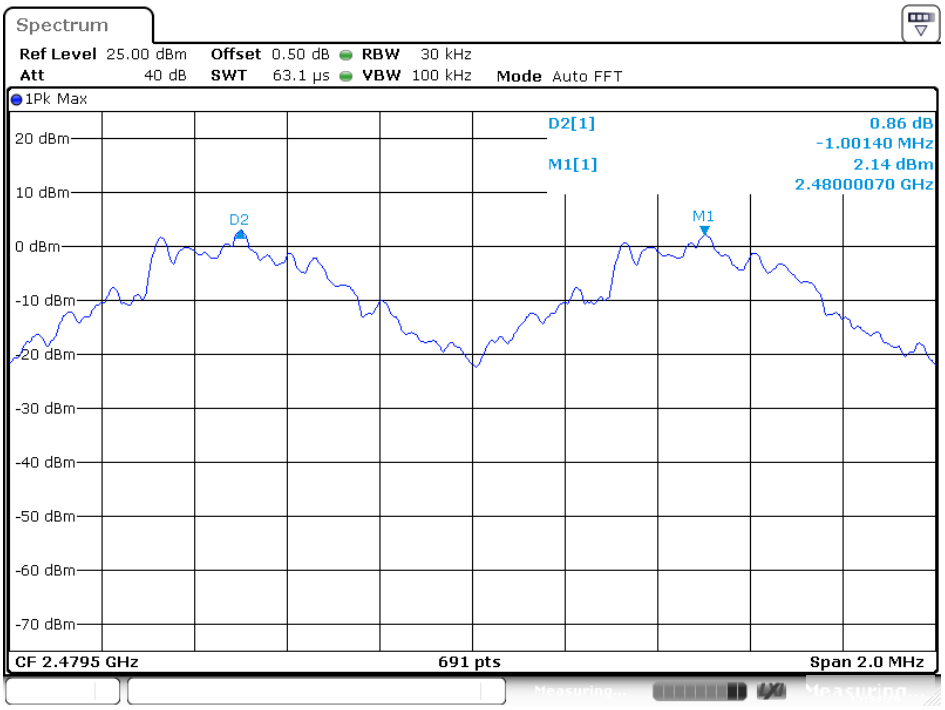
Low channel



Middle channel

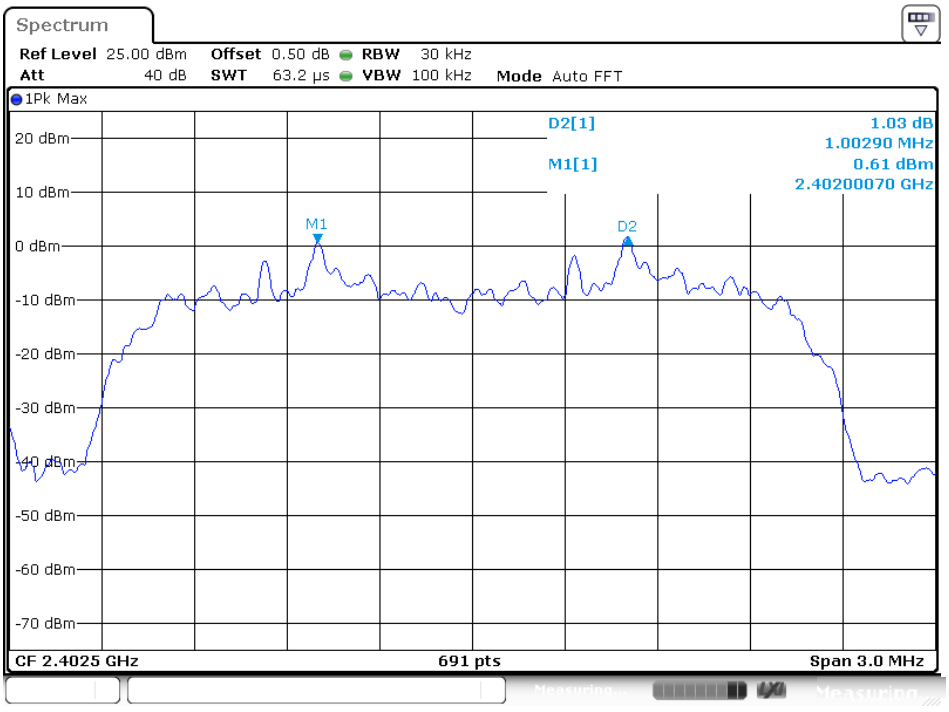


High channel

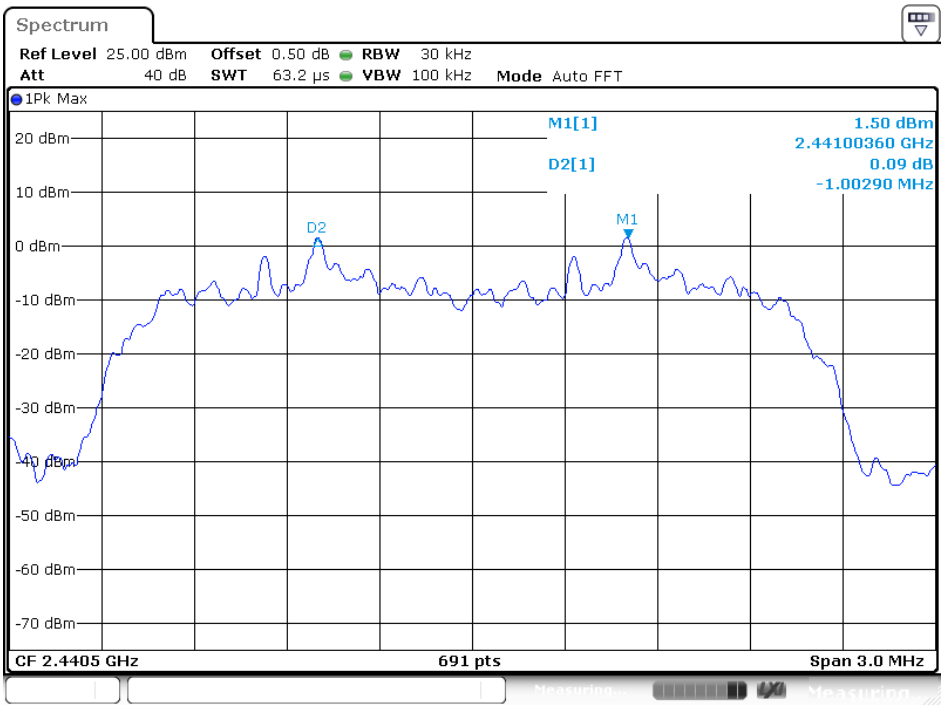


Π/4-DQPSK Mode

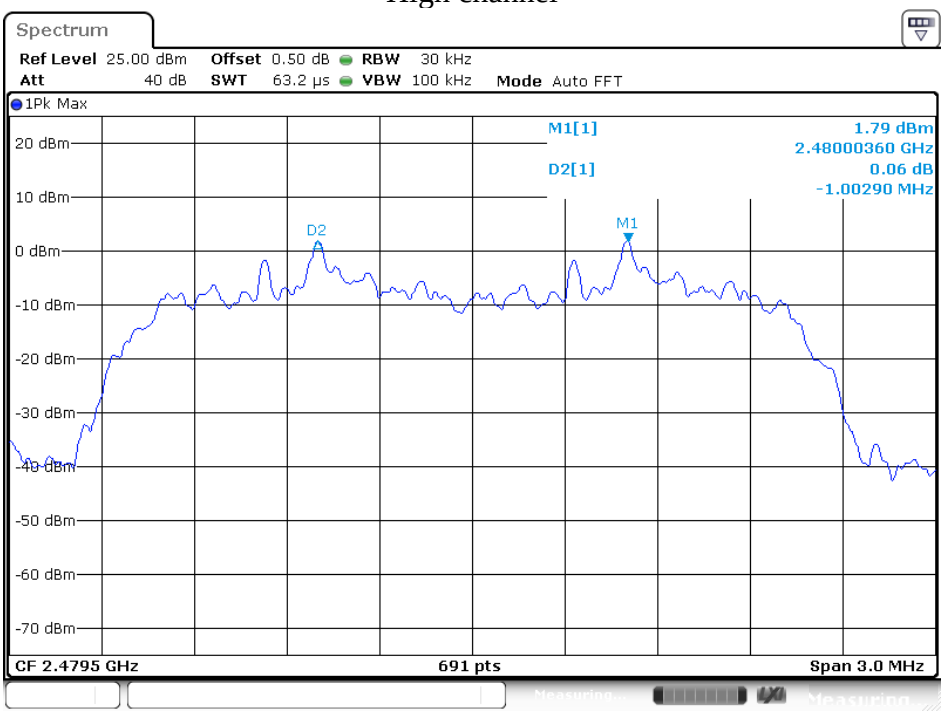
Low channel



Middle channel

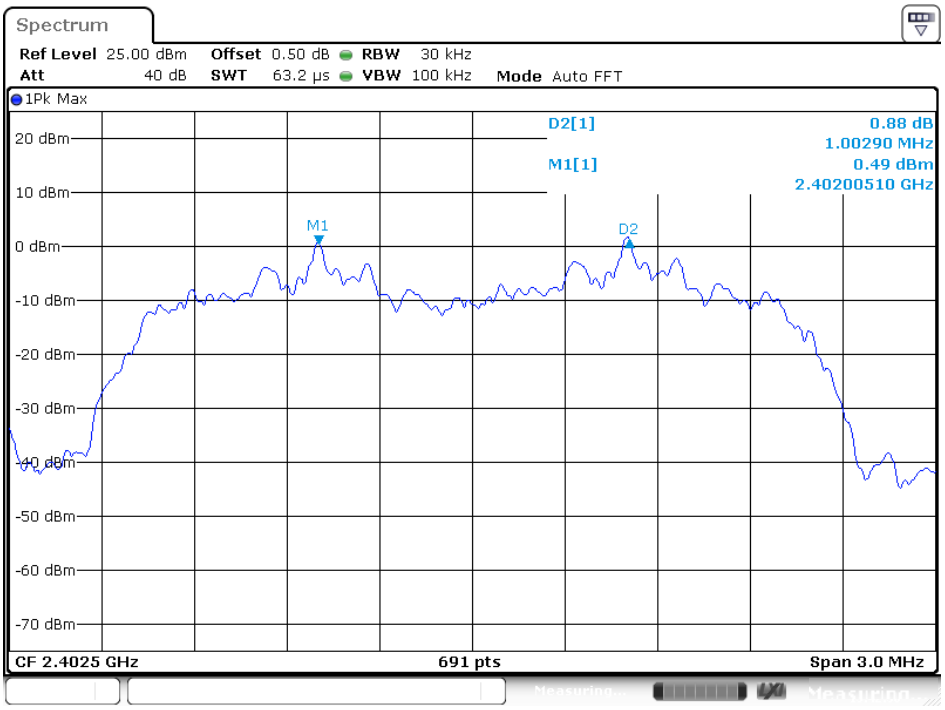


High channel

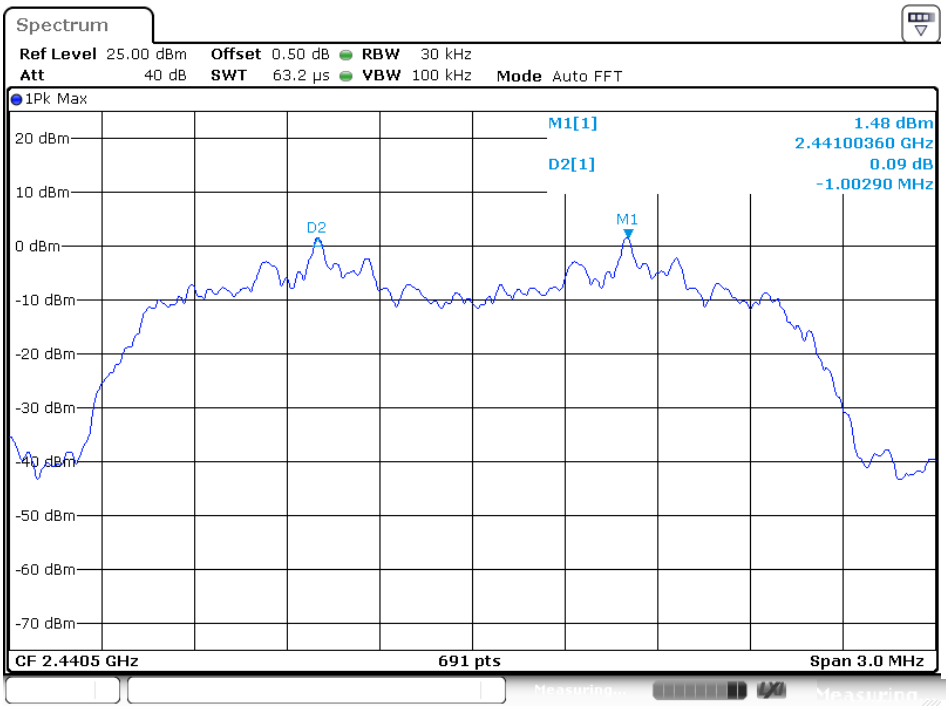


8DPSK Mode

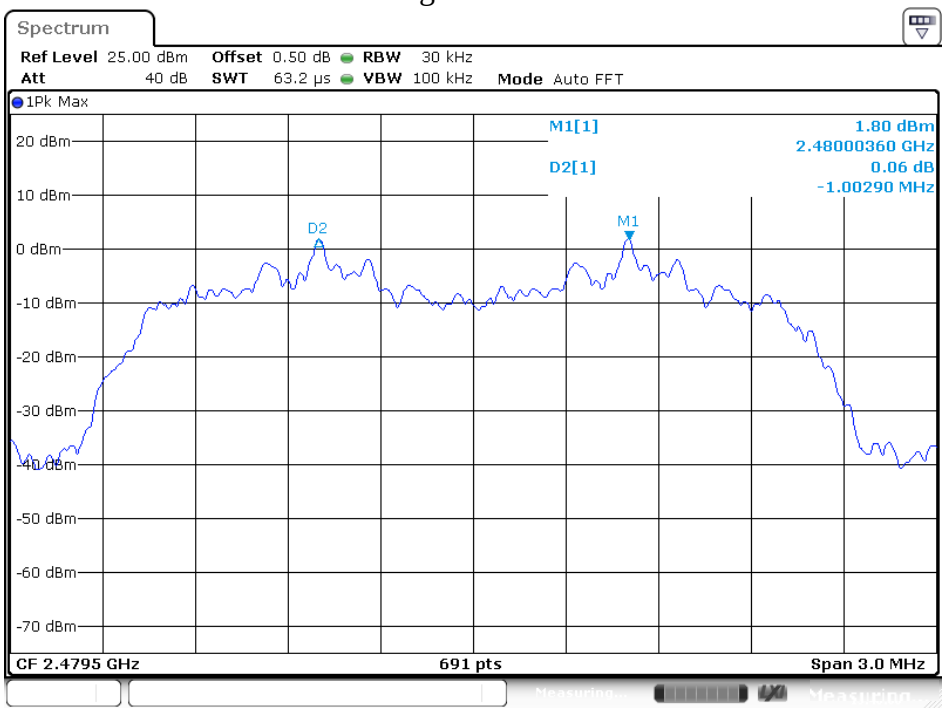
Low channel



Middle channel

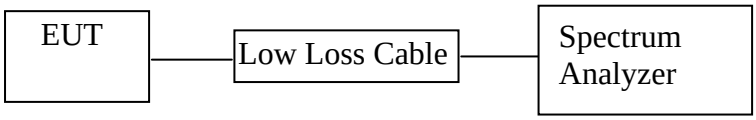


High channel



7. NUMBER OF HOPPING FREQUENCY TEST

7.1.Block Diagram of Test Setup



(EUT: Massage Chair)

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

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 Measurement

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.

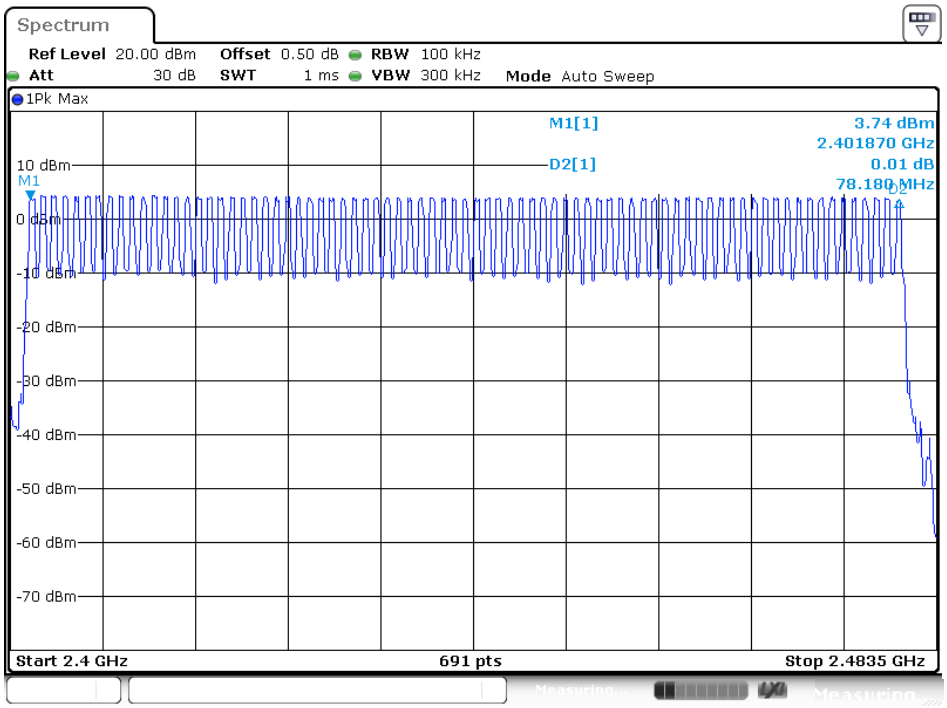
7.5.3.Max hold, view and count how many channel in the band.

7.6.Test Result

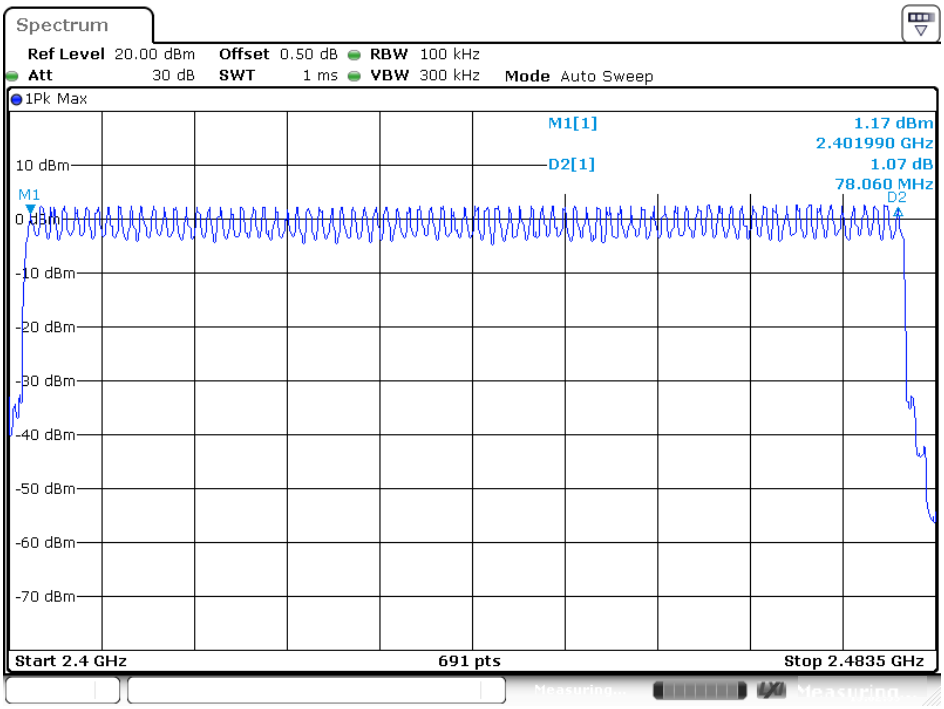
Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	⩾15

The spectrum analyzer plots are attached as below.

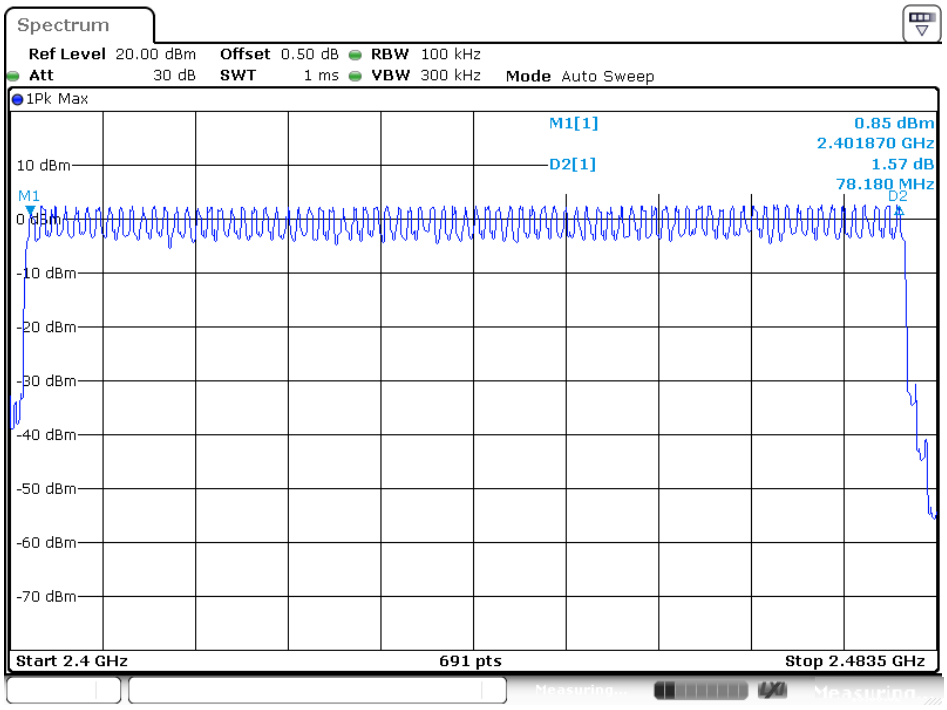
Number of hopping channels(GFSK)



Number of hopping channels(Π/4-DQPSK)

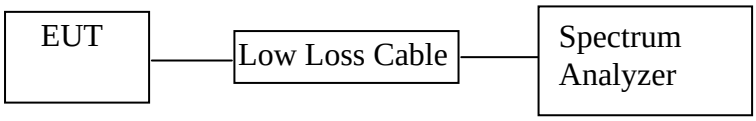


Number of hopping channels(8DPSK)



8. DWELL TIME TEST

8.1.Block Diagram of Test Setup



(EUT: Massage Chair)

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

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 Measurement

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

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.428	136.96	400
	2441	0.438	140.16	400
	2480	0.442	141.44	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(2*79))×31.6				
DH3	2402	1.746	279.36	400
	2441	1.790	286.40	400
	2480	1.761	281.76	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(4*79))×31.6				
DH5	2402	2.978	317.65	400
	2441	2.978	317.65	400
	2480	3.000	320.00	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(6*79))×31.6				

Π/4-DQPSK

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.446	142.72	400
	2441	0.442	141.44	400
	2480	0.438	140.16	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(2*79))×31.6				
DH3	2402	1.714	274.24	400
	2441	1.714	274.24	400
	2480	1.728	276.48	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(4*79))×31.6				
DH5	2402	3.000	320.00	400
	2441	3.022	322.35	400
	2480	2.978	317.65	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(6*79))×31.6				

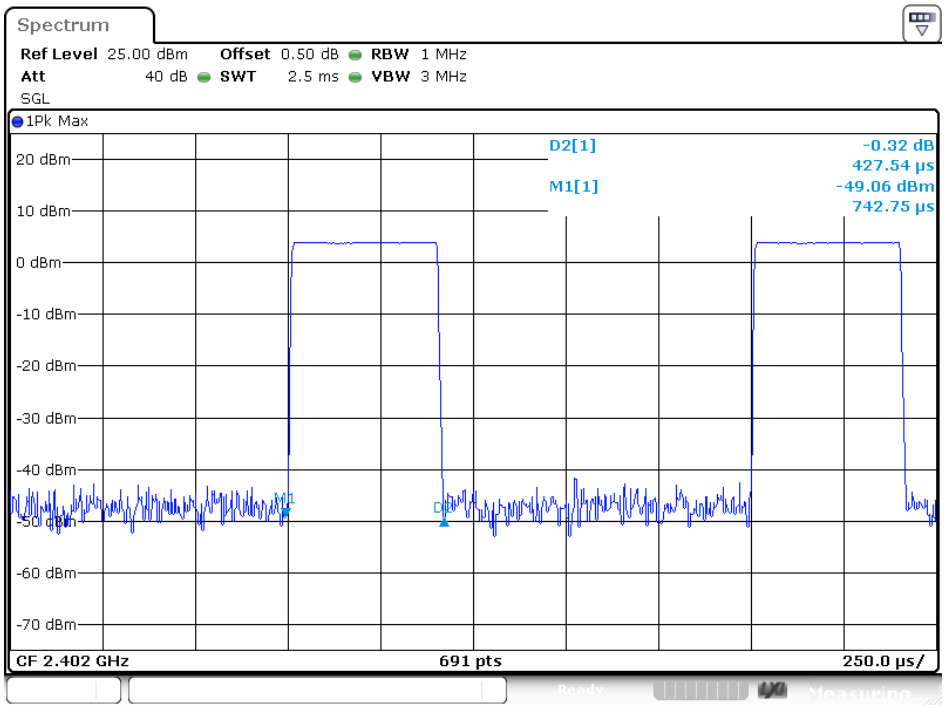
8DPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.449	143.68	400
	2441	0.446	142.72	400
	2480	0.446	142.72	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(2*79))×31.6				
DH3	2402	1.736	277.76	400
	2441	1.721	275.36	400
	2480	1.736	277.76	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(4*79))×31.6				
DH5	2402	3.040	324.27	400
	2441	2.975	317.33	400
	2480	3.062	326.61	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(6*79))×31.6				

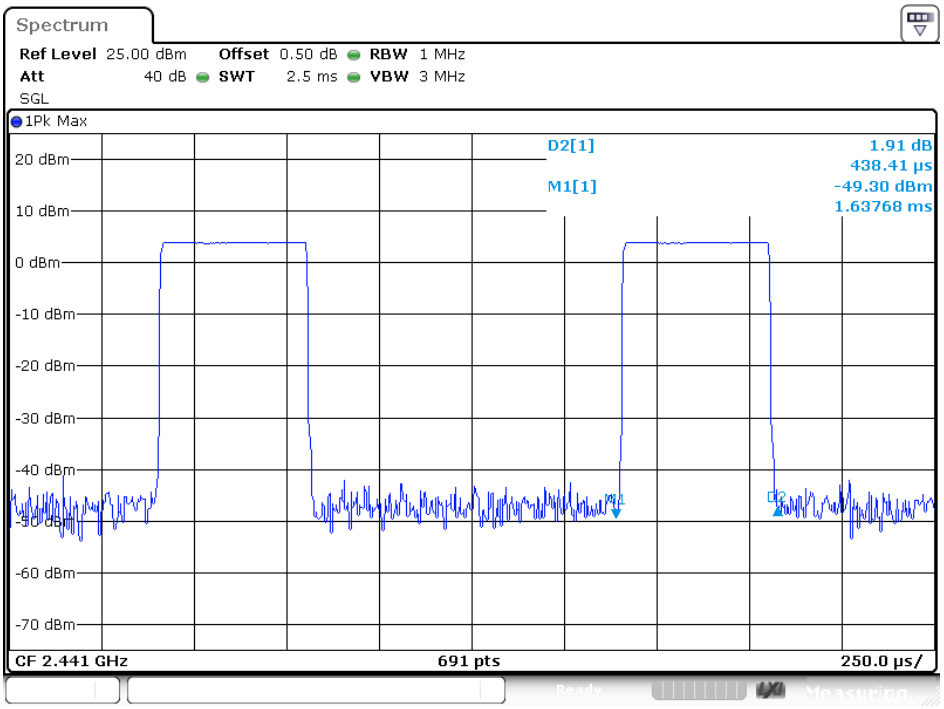
The spectrum analyzer plots are attached as below.

GFSK Mode

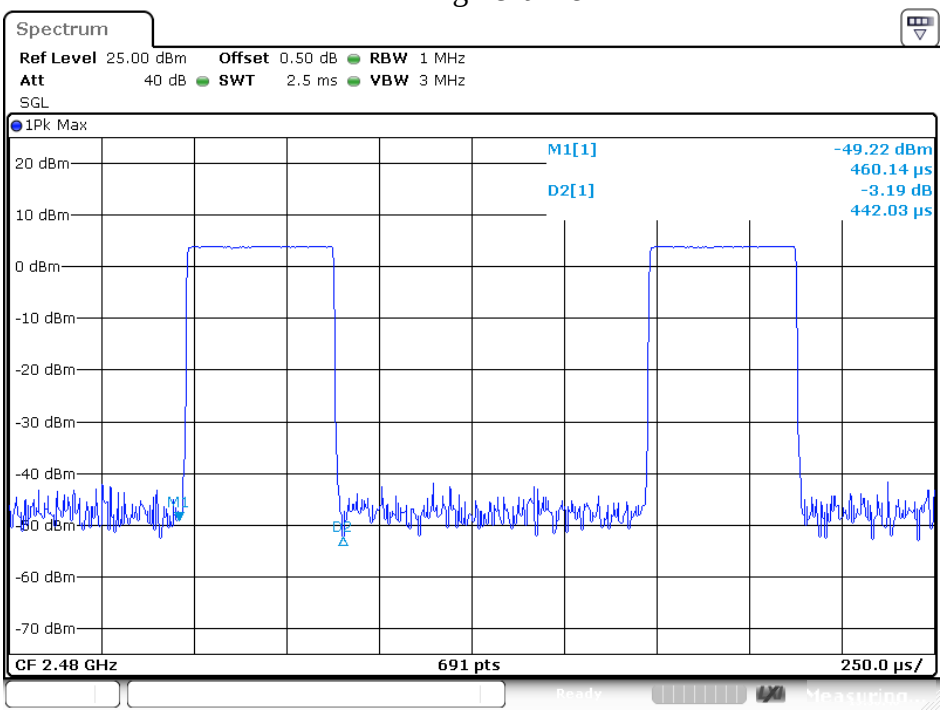
DH1 Low channel



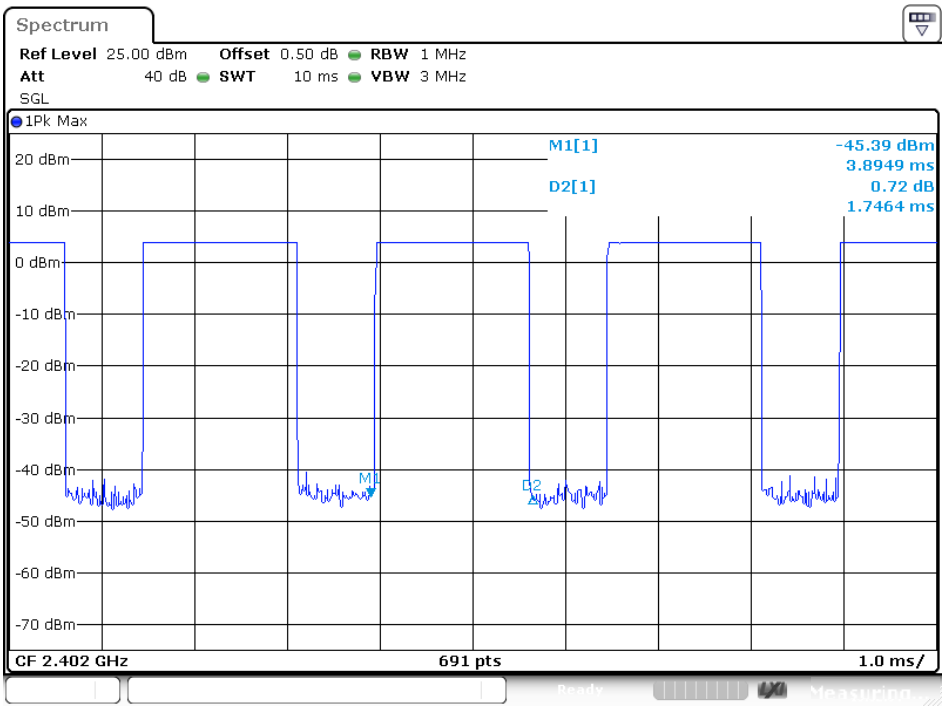
DH1 Middle channel



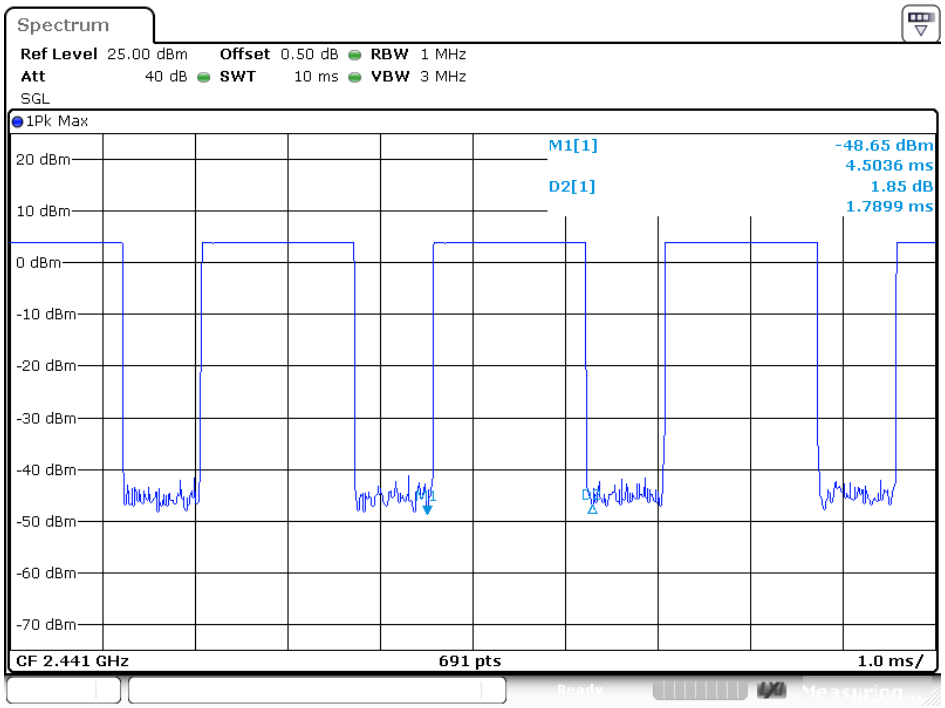
DH1 High channel



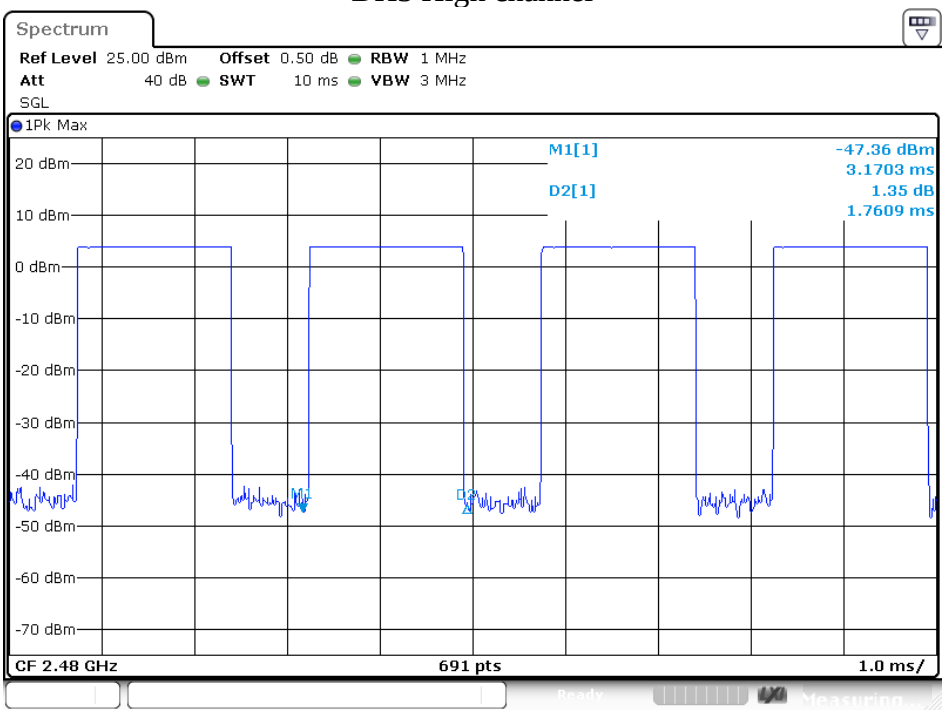
DH3 Low channel



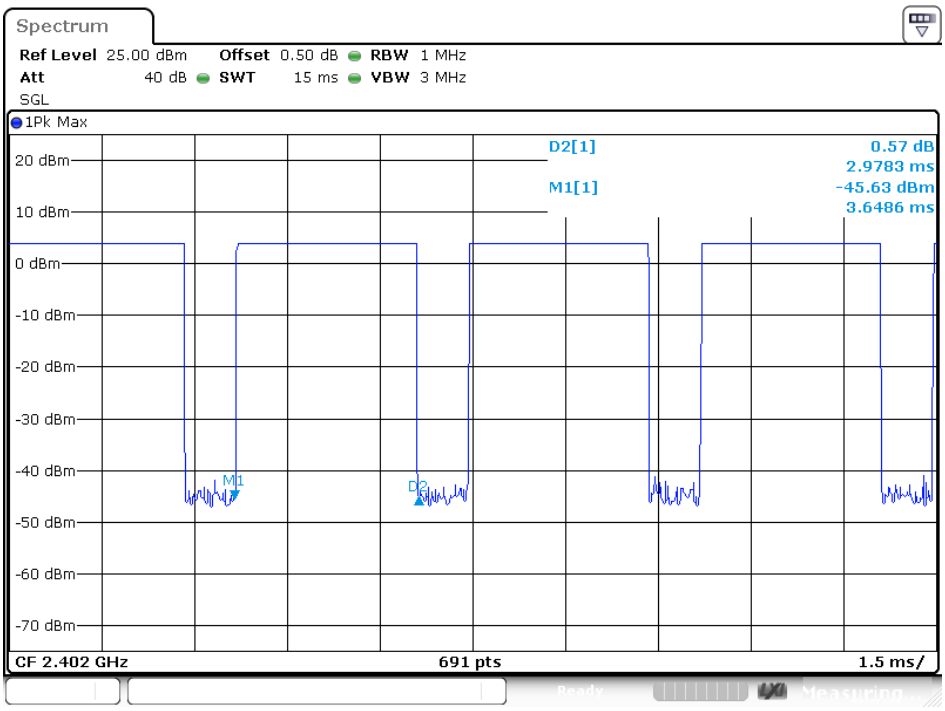
DH3 Middle channel



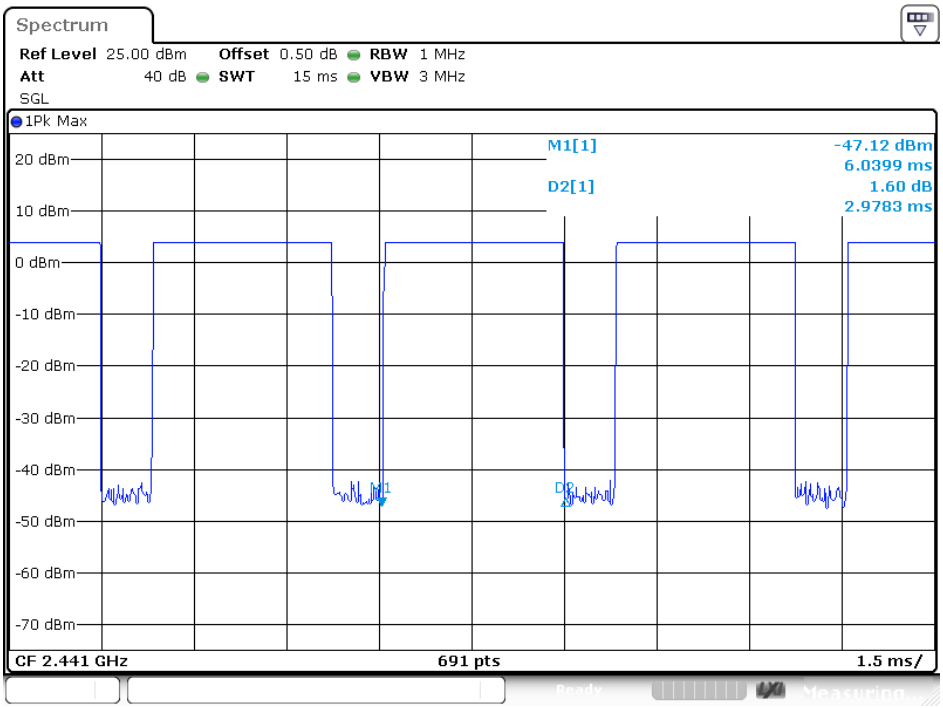
DH3 High channel



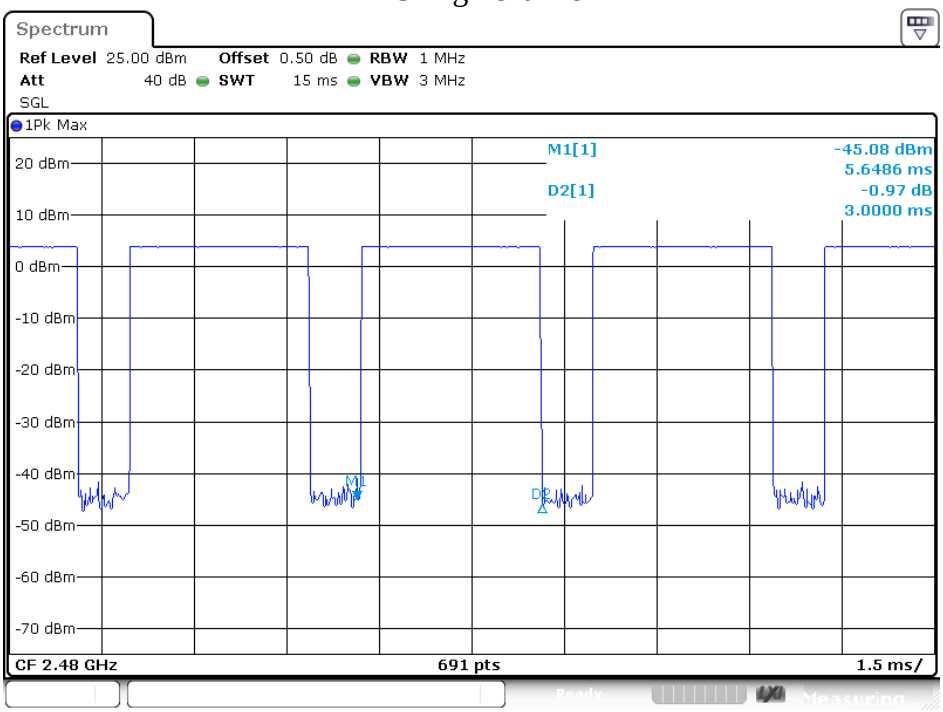
DH5 Low channel



DH5 Middle channel

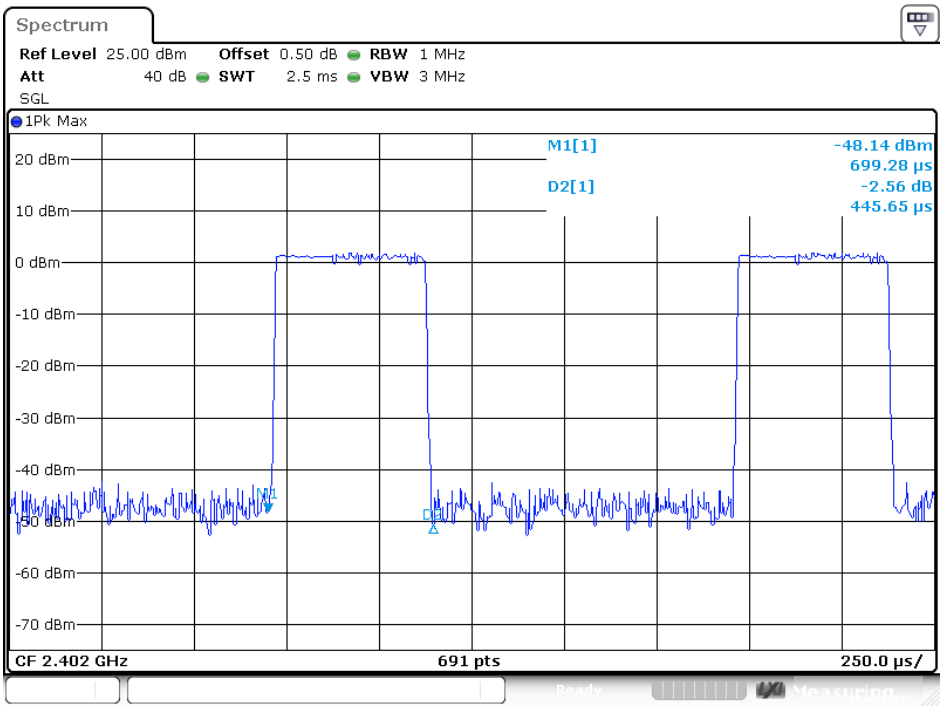


DH5 High channel

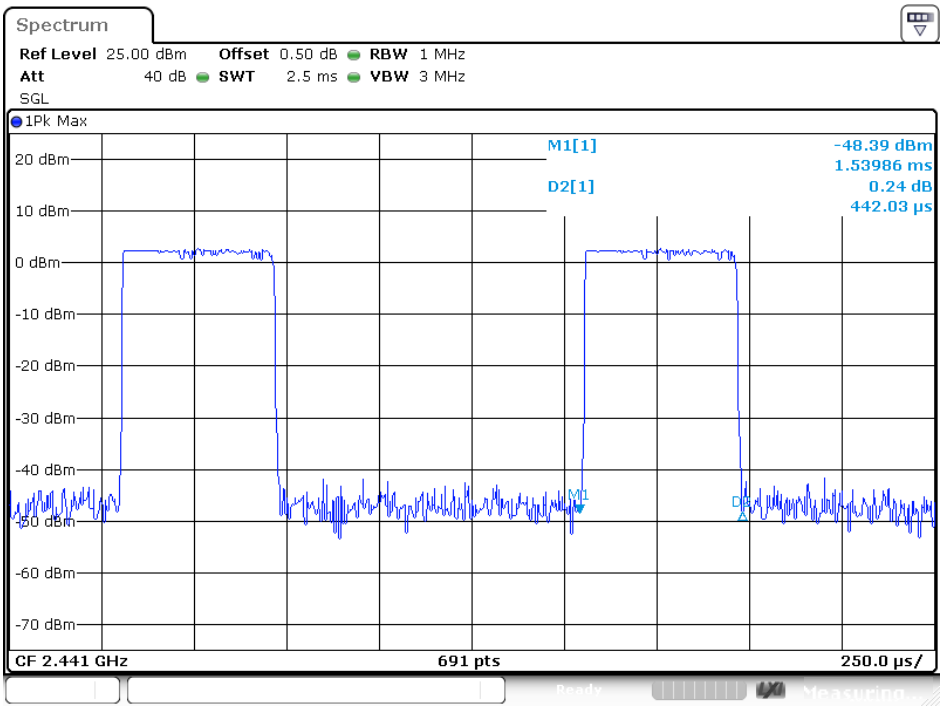


Π/4-DQPSK

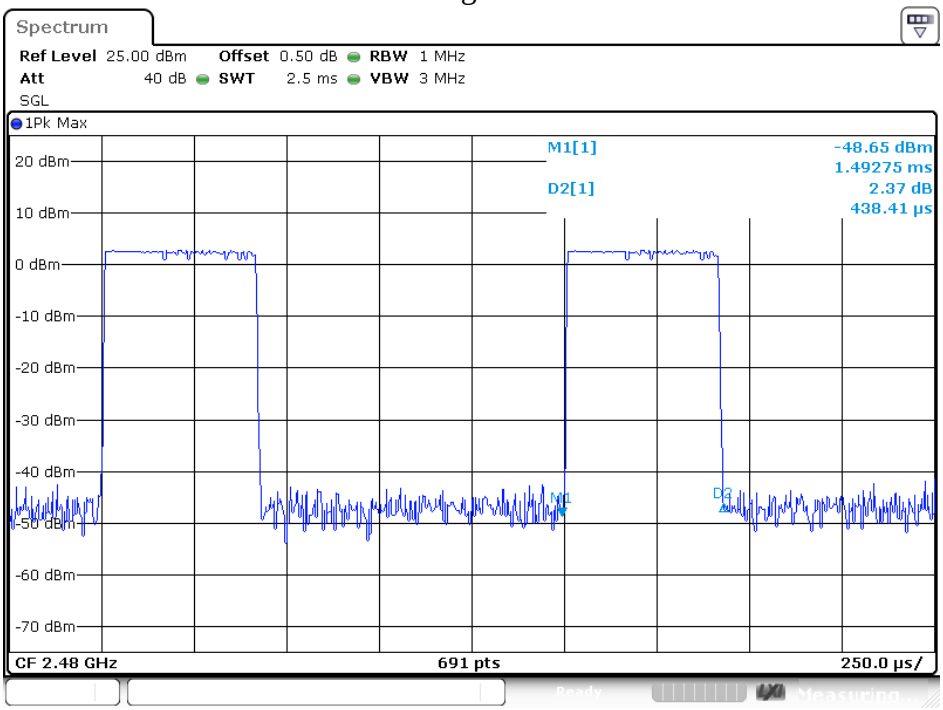
2DH1 Low channel



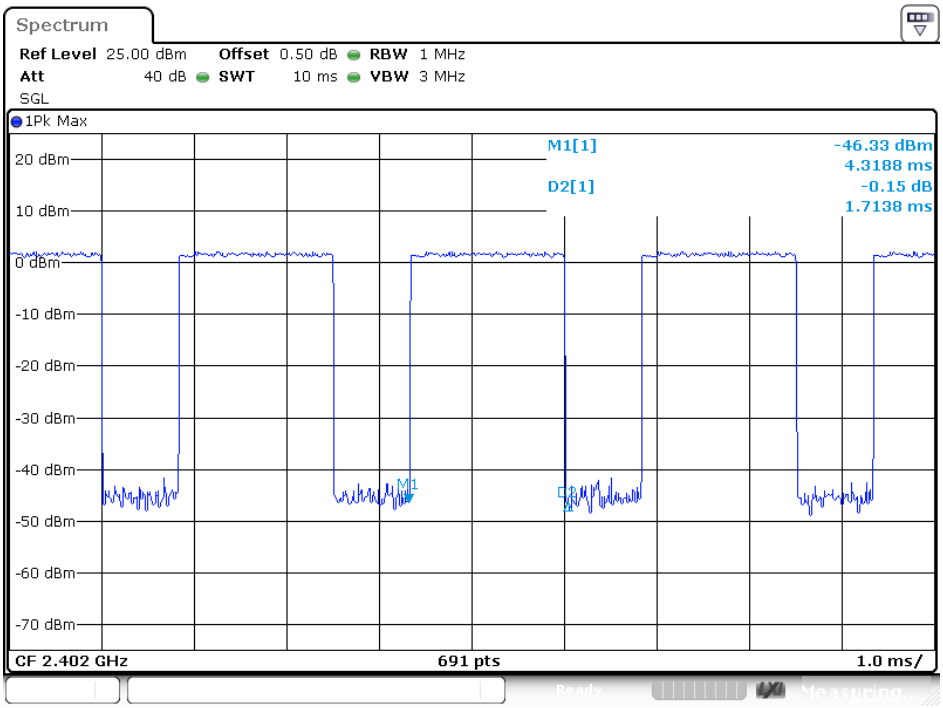
2DH1 Middle channel



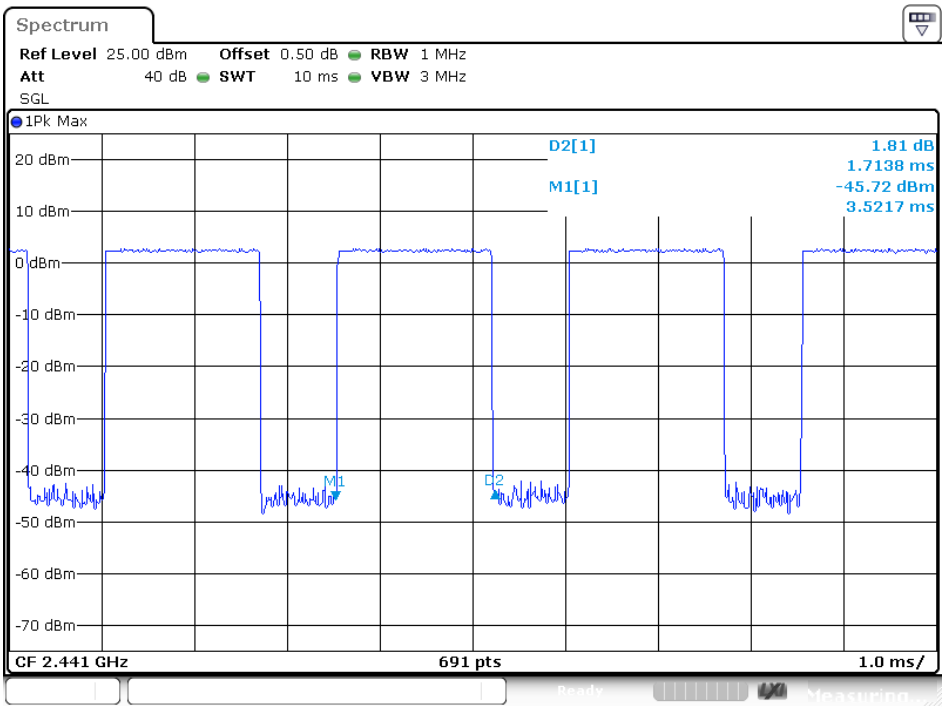
2DH1 High channel



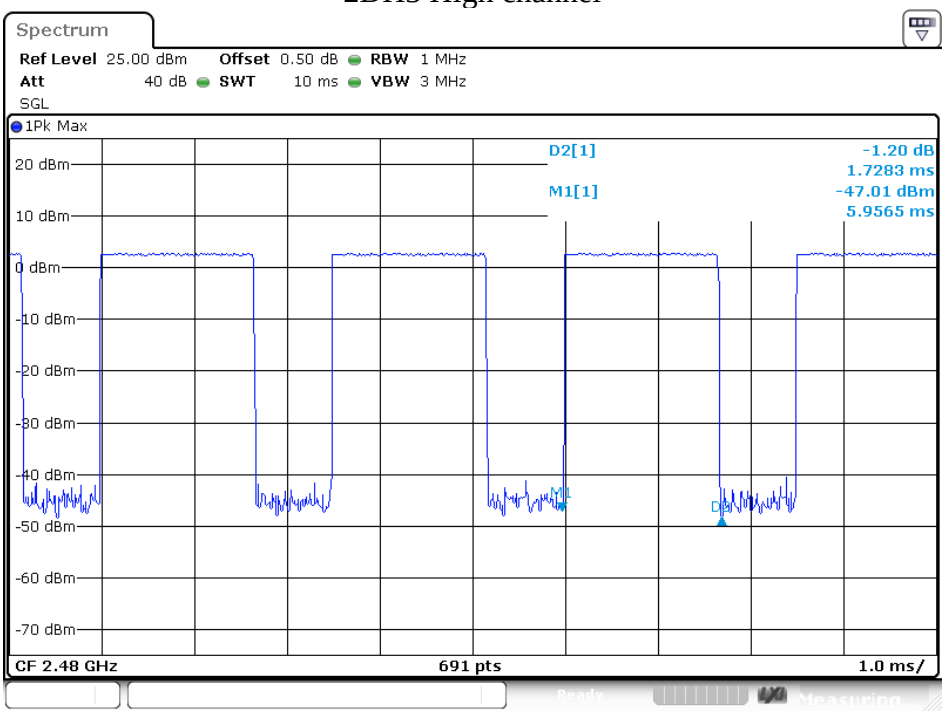
2DH3 Low channel



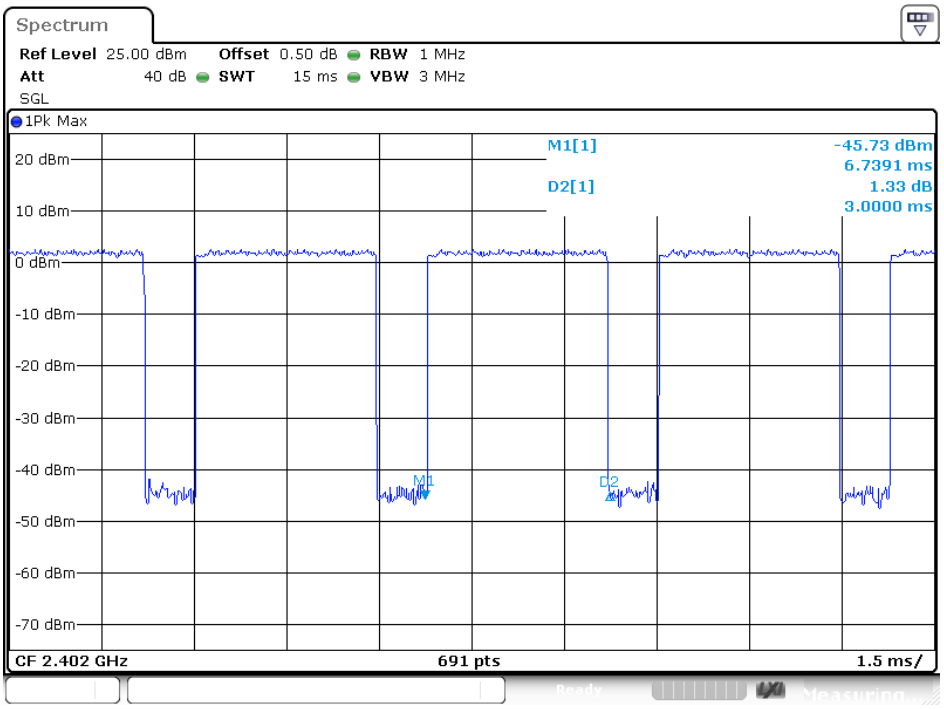
2DH3 Middle channel



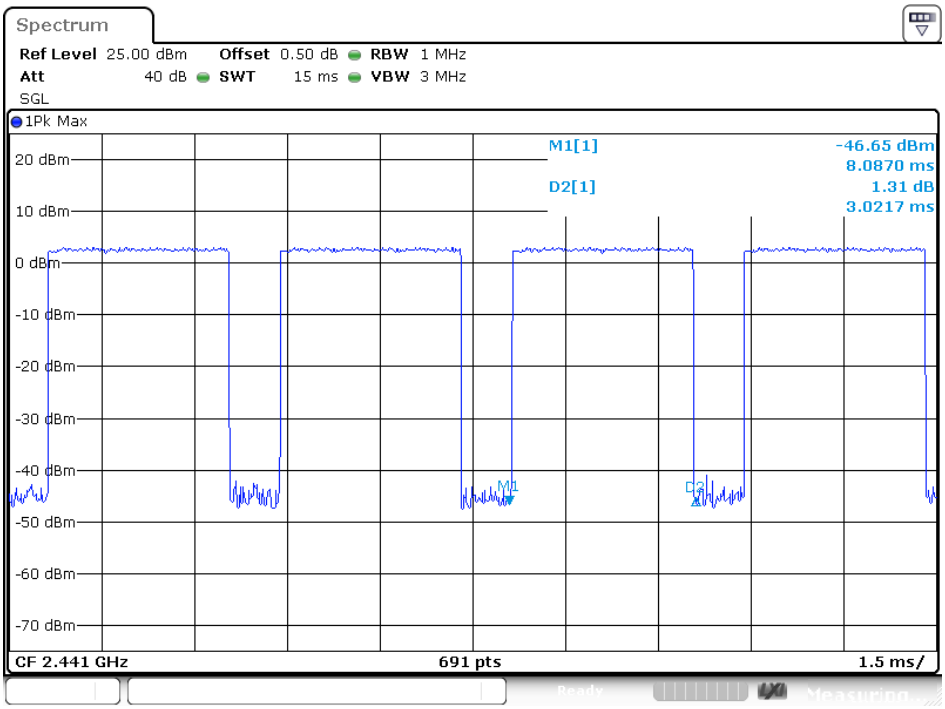
2DH3 High channel



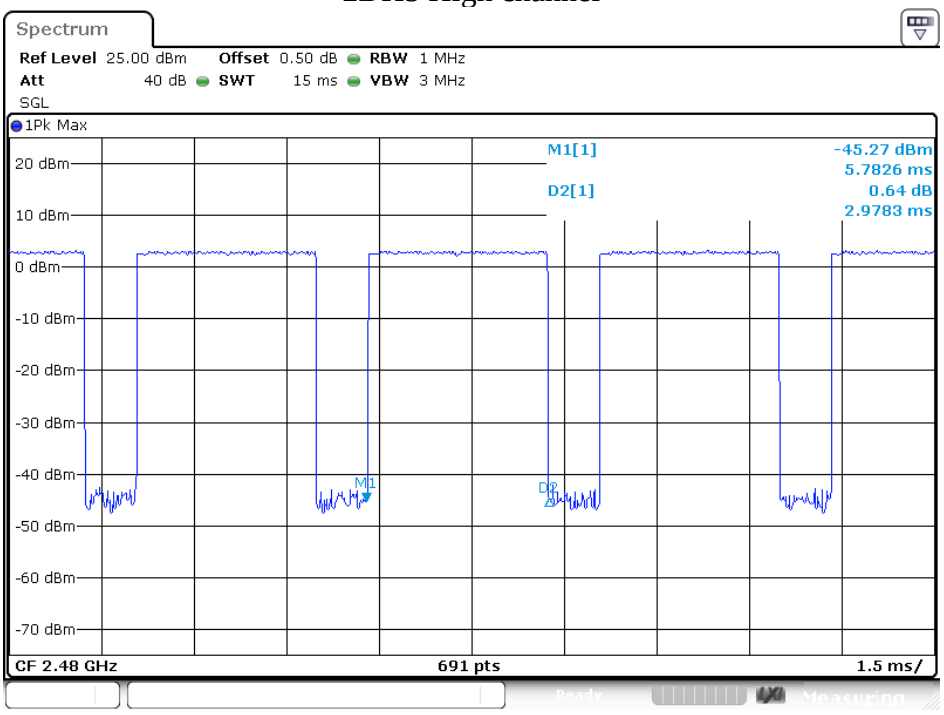
2DH5 Low channel



2DH5 Middle channel

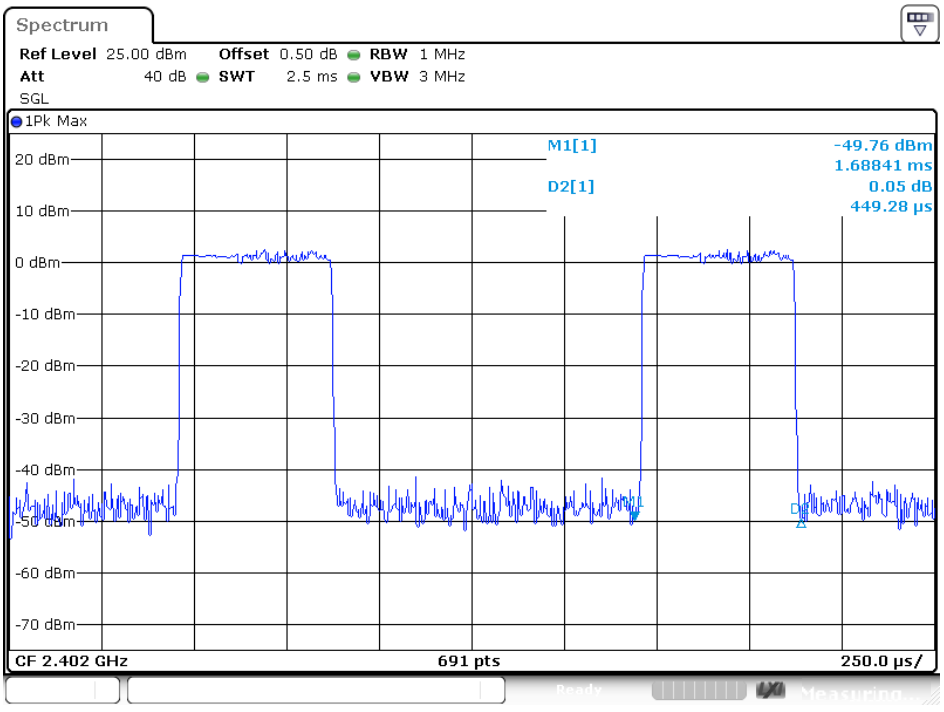


2DH5 High channel

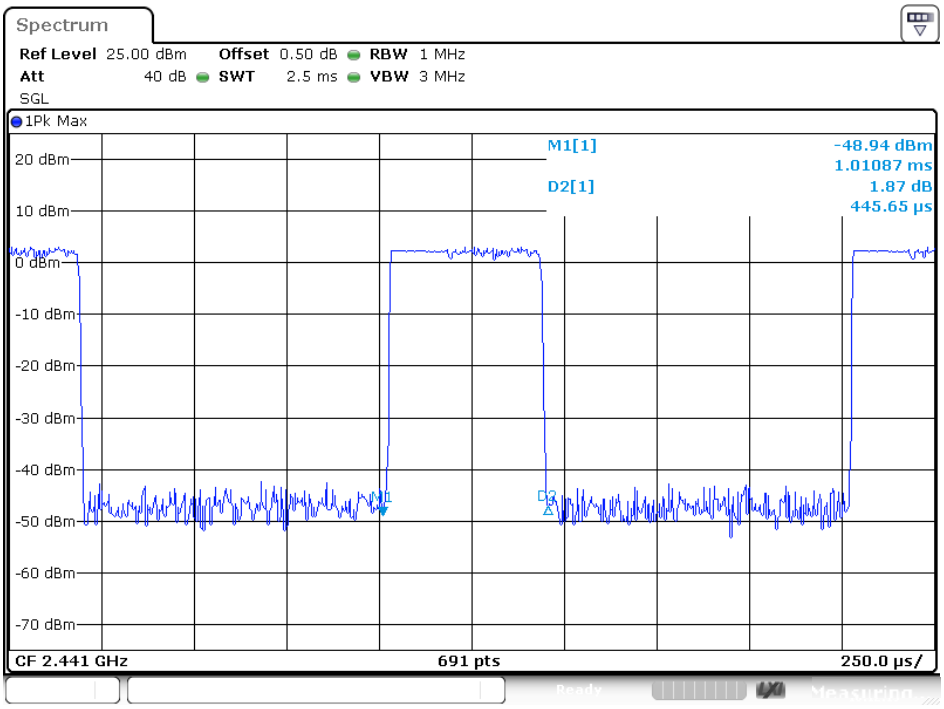


8DPSK Mode

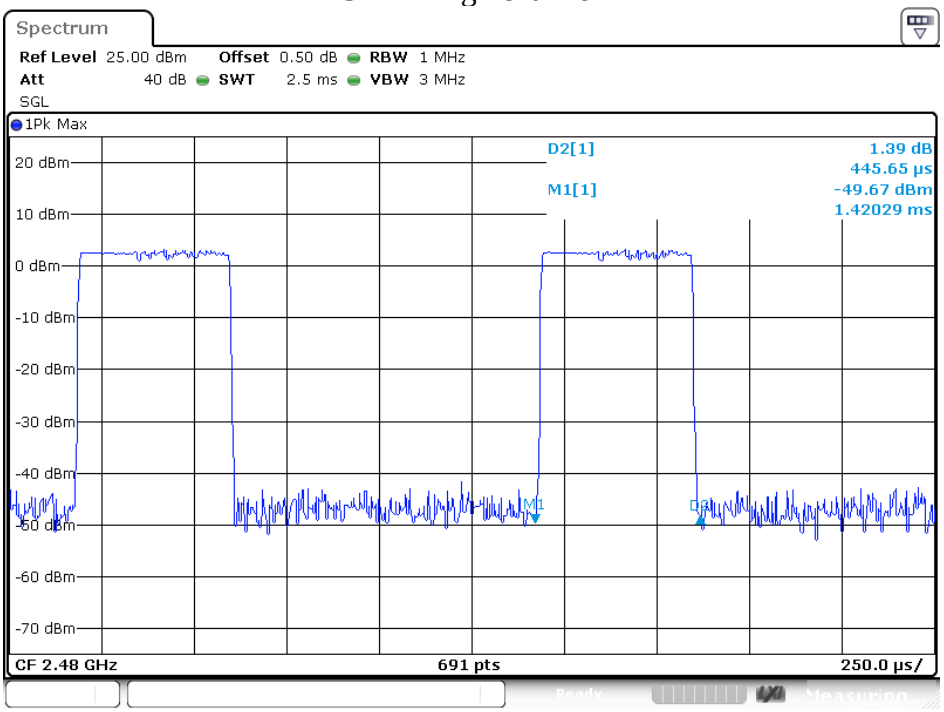
3DH1 Low channel



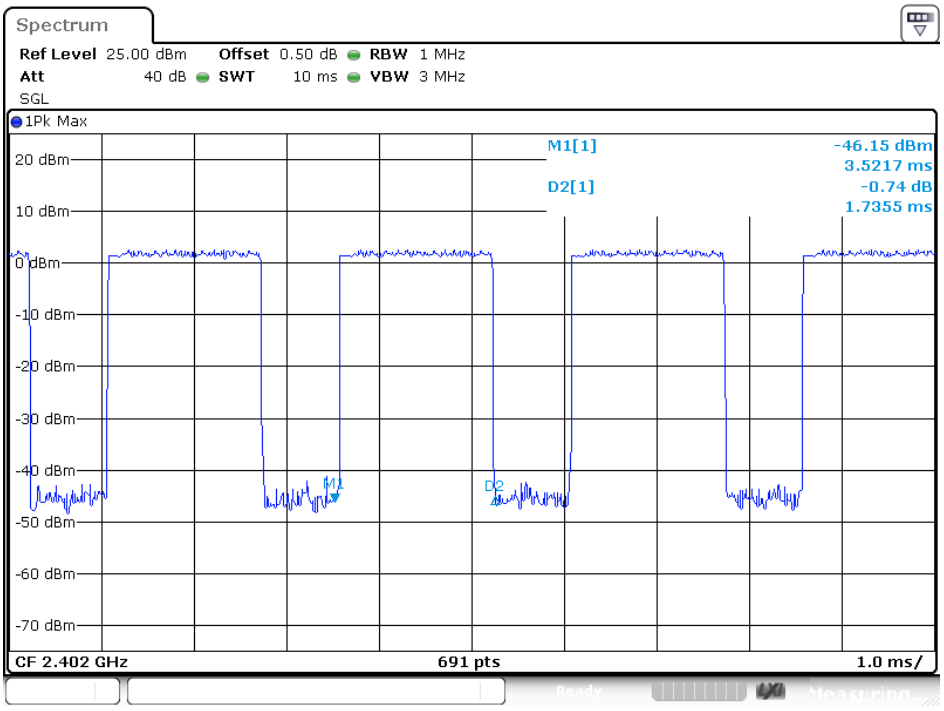
3DH1 Middle channel



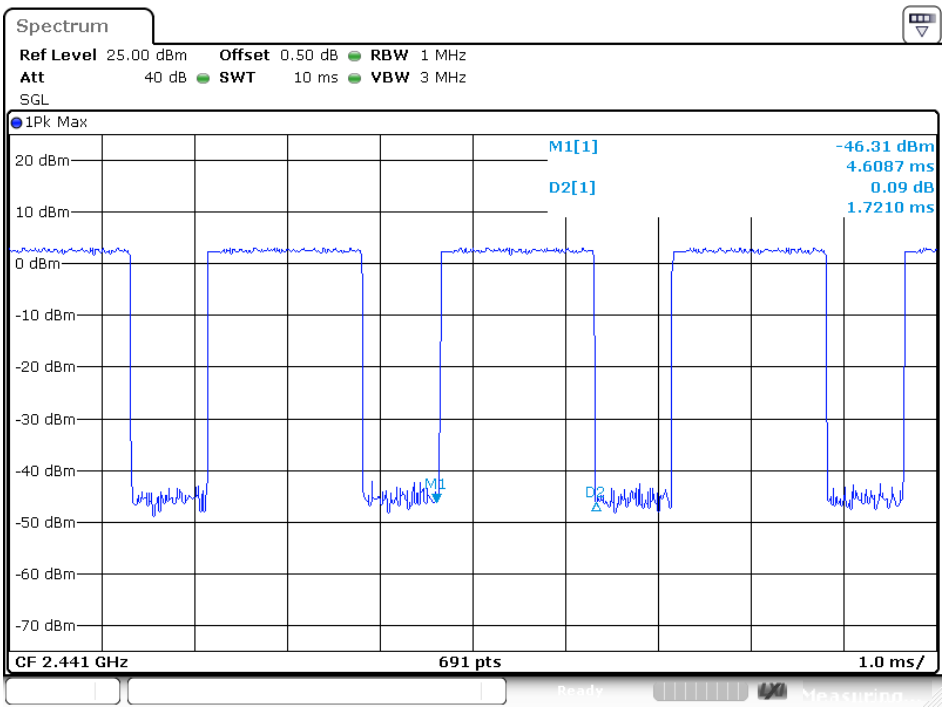
3DH1 High channel



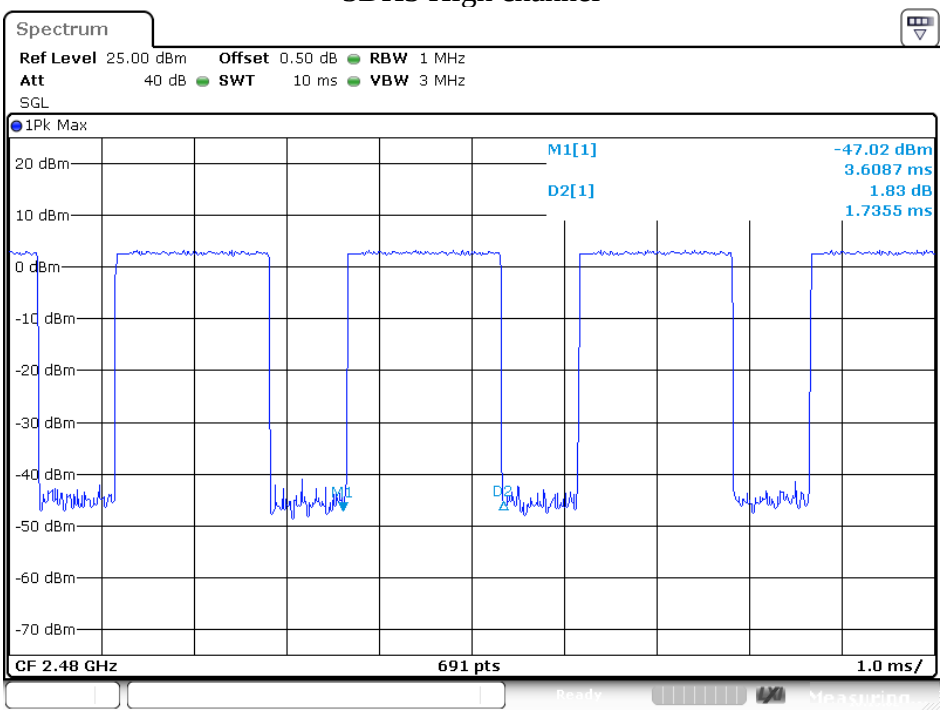
3DH3 Low channel



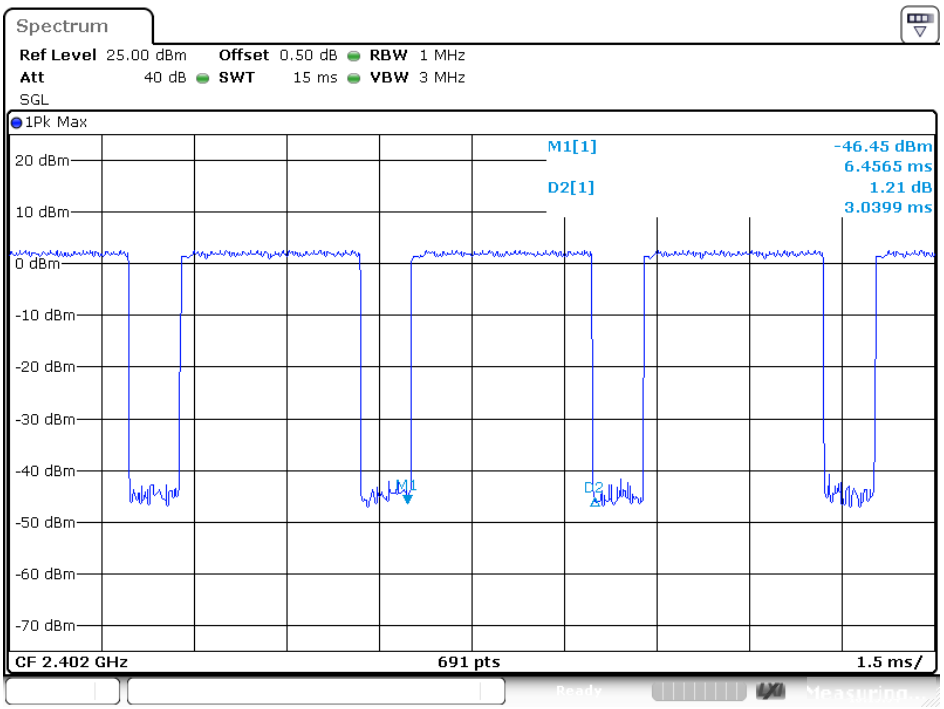
3DH3 Middle channel



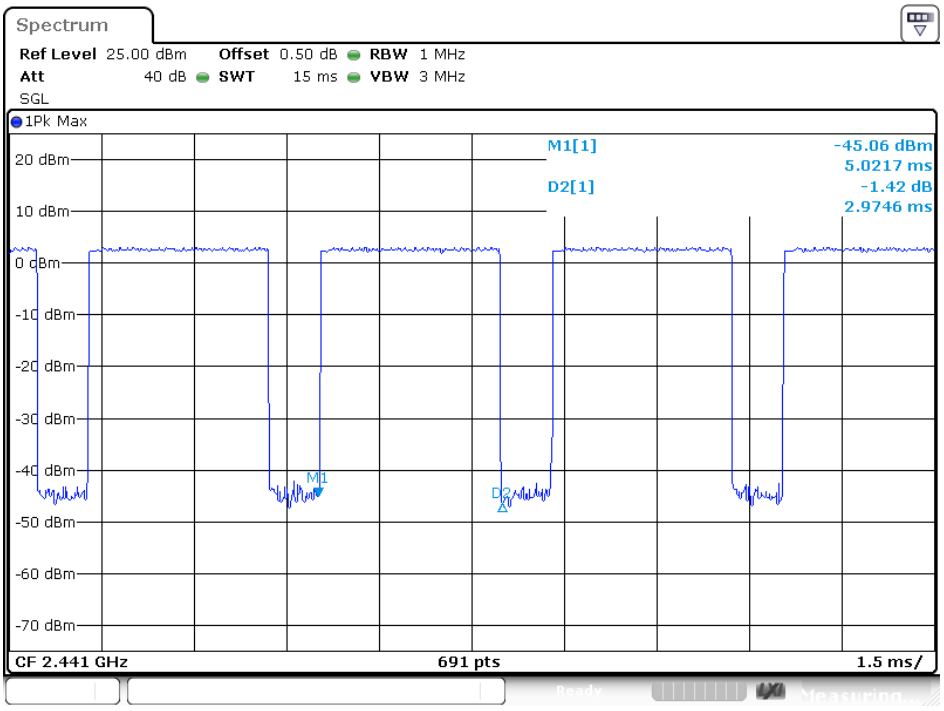
3DH3 High channel



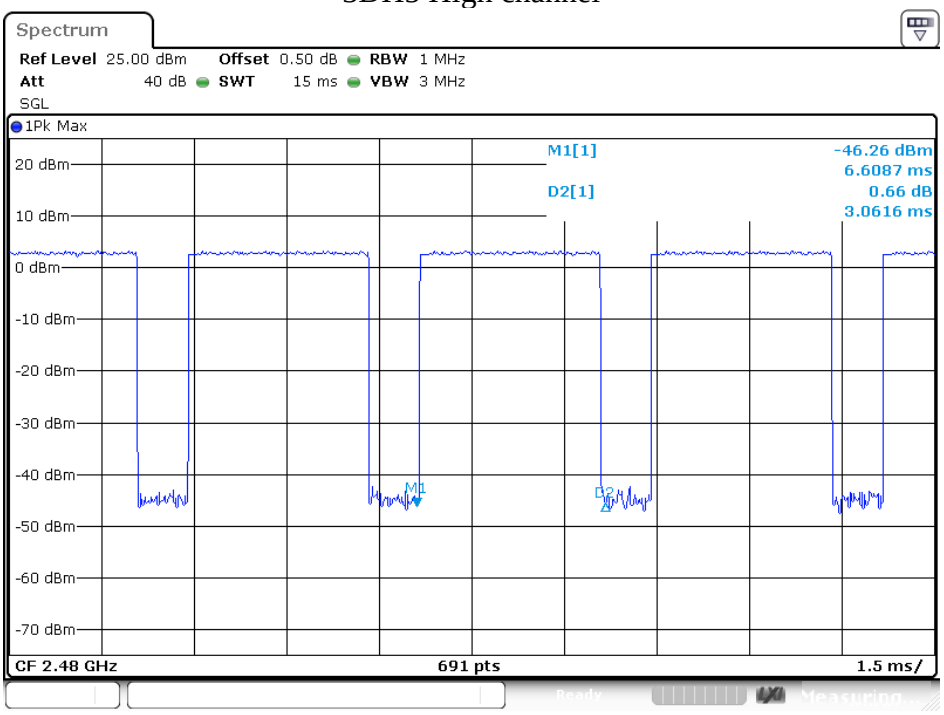
3DH5 Low channel



3DH5 Middle channel

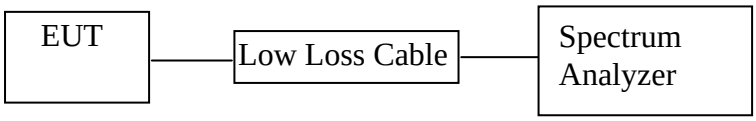


3DH5 High channel



9. MAXIMUM PEAK OUTPUT POWER TEST

9.1.Block Diagram of Test Setup



(EUT: Massage Chair)

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

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 Measurement

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

9.5.3.Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz for other mode

9.5.4.Measurement the maximum peak output power.

9.6.Test Result

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	4.28/0.0027	30 / 1.0
Middle	2441	4.24/0.0027	30 / 1.0
High	2480	4.10/0.0026	30 / 1.0

∏/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	3.36/0.0022	21 / 0.125
Middle	2441	3.78/0.0024	21 / 0.125
High	2480	4.06/0.0025	21 / 0.125

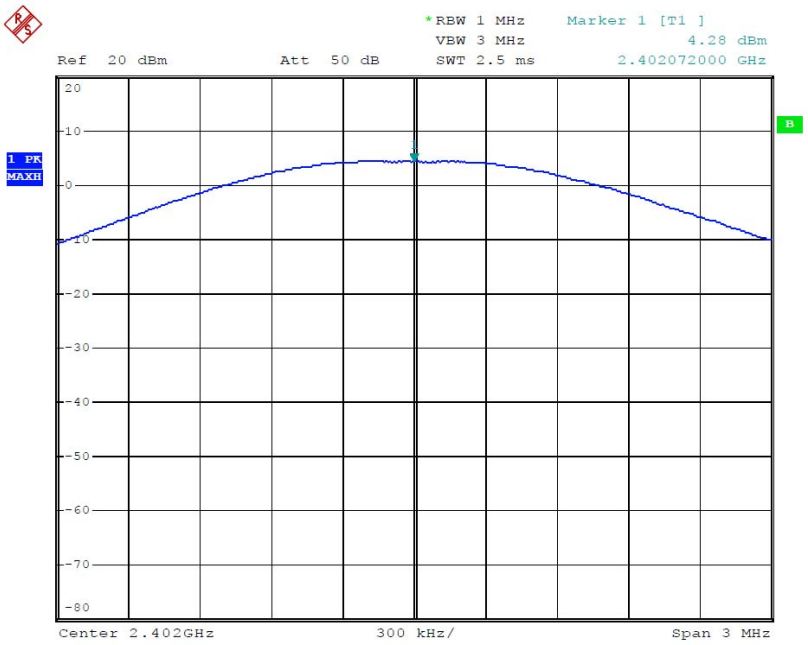
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	3.78/0.0024	21 / 0.125
Middle	2441	3.94/0.0025	21 / 0.125
High	2480	4.15/0.0026	21 / 0.125

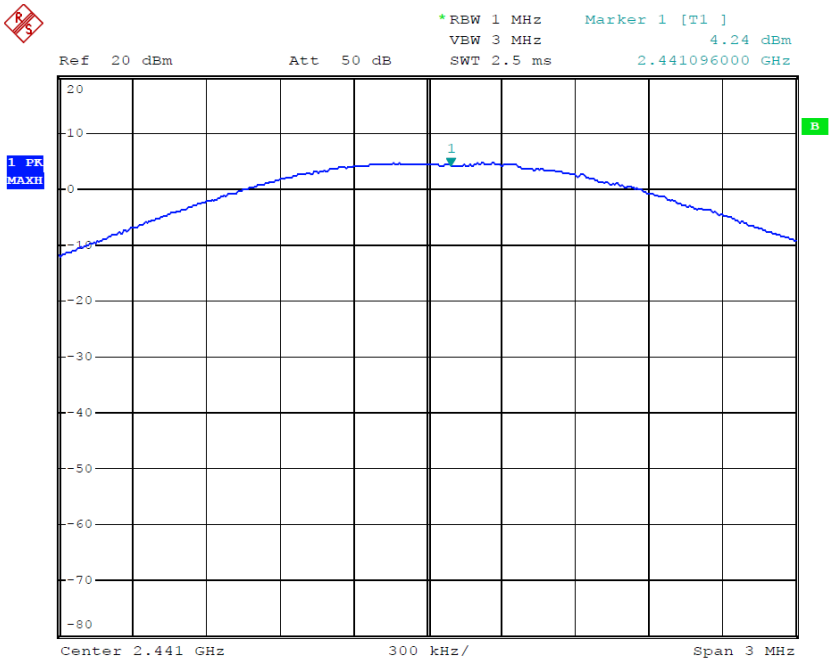
The spectrum analyzer plots are attached as below.

GFSK Mode

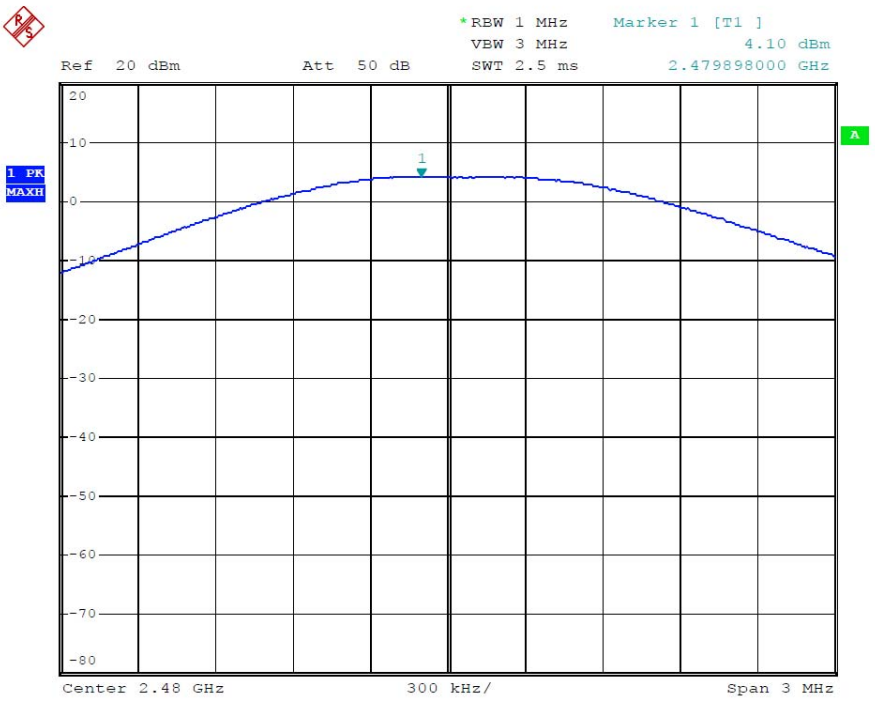
Low channel



Middle channel

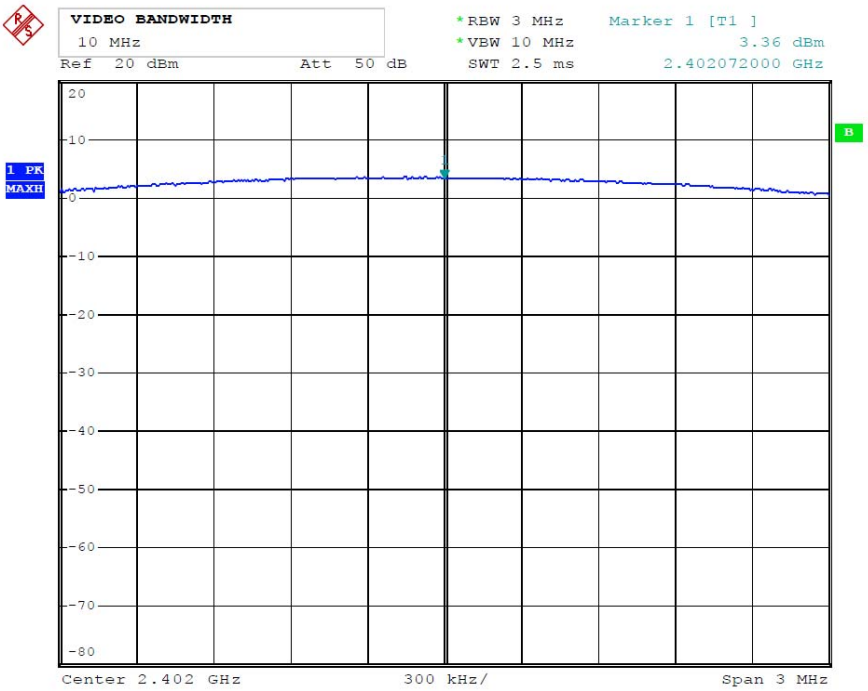


High channel

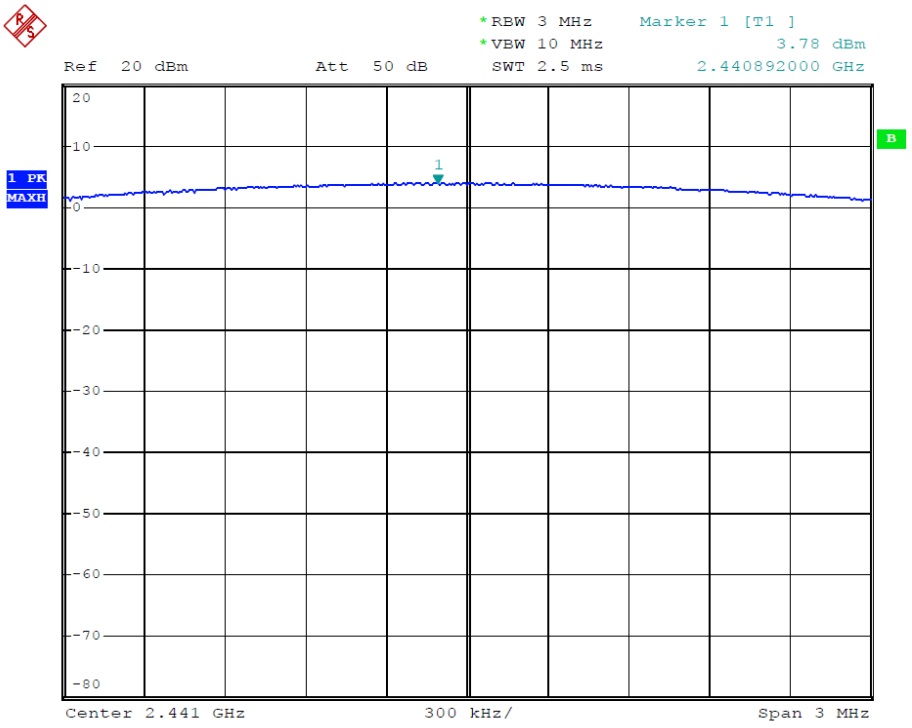


Π/4-DQPSK Mode

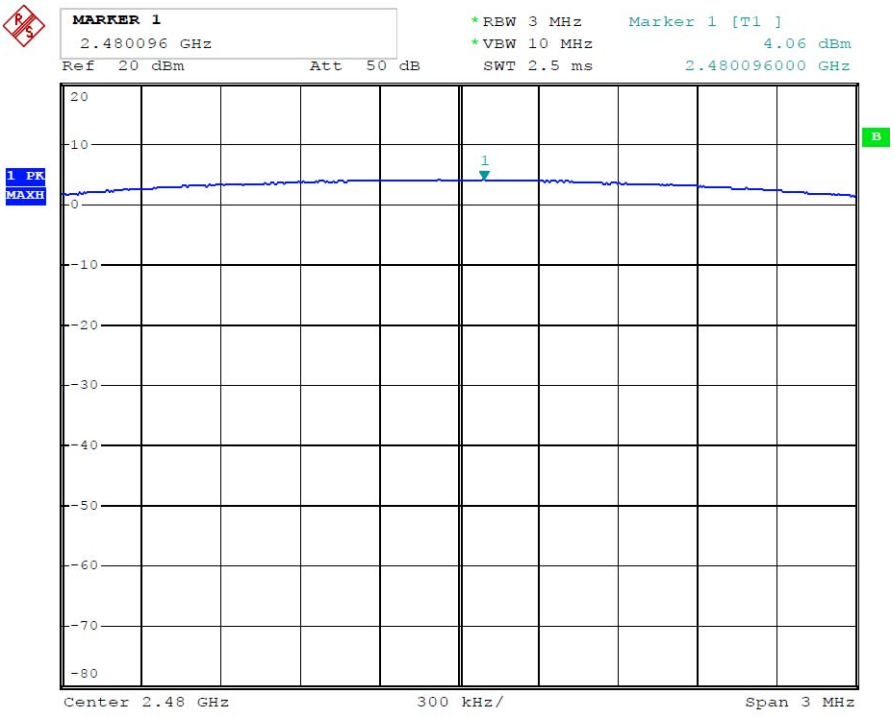
Low channel



Middle channel

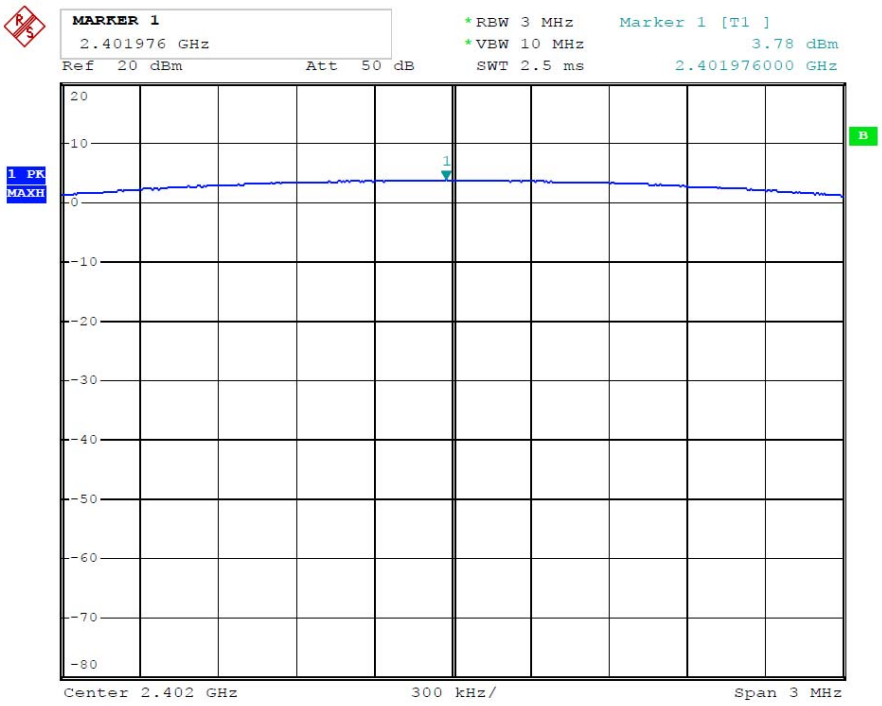


High channel

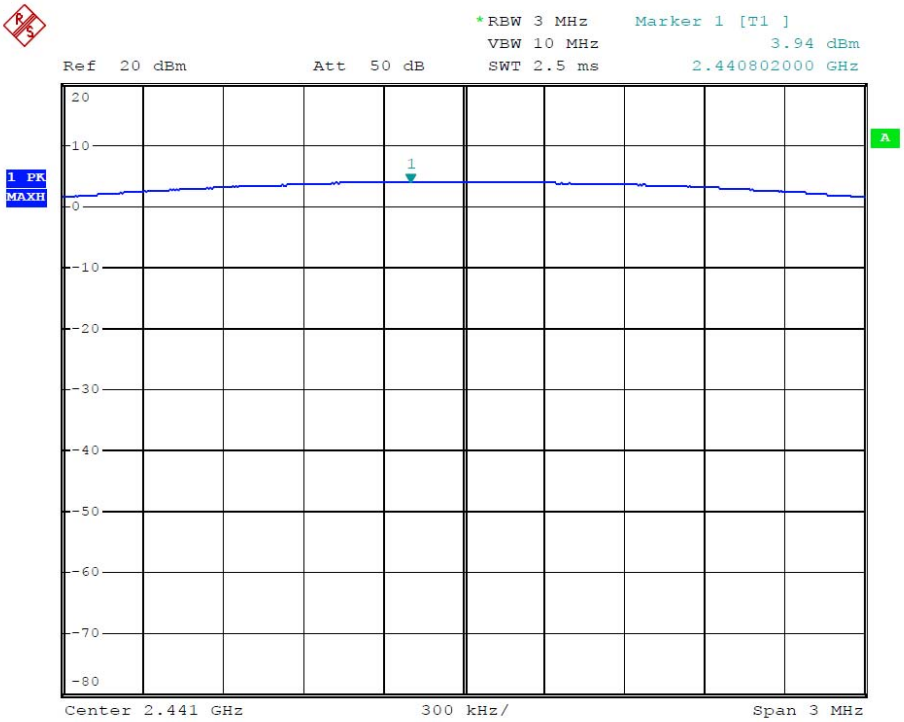


8DPSK Mode

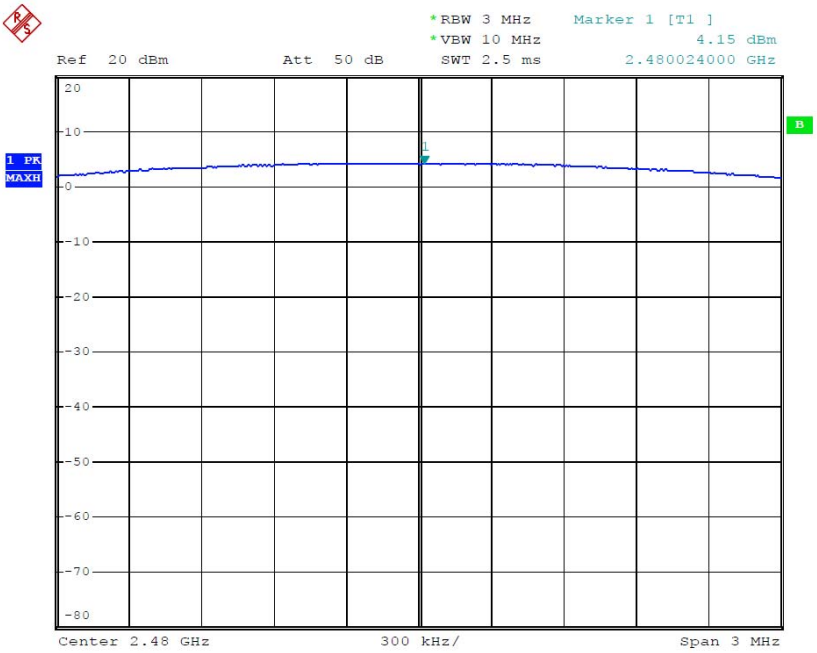
Low channel



Middle channel



High channel



10.RADIATED EMISSION TEST

10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

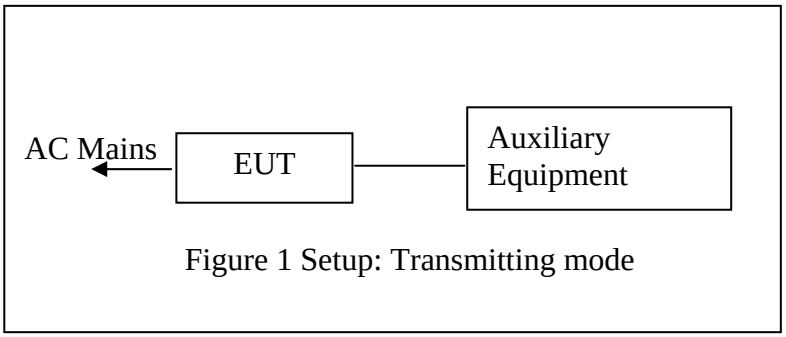
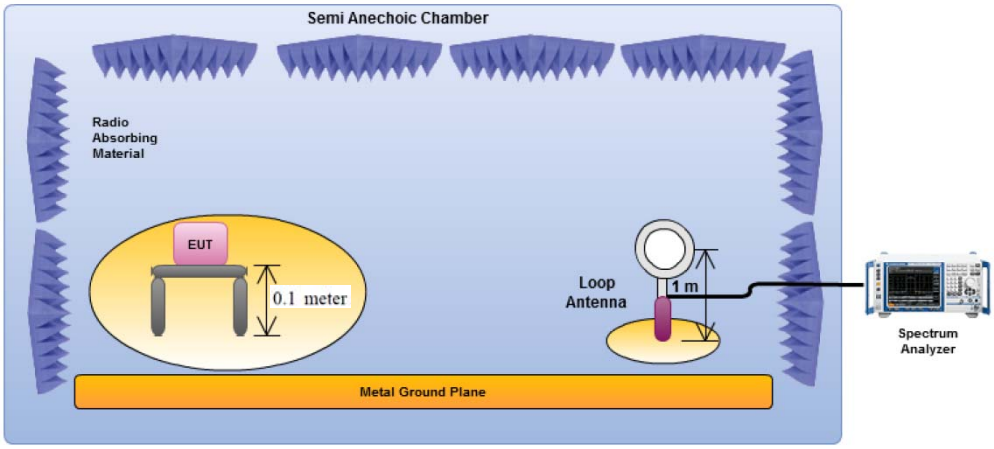


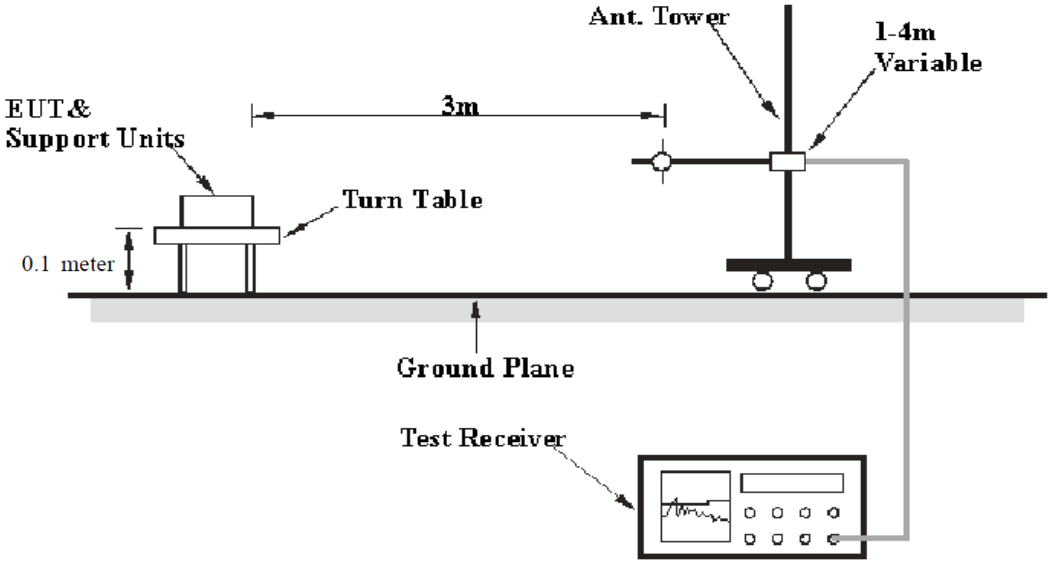
Figure 1 Setup: Transmitting mode

10.1.2.Semi-Anechoic Chamber Test Setup Diagram

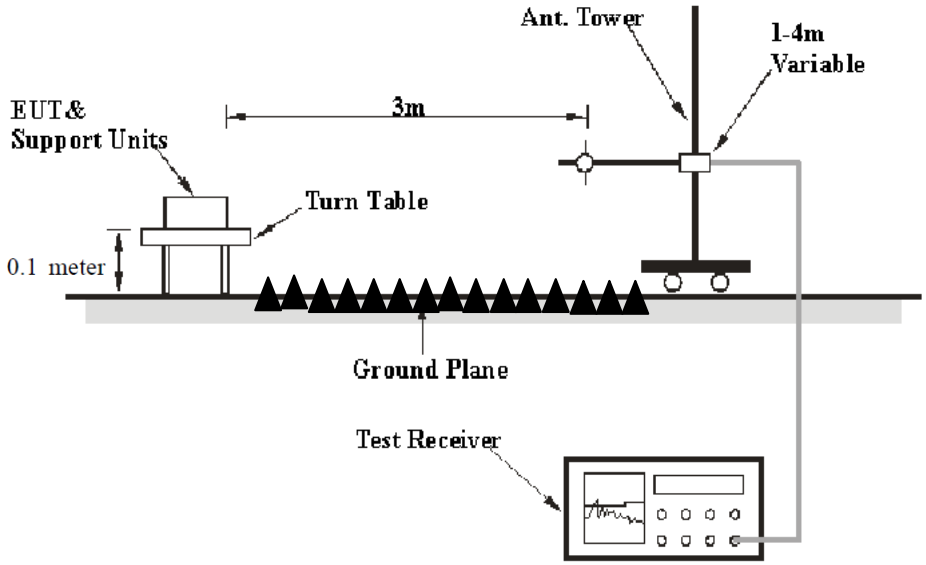
Below 30MHz



Below 1GHz:



Above 1GHz:



10.2.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).

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			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]Above 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.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.

10.5.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 1.5 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. The EUT was tested in 3 orthogonal planes.

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.

10.6.Data Sample

Frequency(MHz)	Reading (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
xx.xxxx	29.46	-12.53	16.93	40.00	-23.07	QP

Frequency(MHz) = Emission frequency in MHz
Reading(dBμv) = Uncorrected Analyzer/Receiver reading
Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain
Result(dBμv/m) = Reading(dBμv) + Factor(dB/m)
Limit (dBμv/m) = Limit stated in standard
Margin (dB) = Result(dBμv/m) - Limit (dBμv/m)
QP = Quasi-peak Reading

Calculation Formula:
Margin(dB) = Result (dBμV/m)–Limit(dBμV/m)
Result(dBμV/m)= Reading(dBμV)+ 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.

10.7.The Field Strength of Radiation Emission Measurement Results

PASS.

Note:

1. We tested GFSK mode, Π/4-DQPSK Mode & 8DPSK mode and recorded the worst case data (GFSK mode) for all test mode.

2. Emissions attenuated more than 20 dB below the permissible value are not reported.

3. *: Denotes restricted band of operation.

4. The radiation emissions from 9kHz-30MHz and 18-26.5GHz are not reported, because the test values lower than the limits of 20dB.

Adapter 1 test data: Below 1GHz

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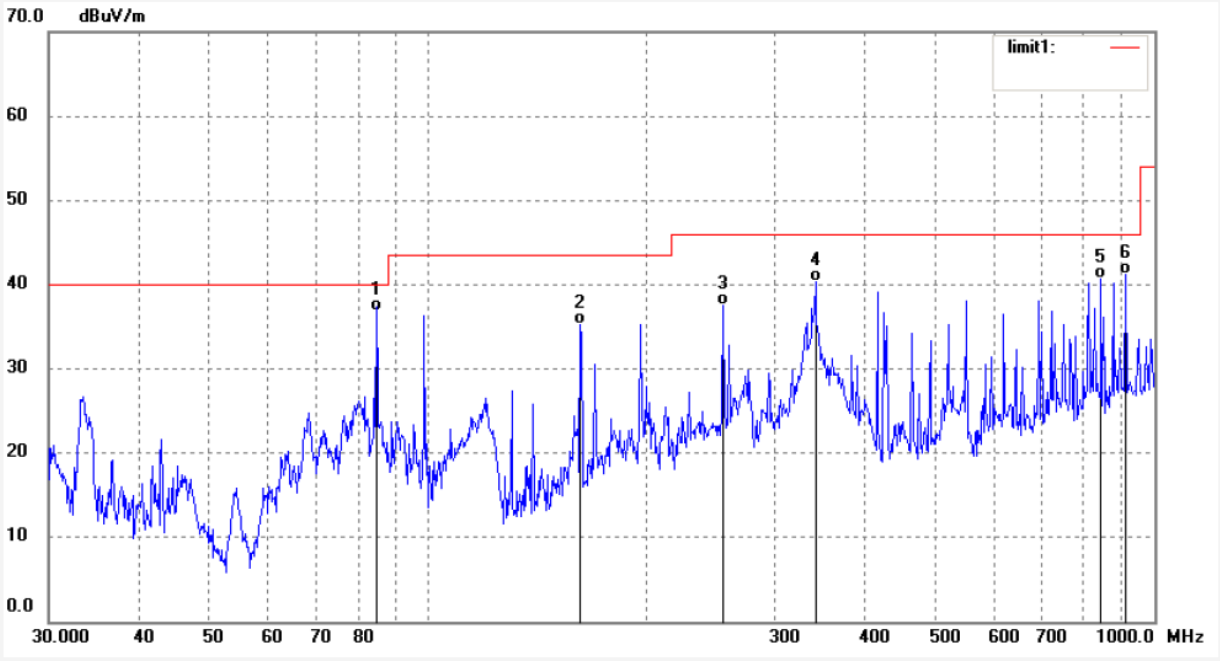
Job No.: frank2018 #204	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 18/03/16/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17/33/47
EUT: Massage Chair	Engineer Signature: Frank
Mode: TX 2402MHz	Distance: 3m
Model: EC-528H	
Manufacturer: MARUTAKATECHNO CO., LTD	

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	84.8782	64.27	-27.45	36.82	40.00	-3.18	QP	200	360	
2	162.0197	62.18	-26.86	35.32	43.50	-8.18	QP	200	144	
3	254.9251	60.89	-23.35	37.54	46.00	-8.46	QP	200	276	
4	341.2441	59.96	-19.69	40.27	46.00	-5.73	QP	200	124	
5	844.8028	48.87	-8.13	40.74	46.00	-5.26	QP	200	348	
6	912.6951	48.17	-6.97	41.20	46.00	-4.80	QP	200	247	

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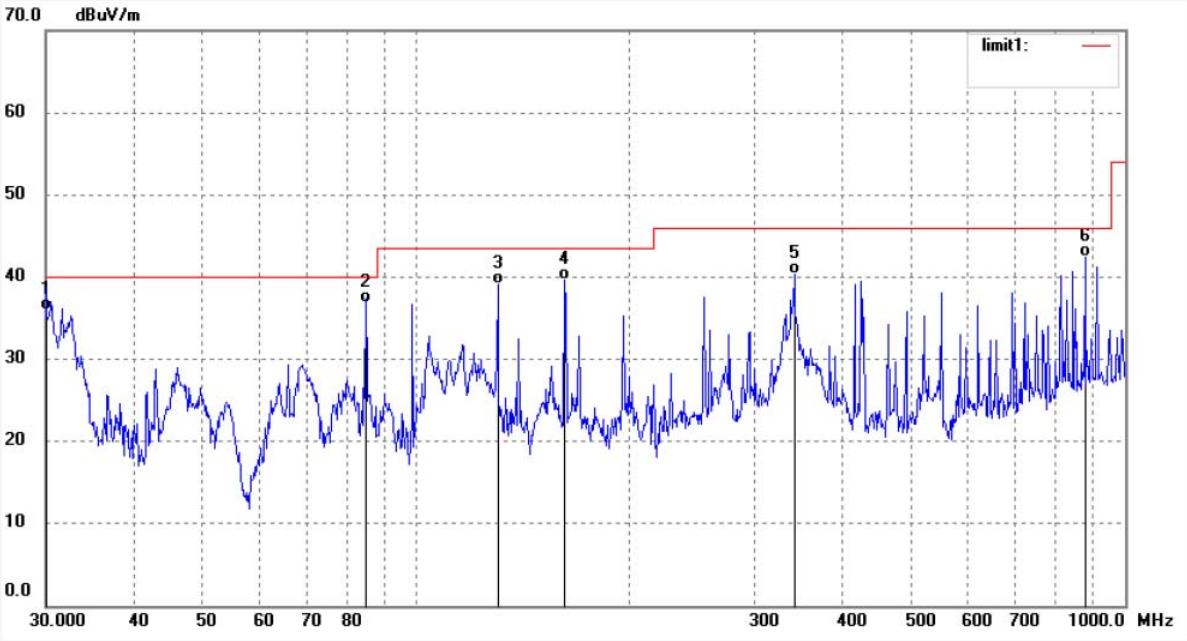
Job No.: frank2018 #205
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX 2402MHz
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 18/03/16/
Time: 17/34/19
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	30.0000	56.15	-20.20	35.95	40.00	-4.05	QP	100	112	
2	84.8782	64.27	-27.45	36.82	40.00	-3.18	QP	100	124	
3	130.3048	66.86	-27.72	39.14	43.50	-4.36	QP	100	235	
4	162.0197	66.57	-26.86	39.71	43.50	-3.79	QP	100	279	
5	341.2441	59.96	-19.69	40.27	46.00	-5.73	QP	100	360	
6	878.0931	49.94	-7.56	42.38	46.00	-3.62	QP	100	193	

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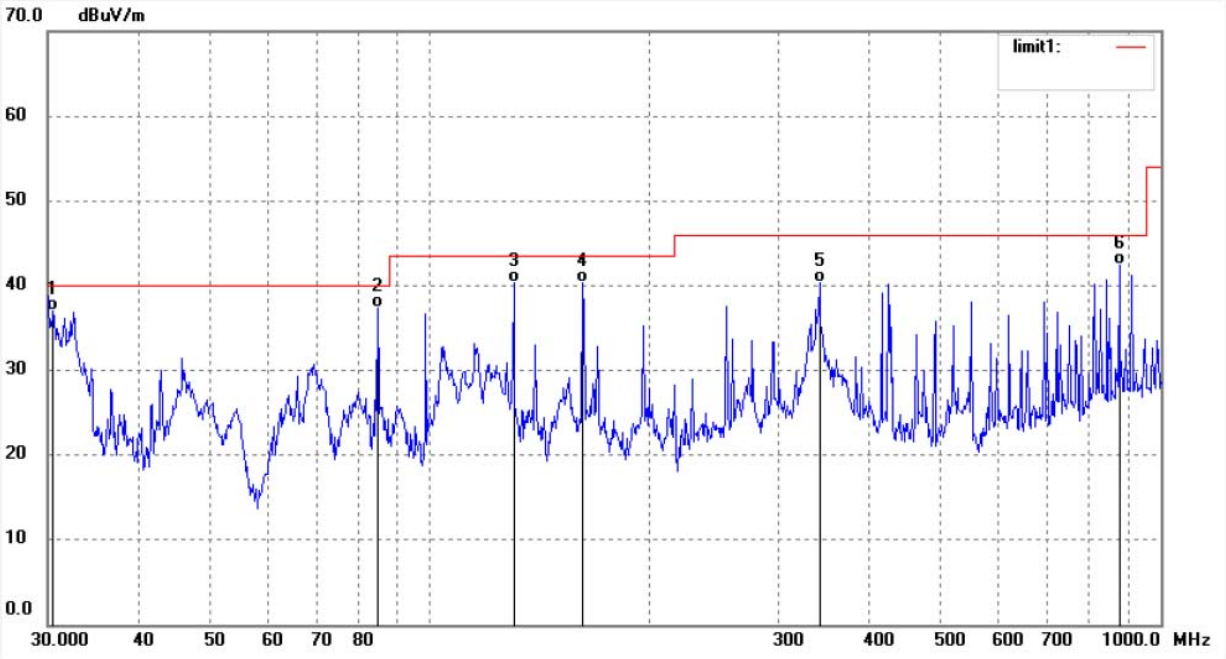
Job No.: frank2018 #206
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX 2441MHz
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 18/03/16/
Time: 17/35/17
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	30.5317	57.38	-20.33	37.05	40.00	-2.95	QP	100	267	
2	84.8782	64.77	-27.45	37.32	40.00	-2.68	QP	100	352	
3	130.3048	68.10	-27.72	40.38	43.50	-3.12	QP	100	246	
4	162.0197	67.15	-26.86	40.29	43.50	-3.21	QP	100	189	
5	341.2441	59.96	-19.69	40.27	46.00	-5.73	QP	100	247	
6	878.0931	49.95	-7.56	42.39	46.00	-3.61	QP	100	103	

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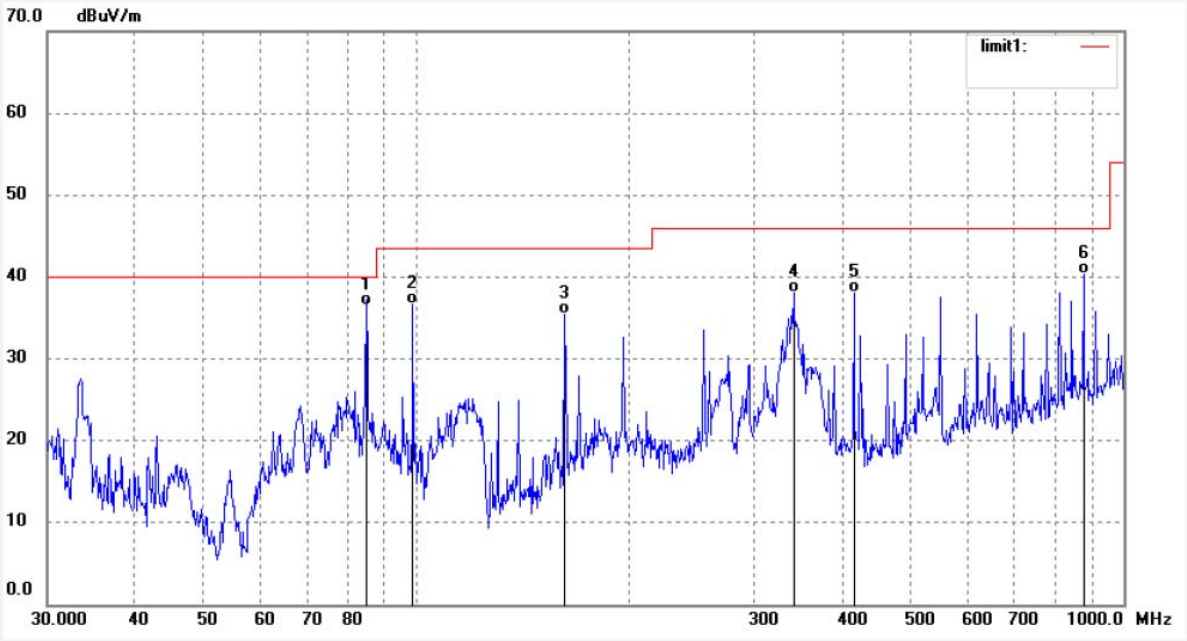
Job No.: frank2018 #207
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX 2441MHz
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 18/03/16/
Time: 17/35/38
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	84.8782	64.01	-27.45	36.56	40.00	-3.44	QP	200	182	
2	98.7215	64.61	-27.88	36.73	43.50	-6.77	QP	200	345	
3	162.0197	62.28	-26.86	35.42	43.50	-8.08	QP	200	240	
4	341.2441	57.74	-19.69	38.05	46.00	-7.95	QP	200	158	
5	415.4485	56.17	-18.05	38.12	46.00	-7.88	QP	200	61	
6	878.0931	47.98	-7.56	40.42	46.00	-5.58	QP	200	324	

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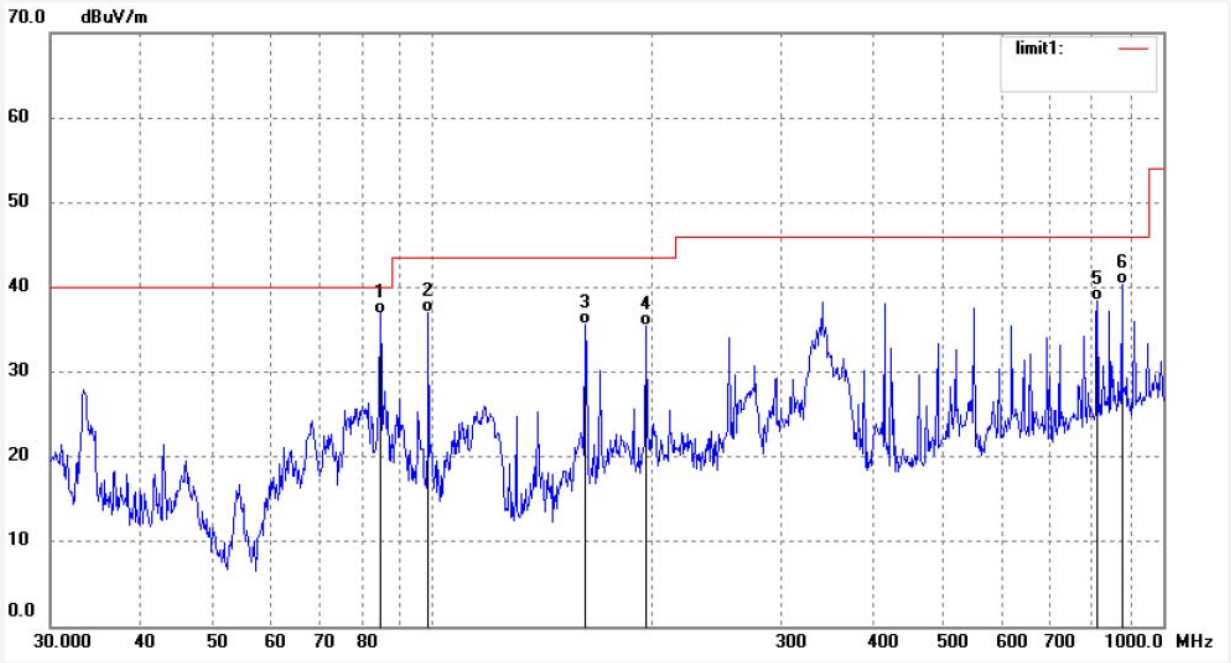
Job No.: frank2018 #208
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX 2480MHz
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 18/03/16/
Time: 17/35/58
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	84.8782	64.21	-27.45	36.76	40.00	-3.24	QP	200	301	
2	98.7215	64.81	-27.88	36.93	43.50	-6.57	QP	200	268	
3	162.0197	62.48	-26.86	35.62	43.50	-7.88	QP	200	261	
4	195.8701	59.98	-24.59	35.39	43.50	-8.11	QP	200	320	
5	812.7744	47.17	-8.71	38.46	46.00	-7.54	QP	200	249	
6	878.0931	47.98	-7.56	40.42	46.00	-5.58	QP	200	155	

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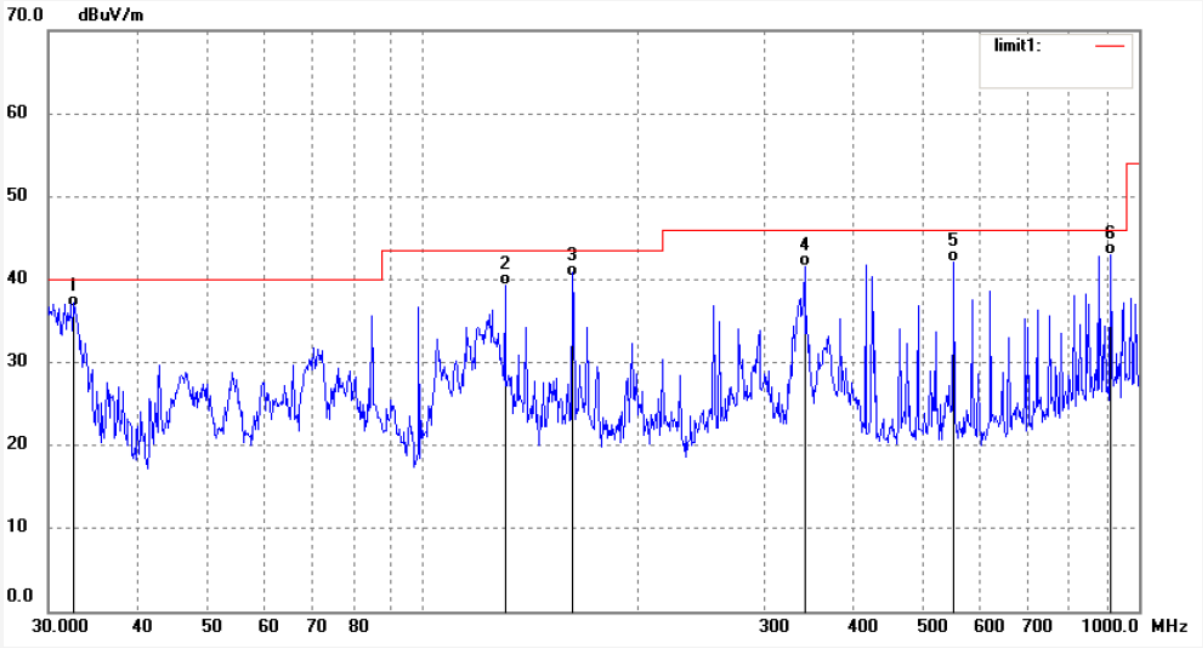
Job No.: frank2018 #209
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX 2480MHz
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 18/03/16/
Time: 17/36/37
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	32.5248	57.51	-20.82	36.69	40.00	-3.31	QP	100	156	
2	130.3048	67.00	-27.72	39.28	43.50	-4.22	QP	100	360	
3	162.0197	67.28	-26.86	40.42	43.50	-3.08	QP	100	248	
4	341.2441	61.17	-19.69	41.48	46.00	-4.52	QP	100	279	
5	552.2269	56.76	-14.75	42.01	46.00	-3.99	QP	100	124	
6	912.6951	49.93	-6.97	42.96	46.00	-3.04	QP	100	235	

Above 1GHz

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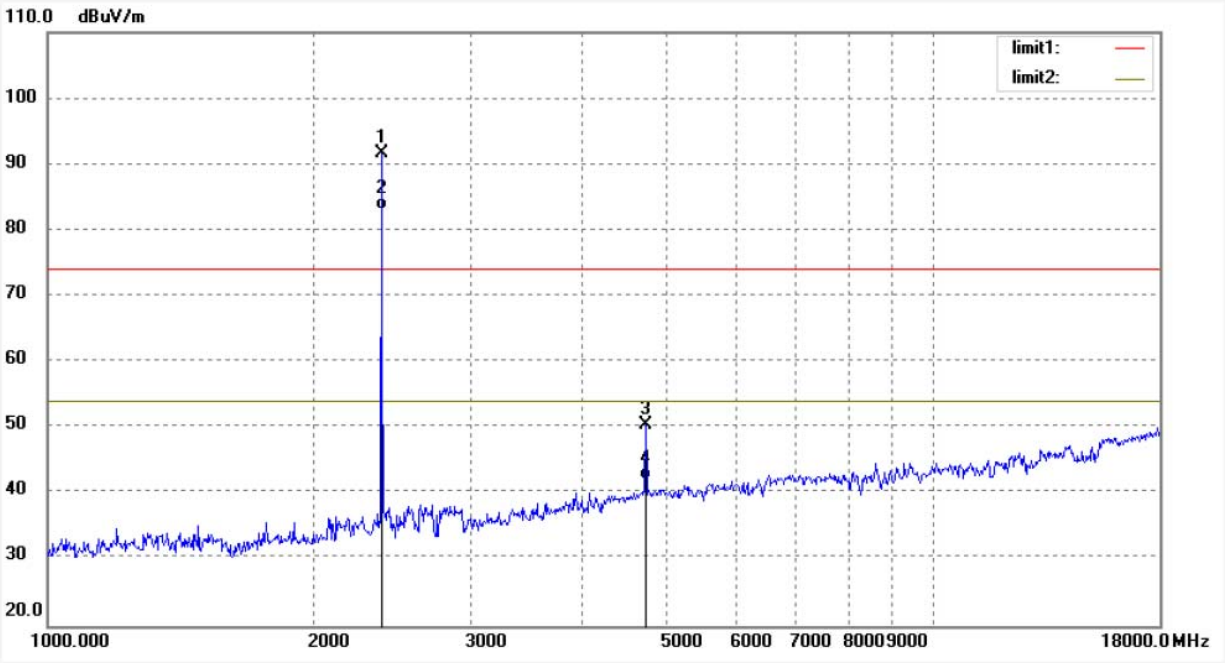
Job No.: frank2018 #210	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 120V; 60Hz
Test item: Radiation Test	Date: 2018/03/29
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 15:08:01
EUT: Massage Chair	Engineer Signature: Frank
Mode: TX2402MHz(GFSK)	Distance: 3m
Model: EC-528H	
Manufacturer: MARUTAKATECHNO CO., LTD	

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	95.93	-4.37	91.56			peak	200	138	
2	2402.000	87.45	-4.37	83.08			AVG	200	152	
3	4804.000	47.78	2.70	50.48	74.00	-23.52	peak	200	214	
4	4804.000	39.42	2.70	42.12	54.00	-11.88	AVG	200	103	

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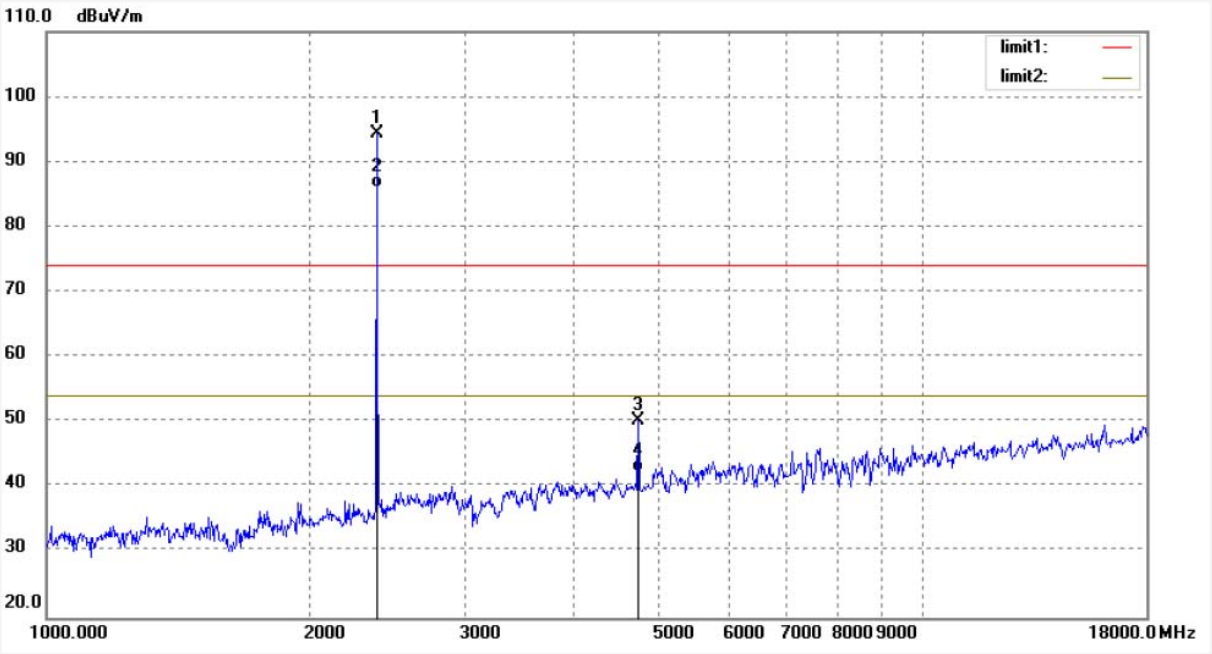
Job No.: frank2018 #211
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX2402MHz(GFSK)
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Vertical
Power Source: AC 120V; 60Hz
Date: 2018/03/29
Time: 15:09:07
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	98.77	-4.37	94.40			peak	250	122	
2	2402.000	90.48	-4.37	86.11			AVG	250	211	
3	4804.000	47.55	2.70	50.25	74.00	-23.75	peak	250	81	
4	4804.000	39.78	2.70	42.48	54.00	-11.52	AVG	250	247	

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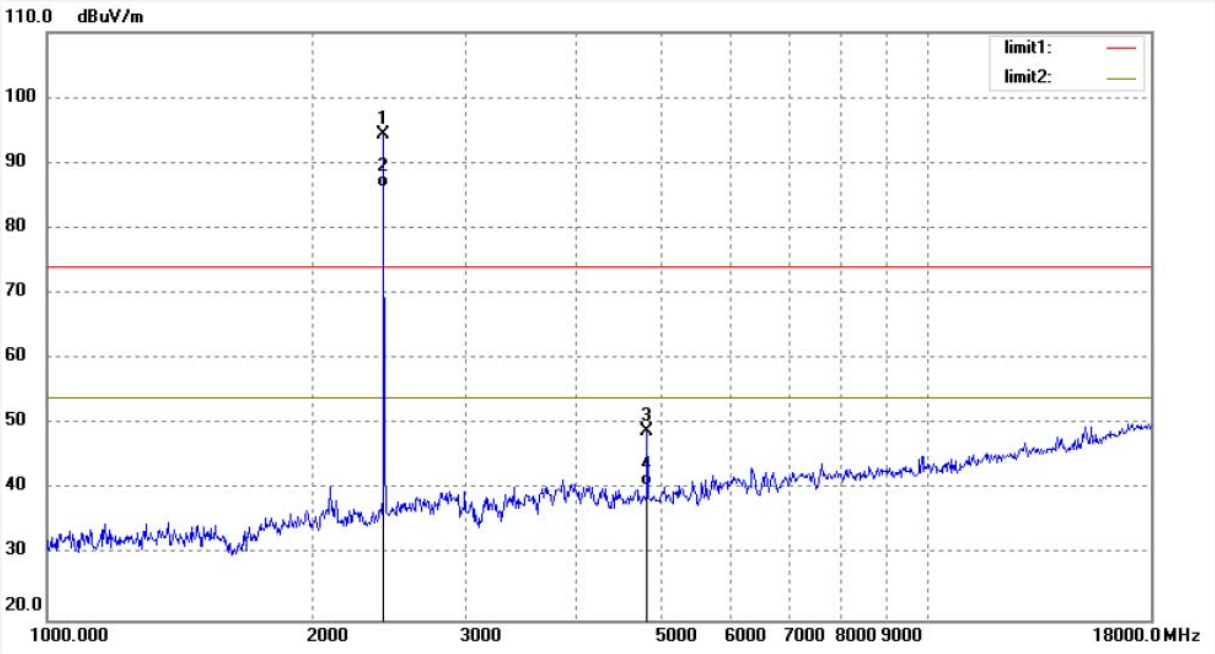
Job No.: frank2018 #212
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX2441MHz(GFSK)
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Vertical
Power Source: AC 120V; 60Hz
Date: 2018/03/29
Time: 15:10:19
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.000	98.62	-4.20	94.42			peak	250	132	
2	2441.000	90.48	-4.20	86.28			AVG	200	222	
3	4882.000	45.81	3.07	48.88	74.00	-25.12	peak	250	94	
4	4882.000	37.48	3.07	40.55	54.00	-13.45	AVG	200	201	

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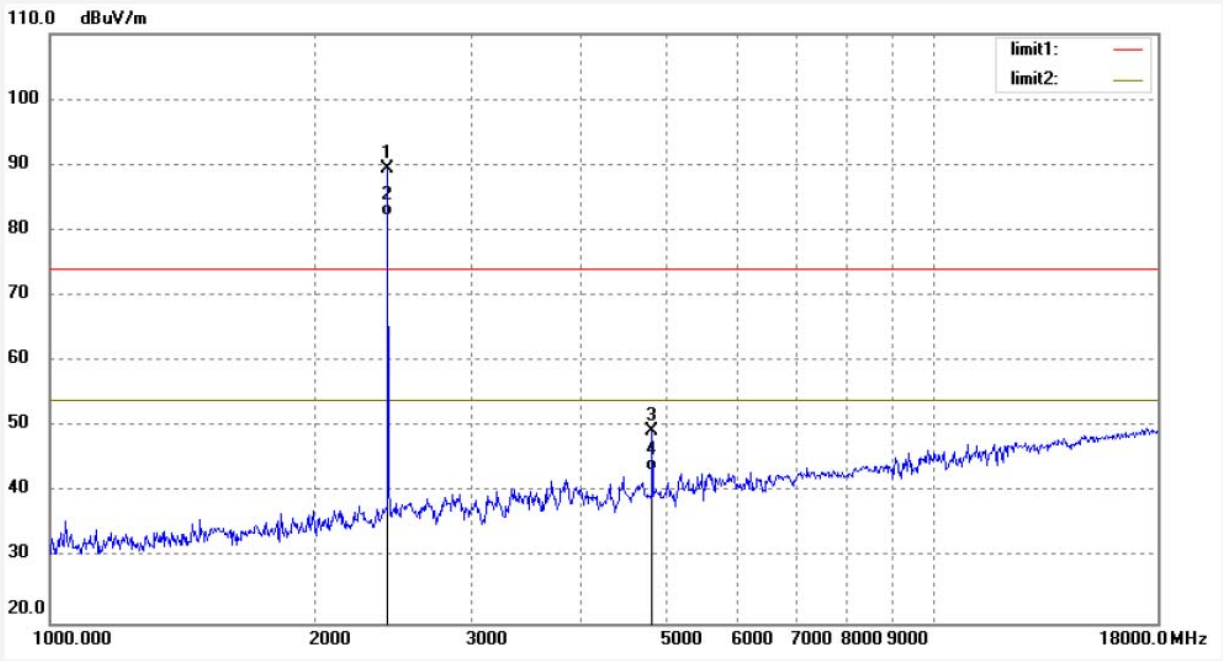
Job No.: frank2018 #213
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX2441MHz(GFSK)
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Horizontal
Power Source: AC 120V; 60Hz
Date: 2018/03/29
Time: 15:11:33
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.000	93.68	-4.20	89.48			peak	200	315	
2	2441.000	86.48	-4.20	82.28			AVG	200	93	
3	4882.000	46.37	3.07	49.44	74.00	-24.56	peak	200	61	
4	4882.000	40.18	3.07	43.25	54.00	-10.75	AVG	250	109	

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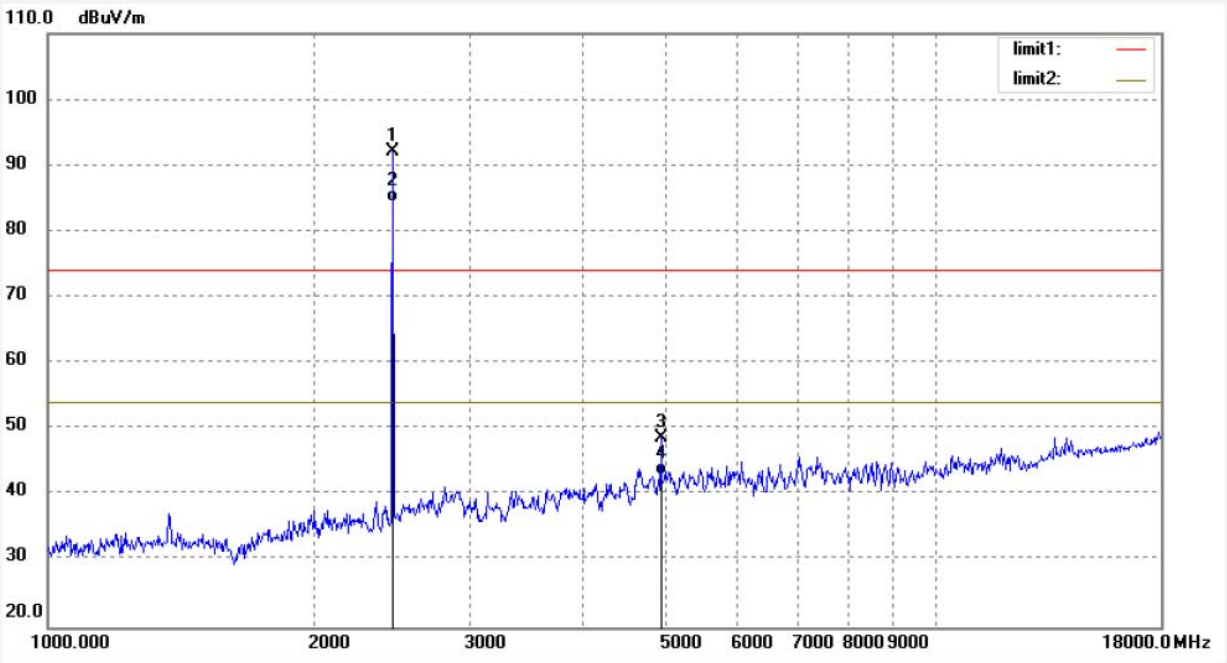
Job No.: frank2018 #214
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Massage Chair
Mode: TX2480MHz(GFSK)
Model: EC-528H
Manufacturer: MARUTAKATECHNO CO., LTD

Polarization: Horizontal
Power Source: AC 120V; 60Hz
Date: 2018/03/29
Time: 15:16:17
Engineer Signature: Frank
Distance: 3m

Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	96.25	-4.04	92.21			peak	200	130	
2	2480.000	88.48	-4.04	84.44			AVG	200	208	
3	4960.000	45.11	3.50	48.61	74.00	-25.39	peak	250	69	
4	4960.000	39.48	3.50	42.98	54.00	-11.02	AVG	250	341	

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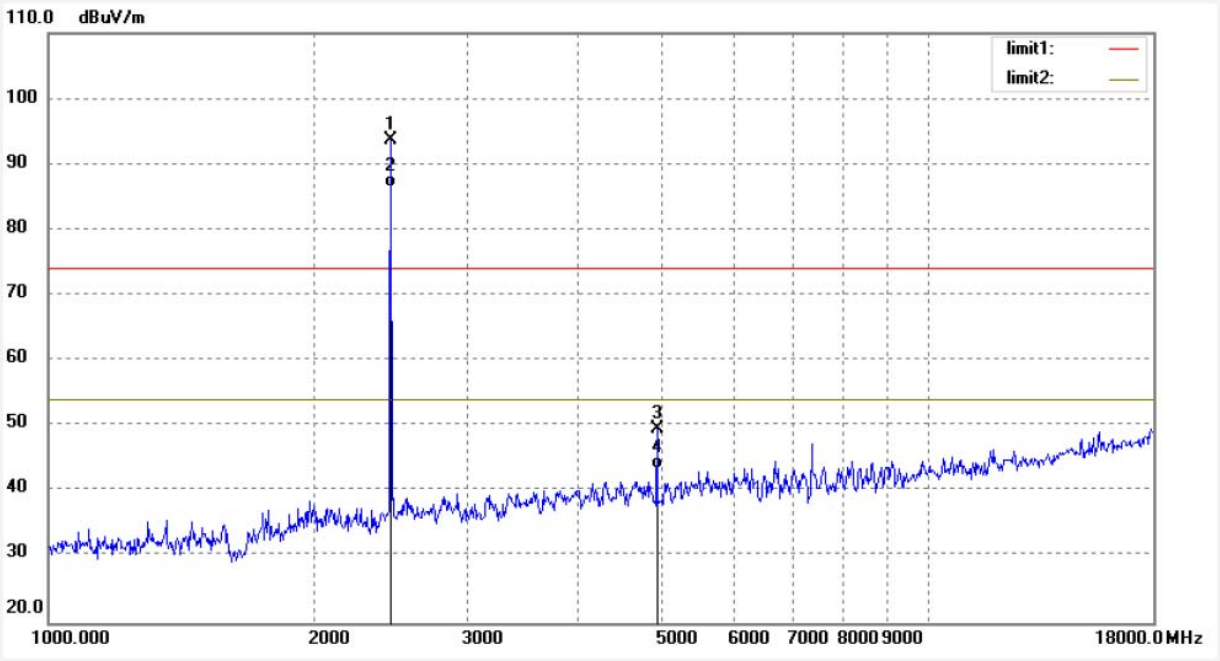
Job No.: frank2018 #215	Polarization: Vertical
Standard: FCC PK	Power Source: AC 120V; 60Hz
Test item: Radiation Test	Date: 2018/03/29
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 15:17:12
EUT: Massage Chair	Engineer Signature: Frank
Mode: TX2480MHz(GFSK)	Distance: 3m
Model: EC-528H	
Manufacturer: MARUTAKATECHNO CO., LTD	

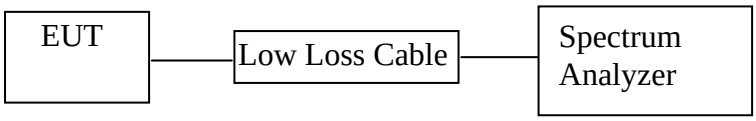
Note: Report NO.:ATE20172091



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2451.034	97.75	-4.04	93.71			peak	250	197	
2	2451.034	90.48	-4.04	86.44			AVG	250	93	
3	4914.444	46.10	3.50	49.60	74.00	-24.40	peak	150	123	
4	4914.444	40.12	3.50	43.62	54.00	-10.38	AVG	200	48	

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: Massage Chair)

11.2.The Requirement 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).

11.3.EUT Configuration on Measurement

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.

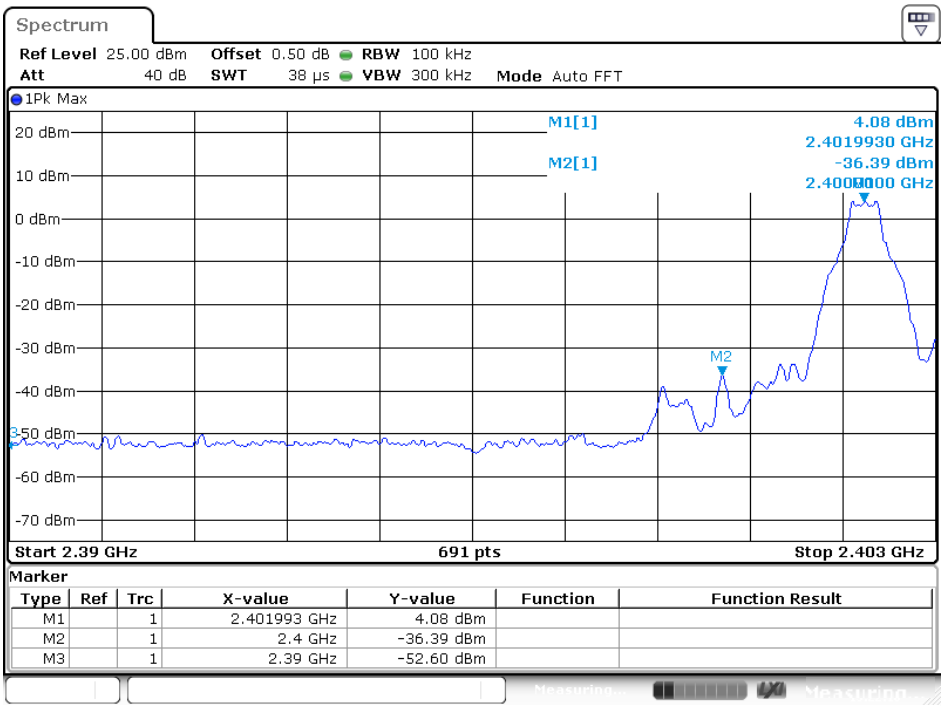
11.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

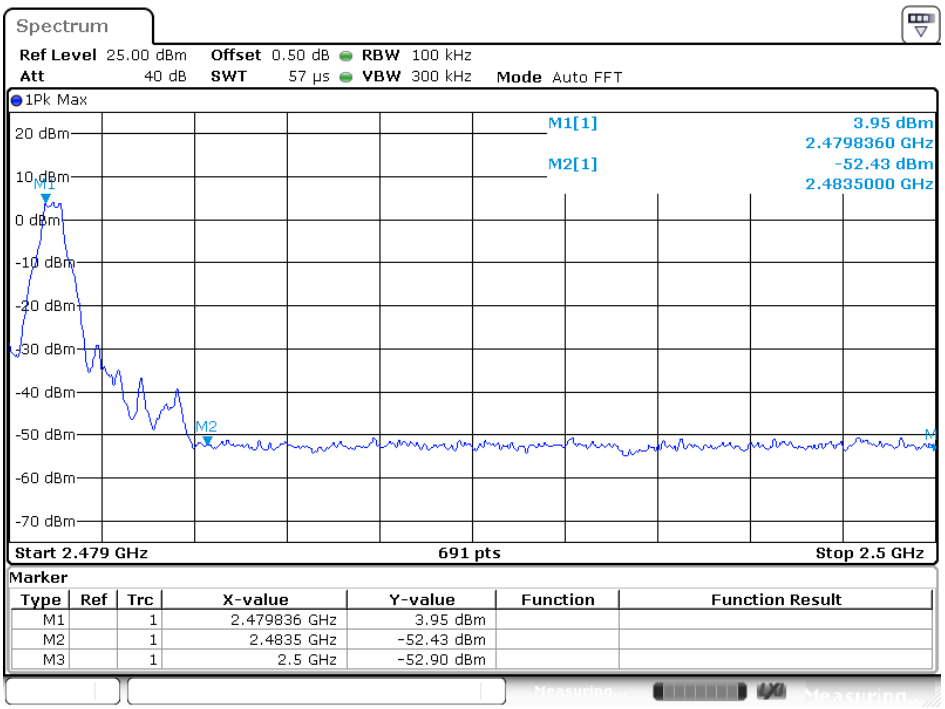
11.5.3.The band edges was measured and recorded.

11.6.Test Result

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK		
2400.00	40.47	> 20dBc
2483.50	56.38	> 20dBc
Π/4-DQPSK Mode		
2400.00	33.86	> 20dBc
2483.50	53.11	> 20dBc
8DPSK		
2400.00	34.13	> 20dBc
2483.50	51.72	> 20dBc

GFSK


Spectrum
Ref Level 25.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 38 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 4.08 dBm
2.4019930 GHz
M2[1] -36.39 dBm
2.4000000 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
Start 2.39 GHz
691 pts
Stop 2.403 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.401993 GHz 4.08 dBm
M2 1 2.4 GHz -36.39 dBm
M3 1 2.39 GHz -52.60 dBm


Spectrum
Ref Level 25.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 57 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 3.95 dBm
2.4798360 GHz
M2[1] -52.43 dBm
2.4835000 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
Start 2.479 GHz
691 pts
Stop 2.5 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.479836 GHz 3.95 dBm
M2 1 2.4835 GHz -52.43 dBm
M3 1 2.5 GHz -52.90 dBm

Π/4-DQPSK Mode