

# FCC TEST REPORT

## FCC ID: 2AIEGB11PRO

Product : Alarm Clock Radio Speaker System

Model Name : B11pro

Brand : Homtime

Report No. : PTC800261160422E-FC01

### Prepared for

All Best Technology Limited  
Yincheng 1st Rd., Yincheng Industrial Zone, Xiabian Village, Chang'an Town,  
Dongguan City, Guangdong Province, China

### Prepared by

DongGuan Precise Testing Service Co.,Ltd.  
Building D, Baoding Technology Park, Guangming Road 2, Guangming Community  
Dongcheng District, Dongguan, Guangdong, China



**TEST RESULT CERTIFICATION**

Applicant's name : All Best Technology Limited  
Address : Yincheng 1st Rd., Yincheng Industrial Zone, Xiabian Village, Chang'an Town, Dongguan City, Guangdong Province, China  
Manufacture's name : All Best Technology Limited  
Address : Yincheng 1st Rd., Yincheng Industrial Zone, Xiabian Village, Chang'an Town, Dongguan City, Guangdong Province, China  
Product name : Alarm Clock Radio Speaker System  
Model name : B11pro  
Standards : FCC CFR47 Part 15 Section 15.247  
Test procedure : ANSI C63.10:2013, DA 00-705  
Test Date : Jul. 01, 2016 ~ Aug. 02, 2016  
Date of Issue : Aug. 10, 2016  
Test Result : Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of PTC, this document may be altered or revised by PTC, personal only, and shall be noted in the revision of the document.

Testing Engineer

August Qiu

Technical Manager

Hack Ye

Authorized Signatory

Chris Du



# Contents

	<b>Page</b>
2.....	<b>TEST SUMMARY</b>
5	
<b>3 GENERAL INFORMATION.....</b>	<b>6</b>
3.1 GENERAL DESCRIPTION OF E.U.T.....	6
3.2 CHANNEL LIST.....	7
3.3 TEST MODE.....	7
3.4 TEST VOLTAGE.....	8
3.5 CONFIGURATION OF SYSTEM.....	8
<b>4 EQUIPMENT DURING TEST.....</b>	<b>9</b>
4.1 EQUIPMENTS LIST.....	9
4.2 MEASUREMENT UNCERTAINTY.....	10
<b>5 CONDUCTED EMISSION.....</b>	<b>11</b>
5.1 E.U.T. OPERATION.....	11
5.2 EUT SETUP.....	11
5.3 MEASUREMENT DESCRIPTION.....	12
5.4 CONDUCTED EMISSION TEST RESULT.....	12
<b>6 RADIATED SPURIOUS EMISSIONS.....</b>	<b>14</b>
6.1 EUT OPERATION.....	14
6.2 TEST SETUP.....	15
6.3 SPECTRUM ANALYZER SETUP.....	16
6.4 TEST PROCEDURE.....	17
6.5 SUMMARY OF TEST RESULTS.....	18
<b>7 CONDUCTED SPURIOUS EMISSIONS.....</b>	<b>26</b>
7.1 TEST PROCEDURE.....	26
7.2 TEST RESULT.....	26
<b>8 BAND EDGE MEASUREMENT.....</b>	<b>30</b>
8.1 TEST PROCEDURE.....	30
8.2 TEST RESULT.....	30
<b>9 20 DB BANDWIDTH MEASUREMENT.....</b>	<b>37</b>
9.1 TEST PROCEDURE.....	37
9.2 TEST RESULT.....	37
<b>10 MAXIMUM PEAK OUTPUT POWER.....</b>	<b>43</b>



10.1	TEST PROCEDURE.....	43
10.2	TEST RESULT .....	43
<b>11</b>	<b>HOPPING CHANNEL SEPARATION .....</b>	<b>49</b>
11.1	TEST PROCEDURE.....	49
11.2	TEST RESULT .....	49
<b>12</b>	<b>NUMBER OF HOPPING FREQUENCY.....</b>	<b>55</b>
12.1	TEST PROCEDURE.....	55
12.2	TEST RESULT .....	55
<b>13</b>	<b>DWELL TIME.....</b>	<b>56</b>
13.1	TEST PROCEDURE.....	56
13.2	TEST RESULT .....	56
<b>14</b>	<b>ANTENNA REQUIREMENT .....</b>	<b>59</b>



## 2 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
Conduct Emission	15.207	PASS
20dB Bandwidth	15.247(a)(1)	PASS
MaximumPeak Output Power	15.247(b)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable



### 3 General Information

#### 3.1 General Description of E.U.T

Product Name	:	Alarm Clock Radio Speaker System
Model Name	:	B11pro
Model Description	:	N/A
Bluetooth Version	:	V4.0(With BLE)
Operating frequency	:	2402-2480MHz,79channels
Antenna installation:	:	PCB printed antenna
Antenna Gain:	:	-0.55dBi
The lowest oscillator:	:	32.768kHz
Type of Modulation	:	GFSK, Pi/4DQPSK, 8DPSK
Adapter1,M/N:CW1203000	:	Input:AC100-240V 50~60Hz 1A Max, Output: DC 12V 3A
Adapter2,M/N:LY036SPS-120300C	:	Input:AC100-240V 50~60Hz 1A Max, Output: DC 12V 3A
Adapter3,M/N:LY036SPS-120300U	:	Input:AC100-240V 50~60Hz 1A Max, Output: DC 12V 3A
Note:Testing in the worst state power with model M/N: LY036SPS-120300C		
		The test facility has a test site registered with the following organization: 371540



### 3.2 Channel List

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

### 3.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting	2402MHz	2441MHz	2480MHz
Hopping	2402-2480MHz		
Tests Carried Out Under FCC part 15.207& 15.209			
Test Item	Test Mode		
Conduction Emission, 0.15MHz to 30MHz	BT Communication		
Radiated Emission, 30M-1GHz	BT Communication		

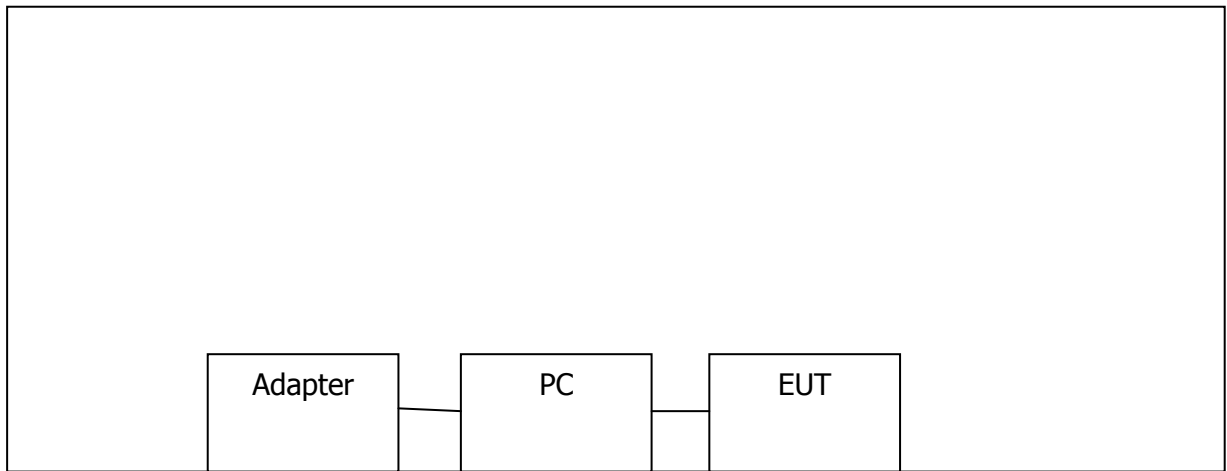


### 3.4 Test Voltage

Normal Test Voltage	Item
120V 60Hz	Conducted Emission & Radiated Emission
240V 60Hz	Conducted Emission & Radiated Emission

Remark: Only the worst case (120V 60Hz) was recorded in the report.

### 3.5 Configuration of System







## 4 Equipment During Test

### 4.1 Equipments List

RF Conducted Test							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2016	Aug.03, 2017	1 year
2	EXA Signal Analyzer	Keysight	N9010A	MY50520207 526B25MPB W7X	Aug.04, 2016	Aug.03, 2017	1 year
3	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
Radiated Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde&Schwarz	ESCI	101417	July 15, 2016	July 14, 2017	1 year
2	Trilog Broadband Antenna	SCHWARZECK	VULB9160	9160-3355	July 15, 2016	July 14, 2017	1 year
3	Amplifier	EM	EM-30180	060538	July 15, 2016	July 14, 2017	1 year
4	Horn Antenna	SCHWARZECK	BBHA9120D	9120D-1246	July 15, 2016	July 14, 2017	1 year
Conducted Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
2	LISN	SCHWARZECK	NSLK 8128	8128-289	July 15, 2016	July 14, 2017	1 year
3	Cable	LARGE	RF300	-	July 15, 2016	July 14, 2017	1 year



#### 4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 <sup>-6</sup>
Bandwidth	± 1.5 x 10 <sup>-6</sup>
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions(150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

## 5 Conducted Emission

Test Requirement: : FCC CFR 47 Part 15 Section 15.207

Test Method: : ANSI C63.10:2013

Test Result: : PASS

Frequency Range: : 150kHz to 30MHz

Class/Severity: : Class B

Limit: : 66-56 dB $\mu$ V between 0.15MHz & 0.5MHz  
 : 56 dB $\mu$ V between 0.5MHz & 5MHz  
 : 60 dB $\mu$ V between 5MHz & 30MHz

Detector: : Peak for pre-scan(9kHz Resolution Bandwidth)

### 5.1 E.U.T. Operation

Operating Environment:

Temperature: : 25.5 °C

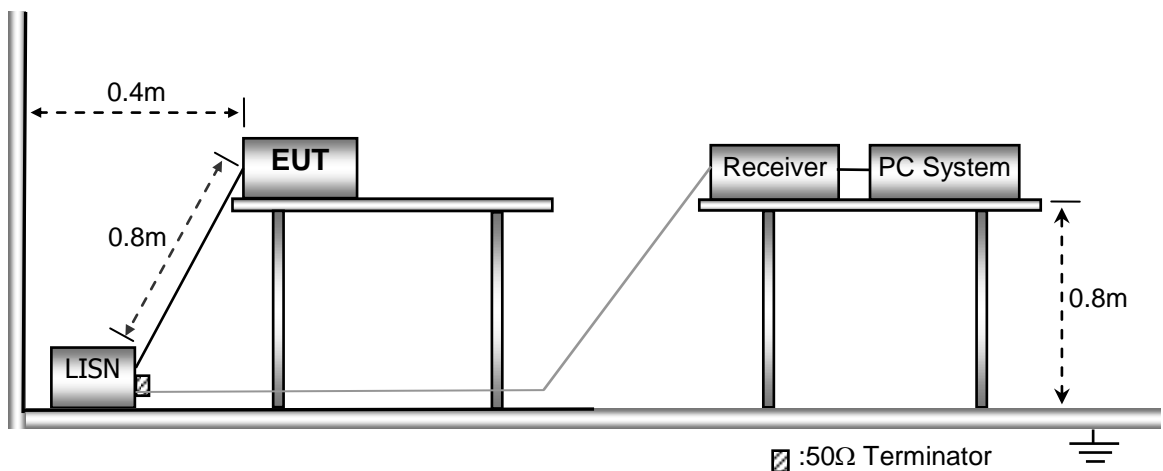
Humidity: : 51 % RH

Atmospheric Pressure: : 101.2kPa

EUT Operation: : Refer to section 3.3

### 5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



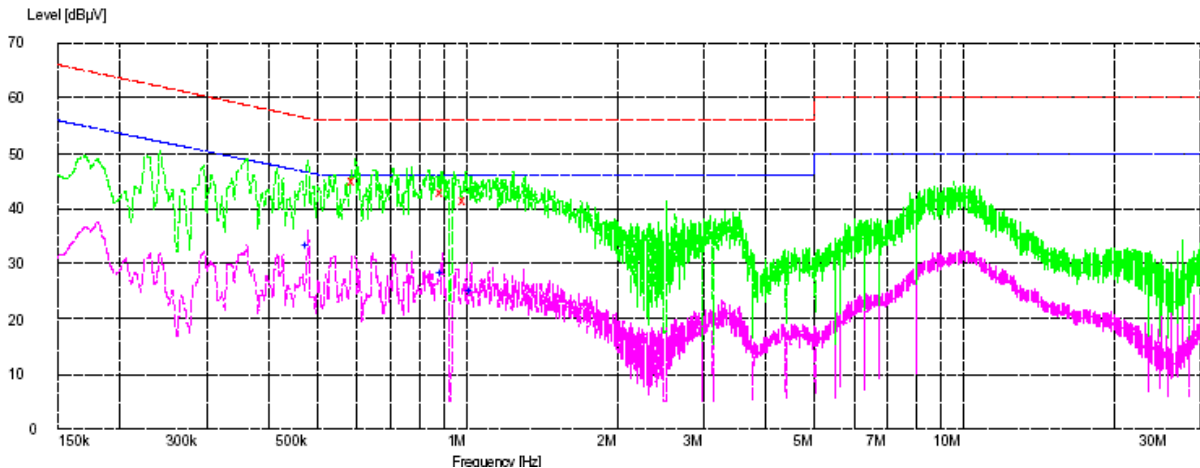


### 5.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

### 5.4 Conducted Emission Test Result

Live line:



**MEASUREMENT RESULT: "vol\_0001\_fin QP"**

8/3/2016 4:15PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.595000	45.20	9.6	56	10.8	L1	GND
0.895000	42.90	9.6	56	13.1	L1	GND
1.000000	41.50	9.6	56	14.5	L1	GND

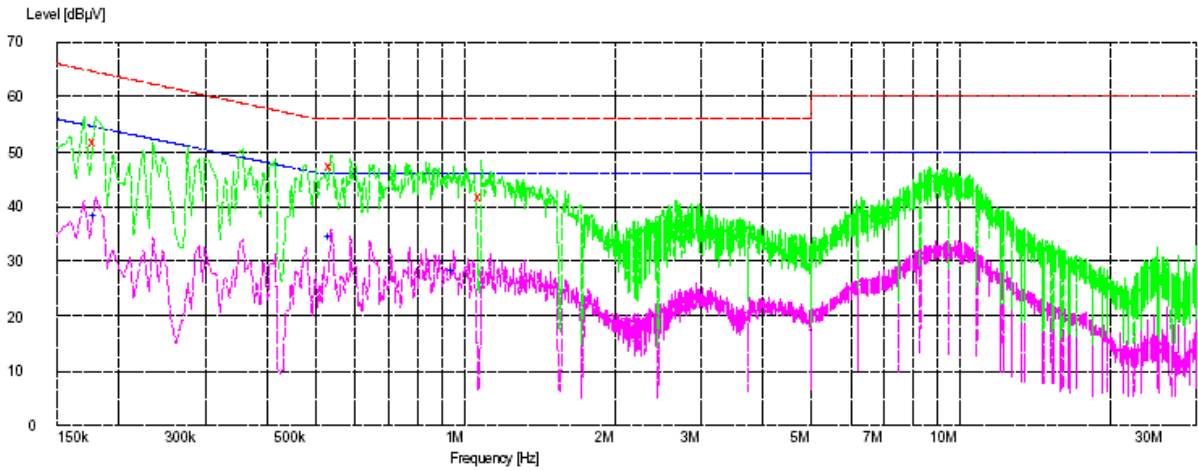
**MEASUREMENT RESULT: "vol\_0001\_fin AV"**

8/3/2016 4:15PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.480000	33.20	9.6	46	13.1	L1	GND
0.895000	28.10	9.6	46	17.9	L1	GND
1.020000	25.30	9.6	46	20.7	L1	GND



Neutral line:



**MEASUREMENT RESULT: "vol\_0001\_fin QP"**

8/3/2016 4:13PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.180000	52.10	9.7	65	12.4	N	GND
0.535000	47.40	9.6	56	8.6	N	GND
1.080000	41.80	9.6	56	14.2	N	GND

**MEASUREMENT RESULT: "vol\_0001\_fin AV"**

8/3/2016 4:13PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.180000	38.40	9.7	55	16.1	N	GND
0.535000	34.40	9.6	46	11.6	N	GND
0.955000	28.40	9.6	46	17.6	N	GND



## 6 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.209 & 15.247  
 Test Method: : ANSI C63.10:2013,DA 00-705  
 Test Result: : PASS  
 Measurement Distance: : 3m  
 Limit: : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log <sup>(2400/F(kHz))</sup> + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40
30 ~ 88	100	3	100	20log <sup>(100)</sup>
88 ~ 216	150	3	150	20log <sup>(150)</sup>
216 ~ 960	200	3	200	20log <sup>(200)</sup>
Above 960	500	3	500	20log <sup>(500)</sup>

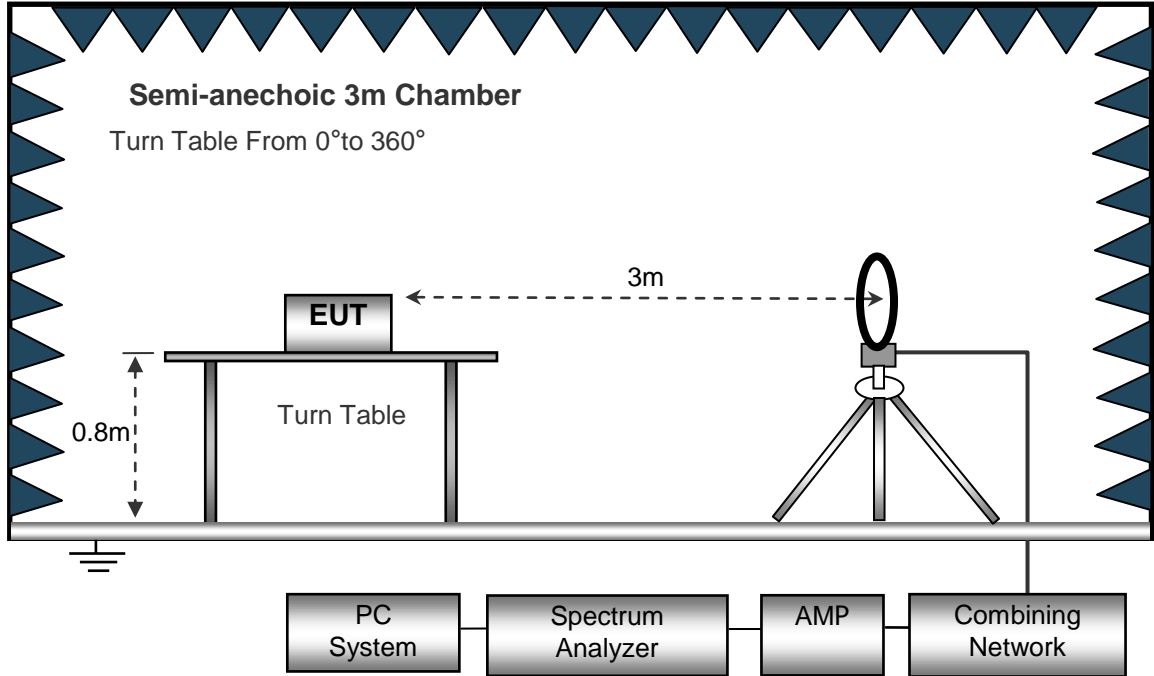
### 6.1 EUT Operation

Operating Environment :  
 Temperature: : 23.5 °C  
 Humidity: : 51.1 % RH  
 Atmospheric Pressure: : 101.2kPa  
 EUT Operation : : Refer to section 3.3

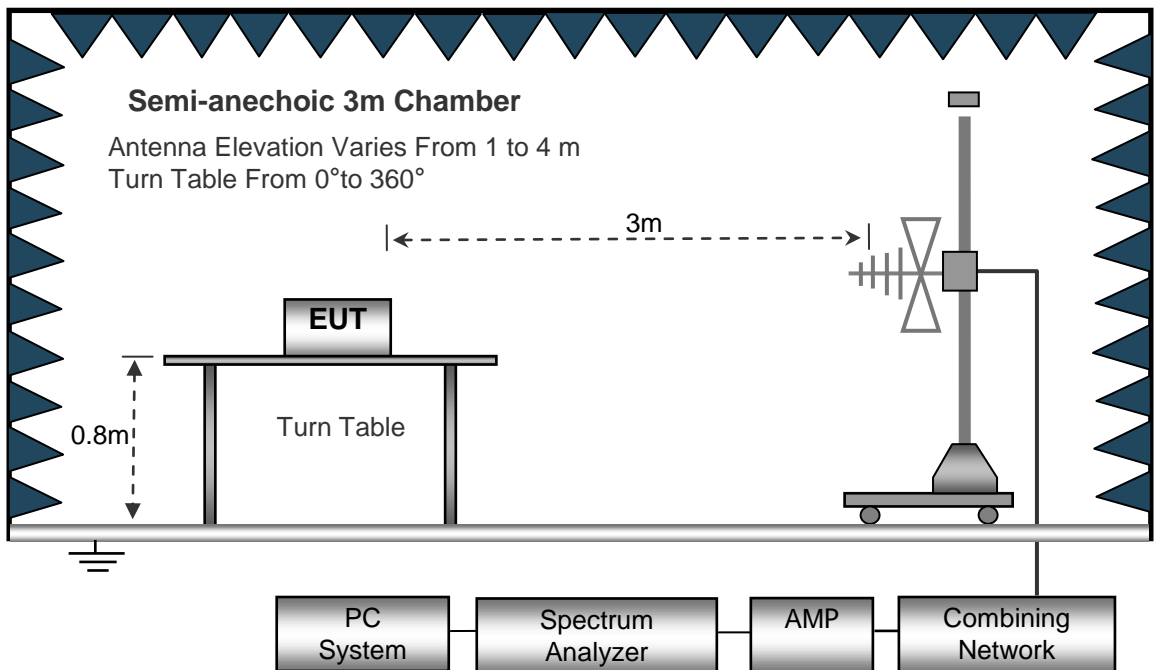
### 6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber testsite

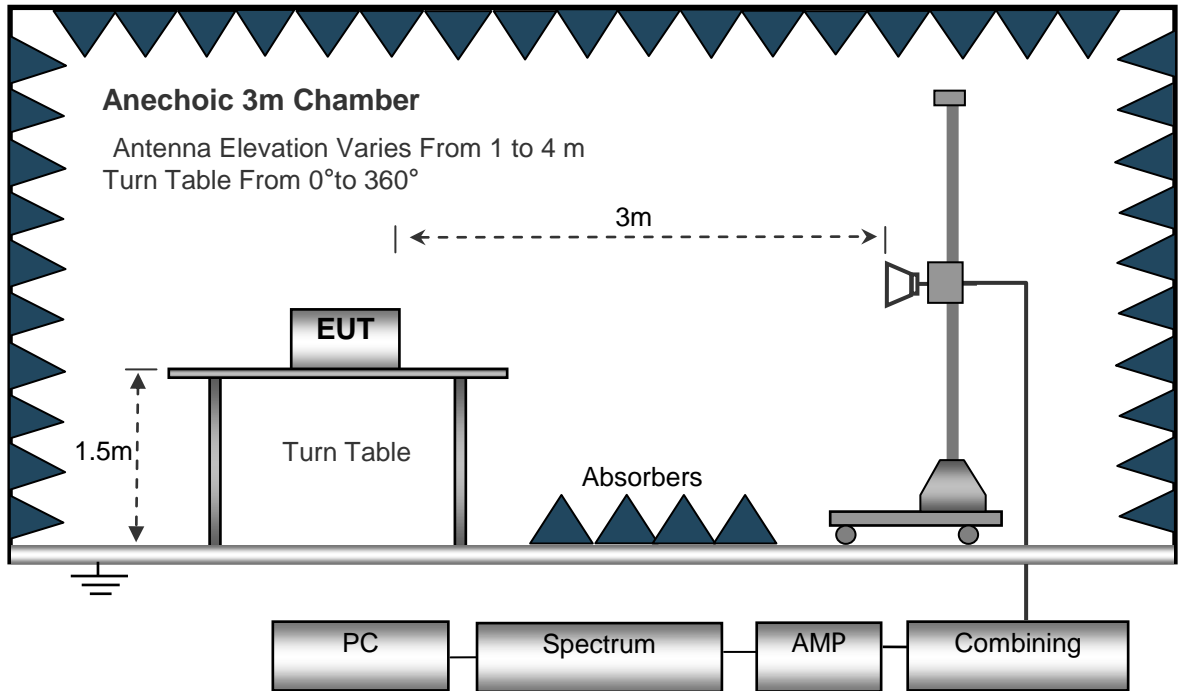
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 6.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed..... Auto  
 IF Bandwidth.....10kHz  
 Video Bandwidth .....10kHz  
 Resolution Bandwidth .....10kHz

30MHz ~ 1GHz

Sweep Speed..... Auto  
 Detector.....PK  
 Resolution Bandwidth .....100kHz  
 Video Bandwidth .....300kHz

Above 1GHz

Sweep Speed..... Auto  
 Detector.....PK  
 Resolution Bandwidth .....1MHz  
 Video Bandwidth .....3MHz  
 Detector.....Ave.  
 Resolution Bandwidth .....1MHz  
 Video Bandwidth .....10Hz





## 6.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.



### 6.5 Summary of Test Results

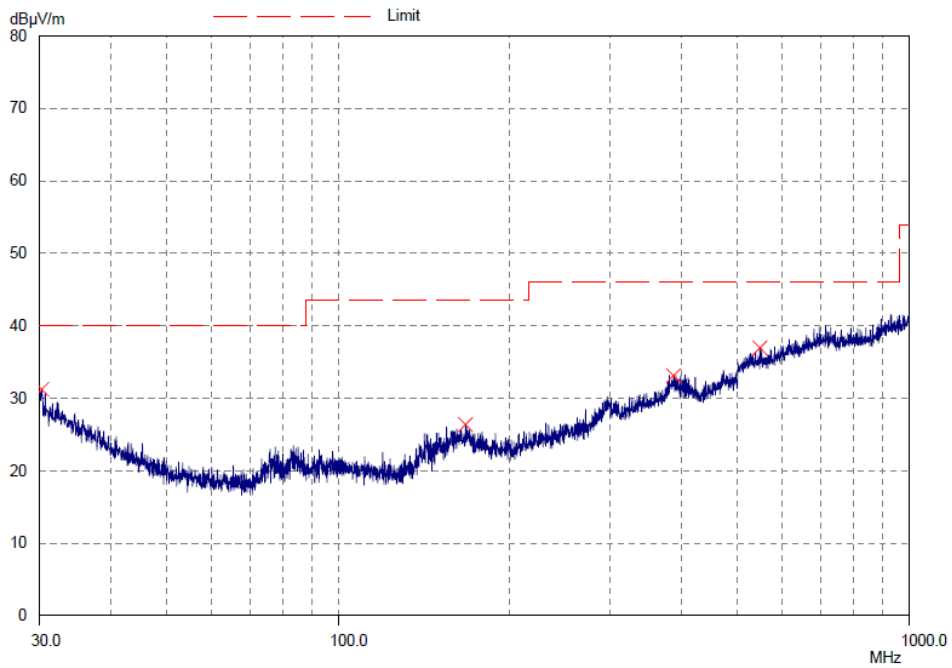
#### Test Frequency: Below 30MHz

The measurements were more than 30 dB below the limit and not reported.

#### Test Frequency: 30MHz ~ 1GHz

The data display worst state in the 2402MHz

Antenna Polarization: Horizontal



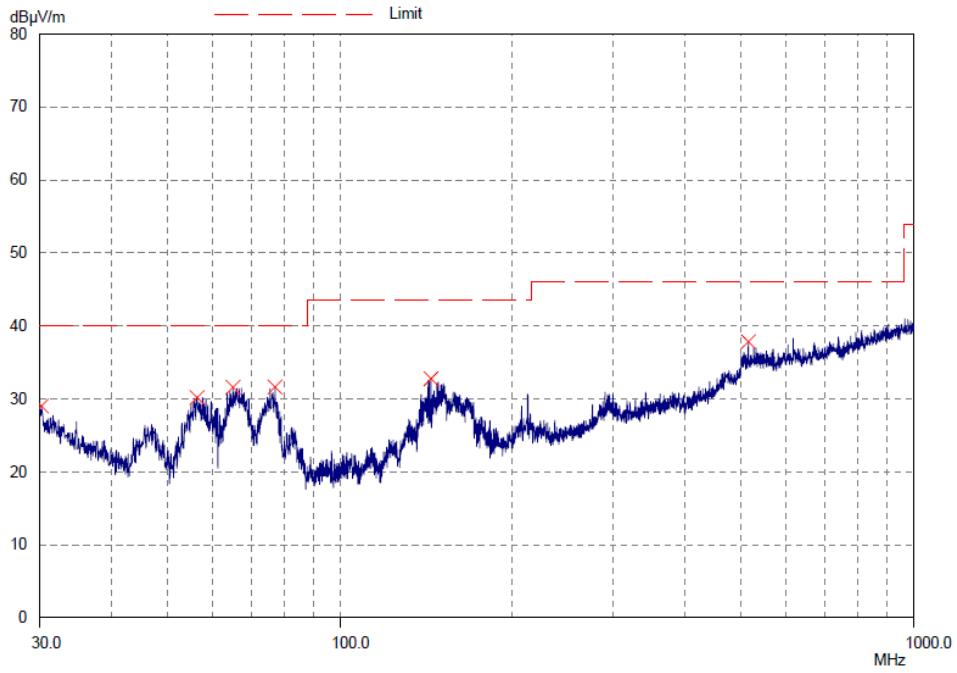
#### Peak Search Results

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB
30.25	31.23	40.00	8.77
167.1875	26.36	43.50	17.14
386.6875	33.12	46.00	12.88
547.75	36.94	46.00	9.06

Frequency MHz	Level dBµV/m	Limit dBµV/m	Delta dB
------------------	-----------------	-----------------	-------------



Antenna Polarization: Vertical



Peak Search Results

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB
30.1875	29.02	40.00	10.98
56.375	30.18	40.00	9.82
65.125	31.59	40.00	8.41
77.125	31.65	40.00	8.35
144.125	32.77	43.50	10.73
515.25	37.84	46.00	8.16

Frequency MHz	Level dBµV/m	Limit dBµV/m	Delta dB
------------------	-----------------	-----------------	-------------



**Test Frequency: 1GHz ~ 18GHz**

Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin	Antenna polarity
(MHz)	(dBμV)	(PK/QP/Ave)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
GFSK Low Channel							
Harmonic & Spurious Emission							
1053.33	56.38	PK	-19.54	36.84	74	-37.16	H
1053.33	48.25	Ave	-19.54	28.71	54	-25.29	H
4804.00	57.31	PK	-1.06	56.25	74	-17.75	H
4804.00	43.58	Ave	-1.06	42.52	54	-11.48	H
7206.00	57.99	PK	1.33	59.32	74	-14.68	V
7206.00	45.36	Ave	1.33	46.69	54	-7.31	V
Restricted bands Emission							
2309.55	55.44	PK	-13.19	42.25	74	-31.75	H
2309.55	49.32	Ave	-13.19	36.13	54	-17.87	H
2390.00	57.54	PK	-13.14	44.4	74	-29.6	H
2390.00	49.34	Ave	-13.14	36.2	54	-17.8	H
2494.19	59.29	PK	-13.08	46.21	74	-27.79	V
2494.19	47.63	Ave	-13.08	34.55	54	-19.45	V
Remark:							
1. Corrected Factor = ANT Factor + Cable Loss – Amp Gain							
2. Corrected Amplitude = Receiver Reading + Corrected Factor							



Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin	Antenna polarity
(MHz)	(dBμV)	(PK/QP/Ave)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
GFSK Middle Channel							
Harmonic & Spurious Emission							
1144.68	59.39	PK	-19.54	39.85	74	-34.15	H
1144.68	45.15	Ave	-19.54	25.61	54	-28.39	H
4882.00	61.53	PK	-0.93	60.6	74	-13.4	H
4882.00	47.41	Ave	-0.93	46.48	54	-7.52	H
7323.00	63.01	PK	1.67	64.68	74	-9.32	V
7323.00	45.87	Ave	1.67	47.54	54	-6.46	V
Restricted bands Emission							
2309.45	58.26	PK	-13.19	45.07	74	-28.93	H
2309.45	56.41	Ave	-13.19	43.22	54	-10.78	H
2362.97	62.54	PK	-13.14	49.4	74	-24.6	H
2362.97	48.79	Ave	-13.14	35.65	54	-18.35	H
2485.99	61.07	PK	-13.08	47.99	74	-26.01	V
2485.99	48.82	Ave	-13.08	35.74	54	-18.26	V
Remark:							
1. Corrected Factor = ANT Factor + Cable Loss – Amp Gain							
2. Corrected Amplitude = Receiver Reading + Corrected Factor							



Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin	Antenna polarity
(MHz)	(dBμV)	(PK/QP/Ave)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
GFSK High Channel							
Harmonic & Spurious Emission							
1158.87	60.23	PK	-19.54	40.69	74	-33.31	H
1158.87	47.55	Ave	-19.54	28.01	54	-25.99	H
4960.00	59.35	PK	-0.87	58.48	74	-15.52	H
4960.00	44.18	Ave	-0.87	43.31	54	-10.69	H
7440.00	62.07	PK	1.84	63.91	74	-10.09	V
7440.00	46.03	Ave	1.84	47.87	54	-6.13	V
Restricted bands Emission							
2336.25	63.42	PK	-13.19	50.23	74	-23.77	H
2336.25	47.43	Ave	-13.19	34.24	54	-19.76	H
2381.58	62.12	PK	-13.14	48.98	74	-25.02	H
2380.58	45.07	Ave	-13.14	31.93	54	-22.07	H
2483.50	56.61	PK	-13.08	43.53	74	-30.47	V
2483.50	47.28	Ave	-13.08	34.2	54	-19.8	V
Remark:							
1. Corrected Factor = ANT Factor + Cable Loss – Amp Gain							
2. Corrected Amplitude = Receiver Reading + Corrected Factor							



Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin	Antenna polarity
(MHz)	(dBμV)	(PK/QP/Ave)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
8DPSK Low Channel							
Harmonic & Spurious Emission							
1181.85	61.82	PK	-19.51	42.31	74	-31.69	H
1181.85	47.42	Ave	-19.51	27.91	54	-26.09	H
4804.00	59.52	PK	-1.06	58.46	74	-15.54	H
4804.00	44.33	Ave	-1.06	43.27	54	-10.73	
7206.00	58.41	PK	1.33	59.74	74	-14.26	V
7206.00	43.69	Ave	1.33	45.02	54	-8.98	V
Restricted bands Emission							
2310.44	60.02	PK	-13.19	46.83	74	-27.17	H
2310.44	47.71	Ave	-13.19	34.52	54	-19.48	H
2390.00	60.56	PK	-13.14	47.42	74	-26.58	H
2390.00	48.59	Ave	-13.14	35.45	54	-18.55	H
2491.40	62.84	PK	-13.08	49.76	74	-24.24	V
2491.40	46.59	Ave	-13.08	33.51	54	-20.49	V
Remark:							
1. Corrected Factor = ANT Factor + Cable Loss – Amp Gain							
2. Corrected Amplitude = Receiver Reading + Corrected Factor							



Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin	Antenna polarity
(MHz)	(dBμV)	(PK/QP/Ave)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
8DPSK Middle Channel							
Harmonic & Spurious Emission							
1150.22	61.43	PK	-19.51	41.92	74	-32.08	H
1150.22	47.53	Ave	-19.51	28.02	54	-25.98	H
4882.00	62.23	PK	-0.93	61.3	74	-12.7	H
4882.00	47.42	Ave	-0.93	46.49	54	-7.51	H
7323.00	56.84	PK	1.67	58.51	74	-15.49	V
7323.00	47.12	Ave	1.67	48.79	54	-5.21	V
Restricted bands Emission							
2315.82	61.15	PK	-13.19	47.96	74	-26.04	H
2315.82	47.35	Ave	-13.19	34.16	54	-19.84	H
2344.51	63.08	PK	-13.14	49.94	74	-24.06	H
2344.51	46.49	Ave	-13.14	33.35	54	-20.65	H
2490.17	61.3	PK	-13.08	48.22	74	-25.78	V
2490.17	46.09	Ave	-13.08	33.01	54	-20.99	V
Remark:							
1. Corrected Factor = ANT Factor + Cable Loss – Amp Gain							
2. Corrected Amplitude = Receiver Reading + Corrected Factor							





Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin	Antenna polarity
(MHz)	(dBµV)	(PK/QP/Ave)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
8DPSK High Channel							
Harmonic & Spurious Emission							
1180.38	62.32	PK	-19.51	42.81	74	-31.19	H
1180.38	47.81	Ave	-19.51	28.3	54	-25.7	H
4960.00	59.17	PK	-0.87	58.3	74	-15.7	H
4960.00	46.58	Ave	-0.87	45.71	54	-8.29	H
7440.00	59.89	PK	1.84	61.73	74	-12.27	V
7440.00	41.89	Ave	1.84	43.73	54	-10.27	V
Restricted bands Emission							
2331.36	63.05	PK	-13.19	49.86	74	-24.14	H
2331.36	47.61	Ave	-13.19	34.42	54	-19.58	H
2384.33	61.47	PK	-13.14	48.33	74	-25.67	H
2384.33	48.74	Ave	-13.14	35.6	54	-18.4	H
2483.50	62.37	PK	-13.08	49.29	74	-24.71	V
2483.50	46.85	Ave	-13.08	33.77	54	-20.23	V
Remark:							
1. Corrected Factor = ANT Factor + Cable Loss – Amp Gain							
2. Corrected Amplitude = Receiver Reading + Corrected Factor							

**Test Frequency: 18-25GHz**

The measurements were more than 30 dB below the limit and not reported

- Remark :
1. The testing has been conformed to 10\*2480 = 24800MHz.
  2. All other emissions more than 30dB below the limit
  - 3: Only the worst data (GFSK/8DPSK modulation mode) were reported.

## 7 Conducted Spurious Emissions

- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : DA 00-705
- Test Limit : 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) (see Section 15.205(c)).

Test Result : PASS

### 7.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer:

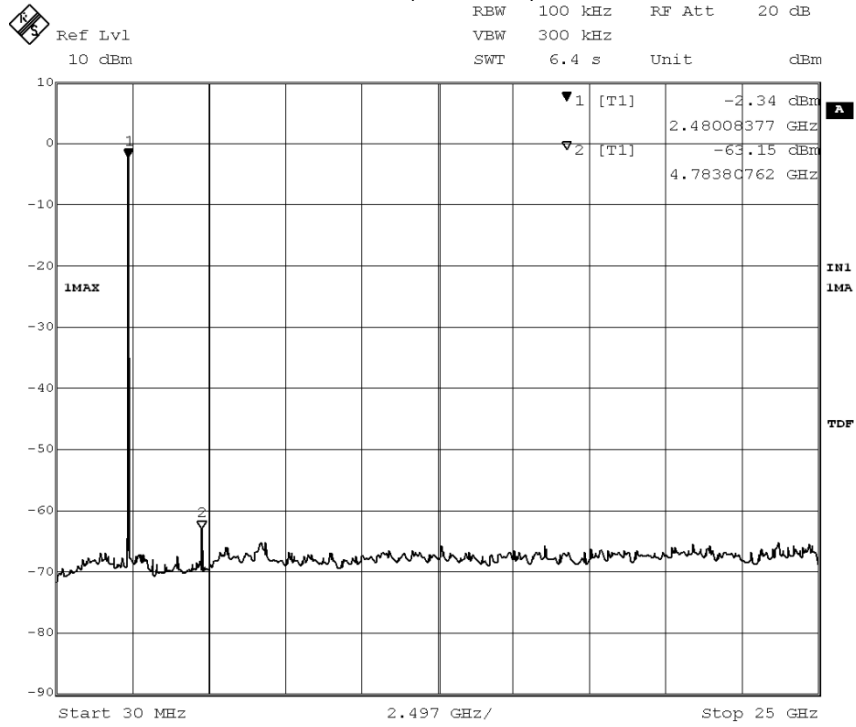
RBW = 100kHz, VBW = 300kHz, Sweep = auto

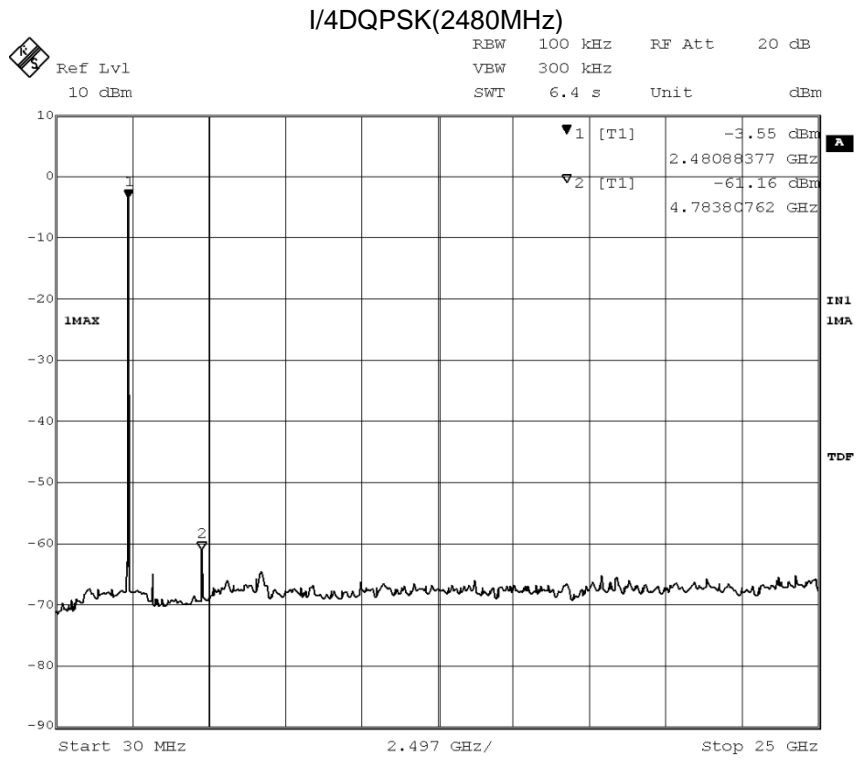
Detector function = peak, Trace = max hold

### 7.2 Test Result

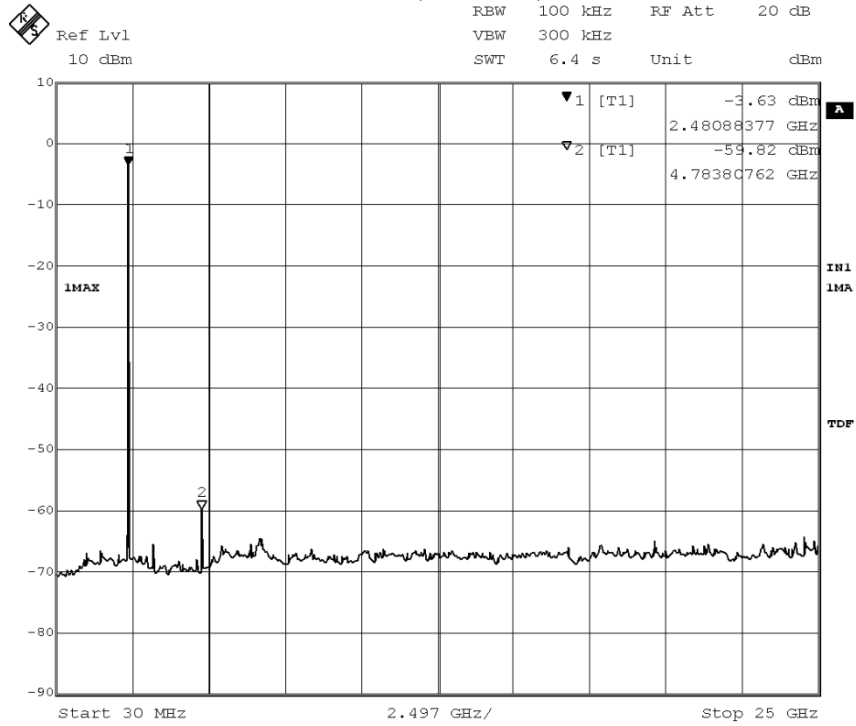
Remark: only the worst data(2480MHz) were reported.

**GFSK(2480MHz)**





8DPSK(2480MHz)





## 8 Band Edge Measurement

Test Requirement : Section 15.247(d) 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) (see Section 15.205(c)).

Test Method : ANSI C63.10:2013,DA 00-705

Test Limit : Regulation 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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Mode : Transmitting & Hopping

Remark : The worst case was recorded.

### 8.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

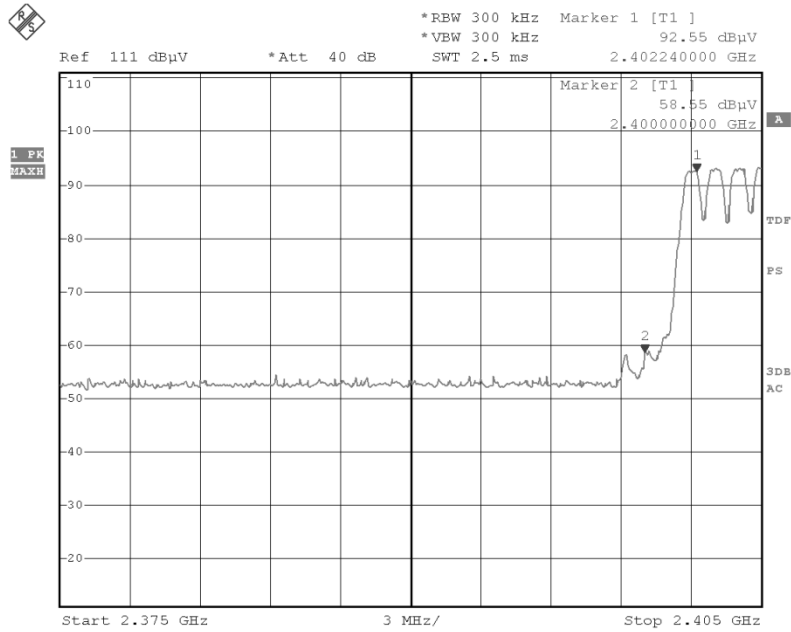
2. Set the spectrum analyzer: RBW = 300kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

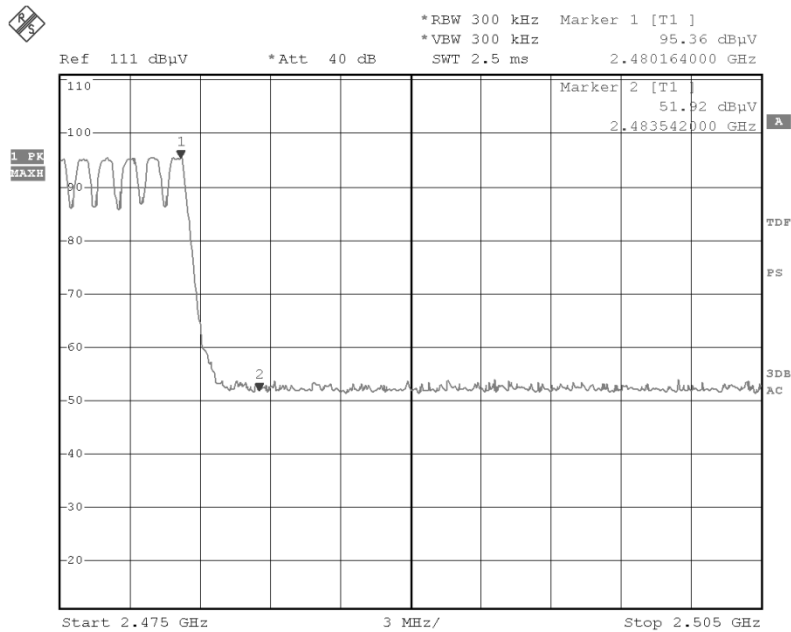
### 8.2 Test Result

Modulation	Mode	Band edge	Value	Limit	Result
GFSK	Hopping	Left	58.55	72.55	Pass
		Right	51.92	75.36	Pass
Pi/4 DQPSK	Hopping	Left	58.74	75.23	Pass
		Right	53.19	72.75	Pass
8DPSK	Hopping	Left	60.38	75.29	Pass
		Right	54.12	72.97	Pass
Remark: Hopping with worst case					
The limit is 20dB below the maximum peak level, please refer to the display line of the follow plot					

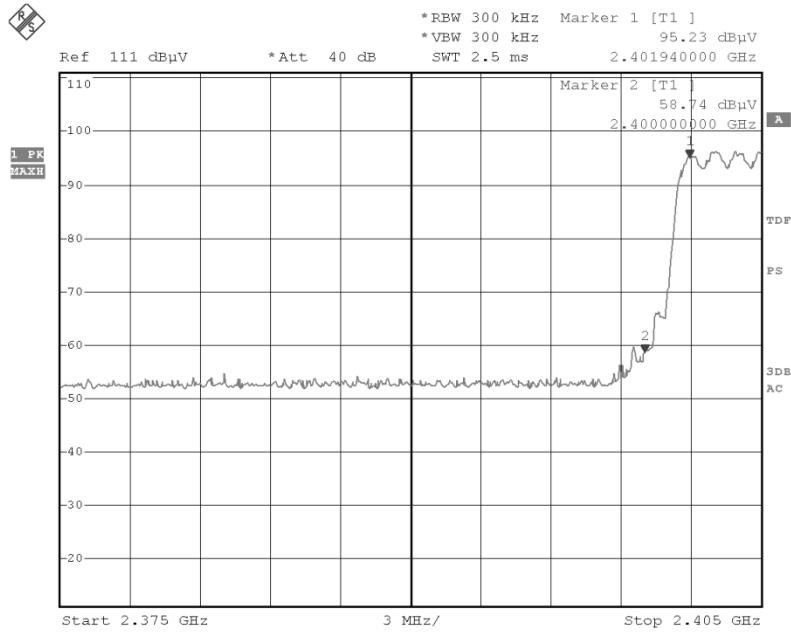
Hopping in GFSK Band edge-left side



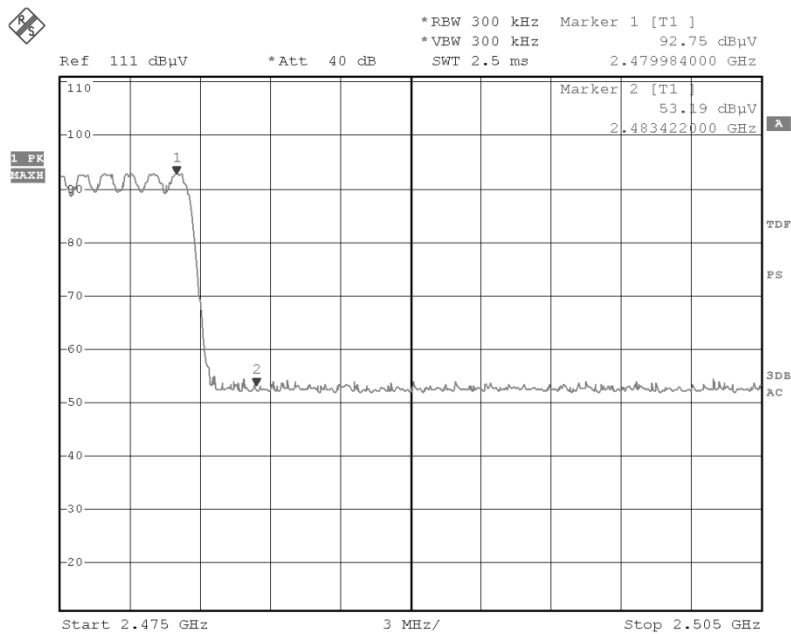
Hopping in GFSK Band edge-right side



Hopping in Pi/4 DQPSK Band edge-left side

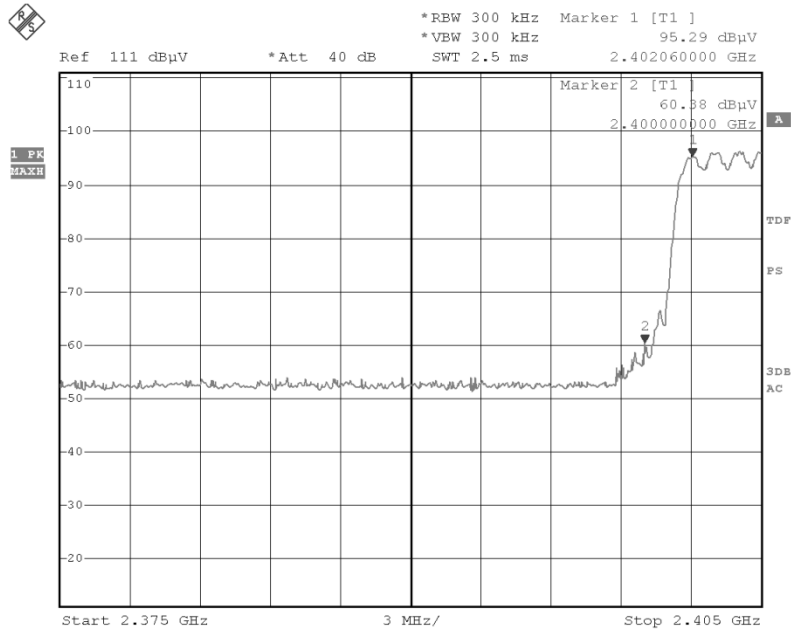


Hopping in Pi/4 DQPSK Band edge-right side

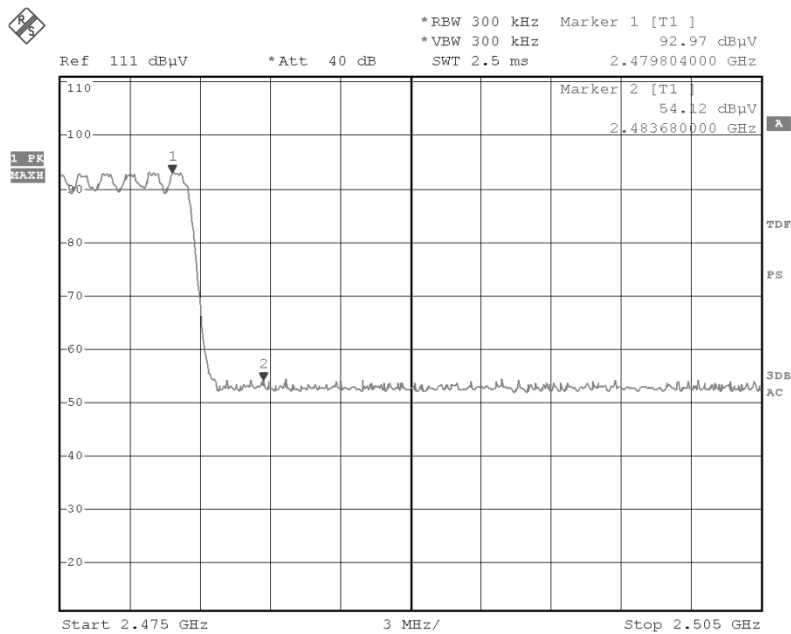




Hopping in 8DPSK Band edge-left side



Hopping in 8DPSK Band edge-right side

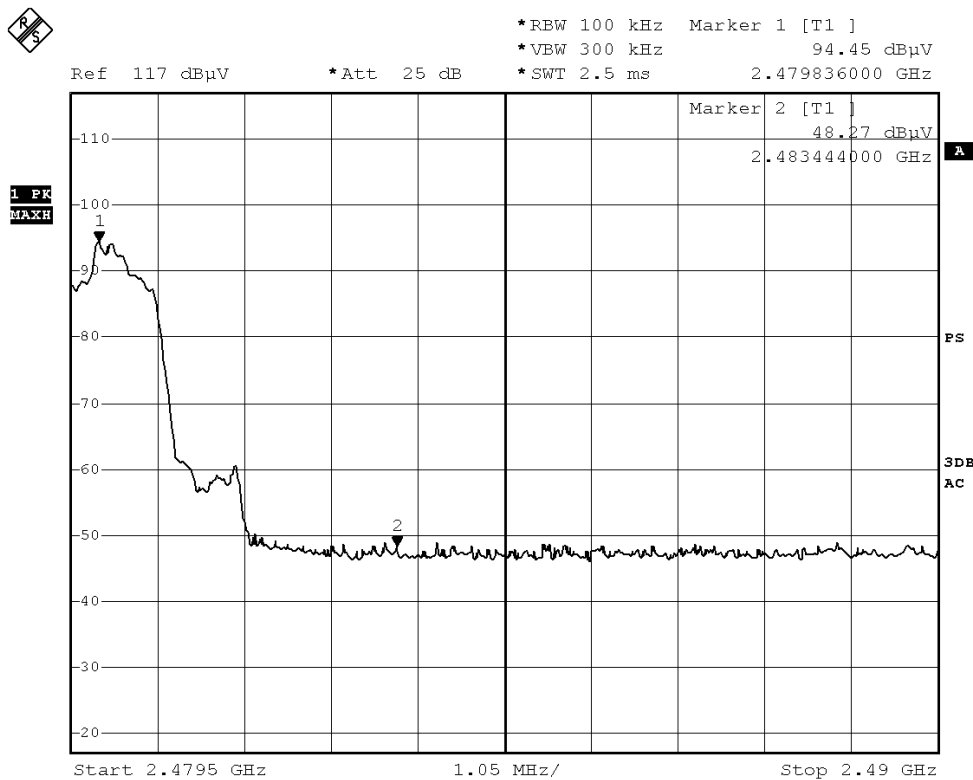




signal in PI/4DQPSK Band edge-left side



signal in PI/4DQPSK Band edge-right side







## 9 20 dB Bandwidth Measurement

TestRequirement : FCC CFR47 Part 15 Section 15.247  
Test Method : ANSI C63.10:2013,DA 00-705  
Test Mode : Refer to section 3.3

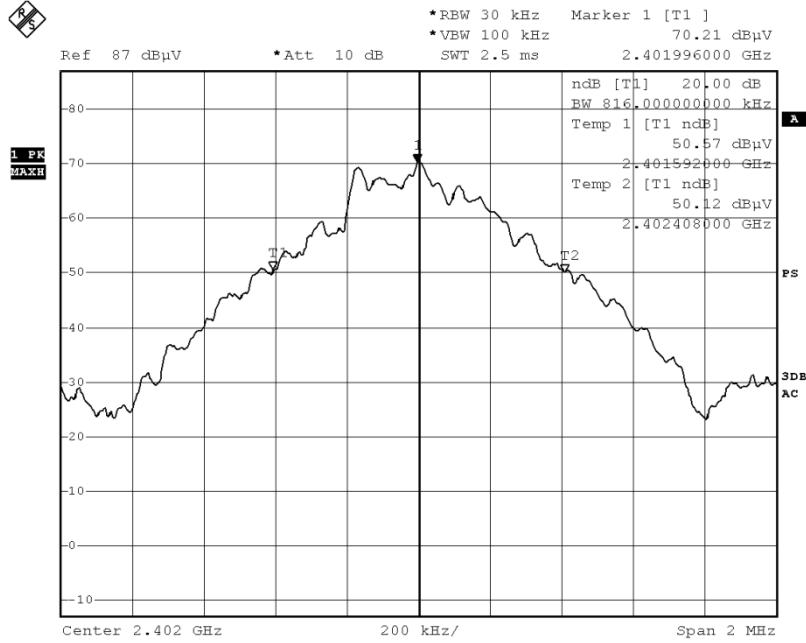
### 9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

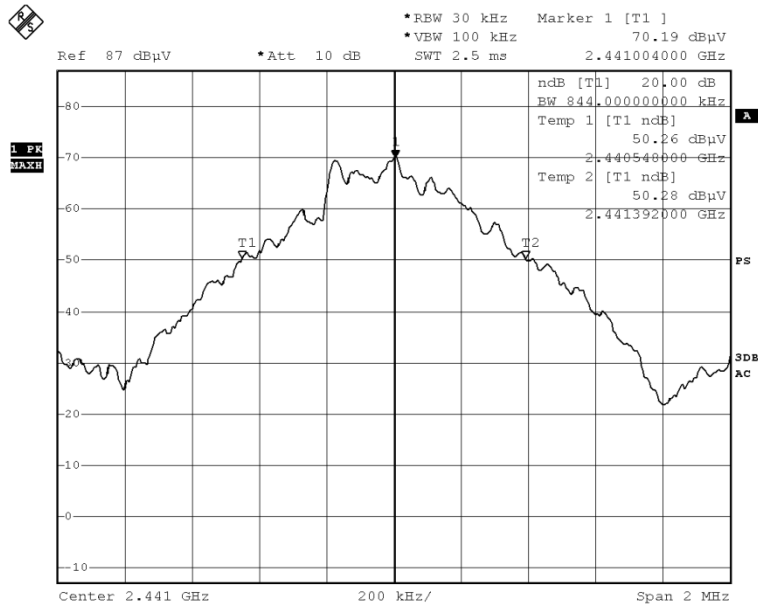
### 9.2 Test Result

Modulation	Test Channel	Bandwidth(MHz)
GFSK	Low	0.816
GFSK	Middle	0.844
GFSK	High	0.888
Pi/4 DQPSK	Low	1.220
Pi/4 DQPSK	Middle	1.225
Pi/4 DQPSK	High	1.220
8DPSK	Low	1.215
8DPSK	Middle	1.215
8DPSK	High	1.215

### GFSK Low Channel

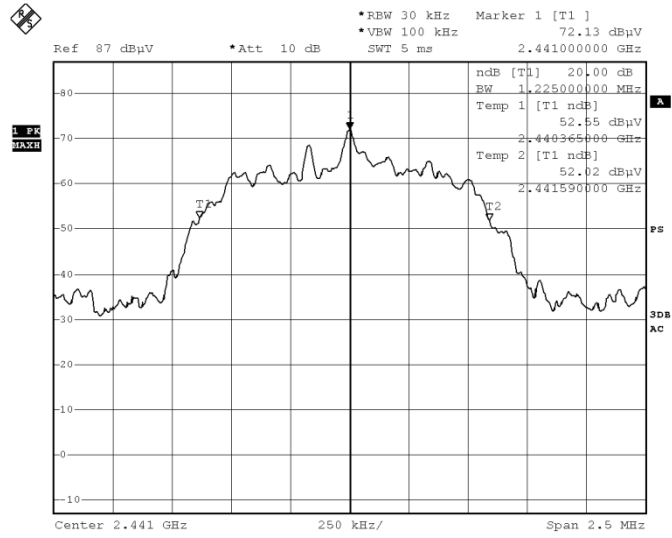


### GFSK Middle Channel

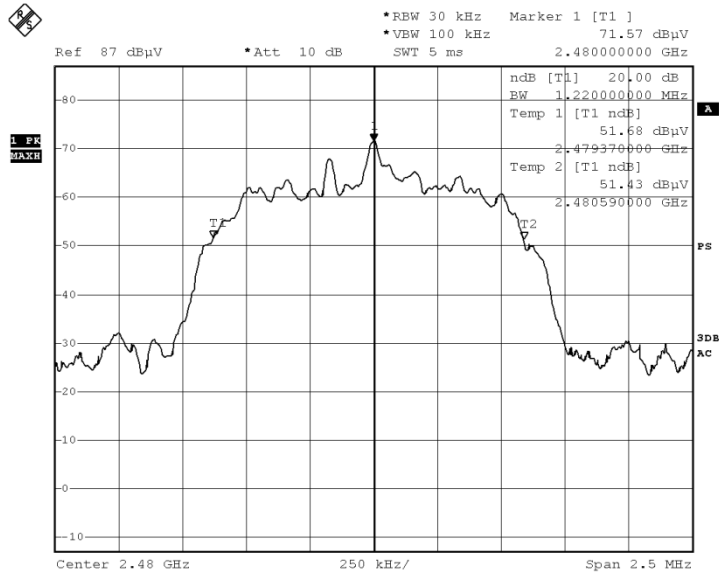




Pi/4DQPSK Middle Channel

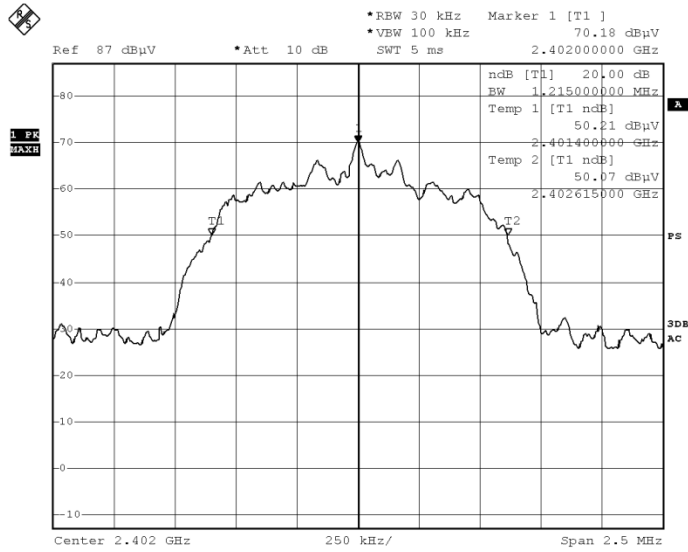


Pi/4DQPSK High Channel

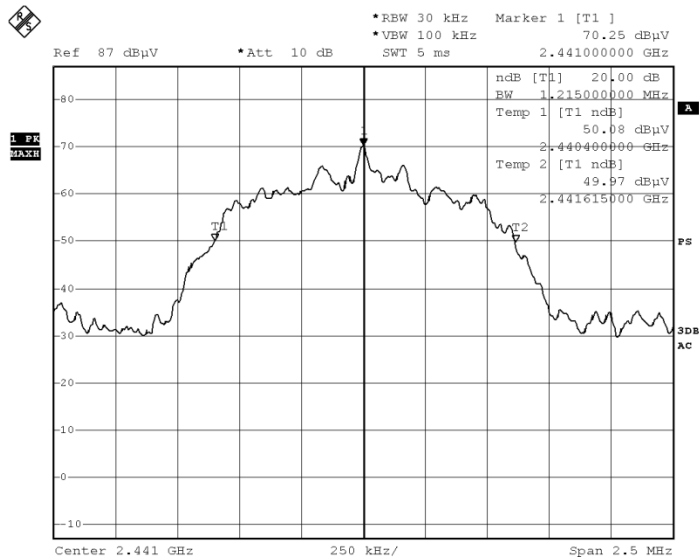




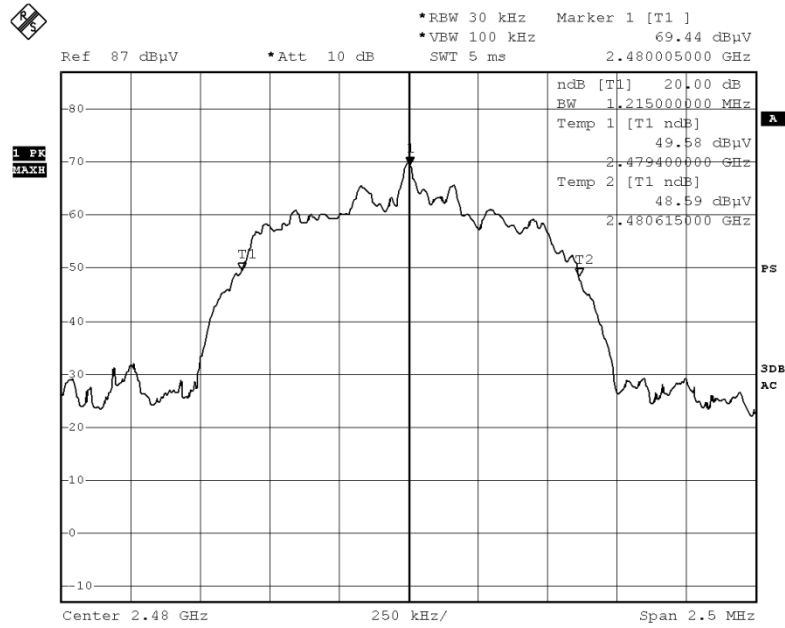
### 8DPSK Low Channel



### 8DPSK Middle Channel



8DPSK High Channel



## 10 MaximumPeak Output Power

- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : ANSI C63.10:2013,DA 00-705
- Test Limit : Regulation 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.
- Refer to the result “Number of Hopping Frequency” of this document. The 0.125watts (20.97 dBm) limit applies.
- Test Mode : Refer to section 3.3

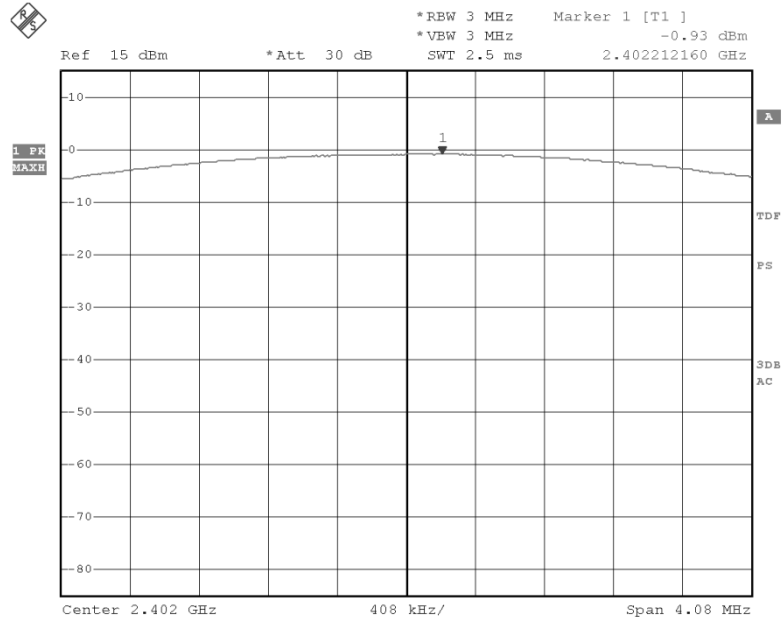
### 10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyser: RBW = 3 MHz. VBW =3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

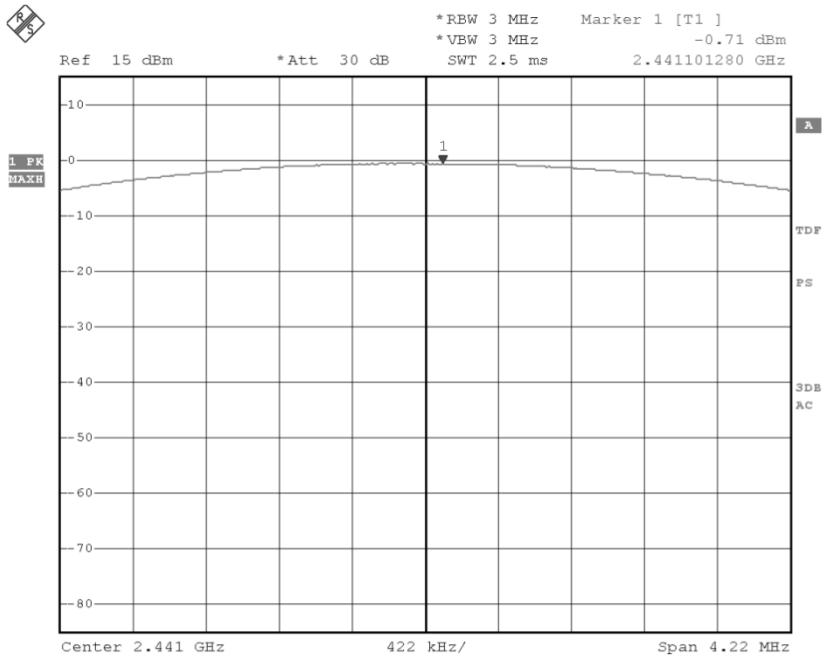
### 10.2 Test Result

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Low	-0.93	30
GFSK	Middle	-0.71	30
GFSK	High	-0.76	30
Pi/4 DQPSK	Low	-2.00	30
Pi/4 DQPSK	Middle	-1.90	30
Pi/4 DQPSK	High	-1.88	30
8DPSK	Low	-2.08	30
8DPSK	Middle	-2.17	30
8DPSK	High	-1.94	30

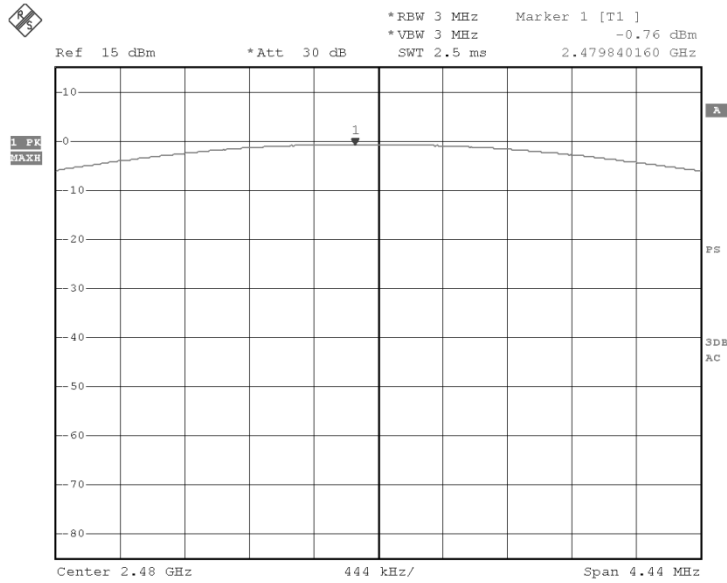
### GFSK Low Channel



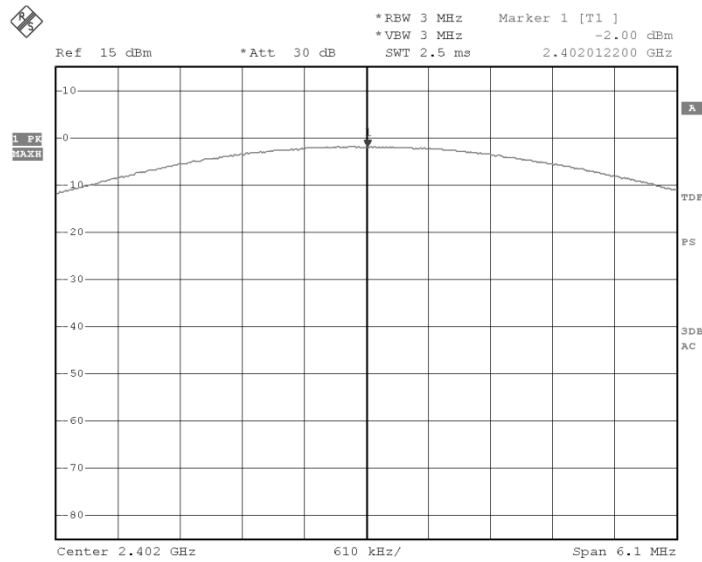
### GFSK Middle Channel



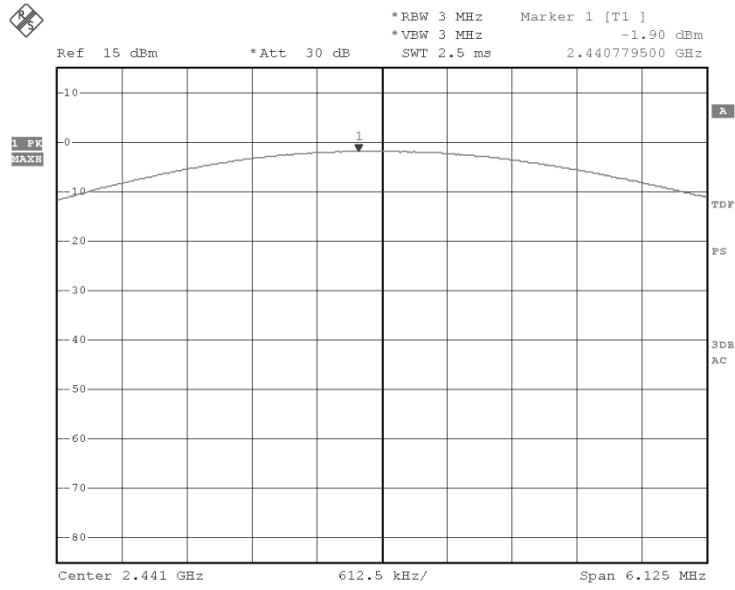
### GFSKHigh Channel



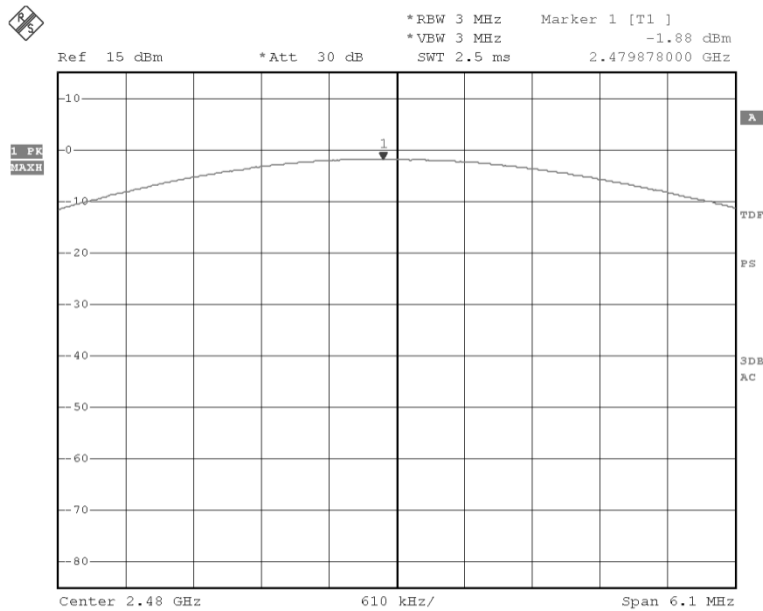
### Pi/4DQPSK LowChannel



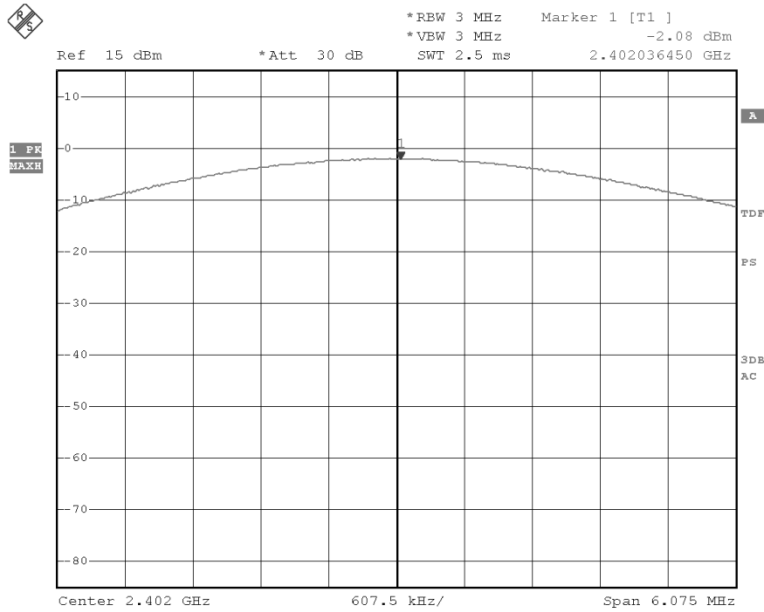
### Pi/4DQPSK Middle Channel



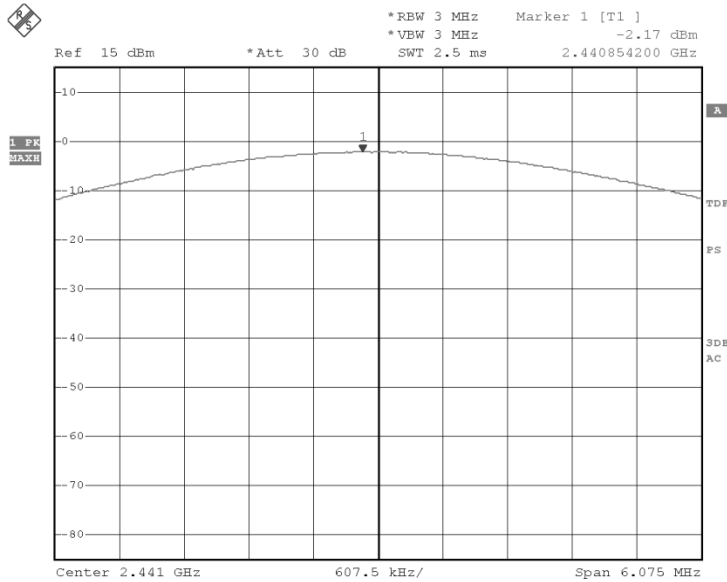
### Pi/4DQPSK High Channel



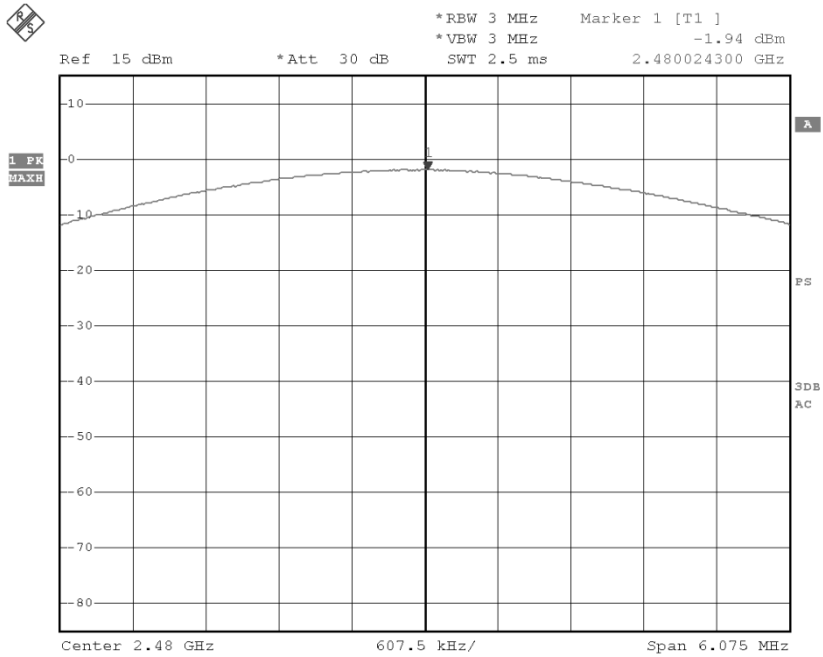
### 8DPSK Low Channel



### 8DPSK Middle Channel



8DPSK High Channel







### 11 Hopping Channel Separation

- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : ANSI C63.10:2013,DA 00-705
- Test Limit : Regulation 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 2400-2483.5MHz 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 1W.
- Test Mode : Hopping

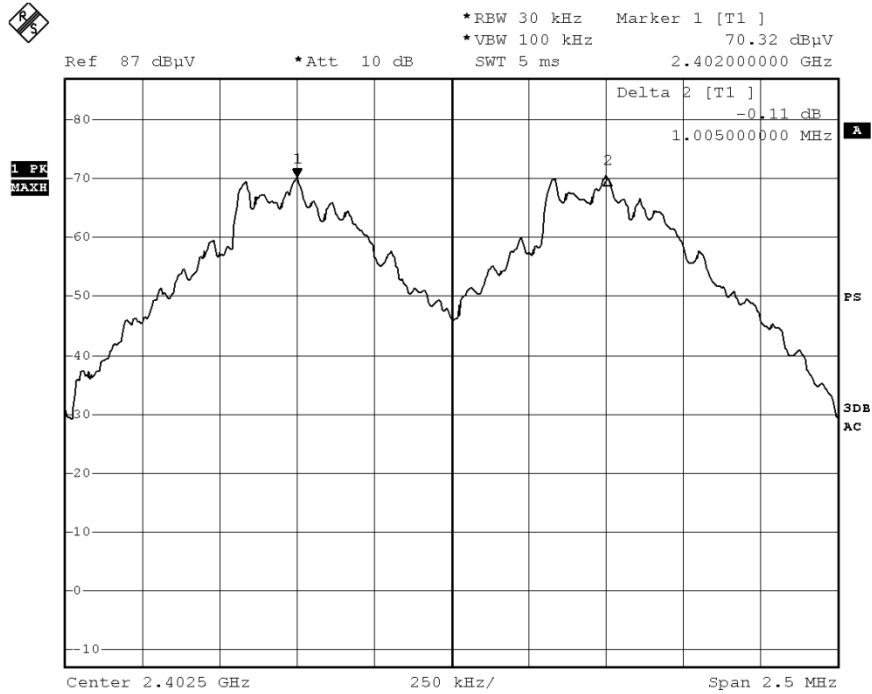
#### 11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30KHz. VBW = 100KHz , Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

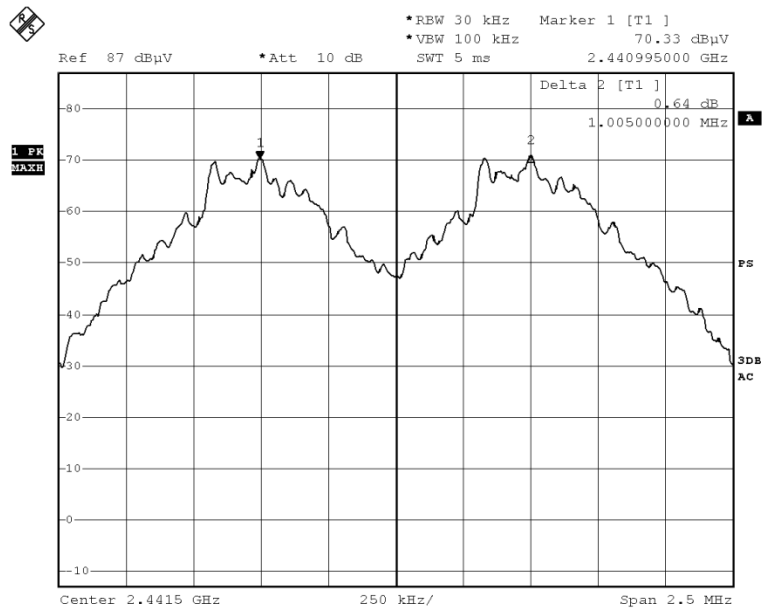
#### 11.2 Test Result

Modulation	Test Channel	Separation (MHz)	Limit (MHz)	Result
GFSK	Low	1.005	0.544	PASS
GFSK	Middle	1.005	0.563	PASS
GFSK	High	1.005	0.592	PASS
Pi/4 DQPSK	Low	1.005	0.813	PASS
Pi/4 DQPSK	Middle	1.005	0.817	PASS
Pi/4 DQPSK	High	1.005	0.813	PASS
8DPSK	Low	1.000	0.810	PASS
8DPSK	Middle	1.005	0.810	PASS
8DPSK	High	1.005	0.810	PASS

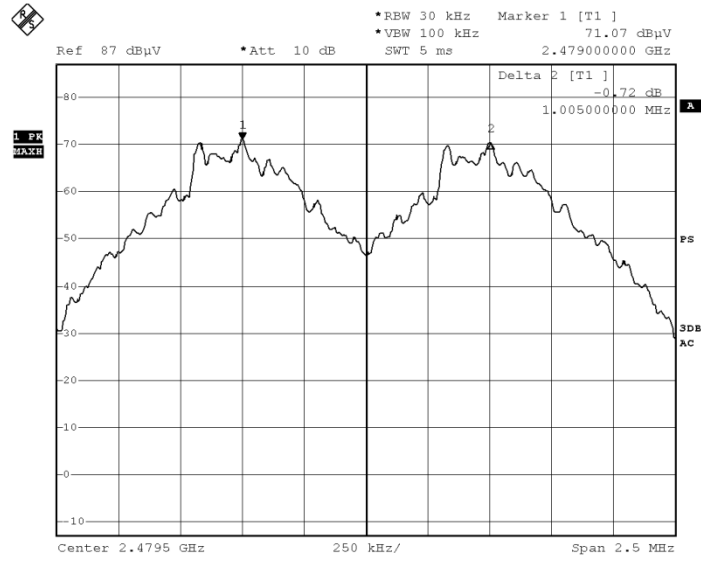
### GFSK Low Channel



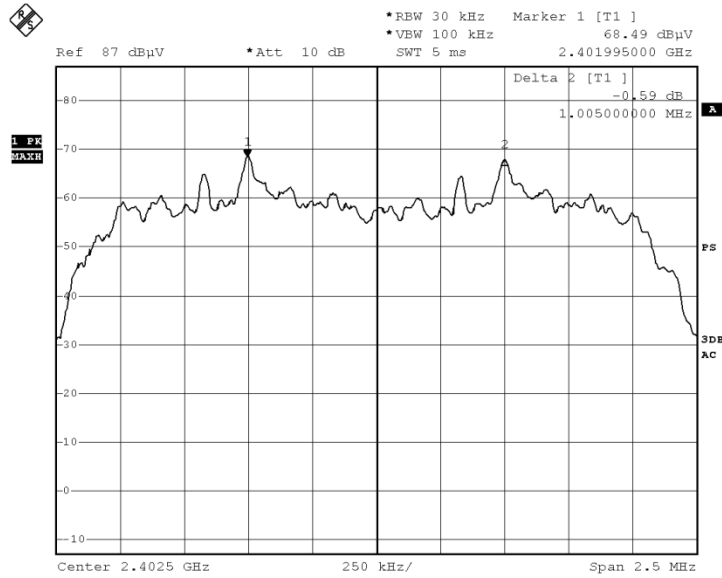
### GFSK Middle Channel



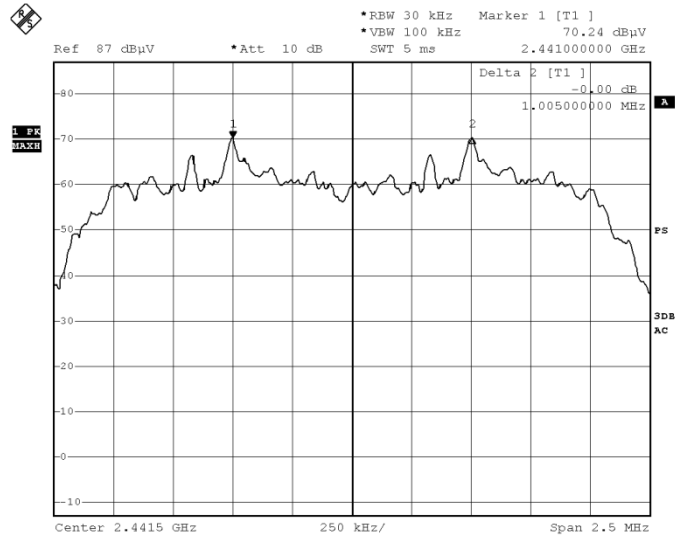
### GFSKHigh Channel



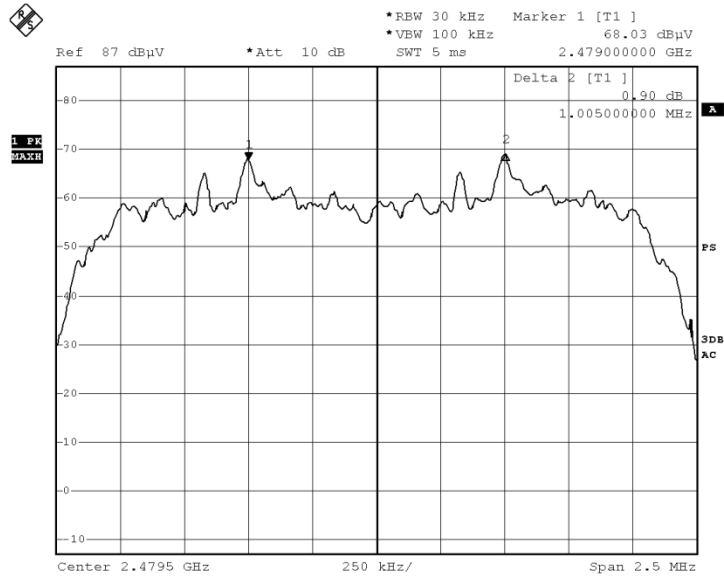
### Pi/4DQPSK LowChannel



Pi/4DQPSK Middle Channel

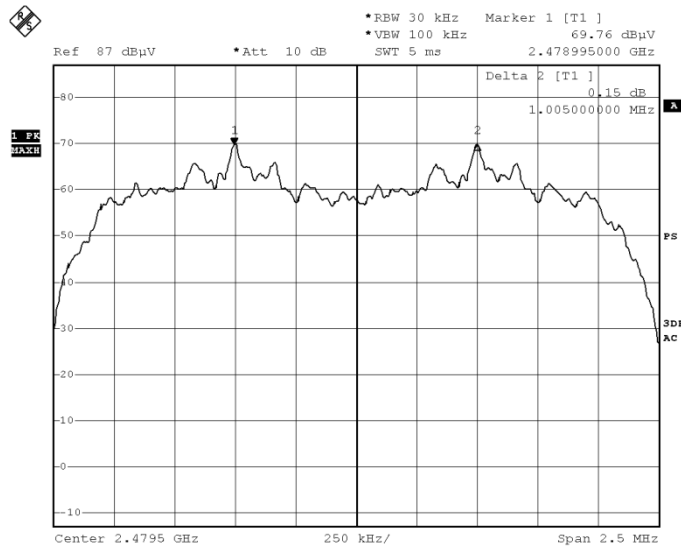


Pi/4DQPSK High Channel





8DPSK High Channel





### 12 Number of Hopping Frequency

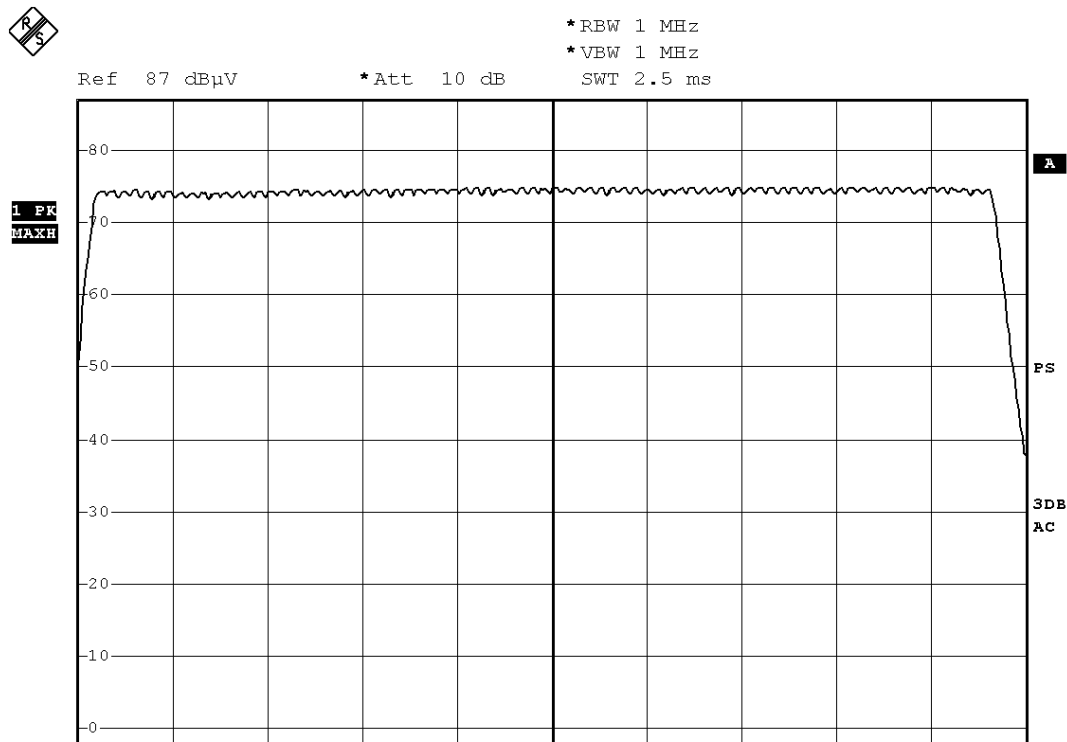
- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : ANSI C63.10:2013,DA 00-705
- Test Limit : Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
- Test Mode : Hopping(GFSK)

#### 12.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.483GHz. Sweep=auto;

#### 12.2 Test Result

Channel Number	Limit
79	≥15





### 13 Dwell Time

- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : ANSI C63.10:2013,DA 00-705
- Test Limit : Regulation 15.247(a)(1)(iii) Frequency hopping systems inthe 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.
- Test Mode : Hopping
- Remark : The worst case(8DPSK,3DH5) was recorded

#### 13.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. Centredon a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel.Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

#### 13.2 Test Result

DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

DH1 Packet permit maximum 1600 / 79 /2 hops per second in each channel (1 time slot RX, 1 time slot TX). So,the Dwell Time can be calculated as follows:

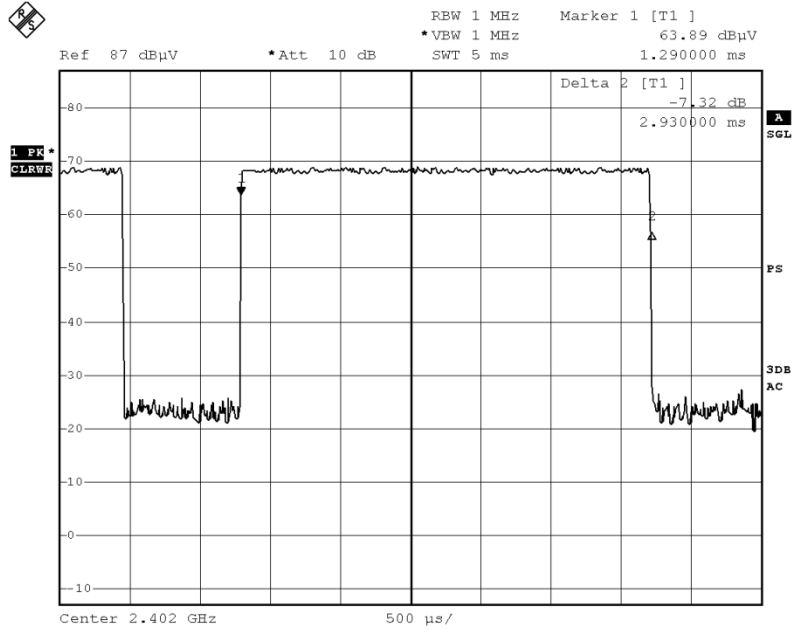
Data Packet	Dwell Time(s)
DH5/2DH5/3DH5	$1600/79/6*0.4*79*(MkrDelta)/1000$
DH3/2DH3/3DH3	$1600/79/4*0.4*79*(MkrDelta)/1000$
DH1/2DH1/3DH1	$1600/79/2*0.4*79*(MkrDelta)/1000$
Remark: Mkr Deltais once pulse time. Only the worst data(DH5) were show as follow.	



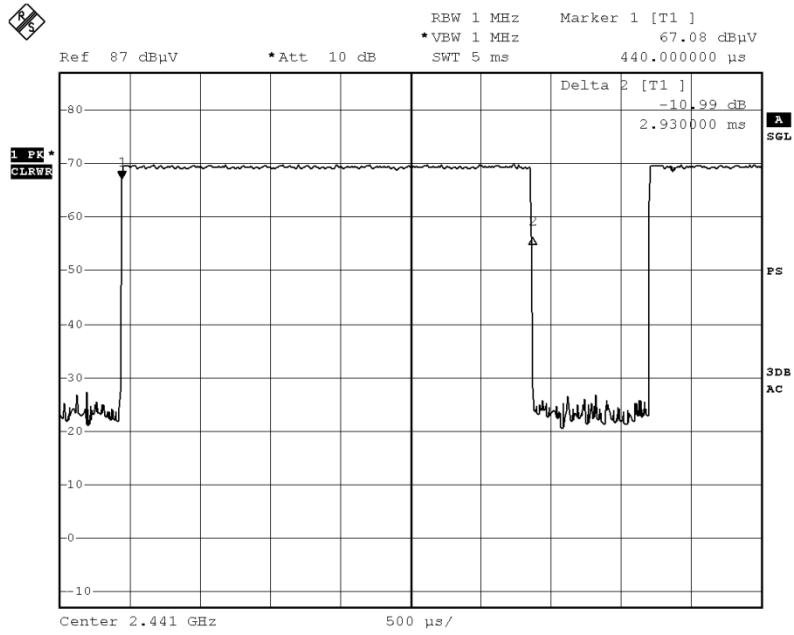


Modulation	Data Packet	Channel	pulse time(ms)	Dwell Time(s)	Limits(s)
8DPSK	3DH5	Low	2.930	0.313	0.4
		middle	2.930	0.313	0.4
		High	2.930	0.313	0.4

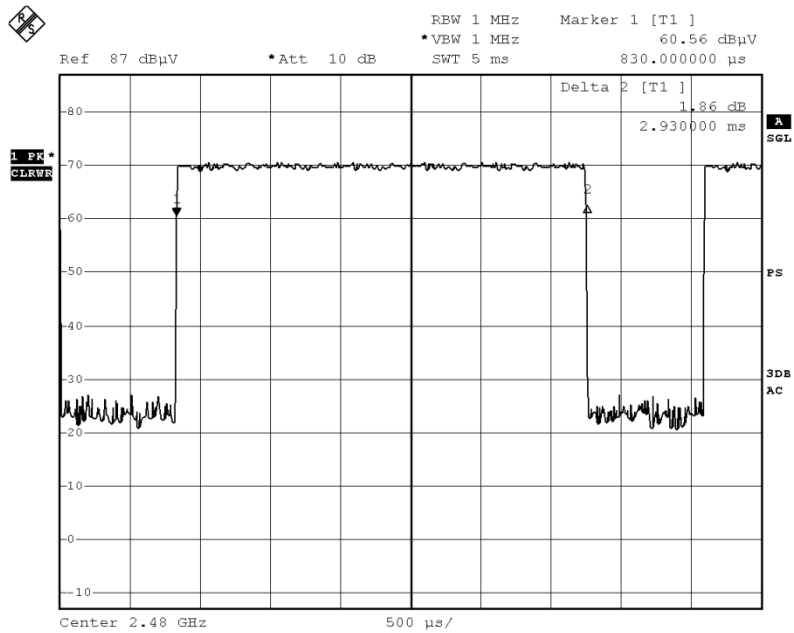
8DPSK Low Channel



### 8DPSK Middle Channel



### 8DPSK High Channel





## 14 Antenna Requirement

According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has a PCB printed antenna, it meet the requirement of this section.

\*\*\*\*\*THE END REPORT\*\*\*\*\*