TEST REPORT

Reference No.	:	WTS14S0918366E
FCC ID	:	2ACV7MF003F
Applicant.....	:	Beijing KiChina Co., Ltd.
Address.....	:	Room 302, Building 4, BeiWu New Technology Park, 23 BeiWuCun Road, HaiDian District, Beijing, China.
Manufacturer	:	The same as above
Address.....	:	The same as above
Product Name.....	:	Car Vehicle FM Transmitter
Model No.	:	MF 003F
Standards.....	:	FCC CFR47 Part 15 Section 15.247:2012
Date of Receipt sample	:	Sep.16, 2014
Date of Test	:	Sep.18~ Sep.22, 2014
Date of Issue.....	:	Nov.05, 2014
Test Result.....	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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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	15.107	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Maximum Peak 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
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

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4 General Information

4.1 General Description of E.U.T.

Product Name : Car Vehicle FM Transmitter

Model No. : MF 003F

Operation Frequency : 2402MHz ~ 2480MHz, 79 channels in total

Type of Modulation : GFSK, Pi/4DQPSK, 8DPSK

The lowest oscillator : 24MHz

Antenna installation : Internal permanent antenna

Antenna Gain : 0dBi

4.2 Details of E.U.T.

Technical Data : DC 5V by USB Charging

DC 3.7V Power supply by battery

4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	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	-	-

4.4 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

4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

  Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A-1, July 12, 2012.

- **FCC – Registration No.: 880581**

  Waltek Services (Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.18,2014	Sep.17,2015
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.18,2014	Sep.17,2015
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.18,2014	Sep.17,2015
4.	Cable	LARGE	RF300	-	Sep.18,2014	Sep.17,2015
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2014	Sep.17,2015
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.18,2014	Sep.17,2015
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2014	Apr.18,2015
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2014	Sep.17,2015
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2014	Apr.18,2015
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.19,2014	Apr.18,2015
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2014	Mar.16,2015
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.10,2014	Apr.09,2015
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer	R&S	ESCI	101155	Sep.18,2014	Sep.17,2015
2.	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	May 16,2014	May 15,2015
3.	DC Power Supply	EVERFINE	WY305	1004002	Apr.11,2014	Apr.10,2015

5.2 Description of Support Units

Equipment	**Manufacturer**	**Model No.**	**Series No.**
MacBook Air	APPLE	A1465 (EW03039-1)	C17KTQDNF5N7

5.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R. China.

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.107
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dBμV between 0.15MHz & 0.5MHz
	56 dBμV between 0.5MHz & 5MHz
	60 dBμV between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment **:**

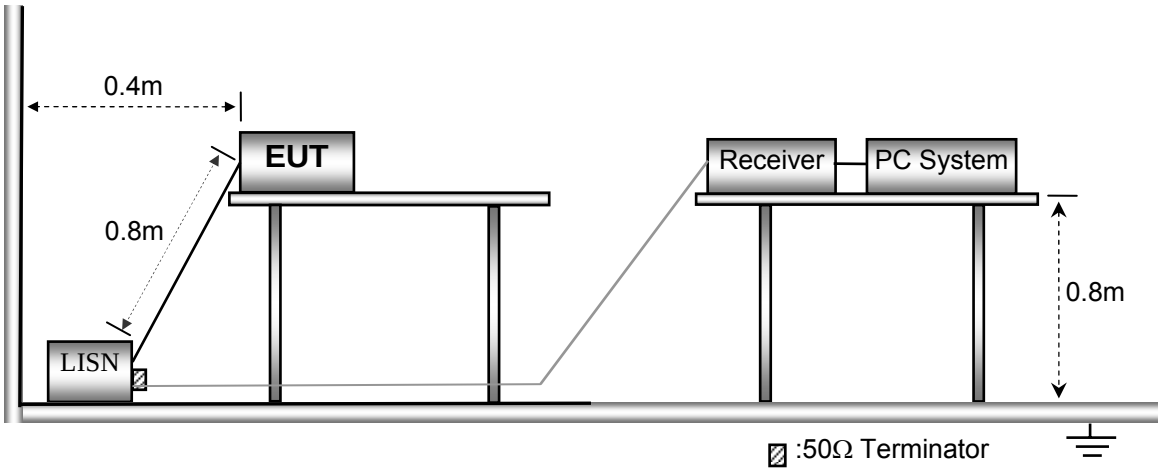
Temperature:	22.8 °C
Humidity:	51.3 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation **:**

The test was performed in charging mode(the EUT cannot be transmitting with charging)

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.

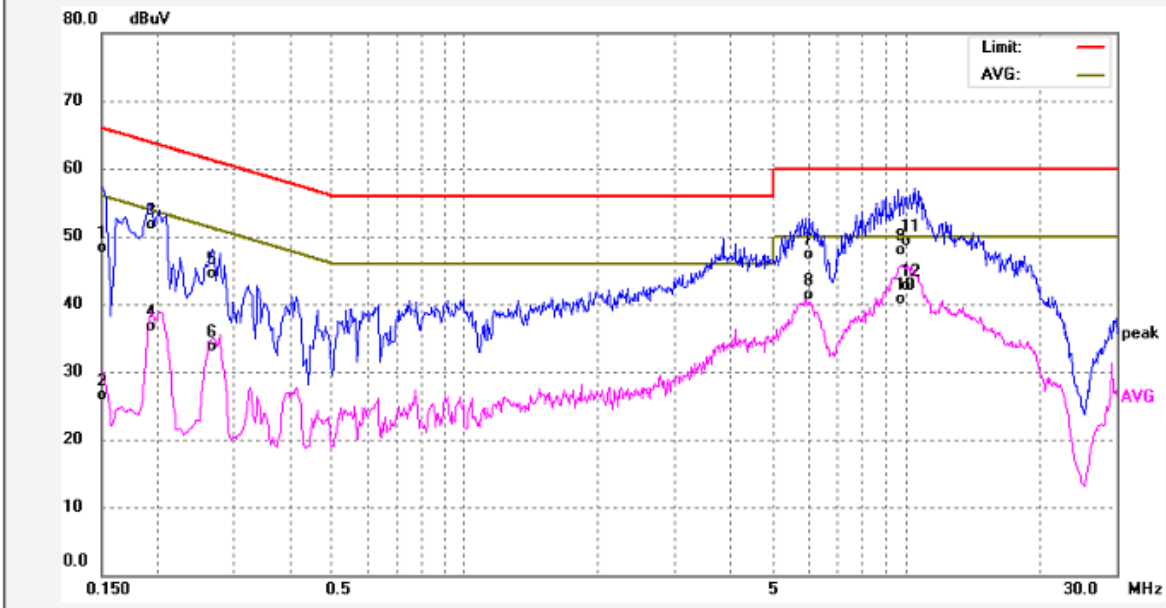


6.3 Measurement Description

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.

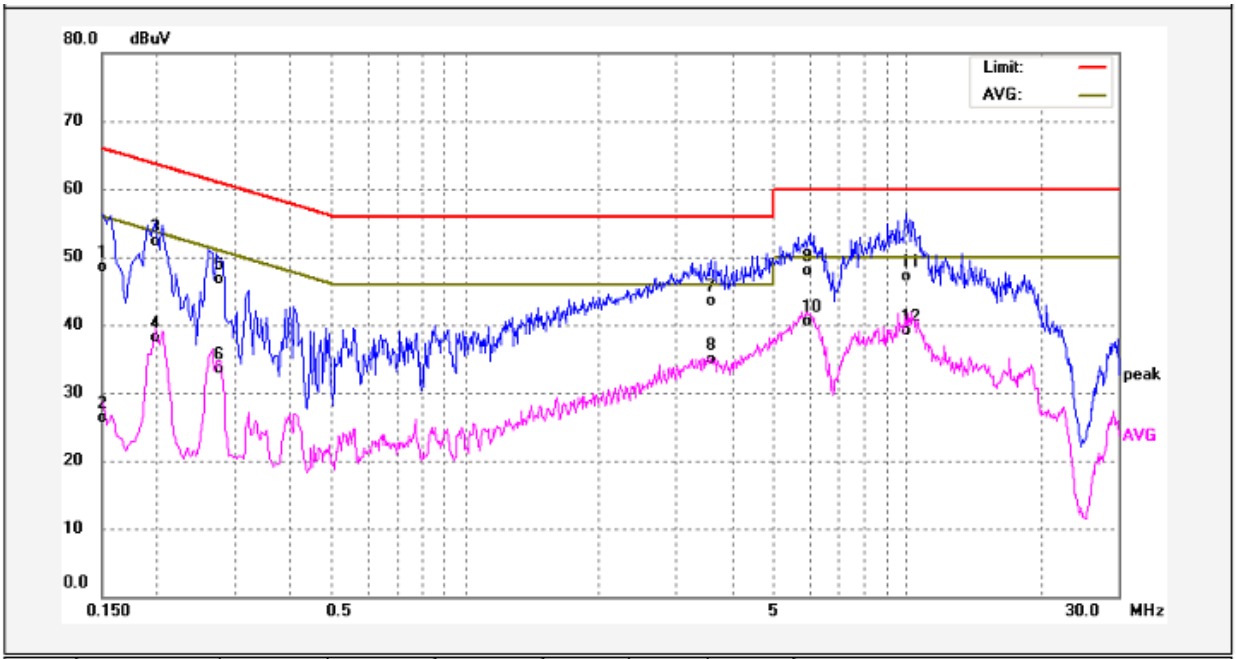
6.4 Conducted Emission Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	37.75	10.57	48.32	65.99	-17.67	QP	
2	0.1500	15.89	10.57	26.46	55.99	-29.53	AVG	
3	0.1940	41.20	10.57	51.77	63.86	-12.09	QP	
4	0.1940	26.15	10.57	36.72	53.86	-17.14	AVG	
5	0.2672	33.90	10.57	44.47	61.20	-16.73	QP	
6	0.2672	23.06	10.57	33.63	51.20	-17.57	AVG	
7	6.0300	36.46	10.75	47.21	60.00	-12.79	QP	
8	6.0300	30.46	10.75	41.21	50.00	-8.79	AVG	
9	9.6059	37.06	10.80	47.86	60.00	-12.14	QP	
10	9.6059	29.83	10.80	40.63	50.00	-9.37	AVG	
11	10.0060	38.48	10.81	49.29	60.00	-10.71	QP	
12	10.0060	31.82	10.81	42.63	50.00	-7.37	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	37.90	10.57	48.47	65.99	-17.52	QP	
2	0.1500	15.76	10.57	26.33	55.99	-29.66	AVG	
3	0.1980	41.82	10.57	52.39	63.69	-11.30	QP	
4	0.1980	27.45	10.57	38.02	53.69	-15.67	AVG	
5	0.2740	36.12	10.57	46.69	60.99	-14.30	QP	
6	0.2740	22.91	10.57	33.48	50.99	-17.51	AVG	
7	3.5900	32.37	11.04	43.41	56.00	-12.59	QP	
8	3.5900	23.87	11.04	34.91	46.00	-11.09	AVG	
9	6.0020	37.13	10.74	47.87	60.00	-12.13	QP	
10	6.0020	29.77	10.74	40.51	50.00	-9.49	AVG	
11	9.9260	36.24	10.81	47.05	60.00	-12.95	QP	
12	9.9260	28.27	10.81	39.08	50.00	-10.92	AVG	

7 Radiated Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: DA 00-705

Test Result: PASS

Measurement Distance: 3m

Limit:

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)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment **:**

Temperature: 22.5 °C

Humidity: 51.9 % RH

Atmospheric Pressure: 101.2kPa

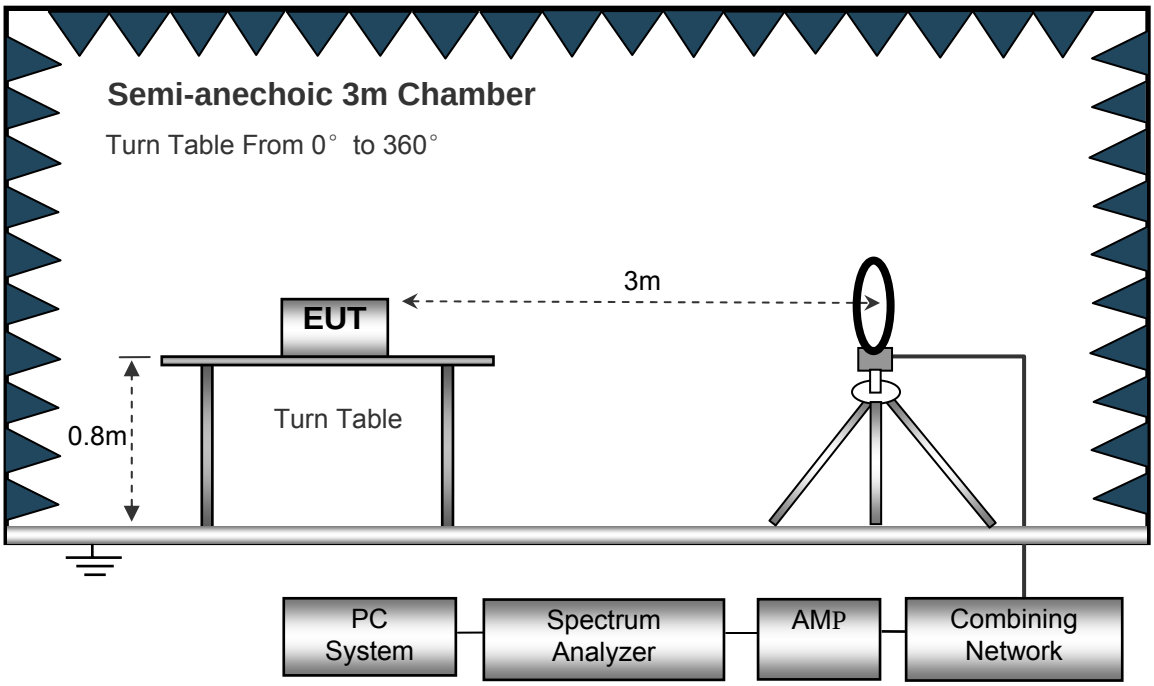
EUT Operation **:**

The test was performed in transmitting mode, the test data were shown in the report.

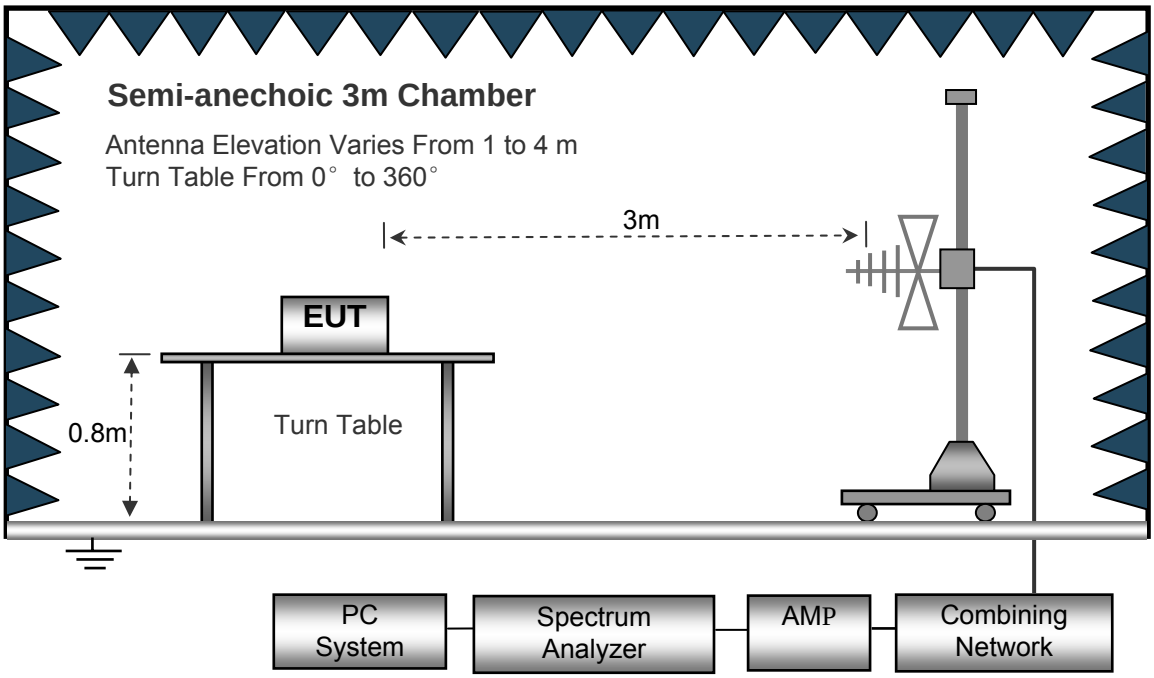
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

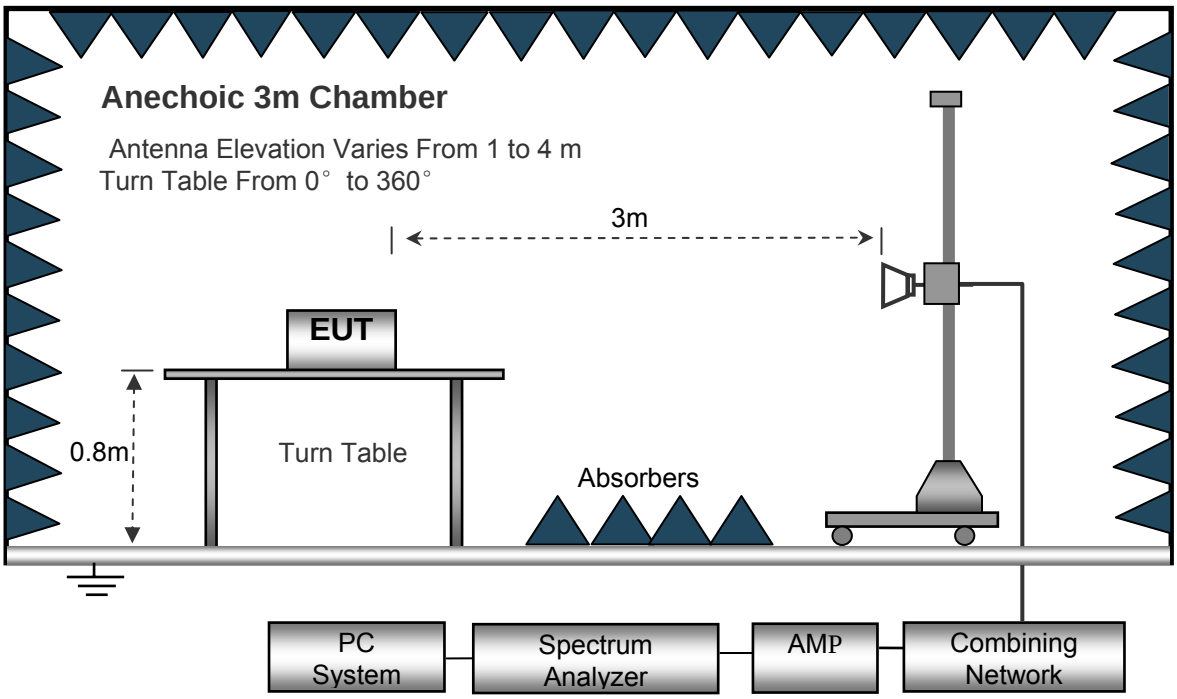
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 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

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
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.

7.5 Summary of Test Results

Test Frequency: 24MHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 18GHz

Remark: only the worst data (GFSK modulation mode) were reported.

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel									
535.18	14.45	PK	341	1.6	H	22.74	37.19	46.00	-8.81
535.18	10.32	PK	175	1.2	V	22.74	33.06	46.00	-12.94
4804.00	64.62	PK	225	1.3	V	-2.36	62.26	74.00	-11.74
4804.00	42.49	Ave	225	1.3	V	-2.36	40.13	54.00	-13.87
7206.00	62.93	PK	323	1.0	H	1.33	64.26	74.00	-9.74
7206.00	41.85	Ave	323	1.0	H	1.33	43.18	54.00	-10.82
2343.67	46.80	PK	322	1.3	V	-13.19	33.61	74.00	-40.39
2343.67	39.48	Ave	322	1.3	V	-13.19	26.29	54.00	-27.71
2389.97	43.15	PK	66	1.6	H	-13.14	30.01	74.00	-43.99
2389.97	36.28	Ave	66	1.6	H	-13.14	23.14	54.00	-30.86
2491.03	43.48	PK	66	1.4	V	-13.08	30.40	74.00	-43.60
2491.03	38.11	Ave	66	1.4	V	-13.08	25.03	54.00	-28.97

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Middle Channel									
535.18	14.25	PK	330	1.3	H	22.74	36.99	46.00	-9.01
535.18	10.62	PK	115	1.9	V	22.74	33.36	46.00	-12.64
4882.00	64.70	PK	143	1.4	V	-2.30	62.40	74.00	-11.60
4882.00	43.18	Ave	143	1.4	V	-2.30	40.88	54.00	-13.12
7323.00	62.85	PK	322	1.6	H	2.21	65.06	74.00	-8.94
7323.00	40.13	Ave	322	1.6	H	2.21	42.34	54.00	-11.66
2341.31	45.57	PK	239	1.5	V	-13.19	32.38	74.00	-41.62
2341.31	38.43	Ave	239	1.5	V	-13.19	25.24	54.00	-28.76
2351.59	42.31	PK	15	1.5	H	-13.14	29.17	74.00	-44.83
2351.59	36.71	Ave	15	1.5	H	-13.14	23.57	54.00	-30.43
2490.00	42.84	PK	280	1.2	V	-13.08	29.76	74.00	-44.24
2490.00	37.95	Ave	280	1.2	V	-13.08	24.87	54.00	-29.13

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
GFSK High Channel									
535.18	13.27	PK	274	2.0	H	22.74	36.01	46.00	-9.99
535.18	12.48	PK	266	1.5	V	22.74	35.22	46.00	-10.78
4960.00	65.35	PK	231	1.2	V	0.05	65.40	74.00	-8.60
4960.00	44.23	Ave	231	1.2	V	0.05	44.28	54.00	-9.72
7440.00	62.67	PK	84	1.9	H	2.84	65.51	74.00	-8.49
7440.00	41.39	Ave	84	1.9	H	2.84	44.23	54.00	-9.77
2340.40	45.57	PK	65	1.4	V	-13.19	32.38	74.00	-41.62
2340.40	37.42	Ave	65	1.4	V	-13.19	24.23	54.00	-29.77
2350.04	44.71	PK	230	1.6	H	-13.14	31.57	74.00	-42.43
2350.04	38.15	Ave	230	1.6	H	-13.14	25.01	54.00	-28.99
2493.62	43.90	PK	176	1.8	V	-13.08	30.82	74.00	-43.18
2493.62	38.96	Ave	176	1.8	V	-13.08	25.88	54.00	-28.12

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported

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:	DA 00-705
Test Mode:	Transmitting & Hopping

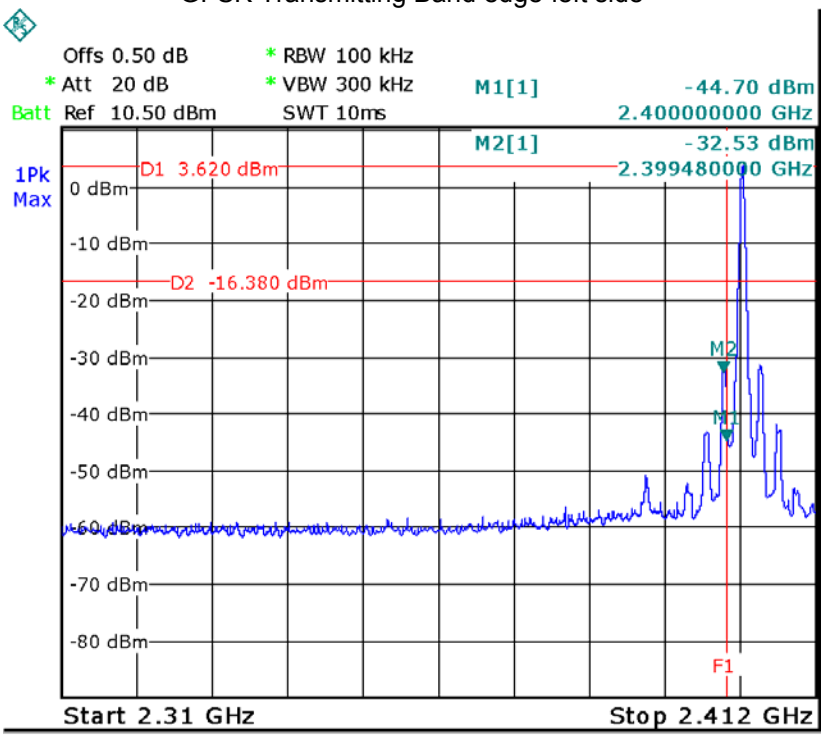
8.1 Test Procedure

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 = 100kHz, VBW = 300kHz, Sweep = auto
   Detector function = peak, Trace = max hold

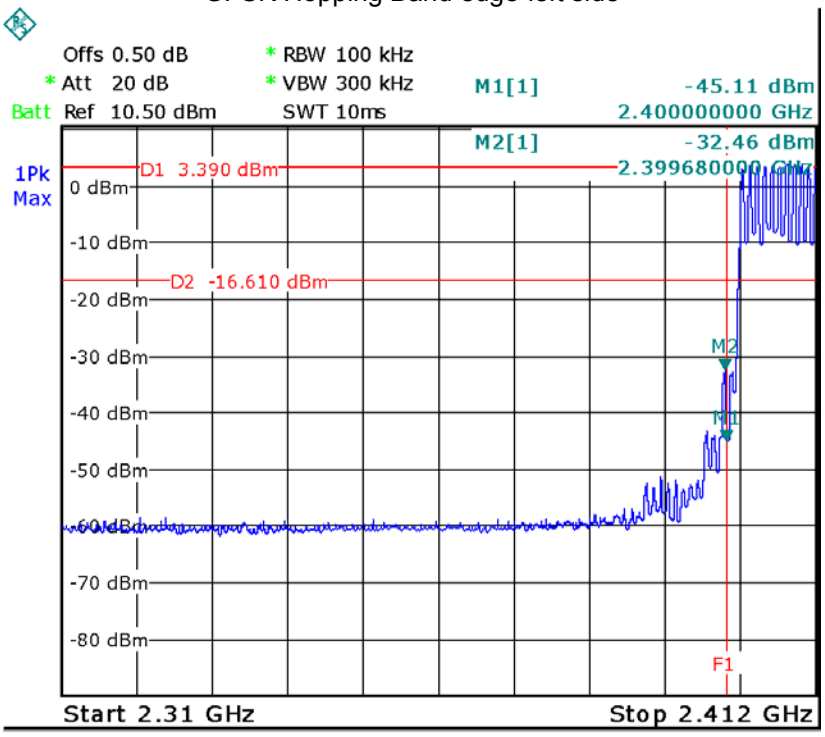
8.2 Test Result

Test plots

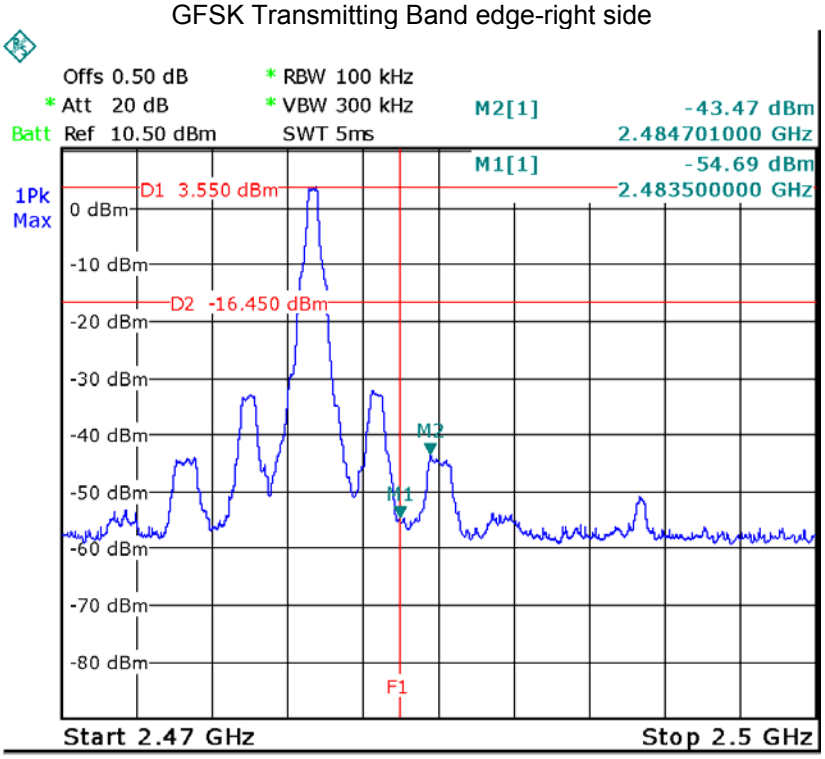
GFSK Transmitting Band edge-left side



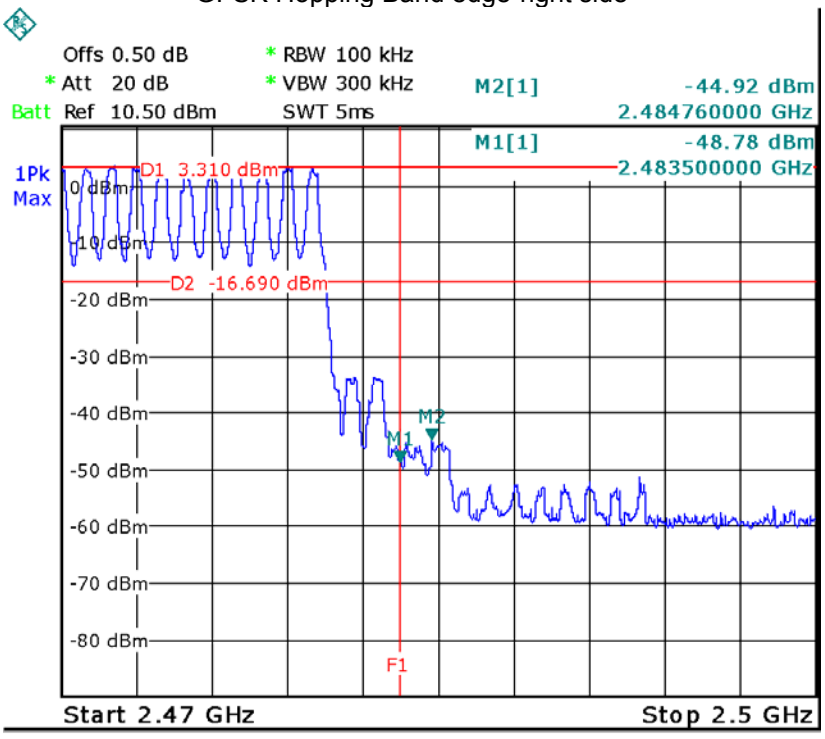
GFSK Hopping Band edge-left side



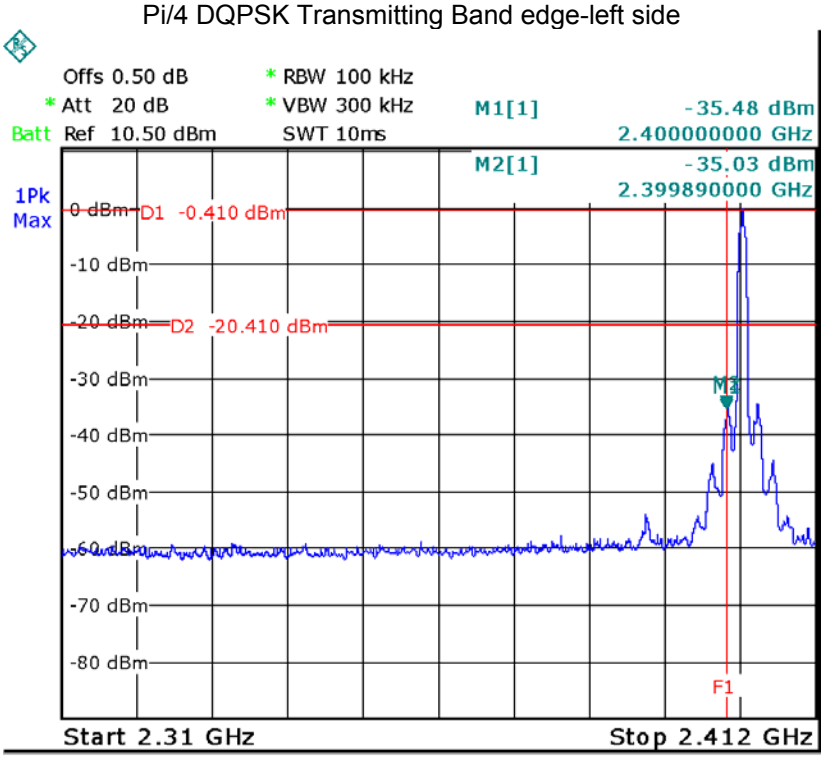
GFSK Transmitting Band edge-right side



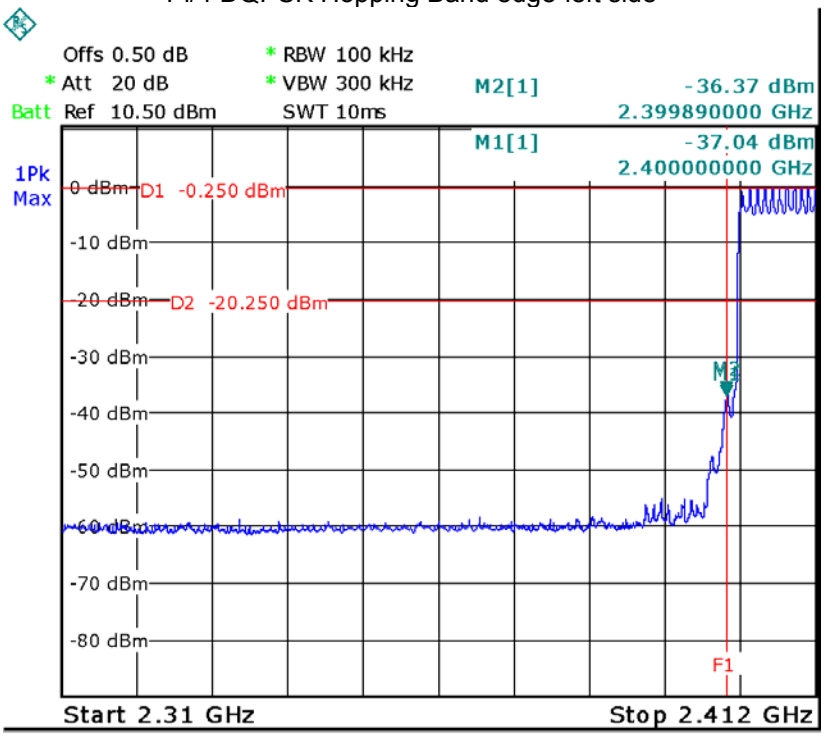
GFSK Hopping Band edge-right side



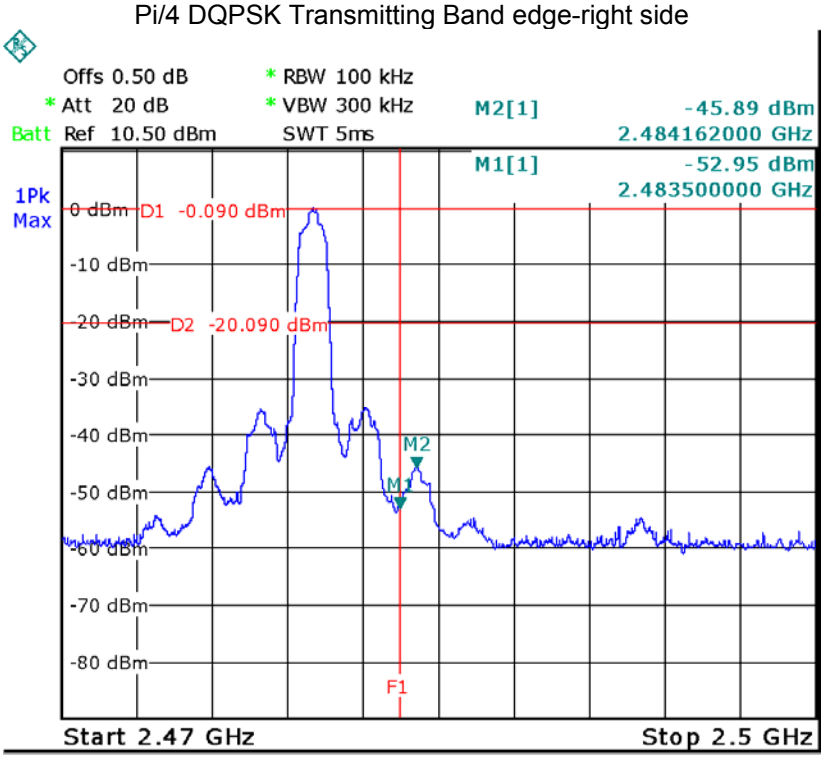
Pi/4 DQPSK Transmitting Band edge-left side



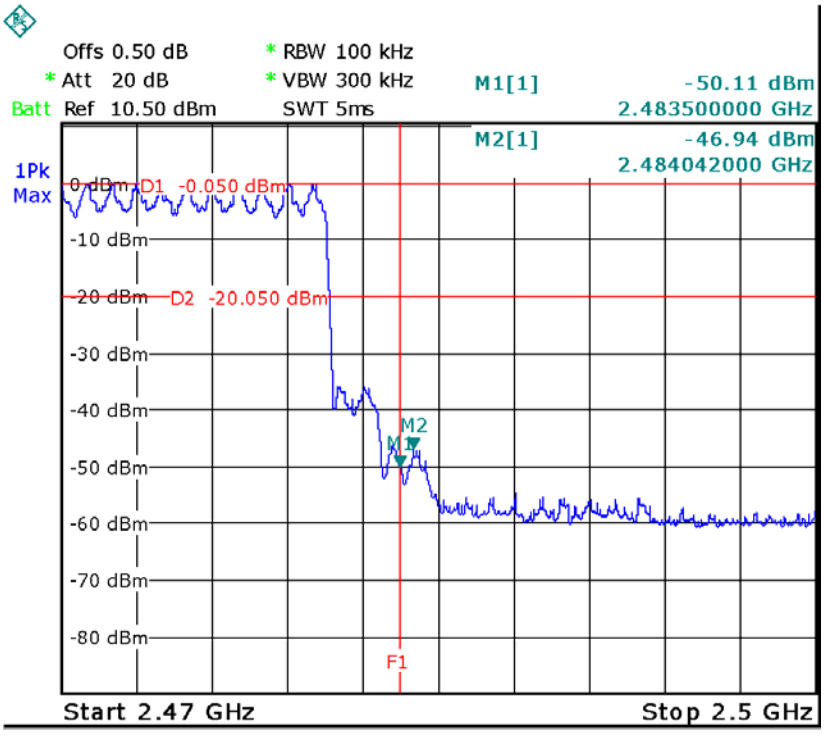
Pi/4 DQPSK Hopping Band edge-left side



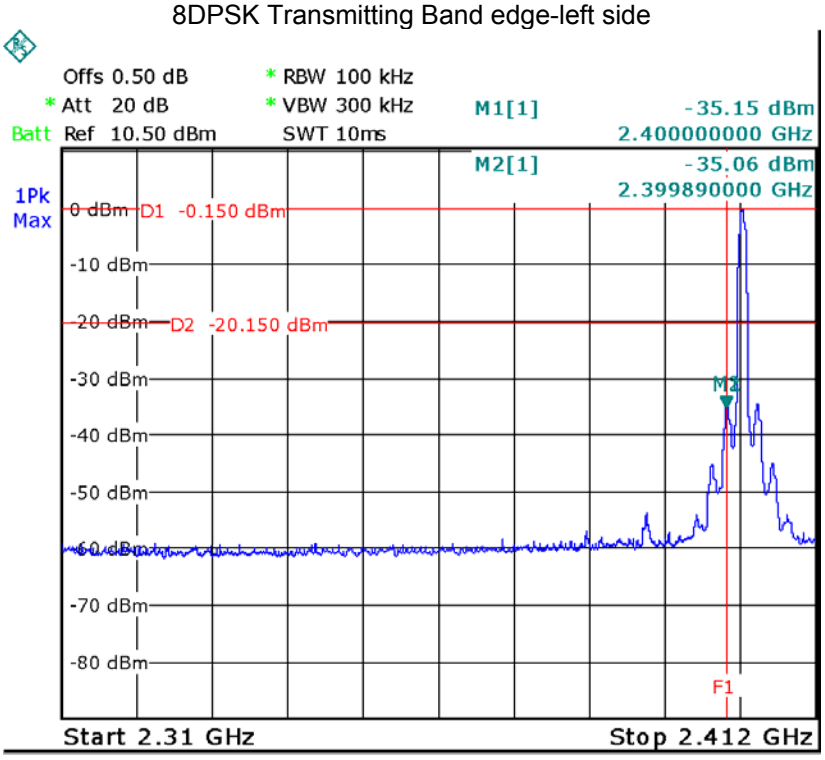
Pi/4 DQPSK Transmitting Band edge-right side



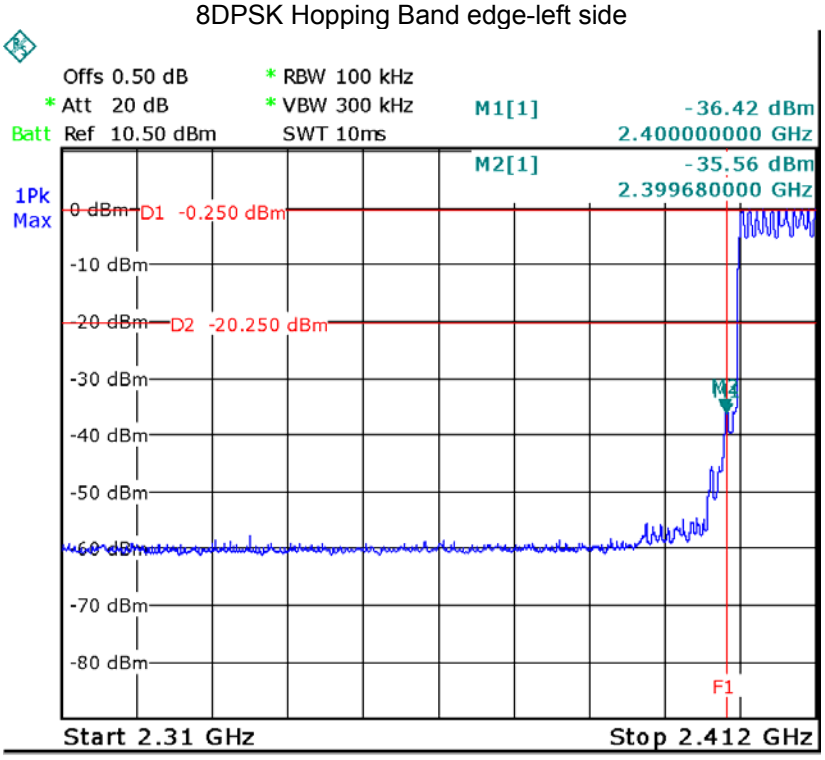
Pi/4 DQPSK Hopping Band edge-right side



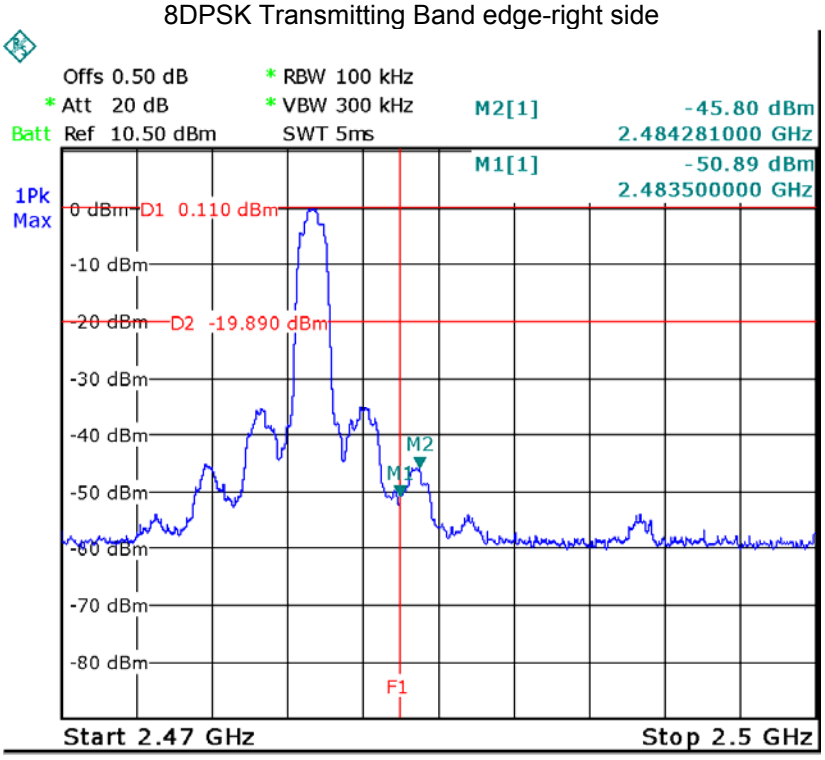
8DPSK Transmitting Band edge-left side



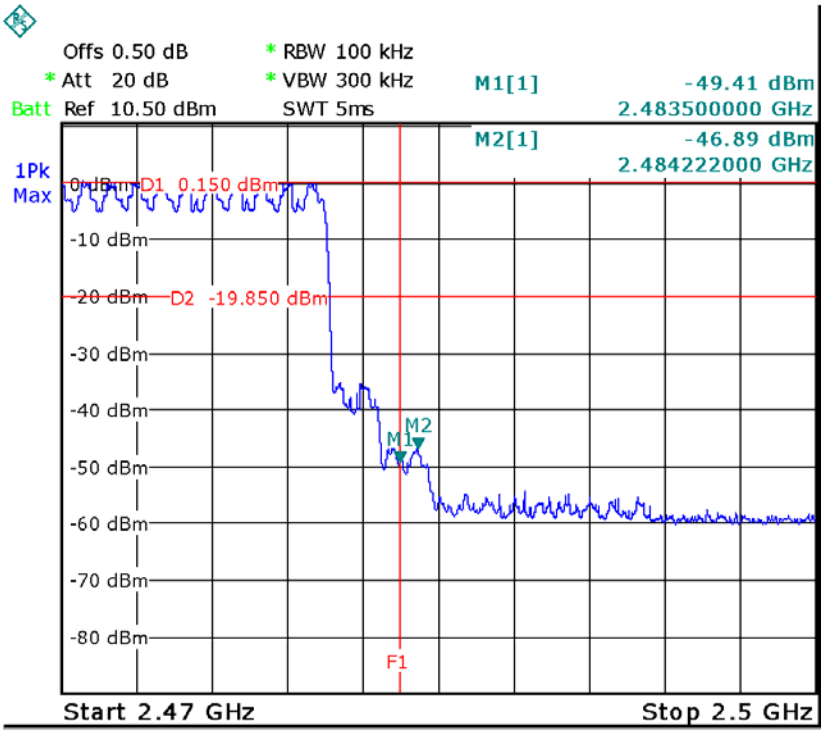
8DPSK Hopping Band edge-left side



8DPSK Transmitting Band edge-right side



8DPSK Hopping Band edge-right side



9 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Mode: Test in fixing operating frequency at low, Middle, high channel.

9.1 Test Procedure

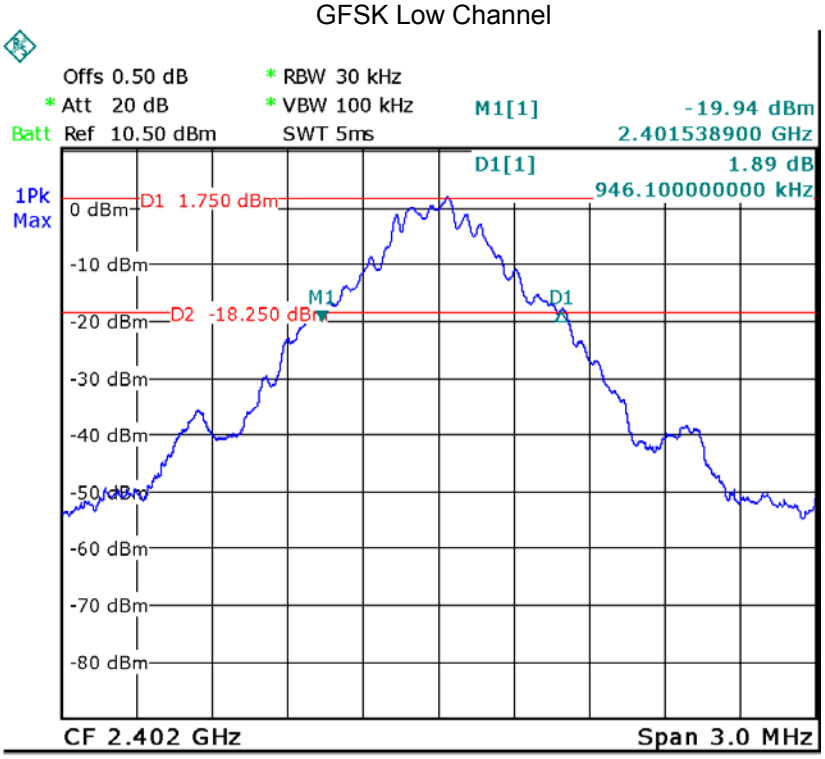
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

9.2 Test Result

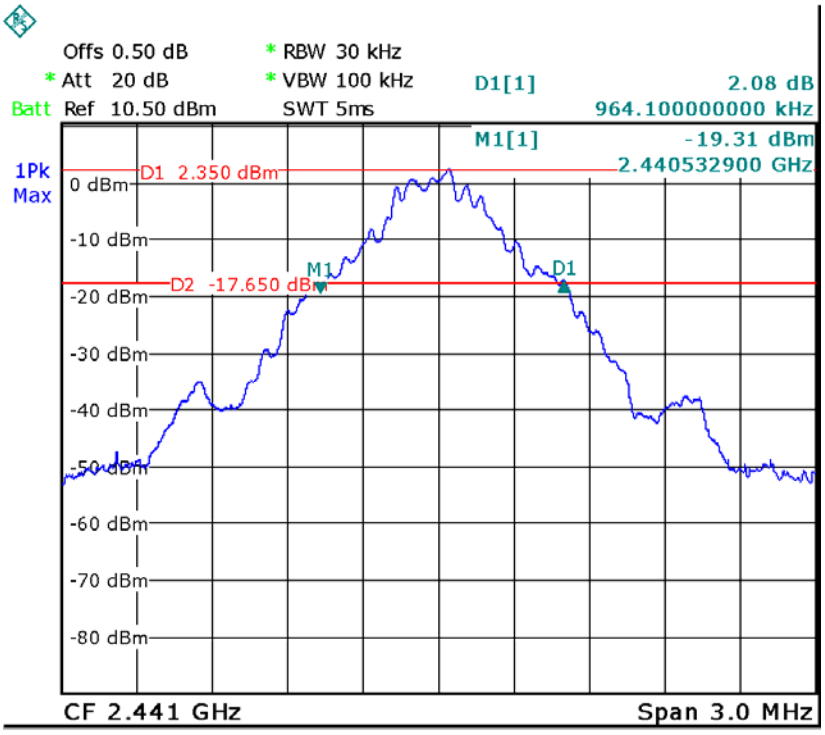
Modulation	Test Channel	Bandwidth
GFSK	Low	0.9461MHz
GFSK	Middle	0.9641MHz
GFSK	High	0.9641MHz
Pi/4 DQPSK	Low	1.3114MHz
Pi/4 DQPSK	Middle	1.3114MHz
Pi/4 DQPSK	High	1.3114MHz
8DPSK	Low	1.2695MHz
8DPSK	Middle	1.2695MHz
8DPSK	High	1.2695MHz

Test plots

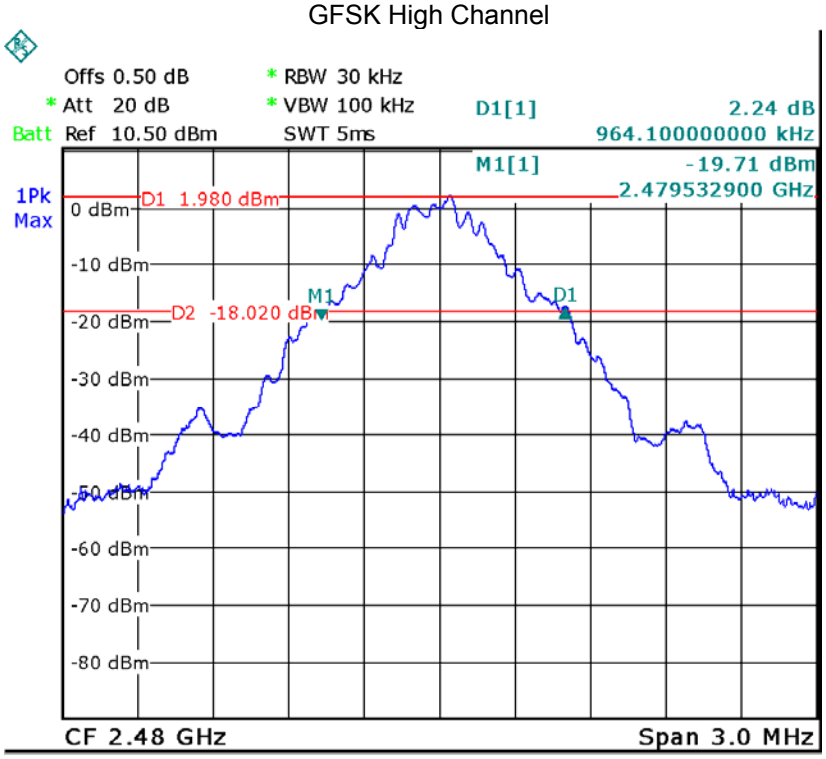
GFSK Low Channel



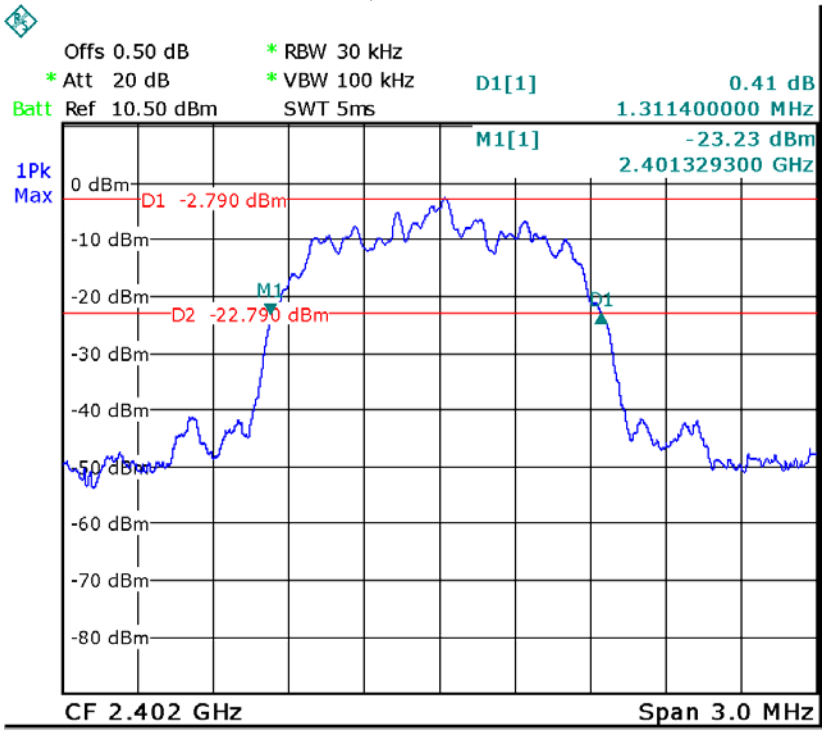
GFSK Middle Channel



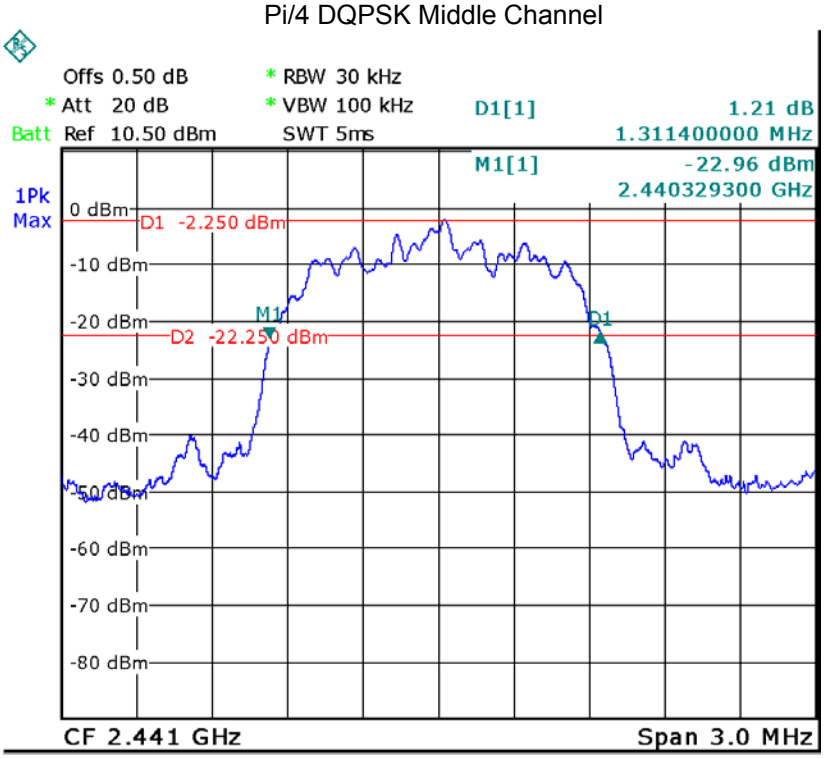
GFSK High Channel



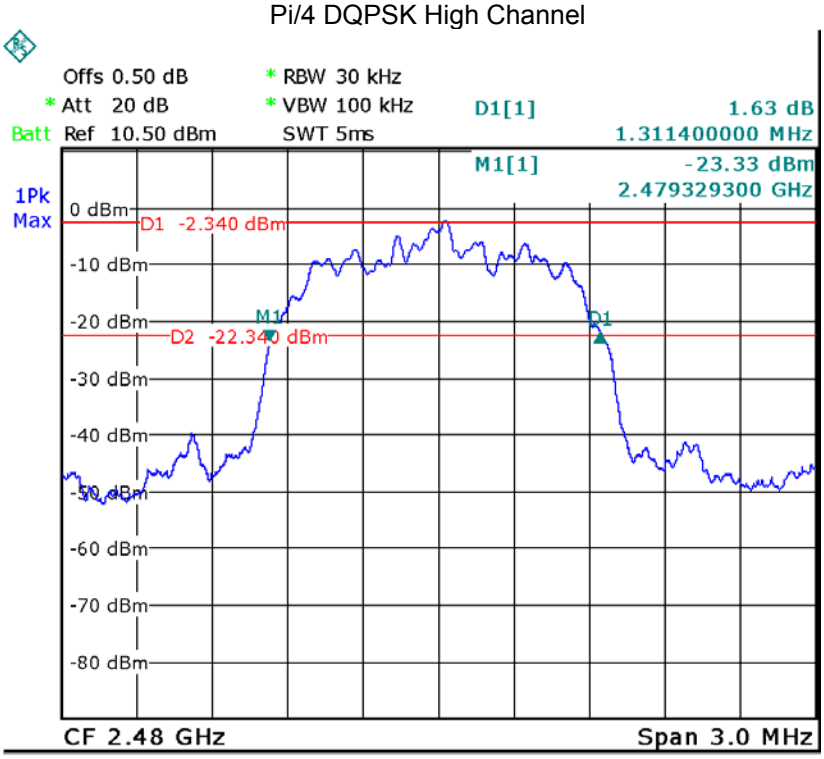
Pi/4 DQPSK Low Channel



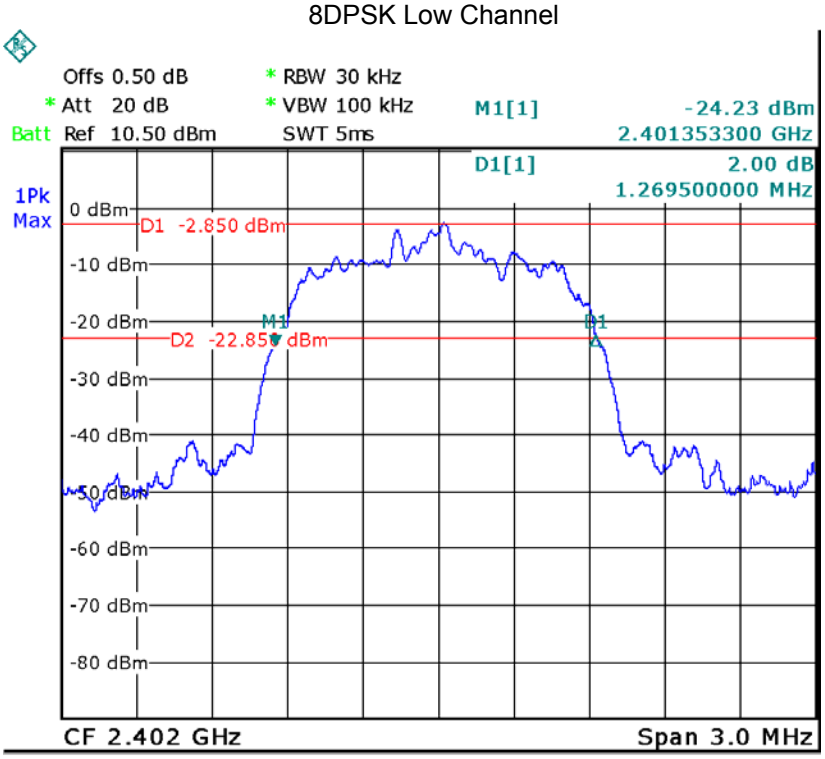
Pi/4 DQPSK Middle Channel



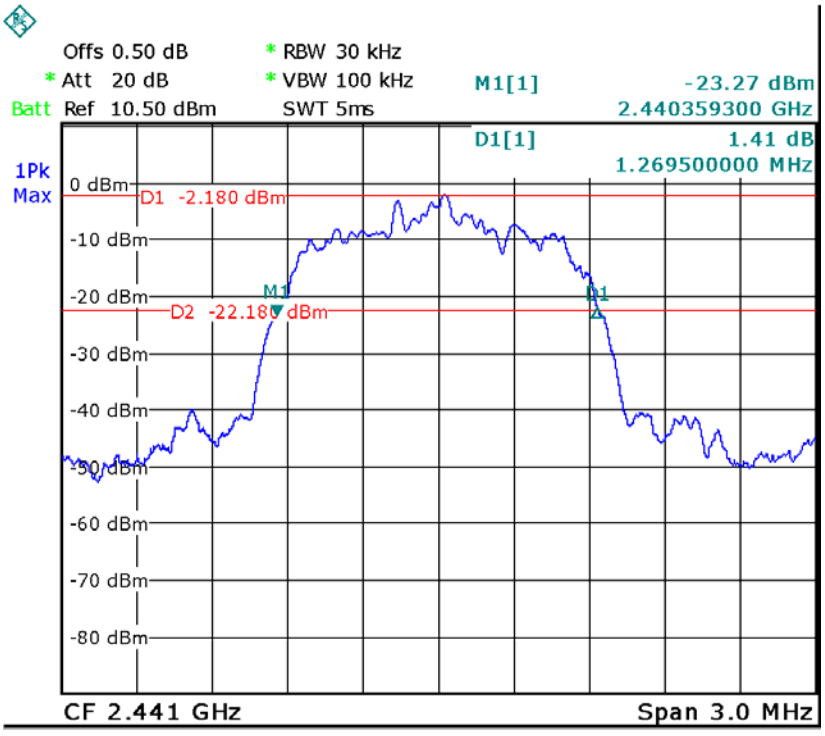
Pi/4 DQPSK High Channel



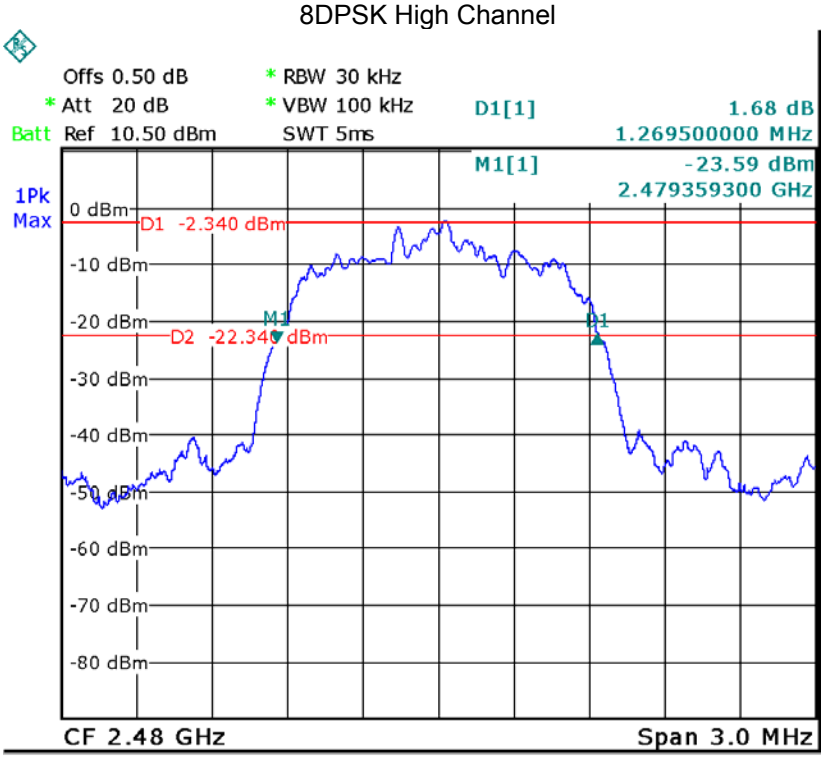
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



10 Maximum Peak Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	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 1watts (30dBm) limit applies.
Test mode:	Test in fixing frequency transmitting mode.

10.1 Test Procedure

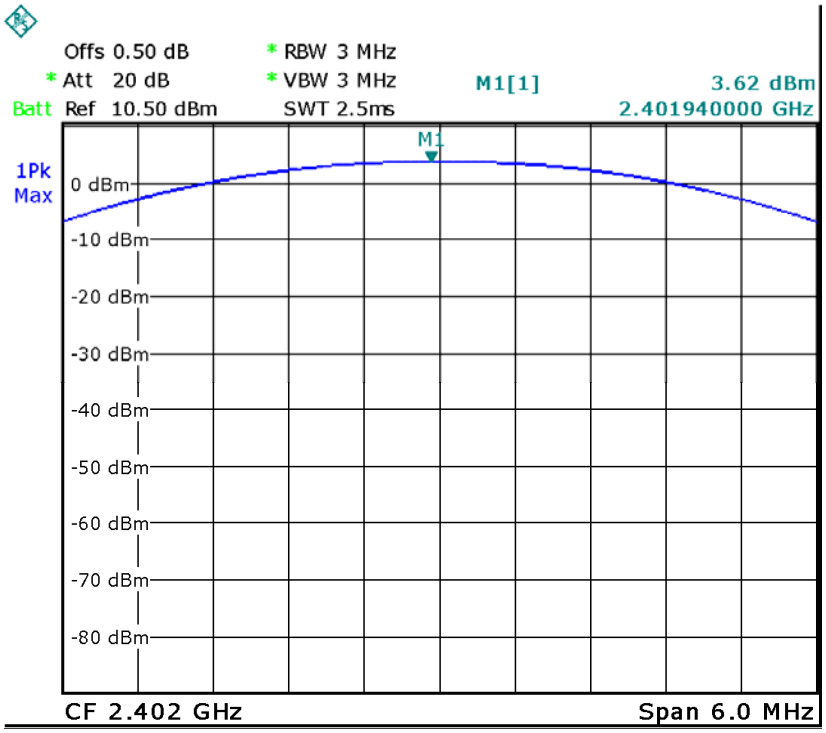
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

10.2 Test Result

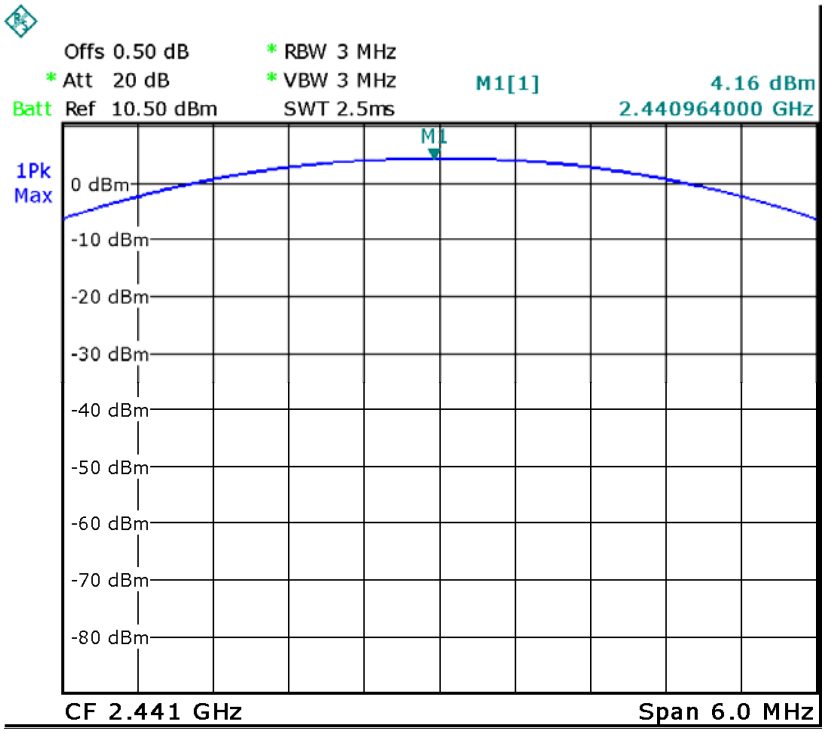
Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Low	3.62	30
GFSK	Middle	4.16	30
GFSK	High	3.83	30
Pi/4 DQPSK	Low	2.66	21
Pi/4 DQPSK	Middle	3.17	21
Pi/4 DQPSK	High	2.76	21
8DPSK	Low	3.27	21
8DPSK	Middle	3.78	21
8DPSK	High	3.49	21

Test plots

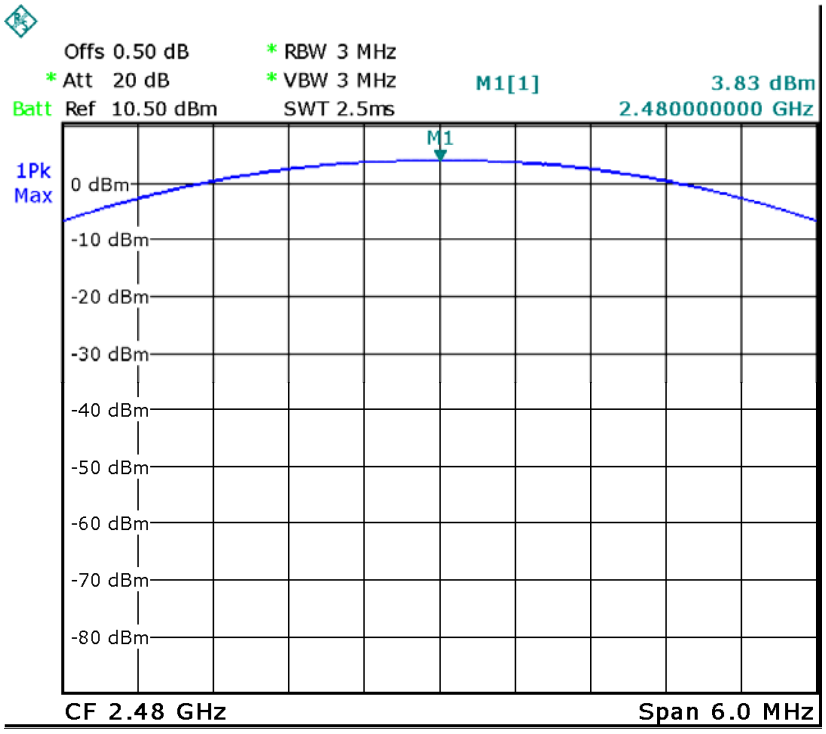
GFSK Low Channel



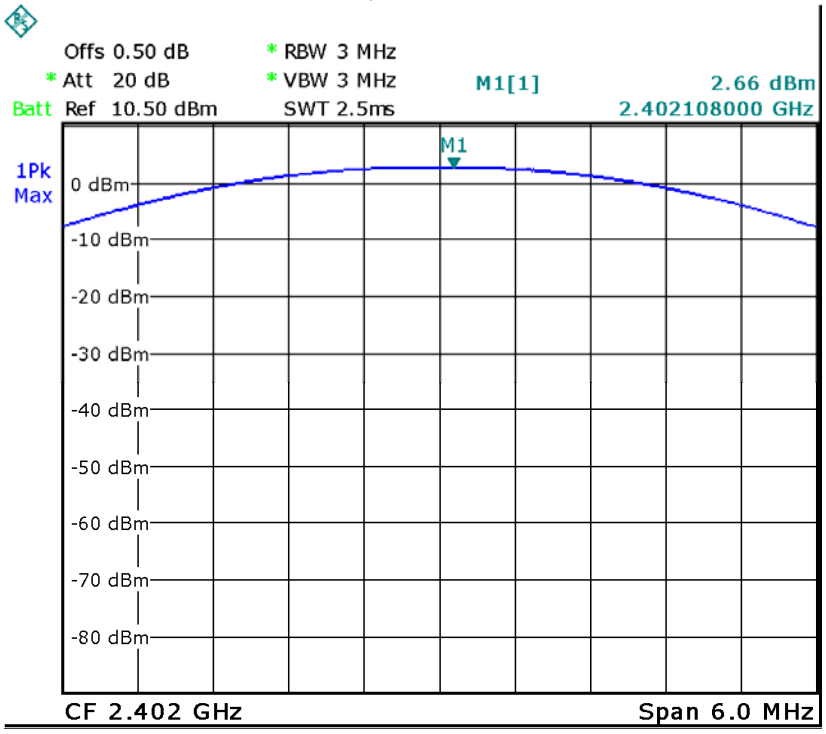
GFSK Middle Channel



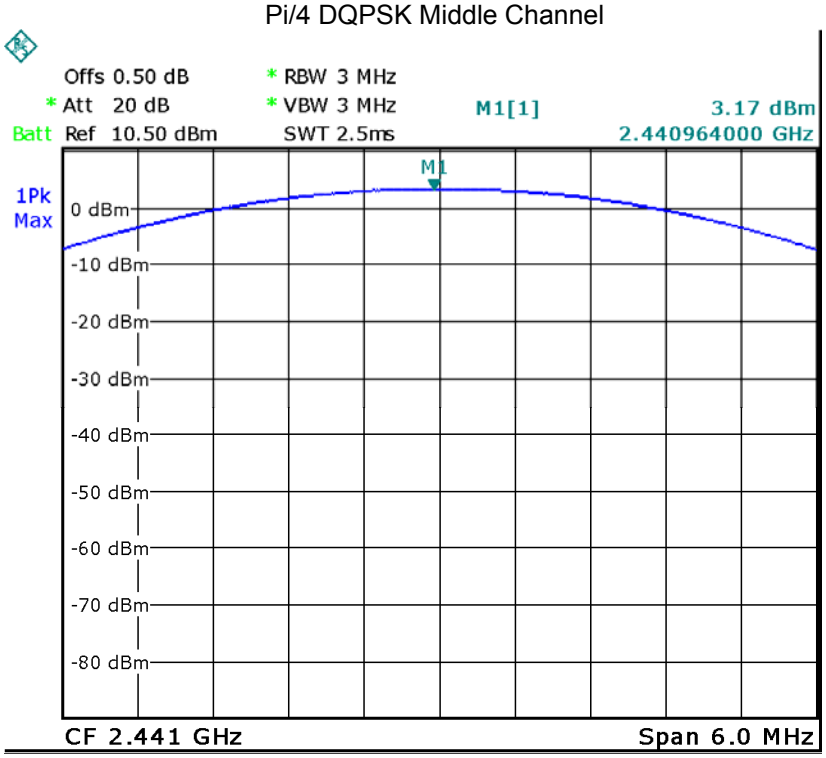
GFSK High Channel



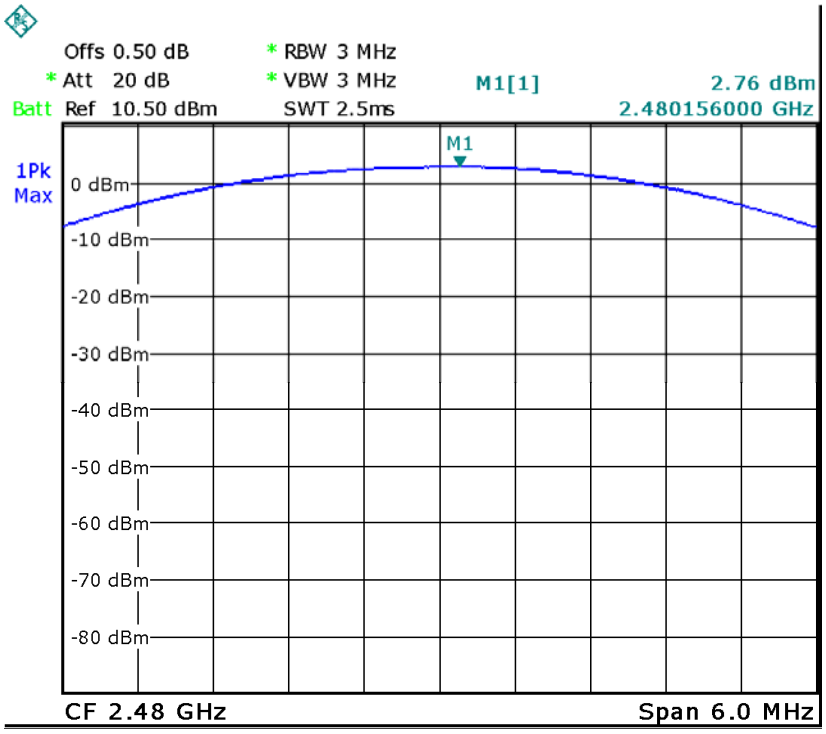
Pi/4 DQPSK Low Channel



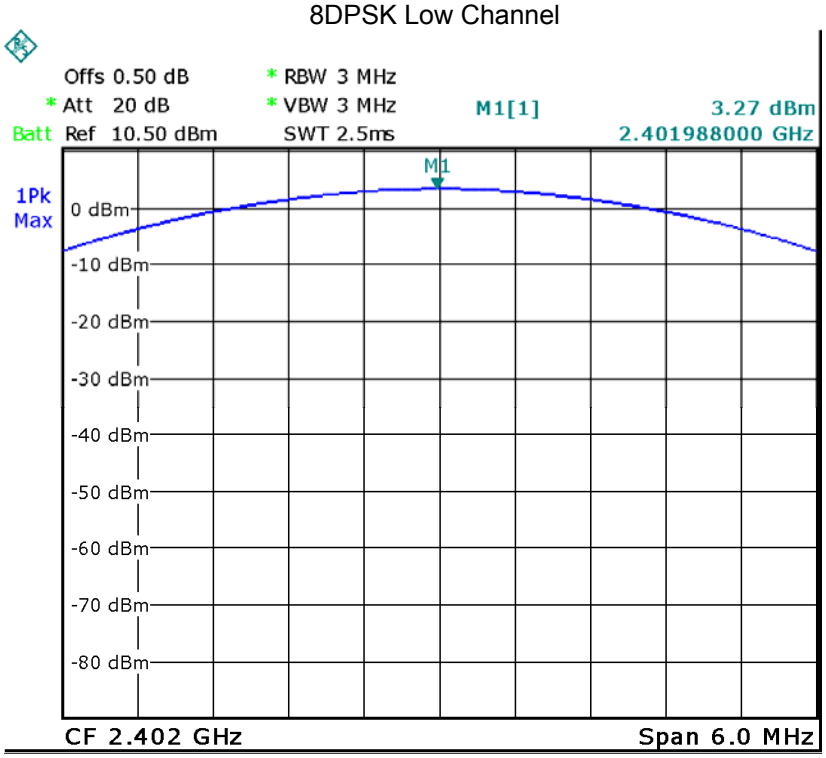
Pi/4 DQPSK Middle Channel



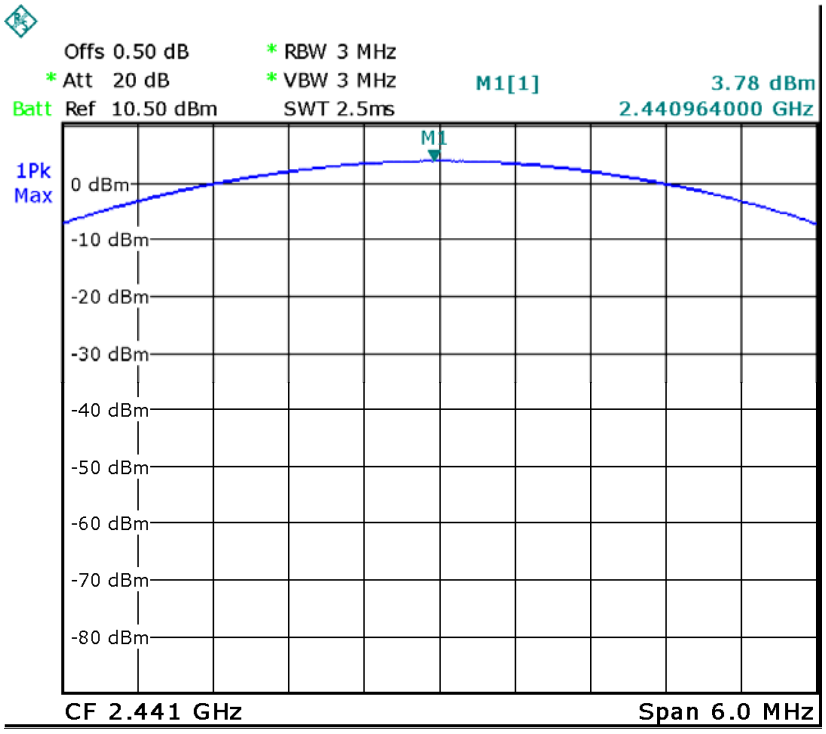
Pi/4 DQPSK High Channel



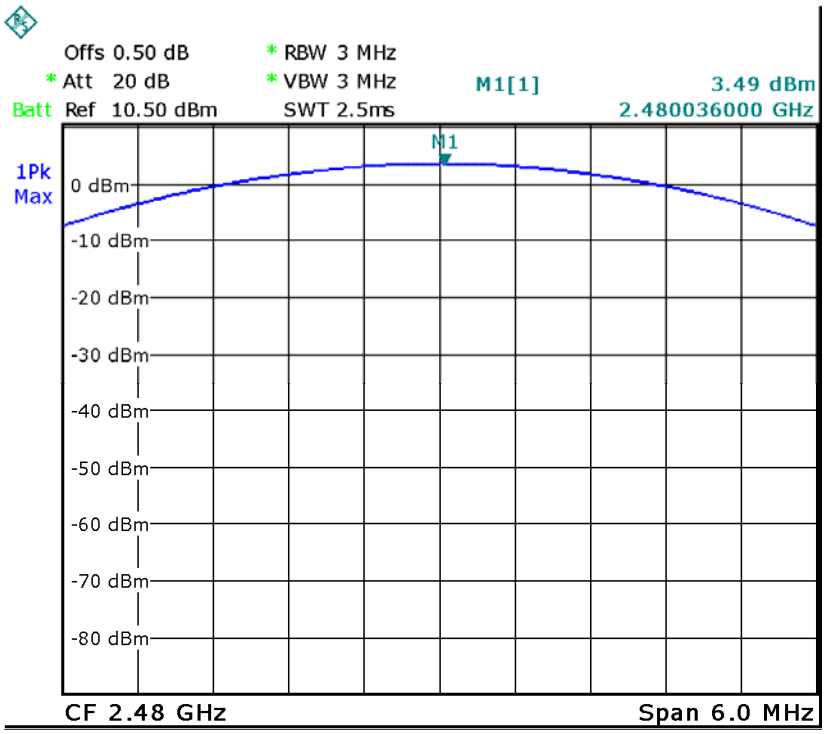
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



11 Hopping Channel Separation

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 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 2400-2483.5 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 1W.

Test Mode: Test in hopping transmitting operating mode.

11.1 Test Procedure

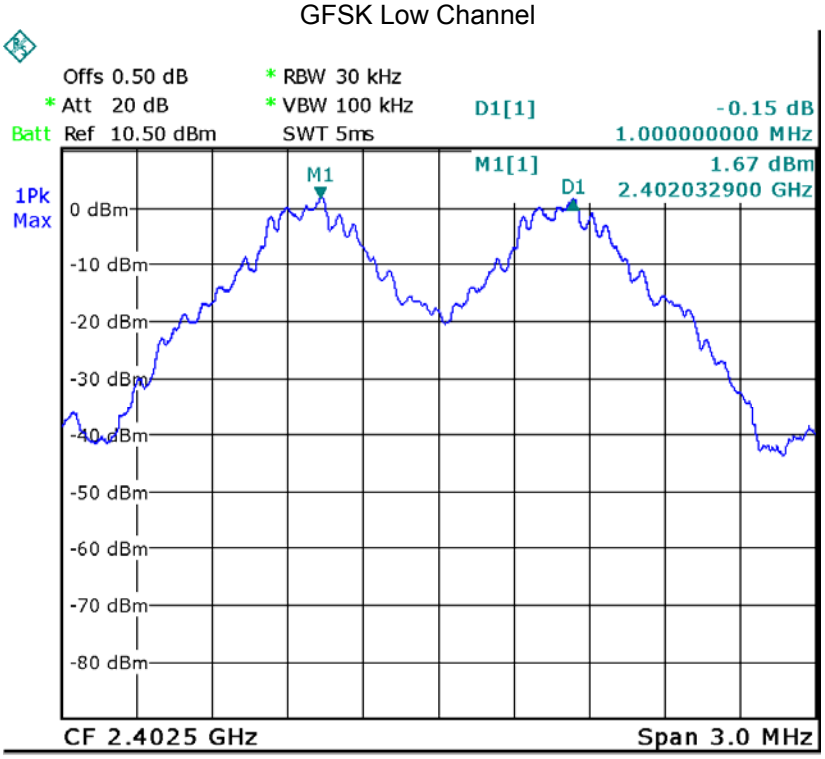
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 3.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to 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

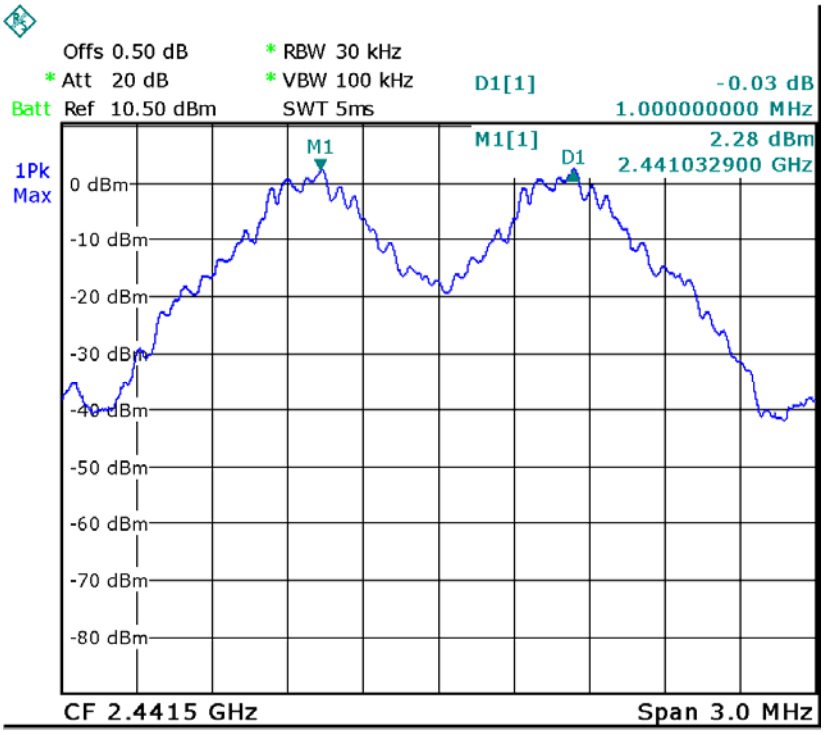
Modulation	Test Channel	Separation (MHz)	Result
GFSK	Low	1.000	PASS
GFSK	Middle	1.000	PASS
GFSK	High	1.000	PASS
Pi/4 DQPSK	Low	1.000	PASS
Pi/4 DQPSK	Middle	1.000	PASS
Pi/4 DQPSK	High	1.000	PASS
8DPSK	Low	1.000	PASS
8DPSK	Middle	1.000	PASS
8DPSK	High	1.000	PASS

Test plots

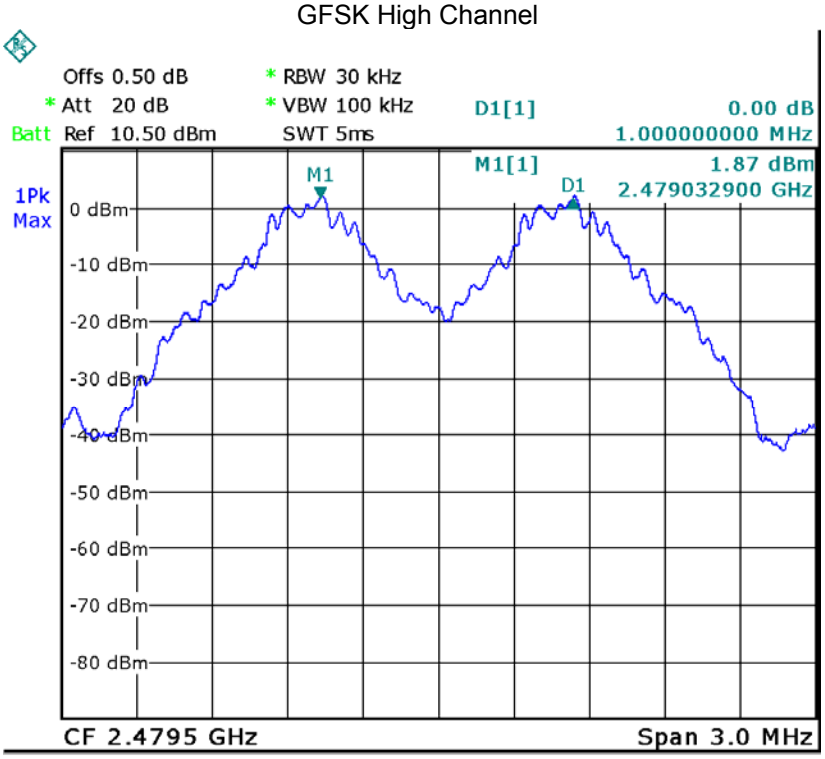
GFSK Low Channel



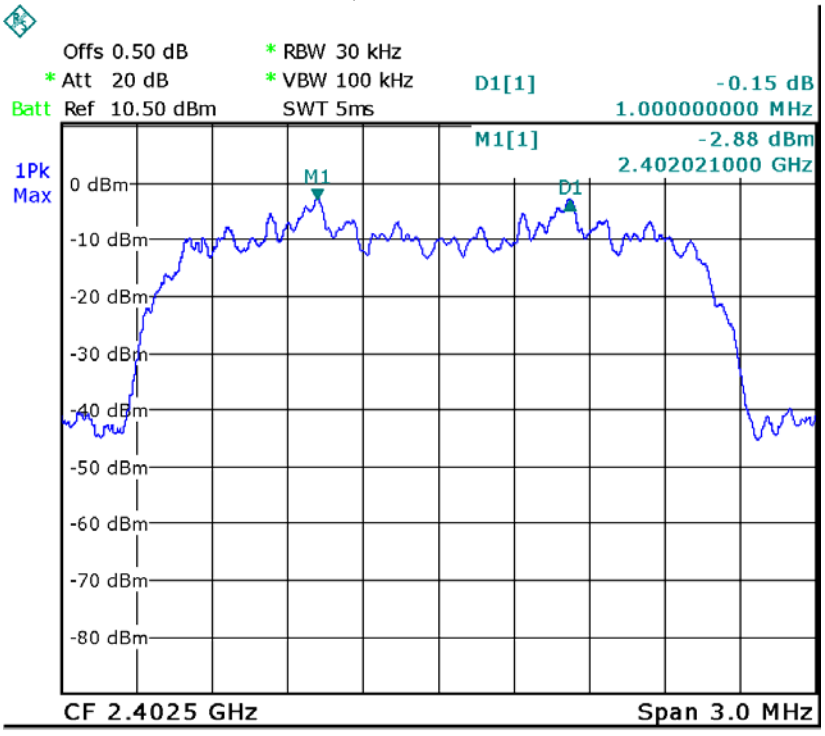
GFSK Middle Channel



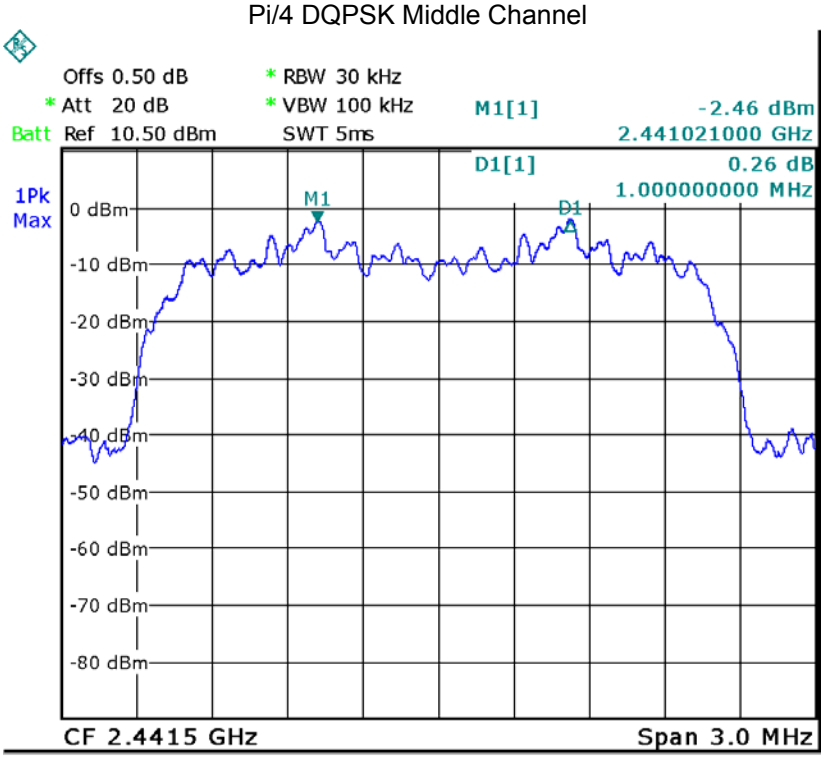
GFSK High Channel



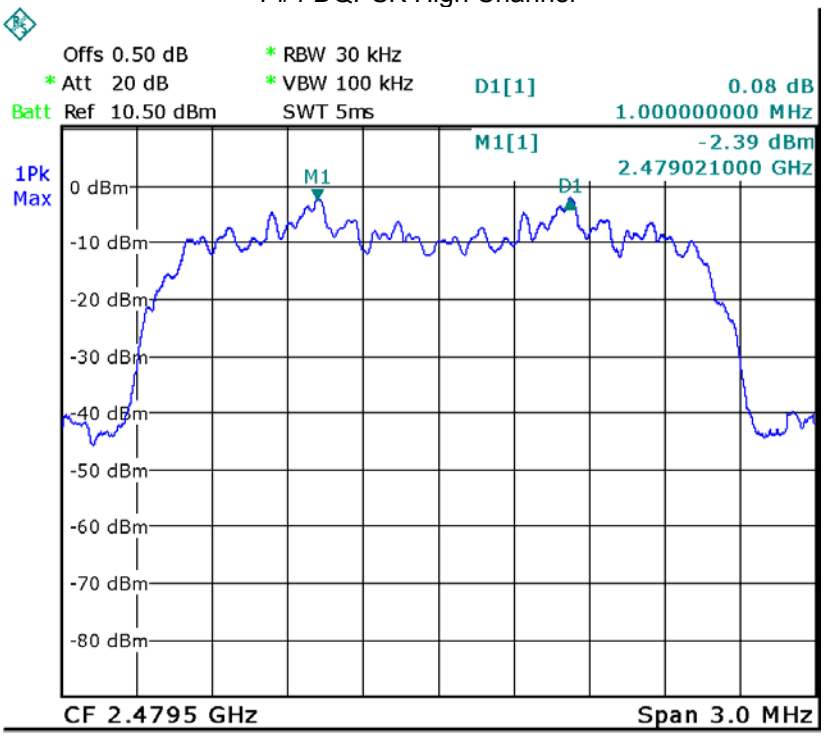
Pi/4 DQPSK Low Channel



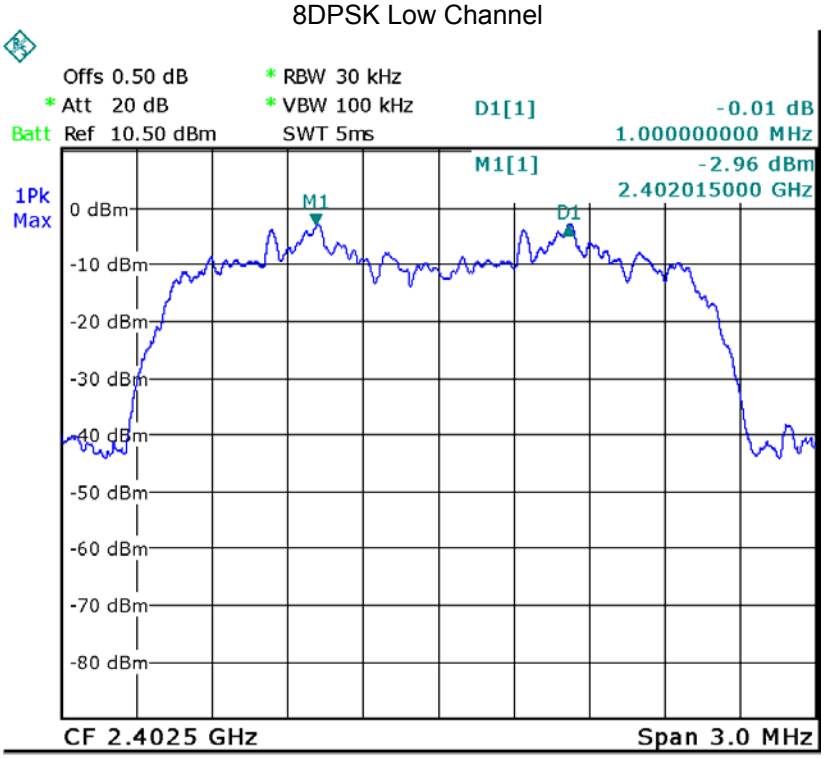
Pi/4 DQPSK Middle Channel



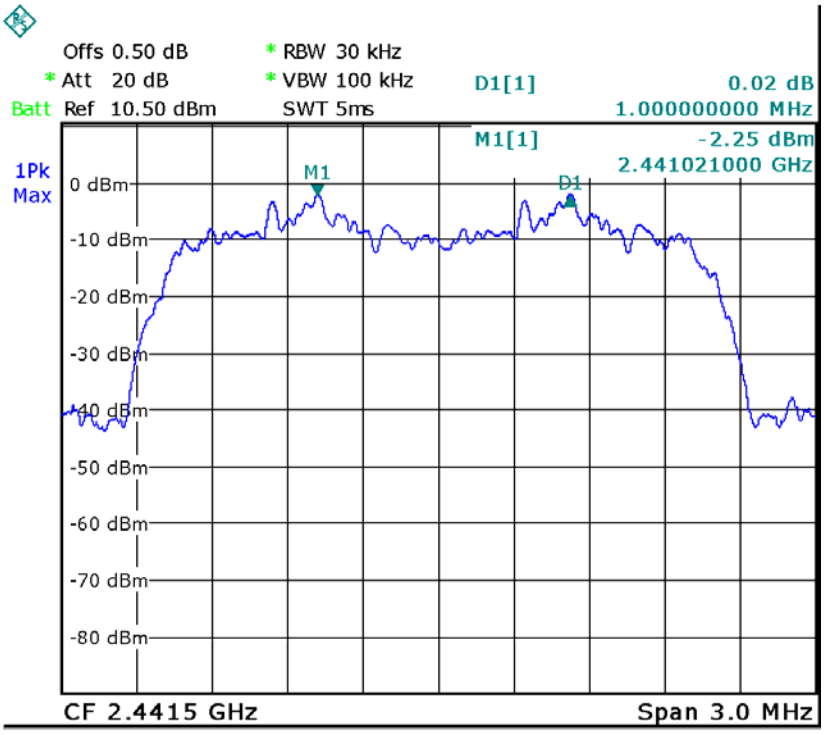
Pi/4 DQPSK High Channel



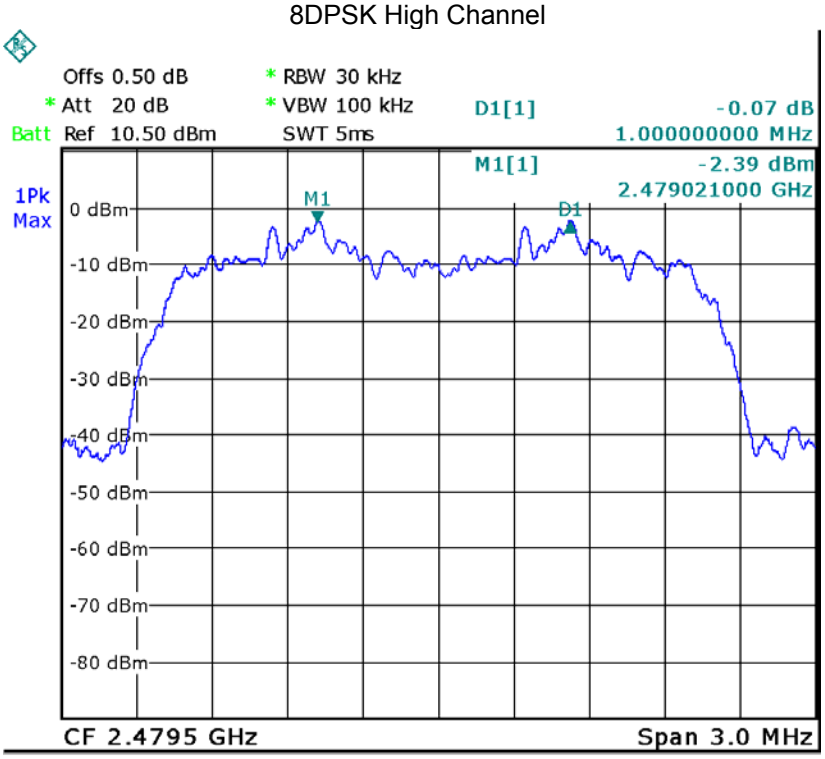
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



12 Number of Hopping Frequency

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	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:	Test in hopping transmitting operating mode.

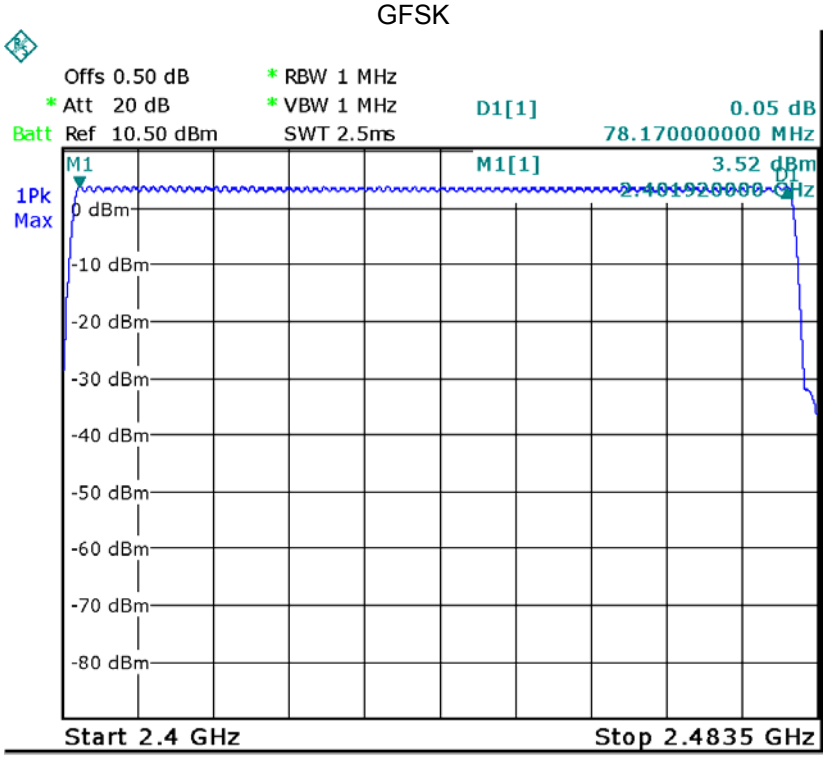
12.1 Test Procedure

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;

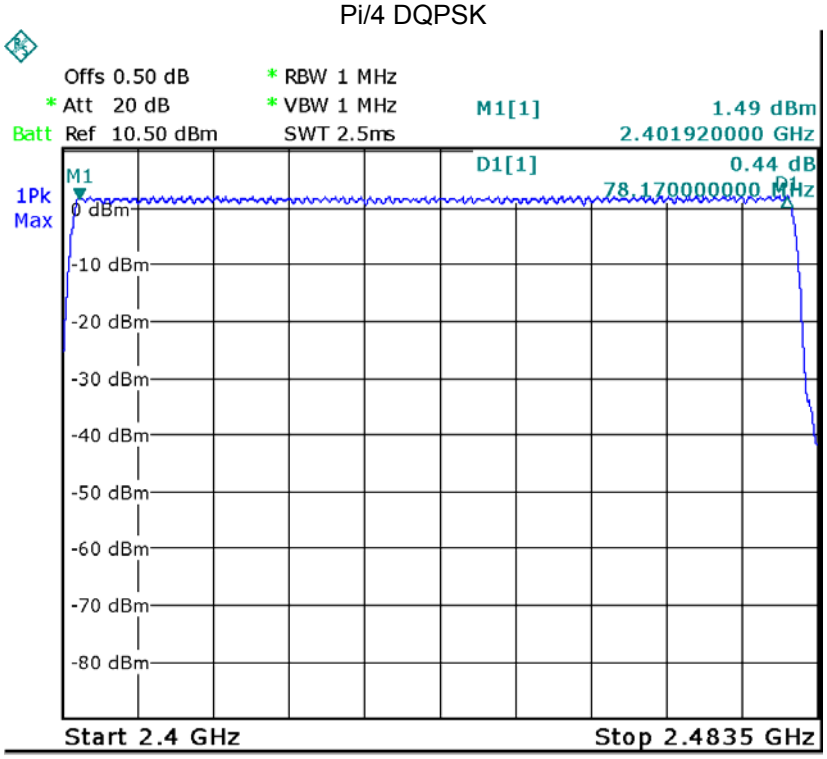
12.2 Test Result

Test Plot: 79 Channels in total

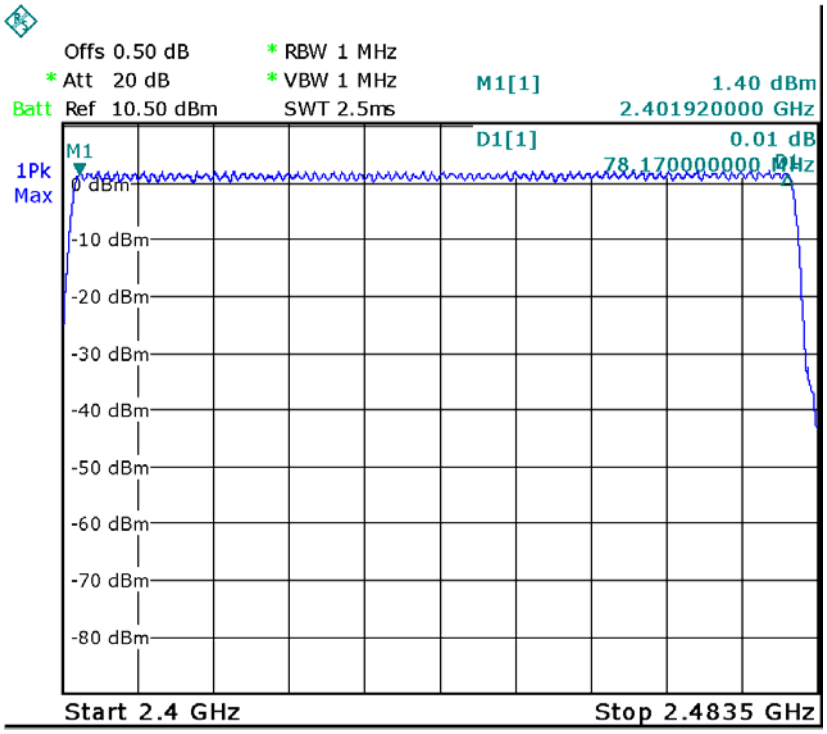
GFSK



Pi/4 DQPSK



8DPSK



13 Dwell Time

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	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. 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.
Test Mode:	Test in hopping transmitting operating mode.

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. Centred on 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).

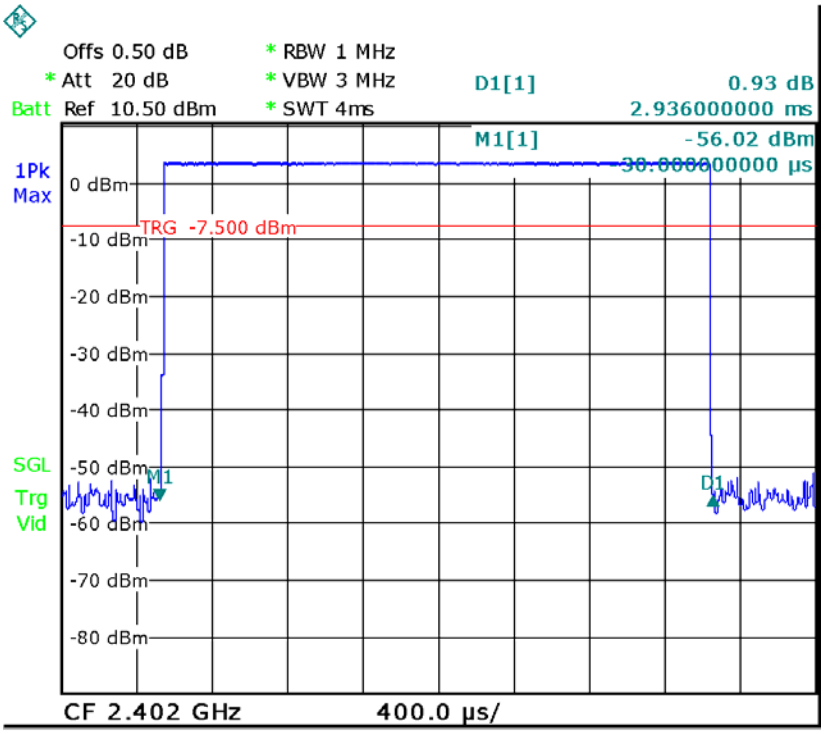
DH1 Packet permit maximum 1600 / 79 /2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

Data Packet	Dwell Time(s)
DH5	1600/79/6*0.4*79*(MkrDelta)/1000
DH3	1600/79/4*0.4*79*(MkrDelta)/1000
DH1	1600/79/2*0.4*79*(MkrDelta)/1000
Remark: Mkr Delta is once pulse time.	

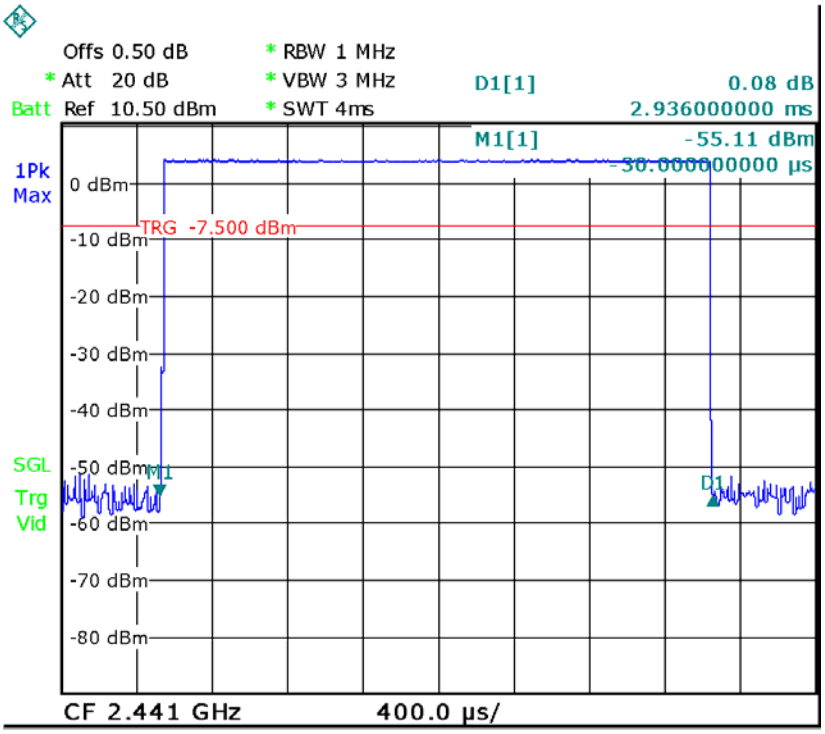
Modulation	Data Packet	Channel	pulse time(ms)	Dwell Time(s)	Limits(s)
GFSK	DH5	Low	2.936	0.313	0.4
		middle	2.936	0.313	0.4
		High	2.952	0.315	0.4
Pi/4DQPSK	DH5	Low	2.936	0.313	0.4
		middle	2.936	0.313	0.4
		High	2.936	0.313	0.4
8DPSK	DH5	Low	2.936	0.313	0.4
		middle	2.936	0.313	0.4
		High	2.936	0.313	0.4

Test Plots

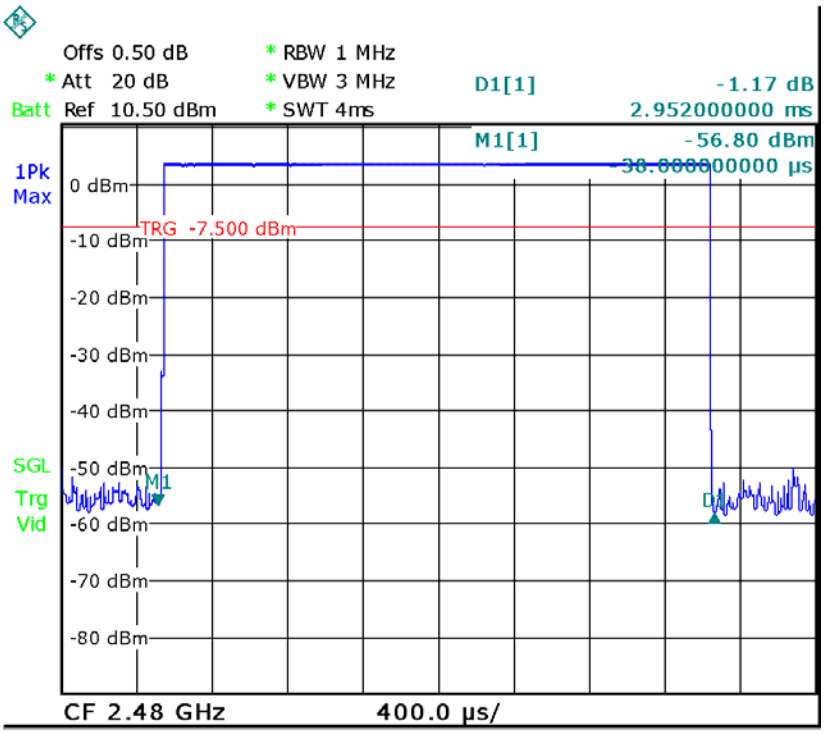
GFSK DH5 Low Channel



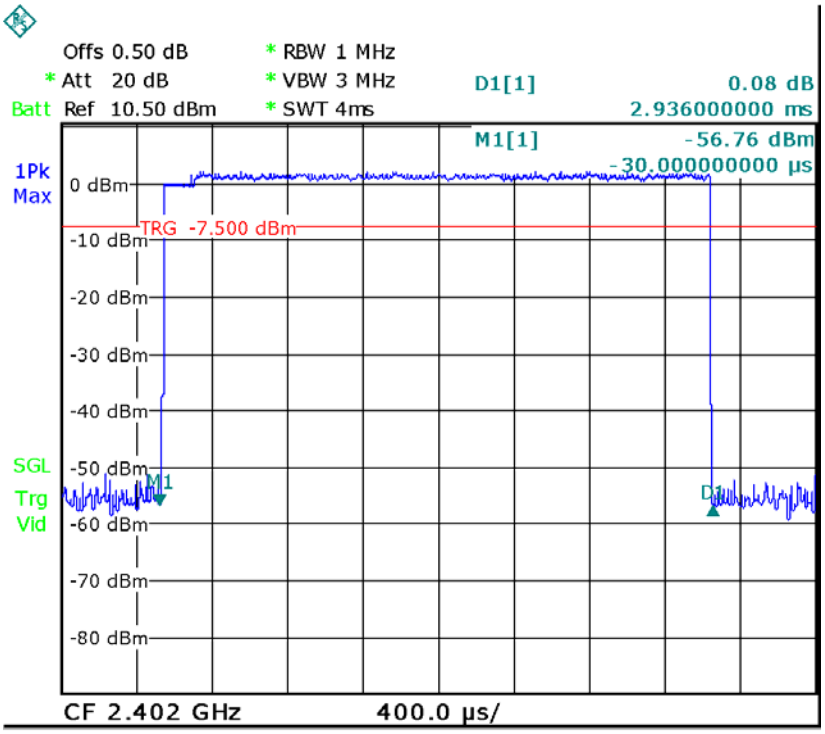
GFSK DH5 Middle Channel



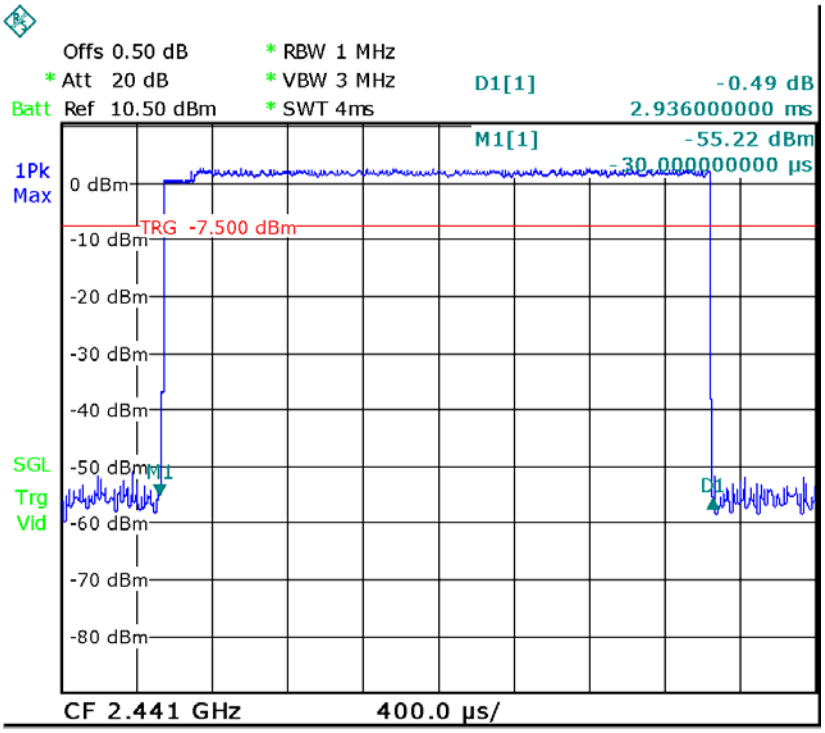
GFSK DH5 High Channel



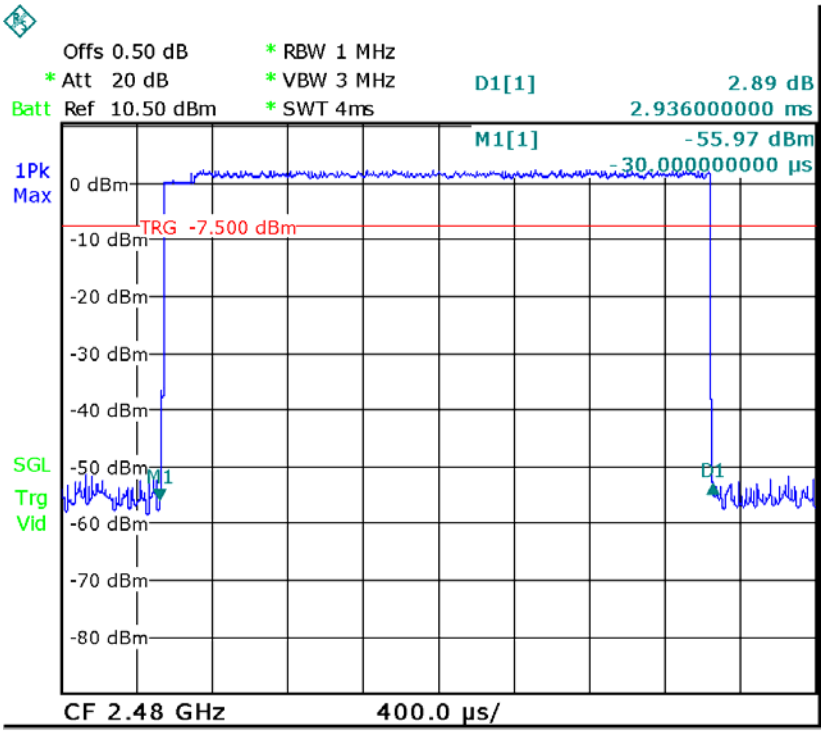
Pi/4DQPSK DH5 Low Channel



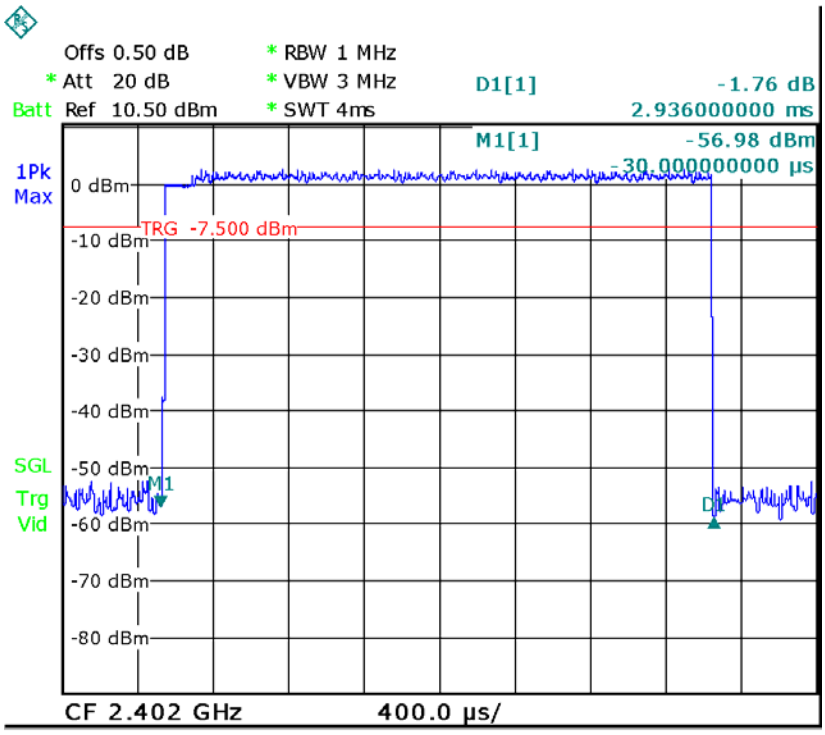
Pi/4DQPSK DH5 Middle Channel



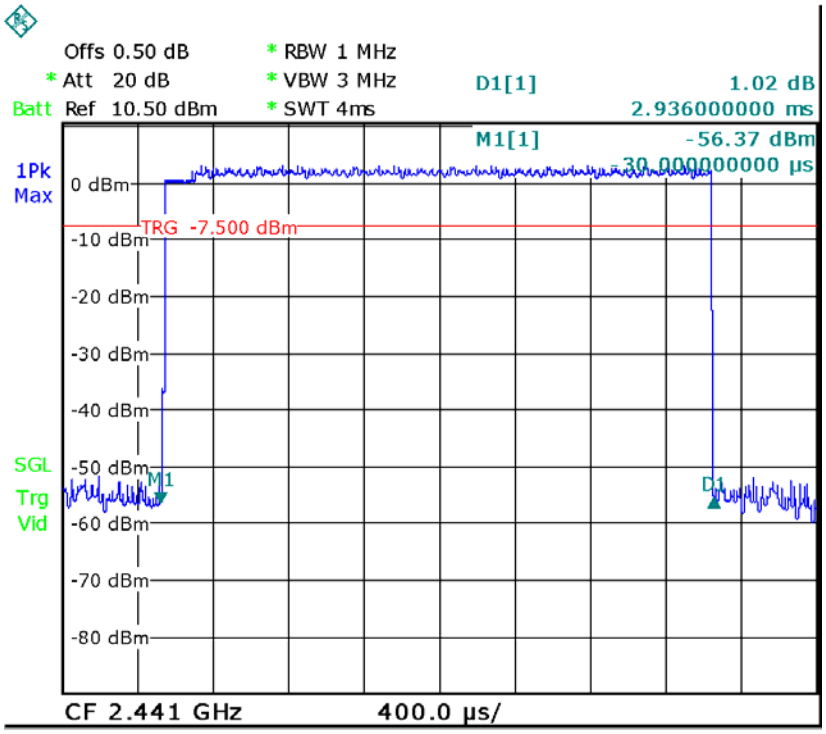
Pi/4DQPSK DH5 High Channel



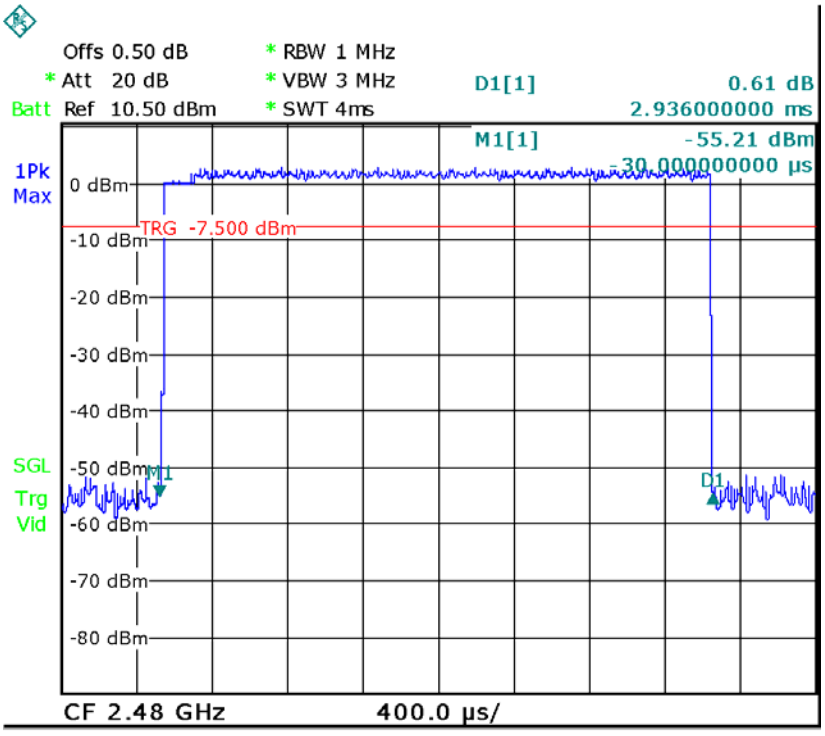
8DPSK DH5 Low Channel



8DPSK DH5 Middle Channel



8DPSK DH5 High Channel



14 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has an internal permanent antenna, fulfil the requirement of this section.

15 RF Exposure

Test Requirement: FCC Part 2.1093

Evaluation Method: KDB 447498 D01 v05r02

15.1 Requiments:

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√f(GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR where

1. f(GHz) is the RF channel transmit frequency in GHz
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

15.2 Test Result

Conducted Peak power(mW)	Source-based time-averaged maximum conducted output power(mW)	Tune-up tolerance (mW)	Minimum test separation distance required for the exposure conditions (mm)	SAR Test Exclusion Thresholds(mW)
2.606	1.9545	±0.25	5	10

Remark: Duty factor is 0.75,

Calculation formula: Source-based time-averaged maximum conducted output power(mW) =Conducted peak power(mW)*Duty factor

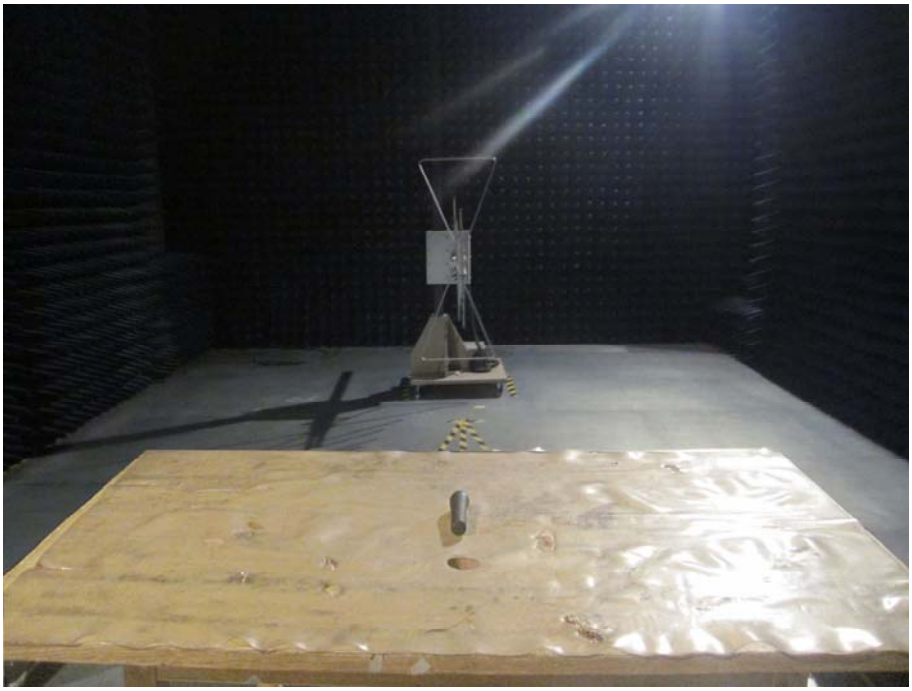
16 Photographs –Model MF 003F Test Setup

16.1 Photograph – Conducted Emission Test Setup

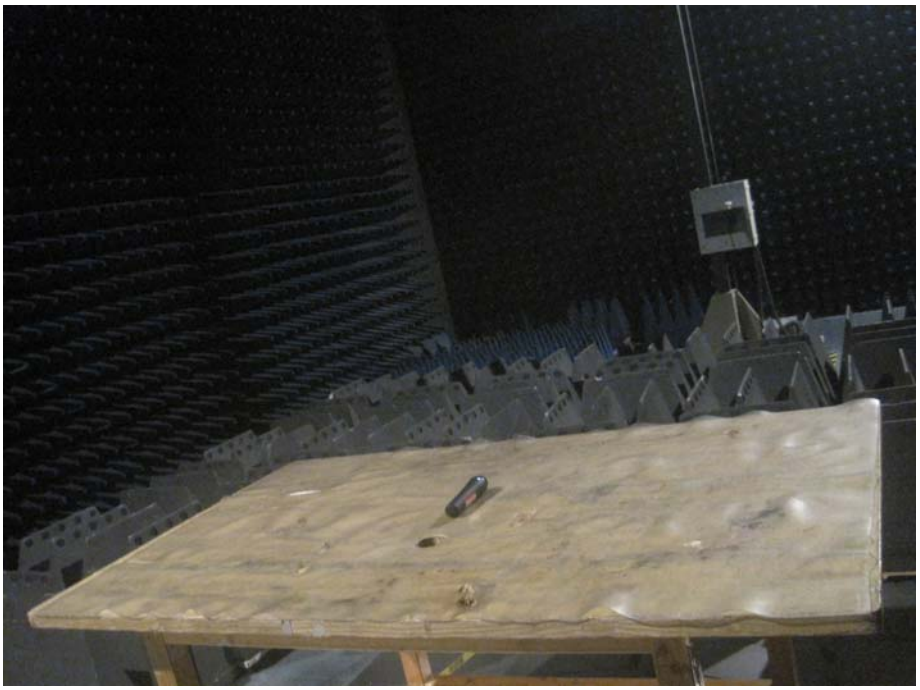
16.2 Photograph – Radiation Spurious Emission Test Setup

24MHz ~30MHz

30MHz-1GHz



1 GHz~25 GHz



17 Photographs - Constructional Details

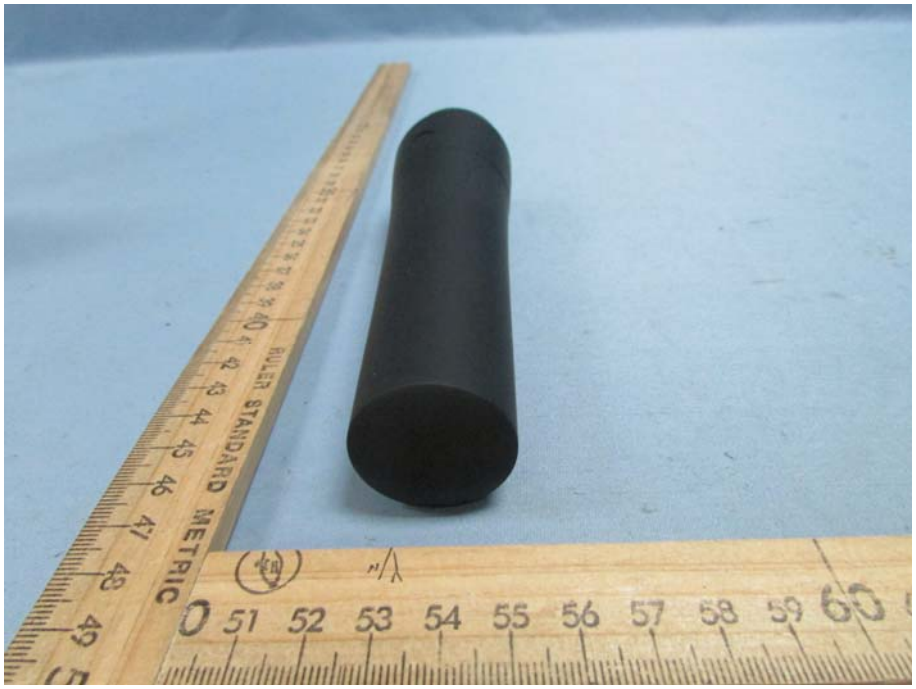
17.1 Model MF 003F - Appearance View

Black

STANDARD METRIC
0 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

STANDARD METRIC
0 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66

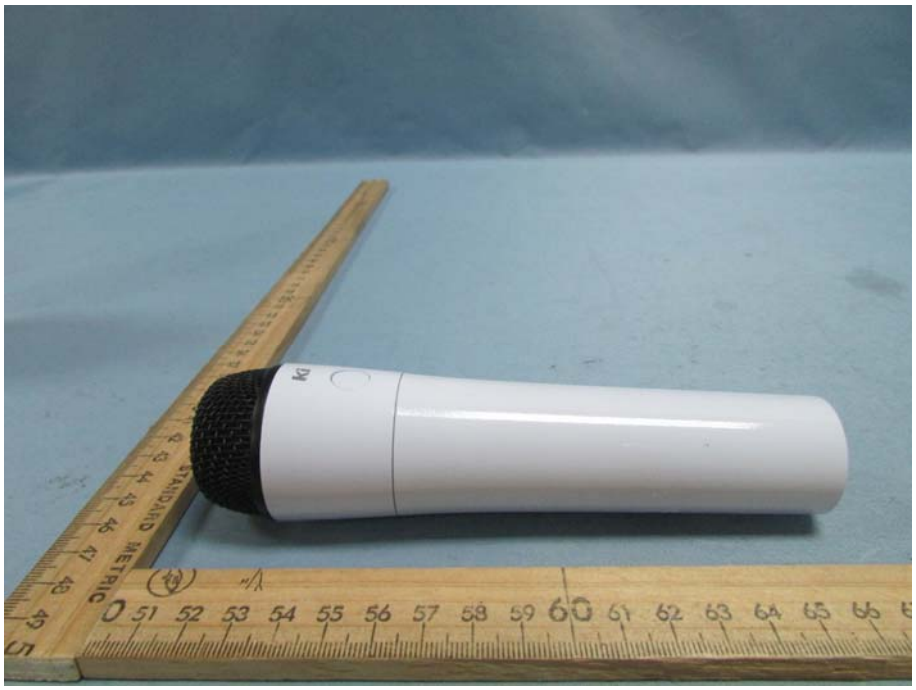
RULER STANDARD METRIC
51 52 53 54 55 56 57 58 59 60


RULER STANDARD METRIC
51 52 53 54 55 56 57 58 59 60

White

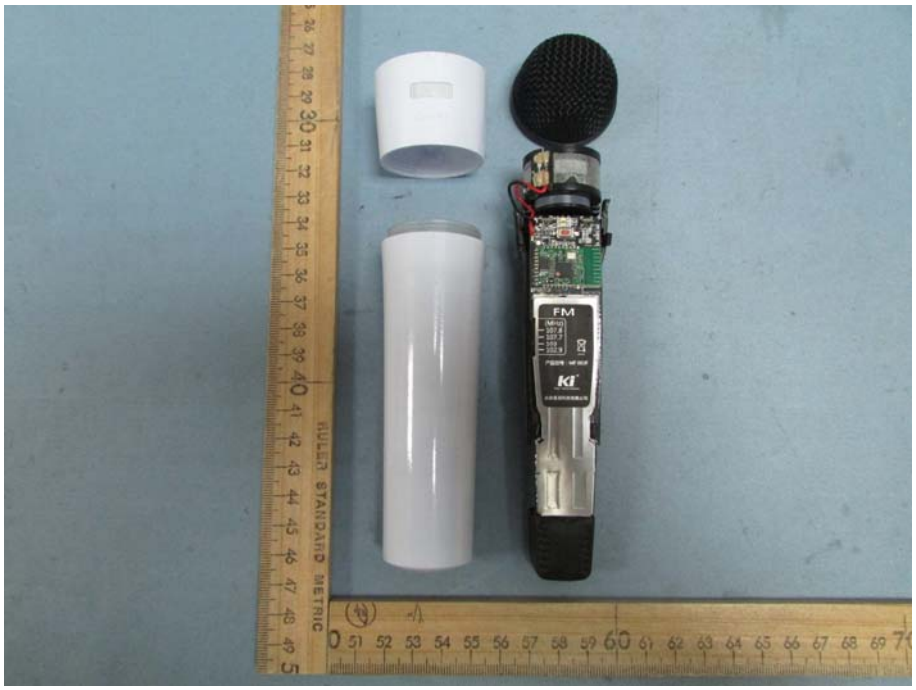
STANDARD METRIC
0 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68

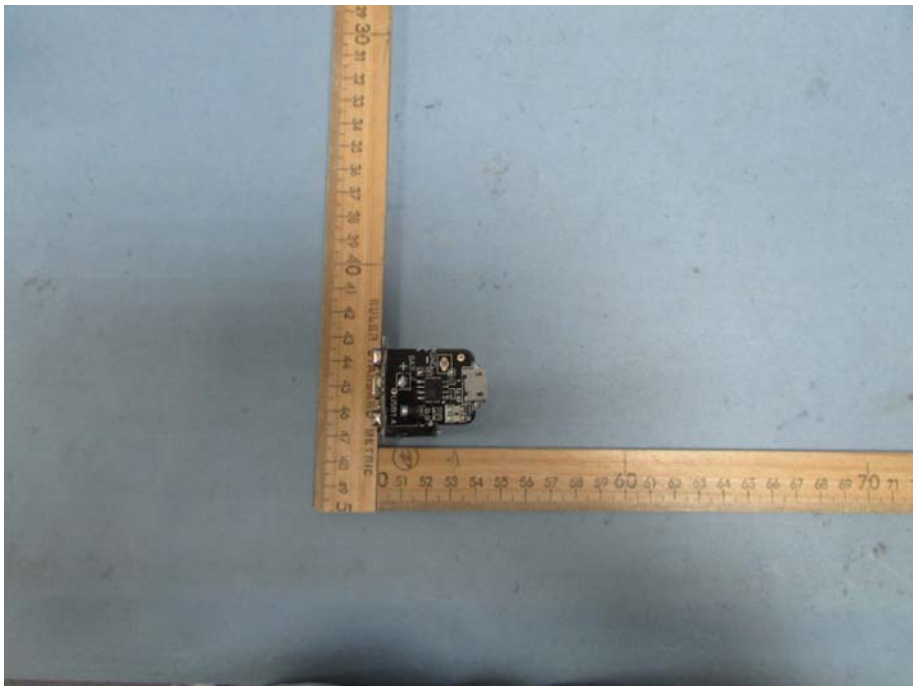
STANDARD METRIC
0 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65



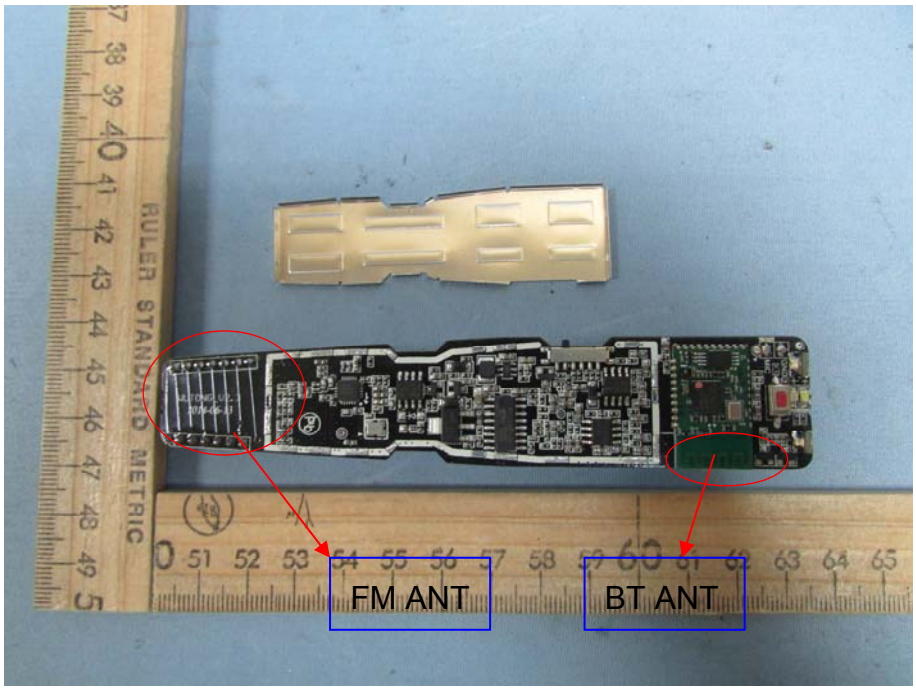
RULER STANDARD METRIC
51 52 53 54 55 56 57 58 59 60

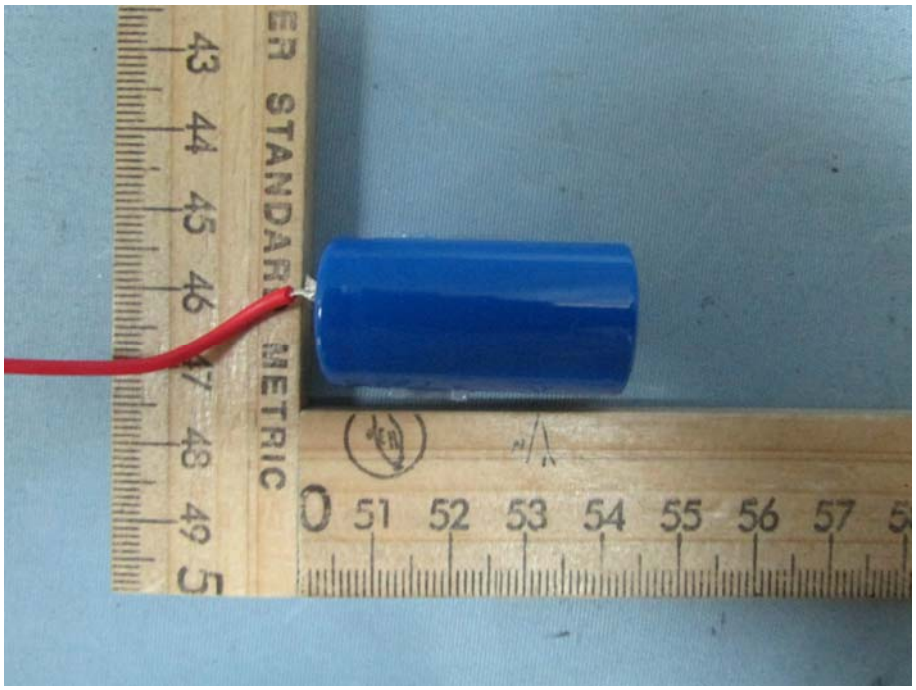
17.2 Model MF 003F- Internal View





RULER STANDARD METRIC
FM
(MHz)
102.9
103
107.7
107.8


FM ANT
BT ANT



======End of Report======