FCC TEST REPORT

FCC ID: 2AI6IHV-SK533BT

Product	:	Bluetooth speaker
Model Name	:	HV-SK533BT,HV-SK159BT,HV-SK539BT,HV-SK559BT,HV-SK560BT,HV-SK561BT,HV-SK562BT,HV-SK563BT,HV-SK565BT,HV-SK566BT
Brand	:	HAVIT
Report No.	:	PT801551160714E-FC01

Prepared for

Guangzhou Havit Technology Co.,LTD

ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE CENTER,NO.1000,XINGANG EAST ROAD,HAIZHU DISTRICT,GUANGZHOU 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	:	Guangzhou Havit Technology Co.,LTD
Address	:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADECENTER,NO.1000,XINGANGEASTROAD,HAIZHU DISTRICT,GUANGZHOU CITY,GUANGDONG PROVINCE,China
Manufacture's name	:	Guangzhou Havit Technology Co.,LTD
Address	:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADECENTER,NO.1000,XINGANGEASTROAD,HAIZHU DISTRICT,GUANGZHOU CITY,GUANGDONG PROVINCE,China
Product name	:	Bluetooth speaker
Model name	:	HV-SK533BT,HV-SK159BT,HV-SK539BT,HV-SK559BT,HV-SK560BT,HV-SK561BT,HV-SK562BT,HV-SK563BT,HV-SK565BT,HV-SK566BT
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013, DA 00-705
Test Date	:	Jul.15, 2016 ~ Jul.24, 2016
Date of Issue	:	Jul.25, 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.

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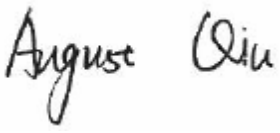
Testing Engineer

August Qiu



Authorized Signatory

Chris Du

Contents

2 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Conducted Spurious emissions	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
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
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Bluetooth speaker
Model Name	:	HV-SK533BT,HV-SK159BT,HV-SK539BT,HV-SK559BT,HV-SK560BT,HV-SK561BT,HV-SK562BT,HV-SK563BT,HV-SK565BT,HV-SK566BT
Model Description	:	Only the models name are different
Bluetooth Version	:	V3.0
Operating frequency	:	2402-2480MHz,79channels
Antenna installation:	:	PCB Printed Antenna
Antenna Gain:	:	0dBi
The lowest oscillator:	:	26MHz
Type of Modulation	:	GFSK, Pi/4DQPSK, 8DPSK
Power supply	:	DC 3.7V 1500mAh Power by battery, DC 5V charging by USB port

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			
Test Item	Test Mode		
Conduction Emission, 0.15MHz to 30MHz	BT Communication		

3.4 Test Site

Dongguan Precise Testing Service Co., Ltd.

Building D,Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China, Dongguan, 523129

China

FCC Registration Number: 371540

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, 2015	Aug.03, 2016	1 year
2	EXA Signal Analyzer	Agilent	N9010A	MY50520207 526B25MPB W7X	Aug.04, 2015	Aug.03, 2016	1 year
3	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
4	Humidity Chamber	GF	GTH-225-40-1P	IAA061225	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	SCHWARZBECK	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	SCHWARZBECK	BBHA9120D	9120D-1246	July 15, 2016	July 14, 2017	1 year
5	Loop Antenna	SCHWARZBECK	FMZB1516	9130D-1243	July 15, 2016	July 14, 2017	1 year
6	3m Anechoic Chamber	CHENGYU	966	PTC-002	June 6, 2016	June 6, 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	SCHWARZBECK	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 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
Note Book	Sony	PCG-51111T	X16-96081
AC Adapter	Sony	NSW24063	SNPA-1900-11SY
AC power line(1.0m)	Cold come	JYD-20	C-2201

4.3 Measurement Uncertainty

Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
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 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)

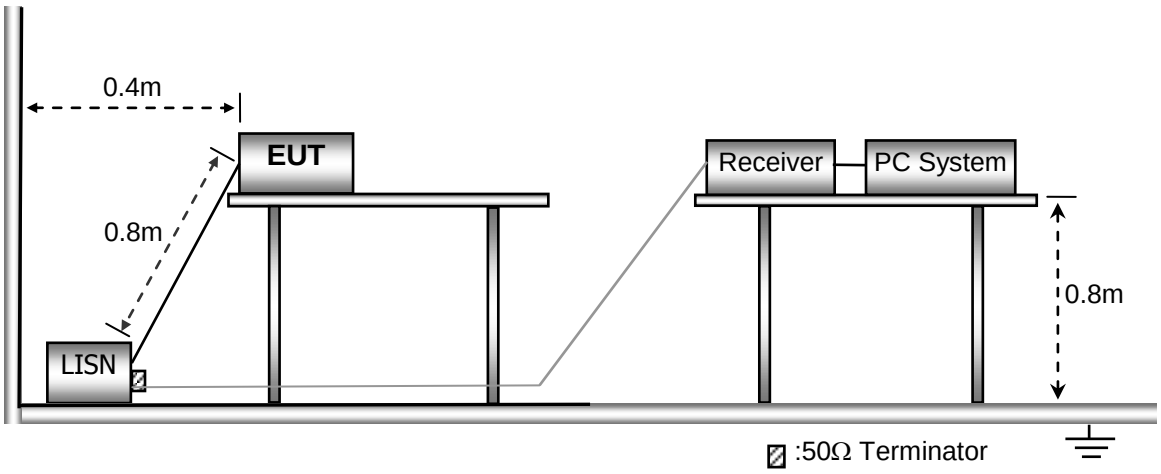
5.1 E.U.T. Operation

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

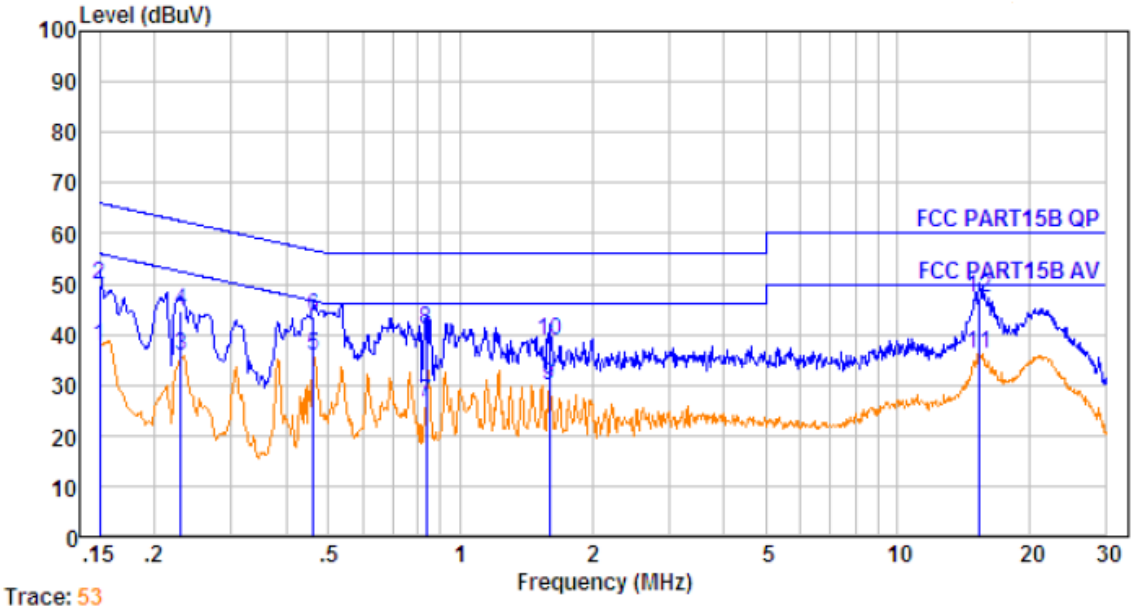
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

Remark: emission level= AMN factor+ Cable Loss +Receiver reading

5.4 Conducted Emission Test Result

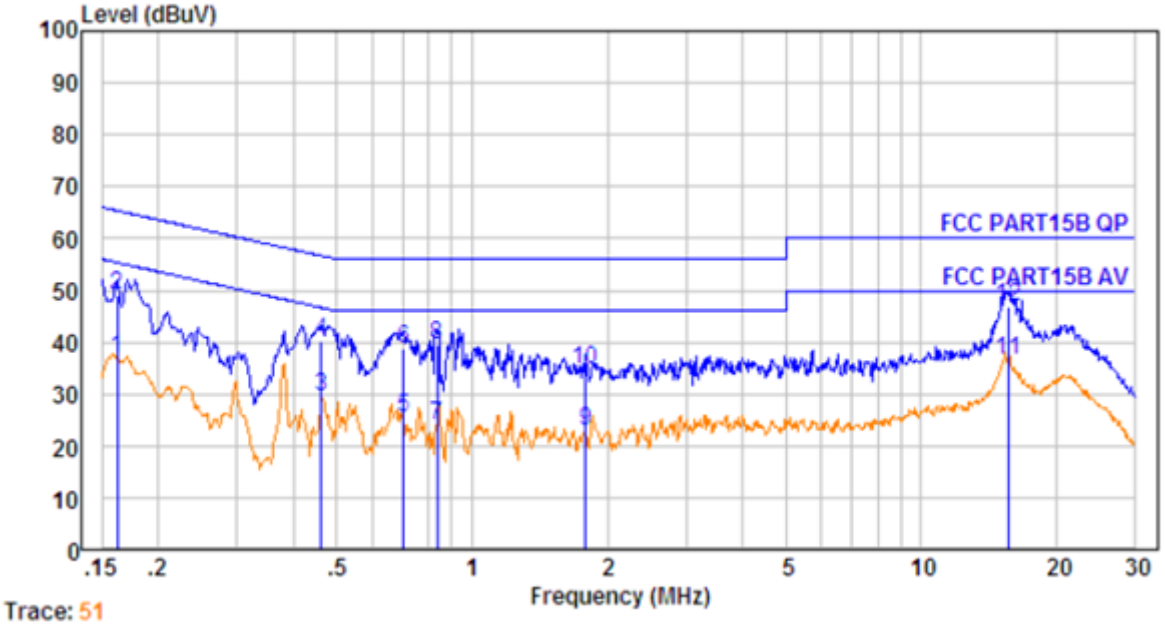
Only show worst data (GFSK/Low CH)

Live line:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	26.44	37.64	56.00	-18.36	Average
2.	0.150	10.60	0.60	38.64	49.84	66.00	-16.16	QP
3.	0.230	10.62	0.60	24.53	35.75	52.44	-16.69	Average
4.	0.230	10.62	0.60	33.33	44.55	62.44	-17.89	QP
5.	0.461	10.64	0.60	24.45	35.69	46.67	-10.98	Average
6.	0.461	10.64	0.60	32.15	43.39	56.67	-13.28	QP
7.	0.835	10.66	0.60	15.33	26.59	46.00	-19.41	Average
8.	0.835	10.66	0.60	29.63	40.89	56.00	-15.11	QP
9.	1.602	10.69	0.60	18.44	29.73	46.00	-16.27	Average
10.	1.602	10.69	0.60	27.64	38.93	56.00	-17.07	QP
11.	15.307	10.77	0.60	24.95	36.32	50.00	-13.68	Average
12.	15.307	10.77	0.60	35.75	47.12	60.00	-12.88	QP

Neutral line:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.162	10.60	0.60	25.81	37.01	55.34	-18.33	Average
2.	0.162	10.60	0.60	38.01	49.21	65.34	-16.13	QP
3.	0.461	10.64	0.60	18.25	29.49	46.67	-17.18	Average
4.	0.461	10.64	0.60	28.95	40.19	56.67	-16.48	QP
5.	0.705	10.66	0.60	14.31	25.57	46.00	-20.43	Average
6.	0.705	10.66	0.60	27.61	38.87	56.00	-17.13	QP
7.	0.835	10.66	0.60	12.81	24.07	46.00	-21.93	Average
8.	0.835	10.66	0.60	28.11	39.37	56.00	-16.63	QP
9.	1.790	10.69	0.60	11.60	22.89	46.00	-23.11	Average
10.	1.790	10.69	0.60	23.40	34.69	56.00	-21.31	QP
11.	15.718	10.78	0.60	25.28	36.66	50.00	-13.34	Average
12.	15.718	10.78	0.60	35.58	46.96	60.00	-13.04	QP

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)	$20\log^{(2400/F(kHz))} + 80$
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	$20\log^{(500)}$

6.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

Humidity: : 51.1 % RH

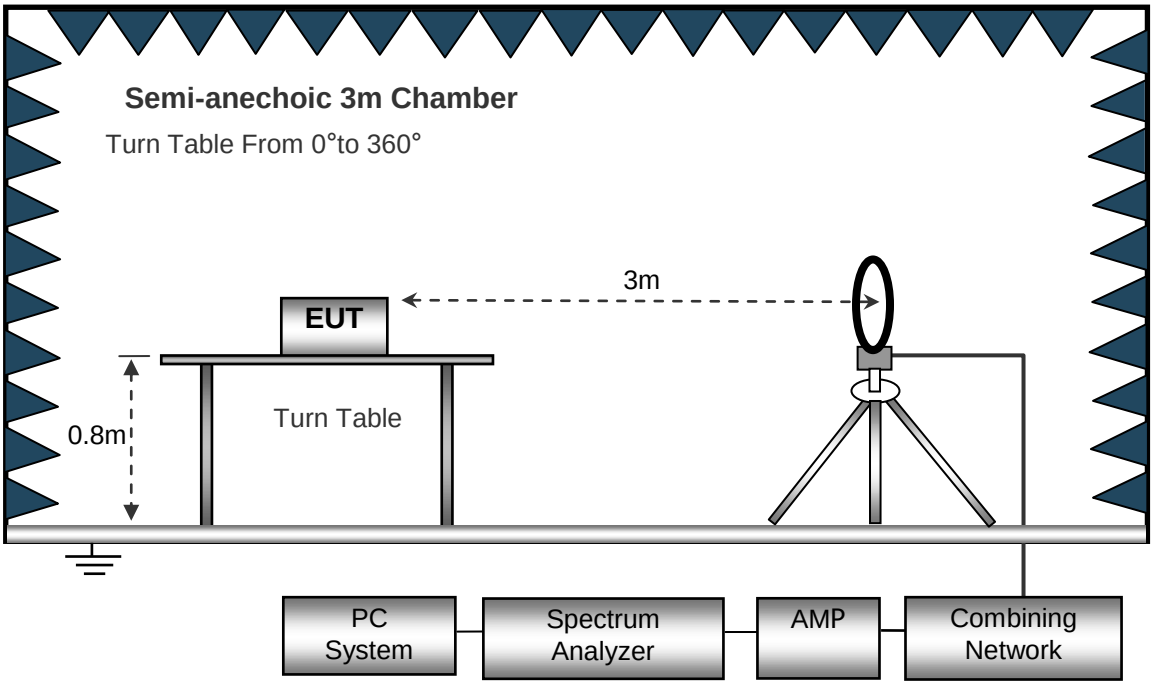
Atmospheric Pressure: : 101.2kPa

EUT Operation : : Refer to section 3.3

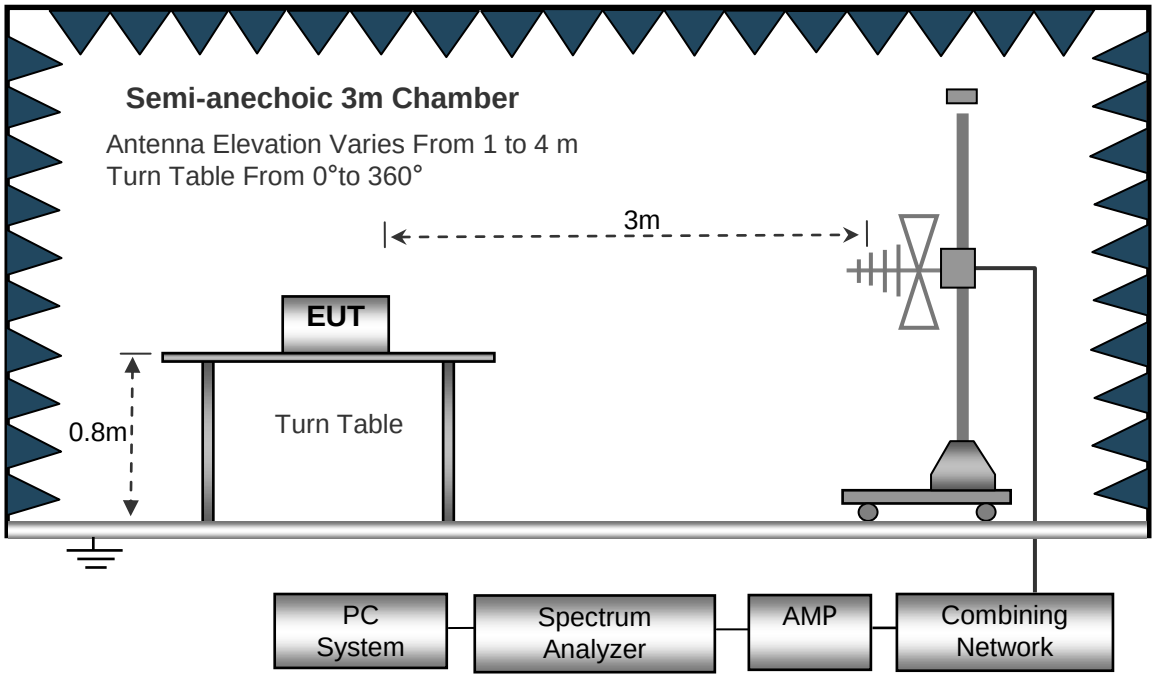
6.2 Test Setup

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

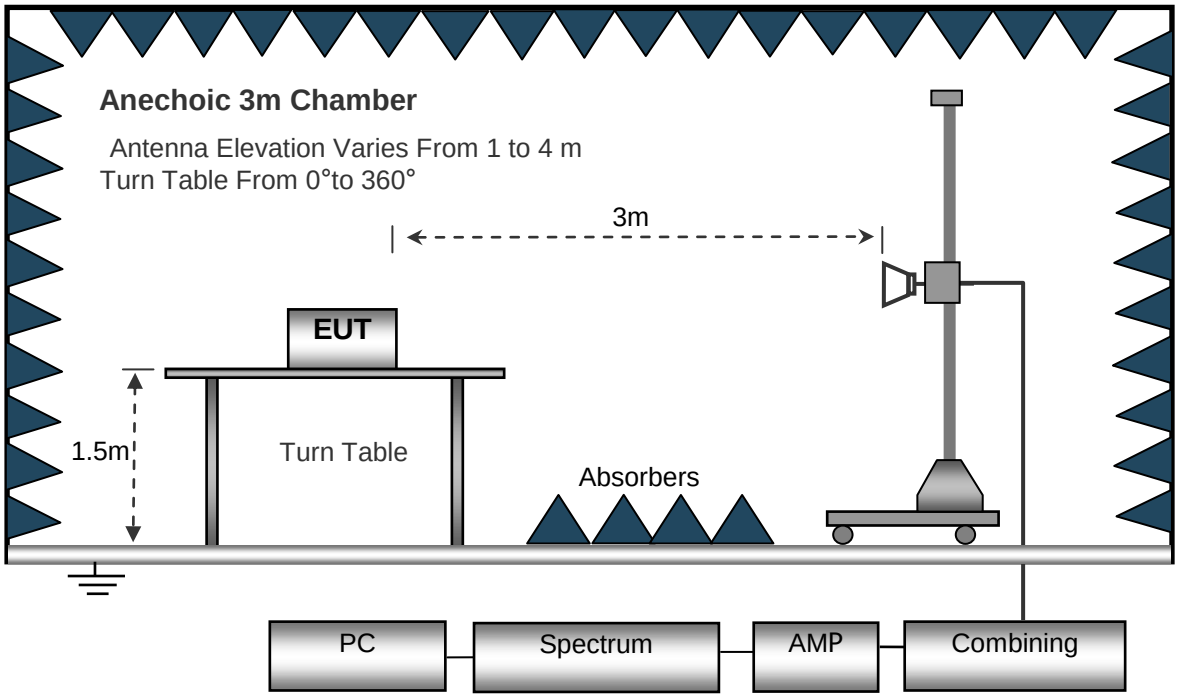
The test setup for emission measurement below 30MHz.



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

Only show worst data (GFSK/Low CH)

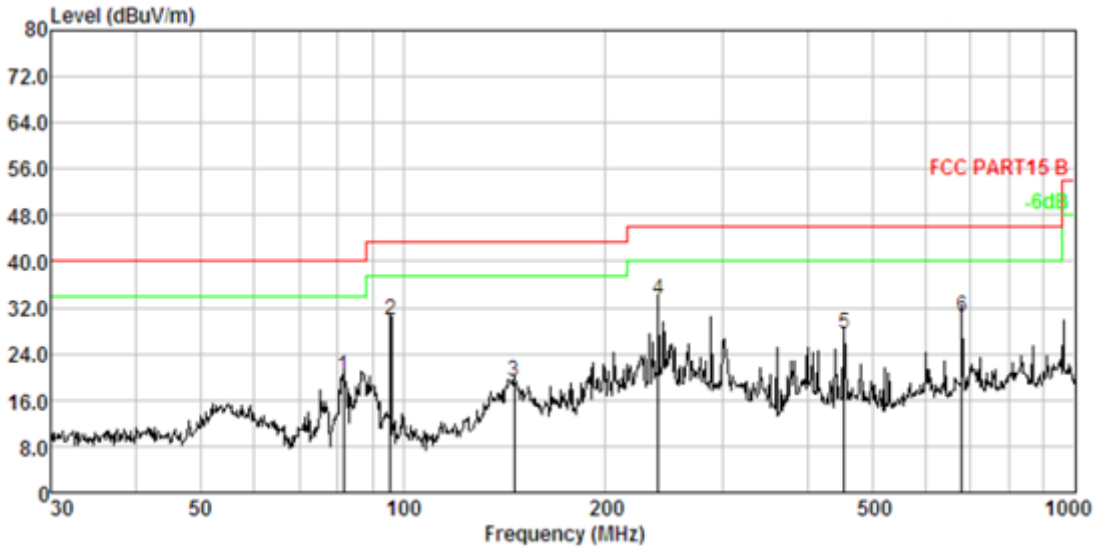
Emission level = Receiver reading + ANT factor + cable loss – Preamp factor

Test Frequency: Below 30MHz

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

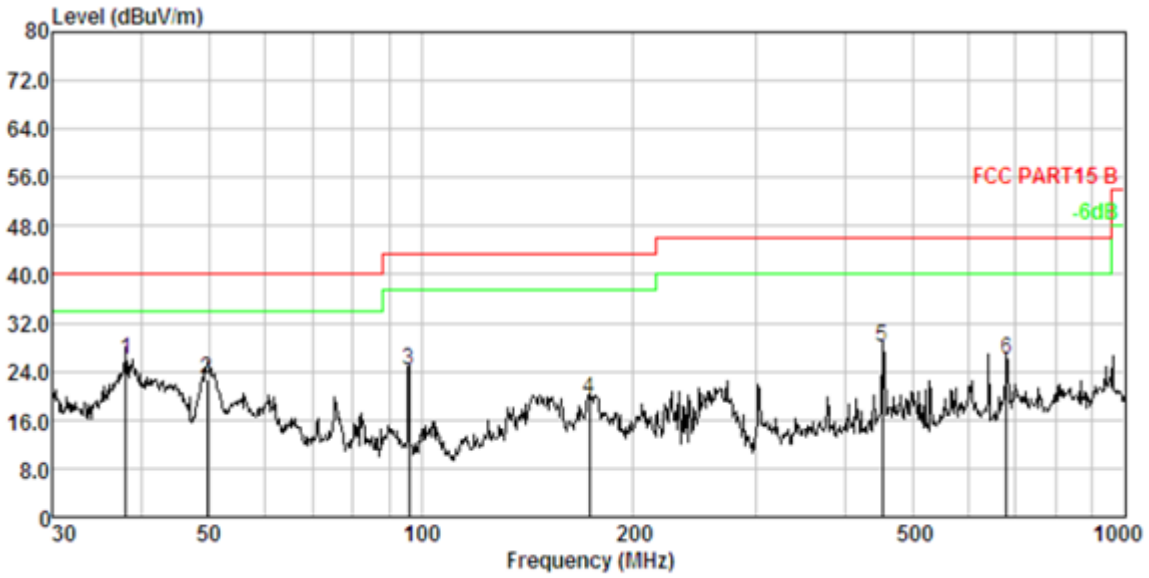
Test Frequency: 30MHz ~ 1GHz

Antenna Polarization: Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	81.497	1.96	8.74	39.78	30.32	20.16	40.00	-19.84	QP
2.	95.762	2.11	9.82	48.33	30.37	29.89	43.50	-13.61	QP
3.	146.374	2.49	13.71	33.57	30.52	19.25	43.50	-24.25	QP
4.	239.987	2.94	11.71	49.25	30.69	33.21	46.00	-12.79	QP
5.	454.310	3.52	16.43	38.34	30.92	27.37	46.00	-18.63	QP
6.	679.960	3.88	19.88	37.64	31.06	30.34	46.00	-15.66	QP

Antenna Polarization: Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	38.078	1.27	13.56	41.30	30.05	26.08	40.00	-13.92	QP
2.	49.707	1.51	12.32	39.05	30.15	22.73	40.00	-17.27	QP
3.	96.099	2.11	9.85	42.53	30.38	24.11	43.50	-19.39	QP
4.	173.205	2.64	13.04	34.30	30.58	19.40	43.50	-24.10	QP
5.	452.720	3.51	16.40	38.97	30.91	27.97	46.00	-18.03	QP
6.	679.960	3.88	19.88	33.33	31.06	26.03	46.00	-19.97	QP

Test Frequency: 1GHz ~ 18GHz

GFSK Low Channel

Frequency MHz	Meter Reading dBµV	Amplifier dB	Loss dB	Antenna Factor dB/m	Corrected Factor dB	Emission Level dBµV/m	Limits dBµV/m	Margin dB	Detector Type	Comment
Low Channel (2402 MHz)										
3265.26	50.09	44.70	6.70	28.20	-9.80	40.29	74.00	-33.71	PK	Vertical
3265.26	40.09	44.70	6.70	28.20	-9.80	30.29	54.00	-23.71	AV	Vertical
3265.23	50.09	44.70	6.70	28.20	-9.80	40.29	74.00	-33.71	PK	Horizontal
3265.23	40.12	44.70	6.70	28.20	-9.80	30.32	54.00	-23.68	AV	Horizontal
4803.93	60.41	44.20	9.04	31.60	-3.56	56.85	74.00	-17.15	PK	Vertical
4803.93	50.39	44.20	9.04	31.60	-3.56	46.83	54.00	-7.17	AV	Vertical
4804.91	60.40	44.20	9.04	31.60	-3.56	56.84	74.00	-17.16	PK	Horizontal
4804.91	50.38	44.20	9.04	31.60	-3.56	46.82	54.00	-7.18	AV	Horizontal
7206.29	52.79	43.50	11.40	35.50	3.40	56.19	74.00	-17.81	PK	Vertical
7206.29	44.78	43.50	11.40	35.50	3.40	48.18	54.00	-5.82	AV	Vertical
7206.33	52.79	43.50	11.40	35.50	3.40	56.19	74.00	-17.81	PK	Horizontal
7206.33	44.77	43.50	11.40	35.50	3.40	48.17	54.00	-5.83	AV	Horizontal

GFSK Mid Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2441 MHz)										
3265.16	50.05	44.70	6.70	28.20	-9.80	40.25	74.00	-33.75	PK	Vertical
3265.16	40.03	44.70	6.70	28.20	-9.80	30.23	54.00	-23.77	AV	Vertical
3265.17	50.05	44.70	6.70	28.20	-9.80	40.25	74.00	-33.75	PK	Horizontal
3265.17	40.02	44.70	6.70	28.20	-9.80	30.22	54.00	-23.78	AV	Horizontal
4882.85	60.31	44.20	9.04	31.60	-3.56	56.75	74.00	-17.25	PK	Vertical
4882.85	50.32	44.20	9.04	31.60	-3.56	46.76	54.00	-7.24	AV	Vertical
4882.80	60.32	44.20	9.04	31.60	-3.56	56.76	74.00	-17.24	PK	Horizontal
4882.80	50.29	44.20	9.04	31.60	-3.56	46.73	54.00	-7.27	AV	Horizontal
7320.20	52.70	43.50	11.40	35.50	3.40	56.10	74.00	-17.90	PK	Vertical
7320.20	44.65	43.50	11.40	35.50	3.40	48.05	54.00	-5.95	AV	Vertical
7320.58	52.73	43.50	11.40	35.50	3.40	56.13	74.00	-17.87	PK	Horizontal
7320.58	44.71	43.50	11.40	35.50	3.40	48.11	54.00	-5.89	AV	Horizontal

GFSK High Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2480 MHz)										
3265.16	50.03	44.70	6.70	28.20	-9.80	40.23	74.00	-33.77	PK	Vertical
3265.16	40.03	44.70	6.70	28.20	-9.80	30.23	54.00	-23.77	AV	Vertical
3265.16	50.05	44.70	6.70	28.20	-9.80	40.25	74.00	-33.75	PK	Horizontal
3265.16	40.03	44.70	6.70	28.20	-9.80	30.23	54.00	-23.77	AV	Horizontal
4960.84	60.34	44.20	9.04	31.60	-3.56	56.78	74.00	-17.22	PK	Vertical
4960.84	50.30	44.20	9.04	31.60	-3.56	46.74	54.00	-7.26	AV	Vertical
4960.83	60.32	44.20	9.04	31.60	-3.56	56.76	74.00	-17.24	PK	Horizontal
4960.83	50.31	44.20	9.04	31.60	-3.56	46.75	54.00	-7.25	AV	Horizontal
7440.16	52.74	43.50	11.40	35.50	3.40	56.14	74.00	-17.86	PK	Vertical
7440.16	44.69	43.50	11.40	35.50	3.40	48.09	54.00	-5.91	AV	Vertical
7440.23	52.72	43.50	11.40	35.50	3.40	56.12	74.00	-17.88	PK	Horizontal
7440.23	44.73	43.50	11.40	35.50	3.40	48.13	54.00	-5.87	AV	Horizontal

Pi/4DQPSK Low Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2402 MHz)										
3265.26	51.13	44.70	6.70	28.20	-9.80	41.33	74.00	-32.67	PK	Vertical
3265.26	40.01	44.70	6.70	28.20	-9.80	30.21	54.00	-23.79	AV	Vertical
3265.23	50.05	44.70	6.70	28.20	-9.80	40.25	74.00	-33.75	PK	Horizontal
3265.23	40.01	44.70	6.70	28.20	-9.80	30.21	54.00	-23.79	AV	Horizontal
4803.93	60.35	44.20	9.04	31.60	-3.56	56.79	74.00	-17.21	PK	Vertical
4803.93	50.30	44.20	9.04	31.60	-3.56	46.74	54.00	-7.26	AV	Vertical
4804.91	60.32	44.20	9.04	31.60	-3.56	56.76	74.00	-17.24	PK	Horizontal
4804.91	50.32	44.20	9.04	31.60	-3.56	46.76	54.00	-7.24	AV	Horizontal
7206.29	52.72	43.50	11.40	35.50	3.40	56.12	74.00	-17.88	PK	Vertical
7206.29	44.69	43.50	11.40	35.50	3.40	48.09	54.00	-5.91	AV	Vertical
7206.33	52.74	43.50	11.40	35.50	3.40	56.14	74.00	-17.86	PK	Horizontal
7206.33	44.82	43.50	11.40	35.50	3.40	48.22	54.00	-5.78	AV	Horizontal

Pi/4DQPSK Mid Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2441 MHz)										
3265.16	52.38	44.70	6.70	28.20	-9.80	42.58	74.00	-31.42	PK	Vertical
3265.16	40.69	44.70	6.70	28.20	-9.80	30.89	54.00	-23.11	AV	Vertical
3265.17	51.61	44.70	6.70	28.20	-9.80	41.81	74.00	-32.19	PK	Horizontal
3265.17	40.86	44.70	6.70	28.20	-9.80	31.06	54.00	-22.94	AV	Horizontal
4882.85	60.68	44.20	9.04	31.60	-3.56	57.12	74.00	-16.88	PK	Vertical
4882.85	50.53	44.20	9.04	31.60	-3.56	46.97	54.00	-7.03	AV	Vertical
4882.80	61.06	44.20	9.04	31.60	-3.56	57.50	74.00	-16.50	PK	Horizontal
4882.80	51.42	44.20	9.04	31.60	-3.56	47.86	54.00	-6.14	AV	Horizontal
7320.20	53.25	43.50	11.40	35.50	3.40	56.65	74.00	-17.35	PK	Vertical
7320.20	46.40	43.50	11.40	35.50	3.40	49.80	54.00	-4.20	AV	Vertical
7320.58	54.61	43.50	11.40	35.50	3.40	58.01	74.00	-15.99	PK	Horizontal
7320.58	45.31	43.50	11.40	35.50	3.40	48.71	54.00	-5.29	AV	Horizontal

Pi/4DQPSK High Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2480 MHz)										
3265.16	53.89	44.70	6.70	28.20	-9.80	44.09	74.00	-29.91	PK	Vertical
3265.16	42.02	44.70	6.70	28.20	-9.80	32.22	54.00	-21.78	AV	Vertical
3265.16	51.53	44.70	6.70	28.20	-9.80	41.73	74.00	-32.27	PK	Horizontal
3265.16	42.24	44.70	6.70	28.20	-9.80	32.44	54.00	-21.56	AV	Horizontal
4960.84	61.43	44.20	9.04	31.60	-3.56	57.87	74.00	-16.13	PK	Vertical
4960.84	52.13	44.20	9.04	31.60	-3.56	48.57	54.00	-5.43	AV	Vertical
4960.83	62.65	44.20	9.04	31.60	-3.56	59.09	74.00	-14.91	PK	Horizontal
4960.83	51.74	44.20	9.04	31.60	-3.56	48.18	54.00	-5.82	AV	Horizontal
7440.16	53.19	43.50	11.40	35.50	3.40	56.59	74.00	-17.41	PK	Vertical
7440.16	47.29	43.50	11.40	35.50	3.40	50.69	54.00	-3.31	AV	Vertical
7440.23	54.89	43.50	11.40	35.50	3.40	58.29	74.00	-15.71	PK	Horizontal
7440.23	47.10	43.50	11.40	35.50	3.40	50.50	54.00	-3.50	AV	Horizontal

8DPSK Low Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2402 MHz)										
3265.26	55.72	44.70	6.70	28.20	-9.80	45.92	74.00	-28.08	PK	Vertical
3265.26	42.62	44.70	6.70	28.20	-9.80	32.82	54.00	-21.18	AV	Vertical
3265.23	51.71	44.70	6.70	28.20	-9.80	41.91	74.00	-32.09	PK	Horizontal
3265.23	42.44	44.70	6.70	28.20	-9.80	32.64	54.00	-21.36	AV	Horizontal
4803.93	61.69	44.20	9.04	31.60	-3.56	58.13	74.00	-15.87	PK	Vertical
4803.93	53.55	44.20	9.04	31.60	-3.56	49.99	54.00	-4.01	AV	Vertical
4804.91	63.01	44.20	9.04	31.60	-3.56	59.45	74.00	-14.55	PK	Horizontal
4804.91	52.08	44.20	9.04	31.60	-3.56	48.52	54.00	-5.48	AV	Horizontal
7206.29	54.38	43.50	11.40	35.50	3.40	57.78	74.00	-16.22	PK	Vertical
7206.29	47.42	43.50	11.40	35.50	3.40	50.82	54.00	-3.18	AV	Vertical
7206.33	55.04	43.50	11.40	35.50	3.40	58.44	74.00	-15.56	PK	Horizontal
7206.33	47.09	43.50	11.40	35.50	3.40	50.49	54.00	-3.51	AV	Horizontal

8DPSK Mid Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2441 MHz)										
3265.16	55.72	44.70	6.70	28.20	-9.80	45.92	74.00	-28.08	PK	Vertical
3265.16	42.62	44.70	6.70	28.20	-9.80	32.82	54.00	-21.18	AV	Vertical
3265.17	51.71	44.70	6.70	28.20	-9.80	41.91	74.00	-32.09	PK	Horizontal
3265.17	42.44	44.70	6.70	28.20	-9.80	32.64	54.00	-21.36	AV	Horizontal
4882.85	61.69	44.20	9.04	31.60	-3.56	58.13	74.00	-15.87	PK	Vertical
4882.85	53.55	44.20	9.04	31.60	-3.56	49.99	54.00	-4.01	AV	Vertical
4882.80	63.01	44.20	9.04	31.60	-3.56	59.45	74.00	-14.55	PK	Horizontal
4882.80	52.08	44.20	9.04	31.60	-3.56	48.52	54.00	-5.48	AV	Horizontal
7320.20	54.38	43.50	11.40	35.50	3.40	57.78	74.00	-16.22	PK	Vertical
7320.20	47.42	43.50	11.40	35.50	3.40	50.82	54.00	-3.18	AV	Vertical
7320.58	55.04	43.50	11.40	35.50	3.40	58.44	74.00	-15.56	PK	Horizontal
7320.58	47.09	43.50	11.40	35.50	3.40	50.49	54.00	-3.51	AV	Horizontal

8DPSK High Channel

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	dB	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
Low Channel (2480 MHz)										
3265.16	56.70	44.70	6.70	28.20	-9.80	46.90	74.00	-27.10	PK	Vertical
3265.16	44.06	44.70	6.70	28.20	-9.80	34.26	54.00	-19.74	AV	Vertical
3265.16	52.47	44.70	6.70	28.20	-9.80	42.67	74.00	-31.33	PK	Horizontal
3265.16	43.65	44.70	6.70	28.20	-9.80	33.85	54.00	-20.15	AV	Horizontal
4960.84	62.37	44.20	9.04	31.60	-3.56	58.81	74.00	-15.19	PK	Vertical
4960.84	54.04	44.20	9.04	31.60	-3.56	50.48	54.00	-3.52	AV	Vertical
4960.83	64.17	44.20	9.04	31.60	-3.56	60.61	74.00	-13.39	PK	Horizontal
4960.83	52.42	44.20	9.04	31.60	-3.56	48.86	54.00	-5.14	AV	Horizontal
7440.16	54.99	43.50	11.40	35.50	3.40	58.39	74.00	-15.61	PK	Vertical
7440.16	48.12	43.50	11.40	35.50	3.40	51.52	54.00	-2.48	AV	Vertical
7440.23	56.11	43.50	11.40	35.50	3.40	59.51	74.00	-14.49	PK	Horizontal
7440.23	48.55	43.50	11.40	35.50	3.40	51.95	54.00	-2.05	AV	Horizontal

Band edge

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	CCorrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBμV	（dB）	dB	dB/m	dB	dBμV/m	dBμV/m	dB	Type	Comment
GFSK										
2400.00	69.17	43.80	4.91	25.90	-12.99	56.18	74	-17.82	PK	Vertical
2400.00	54.97	43.80	4.91	25.90	-12.99	41.98	54	-12.02	AV	Vertical
2400.00	70.16	43.80	4.91	25.90	-12.99	57.17	74	-16.83	PK	Horizontal
2400.00	54.05	43.80	4.91	25.90	-12.99	41.06	54	-12.94	AV	Horizontal
2483.50	70.98	43.80	5.12	25.90	-12.78	58.20	74	-15.80	PK	Vertical
2483.50	53.96	43.80	5.12	25.90	-12.78	41.18	54	-12.82	AV	Vertical
2483.50	71.06	43.80	5.12	25.90	-12.78	58.28	74	-15.72	PK	Horizontal
2483.50	54.00	43.80	5.12	25.90	-12.78	41.22	54	-12.78	AV	Horizontal
π/4-DQPSK										
2400.00	69.20	43.80	4.91	25.90	-12.99	56.21	74	-17.79	PK	Vertical
2400.00	54.98	43.80	4.91	25.90	-12.99	41.99	54	-12.01	AV	Vertical
2400.00	70.20	43.80	4.91	25.90	-12.99	57.21	74	-16.79	PK	Horizontal
2400.00	54.09	43.80	4.91	25.90	-12.99	41.10	54	-12.90	AV	Horizontal
2483.50	70.96	43.80	5.12	25.90	-12.78	58.18	74	-15.82	PK	Vertical
2483.50	53.94	43.80	5.12	25.90	-12.78	41.16	54	-12.84	AV	Vertical
2483.50	71.07	43.80	5.12	25.90	-12.78	58.29	74	-15.71	PK	Horizontal
2483.50	53.96	43.80	5.12	25.90	-12.78	41.18	54	-12.82	AV	Horizontal
8DPSK										
2400.00	69.19	43.80	4.91	25.90	-12.99	56.20	74	-17.80	PK	Vertical
2400.00	55.00	43.80	4.91	25.90	-12.99	42.01	54	-11.99	AV	Vertical
2400.00	70.17	43.80	4.91	25.90	-12.99	57.18	74	-16.82	PK	Horizontal
2400.00	54.06	43.80	4.91	25.90	-12.99	41.07	54	-12.93	AV	Horizontal
2483.50	71.00	43.80	5.12	25.90	-12.78	58.22	74	-15.78	PK	Vertical
2483.50	53.94	43.80	5.12	25.90	-12.78	41.16	54	-12.84	AV	Vertical
2483.50	71.04	43.80	5.12	25.90	-12.78	58.26	74	-15.74	PK	Horizontal
2483.50	54.00	43.80	5.12	25.90	-12.78	41.22	54	-12.78	AV	Horizontal
Low measurement frequencies is range from 2310 to 2400 MHz ,high measurement frequencies is range from 2483.5 to 2500 MHz.										

Hopping Band edge

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	CCorrected Factor	Emission Level	Limits	Margin	Detector	
MHz	dBµV	（dB）	dB	dB/m	dB	dBµV/m	dBµV/m	dB	Type	Comment
GFSK										
2400.00	69.20	43.80	4.91	25.90	-12.99	56.21	74	-17.79	PK	Vertical
2400.00	54.98	43.80	4.91	25.90	-12.99	41.99	54	-12.01	AV	Vertical
2400.00	70.18	43.80	4.91	25.90	-12.99	57.19	74	-16.81	PK	Horizontal
2400.00	54.10	43.80	4.91	25.90	-12.99	41.11	54	-12.89	AV	Horizontal
2483.50	71.00	43.80	5.12	25.90	-12.78	58.22	74	-15.78	PK	Vertical
2483.50	53.94	43.80	5.12	25.90	-12.78	41.16	54	-12.84	AV	Vertical
2483.50	71.09	43.80	5.12	25.90	-12.78	58.31	74	-15.69	PK	Horizontal
2483.50	53.99	43.80	5.12	25.90	-12.78	41.21	54	-12.79	AV	Horizontal
π/4-DQPSK										
2400.00	69.17	43.80	4.91	25.90	-12.99	56.18	74	-17.82	PK	Vertical
2400.00	54.99	43.80	4.91	25.90	-12.99	42.00	54	-12.00	AV	Vertical
2400.00	70.19	43.80	4.91	25.90	-12.99	57.20	74	-16.80	PK	Horizontal
2400.00	54.05	43.80	4.91	25.90	-12.99	41.06	54	-12.94	AV	Horizontal
2483.50	70.97	43.80	5.12	25.90	-12.78	58.19	74	-15.81	PK	Vertical
2483.50	53.97	43.80	5.12	25.90	-12.78	41.19	54	-12.81	AV	Vertical
2483.50	71.05	43.80	5.12	25.90	-12.78	58.27	74	-15.73	PK	Horizontal
2483.50	54.00	43.80	5.12	25.90	-12.78	41.22	54	-12.78	AV	Horizontal
8DPSK										
2400.00	69.16	43.80	4.91	25.90	-12.99	56.17	74	-17.83	PK	Vertical
2400.00	54.99	43.80	4.91	25.90	-12.99	42.00	54	-12.00	AV	Vertical
2400.00	70.18	43.80	4.91	25.90	-12.99	57.19	74	-16.81	PK	Horizontal
2400.00	54.09	43.80	4.91	25.90	-12.99	41.10	54	-12.90	AV	Horizontal

2483.50	70.97	43.80	5.12	25.90	-12.78	58.19	74	-15.81	PK	Vertical
2483.50	53.99	43.80	5.12	25.90	-12.78	41.21	54	-12.79	AV	Vertical
2483.50	71.05	43.80	5.12	25.90	-12.78	58.27	74	-15.73	PK	Horizontal
2483.50	53.96	43.80	5.12	25.90	-12.78	41.18	54	-12.82	AV	Horizontal
Low measurement frequencies is range from 2310 to 2400 MHz, high measurement frequencies is range from 2483.5 to 2500 MHz. Only show the worst point data of the emissions in the frequency 2310-2400 MHz and 2483.5-2500 MHz.										

Test Frequency: Above 18GHz

The measurements were more than 20 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.

7 Conducted Spurious Emissions

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.

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;

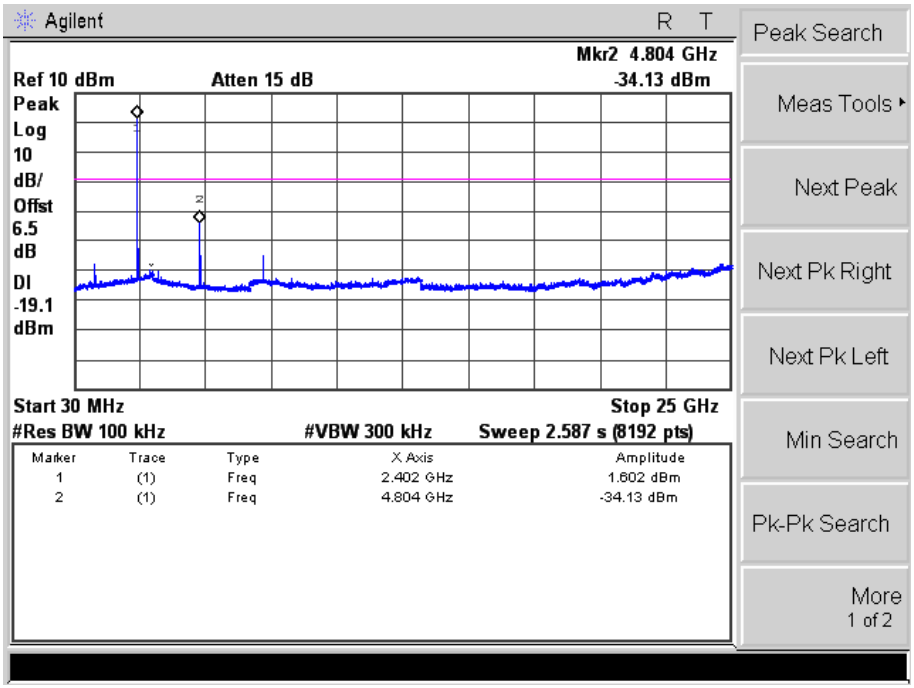
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

7.2 Test Result

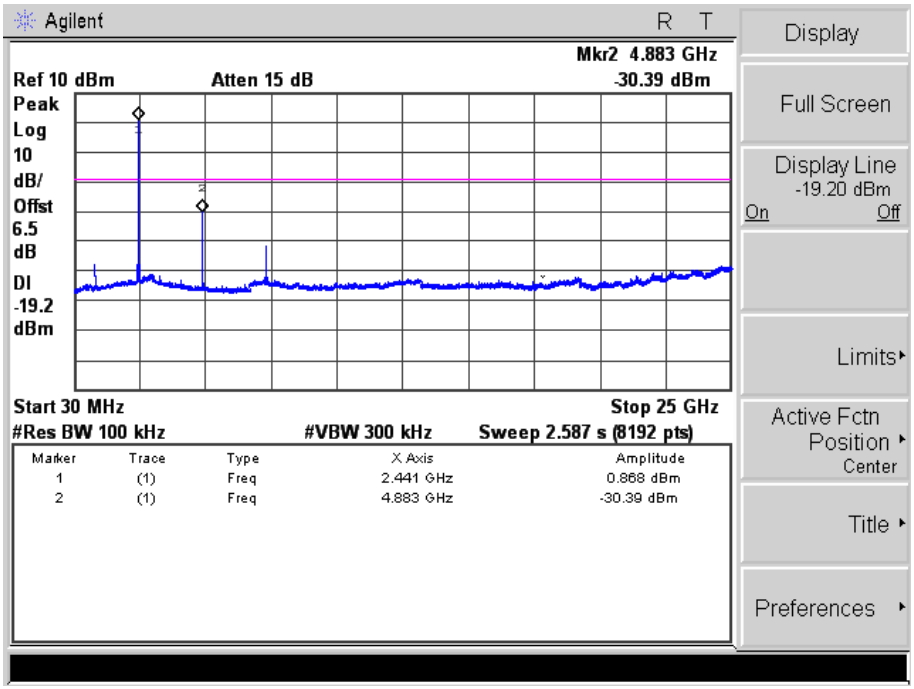
GFSK

0 CH



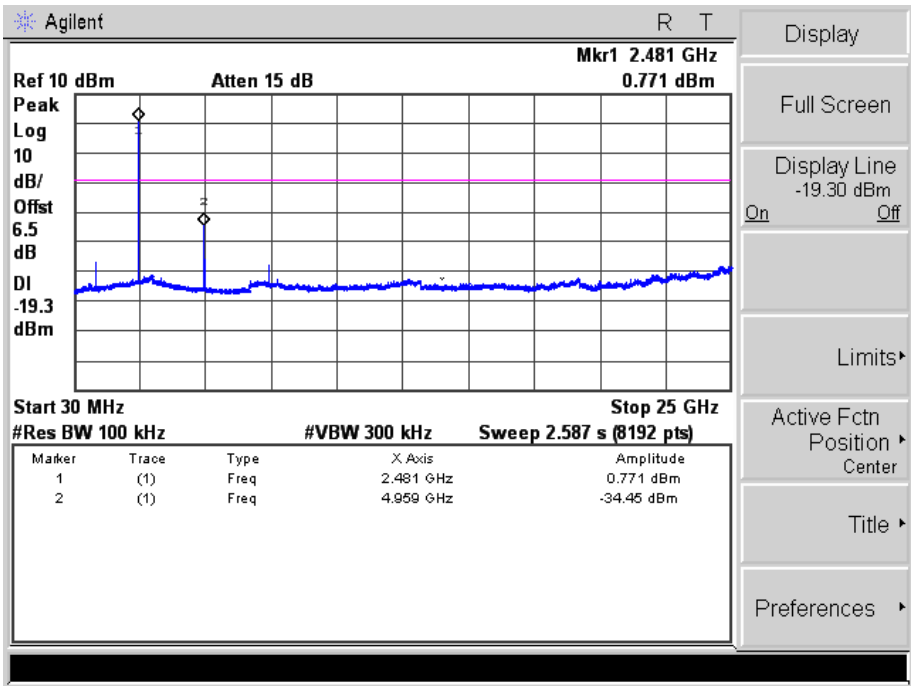
GFSK

39 CH

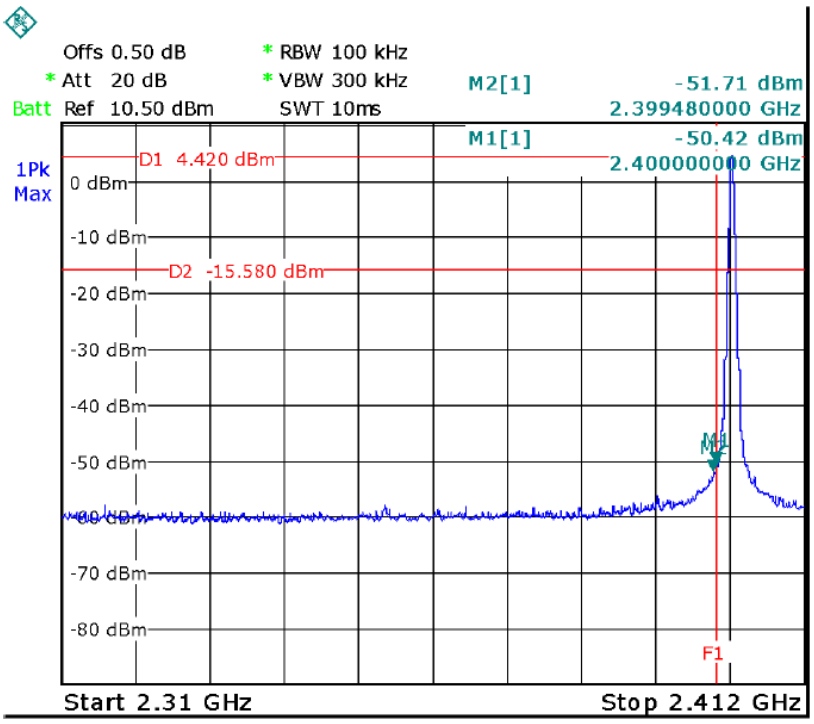


GFSK

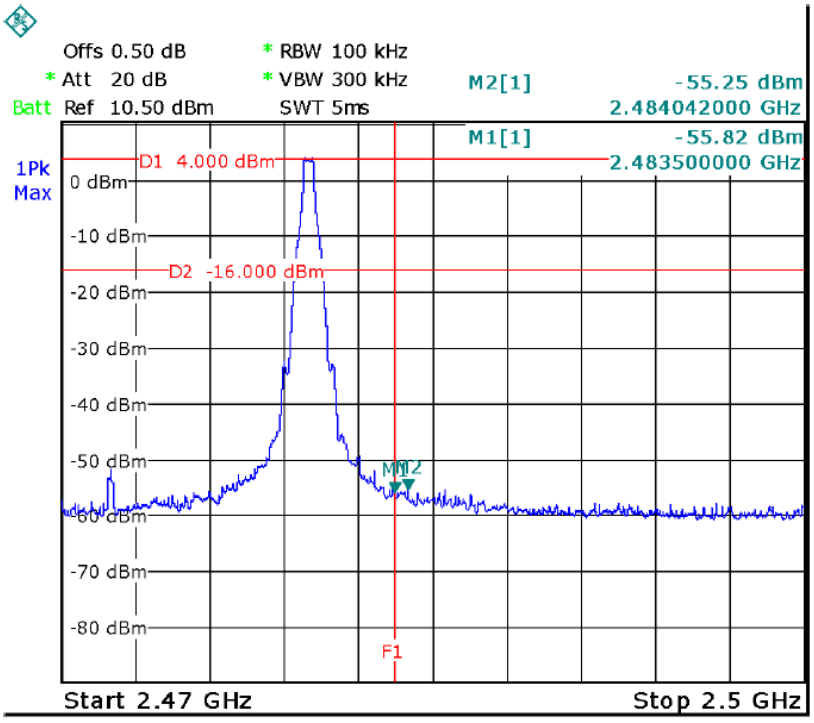
78 CH


Agilent
R T
Mkr1 2.481 GHz
Ref 10 dBm
Atten 15 dB
0.771 dBm
Peak
Log
10
dB/
Offst
6.5
dB
Dl
-19.3
dBm
Start 30 MHz
Stop 25 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.587 s (8192 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.481 GHz 0.771 dBm
2 (1) Freq 4.959 GHz -34.45 dBm
Display
Full Screen
Display Line
-19.30 dBm
On
Off
Limits
Active Fctn
Position
Center
Title
Preferences

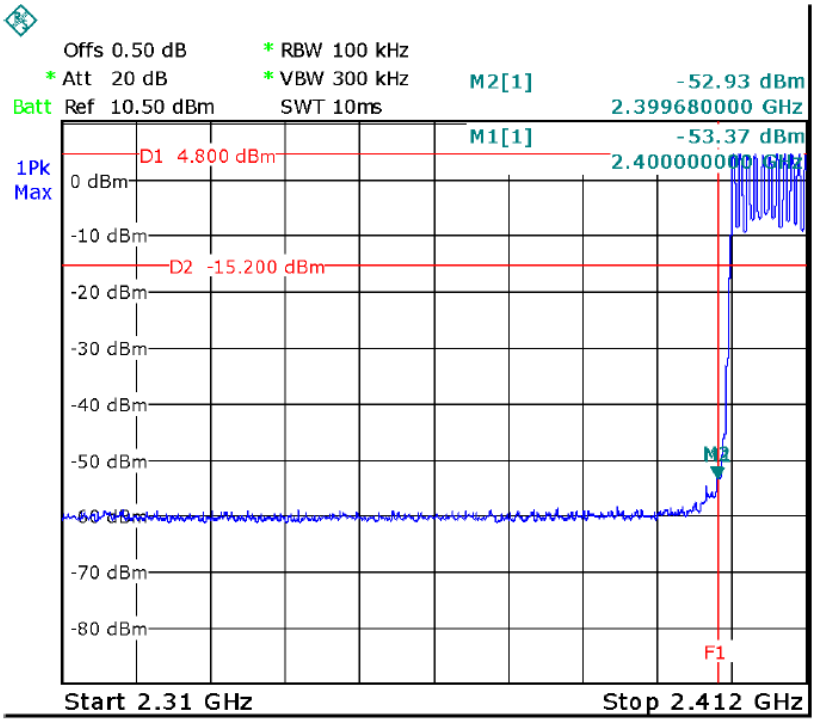
TX in GFSK Band edge-left side



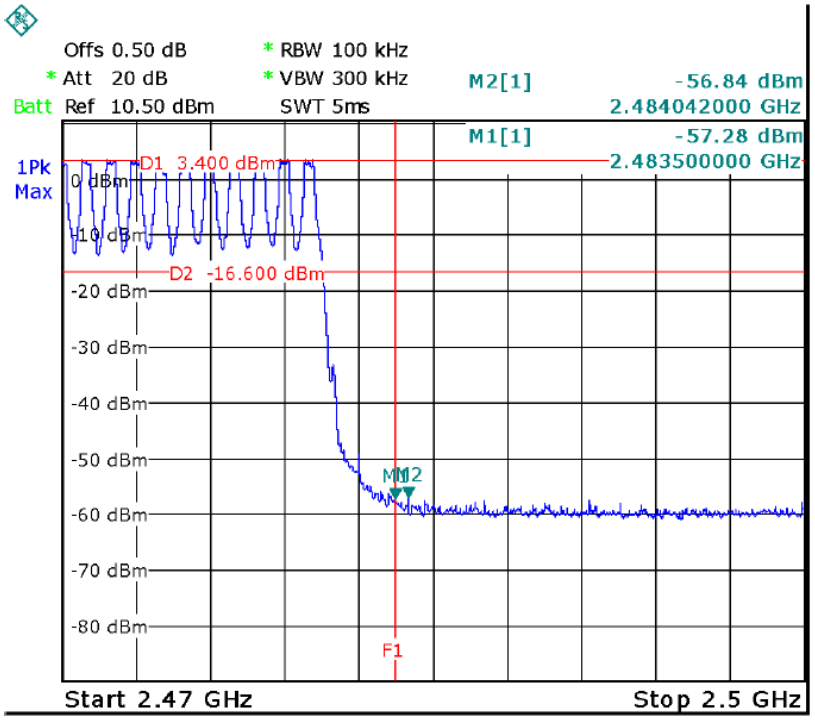
TX in GFSK Band edge-right side



Hopping in GFSK Band edge-left side

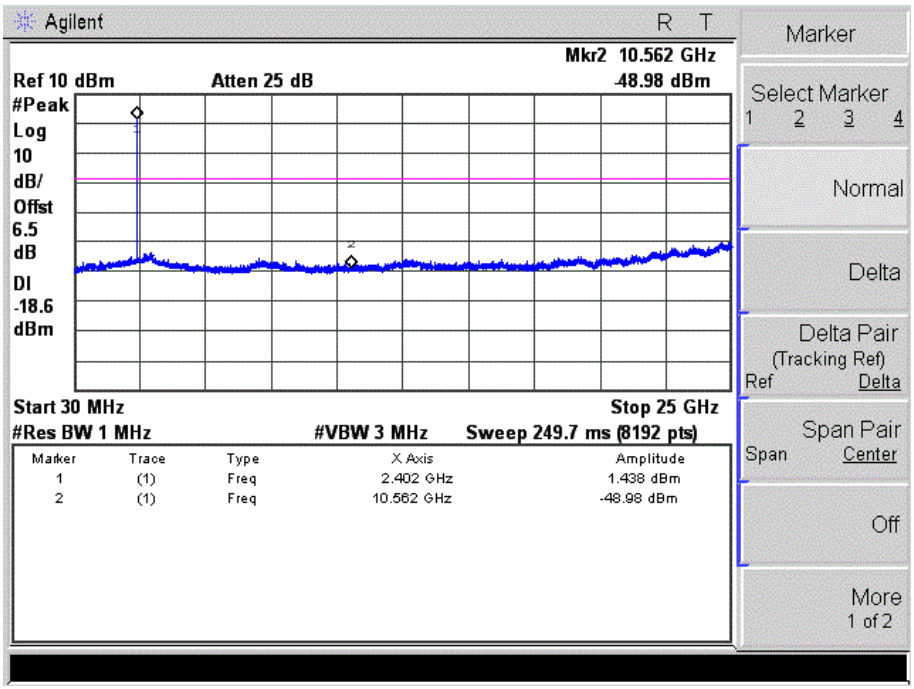


Hopping in GFSK Band edge-right side



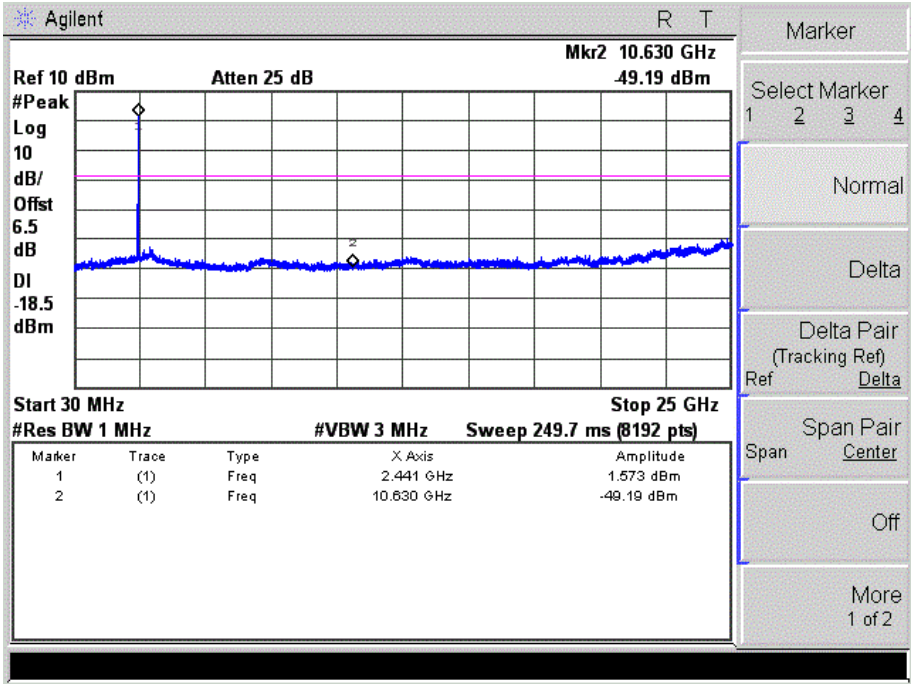
π/4-DQPSK(2Mbps)

00 CH



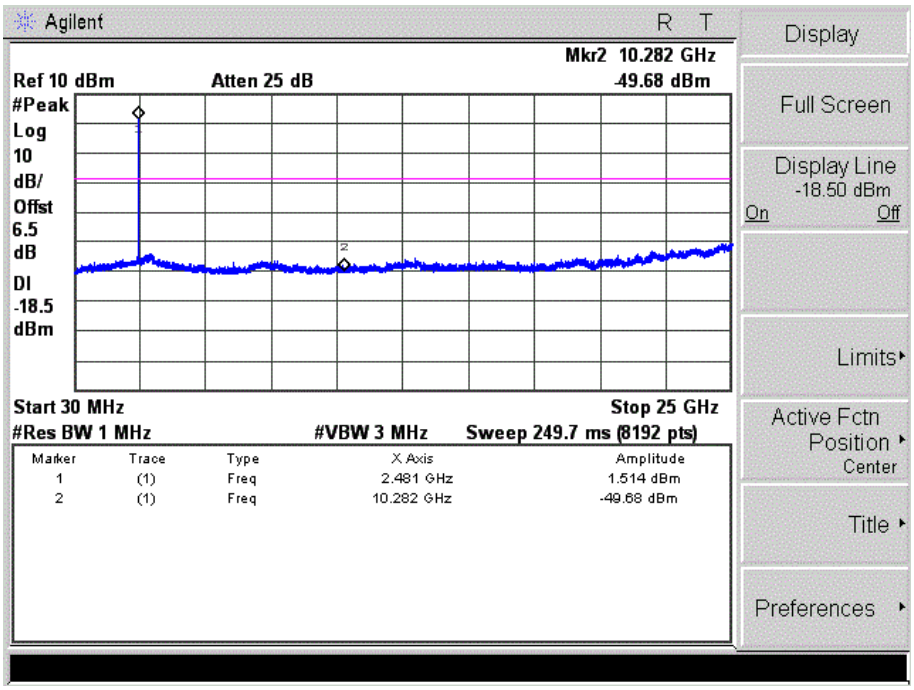
π/4-DQPSK(2Mbps)

39 CH

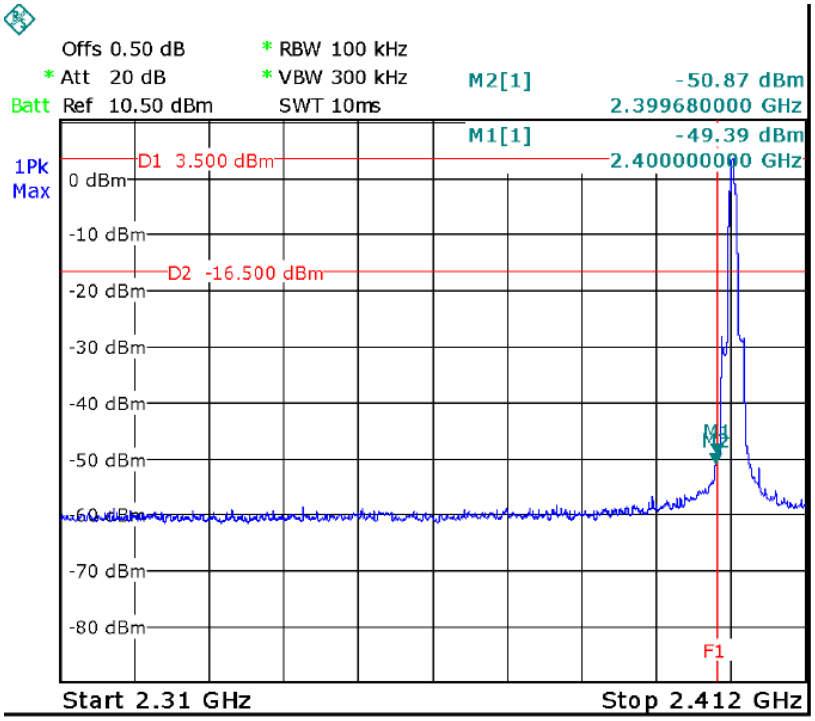


π/4-DQPSK(2Mbps)

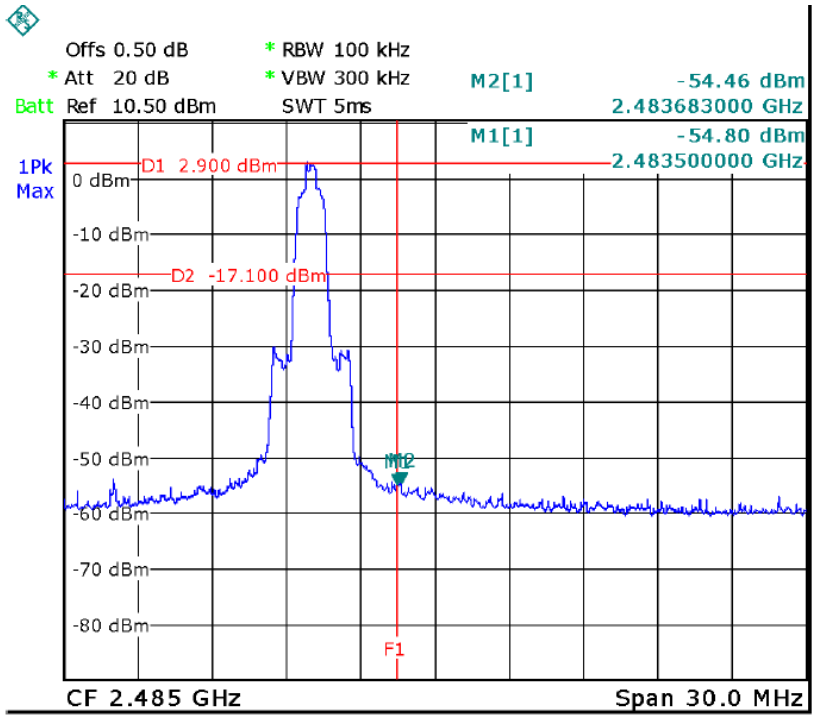
78 CH



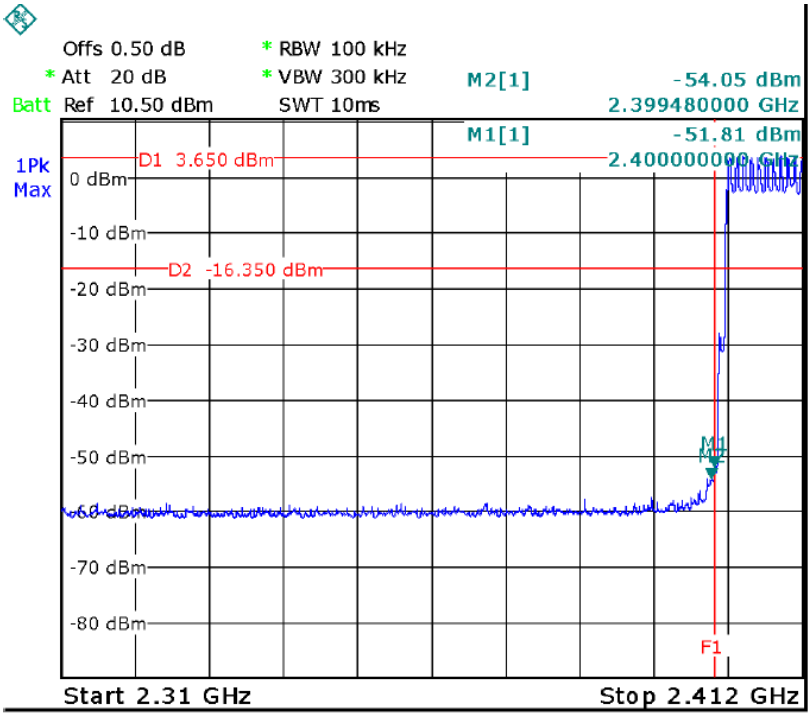
TX in Pi/4 DQPSK Band edge-left side



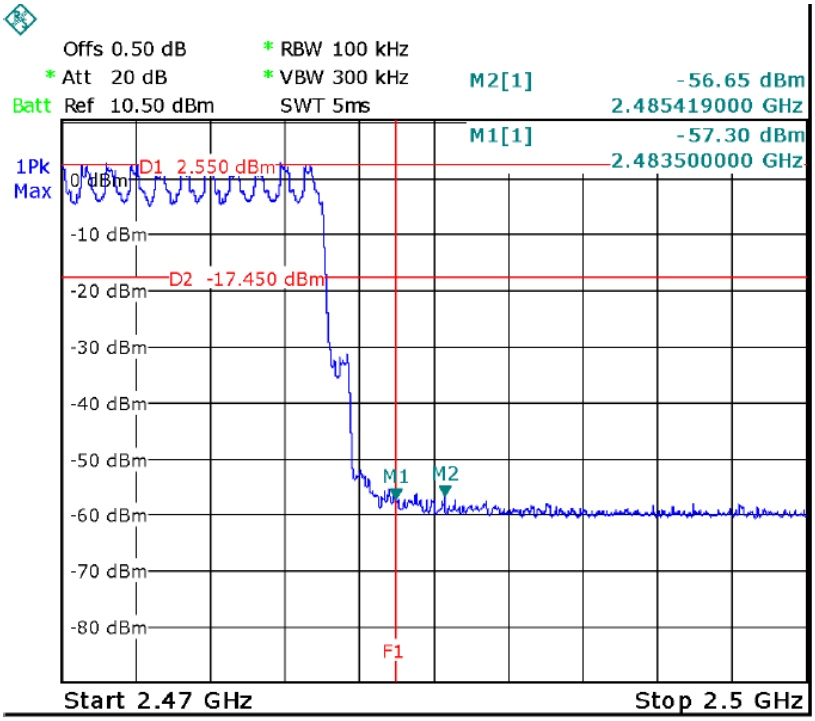
TX in Pi/4 DQPSK Band edge-right side



Hopping in Pi/4 DQPSK Band edge-left side

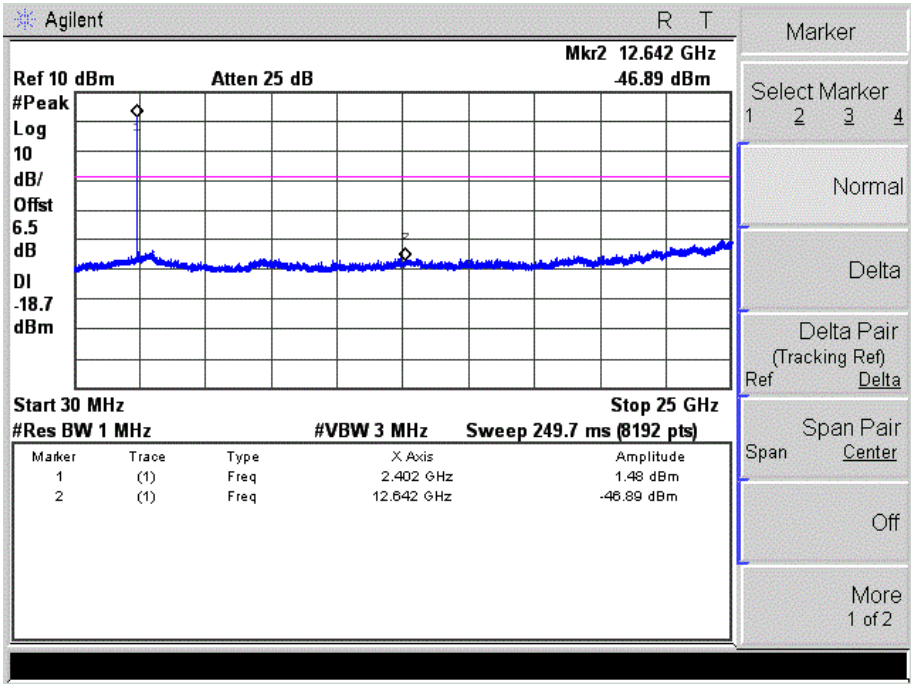


Hopping in Pi/4 DQPSK Band edge-right side



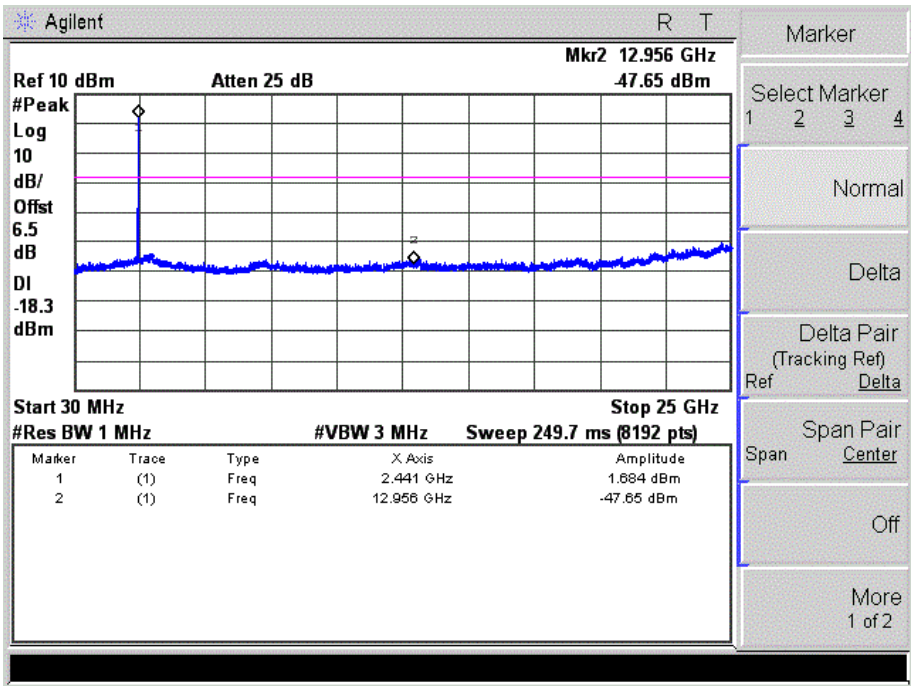
8DPSK

00 CH



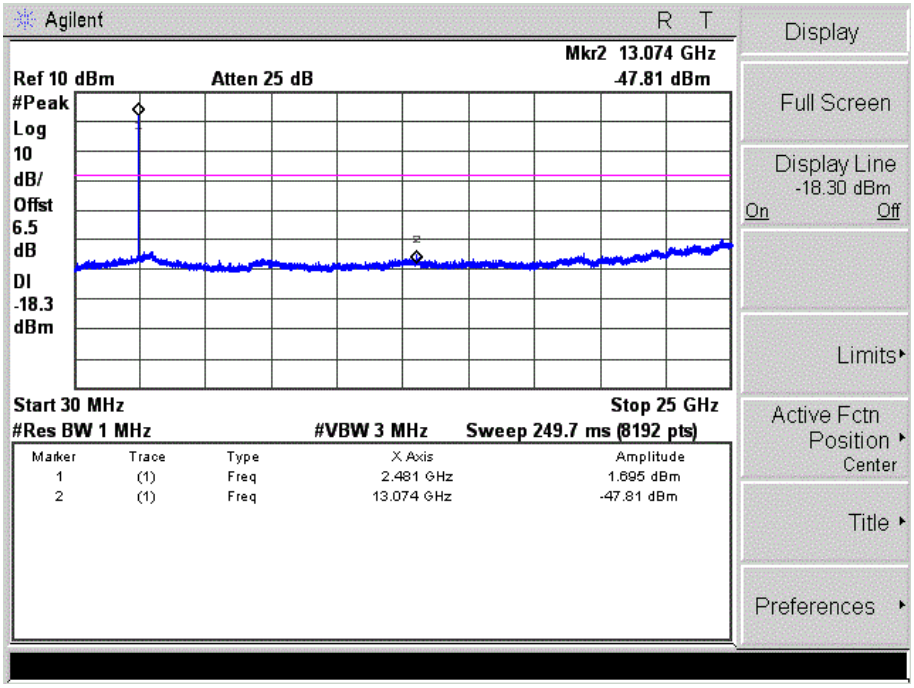
8DPSK

39 CH

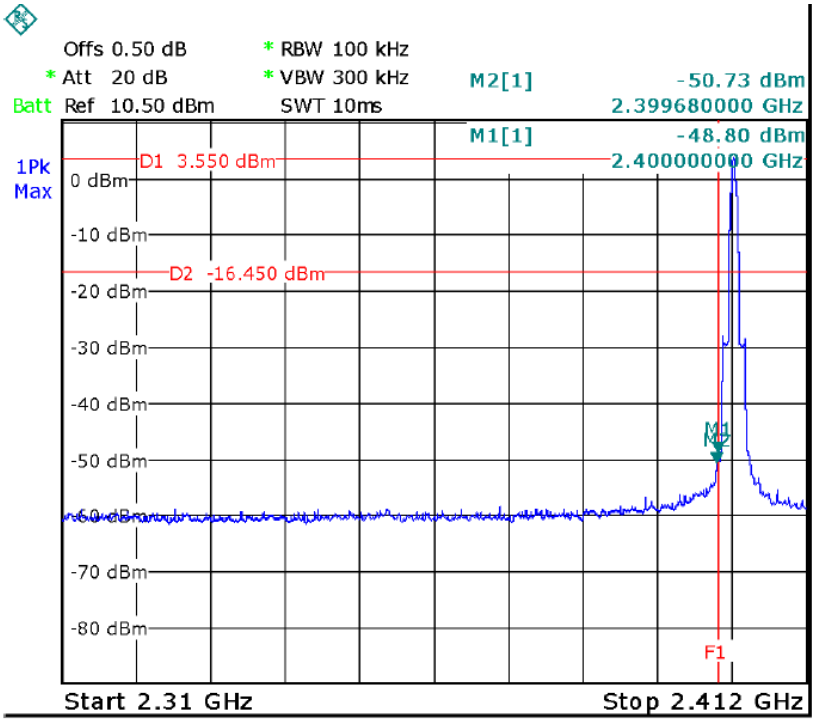


8DPSK

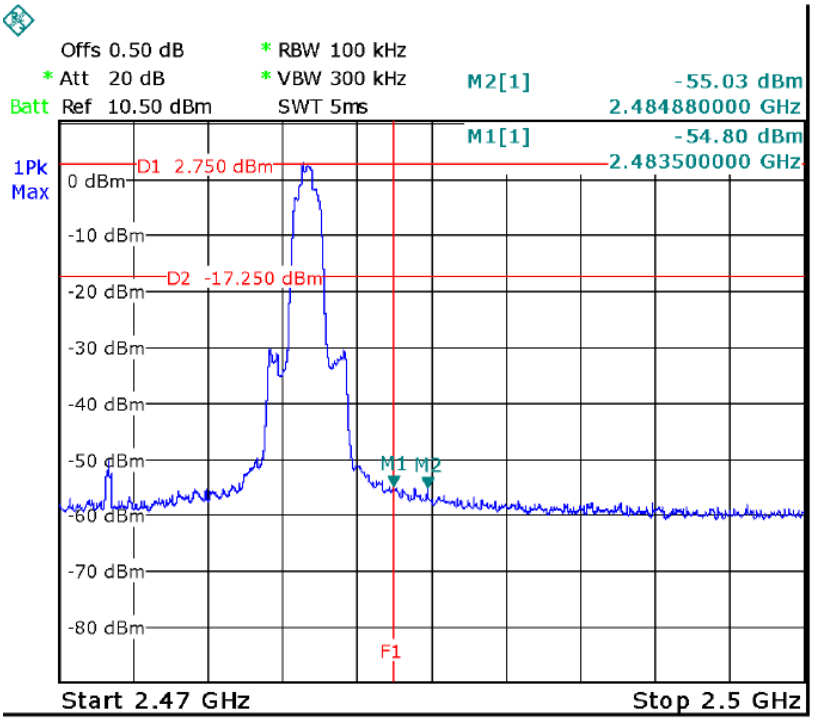
78 CH


Agilent
R T
Mkr2 13.074 GHz
Ref 10 dBm
Atten 25 dB
-47.81 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-18.3
dBm
Start 30 MHz
Stop 25 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 249.7 ms (8192 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.481 GHz 1.695 dBm
2 (1) Freq 13.074 GHz -47.81 dBm
Display
Full Screen
Display Line
-18.30 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences

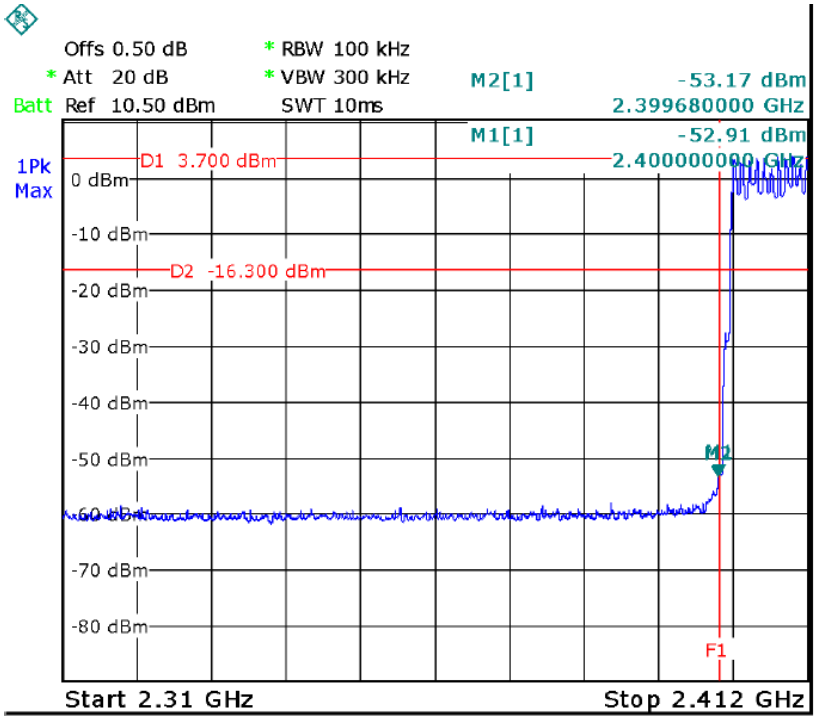
TX in 8DPSK Band edge-left side



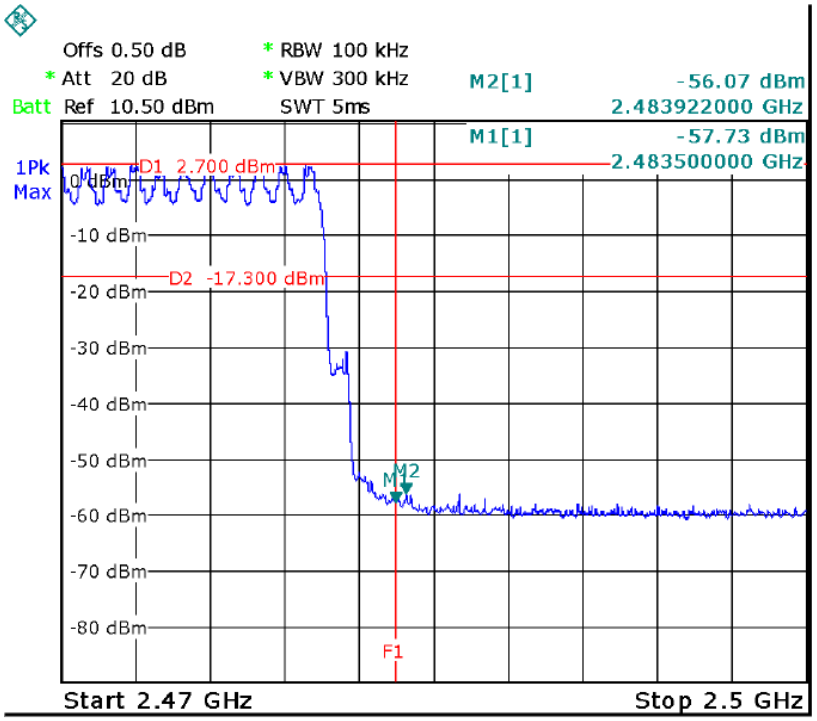
TX in 8DPSK Band edge-right side



Hopping in 8DPSK Band edge-left side



Hopping in 8DPSK Band edge-right side



8 20 dB Bandwidth Measurement

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

8.1 Test Procedure

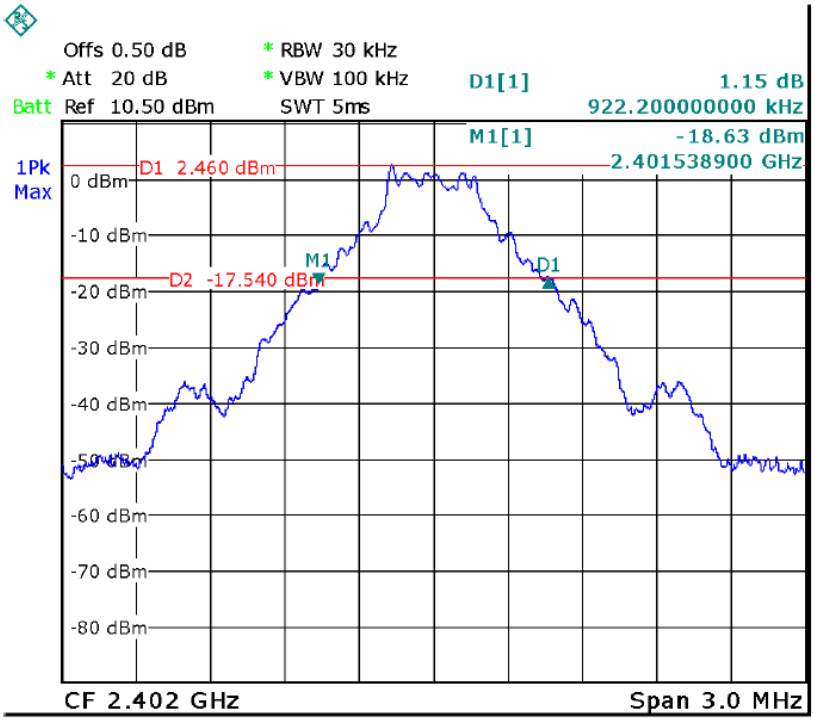
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

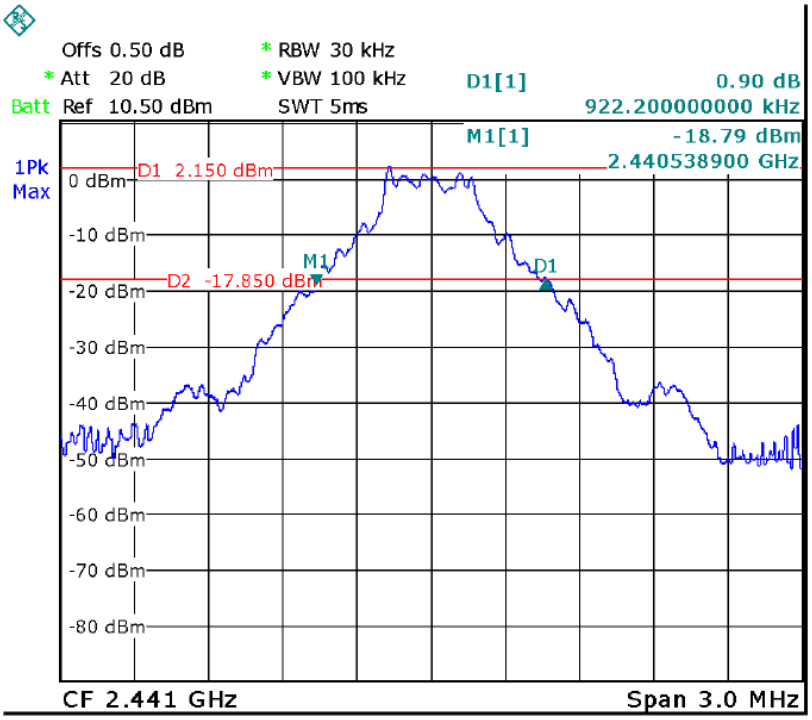
8.2 Test Result

Modulation	Test Channel	Bandwidth(MHz)
GFSK	Low	0.922
GFSK	Middle	0.922
GFSK	High	0.922
Pi/4 DQPSK	Low	1.246
Pi/4 DQPSK	Middle	1.246
Pi/4 DQPSK	High	1.246
8DPSK	Low	1.264
8DPSK	Middle	1.264
8DPSK	High	1.264

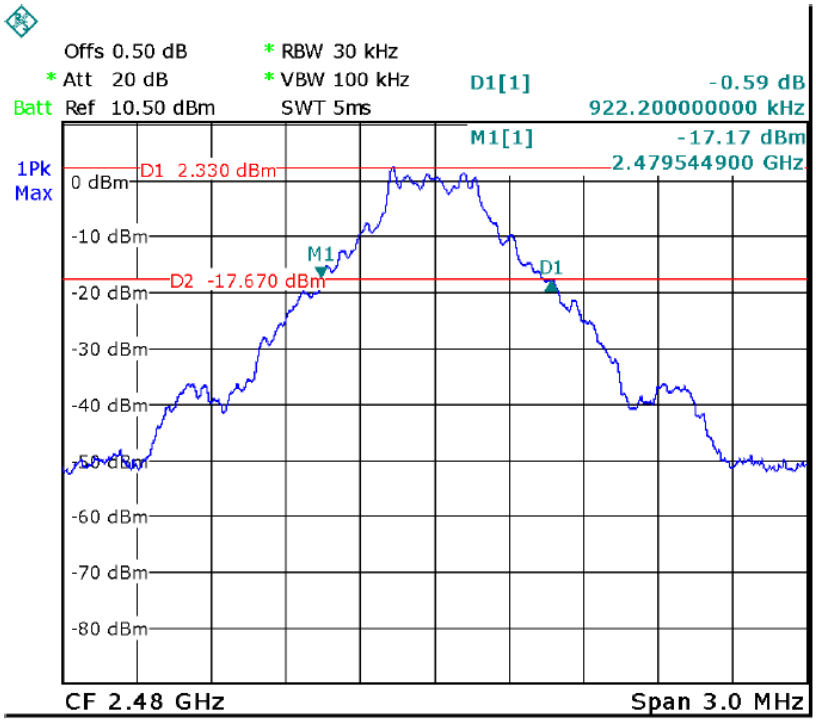
GFSK Low Channel



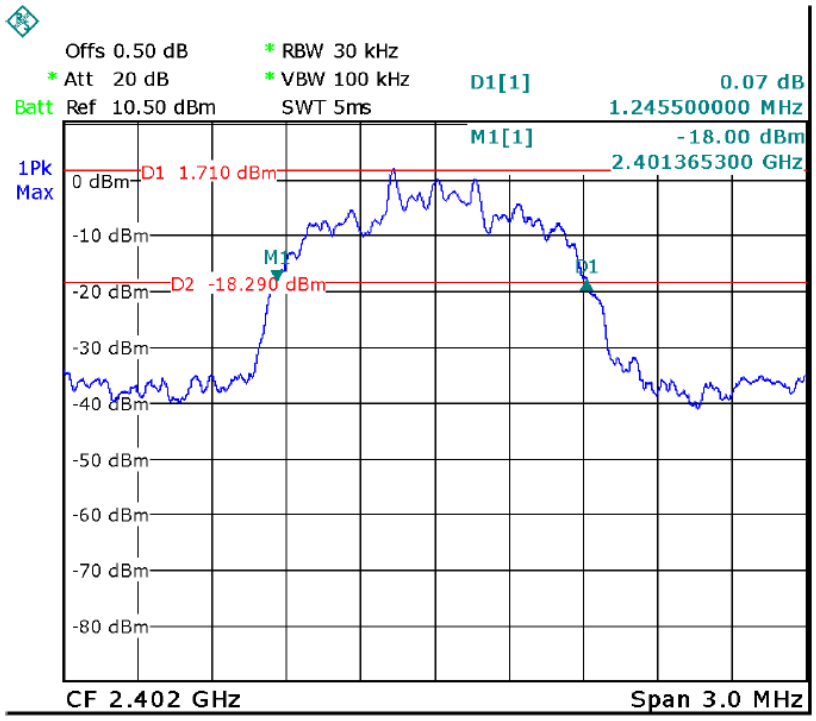
GFSK Middle Channel



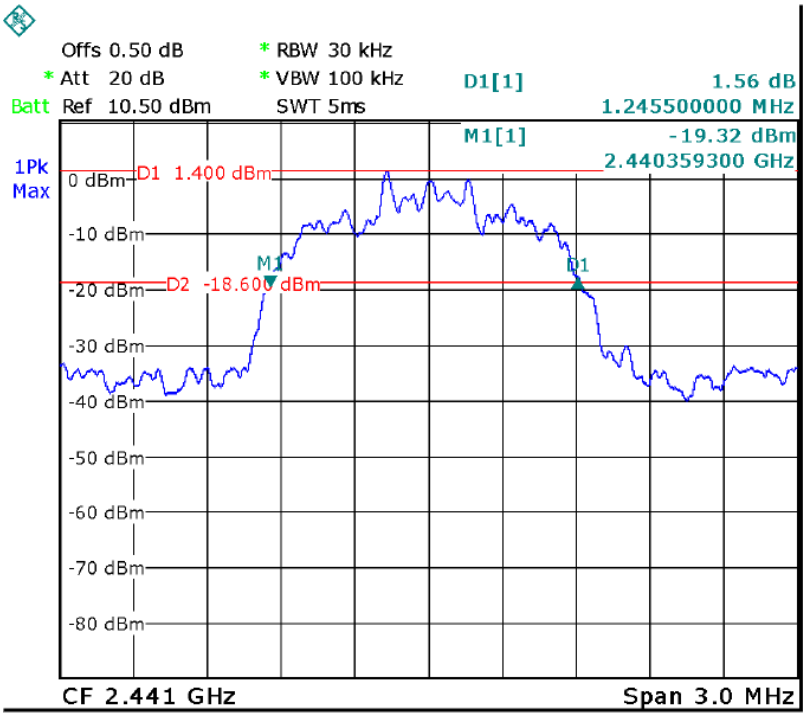
GFSK High Channel



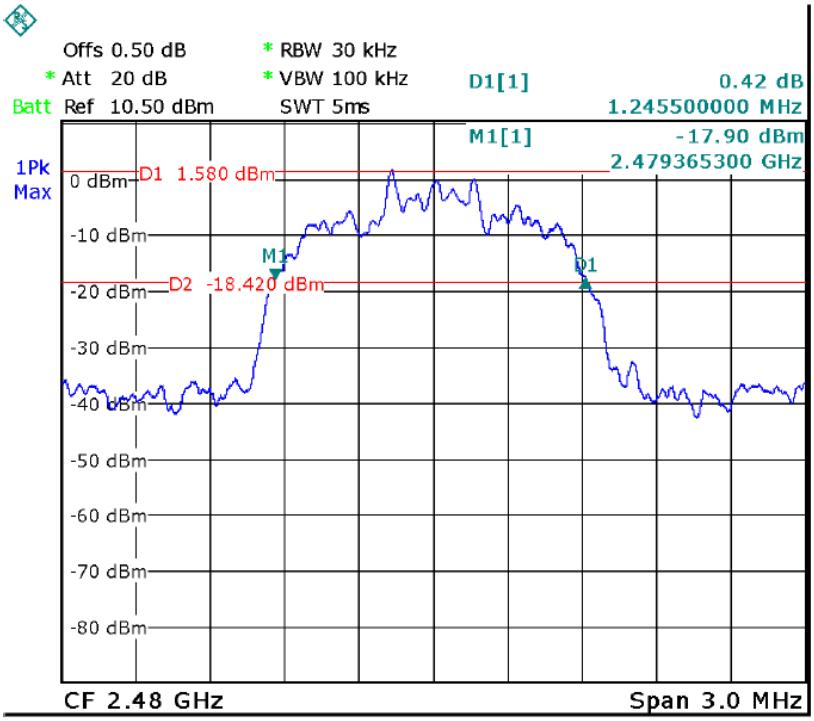
Pi/4DQPSK Low Channel



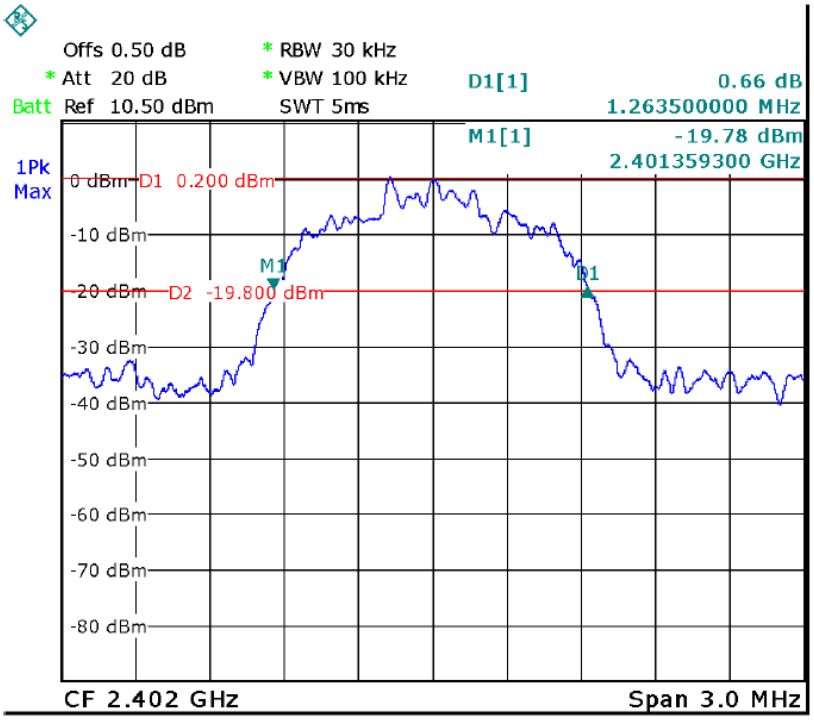
Pi/4DQPSK Middle Channel



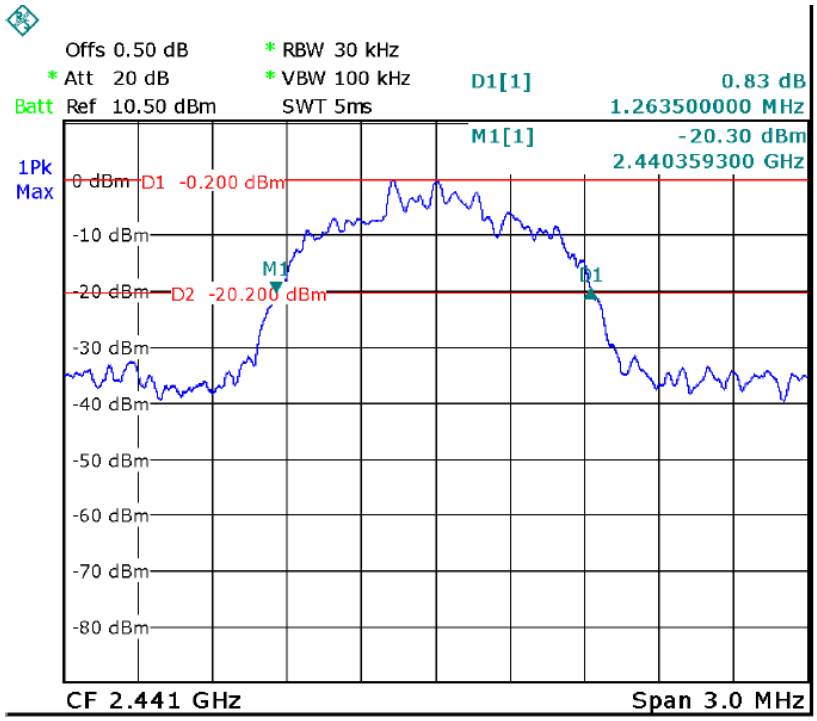
Pi/4DQPSK High Channel



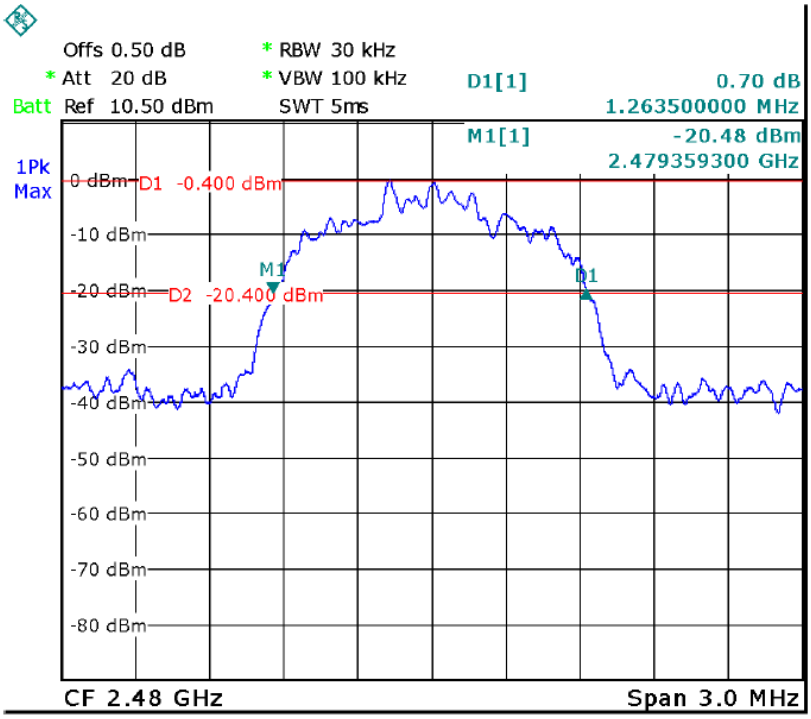
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



9 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013, DA 00-705
Test Limit	:	1 W or 0.125W if channel separation > 2/3 bandwidth provided the systems operate with an output power no greater than 125 mW(20.97dBm)
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.

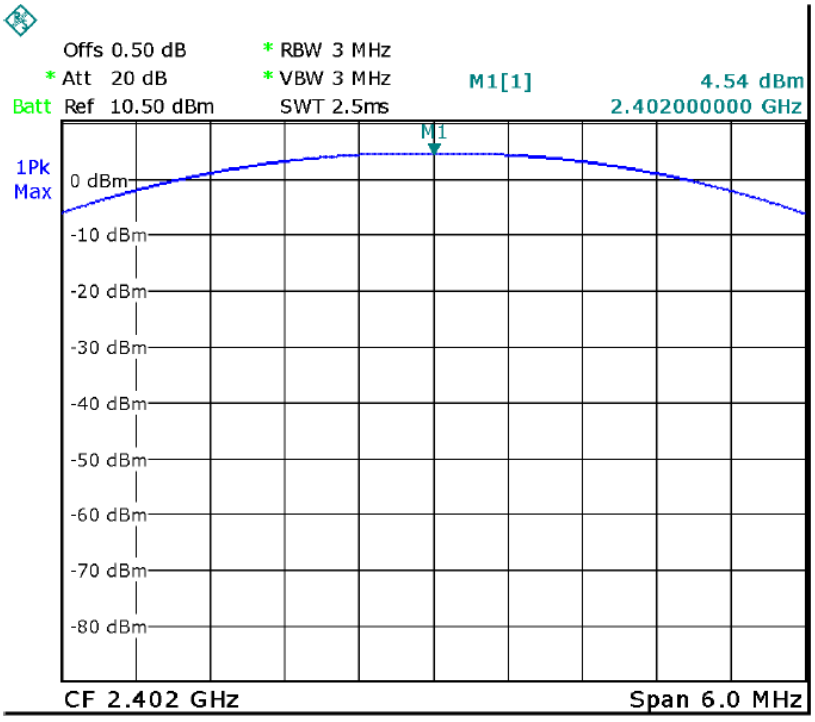
2. Set the spectrum analyser: RBW = 3 MHz. VBW =3 MHz. Sweep = auto; Detector Function = Peak.

3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

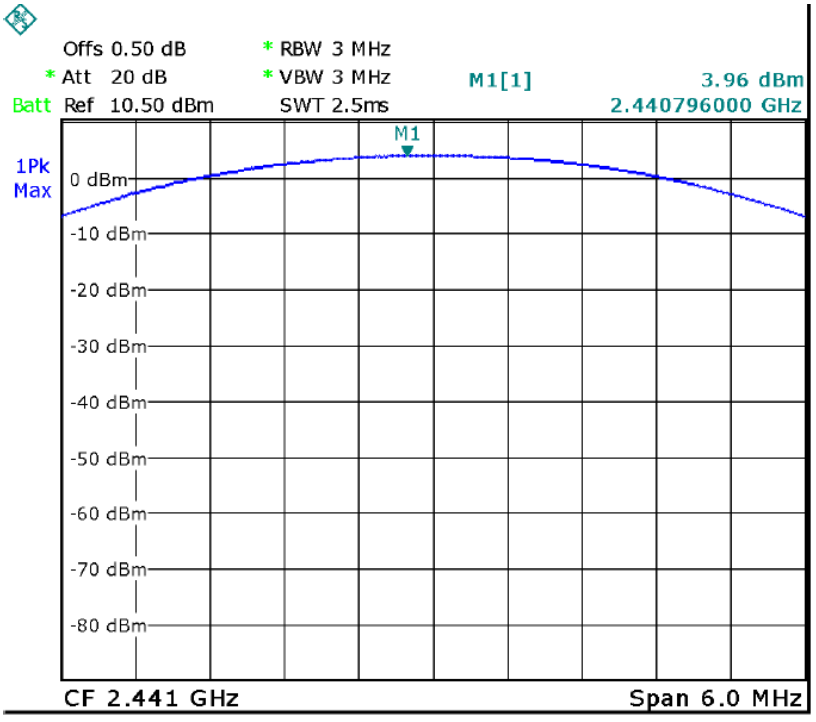
9.2 Test Result

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Low	4.54	30
GFSK	Middle	3.96	30
GFSK	High	4.22	30
Pi/4 DQPSK	Low	4.25	20.97
Pi/4 DQPSK	Middle	3.71	20.97
Pi/4 DQPSK	High	3.69	20.97
8DPSK	Low	4.33	20.97
8DPSK	Middle	4.09	20.97
8DPSK	High	3.94	20.97

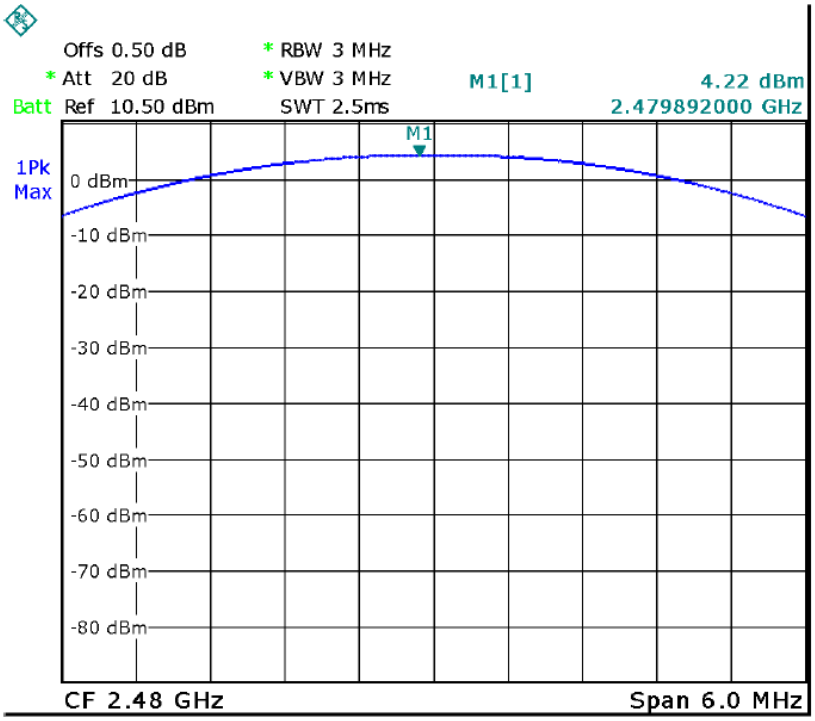
GFSK Low Channel



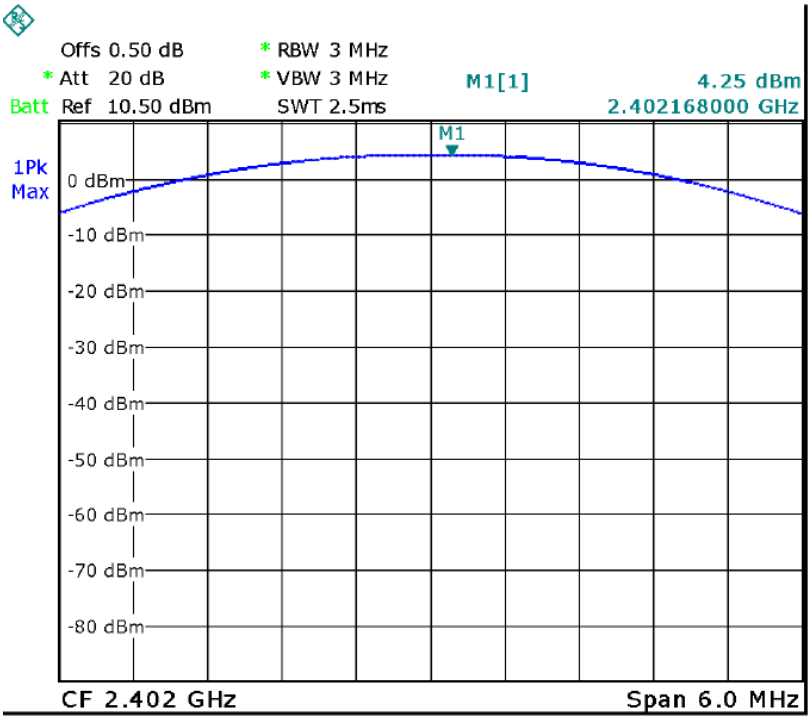
GFSK Middle Channel



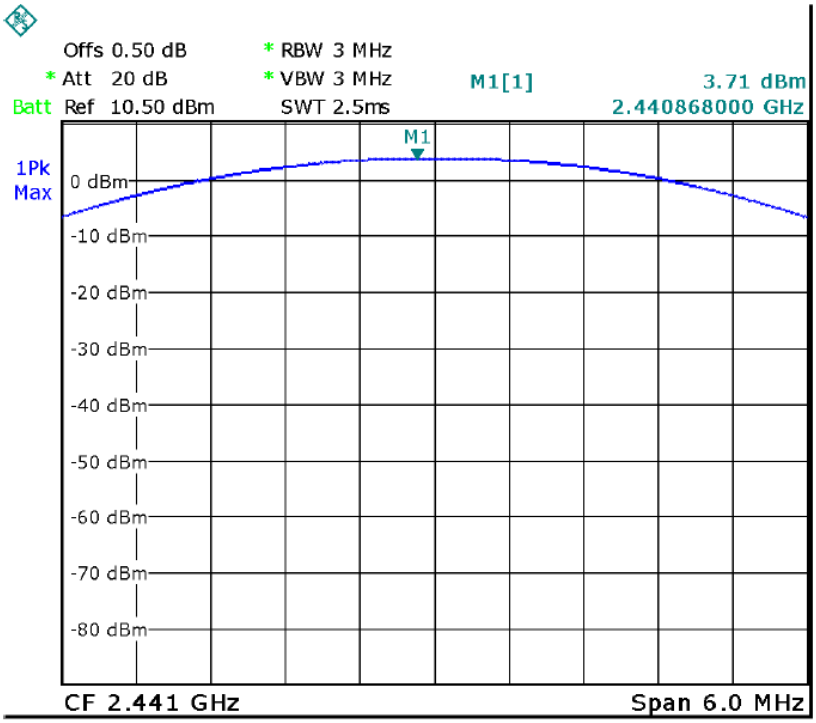
GFSK High Channel



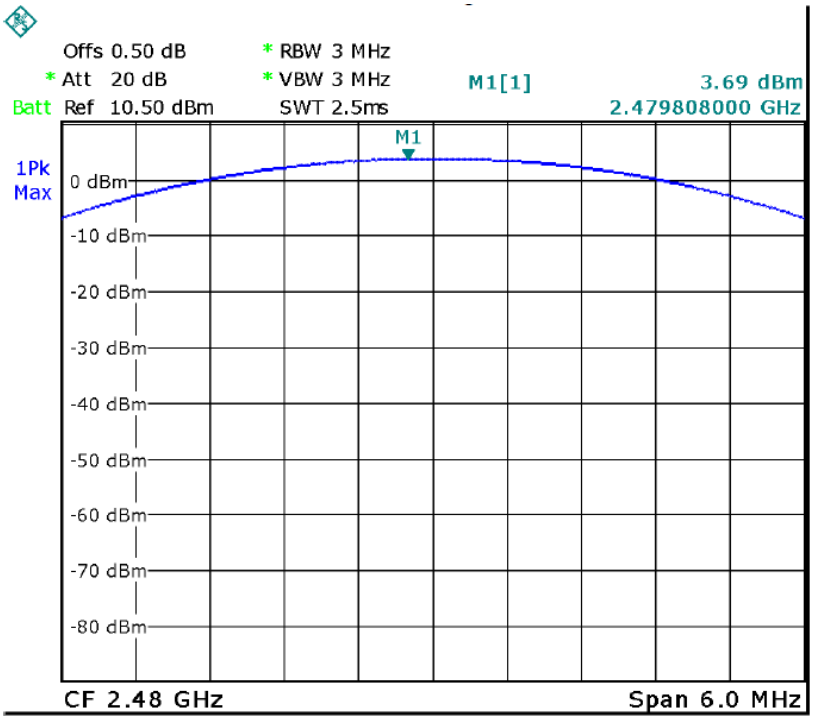
Pi/4DQPSK Low Channel



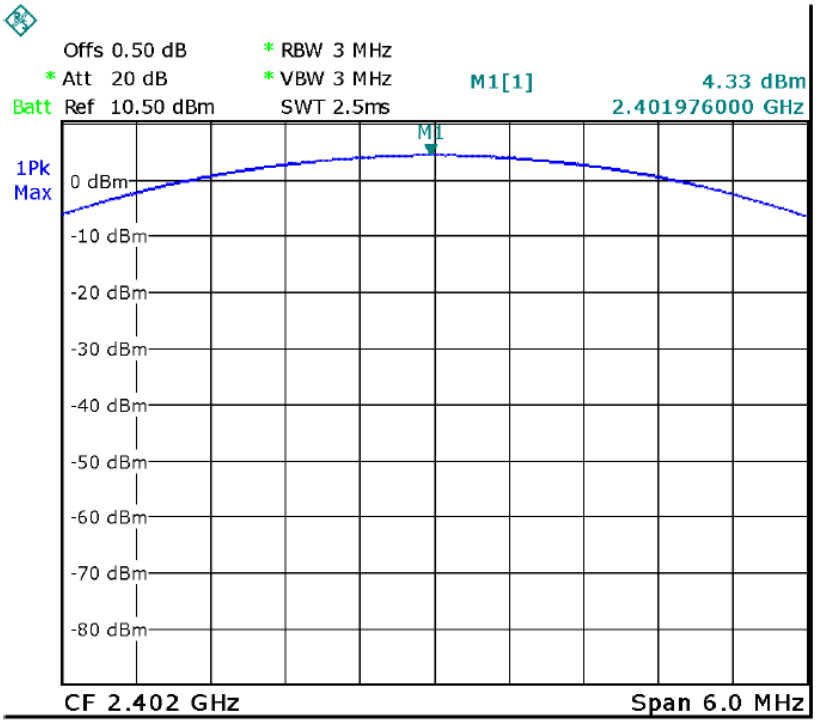
Pi/4DQPSK Middle Channel



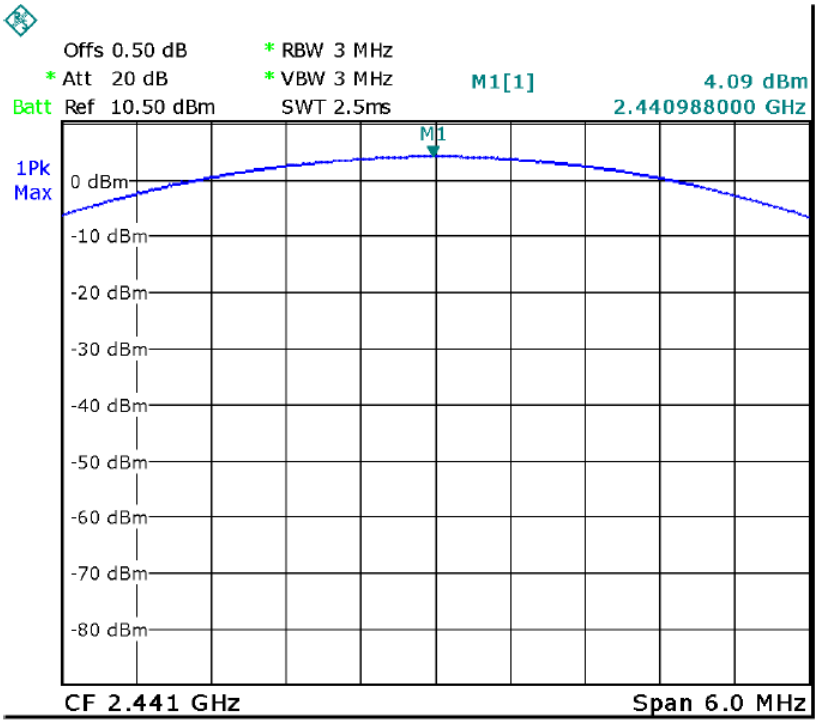
Pi/4DQPSK High Channel



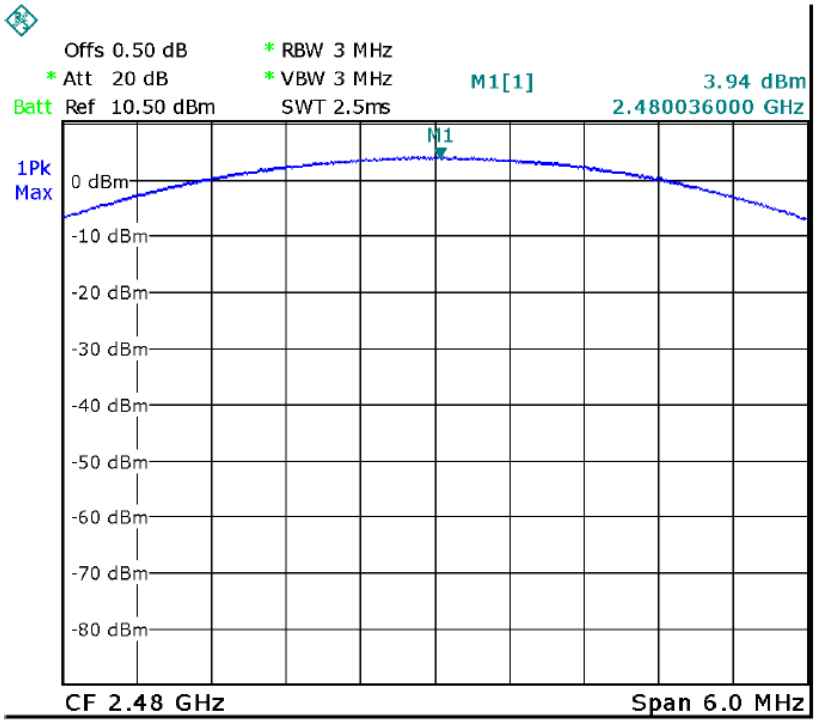
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



10 Hopping Channel Separation

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013, DA 00-705
Test Limit	:	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.
Test Mode	:	Hopping

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.

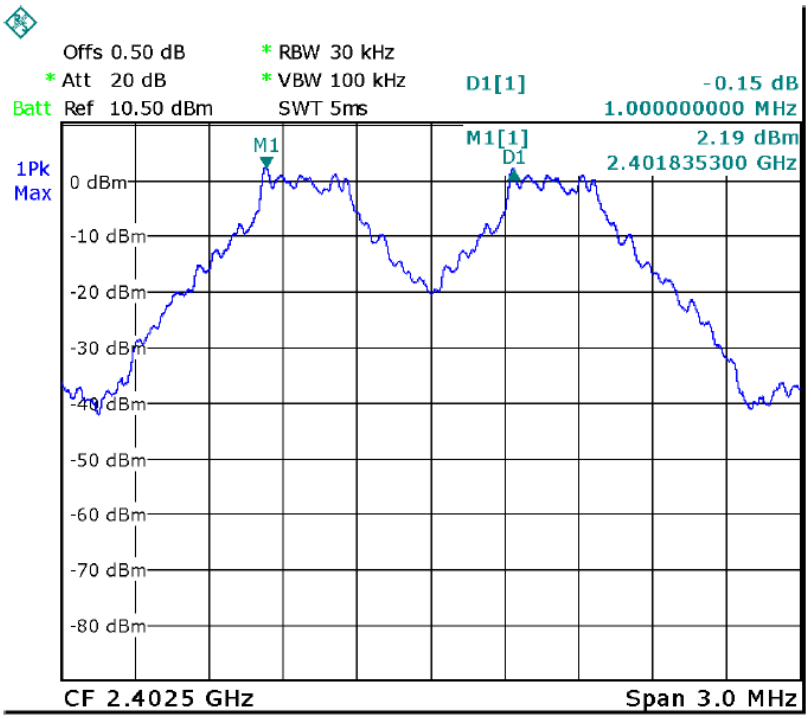
2. Set the spectrum analyzer: RBW = 30KHz. VBW = 100KHz , Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

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.

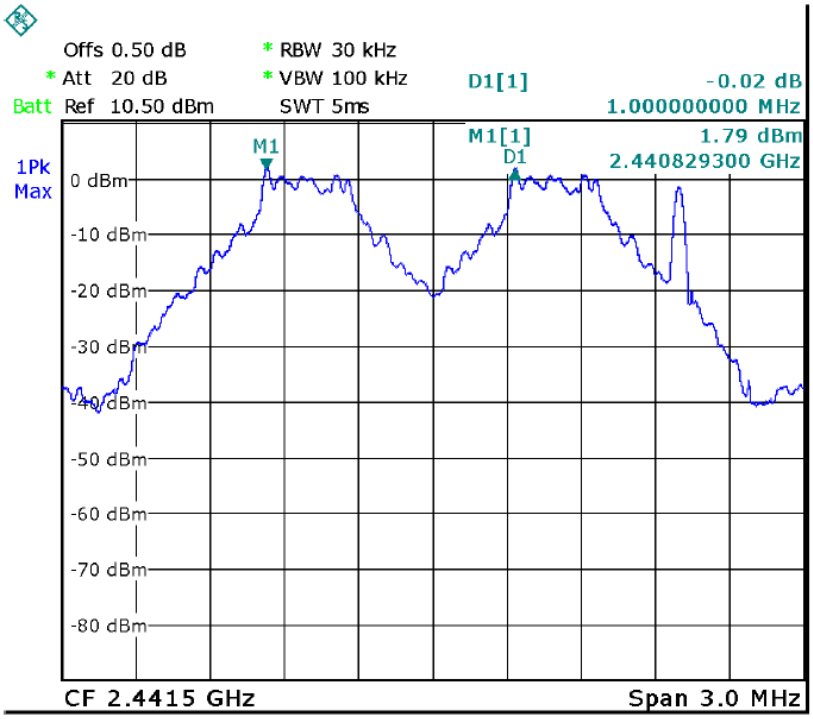
10.2 Test Result

Modulation	Test Channel	Separation (MHz)	Limit (MHz)	Result
GFSK	Low	1.000	0.922	PASS
GFSK	Middle	1.000	0.922	PASS
GFSK	High	1.000	0.922	PASS
Pi/4 DQPSK	Low	1.000	0.831	PASS
Pi/4 DQPSK	Middle	1.000	0.831	PASS
Pi/4 DQPSK	High	1.000	0.831	PASS
8DPSK	Low	1.000	0.843	PASS
8DPSK	Middle	1.000	0.843	PASS
8DPSK	High	1.000	0.843	PASS

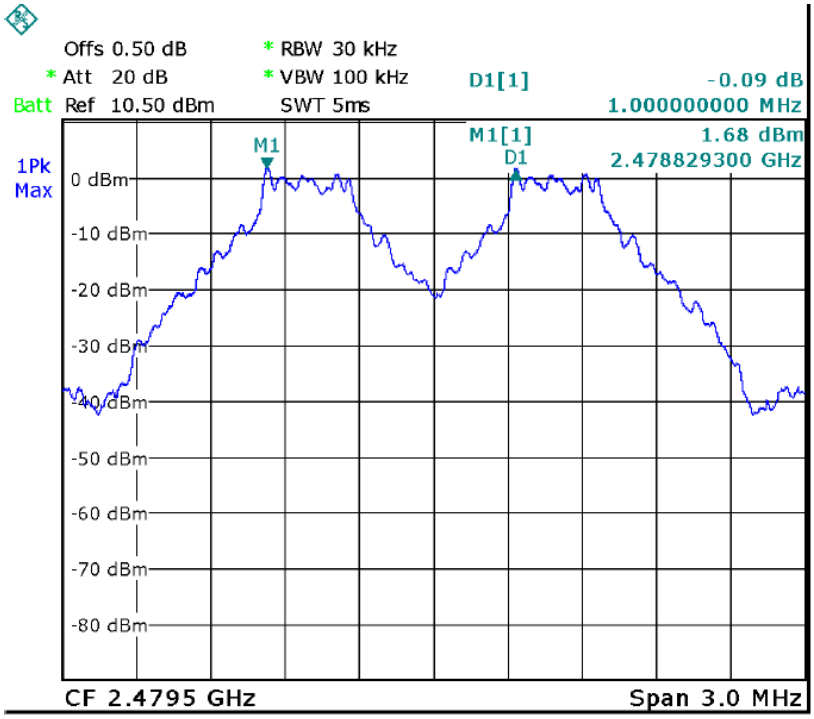
GFSK Low Channel



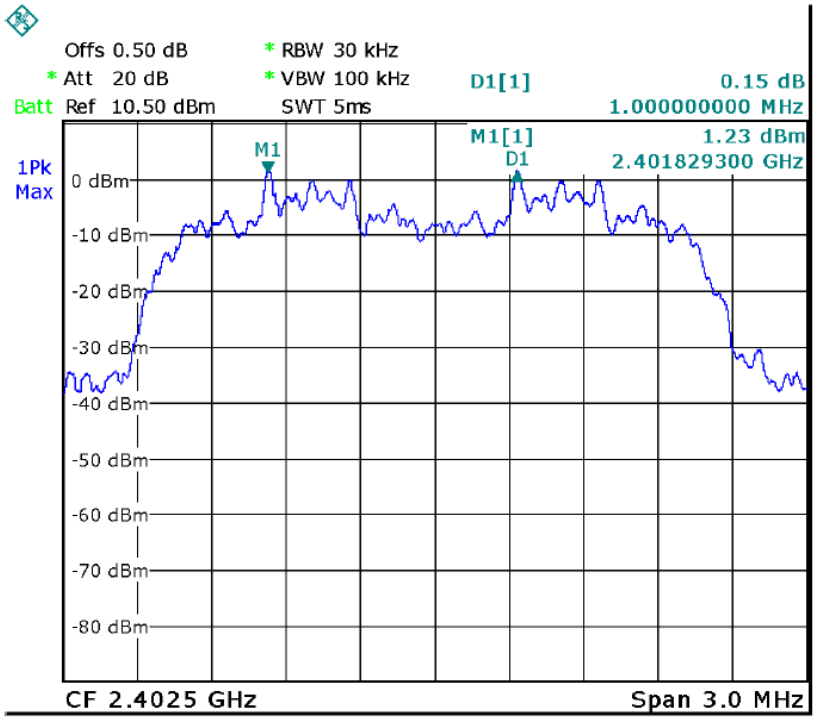
GFSK Middle Channel



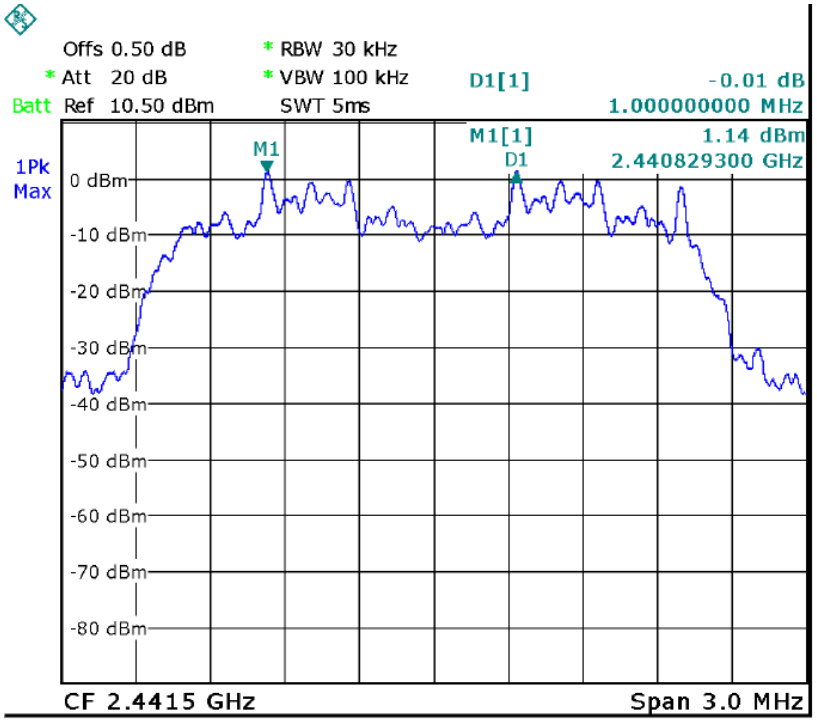
GFSK High Channel



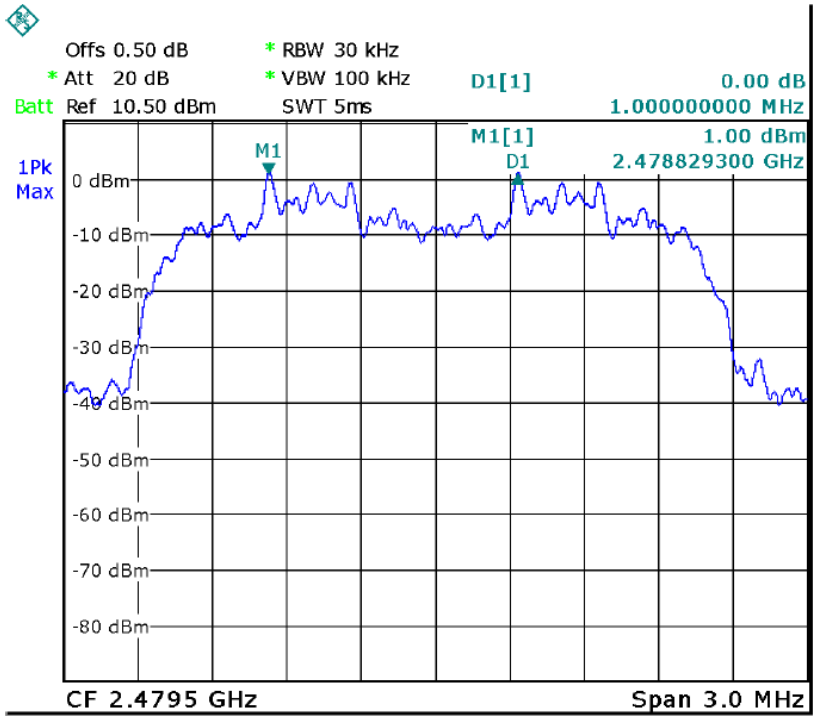
Pi/4DQPSK Low Channel



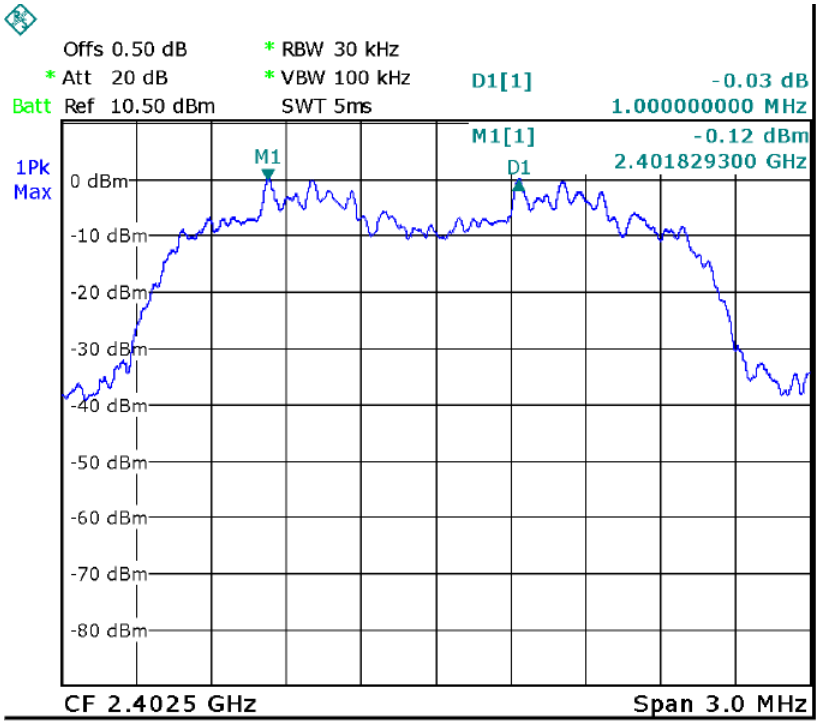
Pi/4DQPSK Middle Channel



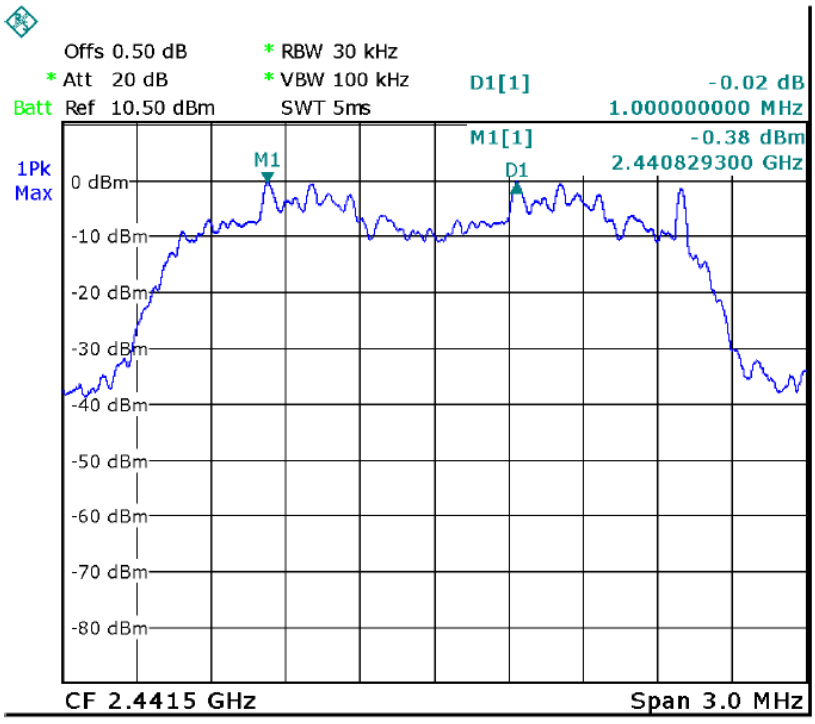
Pi/4DQPSK High Channel



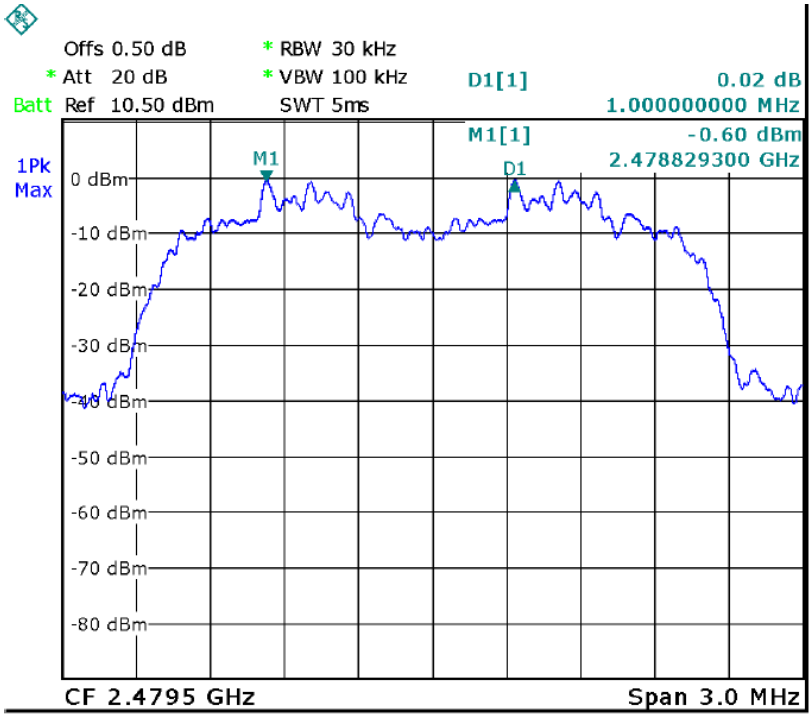
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



11 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)

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.

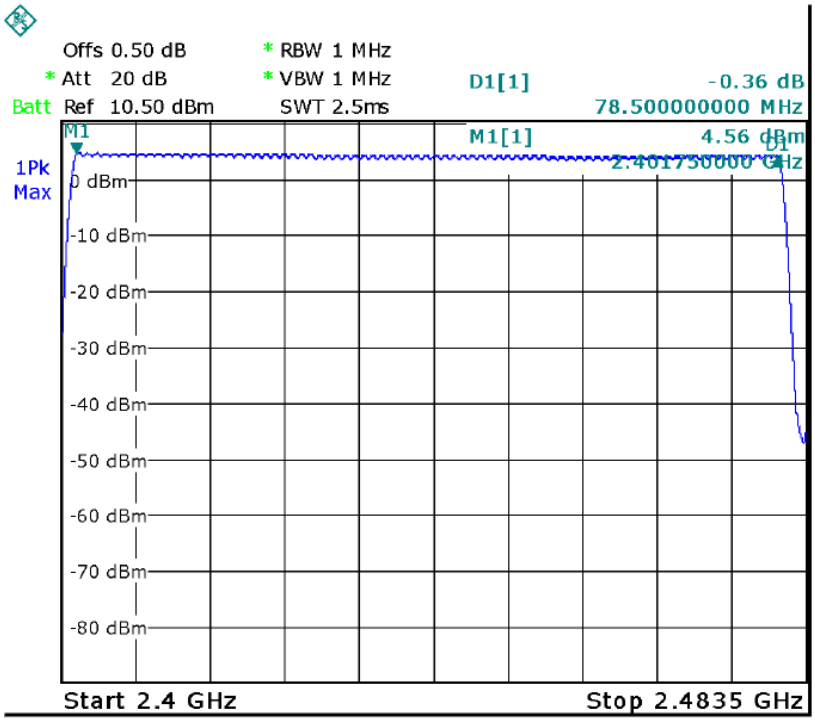
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

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;

11.2 Test Result

Channel Number	Limit
79	≥15



12 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 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.
Test Mode	:	Hopping
Remark	:	The worst case(8DPSK,3DH5) was recorded

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 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).

12.2 Test Result

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

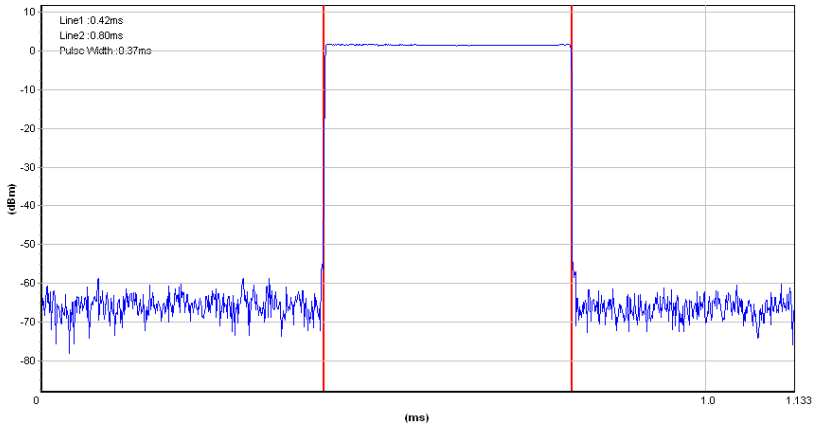
DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

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:

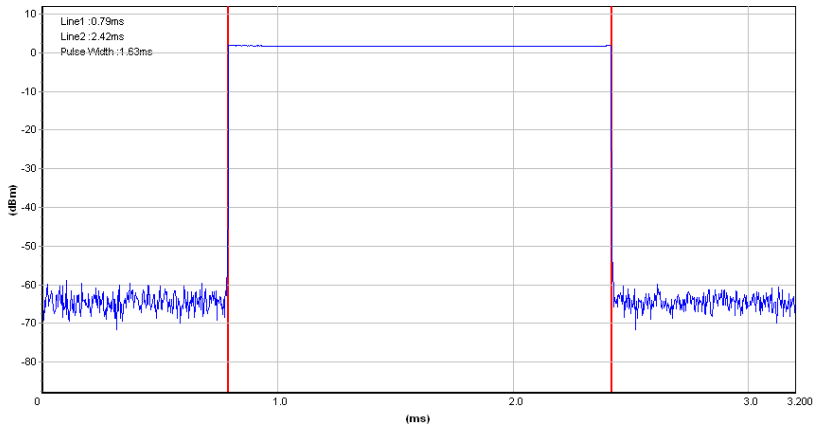
Data Packet	Dwell Time(s)
DH5/2DH5/3DH5	1600/79/6*0.4*79*(MkrDelta)/1000
DH3/2DH3/3DH3	1600/79/4*0.4*79*(MkrDelta)/1000
DH1/2DH1/3DH1	1600/79/2*0.4*79*(MkrDelta)/1000
Remark: Mkr Delta is once pulse time. Only the worst data(DH5) were show as follow.	

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits(s)
DH1	2441 MHz	0.370	0.118	0.4
DH3	2441 MHz	1.630	0.261	0.4
DH5	2441 MHz	2.880	0.307	0.4

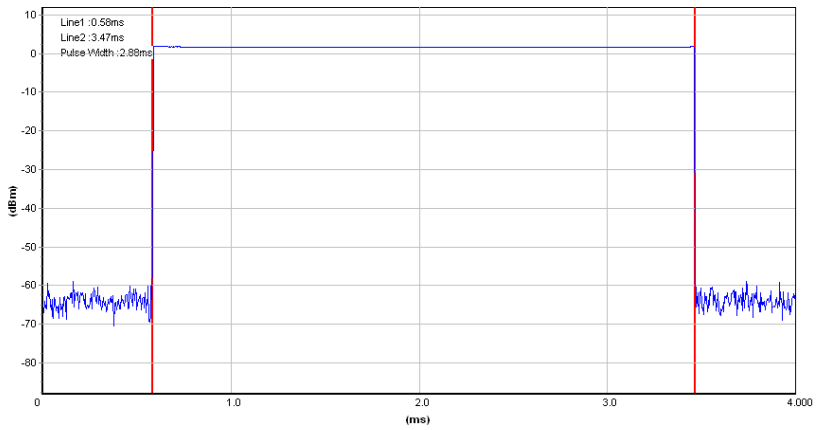
CH39-DH1



CH39-DH3

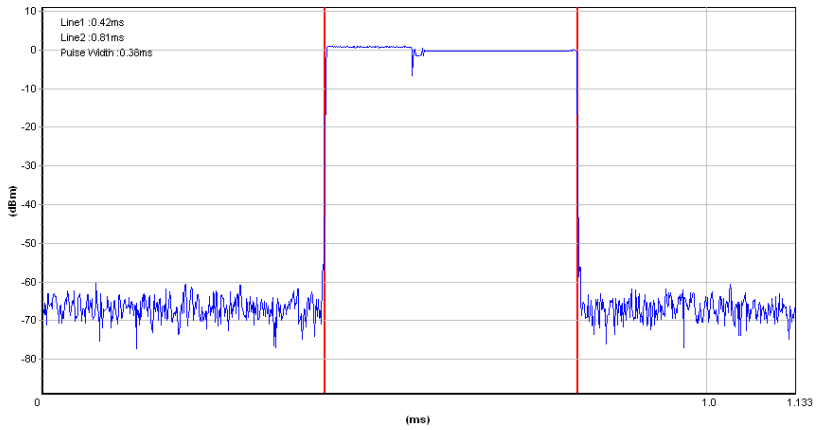


CH39-DH5

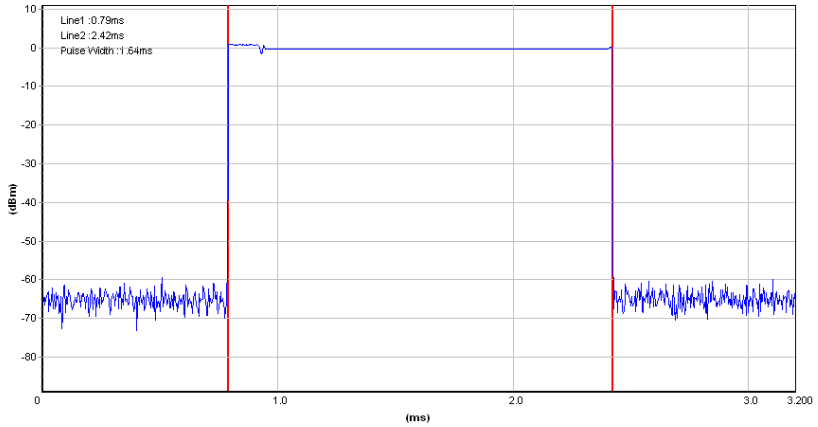


Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits(s)
2DH1	2441 MHz	0.380	0.122	0.4
2DH3	2441 MHz	1.640	0.262	0.4
2DH5	2441 MHz	2.890	0.308	0.4

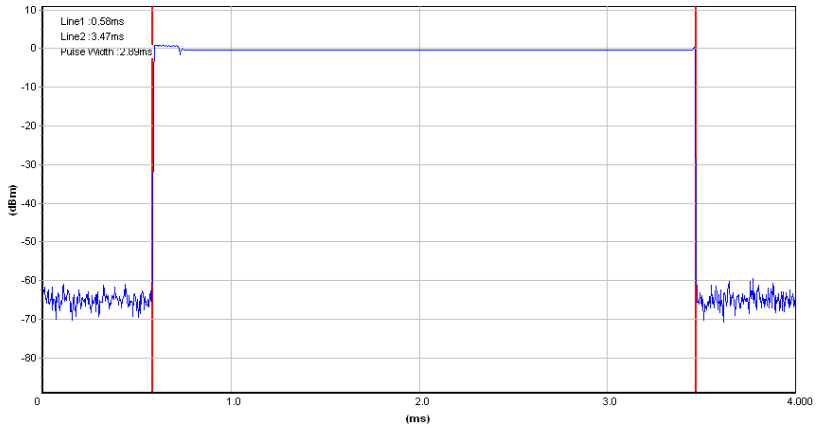
CH39-2DH1



CH39-2DH3

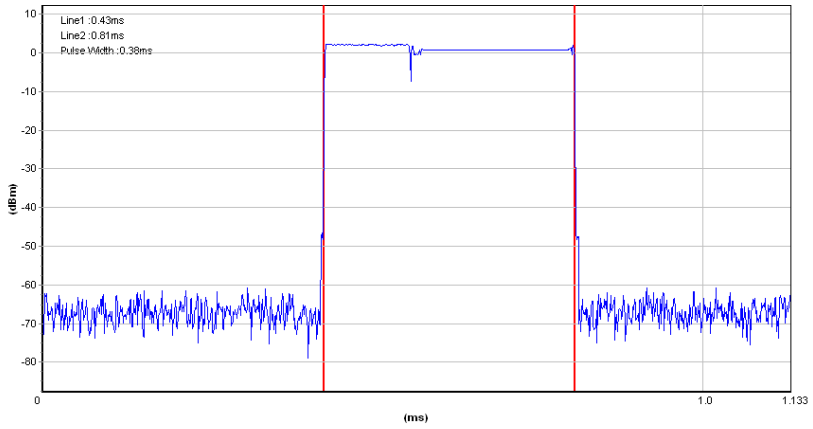


CH39-2DH5

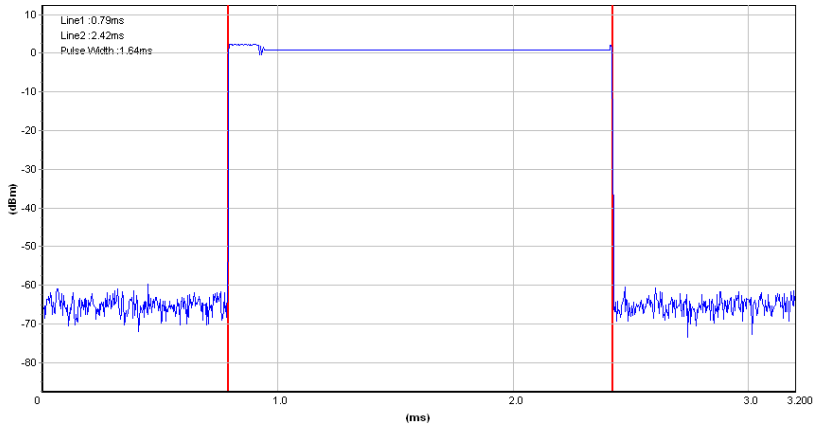


Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits(s)
3DH1	2441 MHz	0.380	0.122	0.4
3DH3	2441 MHz	1.640	0.262	0.4
3DH5	2441 MHz	2.890	0.308	0.4

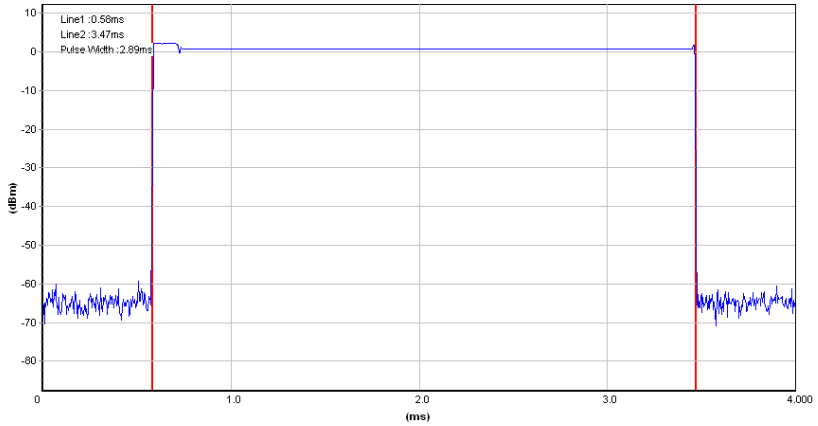
CH39-3DH1



CH39-3DH3



CH39-3DH5

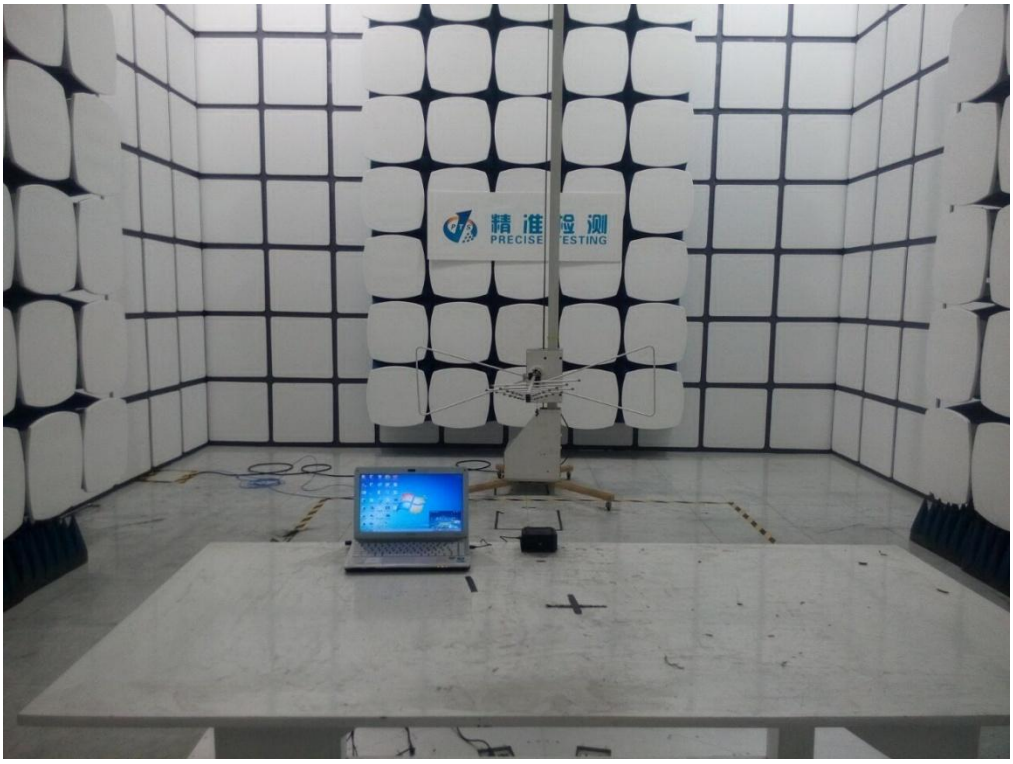


13 Antenna Requirement

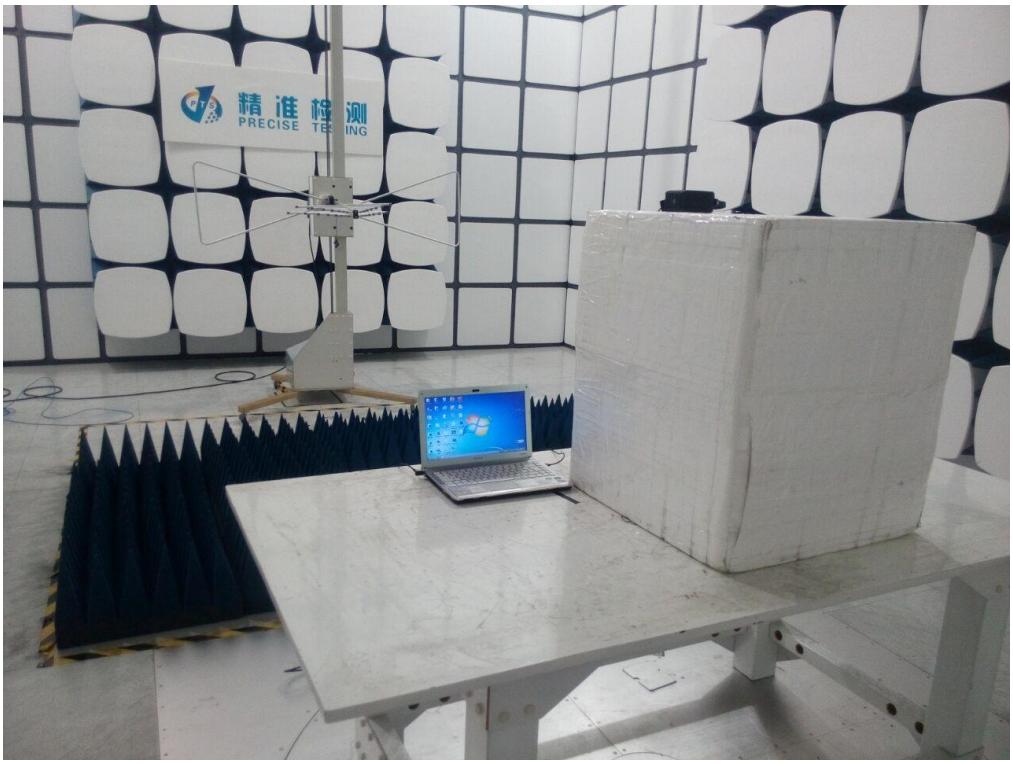
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an PCB printed antenna, it meet the requirement of this section.

14 Test Setup

Spurious Emissions
From 30MHz-1000MHz



Above 1GHz

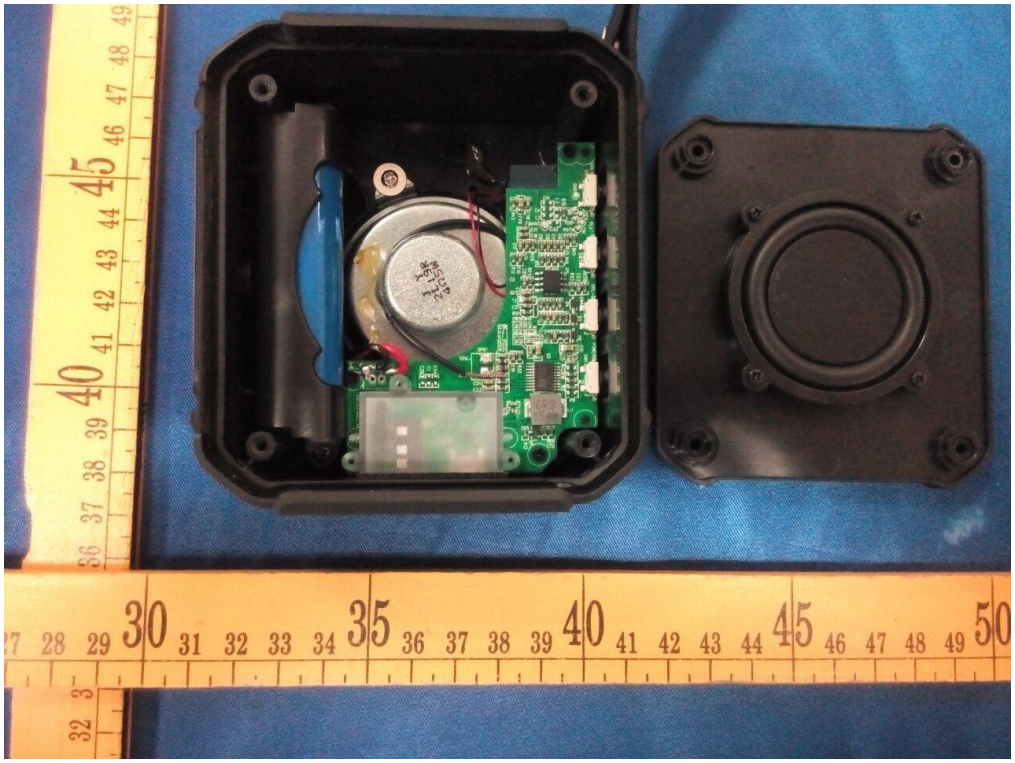


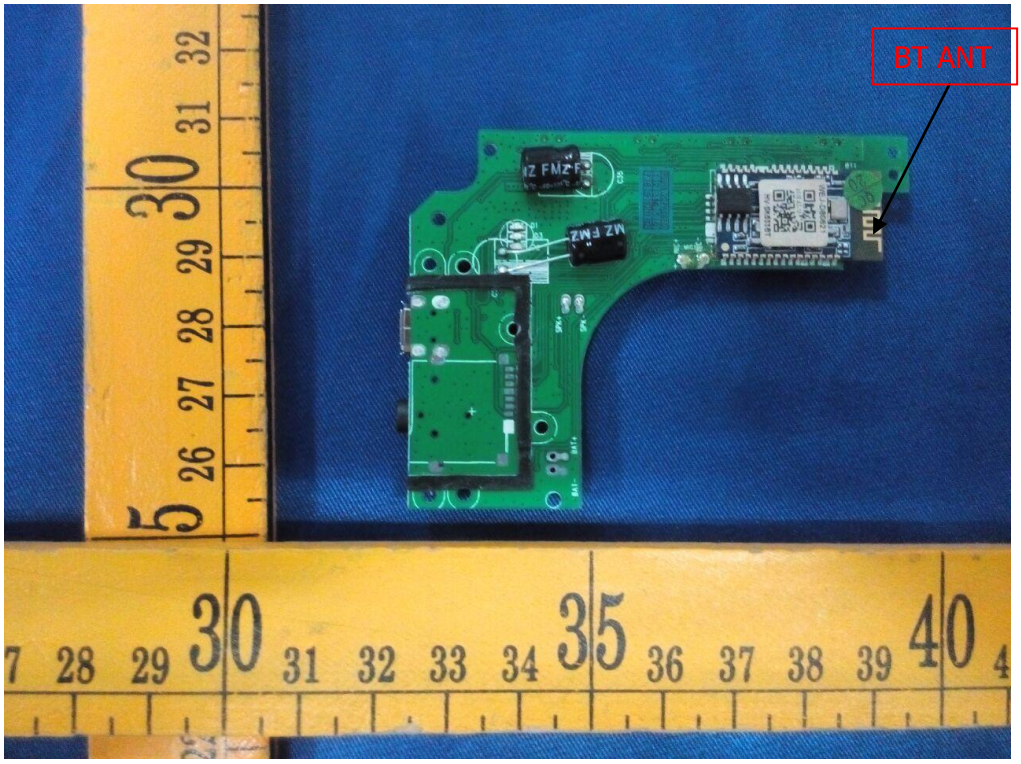
Conducted Emissions

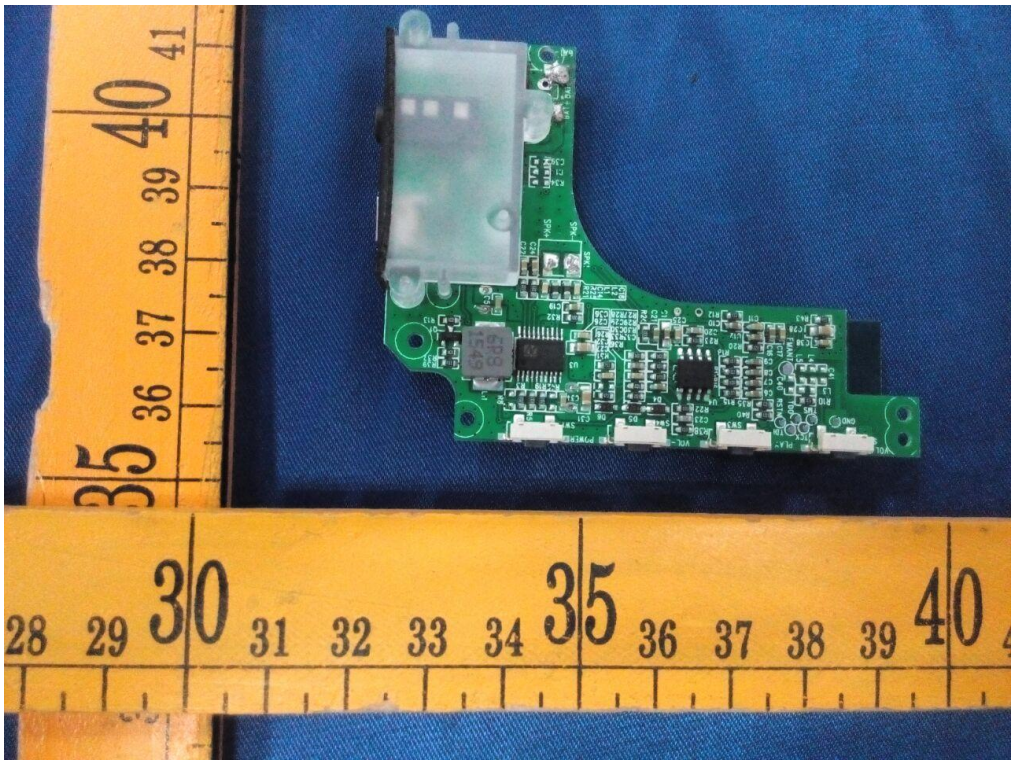
15 EUT Photos

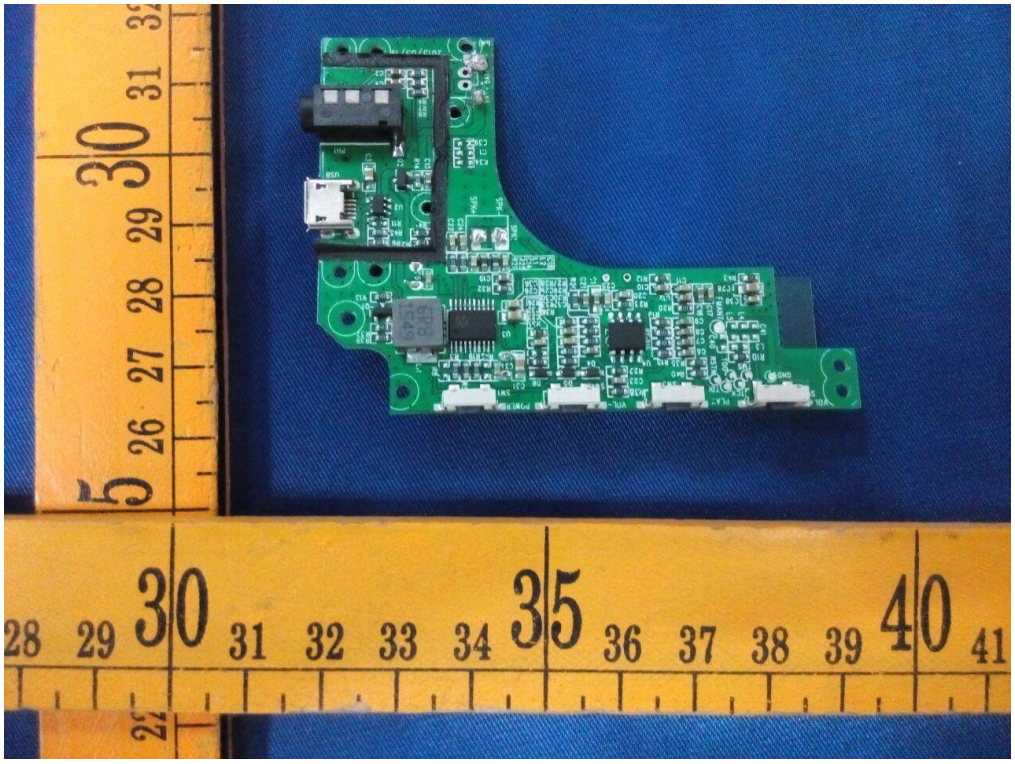
External Photos

Internal Photos









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