FCC TEST REPORT

FCC ID:2AHG3TLK-FC15BT-A

Product	:	15”Rechargeable Speaker
Model Name	:	TLK-FC15BT-A,SP-PS1000,BK-1000
Brand	:	TLK/Speler
Report No.	:	PTC802647160919E-FC01

Prepared for

Aierson(HK) Technology Co.,Ltd

Unit 04,7/F,Bright Way Tower,No.33 Mong Kok Road,Kowloon,Hong Kong

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	:	Aierson(HK) Technology Co.,Ltd
Address	:	Unit 04,7/F,Bright Way Tower,No.33 Mong Kok Road, Kowloon, Hong Kong
Manufacture's name	:	Aierson(HK) Technology Co.,Ltd
Address	:	Unit 04,7/F,Bright Way Tower,No.33 Mong Kok Road, Kowloon, Hong Kong
Product name	:	15"Rechargeable Speaker
Model name	:	TLK-FC15BT-A,SP-PS1000,BK-1000
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013, DA 00-705
Test Date	:	Sep.30, 2016 ~ Oct.09, 2016
Date of Issue	:	Oct.09, 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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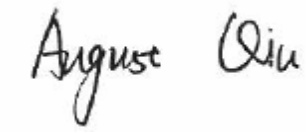
Testing Engineer

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	:	15”Rechargeable Speaker
Model Name	:	TLK-FC15BT-A,SP-PS1000,BK-1000
Model Description	:	Only the models name are different
Bluetooth Version	:	V2.1+EDR
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	:	AC 120V

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.

During the test, the engineering test program was provide and enabled to make EUT transmit at Low channel/Middle channel/High channel.

During test use new and full voltage battery.

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 keeping TX		

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

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

RF Conducted Test							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2016	Aug.03, 2017	1 year
2	EXA Signal Analyzer	Agilent	N9010A	MY50520207 526B25MPB W7X	Aug.04, 2016	Aug.03, 2017	1 year
3	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
4	Humidity Chamber	GF	GTH-225-40-1P	IAA061225	July 15, 2016	July 14, 2017	1 year
5	Temporary Antenna Connector	Murrata	MXHS83Q E3000	201938	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	Horn Antenna	Schwarzbeck	BBHA 9170	9170-0741	July 15, 2016	July 14, 2017	1 year
6	Loop Antenna	SCHWARZBECK	FMZB1516	9130D-1243	July 15, 2016	July 14, 2017	1 year
7	3m Anechoic Chamber	CHENGYU	966	PTC-002	June 6, 2016	June 5, 2017	1 year
8	Coaxial Cable(below 1GHz)	LARGE	CALB1	-	July 15, 2016	July 14, 2017	1 year

9	Coaxial Cable(above 1GHz)	LARGE	CALB2	-	July 15, 2016	July 14, 2017	1 year
Conducted Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
2	LISN	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)

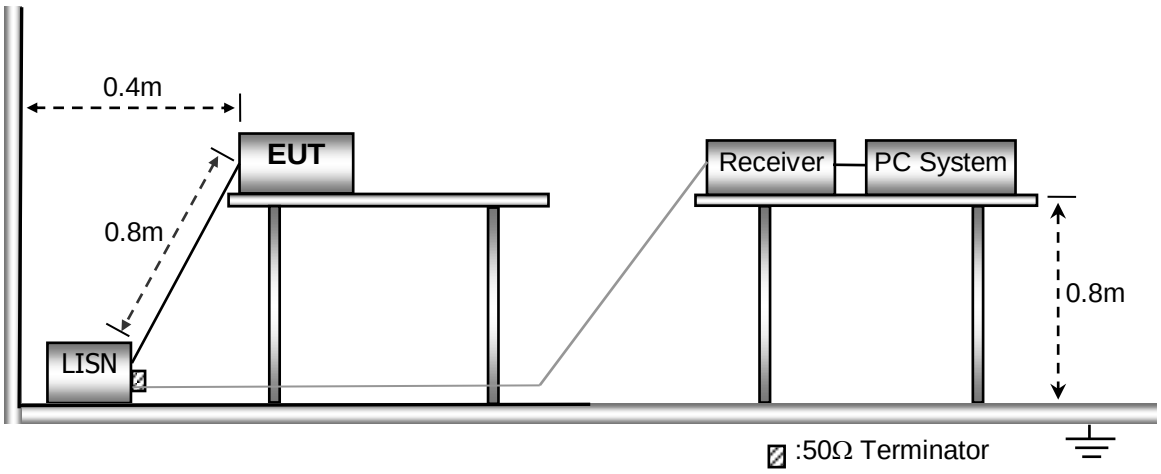
5.1 E.U.T. Operation

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

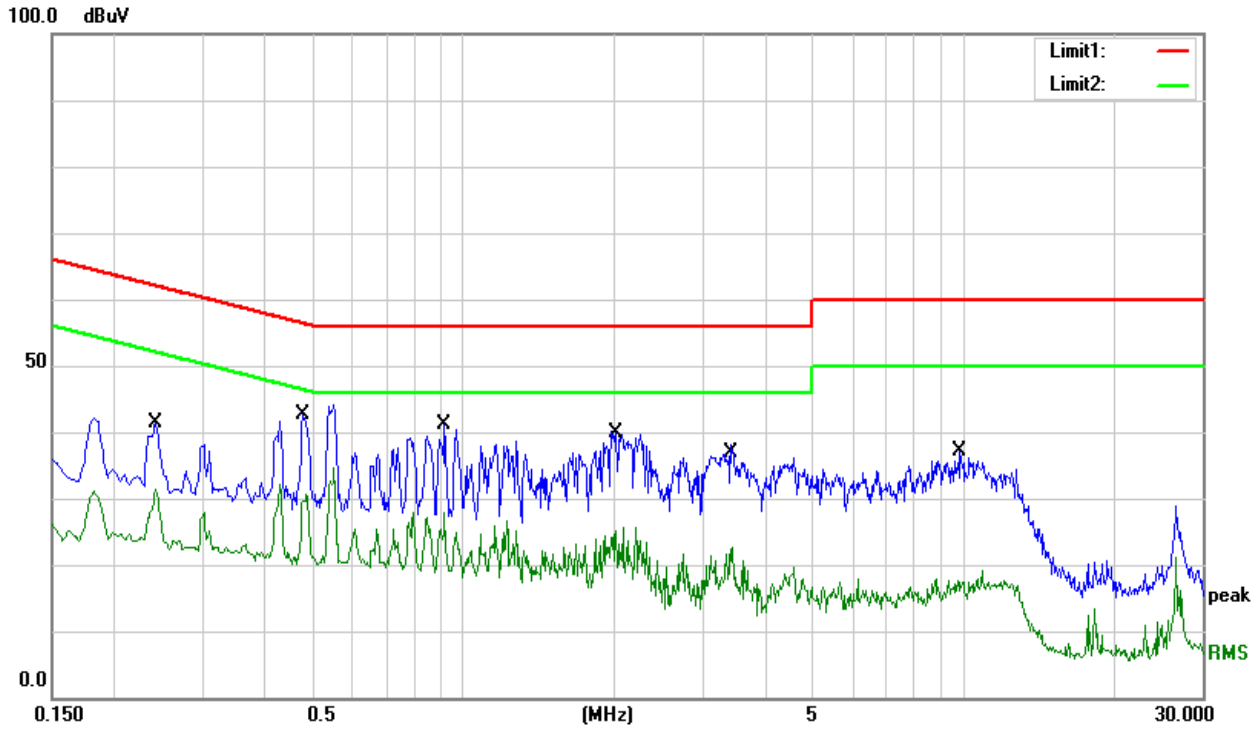
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

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

5.4 Conducted Emission Test Result

Only show worst data(GFSK/Low CH)

Live line:

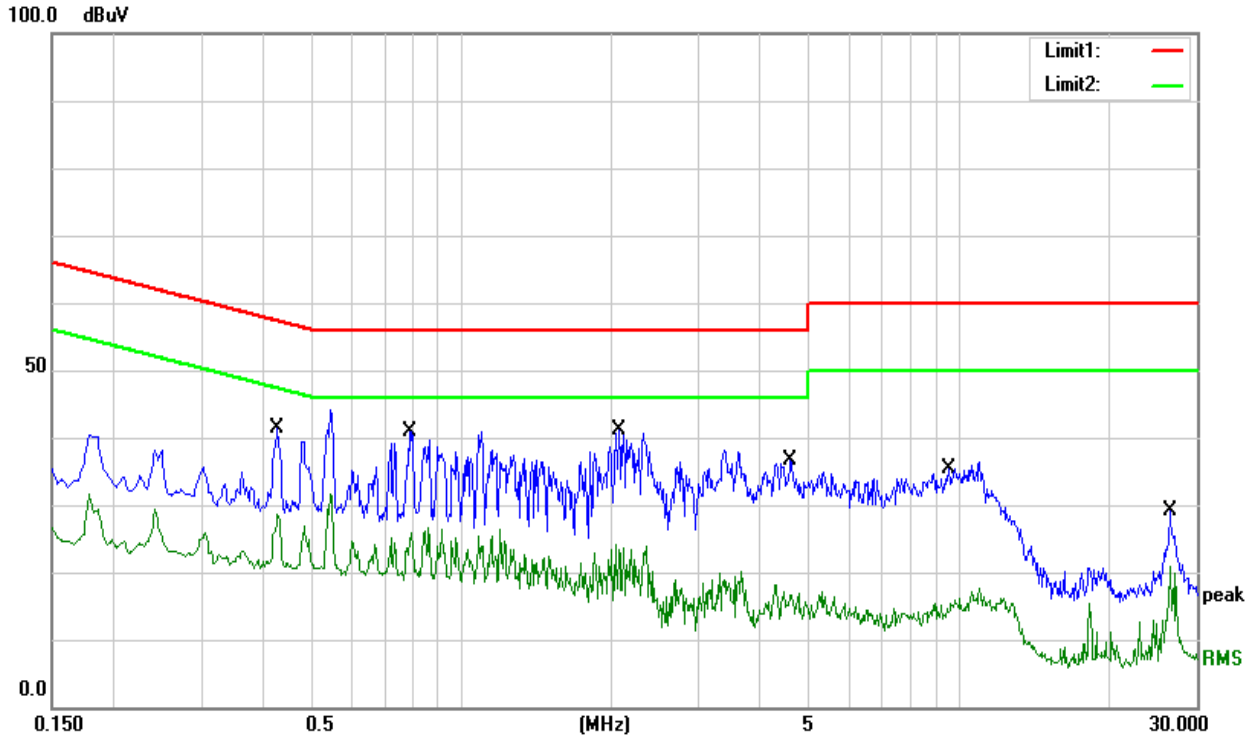


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2404	28.22	9.96	38.18	62.08	-23.90	QP
2	0.2404	20.38	9.96	30.34	52.08	-21.74	AVG
3	0.4784	28.69	9.96	38.65	56.37	-17.72	QP
4	0.4784	18.88	9.96	28.84	46.37	-17.53	AVG
5	0.9125	25.79	9.93	35.72	56.00	-20.28	QP
6	0.9125	14.98	9.93	24.91	46.00	-21.09	AVG
7	2.0063	24.80	10.00	34.80	56.00	-21.20	QP
8	2.0063	9.95	10.00	19.95	46.00	-26.05	AVG
9	3.4850	21.95	10.17	32.12	56.00	-23.88	QP
10	3.4850	7.00	10.17	17.17	46.00	-28.83	AVG
11	9.8762	18.38	10.29	28.67	60.00	-31.33	QP
12	9.8762	4.61	10.29	14.90	50.00	-35.10	AVG

Neutral line:



Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4276	28.21	9.97	38.18	57.30	-19.12	QP
2	0.4276	17.10	9.97	27.07	47.30	-20.23	AVG
3	0.7894	24.67	10.00	34.67	56.00	-21.33	QP
4	0.7894	13.38	10.00	23.38	46.00	-22.62	AVG
5	2.0870	23.98	10.00	33.98	56.00	-22.02	QP
6	2.0870	8.15	10.00	18.15	46.00	-27.85	AVG
7	4.5836	18.60	10.20	28.80	56.00	-27.20	QP
8	4.5836	3.17	10.20	13.37	46.00	-32.63	AVG
9	9.6047	17.18	10.17	27.35	60.00	-32.65	QP
10	9.6047	2.97	10.17	13.14	50.00	-36.86	AVG
11	26.5130	7.81	10.71	18.52	60.00	-41.48	QP
12	26.5130	1.59	10.71	12.30	50.00	-37.70	AVG

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

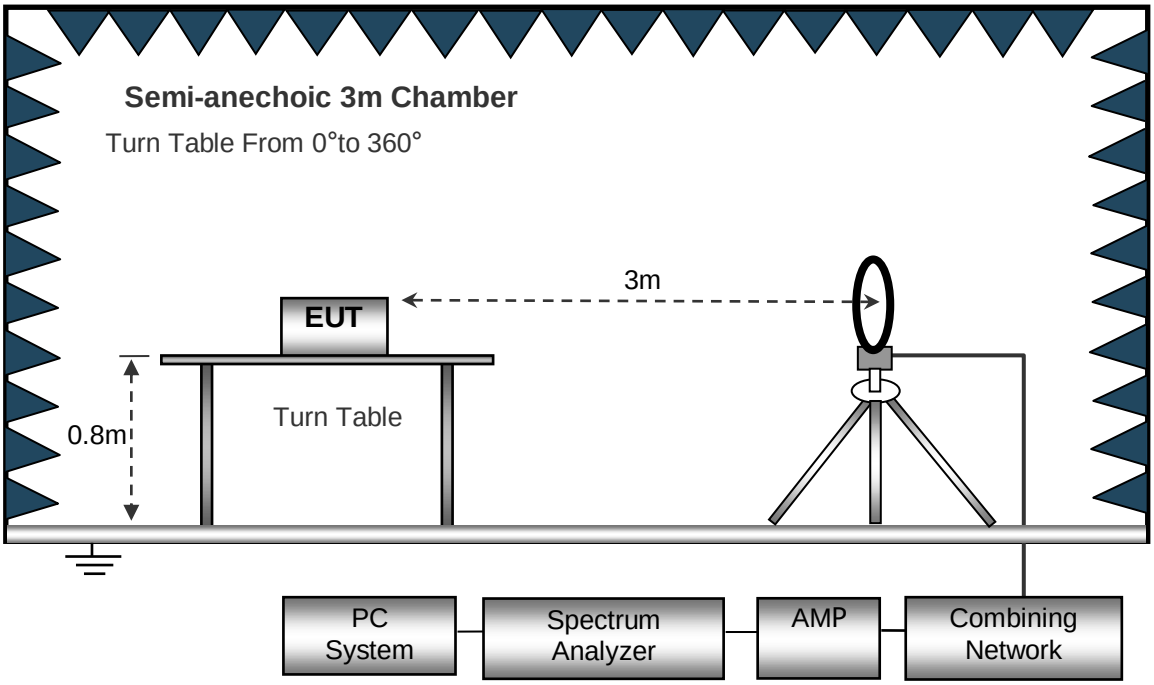
Atmospheric Pressure: : 101.2kPa

EUT Operation : : Refer to section 3.3

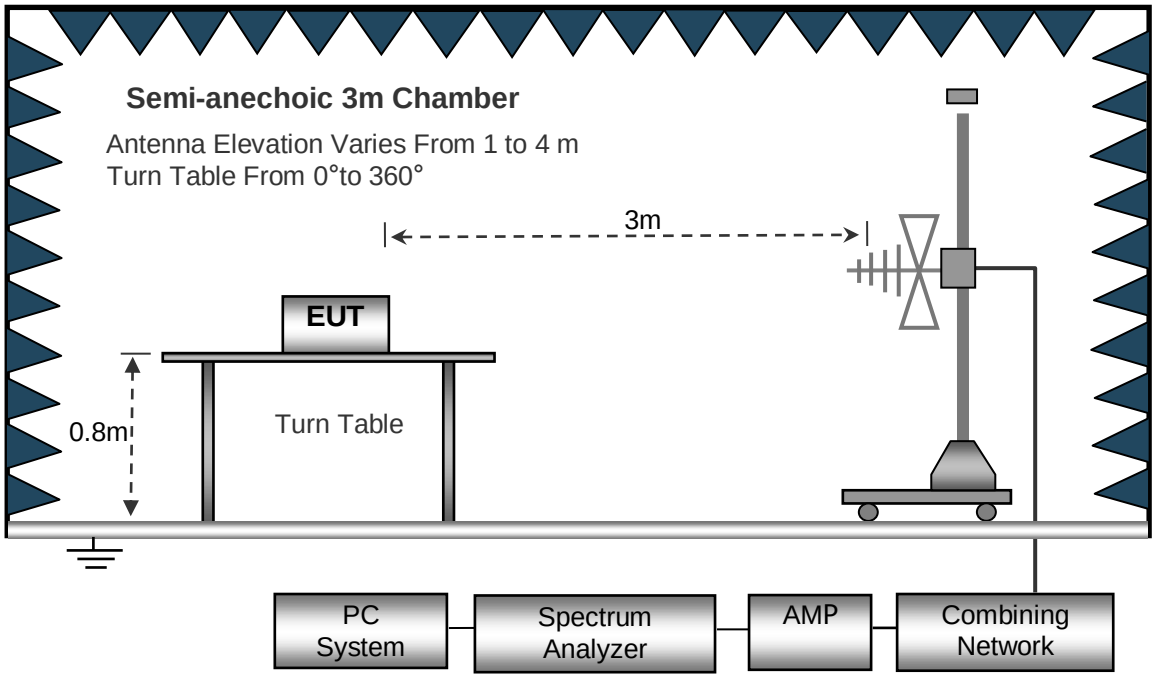
6.2 Test Setup

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

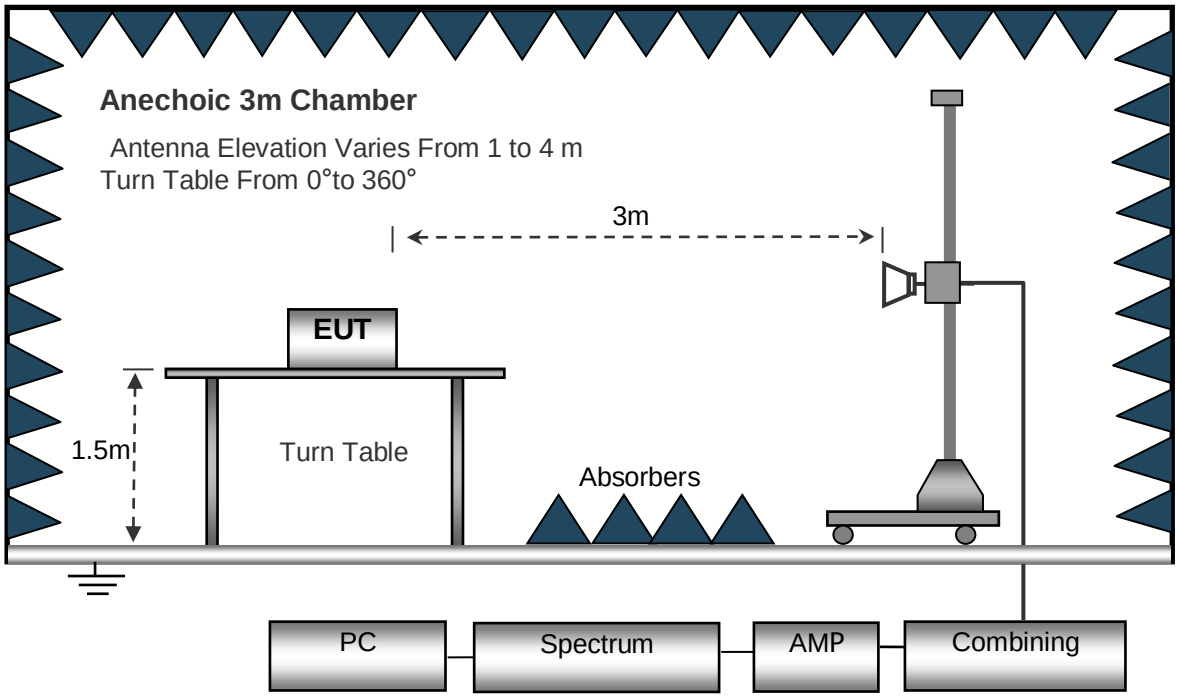
The test setup for emission measurement below 30MHz.



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 .....QP
Resolution Bandwidth.....120kHz
Video Bandwidth 300kHz

Above 1GHz

Sweep Speed..... Auto
Detector .....PK for PK value
Resolution Bandwidth.....1MHz
Video Bandwidth 3MHz
Detector .....PK for AV value
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. In the frequency above 1GHz, Place the measurement antenna 3m away from the EUT for each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

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)

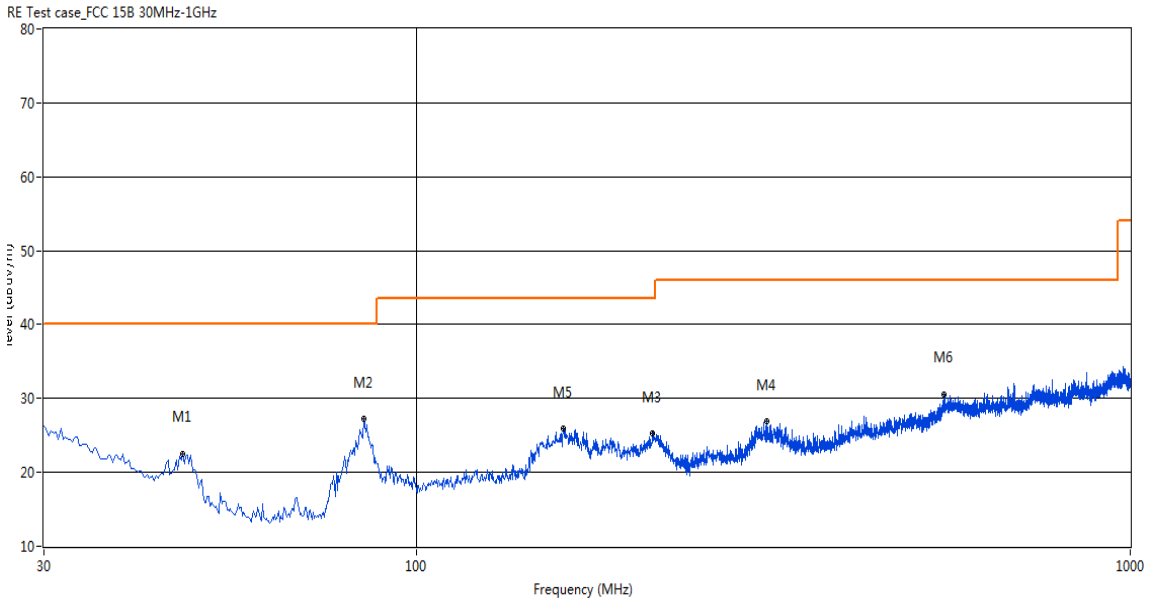
Emission level (Results)= Receiver reading + ANT factor + cable loss – Preamp factor

Test Frequency: Below 30MHz

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

Test Frequency: 30MHz ~ 1GHz

Antenna Polarization: Horizontal

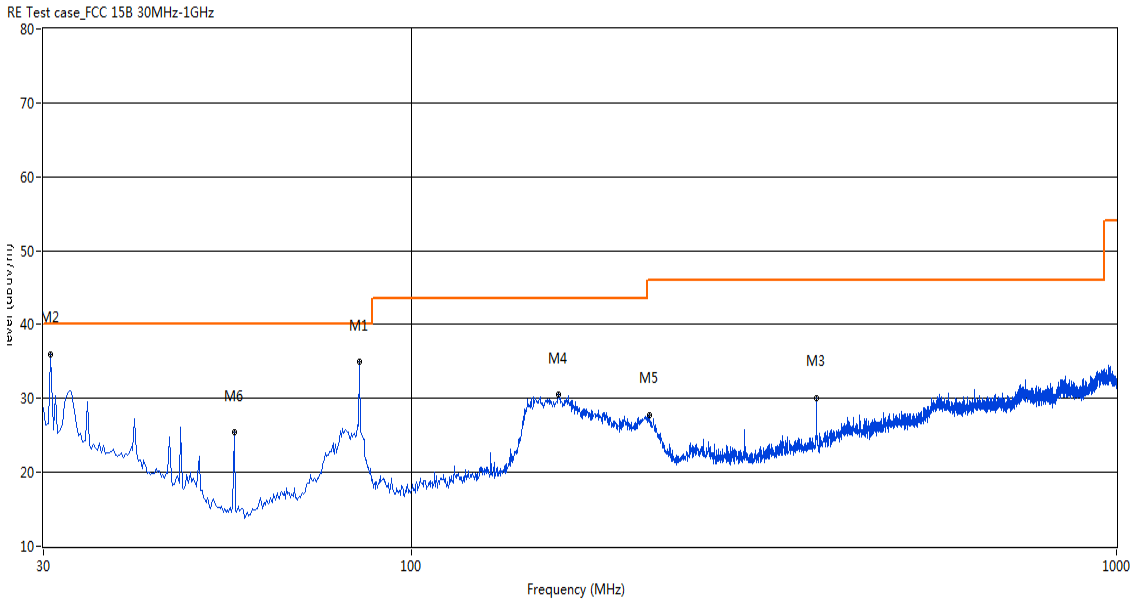


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	46.97	22.50	-24.20	40.0	-17.50	QP	65.00	100	Horizontal	PASS
2	84.31	27.19	-25.41	40.0	-12.81	QP	357.30	100	Horizontal	PASS
3	213.77	25.27	-23.85	43.5	-18.23	QP	255.10	100	Horizontal	PASS
4	309.05	26.88	-18.36	46.0	-19.12	QP	103.80	100	Horizontal	PASS
5	160.19	25.88	-22.21	43.5	-17.62	QP	281.80	100	Horizontal	PASS
6	548.82	30.62	-10.85	46.0	-15.38	QP	114.60	100	Horizontal	PASS

Antenna Polarization: Vertical



Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	84.31	34.98	-25.41	40.0	-5.02	QP	116.00	100	Vertical	PASS
2	30.73	35.99	-15.67	40.0	-4.01	QP	38.80	100	Vertical	PASS
3	374.99	30.12	-16.27	46.0	-15.88	QP	356.30	100	Vertical	PASS
4	161.64	30.54	-22.36	43.5	-12.96	QP	359.40	100	Vertical	PASS
5	217.41	27.76	-23.53	46.0	-18.24	QP	352.20	100	Vertical	PASS
6	55.94	25.39	-27.90	40.0	-14.61	QP	46.20	100	Vertical	PASS

Test Frequency: 1GHz ~ 18GHz

Above 1000 MHz

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)							
4804.264	66.52	-3.62	62.9	74	-11.1	peak	Vertical
4804.264	47.23	-3.62	43.61	54	-10.39	AVG	Vertical
7206.138	63.34	-0.9	62.44	74	-11.56	peak	Vertical
7206.138	42.56	-0.9	41.66	54	-12.34	AVG	Vertical
4804.264	63.31	-3.64	59.67	74	-14.33	peak	Horizontal
4804.264	45.56	-3.64	41.92	54	-12.08	AVG	Horizontal
Mid Channel (2441 MHz)							
4882.128	66.46	-3.65	62.81	74	-11.19	peak	Vertical
4882.128	51.57	-3.65	47.92	54	-6.08	AVG	Vertical
7323.228	62.42	-0.82	61.6	74	-12.4	peak	Vertical
7323.228	45.96	-0.82	45.14	54	-8.86	AVG	Vertical
4882.096	62.68	-3.68	59	74	-15	peak	Horizontal
4882.171	46.98	-3.68	43.3	54	-10.7	AVG	Horizontal
High Channel (2480 MHz)							
4960.190	62.76	-3.59	59.17	74	-14.83	peak	Vertical
4960.190	45.35	-3.59	41.76	54	-12.24	AVG	Vertical
4960.190	64.24	-3.59	60.65	74	-13.35	peak	Horizontal
4960.190	46.78	-3.59	43.19	54	-10.81	AVG	Horizontal

Note:

1) 30MHz~25GHz:(Scan with GFSK, π/4-DQPSK,8DPSK, the worst casw is GFSK Mode)
2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

   Emission Level = Meter Reading + Factor

   Margin = Limit - Emission Leve

Non-hopping

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
GFSK							
2399.9	69.54	-12.99	56.55	74	-17.45	peak	Vertical
2399.9	55.33	-12.99	42.34	54	-11.66	AVG	Vertical
2399.9	70.78	-12.99	57.79	74	-16.21	peak	Horizontal
2399.9	54.68	-12.99	41.69	54	-12.31	AVG	Horizontal
2483.6	71.64	-12.78	58.86	74	-15.14	peak	Vertical
2483.6	54.57	-12.78	41.79	54	-12.21	AVG	Vertical
2483.6	71.46	-12.78	58.68	74	-15.32	peak	Horizontal
2483.6	54.41	-12.78	41.63	54	-12.37	AVG	Horizontal
π/4-DQPSK							
2399.9	71.68	-12.99	58.69	74	-15.31	peak	Vertical
2399.9	54.98	-12.99	41.99	54	-12.01	AVG	Vertical
2399.9	70.79	-12.99	57.8	74	-16.2	peak	Horizontal
2399.9	55.78	-12.99	42.79	54	-11.21	AVG	Horizontal
2483.6	71.57	-12.78	58.79	74	-15.21	peak	Vertical
2483.6	56.56	-12.78	43.78	54	-10.22	AVG	Vertical
2483.6	71.35	-12.78	58.57	74	-15.43	peak	Horizontal
2483.6	54.24	-12.78	41.46	54	-12.54	AVG	Horizontal
8DPSK							
2399.9	71.87	-12.99	58.88	74	-15.12	peak	Vertical
2399.9	55.71	-12.99	42.72	54	-11.28	AVG	Vertical
2399.9	70.68	-12.99	57.69	74	-16.31	peak	Horizontal
2399.9	56.34	-12.99	43.35	54	-10.65	AVG	Horizontal
2483.6	71.76	-12.78	58.98	74	-15.02	peak	Vertical
2483.6	55.76	-12.78	42.98	54	-11.02	AVG	Vertical
2483.6	71.78	-12.78	59	74	-15	peak	Horizontal
2483.6	54.67	-12.78	41.89	54	-12.11	AVG	Horizontal

Hopping

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
GFSK							
2390	69.07	-12.99	56.08	74	-17.92	peak	Vertical
2390	55.62	-12.99	42.63	54	-11.37	AVG	Vertical
2390	68.78	-12.99	55.79	74	-18.21	peak	Horizontal
2390	54.89	-12.99	41.9	54	-12.1	AVG	Horizontal
2483.5	67.87	-12.78	55.09	74	-18.91	peak	Vertical
2483.5	55.24	-12.78	42.46	54	-11.54	AVG	Vertical
2483.5	68.57	-12.78	55.79	74	-18.21	peak	Horizontal
2483.5	55.78	-12.78	43	54	-11	AVG	Horizontal
π/4-DQPSK							
2390	69.87	-12.99	56.88	74	-17.12	peak	Vertical
2390	56.91	-12.99	43.92	54	-10.08	AVG	Vertical
2390	68.87	-12.99	55.88	74	-18.12	peak	Horizontal
2390	54.34	-12.99	41.35	54	-12.65	AVG	Horizontal
2483.5	68.52	-12.78	55.74	74	-18.26	peak	Vertical
2483.5	54.45	-12.78	41.67	54	-12.33	AVG	Vertical
2483.5	69.67	-12.78	56.89	74	-17.11	peak	Horizontal
2483.5	55.56	-12.78	42.78	54	-11.22	AVG	Horizontal
8DPSK							
2390	69.08	-12.99	56.09	74	-17.91	peak	Vertical
2390	55.98	-12.99	42.99	54	-11.01	AVG	Vertical
2390	68.35	-12.99	55.36	74	-18.64	peak	Horizontal
2390	55.67	-12.99	42.68	54	-11.32	AVG	Horizontal
2483.5	69.56	-12.78	56.78	74	-17.22	peak	Vertical
2483.5	55.45	-12.78	42.67	54	-11.33	AVG	Vertical
2483.5	68.35	-12.78	55.57	74	-18.43	peak	Horizontal
2483.5	55.34	-12.78	42.56	54	-11.44	AVG	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.

7 Conducted Spurious Emission

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.

Spectrum Parameter	Setting
Detector	Peak
Start Frequency	30 MHz
Stop Frequency	25GHz(10th carrier harmonic)
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

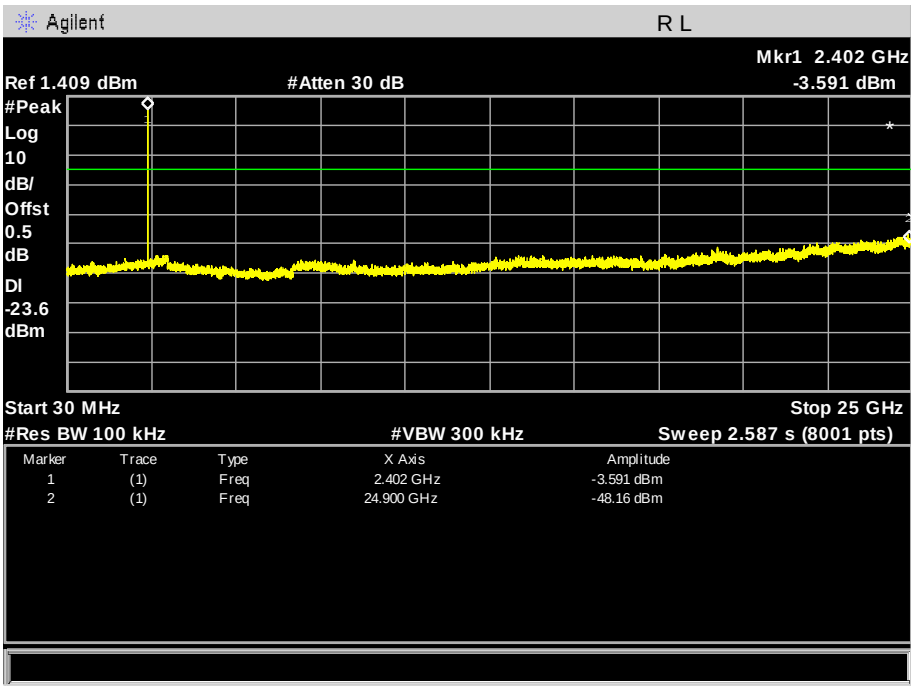
For Band edge

Spectrum Parameter	Setting
Attenuation	Auto
Start/Stop Frequency	Lower Band Edge: 2310 – 2404 MHz Upper Band Edge: 2478 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

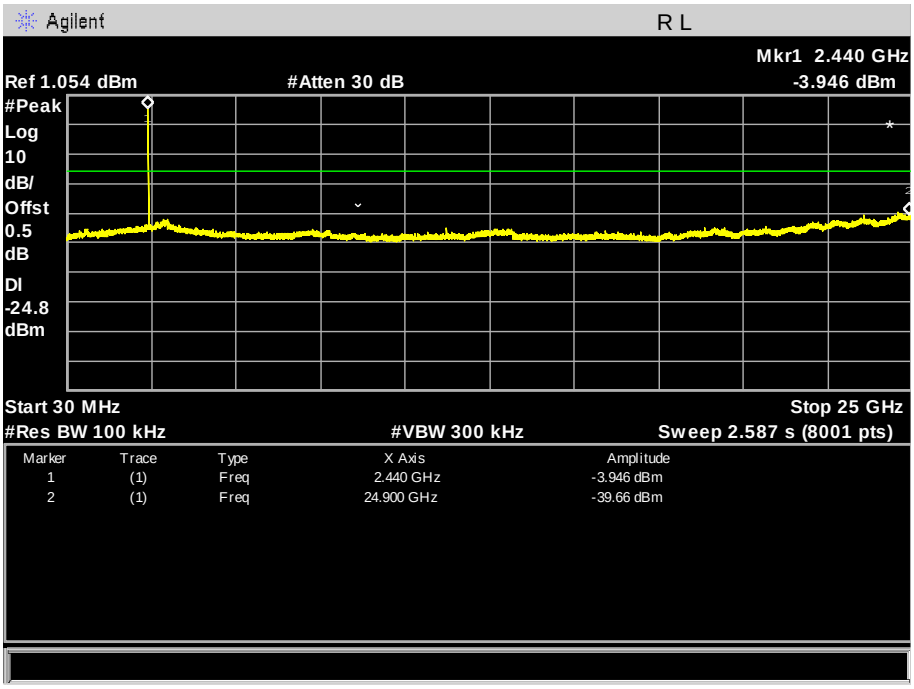
7.2 Test Result

Test Mode :	GFSK(1Mbps)-00/39/78 CH

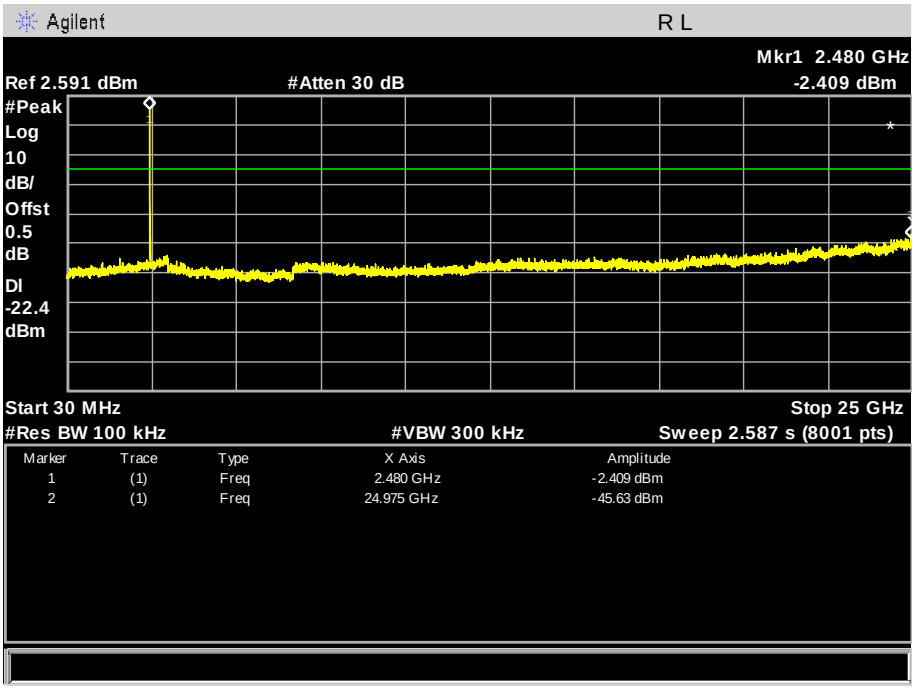
GFSK Low CH



GFSK Middle CH

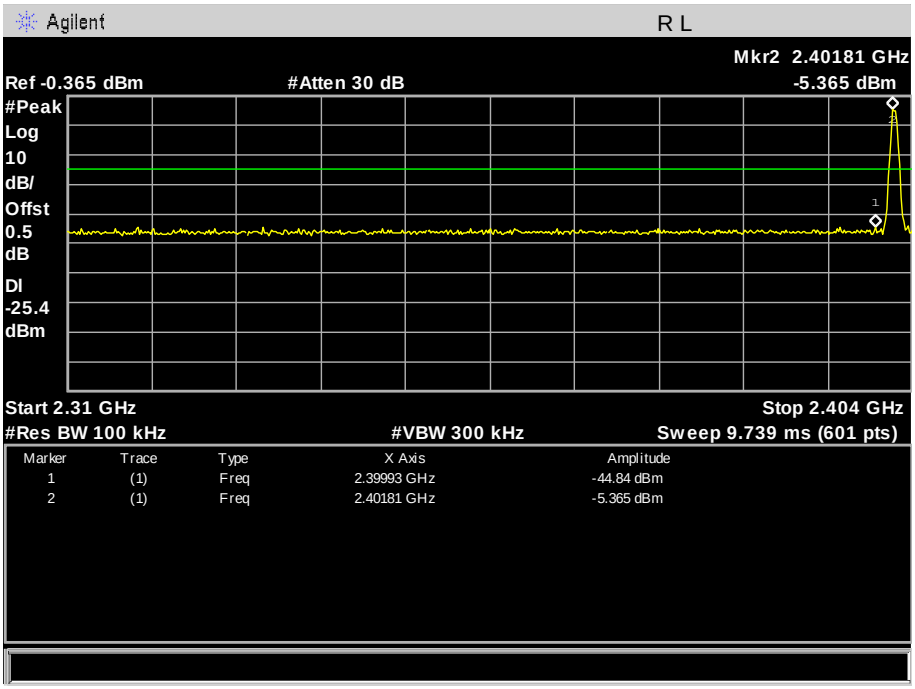


GFSK High CH

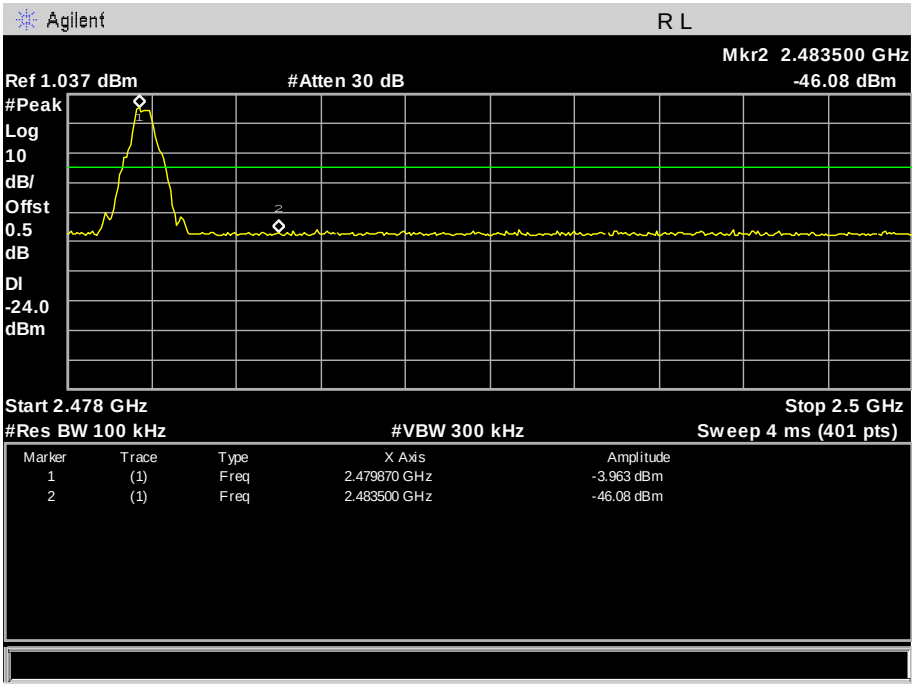

Agilent
R L
Mkr1 2.480 GHz
Ref 2.591 dBm
#Atten 30 dB
-2.409 dBm
#Peak
Log
10
dB/
Offst
0.5
dB
Dl
-22.4
dBm
Start 30 MHz
Stop 25 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.587 s (8001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.480 GHz -2.409 dBm
2 (1) Freq 24.975 GHz -45.63 dBm

For Band edge

00 CH

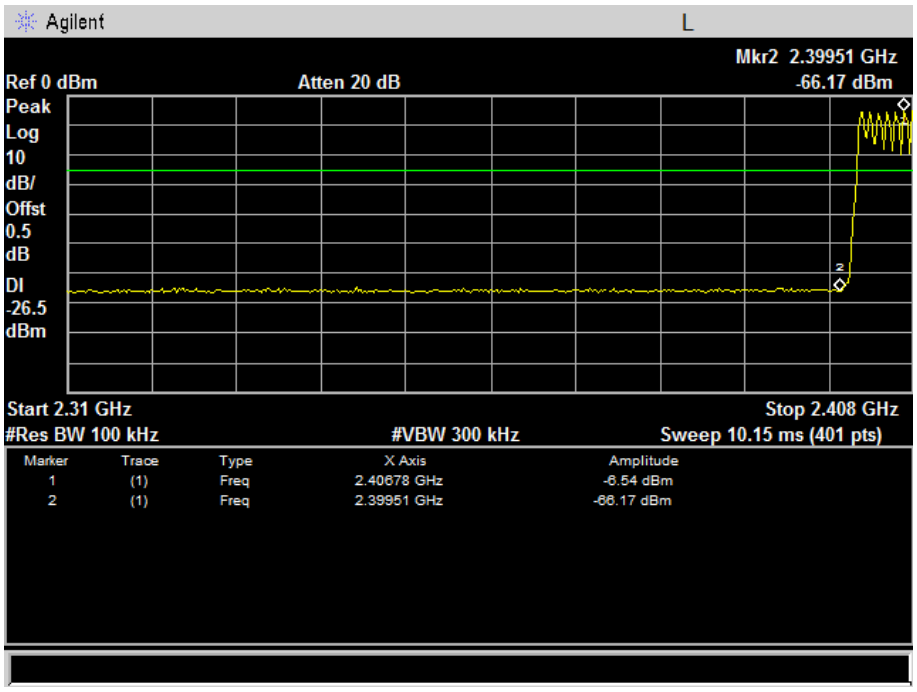


78 CH

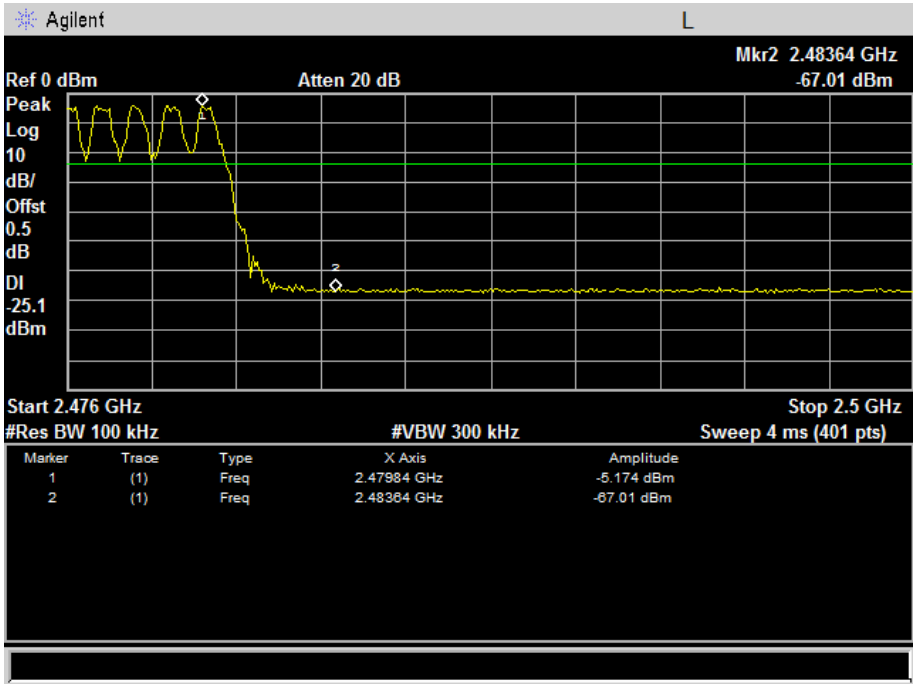


For Hopping Band edge

00 CH

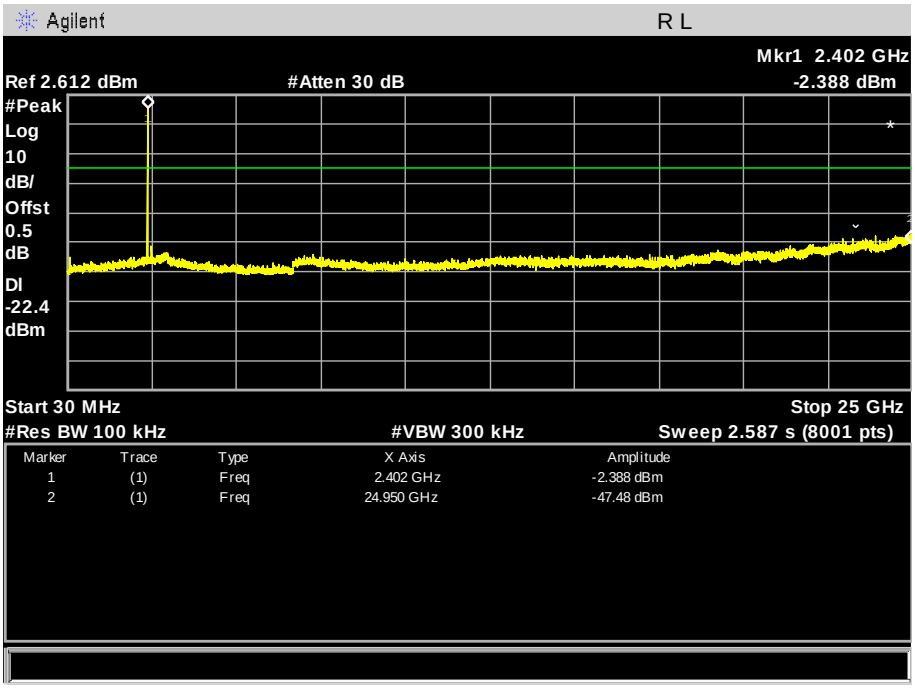


78 CH

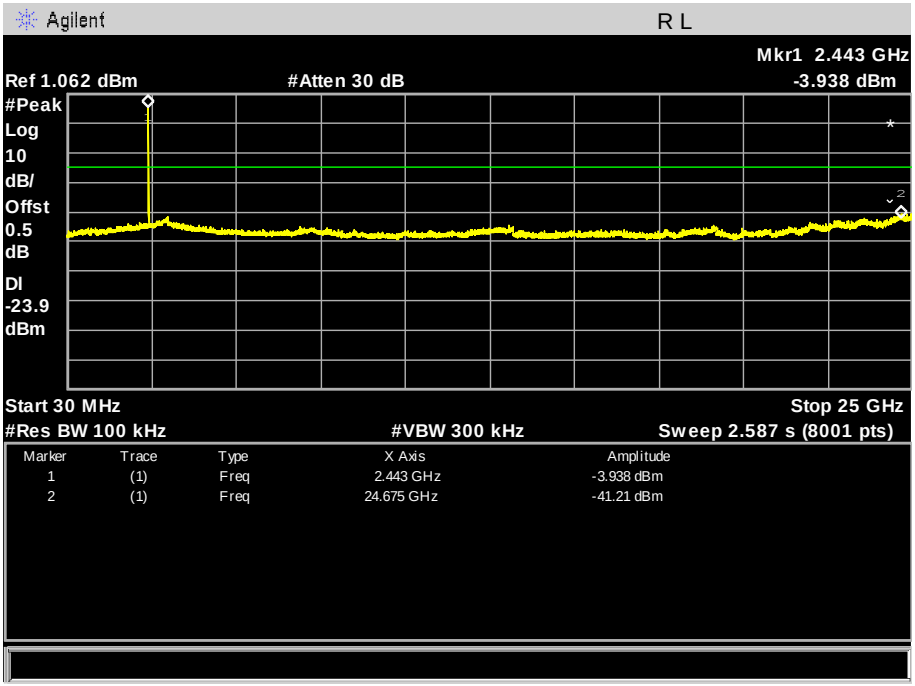


Test Mode ：	π/4-DQPSK(2Mbps) –00/39/78 CH

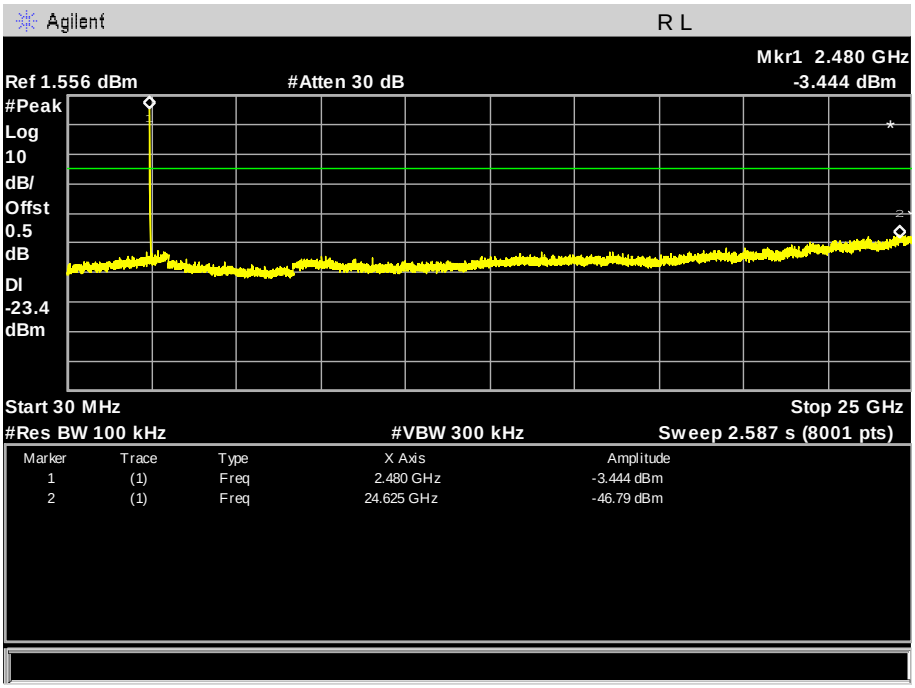
00 CH



39 CH

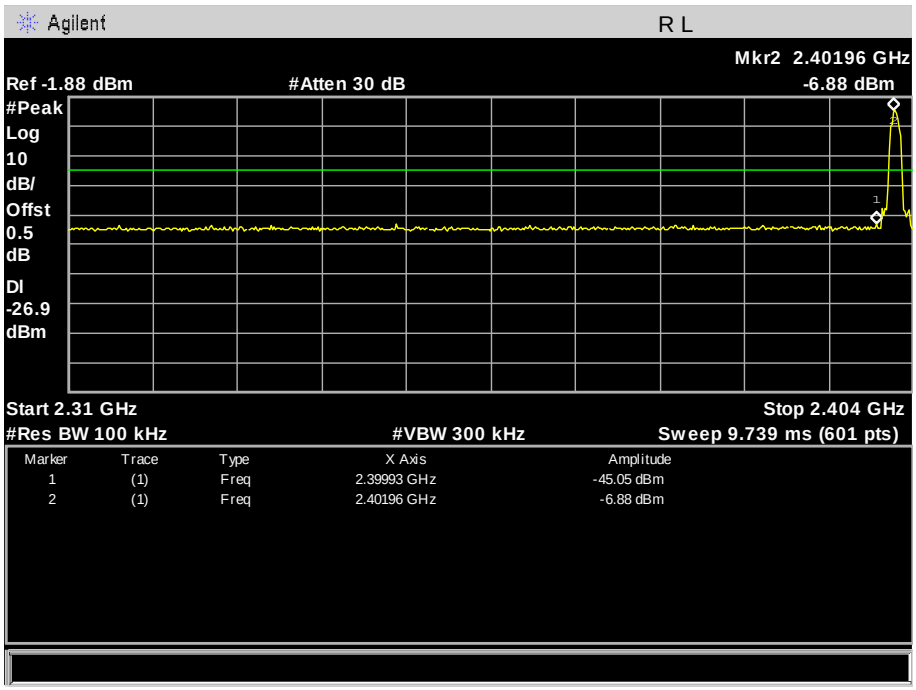


78 CH

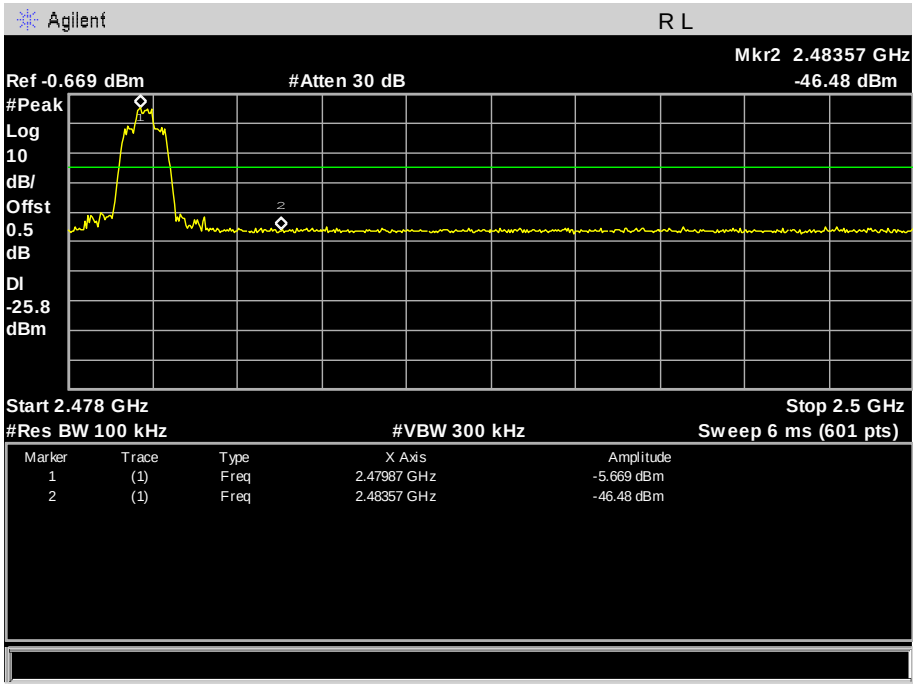

Agilent
R L
Mkr1 2.480 GHz
-3.444 dBm
Ref 1.556 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Dl
-23.4
dBm
Start 30 MHz
Stop 25 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.587 s (8001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.480 GHz -3.444 dBm
2 (1) Freq 24.625 GHz -46.79 dBm

For Band edge

00 CH

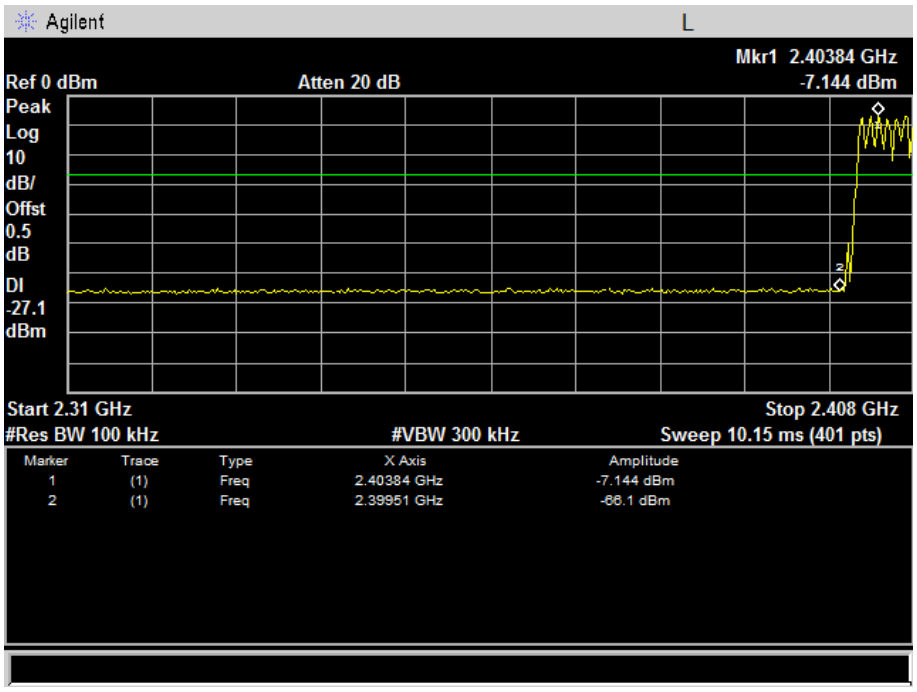


78 CH

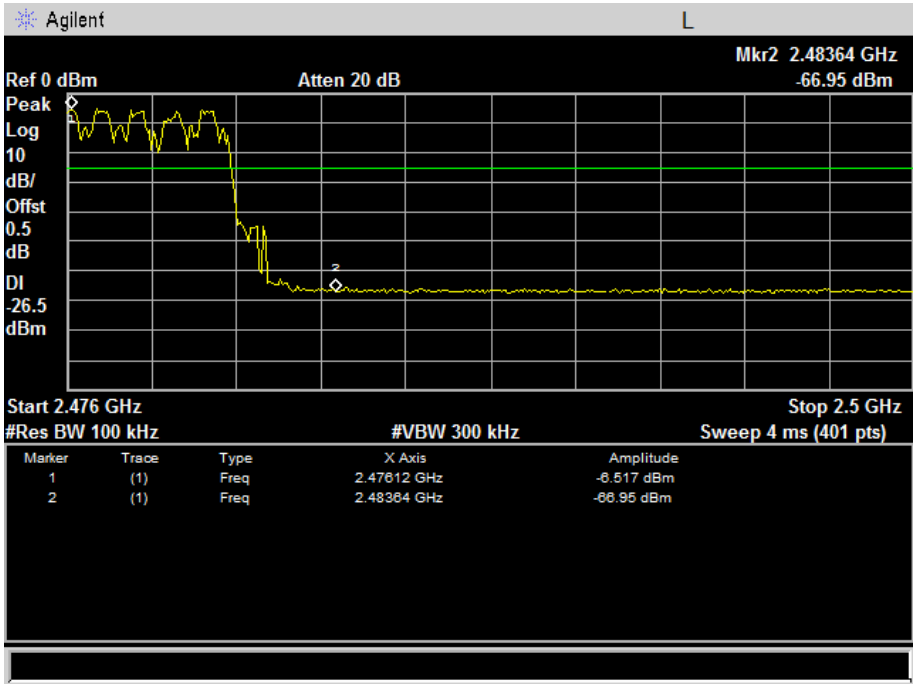


For Hopping Band edge

00 CH

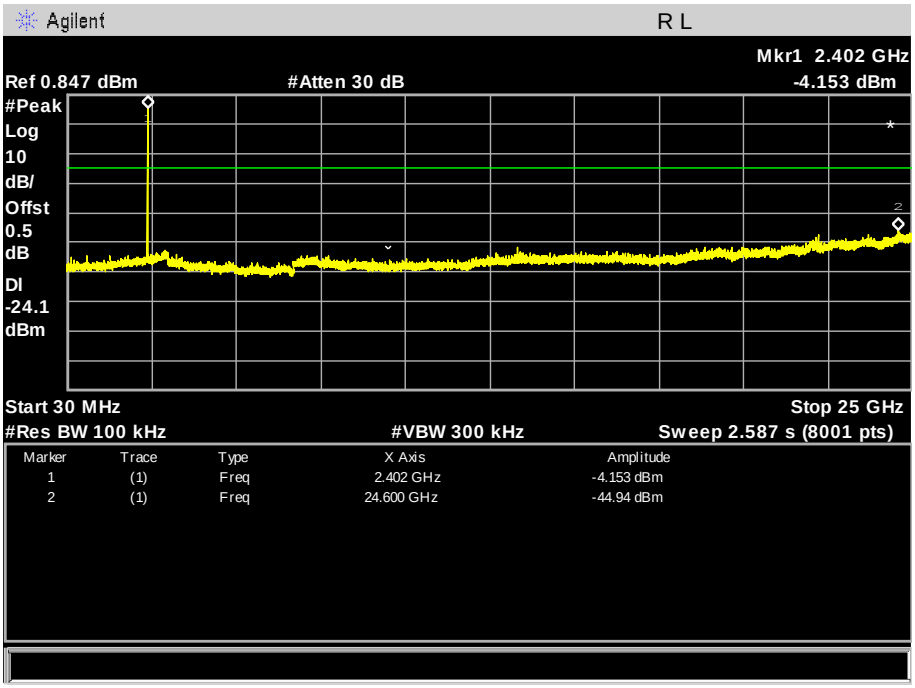


78 CH

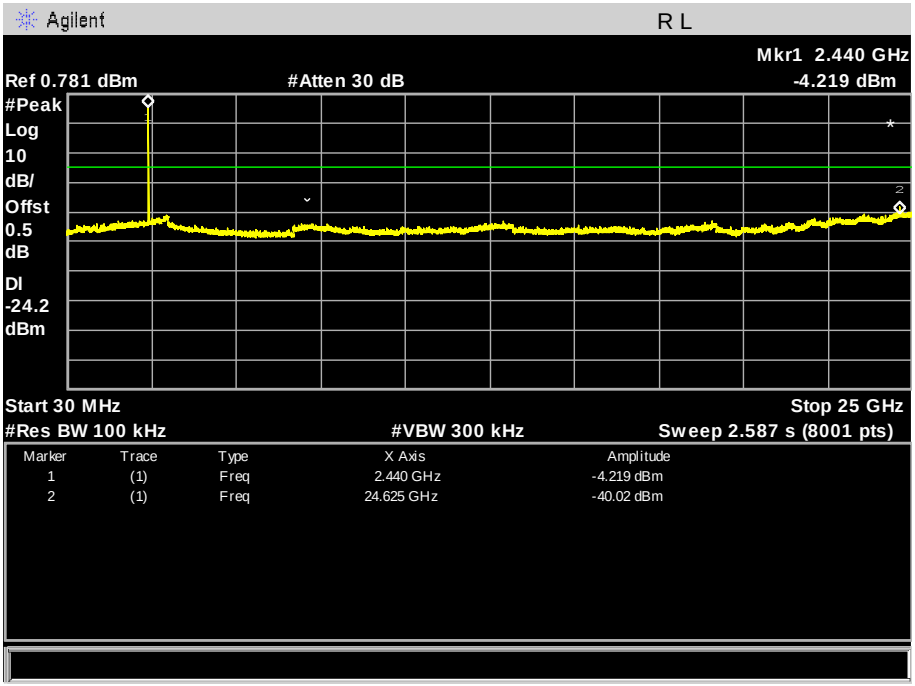


Test Mode ：	8-DPSK(3Mbps)

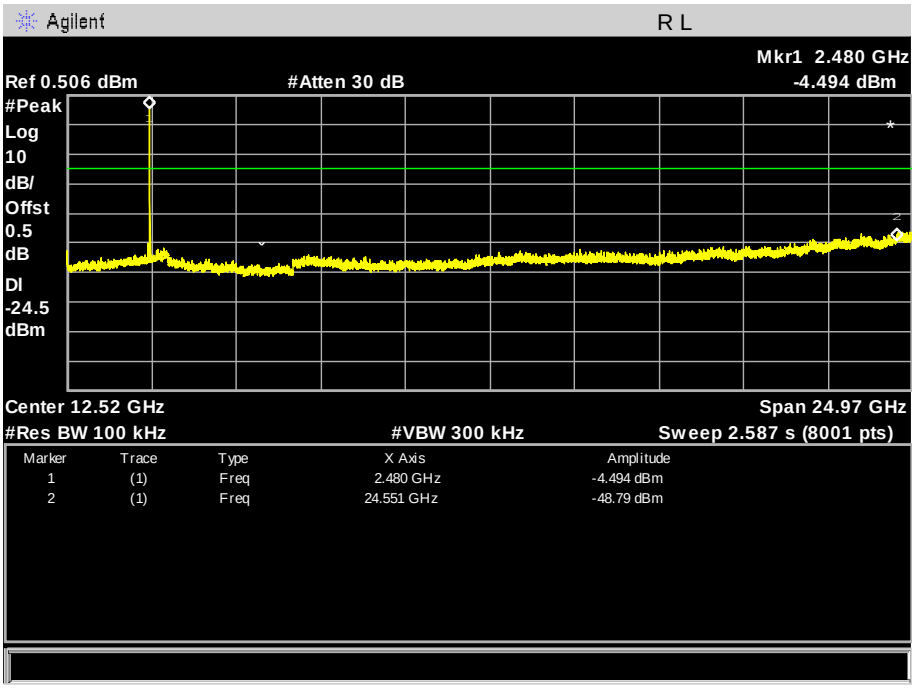
00 CH



39 CH

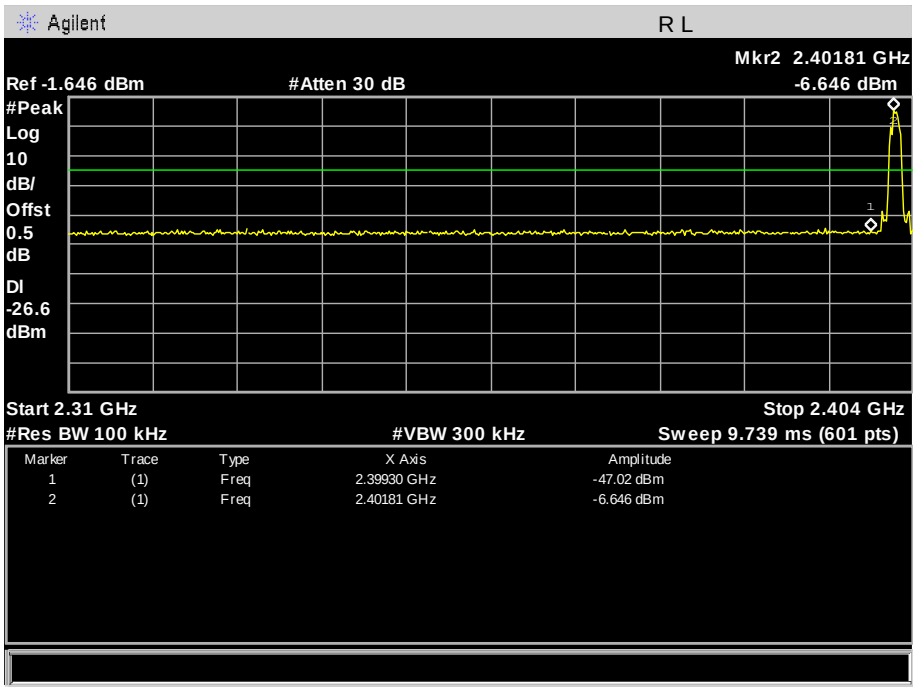


78 CH

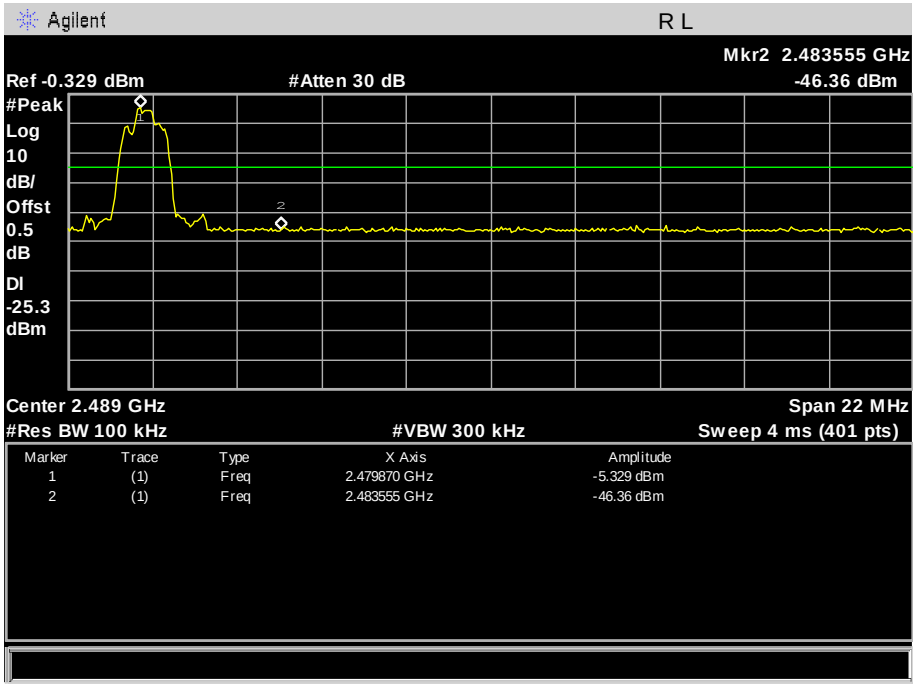

Agilent
R L
Mkr1 2.480 GHz
-4.494 dBm
Ref 0.506 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Dl
-24.5
dBm
Center 12.52 GHz
Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.587 s (8001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.480 GHz -4.494 dBm
2 (1) Freq 24.551 GHz -48.79 dBm

For Band edge

00 CH

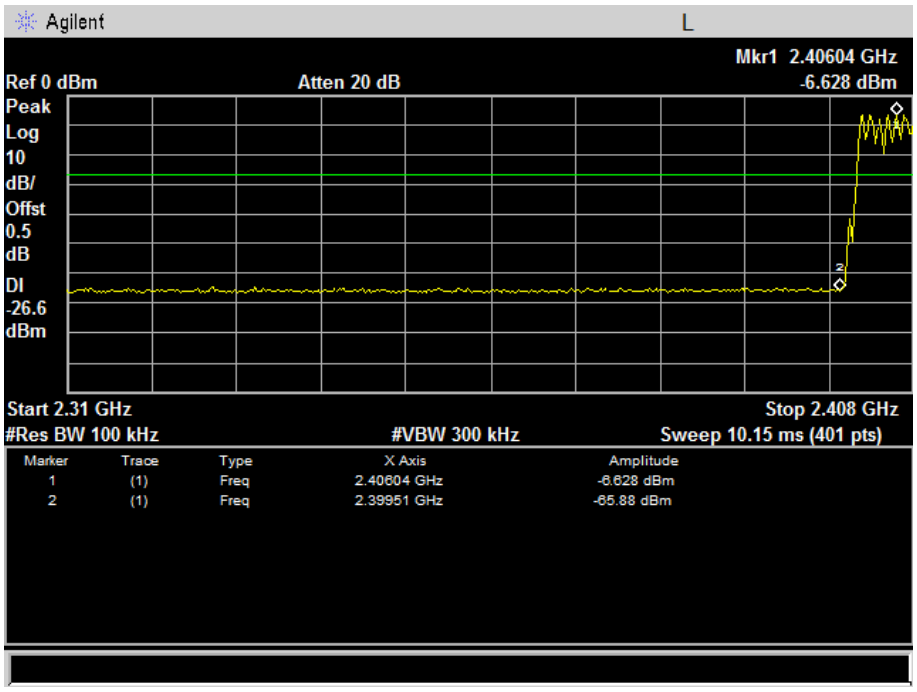


78 CH

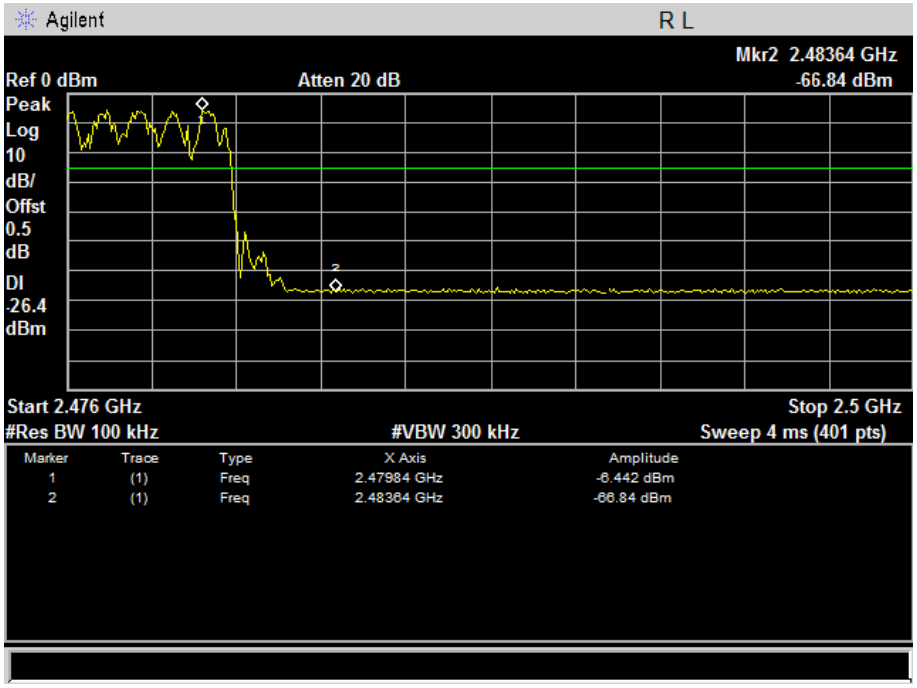


For Hopping Band edge

00 CH



78 CH



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

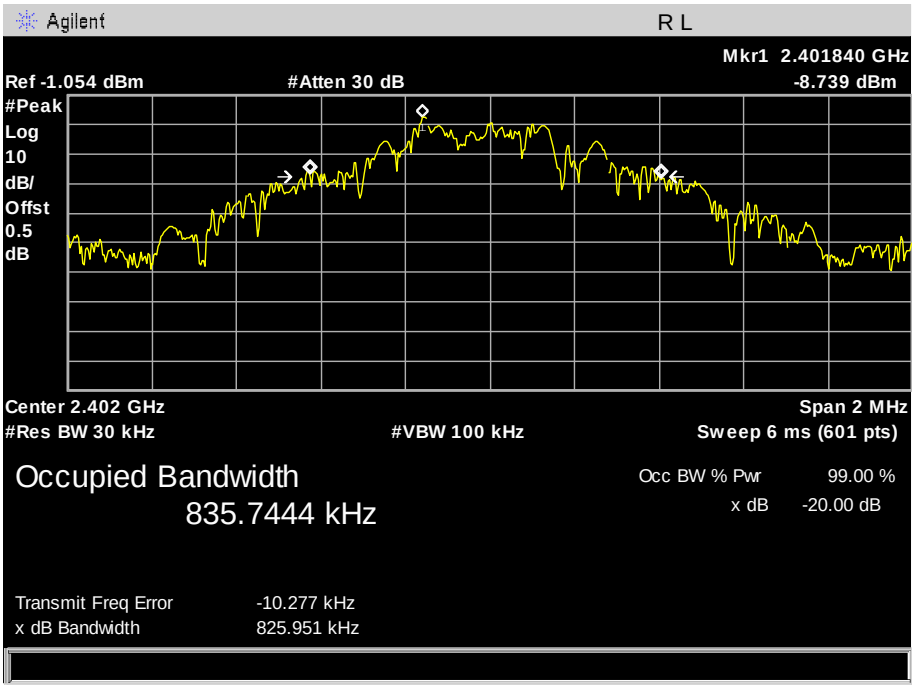
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

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

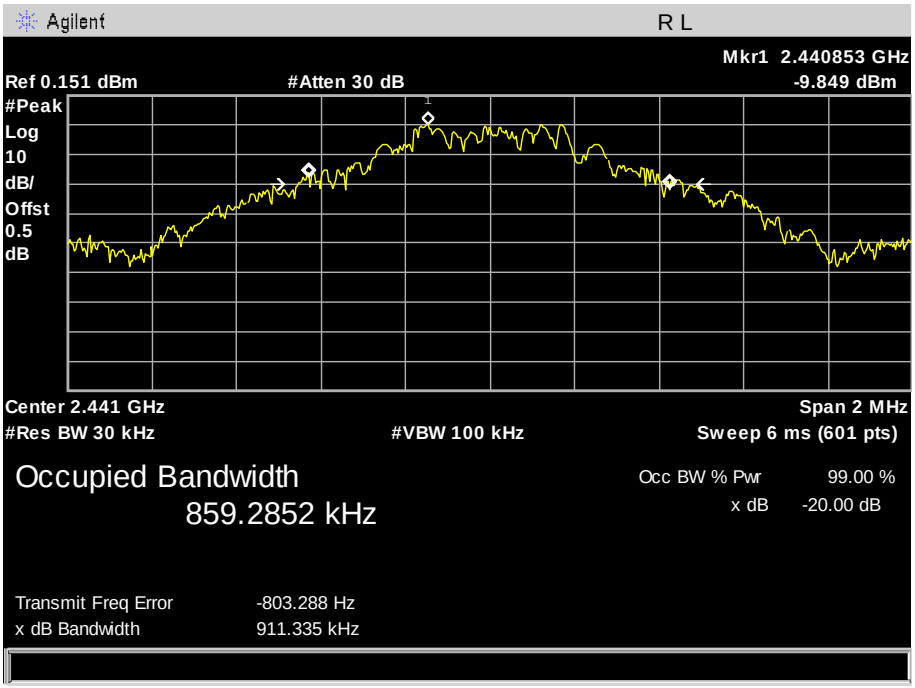
8.2 Test Result

Modulation	Test Channel	Bandwidth(MHz)
GFSK	Low	0.826
GFSK	Middle	0.911
GFSK	High	0.869
Pi/4 DQPSK	Low	1.300
Pi/4 DQPSK	Middle	1.289
Pi/4 DQPSK	High	1.295
8DPSK	Low	1.282
8DPSK	Middle	1.275
8DPSK	High	1.278

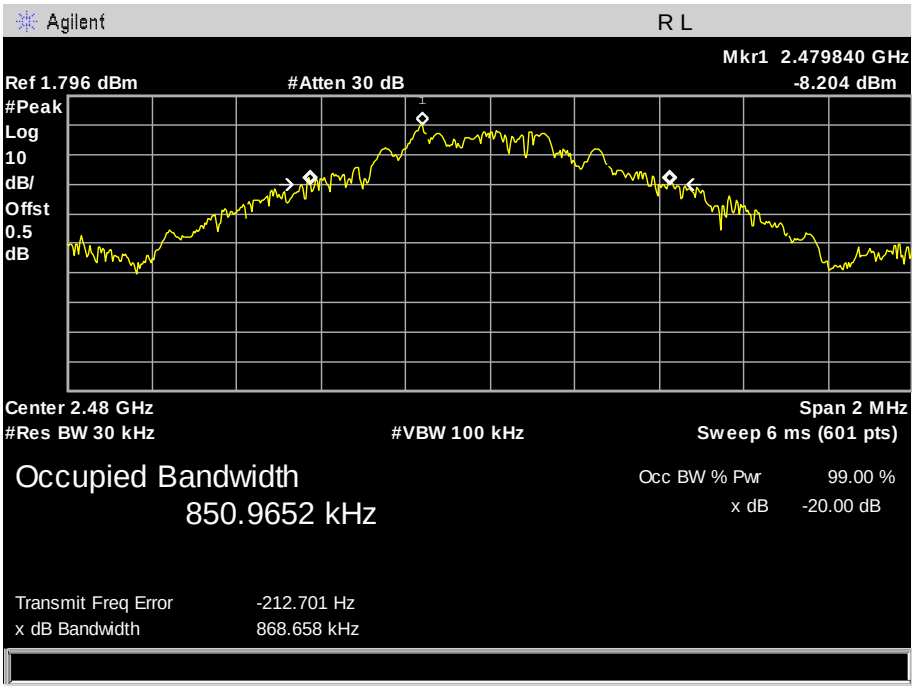
GFSK Low Channel



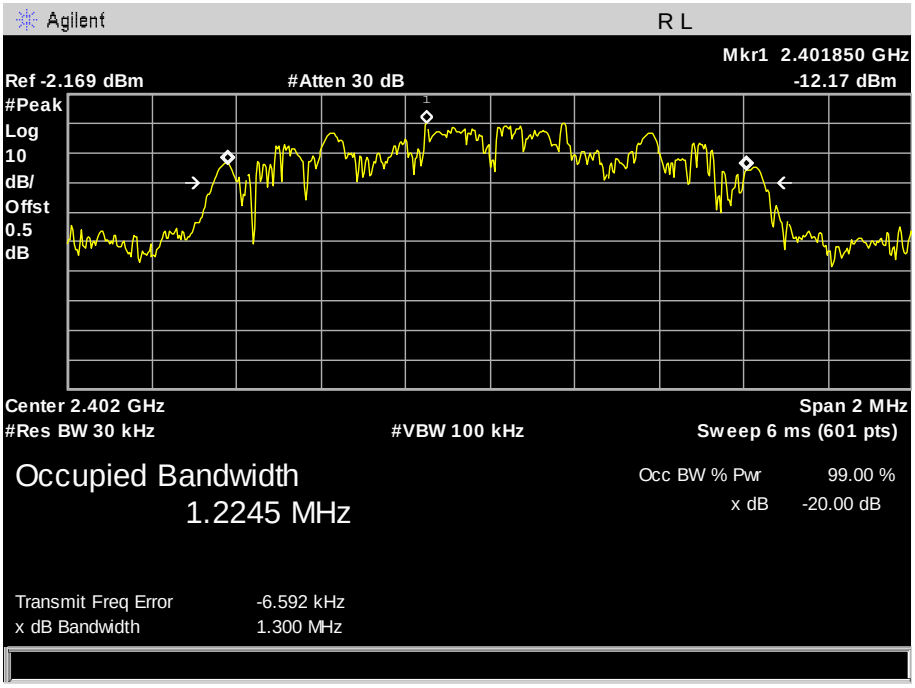
GFSK Middle Channel



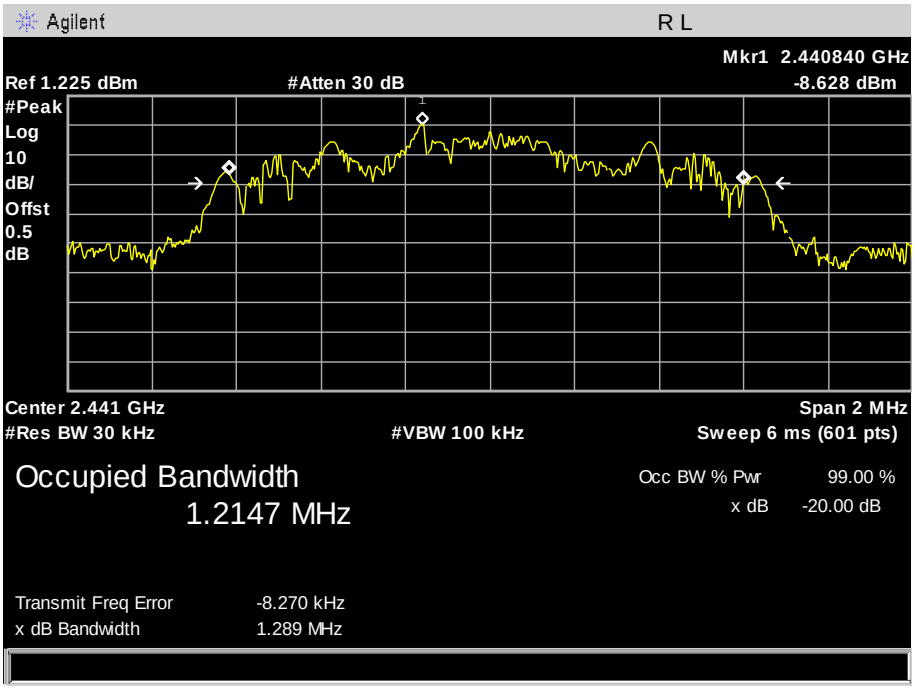
GFSK High Channel



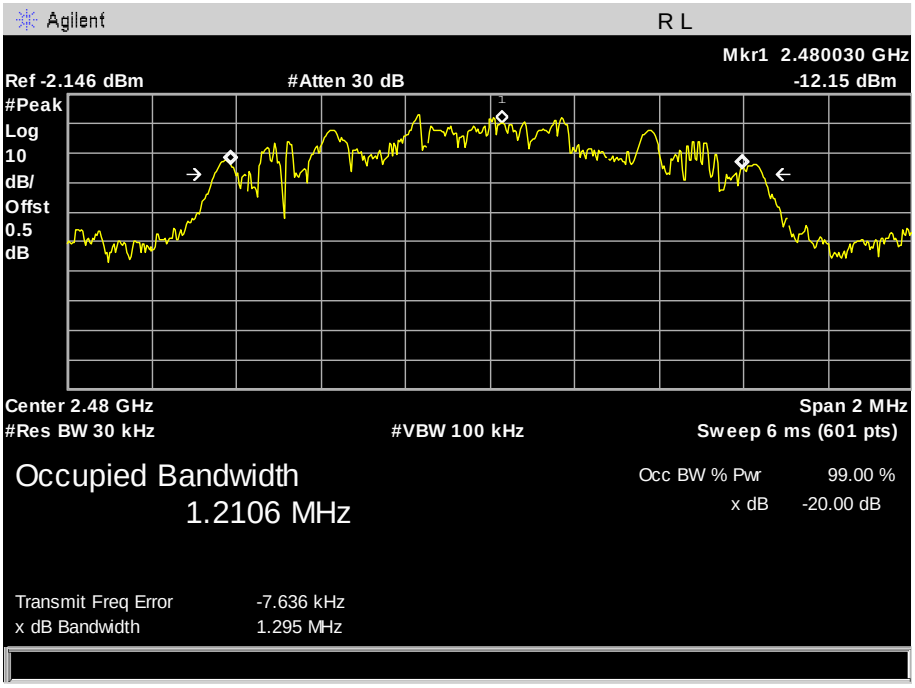
Pi/4DQPSK Low Channel



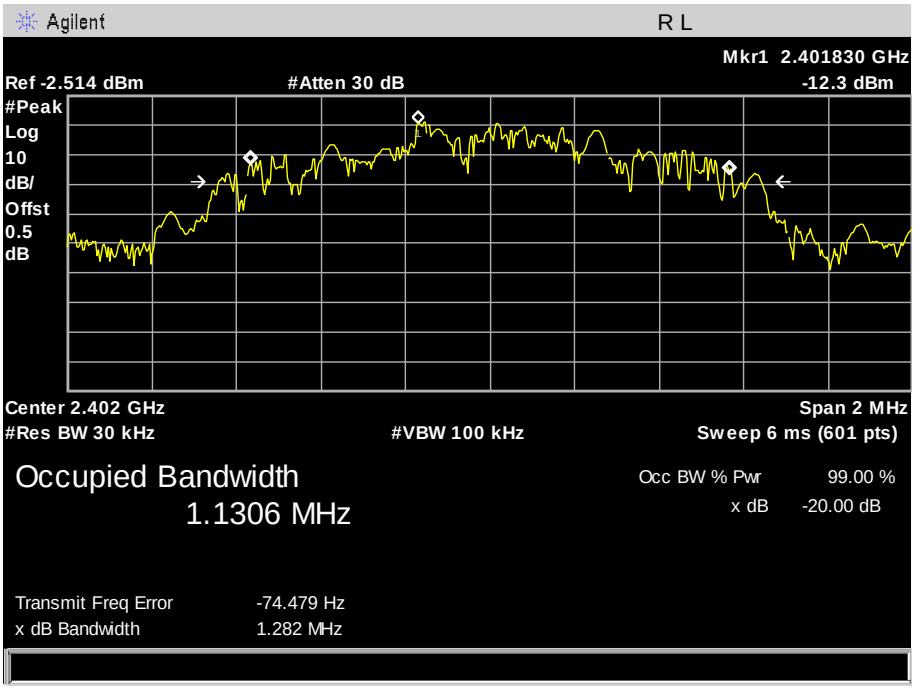
Pi/4DQPSK Middle Channel



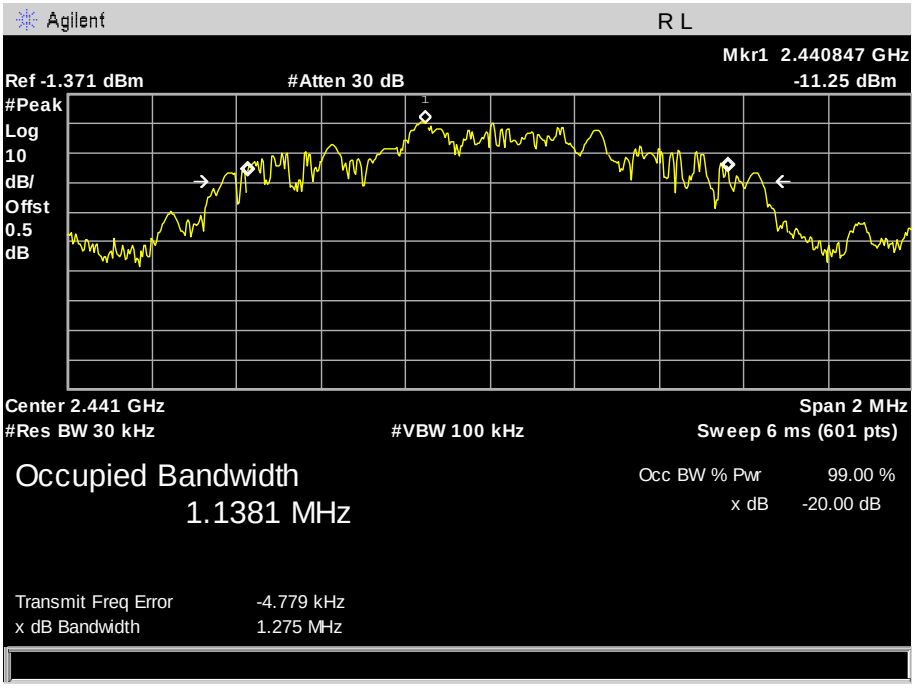
Pi/4DQPSK High Channel



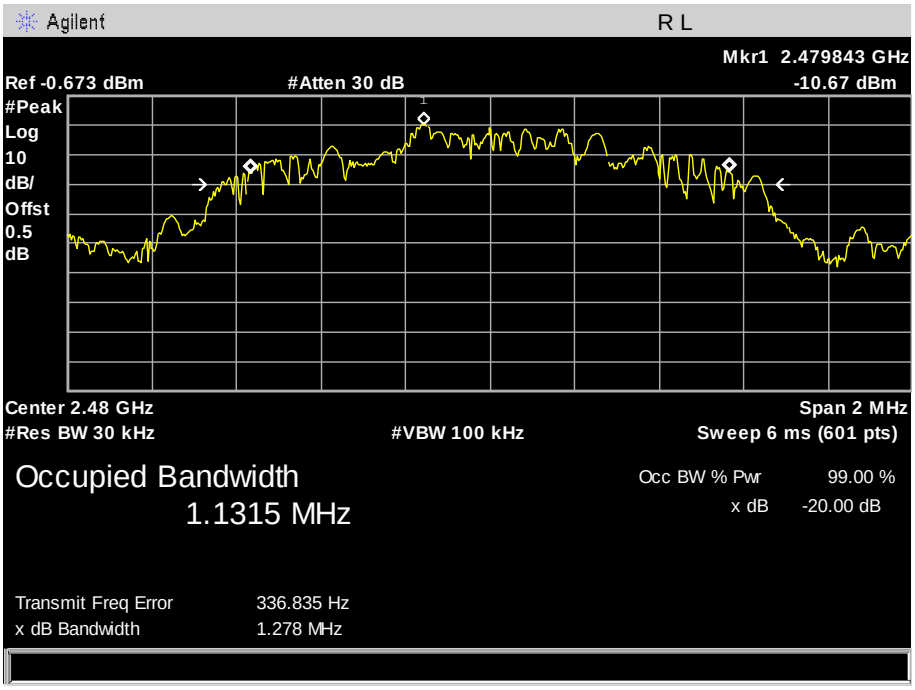
8DPSK Low Channel



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.

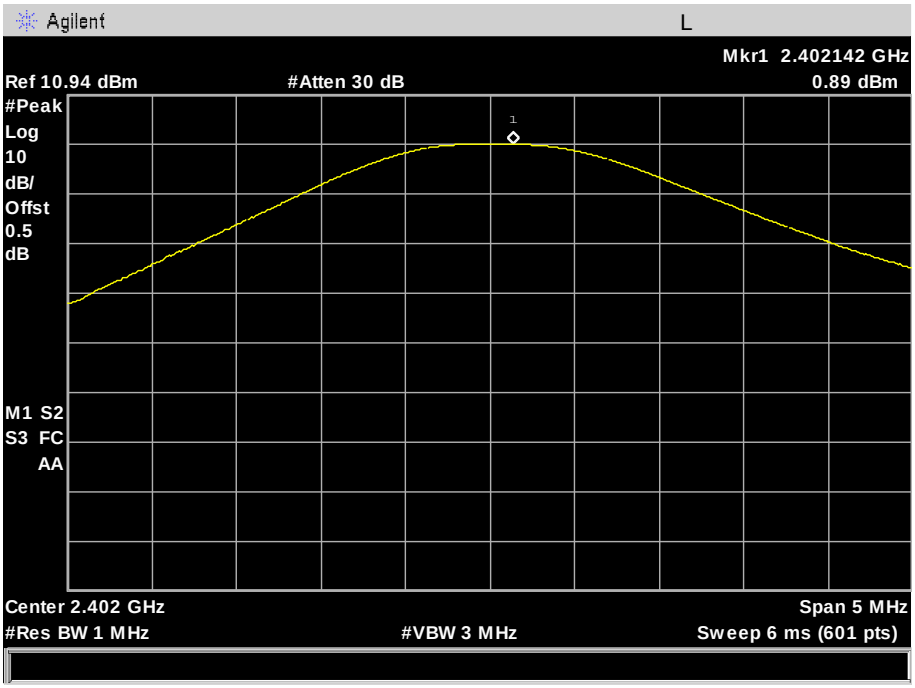
2. Set the spectrum analyser: RBW >20dB BW. VBW >=RBW. Sweep = auto; Detector Function = Peak.

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

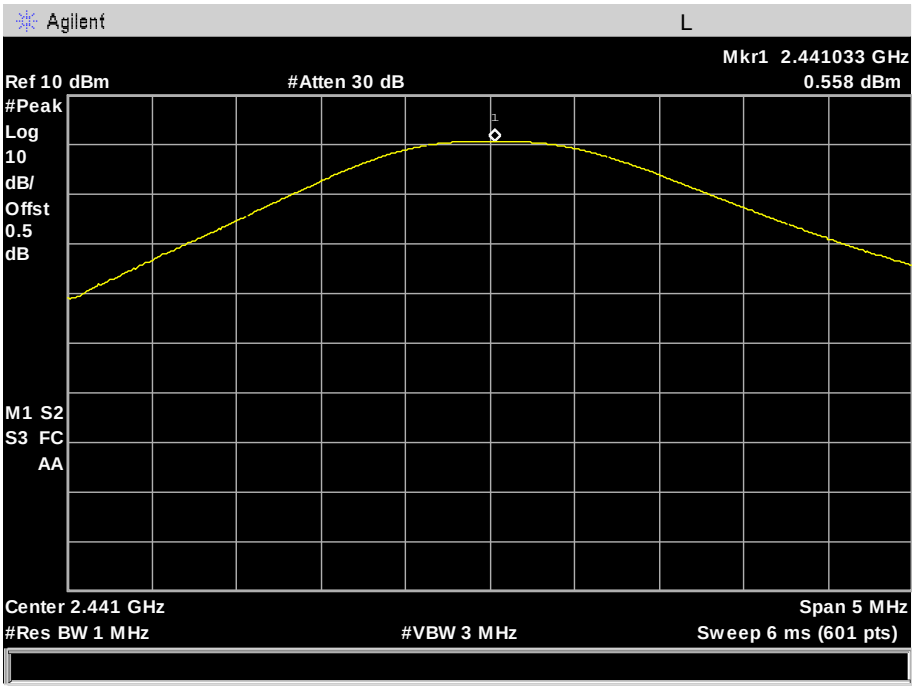
9.2 Test Result

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Low	0.890	30
GFSK	Middle	0.558	30
GFSK	High	-0.069	30
Pi/4 DQPSK	Low	0.264	20.97
Pi/4 DQPSK	Middle	0.157	20.97
Pi/4 DQPSK	High	-0.524	20.97
8DPSK	Low	0.659	20.97
8DPSK	Middle	0.343	20.97
8DPSK	High	-0.259	20.97

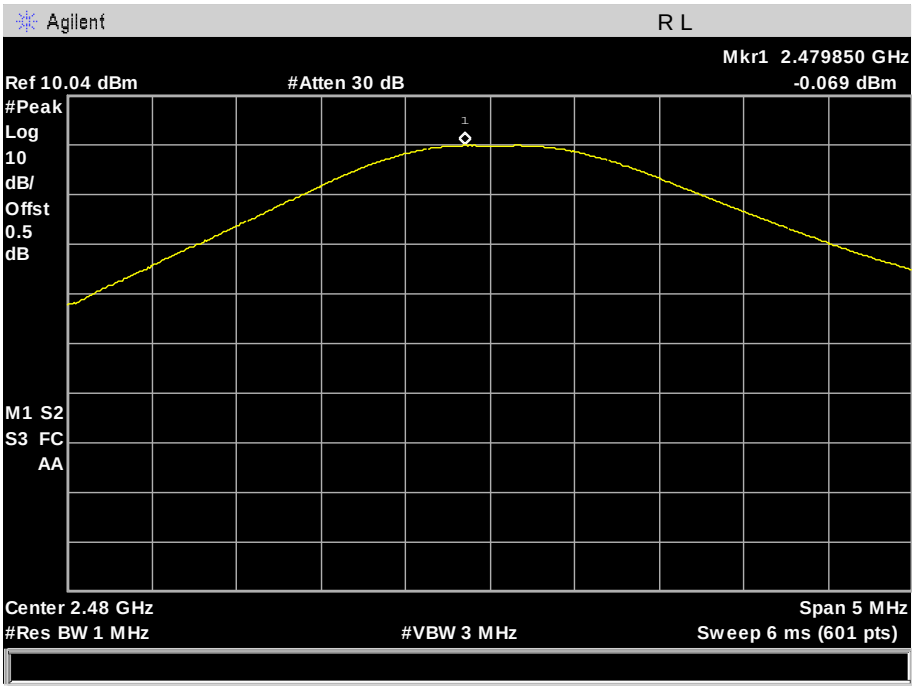
GFSK Low Channel



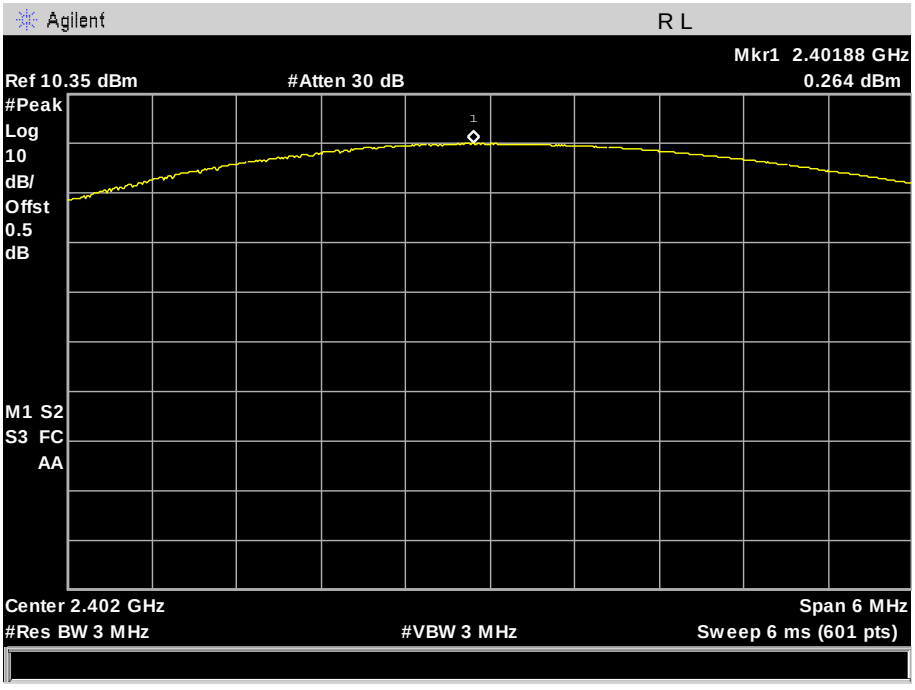
GFSK Middle Channel



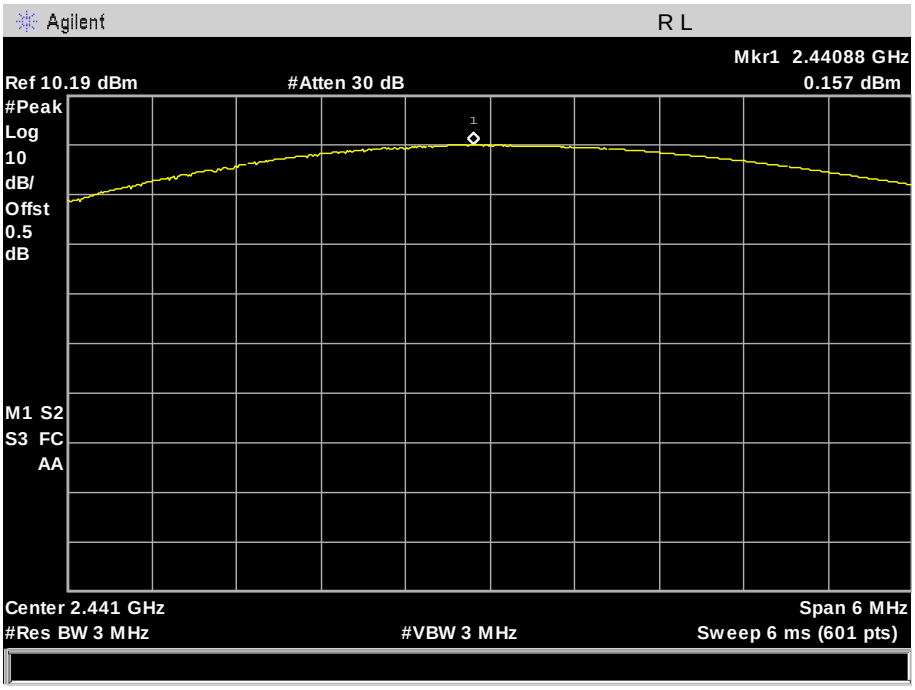
GFSK High Channel



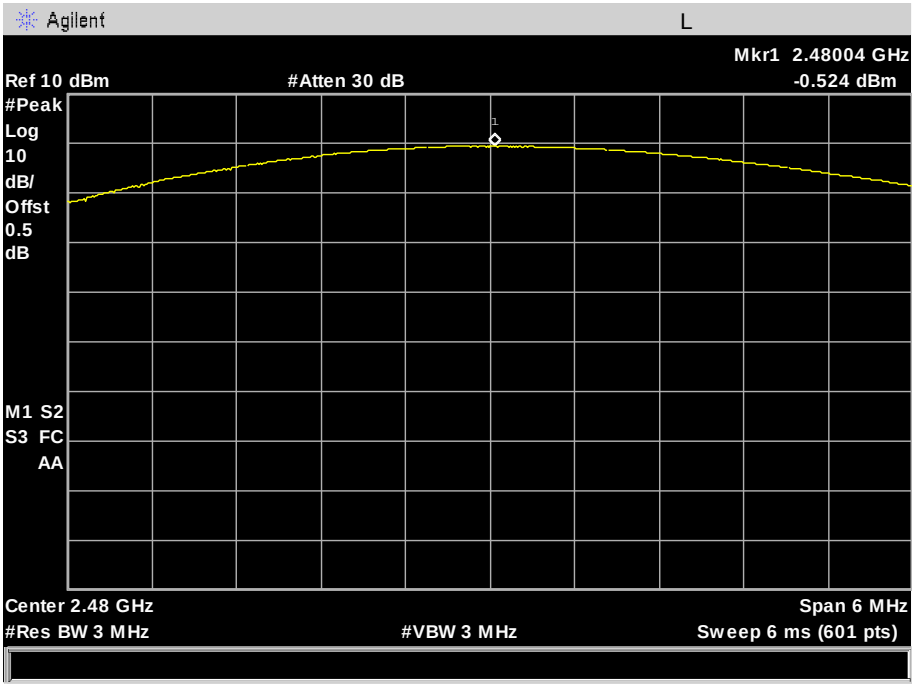
Pi/4DQPSK Low Channel



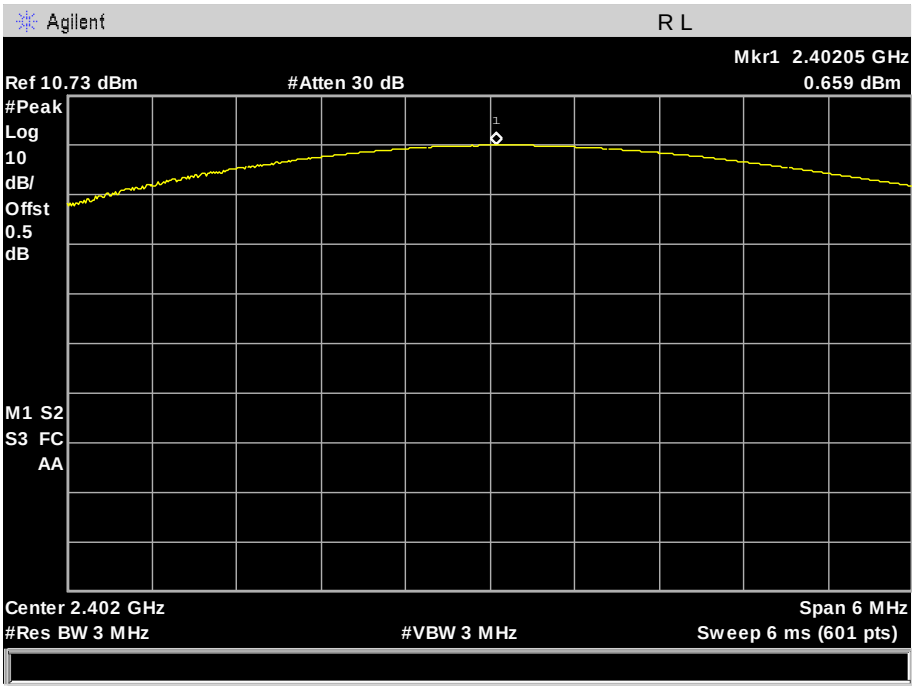
Pi/4DQPSK Middle Channel



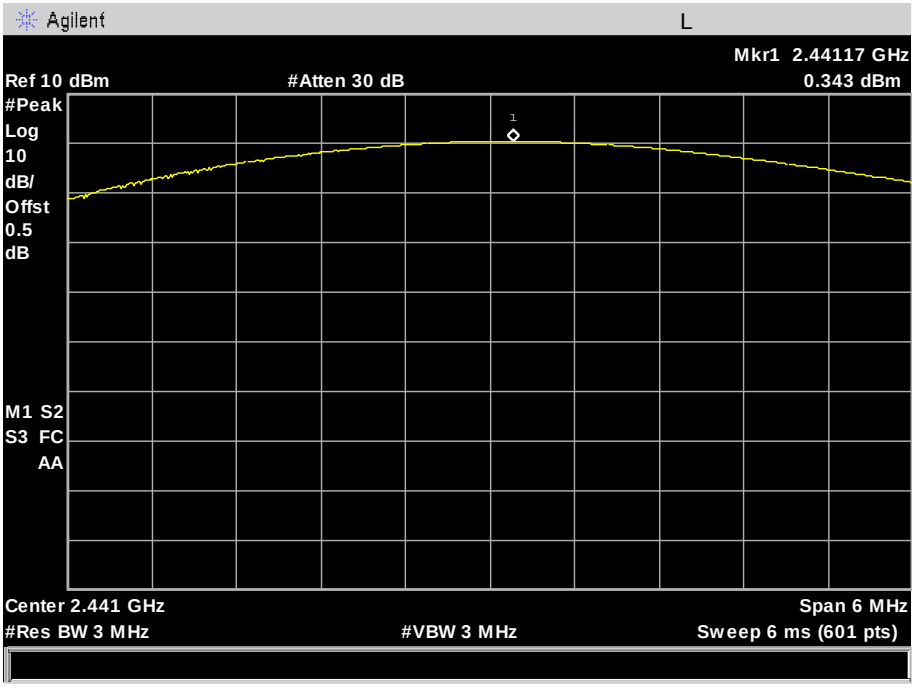
Pi/4DQPSK High Channel



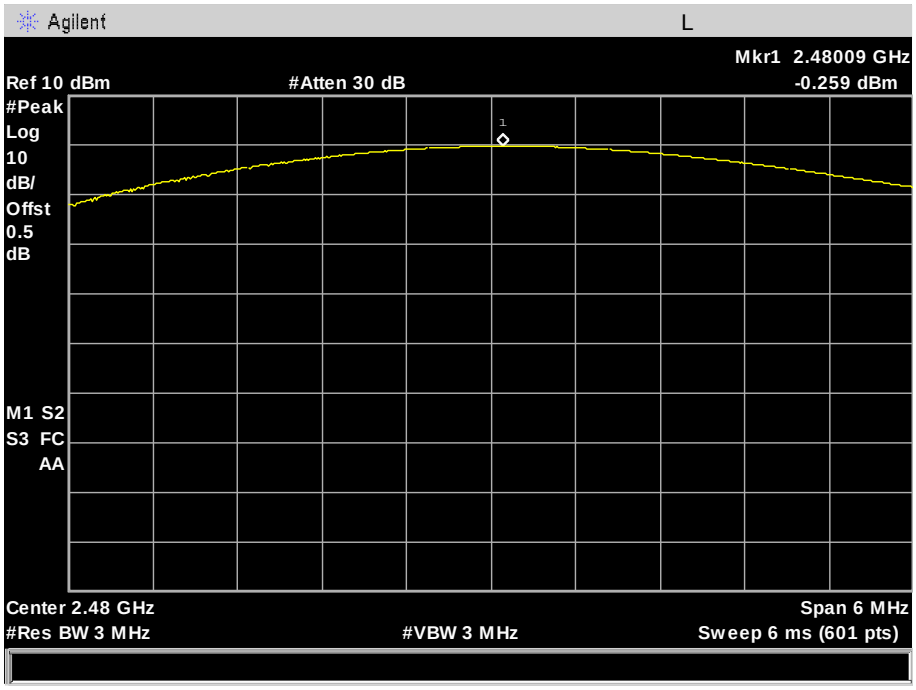
8DPSK Low Channel



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

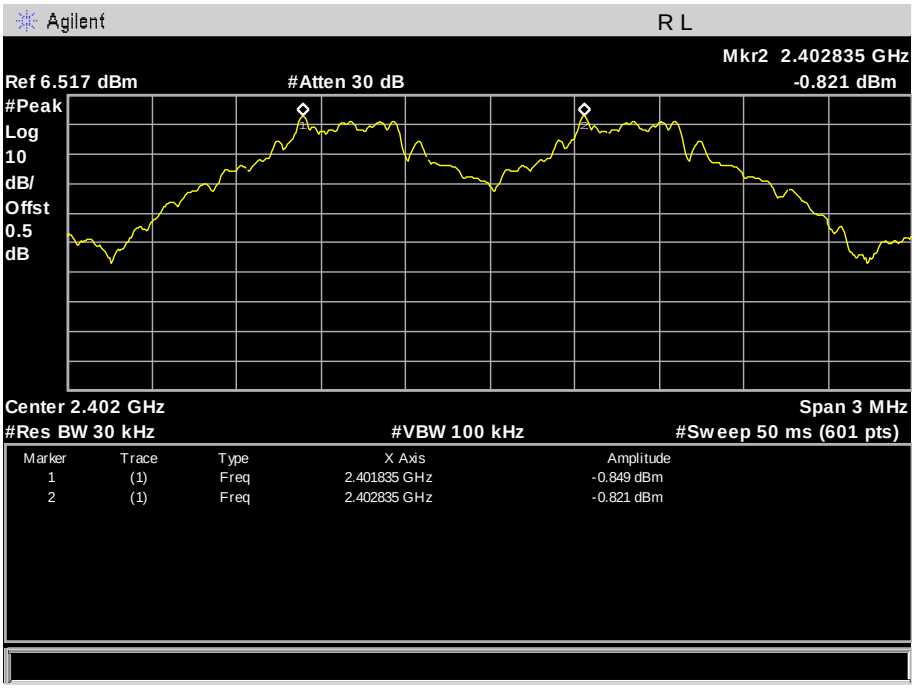
Modulation	Test Channel	Separation (MHz)	Limit (MHz)	Result
GFSK	Low	1.000	0.826	PASS
GFSK	Middle	1.000	0.911	PASS
GFSK	High	1.005	0.869	PASS
Pi/4 DQPSK	Low	1.000	0.867	PASS
Pi/4 DQPSK	Middle	1.000	0.859	PASS
Pi/4 DQPSK	High	1.000	0.863	PASS
8DPSK	Low	1.000	0.855	PASS
8DPSK	Middle	1.000	0.850	PASS
8DPSK	High	1.000	0.852	PASS

For GFSK: Ch. Separation Limits: >20dB bandwidth

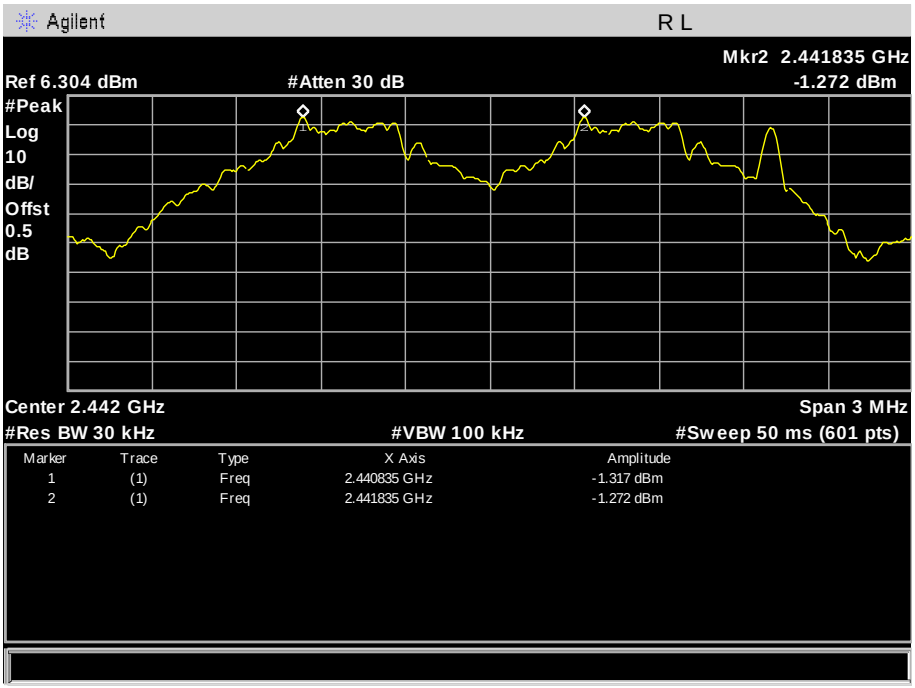
For π/4-DQPSK(2Mbps): Ch. Separation Limits: > two-thirds 20dB bandwidth

For 8-DPSK(3Mbps): Ch. Separation Limits: > two-thirds 20dB bandwidth

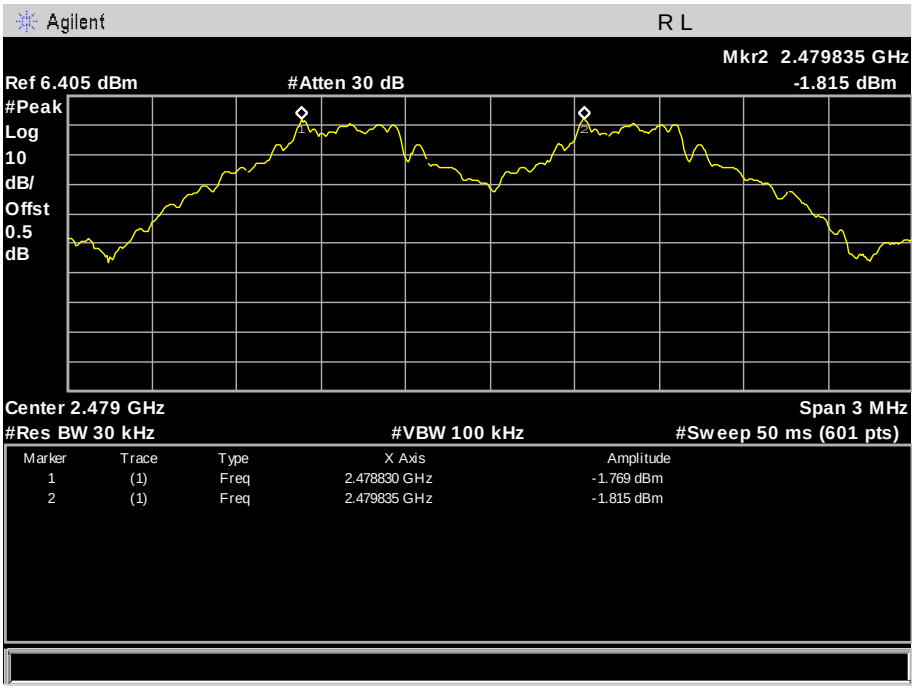
GFSK Low Channel



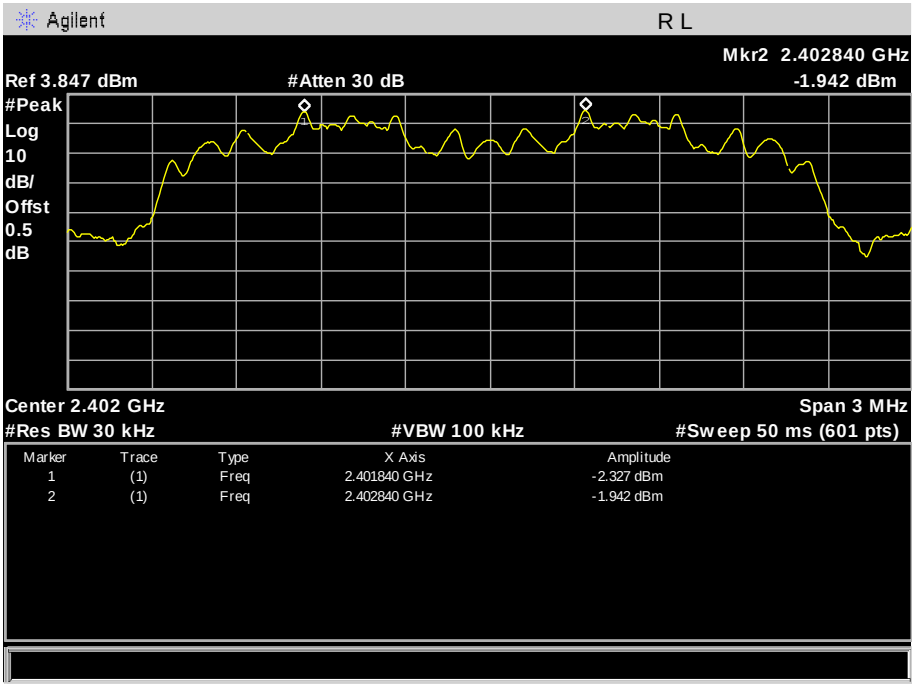
GFSK Middle Channel



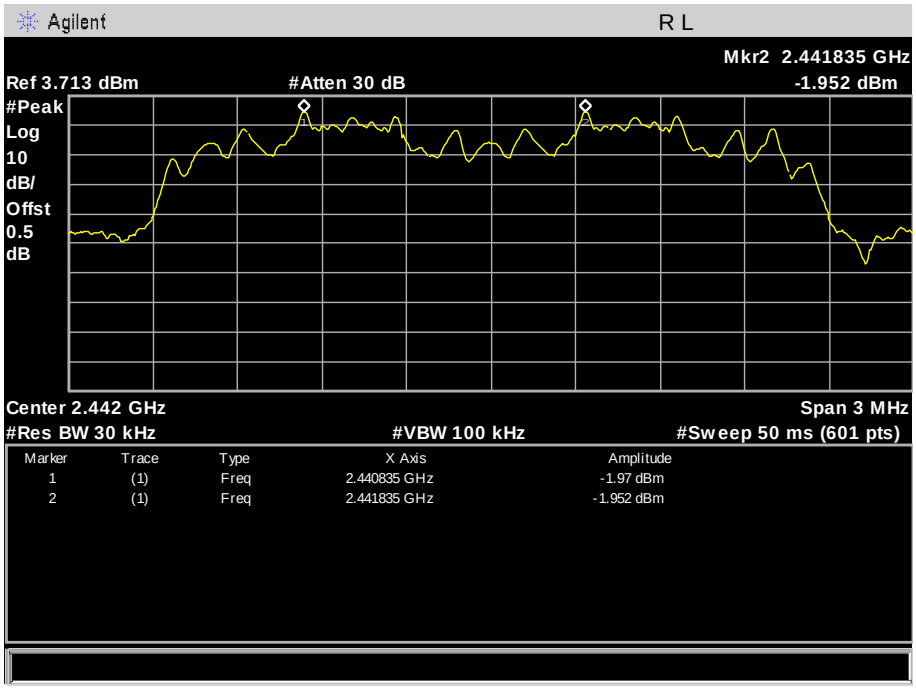
GFSK High Channel



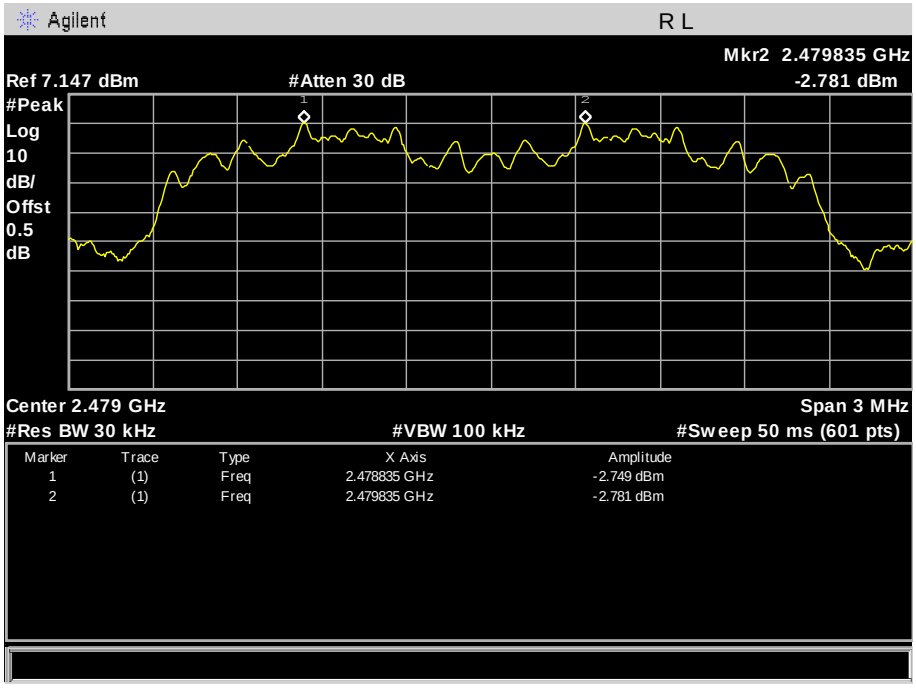
Pi/4DQPSK Low Channel



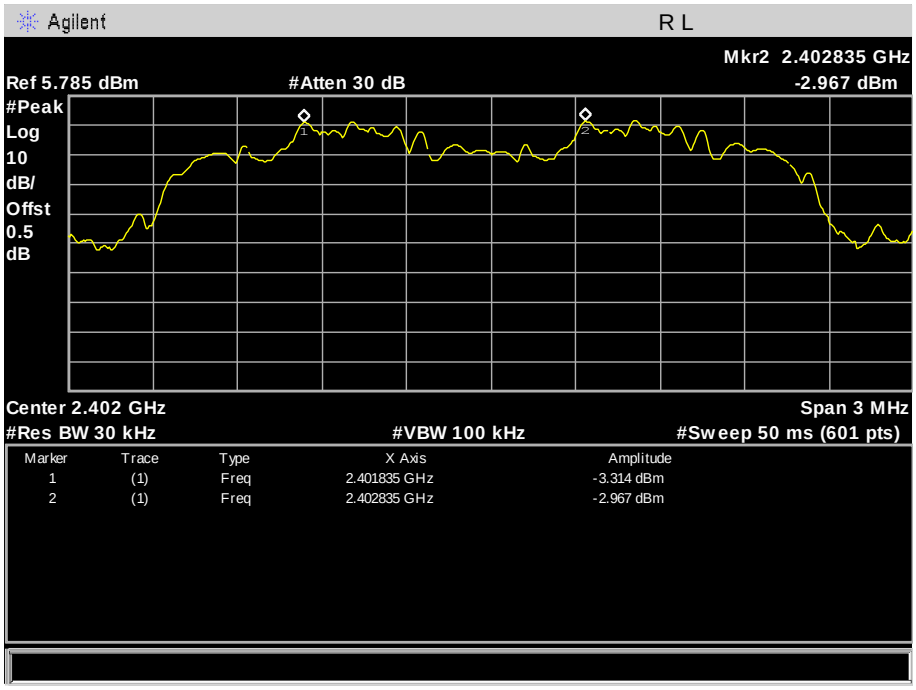
Pi/4DQPSK Middle Channel



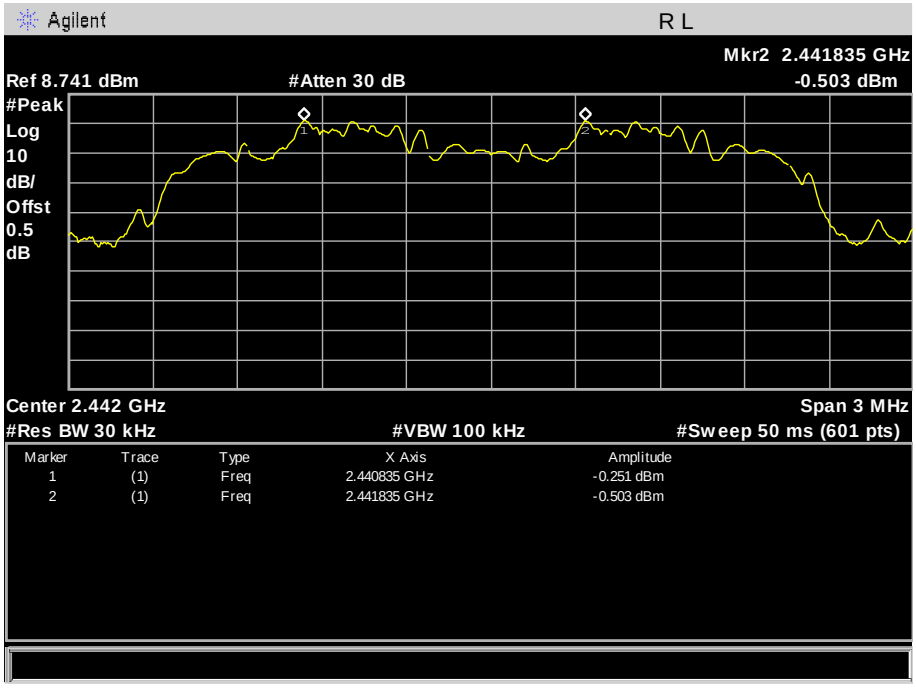
Pi/4DQPSK High Channel



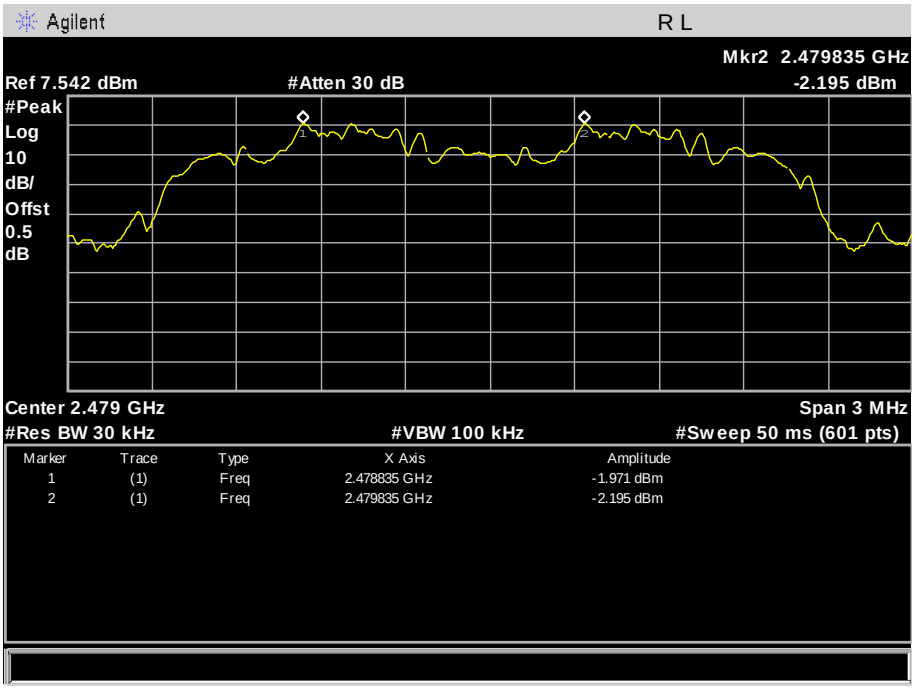
8DPSK Low Channel



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.

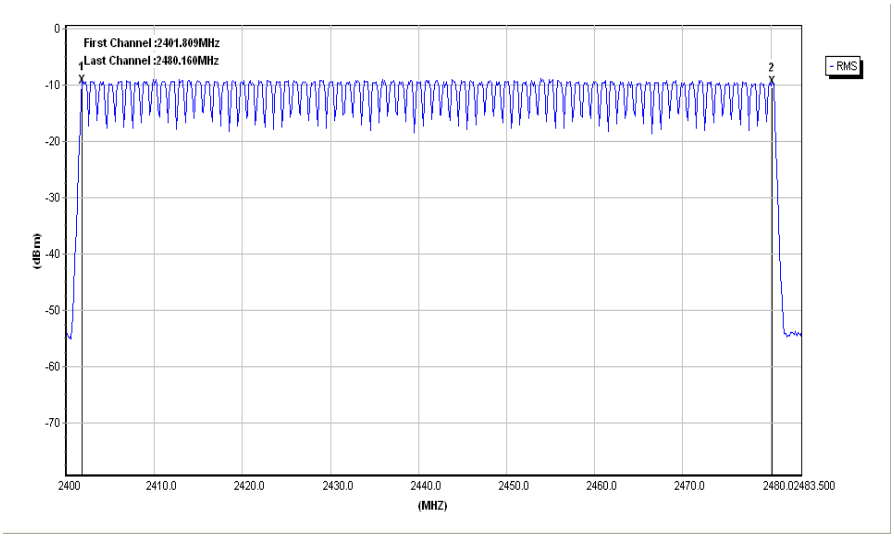
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

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

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).

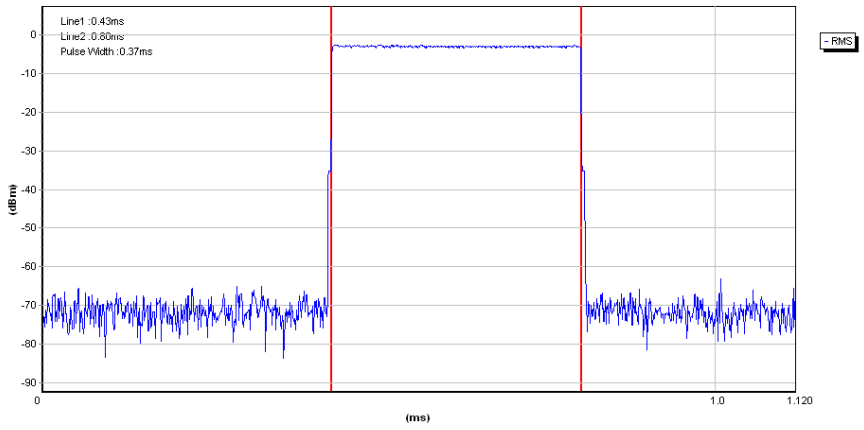
DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

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:

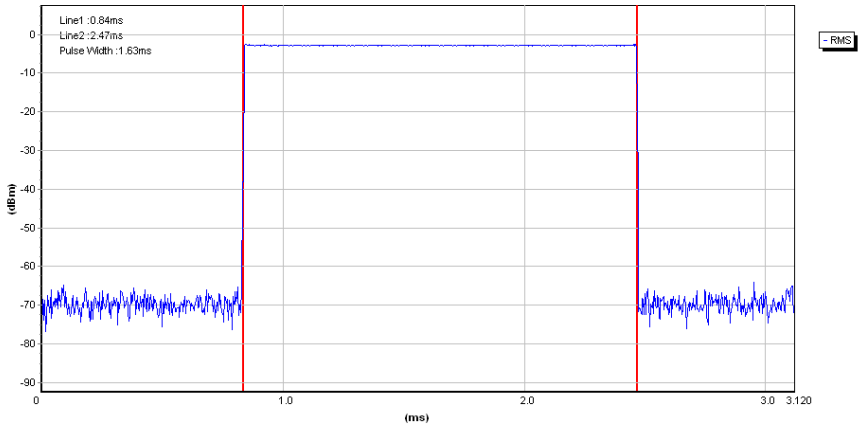
Data Packet	Dwell Time(s)
DH5/2DH5/3DH5	1600/79/6*0.4*79*(MkrDelta)/1000
DH3/2DH3/3DH3	1600/79/4*0.4*79*(MkrDelta)/1000
DH1/2DH1/3DH1	1600/79/2*0.4*79*(MkrDelta)/1000
Remark: Mkr Delta is once pulse time.	

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

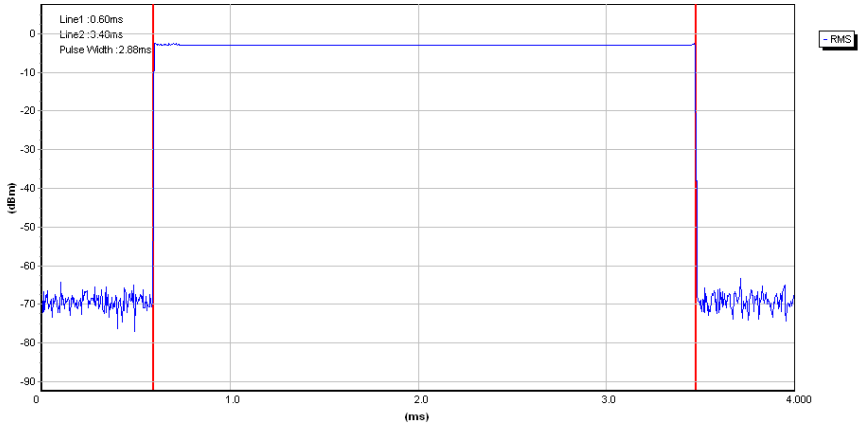
CH39-DH1



CH39-DH3

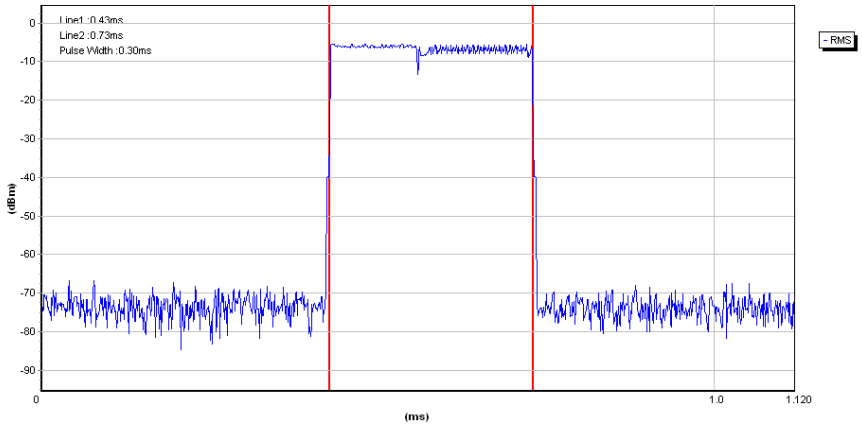


CH39-DH5

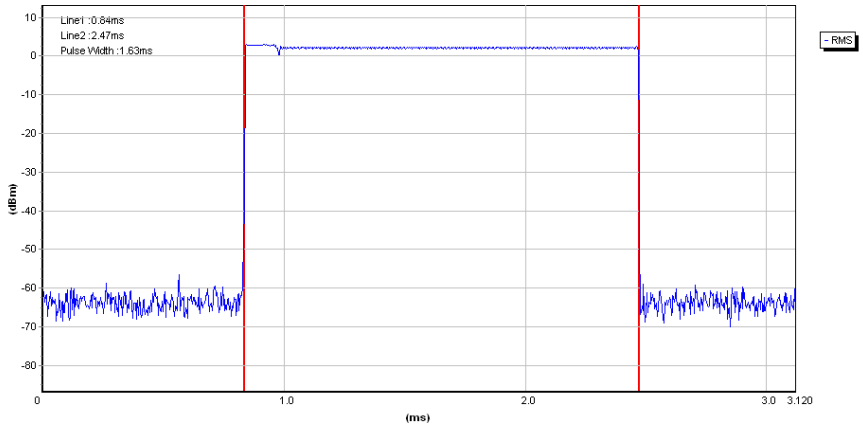


Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits(s)
2DH1	2441 MHz	0.300	0.096	0.4
2DH3	2441 MHz	1.630	0.261	0.4
2DH5	2441 MHz	2.880	0.307	0.4

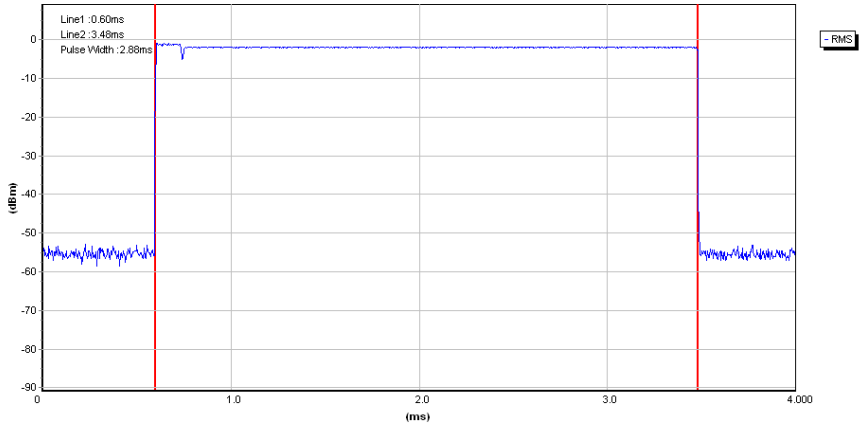
CH39-2DH1



CH39-2DH3

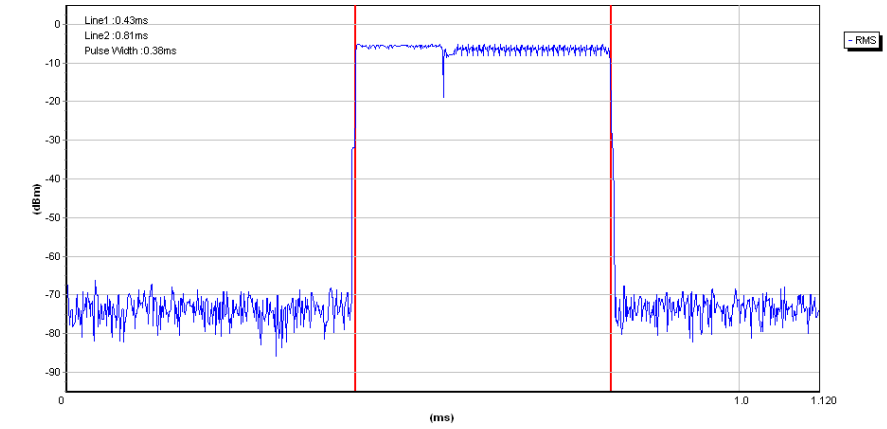


CH39-2DH5

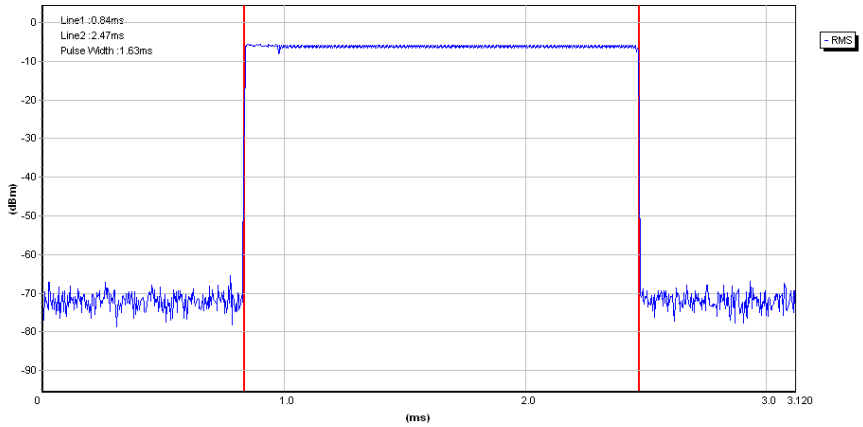


Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits(s)
3DH1	2441 MHz	0.380	0.122	0.4
3DH3	2441 MHz	1.630	0.261	0.4
3DH5	2441 MHz	2.890	0.308	0.4

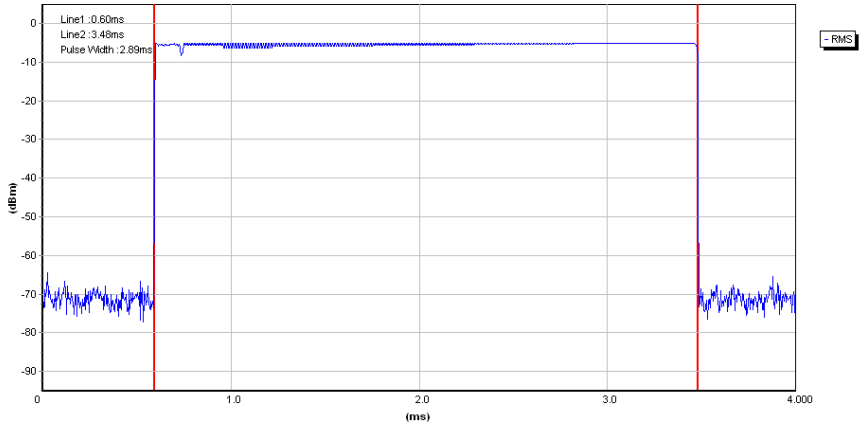
CH39-3DH1



CH39-3DH3



CH39-3DH5

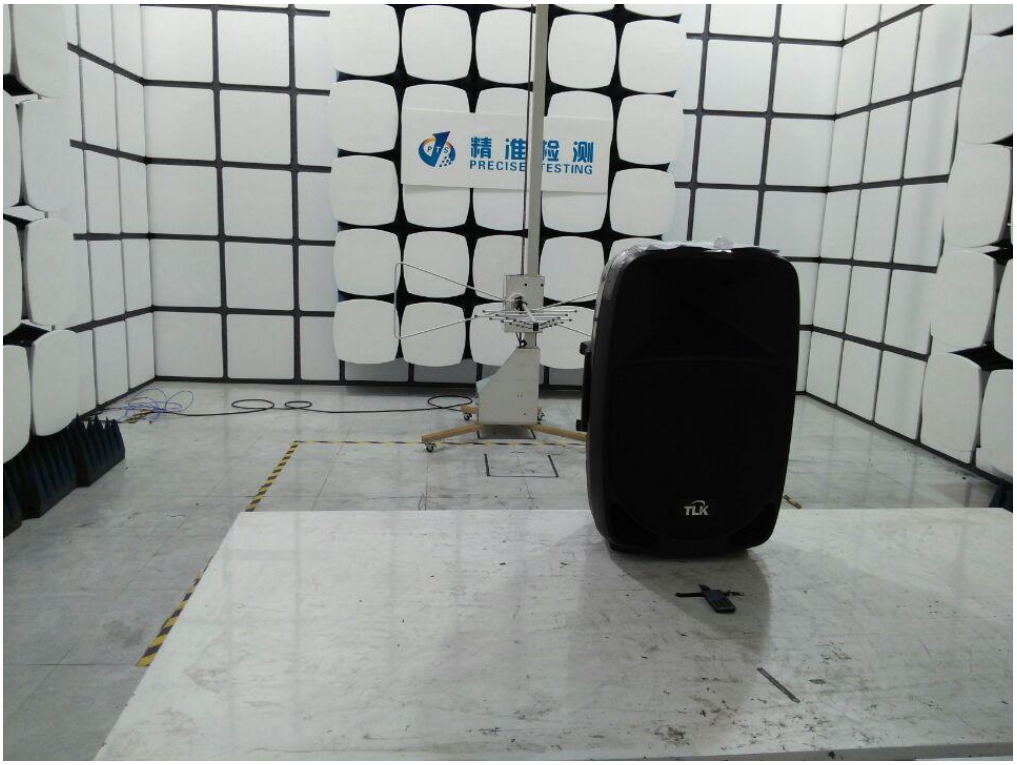


13 Antenna Requirement

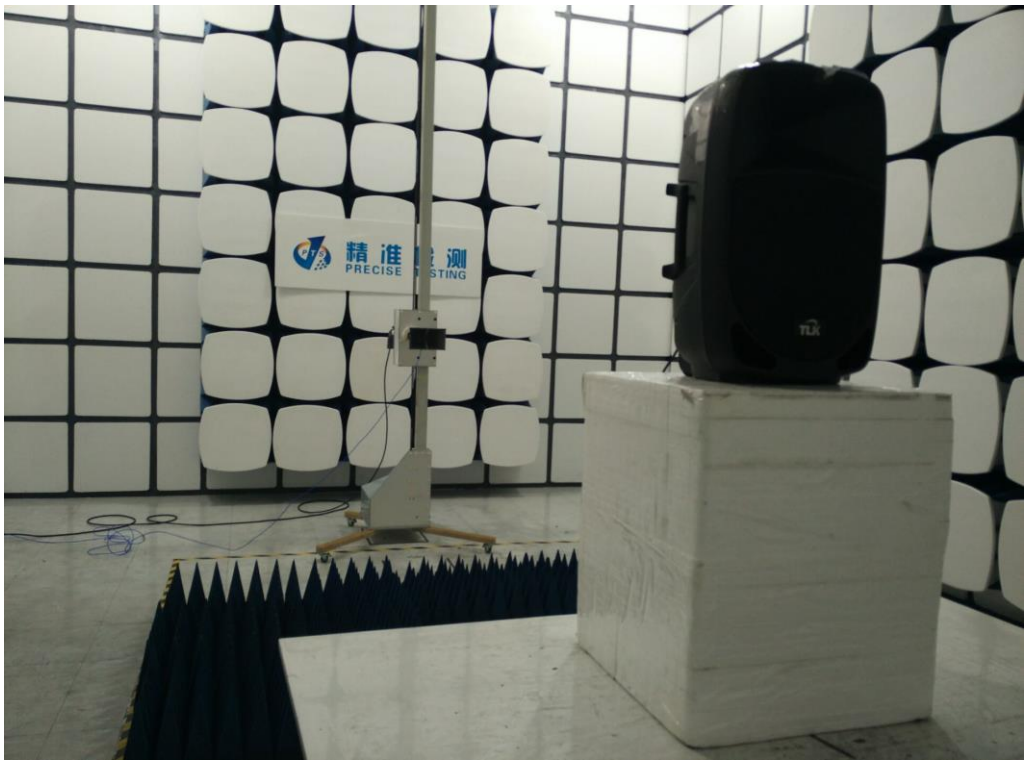
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an PCB printed antenna, it meet the requirement of this section.

14 Test Setup

Spurious Emissions
From 30MHz-1000MHz



Above 1GHz



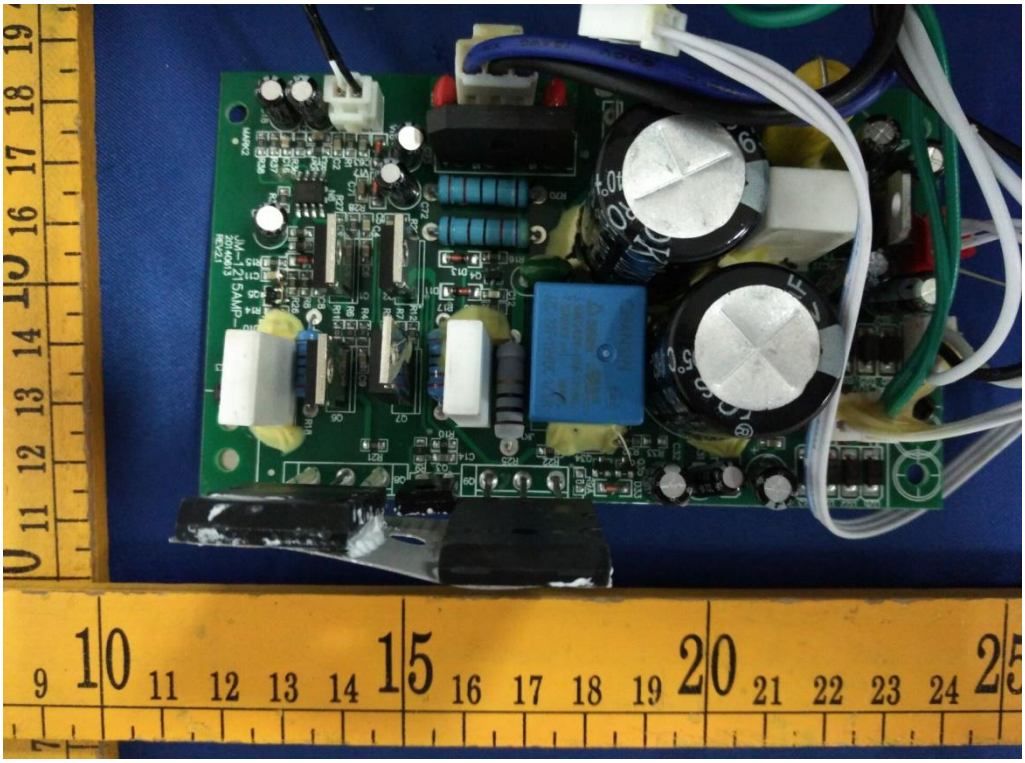
Conducted Emissions

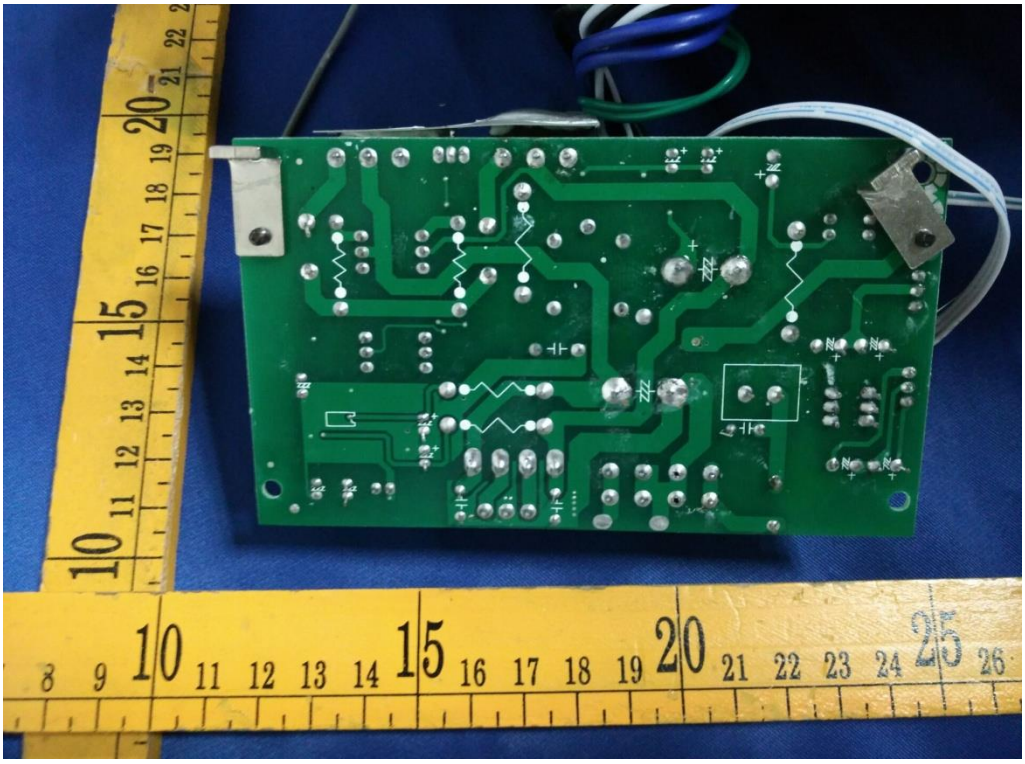
15 EUT Photos

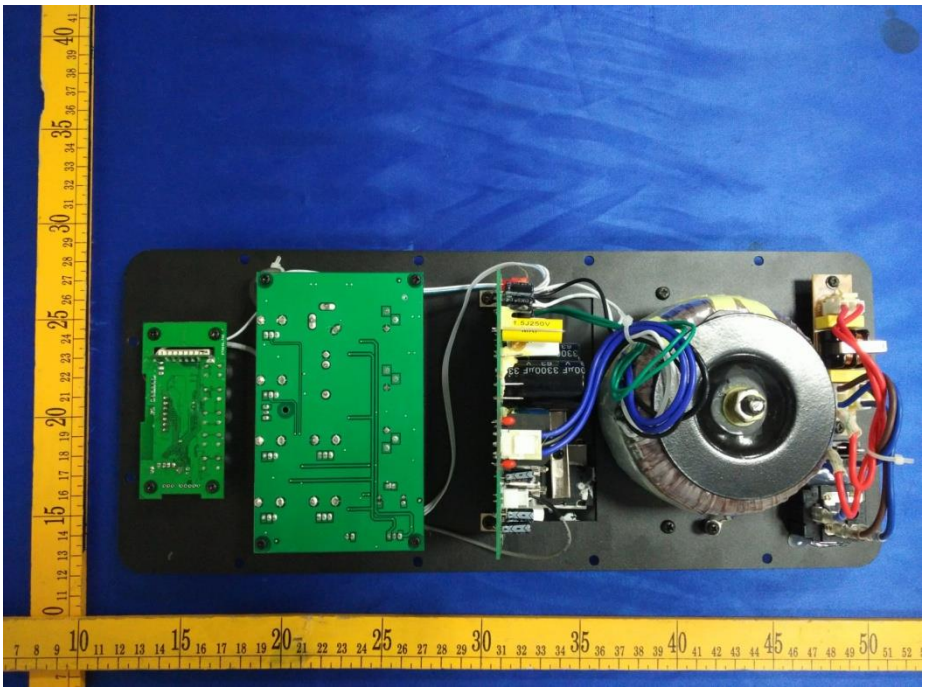
External Photos

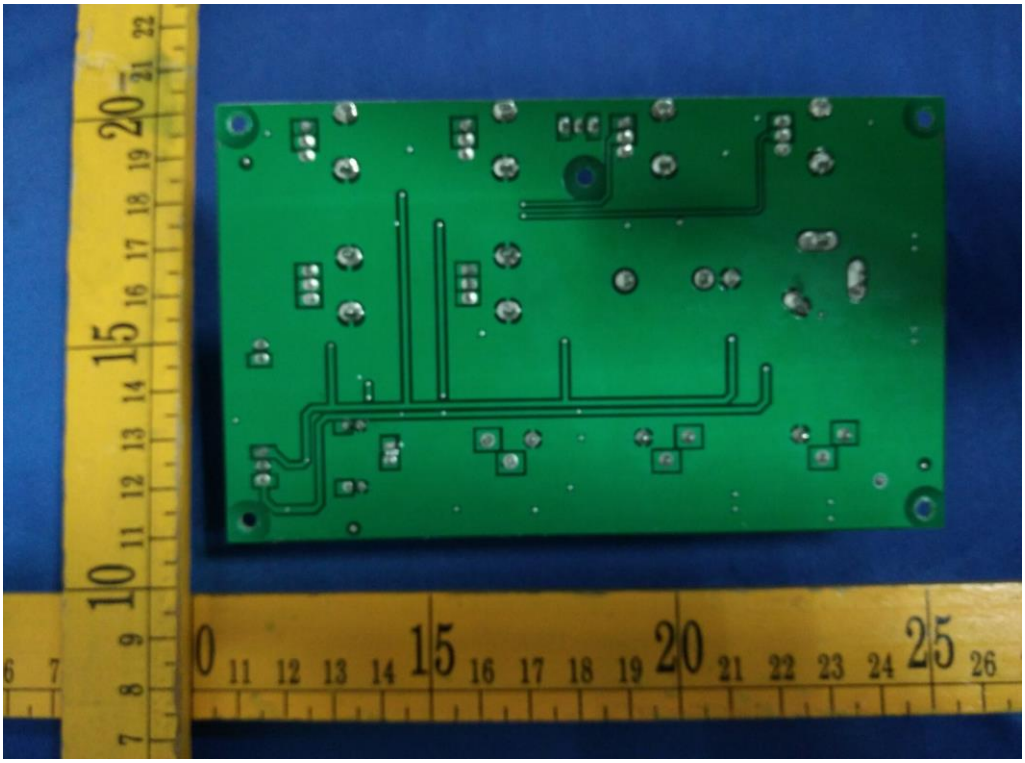

RELEASE
LITHIUM BATTERY
CR2025
3V

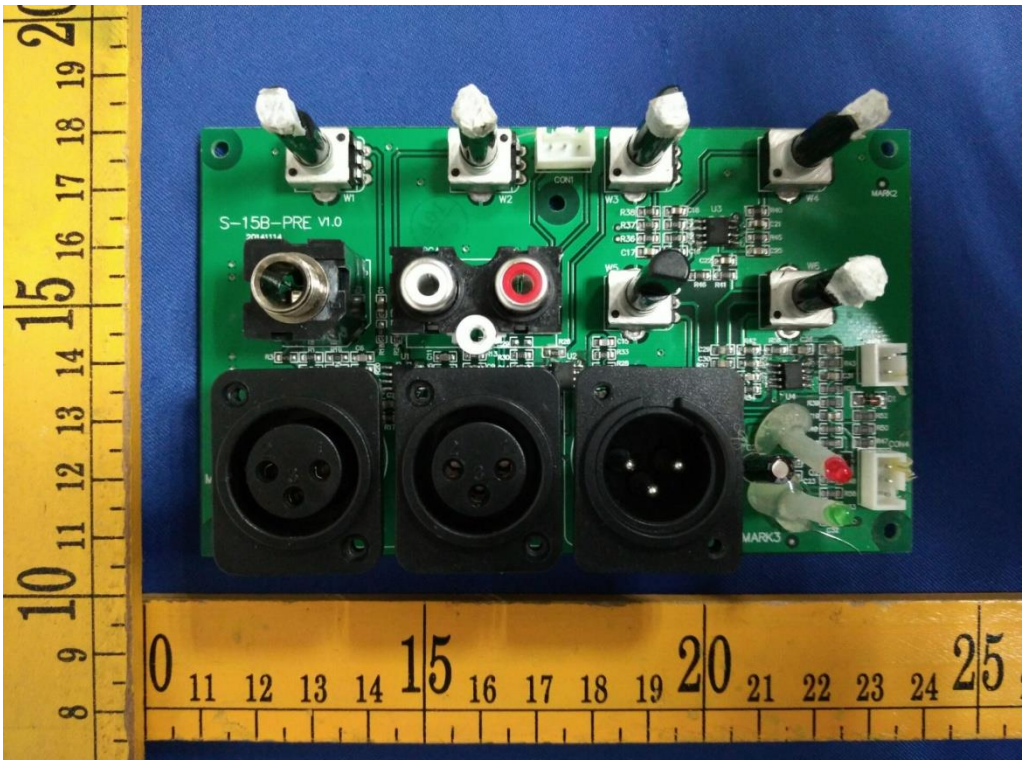
Internal Photos

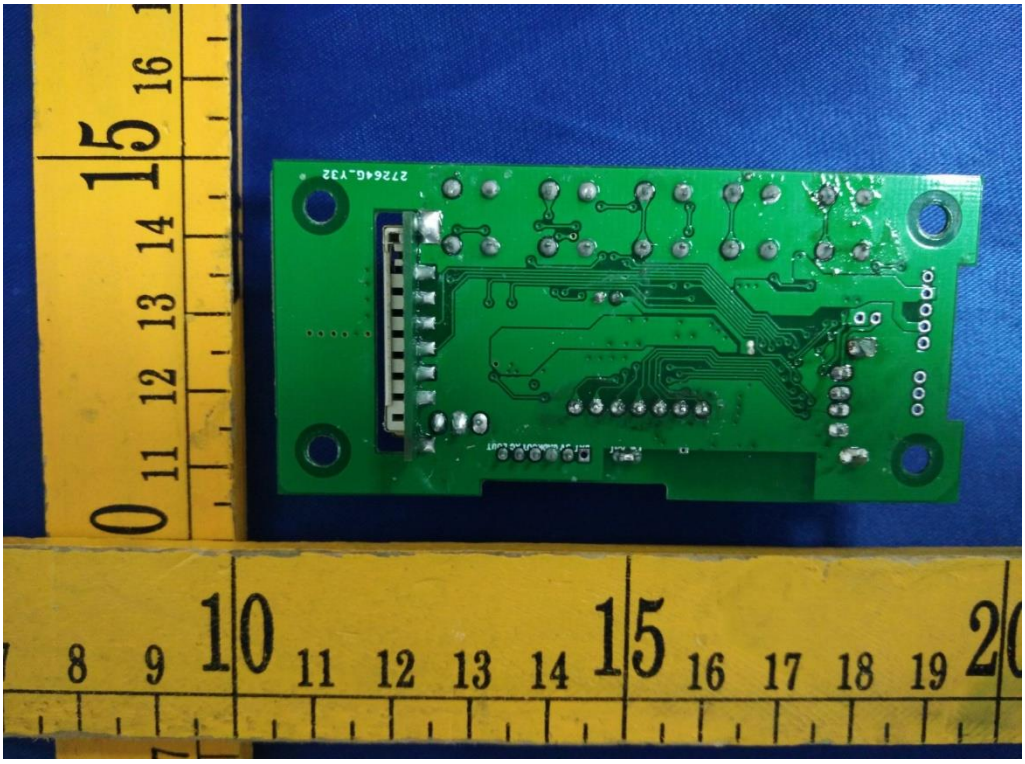


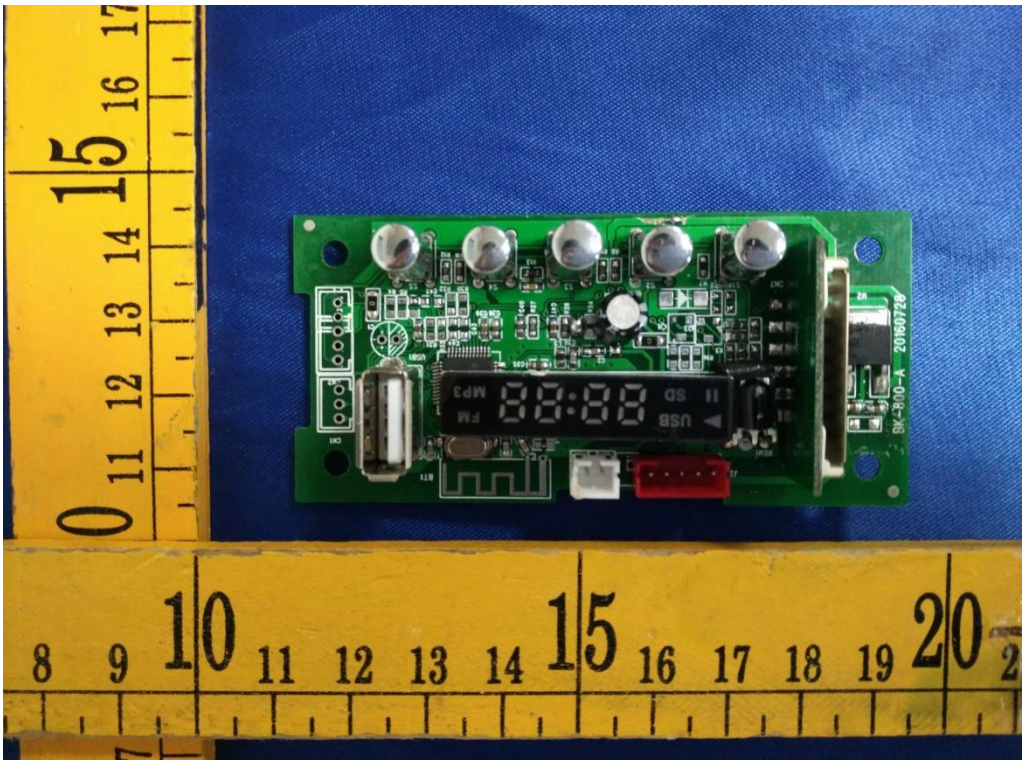


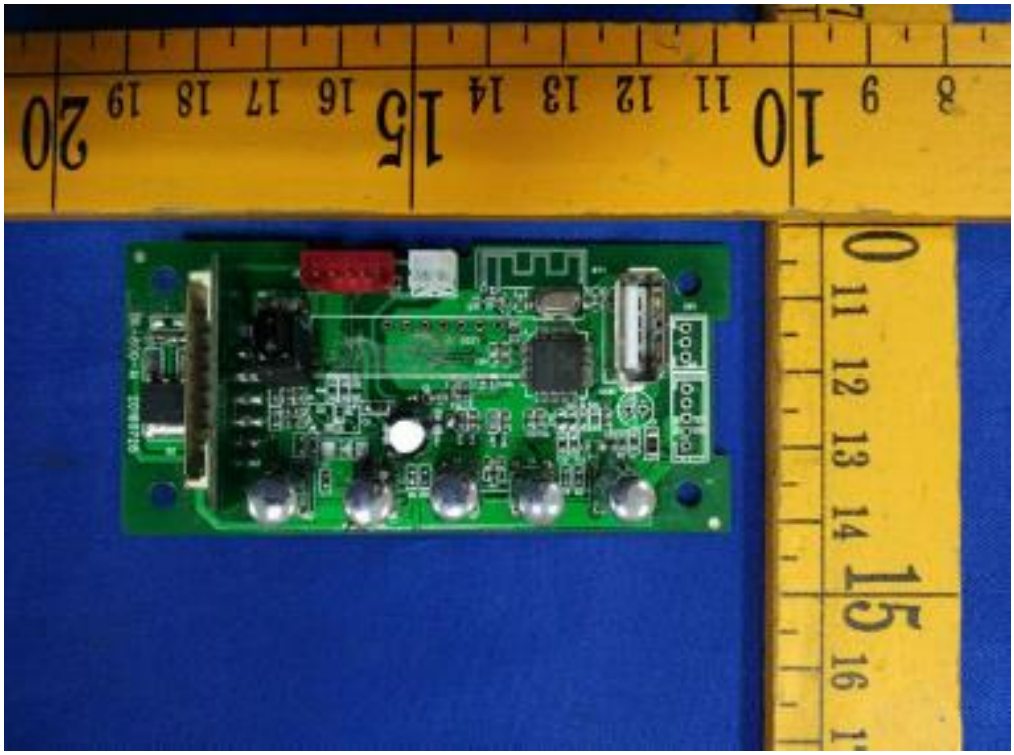


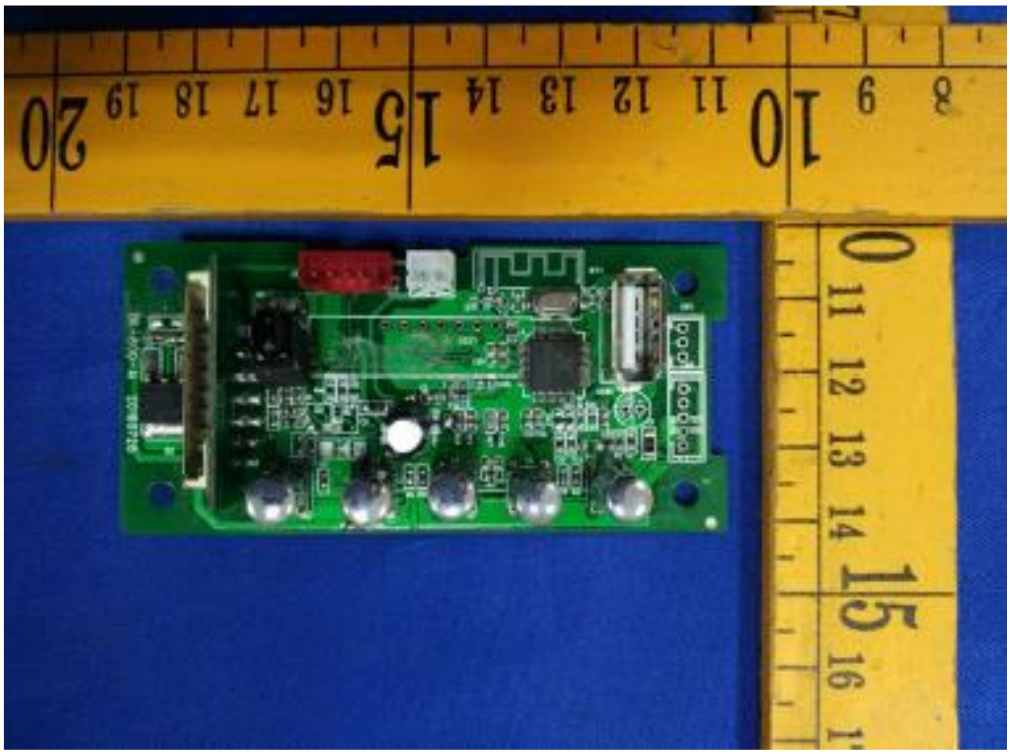



S-15B-PRE V1.0









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