FCC Part 15C TEST REPORT

FCC ID:2AJAA-MR1C

Product	:	**Bluetooth Speaker System**
Model Name	:	**MR1 MK3**
Brand	:	**ruark audio**
Report No.	:	**NCT25008268-1**

Prepared for

Dongguan Meiloon Acoustic Equipments Co., Ltd.

80, Yuanlin Road Fenghuanggang Ind, Estate, Tangxia Town, 523727 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA.

Prepared by

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1 TEST RESULT CERTIFICATION

Applicant's name	:	Dongguan Meiloon Acoustic Equipments Co., Ltd.
Address	:	80, Yuanlin Road Fenghuanggang Ind, Estate, Tangxia Town, 523727 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA.
Manufacture's name	:	Ruark Audio Limited
Address	:	59 Tailors Court, Temple Farm Industrial Estate, Southend on Sea, Essex, SS2 5TH, United Kingdom
Product name	:	Bluetooth Speaker System
Model name	:	MR1 MK3
Additional model	:	N/A
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013
Test Date	:	Jan. 10, 2025 to Feb. 13, 2025
Date of Issue	:	Feb. 14, 2025
Test Result	:	Pass

This device described above has been tested by NCT, 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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Test Engineer:

Keven Wu / Engineer

Technical Manager:

Henry Wang / Manager

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2 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions and Restricted Bandedge	15.205(a) 15.209 15.247(d)	PASS
Conducted Unwanted emissions and Band edge	15.247(d)	PASS
Conduct Emission	15.207	PASS
20dB Bandwidth & 99% OCB	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:

1. “N/A” denotes test is not applicable in this Test Report.

3 TEST FACILITY

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27

The certificate is valid until 2028.01.07

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)

The Certificate Registration Number is L8251

Designation Number: CN1347

Test Firm Registration Number: 894804

Accredited by A2LA, June 14, 2023

The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018

The Conformity Assessment Body Identifier is CN0150

Company Number: 30806

Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.

Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

4 General Information

4.1 General Description of E.U.T.

Product Name	:	Bluetooth Speaker System
Model Name	:	MR1 MK3
Sample ID	:	250110016
Sample(s) Status:	:	Engineer sample
Additional model	:	N/A
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	79 channels
Antenna Type	:	PCB Antenna
Antenna Gain	:	1.8dBi
Type of Modulation	:	GFSK, Π/4-DQPSK, 8DPSK
Power supply	:	DC 18V/2.8A from Adapter
Adapter information	:	Manufacturer:Dongguan Dongsong Electronic Co., Ltd Model:DYS850-180280W-K Input:100-240~50/60Hz 1.3A MAX Output:18.0V/2.8A 50.4W
Hardware Version	:	MR1C MAIN BOARD
Software Version	:	V4.02
Remark：the Antenna gain is provided by customer from Antenna spec. and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.		

4.2 Channel List

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

The EUT has been tested under TX operating condition.

This EUT is a FHSS system, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes GFSK, Π/4-DQPSK, 8DPSK have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test.

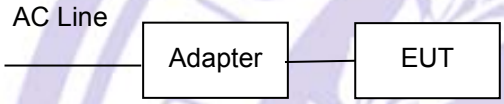
Channel List:

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	-	-

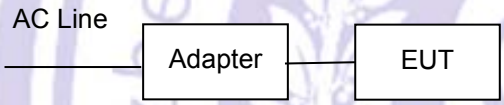
Channel	Frequency(MHz)
0	2402
39	2441
78	2480

4.3 Test Setup Configuration

Conducted Emission



Radiated Emission



Conducted Spurious

4.4 Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Test Software	Bluetest3
Power level setup	5dBm

5 Equipment During Test

5.1 Equipments List

Conducted emission Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	944 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESPI	101604	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	ENV 216	102796	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	VN1-13S	004023	CRANAGE	2024/6/17	2025/6/16
Cable	RG223-1500MM	NA	RG	2024/6/17	2025/6/16

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESCI	101178	Rohde & Schwarz	2024/6/17	2025/6/16
Spectrum Analyze（10Hz-26.5GHz）	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
Amplifi（30MHz-1GHz）	BBV 9743 B	00374	SCHNARZBECK	2023/3/19	2025/3/18
Bilog Antenna（30MHz-1GHz）	VULB9162	00473	SCHNARZBECK	2023/3/19	2025/3/18
Horn antenna（1GHz-18GHz）	BBHA 9120 D	02622	SCHNARZBECK	2024/6/17	2025/6/16
Pream plifier（1GHz-18GHz）	BBV 9718D	0024	SCHNARZBECK	2024/6/17	2025/6/16
Spectrum Analyze（1GHz-40GHz）	FSV 40	100952	Rohde & Schwarz	2024/6/17	2025/6/16
Pream plifier（18GHz-40GHz）	BBV 9721	0056	SCHNWARZBECK	2023/3/19	2025/3/18
Pream plifier（15GHz-40GHz）	BBV 9718D	0024	SCHNARZBECK	2024/6/17	2025/6/16
Broadband Antenna（15GHz-40GHz）	SAS-574	588	A.H.System	2024/6/17	2025/6/16

Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNARZBECK	2024/6/17	2025/6/16
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHNARZBECK	2024/6/17	2025/6/16
MXG Signal Analyzer	N9020A	101178	RS	2024/6/17	2025/6/16
MXG Vector Signal Generator	N5182A	MY50510202	Agilent	2024/6/17	2025/6/16
MXG Analog Signal Generator	N5181A	00374	SCHWARZBECK	2024/6/17	2025/6/16
Power Sensor	TR1029-2	00473	SCHNARZBECK	2024/6/17	2025/6/16
RF Swith	TR1029-1	02622	SCHNARZBECK	2024/6/17	2025/6/16
Cable	DA800-4000MM	NA	DA	2024/6/17	2025/6/16
Cable	DA800-11000MM	NA	DA	2024/6/17	2025/6/16

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	AUDIX	e3	6.120718
2	EMC radiation test system	AUDIX	e3	6.120718
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

5.2 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

5.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Bluetooth Speaker System	ruark audio	MR1 MK3	N/A	EUT
E-2	Notebook	lenovo	B40-80	MP07F6JD	Auxiliary

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

6 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
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

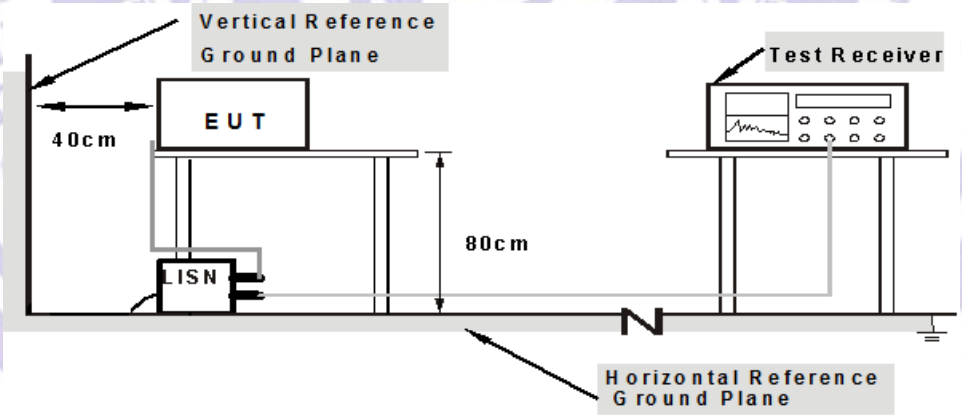
6.1 E.U.T. Operation

Operating Environment **:**

Temperature:	:	23.2°C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.12 kPa
Test Voltage	:	AC 120V/60Hz

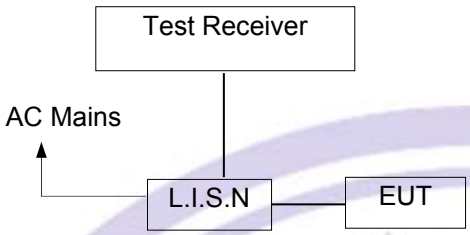
6.2 EUT Setup

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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

6.3 Test SET-UP (Block Diagram of Configuration)



6.4 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

6.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

6.6 Measurement Description

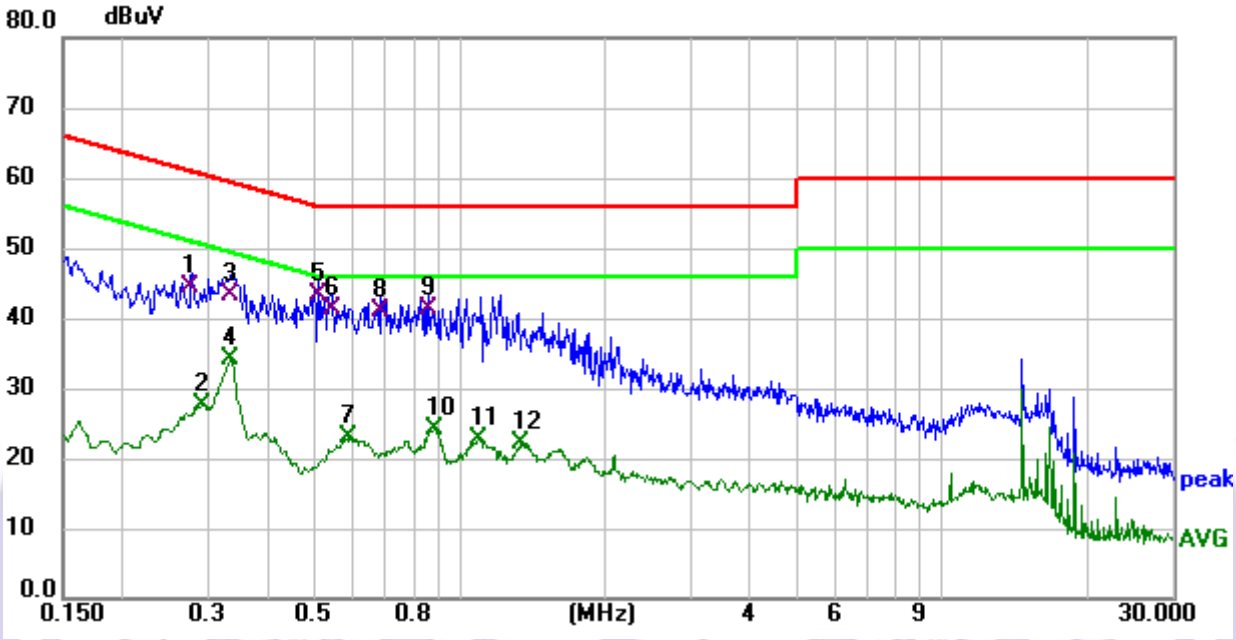
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Pass

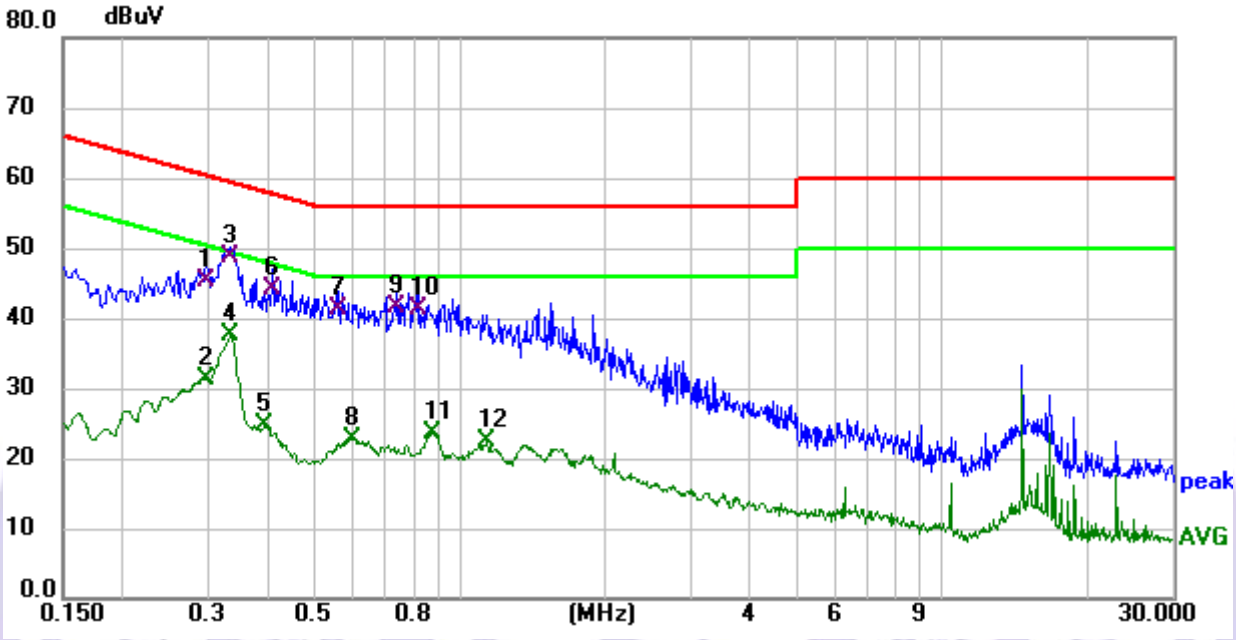
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (8DPSK) are recorded in the following pages and the others modulation methods do not exceed the limits.

Channel:	High	Phase :	L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.276	33.41	10.91	44.32	60.94	-16.62	QP	P
2	0.291	16.80	10.90	27.70	50.50	-22.80	AVG	P
3	0.333	32.40	10.85	43.25	59.38	-16.13	QP	P
4	0.333	23.37	10.85	34.22	49.38	-15.16	AVG	P
5 *	0.509	32.54	10.67	43.21	56.00	-12.79	QP	P
6	0.540	30.56	10.67	41.23	56.00	-14.77	QP	P
7	0.590	12.27	10.68	22.95	46.00	-23.05	AVG	P
8	0.689	30.23	10.79	41.02	56.00	-14.98	QP	P
9	0.860	30.29	10.93	41.22	56.00	-14.78	QP	P
10	0.882	13.25	10.95	24.20	46.00	-21.80	AVG	P
11	1.090	11.59	11.10	22.69	46.00	-23.31	AVG	P
12	1.342	11.14	11.09	22.23	46.00	-23.77	AVG	P

Channel:	High	Phase :	N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.297	34.32	10.90	45.22	60.33	-15.11	QP	P
2	0.297	20.46	10.90	31.36	50.33	-18.97	AVG	P
3 *	0.333	37.78	10.85	48.63	59.38	-10.75	QP	P
4	0.333	26.60	10.85	37.45	49.38	-11.93	AVG	P
5	0.393	13.91	10.77	24.68	48.00	-23.32	AVG	P
6	0.408	33.36	10.75	44.11	57.69	-13.58	QP	P
7	0.558	30.69	10.67	41.36	56.00	-14.64	QP	P
8	0.595	12.10	10.68	22.78	46.00	-23.22	AVG	P
9	0.739	30.72	10.84	41.56	56.00	-14.44	QP	P
10	0.820	30.34	10.89	41.23	56.00	-14.77	QP	P
11	0.878	12.73	10.95	23.68	46.00	-22.32	AVG	P
12	1.135	11.21	11.10	22.31	46.00	-23.69	AVG	P

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

7 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247& 15.247

Test Method : ANSI C63.10:2013

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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature : 24.5 °C

Humidity : 55.5% RH

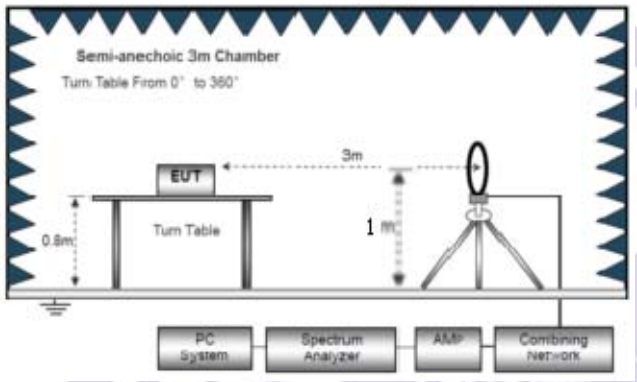
Atmospheric Pressure : 101.3kPa

Test Voltage : AC 120V60Hz

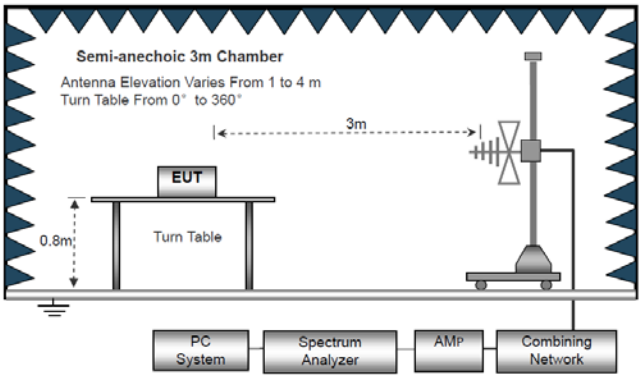
7.2 Test Setup

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

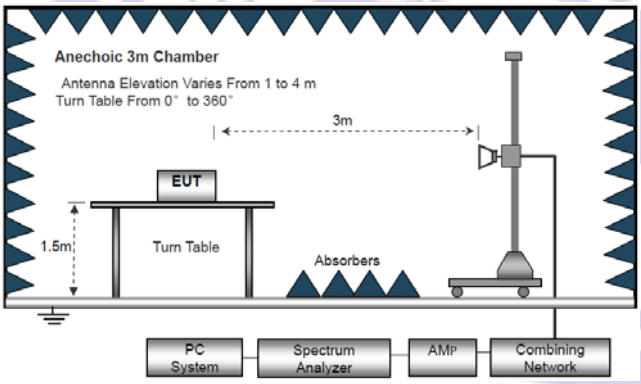
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.

2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

5. Set to the maximum power setting and enable the EUT transmit continuously.

6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.

7. Test Procedure of measurement (For Above 1GHz):

1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).

2) Change the antenna polarization and repeat 1) with vertical polarization.

3) Make a hardcopy of the spectrum.

4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

5) Change the analyser mode to Clear/ Write and found the cone of emission.

6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.

7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.

8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

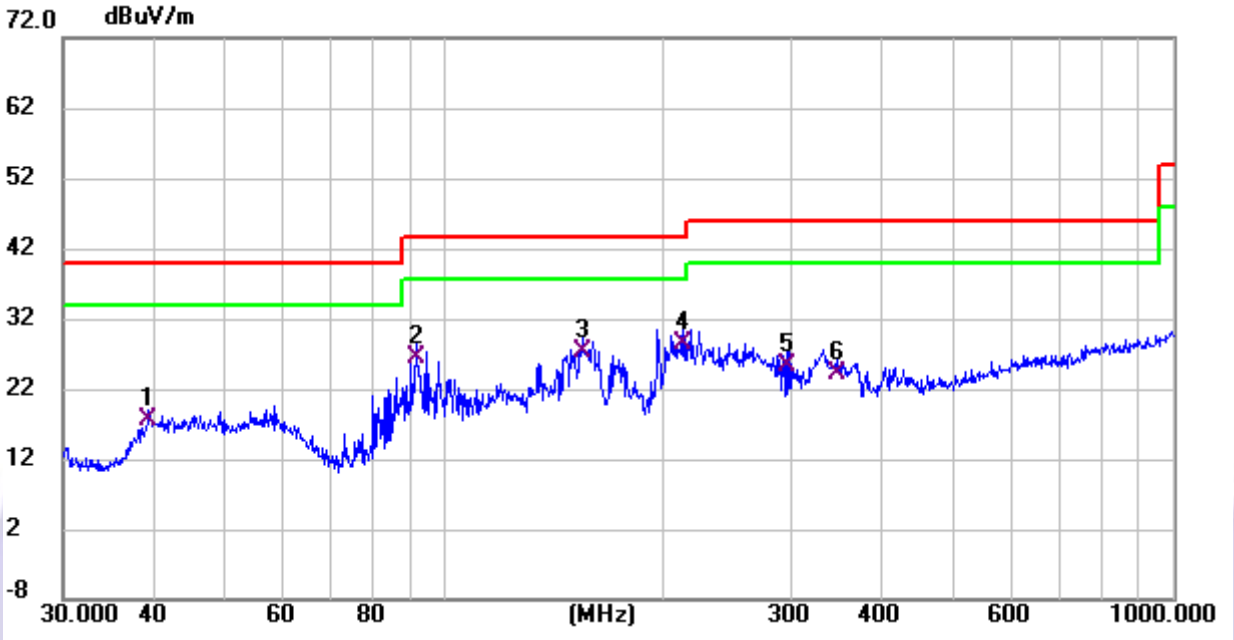
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

Please refer to the following test plots,High Channel (2480MHz) Worst case 8DPSK for record:

Test plot for Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	39.299	4.68	12.88	17.56	40.00	-22.44	QP
2	91.495	12.84	13.48	26.32	43.50	-17.18	QP
3	154.821	18.01	9.40	27.41	43.50	-16.09	QP
4 *	212.269	16.34	12.22	28.56	43.50	-14.94	QP
5	295.147	11.27	14.06	25.33	46.00	-20.67	QP
6	345.595	8.83	15.33	24.16	46.00	-21.84	QP

Remark:Emission Level=Reading+Factor

Test plot for Vertical

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	49.187	16.14	12.42	28.56	40.00	-11.44	QP
2 *	83.522	18.53	12.99	31.52	40.00	-8.48	QP
3	98.142	18.32	14.52	32.84	43.50	-10.66	QP
4	160.346	21.88	12.28	34.16	43.50	-9.34	QP
5	212.269	20.07	10.49	30.56	43.50	-12.94	QP
6	334.859	14.80	15.06	29.86	46.00	-16.14	QP

Remark:Emission Level=Reading+Factor

Test Frequency 1GHz-25GHz

Bluetooth (GFSK, Pi/4-DQPSK, 8DPSK)mode have been tested, and the worst result(8DPSK) was report as below

8DPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4804.00	48.97	34.12	5.03	32.39	52.27	74	-21.73	Pk
V	4804.00	41.31	34.12	5.03	32.39	44.61	54	-9.39	AV
V	7206.00	42.40	32.54	6.29	35.86	52.01	74	-21.99	Pk
V	7206.00	31.03	32.54	6.29	35.86	40.64	54	-13.36	AV
V	9608.00	41.22	32.98	7.55	38.4	54.19	74	-19.81	Pk
V	9608.00	30.52	32.98	7.55	38.4	43.49	54	-10.51	AV
V	12010.00	37.79	32.09	8.93	39	53.63	74	-20.37	Pk
V	12010.00	29.31	32.09	8.93	39	45.15	54	-8.85	AV
H	4804.00	51.38	34.12	5.03	32.39	54.68	74	-19.32	Pk
H	4804.00	40.83	34.12	5.03	32.39	44.13	54	-9.87	AV
H	7206.00	43.02	32.54	6.29	35.86	52.63	74	-21.37	Pk
H	7206.00	34.59	32.54	6.29	35.86	44.20	54	-9.80	AV
H	9608.00	39.48	32.98	7.55	38.4	52.45	74	-21.55	Pk
H	9608.00	32.18	32.98	7.55	38.4	45.15	54	-8.85	AV
H	12010.00	40.69	32.09	8.93	39	56.53	74	-17.47	Pk
H	12010.00	30.64	32.09	8.93	39	46.48	54	-7.52	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2441MHz									
V	4882	50.87	34.07	5.09	32.59	54.48	74	-19.52	Pk
V	4882	40.00	34.07	5.09	32.59	43.61	54	-10.39	AV
V	7323	42.31	32.63	6.34	35.96	51.98	74	-22.02	Pk
V	7323	31.91	32.63	6.34	35.96	41.58	54	-12.42	AV
V	9764	41.42	32.92	7.59	38.4	54.49	74	-19.51	Pk
V	9764	32.51	32.92	7.59	38.4	45.58	54	-8.42	AV
V	12205	38.97	31.96	8.88	39.04	54.93	74	-19.07	Pk
V	12205	29.68	31.96	8.88	39.04	45.64	54	-8.36	AV
H	4882	49.94	34.07	5.09	32.59	53.55	74	-20.45	Pk
H	4882	41.36	34.07	5.09	32.59	44.97	54	-9.03	AV
H	7323	42.87	32.63	6.34	35.96	52.54	74	-21.46	Pk
H	7323	34.96	32.63	6.34	35.96	44.63	54	-9.37	AV
H	9764	42.09	32.92	7.59	38.4	55.16	74	-18.84	Pk
H	9764	30.19	32.92	7.59	38.4	43.26	54	-10.74	AV
H	12205	39.91	31.96	8.88	39.04	55.87	74	-18.13	Pk
H	12205	30.23	31.96	8.88	39.04	46.19	54	-7.81	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2480MHz									
V	4960	50.09	34.02	5.15	32.8	54.02	74	-19.98	Pk
V	4960	38.98	34.02	5.15	32.8	42.91	54	-11.09	AV
V	7440	41.45	32.71	6.4	36.05	51.19	74	-22.81	Pk
V	7440	32.82	32.71	6.4	36.05	42.56	54	-11.44	AV
V	9920	41.28	32.86	7.62	38.4	54.44	74	-19.56	Pk
V	9920	32.53	32.86	7.62	38.4	45.69	54	-8.31	AV
V	12400	39.42	31.82	8.84	39.08	55.52	74	-18.48	Pk
V	12400	29.52	31.82	8.84	39.08	45.62	54	-8.38	AV
H	4960	49.98	34.02	5.15	32.8	53.91	74	-20.09	Pk
H	4960	42.14	34.02	5.15	32.8	46.07	54	-7.93	AV
H	7440	43.51	32.71	6.4	36.05	53.25	74	-20.75	Pk
H	7440	34.26	32.71	6.4	36.05	44.00	54	-10.00	AV
H	9920	41.13	32.86	7.62	38.4	54.29	74	-19.71	Pk
H	9920	30.03	32.86	7.62	38.4	43.19	54	-10.81	AV
H	12400	39.41	31.82	8.84	39.08	55.51	74	-18.49	Pk
H	12400	28.42	31.82	8.84	39.08	44.52	54	-9.48	AV

Note: 1. The testing has been conformed to 10*2480MHz=24800MHz.

2. All other emissions more than 30dB below the limit.

3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Emission Level = Reading + Factor
Margin=Emission Level-Limit

Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

Bluetooth (GFSK, Pi/4-DQPSK, 8DPSK)mode have been tested, and the worst result(8DPSK) was report as below

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin(dB)	Detector Type	Result
8DPSK	Low Channel: 2402MHz										
	H	2385.00	59.39	35.09	3.46	27.47	55.23	74	-18.77	PK	PASS
	H	2385.00	47.40	35.09	3.46	27.47	43.24	54	-10.76	AV	PASS
	H	2390.00	57.87	35.17	3.48	27.49	53.67	74	-20.33	PK	PASS
	H	2390.00	46.02	35.17	3.48	27.49	41.82	54	-12.18	AV	PASS
	V	2385.00	58.88	35.09	3.46	27.47	54.72	74	-19.28	PK	PASS
	V	2385.00	47.58	35.09	3.46	27.47	43.42	54	-10.58	AV	PASS
	V	2390.00	56.28	35.17	3.48	27.49	52.08	74	-21.92	PK	PASS
	V	2390.00	46.91	35.17	3.48	27.49	42.71	54	-11.29	AV	PASS
	High Channel: 2480MHz										
	H	2483.50	57.10	35.11	3.56	27.75	53.30	74	-20.7	PK	PASS
	H	2483.50	44.83	35.11	3.56	27.75	41.03	54	-12.97	AV	PASS
	H	2500.00	56.55	35.1	3.57	27.8	52.82	74	-21.18	PK	PASS
	H	2500.00	45.88	35.1	3.57	27.8	42.15	54	-11.85	AV	PASS
	V	2483.50	56.28	35.11	3.56	27.75	52.48	74	-21.52	PK	PASS
	V	2483.50	57.14	35.11	3.56	27.75	53.34	54	-0.66	AV	PASS
	V	2500.00	56.47	35.1	3.57	27.8	52.74	74	-21.26	PK	PASS
	V	2500.00	45.82	35.1	3.57	27.8	42.09	54	-11.91	AV	PASS

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

8 Maximum Peak Output Power Test

8.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(1)
Test Limit	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

8.2 Test Setup

8.3 Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,

2. Spectrum Setting:

   RBW > the 20 dB bandwidth of the emission being measured

   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

   VBW ≥ RBW

   Sweep = auto

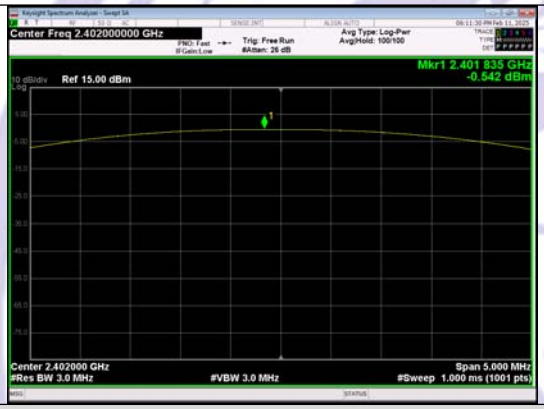
   Detector function = peak

   Trace = max hold

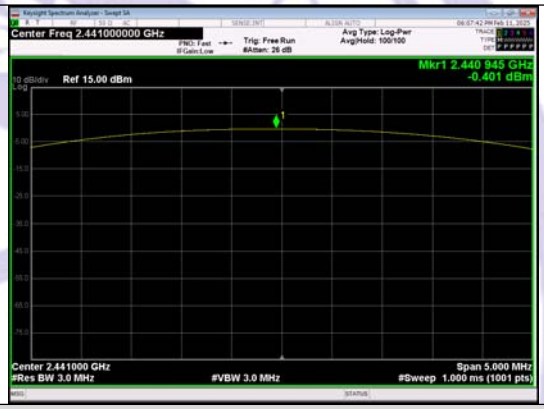
8.4 Test Data

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Max. Avg. Power (dBm)	Limit (dBm)	Result
GFSK	DH1	0	-0.54	0.88	-0.73	≤30	PASS
		39	-0.40	0.91	-0.58		PASS
		78	-0.17	0.96	-0.37		PASS
π/4DQPSK	2-DH1	0	1.36	1.37	-1.51	≤20.97	PASS
		39	1.64	1.46	-1.19		PASS
		78	1.96	1.57	-0.78		PASS
8DPSK	3-DH1	0	2.19	1.66	-1.05		PASS
		39	2.43	1.75	-0.92		PASS
		78	2.65	1.84	-0.57		PASS

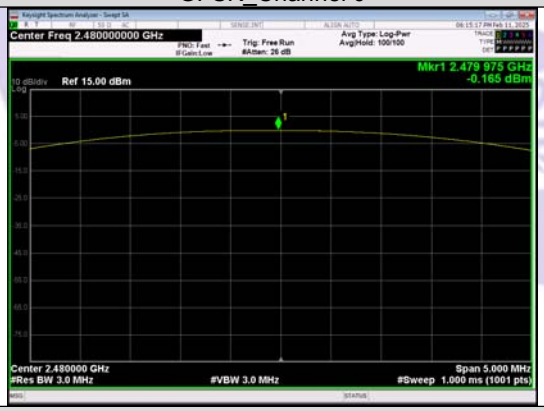
Test Graphs



Peak Output Power
GFSK_Channel 0



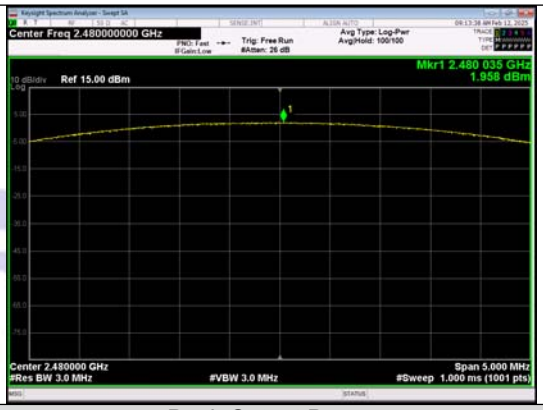
Peak Output Power
GFSK_Channel 39



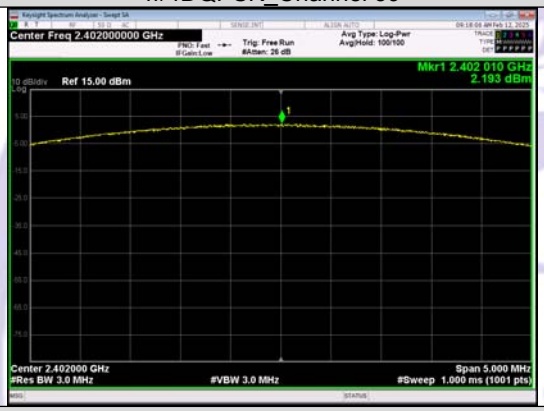
Peak Output Power
GFSK_Channel 78

Peak Output Power
π/4DQPSK_Channel 0

Peak Output Power
π/4DQPSK_Channel 39

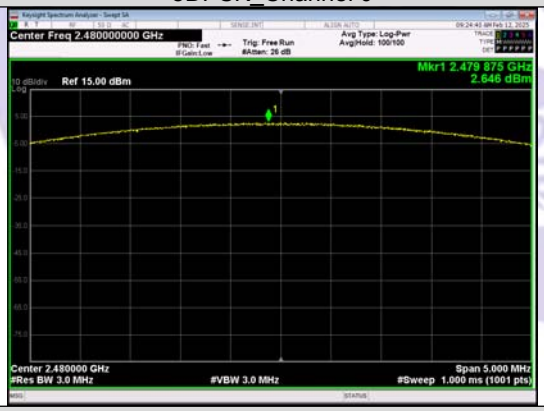


Peak Output Power
π/4DQPSK_Channel 78

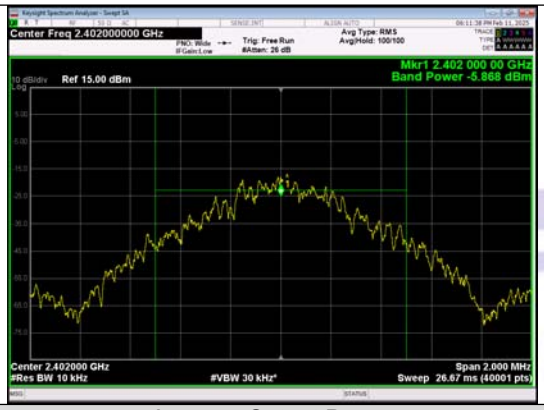


Peak Output Power
8DPSK_Channel 0

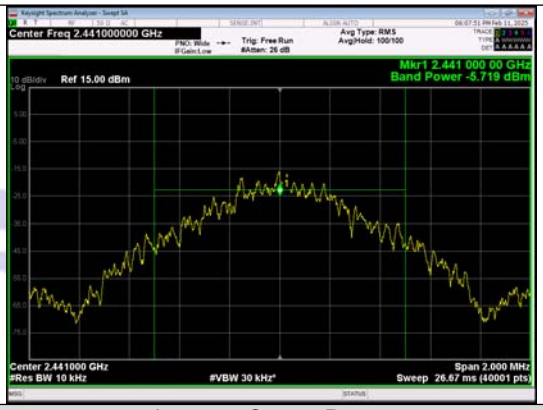
Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78



Average Output Power
GFSK_Channel 0



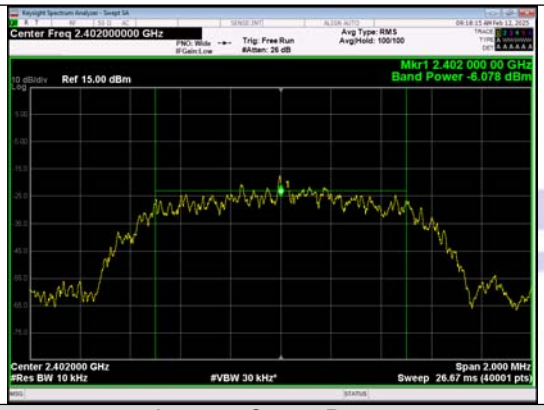
Average Output Power
GFSK_Channel 39

Average Output Power
GFSK_Channel 78

Average Output Power
π/4DQPSK_Channel 0

Average Output Power
π/4DQPSK_Channel 39

Average Output Power
π/4DQPSK_Channel 78



Average Output Power
8DPSK_Channel 0

Average Output Power
8DPSK_Channel 39

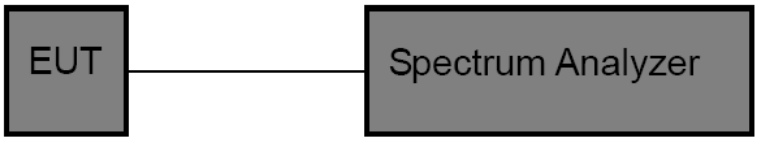
Average Output Power
8DPSK_Channel 78

9 20DB Occupy Bandwidth & 99% OCB Test

9.1 Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)

9.2 Test Setup



9.3 Test Procedure

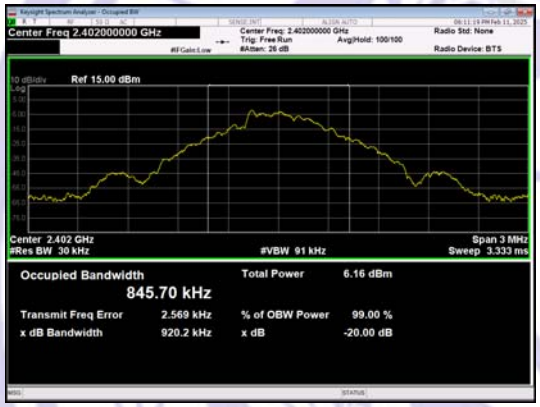
Using the following spectrum analyzer settings:

1. Span= approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.
2. Set the RBW = 30 kHz.
3. Set the VBW = 91 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

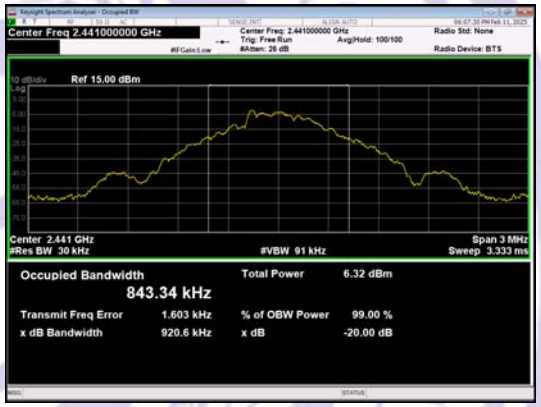
9.4 Test Data

Mode	Test channel	20dB Emission Bandwidth (MHz)	99% Bandwidth (MHz)	Result
GFSK	Lowest	0.9202	0.846	Pass
	Middle	0.9206	0.843	
	Highest	0.9188	0.843	
π/4-DQPSK	Lowest	1.319	1.198	Pass
	Middle	1.319	1.185	
	Highest	1.322	1.186	
8-DPSK	Lowest	1.266	1.174	Pass
	Middle	1.265	1.172	
	Highest	1.267	1.169	

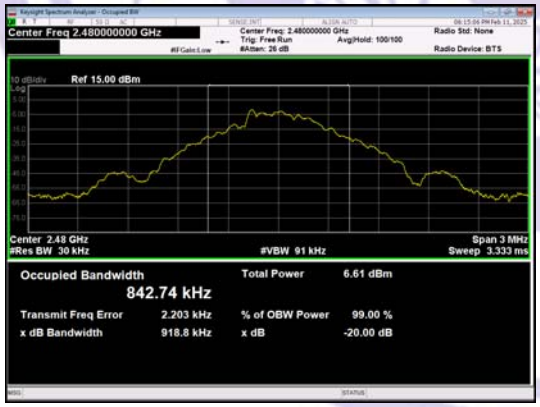
Test plots



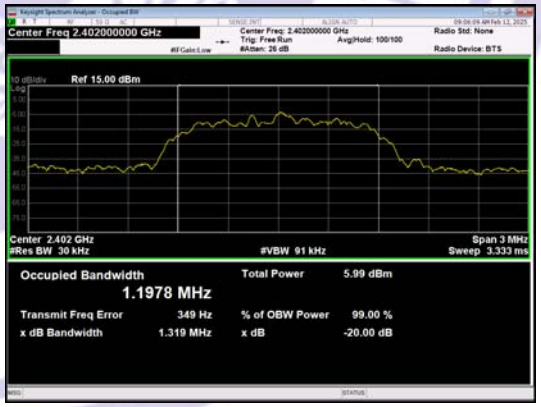
GFSK_DH1_Channel 0



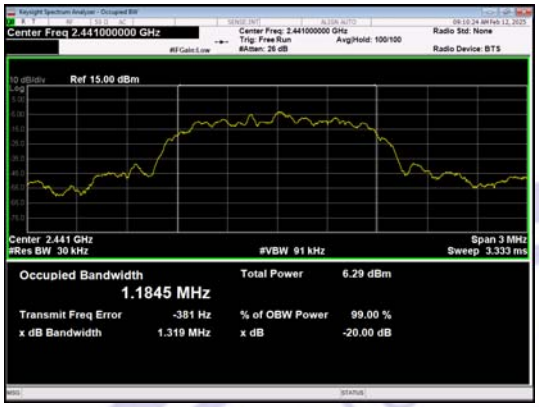
GFSK_DH1_Channel 39



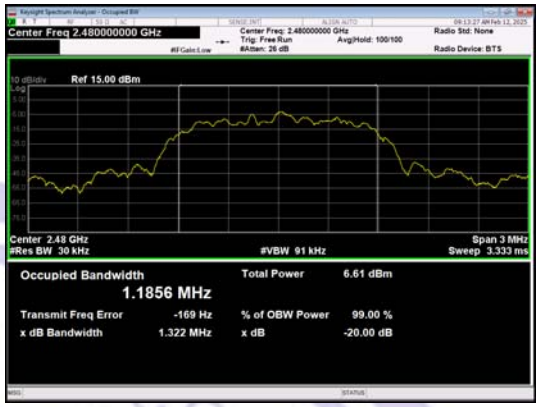
GFSK_DH1_Channel 78



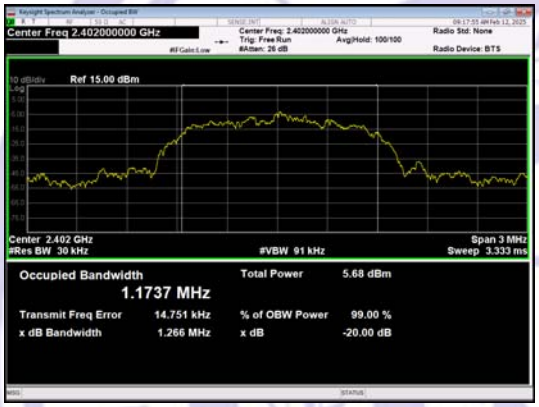
π/4DQPSK_2-DH1_Channel 0



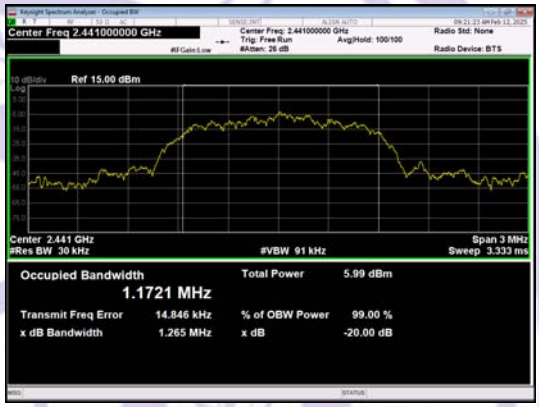
π/4DQPSK_2-DH1_Channel 39



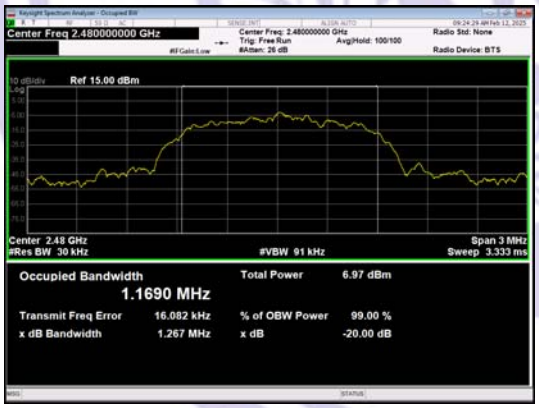
π/4DQPSK_2-DH1_Channel 78



8DPSK_3-DH1_Channel 0



8DPSK_3-DH1_Channel 39



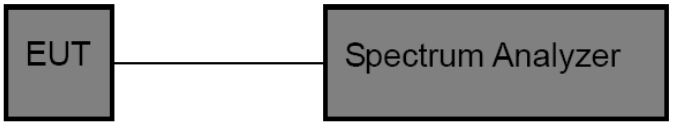
8DPSK_3-DH1_Channel 78

10 Carrier Frequency Separation Test

10.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	GFSK: 20dB bandwidth π/4-DQPSK & 8DPSK: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

10.2 Test Setup



10.3 Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer settings:

1. Span= Wide enough to capture the peaks of two adjacent channels
2. Set the RBW = 100 kHz.
3. Set the VBW = 300 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

10.4 Test Data

Modulation	Separation (MHz)	Limit(MHz)	Result
GFSK	1.0000	0.921	PASS
π/4-DQPSK	1.0000	0.881	PASS
8-DPSK	1.0000	0.845	PASS

GFSK

π/4DQPSK

8DPSK

Void

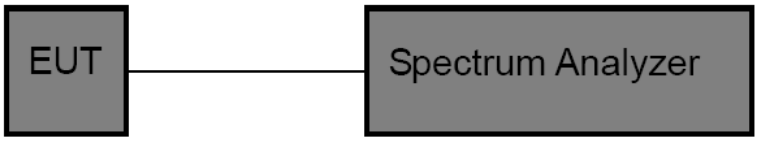
Hotline: 400-8868-419 Fax: 86-755-27790922 http://www.ncttesting.cn

11 Number of Hopping Channel Test

11.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	≥15 channels

11.2 Test Setup



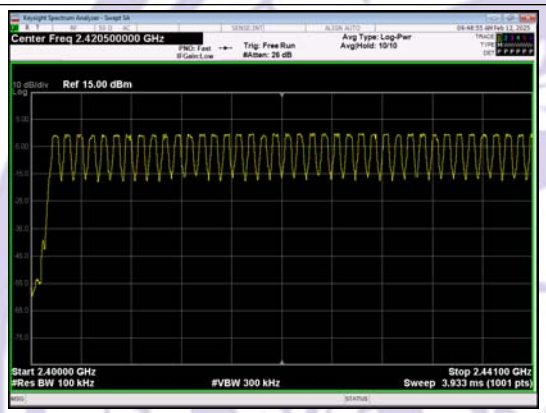
11.3 Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer setting:

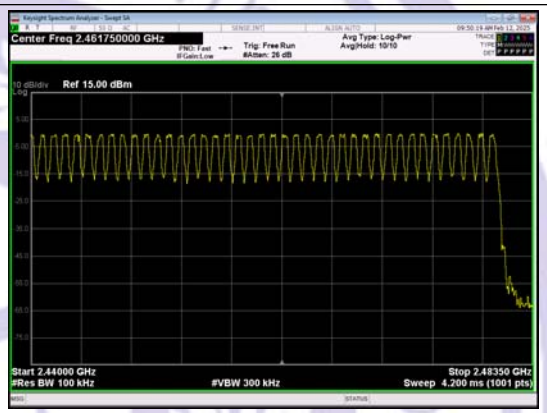
1. Span= the frequency band of operation
2. Set the RBW = 100kHz.
3. Set the VBW = 300kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

11.4 Test Data

Mode	Frequency (MHz)	Packet Type	Num of Hopping Frequencies		Verdict
			ANT1	Limit	
GFSK	HOPP	DH1	79	>=15	Pass
Pi/4DQPSK	HOPP	2DH1	79	>=15	Pass
8DPSK	HOPP	3DH1	79	>=15	Pass



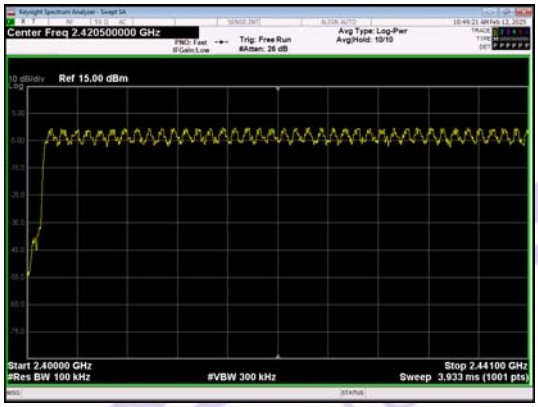
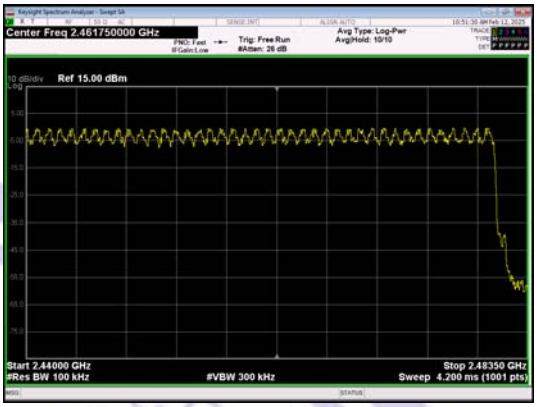
Low End Spectrum Channel Hopping Plot
GFSK



High End Spectrum Channel Hopping Plot
GFSK

Low End Spectrum Channel Hopping Plot
π/4DQPSK

High End Spectrum Channel Hopping Plot
π/4DQPSK

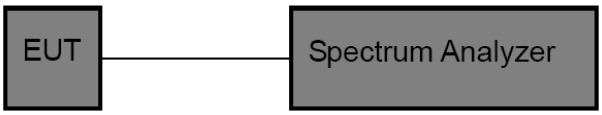
	
Low End Spectrum Channel Hopping Plot 8DPSK	High End Spectrum Channel Hopping Plot 8DPSK

12 Dwell Time Test

12.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	0.4 sec

12.2 Test Setup



12.3 Test Procedure

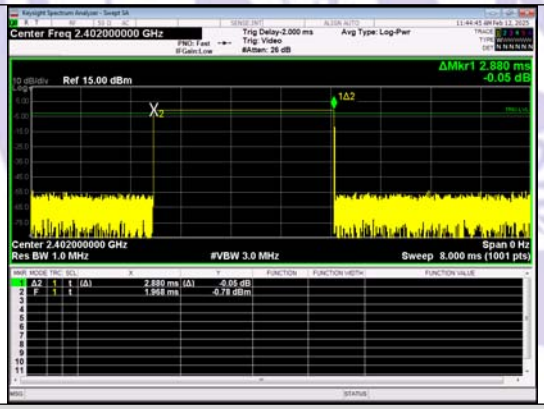
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span= zero span, centered on a hopping channel
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Sweep time = as necessary to capture the entire dwell time per hopping channel.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

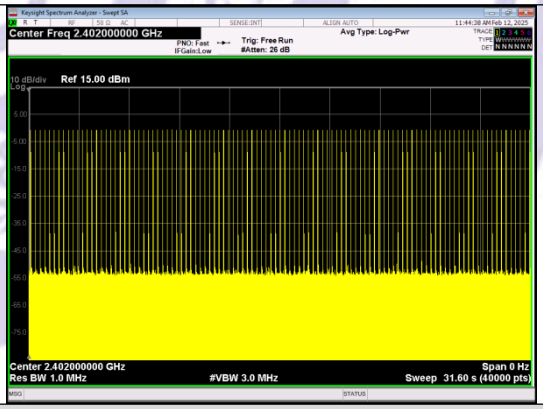
12.4 Test Data

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.880	107	308.16	< 400	PASS
	DH5	CH39 (2441MHz)	2.872	107	307.3		PASS
	DH5	CH78 (2480MHz)	2.880	106	305.28		PASS
π/4DQPSK	2-DH5	CH0 (2402MHz)	2.896	107	309.87		PASS
	2-DH5	CH39 (2441MHz)	2.896	107	309.87		PASS
	2-DH5	CH78 (2480MHz)	2.896	106	306.98		PASS
8DPSK	3-DH5	CH0 (2402MHz)	2.880	107	308.16		PASS
	3-DH5	CH39 (2441MHz)	2.896	107	309.87		PASS
	3-DH5	CH78 (2480MHz)	2.880	107	308.16		PASS

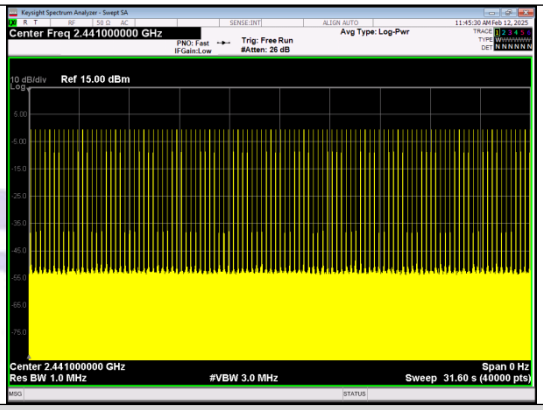
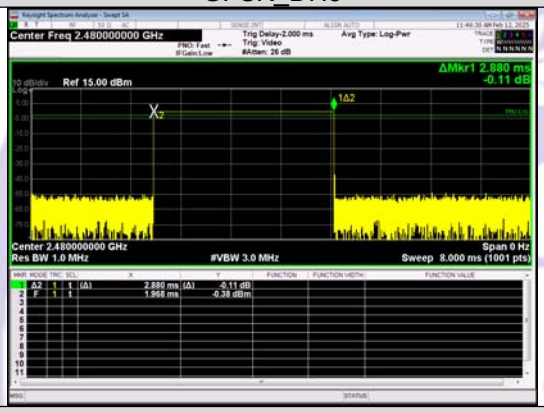
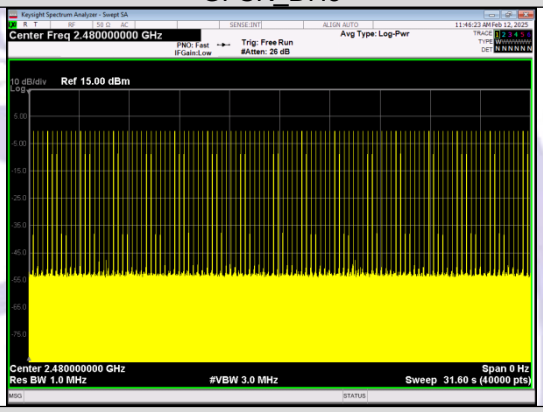
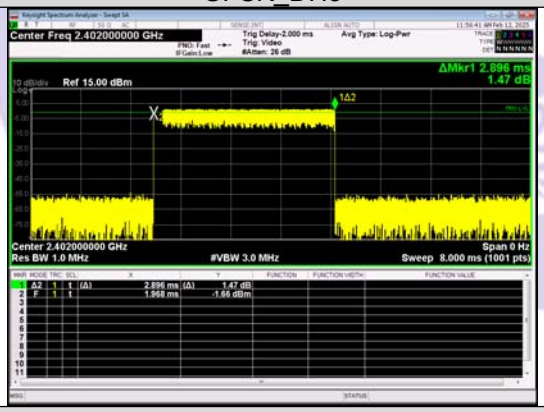
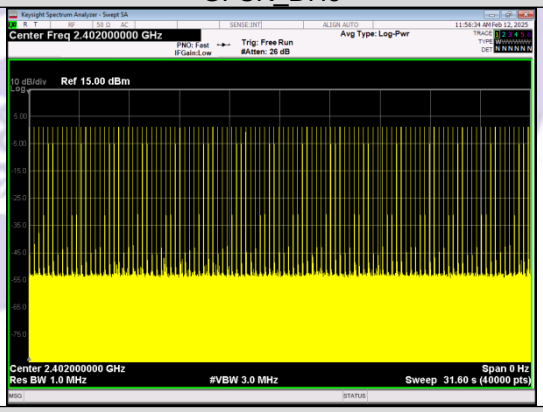
Test Plots

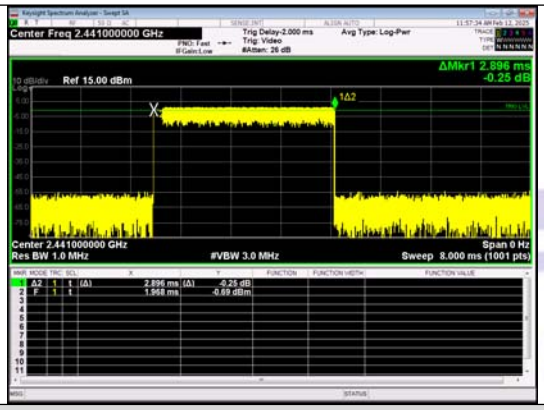
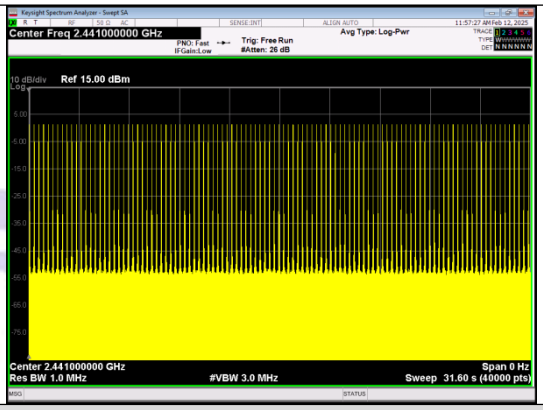
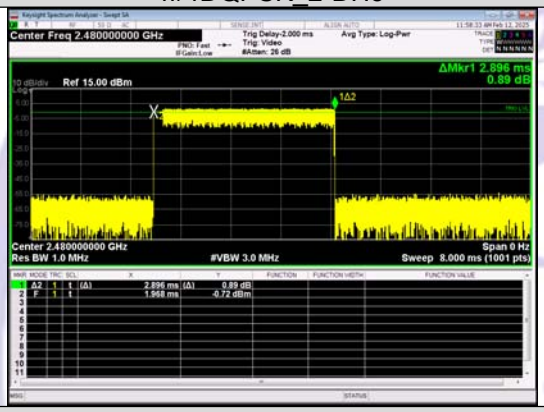
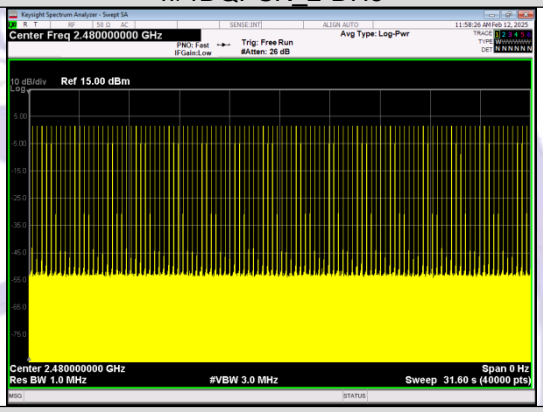
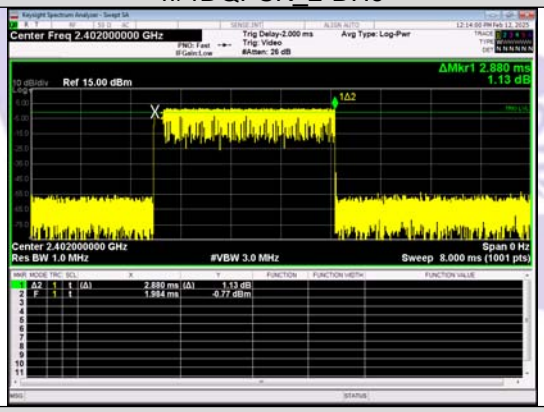
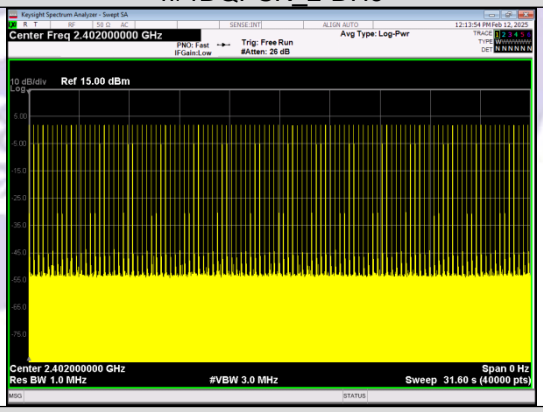


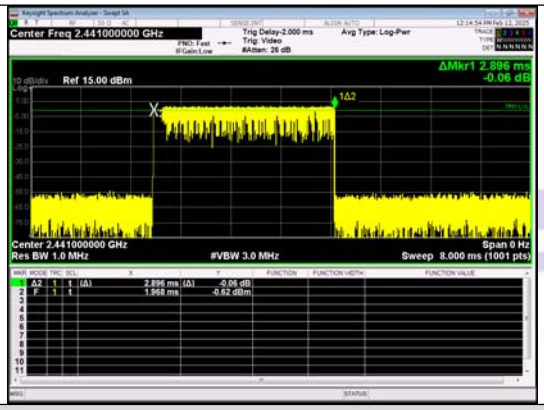
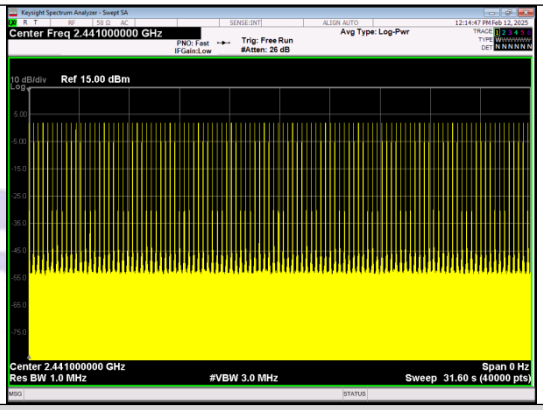
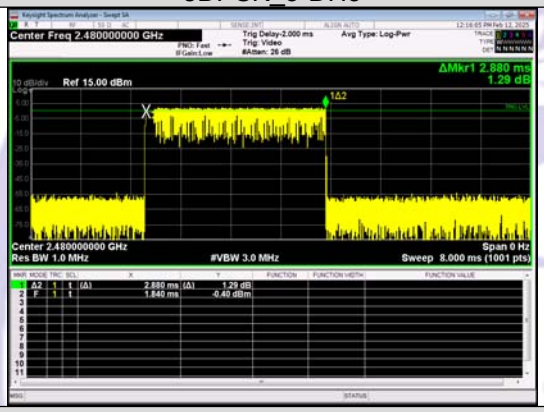
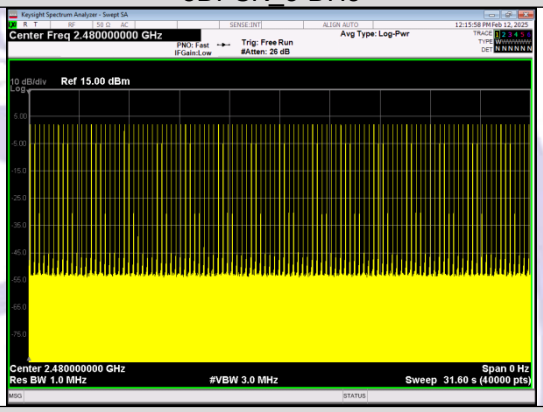
Pulse Width
GFSK_DH5



Number of Pulses in 31.6 seconds
GFSK_DH5

	
Pulse Width GFSK_DH5	Number of Pulses in 31.6 seconds GFSK_DH5
	
Pulse Width GFSK_DH5	Number of Pulses in 31.6 seconds GFSK_DH5
	
Pulse Width π/4DQPSK_2-DH5	Number of Pulses in 31.6 seconds π/4DQPSK_2-DH5

	
Pulse Width π/4DQPSK_2-DH5	Number of Pulses in 31.6 seconds π/4DQPSK_2-DH5
	
Pulse Width π/4DQPSK_2-DH5	Number of Pulses in 31.6 seconds π/4DQPSK_2-DH5
	
Pulse Width 8DPSK_3-DH5	Number of Pulses in 31.6 seconds 8DPSK_3-DH5

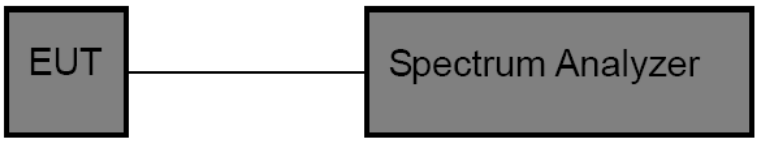
	
Pulse Width 8DPSK_3-DH5	Number of Pulses in 31.6 seconds 8DPSK_3-DH5
	
Pulse Width 8DPSK_3-DH5	Number of Pulses in 31.6 seconds 8DPSK_3-DH5

13 100kHz Bandwidth of Frequency Band Edge Requirement

13.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

13.2 Test Setup



13.3 Test Procedure

The EUT must have its hopping/Non-hopping function enabled. Using the following spectrum analyzer setting:

Reference Level:

1. Set the RBW = 100kHz.

2. Set the VBW = 300kHz.

3. Sweep time = 1.0ms.

4. Detector function = peak.

5. Trace mode = max hold.

6. Allow trace to fully stabilize.

Emission Level:

1. Set the RBW = 100kHz.

2. Set the VBW = 300kHz.

3. Sweep time = auto couple.

4. Detector function = peak.

5. Trace mode = max hold.

6. Allow trace to fully stabilize.

13.4 Test Data

Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH1	0	2394.08	-55.772	-20.61	-35.162	PASS
			2400.00	-57.359	-20.61	-36.749	PASS
			4803.60	-60.749	-20.61	-40.139	PASS
			7205.10	-61.695	-20.61	-41.085	PASS
			9608.50	-61.753	-20.61	-41.143	PASS
			21166.5	-49.020	-20.61	-28.410	PASS
		39	4882.92	-61.310	-20.48	-40.830	PASS
			7322.49	-61.816	-20.48	-41.335	PASS
			9763.93	-63.506	-20.48	-43.026	PASS
			21164.6	-48.213	-20.48	-27.733	PASS
		78	2483.50	-61.599	-20.25	-41.349	PASS
			4959.70	-60.560	-20.25	-40.310	PASS
			7439.85	-62.752	-20.25	-42.502	PASS
			9919.99	-59.965	-20.25	-39.715	PASS
			21150.9	-49.171	-20.25	-28.921	PASS
π/4DQPSK	2-DH1	0	2400.00	-50.750	-21.18	-29.570	PASS
			4804.89	-62.682	-21.18	-41.502	PASS
			7205.13	-61.710	-21.18	-40.530	PASS
			9607.87	-62.013	-21.18	-40.833	PASS
			21592.2	-48.969	-21.18	-27.789	PASS
		39	4881.67	-60.748	-20.77	-39.978	PASS
			7322.49	-63.261	-20.77	-42.491	PASS
			9763.93	-61.748	-20.77	-40.978	PASS
			21591.6	-48.739	-20.77	-27.969	PASS
		78	2483.50	-55.715	-20.53	-35.185	PASS
			4960.95	-60.300	-20.53	-39.770	PASS
			7439.22	-63.789	-20.53	-43.259	PASS
			9920.62	-59.405	-20.53	-38.875	PASS
			21558.5	-49.152	-20.53	-28.622	PASS
8DPSK	3-DH1	0	2400.00	-51.389	-20.79	-30.599	PASS
			4804.89	-60.838	-20.79	-40.048	PASS
			7205.75	-62.315	-20.79	-41.525	PASS
			9607.87	-63.712	-20.79	-42.922	PASS

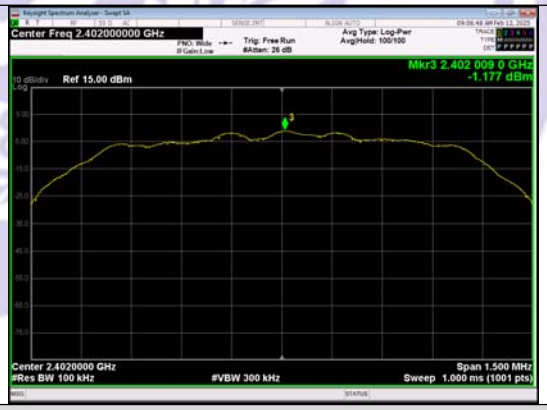
			21561.6	-48.842	-20.79	-28.052	PASS
		39	4882.30	-60.323	-20.62	-39.703	PASS
			7322.49	-62.938	-20.62	-42.319	PASS
			9763.31	-63.584	-20.62	-42.964	PASS
			21129.0	-49.059	-20.62	-28.439	PASS
		78	2483.50	-56.909	-20.4	-36.509	PASS
			4959.08	-60.900	-20.4	-40.500	PASS
			7440.47	-64.169	-20.4	-43.770	PASS
			9920.62	-59.983	-20.4	-39.583	PASS
			21097.8	-48.869	-20.4	-28.469	PASS

Hopping

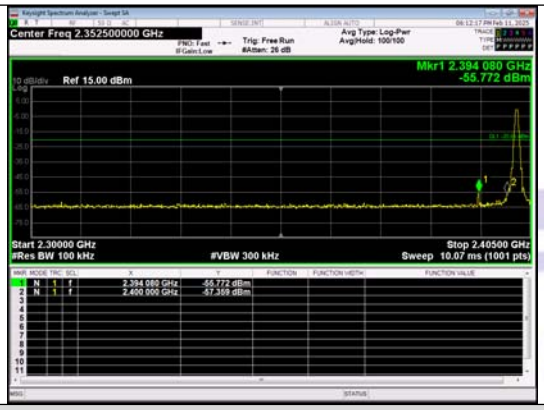
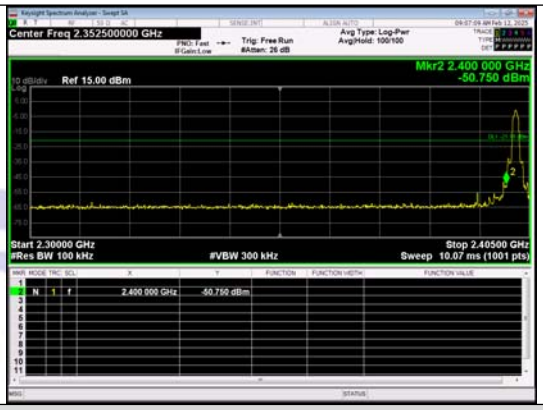
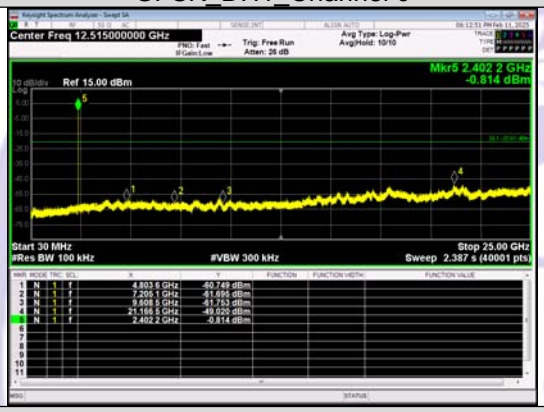
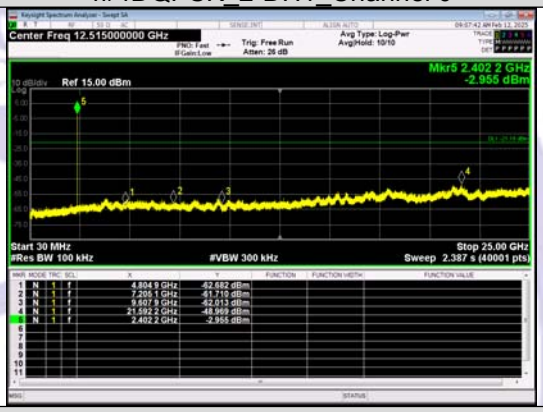
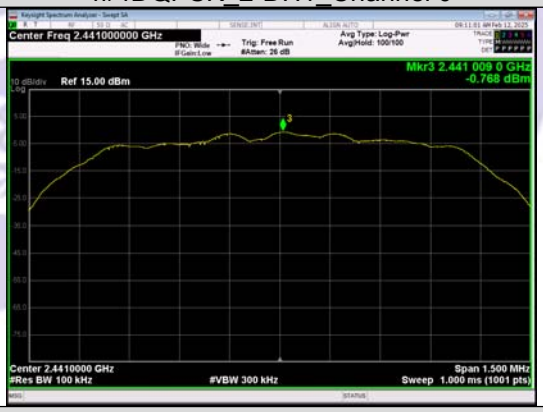
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH1	Hopping	2395.97	-55.243	-20.55	-34.693	PASS
			2400.00	-56.170	-20.55	-35.620	PASS
			2483.50	-62.770	-20.22	-42.550	PASS
π/4DQPSK	2-DH1		2400.00	-53.413	-20.61	-32.803	PASS
			2483.50	-53.417	-20.2	-33.217	PASS
8DPSK	3-DH1		2400.00	-53.194	-20.73	-32.464	PASS
			2483.50	-59.910	-20.33	-39.580	PASS

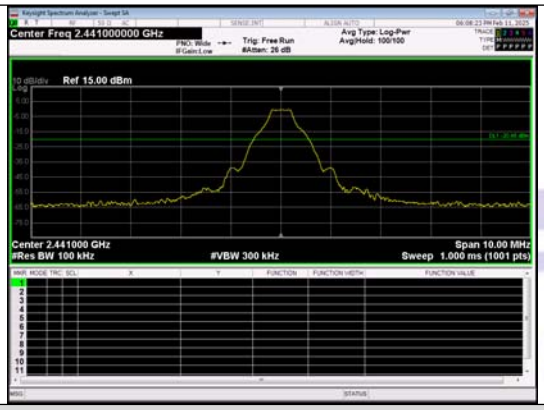
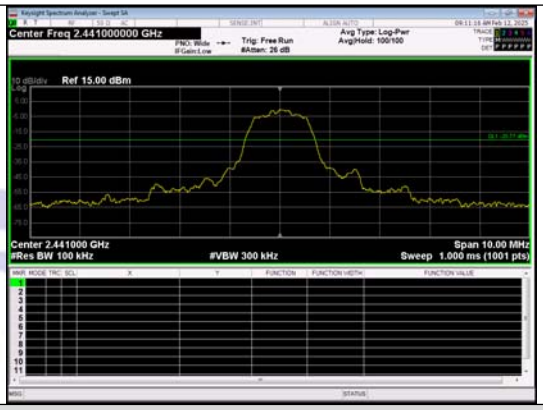
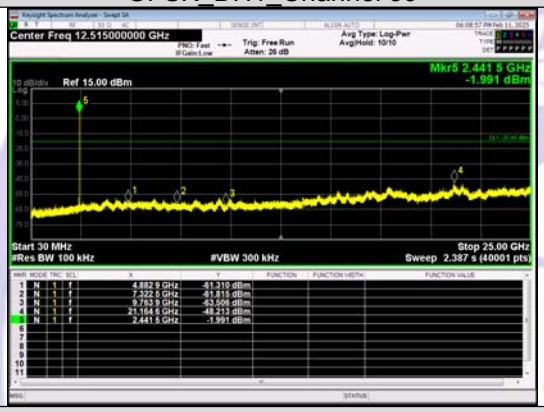
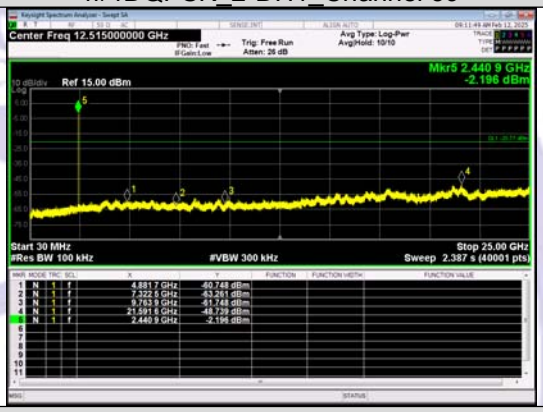
Test Graphs

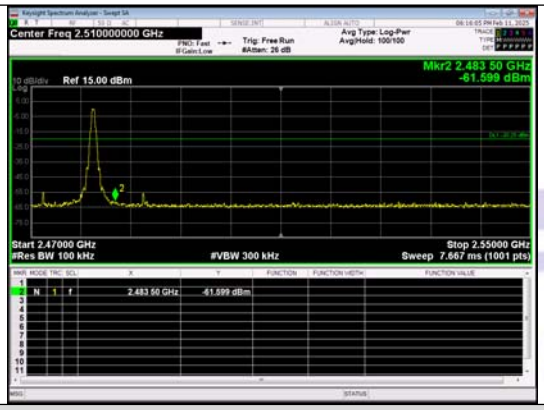
In-Band Reference Level
GFSK_DH1_Channel 0



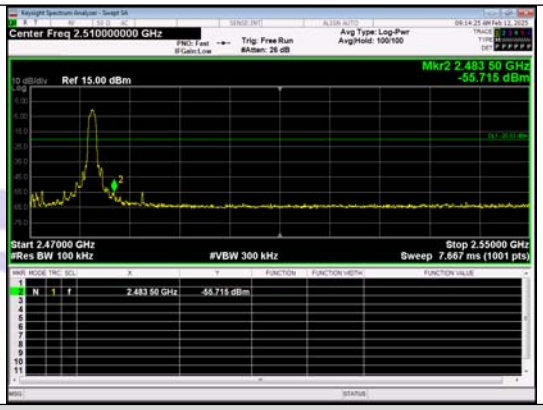
In-Band Reference Level
π/4DQPSK_2-DH1_Channel 0

	
Out Of Band Emission GFSK_DH1_Channel 0	Out Of Band Emission π/4DQPSK_2-DH1_Channel 0
	
30.0 MHz - 25000.0 MHz GFSK_DH1_Channel 0	30.0 MHz - 25000.0 MHz π/4DQPSK_2-DH1_Channel 0
	
In-Band Reference Level GFSK_DH1_Channel 39	In-Band Reference Level π/4DQPSK_2-DH1_Channel 39

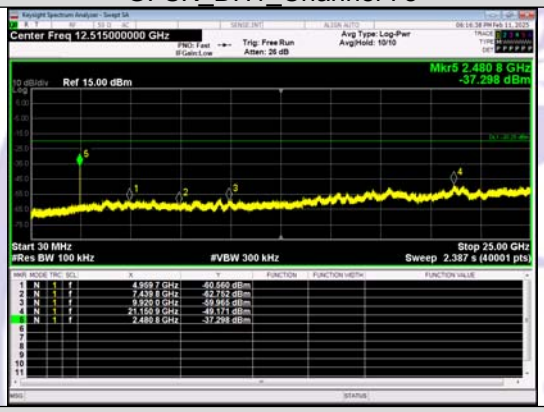
	
Out Of Band Emission GFSK_DH1_Channel 39	Out Of Band Emission π/4DQPSK_2-DH1_Channel 39
	
30.0 MHz - 25000.0 MHz GFSK_DH1_Channel 39	30.0 MHz - 25000.0 MHz π/4DQPSK_2-DH1_Channel 39
	
In-Band Reference Level GFSK_DH1_Channel 78	In-Band Reference Level π/4DQPSK_2-DH1_Channel 78



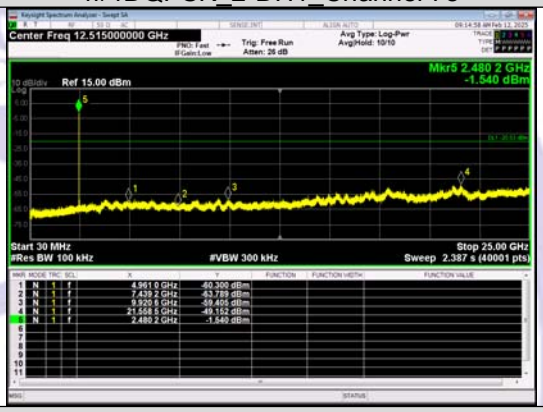
Out Of Band Emission
GFSK_DH1_Channel 78



Out Of Band Emission
π/4DQPSK_2-DH1_Channel 78

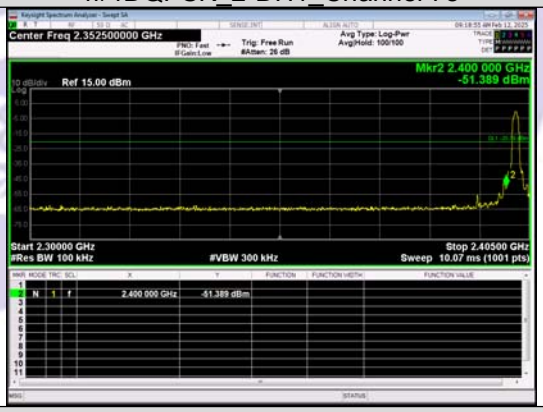


30.0 MHz - 25000.0 MHz
GFSK_DH1_Channel 78

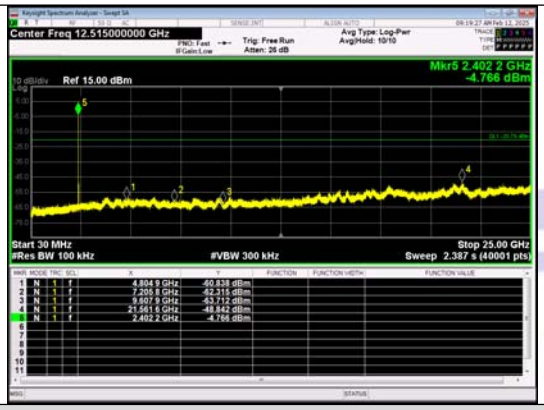
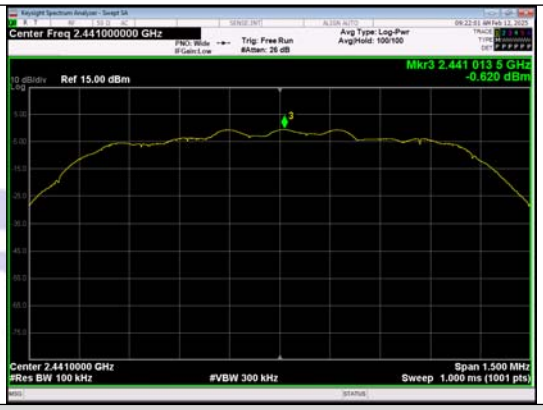
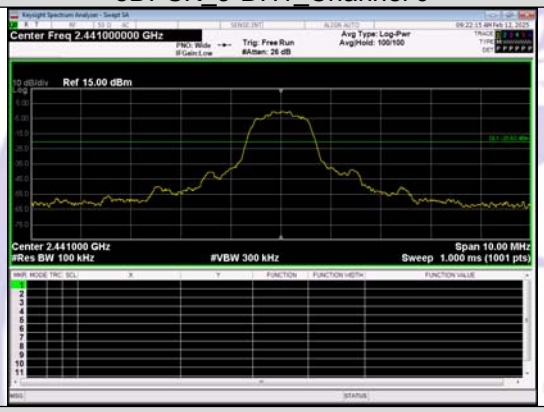
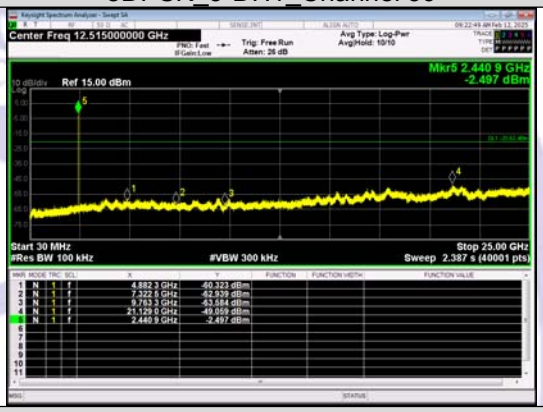
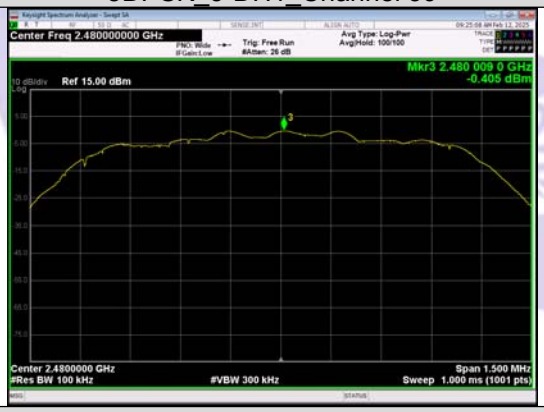
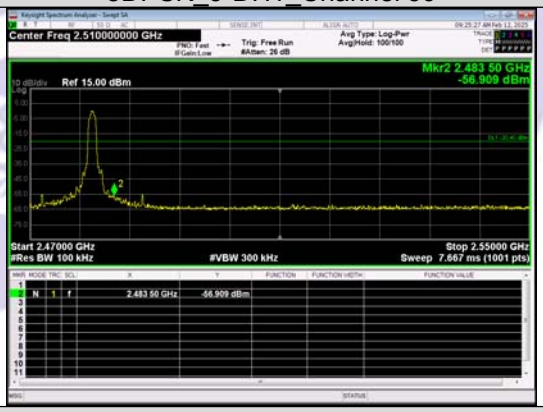


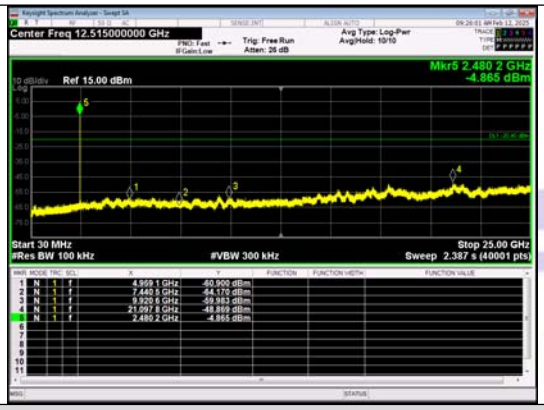
30.0 MHz - 25000.0 MHz
π/4DQPSK_2-DH1_Channel 78

In-Band Reference Level
8DPSK_3-DH1_Channel 0

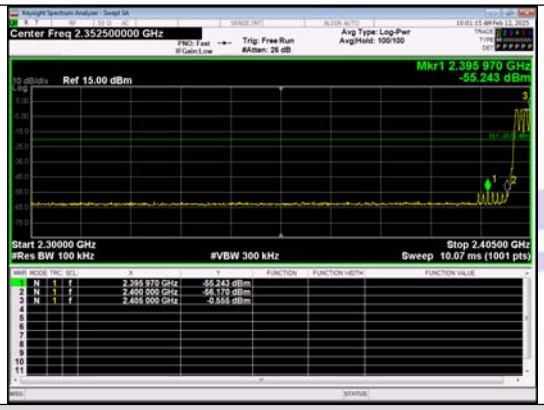


Out Of Band Emission
8DPSK_3-DH1_Channel 0

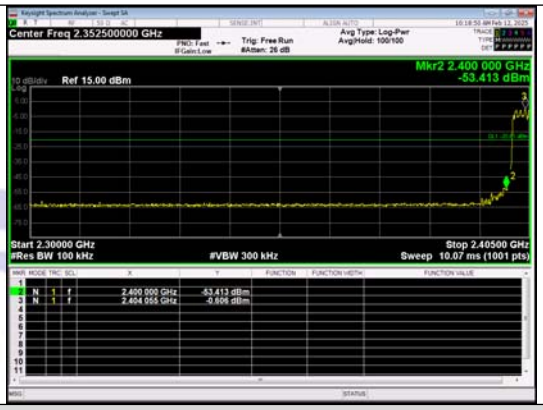
	
30.0 MHz - 25000.0 MHz 8DPSK_3-DH1_Channel 0	In-Band Reference Level 8DPSK_3-DH1_Channel 39
	
Out Of Band Emission 8DPSK_3-DH1_Channel 39	30.0 MHz - 25000.0 MHz 8DPSK_3-DH1_Channel 39
	
In-Band Reference Level 8DPSK_3-DH1_Channel 78	Out Of Band Emission 8DPSK_3-DH1_Channel 78



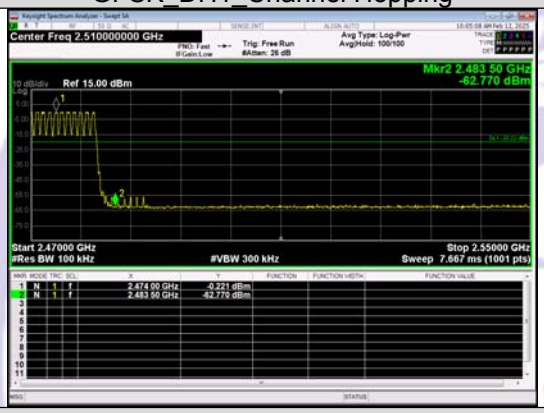
30.0 MHz - 25000.0 MHz
8DPSK_3-DH1_Channel 78



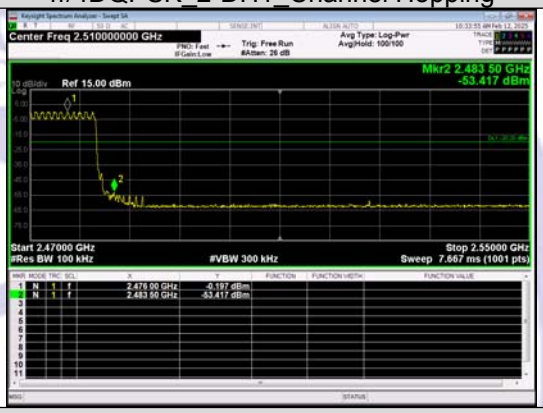
Out Of Band Emission(Left)
GFSK_DH1_Channel Hopping



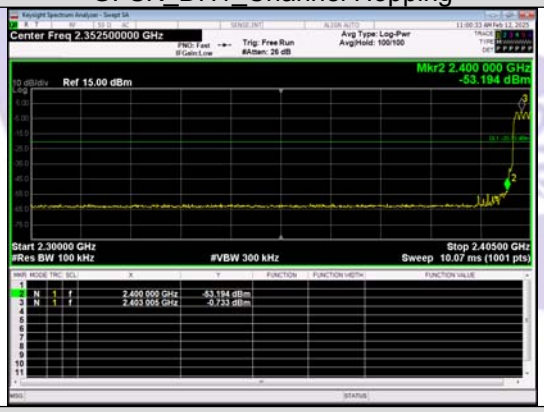
Out Of Band Emission(Left)
π/4DQPSK_2-DH1_Channel Hopping



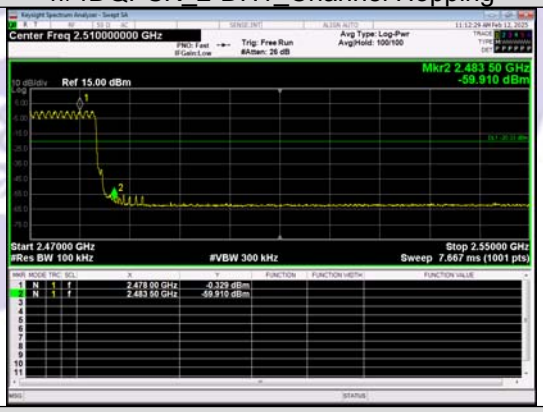
Out Of Band Emission(Right)
GFSK_DH1_Channel Hopping



Out Of Band Emission(Right)
π/4DQPSK_2-DH1_Channel Hopping



Out Of Band Emission(Left)
8DPSK_3-DH1_Channel Hopping



Out Of Band Emission(Right)
8DPSK_3-DH1_Channel Hopping

14 Antenna Requirement

14.1 Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 2) 15.247(c) (1)(i) requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

14.2 Antenna Connected Construction

The antenna is PCB Antenna which permanently attached, and the best case gain of the antenna is 1.8dBi. It complies with the standard requirement.

15 APPENDIX I -- TEST SETUP PHOTOGRAPH

Please see the attachment for details.

16 APPENDIX II -- EUT PHOTOGRAPH

Please see the attachment for details.

---------- End of Report ----------