

FCC TEST REPORT

FCC ID:2BLD2-D11

Product : Wireless microphone
Model Name : D11, D11-1, D11-2, D12, D13
Brand : N/A
Report No. : NCT24038375E

Prepared for

Shenzhen 12Do Technology Co., Ltd

**301, Building C5, Zhuao Zhiyuan Garden, Zhuao Road, Gushu Village, Bao'an District,
Shenzhen City, Guangdong Province**

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

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

TEL: 400-8868-419

FAX: 86-755-27790922

1 TEST RESULT CERTIFICATION

Applicant's name : Shenzhen 12Do Technology Co., Ltd
Address : 301, Building C5, Zhuao Zhiyuan Garden, Zhuao Road, Gushu Village, Bao'an District, Shenzhen City, Guangdong Province
Manufacture's name : Shenzhen 12Do Technology Co., Ltd
Address : 301, Building C5, Zhuao Zhiyuan Garden, Zhuao Road, Gushu Village, Bao'an District, Shenzhen City, Guangdong Province
Product name : Wireless microphone
Model name : D11, D11-1, D11-2, D12, D13
Standards : FCC CFR47 Part 15 Section 15.249
Test procedure : ANSI C63.10:2013
Date of test : Sept. 13, 2024- Sept. 29, 2024
Date of Issue : Sept. 29, 2024

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
Field Strength of Fundamental	FCC Part 15.249(a)	PASS
Spurious Emission	FCC Part 15.209	PASS
Band edge	FCC Part 15.209	PASS
20dB bandwidth	FCC Part 15.215(c)	PASS
Conducted Emission	FCC Part 15.207	PASS
Antenna Requirement	FCC Part 15.203	PASS

Remark:

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

2.1 Test Site

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

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Wireless microphone
Model Name	:	D11
Sample ID	:	NCT24038375A-001
Sample(s) Status:	:	Engineer sample
Series Model	:	D11-1, D11-2, D12, D13
Model Different.:	:	All the same except the model number.
Operating frequency	:	2402-2480MHz
Number of Channels	:	79 channels
Type of Modulation	:	GFSK, $\pi/4$ -DQPSK
Antenna installation	:	Chip Antenna
Antenna Gain	:	1.24dBi
Power supply	:	DC 3.7V from Battery or DC 5V from adapter input AC 120V/60Hz
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.		

3.2 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 harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The details of test channels and bandwidth were for RF conductive measurement.

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	D11	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	-	-

Note:

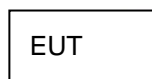
1. Test of channel was included the lowest, middle and highest frequency in highest data rate and to perform the test, then record on this report.

3.3 Test Setup Configuration

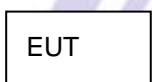
Conducted Emission



Radiated Emission(30MHz-1GHz)



Radiated Emission(above 1GHz)



Conducted Spurious



3.4 Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
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	Channel	Frequency(MHz)
Low Channel	0	2402
Mid Channel	39	2441
High Channel	78	2480

4 Equipment During Test

4.1 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	2024/6/21	2025/6/20
LISN	ENV 216	102796	Rohde & Schwarz	2024/6/21	2025/6/20
LISN	VN1-13S	004023	CRANAGE	2024/6/21	2025/6/20
Cable	RG223-1500MM	NA	RG	2024/6/21	2025/6/20

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	2024/6/21	2025/6/20
Amplifier (30MHz-1GHz)	BBV 9743 B	00374	SCHNWARZBECK	2024/6/21	2025/6/20
Bilog Antenna (30MHz-1GHz)	VULB9162	00473	SCHNWARZBECK	2023/3/19	2025/3/18
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHNWARZBECK	2023/3/19	2025/3/18
Pream plifier (1GHz-18GHz)	BBV 9718D	0024	SCHNWARZBECK	2024/6/21	2025/6/20
Spectrum Analyze (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2024/6/21	2025/6/20
Pream plifier (18GHz-40GHz)	BBV 9721	0056	SCHNWARZBECK	2024/6/21	2025/6/20
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNWARZBECK	2024/6/21	2025/6/20

Amplifier (9KHz-30MHz)	CVP 9222 C	00109	CHNWARZBECK	2024/6/21	2025/6/20
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2024/6/21	2025/6/20
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2024/6/21	2025/6/20
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2024/6/21	2025/6/20
Power Sensor	TR1029-2	512364	Techoy	2024/6/21	2025/6/20
RF Swith	TR1029-1	512364	Techoy	2024/6/21	2025/6/20
Cable	DA800-4000MM	NA	DA	2024/6/21	2025/6/20
Cable	DA800-11000MM	NA	DA	2024/6/21	2025/6/20

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

4.2 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(9kHz~30MHz)	±4.51dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Radiated Emission(25GHz~40GHz)	±3.38dB
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	

4.3 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.

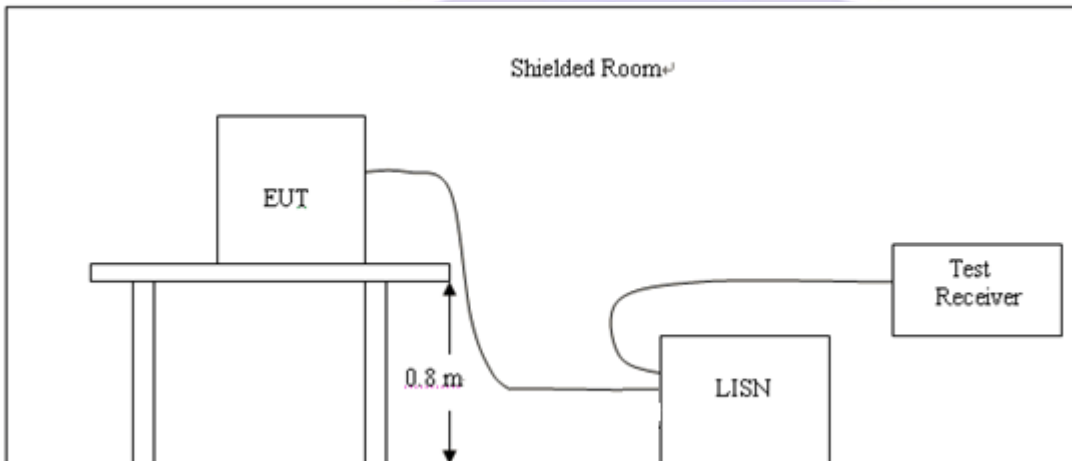
Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Wireless microphone	N/A	D11	N/A	EUT
E-2	Adapter	anju	A18A-050100U-US2	AJ-230600002514	Auxiliary

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.

5 Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

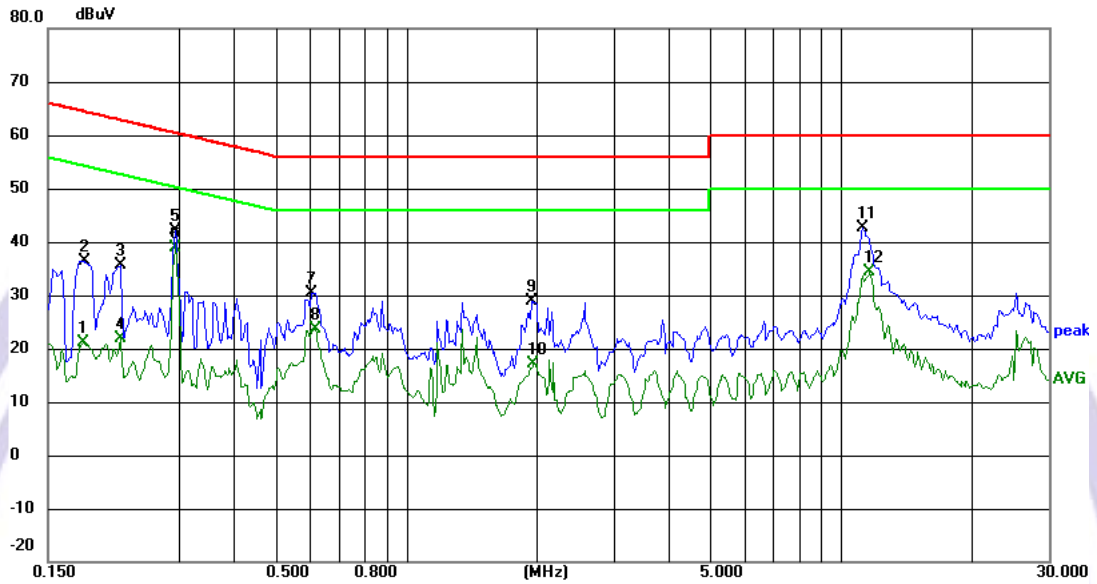
* Decreases with the logarithm of the frequency.

TEST RESULTS

Pass

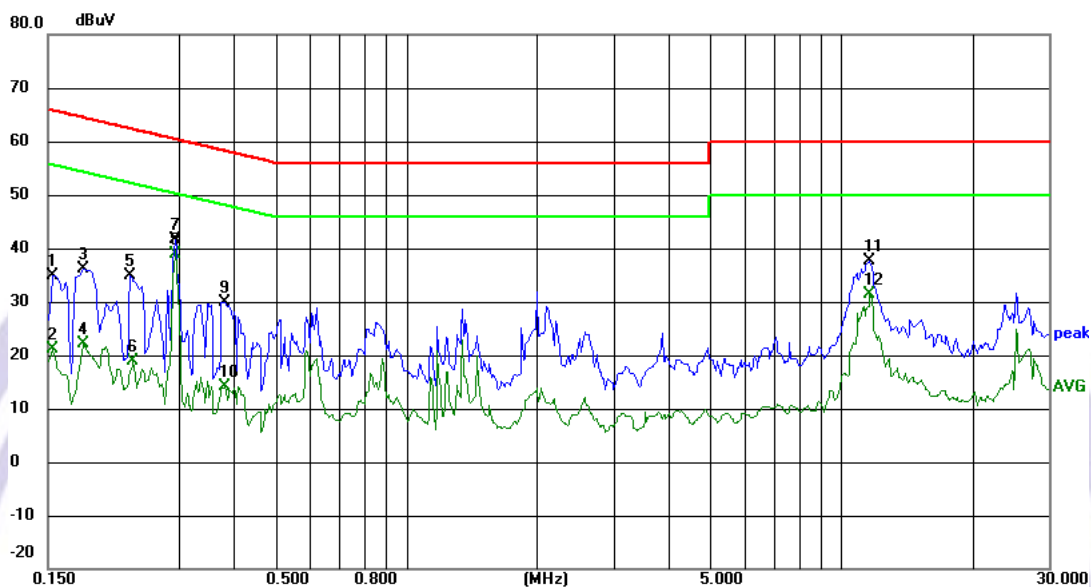
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode ($\pi/4$ -DQPSK) are recorded in the following pages and the others modulation methods do not exceed the limits.

Channel:	Highest	Phase :	L
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1811	11.36	9.76	21.12	54.44	-33.32	AVG	P
2	0.1812	26.63	9.76	36.39	64.43	-28.04	peak	P
3	0.2202	25.77	9.75	35.52	62.81	-27.29	peak	P
4	0.2202	12.06	9.75	21.81	52.81	-31.00	AVG	P
5	0.2943	32.27	9.76	42.03	60.40	-18.37	peak	P
6 *	0.2943	29.23	9.76	38.99	50.40	-11.41	AVG	P
7	0.6060	20.62	9.78	30.40	56.00	-25.60	peak	P
8	0.6179	13.95	9.78	23.73	46.00	-22.27	AVG	P
9	1.9400	18.99	9.80	28.79	56.00	-27.21	peak	P
10	1.9674	7.33	9.80	17.13	46.00	-28.87	AVG	P
11	11.2329	32.42	10.21	42.63	60.00	-17.37	peak	P
12	11.6658	24.21	10.23	34.44	50.00	-15.56	AVG	P

Channel:	Highest	Phase :	N
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1539	25.21	9.78	34.99	65.79	-30.80	peak	P
2	0.1539	11.34	9.78	21.12	55.79	-34.67	AVG	P
3	0.1811	26.34	9.76	36.10	64.44	-28.34	peak	P
4	0.1811	12.46	9.76	22.22	54.44	-32.22	AVG	P
5	0.2318	25.19	9.75	34.94	62.38	-27.44	peak	P
6	0.2358	9.21	9.75	18.96	52.24	-33.28	AVG	P
7	0.2943	31.90	9.76	41.66	60.40	-18.74	peak	P
8 *	0.2943	29.03	9.76	38.79	50.40	-11.61	AVG	P
9	0.3840	20.20	9.76	29.96	58.19	-28.23	peak	P
10	0.3840	4.44	9.76	14.20	48.19	-33.99	AVG	P
11	11.6463	27.33	10.23	37.56	60.00	-22.44	peak	P
12	11.6463	21.13	10.23	31.36	50.00	-18.64	AVG	P

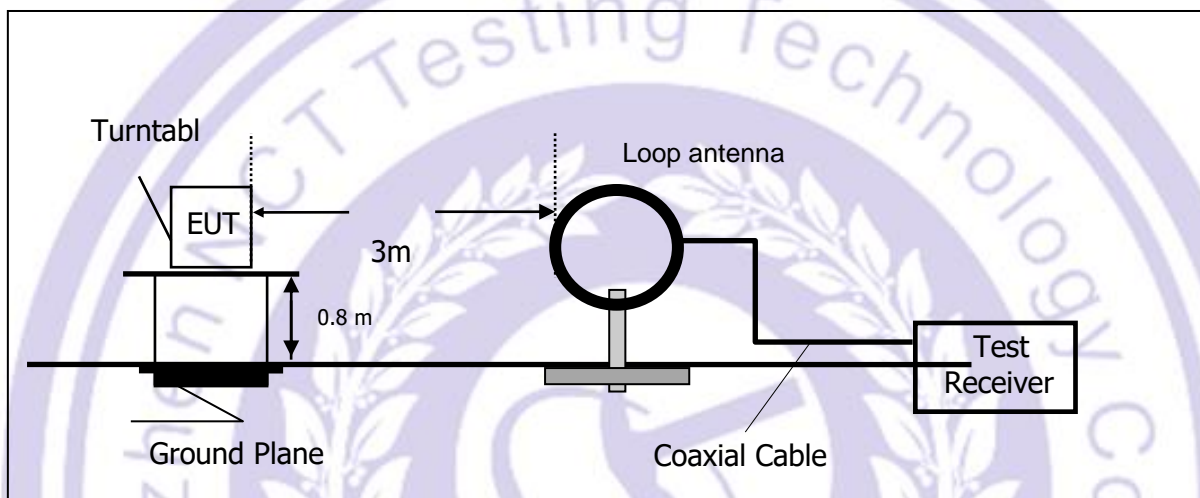
Notes:

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. Measurement Level = Reading level + Correct Factor

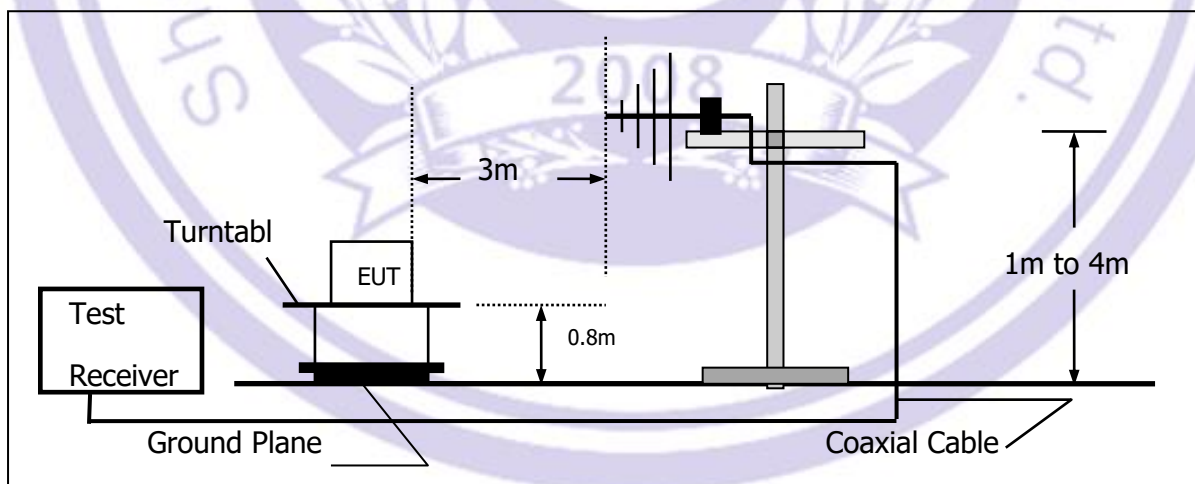
6 Radiated Emission and Band Edges

TEST CONFIGURATION

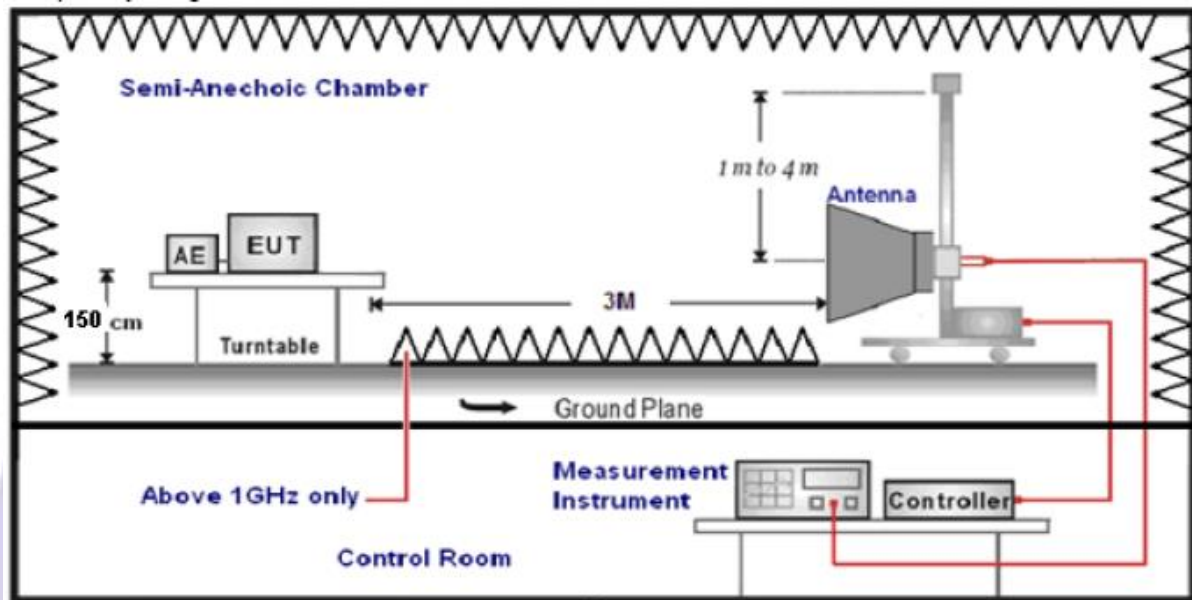
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 26MHz and maximum operation frequency was 1910MHz.so radiated emission test frequency band from 9KHz to 25GHz.

6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

RADIATION LIMIT

According 15.249, the field strength of emissions from intentional radiators operated within 2400MHz-2483.5 MHz shall not exceed 94dB μ V/m (50mV/m):

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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)

Radiated emission limits

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	2400/F(KHz)
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	24000/F(KHz)
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

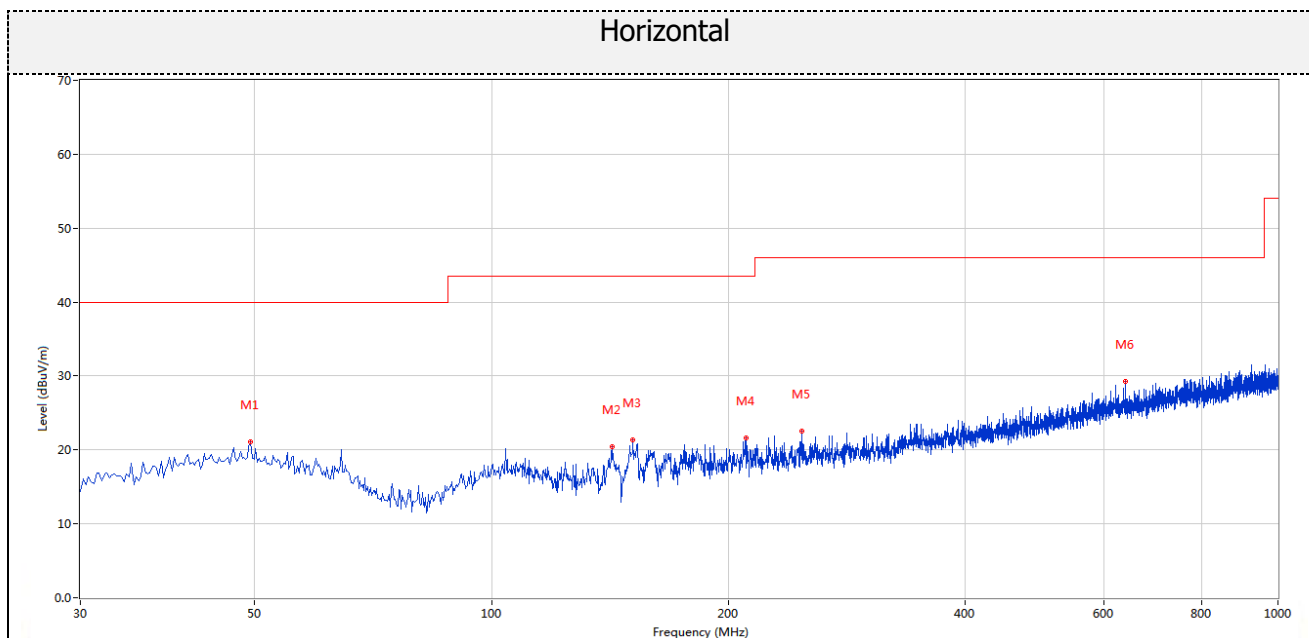
TEST RESULTS

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. Both modes of GFSK $\Pi/4$ -DQPSK were tested at Low, Middle, and High channel and recorded worst mode at $\Pi/4$ -DQPSK High Channel (2480MHz)

Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

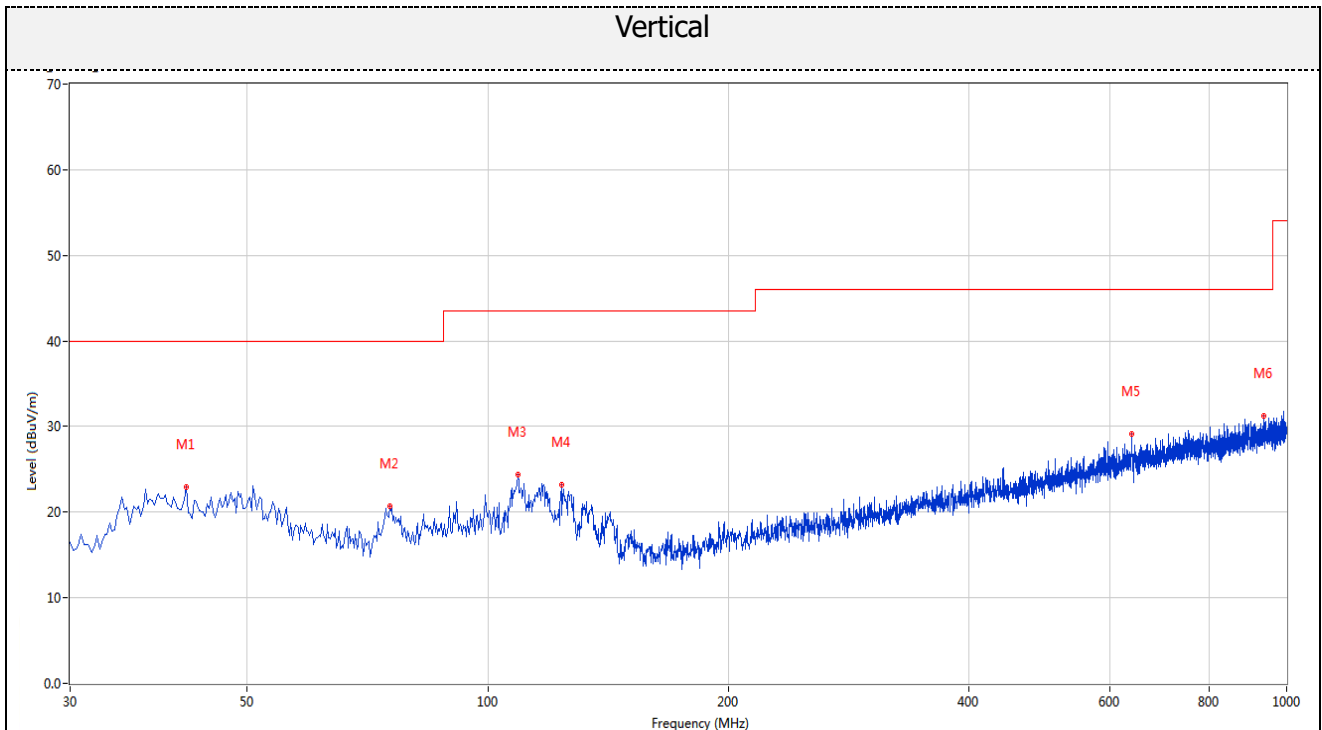


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna	Verdict
1	49.395	21.12	-11.28	40.0	18.88	Peak	Horizontal	Pass
2	142.249	20.46	-17.31	43.5	23.04	Peak	Horizontal	Pass
3	151.220	21.30	-16.97	43.5	22.20	Peak	Horizontal	Pass
4	210.617	21.59	-13.62	43.5	21.91	Peak	Horizontal	Pass
5	247.953	22.60	-12.15	46.0	23.40	Peak	Horizontal	Pass
6	640.220	29.31	-4.78	46.0	16.69	Peak	Horizontal	Pass

Note:1) Results (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBuV/m) - Results (dBuV/m)



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna	Verdict
1	41.880	22.99	-11.72	40.0	17.01	Peak	Horizontal	Pass
2	75.336	20.66	-17.38	40.0	19.34	Peak	Horizontal	Pass
3	109.035	24.41	-13.53	43.5	19.09	Peak	Horizontal	Pass
4	123.582	23.23	-15.99	43.5	20.27	Peak	Horizontal	Pass
5	640.220	29.18	-4.78	46.0	16.82	Peak	Horizontal	Pass
6	935.511	31.21	-1.69	46.0	14.79	Peak	Horizontal	Pass

Note:1) Results (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBuV/m) - Results (dBuV/m)

For 1GHz to 25GHz

GFSK (above 1GHz)

CH Low (2402MHz)

Frequency (MHz)	Level@3m (dBµV/m)	Antenna Polarity	Limit@3m (dBµV/m)
2402	86.14(PK)	H	114(Peak)/ 94(AV)
2402	78.47(PK)	V	114(Peak)/ 94(AV)
4804	49.88(PK)	H	74(Peak)/ 54(AV)
4804	40.09(PK)	V	74(Peak)/ 54(AV)
7206	--	H/V	74(Peak)/ 54(AV)
9608	--	H/V	74(Peak)/ 54(AV)
12010	--	H/V	74(Peak)/ 54(AV)
14412	--	H/V	74(Peak)/ 54(AV)
16814	--	H/V	74(Peak)/ 54(AV)
19216	--	H/V	74(Peak)/ 54(AV)
21618	--	H/V	74(Peak)/ 54(AV)
24020	--	H/V	74(Peak)/ 54(AV)

- Note: 1. Level = Reading + AF + Cable - Preamp
 2. Remark "---" means that the emissions level is too low to be measured

CH Middle (2441MHz)

Frequency (MHz)	Level@3m (dBµV/m)	Antenna Polarity	Limit@3m (dBµV/m)
2441	87.89(PK)	H	114(Peak)/ 94(AV)
2441	80.09(PK)	V	114(Peak)/ 94(AV)
4882	50.13(PK)	H	74(Peak)/ 54(AV)
4882	41.67(PK)	V	74(Peak)/ 54(AV)
7323	--	H/V	74(Peak)/ 54(AV)
9764	--	H/V	74(Peak)/ 54(AV)
12205	--	H/V	74(Peak)/ 54(AV)
14646	--	H/V	74(Peak)/ 54(AV)
17087	--	H/V	74(Peak)/ 54(AV)
19528	--	H/V	74(Peak)/ 54(AV)
21969	--	H/V	74(Peak)/ 54(AV)
24410	--	H/V	74(Peak)/ 54(AV)

- Note: 1. Level = Reading + AF + Cable - Preamp
 2. Remark "---" means that the emissions level is too low to be measured

CH High (2480MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
2480	90.22(PK)	H	114(Peak)/ 94(AV)
2480	83.17(PK)	V	114(Peak)/ 94(AV)
4960	50.67(PK)	H	74(Peak)/ 54(AV)
4960	42.88(PK)	V	74(Peak)/ 54(AV)
7440	--	H/V	74(Peak)/ 54(AV)
9920	--	H/V	74(Peak)/ 54(AV)
12400	--	H/V	74(Peak)/ 54(AV)
14880	--	H/V	74(Peak)/ 54(AV)
17360	--	H/V	74(Peak)/ 54(AV)
19840	--	H/V	74(Peak)/ 54(AV)
22320	--	H/V	74(Peak)/ 54(AV)
24800	--	H/V	74(Peak)/ 54(AV)

- Note: 1. Level = Reading + AF + Cable - Preamp
2. Remark "--" means that the emissions level is too low to be measured

π/4-DQPSK (above 1GHz)

CH Low (2402MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
2402	88.11 (PK)	H	114(Peak)/ 94(AV)
2402	80.65(PK)	V	114(Peak)/ 94(AV)
4804	49.89(PK)	H	74(Peak)/ 54(AV)
4804	41.75(PK)	V	74(Peak)/ 54(AV)
7206	--	H/V	74(Peak)/ 54(AV)
9608	--	H/V	74(Peak)/ 54(AV)
12010	--	H/V	74(Peak)/ 54(AV)
14412	--	H/V	74(Peak)/ 54(AV)
16814	--	H/V	74(Peak)/ 54(AV)
19216	--	H/V	74(Peak)/ 54(AV)
21618	--	H/V	74(Peak)/ 54(AV)
24020	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp
 2. Remark "---" means that the emissions level is too low to be measured

CH Middle (2441MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
2441	90.56(PK)	H	114(Peak)/ 94(AV)
2441	84.03(PK)	V	114(Peak)/ 94(AV)
4882	50.87(PK)	H	74(Peak)/ 54(AV)
4882	42.79(PK)	V	74(Peak)/ 54(AV)
7323	--	H/V	74(Peak)/ 54(AV)
9764	--	H/V	74(Peak)/ 54(AV)
12205	--	H/V	74(Peak)/ 54(AV)
14646	--	H/V	74(Peak)/ 54(AV)
17087	--	H/V	74(Peak)/ 54(AV)
19528	--	H/V	74(Peak)/ 54(AV)
21969	--	H/V	74(Peak)/ 54(AV)
24410	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp
 2. Remark "---" means that the emissions level is too low to be measured

CH High (2480MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
2480	93.27(PK)	H	114(Peak)/ 94(AV)
2480	88.04(PK)	V	114(Peak)/ 94(AV)
4960	52.78(PK)	H	74(Peak)/ 54(AV)
4960	44.18(PK)	V	74(Peak)/ 54(AV)
7440	--	H/V	74(Peak)/ 54(AV)
9920	--	H/V	74(Peak)/ 54(AV)
12400	--	H/V	74(Peak)/ 54(AV)
14880	--	H/V	74(Peak)/ 54(AV)
17360	--	H/V	74(Peak)/ 54(AV)
19840	--	H/V	74(Peak)/ 54(AV)
22320	--	H/V	74(Peak)/ 54(AV)
24800	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp
2. Remark "---" means that the emissions level is too low to be measured

Results of Band Edges Test (Radiated)

	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)	Detector Type	Result	
GFSK	Low Channel: 2402MHz										
	H	2310.00	55.76	35.17	3.48	27.49	51.56	74.00	PK	PASS	
	H	2310.00	48.21	35.17	3.48	27.49	44.01	54.00	AV	PASS	
	H	2390.00	58.09	35.17	3.48	27.49	53.89	74.00	PK	PASS	
	H	2390.00	51.17	35.17	3.48	27.49	46.97	54.00	AV	PASS	
	H	2400.00	60.45	35.16	3.49	27.52	56.3	74.00	PK	PASS	
	H	2400.00	52.66	35.16	3.49	27.52	48.51	54.00	AV	PASS	
	V	2310.00	55.17	35.17	3.48	27.49	50.97	74.00	PK	PASS	
	V	2310.00	46.09	35.17	3.48	27.49	41.89	54.00	AV	PASS	
	V	2390.00	57.78	35.17	3.48	27.49	53.58	74.00	PK	PASS	
	V	2390.00	52.18	35.17	3.48	27.49	47.98	54.00	AV	PASS	
	V	2400.00	59.54	35.16	3.49	27.52	55.39	74.00	PK	PASS	
	V	2400.00	52.09	35.16	3.49	27.52	47.94	54.00	AV	PASS	
	High Channel: 2480MHz										
	H	2483.50	58.54	35.11	3.56	27.75	54.74	74.00	PK	PASS	
	H	2483.50	51.18	35.11	3.56	27.75	47.38	54.00	AV	PASS	
	H	2500.00	59.09	35.1	3.57	27.8	55.36	74.00	PK	PASS	
	H	2500.00	50.11	35.1	3.57	27.8	46.38	54.00	AV	PASS	
V	2483.50	58.65	35.11	3.56	27.75	54.85	74.00	PK	PASS		
V	2483.50	49.43	35.11	3.56	27.75	45.63	54.00	AV	PASS		
V	2500.00	58.17	35.1	3.57	27.8	54.44	74.00	PK	PASS		
V	2500.00	49.43	35.1	3.57	27.8	45.7	54.00	AV	PASS		
π/4-DQPSK	Low Channel: 2402MHz										
	H	2310.00	56.65	35.17	3.48	27.49	52.45	74.00	PK	PASS	

H	2310.00	47.76	35.17	3.48	27.49	43.56	54.00	AV	PASS	
H	2390.00	59.11	35.17	3.48	27.49	54.91	74.00	PK	PASS	
H	2390.00	50.21	35.17	3.48	27.49	46.01	54.00	AV	PASS	
H	2400.00	60.56	35.16	3.49	27.52	56.41	74.00	PK	PASS	
H	2400.00	51.31	35.16	3.49	27.52	47.16	54.00	AV	PASS	
V	2310.00	55.56	35.17	3.48	27.49	51.36	74.00	PK	PASS	
V	2310.00	45.09	35.17	3.48	27.49	40.89	54.00	AV	PASS	
V	2390.00	58.01	35.17	3.48	27.49	53.81	74.00	PK	PASS	
V	2390.00	49.78	35.17	3.48	27.49	45.58	54.00	AV	PASS	
V	2400.00	60.04	35.16	3.49	27.52	55.89	74.00	PK	PASS	
V	2400.00	50.27	35.16	3.49	27.52	46.12	54.00	AV	PASS	
High Channel: 2480MHz										
H	2483.50	59.66	35.11	3.56	27.75	55.86	74.00	PK	PASS	
H	2483.50	51.37	35.11	3.56	27.75	47.57	54.00	AV	PASS	
H	2500.00	60.87	35.1	3.57	27.8	57.14	74.00	PK	PASS	
H	2500.00	50.09	35.1	3.57	27.8	46.36	54.00	AV	PASS	
V	2483.50	59.32	35.11	3.56	27.75	55.52	74.00	PK	PASS	
V	2483.50	50.98	35.11	3.56	27.75	47.18	54.00	AV	PASS	
V	2500.00	59.62	35.1	3.57	27.8	55.89	74.00	PK	PASS	
V	2500.00	50.07	35.1	3.57	27.8	46.34	54.00	AV	PASS	

Remark:

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

7 20dB Bandwidth Measurement

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30KHz RBW and 100KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

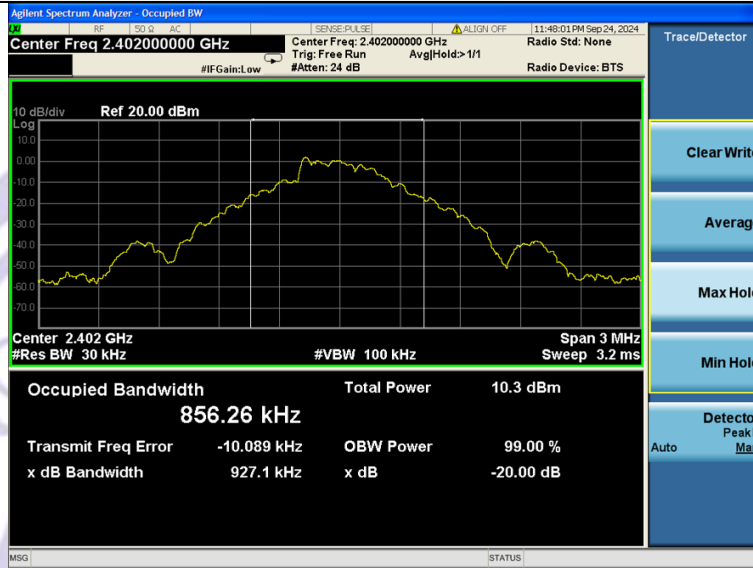
N/A

TEST RESULTS

Modulation	Channel	20dB bandwidth (MHz)	Result
GFSK	2402MHz	0.927	PASS
	2441MHz	0.924	
	2480MHz	0.925	
$\pi/4$ -DQPSK	2402MHz	1.218	PASS
	2441MHz	1.222	
	2480MHz	1.221	

Note: 1.The test results including the cable lose.

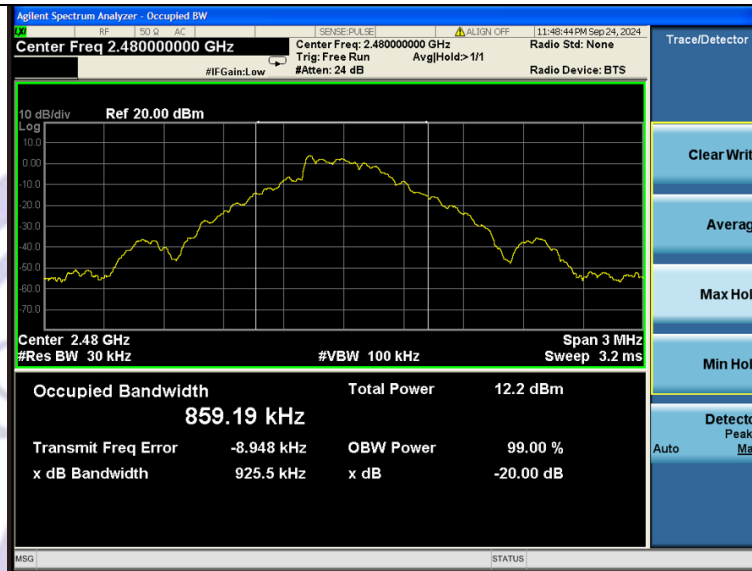
GFSK Low



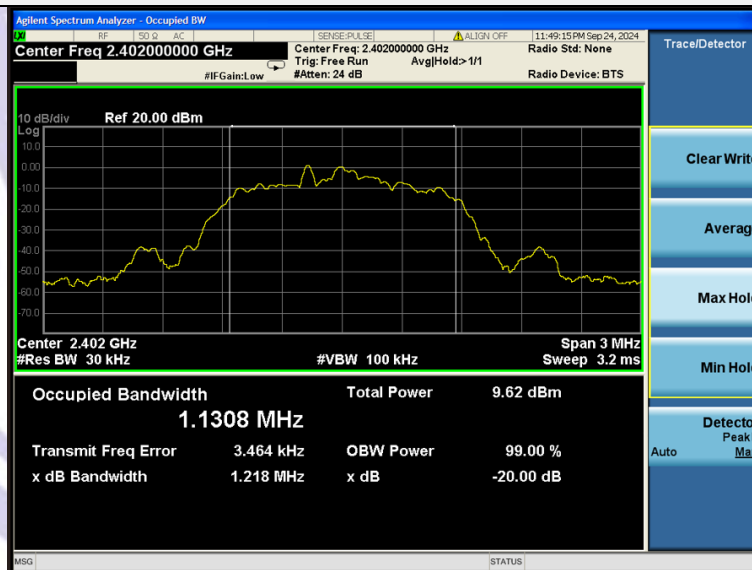
Mid



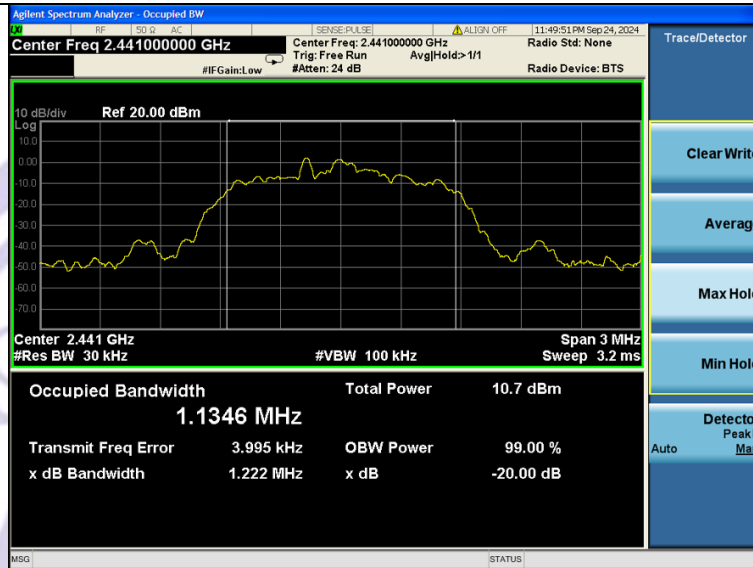
High



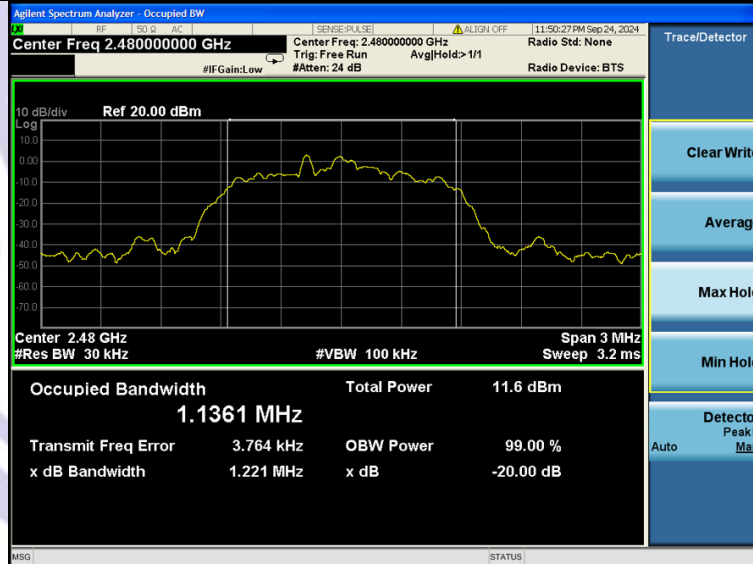
$\pi/4$ -DQPSK Low



Mid



High



8 Antenna Application

8.1 Antenna Requirement

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.

8.2 Result

The antenna is Chip Antenna, the best case gain of the antennas is 1.24dBi, reference to the attachment for details.

9 Test Setup Photos and EUT Photos

Please see the attachment for details.

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

