

TEST REPORT

Applicant: Lenovo (Shanghai) Electronics Technology Co., Ltd.
Address: Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA
Equipment Type: Handheld Console PC
Model Name: Legion Go 8AHP2
Legion Go 8ASP2
(refer to section 2.3)
Brand Name: Lenovo
Test Standard: MIC Notice No.88 Appendix No.43
Ordinance of MPT No.37, 1981:
Article 2 paragraph 1 item (19)
Sample Arrival Date: May 27, 2025
Test Date: Jun. 01, 2025 - Jun. 05, 2025
Date of Issue: Jun. 30, 2025

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Li Ganming**Checked by:** Ye Hongji**Approved by:** Sunny Zou
(Technical Director)

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Jun. 30, 2025</u>	<u>Initial Issue</u>

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1. GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China

2. PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Lenovo (Shanghai) Electronics Technology Co., Ltd.
Address	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

2.2 Manufacturer Information

Manufacturer	Lenovo PC HK Limited
Address	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, P.R. China

2.3 General Description for Equipment under Test (EUT)

EUT Name	Handheld Console PC
Model Name Under Test	Legion Go 8AHP2
Series Model Name	Legion Go 8ASP2 Legion Go 8AHP2***** Legion Go 8ASP2***** (* can be 0-9, a-z, A-Z, any symbol, blank or nothing)
Description of Model name differentiation	Only differences are model names for trading purpose. (this information provided by the applicant)
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

Antenna Information:

Antenna Port	Model Name	Antenna Manufacturer	Antenna Type	Antenna Gain (dBi)
				2.4 GHz
Main Antenna	3.6.02.0423	Hubble	PIFA	1.34
Main Antenna	F001K6813T13000	INNOWAVE	PIFA	1.51
Note: The report only shown the antenna which matches the antenna with the highest antenna gain.				

2.4 Technical Information

Network and Wireless connectivity	Bluetooth (BR+EDR)
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The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	Bluetooth(For Classic): FHSS
Modulation Type	Bluetooth(For Classic): GFSK, $\pi/4$ -DQPSK
Transfer Rate	DH5: 1 Mbps 2DH5: 2 Mbps
Frequency Range	The frequency range used is 2402MHz - 2480MHz; The frequency block is 2400MHz to 2483.5MHz.
Number of Channel	Bluetooth(For Classic): 79 (at intervals of 1 MHz)
Tested Channel	Bluetooth(For Classic): 0 (2402 MHz), 39 (2441 MHz), 78 (2480 MHz)
Antenna Type	PIFA Antenna
Antenna Gain	1.51 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)
Whether to support AFH mode in Classic Bluetooth	The EUT does need to measure AFH occupied bandwidth, spread bandwidth and output power density (total power divided by spread bandwidth)
Declare Max rated power density	Bluetooth (For Classic): 0.1500 mW/MHz
About the Product	Only the Bluetooth was tested in this report.

All channel was listed on the following table:

For Classic

Channel number	Freq. (MHz)	Channel number	Freq. (MHz)	Channel number	Freq. (MHz)	Channel number	Freq. (MHz)
0	2402	21	2423	42	2444	63	2465
1	2403	22	2424	43	2445	64	2466
2	2404	23	2425	44	2446	65	2467
3	2405	24	2426	45	2447	66	2468
4	2406	25	2427	46	2448	67	2469
5	2407	26	2428	47	2449	68	2470
6	2408	27	2429	48	2450	69	2471
7	2409	28	2430	49	2451	70	2472
8	2410	29	2431	50	2452	71	2473
9	2411	30	2432	51	2453	72	2474
10	2412	31	2433	52	2454	73	2475
11	2413	32	2434	53	2455	74	2476
12	2414	33	2435	54	2456	75	2477
13	2415	34	2436	55	2457	76	2478
14	2416	35	2437	56	2458	77	2479
15	2417	36	2438	57	2459	78	2480
16	2418	37	2439	58	2460	-	-
17	2419	38	2440	59	2461	-	-
18	2420	39	2441	60	2462	-	-
19	2421	40	2442	61	2463	-	-
20	2422	41	2443	62	2464	-	-

3. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Part	Description	Channel (BT for Classic)	Test Mode	Data Rate (Mbps)	Verdict
5.1	Frequency Error	Low/Middle/High	un-modulation	/	Pass
5.2	Occupied Bandwidth and Spread-spectrum Bandwidth	Hopping Mode AFH Mode	GFSK, $\pi/4$ -DQPSK	1/2	Pass
5.3	The frequency retention time	Hopping Mode	GFSK, $\pi/4$ -DQPSK	1/2	Pass
5.4	Unwanted Emission Intensity	Low/Middle/High	GFSK, $\pi/4$ -DQPSK	1/2	Pass
5.5	Antenna Power Error	Hopping Mode AFH Mode	GFSK, $\pi/4$ -DQPSK	1/2	Pass
5.6	Limitation of Collateral Emission of Receiver	Low/Middle/High	GFSK, $\pi/4$ -DQPSK	1/2	Pass
5.7	Transmission Antenna Gain (EIRP Antenna Power)	N/A	N/A	N/A	N/A ^{Note2}
5.8	Transmission Radiation Angle Width (3dB Beamwidth)	N/A	N/A	N/A	N/A ^{Note2}
5.9	Radio Interference Prevention Capability	---	---	---	Pass
5.10	Construction Protection Confirmation	---	---	---	Pass
Note 1: The tests were performed according to the method of measurements prescribed in MIC Notice No.88 Appendix No.43.					
Note 2: When the EIRP is less than 6.91 dBm/MHz, it is not necessary.					

3.1 MEASUREMENT UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameters	Uncertainty
Frequency Error / 99% & 90% Bandwidth	$(3.2 \times f \times 10^{-6})$ Hz
Antenna Power	1.82 dB
TX-RX Spurious Emissions	1.84 dB
Transmission Antenna Gain	5.36 dB
Temperature	0.8°C
Humidity	4%
DC / AC Power Source	0.04%
Note: “ f ” is the nominal signal frequency in Hz.	

4. GENERAL TEST CONFIGURATIONS

4.1 Test Environment Conditions

During the measurement, the normal environment conditions were within the listed ranges:

Relative Humidity (%)	48% to 59%	
Atmospheric Pressure (kPa)	86 kPa to 106 kPa	
Temperature	+20.1°C to +23.9°C	
Working Voltage of the EUT	NV (Normal Voltage)	15.60 V
	LV (Low Voltage)	14.04 V
	HV (High Voltage)	17.16 V

4.2 Test Equipment List

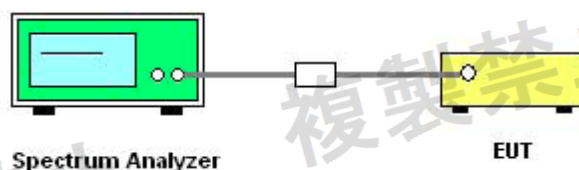
Description	Manufacturer	Model	Serial No.	Calibration Company	Calibration Address	Calibration By	Cal. Date	Cal. Due	Calibration Method
Spectrum Analyzer	KEYSIGHT	N9020A	MY46471071	Ti Testing & Certification Group Co., Ltd. Shenzhen Branch	103, Building B, Ganghongji High tech Intelligent Industrial Park, No. 1008 Songbai Road, Nanshan District, Shenzhen	Zhang Suting	2024.07.04	2025.07.03	c)
Power Sensor	KEYSIGHT	U2063XA	MY58000251	Ti Testing & Certification Group Co., Ltd. Shenzhen Branch	103, Building B, Ganghongji High tech Intelligent Industrial Park, No. 1008 Songbai Road, Nanshan District, Shenzhen	Zhang Suting	2024.07.04	2025.07.03	c)
Multimeter	Fluke	289	44860089	Ti Testing & Certification Group Co., Ltd. Shenzhen Branch	103, Building B, Ganghongji High tech Intelligent Industrial Park, No. 1008 Songbai Road, Nanshan District, Shenzhen	Huang Guoliang	2024.08.07	2025.08.06	c)
DC Power Supply	ITECH	IT6720	600103010717610007	Ti Testing & Certification Group Co., Ltd. Shenzhen Branch	103, Building B, Ganghongji High tech Intelligent Industrial Park, No. 1008 Songbai Road, Nanshan District, Shenzhen	Zhang Suting	2024.07.04	2025.07.03	c)

Note:

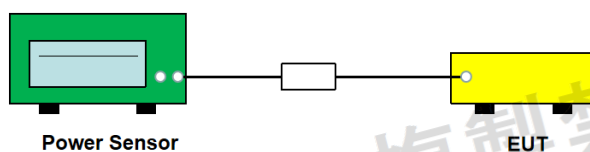
- a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1)
- b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)
- c) Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)
- d) Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c)

4.3 Description of Test Setup

4.3.1 For Antenna Port Test

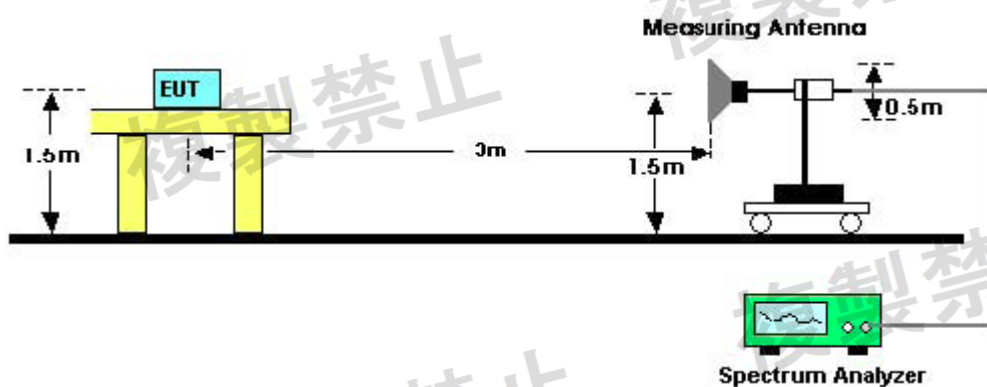


(Diagram 1)

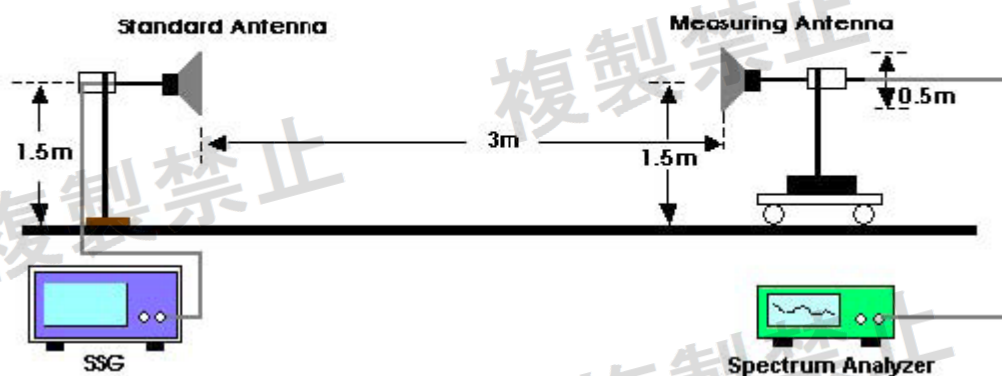


(Diagram 2)

4.3.2 For EIRP Antenna Power Test

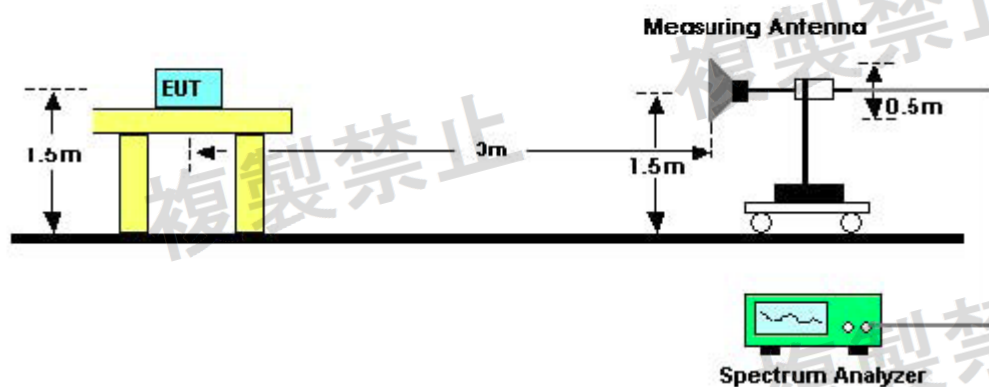


(Diagram 3)



(Diagram 4)

4.3.3 For 3dB Beamwidth Test



(Diagram 5)

5. TEST ITEMS

5.1 Frequency Error Measurement

5.1.1 Limit

Item	Limits
Frequency Tolerance	$\leq \pm 50$ ppm

5.1.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.1.3 Test Procedure

- 1 Frequency accuracy of SA shall be less than 10% of limits tolerance (5 ppm)
- 2 Setting of SA is following as: RB:1 kHz / VB:3 kHz / SPAN: 100 kHz
- 3 Center Frequency: The center frequency of testing for EUT
- 4 Sweep time: Auto
- 5 Sweep mode: Continuous sweep
- 6 Detect mode: Positive peak
- 7 Mark function: Frequency Counter (Resolution 100 Hz)
- 8 EUT have transmitted absence of modulation signal and fixed channelize. f is using the mark cursor to mark the peak frequency value, fc is declaring of channel frequency. Then the frequency error formula is $(f_c - f) / f_c \times 10^6$ ppm and the limit is less than ± 50 ppm

5.1.4 Test Deviation

There is no deviation with the original standard.

5.1.5 EUT Operation during Test

The EUT was placed on the test table and programmed in un-modulation function.

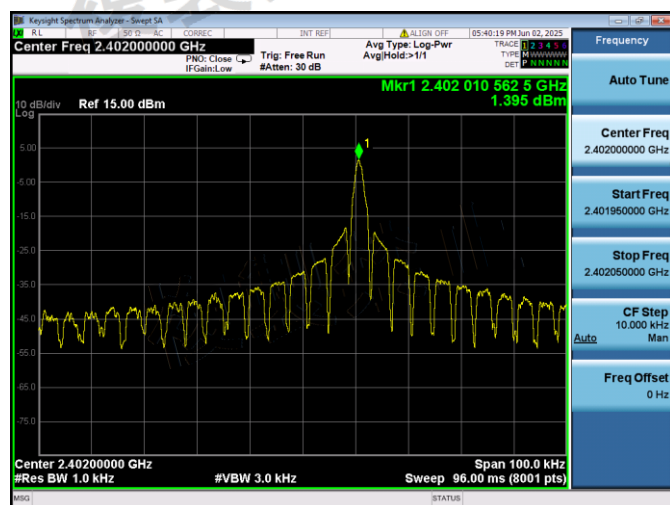
5.1.6 Test Result

Test Data for Bluetooth (Classic)

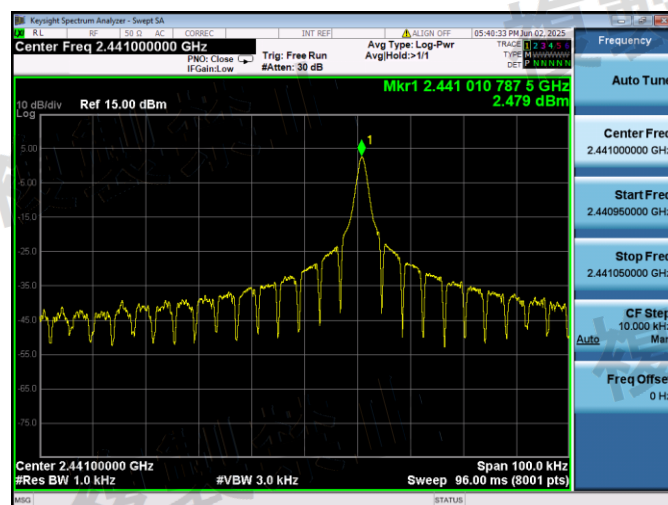
Test Mode	Test Voltage	Frequency (MHz)	Test Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)	Refer to Plot	Verdict
Unmodulated	LV	2402	2402.01056	4.40	± 50	A.1.1	Pass
		2441	2441.01079	4.42	± 50	A.1.2	Pass
		2480	2480.01096	4.42	± 50	A.1.3	Pass
	NV	2402	2402.00931	3.88	± 50	A.1.4	Pass
		2441	2441.00941	3.86	± 50	A.1.5	Pass
		2480	2480.00951	3.84	± 50	A.1.6	Pass
	HV	2402	2402.00983	4.09	± 50	A.1.7	Pass
		2441	2441.00985	4.04	± 50	A.1.8	Pass
		2480	2480.01016	4.10	± 50	A.1.9	Pass

Test Plots

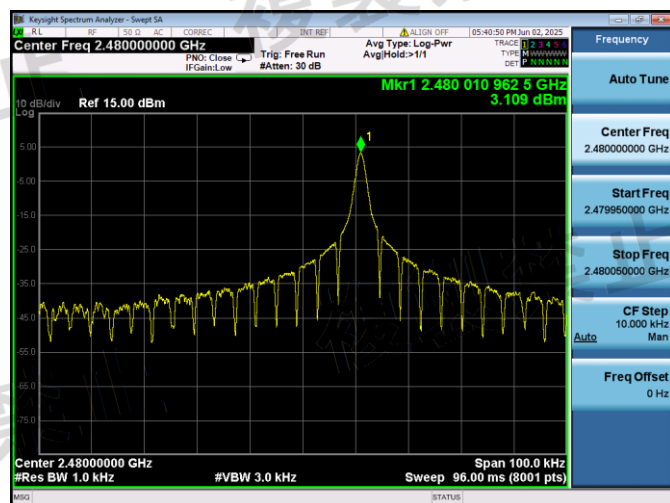
A.1.1 LV 2402 Channel



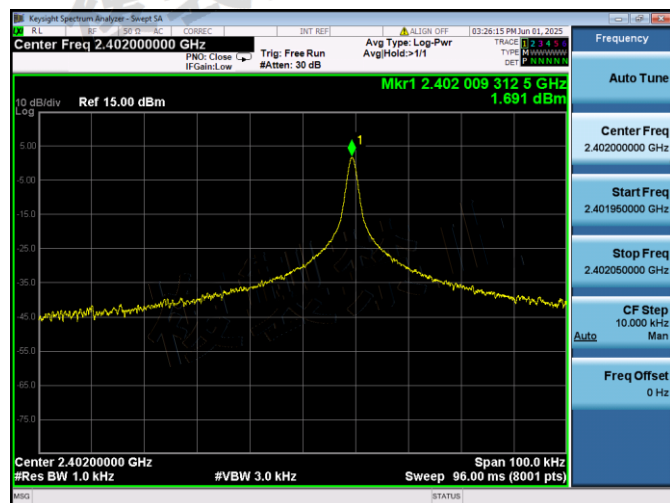
A.1.2 LV 2441 Channel



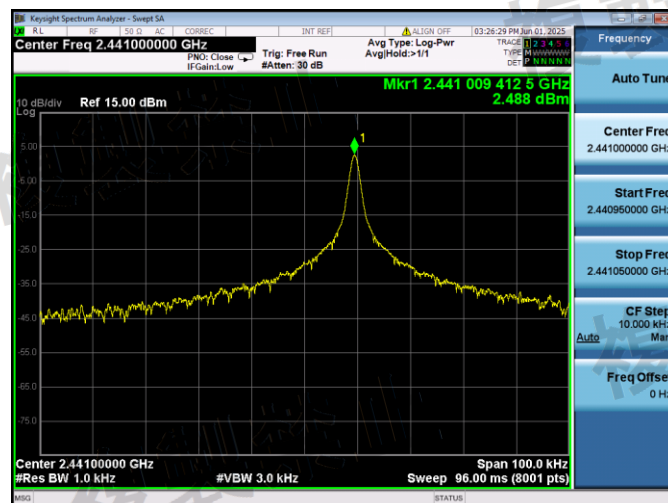
A.1.3 LV 2480 Channel



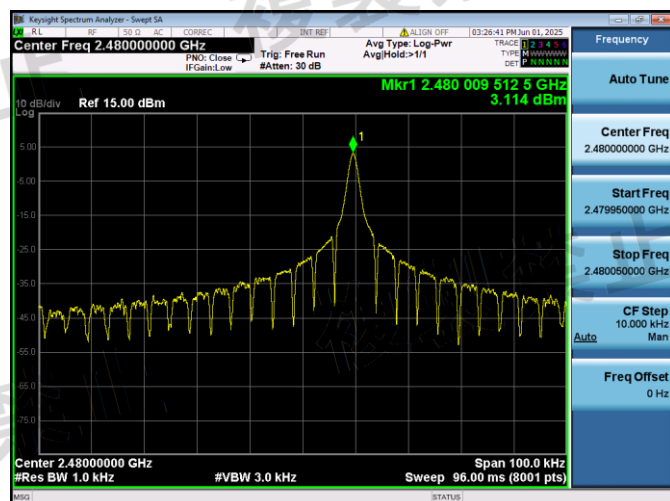
A.1.4 NV 2402 Channel



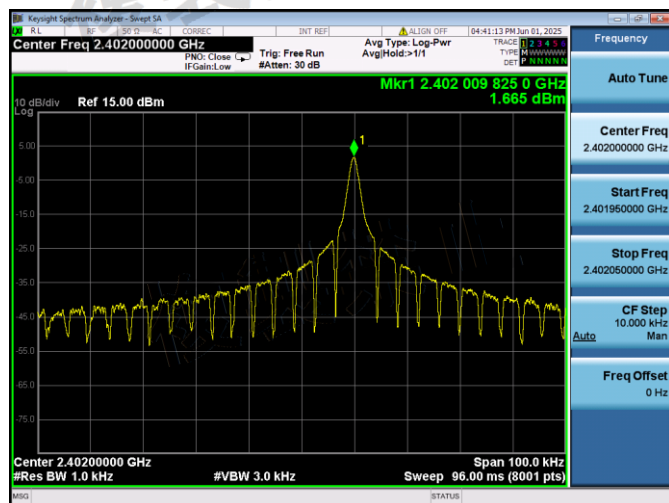
A.1.5 NV 2441 Channel



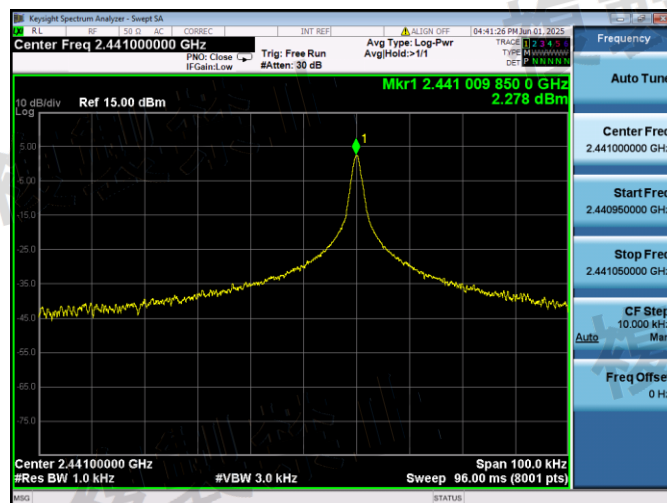
A.1.6 NV 2480 Channel



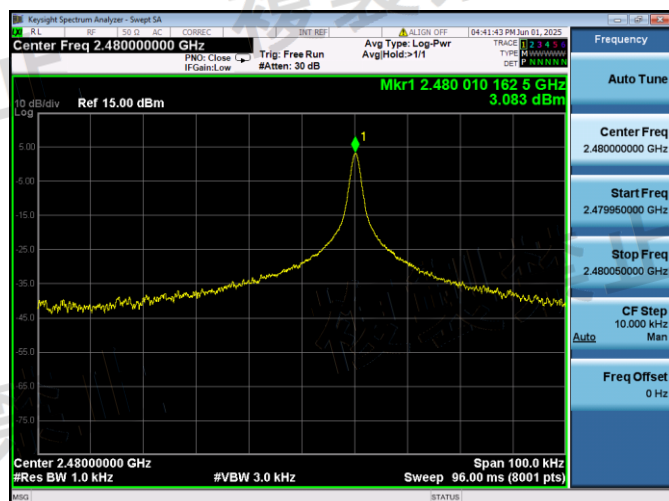
A.1.7 HV 2402 Channel



A.1.8 HV 2441 Channel



A.1.9 HV 2480 Channel



5.2 Occupied Bandwidth and Spread-spectrum Bandwidth

5.2.1 Limit

Item	Limits
Occupied Band Width	FHSS $\leq$ 83.5MHz; OFDM $\leq$ 40MHz; DSSS $\leq$ 26MHz; Others $\leq$ 26MHz

5.2.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.2.3 Test Procedure

- Set the spectrum analyzer as follows:
 - Center frequency: Test frequency
 - Span: Approximately 2 to 3.5 times nominal bandwidth
 - Resolution bandwidth: Approximately 3% or less nominal bandwidth
 - Video bandwidth: equivalent to resolution bandwidth
 - Sweep time: auto
 - Sweep mode: Continuous sweep
 - Detection: Positive peak
 - Trace mode: Maximum hold
- After repeating sweeps until the display shows steady data, store the values at all data points into the computer array variables.
- Convert the dB values at all data points to antilogarithm on the power dimension.
- Obtain sum total of the power at all data points, and store it as "total power".
- Accumulate the power at each data point sequentially upward from the lowest frequency and obtain the limit data point where the accumulated power becomes 0.5% (5% for spreading bandwidth) of the "total power". Then convert the limit data point into frequency and store it as "lower limit frequency"
- Accumulate the power at each data point sequentially downward from the highest frequency and obtain the limit data point where the accumulated power becomes 0.5% (5% for spreading bandwidth) of the "total power". Then convert the limit data point into frequency and store it as "upper limit frequency".

5.2.4 Test Deviation

There is no deviation with the original standard.

5.2.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.2.6 Test Result

Test Data for Bluetooth (Classic)

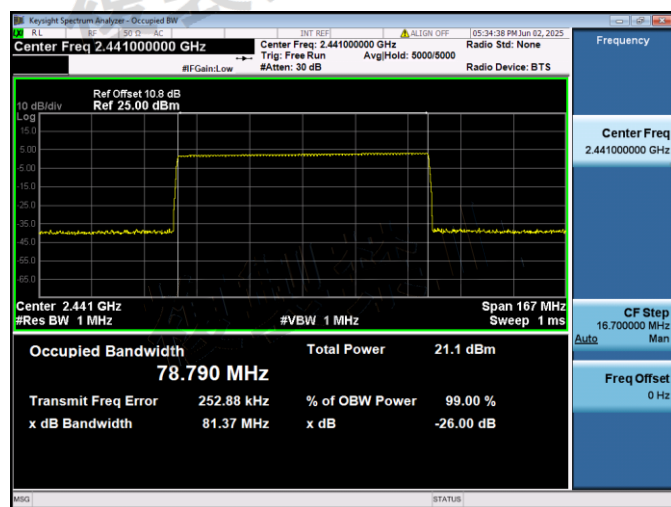
Results of Occupied Bandwidth	MODE	Test Voltage	Measured 99% Occupied Bandwidth (MHz)	Occupied Bandwidth Limit (MHz)	Refer to Plot	Verdict
	GFSK	LV	78.79	≤ 83.5	A.2.1	Pass
		NV	78.79	≤ 83.5	A.2.2	Pass
		HV	78.80	≤ 83.5	A.2.3	Pass
	$\pi/4$ -DQPSK	LV	78.88	≤ 83.5	A.2.4	Pass
		NV	78.88	≤ 83.5	A.2.5	Pass
		HV	78.89	≤ 83.5	A.2.6	Pass
Results of Spread-spectrum Bandwidth	MODE	Test Voltage	Measured 90% Spread-spectrum Bandwidth (MHz)		Refer to Plot	Verdict
	GFSK	LV	71.46		A.2.7	Pass
		NV	71.46		A.2.8	Pass
		HV	71.45		A.2.9	Pass
	$\pi/4$ -DQPSK	LV	71.62		A.2.10	Pass
		NV	71.48		A.2.11	Pass
		HV	71.46		A.2.12	Pass

Test Data for AFH Mode

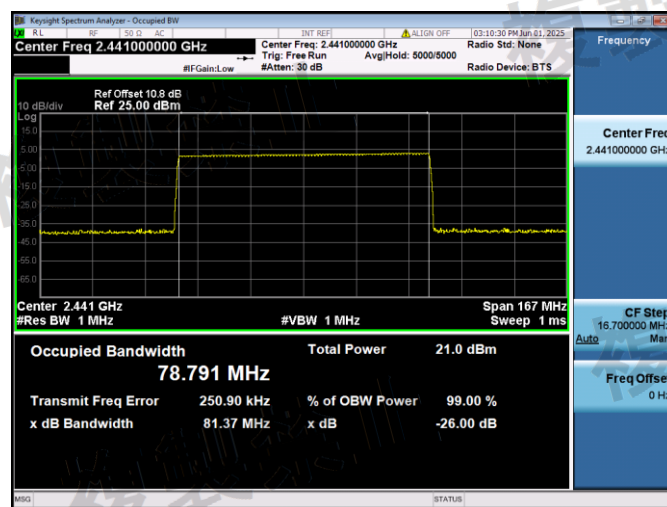
Results of Occupied Bandwidth	MODE	Test Voltage	Measured 99% Occupied Bandwidth (MHz)	Occupied Bandwidth Limit (MHz)	Refer to Plot	Verdict
	GFSK	LV	20.55	≤ 83.5	A.2.13	Pass
		NV	20.56	≤ 83.5	A.2.14	Pass
		HV	20.55	≤ 83.5	A.2.15	Pass
	$\pi/4$ -DQPSK	LV	20.75	≤ 83.5	A.2.16	Pass
		NV	20.76	≤ 83.5	A.2.17	Pass
		HV	20.78	≤ 83.5	A.2.18	Pass
Results of Spread-spectrum Bandwidth	MODE	Test Voltage	Measured 90% Spread-spectrum Bandwidth (MHz)		Refer to Plot	Verdict
	GFSK	LV	18.51		A.2.19	Pass
		NV	18.53		A.2.20	Pass
		HV	18.53		A.2.21	Pass
	$\pi/4$ -DQPSK	LV	18.63		A.2.22	Pass
		NV	18.64		A.2.23	Pass
		HV	18.60		A.2.24	Pass

Test Plots (Occupied Bandwidth)

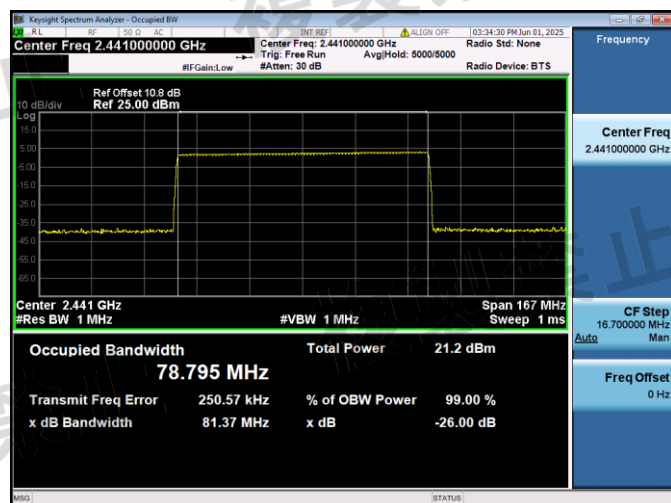
A.2.1 GFSK LV

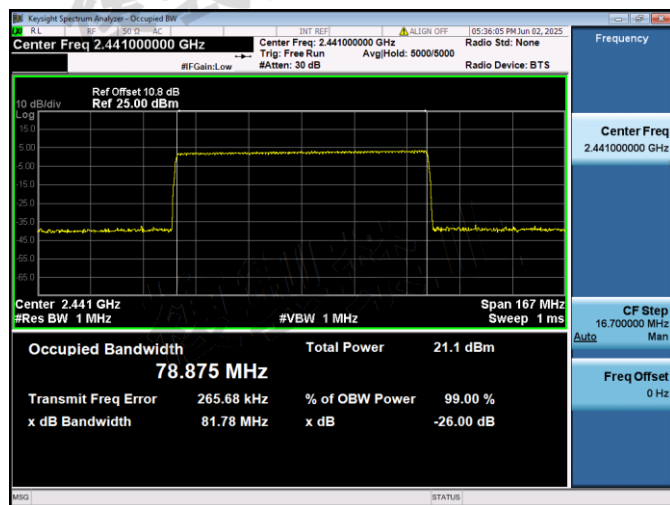
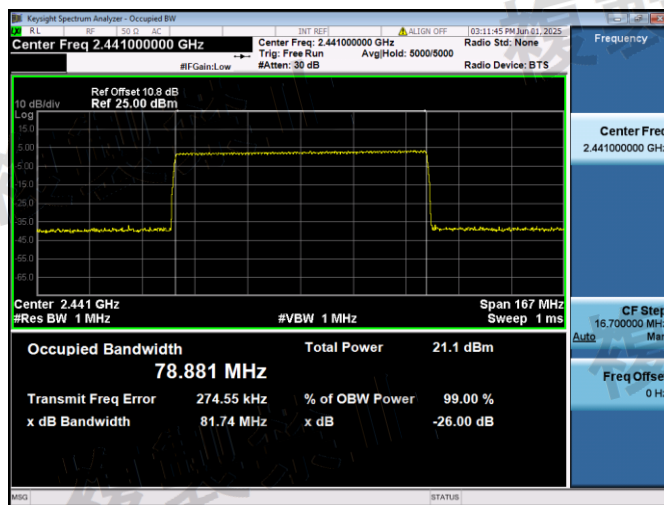
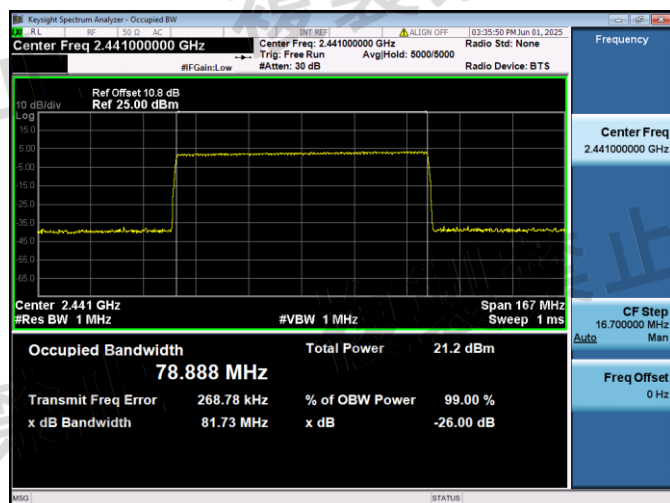


A.2.2 GFSK NV



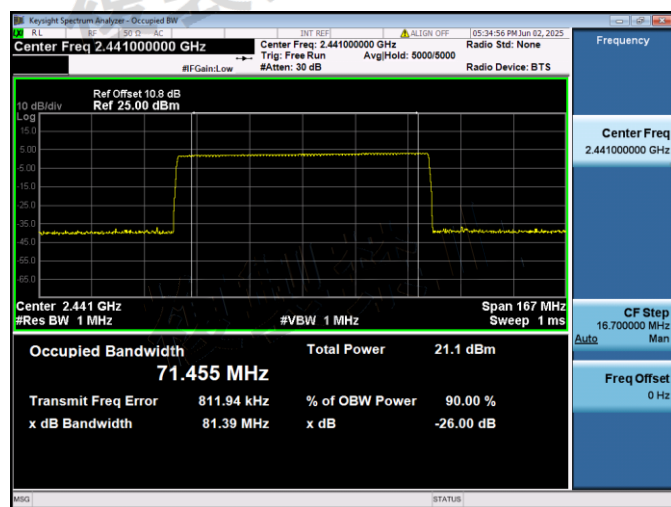
A.2.3 GFSK HV



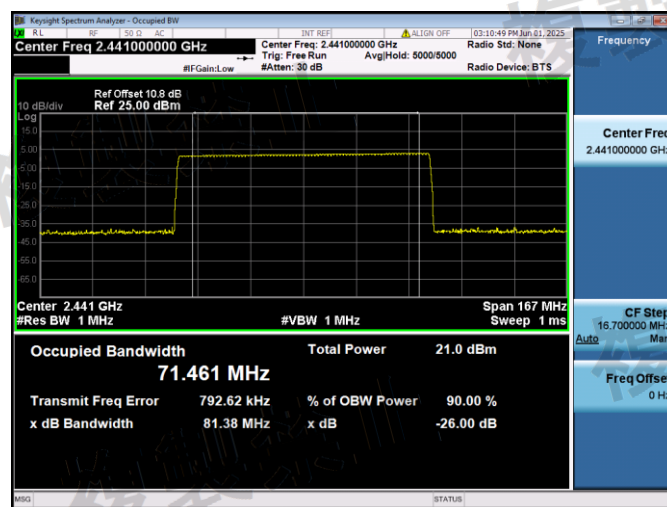
A.2.4 $\pi/4$ -DQPSK LVA.2.5 $\pi/4$ -DQPSK NVA.2.6 $\pi/4$ -DQPSK HV

Test Plots (Spread-spectrum Bandwidth)

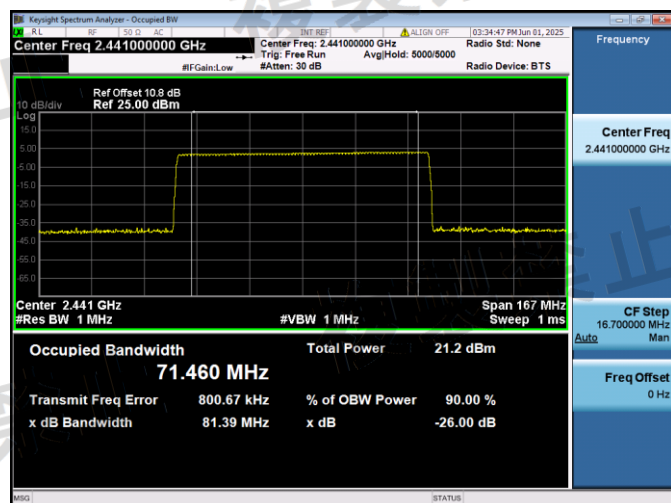
A.2.7 GFSK LV

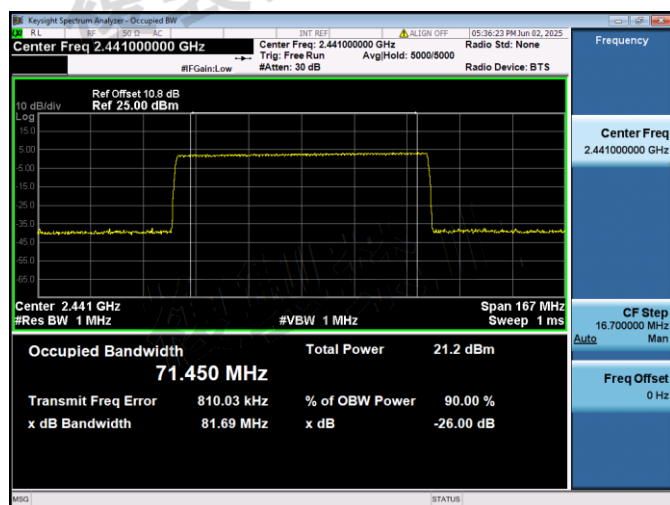
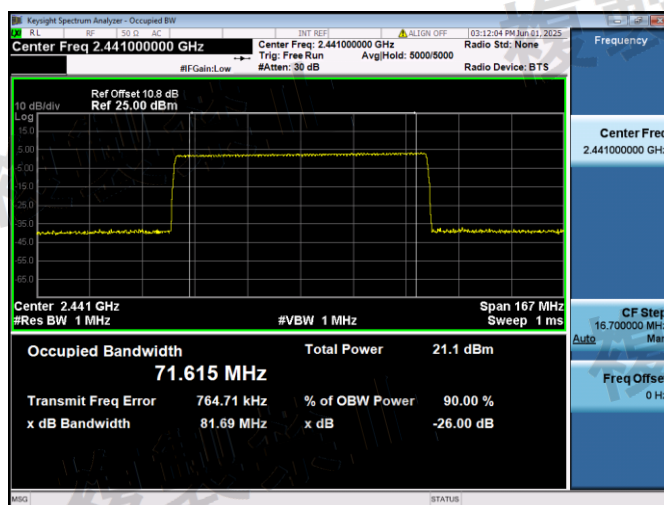
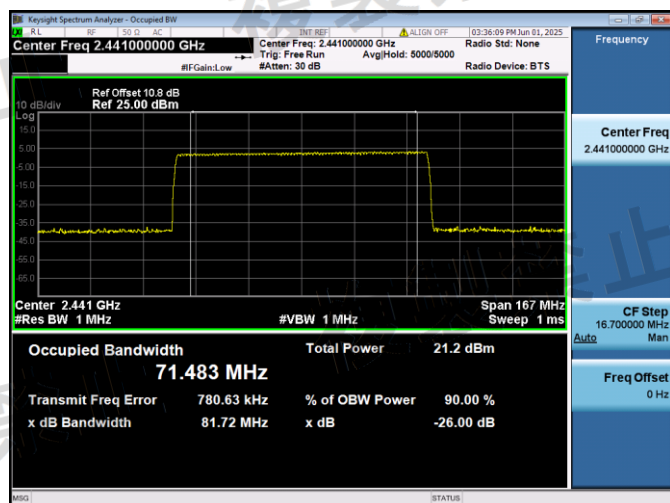


A.2.8 GFSK NV



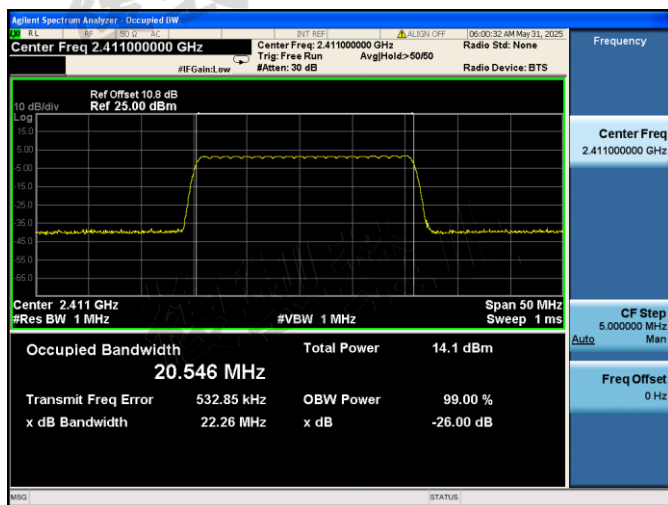
A.2.9 GFSK HV



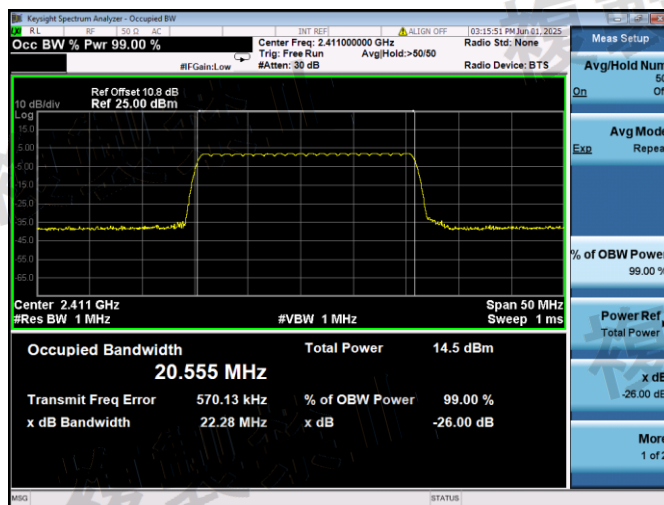
A.2.10 $\pi/4$ -DQPSK LVA.2.11 $\pi/4$ -DQPSK NVA.2.12 $\pi/4$ -DQPSK HV

Test Plots (Occupied Bandwidth)-AFH Mode

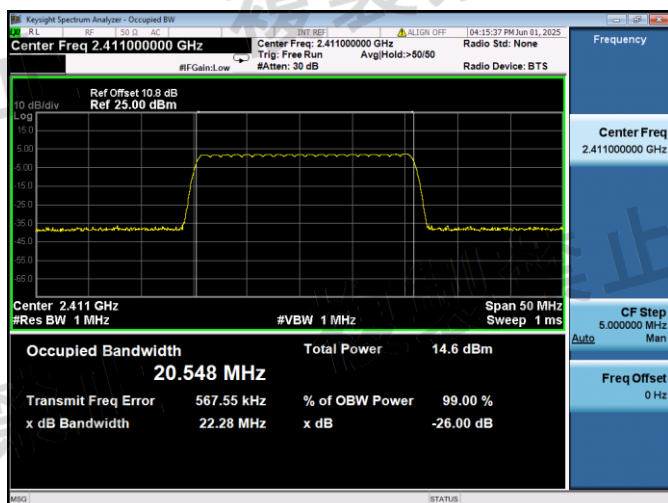
A.2.13 GFSK LV

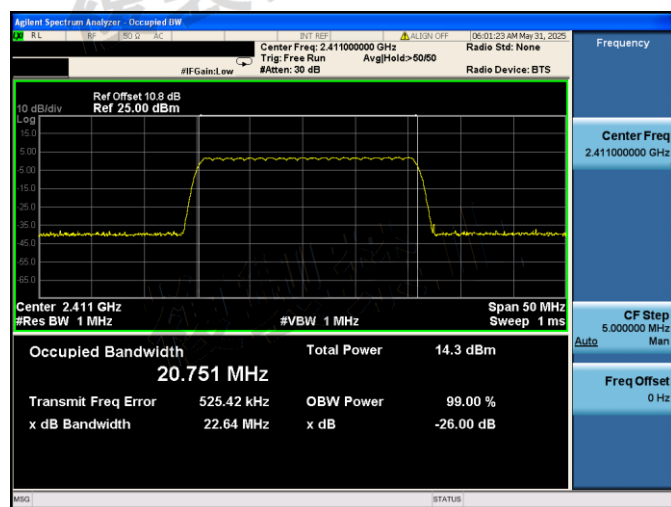
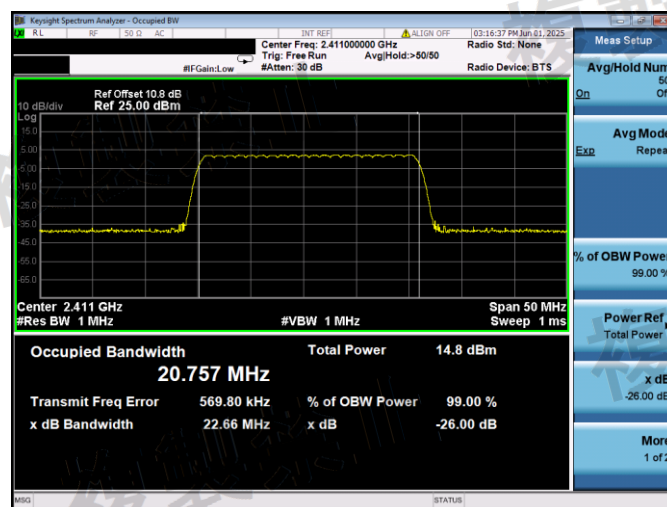
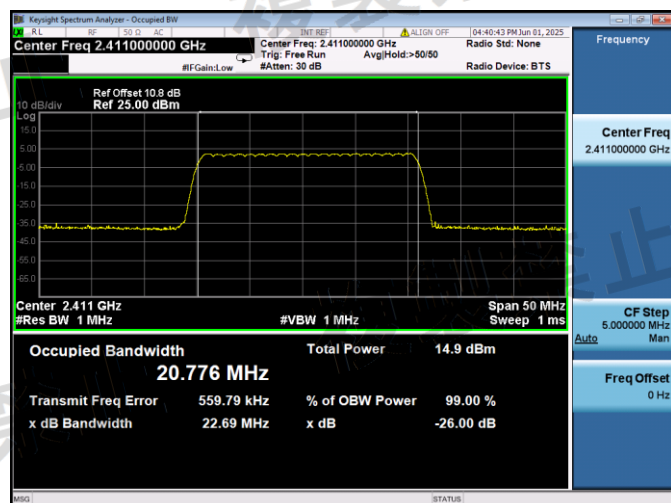


A.2.14 GFSK NV



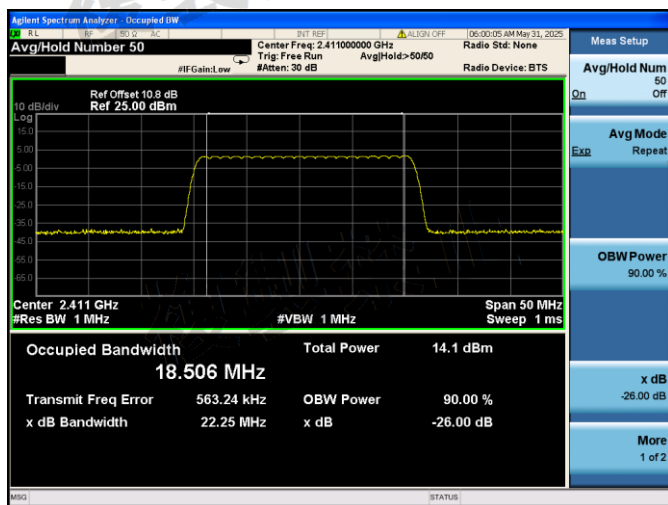
A.2.15 GFSK HV



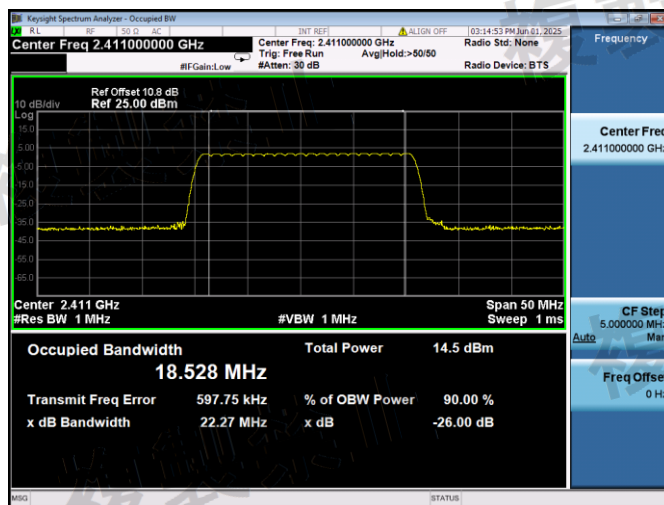
A.2.16 $\pi/4$ -DQPSK LVA.2.17 $\pi/4$ -DQPSK NVA.2.18 $\pi/4$ -DQPSK HV

Test Plots (Spread-spectrum Bandwidth)-AFH Mode

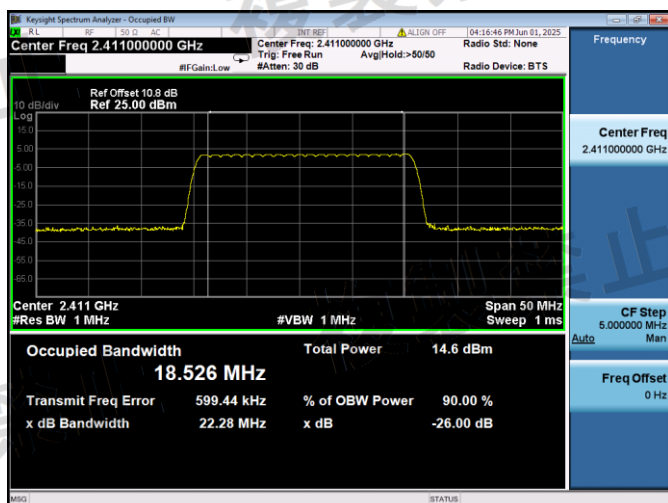
A.2.19 GFSK LV

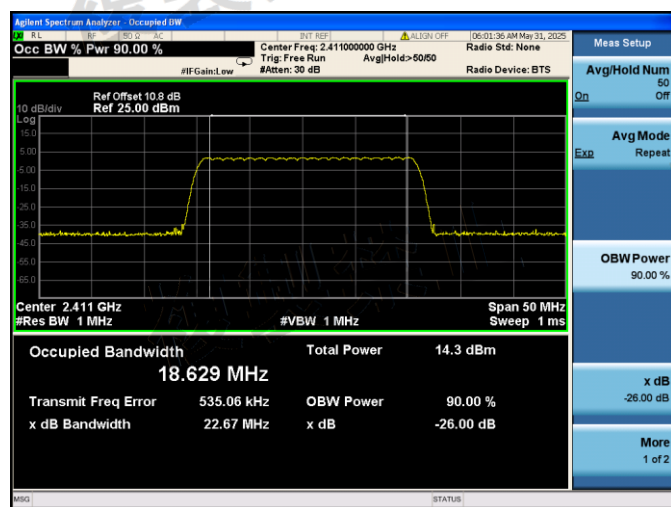
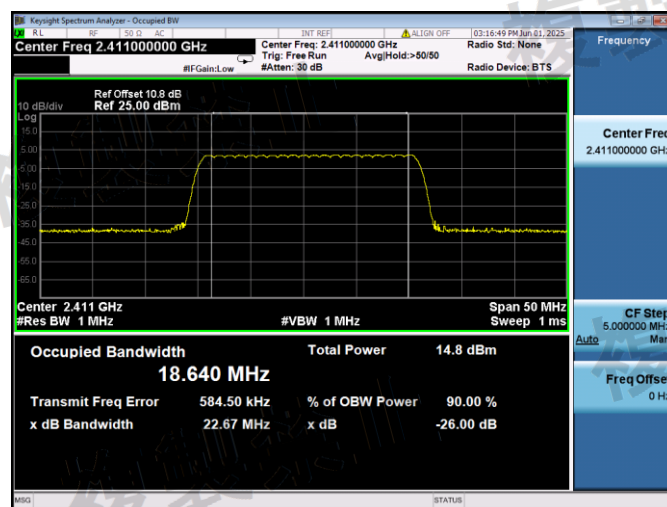
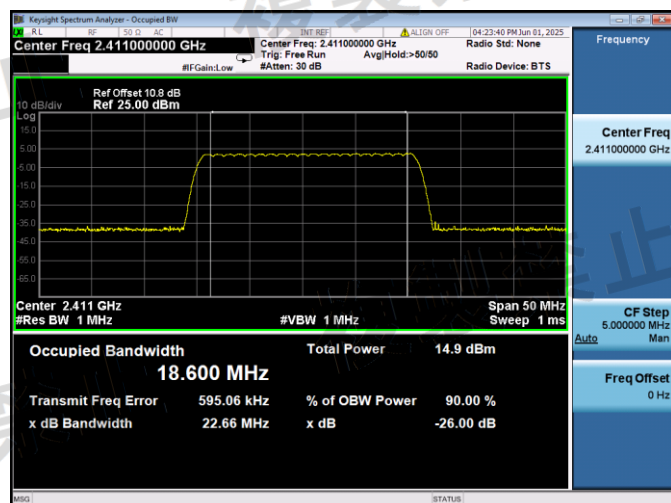


A.2.20 GFSK NV



A.2.21 GFSK HV



A.2.22 $\pi/4$ -DQPSK LVA.2.23 $\pi/4$ -DQPSK NVA.2.24 $\pi/4$ -DQPSK HV

5.3 The frequency retention time

5.3.1 Limit

Item	Limits
retention time	For the radio equipment that uses the frequency hopping method excluding a combination of the spread spectrum method and OFDM, the total sum of the frequency retention time in any frequency within the time obtained by multiplying the diffusion rate by 0.4 second shall be 0.4 second or shorter

5.3.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.3.3 Measuring Instruments and setting

Spectrum analyzer setting up is as follows.

Center frequency Hopping test frequency

Sweep bandwidth 0 Hz

Resolvable bandwidth 1 MHz

Video bandwidth equivalent to resolvable bandwidth

Y-axis scale 10 dB/Div.

Sweep time hopping cycle

Sweep mode Single sweep

Trigger condition Video trigger

Detection mode Positive peak

5.3.4 Test procedure

- (1) Set the spectrum analyzer according to the above 2 and wait the hopping signal with the hopping frequency.
- (2) Read the maximum level of the residence time of the hopping frequency at hopping cycle using marker etc. from the trace on the display and confirm that it is shorter than 0.4sec.
- (3) By means of the method same to the above (2), read the sum of the residence time of the hopping frequency at hopping cycle.
- (4) Calculate the total of frequency residence time of the hopping frequency as follows.
 1. Total = (0.4s x diffusion rate / hopping cycle) x sum of the residence time of (3)
 2. There, "diffusion rate" is a value of the diffusion bandwidth divided by a frequency equal to transmitting velocity of modulation signal.

5.3.5 Test Result

Test Data

GFSK Mode:

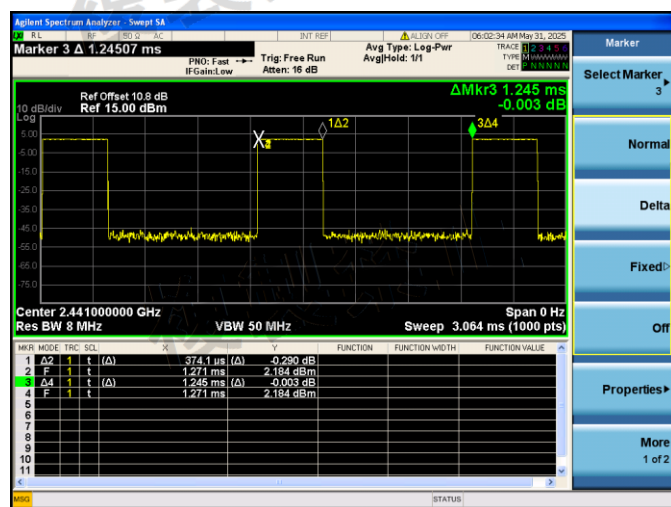
Package Mode	Test Voltage	On Time (ms)	On+Off Time (ms)	Duty Cycle	Total of Dwell (ms)	Limit (ms)	Refer to Plot	Verdict
DH1	LV	0.374	1.245	0.300	108.714	≤400	A.3.1	Pass
DH3		1.629	2.493	0.653	236.409	≤400	A.3.2	Pass
DH5		2.878	3.752	0.767	277.519	≤400	A.3.3	Pass
DH1	NV	0.365	1.251	0.292	105.511	≤400	A.3.4	Pass
DH3		1.611	2.507	0.643	232.511	≤400	A.3.5	Pass
DH5		2.848	3.737	0.762	275.752	≤400	A.3.6	Pass
DH1	HV	0.365	1.251	0.292	105.510	≤400	A.3.7	Pass
DH3		1.611	2.507	0.643	232.508	≤400	A.3.8	Pass
DH5		2.863	3.752	0.763	276.092	≤400	A.3.9	Pass

 $\pi/4$ -DQPSK Mode:

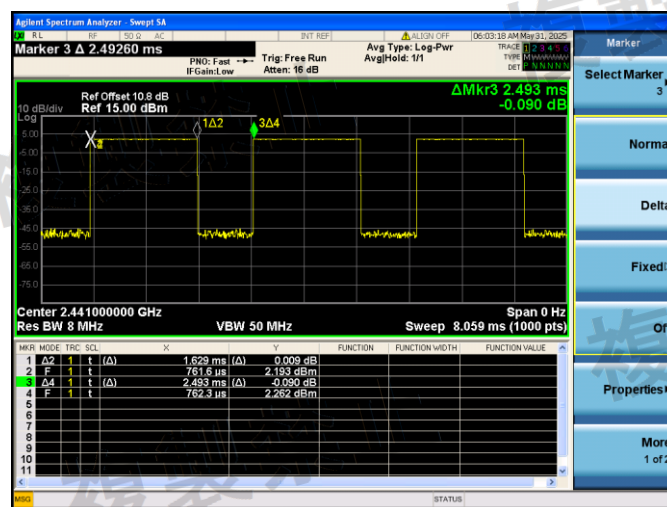
Package Mode	Test Voltage	On Time (ms)	On+Off Time (ms)	Duty Cycle	Total of Dwell (ms)	Limit (ms)	Refer to Plot	Verdict
2DH1	LV	0.370	1.241	0.298	107.832	≤400	A.3.10	Pass
2DH3		1.631	2.497	0.653	236.304	≤400	A.3.11	Pass
2DH5		2.878	3.737	0.770	278.614	≤400	A.3.12	Pass
2DH1	NV	0.375	1.246	0.301	109.102	≤400	A.3.13	Pass
2DH3		1.611	2.497	0.645	233.945	≤400	A.3.14	Pass
2DH5		2.863	3.737	0.766	277.802	≤400	A.3.15	Pass
2DH1	HV	0.375	1.246	0.301	108.901	≤400	A.3.16	Pass
2DH3		1.621	2.507	0.647	234.026	≤400	A.3.17	Pass
2DH5		2.848	3.737	0.762	275.837	≤400	A.3.18	Pass

Test Plots

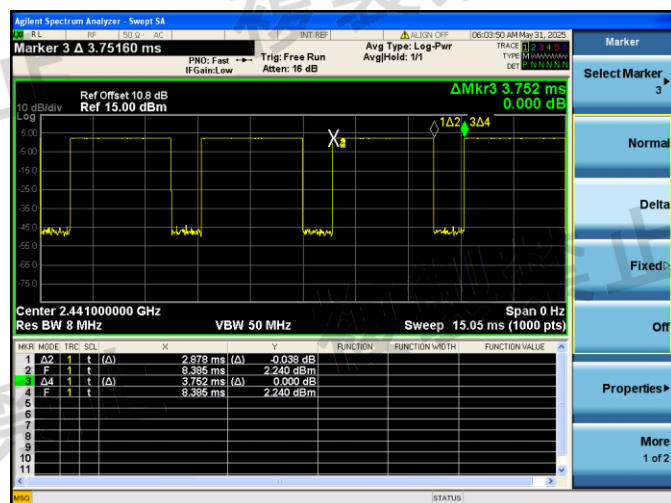
A.3.1. GFSK DH1 LV



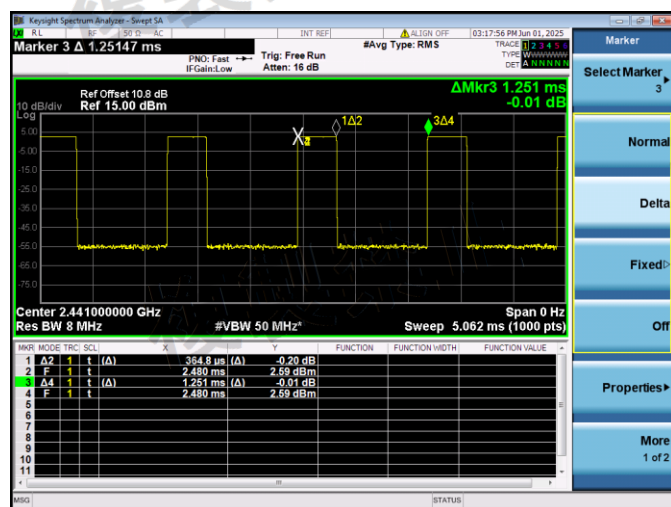
A.3.2. GFSK DH3 LV



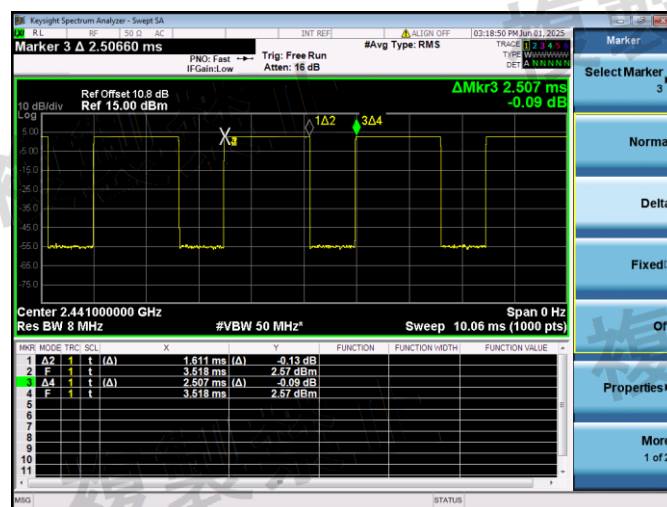
A.3.3. GFSK DH5 LV



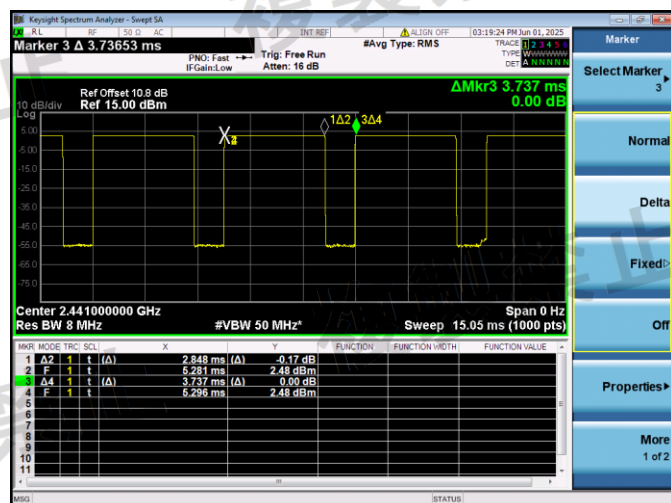
A.3.4. GFSK DH1 NV



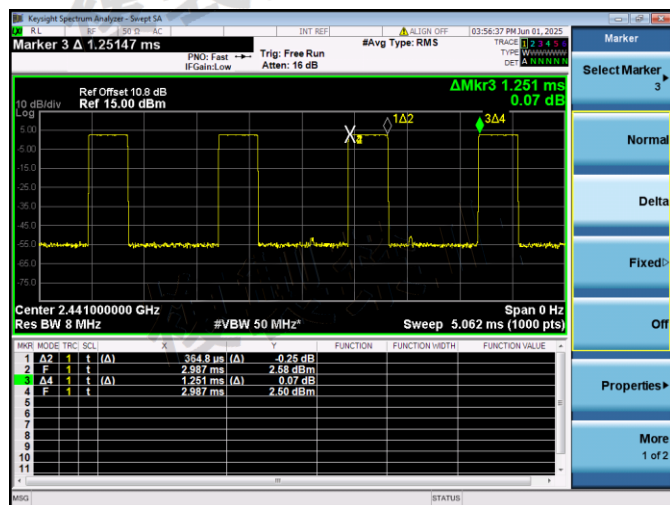
A.3.5. GFSK DH3 NV



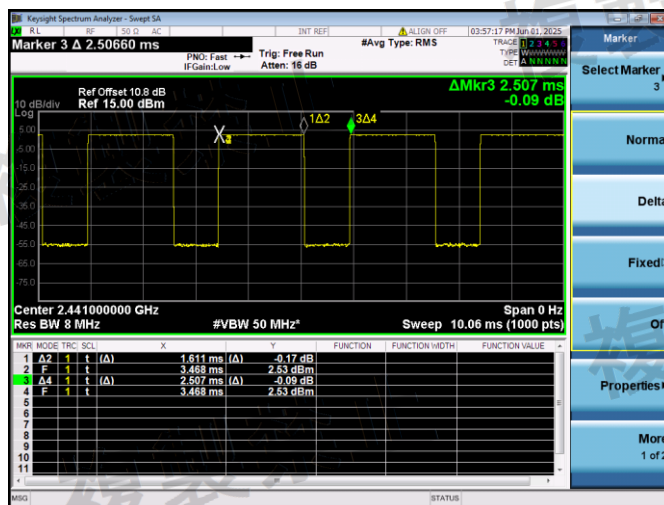
A.3.6. GFSK DH5 NV



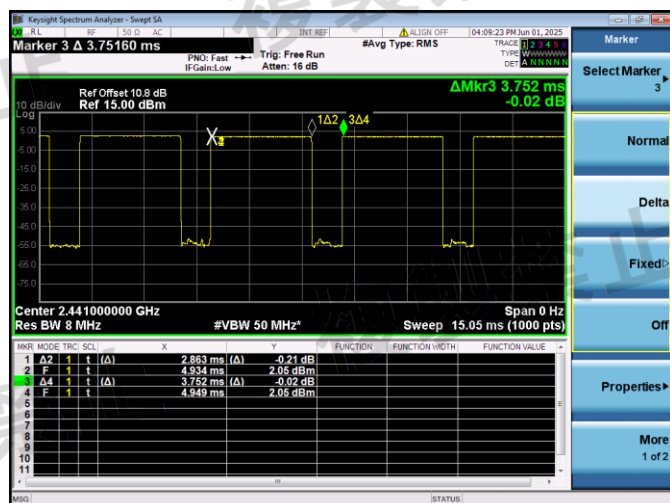
A.3.7. GFSK DH1 HV

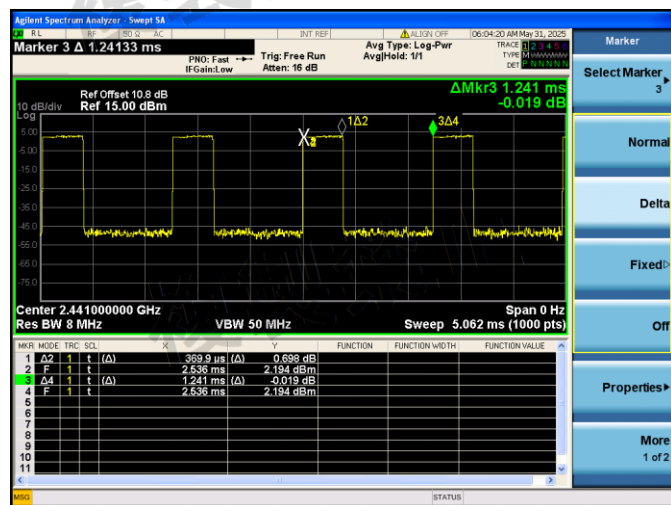
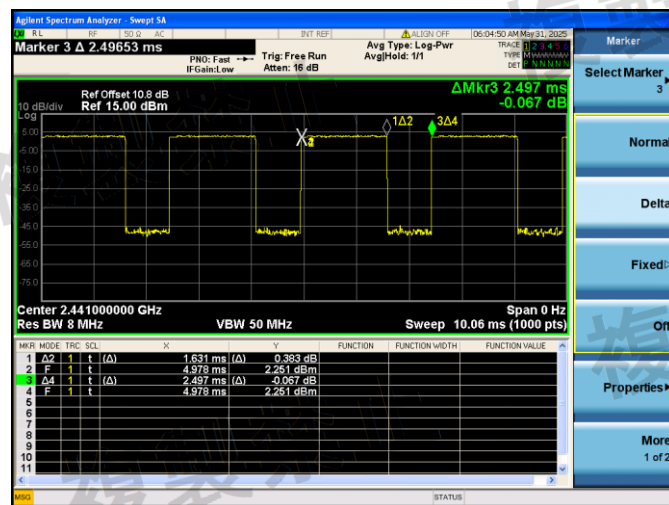
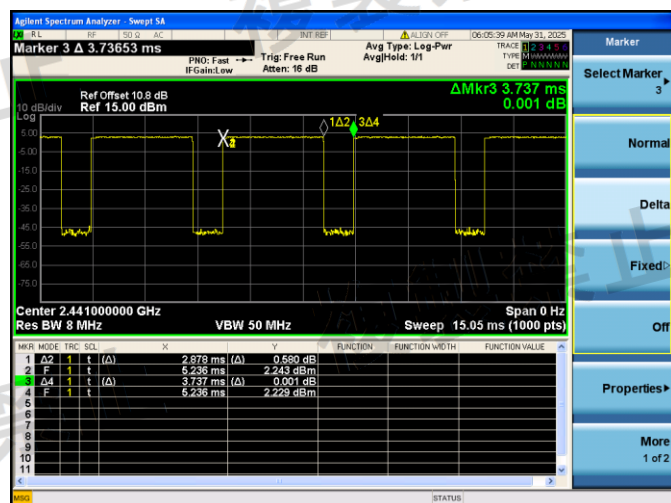


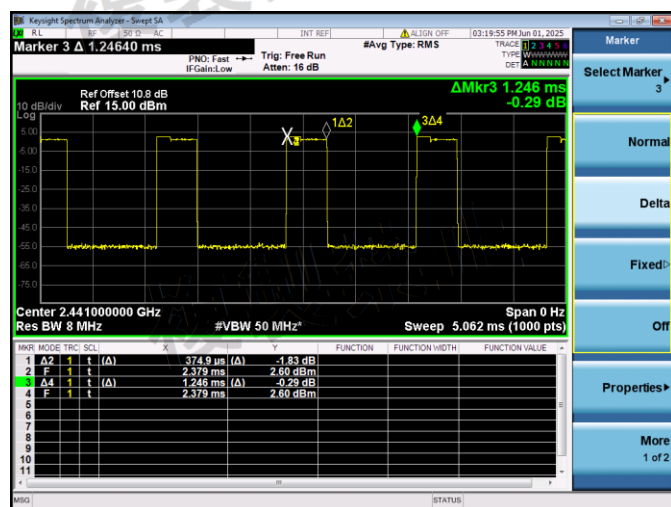
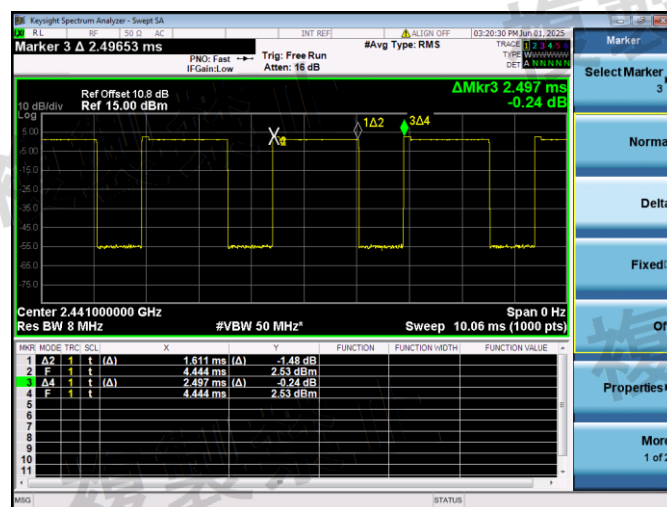
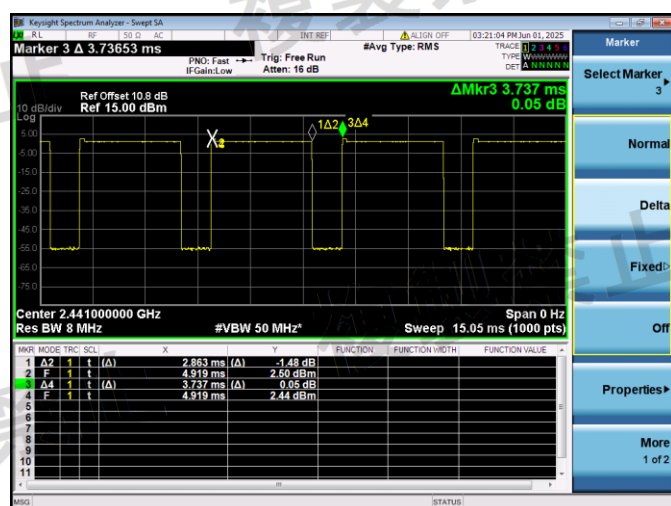
A.3.8. GFSK DH3 HV

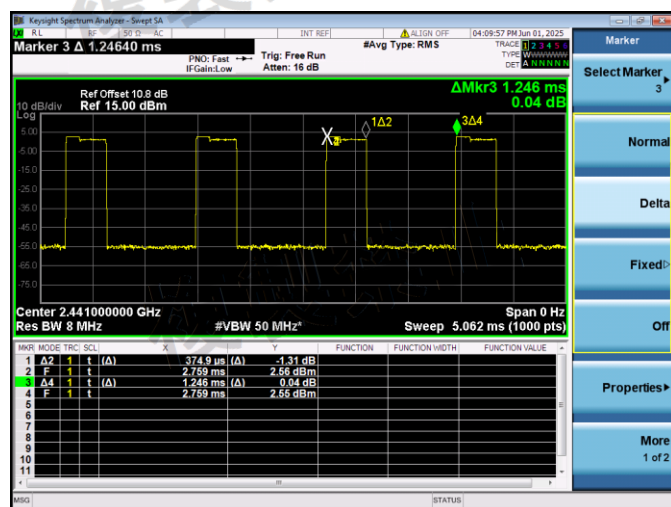
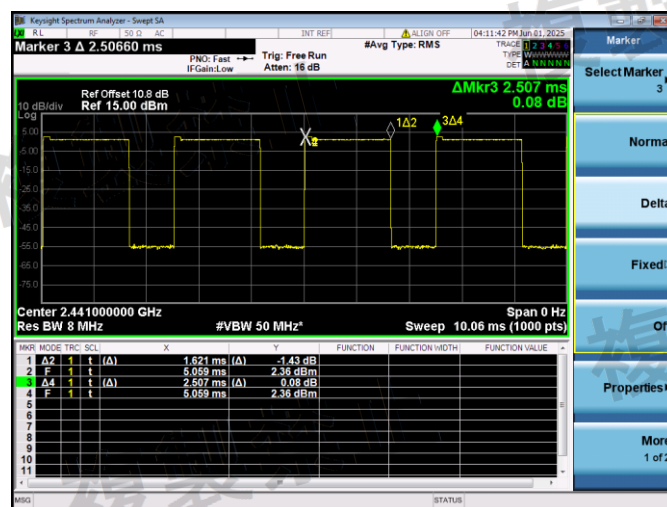
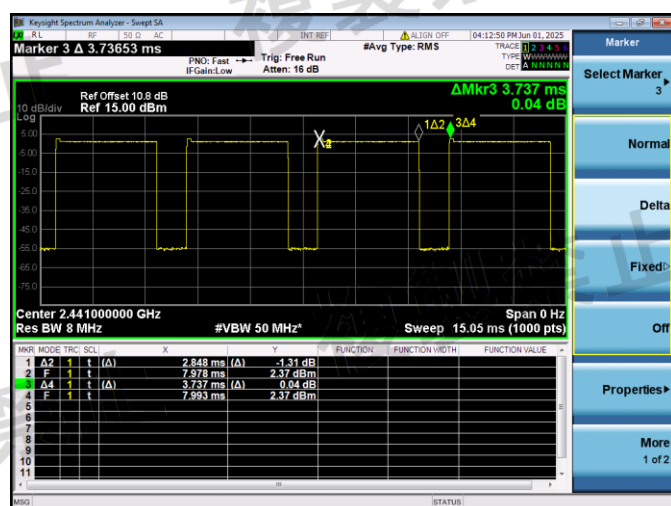


A.3.9. GFSK DH5 HV



A.3.10. $\pi/4$ -DQPSK 2DH1 LVA.3.11. $\pi/4$ -DQPSK 2DH3 LVA.3.12. $\pi/4$ -DQPSK 2DH5 LV

A.3.13. $\pi/4$ -DQPSK 2DH1 NVA.3.14. $\pi/4$ -DQPSK 2DH3 NVA.3.15. $\pi/4$ -DQPSK 2DH5 NV

A.3.16. $\pi/4$ -DQPSK 2DH1 HVA.3.17. $\pi/4$ -DQPSK 2DH3 HVA.3.18. $\pi/4$ -DQPSK 2DH5 HV

5.4 Unwanted Emission Intensity Measurement

5.4.1 Limit

Item	Limits
TX Spurious Emission	$\leq 2.5\mu\text{W}$ (2387MHz > f ; 2496.5MHz < f)
	$\leq 25\mu\text{W}$ (2387MHz $\leq$ f < 2400MHz) and (2483.5MHz < f $\leq$ 2496.5MHz)

5.4.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.4.3 Test Procedure

- 1 The EUT is placed in transmit mode at maximum power/modulation at a fixed channel.
- 2 Setting of SA is following as: RBW/VBW = 1MHz; / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- 3 Setting of SA is following as 30 MHz and stop frequency 2387 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
- 4 SA adjusted to start frequency 2387 MHz and stop frequency 2400 MHz. Then to mark peak reading value + cable loss shall be less than 25 μW .
- 5 SA adjusted to start frequency 2483.5 MHz and stop frequency 2496.5 MHz Then to mark peak reading value + cable loss shall be less than 25 μW
- 6 SA adjusted to start frequency 2496.5 MHz and stop frequency 12500 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
- 7 Measure side band spurious as follows: For 2.4 GHz band: 2374 MHz~2400 MHz and 2483.5 MHz~2509.5 MHz RBW = VBW = 30 kHz, Result_Value = Measured_Value + 15.2 [dBm]
- 8 If the Result_Value is over the requirement, take total sum of 1MHz band centered at the spur frequency like ACLP measurement as Result_Value.

5.4.4 Test Deviation

There is no deviation with the original standard.

5.4.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

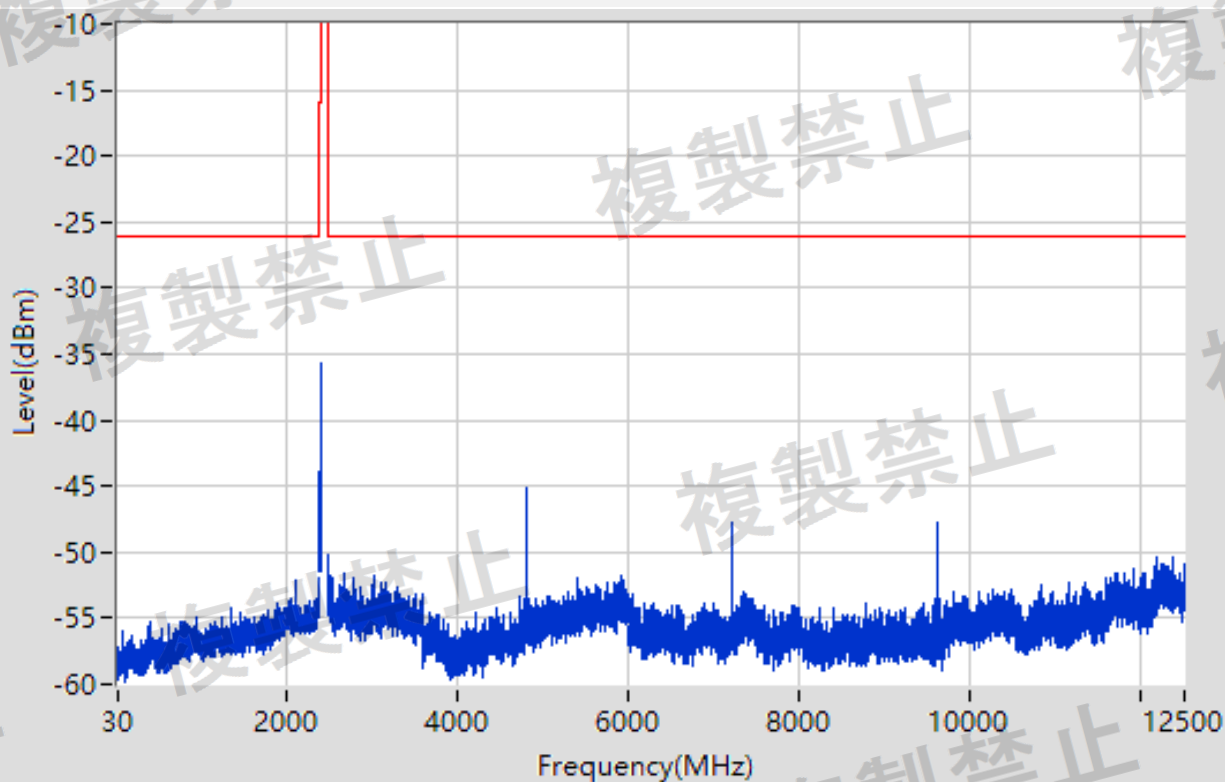
5.4.6 Test Result

Test Data

Mode	Test Voltage	Channel	Refer to Plot	Verdict
GFSK	LV	Low	A.4.1	Pass
	NV		A.4.2	Pass
	HV		A.4.3	Pass
	LV	Middle	A.4.4	Pass
	NV		A.4.5	Pass
	HV		A.4.6	Pass
	LV	High	A.4.7	Pass
	NV		A.4.8	Pass
	HV		A.4.9	Pass
$\pi/4$ -DQPSK	LV	Low	A.4.10	Pass
	NV		A.4.11	Pass
	HV		A.4.12	Pass
	LV	Middle	A.4.13	Pass
	NV		A.4.14	Pass
	HV		A.4.15	Pass
	LV	High	A.4.16	Pass
	NV		A.4.17	Pass
	HV		A.4.18	Pass

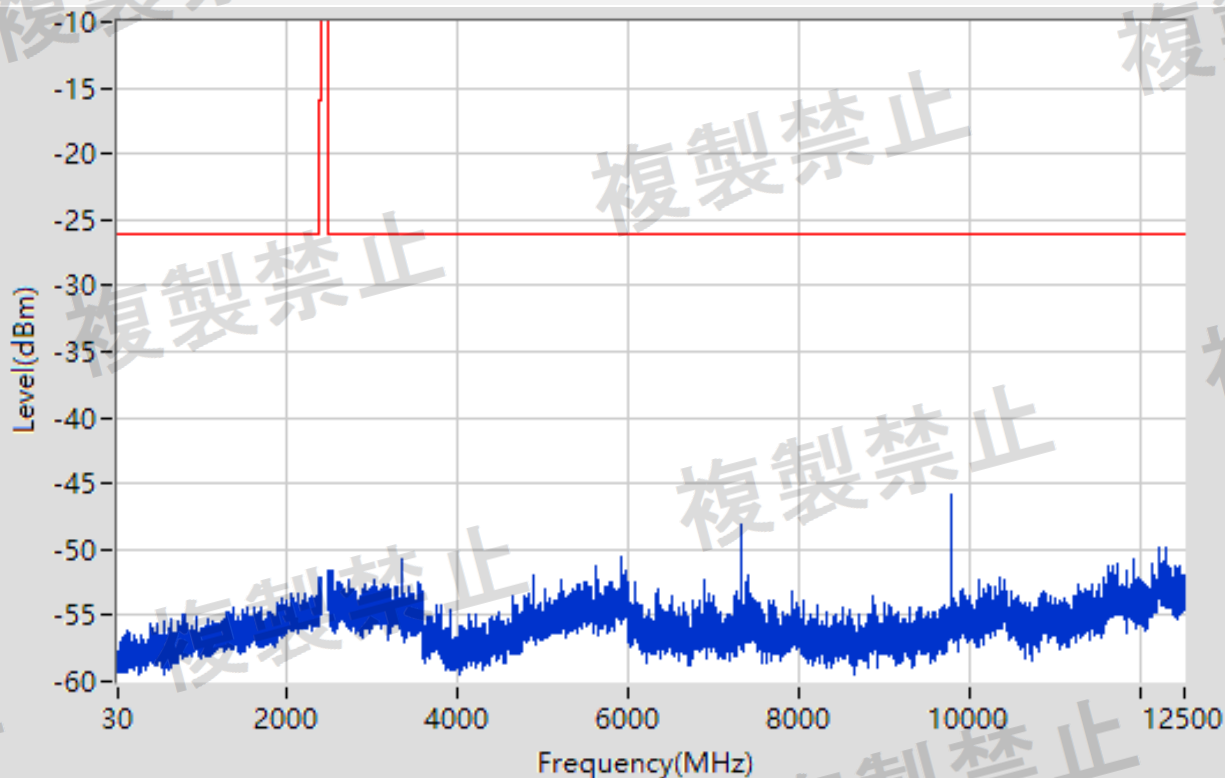
Test Plots

A.4.1 GFSK LV Low Channel



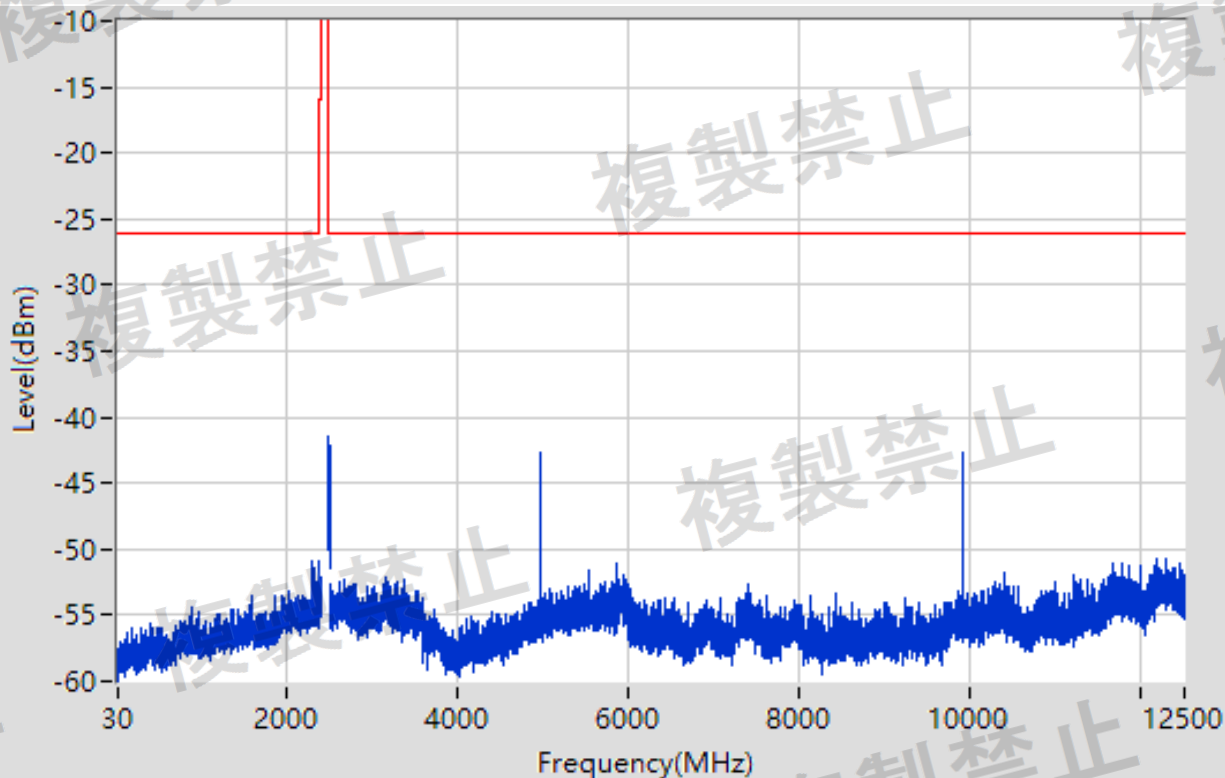
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	952	-54.89	0.003	2.5	Pass
1000	2374	1	Peak	2374	-51.88	0.006	2.5	Pass
2374	2387	1	Peak	2379.103	-43.97	0.040	2.5	Pass
2387	2400	1	Peak	2400	-35.73	0.267	25	Pass
2483.5	2496.5	1	Peak	2483.598	-51.83	0.007	25	Pass
2496.5	2509.5	1	Peak	2498.288	-50.27	0.009	2.5	Pass
2509.5	6000	1	Peak	4803.829	-45.18	0.030	2.5	Pass
6000	12500	1	Peak	9608	-47.7	0.017	2.5	Pass

A.4.2 GFSK LV Middle Channel



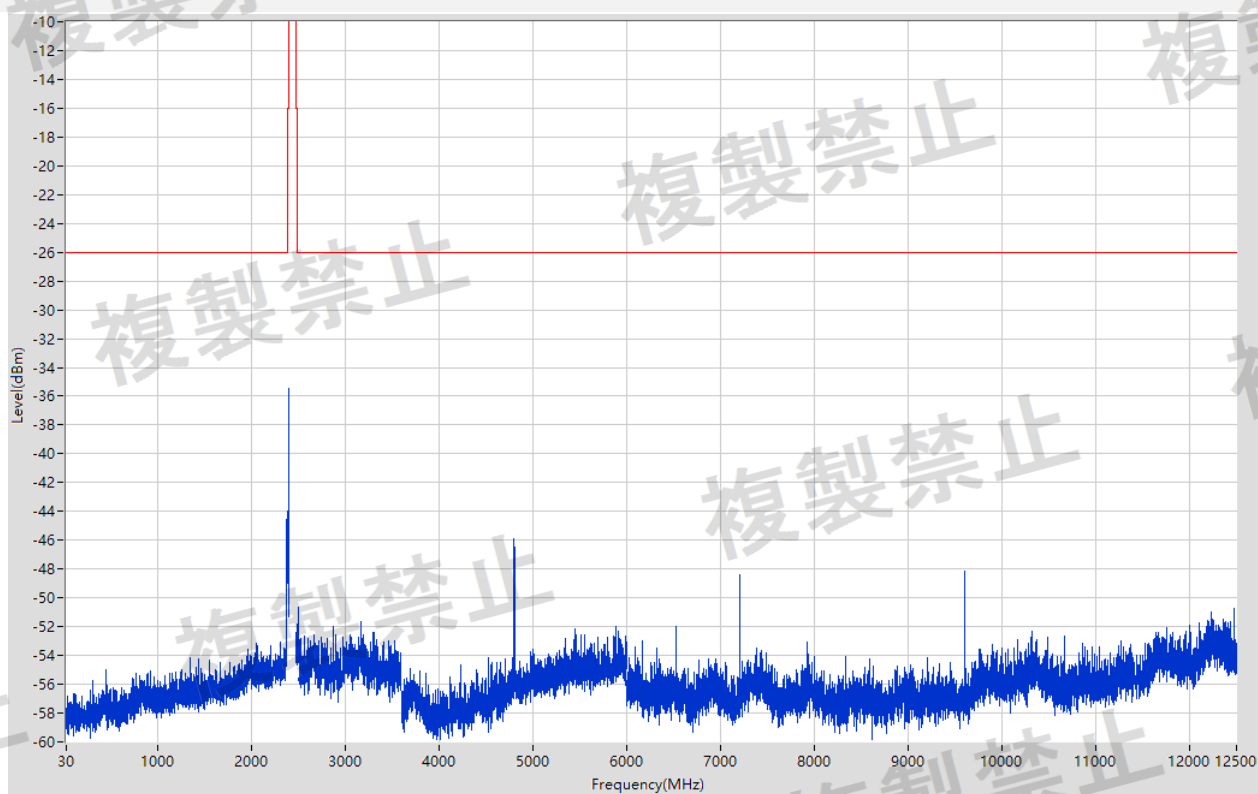
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	807	-54.86	0.003	2.5	Pass
1000	2374	1	Peak	2133	-53.3	0.005	2.5	Pass
2374	2387	1	Peak	2378.713	-52.15	0.006	2.5	Pass
2387	2400	1	Peak	2399.285	-52.11	0.006	25	Pass
2483.5	2496.5	1	Peak	2488.733	-51.59	0.007	25	Pass
2496.5	2509.5	1	Peak	2507.973	-51.55	0.007	2.5	Pass
2509.5	6000	1	Peak	5911.987	-50.63	0.009	2.5	Pass
6000	12500	1	Peak	9764	-45.81	0.026	2.5	Pass

A.4.3 GFSK LV High Channel



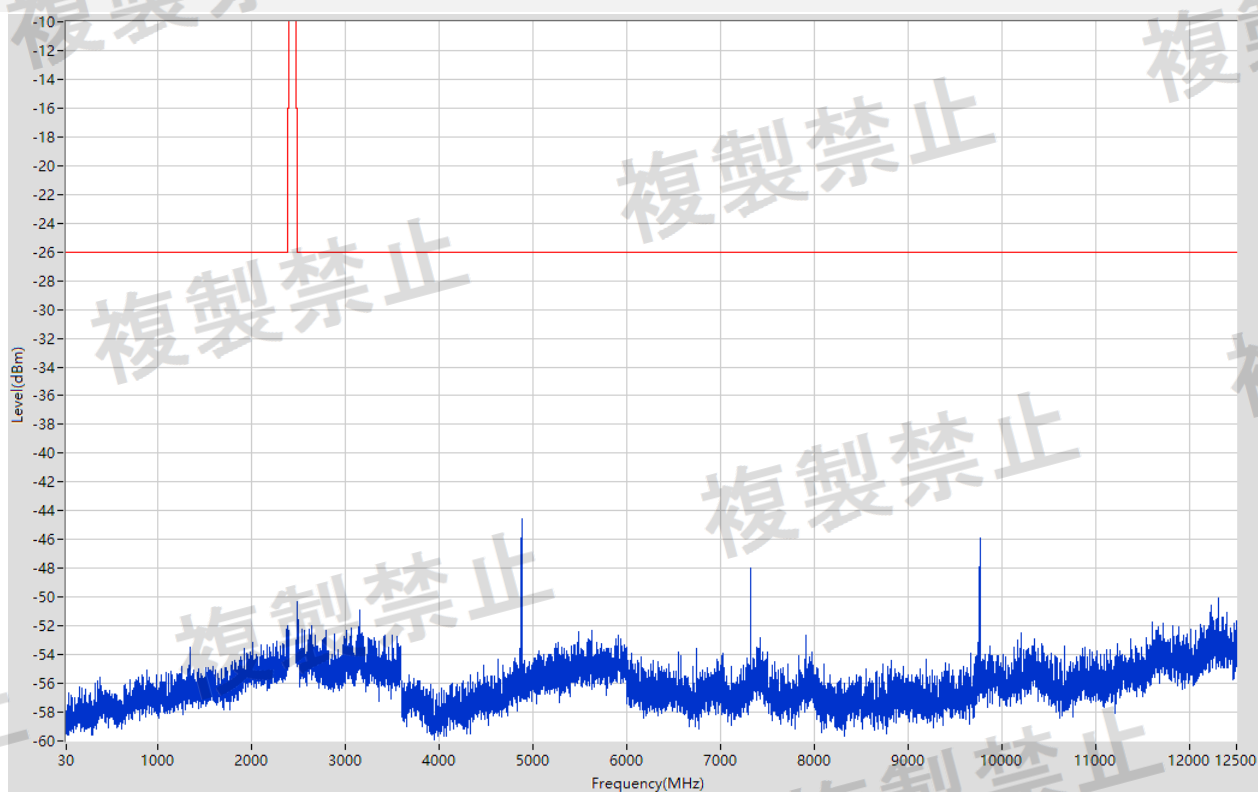
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	891	-54.36	0.004	2.5	Pass
1000	2374	1	Peak	2291	-50.86	0.008	2.5	Pass
2374	2387	1	Peak	2384.303	-50.95	0.008	2.5	Pass
2387	2400	1	Peak	2392.623	-52.14	0.006	25	Pass
2483.5	2496.5	1	Peak	2483.533	-41.44	0.072	25	Pass
2496.5	2509.5	1	Peak	2499.75	-42.21	0.060	2.5	Pass
2509.5	6000	1	Peak	4959.851	-42.74	0.053	2.5	Pass
6000	12500	1	Peak	9920	-42.68	0.054	2.5	Pass

A.4.4 GFSK NV Low Channel



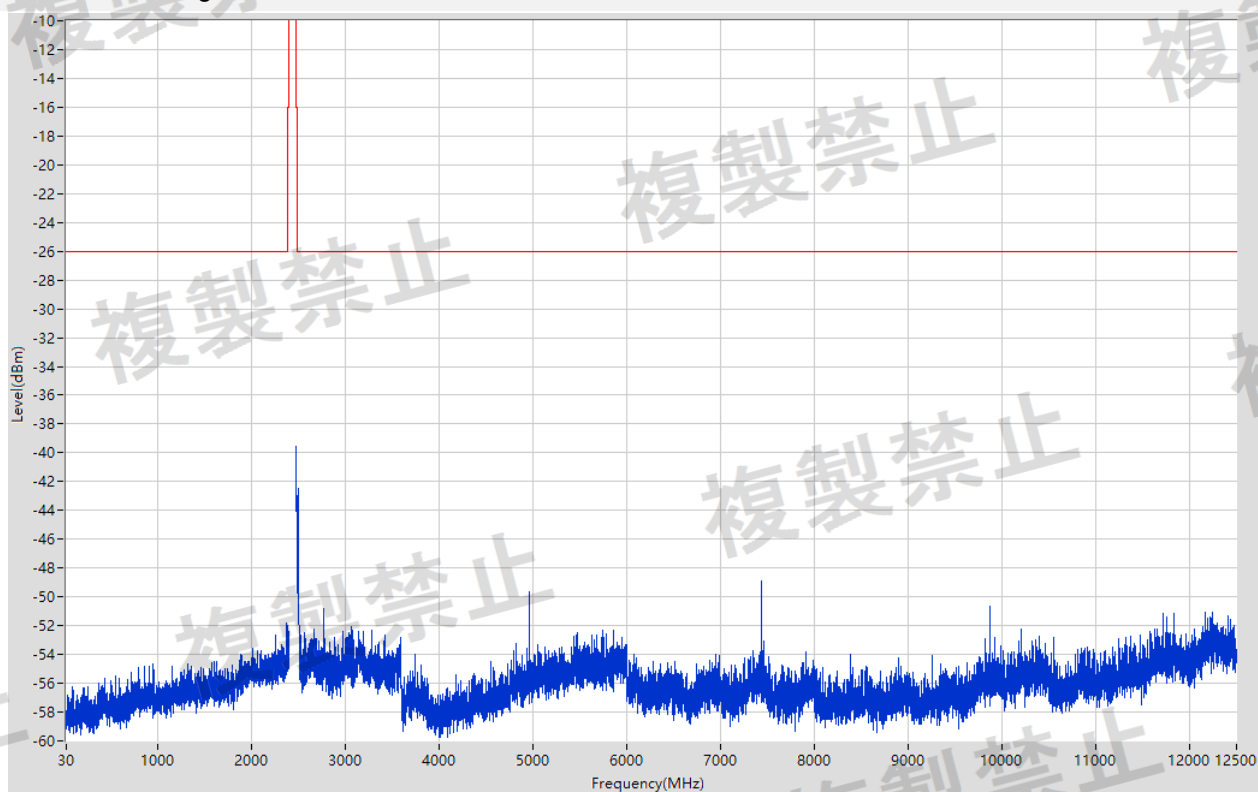
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	457	-54.99	0.003	2.5	Pass
1000	2374	1	Peak	2374	-51.21	0.008	2.5	Pass
2374	2387	1	Peak	2384.108	-43.95	0.040	2.5	Pass
2387	2400	1	Peak	2399.87	-35.48	0.283	25	Pass
2483.5	2496.5	1	Peak	2485.06	-51.8	0.007	25	Pass
2496.5	2509.5	1	Peak	2498.125	-50.66	0.009	2.5	Pass
2509.5	6000	1	Peak	4803.829	-45.93	0.026	2.5	Pass
6000	12500	1	Peak	9608	-48.17	0.015	2.5	Pass

A.4.5 GFSK NV Middle Channel



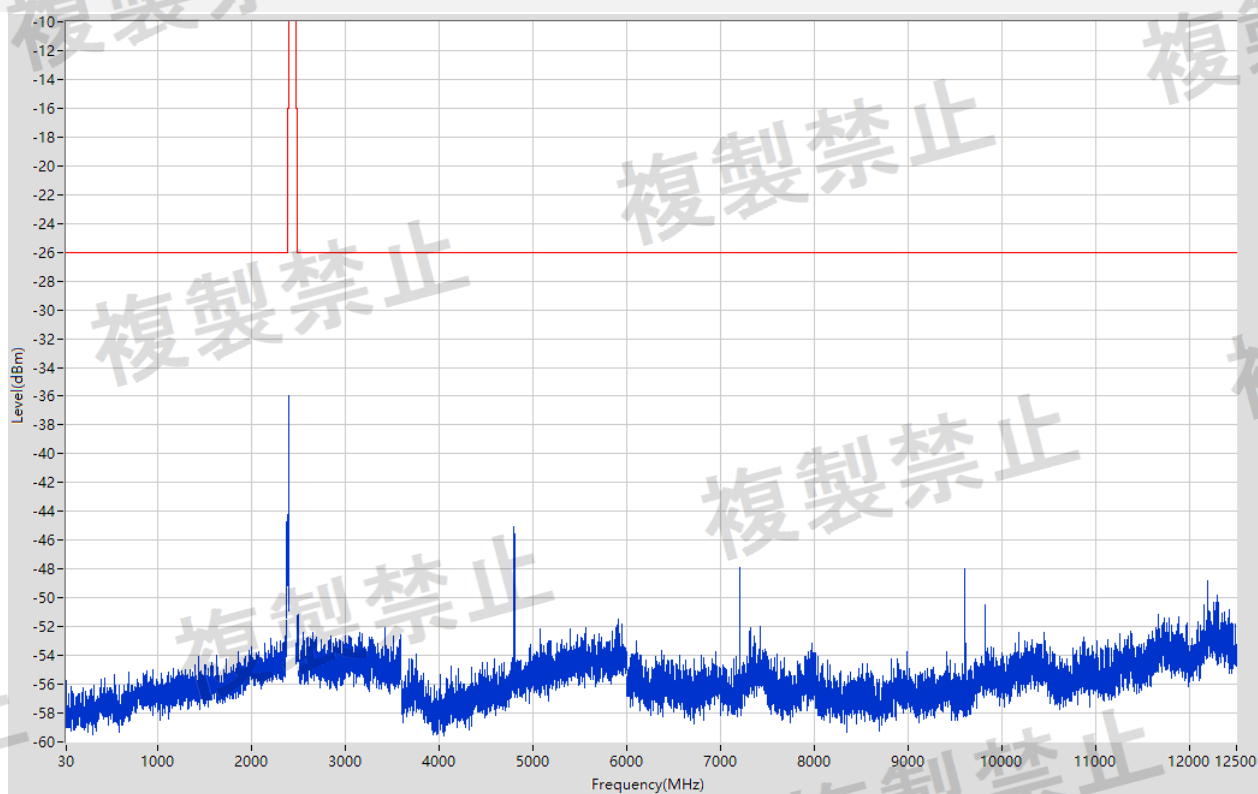
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	887	-55.11	0.003	2.5	Pass
1000	2374	1	Peak	2267	-53.05	0.005	2.5	Pass
2374	2387	1	Peak	2376.763	-52.23	0.006	2.5	Pass
2387	2400	1	Peak	2393.598	-51.97	0.006	25	Pass
2483.5	2496.5	1	Peak	2488.635	-50.28	0.009	25	Pass
2496.5	2509.5	1	Peak	2509.013	-51.59	0.007	2.5	Pass
2509.5	6000	1	Peak	4881.84	-44.56	0.035	2.5	Pass
6000	12500	1	Peak	9764	-45.87	0.026	2.5	Pass

A.4.6 GFSK NV High Channel



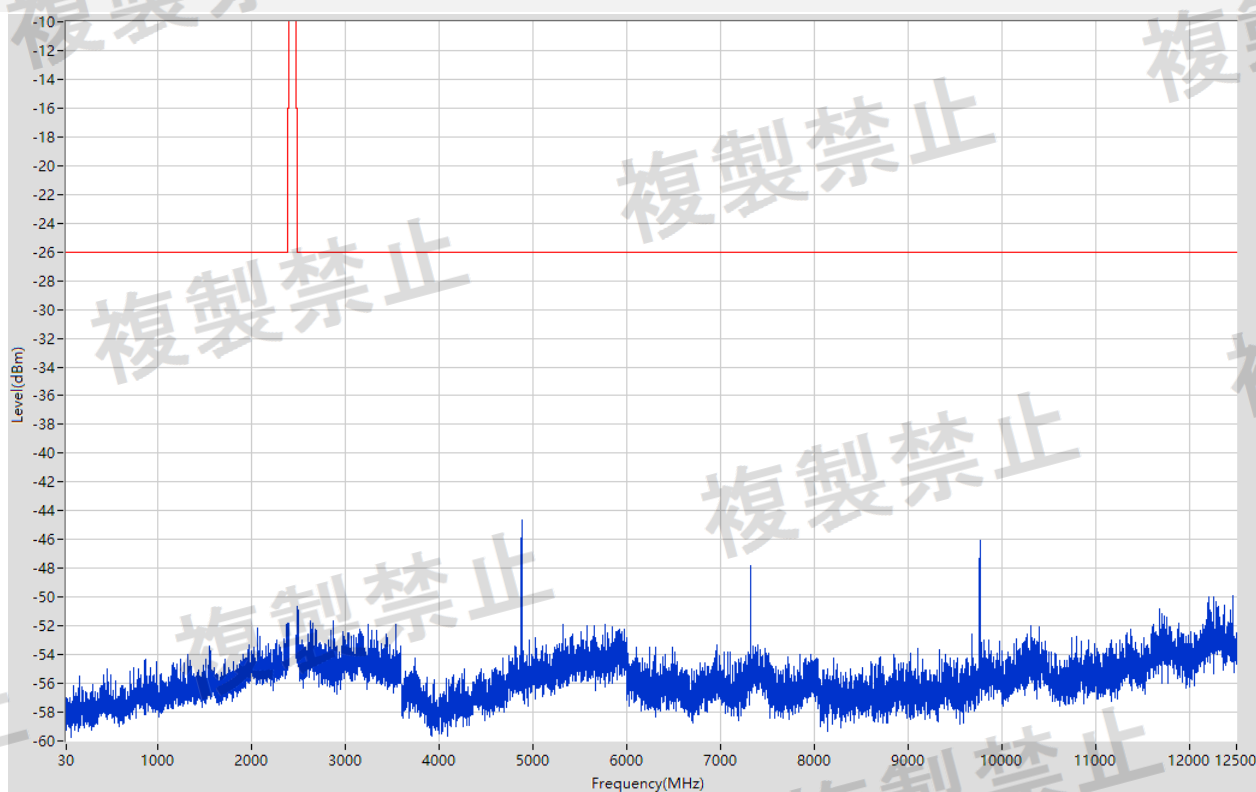
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	950	-54.64	0.003	2.5	Pass
1000	2374	1	Peak	2263	-52.62	0.005	2.5	Pass
2374	2387	1	Peak	2376.665	-51.79	0.007	2.5	Pass
2387	2400	1	Peak	2392.168	-52.18	0.006	25	Pass
2483.5	2496.5	1	Peak	2483.63	-39.55	0.111	25	Pass
2496.5	2509.5	1	Peak	2498.71	-42.47	0.057	2.5	Pass
2509.5	6000	1	Peak	4958.851	-49.66	0.011	2.5	Pass
6000	12500	1	Peak	7440	-48.89	0.013	2.5	Pass

A.4.7 GFSK HV Low Channel



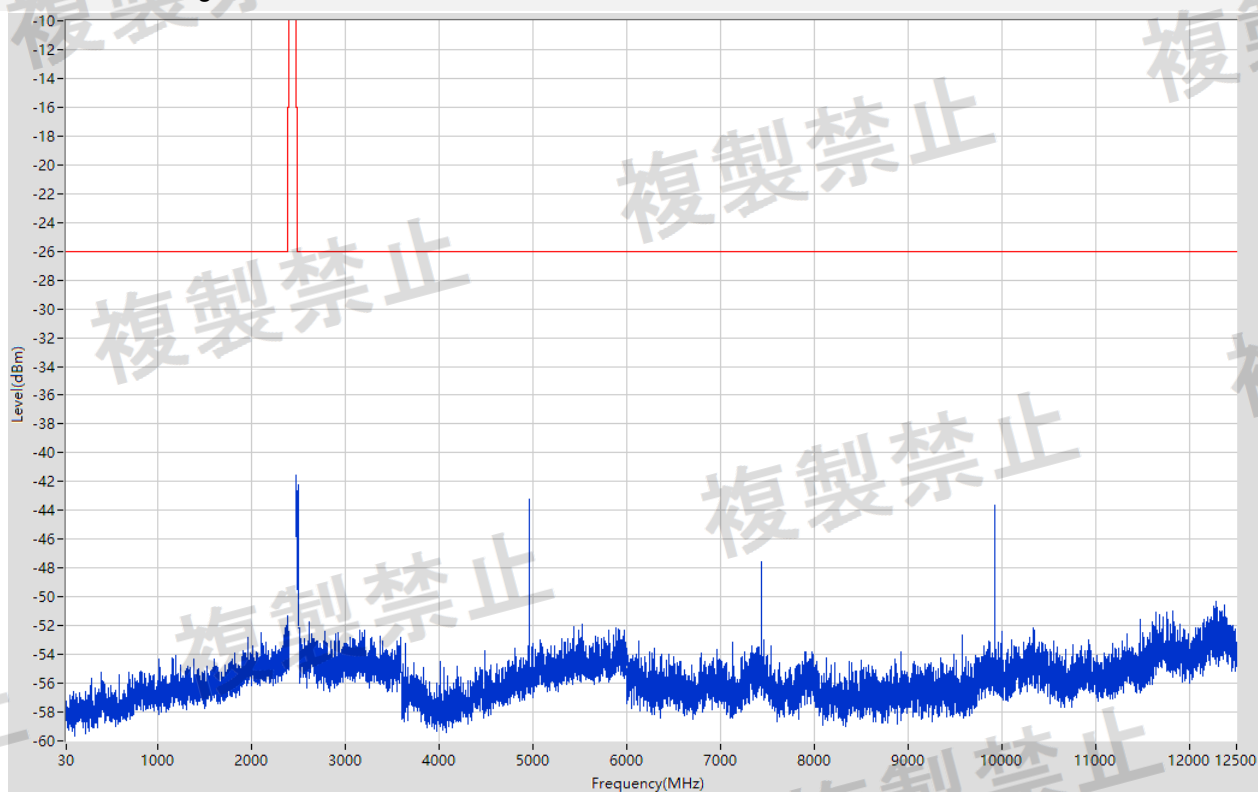
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	958	-55	0.003	2.5	Pass
1000	2374	1	Peak	2373	-51.54	0.007	2.5	Pass
2374	2387	1	Peak	2385.473	-44.2	0.038	2.5	Pass
2387	2400	1	Peak	2400	-35.95	0.254	25	Pass
2483.5	2496.5	1	Peak	2496.143	-51.26	0.007	25	Pass
2496.5	2509.5	1	Peak	2504.333	-51.13	0.008	2.5	Pass
2509.5	6000	1	Peak	4803.829	-45.08	0.031	2.5	Pass
6000	12500	1	Peak	7206	-47.87	0.016	2.5	Pass

A.4.8 GFSK HV Middle Channel

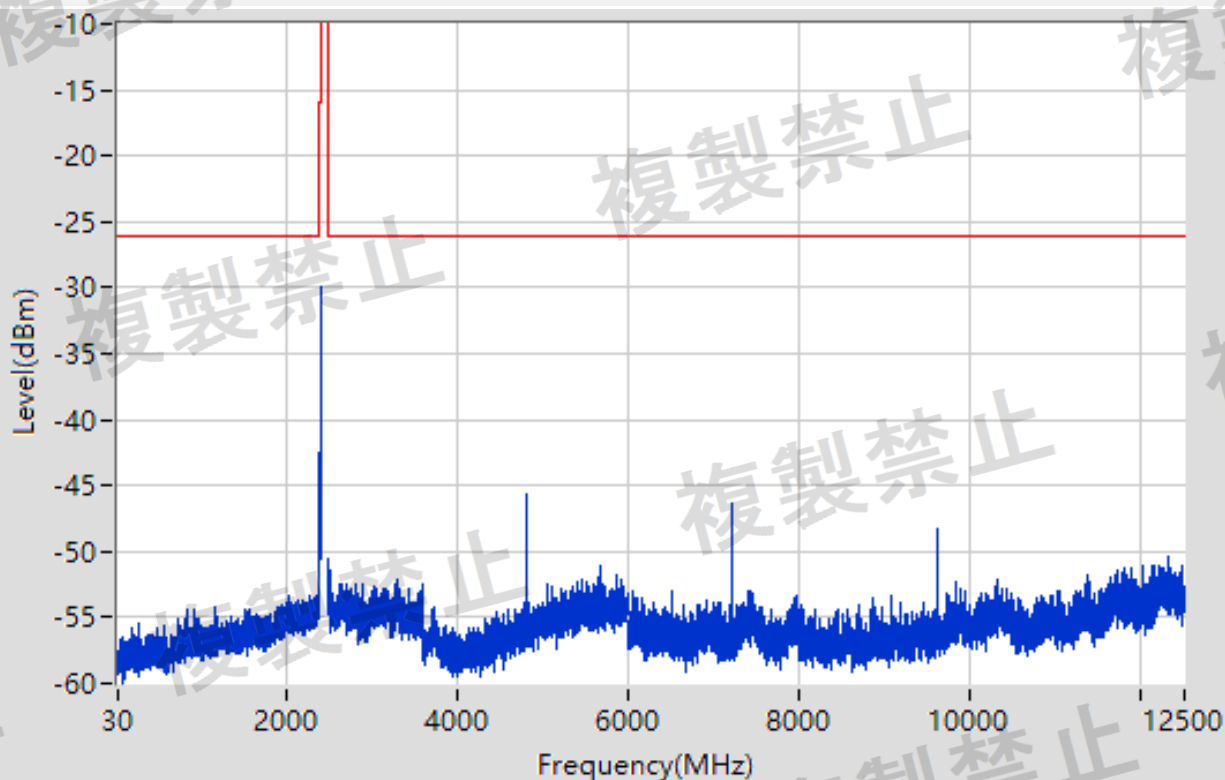


Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	877	-54.34	0.004	2.5	Pass
1000	2374	1	Peak	2069	-52.17	0.006	2.5	Pass
2374	2387	1	Peak	2378.778	-51.89	0.006	2.5	Pass
2387	2400	1	Peak	2393.37	-51.8	0.007	25	Pass
2483.5	2496.5	1	Peak	2496.403	-50.67	0.009	25	Pass
2496.5	2509.5	1	Peak	2507.095	-50.89	0.008	2.5	Pass
2509.5	6000	1	Peak	4882.84	-44.63	0.034	2.5	Pass
6000	12500	1	Peak	9764	-46.05	0.025	2.5	Pass

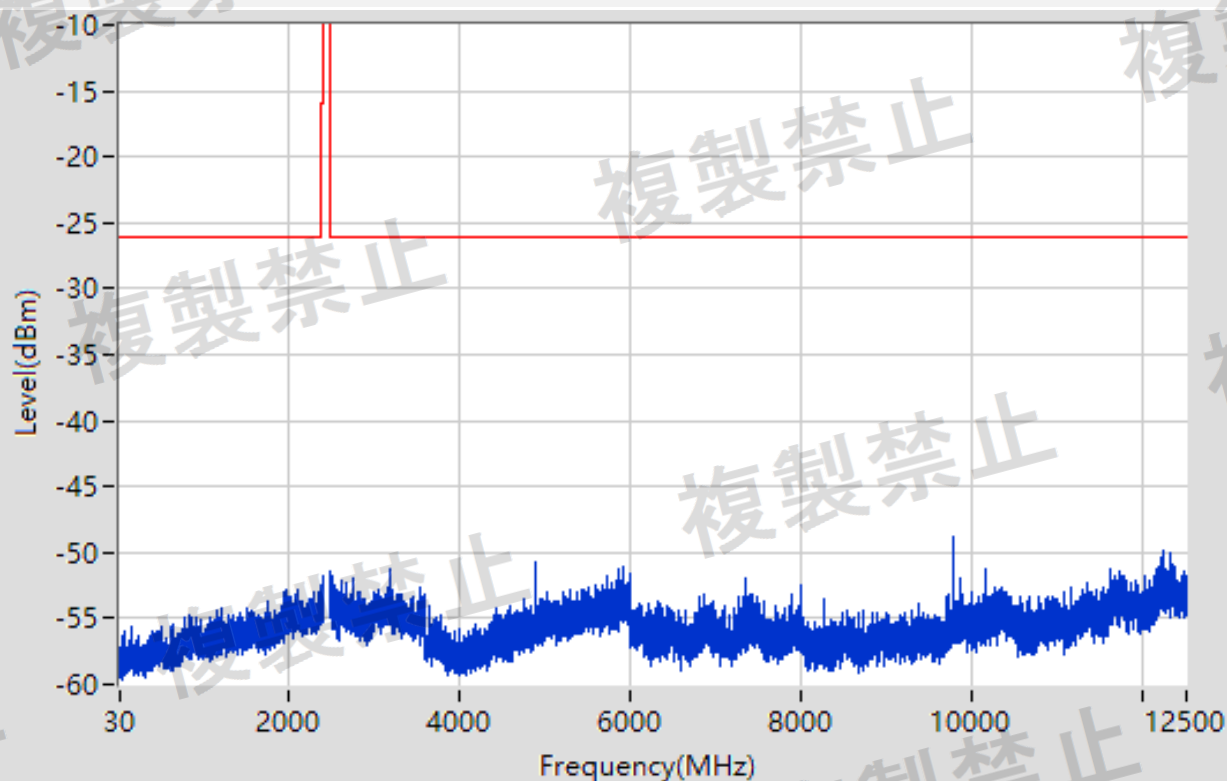
A.4.9 GFSK HV High Channel



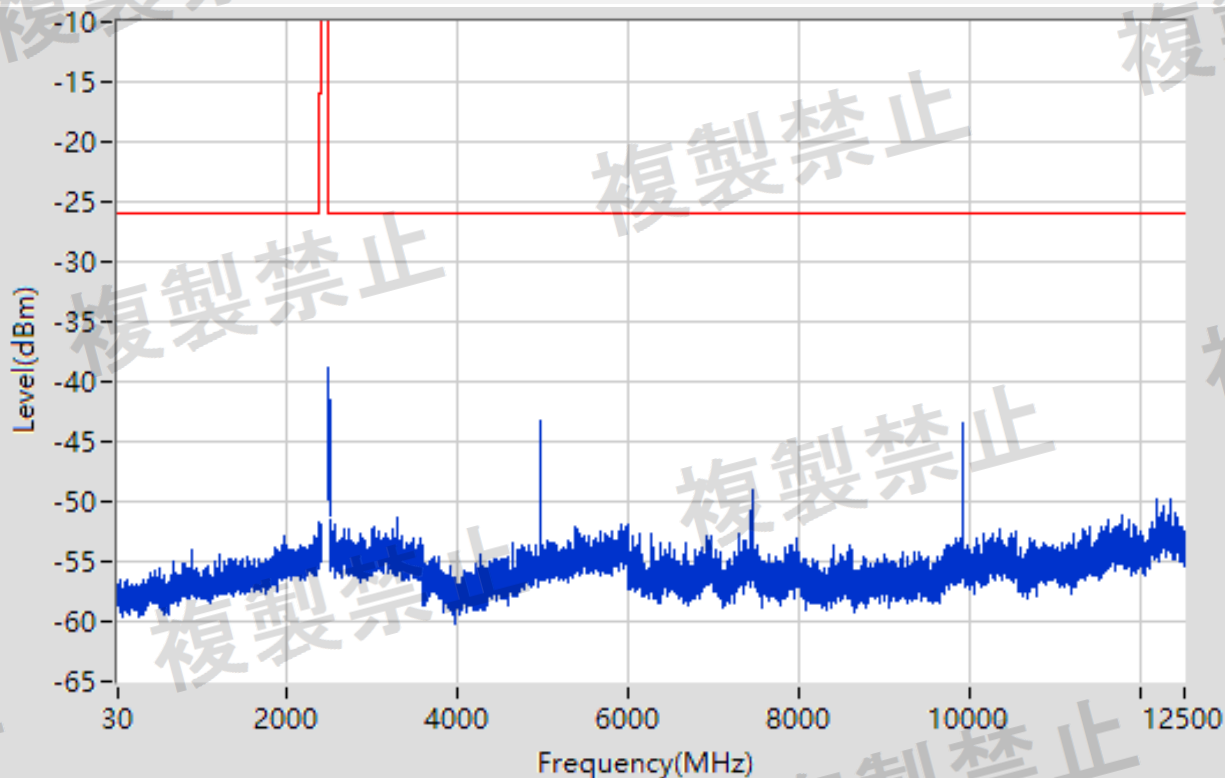
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	828	-55.19	0.003	2.5	Pass
1000	2374	1	Peak	2358	-52.19	0.006	2.5	Pass
2374	2387	1	Peak	2384.01	-51.33	0.007	2.5	Pass
2387	2400	1	Peak	2388.723	-52	0.006	25	Pass
2483.5	2496.5	1	Peak	2483.5	-41.52	0.070	25	Pass
2496.5	2509.5	1	Peak	2498.905	-42.24	0.060	2.5	Pass
2509.5	6000	1	Peak	4960.851	-43.21	0.048	2.5	Pass
6000	12500	1	Peak	9920	-43.62	0.043	2.5	Pass

A.4.10 $\pi/4$ -DQPSK LV Low Channel

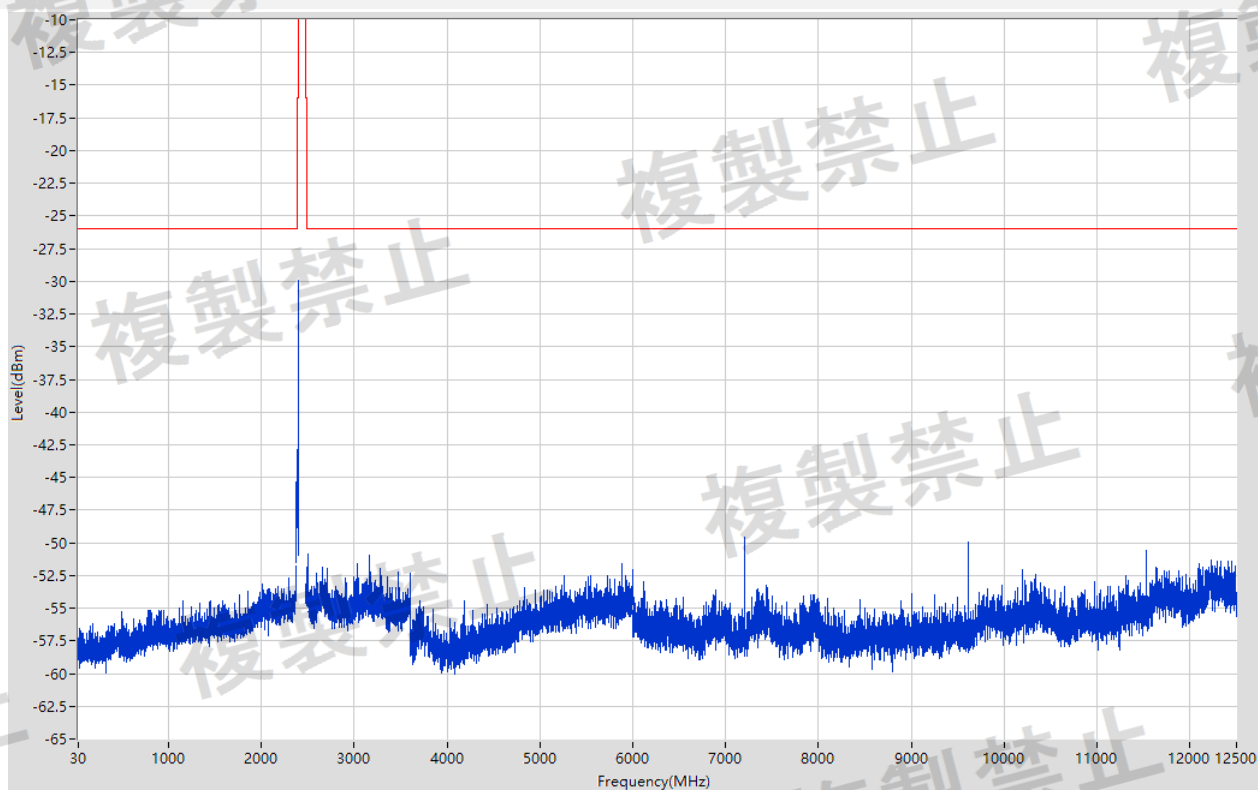
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	827	-54.35	0.004	2.5	Pass
1000	2374	1	Peak	2374	-51.42	0.007	2.5	Pass
2374	2387	1	Peak	2383.75	-42.51	0.056	2.5	Pass
2387	2400	1	Peak	2400	-29.98	1.004	25	Pass
2483.5	2496.5	1	Peak	2496.013	-51.64	0.007	25	Pass
2496.5	2509.5	1	Peak	2497.735	-50.53	0.009	2.5	Pass
2509.5	6000	1	Peak	4803.829	-45.65	0.027	2.5	Pass
6000	12500	1	Peak	7206	-46.32	0.023	2.5	Pass

A.4.11 $\pi/4$ -DQPSK LV Middle Channel

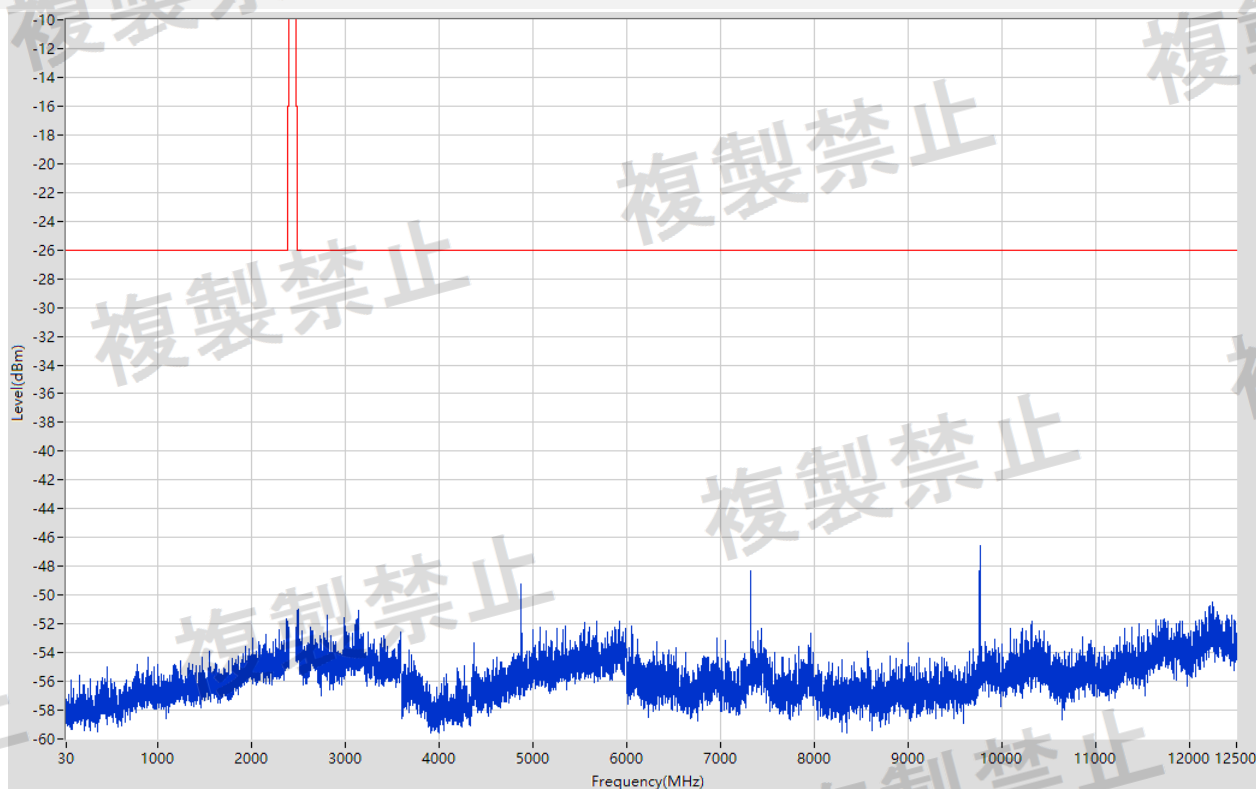
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	830	-54.79	0.003	2.5	Pass
1000	2374	1	Peak	2115	-52.76	0.005	2.5	Pass
2374	2387	1	Peak	2386.155	-52.55	0.006	2.5	Pass
2387	2400	1	Peak	2392.883	-51.83	0.007	25	Pass
2483.5	2496.5	1	Peak	2488.473	-51.43	0.007	25	Pass
2496.5	2509.5	1	Peak	2505.308	-51.75	0.007	2.5	Pass
2509.5	6000	1	Peak	4882.84	-50.67	0.009	2.5	Pass
6000	12500	1	Peak	9763	-48.88	0.013	2.5	Pass

A.4.12 $\pi/4$ -DQPSK LV High Channel

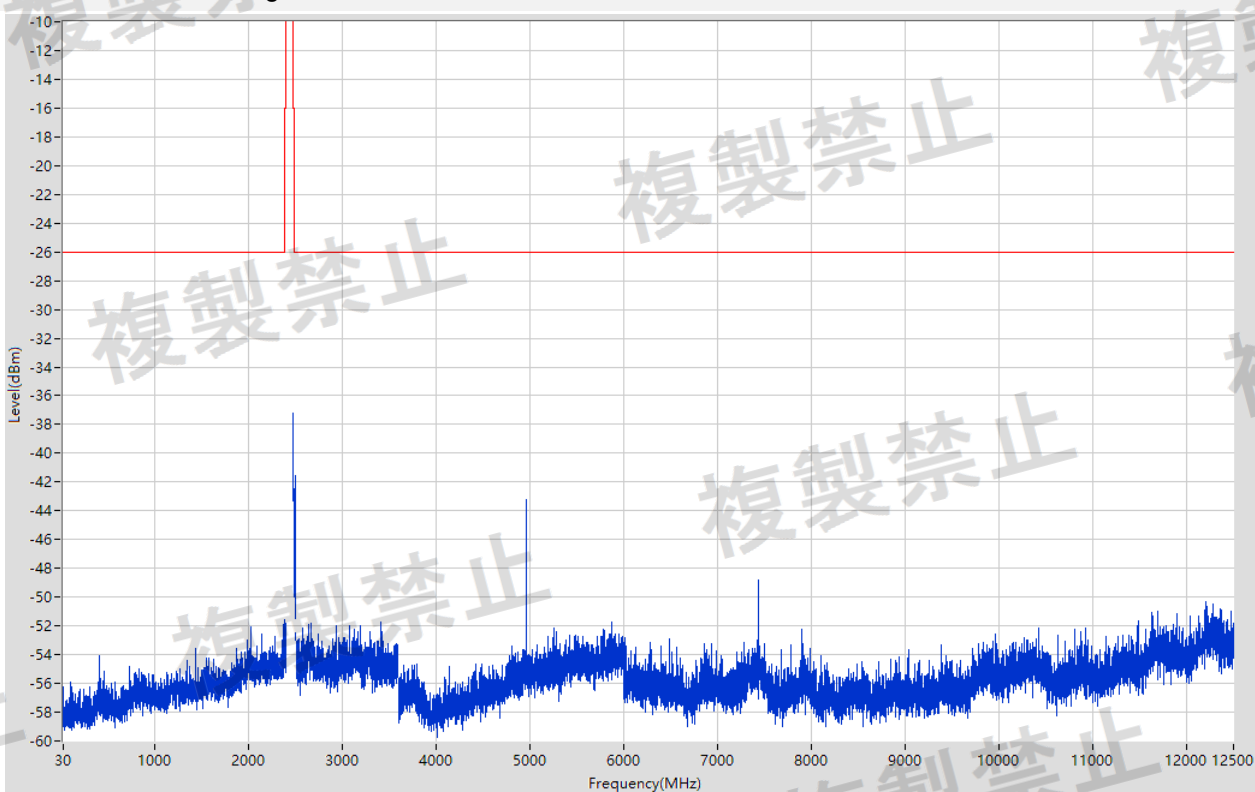
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	897	-54.05	0.004	2.5	Pass
1000	2374	1	Peak	2311	-52.94	0.005	2.5	Pass
2374	2387	1	Peak	2383.36	-51.72	0.007	2.5	Pass
2387	2400	1	Peak	2391.323	-51.83	0.007	25	Pass
2483.5	2496.5	1	Peak	2483.5	-38.86	0.130	25	Pass
2496.5	2509.5	1	Peak	2499.978	-41.47	0.071	2.5	Pass
2509.5	6000	1	Peak	4959.851	-43.31	0.047	2.5	Pass
6000	12500	1	Peak	9920	-43.38	0.046	2.5	Pass

A.4.13 $\pi/4$ -DQPSK NV Low Channel

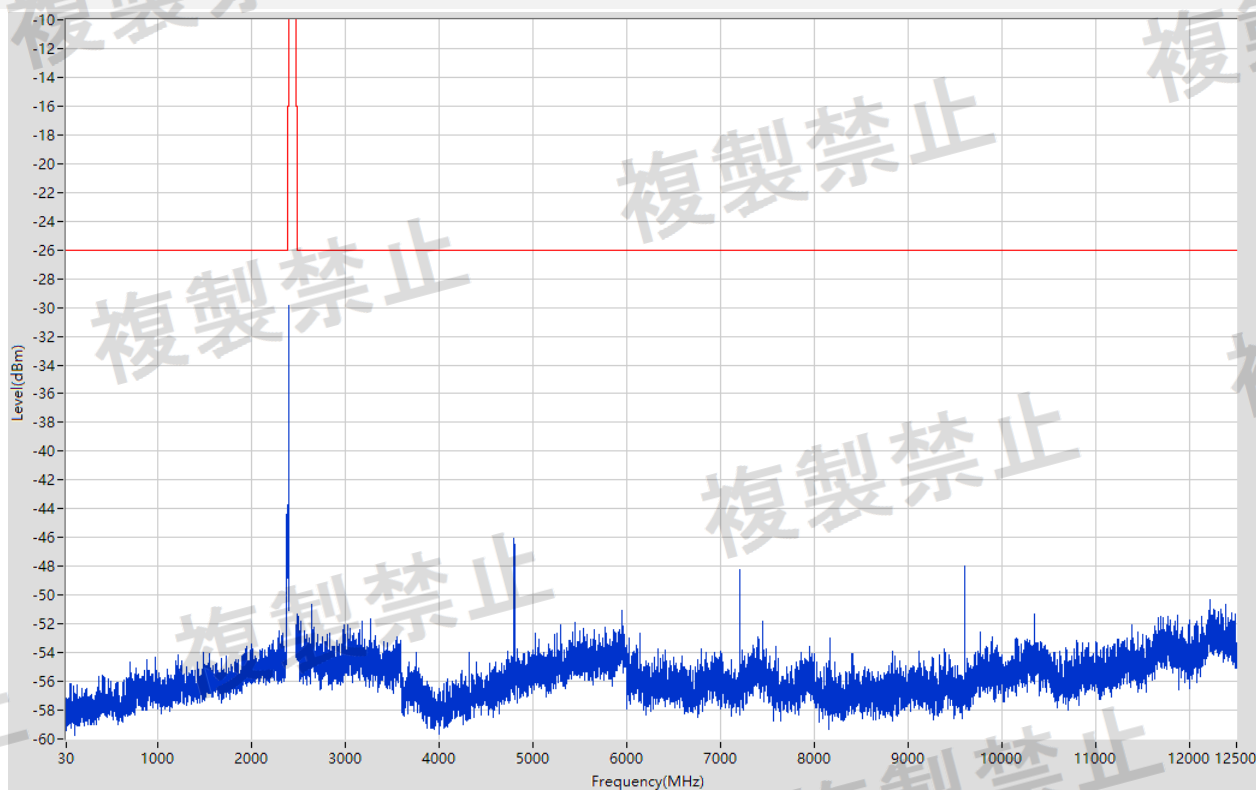
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	801	-55.13	0.003	2.5	Pass
1000	2374	1	Peak	2374	-51.82	0.007	2.5	Pass
2374	2387	1	Peak	2383.685	-42.84	0.052	2.5	Pass
2387	2400	1	Peak	2400	-29.93	1.015	25	Pass
2483.5	2496.5	1	Peak	2496.11	-51.89	0.006	25	Pass
2496.5	2509.5	1	Peak	2497.898	-50.89	0.008	2.5	Pass
2509.5	6000	1	Peak	3169.595	-50.99	0.008	2.5	Pass
6000	12500	1	Peak	7206	-49.58	0.011	2.5	Pass

A.4.14 $\pi/4$ -DQPSK NV Middle Channel

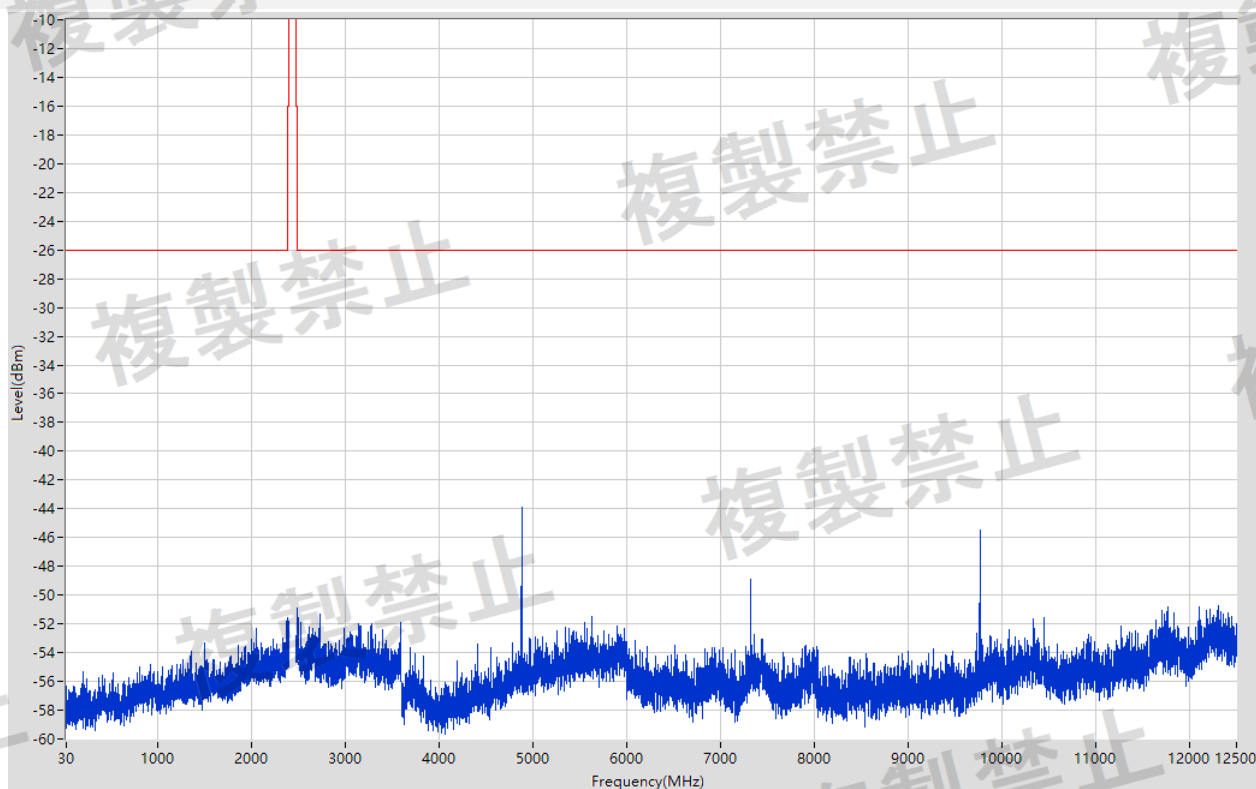
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	896	-54.33	0.004	2.5	Pass
1000	2374	1	Peak	2304	-52.41	0.006	2.5	Pass
2374	2387	1	Peak	2380.305	-51.62	0.007	2.5	Pass
2387	2400	1	Peak	2388.593	-51.85	0.007	25	Pass
2483.5	2496.5	1	Peak	2489.025	-51.06	0.008	25	Pass
2496.5	2509.5	1	Peak	2508.525	-50.98	0.008	2.5	Pass
2509.5	6000	1	Peak	4880.84	-49.23	0.012	2.5	Pass
6000	12500	1	Peak	9764	-46.6	0.022	2.5	Pass

A.4.15 $\pi/4$ -DQPSK NV High Channel

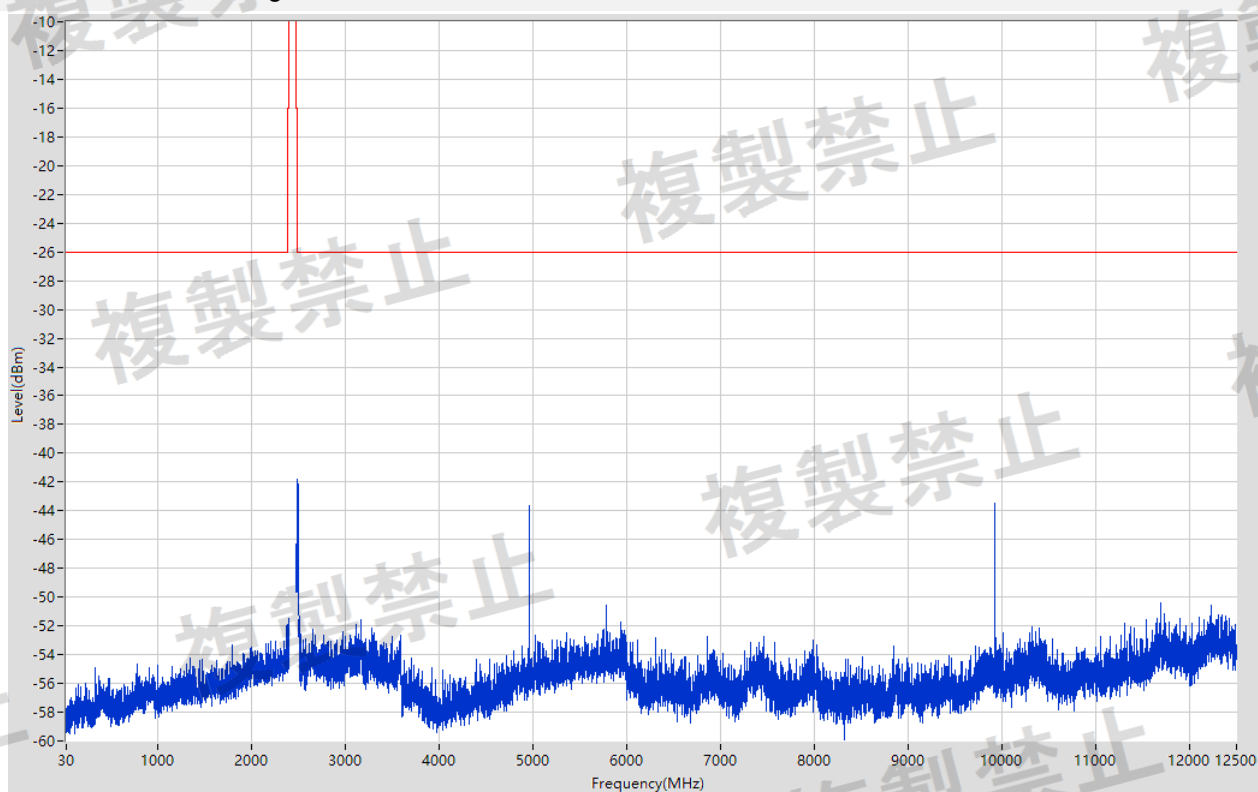
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	417	-54.11	0.004	2.5	Pass
1000	2374	1	Peak	2025	-52.11	0.006	2.5	Pass
2374	2387	1	Peak	2383.555	-51.59	0.007	2.5	Pass
2387	2400	1	Peak	2399.903	-51.81	0.007	25	Pass
2483.5	2496.5	1	Peak	2483.5	-37.22	0.190	25	Pass
2496.5	2509.5	1	Peak	2500.043	-41.56	0.070	2.5	Pass
2509.5	6000	1	Peak	4959.851	-43.19	0.048	2.5	Pass
6000	12500	1	Peak	7440	-48.81	0.013	2.5	Pass

A.4.16 $\pi/4$ -DQPSK HV Low Channel

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	981	-54.35	0.004	2.5	Pass
1000	2374	1	Peak	2374	-51.27	0.007	2.5	Pass
2374	2387	1	Peak	2386.09	-43.72	0.043	2.5	Pass
2387	2400	1	Peak	2400	-29.87	1.030	25	Pass
2483.5	2496.5	1	Peak	2496.013	-51.34	0.007	25	Pass
2496.5	2509.5	1	Peak	2498.483	-51.48	0.007	2.5	Pass
2509.5	6000	1	Peak	4803.829	-46.06	0.025	2.5	Pass
6000	12500	1	Peak	9608	-48.02	0.016	2.5	Pass

A.4.17 $\pi/4$ -DQPSK HV Middle Channel

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	933	-54.82	0.003	2.5	Pass
1000	2374	1	Peak	2051	-52.32	0.006	2.5	Pass
2374	2387	1	Peak	2376.633	-51.85	0.007	2.5	Pass
2387	2400	1	Peak	2387.813	-51.6	0.007	25	Pass
2483.5	2496.5	1	Peak	2488.343	-50.9	0.008	25	Pass
2496.5	2509.5	1	Peak	2507.68	-51.58	0.007	2.5	Pass
2509.5	6000	1	Peak	4881.84	-43.93	0.040	2.5	Pass
6000	12500	1	Peak	9764	-45.45	0.029	2.5	Pass

A.4.18 $\pi/4$ -DQPSK HV High Channel

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μ W/MHz)	Limit (μ W/MHz)	Verdict
30	1000	1	Peak	790	-54.7	0.003	2.5	Pass
1000	2374	1	Peak	2258	-53.04	0.005	2.5	Pass
2374	2387	1	Peak	2380.533	-52.02	0.006	2.5	Pass
2387	2400	1	Peak	2399.903	-51.46	0.007	25	Pass
2483.5	2496.5	1	Peak	2495.428	-41.79	0.066	25	Pass
2496.5	2509.5	1	Peak	2499.068	-42.17	0.061	2.5	Pass
2509.5	6000	1	Peak	4959.851	-43.62	0.043	2.5	Pass
6000	12500	1	Peak	9920	-43.45	0.045	2.5	Pass

5.5 Antenna Power Error Measurement

5.5.1 Limit

Item	Limits
Antenna Power Density	a) FH,FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: ≤ 3 mW/MHz b) DS but other than a) from 2400~2483.5 MHz: ≤ 10 mW/MHz c) OFDM, but other than a): For OCB of 26MHz or less: ≤ 10 mW/MHz For OCB of over 26 MHz to 40 MHz: ≤ 5 mw/MHz d) Other than a), b) and c): ≤ 10 mW
Antenna Power Error	+20% (Base on manufacturer declare antenna power density)

5.5.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.5.3 Test Procedure

- Setting of SA is following as: RB:1 MHz / VB: 3 MHz / SPAN: About twice the occupied frequency bandwidth / AT: 10 dB Ref: 10 dBm / Sweep time: Minimum time for guaranteed measurement accuracy/Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold/Trigger condition: Free run.
- Setting of SA is following as: RB:1 MHz / VB: 1 MHz / SPAN: 0 Hz/ AT: 10 dB Ref: 10 dBm / Sweep Mode: Continuous sweep
- Those using frequency hopping method (including DSSS or composite method with OFDM):
 - Confirming in the submitted document that the frequency hopping intervals in the frequency distribution of frequency hopping are equal intervals of 1 MHz or less, and that the probability of occurrence at each hopping frequency is uniform, and that the probability of occurrence at each hopping frequency is uniform. If it is, it is implemented by the following method.
 - Connect a high frequency power meter to the output of the dummy load (attenuator) and measure the total power.
 - Divide the total power by the spreading bandwidth to calculate the average power per 1 MHz.
 - Antenna power shall be as follows:
 - Value of b for continuous wave
 - For burst wave Average power in burst is calculated from the value of b and the transmission time rate.
 - If the frequency distribution of frequency hopping or the probability of occurrence at each hopping frequency is not uniform, set the spectrum analyzer as in 1 to search for the frequency that gives the maximum antenna power, and then perform spectrum analysis. Set the device as in 2, and measure the antenna power at the frequency that gives the maximum power.

4 In the case of those using OFDM or DSSS

- (1) Set the spectrum analyzer as in according to the above 1
- (2) After repeating the sweep until no change is observed in the display, measure the frequency at which the power per 1 MHz gives the maximum value.
- (3) Set the spectrum analyzer as in according to the above 2
- (4) Connect the high frequency power meter to the IF output terminal of the spectrum analyzer.
- (5) Antenna power shall be as follows:
 - a. For continuous wave
 - b. Burst wave Calculated average power in a burst from values corrected in the same way as for continuous waves and the transmission time rate

(6) In the case of using the orthogonal frequency division multiplexing system, when there are multiple subcarrier modulation systems, measure the antenna power at each time and take the largest value as the measured value.

5 In the case of items using other methods

- (1) Connect a high-frequency power meter to the output of the dummy load (attenuator) and measure the total power.
- (2) Antenna power shall be as follows:
 - a. Value of a for continuous wave
 - b. Burst wave The average power in the burst is calculated from the value of (a) and the transmission time rate.

6 Antenna Power Error is definition that actual measure antenna power tolerance Upper Limit +20% power that base on manufacturer declare the conducted power density.

5.5.4 Test Deviation

There is no deviation with the original standard.

5.5.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6 Test Result

GFSK Test Result

Duty cycle = 0.764

Antenna Power Density PD = Antenna Power mW / Spread Spectrum Bandwidth MHz

Manufacturer declares the rated power density = 0.0400 mW/MHz

Test Mode	Test Voltage	Antenna Power (dBm)	Antenna Power (mW)	Antenna Power Density PD (mW / MHz)	Antenna Power Error	Upper Limit (%)	Verdict
GFSK	LV	2.91	1.9543	0.0274	-31.62%	20	Pass
	NV	2.87	1.9364	0.0271	-32.26%	20	Pass
	HV	2.86	1.9320	0.0270	-32.41%	20	Pass

EIRP Antenna Power

Test Mode	Test Voltage	Measured EIRP (dBm/ MHz)	Limit (dBm/MHz)	Verdict
GFSK	LV	-14.12	6.91	Pass
	NV	-14.16	6.91	Pass
	HV	-14.17	6.91	Pass

 $\pi/4$ -DQPSK Test Result

Duty cycle = 0.767

Antenna Power Density PD = Antenna Power mW / Spread Spectrum Bandwidth MHz

Manufacturer declares the rated power density = 0.0250 mW/MHz

Test Mode	Test Voltage	Antenna Power (dBm)	Antenna Power (mW)	Antenna Power Density PD (mW / MHz)	Antenna Power Error	Upper Limit (%)	Verdict
$\pi/4$ -DQPSK	LV	1.42	1.3868	0.0194	-22.36%	20	Pass
	NV	1.43	1.3900	0.0194	-22.37%	20	Pass
	HV	1.38	1.3740	0.0192	-23.11%	20	Pass

EIRP Antenna Power

Test Mode	Test Voltage	Measured EIRP (dBm/ MHz)	Limit (dBm/MHz)	Verdict
$\pi/4$ -DQPSK	LV	-15.61	6.91	Pass
	NV	-15.61	6.91	Pass
	HV	-15.65	6.91	Pass

GFSK (AFH Mode) Test Result

Duty cycle = 0.764

Antenna Power Density PD = Antenna Power mW / Spread Spectrum Bandwidth MHz

Manufacturer declares the rated power density = 0.1500 mW/MHz

Test Mode	Test Voltage	Antenna Power (dBm)	Antenna Power (mW)	Antenna Power Density PD (mW / MHz)	Antenna Power Error	Upper Limit (%)	Verdict
GFSK	LV	2.59	1.8155	0.0981	-34.60%	20	Pass
	NV	2.64	1.8365	0.0991	-33.92%	20	Pass
	HV	2.57	1.8072	0.0975	-34.97%	20	Pass

EIRP Antenna Power

Test Mode	Test Voltage	Measured EIRP (dBm/ MHz)	Limit (dBm/MHz)	Verdict
GFSK	LV	-8.57	6.91	Pass
	NV	-8.53	6.91	Pass
	HV	-8.60	6.91	Pass

 $\pi/4$ -DQPSK (AFH Mode) Test Result

Duty cycle = 0.767

Antenna Power Density PD = Antenna Power mW / Spread Spectrum Bandwidth MHz

Manufacturer declares the rated power density = 0.1000 mW/MHz

Test Mode	Test Voltage	Antenna Power (dBm)	Antenna Power (mW)	Antenna Power Density PD (mW / MHz)	Antenna Power Error	Upper Limit (%)	Verdict
$\pi/4$ -DQPSK	LV	1.15	1.3043	0.0700	-29.99%	20	Pass
	NV	1.15	1.3043	0.0700	-30.03%	20	Pass
	HV	1.15	1.3043	0.0701	-29.88%	20	Pass

EIRP Antenna Power

Test Mode	Test Voltage	Measured EIRP (dBm/ MHz)	Limit (dBm/MHz)	Verdict
$\pi/4$ -DQPSK	LV	-10.04	6.91	Pass
	NV	-10.04	6.91	Pass
	HV	-10.03	6.91	Pass

5.6 Limitation of Collateral Emission of Receiver Measurement

5.6.1 Limit

Item	Limits
RX Spurious Emission	$\leq 4\text{nW}$ ($f < 1\text{GHz}$)
	$\leq 20\text{nW}$ ($1\text{GHz} \leq f$)

5.6.2 Test Setup

See section 4.3.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.6.3 Test Procedure

- 1 The EUT is placed in Rx mode and set to a fixed channel.
- 2 Setting of SA is following as RB / VB: 100 kHz (below 1GHz emissions) / 1 MHz (above 1GHz emissions) / AT:10 dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- 3 SA set RB: 100 kHz and VB: 100 kHz. Then adjust to start frequency 30 MHz and stop frequency 1000 MHz. Search to mark peak reading value + cable loss shall be less than 4 nW
- 4 SA set RB: 1 MHz and VB: 1 MHz. Then adjust to start frequency 1000 MHz and stop frequency 12500 MHz. Search to mark peak reading value + cable loss shall be less than 20 nW
- 5 If power level of lower emissions are more than 1/10 of limit (0.4nW for $f < 1\text{GHz}$, 2 nW for $f \geq 1\text{GHz}$), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated

5.6.4 Test Deviation

There is no deviation with the original standard.

5.6.5 EUT Operation during Test

The EUT was programmed to be in continuously receiving mode.

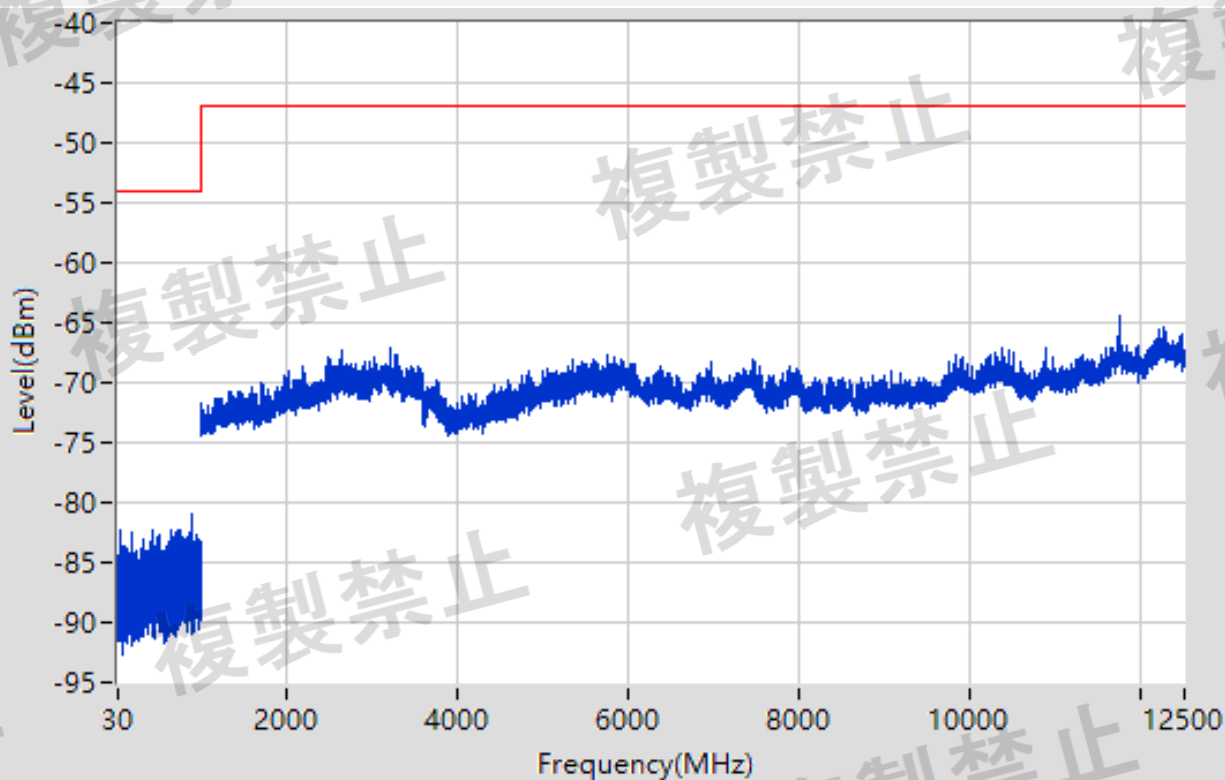
5.6.6 Test Result

Test Data

Mode	Test Voltage	Channel	Refer to Plot	Verdict
GFSK	LV	Low	A.6.1	Pass
	NV		A.6.2	Pass
	HV		A.6.3	Pass
	LV	Middle	A.6.4	Pass
	NV		A.6.5	Pass
	HV		A.6.6	Pass
	LV	High	A.6.7	Pass
	NV		A.6.8	Pass
	HV		A.6.9	Pass
$\pi/4$ -DQPSK	LV	Low	A.6.10	Pass
	NV		A.6.11	Pass
	HV		A.6.12	Pass
	LV	Middle	A.6.13	Pass
	NV		A.6.14	Pass
	HV		A.6.15	Pass
	LV	High	A.6.16	Pass
	NV		A.6.17	Pass
	HV		A.6.18	Pass

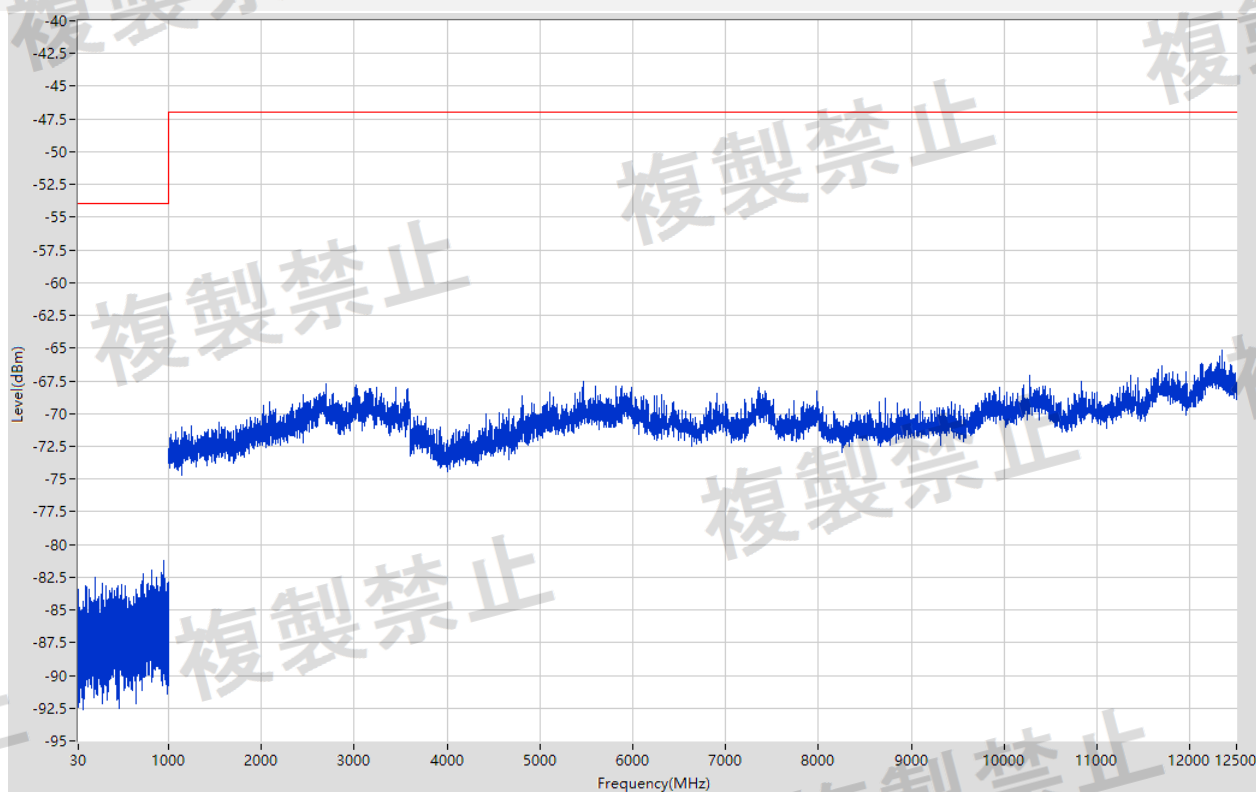
Test Plots

A.6.1 GFSK LV Low Channel



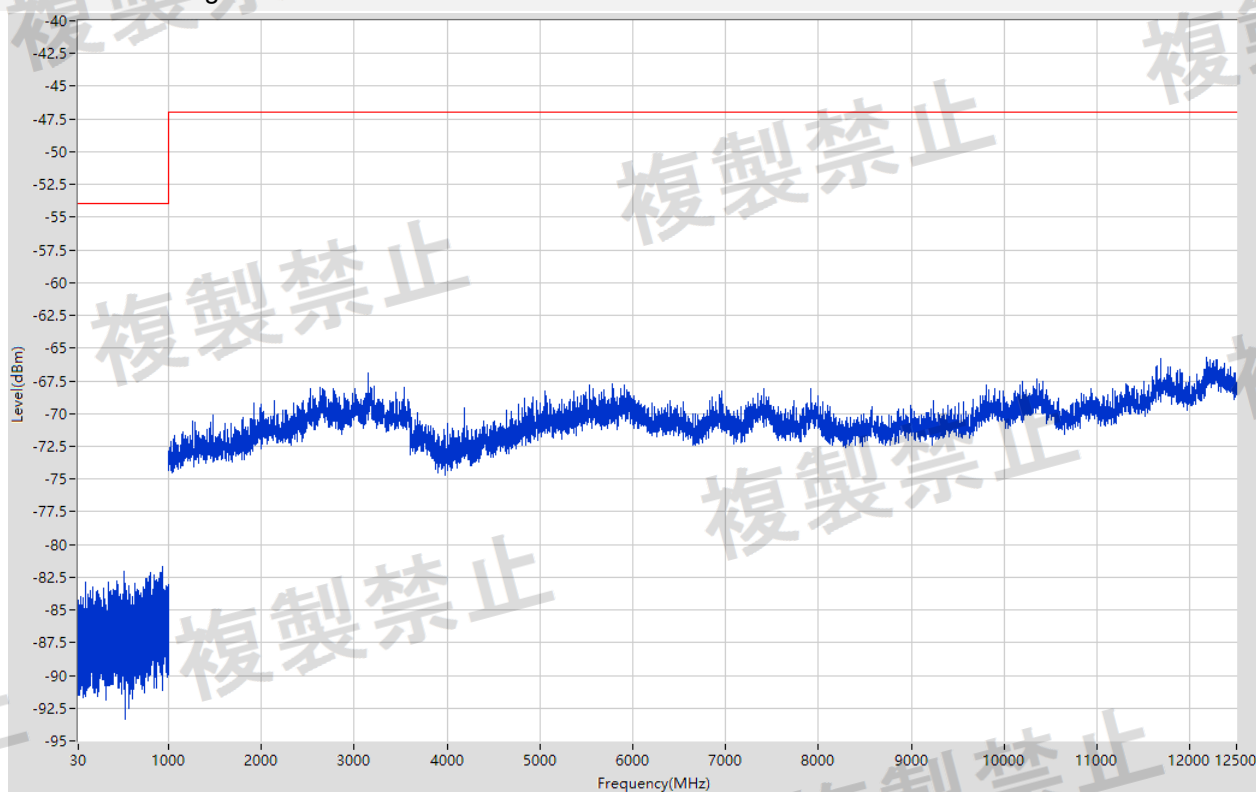
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	896.453	-80.97	0.01	-54	4.0	26.97	Pass
1000	6000	1	Peak	3213.75	-67.2	0.19	-47	20.0	20.2	Pass
6000	12500	1	Peak	11749.25	-64.46	0.36	-47	20.0	17.46	Pass

A.6.2 GFSK LV Middle Channel



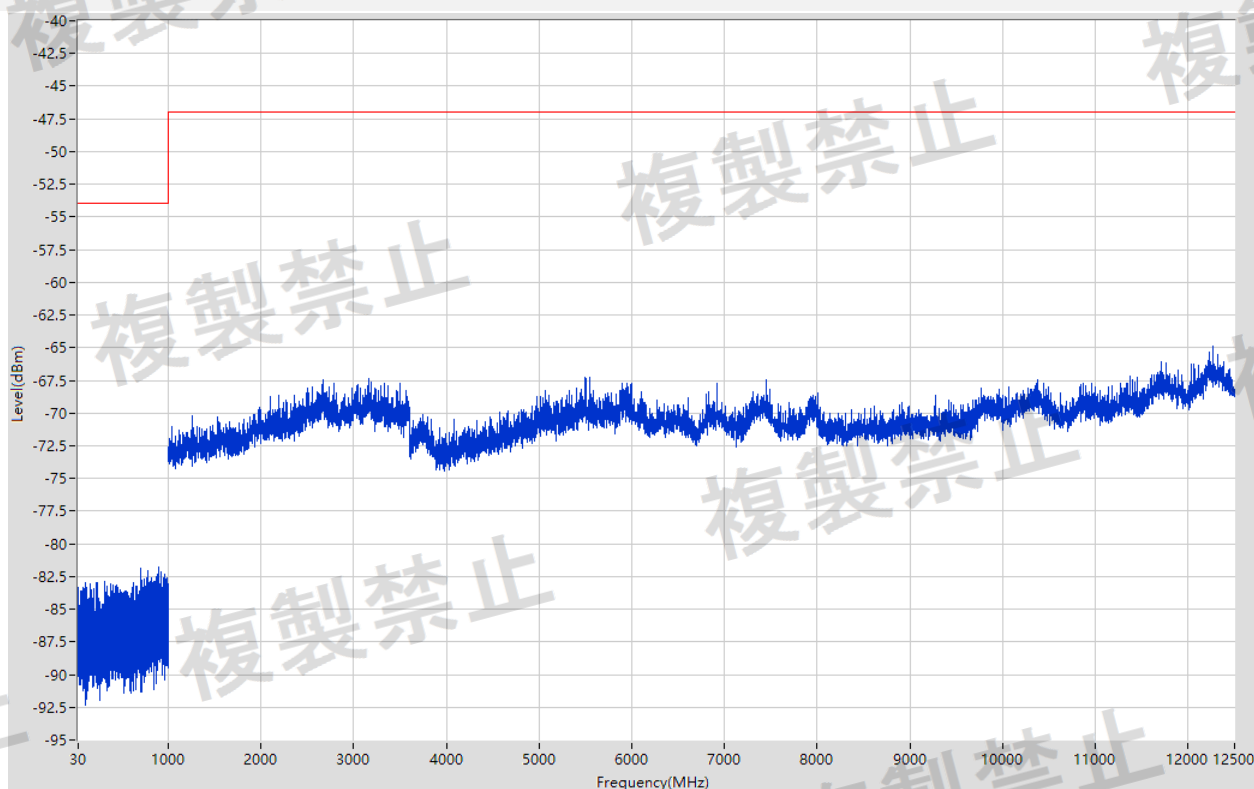
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	943.619	-81.23	0.01	-54	4.0	27.23	Pass
1000	6000	1	Peak	5467.5	-67.56	0.18	-47	20.0	20.56	Pass
6000	12500	1	Peak	12344	-65.19	0.3	-47	20.0	18.19	Pass

A.6.3 GFSK LV High Channel



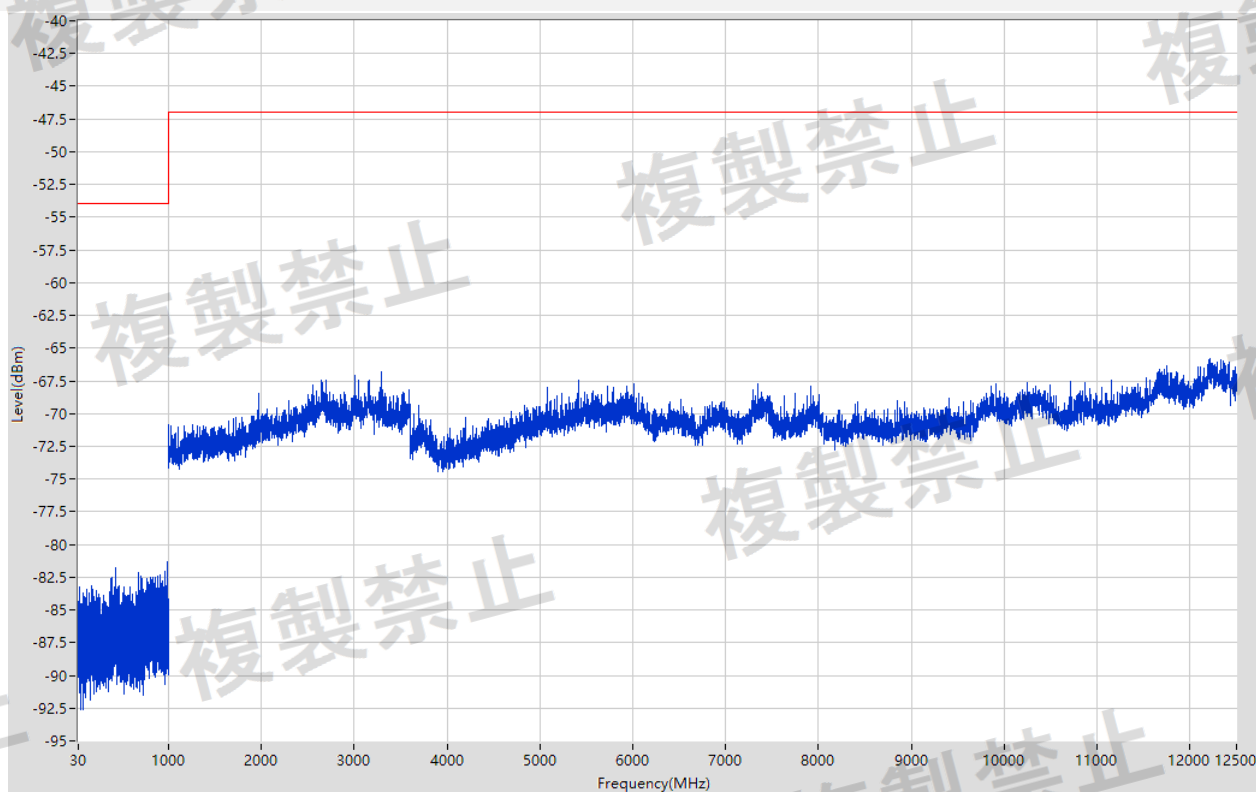
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	935.616	-81.67	0.01	-54	4.0	27.67	Pass
1000	6000	1	Peak	3146.25	-66.89	0.21	-47	20.0	19.89	Pass
6000	12500	1	Peak	12178.25	-65.72	0.27	-47	20.0	18.72	Pass

A.6.4 GFSK NV Low Channel



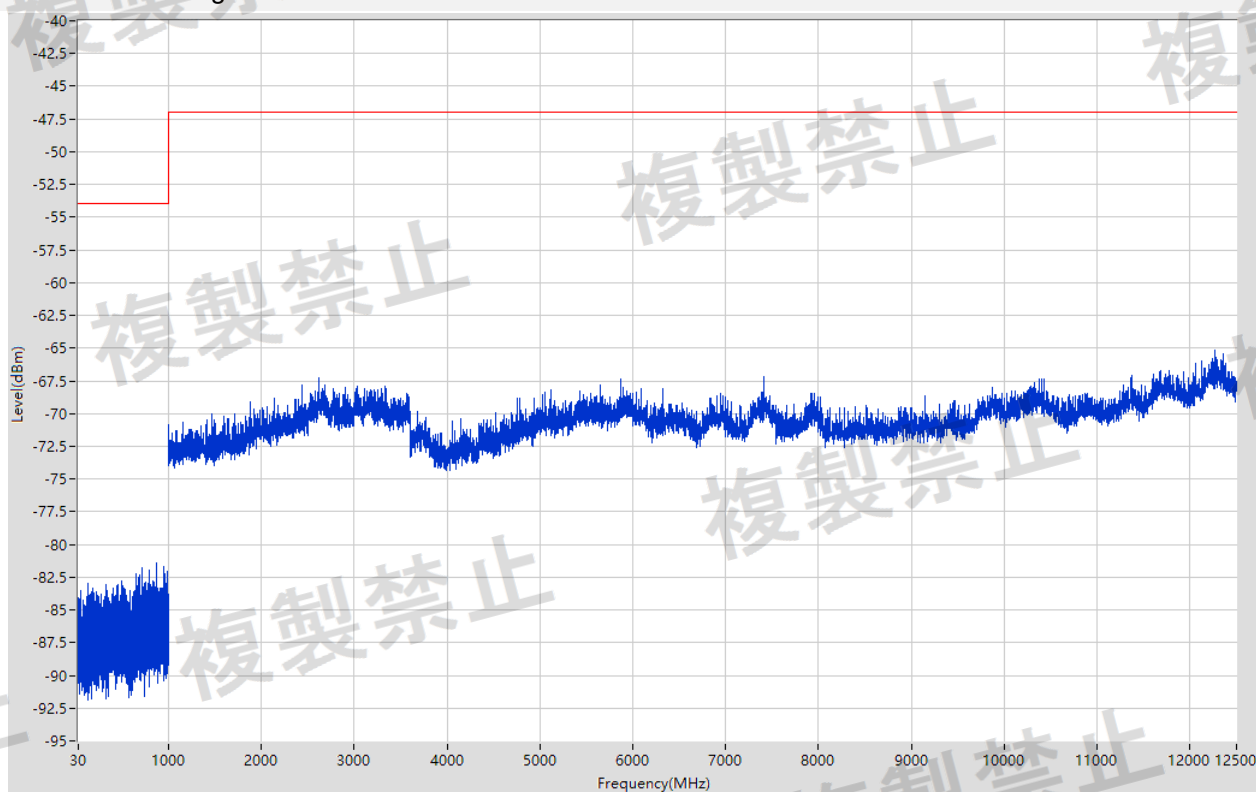
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	902.151	-81.81	0.01	-54	4.0	27.81	Pass
1000	6000	1	Peak	5541.25	-67.27	0.19	-47	20.0	20.27	Pass
6000	12500	1	Peak	12264.375	-64.9	0.32	-47	20.0	17.9	Pass

A.6.5 GFSK NV Middle Channel



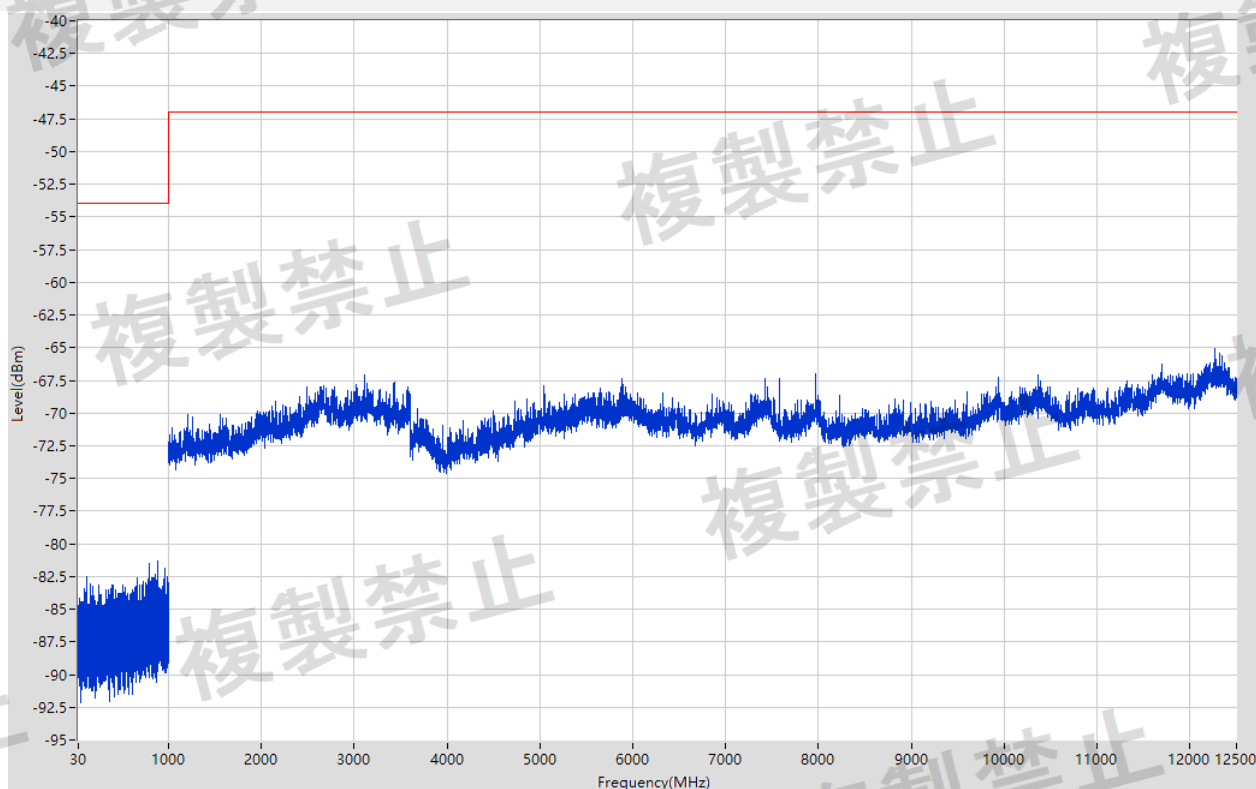
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	988.724	-81.29	0.01	-54	4.0	27.29	Pass
1000	6000	1	Peak	3293.75	-66.78	0.21	-47	20.0	19.78	Pass
6000	12500	1	Peak	12210.75	-65.79	0.26	-47	20.0	18.79	Pass

A.6.6 GFSK NV High Channel



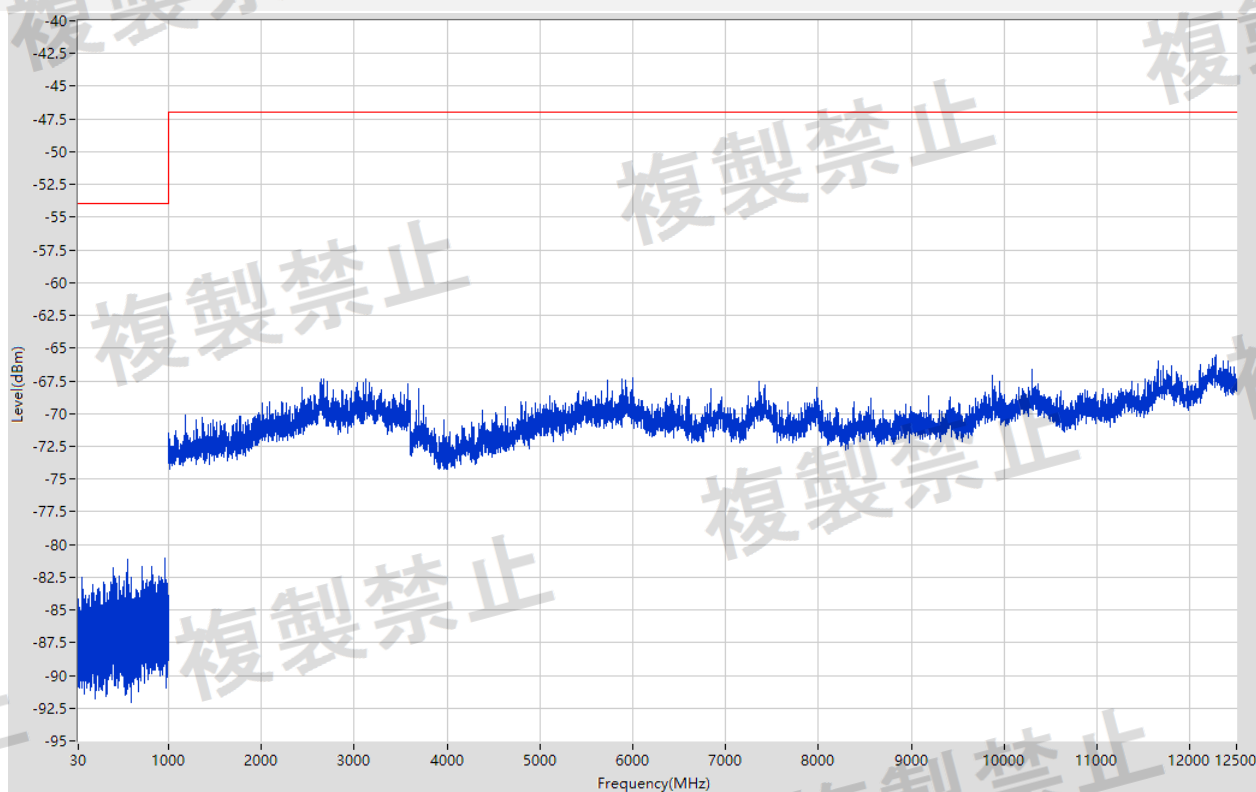
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	872.445	-81.39	0.01	-54	4.0	27.39	Pass
1000	6000	1	Peak	2618.75	-67.3	0.19	-47	20.0	20.3	Pass
6000	12500	1	Peak	12261.125	-65.15	0.31	-47	20.0	18.15	Pass

A.6.7 GFSK HV Low Channel



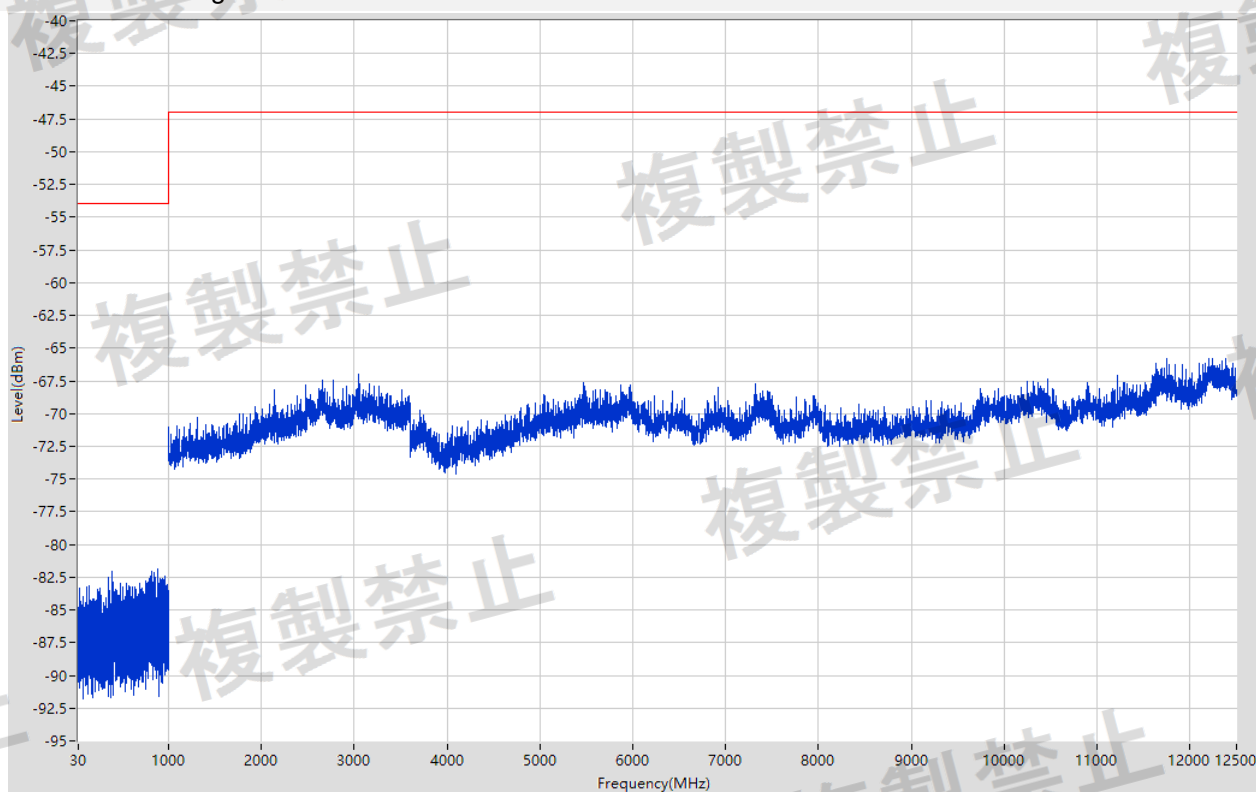
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	882.873	-81.28	0.01	-54	4.0	27.28	Pass
1000	6000	1	Peak	3112.5	-67.11	0.2	-47	20.0	20.11	Pass
6000	12500	1	Peak	12272.5	-65.08	0.31	-47	20.0	18.08	Pass

A.6.8 GFSK HV Middle Channel

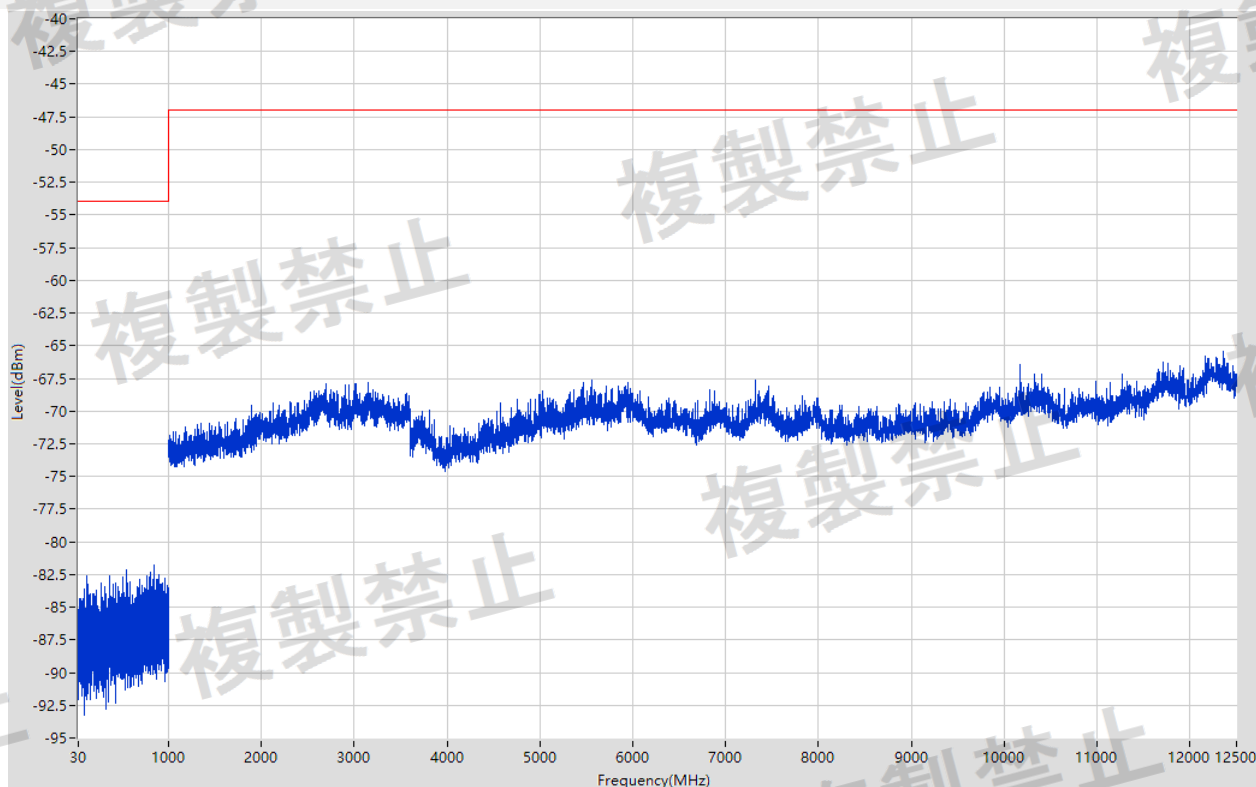


Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	962.17	-81.01	0.01	-54	4.0	27.01	Pass
1000	6000	1	Peak	5995	-67.24	0.19	-47	20.0	20.24	Pass
6000	12500	1	Peak	12277.375	-65.55	0.28	-47	20.0	18.55	Pass

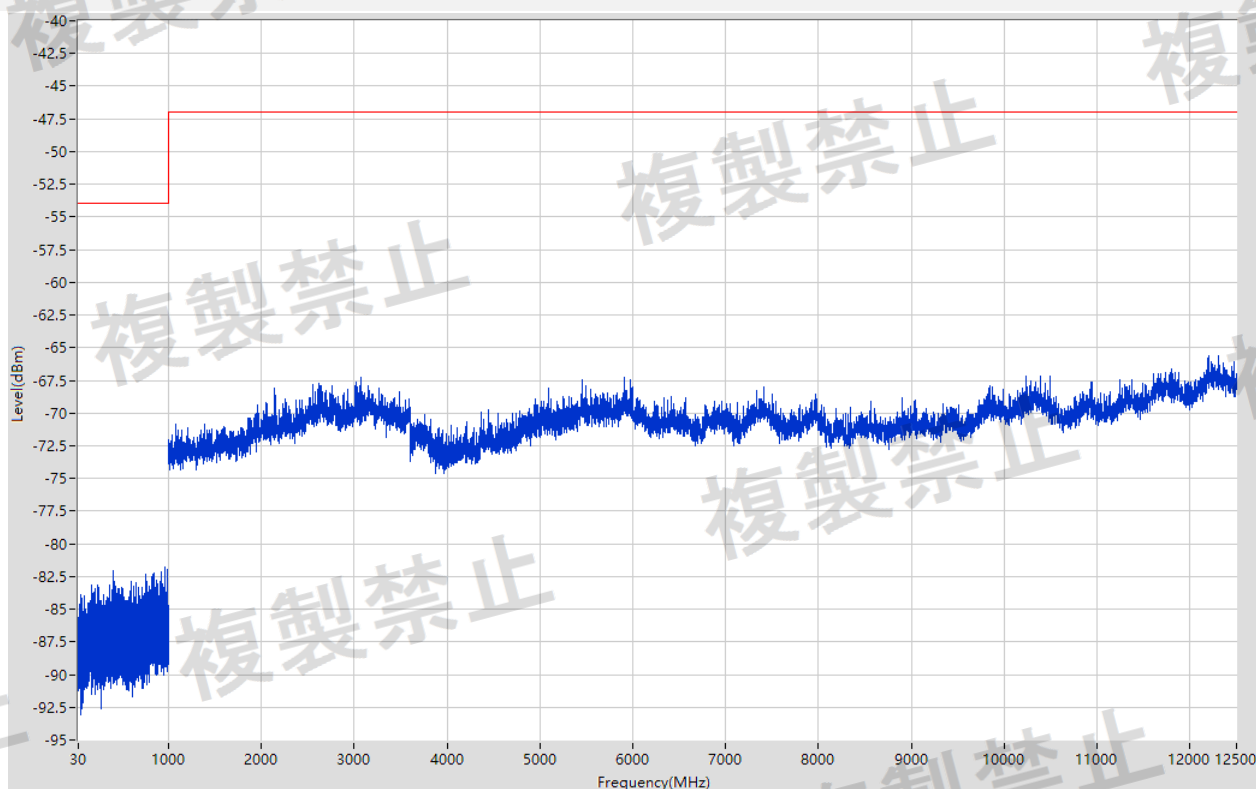
A.6.9 GFSK HV High Channel



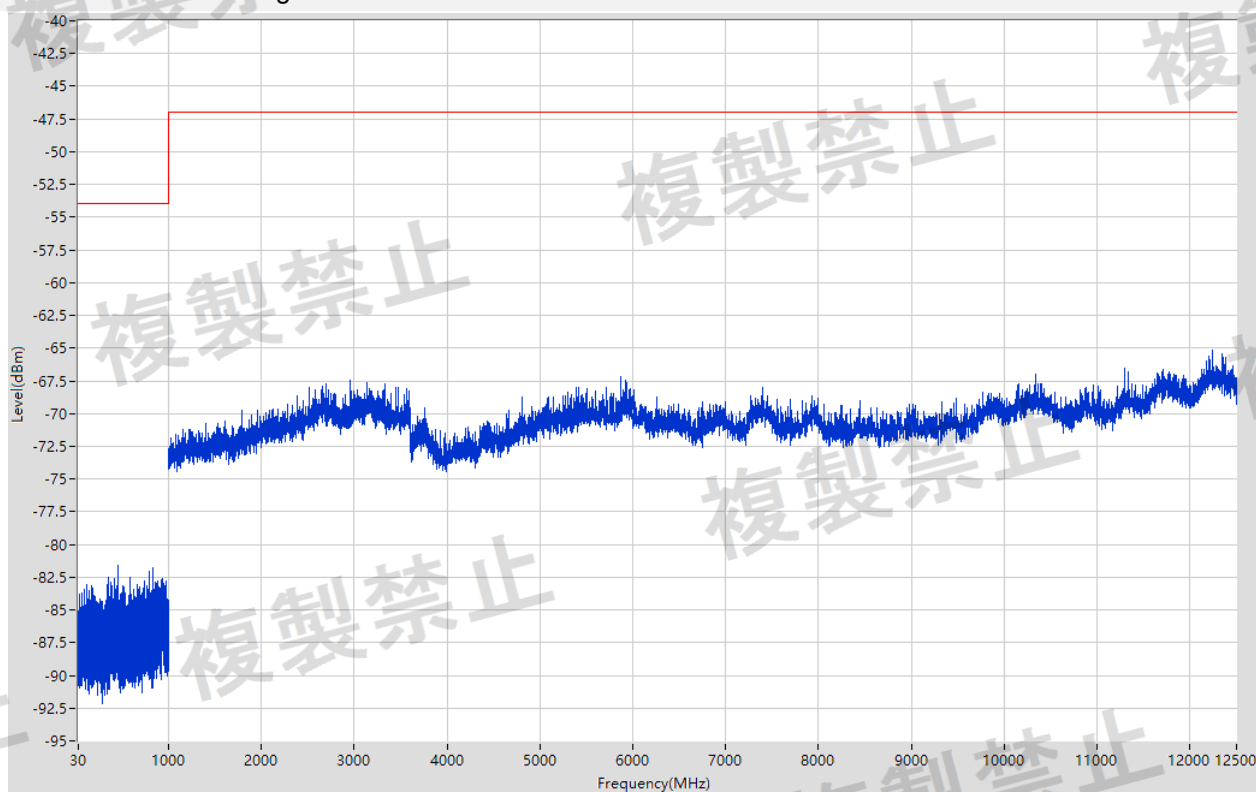
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	886.631	-81.87	0.01	-54	4.0	27.87	Pass
1000	6000	1	Peak	3041.25	-66.95	0.2	-47	20.0	19.95	Pass
6000	12500	1	Peak	12201	-65.79	0.26	-47	20.0	18.79	Pass

A.6.10 $\pi/4$ -DQPSK LV Low Channel

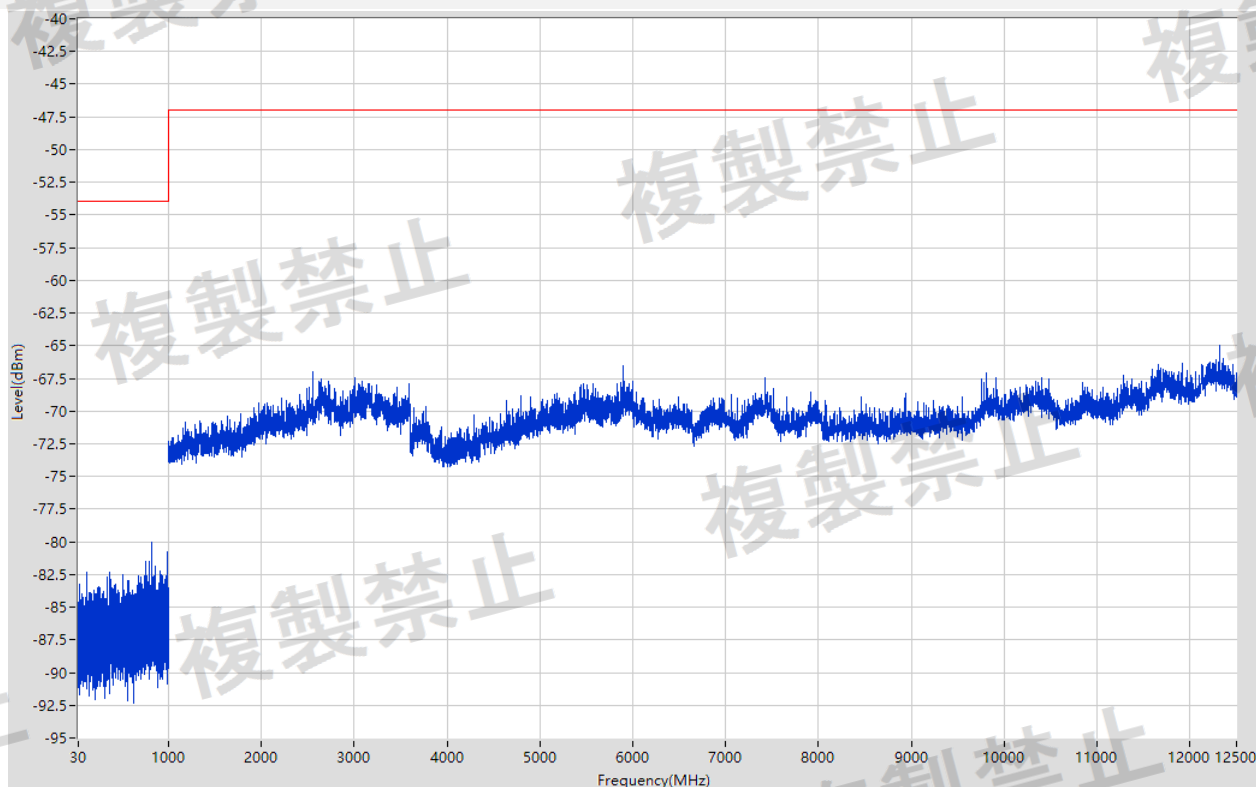
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	841.163	-81.77	0.01	-54	4.0	27.77	Pass
1000	6000	1	Peak	5553.75	-67.66	0.17	-47	20.0	20.66	Pass
6000	12500	1	Peak	12360.25	-65.47	0.28	-47	20.0	18.47	Pass

A.6.11 $\pi/4$ -DQPSK LV Middle Channel

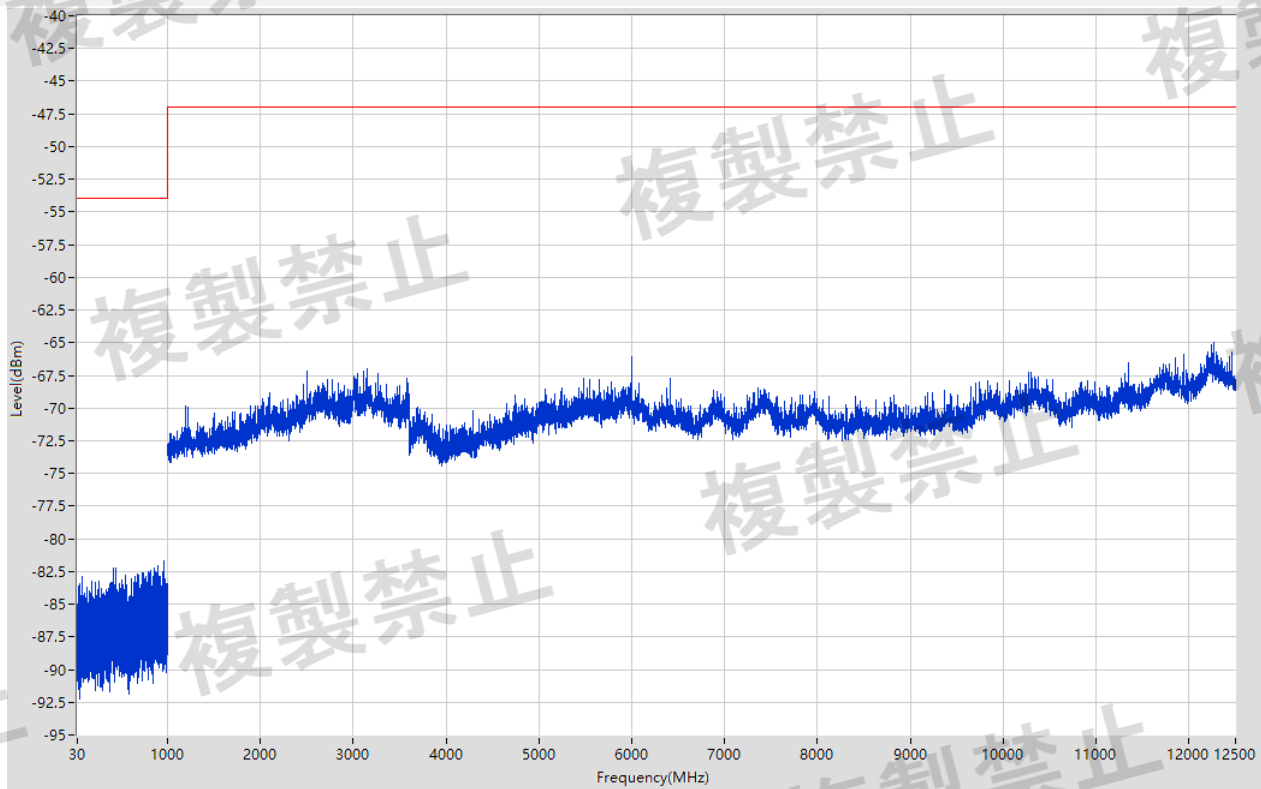
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	959.988	-81.77	0.01	-54	4.0	27.77	Pass
1000	6000	1	Peak	3072.5	-67.23	0.19	-47	20.0	20.23	Pass
6000	12500	1	Peak	12204.25	-65.59	0.28	-47	20.0	18.59	Pass

A.6.12 $\pi/4$ -DQPSK LV High Channel

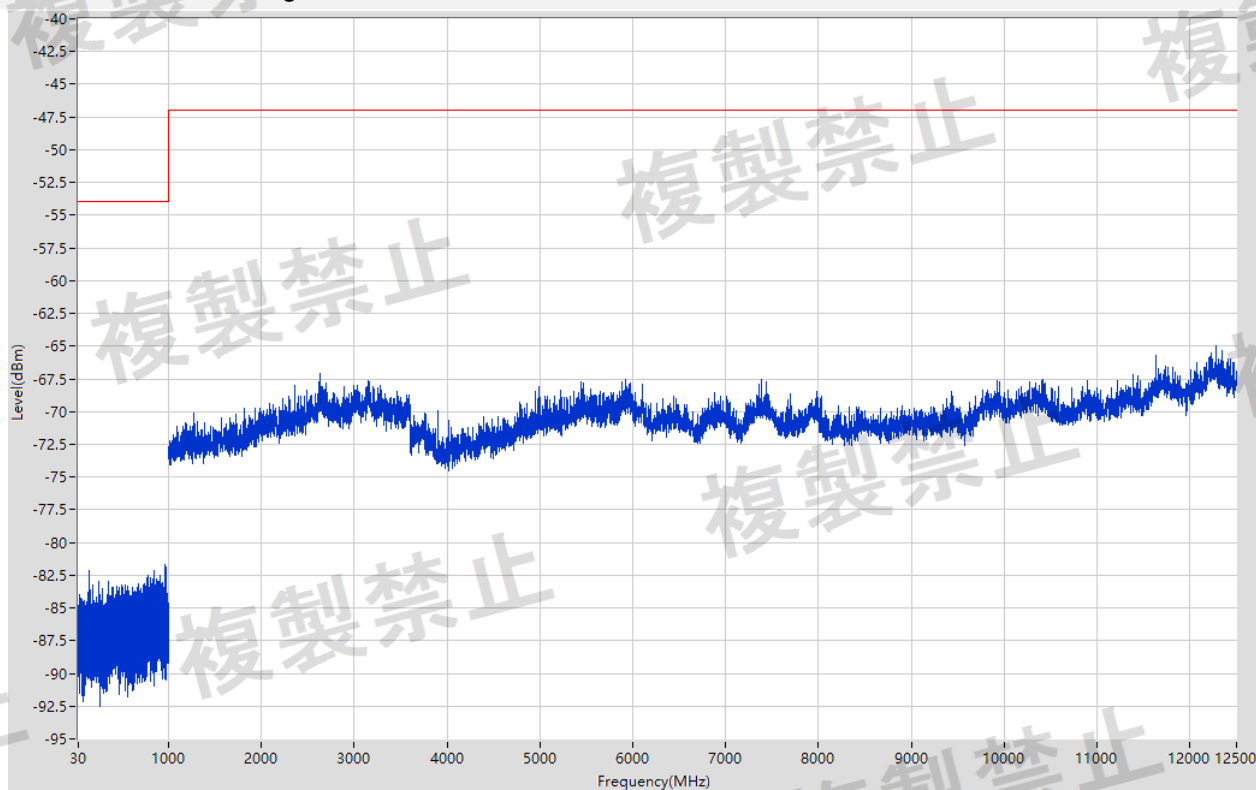
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	451.465	-81.56	0.01	-54	4.0	27.56	Pass
1000	6000	1	Peak	5873.75	-67.2	0.19	-47	20.0	20.2	Pass
6000	12500	1	Peak	12238.375	-65.15	0.31	-47	20.0	18.15	Pass

A.6.13 $\pi/4$ -DQPSK NV Low Channel

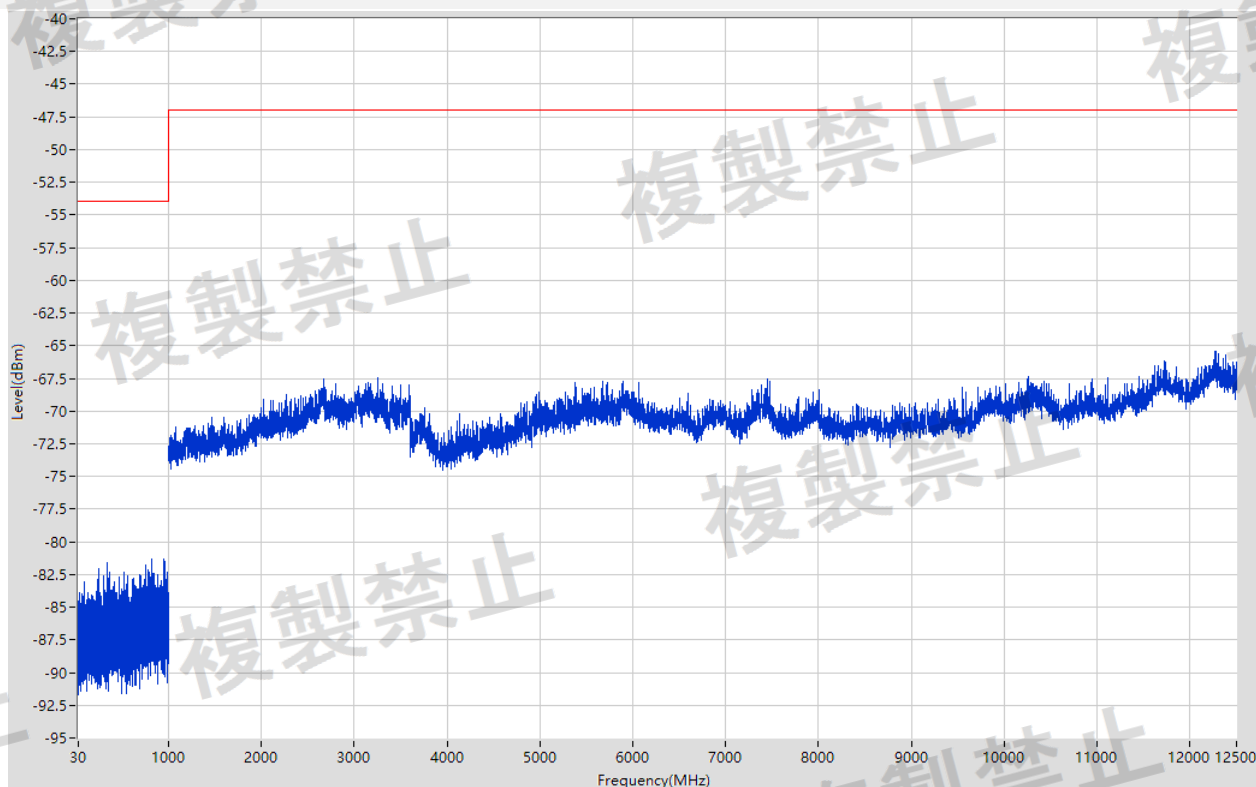
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	818.974	-80	0.01	-54	4.0	26	Pass
1000	6000	1	Peak	5900	-66.58	0.22	-47	20.0	19.58	Pass
6000	12500	1	Peak	12318	-65.02	0.32	-47	20.0	18.02	Pass

A.6.14 $\pi/4$ -DQPSK NV Middle Channel

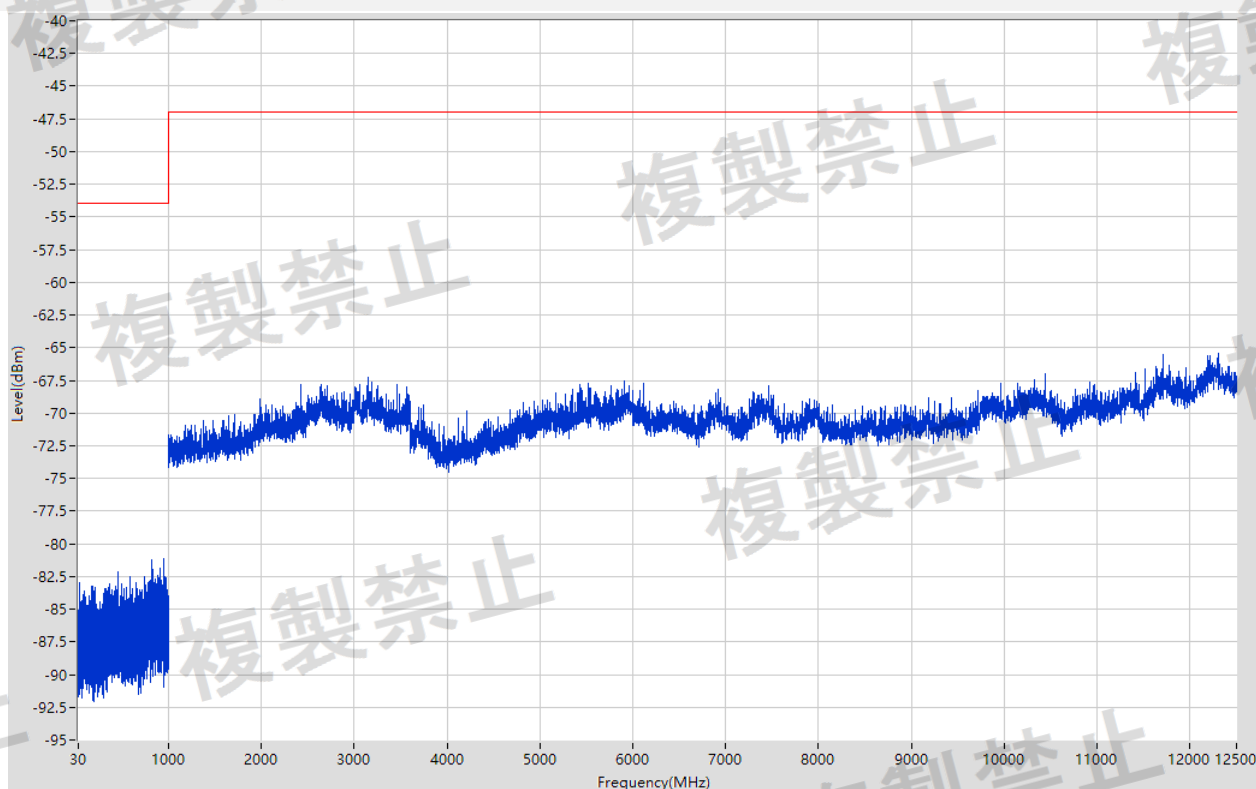
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	960.109	-81.66	0.01	-54	4.0	27.66	Pass
1000	6000	1	Peak	5993.75	-66.07	0.25	-47	20.0	19.07	Pass
6000	12500	1	Peak	12267.625	-64.95	0.32	-47	20.0	17.95	Pass

A.6.15 $\pi/4$ -DQPSK NV High Channel

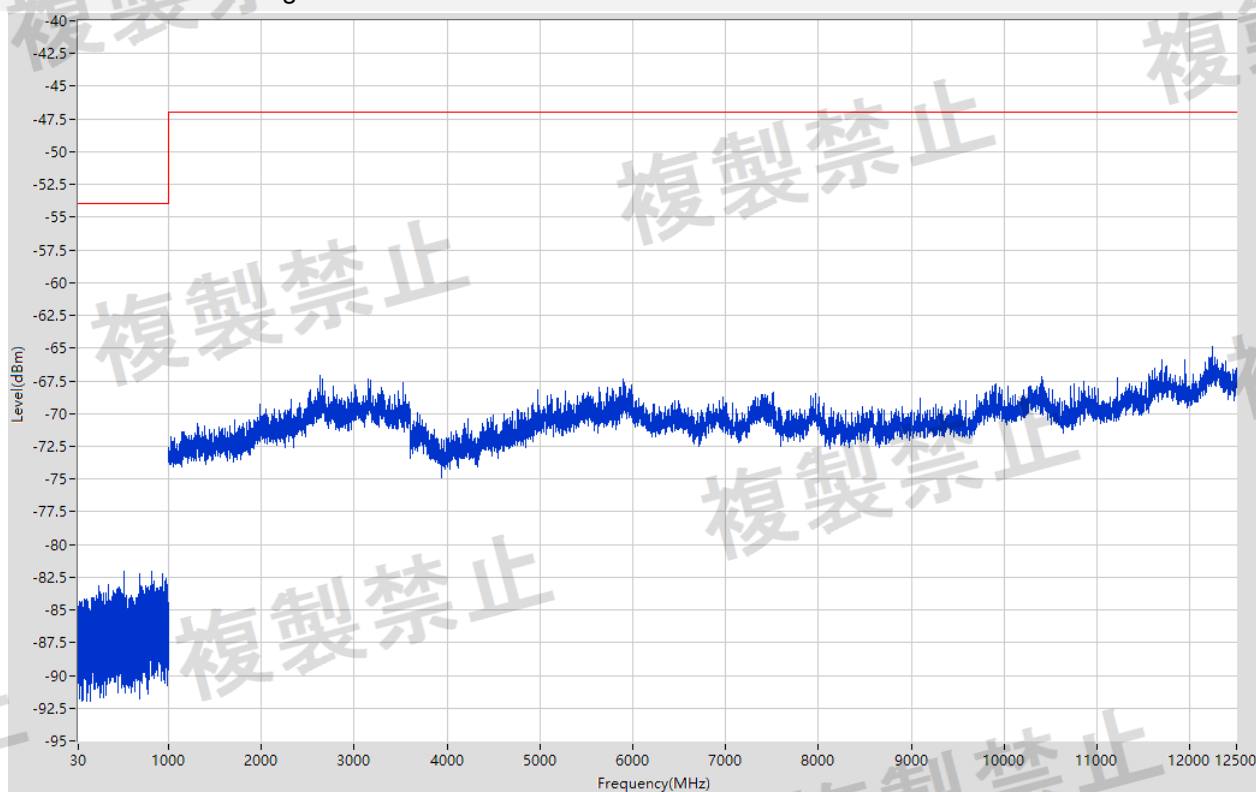
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	959.988	-81.65	0.01	-54	4.0	27.65	Pass
1000	6000	1	Peak	2627.5	-67.1	0.2	-47	20.0	20.1	Pass
6000	12500	1	Peak	12275.75	-64.98	0.32	-47	20.0	17.98	Pass

A.6.16 $\pi/4$ -DQPSK HV Low Channel

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	817.034	-81.3	0.01	-54	4.0	27.3	Pass
1000	6000	1	Peak	3248.75	-67.47	0.18	-47	20.0	20.47	Pass
6000	12500	1	Peak	12264.375	-65.42	0.29	-47	20.0	18.42	Pass

A.6.17 $\pi/4$ -DQPSK HV Middle Channel

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	953.561	-81.18	0.01	-54	4.0	27.18	Pass
1000	6000	1	Peak	3151.25	-67.23	0.19	-47	20.0	20.23	Pass
6000	12500	1	Peak	12305	-65.43	0.29	-47	20.0	18.43	Pass

A.6.18 $\pi/4$ -DQPSK HV High Channel

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	824.915	-82.06	0.01	-54	4.0	28.06	Pass
1000	6000	1	Peak	2638.75	-67.07	0.2	-47	20.0	20.07	Pass
6000	12500	1	Peak	12243.25	-64.88	0.33	-47	20.0	17.88	Pass

5.7 Transmission Antenna Gain (EIRP Antenna Power) Measurement

5.7.1 Limit

Item	Non-directional antennal limits	Directional antennal limits
EIRP Power Density	a) FH, FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: ≤ 6.91 dBm/MHz	a) FH, FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: ≤ 16.91 dBm/MHz
	b) DS but other than a) from 2400~2483.5 MHz: ≤ 12.14 dBm/MHz	b) DS but other than a) from 2400~2483.5 MHz: ≤ 22.14 dBm/MHz z
	c) OFDM, but other than a): For OCB of 26MHz or less: ≤ 12.14 dBm/MHz For OCB of over 26 MHz to 40 MHz: ≤ 9.14 dBm/MHz	c) OFDM, but other than a): For OCB of 26MHz or less: ≤ 22.14 dBm/MHz For OCB of over 26 MHz to 40 MHz: ≤ 19.14 dBm/MHz
	d) Other than a), b) and c): ≤ 12.14 dBm	d) Other than a), b) and c): ≤ 22.14 dBm
Note: This test item is not applied to EUT with EIRP Antenna power lower than 12.14 dBm/MHz.		

5.7.2 Test Setup

See section 4.3.3 for test setup description for the antenna port.

5.7.3 Test Procedure

- 1 Set EUT ad measuring antenna at the same height and roughly facing each other.
- 2 Set spectrum analyzer with RBW=1MHz, VBW=1MHz, Detector=Peak, Trace mode=Max Hold, and tune reference level to observe receving signal position.
- 3 Move the measuring antenna height up and down within ± 50 cm of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read sa "E".
- 4 Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal
- 5 Swing the replacing antenna give a maximum receiving level.
- 6 Move the measuring antenna height up and down within ± 50 cm of replacing antenna height and swing it to find the maximum receiving level.
- 7 Set SSG output power at Pt to give the equivalent output level of "E" or caluate Pt with SSG output which gives the nearest of "E" and difference (± 1 dB). Record the Pt.
- 8 Calculate EIRP by the formula below $EIRP = G_t - L + P_t$.

Gt: gain of replacing antenna (dBi)

L: feeder loss between SSG and replacing antenna

Pt: Output power of the SSG

- 9 If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

5.7.4 Test Deviation

There is no deviation with the original standard.

5.7.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.7.6 Test Result

Note: Not applicable.

5.8 Transmission Radiation Angle Width (3dB Beamwidth) Measurement

5.8.1 Limit

Item	Limits
3dB antenna beam width	$360/A$ (If $A < 1$; then $A = 1$) $A = \{ \text{EIRP Power [mW]} / 16.36 \text{ for DS, OFDM} \}$ or $A = \{ \text{EIRP Power [mW]} / 4.9 \text{ for FH} \}$
Note: This test item is not applied to EUT with EIRP Antenna power lower than 12.14 dBm/MHz.	

5.8.2 Test Setup

See section 4.3.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX A.

5.8.3 Test Procedure

- 1 Set EUT and measuring antenna at the same height and roughly facing each other.
- 2 Set spectrum analyzer with RBW=1 MHz, VBW=1 KHz, Y scale=5 dB, Detector=Peak, Trace mode=Max Hold, and tune reference level to observe receiving signal position.
- 3 Rotate directions of the EUT horizontally and vertically to find the maximum receiving power.
- 4 Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as "E"
- 5 Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
- 6 Calculate 3dB antenna beam width by the formula below $360/A$ (If $A < 1$; then $A = 1$). $A = \{ \text{EIRP Power [mW]} / 16.36 \text{ for DS, OFDM} \}$ or $A = \{ \text{EIRP Power [mW]} / 4.9 \text{ for FH} \}$

5.8.4 Test Deviation

There is no deviation with the original standard.

5.8.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.8.6 Test Result

Note: Not applicable.

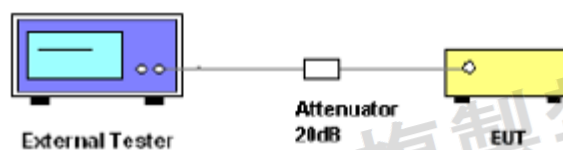
5.9 Radio Interference Prevention Capability Measurement

5.9.1 Limit

Item	Limits
Identification	≥ 48 bits

5.9.2 Test Setup

The photo of test setup please refer to ANNEX A.



5.9.3 Test Procedure

- In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes form EUT. b. Check the transmitted identification codes with the demodulator.
- In the case of receiving the identification code: a. Transmit the predetermined identification codes form the counterpart. b. Check if communication is normal. c. Transmit the signals other than predetermined ID codes form the counterpart. d. check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

5.9.4 Test Deviation

There is no deviation with the original standard.

5.9.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

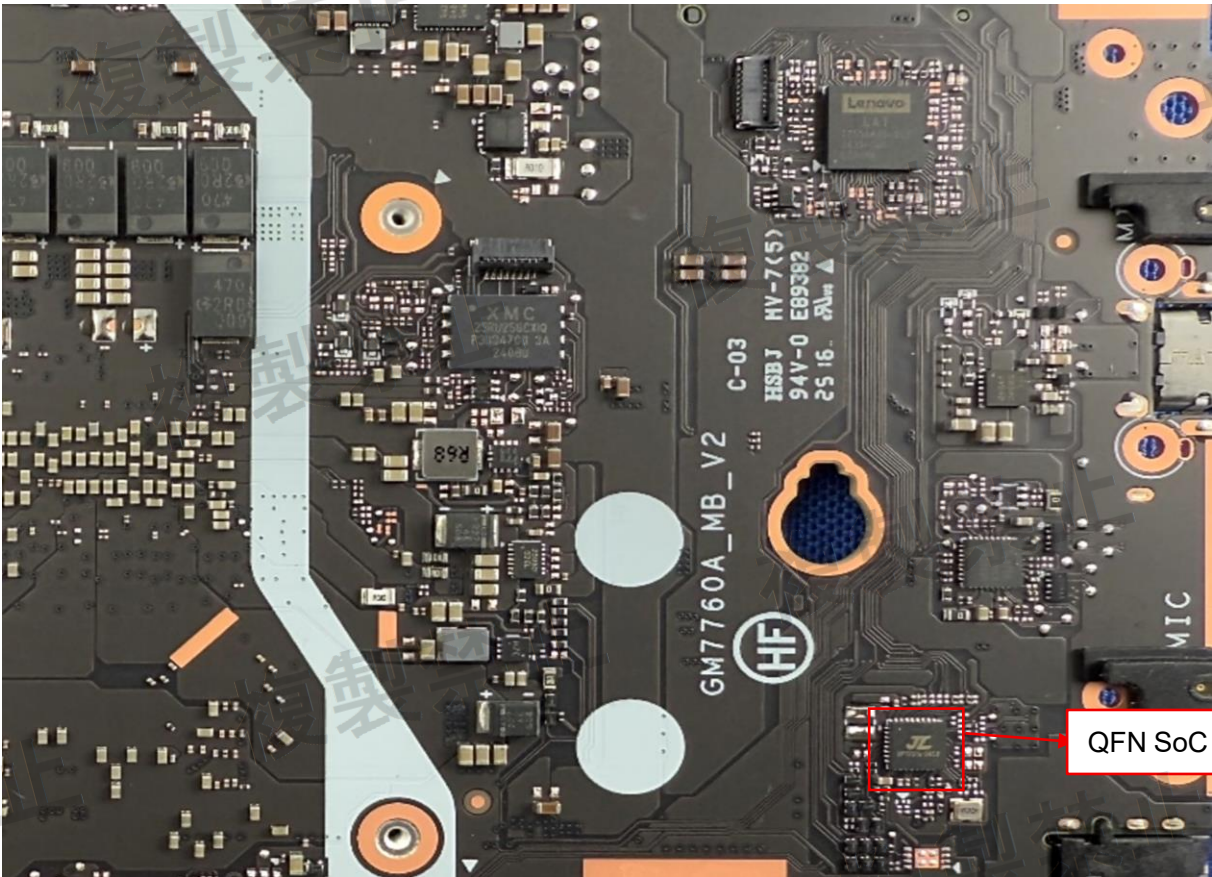
5.9.6 Test Result

BD Address: 046874D23A72

Test Voltage	Test Result (ID Code)	Verdict
NV	GOOD	Pass

5.10 Construction Protection Confirmation Method

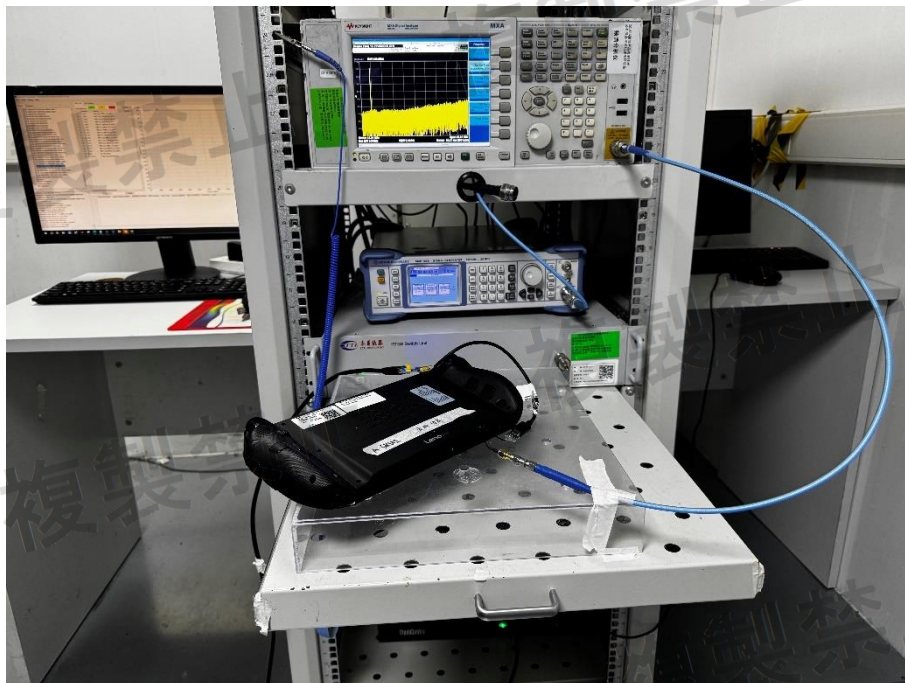
The RF and modulation portions are protected against illegal modification as following method:

Protected Method	Description
Structure protection	The RF Module is QFN SoC IC, and RF part is mounted on PCB with surface mount technology, can't be easily modified
Reference Photo	
	

ANNEX A TEST SETUP PHOTOS

1 Conducted Test Photo

Conducted Test



Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
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6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--