TEST REPORT

Applicant:	Shenzhen Hollyland Technology Co., Ltd.
Address:	8F, 5D Building, Skyworth Innovation Valley, Tangtou Road, Shiyan Street, Baoan District, Shenzhen, 518108, China
Equipment Type:	Wireless Microphone
Model Name:	M28R1
Brand Name:	HOLLYLAND
Test Standard:	MIC Notice No.88 Appendix No.43 Ordinance of MPT No.37, 1981: Article 2 paragraph 1 item (19)
Sample Arrival Date:	Apr. 23, 2026
Test Date:	Apr. 29, 2026 - May 10, 2026
Date of Issue:	May 28, 2026

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Li Renyu **Checked by:** Li Ganming **Approved by:** Tolan Tu (Testing Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	May 28, 2026	Initial Issue

TABLE OF CONTENTS

1. GENERAL INFORMATION 4
1.1 Test Laboratory 4
1.2 Test Location 4
2. PRODUCT INFORMATION 5
2.1 Applicant Information 5
2.2 Manufacturer Information 5
2.3 General Description for Equipment under Test (EUT) 5
2.4 Technical Information 6
3. SUMMARY OF TEST RESULTS 7
3.1 MEASUREMENT UNCERTAINTY 8
4. GENERAL TEST CONFIGURATIONS 9
4.1 Test Environment Conditions 9
4.2 Test Equipment List 10
4.3 Test Software List 11
4.4 Description of Test Setup 11
5. TEST ITEMS 13
5.1 Frequency Error Measurement 13
5.2 Occupied Bandwidth and Spread-spectrum Bandwidth 14
5.3 The frequency retention time 16
5.4 Unwanted Emission Intensity Measurement 17
5.5 Antenna Power Error Measurement 18
5.6 Limitation of Collateral Emission of Receiver Measurement 20
5.7 Transmission Antenna Gain (EIRP Antenna Power) Measurement 21
5.8 Transmission Radiation Angle Width (3dB Beamwidth) Measurement 23

複製禁止

5.9 Radio Interference Prevention Capability Measurement 24
ANNEX A TEST RESULT 25
A.1 Frequency Error 25
A.2 Occupied Bandwidth and Spread-spectrum Bandwidth 26
A.3 The frequency retention time (Dwell time) 27
A.4 Unwanted Emission Intensity Measurement 28
A.5 Antenna Power Error Measurement 31
A.6 Limitation of Collateral Emission of Receiver Measurement 32
A.7 Transmission Antenna Gain (EIRP Antenna Power) Measurement 35
A.8 Transmission Radiation Angle Width (3dB Bandwidth) Measurement 35
A.9 Radio Interference Prevention Capability Measurement 35
A.10 Construction Protection Confirmation Method 35
ANNEX B TEST SETUP PHOTOS 36
ANNEX C EUT EXTERNAL PHOTOS 36
ANNEX D EUT INTERNAL PHOTOS 36

1. GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	601, Building 2, Intelligent Connected Vehicle Industrial Park, No.55, Xiangshan Road, Luotian Community, Yanluo Sub-district, Bao'an District, Shenzhen
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☑ Building 2, Intelligent Connected Vehicle Industrial Park, No.55, Xiangshan Road, Luotian Community, Yanluo Sub-district, Bao'an District, Shenzhen, Guangdong
	☐ 1/F., Building B, Ganghongji High-Tech Intelligent Industrial Park, No.1008, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong

2. PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Shenzhen Hollyland Technology Co., Ltd.
Address	8F, 5D Building, Skyworth Innovation Valley, Tangtou Road, Shiyan Street, Baoan District, Shenzhen, 518108, China

2.2 Manufacturer Information

Manufacturer	Shenzhen Hollyland Technology Co., Ltd.
Address	8F, 5D Building, Skyworth Innovation Valley, Tangtou Road, Shiyan Street, Baoan District, Shenzhen, 518108, China

2.3 General Description for Equipment under Test (EUT)

EUT Name	Wireless Microphone
Model Name Under Test	M28R1
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V18
Software Version	V2.0.1.012
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	2.4G ISM Band

The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	DTS
Modulation Type	GFSK
Transfer Rate	2 Mbps
Frequency Range	The frequency range used is 2402 MHz – 2480 MHz; The frequency block is 2400 MHz to 2483.5 MHz.
Number of Channel	2 Mbps: 40 (at intervals of 2 MHz)
Tested Channel	2 Mbps: Low (2402 MHz), Middle (2440 MHz), High (2480 MHz)
Antenna Type	Ceramic Antenna
Antenna Gain	0.42 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)
Declare Max rated power	10.0000 mW
About the Product	The equipment is Wireless Microphone, it contains 2.4G ISM Band (GFSK modulation). The 2.4G ISM Band (GFSK modulation) was tested in this report.

All channel was listed on the following table:

2 Mbps:

Channel number	Freq. (MHz)	Channel number	Freq. (MHz)	Channel number	Freq. (MHz)	Channel number	Freq. (MHz)
1	**2402**	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474
8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	**20**	**2440**	30	2460	**40**	**2480**

3. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Part	Description	Channel	Test Mode	Data Rate (Mbps)	Verdict
5.1	Frequency Error	Low/Middle/High	un-modulation	/	Pass
5.2	Occupied Bandwidth	Low/Middle/High	GFSK	2	Pass
5.3	The frequency retention time	N/A	N/A	N/A	N/A
5.4	Unwanted Emission Intensity	Low/Middle/High	GFSK	2	Pass
5.5	Antenna Power Error	Low/Middle/High	GFSK	2	Pass
5.6	Limitation of Collateral Emission of Receiver	Low/Middle/High	GFSK	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
--	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 12.14 dBm, it is not necessary.

The test channel corresponding to the frequency list.

Mode	Description	Channel	Frequency(MHz)
GFSK (2 Mbps)	Low/Middle/High(L/M/H)	Channel 1/Channel 20/Channel 40	2402/2440/2480

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℃
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 (%)	47% to 56%	
Atmospheric Pressure (kPa)	86 kPa to 106 kPa	
Temperature	+21.7℃ to +22.8℃	
Working Voltage of the EUT	NV (Normal Voltage)	5.0 V
	LV (Low Voltage)	4.5 V
	HV (High Voltage)	5.5 V

Note: When the input voltage deviation from the external power supply is+/- 10%, and the voltage deviation provided to the radio part of the EUT (excluding the power circuit) is kept within+/- 1%, only the normal voltage is used for testing.

Voltage fluctuation results:

The measuring point is a component with schematic number.

External power supply	Rated operating voltage of EUT	Actual measured voltage of EUT	± 1% voltage operating range
4.500 V	1.800 V	1.798V	1.782 V~1.818 V
5.000 V	1.800 V	1.803V	1.782 V~1.818 V
5.500 V	1.800 V	1.810V	1.782 V~1.818 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	GUANGZHOU NEM METROLOGY&TEST TECHNOLGY CO., LTD.	2/F., Buiding. No.176Hedong Road, Liwan District, Guangzhou, Guangdong, China	LiWengeng	2025.06.16	2026.06.15	c)
Power Sensor	KEYSIGHT	U2063XA	MY58000247	GUANGZHOU NEM METROLOGY&TEST TECHNOLGY CO., LTD.	2/F., Buiding. No.176Hedong Road, Liwan District, Guangzhou, Guangdong, China	LiWengeng	2025.06.16	2026.06.15	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	2025.07.09	2026.07.08	c)
DC Power Supply	ITECH	IT6720	600103010717610007	GUANGZHOU NEM METROLOGY&TEST TECHNOLGY CO., LTD.	2/F., Buiding. No.176Hedong Road, Liwan District, Guangzhou, Guangdong, China	LuoJisong	2025.06.17	2026.06.16	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)

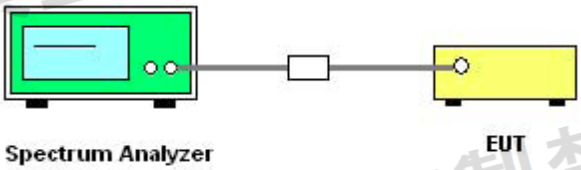
d) Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c)

4.3 Test Software List

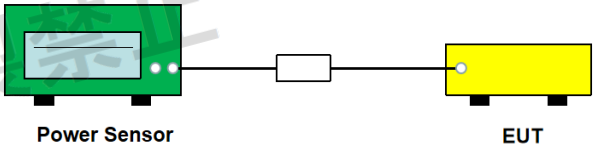
Description	Manufacturer	Software Version	Serial No.	Applicable test Setup
BL410R	BALUN	V2.1.1.488	N/A	The section 4.4.1

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

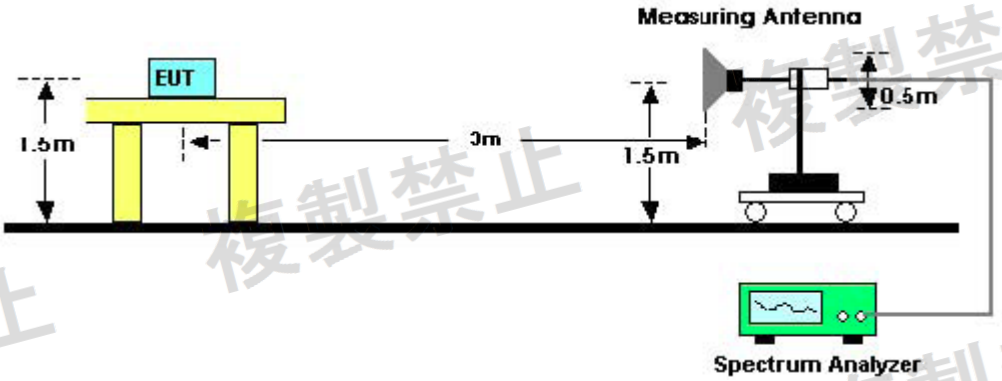


(Diagram 1)

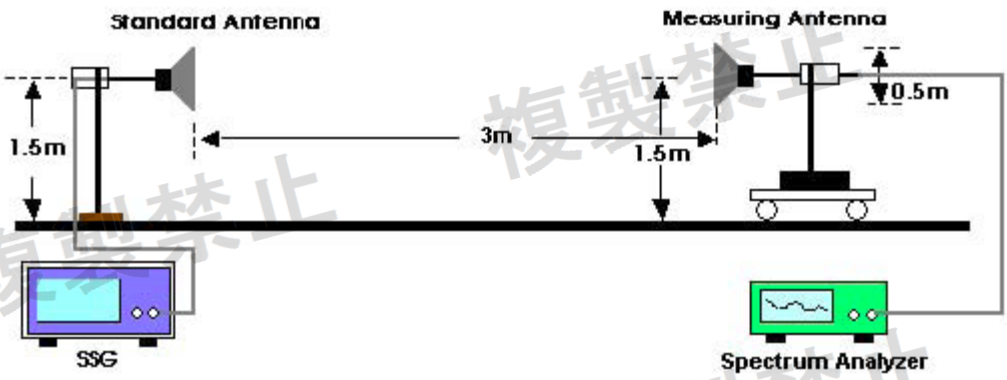


(Diagram 2)

4.4.2 For EIRP Antenna Power Test

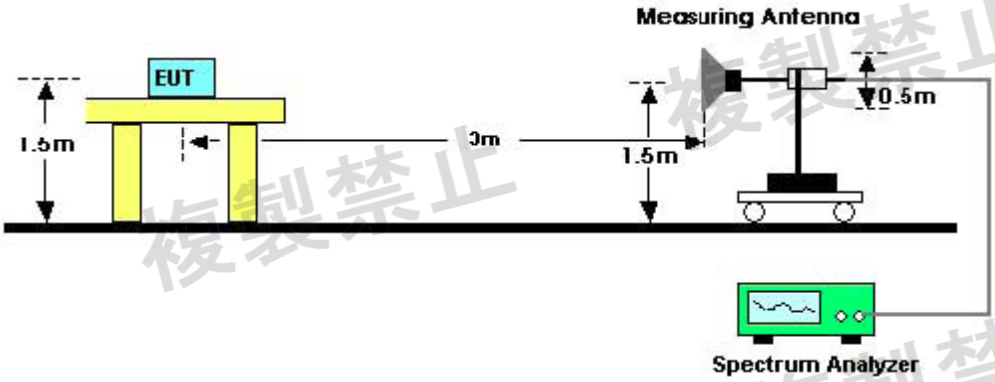


(Diagram 3)



(Diagram 4)

4.4.3 For 3dB Beamwidth Test



(Diagram 5)

5. TEST ITEMS

5.1 Frequency Error Measurement

5.1.1 Limit

Item	Limits
Frequency Tolerance	≤±50 ppm

5.1.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

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 $(fc-f)/fc\times10^6$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

Please refer to ANNEX A.1.

5.2 Occupied Bandwidth and Spread-spectrum Bandwidth

5.2.1 Limit

Item	Limits
Occupied Band Width	FHSS≦83.5MHz; OFDM≦40MHz,DSSS≦26MHz; Others≦26MHz

5.2.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

1 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

2 After repeating sweeps until the display shows steady data, store the values at all data points into the computer array variables.

3 Convert the dB values at all data points to antilogarithm on the power dimension.

4 Obtain sum total of the power at all data points, and store it as “total power”.

5 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”

6 Accumulate the power at each data point sequentially downward form 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

Please refer to ANNEX A.2.

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 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Measuring Instruments and setting

Spectrum analyzer setting up is as follows.
Center frequency Hopping test frequency
Sweep bandwidth 0 Hz
Resoluble bandwidth 1 MHz
Video bandwidth equivalent to resoluble 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

Please refer to ANNEX A.3.

5.4 Unwanted Emission Intensity Measurement

5.4.1 Limit

Item	Limits
TX Spurious Emission	≦2.5μW/MHz (2387MHz>f ; 2496.5MHz<f)
	≦ 25μW/MHz (2387MHz ≦ f<2400MHz) and (2483.5MHz<f ≦ 2496.5MHz)

5.4.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

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 = Meaured_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

Please refer to ANNEX A.4.

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 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

1 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.

2 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

3 Those using frequency hopping method (including DSSS or composite method with OFDM):

(1) 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.

a. Connect a high frequency power meter to the output of the dummy load (attenuator) and measure the total power.

b. Divide the total power by the spreading bandwidth to calculate the average power per 1 MHz.

c. Antenna power shall be as follows:

A. Value of b for continuous wave

B. For burst wave Average power in burst is calculated from the value of b and the transmission time rate.

(2) 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 above1

(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 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

Please refer to ANNEX A.5.

5.6 Limitation of Collateral Emission of Receiver Measurement

5.6.1 Limit

Item	Limits
RX Spurious Emission	≦4nW (f<1GHz)
	≦20nW (1GHz≦f)

5.6.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

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 GHz, 2 nW for f≥ 1GHz), 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

Please refer to ANNEX A.6.

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 b) DS but other than a) from 2400~2483.5 MHz: ≦12.14 dBm/MHz 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 d) Other than a), b) and c): ≦ 12.14 dBm	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: ≦22.14 dBm/MHz z 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): ≦ 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 4.4.3 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 ± 50cm 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 ± 50cm 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 (± 1dB). Record the Pt.

8 Calculate EIRP by the formula below EIRP = Gt – L + Pt.

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

Please refer to ANNEX A.7.

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 = {EIRP Power [mW] / 16.36 for DS, OFDM} or A = {EIRP Power [mW] / 4.9 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 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

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 ± 50cm 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 = {EIRP Power [mW] / 16.36 for DS, OFDM} or A = {EIRP Power [mW] / 4.9 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

Please refer to ANNEX A.8.

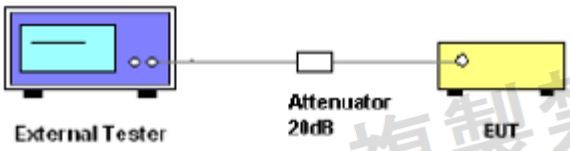
5.9 Radio Interference Prevention Capability Measurement

5.9.1 Limit

Item	Limits
Identification	≥ 48 bits

5.9.2 Test Setup

The photo of test setup please refer to ANNEX B.



5.9.3 Test Procedure

1 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.

2 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

Please refer to ANNEX A.9.

ANNEX A TEST RESULT

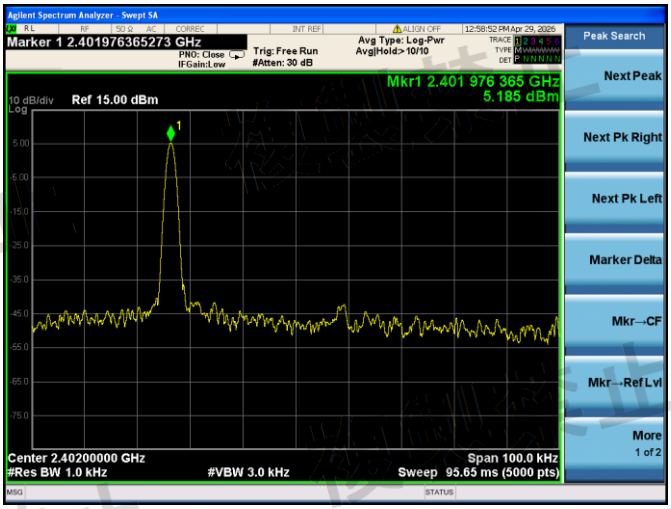
A.1 Frequency Error

Test Data for GSFK (2 Mbps)

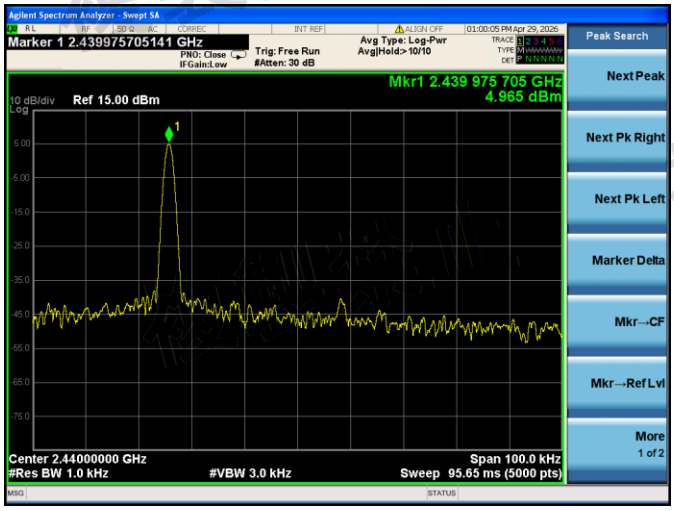
Test Mode	Test Voltage	Frequency (MHz)	Test Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)	Refer to Plot	Verdict
Unmodulated	NV	2402	2401.976365	-9.84	±50	A.1.1	Pass
		2440	2439.975705	-9.96	±50	A.1.2	Pass
		2480	2479.975285	-9.97	±50	A.1.3	Pass

Test Plots for GSFK (2 Mbps)

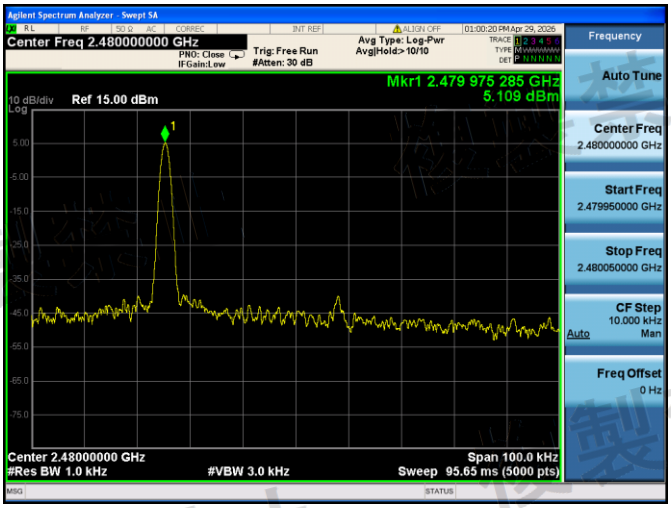
A.1.1 NV 2402 Channel



A.1.2 NV 2440 Channel



A.1.3 NV 2480 Channel



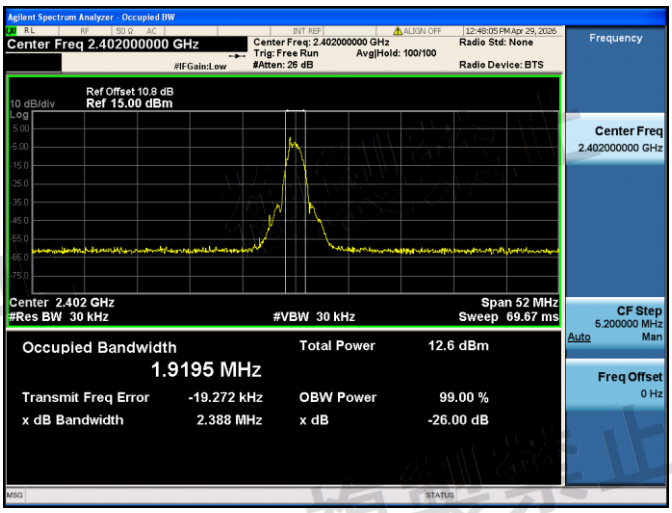
A.2 Occupied Bandwidth and Spread-spectrum Bandwidth

Test Data for GSFK (2 Mbps)

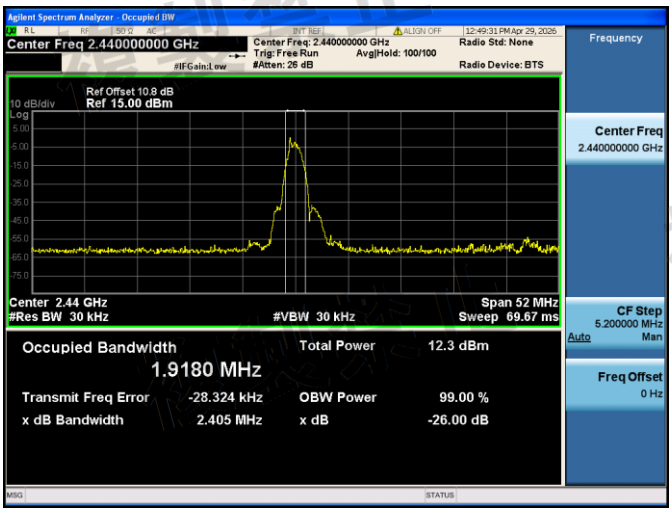
Results of Occupied Bandwidth	Channel	Test Voltage	Measured 99% Occupied Bandwidth (MHz)	Occupied Bandwidth Limit (MHz)	Refer to Plot	Verdict
	Low	NV	1.92	≤ 26	A.2.1	Pass
	Middle		1.92	≤ 26	A.2.2	Pass
	High		1.94	≤ 26	A.2.3	Pass

Test Data for GSFK (2 Mbps)

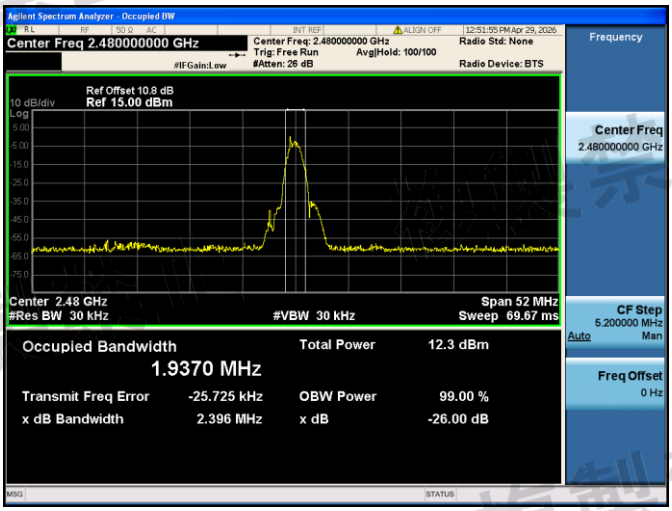
A.2.1 Low Channel NV



A.2.2 Middle Channel NV



A.2.3 High Channel NV



A.3 The frequency retention time (Dwell time)

Note: Not applicable.

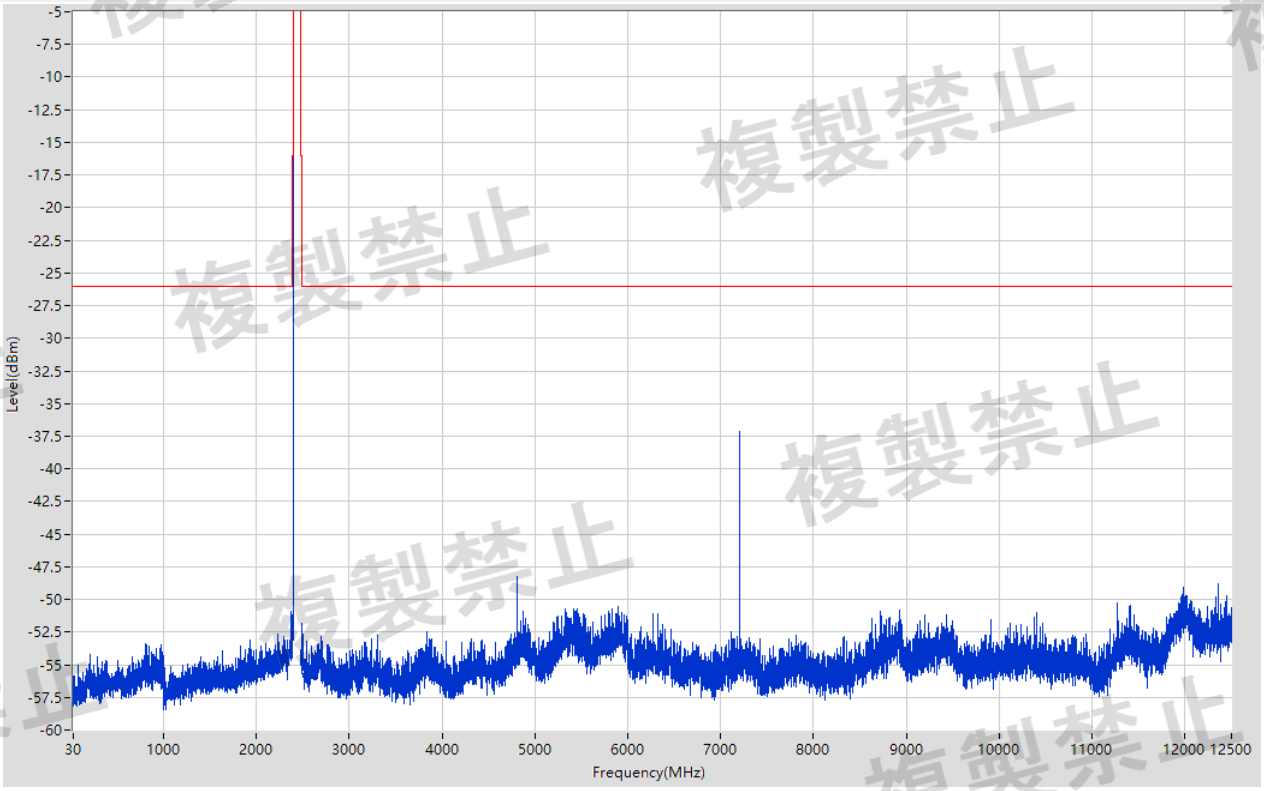
A.4 Unwanted Emission Intensity Measurement

Test Data

Mode	Channel	Test Voltage	Refer to Plot	Verdict
GFSK (2 Mbps)	Low	NV	A.4.1	Pass
	Middle		A.4.2	Pass
	High		A.4.3	Pass

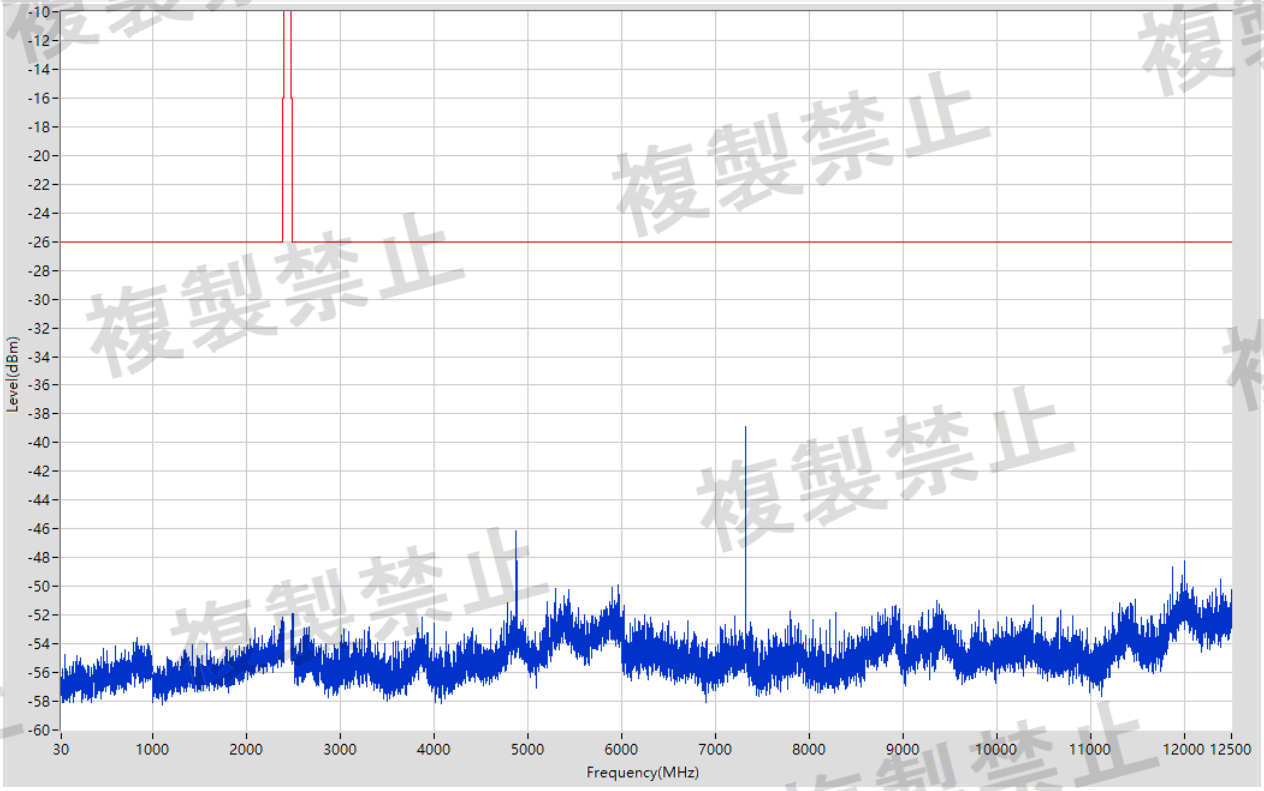
Test Plots

A.4.1 GFSK (2 Mbps) NV Low Channel



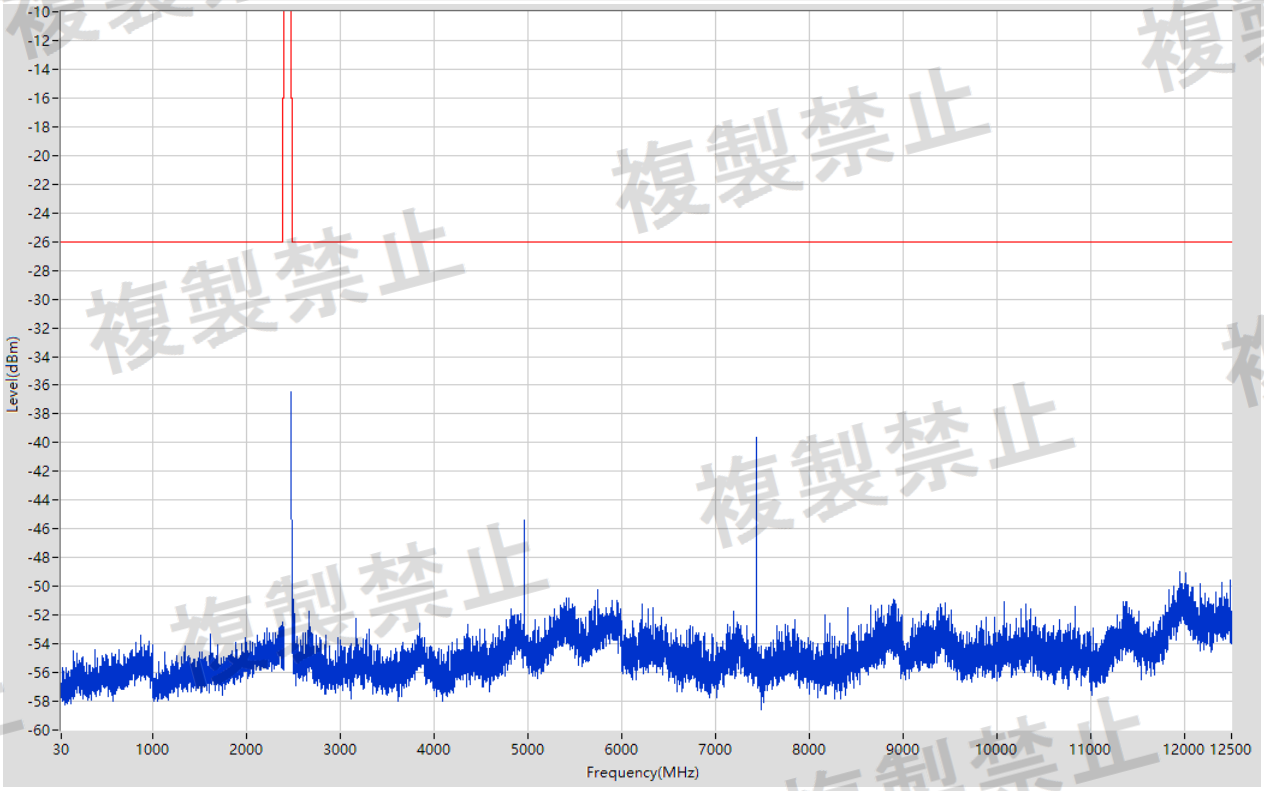
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm/MHz)	Power (μW/MHz)	Limit (μW/MHz)	Verdict
30	1000	1	Peak	802	-53.37	0.005	2.5	Pass
1000	2374	1	Peak	2371	-50.88	0.008	2.5	Pass
2374	2387	1	Peak	2380.208	-51.49	0.007	2.5	Pass
2387	2400	1	Peak	2400	-14.63	34.441	25	N/A
			Sample		-23.23	4.753		Pass
2483.5	2496.5	1	Peak	2494.94	-51.81	0.007	25	Pass
2496.5	2509.5	1	Peak	2496.923	-52.65	0.005	2.5	Pass
2509.5	6000	1	Peak	4802.829	-48.22	0.015	2.5	Pass
6000	12500	1	Peak	7206	-37.14	0.193	2.5	Pass

A.4.2 GFSK (2 Mbps) 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	842	-53.61	0.004	2.5	Pass
1000	2374	1	Peak	2300	-52.71	0.005	2.5	Pass
2374	2387	1	Peak	2381.28	-52.36	0.006	2.5	Pass
2387	2400	1	Peak	2387.845	-52.12	0.006	25	Pass
2483.5	2496.5	1	Peak	2492.47	-51.91	0.006	25	Pass
2496.5	2509.5	1	Peak	2497.93	-51.94	0.006	2.5	Pass
2509.5	6000	1	Peak	4878.839	-46.15	0.024	2.5	Pass
6000	12500	1	Peak	7320	-38.92	0.128	2.5	Pass

A.4.3 GFSK (2 Mbps) 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	879	-53.38	0.005	2.5	Pass
1000	2374	1	Peak	2359	-52.82	0.005	2.5	Pass
2374	2387	1	Peak	2385.928	-52.51	0.006	2.5	Pass
2387	2400	1	Peak	2392.655	-52.46	0.006	25	Pass
2483.5	2496.5	1	Peak	2483.5	-36.47	0.225	25	Pass
2496.5	2509.5	1	Peak	2498.84	-50.88	0.008	2.5	Pass
2509.5	6000	1	Peak	4958.851	-45.4	0.029	2.5	Pass
6000	12500	1	Peak	7438	-39.62	0.109	2.5	Pass

A.5 Antenna Power Error Measurement

GFSK (2 Mbps) Test Result

Duty cycle = 0.851

Manufacturer declares the rated power = 10.0000 mW

Test Channel	Test Voltage	Antenna Power (dBm)	Antenna Power (mW)	Antenna Power Error	Upper Limit (%)	Verdict
Low	NV	9.86	9.6828	-3.17%	20	Pass
Middle		9.88	9.7275	-2.73%	20	Pass
High		9.94	9.8628	-1.37%	20	Pass

EIRP Antenna Power

Channel	Test Voltage	Frequency (MHz)	Measured EIRP (dBm)	Limit (dBm)	Verdict
Low	NV	2402	10.28	12.14	Pass
Middle		2440	10.30		Pass
High		2480	10.36		Pass

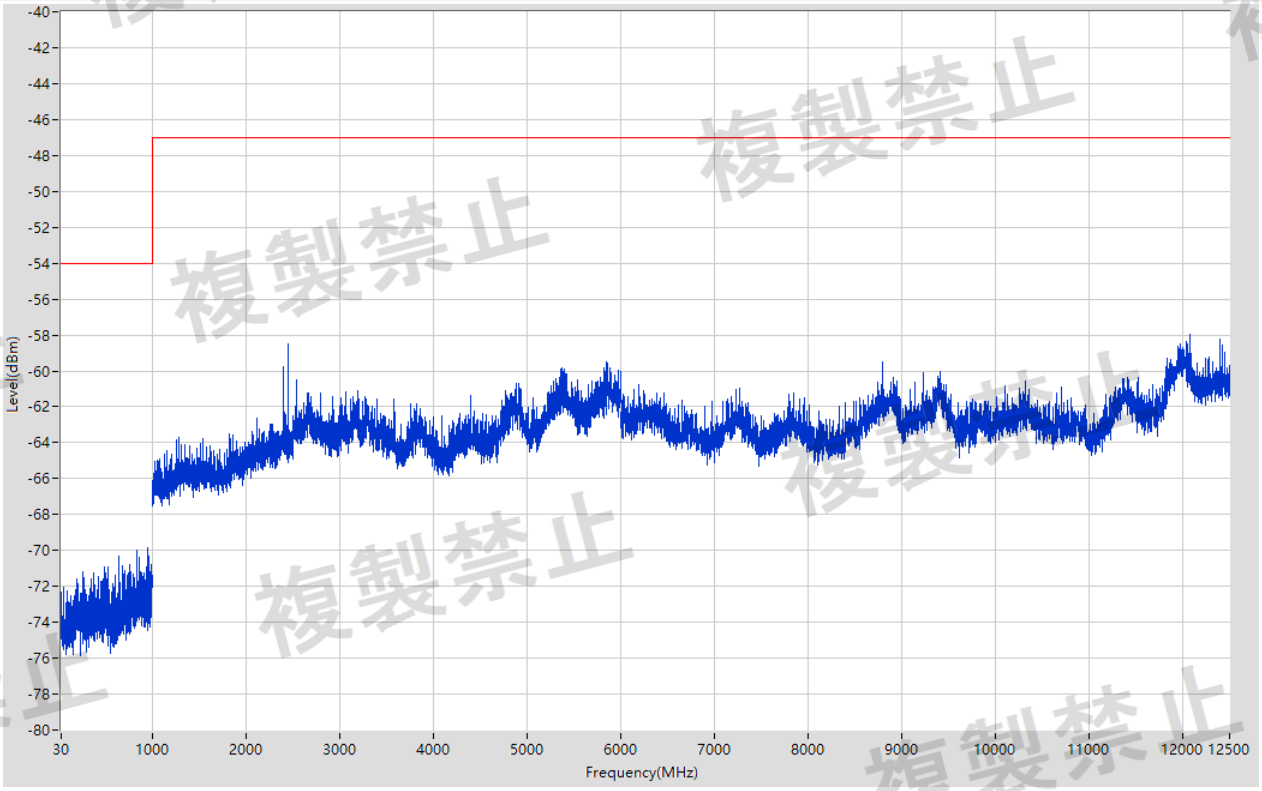
A.6 Limitation of Collateral Emission of Receiver Measurement

Test Data

Mode	Channel	Test Voltage	Refer to Plot	Verdict
GFSK (2 Mbps)	Low	NV	A.6.1	Pass
	Middle		A.6.2	Pass
	High		A.6.3	Pass

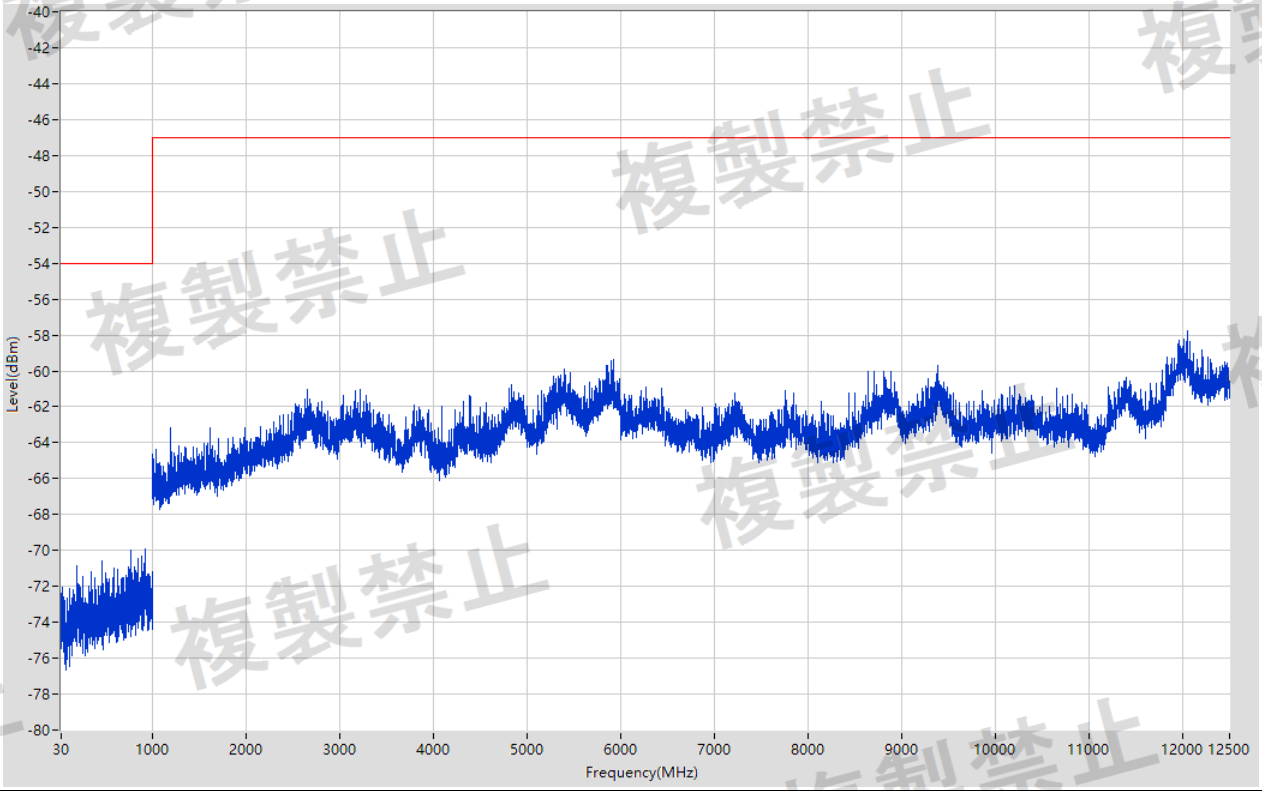
Test Plots

A.6.1 GFSK (2 Mbps) NV Low Channel



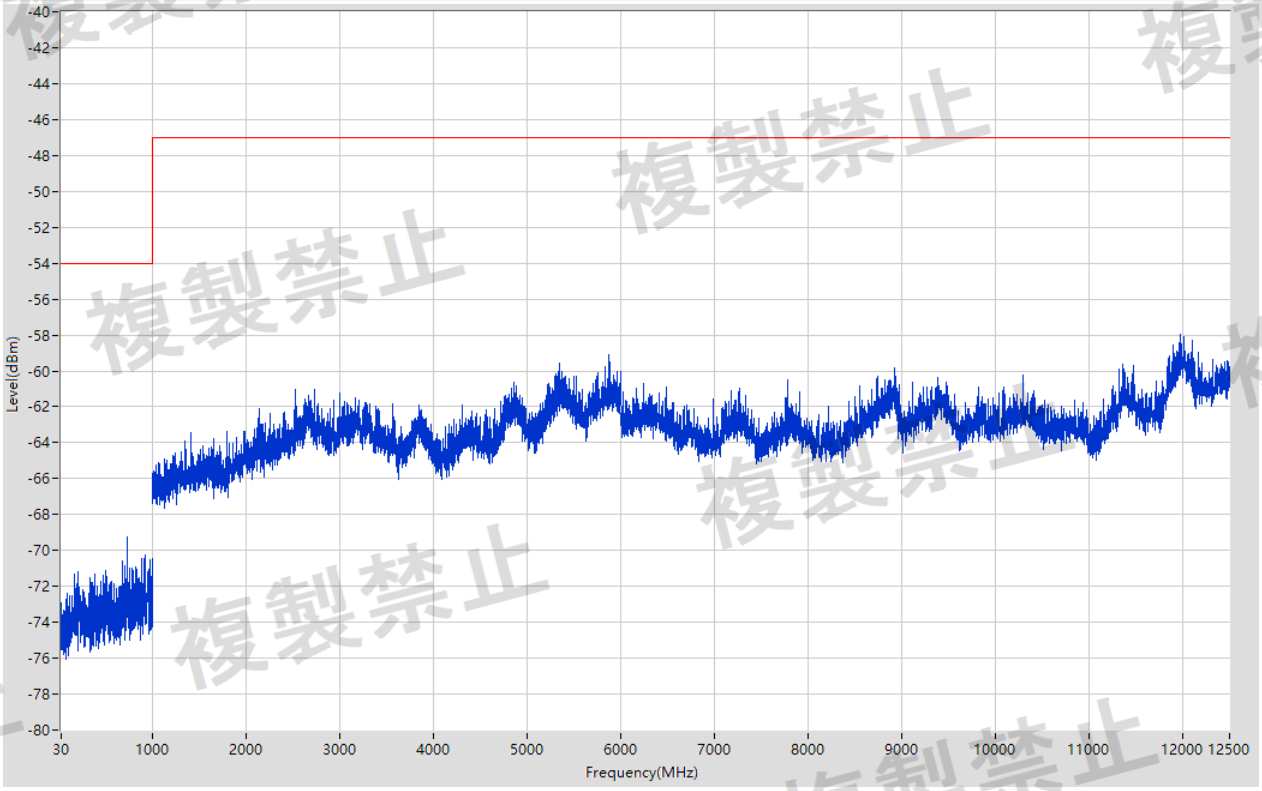
Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Power (nW)	Limit (dBm)	Limit (nW)	Margin (dB)	Verdict
30	1000	0.1	Peak	946.65	-69.87	0.1	-54	4.0	15.87	Pass
1000	6000	1	Peak	2452.5	-58.49	1.42	-47	20.0	11.49	Pass
6000	12500	1	Peak	12072.625	-57.97	1.6	-47	20.0	10.97	Pass

A.6.2 GFSK (2 Mbps) 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	925.31	-69.91	0.1	-54	4.0	15.91	Pass
1000	6000	1	Peak	5922.5	-59.35	1.16	-47	20.0	12.35	Pass
6000	12500	1	Peak	12054.75	-57.75	1.68	-47	20.0	10.75	Pass

A.6.3 GFSK (2 Mbps) 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	737.13	-69.23	0.12	-54	4.0	15.23	Pass
1000	6000	1	Peak	5868.75	-59.08	1.24	-47	20.0	12.08	Pass
6000	12500	1	Peak	11978.375	-57.95	1.61	-47	20.0	10.95	Pass

A.7 Transmission Antenna Gain (EIRP Antenna Power) Measurement

Note: Not applicable.

A.8 Transmission Radiation Angle Width (3dB Bandwidth) Measurement

Note: Not applicable.

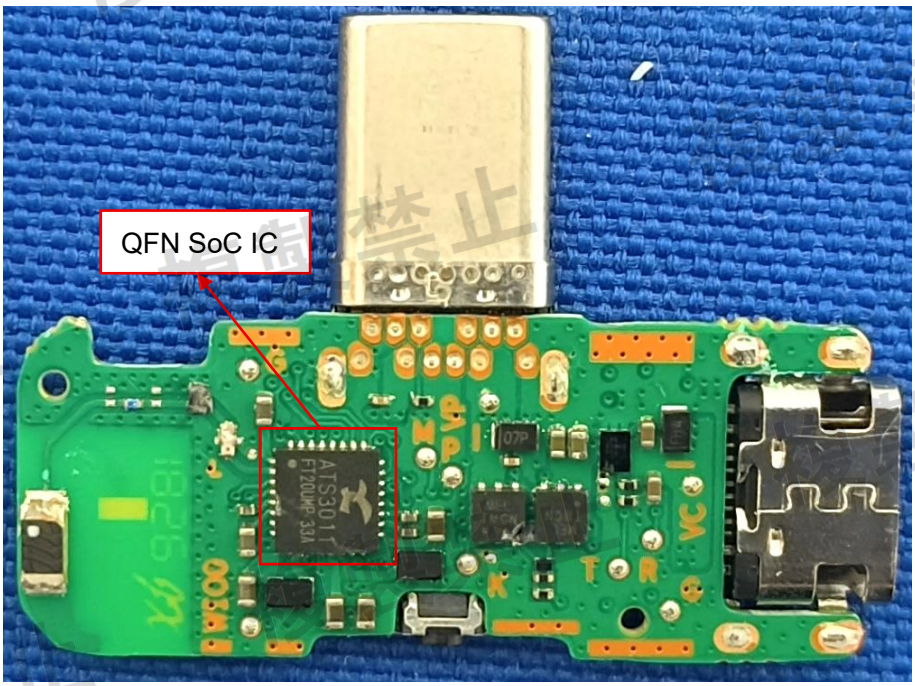
A.9 Radio Interference Prevention Capability Measurement

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

A.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 B TEST SETUP PHOTOS

Please refer the document “Ti-EE26040538-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “Ti-EE26040538-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “Ti-EE26040538-AI.PDF”.

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.
5. The test data and results are only valid for the tested samples provided by the customer.
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--

複製禁止