



Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

TEST REPORT

Ordinance Article 2 paragraph 1 item (19)

Report Reference No.....: CTA25021000501

Compiled by

(position+printed name+signature)...: File administrators Joan Wu

Supervised by

(position+printed name+signature)...: Project Engineer Zoey Cao

Approved by

(position+printed name+signature)...: RF Manager Eric Wang

Date of issue.....: Feb. 15, 2025

Testing Laboratory Name: Shenzhen CTA Testing Technology Co., Ltd.

Address: Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name.....: Chengdu Shuiyueyu Technology Co.,Ltd.

Address: Haixia Technology Industry Park, Wenjiang District, Chengdu

Test specification

Standard: Ordinance Article 2 paragraph 1 item (19)

Shenzhen CTA Testing Technology Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen CTA Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen CTA Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description: **PILL**

Trade Mark: MOONDROP

Manufacturer: Chengdu Shuiyueyu Technology Co.,Ltd.

Model/Type reference.....: MD-OWS-003

Listed Models: N/A

Modulation: GFSK

Frequency.....: From 2402MHz-2480MHz

Input: DC 5V/1A

Ratings: Charging Box: DC 3.7V From Battery

Earphone: DC 3.7V From Battery

Result.....: **PASS**

TEST REPORT

Equipment under Test : PILL

Model /Type : MD-OWS-003

Listed Models : N/A

Applicant : Chengdu Shuiyueyu Technology Co.,Ltd.

Address : Haixia Technology Industry Park, Wenjiang District, Chengdu

Manufacturer : Chengdu Shuiyueyu Technology Co.,Ltd.

Address : Haixia Technology Industry Park, Wenjiang District, Chengdu

Test Result:

PASS

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1	SUMMARY	4
1.1	Test Standards	4
1.2	Test Description	4
1.3	TEST ENVIRONMENT	5
1.4	Measurement Uncertainty	5
2	GENERAL INFORMATION	6
2.1	General Remarks	6
2.2	Environmental conditions	6
2.3	General Description of EUT	6
2.4	Description of Test Modes	7
2.5	Measurement Instruments List	7
2.6	Table for Parameters of Test Software Setting	8
2.7	Description of Test Modes	8
2.8	Test Voltage	8
3	TEST CONDITIONS AND RESULTS	9
3.1	Frequency Error	9
3.2	Antenna Output Power and Output Power Tolerance	11
3.3	Occupied Bandwidth and Spreading Bandwidth	13
3.4	Unwanted Emission Strength	20
3.5	Secondary Radiated Emission Strength	28
3.6	Construction Protection Method	31
3.7	Interference Prevention Function	32
3.8	Carrier Sensing Function	33
4	TEST SETUP PHOTOS OF THE EUT	34
5	PHOTOS OF THE EUT	35

1 SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

[ARIB STD-T66](#): Second-Generation Low-Power Data Communication System/Wireless LAN System
[MIC Notice No.88 Appendix No. 43](#): 2.4 GHz band wide-band low-power data communication system

1.2 Test Description

ARIB STD-T66		
CLAUSE	Description of Test (Transmitter Parameters)	Result
3.2 (2)	Antenna Power	Complies
3.2 (3)	Tolerances for Antenna Power	Complies
3.2 (4)	Frequency Tolerance	Complies
3.2 (5)	Transmission Rate	Complies
3.2 (7)	Occupied Frequency Bandwidth	Complies
3.2 (8)	Spread Bandwidth	Complies
3.2 (11)	Dwell Time	N/A
3.2 (6)	Spurious Emissions	Complies
3.6	Transmission Antenna Gain (EIRP Antenna Power)	N/A
3.6	Transmission Radiated Angle Width (3dB Beam width)	N/A
/	Interference prevention function	Complies
/	Carrier Sensing function	N/A
Receiver Parameters		
3.3 (1)	Secondary Radiated Emissions	Complies

Note: (1) N/A is an abbreviation for Not Applicable.
 (2) N/T means this test item is not tested.

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

2: MIC Public Notice 88:2004, annex 1 and annex 43

3: MIC Ordinance Regulating Radio Equipment Section 4.17 of Article 49.20

4: Referenced in the standard ARIB STD-T66

1.3 TEST ENVIRONMENT

1.3.1 Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

1.3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

1.3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2

1.4 Measurement Uncertainty

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR100028-1 [2] and shall correspond to an expansion factor (coverage factor) $K=1.96$ or $K=2$ (which provide confidence levels of respectively 95% and 95.5% in the case where the distributions characterizing the actual measurement uncertainties are normal).

Parameter	Uncertainty
Frequency error / 99%&90% bandwidth	$\pm 1.62 \times 10^{-6}$
Total RF power, conducted	$\pm 0.8\text{dB}$
Spurious emissions, conducted	$\pm 0.8\text{dB}$
DC and low frequency voltages	$\pm 0.05\%$
Humidity	$\pm 5\%$
Temperature	$\pm 1^\circ\text{C}$

2 GENERAL INFORMATION

2.1 General Remarks

Date of receipt of test sample	:	Feb. 10, 2025
Testing commenced on	:	Feb. 10, 2025
Testing concluded on	:	Feb. 15, 2025

2.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Voltage	Normal Voltage	DC 3.70V
	High Voltage	DC 4.20V
	Low Voltage	DC 3.40V
Other	Normal Temperature	25°C
	Relative Humidity	55 %
	Air Pressure	989 hPa

2.3 General Description of EUT

Product Name:	PILL
Model/Type reference:	MD-OWS-003
Power supply:	Input: DC 5V/1A Charging Box: DC 3.7V From Battery Earphone: DC 3.7V From Battery
Bluetooth BLE	
Supported type:	Bluetooth for low Energy
Bluetooth version:	6.0
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2 MHz
Rated power	0.0025 W
Antenna type:	Ceramic antenna
Antenna gain:	1.9 dBi
Hardware version:	V1.0
Software version:	V1.0

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.4 Description of Test Modes

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency List BLE:

Channel	Frequency (MHz)
00	2402
01	2404
02	2406
⋮	⋮
19	2440
⋮	⋮
37	2476
38	2478
39	2480

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

The difference both for left side and right side as follows;

Description	Left Side	Right Side
Schematic	Same	Same
Block diagram	Same	Same
PCB layout	Difference	Difference
Software version	Same	Same
BT modular – Schematic	Same	Same
BT modular – Block diagram	Same	Same
BT modular – PCB layout	Same	Same
BT modular RF power setting level	Same	Same
BT modular – Software	Same	Same
BT modular – RF Rated power	Same	Same

The only difference compare left side and right side are PCB layout difference as left ear and right ear;

We pre-check left side and right as BT modular (including hardware, software, power level setting, rated power) are same, others measure items except antenna power at highest measure antenna power at left side, description as table;

Description	Left Side	Right Side
Antenna Power	Measured	Measured
Frequency Tolerance	Measured	Not Measured
Occupied Frequency Bandwidth	Measured	Not Measured
Spread Bandwidth	Measured	Not Measured
Spurious Emissions	Measured	Not Measured
Secondary Radiated Emissions	Measured	Not Measured

2.5 Measurement Instruments List

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Institution	Calibration Date	Calibration Due Date
1	Spectrum Analyzer	Agilent	N9020A	MY53281423	LISAI	2024/08/03	2025/08/02
2	Signal generator	Agilent	N5182A	MY46240709	LISAI	2024/08/03	2025/08/02
3	Power Meter	Agilent	U2021X	MY47410295	LISAI	2024/08/03	2025/08/02
4	DC Power Supply	Agilent	E3642A	N/A	LISAI	2024/08/03	2025/08/02
5	Oscilloscope	Tektronix	TDS3012	B021220	LISAI	2024/08/03	2025/08/02
6	Spectrum Analyzer	R&S	FSU	200311	LISAI	2024/08/03	2025/08/02

Calibration by the calibration agencies listed in the table correspond to paragraph 4 (ii) (c) of Article 24-2 in the Radio Law".

LiSai-Guangzhou LiSai Calibration and Testing Co.,LTD.

2.6 Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters:

Test Software Version	Bluetooth MP Tool		
Frequency	2402MHz	2440MHz	2480MHz
Bluetooth V6.0	Default	Default	Default

2.7 Description of Test Modes

Tested channel, Frequency and Modulation Information		
CH0	2402MHz	GFSK(1Mbps)
CH19	2440MHz	GFSK(1Mbps)
CH39	2480MHz	GFSK(1Mbps)
CH0	2402MHz	GFSK(2Mbps)
CH19	2440MHz	GFSK(2Mbps)
CH39	2480MHz	GFSK(2Mbps)
Note: According exploratory test, EUT has maximum output power for GFSK modulation, All the test modes were tested, but only the worst case was recorded in this report.		

2.8 Test Voltage

POWER SUPPLY VOLTAGE FLUCTUATION TEST

Voltage Fluctuation Test	Normal Voltage	High Voltage +10% of Normal Voltage	Low Voltage -10% of Normal Voltage
Input To EUT	DC 3.70V	DC 4.20V	DC 3.40V
Output To RF Module	DC 3.30V	DC 3.333V	DC 3.234V
Voltage Variation (%)	--	1%	-2%

Note:

Voltage Variation (%)

= (Output high or Low Voltage - Output Normal Voltage) / Output Normal Voltage * 100

During the input supply voltage to the EUT from the external power source is varied by +/- 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than +/-1%. Exempt extremely high and low supply voltage condition test, EUT only operated in normal voltage to test all regulations.

During the input supply voltage to the EUT from the external power source is varied by $\pm 10\%$, the fluctuation of input voltage to the circuit of RF unit of test equipment is exceed $\pm 1\%$. So, all measurement has been conducted by normal and limit voltage.

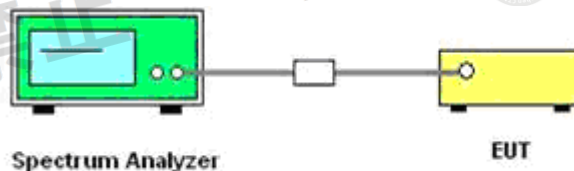
3 Test conditions and Results

3.1 Frequency Error

LIMIT

Tolerance of frequency shall be $\pm 50 \times 10^{-6}$.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was directly connected to the spectrum analyser and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: non-modulation

Spectrum Condition:

Frequency: test frequency

Span: 300 KHz

RBW: 10 KHz

VBW: 0 KHz

Sweep time: Auto

Detector mode: Positive peak

Indication mode: max hold

TEST RESULTS

Normal Voltage:

Test Condition	Frequency (MHz)	Read (MHz)	Deviation (MHz)	Tolerance (ppm)	Limit (ppm)	Result
Non-modulation	2402.00	2402.0093	0.0093	3.8718	50.00	Pass
	2440.00	2440.0081	0.0081	3.3197		
	2480.00	2480.0066	0.0066	2.6613		

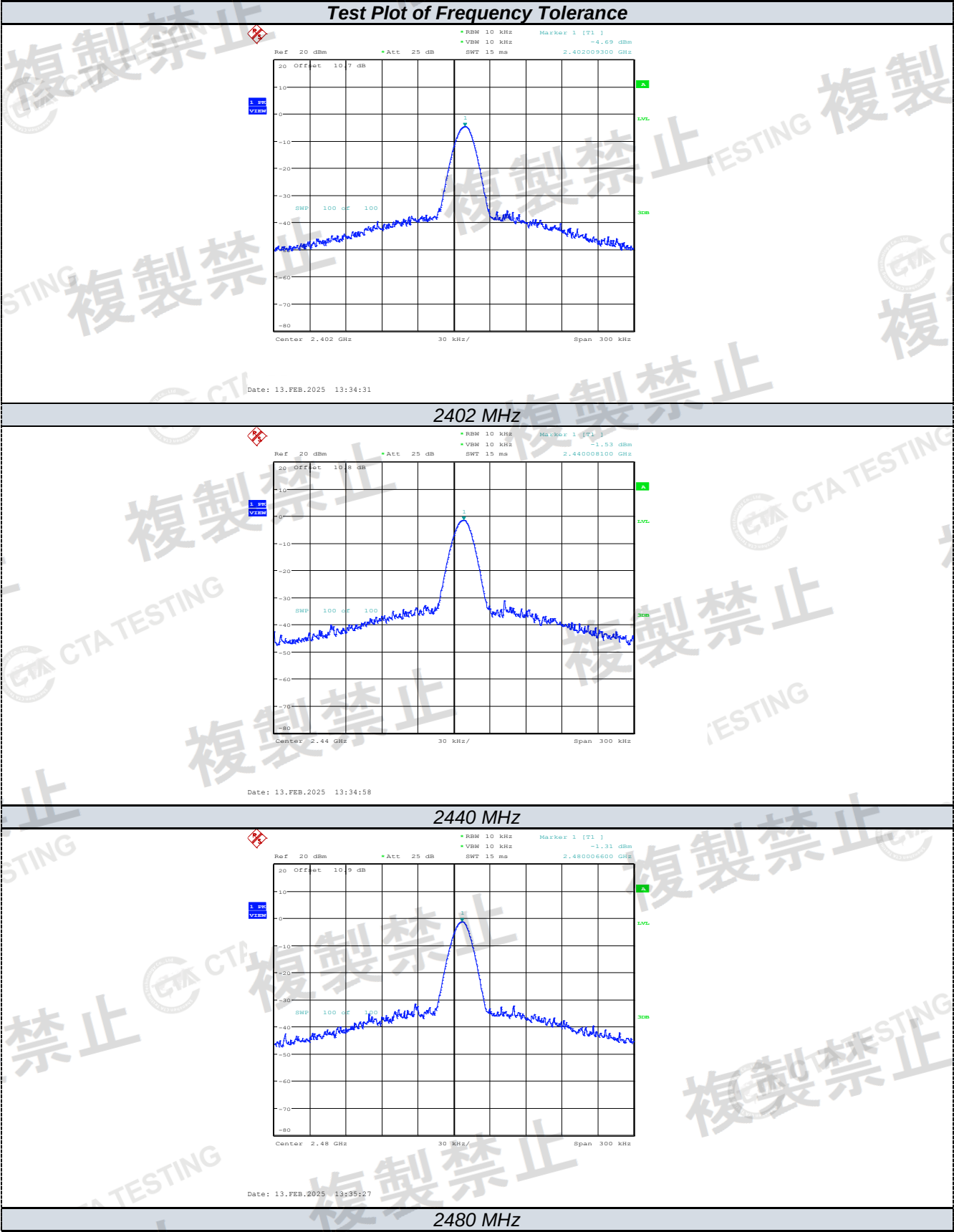
High Voltage:

Test Condition	Frequency (MHz)	Read (MHz)	Deviation (MHz)	Tolerance (ppm)	Limit (ppm)	Result
Non-modulation	2402	2402.0090	0.0090	3.7469	50.00	Pass
	2440	2440.0078	0.0078	3.1967		
	2480	2480.0063	0.0063	2.5403		

Low Voltage:

Test Condition	Frequency (MHz)	Read (MHz)	Deviation (MHz)	Tolerance (ppm)	Limit (ppm)	Result
Non-modulation	2402	2402.0086	0.0086	3.5803	50.00	Pass
	2440	2440.0074	0.0074	3.0328		
	2480	2480.0060	0.0060	2.4194		

Note:We test Normal Voltage, High Voltage, Low Voltage ,and recorded the worst test plot.



3.2 Antenna Output Power and Output Power Tolerance

LIMIT

- $\leq 3 \text{ mW /MHz}$ (FHSS from 2402-2480 MHz)
- $\leq 10 \text{ mW/MHz}$ (OFDM, DSSS from 2400-2483.5 MHz)
- $\leq 10 \text{ mW}$ (other from 2400-2483.5 MHz)

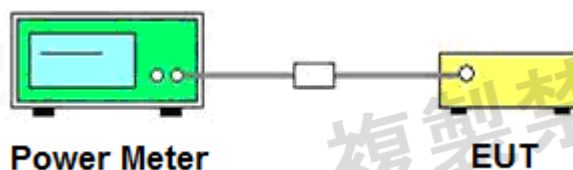
The Output Power Tolerance must be within +20%.

E.i.r.p:

- $\leq 12.14 \text{ dBm/MHz}$ (OFDM, DS form 2400-2483.5 MHz)

Note: E.I.R.P will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

TEST CONFIGURATION



TEST PROCEDURE

- EUT have transmitted continuous maximum power
- Antenna Power Error is definition that actual measure antenna power tolerance within +20% power range that base on manufacturer declare the conducted power density.

TEST RESULTS

Conducted Antenna Power

Normal Voltage:

Left Side

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (1 Mbps)	2402	2.75	1.8836	10	2.50	-24.66%	20%	Pass
	2440	2.88	1.9409	10	2.50	-22.36%		
	2480	3.42	2.1979	10	2.50	-12.08%		

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (2 Mbps)	2402	2.53	1.7906	10	2.50	-28.38%	20%	Pass
	2440	2.92	1.9588	10	2.50	-21.65%		
	2480	3.56	2.2699	10	2.50	-9.20%		

Right Side

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (1 Mbps)	2402	2.71	1.8664	10	2.50	-25.34%	20%	Pass
	2440	2.84	1.9231	10	2.50	-23.08%		
	2480	3.37	2.1727	10	2.50	-13.09%		

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (2 Mbps)	2402	2.50	1.7783	10	2.50	-28.87%	20%	Pass
	2440	2.87	1.9364	10	2.50	-22.54%		
	2480	3.51	2.2439	10	2.50	-10.24%		

High Voltage:

Left Side

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (1 Mbps)	2402	2.78	1.8967	10	2.50	-24.13%	20%	Pass
	2440	2.90	1.9498	10	2.50	-22.01%		
	2480	3.45	2.2131	10	2.50	-11.48%		

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (2 Mbps)	2402	2.55	1.7989	10	2.50	-28.04%	20%	Pass
	2440	2.94	1.9679	10	2.50	-21.28%		
	2480	3.58	2.2803	10	2.50	-8.79%		

Right Side

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (1 Mbps)	2402	2.74	1.8793	10	2.50	-24.83%	20%	Pass
	2440	2.86	1.9320	10	2.50	-22.72%		
	2480	3.39	2.1827	10	2.50	-12.69%		

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (2 Mbps)	2402	2.52	1.7865	10	2.50	-28.54%	20%	Pass
	2440	2.91	1.9543	10	2.50	-21.83%		
	2480	3.55	2.2646	10	2.50	-9.42%		

Low Voltage:

Left Side

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (1 Mbps)	2402	2.81	1.9099	10	2.50	-23.60%	20%	Pass
	2440	2.93	1.9634	10	2.50	-21.46%		
	2480	3.47	2.2233	10	2.50	-11.07%		

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (2 Mbps)	2402	2.58	1.8113	10	2.50	-27.55%	20%	Pass
	2440	2.96	1.9770	10	2.50	-20.92%		
	2480	3.61	2.2961	10	2.50	-8.16%		

Right Side

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (1 Mbps)	2402	2.77	1.8923	10	2.50	-24.31%	20%	Pass
	2440	2.89	1.9454	10	2.50	-22.18%		
	2480	3.42	2.1979	10	2.50	-12.08%		

Mode	Channel (MHz)	Average burst power (dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
GFSK (2 Mbps)	2402	2.56	1.8030	10	2.50	-27.88%	20%	Pass
	2440	2.97	1.9815	10	2.50	-20.74%		
	2480	3.59	2.2856	10	2.50	-8.58%		

Note:

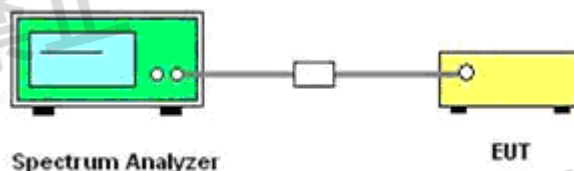
1). Test Result: Pass.

3.3 Occupied Bandwidth and Spreading Bandwidth

LIMIT

- Occupied bandwidth: FH $\leq$ 83.5 MHz; OFDM $\leq$ 38 MHz; DS $\leq$ 26 MHz; Others $\leq$ 26 MHz
- Spread Bandwidth: $\geq$ 500 kHz (FH, DS)
- Spread factor >5 .

TEST CONFIGURATION



TEST PROCEDURE

Setting of SA is following as follow:

RBW: 30 kHz

VBW: 30 kHz

Sweep time: Auto

Sweep Mode: Continuous sweep

Detect mode: Positive peak

Trace mode: Max hold

EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.

EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 90% of occupied bandwidth to measure spread bandwidth.

Spread Factor=Spread Bandwidth/modulation rate.

The modulation rate: MR=1.375Mbps for 802.11b

TEST RESULTS

99% Occupied Bandwidth

Normal Voltage:

Type	Channel (MHz)	Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK(1 Mbps)	2402	1.264	<26	Pass
	2440	1.264		
	2480	1.264		

Type	Channel (MHz)	Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK(2 Mbps)	2402	2.108	<26	Pass
	2440	2.104		
	2480	2.104		

High Voltage:

Type	Channel (MHz)	Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK(1 Mbps)	2402	1.261	<26	Pass
	2440	1.262		
	2480	1.260		

Type	Channel (MHz)	Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK(2 Mbps)	2402	2.105	<26	Pass
	2440	2.102		
	2480	2.101		

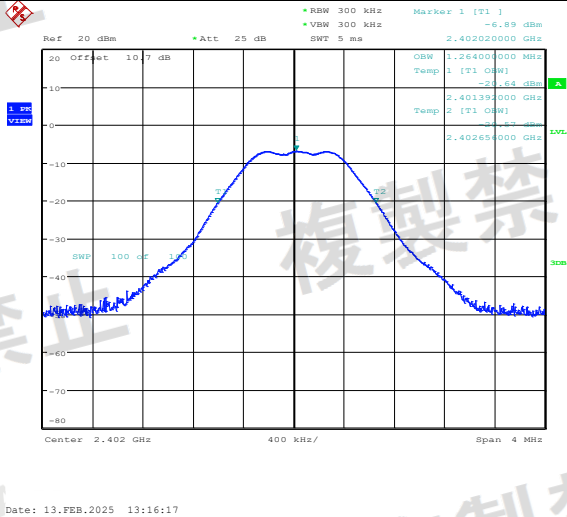
Low Voltage:

Type	Channel (MHz)	Occupuied Bandwidth (MHz)	Limit (MHz)	Result
GFSK(1 Mbps)	2402	1.258	<26	Pass
	2440	1.260		
	2480	1.257		

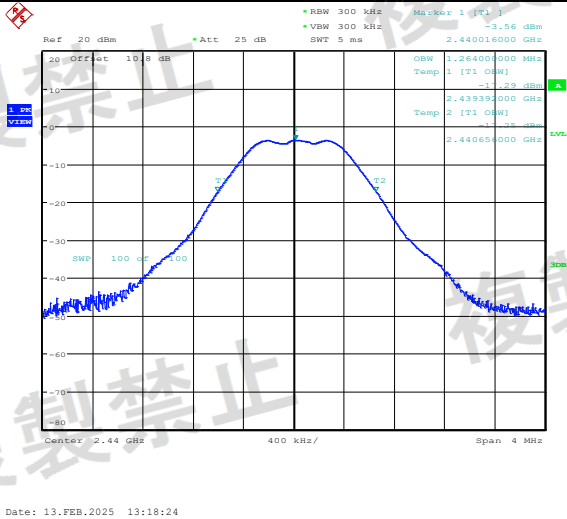
Type	Channel (MHz)	Occupuied Bandwidth (MHz)	Limit (MHz)	Result
GFSK(2 Mbps)	2402	2.101	<26	Pass
	2440	2.096		
	2480	2.098		

Note:We test Normal Voltage, High Voltage, Low Voltage ,and recorded the worst test plot.

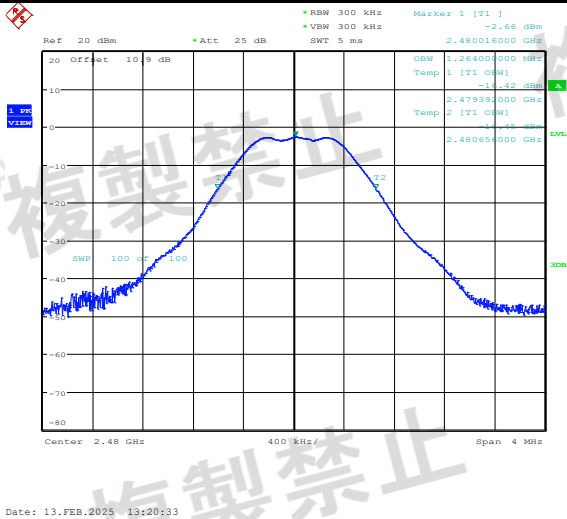
Test Plot of 99% Occupied Bandwidth (GFSK 1 Mbps)



2402 MHz



2440 MHz

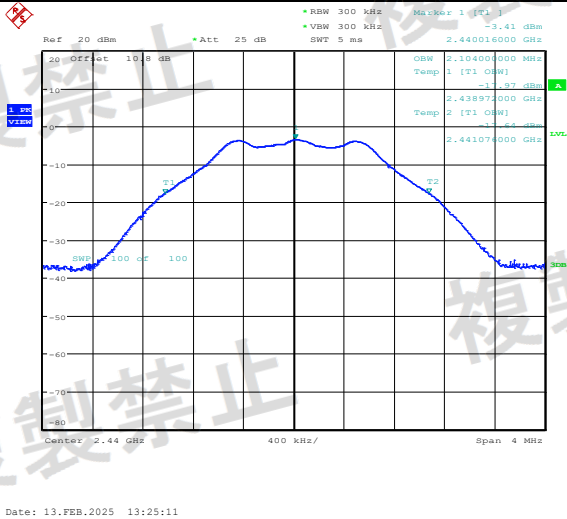


2480 MHz

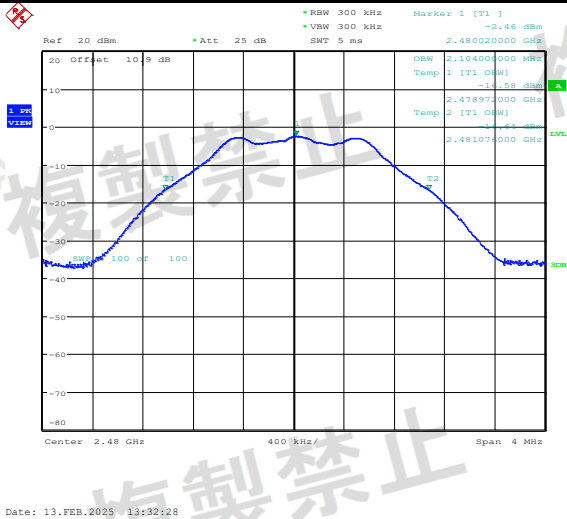
Test Plot of 99% Occupied Bandwidth (GFSK 2 Mbps)



2402 MHz



2442 MHz



2482 MHz

90% Spread Bandwidth

Normal Voltage:

Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
GFSK (1 Mbps)	2402	0.832	N/A	≥ 0.5	N/A	Pass
	2440	0.832				
	2480	0.832				

Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
GFSK (2 Mbps)	2402	1.328	N/A	≥ 0.5	N/A	Pass
	2440	1.324				
	2480	1.332				

High Voltage:

Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
GFSK (1 Mbps)	2402	0.830	N/A	≥ 0.5	N/A	Pass
	2440	0.828				
	2480	0.826				

Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
GFSK (2 Mbps)	2402	1.326	N/A	≥ 0.5	N/A	Pass
	2440	1.321				
	2480	1.330				

Low Voltage:

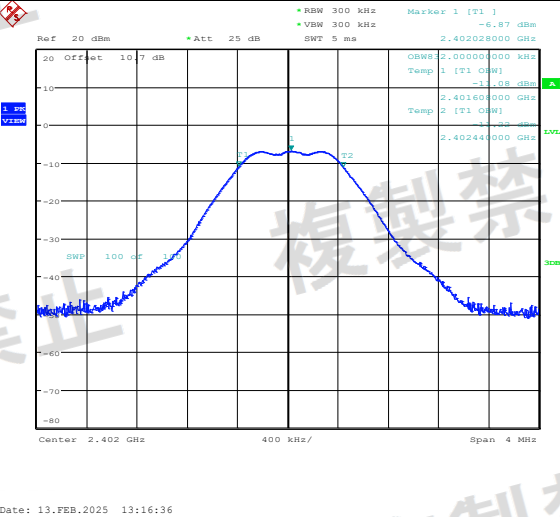
Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
GFSK (1 Mbps)	2402	0.829	N/A	≥ 0.5	N/A	Pass
	2440	0.827				
	2480	0.828				

Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
GFSK (2 Mbps)	2402	1.324	N/A	≥ 0.5	N/A	Pass
	2440	1.322				
	2480	1.329				

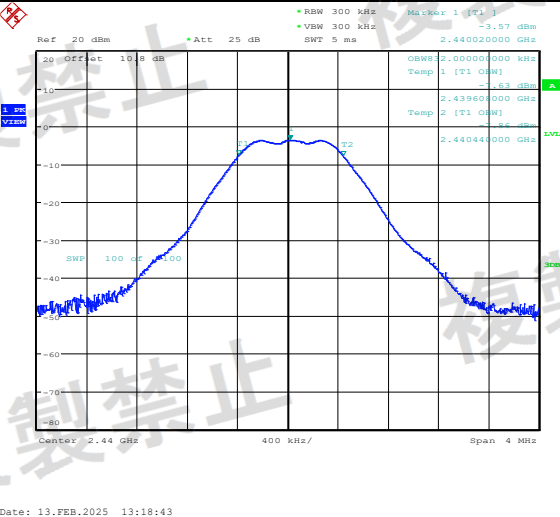
Note: N/A means not applicable to this modulation type.

Note:We test Normal Voltage, High Voltage, Low Voltage ,and recorded the worst test plot.

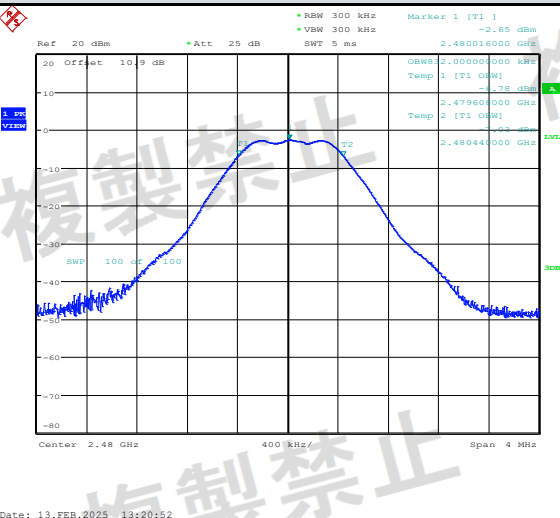
Test Plot of 99% Spread Bandwidth(GFSK 1 Mbps)



2402 MHz

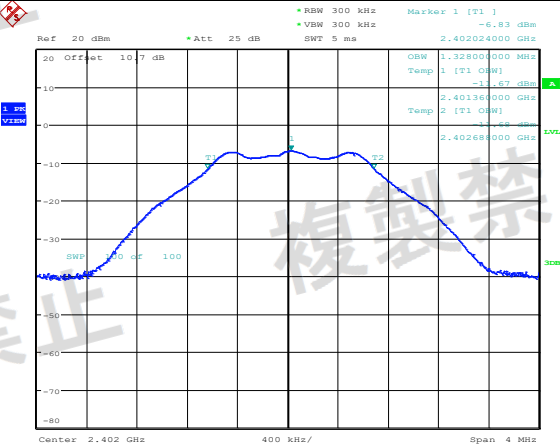


2440 MHz



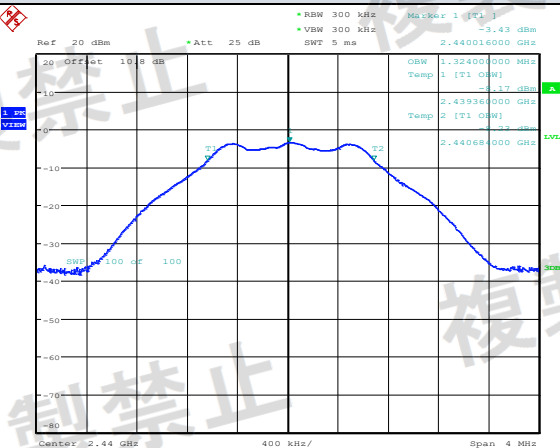
2480 MHz

Test Plot of 99% Spread Bandwidth(GFSK 2 Mbps)



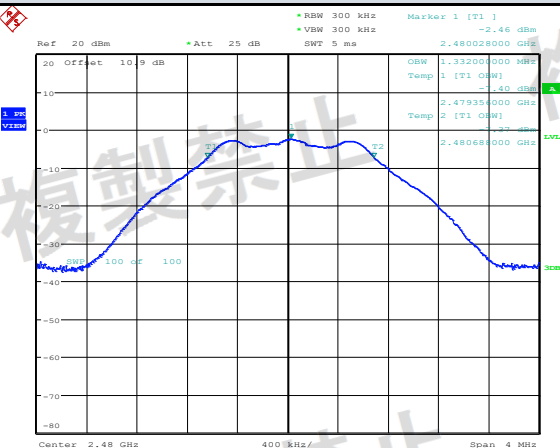
Date: 13.FEB.2025 13:23:02

2402 MHz



Date: 13.FEB.2025 13:25:30

2440 MHz



Date: 13.FEB.2025 13:32:46

2480 MHz

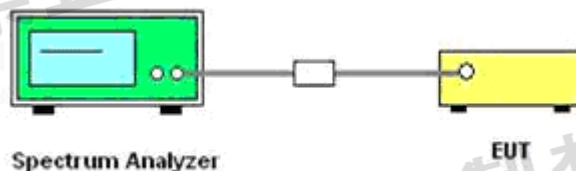
3.4 Unwanted Emission Strength

LIMIT

Permissible mean power of spurious emission of each frequency supplied to a feeder, that is, mean power of spurious emission in the 1 MHz bandwidth at frequency f other than frequency band used shall be as follows:

- a. $2,387\text{MHz} \leq f \leq 2,400\text{MHz}$ and $2,483.5\text{MHz} < f \leq 2,496.5\text{MHz}$ 25 μW or less
- b. $2,387\text{MHz} > f$ and $2,496.5\text{MHz} < f$ 2.5 μW or less

TEST CONFIGURATION



TEST PROCEDURE

The EUT was directly connected to the spectrum analyser and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

Frequency: 30MHz-12.5GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)

VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)

Sweep time: Auto

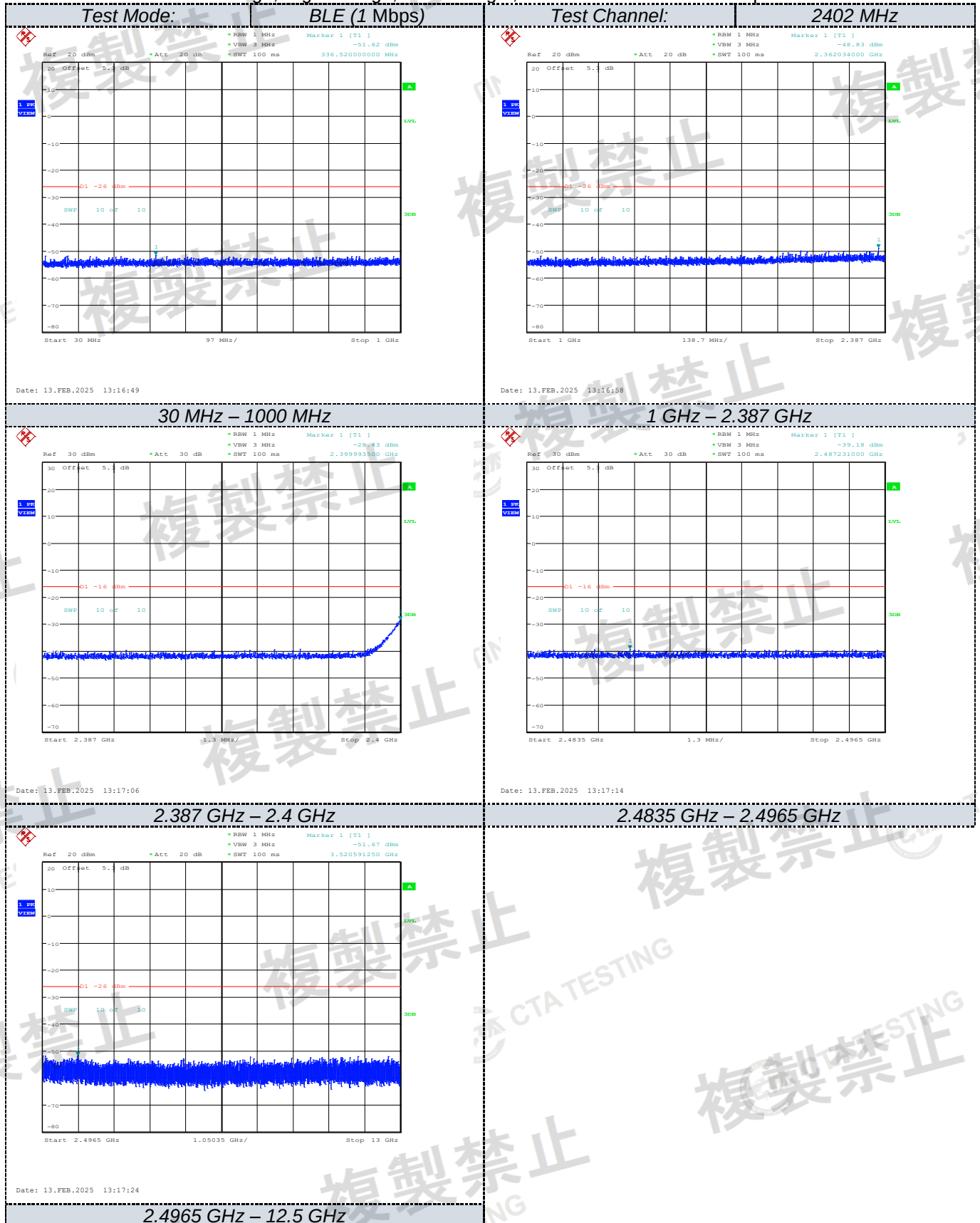
Detector mode: Positive peak

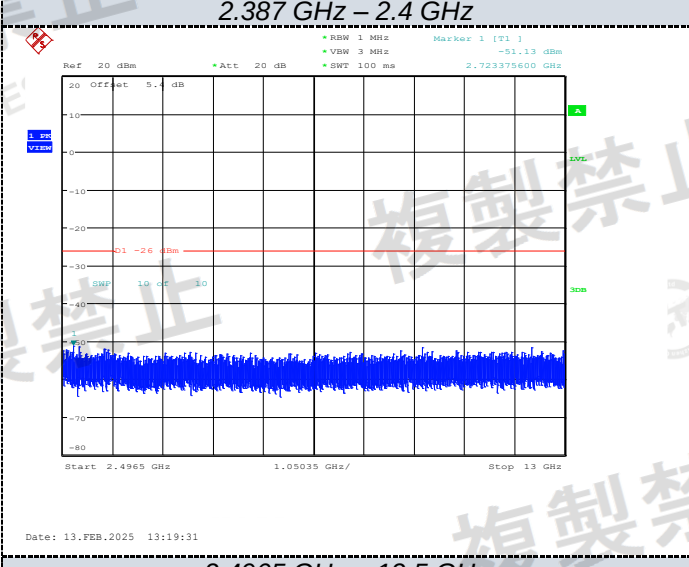
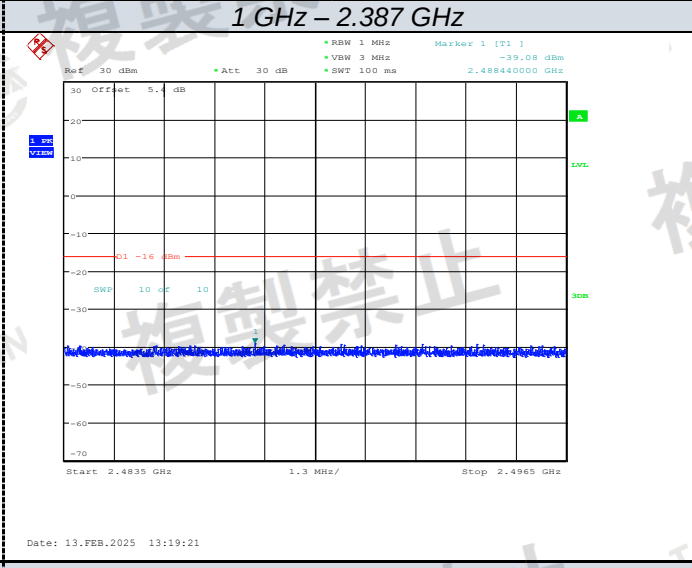
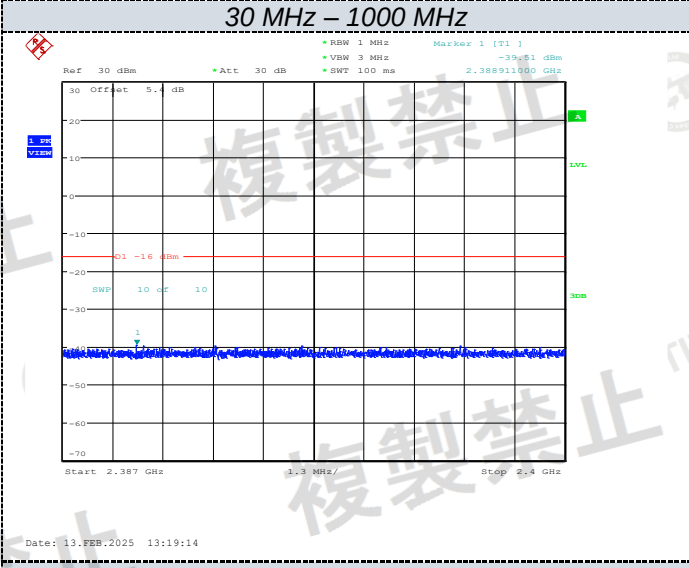
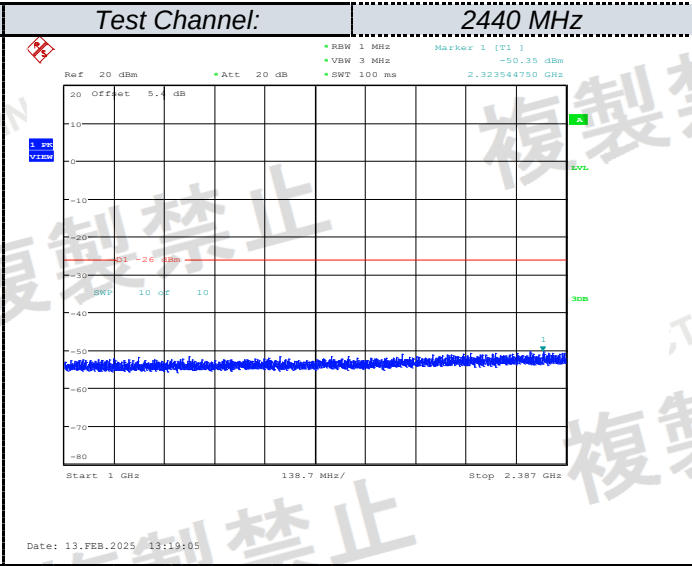
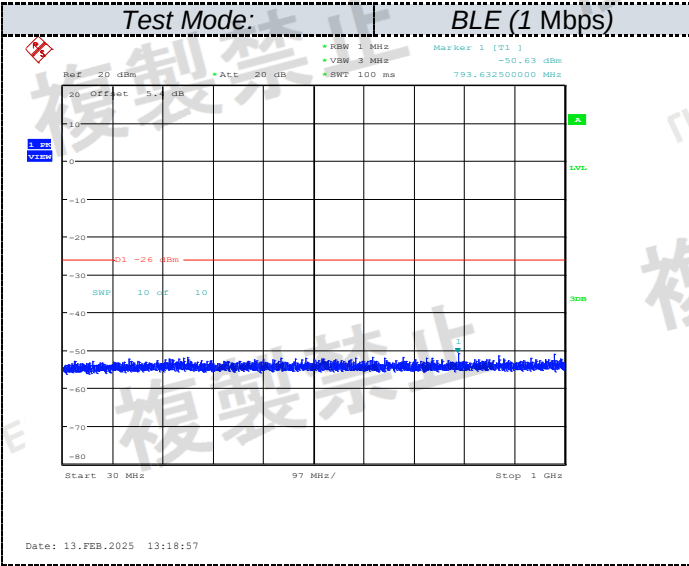
Indication mode: max hold

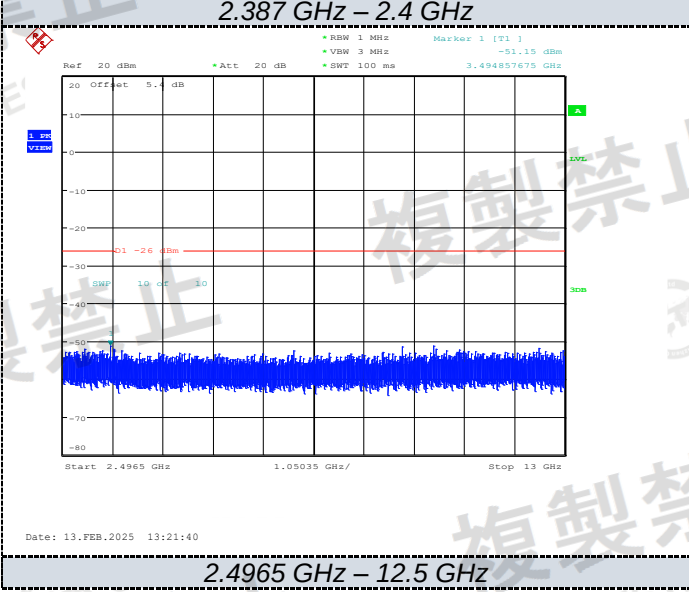
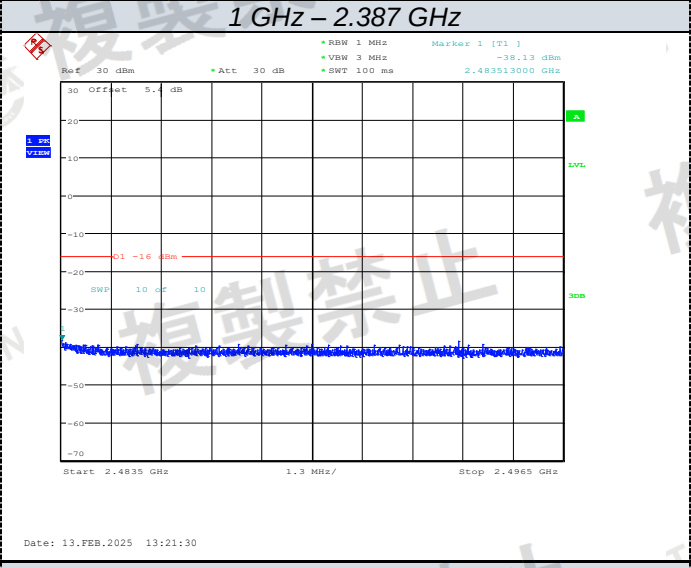
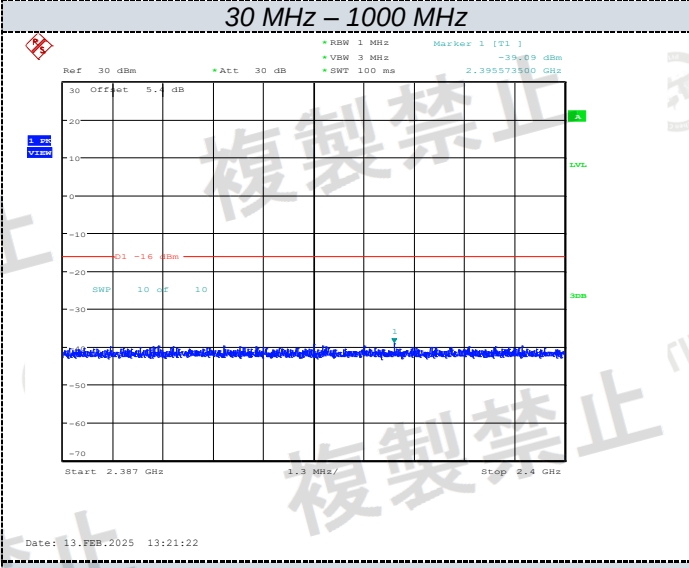
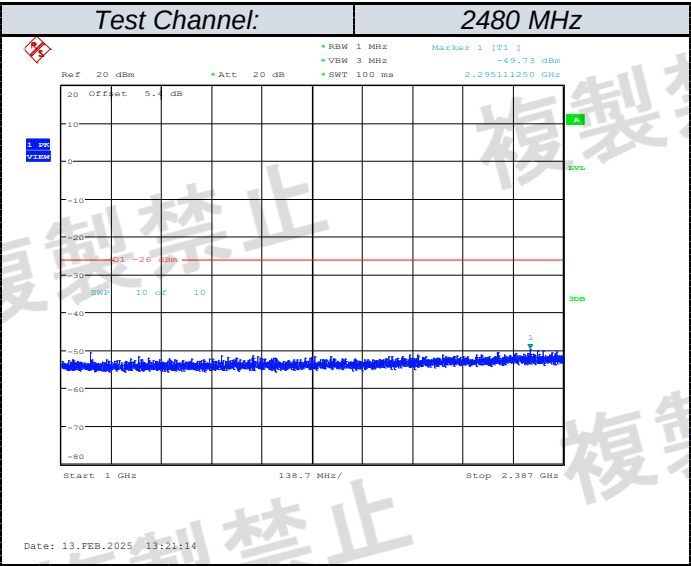
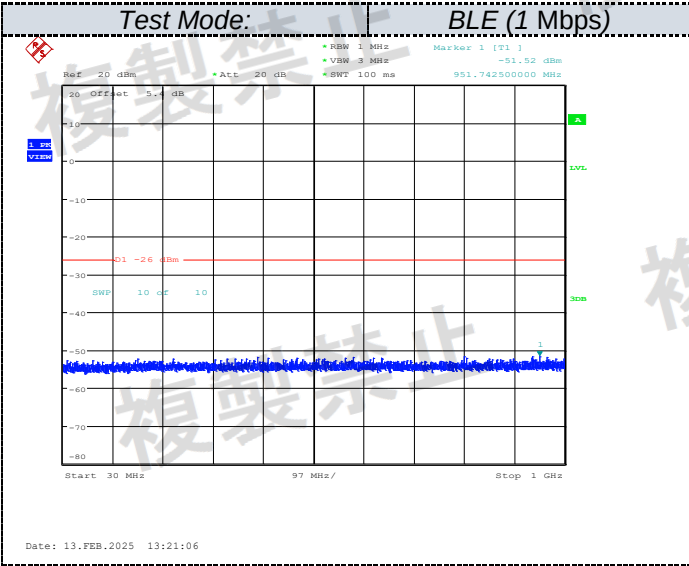
TEST RESULTS

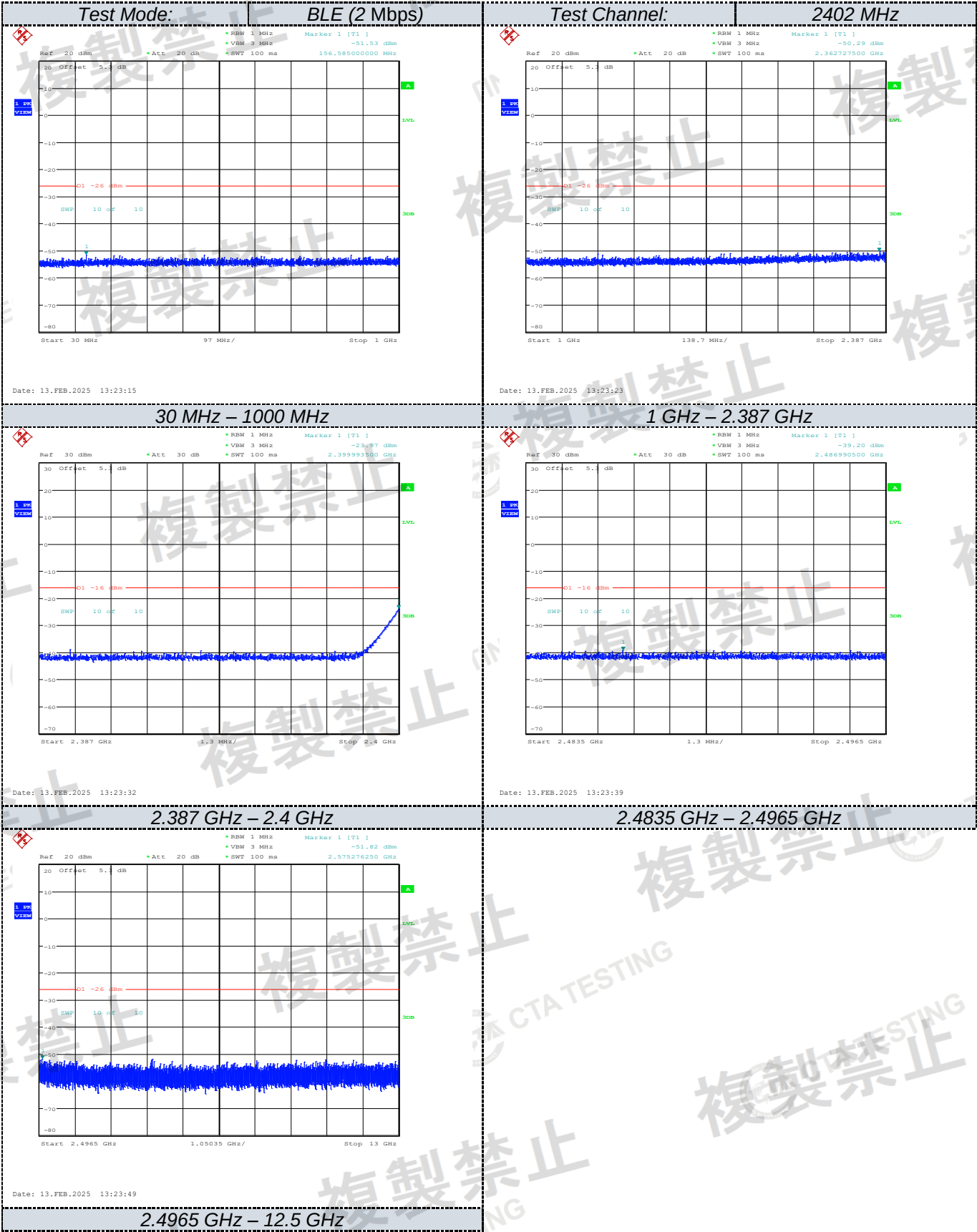
TestCondition	TestMode	Antenna	Freq(MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	BLE_1M	Ant1	2402	30~1000	336.52	-51.62	≤-26	0.00689	≤2.5	PASS
				1000~2387	2362.03	-48.83	≤-26	0.01309	≤2.5	PASS
				2387~2400	2399.99	-28.43	≤-16	1.43549	≤25	PASS
				2483.5~2496.5	2487.23	-39.18	≤-16	0.12078	≤25	PASS
				2496.5~13000	3520.59	-51.67	≤-26	0.00681	≤2.5	PASS
			2440	30~1000	793.63	-50.63	≤-26	0.00865	≤2.5	PASS
				1000~2387	2323.54	-50.35	≤-26	0.00923	≤2.5	PASS
				2387~2400	2388.91	-39.51	≤-16	0.11194	≤25	PASS
				2483.5~2496.5	2488.44	-39.08	≤-16	0.12359	≤25	PASS
				2496.5~13000	2723.38	-51.13	≤-26	0.00771	≤2.5	PASS
	BLE_2M	Ant1	2480	30~1000	951.74	-51.52	≤-26	0.00705	≤2.5	PASS
				1000~2387	2295.11	-49.73	≤-26	0.01064	≤2.5	PASS
				2387~2400	2395.57	-39.09	≤-16	0.12331	≤25	PASS
				2483.5~2496.5	2483.51	-38.13	≤-16	0.15382	≤25	PASS
				2496.5~13000	3494.86	-51.15	≤-26	0.00767	≤2.5	PASS
			2402	30~1000	156.59	-51.53	≤-26	0.00703	≤2.5	PASS
				1000~2387	2362.73	-50.29	≤-26	0.00935	≤2.5	PASS
				2387~2400	2399.99	-23.97	≤-16	4.00867	≤25	PASS
				2483.5~2496.5	2486.99	-39.20	≤-16	0.12023	≤25	PASS
				2496.5~13000	2575.28	-51.82	≤-26	0.00658	≤2.5	PASS
			2440	30~1000	161.68	-50.63	≤-26	0.00865	≤2.5	PASS
				1000~2387	2345.74	-49.34	≤-26	0.01164	≤2.5	PASS
				2387~2400	2394.07	-38.92	≤-16	0.12823	≤25	PASS
				2483.5~2496.5	2483.83	-38.72	≤-16	0.13428	≤25	PASS
				2496.5~13000	12696.97	-51.75	≤-26	0.00668	≤2.5	PASS
			2480	30~1000	285.11	-51.12	≤-26	0.00773	≤2.5	PASS
				1000~2387	2279.16	-49.84	≤-26	0.01038	≤2.5	PASS
				2387~2400	2396.24	-38.80	≤-16	0.13183	≤25	PASS
				2483.5~2496.5	2483.50	-36.94	≤-16	0.20230	≤25	PASS
				2496.5~13000	3406.10	-51.82	≤-26	0.00658	≤2.5	PASS

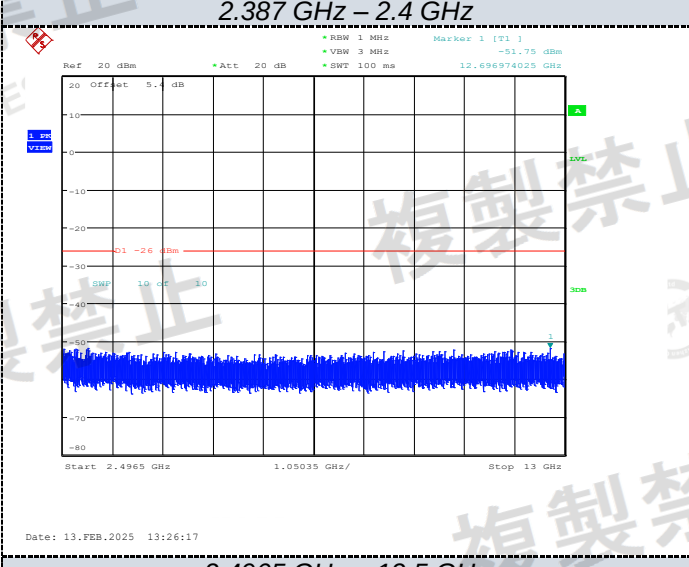
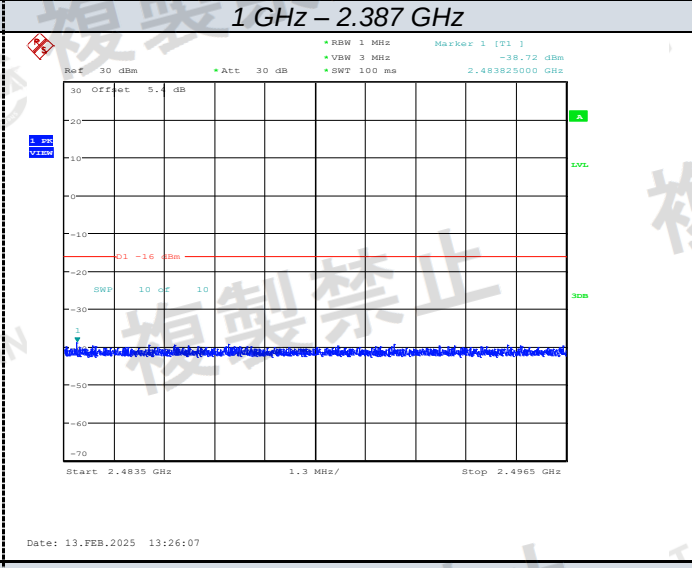
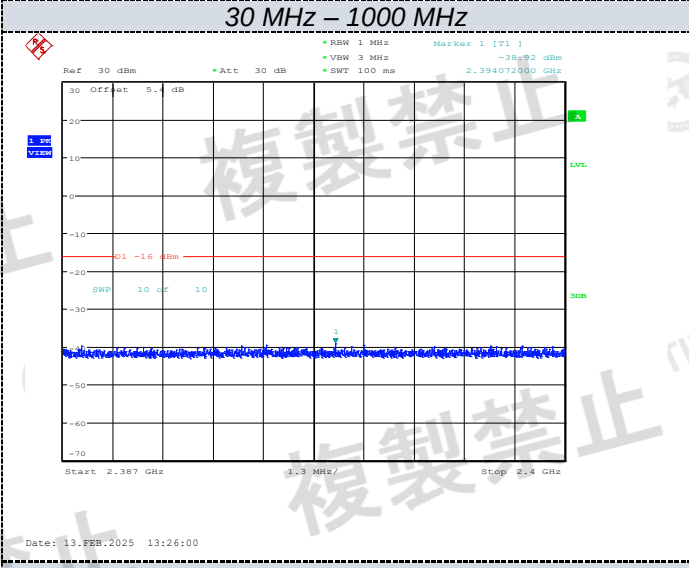
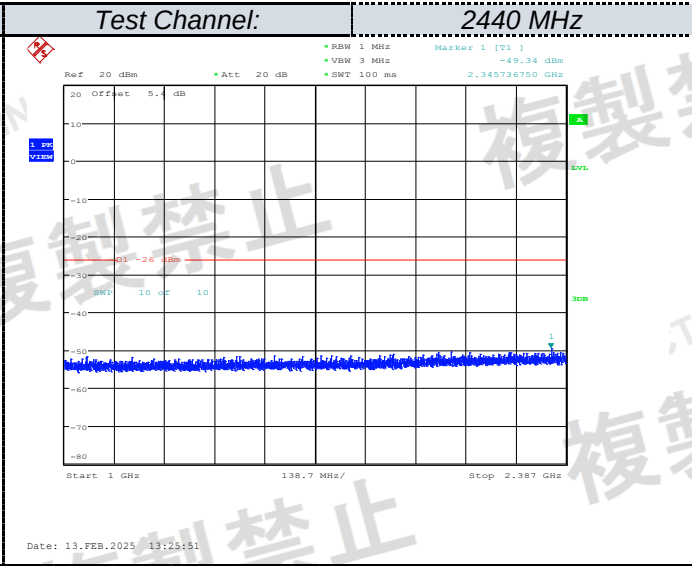
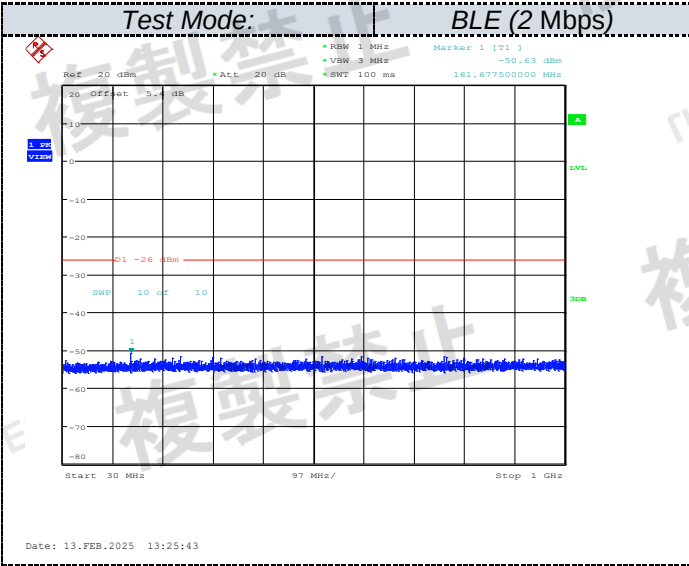
Note: We test Normal Voltage, High Voltage, Low Voltage, and recorded the worst test plot.

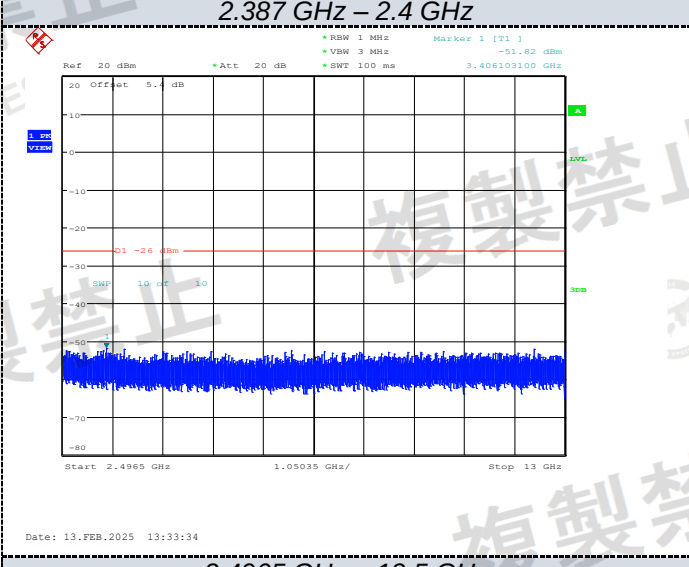
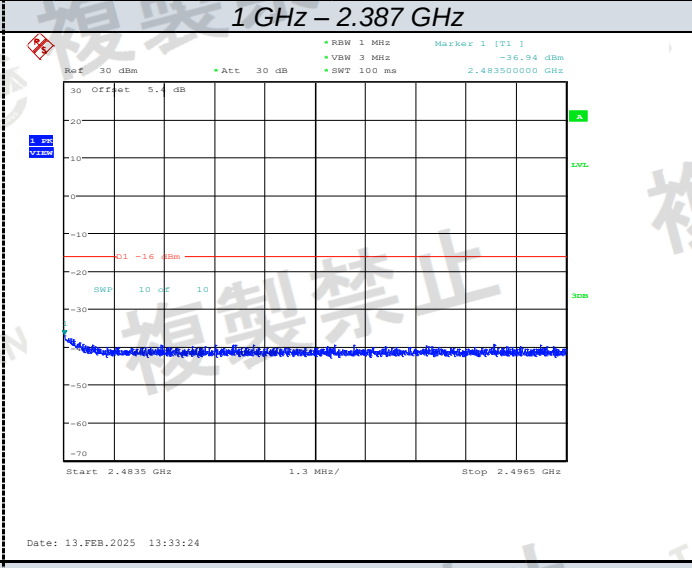
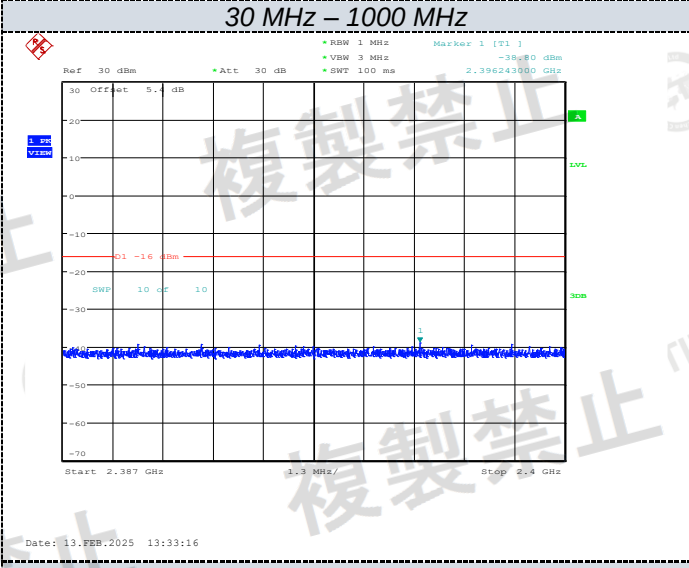
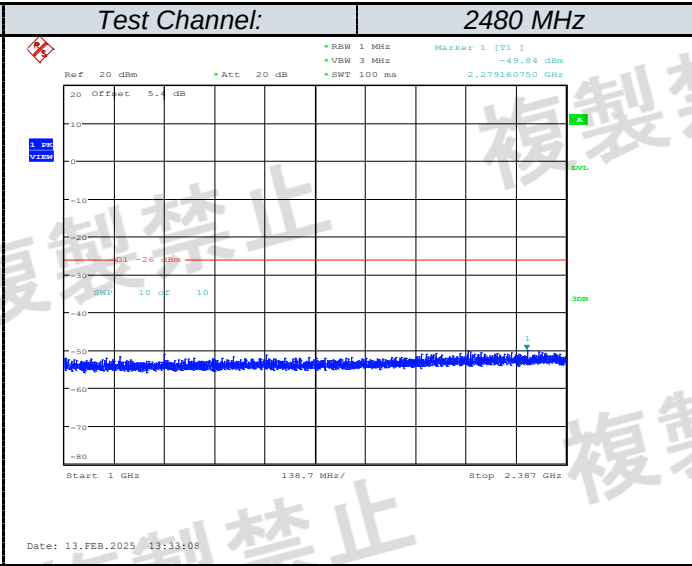
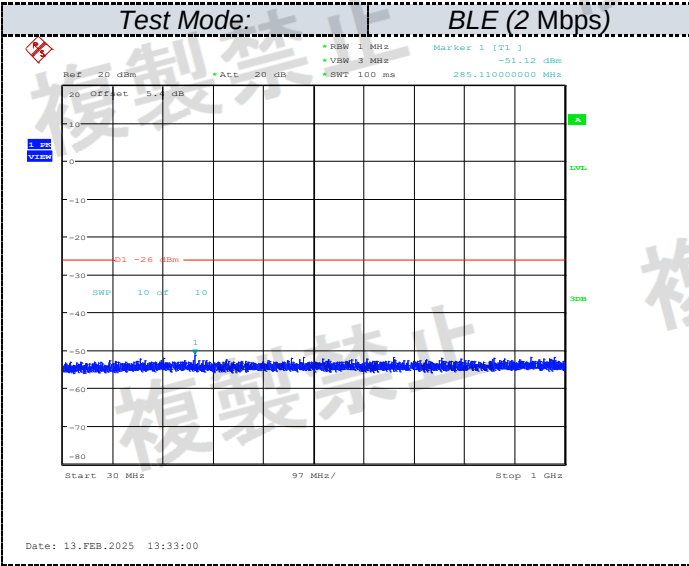










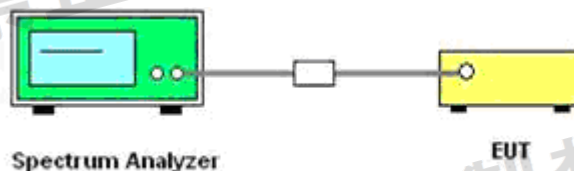


3.5 Secondary Radiated Emission Strength

LIMIT

The limit on secondary emissions radiated from the receiving equipment within which the function of other radio equipment will not be impaired shall be, in terms of the power of a dummy antenna circuit that has the same electrical constant as the receiving antenna, 4nW or less at a frequency below 1 GHz and 20 nW or less at a frequency of 1 GHz or higher as measured using the circuit.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was directly connected to the spectrum analyser and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

Frequency: 30MHz-12.5GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)

VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)

Sweep time: Auto

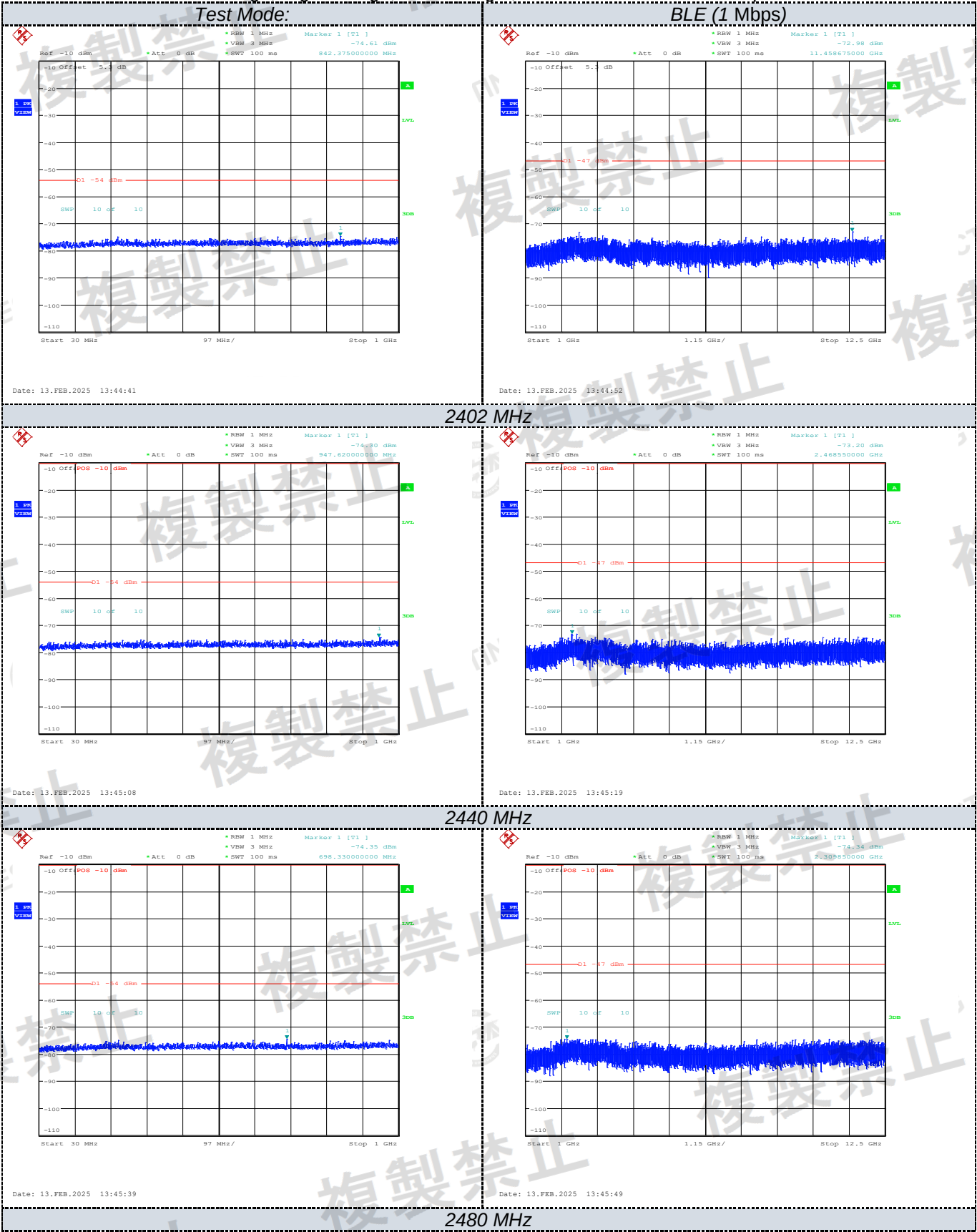
Detector mode: Positive peak

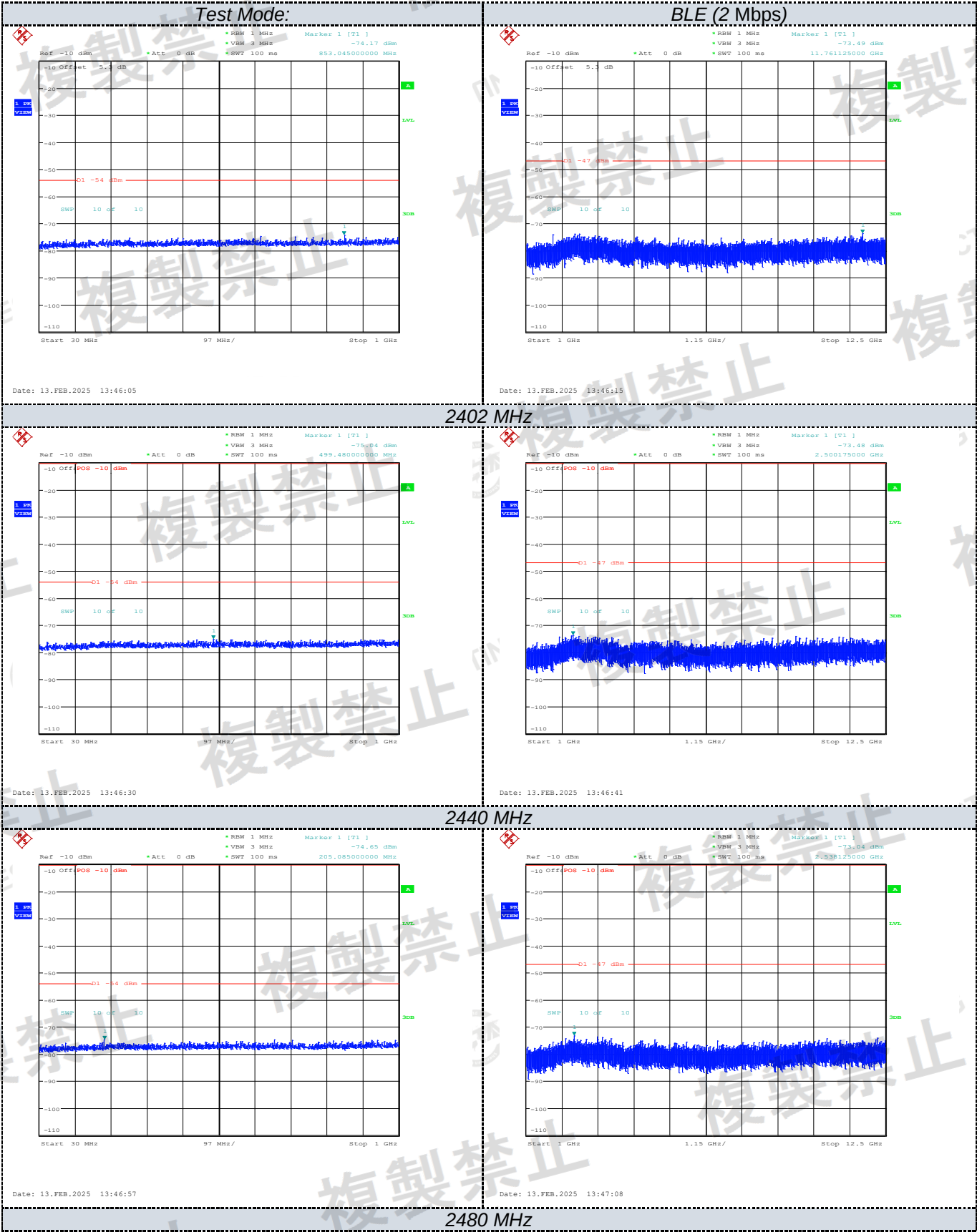
Indication mode: max hold

TEST RESULTS

TestCondition	TestMode	Antenna	Freq(MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
NTNV	BLE_1M	Ant1	2402	30~1000	842.38	-74.61	≤-54	0.03459	≤4	PASS
				1000~12500	11458.68	-72.98	≤-47	0.05035	≤20	PASS
			2440	30~1000	947.62	-74.30	≤-54	0.03715	≤4	PASS
				1000~12500	2468.55	-73.20	≤-47	0.04786	≤20	PASS
			2480	30~1000	698.33	-74.35	≤-54	0.03673	≤4	PASS
				1000~12500	2309.85	-74.34	≤-47	0.03681	≤20	PASS
	BLE_2M	Ant1	2402	30~1000	853.05	-74.17	≤-54	0.03828	≤4	PASS
				1000~12500	11761.13	-73.49	≤-47	0.04477	≤20	PASS
			2440	30~1000	499.48	-75.04	≤-54	0.03133	≤4	PASS
				1000~12500	2500.18	-73.48	≤-47	0.04487	≤20	PASS
			2480	30~1000	205.09	-74.65	≤-54	0.03428	≤4	PASS
				1000~12500	2538.13	-73.04	≤-47	0.04966	≤20	PASS

Note: We test Normal Voltage, High Voltage, Low Voltage, and recorded the worst test plot.





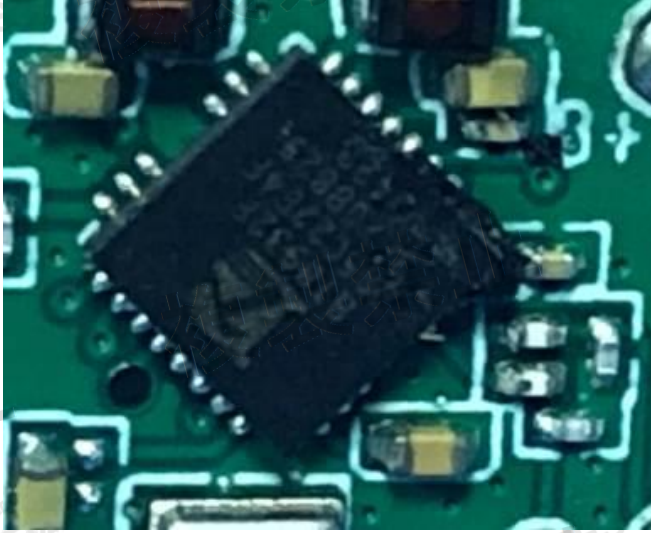
3.6 Construction Protection Method

REQUIREMENT

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

CONFIRMATION METHOD

Our products apply for RF certification in Japan. The high frequency part and modulation part use SMT technology, which is not easy to change. (The chip has more than 12 chip pins, and the pin distance is less than 1.5mm.)



3.7 Interference Prevention Function

REQUIREMENT

Clarify the one automatically to transmit and to receive identification code with the wireless equipment of the wireless station used in the same premises.

Item	Limits
Identification code	≥ 48 bits

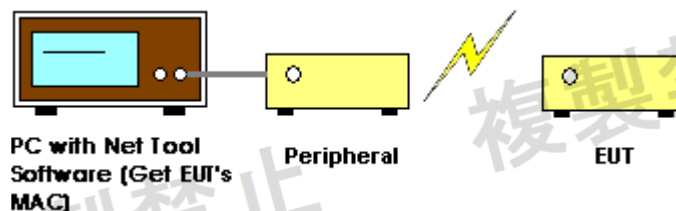
CONFIRMATION METHOD

A communication link was made where the ID code is correct (Identical).

TEST PROCEDURE

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

TEST CONFIGURATION



TEST RESULTS

PASS

MAC: A2: 4C: 6D: 1A: 3B: 5E

3.8 Carrier Sensing Function

LIMIT

Item	Limits
Carrier Sense	Good – EUT stop RF transmission signal after carrier inject to EUT. (On $22.79 + Gr - 20 \cdot \log(f)$ [dBm] (Gr: dBi; f: MHz) or 100mV/m)

INSTRUMENTS SETTING

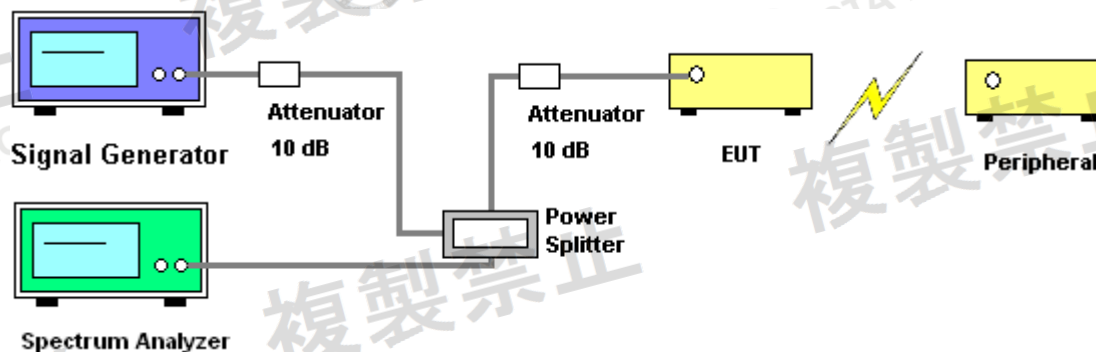
The following table is the setting of spectrum analyser and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
RB / VB	1 MHz
Span	0 MHz
Sweep	Continuous
Detector	Peak
Trigger mode	Video

TEST PROCEDURE

- SSG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SSG and power level is (On $22.79 + Gr - 20 \cdot \log(f)$ [dBm] (Gr: dBi; f: MHz). Then turn off the RF signal of SSG.
- EUT have transmitted the maximum modulation signal and fixed channelize.
- Setting of SA is following as: RB: 1MHz / VB: 1MHz / SPAN: 50MHz / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak.
- SSG RF Signal On.
- EUT shall be stop the transmitted any signal and SSG RF Signal Off. Then EUT will be continuous transmitted signal.

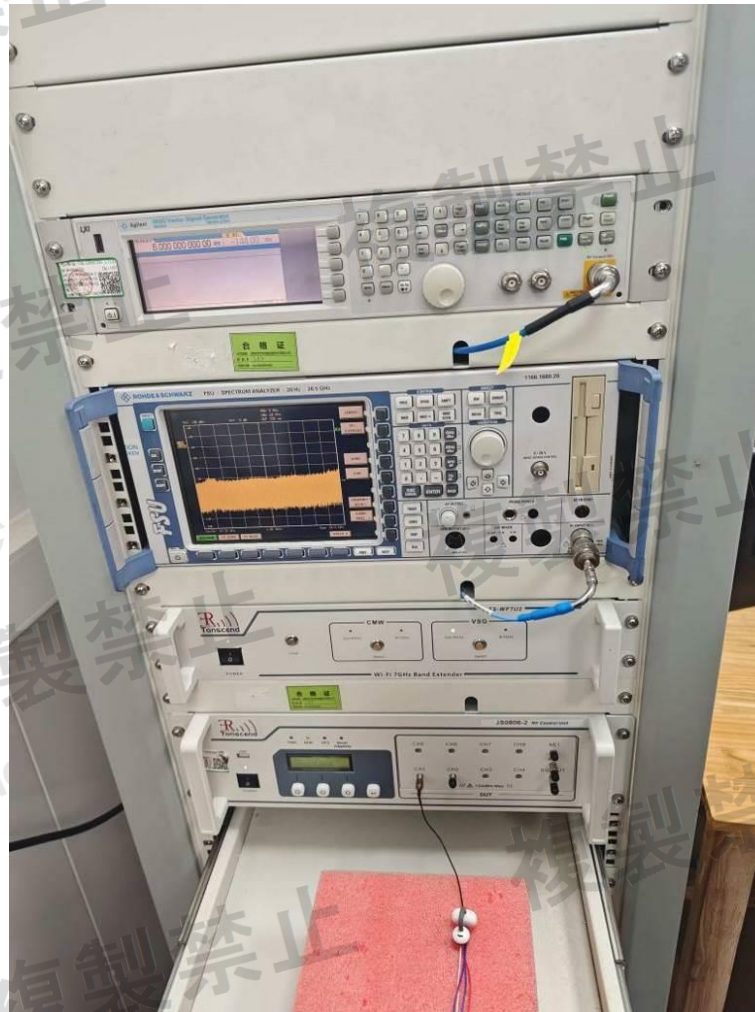
TEST CONFIGURATION



TEST RESULTS

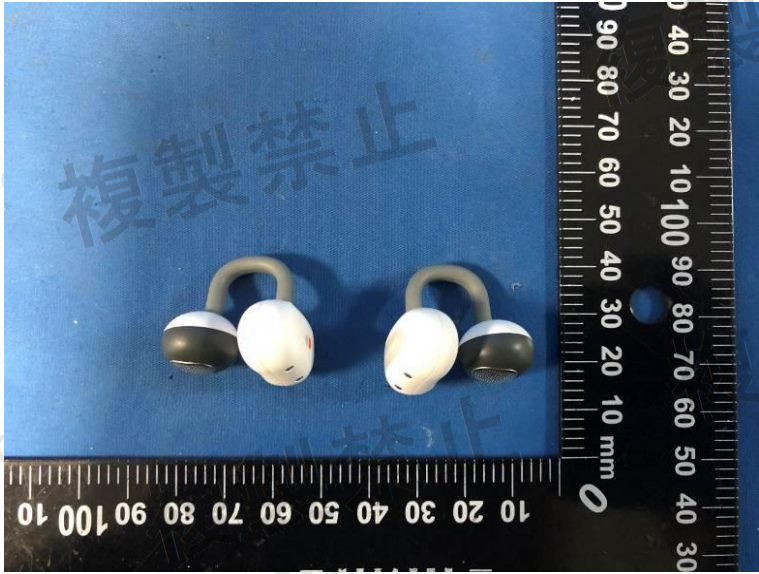
Not Applicable.

4 Test Setup Photos of the EUT



5 Photos of the EUT

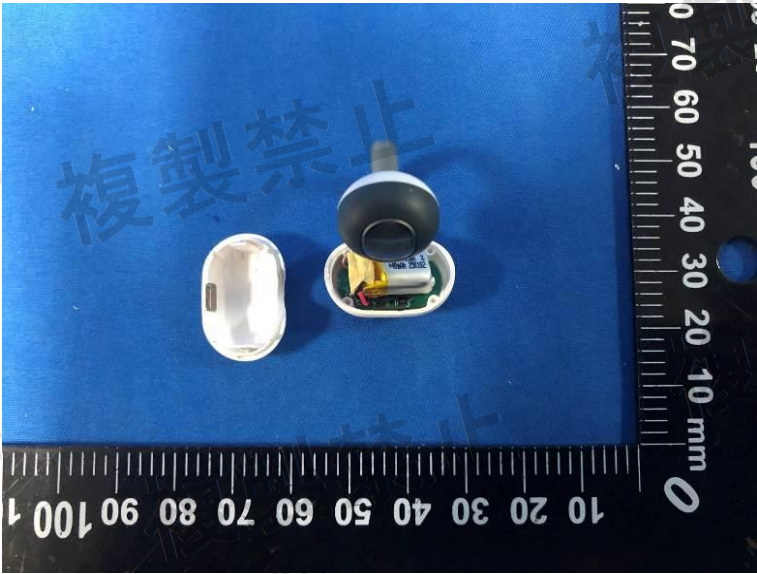


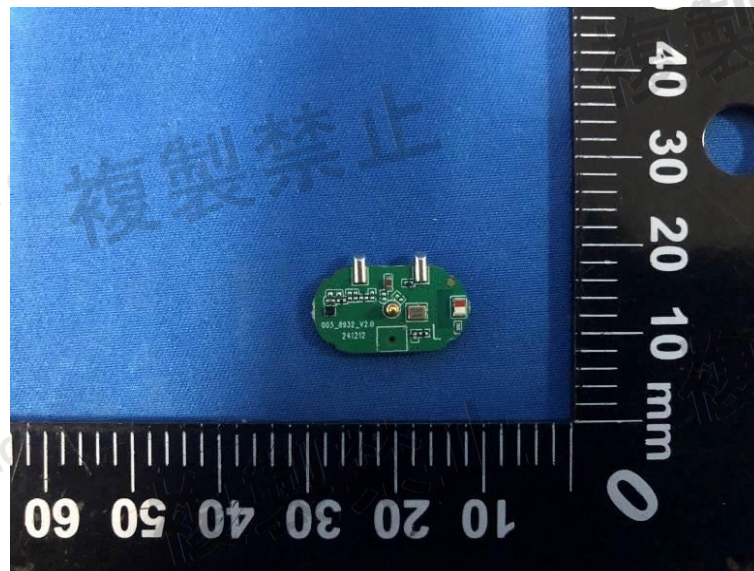
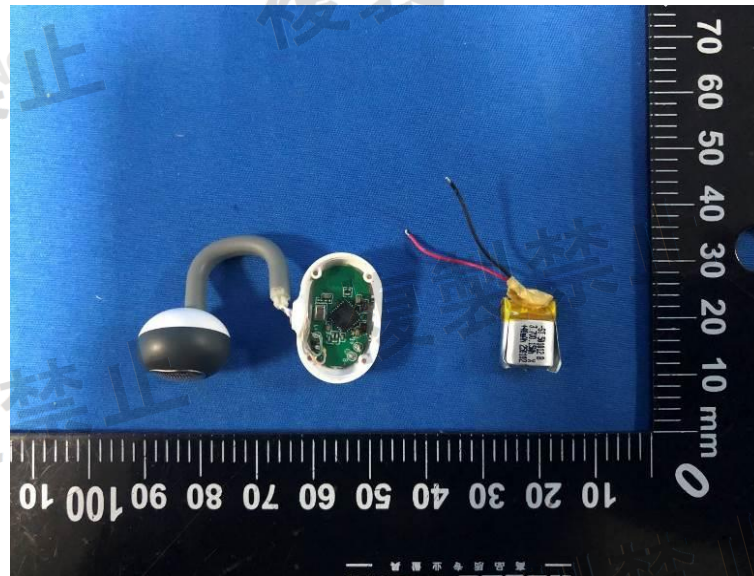


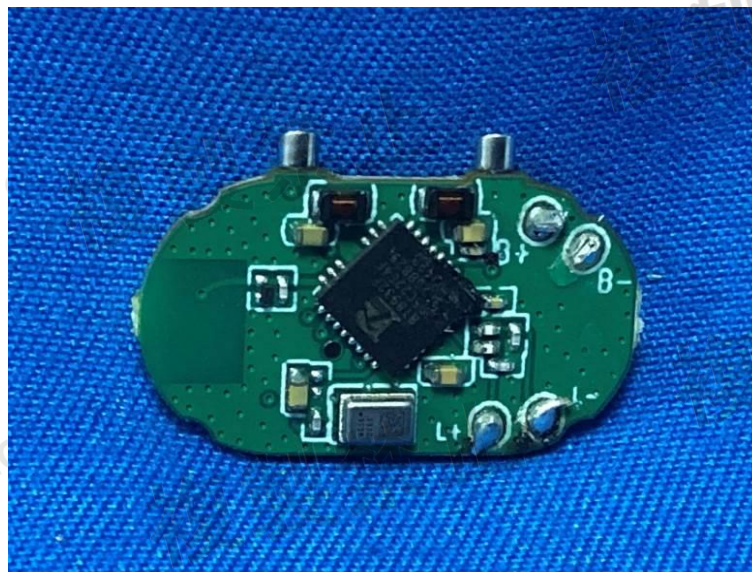
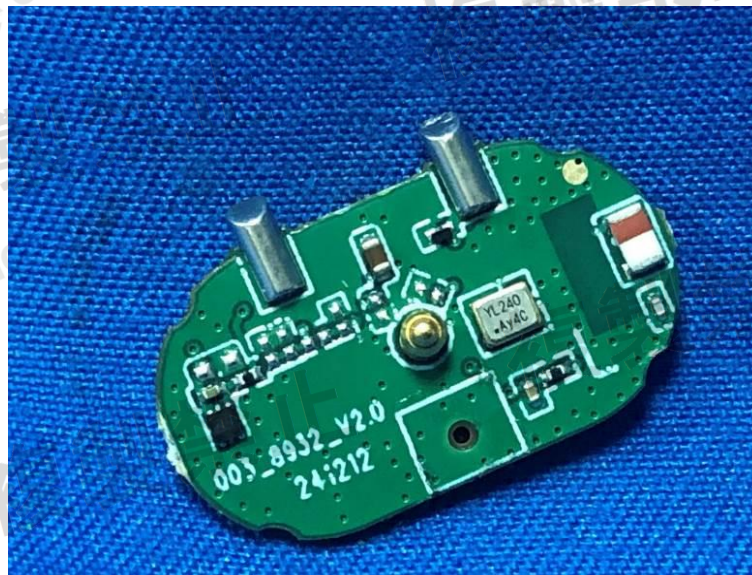
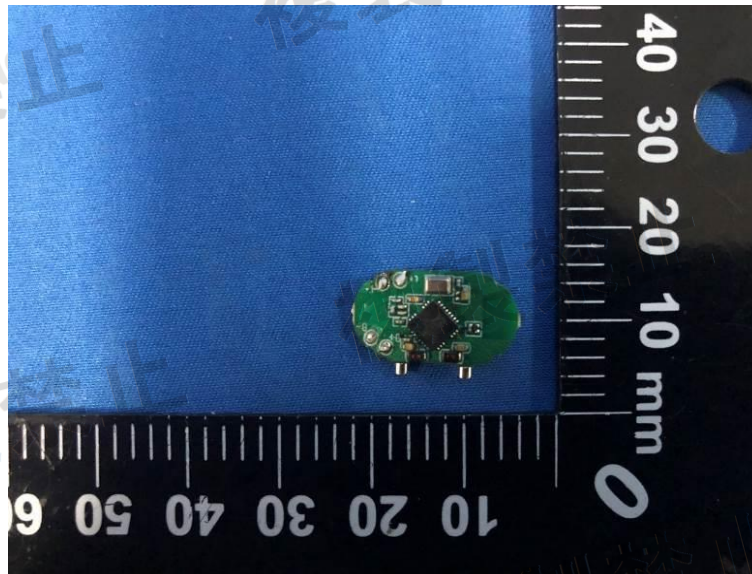


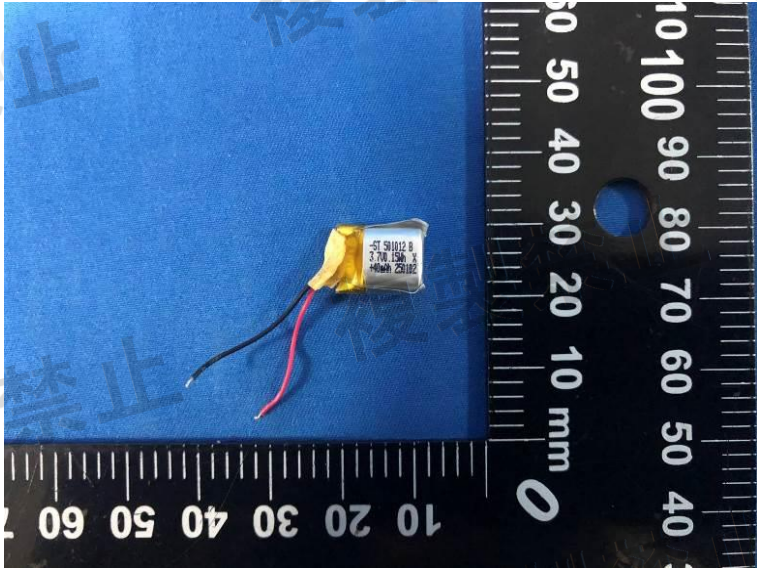


Left

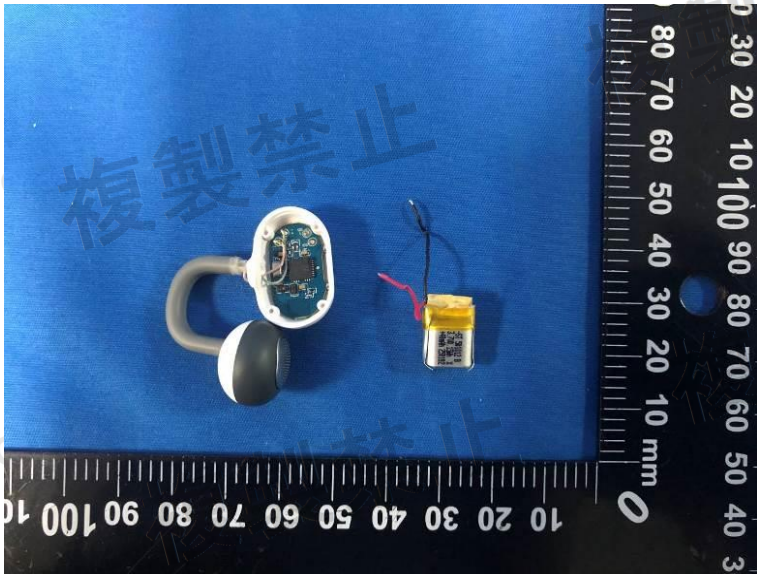
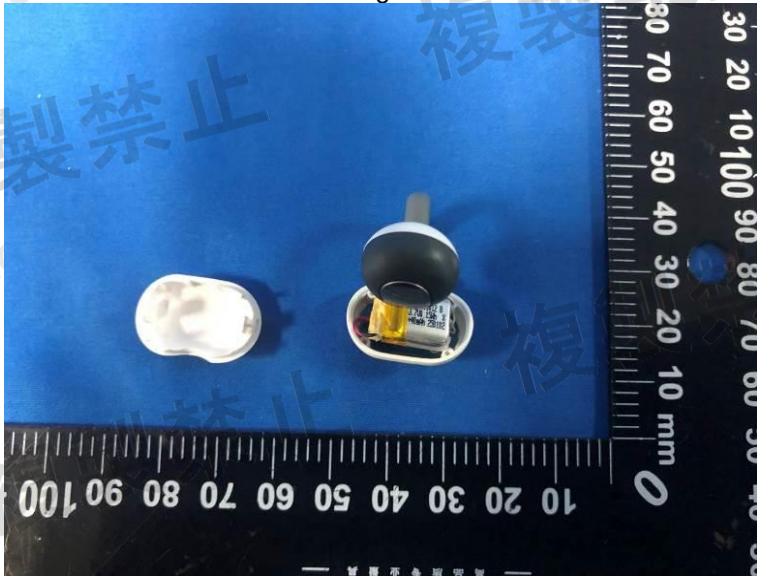


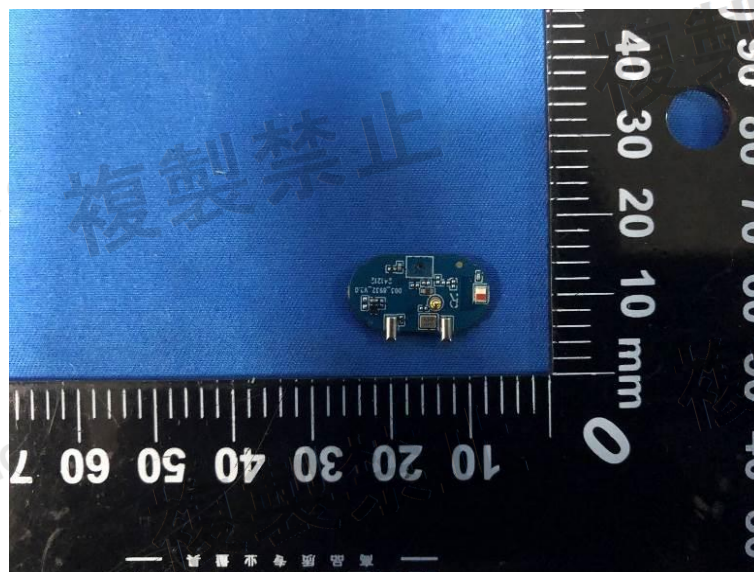
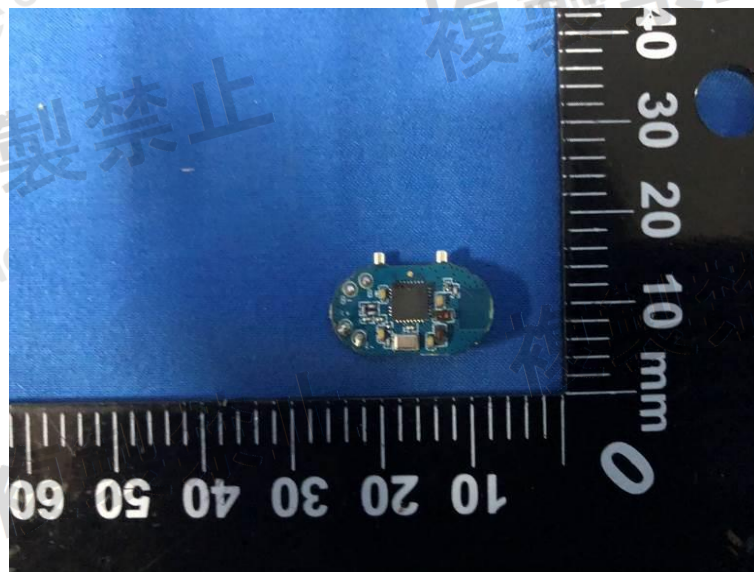
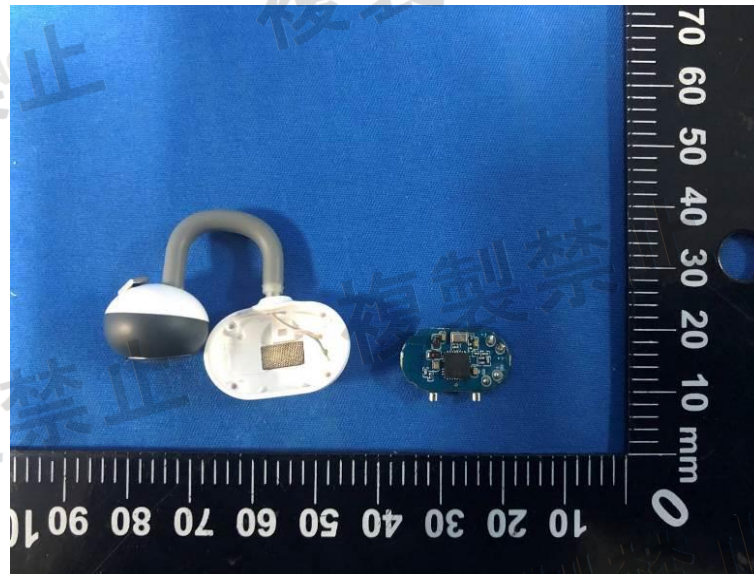


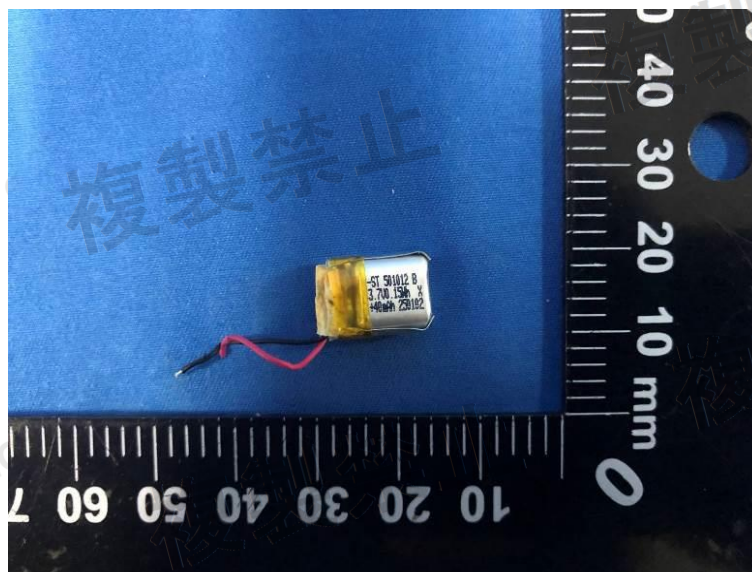
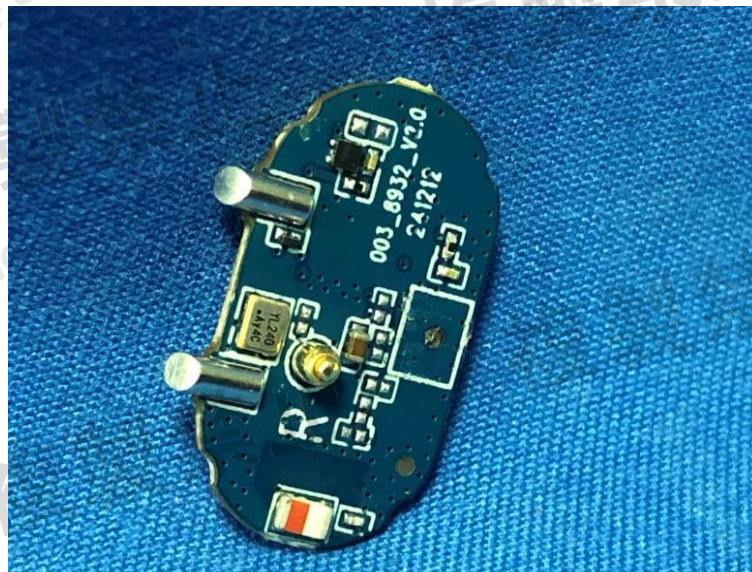
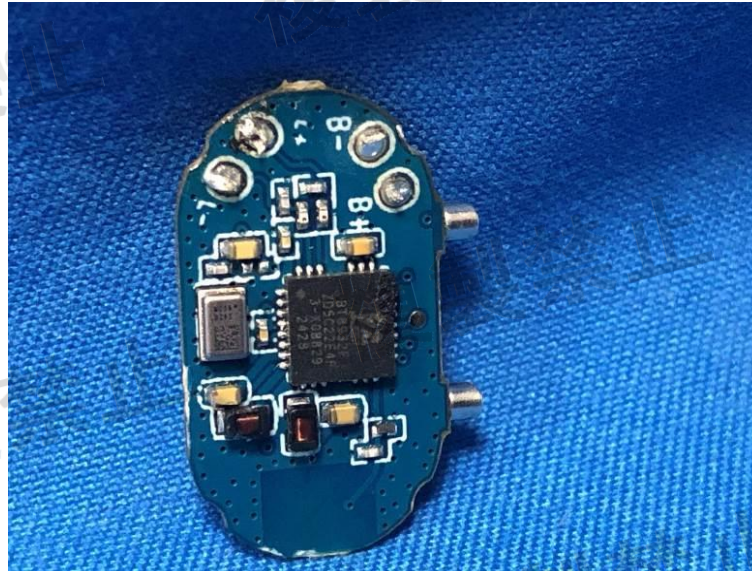




Right







***** End of Report *****