



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.....: CTA25031100701

Compiled by  
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Date of issue.....: Mar. 13, 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 .....: Guangzhou Yonghe Electronics Co.,Ltd.

Address .....: Room 304, Building 7, Taohui Home Appliance Park, Shunjiang Community, Beijiao Town, Shunde District, Foshan City, Guangdong Province, China

Test specification .....

Standard .....: Ordinance Article 2 paragraph 1 item (19)

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Test item description .....: Bluetooth headset

Trade Mark .....: N/A

Manufacturer .....: DongGuan Kemi Electronics Technology Co., Ltd

Model/Type reference.....: X7

Listed Models .....: N/A

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

Modulation .....: GFSK,  $\pi/4$ DQPSK, 8DPSK

Ratings .....: DC 3.7V From battery and DC 5.0V From external circuit

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

Shenzhen CTA Testing Technology Co., Ltd.

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**TEST REPORT**

Equipment under Test : Bluetooth headset

Model /Type : X7

Listed Models : N/A

**Applicant** : Guangzhou Yonghe Electronics Co.,Ltd.

**Address** : Room 304, Building 7, Taohui Home Appliance Park, Shunjiang Community, Beijiao Town, Shunde District, Foshan City, Guangdong Province, China

**Manufacturer** : DongGuan Kemi Electronics Technology Co., Ltd

**Address** : Room 201, Floor 2, Building 4, Taixing Science Park, No.3, Taixing Road, Shigu.Tangxia Town, Dongguan city, China

**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.

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# 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 Version 3.7/2014                  |                                                    |              |
|------------------------------------------------|----------------------------------------------------|--------------|
| ARIB STD-T66                                   | Test Description                                   | Test Results |
| 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                                         | Complies     |
| 3.2 (6)                                        | Spurious Emissions                                 | Complies     |
| 3.6                                            | Transmission Antenna Gain (EIRP Antenna Power)     | Complies     |
| 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     |
| (1) N/A is an abbreviation for Not Applicable. |                                                    |              |

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 the test laboratory

### 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:

**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

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#### 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 | : | Mar. 07, 2025 |
| Testing commenced on           | : | Mar. 07, 2025 |
| Testing concluded on           | : | Mar. 13, 2025 |

### 2.2 Environmental conditions

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

|         |                    |         |
|---------|--------------------|---------|
| Voltage | Normal Voltage     | DC 3.7V |
|         | High Voltage       | DC 4.2V |
|         | Low Voltage        | DC 3.4V |
| Other   | Normal Temperature | 25°C    |
|         | Relative Humidity  | 55 %    |
|         | Air Pressure       | 989 hPa |

Note: As the EUT was powered by DC 3.7V From battery and DC 5.0V From external circuit, and with the voltage stabilizing circuit used, the chip voltage received floating not exceed  $\pm 1\%$  of nominal condition when working on extreme voltage, so all test performed at nominal voltage only.

### 2.3 General Description of EUT

|                       |                                                        |
|-----------------------|--------------------------------------------------------|
| Product Name:         | Bluetooth headset                                      |
| Model/Type reference: | X7                                                     |
| Power supply:         | DC 3.7V From battery and DC 5.0V From external circuit |
| Bluetooth             |                                                        |
| Supported type:       | Supported Bluetooth BR/EDR                             |
| Bluetooth version:    | 5.3                                                    |
| Modulation:           | GFSK, $\pi/4$ DQPSK, 8DPSK                             |
| Operation frequency:  | 2402MHz~2480MHz                                        |
| Channel number:       | 79                                                     |
| Channel separation:   | 1MHz                                                   |
| Rated power:          | 0.000070 W/MHz                                         |
| Antenna type:         | Ceramic antenna                                        |
| Antenna Gain:         | 2.5 dBi                                                |
| Software version:     | V1.0                                                   |
| Hardware 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:

| Channel | Frequency (MHz) |
|---------|-----------------|
| 0       | 2402            |
| 1       | 2403            |
| ⋮       | ⋮               |
| 38      | 2440            |
| 39      | 2441            |
| 40      | 2442            |
| ⋮       | ⋮               |
| 77      | 2479            |
| 78      | 2480            |

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

## 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           | 2441MHz | 2480MHz |
| Bluetooth V5.3        | Default           | Default | Default |

## 2.7 Description of Test Modes

| Tested channel, Frequency and Modulation Information                                |         |                                                   |
|-------------------------------------------------------------------------------------|---------|---------------------------------------------------|
| CH0                                                                                 | 2402MHz | GFSK(1Mbps), $\pi/4$ -DQPSK(2Mbps), 8-DPSK(3Mbps) |
| CH39                                                                                | 2441MHz | GFSK(1Mbps), $\pi/4$ -DQPSK(2Mbps), 8-DPSK(3Mbps) |
| CH78                                                                                | 2480MHz | GFSK(1Mbps), $\pi/4$ -DQPSK(2Mbps), 8-DPSK(3Mbps) |
| Hopping Mode                                                                        |         | GFSK(1Mbps), $\pi/4$ -DQPSK(2Mbps), 8-DPSK(3Mbps) |
| Note: According exploratory test, EUT has maximum output power for GFSK modulation. |         |                                                   |

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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 3.30V                            | DC 3.30V                           |
| Voltage Variation(%)     | --             | --                                  | --                                 |

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.

The sample power supply was confirmed that input voltage variation at the radio unit in the radio equipment to be tested is less than +1% against a variation of +10% at the input voltage from the external power supply to the radio equipment, and the radio equipment was designed so as to be operated in a specified voltage variation limit within +10%, Radio can only tested at rated voltage.

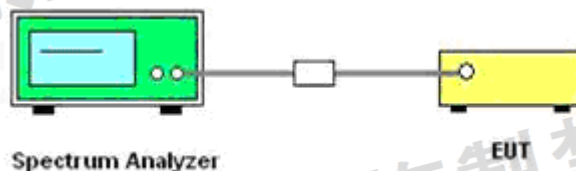
### 3 Test conditions and Results

#### 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: 10 KHz

Sweep time: Auto

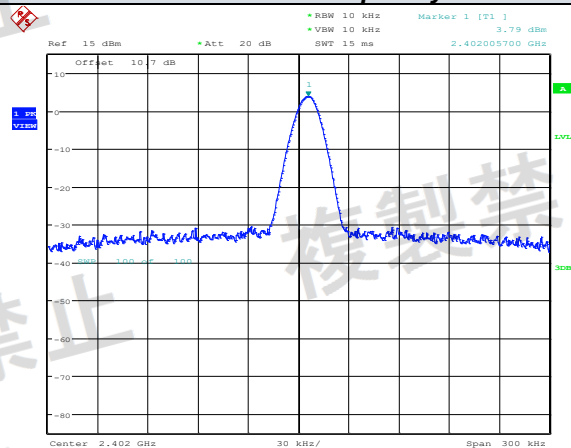
Detector mode: Positive peak

Indication mode: max hold

##### TEST RESULTS

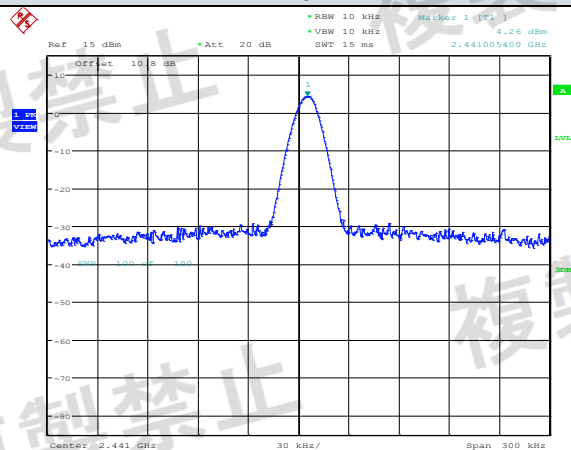
| Test Condition | Frequency (MHz) | Read (MHz) | Deviation (MHz) | Tolerance (ppm) | Limit (ppm) | Result |
|----------------|-----------------|------------|-----------------|-----------------|-------------|--------|
| Non-modulation | 2402            | 2402.0057  | 0.0057          | 2.3730          | +/- 50.00   | Pass   |
|                | 2441            | 2441.0054  | 0.0054          | 2.2122          |             |        |
|                | 2480            | 2480.0051  | 0.0051          | 2.0565          |             |        |

## Test Plots of Frequency Error



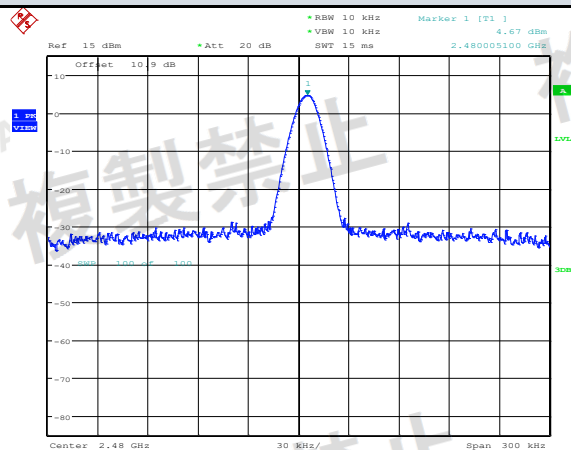
Date: 12.MAR.2025 15:20:18

## 2402 MHz



Date: 12.MAR.2025 15:20:40

## 2441 MHz



Date: 12.MAR.2025 15:21:10

## 2480 MHz

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### 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)

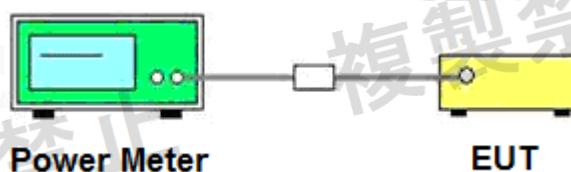
The Output Power Tolerance must be within +20%.

E.i.r.p:

- $\leq 6.91 \text{ dBm/MHz}$  (FHSS)

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

1. The EUT was placed on a table which is 0.8m above ground plane.
2. The EUT was directly connected to the Power meter.
3. EUT have transmitted continuous maximum power of hopping mode (For FHSS Device);
4. The Antenna Power Density (PD) is equal to the:  
 $PD = \text{Average value} / (\text{Duty Cycle} * \text{Spreading bandwidth});$
5. 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

| Mode             | Packet | Declared power | Measured Value | Result   | Tolerance | Limit |
|------------------|--------|----------------|----------------|----------|-----------|-------|
|                  |        | (W/MHz)        | (dBm)          | (W/MHz)  | /         | /     |
| Tx (1Mbps)       | DH5    | 0.00007        | 5.53           | 0.000065 | -7.14%    | +20%  |
| Tx (2Mbps)       | 2DH5   | 0.00007        | 5.47           | 0.000065 | -7.14%    | +20%  |
| Tx (3Mbps)       | 3DH5   | 0.00007        | 5.34           | 0.000063 | -10.00%   | +20%  |
| Conclusion: PASS |        |                |                |          |           |       |

#### EIRP

| Mode       | Packet | Average burst power (dBm) | Gain (dBi) | EIRP (dBm/MHz) | Limit (dBm/MHz) | Result |
|------------|--------|---------------------------|------------|----------------|-----------------|--------|
| Tx (1Mbps) | DH5    | 5.53                      | 2.5        | 0.0895         | 6.91            | Pass   |
| Tx (2Mbps) | 2DH5   | 5.47                      | 2.5        | 0.0888         | 6.91            |        |
| Tx (3Mbps) | 3DH5   | 5.34                      | 2.5        | 0.0855         | 6.91            |        |

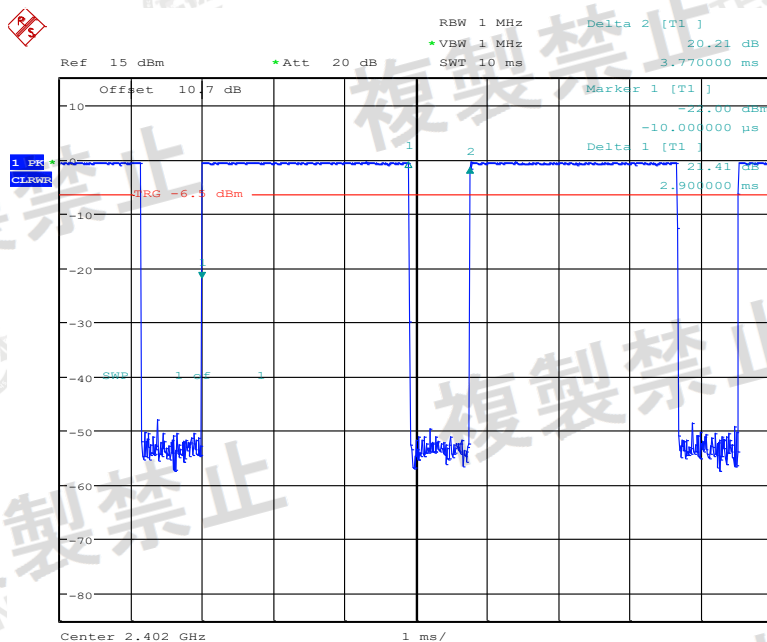
Result power= Average value / (Duty Cycle \* Spreading bandwidth)

Spread Bandwidth (DH5) = 71.000MHz, Spread Bandwidth (2DH5) =70.600MHz,

Spread Bandwidth (3DH5) = 71.100MHz

Duty cycle = 76.92%

Duty cycle= [Ton/ (Ton+Toff)]\*100% = 2.90/3.77\*100% = 76.92%



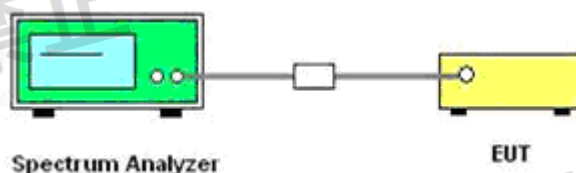
Date: 12.MAR.2025 14:47:33

### 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

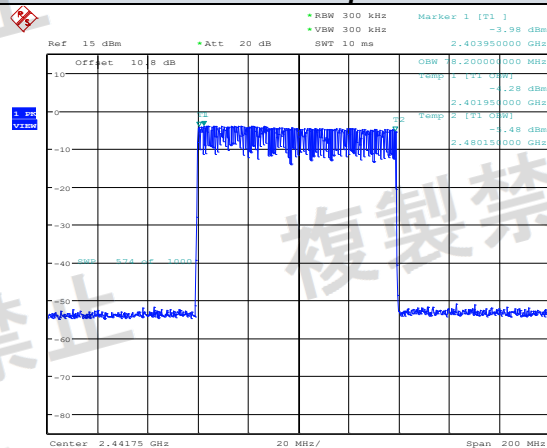
1. Setting of SA is following as follow:
  - RBW: under 3% of OBW
  - VBW: = RBW
  - Sweep time: Auto
  - Sweep Mode: Continuous sweep
  - Detect mode: Positive peak
  - Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.
3. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 90% of occupied bandwidth to measure spread bandwidth.
4. Spread Factor=Spread Bandwidth/modulation rate. The modulation rate: MR=1Mbps (declare by client)

#### TEST RESULTS

##### *Test Result of Occupied Bandwidth*

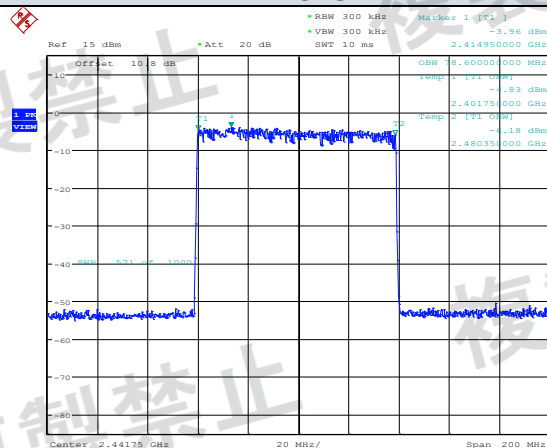
| Type          | Channel (MHz) | Occupied Bandwidth (MHz) | Limit (MHz) | Result |
|---------------|---------------|--------------------------|-------------|--------|
| GFSK          | 2402-2480     | 78.200                   | <83.5       | Pass   |
| $\pi/4$ DQPSK | 2402-2480     | 78.600                   |             |        |
| 8DPSK         | 2402-2480     | 78.400                   |             |        |

## Test Plots of Occupied Bandwidth

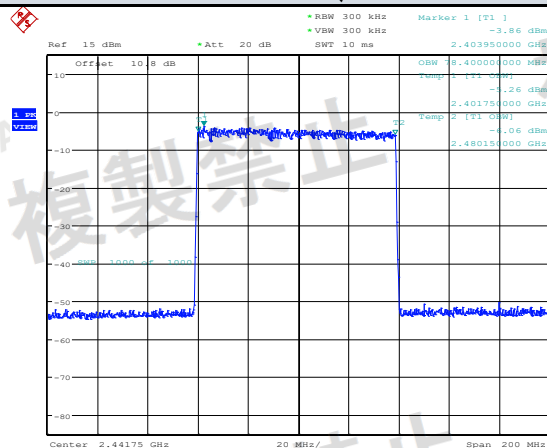


Date: 12.MAR.2025 15:04:57

## GFSK



Date: 12.MAR.2025 15:07:49

 $\pi/4$ DQPSK

Date: 12.MAR.2025 15:12:43

## 8DPSK

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**Test Result of Spectrum Bandwidth**

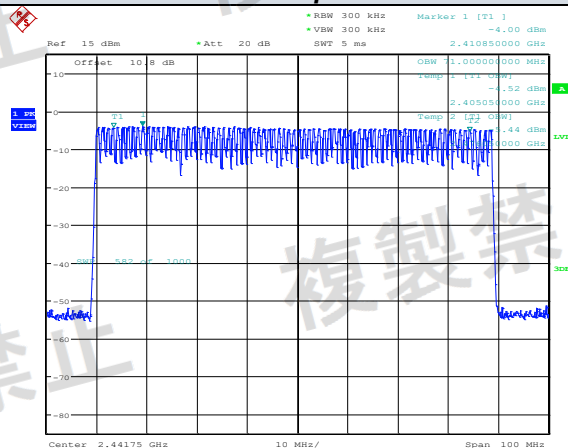
| Type          | Channel (MHz) | Spread Bandwidth (MHz) | Limit (MHz) | Result |
|---------------|---------------|------------------------|-------------|--------|
| GFSK          | 2402-2480     | 71.000                 | <83.5       | Pass   |
| $\pi/4$ DQPSK | 2402-2480     | 70.600                 |             |        |
| 8DPSK         | 2402-2480     | 71.100                 |             |        |

**Test Result of Spread Spectrum Factor**

| Mode            | CH  | Result | Modulation Rate | Spread Factor | Limit |
|-----------------|-----|--------|-----------------|---------------|-------|
|                 |     | (MHz)  | (MHz)           |               |       |
| Hopping (1Mbps) | All | 71.000 | 1               | 71.000        | ≥5    |
| Hopping (2Mbps) | All | 70.600 | 2               | 35.300        | ≥5    |
| Hopping (3Mbps) | All | 71.100 | 3               | 23.700        | ≥5    |

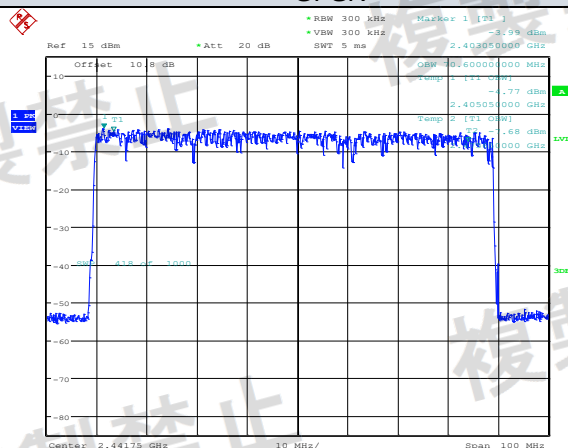
Note: Spread Factor=Spread Bandwidth/modulation rate.

## Test Plots of Spread Bandwidth

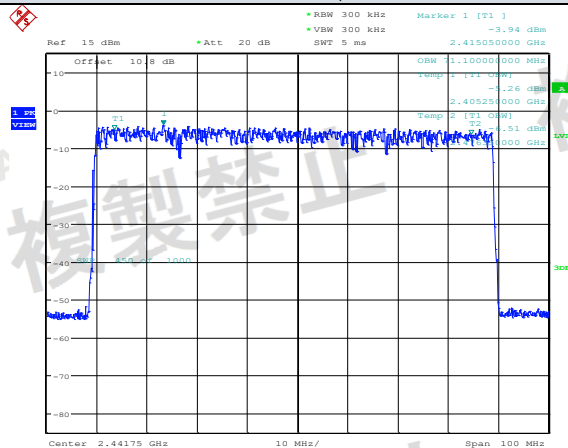


Date: 12.MAR.2025 15:04:15

## GFSK



Date: 12.MAR.2025 15:06:32

 $\pi/4$ DQPSK

Date: 12.MAR.2025 15:11:42

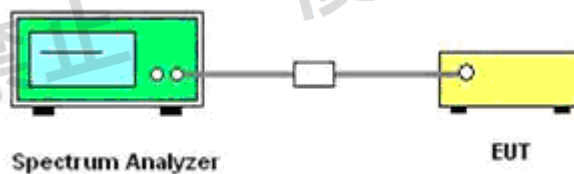
## 8DPSK

### 3.4 Dwell Time

#### LIMIT

Frequency dwell time (time during which radio waves continue to be emitted at a specified frequency) of a transmitting equipment using the FH system shall be 0.4 seconds 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

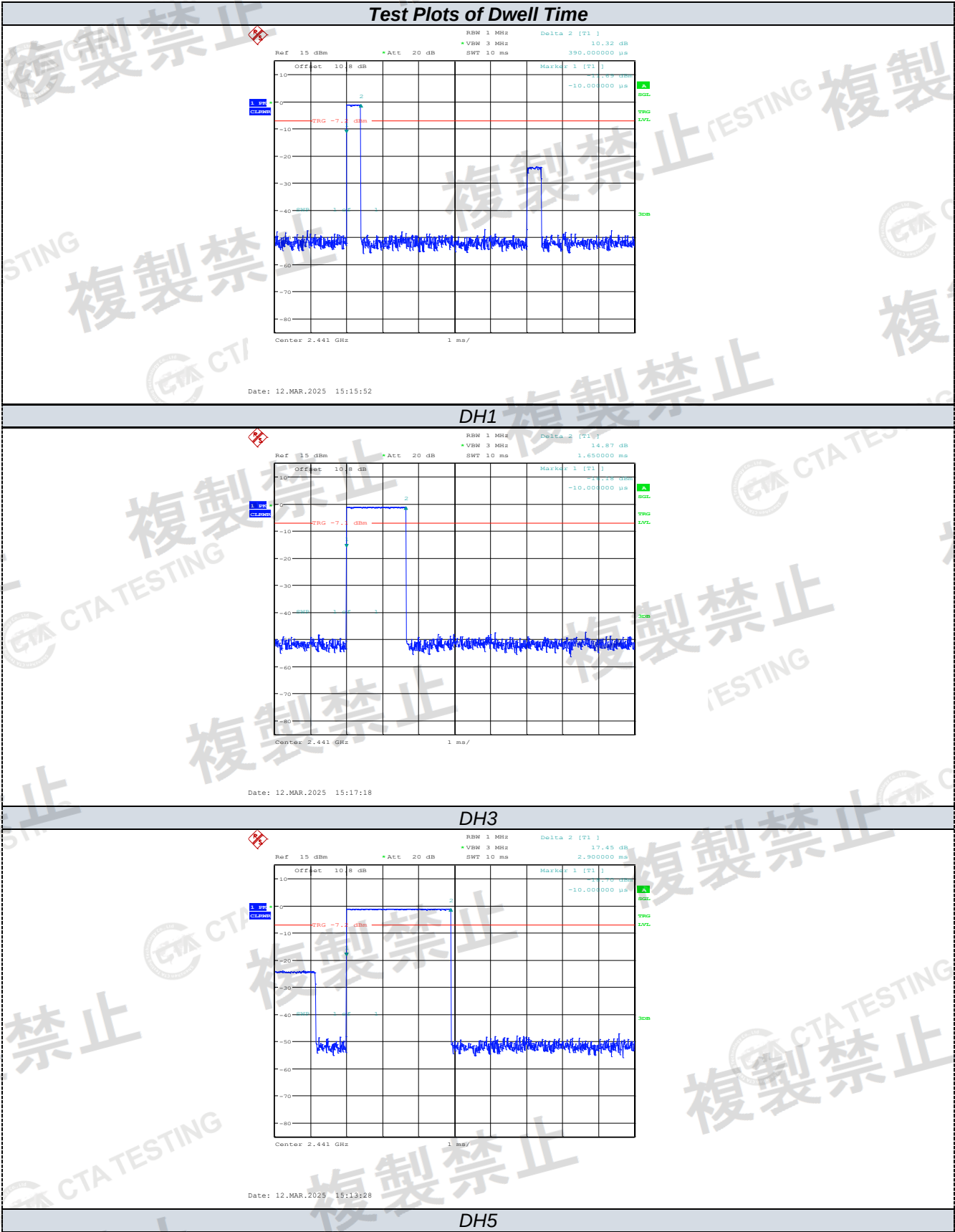
Spectrum Condition:

- Frequency: test channel
- Span=0MHz
- RBW: 1MHz
- VBW: 3MHz
- Sweep time: Auto
- Detector mode: Positive peak

#### TEST RESULTS

| Worst test result of Low Channel for GFSK (1Mbps) Modulation |                         |                                   |                     |                |        |
|--------------------------------------------------------------|-------------------------|-----------------------------------|---------------------|----------------|--------|
| Type                                                         | Number of hops in 31.6S | transmission time of 1 burst (ms) | Dwell time (second) | Limit (second) | Result |
| DH1                                                          | 316                     | 0.39                              | 0.123               | 0.4            | Pass   |
| DH3                                                          | 158                     | 1.65                              | 0.261               |                |        |
| DH5                                                          | 99                      | 2.90                              | 0.287               |                |        |

\*Note: Dwell time= Pulse Time\* Number of hops in 31.6S;  
Measured all types and recorded worst case at GFSK (1M) modulation;



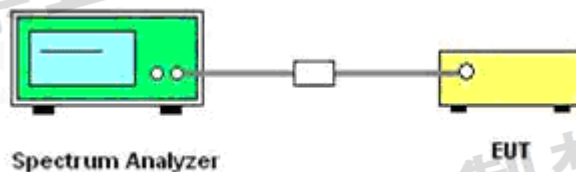
### 3.5 Unwanted Emission Strength

#### 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  $2,483.5\text{MHz} < f \leq 2,496.5\text{MHz}$      $25 \mu\text{W}$  or less  
b.  $2,387\text{MHz} > f$  and  $2,496.5\text{MHz} < f$      $2.5 \mu\text{W}$  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-13GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

VBW: 300 KHz (30MHz-1GHz), 3MHz (1GHz-13GHz)

Sweep time: Auto

Detector mode: Positive peak

Indication mode: max hold

#### TEST RESULTS

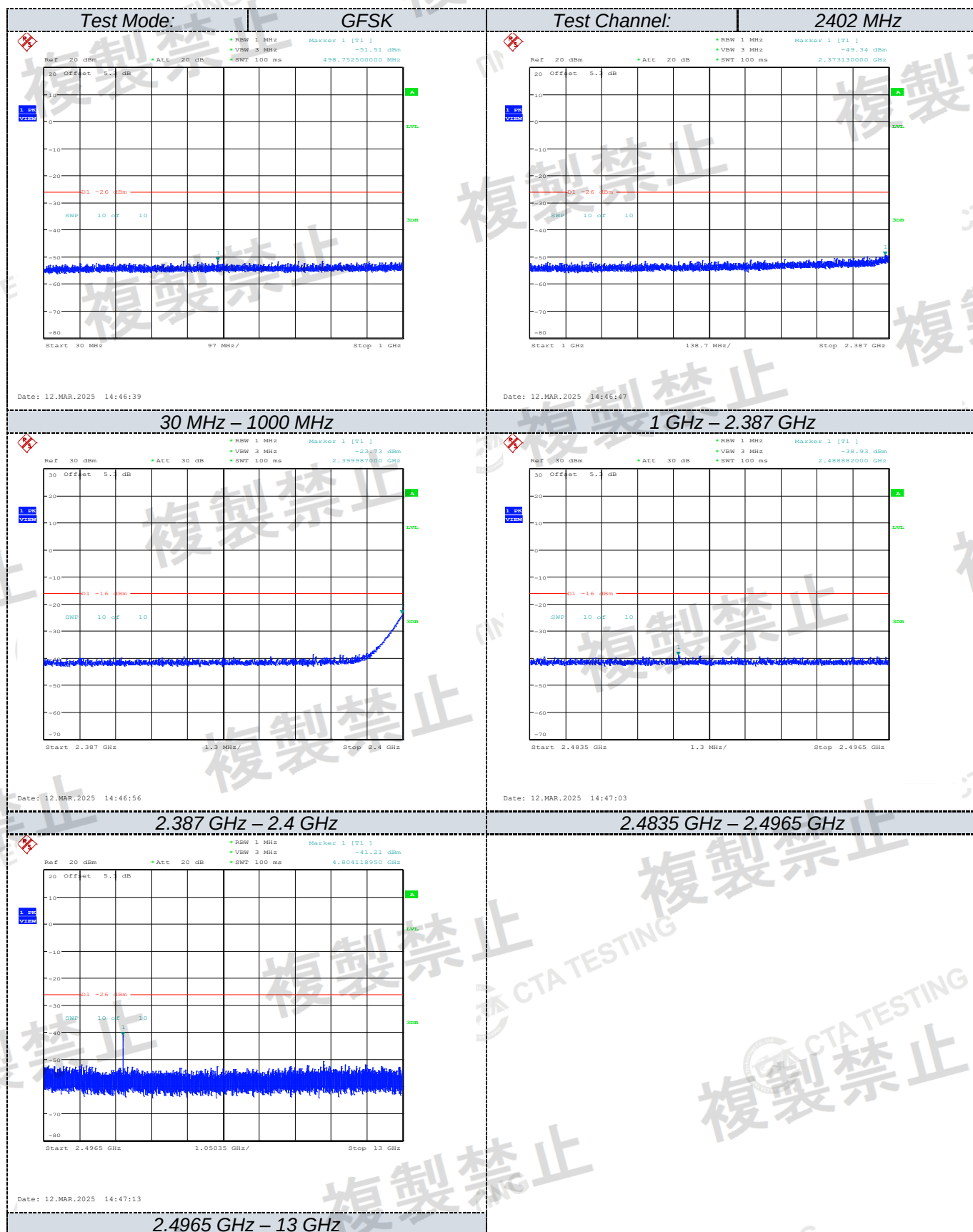
| Test Condition | Test Mode | Antenna | Freq(MHz) | Freq.Range [MHz] | Freq. [MHz] | Result [dBm] | Limit [dBm] | Result [μW] | Limit [μW] | Verdict |
|----------------|-----------|---------|-----------|------------------|-------------|--------------|-------------|-------------|------------|---------|
| NTNV           | DH5       | Ant1    | 2402      | 30~1000          | 498.75      | -51.51       | ≤-26        | 0.00706     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2373.13     | -49.34       | ≤-26        | 0.01164     | ≤2.5       | PASS    |
|                |           |         |           | 2387~2400        | 2399.99     | -23.73       | ≤-16        | 4.23643     | ≤25        | PASS    |
|                |           |         |           | 2483.5~2496.5    | 2488.88     | -38.93       | ≤-16        | 0.12794     | ≤25        | PASS    |
|                |           |         |           | 2496.5~13000     | 4804.12     | -41.21       | ≤-26        | 0.07568     | ≤2.5       | PASS    |
|                |           |         | 2441      | 30~1000          | 190.05      | -51.28       | ≤-26        | 0.00745     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2328.05     | -50.06       | ≤-26        | 0.00986     | ≤2.5       | PASS    |
|                |           |         |           | 2387~2400        | 2396.36     | -39.04       | ≤-16        | 0.12474     | ≤25        | PASS    |
|                |           |         |           | 2483.5~2496.5    | 2483.61     | -38.85       | ≤-16        | 0.13032     | ≤25        | PASS    |
|                |           |         |           | 2496.5~13000     | 4881.32     | -41.29       | ≤-26        | 0.07430     | ≤2.5       | PASS    |
|                | 2DH5      | Ant1    | 2402      | 30~1000          | 833.16      | -48.80       | ≤-26        | 0.01318     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2306.90     | -48.98       | ≤-26        | 0.01265     | ≤2.5       | PASS    |
|                |           |         |           | 2387~2400        | 2388.14     | -39.21       | ≤-16        | 0.11995     | ≤25        | PASS    |
|                |           |         |           | 2483.5~2496.5    | 2483.58     | -37.90       | ≤-16        | 0.16218     | ≤25        | PASS    |
|                |           |         |           | 2496.5~13000     | 4960.10     | -40.99       | ≤-26        | 0.07962     | ≤2.5       | PASS    |
|                |           |         | 2441      | 30~1000          | 829.52      | -51.59       | ≤-26        | 0.00693     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2366.20     | -49.19       | ≤-26        | 0.01205     | ≤2.5       | PASS    |
|                |           |         |           | 2387~2400        | 2400.00     | -22.42       | ≤-16        | 5.72796     | ≤25        | PASS    |
|                |           |         |           | 2483.5~2496.5    | 2492.63     | -39.35       | ≤-16        | 0.11614     | ≤25        | PASS    |
|                |           |         |           | 2496.5~13000     | 4804.12     | -45.53       | ≤-26        | 0.02799     | ≤2.5       | PASS    |
|                | 3DH5      | Ant1    | 2402      | 30~1000          | 908.34      | -51.51       | ≤-26        | 0.00706     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2347.12     | -50.03       | ≤-26        | 0.00993     | ≤2.5       | PASS    |
|                |           |         |           | 2387~2400        | 2395.69     | -39.26       | ≤-16        | 0.11858     | ≤25        | PASS    |
|                |           |         |           | 2483.5~2496.5    | 2490.35     | -39.08       | ≤-16        | 0.12359     | ≤25        | PASS    |
|                |           |         |           | 2496.5~13000     | 4882.37     | -43.87       | ≤-26        | 0.04102     | ≤2.5       | PASS    |
|                |           |         | 2441      | 30~1000          | 904.70      | -41.25       | ≤-26        | 0.07499     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2168.89     | -50.20       | ≤-26        | 0.00955     | ≤2.5       | PASS    |
|                |           |         |           | 2387~2400        | 2396.26     | -38.60       | ≤-16        | 0.13804     | ≤25        | PASS    |
|                |           |         |           | 2483.5~2496.5    | 2483.52     | -38.43       | ≤-16        | 0.14355     | ≤25        | PASS    |
|                |           |         |           | 2496.5~13000     | 4959.57     | -45.21       | ≤-26        | 0.03013     | ≤2.5       | PASS    |
|                |           |         | 2402      | 30~1000          | 989.09      | -51.61       | ≤-26        | 0.00690     | ≤2.5       | PASS    |
|                |           |         |           | 1000~2387        | 2371.05     | -49.79       | ≤-26        | 0.0105      | ≤2.5       | PASS    |

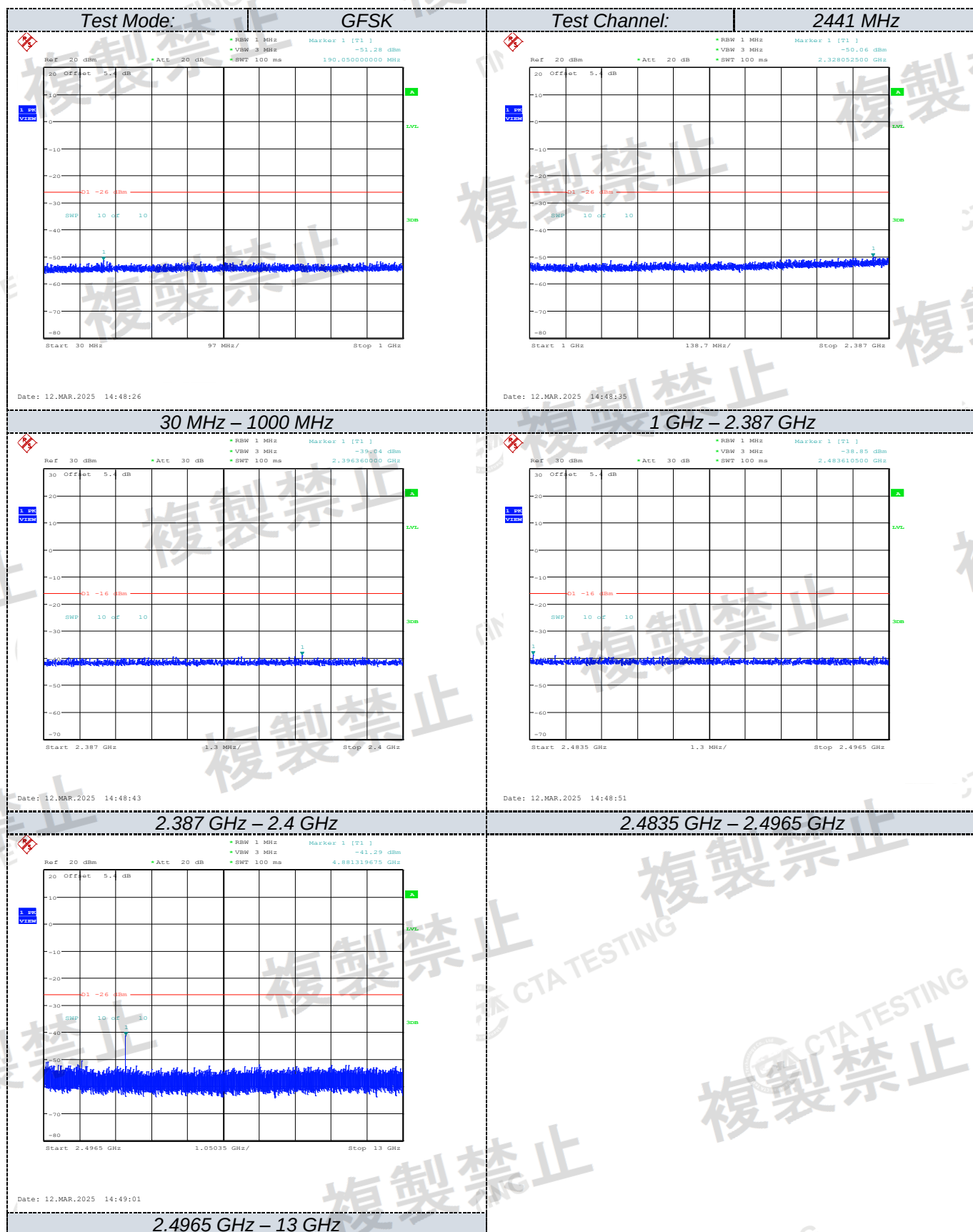
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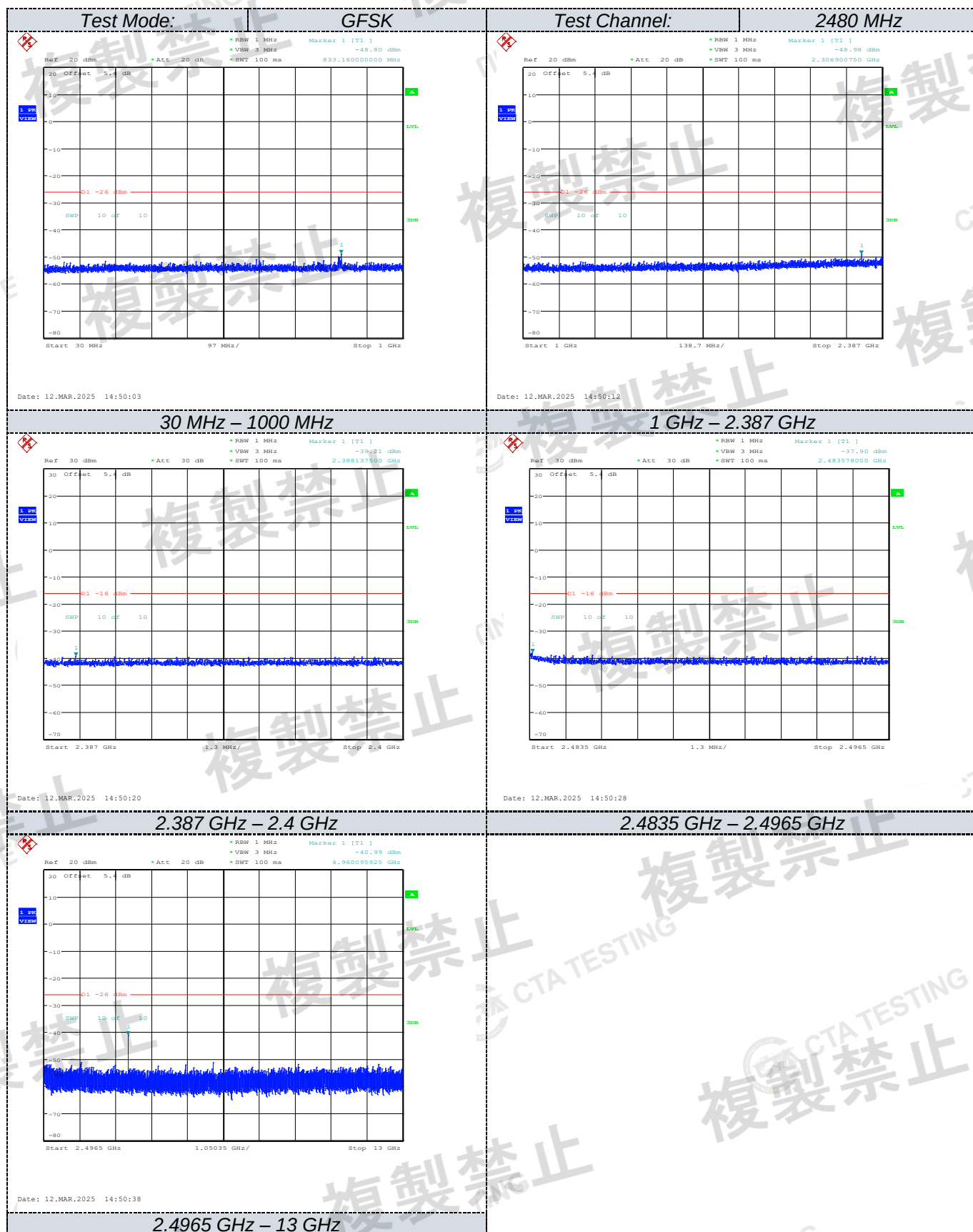
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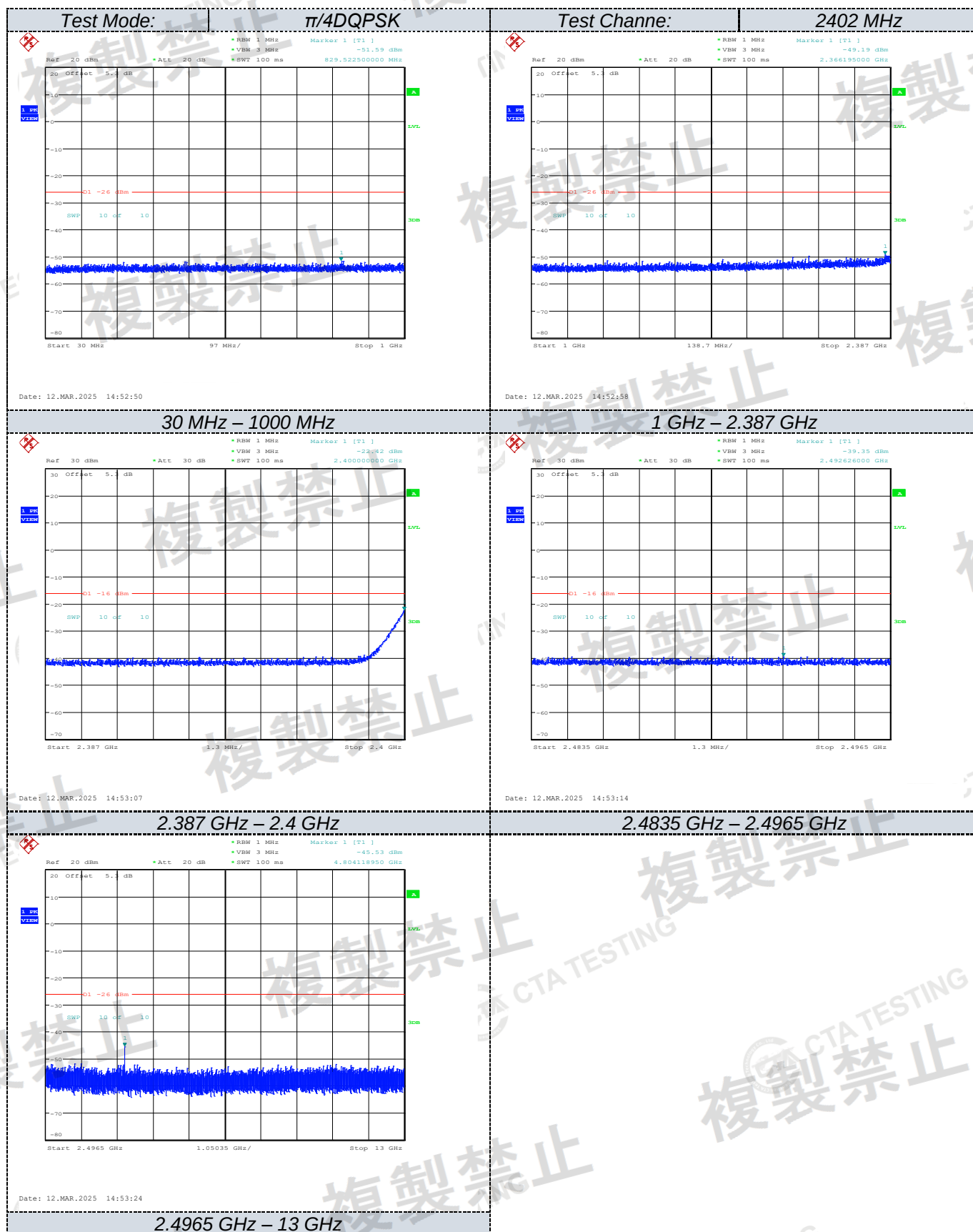
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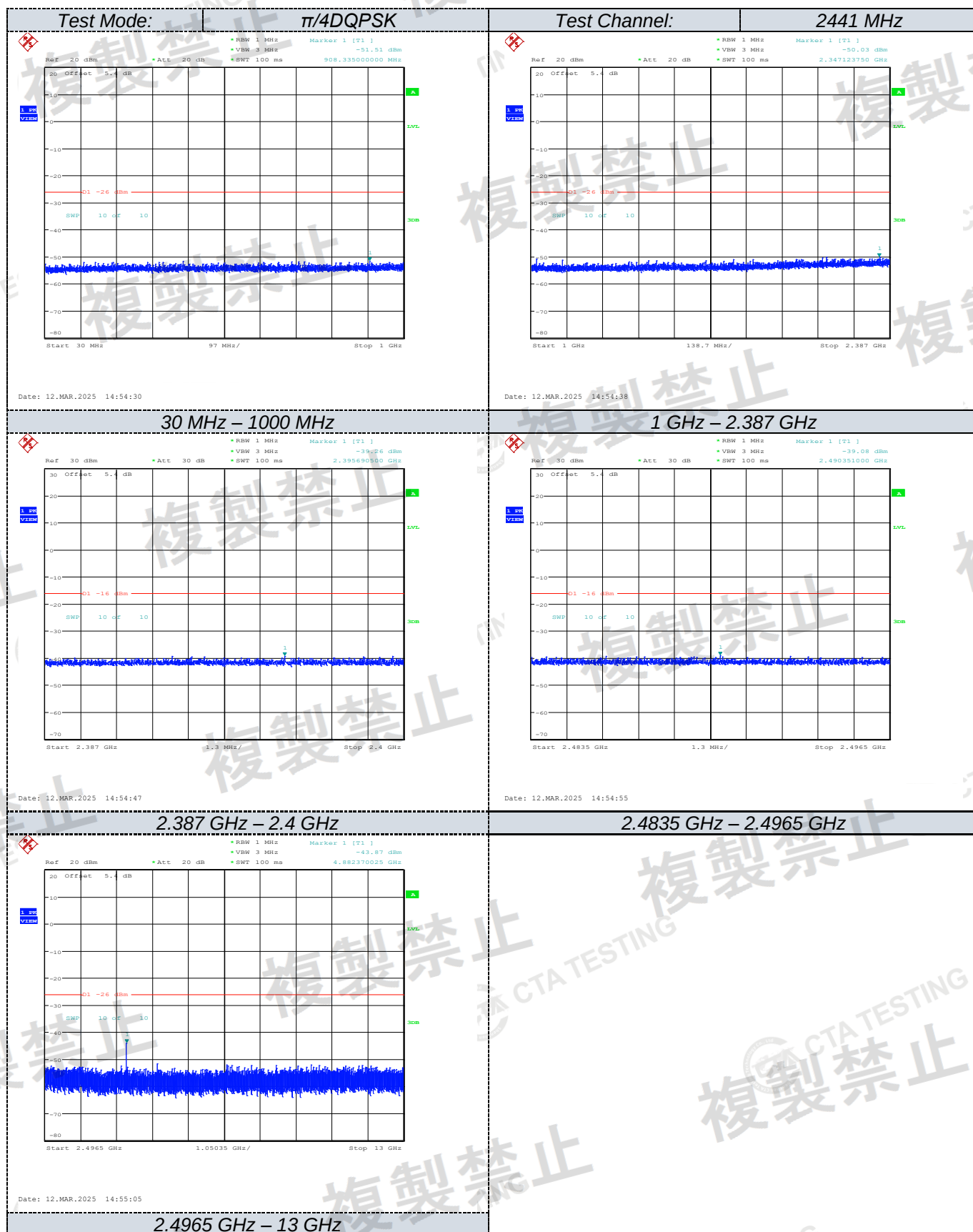
|  |  |      |               |         |        |      |             |      |      |
|--|--|------|---------------|---------|--------|------|-------------|------|------|
|  |  |      |               |         |        |      | 0           |      |      |
|  |  |      | 2387~2400     | 2399.99 | -22.67 | ≤-16 | 5.4075<br>4 | ≤25  | PASS |
|  |  |      | 2483.5~2496.5 | 2484.01 | -39.03 | ≤-16 | 0.1250<br>3 | ≤25  | PASS |
|  |  |      | 2496.5~13000  | 4804.12 | -45.09 | ≤-26 | 0.0309<br>7 | ≤2.5 | PASS |
|  |  | 2441 | 30~1000       | 912.46  | -35.01 | ≤-26 | 0.3155<br>0 | ≤2.5 | PASS |
|  |  |      | 1000~2387     | 2386.65 | -49.15 | ≤-26 | 0.0121<br>6 | ≤2.5 | PASS |
|  |  |      | 2387~2400     | 2396.37 | -39.41 | ≤-16 | 0.1145<br>5 | ≤25  | PASS |
|  |  |      | 2483.5~2496.5 | 2490.96 | -38.81 | ≤-16 | 0.1315<br>2 | ≤25  | PASS |
|  |  |      | 2496.5~13000  | 4881.84 | -44.14 | ≤-26 | 0.0385<br>5 | ≤2.5 | PASS |
|  |  | 2480 | 30~1000       | 598.91  | -50.88 | ≤-26 | 0.0081<br>7 | ≤2.5 | PASS |
|  |  |      | 1000~2387     | 2261.82 | -50.13 | ≤-26 | 0.0097<br>1 | ≤2.5 | PASS |
|  |  |      | 2387~2400     | 2393.66 | -39.52 | ≤-16 | 0.1116<br>9 | ≤25  | PASS |
|  |  |      | 2483.5~2496.5 | 2484.35 | -38.57 | ≤-16 | 0.1390<br>0 | ≤25  | PASS |
|  |  |      | 2496.5~13000  | 4960.10 | -45.25 | ≤-26 | 0.0298<br>5 | ≤2.5 | PASS |

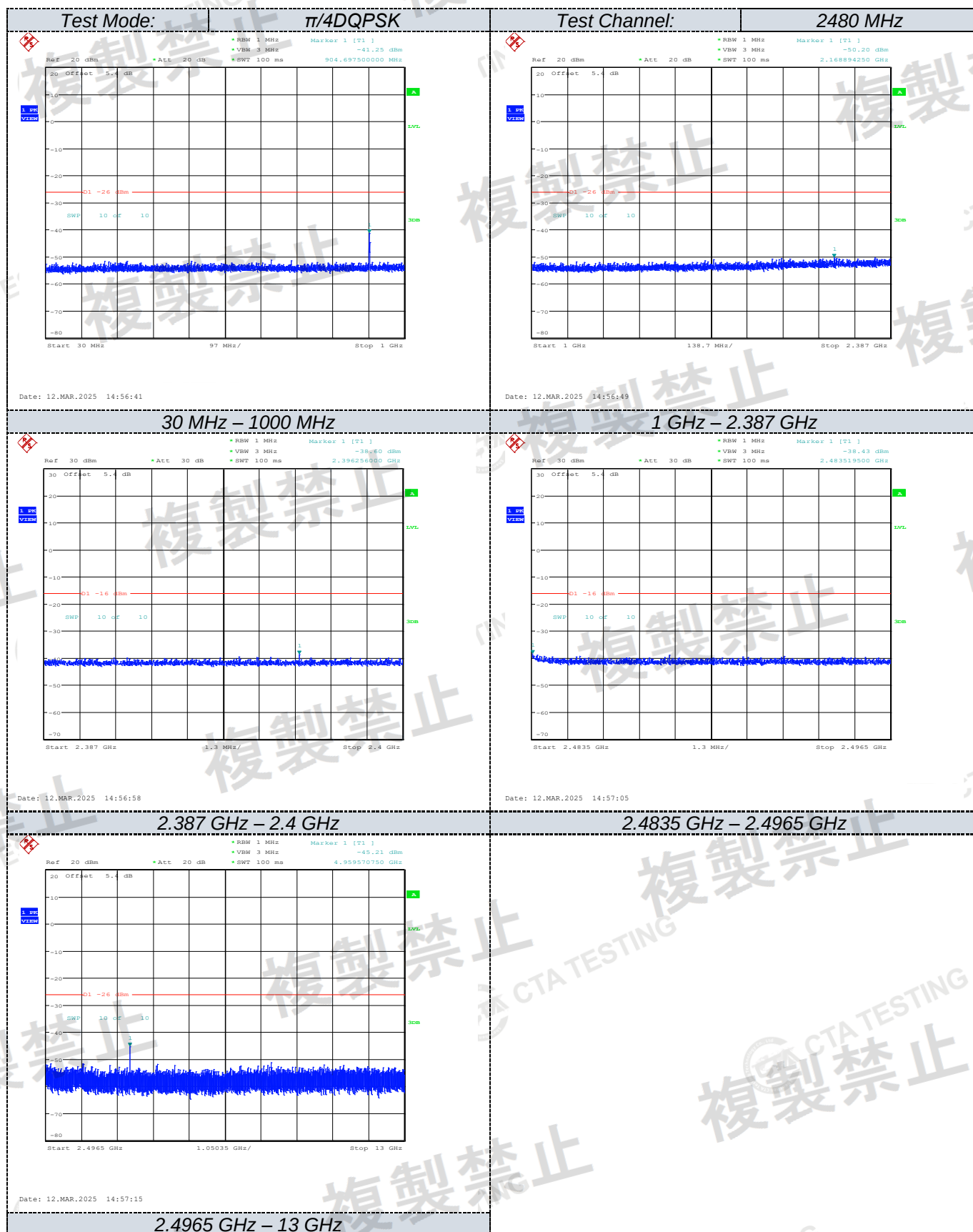


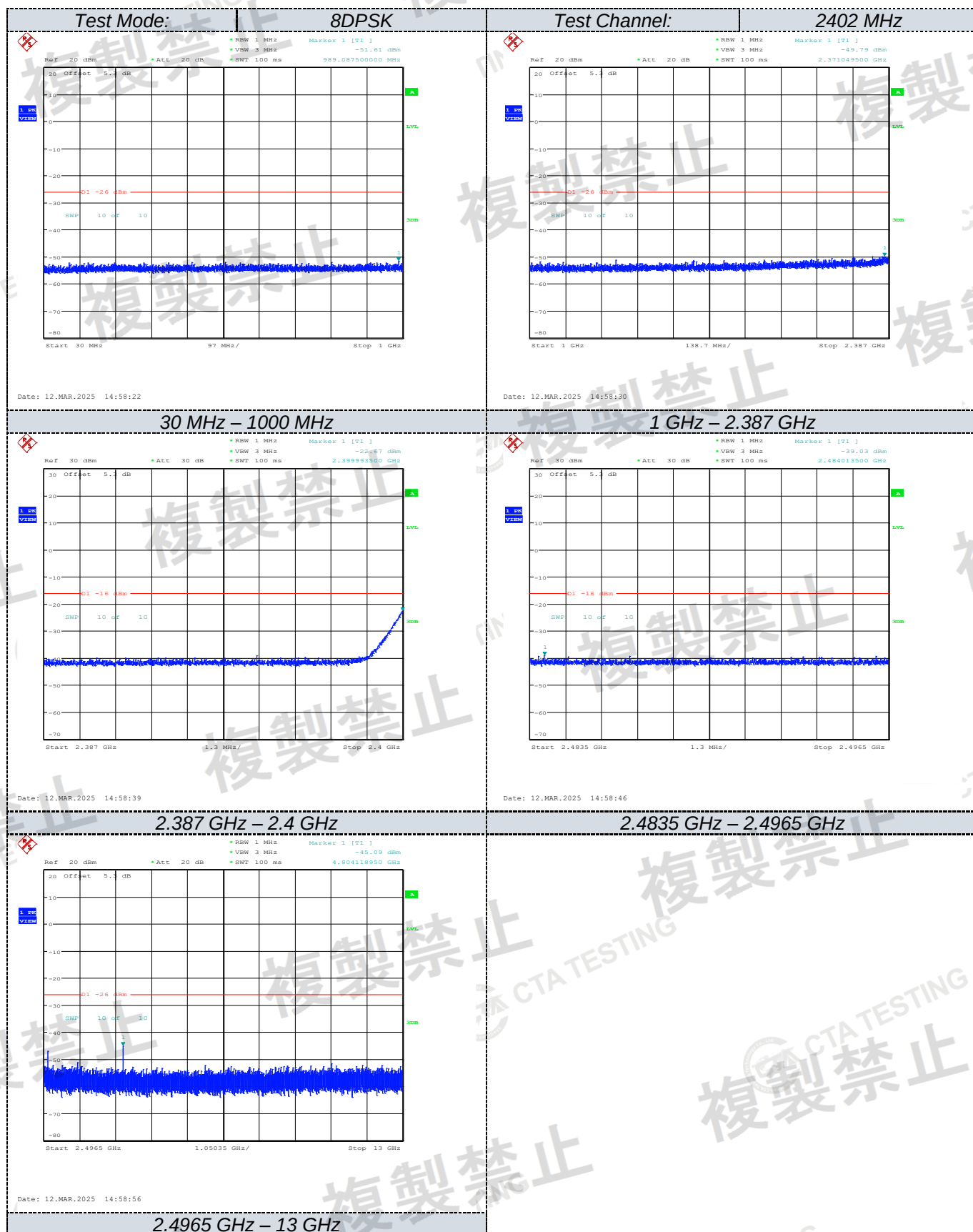


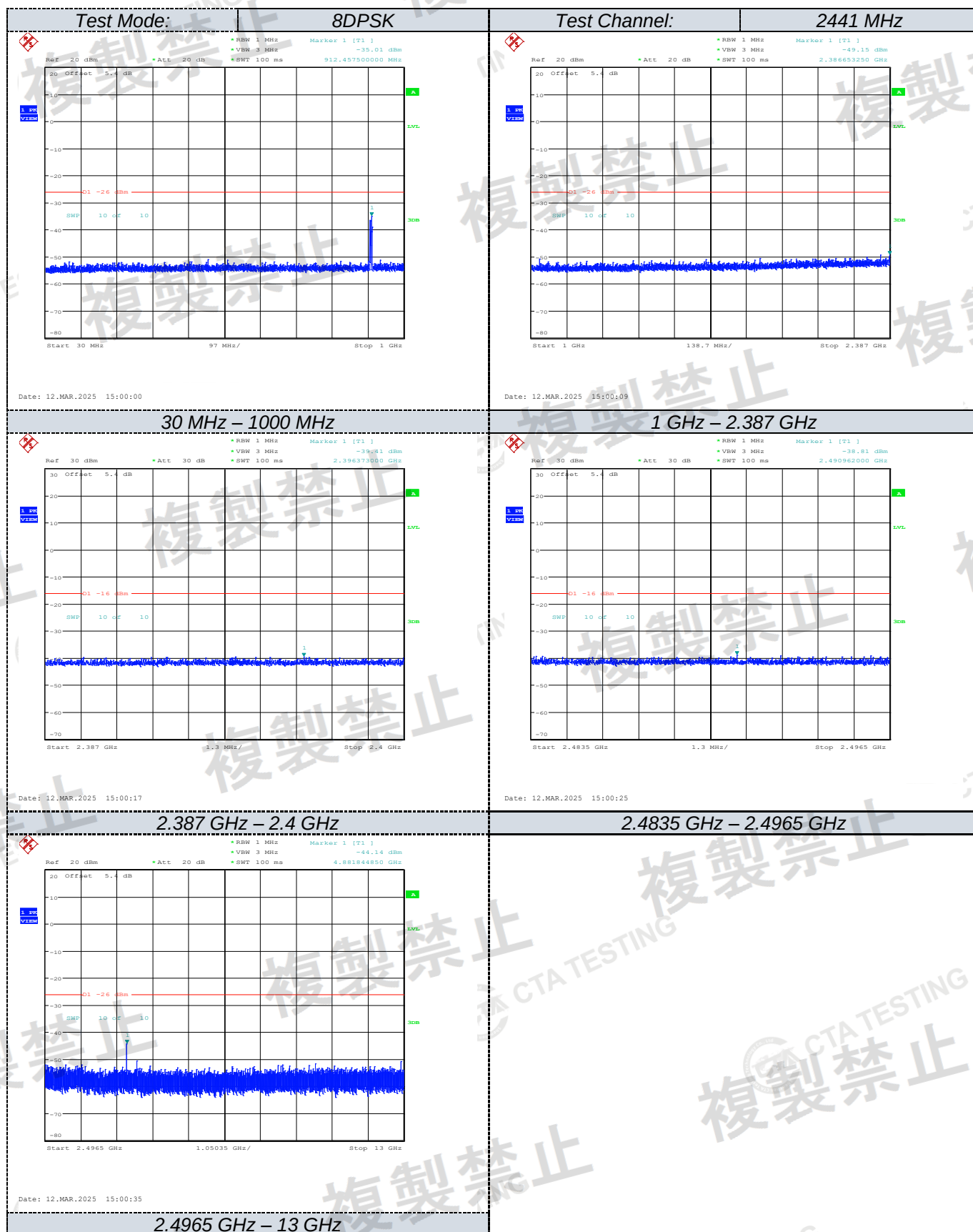


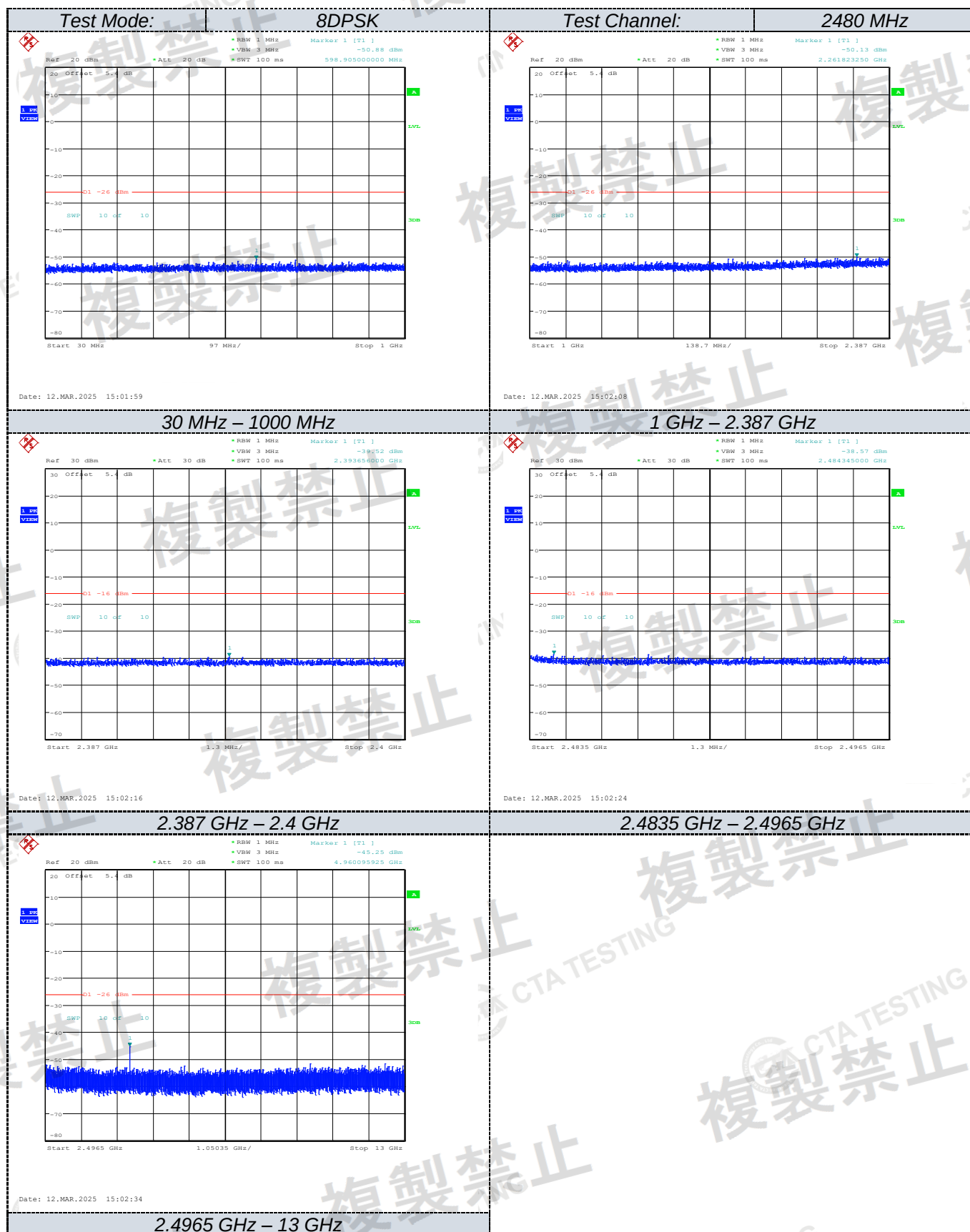










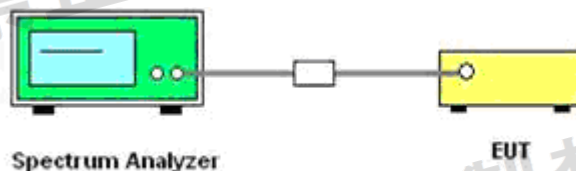


### 3.6 Secondary Radiated Emission Strength

#### 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-13GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

VBW: 300 KHz (30MHz-1GHz), 3MHz (1GHz-13GHz)

Sweep time: Auto

Detector mode: Positive peak

Indication mode: max hold

#### TEST RESULTS

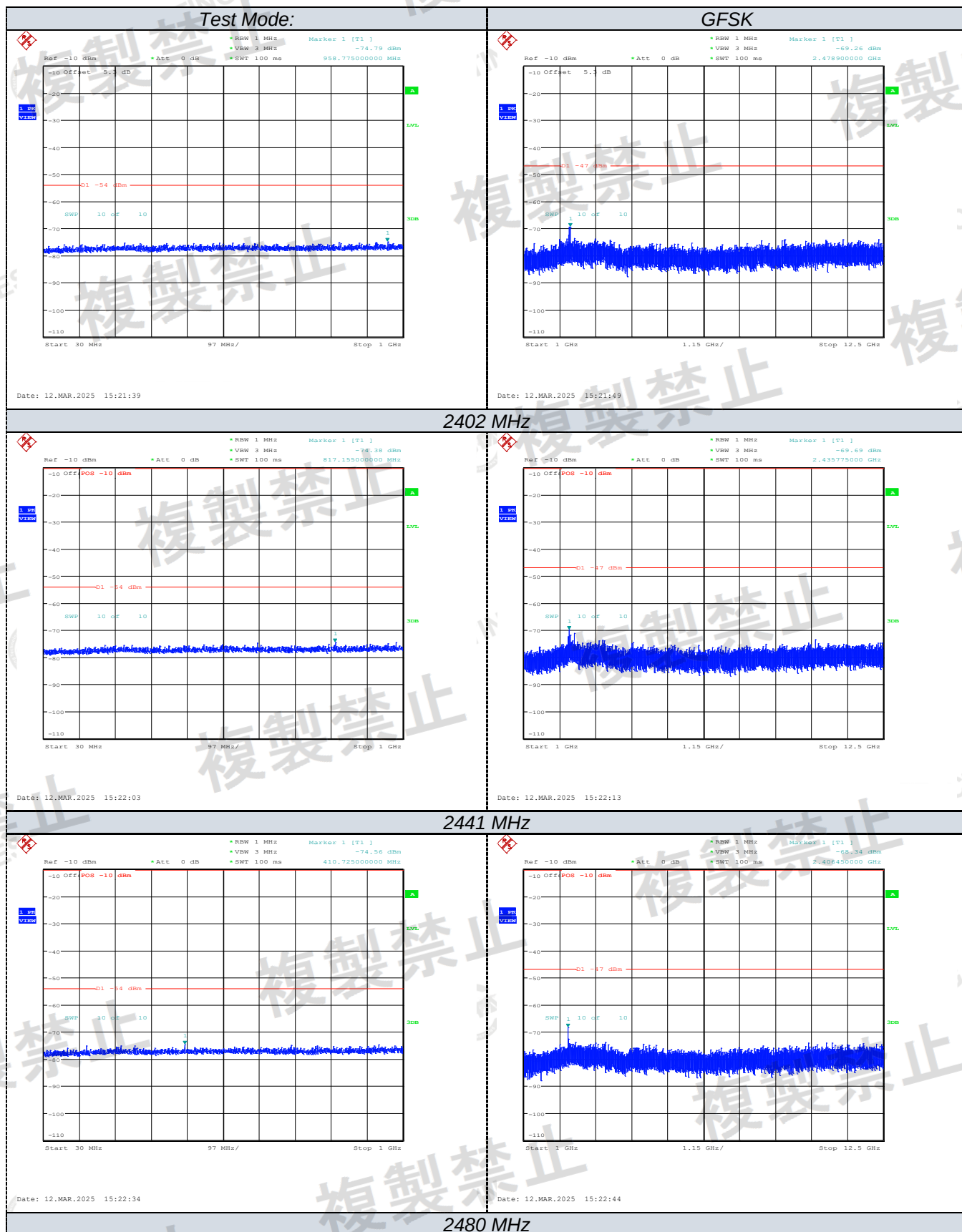
| Test Condition | Test Mode | Antenna | Freq(MHz) | Freq.Range [MHz] | Freq. [MHz] | Result [dBm] | Limit [dBm] | Result [nW] | Limit [nW] | Verdict |
|----------------|-----------|---------|-----------|------------------|-------------|--------------|-------------|-------------|------------|---------|
| NTNV           | DH5       | Ant1    | 2402      | 30~1000          | 958.78      | -74.79       | ≤-54        | 0.03319     | ≤4         | PASS    |
|                |           |         |           | 1000~12500       | 2478.90     | -69.26       | ≤-47        | 0.11858     | ≤20        | PASS    |
|                |           |         | 2441      | 30~1000          | 817.16      | -74.38       | ≤-54        | 0.03648     | ≤4         | PASS    |
|                |           |         |           | 1000~12500       | 2435.78     | -69.69       | ≤-47        | 0.10740     | ≤20        | PASS    |
|                |           |         | 2480      | 30~1000          | 410.73      | -74.56       | ≤-54        | 0.03499     | ≤4         | PASS    |
|                |           |         |           | 1000~12500       | 2406.45     | -68.34       | ≤-47        | 0.14655     | ≤20        | PASS    |
|                | 2DH5      | Ant1    | 2402      | 30~1000          | 550.41      | -74.31       | ≤-54        | 0.03707     | ≤4         | PASS    |
|                |           |         |           | 1000~12500       | 2454.18     | -61.70       | ≤-47        | 0.67608     | ≤20        | PASS    |
|                |           |         | 2441      | 30~1000          | 983.51      | -73.90       | ≤-54        | 0.04074     | ≤4         | PASS    |
|                |           |         |           | 1000~12500       | 3165.45     | -73.65       | ≤-47        | 0.04315     | ≤20        | PASS    |
|                |           |         | 2480      | 30~1000          | 731.80      | -74.79       | ≤-54        | 0.03319     | ≤4         | PASS    |
|                |           |         |           | 1000~12500       | 2444.98     | -70.55       | ≤-47        | 0.08810     | ≤20        | PASS    |
|                | 3DH5      | Ant1    | 2402      | 30~1000          | 944.23      | -74.88       | ≤-54        | 0.03251     | ≤4         | PASS    |

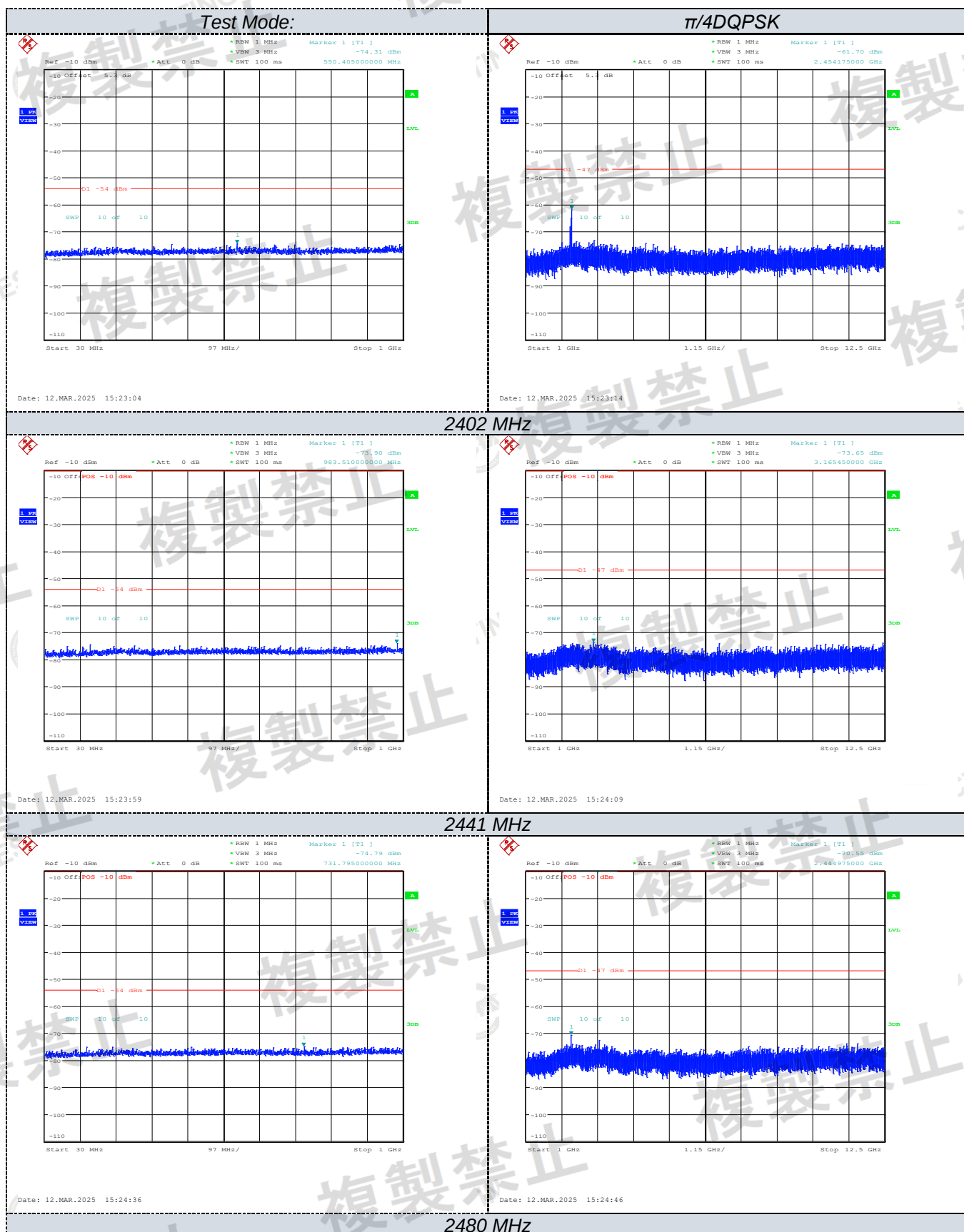
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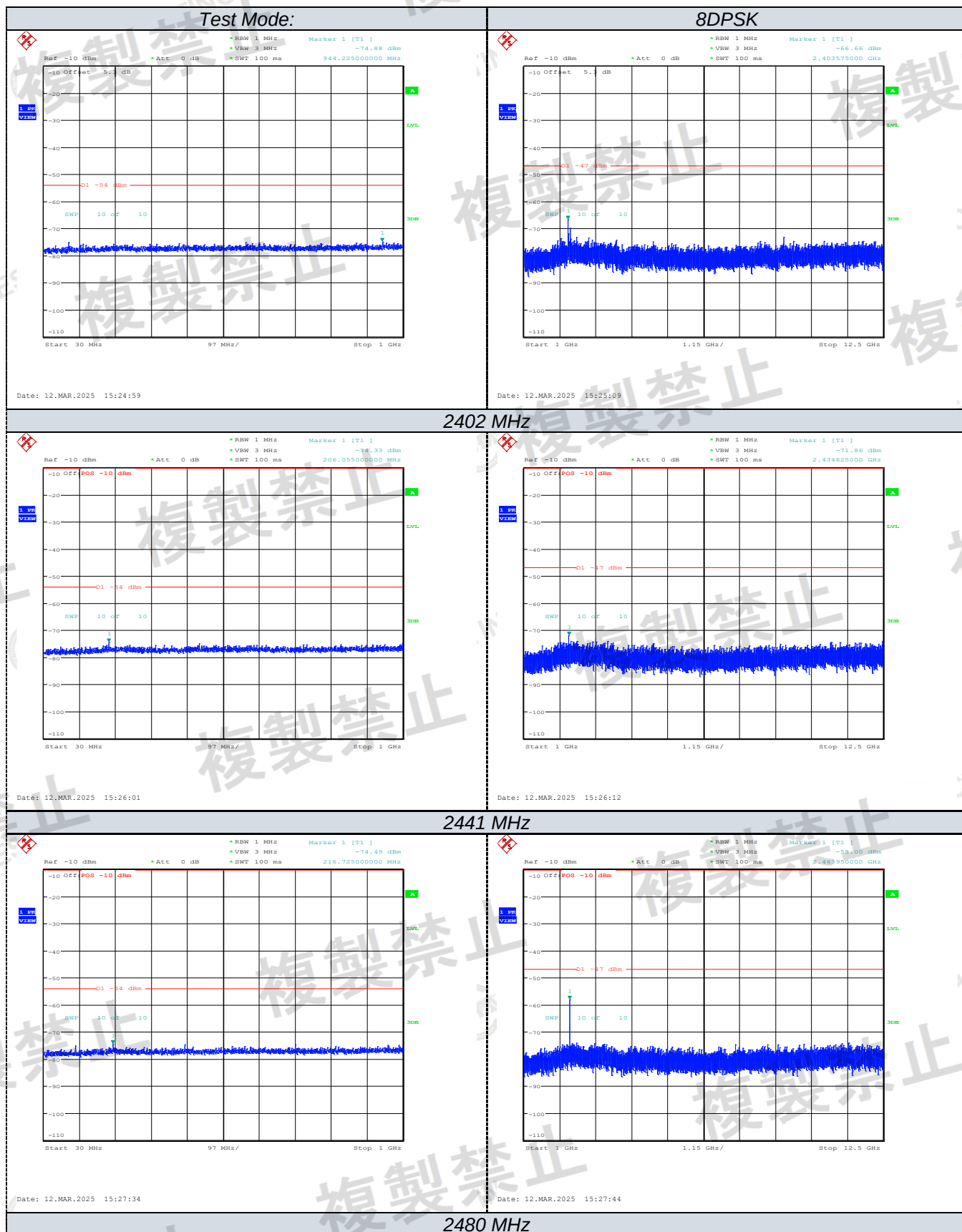
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|  |  |      |            |             |        |      |             |     |      |
|--|--|------|------------|-------------|--------|------|-------------|-----|------|
|  |  |      | 1000~12500 | 2403.5<br>8 | -66.66 | ≤-47 | 0.2157<br>7 | ≤20 | PASS |
|  |  | 2441 | 30~1000    | 206.06      | -74.33 | ≤-54 | 0.0369<br>0 | ≤4  | PASS |
|  |  |      | 1000~12500 | 2434.6<br>3 | -71.86 | ≤-47 | 0.0651<br>6 | ≤20 | PASS |
|  |  | 2480 | 30~1000    | 216.73      | -74.49 | ≤-54 | 0.0355<br>6 | ≤4  | PASS |
|  |  |      | 1000~12500 | 2463.9<br>5 | -58.00 | ≤-47 | 1.5848<br>9 | ≤20 | PASS |







### 3.7 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.)



### 3.8 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 | $\geq 48$ bits |

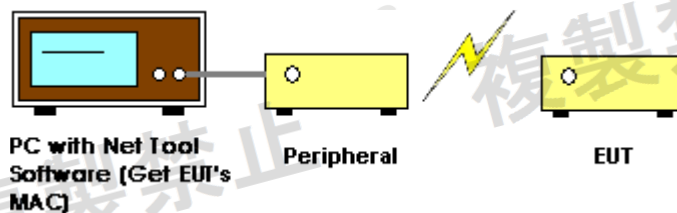
#### CONFIRMATION METHOD

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

#### TEST PROCEDURE

- 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.
- 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: A3: D6: 4E: B2: 1C: E5

### 3.9 Carrier Sensing Function

#### LIMIT

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

#### INSTRUMENTS SETTING

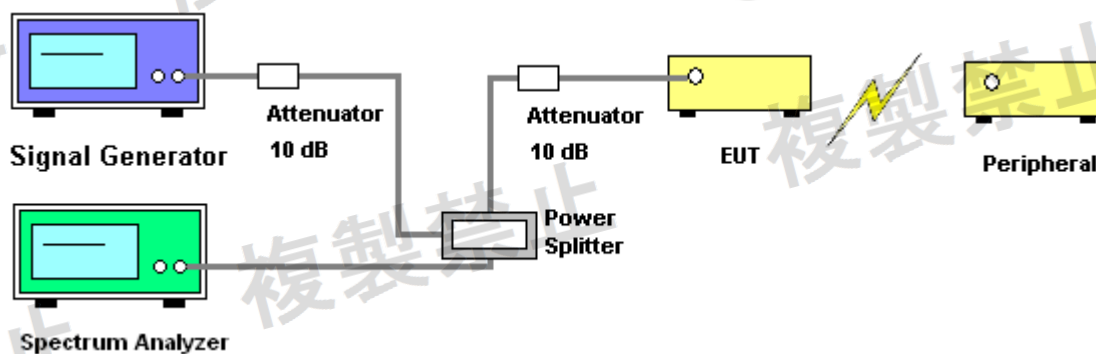
The following table is the setting of spectrum analyser and receiver.

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

#### TEST PROCEDURE

1. 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.
2. EUT have transmitted the maximum modulation signal and fixed channelize.
3. 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.
4. SSG RF Signal On.
5. EUT shall be stop the transmitted any signal and SSG RF Signal Off. Then EUT will be continuous transmitted signal.

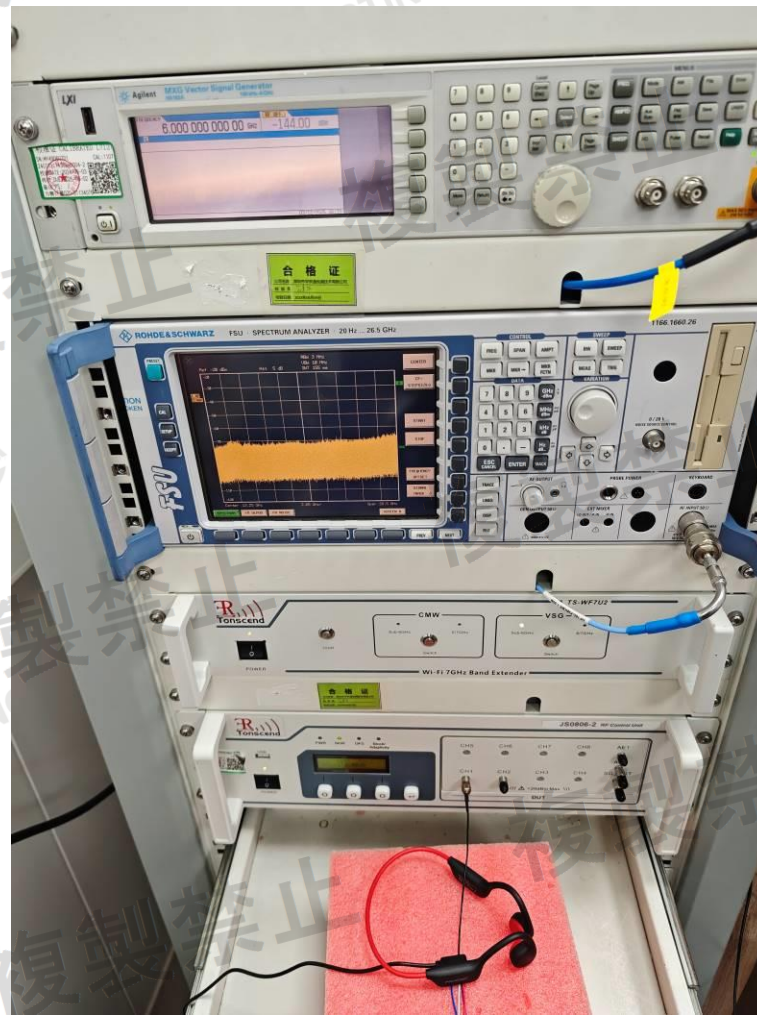
#### TEST CONFIGURATION



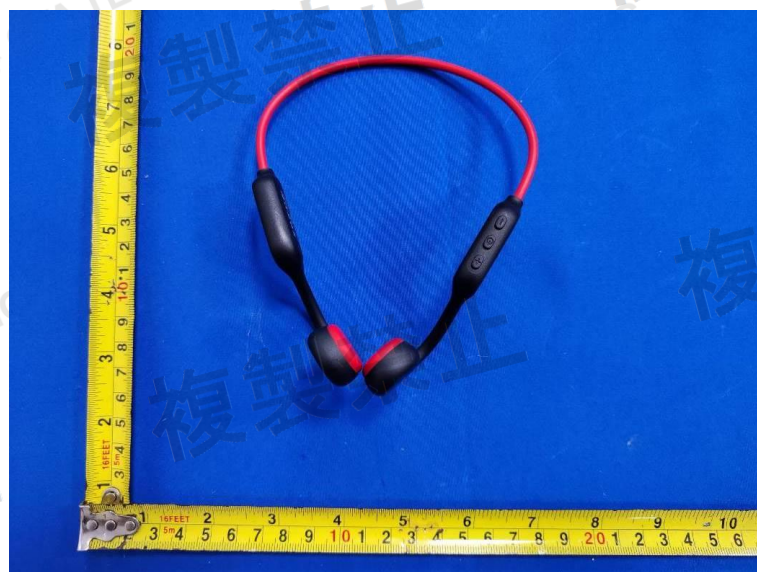
#### TEST RESULTS

Not Applicable.

#### 4 Test Setup Photos of the EUT



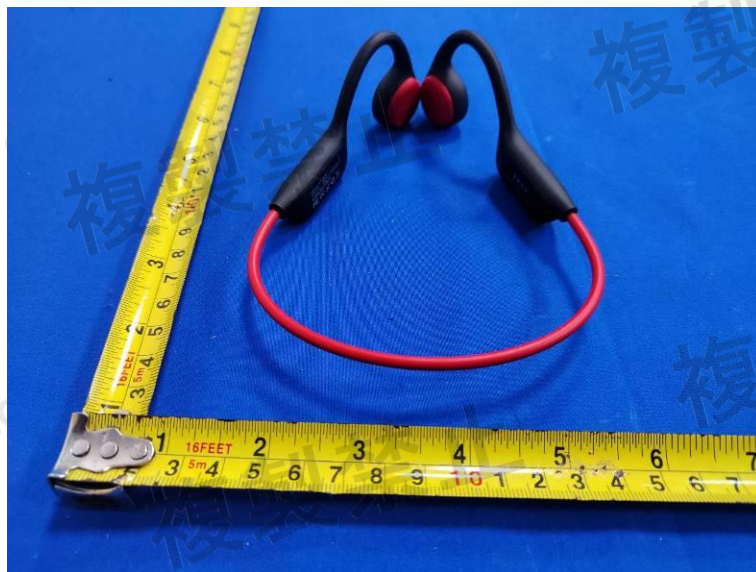
## 5 Photos of the EUT



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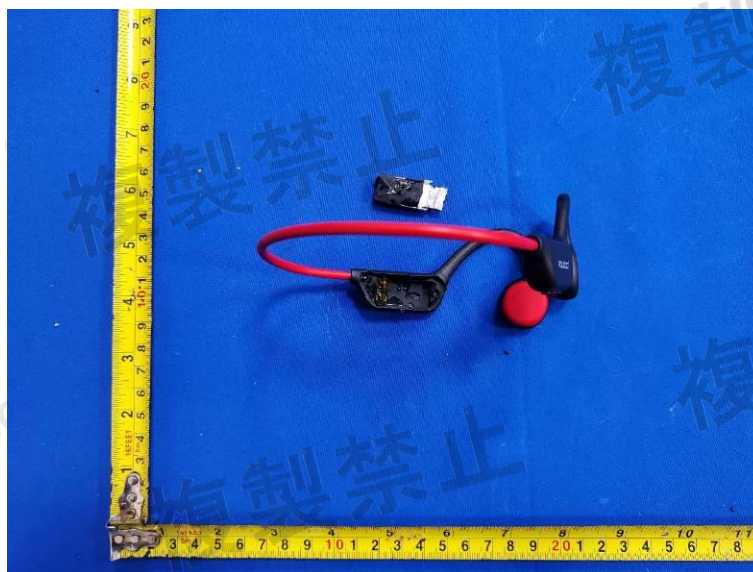
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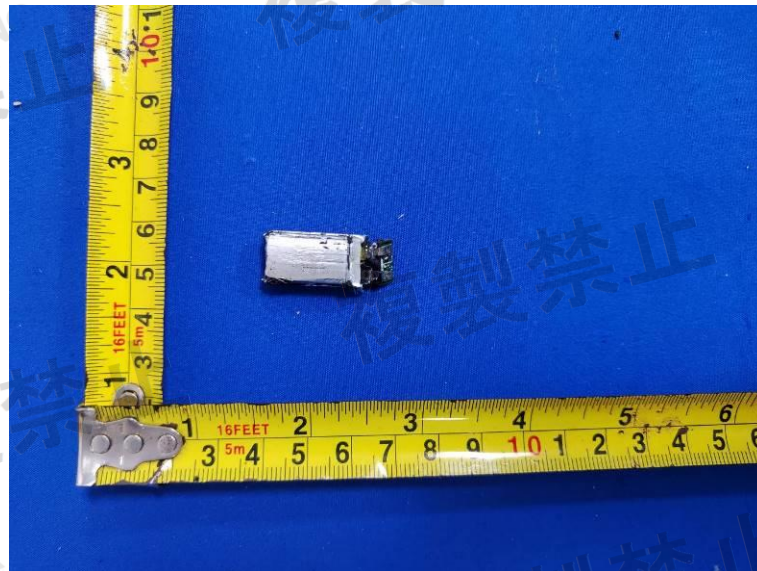
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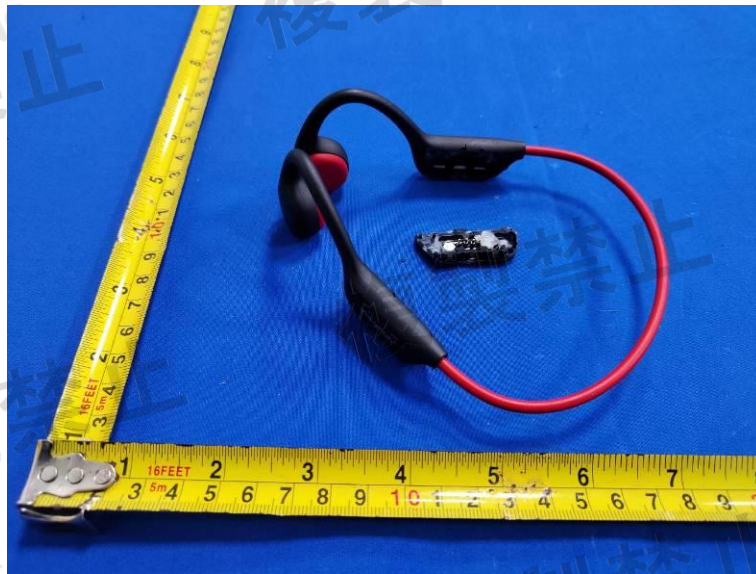
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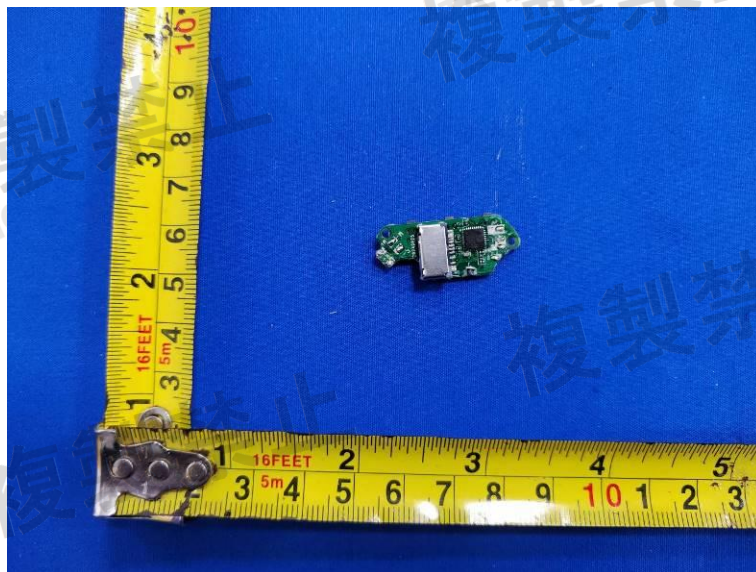
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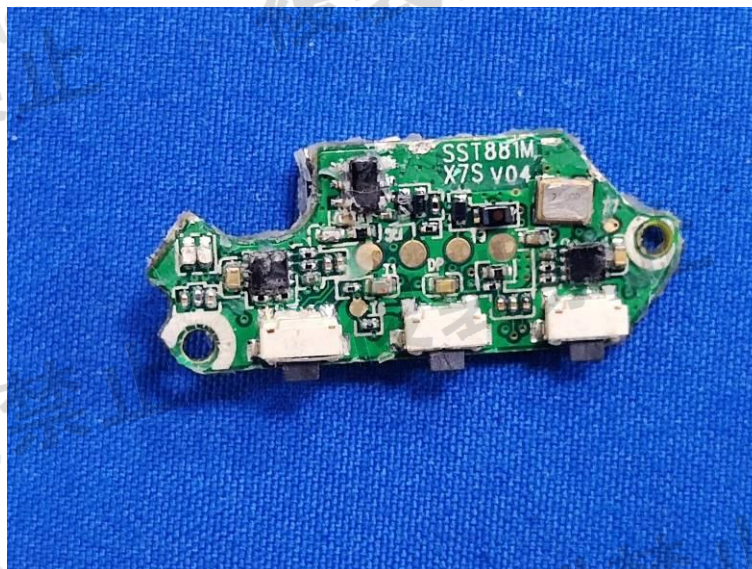
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\*\*\*\*\* End of Report \*\*\*\*\*