

## ARIB STD-T66 TEST REPORT

### FOR

Applicant	:	70mai Co.,Ltd.
Address	:	Room 2220, building 2, No. 588, Zixing road, MinHang District, Shanghai.CHINA
Equipment under Test	:	Smart Band
Model No.	:	M2101B1
Trade Mark	:	Xiaomi
Manufacturer	:	70mai Co.,Ltd.
Address	:	Room 2220, building 2, No. 588, Zixing road, MinHang District, Shanghai.CHINA

**Issued By: Dongguan Dongdian Testing Service Co., Ltd.**

**Add:** No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan  
City, Guangdong Province, China, 523808

**Tel:** +86-0769-38826678, **E-mail:** ddt@dgddt.com, <http://www.dgddt.com>

# REPORT

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## TEST REPORT DECLARE

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**Test Standard Used:** ARIB STD-T66 Version 3.7/2014-10, Second-Generation Low-Power Data Communication System/wireless LAN System, Article 2 Paragraph 1 Item (19).

**We Declare:**

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standard specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above ARIB standard.**

Report No.:	DDT-R21041204-1E1		
Date of Receipt:	Apr. 12, 2021	Date of Test:	Apr. 12, 2021 ~ May 12, 2021

**Prepared By:**

Sam Li

**Sam Li/Engineer****Approved By:**

Damon Hu

**Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

## Revision history

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	May 12, 2021	

## 1. Summary of test results

CLAUSE (ARIB STD-T66)	TEST PARAMETER	RESULTS
3.2 (2)	Antenna Power	PASS
3.2 (3)	Tolerances for Antenna Power	PASS
3.2 (4)	Frequency Tolerance	PASS
3.2 (5)	Transmission Rate	N/A
3.2 (7)	Occupied Frequency Bandwidth	PASS
3.2 (8)	Spread Bandwidth	N/A
3.2 (9)	Spreading Factor	N/A
3.2 (10)	Number of Carriers	N/A
3.2 (11)	Dwell Time	N/A
3.2 (6)	Spurious Emissions	PASS
---	Carrier Sense	N/A
3.6	Process Gain	N/A
3.3 (1)	Secondary Radiated Emissions	PASS
N/A is an abbreviation for Not Applicable.		

## 2. General test information

### 2.1. Description of EUT

EUT* Name	: Smart Band
Model Number	: M2101B1
EUT function description	: Please reference user manual of this device
Power supply	: DC 3.87V by Polymer Li-ion built-in battery
Radio Specification	: Bluetooth V5.0
Operation frequency	: 2402MHz-2480MHz
Modulation	: GFSK
Data rate	: 1Mbps
Antenna Type	: LDS antenna, maximum PK gain: -0.7 dBi
Sample Number	: N/A

Note: EUT is the ab. of equipment under test.

### 2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Serial No.	Other
USB Cable	N/A	N/A	Length 0.5m, Unshielded	N/A

### 2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	Lenovo Beijing Co. Ltd.	ThinkPad	FCC/CE	TP00015A

### 2.4. Block diagram of EUT configuration for test



The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

Test software: SSCOM.EXE

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK Tx mode	CH Low	2402
	CH Middle	2440
	CH High	2480
GFSK Rx mode	CH Low	2402
	CH Middle	2440
	CH High	2480

## 2.5. Test environment conditions

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

	Normal Conditions
Temperature range	23.5℃
Humidity range	44%
Pressure range	101.4kPa
Power supply	DC 3.87V (When the input voltage to equipment fluctuated $\pm 10\%$ , the RF unit circuit voltage fluctuation under 1%, therefore all test performed on the rated voltage for equipment.)

The measurement result of the voltage fluctuation at RF circuit when DC 3.87V $\pm 10\%$ .	
Input voltage	RF module voltage
DC 4.26V	DC 3.30V
DC 3.87V	DC 3.30V
DC 3.48V	DC 3.30V

## 2.6. Deviations of test standard

No Deviation.

## 2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

## 2.8. Measurement uncertainty

Test Item	Uncertainty
Occupied Channel Bandwidth	±1%
Uncertainty for radio frequency	$1 \times 10^{-9}$
RF Output power, conducted	±0.6dB
Power Spectral Density, Conducted	±1.2dB
Unwanted Emissions, Conducted	±0.6dB
Temperature	±0.2℃
Humidity	±1%
DC and Low frequency voltage	±0.5%
Time	±1%
Duty Cycle	±1%

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

## 3. Equipment used during test

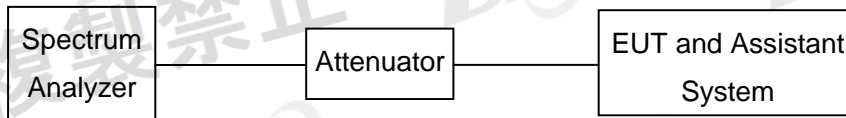
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Calibration body
<b>RF Connected Test (Tonscend RF Measurement System)</b>						
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year	CEPREI
Power Sensor	Agilent	U2021XA	MY55150010	Jul. 01, 2020	1 Year	CEPREI
Power Sensor	Agilent	U2021XA	MY55150011	Jul. 01, 2020	1 Year	CEPREI
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Jul. 01, 2020	1 Year	CEPREI
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year	CEPREI
MULTIMETER	FLUKE	179	11400838	Jul. 01, 2020	1 Year	CEPREI
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A	CEPREI
Remark: Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).						

## 4. Antenna Power

### 4.1. Limit

Limit	10mW (10dBm)
Tolerance	+20%, -80%

### 4.2. Block diagram of test setup



### 4.3. Test Procedure

- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 2MHz.

Video BW: 2MHz.

Span: 5MHz.

Detector: Peak.

Trace Mode: Max Hold.

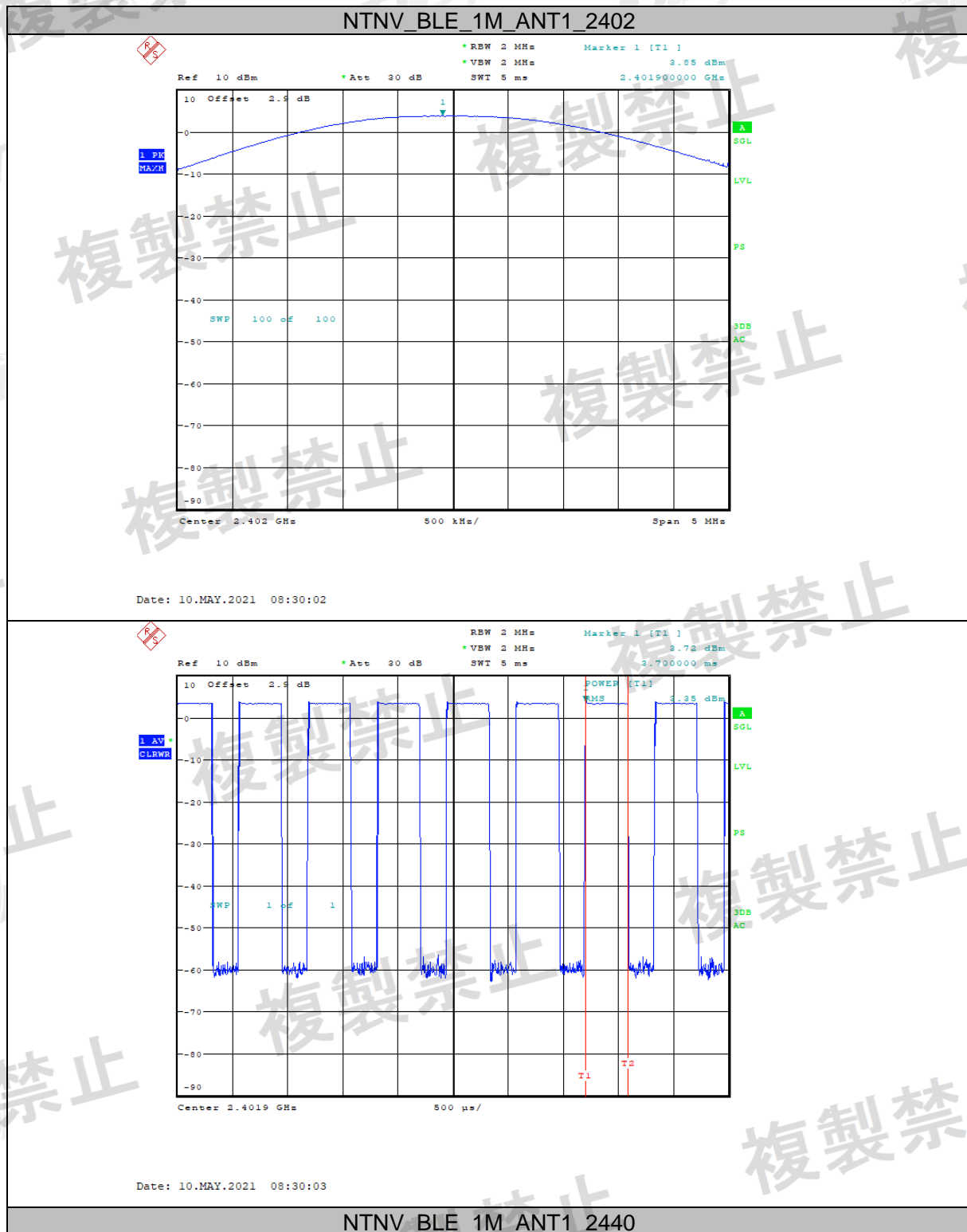
- (2) When the trace is complete, search the frequency of peak power

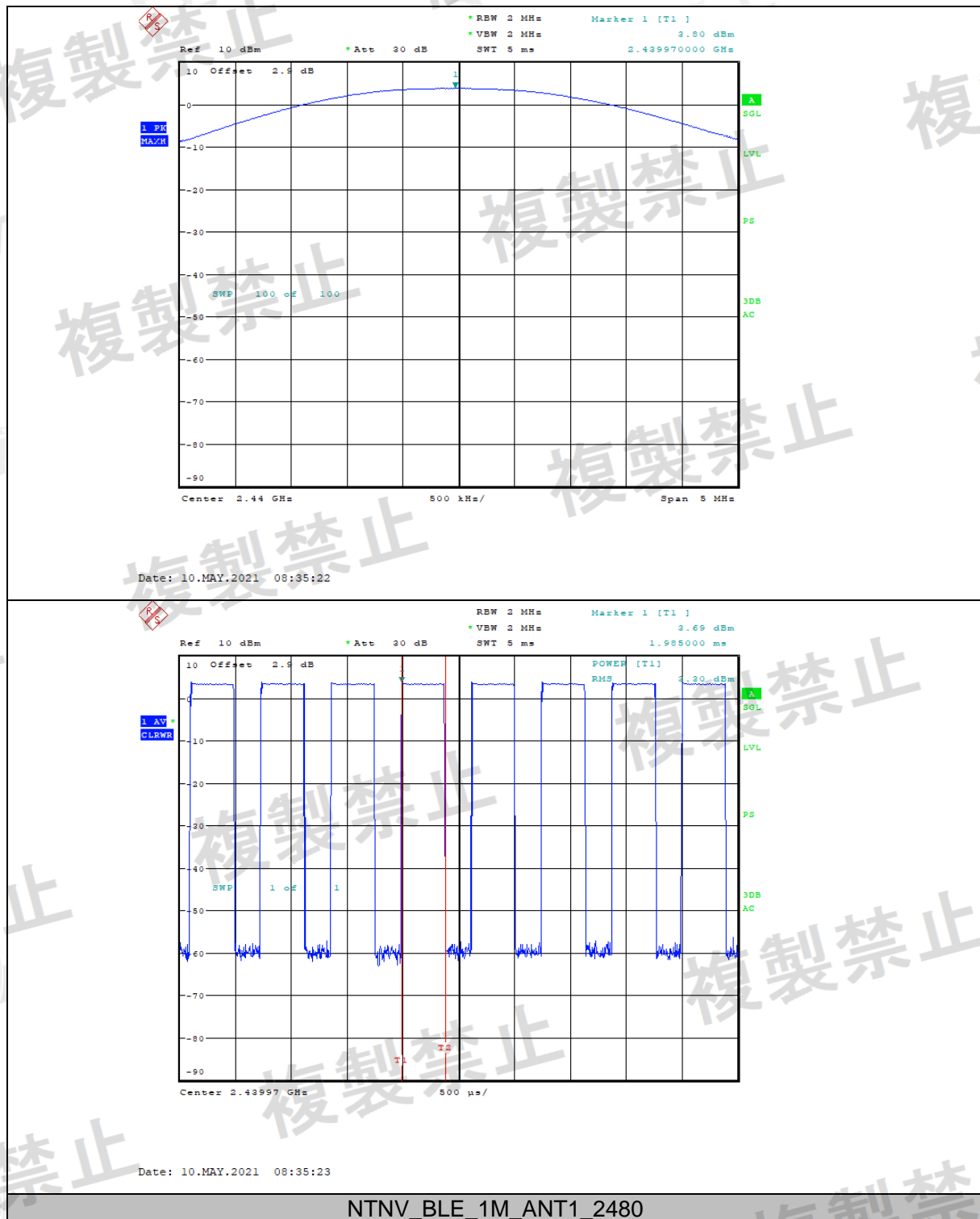
Note: The cable loss and attenuator loss have been put into spectrum analyzer as amplitude offset.

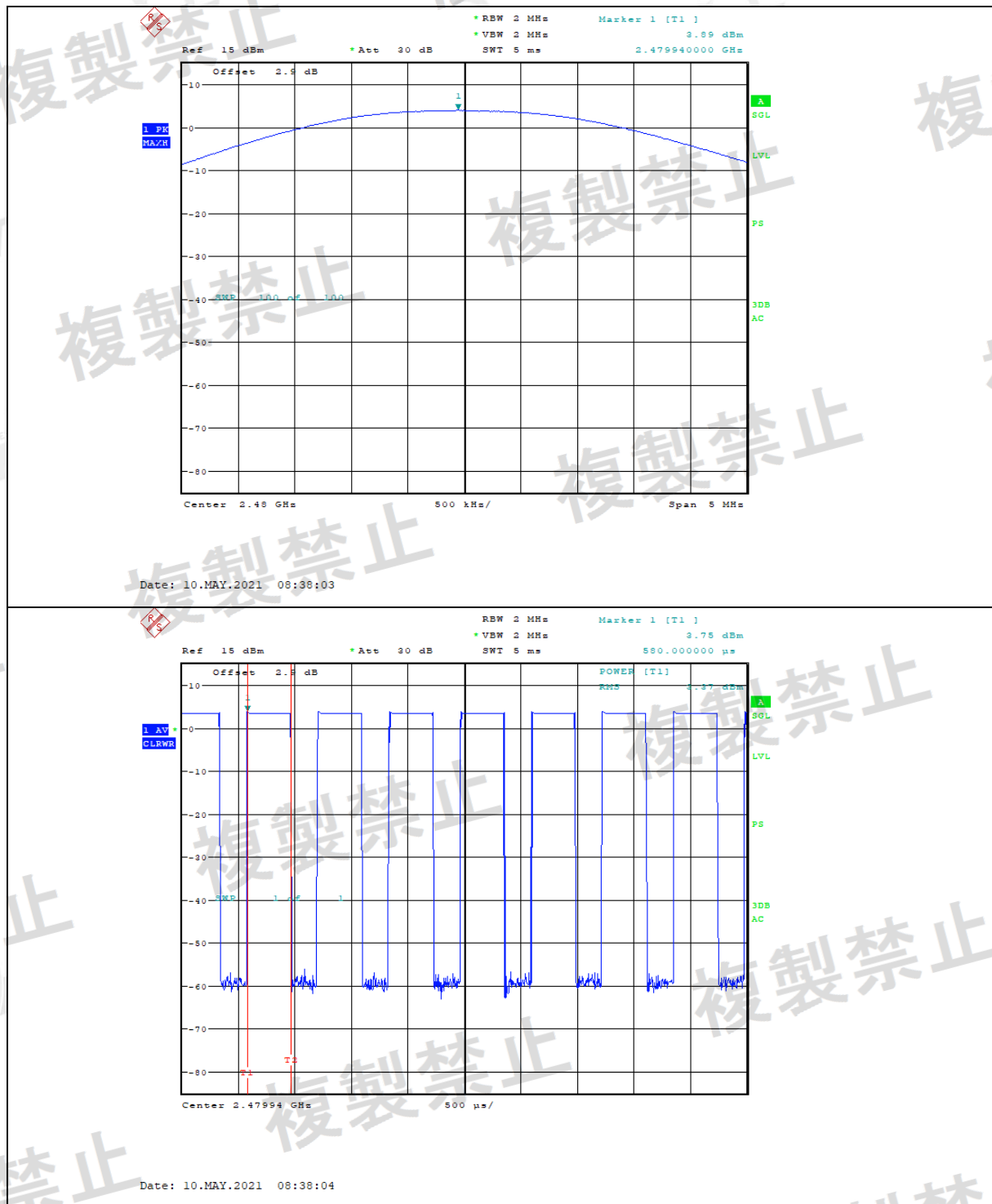
### 4.4. Test result

Mode	Antenna	Frequency MHz	Measured		Tolerances %	Stated power (mW)	Limit mW
			dBm	mW			
GFSK Tx mode	Ant1	2402	3.35	2.17	8.50	2	10
	Ant1	2440	3.30	2.14	7.00	2	10
	Ant1	2480	3.37	2.17	8.50	2	10
Tolerances for Antenna Power Limit: +20%, -80%							
<b>Conclusion: PASS</b>							

## 4.5. Original test data





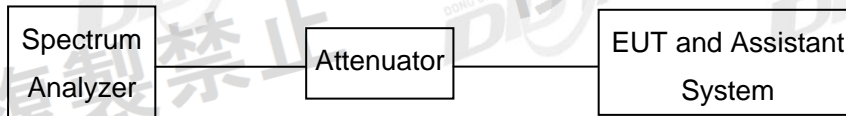


## 5. Frequency Tolerance

### 5.1. Limit

$\pm 50 \times 10^{-6}$  or less (50ppm)

### 5.2. Block diagram of test setup



### 5.3. Test Procedure

- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 10 kHz.

Video BW: 10 kHz.

Span: 1 MHz

Detector: Peak.

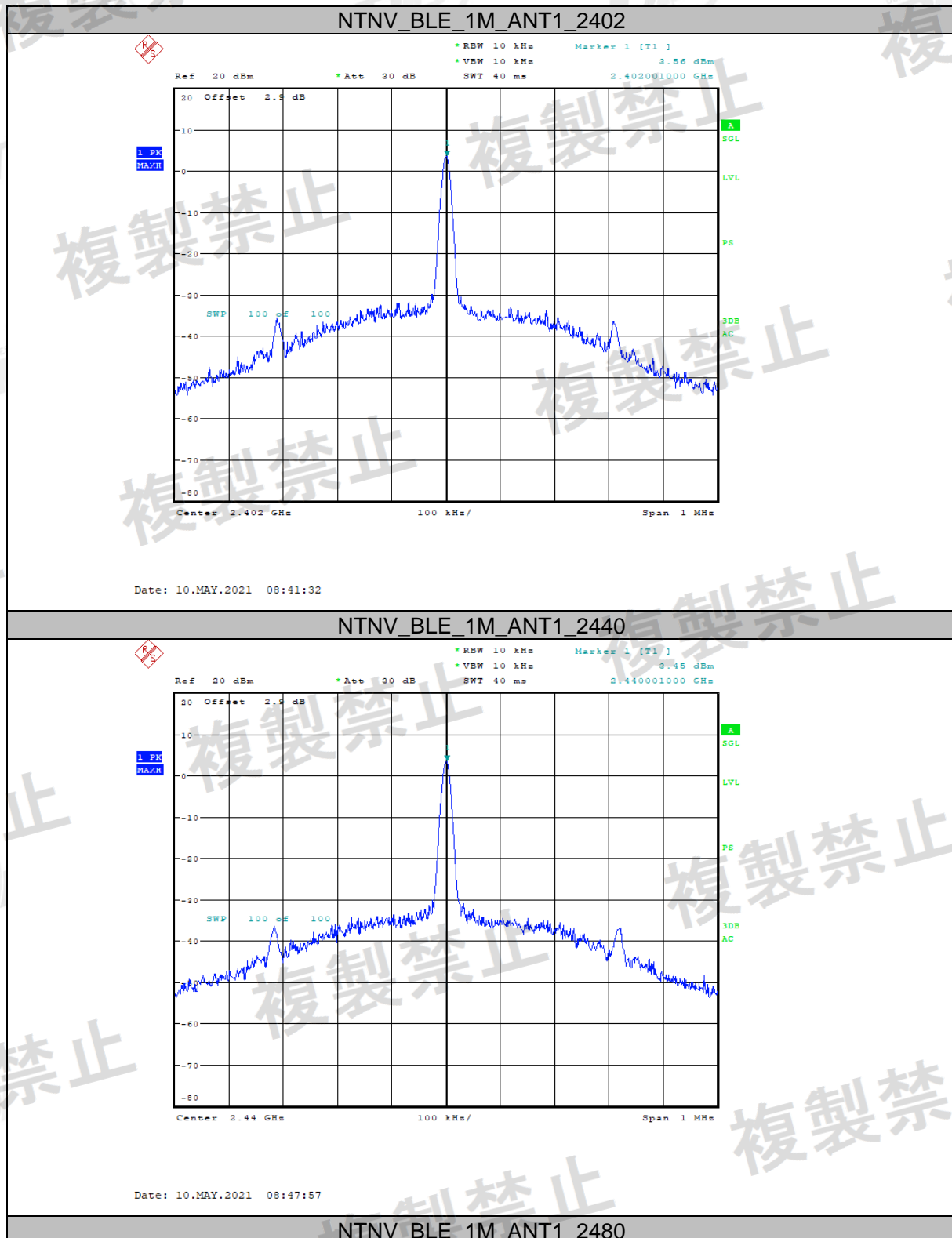
Trace Mode: Max Hold.

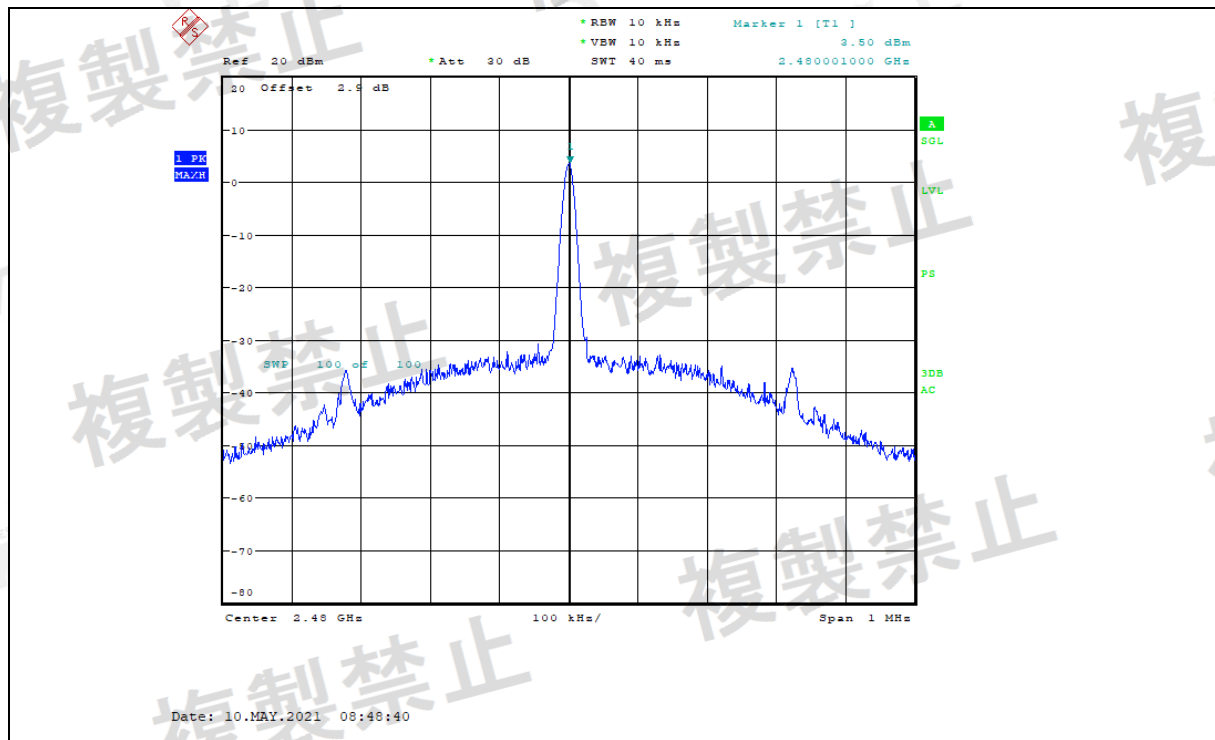
- (2) When the trace is complete, find the peak value of the power envelope and record the frequency.

### 5.4. Test result

Mode	Frequency MHz	Result			Limit
		Measured (MHz)	Tolerance (Hz)	Tolerance (ppm)	
Carrier Tx mode	2402	2402.001	1000	+0.42	$\pm 50$
	2440	2440.001	1000	+0.41	$\pm 50$
	2480	2480.001	1000	+0.40	$\pm 50$
<b>Conclusion: PASS</b>					

## 5.5. Original test data



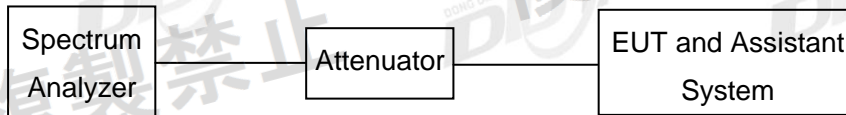


## 6. Occupied Frequency Bandwidth

### 6.1. Limit

26MHz or less

### 6.2. Block diagram of test setup



### 6.3. Test Procedure

- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 30 kHz

Video BW: 30 kHz

Span: 3MHz

Detector: Peak.

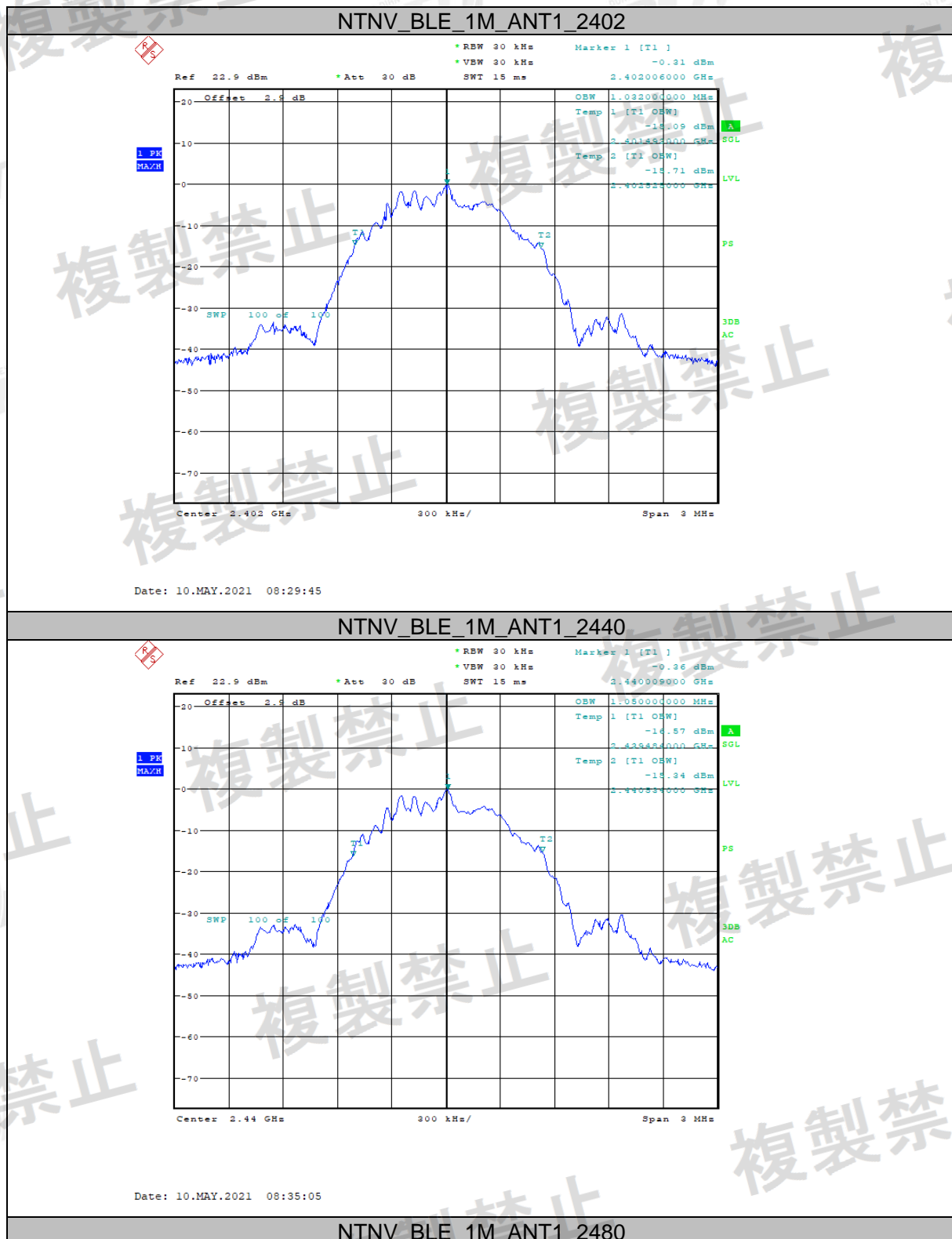
Trace Mode: Max Hold.

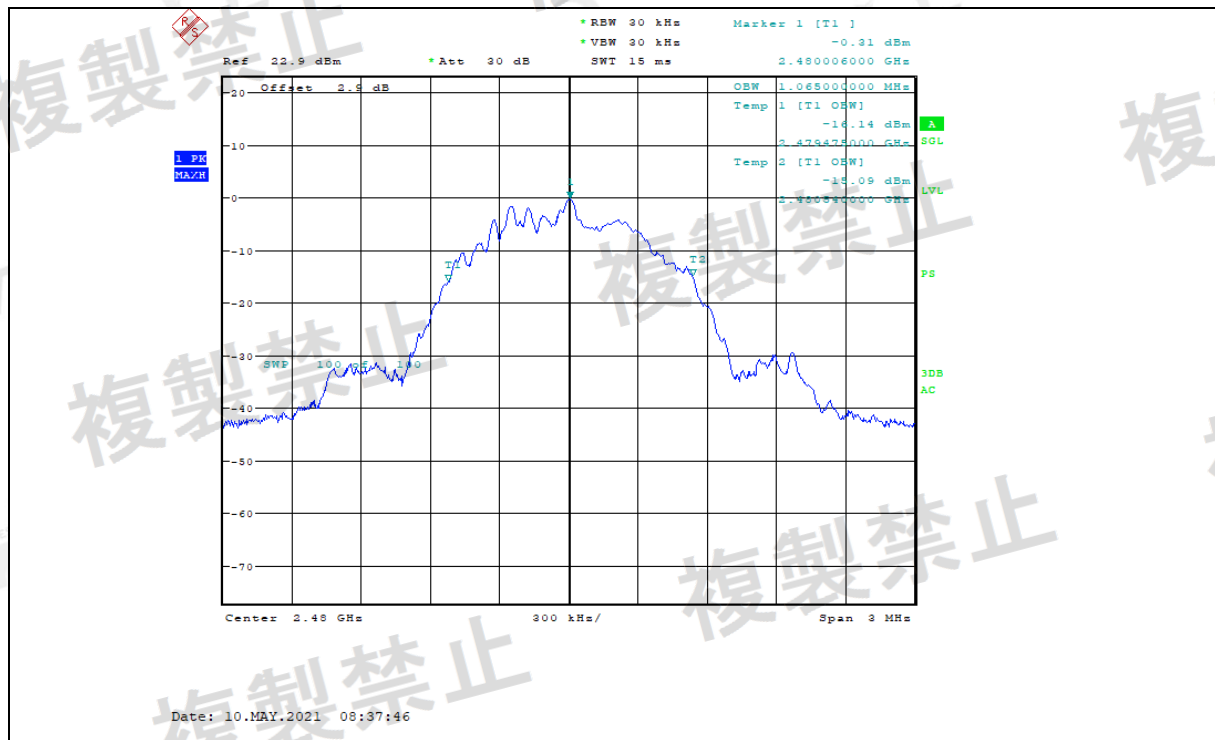
- (2) When the trace is complete, measure the Occupied bandwidth (99% bandwidth) with spectrum analyzer's bandwidth measure function.

### 6.4. Test result

Mode	Frequency MHz	Antenna	Measured	Limit
			MHz	MHz
GFSK Tx mode	2402	Ant1	1.032	<26
	2440	Ant1	1.050	<26
	2480	Ant1	1.065	<26
<b>Conclusion: PASS</b>				

## 6.5. Original test data





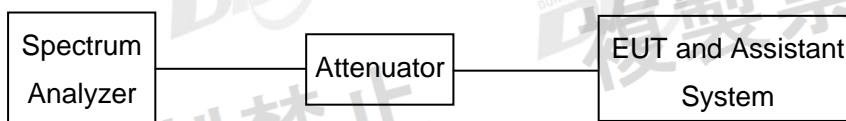
## 7. Transmitter Spurious Emissions (conducted)

### 7.1. 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

### 7.2. Block diagram of test setup



### 7.3. Test Procedure

- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Resolution BW: 1MHz. Video BW: 1MHz.

Detector: Peak. Trace Mode: Max Hold.

- (2) All the emissions from 30MHz to 13GHz were measured and record.

### 7.4. Test result

Test Condition	Test Mode	Antenna	Channel	Freq. Range	Result (dBm)	Limit	Verdict
NTNV	BLE	ANT1	2402	30~1000	-55.19	-26	PASS
NTNV	BLE	ANT1	2402	1000~2387	-33.43	-26	PASS
NTNV	BLE	ANT1	2402	2387~2400	-30.83	-16	PASS
NTNV	BLE	ANT1	2402	2483.5~2496.5	-44.63	-16	PASS
NTNV	BLE	ANT1	2402	2496.5~13000	-33.22	-26	PASS
NTNV	BLE	ANT1	2440	30~1000	-55.31	-26	PASS
NTNV	BLE	ANT1	2440	1000~2387	-43.46	-26	PASS
NTNV	BLE	ANT1	2440	2387~2400	-41.32	-16	PASS
NTNV	BLE	ANT1	2440	2483.5~2496.5	-40.03	-16	PASS
NTNV	BLE	ANT1	2440	2496.5~13000	-34.27	-26	PASS
NTNV	BLE	ANT1	2480	30~1000	-54.91	-26	PASS
NTNV	BLE	ANT1	2480	1000~2387	-47.07	-26	PASS
NTNV	BLE	ANT1	2480	2387~2400	-45.88	-16	PASS
NTNV	BLE	ANT1	2480	2483.5~2496.5	-20.58	-16	PASS

NTNV	BLE	ANT1	2480	2496.5~13000	-33.36	-26	PASS
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Note: If spurious emissions are greater than [limit -3dB] in 1MHz RBW, then more detailed measurements are required. Repeat the test in 30kHz RBW, the spurious emission value using following the formula below:

Calculated Value = (Measured Value + 15.2 dB)

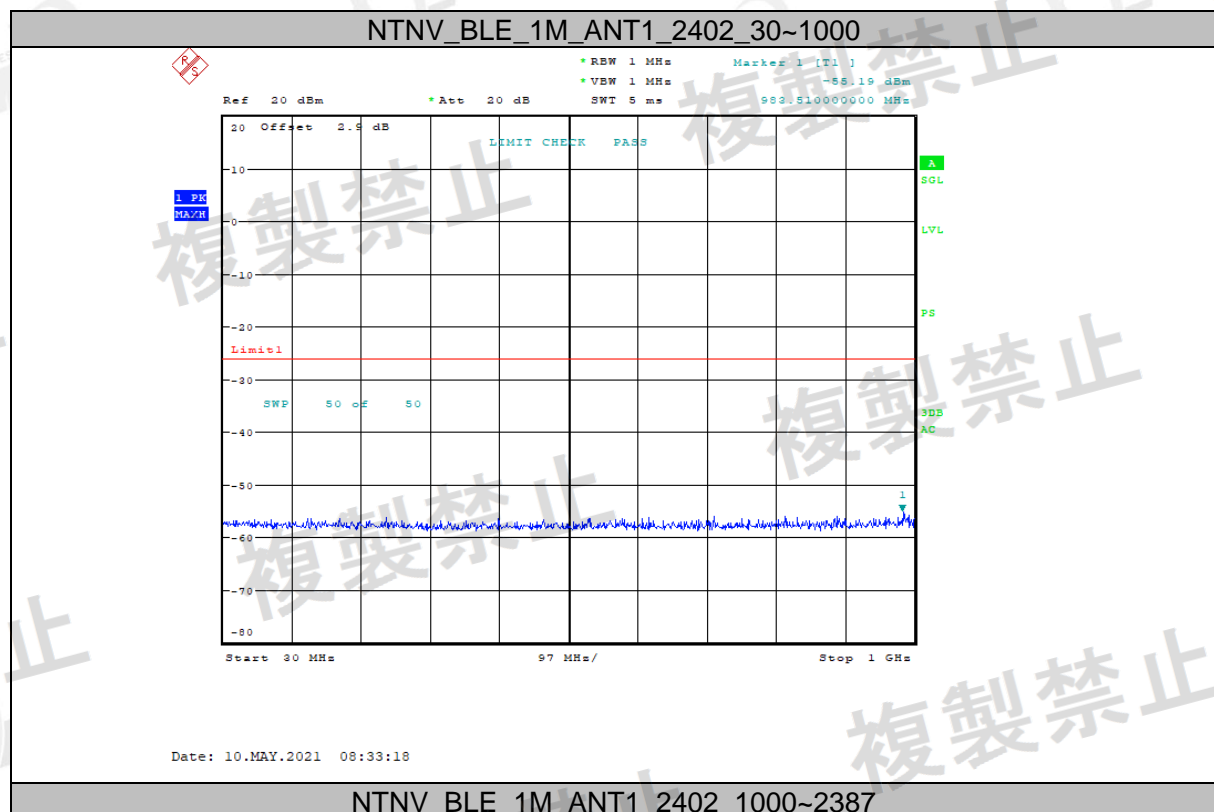
15.2 dB adjustment is derived from the Conversion Factor of RBW

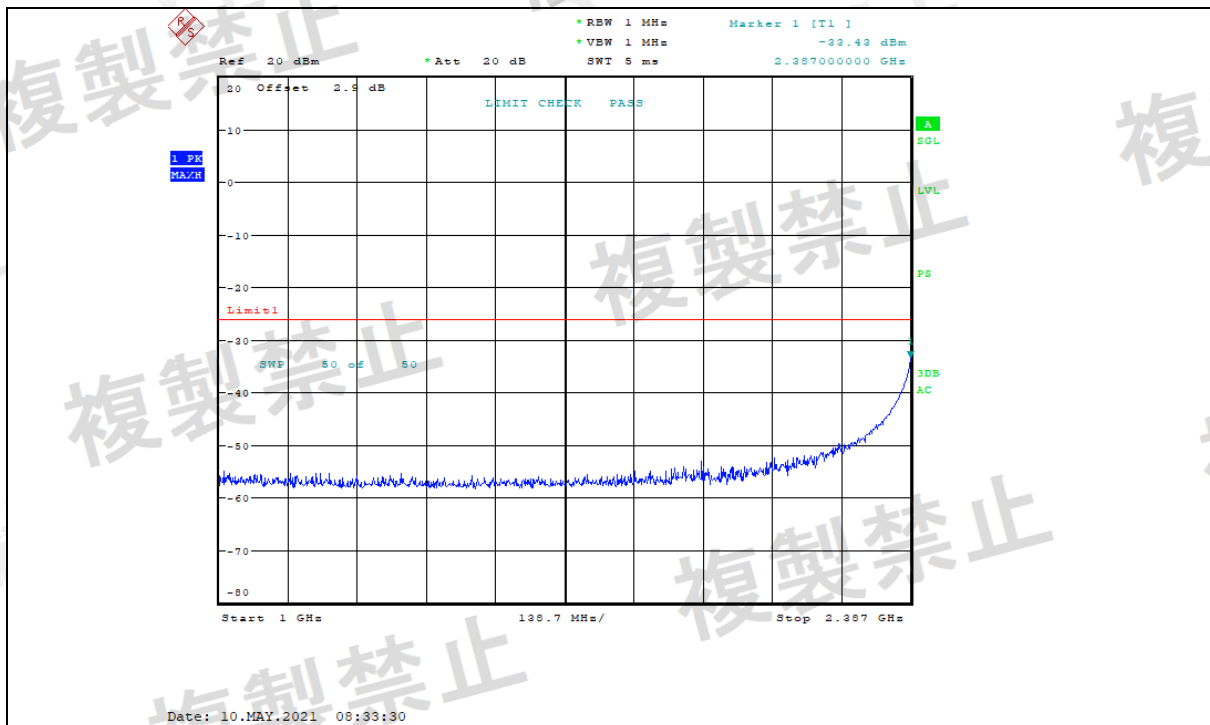
Conversion Factor of RBW =  $10 \times \log(\text{Reference Bandwidth} / \text{RBW of measurement}) = 15.2[\text{dB}]$

Where: Reference Bandwidth = 1 MHz

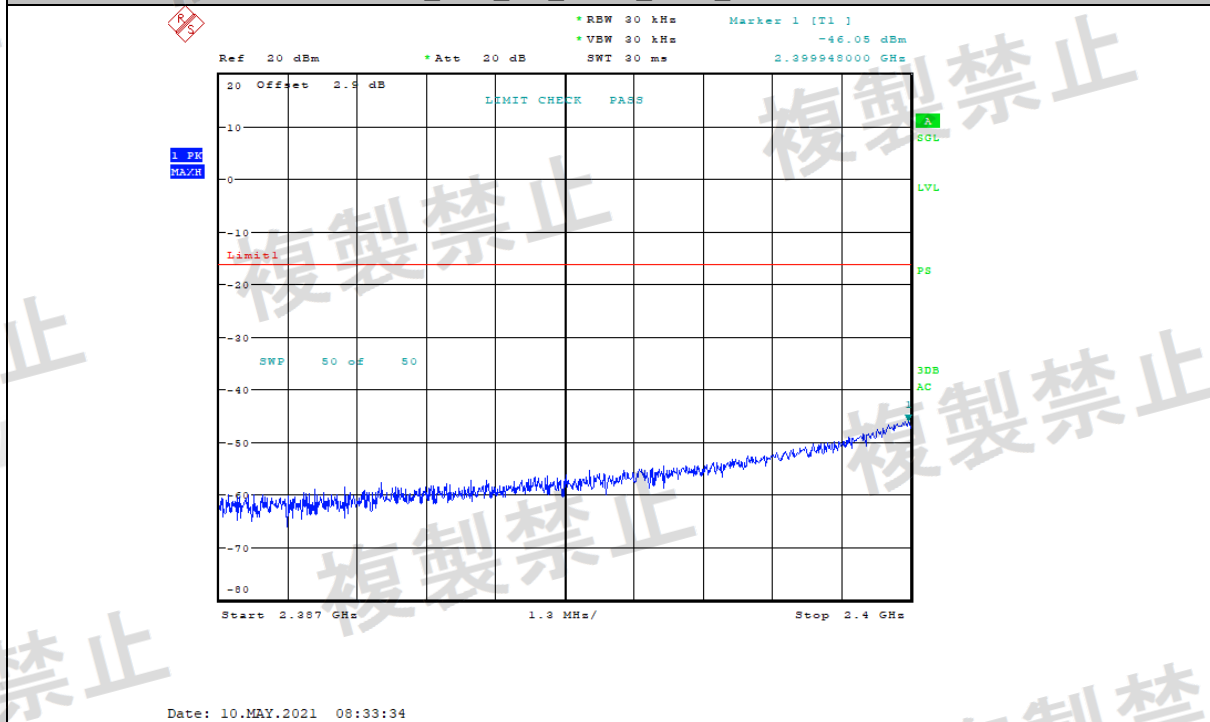
RBW of measurement = 30 kHz

## 7.5. Original test data

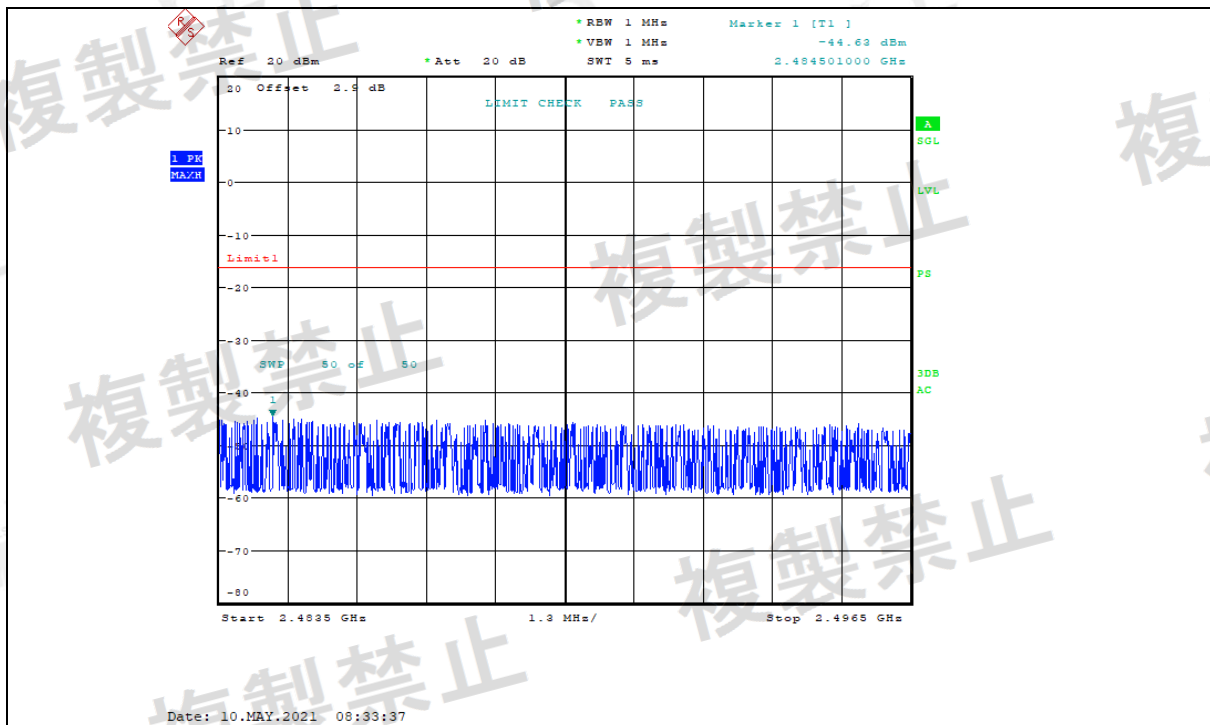




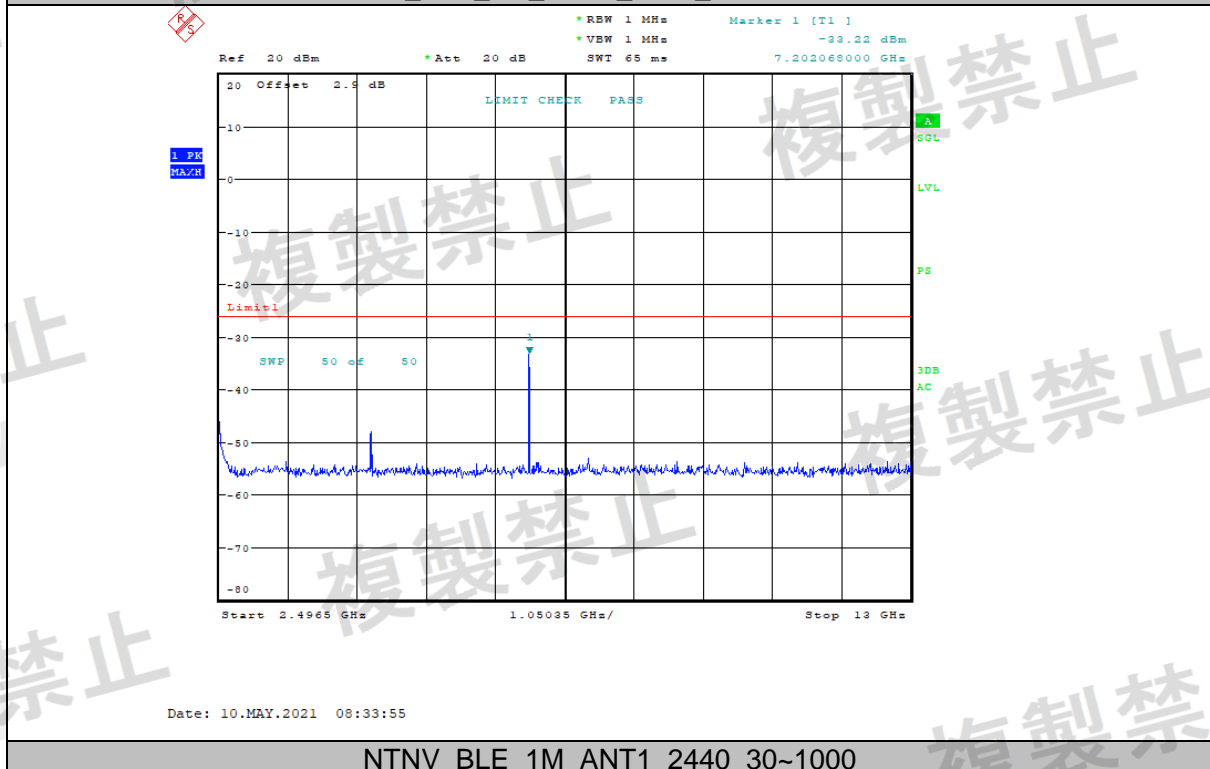
## NTNV\_BLE\_1M\_ANT1\_2402\_2387~2400



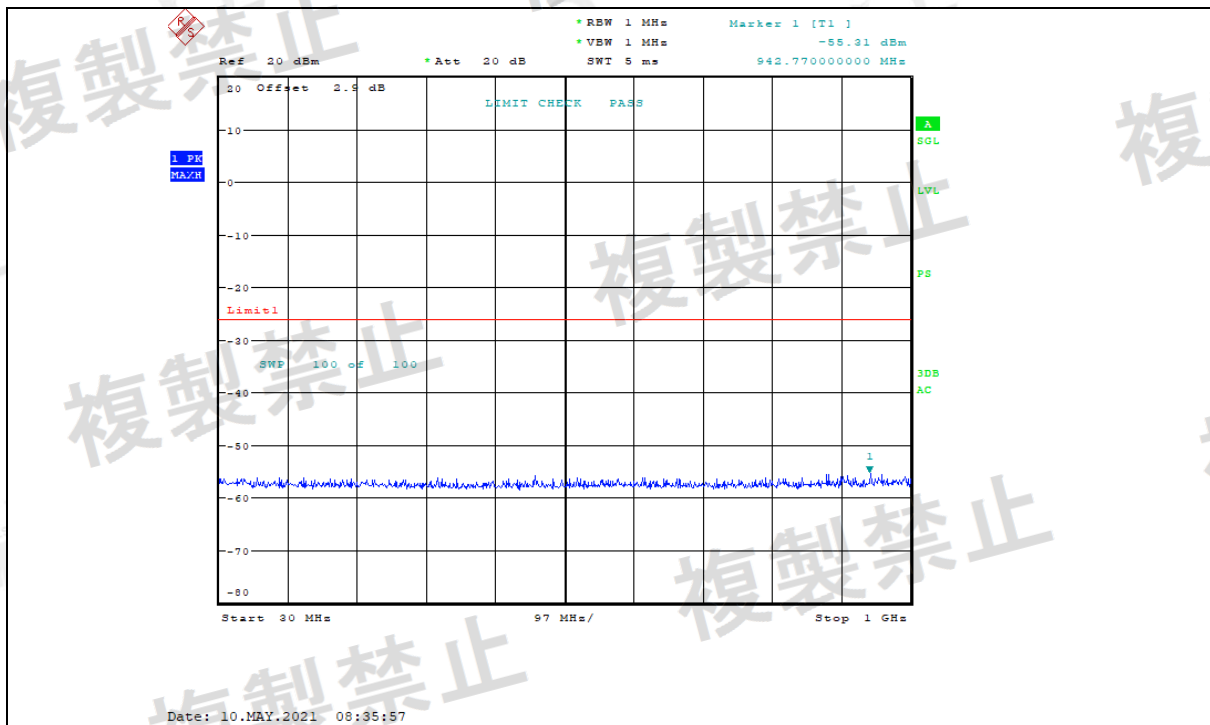
## NTNV\_BLE\_1M\_ANT1\_2402\_2483.5~2496.5



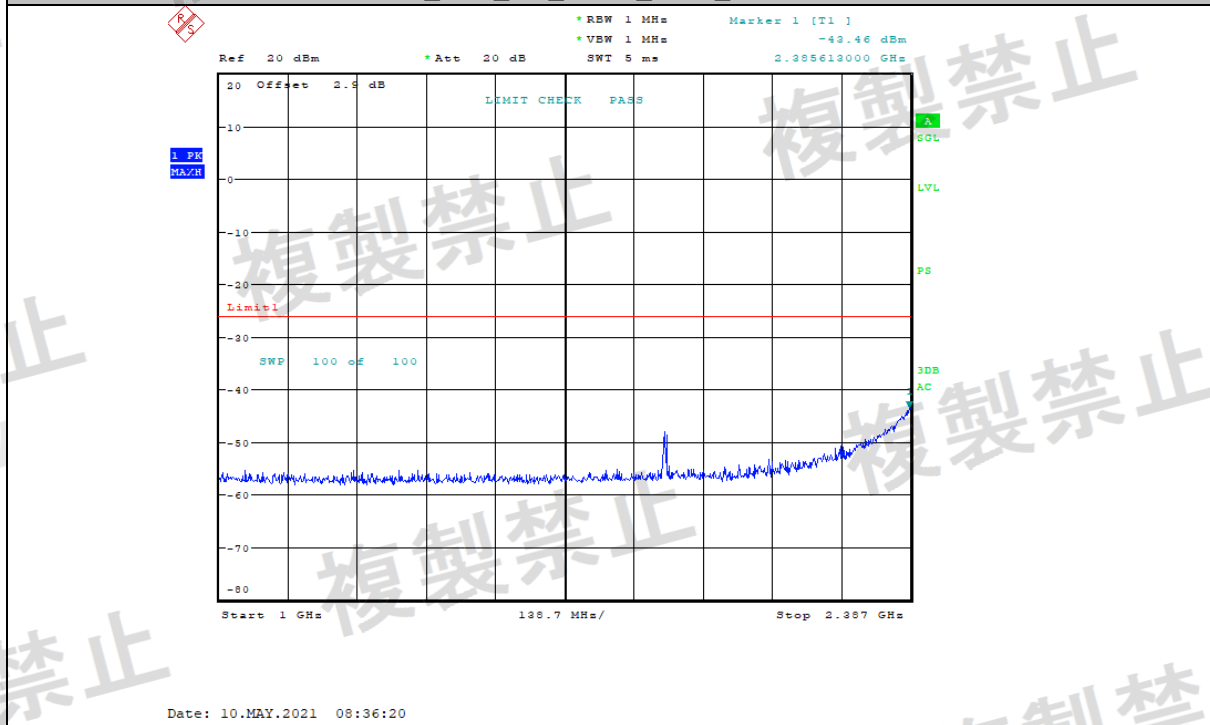
## NTNV\_BLE\_1M\_ANT1\_2402\_2496.5~13000



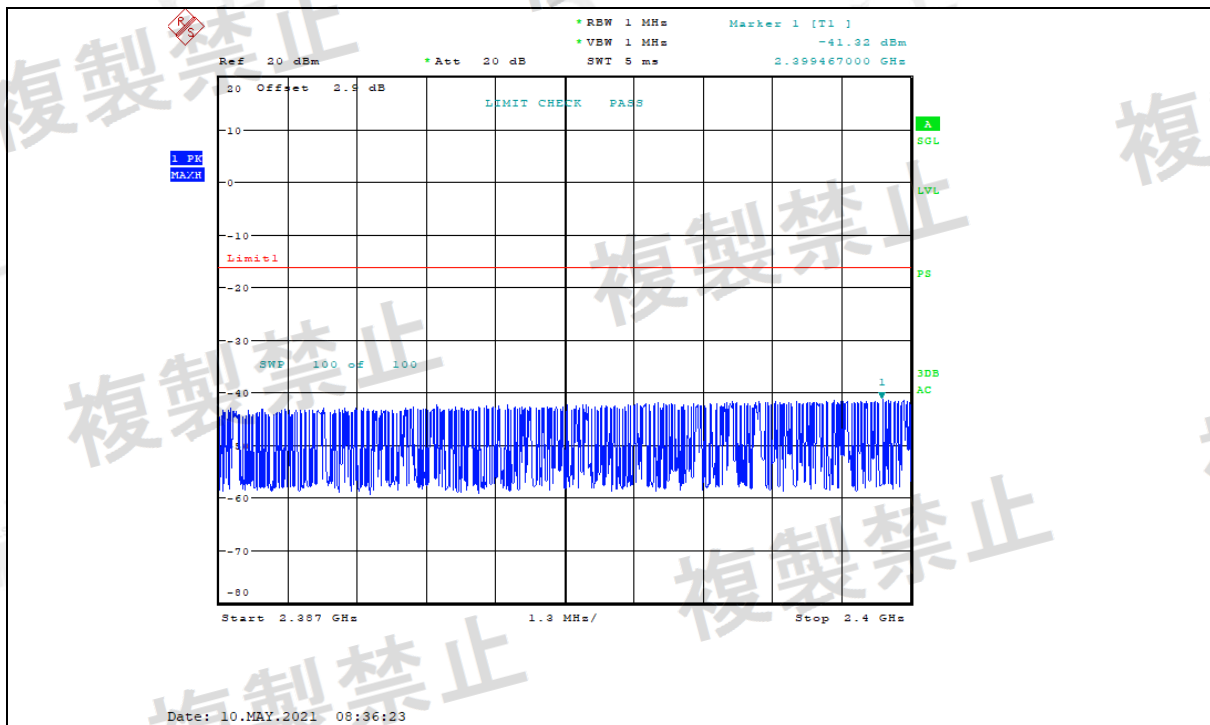
## NTNV\_BLE\_1M\_ANT1\_2440\_30~1000



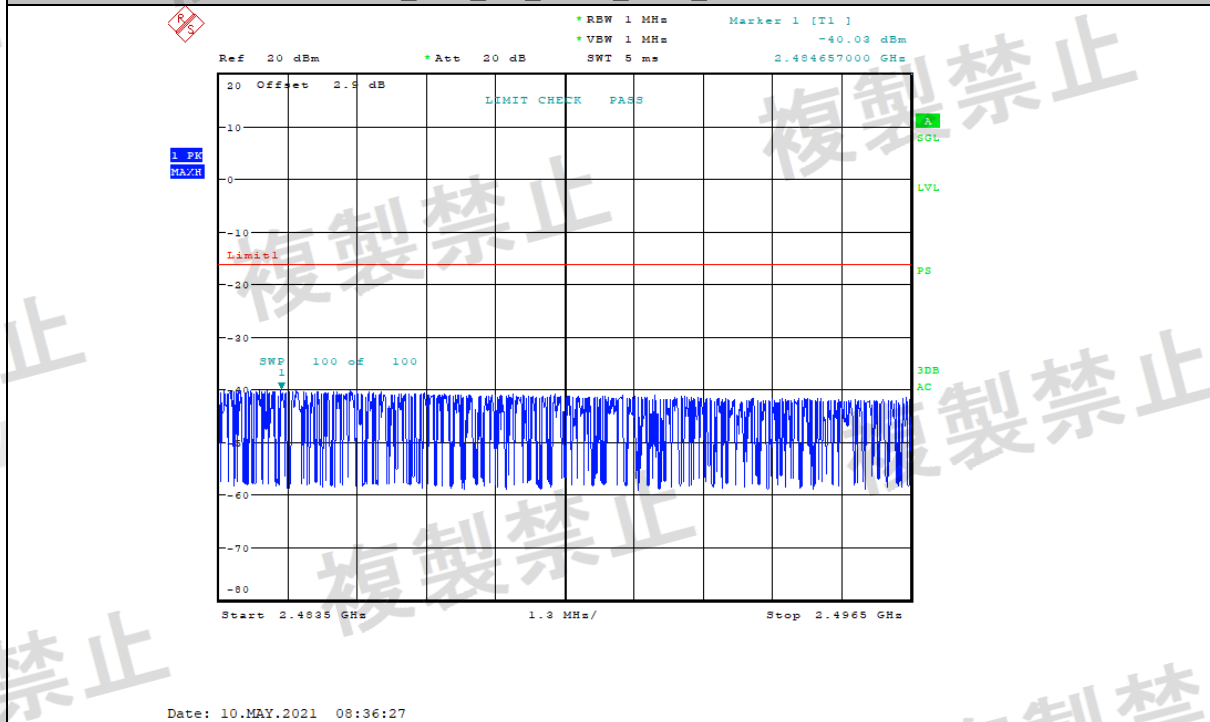
## NTNV\_BLE\_1M\_ANT1\_2440\_1000~2387



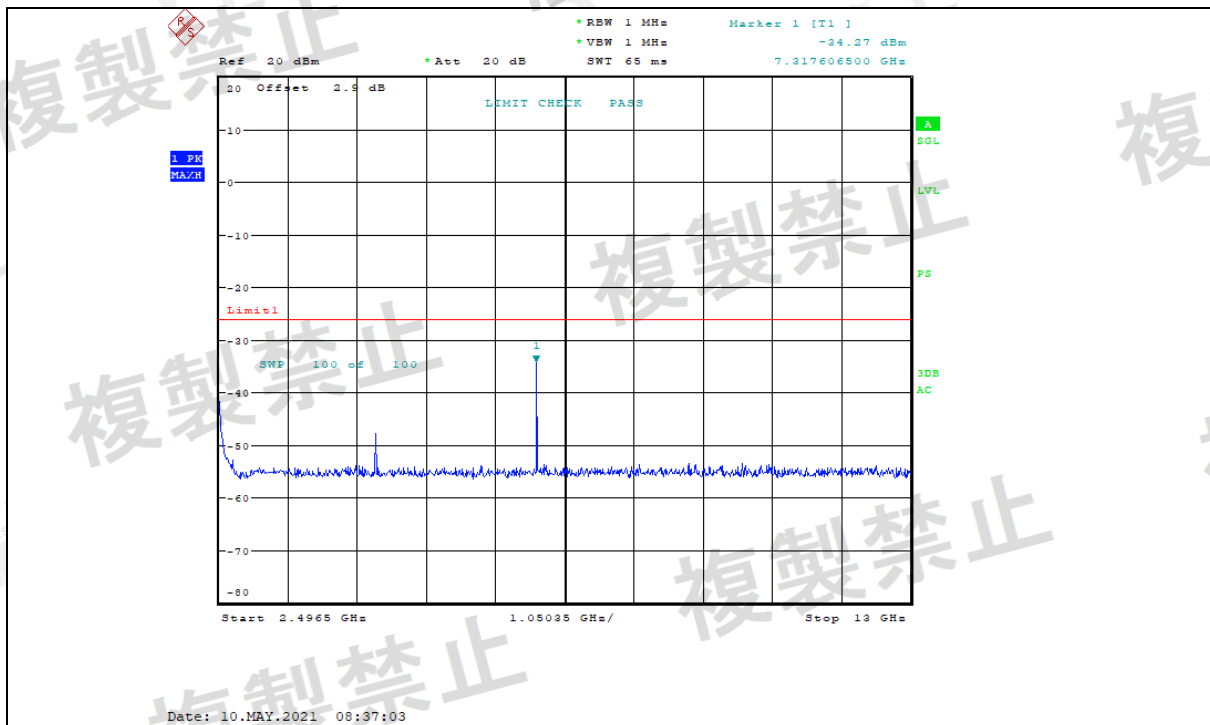
## NTNV\_BLE\_1M\_ANT1\_2440\_2387~2400



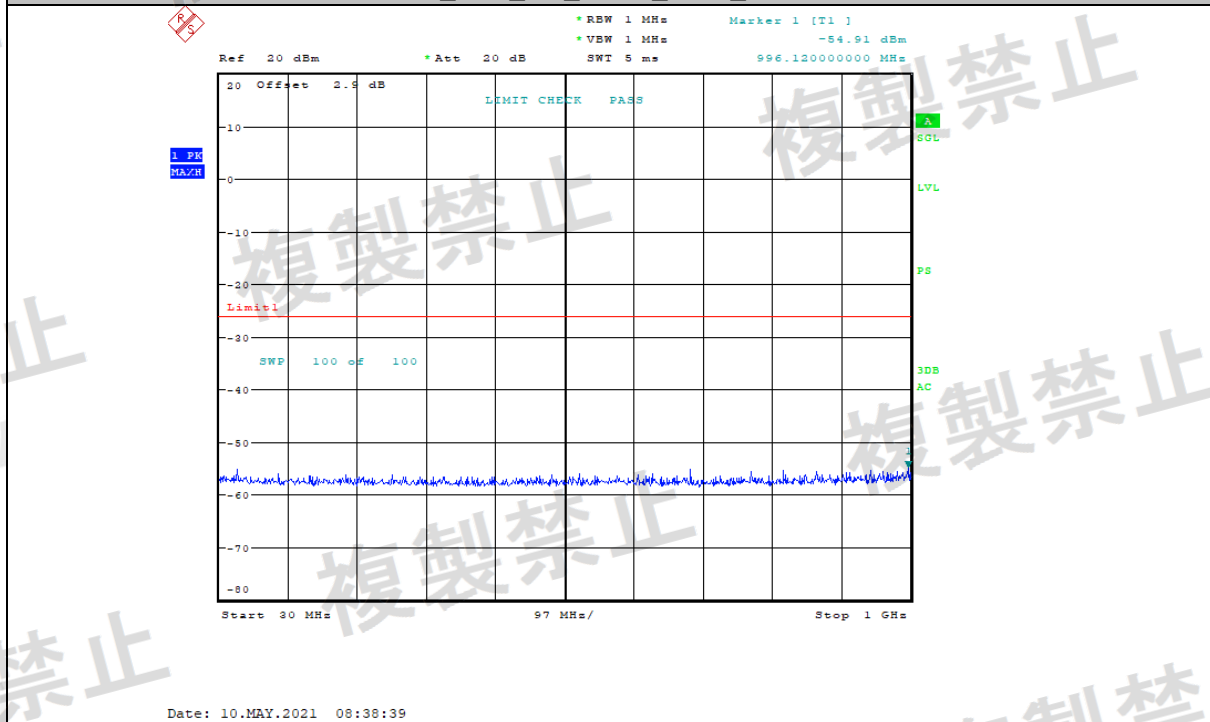
## NTNV\_BLE\_1M\_ANT1\_2440\_2483.5~2496.5



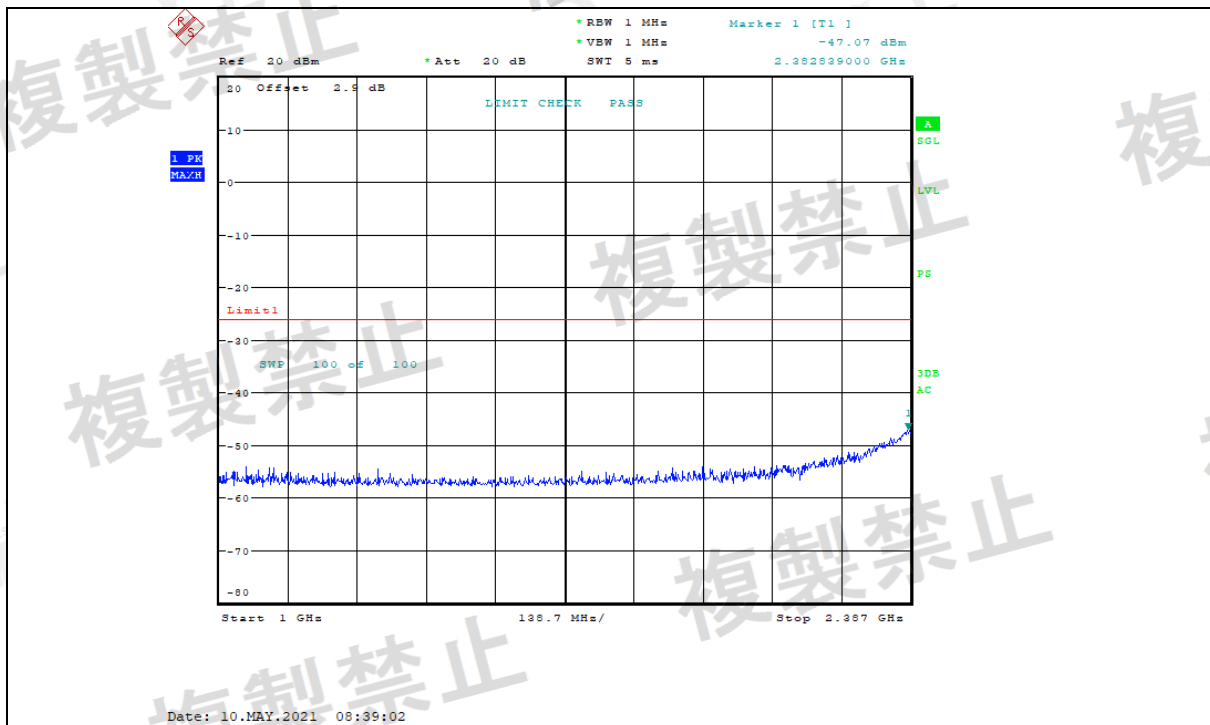
## NTNV\_BLE\_1M\_ANT1\_2440\_2496.5~13000



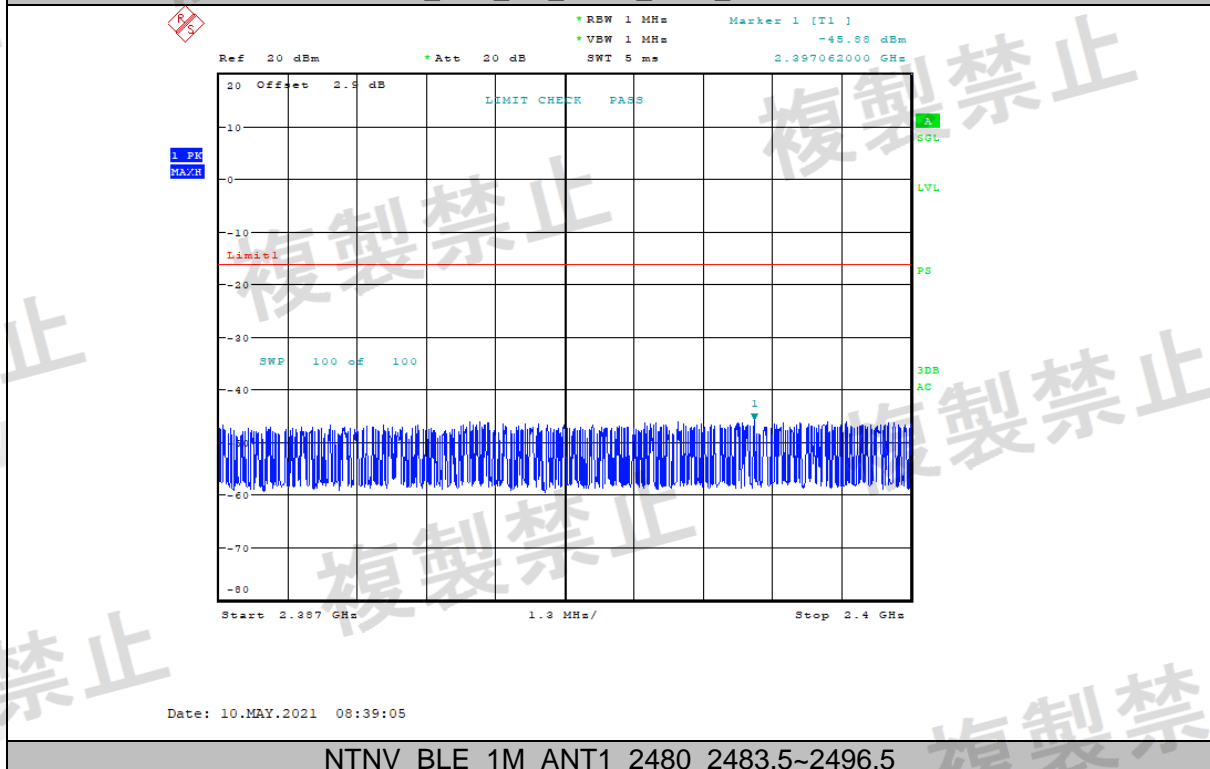
## NTNV\_BLE\_1M\_ANT1\_2480\_30~1000

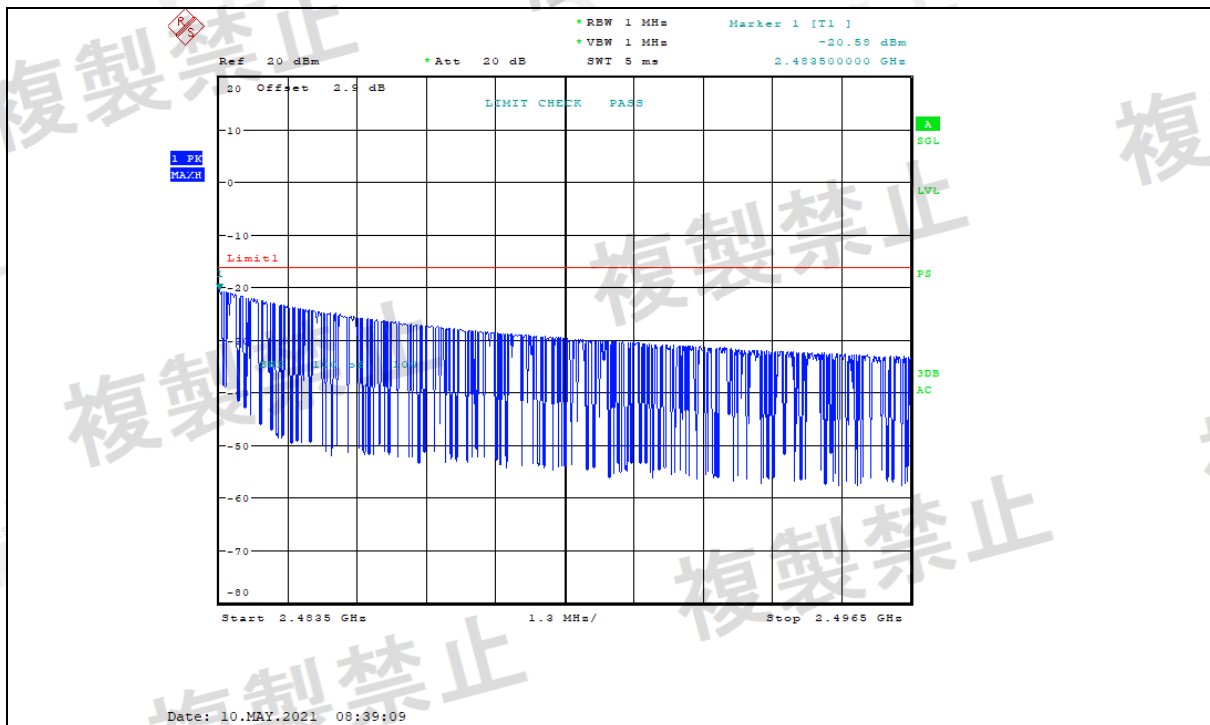


## NTNV\_BLE\_1M\_ANT1\_2480\_1000~2387

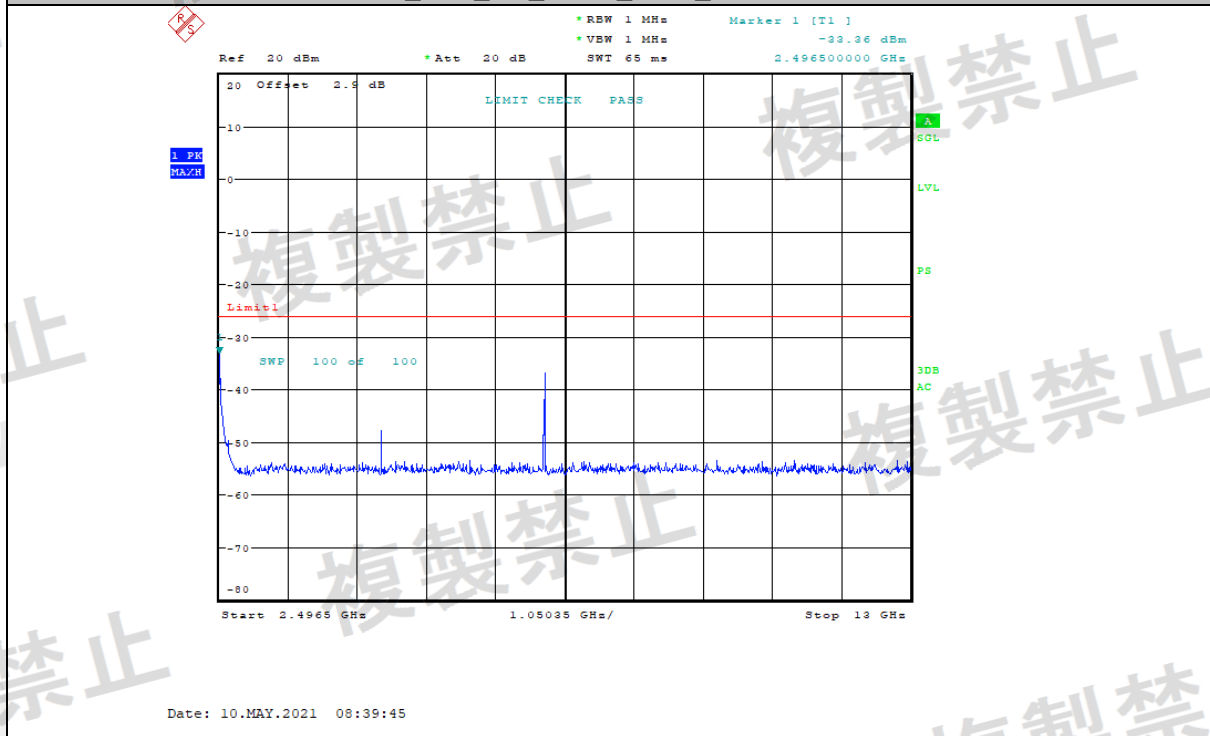


## NTNV\_BLE\_1M\_ANT1\_2480\_2387~2400





## NTNV\_BLE\_1M\_ANT1\_2480\_2496.5~13000

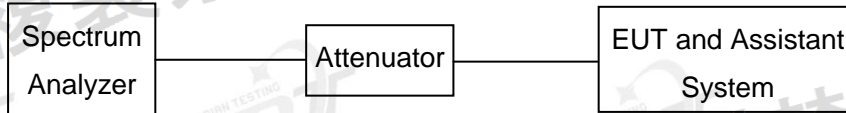


## 8. Secondary Radiated Emissions

### 8.1. 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, 4 nW 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.

### 8.2. Block diagram of test setup



### 8.3. Test Procedure

- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Resolution BW: 100 kHz for frequency below 1GHz and 1MHz for frequency above 1GHz

Video BW: 100 kHz for frequency below 1GHz and 1MHz for frequency above 1GHz

Detector: Peak.

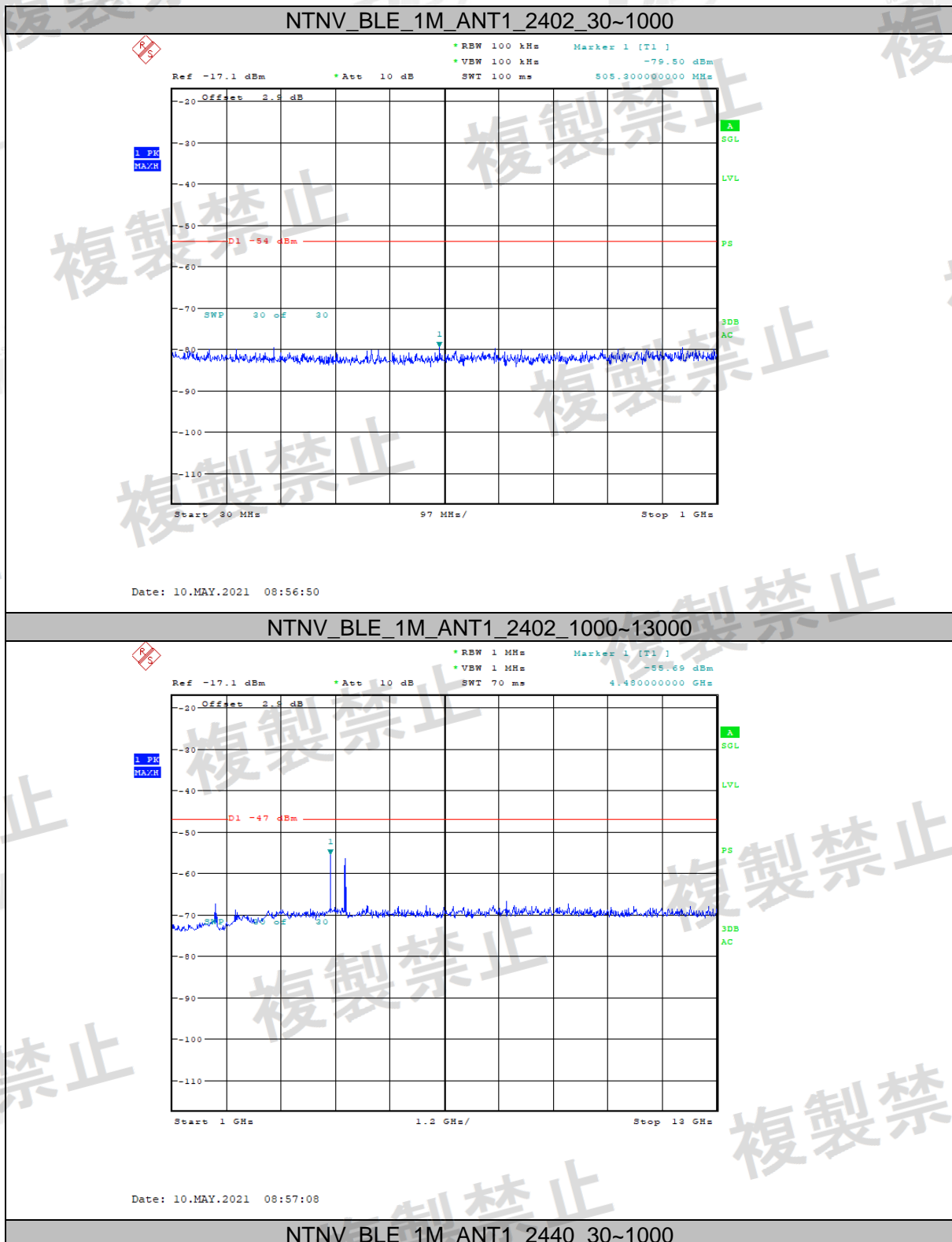
Trace Mode: Max Hold.

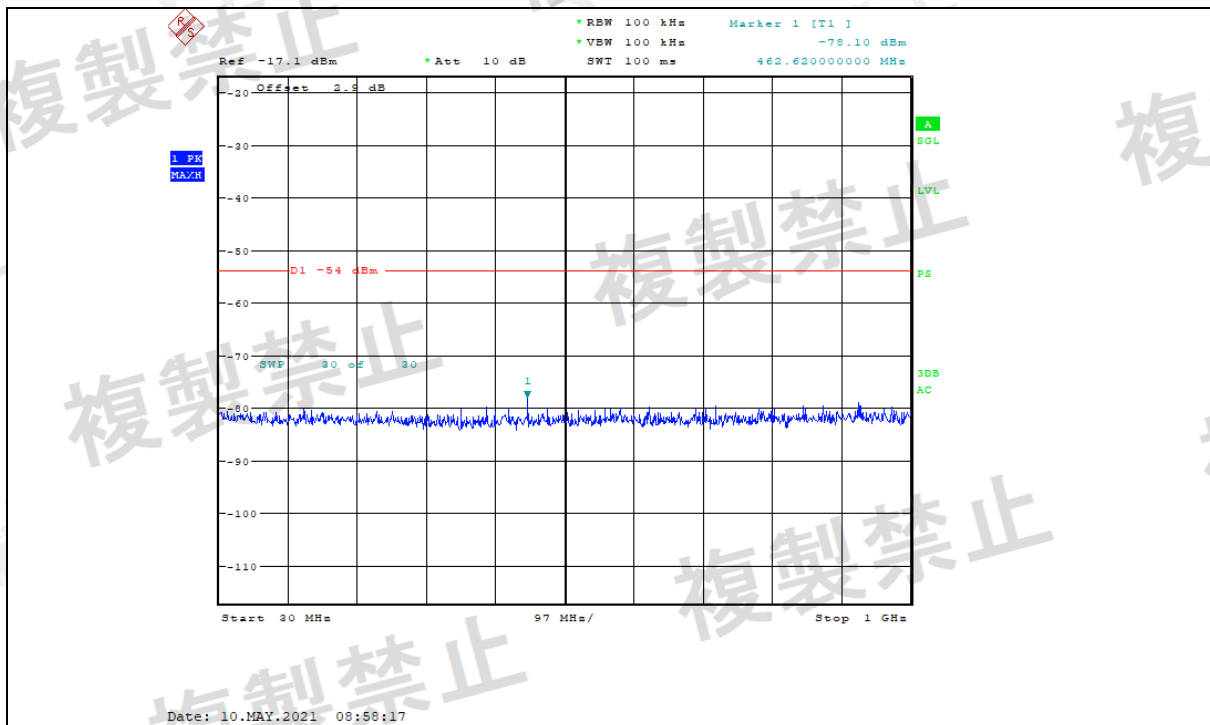
- (2) All the emissions from 30MHz to 13GHz were measured and record.

### 8.4. Test result

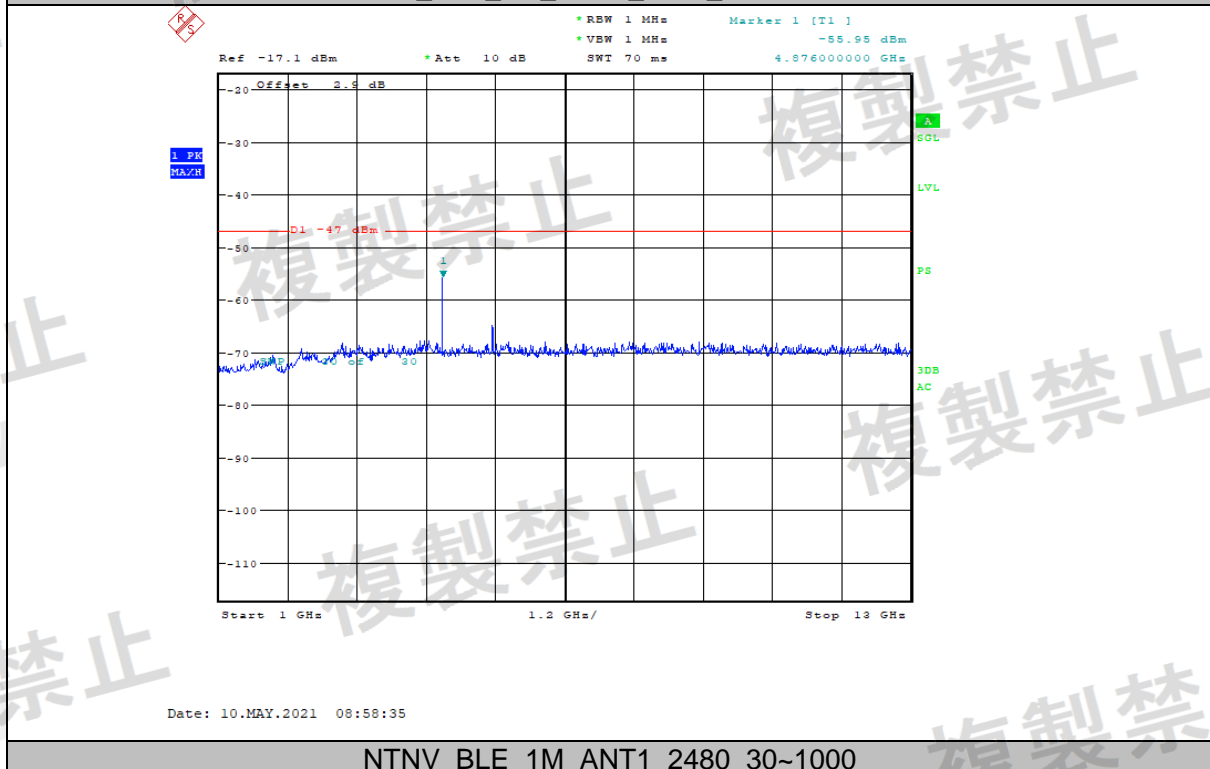
Test Condition	Test Mode	Antenna	Channel	Freq. Range	Result (dBm)	Limit	Verdict
NTNV	BLE	ANT1	2402	30~1000	-79.50	-54	PASS
NTNV	BLE	ANT1	2402	1000~13000	-55.69	-47	PASS
NTNV	BLE	ANT1	2440	30~1000	-78.10	-54	PASS
NTNV	BLE	ANT1	2440	1000~13000	-55.95	-47	PASS
NTNV	BLE	ANT1	2480	30~1000	-79.32	-54	PASS
NTNV	BLE	ANT1	2480	1000~13000	-55.45	-47	PASS

## 8.5. Original test data

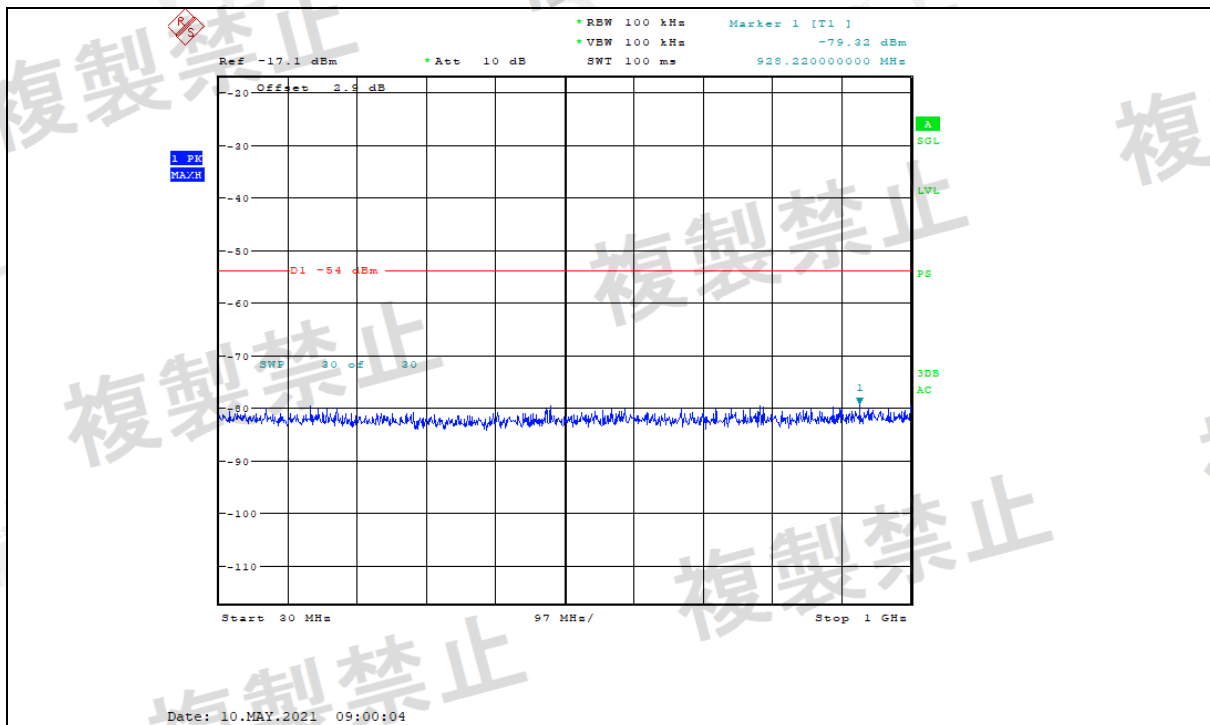




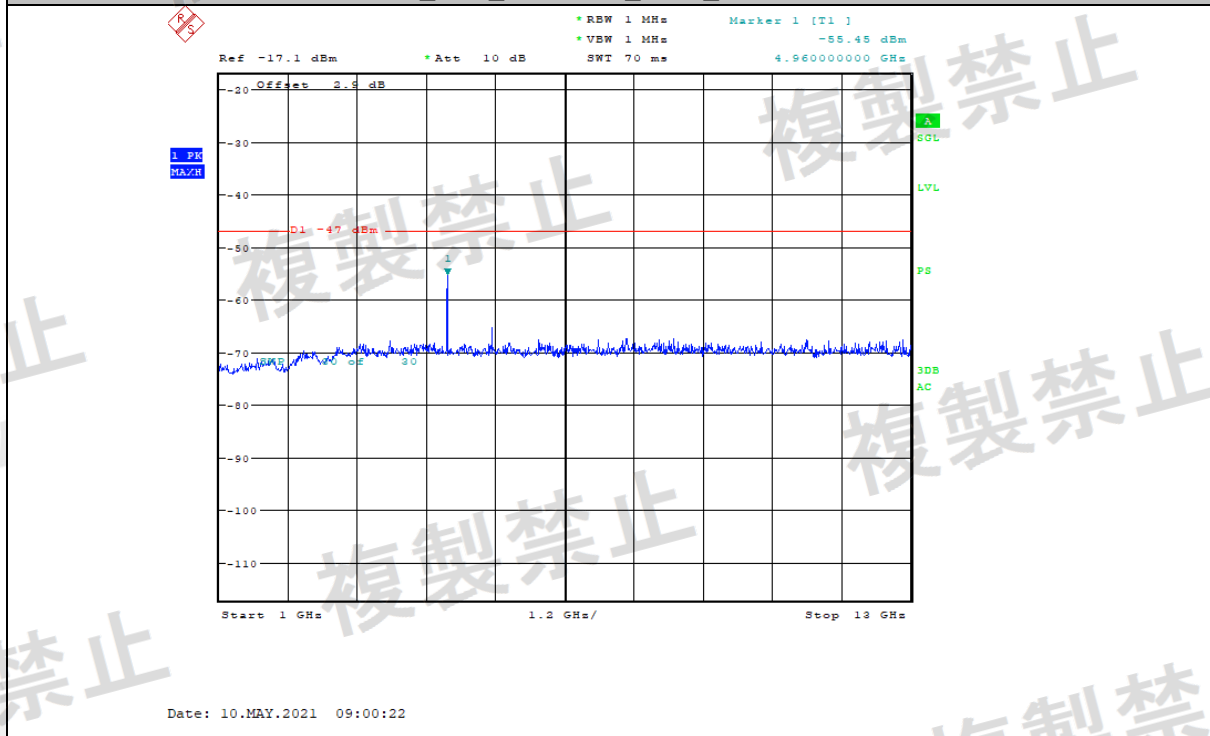
## NTNV\_BLE\_1M\_ANT1\_2440\_1000~13000



## NTNV\_BLE\_1M\_ANT1\_2480\_30~1000



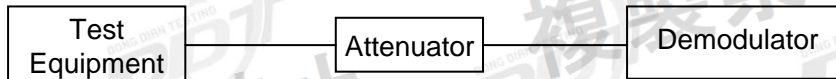
## NTNV\_BLE\_1M-ANT1\_2480\_1000~13000



## 9. Interference prevention function

### 9.1. Measurement system diagram

1) When transmitting identification code



2) Condition of measuring instrument

Demodulator must be able to demodulate the transmitting signal emitted by test equipment and to indicate the identification code.

3) Condition of test equipment the mode of normal use.

### 9.2. Measuring operation procedure

1) When test equipment has the function to transmit identification code automatically:

A) Transmit the predetermined identification code from test equipment.

B) Confirm the transmitted identification code by demodulator.



### 9.3. Test result: The unit does meet the requirements (Good).

Test result: The unit does meet the requirements.  
PASS

## 10. Test setup photograph

