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TEST REPORT

Application No.: CQASZ20251203059E-04
Applicant: PenPower Technology Ltd.
Address of Applicant: 7F., No.47, Lane 2, Sec. 2, Guangfu Rd., Hsinchu 300, Taiwan, R.O.C
Manufacturer: PenPower Technology Ltd.
Address of Manufacturer: 7F., No.47, Lane 2, Sec. 2, Guangfu Rd., Hsinchu 300, Taiwan, R.O.C
Factory: SHENZHEN XUEZHIYOU TECHNOLOGY CO., LTD
Address of Factory: 2/F, Plant 6, Lianchuang Science Park, No. 21, Bulan Road, Narman Street, Longgang District, Shenzhen
Equipment Under Test (EUT):
Product: WorldPenScan Ai Reader
All Model No.: MSE12
Test Model No.: MSE12
Brand Name: N/A
Standards: Item 19-3 of Article 2 Paragraph 1
Date of Receipt: 2025-12-24
Date of Test: 2025-12-24 to 2026-01-12
Date of Issue: 2026-01-27
Test Result : PASS*
Test Methods: Test method temporarily determined by TACOYAKI

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Timo Lei

(Timo Lei)

Approved By:

Jack Ai

(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Report No.	Version	Description	Issue Date
CQASZ20251203059E-04	Rev.01	Initial report	2026-01-27

2 Test Summary

Test	Test Requirement	Result
Antenna Requirement	Item 19-3 of Article 2-1	PASS
Frequency Error		PASS
Occupied Bandwidth		PASS
Spurious Emission of Tx		PASS
Antenna Power		PASS
Equivalent isotropically radiated power (EIRP)		PASS
Adjacent channel power tolerance		PASS
Out-band emission power		PASS
Spurious Emission of Rx		PASS
Interference prevention function		PASS
Carrier sense function		PASS
Transmission Burst Length		PASS

Remark:

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

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4 General Information

4.1 General Description of EUT

Product Name: WorldPenScan Ai Reader

All Model No: MSE12

Test Model No: MSE12

Trade Mark: N/A

4.2 Technical Specifications

Operation Frequency: 5180~5240MHz

Modulation Technique: IEEE for 802.11a/n: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)

Transmit Data Rate: 802.11a: 6M/9M/12M/18M/24M/36M/48M/54M bps
802.11n: ~72M bps

Software version: 202501070913

Hardware version: XZY_Q5A

Antenna Type: FPC antenna

Antenna Gain: 2.63dBi

Rated power: 1.7mW/MHz

4.3 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
/	/	/

4.4 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.5 Test Facility

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

• **CNAS (No. CNAS L5785)**

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **ISED Registration No.: 22984-1**

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been

registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

4.6 Measurement Uncertainty

No.	Parameter	Measurement Uncertainty
1	Radio Frequency	3×10^{-8}
2	Duty cycle	0.6 %.
3	Occupied Bandwidth	1.1%
4	RF conducted power	0.86dB
5	RF power density	0.74
6	Conducted Spurious emissions	0.86dB
7	Temperature test	0.8℃
8	Humidity test	2.0%
9	Supply voltages	0.5 %.
10	Frequency Error	5.5 Hz

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

5 Equipment Used during Test

Test Equipment List						
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (yyyy-mm-dd)	Calibration body	Classificati on
Humi/ Temp Indicator	ANPUHUA	HTC-1	212066	2025/9/1	CCIC (Shenzhen) Metrology & Testing Service Co.,Ltd	(c)
Spectrum Analyzer	Rohde & Schwarz	FSU26	200019	2025/9/1	CCIC (Shenzhen) Metrology & Testing Service Co.,Ltd	(c)
Multimeter	Fluke	15B	96710318	2025/9/1	CCIC (Shenzhen) Metrology & Testing Service Co.,Ltd	(c)
Signal generator	ANRITSU	MG3692B	074702	2025/9/1	CCIC (Shenzhen) Metrology & Testing Service Co.,Ltd	(c)
DC Power Supply	GW	GPC3030D	A671672	2025/9/1	CCIC (Shenzhen) Metrology & Testing Service Co.,Ltd	(c)

Remark:

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

From JRL Article 24-2, paragraph 4,

Item 2

Notice: Calibration duration for above equipments is 1 year.

6 Test Results

6.1 Radio Technical Requirements Specification

Tabel 1: 5 GHz band low-power data communication system (1)

Items	Technical standard																																		
Assigned frequency or designated frequency	5180MHz-5240MHz																																		
Tolerance of frequency	20×10^{-6}																																		
Tolerance of occupied bandwidth	20MHz or less for 20MHz system 40MHz or less for 40MHz system 80MHz or less for 80MHz system																																		
Tolerance of unwanted emission intensity	<table><tr><th colspan="2">20MHz system</th></tr><tr><th>OBW : 18MHz or less</th><th>OBW : 18 - 20 MHz</th></tr><tr><td>5,142 MHz or less : 2.5 μW/MHz</td><td>5,142 MHz or less : 2.5 μW/MHz</td></tr><tr><td>5,142 - 5,150 MHz : 15 μW/MHz</td><td>5,142 - 5,150 MHz : 15 μW/MHz</td></tr><tr><td>5,250 - 5,251 MHz : $10^{1-(f-9)}\text{mW/MHz}$</td><td>5,250 - 5,251 MHz : $10^{1-(f-9)}\text{mW/MHz}$</td></tr><tr><td>5,251 - 5,260 MHz : $10^{-1-(8/90)(f-11)}\text{mW/MHz}$</td><td>5,251 - 5,260 MHz : $10^{-1-(8/90)(f-11)}\text{mW/MHz}$</td></tr><tr><td>5,260 - 5,266.7 MHz : $10^{-1.8-(6/50)(f-20)}\text{mW/MHz}$</td><td>5,260 - 5,266.7 MHz : $10^{-1.8-(6/50)(f-20)}\text{mW/MHz}$</td></tr><tr><td>5,266.7 MHz or more : 2.5 μW/MHz</td><td>5,266.7 MHz or more : 2.5 μW/MHz</td></tr><tr><td>f = MHz, Difference from 5240 (MHz)</td><td>f = MHz, Difference from 5240 (MHz)</td></tr></table> <table><tr><th>40MHz system</th><th>80MHz system</th></tr><tr><td>5,141.6 MHz or less : 2.5 μW/MHz</td><td>5,123.2 MHz or less : 2.5 μW/MHz</td></tr><tr><td>5,141.6 - 5,150 MHz : 15 μW/MHz</td><td>5,123.2 - 5,150 MHz : 15 μW/MHz</td></tr><tr><td>5,250 - 5,251 MHz : $10^{-(f-20)+\log(1/2)}\text{mW/MHz}$</td><td>5,250 - 5,251 MHz : $10^{-(f-40)+\log(1/4)}\text{mW/MHz}$</td></tr><tr><td>5,251 - 5,270 MHz : $10^{-(8/190)(f-21)-1+\log(1/2)}\text{mW/MHz}$</td><td>5,251 - 5,290 MHz : $10^{-(8/390)(f-41)-1+\log(1/4)}\text{mW/MHz}$</td></tr><tr><td>5,270 - 5,278.4 MHz : $10^{-(3/50)(f-40)-1.8+\log(1/2)}\text{mW/MHz}$</td><td>5,290 - 5,296.7 MHz : $10^{-(3/100)(f-80)-1.8+\log(1/4)}\text{mW/MHz}$</td></tr><tr><td>5,278.4 MHz or more : 2.5 μW/MHz</td><td>5,296.7 MHz or more : 2.5 μW/MHz</td></tr><tr><td>f = MHz, Difference from 5230 (MHz)</td><td>f = MHz, Difference from 5210 (MHz)</td></tr></table>	20MHz system		OBW : 18MHz or less	OBW : 18 - 20 MHz	5,142 MHz or less : 2.5 μ W/MHz	5,142 MHz or less : 2.5 μ W/MHz	5,142 - 5,150 MHz : 15 μ W/MHz	5,142 - 5,150 MHz : 15 μ W/MHz	5,250 - 5,251 MHz : $10^{1-(f-9)}\text{mW/MHz}$	5,250 - 5,251 MHz : $10^{1-(f-9)}\text{mW/MHz}$	5,251 - 5,260 MHz : $10^{-1-(8/90)(f-11)}\text{mW/MHz}$	5,251 - 5,260 MHz : $10^{-1-(8/90)(f-11)}\text{mW/MHz}$	5,260 - 5,266.7 MHz : $10^{-1.8-(6/50)(f-20)}\text{mW/MHz}$	5,260 - 5,266.7 MHz : $10^{-1.8-(6/50)(f-20)}\text{mW/MHz}$	5,266.7 MHz or more : 2.5 μ W/MHz	5,266.7 MHz or more : 2.5 μ W/MHz	f = MHz, Difference from 5240 (MHz)	f = MHz, Difference from 5240 (MHz)	40MHz system	80MHz system	5,141.6 MHz or less : 2.5 μ W/MHz	5,123.2 MHz or less : 2.5 μ W/MHz	5,141.6 - 5,150 MHz : 15 μ W/MHz	5,123.2 - 5,150 MHz : 15 μ W/MHz	5,250 - 5,251 MHz : $10^{-(f-20)+\log(1/2)}\text{mW/MHz}$	5,250 - 5,251 MHz : $10^{-(f-40)+\log(1/4)}\text{mW/MHz}$	5,251 - 5,270 MHz : $10^{-(8/190)(f-21)-1+\log(1/2)}\text{mW/MHz}$	5,251 - 5,290 MHz : $10^{-(8/390)(f-41)-1+\log(1/4)}\text{mW/MHz}$	5,270 - 5,278.4 MHz : $10^{-(3/50)(f-40)-1.8+\log(1/2)}\text{mW/MHz}$	5,290 - 5,296.7 MHz : $10^{-(3/100)(f-80)-1.8+\log(1/4)}\text{mW/MHz}$	5,278.4 MHz or more : 2.5 μ W/MHz	5,296.7 MHz or more : 2.5 μ W/MHz	f = MHz, Difference from 5230 (MHz)	f = MHz, Difference from 5210 (MHz)
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f = MHz, Difference from 5230 (MHz)	f = MHz, Difference from 5210 (MHz)																																		
Antenna power	Tolerance: W52:+20% to -80%																																		
Equivalent isotropically radiated power (EIRP)	W52:10mW MHz or less																																		
Adjacent Channel Power Tolerance	Out-band leakage power EIRP: See Attached Table 1, 2 and 3.																																		
Limit of secondary radiated emissions	(1) Below 1GHz : 4nW (2) 1GHz - 10GHz : 20nW (3) 10GHz or higher : 20nW																																		
Interference prevention function	Shall have the function of automatic transmission or reception of identification code.																																		
Carrier sensing function	Shall not transmit radio wave when receiving over 100mV/m																																		
Transmission burst length	8ms or less																																		
Note	DS: Direct spreading OFDM : Orthogonal frequency division multiplexing																																		

Test Methods: Test method temporarily determined by TACOYAKI

6.2 E.U.T. test conditions

Power supply:

The RF unit is supplied DC3.3V. The fluctuation of input voltage to the circuit of RF unit of test equipment is under $\pm 1\%$, when input voltage from DC12V to the test equipment is fluctuated by $\pm 10\%$, So, all measurement has been conducted by only rated voltage.

The measurement result of the voltage fluctuation at RF circuit		
	EUT Voltage for operation	RF Circuitry Voltage
High voltage	4.18V	3.3V
Normal voltage	3.8V	3.3V
Low voltage	3.42V	3.3V

Temperature:

5 -35.0 °C

Humidity:

45-85 % RH

Atmospheric Pressure:

1000 -1010 mbar

Test frequencies:

If the EUT can be set to 3 or more different (carrier) frequencies in 1 allocated band, testing shall be performed using the Lowest, Middle and the Highest frequency (L, M and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.

For 5180~5240MHz:

For 802.11a/n Operation in the 5150MHz ~5350 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

Channel	Frequency(MHz)
The Lowest channel	5180
The middle channel	5200
The Highest channel	5240

For 5190~5230MHz:

For 802.11n Operation in the 5150MHz ~5350 MHz band			
Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

Channel	Frequency(MHz)
The Lowest channel	5190
The Highest channel	5230

6.3 Test Environment

Operating Environment:	
Temperature:	26 °C
Humidity:	49 % RH
Atmospheric Pressure:	1005 mbar

6.4 Antenna Requirement

Standard requirement

Applicable for equipment with an antenna terminal, including testing terminals) If an antenna connector is available, all relevant tests will be carried out conducted. If not, tests will be carried out in an anechoic room or with a suitable test-fixture.

EUT Antenna



The EUT with FPC antenna, the max peak gain of the antenna is 2.63dBi.

Note: An antenna connector is available, all relevant tests will be carried out conducted.

6.5 Interference prevention function

The device consists of the external antenna and 5 GHz IC; Component IC CPU also can use the protocol function to protect interference come from outside.

(MAC: 56:4C:6E:3D:B6:05)

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

6.6 Frequency Error

Test Requirement: Item 19-3 of Article 2-1

Tolerance of frequency: $\pm 20 \times 10^{-6}$

Test Status: Test the EUT in transmitting mode without modulation.

Test Configuration:



Test Procedure:

1) Test Conditions:

Spectrum Analyzer is used for measurement.

2) EUT conditions:

Modulation/Spread/Hopping OFF, CW Tx

3) Spectrum Analyzer conditions:

Frequency: Test Frequency

Span 1MHz

RBW 10 kHz (Modulation OFF),

VBW 10 kHz (Modulation OFF),

Sweep Time Auto

Detector mode Positive peak

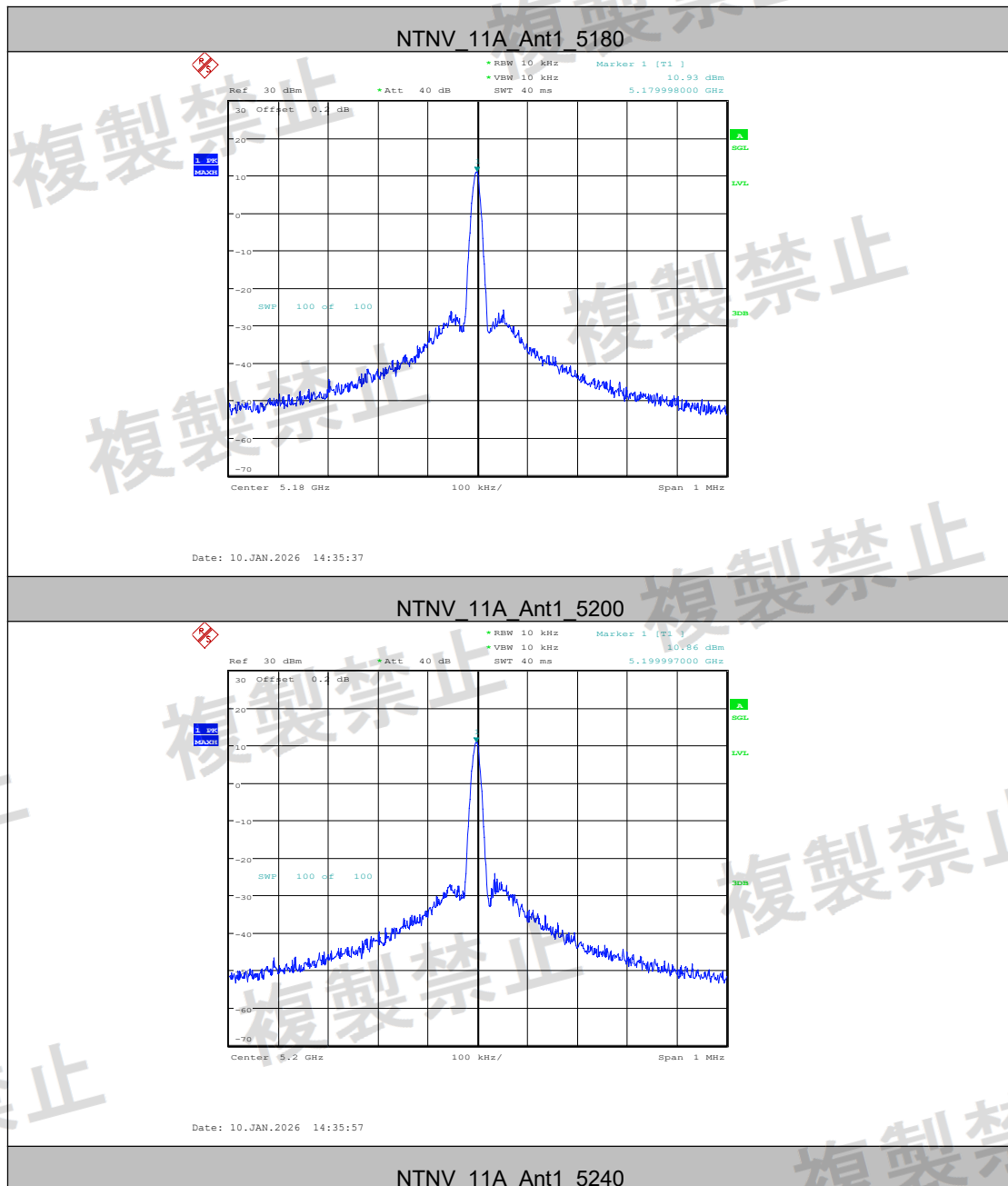
Indication mode Max hold

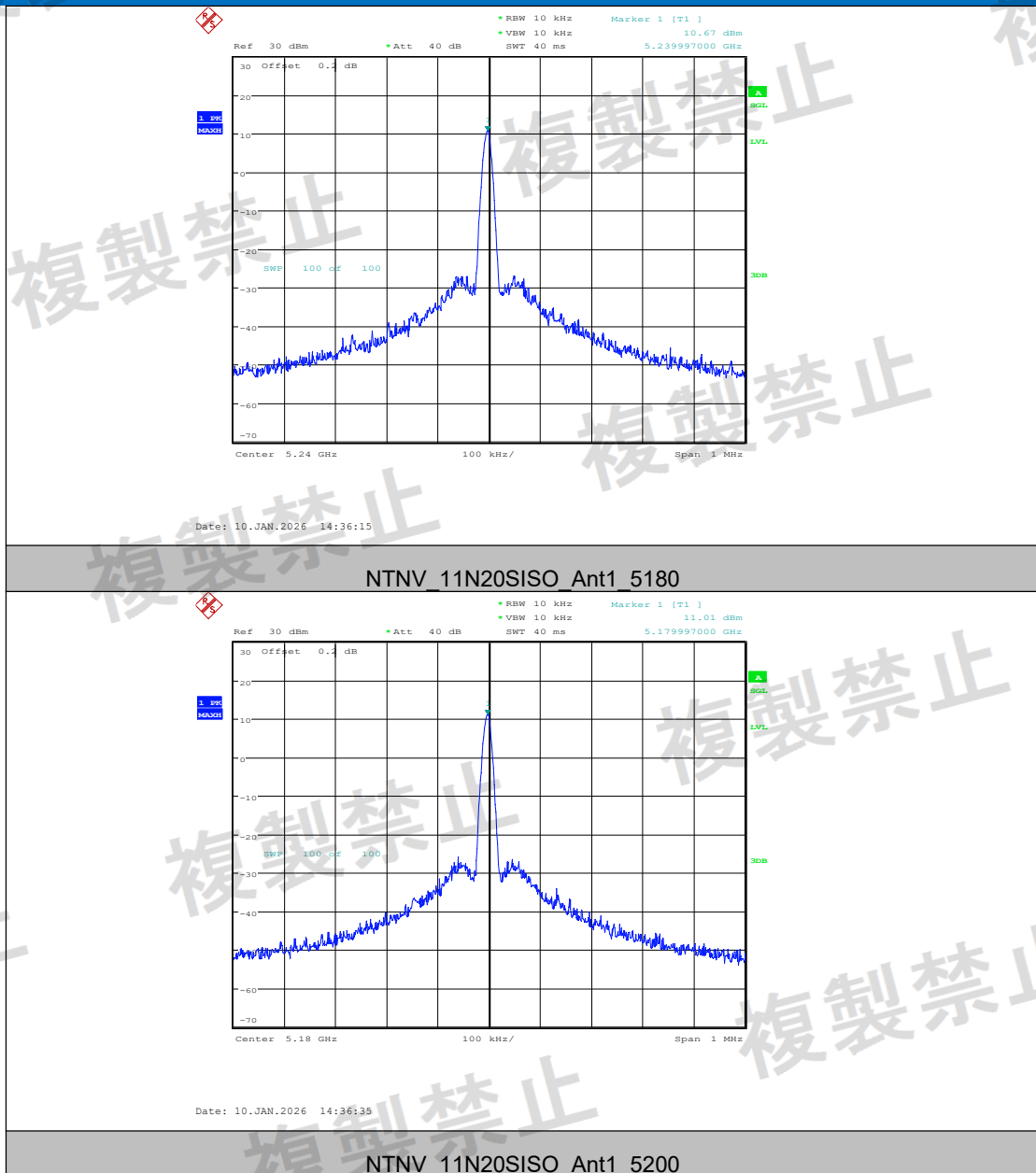
Test Data:

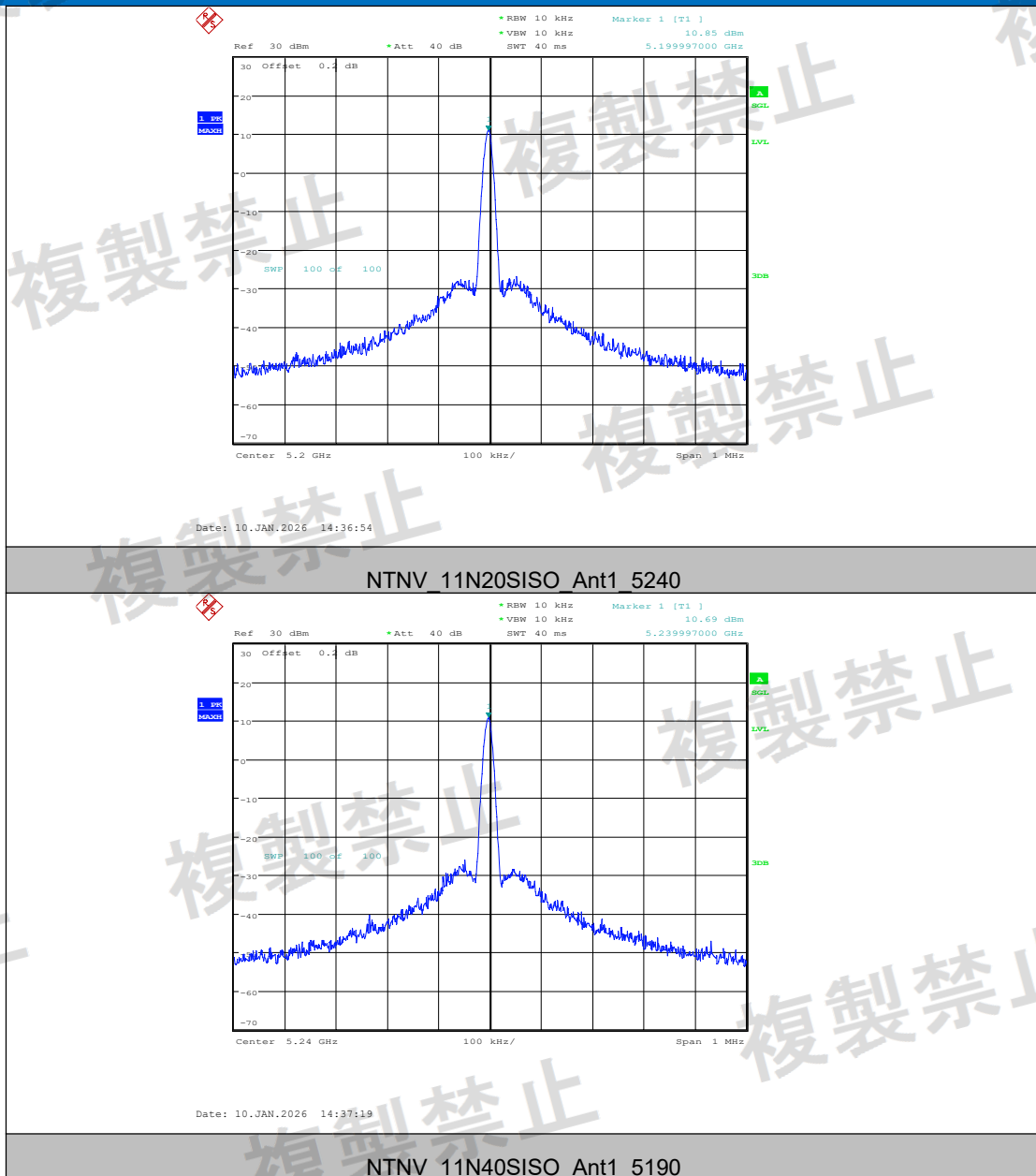
TestCondition n	TestMod e	Antenna	Freq(M Hz)	CenterFreq [MHz]	Result [ppm]	Limit [ppm]	Verdic t
NTNV	11A	Ant1	5180	5179.998	-0.38610	±20	PASS
			5200	5199.997	-0.57692	±20	PASS
			5240	5239.997	-0.57252	±20	PASS
	11N20SI SO	Ant1	5180	5179.997	-0.57915	±20	PASS
			5200	5199.997	-0.57692	±20	PASS
			5240	5239.997	-0.57252	±20	PASS
	11N40SI SO	Ant1	5190	5189.997	-0.57804	±20	PASS
			5230	5229.997	-0.57361	±20	PASS

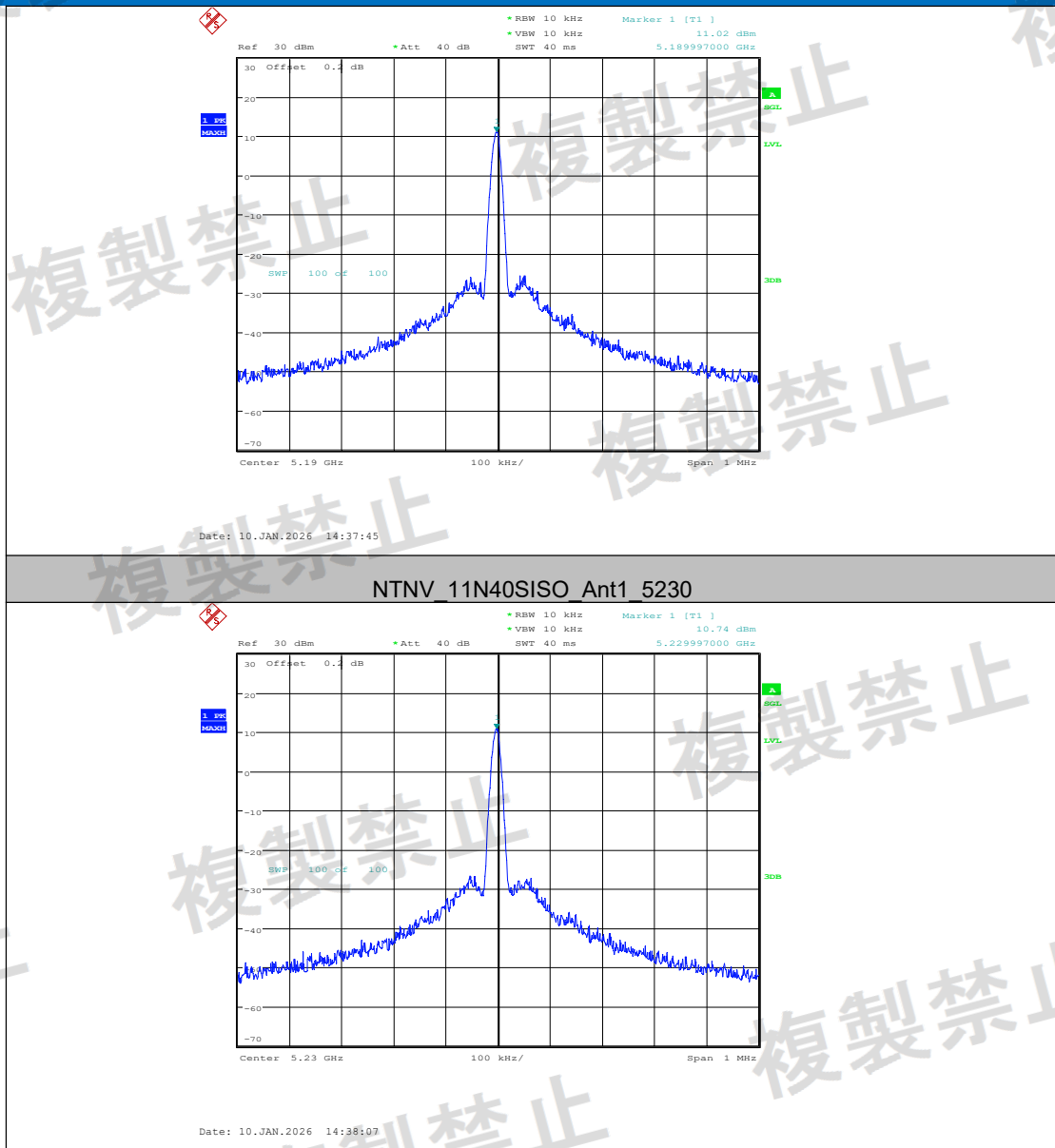
Note: The nominal frequency shall be confirmed by the applicant and test lab.

Test plot as follows:







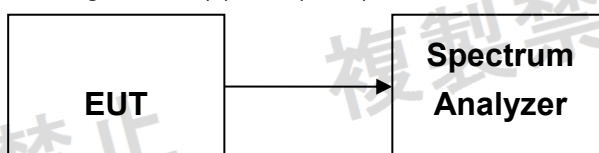


6.7 Occupied Bandwidth (99%)

Test Requirement: Item 19-3 of Article 2-1
20MHz or less for 20MHz system
40MHz or less for 40MHz system
80MHz or less for 80MHz system

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1) Test Conditions:

Spectrum Analyzer is used for measurement.

2) EUT conditions:

Modulation/Spread

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3) Spectrum Analyzer conditions:

Frequency: Test Frequency

Span 40 MHz

RBW Within 3% of the technical standard

VBW Same as RBW

Sweep Time Auto

detector mode Positive peak

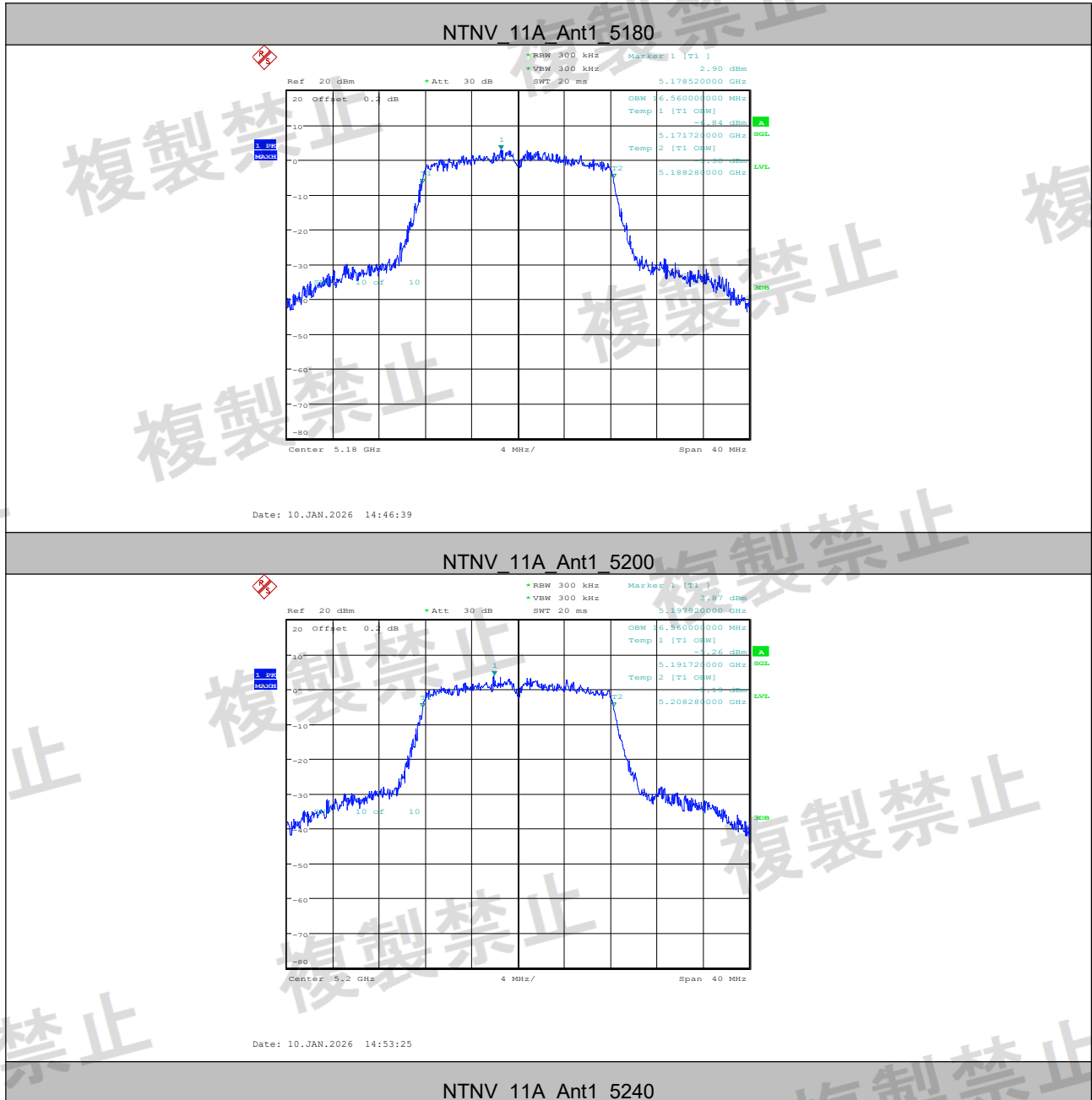
Indication mode Maxhold

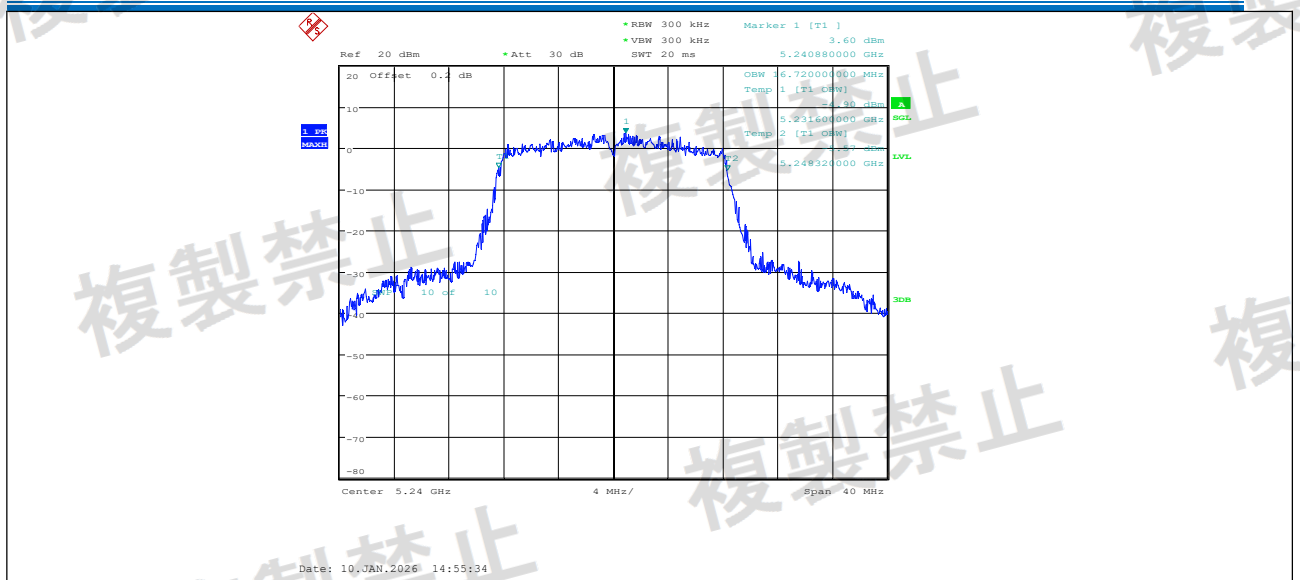
OBW 99%

Test result:

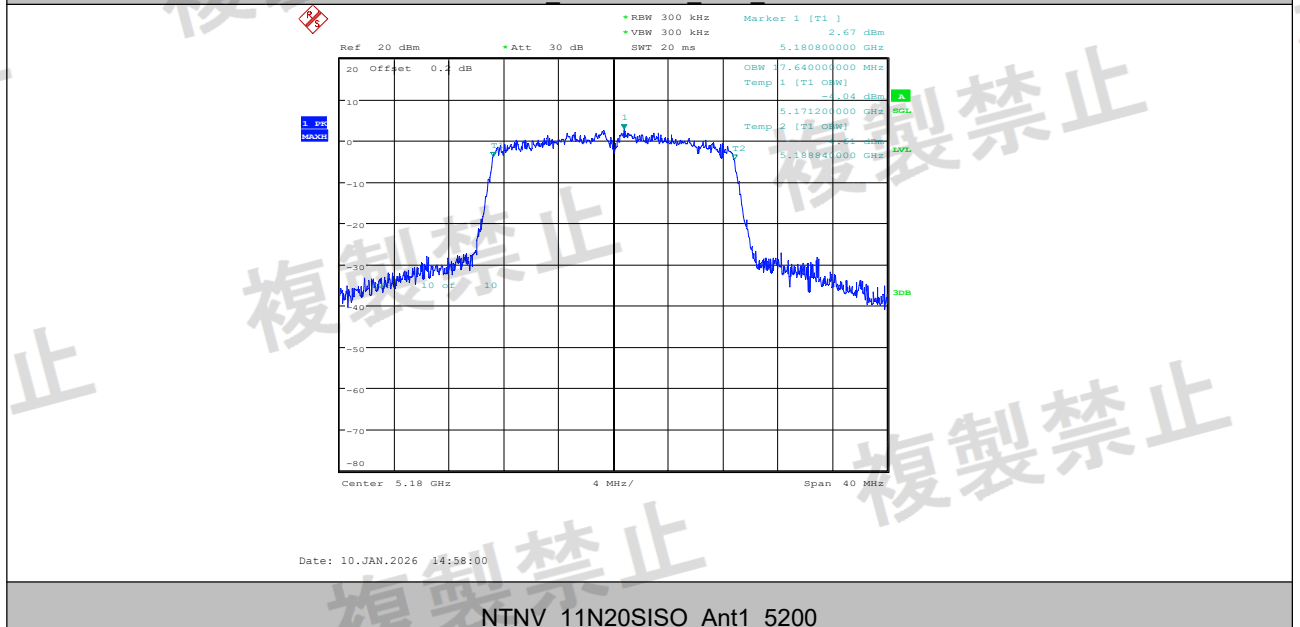
TestCondition	TestMode	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	11A	5180	16.560	≤20	PASS
		5200	16.560	≤20	PASS
		5240	16.720	≤20	PASS
	11N20SI SO	5180	17.640	≤20	PASS
		5200	17.640	≤20	PASS
		5240	17.640	≤20	PASS
	11N40SI SO	5190	35.920	≤40	PASS
		5230	35.920	≤40	PASS

Test plot as follows:

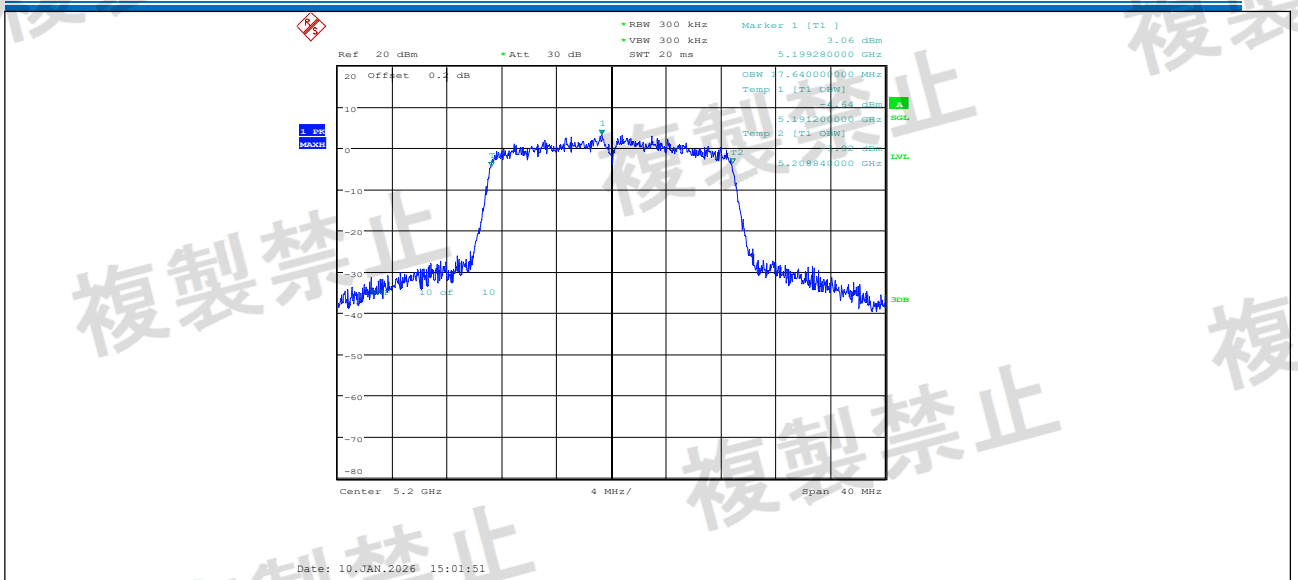




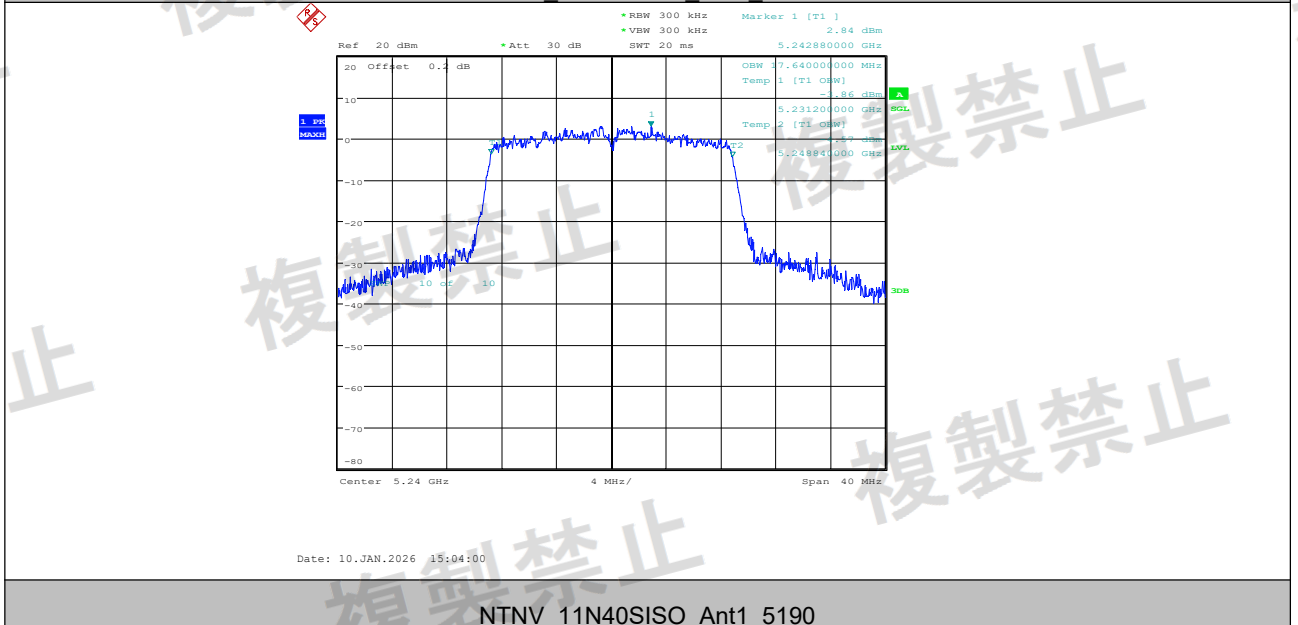
NTNV_11N20SISO Ant1 5180



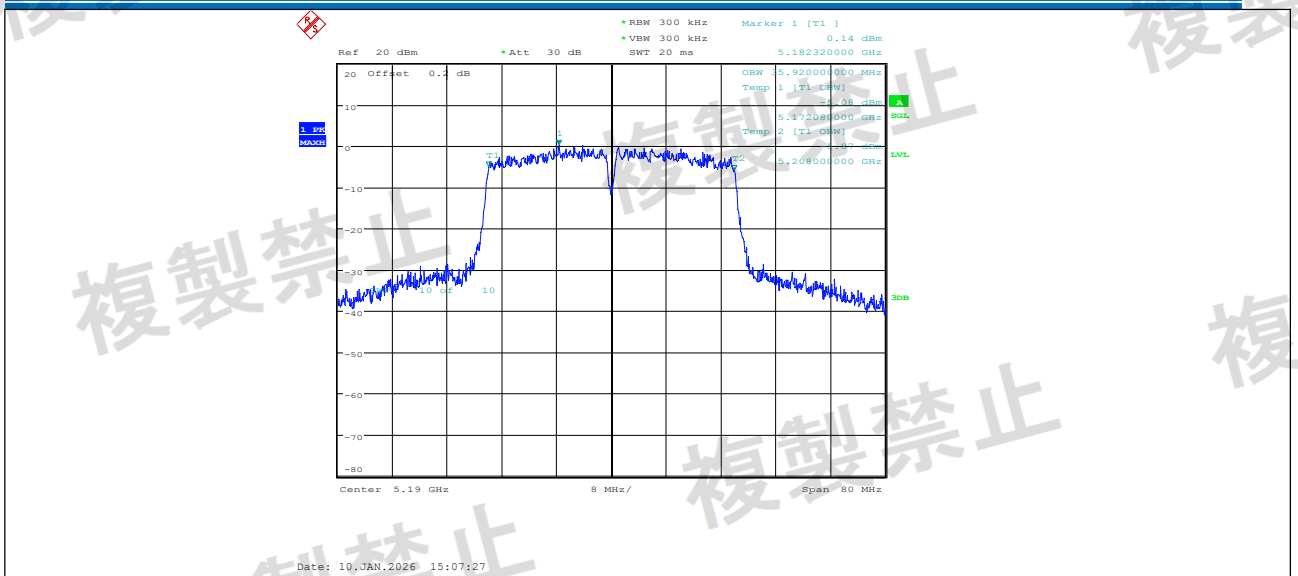
NTNV_11N20SISO Ant1 5200



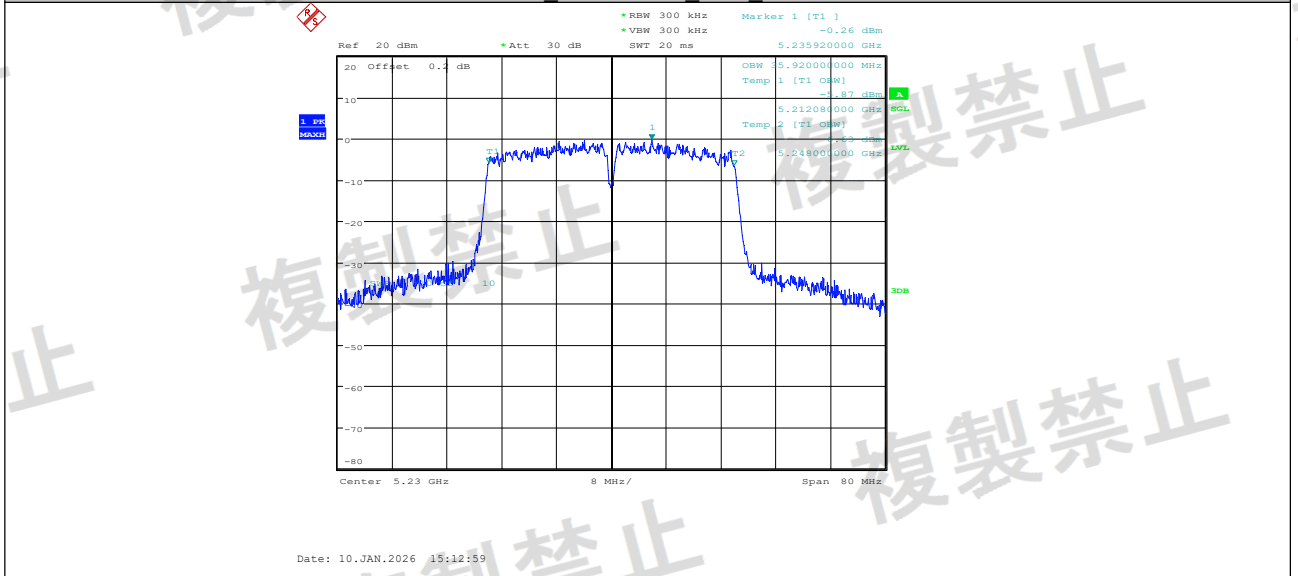
NTVN_11N20SISO Ant1 5240



NTVN_11N40SISO Ant1 5190



NTNV_11N40SISO Ant1 5230



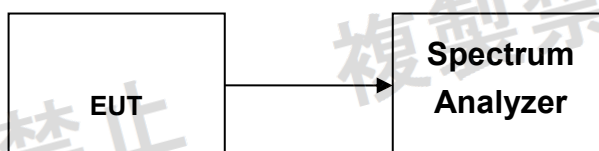
6.8 Antenna Power

Test Requirement: Item 19-3 of Article 2-1

(1) OFDM, DS :
OBW $\leq$ 20MHz: 10mW / MHz or less
Tolerance :
W52: +20% to -80%
W56: $\pm$ 50%

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1) Test Conditions:

Spectrum Analyzer is used for measurement.

2) EUT conditions:

Modulation/Spread

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3) Spectrum Analyzer conditions:

[Setting 1] – Search for peak power frequency

Frequency: Test Frequency

Span Approximately twice the occupied bandwidth

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

[Setting 2] – Measurement of average antenna power for OFDM, DSSS

Frequency: Frequency of peak power found using [Setting 1]

Span: 0 Hz

RBW: 1MHz

Detector mode: Sample

Sweep: Minimum time required to make an accurate measurement.

For burst type (intermittent) transmission, sweep time shall be greater than one burst interval

Sweep data points: 1001 or greater

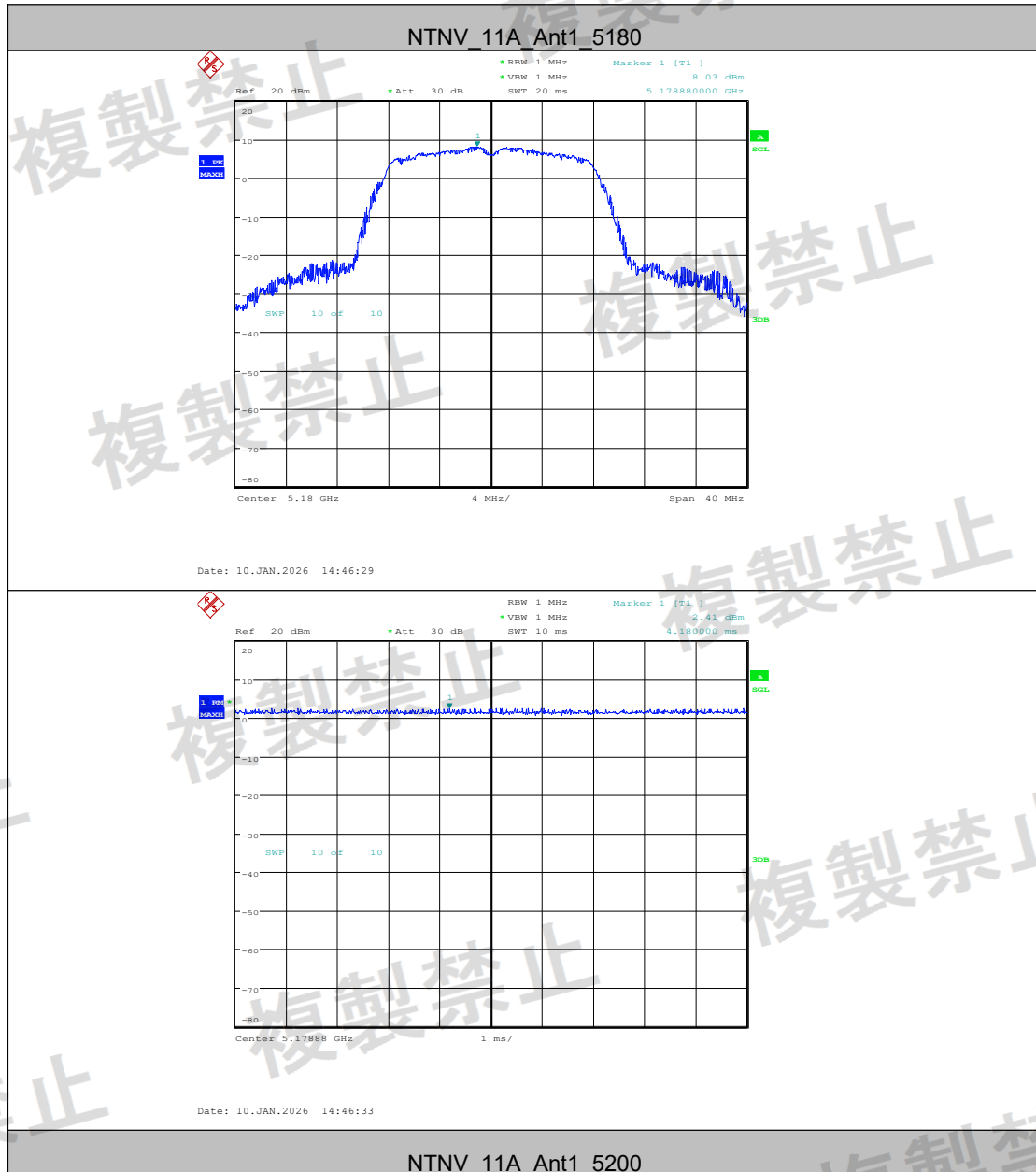
Test Data:

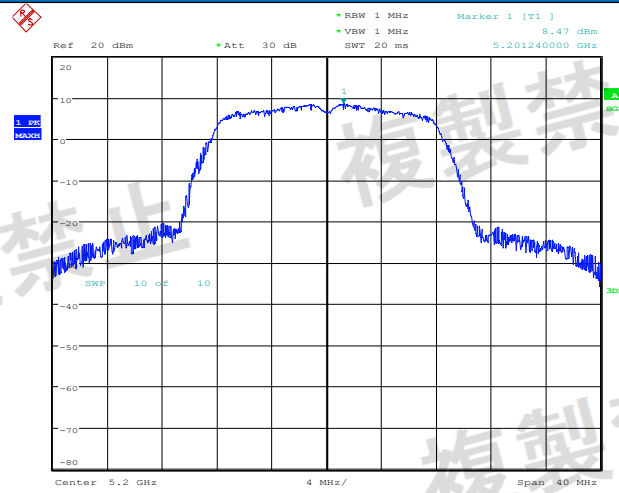
Antenna Power							
TestCondition	TestMode	Antenna	Freq(MHz)	Result(dBm/MHz)	Result(mW/MHz)	Limit(mW/MHz)	Verdict
NTNV	11A	Ant1	5180	2.41	1.7418	≤10	PASS
			5200	2.80	1.9055	≤10	PASS
			5240	2.96	1.9770	≤10	PASS
	11N20SI SO	Ant1	5180	1.95	1.5668	≤10	PASS
			5200	2.77	1.8923	≤10	PASS
			5240	2.57	1.8072	≤10	PASS
	11N40SI SO	Ant1	5190	0.26	1.0617	≤5	PASS
			5230	-0.51	0.8892	≤5	PASS

Tolerance								
Test Condition	Test Mode	Antenna	Freq(MHz)	Power (mW/MHz)	RatedPower (mW/MHz)	Result (%)	Limit (%)	Verdict
NTNV	11A	Ant1	5180	1.7418	1.7	2.46	-80 to +20	PASS
			5200	1.9055	1.7	12.09	-80 to +20	PASS
			5240	1.9770	1.7	16.29	-80 to +20	PASS
	11N20SI SO	Ant1	5180	1.5668	1.7	-7.84	-80 to +20	PASS
			5200	1.8923	1.7	11.31	-80 to +20	PASS
			5240	1.8072	1.7	6.31	-80 to +20	PASS
	11N40SI SO	Ant1	5190	1.0617	1.7	-37.55	-80 to +20	PASS
			5230	0.8892	1.7	-47.69	-80 to +20	PASS

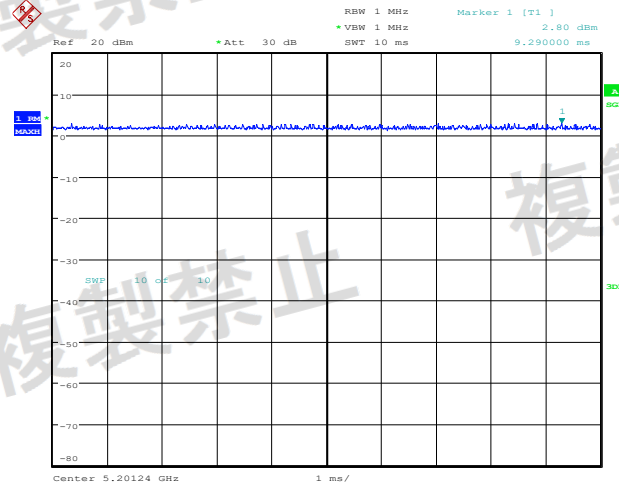
EIRP							
TestCondition	TestMode	Antenna	Freq(MHz)	Result(mW/MHz)	EIRP(mW/MHz)	Limit(mW/MHz)	Verdict
NTNV	11A	Ant1	5180	2.41	5.04	≤10	PASS
			5200	2.80	5.43	≤10	PASS
			5240	2.96	5.59	≤10	PASS
	11N20SI SO	Ant1	5180	1.95	4.58	≤10	PASS
			5200	2.77	5.4	≤10	PASS
			5240	2.57	5.2	≤10	PASS
	11N40SI SO	Ant1	5190	0.26	2.89	≤5	PASS
			5230	-0.51	2.12	≤5	PASS

Test plot as follows:



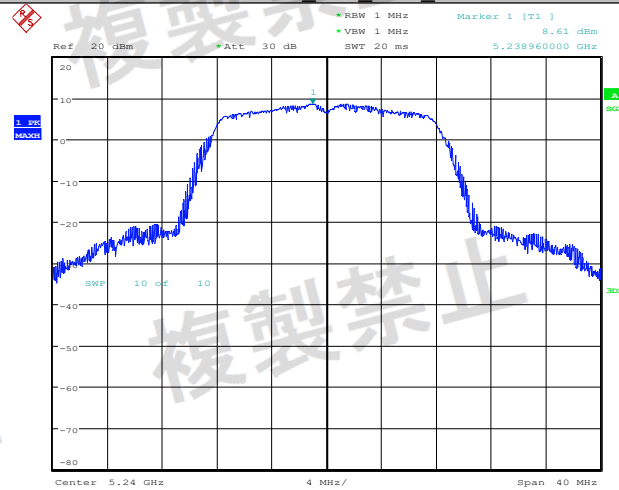


Date: 10.JAN.2026 14:53:14

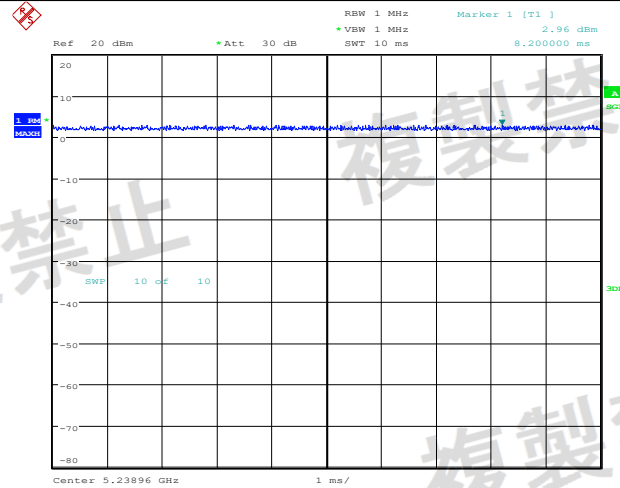


Date: 10.JAN.2026 14:53:18

NTNV_11A_Ant1_5240

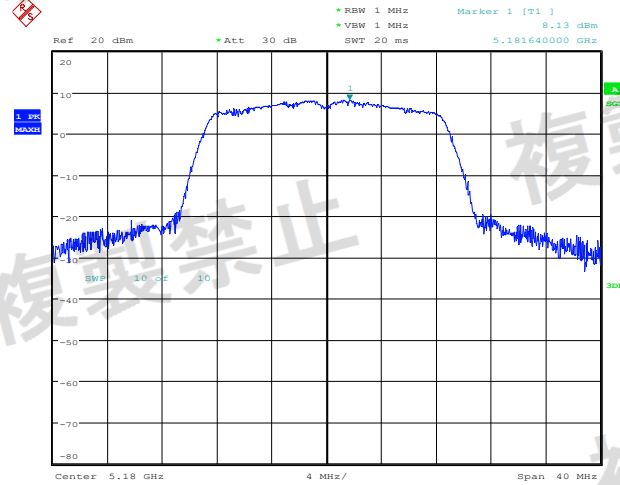


Date: 10.JAN.2026 14:55:23

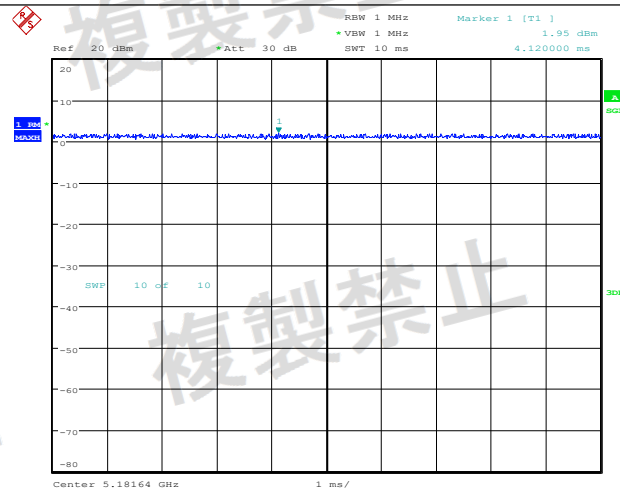


Date: 10.JAN.2026 14:55:27

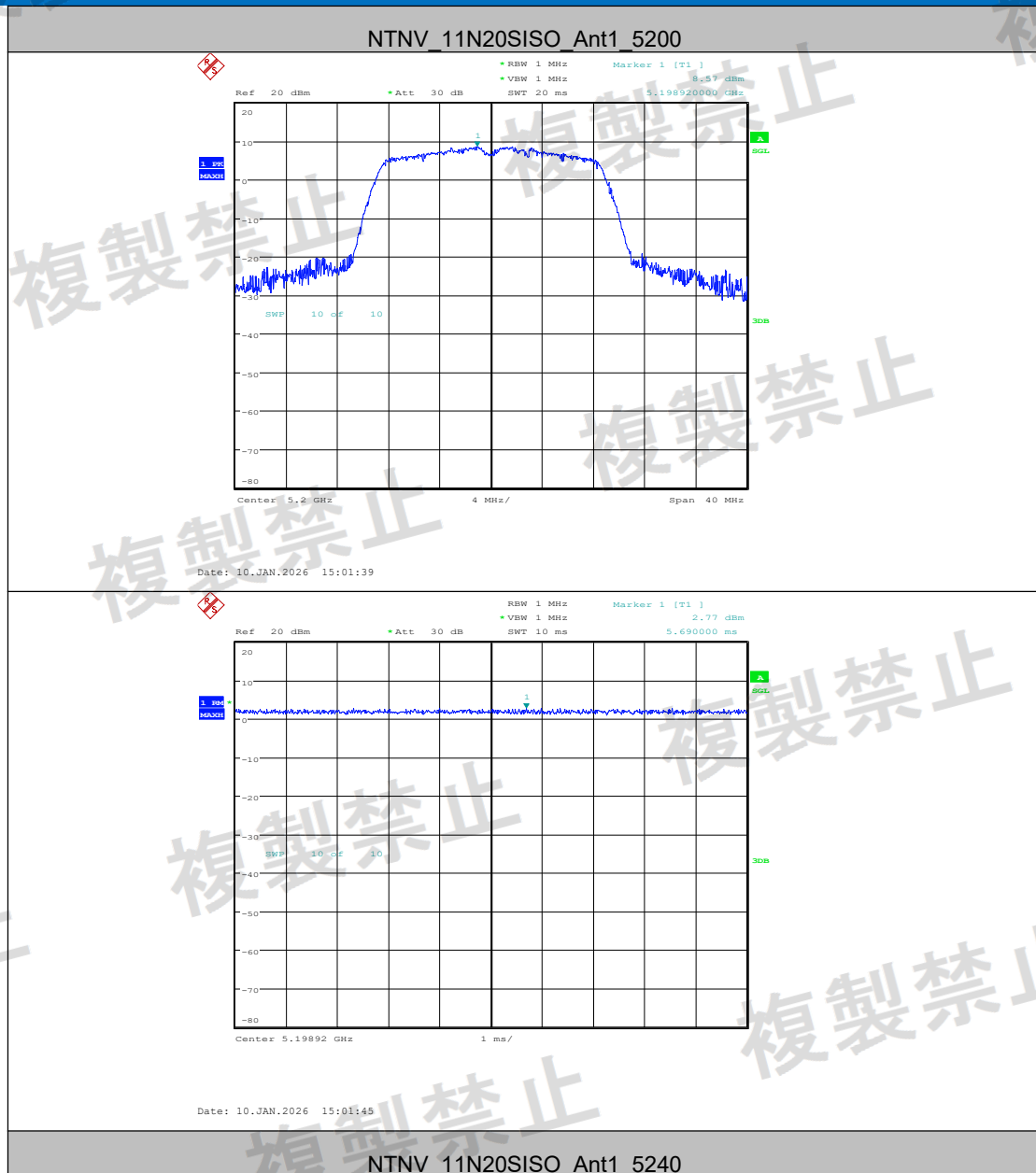
NTNV_11N20SISO Ant1 5180

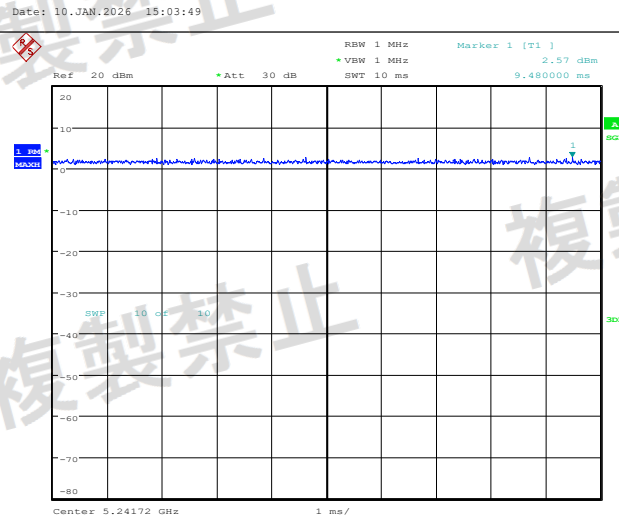
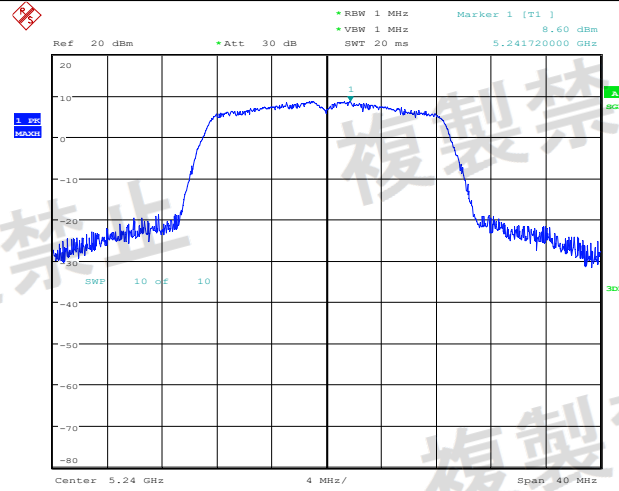


Date: 10.JAN.2026 14:57:49

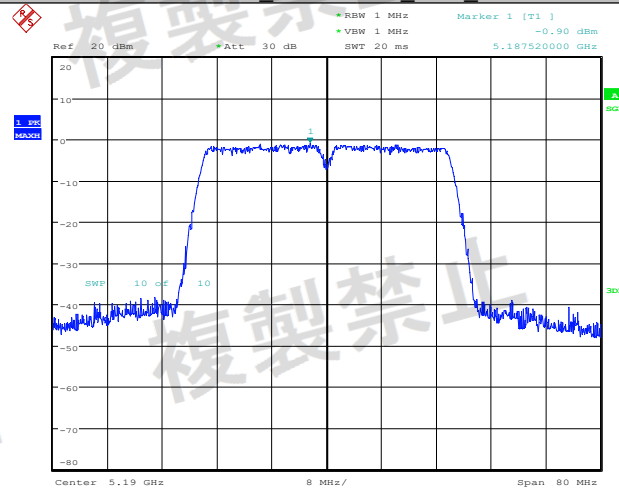


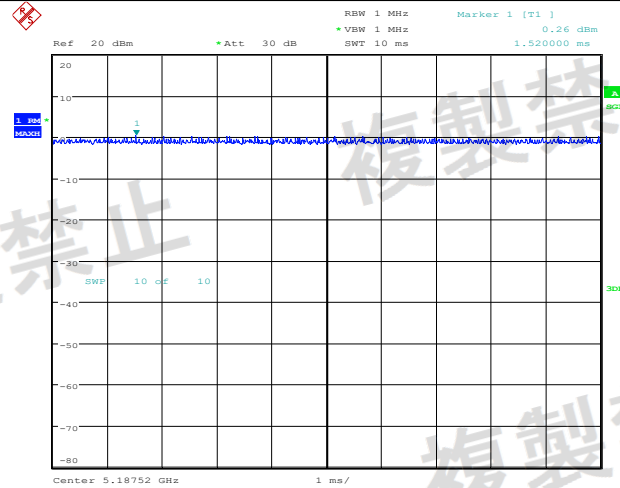
Date: 10.JAN.2026 14:57:53





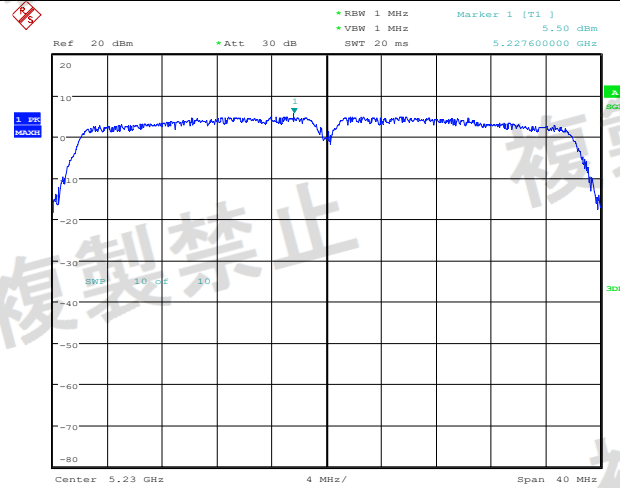
NTNV 11N40SISO Ant1 5190



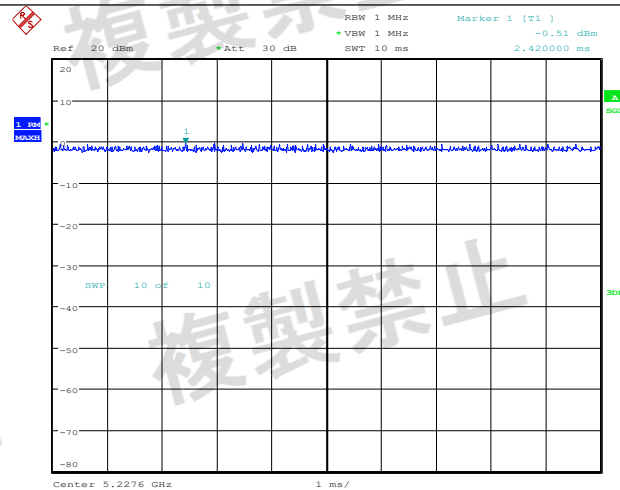


Date: 10.JAN.2026 15:07:20

NTNV_11N40SISO Ant1 5230



Date: 10.JAN.2026 15:12:47



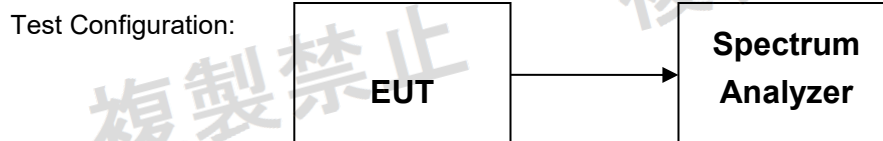
Date: 10.JAN.2026 15:12:52

6.9 Adjacent Channel Power Tolerance

Test Requirement: Item 19-3 of Article 2 Paragraph 1

$F_c \pm 20\text{MHz}$ $\pm 10\text{MHz BW} : -25\text{dBc}$
$F_c \pm 40\text{MHz}$ $\pm 10\text{MHz BW} : -40\text{dBc}$

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channels were selected for the final test as listed below.

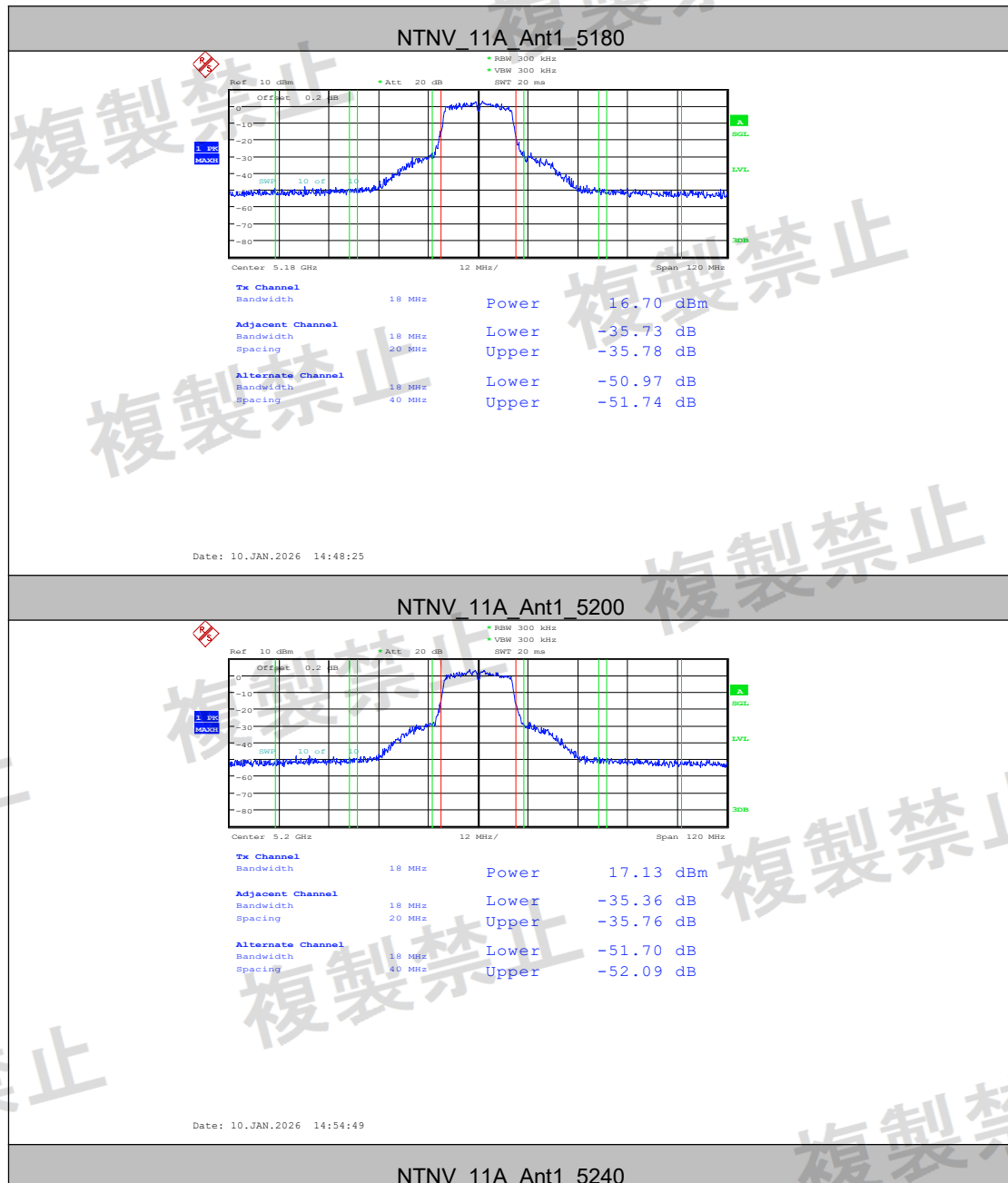


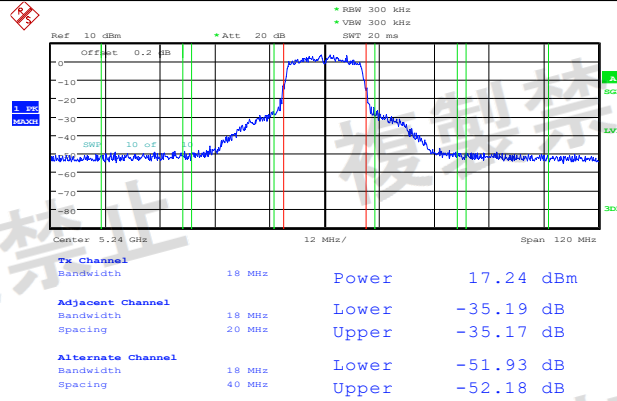
Test Procedure:

- 1) Test Conditions:
Power meter or Spectrum Analyzer is used for measurement.
- 2) EUT conditions:
Modulation/Spread
For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
- 3) Spectrum Analyzer conditions:
Frequency: Test Frequency
RBW 300kHz, VBW 300kHz
Span: 120MHz
Tx bandwidth 20MHz
Adjacent channel bandwidth 20MHz, Channel spacing 20MHz
Alternate channel bandwidth 20MHz, Channel spacing 40MHz
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold

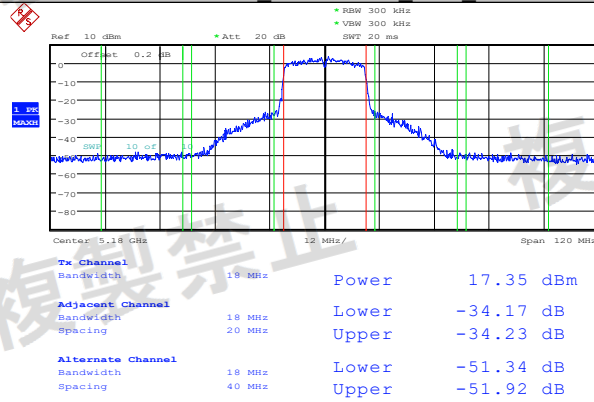
TestCondition	TestMode	Freq(MHz)	Offset [MHz]	Result [dBc]	Limit [dBc]	Verdict
NTNV	11A	5180	-40	-50.97	≤-40	PASS
			-20	-35.73	≤-25	PASS
			+20	-35.78	≤-25	PASS
			+40	-51.74	≤-40	PASS
		5200	-40	-51.70	≤-40	PASS
			-20	-35.36	≤-25	PASS
			+20	-35.76	≤-25	PASS
			+40	-52.09	≤-40	PASS
		5240	-40	-51.93	≤-40	PASS
			-20	-35.19	≤-25	PASS
			+20	-35.17	≤-25	PASS
			+40	-52.18	≤-40	PASS
	11N20SI SO	5180	-40	-51.34	≤-40	PASS
			-20	-34.17	≤-25	PASS
			+20	-34.23	≤-25	PASS
			+40	-51.92	≤-40	PASS
		5200	-40	-51.28	≤-40	PASS
			-20	-34.46	≤-25	PASS
			+20	-34.76	≤-25	PASS
			+40	-51.62	≤-40	PASS
		5240	-40	-51.80	≤-40	PASS
			-20	-34.33	≤-25	PASS
			+20	-34.47	≤-25	PASS
			+40	-52.08	≤-40	PASS
	11N40SI SO	5190	-80	-50.18	≤-40	PASS
			-40	-32.84	≤-25	PASS
			+40	-33.74	≤-25	PASS
			+80	-50.91	≤-40	PASS
		5230	-80	-50.29	≤-40	PASS
			-40	-33.86	≤-25	PASS
			+40	-34.81	≤-25	PASS
			+80	-50.63	≤-40	PASS

Test plot as follows:

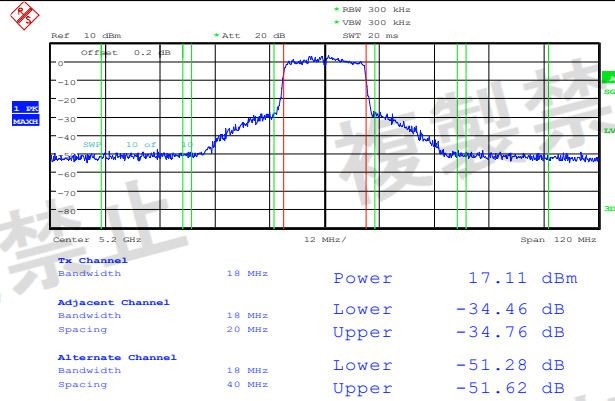




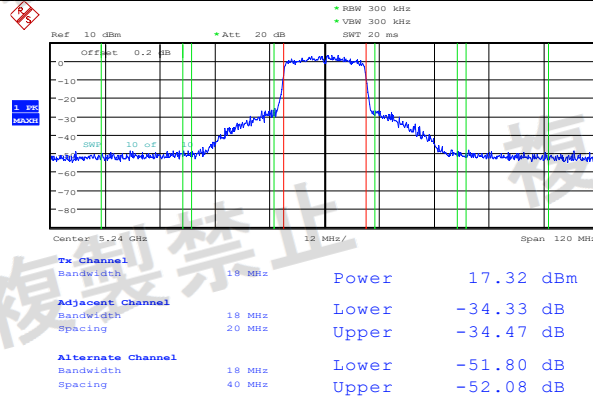
NTNV_11N20SISO_Ant1_5180



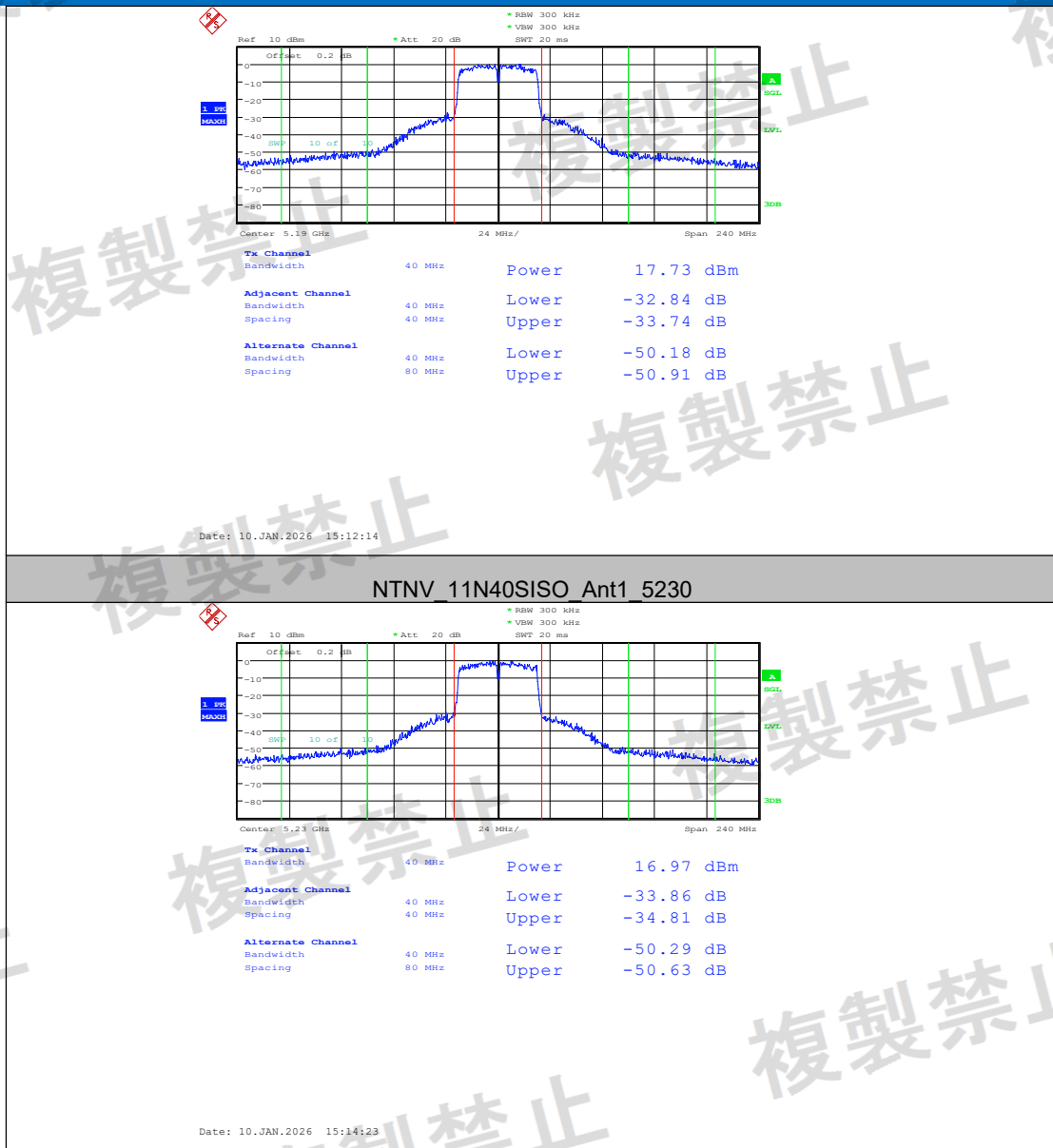
NTNV_11N20SISO_Ant1_5200



NTNV_11N20SISO Ant1_5240



NTNV_11N40SISO Ant1_5190



Test result: The unit does meet the requirements.

6.10 Spurious Emissions of TX

Test Requirement: Item 19-3 of Article 2-1

20MHz system	
OBW : 18MHz or less	OBW : 18 - 20 MHz
5,142 MHz or less : 2.5 μ W/MHz	5,142 MHz or less : 2.5 μ W/MHz
5,142 - 5,150 MHz : 15 μ W/MHz	5,142 - 5,150 MHz : 15 μ W/MHz
	5,250 - 5,250.2 MHz : $10^{1-(8/3)(f-9.75)}$ mW/MHz
5,250 - 5,251 MHz : $10^{1-(f-9)}$ mW/MHz	5,250.2 - 5,251 MHz : $10^{1-(f-9)}$ mW/MHz
5,251 - 5,260 MHz : $10^{1-(8/90)(f-11)}$ mW/MHz	5,251 - 5,260 MHz : $10^{1-(8/90)(f-11)}$ mW/MHz
5,260 - 5,266.7 MHz : $10^{1.8-(6/50)(f-20)}$ mW/MHz	5,260 - 5,266.7 MHz : $10^{1.8-(6/50)(f-20)}$ mW/MHz
5,266.7 MHz or more : 2.5 μ W/MHz	5,266.7 MHz or more : 2.5 μ W/MHz
f = MHz, Difference from 5240 (MHz)	f = MHz, Difference from 5240 (MHz)

40MHz system	80MHz system
5,141.6 MHz or less : 2.5 μ W/MHz	5,123.2 MHz or less : 2.5 μ W/MHz
5,141.6 - 5,150 MHz : 15 μ W/MHz	5,123.2 - 5,150 MHz : 15 μ W/MHz
5,250 - 5,251 MHz : $10^{-(f-20)+\log(1/2)}$ mW/MHz	5,250 - 5,251 MHz : $10^{-(f-40)+\log(1/4)}$ mW/MHz
5,251 - 5,270 MHz : $10^{-(8/190)(f-21)-1+\log(1/2)}$ mW/MHz	5,251 - 5,290 MHz : $10^{-(8/390)(f-41)-1+\log(1/4)}$ mW/MHz
5,270 - 5,278.4 MHz : $10^{-(3/50)(f-40)-1.8+\log(1/2)}$ mW/MHz	5,290 - 5,296.7 MHz : $10^{-(3/100)(f-80)-1.8+\log(1/4)}$ mW/MHz
5,278.4 MHz or more : 2.5 μ W/MHz	5,296.7 MHz or more : 2.5 μ W/MHz
f = MHz, Difference from 5230 (MHz)	f = MHz, Difference from 5210 (MHz)

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1) Test Conditions:

Spectrum Analyzer is used for measurement.

2) EUT conditions:

Modulation/Spread

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3) Spectrum Analyzer conditions:

Step 1

All spurious are measured from 30 MHz to 40 GHz by peak mode.

Step 2:

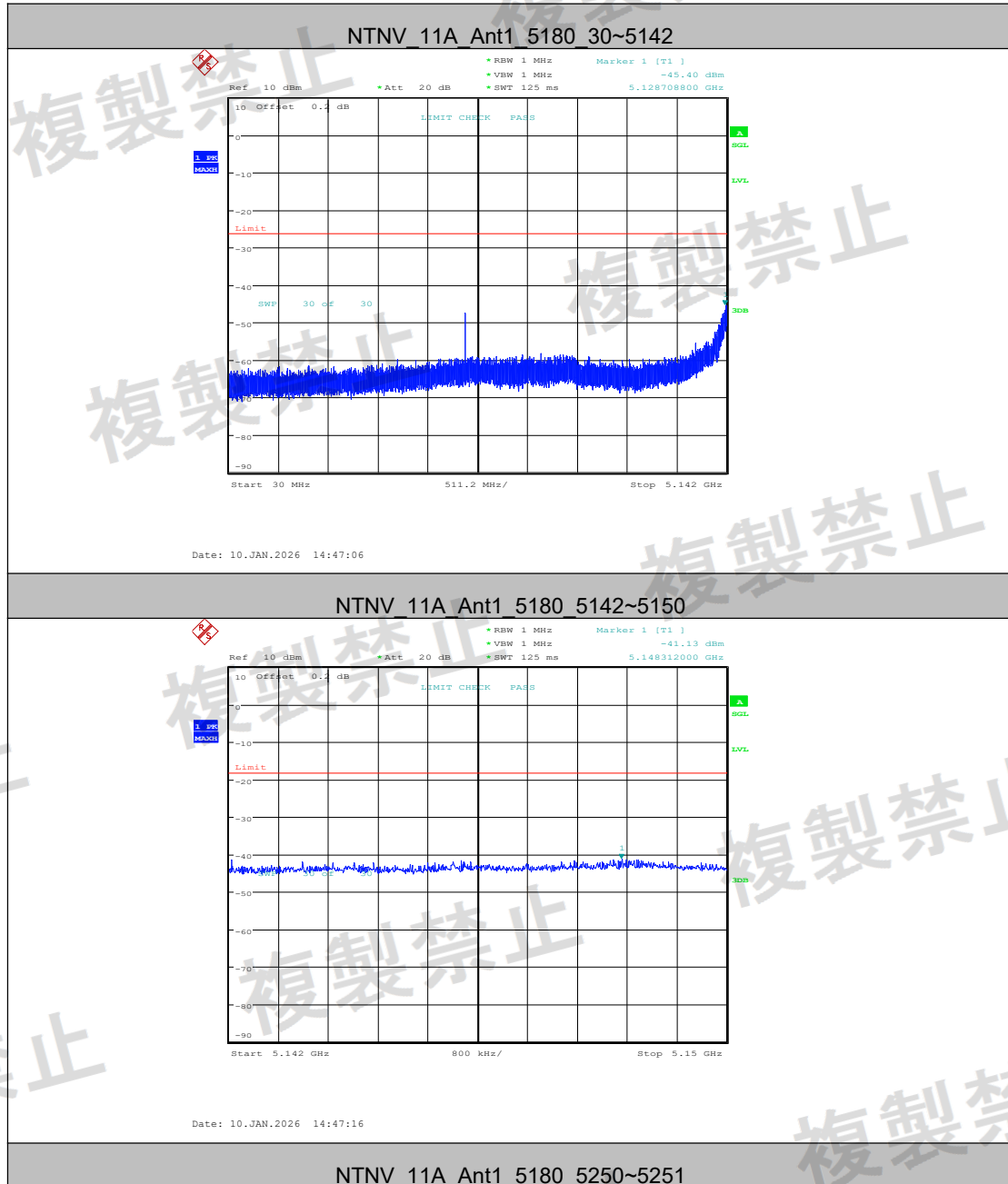
Frequency: Spurious Frequency
RBW 1 MHz
VBW 1 MHz
Sweep Time Auto
detector mode Sample
Indication mode Max hold

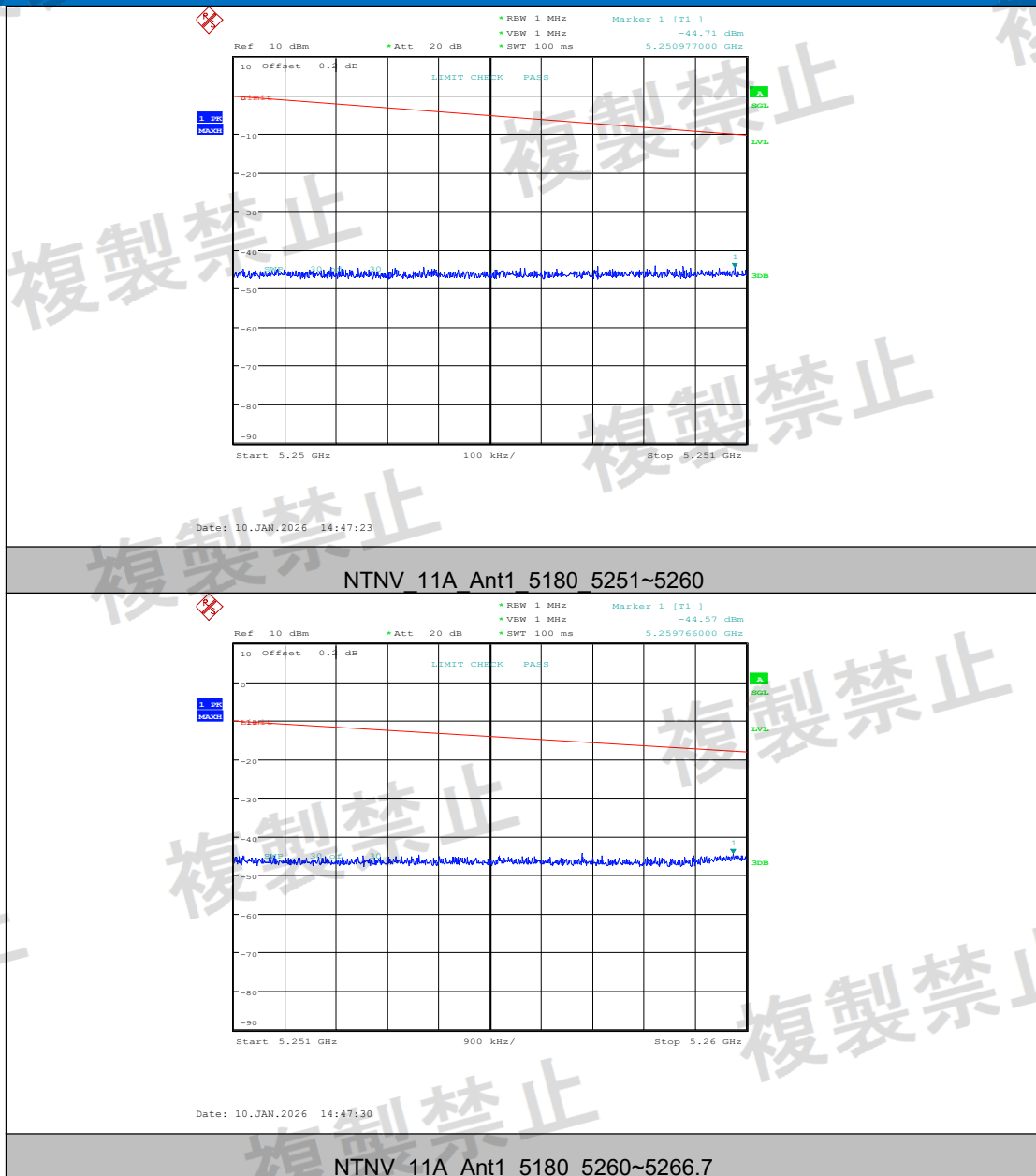
TestCondition	TestMode	Channel (MHz)	Freq.Range [MHz]	Freq. [MHz]	EIRP [dBm]	Result [μW]	Limit [μW]	Verdict
NTNV	11A	5180	30~5142	5128.71	- 45.40	0.02884	≤2.5	PASS
			5142~5150	5148.31	- 41.13	0.07709	≤15	PASS
			5250~5251	5250.98	- 44.71	0.03381	≤104.7	PASS
			5251~5260	5259.77	- 44.57	0.03491	≤16.6	PASS
			5260~5266.7	5266.18	- 45.27	0.02972	≤2.9	PASS
			5266.7~26000	5271.54	- 49.70	0.01072	≤2.5	PASS
		5200	30~5142	5127.52	- 46.04	0.02489	≤2.5	PASS
			5142~5150	5147.81	- 42.81	0.05236	≤15	PASS
			5250~5251	5250.98	- 43.90	0.04074	≤104.7	PASS
			5251~5260	5259.18	- 43.79	0.04178	≤18.7	PASS
			5260~5266.7	5266.63	- 44.77	0.03334	≤2.5	PASS
			5266.7~26000	5272.92	- 47.74	0.01683	≤2.5	PASS
		5240	30~5142	5139.10	- 50.36	0.00920	≤2.5	PASS
			5142~5150	5147.33	- 46.13	0.02438	≤15	PASS
			5250~5251	5251.00	- 18.50	14.1253 8	≤100.0	PASS
			5251~5260	5257.77	- 24.62	3.45144	≤25.0	PASS
			5260~5266.7	5260.04	- 30.82	0.82794	≤15.7	PASS

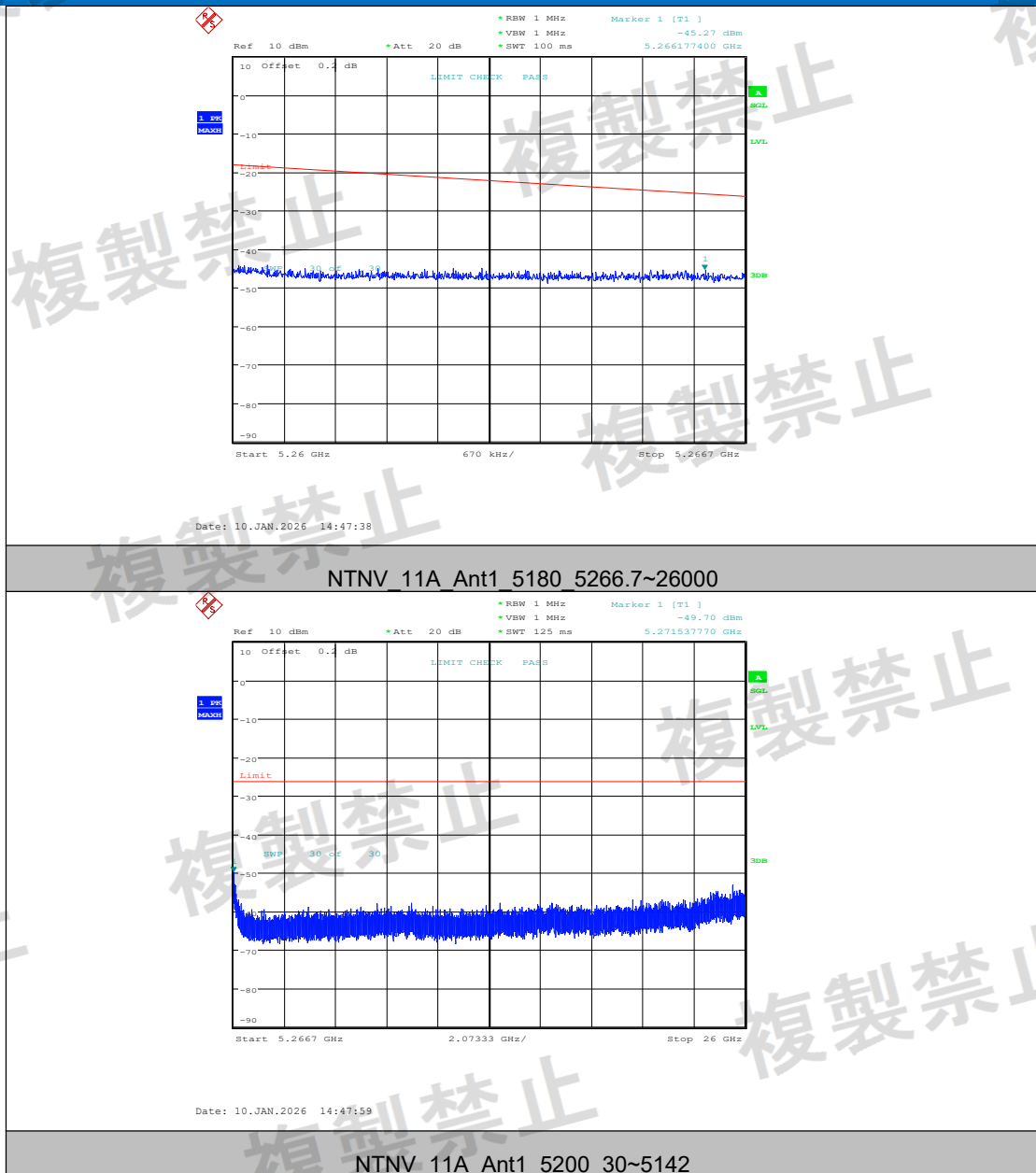
	11N20SI SO	5180	5266.7~26000	5268.08	- 45.59	0.02761	≤2.5	PASS
			30~5142	2410.83	- 42.31	0.05875	≤2.5	PASS
			5142~5150	5149.90	- 38.90	0.12882	≤15	PASS
			5250~5251	5250.98	- 44.32	0.03698	≤104.7	PASS
			5251~5260	5259.91	- 44.43	0.03606	≤16.1	PASS
			5260~5266.7	5266.15	- 45.12	0.03076	≤2.9	PASS
			5266.7~26000	5269.46	- 49.10	0.01230	≤2.5	PASS
		5200	30~5142	2412.19	- 40.79	0.08337	≤2.5	PASS
			5142~5150	5147.84	- 42.14	0.06109	≤15	PASS
			5250~5251	5250.93	- 43.16	0.04831	≤117.5	PASS
			5251~5260	5259.74	- 43.76	0.04207	≤16.7	PASS
			5260~5266.7	5266.69	- 43.84	0.04130	≤2.5	PASS
			5266.7~26000	5268.08	- 47.32	0.01854	≤2.5	PASS
		5240	30~5142	2432.30	- 42.21	0.06012	≤2.5	PASS
			5142~5150	5146.12	- 46.33	0.02328	≤15	PASS
			5250~5251	5250.01	-8.29	148.251 81	≤977.2	PASS
			5251~5260	5259.96	- 24.61	3.45939	≤16.0	PASS
			5260~5266.7	5260.60	- 24.80	3.31131	≤13.4	PASS
			5266.7~26000	5271.54	-	0.03119	≤2.5	PASS

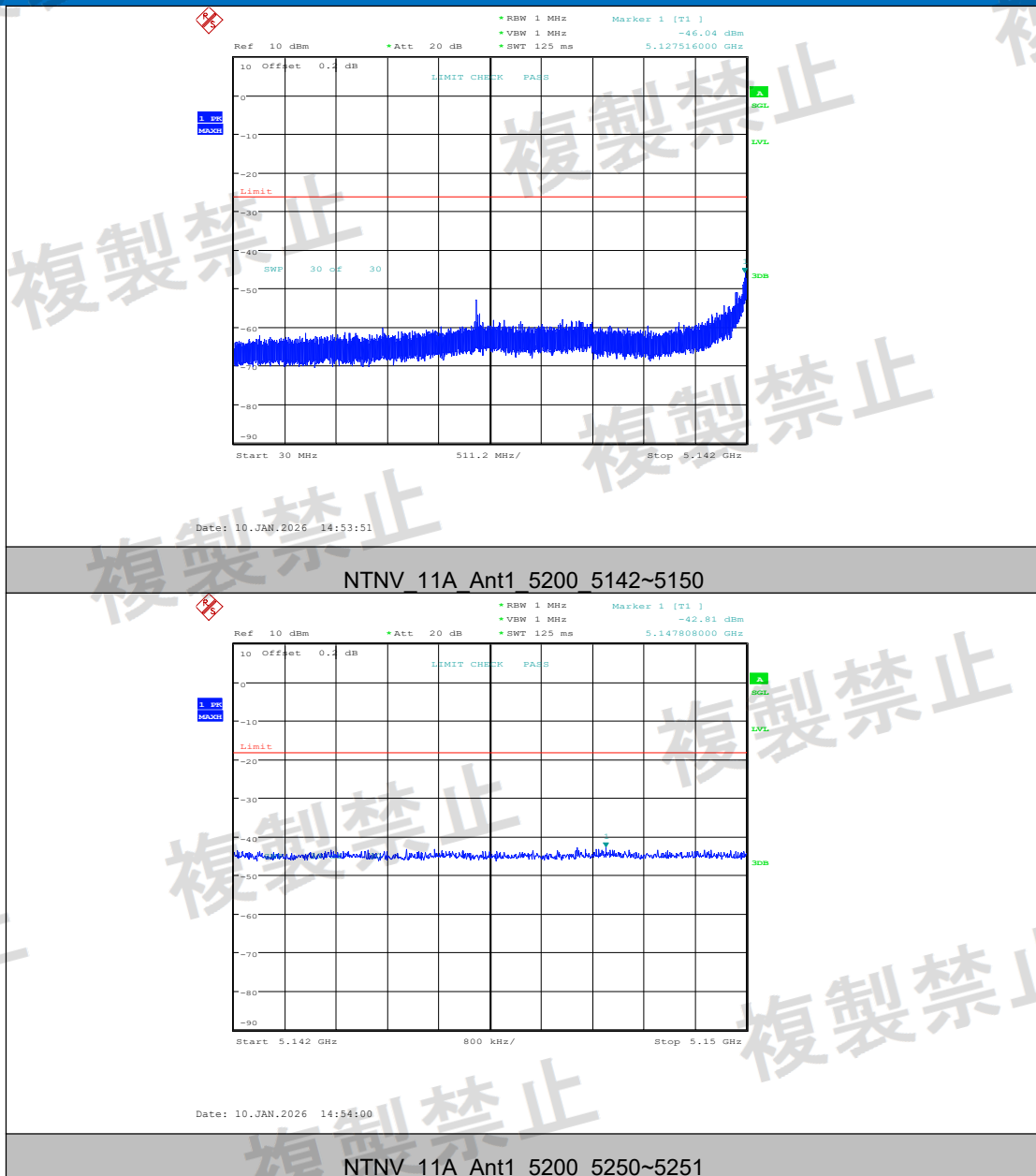
					45.06			
			30~5141.6	5141.60	- 37.08	0.19588	≤2.5	PASS
			5141.6~5150	5150.00	- 28.16	1.52757	≤15	PASS
		5190	5250~5251	5250.98	- 42.47	0.05662	≤52.4	PASS
			5251~5270	5269.28	- 43.80	0.04169	≤8.5	PASS
			5270~5278.4	5278.36	- 46.10	0.02455	≤2.5	PASS
			5278.4~26000	5281.85	- 47.57	0.01750	≤2.5	PASS
	11N40SI SO		30~5141.6	2453.75	- 47.21	0.01901	≤2.5	PASS
			5141.6~5150	5145.25	- 43.81	0.04159	≤15	PASS
		5230	5250~5251	5251.00	- 23.86	4.11150	≤50	PASS
			5251~5270	5265.73	- 27.35	1.84077	≤12.0	PASS
			5270~5278.4	5273.98	- 32.74	0.53211	≤4.6	PASS
			5278.4~26000	5278.40	- 43.10	0.04898	≤2.5	PASS

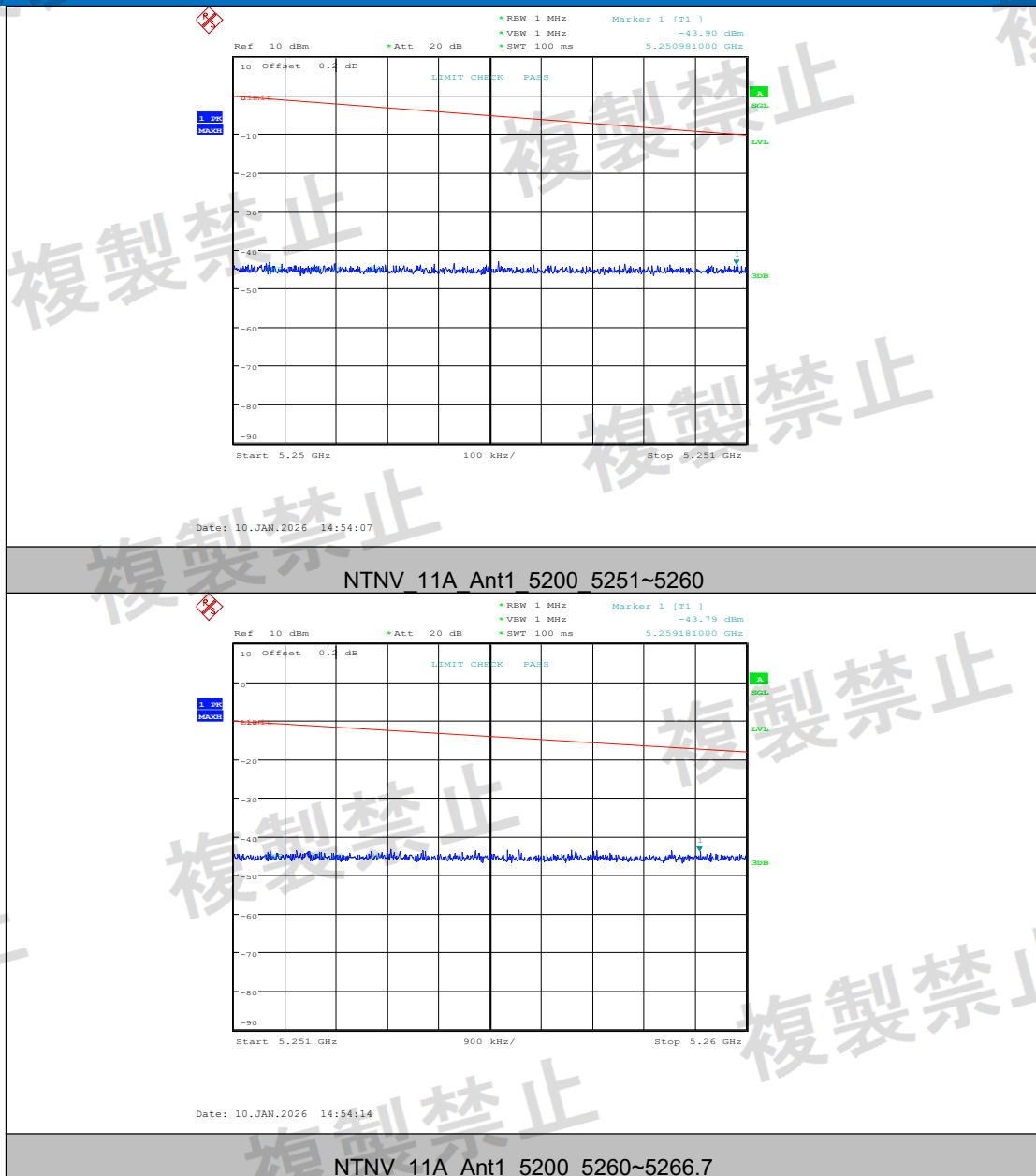
Test plot as follows:

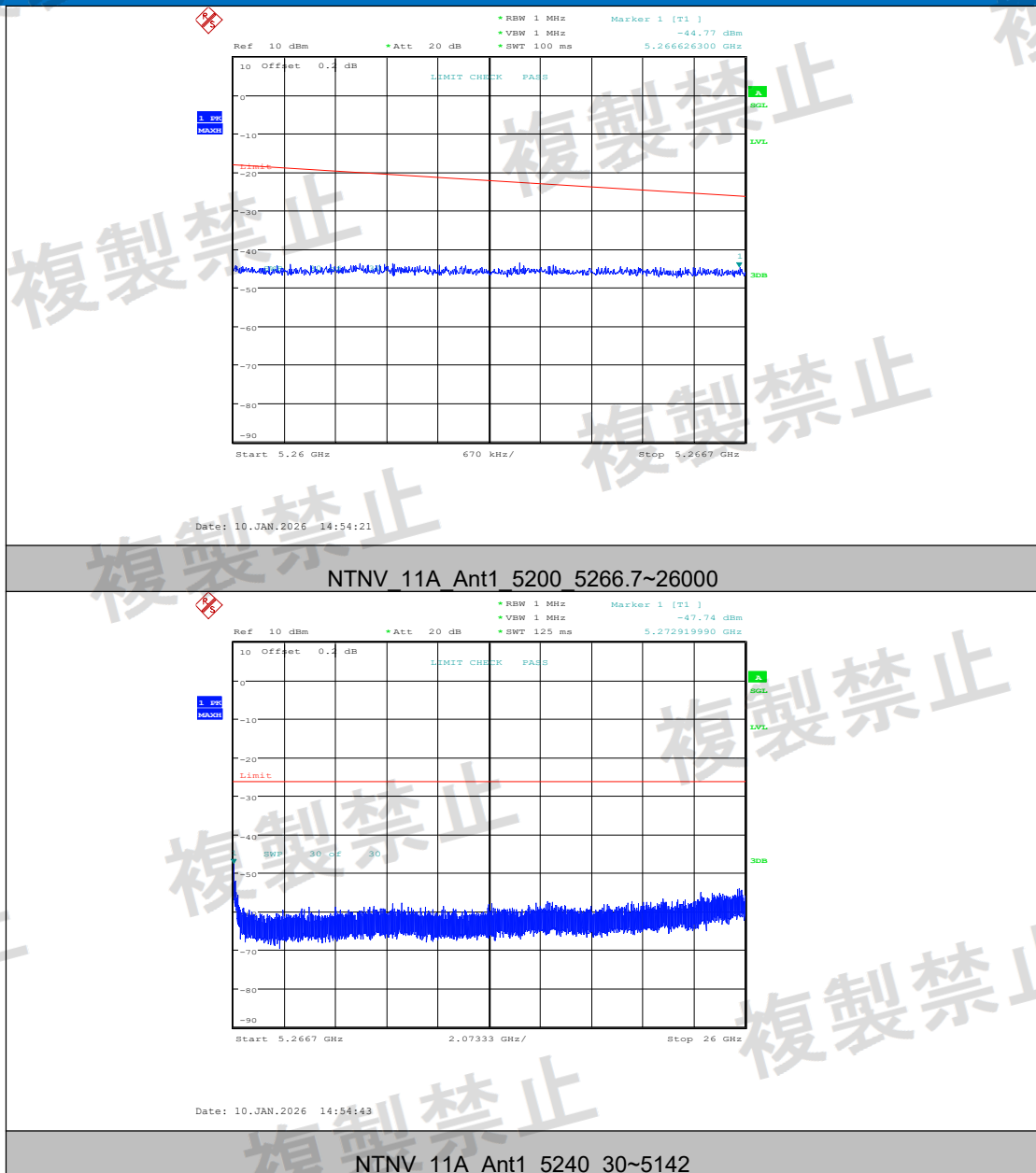


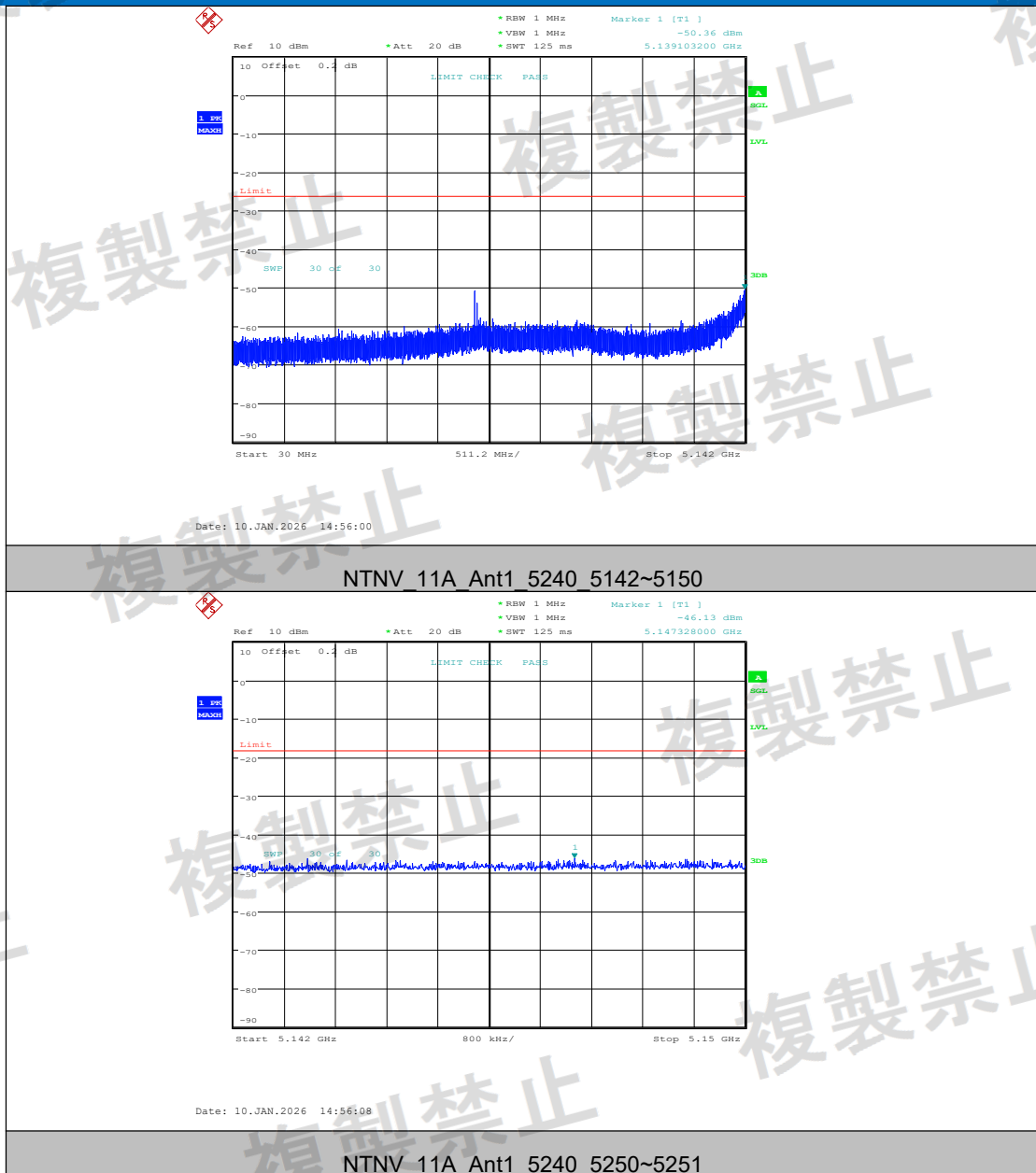


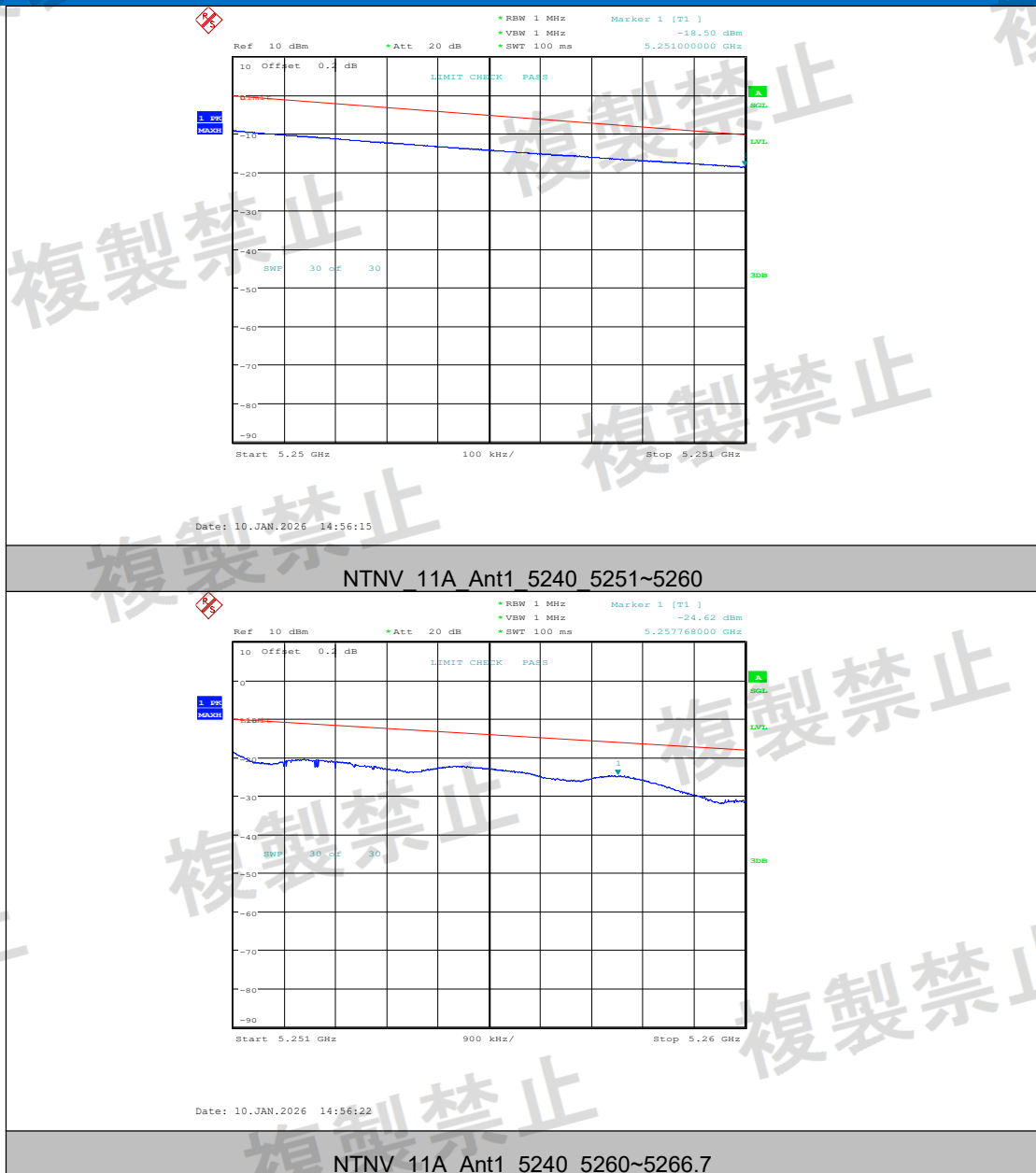


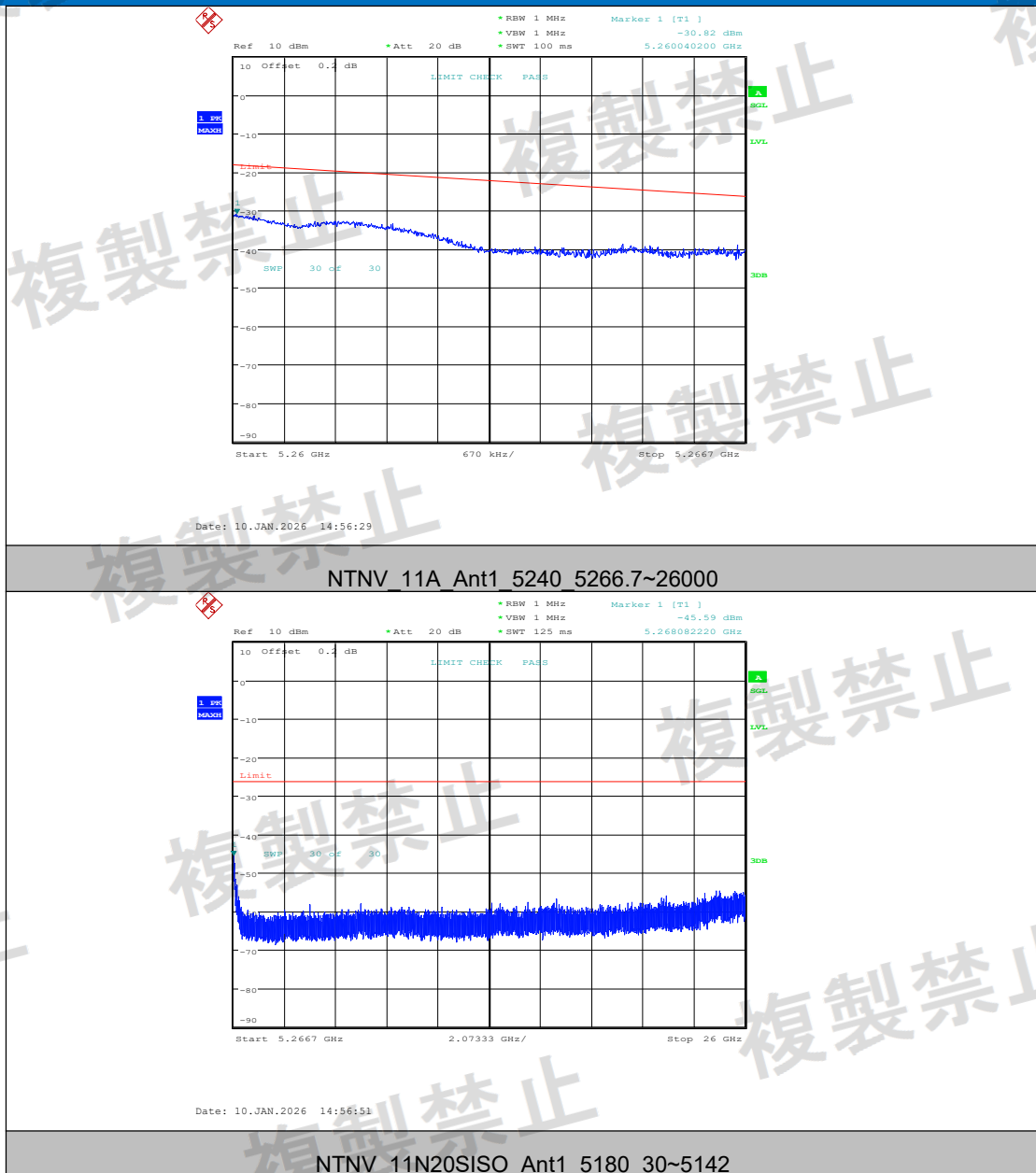


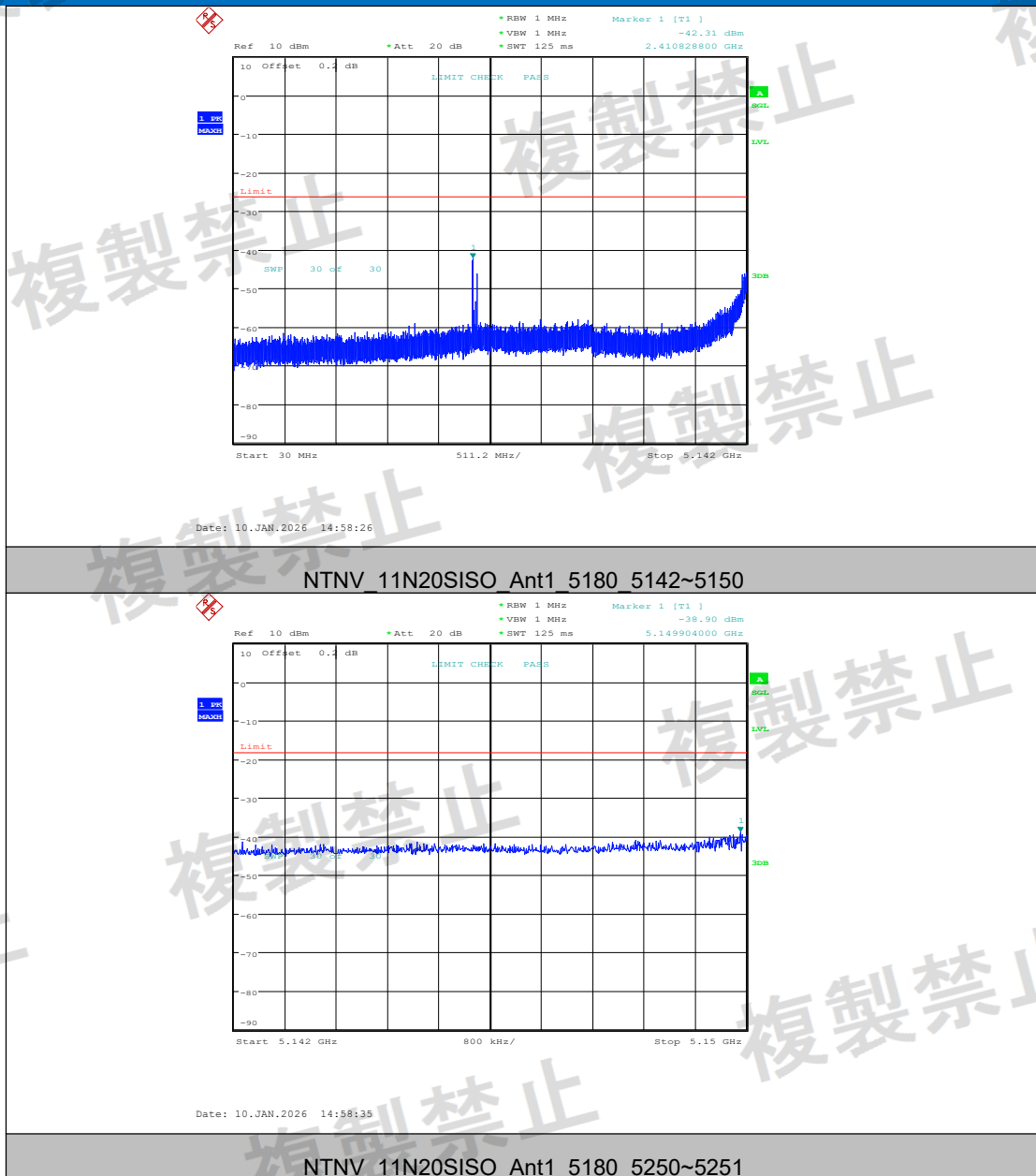


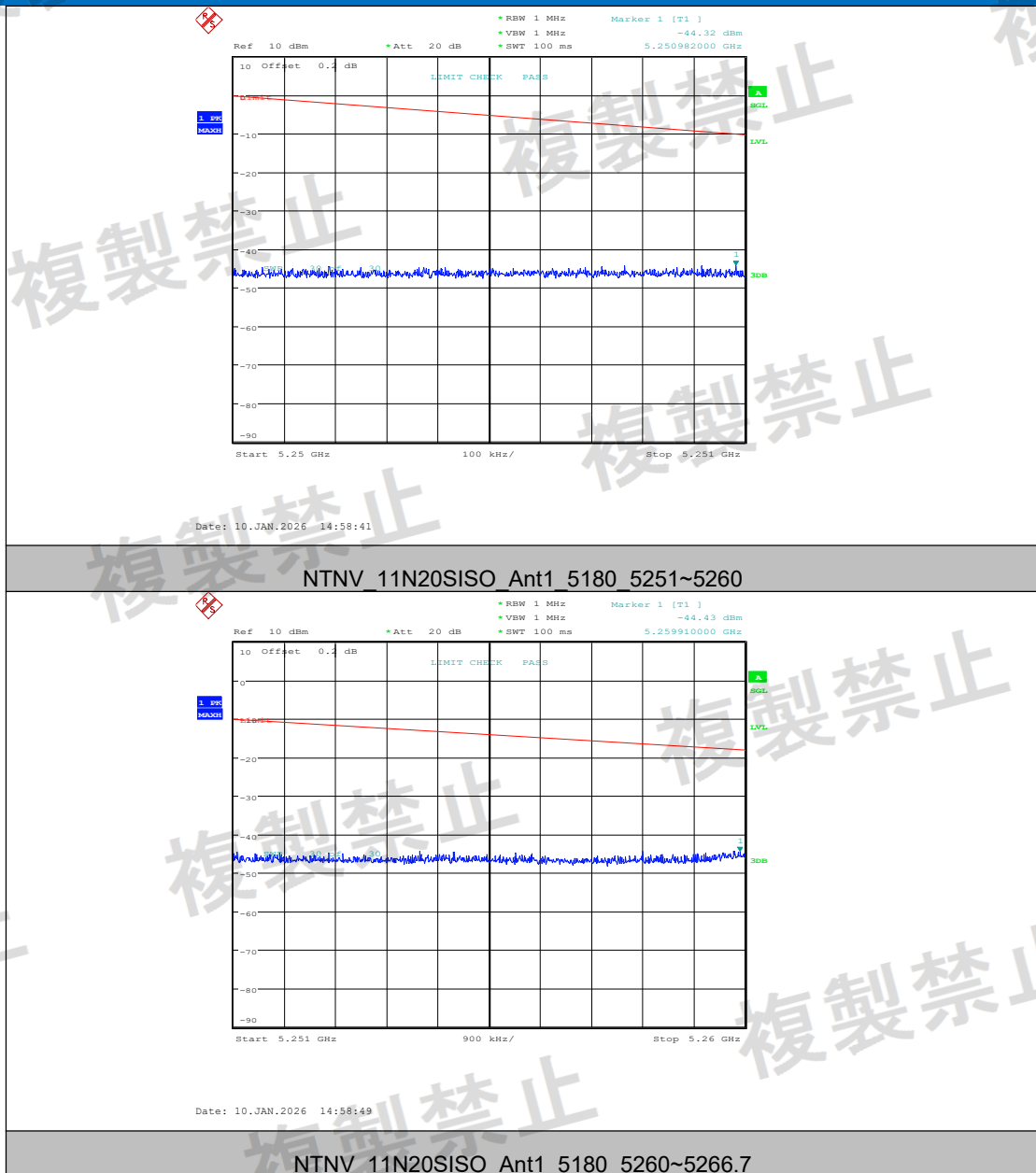


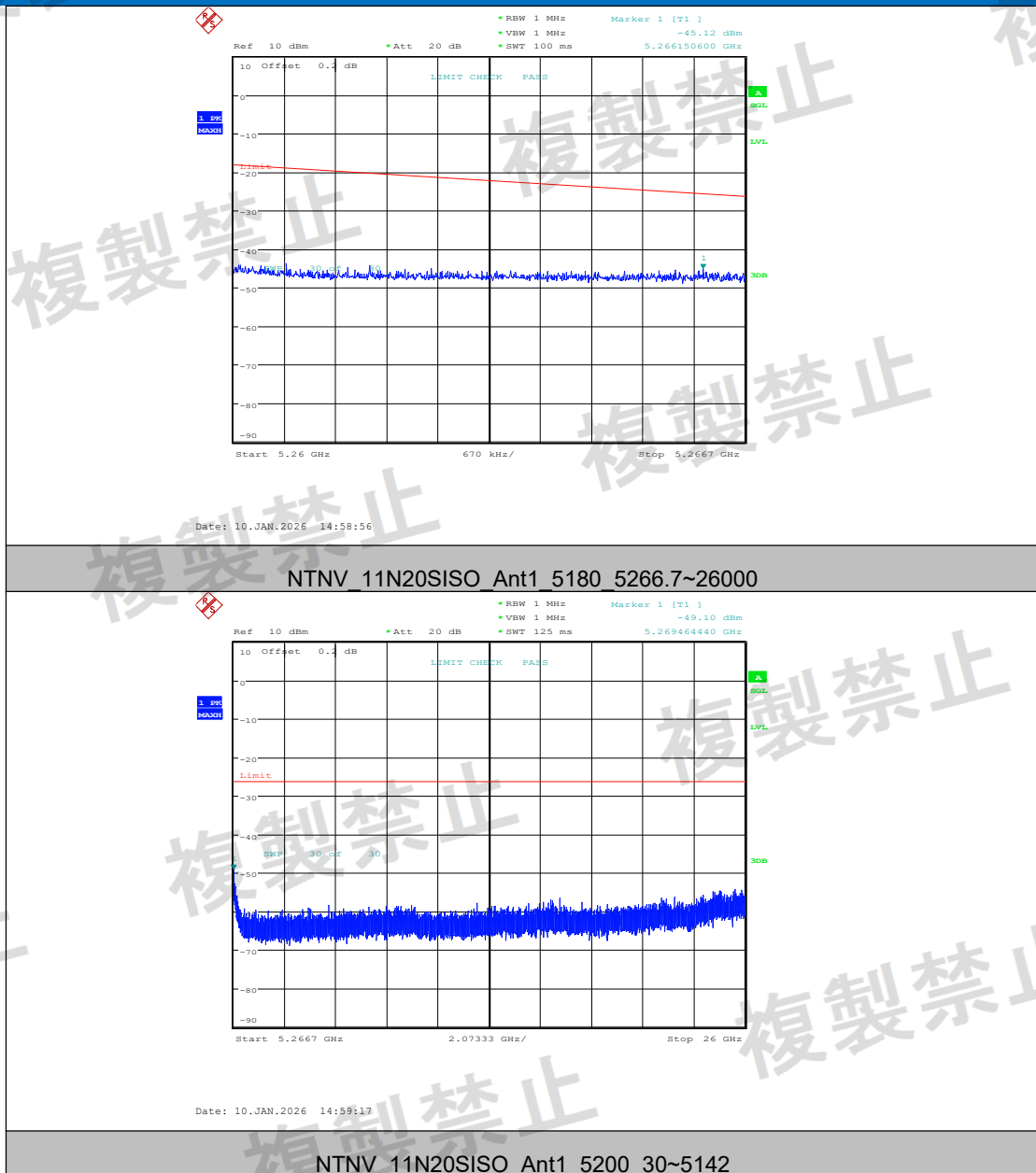


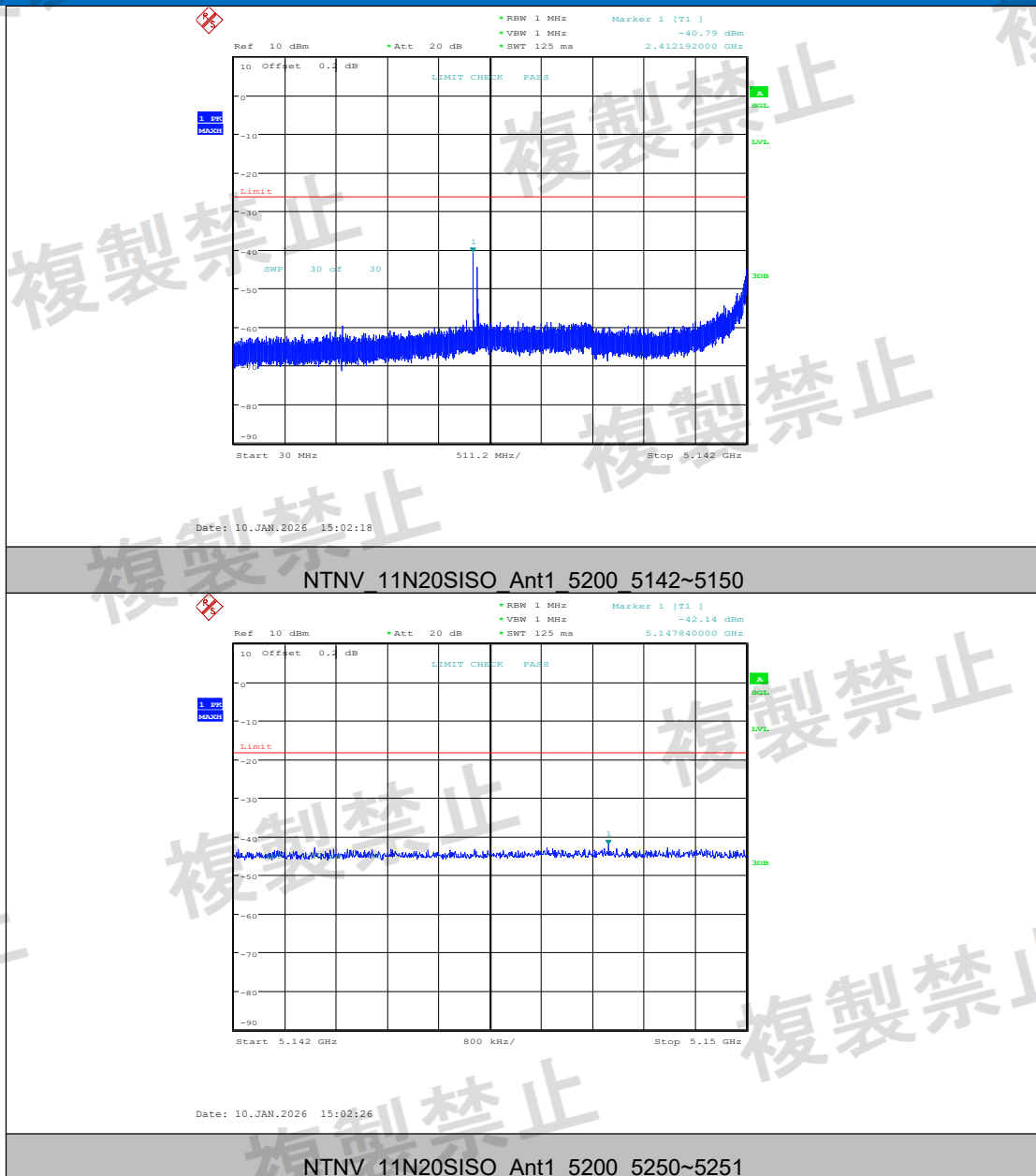


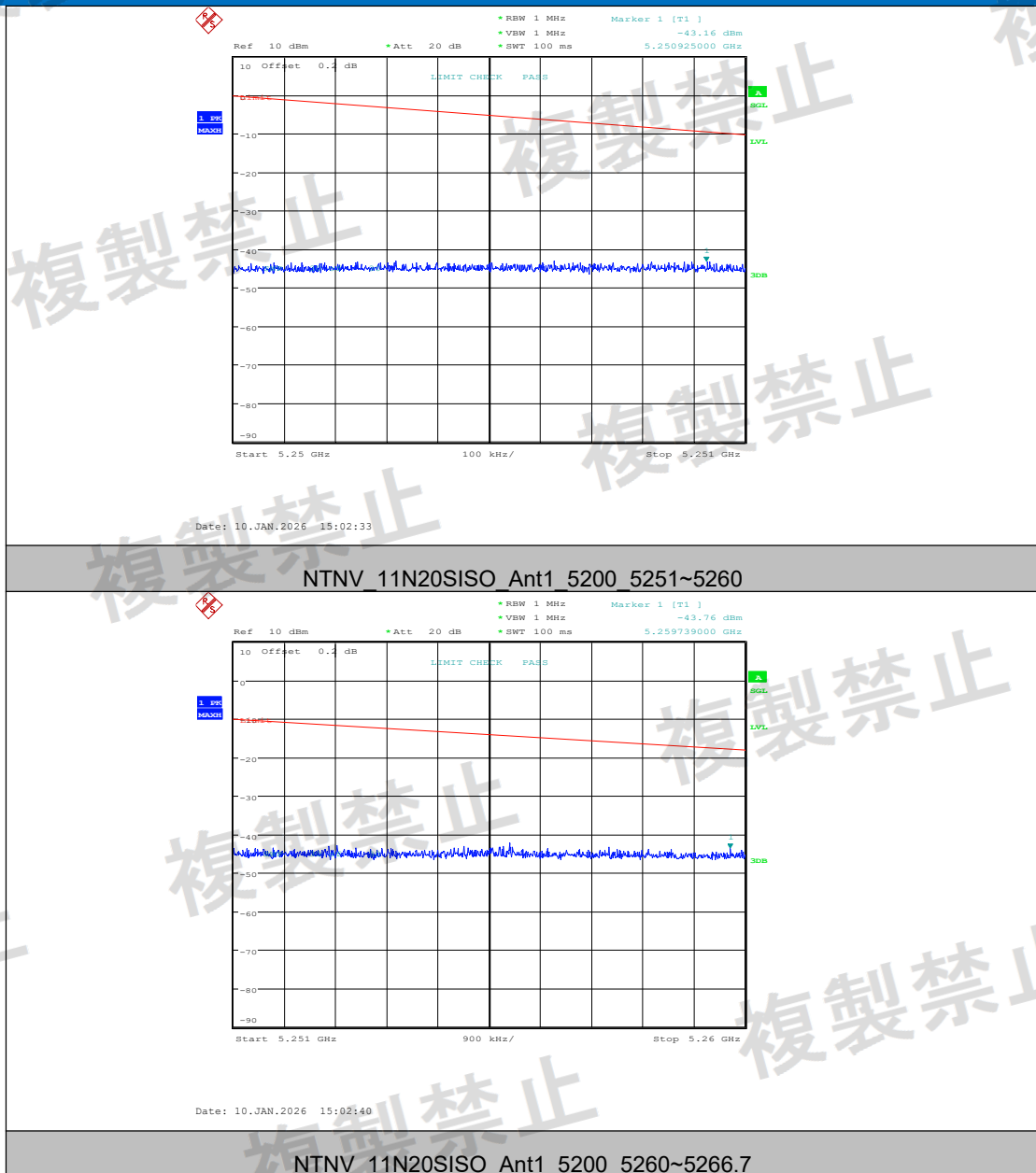


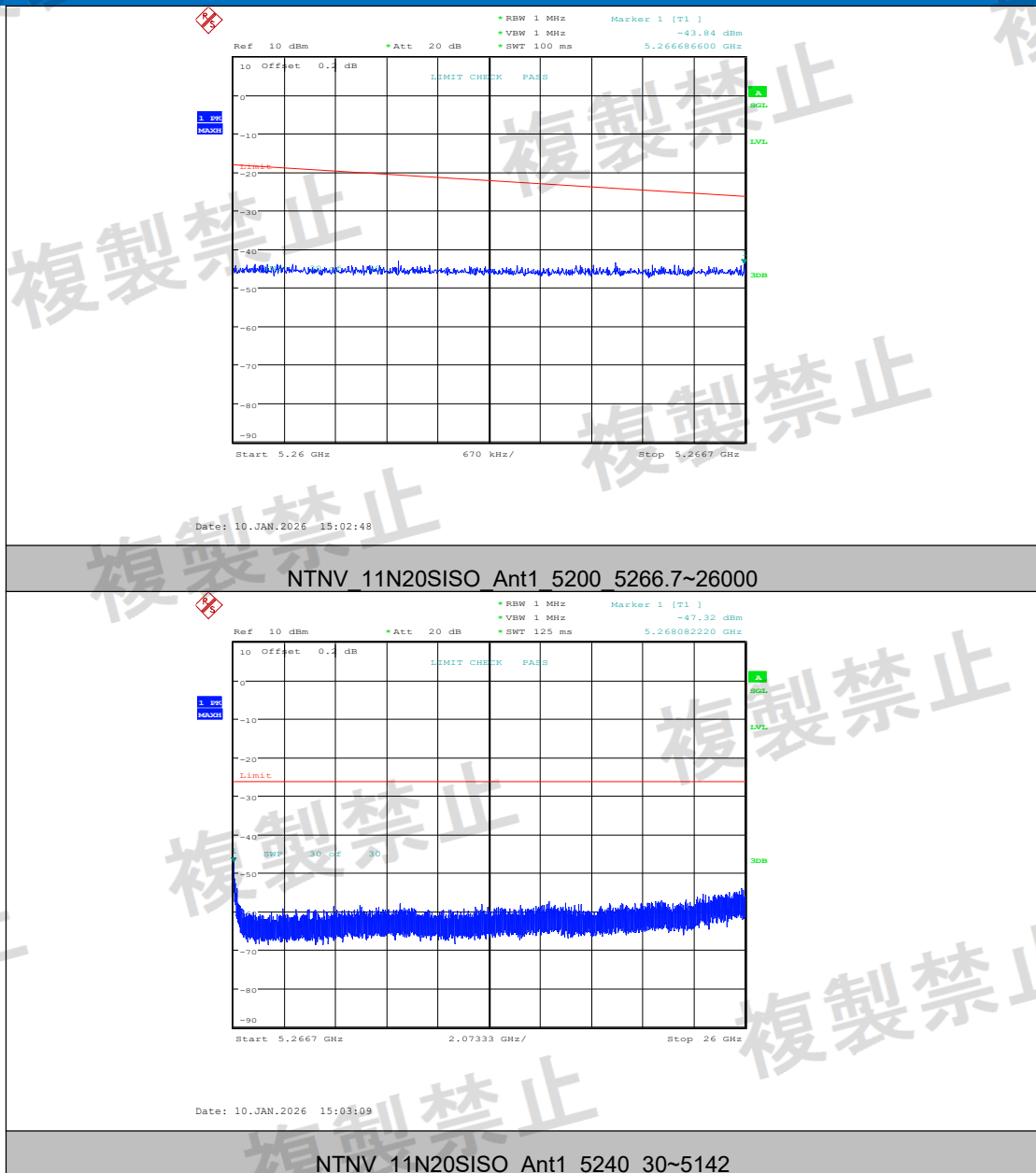


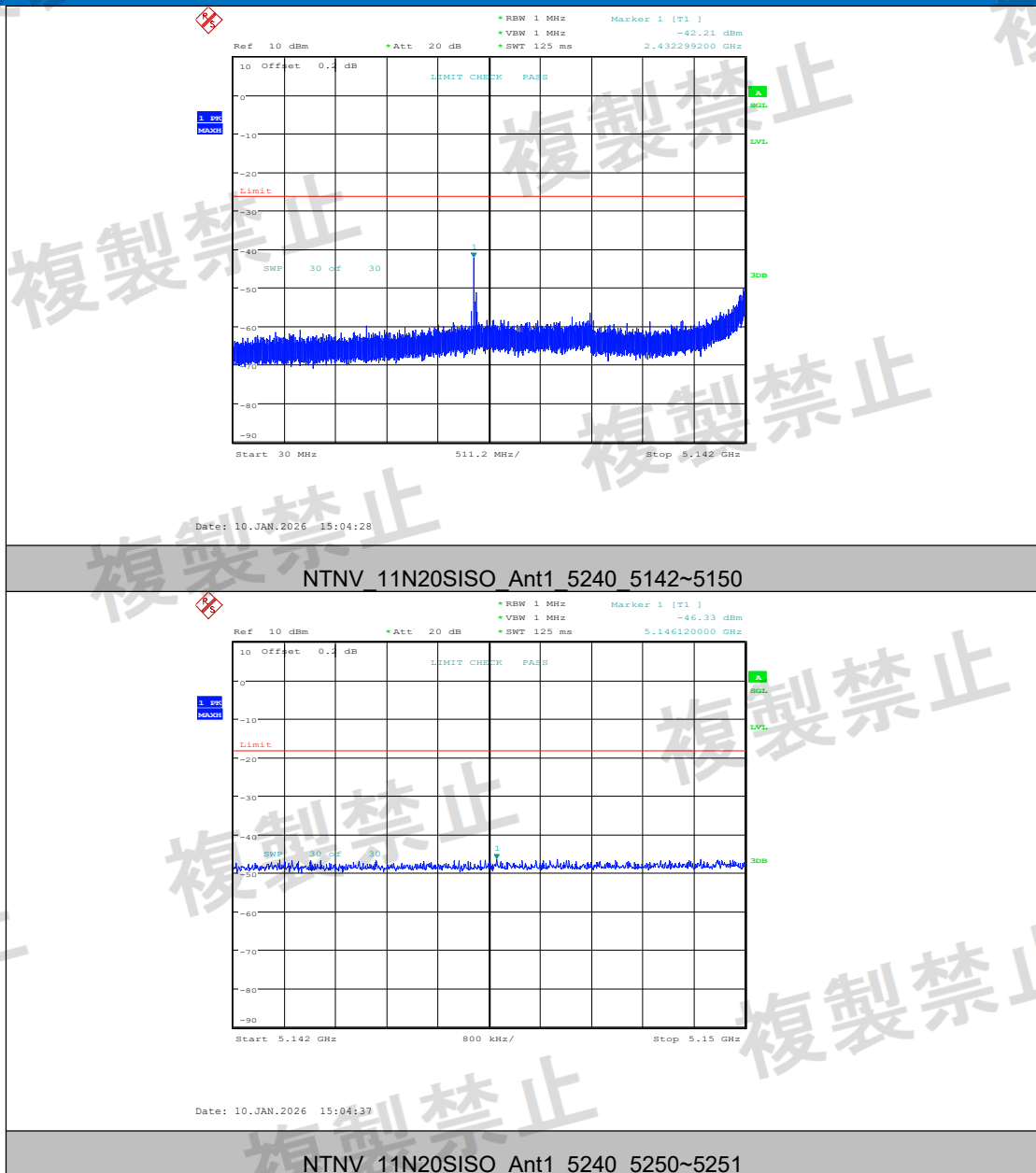


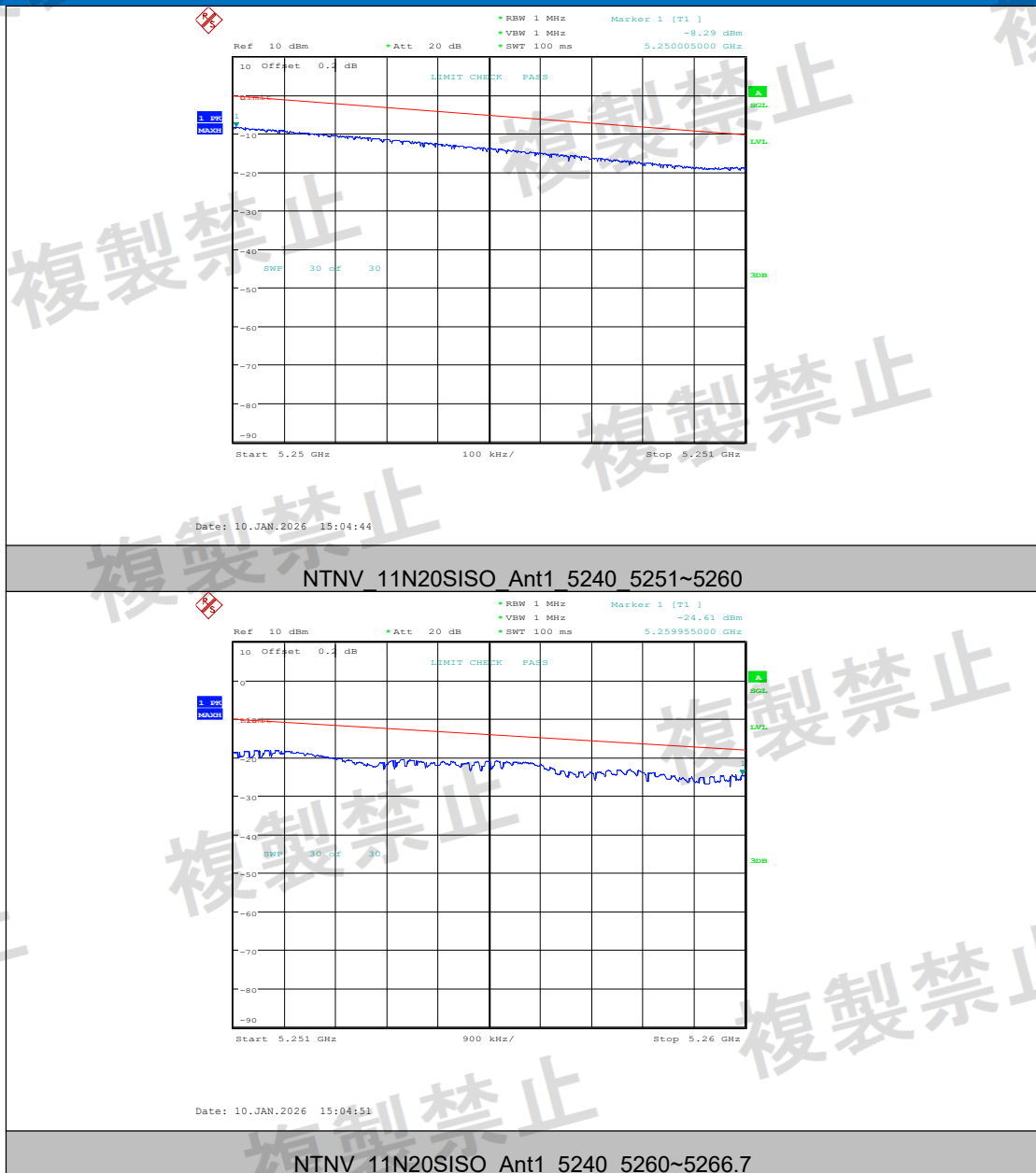


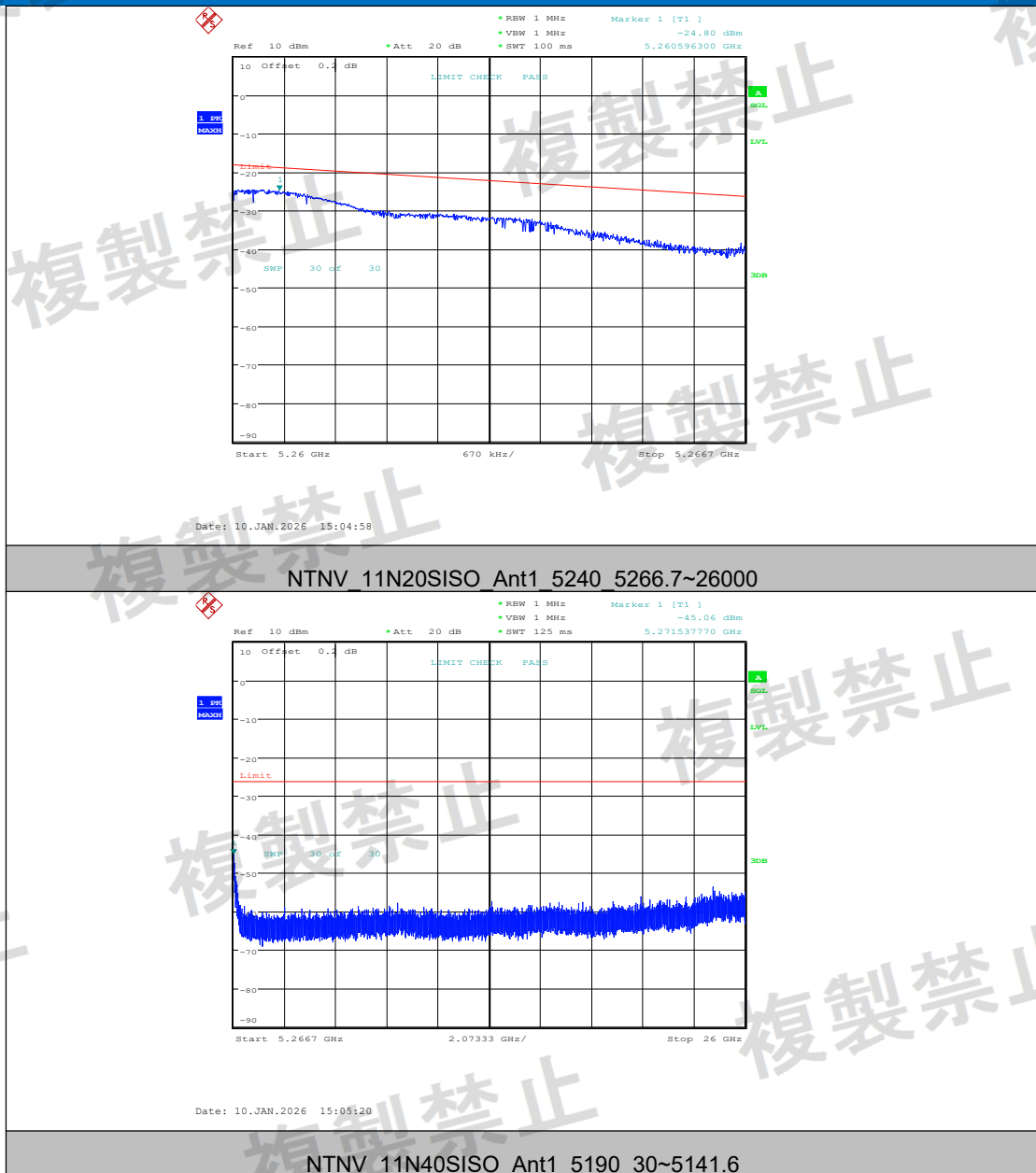


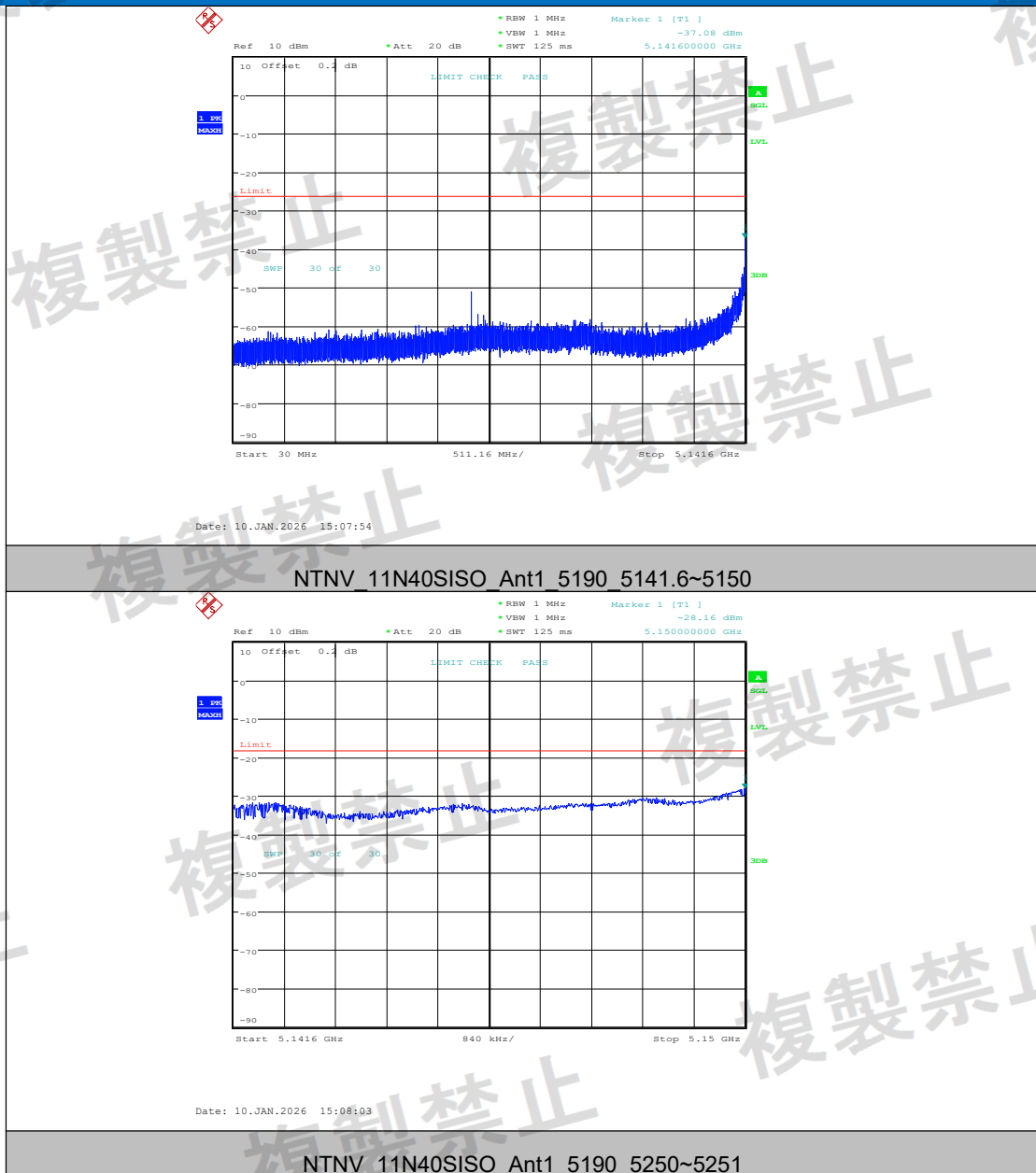


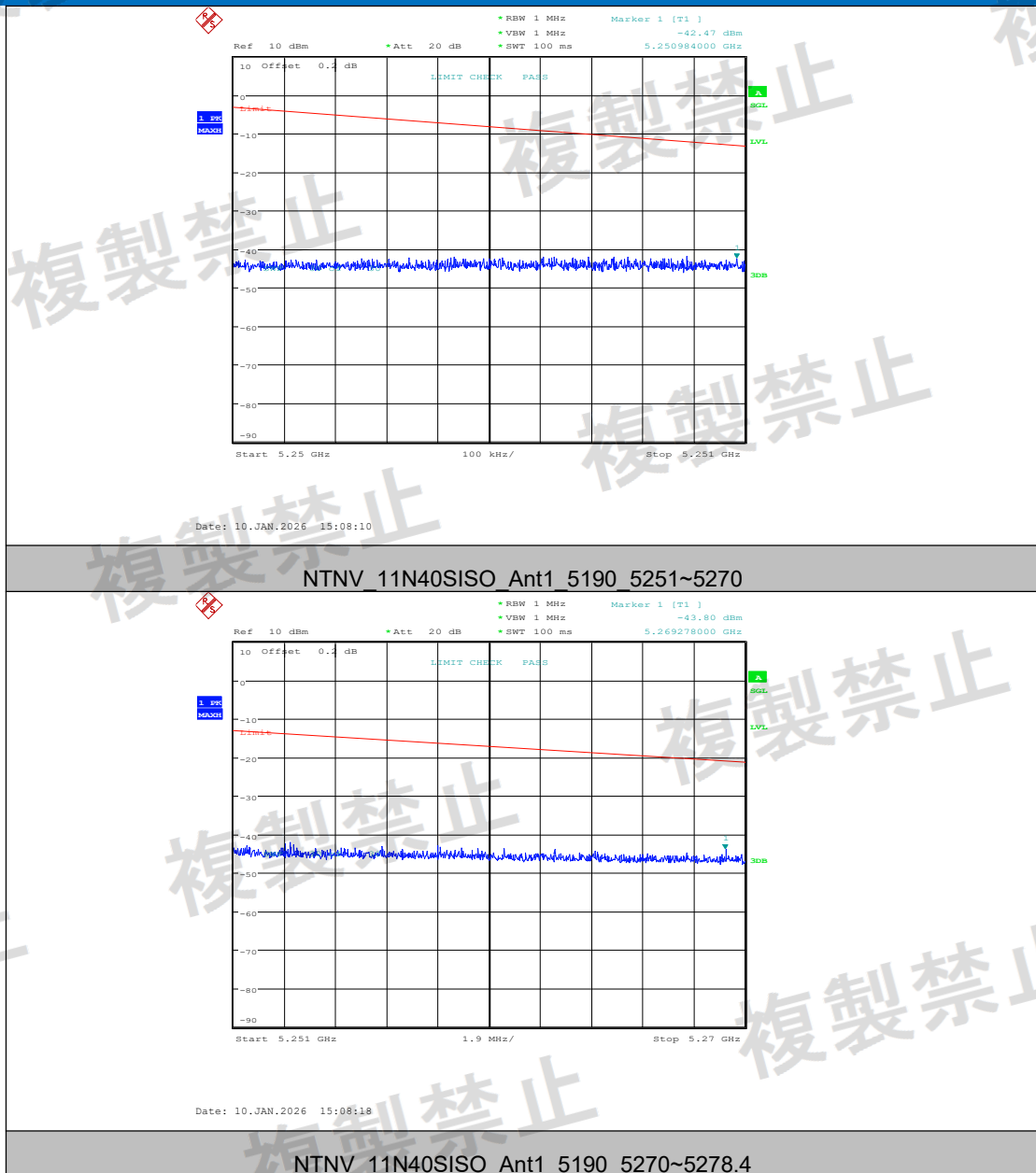


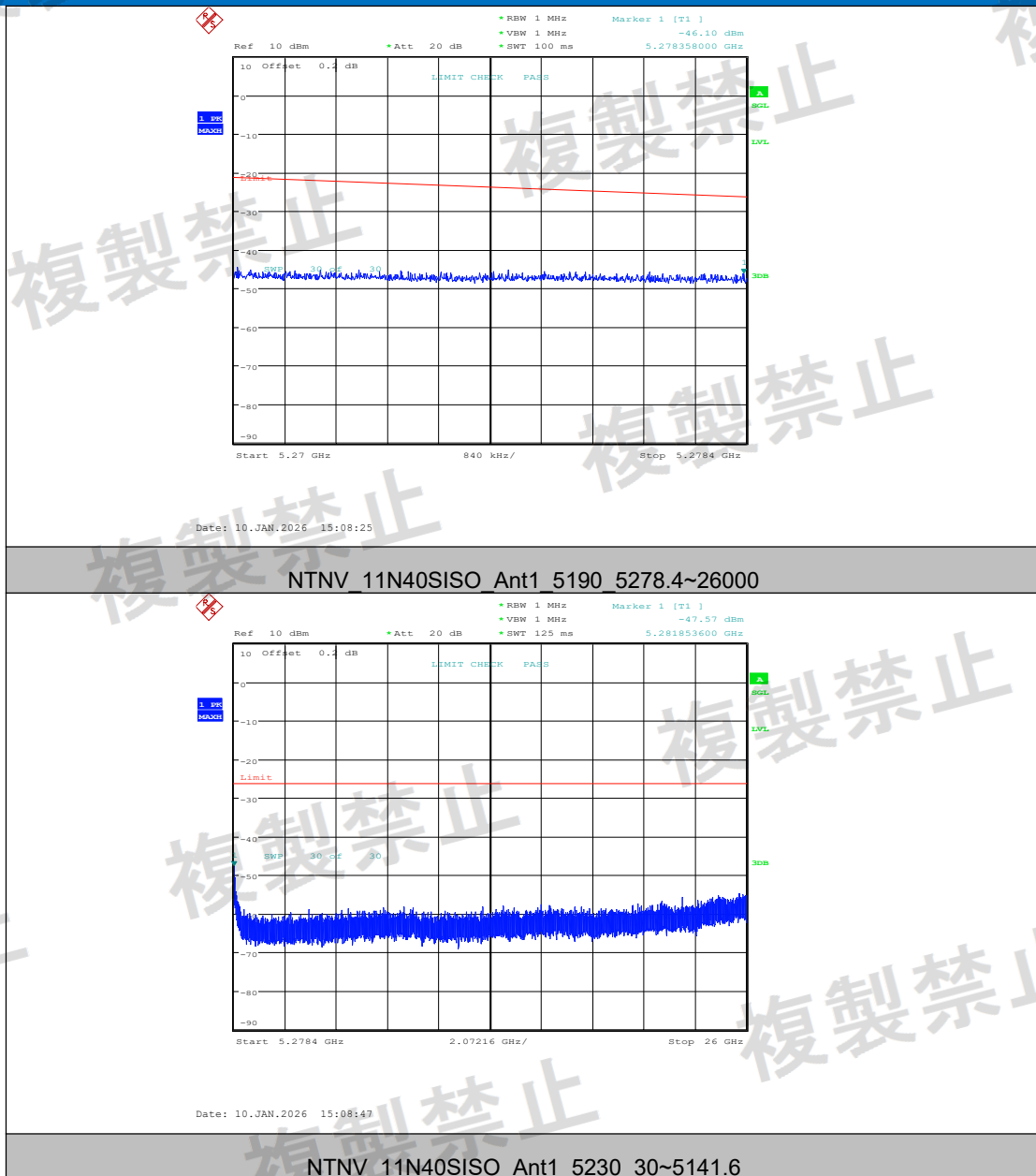


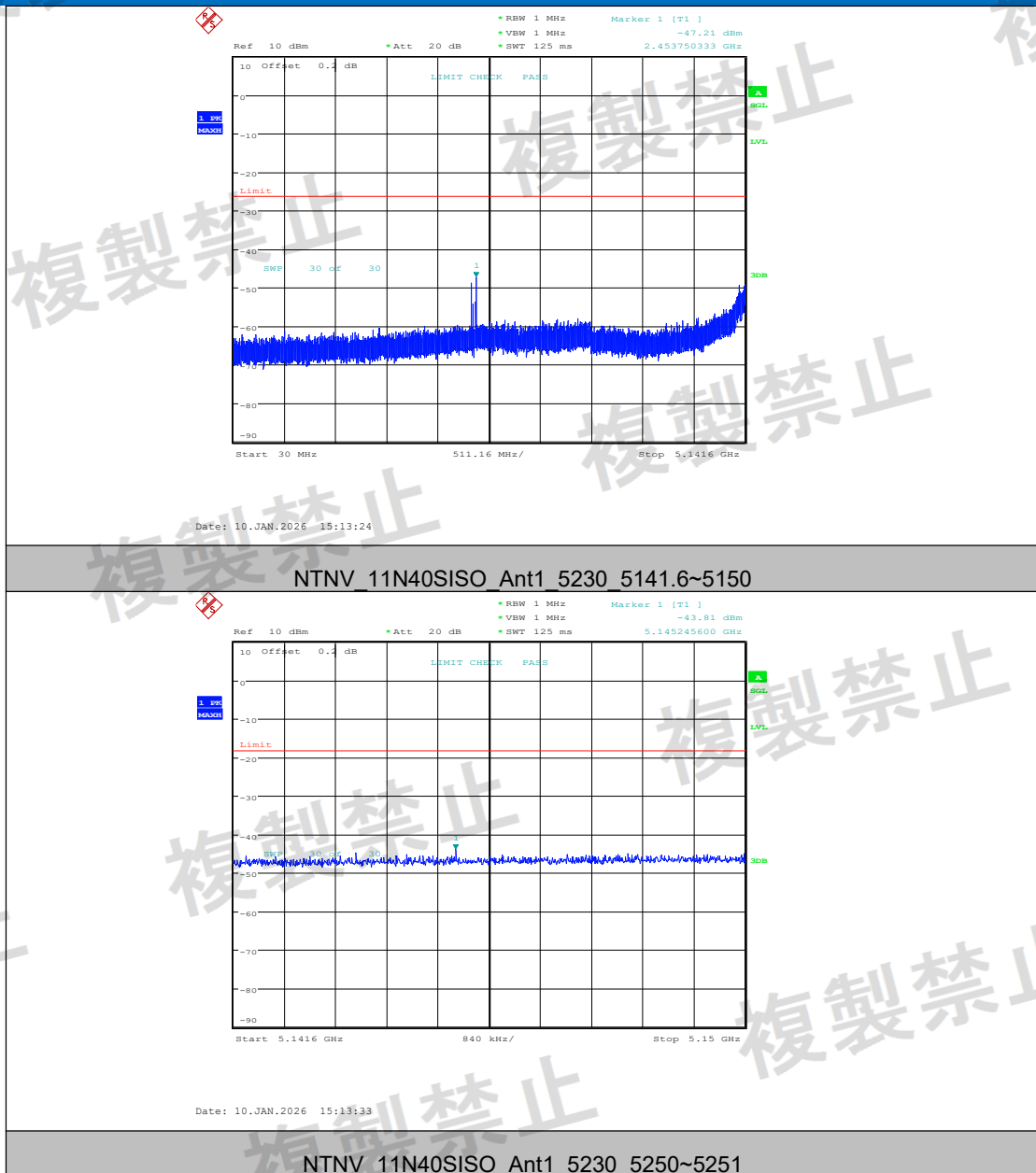


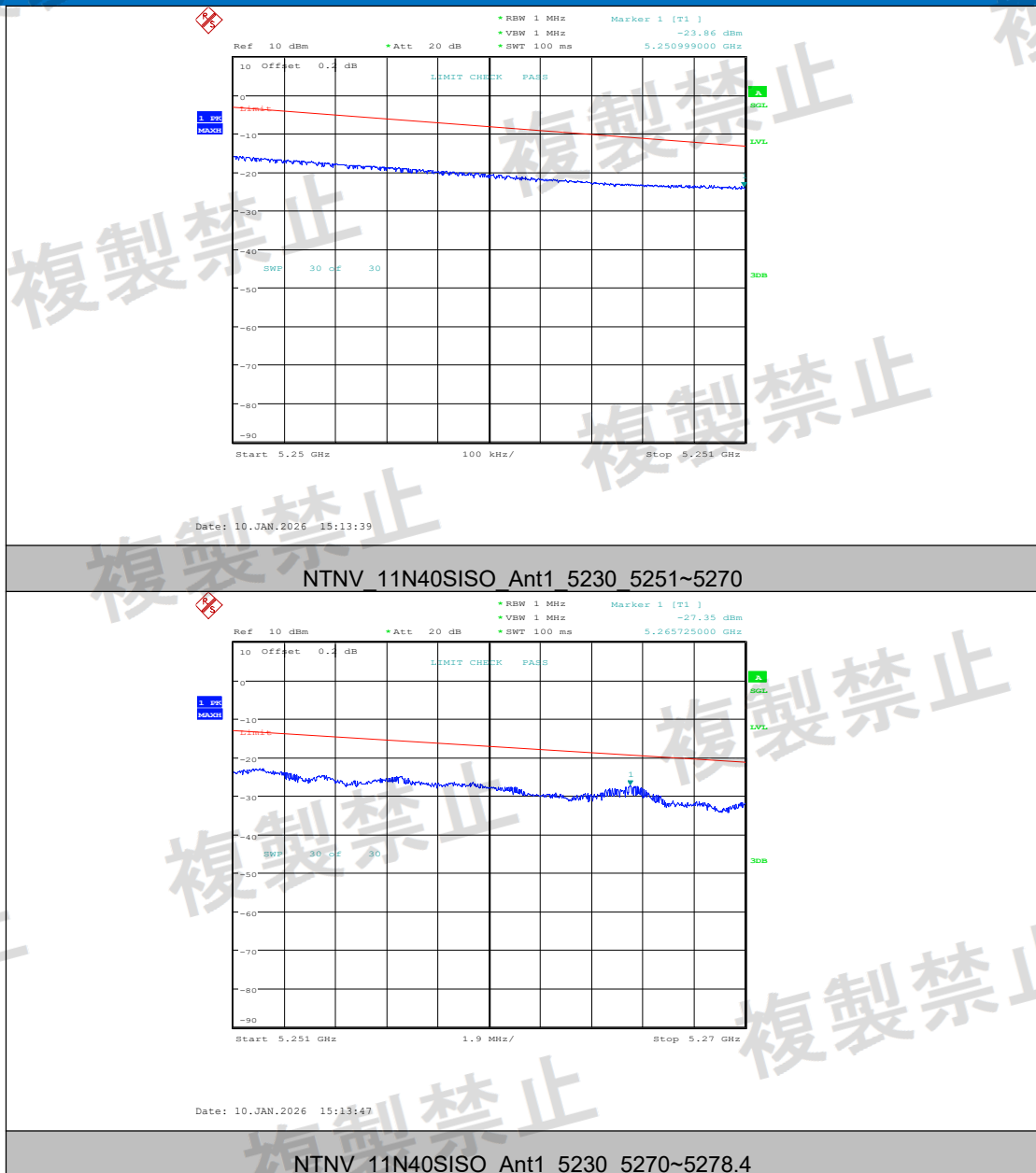


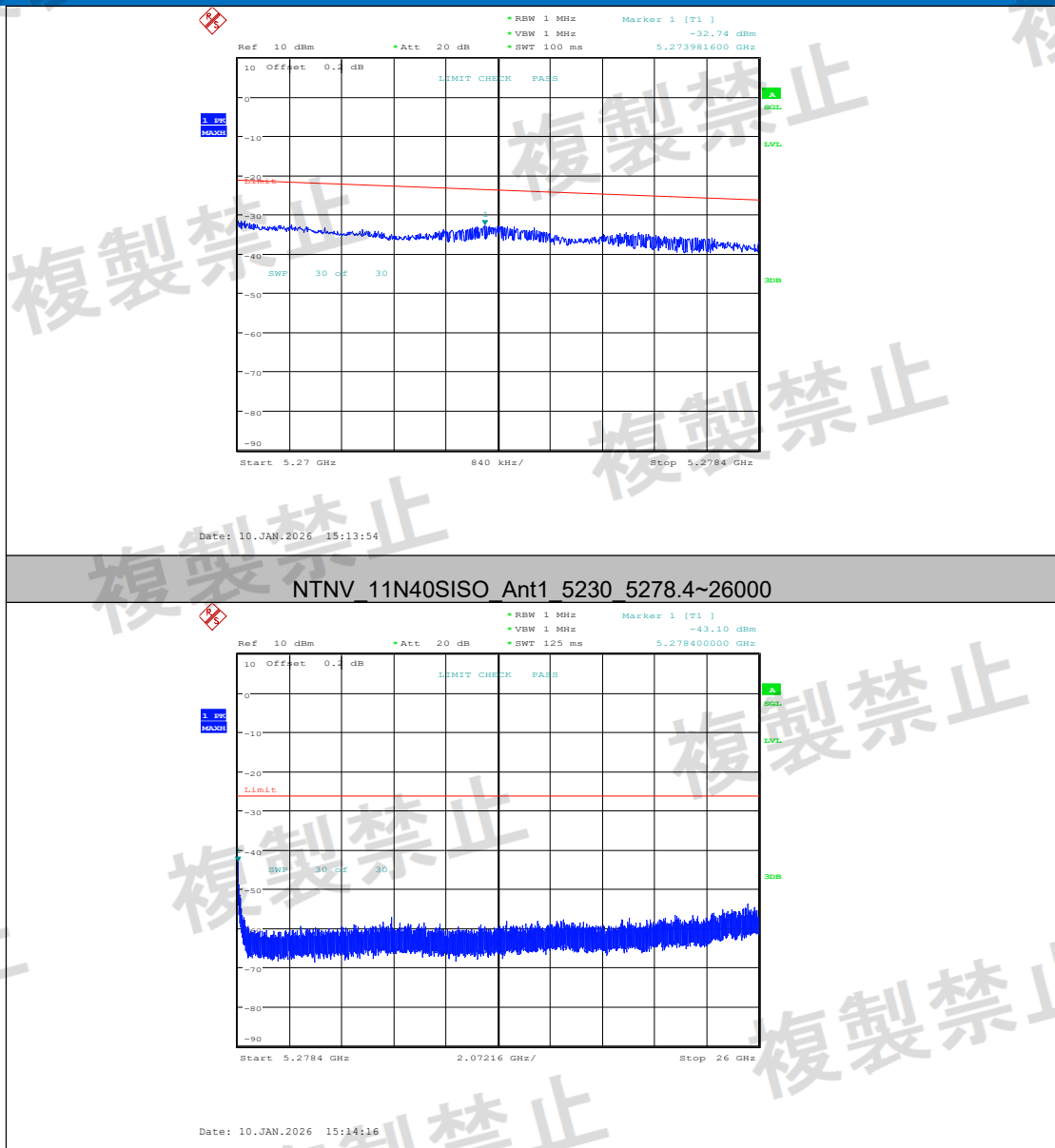












6.11 Spurious Emissions of Rx

Test Requirement: Item 19-3 of Article 2-1

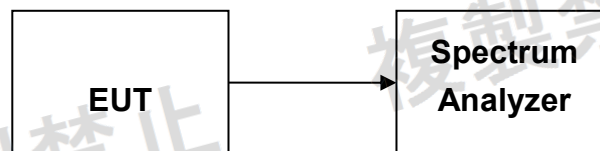
(1) Below 1 GHz : 4 nW or less

(2) 1 GHz and over : 20 nW or less

Note: 4 nW=-54dBm, 20 nW=-47dBm

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1) Test Conditions:

Spectrum Analyzer is used for measurement.

2) EUT conditions:

Modulation/Spread

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3) Spectrum Analyzer conditions:

Step 1

All spurious are measured from 30 MHz to 26GHz by peak mode.

Step 2:

Frequency: Spurious Frequency

RBW below 1G: 100kHz, above 1G:1 MHz

VBW below 1G: 100kHz, above 1G:1 MHz

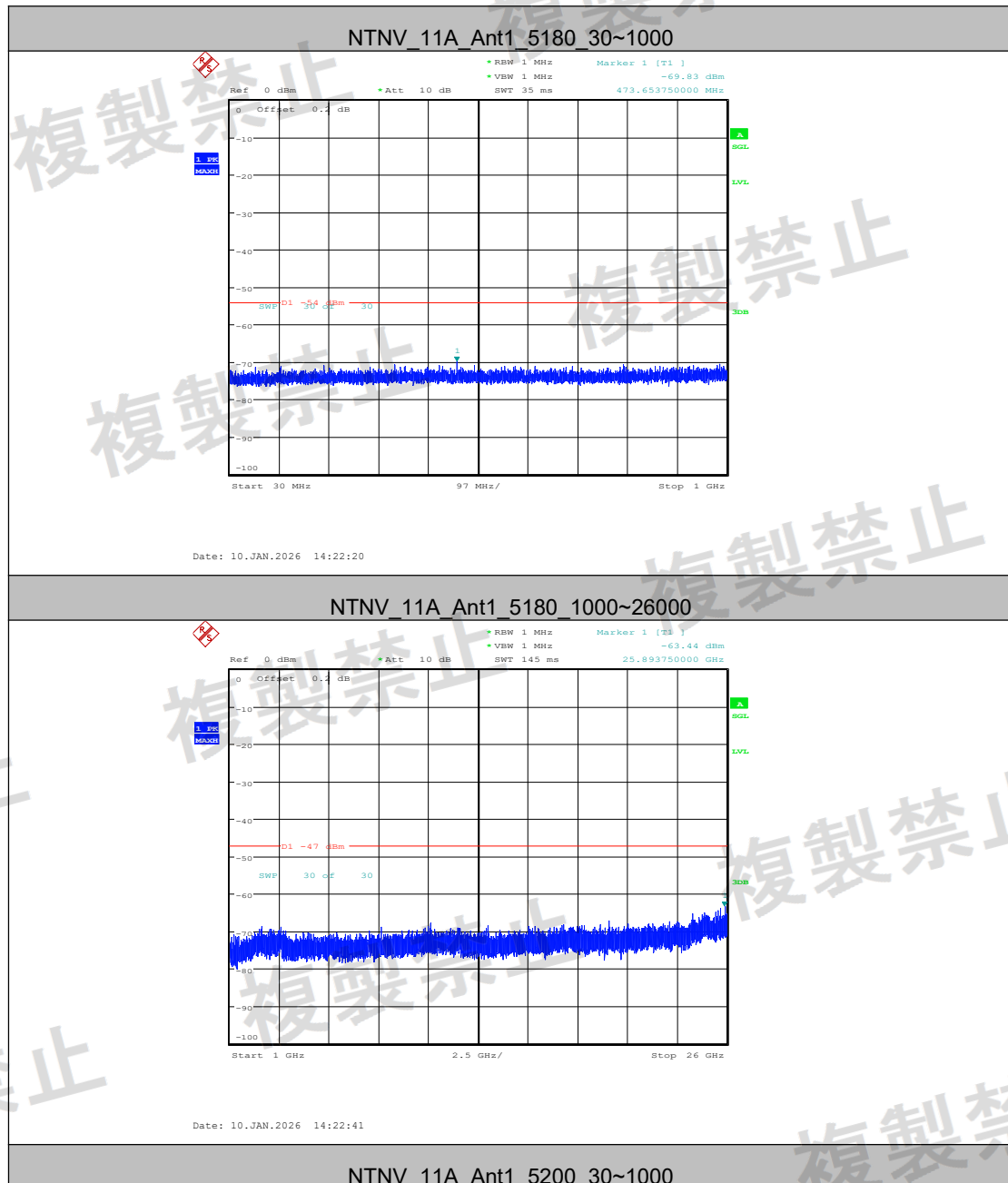
Sweep Time Auto

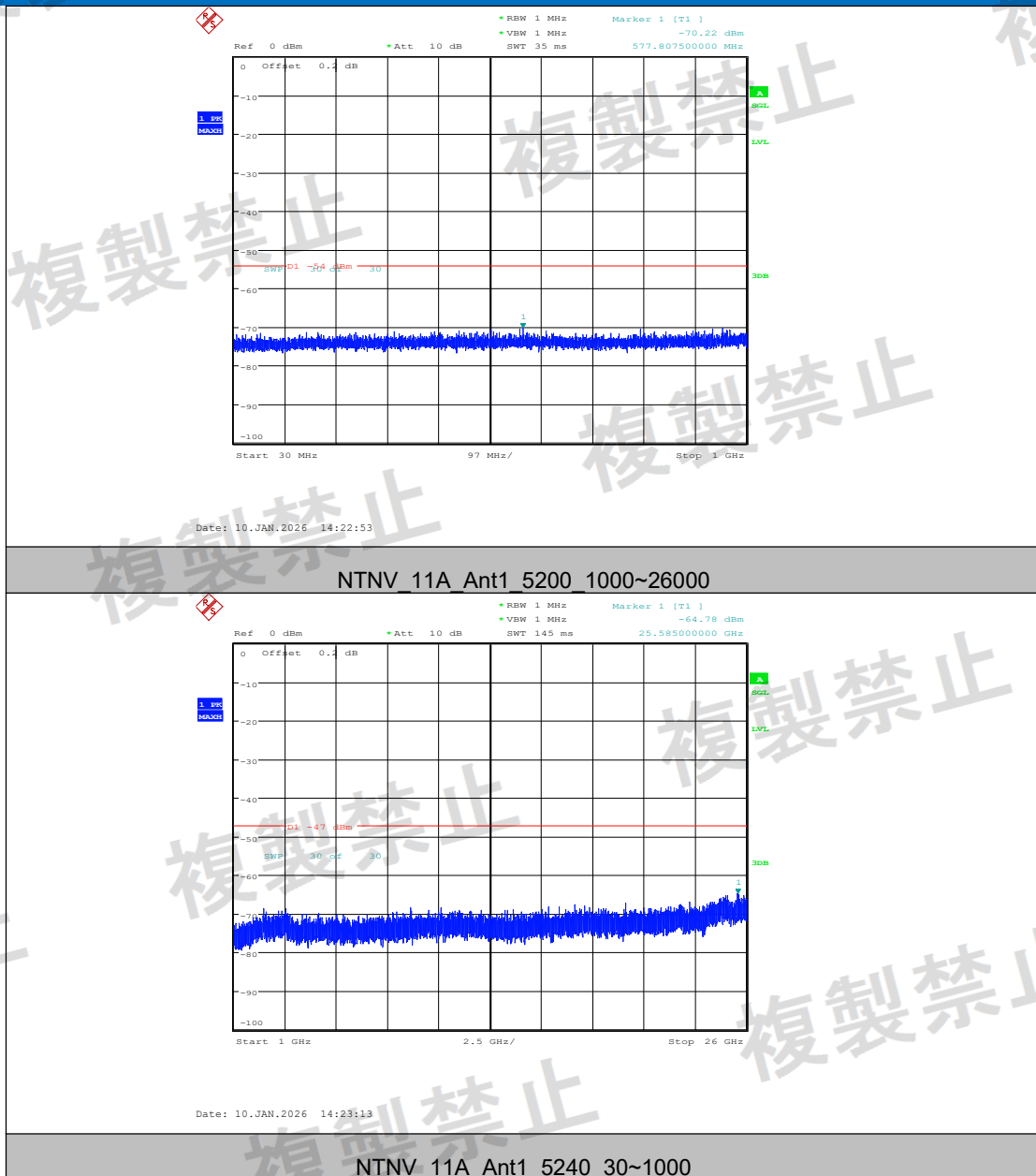
detector mode Sample

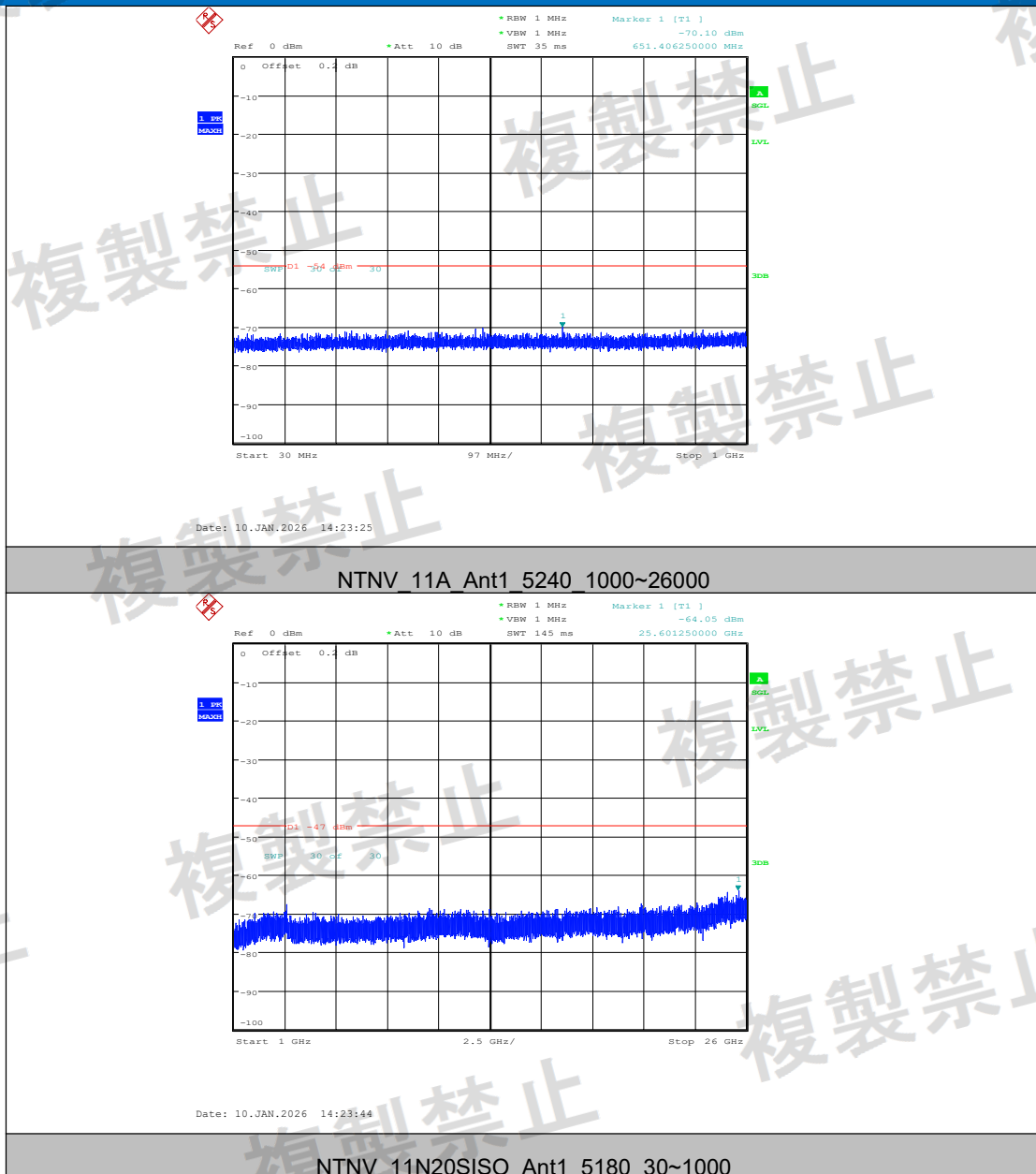
Indication mode Max hold

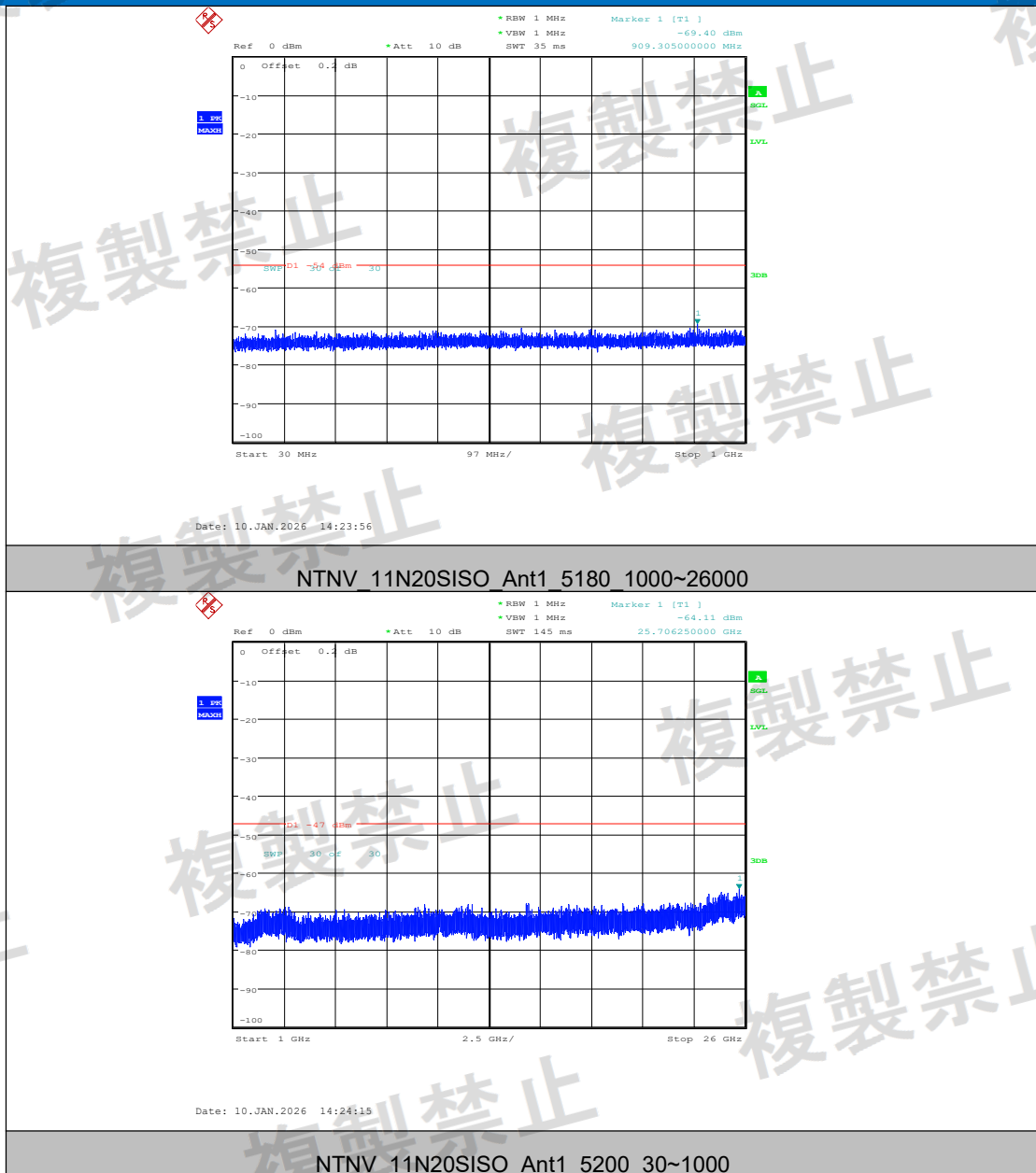
TestCondition	TestMode	Freq(MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
NTNV	11A	5180	30~1000	473.65	-69.83	≤-54	0.10399	≤4	PASS
			1000~26000	25893.75	-63.44	≤-47	0.45290	≤20	PASS
		5200	30~1000	577.81	-70.22	≤-54	0.09506	≤4	PASS
			1000~26000	25585.00	-64.78	≤-47	0.33266	≤20	PASS
		5240	30~1000	651.41	-70.10	≤-54	0.09772	≤4	PASS
			1000~26000	25601.25	-64.05	≤-47	0.39355	≤20	PASS
	11N20SI SO	5180	30~1000	909.31	-69.40	≤-54	0.11482	≤4	PASS
			1000~26000	25706.25	-64.11	≤-47	0.38815	≤20	PASS
		5200	30~1000	832.80	-70.04	≤-54	0.09908	≤4	PASS
			1000~26000	24730.00	-64.30	≤-47	0.37154	≤20	PASS
		5240	30~1000	969.57	-70.27	≤-54	0.09397	≤4	PASS
			1000~26000	24960.00	-64.28	≤-47	0.37325	≤20	PASS
	11N40SI SO	5190	30~1000	968.35	-70.11	≤-54	0.09750	≤4	PASS
			1000~26000	25907.50	-62.44	≤-47	0.57016	≤20	PASS
		5230	30~1000	705.48	-69.98	≤-54	0.10046	≤4	PASS
			1000~26000	24778.75	-63.99	≤-47	0.39902	≤20	PASS

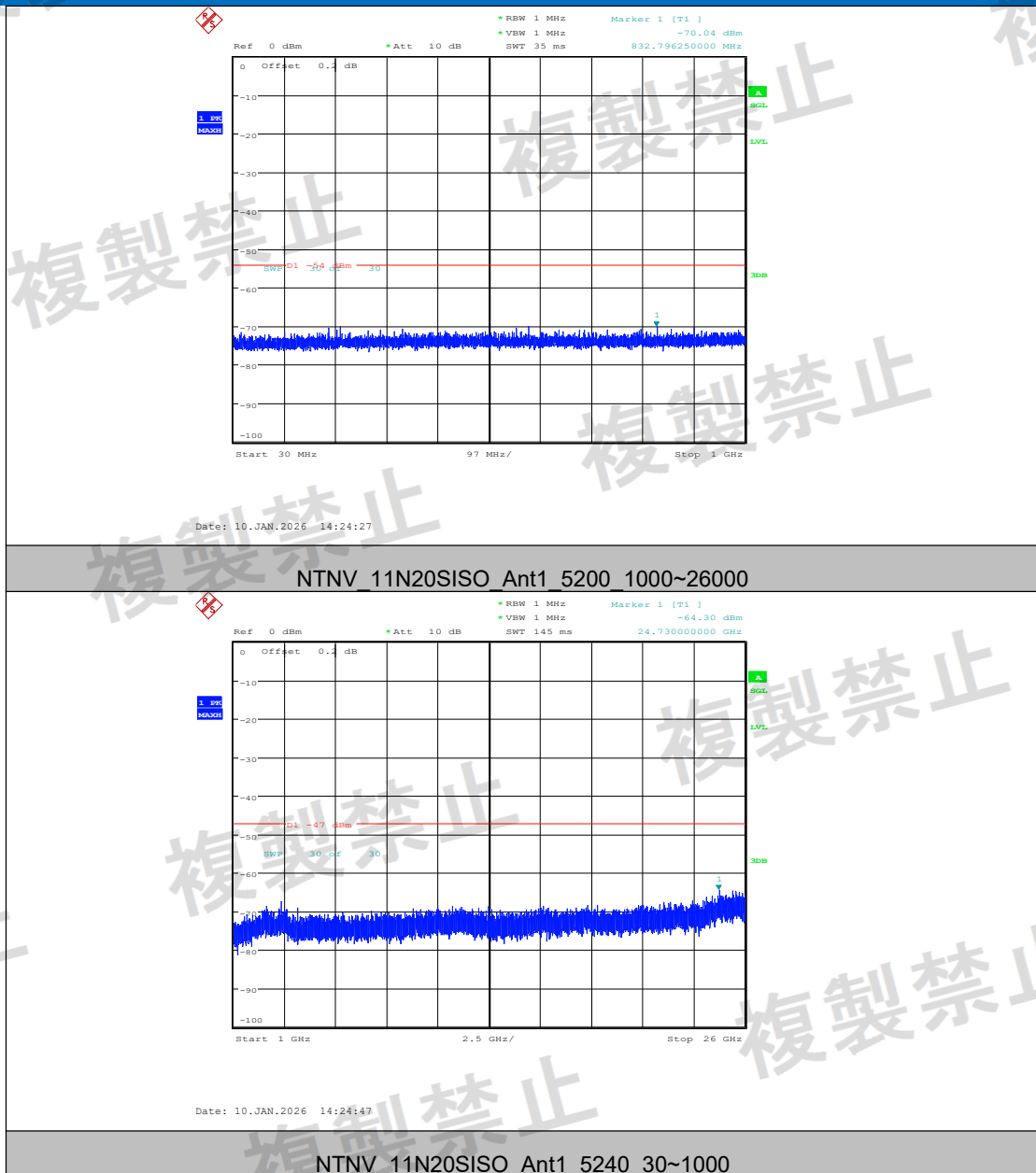
Test plot as follows:

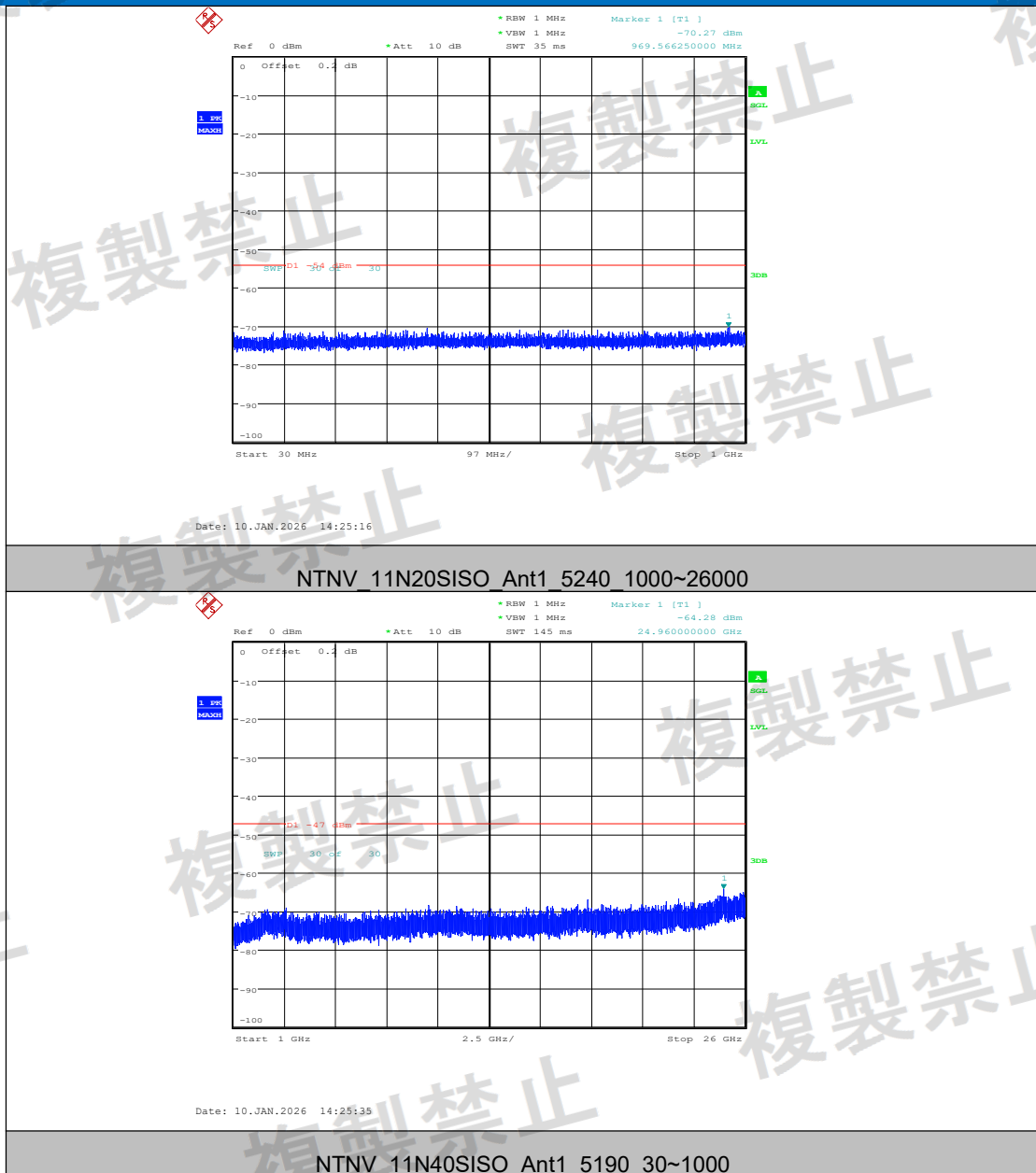


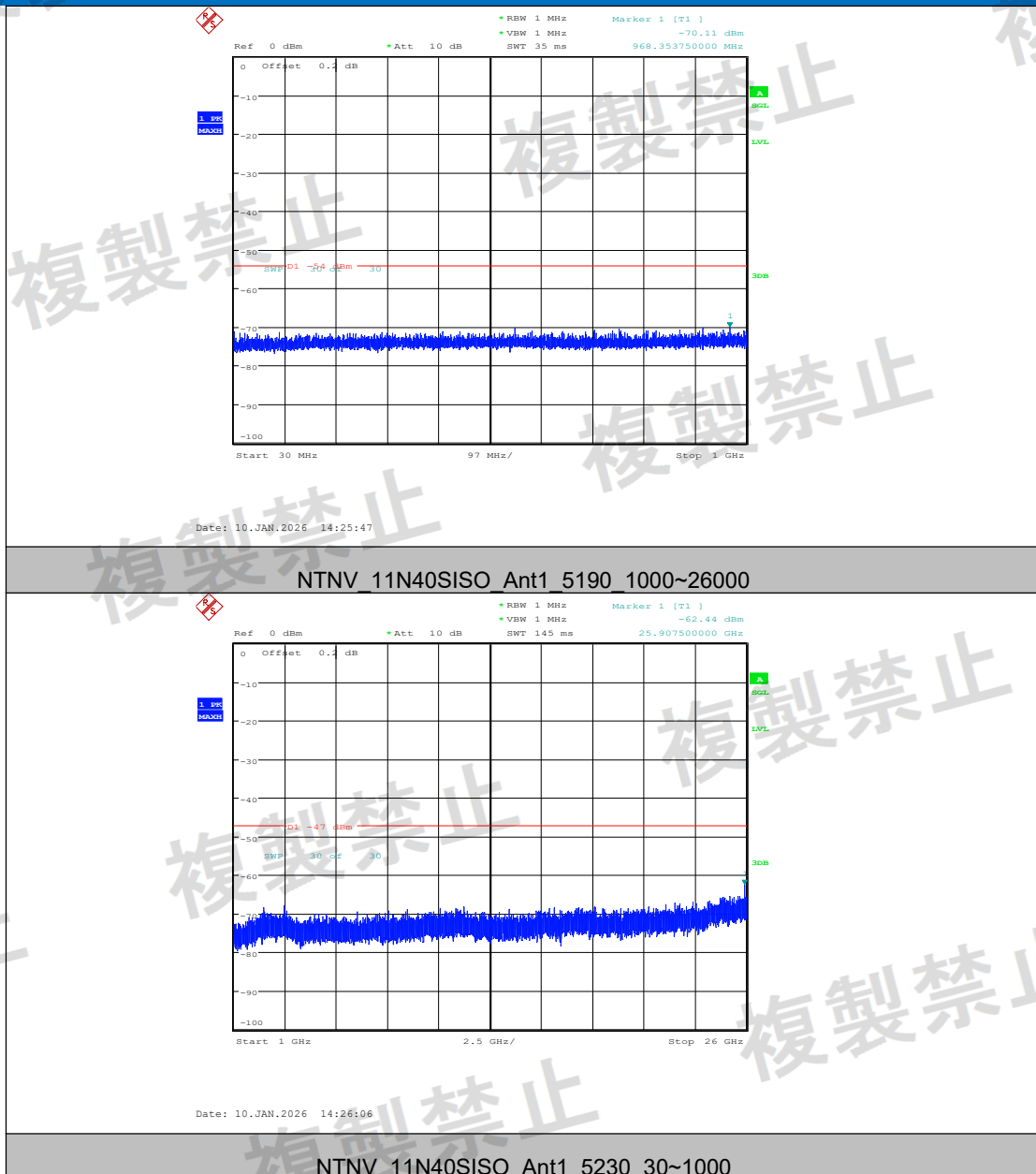


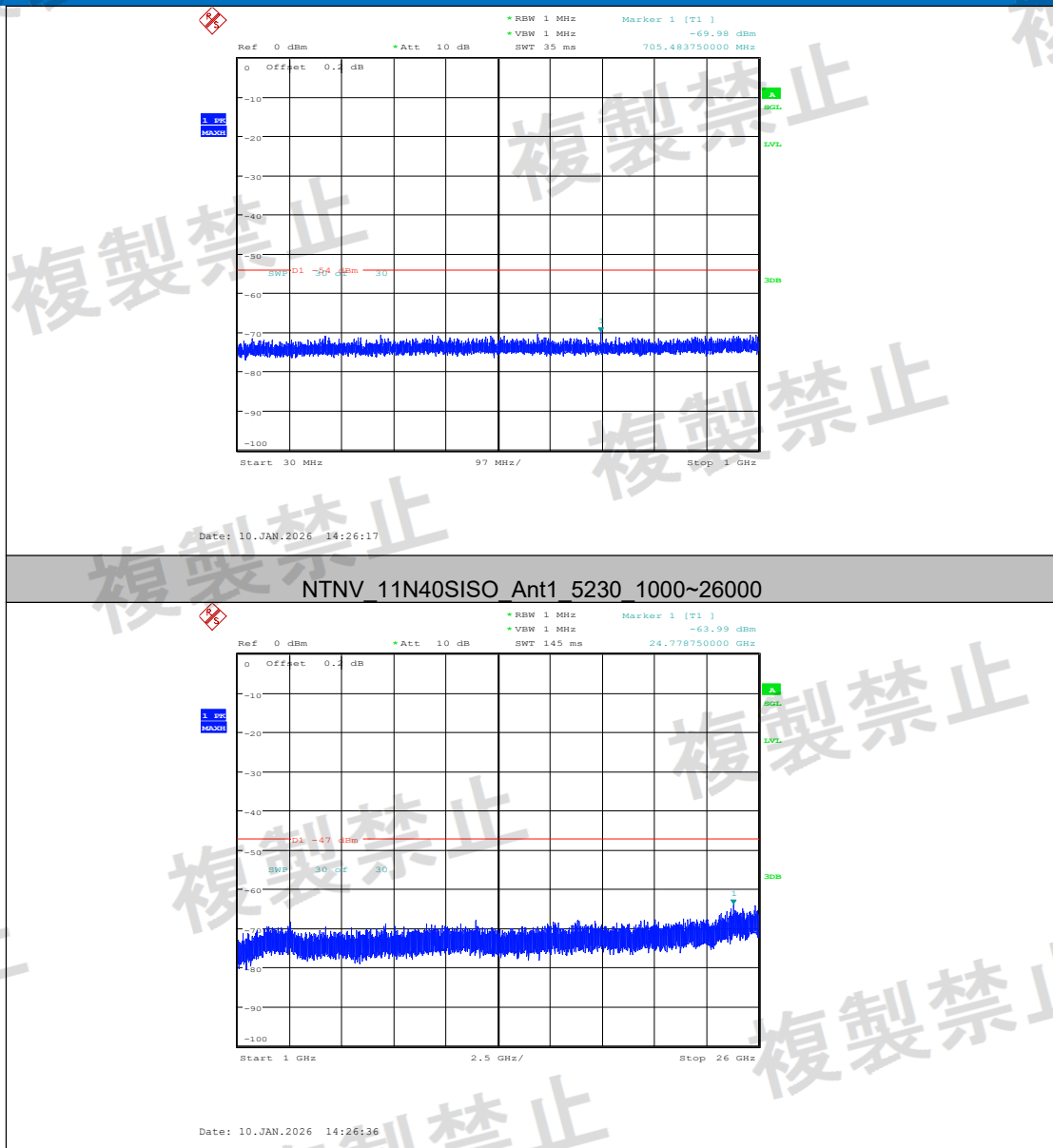










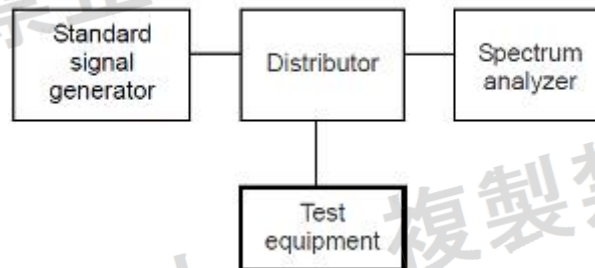


6.12 Carrier sense capability

Test Requirement: Item 19-3 of Article 2-1

Shall not transmit radio wave when receiving over 100mV/m

Test Configuration: Test with test equipment only



Test Procedure:

- 1) Test Conditions:
Spectrum Analyzer and signal generator is used for measurement.
- 2) EUT conditions:
Set the test equipment at the test frequency and the test spread code, and set it to the receiving mode, when using external test equipment, establish a connection
- 3) Set the standard signal generator as follows:
Carrier frequency: Center frequency of receiving frequency band of test equipment
Modulation: No modulation (when the carrier sense function does not work by the the unmodulated subcarrier in center frequency, shift the frequency or modulate if needed.)
Output level: In the antenna input unit of a test equipment, field intensity is equivalent to the value which becomes 100mV/m.
- 4) Set the spectrum analyzer as follows:
Center frequency: Center frequency of the bandwidth used.
Sweep frequency band: 50MHz
Resolution bandwidth: Approximately 1 MHz
Video bandwidth: Approximately same as the resolution bandwidth
Y-axis scale: 10dB/Div
Trigger condition: Free-run
Detective mode: Positive peak

5) Measuring operation

- (1) Test with test equipment only: Set the test equipment to the transmitting operation with the output of standard signal generator OFF, and confirm that it emits radio wave, using spectrum analyzer.
- (2) Set the test equipment to the receiving mode.
- (3) Set the test equipment to the transmitting operation with the output of standard signal generator ON, and confirm that it does not emit radio wave, using spectrum analyzer.

Test result: The product did not transmit radio wave when receiving over 100mV/m. The unit does meet the requirements

6.13 Burst Length

Test Requirement: Item 19-3 of Article 2-1
8ms or less

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1) Test Conditions:

Frequency Counter or Spectrum Analyzer is used for measurement.

2) EUT conditions:

Modulation/Spread On,

3) Spectrum Analyzer conditions:

Frequency: Test Frequency

Span 0 MHz

RBW 10 MHz,

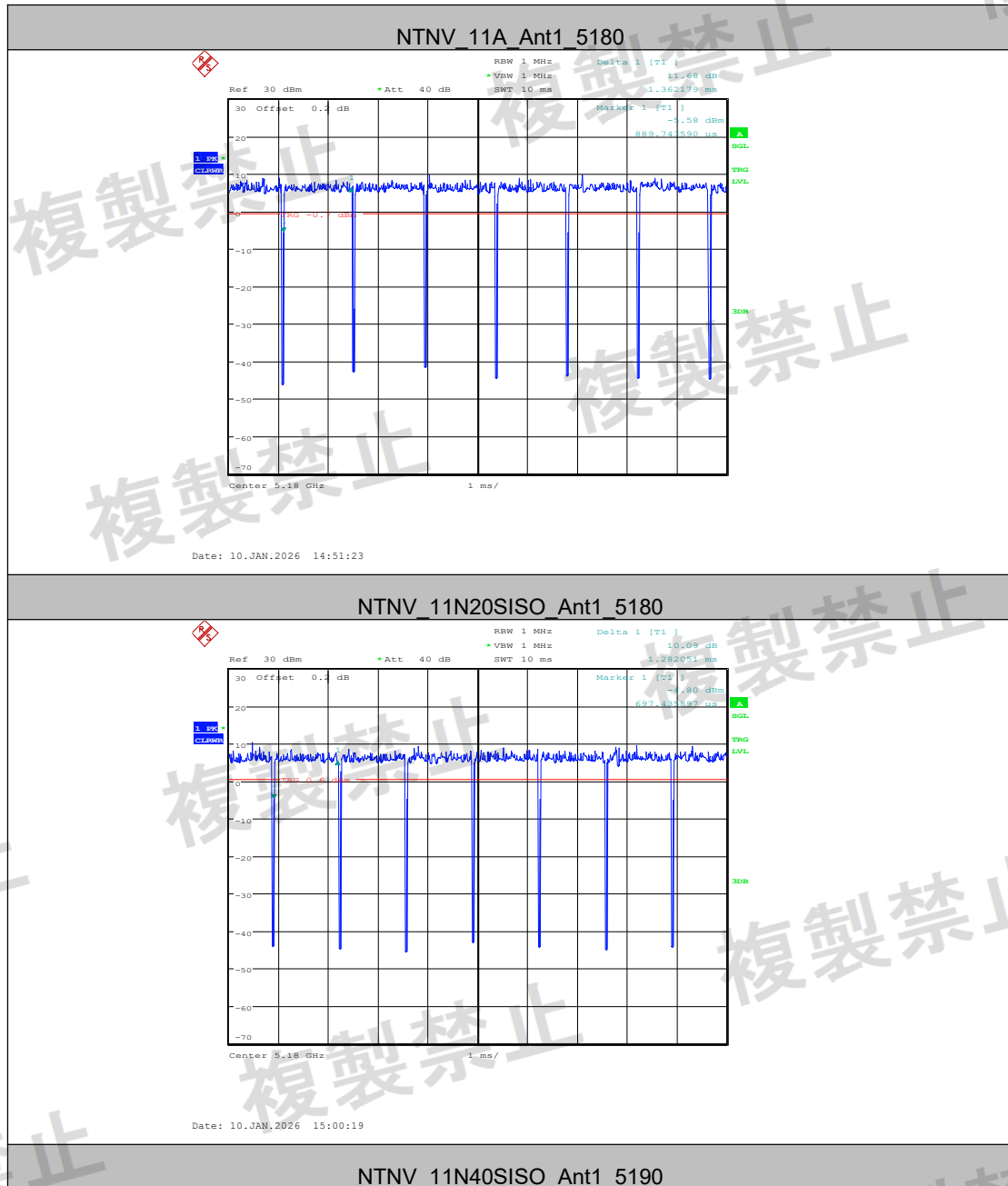
VBW 10 MHz,

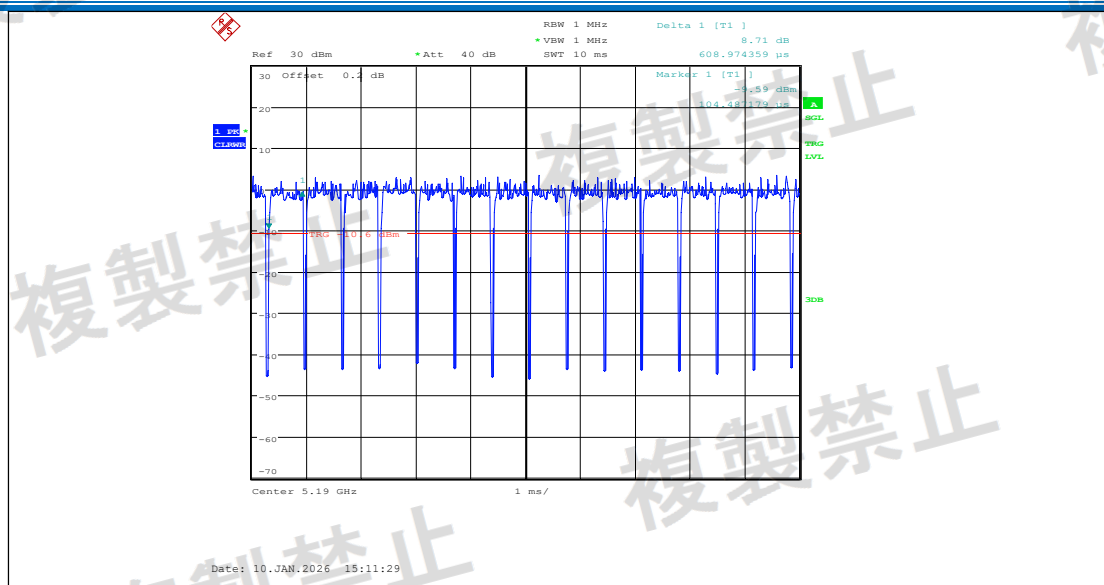
Detector mode Positive peak

Indication mode Max hold

Test Data:

TestCondition	TestMode	Freq(MHz)	Result [ms]	Limit [ms]	Verdict
NTNV	11A	5180	1.36	≤8	PASS
	11N20SI SO	5180	1.28	≤8	PASS
	11N40SI SO	5190	0.61	≤8	PASS



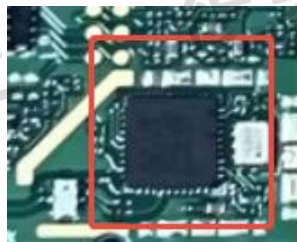


6.14 RF accessibility

Standard requirement

Article 2, Item (19) Notice 88 Appendix 43, 44, 45

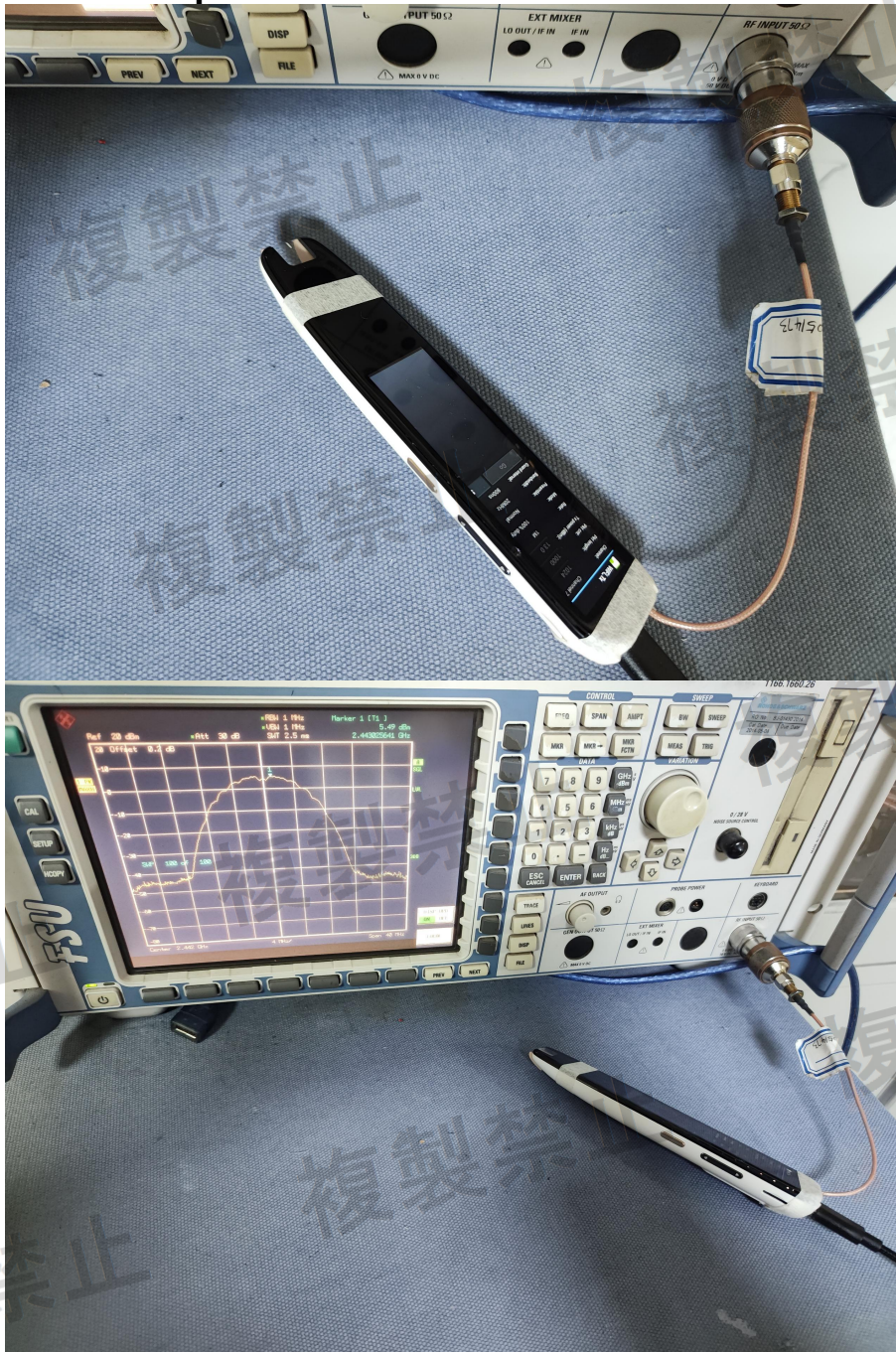
The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common type(s) like a Phillips, but special versions like Torx, so that the user cannot open the device with common tools.



The method used to meet the "can't be opened easily" is that the chip is directly attached to the motherboard.

Any attempt to modify the RF chip will invalidate the normal operation of the device.

7 Test Setup



8 EUT Constructional Details

Refer to Photographs - EUT Constructional Details OF EUT for CQASZ20251203059E-01.

*** END OF REPORT ***