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TEST REPORT

Report No.: CQASZ20251203059E-03
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
Test Model No.: MSE12
Model No.: MSE12
Brand Name: N/A
Standards: Item 19 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 Method: MIC Notice No.88 Appendix No.43

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Timo Lei

(Timo Lei)

Approved By:

Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20251203059E-03	Rev.01	Initial report	2026-01-27

2 Test Summary

Test	Test Requirement	Result
Frequency Error	Item 19 of Article 2-1	PASS
Occupied Bandwidth	Item 19 of Article 2-1	PASS
Spread-spectrum Bandwidth	Item 19 of Article 2-1	PASS
Antenna Power	Item 19 of Article 2-1	PASS
Spurious Emission of Tx	Item 19 of Article 2-1	PASS
Interference prevention capability	Item 19 of Article 2-1	PASS
Carrier sense capability	Item 19 of Article 2-1	PASS
RF accessibility	Item 19 of Article 2-1	PASS
Spurious Emission of Rx	Item 19 of Article 2-1	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.

Other: NV-Normal voltage, HV-High voltage, LV-Low voltage, NTNV-Normal temperature & normal voltage

3 Contents

1 VERSION	2
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 General Description of E.U.T.	5
4.2 Details of E.U.T.	5
4.3 Description of Support Units	6
4.4 Deviation from Standards	6
4.5 Abnormalities from Standard Conditions	6
4.6 Other Information Requested by the Customer	6
4.7 Test Location	6
4.8 Test Facility	6
5 EQUIPMENT USED DURING TEST	7
6 TEST RESULTS	9
6.1 Radio Technical Requirements Specification	9
6.2 E.U.T. test conditions	10
6.3 Test Environment	12
6.4 Antenna Requirement	12
6.5 Interference prevention function	13
6.6 Carrier sense capability	13
6.7 Frequency Error	14
6.8 Occupied Bandwidth (99%)	22
6.9 Spread spectrum Bandwidth (90%)	30
6.10 Antenna Power	38
6.11 Spurious Emissions of Tx	50
6.12 RF accessibility	85
6.13 Spurious Emissions of Rx	86
7 PHOTOGRAPHS	100
7.1 EUT Test Setup	100
8 PHOTOGRAPHS - EUT CONSTRUCTIONAL DETAILS	101

4 General Information

4.1 General Description of E.U.T.

Product Name: WorldPenScan Ai Reader
Model No: MSE12
Test Model No: MSE12
Trade Mark: N/A

4.2 Details of E.U.T.

Operating Frequency: IEEE 802.11b: 2412MHz to 2472MHz
IEEE 802.11g/n(HT20)/ax : 2412 MHz to 2472 MHz

Type of Modulation: 802.11b: DSSS(CCK/QPSK/BPSK)
802.11g: OFDM(BPSK/QPSK/16QAM/64QAM)
802.11n (HT20/40): OFDM (64QAM, 16QAM, QPSK, BPSK)

Transmit Data Rate: 802.11b: 1M/2M/5.5M/11M bps
802.11g: 6M/9M/12M/18M/24M/36M/48M/54M bps
802.11n(HT20/40): 7.2M/14.4M/21.7M/28.9M/43.3M/57.8M/65M/72.2M bps

Number of Channels: 802.11b: 13 Channels
802.11g/n(HT20) : 13 Channels
802.11n(HT40) : 11 Channels

Channel Separation: 5 MHz

Software version: 202501070913

Hardware version: XZY_Q5A

Antenna Type: FPC antenna

Antenna Gain: 1.21dBi

The Max. Antenna Power: 3.3mW/MHz

Sample Type: Portable product

Power Supply: ☒ For EUT operation: lithium battery, DC3.8V, 1200mAh
☐ For other: Charge by DC5.0V

Test Voltage: ☒ Normal voltage (EUT operation): DC3.8V
☐ Low voltage (Normal voltage -10%):
☐ High voltage (Normal voltage+10%):

4.3 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark
/	/	/	/

4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.

4.7 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

4.8 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.

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: Radio Technical Requirements Specification for 2.4 GHz band wide-band low-power data communication system (Item 19 of Article 2-1)

Items	Technical standard
Assigned frequency or designated frequency	2400-2483.5MHz
Communication method	One-way communication, simplex, semi-duplex, or duplex operation of digital signal transmission including spread spectrum
Tolerance of frequency ($\times 10^{-6}$)	± 50
Tolerance of occupied bandwidth	FH : 83.5MHz or less FH + DS : 83.5MHz or less FH + OFDM : 83.5MHz or less OFDM 40MHz System: 26~40MHz Others : 26MHz or less
Antenna power	Designated value (1) FH, FH+DS , FH+OFDM: 3mW/MHz (used in the range of 2427 - 2470.75 MHz) (2) OFDM , DS other than (1) 10mW/MHz (3) Other than (1) & (2) 10mW (4) OFDM OBW 26 - 38MHz: 5mW/MHz Tolerance: +20%
Antenna gain	1) 12.14 dBi or less in principle 2) In case of directional antenna (1) FH, FH+DS or FH+OFDM using 2427-2470.75 MHz EIRP $\leq$ 16.91 dBm/MHz (2) OFDM or DS other than (1) EIRP $\leq$ 22.14 dBm/MHz (3) Other than (1) and (2): 22.14 dBm or less (4) OFDM OBW 26 - 40MHz: 19.14dBm/MHz (5) Half-power angle of directional antenna (e) in case of the item 2): $e \leq 360/A$ (The A is 10 in maximum.)
Tolerance of spurious emission intensity	for 2412-2472MHz (1) Below 2387 MHz : 2.5 μ W/MHz (2) 2387 to 2400 MHz : 25 μ W/MHz (3) 2483.5 through 2496.5 MHz : 25 μ W/MHz (4) Over 2496.5 MHz : 2.5 μ W/MHz
Spreading bandwidth	DS, FH, FH+DS, FH+OFDM : 500kHz or more
Spreading rate of spectrum	For DS system; (Spreading bandwidth) / (Frequency corresponding to transmission rate) ≥ 5
Limit of secondary radiated emissions	(1) Below 1 GHz : 4 nW (2) 1 GHz or higher : 20 nW
Interference prevention function	Shall have the function of automatic transmission and reception of identification sign.
Structure	Shall be of the structure that the RF and modulator sections excluding antenna cannot easily be opened.
Note	DS: Direct spread FH: Frequency hopping OFDM: Orthogonal frequency division multiplexing

6.2 E.U.T. test conditions

Power supply:

The fluctuation of input voltage to the circuit of RF unit of test equipment is under $\pm 1\%$, when input voltage 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 -1020 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.

EUT channels and frequencies list:

802.11b/g/n (HT20)

Channel	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462
12	2467
13	2472

Test frequencies are the lowest channel: 1 channel(2412MHz), middle channel: 7 channel(2442 MHz) and the highest channel: 13 channel(2472 MHz)

802.11n (HT40)

Channel	Frequency (MHz)
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

Test frequencies are the lowest channel: 3 channel(2422MHz), middle channel: 7 channel(2442 MHz) and the highest channel: 11 channel(2462MHz).

6.3 Test Environment

Operating Environment:	
Temperature:	25.5°C
Humidity:	53 % RH
Atmospheric Pressure:	1009 mbar

6.4 Antenna Requirement

Standard requirement

EUT Antenna



The EUT with FPC antenna, the max peak gain of the antenna is 1.21dBi.

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

6.5 Interference prevention function

The device consists of the internal antenna and 2.4 GHz WIFI IC; Component IC CPU also can use the protocol function to protect interference come from outside.

The identification code is: 56:4C:6E:3D:B6:05

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

6.6 Carrier sense capability

Conducted carrier sense function with test procedure annex table No.45 and confirmed the result was OK.

Test result: The unit does meet the requirements.

6.7 Frequency Error

Test Requirement:

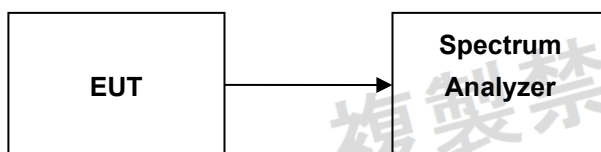
Item 19 of Article 2-1

Tolerance of frequency: $\pm 50 \times 10^{-6}$

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

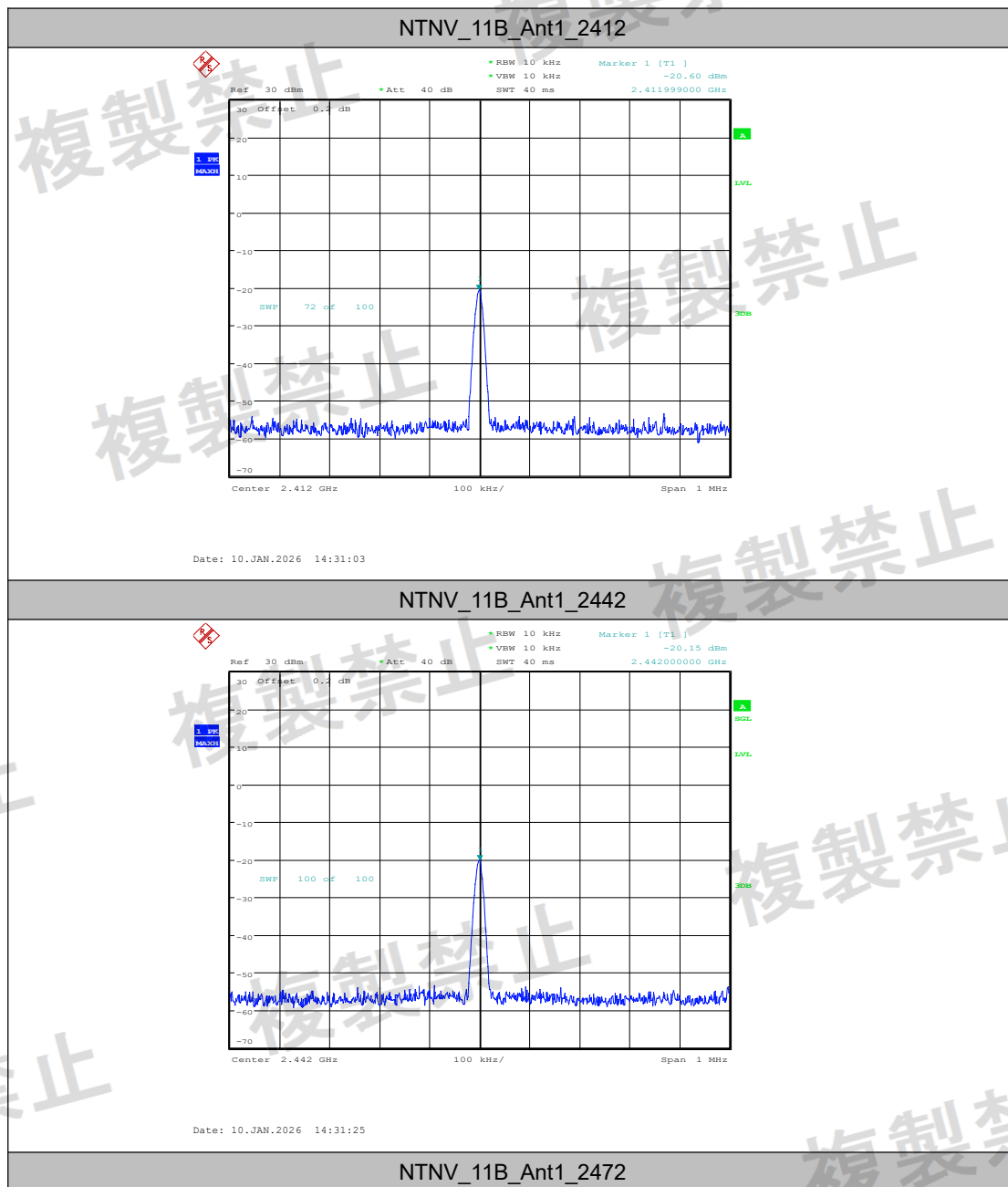
Indication mode Max hold

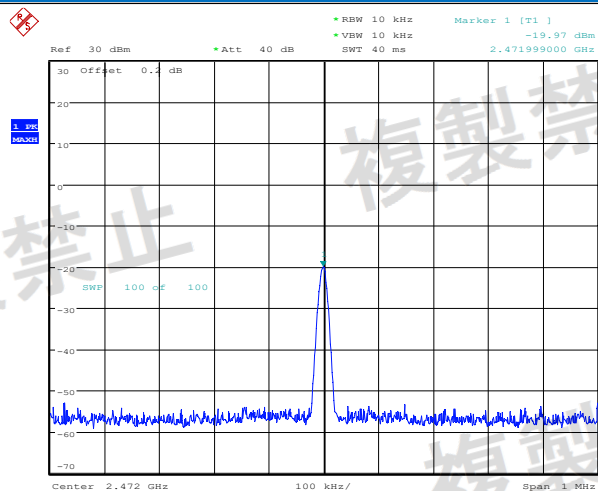
Test result:

TestCondition	TestMode	Antenna	Freq(MHz)	CenterFreq [MHz]	Result[ppm]	Limit[ppm]	Verdict
NTNV	11B	Ant1	2412	2411.999	-0.41459	±50	PASS
			2442	2442	0.00000	±50	PASS
			2472	2471.999	-0.40453	±50	PASS
	11G	Ant1	2412	2411.999	-0.41459	±50	PASS
			2442	2441.999	-0.40950	±50	PASS
			2472	2471.999	-0.40453	±50	PASS
	11N20SISO	Ant1	2412	2411.999	-0.41459	±50	PASS
			2442	2441.999	-0.40950	±50	PASS
			2472	2471.999	-0.40453	±50	PASS
	11N40SISO	Ant1	2422	2421.999	-0.41288	±50	PASS
			2442	2441.999	-0.40950	±50	PASS
			2462	2461.999	-0.40617	±50	PASS

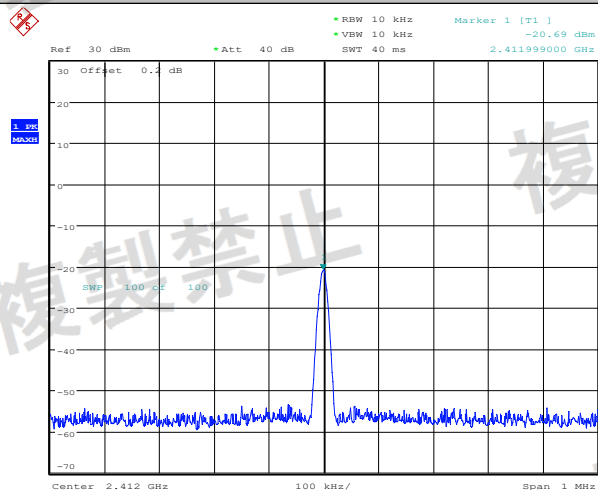
Note: The nominal frequency shall be confirmed by the applicant and test lab.

Result plot as follows:

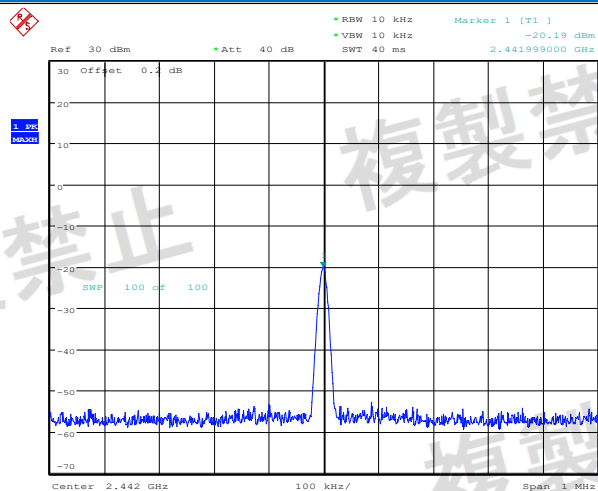




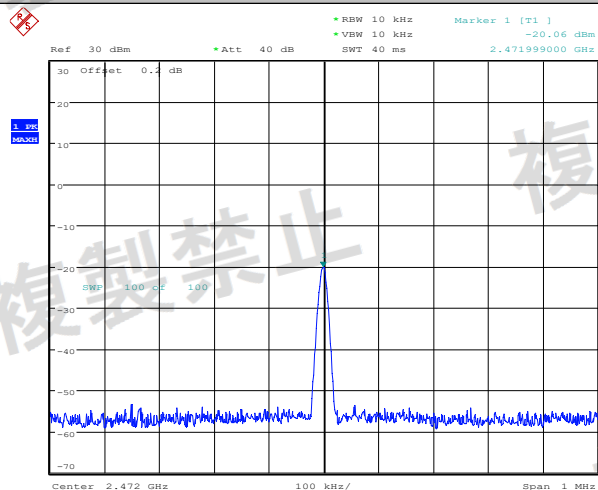
NTNV_11G_Ant1_2412



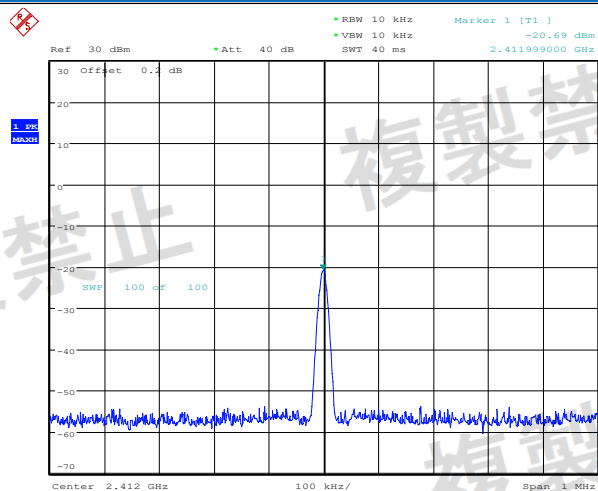
NTNV_11G_Ant1_2442



NTVN_11G_Ant1_2472

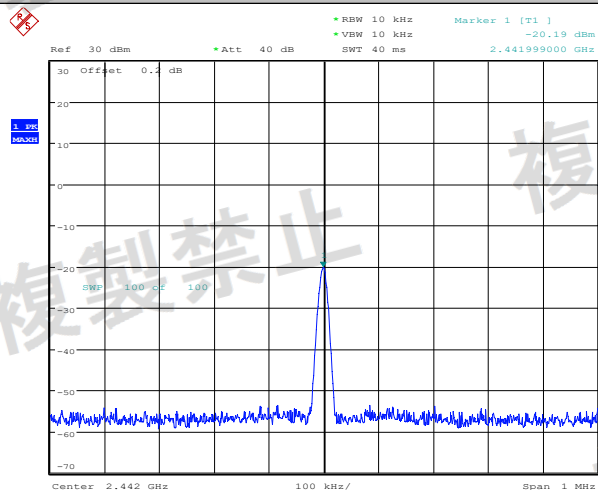


NTVN_11N20SISO_Ant1_2412



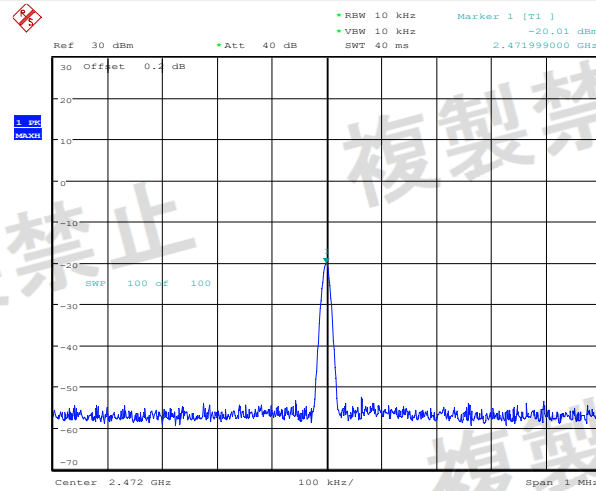
Date: 10.JAN.2026 14:33:09

NTNV 11N20SISO Ant1 2442

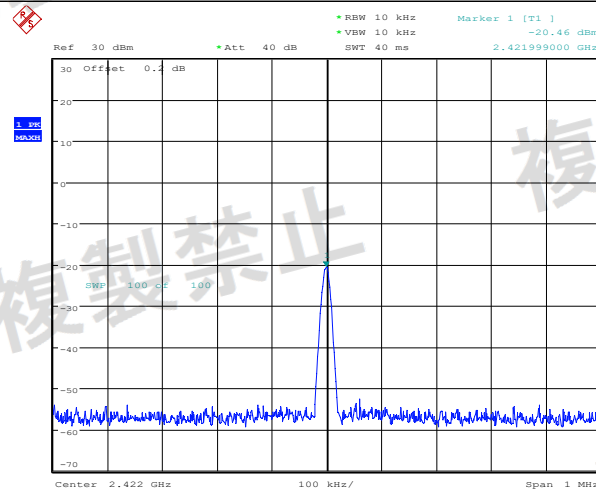


Date: 10.JAN.2026 14:33:27

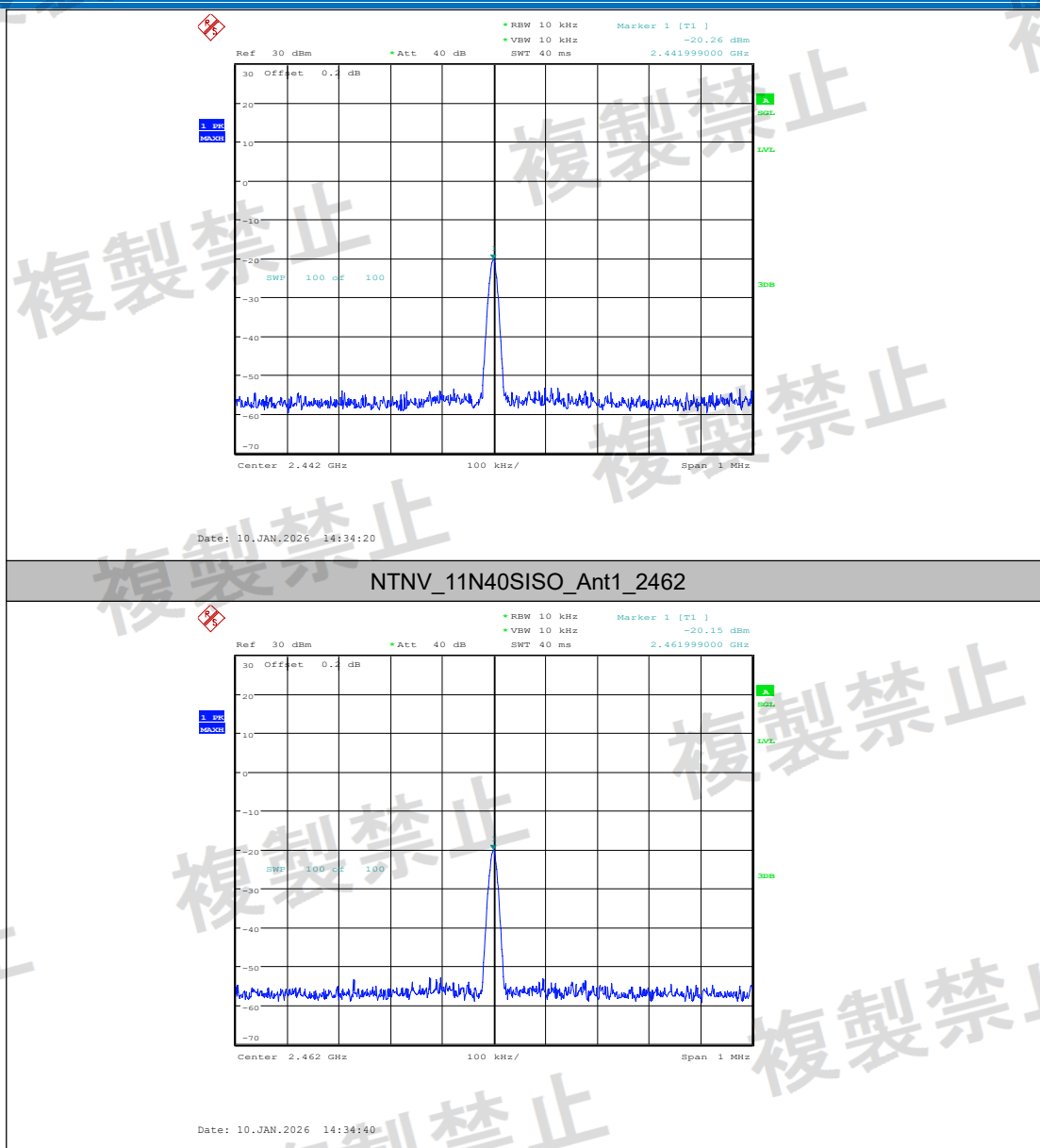
NTNV_11N20SISO_Ant1_2472



NTNV_11N40SISO_Ant1_2422



NTNV_11N40SISO_Ant1_2442



Test result: The unit does meet the requirements.

6.8 Occupied Bandwidth (99%)

Test Requirement:

Item 19 of Article 2-1

DSSS: 26 MHz or less

OFDM 20MHz System: 26 MHz or less

OFDM 40MHz System: 26~40 MHz 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:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON

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 40MHz/60MHz (DSSS,OFDM)

RBW 300 kHz

VBW 300 kHz

Sweep Time Auto

detector mode Positive peak

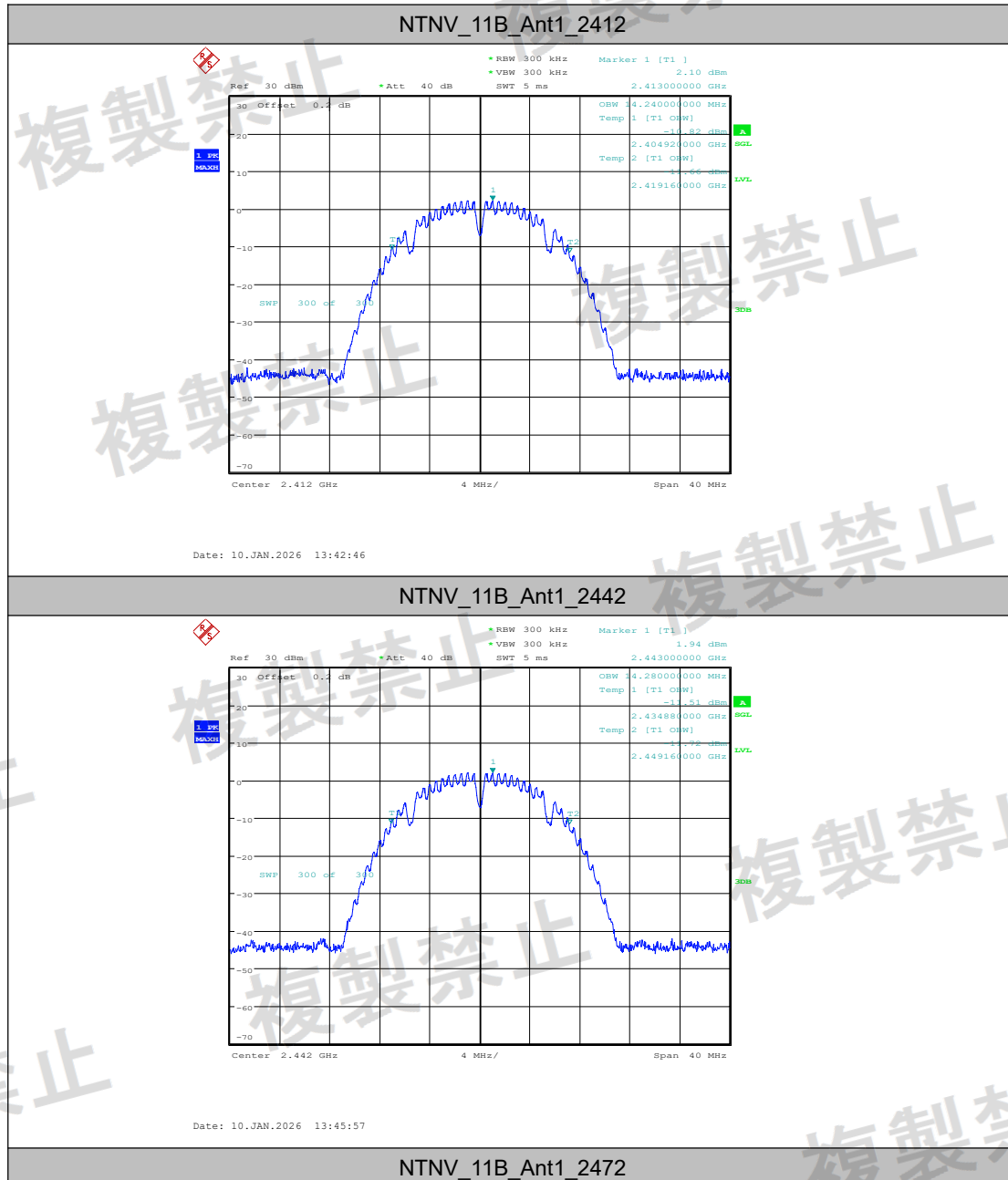
Indication mode Max hold

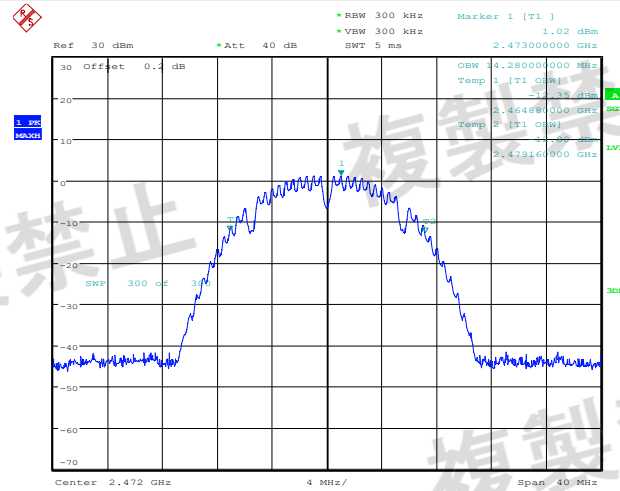
OBW 99%

Test result:

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	11B	Ant1	2412	14.240	≤26	PASS
			2442	14.280	≤26	PASS
			2472	14.280	≤26	PASS
	11G	Ant1	2412	17.080	≤26	PASS
			2442	17.080	≤26	PASS
			2472	16.920	≤26	PASS
	11N20SI SO	Ant1	2412	17.840	≤26	PASS
			2442	17.800	≤26	PASS
			2472	17.800	≤26	PASS
	11N40SI SO	Ant1	2422	36.160	26-40	PASS
			2442	36.160	26-40	PASS
			2462	36.160	26-40	PASS

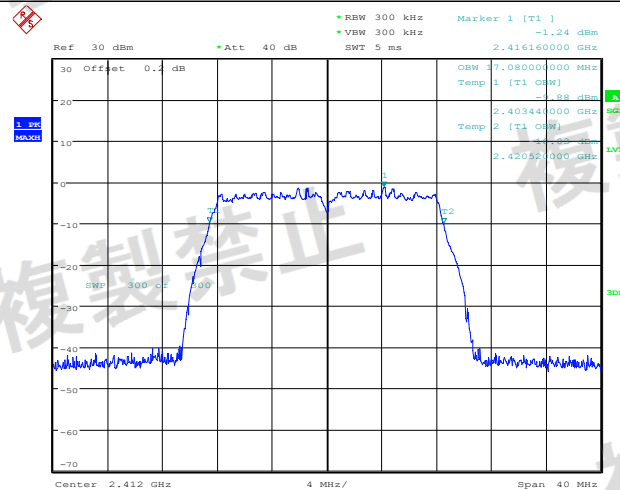
Result plot as follows:





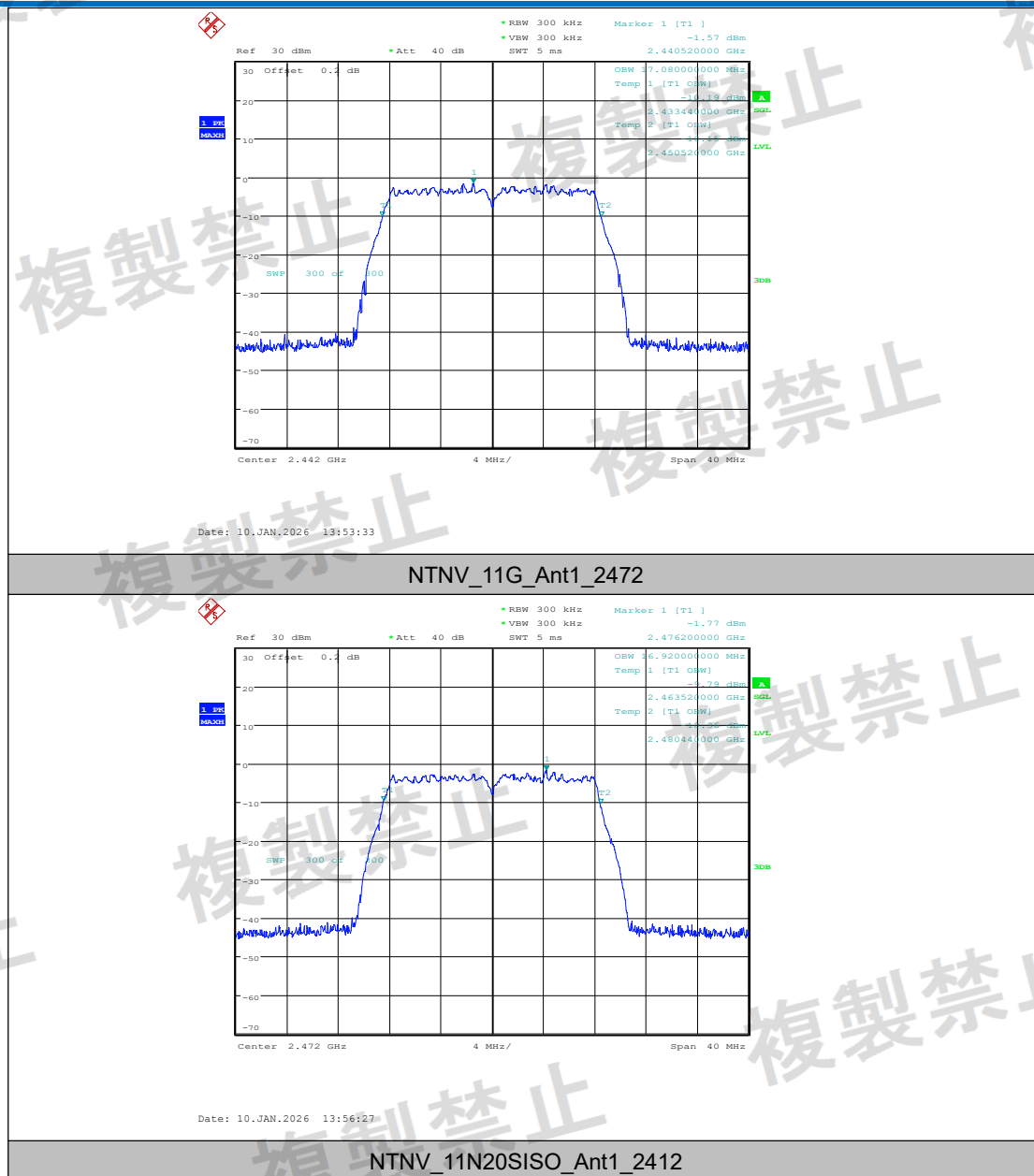
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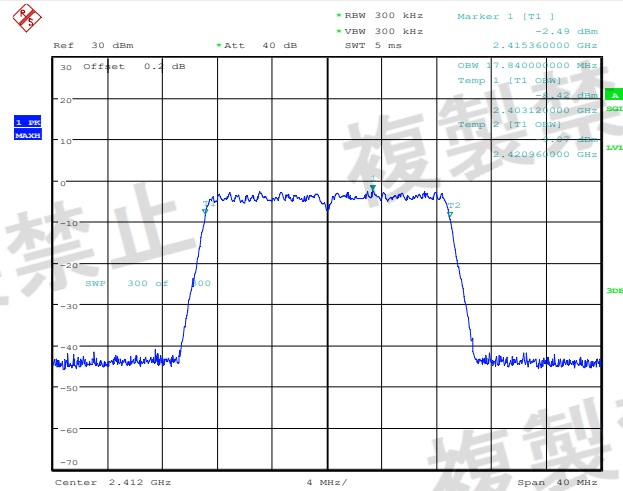
NTNV_11G_Ant1_2412



Date: 10.JAN.2026 13:51:27

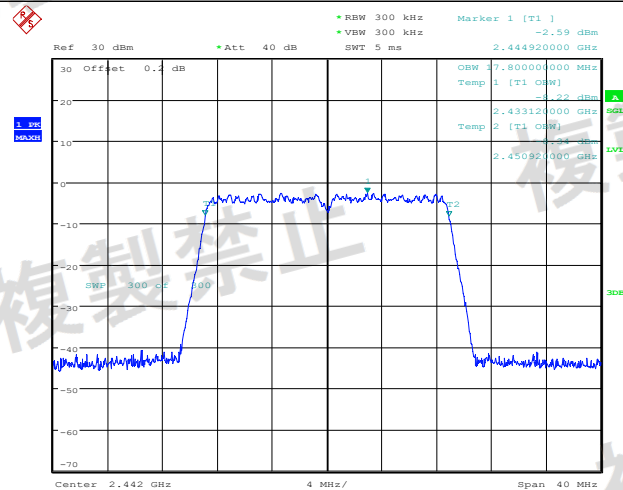
NTNV_11G_Ant1_2442





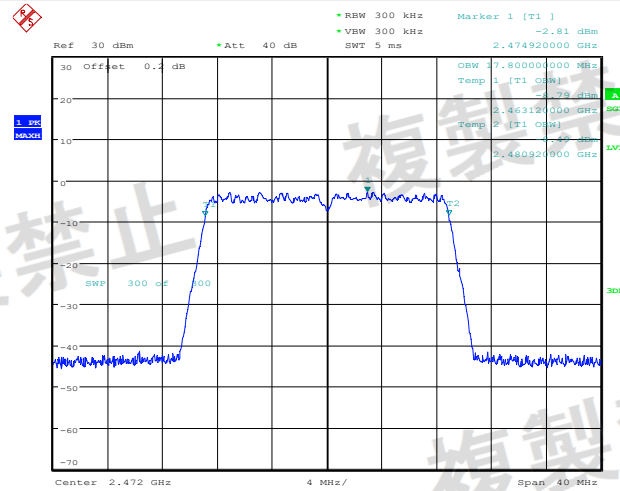
Date: 10.JAN.2026 14:00:24

NTNV_11N20SISO_Ant1_2442

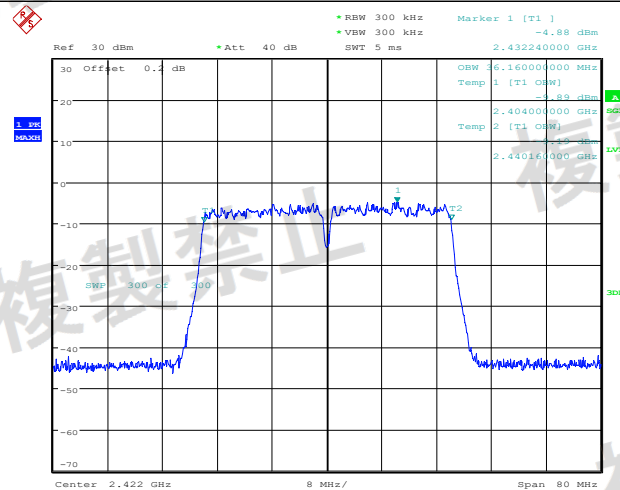


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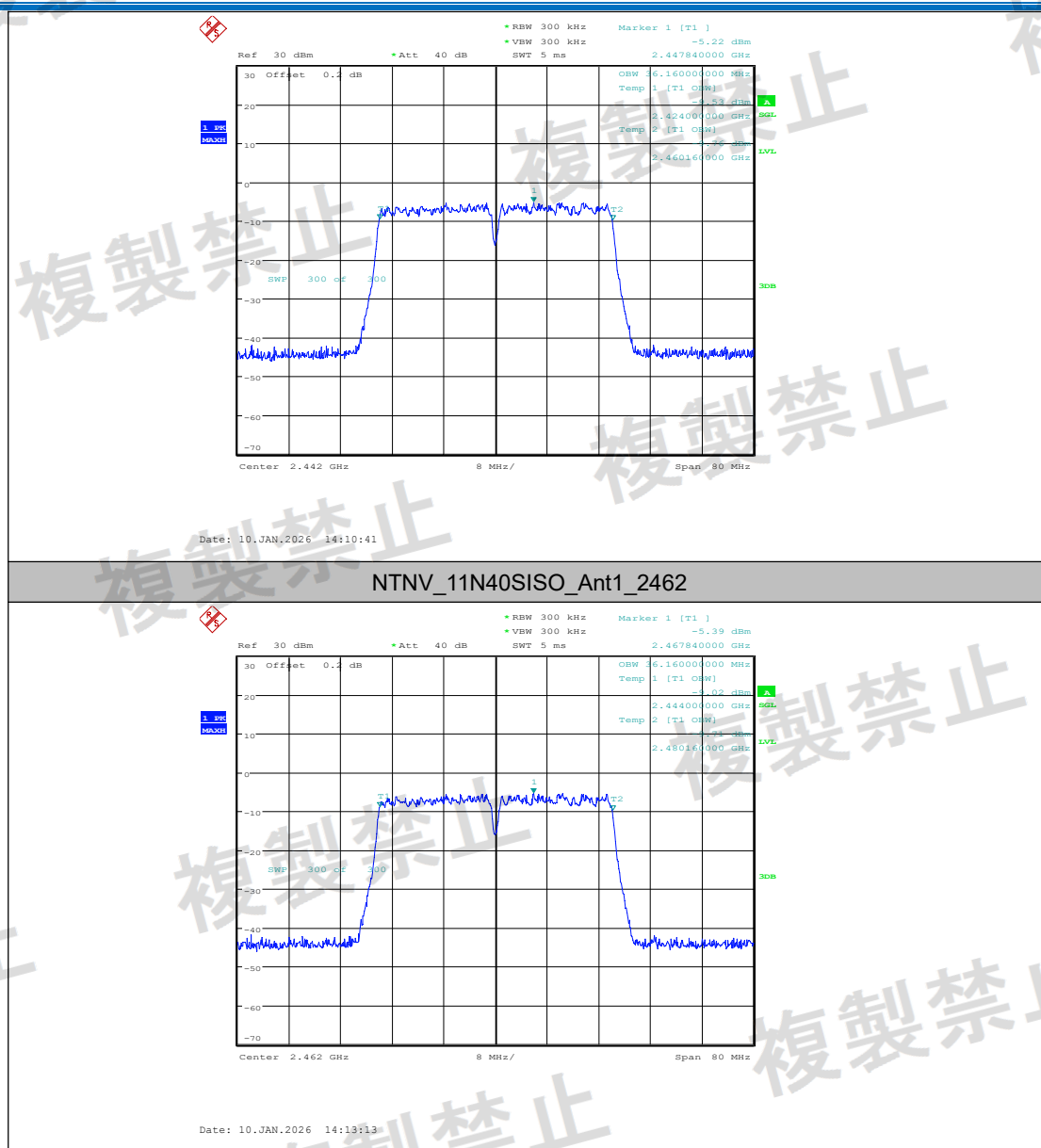
NTNV_11N20SISO_Ant1_2472



NTNV_11N40SISO_Ant1_2422



NTNV_11N40SISO_Ant1_2442



6.9 Spread spectrum Bandwidth (90%)

Test Requirement: Item 19 of Article 2-1
500 kHz or more

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/Hopping ON

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 40MHz/60MHz (DSSS,OFDM)

RBW 300kHz

VBW 300kHz

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

OBW 90%

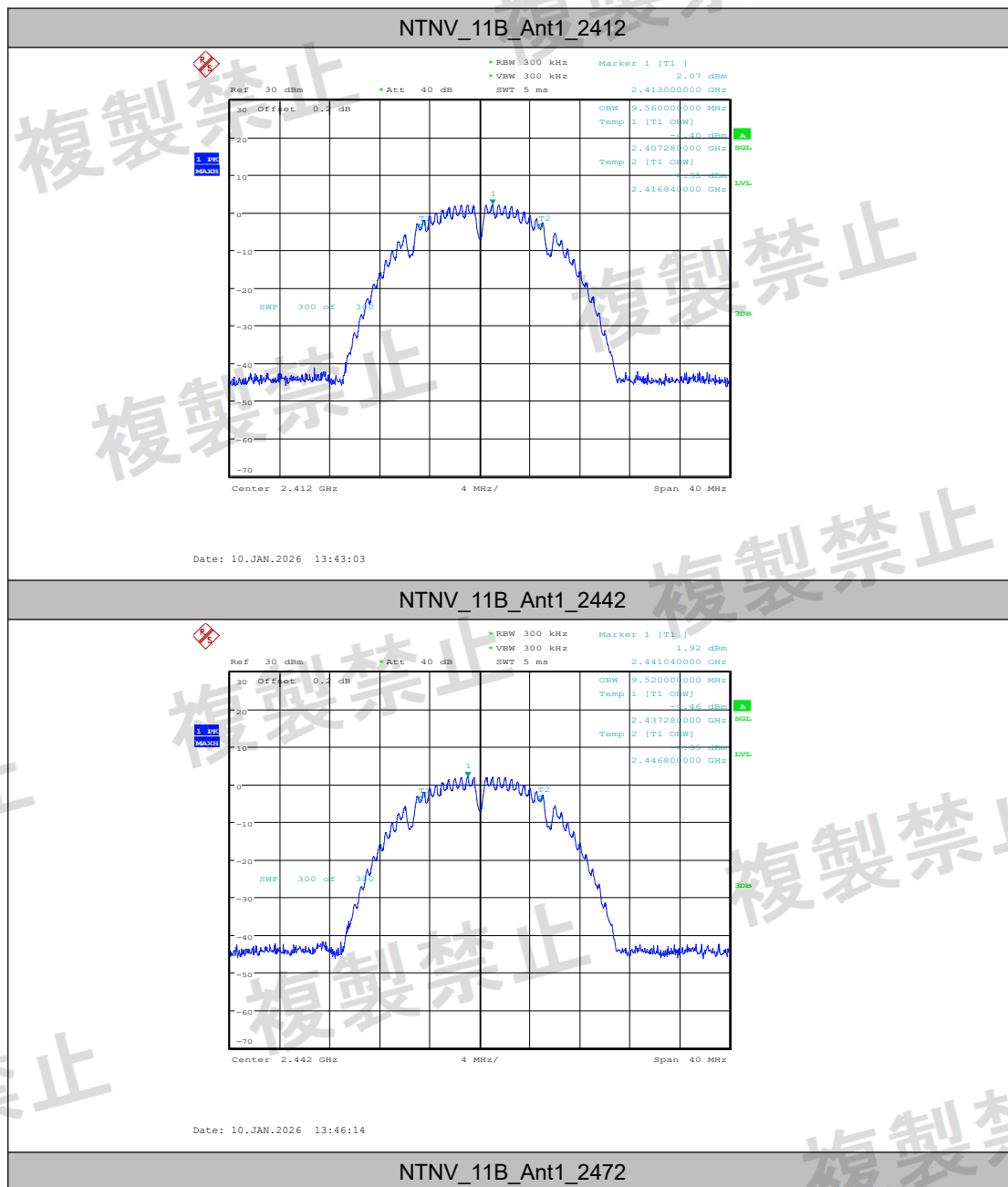
Test result:

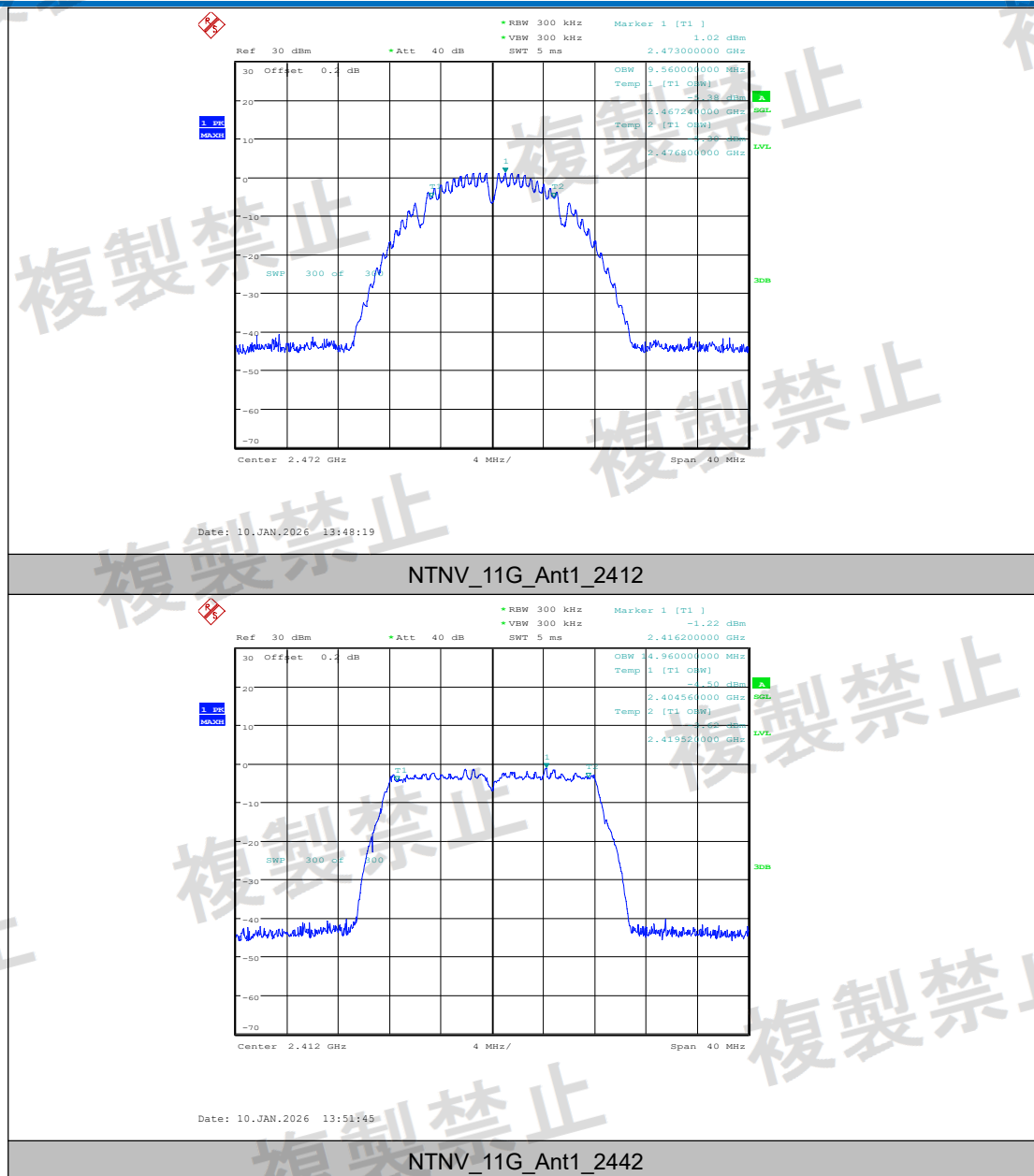
TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Spread Factor	Limit	Verdict
NTNV	11B	Ant1	2412	9.560	≥0.5	6.953	>5	PASS
			2442	9.520	≥0.5	6.924	>5	PASS
			2472	9.560	≥0.5	6.953	>5	PASS
	11G	Ant1	2412	14.960	≥0.5	---	---	PASS
			2442	14.880	≥0.5	---	---	PASS
			2472	14.920	≥0.5	---	---	PASS
	11N20SI SO	Ant1	2412	15.880	≥0.5	---	---	PASS
			2442	15.880	≥0.5	---	---	PASS
			2472	15.920	≥0.5	---	---	PASS
	11N40SI SO	Ant1	2422	32.560	≥0.5	---	---	PASS
			2442	32.640	≥0.5	---	---	PASS
			2462	32.640	≥0.5	---	---	PASS

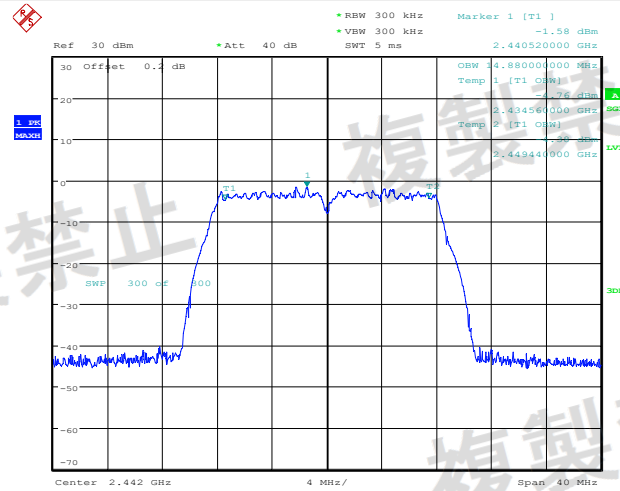
Remark:

1. Spreading factor = Spread bandwidth/ Transmission rate
2. 802.11b max rate of 11Mbps, Transmission rate= max rate/8

Result plot as follows:

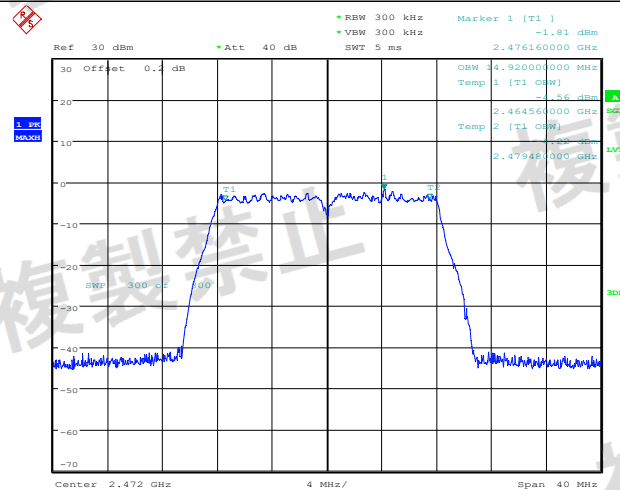






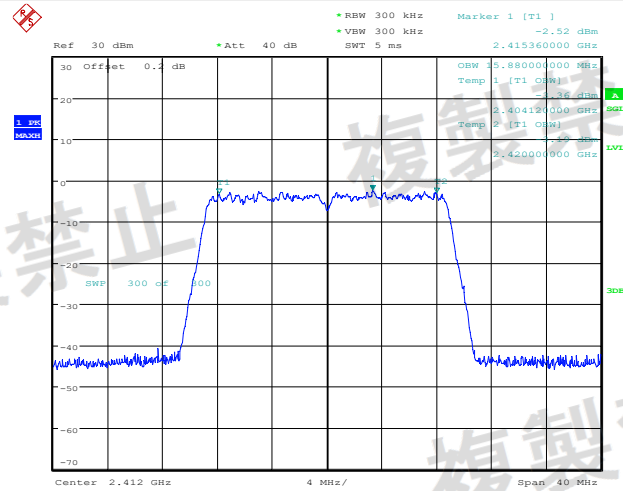
Date: 10.JAN.2026 13:53:49

NTNV_11G_Ant1_2472



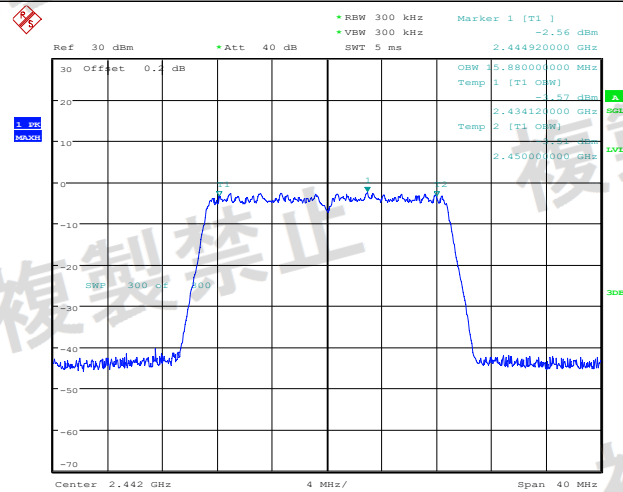
Date: 10.JAN.2026 13:56:43

NTNV_11N20SISO_Ant1_2412



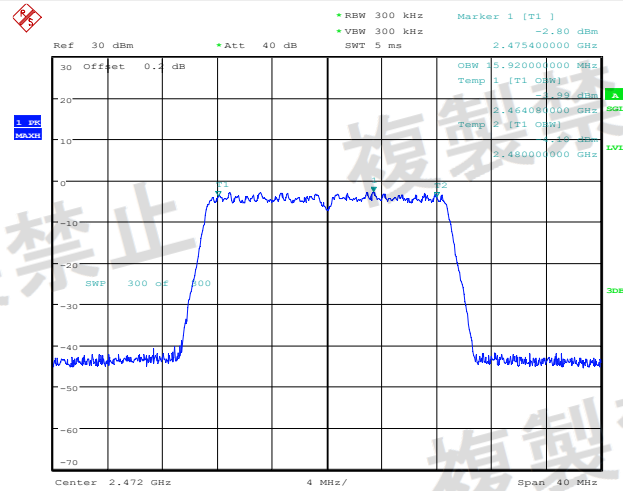
Date: 10.JAN.2026 14:00:42

NTNV_11N20SISO_Ant1_2442



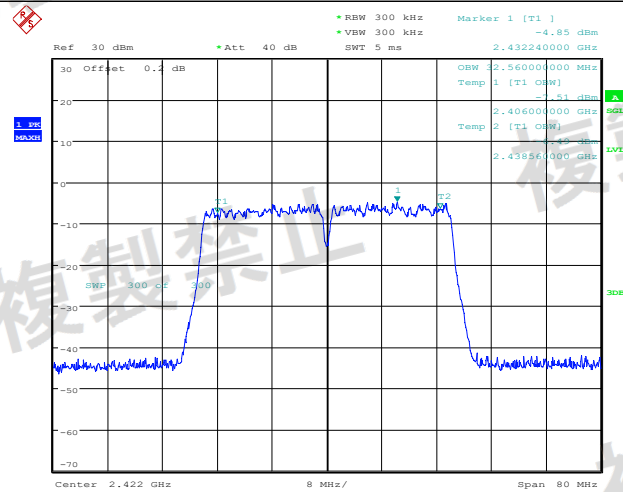
Date: 10.JAN.2026 14:03:13

NTNV_11N20SISO_Ant1_2472



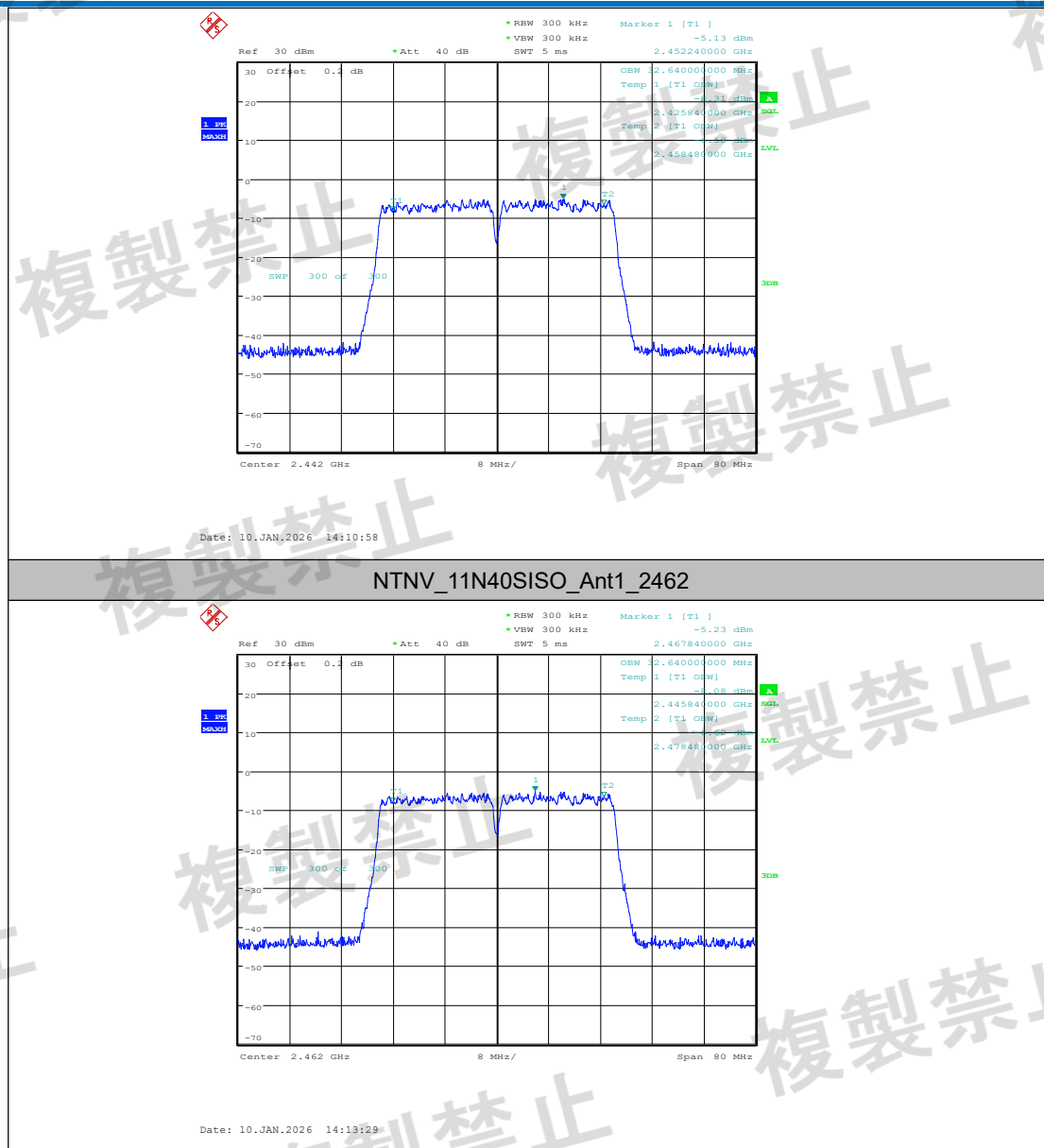
Date: 10.JAN.2026 14:05:46

NTNV_11N40SISO_Ant1_2422



Date: 10.JAN.2026 14:08:26

NTNV_11N40SISO_Ant1_2442



6.10 Antenna Power

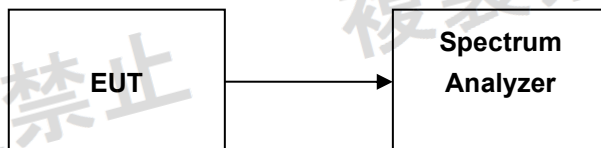
Test Requirement:

Item 19 of Article 2-1
10mW/MHz 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:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON

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/60MHz (DSSS,OFDM)

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

Test result:

Antenna Power							
Test Condition	Test Mode	Antenna	Freq(M Hz)	Result(dBm /MHz)	Result(mW/ MHz)	Limit(mW /MHz)	Verdict
NTNV	11B	Ant1	2412	5.31	3.3963	≤10	PASS
			2442	5.42	3.4834	≤10	PASS
			2472	4.63	2.9040	≤10	PASS
	11G	Ant1	2412	3.05	2.0184	≤10	PASS
			2442	3.41	2.1928	≤10	PASS
			2472	3.11	2.0464	≤10	PASS
	11N20SI SO	Ant1	2412	3.16	2.0701	≤10	PASS
			2442	3.29	2.1330	≤10	PASS
			2472	3.09	2.0370	≤10	PASS
	11N40SI SO	Ant1	2422	0.85	1.2162	≤5	PASS
			2442	0.68	1.1695	≤5	PASS
			2462	0.46	1.1117	≤5	PASS

Tolerance								
Test Condition	Test Mode	Antenna	Freq(MHz)	Power (mW/ MHz)	RatedPower (mW/MHz)	Result (%)	Limit (%)	Verdict
NTNV	11B	Ant1	2412	3.3963	3.3	2.92	+20	PASS
			2442	3.4834	3.3	5.56	+20	PASS
			2472	2.9040	3.3	-12.00	+20	PASS
	11G	Ant1	2412	2.0184	3.3	-38.84	+20	PASS
			2442	2.1928	3.3	-33.55	+20	PASS
			2472	2.0464	3.3	-37.99	+20	PASS
	11N20SI SO	Ant1	2412	2.0701	3.3	-37.27	+20	PASS
			2442	2.1330	3.3	-35.36	+20	PASS
			2472	2.0370	3.3	-38.27	+20	PASS
	11N40SI SO	Ant1	2422	1.2162	3.3	-63.15	+20	PASS
			2442	1.1695	3.3	-64.56	+20	PASS
			2462	1.1117	3.3	-66.31	+20	PASS

EIRP							
Test Condition	Test Mode	Antenna	Freq(M Hz)	Result(dBm/ MHz)	EIRP(dBm/ MHz)	Limit(dBm/ MHz)	Verdict
NTNV	11B	Ant1	2412	5.31	6.52	≤12.14	PASS
			2442	5.42	6.63	≤12.14	PASS
			2472	4.63	5.84	≤12.14	PASS

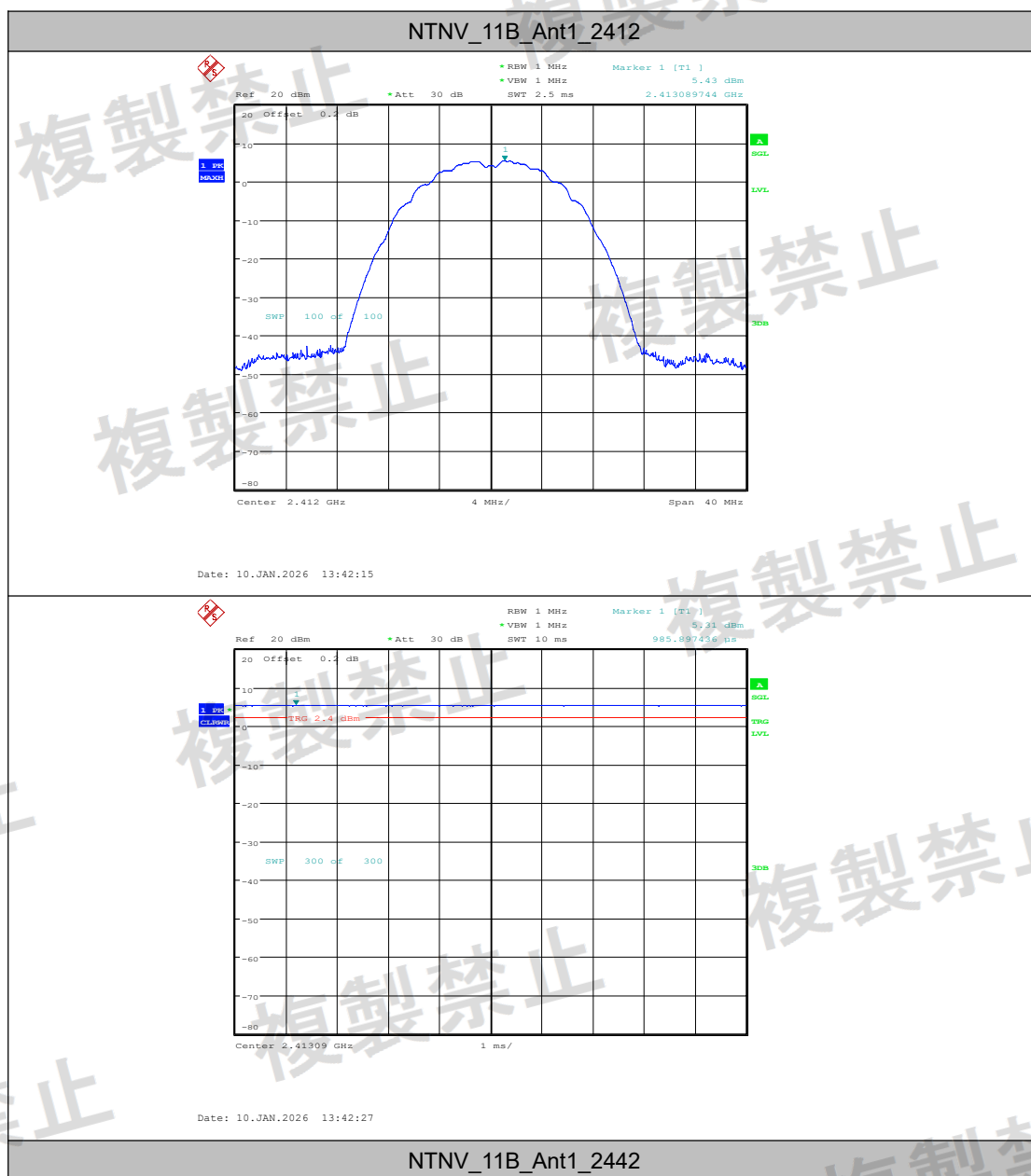
	11G	Ant1	2412	3.05	4.26	≤12.14	PASS
			2442	3.41	4.62	≤12.14	PASS
			2472	3.11	4.32	≤12.14	PASS
	11N20SI SO	Ant1	2412	3.16	4.37	≤12.14	PASS
			2442	3.29	4.5	≤12.14	PASS
			2472	3.09	4.3	≤12.14	PASS
	11N40SI SO	Ant1	2422	0.85	2.06	≤9.13	PASS
			2442	0.68	1.89	≤9.13	PASS
			2462	0.46	1.67	≤9.13	PASS

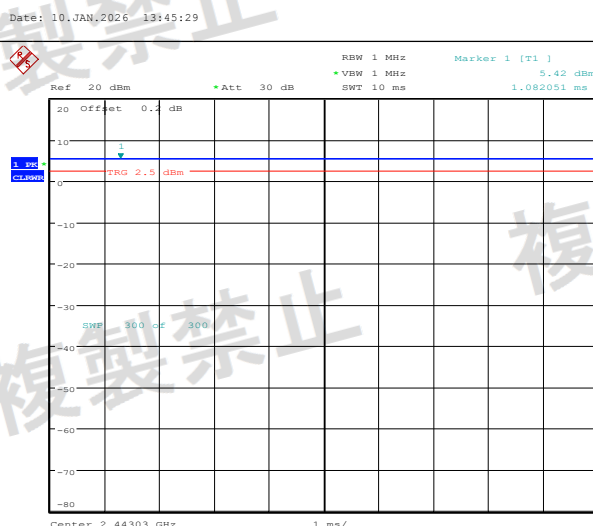
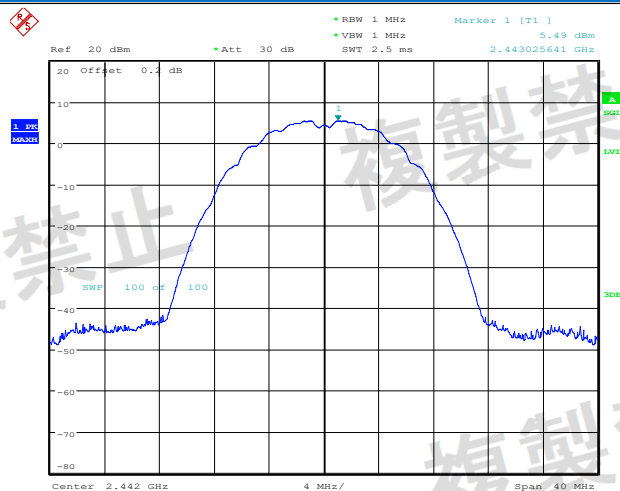
Remark:

Rated power:

3.3mW/MHz

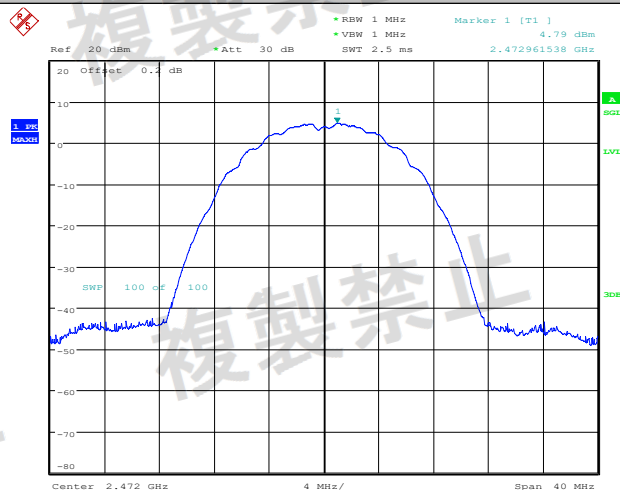
Result plot as follows:



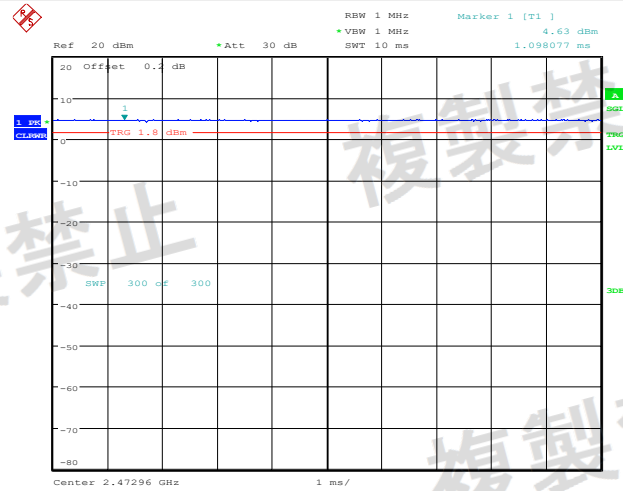


Date: 10.JAN.2026 13:45:40

NTNV_11B_Ant1_2472

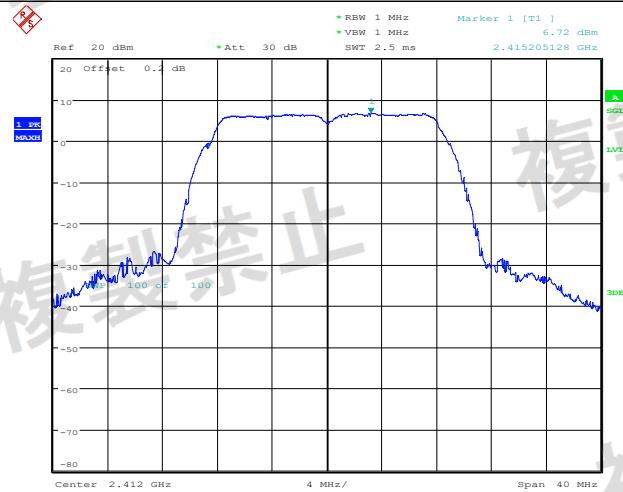


Date: 10.JAN.2026 13:47:32

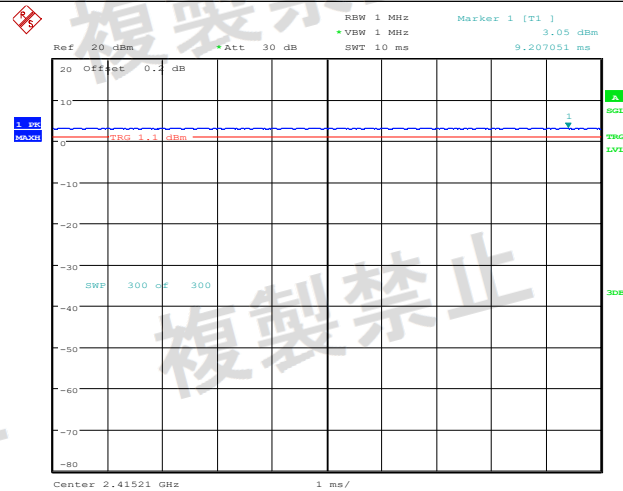


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NTNV_11G_Ant1_2412

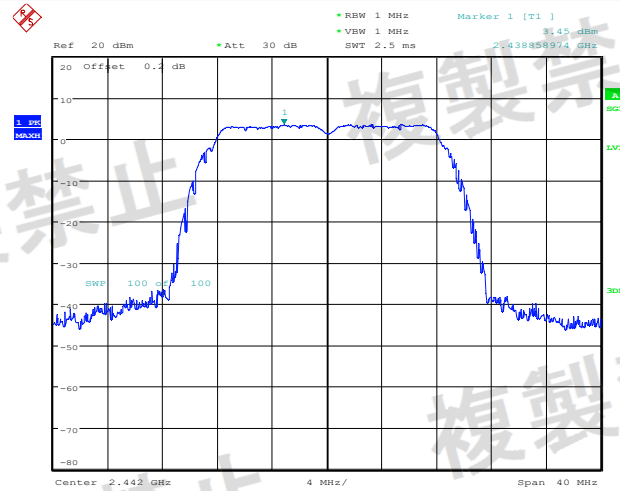


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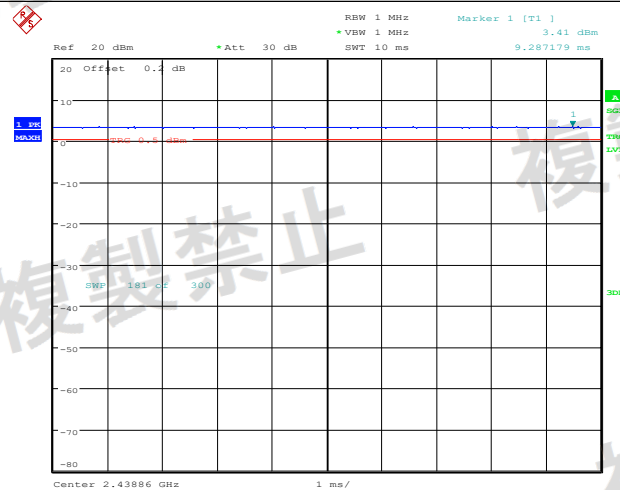


Date: 10.JAN.2026 13:51:10

NTNV_11G_Ant1_2442

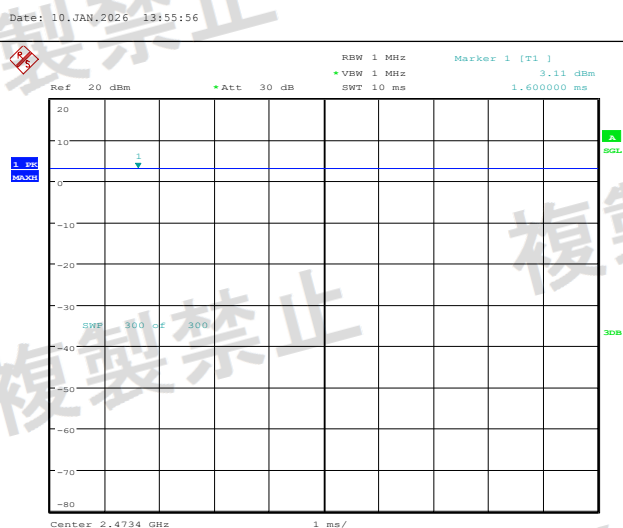
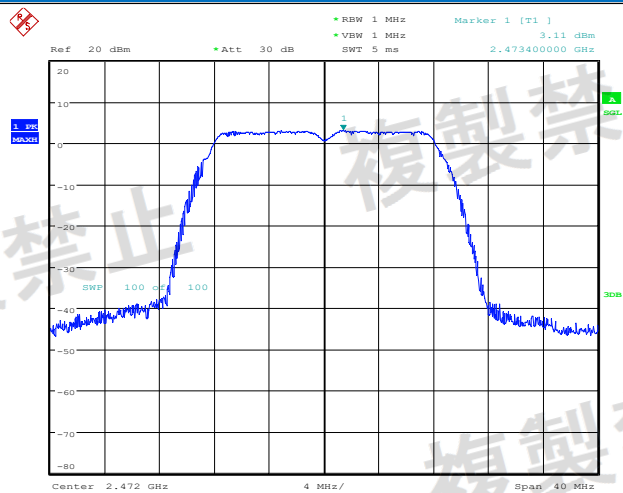


Date: 10.JAN.2026 13:53:04



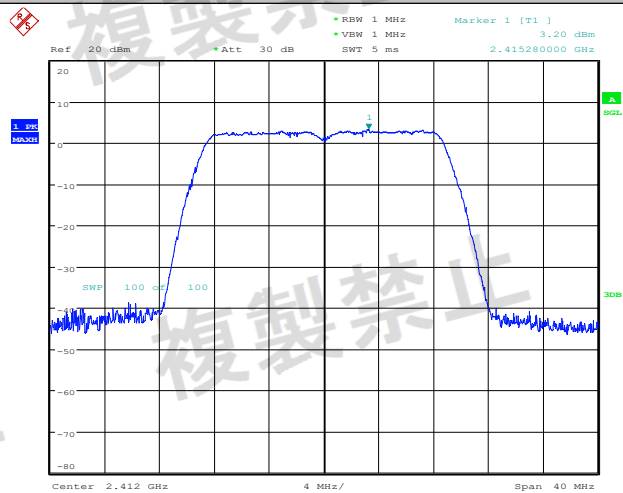
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NTNV_11G_Ant1_2472

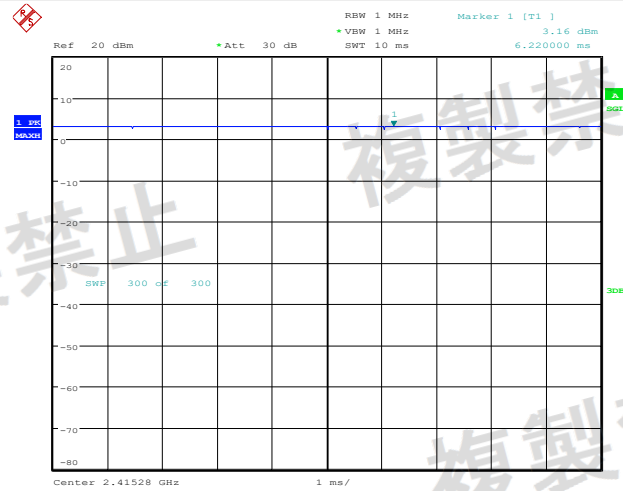


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NTNV_11N20SISO_Ant1_2412

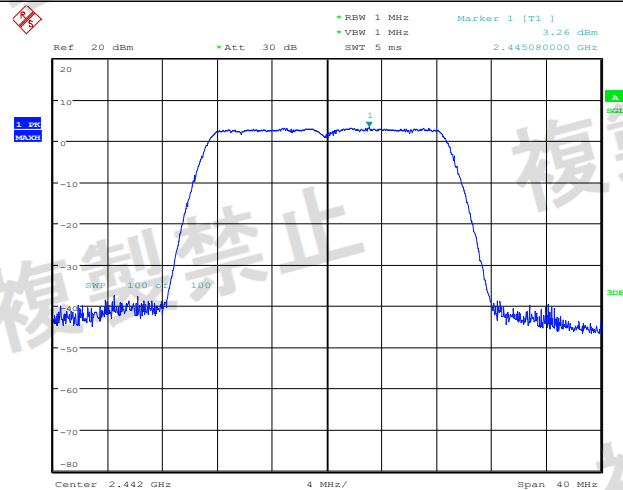


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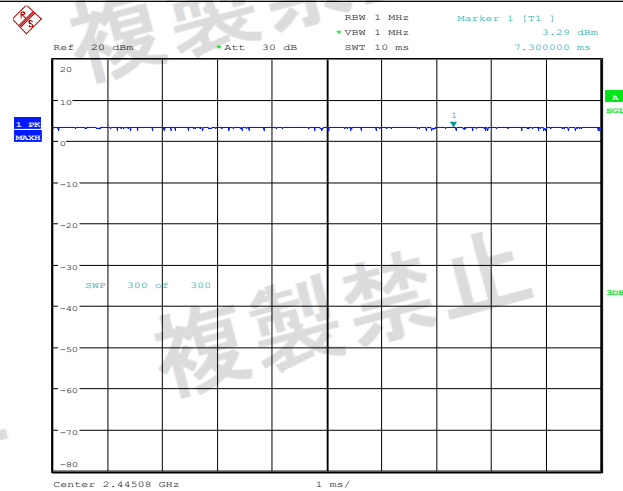


Date: 10.JAN.2026 14:00:06

NTNV_11N20SISO_Ant1_2442

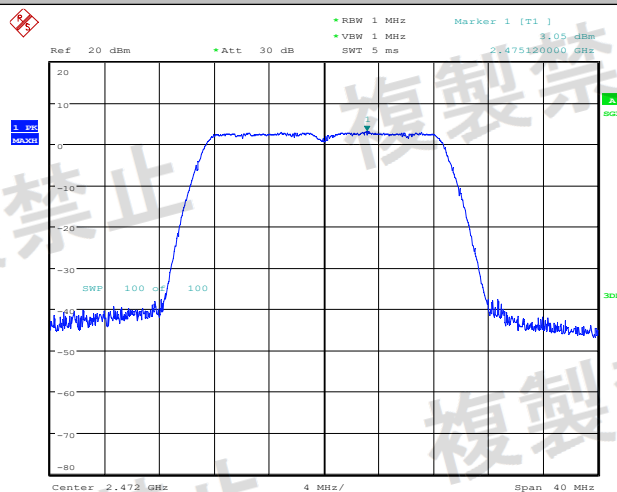


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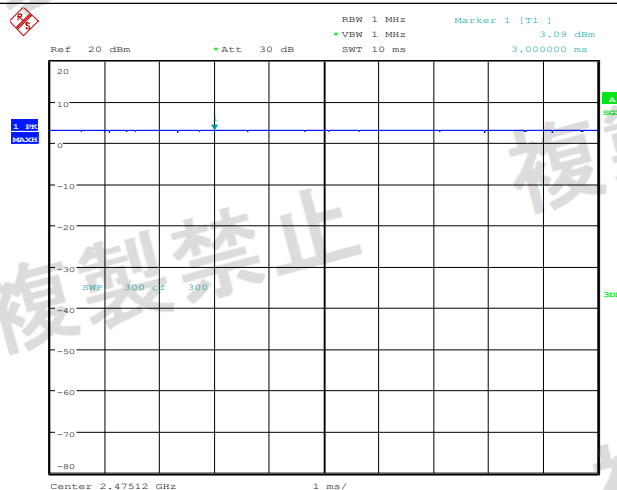


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NTNV_11N20SISO_Ant1_2472

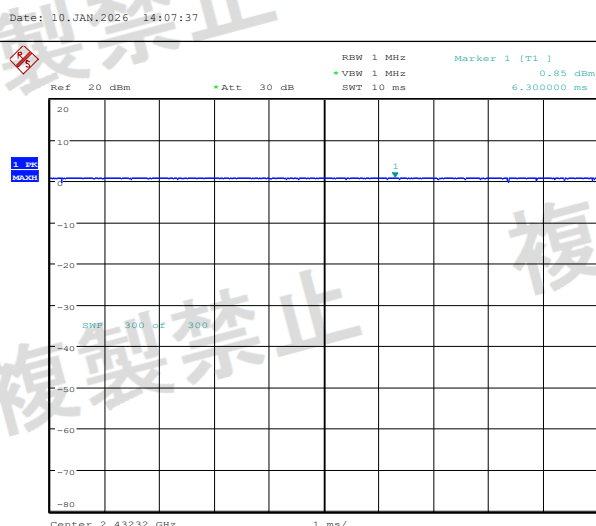
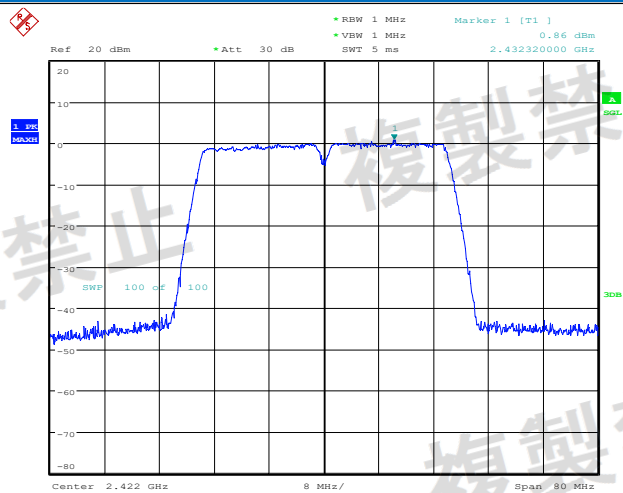


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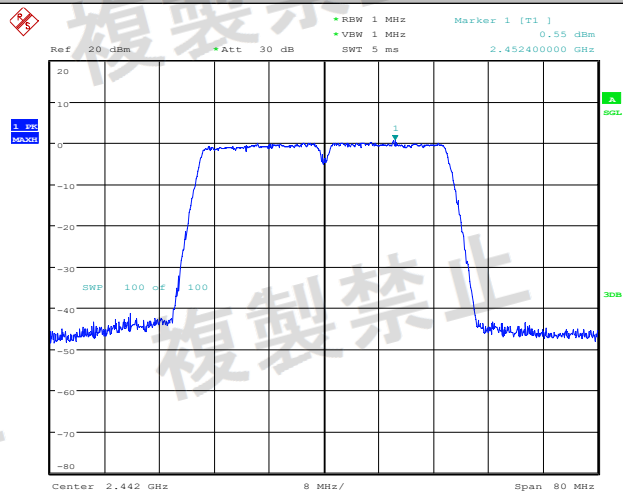
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NTNV_11N40SISO_Ant1_2422

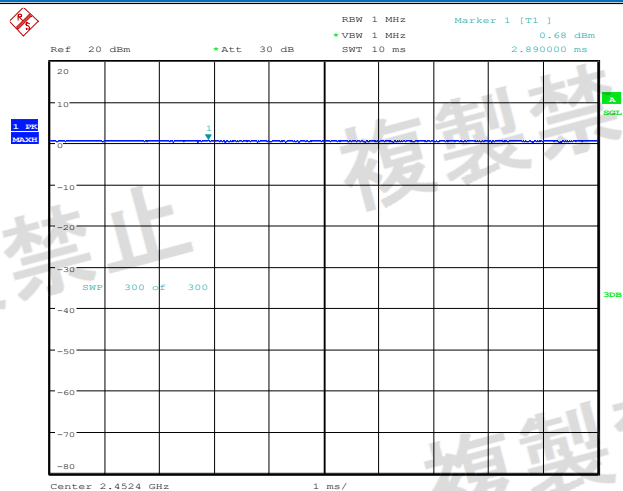


Date: 10.JAN.2026 14:07:37

NTNV_11N40SISO_Ant1_2442

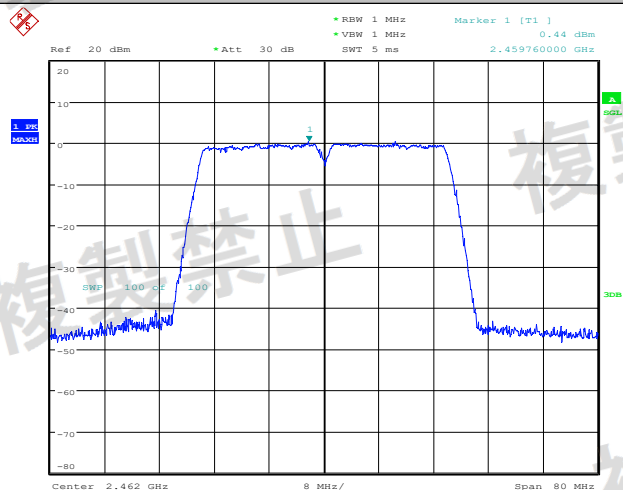


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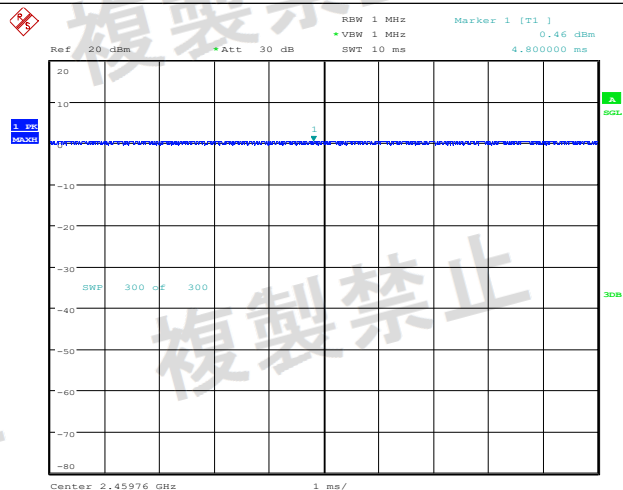


Date: 10.JAN.2026 14:10:23

NTNV_11N40SISO_Ant1_2462



Date: 10.JAN.2026 14:12:42



Date: 10.JAN.2026 14:12:56

6.11 Spurious Emissions of Tx

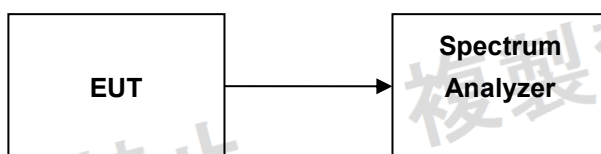
Test Requirement: Item 19 of Article 2-1

for 2412-2472MHz

- (1) Below 2387 MHz : 2.5 μ W/MHz
- (2) 2387 to 2400 MHz : 25 μ W/MHz
- (3) 2483.5 through 2496.5 MHz : 25 μ W/MHz
- (4) Over 2496.5 MHz : 2.5 μ W/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/Hopping ON

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 13 GHz by peak mode.

Step 2

IF the value measured by Step1 is 2 dB or less, measure in average mode.

Test setup for Step 1:

Frequency: 30 MHz – 1000 MHz

RBW 100 KHz

VBW 100 KHz

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

Frequency: 1000 MHz – 2400 MHz , 2483.5 MHz –13 GHz

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

Test setup for Step 2:

Frequency: Spurious Frequency

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

detector mode Sample

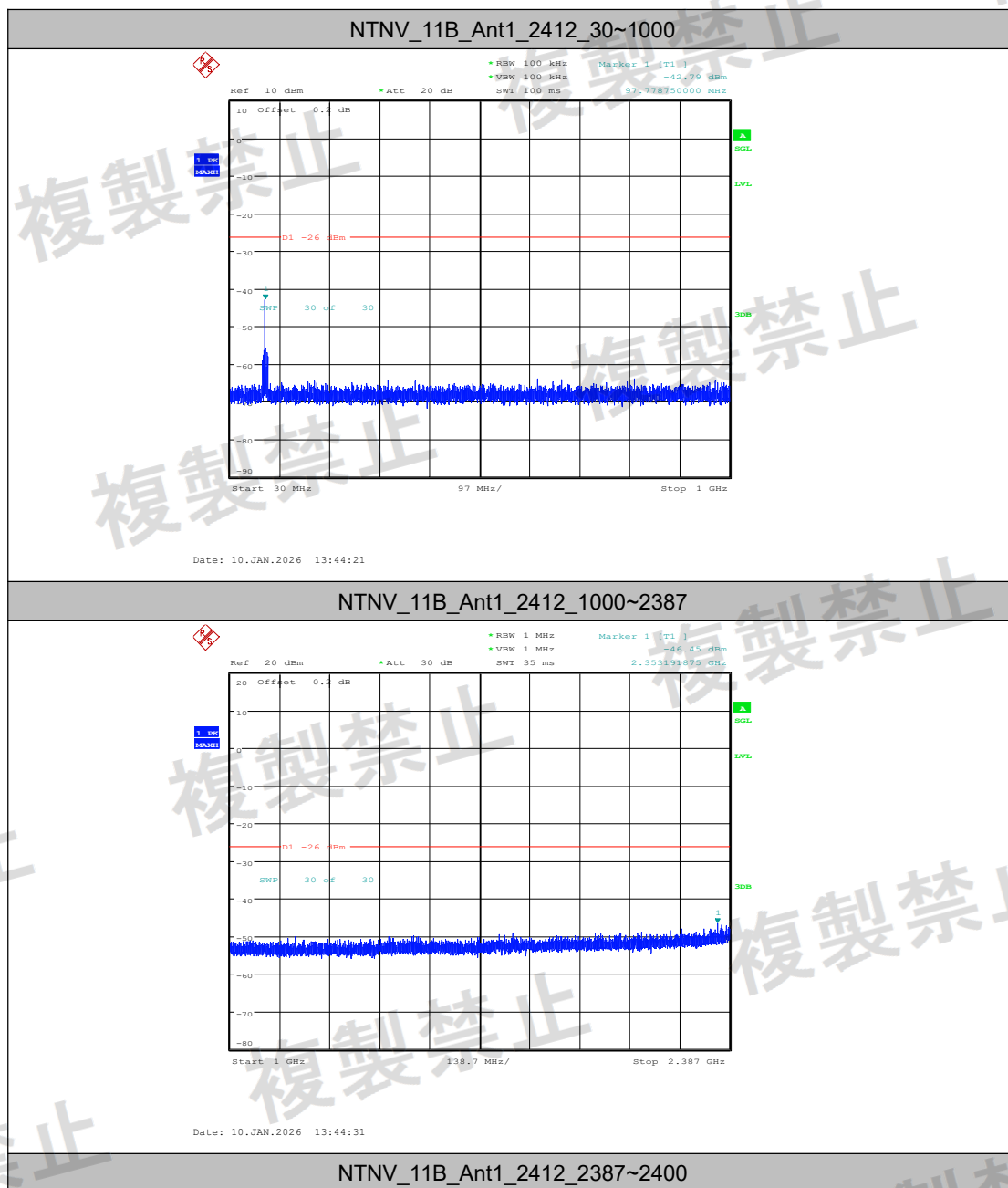
Indication mode Max hold

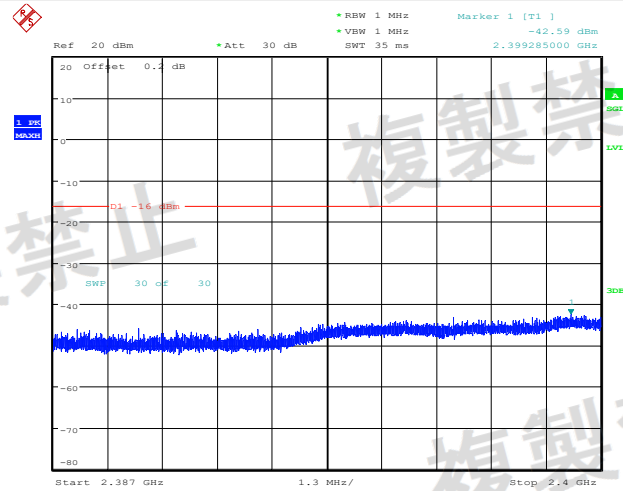
TestCondition	TestMode	Channel (MHz)	Freq.Range [MHz]	Freq (MHz)	Result [dBm/M Hz]	Limit [dBm/ MHz]	Result [μW/MH z]	Limit [μW/ MHz]	Verdict
NTNV	11B	2412	30~1000	97.78	-42.79	≤-26	0.05260	≤2.5	PASS
			1000~2387	2353.1 9	-46.45	≤-26	0.02265	≤2.5	PASS
			2387~2400	2399.2 9	-42.59	≤-16	0.05508	≤25	PASS
			2483.5~2496.5	2493.6 2	-45.43	≤-16	0.02864	≤25	PASS
			2496.5~13000	5178.5 7	-51.99	≤-26	0.00632	≤2.5	PASS
		2442	30~1000	127.73	-43.21	≤-26	0.04775	≤2.5	PASS
			1000~2387	2322.1 6	-48.19	≤-26	0.01517	≤2.5	PASS
			2387~2400	2391.9 0	-46.18	≤-16	0.02410	≤25	PASS
			2483.5~2496.5	2490.5 6	-44.92	≤-16	0.03221	≤25	PASS
			2496.5~13000	2500.7 0	-52.63	≤-26	0.00546	≤2.5	PASS
	11G	2472	30~1000	157.80	-44.11	≤-26	0.03882	≤2.5	PASS
			1000~2387	2081.6 9	-48.68	≤-26	0.01355	≤2.5	PASS
			2387~2400	2392.7 2	-47.03	≤-16	0.01982	≤25	PASS
			2483.5~2496.5	2483.5 5	-41.77	≤-16	0.06653	≤25	PASS
			2496.5~13000	2496.5 0	-53.69	≤-26	0.00428	≤2.5	PASS
		2412	30~1000	97.66	-56.64	≤-26	0.00217	≤2.5	PASS
			1000~2387	2383.5 3	-45.12	≤-26	0.03076	≤2.5	PASS
			2387~2400	2399.6 1	-34.68	≤-16	0.34041	≤25	PASS
			2483.5~2496.5	2491.5 0	-43.63	≤-16	0.04335	≤25	PASS
			2496.5~13000	2515.9 3	-52.63	≤-26	0.00546	≤2.5	PASS
		2442	30~1000	127.00	-56.92	≤-26	0.00203	≤2.5	PASS
			1000~2387	2279.3	-47.36	≤-26	0.01837	≤2.5	PASS

Page:53 of 101

				3					
				30~1000	107.72	-59.88	≤-26	0.00103	≤2.5 PASS
				1000~2387	2385.6 1	-44.95	≤-26	0.03199	≤2.5 PASS
			2422	2387~2400	2399.9 9	-39.46	≤-16	0.11324	≤25 PASS
				2483.5~2496.5	2483.7 9	-43.44	≤-16	0.04529	≤25 PASS
				2496.5~13000	2504.3 8	-50.43	≤-26	0.00906	≤2.5 PASS
			11N40SI SO	30~1000	126.64	-59.24	≤-26	0.00119	≤2.5 PASS
				1000~2387	1933.8 0	-42.74	≤-26	0.05321	≤2.5 PASS
				2387~2400	2397.4 7	-45.38	≤-16	0.02897	≤25 PASS
				2483.5~2496.5	2491.9 8	-43.14	≤-16	0.04853	≤25 PASS
				2496.5~13000	2499.6 5	-50.22	≤-26	0.00951	≤2.5 PASS
			2462	30~1000	148.58	-59.92	≤-26	0.00102	≤2.5 PASS
				1000~2387	2248.9 9	-47.92	≤-26	0.01614	≤2.5 PASS
				2387~2400	2395.7 4	-45.82	≤-16	0.02618	≤25 PASS
				2483.5~2496.5	2483.5 2	-34.37	≤-16	0.36559	≤25 PASS
				2496.5~13000	2520.6 6	-49.30	≤-26	0.01175	≤2.5 PASS

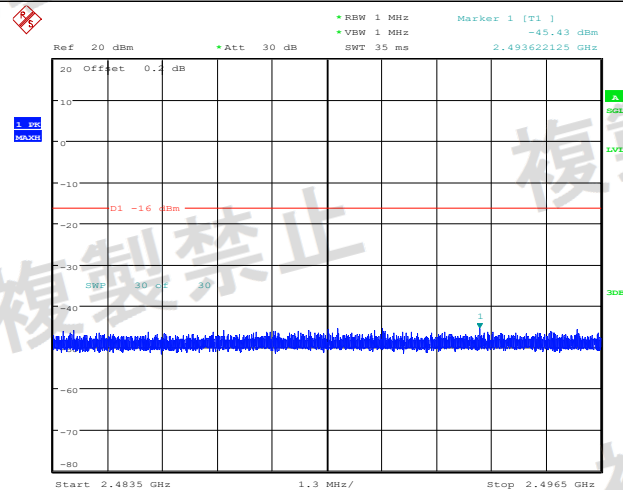
6.11.1 Test Graphs





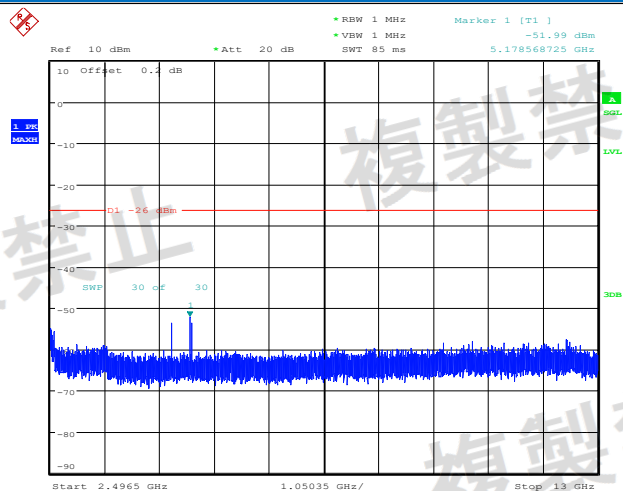
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NTNV_11B_Ant1_2412_2483.5~2496.5



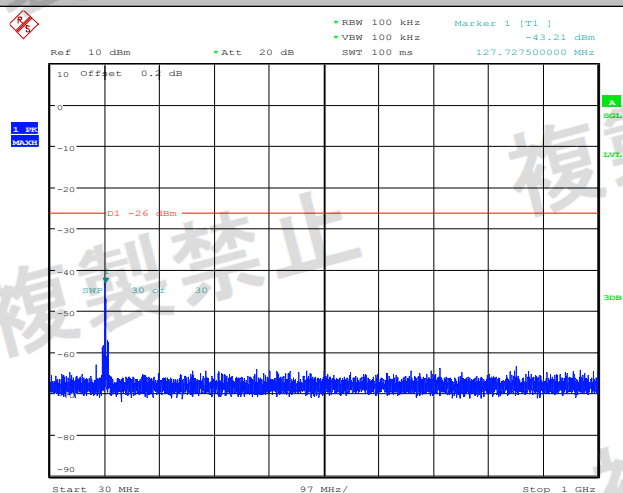
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NTNV_11B_Ant1_2412_2496.5~13000



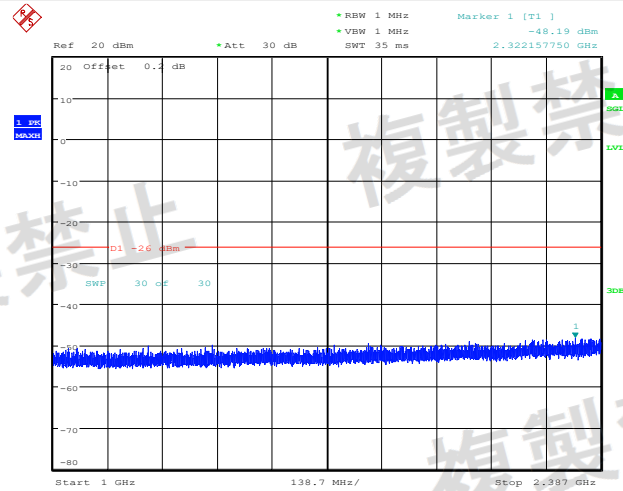
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NTNV_11B_Ant1_2442_30~1000



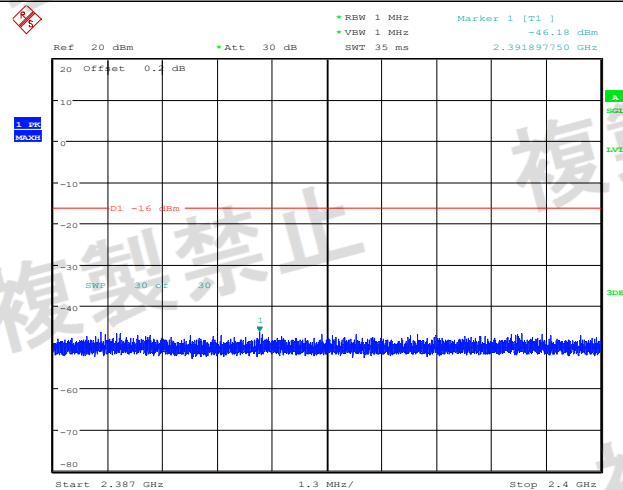
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NTNV_11B_Ant1_2442_1000~2387



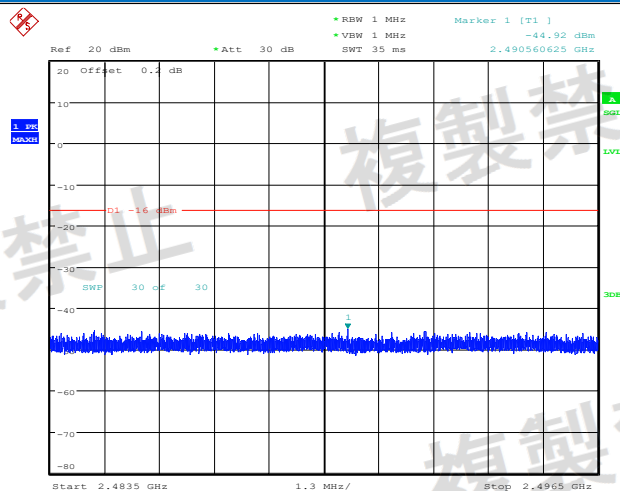
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NTNV_11B_Ant1_2442_2387~2400



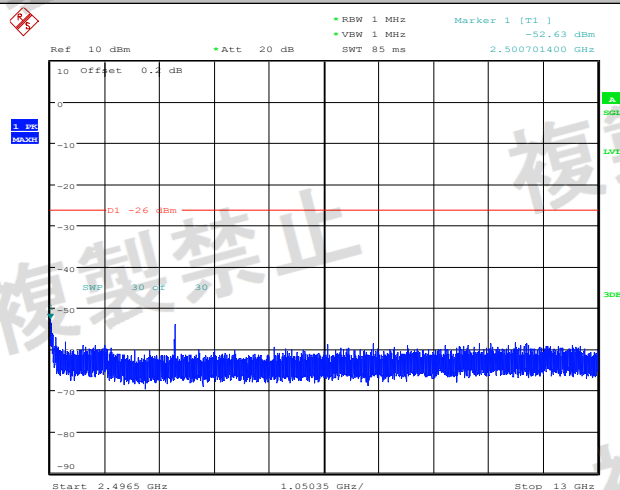
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NTNV_11B_Ant1_2442_2483.5~2496.5



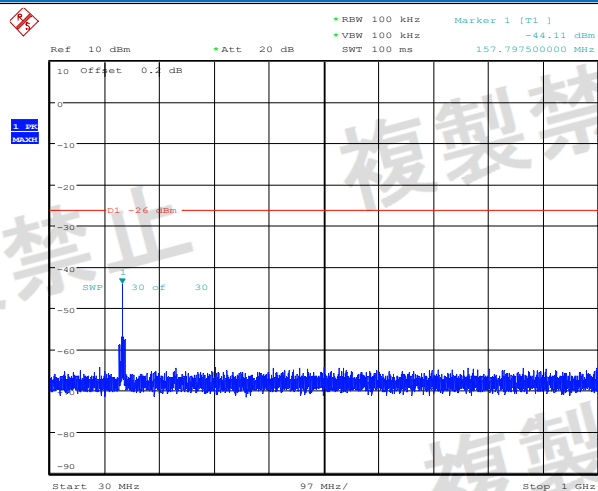
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NTNV 11B Ant1 2442 2496.5~13000

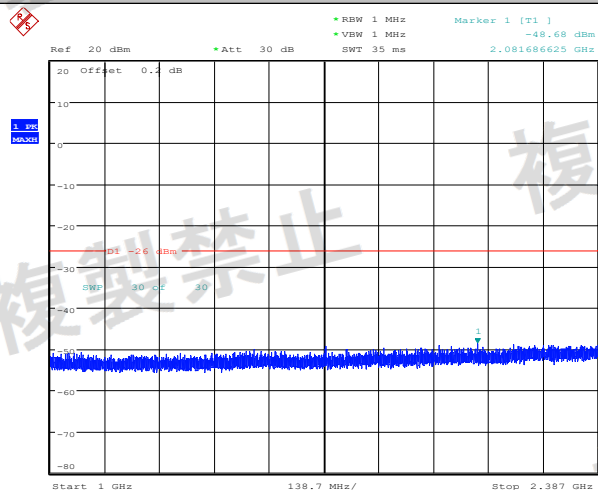


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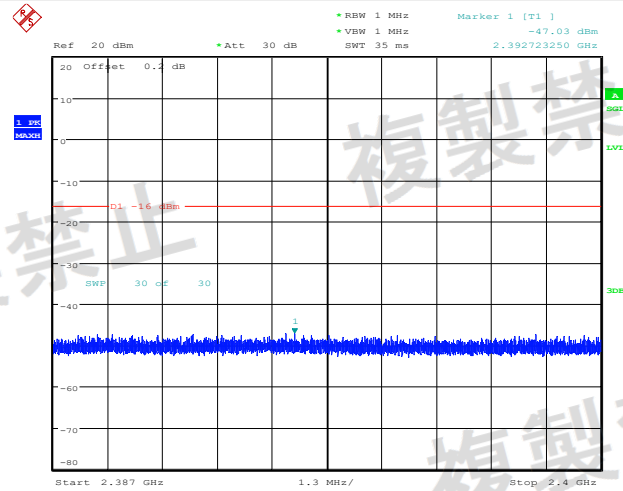
NTNV_11B_Ant1_2472_30~1000



NTNV_11B_Ant1_2472_1000~2387

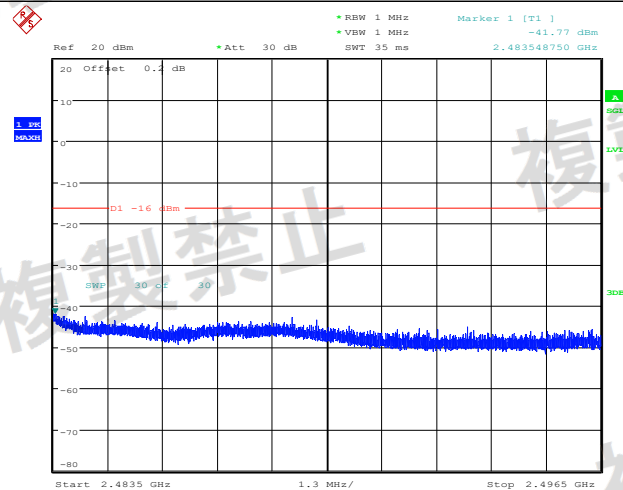


NTNV_11B_Ant1_2472_2387~2400



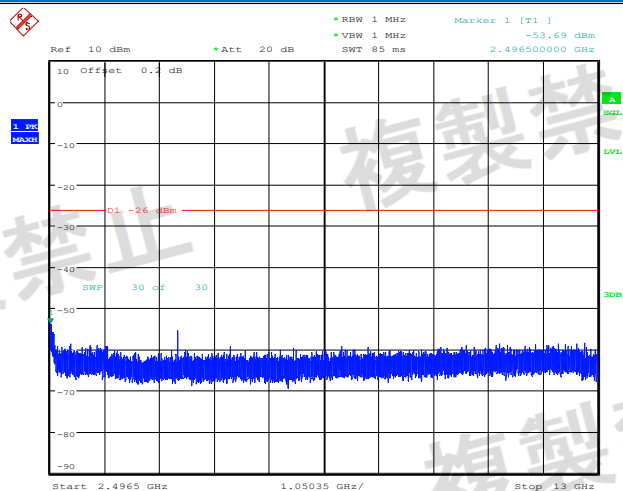
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NTNV_11B_Ant1_2472_2483.5~2496.5

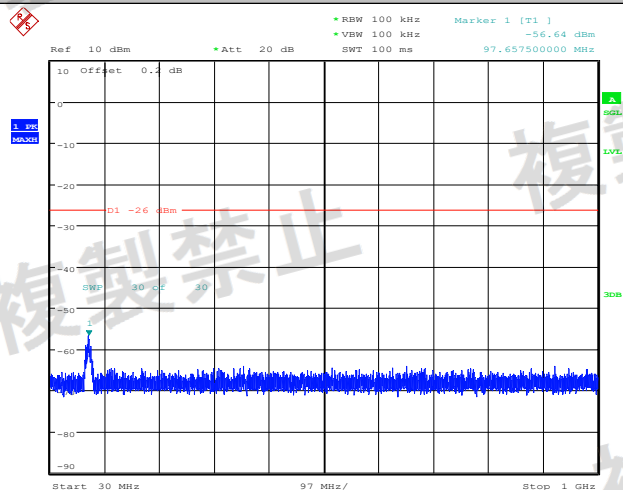


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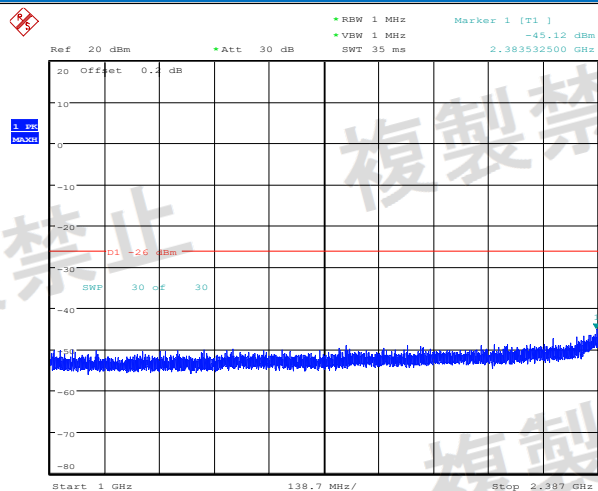
NTNV_11B_Ant1_2472_2496.5~13000



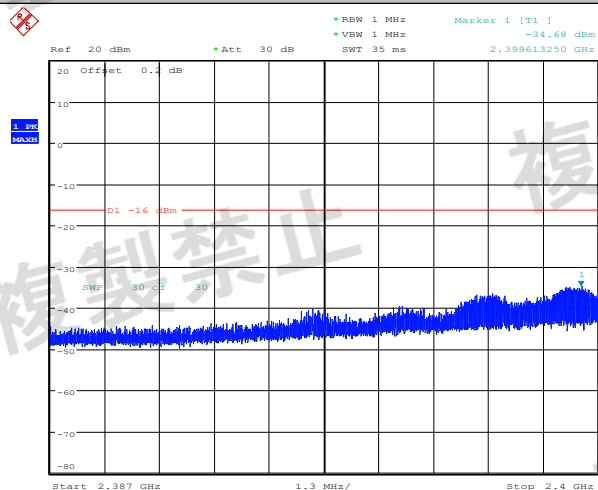
NTNV_11G_Ant1_2412_30~1000



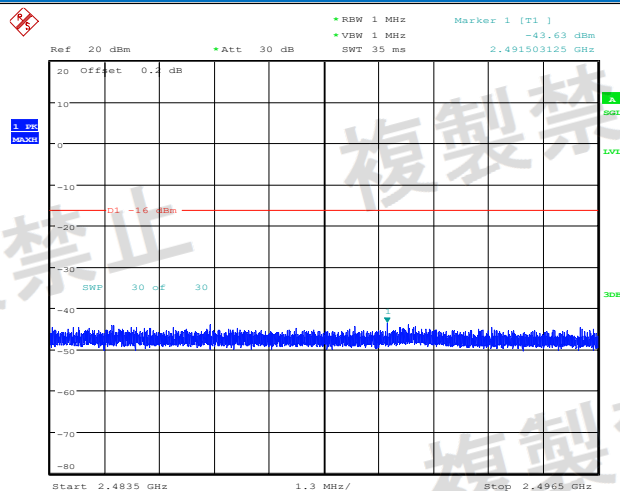
NTNV_11G_Ant1_2412_1000~2387



NTNV_11G_Ant1_2412_2387~2400

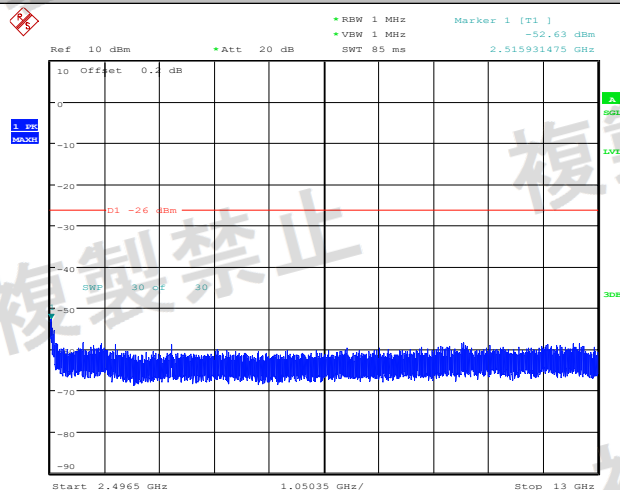


NTNV_11G_Ant1_2412_2483.5~2496.5



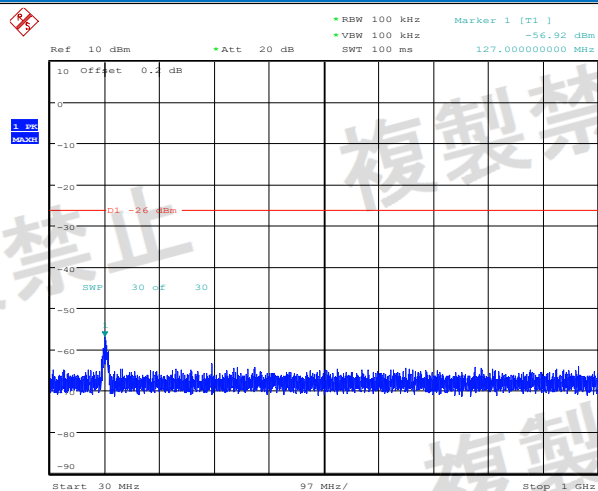
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NTNV_11G_Ant1_2412_2496.5~13000



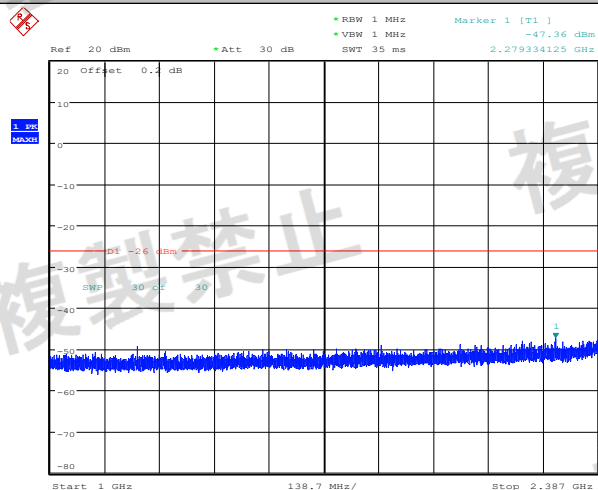
Date: 10.JAN.2026 13:52:39

NTNV_11G_Ant1_2442_30~1000



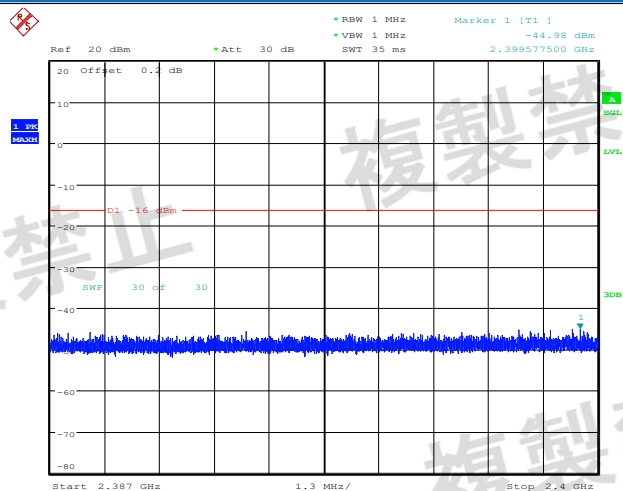
Date: 10.JAN.2026 13:54:01

NTNV_11G_Ant1_2442_1000~2387



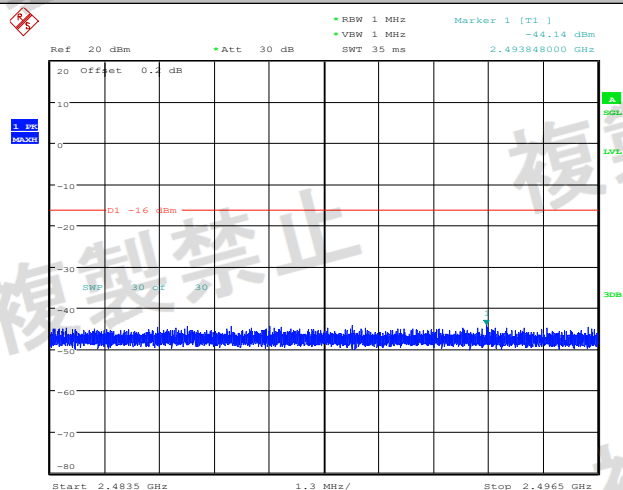
Date: 10.JAN.2026 13:54:11

NTNV_11G_Ant1_2442_2387~2400



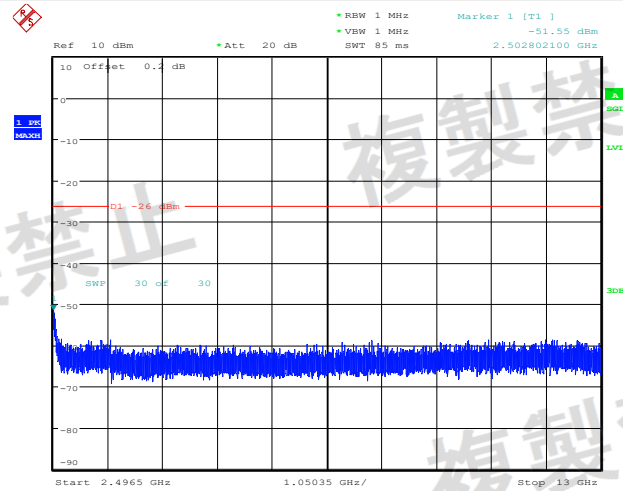
Date: 10.JAN.2026 13:54:20

NTNV_11G_Ant1_2442_2483.5~2496.5



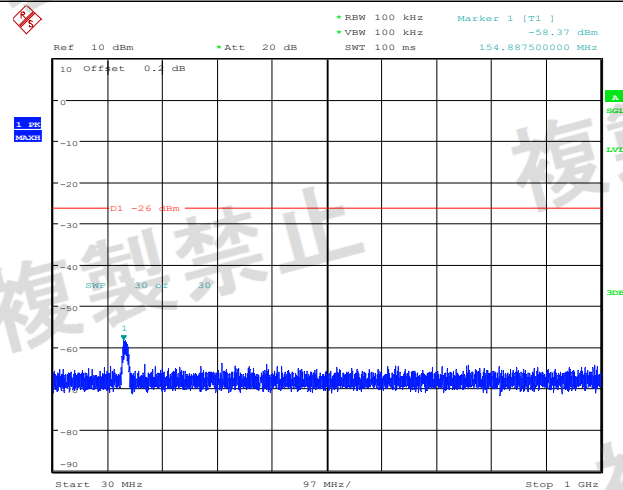
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NTNV_11G_Ant1_2442_2496.5~13000



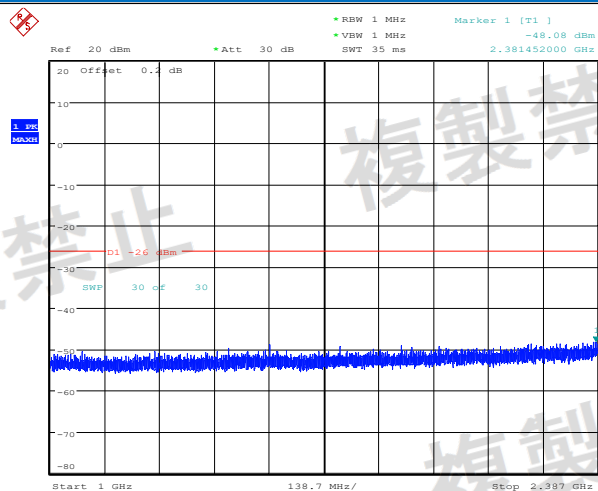
Date: 10.JAN.2026 13:54:43

NTNV_11G_Ant1_2472_30~1000



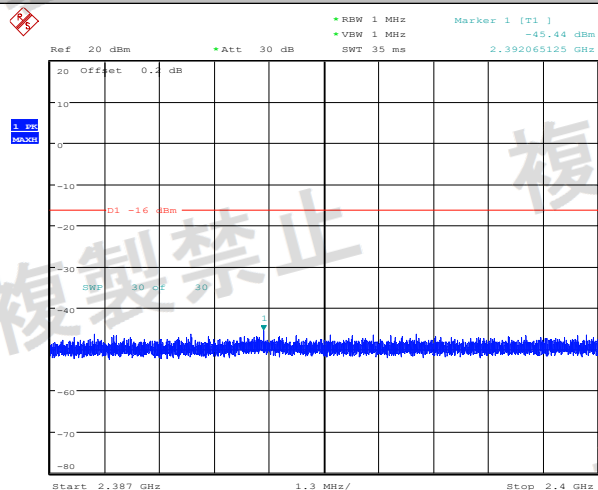
Date: 10.JAN.2026 13:58:22

NTNV_11G_Ant1_2472_1000~2387



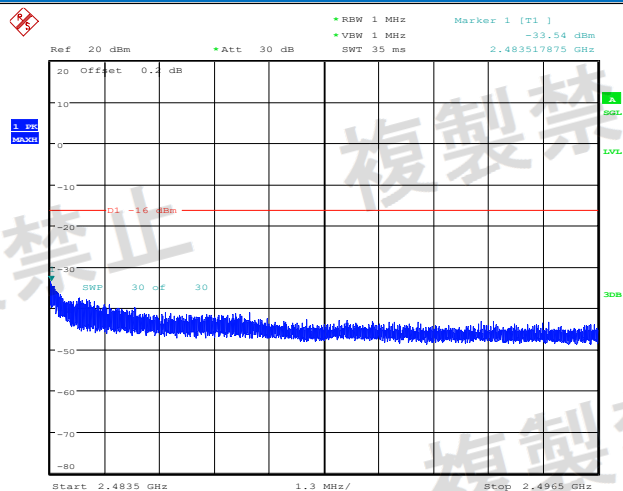
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NTNV_11G_Ant1_2472_2387~2400



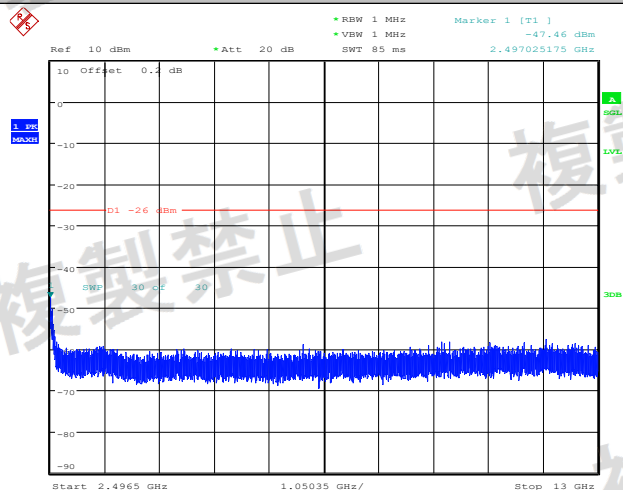
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NTNV_11G_Ant1_2472_2483.5~2496.5



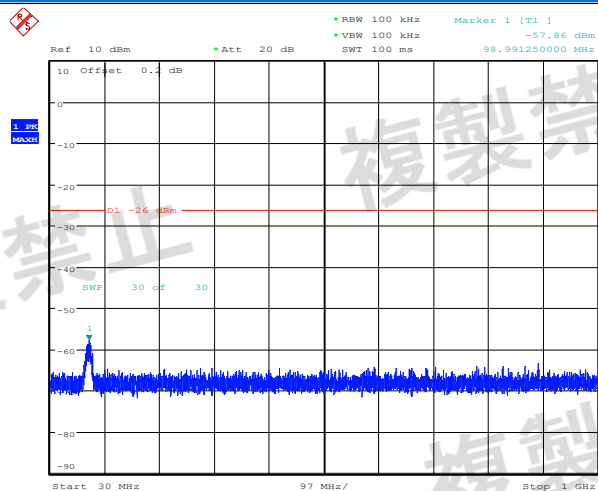
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NTV_11G_Ant1_2472_2496.5~13000



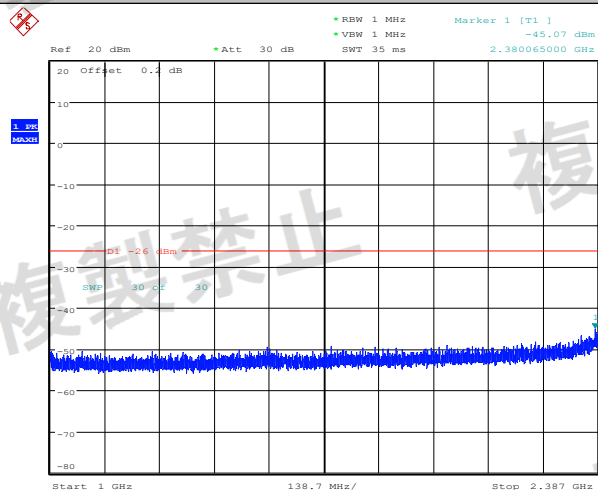
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NTV_11N20SISO_Ant1_2412_30~1000



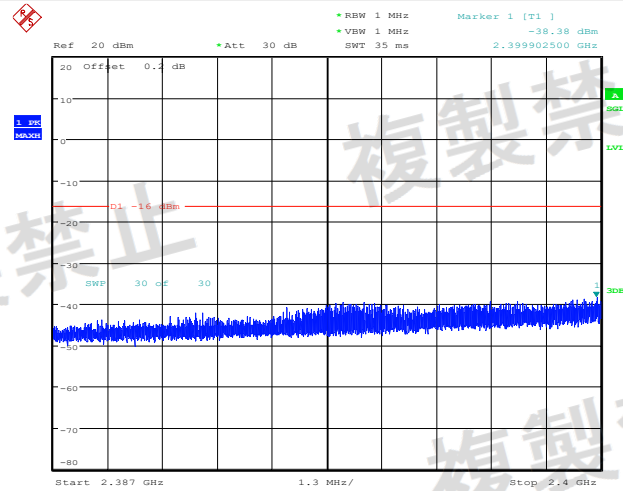
Date: 10.JAN.2026 14:00:55

NTNV_11N20SISO_Ant1_2412_1000~2387



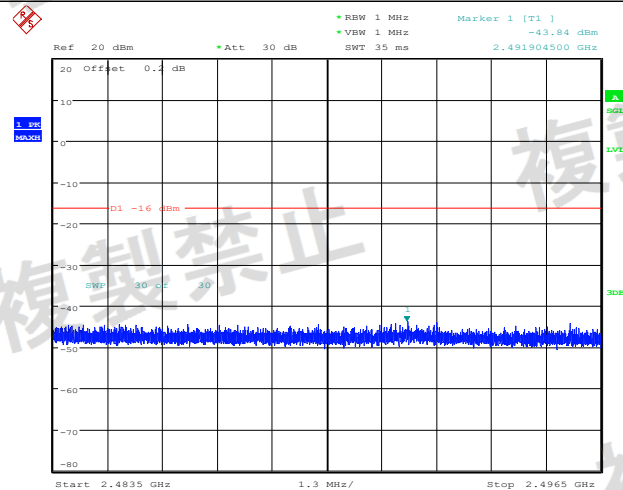
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NTNV_11N20SISO_Ant1_2412_2387~2400



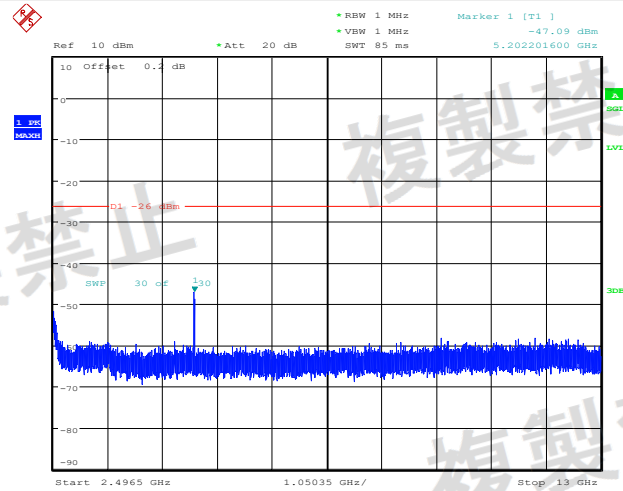
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NTNV_11N20SISO_Ant1_2412_2483.5~2496.5



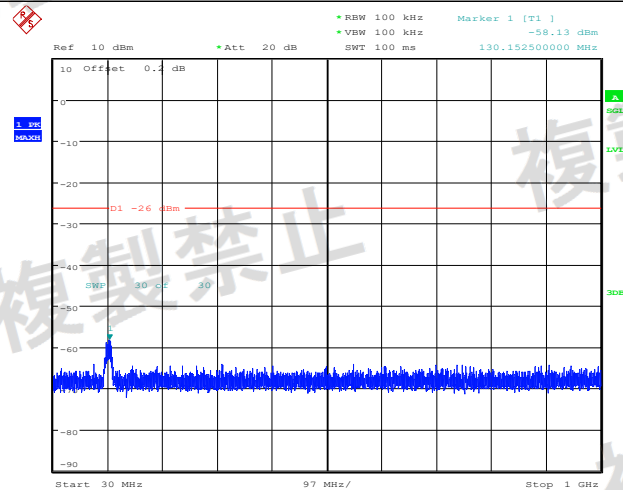
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NTNV_11N20SISO_Ant1_2412_2496.5~13000



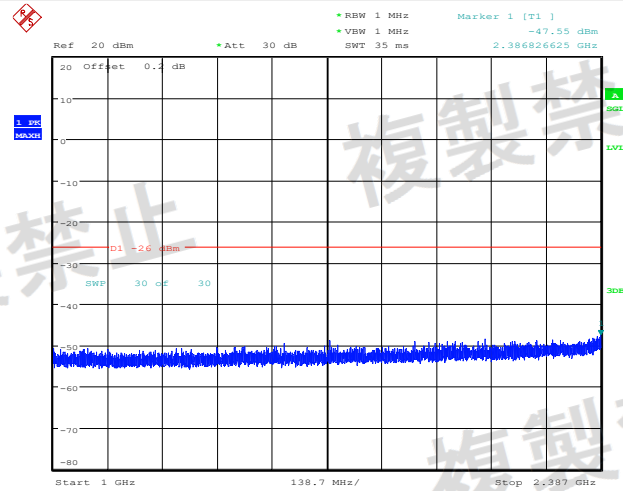
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NTNV_11N20SISO_Ant1_2442_30~1000



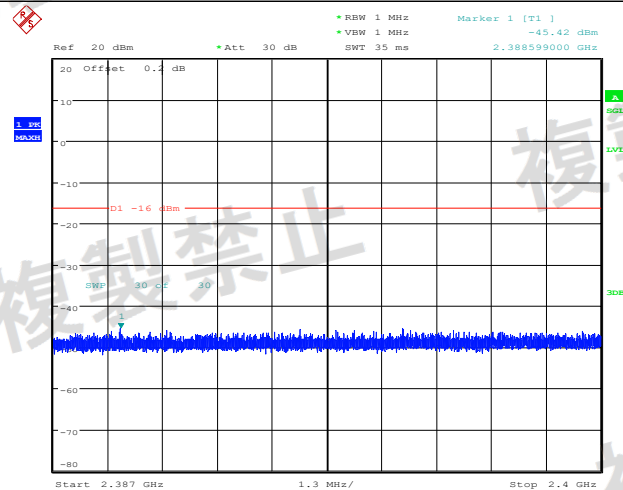
Date: 10.JAN.2026 14:03:25

NTNV_11N20SISO_Ant1_2442_1000~2387



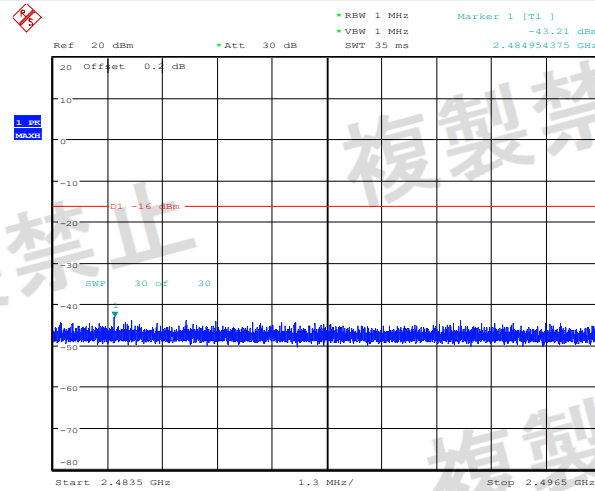
Date: 10.JAN.2026 14:03:35

NTNV_11N20SISO_Ant1_2442_2387~2400



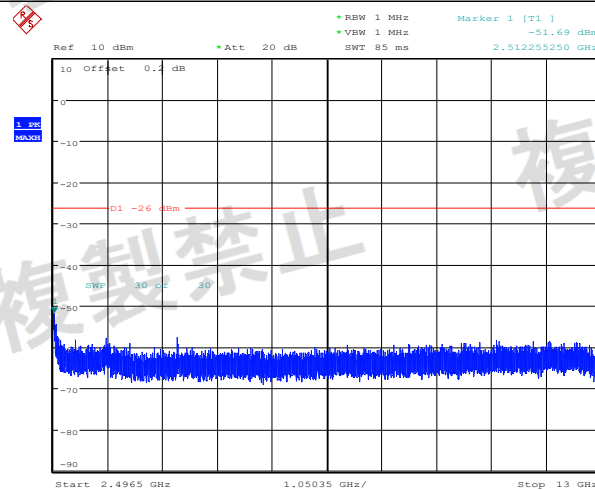
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NTNV_11N20SISO_Ant1_2442_2483.5~2496.5



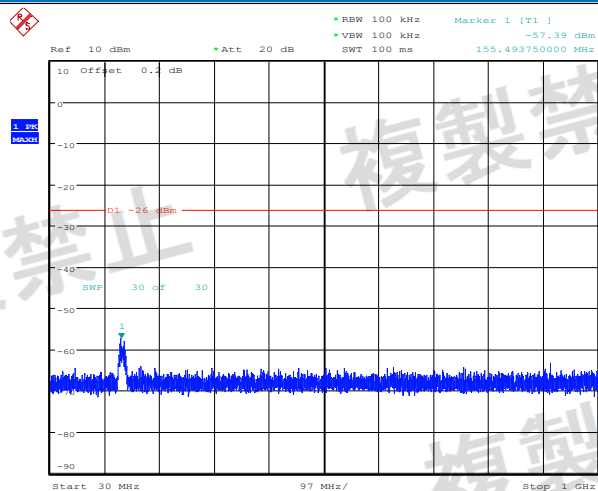
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NTNV_11N20SISO_Ant1_2442_2496.5~13000



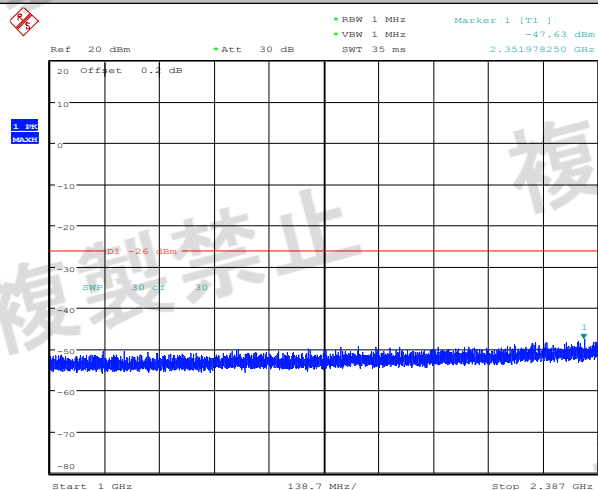
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NTNV_11N20SISO_Ant1_2472_30~1000



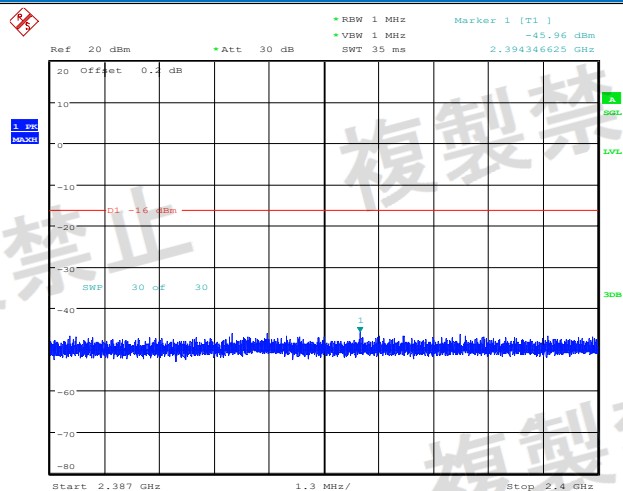
Date: 10.JAN.2026 14:05:58

NTNV_11N20SISO_Ant1_2472_1000~2387

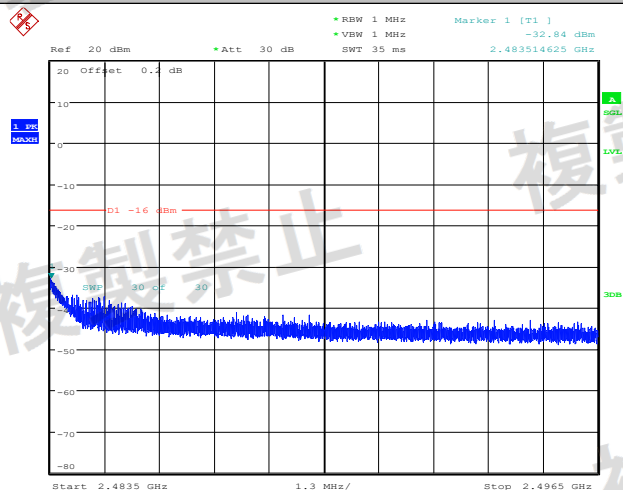


Date: 10.JAN.2026 14:06:08

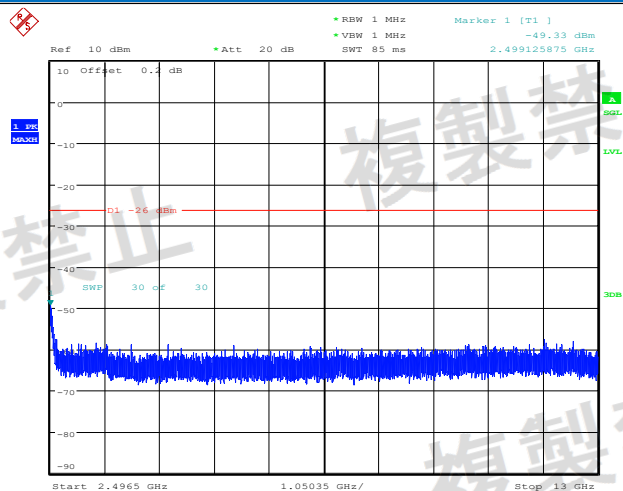
NTNV_11N20SISO_Ant1_2472_2387~2400



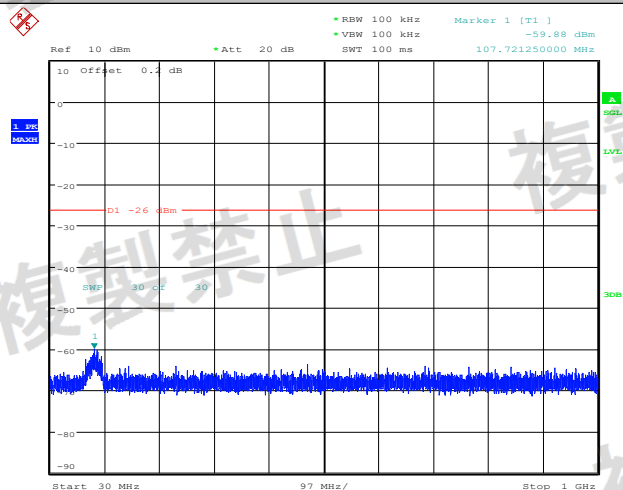
NTNV_11N20SISO_Ant1_2472_2483.5~2496.5



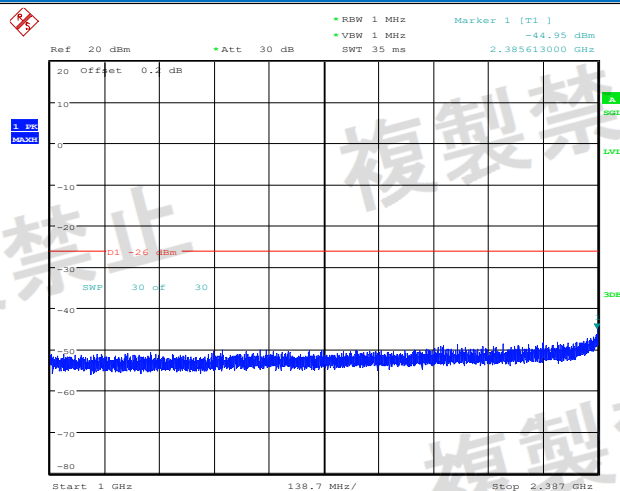
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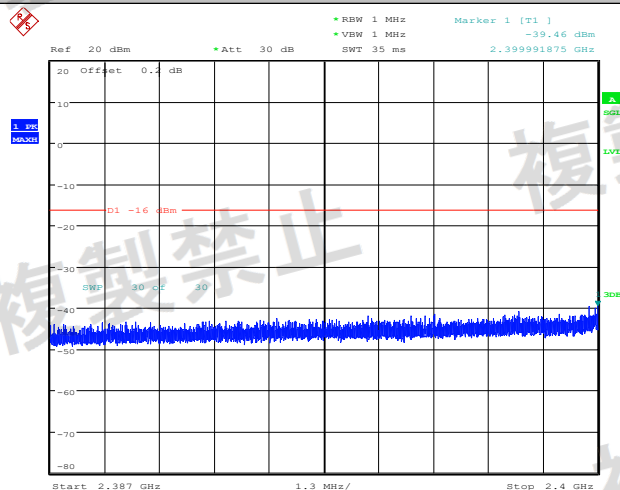
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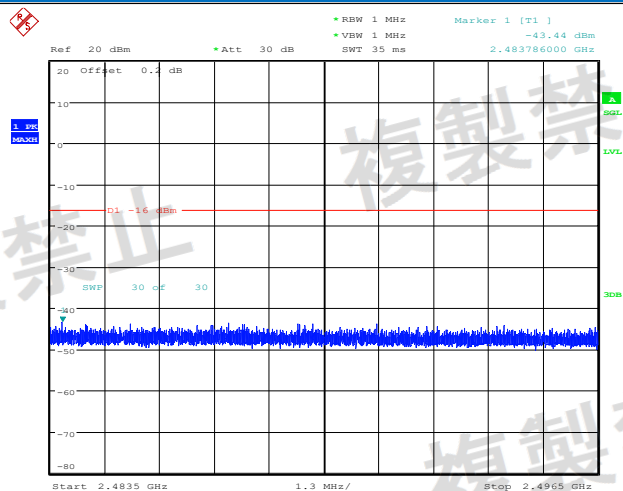
NTNV_11N40SISO_Ant1_2422_1000~2387



NTNV_11N40SISO_Ant1_2422_2387~2400

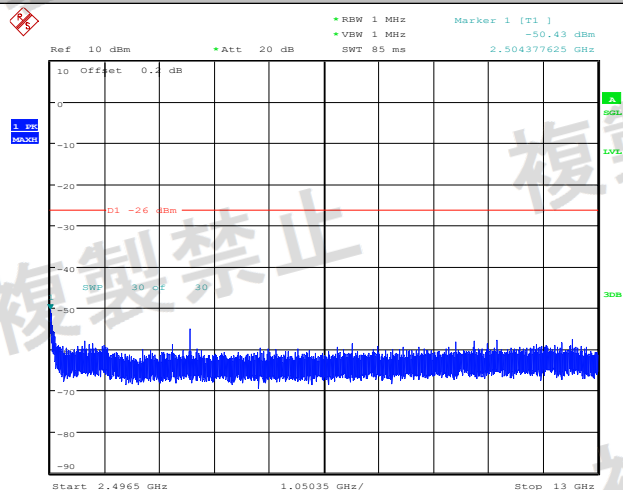


NTNV_11N40SISO_Ant1_2422_2483.5~2496.5



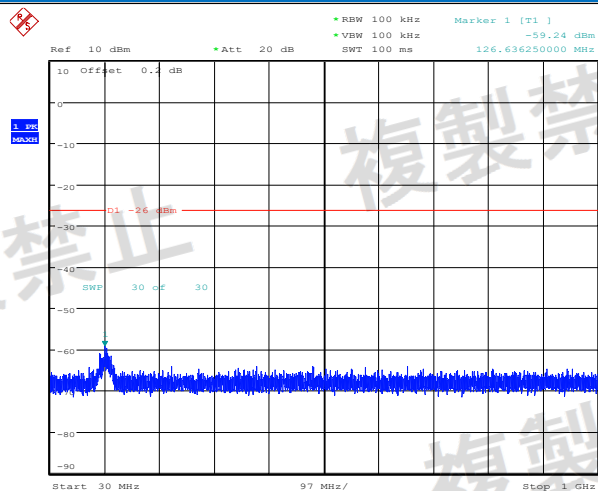
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NTNV_11N40SISO_Ant1_2422_2496.5~13000



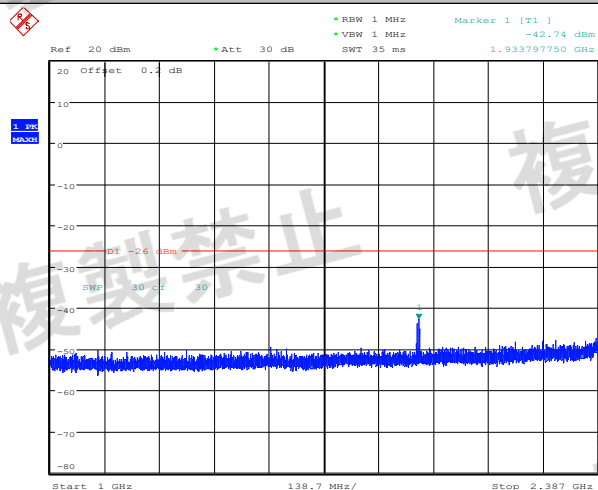
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NTNV_11N40SISO_Ant1_2442_30~1000



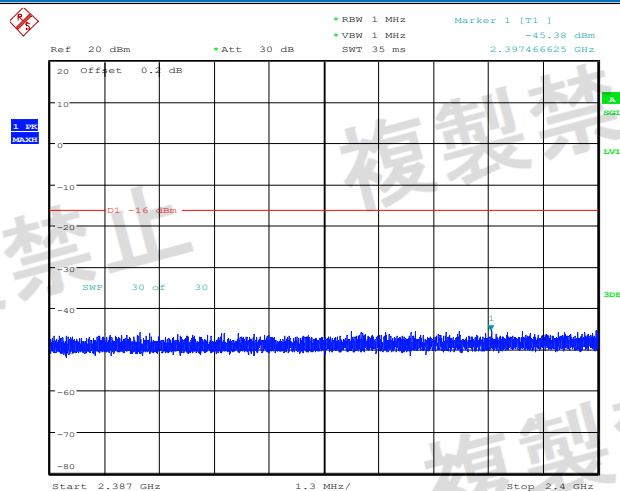
Date: 10.JAN.2026 14:11:10

NTNV_11N40SISO_Ant1_2442_1000~2387



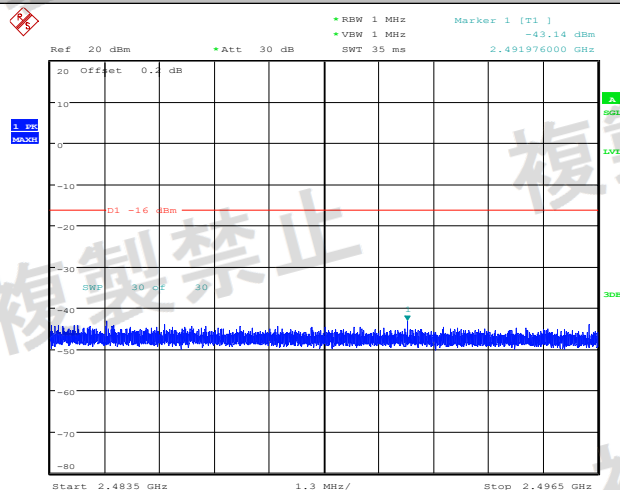
Date: 10.JAN.2026 14:11:20

NTNV_11N40SISO_Ant1_2442_2387~2400



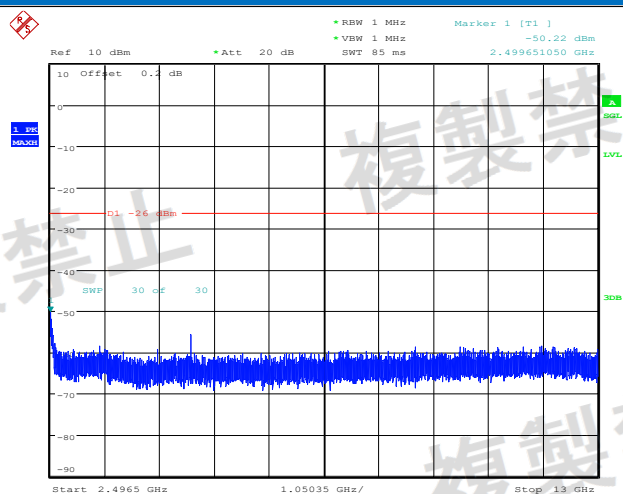
Date: 10.JAN.2026 14:11:29

NTNV_11N40SISO_Ant1_2442_2483.5~2496.5



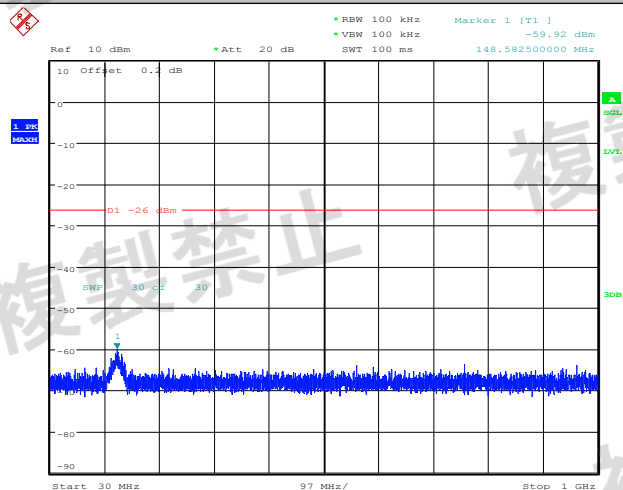
Date: 10.JAN.2026 14:11:37

NTNV_11N40SISO_Ant1_2442_2496.5~13000



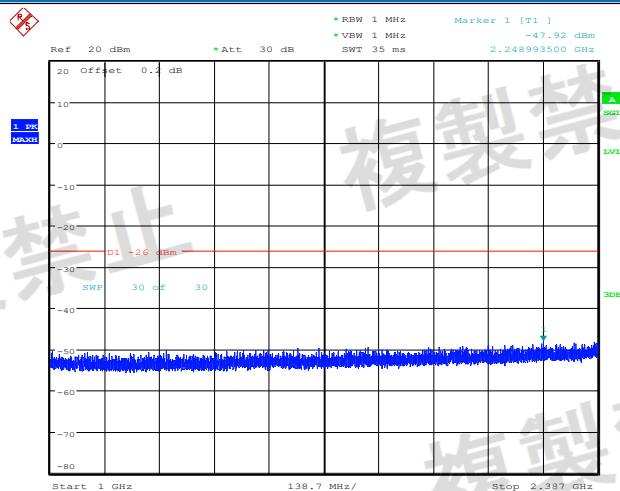
Date: 10.JAN.2026 14:11:53

NTNV 11N40SISO Ant1 2462 30~1000



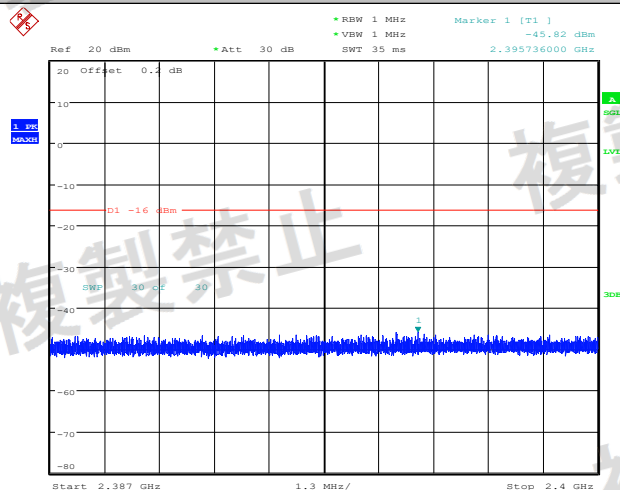
Date: 10.JAN.2026 14:13:42

NTNV_11N40SISO_Ant1_2462_1000~2387



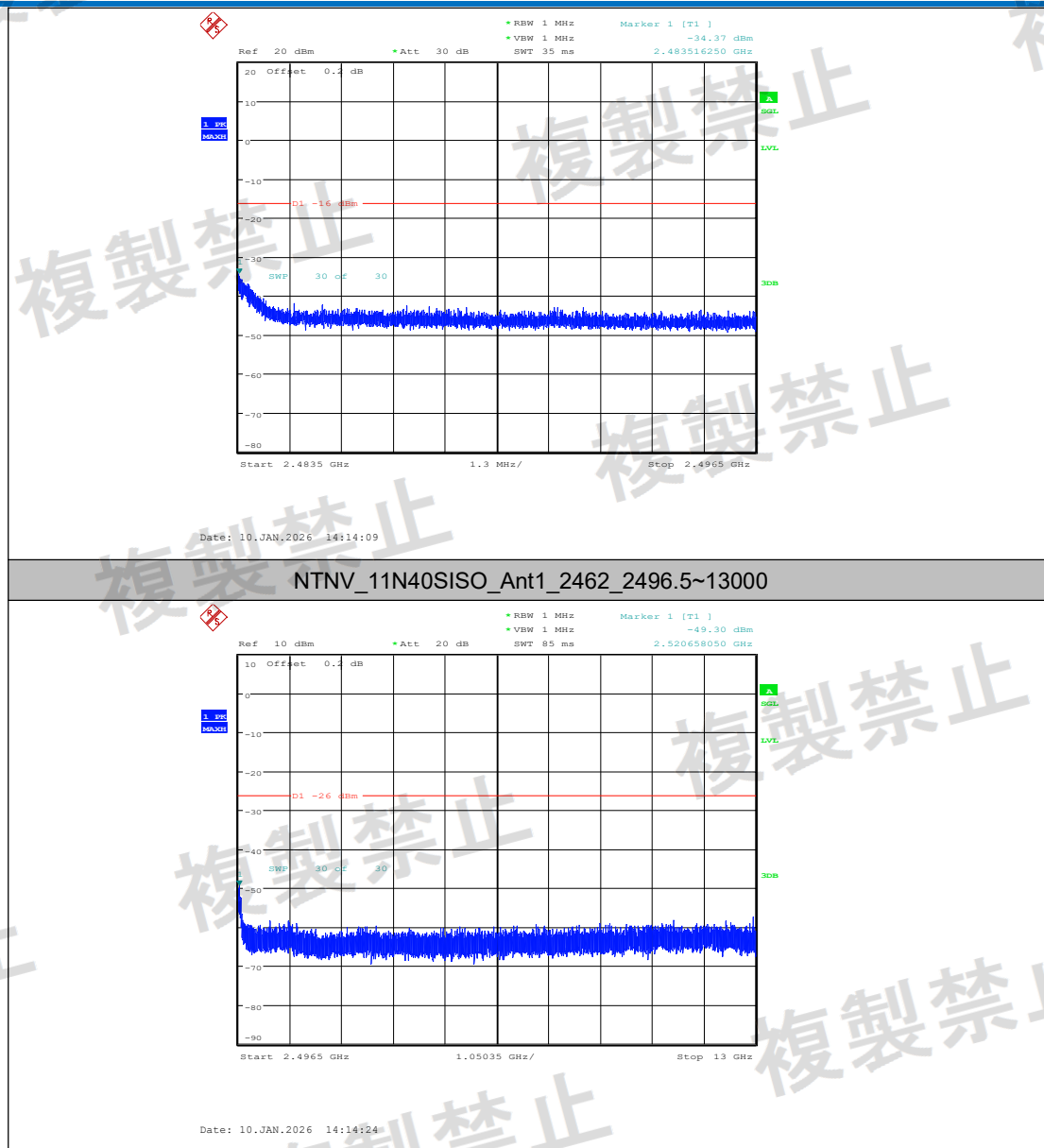
Date: 10.JAN.2026 14:13:51

NTNV_11N40SISO_Ant1_2462_2387~2400



Date: 10.JAN.2026 14:14:01

NTNV_11N40SISO_Ant1_2462_2483.5~2496.5



Test Result: The unit does meet the requirements.

6.12 RF accessibility

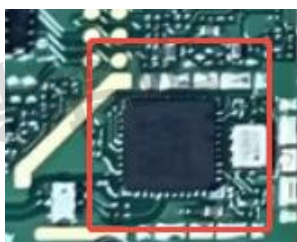
Standard requirement

Article 49-20, paragraph 1 (a)

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.

Tamper proof Declaration:

- ☐ 1. Sealed with special screws.
- ☐ 2. Plastic chassis is being welded using ultrasonic waves.
- ☐ 3. Chassis is glued using a special adhesive.
- ☐ 4. Metal covers are spot-fused.
- ☐ 5. Cover is specially interlocked.
- ☐ 6. RF and Modulation components are covered with shielding case and this shielding case is soldered.
- ☐ 7. Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
- ☐ 8. Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive.
- ☐ 9. Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
- ☒ 10. RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable parts on PCB or adjustable parts are not exposed.



Result: Method used to meet "can not open easily requirement" is shielding cover, Any attempt to modify the RF chip will void the normal operation of this device.

6.13 Spurious Emissions of Rx

Test Requirement: Item 19 of Article 2-1

- (1) Below 1 GHz : 4 nW
- (2) 1 GHz and over : 20 nW

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:

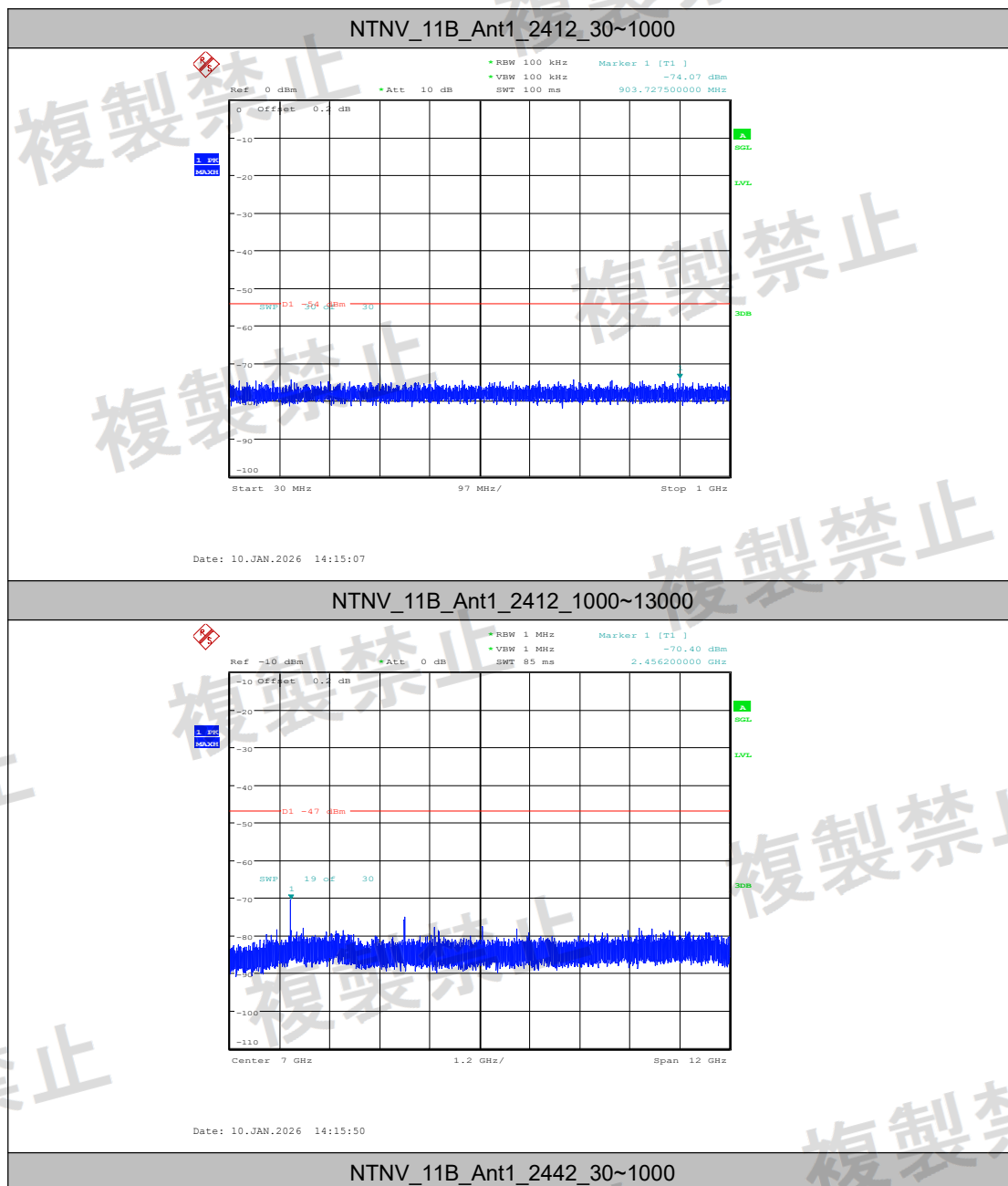


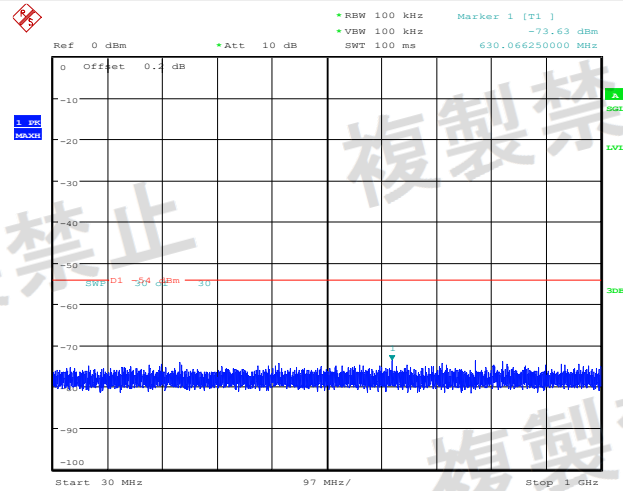
Test Procedure:

1. Test Conditions:
Spectrum Analyzer is used for measurement.
2. EUT conditions:
Modulation/Spread/Hopping ON
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 13 GHz by peak mode.
Step 2
IF the value measured by Step1 is 2 dB or less, measure in average mode.
Test setup for Step 1:
Frequency: 30 MHz – 1GHz , 1GHz – 13 GHz (for 2412MHz-2472MHz)
RBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)
VBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold
Test setup for Step 2:
Frequency: Spurious Frequency
Span 0 Hz
RBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)
VBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)
Sweep Time Auto
detector mode Sample
Indication mode Max hold

TestCondition	TestMode	Channel (MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm/MH z]	Limit [dBm/ MHz]	Result [μW/MH z]	Limit μW/MH z]	Verdict
NTNV	11B	2412	30~1000	903.73	-74.07	≤-54	0.03917	≤4	PASS
			1000~13000	2456.20	-70.40	≤-47	0.09120	≤20	PASS
		2442	30~1000	630.07	-73.63	≤-54	0.04335	≤4	PASS
			1000~13000	2482.00	-73.61	≤-47	0.04355	≤20	PASS
		2472	30~1000	757.74	-73.55	≤-54	0.04416	≤4	PASS
			1000~13000	2454.40	-71.11	≤-47	0.07745	≤20	PASS
	11G	2412	30~1000	688.02	-73.33	≤-54	0.04645	≤4	PASS
			1000~13000	11989.00	-78.24	≤-47	0.01500	≤20	PASS
		2442	30~1000	675.41	-73.69	≤-54	0.04276	≤4	PASS
			1000~13000	3506.80	-77.90	≤-47	0.01622	≤20	PASS
		2472	30~1000	97.29	-74.23	≤-54	0.03776	≤4	PASS
			1000~13000	9583.00	-78.36	≤-47	0.01459	≤20	PASS
	11N20SI SO	2412	30~1000	907.85	-74.21	≤-54	0.03793	≤4	PASS
			1000~13000	5187.40	-73.51	≤-47	0.04457	≤20	PASS
		2442	30~1000	800.67	-72.47	≤-54	0.05662	≤4	PASS
			1000~13000	3567.40	-77.70	≤-47	0.01698	≤20	PASS
		2472	30~1000	309.48	-73.98	≤-54	0.03999	≤4	PASS
			1000~13000	9913.60	-77.39	≤-47	0.01824	≤20	PASS
	11N40SI SO	2422	30~1000	773.26	-74.11	≤-54	0.03882	≤4	PASS
			1000~13000	12112.00	-78.51	≤-47	0.01409	≤20	PASS
		2442	30~1000	873.42	-73.66	≤-54	0.04305	≤4	PASS
			1000~13000	12481.60	-77.69	≤-47	0.01702	≤20	PASS
		2462	30~1000	761.26	-73.55	≤-54	0.04416	≤4	PASS
			1000~13000	11884.00	-78.29	≤-47	0.01483	≤20	PASS

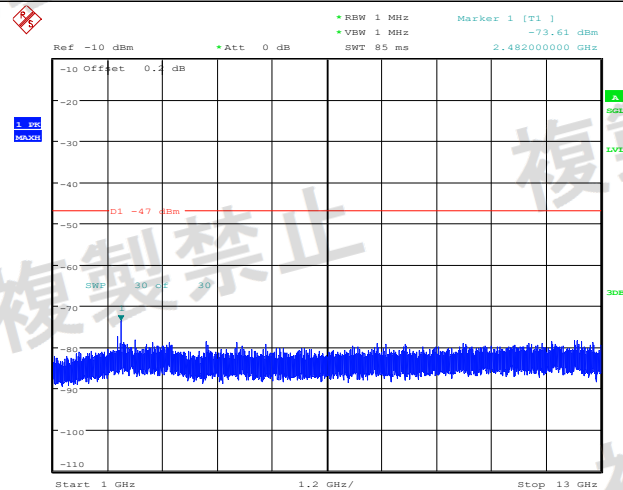
Result plot as follows:





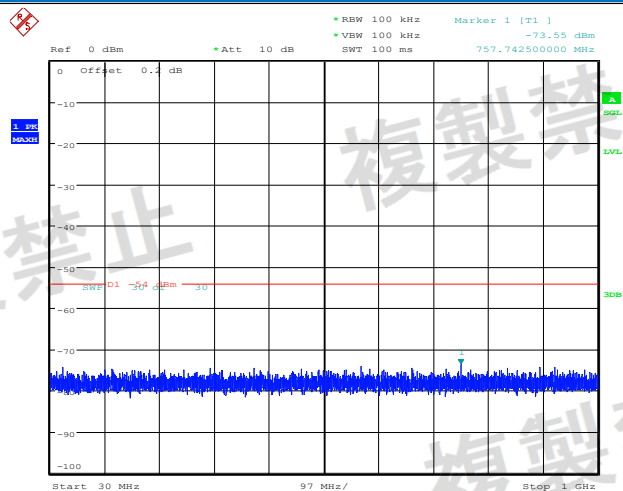
Date: 10.JAN.2026 14:16:09

NTNV_11B_Ant1_2442_1000~13000



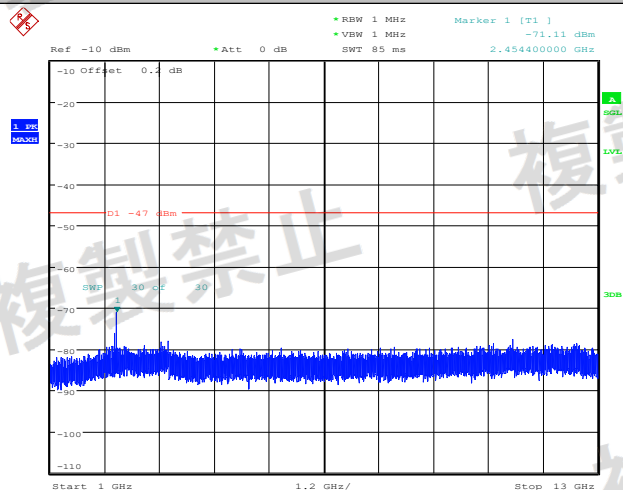
Date: 10.JAN.2026 14:16:25

NTNV_11B_Ant1_2472_30~1000



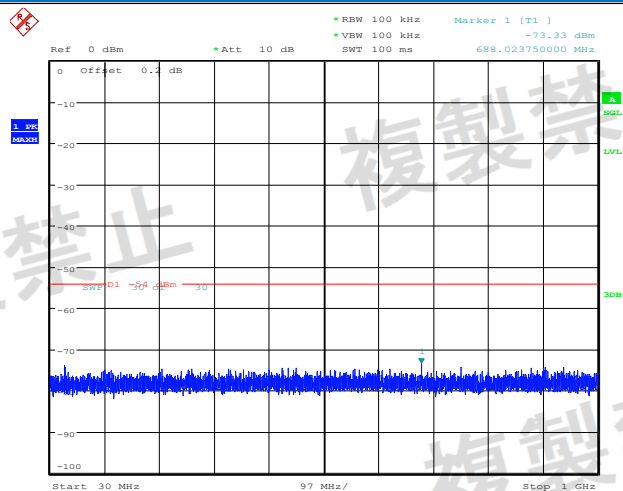
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NTNV_11B_Ant1_2472_1000~13000



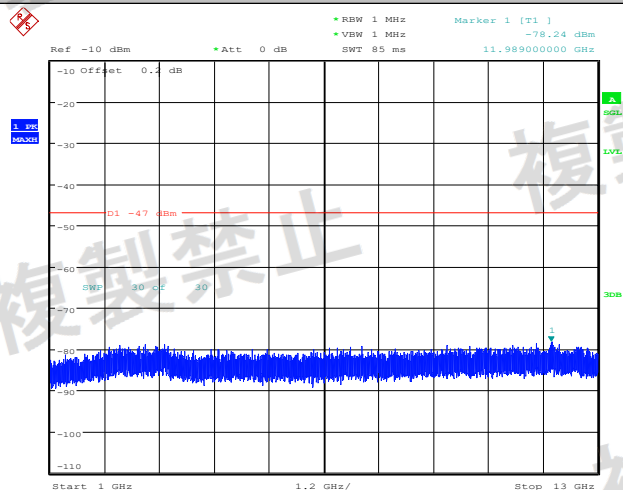
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NTNV_11G_Ant1_2412_30~1000



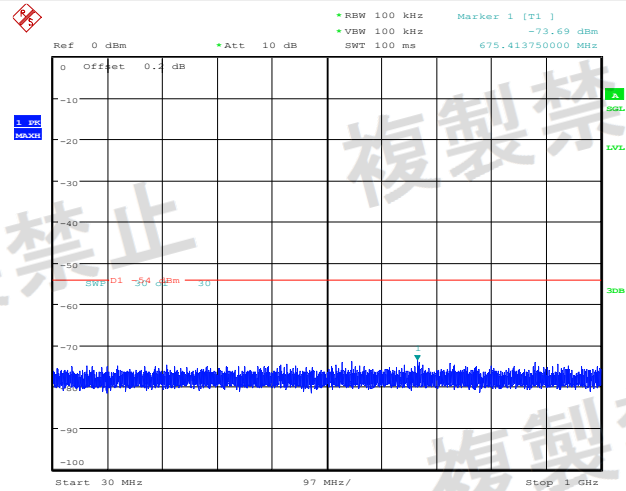
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NTNV_11G_Ant1_2412_1000~13000



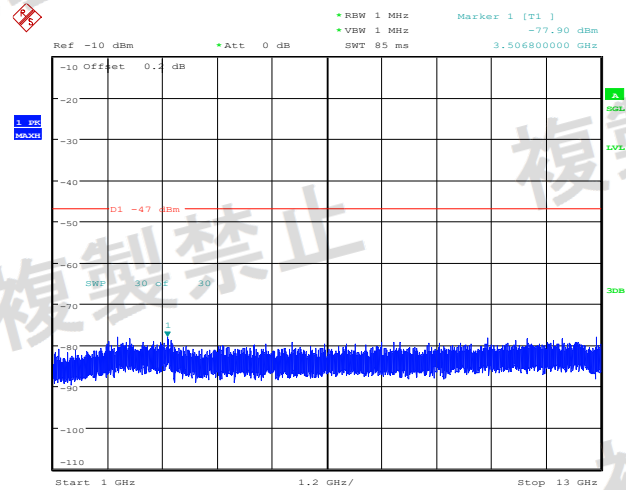
Date: 10.JAN.2026 14:17:35

NTNV_11G_Ant1_2442_30~1000



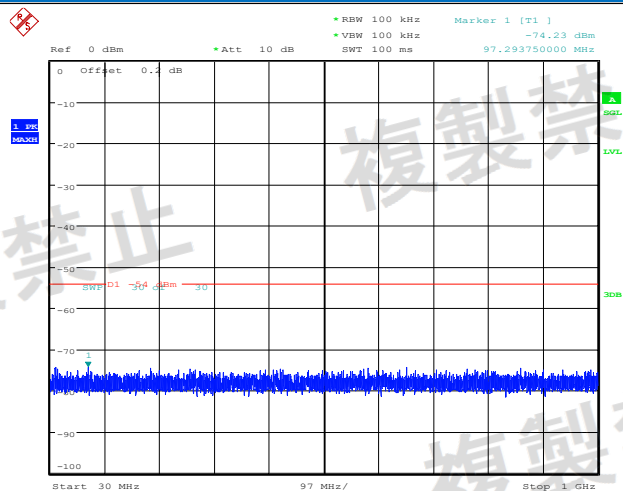
Date: 10.JAN.2026 14:17:52

NTNV_11G_Ant1_2442_1000~13000



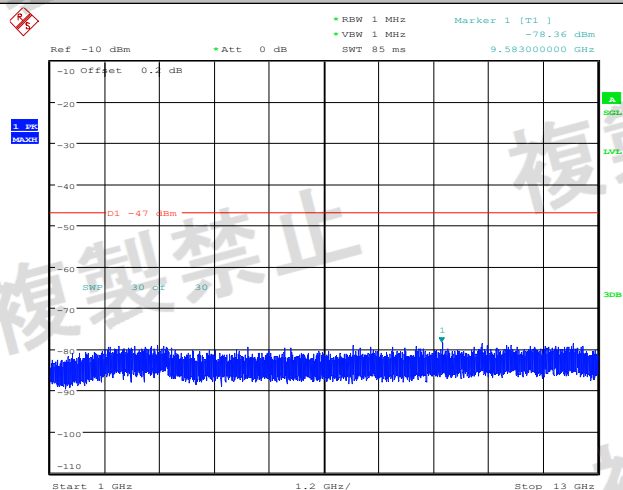
Date: 10.JAN.2026 14:18:10

NTNV_11G_Ant1_2472_30~1000



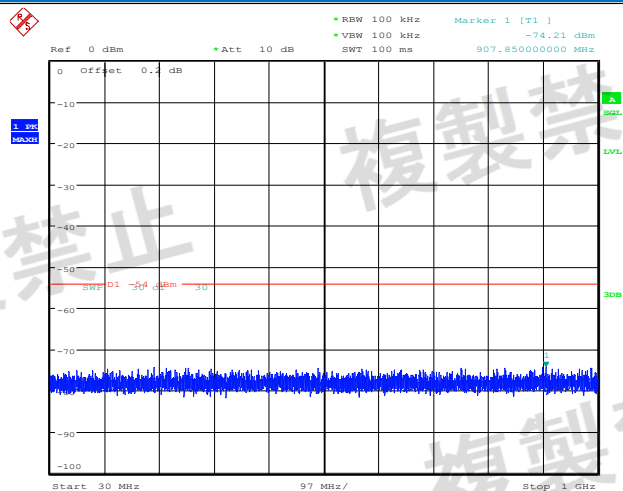
Date: 10.JAN.2026 14:18:25

NTNV_11G_Ant1_2472_1000~13000



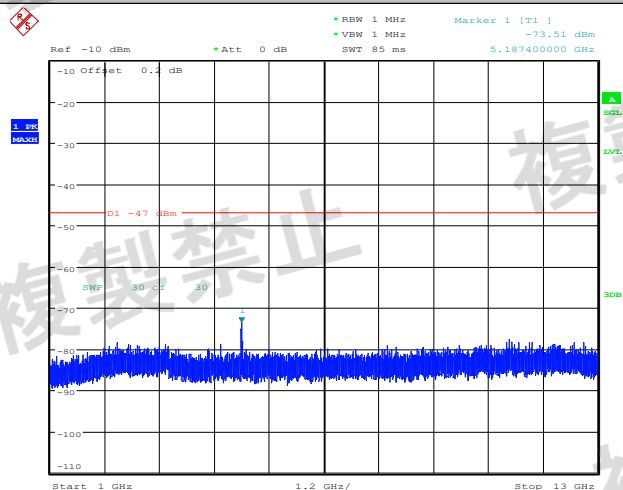
Date: 10.JAN.2026 14:18:41

NTNV_11N20SISO_Ant1_2412_30~1000



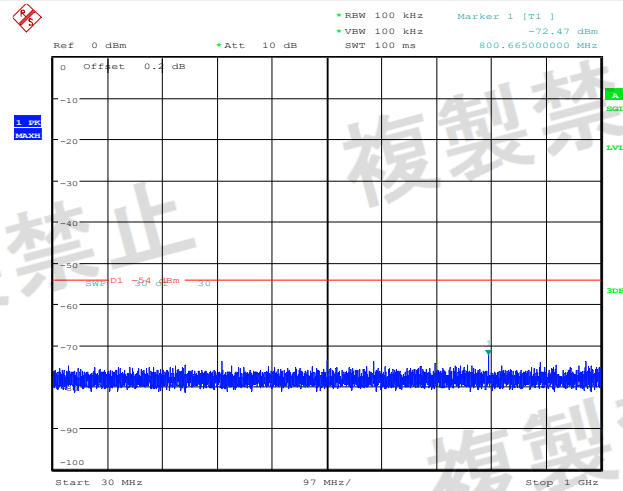
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NTNV_11N20SISO_Ant1_2412_1000~13000



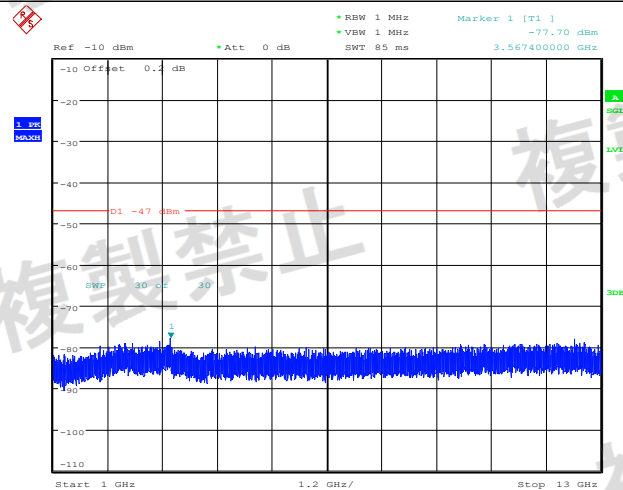
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NTNV_11N20SISO_Ant1_2442_30~1000



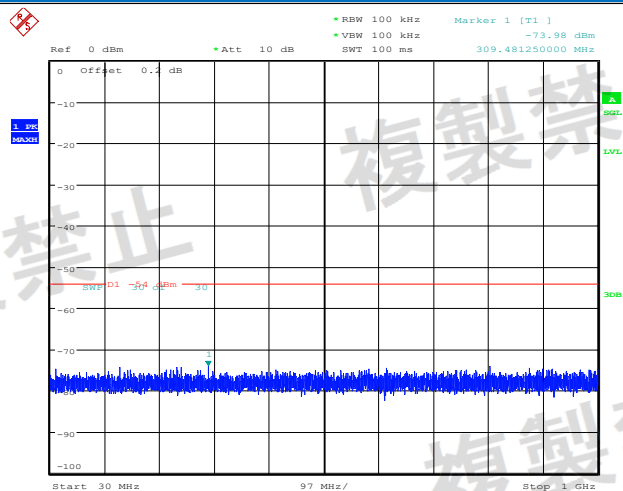
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NTNV_11N20SISO_Ant1_2442_1000~13000



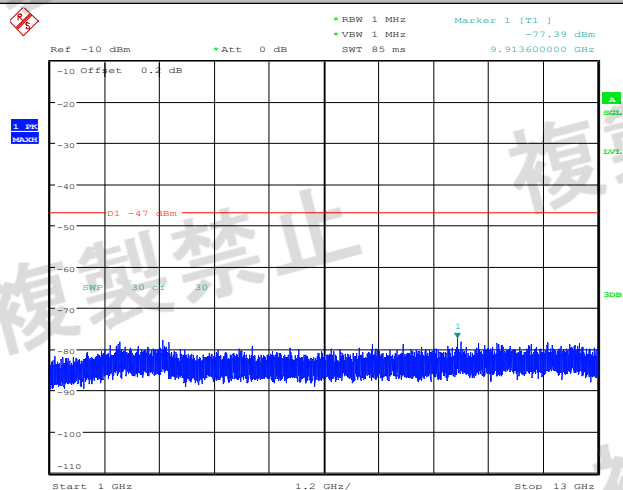
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NTNV_11N20SISO_Ant1_2472_30~1000



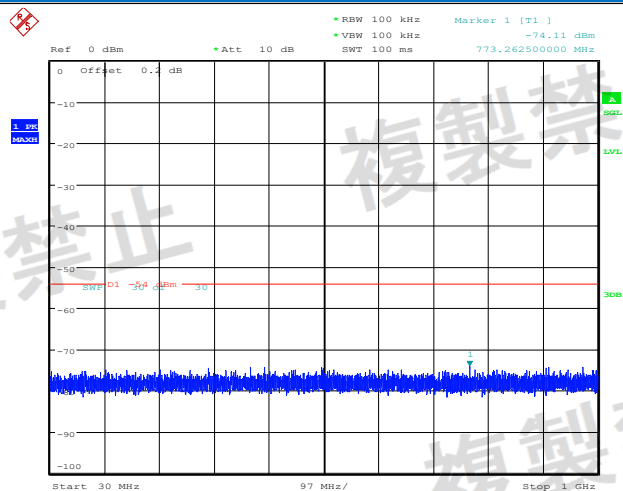
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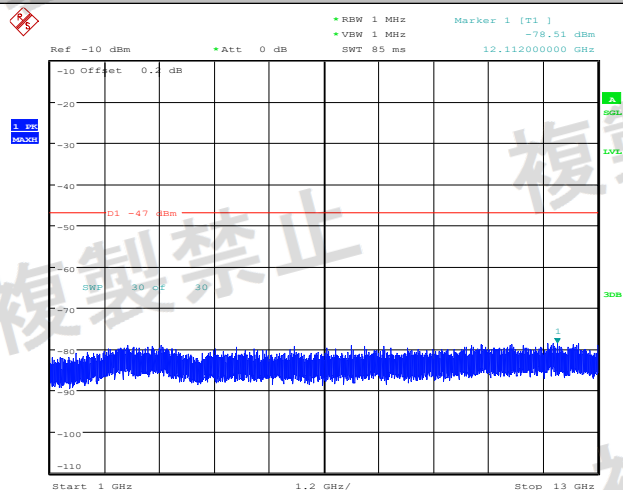
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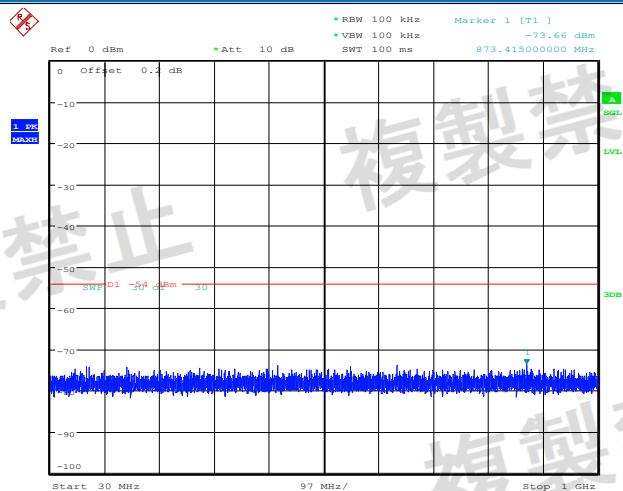
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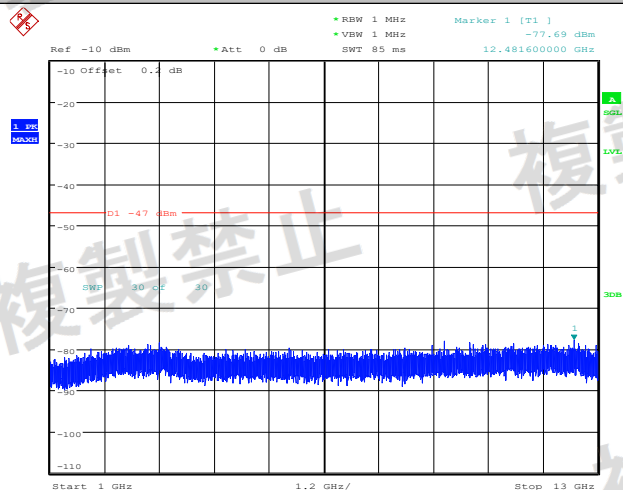
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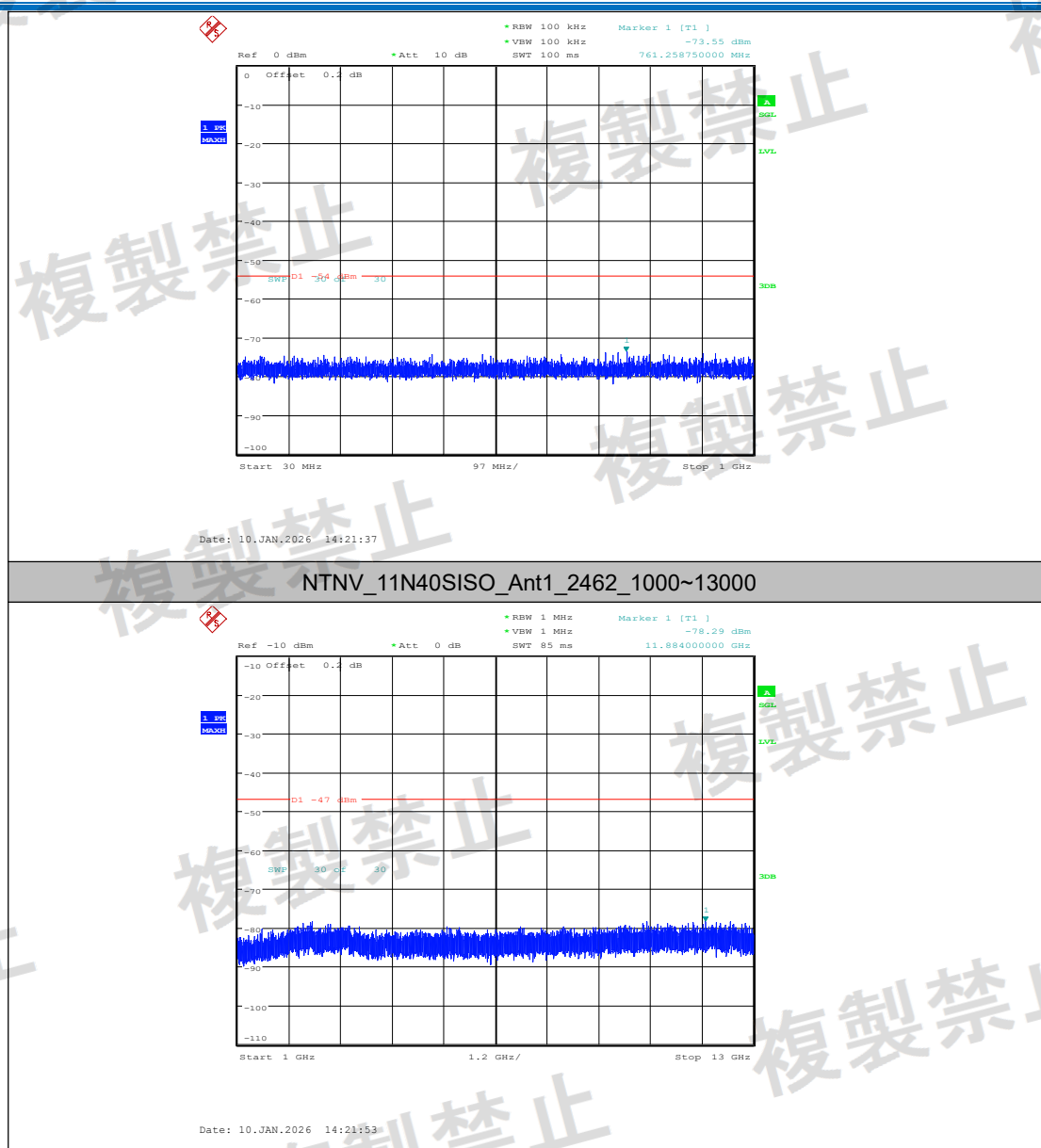
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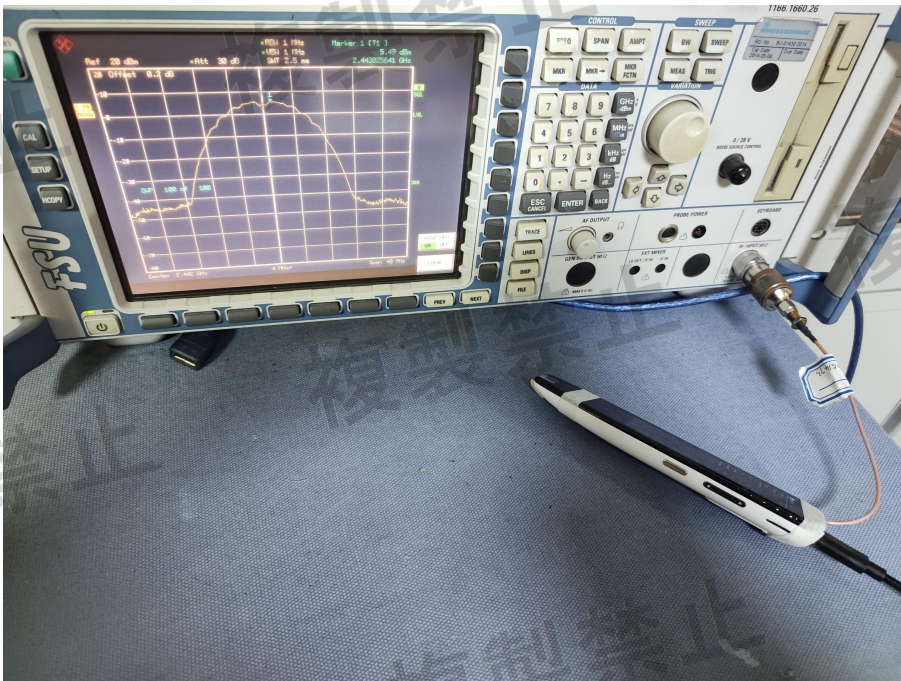
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NTNV_11N40SISO_Ant1_2462_30~1000



7 Photographs

7.1 EUT Test Setup



8 Photographs - EUT Constructional Details

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

*** END OF REPORT ***