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Report Template Version: V05
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TEST REPORT

Application No.: CQASZ20260601217E-02
Applicant: Ultimea Technology (Shenzhen) Limited
Address of Applicant: 20th Floor, Building 4, Tianan Cloud Park, Bantian St., Longgang District, Shenzhen, China
Manufacturer: Ultimea Technology (Shenzhen) Limited
Address of Manufacturer: 20th Floor, Building 4, Tianan Cloud Park, Bantian St., Longgang District, Shenzhen, China
Factory: Zhong Shan City Richsound Electronic Industrial Ltd.
Address of Factory: No.16, East Shagang Road, Gangkou, Zhongshan, Guangdong, China
Equipment Under Test (EUT):
Product: Soundbar
Model No.: U2621, U2523, U2521, U2624, U2625, U2626, U2627, U2628, U2629, U2630
Test Model No.: U2621
Brand Name: ULTIMEA
Standards: Item 19 of Article 2 Paragraph 1
Date of Receipt: 2024-08-22
Date of Test: 2024-08-22 to 2024-09-05
Date of Issue: 2026-7-8
Test Result: PASS*
* In the configuration tested, the EUT complied with the standards specified above.
Test Method: MIC Notice No.88 Appendix No.43

Tested By: Lewis Zhou
(Lewis Zhou)

Reviewed By: Timo Lei
(Timo Lei)

Approved By: Alex Wang
(Alex Wang)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20240801783E-02	Rev.01	Initial report	2024-09-14
CQASZ20260601217E-02	Rev.02	Update report	2026-7-8

Note:

This test report (Ref. No.: CQASZ20260601217E-02)

All test data comes from source test reports (Ref. No.: CQASZ20240801783E-02).

Only on the basis of the original report Add the series model No..

The tested samples have not been changed.

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
Dwell Time	Item 19 of Article 2-1	PASS
Interference prevention 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
Transmission Antenna Gain	Item 19 of Article 2-1	N/A
Transmission Radiation Angle Width	Item 19 of Article 2-1	N/A

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

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4 General Information

4.1 General Description of E.U.T.

Product Name: Soundbar

Model No: U2621, U2523, U2521,U2624, U2625, U2626, U2627, U2628, U2629, U2630

Test Model No: U2621

Trade Mark: ULTIMEA

Note:

Model No.: U2621, U2523, U2521,U2624, U2625, U2626, U2627, U2628, U2629, U2630.

Their electrical circuit design, layout, components used and internal wiring are identical,

Only the model name is different.

4.2 Details of E.U.T.

Operating Frequency: 2402 MHz to 2480 MHz

Type of Modulation: GFSK, ($\pi/4$)DQPSK, 8DPSK

Number of Channels: 79 Channels

Channel Separation: 1 MHz

Bluetooth Version: 5.4

Software version: 0.1

Hardware version: 0.2

Antenna Type: FPC antenna

Antenna Gain: 3.02 dBi

Rated power: 1.0 mW/MHz

Sample Type: Mobile product

Power Supply: ☐ For EUT operation:

☒ For other: Supply by DC24V

Test Voltage: ☒ Normal voltage (EUT operation): DC24V

☐ 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

No tests were sub-contracted.

4.8 Test Facility

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

- **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 List

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	2023/9/8	DHCT	(c)
Spectrum Analyzer	Rohde & Schwarz	FSU26	200019	2023/9/8	LiSai	(c)
Multimeter	Fluke	15B	96710318	2023/9/8	CICC	(c)
Signal generator	ANRITSU	MG3692B	074702	2023/9/8	LiSai	(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

Table 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	2402-2480MHz
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 2402 - 2480MHz) (2) OFDM, DS other than (1) 10mW/MHz (3) Other than (1) & (2) 10mW (4) OFDM OBW 26 - 38MHz: 5mW/MHz Tolerance: +20%, -80%
Antenna gain	1) 0dBi or less in principle 2) In case of directional antenna (1) FH, FH+DS or FH+OFDM using 2402-2480 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 - 38MHz: 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	(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: 4nW (2) 1 GHz or higher: 20nW
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	26.4V	3.25V
Normal voltage	24V	3.25V
Low voltage	21.6V	3.25V

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.

EUT Channels and Frequencies List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	27	2429	54	2456
1	2403	28	2430	55	2457
2	2404	29	2431	56	2458
3	2405	30	2432	57	2459
4	2406	31	2433	58	2460
5	2407	32	2434	59	2461
6	2408	33	2435	60	2462
7	2409	34	2436	61	2463
8	2410	35	2437	62	2464
9	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

Test frequencies are the lowest channel: 0 channel (2402 MHz),
middle channel: 39 channel (2441 MHz) and highest channel: 78 channel (2480 MHz).

6.3 Test Environment

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



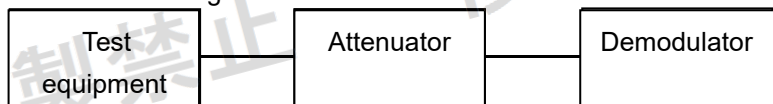
The EUT with FPC antenna, the max peak gain of the antenna is 3.02 dBi.

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

6.5 Interference prevention function

1) Measurement system diagram

(1) When transmitting identification code



2) Condition of measuring instrument

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

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

4) Measuring operation procedure

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

A) Transmit the predetermined identification code from test equipment.

B) Confirm the transmitted identification code by demodulator.

5) Test result: Record the identification code and test result.

Test result: PASS

The identification code is 56:4C:6E:1D:B6:05

The unit does meet the requirements.

6.6 Frequency Error

Test Requirement: Item 19 of Article 2-1
Tolerance of frequency: $\pm 50 \times 10^{-6}$

Test Method: MIC Notice No.88 Appendix No.43

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

Test Configuration:



Test Procedure:

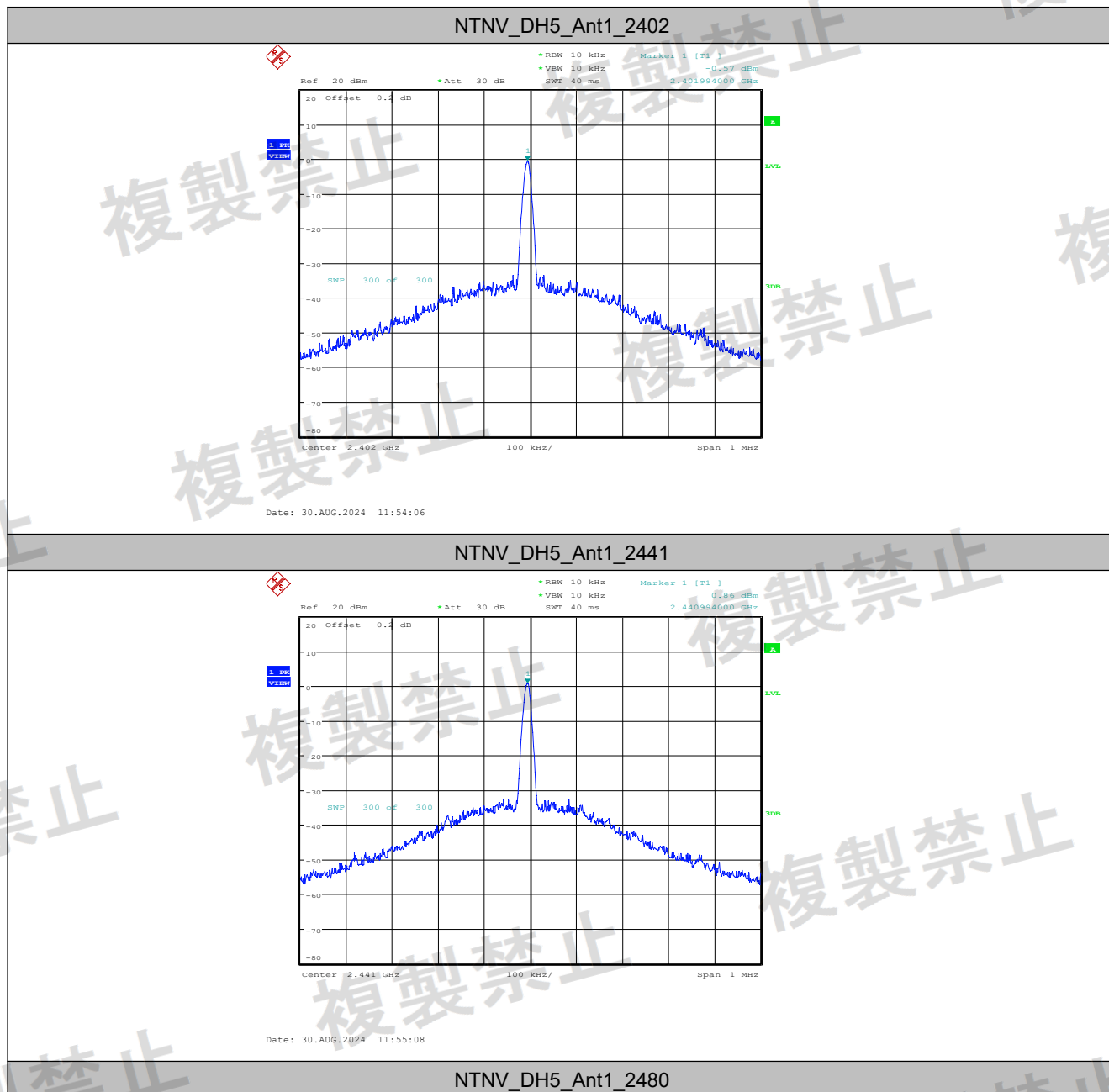
1. Test Conditions:
Spectrum Analyzer is used for measurement.
2. EUT conditions:
Modulation/Spread/Hopping OFF, CW Tx
3. Spectrum Analyzer conditions:
Frequency: Test Frequency
Span 1MHz
RBW 10 kHz (Modulation OFF),
VBW 10 kHz (Modulation OFF),
Sweep Time Auto
Detector mode Positive peak
Indication mode Max hold

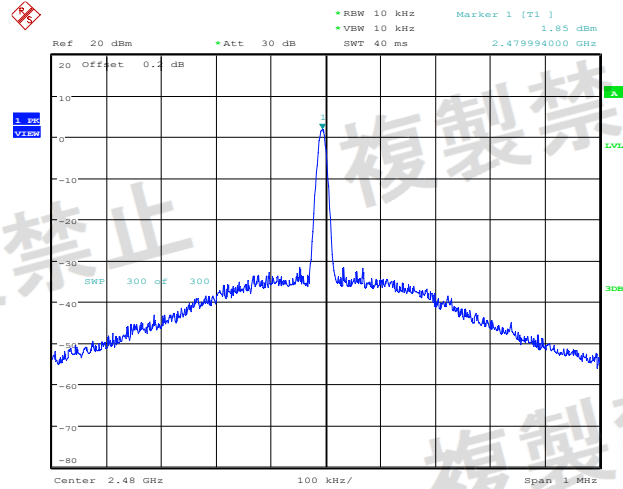
Test Result:

Test Mode	Antenna	Freq(MHz)	CenterFreq	Result[ppm]	Limit[ppm]	Verdict
DH5	Ant1	2402	2401.994	-2.49792	±50	PASS
		2441	2440.994	-2.45801	±50	PASS
		2480	2479.994	-2.41936	±50	PASS
2DH5	Ant1	2402	2401.994	-2.49792	±50	PASS
		2441	2440.994	-2.45801	±50	PASS
		2480	2479.994	-2.41936	±50	PASS
3DH5	Ant1	2402	2401.969	-12.90591	±50	PASS
		2441	2440.994	-2.45801	±50	PASS
		2480	2479.993	-2.82258	±50	PASS

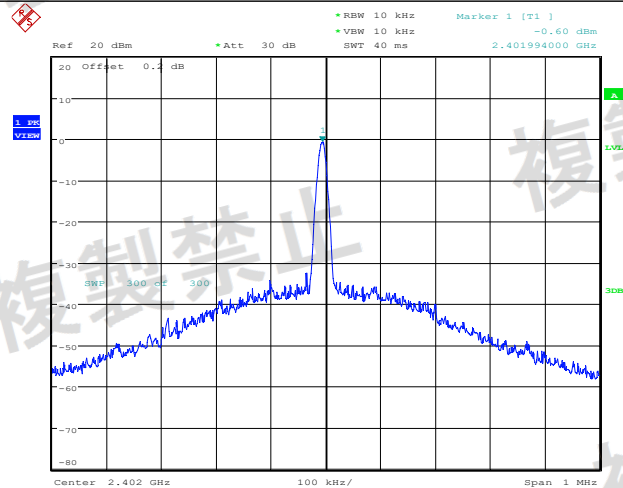
Note: The nominal frequency shall be confirmed by the applicant and test lab.

Result plot as follows:

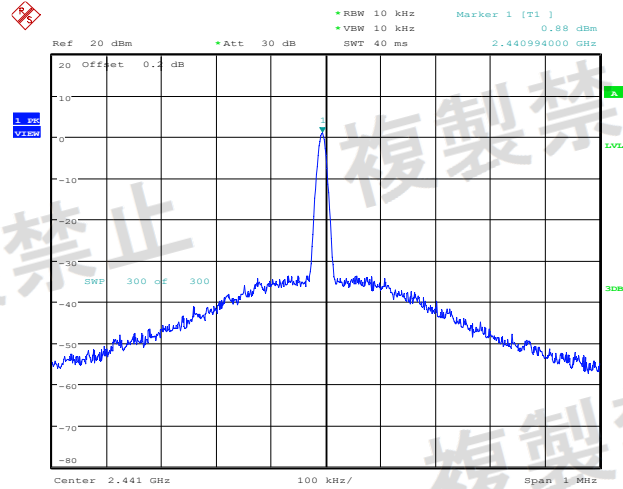




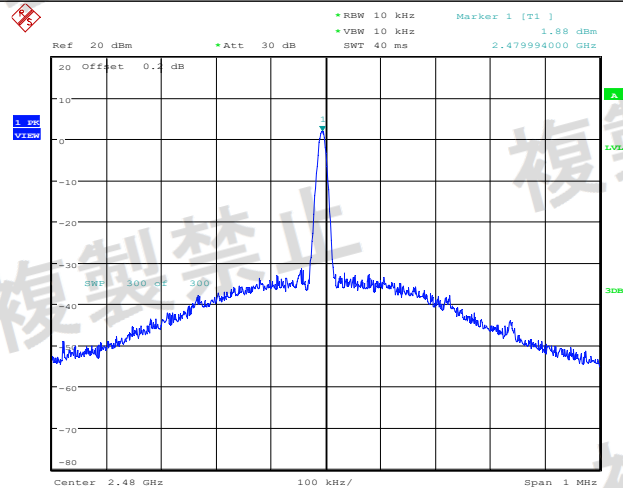
NTNV_2DH5_Ant1_2402



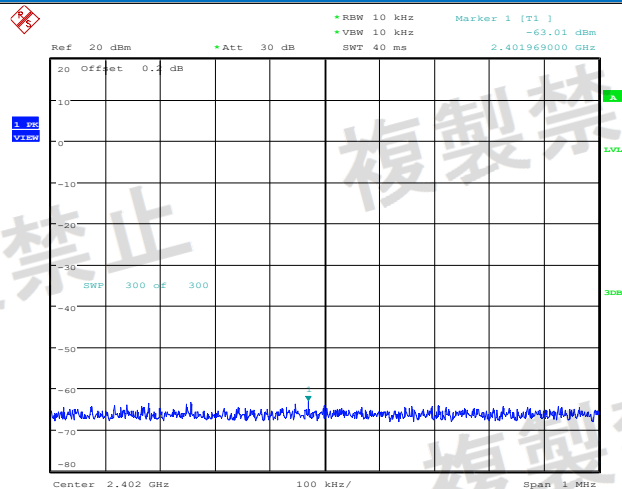
NTNV_2DH5_Ant1_2441



NTNV_2DH5_Ant1_2480

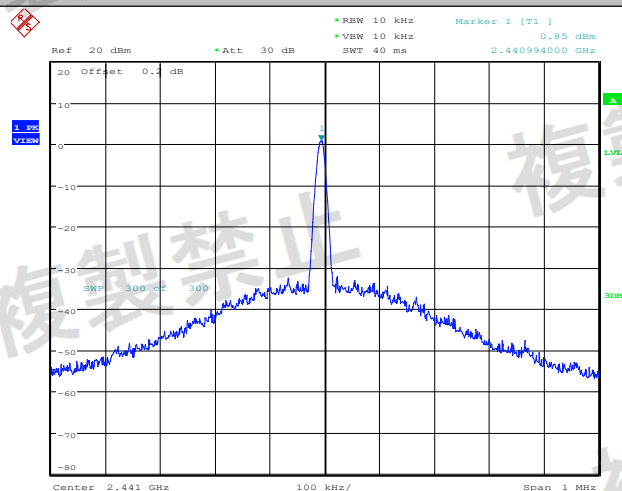


NTNV_3DH5_Ant1_2402



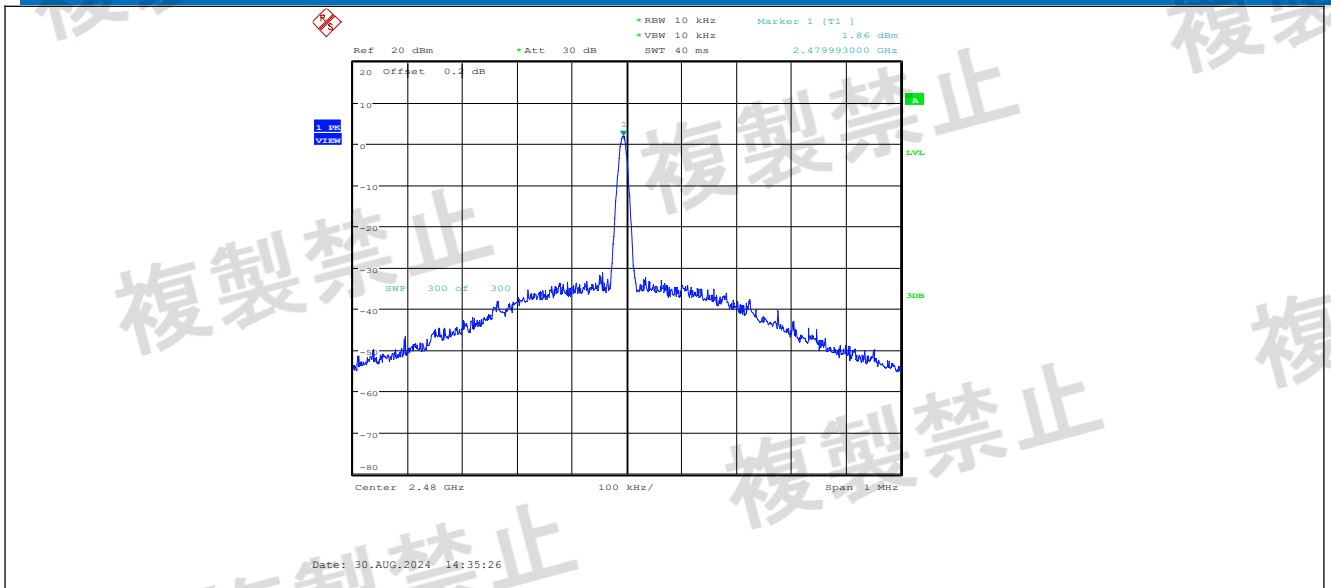
Date: 30.AUG.2024 13:51:27

NTNV_3DH5_Ant1_2441



Date: 30.AUG.2024 14:35:57

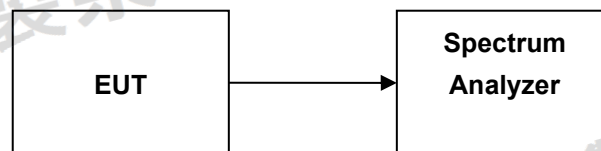
NTNV_3DH5_Ant1_2480



6.7 Occupied Bandwidth (99%)

Test Requirement:	Item 19 of Article 2-1 FH: 83.5MHz or less
Test Method:	MIC Notice No.88 Appendix No.43
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:



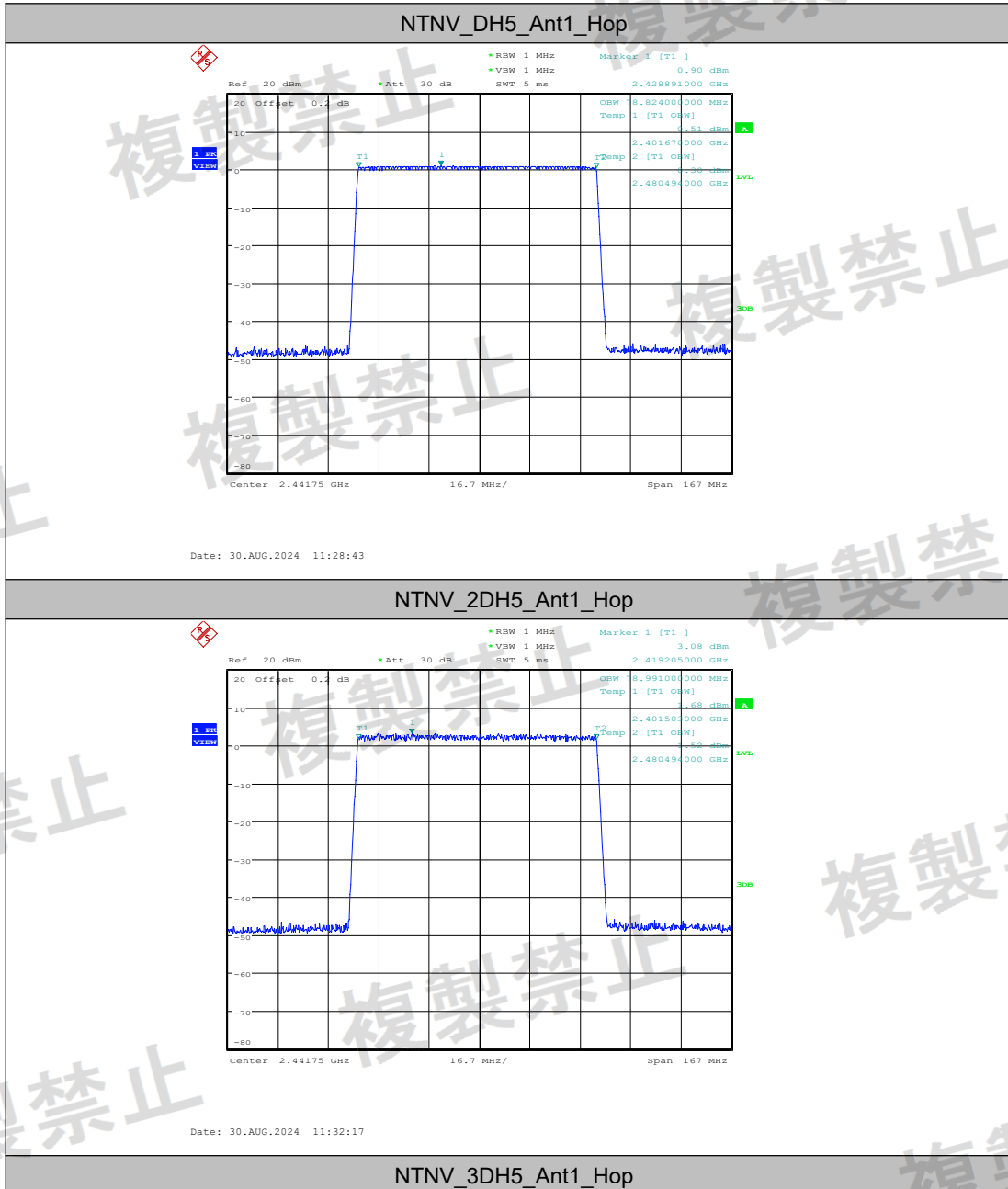
Test Procedure:

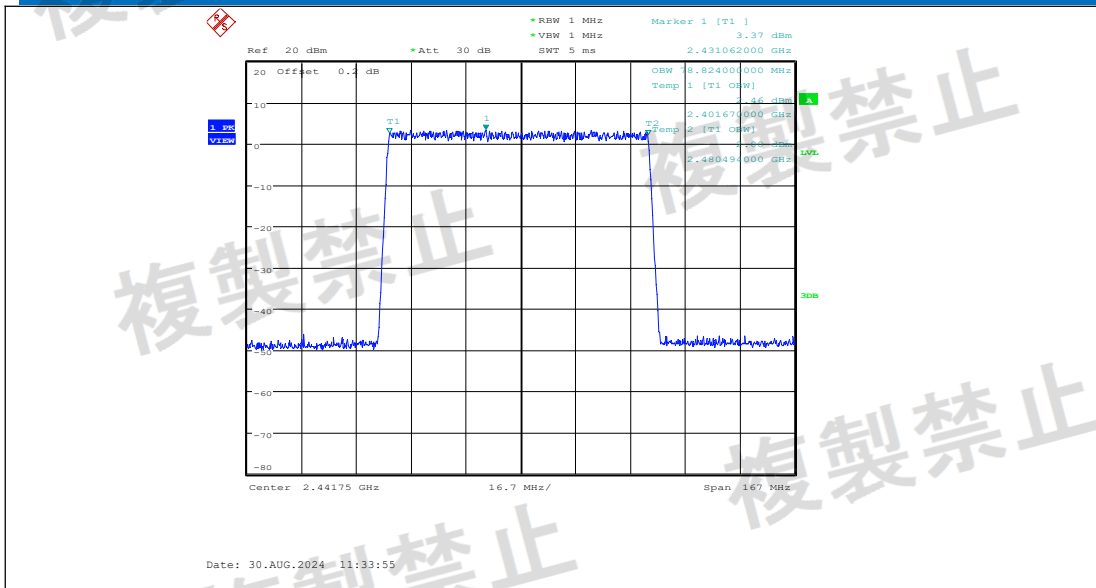
1. Test Conditions:
Spectrum Analyzer is used for measurement.
2. EUT conditions:
Modulation/Spread/Hopping ON, Modulation Tx
For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:
Frequency: Test Frequency
Span 167 MHz (FHSS),
RBW 1 MHz
VBW 1 MHz
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold
OBW 99%

Test Result:

Test Condition	Test Mode	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Hop	78.824	≤83.5	PASS
	2DH5	Hop	78.991	≤83.5	PASS
	3DH5	Hop	78.824	≤83.5	PASS

Result plot as follows:





Test Result: The unit does meet the requirements.

6.8 Spread spectrum Bandwidth (90%)

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

Test Method: MIC Notice No.88 Appendix No.43

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, Modulation Tx

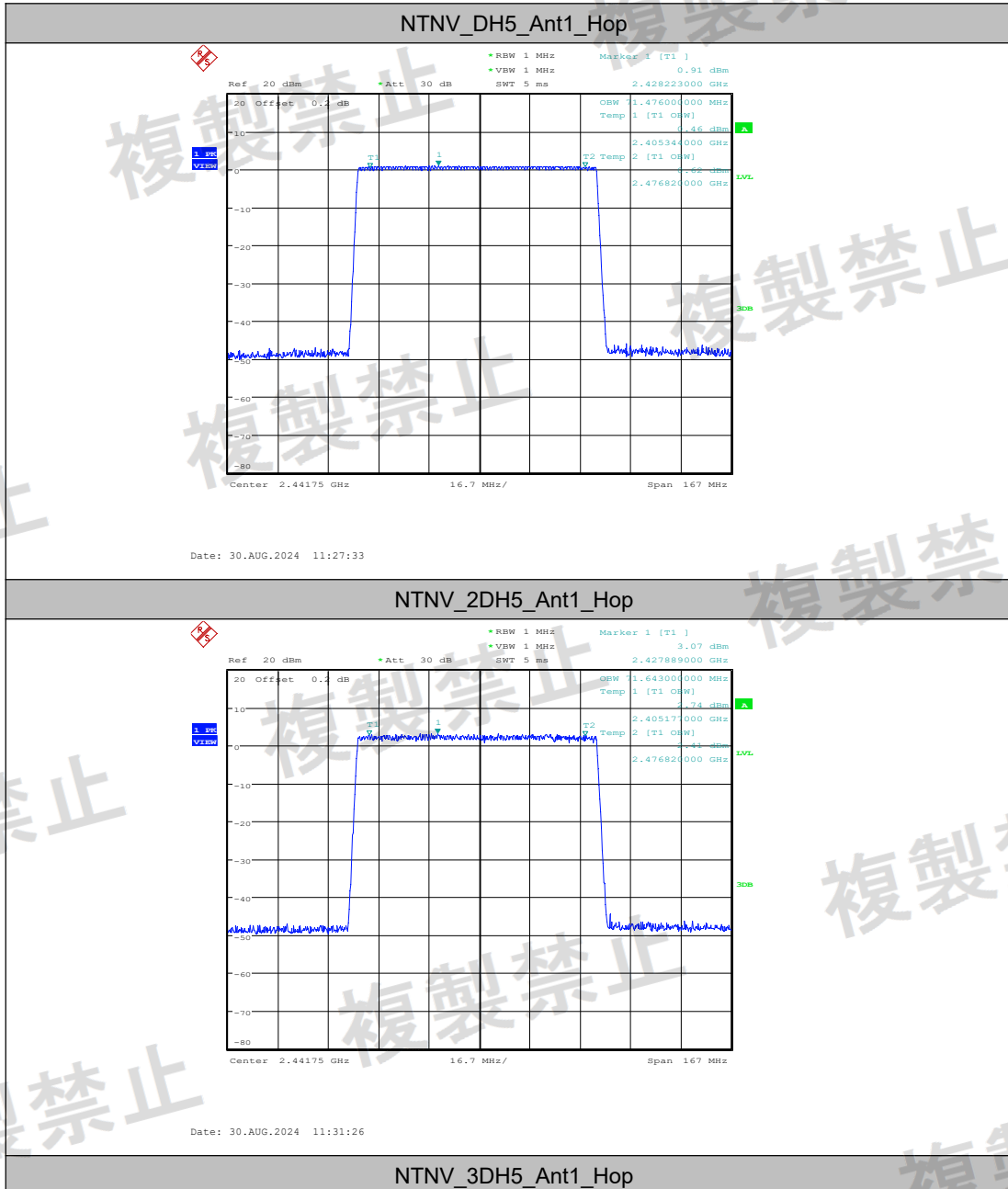
For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:
Frequency: Test Frequency
Span 167MHz (FHSS),
RBW 1 MHz
VBW 1 MHz
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold

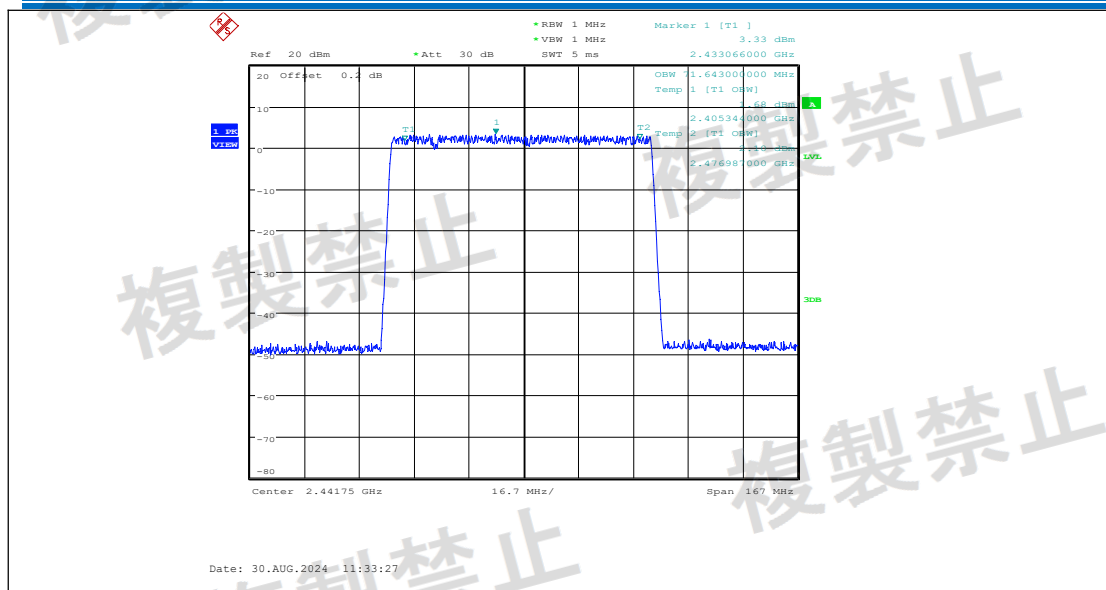
OBW 90%

Test Result:

Test Condition	Test Mode	Freq(MHz)	Result [MHz]	Limit [MHz]	Spread Factor	Limit	Verdict
NTNV	DH5	Hop	71.476	≥ 0.5	71.476	>5	PASS
	2DH5	Hop	71.643	≥ 0.5	71.643	>5	PASS
	3DH5	Hop	71.643	≥ 0.5	71.643	>5	PASS

Result plot as follows:





Test Result: The unit does meet the requirements.

6.9 Antenna Power

Test Requirement:

Item 19 of Article 2-1

2400-2427MHz, 2470.75-2483.5MHz: 10mW/MHz or less

2427-2470.75MHz: 3mW/MHz or less

Test Method:

MIC Notice No.88 Appendix No.43

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, Modulation Tx

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

3. Spectrum Analyzer conditions:

Center Frequency: Test Frequency

Span: 2 times of occupied bandwidth

RBW: 1 MHz

VBW: 3 MHz

Sweep Time: Auto

detector mode: Positive peak

Indication mode: Max hold

4. Spectrum Analyzer conditions(Measure of Antenna Power):

Center Frequency: Frequency of Peak Power (Search Frequency by 3)

Span: 0Hz

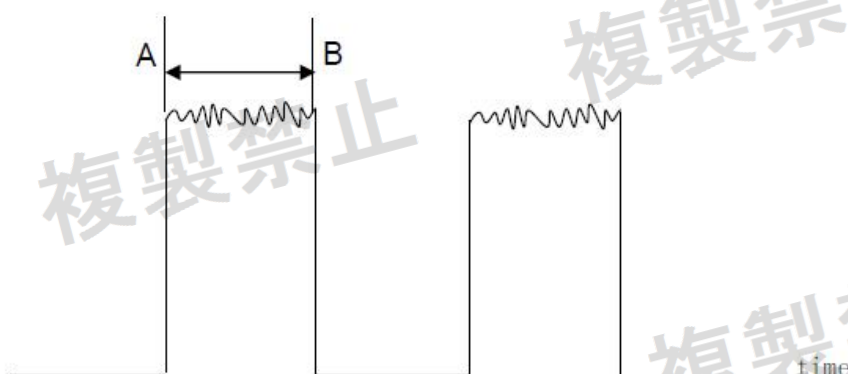
RBW: 1 MHz

VBW: 1 MHz

Sweep Time: Auto

detector mode: Positive peak

Indication mode: Sample Average



Test Result:

Antenna Power							
Test Condition	Test Mode	Antenna	Channel	Result(dBm/MHz)	Result(mW/MHz)	Limit(mW/MHz)	Verdict
NTNV	DH5	Ant1	2441	-1.03	0.7889	≤3	PASS
	2DH5	Ant1	2441	-0.51	0.8892	≤3	PASS
	3DH5	Ant1	2441	-0.47	0.8974	≤3	PASS

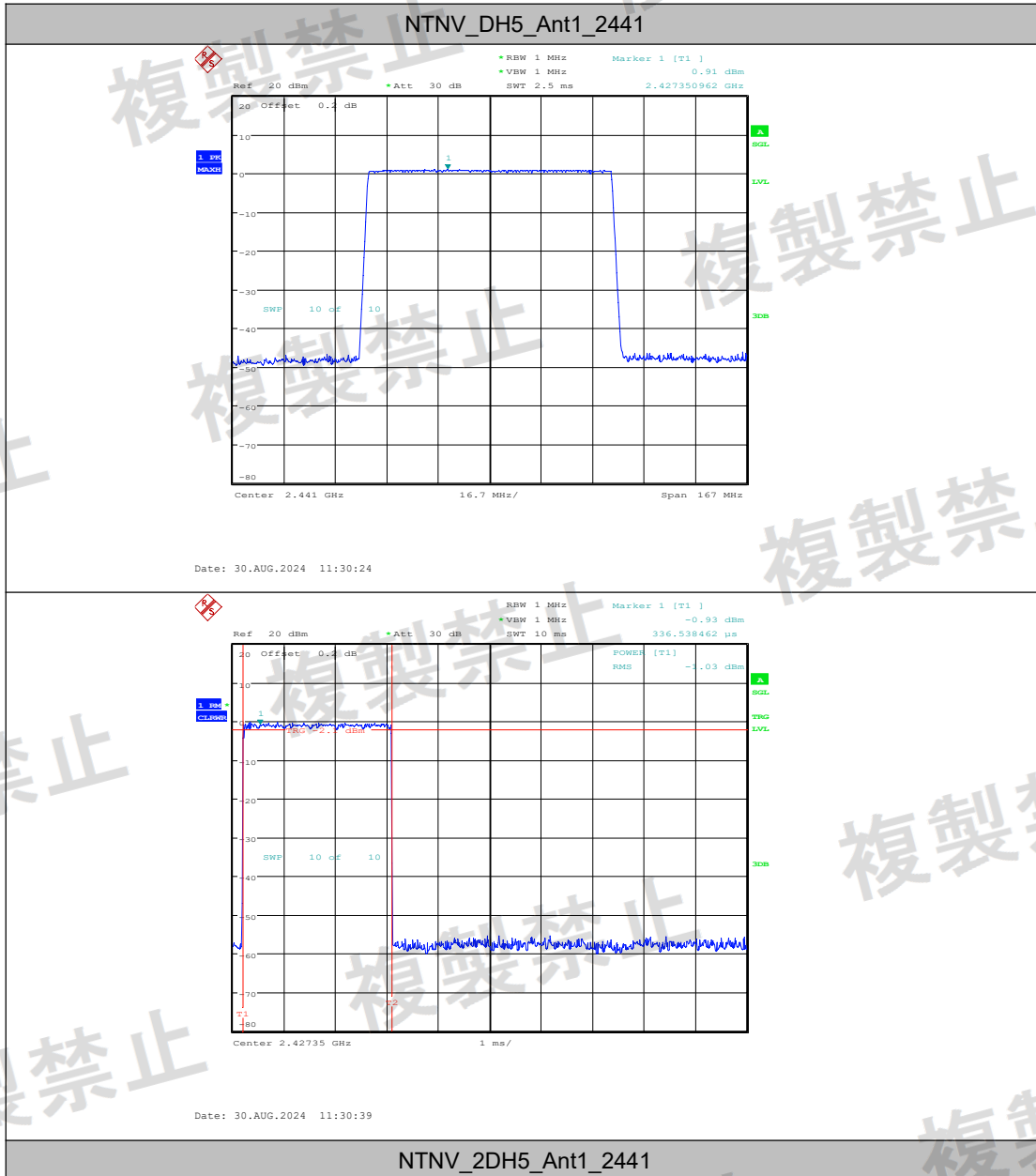
Tolerance								
Test Condition	Test Mode	Antenna	Channel	Power (mW/MHz)	RatedPower (mW/MHz)	Result (%)	Limit (%)	Verdict
NTNV	DH5	Ant1	2441	0.7889	1.0	-21.11	-80 to +20	PASS
	2DH5	Ant1	2441	0.8892	1.0	-11.08	-80 to +20	PASS
	3DH5	Ant1	2441	0.8974	1.0	-10.26	-80 to +20	PASS

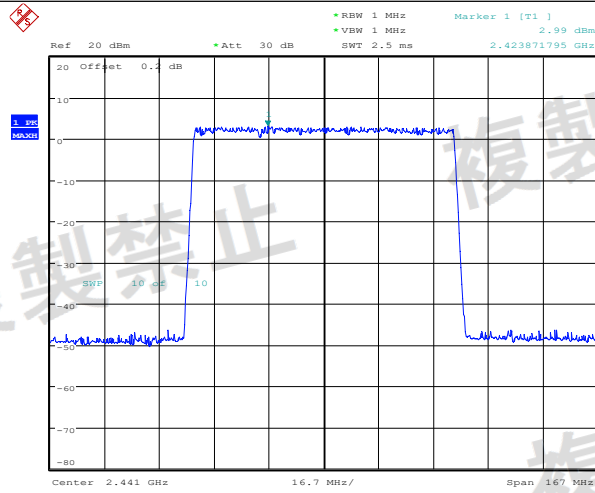
EIRP							
Test Condition	Test Mode	Antenna	Channel	Result(dBm/MHz)	EIRP(dBm/MHz)	Limit(dBm/MHz)	Verdict
NTNV	DH5	Ant1	2441	-1.03	1.99	≤6.91	PASS
	2DH5	Ant1	2441	-0.51	2.51	≤6.91	PASS
	3DH5	Ant1	2441	-0.47	2.55	≤6.91	PASS

Remark:

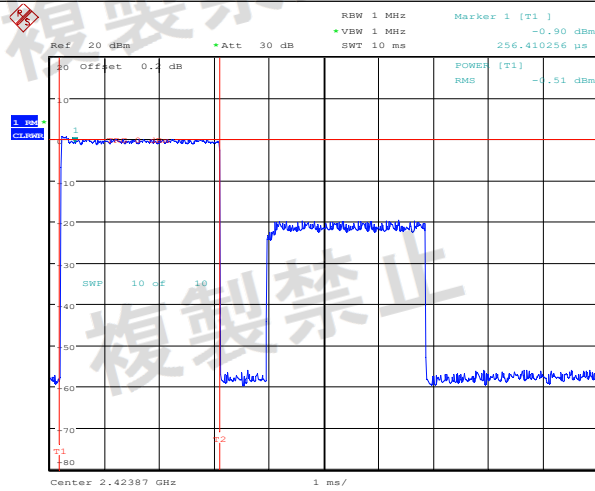
EIRP= Antenna power + Antenna Gain

Test Graphs



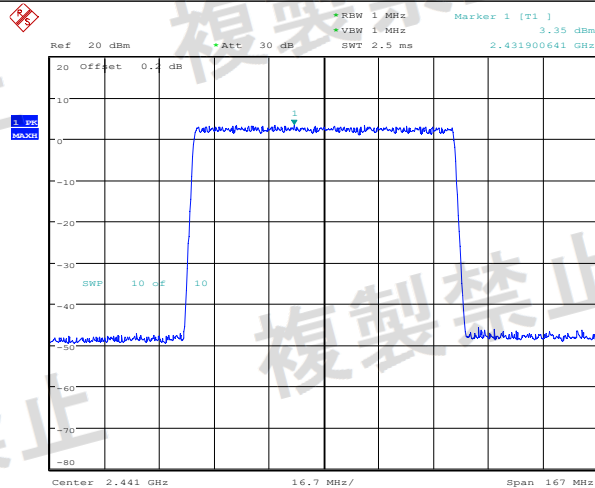


Date: 30.AUG.2024 11:32:41

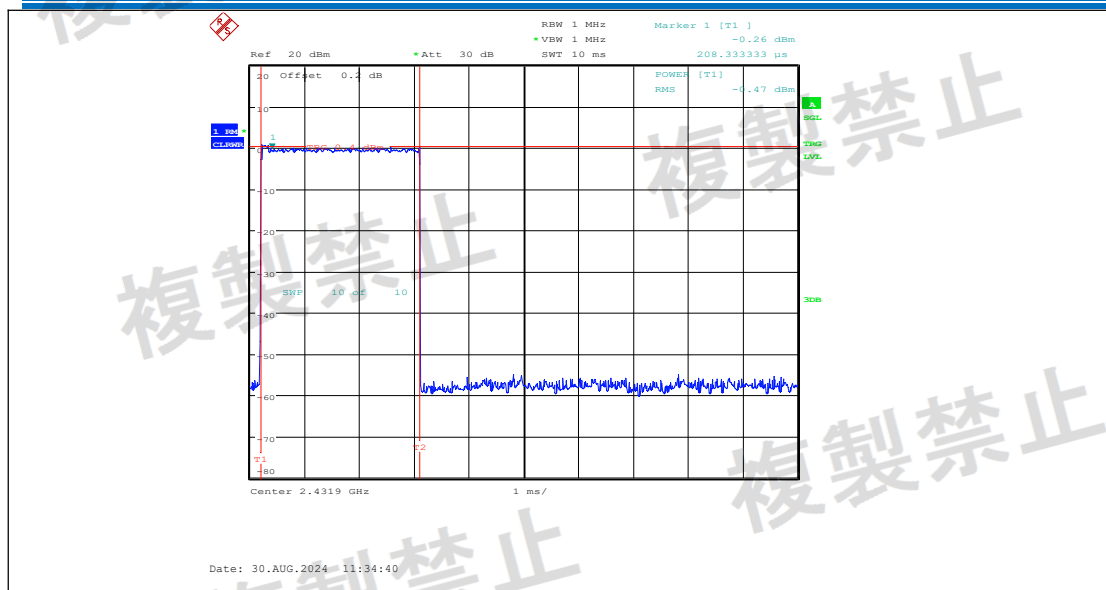


Date: 30.AUG.2024 11:32:49

NTNV_3DH5_Ant1_2441

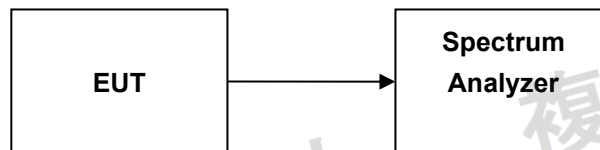


Date: 30.AUG.2024 11:34:32



6.10 Spurious Emissions of Tx

Test Requirement:	Item 19 of Article 2-1
Test Method:	MIC Notice No.88 Appendix No.43 (1) Below 2387 MHz: 2.5 μ W/MHz(-26dBm/MHz) (2) 2387 to 2400 MHz: 25 μ W/MHz(-16dBm/MHz) (3) 2483.5 through 2496.5 MHz: 25 μ W/MHz(-16dBm/MHz) (4) Over 2496.5 MHz: 2.5 μ W/MHz(-26dBm/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, , Modulation Tx
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

6.10.1 Test Result

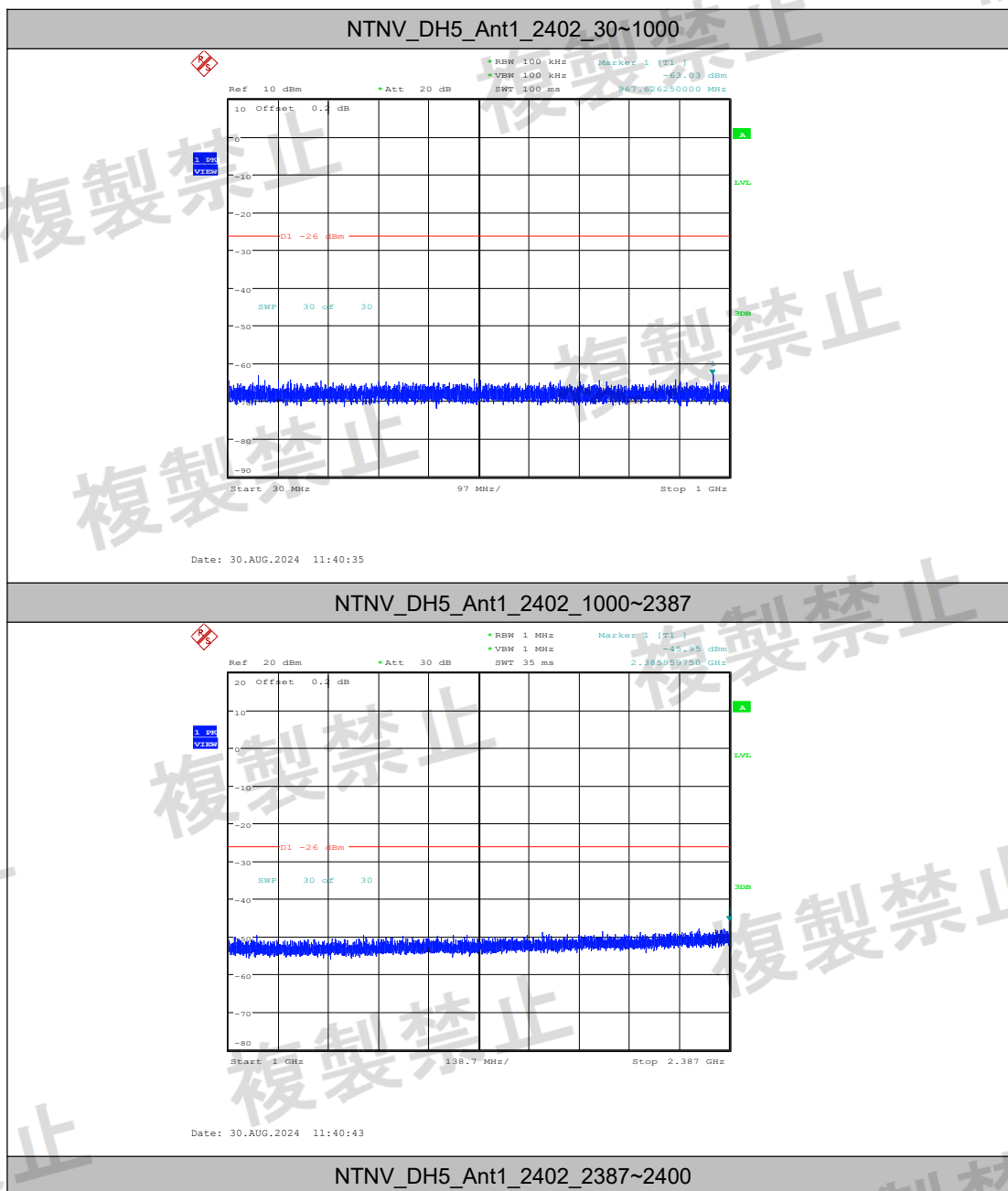
Test Mode	Freq (MHz)	Freq.Range [MHz]	Freq [MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Result [μW/MHz]	Limit [μW/MHz]	Verdict
DH5	2402	30~1000	967.63	-63.03	≤-26	0.00050	≤2.5	PASS
		1000~2387	2385.96	-45.95	≤-26	0.02541	≤2.5	PASS
		2387~2400	2400.00	-24.19	≤-16	3.81066	≤25	PASS
		2483.5~2496.5	2491.07	-46.20	≤-16	0.02399	≤25	PASS
		2496.5~13000	4804.12	-39.89	≤-26	0.10257	≤2.5	PASS
	2441	30~1000	126.64	-62.03	≤-26	0.00063	≤2.5	PASS
		1000~2387	2259.57	-47.60	≤-26	0.01738	≤2.5	PASS
		2387~2400	2387.07	-46.63	≤-16	0.02173	≤25	PASS
		2483.5~2496.5	2492.69	-46.27	≤-16	0.02360	≤25	PASS
		2496.5~13000	4881.84	-40.26	≤-26	0.09419	≤2.5	PASS
	2480	30~1000	165.92	-61.32	≤-26	0.00074	≤2.5	PASS
		1000~2387	2281.93	-47.74	≤-26	0.01683	≤2.5	PASS
		2387~2400	2398.56	-47.12	≤-16	0.01941	≤25	PASS
		2483.5~2496.5	2484.76	-42.08	≤-16	0.06194	≤25	PASS
		2496.5~13000	4959.57	-40.13	≤-26	0.09705	≤2.5	PASS
2DH5	2402	30~1000	87.59	-62.45	≤-26	0.00057	≤2.5	PASS
		1000~2387	2299.97	-47.46	≤-26	0.01795	≤2.5	PASS
		2387~2400	2400	-18.89	≤-16	12.91219	≤25.1	See table below
		2483.5~2496.5	2483.78	-46.18	≤-16	0.02410	≤25	PASS
		2496.5~13000	4803.59	-39.39	≤-26	0.11508	≤2.5	PASS
	2441	30~1000	126.64	-62.93	≤-26	0.00051	≤2.5	PASS
		1000~2387	2313.66	-47.91	≤-26	0.01618	≤2.5	PASS
		2387~2400	2395.77	-45.89	≤-16	0.02576	≤25	PASS
		2483.5~2496.5	2490.04	-46.25	≤-16	0.02371	≤25	PASS
		2496.5~13000	4882.37	-38.79	≤-26	0.13213	≤2.5	PASS
	2480	30~1000	165.68	-63.39	≤-26	0.00046	≤2.5	PASS
		1000~2387	2338.28	-48.28	≤-26	0.01486	≤2.5	PASS
		2387~2400	2388.82	-47.26	≤-16	0.01879	≤25	PASS
		2483.5~2496.5	2483.50	-39.54	≤-16	0.11117	≤25	PASS
		2496.5~13000	4960.10	-40.13	≤-26	0.09705	≤2.5	PASS
3DH5	2402	30~1000	87.59	-61.99	≤-26	0.00063	≤2.5	PASS
		1000~2387	2379.20	-46.50	≤-26	0.02239	≤2.5	PASS
		2387~2400	2399.99	-19.05	≤-16	12.44515	≤25	PASS
		2483.5~2496.5	2485.79	-46.31	≤-16	0.02339	≤25	PASS
		2496.5~13000	4804.12	-38.36	≤-26	0.14588	≤2.5	PASS

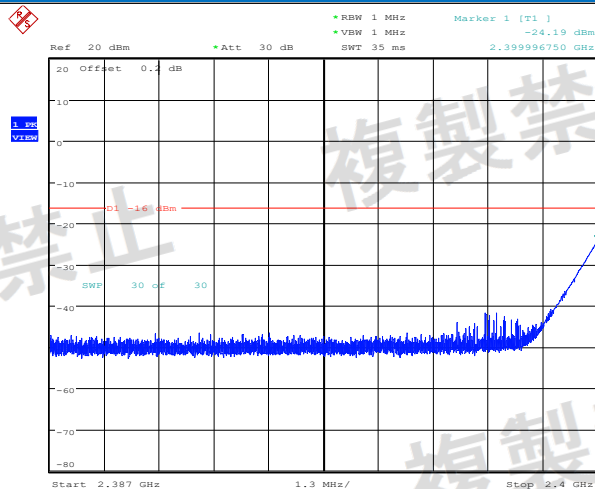
	2441	30~1000	126.88	-62.90	≤-26	0.00051	≤2.5	PASS
		1000~2387	2342.79	-47.83	≤-26	0.01648	≤2.5	PASS
		2387~2400	2398.87	-46.66	≤-16	0.02158	≤25	PASS
		2483.5~2496.5	2489.23	-46.20	≤-16	0.02399	≤25	PASS
		2496.5~13000	4882.37	-39.36	≤-26	0.11588	≤2.5	PASS
	2480	30~1000	165.92	-62.51	≤-26	0.00056	≤2.5	PASS
		1000~2387	2293.38	-47.13	≤-26	0.01936	≤2.5	PASS
		2387~2400	2394.30	-46.92	≤-16	0.02032	≤25	PASS
		2483.5~2496.5	2483.51	-39.34	≤-16	0.11641	≤25	PASS
		2496.5~13000	4959.57	-39.35	≤-26	0.11614	≤2.5	PASS

6.10.2 Test Result_Step2

Test Condition	Test Mode	Freq(MHz)	Freq. [MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Result [μW/MHz]	Limit [μW/MHz]	Verdict
NTNV	2DH5	2402	2400.00	-24.89	≤-16	3.24340	≤25	PASS

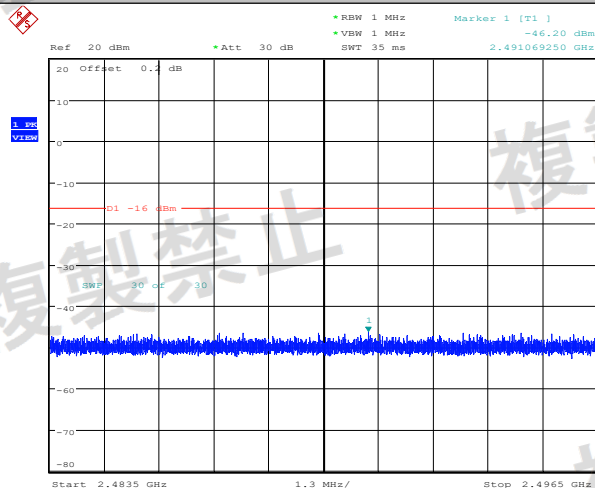
6.10.3 Test Graphs





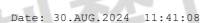
Date: 30.AUG.2024 11:40:51

NTNV_DH5_Ant1_2402_2483.5~2496.5



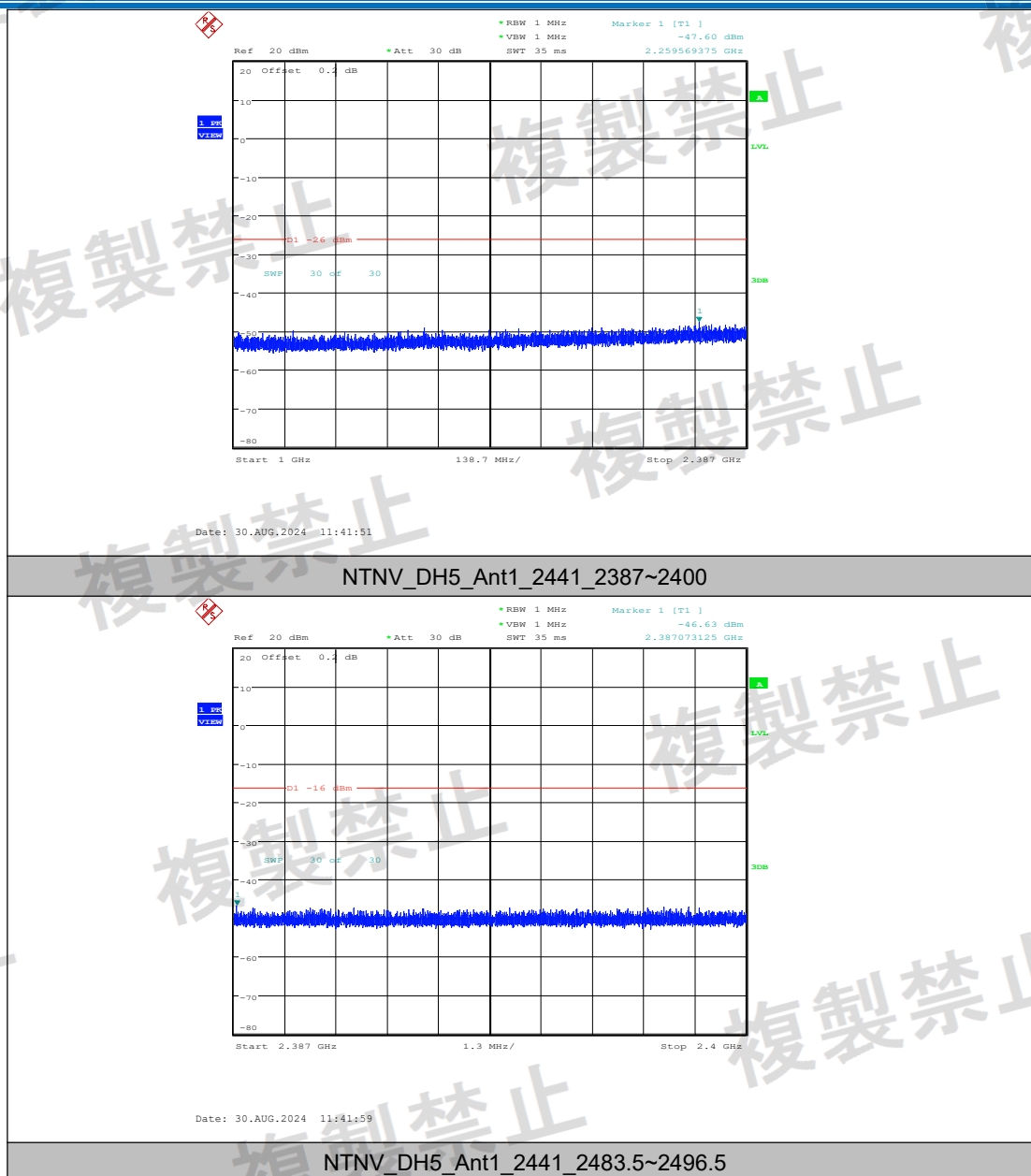
Date: 30.AUG.2024 11:40:58

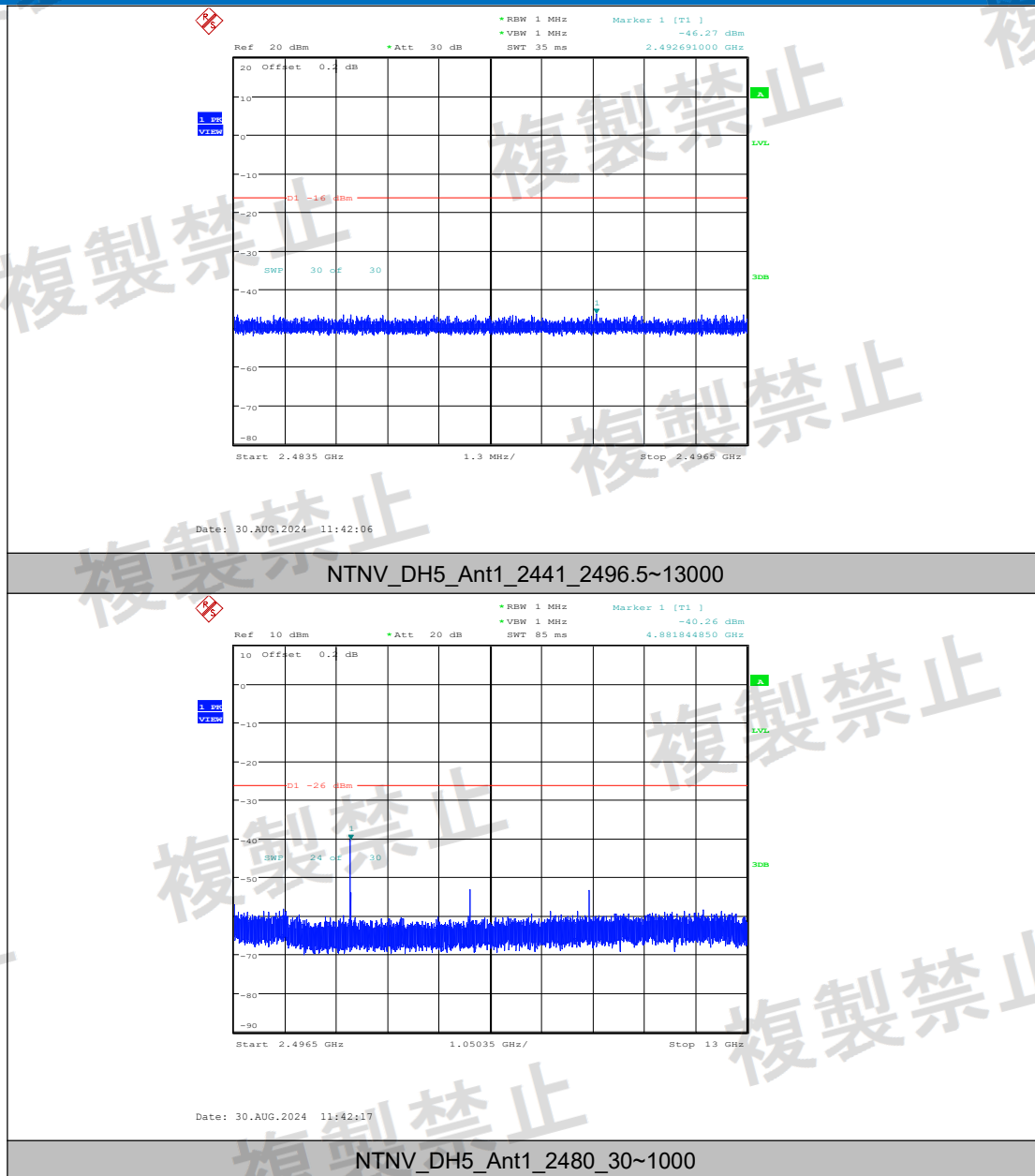
NTNV_DH5_Ant1_2402_2496.5~13000

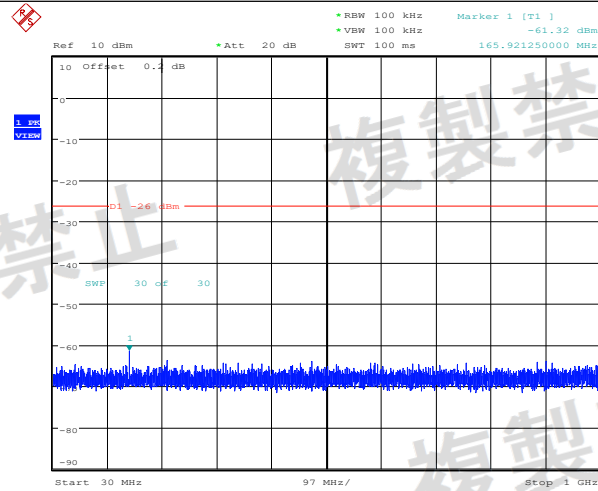


Date: 30.AUG.2024 11:41:43

Page:42 of 84

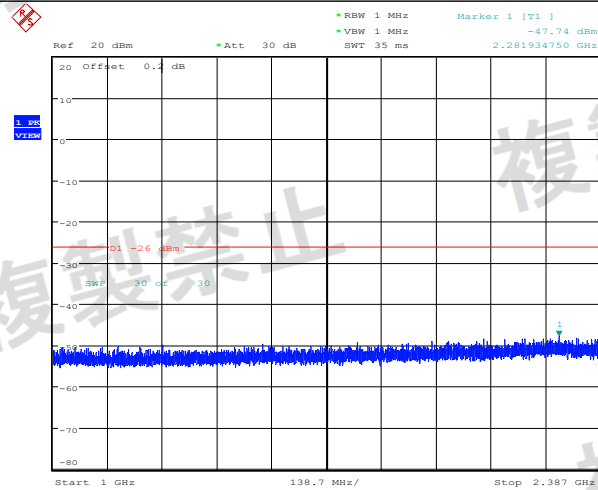






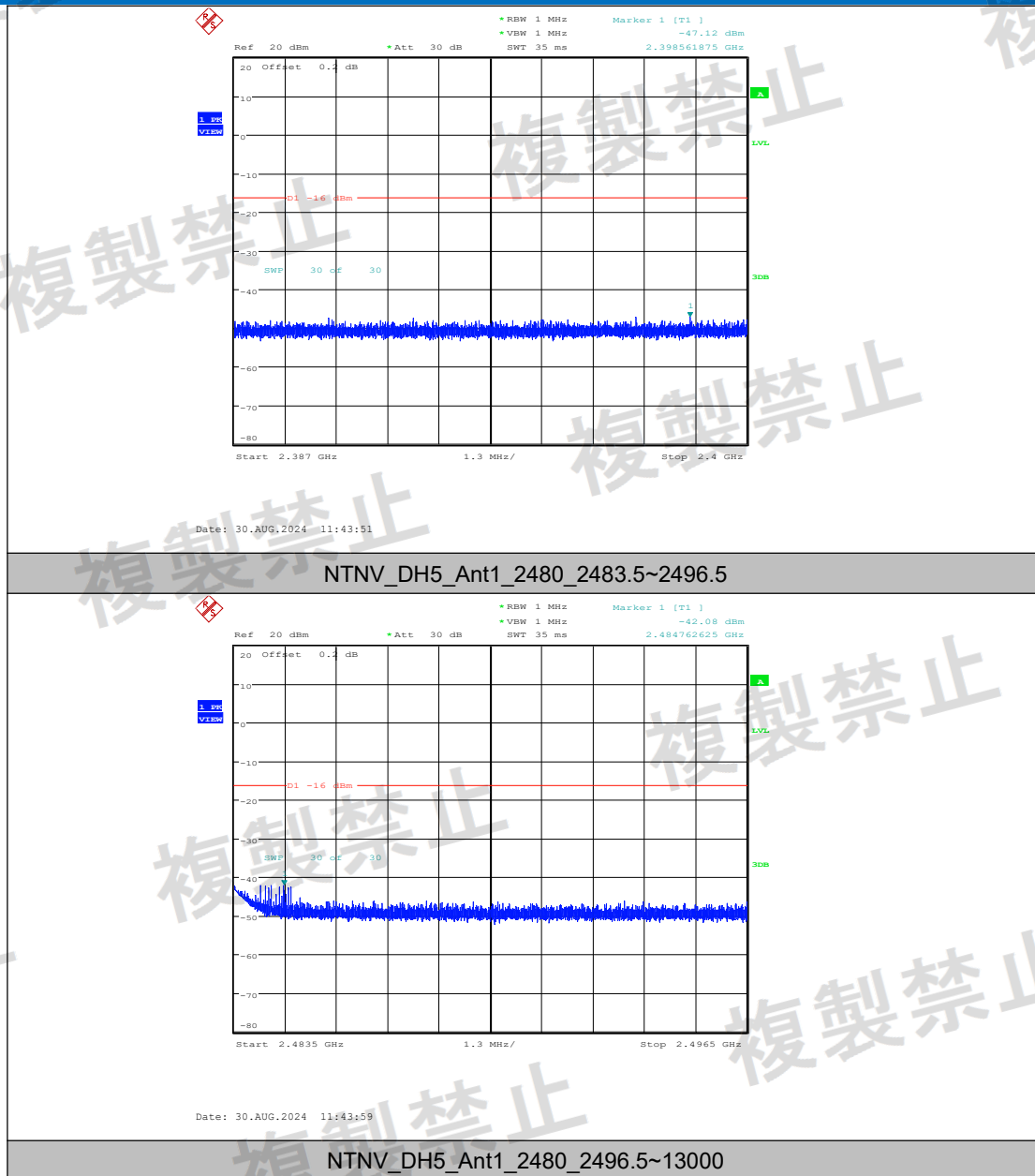
Date: 30.AUG.2024 11:43:35

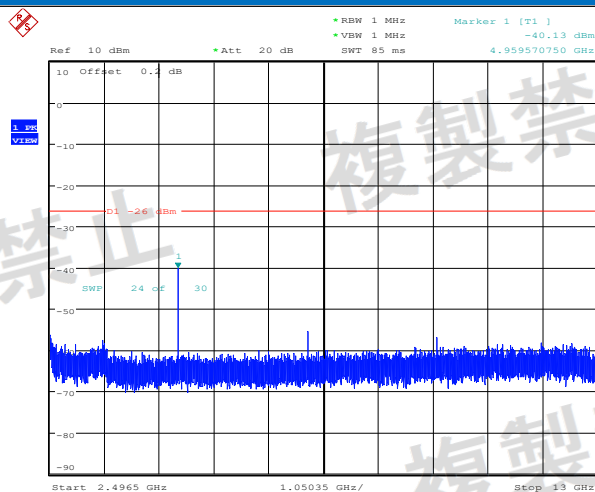
NTNV_DH5_Ant1_2480_1000~2387



Date: 30.AUG.2024 11:43:43

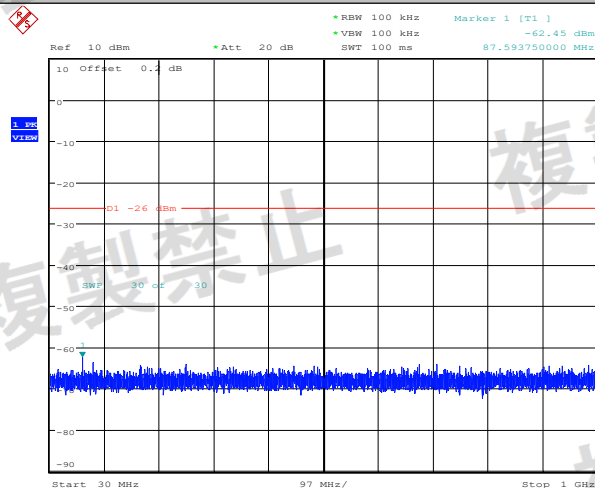
NTNV_DH5_Ant1_2480_2387~2400





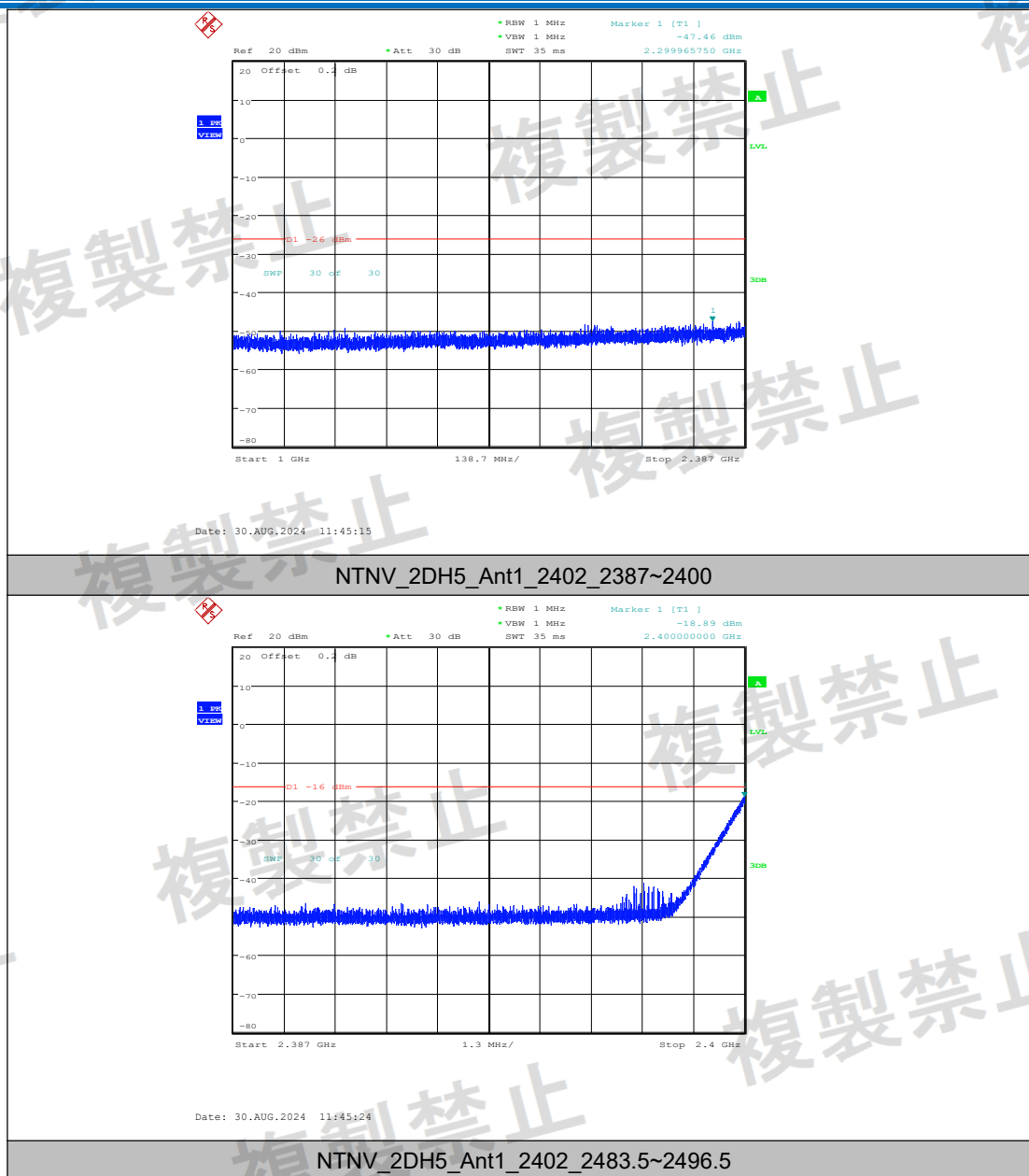
Date: 30.AUG.2024 11:44:09

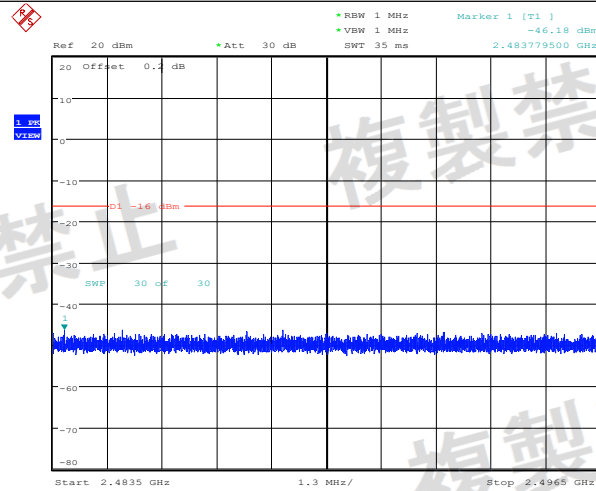
NTNV_2DH5_Ant1_2402_30~1000



Date: 30.AUG.2024 11:45:07

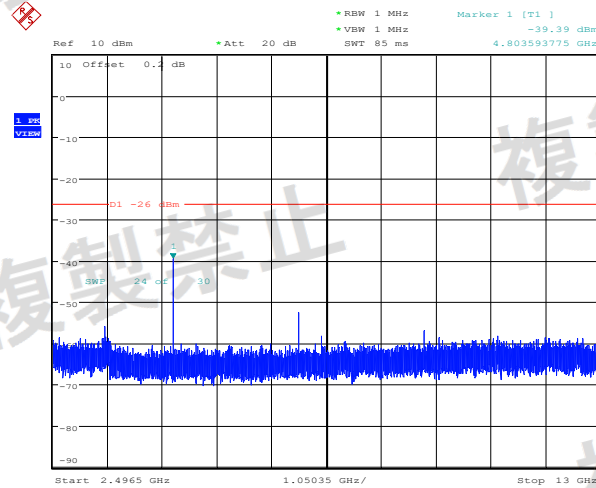
NTNV_2DH5_Ant1_2402_1000~2387





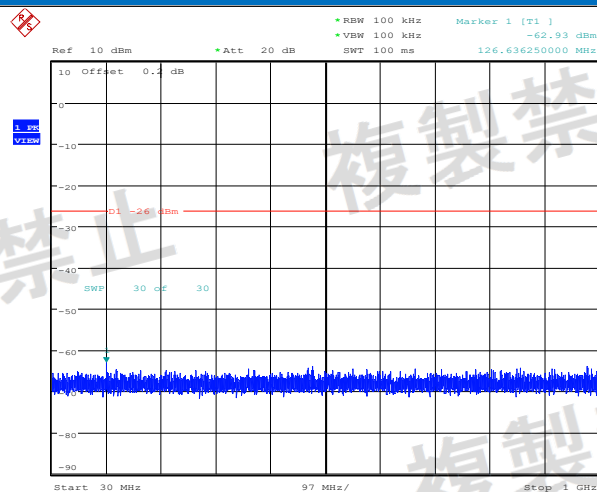
Date: 30.AUG.2024 11:46:05

NTNV_2DH5_Ant1_2402_2496.5~13000



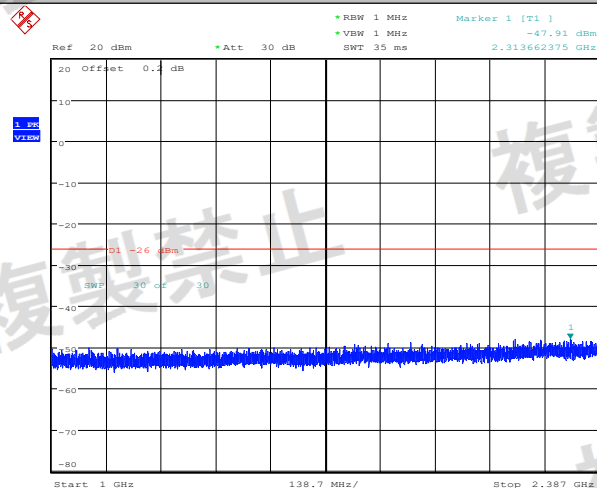
Date: 30.AUG.2024 11:46:16

NTNV_2DH5_Ant1_2441_30~1000



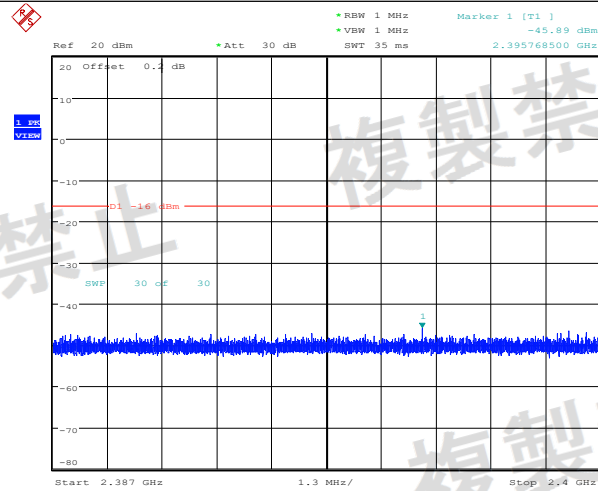
Date: 30.AUG.2024 11:46:46

NTNV_2DH5_Ant1_2441_1000~2387



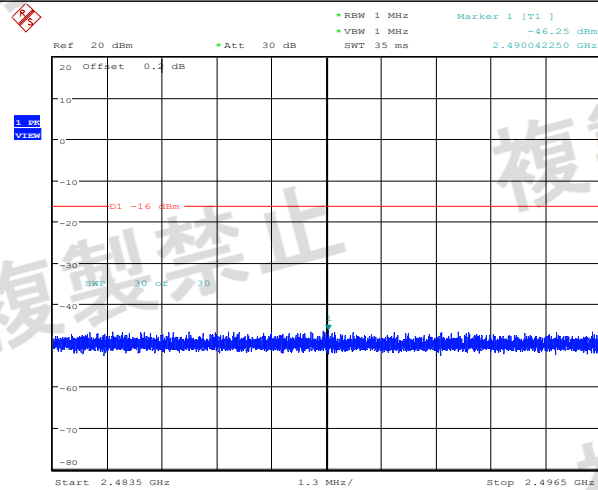
Date: 30.AUG.2024 11:46:54

NTNV_2DH5_Ant1_2441_2387~2400



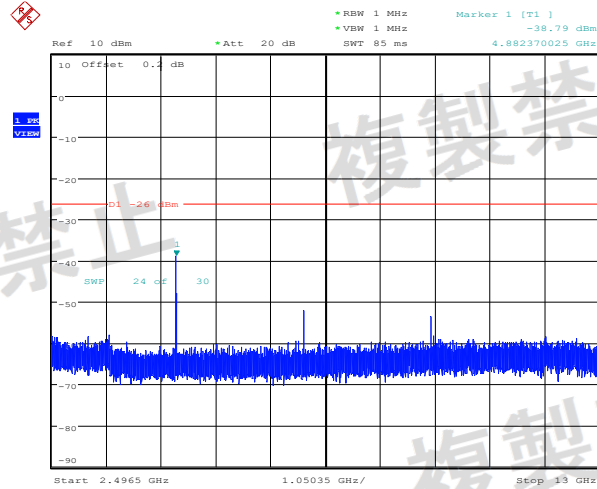
Date: 30.AUG.2024 11:47:02

NTNV_2DH5_Ant1_2441_2483.5~2496.5



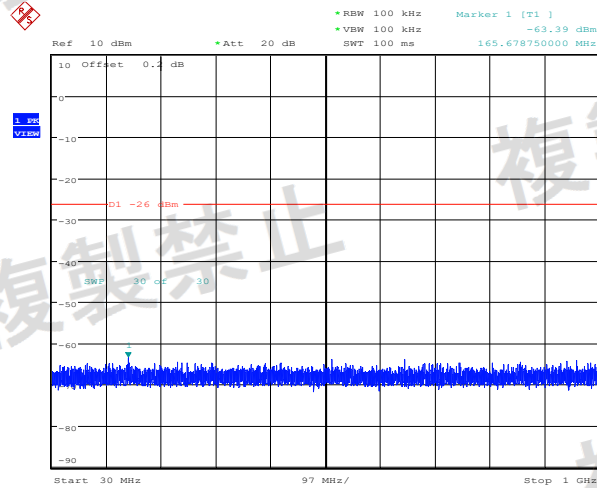
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NTNV_2DH5_Ant1_2441_2496.5~13000



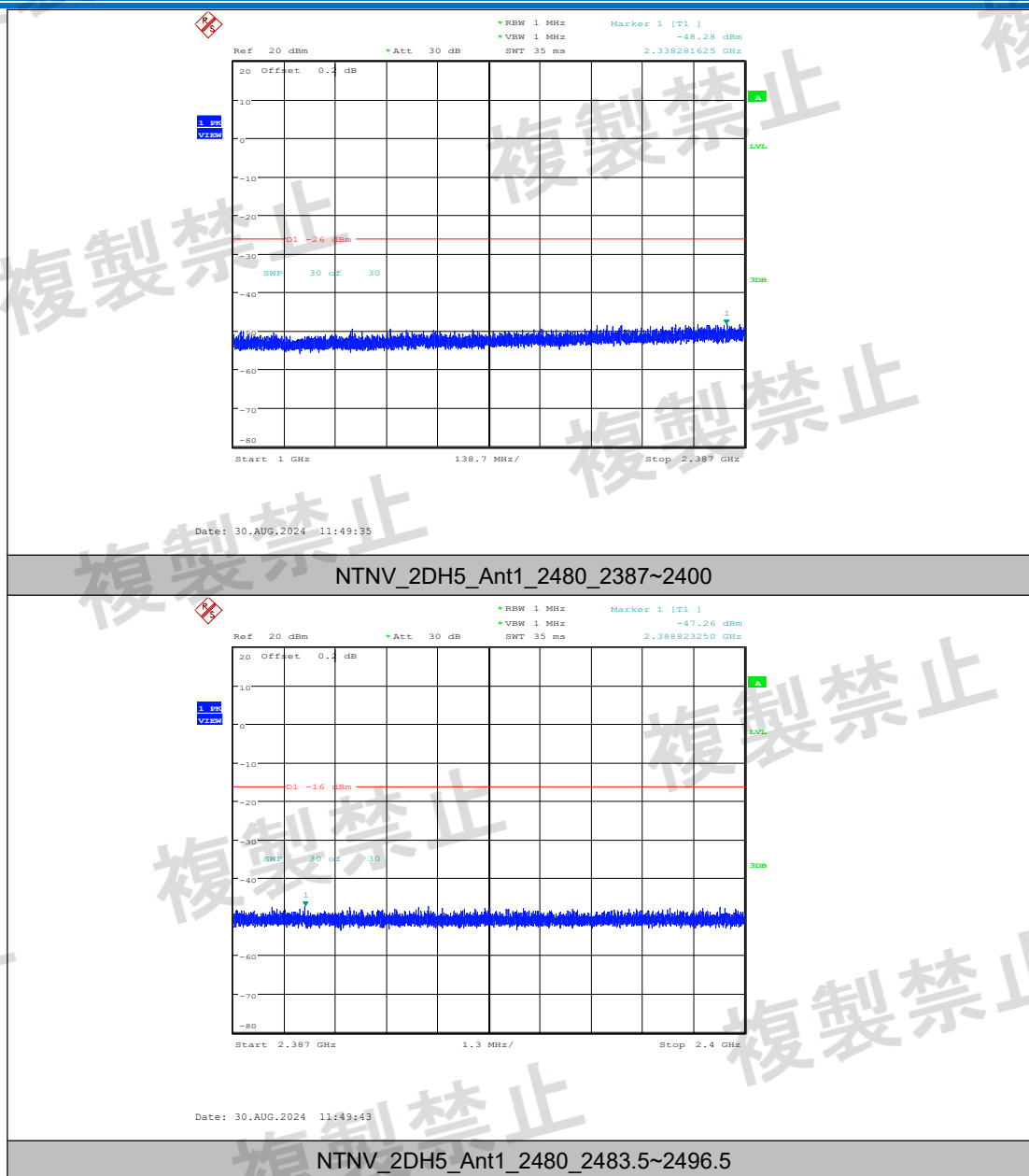
Date: 30.AUG.2024 11:47:20

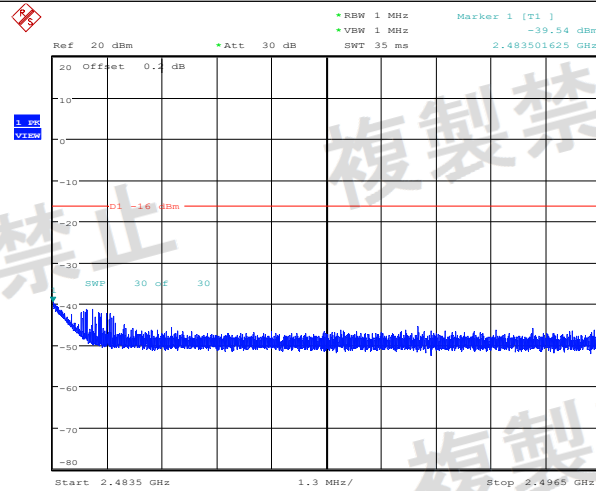
NTNV_2DH5_Ant1_2480_30~1000



Date: 30.AUG.2024 11:49:27

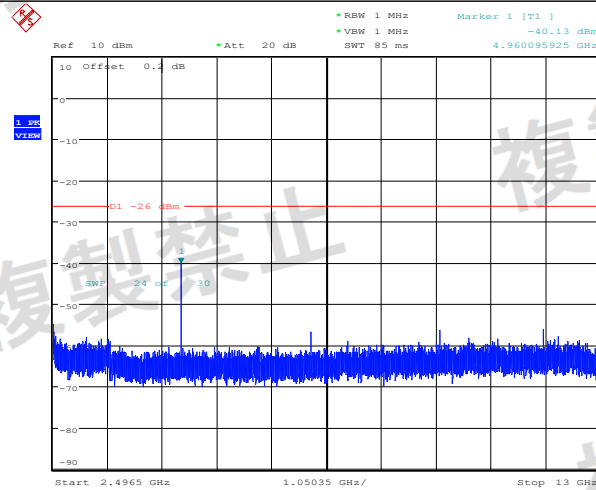
NTNV_2DH5_Ant1_2480_1000~2387





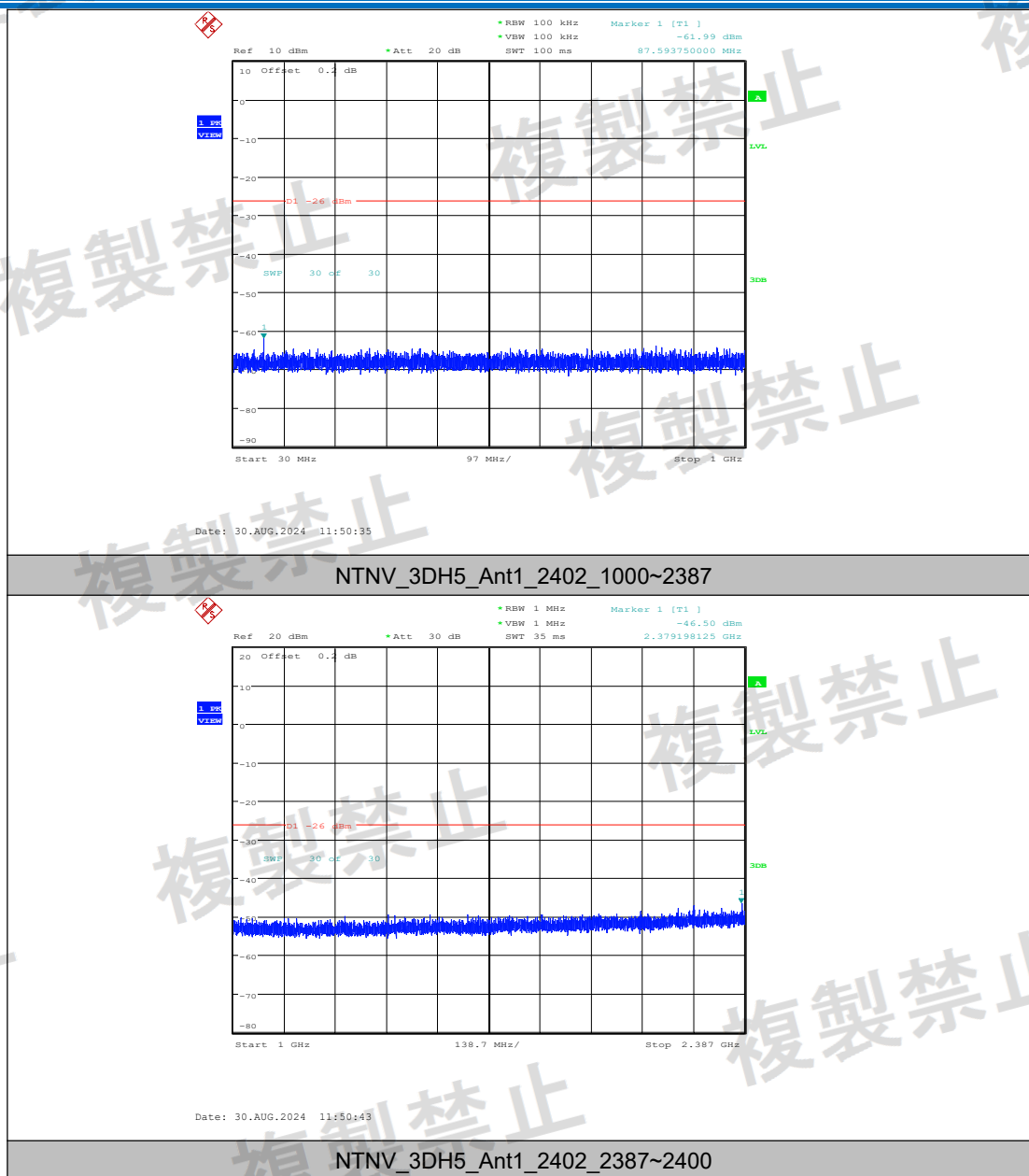
Date: 30.AUG.2024 11:49:51

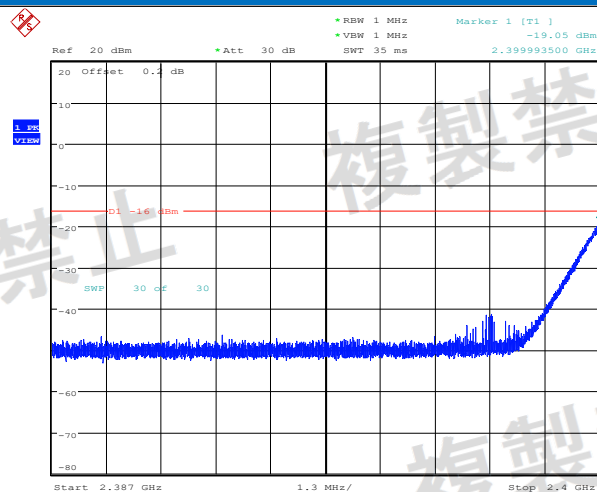
NTNV_2DH5_Ant1_2480_2496.5~13000



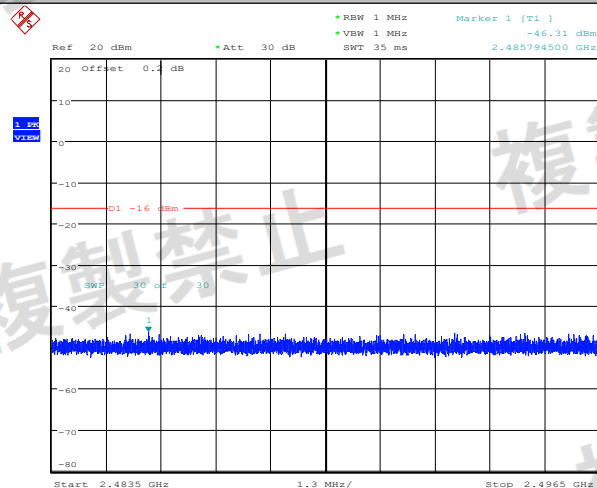
Date: 30.AUG.2024 11:50:01

NTNV_3DH5_Ant1_2402_30~1000

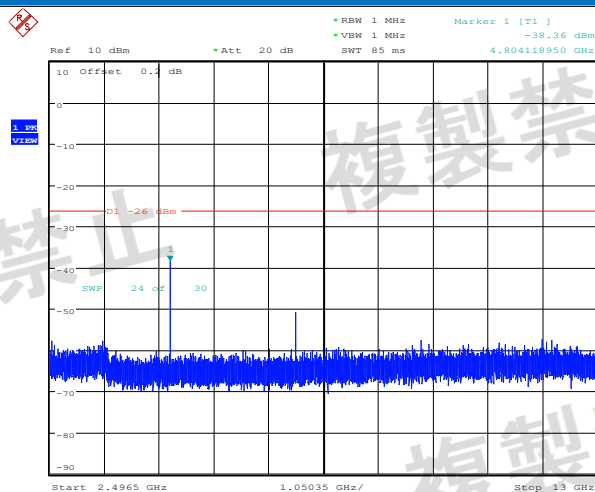




NTNV_3DH5_Ant1_2402_2483.5~2496.5

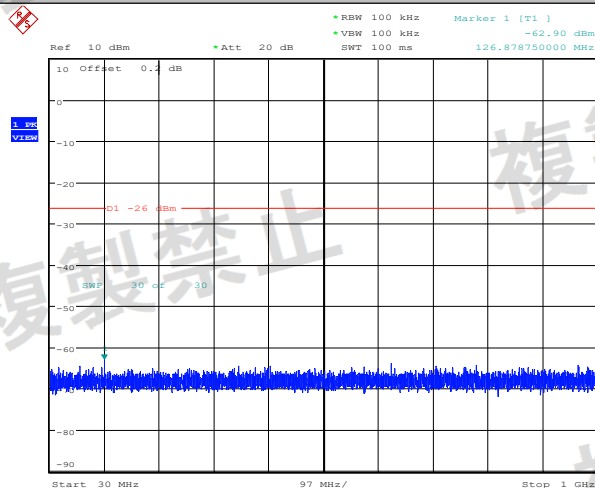


NTNV_3DH5_Ant1_2402_2496.5~13000



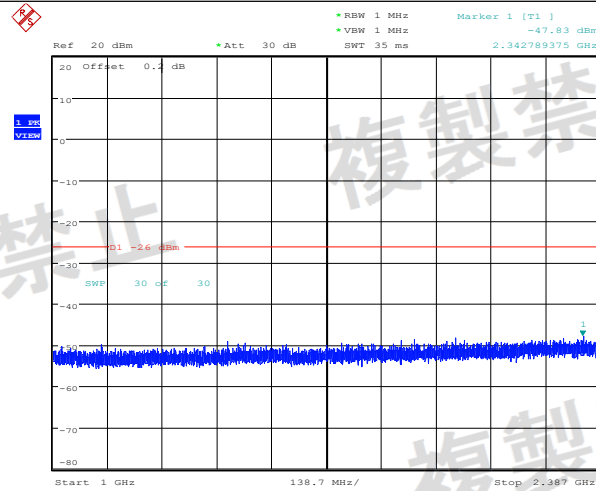
Date: 30.AUG.2024 11:51:09

NTNV_3DH5_Ant1_2441_30~1000



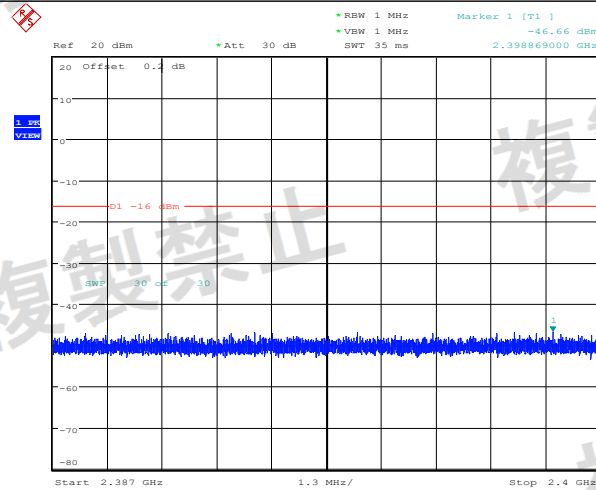
Date: 30.AUG.2024 11:51:44

NTNV_3DH5_Ant1_2441_1000~2387



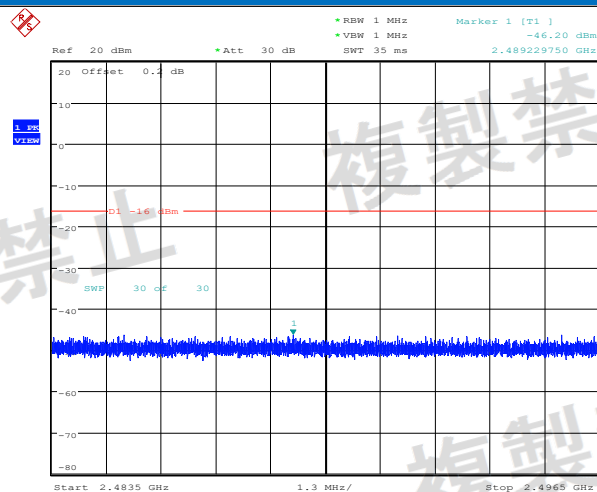
Date: 30.AUG.2024 11:51:52

NTNV_3DH5_Ant1_2441_2387~2400



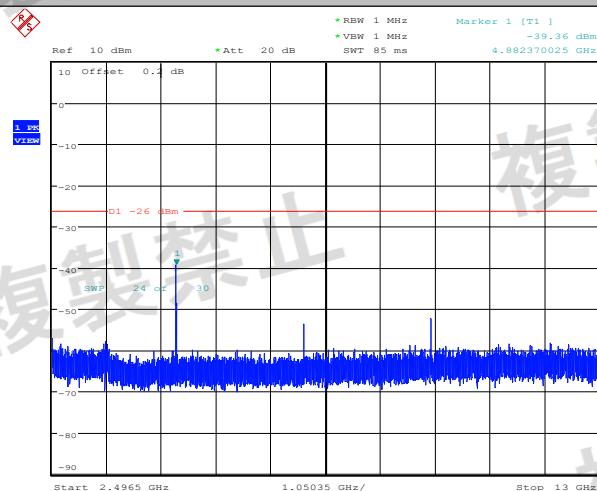
Date: 30.AUG.2024 11:52:00

NTNV_3DH5_Ant1_2441_2483.5~2496.5



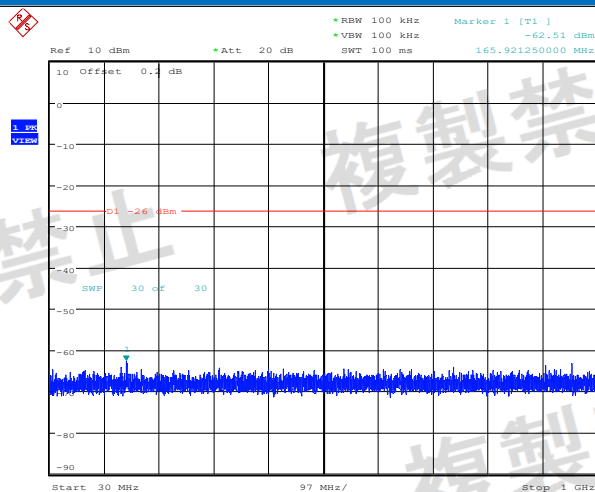
Date: 30.AUG.2024 11:52:07

NTNV_3DH5_Ant1_2441_2496.5~13000



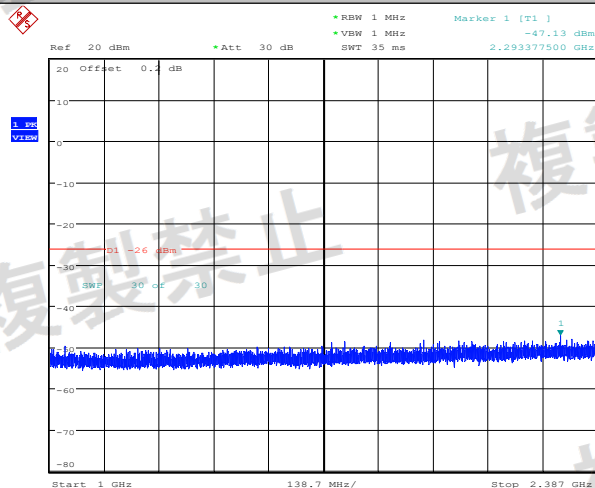
Date: 30.AUG.2024 11:52:18

NTNV_3DH5_Ant1_2480_30~1000



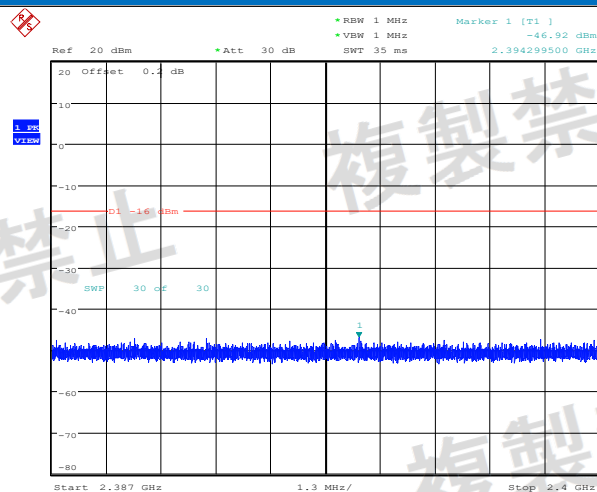
Date: 30.AUG.2024 11:52:49

NTNV_3DH5_Ant1_2480_1000~2387



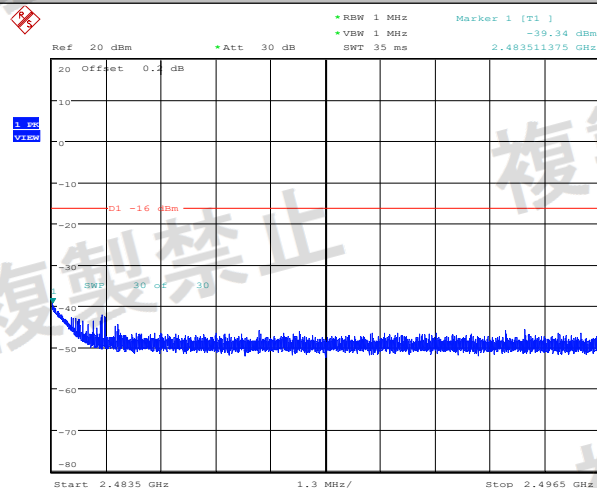
Date: 30.AUG.2024 11:52:57

NTNV_3DH5_Ant1_2480_2387~2400



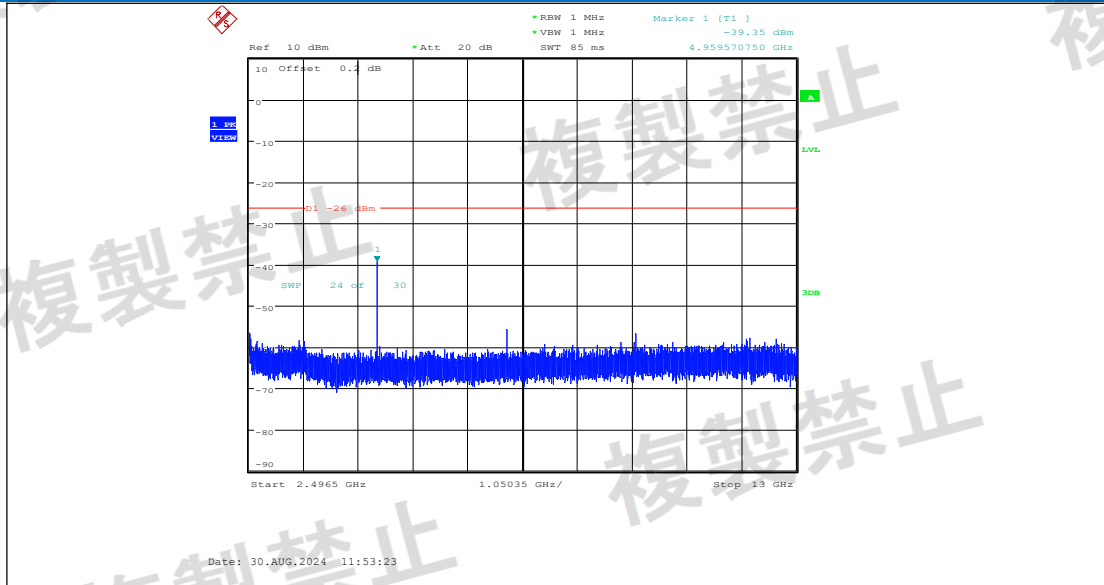
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NTNV_3DH5_Ant1_2480_2483.5~2496.5



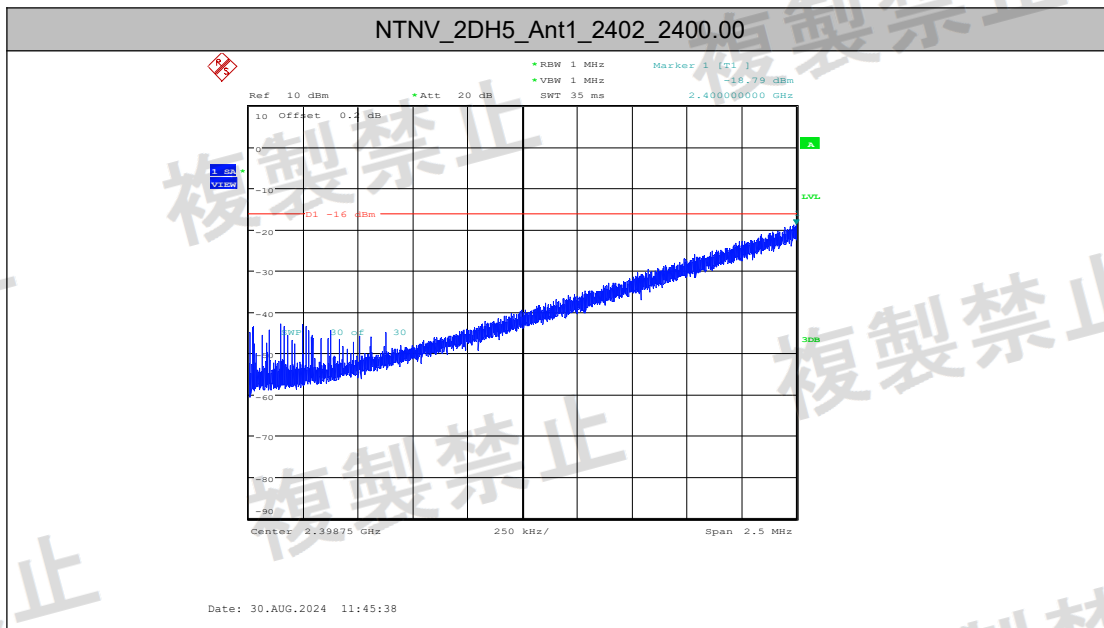
Date: 30.AUG.2024 11:53:13

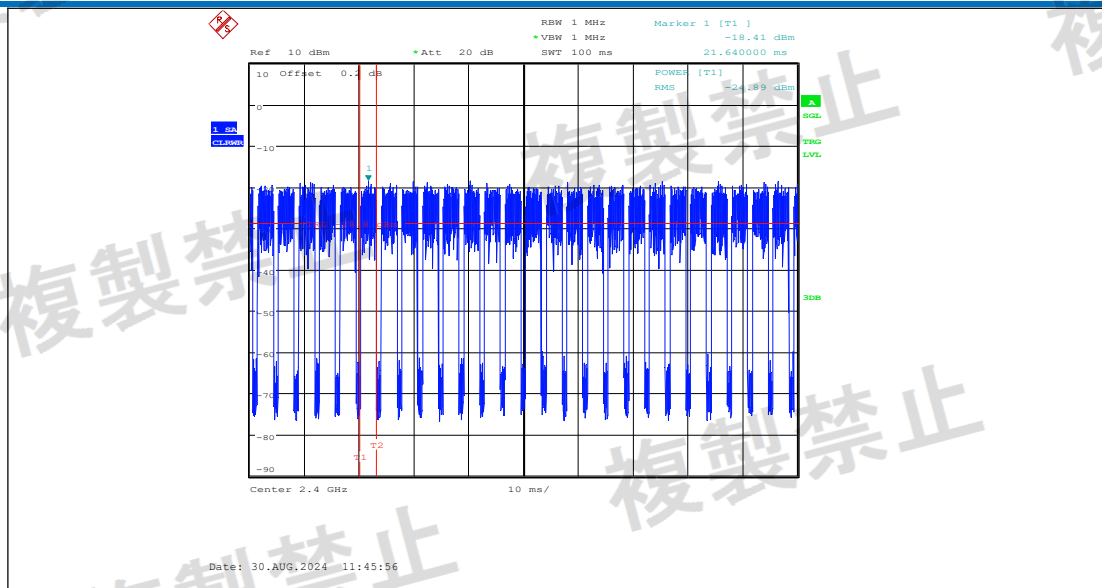
NTNV_3DH5_Ant1_2480_2496.5~13000



Test Result: The unit does meet the requirements.

6.10.4 Test Graphs_Step2

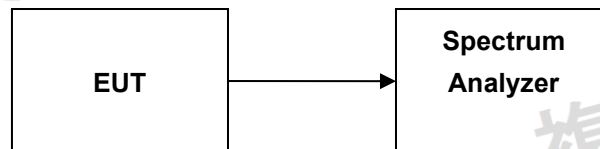




6.11 Dwell Time

Test Requirement:	Item 19 of Article 2-1 less than 0.4sec
Test Method:	MIC Notice No.88 Appendix No.43
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. Modulation/Spread/Hopping ON, Hopping frequency is fixed, Bluetooth equipment is setting DH5 mode

Test Configuration:



Test Procedure:

1. Test Conditions:
Spectrum Analyzer is used for measurement.
2. EUT conditions:
Modulation/Spread/Hopping ON, Hopping frequency is fixed, Bluetooth equipment is setting DH5 mode
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 (fixed hopping frequency)
Span 0 Hz
RBW 1 MHz
VBW 1 MHz
Sweep Time EUT condition
Trigger Video Trigger
Measures the Transmission time of 1 burst (sec)
Measures the Burst cycle (sec)
4. Calculation procedure :
$$\text{Dwell time} = (0.4(\text{s}) \times [\text{spreading rate}] \times [\text{Transmission time of 1 burst}(\text{s})]) / ([\text{burst cycle}(\text{s})] \times [\text{No. of hopping channel}])$$

Note:
* Spreading rate = [Spread bandwidth (actual measurement value)] / [Transmission rate]

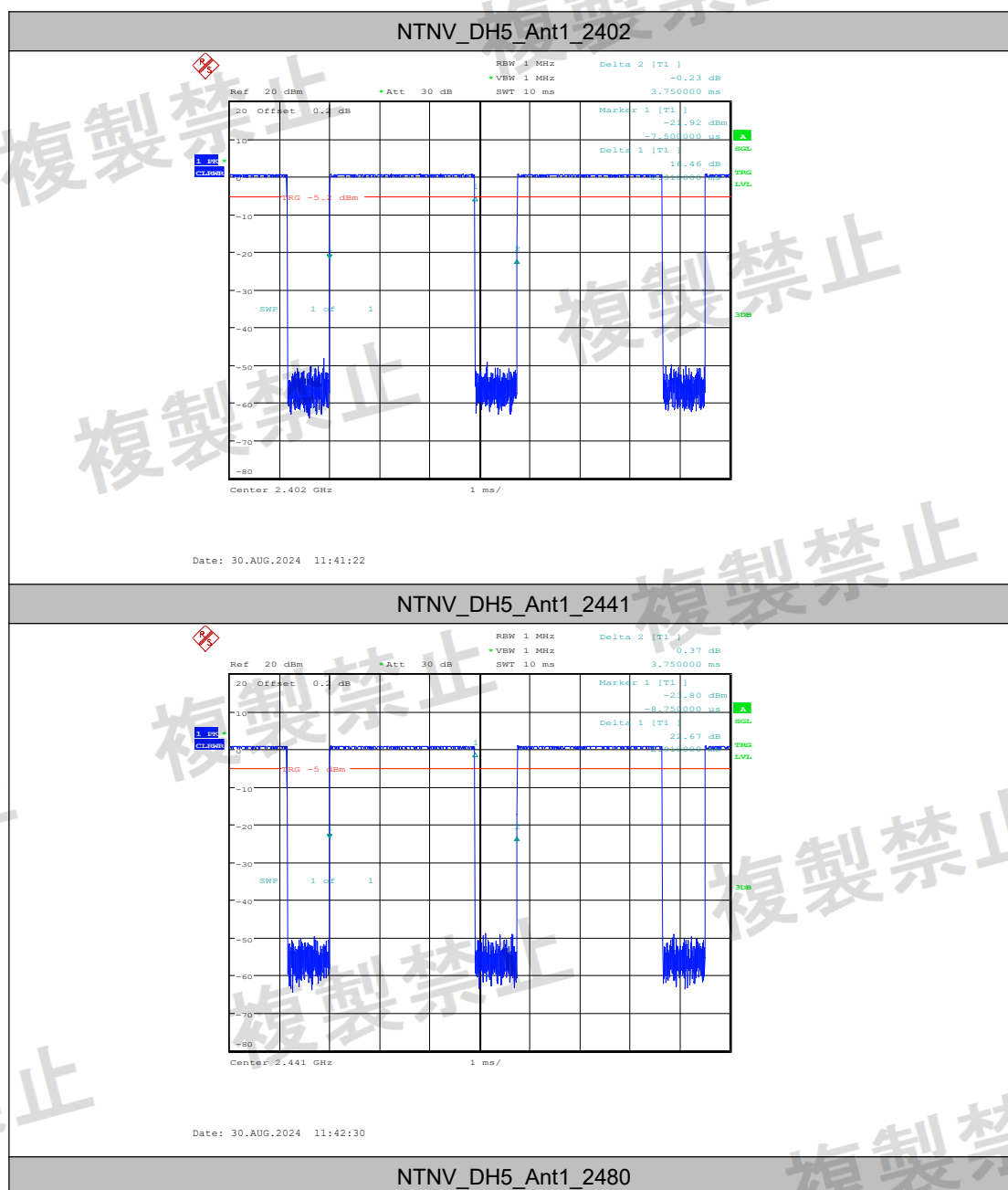
Test Result:

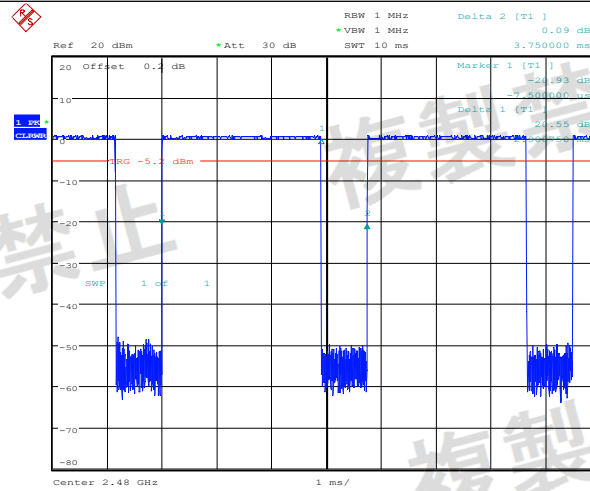
Test Condition	TestMode	Antenna	Channel	BurstWidth [ms]	Period [ms]	Result [s]	Limit [s]	Verdict
NTNV	DH5	Ant1	2402	2.91	3.75	0.28	<0.4	PASS
			2441	2.91	3.75	0.28	<0.4	PASS
			2480	2.91	3.75	0.28	<0.4	PASS
	2DH5	Ant1	2402	2.92	3.75	0.14	<0.4	PASS
			2441	2.92	3.75	0.14	<0.4	PASS
			2480	2.92	3.75	0.14	<0.4	PASS
	3DH5	Ant1	2402	2.92	3.75	0.09	<0.4	PASS
			2441	2.92	3.75	0.09	<0.4	PASS
			2480	2.92	3.75	0.09	<0.4	PASS

Remark: Calculated method: Dwell time = (0.4(s) x [spreading rate] x [Transmission time of 1 burst(s)] / ([burst cycle(s)] x [No. of hopping channel])

Note: Spreading rate = [Spread bandwidth (actual measurement value)] / [Transmission rate]

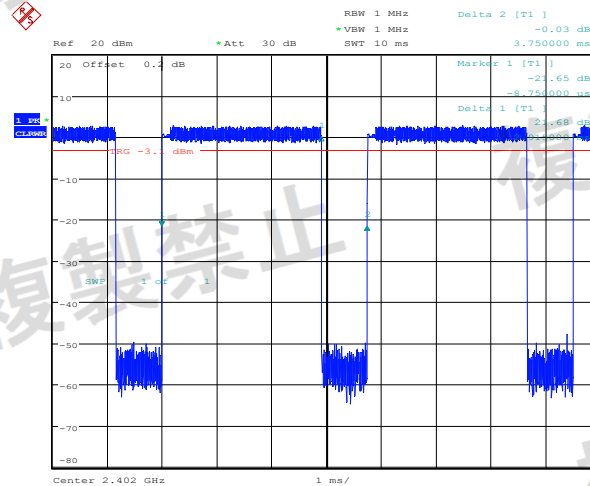
Result plot as follows:





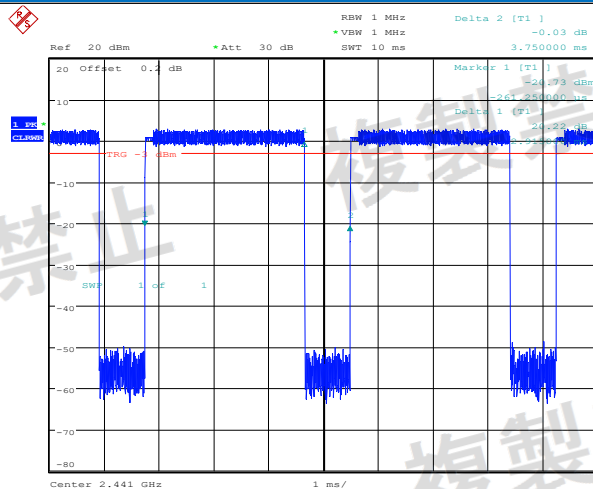
Date: 30.AUG.2024 11:44:23

NTVN_2DH5_Ant1_2402



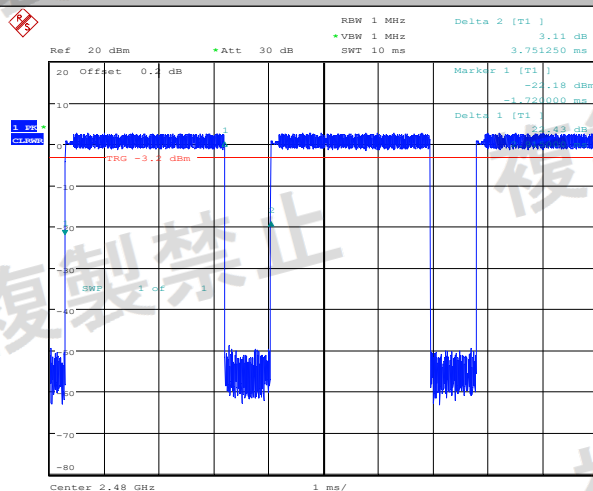
Date: 30.AUG.2024 11:46:29

NTVN_2DH5_Ant1_2441



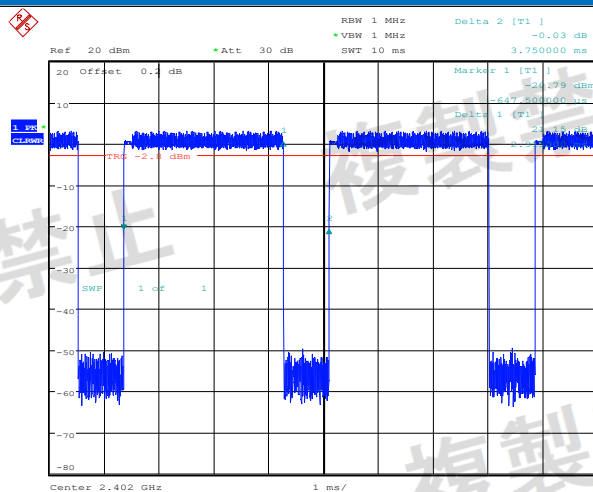
Date: 30.AUG.2024 11:47:33

NTNV_2DH5_Ant1_2480



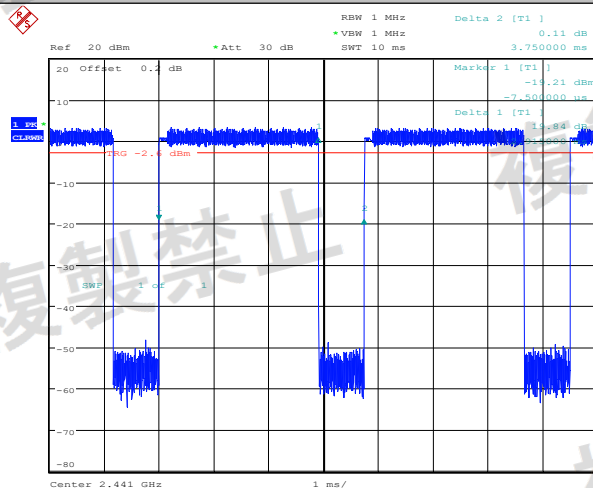
Date: 30.AUG.2024 11:50:15

NTNV_3DH5_Ant1_2402



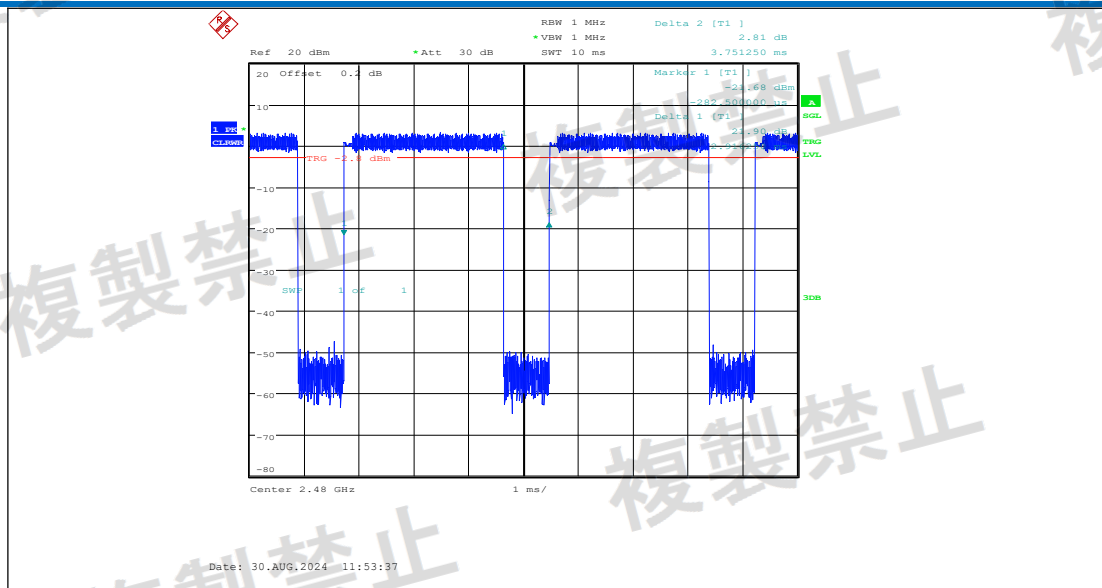
Date: 30.AUG.2024 11:51:22

NTVN_3DH5_Ant1_2441



Date: 30.AUG.2024 11:52:31

NTVN_3DH5_Ant1_2480



Test Result: The unit does meet the requirements.

6.12 RF accessibility

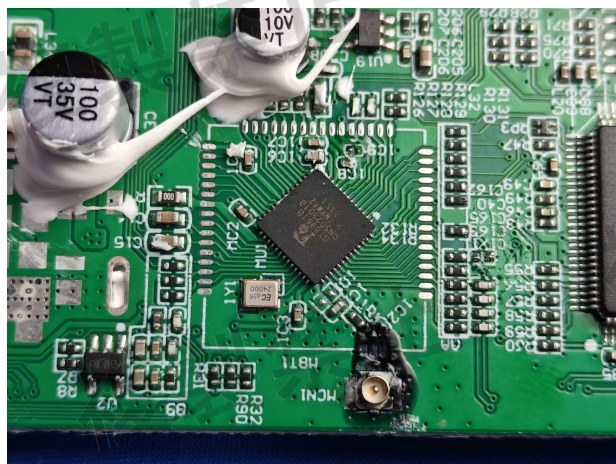
Standard requirement

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.



The method used to meet the "cannot be opened easily" is to use a shielding cover to seal it. Any attempt to modify the RF chip will invalidate the normal operation of the device.

6.13 Spurious Emissions of Rx

Test Requirement:	Item 19 of Article 2-1
Test Method:	MIC Notice No.88 Appendix No.43 (1) Below 1 GHz : 4 nW(-54dBm) or less (2) 1 GHz and over : 20 nW(-47dBm) 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:	



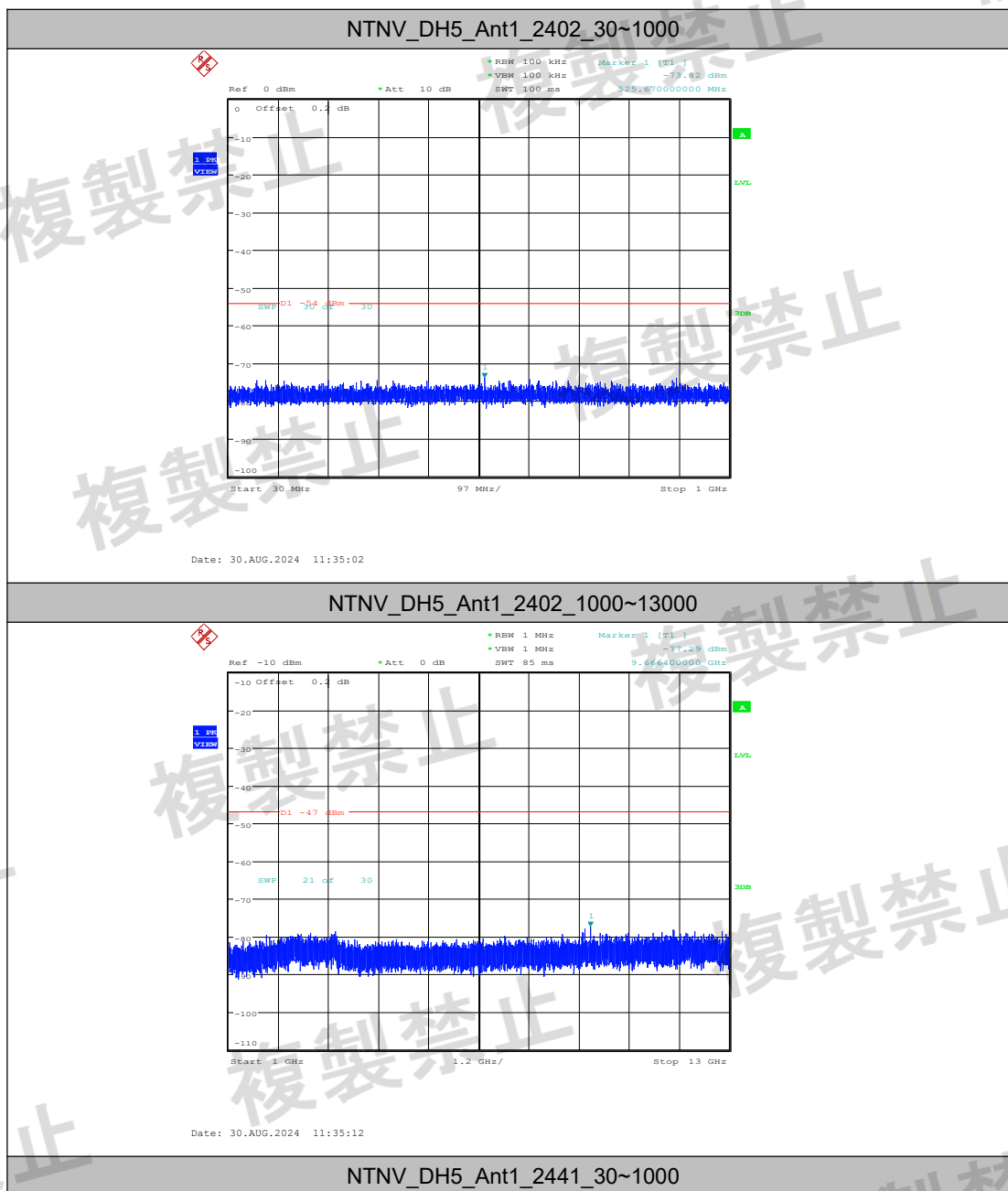
Test Procedure:

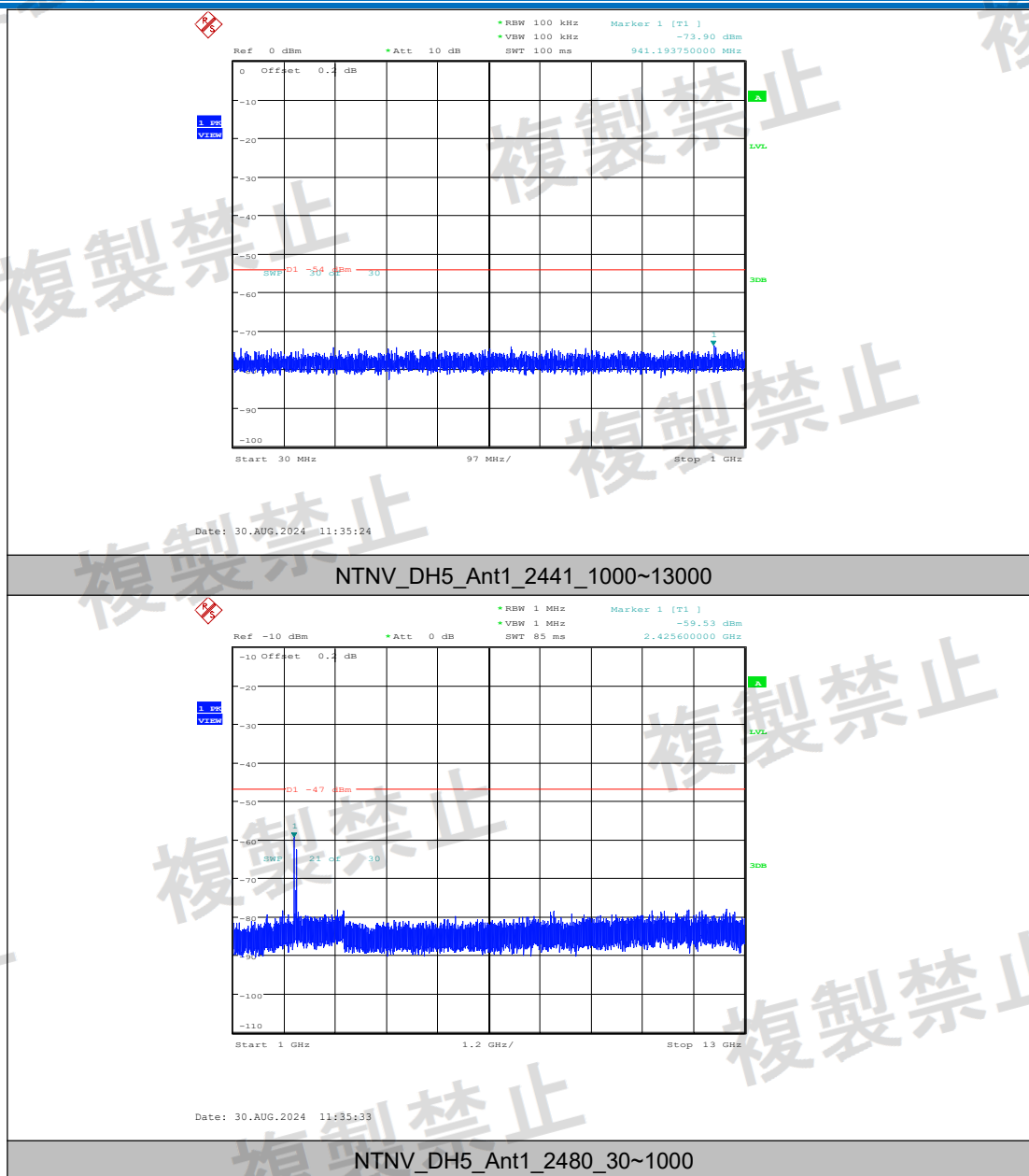
1. Test Conditions:
Spectrum Analyzer is used for measurement.
2. EUT conditions:
Modulation/Spread/Hopping ON
For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:
Step 1
All spurious are measured from 30 MHz 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 – 2400 MHz , 2483.5 MHz –13 GHz
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

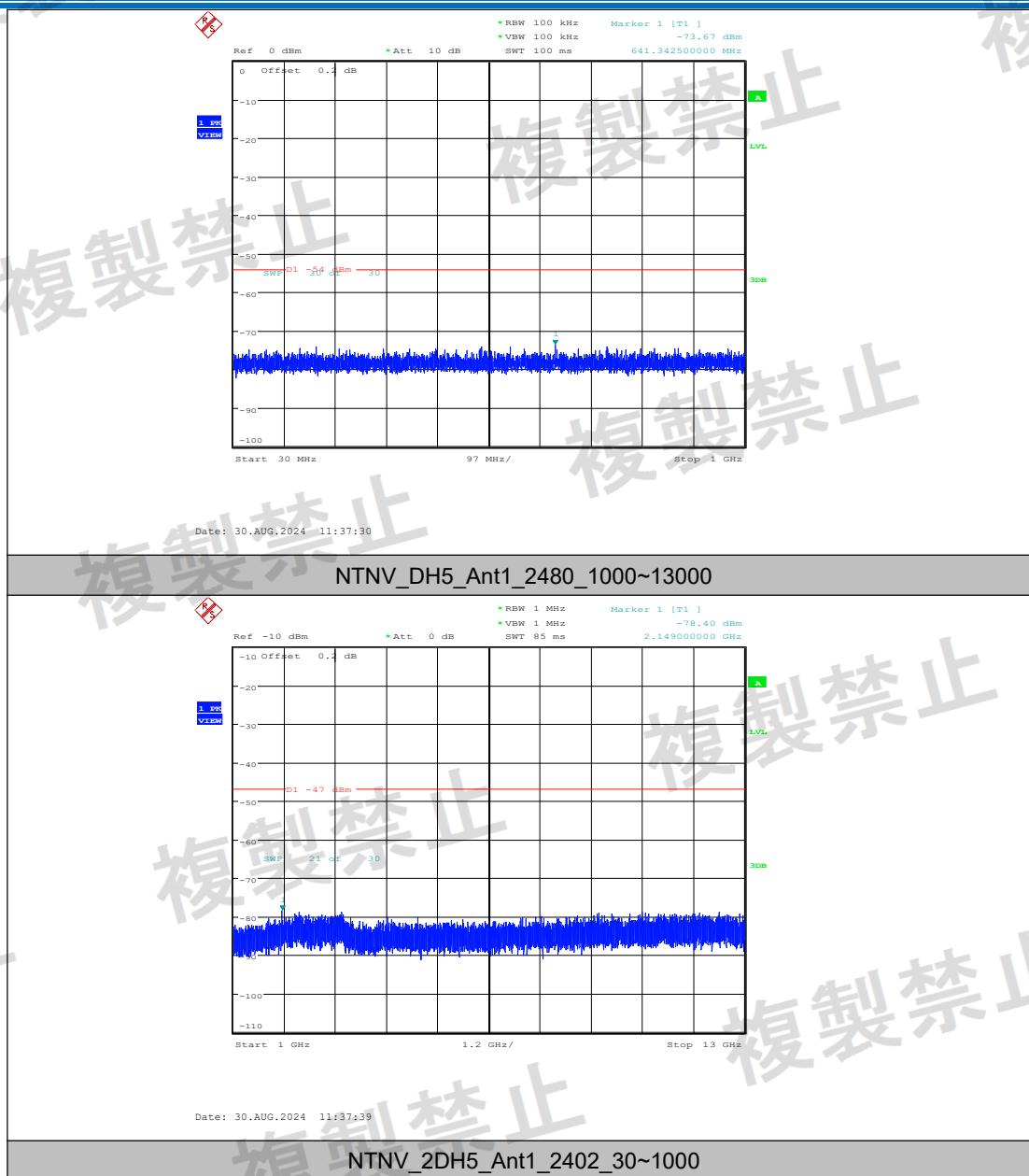
Test Result:

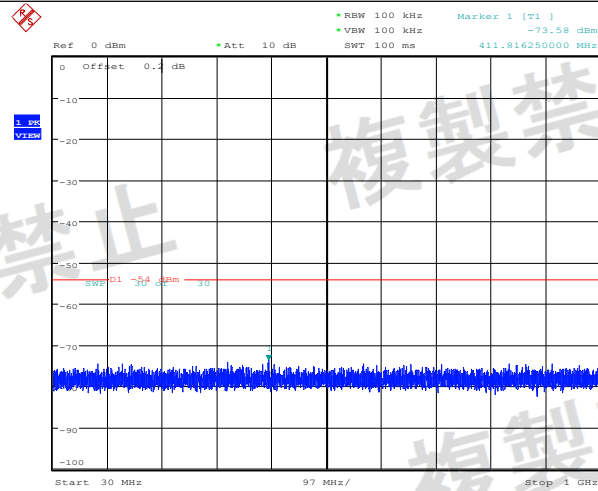
Test Mode	Freq (MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
DH5	2402	30~1000	525.67	-73.82	≤-54	0.04150	≤4	PASS
		1000~13000	9666.40	-77.29	≤-47	0.01866	≤20	PASS
	2441	30~1000	941.19	-73.90	≤-54	0.04074	≤4	PASS
		1000~13000	2425.60	-59.53	≤-47	1.11429	≤20	PASS
	2480	30~1000	641.34	-73.67	≤-54	0.04295	≤4	PASS
		1000~13000	2149.00	-78.40	≤-47	0.01445	≤20	PASS
2DH5	2402	30~1000	411.82	-73.58	≤-54	0.04385	≤4	PASS
		1000~13000	2635.00	-77.65	≤-47	0.01718	≤20	PASS
	2441	30~1000	228.00	-74.08	≤-54	0.03908	≤4	PASS
		1000~13000	2626.00	-77.99	≤-47	0.01589	≤20	PASS
	2480	30~1000	611.76	-73.93	≤-54	0.04046	≤4	PASS
		1000~13000	3585.40	-78.20	≤-47	0.01514	≤20	PASS
3DH5	2402	30~1000	153.55	-73.55	≤-54	0.04416	≤4	PASS
		1000~13000	2401.60	-74.94	≤-47	0.03206	≤20	PASS
	2441	30~1000	169.44	-73.96	≤-54	0.04018	≤4	PASS
		1000~13000	3026.20	-77.63	≤-47	0.01726	≤20	PASS
	2480	30~1000	929.80	-73.83	≤-54	0.04140	≤4	PASS
		1000~13000	2401.60	-61.78	≤-47	0.66374	≤20	PASS

6.13.1 Test Graphs



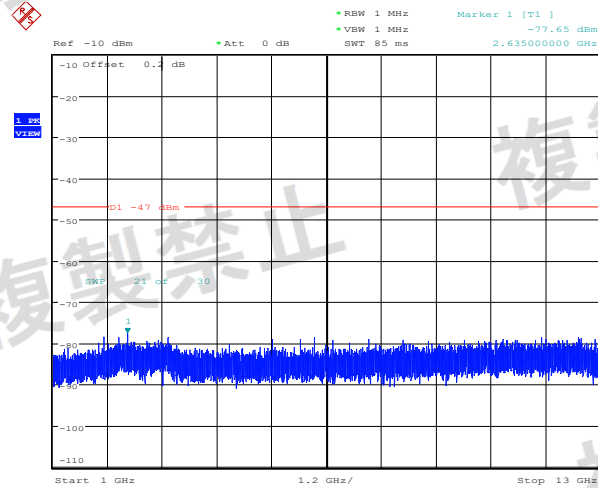






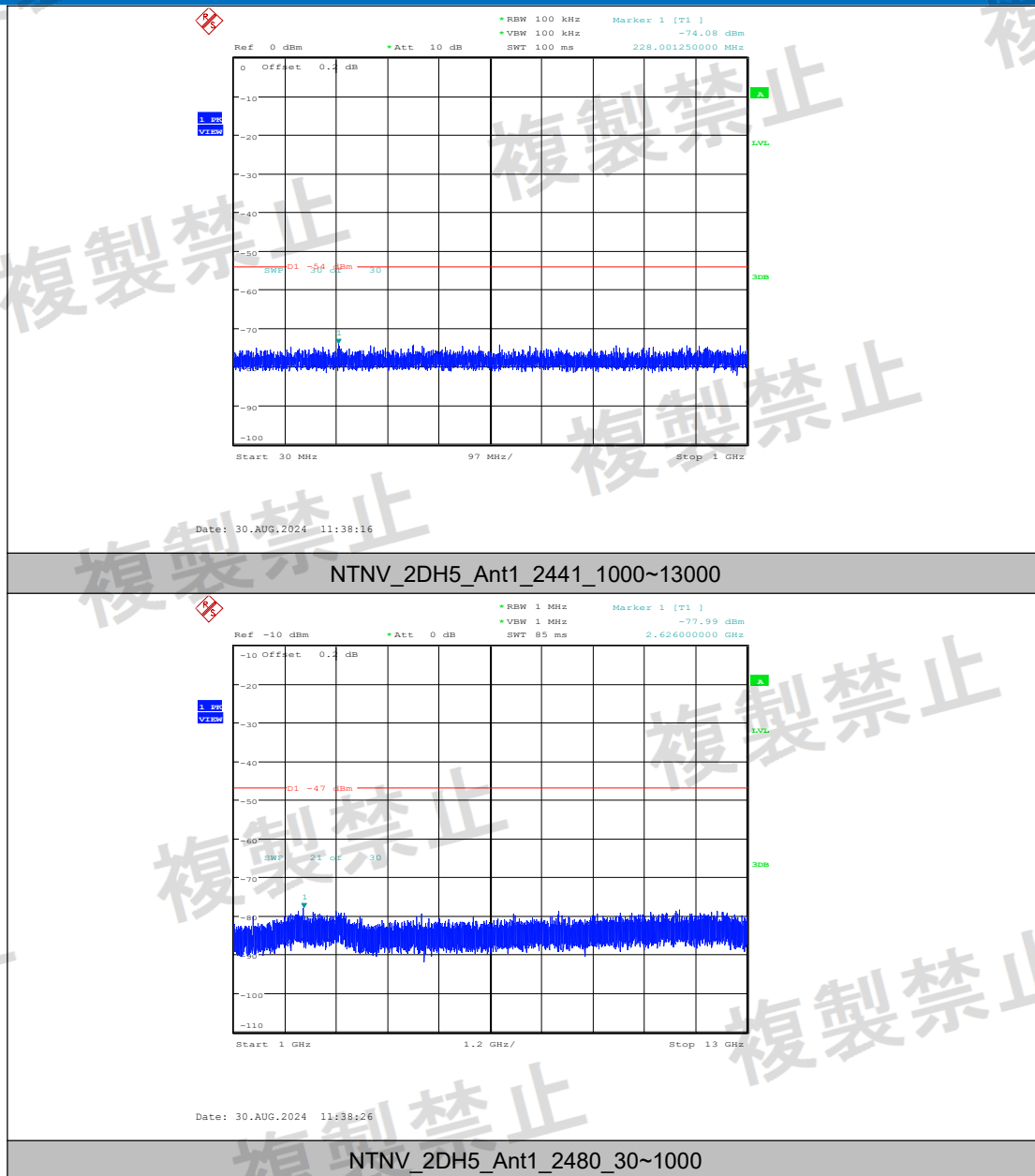
Date: 30.AUG.2024 11:37:55

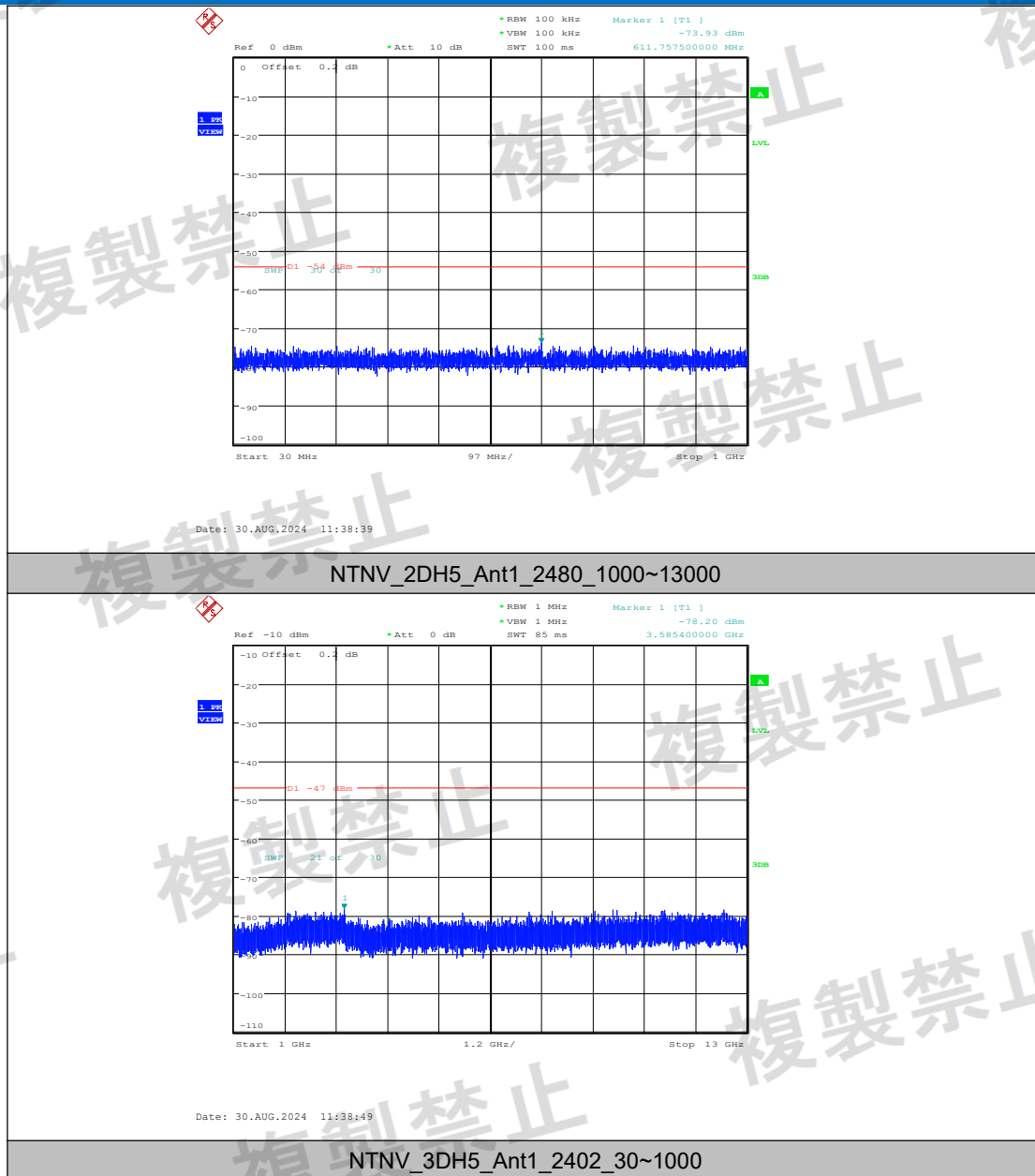
NTVN_2DH5_Ant1_2402_1000~13000

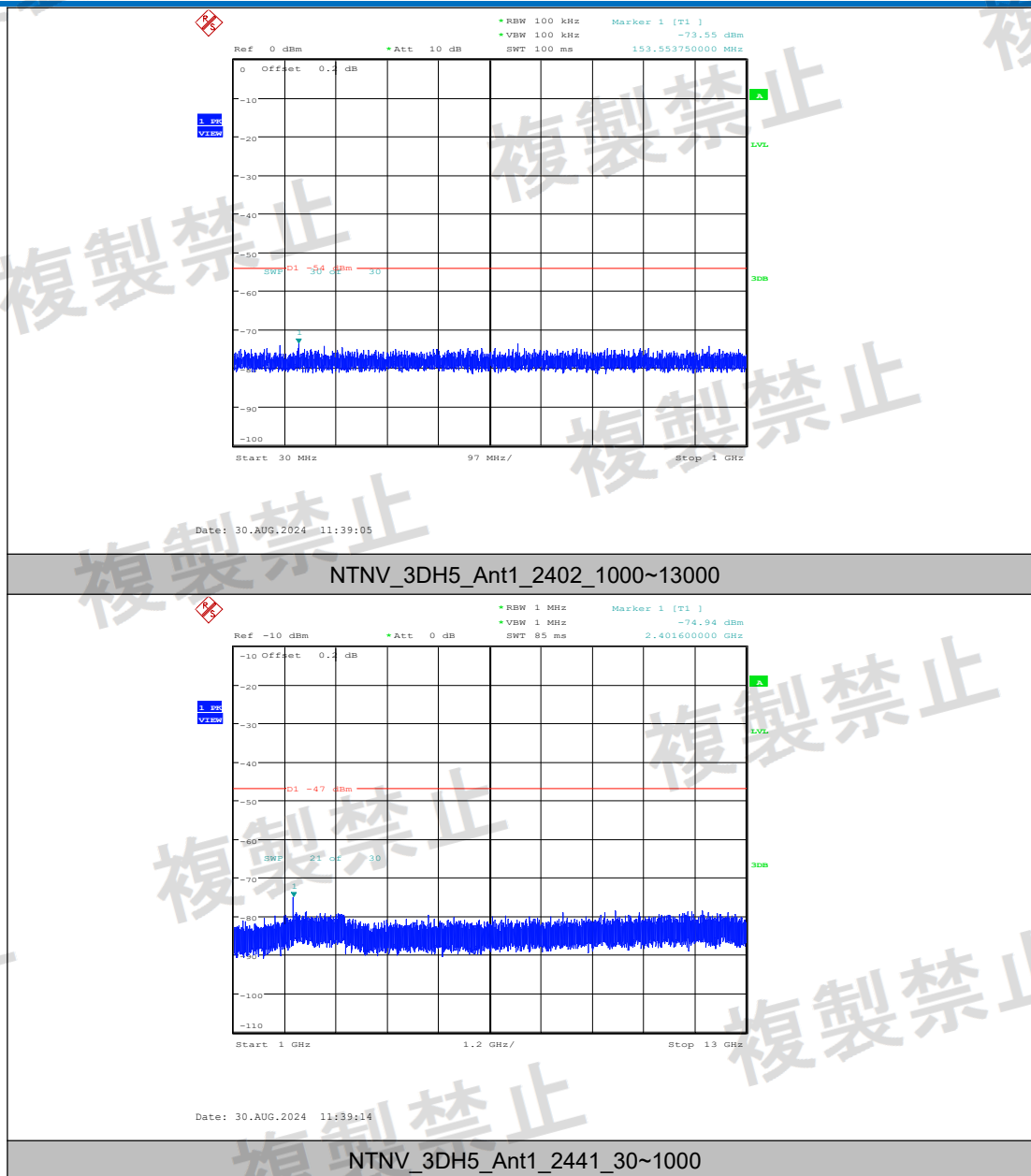


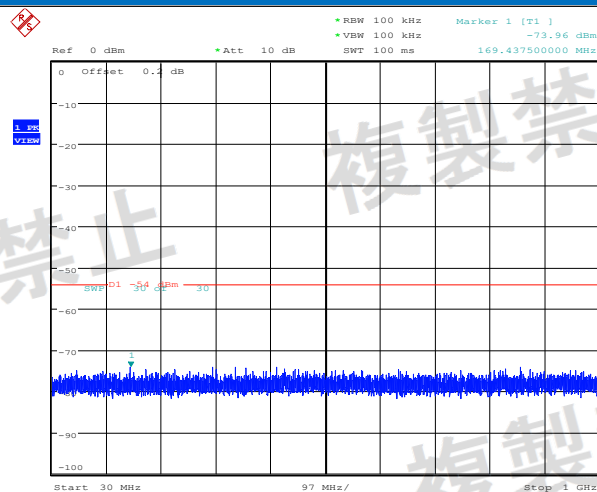
Date: 30.AUG.2024 11:38:05

NTVN_2DH5_Ant1_2441_30~1000



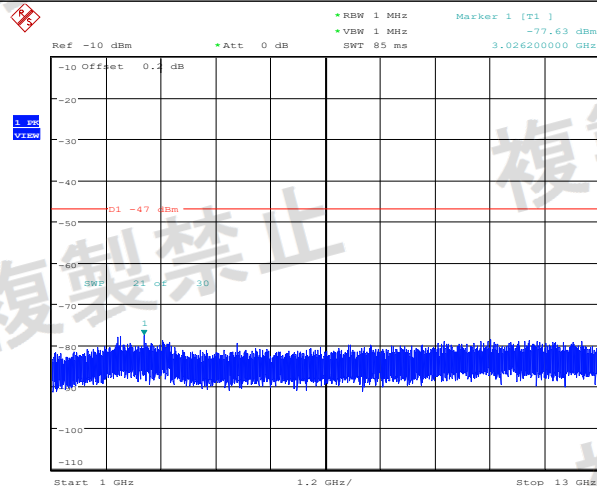






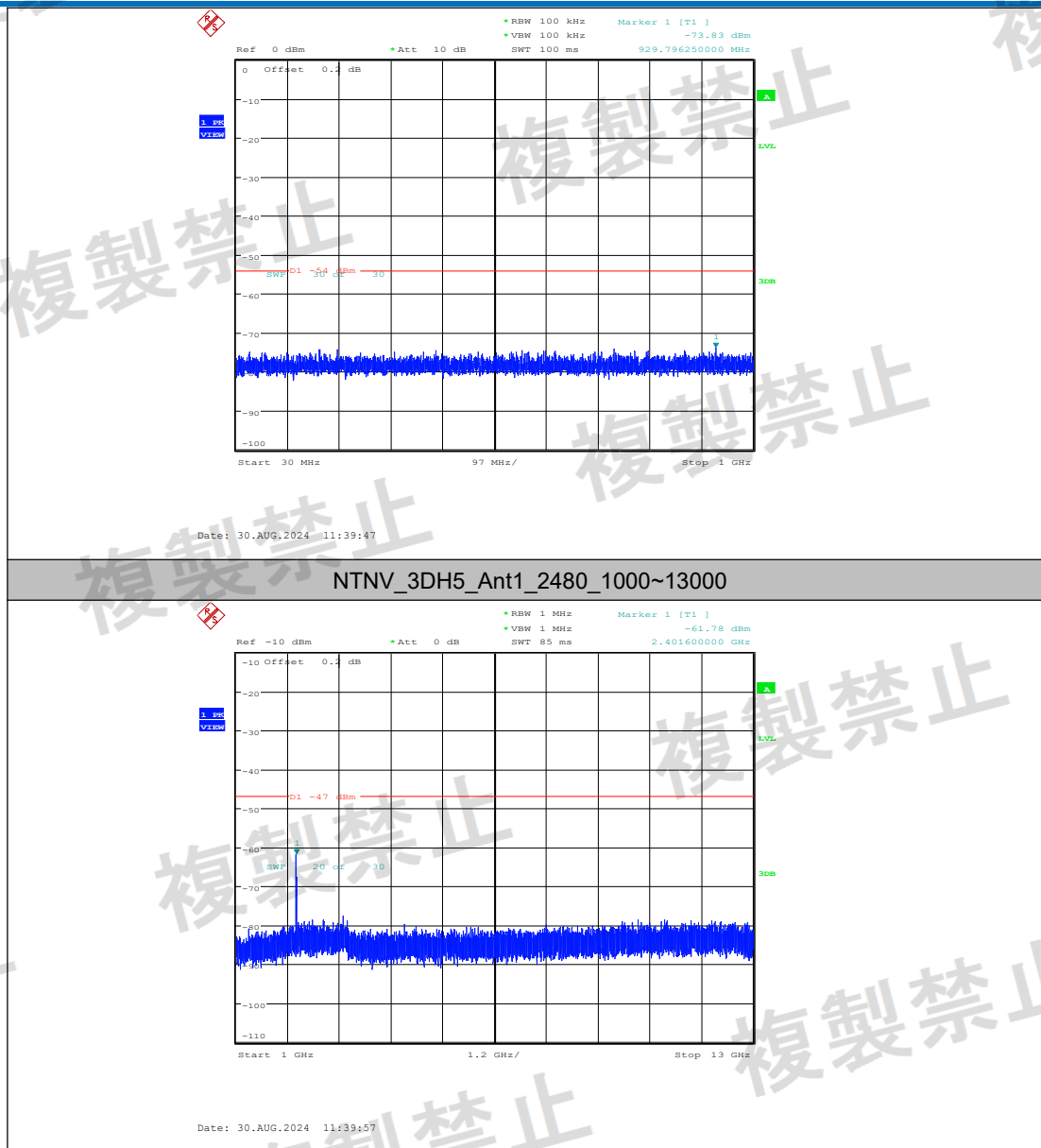
Date: 30.AUG.2024 11:39:25

NTNV_3DH5_Ant1_2441_1000~13000



Date: 30.AUG.2024 11:39:35

NTNV_3DH5_Ant1_2480_30~1000



7 Photographs

7.1 Test Setup



8 Photographs - EUT Constructional Details

Refer to Photographs - EUT Constructional Details OF EUT for CQASZ20260601217E-01.

*** END OF REPORT ***