

TEST REPORT

Product Name: Portable Radio

Trade Mark:

PHILIPS or



Model No.: TAV2000FB

Add. Model No.: TAV2000FB/98, TAV2000FB/00,
TAV2000FB/61, TAV2000FB/79,
TAV2000FB/10, TAV2000FB/12,
TAV2000FB/11

Report Number: 26010821788RFC-1

Specified Categories: Item 19 of Article 2 Paragraph 1

Standard: MIC Notification No. 88 Appendix No.43

Test Result: PASS

Date of Issue: March 5, 2026

Prepared for:

MMD Hong Kong Holding Limited

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UTTR-RF-STDT66-V1.1

Version

Version No.	Date	Description
V1.0	March 5, 2026	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	MMD Hong Kong Holding Limited
Address of Applicant:	Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon,Hong Kong
Manufacturer:	MMD Hong Kong Holding Limited
Address of Manufacturer:	Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon,Hong Kong

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Portable Radio	
Model No.:	TAV2000FB	
Add. Model No.:	TAV2000FB/98, TAV2000FB/00, TAV2000FB/61, TAV2000FB/79, TAV2000FB/10, TAV2000FB/12, TAV2000FB/11	
Trade Mark:	PHILIPS OR 	
DUT Stage:	Identical Prototype	
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	Bluetooth V5.4
Software Version:	REV1.0 (Provided by the customer)	
Hardware Version:	REV1.0 (Provided by the customer)	
Sample Received Date:	January 6, 2026	
Sample Tested Date:	January 20, 2026 to January 26, 2026	
Note: The additional model TAV2000FB/98, TAV2000FB/00, TAV2000FB/61, TAV2000FB/79, TAV2000FB/10, TAV2000FB/12, TAV2000FB/11 is identical with the test model TAV2000FB except the product colour and model number for marketing purpose.		

Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.

1.2.2 Description of Accessories

Battery	
Model No.:	TACR5001BA
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.65 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	2600 mAh

Cable	
Description:	USB Cable
Cable Type:	Unshielded without ferrite
Length:	1.1 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Module:	AB5301C
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Radio Technique:	Bluetooth BR + EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79 (Please see NOTE 1)
Channel Separation:	1 MHz
RF Output Power:	Please see NOTE 2
Antenna Type: (Provided by the customer)	PCB Antenna
Antenna Gain: (Provided by the customer)	3.63 dBi
Test Voltage:	Please see NOTE 3

NOTE:

1. Operation frequency each of channel

Operation Frequency Each of Channel	
$f = 2402 + k \text{ MHz}, k = 0, \dots, 78$	
Note:	
f	is the operating frequency (MHz);
k	is the operating channel.

2. The RF output power as below table:

	Rated output power density (mW/MHz)	Conducted RF output power density (mW/MHz)	Radiated RF output power density (mW/MHz)
GFSK	0.02	0.0191	0.0440
$\pi/4$ DQPSK	0.02	0.0182	0.0420
8DPSK	0.02	0.0183	0.0421

3. Test voltage as below table:

	Normal Voltage	Low Extreme Voltage	High Extreme Voltage
Operating Voltage (V)	5 V	4.5 V	5.5 V
Measuring Voltage (V)	3.3 V	3.31 V	3.3 V
Tolerance (%)	--	0.3 %	0 %

When EUT be operated at $\pm 10\%$ from the normal supply voltage, the supply voltage of RF part was varied within $\pm 1\%$. All test cases were done under the normal supply voltage.

1.4 OTHER INFORMATION

Modulation Configure			
Modulation	Packet	Packet Type	Packet Size
GFSK	1-DH1	4	27
	1-DH3	11	183
	1-DH5	15	339
$\pi/4$ DQPSK	2-DH1	20	54
	2-DH3	26	367
	2-DH5	30	679
8DPSK	3-DH1	24	83
	3-DH3	27	552
	3-DH5	31	1021

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

Item 19 of Article 2 Paragraph 1,
MIC Notification No. 88 Appendix No.43

All test items have been performed and recorded as per the above standards

1.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Latitude 3400	16238087894	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.1 Meter	Applicant

1.7 TEST LOCATION

All tests were performed at:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

Telephone: +86 (0) 755 2823 0888

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1.8 TEST FACILITY

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.9 DEVIATION FROM STANDARDS

None.

1.10 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.11 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.12 MEASUREMENT UNCERTAINTY

No.	Item	Measurement Uncertainty
1	Radio frequency	$\pm 6.5 \times 10^{-8}$
2	Occupied Channel Bandwidth	$\pm 1.86 \%$
3	RF output power, conducted	$\pm 0.68 \text{ dB}$
4	Power Spectral Density	$\pm 0.6 \text{ dB}$
5	Spurious emissions, conducted	$\pm 2.7 \text{ dB}$
6	Supply voltages	$\pm 0.68 \%$
7	Time	$\pm 0.19 \%$
Remark: 95% Confidence Levels, k=2.		

2. TEST SUMMARY

Item	Notice 88 Appendix 43 Reference	ARIB STD-T66 Reference	Report reference	Result
GENERAL PROVISIONS				
Frequency Tolerance	C	3.2 (4)	5.3	PASS
Occupied bandwidth	D	3.2 (7)	5.4	PASS
Spurious emissions	E	3.2 (6)	5.6	PASS
TRANSMITTING EQUIPMENT				
Antenna power	F	3.2 (1)	5.7	PASS
SAR	--	--	--	N/A
TRANSMITTING ANTENNA				
Type, configuration, etc. of transmitting antenna	--	--	1.3, 5.2	PASS
Direction pattern of transmitting antenna	--	--	5.2	PASS
RECEIVING EQUIPMENT				
Spurious emissions of receiver	H	3.3 (1)	5.8	PASS
Refer to all articles for transmitting antenna	--	--	5.2	PASS
OPERATING FREQUENCY 2402 TO 2480MHZ				
High Frequency/modulation section cannot be opened easily	--	3.7 (1)	5.11	PASS
Communication method	--	3.1 (1)	1.3	PASS
Modulation method	--	3.2 (1)a	1.3	PASS
Spread spectrum method	--	3.2 (1)a	5.5	Only for reported
Antenna power	--	3.2 (2)	5.7	PASS
Absolute gain of transmitting antenna	--	3.6 (2)	5.7	PASS
Angular width of principal radiation (AWPR)	--	3.6 (2)	5.7	PASS
Number of carriers within 1 MHz bandwidth in OFDM	--	3.2 (10)	--	N/A
Diffusion bandwidth	--	3.2 (8)	5.5	PASS
Spreading factor	--	3.2 (9)	5.5	Only for reported
Frequency retention time (FH employed)	--	3.2 (11)	5.9	PASS
Interference Prevention Function	--	3.4.1 (1)	5.10	PASS
Note:				
1) N/A: In this whole report not applicable.				
Disclaimer and Explanations:				
The declared of product specification and data (e.g., antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.				

3. EQUIPMENT LIST

Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	24-Oct-2025	23-Oct-2026
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	24-Oct-2025	23-Oct-2026
☒	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	24-Oct-2025	23-Oct-2026
☐	Wideband Radio Communication Tester	R&S	CMW500	120932	28-Mar-2025	27-Mar-2026
☒	Digital multimeter	FLUKE	15B MAX-01/CN	65041218WS	03-Nov-2025	02-Nov-2026

Note 1: Calibration Method

- Calibration conducted by the National Institute of Information and Communications Technology [NICT](#) or a designated calibration agency under Article 102-18 paragraph
- Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)
- Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the [NICT](#) or a designated calibration agency under Article 102-18 paragraph
- 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

The all calibration corresponds to c) described above.

Note 2: Calibration information

Calibration Agency: Guangzhou LiSai Metrology & Test Co., Ltd.

Address: No.8, South Street Shi Ji Institute Guangzhou, Guangdong, China

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	5	20 to 75
NT/LV		4.5	
NT/HV		5.5	
Remark: 1) NV: Normal Voltage; NT: Normal Temperature; 2) LV: Low Extreme Test Voltage; HV: High Extreme Test Voltage. 3) The operating voltage range of this device declared by client is 4.5V to 5.5 V.			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Frequency Tolerance	20.4	44.6	100.7	S202601067499-ZJA02/2	David Du
Occupied bandwidth & Spreading bandwidth					
Spurious emissions					
Antenna power					
Spurious emissions of receiver					
Dwell Time					

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
π /4DQPSK (2DH1, 2DH3, 2DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
8DPSK (3DH1, 3DH3, 3DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz

4.3 EUT TEST STATUS

Type of Modulation	Tx/Rx Function	Description
GFSK/ π /4DQPSK/ 8DPSK	1Tx/1Rx	<ol style="list-style-type: none"> 1. Keep the EUT in continuously transmitting with modulation or un-modulation test single. 2. Keep the EUT in continuously receiving. 3. Keep the EUT in continuously transmitting with modulation test Hopping Frequency.

Power Setting (Provided by the customer)

7

Test Software (Provided by the customer)

BT_Tool, 1.1.2

4.4 PRE-SCAN

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

4.4.1 Worst-case data packets

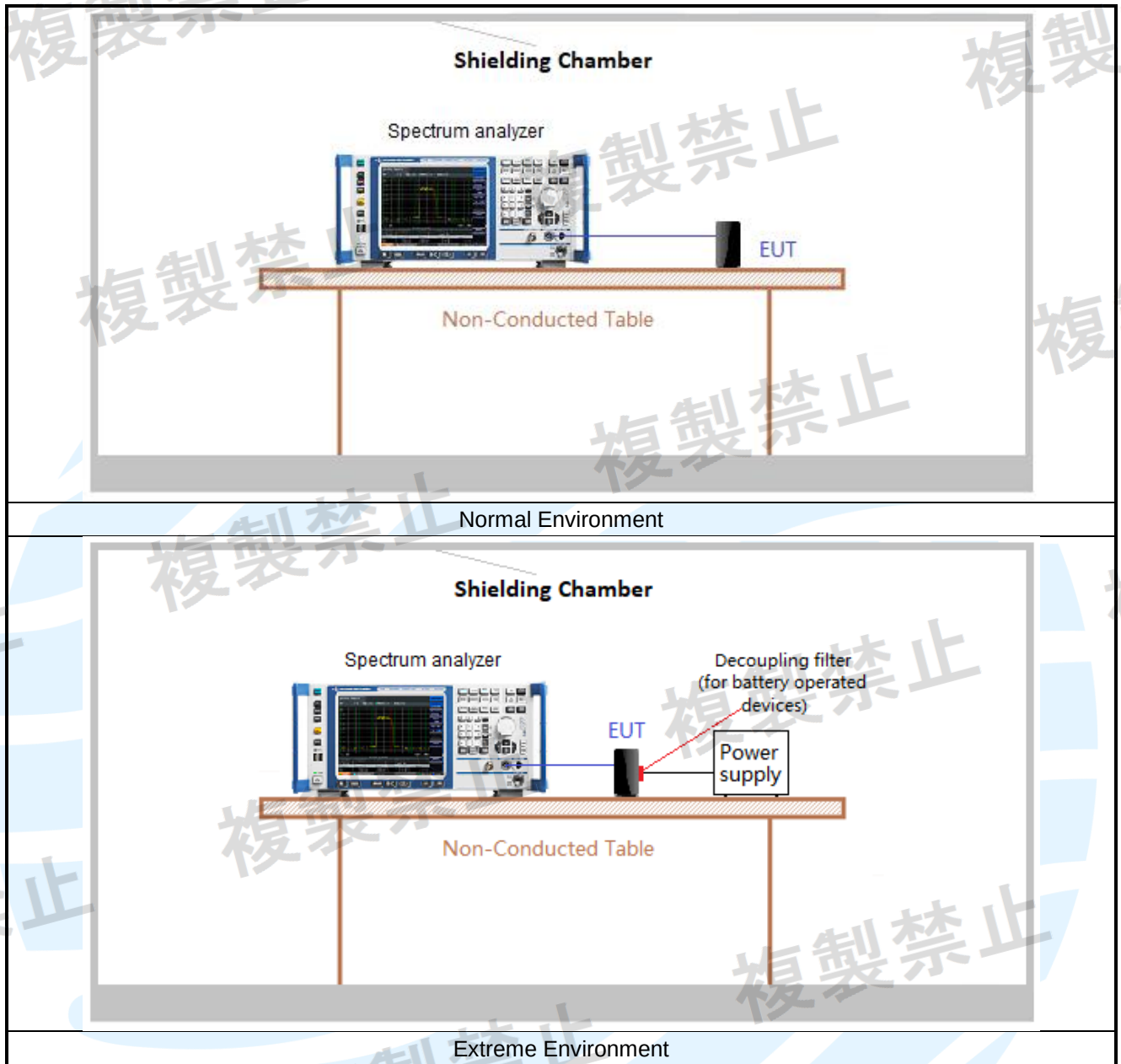
Type of Modulation	Worst-case data rates
GFSK	DH5
π /4DQPSK	2DH5
8DPSK	3DH5

4.4.2 Tested channel detail

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

Type of Modulation	GFSK			π /4DQPSK			8DPSK		
Data Packets	DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
Available Channel	0 to 78								
Test Item	Test channel and choose of data packets								
Frequency Tolerance	Unmodulation or modulation mode Channel 0 & 39 & 78								
	☐	☐	☒	☐	☐	☒	☐	☐	☒
Antenna power	Frequency Hopping Channel 0 to 78								
	☒	☒	☒	☒	☒	☒	☒	☒	☒
Occupied bandwidth & Spreading bandwidth	Channel 0 & 39 & 78								
	☐	☐	☒	☐	☐	☒	☐	☐	☒
Spurious emissions	Channel 0 & 39 & 78								
	☐	☐	☒	☐	☐	☒	☐	☐	☒
Spurious emissions of receiver	Channel 0 & 39 & 78								
	☐	☐	☒	☐	☐	☒	☐	☐	☒
Dwell Time	Channel 39								
	☒	☒	☒	☒	☒	☒	☒	☒	☒
Remark: 1. The mark "☑" means is chosen for testing; 2. The mark "☐" means is not chosen for testing									

4.5 TEST SETUP



5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

Item 19 of Article 2 Paragraph 1: Low power data communications system in the 2.4GHz band

ARIB STD-T66 Version 3.7: Second generation low power data communication system/ wireless LAN system

MIC Notification No. 88 Appendix No.43 (2004) of the Ordinance Concerning Technical Regulations
Conformity Certification of Specified Radio Equipment

5.2 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 antenna is installed inside the EUT and no consideration of replacement. The best-case gain of the antenna is 3.63 dBi, for more antenna details, refer to the antenna report.

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



5.3 FREQUENCY TOLERANCE

5.3.1 Limit

Tolerance of frequency shall be +/- 50ppm.

5.3.2 Test Setup

Refer to section 4.5 for details.

5.3.3 Instruments Used

Refer to section 3 for details

5.3.4 Test Procedures

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

1. Center Frequency = test frequency
2. RBW = 10kHz, VBW = 10kHz;
3. Sweep = auto;
4. Detector function = peak
5. Trace = max hold
6. The frequency tolerance test case is directly measured using spectrum analyzer. Then the frequency error formula is $(f-f_c)/f_c \times 10^6$ ppm and the limit is less than ± 50 ppm.

5.3.5 Test Result

Please refer to Appendix A

5.4 OCCUPIED BANDWIDTH (99% BW)

5.4.1 Limit

Occupied bandwidth shall be 83.5MHz or less.

5.4.2 Test Setup

Refer to section 4.5 for details.

5.4.3 Instruments Used

Refer to section 3 for details

5.4.4 Test Procedures

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

1. Center Frequency = 2442 MHz
2. Span = 200MHz
3. RBW = 300kHz, VBW = 300kHz;
4. Sweep = auto;
5. Trace = max hold
6. Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

5.4.5 Test Result

Please refer to Appendix A

5.5 SPREADING BANDWIDTH (90% BW)

5.5.1 Limit

None.

5.5.2 Test Setup

Refer to section 4.5 for details.

5.5.3 Instruments Used

Refer to section 3 for details

5.5.4 Test Procedures

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

1. Center Frequency = 2442 MHz
2. Span = 200MHz
3. RBW = 300kHz, VBW = 300kHz;
4. Sweep = auto;
5. Trace = max hold
6. Use the 90 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

5.5.5 Test Result

Please refer to Appendix A

5.6 SPURIOUS EMISSIONS

5.6.1 Limit

Frequency (MHz)	Limit	
	uW/MHz	dBm/MHz
Operating frequency 2400 to 2483.5MHz		
$2387 \leq f < 2400$	≤ 25	-16
$2483.5 < f \leq 2496.5$	≤ 25	-16
All other frequencies	≤ 2.5	-26

5.6.2 Test Setup

Refer to section 4.5 for details.

5.6.3 Instruments Used

Refer to section 3 for details

5.6.4 Test Procedures

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

1. Set RBW = 1 MHz, VBW = 3 MHz
2. Detector = peak.
3. Sweep = auto couple.
4. Trace Mode = max hold.
5. Allow trace to fully stabilize.
6. Use the peak marker function to determine the maximum amplitude level.

5.6.5 Test Result

Please refer to Appendix A

5.7 ANTENNA POWER

5.7.1 Limit

Antenna power	EIRP (max)	
	Omni-directional case	Directional case
3mW/MHz or less	6.91 dBm/MHz	16.91 dBm/MHz
	4.91 mW/MHz	49.09 mW/MHz

Tolerance of antenna power shall be +20% (upper value) and -80% (lower value).

5.7.2 Test Setup

Refer to section 4.5 for details.

5.7.3 Instruments Used

Refer to section 3 for details

5.7.4 Test Procedures

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. EUT have transmitted continuous maximum power on hopping mode (For FHSS Device).
3. Frequency hopping system or combined systems of direct spread and frequency hopping:
 - a) Connect the high frequency power meter to the output of the antenna and measure the total power (without bandwidth limitation)
 - b) Divide the total power by the spread bandwidth to find the “average” power per MHz. The average power per MHz is equal to the power meter value dBm + cable loss dB + $10 \log_{10} (1/\text{Duty Cycle})$ dB + $10 \log_{10} (1/\text{Spread Bandwidth})$ dB.
 - c) Confirm that frequency distribution of the hopping frequencies is homogeneous according to the supporting data.
If frequency distribution of the frequencies is not homogeneous, consider other measurement or correction methods based on the supporting data.
 - d) Antenna RF Output Power Tolerance is definition that actual measure antenna power tolerance between + 20% to - 80% power range that manufacturer declare the conducted power density

5.7.5 Test Result

Normal mode _ Conducted antenna power

Test Voltage	Modulation	Channel / Frequency (MHz)	Antenna power	Antenna power density	Tolerance (%)	Rated power (mW/MHz)	Conclusion
			(dBm)	(mW/MHz)			
NV	GFSK_DH5	0/2402	1.300	0.0191	-4.57	0.02 (-80%~+20%)	PASS
		39/2441	-0.120	0.0138	-31.18		PASS
		79/2480	-1.440	0.0102	-49.22		PASS
	π/4DQPSK_2DH5	0/2402	1.100	0.0182	-8.94	0.02 (-80%~+20%)	PASS
		39/2441	-0.300	0.0132	-34.03		PASS
		79/2480	-1.630	0.0097	-51.43		PASS
	8DPSK_3DH5	0/2402	1.110	0.0183	-8.71	0.02 (-80%~+20%)	PASS
		39/2441	-0.310	0.0132	-34.17		PASS
		79/2480	-1.640	0.0097	-51.53		PASS

Note: Antenna power density = Antenna power / Spread-Spectrum

Normal mode _ Radiated antenna power (EIRP)

Test Voltage	Modulation	Channel / Frequency (MHz)	Antenna Gain (dBi)	Radiated RF output power density	
				(mW/MHz)	(dBm/MHz)
NV	GFSK_DH5	0/2402	3.63	0.0440	-13.57
		39/2441		0.0317	-14.99
		79/2480		0.0234	-16.31
	π/4DQPSK_2DH5	0/2402		0.0420	-13.77
		39/2441		0.0304	-15.17
		79/2480		0.0224	-16.50
	8DPSK_3DH5	0/2402		0.0421	-13.76
		39/2441		0.0304	-15.17
		79/2480		0.0224	-16.50

Note: 1. The maximum EIRP is calculated from max output power and antenna gain, the antenna gain provided by the customer, and the customer takes all the responsibilities for the accuracy of antenna gain.
2. The EIRP is less than Limit, HBPA is not necessary.

5.8 SPURIOUS EMISSIONS OF RECEIVER

5.8.1 Limit

Frequency (MHz)	Limit	
	nW	dBm
Below 1GHz	≤ 4	-54
Above 1GHz	≤ 20	-47

5.8.2 Test Setup

Refer to section 4.5 for details.

5.8.3 Instruments Used

Refer to section 3 for details

5.8.4 Test Procedures

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

- a) Below 1GHz
 1. Set RBW = 100 kHz, VBW = 300 kHz
 2. Detector = peak.
 3. Sweep = auto couple.
 4. Trace Mode = max hold.
 5. Allow trace to fully stabilize.
 6. Use the peak marker function to determine the maximum amplitude level.
- b) Above 1GHz
 7. Set RBW = 1 MHz, VBW = 3 MHz
 8. Detector = peak.
 9. Sweep = auto couple.
 10. Trace Mode = max hold.
 11. Allow trace to fully stabilize.
 12. Use the peak marker function to determine the maximum amplitude level.

5.8.5 Test Result

Please refer to Appendix A

5.9 DWELL TIME

5.9.1 Limit

The frequency retention time in the frequency hopping method shall be 0.4 second or less. The total sum of the frequency retention time in any frequency within the time obtained by multiplying the diffusion rate by 0.4 second shall be 0.4 second or shorter.

5.9.2 Test Setup

Refer to section 4.5 for details.

5.9.3 Instruments Used

Refer to section 3 for details

5.9.4 Test Procedures

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

- a) Span = zero span, centered on a hopping channel
- b) RBW = 1 MHz, RBW = 1 MHz
- c) Sweep = As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- d) Detector function = peak
- e) Trace = max hold
- f) Use the marker-delta function to determine the dwell time

5.9.5 Test Result

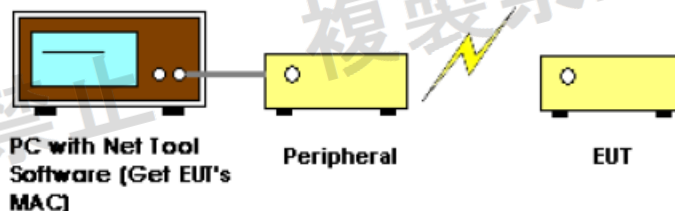
Please refer to Appendix A

5.10 INTERFERENCE PREVENTION FUNCTION

5.10.1 Limit

Identification code $\geq$ 48 bits

5.10.2 Test Setup



5.10.3 Test Procedures

1. In the case that the EUT has the function of automatically transmitting the identification code:
 - a. Transmit the predetermined identification codes from EUT.
 - b. Check the transmitted identification codes with the demodulator.
2. In the case of receiving the identification code:
 - a. Transmit the predetermined identification codes from the counterpart.
 - b. Check if communication is normal.
 - c. Transmit the signals other than predetermined ID codes from the counterpart.
 - d. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

5.10.4 Test Result

TX: The transmitting mode of EUT is on normal operating, the interference prevention function is okay.

RX: The receiving mode of EUT is on normal operating, the interference prevention function is okay.

The ID Code of this Bluetooth device is 41-42-D2-DD-53-E1 as below list:



5.11 CONSTRUCTION PROTECTION

5.11.1 Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

5.11.2 Confirmation Method

☒	Sealed with special screws.
☐	Plastic chassis is being welded using ultrasonic waves.
☐	Chassis is glued using a special adhesive.
☐	Metal covers are spot-fused.
☐	Cover is specially interlocked.
☐	RF and Modulation components are covered with shielding case and this shielding case is soldered.
☐	Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
☐	Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive.
☐	Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
☐	Other :

APPENDIX A TEST DATA

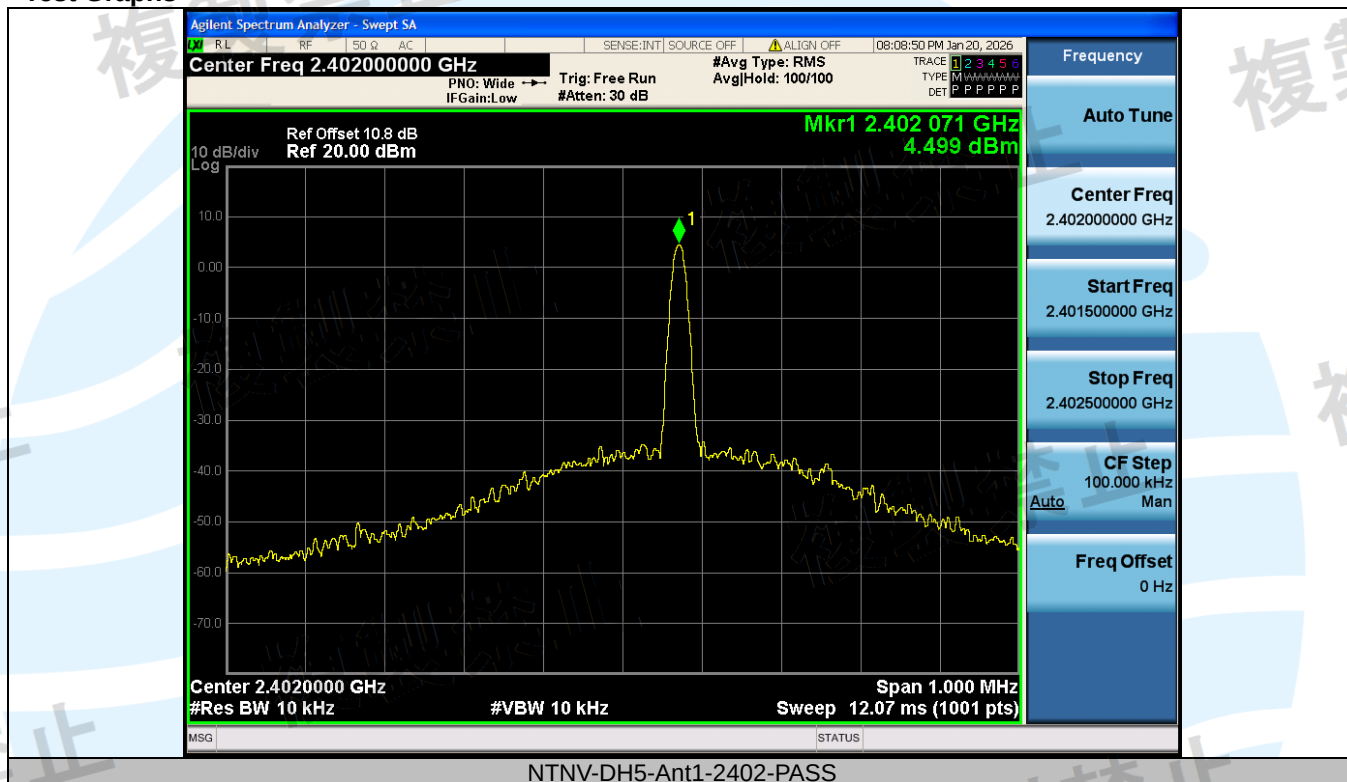
A.1 FREQUENCY TOLERANCE

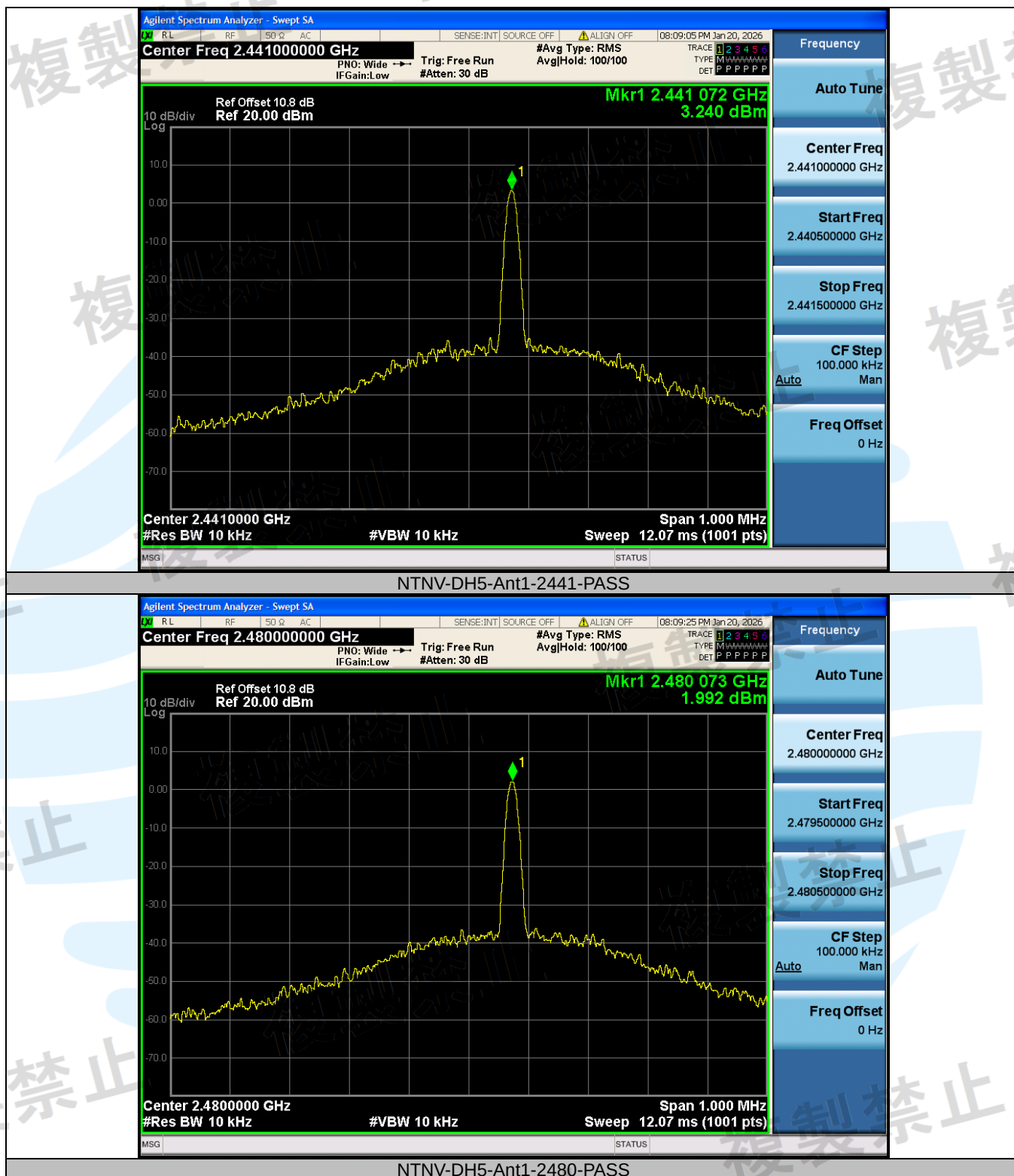
Test Result

Test Condition	Test Mode	Antenna	Frequency [MHz]	Center Freq. [MHz]	Result [ppm]	Limit [ppm]	Verdict
NTNV	DH5	Ant1	2402	2402.071	29.55870	±50	PASS
NTNV	DH5	Ant1	2441	2441.072	29.49611	±50	PASS
NTNV	DH5	Ant1	2480	2480.073	29.43548	±50	PASS

Note: Result [ppm]= (CenterFreq - Channel)/Channel*1000000

Test Graphs



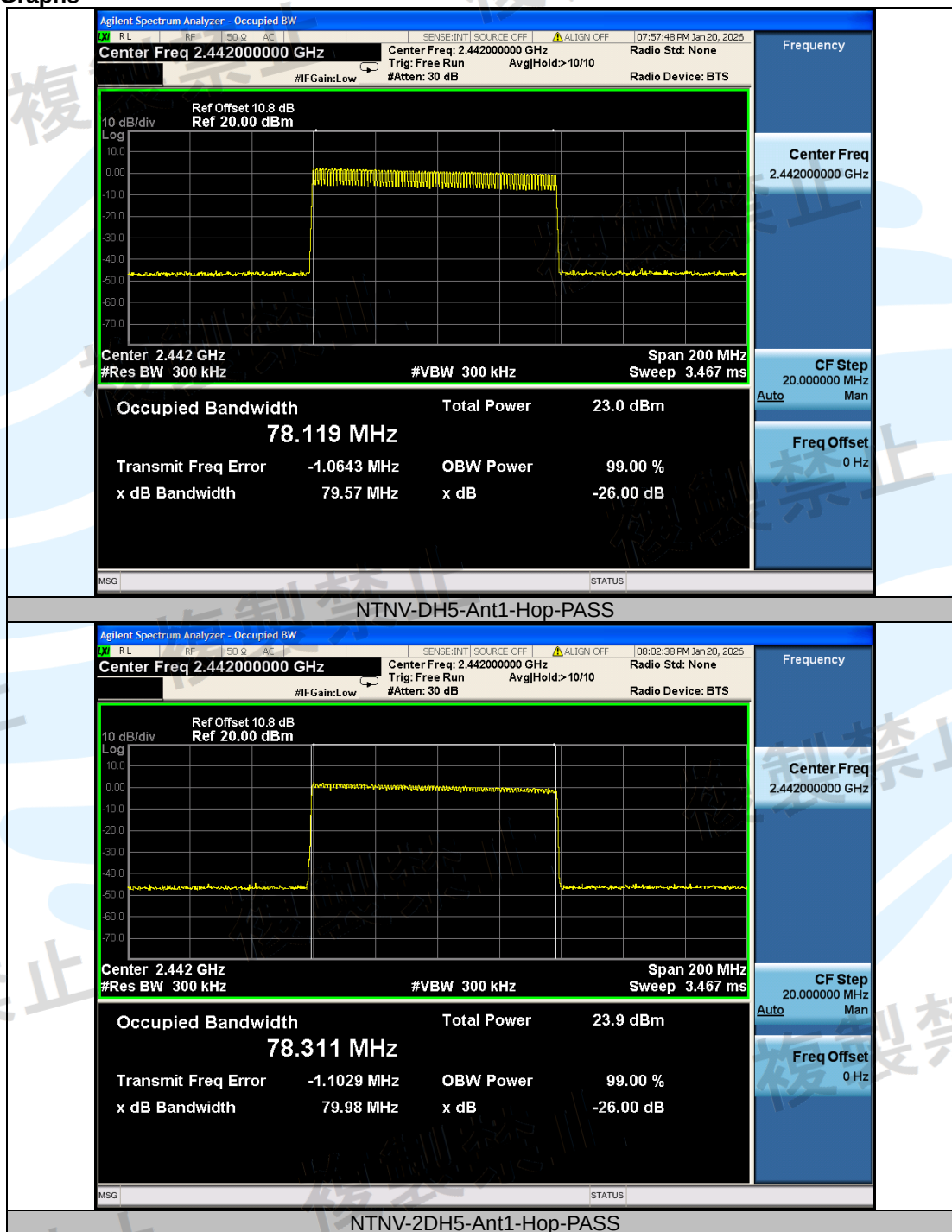


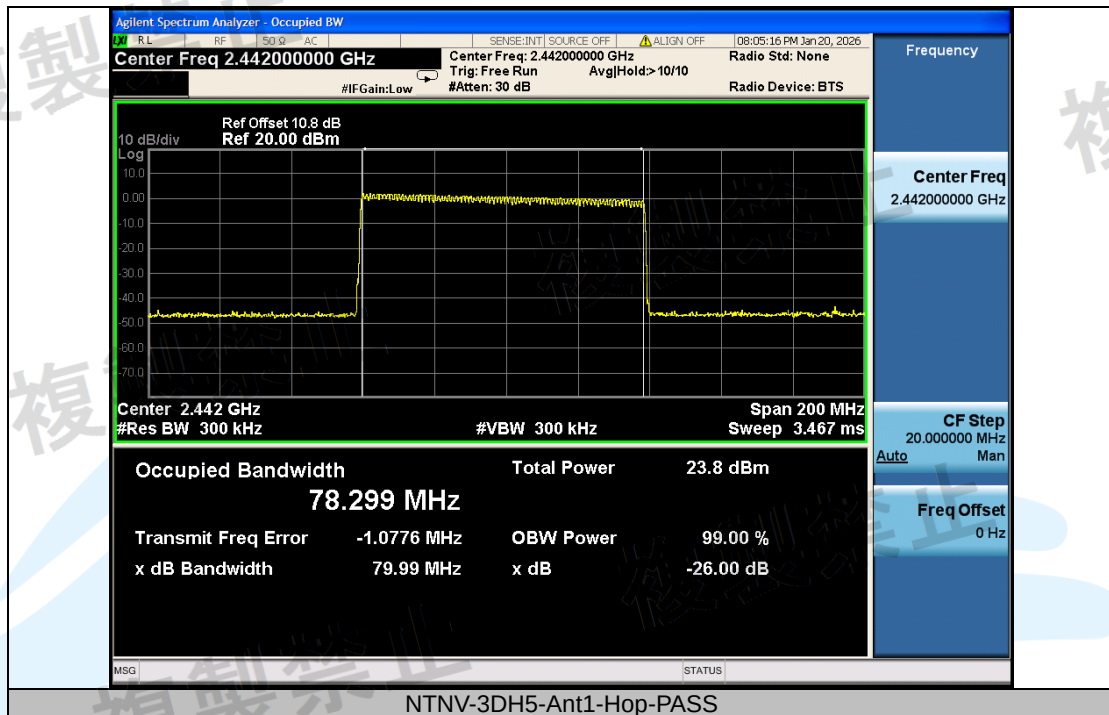
A.2 OCCUPIED BANDWIDTH (99% BW)

Test Result

Test Condition	Test Mode	Antenna	Frequency [MHz]	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	78.119	≤83.5	PASS
NTNV	2DH5	Ant1	Hop	78.311	≤83.5	PASS
NTNV	3DH5	Ant1	Hop	78.299	≤83.5	PASS

Test Graphs





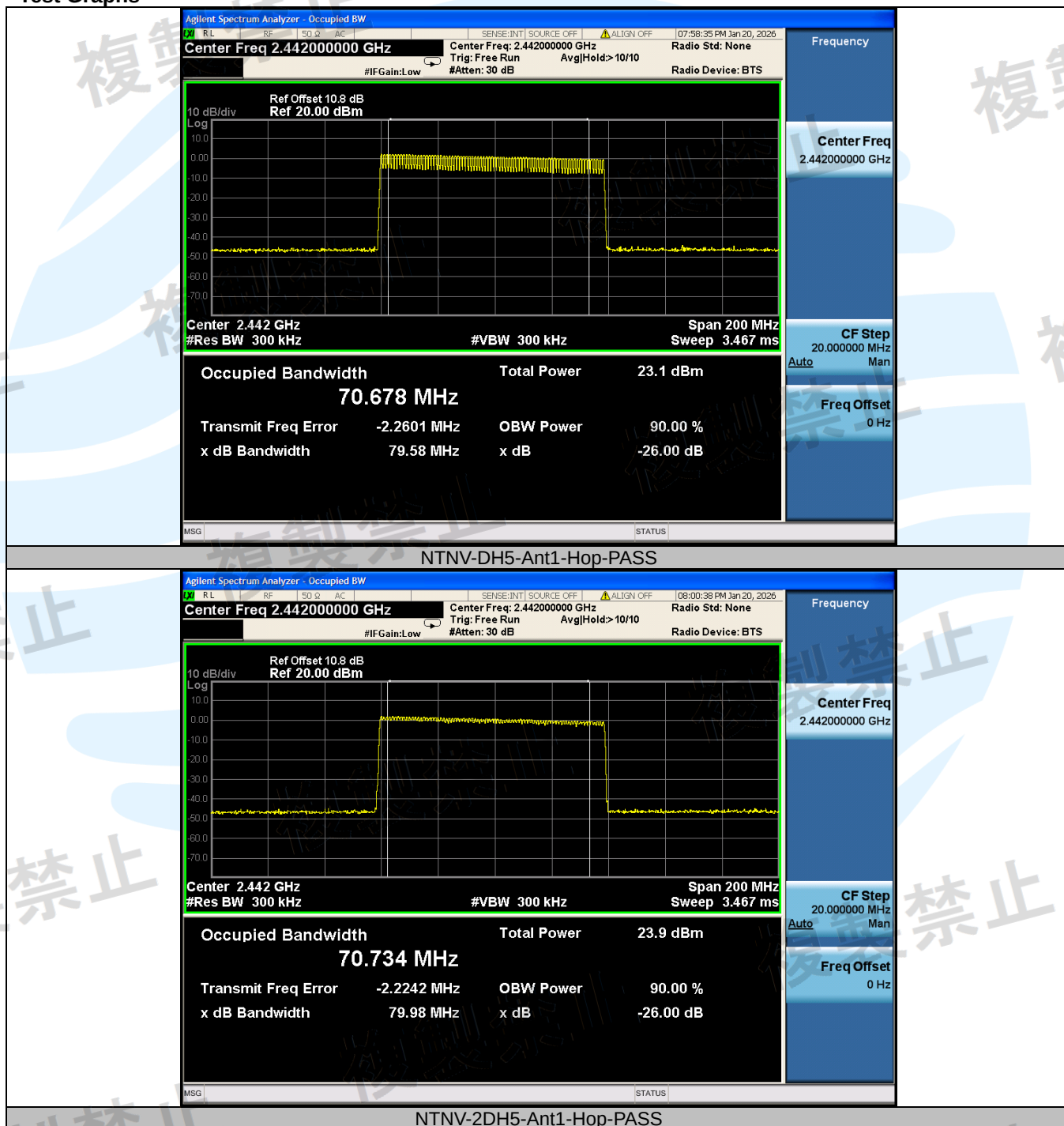
A.3 SPREADING BANDWIDTH (90% BW)

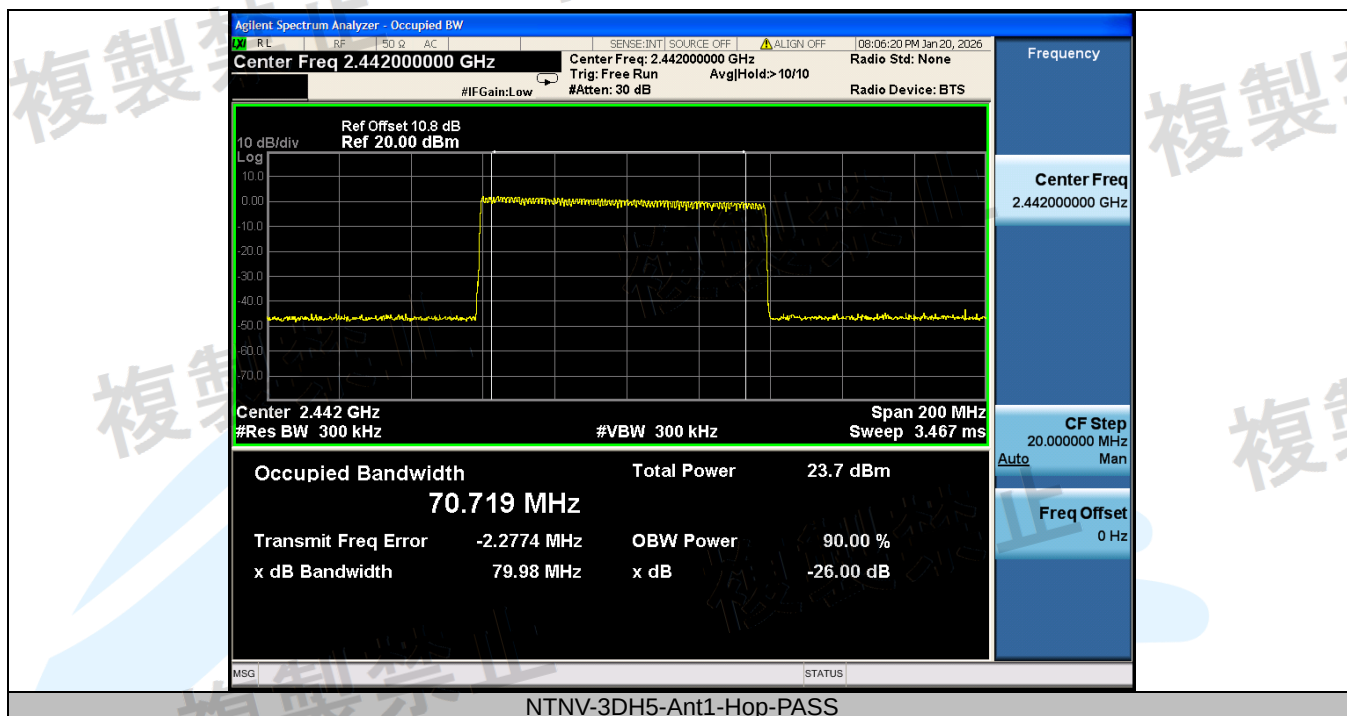
Test Result

Test Condition	Test Mode	Antenna	Frequency [MHz]	Result [MHz]	Verdict
NTNV	DH5	Ant1	Hop	70.678	PASS
NTNV	2DH5	Ant1	Hop	70.734	PASS
NTNV	3DH5	Ant1	Hop	70.719	PASS

Note: Spreading Factor: 90% channel power bandwidth / 1.

Test Graphs





A.4 DWELL TIME

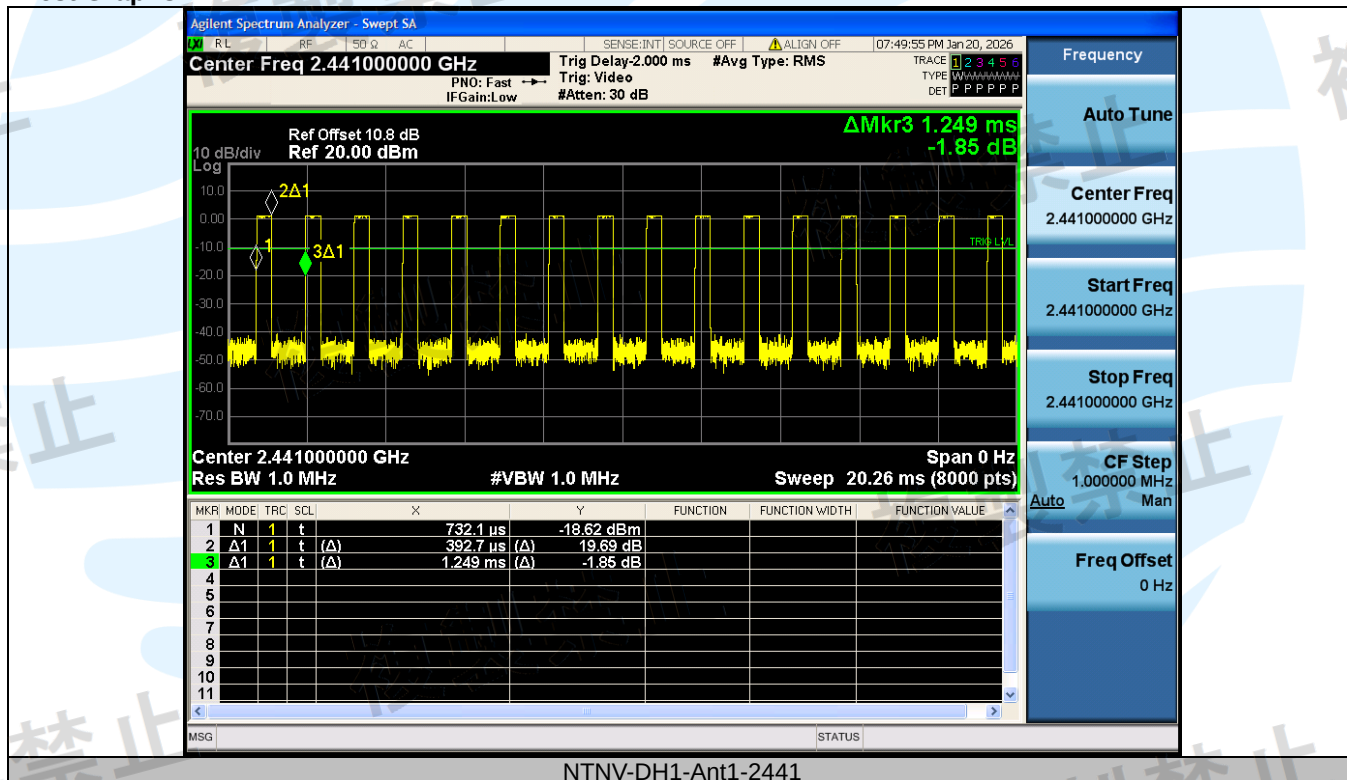
Test Result

Modulation	Packet	Spreading Rate	(Spreading Rate / 79) * 0.4	On Time (msec)	Period (msec)	Burst Ratio	Dwell Time (msec)	Limit (msec)	Result
GFSK	1DH1	70.678	0.3579	0.39	1.25	0.3120	111.6530	400	PASS
GFSK	1DH3			1.65	2.50	0.6600	236.1900	400	PASS
GFSK	1DH5			2.90	3.75	0.7733	276.7480	400	PASS
$\pi/4$ DQPSK	2-DH1	70.734	0.3581	0.40	1.25	0.3200	114.6070	400	PASS
$\pi/4$ DQPSK	2-DH3			1.65	2.50	0.6600	236.3770	400	PASS
$\pi/4$ DQPSK	2-DH5			2.90	3.75	0.7733	276.9670	400	PASS
8DPSK	3-DH1	70.719	0.3581	0.40	1.25	0.3200	114.5830	400	PASS
8DPSK	3-DH3			1.65	2.50	0.6600	236.3270	400	PASS
8DPSK	3-DH5			2.91	3.75	0.7760	277.8630	400	PASS

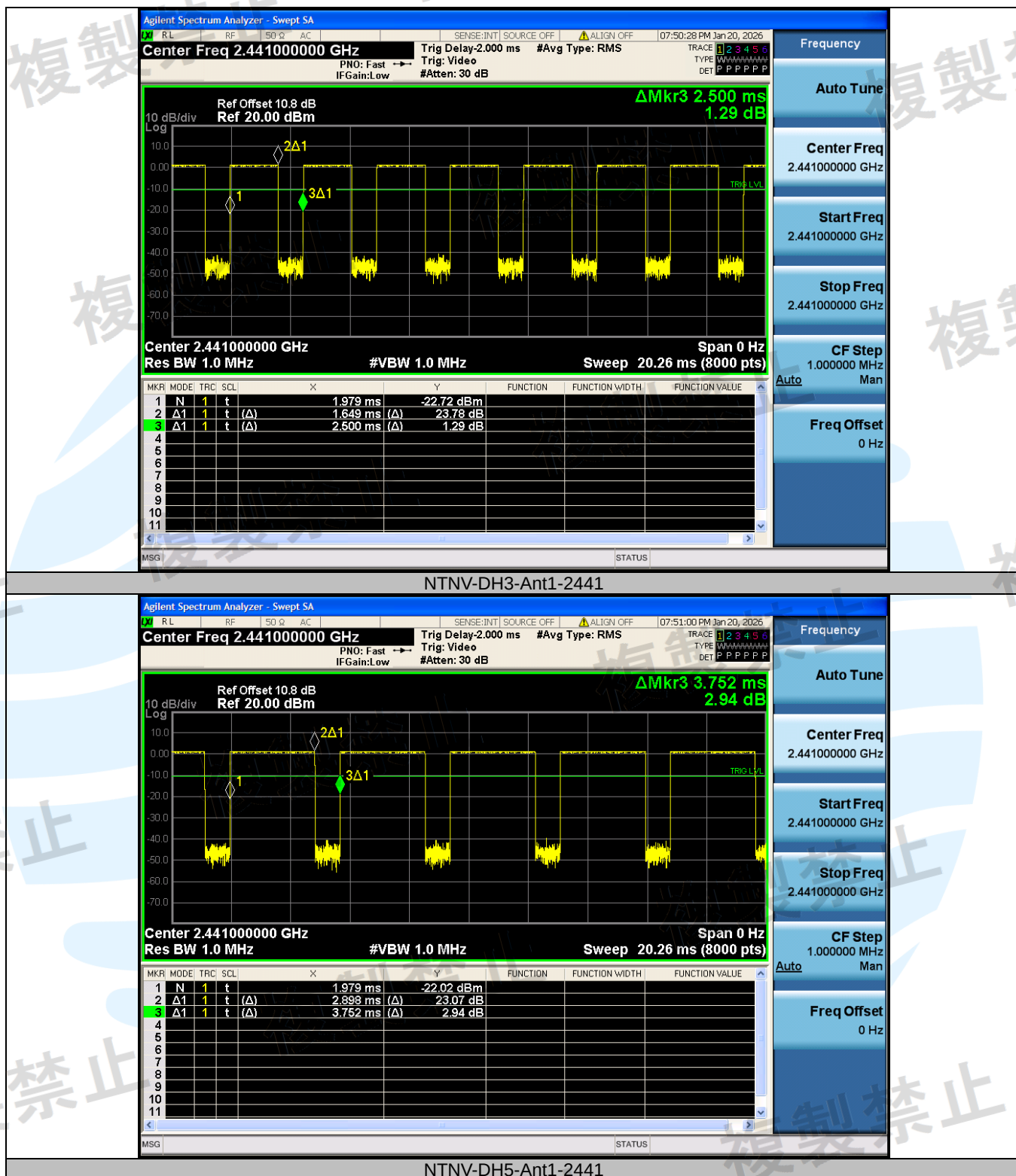
Note:

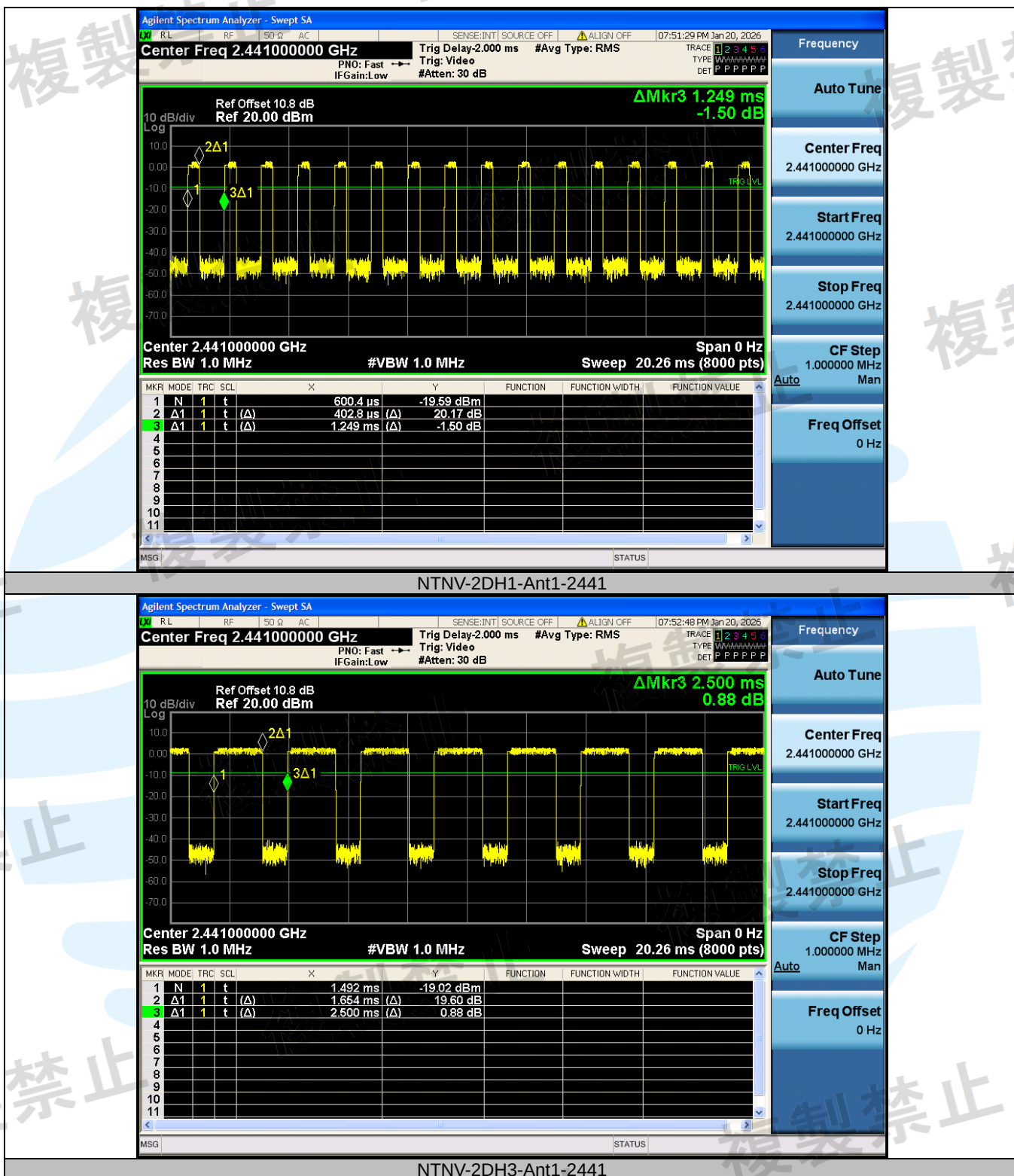
1. Spreading Rate = Spreading factor;
2. Normal mode Dwell time = (Spreading rate/79) x Burst Ratio x 0.4 seconds.
3. Burst Ratio = Duty Cycle = On Time / Period

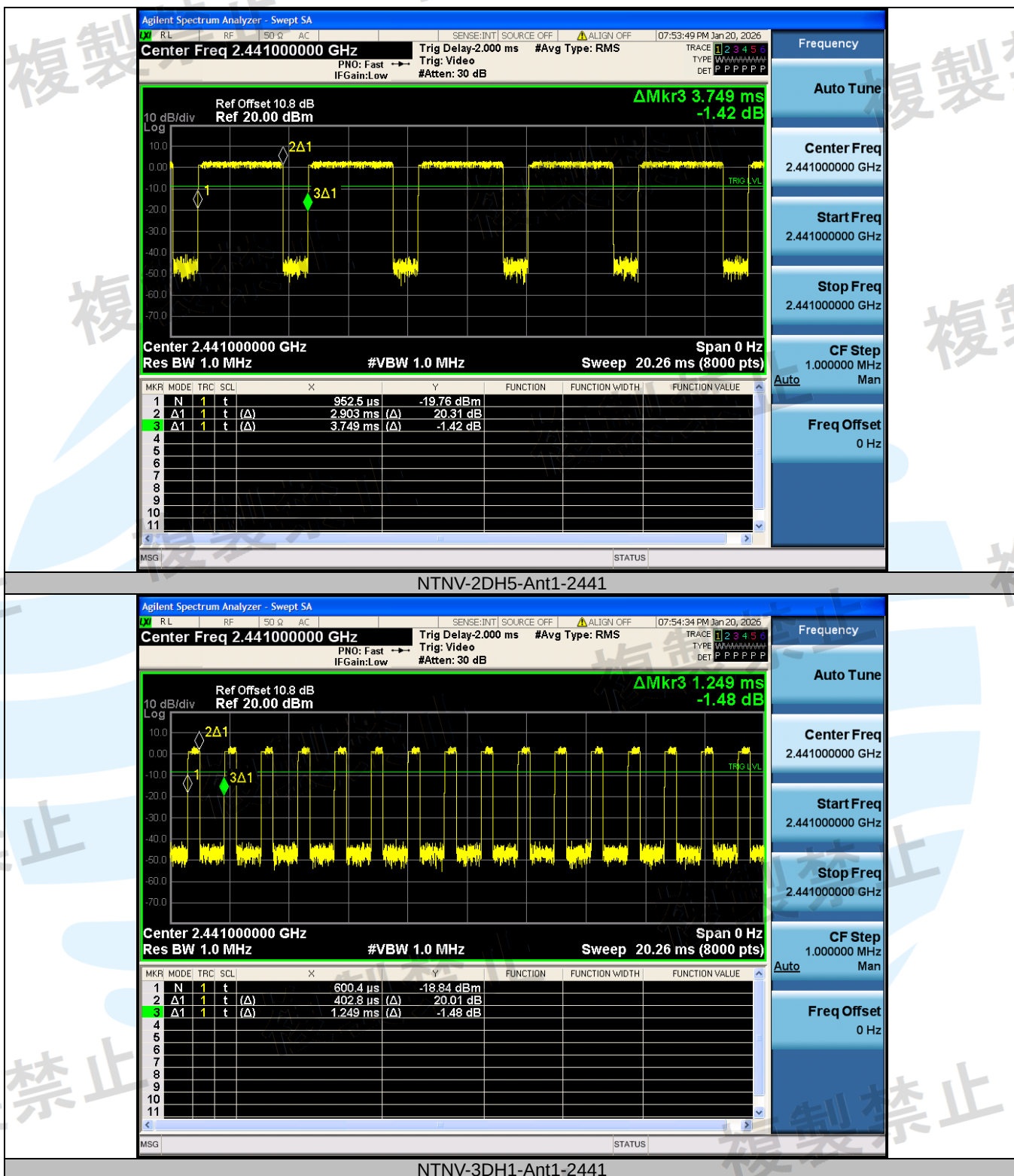
Test Graphs

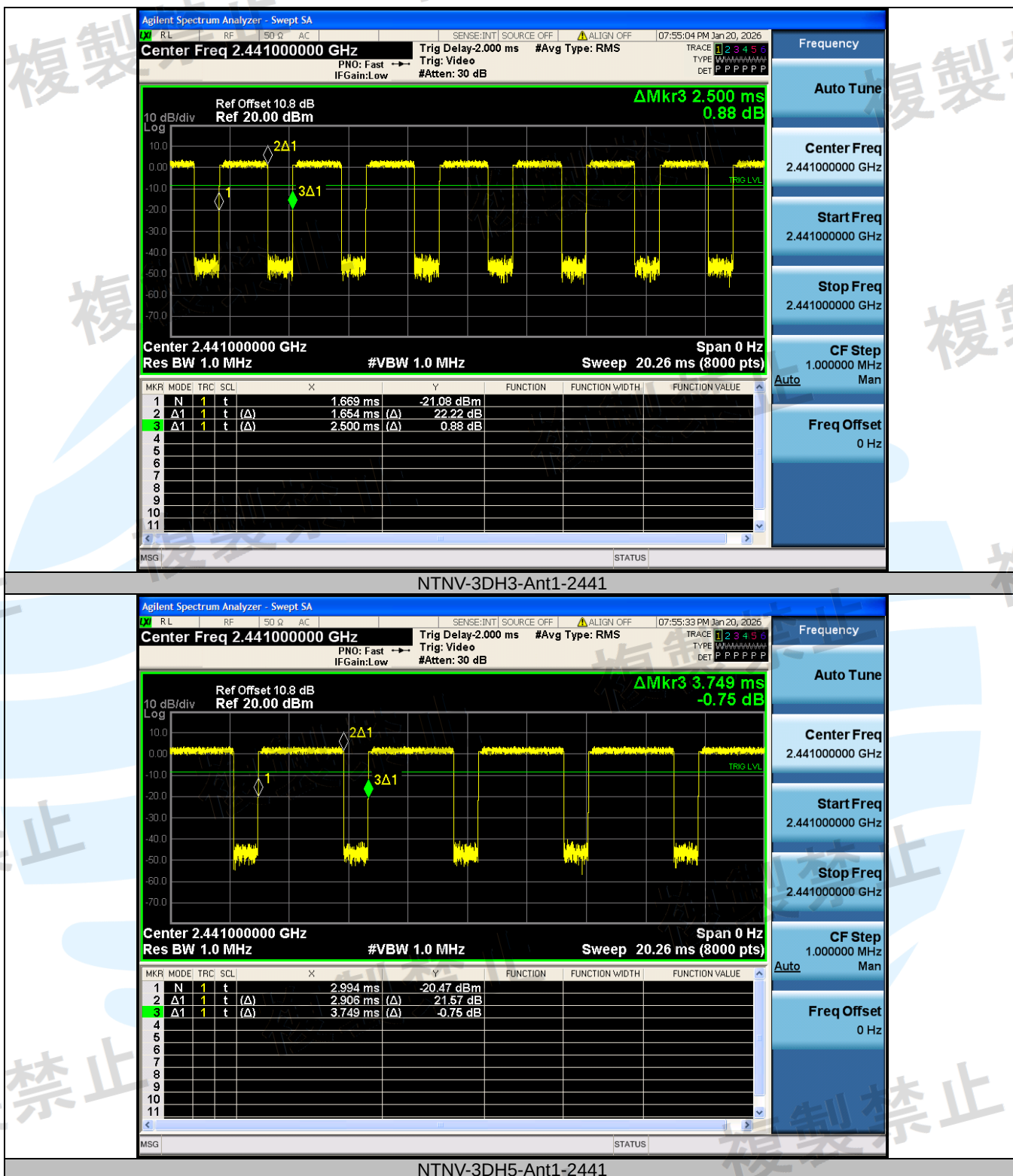


NTNV-DH1-Ant1-2441









A.5 SPURIOUS EMISSIONS

Test Result

Test Condition	Test Mode	Antenna	Freq. [MHz]	Freq. Range [MHz]	Freq. [MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Result [μW/MHz]	Limit [μW/MHz]	Verdict
NTNV	DH5	Ant1	2402	30~1000	798.24	-48.91	≤-26	0.01285	≤2.5	PASS
NTNV	DH5	Ant1	2402	1000~2387	2349.90	-46.95	≤-26	0.02018	≤2.5	PASS
NTNV	DH5	Ant1	2402	2387~2400	2400.00	-26.72	≤-16	2.12814	≤25	PASS
NTNV	DH5	Ant1	2402	2483.5~2496.5	2494.71	-37.00	≤-16	0.19953	≤25	PASS
NTNV	DH5	Ant1	2402	2496.5~13000	4804.12	-34.38	≤-26	0.36475	≤2.5	See table below
NTNV	DH5	Ant1	2441	30~1000	895.48	-48.89	≤-26	0.01291	≤2.5	PASS
NTNV	DH5	Ant1	2441	1000~2387	2271.19	-48.03	≤-26	0.01574	≤2.5	PASS
NTNV	DH5	Ant1	2441	2387~2400	2396.03	-37.53	≤-16	0.17660	≤25	PASS
NTNV	DH5	Ant1	2441	2483.5~2496.5	2493.50	-36.94	≤-16	0.20230	≤25	PASS
NTNV	DH5	Ant1	2441	2496.5~13000	4882.37	-35.45	≤-26	0.28510	≤2.5	See table below
NTNV	DH5	Ant1	2480	30~1000	984.48	-48.91	≤-26	0.01285	≤2.5	PASS
NTNV	DH5	Ant1	2480	1000~2387	2382.84	-47.38	≤-26	0.01828	≤2.5	PASS
NTNV	DH5	Ant1	2480	2387~2400	2398.88	-36.90	≤-16	0.20417	≤25	PASS
NTNV	DH5	Ant1	2480	2483.5~2496.5	2490.47	-36.88	≤-16	0.20512	≤25	PASS
NTNV	DH5	Ant1	2480	2496.5~13000	4960.10	-38.34	≤-26	0.14655	≤2.5	PASS
NTNV	DH5	Ant1	Hop	30~1000	887.97	-60.00	≤-26	0.00100	≤2.5	PASS
NTNV	DH5	Ant1	Hop	1000~2387	2284.36	-57.66	≤-26	0.00171	≤2.5	PASS
NTNV	DH5	Ant1	Hop	2387~2400	2399.36	-45.40	≤-16	0.02884	≤25	PASS
NTNV	DH5	Ant1	Hop	2483.5~2496.5	2486.36	-47.48	≤-16	0.01786	≤25	PASS
NTNV	DH5	Ant1	Hop	2496.5~13000	4815.67	-45.73	≤-26	0.02673	≤2.5	PASS
NTNV	2DH5	Ant1	2402	30~1000	895.73	-49.13	≤-26	0.01222	≤2.5	PASS
NTNV	2DH5	Ant1	2402	1000~2387	2351.28	-47.35	≤-26	0.01841	≤2.5	PASS
NTNV	2DH5	Ant1	2402	2387~2400	2400.00	-26.90	≤-16	2.04174	≤25	PASS
NTNV	2DH5	Ant1	2402	2483.5~2496.5	2493.00	-37.30	≤-16	0.18621	≤25	PASS
NTNV	2DH5	Ant1	2402	2496.5~13000	4804.64	-32.62	≤-26	0.54702	≤2.5	See table below
NTNV	2DH5	Ant1	2441	30~1000	928.71	-48.43	≤-26	0.01435	≤2.5	PASS
NTNV	2DH5	Ant1	2441	1000~2387	2363.42	-47.43	≤-26	0.01807	≤2.5	PASS
NTNV	2DH5	Ant1	2441	2387~2400	2387.31	-37.54	≤-16	0.17620	≤25	PASS
NTNV	2DH5	Ant1	2441	2483.5~2496.5	2484.50	-36.48	≤-16	0.22491	≤25	PASS
NTNV	2DH5	Ant1	2441	2496.5~13000	4881.84	-33.47	≤-26	0.44978	≤2.5	See table

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										below
NTNV	2DH 5	Ant1	2480	30~1000	765.75	-49.46	≤-26	0.01132	≤2.5	PASS
NTNV	2DH 5	Ant1	2480	1000~2387	2235.4 7	-47.18	≤-26	0.01914	≤2.5	PASS
NTNV	2DH 5	Ant1	2480	2387~2400	2391.6 9	-37.13	≤-16	0.19364	≤25	PASS
NTNV	2DH 5	Ant1	2480	2483.5~2496. 5	2483.6 2	-36.96	≤-16	0.20137	≤25	PASS
NTNV	2DH 5	Ant1	2480	2496.5~1300 0	4960.1	-35.88	≤-26	0.25823	≤2.5	See table below
NTNV	2DH 5	Ant1	Hop	30~1000	509.42	-59.77	≤-26	0.00105	≤2.5	PASS
NTNV	2DH 5	Ant1	Hop	1000~2387	2051.6 9	-58.27	≤-26	0.00149	≤2.5	PASS
NTNV	2DH 5	Ant1	Hop	2387~2400	2399.9 9	-38.58	≤-16	0.13868	≤25	PASS
NTNV	2DH 5	Ant1	Hop	2483.5~2496. 5	2491.6 8	-47.18	≤-16	0.01914	≤25	PASS
NTNV	2DH 5	Ant1	Hop	2496.5~1300 0	4838.2 6	-43.72	≤-26	0.04246	≤2.5	PASS
NTNV	3DH 5	Ant1	2402	30~1000	954.17	-48.86	≤-26	0.01300	≤2.5	PASS
NTNV	3DH 5	Ant1	2402	1000~2387	2375.9 0	-47.26	≤-26	0.01879	≤2.5	PASS
NTNV	3DH 5	Ant1	2402	2387~2400	2399.9 9	-26.98	≤-16	2.00447	≤25	PASS
NTNV	3DH 5	Ant1	2402	2483.5~2496. 5	2492.2 6	-37.28	≤-16	0.18707	≤25	PASS
NTNV	3DH 5	Ant1	2402	2496.5~1300 0	4804.1 2	-32.50	≤-26	0.56234	≤2.5	See table below
NTNV	3DH 5	Ant1	2441	30~1000	765.02	-48.81	≤-26	0.01315	≤2.5	PASS
NTNV	3DH 5	Ant1	2441	1000~2387	2343.6 6	-46.94	≤-26	0.02023	≤2.5	PASS
NTNV	3DH 5	Ant1	2441	2387~2400	2388.8 6	-37.63	≤-16	0.17258	≤25	PASS
NTNV	3DH 5	Ant1	2441	2483.5~2496. 5	2493.5 3	-37.15	≤-16	0.19275	≤25	PASS
NTNV	3DH 5	Ant1	2441	2496.5~1300 0	4882.3 7	-33.36	≤-26	0.46132	≤2.5	See table below
NTNV	3DH 5	Ant1	2480	30~1000	905.18	-48.98	≤-26	0.01265	≤2.5	PASS
NTNV	3DH 5	Ant1	2480	1000~2387	2342.9 6	-47.79	≤-26	0.01663	≤2.5	PASS
NTNV	3DH 5	Ant1	2480	2387~2400	2387.7 3	-36.97	≤-16	0.20091	≤25	PASS
NTNV	3DH 5	Ant1	2480	2483.5~2496. 5	2493.9 5	-36.42	≤-16	0.22803	≤25	PASS
NTNV	3DH 5	Ant1	2480	2496.5~1300 0	4960.1	-35.73	≤-26	0.26730	≤2.5	See table below
NTNV	3DH 5	Ant1	Hop	30~1000	782.96	-60.20	≤-26	0.00095	≤2.5	PASS
NTNV	3DH 5	Ant1	Hop	1000~2387	2144.2 8	-58.16	≤-26	0.00153	≤2.5	PASS
NTNV	3DH 5	Ant1	Hop	2387~2400	2400.0 0	-38.57	≤-16	0.13900	≤25	PASS
NTNV	3DH 5	Ant1	Hop	2483.5~2496. 5	2490.9 4	-47.68	≤-16	0.01706	≤25	PASS
NTNV	3DH 5	Ant1	Hop	2496.5~1300 0	4806.2 2	-44.14	≤-26	0.03855	≤2.5	PASS

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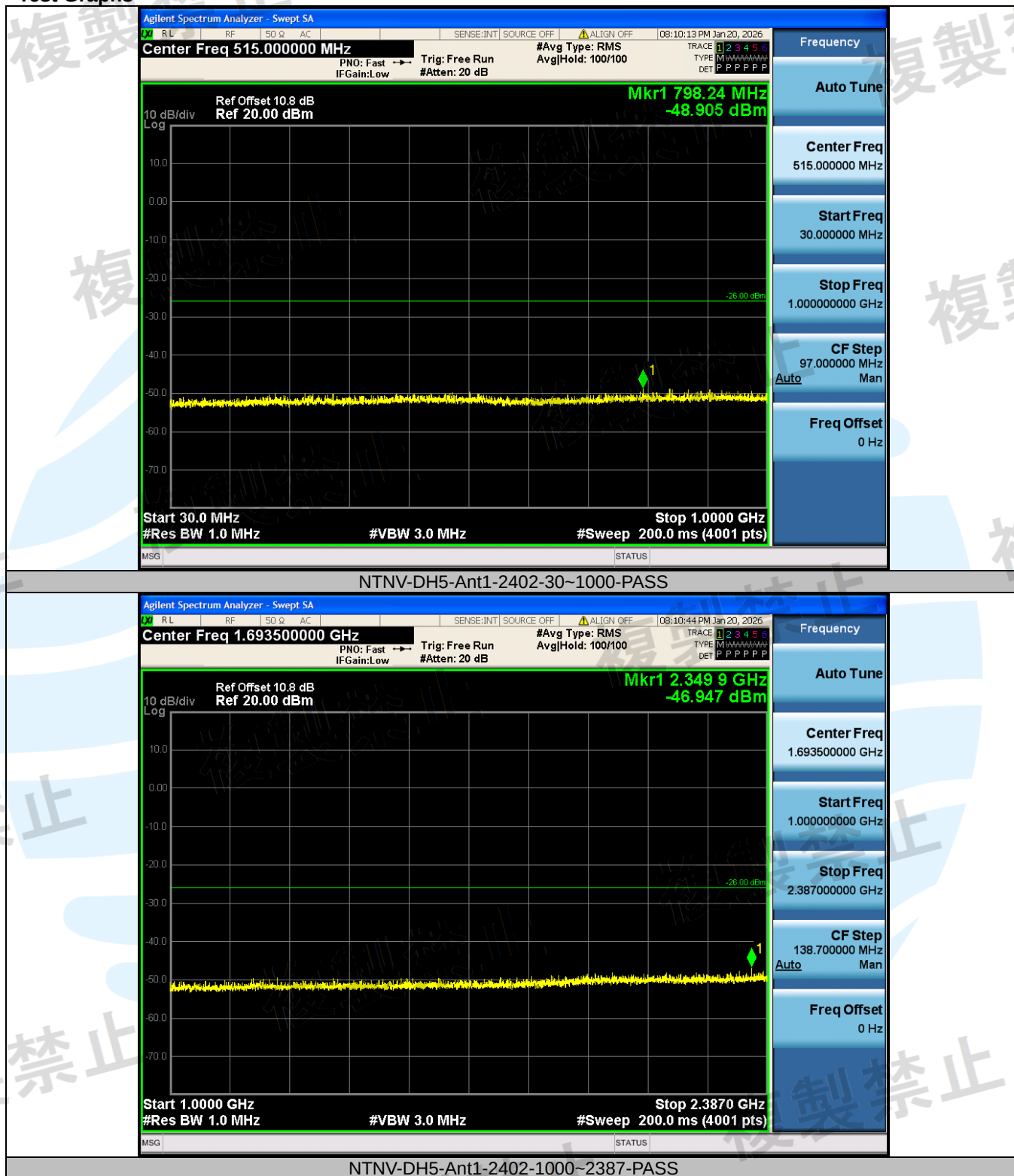
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Test Result Step2

Test Condition	Test Mode	Antenna	Frequency [MHz]	Freq. [MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Result [μW/MHz]	Limit [μW/MHz]	Verdict
NTNV	DH5	Ant1	2402	4804.12	-36.97	≤-26	0.20091	≤2.5	PASS
NTNV	DH5	Ant1	2441	4882.37	-39.08	≤-26	0.12359	≤2.5	PASS
NTNV	2DH5	Ant1	2402	4804.64	-38.11	≤-26	0.15453	≤2.5	PASS
NTNV	2DH5	Ant1	2441	4881.84	-39.87	≤-26	0.10304	≤2.5	PASS
NTNV	2DH5	Ant1	2480	4960.10	-42.39	≤-26	0.05768	≤2.5	PASS
NTNV	3DH5	Ant1	2402	4804.12	-37.78	≤-26	0.16672	≤2.5	PASS
NTNV	3DH5	Ant1	2441	4882.37	-39.79	≤-26	0.10495	≤2.5	PASS
NTNV	3DH5	Ant1	2480	4960.10	-42.39	≤-26	0.05768	≤2.5	PASS

Test Graphs



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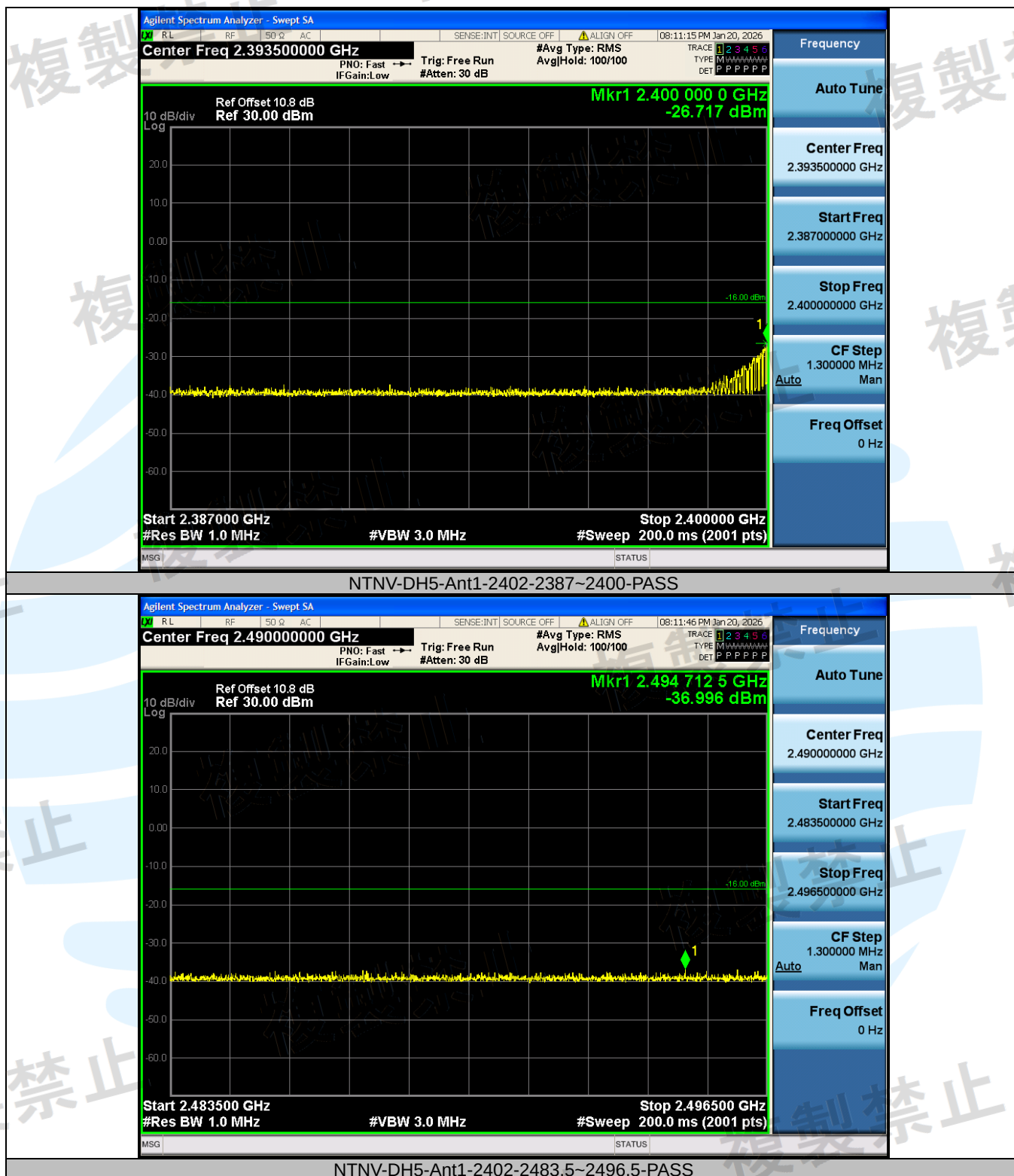
Tel: +86-755-28230888

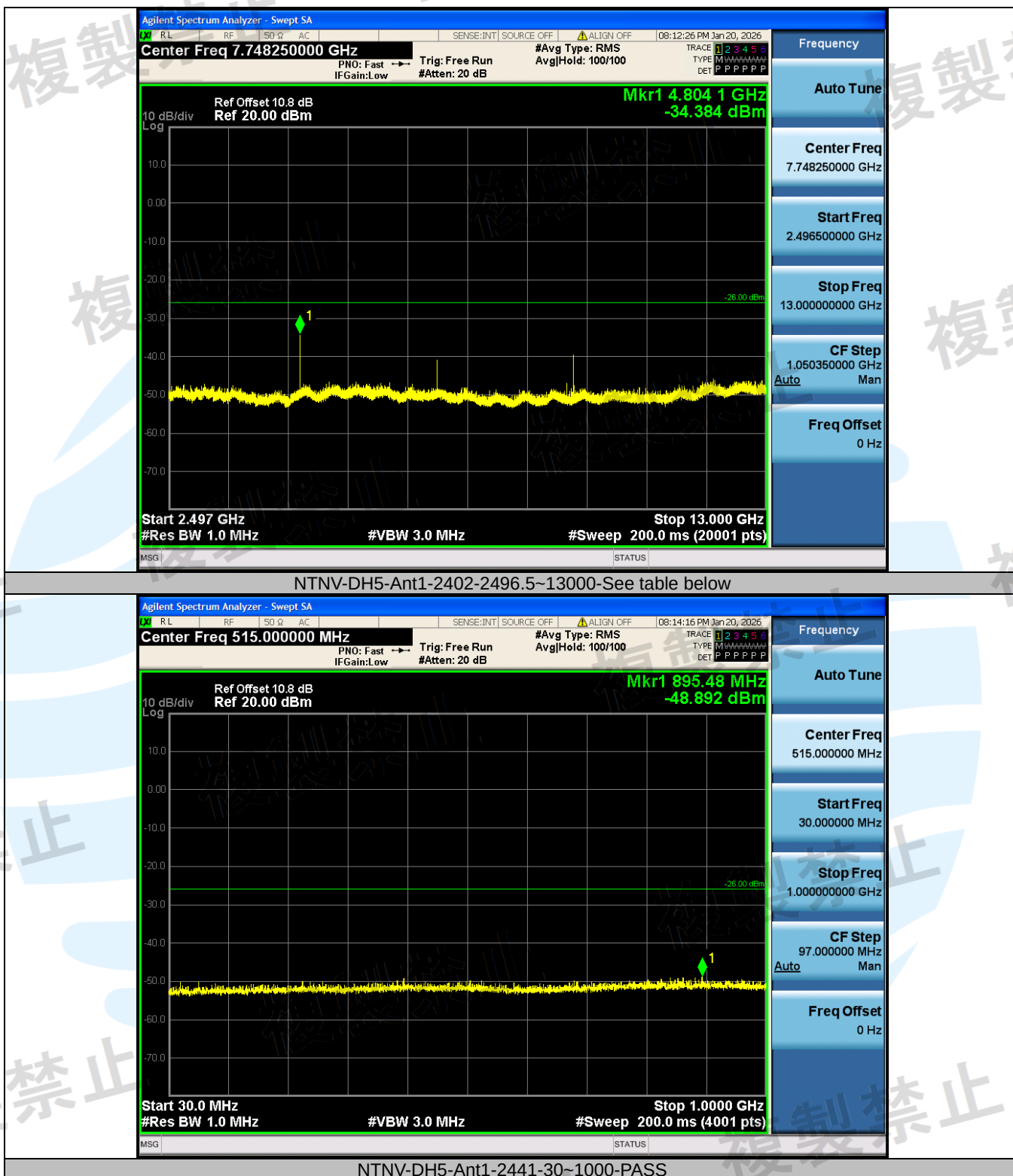
Fax: +86-755-28230886

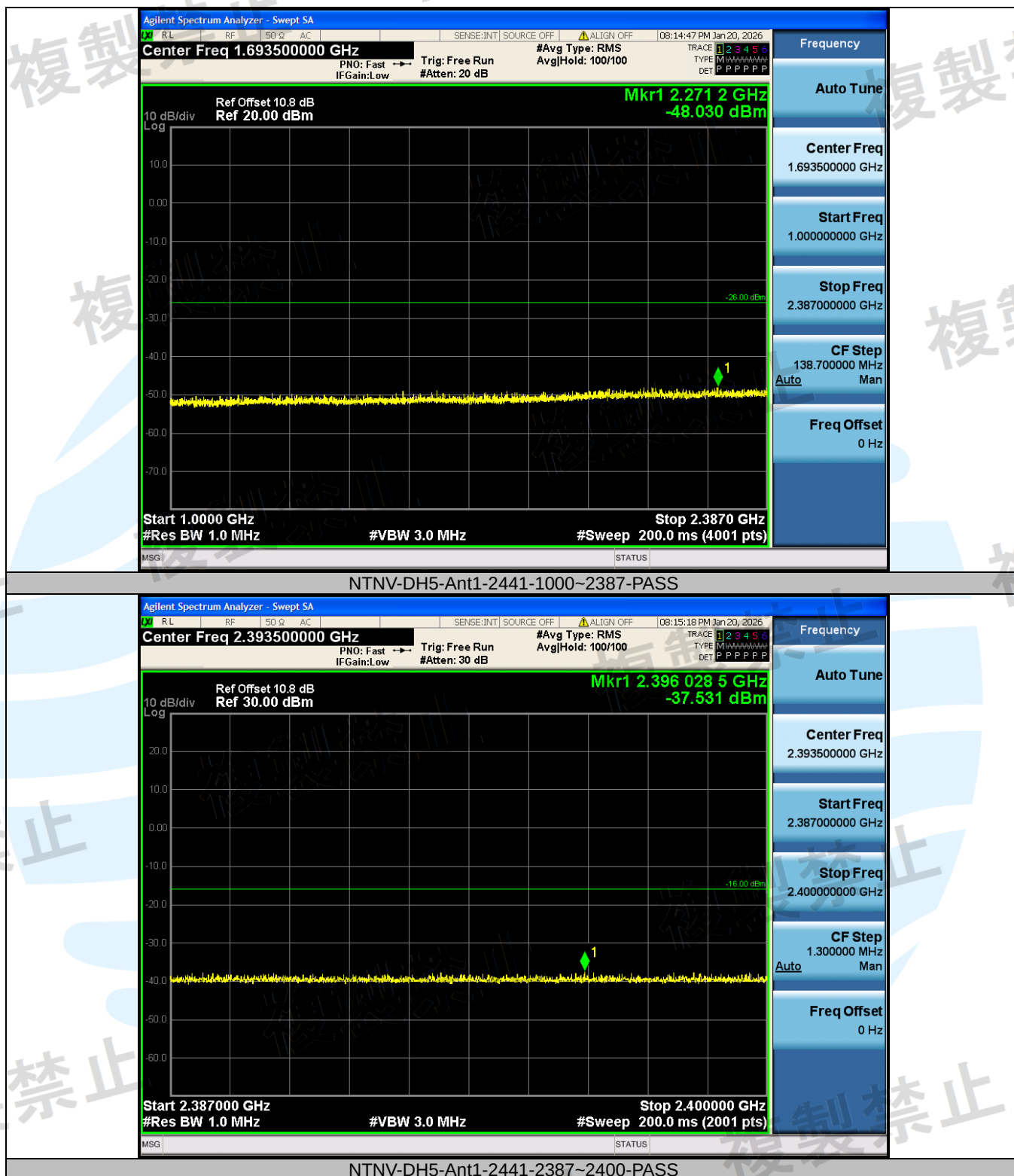
E-mail: info@uttlab.com

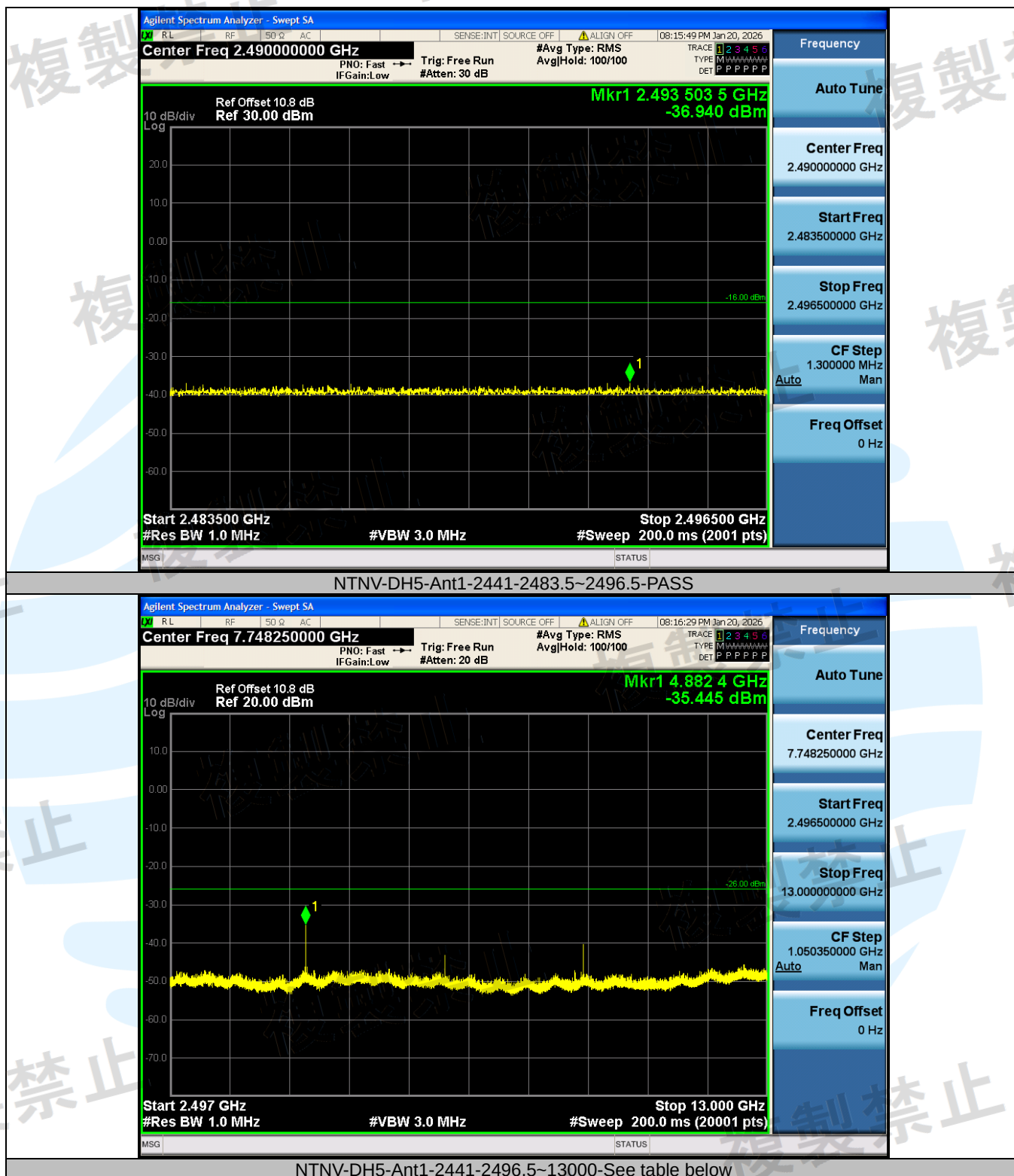
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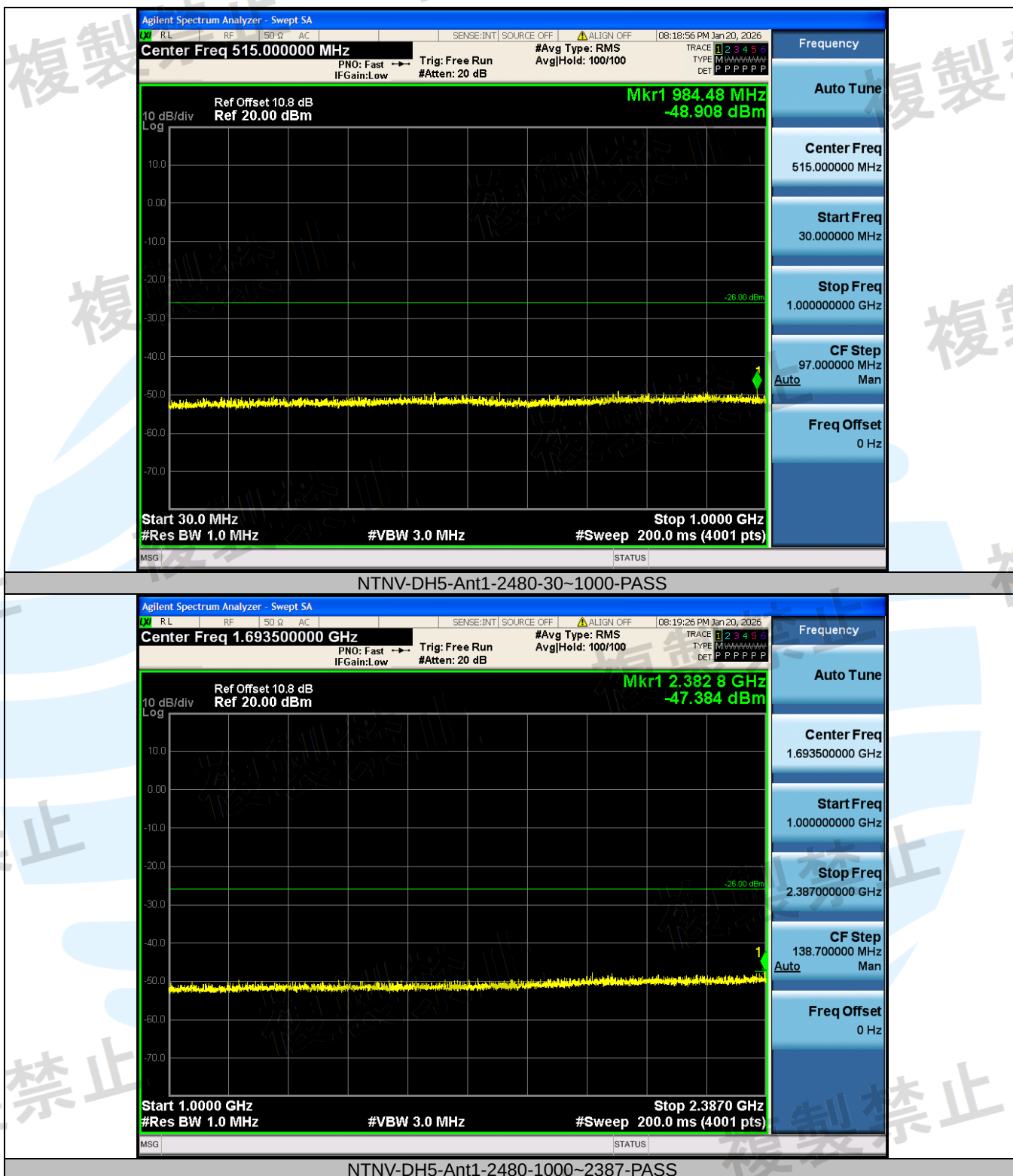
Tel: +86-755-28230888

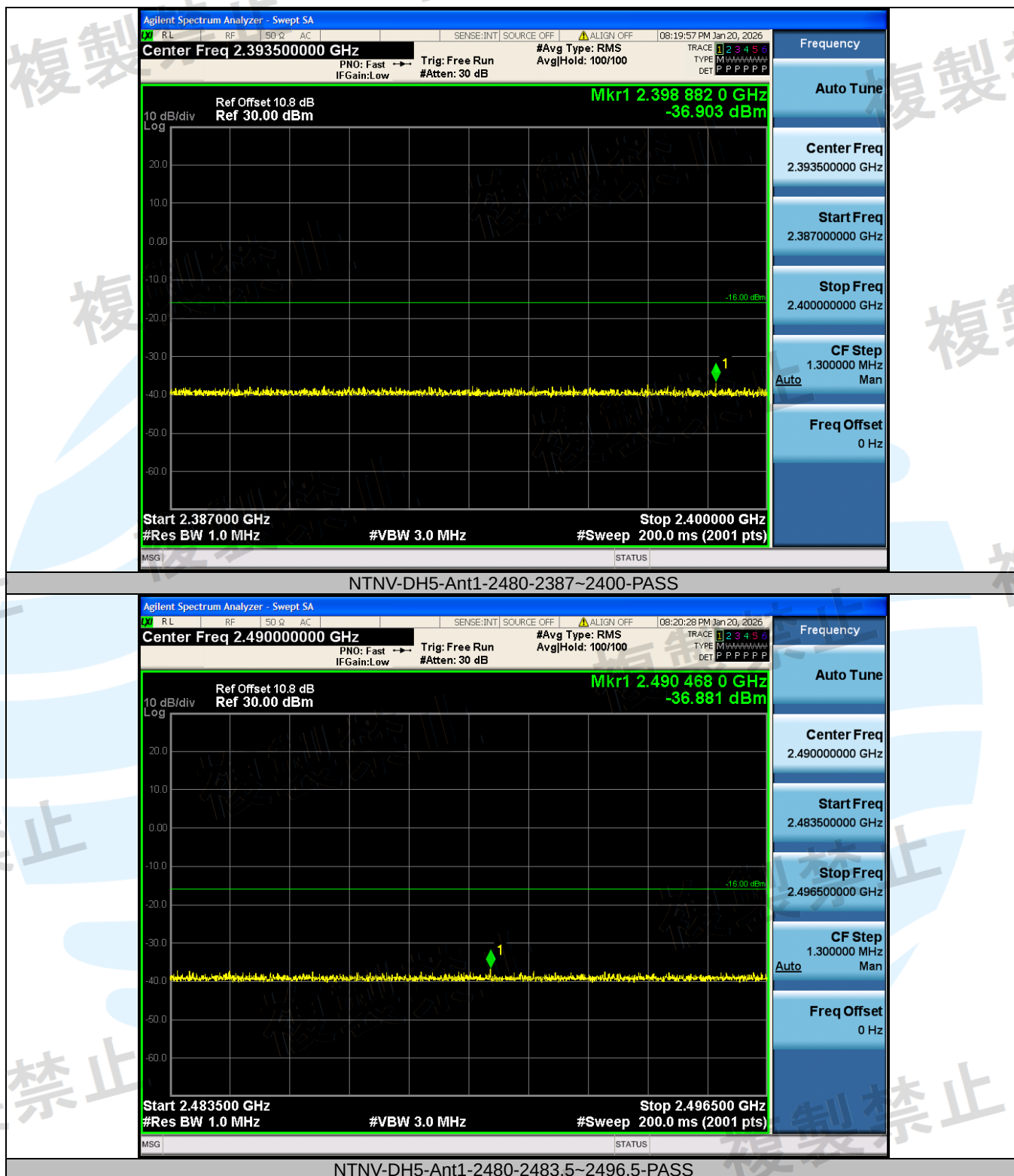
Fax: +86-755-28230886

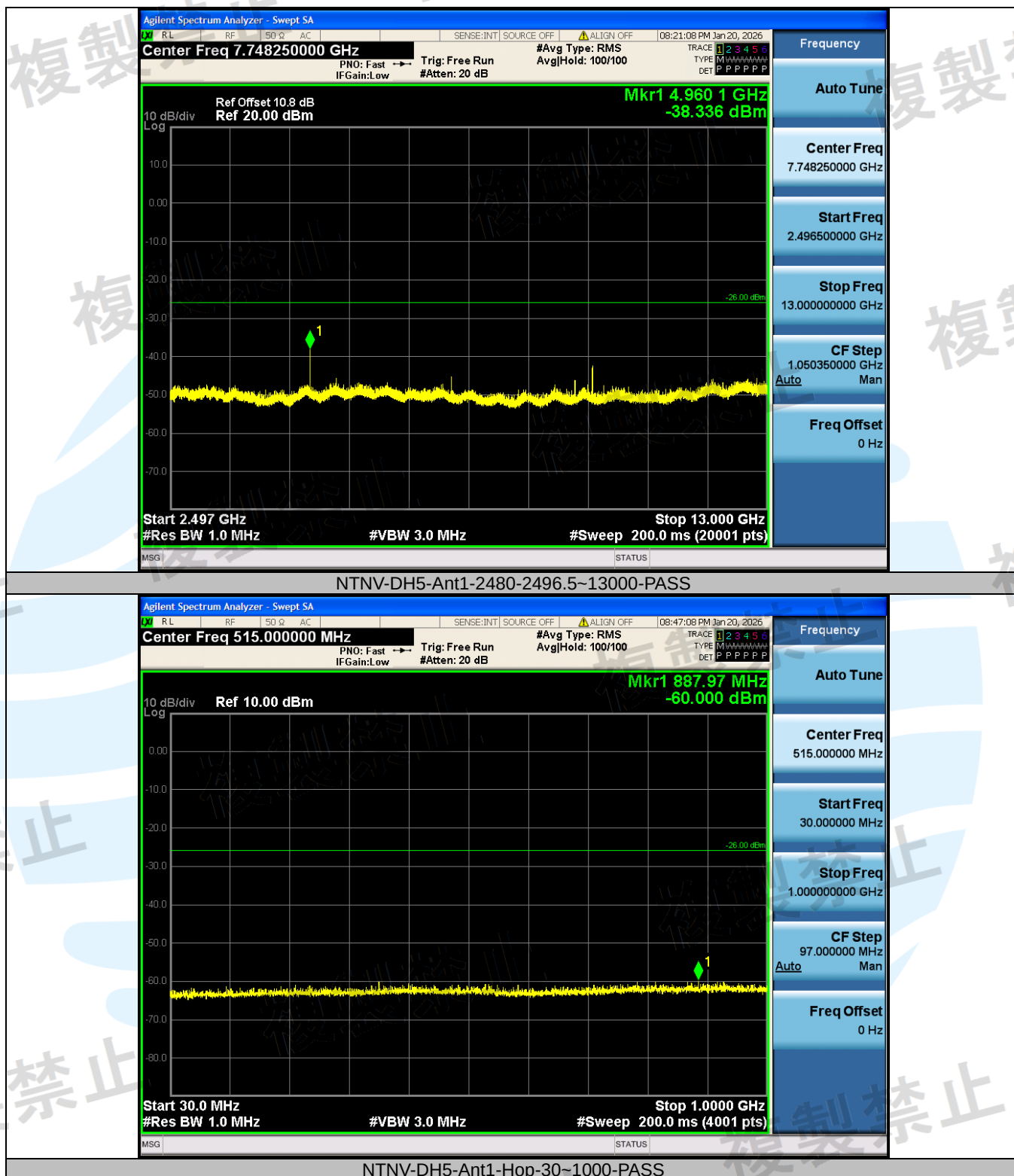
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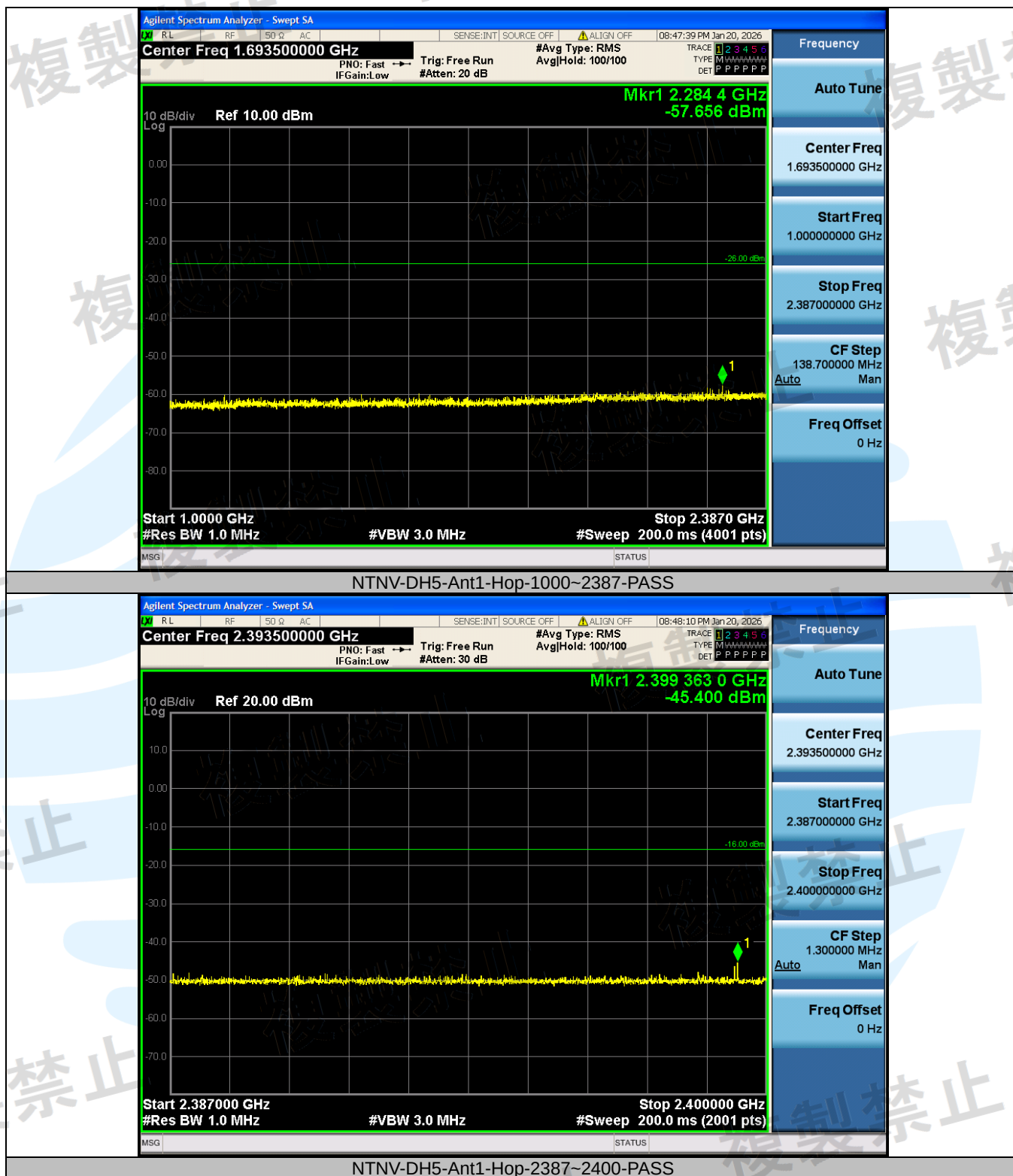
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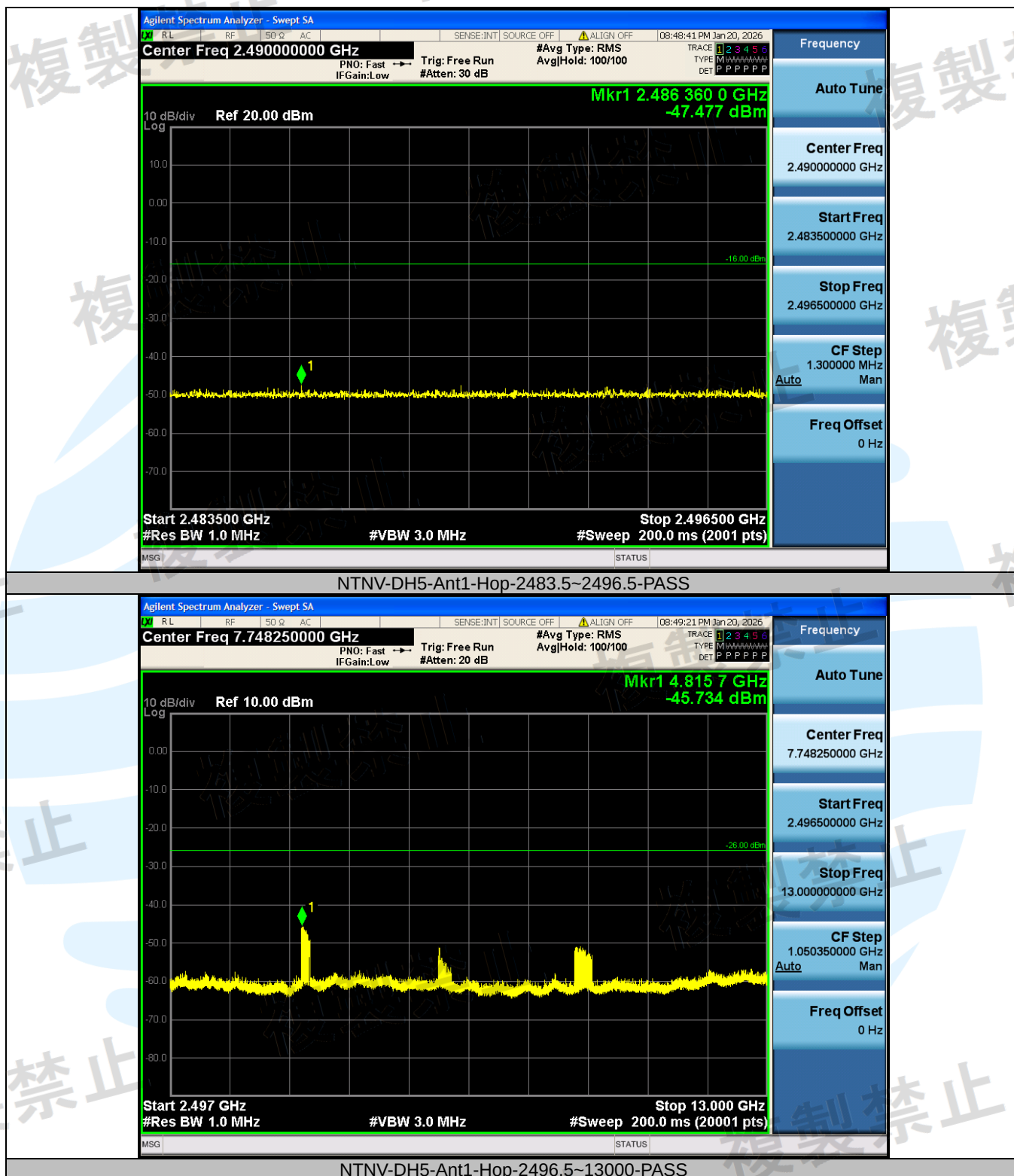
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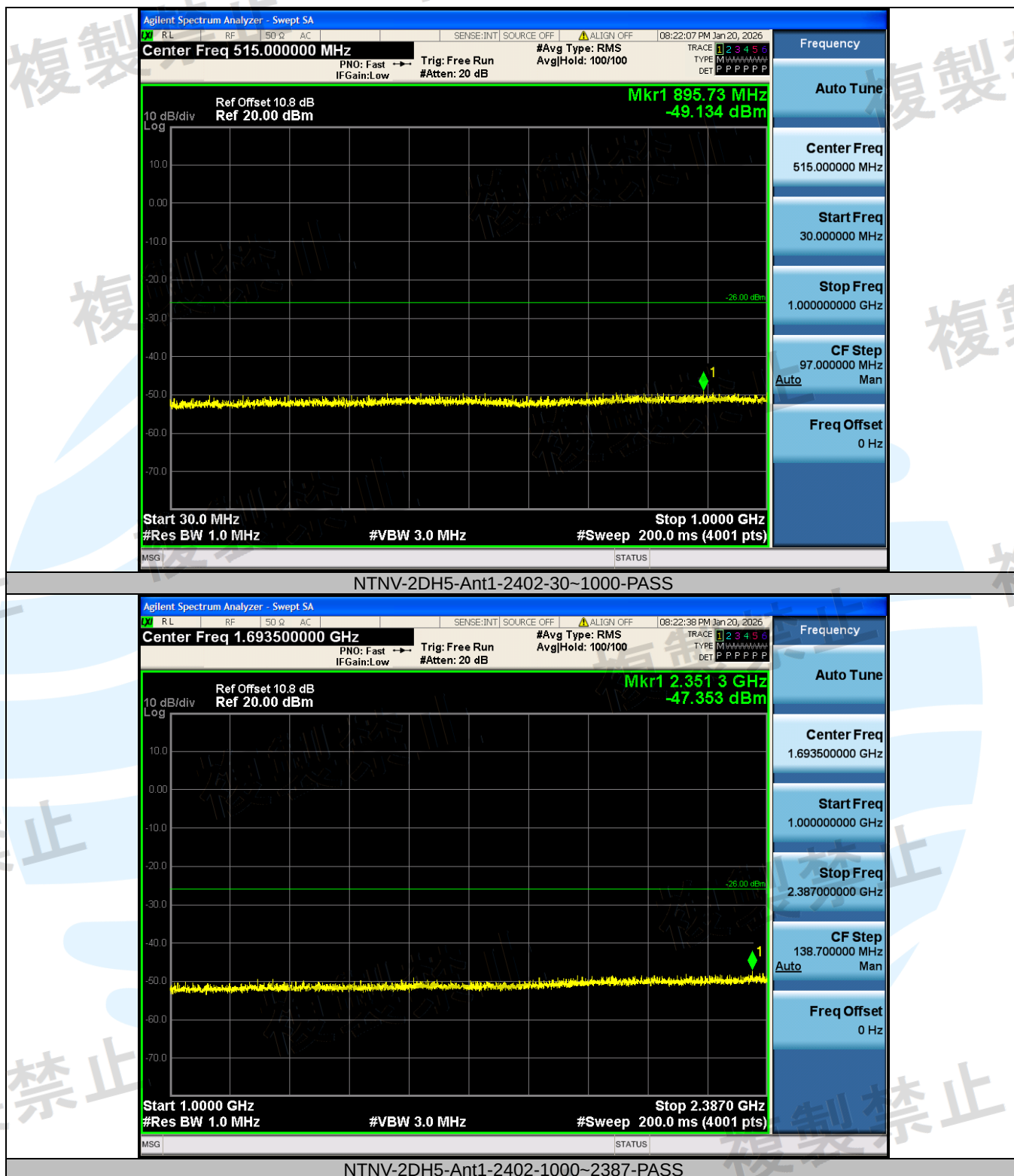


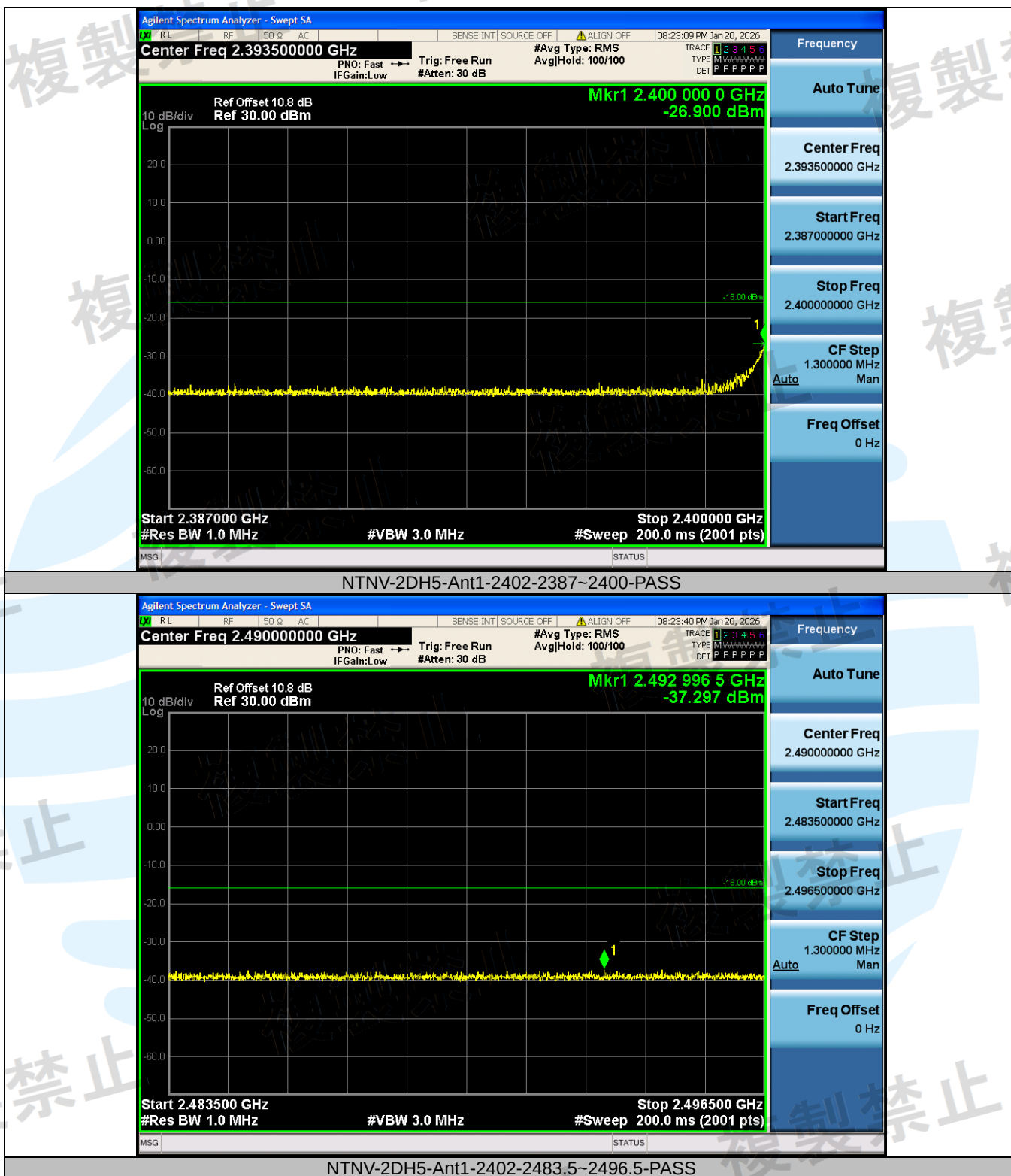


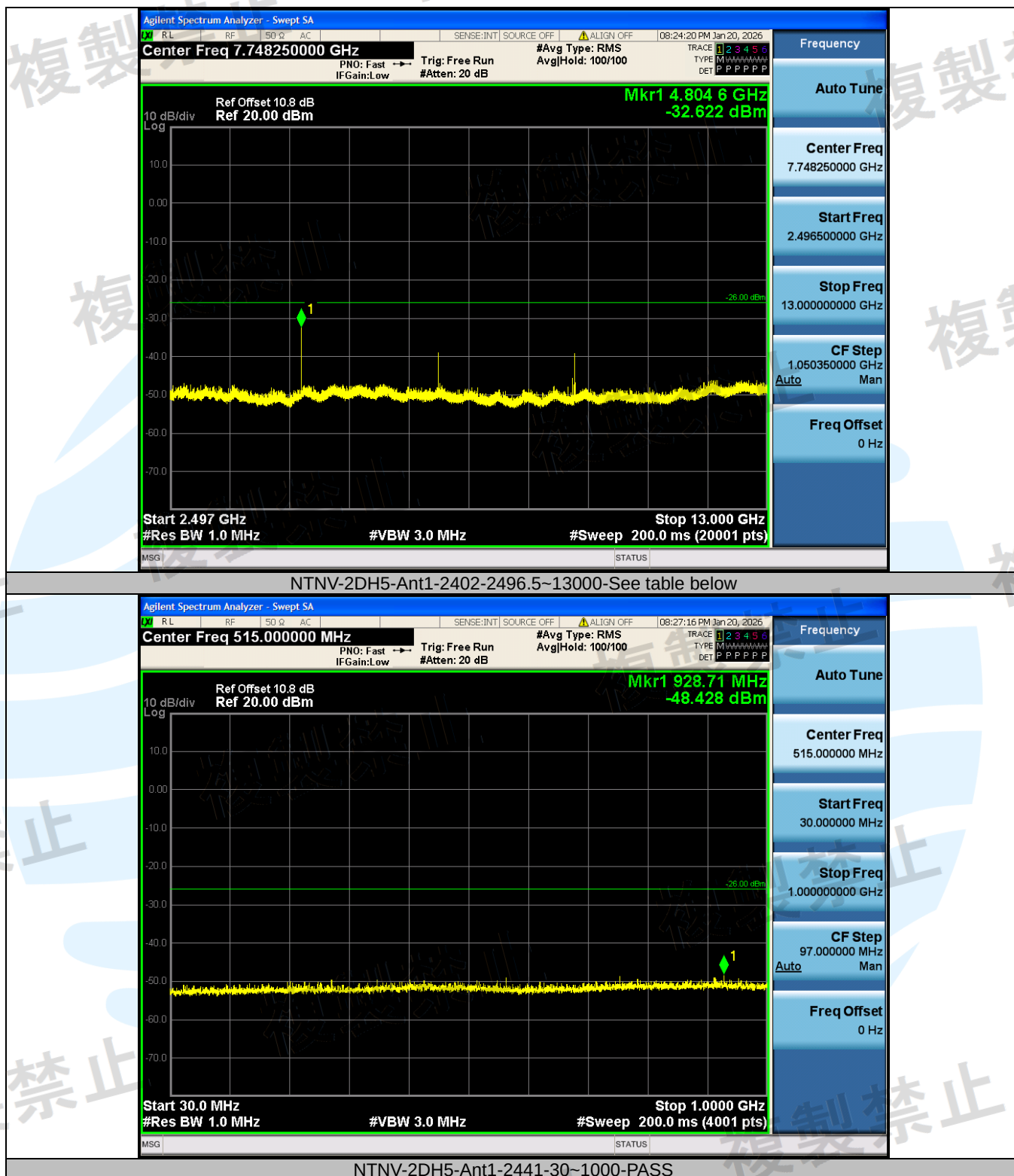










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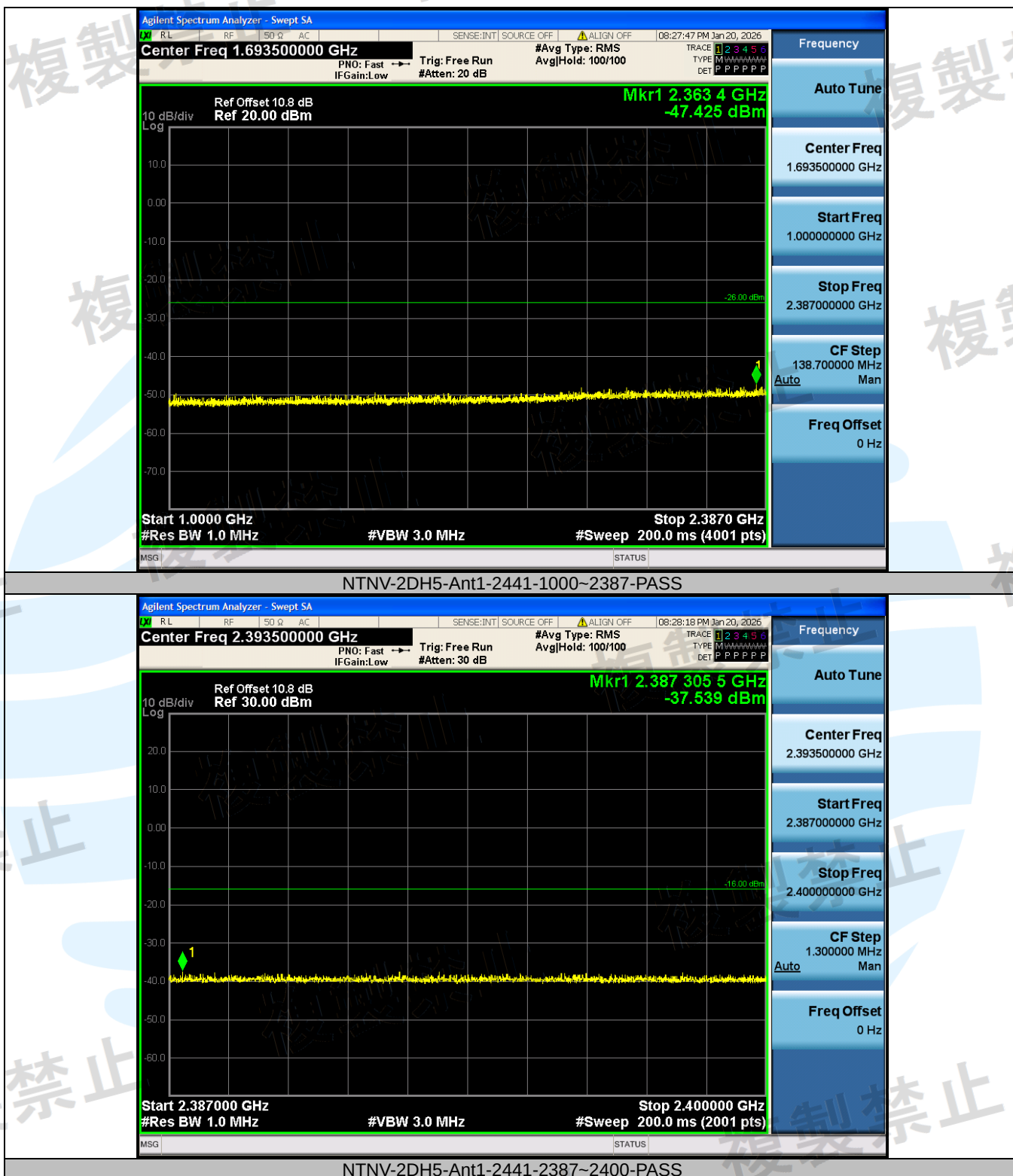
Tel: +86-755-28230888

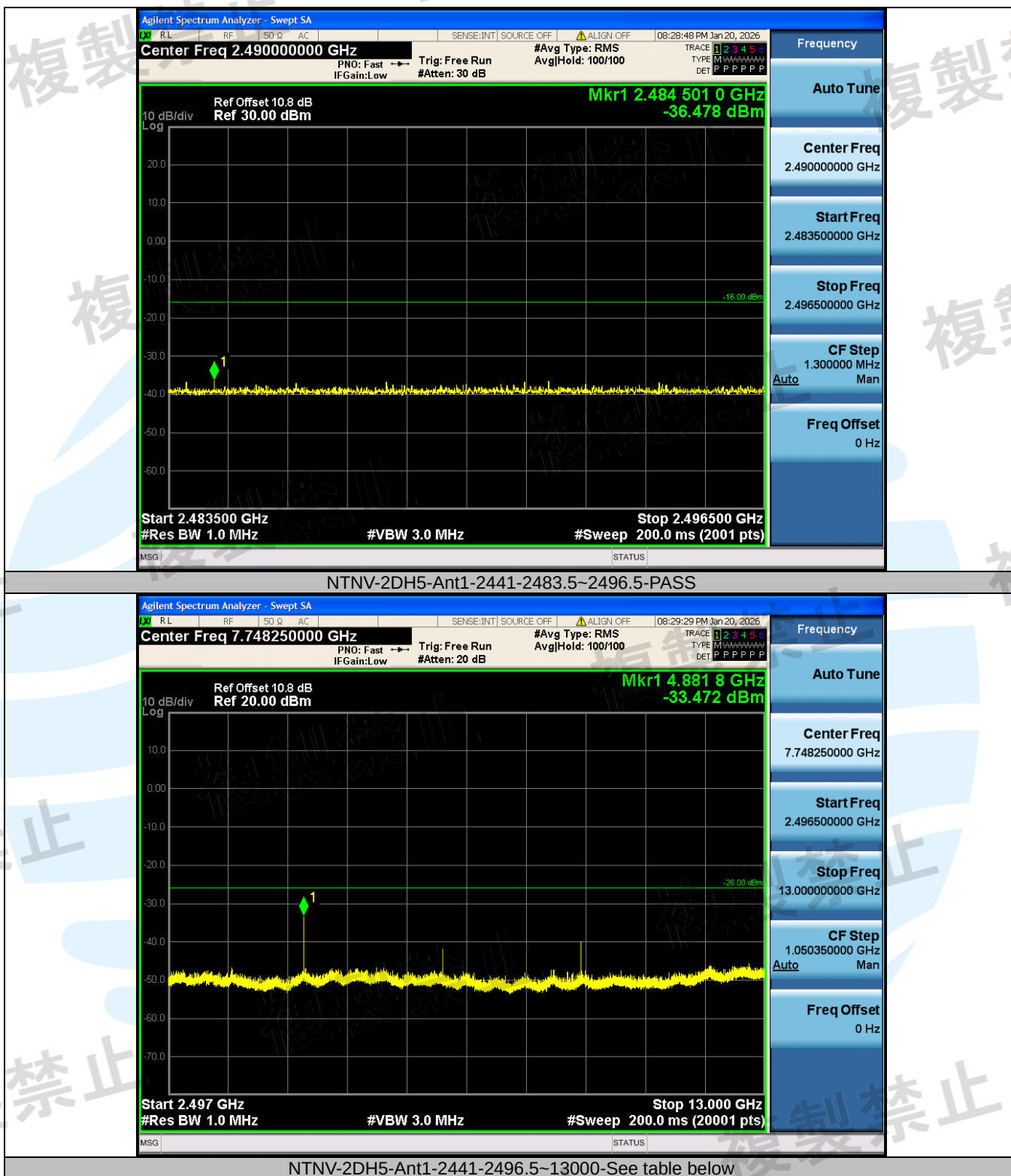
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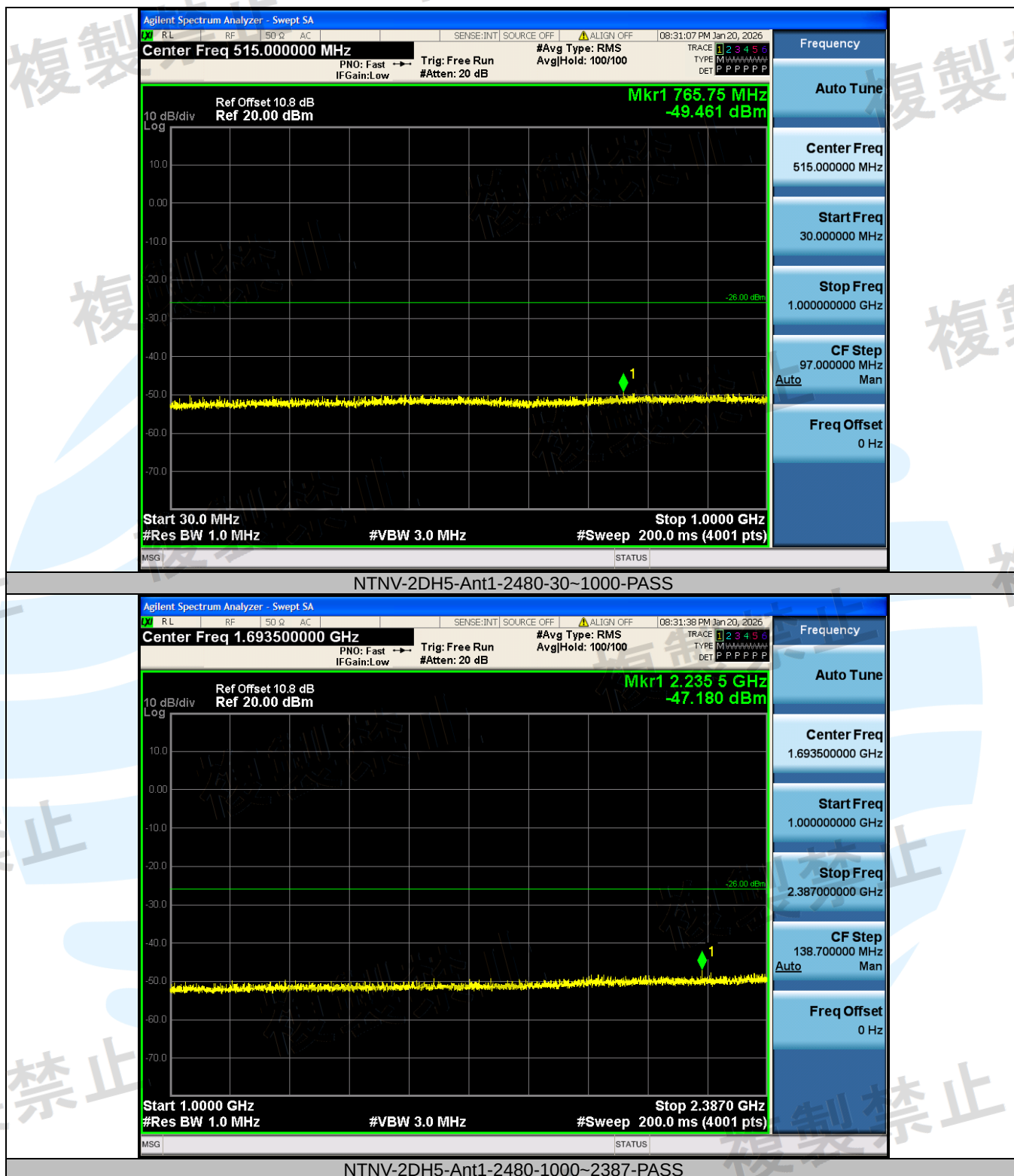
E-mail: info@uttlab.com

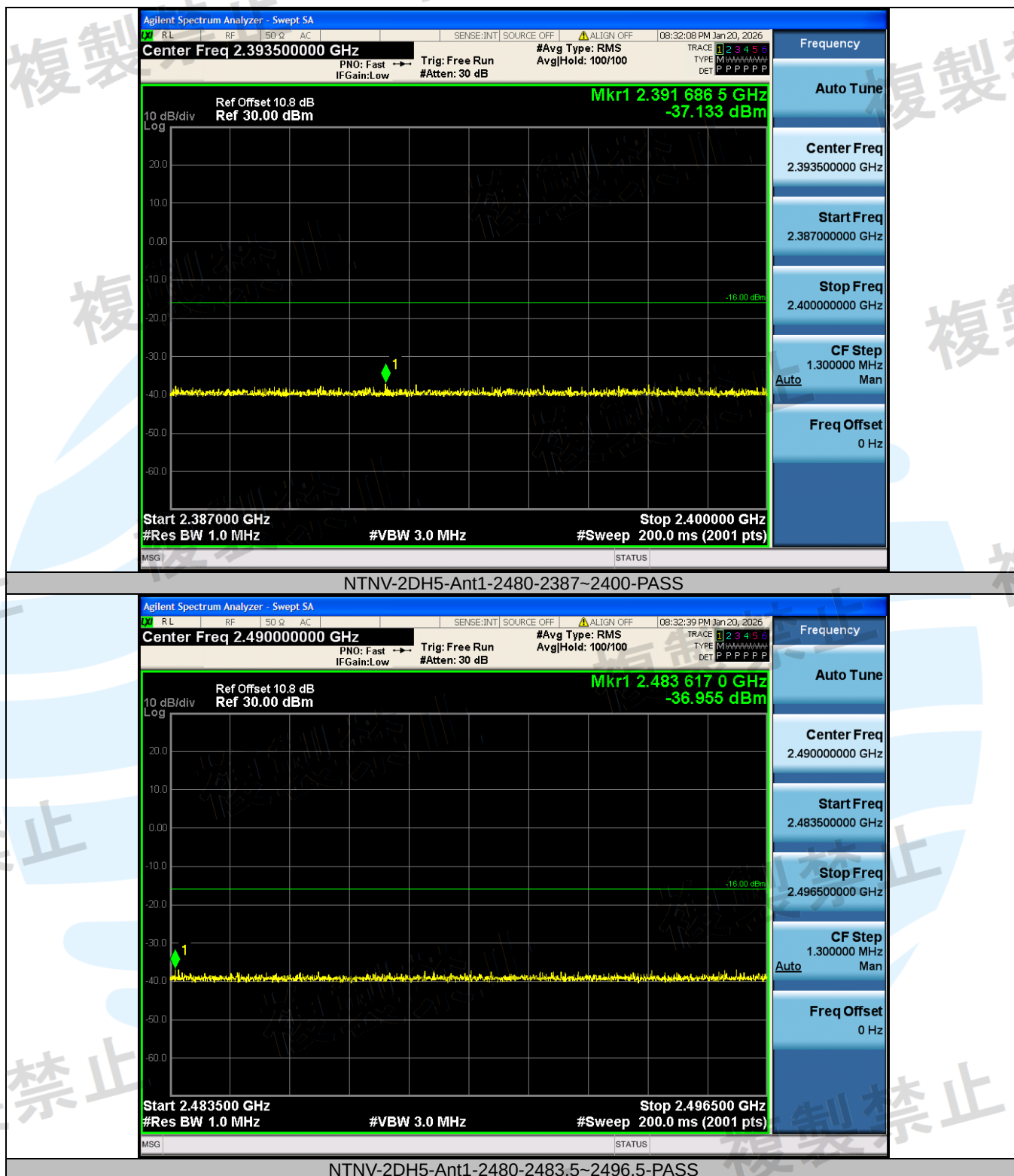
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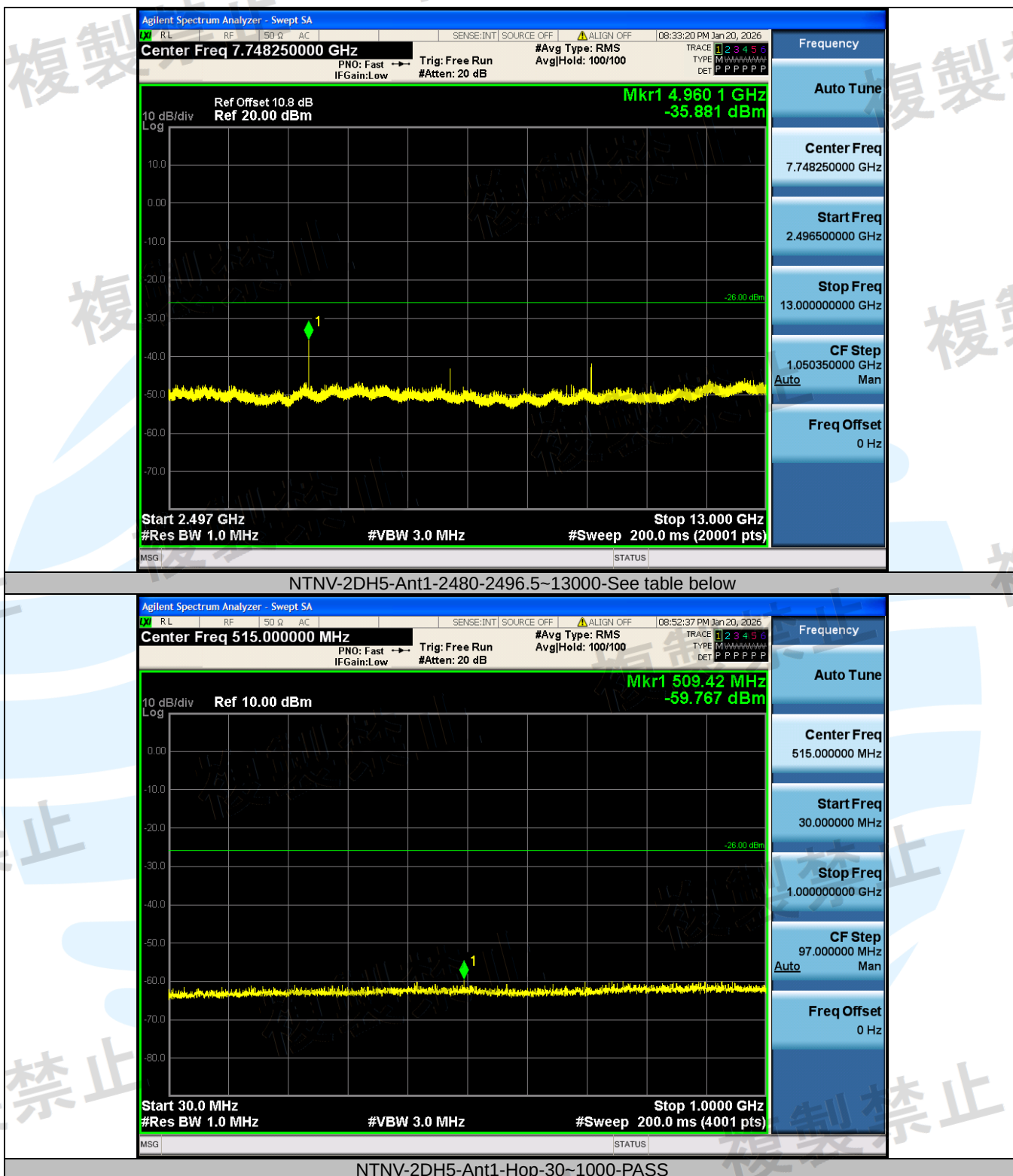
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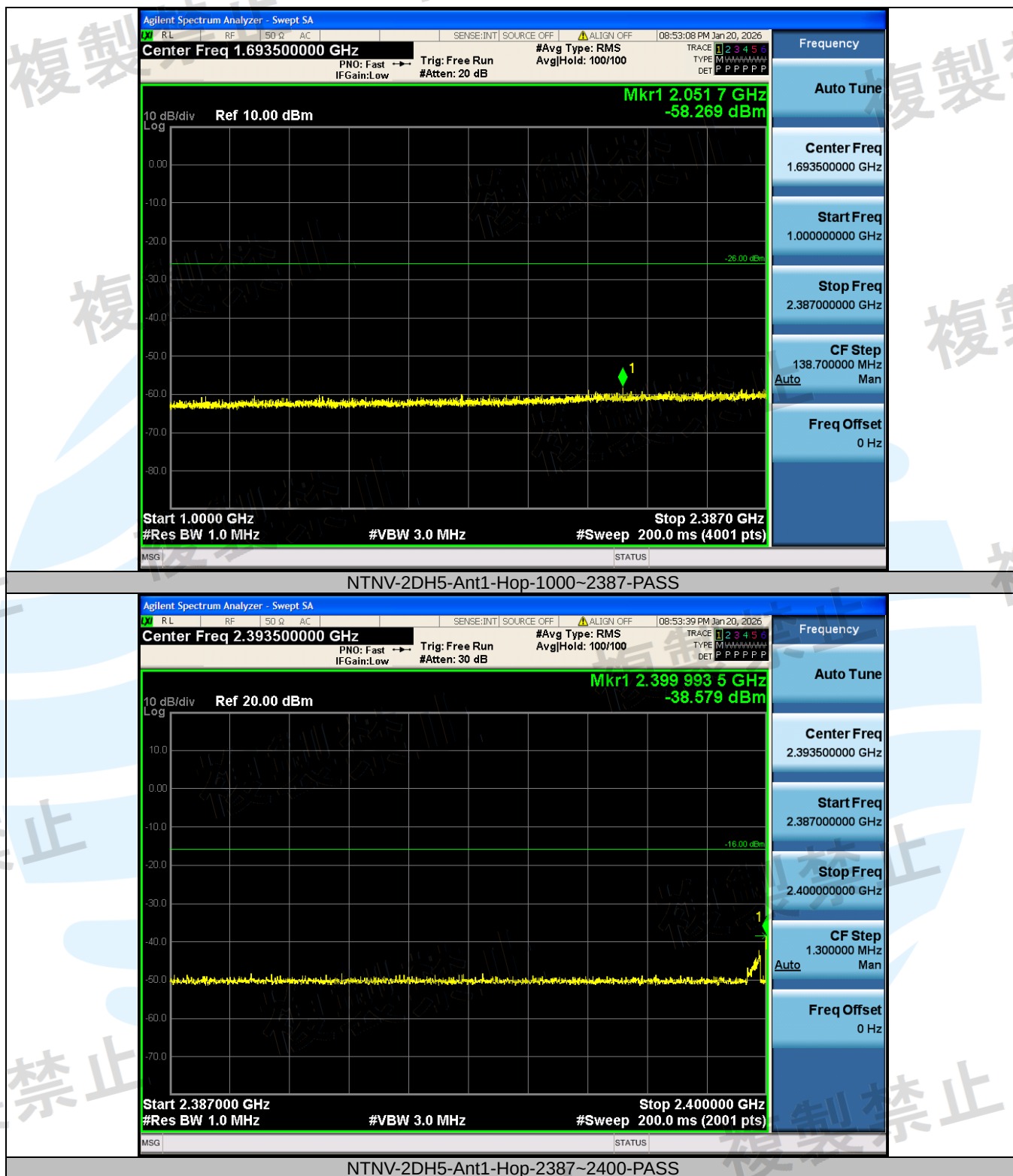


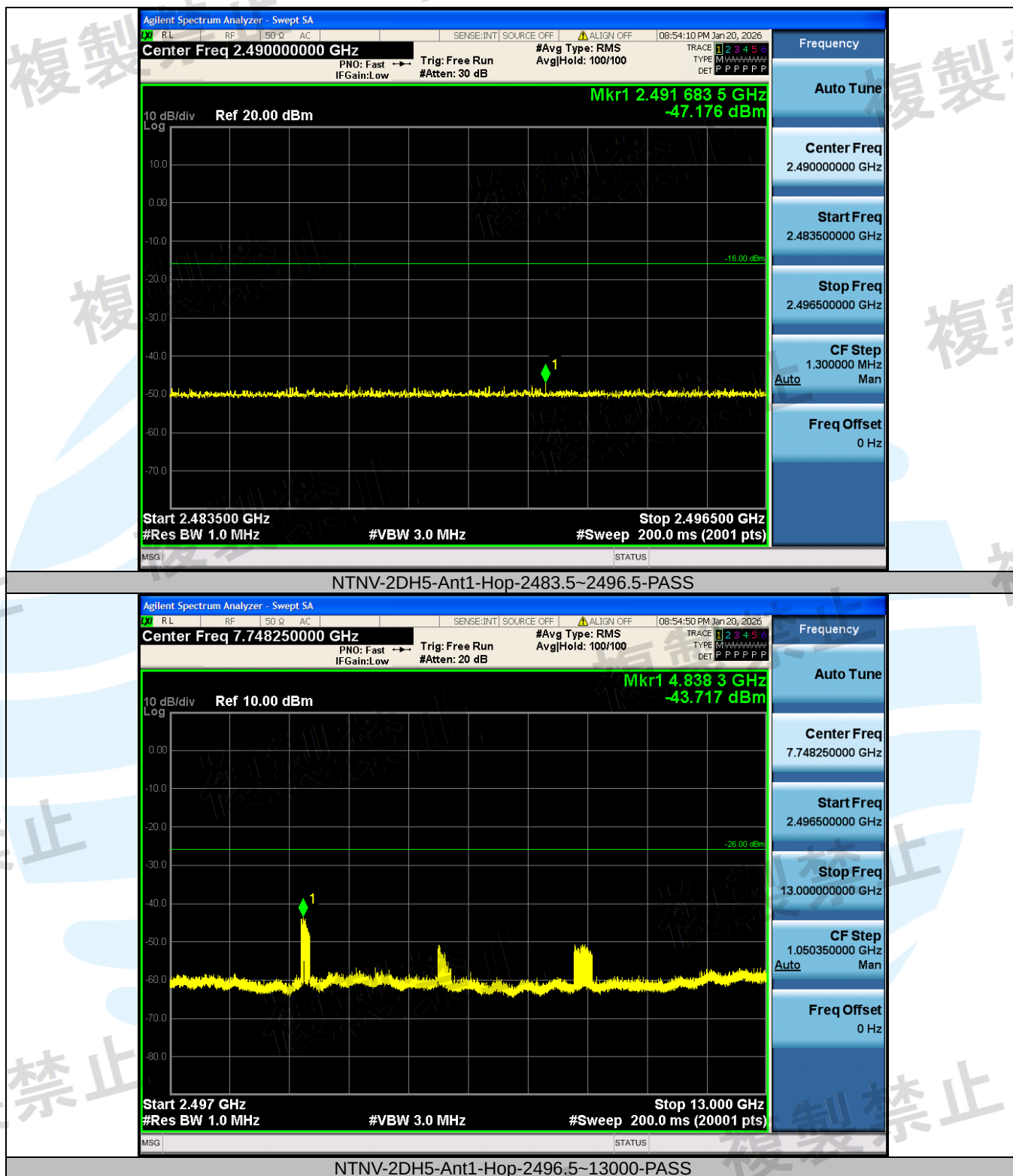


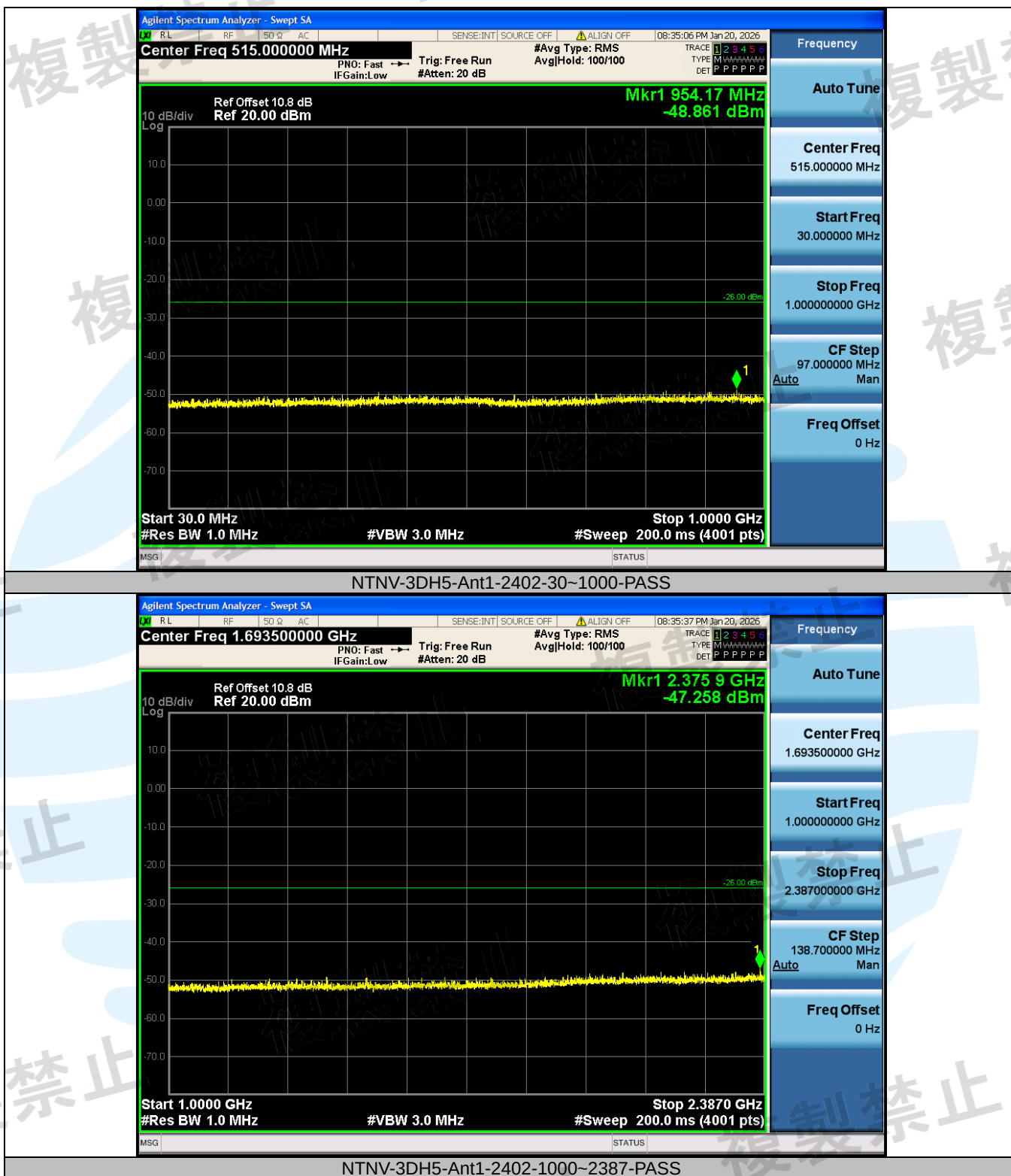


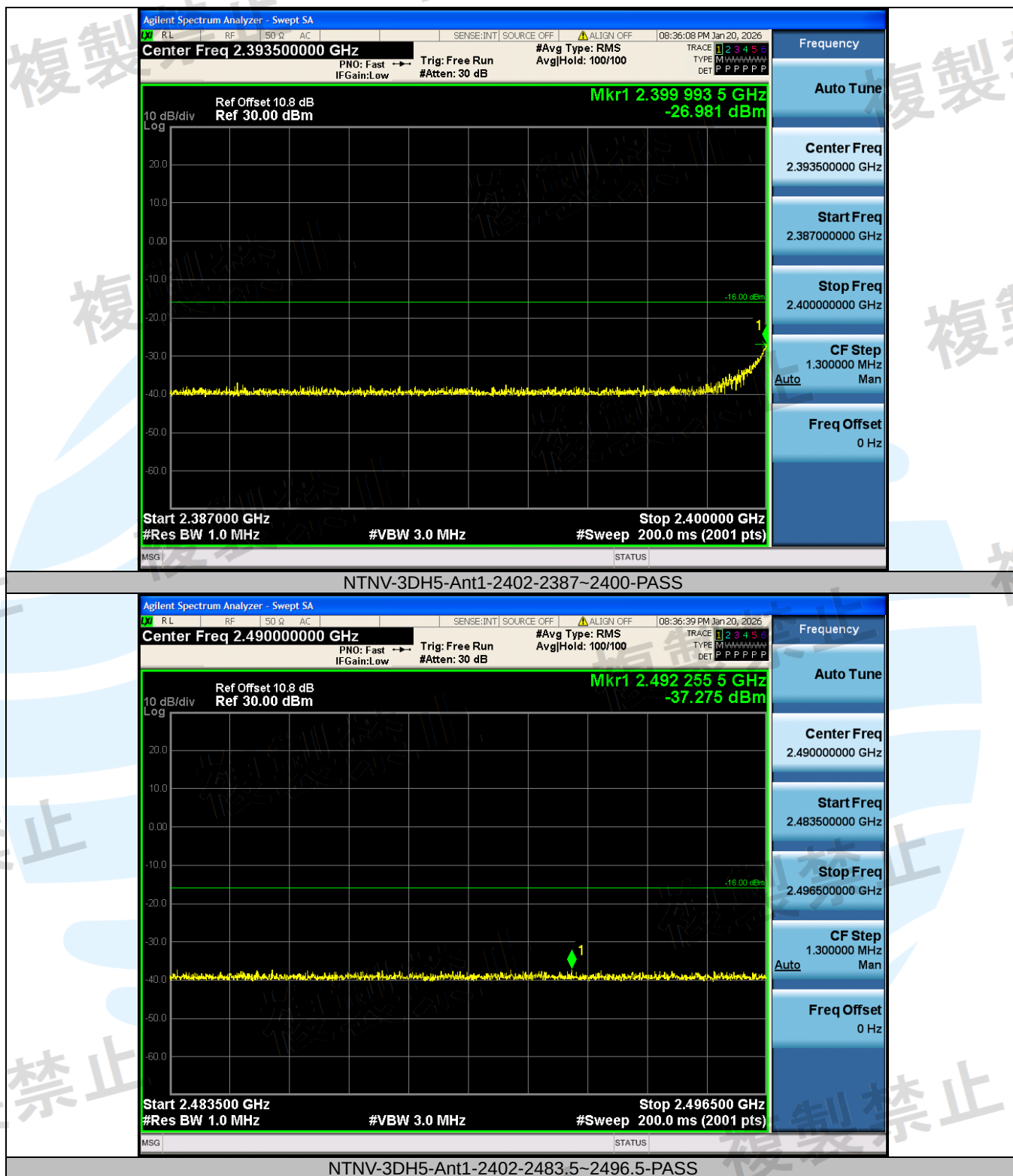










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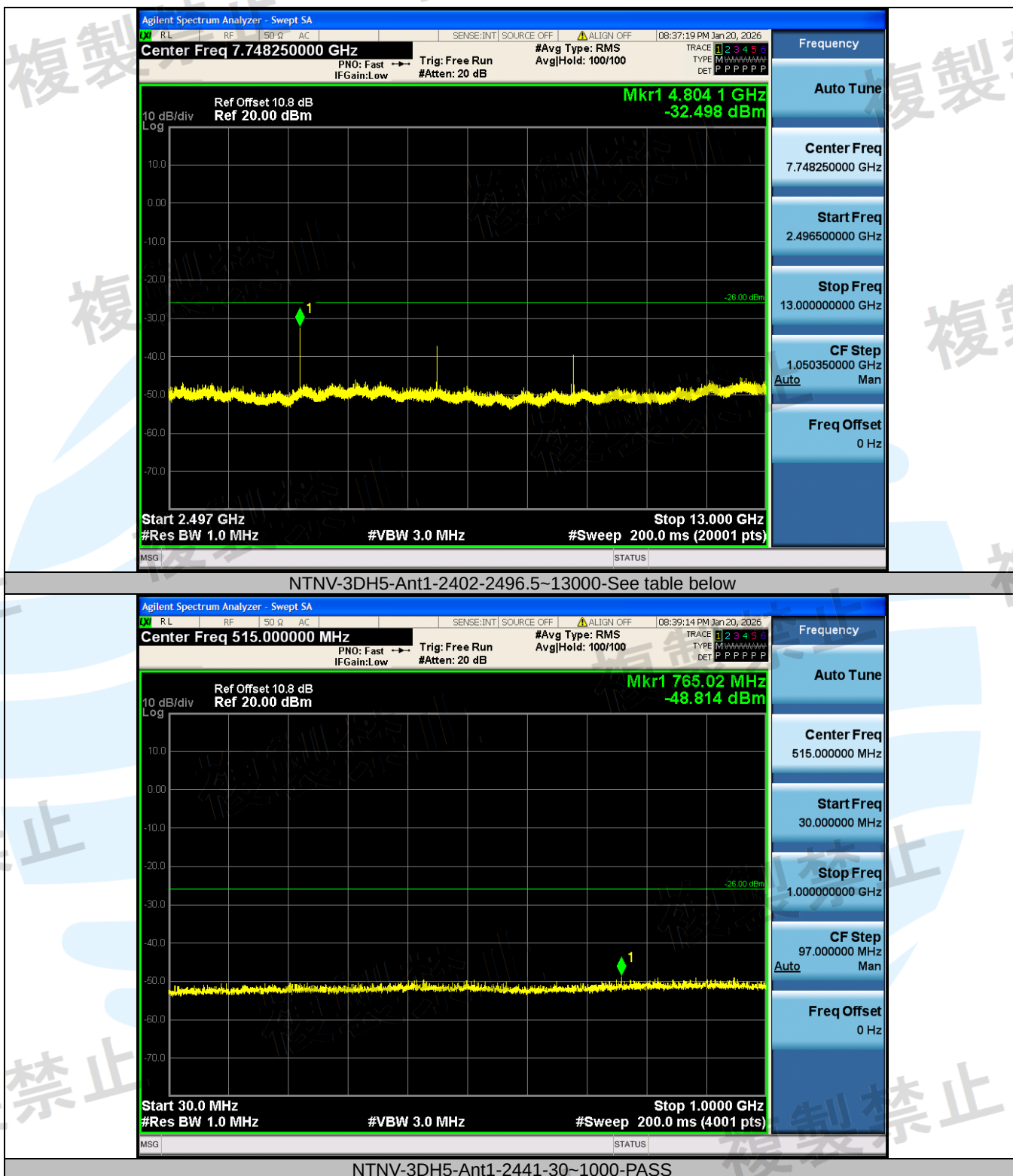
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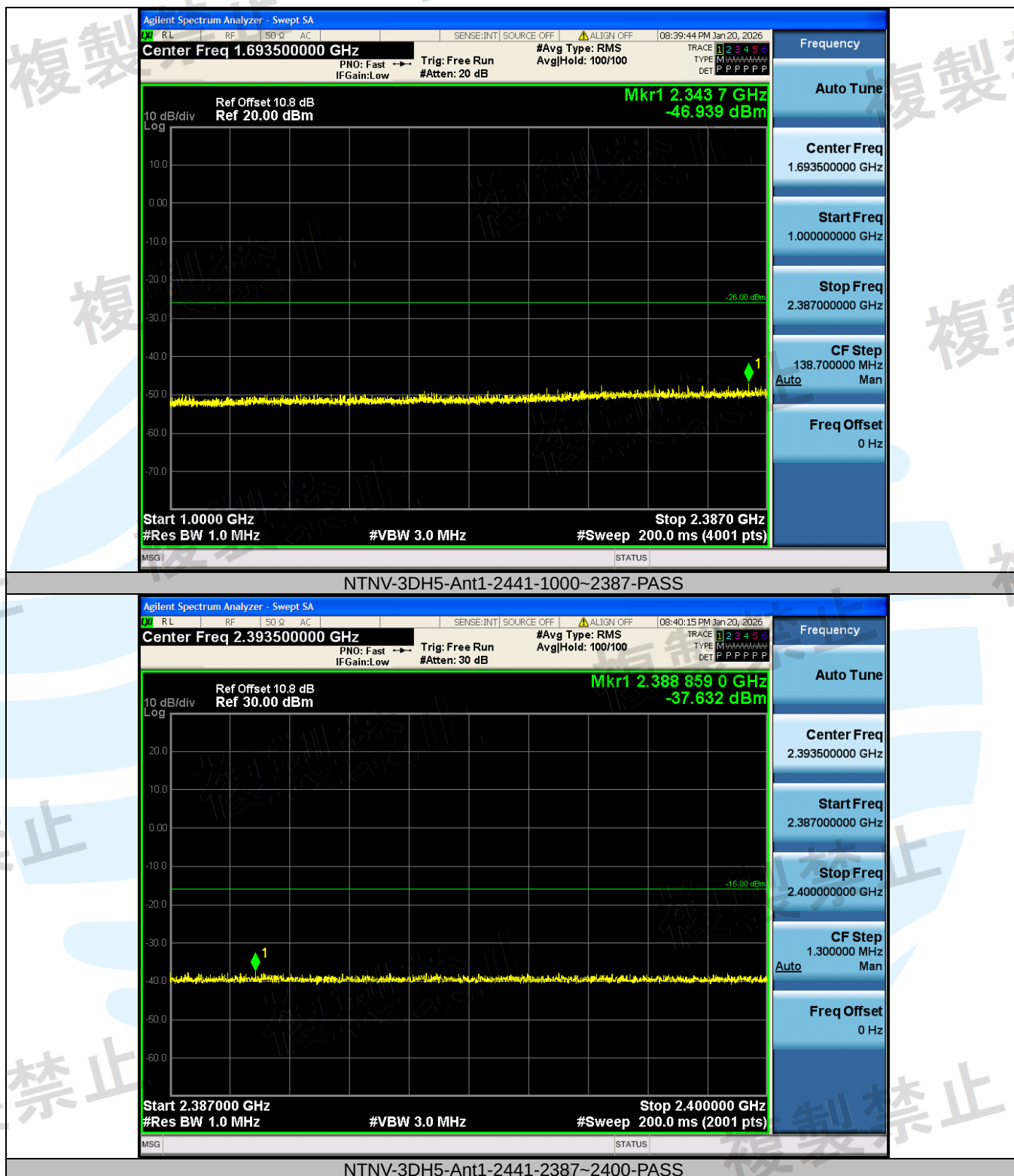
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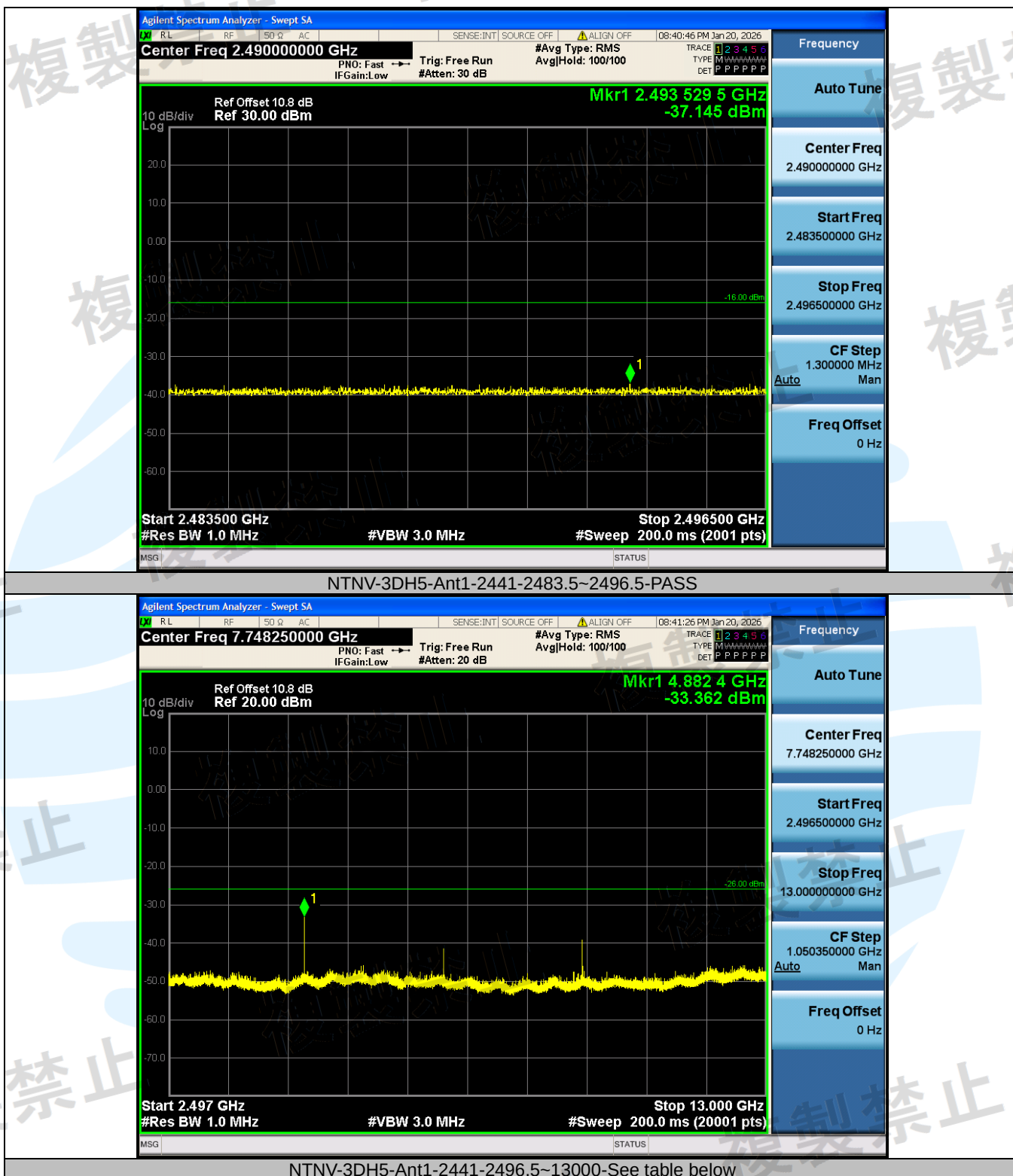
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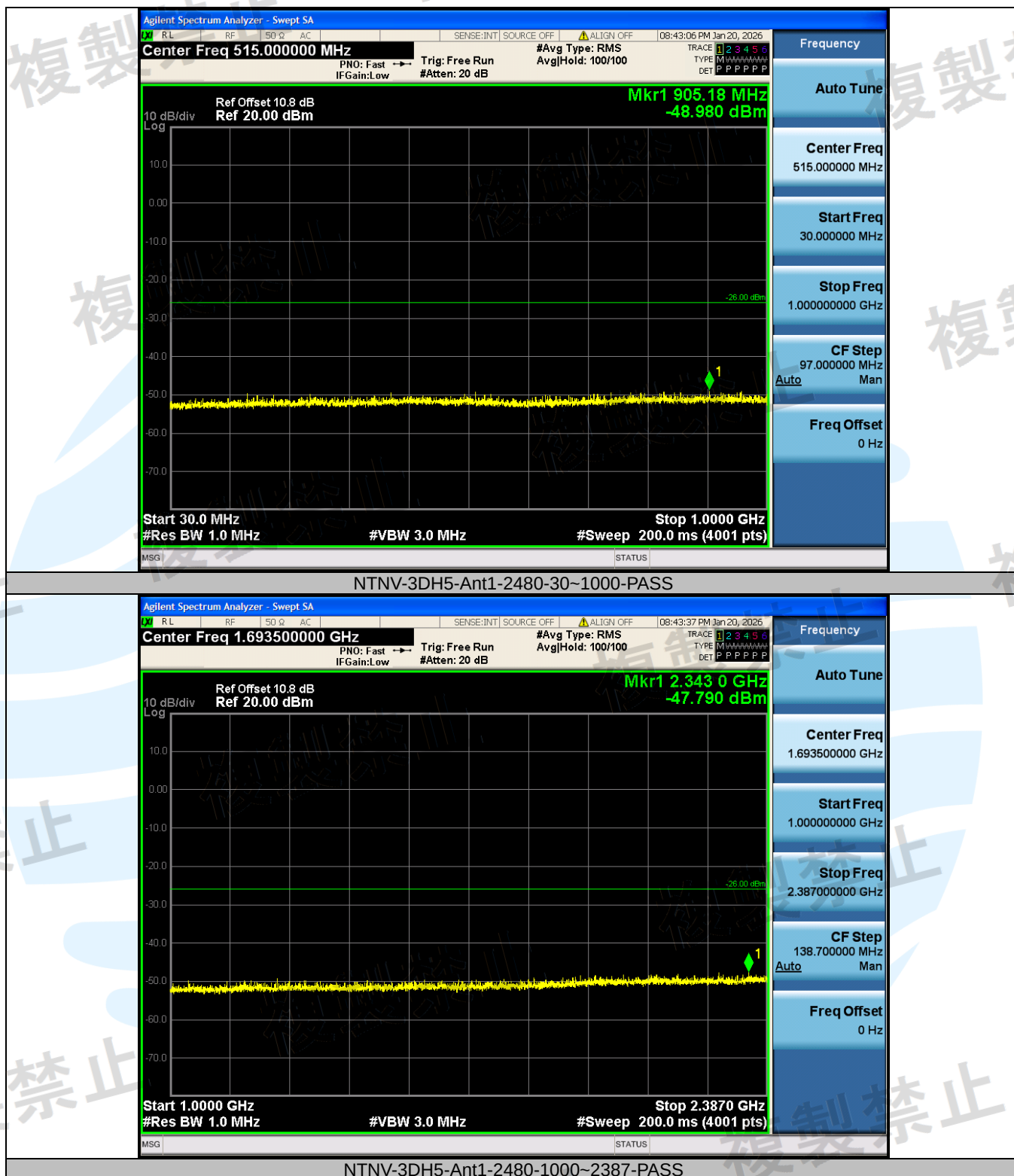
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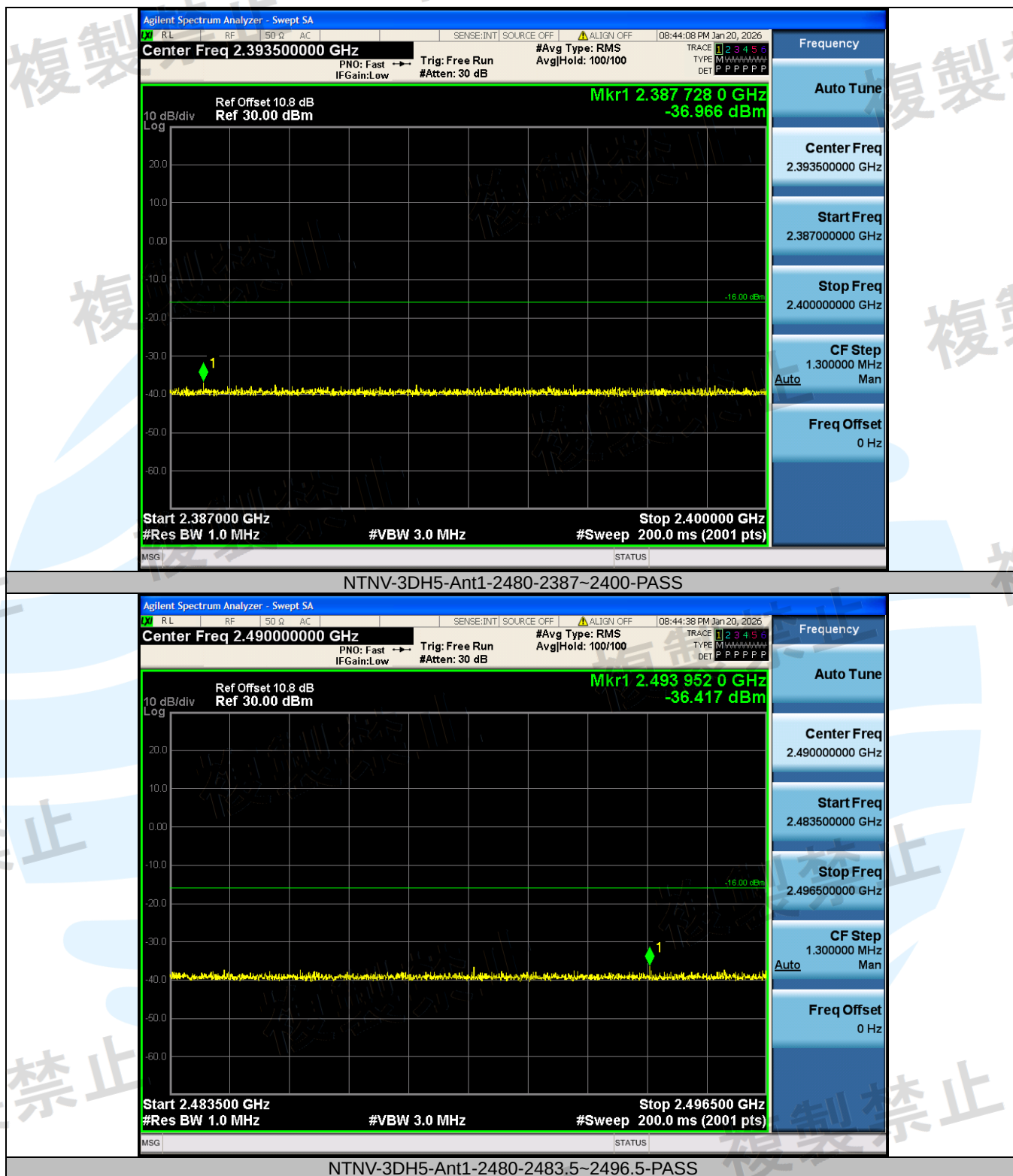
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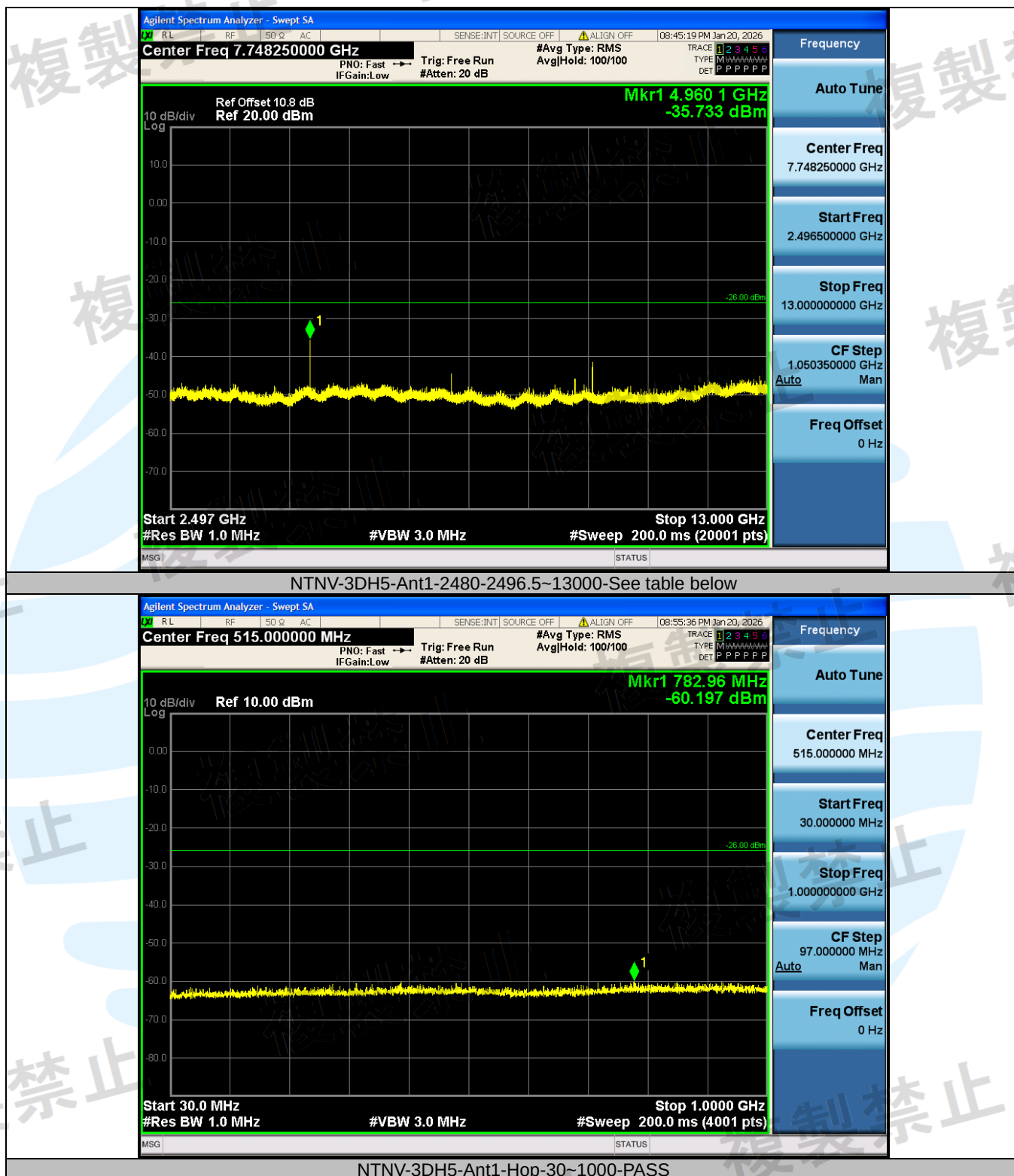
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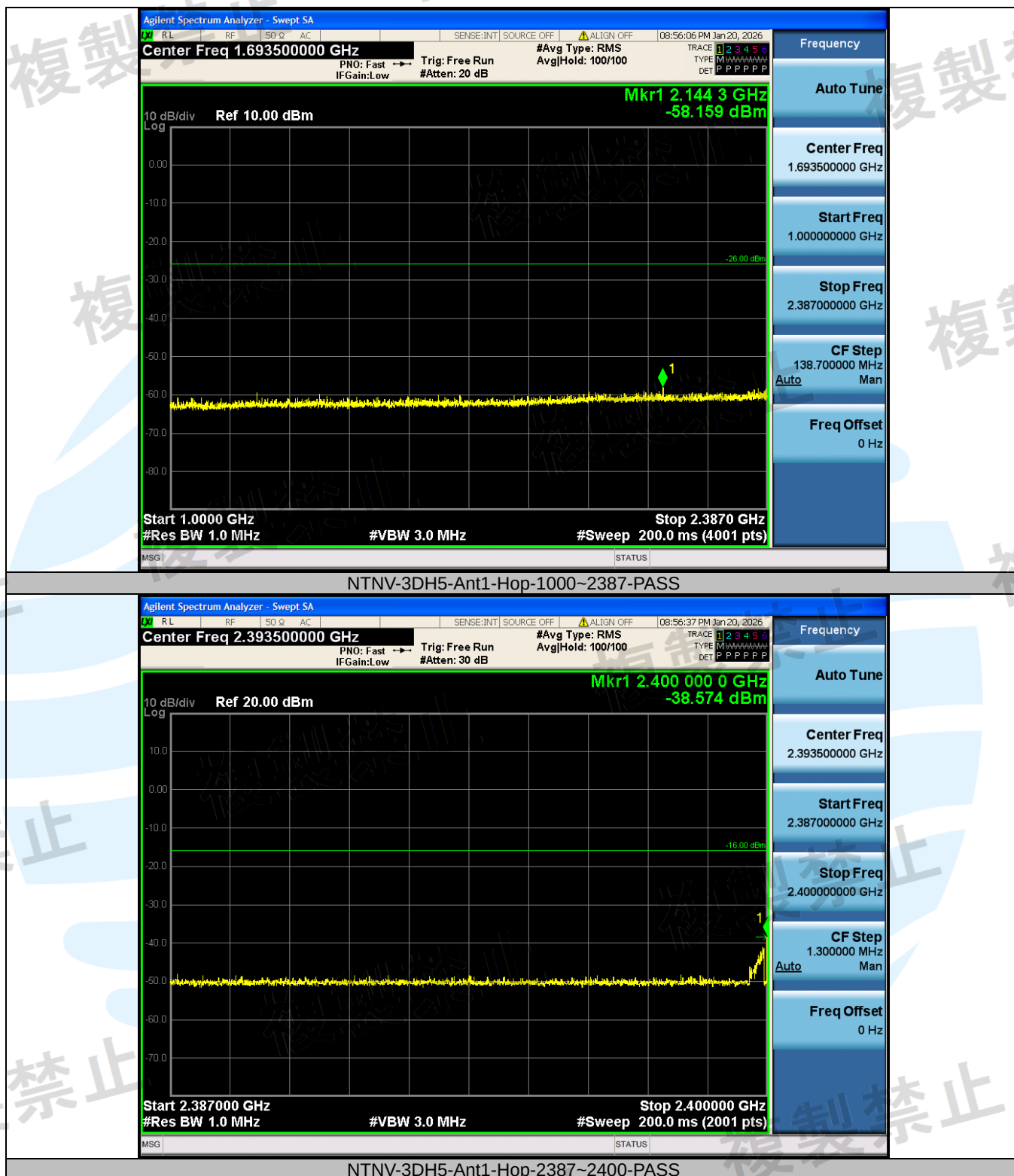
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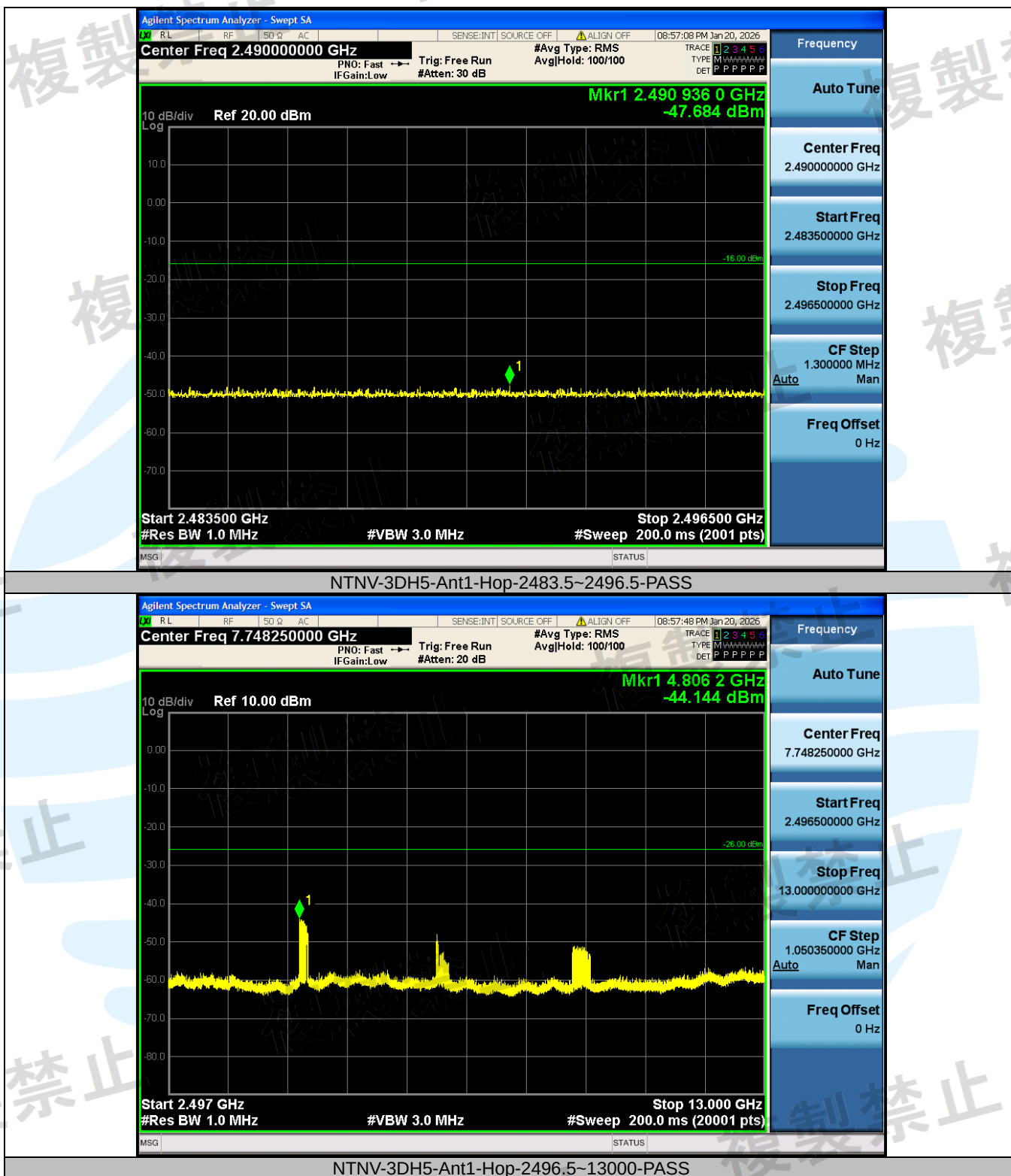
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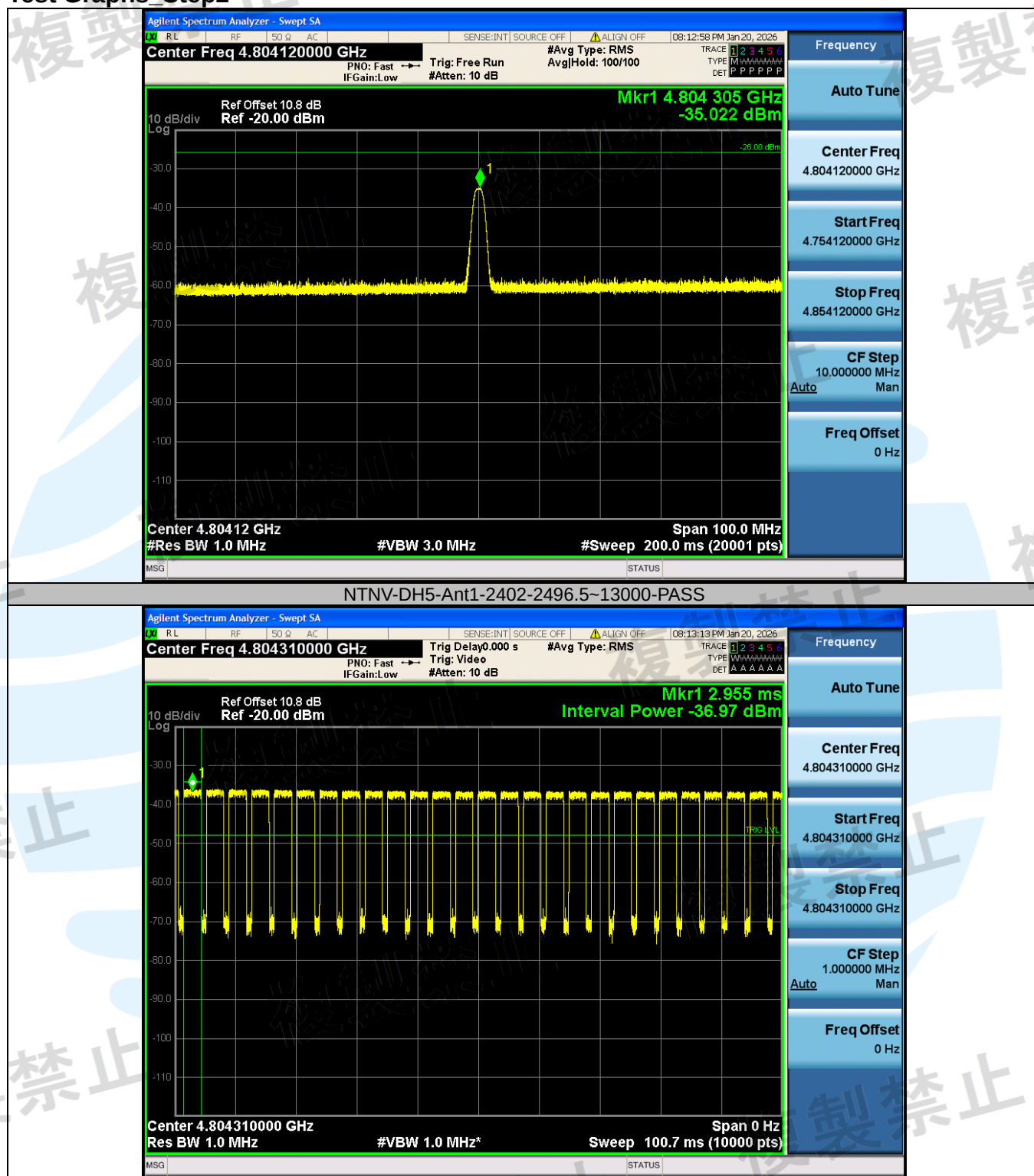
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Test Graphs Step2



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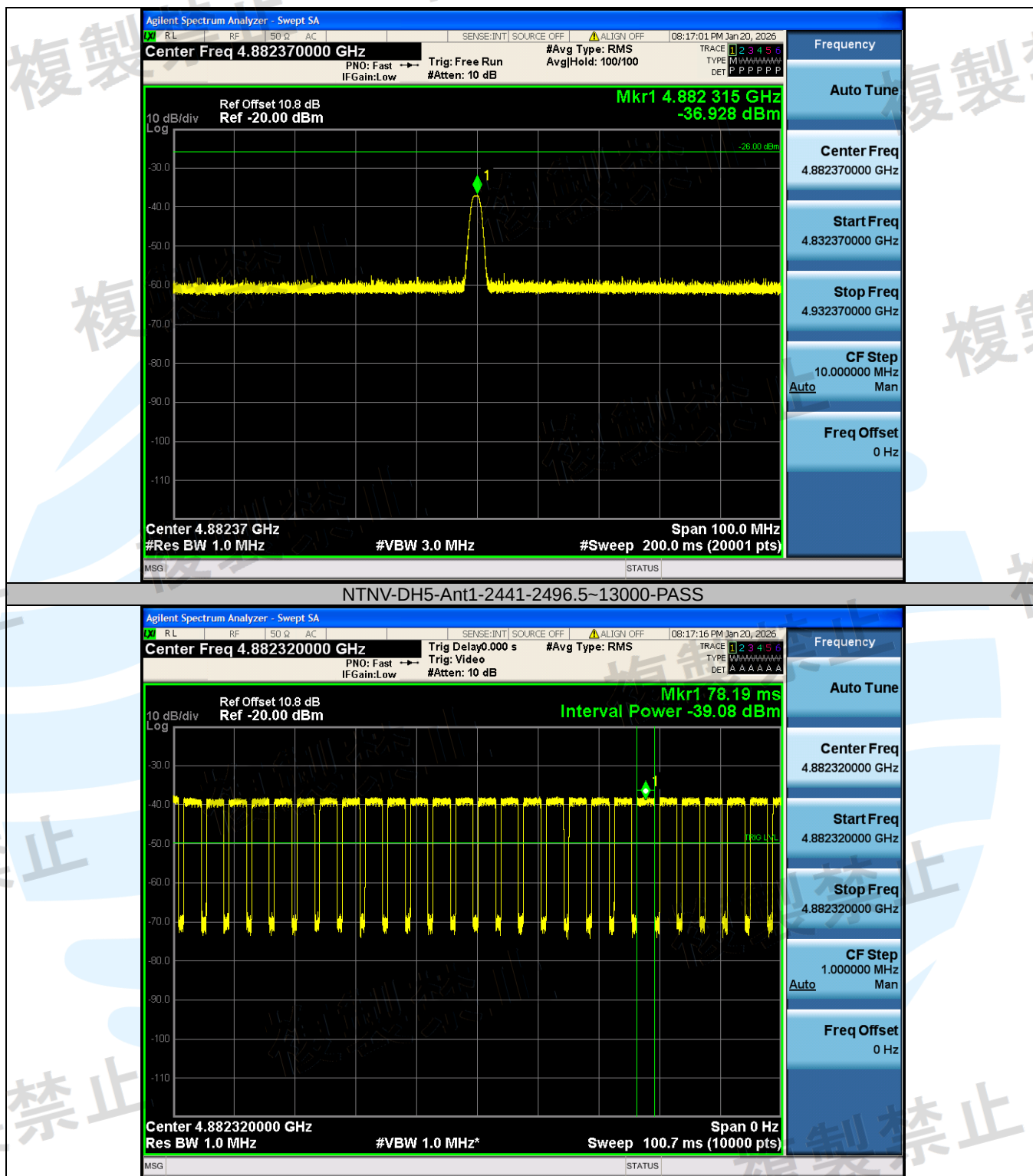
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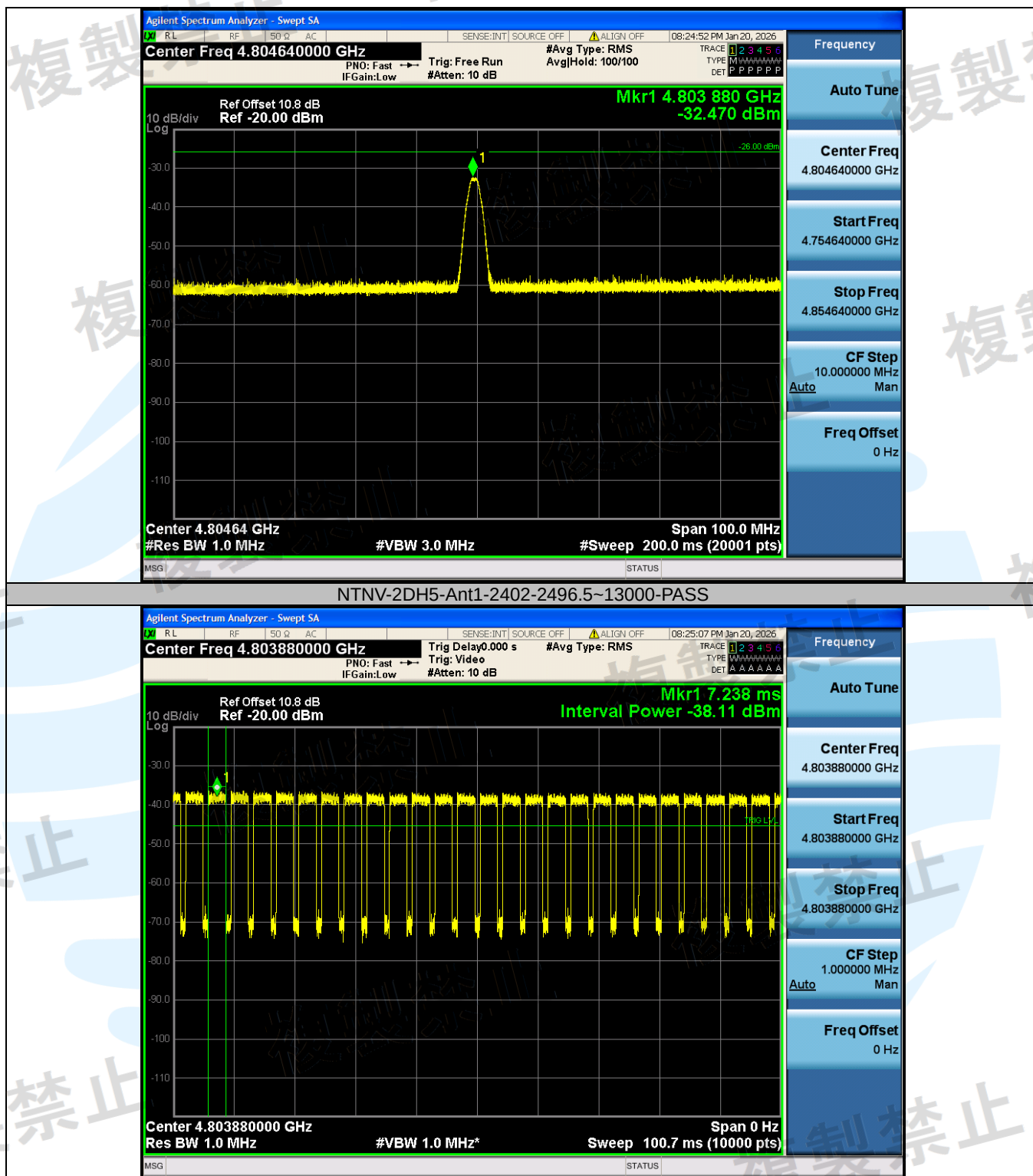
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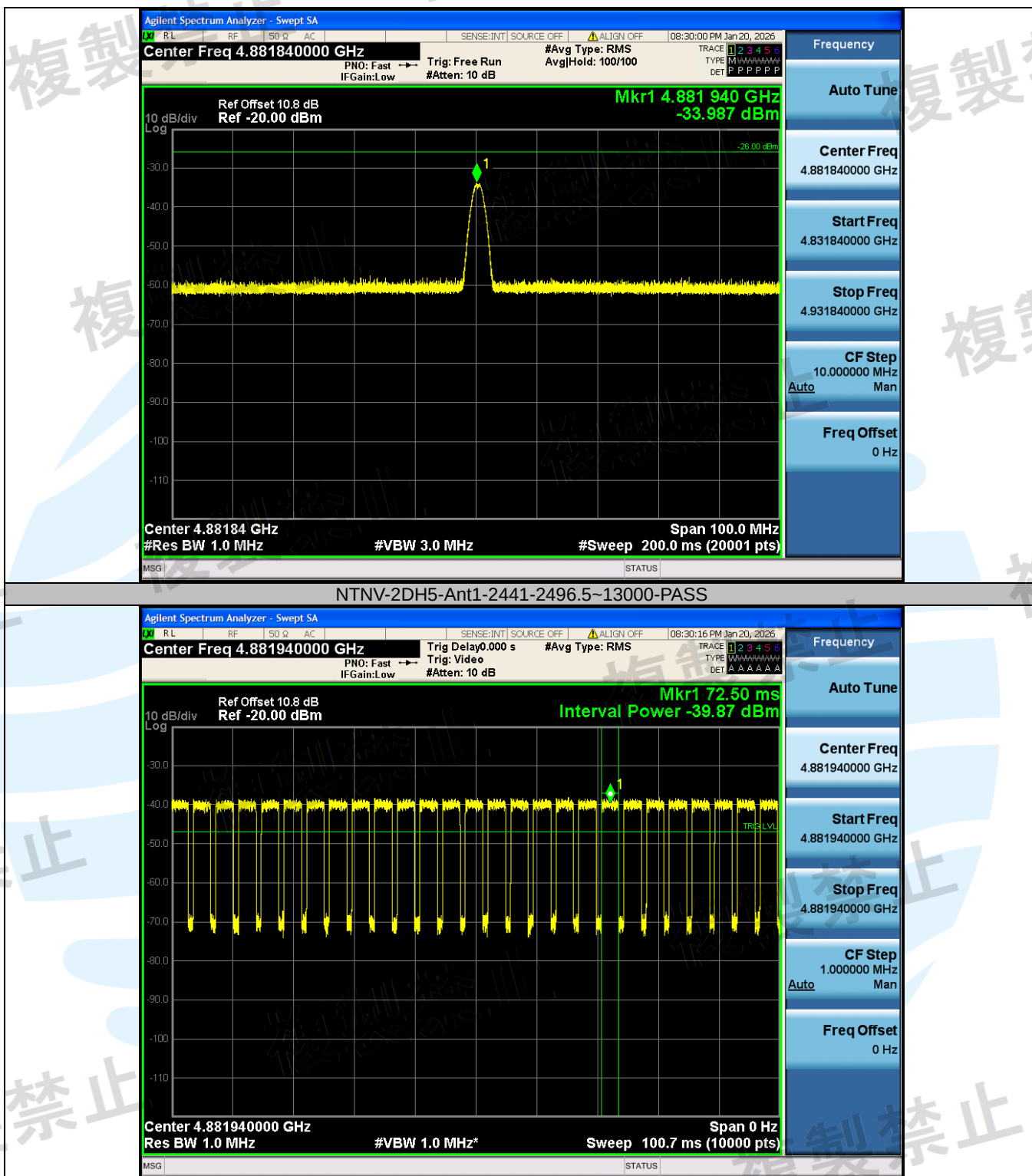
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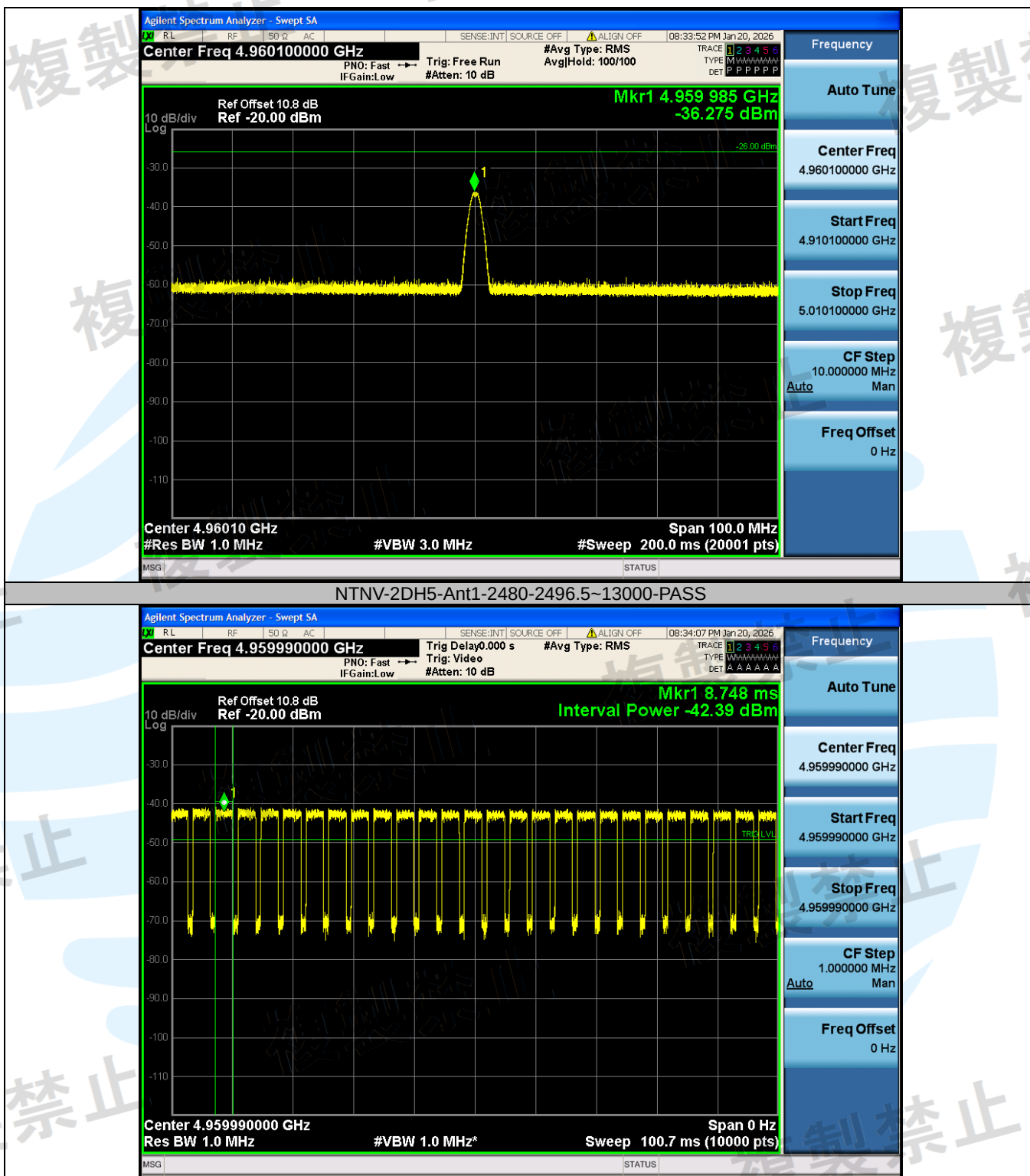
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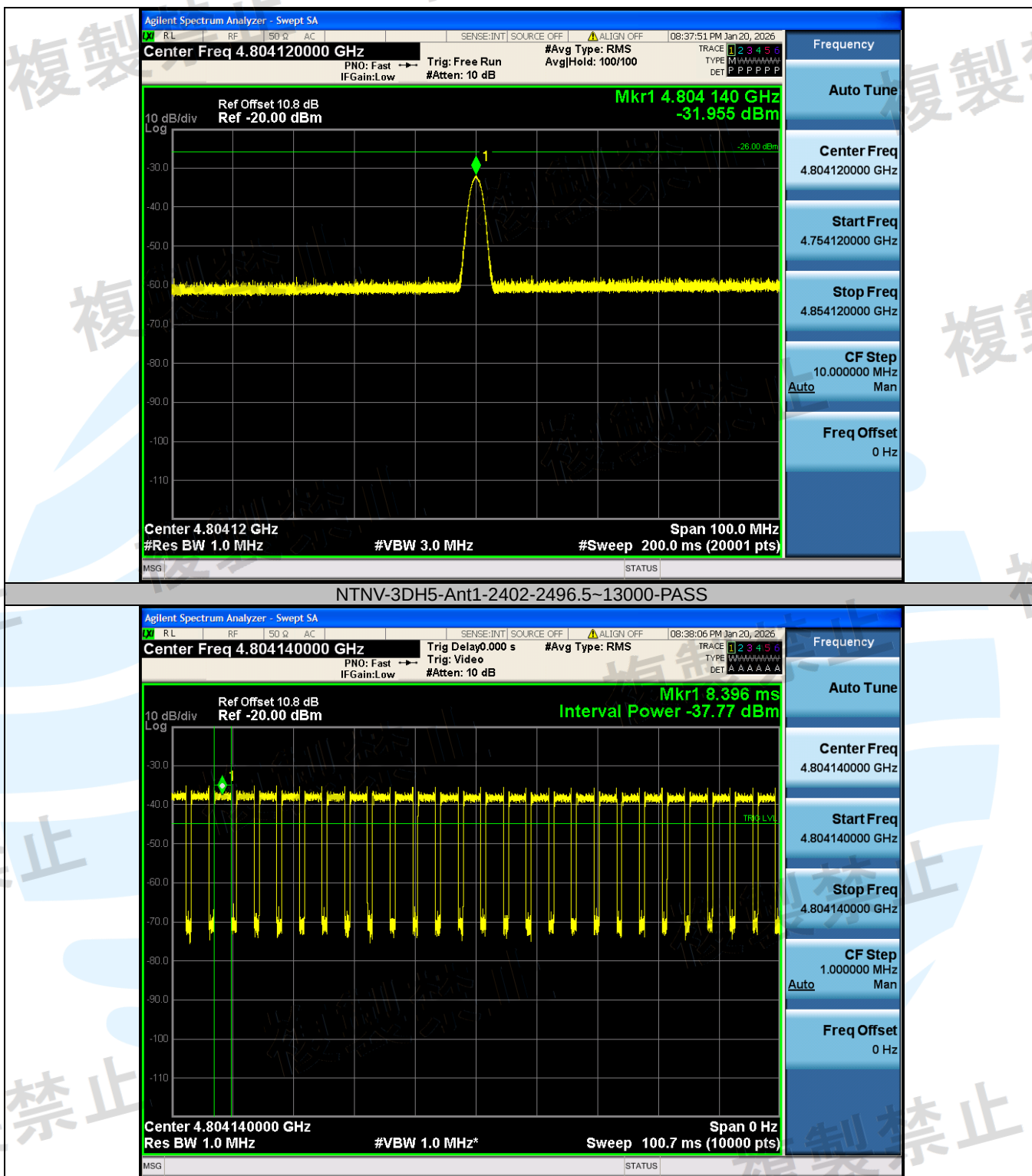
E-mail: info@uttlab.com

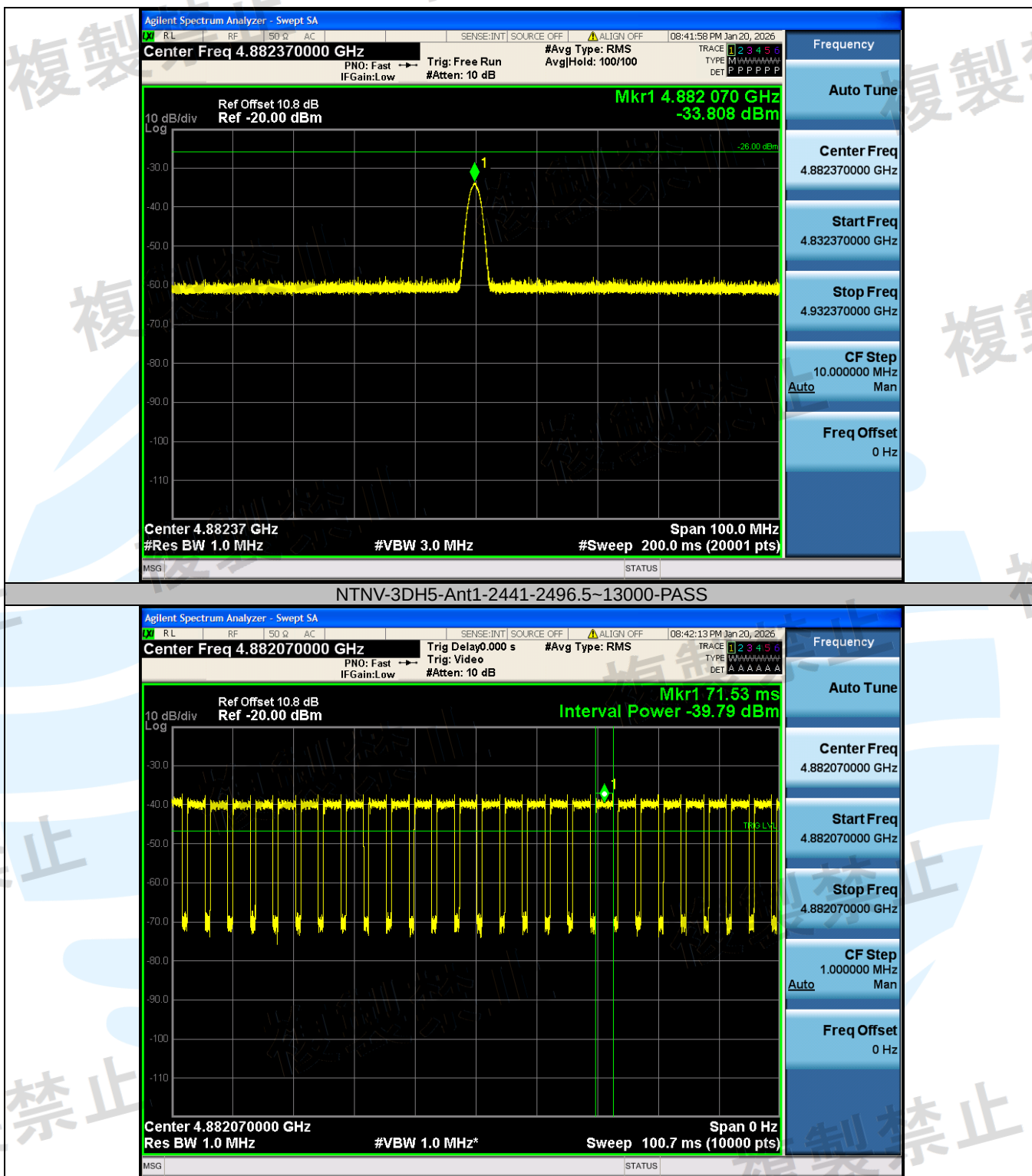
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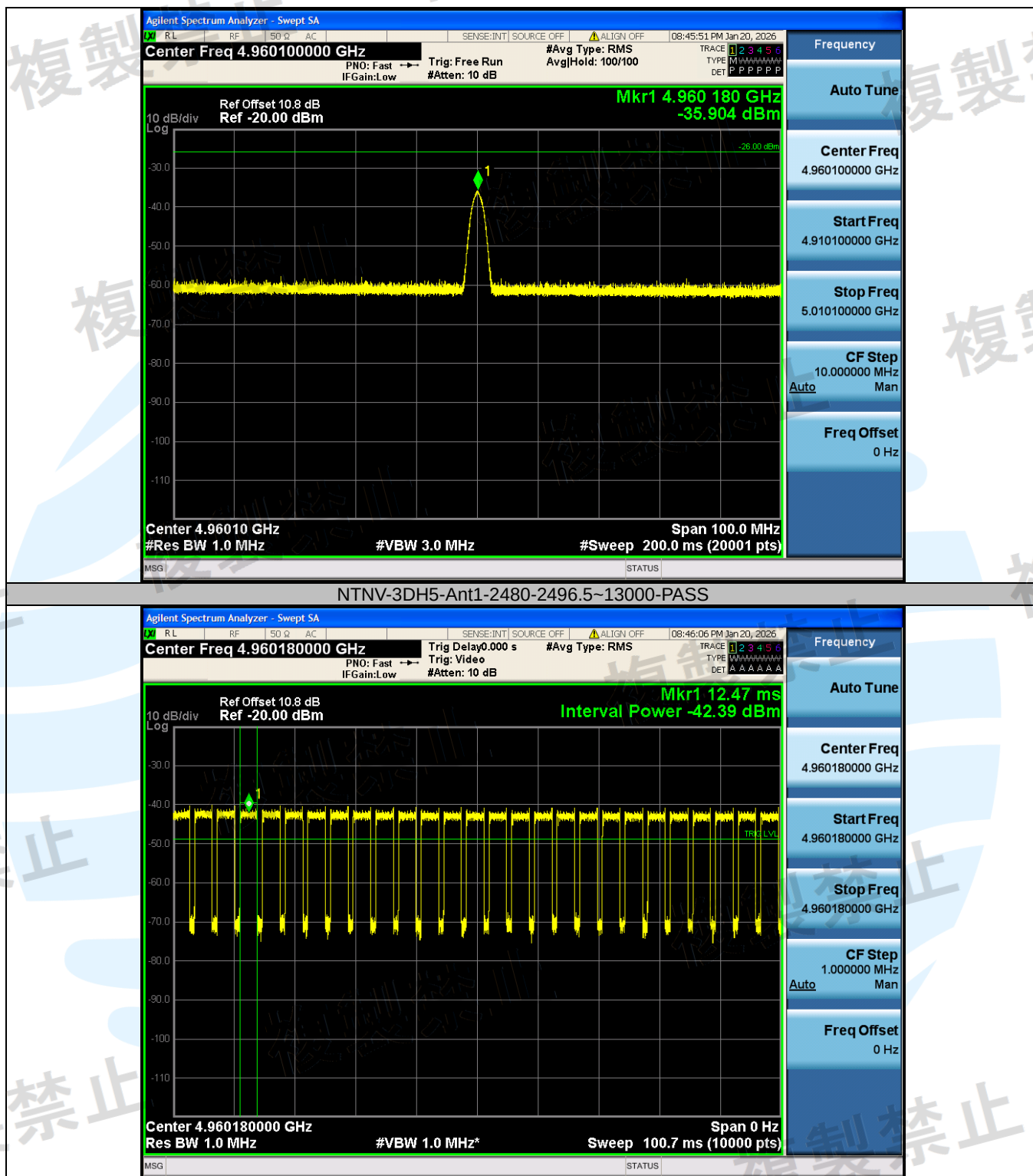
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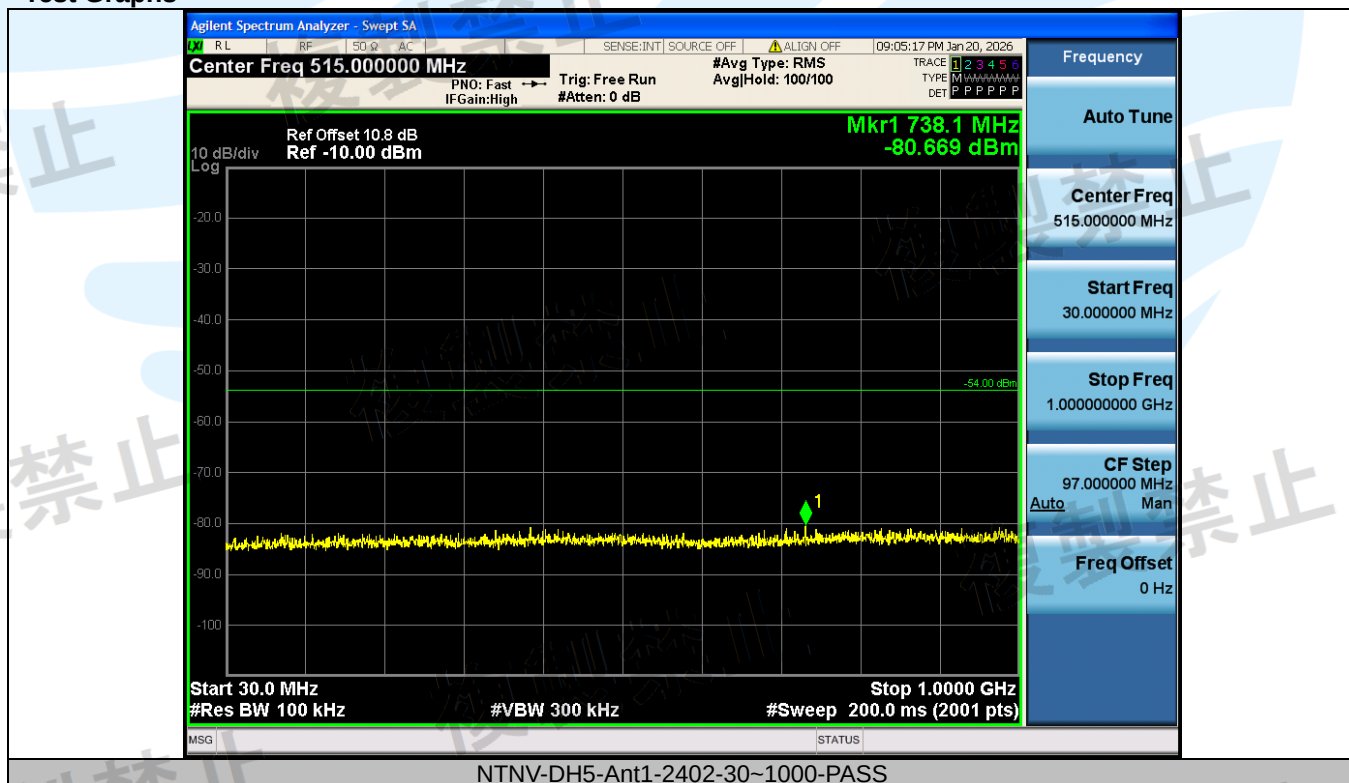


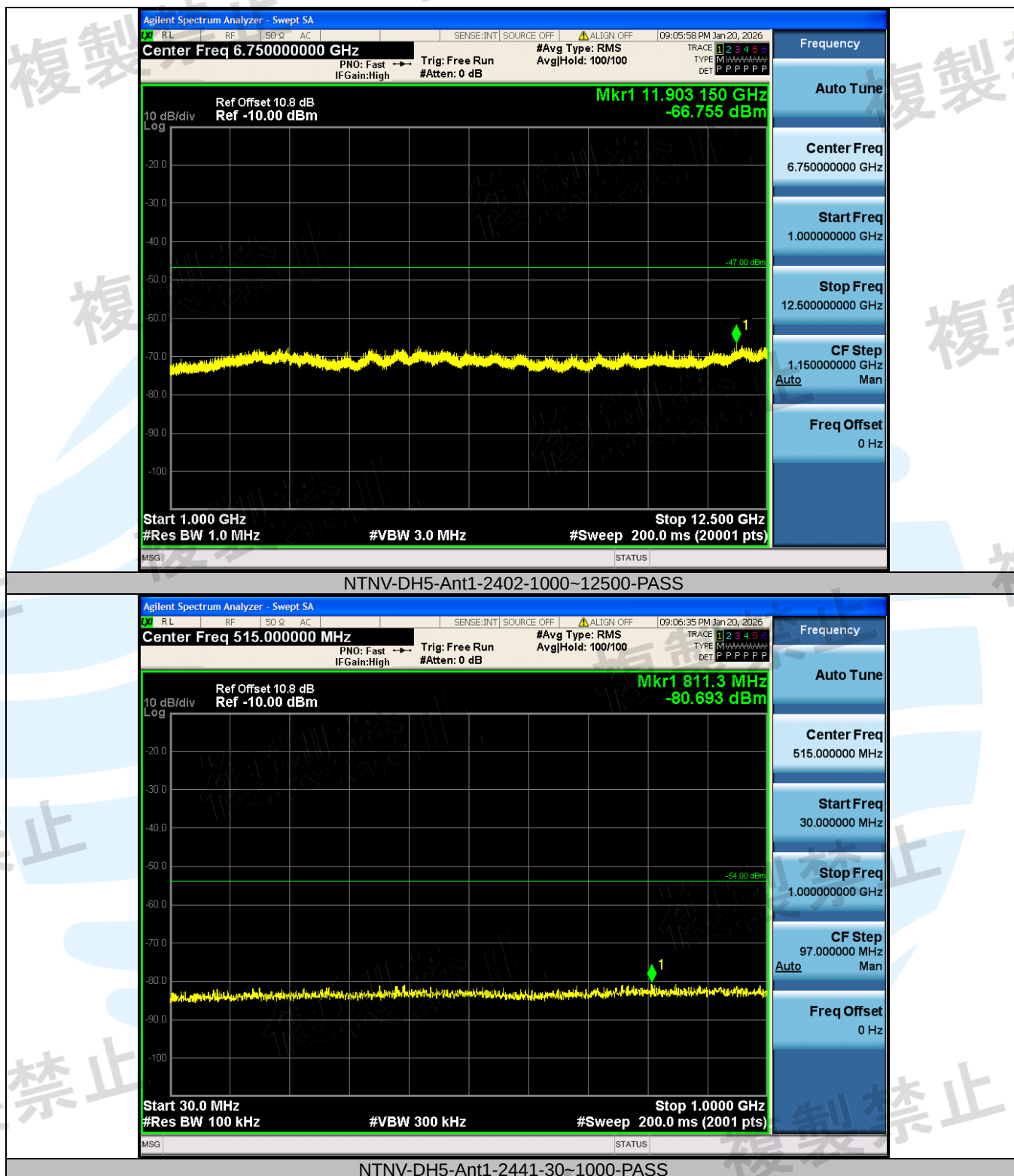
A.6 SPURIOUS EMISSIONS OF RECEIVER

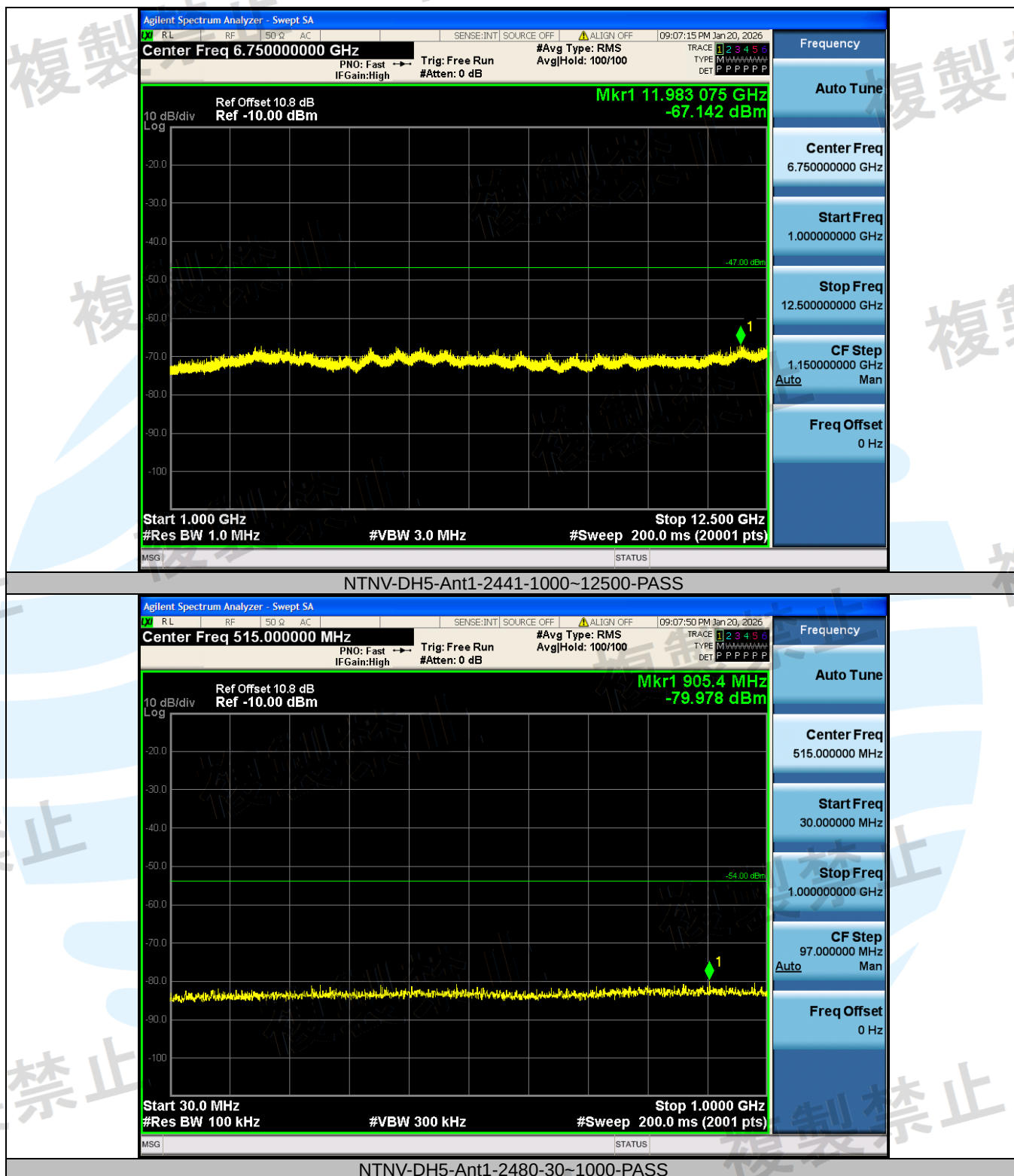
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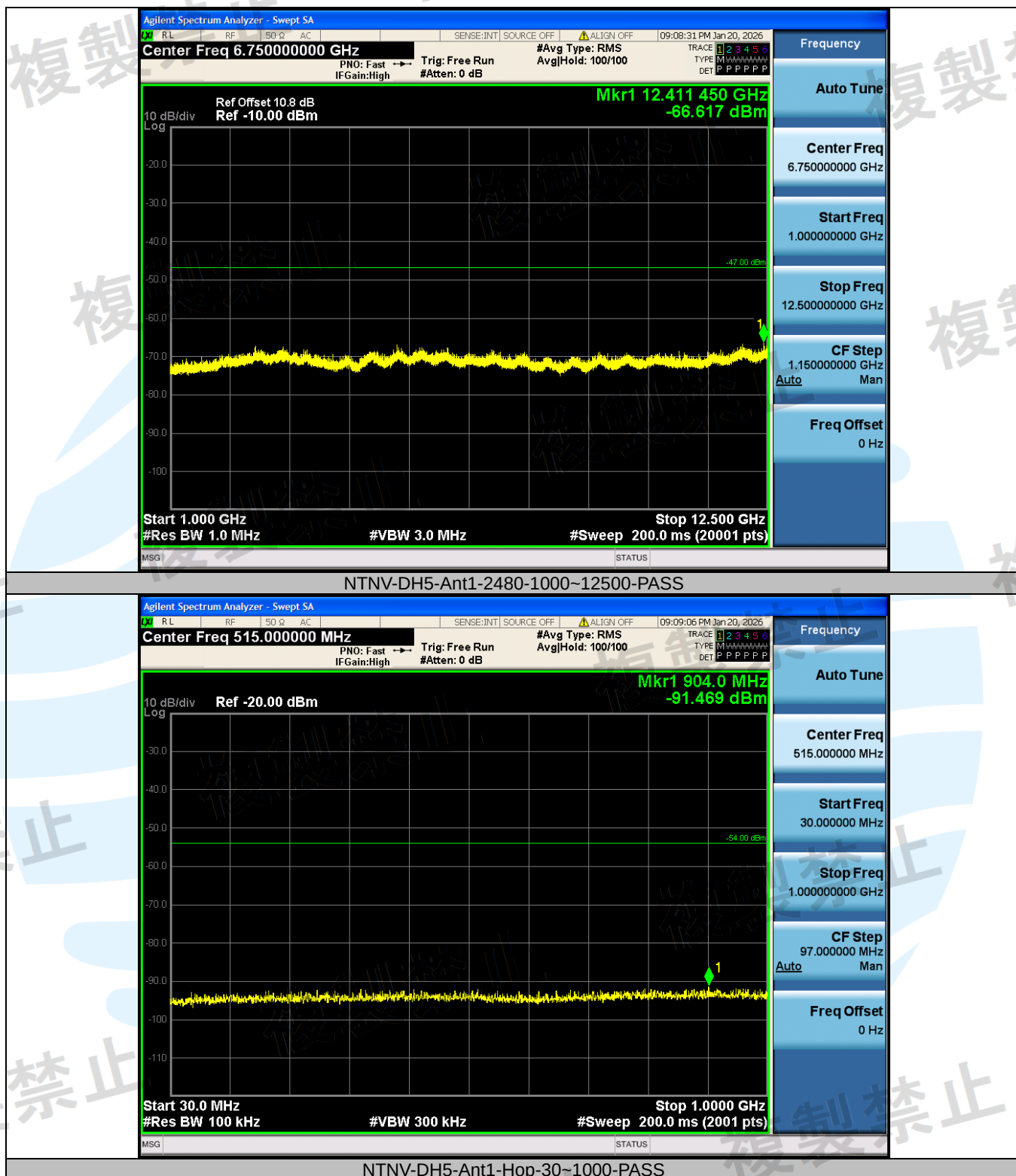
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NTNV	DH5	Ant1	2402	30~1000	738.10	-80.67	≤-54	0.00857	≤4	PASS
NTNV	DH5	Ant1	2402	1000~12500	11903.15	-66.76	≤-47	0.21086	≤20	PASS
NTNV	DH5	Ant1	2441	30~1000	811.34	-80.69	≤-54	0.00853	≤4	PASS
NTNV	DH5	Ant1	2441	1000~12500	11983.08	-67.14	≤-47	0.19320	≤20	PASS
NTNV	DH5	Ant1	2480	30~1000	905.43	-79.98	≤-54	0.01005	≤4	PASS
NTNV	DH5	Ant1	2480	1000~12500	12411.45	-66.62	≤-47	0.21777	≤20	PASS
NTNV	DH5	Ant1	Hop	30~1000	903.97	-91.47	≤-54	0.00071	≤4	PASS
NTNV	DH5	Ant1	Hop	1000~12500	12042.30	-78.01	≤-47	0.01581	≤20	PASS
NTNV	2DH5	Ant1	2402	30~1000	932.59	-80.48	≤-54	0.00895	≤4	PASS
NTNV	2DH5	Ant1	2402	1000~12500	12010.68	-67.02	≤-47	0.19861	≤20	PASS
NTNV	2DH5	Ant1	2441	30~1000	911.73	-80.12	≤-54	0.00973	≤4	PASS
NTNV	2DH5	Ant1	2441	1000~12500	12037.13	-66.41	≤-47	0.22856	≤20	PASS
NTNV	2DH5	Ant1	2480	30~1000	781.27	-79.44	≤-54	0.01138	≤4	PASS
NTNV	2DH5	Ant1	2480	1000~12500	12485.05	-66.95	≤-47	0.20184	≤20	PASS
NTNV	2DH5	Ant1	Hop	30~1000	958.29	-91.40	≤-54	0.00072	≤4	PASS
NTNV	2DH5	Ant1	Hop	1000~12500	11984.80	-77.21	≤-47	0.01901	≤20	PASS
NTNV	3DH5	Ant1	2402	30~1000	887.97	-79.99	≤-54	0.01002	≤4	PASS
NTNV	3DH5	Ant1	2402	1000~12500	12470.68	-66.60	≤-47	0.21878	≤20	PASS
NTNV	3DH5	Ant1	2441	30~1000	445.65	-80.00	≤-54	0.01000	≤4	PASS
NTNV	3DH5	Ant1	2441	1000~12500	11993.43	-67.17	≤-47	0.19187	≤20	PASS
NTNV	3DH5	Ant1	2480	30~1000	800.18	-79.47	≤-54	0.01130	≤4	PASS
NTNV	3DH5	Ant1	2480	1000~12500	6323.35	-66.23	≤-47	0.23823	≤20	PASS
NTNV	3DH5	Ant1	Hop	30~1000	416.06	-91.20	≤-54	0.00076	≤4	PASS
NTNV	3DH5	Ant1	Hop	1000~12500	5284.90	-77.62	≤-47	0.01730	≤20	PASS

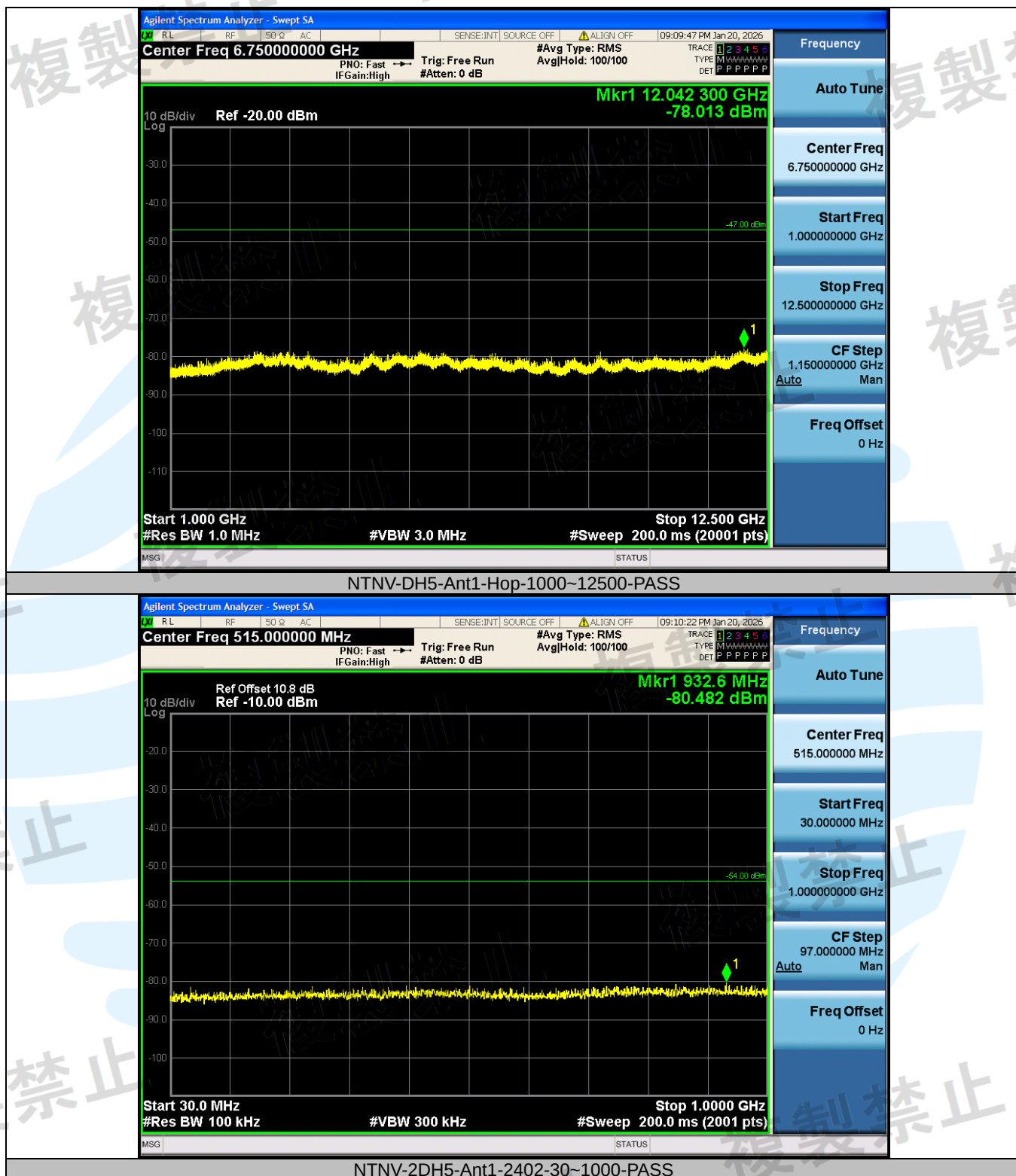
Test Graphs

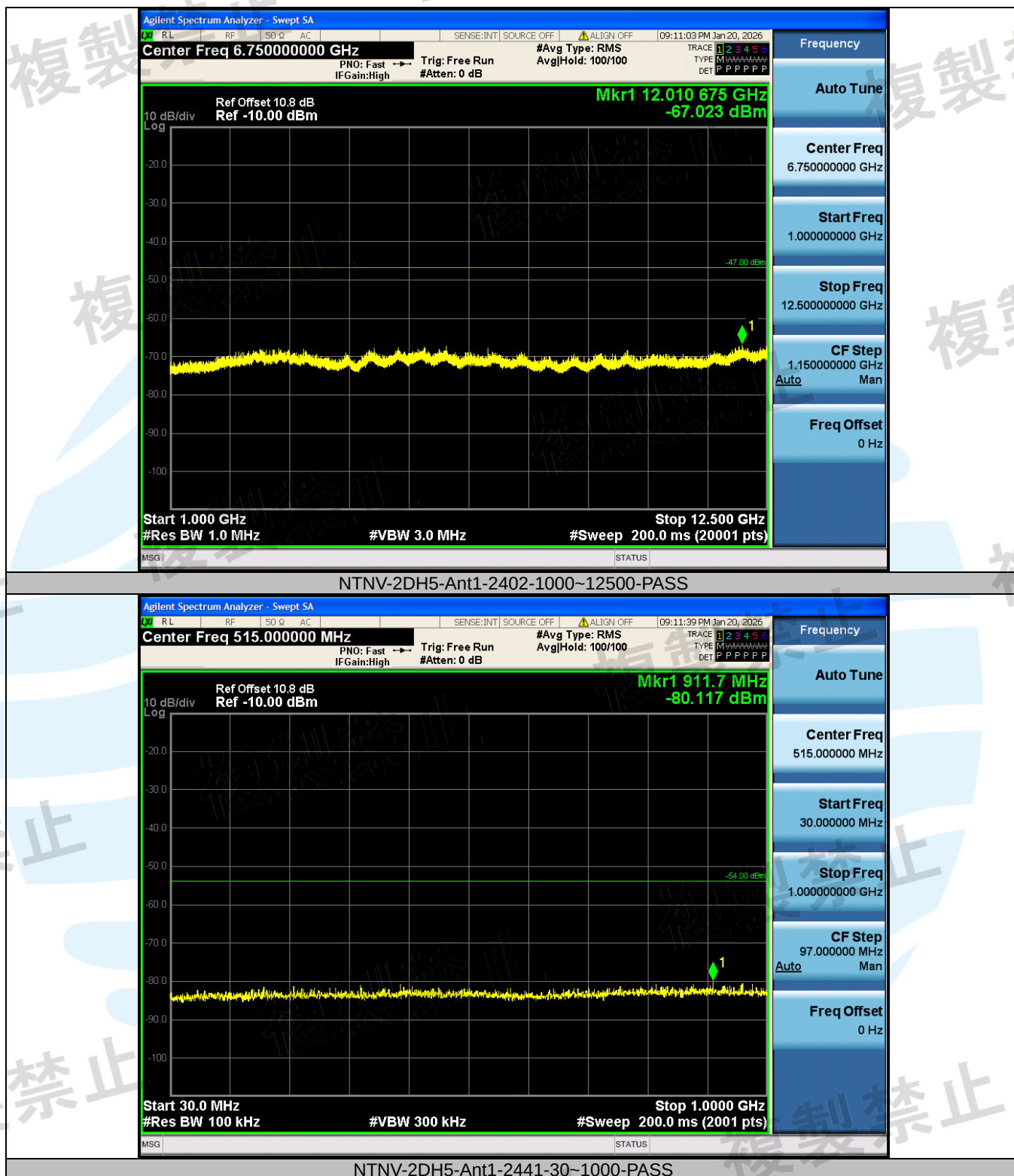


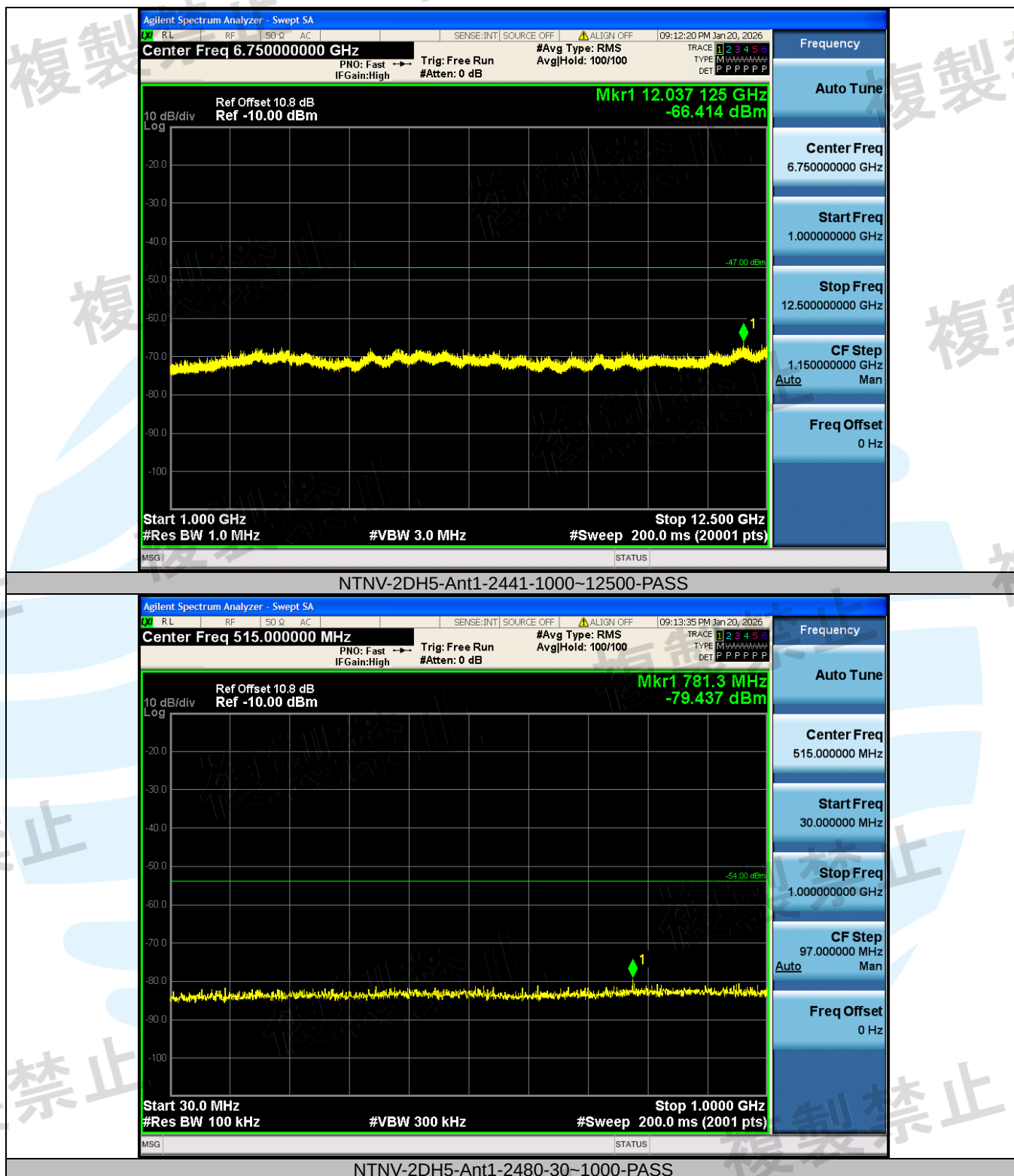


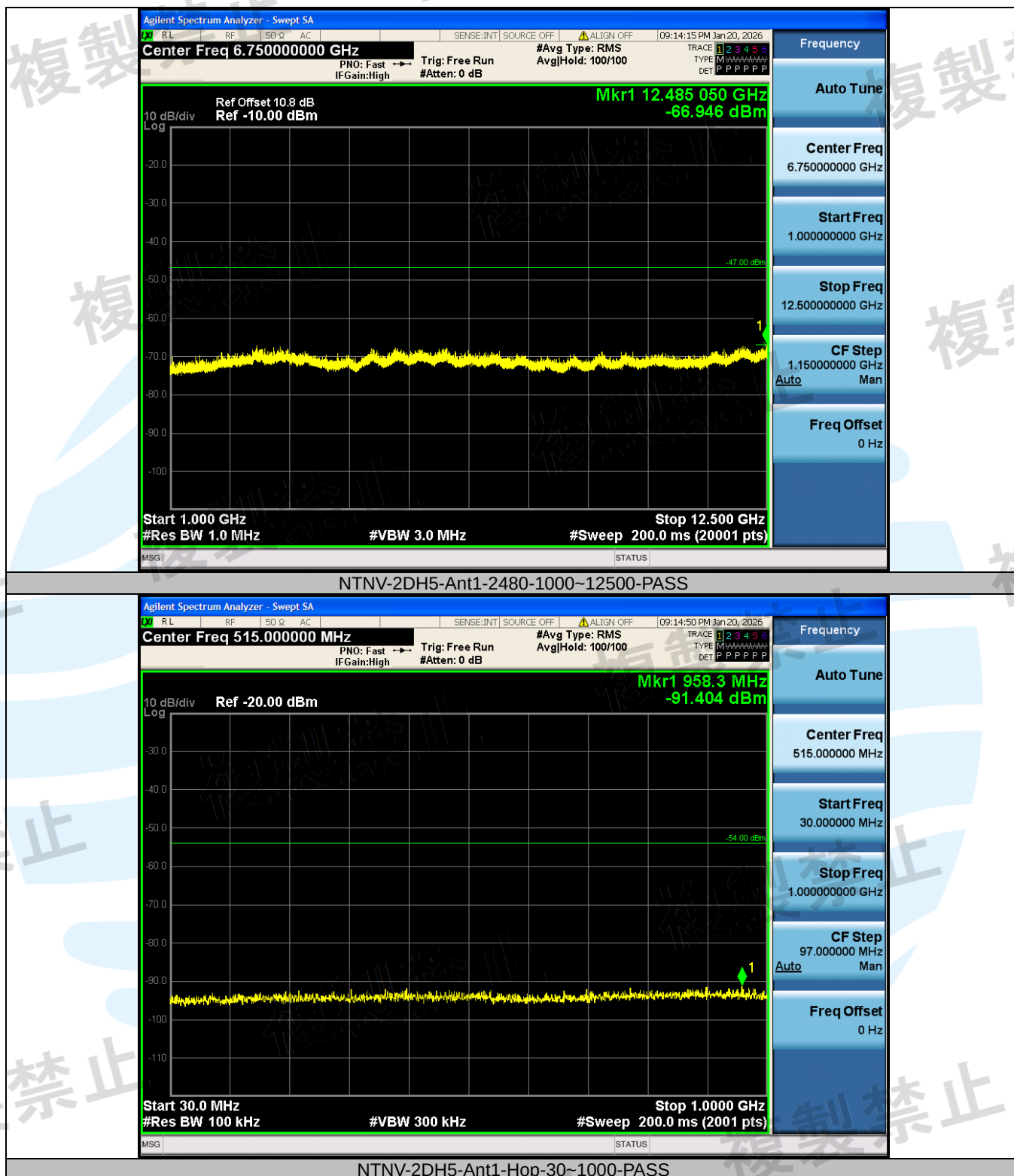


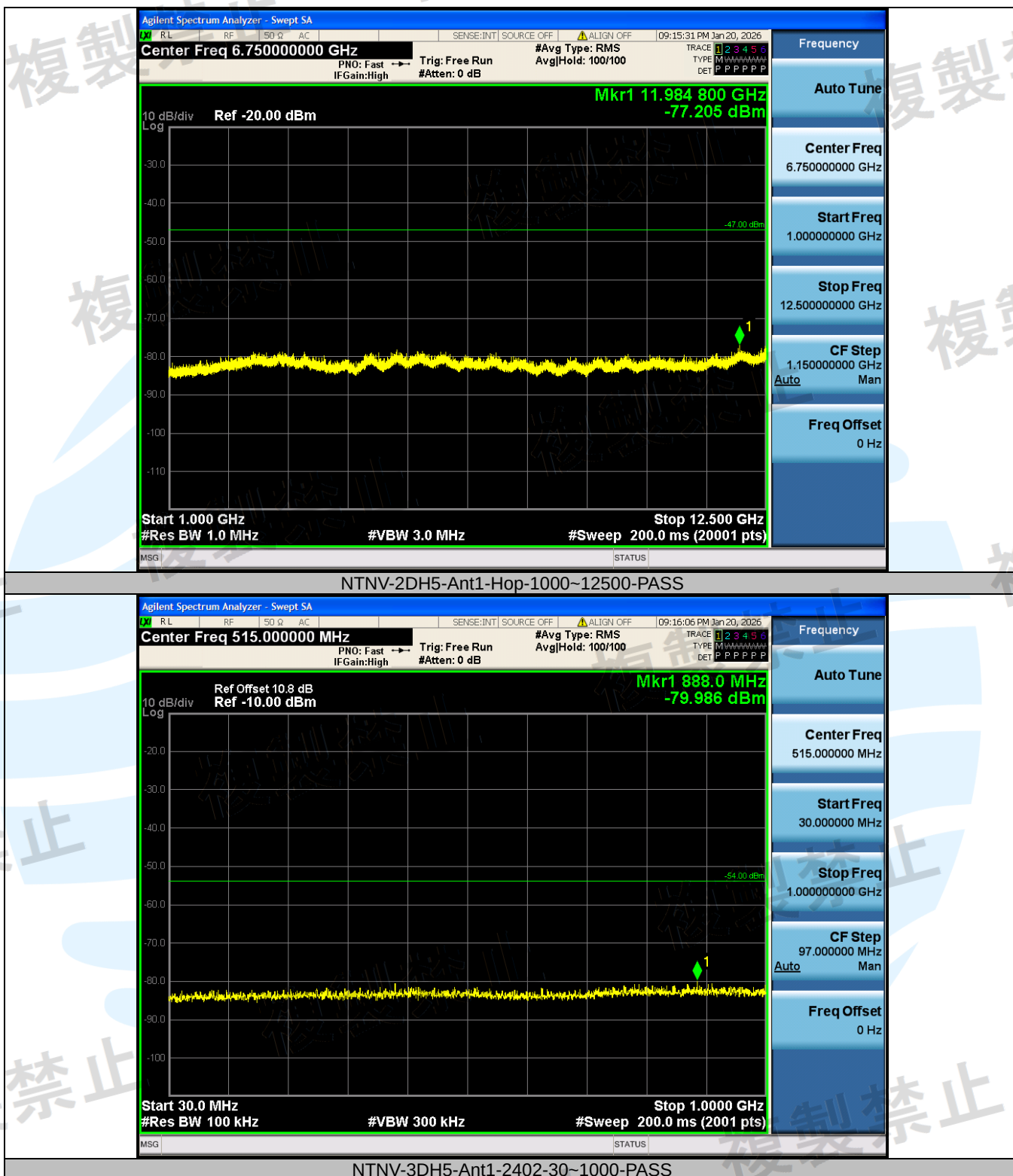


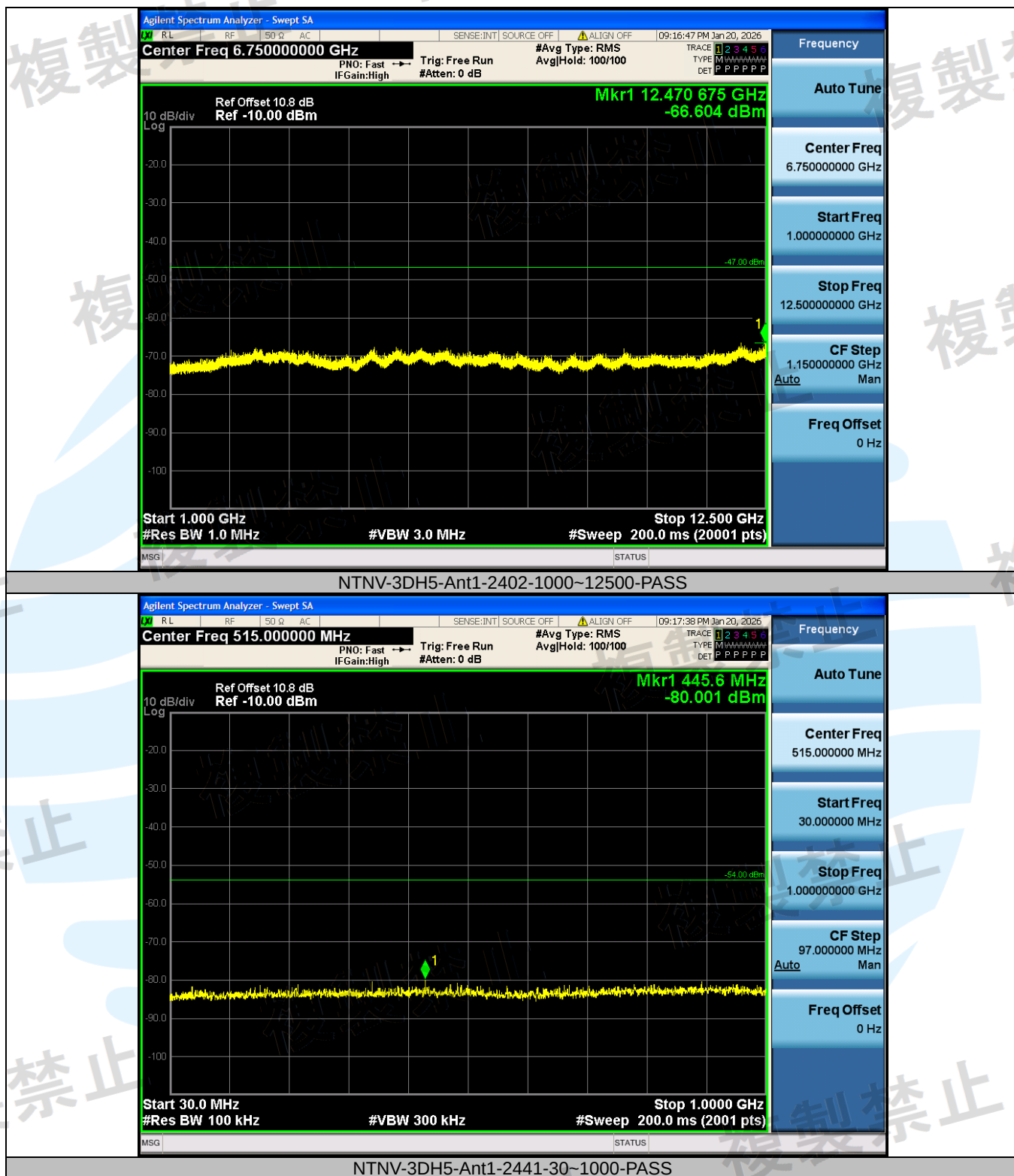












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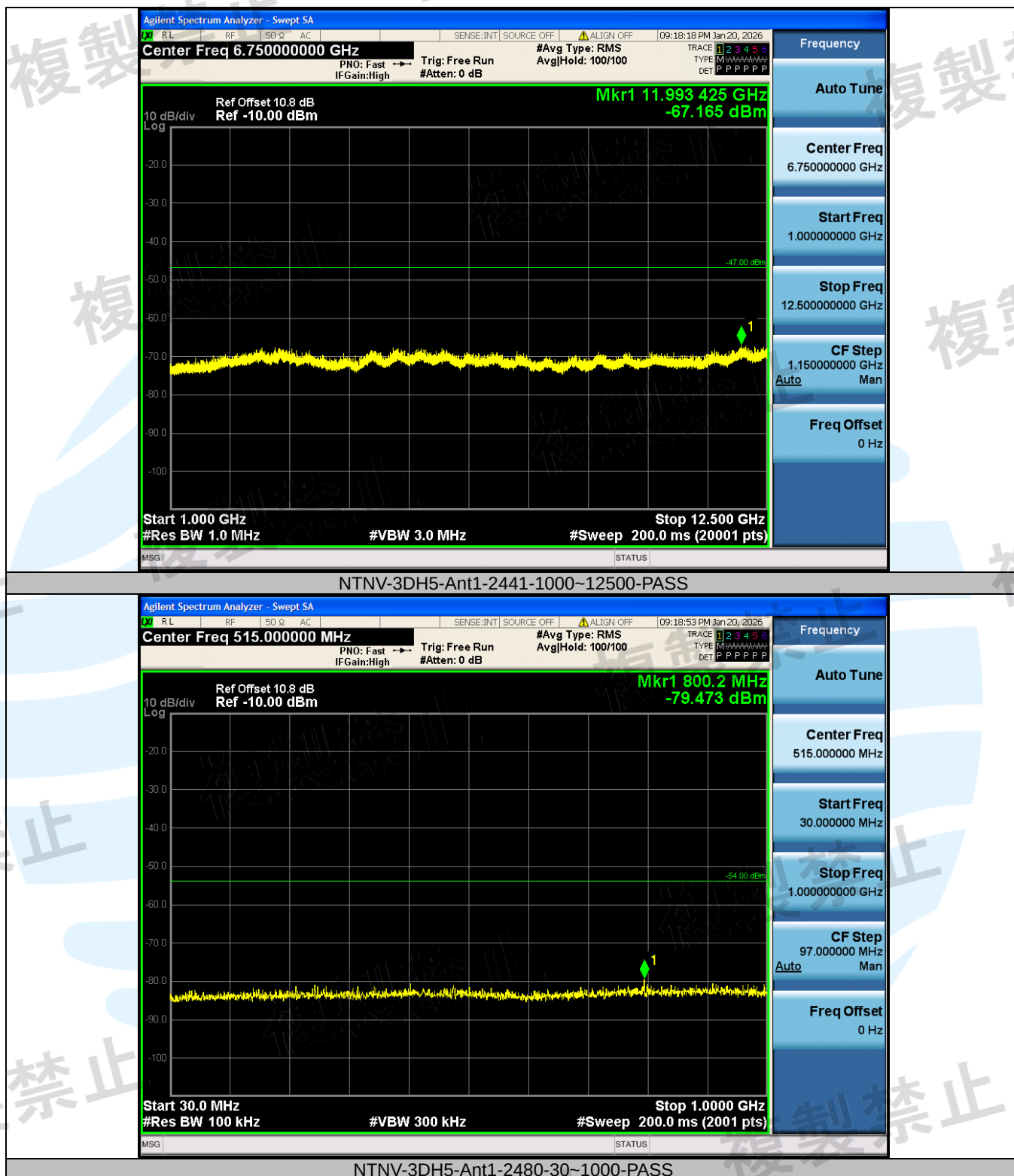
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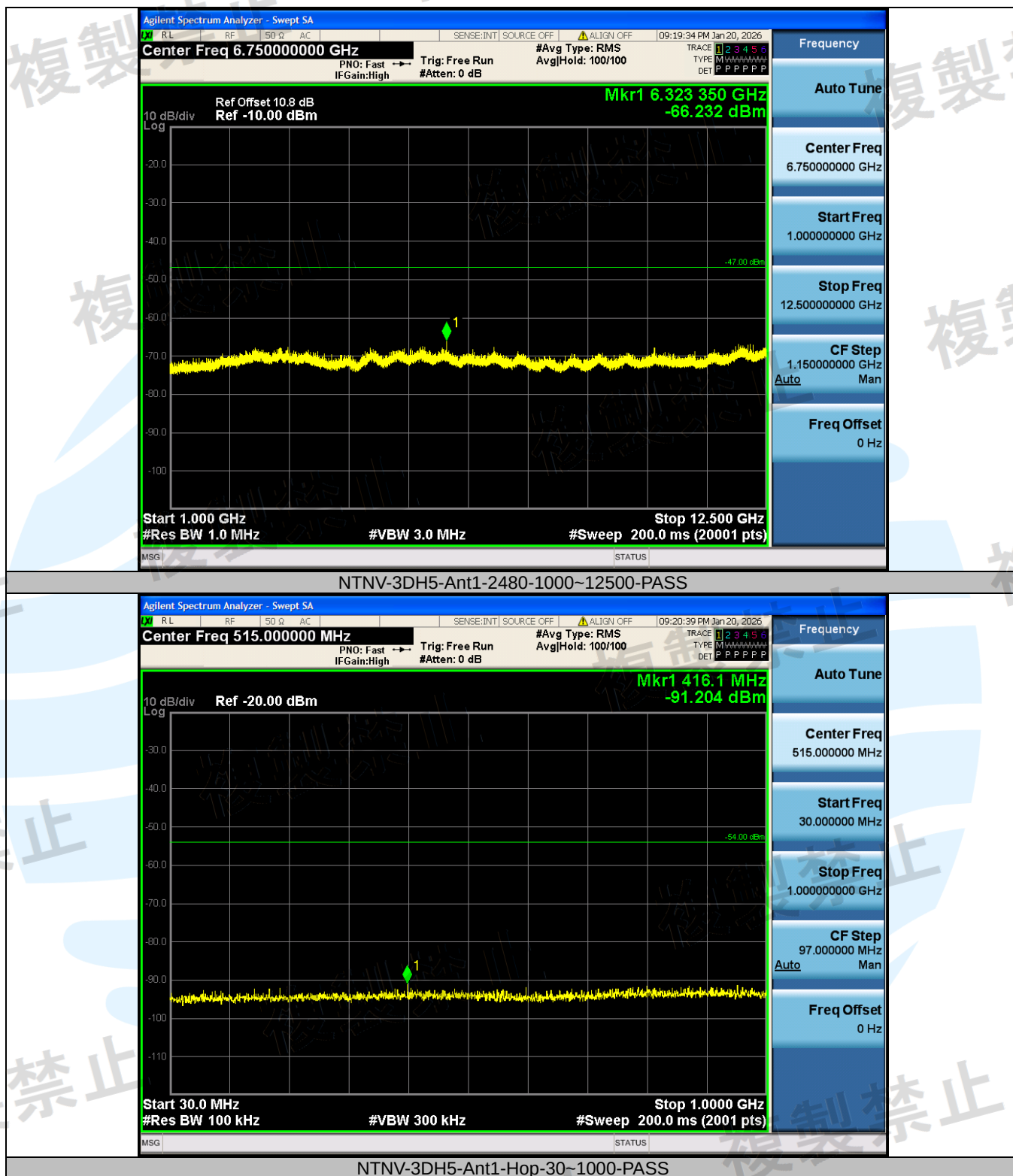
Fax: +86-755-28230886

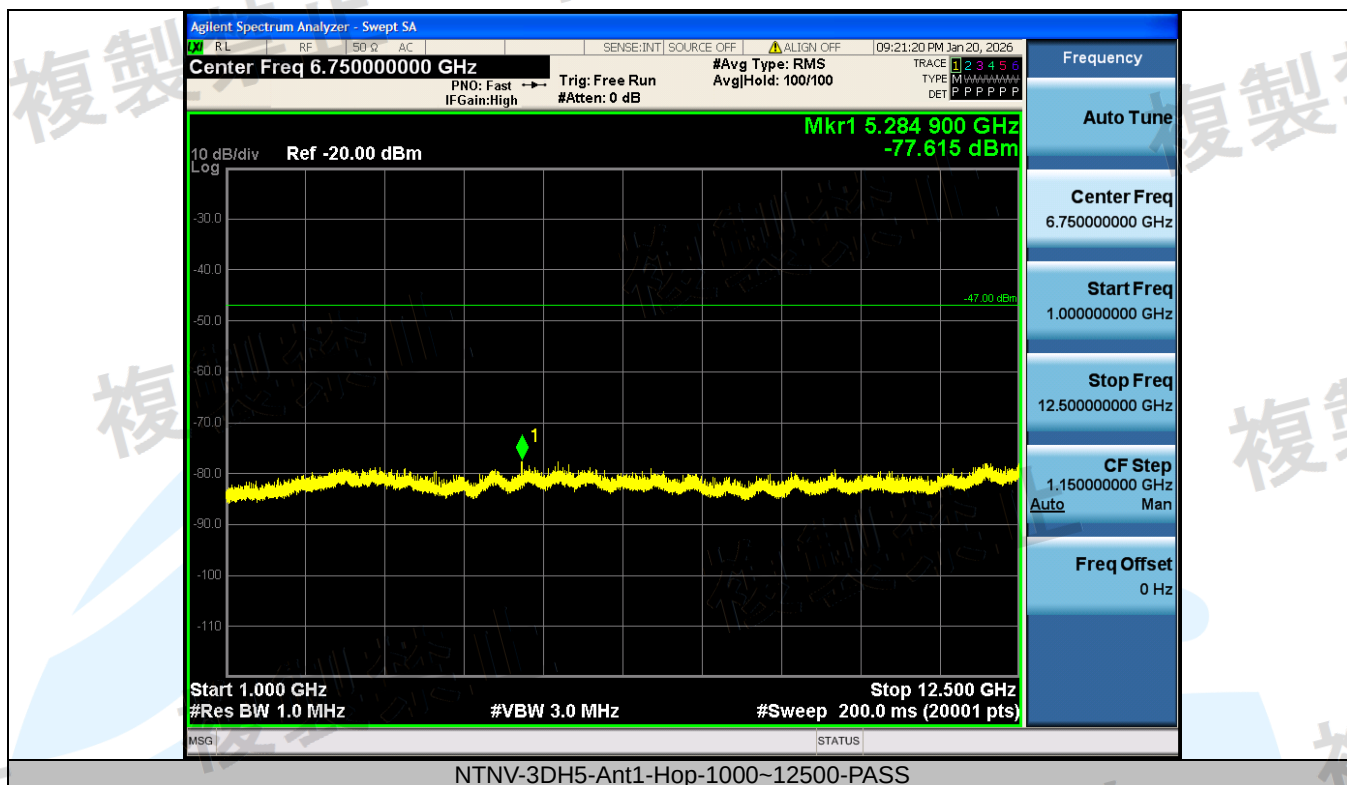
E-mail: info@uttlab.com

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APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Refer to Appendix 1 for Test Setup photos.

APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix for EUT photos.

*** End of Report ***

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