

Prüfbericht-Nr.: Test report no.:		CN26UBLH 001	Auftragsnr.: Order No.:	27227850	Page 1 of 18 Seite 1 von 18
Kunden-Referenz-Nr.: Client reference no.:		N/A	Auftragsdatum: Order date:	2026-03-19	
Auftraggeber: Client:		SHOKZ (SINGAPORE) PTE. LTD. 11 NORTH BUONA VISTA DRIVE #16-09 THE METROPOLIS, SINGAPORE 138589, Singapore			
Prüfgegenstand: Test item:		OpenRun Air 2; OpenRun Air 2 Mini			
Bezeichnung / Typ-Nr.: Identification / Type no.:		SHOKZ S610; SHOKZ S611 (Trademark: SHOKZ)			
Auftrags-Inhalt: Order content:		Type test			
Prüfgrundlage: Test specification:		Notification No.88 of MIC, 2004 Annex 43 Ordinance Regulating Radio Equipment 49-20-1 ARIB STD-T66, Article 2 Section 1 Item 19			
Wareneingangsdatum: Date of sample receipt:		2026-04-08			
Prüfmuster-Nr.: Test sample no.:		A004246001			
Prüfzeitraum: Testing period:		2026-04-09 – 2026-04-30			
Ort der Prüfung: Place of testing:		TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:		TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:		Pass			
geprüft von: tested by:				genehmigt von: authorized by:	
Datum: Date:		2026-05-27		Ausstellungsdatum: Issue date:	2026-05-27
Stellung / Position:		Project Manager		Stellung / Position:	Authorizer
Sonstiges / Other:		This test report is for Classic Bluetooth function.			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:		P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet			
* Legend:		P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested			
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.					

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Remarks
Anmerkungen

- | | |
|---|--|
| 1 | <p>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</p> <p><i>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</i></p> <p><i>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</i></p> |
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| 3 | <p>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</p> <p><i>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</i></p> |
| 4 | <p>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</p> <p><i>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</i></p> |

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1 TEST SITES

1.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.

2-3F, 101 & 102, No.2, Nuclear Power Industrial Park, Fuming Community, Fucheng Street, Longhua District, Shenzhen 518000, People's Republic of China

1.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Equipment	Manufacturer	Model	Serial No.	Calibration Company	Date calibrated	Cal. until	Note (Radio Law)
Wireless Connectivity Tester	R&S	CMW270	101375	GRGTEST	23.09.2025	22.09.2026	24-2-4-2-(ha)
Signal Analyzer	Rohde & Schwarz	FSV 40	101441	GRGTEST	23.09.2025	22.09.2026	24-2-4-2-(ha)
Power Meter	Rohde & Schwarz	NRP2	107105	GRGTEST	30.10.2025	29.10.2026	24-2-4-2-(ha)
Power Sensor	Rohde & Schwarz	NRP-Z81	105677	GRGTEST	23.09.2025	22.09.2026	24-2-4-2-(ha)
DC Power Supply	KIKUSUI	PAN35-5A	YM002997	GRGTEST	02.02.2026	01.02.2027	24-2-4-2-(ha)
Digital Multi Meter	FLUKE	F15B	44350844WS	GRGTEST	02.02.2026	01.02.2027	24-2-4-2-(ha)

1.3 UNCERTAINTY OF MEASUREMENT

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

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

ITEM	UNCERTAINTY
Occupied Bandwidth	206.50 Hz
Spurious emissions	$\pm 3.93\text{dB}$
Output power density	1.37dB
Out of band radiated power	2.52 dB
Frequency Tolerance	0.104 ppm

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2 GENERAL PRODUCT INFORMATION

2.1 PRODUCT FUNCTION AND INTENDED USE

The EUTs are Bluetooth Headset, it supports Bluetooth dual mode wireless technology.

This product has different color of enclosure.

Two models are identical except the product name & model number due to different lengths of neckband, details as below:

Product name	Model Number	Difference	Note
OpenRun Air 2	SHOKZ S610	Longer neckband	The OpenRun Air 2 (SHOKZ610) features a longer neckband, while the OpenRun Air 2 Mini (SHOKZ S611) features a shorter neckband. All other schematics and PCB layouts are identical.
OpenRun Air 2 Mini	SHOKZ S611	Shorter neckband	

All test were applied on model SHOKZ S610.

For details refer to the User Manual, Technical Description and Circuit Diagram.

2.2 RATINGS AND SYSTEM DETAILS

Table 2: Technical Specification of EUT

General Information of EUT	Description
Kind of Equipment	OpenRun Air 2; OpenRun Air 2 Mini
Type Designation	SHOKZ S610; SHOKZ S611
Trade Mark	SHOKZ
Extreme Temperature Range	0°C to +40°C
Operating Voltage (for earbuds):	Internal battery operated (3.87Vdc)
Hardware release No.:	NCE306C
Software release No.:	NCE_HU_T_01
Technical Specification of Bluetooth (BDR & EDR)	
Characteristic	Description
Operating Frequency band	2402 – 2480 MHz
Channel Number	79 channels
Channel separation	1MHz
Modulation	GFSK, 8DPSK, $\pi/4$ DQPSK
Antenna Type	PIFA Antenna
Antenna Gain	-3.00 dBi (Provided by the Client)
rated RF output power:	Please refer to Note 1
Conducted RF output power:	Please refer to Note 1
EIRP output power:	Please refer to Note 1
Technical Specification of Bluetooth Low Energy	
Operating Frequency band	2402 – 2480 MHz for data rate 1Mbps 2404 - 2478 MHz for data rate 2Mbps
Channel Number	40 channels for data rate 1Mbps 38 channels for data rate 2Mbps
Channel separation	2MHz
Data rate	1Mbps, 2Mbps
Modulation	GFSK
Antenna Type	PIFA Antenna
Antenna Gain	-3.00 dBi (Provided by the Client)

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NOTES:

1. The power table as below table:

Test mode	Rated output power density (mW/MHz)	Conducted power density (mW/MHz)
GFSK	1.5	0.4420
GFSK Enable AFH function	3.0	1.7251
8DPSK	0.8	0.2015
8DPSK Enable AFH function	2.0	0.7905

2. For the test results, the EUT had been tested with all conditions.
3. The above EUT information was declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or user's manual.

Table 3: RF Channel and Frequency, Bluetooth (BDR & EDR)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402.00	20	2422.00	40	2442.00	60	2462.00
1	2403.00	21	2423.00	41	2443.00	61	2463.00
2	2404.00	22	2424.00	42	2444.00	62	2464.00
3	2405.00	23	2425.00	43	2445.00	63	2465.00
4	2406.00	24	2426.00	44	2446.00	64	2466.00
5	2407.00	25	2427.00	45	2447.00	65	2467.00
6	2408.00	26	2428.00	46	2448.00	66	2468.00
7	2409.00	27	2429.00	47	2449.00	67	2469.00
8	2410.00	28	2430.00	48	2450.00	68	2470.00
9	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	78	2480.00
19	2421.00	39	2441.00	59	2461.00		

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Table 4: RF Channel and Frequency of Bluetooth Low Energy

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	2402.00	10	2422.00	20	2442.00	30	2462.00
01	2404.00	11	2424.00	21	2444.00	31	2464.00
02	2406.00	12	2426.00	22	2446.00	32	2466.00
03	2408.00	13	2428.00	23	2448.00	33	2468.00
04	2410.00	14	2430.00	24	2450.00	34	2470.00
05	2412.00	15	2432.00	25	2452.00	35	2472.00
06	2414.00	16	2434.00	26	2454.00	36	2474.00
07	2416.00	17	2436.00	27	2456.00	37	2476.00
08	2418.00	18	2438.00	28	2458.00	38	2478.00
09	2420.00	19	2440.00	29	2460.00	39	2480.00

Six modes are provided:

Mode	Conditions
Mode A	GFSK
Mode B	$\pi/4$ -DQPSK
Mode C	8DPSK
Mode D	Enable AFH GFSK
Mode E	Enable AFH $\pi/4$ -DQPSK
Mode F	Enable AFH 8DPSK

Note:

- For the test results, the EUT had been tested with all conditions. But only the worst case (Mode A & Mode C & Mode D & Mode F) was shown in test report.
- For AFH function only tested occupied bandwidth, spreading bandwidth, Antenna power and dwell time.

2.3 TEST CONDITIONS

Test conditions	Voltage (Vdc)
V_{normal}	3.87
V_{max}	4.257
V_{min}	3.483

Test conditions	Unit
Temperature	23.5 deg °C
Humidity	53.0 %

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2.4 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	T480	PF-16A6N8	N/A

2.5 ANTENNA SPECIFICATIONS

2.5.1 ANTENNA GAIN

Ant. Type	Connector Type	Highest Peak Gain (dBi) 2.4GHz ~ 2.5GHz
PIFA Antenna	N/A	-3.0 dBi

2.5.2 ANTENNA PATTERN

Please refer to the attached file (Antenna report).

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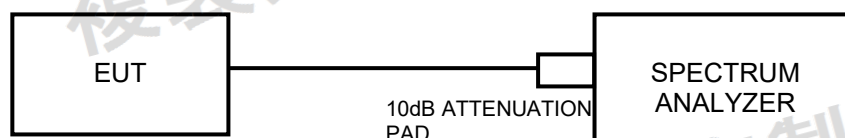
3 TEST RESULTS

3.1 FREQUENCY TOLERANCE MEASUREMENT

3.1.1 LIMITS OF FREQUENCY TOLERANCE MEASUREMENT

Tolerance of frequency shall be +/- 50ppm

3.1.2 TEST SETUP



3.1.3 TEST RESULTS

For the measurement records, refer to the appendix A.

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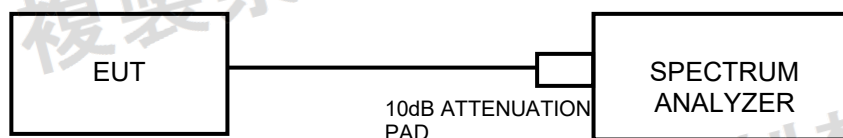
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3.2 OCCUPIED BANDWIDTH MEASUREMENT (99% POWER BANDWIDTH)

3.2.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

ITEM	LIMIT	REMARK
Occupied bandwidth	Occupied bandwidth shall be 83.5MHz or less.	N/A

3.2.2 TEST SETUP



3.2.3 TEST RESULTS

For the measurement records, refer to the appendix A.

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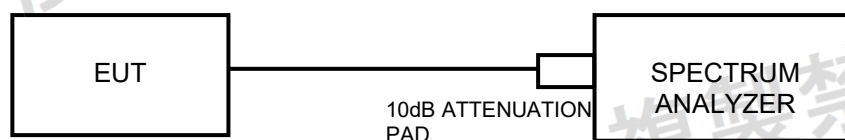
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3.3 SPREADING BANDWIDTH MEASUREMENT (90% POWER BANDWIDTH)

3.3.1 LIMITS OF SPREADING BANDWIDTH AND SPREADING FACTOR

ITEM	LIMIT	REMARK
SPREADING BANDWIDTH	$\geq 500\text{kHz}$	N/A
SPREADING FACTOR	≥ 5	Operating frequency 2400 to 2483MHz
	≥ 10	Operating frequency 2471 to 2497MHz

3.3.2 TEST SETUP



3.3.3 TEST RESULTS

For the measurement records, refer to the appendix A.

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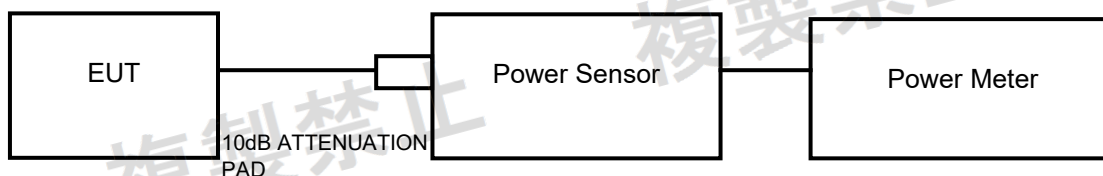
3.4 ANTENNA POWER MEASUREMENT

3.4.1 LIMITS OF ANTENNA POWER

Antenna power shall be 3mW/MHz or less.

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

3.4.2 TEST SETUP



3.4.3 TEST RESULTS

For the measurement records, refer to the appendix A.

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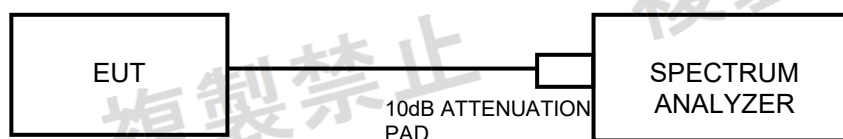
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3.5 SPURIOUS EMISSIONS FOR TRANSMITTER MEASUREMENT

3.5.1 LIMITS OF SPURIOUS EMISSIONS

FREQUENCIES (MHz)	LIMIT
Operating frequency 2400 to 2483.5MHz	
30.0MHz to 2387MHz	$\leq 2.5\mu\text{W/MHz}$
2387.0MHz to 2400.0MHz	$\leq 25\mu\text{W/MHz}$
2483.5MHz to 2496.5MHz	$\leq 25\mu\text{W/MHz}$
2496.5MHz to 12500.0MHz	$\leq 2.5\mu\text{W/MHz}$

3.5.2 TEST SETUP



3.5.3 TEST RESULT

For the measurement records, refer to the appendix A.

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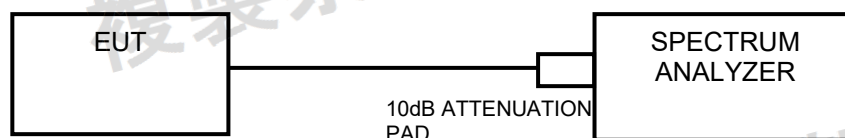
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3.6 SPURIOUS EMISSIONS FOR RECEIVER

3.6.1 LIMITS OF SPURIOUS EMISSIONS FOR RECEIVER

FREQUENCIES (MHz)	LIMIT
Below 1GHz	$\leq 4\text{nW}$ (-54dBm)
Above 1GHz	$\leq 20\text{nW}$ (-47dBm)

3.6.2 TEST SETUP



3.6.3 TEST RESULT

For the measurement records, refer to the appendix A.

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3.7 MAX. BURST LENGTH / DWELL TIME

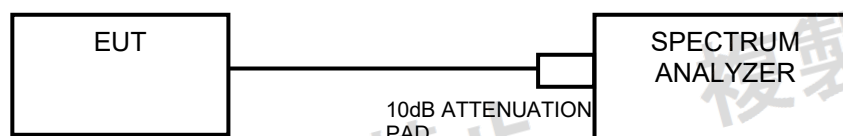
3.7.1 LIMITS OF SPREADING BANDWIDTH AND SPREADING FACTOR

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.

Formula : **(Normal mode)** dwell time = [Spreading rate/79] x duty ratio x 0.4 seconds

(AFH mode) dwell time = [Spreading rate/20] x duty ratio x 0.4 seconds

3.7.2 MEASURING SYSTEM BLOCK DIAGRAM



3.7.3 TEST RESULTS

For the measurement records, refer to the appendix A.

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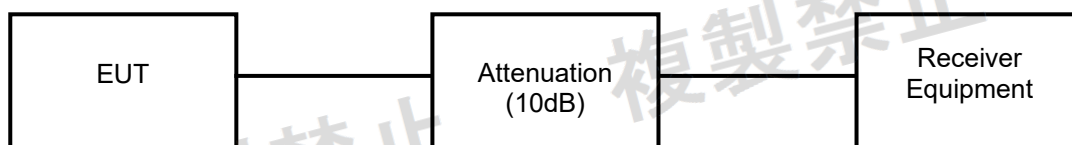
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3.8 INTERFERENCE PREVENTION FUNCTION

3.8.1 LIMITS OF Interference Prevention Function

The function specified in Article 9-4 of the Ordinance Regulating Radio Equipment

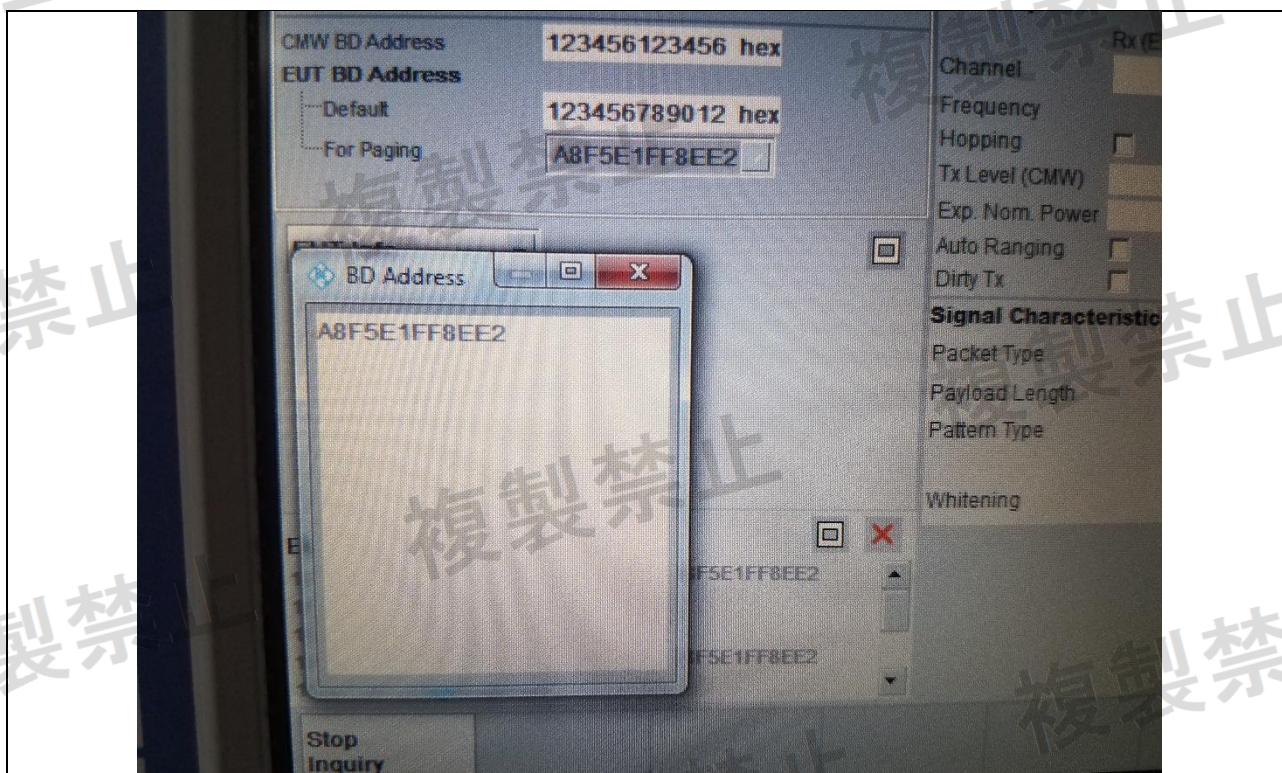
3.8.2 TEST SETUP



3.8.3 TEST RESULTS

ENVIRONMENTAL CONDITIONS	23.5 deg.C, 53.0% RH
LINK MODE	TEST RESULT
BT	PASS

EUT connected to CMW270, MAC address (A8F5E1FFF8EE2) as below:

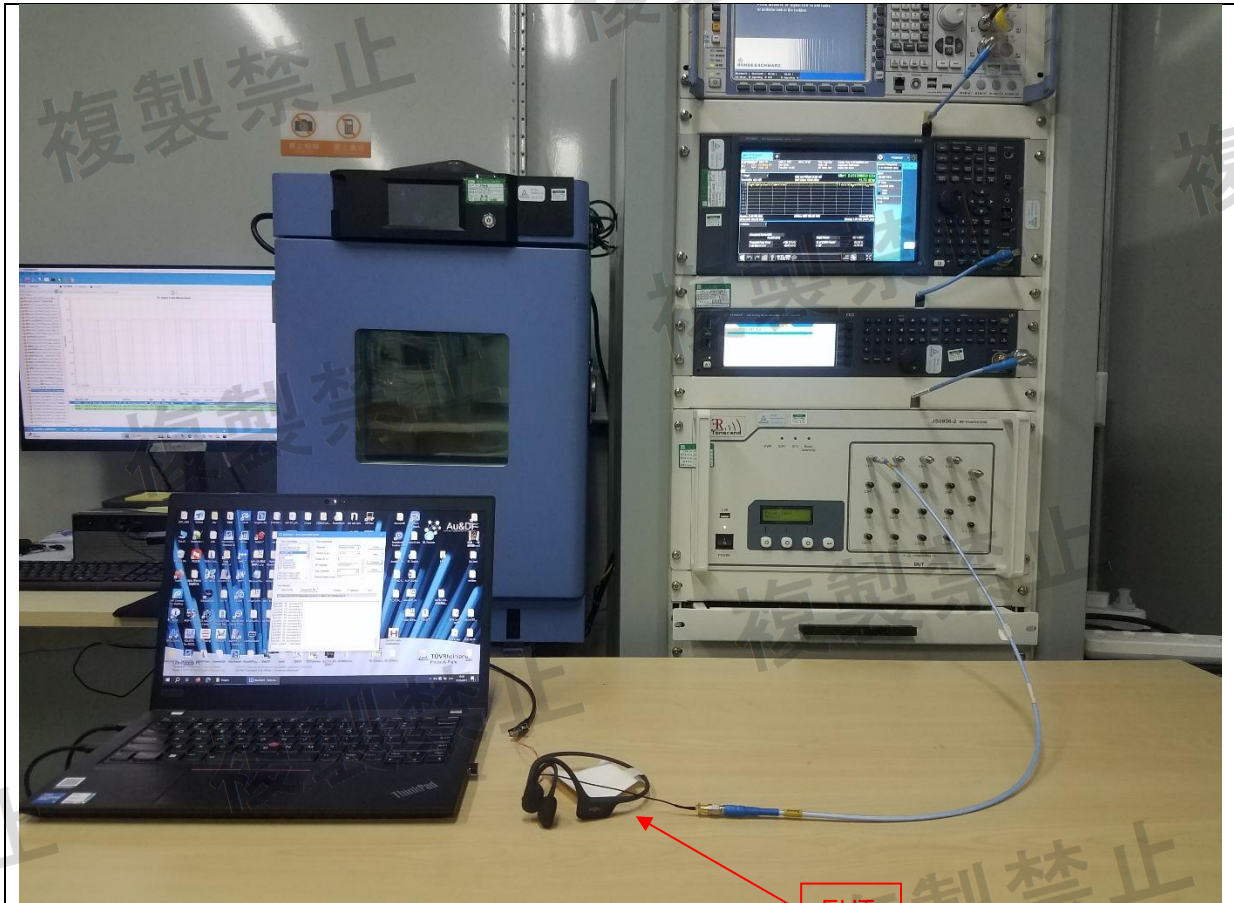


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4 PHOTOGRAPHS OF THE TEST CONFIGURATION



---END---

Appendix A

Test results of Classic Bluetooth

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6	APPENDIX A.6: SPURIOUS EMISSIONS FOR RECEIVER.....	66
7	APPENDIX A.7: DWELL TIME.....	85

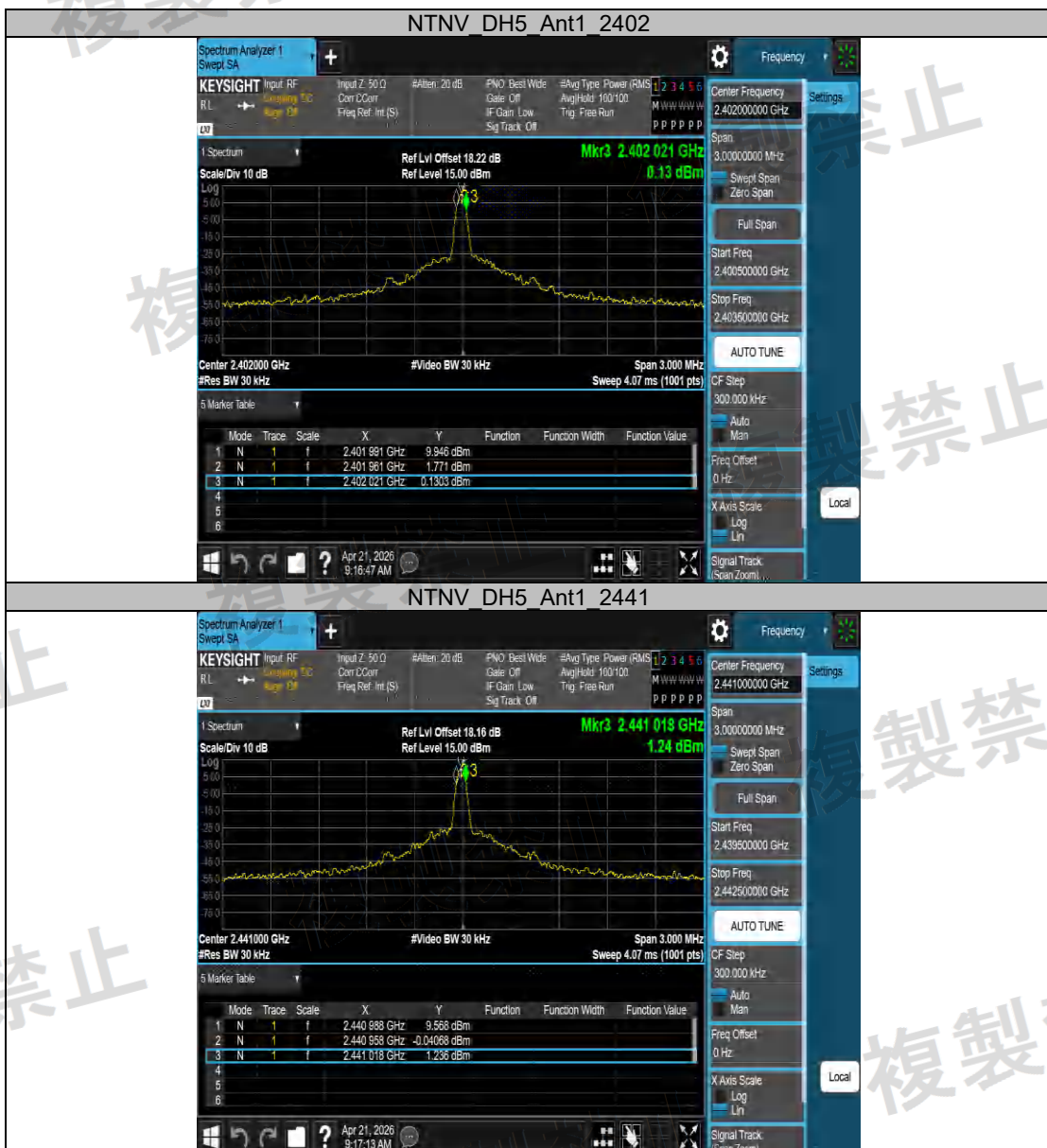
1 Appendix A.1 : FREQUENCY TOLERANCE

Note:

NTNV means: Normal Temperature & Normal Voltage, NTHV means: Normal Temperature & Max. Voltage, NTLV means: Normal Temperature & Min. Voltage.

Test Condition	Test Mode	Antenna	Freq(MHz)	Result[ppm]	Limit[ppm]	Verdict
NTNV	DH5	Ant1	2402	-3.74688	±50	PASS
			2441	-4.91602	±50	PASS
			2480	-4.83871	±50	PASS
NTLV	DH5	Ant1	2402	-3.74688	±50	PASS
			2441	-4.91602	±50	PASS
			2480	-4.83871	±50	PASS
NTHV	DH5	Ant1	2402	-4.37136	±50	PASS
			2441	-4.91602	±50	PASS
			2480	-4.83871	±50	PASS

Note: DH5 was the worst-case scenario under the pre-scan, so only DH5 was reported.



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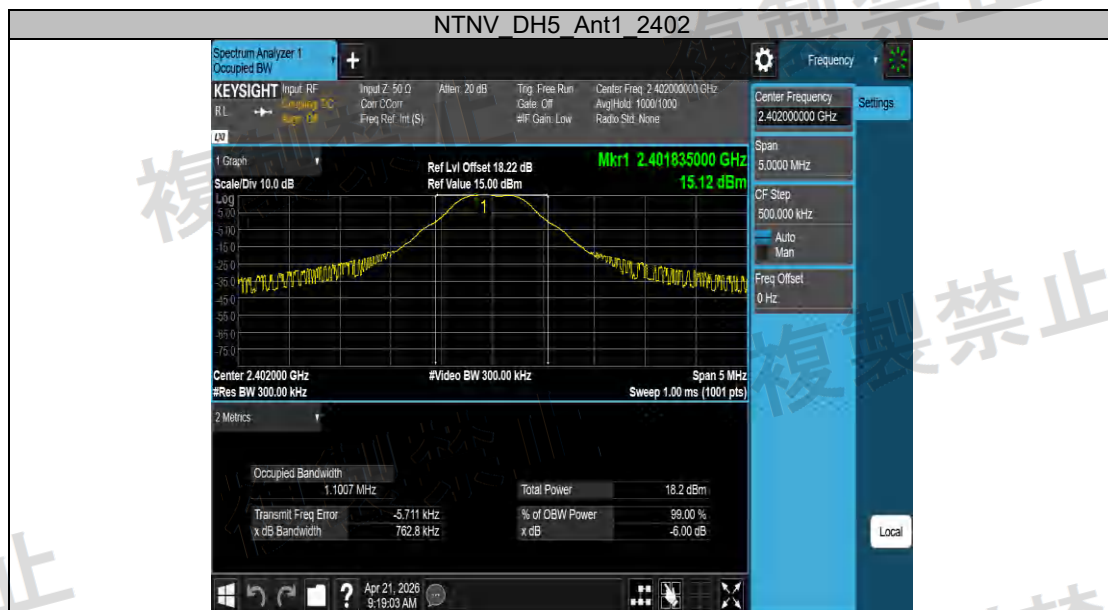
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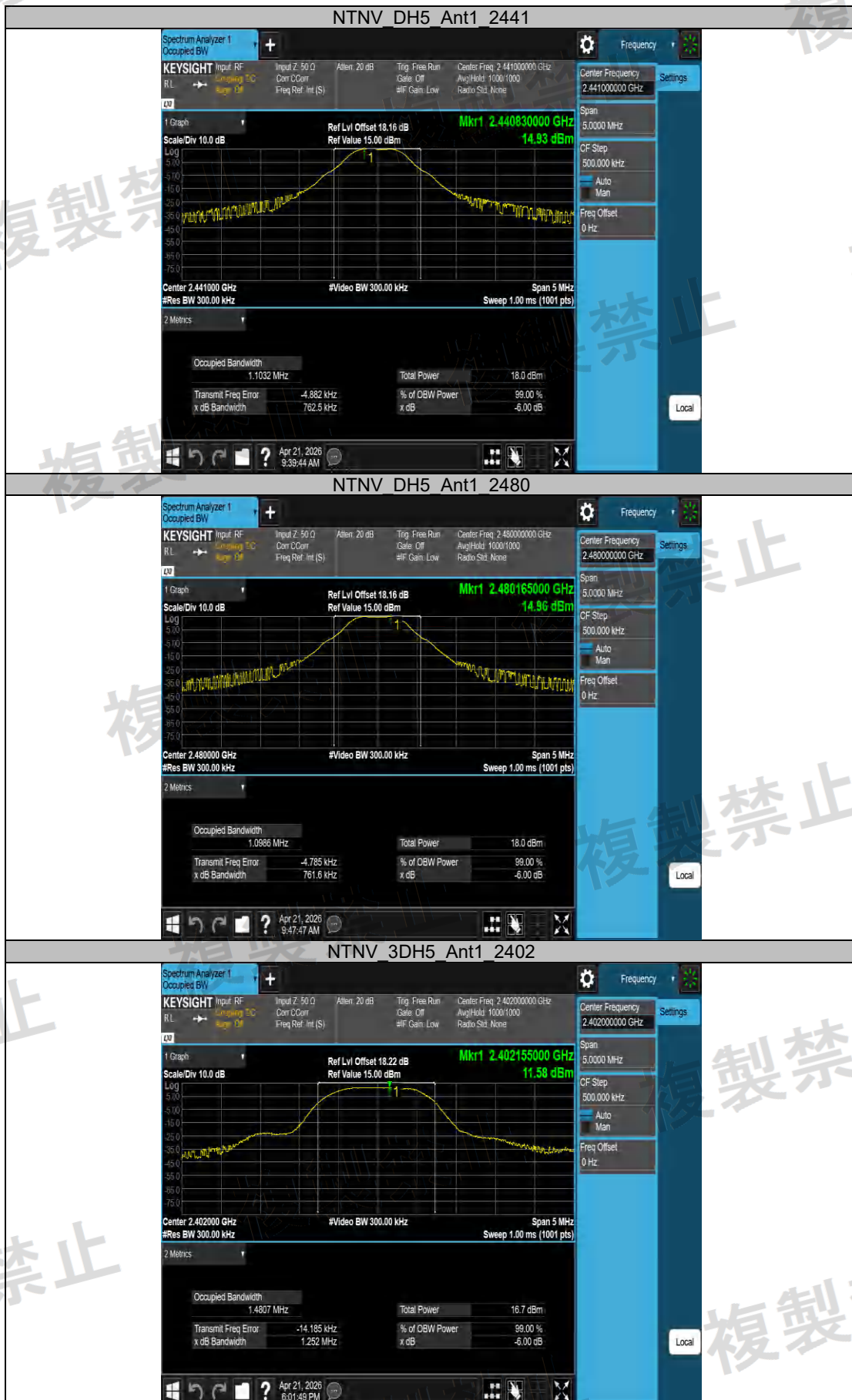




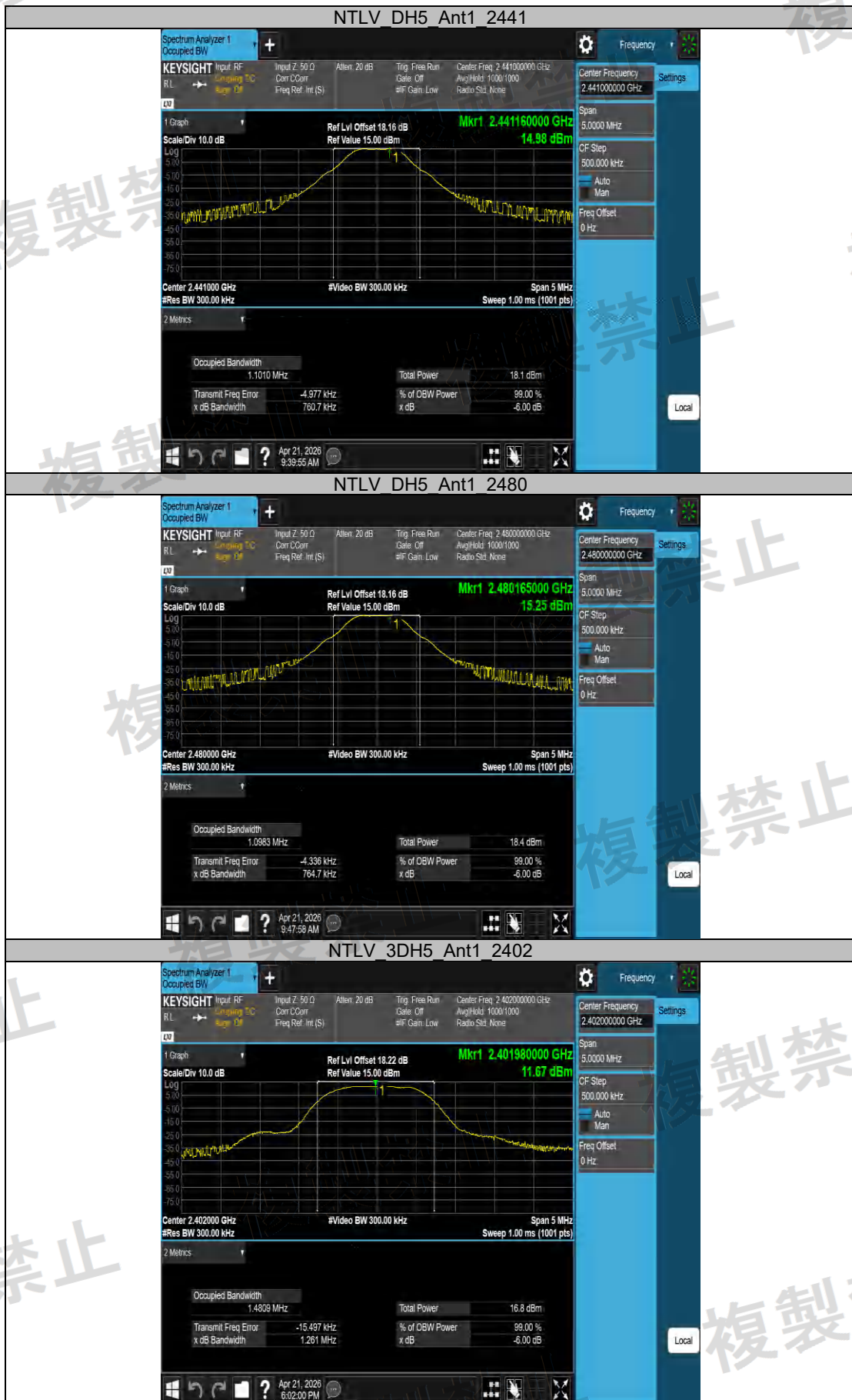
2 Appendix A.2 : OCCUPIED BANDWIDTH

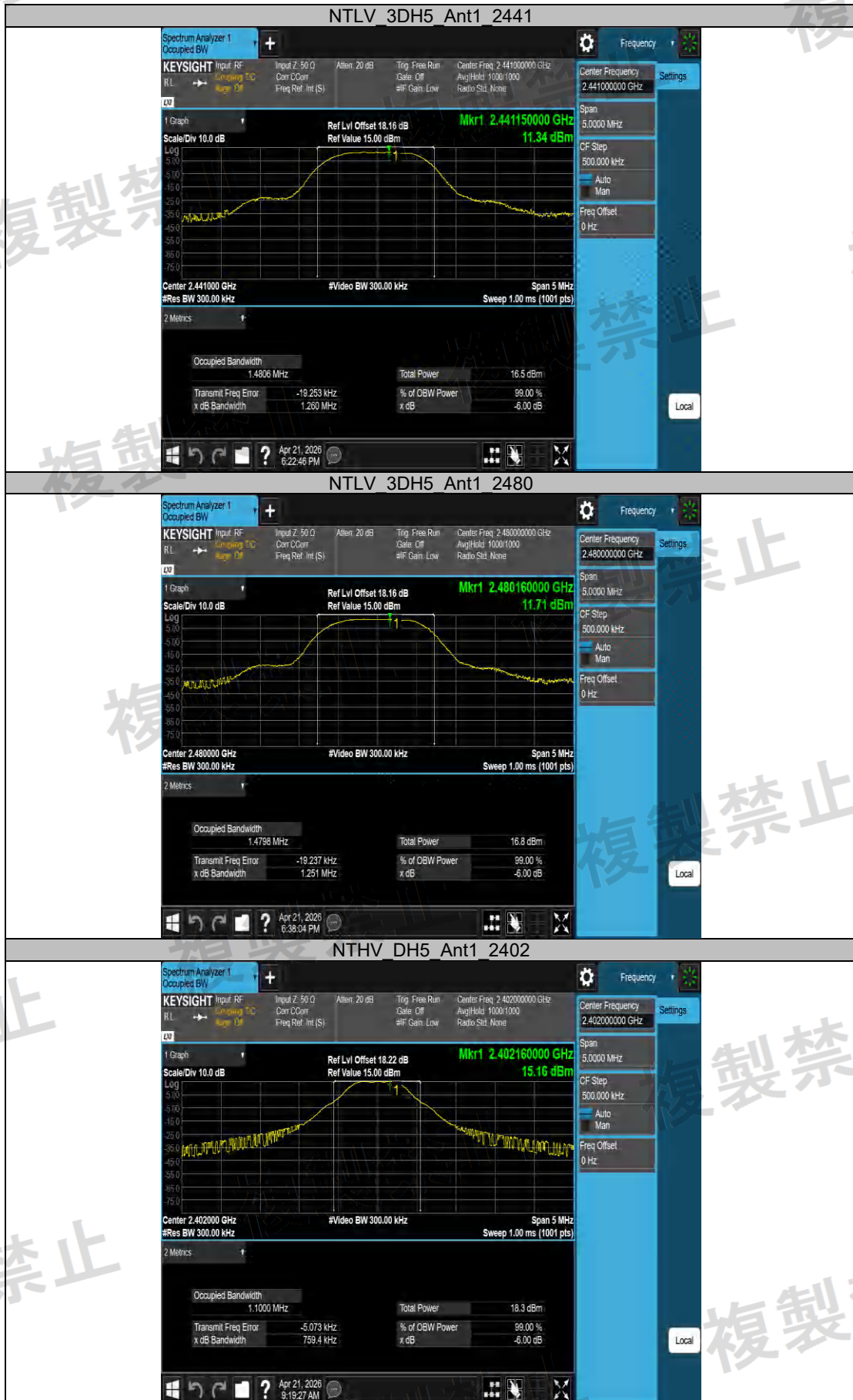
Test Condition	Test Mode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	2402	1.101	≤83.5	PASS
			2441	1.103	≤83.5	PASS
			2480	1.099	≤83.5	PASS
	3DH5	Ant1	2402	1.481	≤83.5	PASS
			2441	1.481	≤83.5	PASS
			2480	1.478	≤83.5	PASS
NTLV	DH5	Ant1	2402	1.100	≤83.5	PASS
			2441	1.101	≤83.5	PASS
			2480	1.098	≤83.5	PASS
	3DH5	Ant1	2402	1.481	≤83.5	PASS
			2441	1.481	≤83.5	PASS
			2480	1.480	≤83.5	PASS
NTHV	DH5	Ant1	2402	1.100	≤83.5	PASS
			2441	1.103	≤83.5	PASS
			2480	1.100	≤83.5	PASS
	3DH5	Ant1	2402	1.479	≤83.5	PASS
			2441	1.482	≤83.5	PASS
			2480	1.482	≤83.5	PASS

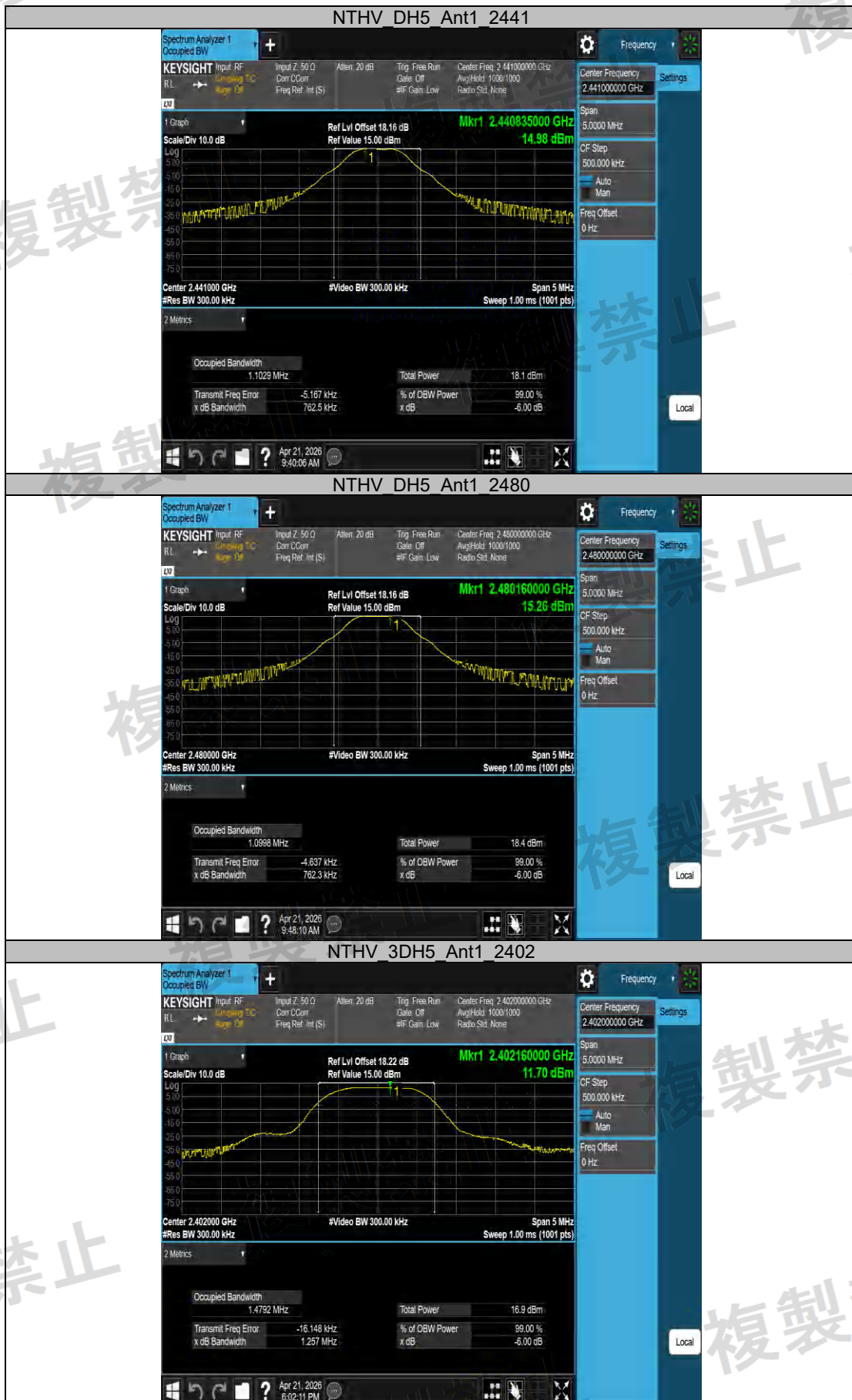


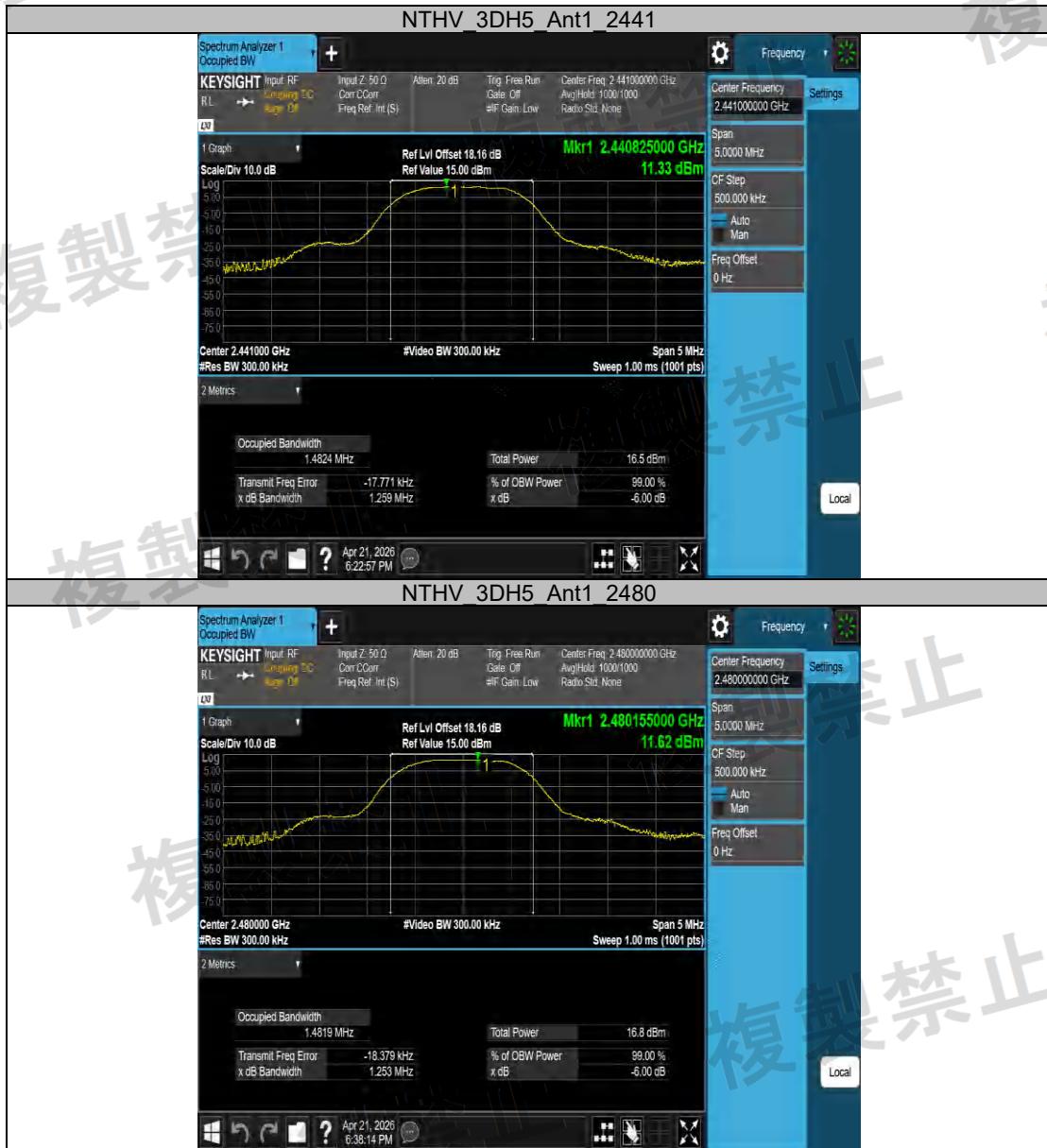










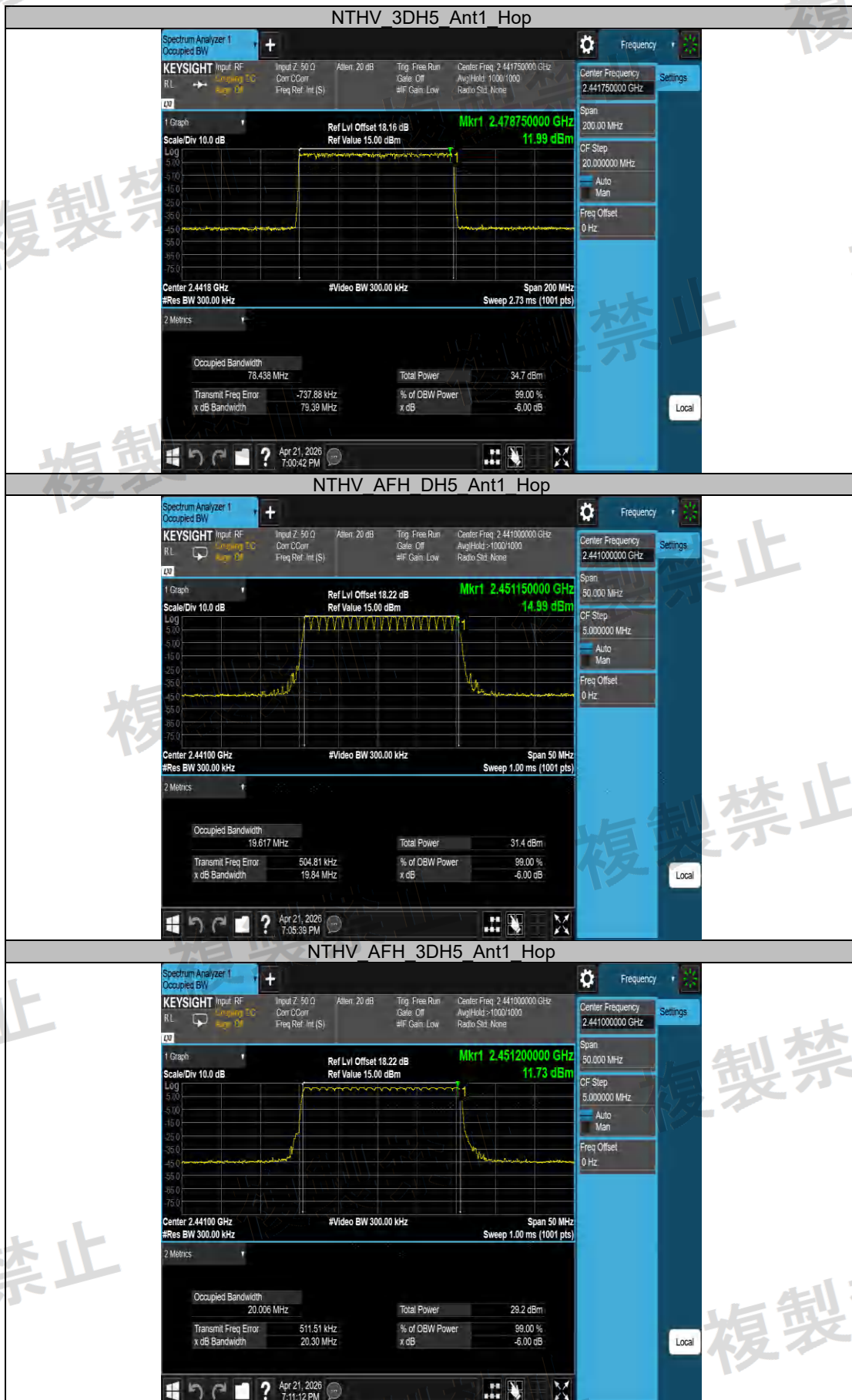


Test Condition	Test Mode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	DH5	Ant1	Hop	78.280	≤83.5	PASS
	3DH5	Ant1	Hop	78.398	≤83.5	PASS
	AFH_DH5	Ant1	Hop	19.617	≤83.5	PASS
	AFH_3DH5	Ant1	Hop	19.986	≤83.5	PASS
NTLV	DH5	Ant1	Hop	78.230	≤83.5	PASS
	3DH5	Ant1	Hop	78.483	≤83.5	PASS
	AFH_DH5	Ant1	Hop	19.619	≤83.5	PASS
	AFH_3DH5	Ant1	Hop	19.998	≤83.5	PASS
NTHV	DH5	Ant1	Hop	78.272	≤83.5	PASS
	3DH5	Ant1	Hop	78.438	≤83.5	PASS
	AFH_DH5	Ant1	Hop	19.616	≤83.5	PASS
	AFH_3DH5	Ant1	Hop	20.006	≤83.5	PASS



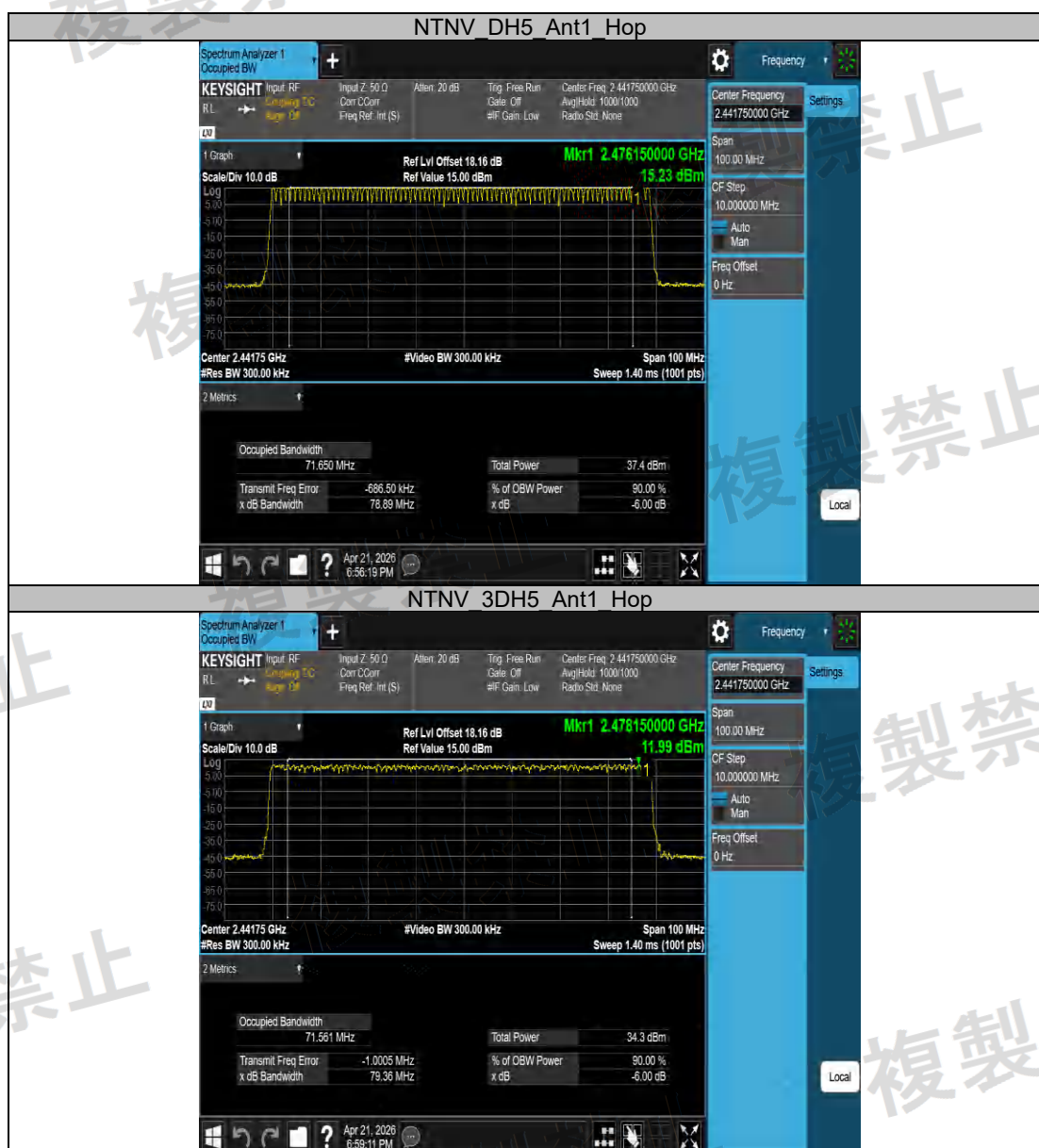






3 Appendix A.3 : SPREADING BANDWIDTH

Test Condition	Test Mode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Spread Factor	Limit	Verdict
NTNV	DH5	Ant1	Hop	71.650	≥0.5	71.650	>5	PASS
	3DH5	Ant1	Hop	71.561	≥0.5	71.561	>5	PASS
	AFH_DH5	Ant1	Hop	18.163	≥0.5	18.163	>5	PASS
	AFH_3DH5	Ant1	Hop	18.246	≥0.5	18.246	>5	PASS
NTLV	DH5	Ant1	Hop	71.649	≥0.5	71.649	>5	PASS
	3DH5	Ant1	Hop	71.415	≥0.5	71.415	>5	PASS
	AFH_DH5	Ant1	Hop	18.176	≥0.5	18.176	>5	PASS
	AFH_3DH5	Ant1	Hop	18.266	≥0.5	18.266	>5	PASS
NTHV	DH5	Ant1	Hop	71.059	≥0.5	71.059	>5	PASS
	3DH5	Ant1	Hop	71.548	≥0.5	71.548	>5	PASS
	AFH_DH5	Ant1	Hop	18.173	≥0.5	18.173	>5	PASS
	AFH_3DH5	Ant1	Hop	18.244	≥0.5	18.244	>5	PASS











4 Appendix A.4 : ANTENNA POWER

Test Result

Antenna Power									
Test Condition	TestMode	Antenna	Freq (MHz)	Result (dBm)	Result (mW)	90% BW (MHz)	Result (mW /MHz)	Limit (mW /MHz)	Verdict
NTNV	DH5	Ant1	Hop	14.97	31.4051	71.650	0.4383	≤3	PASS
	3DH5	Ant1	Hop	11.56	14.3219	71.561	0.2001	≤3	PASS
	AFH_DH5	Ant1	Hop	14.96	31.3329	18.163	1.7251	≤3	PASS
	AFH_3DH5	Ant1	Hop	11.58	14.3880	18.246	0.7886	≤3	PASS
NTLV	DH5	Ant1	Hop	14.98	31.4775	71.649	0.4393	≤3	PASS
	3DH5	Ant1	Hop	11.58	14.3880	71.415	0.2015	≤3	PASS
	AFH_DH5	Ant1	Hop	14.96	31.3329	18.176	1.7239	≤3	PASS
	AFH_3DH5	Ant1	Hop	11.58	14.3880	18.266	0.7877	≤3	PASS
NTHV	DH5	Ant1	Hop	14.97	31.4051	71.059	0.4420	≤3	PASS
	3DH5	Ant1	Hop	11.57	14.3549	71.548	0.2006	≤3	PASS
	AFH_DH5	Ant1	Hop	14.96	31.3329	18.173	1.7241	≤3	PASS
	AFH_3DH5	Ant1	Hop	11.59	14.4212	18.244	0.7905	≤3	PASS

Tolerance								
Test Condition	Test Mode	Antenna	Freq (MHz)	Power (mW /MHz)	RatedPower (mW /MHz)	Result (%)	Limit (%)	Verdict
NTNV	DH5	Ant1	Hop	0.4383	1.50	-70.78	+20	PASS
	3DH5	Ant1	Hop	0.2001	0.80	-74.99	+20	PASS
	AFH_DH5	Ant1	Hop	1.7251	3.00	-42.50	+20	PASS
	AFH_3DH5	Ant1	Hop	0.7886	2.00	-60.57	+20	PASS
NTLV	DH5	Ant1	Hop	0.4393	1.50	-70.71	+20	PASS
	3DH5	Ant1	Hop	0.2015	0.80	-74.81	+20	PASS
	AFH_DH5	Ant1	Hop	1.7239	3.00	-42.54	+20	PASS
	AFH_3DH5	Ant1	Hop	0.7877	2.00	-60.62	+20	PASS
NTHV	DH5	Ant1	Hop	0.4420	1.50	-70.53	+20	PASS
	3DH5	Ant1	Hop	0.2006	0.80	-74.93	+20	PASS
	AFH_DH5	Ant1	Hop	1.7241	3.00	-42.53	+20	PASS
	AFH_3DH5	Ant1	Hop	0.7905	2.00	-60.48	+20	PASS

EIRP							
Test Condition	TestMode	Antenna	Freq (MHz)	Power (dBm/MHz)	EIRP (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	DH5	Ant1	Hop	-3.58	-6.58	≤6.91	PASS
	3DH5	Ant1	Hop	-6.99	-9.99	≤6.91	PASS
	AFH_DH5	Ant1	Hop	2.37	-0.63	≤6.91	PASS
	AFH_3DH5	Ant1	Hop	-1.03	-4.03	≤6.91	PASS
NTLV	DH5	Ant1	Hop	-3.57	-6.57	≤6.91	PASS
	3DH5	Ant1	Hop	-6.96	-9.96	≤6.91	PASS
	AFH_DH5	Ant1	Hop	2.37	-0.63	≤6.91	PASS
	AFH_3DH5	Ant1	Hop	-1.04	-4.04	≤6.91	PASS
NTHV	DH5	Ant1	Hop	-3.55	-6.55	≤6.91	PASS
	3DH5	Ant1	Hop	-6.98	-9.98	≤6.91	PASS
	AFH_DH5	Ant1	Hop	2.37	-0.63	≤6.91	PASS
	AFH_3DH5	Ant1	Hop	-1.02	-4.02	≤6.91	PASS

5 Appendix A.5: SPURIOUS EMISSIONS FOR TRANSMITTER

Test Result_Step1

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	30~500	199.79	-47.71	≤-26	0.01694	≤2.5	PASS
				500~1000	943.25	-55.50	≤-26	0.00282	≤2.5	PASS
				1000~2387	1201.46	-39.39	≤-26	0.11508	≤2.5	PASS
				2387~2400	2400	-15.97	≤-16	25.29298	≤25	See table below
				2483.5~2496.5	2487.58	-43.48	≤-16	0.04487	≤25	PASS
				2496.5~13000	4804.12	-50.83	≤-26	0.00826	≤2.5	PASS
			2441	30~500	191.92	-48.50	≤-26	0.01413	≤2.5	PASS
				500~1000	991.00	-55.20	≤-26	0.00302	≤2.5	PASS
				1000~2387	1220.53	-41.11	≤-26	0.07745	≤2.5	PASS
				2387~2400	2388.23	-43.56	≤-16	0.04406	≤25	PASS
				2483.5~2496.5	2485.26	-42.94	≤-16	0.05082	≤25	PASS
				2496.5~13000	4881.84	-38.34	≤-26	0.14655	≤2.5	PASS
			2480	30~500	166.18	-47.55	≤-26	0.01758	≤2.5	PASS
				500~1000	927.75	-55.75	≤-26	0.00266	≤2.5	PASS
				1000~2387	1239.95	-42.19	≤-26	0.06039	≤2.5	PASS
				2387~2400	2393.05	-43.73	≤-16	0.04236	≤25	PASS
				2483.5~2496.5	2483.50	-26.56	≤-16	2.20800	≤25	PASS
				2496.5~13000	4960.10	-38.30	≤-26	0.14791	≤2.5	PASS
	3DH5	Ant1	2402	30~500	176.88	-48.51	≤-26	0.01409	≤2.5	PASS
				500~1000	559.63	-56.14	≤-26	0.00243	≤2.5	PASS
				1000~2387	1201.12	-42.16	≤-26	0.06081	≤2.5	PASS
				2387~2400	2400	-16.50	≤-16	22.38721	≤25	See table below
				2483.5~2496.5	2496.44	-43.31	≤-16	0.04667	≤25	PASS
				2496.5~13000	3805.76	-53.22	≤-26	0.00476	≤2.5	PASS
			2441	30~500	193.68	-48.23	≤-26	0.01503	≤2.5	PASS
				500~1000	922.88	-55.54	≤-26	0.00279	≤2.5	PASS
				1000~2387	1220.53	-42.18	≤-26	0.06053	≤2.5	PASS
				2387~2400	2396.26	-43.79	≤-16	0.04178	≤25	PASS
				2483.5~2496.5	2494.24	-42.97	≤-16	0.05047	≤25	PASS
				2496.5~13000	4881.84	-40.99	≤-26	0.07962	≤2.5	PASS
			2480	30~500	180.99	-48.33	≤-26	0.01469	≤2.5	PASS
				500~1000	579.00	-55.57	≤-26	0.00277	≤2.5	PASS
				1000~2387	1240.30	-41.69	≤-26	0.06776	≤2.5	PASS
				2387~2400	2392.10	-43.49	≤-16	0.04477	≤25	PASS
				2483.5~2496.5	2483.52	-29.20	≤-16	1.20226	≤25	PASS
				2496.5~13000	4959.57	-41.67	≤-26	0.06808	≤2.5	PASS

NTLV	DH5	Ant1	2402	30~500	175.47	-47.92	≤-26	0.01614	≤2.5	PASS
				500~1000	548.50	-55.97	≤-26	0.00253	≤2.5	PASS
				1000~2387	1201.12	-40.43	≤-26	0.09057	≤2.5	PASS
				2387~2400	2399.99	-15.86	≤-16	25.94179	≤25	See table below
				2483.5~2496.5	2484.60	-43.16	≤-16	0.04831	≤25	PASS
				2496.5~13000	4804.12	-50.93	≤-26	0.00807	≤2.5	PASS
			2441	30~500	174.76	-47.43	≤-26	0.01807	≤2.5	PASS
				500~1000	902.75	-55.07	≤-26	0.00311	≤2.5	PASS
				1000~2387	1220.19	-40.06	≤-26	0.09863	≤2.5	PASS
				2387~2400	2390.84	-43.54	≤-16	0.04426	≤25	PASS
				2483.5~2496.5	2487.06	-43.06	≤-16	0.04943	≤25	PASS

3DH5	Ant1	2480	2496.5~13000	4882.37	-38.33	≤-26	0.14689	≤2.5	PASS
			30~500	193.09	-47.70	≤-26	0.01698	≤2.5	PASS
			500~1000	905.00	-55.83	≤-26	0.00261	≤2.5	PASS
			1000~2387	1239.95	-41.85	≤-26	0.06531	≤2.5	PASS
			2387~2400	2398.10	-43.56	≤-16	0.04406	≤25	PASS
			2483.5~2496.5	2483.51	-26.24	≤-16	2.37684	≤25	PASS
			2496.5~13000	4960.10	-38.33	≤-26	0.14689	≤2.5	PASS
			30~500	187.69	-47.48	≤-26	0.01786	≤2.5	PASS
			500~1000	876.88	-55.45	≤-26	0.00285	≤2.5	PASS
			1000~2387	1200.77	-41.31	≤-26	0.07396	≤2.5	PASS
			2387~2400	2400	-16.51	≤-16	22.33572	≤25	See table below
			2483.5~2496.5	2484.20	-43.37	≤-16	0.04603	≤25	PASS
		2402	2496.5~13000	3815.74	-53.07	≤-26	0.00493	≤2.5	PASS
			30~500	179.58	-48.12	≤-26	0.01542	≤2.5	PASS
			500~1000	966.88	-56.17	≤-26	0.00242	≤2.5	PASS
			1000~2387	2152.94	-42.39	≤-26	0.05768	≤2.5	PASS
			2387~2400	2390.76	-43.79	≤-16	0.04178	≤25	PASS
			2483.5~2496.5	2495.62	-43.18	≤-16	0.04808	≤25	PASS
		2441	2496.5~13000	4881.84	-40.90	≤-26	0.08128	≤2.5	PASS
			30~500	175.82	-47.93	≤-26	0.01611	≤2.5	PASS
			500~1000	934.13	-55.83	≤-26	0.00261	≤2.5	PASS
			1000~2387	1239.95	-41.76	≤-26	0.06668	≤2.5	PASS
			2387~2400	2389.36	-43.65	≤-16	0.04315	≤25	PASS
			2483.5~2496.5	2483.52	-29.17	≤-16	1.21060	≤25	PASS
		2480	2496.5~13000	4960.10	-41.62	≤-26	0.06887	≤2.5	PASS

NTHV	DH5	Ant1	2402	30~500	194.50	-48.33	≤-26	0.01469	≤2.5	PASS
				500~1000	922.50	-55.20	≤-26	0.00302	≤2.5	PASS
				1000~2387	1201.12	-39.79	≤-26	0.10495	≤2.5	PASS
				2387~2400	2399.97	-16.16	≤-16	24.21029	≤25	See table below
				2483.5~2496.5	2490.82	-43.54	≤-16	0.04426	≤25	PASS
				2496.5~13000	4803.59	-50.63	≤-26	0.00865	≤2.5	PASS
			2441	30~500	182.63	-48.06	≤-26	0.01563	≤2.5	PASS
				500~1000	768.88	-55.27	≤-26	0.00297	≤2.5	PASS
				1000~2387	1220.19	-40.50	≤-26	0.08913	≤2.5	PASS
				2387~2400	2395.89	-43.41	≤-16	0.04560	≤25	PASS
				2483.5~2496.5	2495.68	-43.36	≤-16	0.04613	≤25	PASS
				2496.5~13000	4881.84	-38.16	≤-26	0.15276	≤2.5	PASS
			2480	30~500	193.09	-47.46	≤-26	0.01795	≤2.5	PASS
				500~1000	803.50	-55.58	≤-26	0.00277	≤2.5	PASS
				1000~2387	1239.95	-41.56	≤-26	0.06982	≤2.5	PASS
				2387~2400	2387.45	-43.64	≤-16	0.04325	≤25	PASS
				2483.5~2496.5	2483.52	-26.30	≤-16	2.34423	≤25	PASS
				2496.5~13000	4960.10	-38.51	≤-26	0.14093	≤2.5	PASS
	3DH5	Ant1	2402	30~500	182.63	-47.89	≤-26	0.01626	≤2.5	PASS
				500~1000	585.13	-55.83	≤-26	0.00261	≤2.5	PASS
				1000~2387	1200.77	-42.50	≤-26	0.05623	≤2.5	PASS
				2387~2400	2400	-16.65	≤-16	21.62719	≤25	See table below
				2483.5~2496.5	2491.35	-43.62	≤-16	0.04345	≤25	PASS
				2496.5~13000	3753.77	-52.90	≤-26	0.00513	≤2.5	PASS
			2441	30~500	173.23	-48.51	≤-26	0.01409	≤2.5	PASS
				500~1000	846.88	-55.80	≤-26	0.00263	≤2.5	PASS
				1000~2387	1220.53	-41.75	≤-26	0.06683	≤2.5	PASS
				2387~2400	2396.98	-43.21	≤-16	0.04775	≤25	PASS
				2483.5~2496.5	2485.96	-43.62	≤-16	0.04345	≤25	PASS
				2496.5~13000	4881.84	-41.07	≤-26	0.07816	≤2.5	PASS
			2480	30~500	169.47	-48.48	≤-26	0.01419	≤2.5	PASS

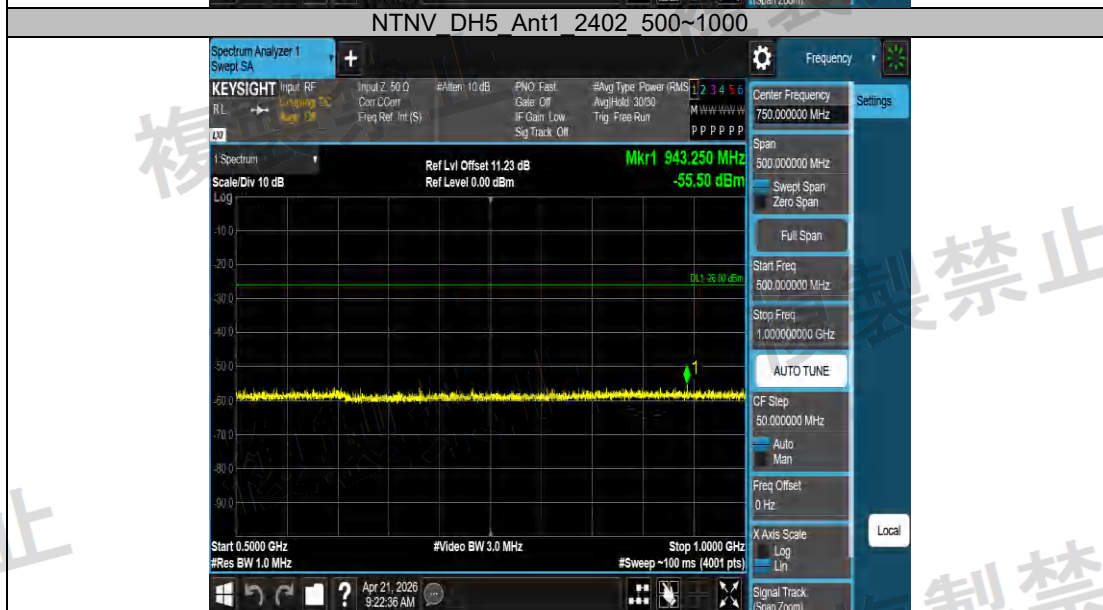
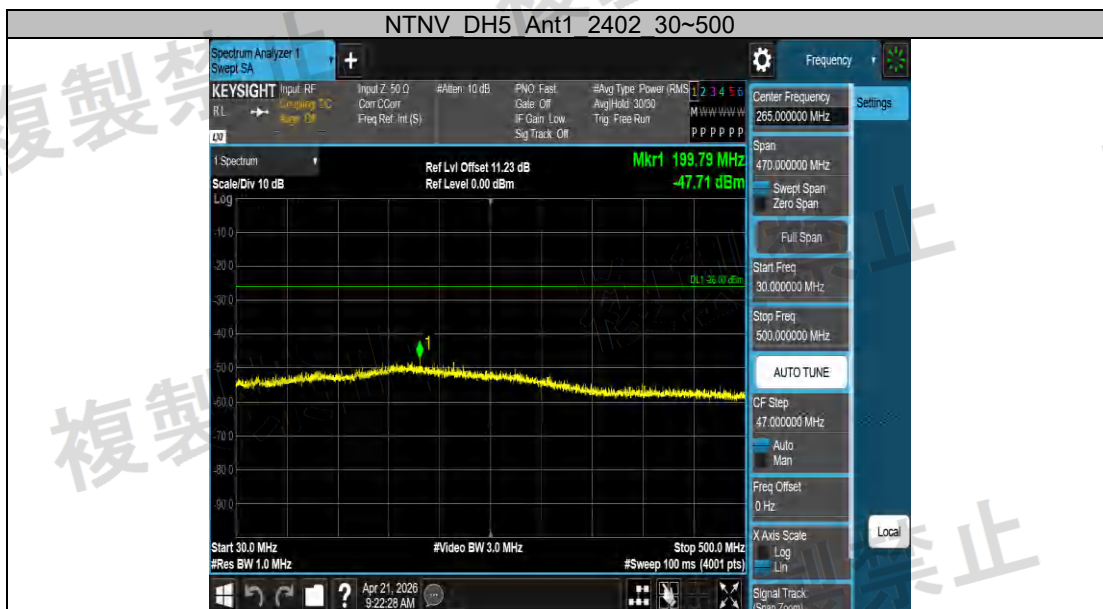
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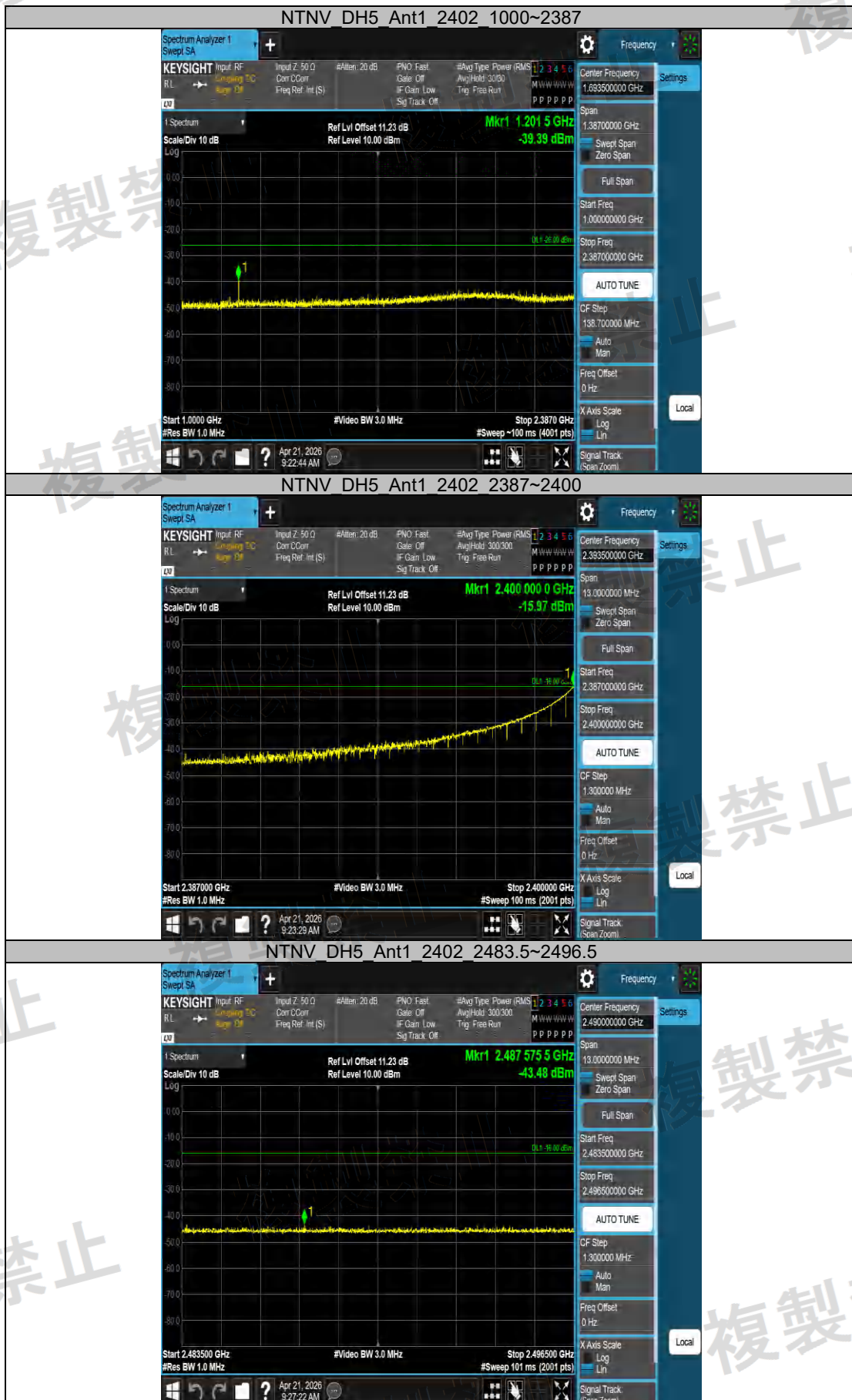


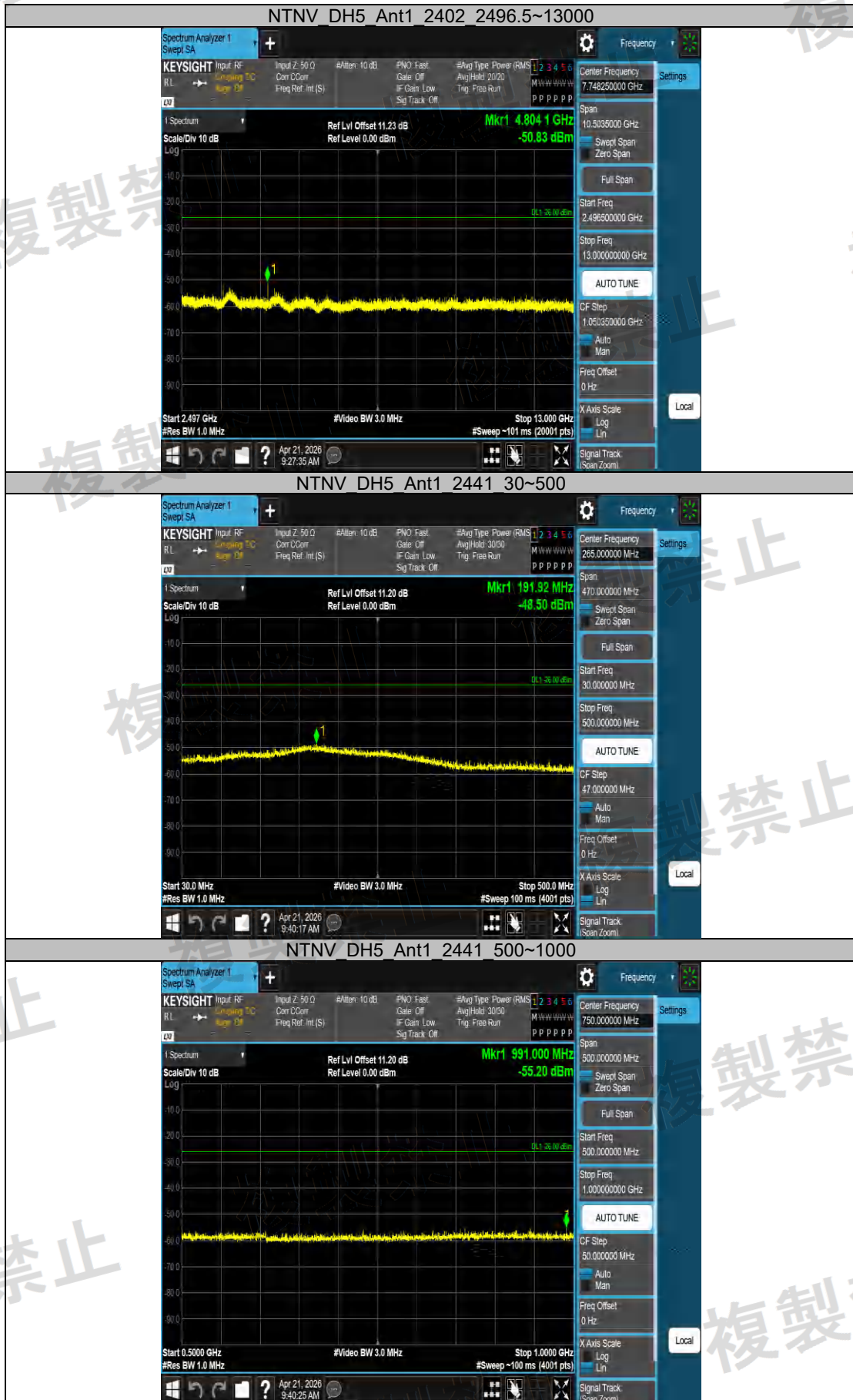
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			500~1000	549.75	-56.19	≤-26	0.00240	≤2.5	PASS
			1000~2387	1239.95	-41.83	≤-26	0.06561	≤2.5	PASS
			2387~2400	2395.53	-43.28	≤-16	0.04699	≤25	PASS
			2483.5~2496.5	2483.53	-29.10	≤-16	1.23027	≤25	PASS
			2496.5~13000	4959.57	-42.06	≤-26	0.06223	≤2.5	PASS







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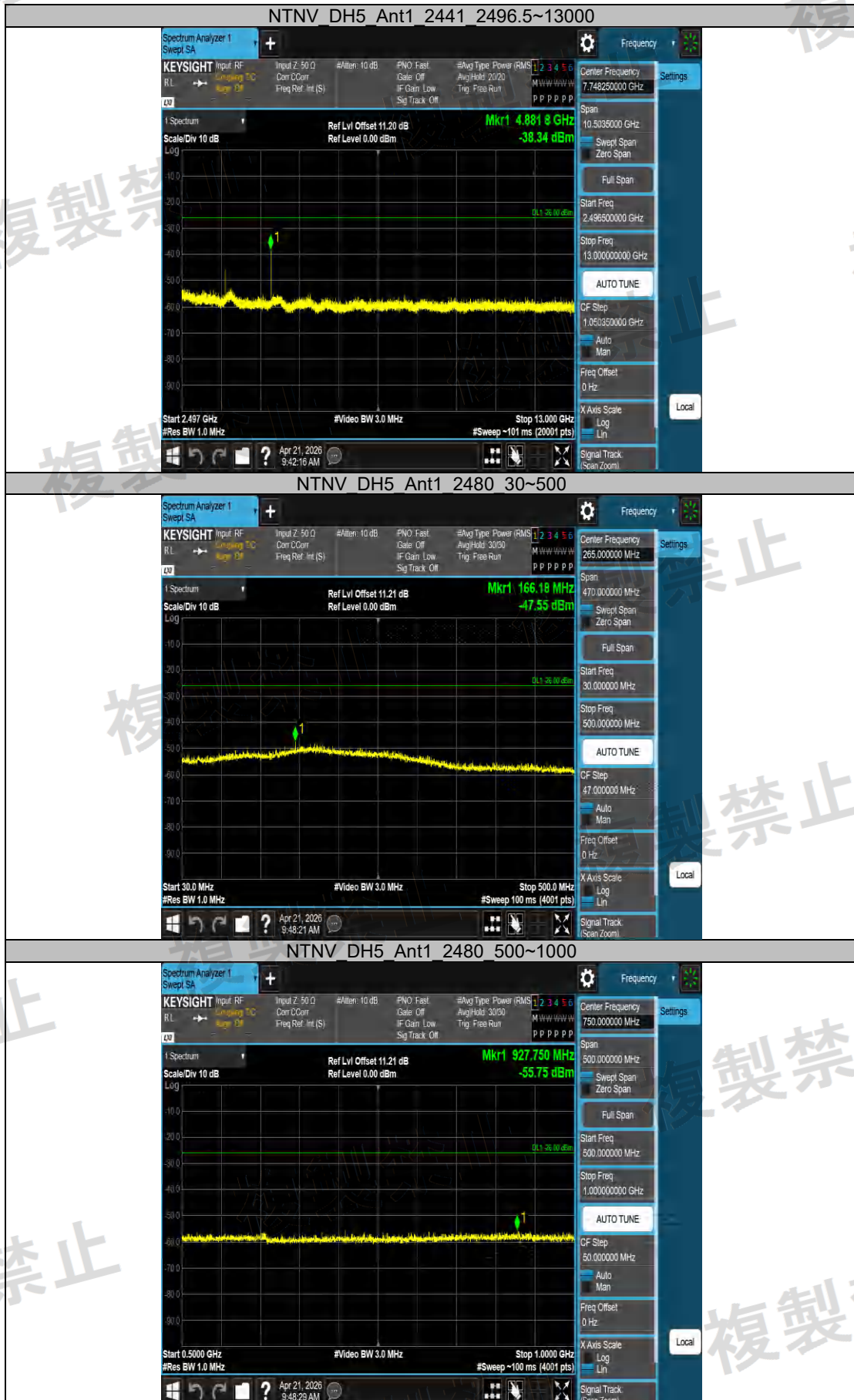


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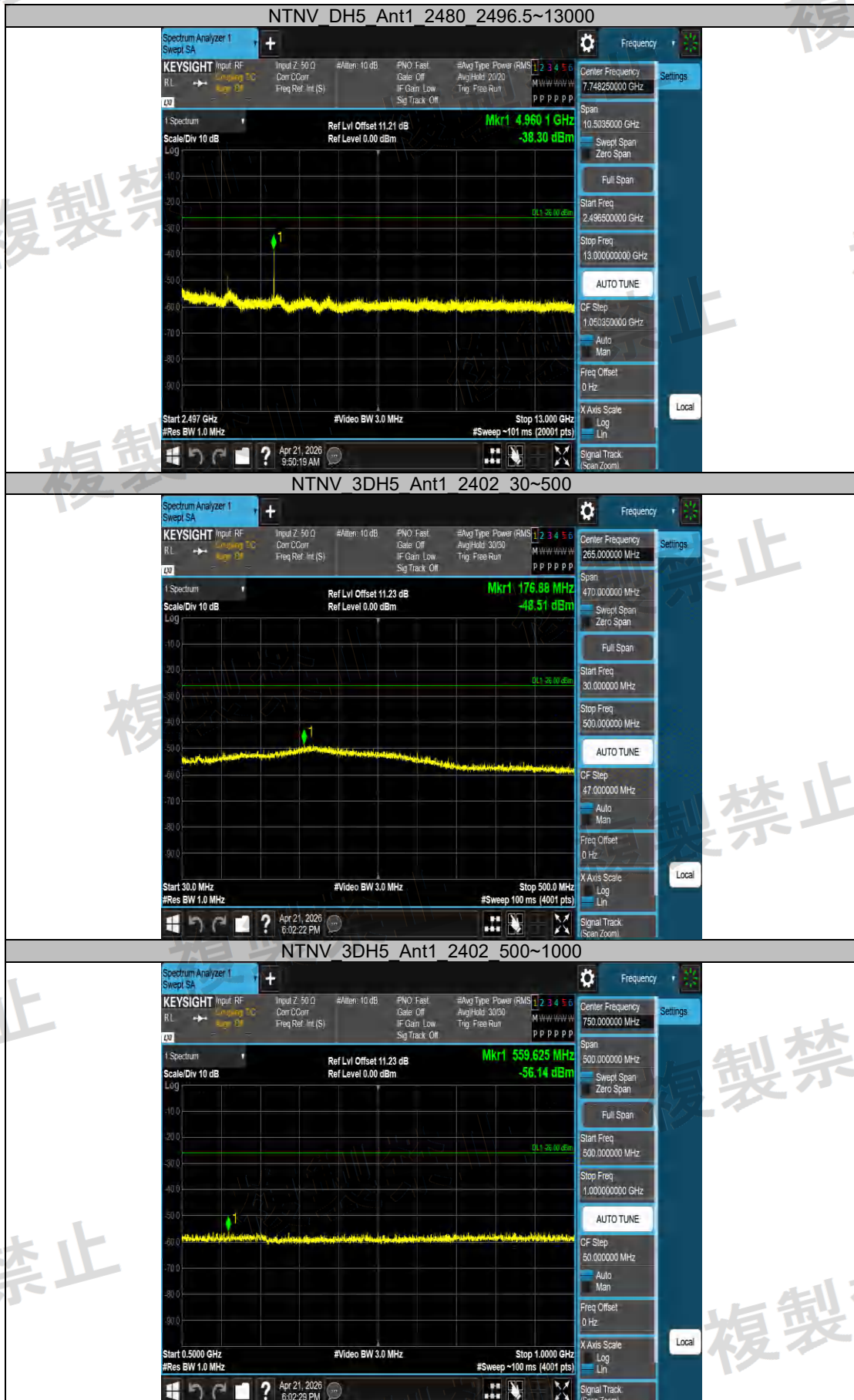


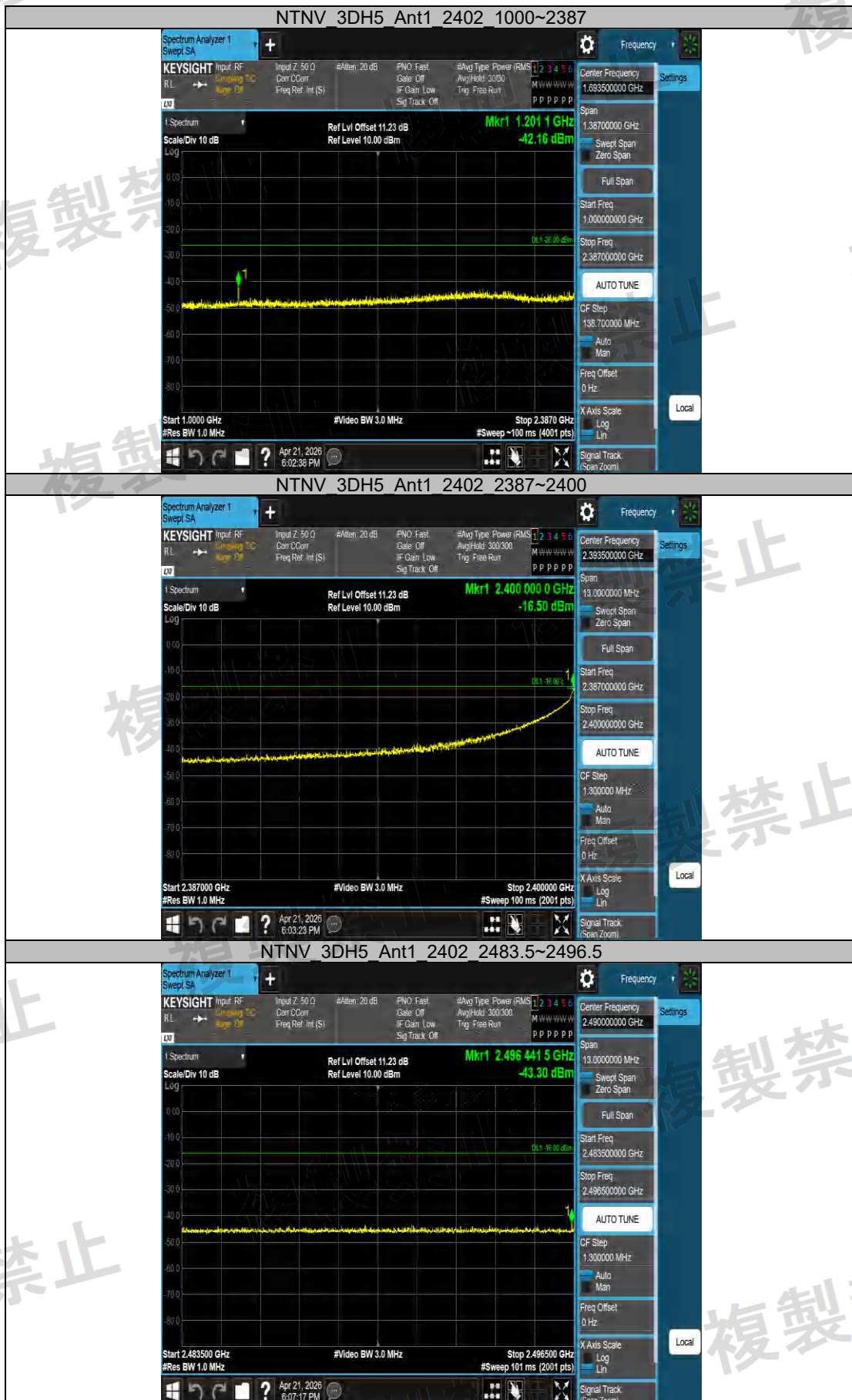


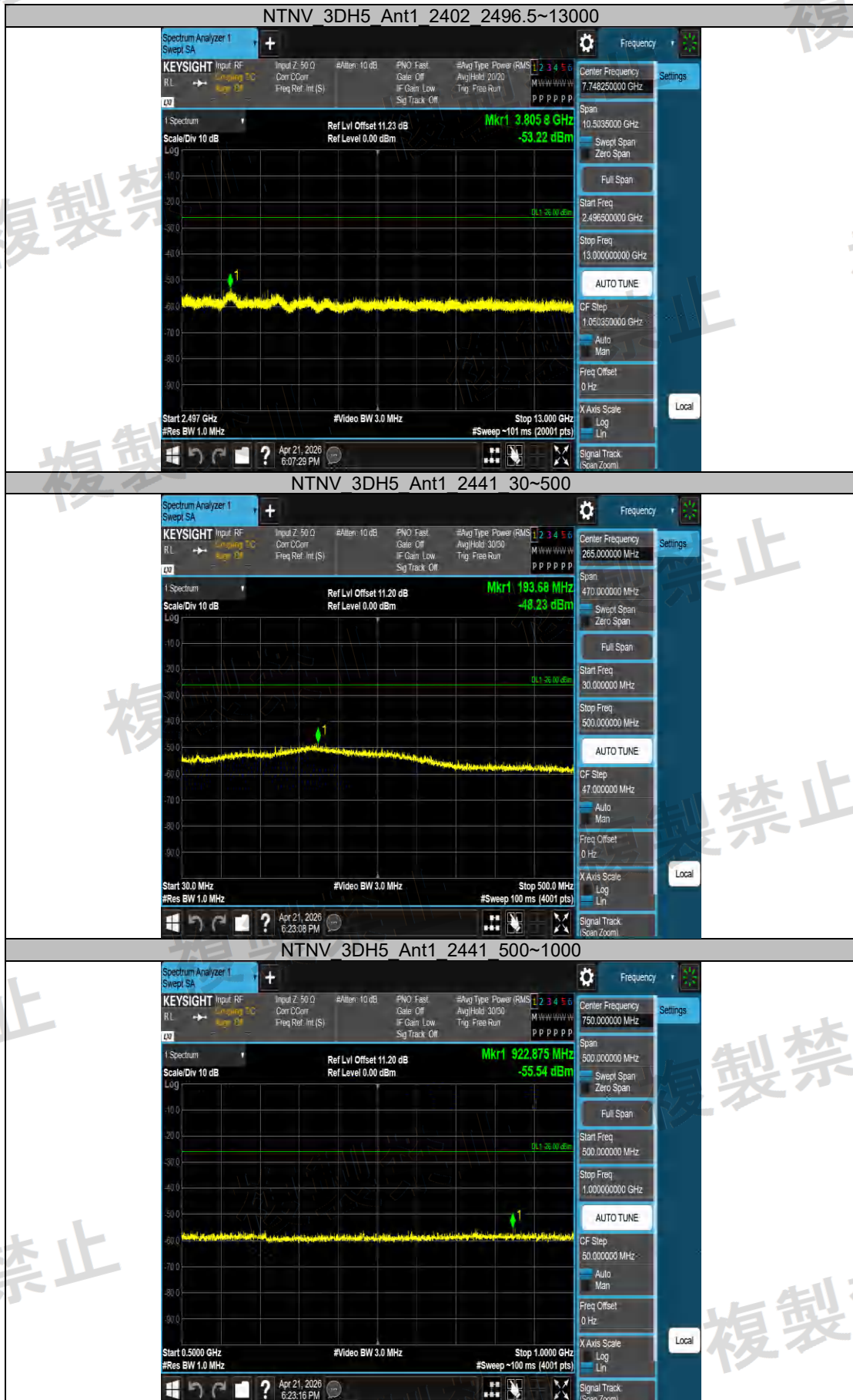
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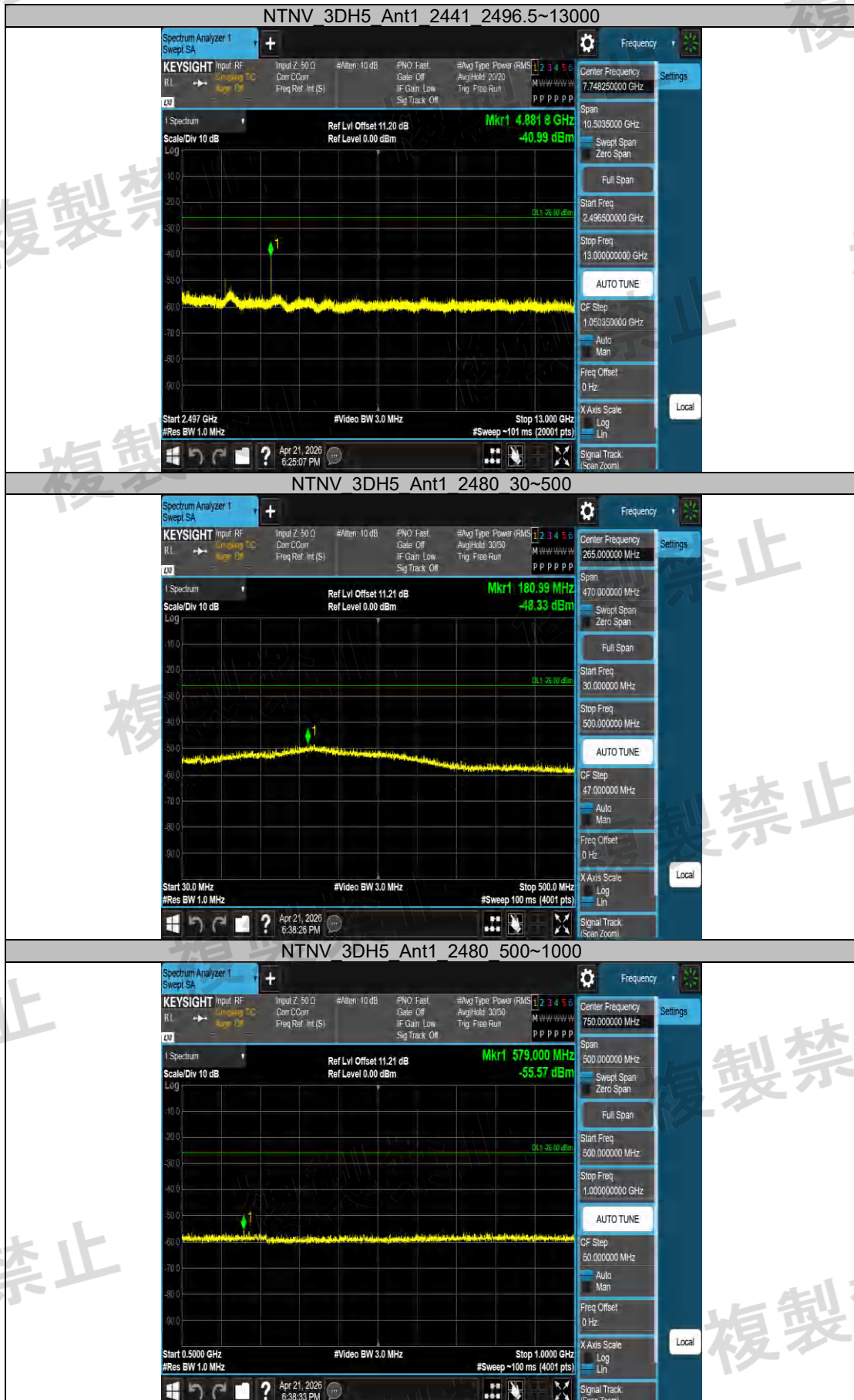


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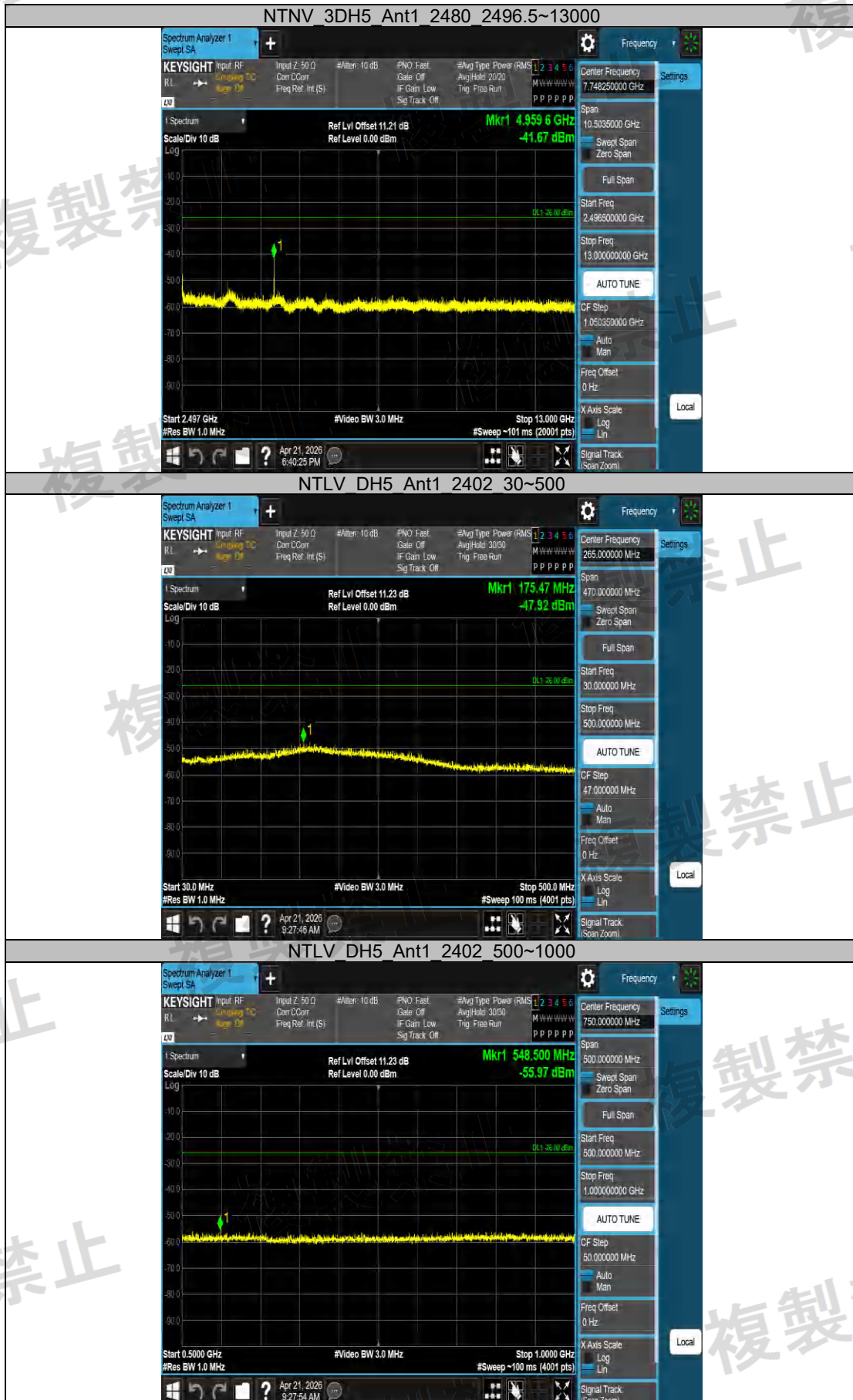


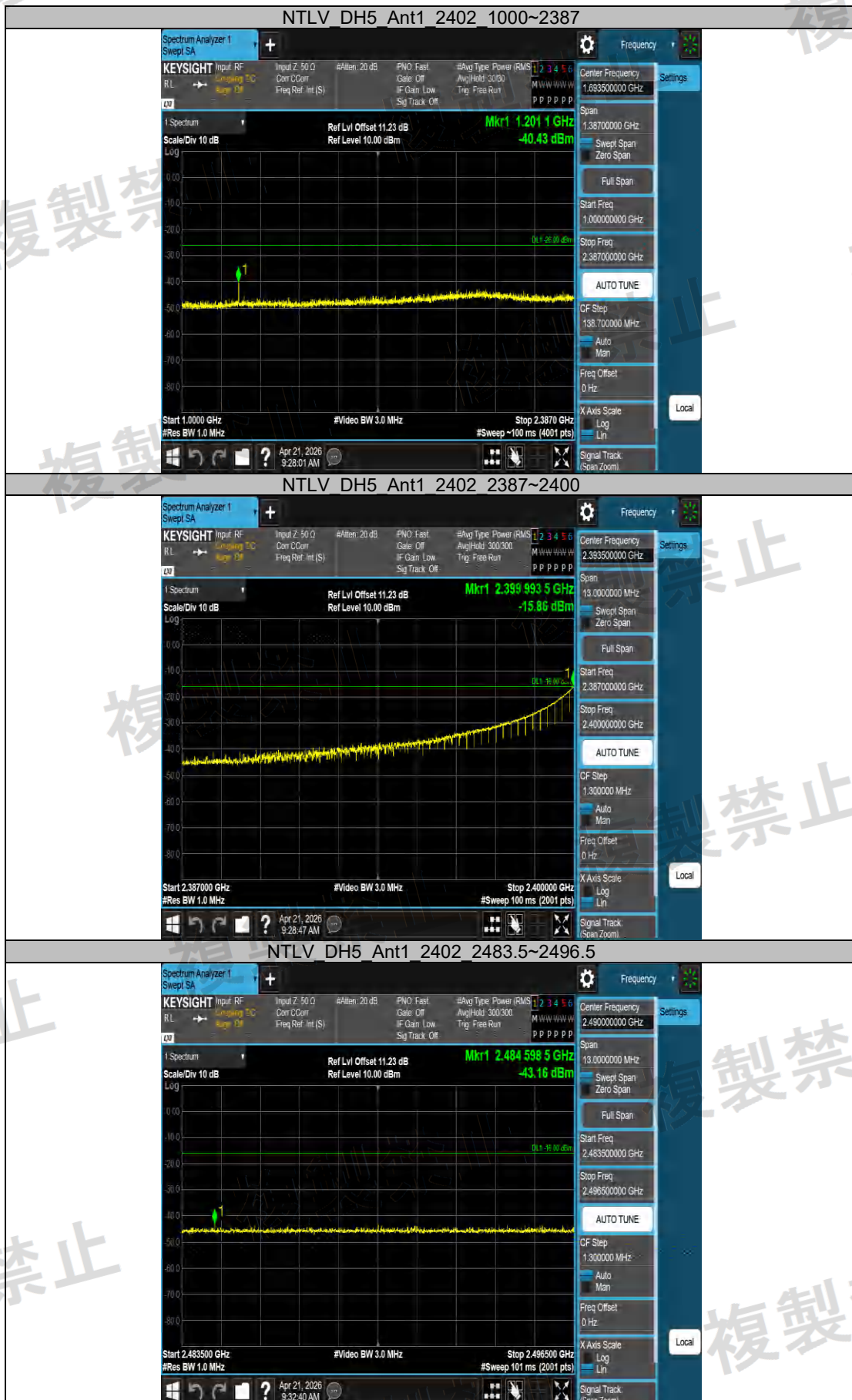
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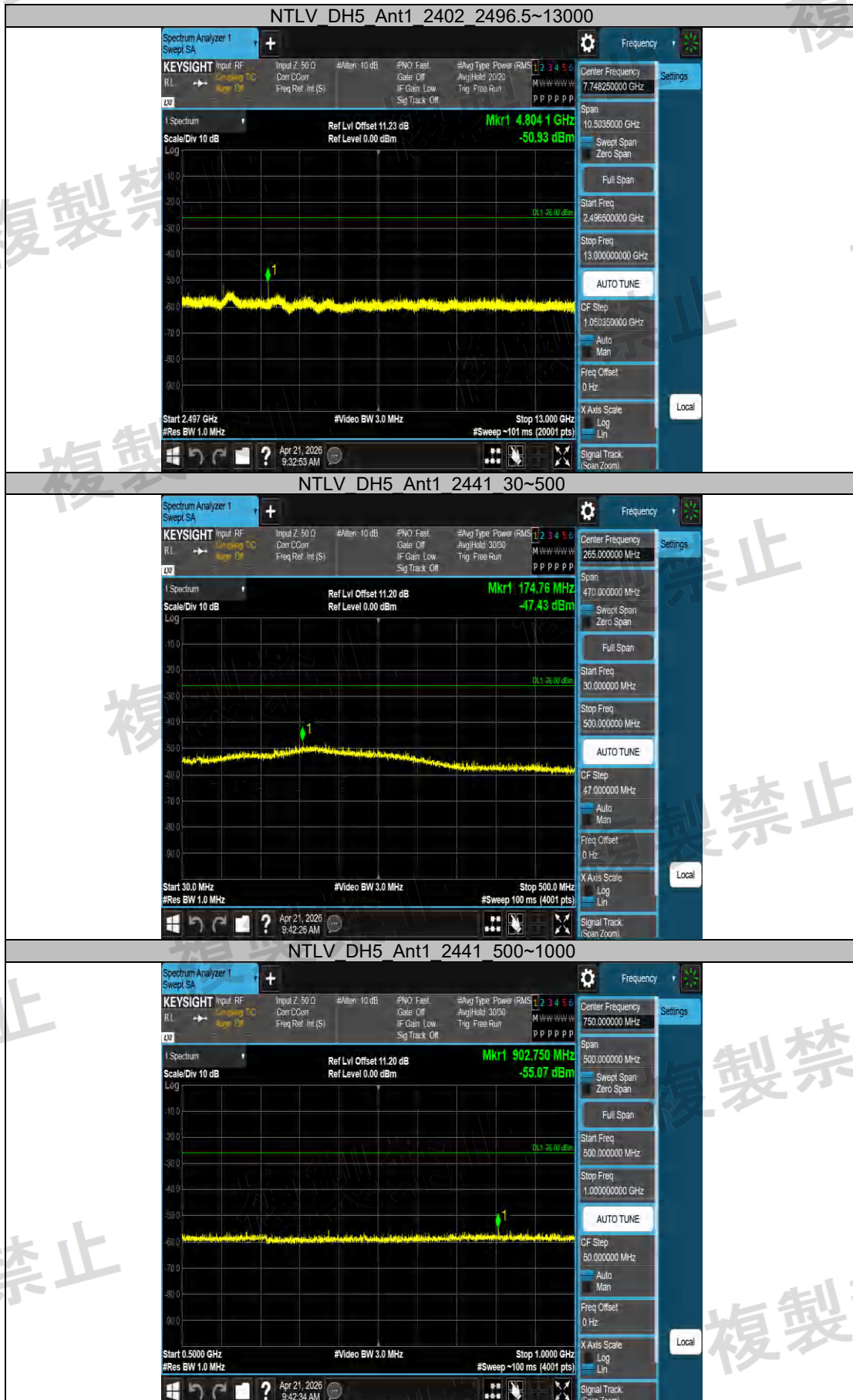
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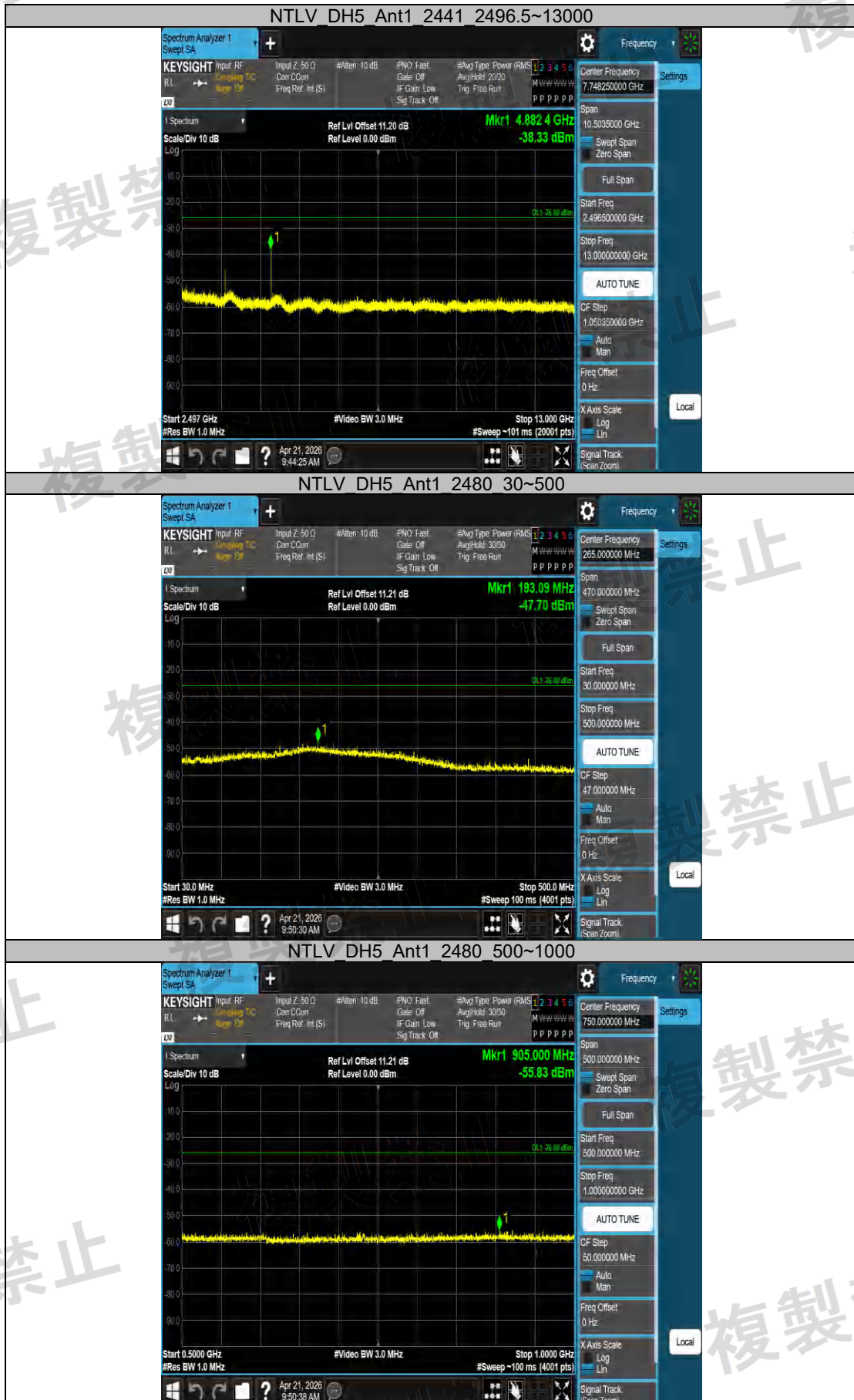


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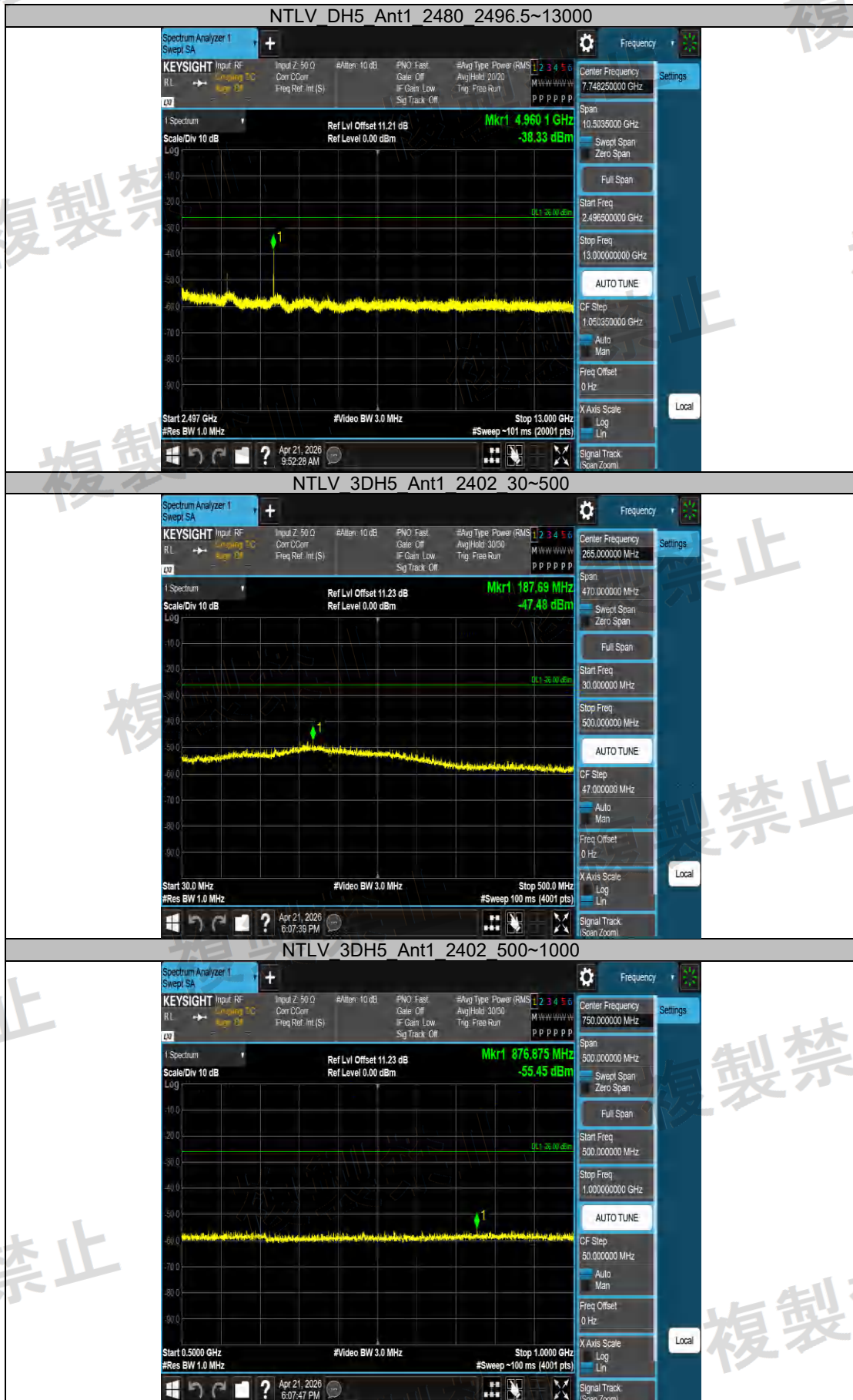


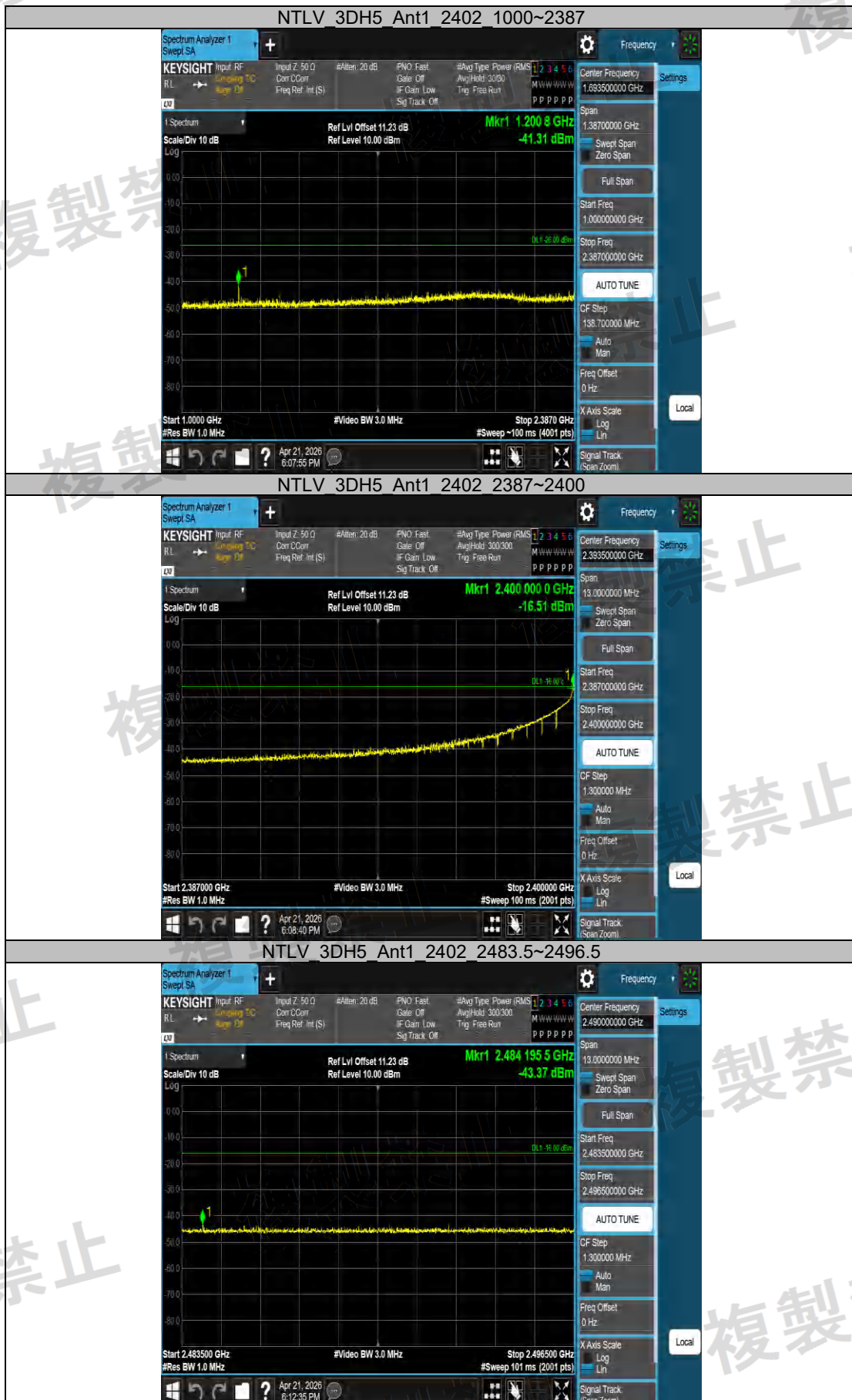
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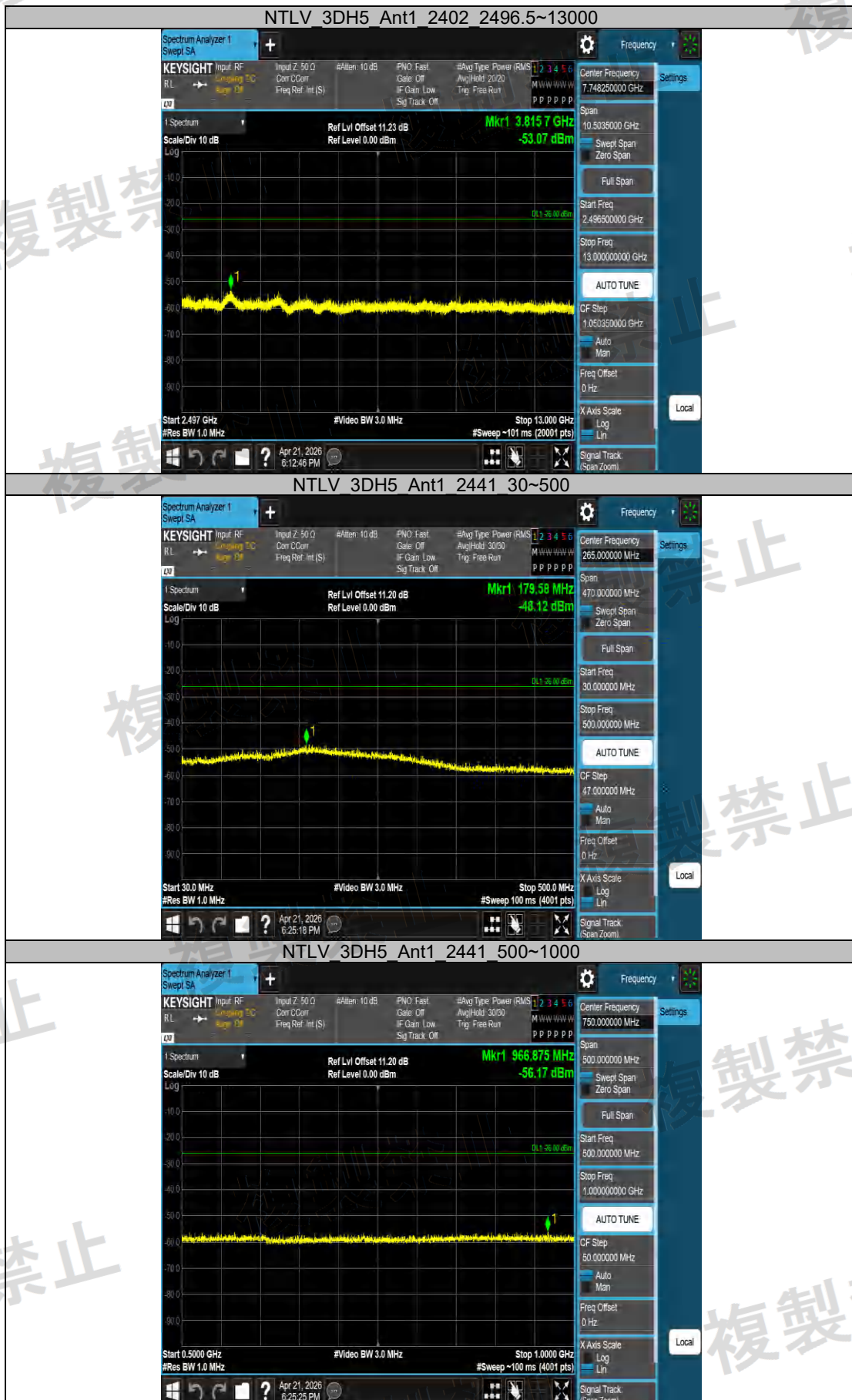
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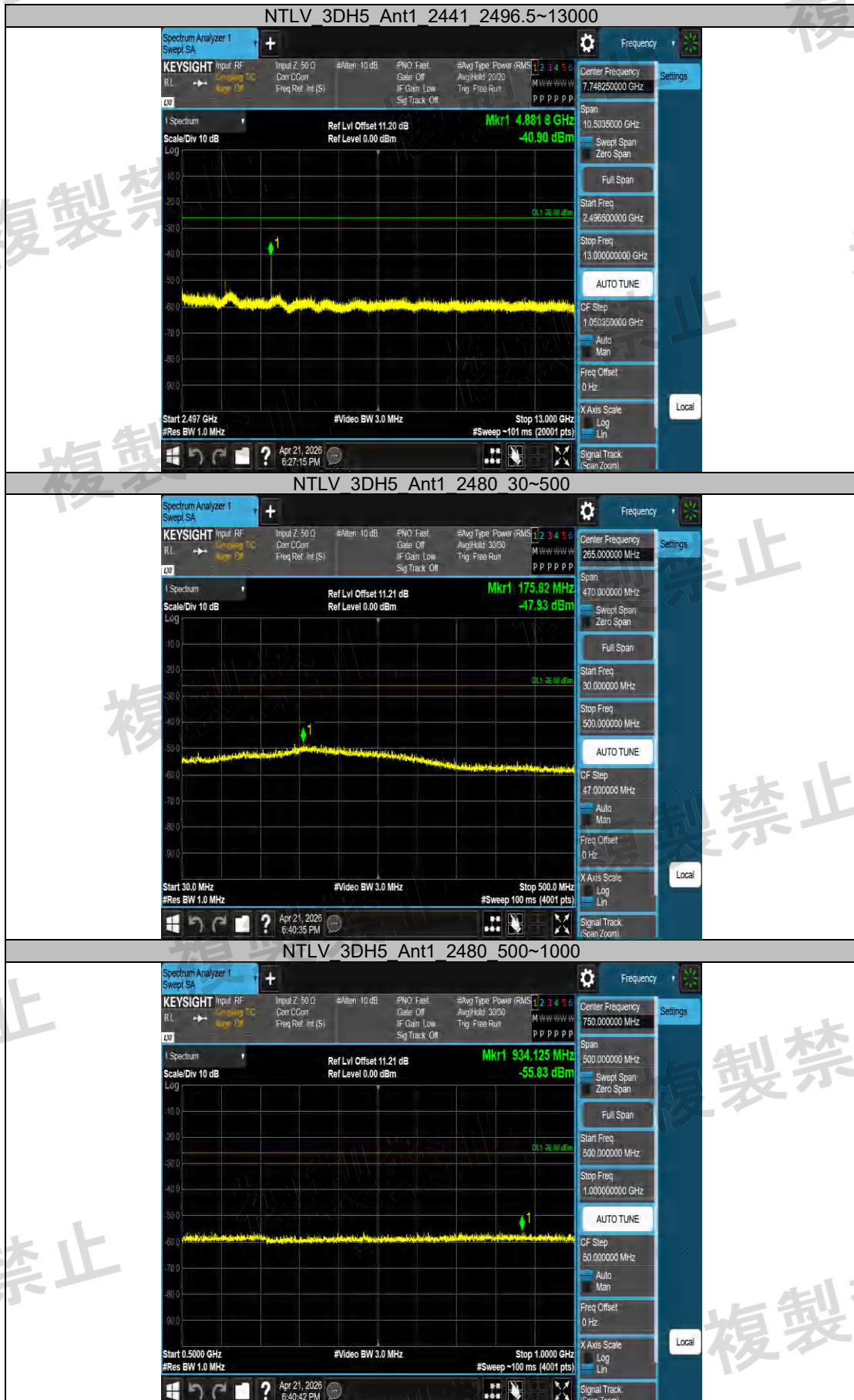




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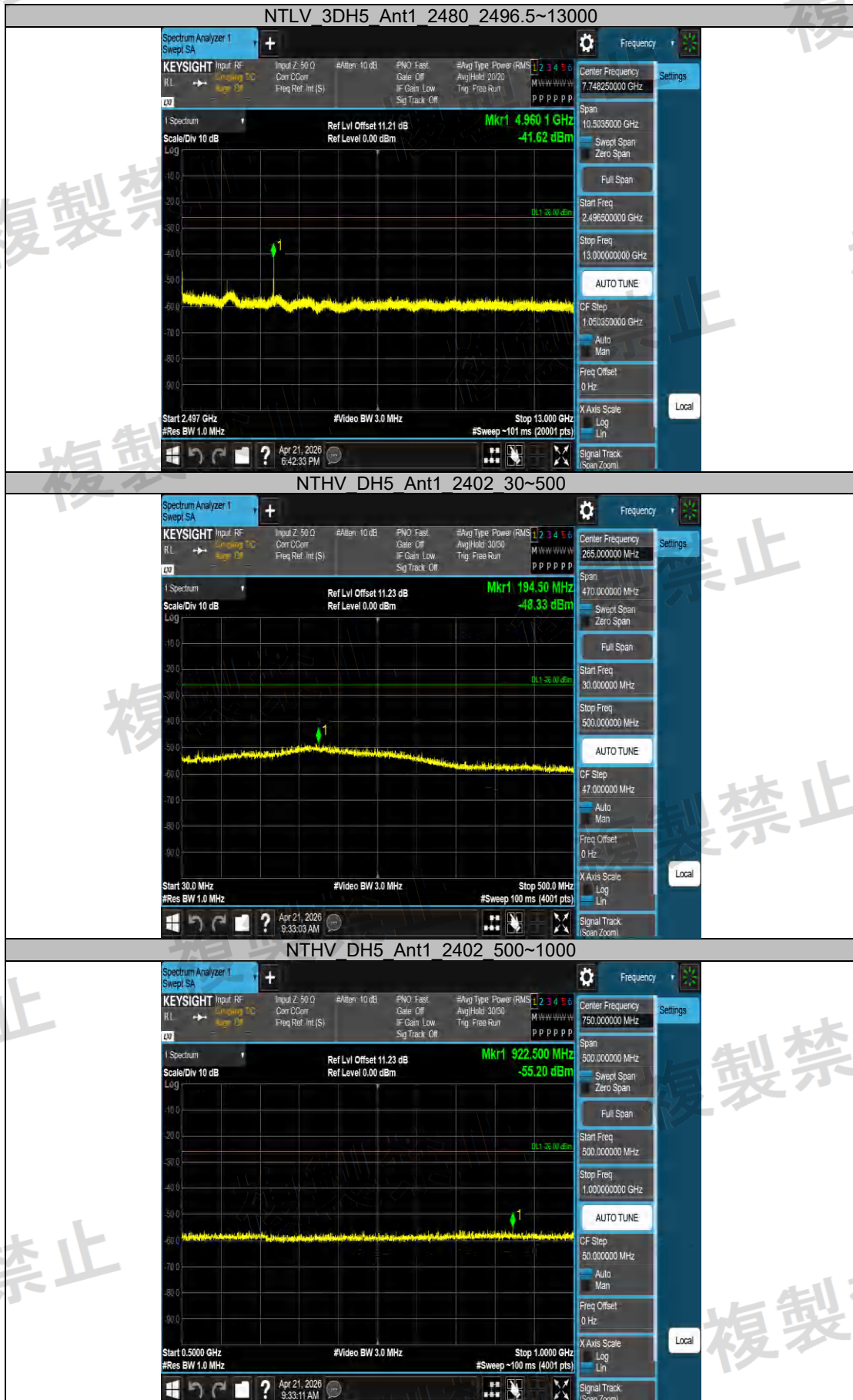


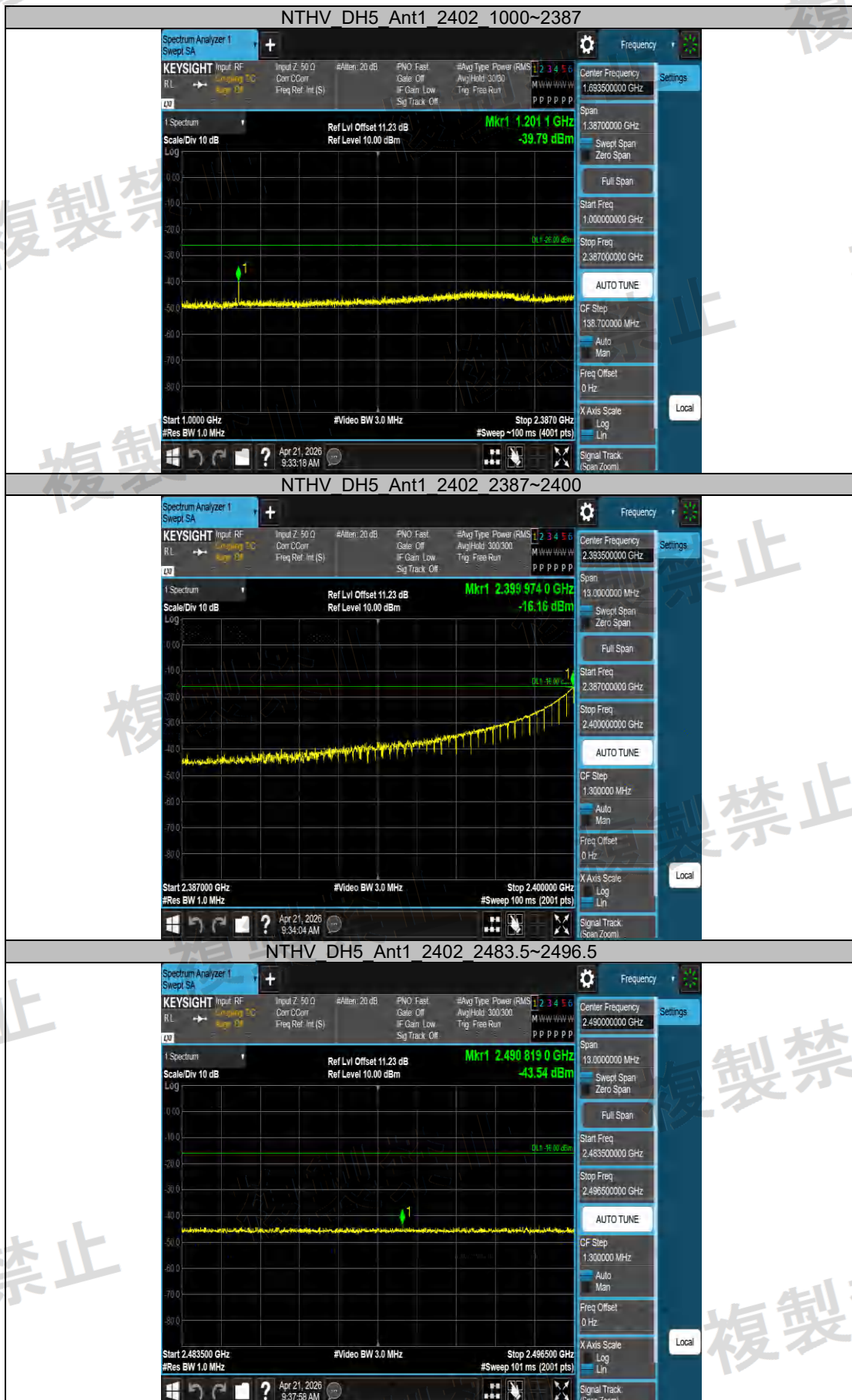
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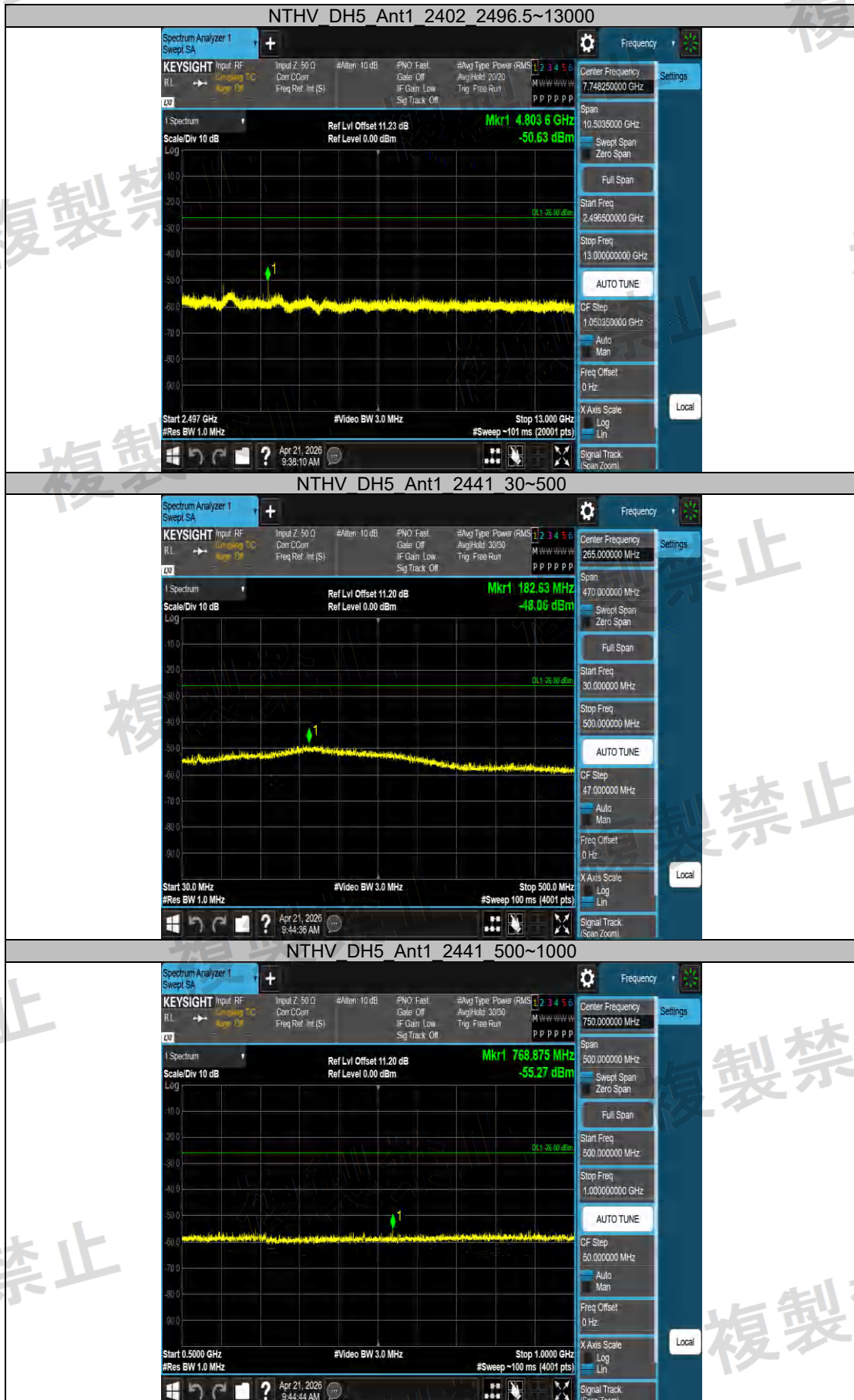


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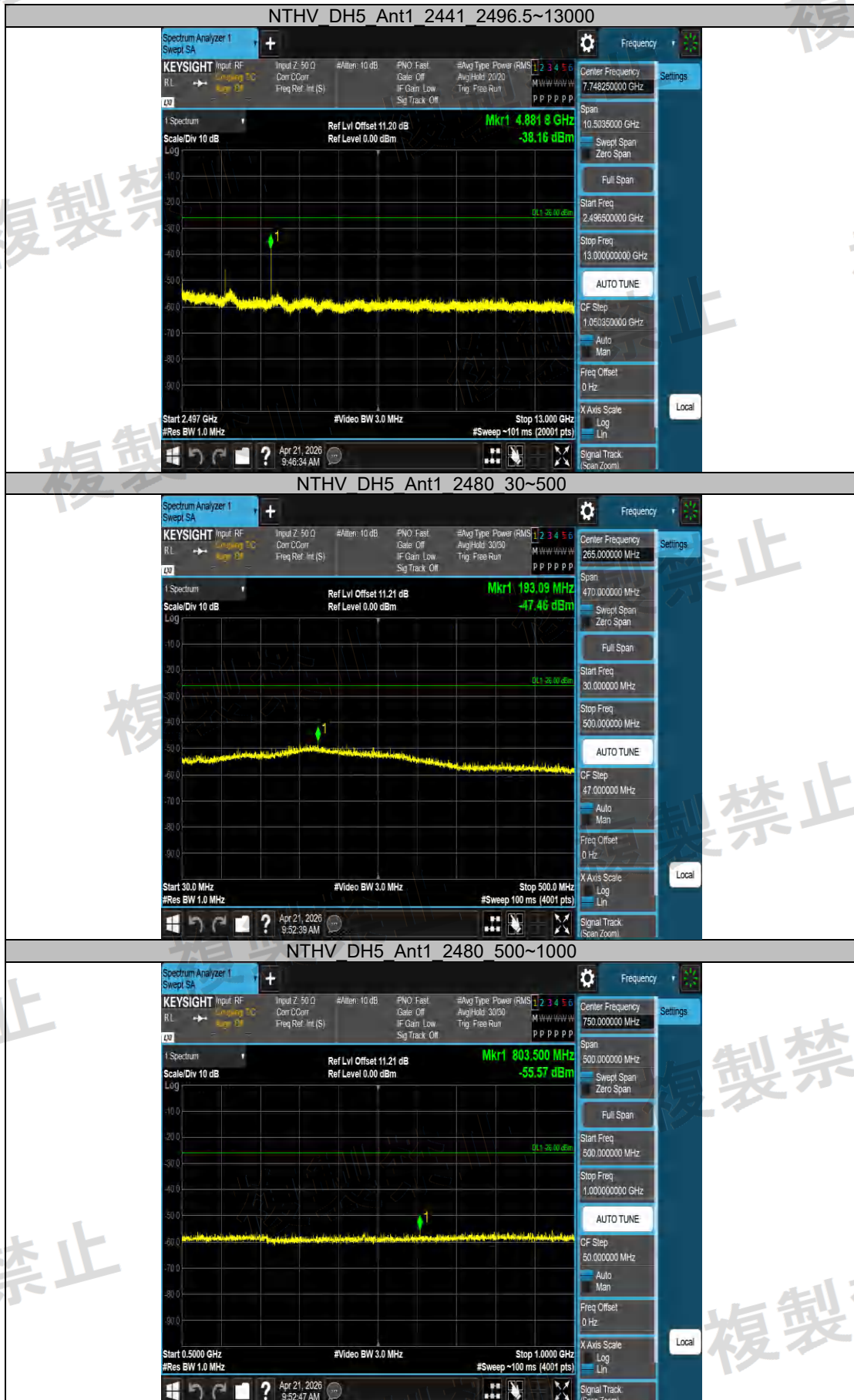


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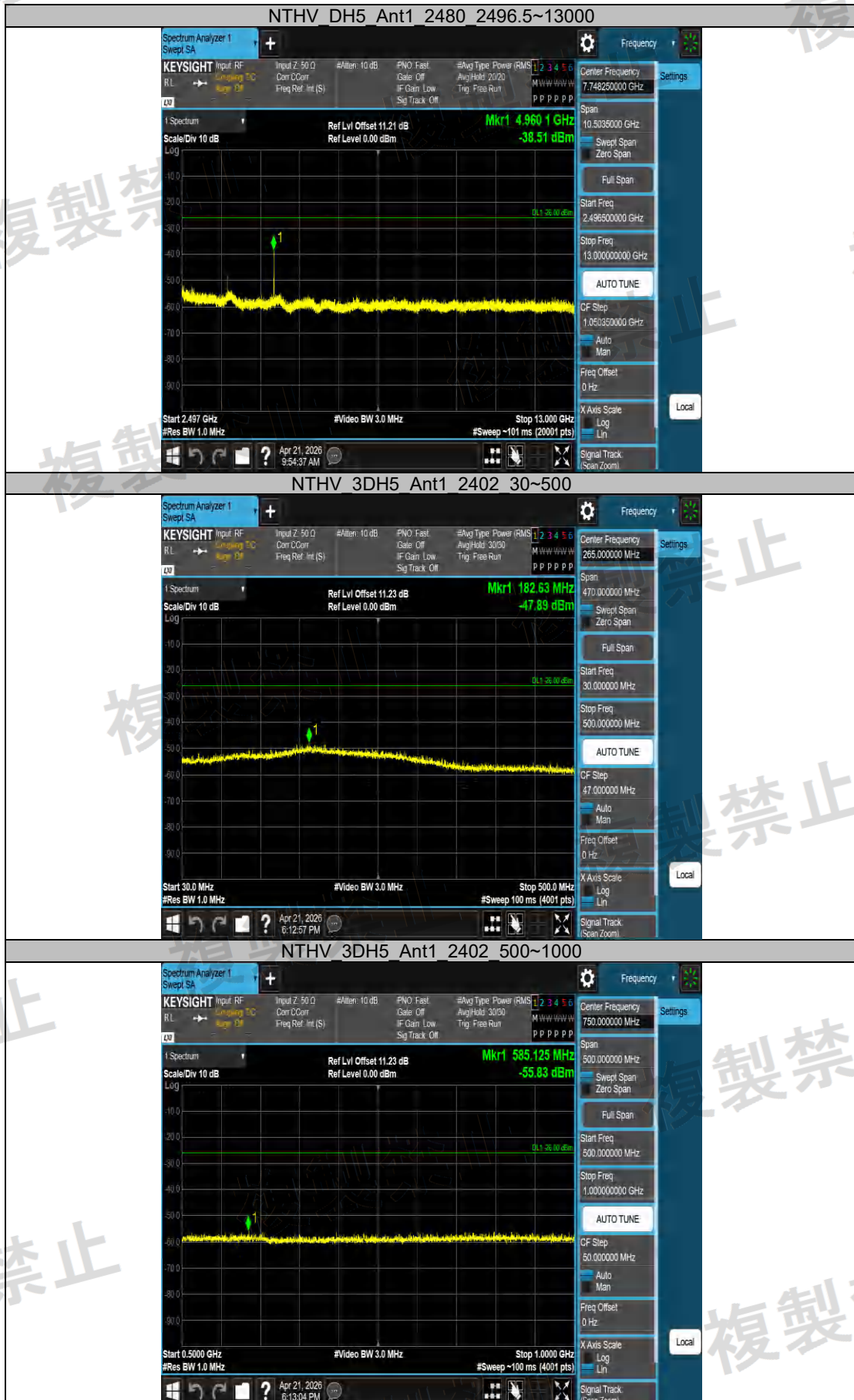


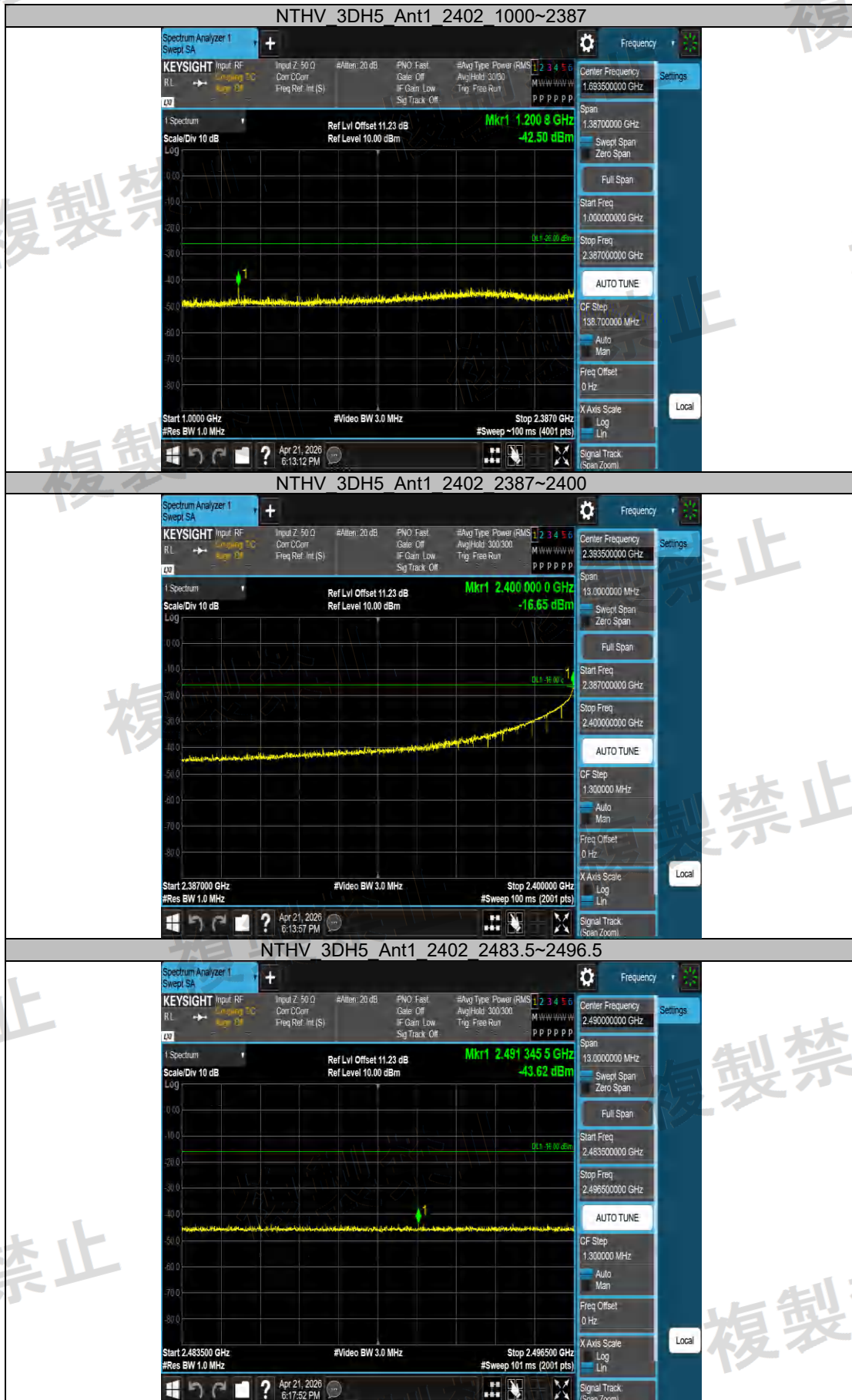
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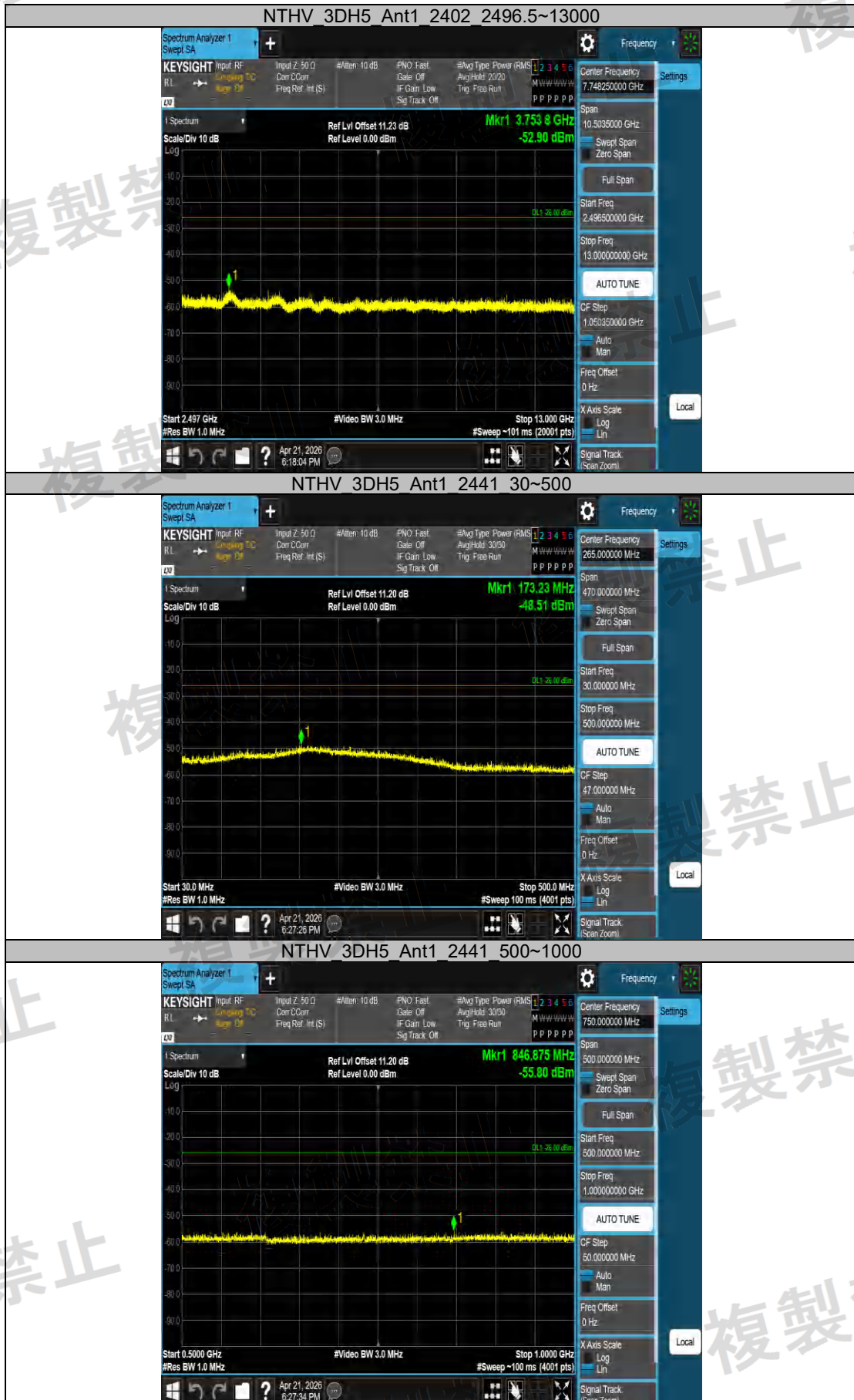


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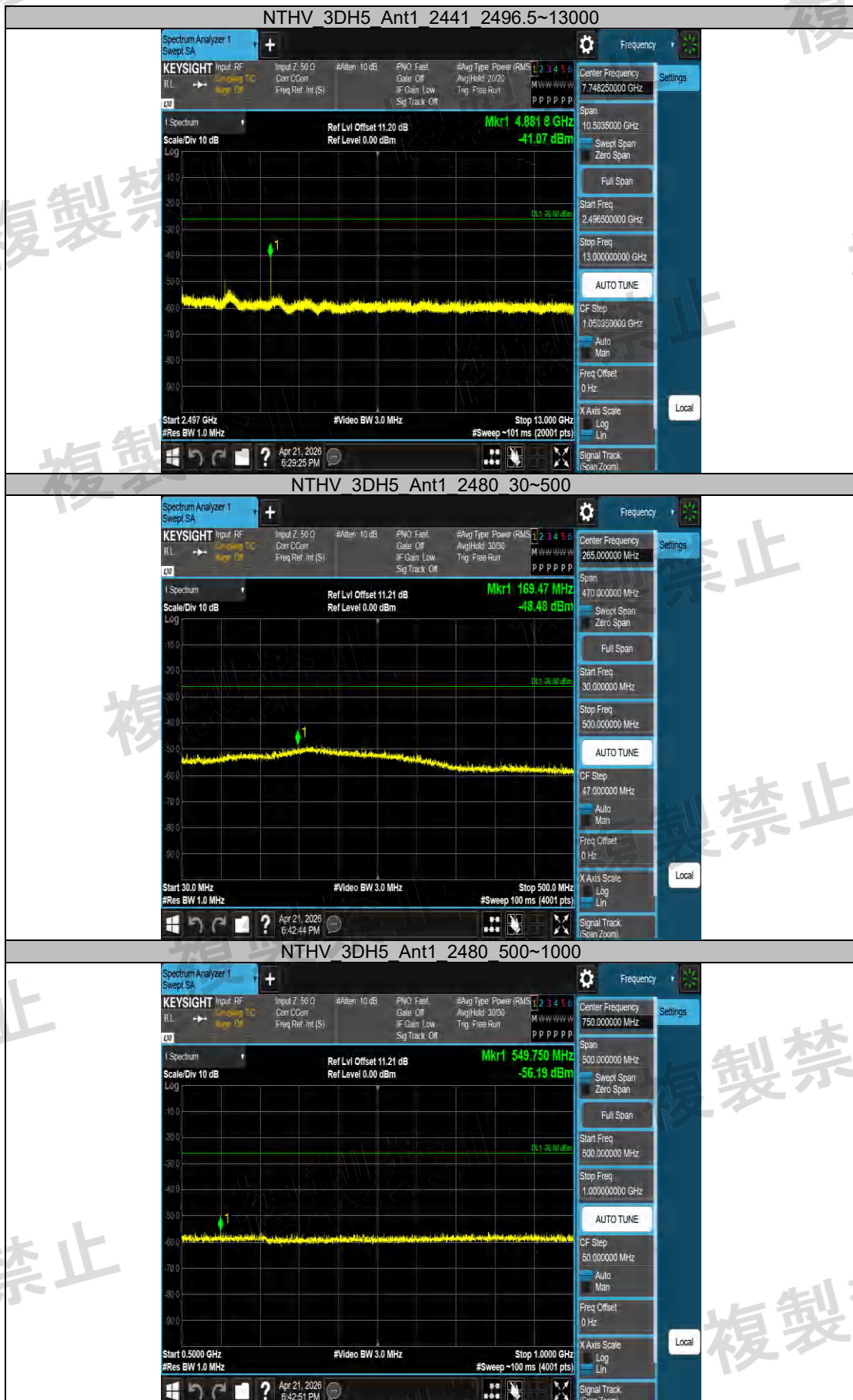


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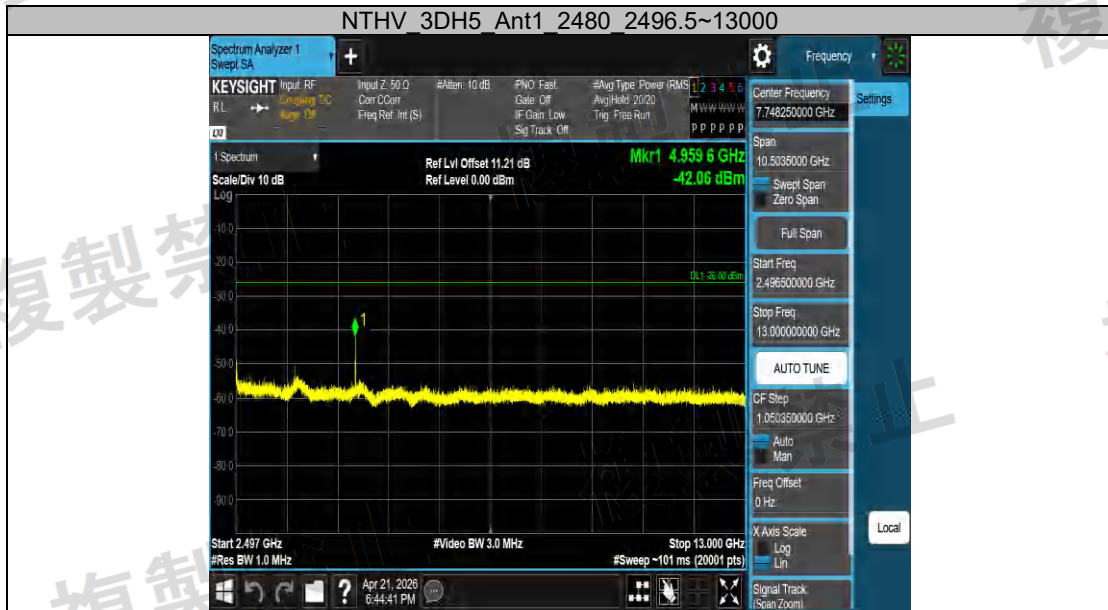


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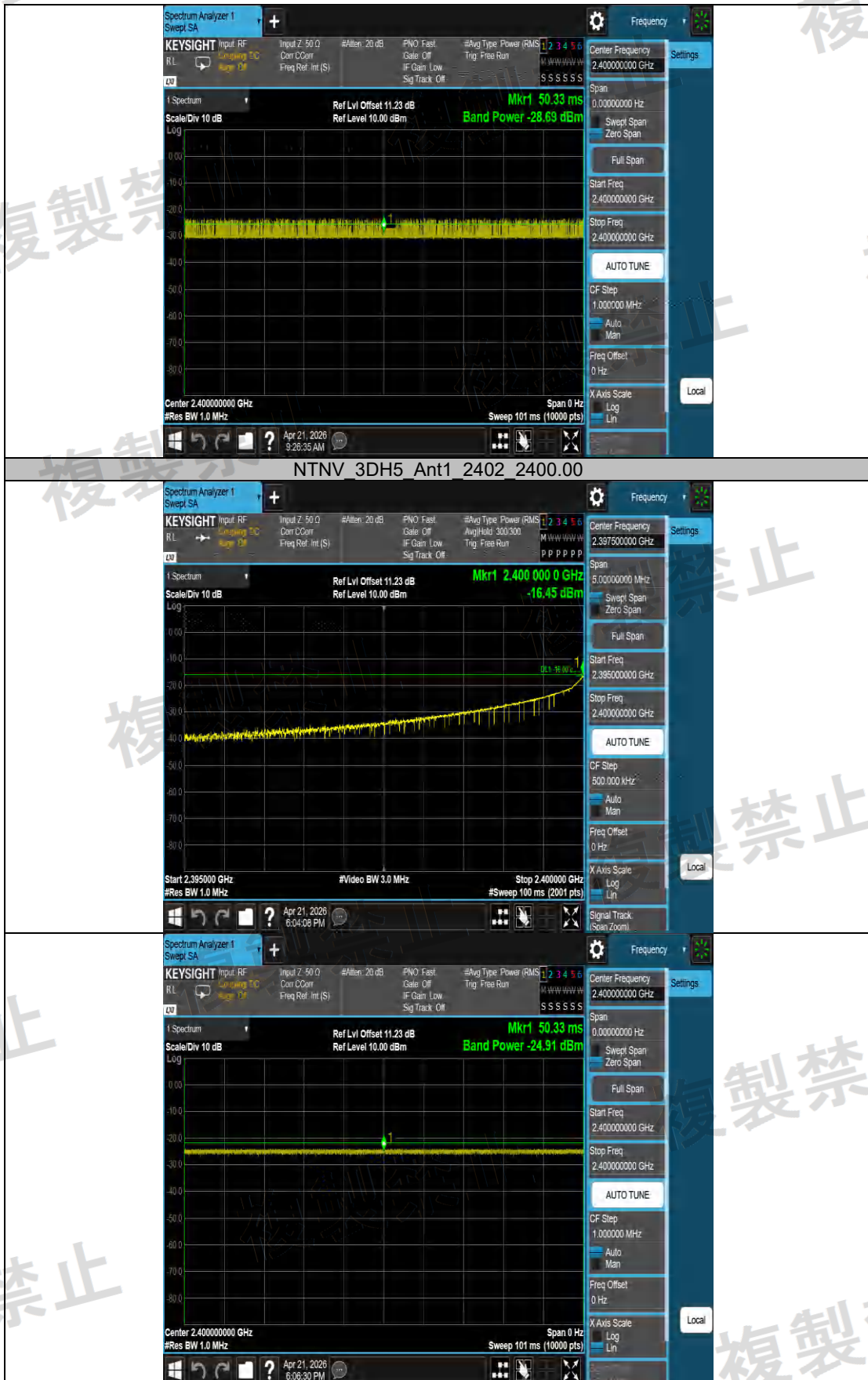


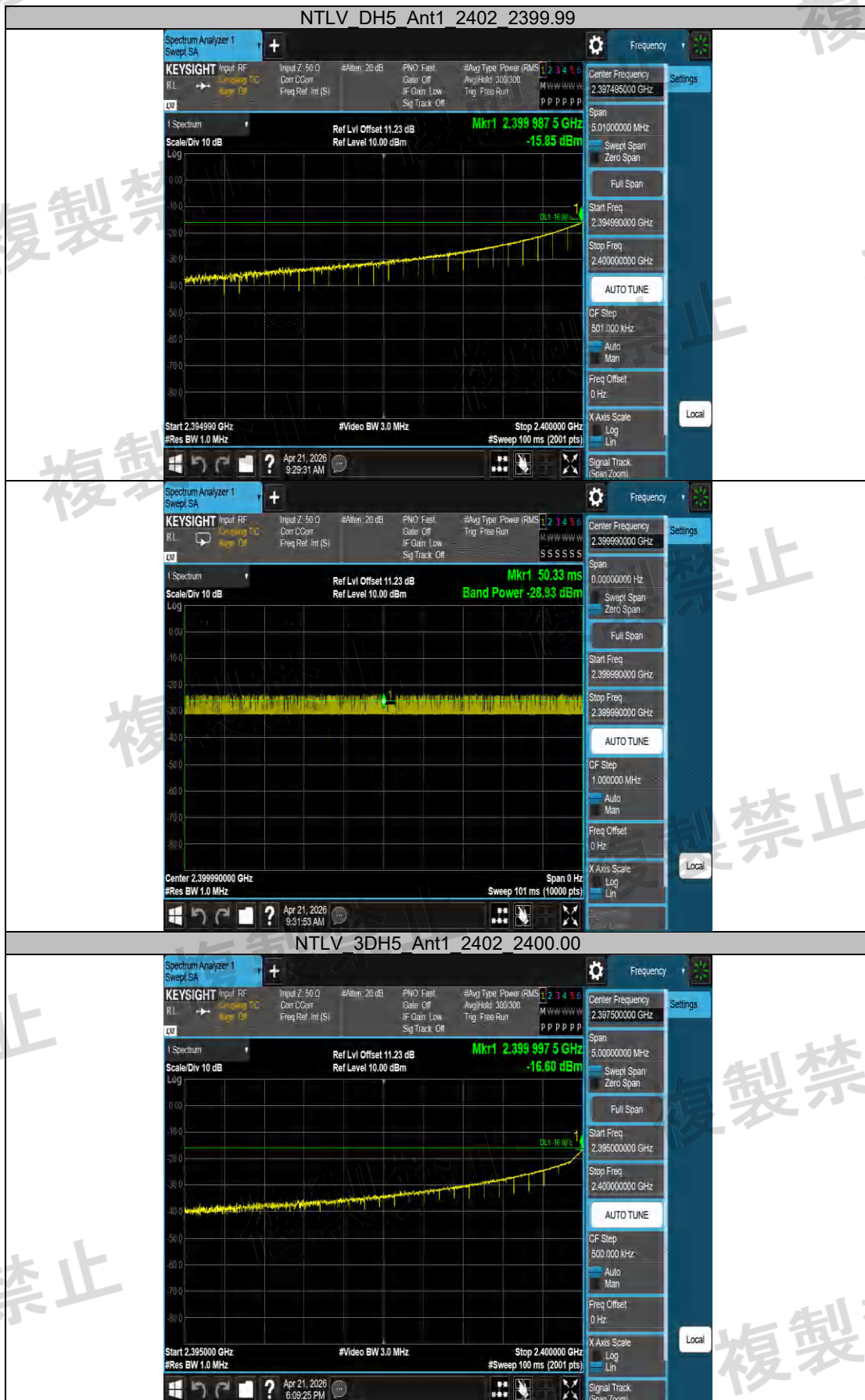


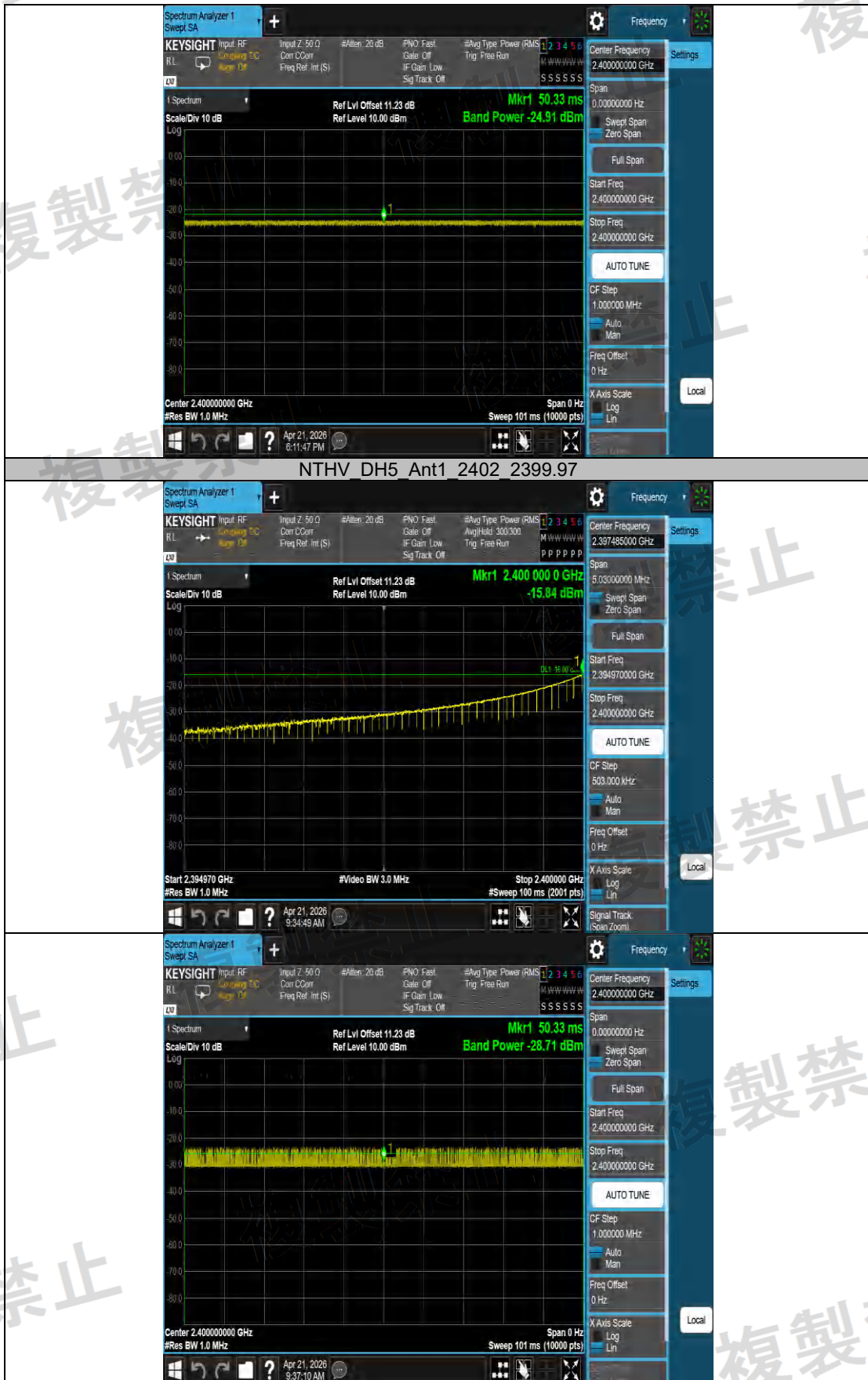
Test Result_Step2

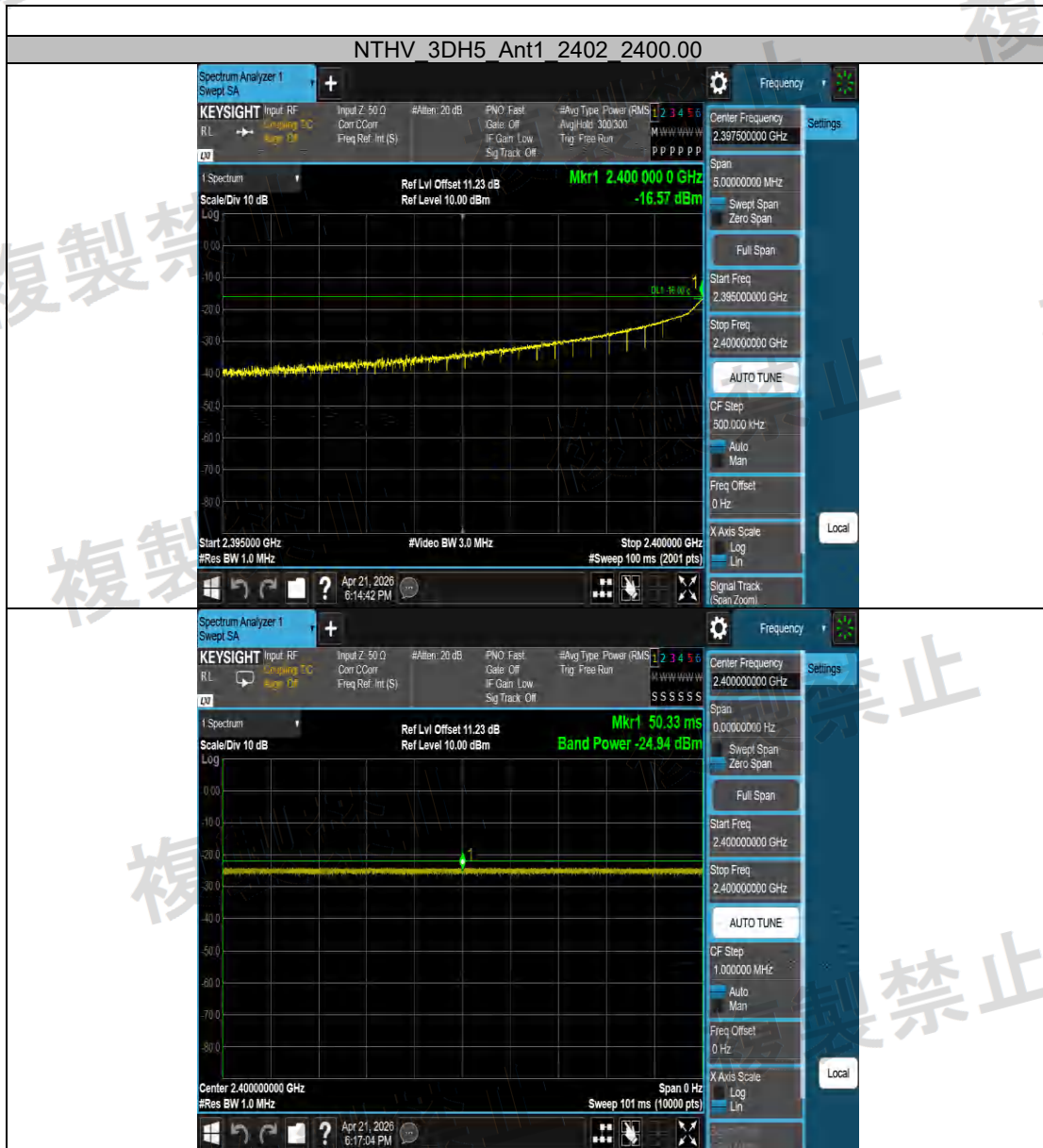
Test Condition	Test Mode	Antenna	Freq (MHz)	Freq. [MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Result [μW/MHz]	Limit [μW/MHz]	Verdict
NTNV	DH5	Ant1	2402	2400.00	-28.69	≤-16	1.35207	≤25	PASS
	3DH5	Ant1	2402	2400.00	-24.91	≤-16	3.22849	≤25	PASS
NTLV	DH5	Ant1	2402	2399.99	-28.93	≤-16	1.27938	≤25	PASS
	3DH5	Ant1	2402	2400.00	-24.91	≤-16	3.22849	≤25	PASS
NTHV	DH5	Ant1	2402	2399.97	-28.71	≤-16	1.34586	≤25	PASS
	3DH5	Ant1	2402	2400.00	-24.94	≤-16	3.20627	≤25	PASS









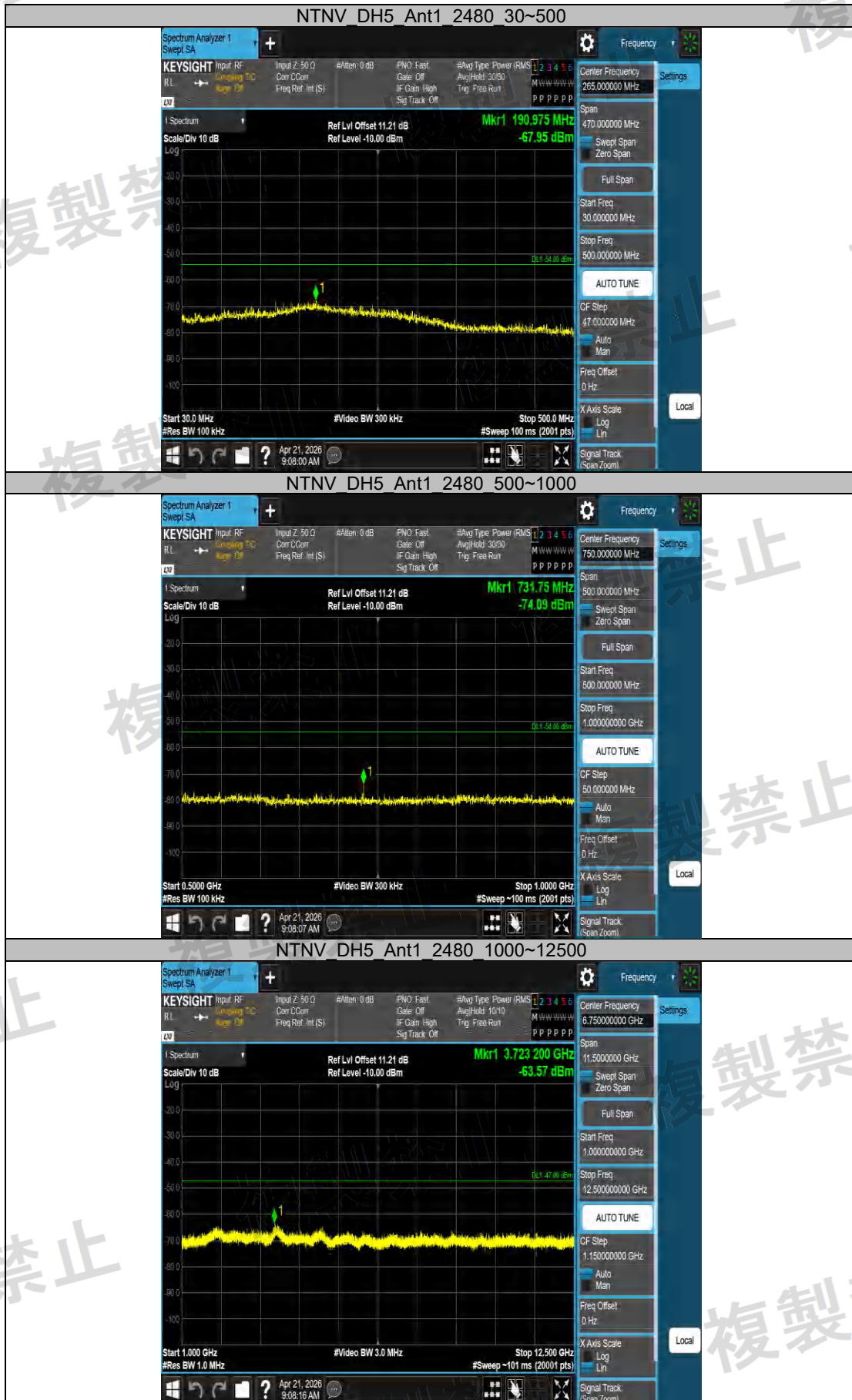


6 Appendix A.6: SPURIOUS EMISSIONS FOR RECEIVER

Test Condition	Test Mode	Antenna	Freq(MHz)	Freq.Range [MHz]	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [nW]	Limit [nW]	Verdict
NTNV	DH5	Ant1	2402	30~500	198.97	-67.16	≤-54	0.19231	≤4	PASS
				500~1000	731.75	-75.12	≤-54	0.03076	≤4	PASS
				1000~12500	3786.45	-63.62	≤-47	0.43451	≤20	PASS
			2441	30~500	178.29	-67.19	≤-54	0.19099	≤4	PASS
				500~1000	731.75	-75.17	≤-54	0.03041	≤4	PASS
				1000~12500	3776.68	-63.35	≤-47	0.46238	≤20	PASS
			2480	30~500	190.98	-67.95	≤-54	0.16032	≤4	PASS
				500~1000	731.75	-74.09	≤-54	0.03899	≤4	PASS
				1000~12500	3723.20	-63.57	≤-47	0.43954	≤20	PASS
	3DH5	Ant1	2402	30~500	184.16	-67.86	≤-54	0.16368	≤4	PASS
				500~1000	731.75	-75.59	≤-54	0.02761	≤4	PASS
				1000~12500	3857.18	-63.40	≤-47	0.45709	≤20	PASS
			2441	30~500	199.91	-67.37	≤-54	0.18323	≤4	PASS
				500~1000	731.75	-75.71	≤-54	0.02685	≤4	PASS
				1000~12500	3707.68	-64.06	≤-47	0.39264	≤20	PASS
			2480	30~500	182.52	-67.69	≤-54	0.17022	≤4	PASS
				500~1000	731.75	-74.69	≤-54	0.03396	≤4	PASS
				1000~12500	3742.18	-63.85	≤-47	0.41210	≤20	PASS
NTLV	DH5	Ant1	2402	30~500	189.10	-67.65	≤-54	0.17179	≤4	PASS
				500~1000	731.75	-76.20	≤-54	0.02399	≤4	PASS
				1000~12500	3790.48	-62.83	≤-47	0.52119	≤20	PASS
			2441	30~500	178.52	-67.28	≤-54	0.18707	≤4	PASS
				500~1000	731.75	-75.36	≤-54	0.02911	≤4	PASS
				1000~12500	3788.18	-62.75	≤-47	0.53088	≤20	PASS
			2480	30~500	181.34	-68.43	≤-54	0.14355	≤4	PASS
				500~1000	731.75	-75.44	≤-54	0.02858	≤4	PASS
				1000~12500	3731.25	-63.13	≤-47	0.48641	≤20	PASS
	3DH5	Ant1	2402	30~500	192.86	-68.29	≤-54	0.14825	≤4	PASS
				500~1000	731.75	-75.70	≤-54	0.02692	≤4	PASS
				1000~12500	3769.20	-63.20	≤-47	0.47863	≤20	PASS
			2441	30~500	180.17	-68.03	≤-54	0.15740	≤4	PASS
				500~1000	731.75	-76.09	≤-54	0.02460	≤4	PASS
				1000~12500	3797.95	-63.35	≤-47	0.46238	≤20	PASS
			2480	30~500	190.27	-68.56	≤-54	0.13932	≤4	PASS
				500~1000	731.75	-74.86	≤-54	0.03266	≤4	PASS
				1000~12500	3819.80	-63.05	≤-47	0.49545	≤20	PASS
NTHV	DH5	Ant1	2402	30~500	182.75	-67.73	≤-54	0.16866	≤4	PASS
				500~1000	731.75	-76.17	≤-54	0.02415	≤4	PASS
				1000~12500	3807.73	-63.87	≤-47	0.41020	≤20	PASS
			2441	30~500	185.57	-68.07	≤-54	0.15596	≤4	PASS
				500~1000	731.75	-75.76	≤-54	0.02655	≤4	PASS
				1000~12500	3779.55	-63.11	≤-47	0.48865	≤20	PASS
			2480	30~500	208.13	-67.67	≤-54	0.17100	≤4	PASS
				500~1000	731.75	-75.33	≤-54	0.02931	≤4	PASS
				1000~12500	3777.83	-63.82	≤-47	0.41495	≤20	PASS
	3DH5	Ant1	2402	30~500	183.22	-67.57	≤-54	0.17498	≤4	PASS
				500~1000	731.75	-75.29	≤-54	0.02958	≤4	PASS
				1000~12500	3824.40	-63.86	≤-47	0.41115	≤20	PASS
			2441	30~500	181.11	-68.10	≤-54	0.15488	≤4	PASS
				500~1000	731.75	-75.28	≤-54	0.02965	≤4	PASS
				1000~12500	1997.63	-63.83	≤-47	0.41400	≤20	PASS
			2480	30~500	173.35	-67.77	≤-54	0.16711	≤4	PASS
				500~1000	731.75	-75.52	≤-54	0.02805	≤4	PASS
				1000~12500	3793.35	-63.37	≤-47	0.46026	≤20	PASS



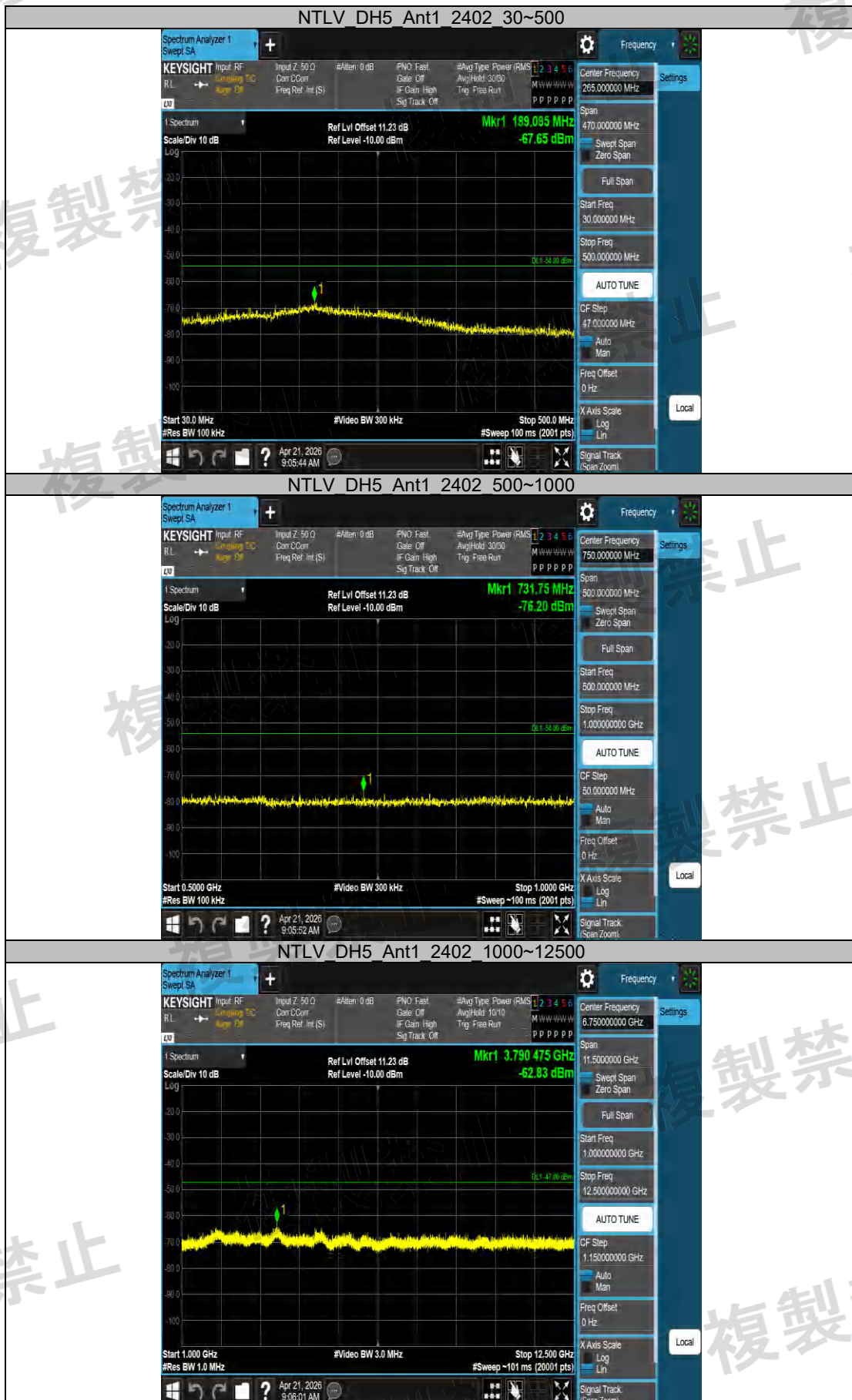






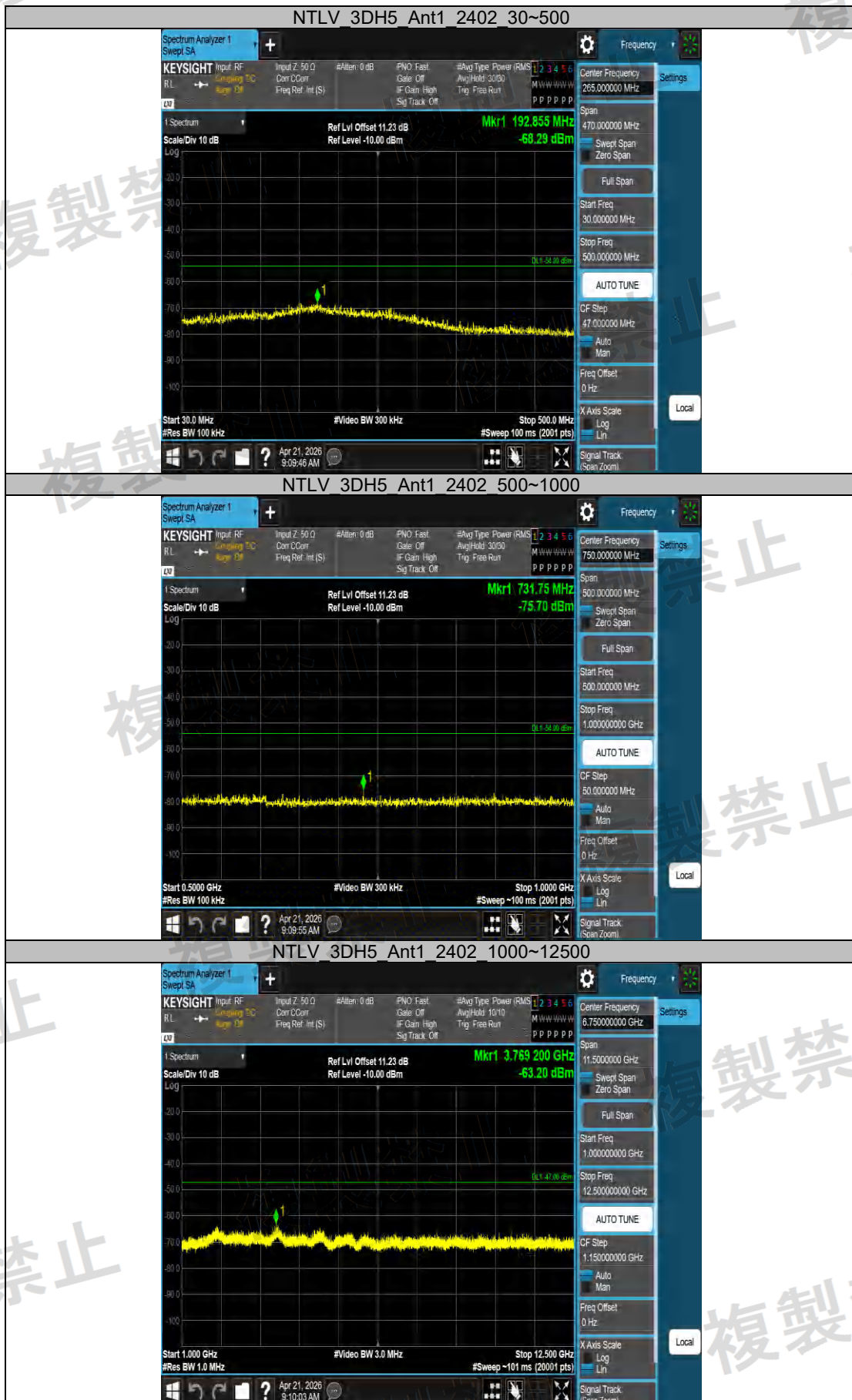




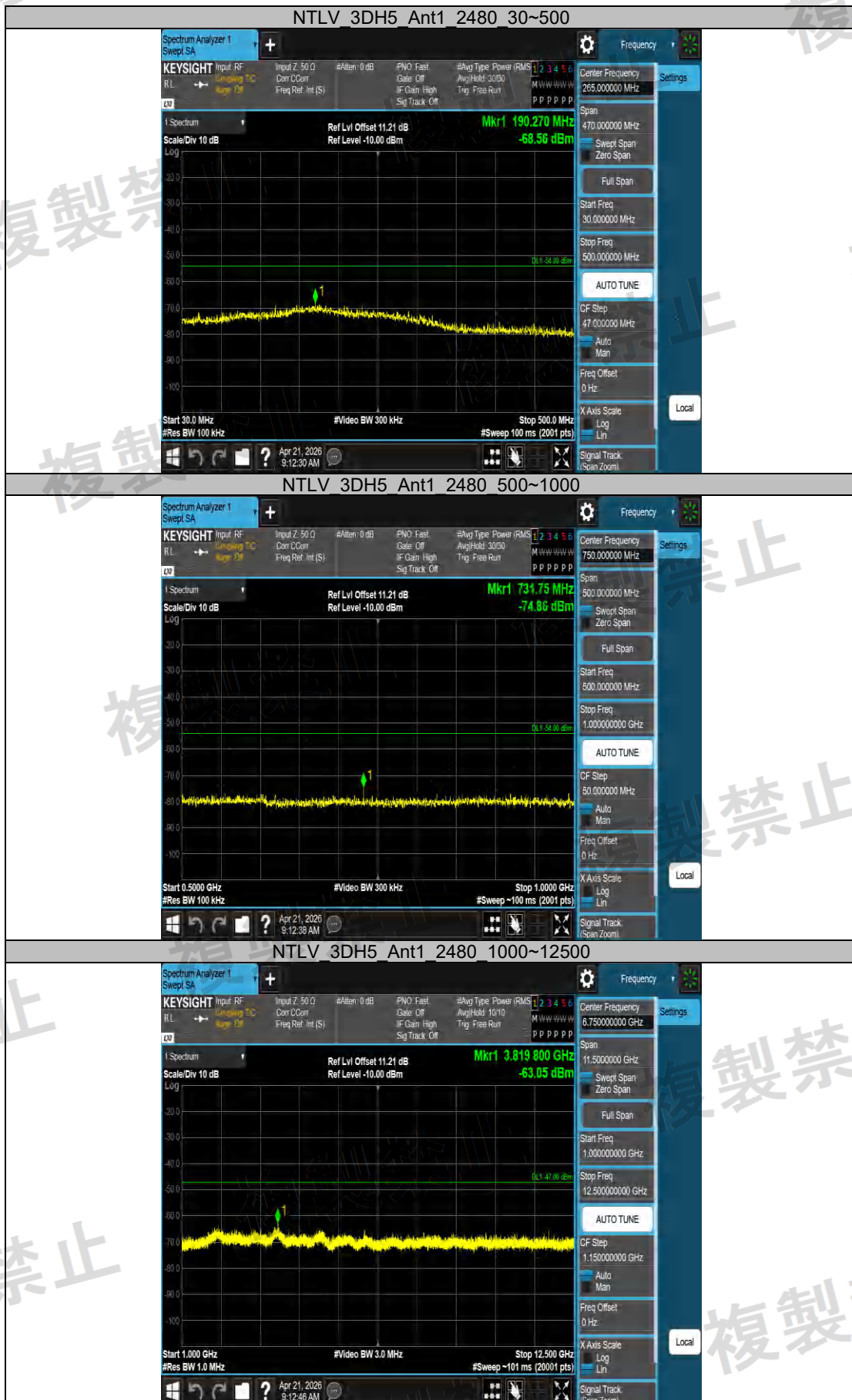


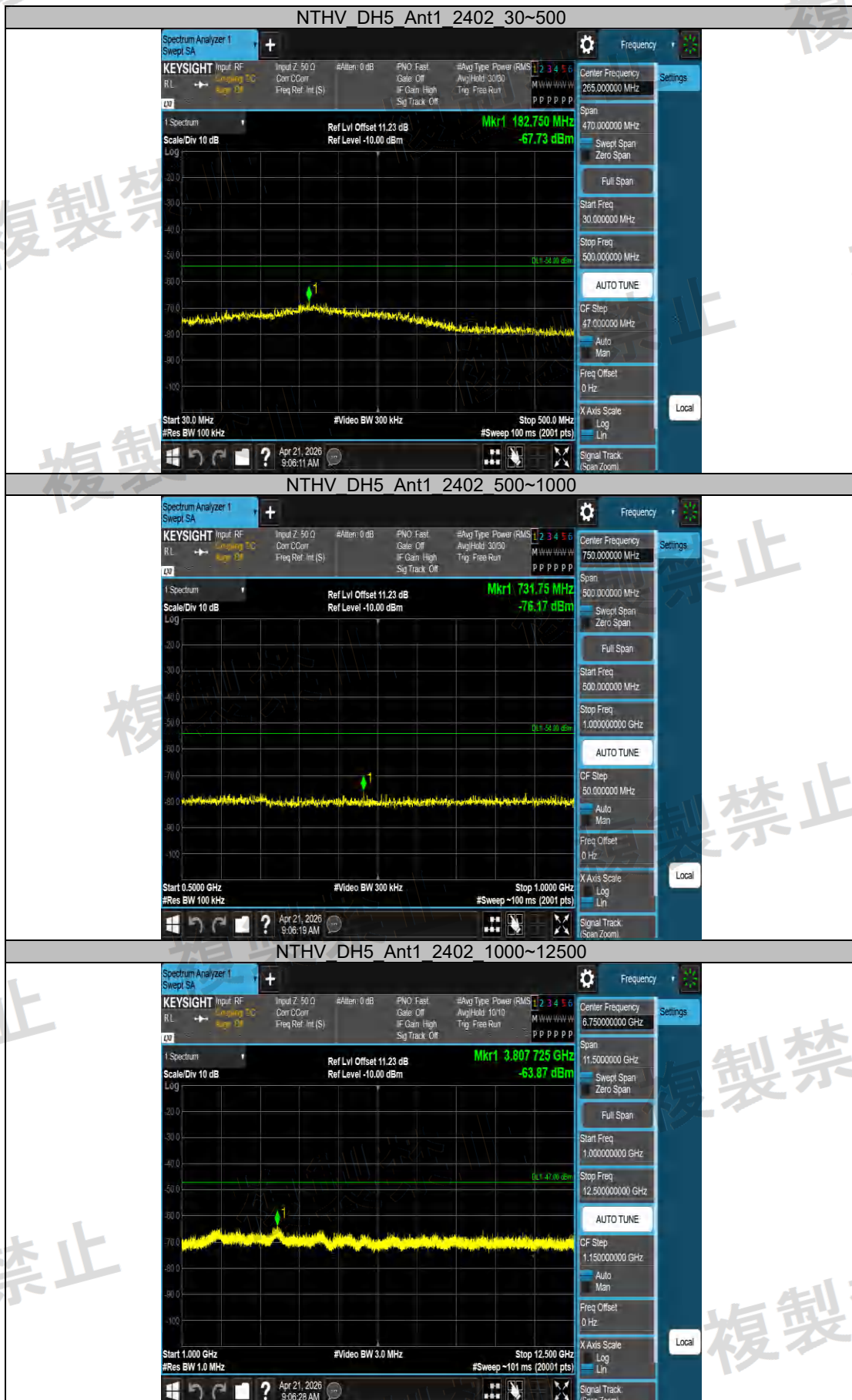


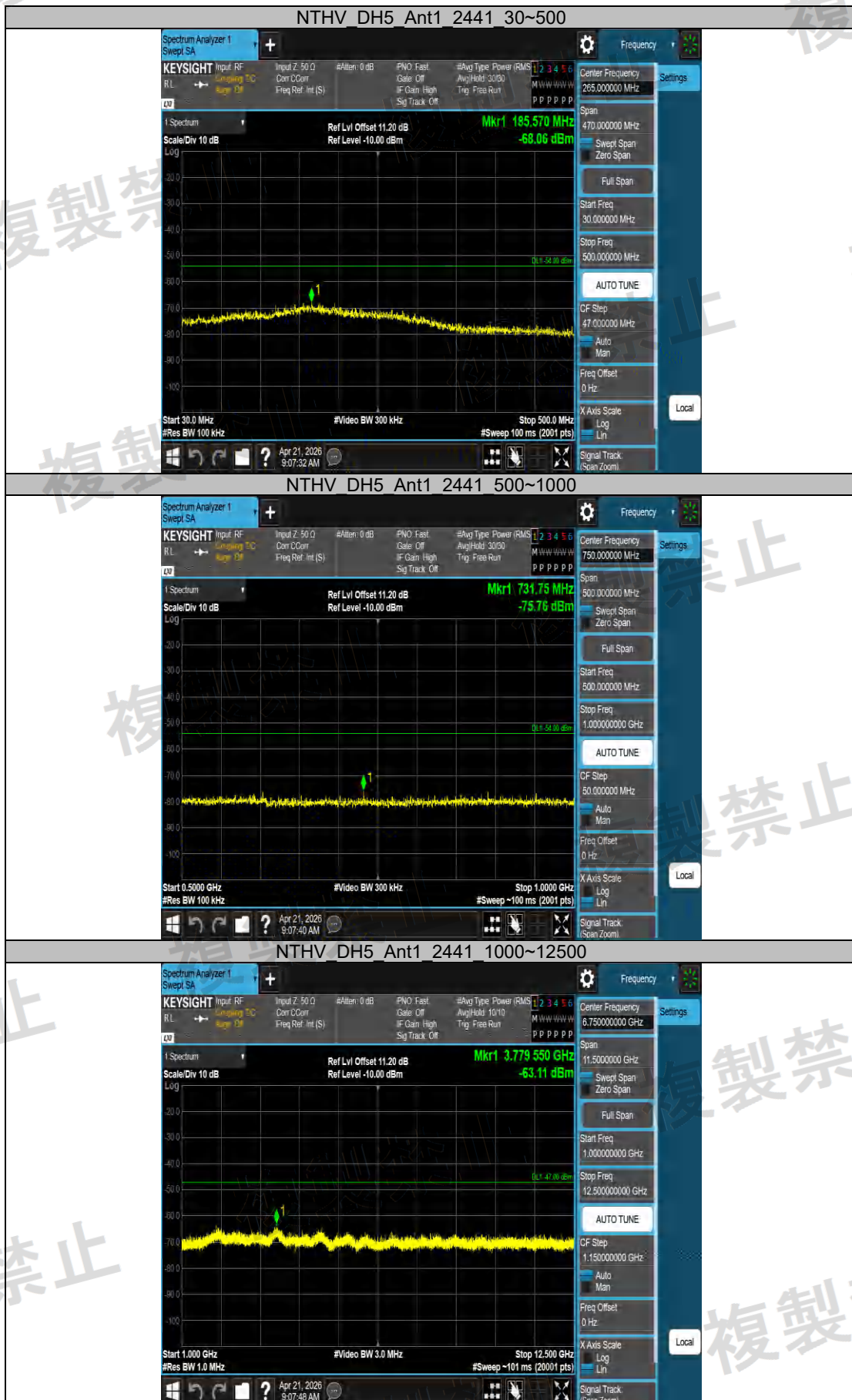


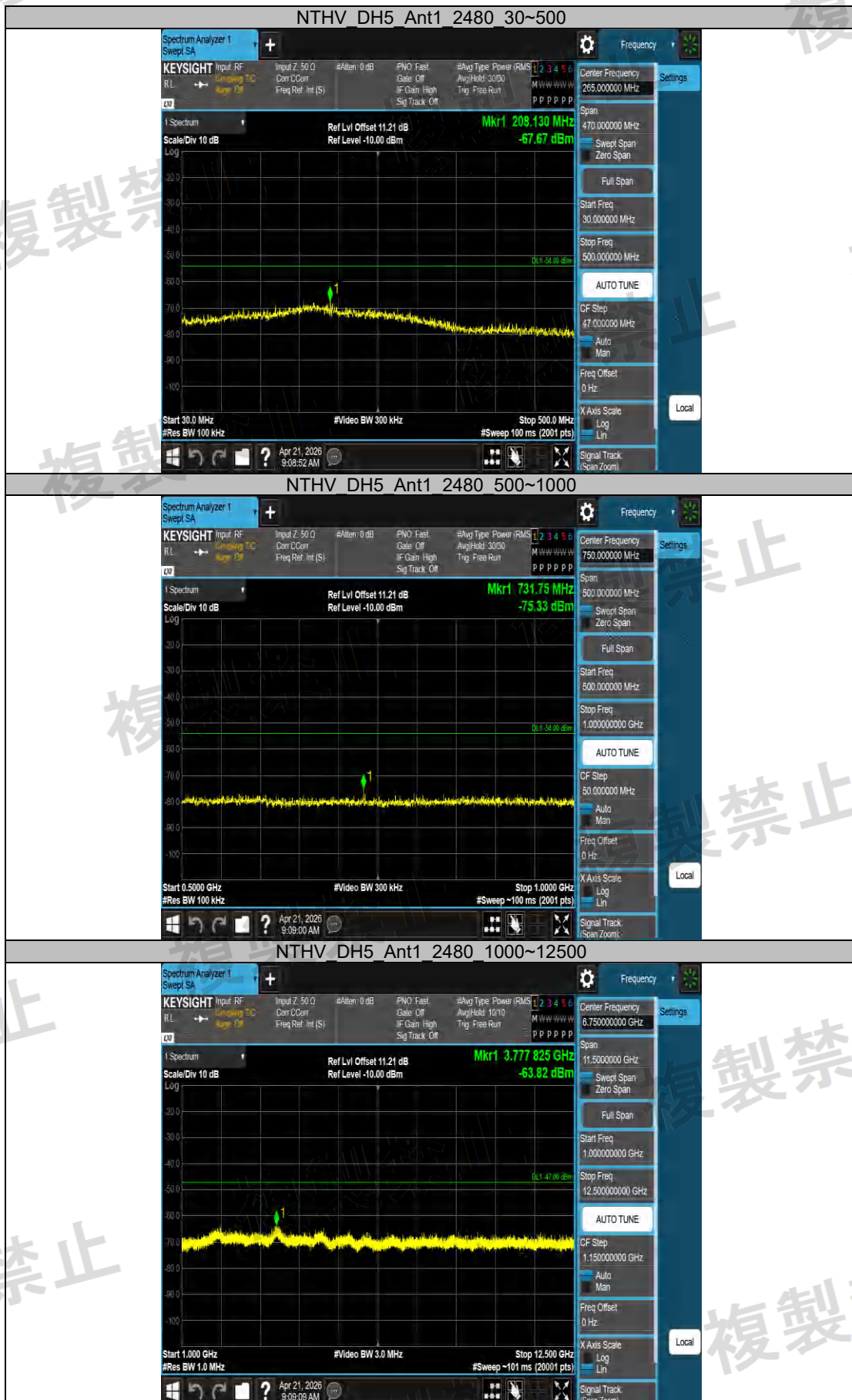




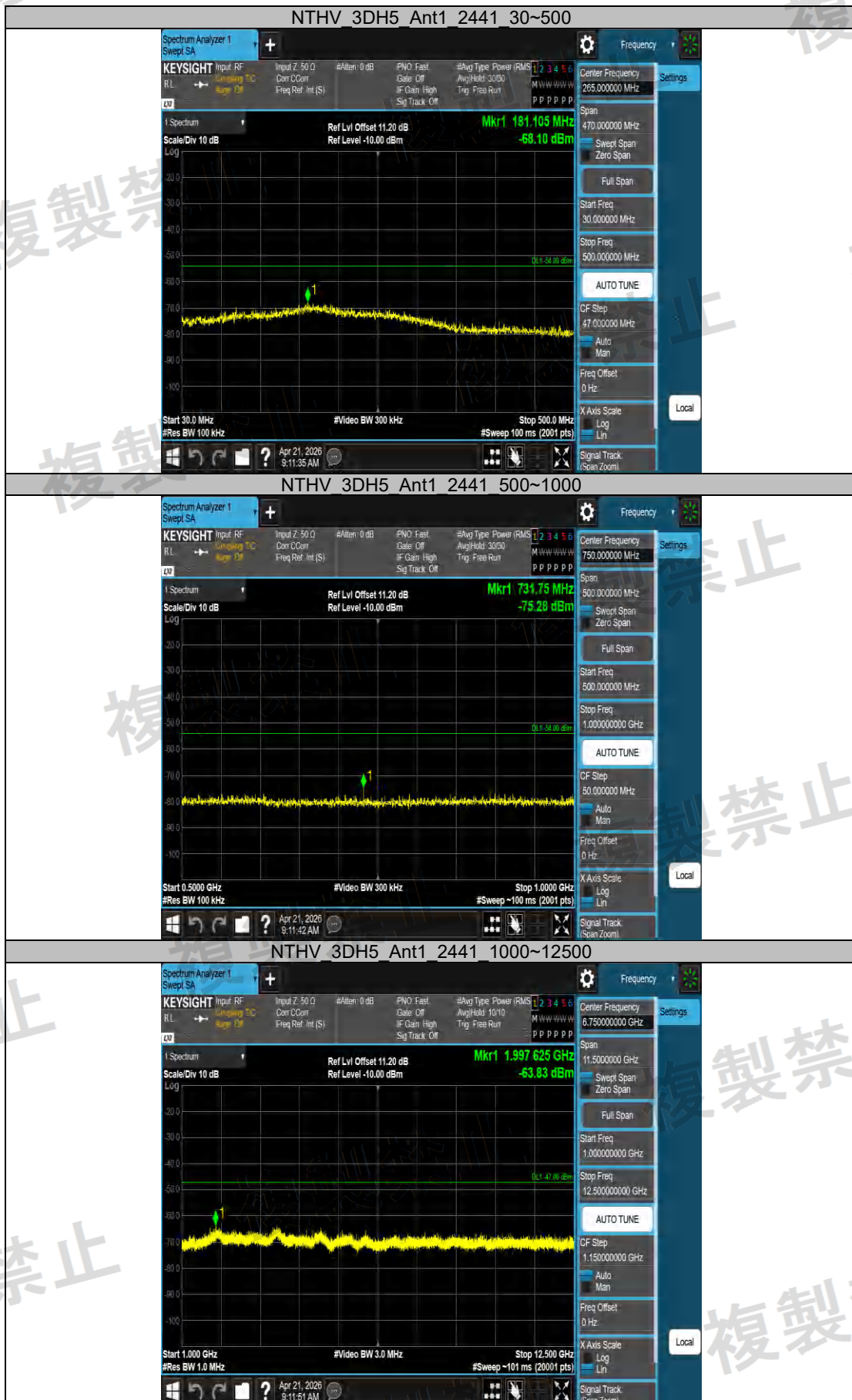














7 Appendix A.7: DWELL TIME

For GFSK:

Normal Voltage	Mode	SPREADING RATE	[Spreading rate/79]*0.4	Duty Ratio	Result (msec)	Limit (msec)
	DH5	71.650	0.3628	0.7653	277.64	400
Voltage +10%	DH5	71.059	0.3598	0.7653	275.35	400
Voltage - 10%	DH5	71.649	0.3628	0.7653	277.64	400

For GFSK< Enable AFH function>:

Normal Voltage	Mode	SPREADING RATE	[Spreading rate/20]*0.4	Duty Ratio	Result (msec)	Limit (msec)
	DH5	18.163	0.3633	0.7653	278.00	400
Voltage +10%	DH5	18.173	0.3635	0.7653	278.16	400
Voltage - 10%	DH5	18.176	0.3635	0.7653	278.20	400

For 8DPSK:

Normal Voltage	Mode	SPREADING RATE	[Spreading rate/79]*0.4	Duty Ratio	Result (msec)	Limit (msec)
	3DH5	71.561	0.3623	0.7653	277.29	400
Voltage +10%	3DH5	71.548	0.3623	0.768	278.22	400
Voltage - 10%	3DH5	71.415	0.3616	0.7653	276.73	400

For 8DPSK< Enable AFH function>:

Normal Voltage	Mode	SPREADING RATE	[Spreading rate/20]*0.4	Duty Ratio	Result (msec)	Limit (msec)
	3DH5	18.246	0.3649	0.7653	279.27	400
Voltage +10%	3DH5	18.244	0.3649	0.768	280.23	400
Voltage - 10%	3DH5	18.266	0.3653	0.7653	279.58	400

NTLV-DH5-Ant1-2441



NTHV-DH5-Ant1-2441



NTVN-3DH5-Ant1-2441



NTLV-3DH5-Ant1-2441



NTHV-3DH5-Ant1-2441