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Report No.: GZEM190201087501

Page: 1 of 145

TEST REPORT

Application No.: GZEM1902010875CR
Applicant: QUANZHOU MAINCHANCE TECHNOLOGY CO.LTD
Address of Applicant: 2/F., Building 2, Yitang Community, 2 Taikang Road, Xiantang Community, Changtai Street, Licheng District, Quanzhou, Fujian, China
Manufacturer: The same as Applicant
Address of Manufacturer: The same as Applicant
Factory: The same as Applicant
Address of Factory: The same as Applicant
Equipment Under Test (EUT):
EUT Name: Bamboo tube wireless speaker
Model No.: MY8
Trade Mark:



Te-rich,

Standard(s) : MIC Item 19 of Article 2 Paragraph 1
Date of Receipt: 2019-02-27
Date of Test: 2019-03-08
Date of Issue: 2019-04-18

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian
Lab Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-04-18		Original

Authorized for issue by:			
Tested By		2019-03-08	
	Lily_Kuang /Project Engineer	Date	
Checked By		2019-03-18	
	Jerry Chan /Reviewer	Date	



2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	MIC Item 19 of Article 2 Paragraph 1	N/A	MIC Item 19 of Article 2 Paragraph 1	Pass
Interference prevention capability	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
RF accessibility	MIC Item 19 of Article 2 Paragraph 1	N/A	MIC Item 19 of Article 2 Paragraph 1	Pass

N/A: Not applicable

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Frequency Error	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Occupied Bandwidth(99%)	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Spread spectrum Bandwidth(90%)	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Antenna Power	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Dwell time	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Spurious emission Intensity	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Limit of secondary radiated emissions	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass

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4 General Information

4.1 Details of E.U.T.

Power Supply:	Powered by built-in battery as below: Rated: DC 3.7 V DC 5V for charging mode
Test Voltage:	DC 3.33V DC 3.70V DC 4.07V
Cable:	USB ports (<3m, unshielded)
Software:	FCC AssistV2.4
Antenna Gain:	-0.58dBi
BT Version:	V4.2 for classic only+EDR
Antenna Type:	Integrated Antenna
Channel Spacing:	1MHz
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	T430u	REF. No.SEA1800

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 5.5 \times 10^{-8}$
2	Duty cycle	$\pm 0.57\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF Conducted power	$\pm 0.68\text{dB}$
5	RF Power Density	$\pm 1.50\text{dB}$
6	Conducted Spurious Emissions	$\pm 1.04\text{dB}$
7	RF Radiated Power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious Emission Test	$\pm 4.5\text{dB}$ (30MHz-1GHz)
		$\pm 4.8\text{dB}$ (1GHz-18GHz)
9	Temperature	$\pm 0.4^\circ\text{C}$
10	Humidity	$\pm 1.3\%$
11	Supply Voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$

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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

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4.5 Test Facility

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

● **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

● **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

● **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

● **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

● **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

● **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

● **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

● **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

Frequency Error					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A

Occupied Bandwidth(99%)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A

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Spread spectrum Bandwidth(90%)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A

Antenna Power & Power Stability					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A

Dwell time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A



Spurious emission Intensity					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A

Limit of secondary radiated emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A

Antenna Requirement					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2019-02-24	2020-02-23
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2018-04-10	2019-04-10
EXG Analog Signal Generator	AgilentTechnologies	N5171B	SEM006-04	2017-07-26	2020-07-25
Power Meter	AgilentTechnologies	U2021XA_Ch2	SEM009-02	2018-09-20	2019-09-19
Power Meter	AgilentTechnologies	U2021XA_Ch3	SEM009-03	2018-09-20	2019-09-19
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A



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Guangzhou Branch

Report No.: GZEM190201087501
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General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2018-07-20	2019-07-19
DMM	Fluke	73	EMC0007	2018-07-19	2019-07-18



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

MIC Item 19 of Article 2 Paragraph 1

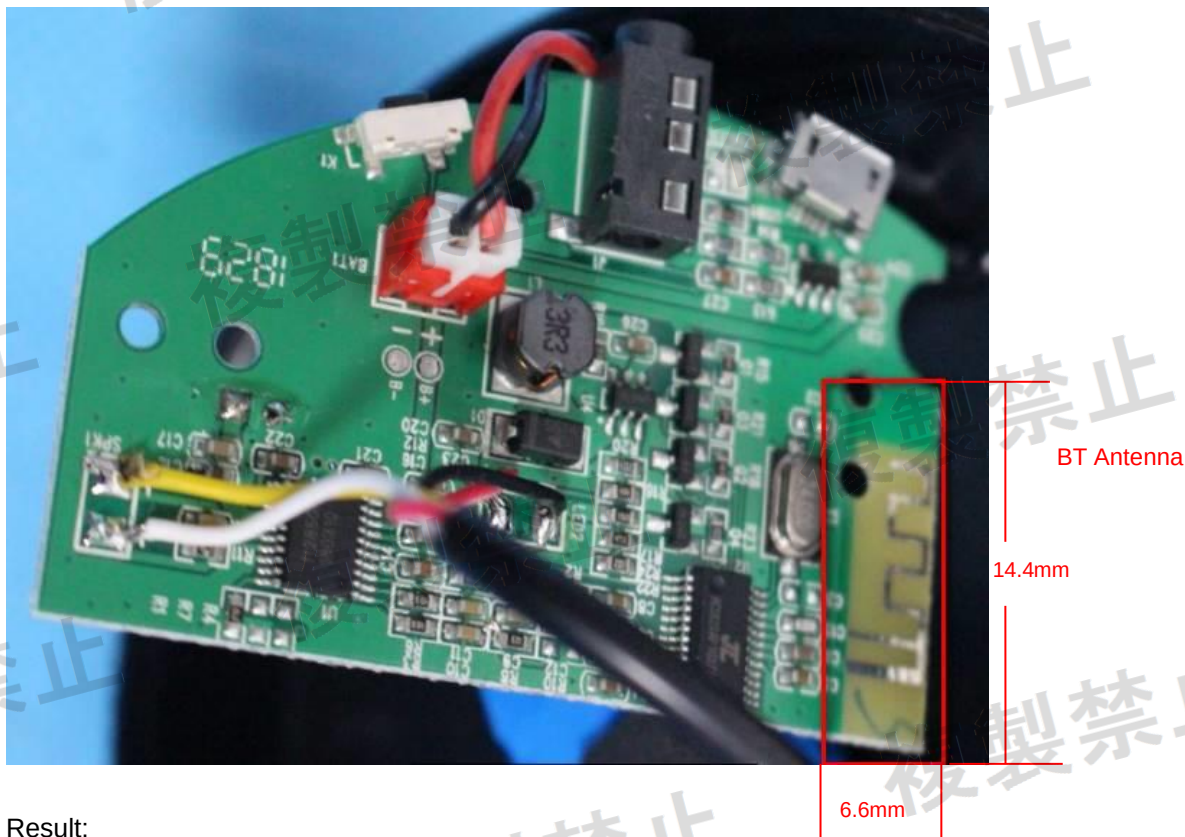
6.1.2 Conclusion

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 Details:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.58dBi.



Result:

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

6.2 Interference prevention capability

6.2.1 Test Requirement:

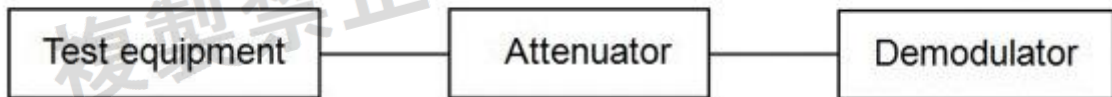
MIC Item 19 of Article 2 Paragraph 1

Limit:

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

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

6.2.2 Test Setup Diagram



6.2.3 Conclusion

Standard Requirement:

- 1) Measurement system diagram as shown above and test equipment keep 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.

D8:F8:AD:01:90:DF

EUT Details:

The unit does meet the requirements (Good).



6.3 RF accessibility

6.3.1 Test Requirement:

MIC Item 19 of Article 2 Paragraph 1

6.3.2 Conclusion

Standard Requirement:

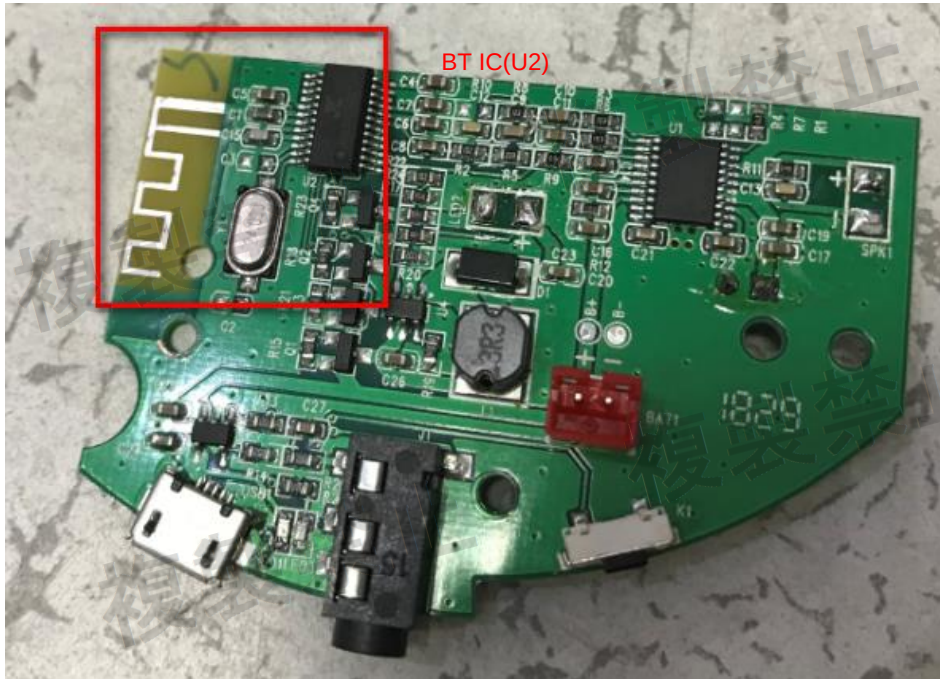
The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common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



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EUT Details:

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.



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7 Radio Spectrum Matter Test Results

7.1 Frequency Error

Test Requirement MIC Item 19 of Article 2 Paragraph 1
Test Method: MIC Notice No.88 Appendix No.43
Limit: Tolerance of frequency: $\pm 50\text{E-6}$

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar
Test mode a: TX_Keep the EUT in transmitting mode

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

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

Alternative method:

Frequency: Test Frequency

Span 2 times channel bandwidth

RBW 100 kHz (Modulation ON),

VBW 100 kHz (Modulation ON),

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

The detailed test data see: Appendix MIC19-2



7.2 Occupied Bandwidth(99%)

Test Requirement MIC Item 19 of Article 2 Paragraph 1
Test Method: MIC Notice No.88 Appendix No.43
Limit:
FH: 83.5MHz or less
FH + DS: 83.5MHz or less
FH + OFDM: 83.5MHz or less
OFDM: 38MHz or less
Others: 26MHz or less

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar
Test mode a: TX_Keep the EUT in transmitting mode

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

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 83.5 MHz (FHSS); 40/60 MHz (OFDM; DSSS); 2-5 times OBW (Others)

RBW 1 MHz (FHSS); 300kHz (OFDM; DSSS); 3% OBW (Others)

VBW 1 MHz (FHSS); 300kHz (OFDM; DSSS); 3 times RBW (Others)

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

OBW 99%

The detailed test data see: Appendix MIC19-2

7.3 Spread spectrum Bandwidth(90%)

Test Requirement MIC Item 19 of Article 2 Paragraph 1
Test Method: MIC Notice No.88 Appendix No.43
Limit: DS,FH,FH+DS,FH+OFDM: 500kHz or more

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar
Test mode a: TX_Keep the EUT in transmitting mode

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

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 83.5 MHz (FHSS); 40/60 MHz (OFDM; DSSS)

RBW 1 MHz (FHSS); 300kHz (OFDM; DSSS)

VBW 1 MHz (FHSS); 300kHz (OFDM; DSSS)

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

OBW 90%

The detailed test data see: Appendix MIC19-2

7.4 Antenna Power

Test Requirement	MIC Item 19 of Article 2 Paragraph 1		
Test Method:	MIC Notice No.88 Appendix No.43		
Limit:	The difference between measured output power and the rated output power (declared in the construction design document) shall be within a tolerance of +20% to -80%. In addition, the rated output power shall not be over the limits shown below:		
	Limit (rated output power, upper limit)		
	(1) FHSS, FHSS+DSSS, FHSS+OFDM (in range 2427.0 - 2470.75 MHz)	3mW/MHz or less	
	(2) OFDM OBW < 26MHz, DSSS, FHSS other (1)	10mW/MHz or less	
	(3) OFDM OBW 26 – 38MHz	5mW/MHz or less	
	(4) Other than (1), (2), (3)	10mW/MHz or less	

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar
Test mode a: TX_Keep the EUT in transmitting mode

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

- Continuous or burst transmission
- Modulated
- Rated output power declared in the construction design document

3. Spectrum Analyzer conditions:

Setting 1 - Search for peak power frequency

Frequency: Test Frequency

Span: Approximately twice the occupied bandwidth

RBW: 1MHz

VBW: Approximately three times the RBW

Sweep Time: Auto

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold



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Setting 2 - Measurement of average antenna power for FHSS, DSSS, OFDM
Frequency: Frequency of peak power found using [Setting 1]
Span: 0Hz

RBW: 3MHz (FHSS in below procedure 1)
1MHz (DSSS, OFDM, FHSS in below procedure 2)

Detector mode: Sample

Sweep: Minimum time required to make an accurate measurement.

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

Sweep data points: 1001 or greater

Setting 3 - Measurement of average antenna power other than for FHSS, DSSS, OFDM

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

Span: 0Hz

RBW: Bandwidth sufficient to cover that occupied by the carrier

VBW: Bandwidth sufficient to cover that occupied by the carrier

Detector mode: Sample

Sweep: Minimum time required to make an accurate measurement.

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

Sweep data points: 1001 or greater

4. Test procedure:

Procedure 1 for FHSS systems with the following characteristics:

- A hopping transmission separation of 1MHz or less with a constant transmission interval
- The transmission probability is equal for all hopping frequencies.

① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;

② After configuring the spectrum analyser to [Setting 2], measure the average burst power of the frequency found in (1)

③ Calculate antenna power using the following formula:

$$\text{Antenna Power (W/MHz)} = \text{Average Burst Power (W)} / \text{Spread Bandwidth (MHz)}$$

Note:

*Spread Bandwidth in the formula above is derived from the data collected in section 7.3 (Spread Bandwidth (90%))

④ If the EUT has multiple antennas then each antenna power output shall be measured individually – the sum of these individual measurements shall represent the power output value.



Procedure 2 for FHSS systems other than the above

- ① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;
- ② After configuring the spectrum analyser to [Setting 2], measure the average burst power of the frequency found in (1)

$$\text{Antenna Power (W/MHz)} = \text{Average Burst Power}$$

Procedure 3 for DSSS, FHSS systems

- ① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;
- ② After configuring the spectrum analyser to [Setting 2], measure the average burst power of the frequency found in (1)

$$\text{Antenna Power (W/MHz)} = \text{Average Burst Power}$$

Procedure 4 for other than FHSS, DSSS, FHSS systems

- ① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;
- ② After configuring the spectrum analyser to [Setting 3], measure the average burst power of the frequency found in (1)

$$\text{Antenna Power (Watts)} = \text{Average Burst Power}$$

The detailed test data see: Appendix MIC19-2



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7.5 Dwell time

Test Requirement MIC Item 19 of Article 2 Paragraph 1
Test Method: MIC Notice No.88 Appendix No.43
Limit:
(1) For all cases other than (2)
-Transmit ON Time shall be less than 0.4 seconds
-Total Dwell Time shall be less than 0.4 seconds
(2) For equipment used to control model aircraft for outdoor use
-Transmit ON Time shall be less than 0.05 seconds
-Total Dwell Time shall be less than 0.4 seconds

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar
Test mode a: TX_Keep the EUT in transmitting mode

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

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:

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]

The detailed test data see: Appendix MIC19-2



7.6 Spurious emission Intensity

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

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

- Continuous or burst transmission
- Modulated
- Rated output power declared in the construction design document

3. Spectrum Analyzer conditions:

Setting 1

Frequency: (see Note 1)

RBW: 1 MHz

VBW: 1 MHz

Sweep Time: Minimum time required to make an accurate measurement

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold (see Note 2)

Note 1: Measurement range shall be 30 MHz to 12.5 GHz, except for the following cases:

- FHSS, FHSS+DSSS, FHSS+ODFM: 2374 MHz to 2509.5 MHz
- Other than FHSS, FHSS+DSSS, FHSS+ODFM: 2400 MHz to 2483.5 MHz

Note 2: Sweep shall be repeated until the max hold waveform is stable

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Setting 2

Frequency: 2374 MHz to 2400 MHz

2483.5MHz to 2509.5 MHz

RBW: 30 kHz

VBW: 30 kHz

Sweep Time: Minimum time required to make an accurate measurement

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold

The detailed test data see: Appendix MIC19-2



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7.7 Limit of secondary radiated emissions

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

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar
Test mode b: RX_Keep the EUT in receiving mode

7.7.2 Test Setup Diagram



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7.7.3 Measurement Procedure and Data

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

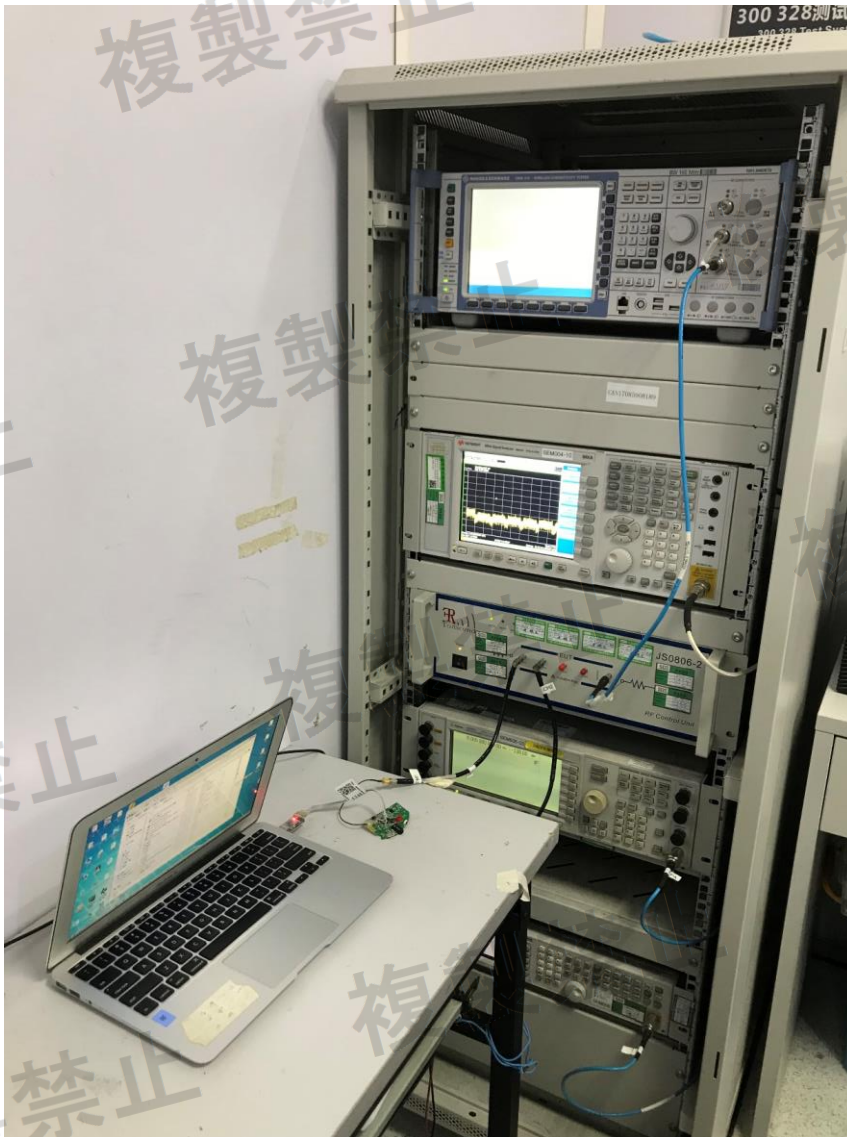
Indication mode Max hold

The detailed test data see: Appendix MIC19-2



8 Photographs

8.1 EUT Test Setup



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8.2 EUT Constructional Details



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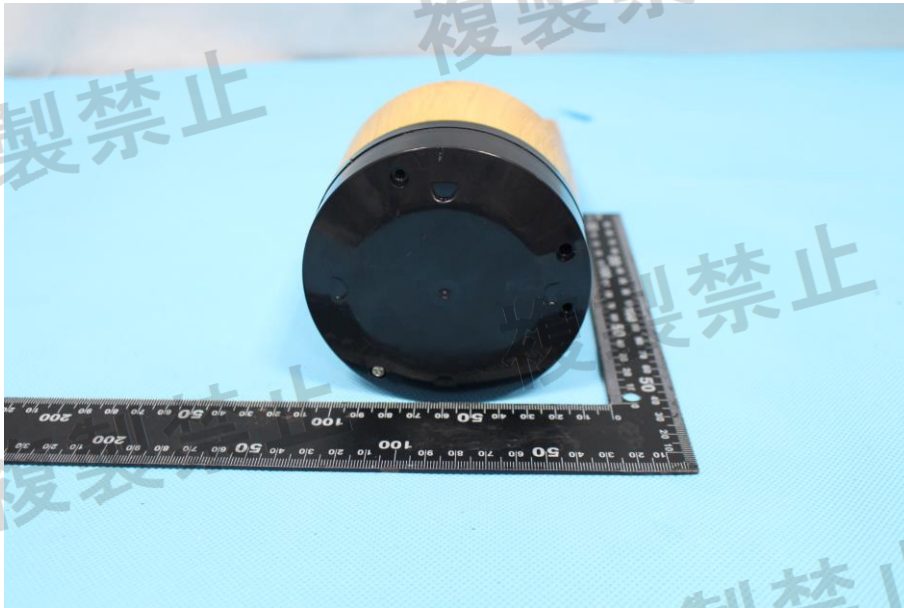
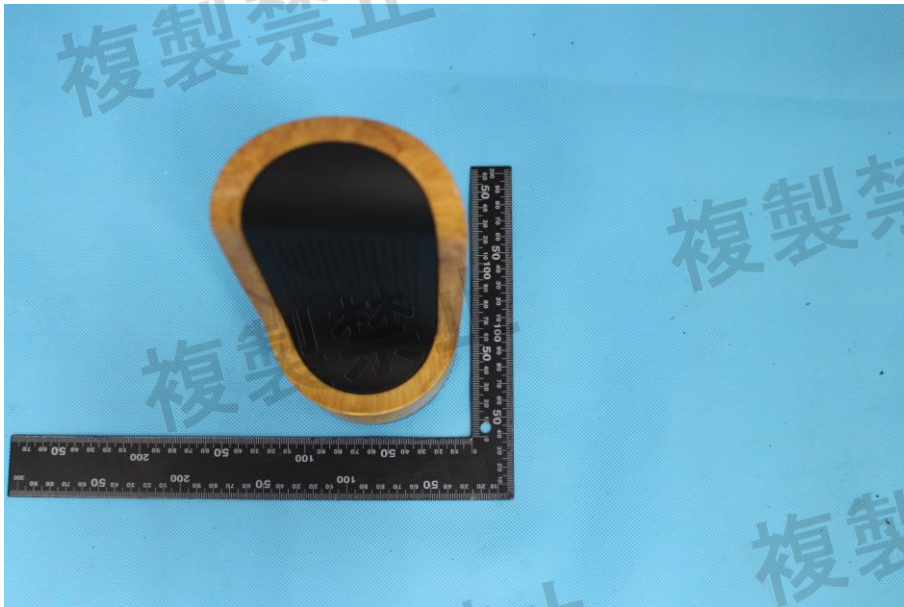
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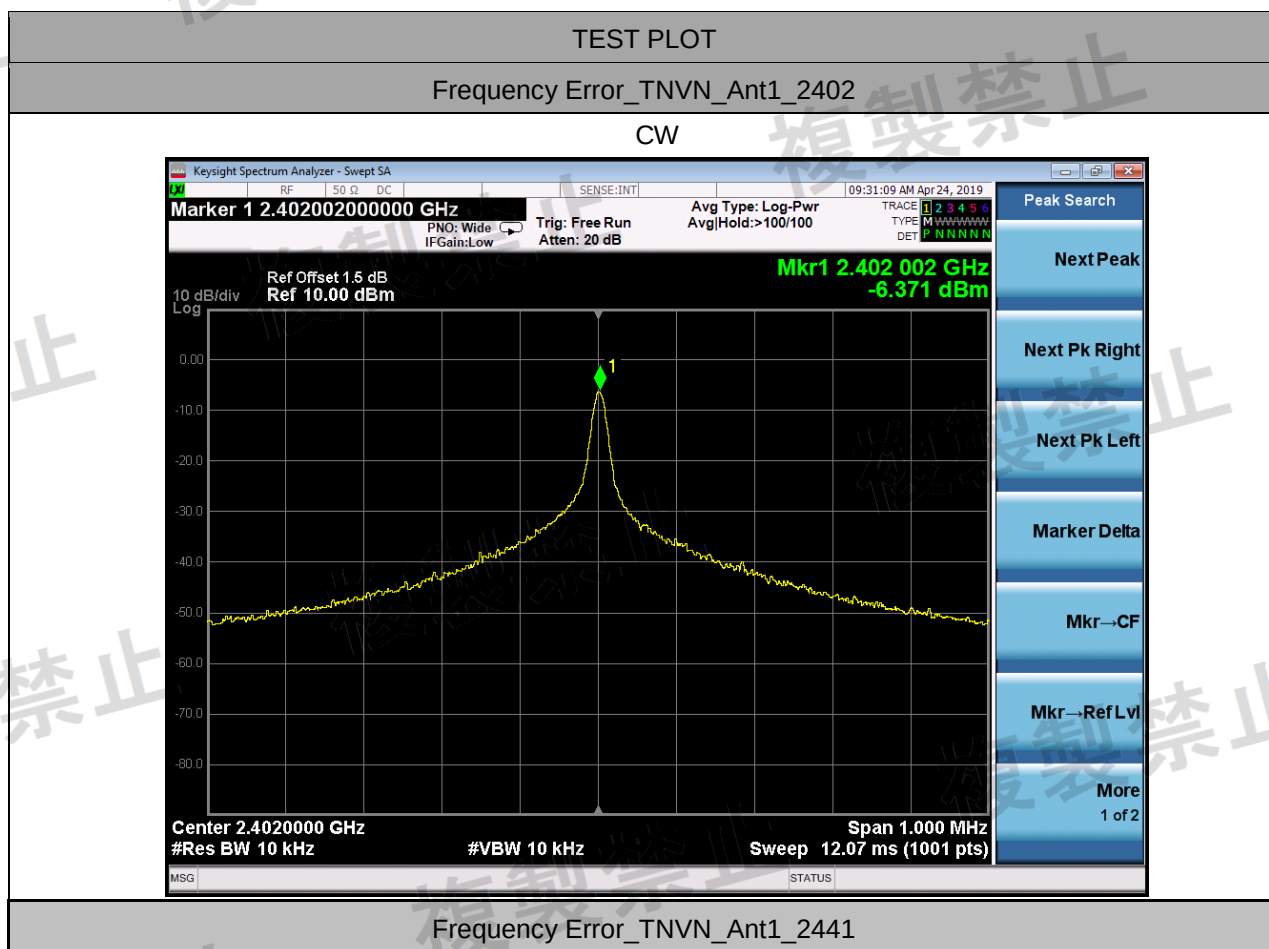
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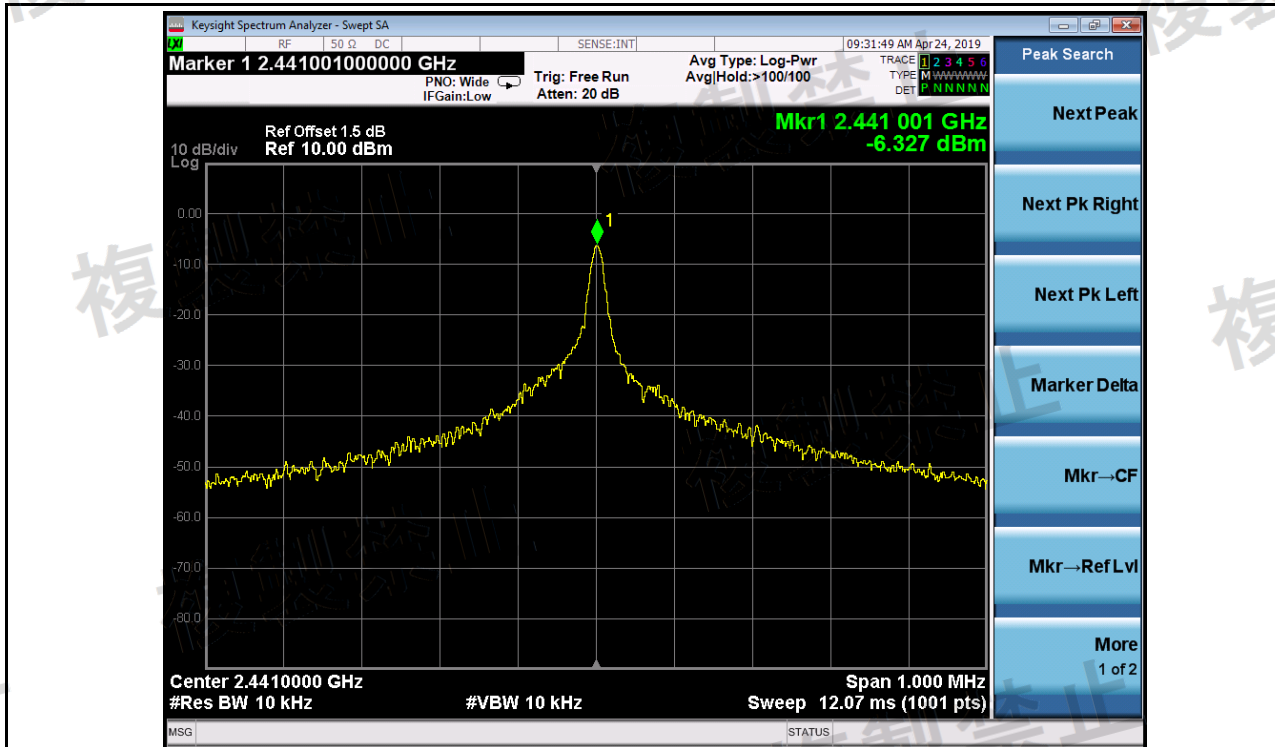
9 Appendix

9.1 Appendix MIC19-2(DC 3.33V)

1.Frequency Error

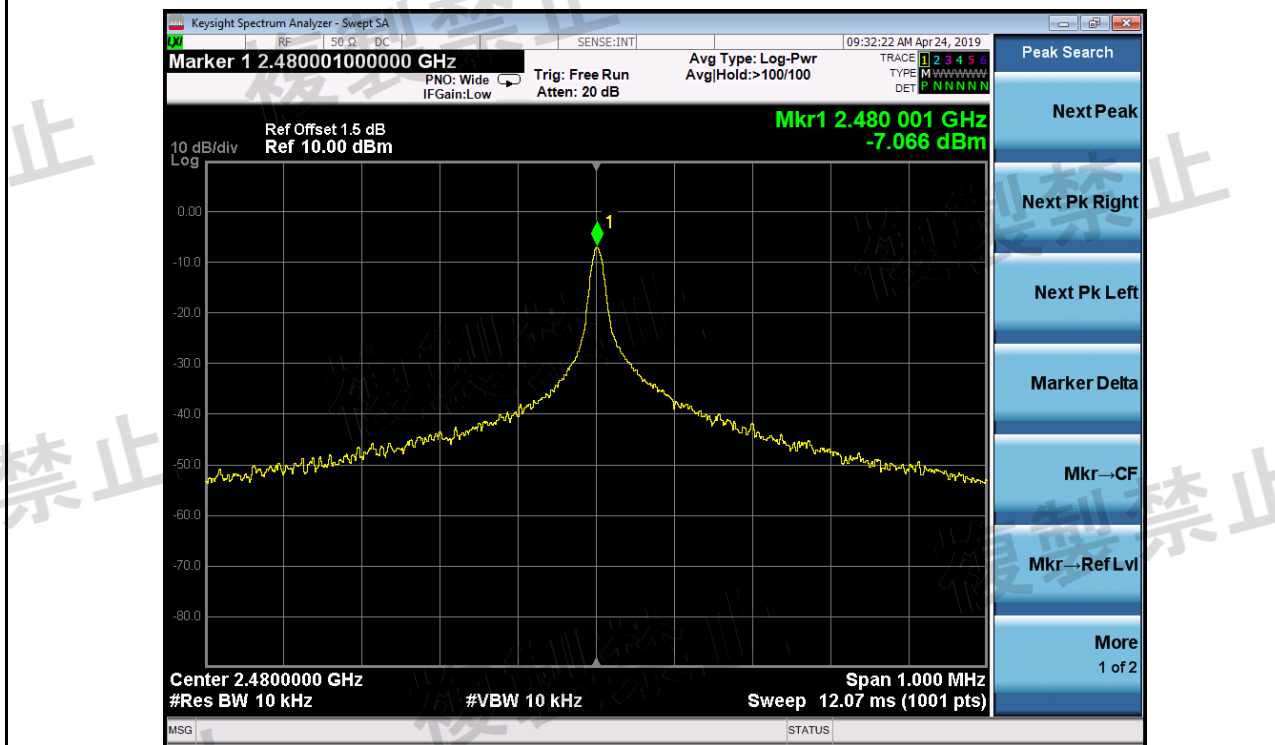
Test Condition	Test Mode	Test Channel	Ant	Result [MHz]	Result [PPM]	Limit [PPM]	Verdict
TNVN	CW	2402	Ant1	2402.002	0.83	<=+/-50	PASS
TNVN	CW	2441	Ant1	2441.001	0.41	<=+/-50	PASS
TNVN	CW	2480	Ant1	2480.001	0.40	<=+/-50	PASS





Frequency Error_TNVN_Ant1_2480

DH5

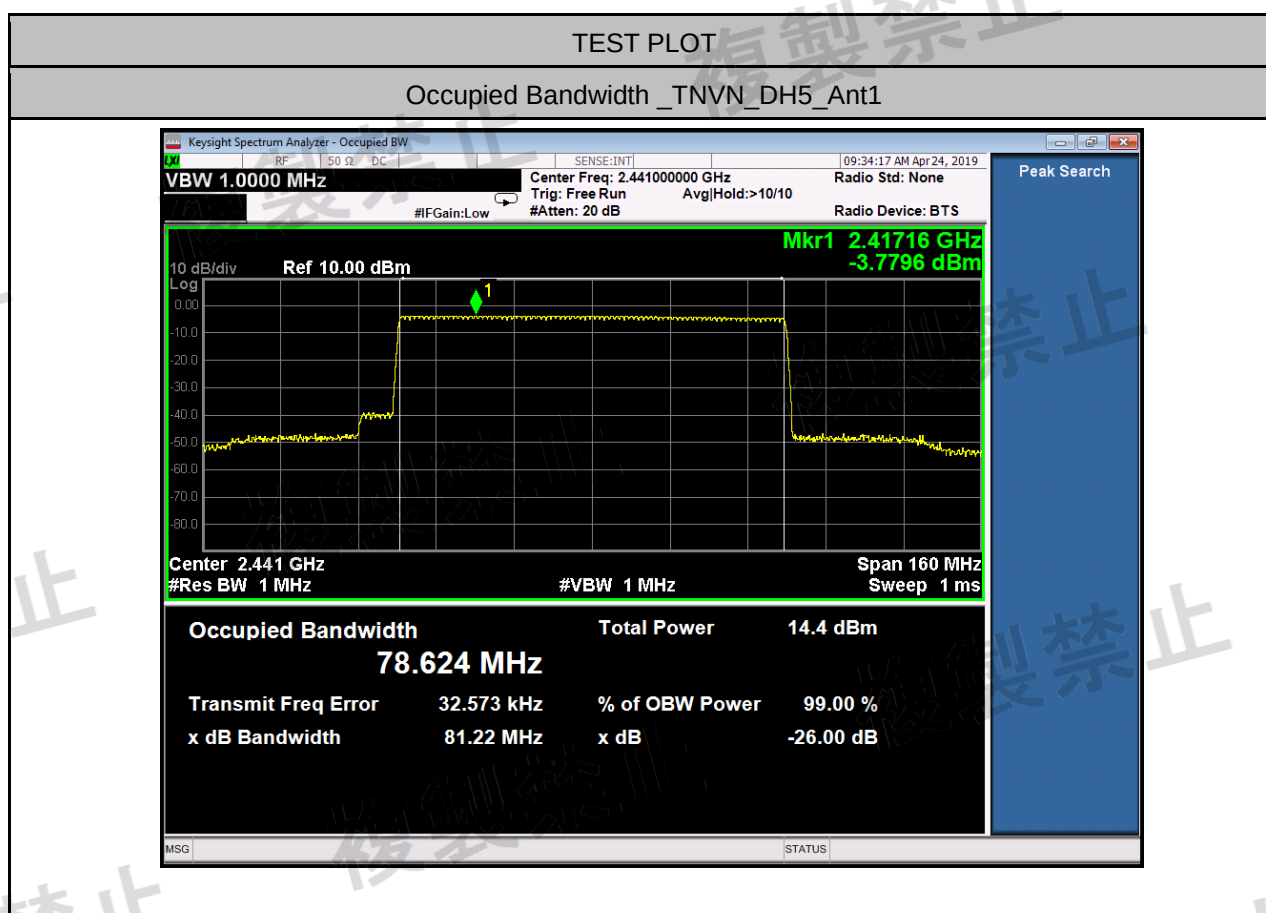


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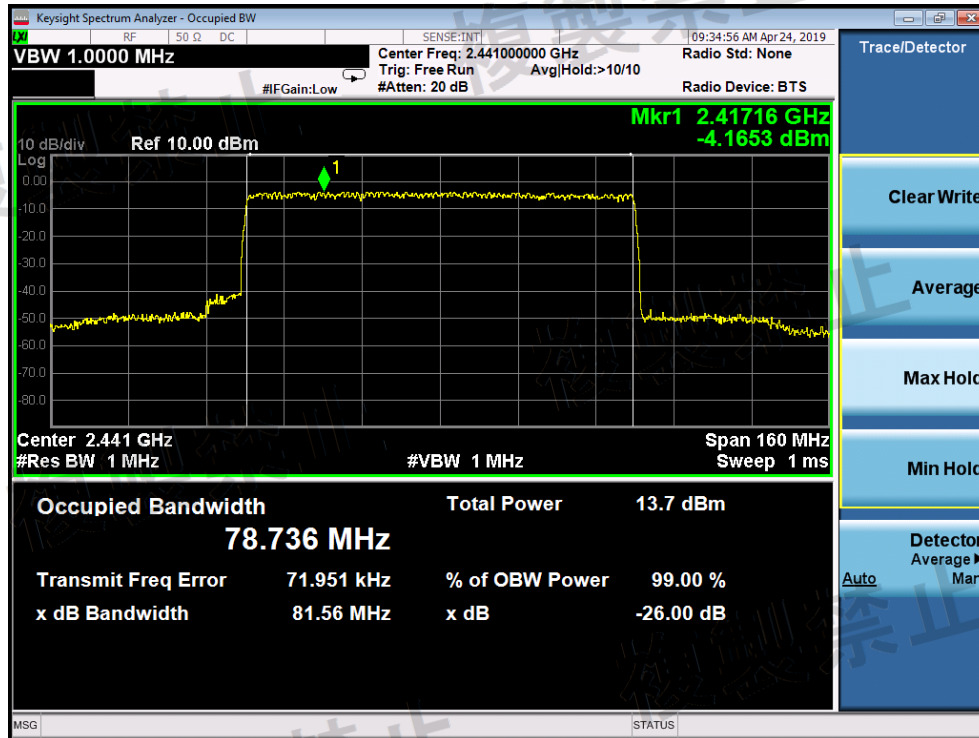
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2.Occupied Bandwidth (99%)

Test Condition	Test Mode	Ant	Test Result [MHz]	Limit [MHz]	Verdict
TNVN	DH5	Ant1	78.624	<=83.5	PASS
TNVN	2DH5	Ant1	78.736	<=83.5	PASS



Occupied Bandwidth_TNVN_2DH5_Ant1

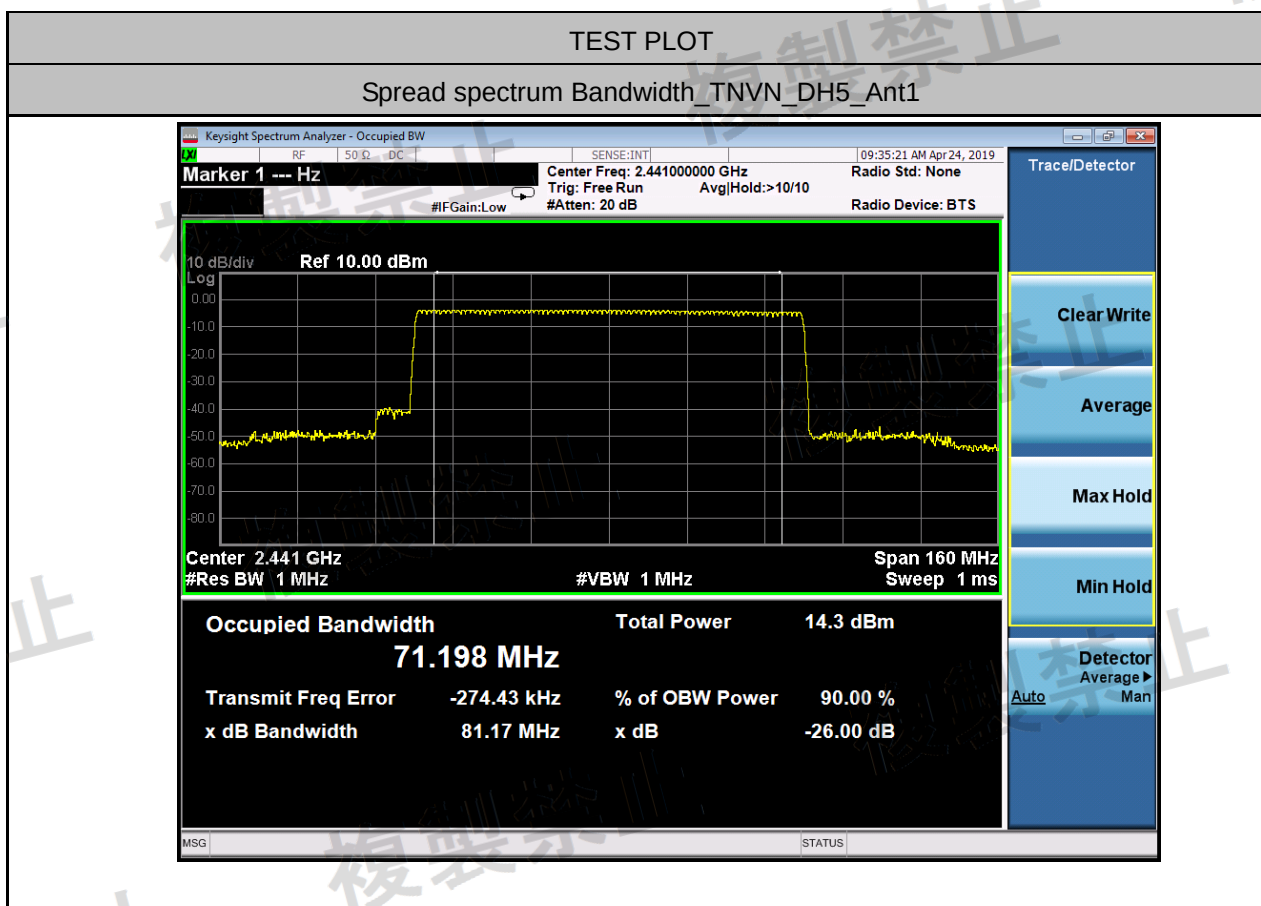


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3. Spread spectrum Bandwidth (90%)

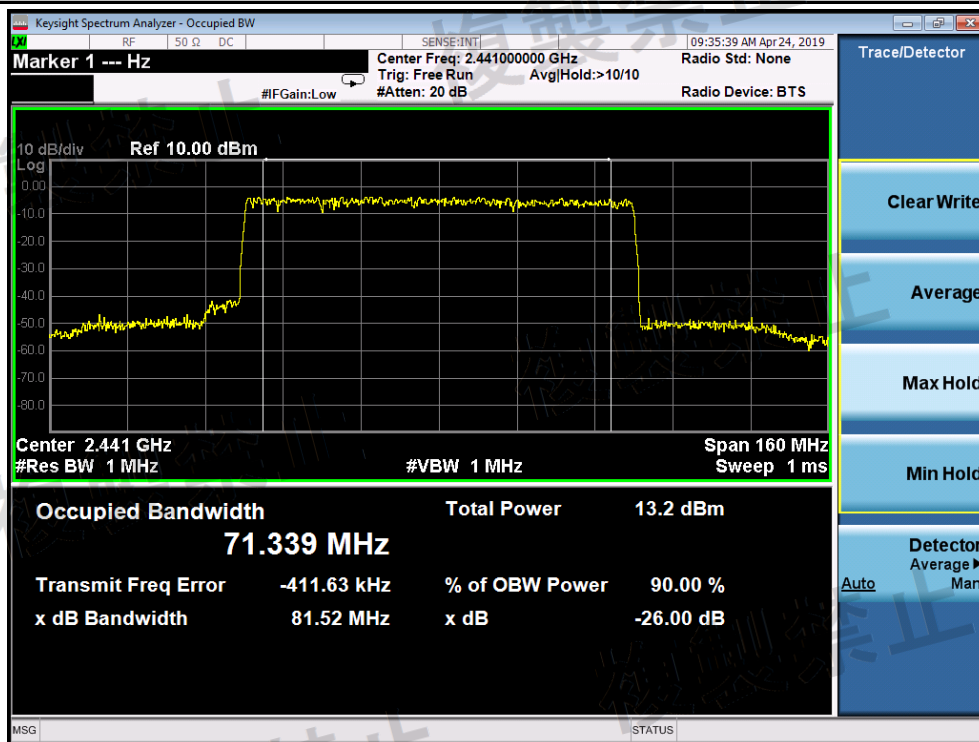
Test Condition	Test Mode	Ant	Test Result [MHz]	Limit [MHz]	Max. power Fre. [MHz]	Verdict
TNVN	DH5	Ant1	71.198	≥ 0.5	2441	PASS
TNVN	2DH5	Ant1	71.339	≥ 0.5	2441	PASS



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Spread spectrum Bandwidth_TNVN_2DH5_Ant1

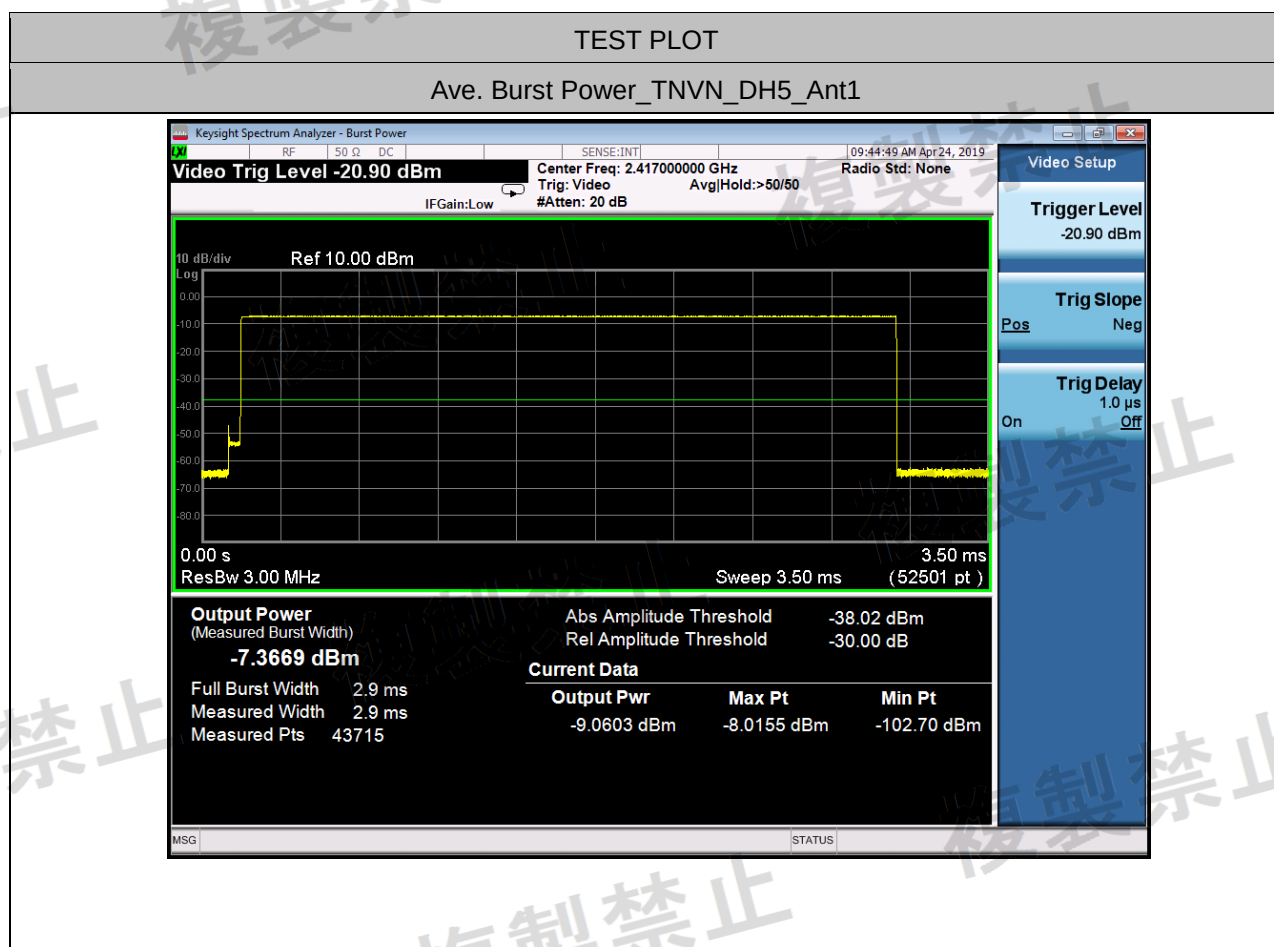


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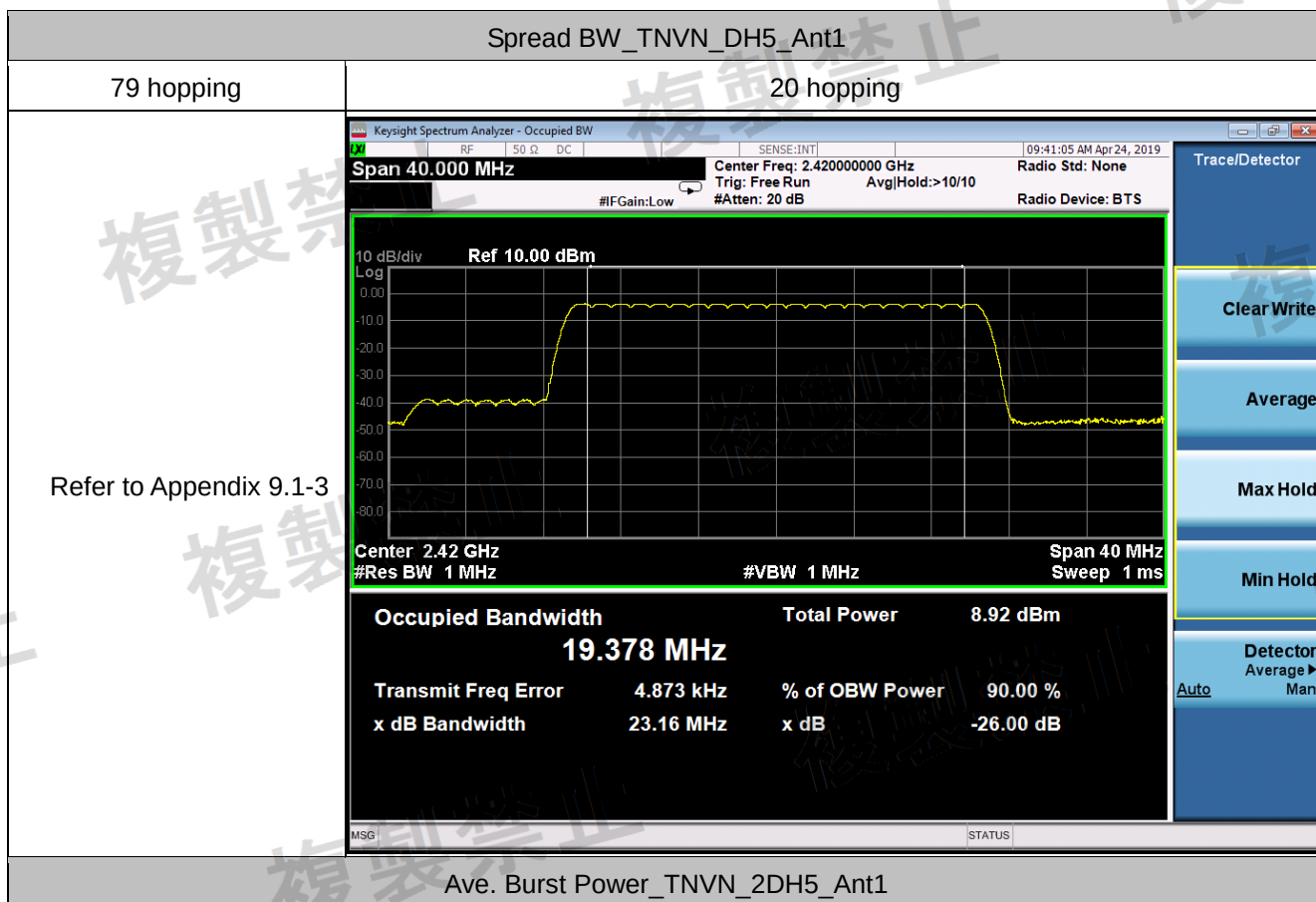
4. Antenna Power

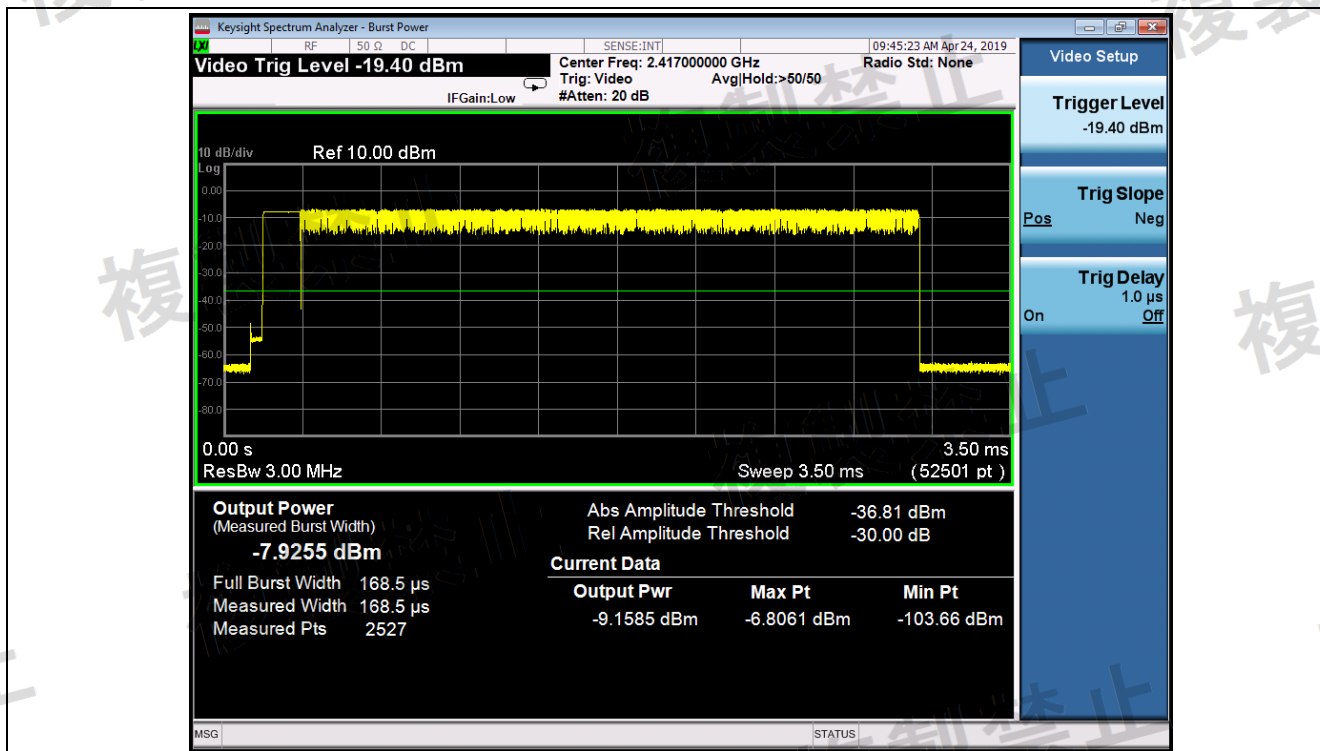
Test Condition	Test Mode	Ant	Max. power Fre. [MHz]	Ave. Burst Power [mW]	Hop Number	Spread BW [MHz]	Result [mW/MHz]	Limit [mW/MHz]	Tolerance [%]	Limit [%]	Verdict
TNVN	DH5	Ant1	2430	0.183	20	19.378	0.0094	3	-32.55	-80 to +20	PASS
					79	71.198	0.0026	3	-35.74	-80 to +20	PASS
TNVN	2DH5	Ant1	2430	0.161	20	19.491	0.0083	3	-41.00	-80 to +20	PASS
					79	71.339	0.0023	3	-43.58	-80 to +20	PASS
Remark: Rated antenna power: 0.004mW/MHz - 0.014mW/MHz											



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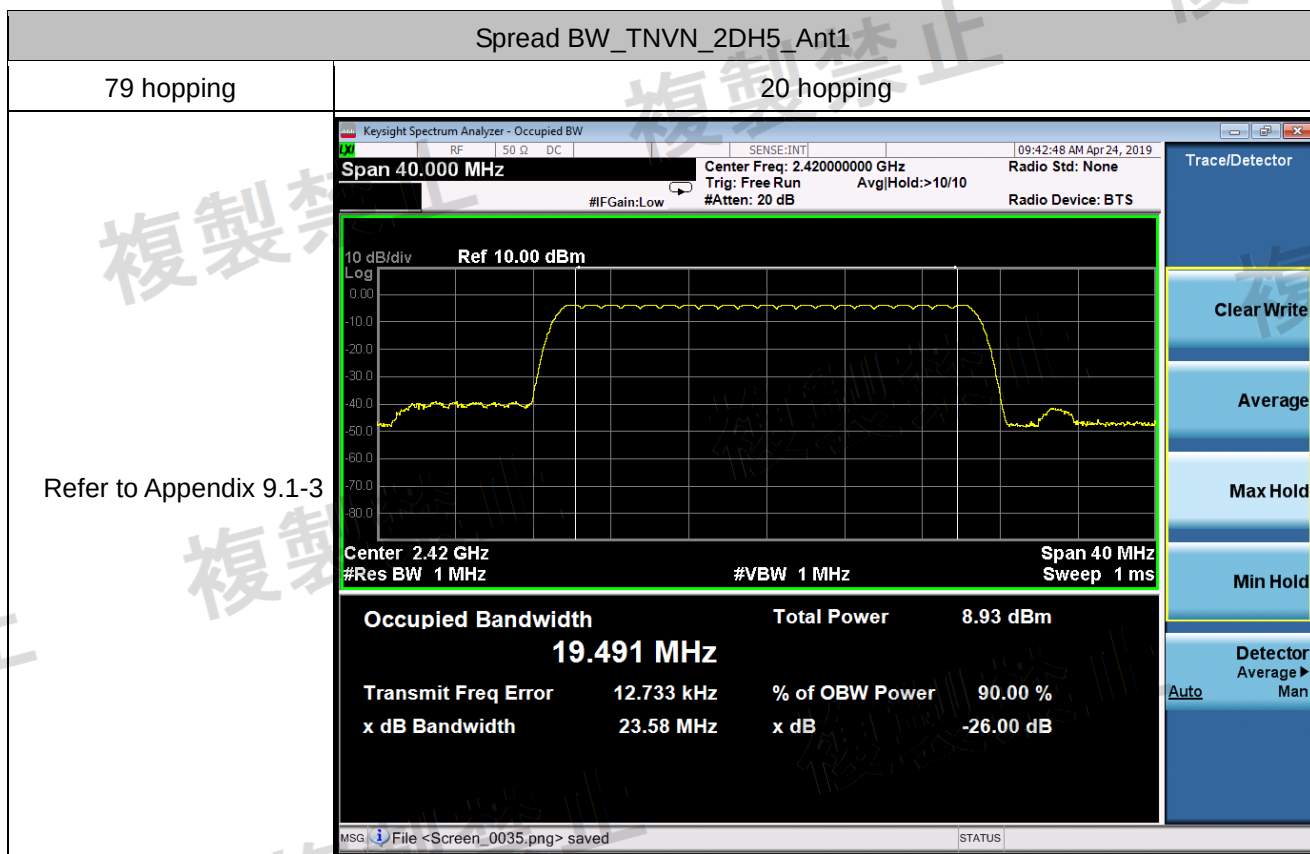
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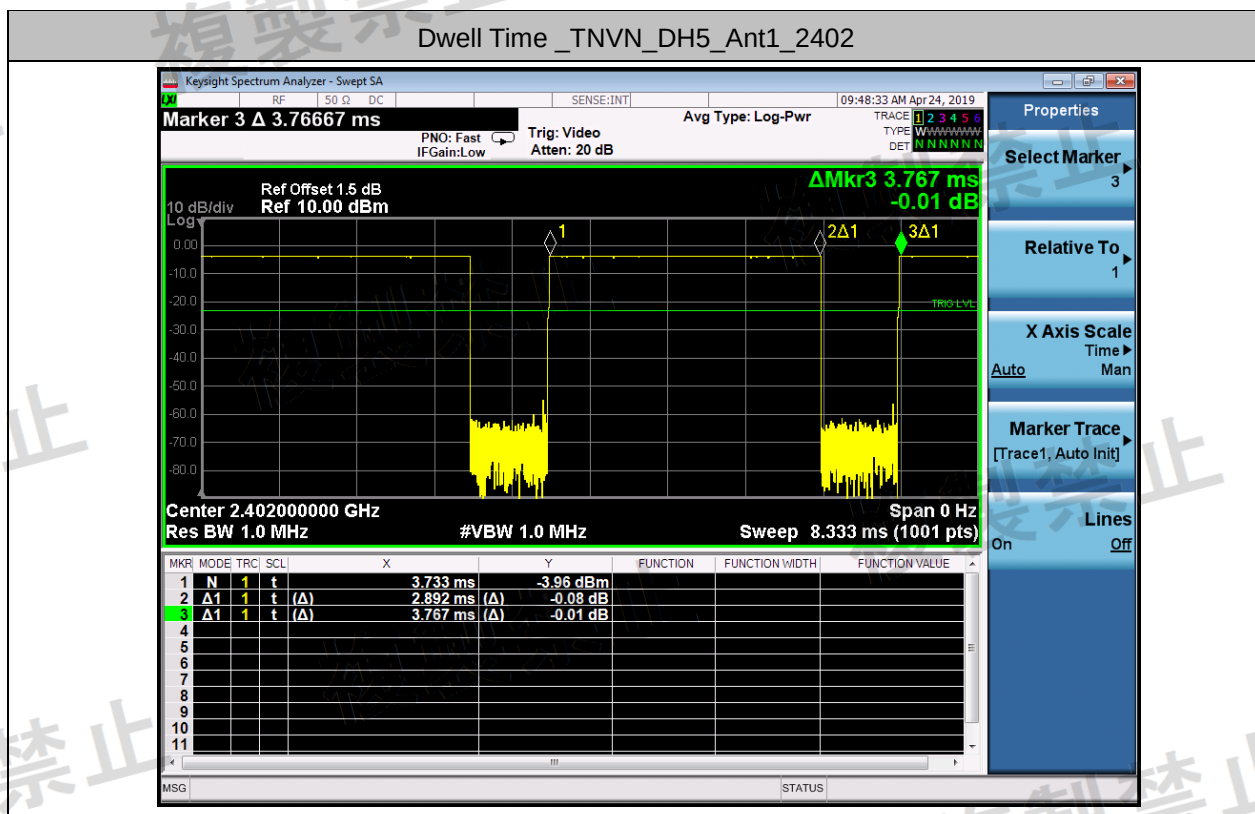
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5.Dwell Time

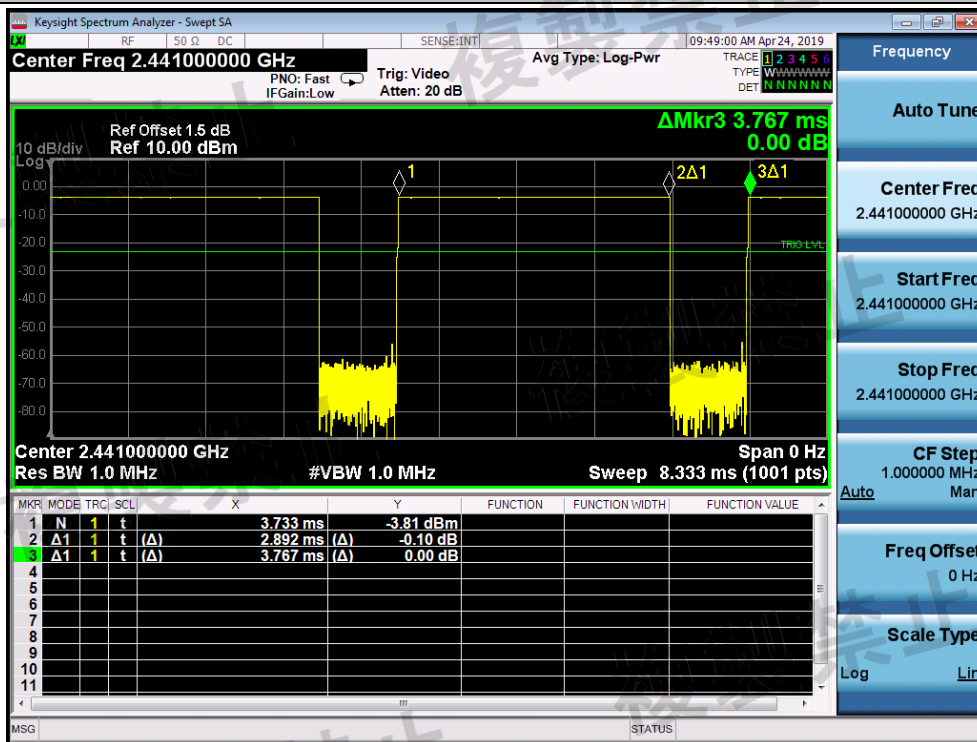
Test Condition	Test Mode	Test Channel	Ant	Burst Width [ms]	Dwell Time [s]	Limit [s]	Verdict
TNVN	DH5	2402	Ant1	2.892	0.21	<0.4	PASS
TNVN	DH5	2441	Ant1	2.892	0.21	<0.4	PASS
TNVN	DH5	2480	Ant1	2.892	0.21	<0.4	PASS
TNVN	2DH5	2402	Ant1	2.902	0.21	<0.4	PASS
TNVN	2DH5	2441	Ant1	2.902	0.21	<0.4	PASS
TNVN	2DH5	2480	Ant1	2.902	0.21	<0.4	PASS



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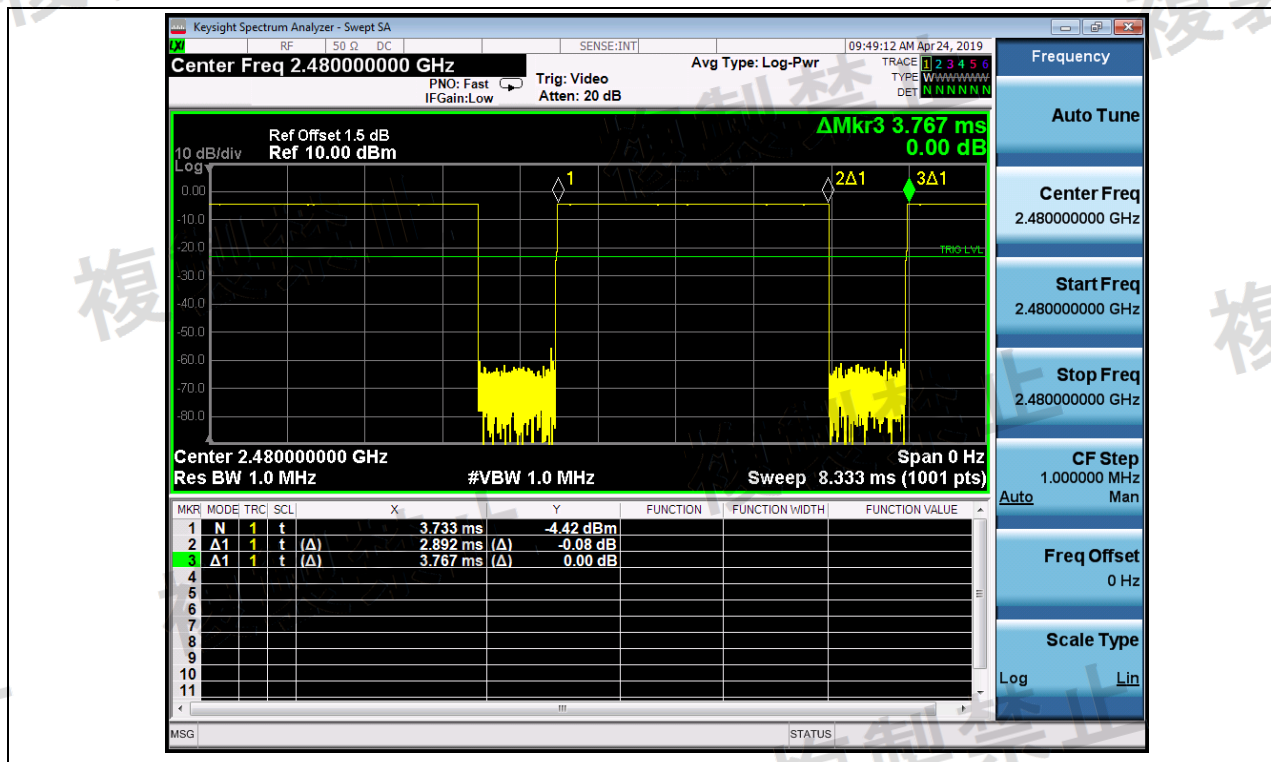
Dwell Time _TNVN_DH5_Ant1_2441



Dwell Time _TNVN_DH5_Ant1_2480

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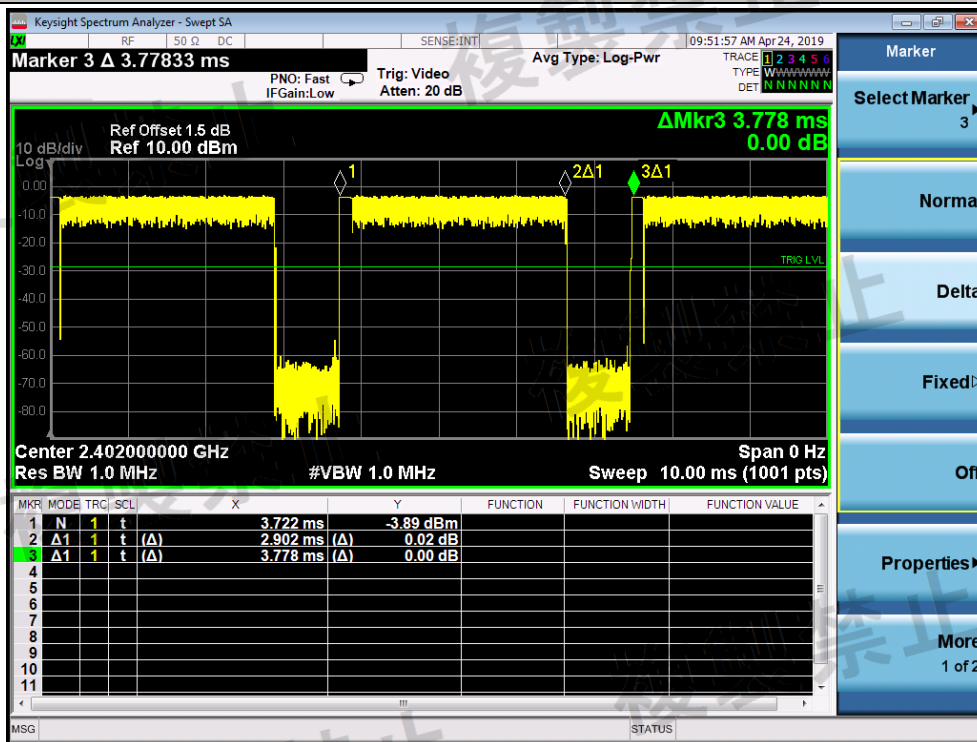
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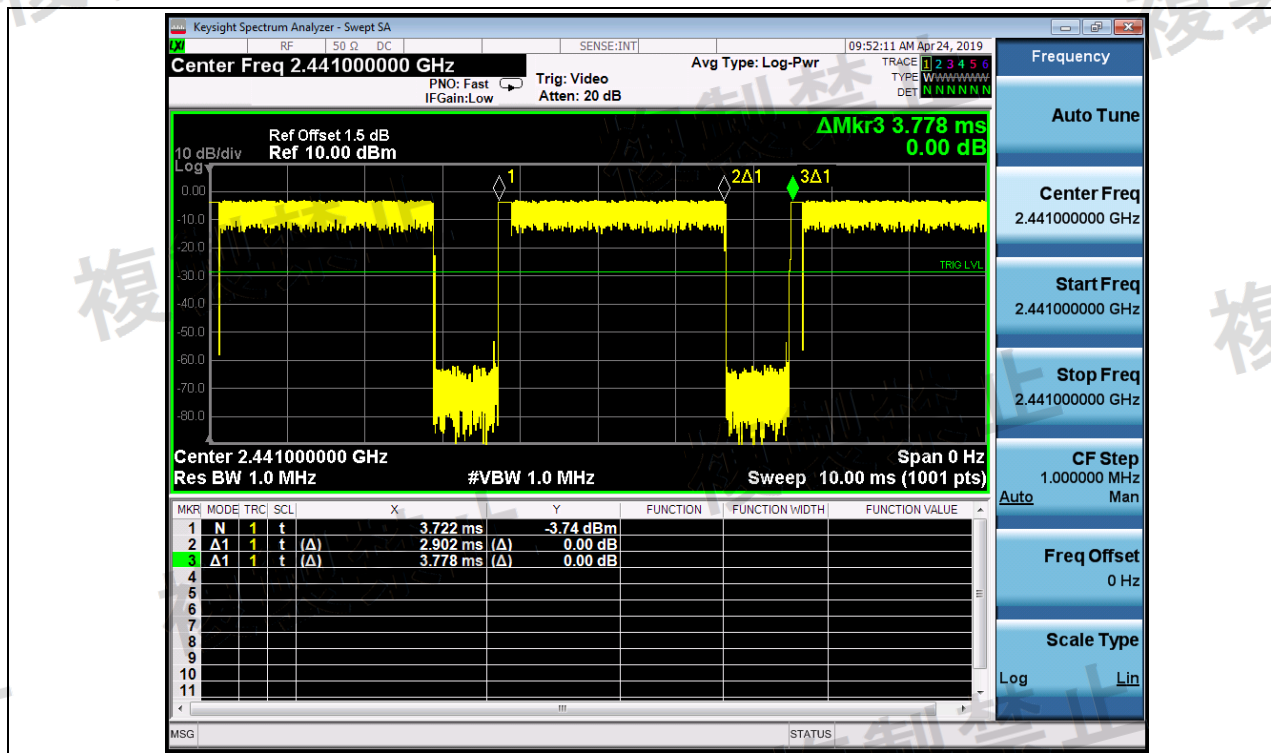
Dwell Time_TNVN_2DH5_Ant1_2402



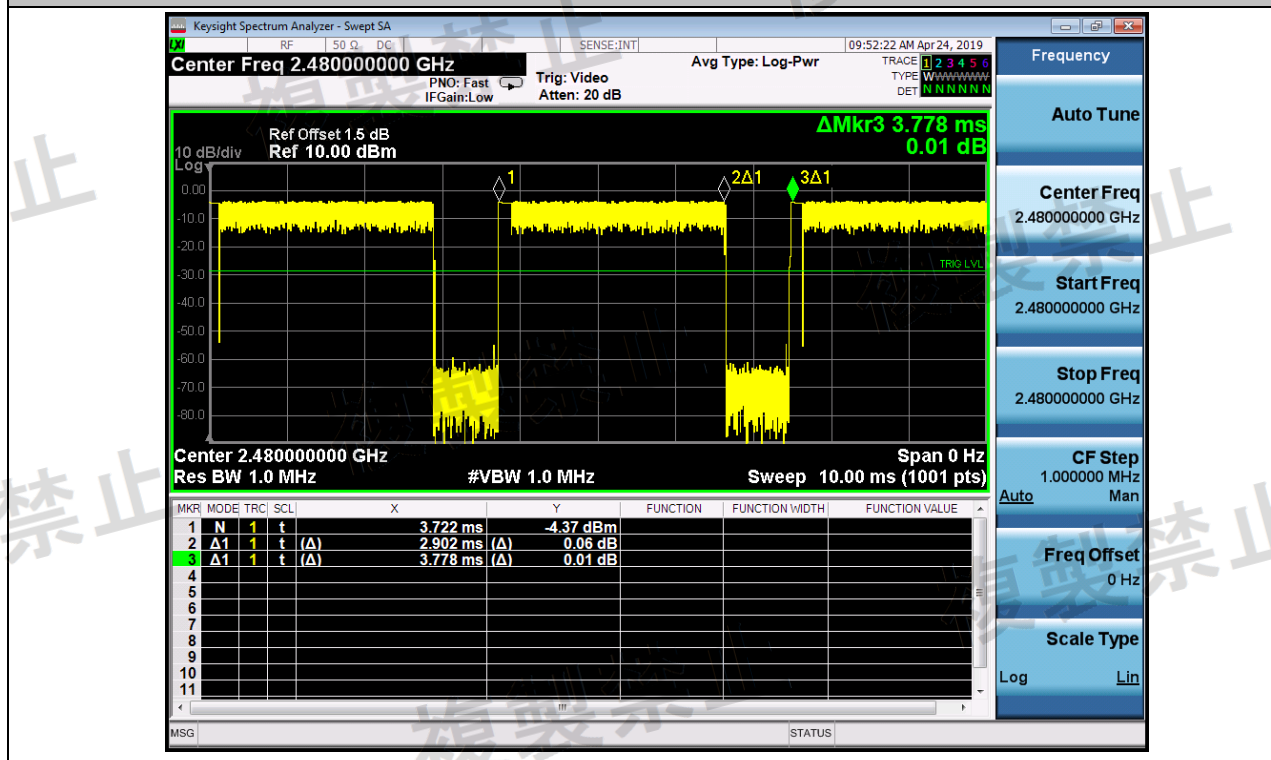
Dwell Time_TNVN_2DH5_Ant1_2441

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Dwell Time _TNVN_2DH5_Ant1_2480



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6. Spurious Emissions of Tx

Test Mode	Test Channel	StartFre[MHz]	StopFre[MHz]	Max. Fre[MHz]	Test Result [μW]	Limit [μW]	Verdict	Verdict
DH5	2402	30	2374	2371.7	0.027	2.5	PASS	PASS
DH5	2402	2374	2387	2386.038	0.049	2.5	PASS	PASS
DH5	2402	2387	2400	2398.05	1.213	25	PASS	PASS
DH5	2402	2483.5	2496.5	2496.006	0.016	25	PASS	PASS
DH5	2402	2496.5	2509.5	2500.894	0.001	2.5	PASS	PASS
DH5	2402	2509.5	12750	4807.00	0.041	2.5	PASS	PASS
DH5	2441	30	2374	2367.0	0.002	2.5	PASS	PASS
DH5	2441	2374	2387	2376.99	0.165	2.5	PASS	PASS
DH5	2441	2387	2400	2387.88	0.002	25	PASS	PASS
DH5	2441	2483.5	2496.5	2495.98	0.013	25	PASS	PASS
DH5	2441	2496.5	2509.5	2505.00	0.119	2.5	PASS	PASS
DH5	2441	2509.5	12750	4887	0.054	2.5	PASS	PASS
DH5	2480	30	2374	2303.7	0.002	2.5	PASS	PASS
DH5	2480	2374	2387	2386.428	0.001	2.5	PASS	PASS
DH5	2480	2387	2400	2400.0	0.005	25	PASS	PASS
DH5	2480	2483.5	2496.5	2487.998	0.068	25	PASS	PASS
DH5	2480	2496.5	2509.5	2497.54	0.018	2.5	PASS	PASS
DH5	2480	2509.5	12750	4957	0.054	2.5	PASS	PASS
2DH5	2402	30	2374	2367	0.019	2.5	PASS	PASS
2DH5	2402	2374	2387	2386.168	0.045	2.5	PASS	PASS
2DH5	2402	2387	2400	2397.998	1.884	25	PASS	PASS
2DH5	2402	2483.5	2496.5	2496.006	0.015	25	PASS	PASS
2DH5	2402	2496.5	2509.5	2501.336	0.002	2.5	PASS	PASS
2DH5	2402	2509.5	12750	4807	0.045	2.5	PASS	PASS
2DH5	2441	30	2374	2303.7	0.003	2.5	PASS	PASS
2DH5	2441	2374	2387	2377.016	0.157	2.5	PASS	PASS
2DH5	2441	2387	2400	2399.974	0.007	25	PASS	PASS

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Guangzhou Branch

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2DH5	2441	2483.5	2496.5	2496.006	0.015	25	PASS	PASS
2DH5	2441	2496.5	2509.5	2505.002	0.119	2.5	PASS	PASS
2DH5	2441	2509.5	12750	4877	0.190	2.5	PASS	PASS
2DH5	2480	30	2374	2369.3	0.013	2.5	PASS	PASS
2DH5	2480	2374	2387	2386.87	0.001	2.5	PASS	PASS
2DH5	2480	2387	2400	2400	0.005	25	PASS	PASS
2DH5	2480	2483.5	2496.5	2487.998	0.068	25	PASS	PASS
2DH5	2480	2496.5	2509.5	2498.788	0.029	2.5	PASS	PASS
2DH5	2480	2509.5	12750	4957	0.057	2.5	PASS	PASS

Remark:

Because of the test using 30KHz RBW , and the limit is under 1MHz RBW situation,
Calculate the spurious emission value using following the formula below:

Calculated value= (measure value +15.2dB)

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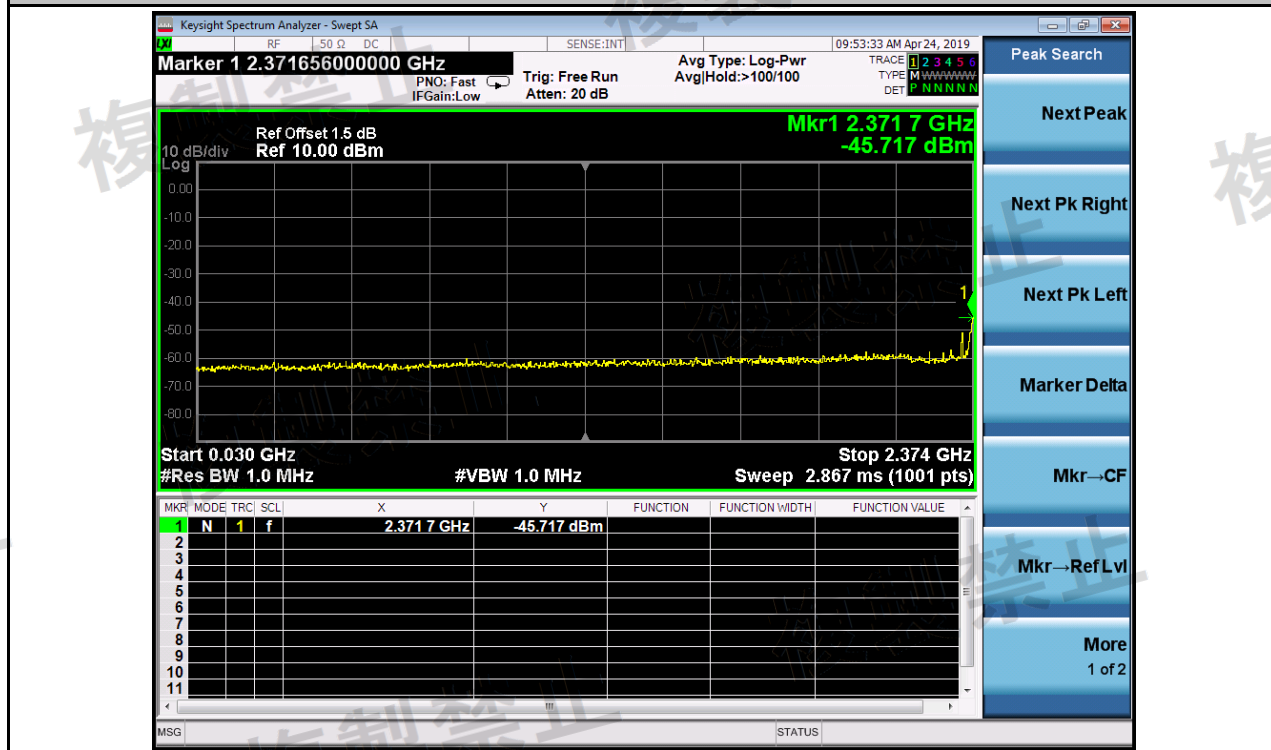
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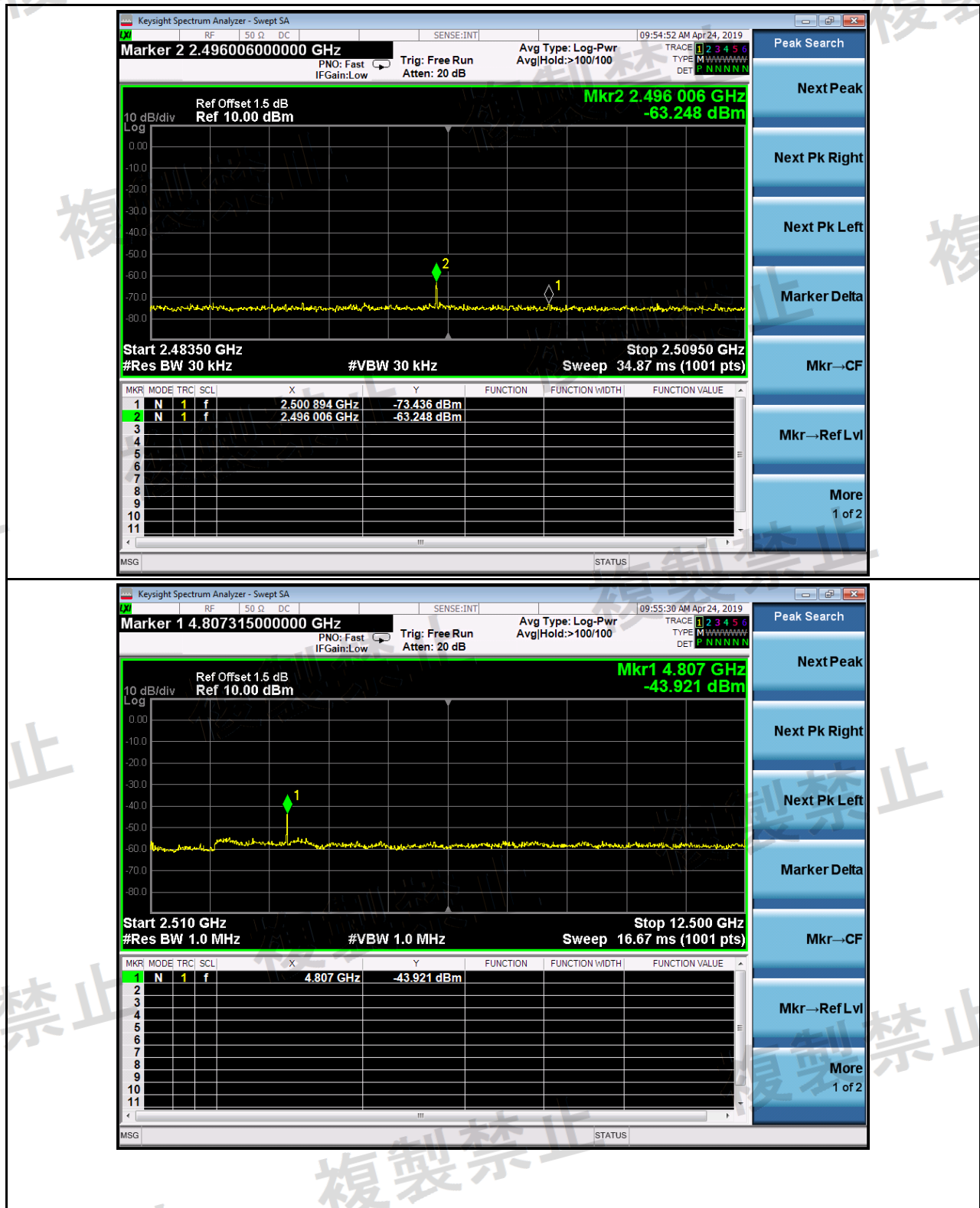
TEST PLOT

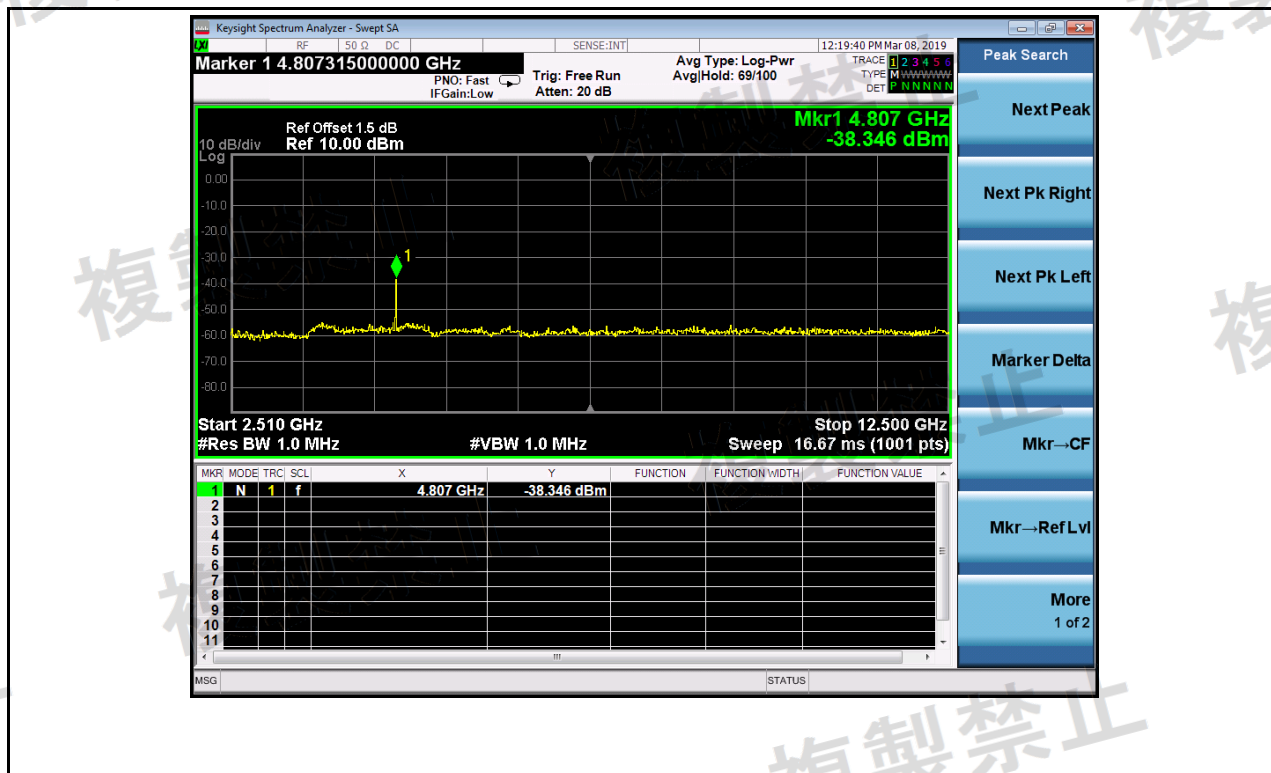
Spurious Emissions of Tx_TNVN_DH5_2402_Ant1



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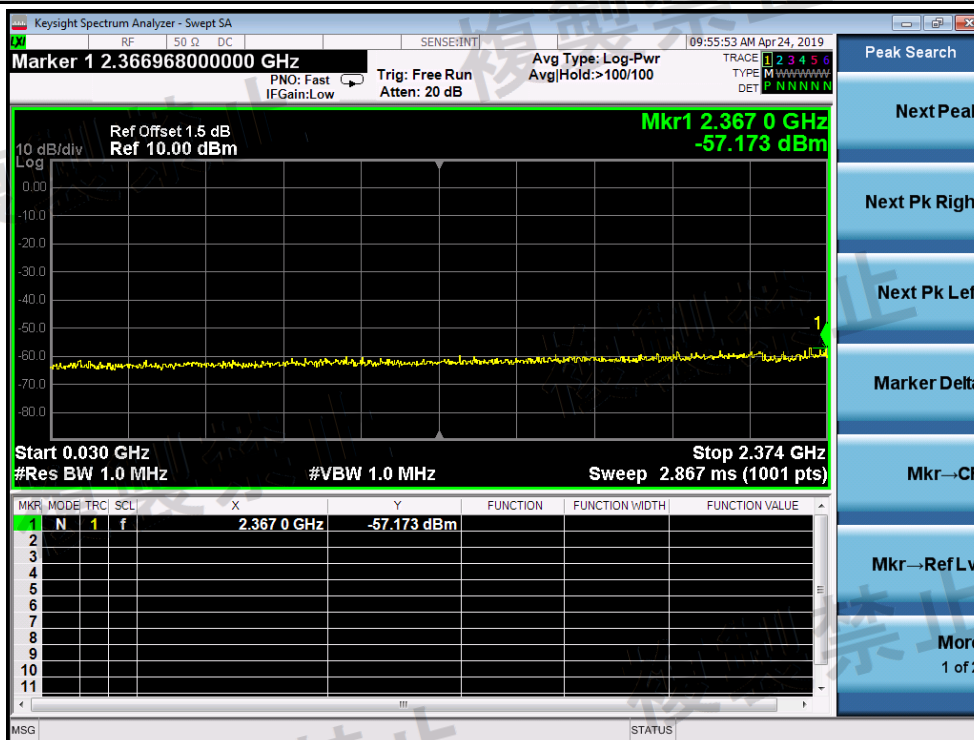
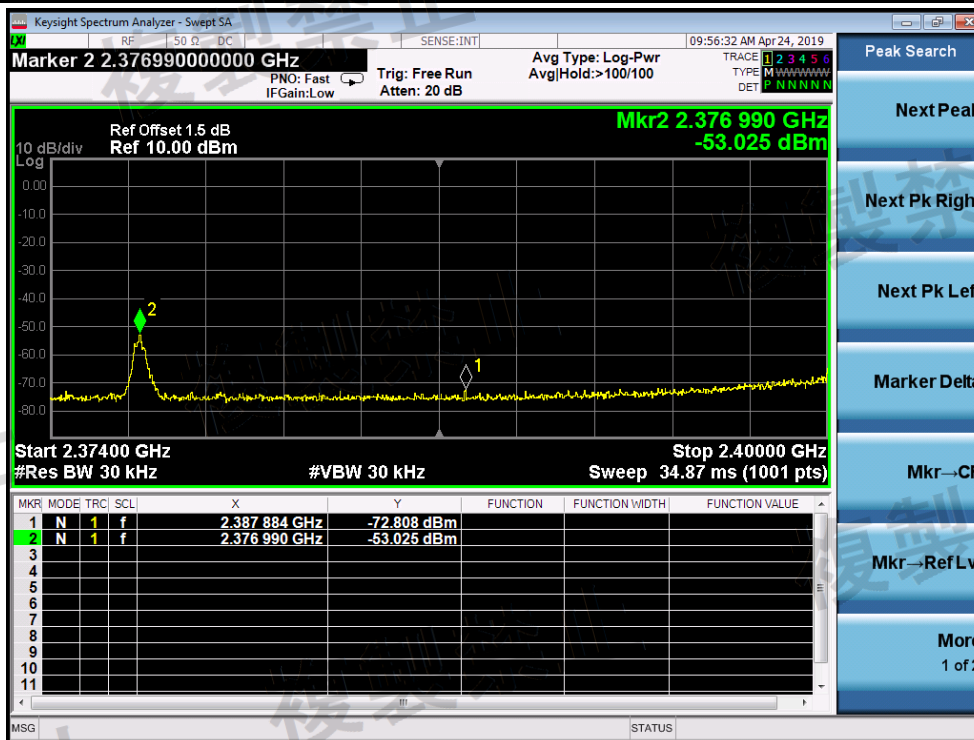




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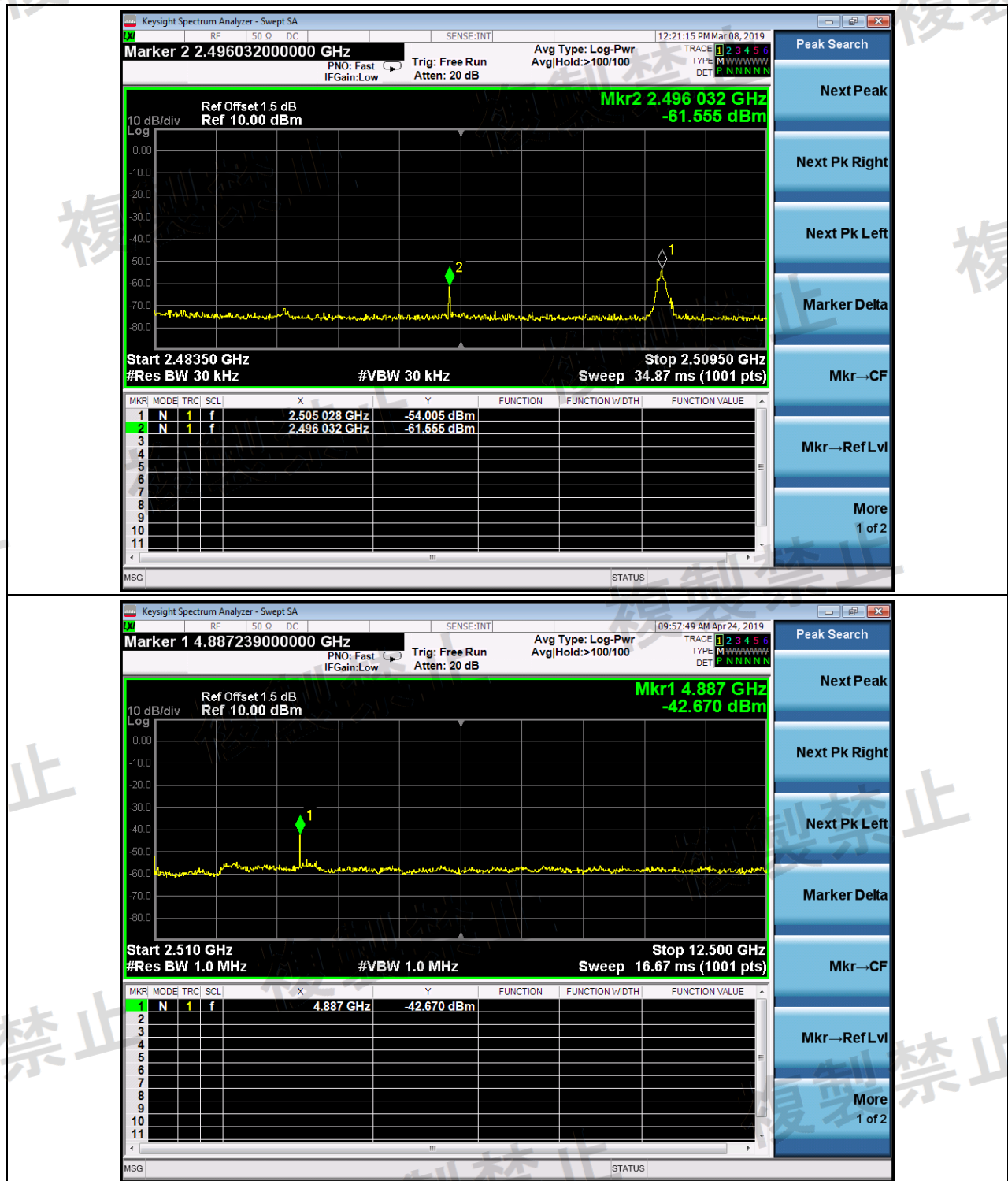
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Spurious Emissions of Tx_TNVN_DH5_2441_Ant1



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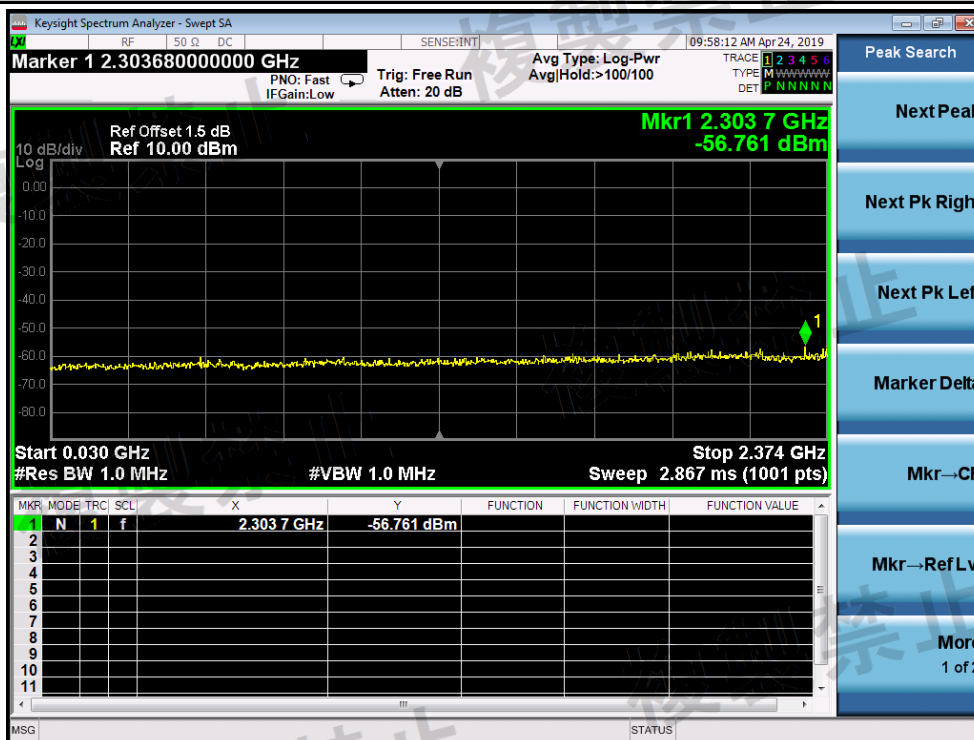
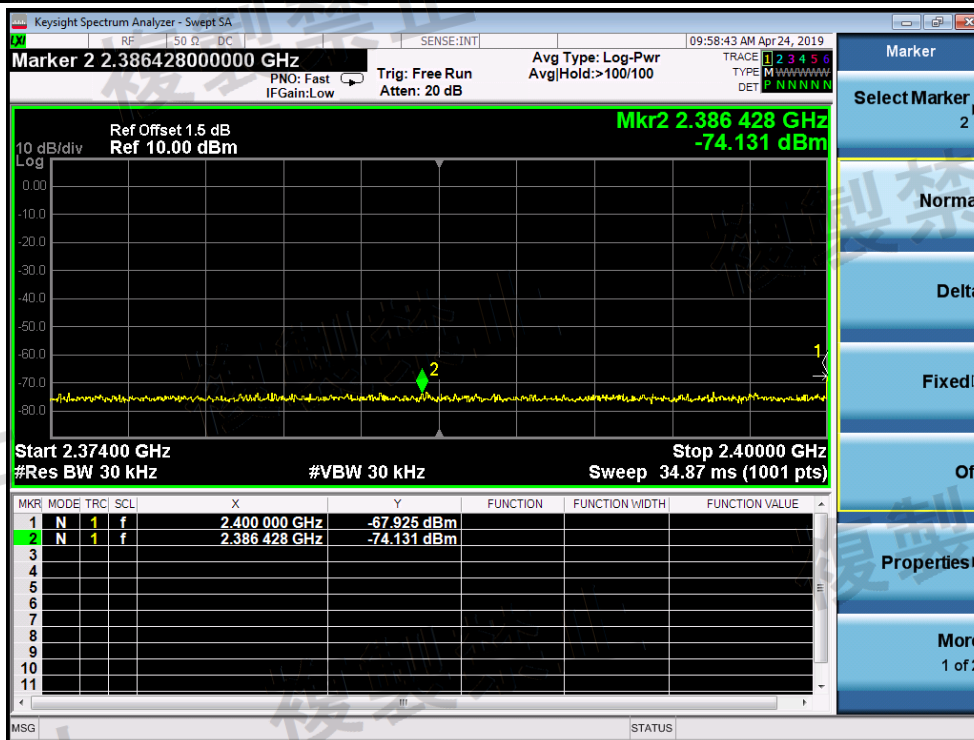
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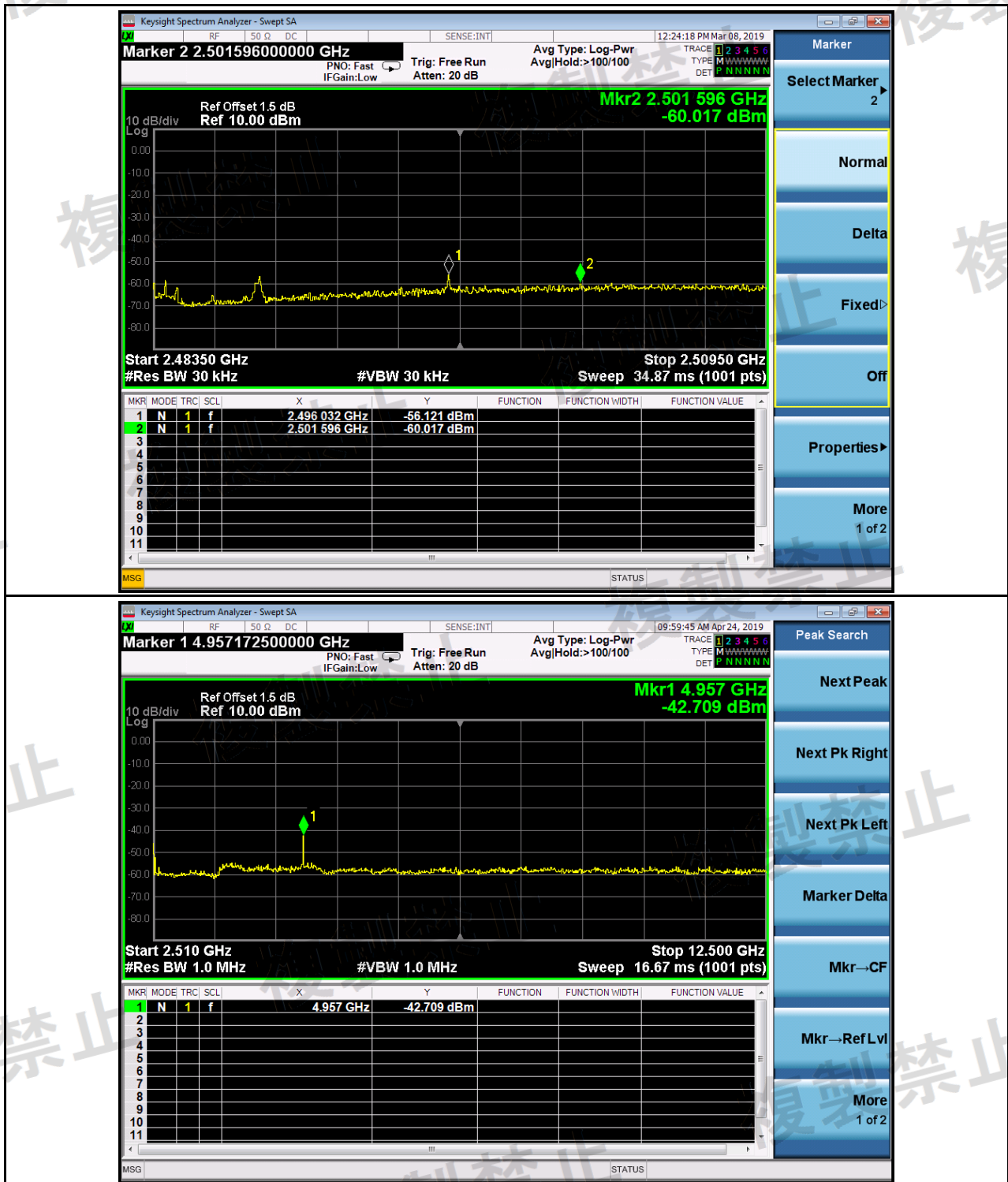
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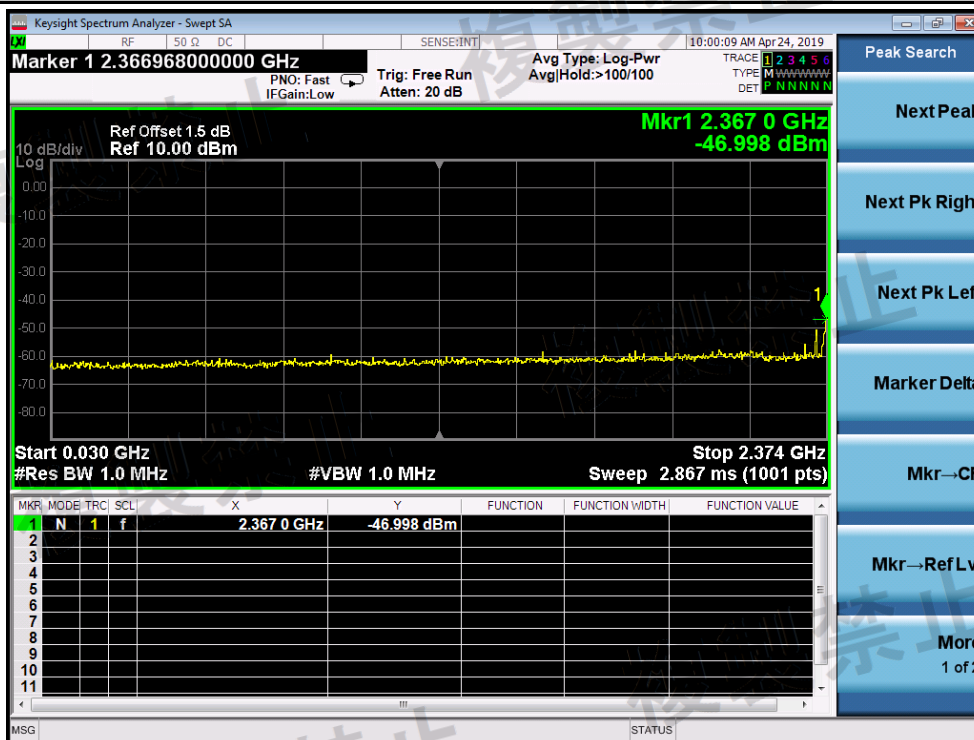
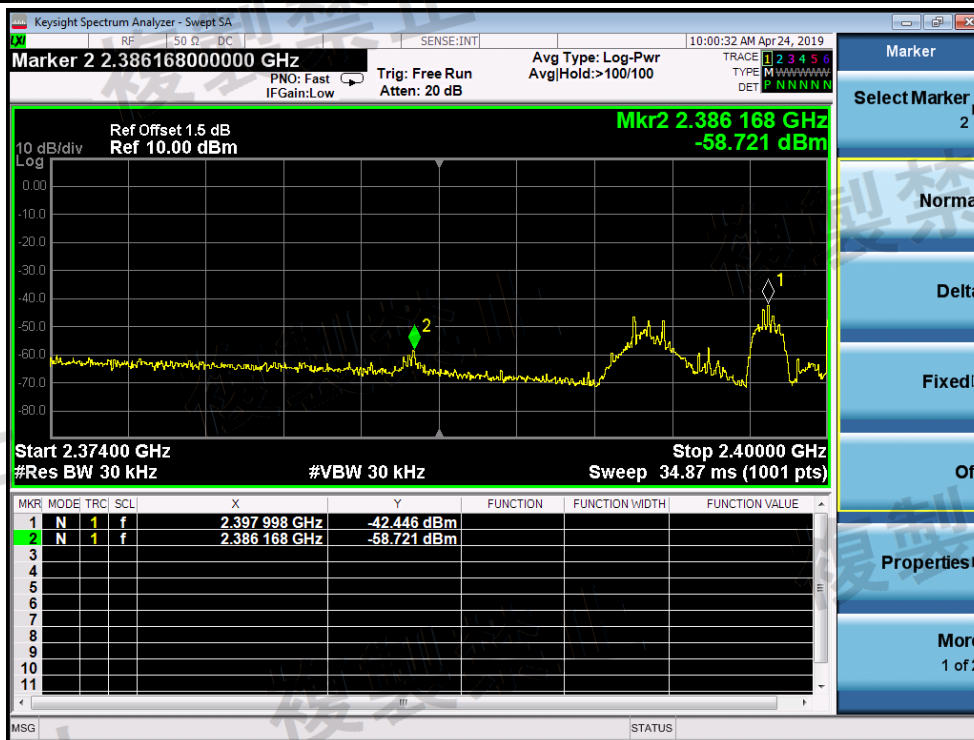
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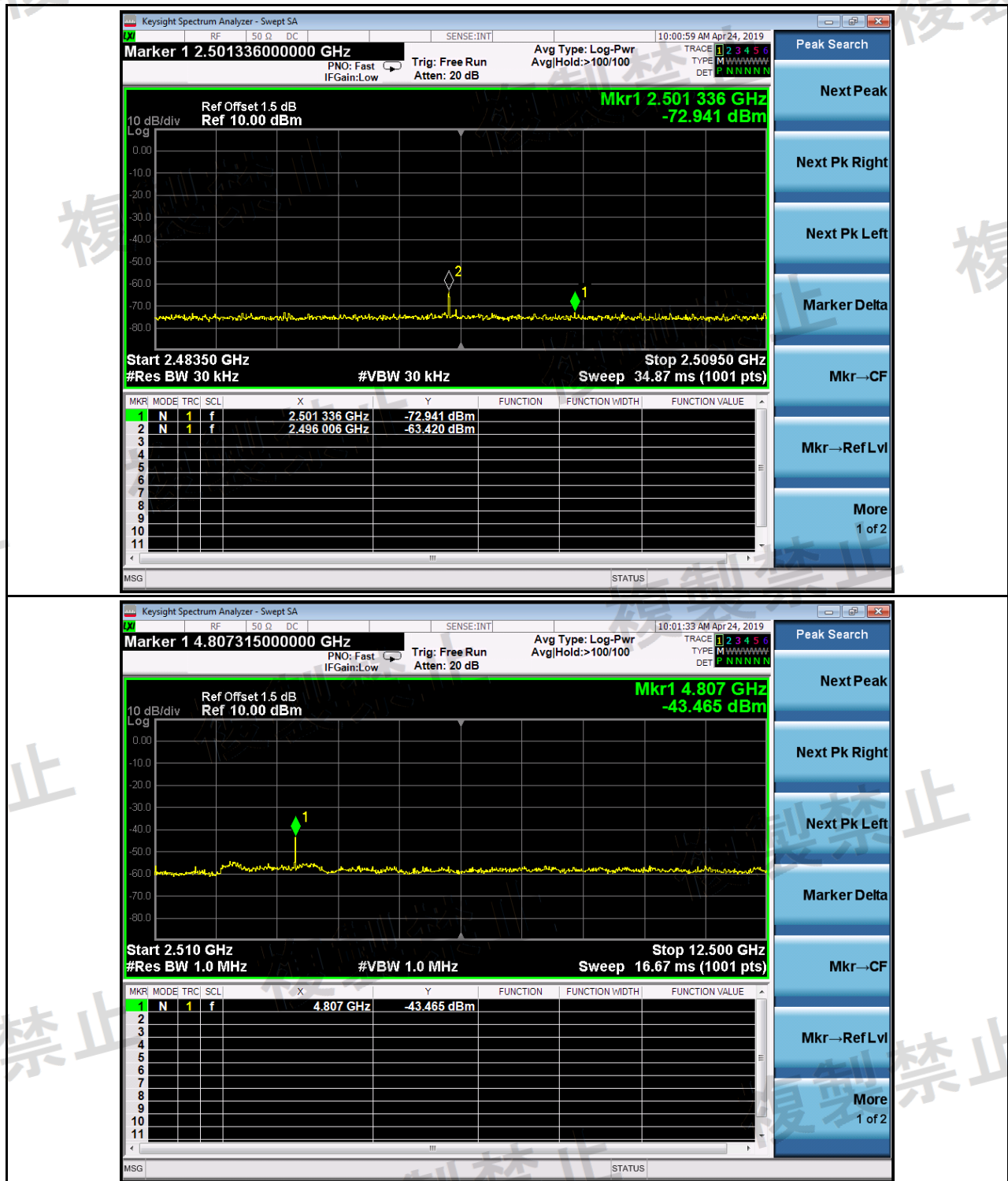
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Spurious Emissions of Tx_TNVN_2DH5_2402_Ant1



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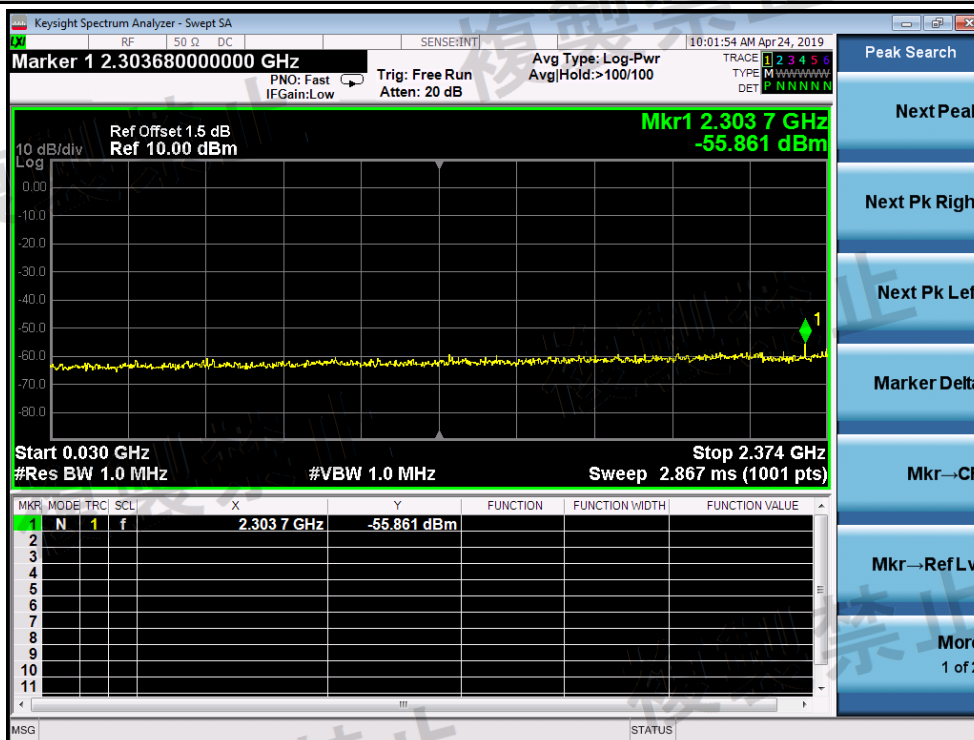
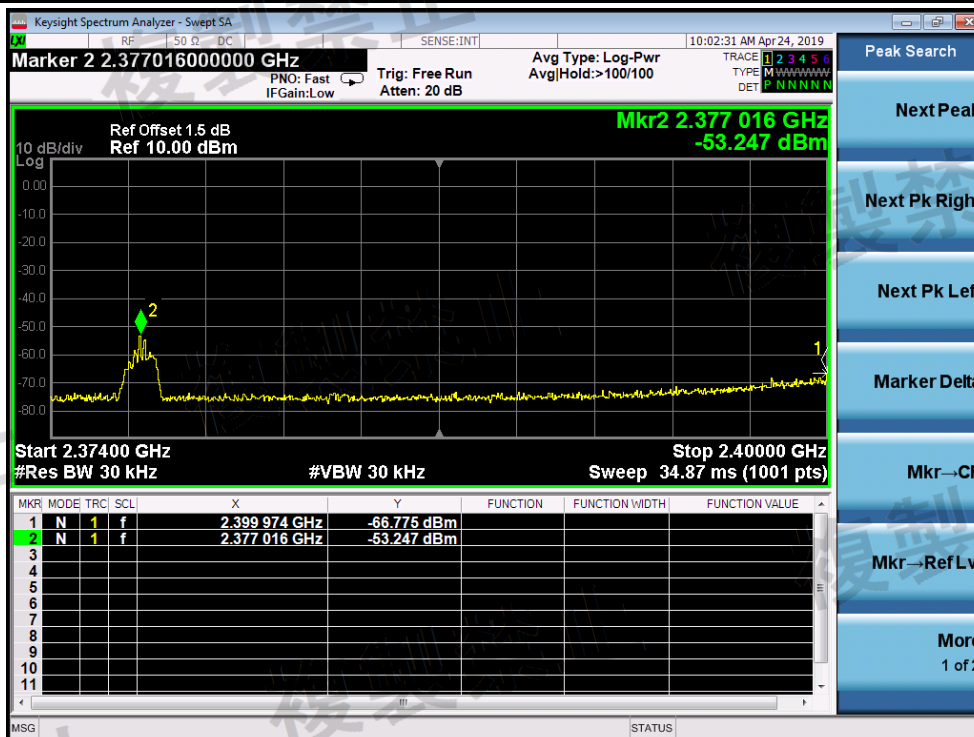
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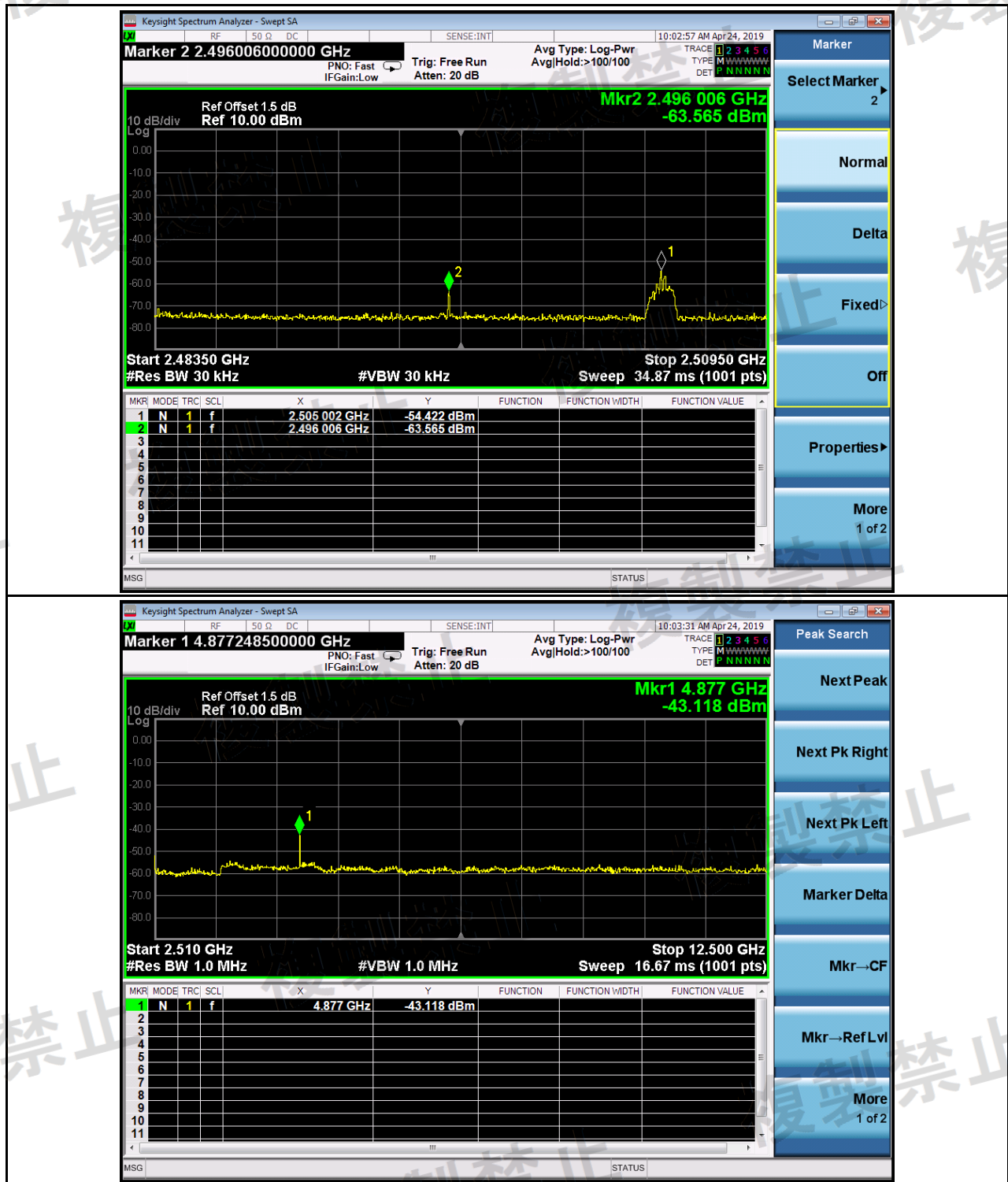
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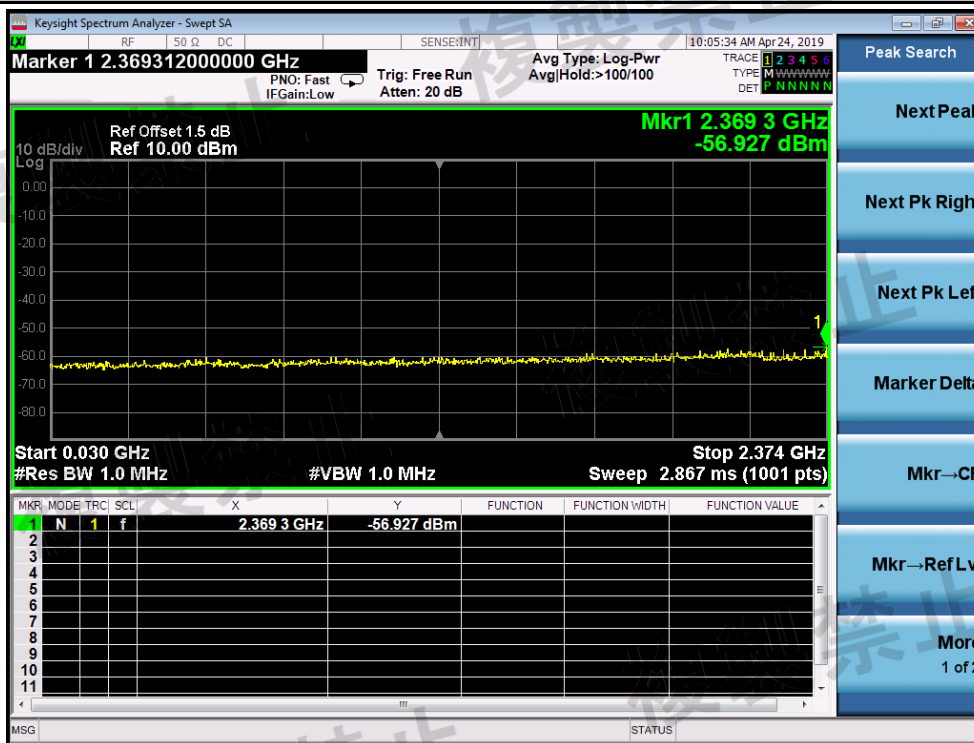
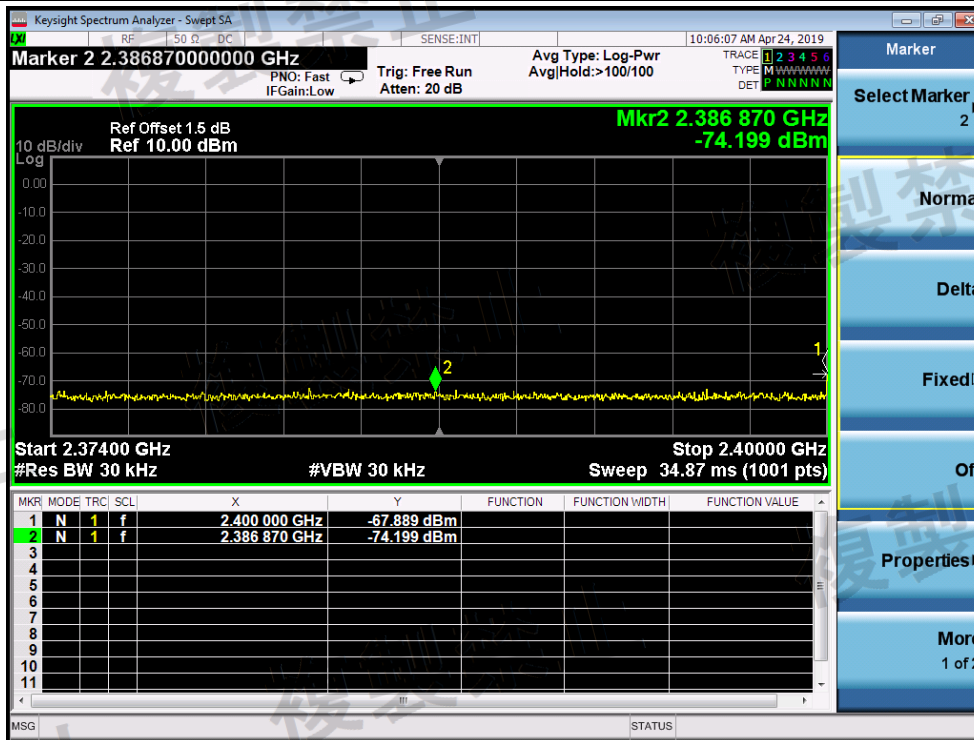
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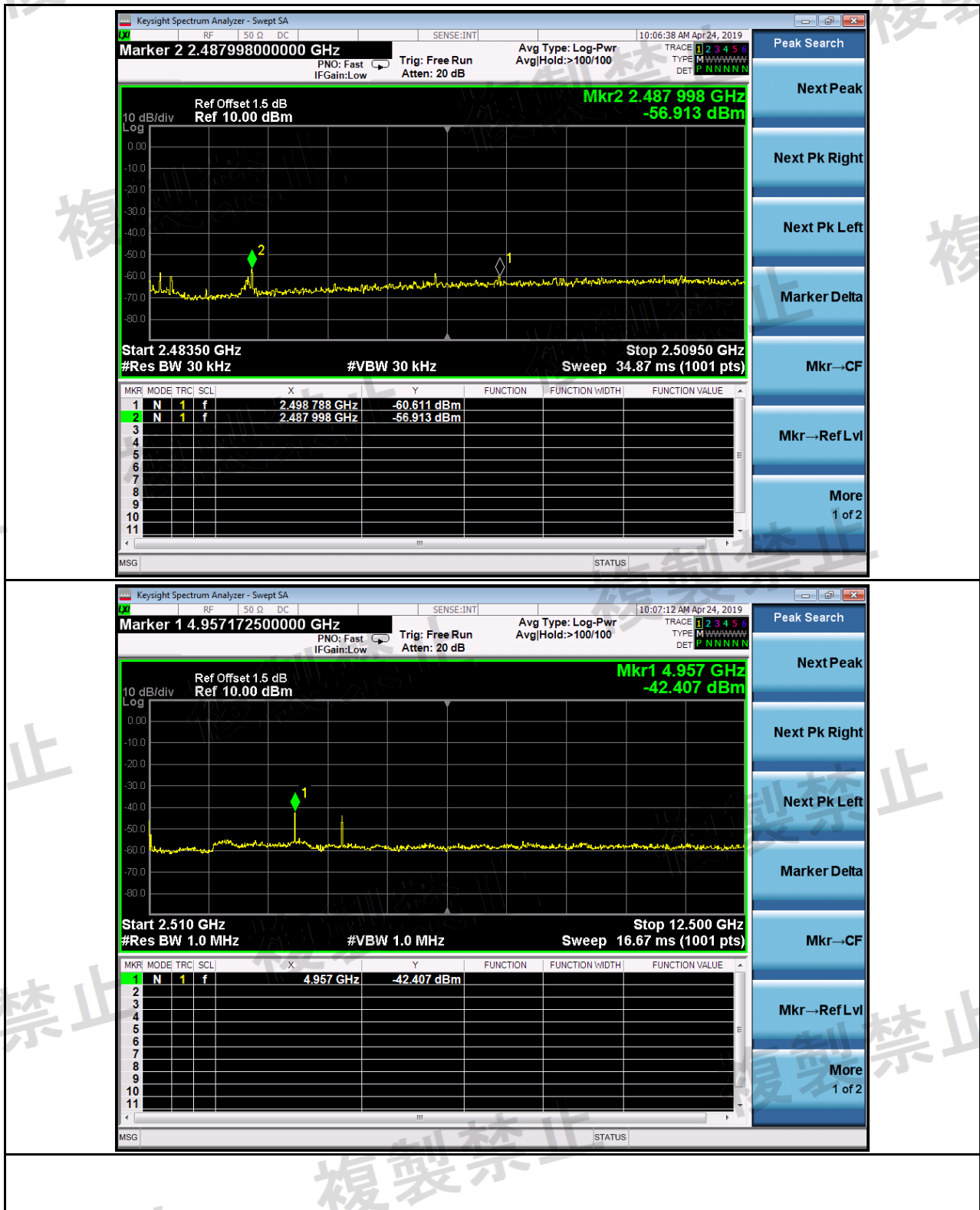
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Spurious Emissions of Tx _TNVN_2DH5_2480_Ant1



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7. Spurious Emissions of Rx

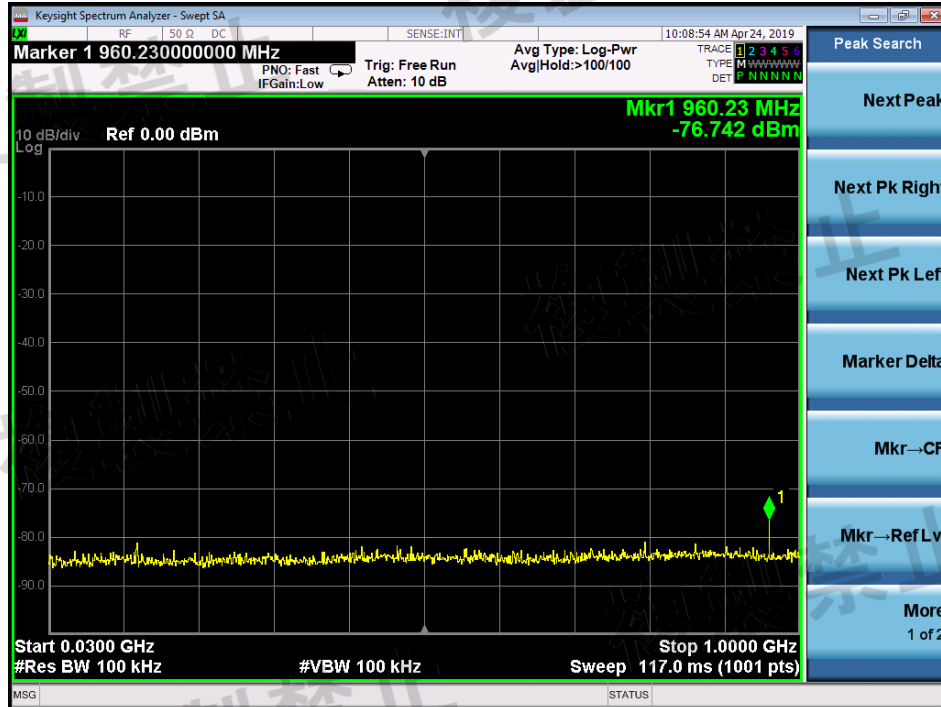
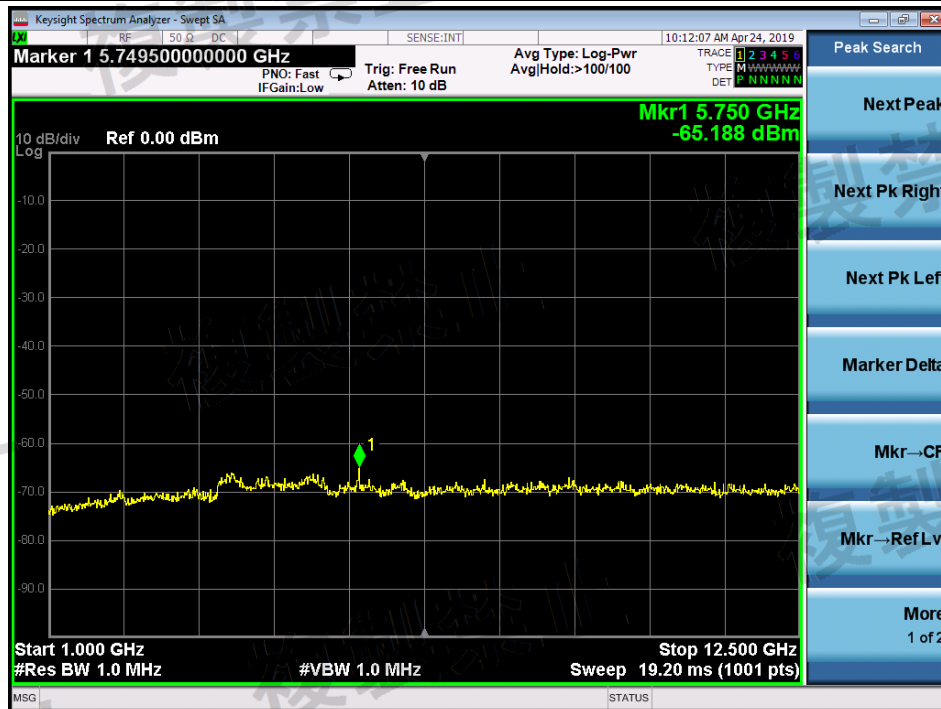
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	Max. Fre[MHz]	Test Result [μW]	Limit [μW]	Verdict
DH5	2402	30	1000	960.23	0.001	4	PASS
DH5	2402	1000	13000	5750	0.005	20	PASS
DH5	2441	30	1000	278.32	0.001	4	PASS
DH5	2441	1000	13000	3772	0.005	20	PASS
DH5	2480	30	1000	943.74	0.001	4	PASS
DH5	2480	1000	13000	3852	0.002	20	PASS
2DH5	2402	30	1000	888.45	0.001	4	PASS
2DH5	2402	1000	13000	3795	0.001	20	PASS
2DH5	2441	30	1000	887.48	0.001	4	PASS
2DH5	2441	1000	13000	5048	0.001	20	PASS
2DH5	2480	30	1000	792.42	0.001	4	PASS
2DH5	2480	1000	13000	3737	0.001	20	PASS

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TEST PLOT

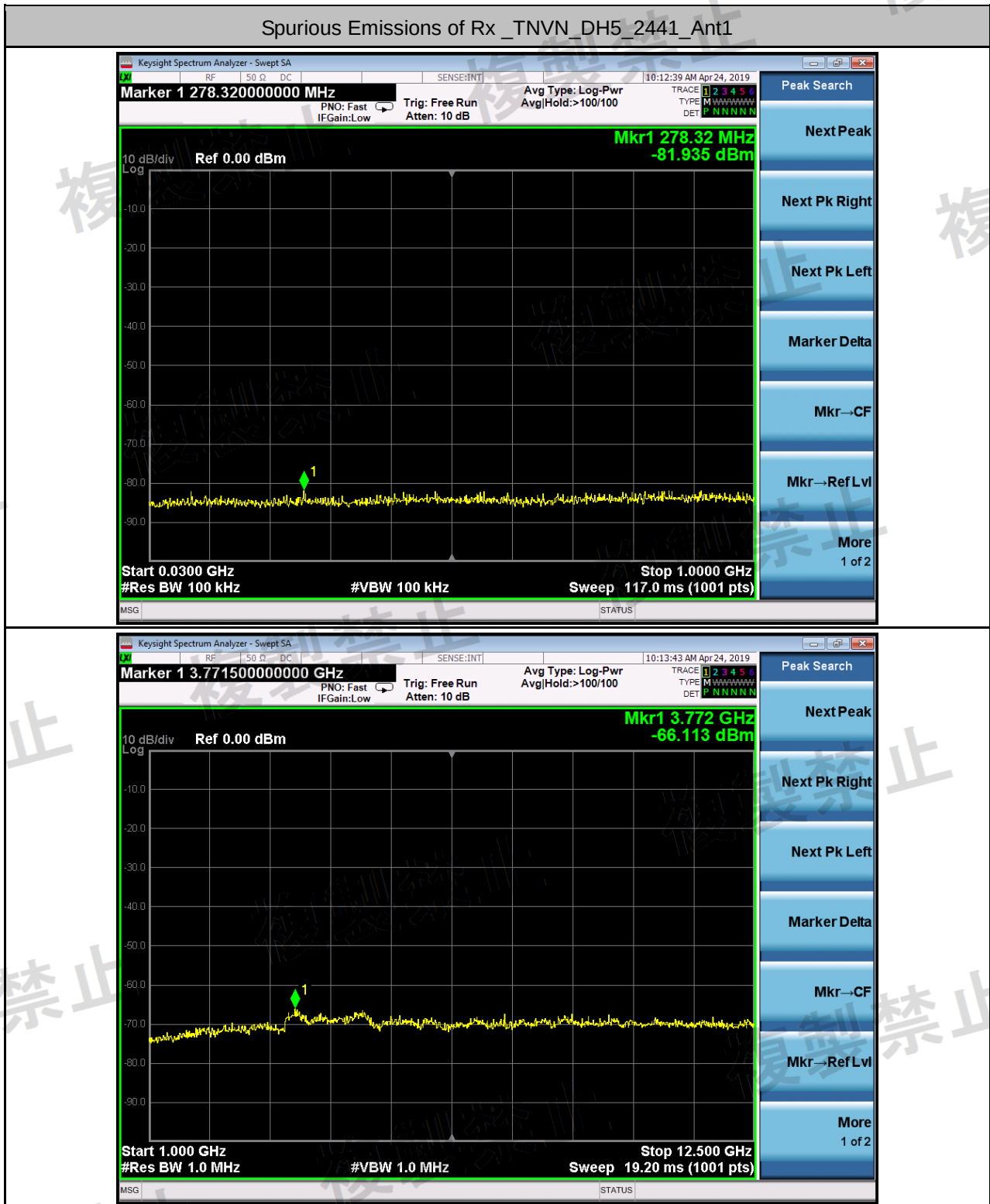
Spurious Emissions of Rx_TNVN_DH5_2402_Ant1



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Spurious Emissions of Rx_TNVN_DH5_2441_Ant1



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