



Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

Ordinance Article 2 paragraph 1 item (19)

Report Reference No.: CTL1903162021-W01

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Ivan Xie

Product Name..... Subminiature multifunctional smart home gateway

Model/Type reference..... RG4100+

List Model(s)..... N/A

Trade Mark..... N/A

Applicant's name..... Japan Huijing Intelligent Tech Co.,Ltd.

Address of applicant..... 6F, Kinbai Third Bldg.1-14-5, Shinkawa, Chuo-ku, Tokyo
104-0033 Japan

Test Firm..... Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm..... Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,
Nanshan District, Shenzhen, China 518055

Test specification.....

Standard..... Ordinance Article 2 paragraph 1 item (19)

TRF Originator..... Shenzhen CTL Testing Technology Co., Ltd.

Master TRF..... Dated 2011-01

Date of receipt of test item..... Apr. 11, 2019

Date of sampling..... Apr. 11, 2019

Date of Test Date..... Apr. 11, 2019-Apr. 28, 2019

Data of Issue..... Apr. 28, 2019

Result..... Pass

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TEST REPORT

Test Report No. :	CTL1903162021-W01	Apr. 28, 2019 Date of issue
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Equipment under Test : Subminiature multifunctional smart home gateway

Model /Type : RG4100+

Listed Models : N/A

Applicant : **Japan Huijing Intelligent Tech Co.,Ltd.**

Address : 6F, Kinbai Third Bldg.1-14-5, Shinkawa, Chuo-ku,
Tokyo 104-0033 Japan

Manufacturer : **Guangdong Mansion Intelligent Technology Co., Ltd.**

Address : No. 36, Xiaolan Industrial Avenue, Xiaolan Town,
Zhongshan City, Guangdong Province, China

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

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1. SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

[MIC Notice No.88 Appendix No.43](#)

1.2. Test Description

Test Item	Result
Frequency Error	Pass
Antenna Output Power and Output Power Tolerance	Pass
Occupied Bandwidth and Spread spectrum bandwidth	Pass
Unwanted Emission Strength	Pass
Secondary Radiated Emission Strength	Pass
Construction protection method	Pass
Interference Prevention Function	Pass

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shaheji Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9518B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9518B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology 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 399832, December 08, 2017.

1.4. Measurement Uncertainty

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR100028-1 [2] and shall correspond to an expansion factor (coverage factor) $K=1.96$ or $K=2$ (which provide confidence levels of respectively 95% and 95.5% in the case where the distributions characterizing the actual measurement uncertainties are normal.

Parameter	Uncertainty
Frequency error / 99%&90% bandwidth	$\pm 1.62 \times 10^{-6}$
Total RF power, conducted	$\pm 0.8\text{dB}$
Spurious emissions, conducted	$\pm 0.8\text{dB}$
DC and low frequency voltages	$\pm 0.05\%$
Humidity	$\pm 5\%$
Temperature	$\pm 1^\circ\text{C}$

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Voltage	Normal Voltage	AC 100V
	High Voltage	AC 110V
	Low Voltage	AC 90V
Other	Normal Temperature	25°C
	Relative Humidity	55 %
	Air Pressure	989 hPa

Note : As the EUT was powered by DC 5V, and with the voltage stabilizing circuit used the chip voltage received floating not exceed $\pm 1\%$ of nominal condition when working on extreme voltage, so all test performed at nominal voltage only.

2.2. General Description of EUT

Product Name:	Subminiature multifunctional smart home gateway
Model/Type reference:	RG4100+
Power supply:	DC 5V from adapter
Adapter information:	Model:RD0501000-USBA-110GB Input :100-240V~, 50/60Hz 0.3A Max Output : 5V === 1000mA
Hardware version:	RG4100+
Software version:	3.10.14
WIFI 2.4GHz	
Supported type:	802.11b/802.11g/802.11n(HT20)/802.11n(HT40)
Modulation:	802.11b: DSSS 802.11g/802.11n(HT20)/802.11n(HT40): OFDM
Operation frequency:	802.11b:2412MHz~2472MHz, and 2484MHz 802.11g/802.11n(HT20):2412MHz~2472MHz 802.11n(HT40):2422MHz~2462MHz
Channel number:	802.11b:14 802.11g/802.11n(HT20): 13 802.11n(HT40): 9
Channel separation:	5MHz
Antenna type:	FPC antenna
Antenna gain:	2dBi

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.3. Description of Test Modes

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency List WIFI on 2.4G Band:

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

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

2.4. Measurement Instruments List

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Institution	Calibration Date	Calibration Due Date
1	Spectrum Analyzer	Agilent	N9020	US46220290	Shenzhen Academy of metrology & Quality Inspection	2019/01/16	2020/01/15
2	Signal generator	Agilent	N5182A	MY47420864	Shenzhen Academy of metrology & Quality Inspection	2018/05/19	2019/05/18

Calibration by the calibration agencies listed in the table correspond to paragraph 4 (ii) (c) of Article 24-2 in the Radio Law".

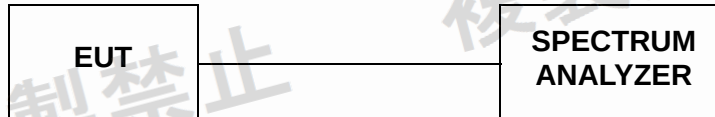
3. Test conditions and Results

3.1. Frequency Error

LIMIT

50ppm

TEST CONFIGURATION



TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: non-modulation

Spectrum Condition:

Frequency: test frequency

Span: 300 KHz

RBW: 30 KHz

VBW: 30 KHz

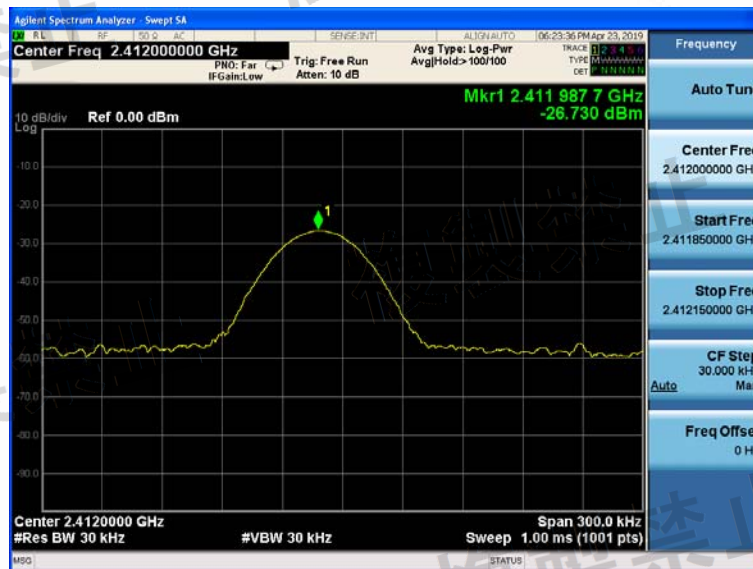
Sweep time: Auto

Detector mode: Positive peak

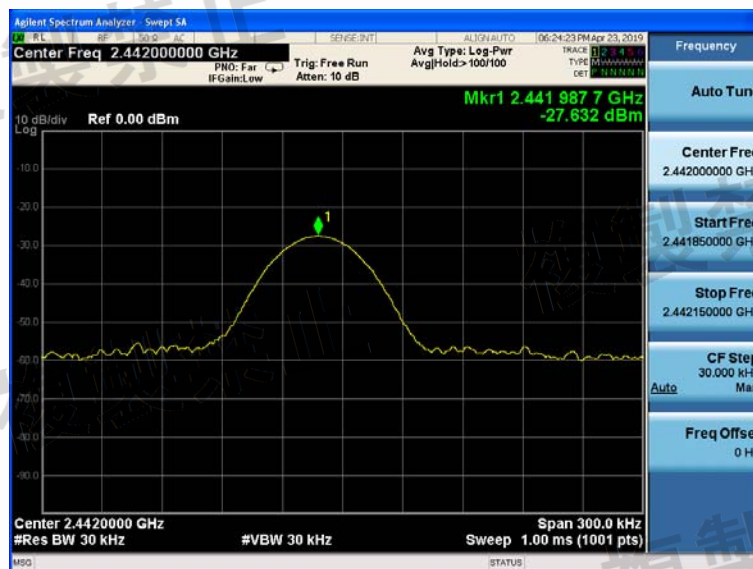
Indication mode: max hold

TEST RESULTS

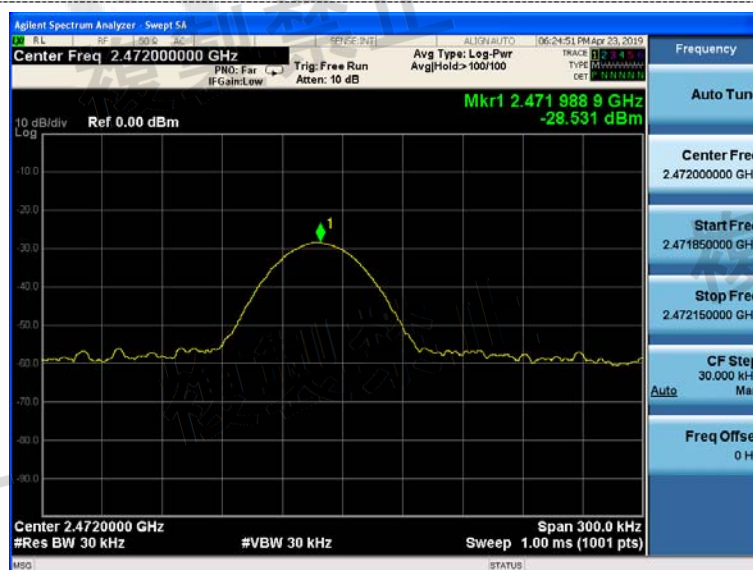
WIFI						
Test Condition	Frequency (MHz)	Read (MHz)	Deviation (MHz)	Tolerance (ppm)	Limit (ppm)	Result
Non-modulation	2412.00	2411.9877	-0.0123	-5.10	±50.00	Pass
	2442.00	2441.9877	-0.0123	-5.04		
	2472.00	2471.9889	-0.0111	-4.49		



2412 MHz



2442MHz



2472MHz

3.2. Antenna Output Power and Output Power Tolerance

LIMIT

- $\leq 3 \text{ mW /MHz}$ (FHSS from 2402-2480 MHz)
- $\leq 10 \text{ mW/MHz}$ (OFDM, DSSS from 2400-2483.5 MHz)
- $\leq 10 \text{ mW/MHz}$ (OFDM 26MHz $\leq$ OBW $\leq$ 38MHz)
- $\leq 10 \text{ mW}$ (other from 2400-2483.5 MHz)

The Output Power Tolerance must be within +20%, -80%.

E.i.r.p:

- $\leq 12.14 \text{ dBm/MHz}$ (OFDM, DS from 2400-2483.5 MHz)

Note: E.I.R.P will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

TEST CONFIGURATION



TEST PROCEDURE

Step 1:

Connect the UUT to the spectrum analyzer as TEST CONFIGURATION and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz
- VBW: 1 MHz
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak
- Trace Mode: Max Hold

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyzer:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 0 MHz
- RBW: 1 MHz
- VBW: 1 MHz
- Detector: RMS
- Trace Mode: Clear Write

TEST RESULTS

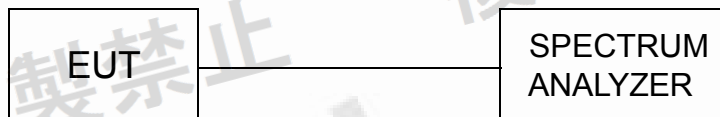
Mode	Channel (MHz)	Average burst power(dBm)	Output power (mW/MHz)	Limit (mW/MHz)	Rated output power (mW/MHz)	Tolerance (%)	Limit	Result
802.11b	2412	6.447	4.4127	10.00	10.00	-55.87%	-80%~20%	Pass
	2442	7.064	5.0863	10.00	10.00	-49.14%		
	2472	6.979	4.9877	10.00	10.00	-50.12%		
802.11g	2412	8.265	6.7066	10.00	10.00	-32.93%		
	2442	9.640	9.2045	10.00	10.00	-7.96%		
	2472	8.277	6.7251	10.00	10.00	-32.75%		
802.11n(HT20)	2412	8.365	6.8628	10.00	10.00	-31.37%		
	2442	8.919	7.7965	10.00	10.00	-22.03%		
	2472	8.168	6.5584	10.00	10.00	-34.42%		
802.11n(HT40)	2422	0.230	1.0544	5.00	5.00	-78.91%		
	2442	0.530	1.1298	5.00	5.00	-77.40%		
	2462	0.431	1.1043	5.00	5.00	-77.91%		

3.3. OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH

LIMIT

- Occupied bandwidth: FH≤83.5 MHz; OFDM≤38 MHz; DS≤26 MHz; Others≤26 MHz
- Spread Bandwidth:≥ 500 kHz(FH,DS)
- Spread factor>5.

TEST CONFIGURATION



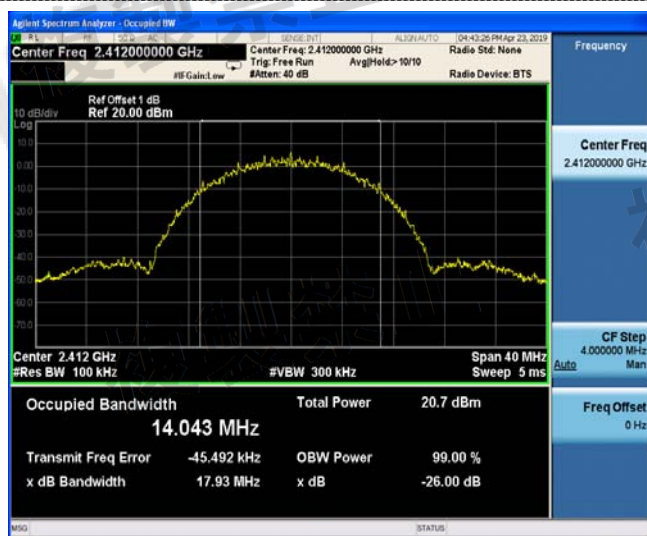
TEST PROCEDURE

1. Setting of SA is following as follow:
 RBW: 300 kHz
 VB: 300 kHz
 Sweep time: Auto
 Sweep Mode: Continuous sweep
 Detect mode: Positive peak
 Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.
3. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 90% of occupied bandwidth to measure spread bandwidth.
4. Spread Factor=Spread Bandwidth/modulation rate. The modulation rate: MR=1.375Mbps for 802.11b

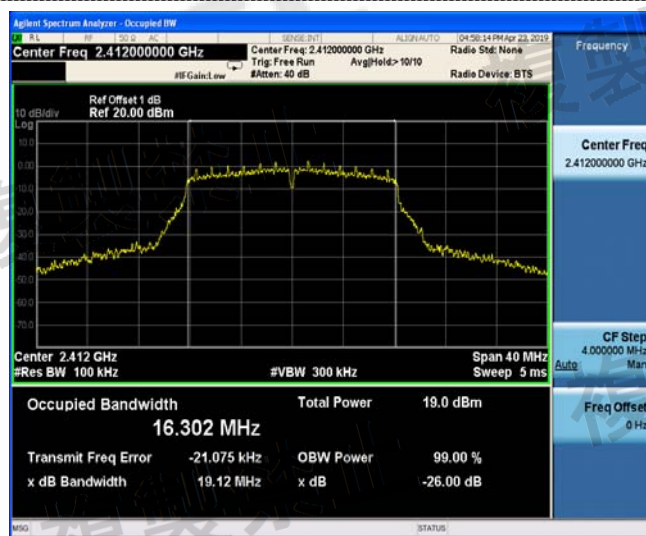
TEST RESULTS

Type	Channel (MHz)	Occupy Bandwidth (MHz)	Limit (MHz)	Result
802.11b	2412	14.403	<26	Pass
	2442	14.034		
	2472	14.027		
802.11g	2412	16.302		
	2442	16.302		
	2472	16.313		
802.11n(HT20)	2412	17.497		
	2442	17.490		
	2472	17.487		
802.11n(HT40)	2422	35.768	<38	
	2442	35.756		
	2462	35.756		

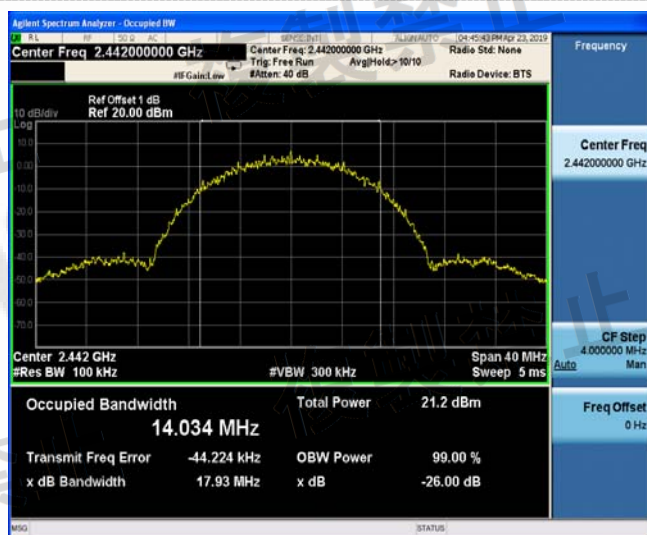
802.11b



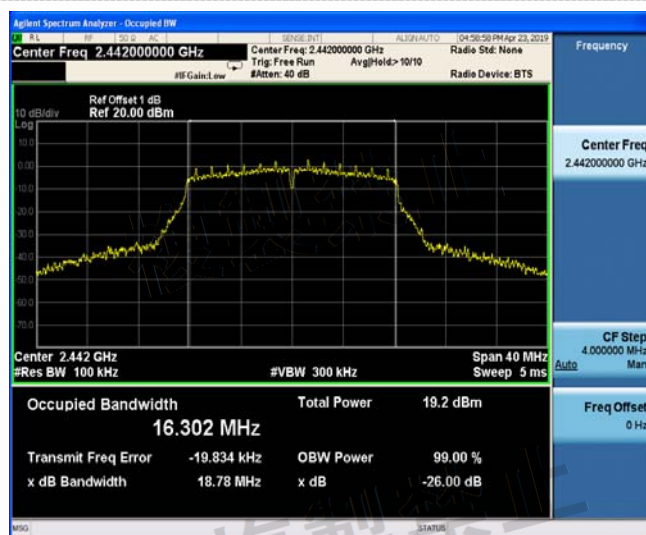
802.11g



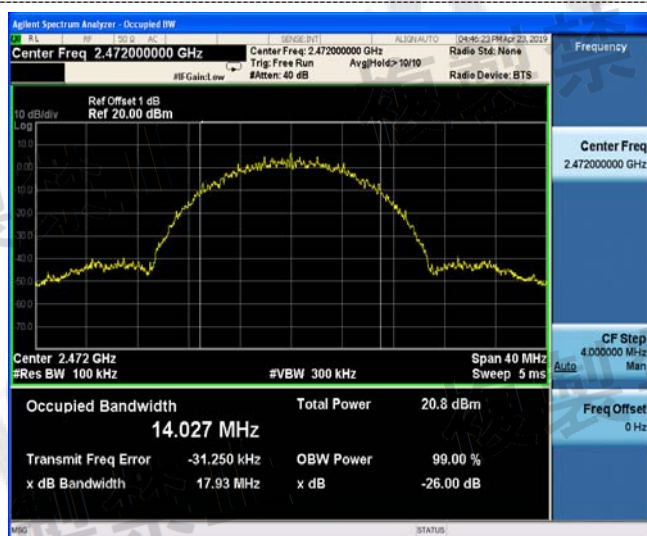
2412MHz



2412MHz



2442MHz



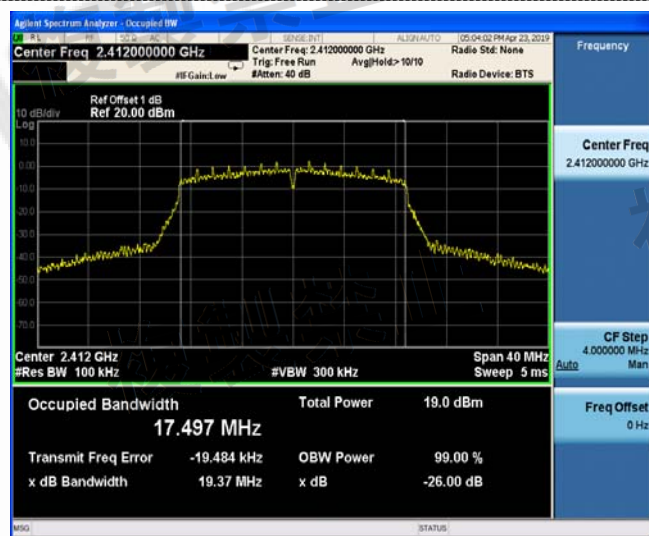
2442MHz



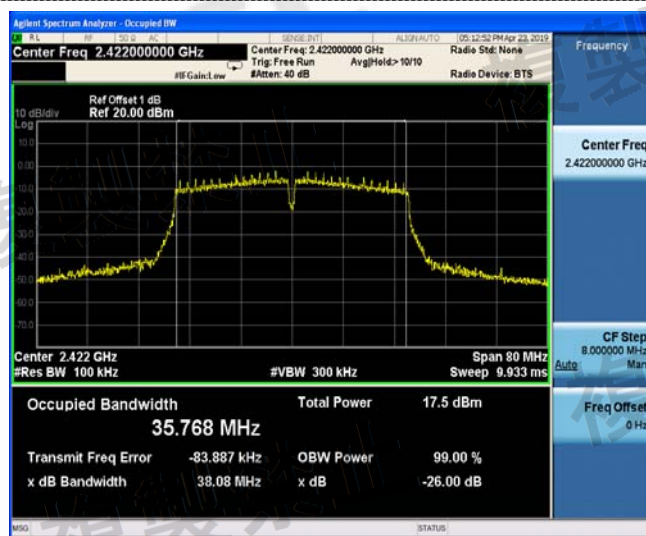
2472MHz

2472MHz

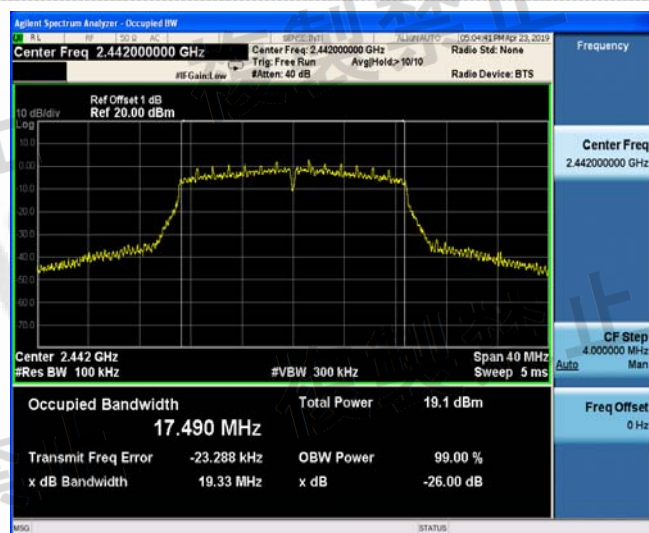
802.11n(HT20)



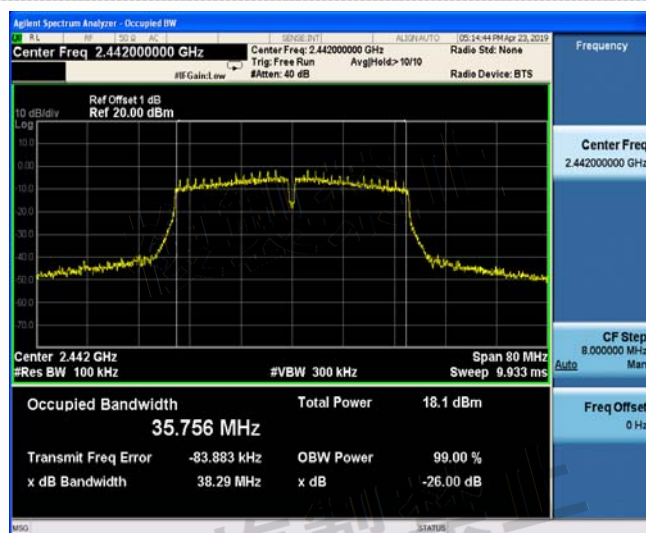
802.11n(HT40)



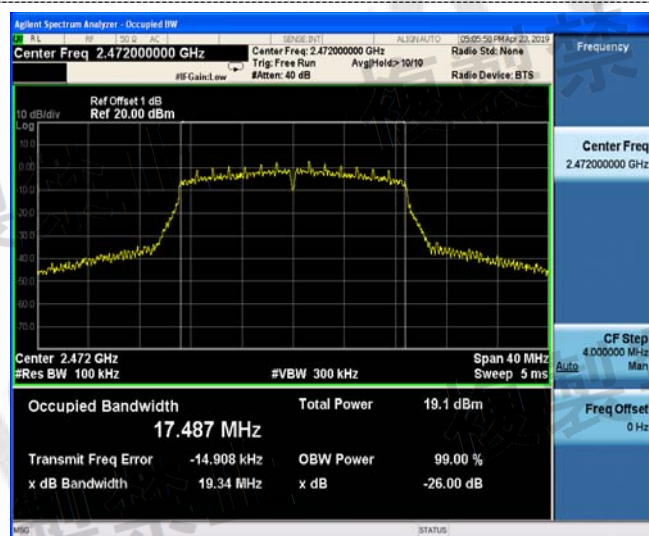
2412MHz



2422MHz



2442MHz



2442MHz



2472MHz

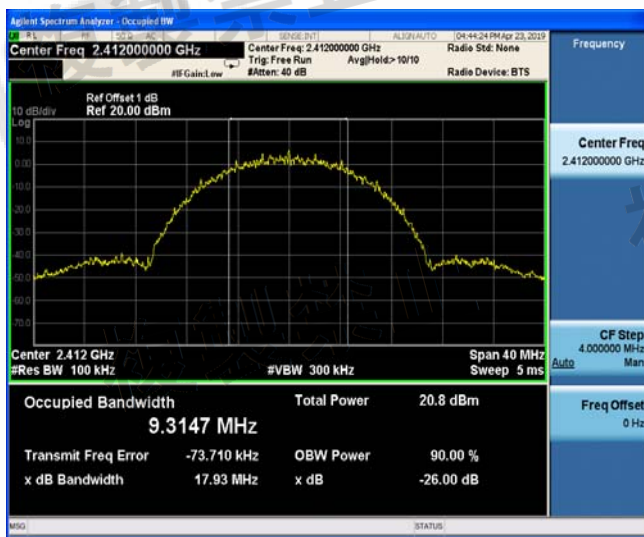
2462MHz

Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
802.11b	2412	9.3147	6.77	>0.5	>5	Pass
	2442	9.2817	6.75			
	2472	9.2861	6.75			
802.11g	2412	13.847	N/A		N/A	
	2442	13.857				
	2472	13.842				
802.11n(HT20)	2412	14.695	N/A		N/A	
	2442	14.692				
	2472	14.644				
802.11n(HT40)	2422	30.201	N/A		N/A	
	2442	30.233				
	2462	30.228				

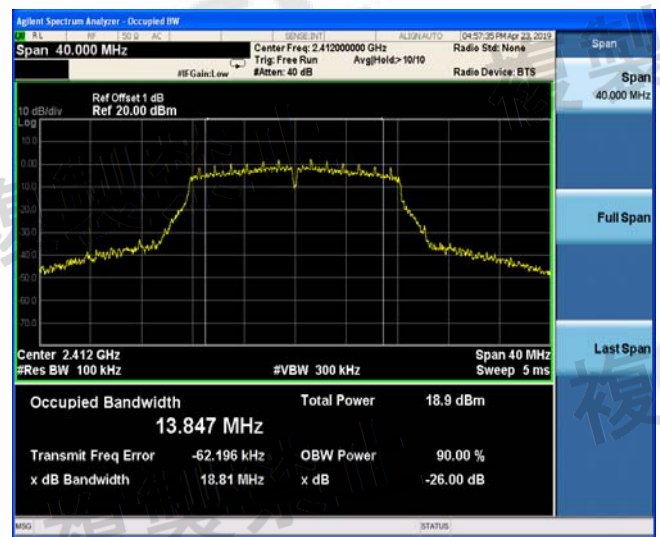
Note:

1. Spread Factor=Spread Bandwidth/modulation rate. The modulation rate: MR=1.375Mbps for 802.11b
2. N/A means not applicable to this modulation type.

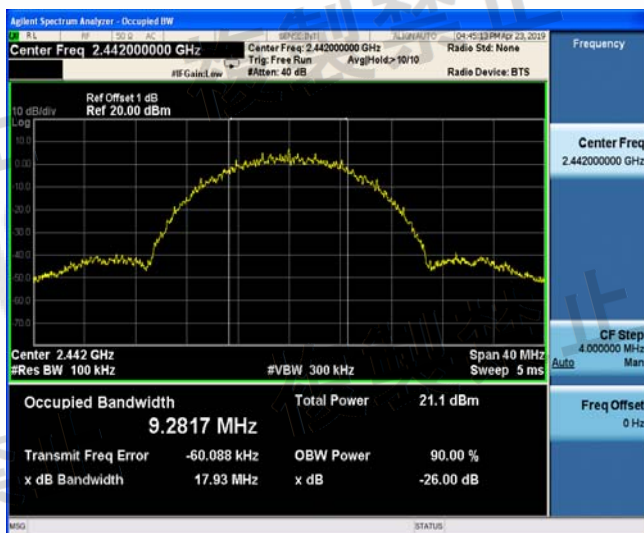
802.11b



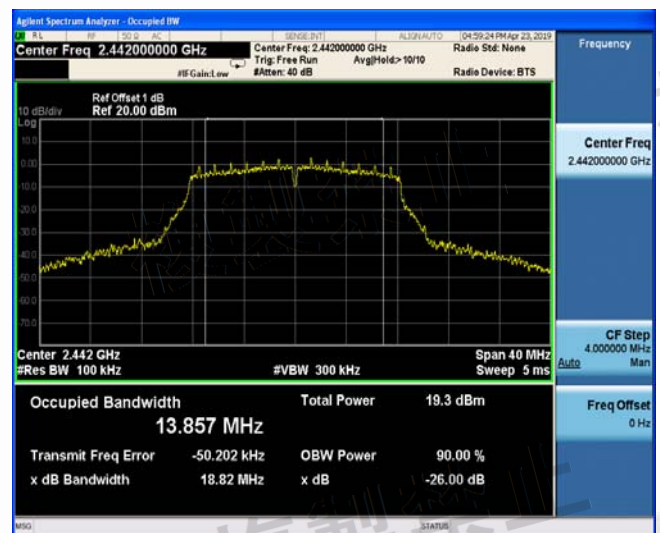
802.11g



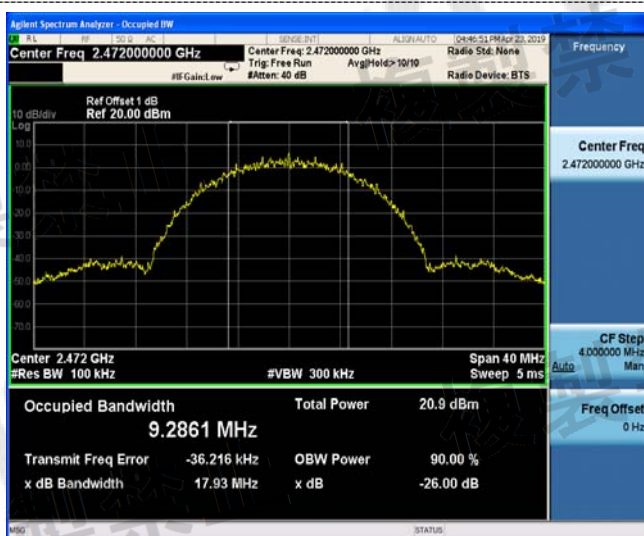
2412MHz



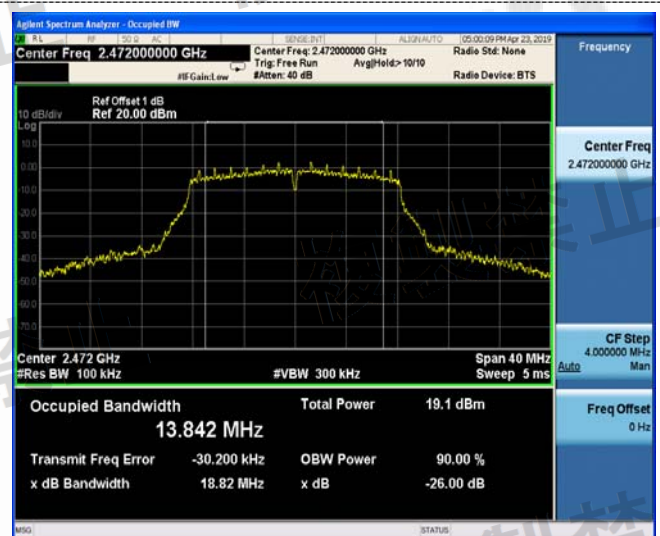
2412MHz



2442MHz



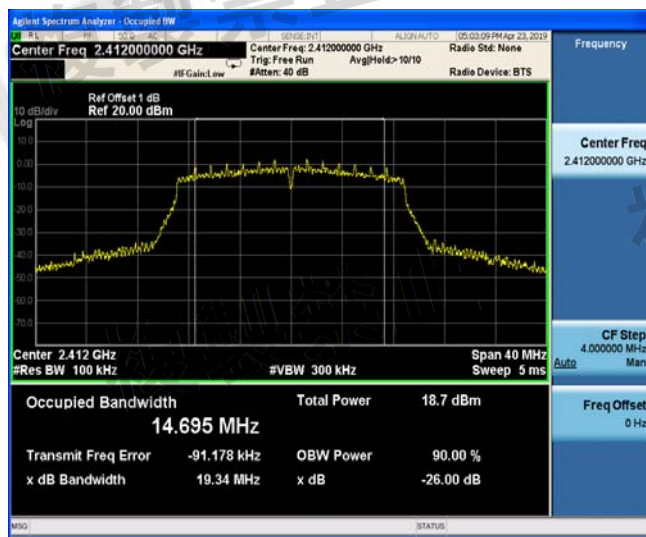
2442MHz



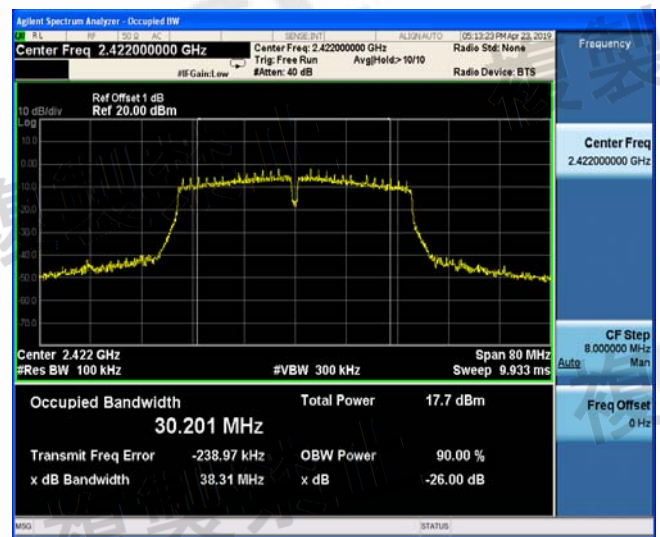
2472MHz

2472MHz

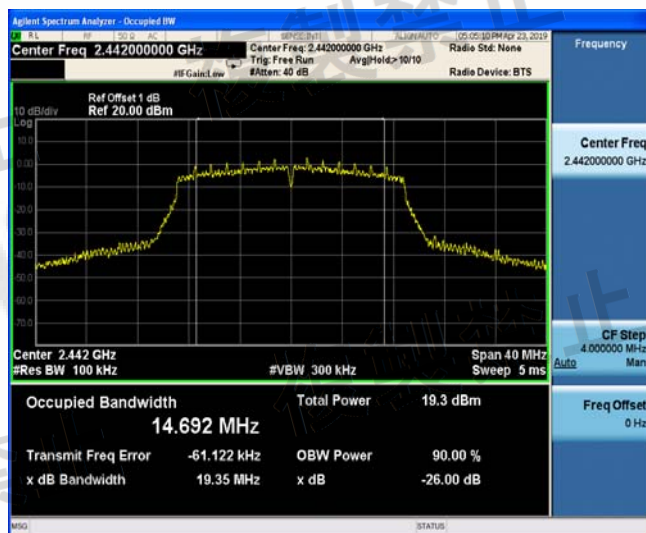
802.11n(HT20)



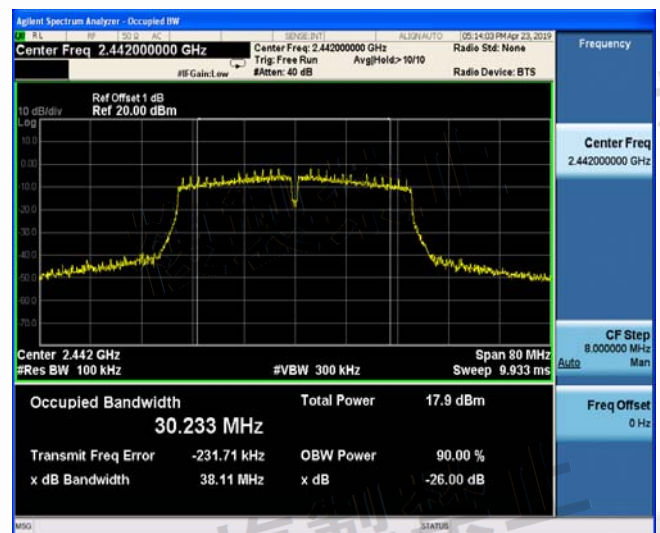
802.11n(HT40)



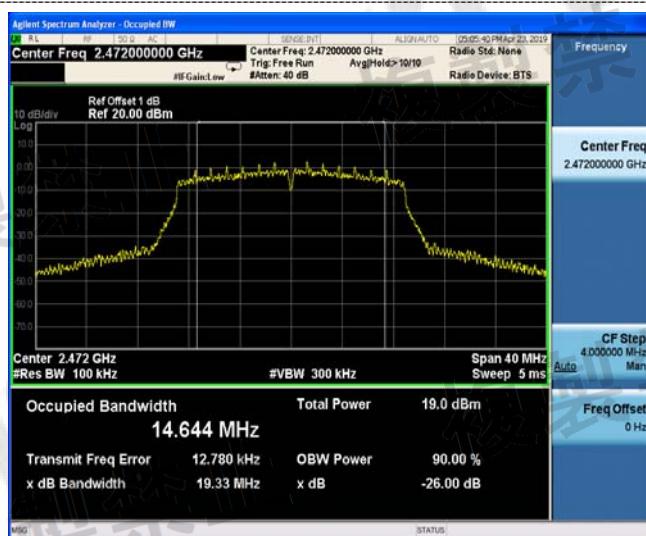
2412MHz



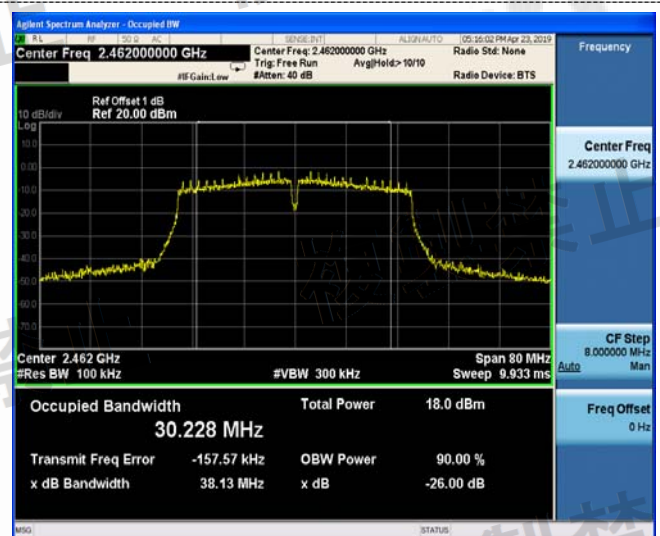
2422MHz



2442MHz



2442MHz



2472MHz

2462MHz

3.4. Unwanted Emission Strength

LIMIT

Below 2387 MHz: 2.5 μ W/MHz or less

2387 to 2400 MHz: 25 μ W/MHz or less

2483.5 Through 2496.5 MHz: 25 μ W/MHz or less

Over 2496.5 MHz: 2.5 μ W/MHz or less

TEST CONFIGURATION



TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

Frequency: 30MHz-13GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

Sweep time: Auto

Detector mode: Positive peak

Indication mode: max hold

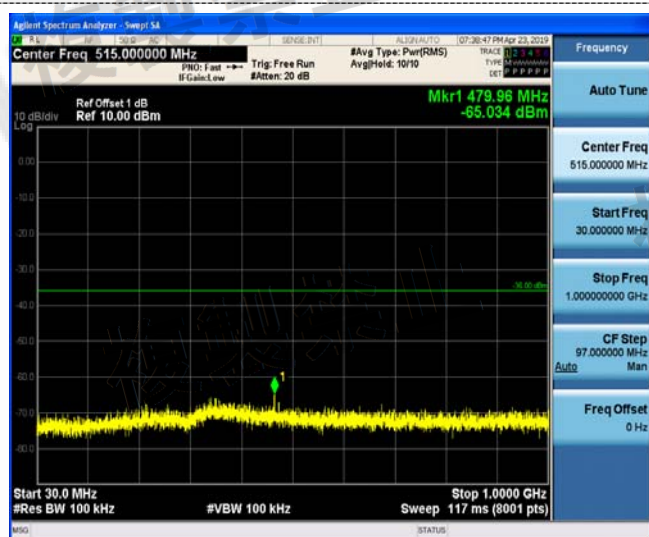
TEST RESULTS

Test mode:

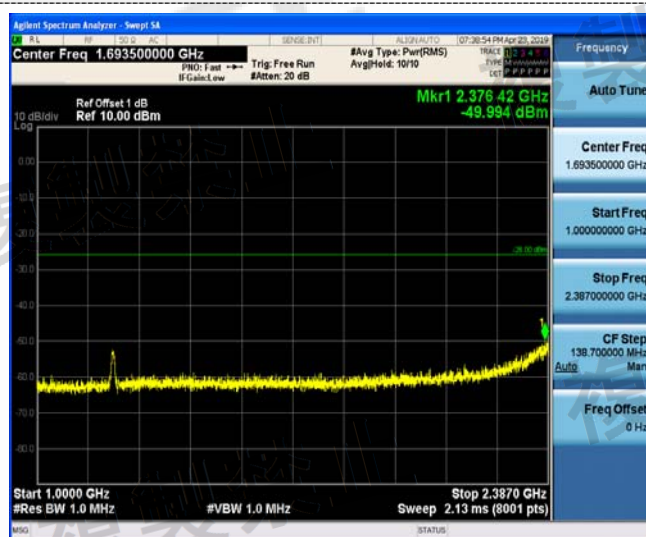
802.11b

Test channel:

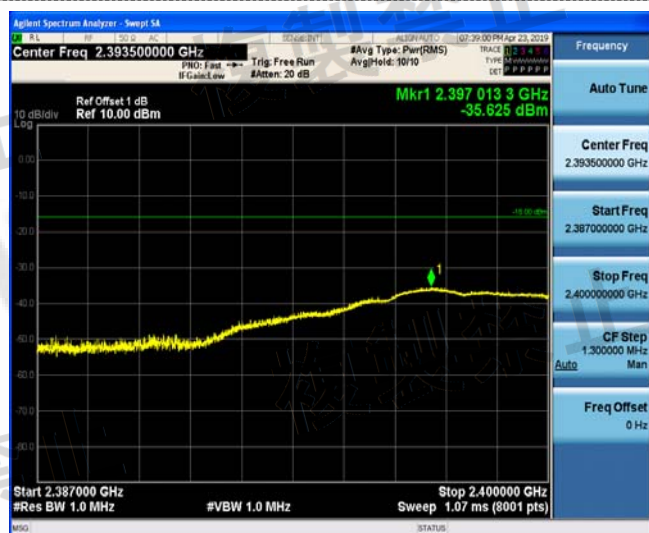
2412MHz



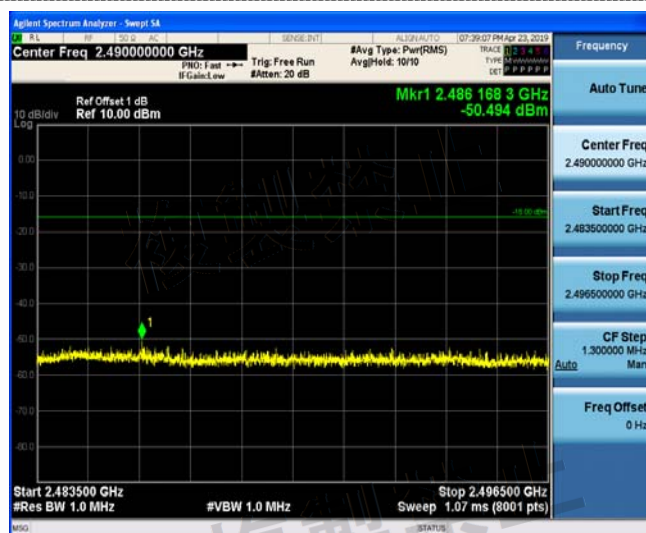
30MHz~1GHz



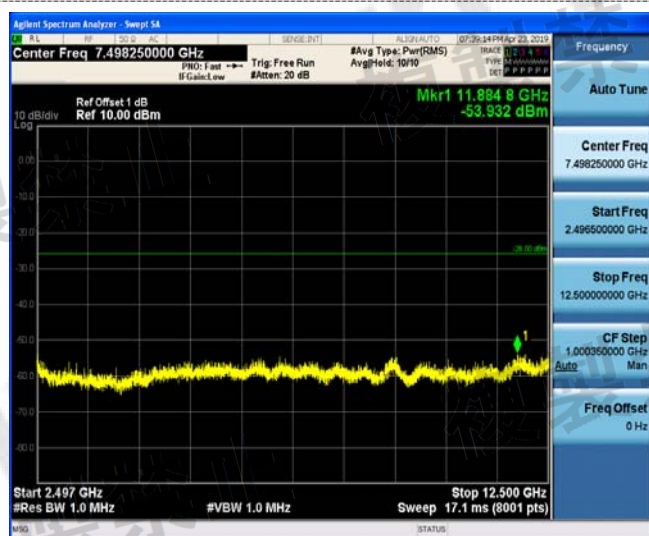
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz



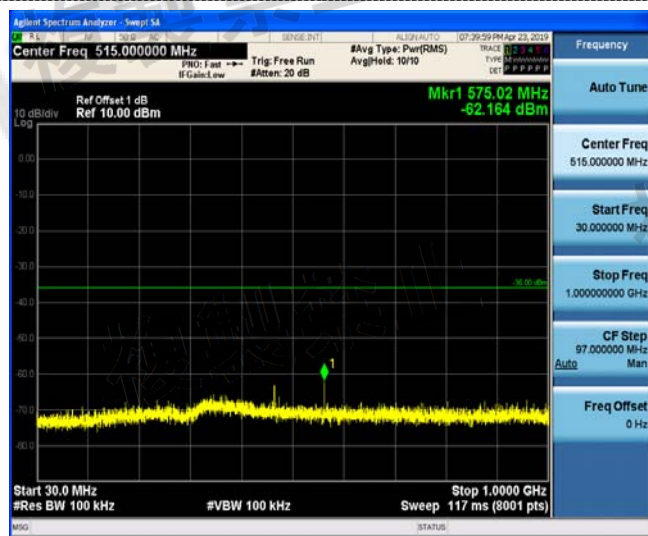
2.4965GHz~12.5GHz

Test mode:

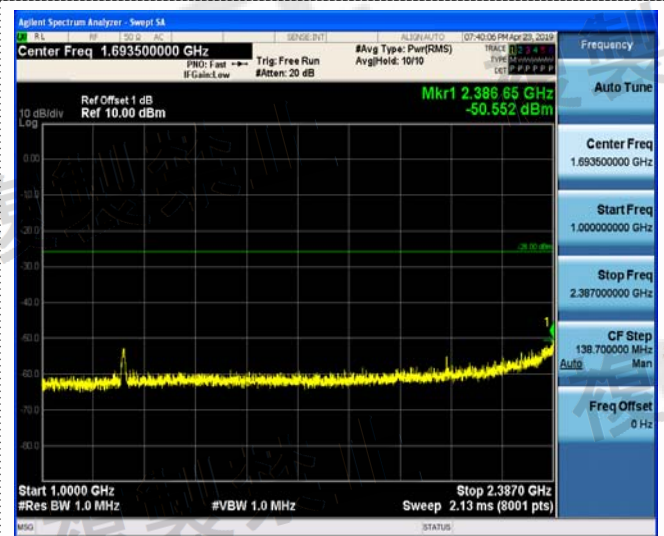
802.11b

Test channel:

2442MHz



30MHz~1GHz



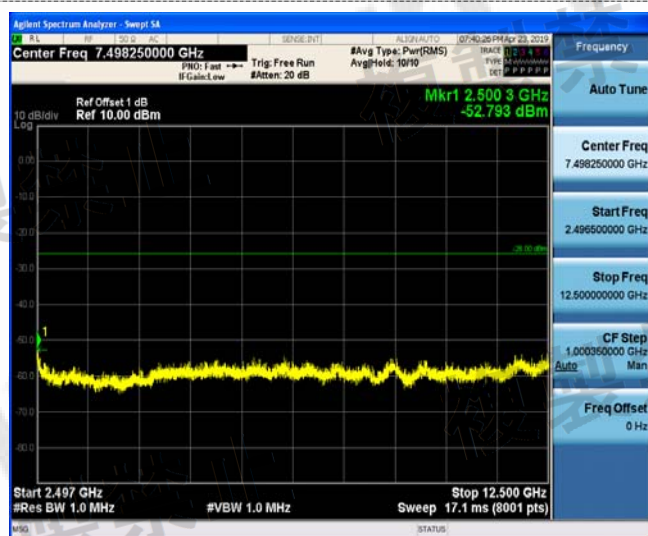
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz



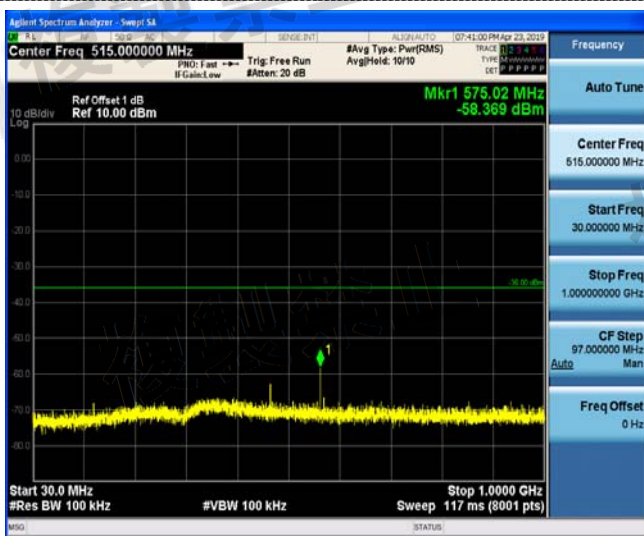
2.4965GHz~12.5GHz

Test mode:

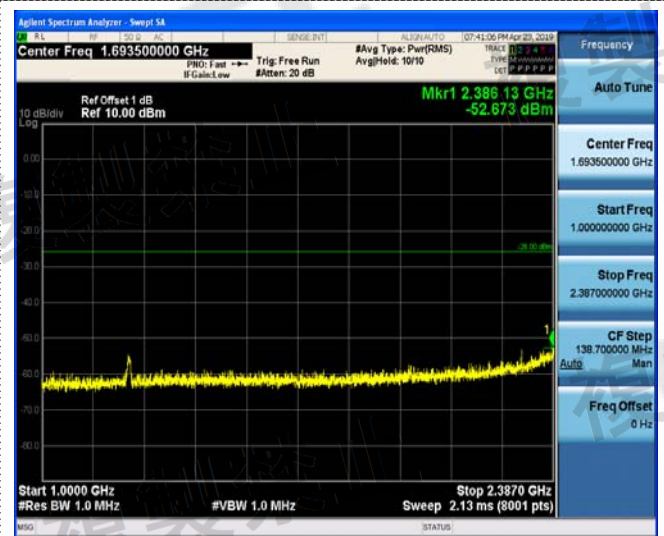
802.11b

Test channel:

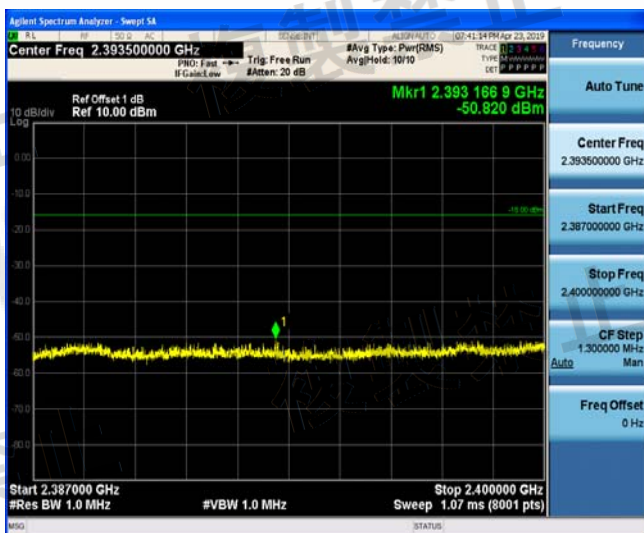
2472MHz



30MHz~1GHz



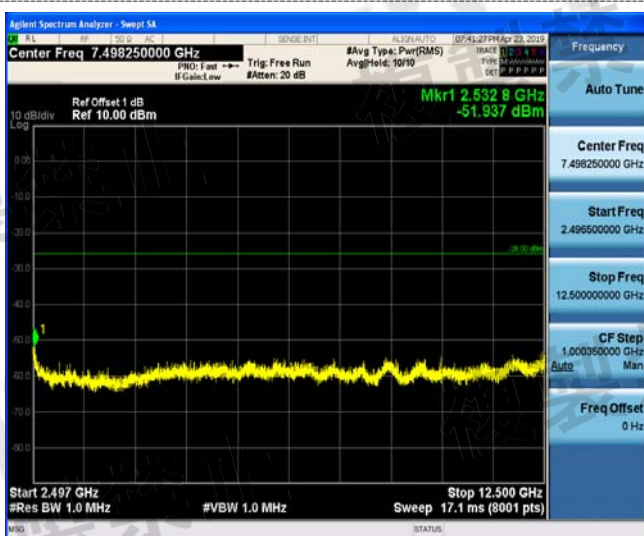
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz



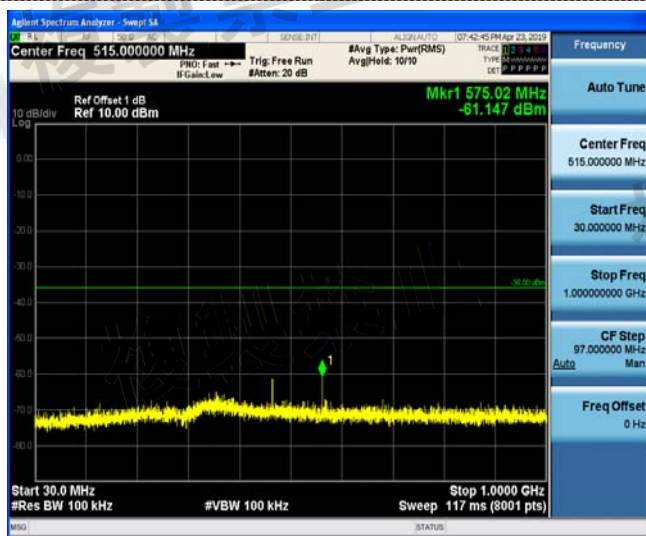
2.4965GHz~12.5GHz

Test mode:

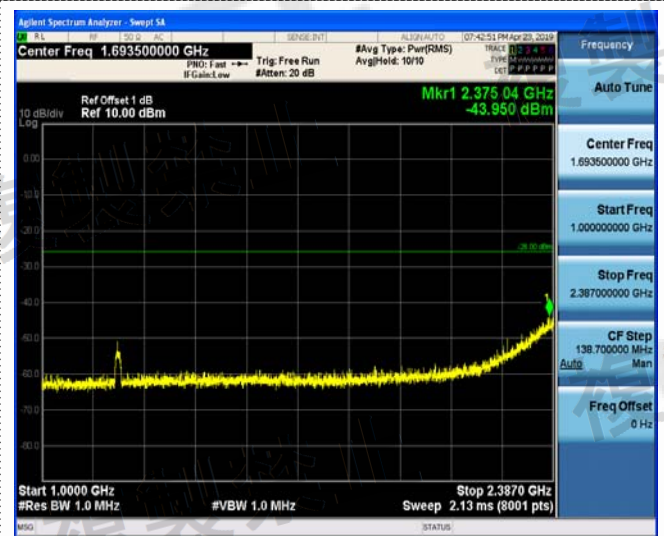
802.11g

Test channel:

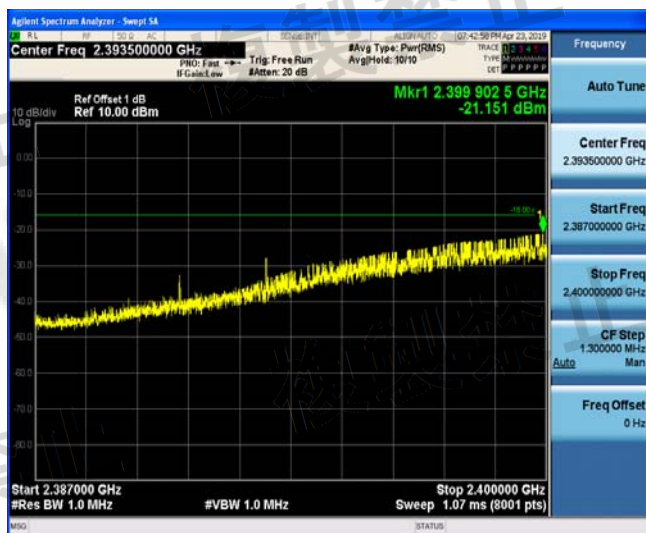
2412MHz



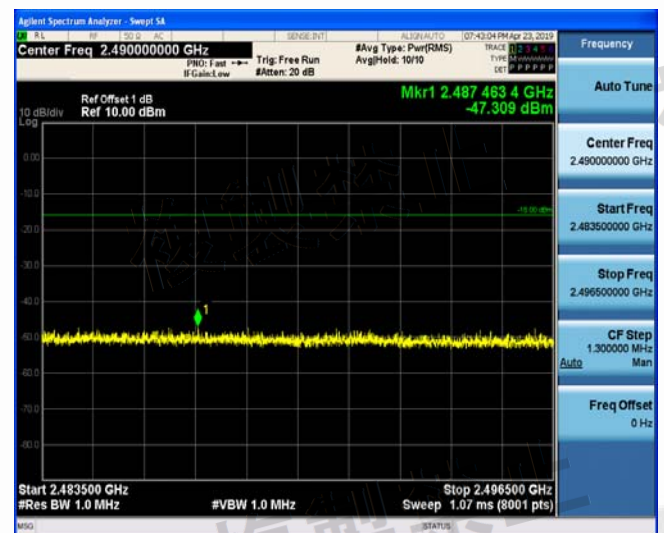
30MHz~1GHz



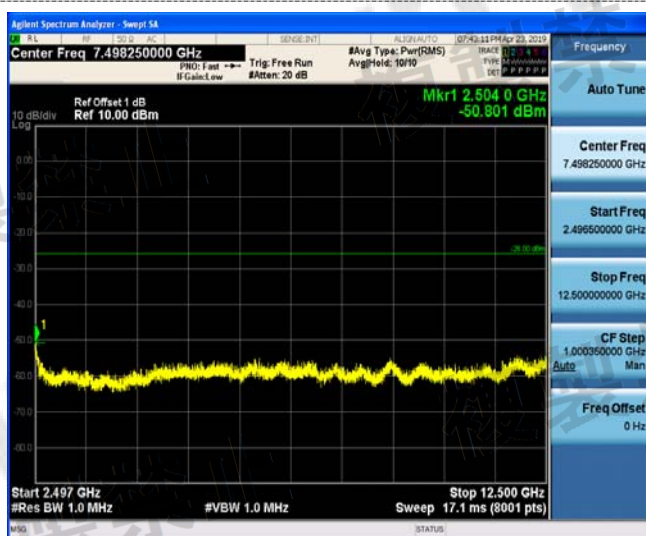
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz



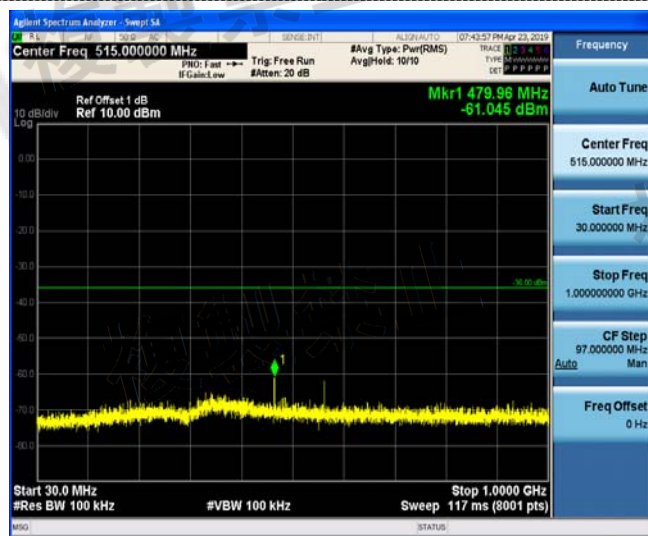
2.4965GHz~12.5GHz

Test mode:

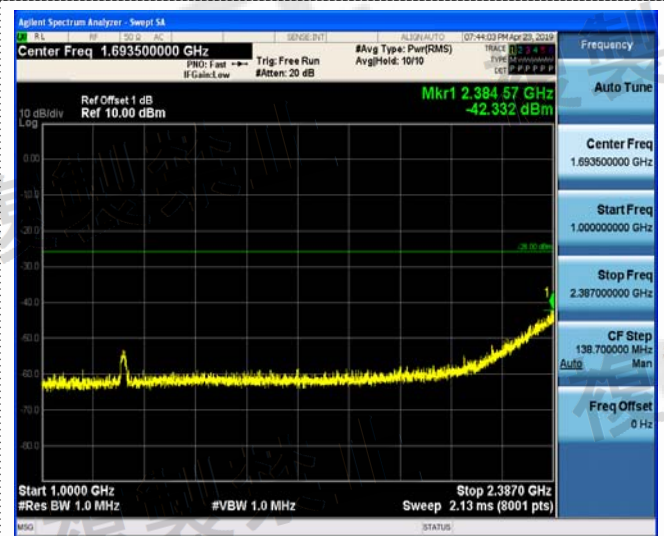
802.11g

Test channel:

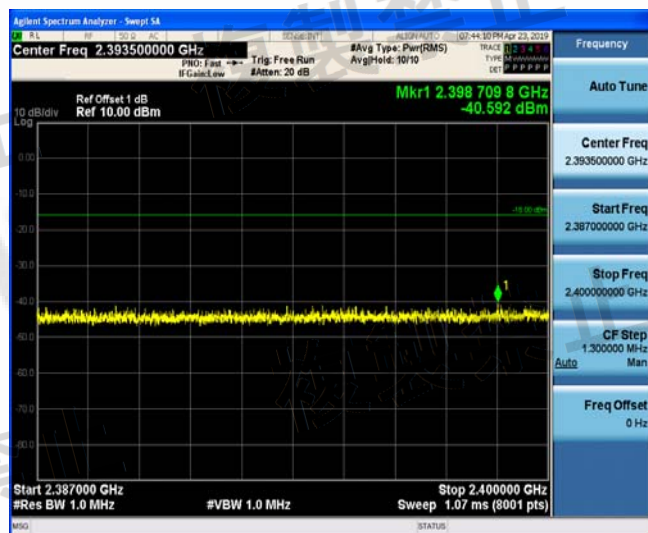
2442MHz



30MHz~1GHz



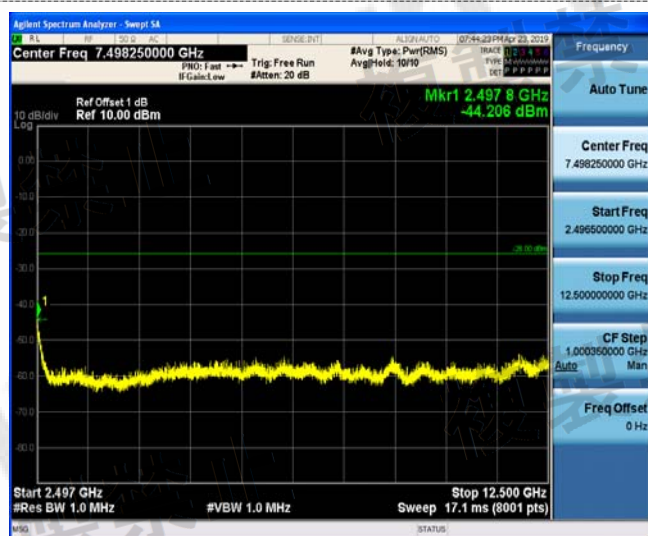
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz



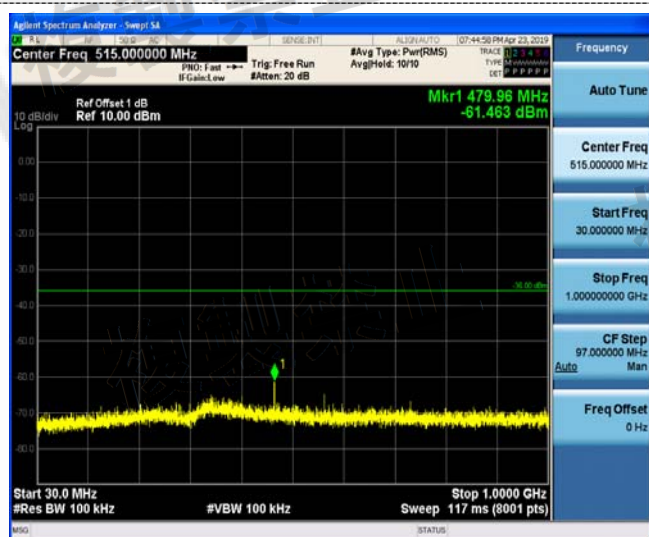
2.4965GHz~12.5GHz

Test mode:

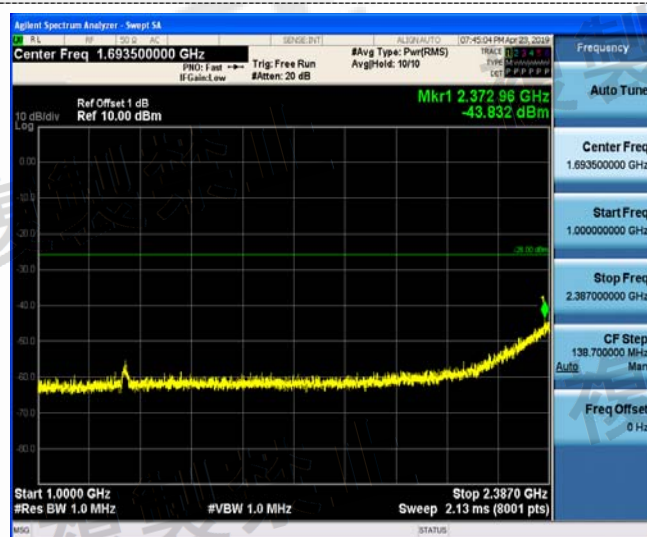
802.11g

Test channel:

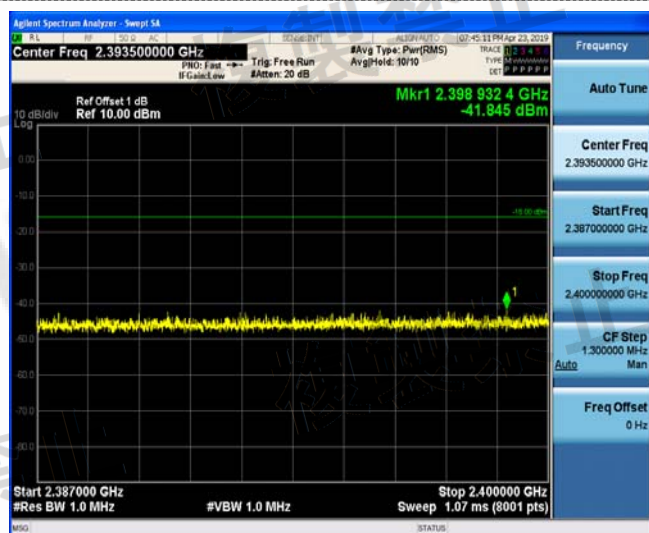
2472MHz



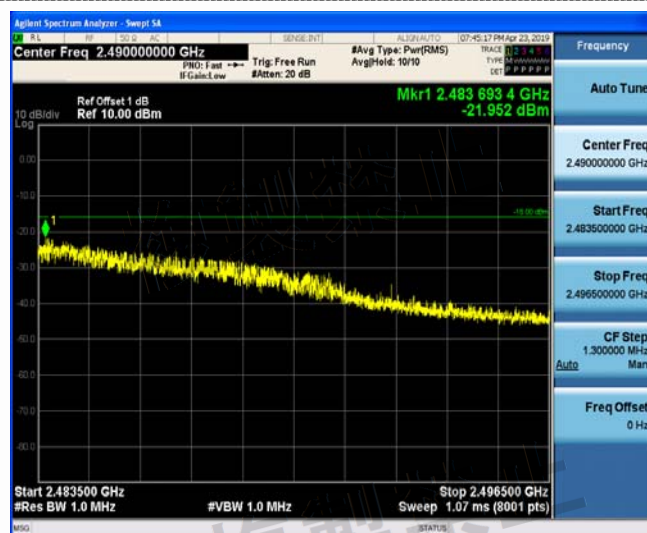
30MHz~1GHz



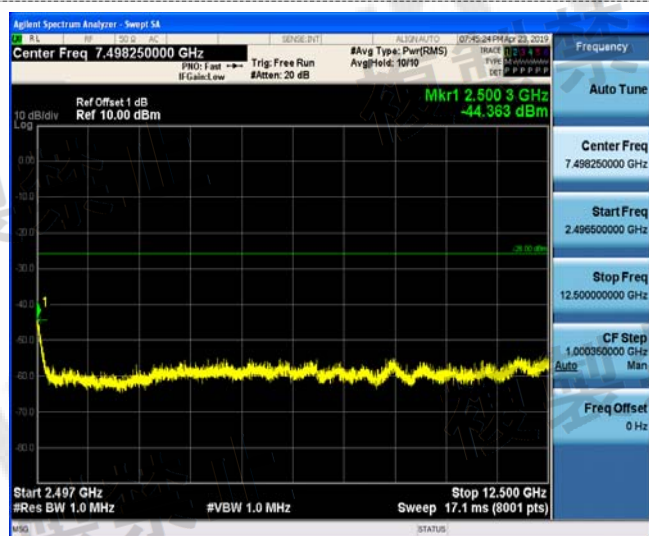
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz

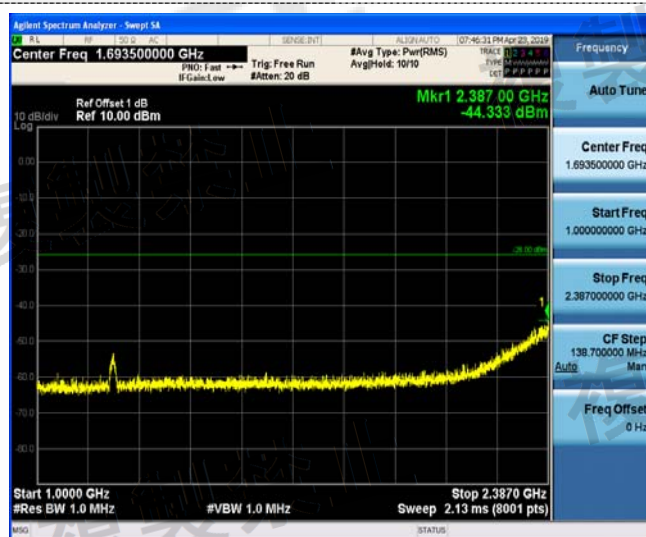
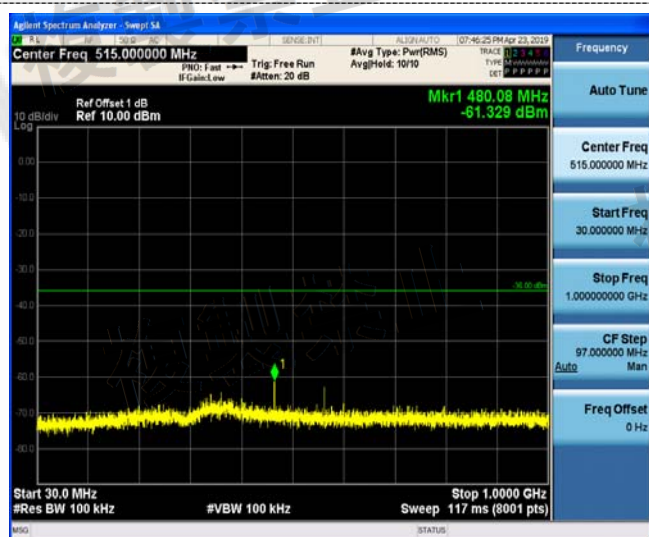


2.4965GHz~12.5GHz

Test mode: 802.11n(HT20)

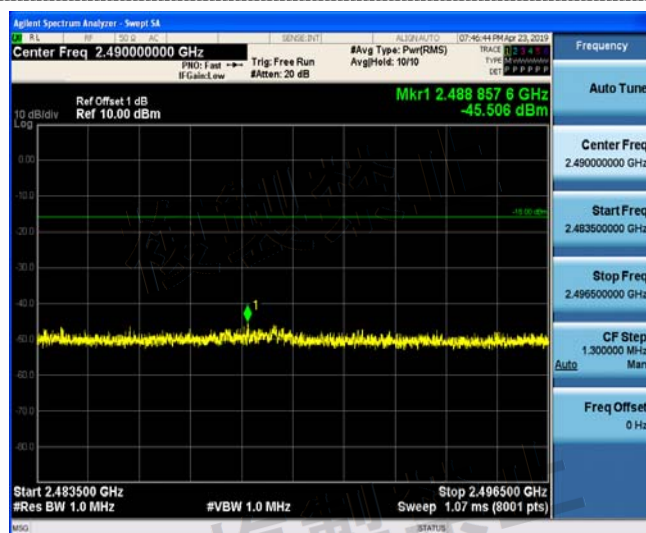
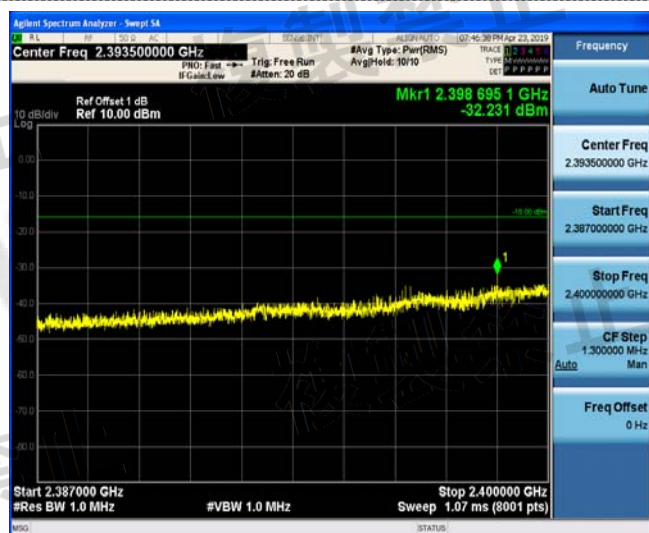
Test channel:

2412MHz



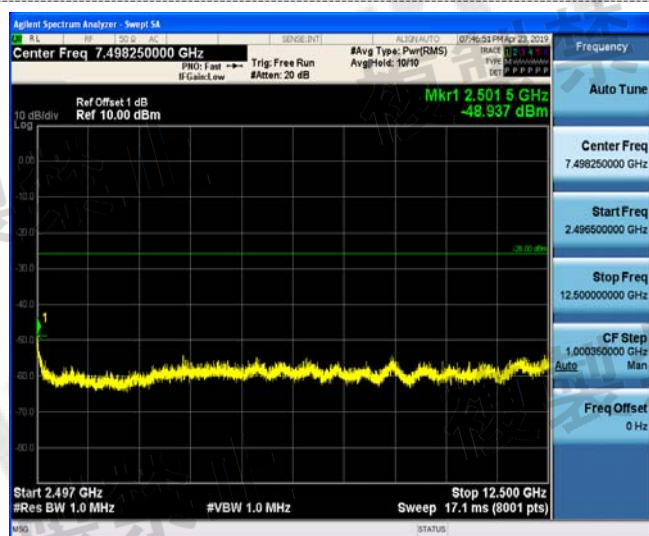
30MHz~1GHz

1GHz~2.387GHz



2.387GHz~2.4 GHz

2.4835GHz~2.4965GHz

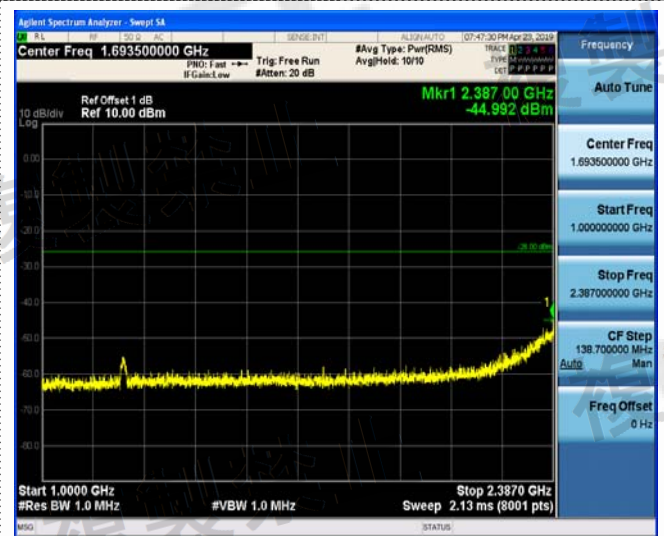
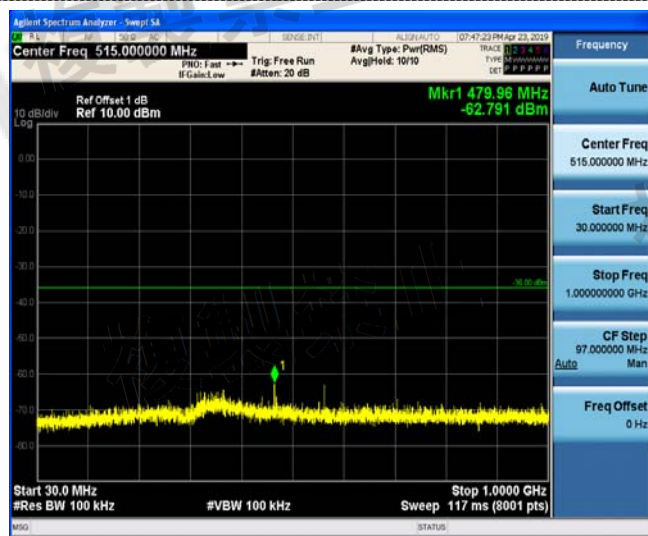


2.4965GHz~12.5GHz

Test mode: 802.11n(HT20)

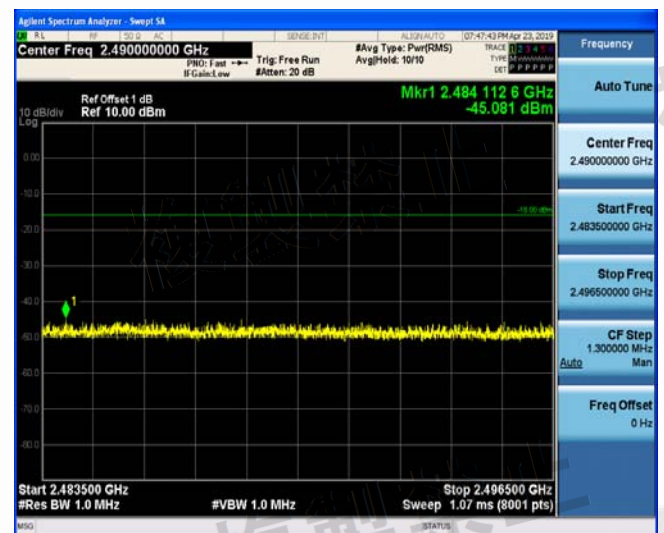
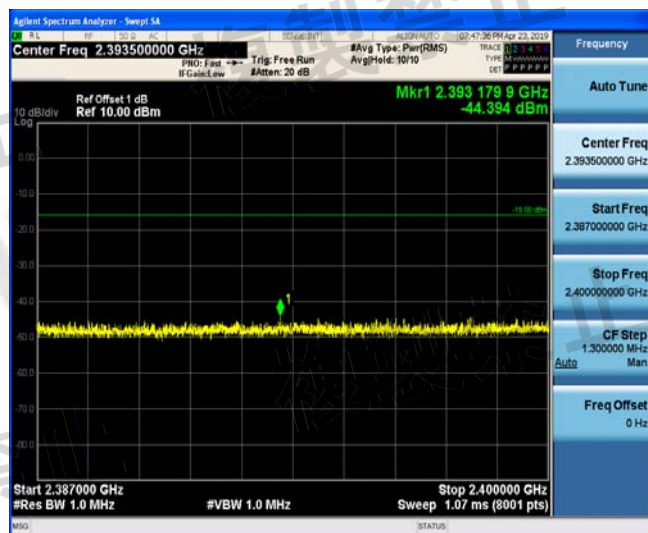
Test channel:

2442MHz



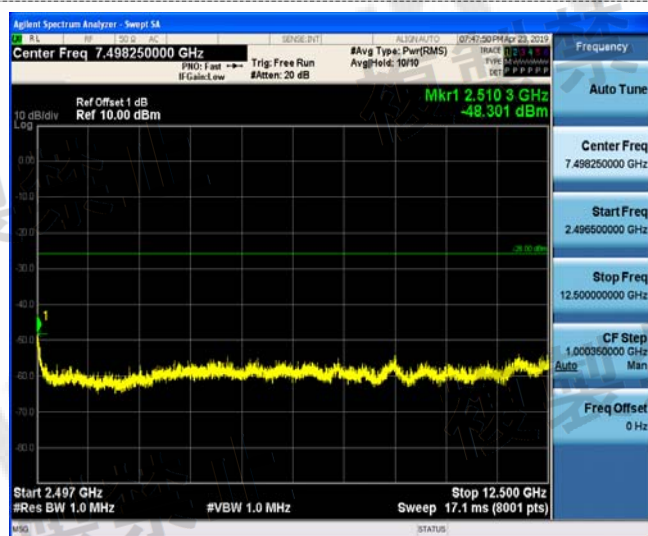
30MHz~1GHz

1GHz~2.387GHz



2.387GHz~2.4 GHz

2.4835GHz~2.4965GHz



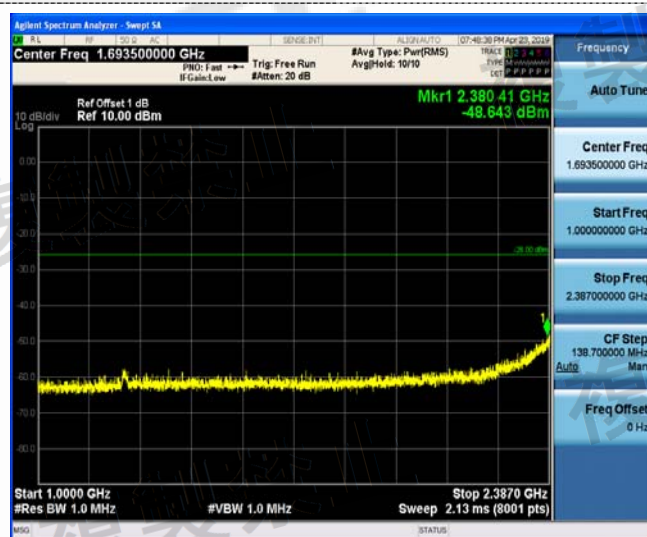
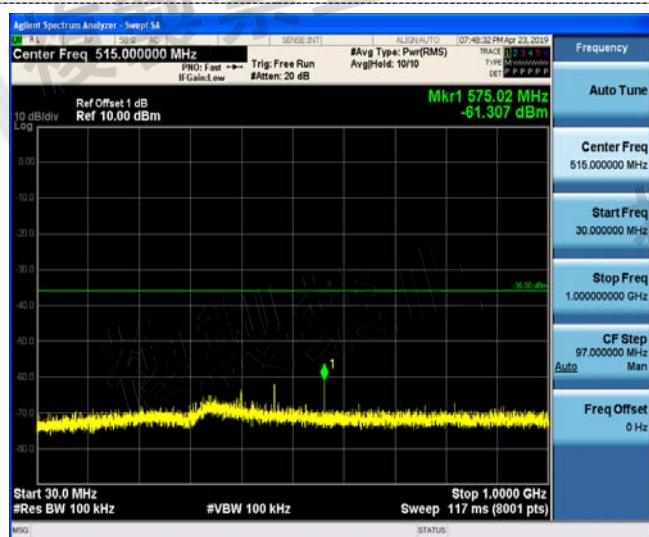
2.4965GHz~12.5GHz

Test mode:

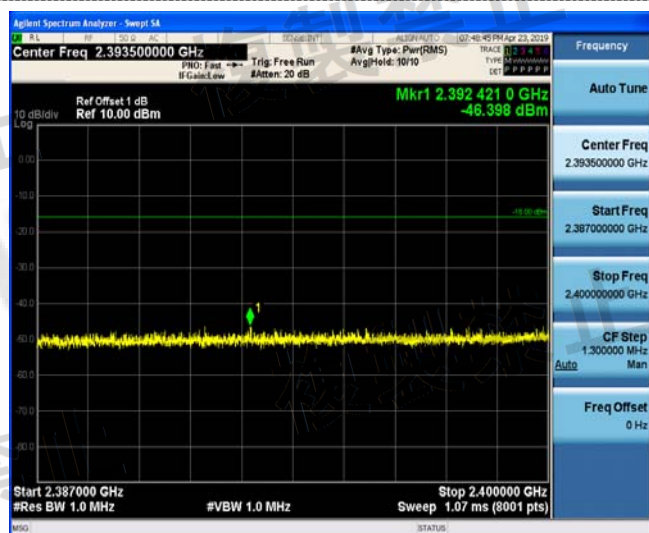
802.11n(HT20)

Test channel:

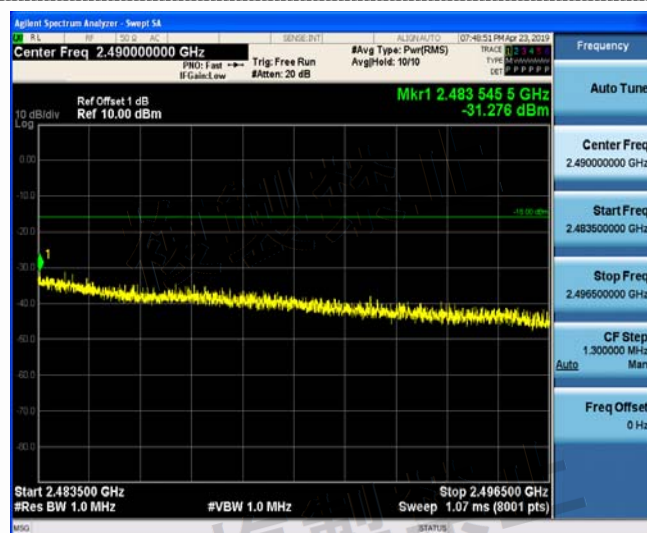
2472MHz



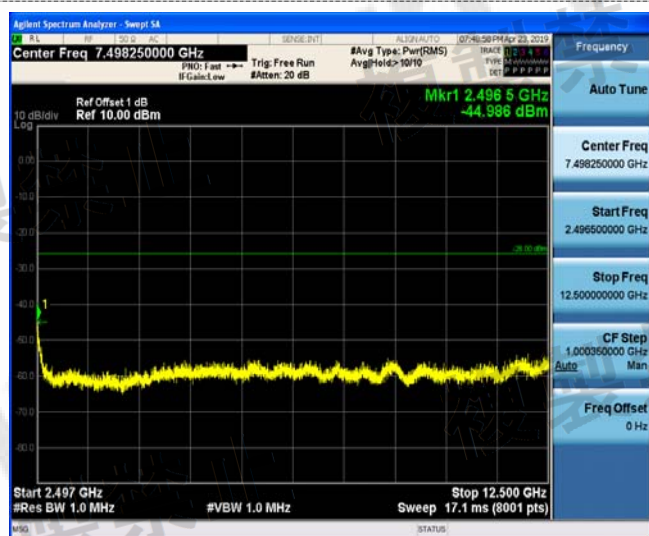
30MHz~1GHz



1GHz~2.387GHz

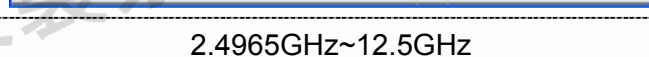


2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz

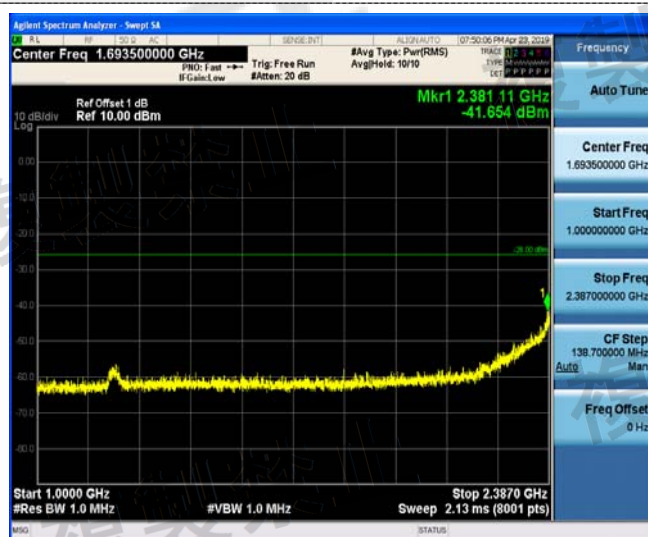
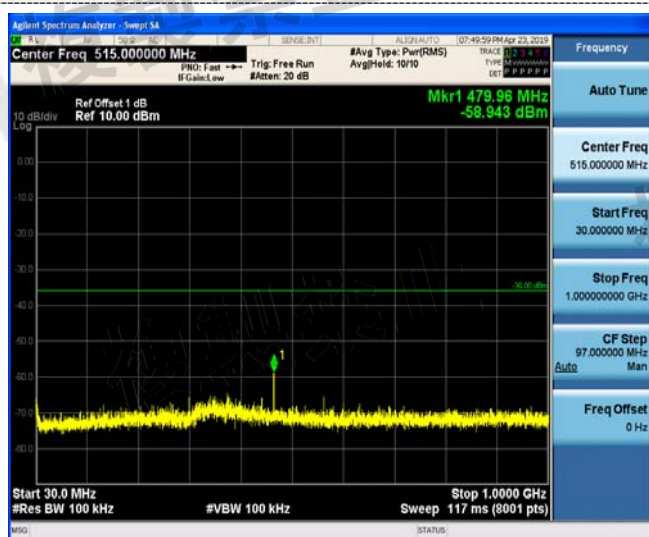
2.4965GHz~12.5GHz



Test mode: 802.11n(HT40)

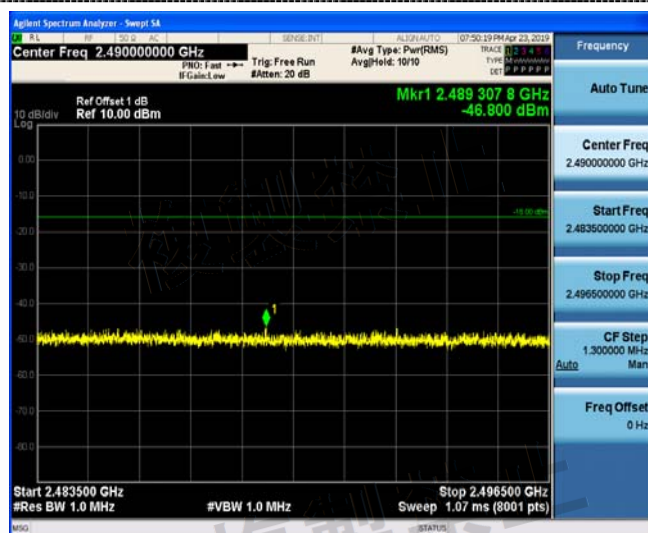
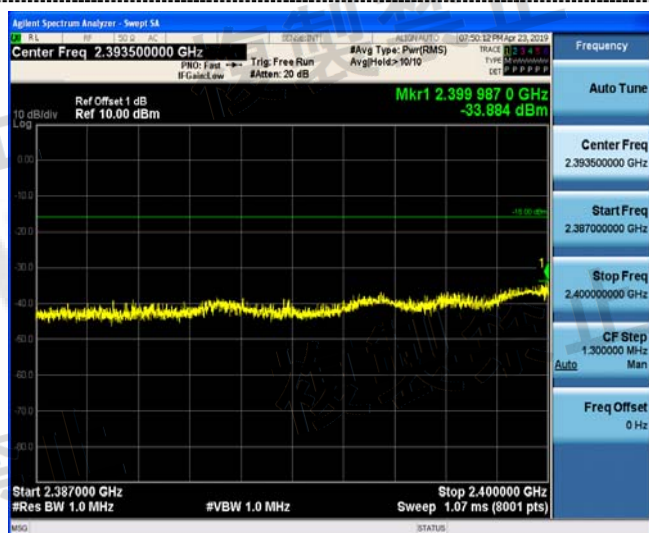
Test channel:

2422MHz



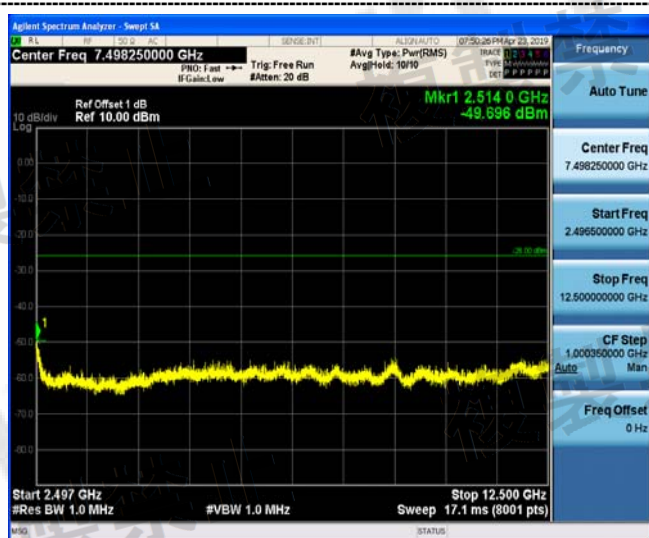
30MHz~1GHz

1GHz~2.387GHz



2.387GHz~2.4 GHz

2.4835GHz~2.4965GHz

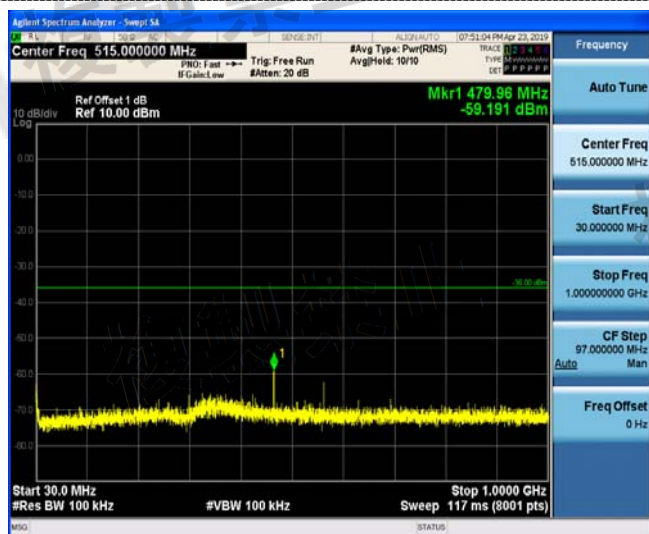


2.4965GHz~12.5GHz

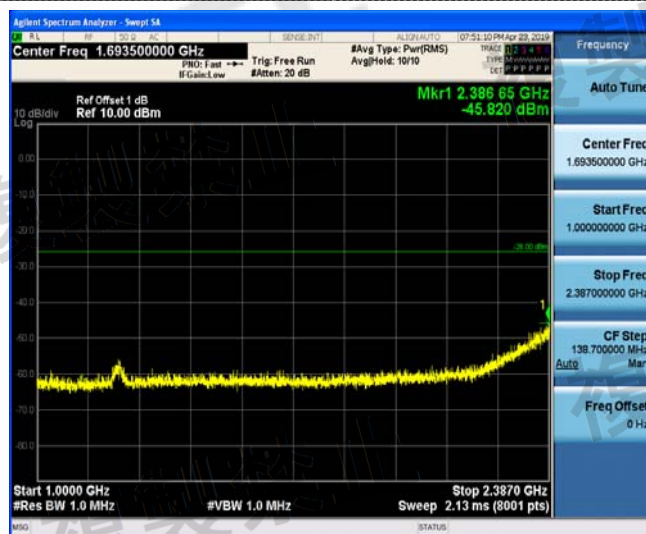
Test mode: 802.11n(HT40)

Test channel:

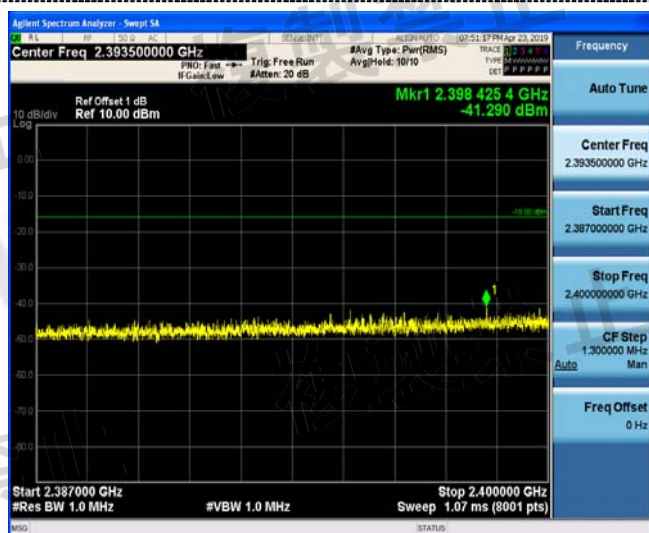
2442MHz



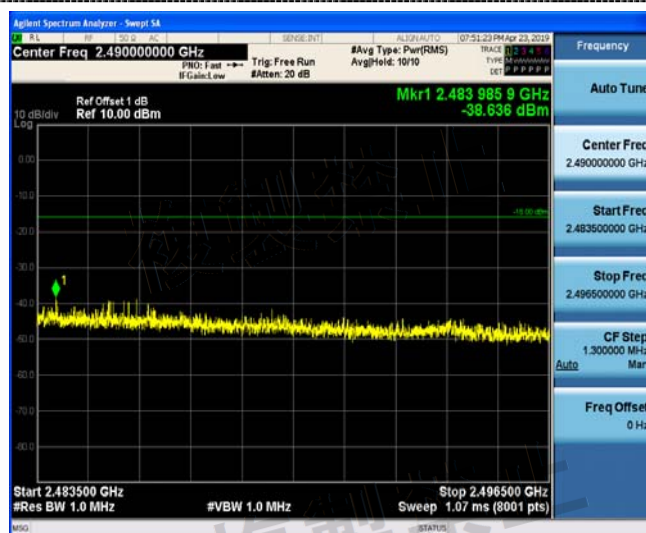
30MHz~1GHz



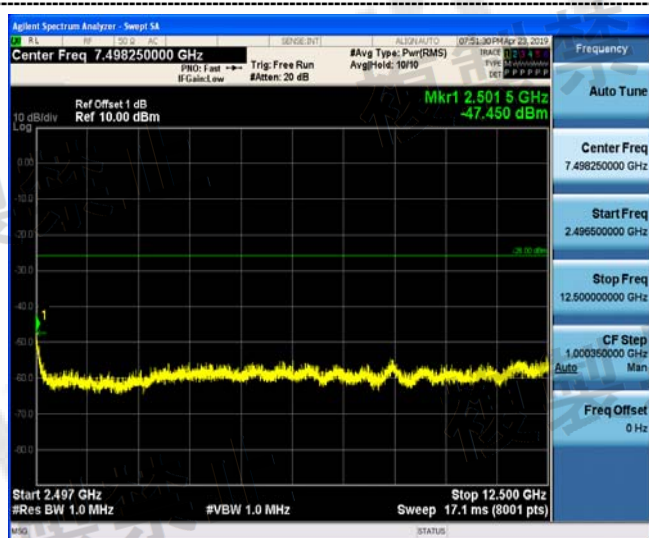
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz

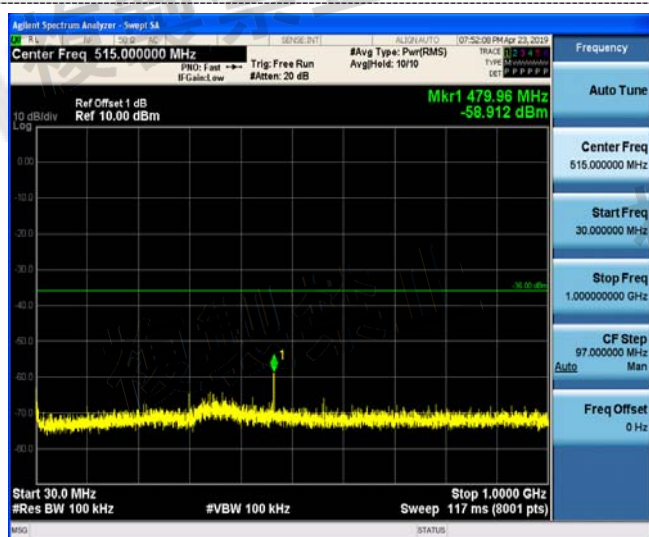


2.4965GHz~12.5GHz

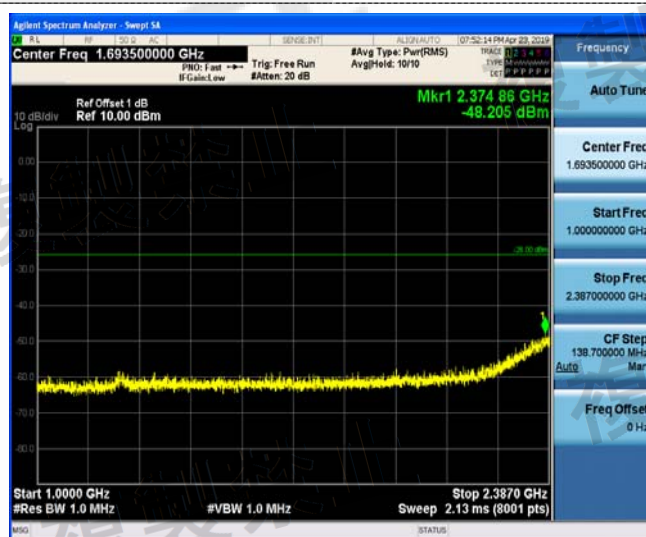
Test mode: 802.11n(HT40)

Test channel:

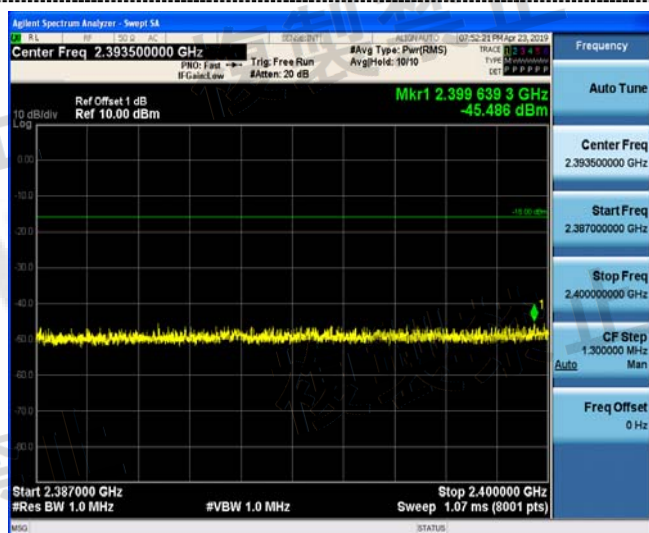
2462MHz



30MHz~1GHz



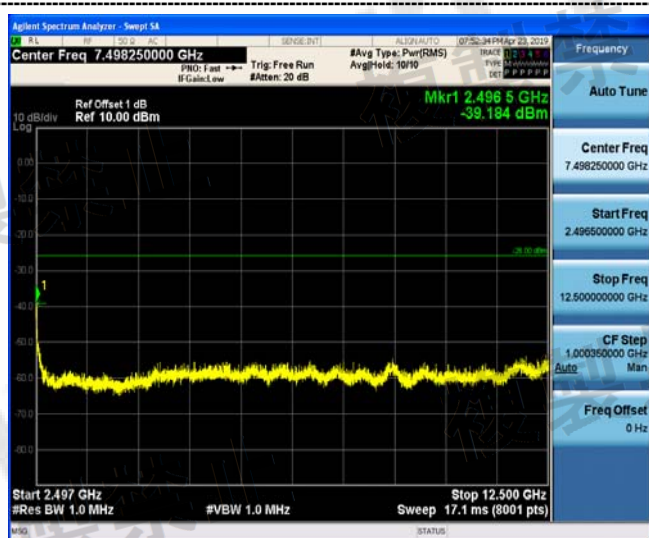
1GHz~2.387GHz



2.387GHz~2.4 GHz



2.4835GHz~2.4965GHz



2.4965GHz~12.5GHz