

2.4 GHz Wideband Low Power Data Communication System Test Report

Product Name : Wireless-AC2200 Tri Band Gigabit Router

Trade Name : ASUS

Model No. : Lyra Voice

Applicant : ASUSTeK COMPUTER INC.

Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt : Jun. 24, 2018

Issued Date : Dec. 12, 2018

Report No. : 1860341R-RFJPP21V00

Report Version : V1.0

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Report Certification

Issued Date: Dec. 12, 2018

Report No. : 1860341R-RFJPP21V00



Product Name : Wireless-AC2200 Tri Band Gigabit Router
Applicant : ASUSTeK COMPUTER INC.
Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
Manufacturer : ASUSTeK COMPUTER INC.
Model No. : Lyra Voice
EUT Voltage : AC 100-240V, 50-60Hz
Testing Voltage : AC 100V/50Hz
Trade Name : ASUS
Measurement Standard : ARIB STD-T66 Ver. 3.7 (2014.10.02)
Laboratory Name : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied


Documented By


(Carol Tsai / Senior Engineering Adm. Specialist)

Tested By


(Andy Tsai / Senior Engineer)

Approved By


(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1860341R-RFJPP21V00	V1.0	Initial issue of report	Dec. 12, 2018

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	6
1.1. EUT Description	6
1.2. Test Mode.....	12
1.3. Tested System Details.....	13
1.4. Configuration of tested System.....	13
1.5. EUT Exercise Software	13
1.6. Test Facility	14
1.7. List of Test Equipment.....	15
1.8. Measurement Uncertainty	17
2. Output Power 、 Output Power Tolerance and E.I.R.P.....	18
2.1. Test Setup	18
2.2. Test Procedure	18
2.3. Limits.....	19
2.4. Test Result of Output Power Density	20
2.5. Test Result of Output Power Tolerance.....	26
2.6. Test Result of E.I.R.P	28
3. Spread Bandwidth and Spread Factor.....	30
3.1. Test Setup	30
3.2. Test Procedure	30
3.3. Limits.....	30
3.4. Test Result of Spread Bandwidth and Spread Factor.....	31
4. Occupied Bandwidth	51
4.1. Test Setup	51
4.2. Test Procedure	51
4.3. Limits.....	51
4.4. Test Result of Occupied Bandwidth	52
5. Frequency Tolerance	68
5.1. Test Setup	68
5.2. Test Procedure	68
5.3. Limits.....	68
5.4. Test Result of Frequency Tolerance.....	69
6. Transmitter Spurious Emissions.....	71

6.1. Test Setup	71
6.2. Test Procedure	71
6.3. Limits	71
6.4. Test Result of Transmitter Spurious Emissions	72
7. Receiver Spurious Emissions	88
7.1. Test Setup	88
7.2. Test Procedure	88
7.3. Limits	88
7.4. Test Result of Receiver Spurious Emissions	89
8. Carrier Sense	105
8.1. Test Setup	105
8.2. Test Procedure	105
8.3. Limits	105
8.4. Test Result of Carrier Sense	106
9. EMI Reduction Method During Compliance Testing.....	109
Attachment 1	110
Test Photograph	110
Attachment 2	111
EUT External Photograph	111
Attachment 3	127
EUT Internal Photograph	127

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless-AC2200 Tri Band Gigabit Router
Trade Name	ASUS
Model No.	Lyra Voice
Frequency Range/Channel Number -IEEE 802.11b/g & IEEE 802.11n (20MHz)	2412~2472MHz / 13 Channels
Frequency Range/Channel Number -IEEE 802.11n (40MHz)	2422~2462MHz / 9 Channels
Type of Modulation (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Type of Modulation (IEEE 802.11g/n)	Orthogonal Frequency Division Multiplexing (OFDM)
Data Speed (IEEE 802.11b)	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data Speed (IEEE 802.11g)	6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,48Mbps,54Mbps
Data Speed (IEEE 802.11n)	Support a subset of the combination of GI, MCS 0~MCS 15 and bandwidth defined in 802.11n
Length / Width / Height	270mm*75mm*75mm
Weight	975g

Antenna Information				
Antenna List	Frequency band	MFR. / Model	Antenna Type	Antenna Gain (dBi)
Ant-1	2.4G	WHA YU / C660-510449-A	PCB Dipole	0.458 (Effective Gain)
Ant-2	BT	WHA YU / C660-510419-A	PCB Dipole	1.96
Ant-3	2.4G	WHA YU / C660-510450-A	PCB Dipole	0.458 (Effective Gain)
Ant-4	5G-B3	WHA YU / C660-510451-A	Dipole & PCB Dipole	2.721 (Effective Gain)
Ant-5	5G-B3	WHA YU / C660-510452-A	Dipole & PCB Dipole	2.721 (Effective Gain)
Ant-6	5G-B1&B2	WHA YU / C660-510453-A	Dipole & PCB Dipole	2.546 (Effective Gain)
Ant-7	5G-B1&B2	WHA YU / C660-510454-A	Dipole & PCB Dipole	2.546 (Effective Gain)

Accessories Information	
LAN Cable	Non-Shielded, 1.4m
Power Adapter	DELTA, ADP-45BW B I/P : 100-240V~1.2A 50-60Hz O/P : 19V \equiv 2.37A Cable Out: Non-Shielded, 2.2m
Power Adapter	DELTA, ADP-45BW B C.C.: H I/P : 100-240V~1.2A 50-60Hz O/P : 19V \equiv 2.37A Cable Out: Non-Shielded, 2.2m
Power Adapter	DELTA, ADP-45BW Y I/P : 100-240V~50-60Hz 1.2A O/P : 19V \equiv 2.37A Cable Out: Non-Shielded, 2.2m
Power Adapter	PI, AD2066320 I/P : 100-240V~50/60Hz 1.0A O/P : 19V \equiv 2.37A Cable Out: Non-Shielded, 2.2m
Power Adapter	PI, AD2066320010-5LF I/P : 100-240V~50/60Hz 1.0A O/P : 19V \equiv 2.37A Cable Out: Non-Shielded, 2.2m
Power Adapter	PI, AD883J20 I/P : 100-240V~50/60Hz 1.0A O/P : 19V \equiv 2.37A Cable Out: Non-Shielded, 2.2m

ANT-TX / RX & Bandwidth

ANT-TX / RX	TX			RX		
Mode/ Channel Bandwidth	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
IEEE802.11b	✓			✓		
IEEE802.11g	✓			✓		
IEEE802.11n/ac	✓	✓		✓	✓	

IEEE802.11n

MCS Index	Modulation	R	N _{BPSCS}	N _{CBPS}		N _{DBPS}		Data Rate(Mb/s)			
				20MHz	40MHz	20MHz	40MHz	800ns GI		400ns GI	
								20MHz	40MHz	20MHz	40MHz
0	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.2	15.0
1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.4	30.0
2	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.7	45.0
3	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.9	60.0
4	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.3	90.0
5	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.8	120.0
6	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.0	135.0
7	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.2	150.0

Note 1: Support of 400ns GI is optional on transmit and receive.

Table 1 – MCS parameters for TX Antenna number = 1

MCS Index	Modulation	R	N _{BPSCS}	N _{CBPS}		N _{DBPS}		Data Rate(Mb/s)			
				20MHz	40MHz	20MHz	40MHz	800ns GI		400ns GI	
								20MHz	40MHz	20MHz	40MHz
8	BPSK	1/2	1	104	216	52	108	13.0	27.0	14.4	30.0
9	QPSK	1/2	2	208	432	104	216	26.0	54.0	28.9	60.0
10	QPSK	3/4	2	208	432	156	324	39.0	81.0	43.3	90.0
11	16-QAM	1/2	4	416	864	208	432	52.0	108.0	57.8	120.0
12	16-QAM	3/4	4	416	864	312	648	78.0	162.0	86.7	180.0
13	64-QAM	2/3	6	624	1296	416	864	104.0	216.0	115.6	240.0
14	64-QAM	3/4	6	624	1296	468	972	117.0	243.0	130.0	270.0
15	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0	144.4	300.0

Note 1: Support of 400ns GI is optional on transmit and receive.

Table 2 – MCS parameters for TX Antenna number = 2

Symbol	Explanation
R	Code rate
N _{BPSC}	Number of coded bits per single carrier
N _{CBPS}	Number of coded bits per symbol
N _{DBPS}	Number of data bits per symbol
GI	guard interval

IEEE 802.11ac Data Rate

Spatial Streams (Note1)	MCS Index	Modulation type	Coding rate	Data Rate(Mb/s)					
				20 MHz		40 MHz		80 MHz	
				Guard Interval		Guard Interval		Guard Interval	
				800ns	400ns	800ns	400ns	800ns	400ns
1	0	BPSK	1/2	6.5	7.2	13.5	15	29.3	32.5
	1	QPSK	1/2	13	14.4	27	30	58.5	65
	2	QPSK	3/4	19.5	21.7	40.5	45	87.8	97.5
	3	16-QAM	1/2	26	28.9	54	60	117	130
	4	16-QAM	3/4	39	43.3	81	90	175.5	195
	5	64-QAM	2/3	52	57.8	108	120	234	260
	6	64-QAM	3/4	58.5	65	121.5	135	263.3	292.5
	7	64-QAM	5/6	65	72.2	135	150	292.5	325
	8	256-QAM	3/4	78	86.7	162	180	351	390
	9	256-QAM	5/6	N/A	N/A	180	200	390	433.3
2	0	BPSK	1/2	13	14.4	27	30	58.6	65
	1	QPSK	1/2	26	28.8	54	60	117	130
	2	QPSK	3/4	39	43.4	81	90	175.6	195
	3	16-QAM	1/2	52	57.8	108	120	234	260
	4	16-QAM	3/4	78	86.6	162	180	351	390
	5	64-QAM	2/3	104	115.6	216	240	468	520
	6	64-QAM	3/4	117	130	243	270	526.6	585
	7	64-QAM	5/6	130	144.4	270	300	585	650
	8	256-QAM	3/4	156	173.4	324	360	702	780
	9	256-QAM	5/6	N/A	N/A	360	400	780	866.6

IEEE 802.11b/g & IEEE 802.11n (20MHz) & IEEE 802.11ac (20MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
001	2412 MHz	002	2417 MHz	003	2422 MHz	004	2427 MHz
005	2432 MHz	006	2437 MHz	007	2442 MHz	008	2447 MHz
009	2452 MHz	010	2457 MHz	011	2462 MHz	012	2467 MHz
013	2472 MHz						

IEEE 802.11n (40MHz) & IEEE 802.11ac (40MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
003	2422 MHz	004	2427 MHz	005	2432 MHz	006	2437 MHz
007	2442 MHz	008	2447 MHz	009	2452 MHz	010	2457 MHz
011	2462 MHz						

1.2. Test Mode

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

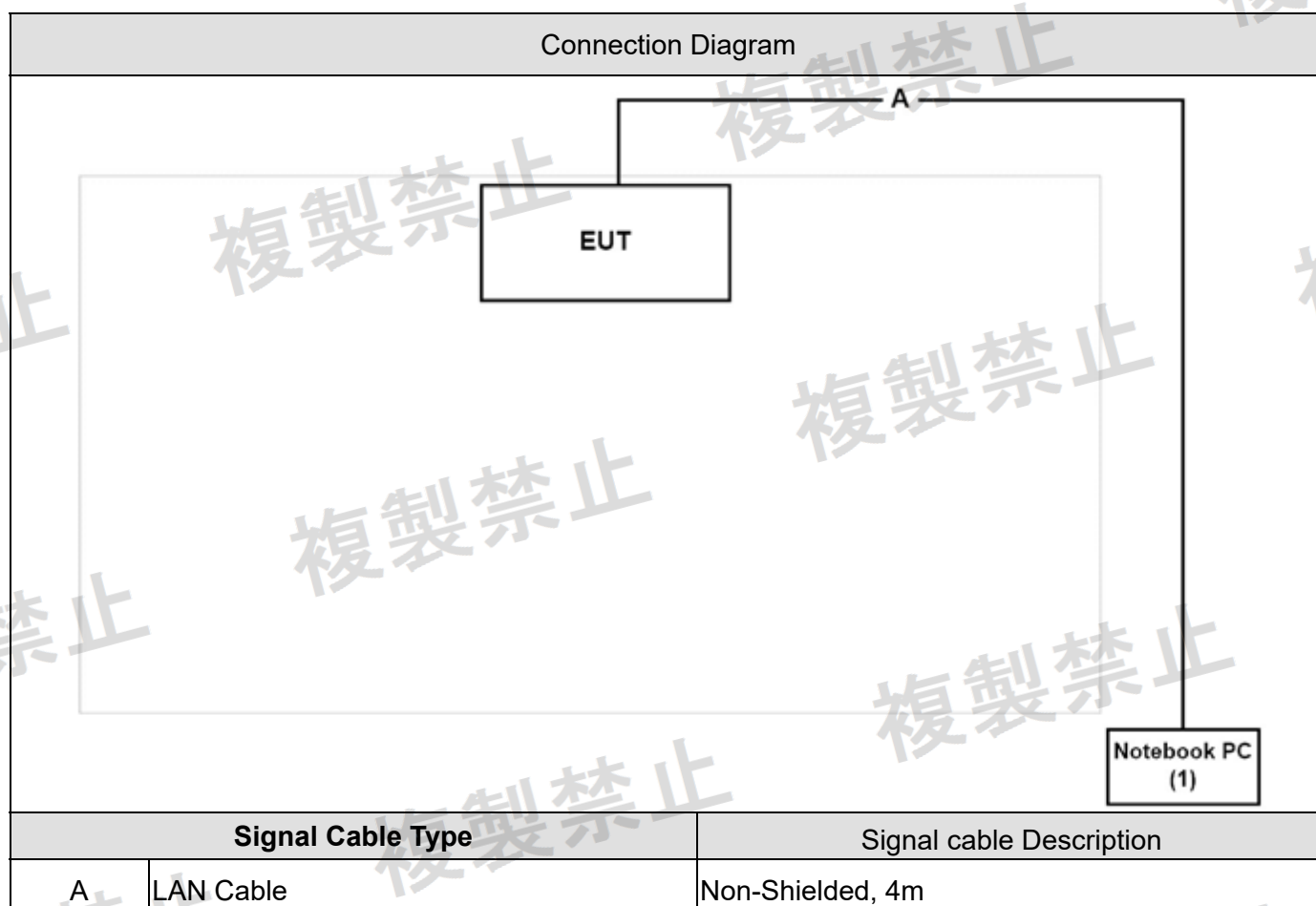
Test Mode
Mode 1: Transmitter (CCD Mode)
Mode 2: Transmitter (BF Mode)
Mode 3: Receiver

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	Lenovo	B590	WB1529782
				Non-Shielded, 1.8m, one ferrite core bonded

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Execute the Control program “QCA Radio Control Toolkit” on the laptop.
3	Configure the test mode, the test channel, and the data rate.
4	Make the EUT to start the continuous transmitting.
5	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	ARIB STD-T66 Output Power 、 Output Power Tolerance and E.I.R.P	15 - 35	25	3
Humidity (%RH)		25 - 75	50	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T66 Spread Bandwidth and Spread Factor	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T66 Occupied Bandwidth	15 - 35	25	3
Humidity (%RH)		25 - 75	50	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T66 Frequency Tolerance	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T66 Transmitter Spurious Emissions	15 - 35	25	3
Humidity (%RH)		25 - 75	50	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T66 Receiver Spurious Emissions	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T66 Carrier Sense	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	

Note: Test site information refers to Laboratory Information.

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

- No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : info.tw@dekra.com
- No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com
- No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com

1.7. List of Test Equipment

Output Power 、 Output Power Tolerance and E.I.R.P / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2018/01/02	2019/01/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	2018/01/02	2019/01/01
Pulse Power Sensor	Anritsu	MA2411B	1531044	2018/01/02	2019/01/01
ESG Vector Signal Generator	Agilent	E4438C	MY45095759	2018/05/24	2019/05/23

Spread Bandwidth and Spread Factor / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Occupied Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Frequency Tolerance / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Transmitter Spurious Emissions / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Receiver Spurious Emissions / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04

Carrier Sense / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/05	2019/03/04
ESG Vector Signal Generator	Agilent	E4438C	MY45095759	2018/05/24	2019/05/23

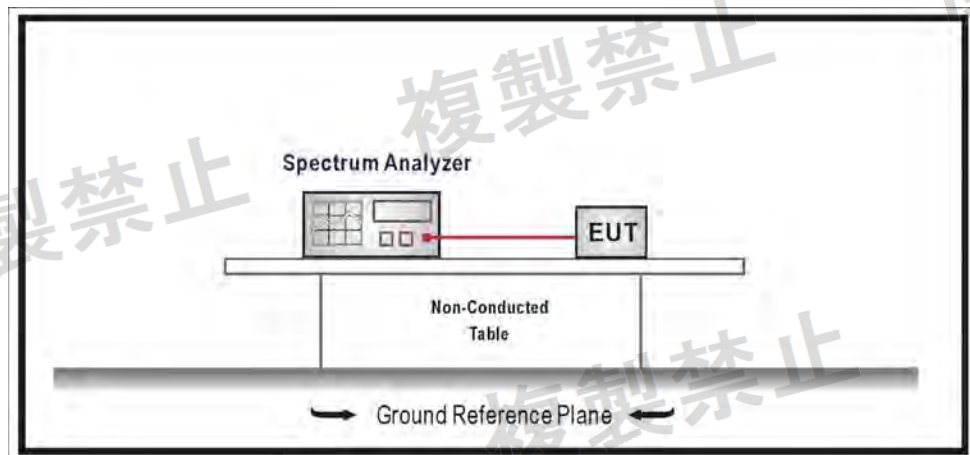
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.8. Measurement Uncertainty

Test Item	Uncertainty
Output Power 、 Output Power Tolerance and E.I.R.P	± 1.27 dB
Spread Bandwidth and Spread Factor	± 50 kHz
Occupied Bandwidth	± 50 kHz
Frequency Tolerance	± 50 kHz
Transmitter Spurious Emissions	± 3.19 dB
Receiver Spurious Emissions	± 3.19 dB
Carrier Sense	± 1.27 dB

2. Output Power, Output Power Tolerance and E.I.R.P

2.1. Test Setup



2.2. Test Procedure

The output power shall be determined using a spectrum analyzer of adequate bandwidth for the type of modulation being used in combination with an RF power meter.

Connect an RF power meter to the IF output of the spectrum analyzer and correct its reading using a known reference source.

The above procedure shall be repeated for each of the three frequencies identified by the procedure given in limit.

Where the spectrum analyzer bandwidth is non-Gaussian, a suitable correction factor shall be determined and applied.

Where a spectrum analyzer is equipped with a facility to measure power density, this facility may be used instead of the above procedure.

2.3. Limits

Output Power:

For 20MHz Bandwidth: $\leq 10\text{mW/MHz}$

For 40MHz Bandwidth: $\leq 5\text{mW/MHz}$

Output Power Tolerance: +20% to -80%

EIRP:

For 20MHz Bandwidth: $\leq 12.14\text{dBm/MHz}$

For 40MHz Bandwidth: $\leq 9.13\text{dBm/MHz}$

2.4. Test Result of Output Power Density

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Output Power Density
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11b_ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.877	4.872	10
2442	6.848	4.839	10
2472	6.882	4.878	10
Test Mode: 802.11b_ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.974	4.982	10
2442	6.950	4.955	10
2472	6.976	4.984	10
Test Mode : 802.11b_ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
2412	9.854		10
2442	9.794		10
2472	9.862		10

Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : Output Power Density
Test Mode : Mode 1: Transmitter (CCD Mode)
Test Date : 2018/08/06

Test Mode: 802.11g_ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.963	4.969	10
2442	6.946	4.950	10
2472	6.894	4.891	10
Test Mode: 802.11g_ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.922	4.923	10
2442	6.924	4.925	10
2472	6.924	4.925	10
Test Mode : 802.11g_ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
2412	9.892		10
2442	9.875		10
2472	9.816		10

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Output Power Density
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11ac (20MHz)_ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.934	4.936	10
2442	6.893	4.890	10
2472	6.874	4.869	10
Test Mode: 802.11ac (20MHz)_ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.853	4.845	10
2442	6.843	4.834	10
2472	6.864	4.857	10
Test Mode: 802.11ac (20MHz)_ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
2412	9.781		10
2442	9.724		10
2472	9.726		10

Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : Output Power Density
Test Mode : Mode 1: Transmitter (CCD Mode)
Test Date : 2018/08/06

Test Mode: 802.11ac (40MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2422	3.832	2.417	5
2442	3.873	2.439	5
2462	3.906	2.458	5
Test Mode: 802.11ac (40MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2422	3.885	2.446	5
2442	3.889	2.448	5
2462	3.917	2.464	5
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
2422	4.863		5
2442	4.888		5
2462	4.922		5

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Output Power Density
 Test Mode : Mode 2: Transmitter (BF Mode)
 Test Date : 2018/08/06

Test Mode: 802.11ac (20MHz)_ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.934	4.936	10
2442	6.893	4.890	10
2472	6.874	4.869	10
Test Mode: 802.11ac (20MHz)_ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2412	6.853	4.845	10
2442	6.843	4.834	10
2472	6.864	4.857	10
Test Mode: 802.11ac (20MHz)_ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
2412	9.781		10
2442	9.724		10
2472	9.726		10

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Output Power Density
 Test Mode : Mode 2: Transmitter (BF Mode)
 Test Date : 2018/08/06

Test Mode: 802.11ac (40MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2422	3.832	2.417	5
2442	3.873	2.439	5
2462	3.906	2.458	5
Test Mode: 802.11ac (40MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
2422	3.885	2.446	5
2442	3.889	2.448	5
2462	3.917	2.464	5
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
2422	4.863		5
2442	4.888		5
2462	4.922		5

2.5. Test Result of Output Power Tolerance

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Output Power Tolerance
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11b_ANT0+1				
Frequency (MHz)	Declared Output Power(mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
2412	10.000	9.854	-1.46%	+20%~-80%
2442	10.000	9.794	-2.06%	+20%~-80%
2472	10.000	9.862	-1.38%	+20%~-80%

Test Mode: 802.11g_ANT0+1				
Frequency (MHz)	Declared Output Power(mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
2412	10.000	9.892	-1.08%	+20%~-80%
2442	10.000	9.875	-1.25%	+20%~-80%
2472	10.000	9.816	-1.84%	+20%~-80%

Test Mode: 802.11ac (20M)_ANT0+1				
Frequency (MHz)	Declared Output Power(mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
2412	10.000	9.781	-2.19%	+20%~-80%
2442	10.000	9.724	-2.76%	+20%~-80%
2472	10.000	9.726	-2.74%	+20%~-80%

Test Mode: 802.11ac (40M)_ANT0+1				
Frequency (MHz)	Declared Output Power(mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
2422	5.000	4.863	-2.74%	+20%~-80%
2442	5.000	4.888	-2.24%	+20%~-80%
2462	5.000	4.922	-1.55%	+20%~-80%

Deviation = (Output Power - Declared Output Power) / Declared Output Power * 100%

Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : Output Power Tolerance
Test Mode : Mode 2: Transmitter (BF Mode)
Test Date : 2018/08/06

Test Mode: 802.11ac (20M)_ANT0+1				
Frequency (MHz)	Declared Output Power(mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
2412	10.000	9.781	-2.19%	+20%~-80%
2442	10.000	9.724	-2.76%	+20%~-80%
2472	10.000	9.726	-2.74%	+20%~-80%

Test Mode: 802.11ac (40M)_ANT0+1				
Frequency (MHz)	Declared Output Power(mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
2422	5.000	4.863	-2.74%	+20%~-80%
2442	5.000	4.888	-2.24%	+20%~-80%
2462	5.000	4.922	-1.55%	+20%~-80%

Deviation = (Output Power - Declared Output Power) / Declared Output Power * 100%

Test Result	PASS
-------------	------

2.6. Test Result of E.I.R.P

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : EIRP
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11b, ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
2412	9.936	10.394	12.14
2442	9.910	10.368	12.14
2472	9.940	10.398	12.14
Test Mode: 802.11g, ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
2412	9.953	10.411	12.14
2442	9.945	10.403	12.14
2472	9.919	10.377	12.14
Test Mode: 802.11ac (20MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
2412	9.904	10.362	12.14
2442	9.878	10.336	12.14
2472	9.879	10.337	12.14
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
2422	6.869	7.327	9.14
2442	6.891	7.349	9.14
2462	6.922	7.380	9.14

Real Value = Output Power+ Antenna Max Gain (dBi)

Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : EIRP
Test Mode : Mode 2: Transmitter (BF Mode)
Test Date : 2018/08/06

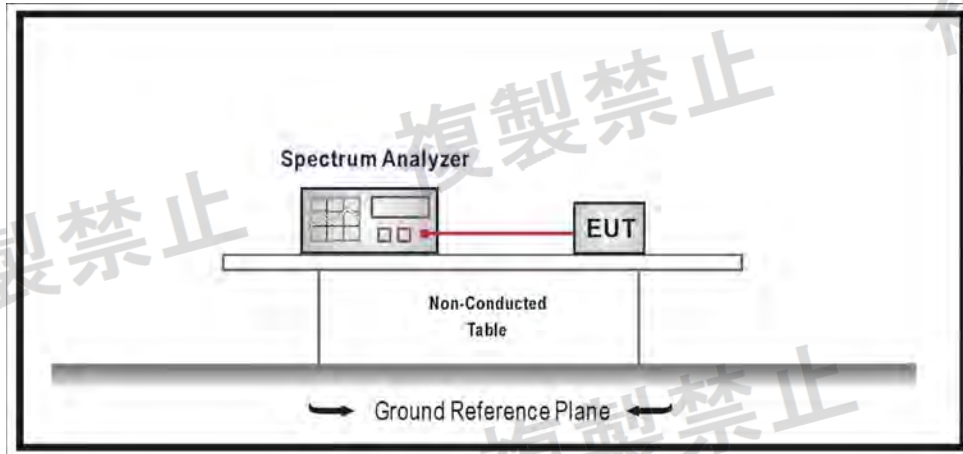
Test Mode: 802.11ac (20MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
2412	9.904	11.382	12.14
2442	9.878	11.356	12.14
2472	9.879	11.357	12.14
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
2422	6.869	8.347	9.14
2442	6.891	8.369	9.14
2462	6.922	8.400	9.14

Real Value = Output Power+ Antenna Max Gain (dBi)

Test Result	PASS
--------------------	------

3. Spread Bandwidth and Spread Factor

3.1. Test Setup



3.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) A measurement instrument with an integrated 90% power bandwidth function may be used to automate the test process.
- (c) The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slowly, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (d) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

3.3. Limits

Spread Bandwidth ≥ 500 kHz

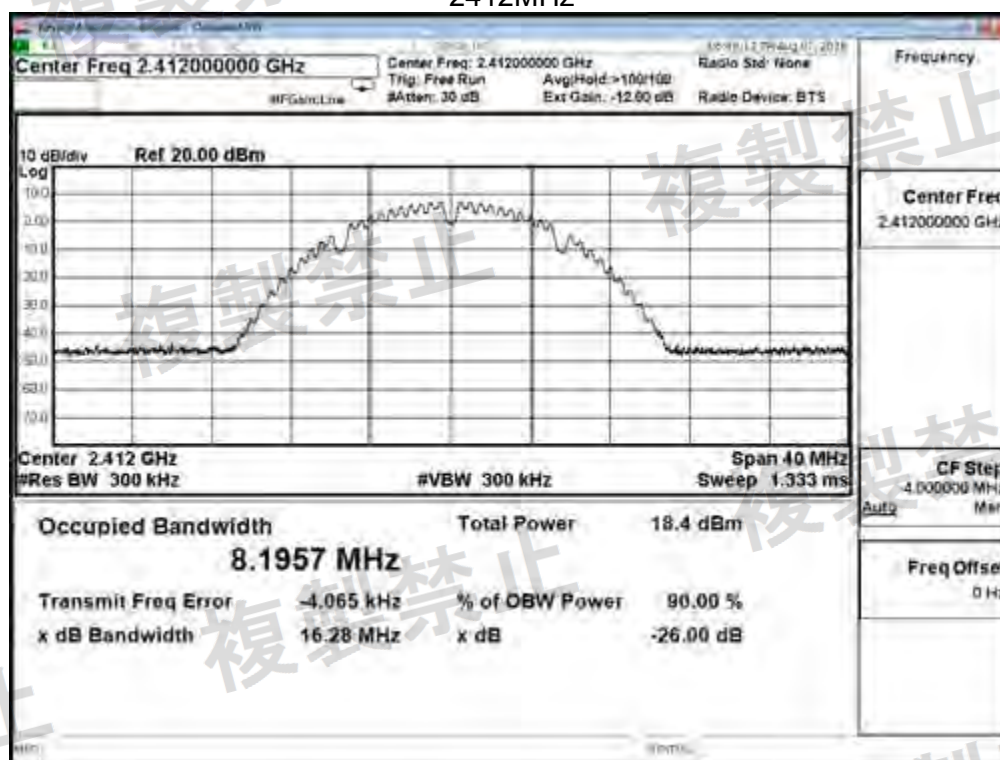
Spread Factor ≥ 5 for 2400 ~ 2483.5 MHz

3.4. Test Result of Spread Bandwidth and Spread Factor

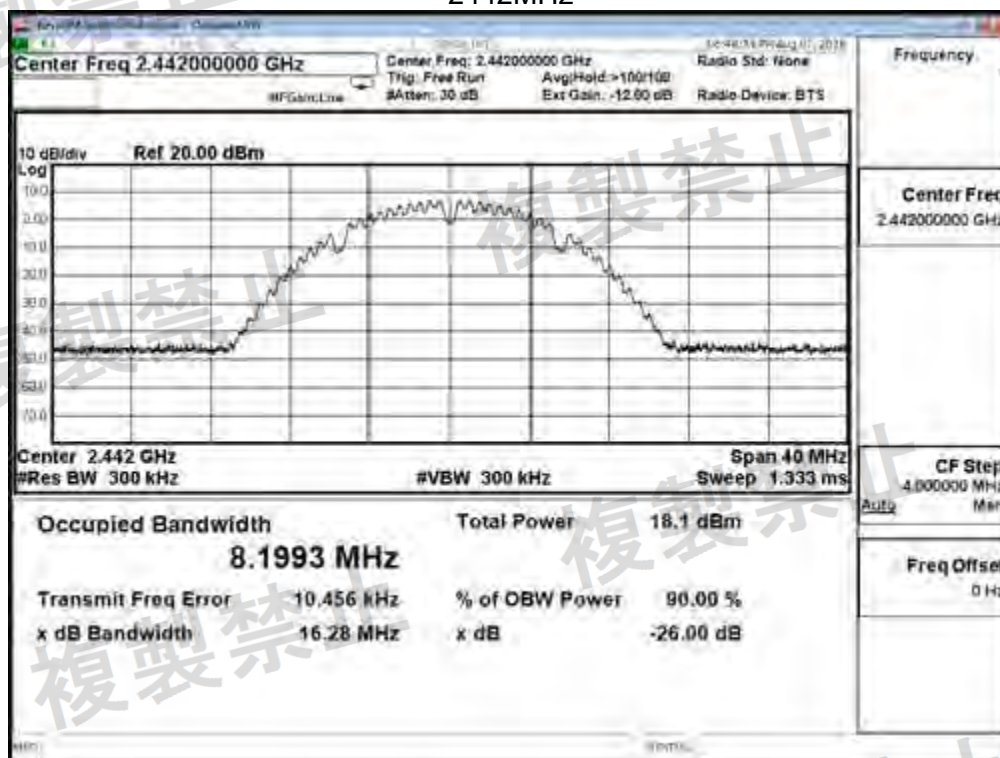
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11b, Ant0		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2412	8.196	≥ 500
2442	8.199	≥ 500
2472	8.212	≥ 500

2412MHz



2442MHz



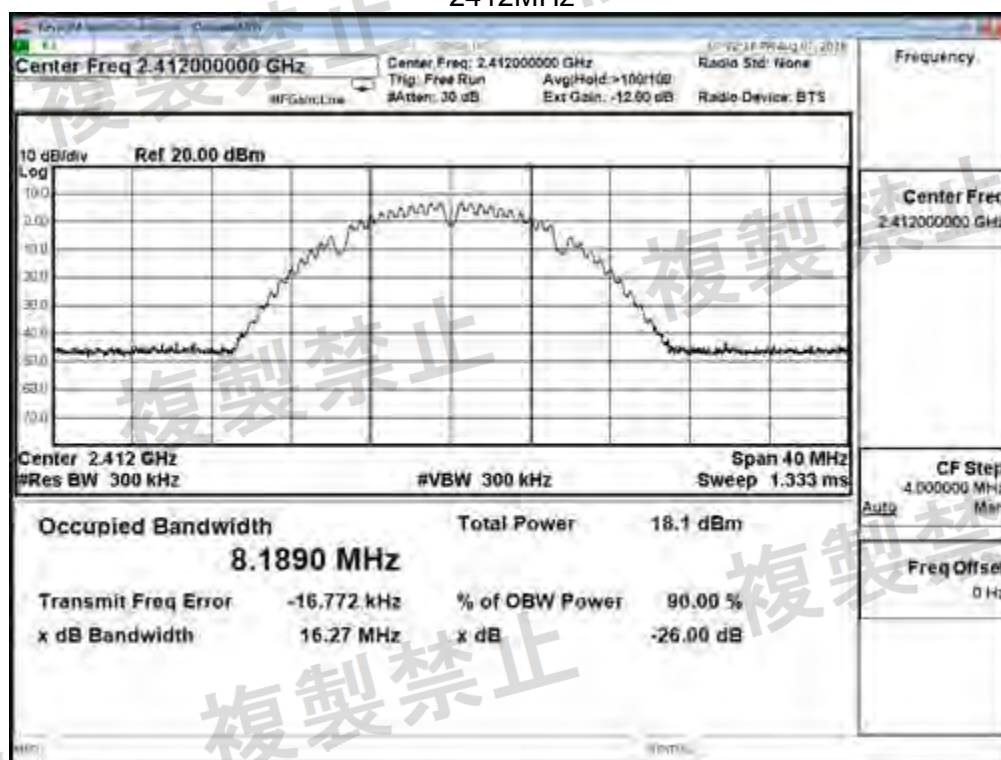
2472MHz



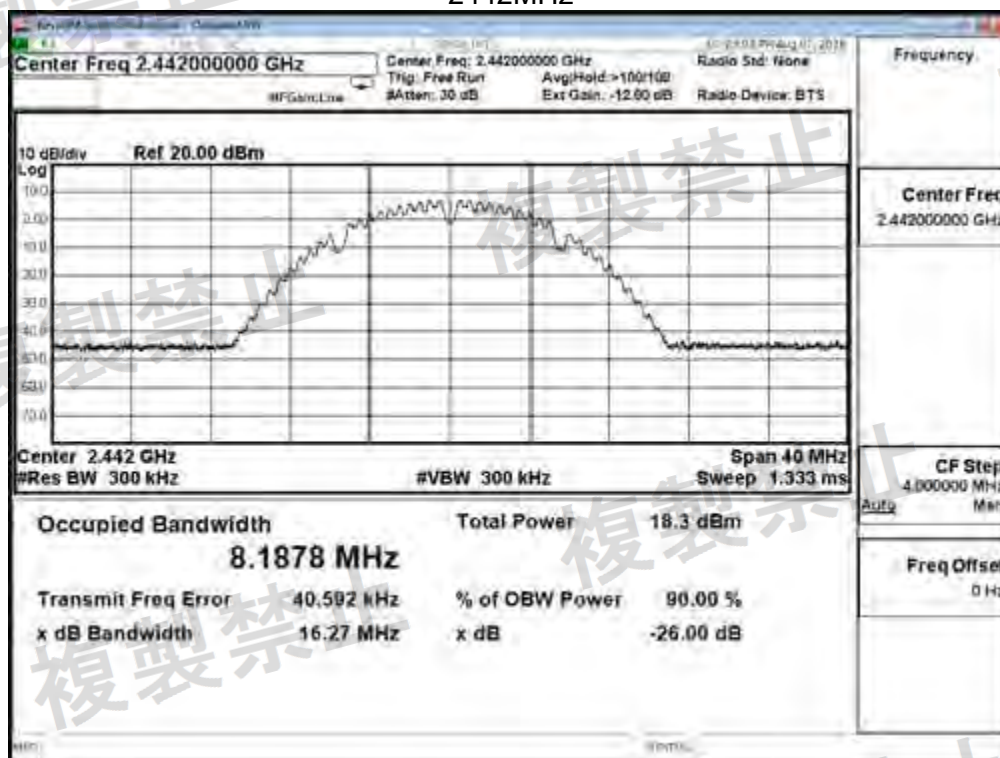
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11b, Ant1		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2412	8.189	≥ 500
2442	8.188	≥ 500
2472	8.229	≥ 500

2412MHz



2442MHz



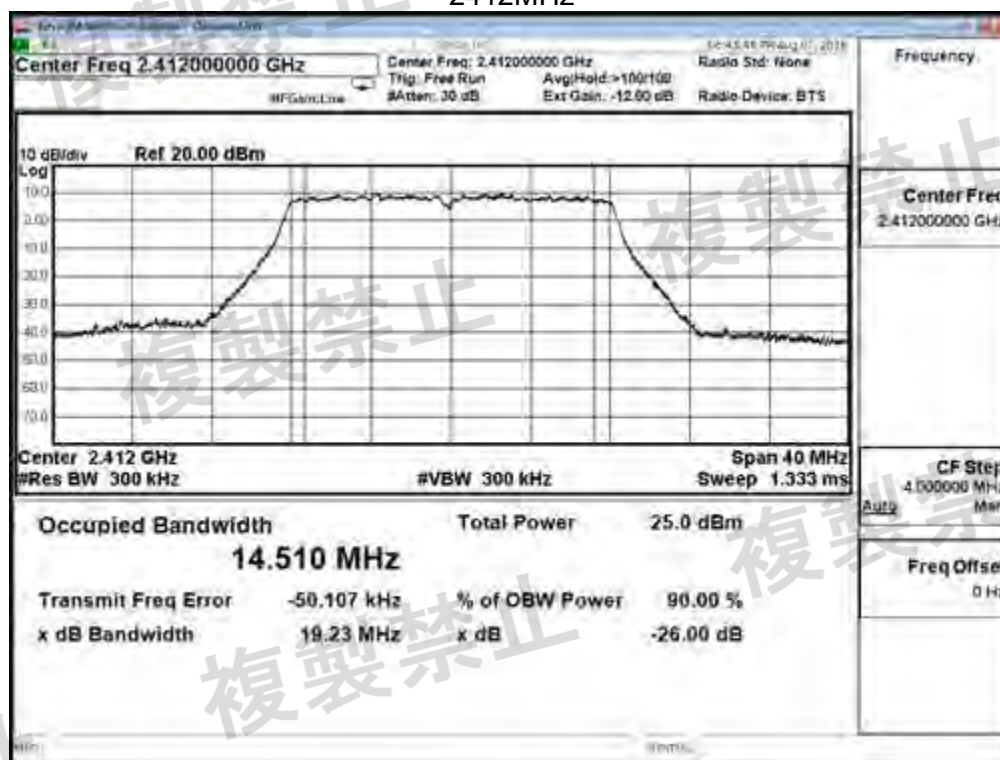
2472MHz



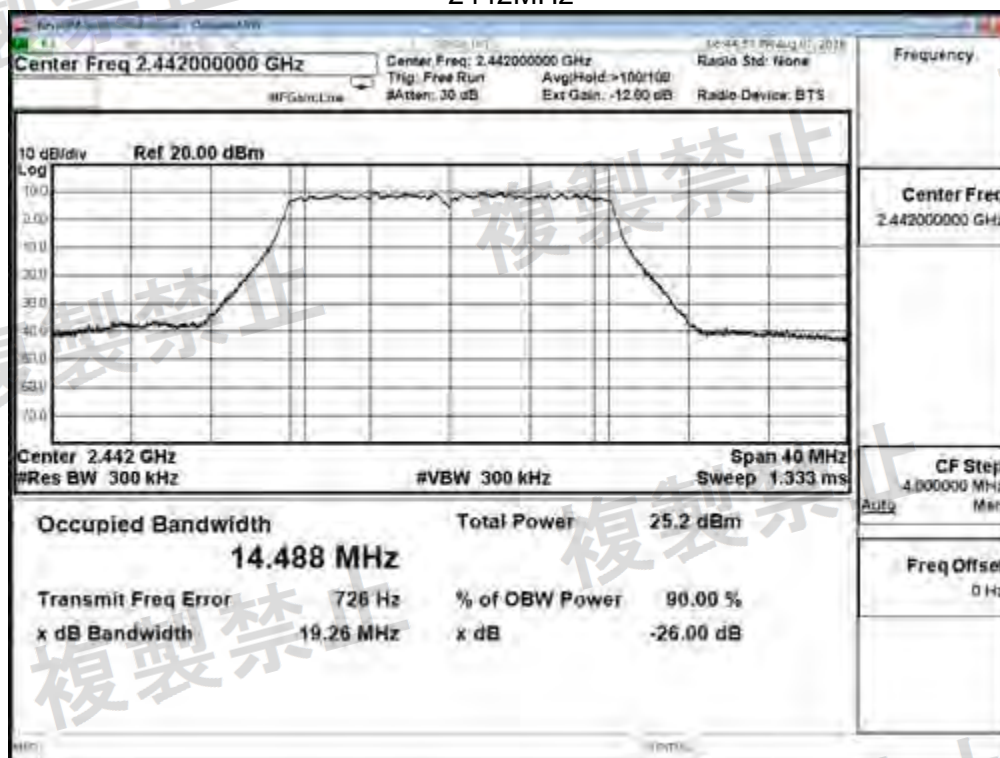
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11g, Ant0		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2412	14.510	≥ 500
2442	14.488	≥ 500
2472	14.540	≥ 500

2412MHz



2442MHz



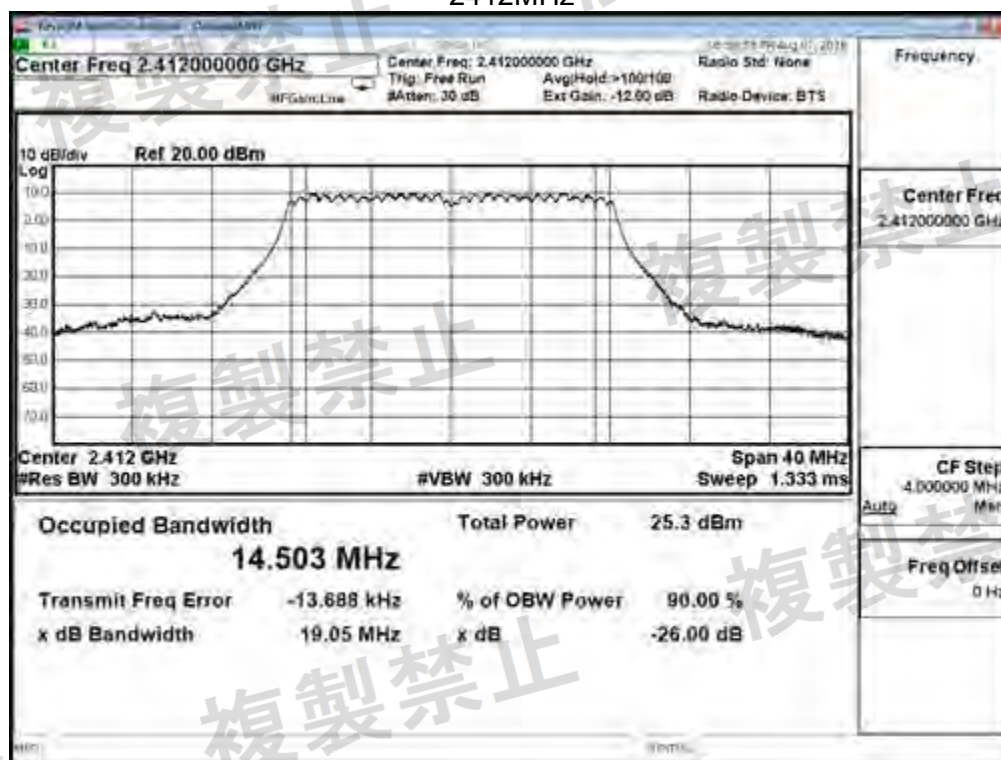
2472MHz



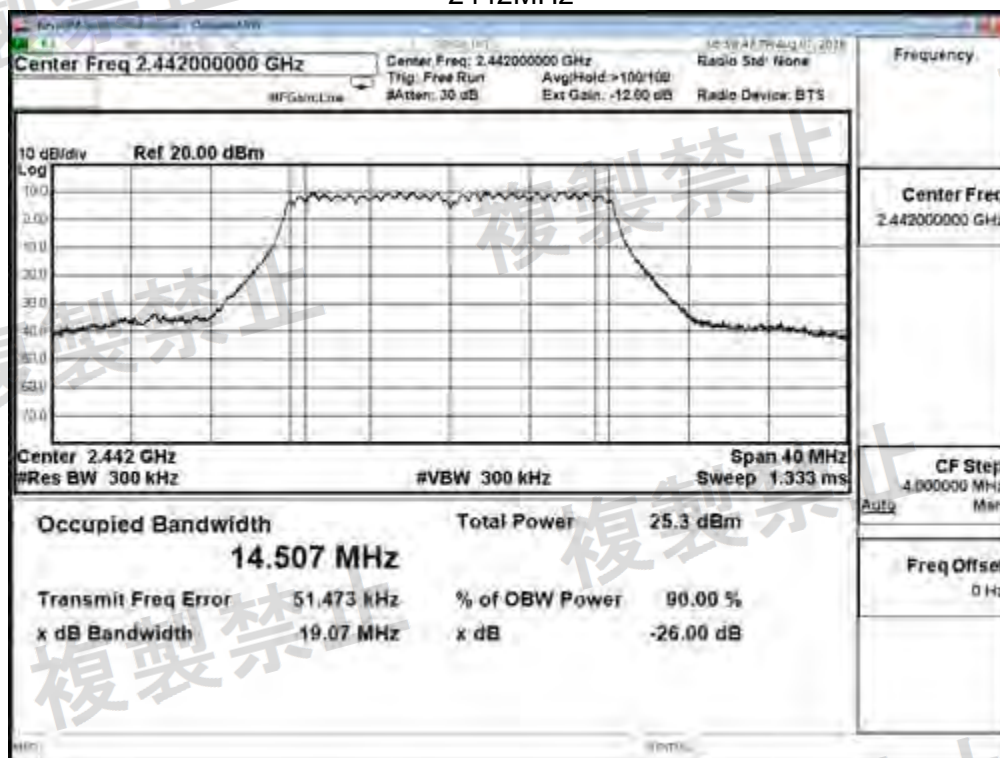
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11g, Ant1		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2412	14.503	≥ 500
2442	14.507	≥ 500
2472	14.603	≥ 500

2412MHz



2442MHz



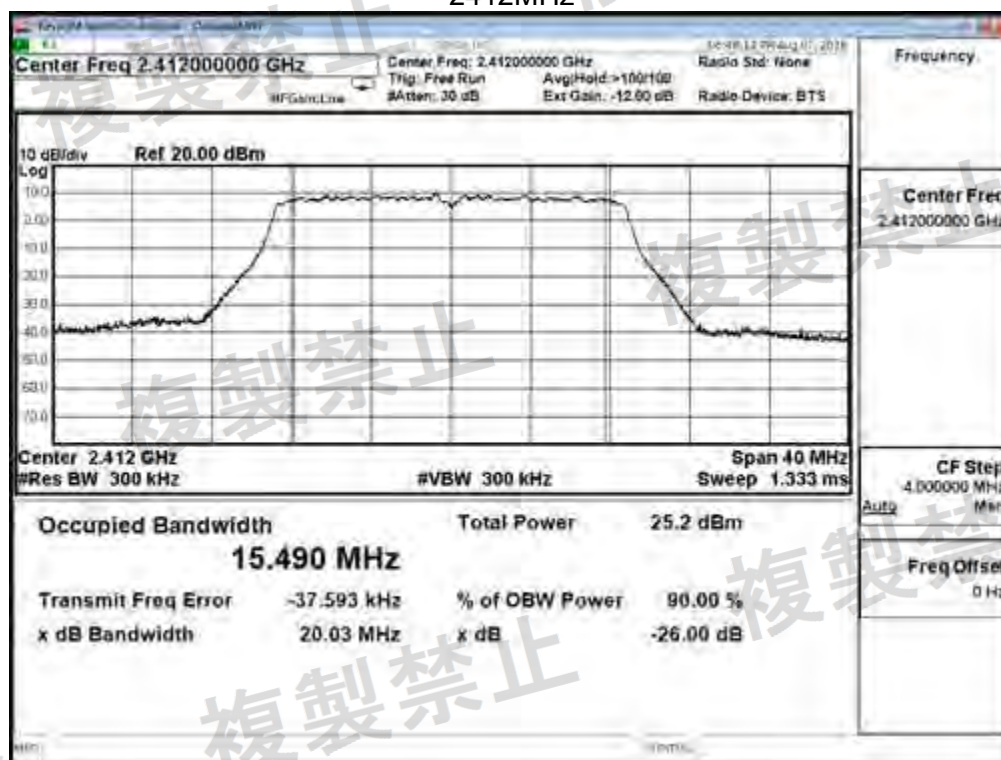
2472MHz



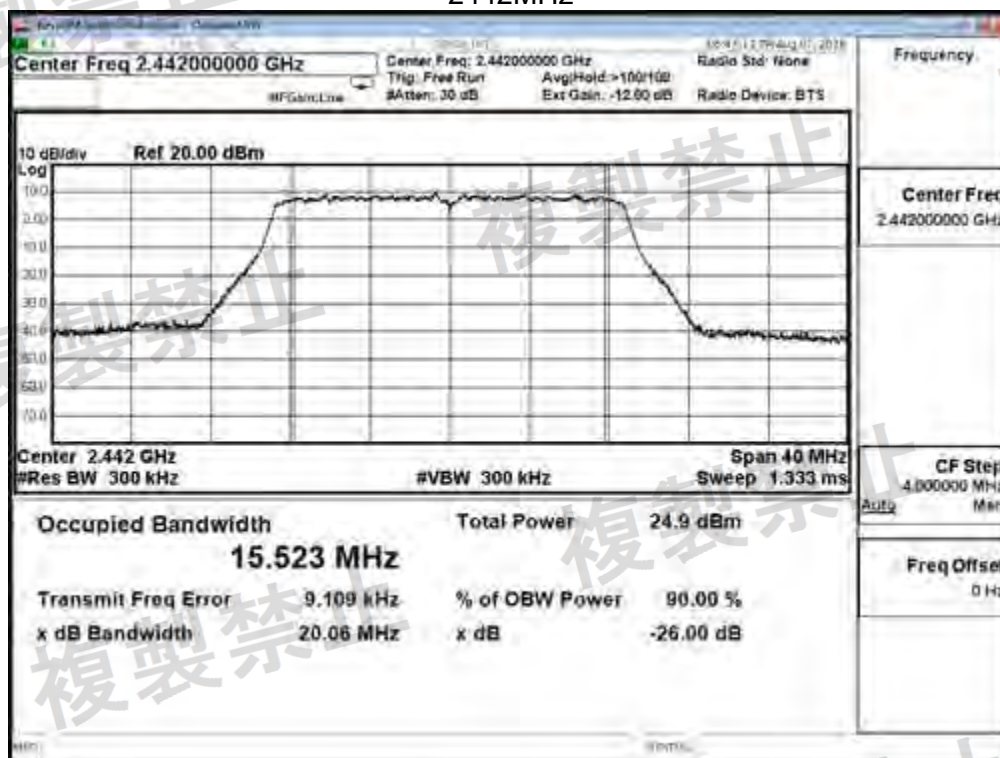
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (20MHz), Ant 0		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2412	15.490	≥ 500
2442	15.523	≥ 500
2472	15.518	≥ 500

2412MHz



2442MHz



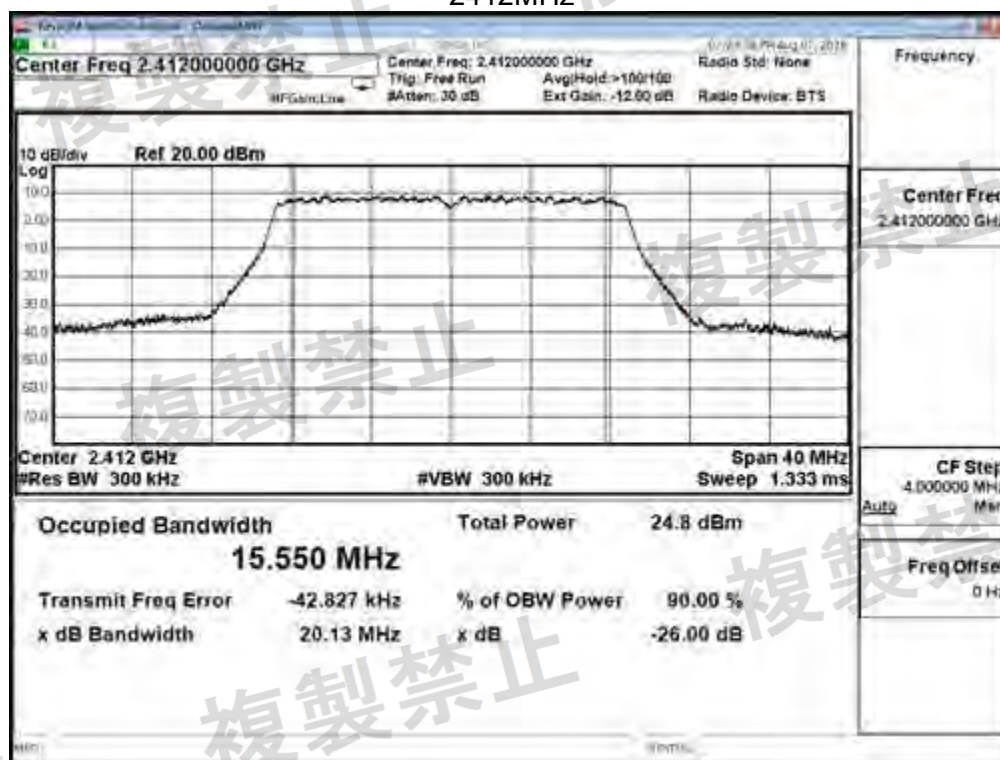
2472MHz



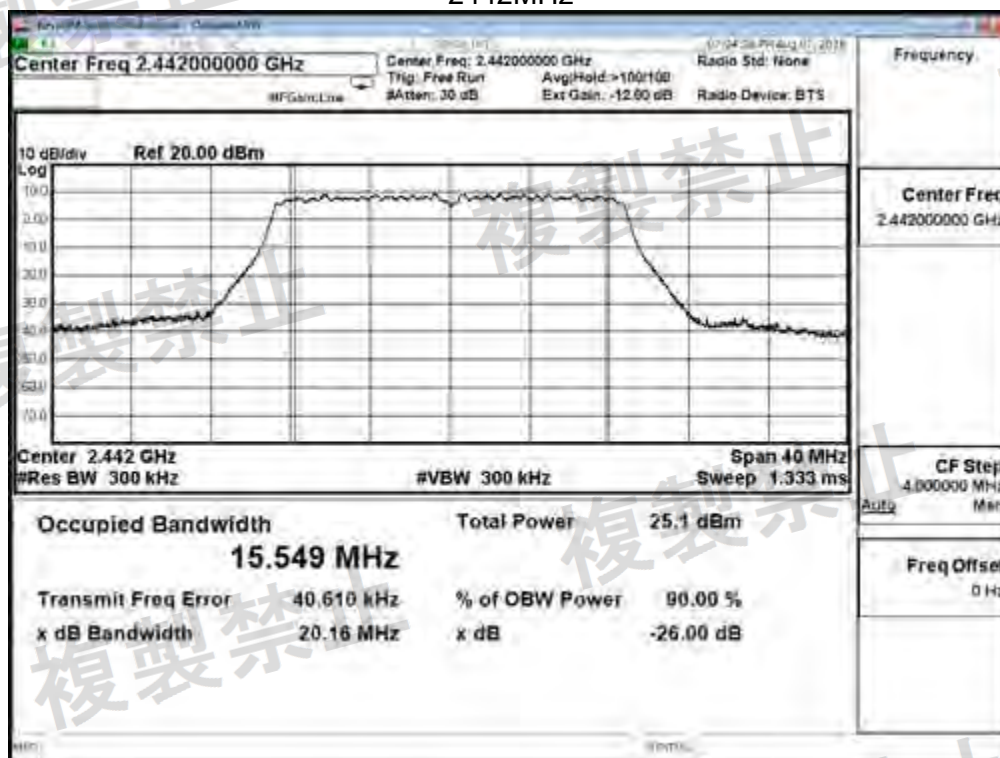
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (20MHz), Ant 1		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2412	15.550	≥ 500
2442	15.549	≥ 500
2472	15.608	≥ 500

2412MHz



2442MHz



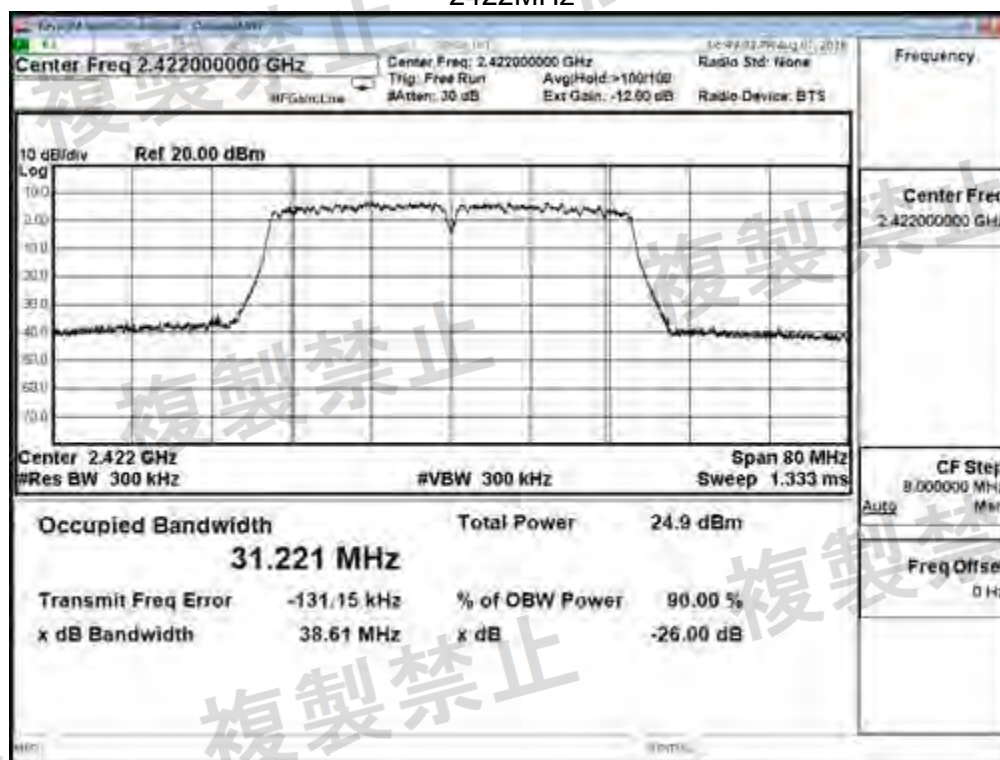
2472MHz



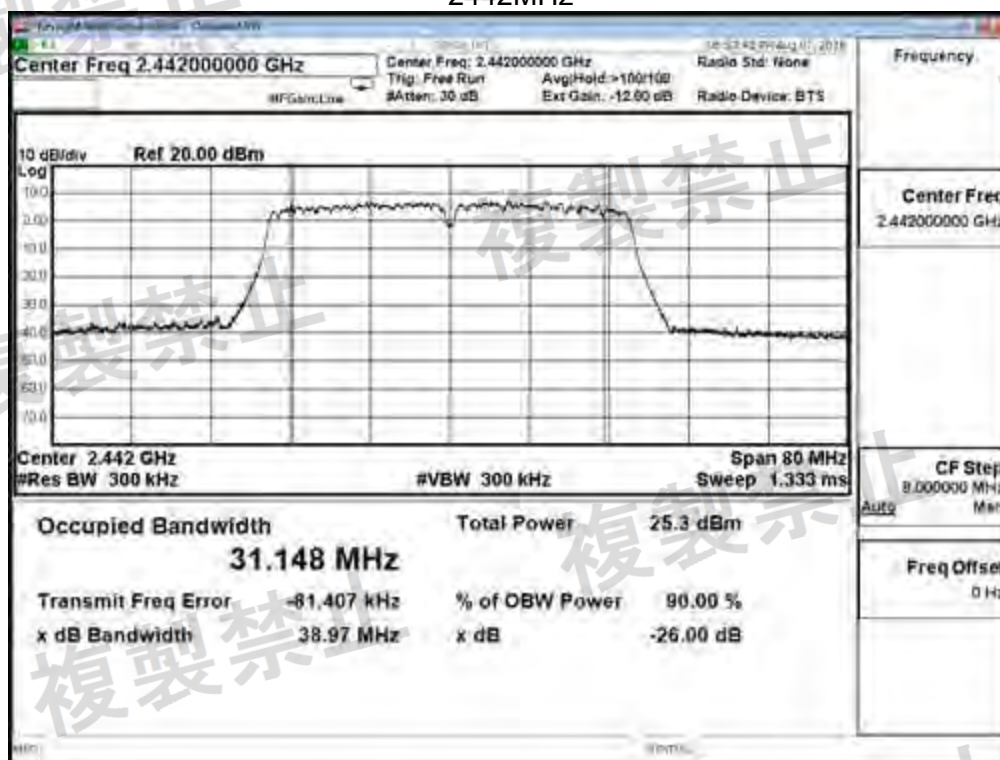
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (40MHz), Ant 0		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2422	31.221	≥ 500
2442	31.148	≥ 500
2462	31.027	≥ 500

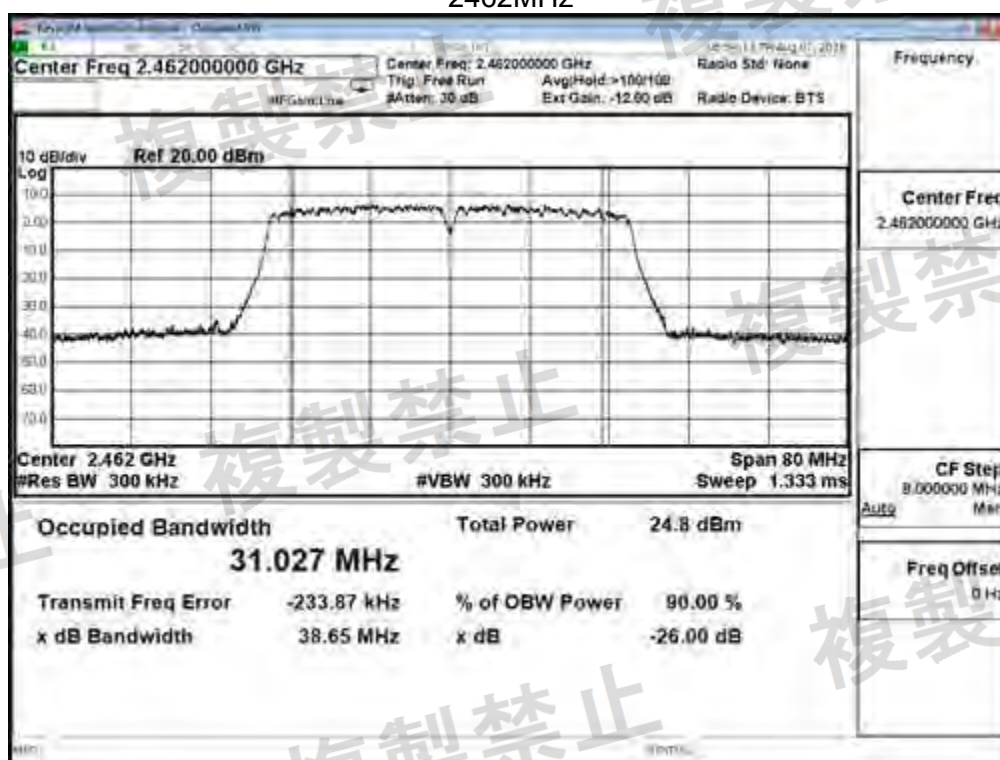
2422MHz



2442MHz



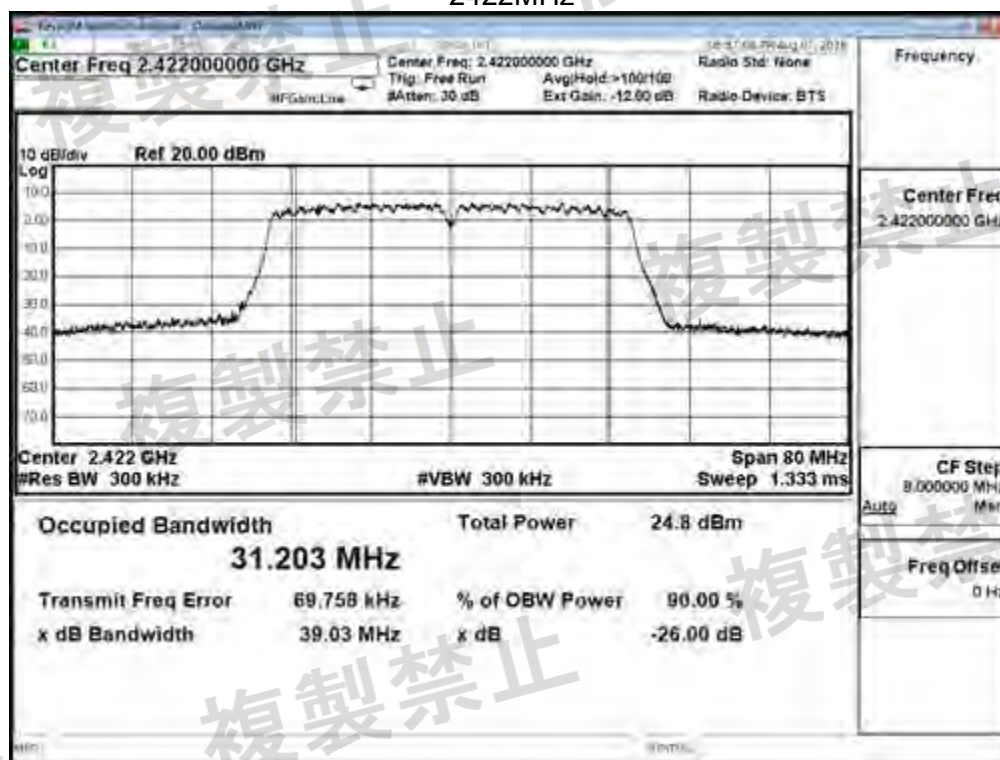
2462MHz



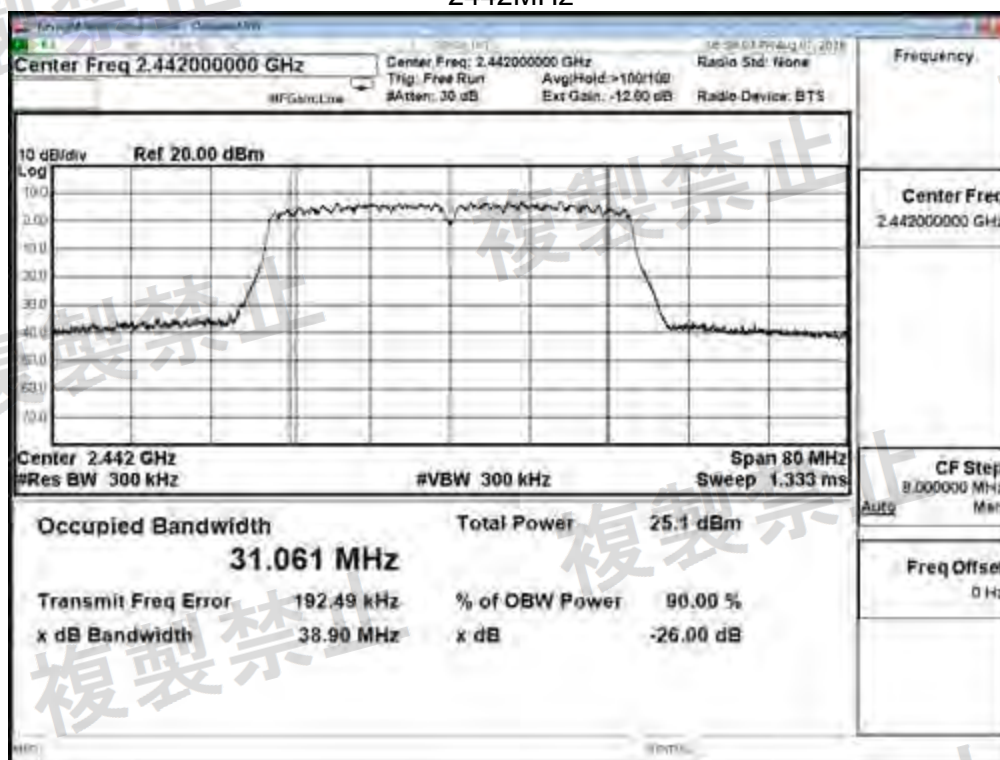
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (40MHz), Ant 1		
Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
2422	31.203	≥ 500
2442	31.061	≥ 500
2462	30.953	≥ 500

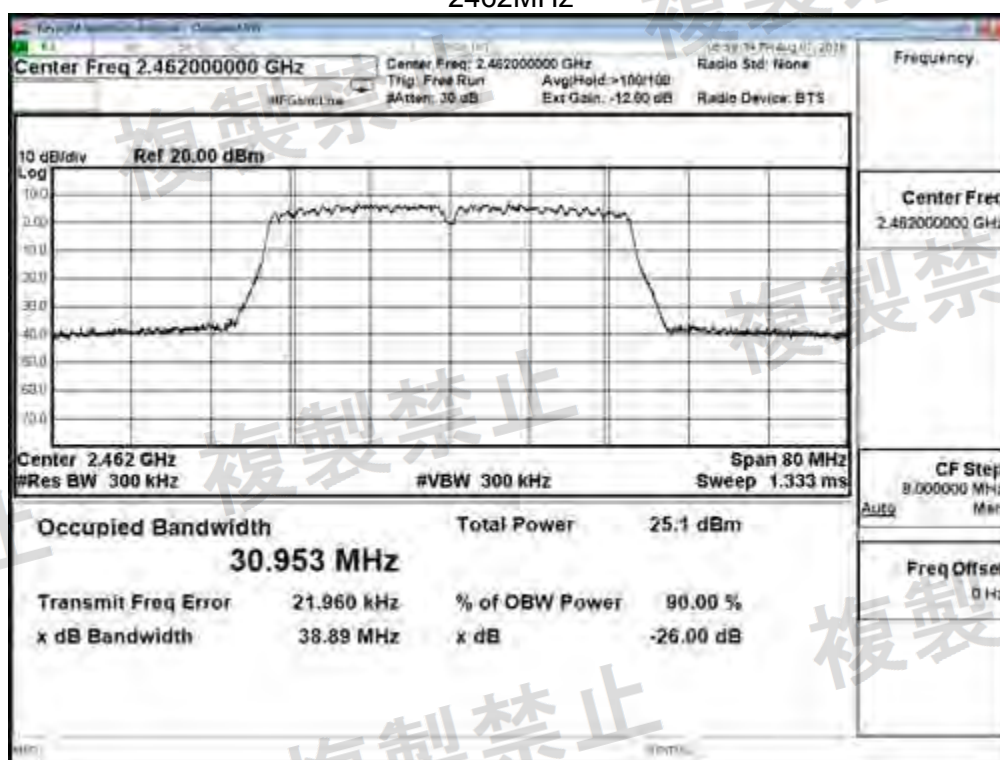
2422MHz



2442MHz



2462MHz



Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Factor
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11b, Ant0				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2412	8.196	1.375	5.961	≥ 5
2442	8.199	1.375	5.963	≥ 5
2472	8.212	1.375	5.972	≥ 5
Test Mode: 802.11b, Ant1				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2412	8.189	1.375	5.956	≥ 5
2442	8.188	1.375	5.955	≥ 5
2472	8.229	1.375	5.984	≥ 5

Calculation Method: Spread Factor

= (SBW)/ (Frequency equal to the transmission rate of the modulation signal)

Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : Spread Factor
Test Mode : Mode 1: Transmitter (CCD Mode)
Test Date : 2018/08/06

Test Mode: 802.11g, Ant0				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2412	14.510	1.375	10.553	≥ 5
2442	14.488	1.375	10.537	≥ 5
2472	14.540	1.375	10.575	≥ 5
Test Mode: 802.11g, Ant1				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2412	14.503	1.375	10.548	≥ 5
2442	14.507	1.375	10.551	≥ 5
2472	14.603	1.375	10.620	≥ 5

Calculation Method: Spread Factor

= (SBW)/ (Frequency equal to the transmission rate of the modulation signal)

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Factor
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11ac (20MHz), Ant 0				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2412	15.490	1.375	11.265	≥ 5
2442	15.523	1.375	11.289	≥ 5
2472	15.518	1.375	11.286	≥ 5
Test Mode: 802.11ac (20MHz), Ant 1				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2412	15.550	1.375	11.309	≥ 5
2442	15.549	1.375	11.308	≥ 5
2472	15.608	1.375	11.351	≥ 5

Calculation Method: Spread Factor

= (SBW)/ (Frequency equal to the transmission rate of the modulation signal)

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Spread Factor
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Test Mode: 802.11ac (40MHz), Ant 0				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2422	31.221	1.375	22.706	≥ 5
2442	31.148	1.375	22.653	≥ 5
2462	31.027	1.375	22.565	≥ 5
Test Mode: 802.11ac (40MHz), Ant 1				
Frequency	Spread Bandwidth	Transmission rate	Spread Factor	Limit
2422	31.203	1.375	22.693	≥ 5
2442	31.061	1.375	22.590	≥ 5
2462	30.953	1.375	22.511	≥ 5

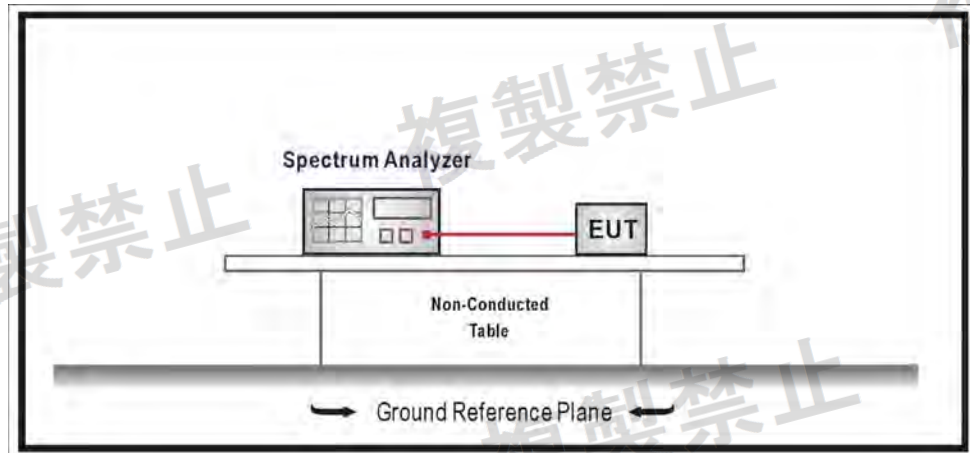
Calculation Method: Spread Factor

= (SBW)/ (Frequency equal to the transmission rate of the modulation signal)

Test Result	PASS
--------------------	------

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) A measurement instrument with an integrated 99% power bandwidth function may be used to automate the test process.
- (c) The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slowly, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (d) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

4.3. Limits

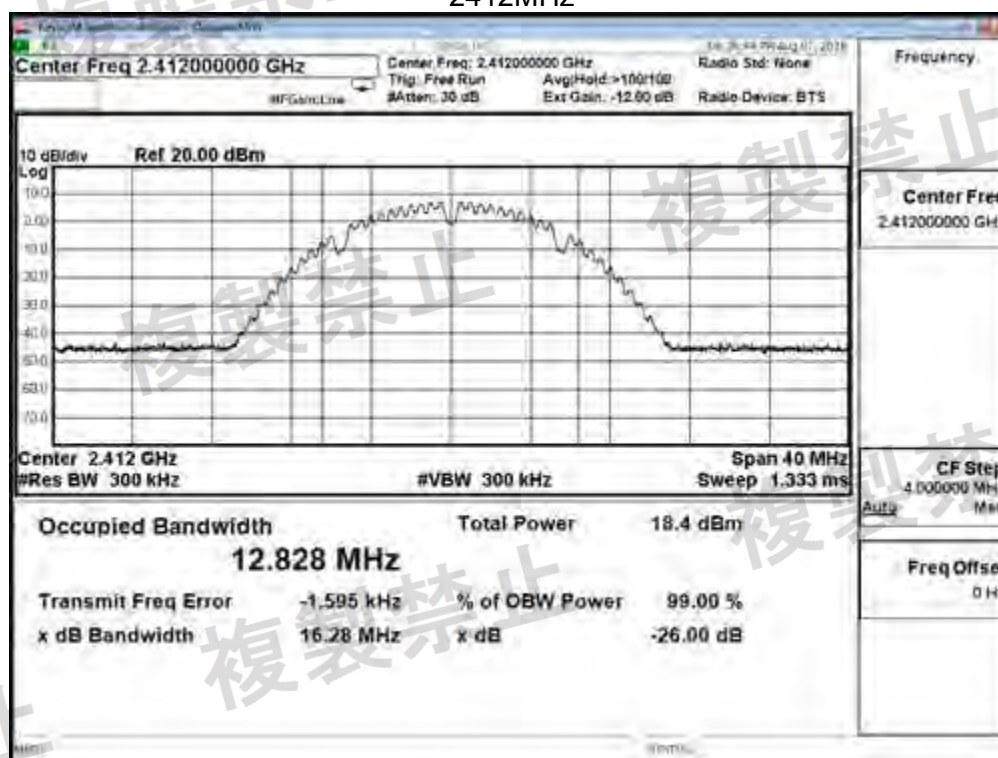
≤ 26 MHz or ≤ 38 MHz for DSSS, ≤ 83.5 MHz for FHSS

4.4. Test Result of Occupied Bandwidth

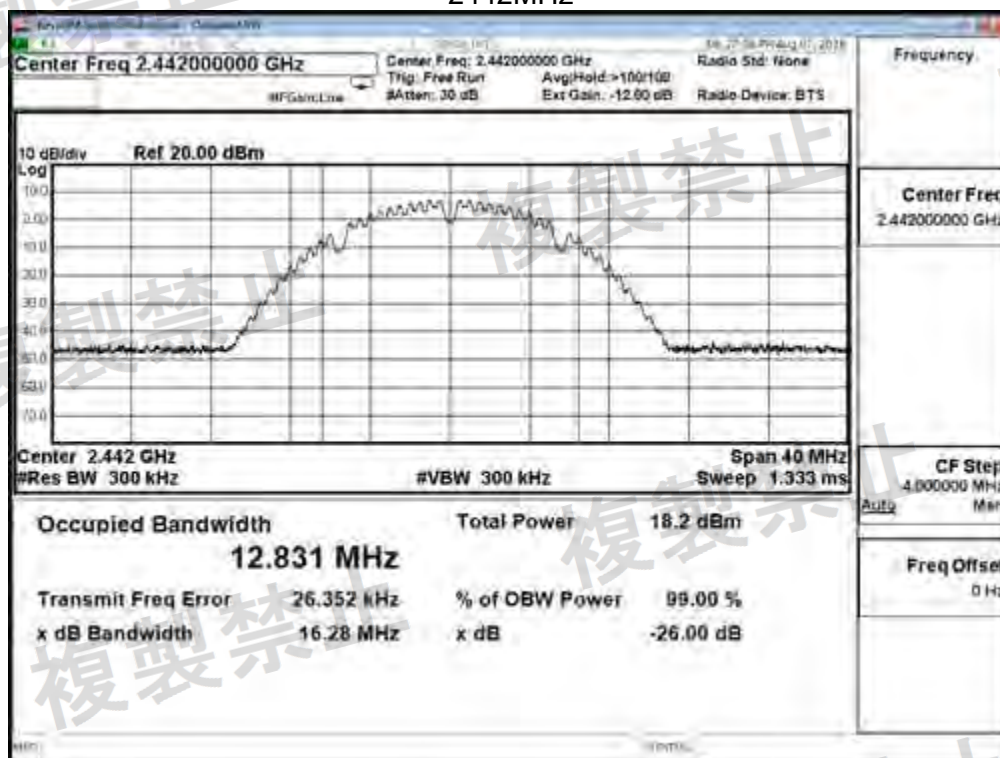
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11b, ANT0		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2412	12.828	≤ 26
2442	12.831	≤ 26
2472	12.853	≤ 26

2412MHz



2442MHz



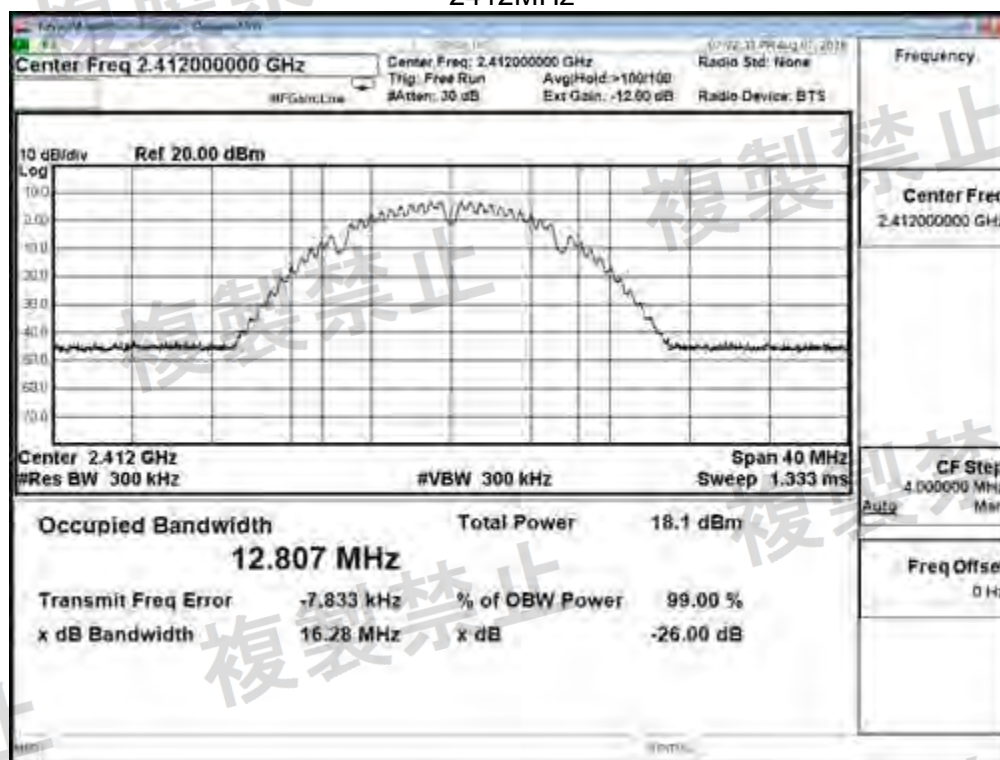
2472MHz



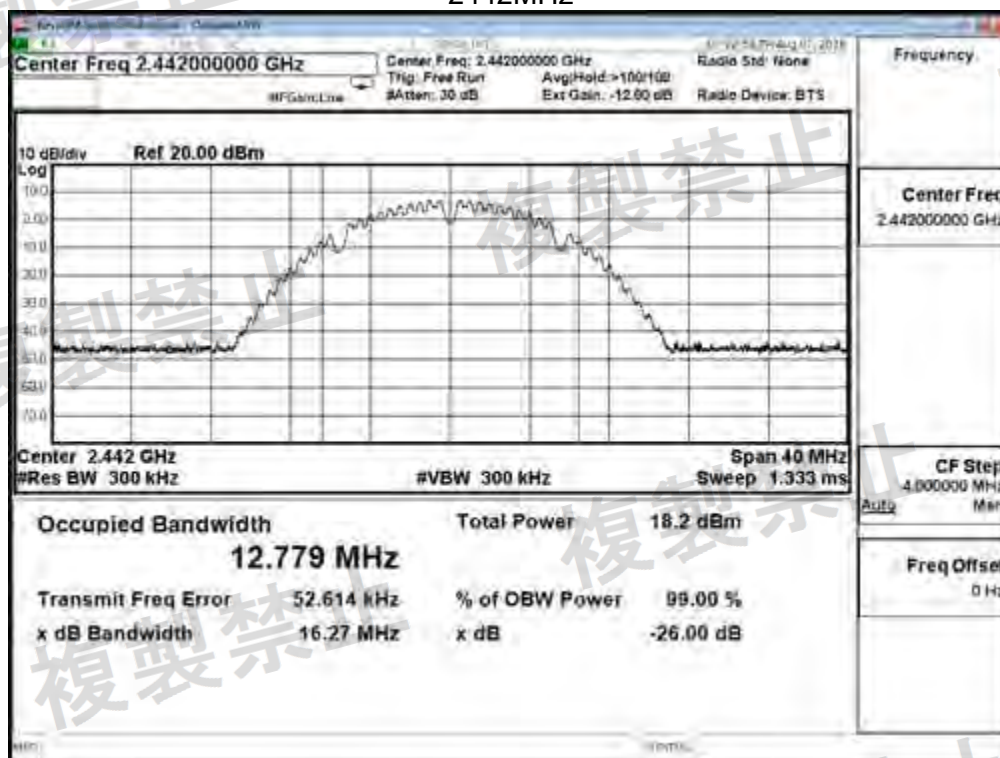
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11b, ANT1		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2412	12.807	≤ 26
2442	12.779	≤ 26
2472	12.871	≤ 26

2412MHz



2442MHz



2472MHz



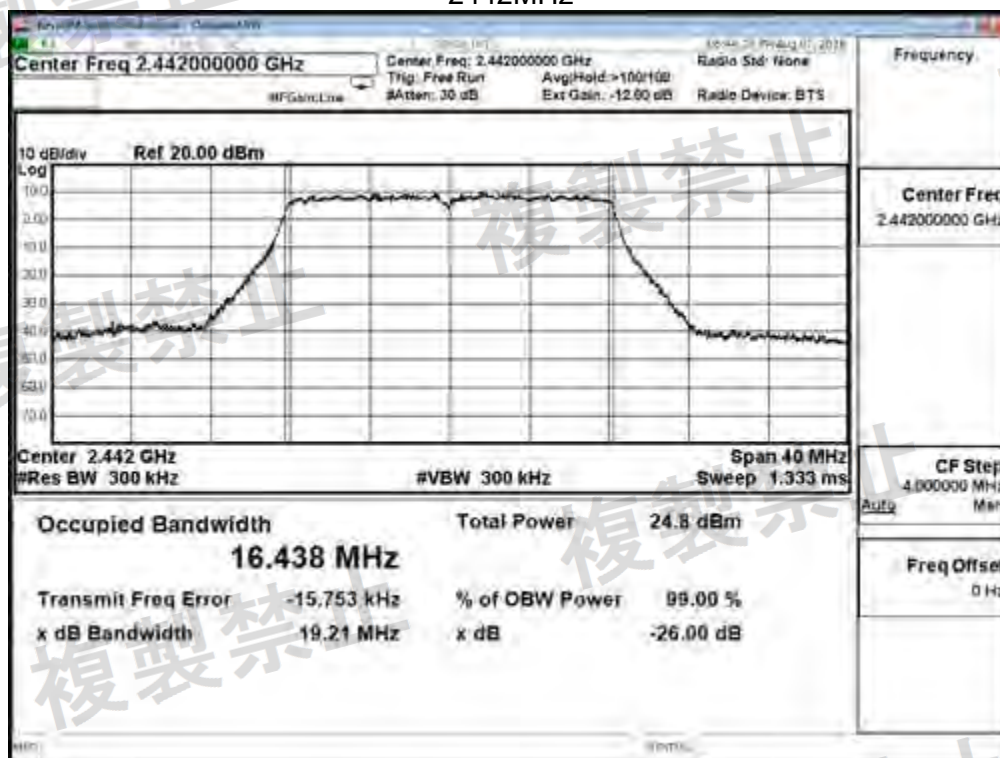
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11g, ANT0		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2412	16.434	≤ 26
2442	16.438	≤ 26
2472	16.431	≤ 26

2412MHz



2442MHz



2472MHz



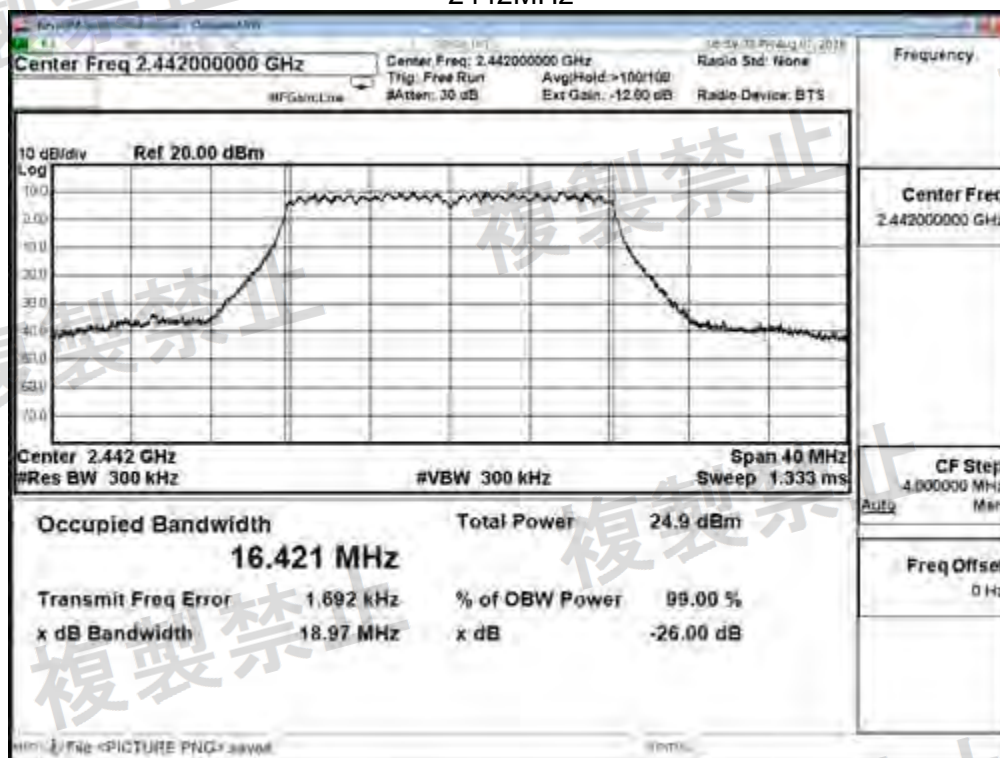
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11g, ANT1		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2412	16.407	≤ 26
2442	16.421	≤ 26
2472	16.416	≤ 26

2412MHz



2442MHz



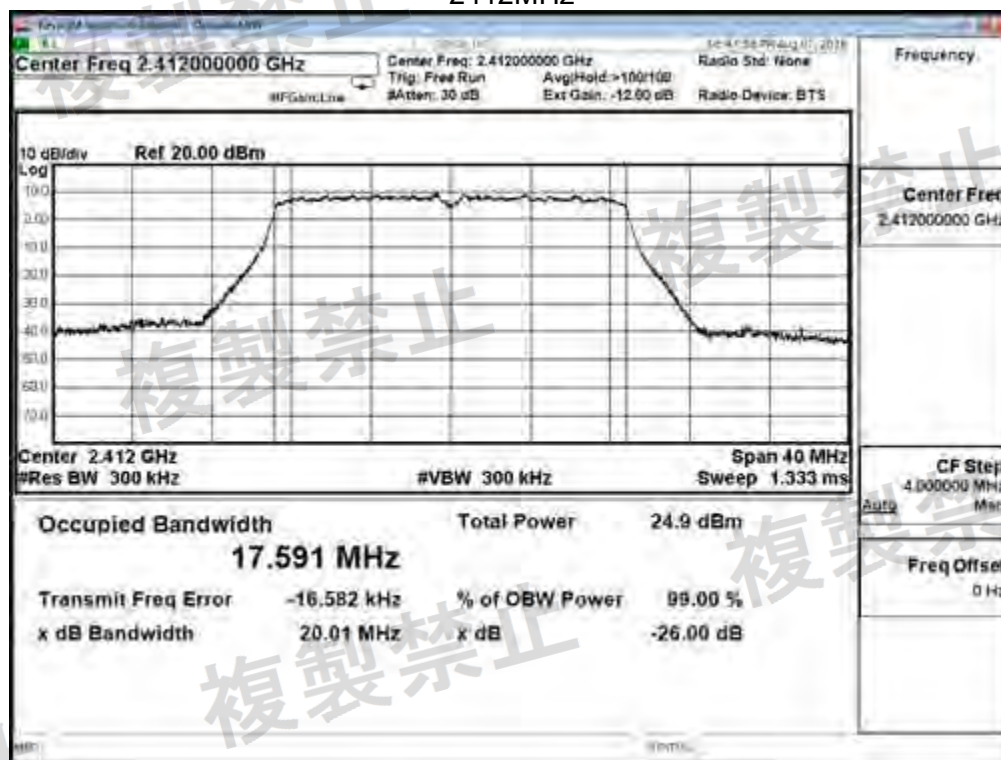
2472MHz



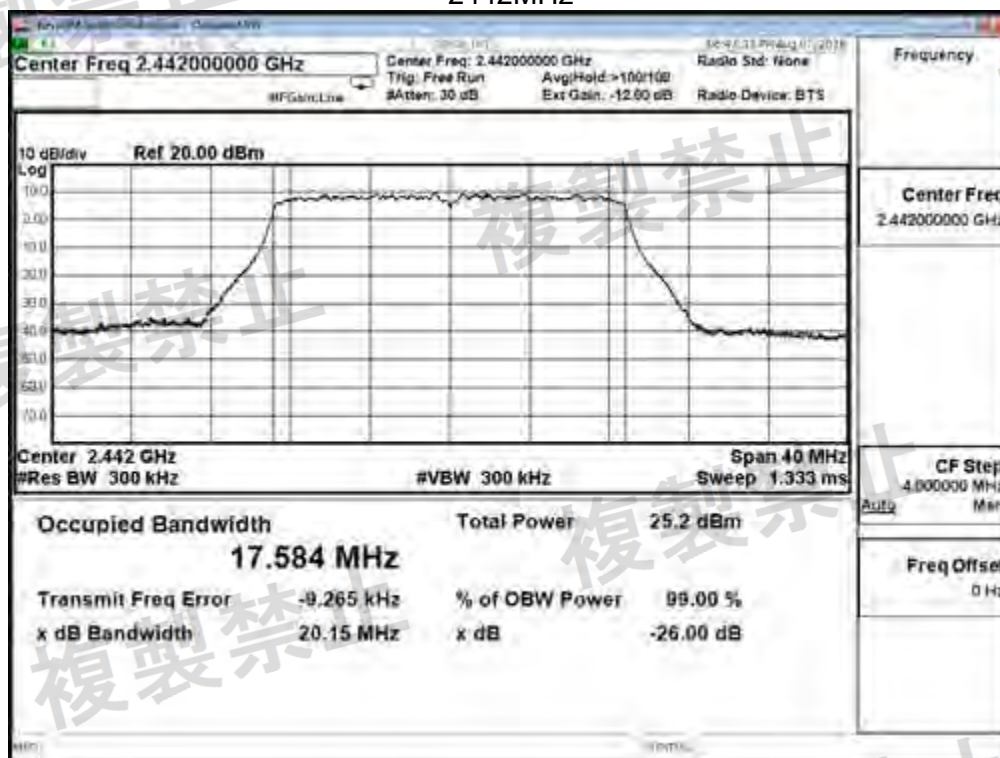
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (20MHz), Ant 0		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2412	17.591	≤ 26
2442	17.584	≤ 26
2472	17.604	≤ 26

2412MHz



2442MHz



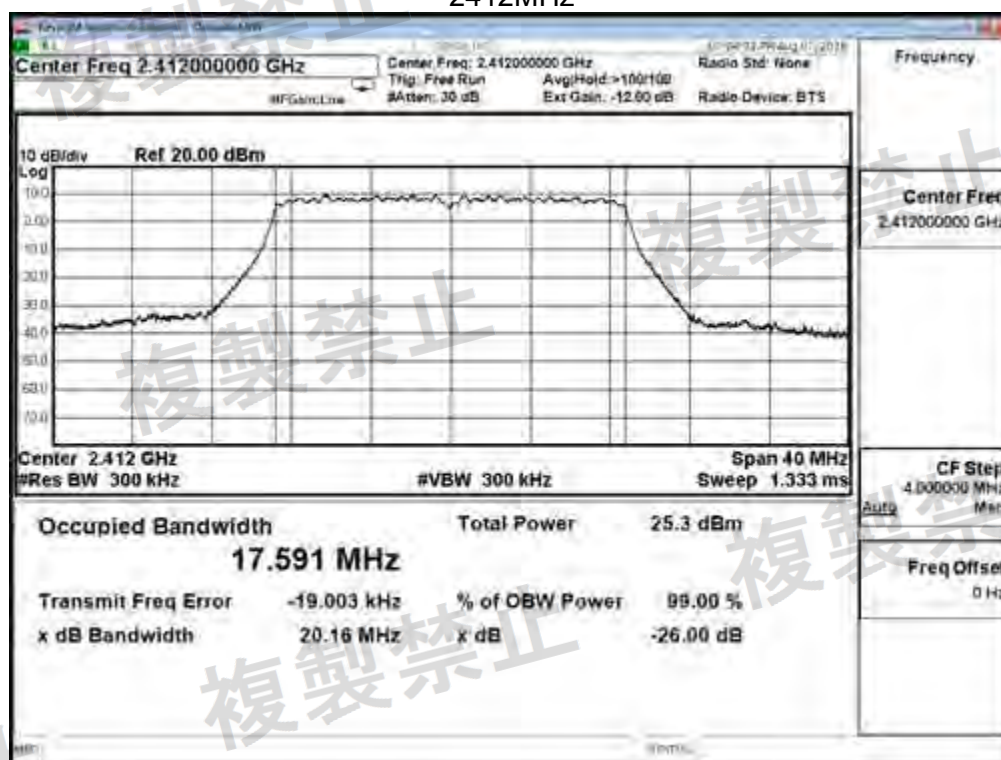
2472MHz



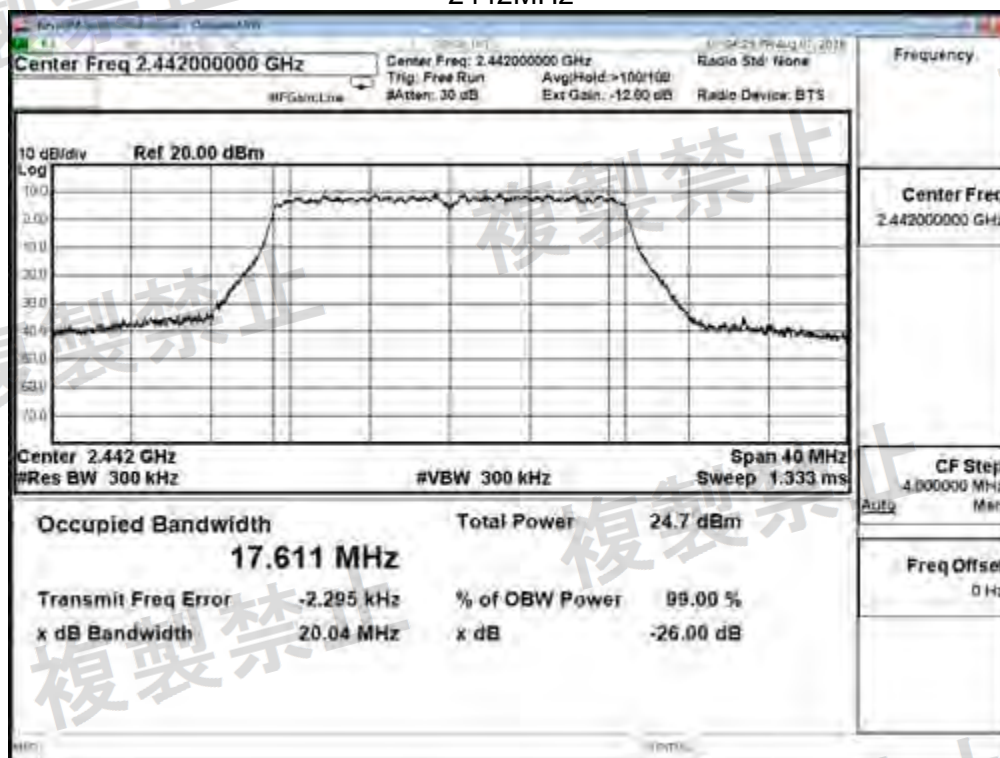
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (20MHz), Ant 1		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2412	17.591	≤ 26
2442	17.611	≤ 26
2472	17.601	≤ 26

2412MHz



2442MHz



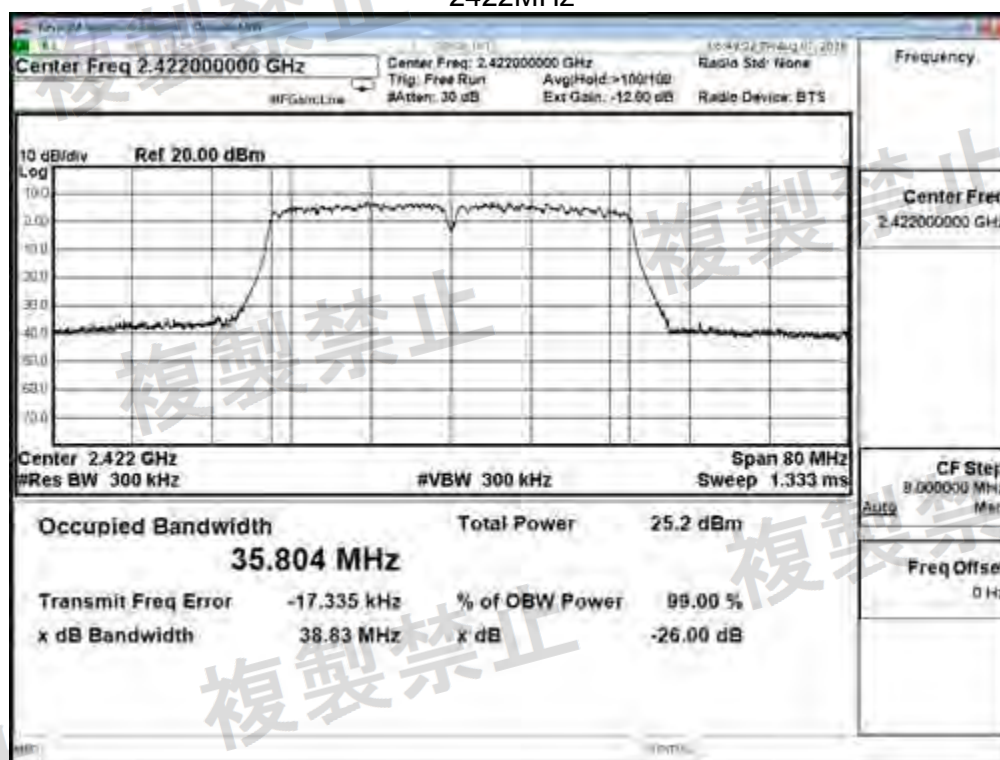
2472MHz



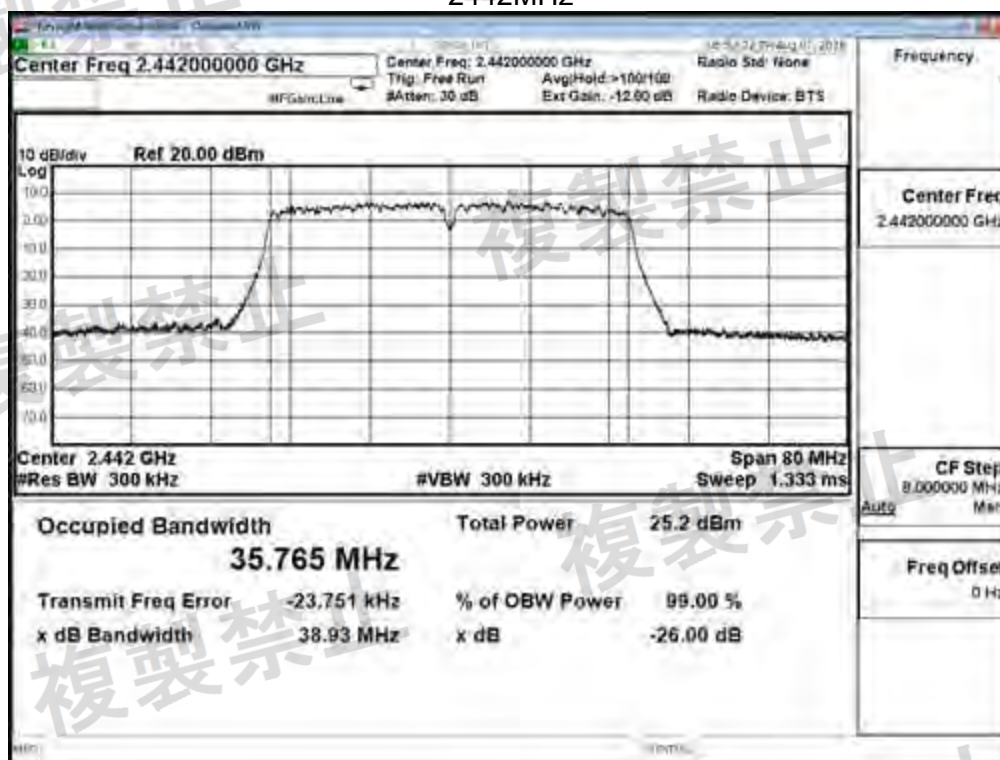
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (40MHz), Ant 0		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2422	35.804	≤ 38
2442	35.765	≤ 38
2462	35.755	≤ 38

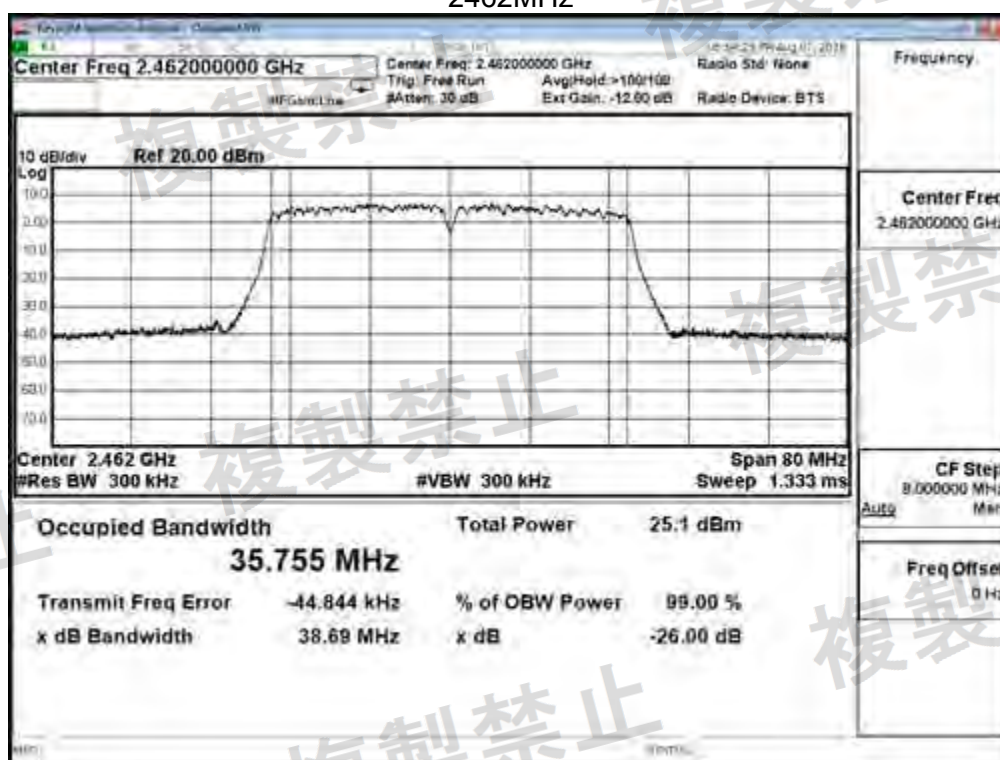
2422MHz



2442MHz



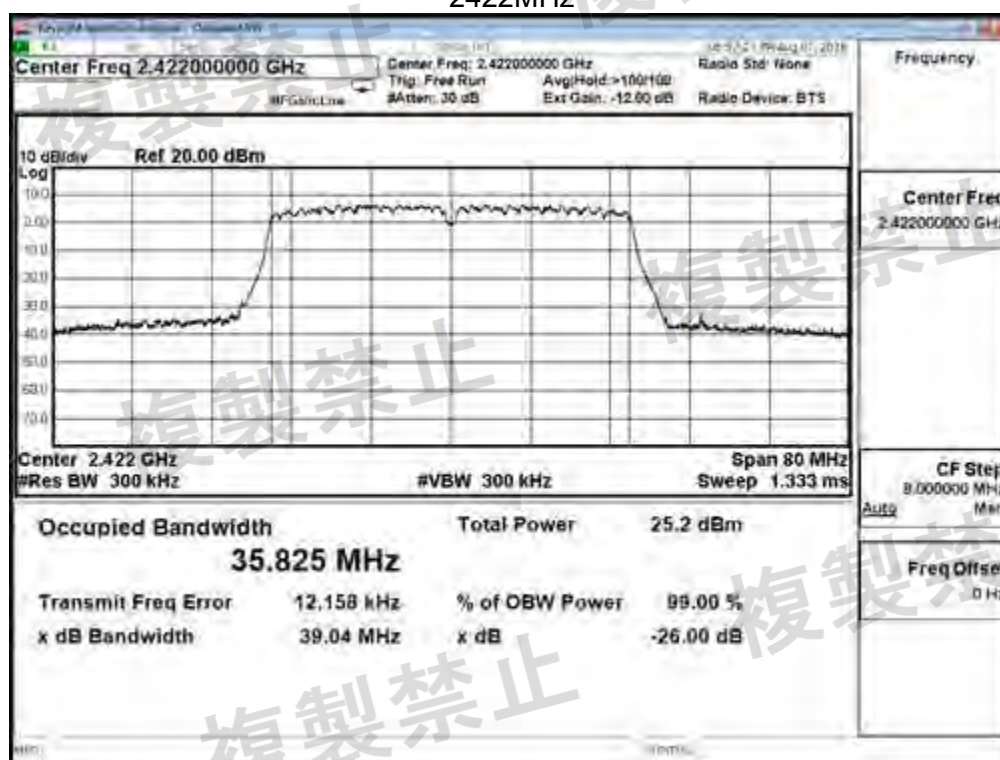
2462MHz



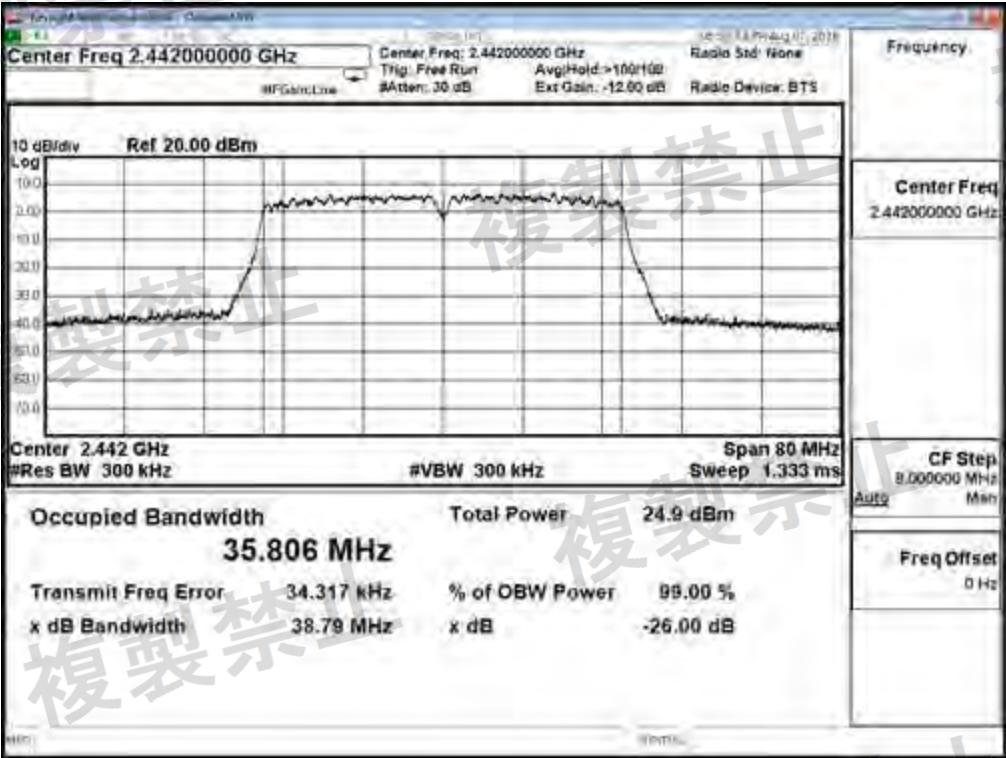
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/07

Test Mode: 802.11ac (40MHz), Ant 1		
Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2422	35.825	≤ 38
2442	35.806	≤ 38
2462	35.778	≤ 38

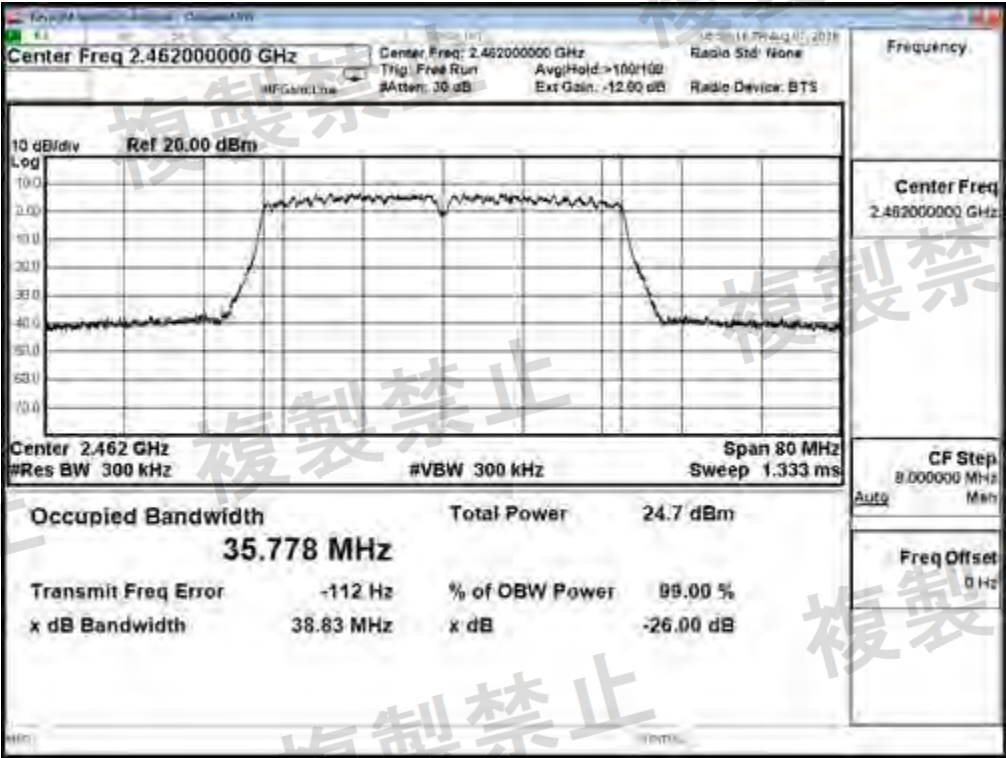
2422MHz



2442MHz



2462MHz

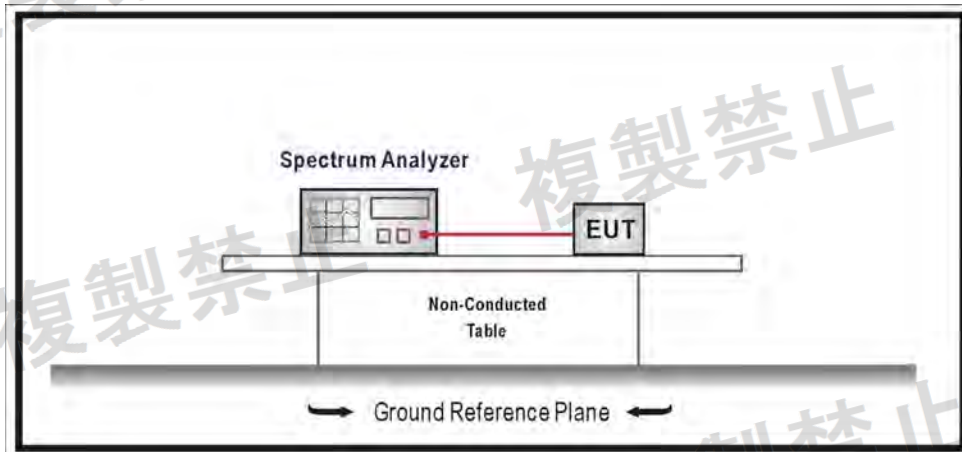


Test Result

PASS

5. Frequency Tolerance

5.1. Test Setup



5.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slowly, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (c) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

5.3. Limits

$\leq \pm 50$ ppm

5.4. Test Result of Frequency Tolerance

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Frequency Tolerance
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

Ant 0				
Frequency (MHz)	Working Voltage (V)	Real Value (MHz)	Real Value (ppm)	Limit (ppm)
2412	90	2411.994000	-2.487562	±50
	100	2411.996000	-1.658375	
	110	2411.998000	-0.829187	
2422	90	2421.996000	-1.651528	
	100	2421.996000	-1.651528	
	110	2421.998000	-0.825764	
2442	90	2442.026000	10.647011	
	100	2442.028000	11.466011	
	110	2442.028000	11.466011	
2462	90	2461.984000	-6.498781	
	100	2461.982000	-7.311129	
	110	2461.982000	-7.311129	
2472	90	2471.994000	-2.427184	
	100	2471.998000	-0.809061	
	110	2471.996000	-1.618123	

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Frequency Tolerance
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/06

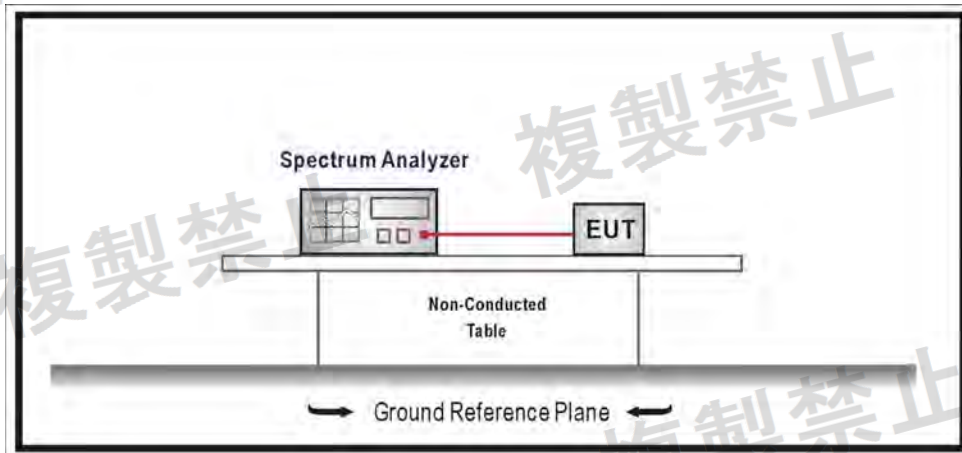
Ant 1				
Frequency (MHz)	Working Voltage (V)	Real Value (MHz)	Real Value (ppm)	Limit (ppm)
2412	90	2412.002000	0.829187	±50
	100	2412.002000	0.829187	
	110	2412.000000	0.000000	
2422	90	2422.004000	1.651528	
	100	2422.006000	2.477291	
	110	2422.002000	0.825764	
2442	90	2442.037995	15.558968	
	100	2442.035995	14.739967	
	110	2442.035995	14.739967	
2462	90	2461.998000	-0.812348	
	100	2461.998000	-0.812348	
	110	2461.996000	-1.624695	
2472	90	2472.006000	2.427184	
	100	2472.006000	2.427184	
	110	2472.006910	2.795307	

Test Result

PASS

6. Transmitter Spurious Emissions

6.1. Test Setup



6.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (c) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

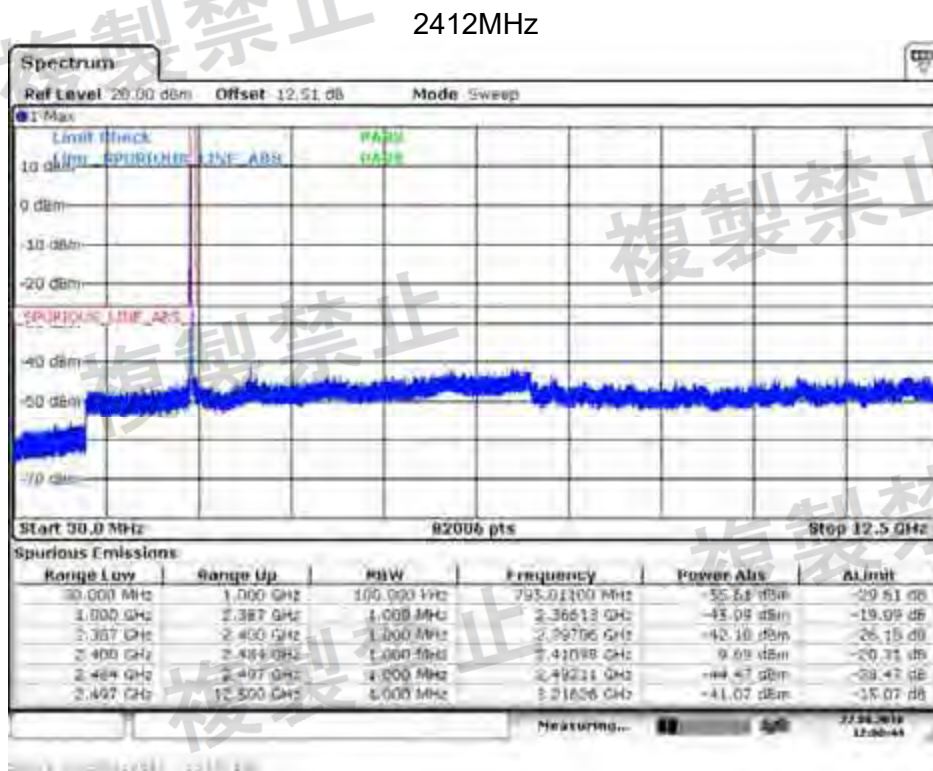
6.3. Limits

- ≤ 26 MHz 2.5uW for 30 – 2387 MHz
- ≤ 26 MHz 25uW for 2387 – 2400 MHz
- ≤ 25 uW for 2483.5 – 2496.5 MHz
- ≤ 2.5 uW for 2496.5 – 12500 MHz

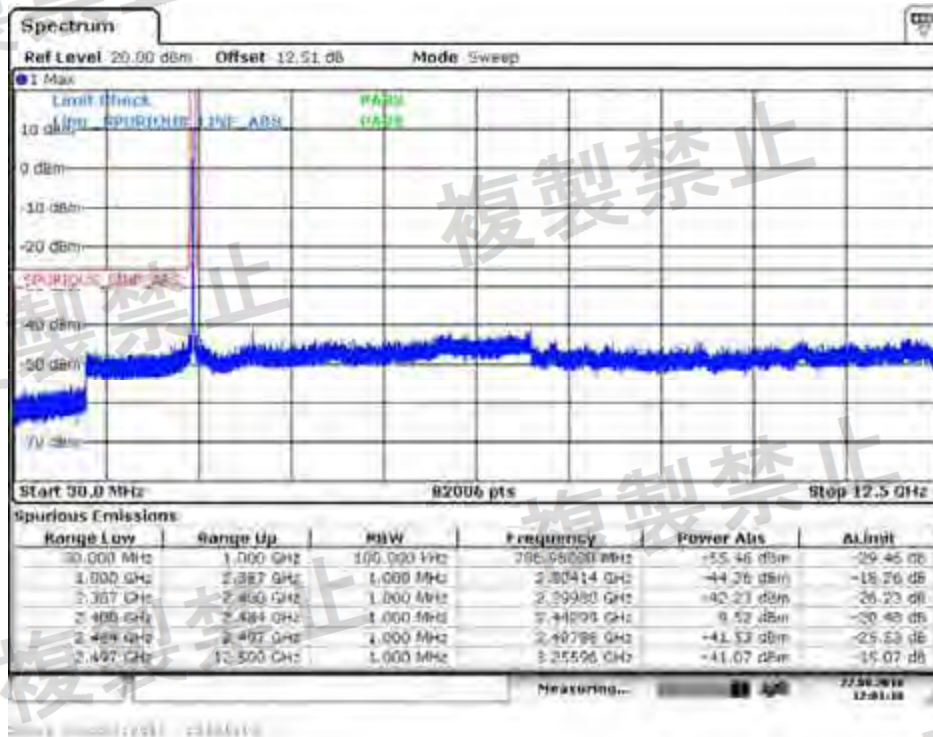
6.4. Test Result of Transmitter Spurious Emissions

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

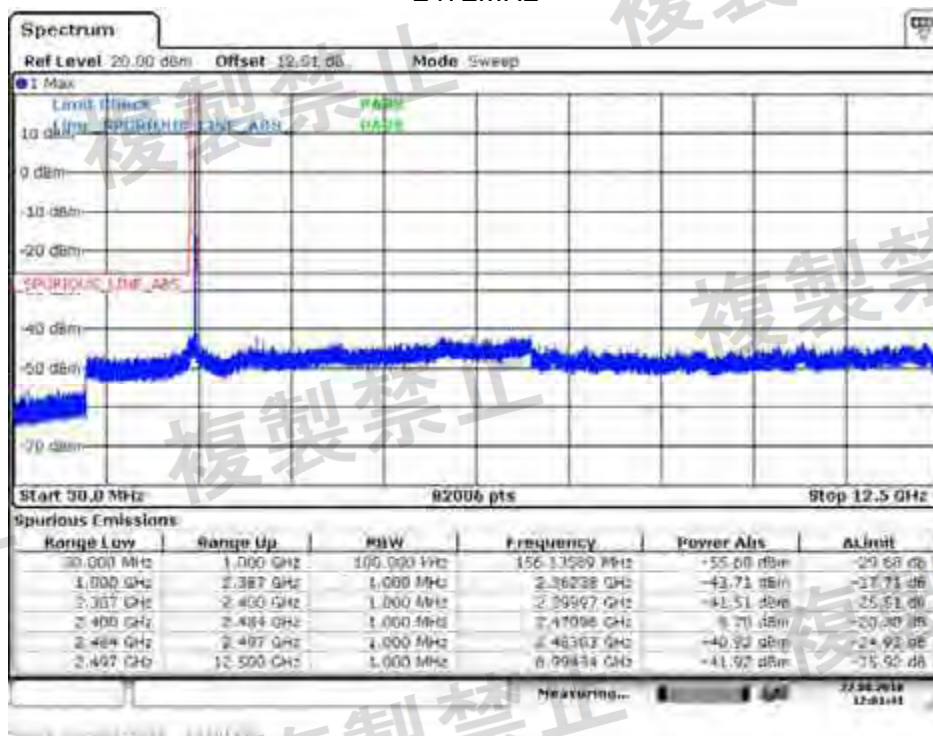
Test Mode: 802.11b, ANT0	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



2442MHz



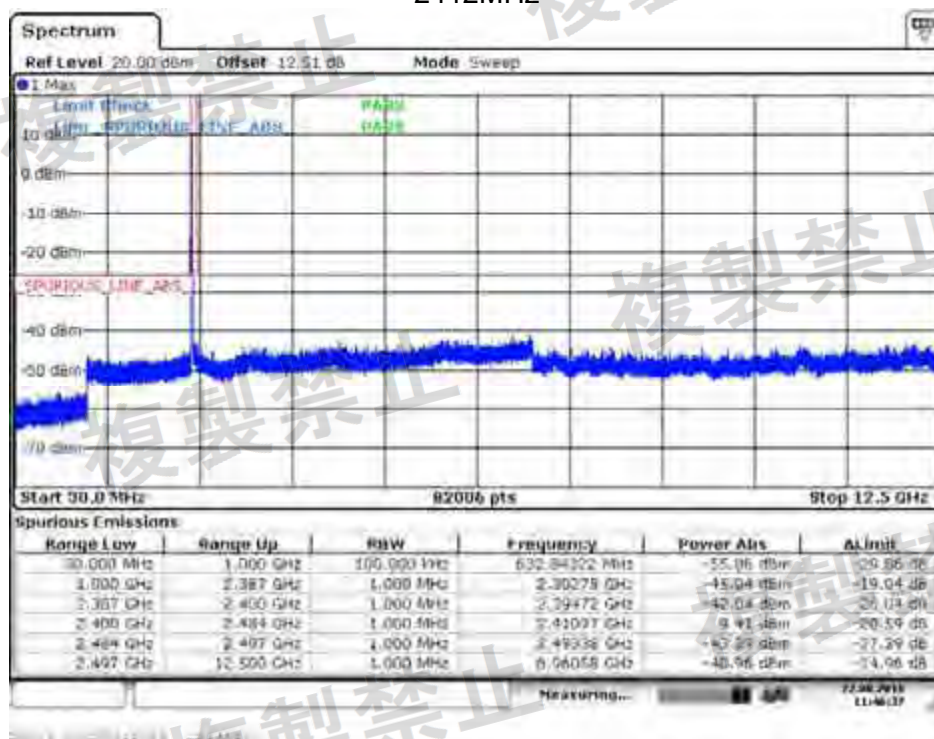
2472MHz



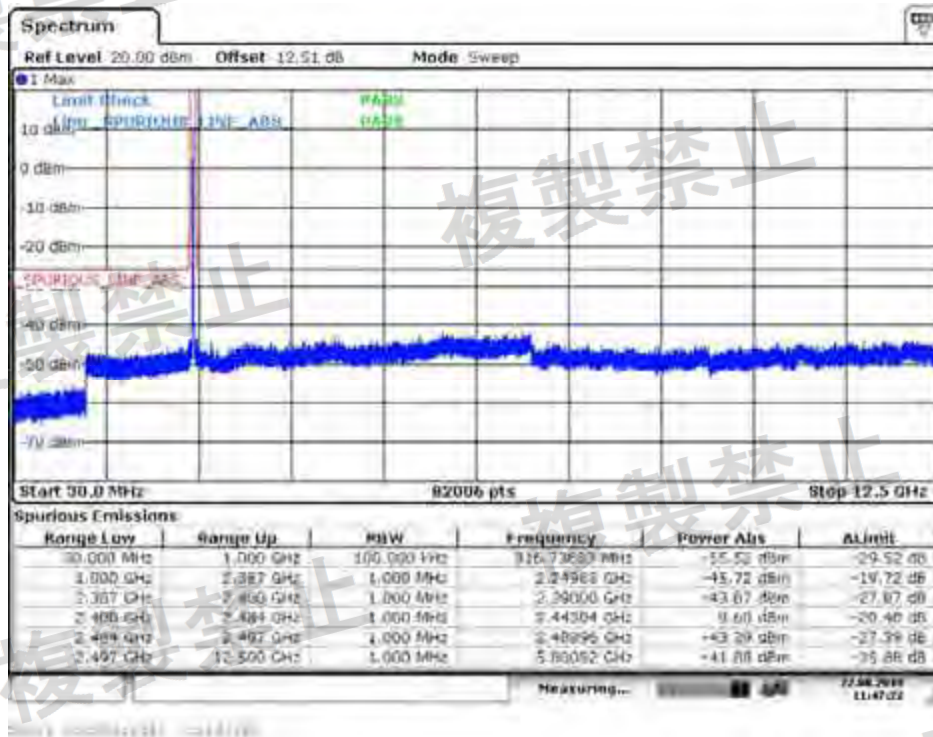
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

Test Mode: 802.11b, ANT1	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS

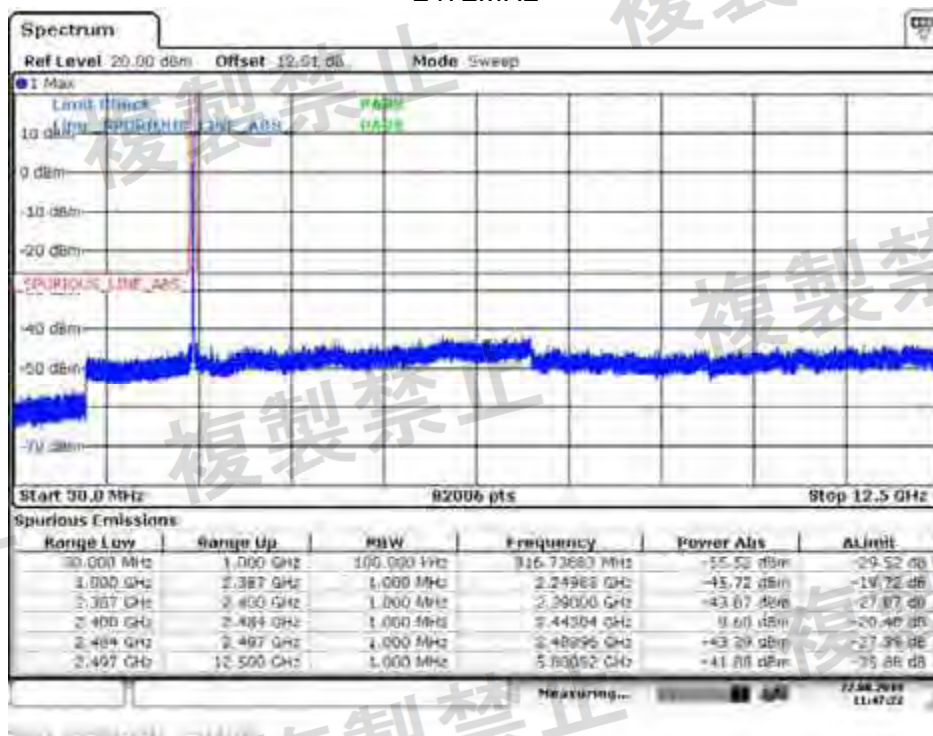
2412MHz



2442MHz

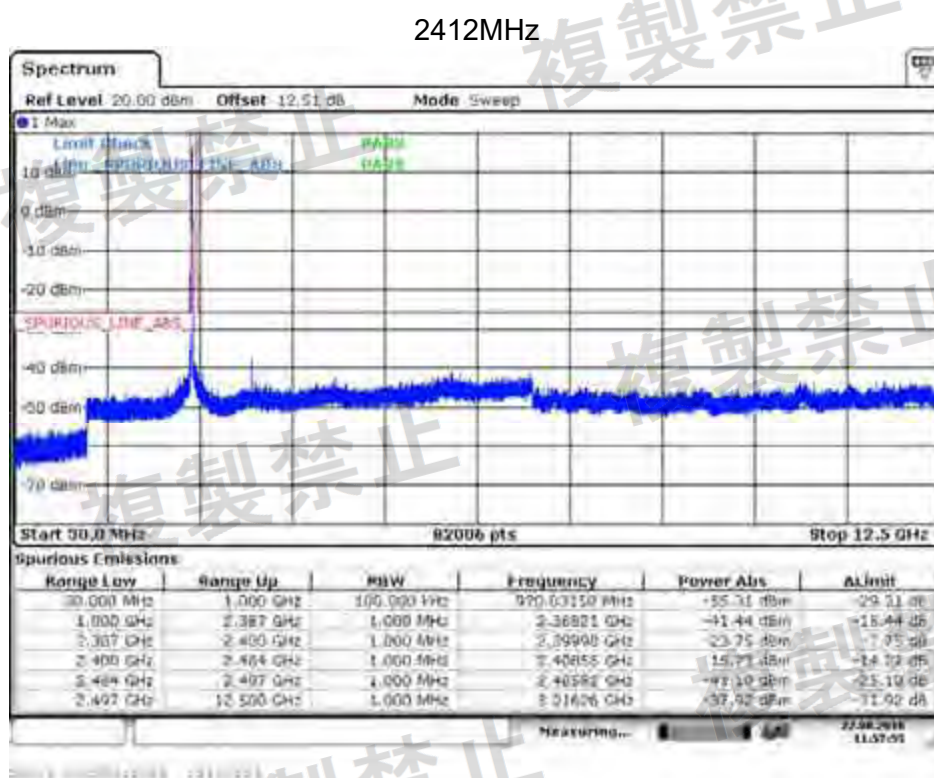


2472MHz

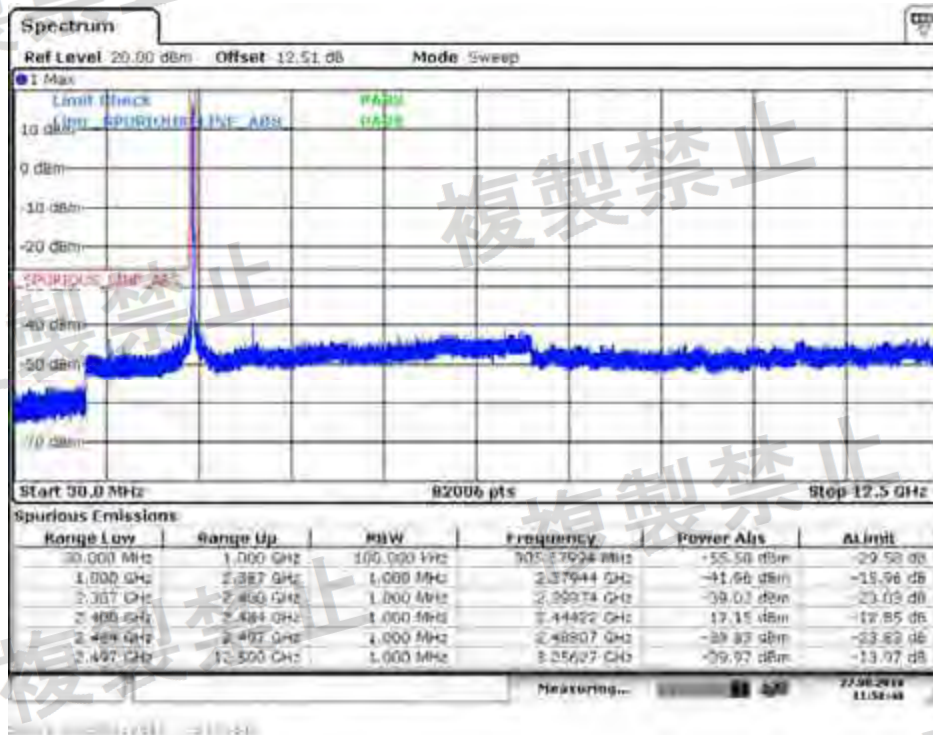


Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

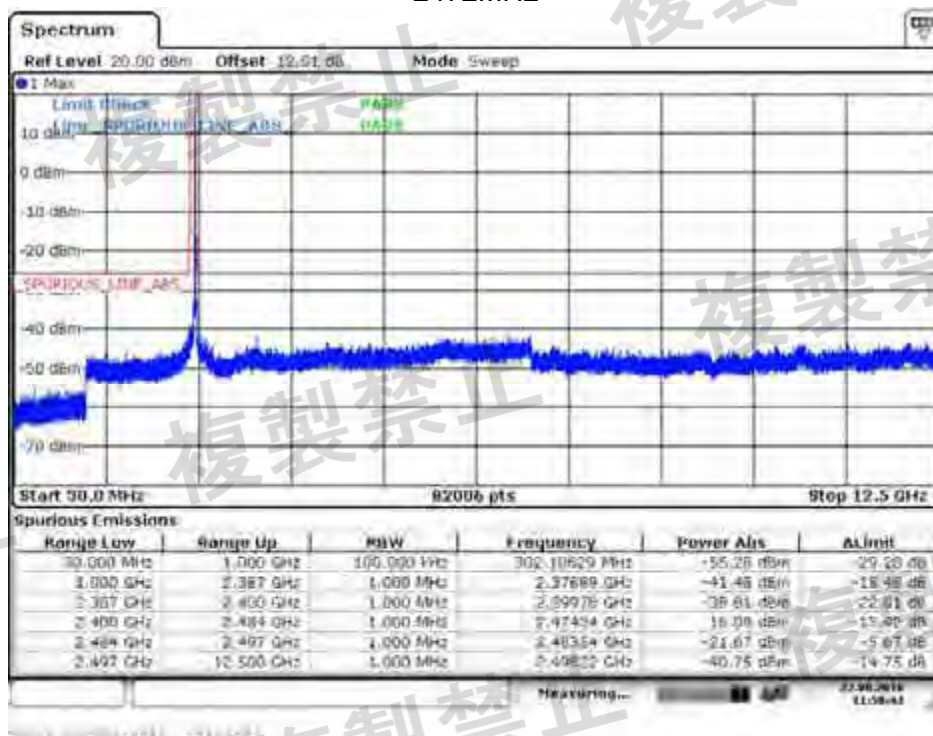
Test Mode: 802.11g, ANT0	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



2442MHz



2472MHz

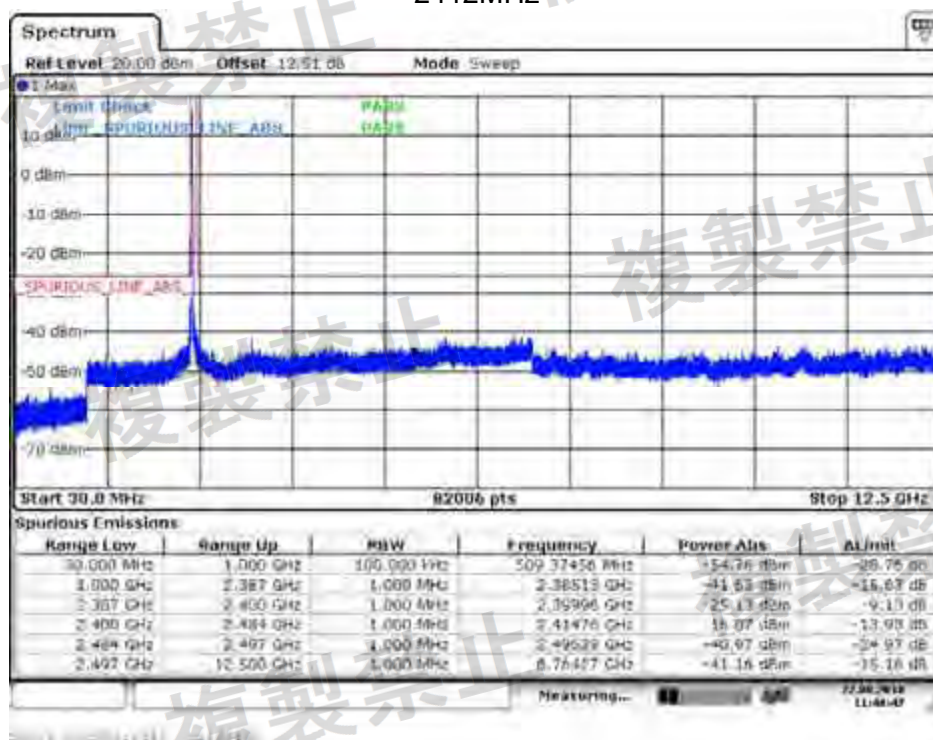


Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

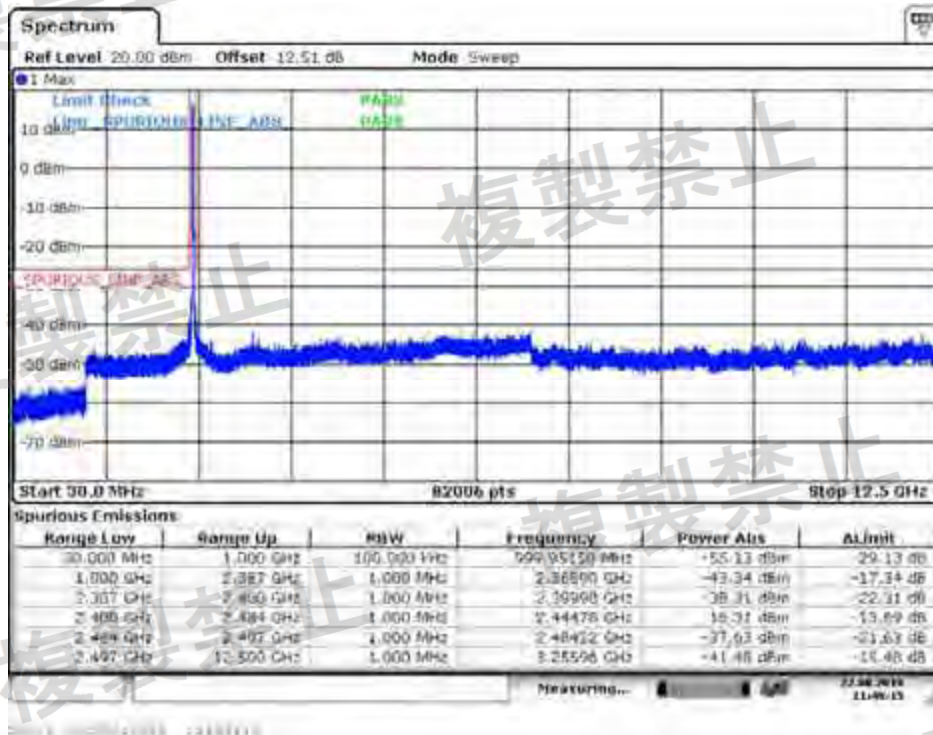
Test Mode: 802.11g, ANT1

Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS

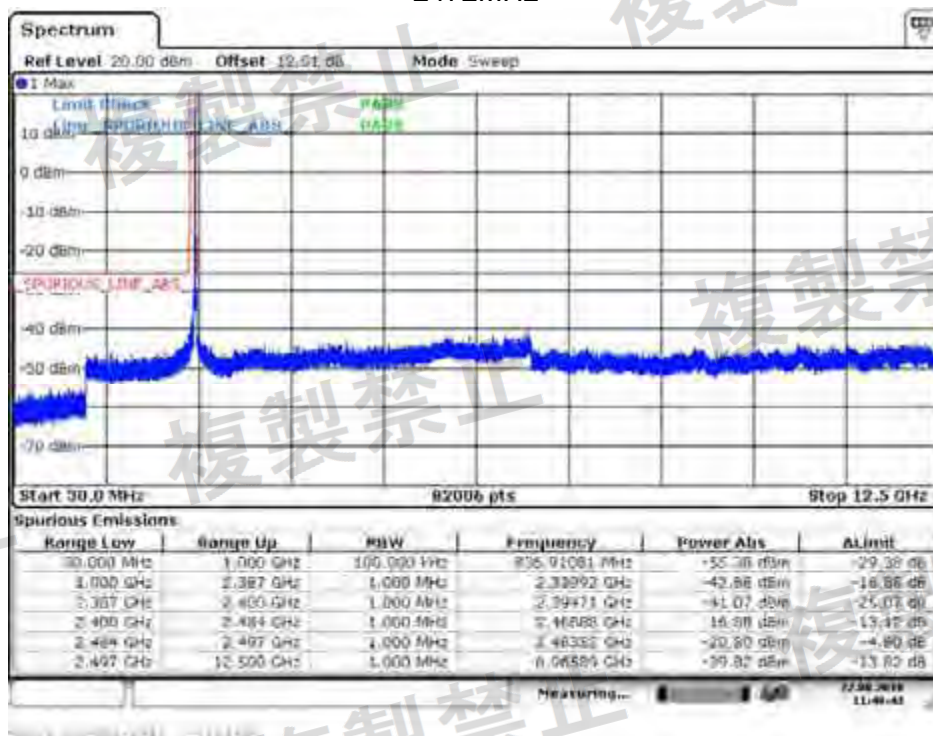
2412MHz



2442MHz



2472MHz

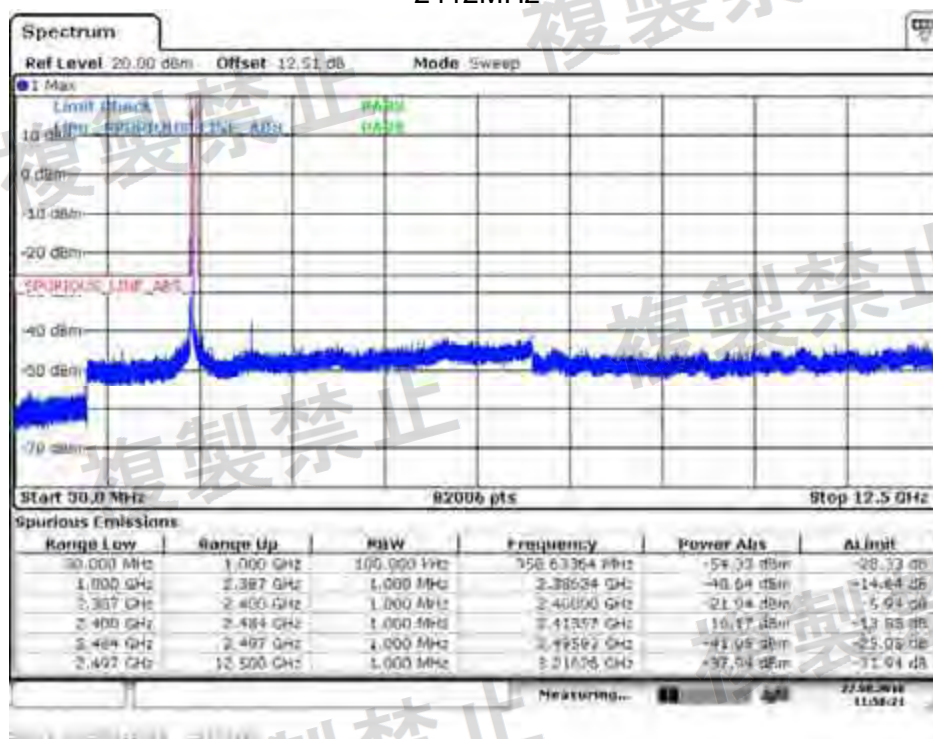


Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

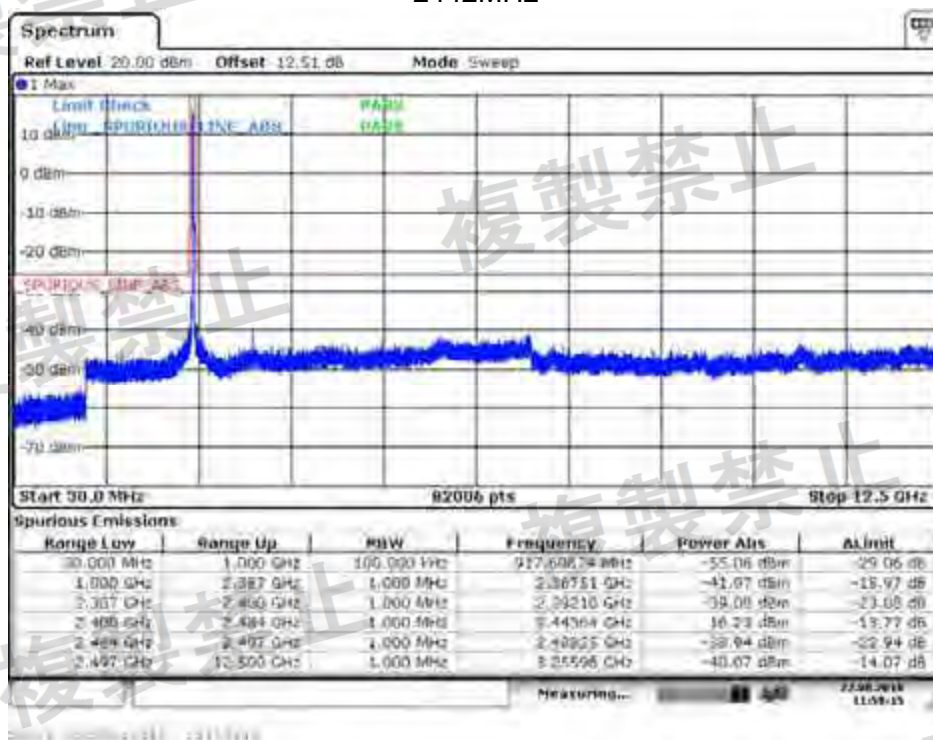
Test Mode: 802.11ac (20MHz), ANT0

Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS

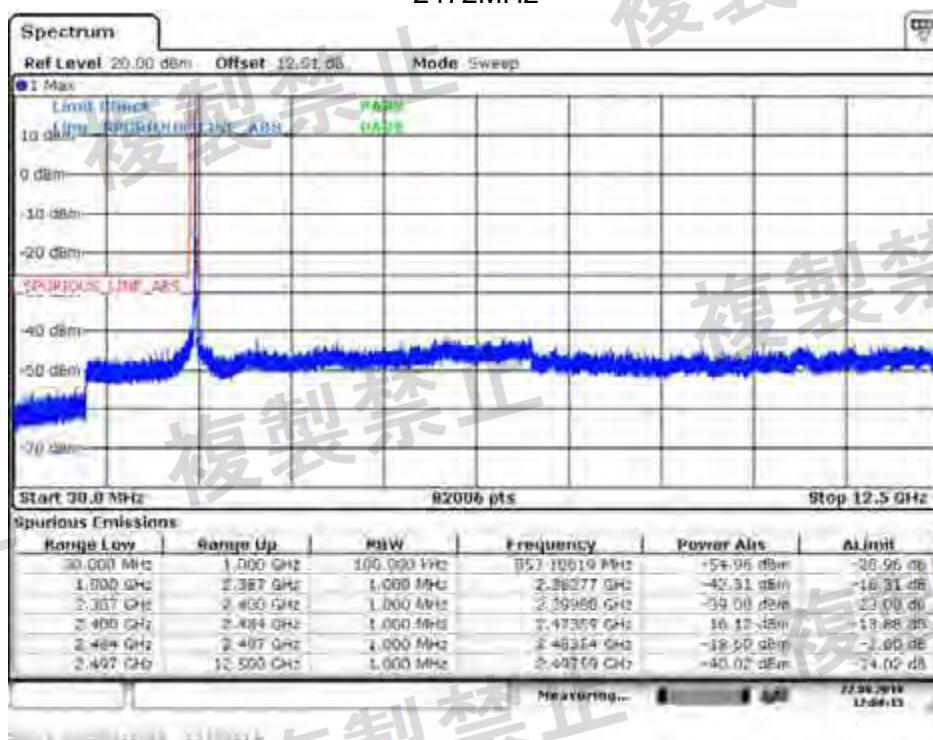
2412MHz



2442MHz

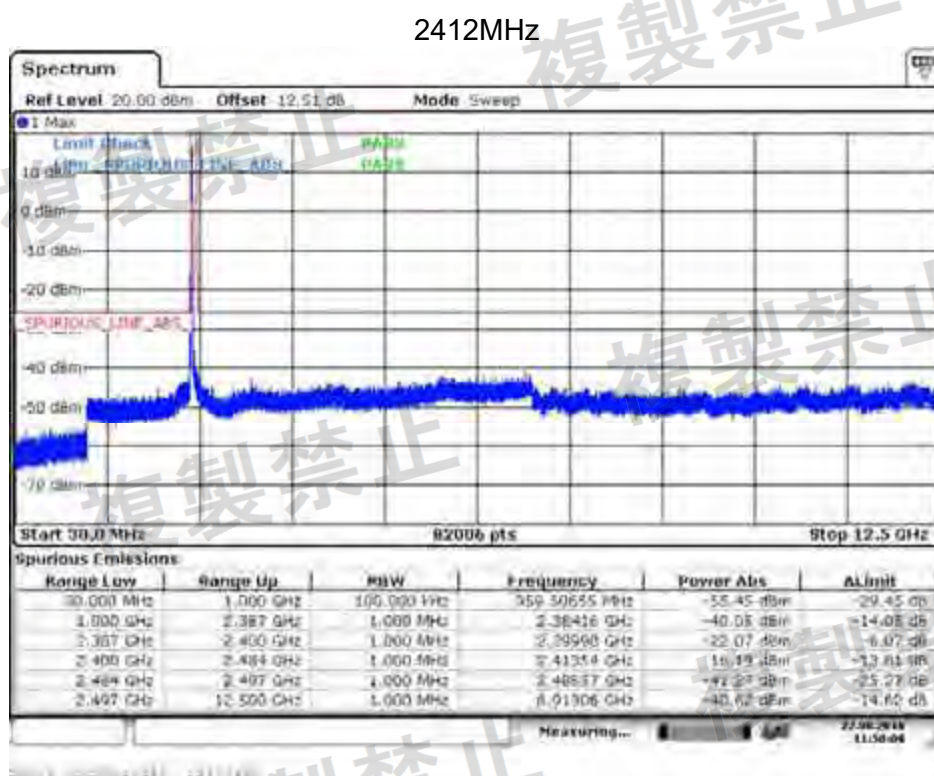


2472MHz

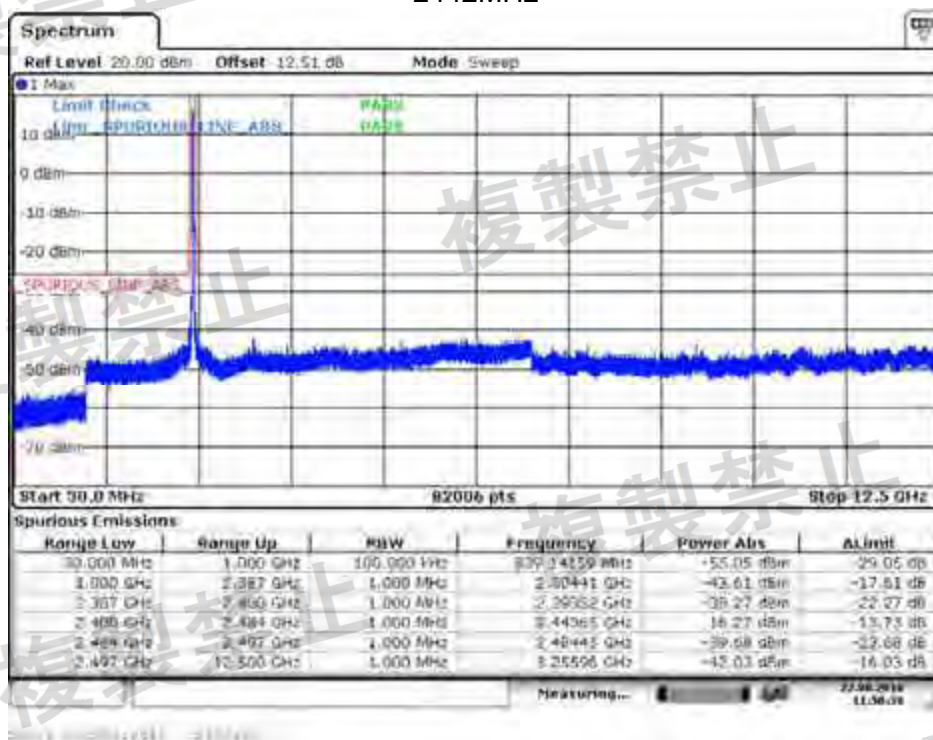


Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

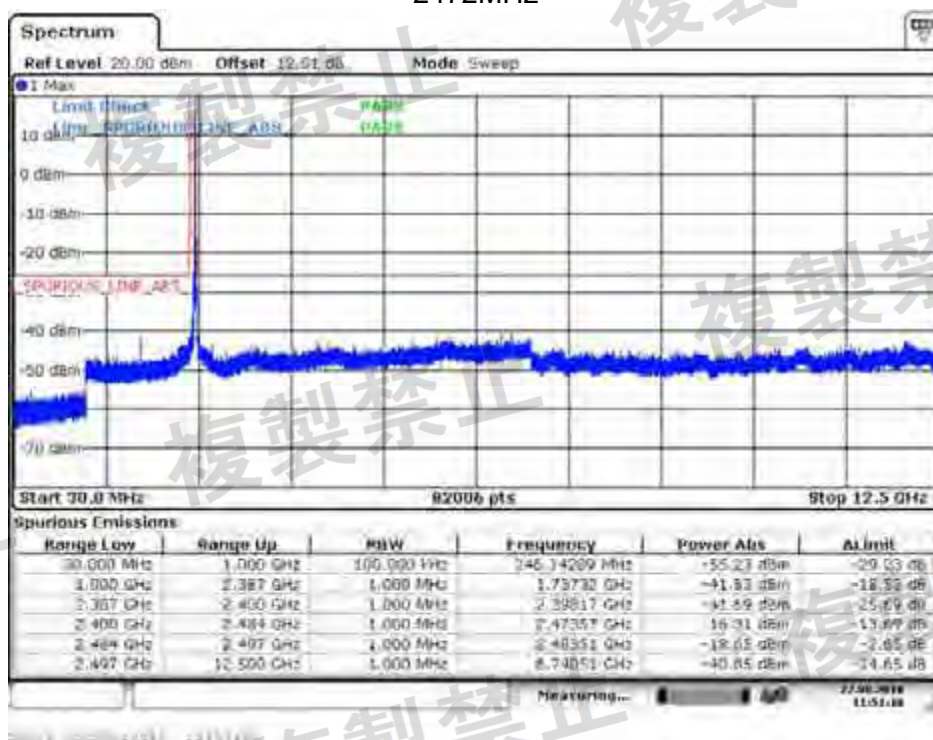
Test Mode: 802.11ac (20MHz), AN1	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



2442MHz



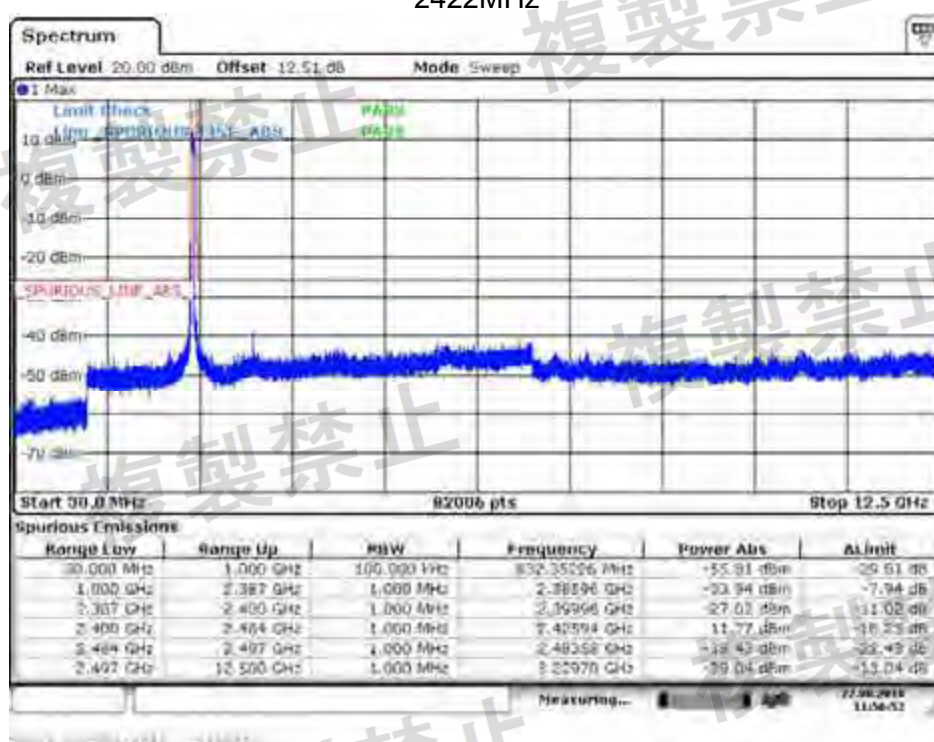
2472MHz



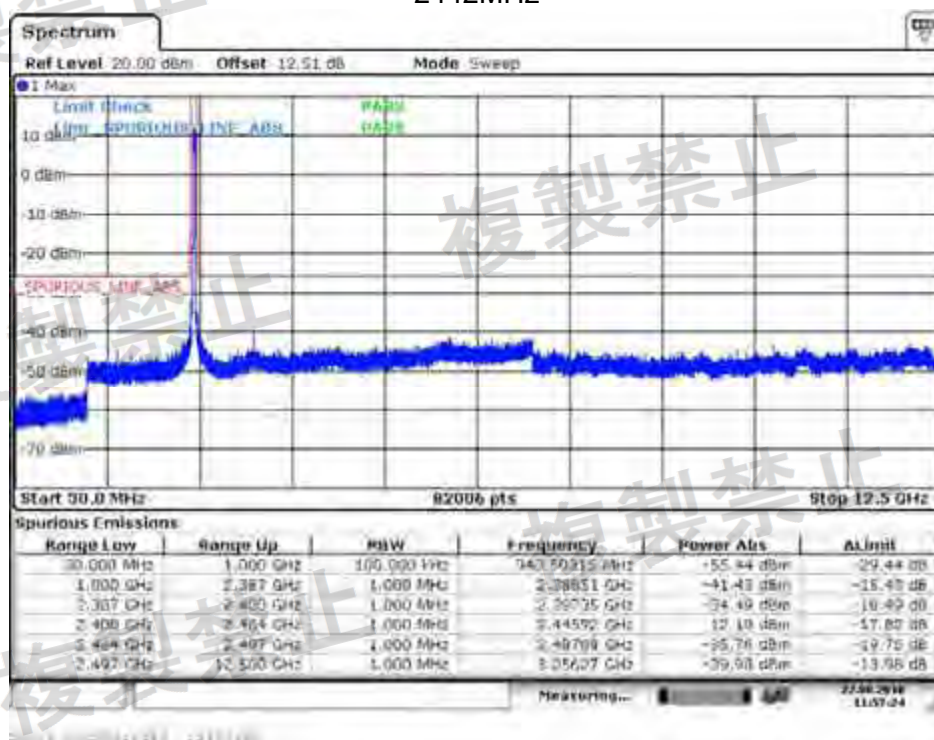
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

Test Mode: 802.11ac (40MHz), ANT0	
Frequency (MHz)	Test Result
2422	PASS
2442	PASS
2462	PASS

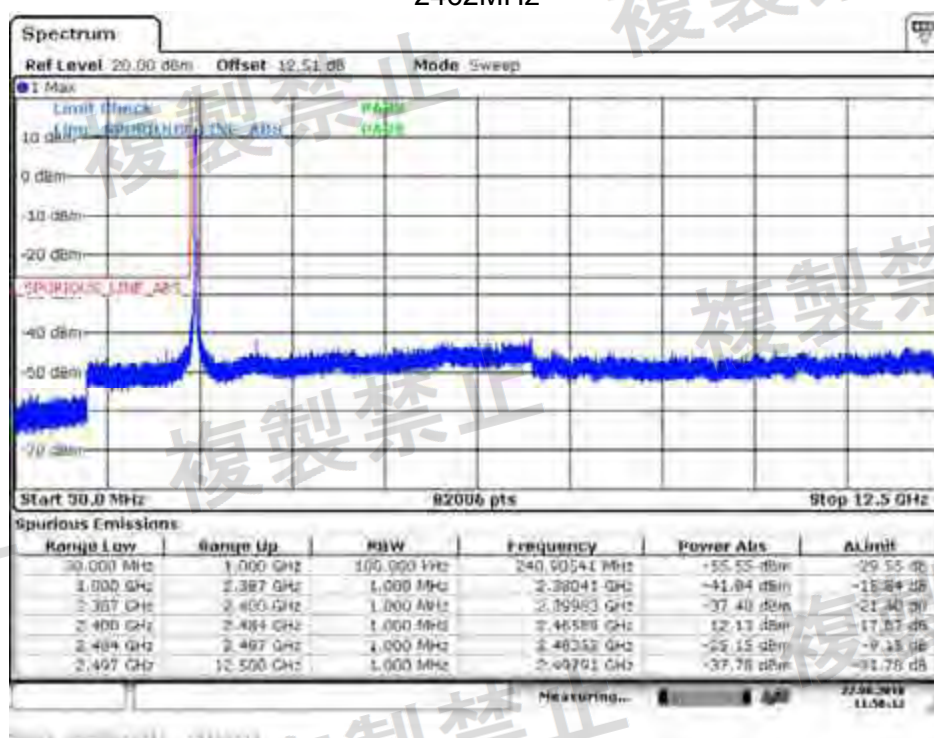
2422MHz



2442MHz



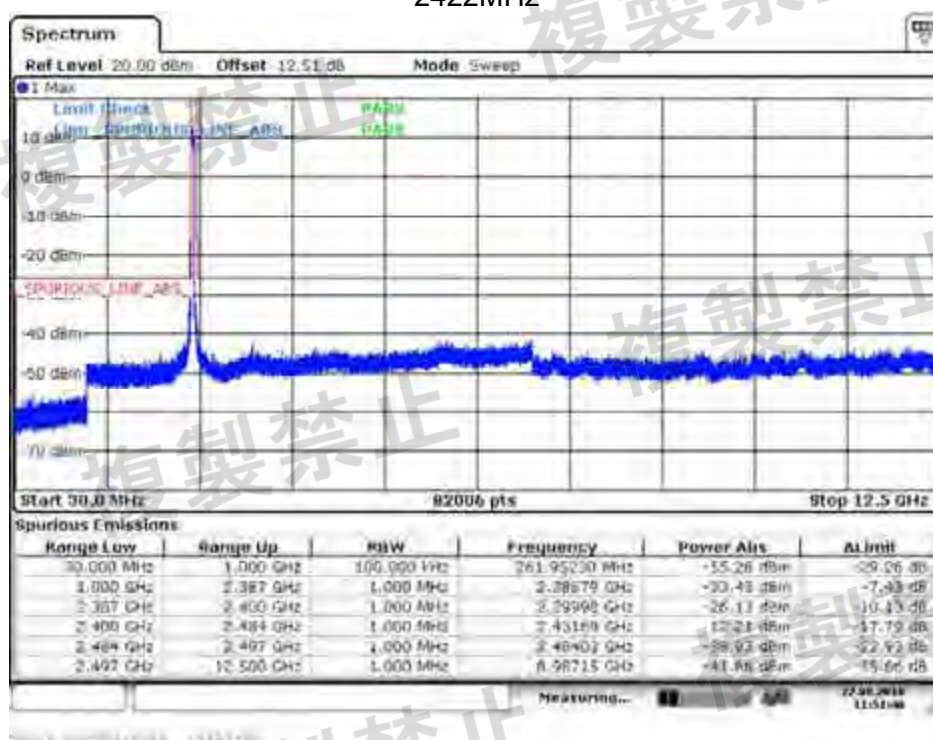
2462MHz



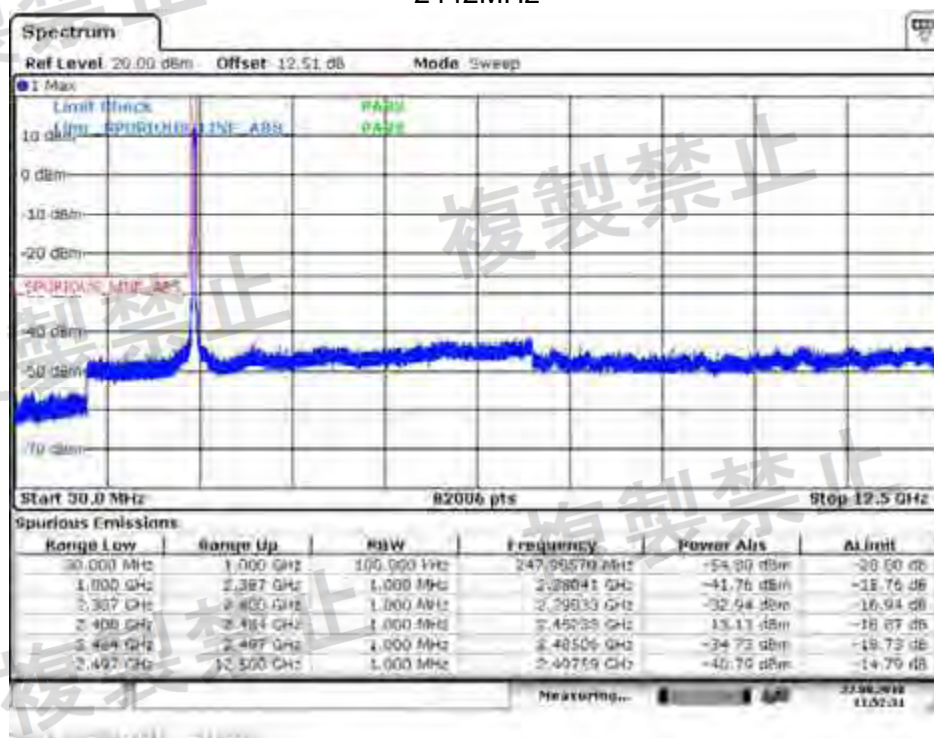
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Transmitter Spurious Emissions
 Test Mode : Mode 1: Transmitter (CCD Mode)
 Test Date : 2018/08/22

Test Mode: 802.11ac (40MHz), ANT1	
Frequency (MHz)	Test Result
2422	PASS
2442	PASS
2462	PASS

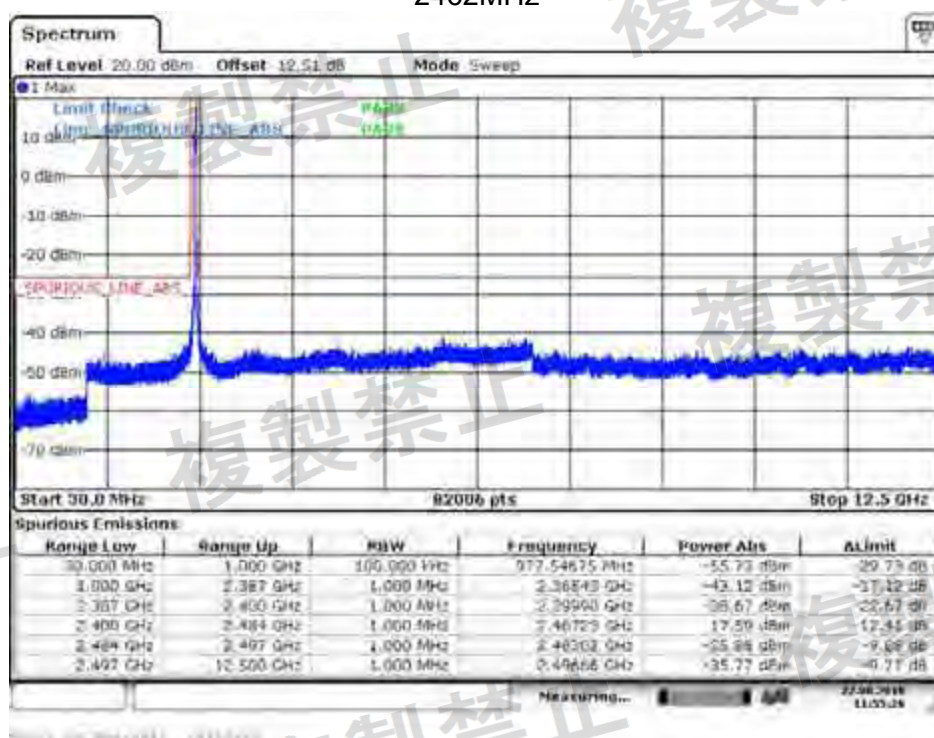
2422MHz



2442MHz



2462MHz

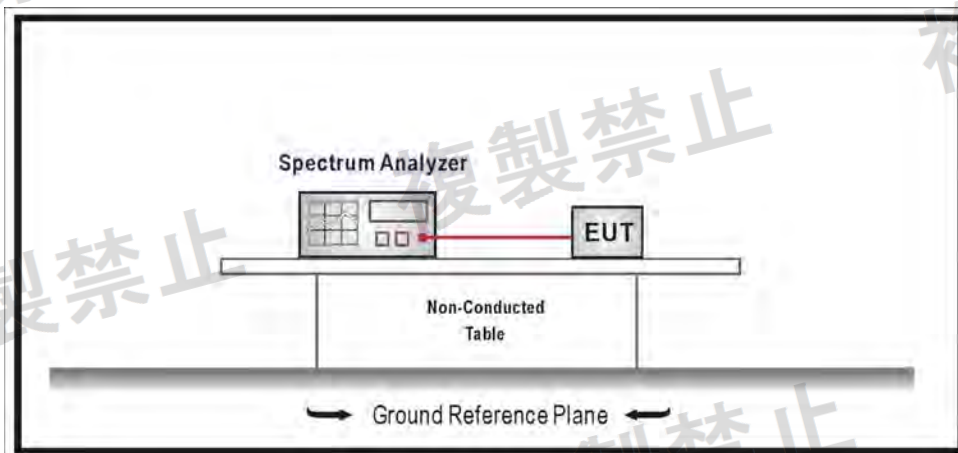


Test Result

PASS

7. Receiver Spurious Emissions

7.1. Test Setup



7.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slowly, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (c) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

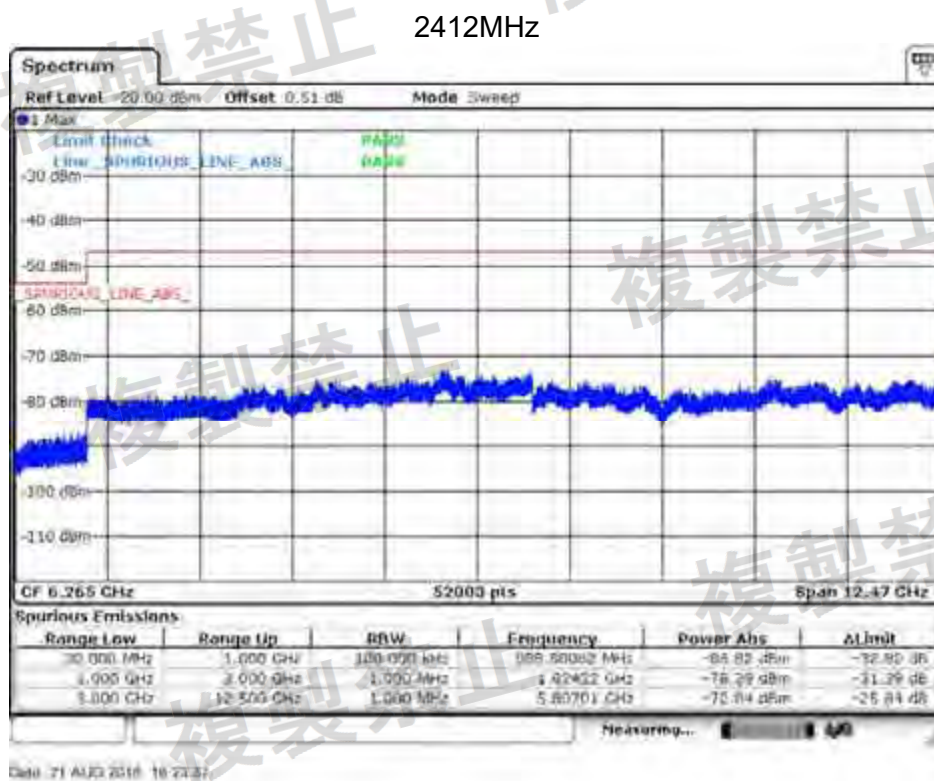
7.3. Limits

- $\leq 4\text{nW}$ for 30 – 1000 MHz
- $\leq 20\text{nW}$ for 1000 – 3000 MHz
- $\leq 20\text{nW}$ for 3000 – 12500 MHz

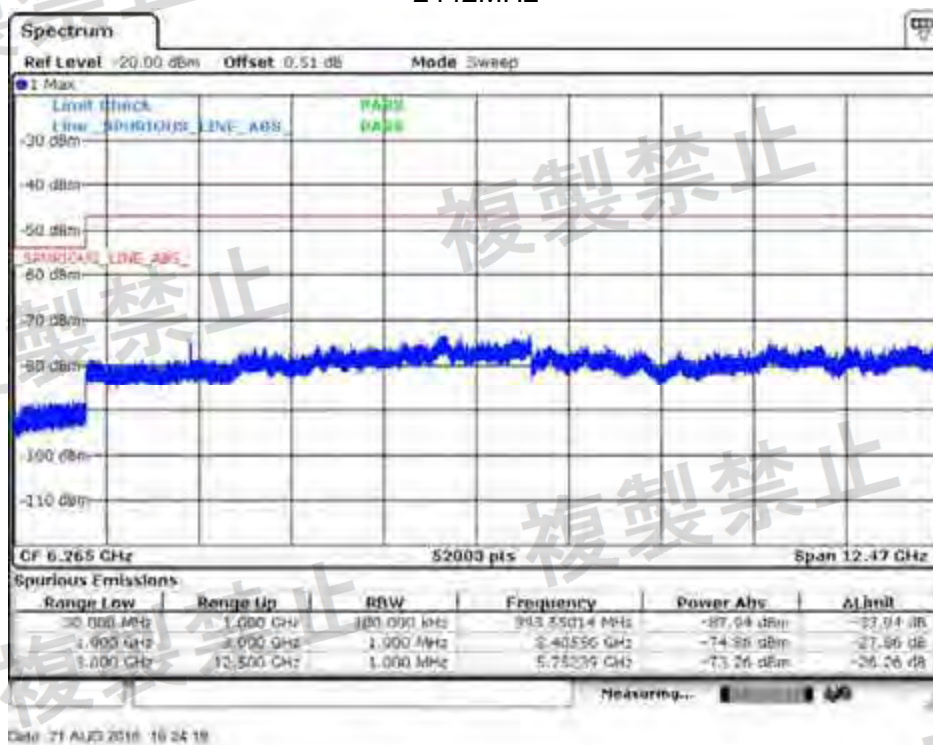
7.4. Test Result of Receiver Spurious Emissions

Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Receiver Spurious Emissions
 Test Mode : Mode 3: Receiver
 Test Date : 2018/08/21

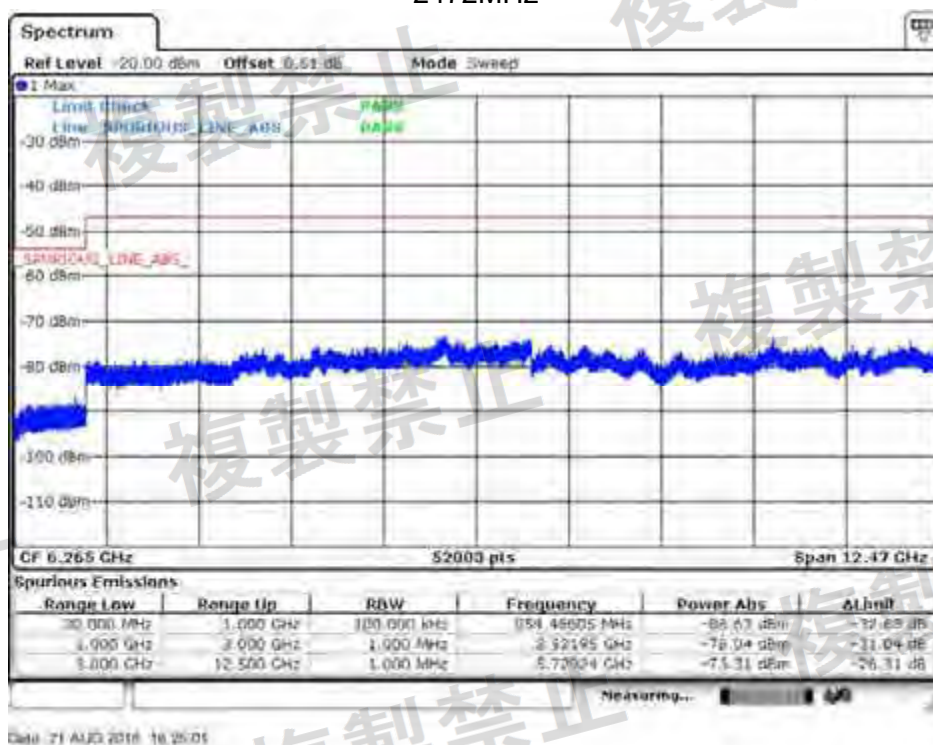
Test Mode: 802.11b, ANT0	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



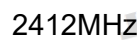
2442MHz



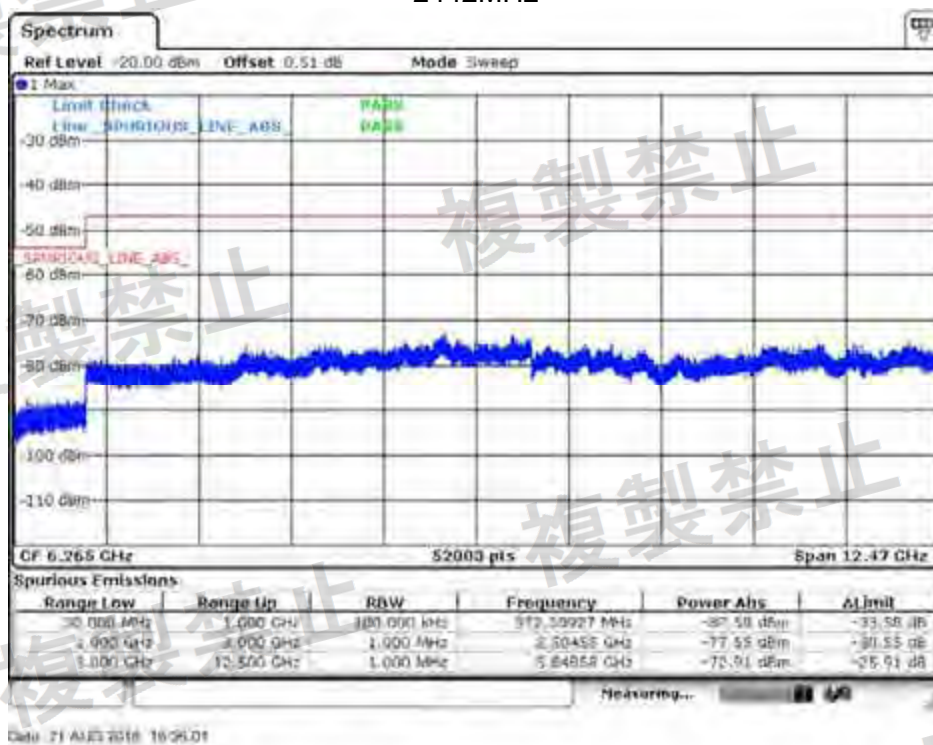
2472MHz



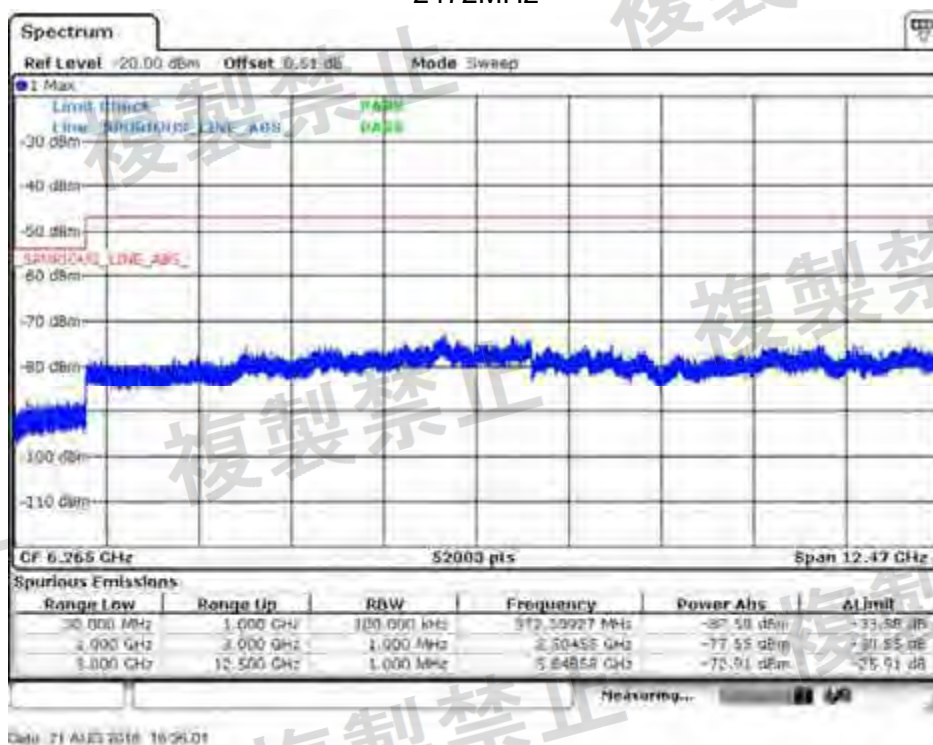
Test Mode: 802.11b, ANT1	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



2442MHz



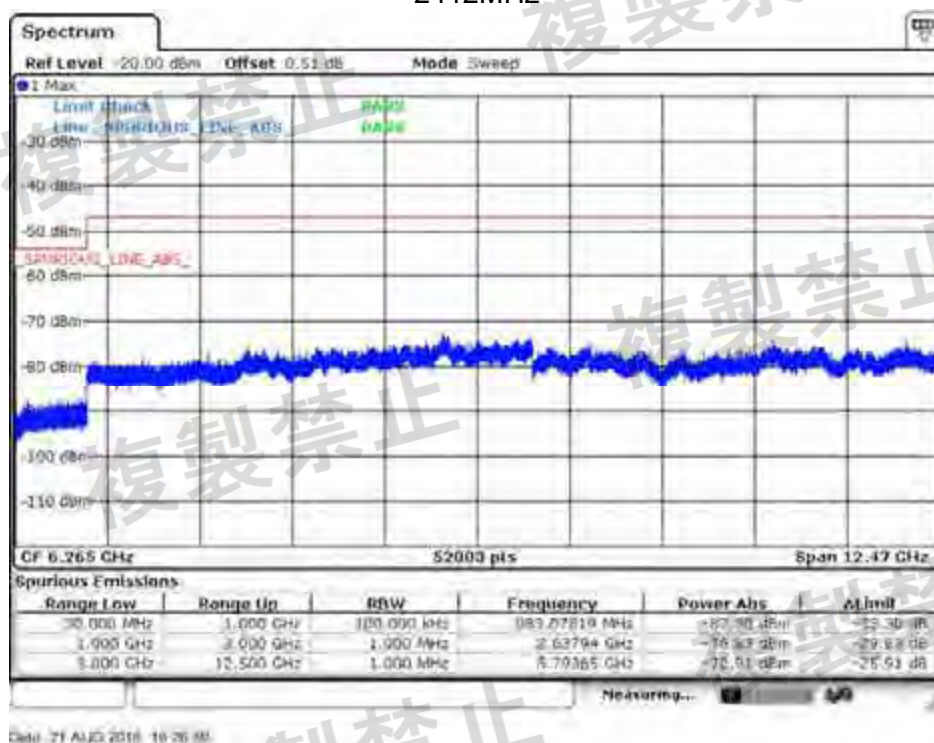
2472MHz



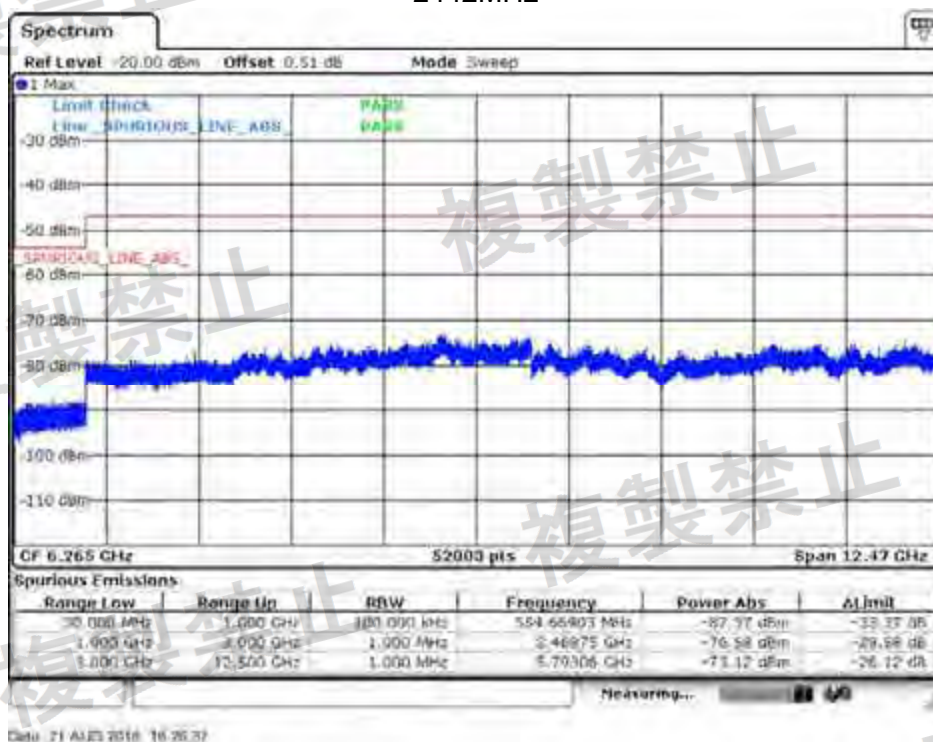
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Receiver Spurious Emissions
 Test Mode : Mode 3: Receiver
 Test Date : 2018/08/21

Test Mode: 802.11g, ANT0	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS

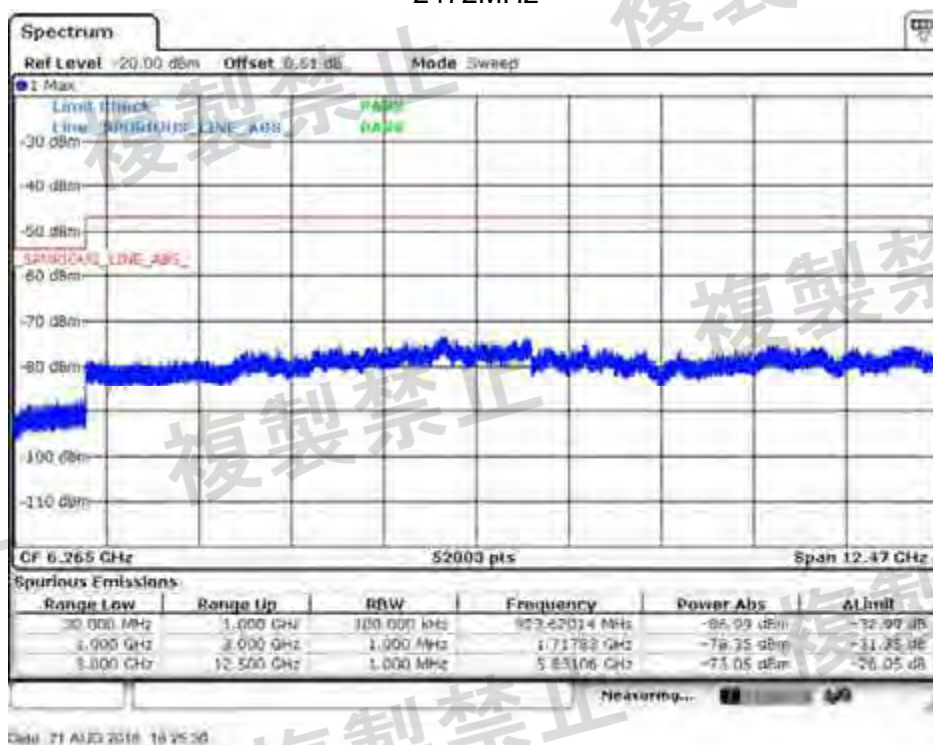
2412MHz



2442MHz

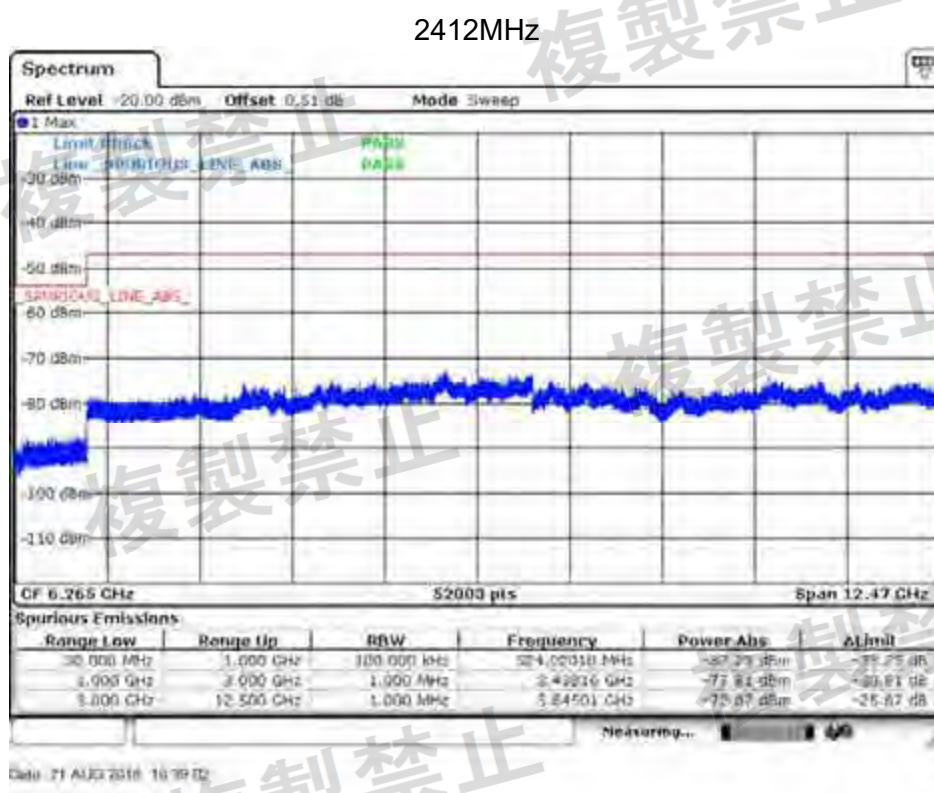


2472MHz

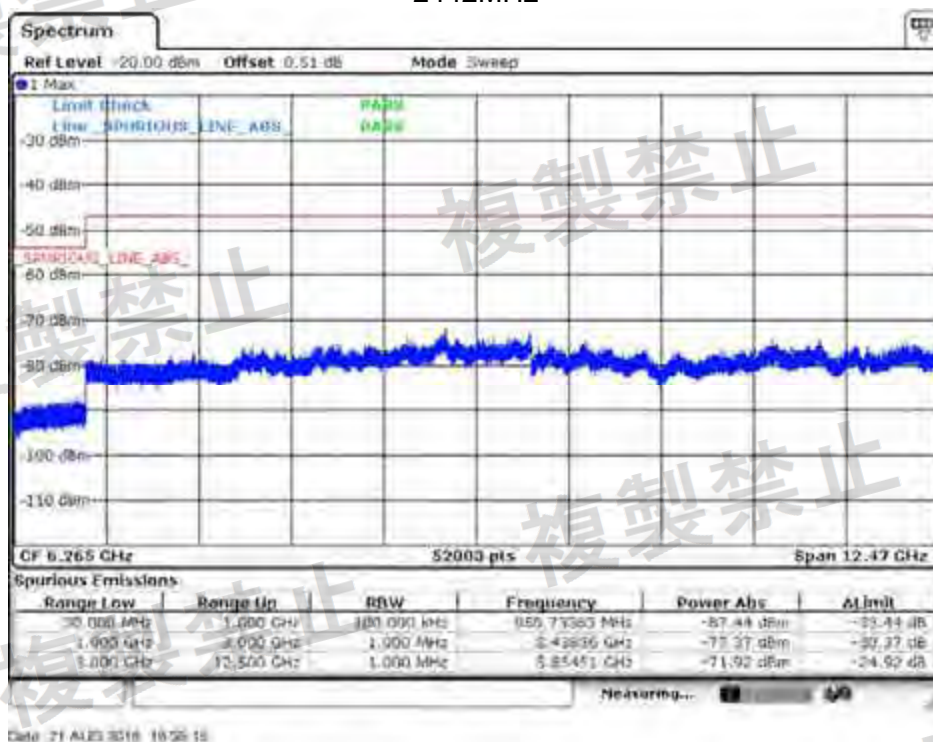


Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Receiver Spurious Emissions
 Test Mode : Mode 3: Receiver
 Test Date : 2018/08/21

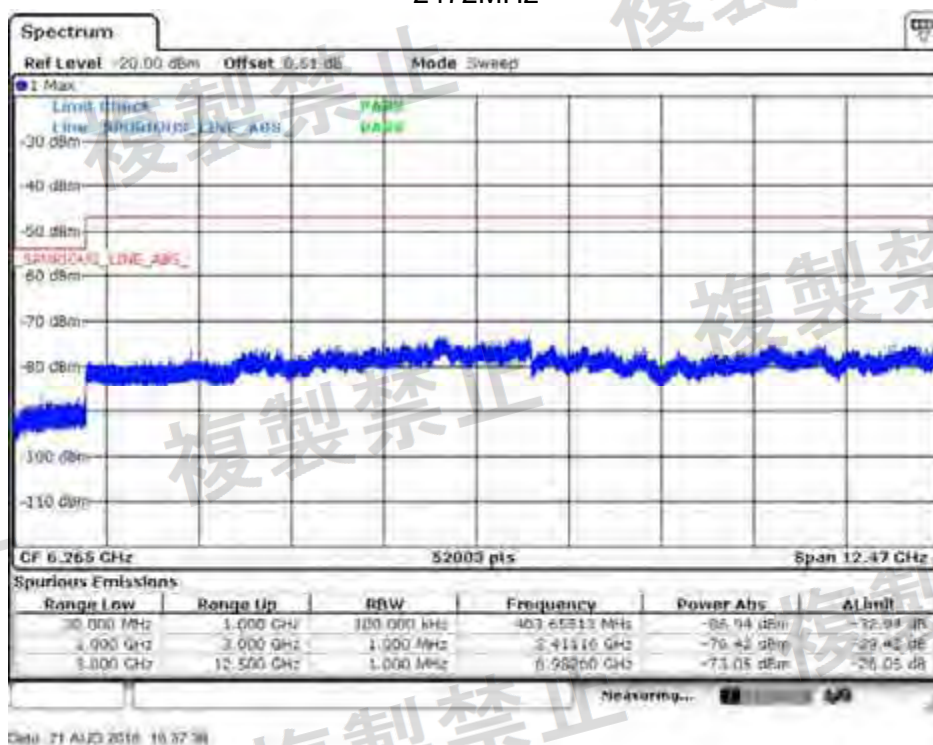
Test Mode: 802.11g, ANT1	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



2442MHz



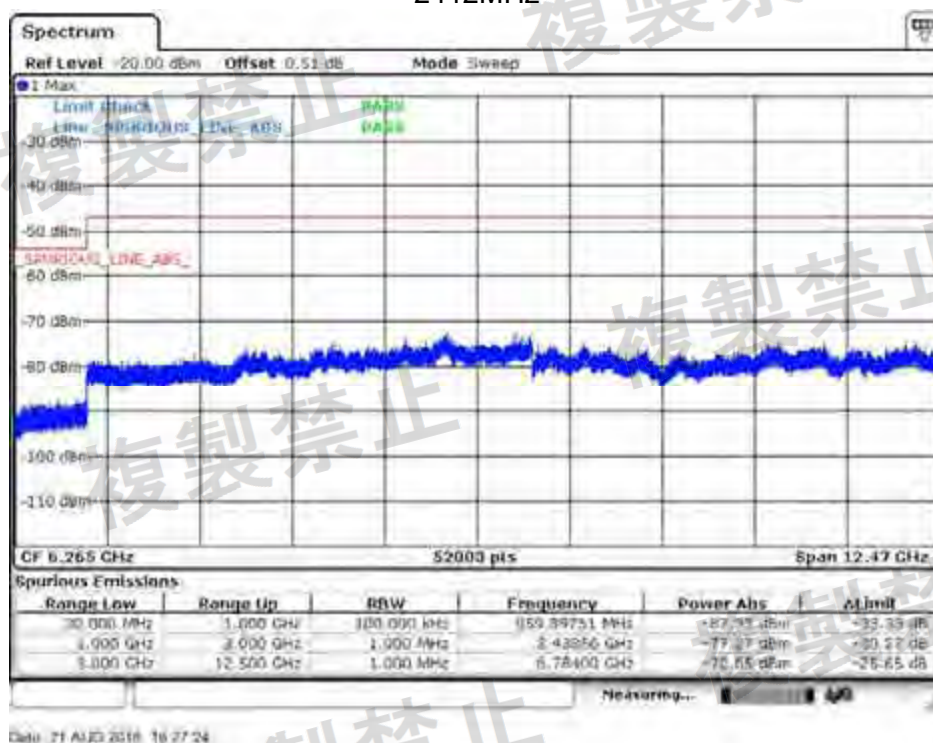
2472MHz



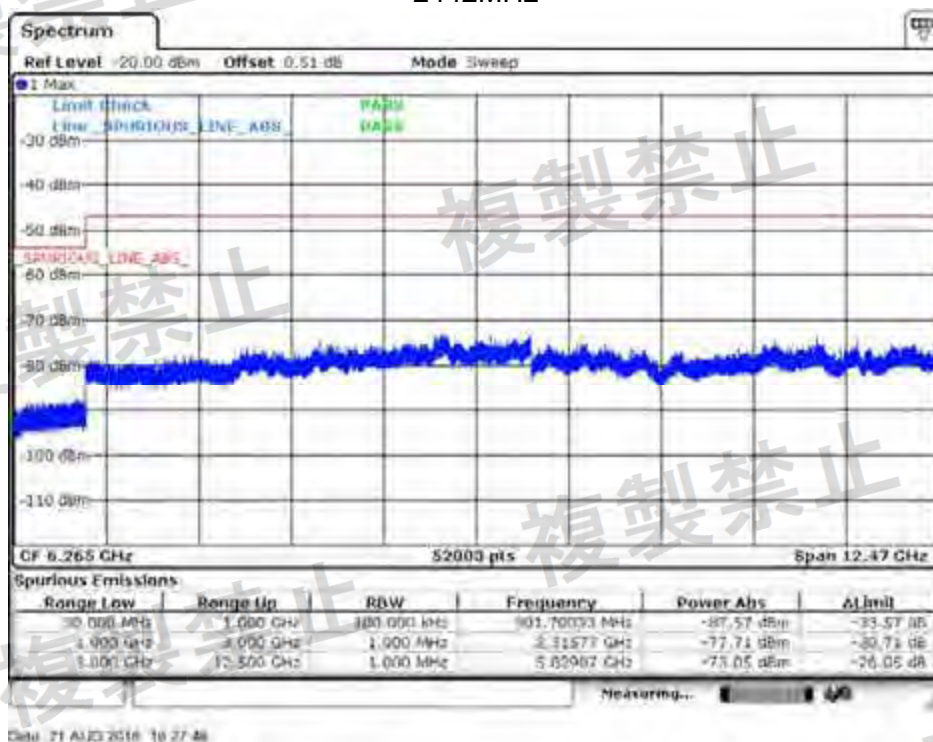
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Receiver Spurious Emissions
 Test Mode : Mode 3: Receiver
 Test Date : 2018/08/21

Test Mode: 802.11ac (20MHz), ANT0	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS

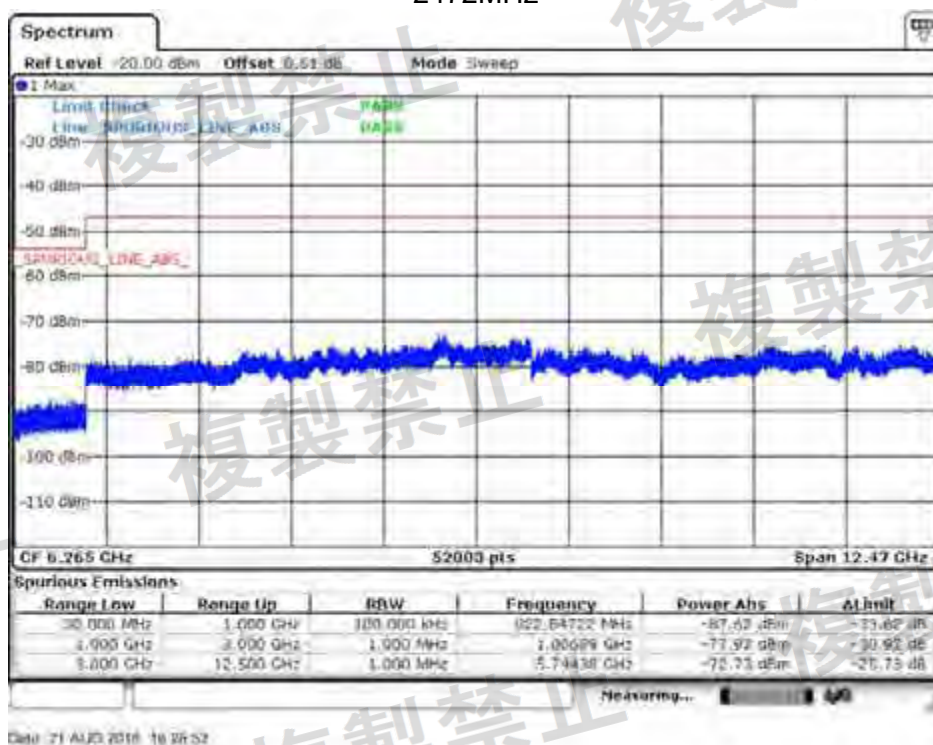
2412MHz



2442MHz



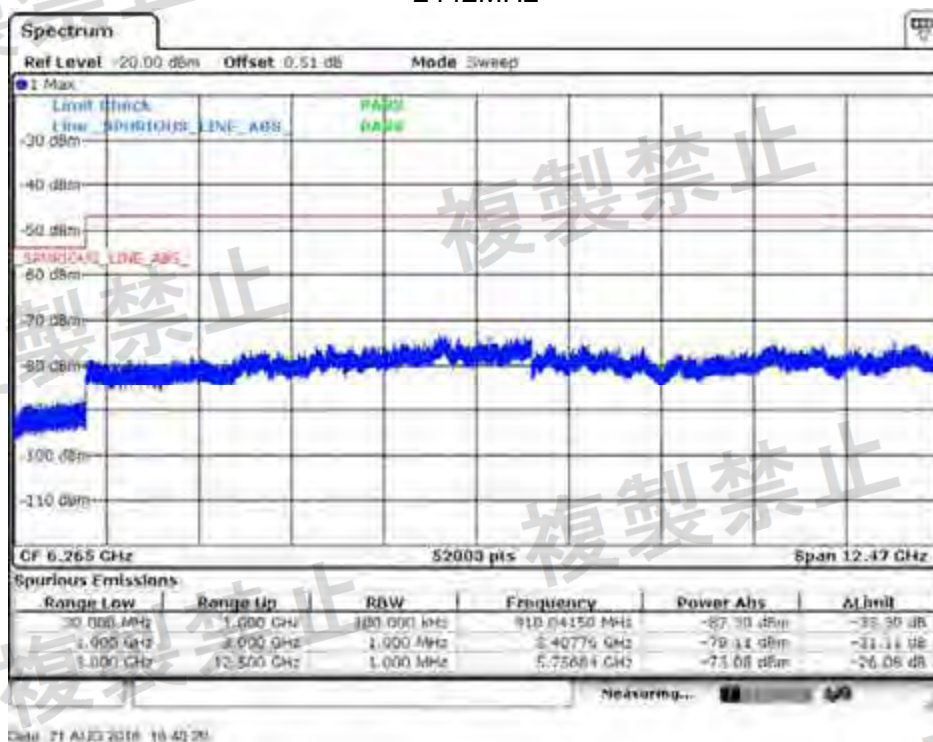
2472MHz



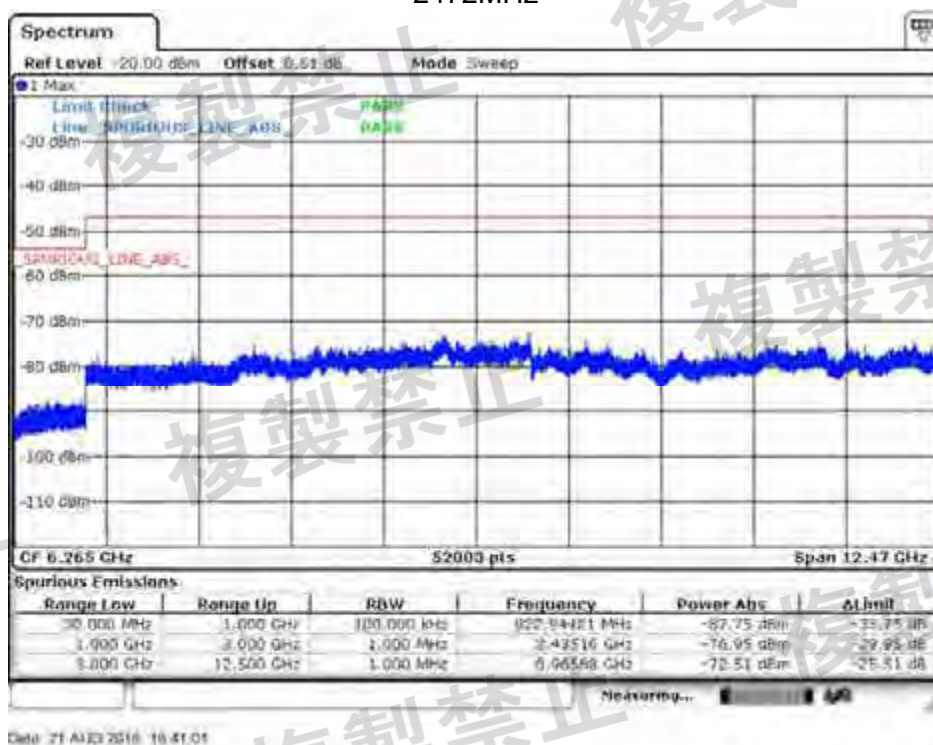
Test Mode: 802.11ac (20MHz), ANT1	
Frequency (MHz)	Test Result
2412	PASS
2442	PASS
2472	PASS



2442MHz



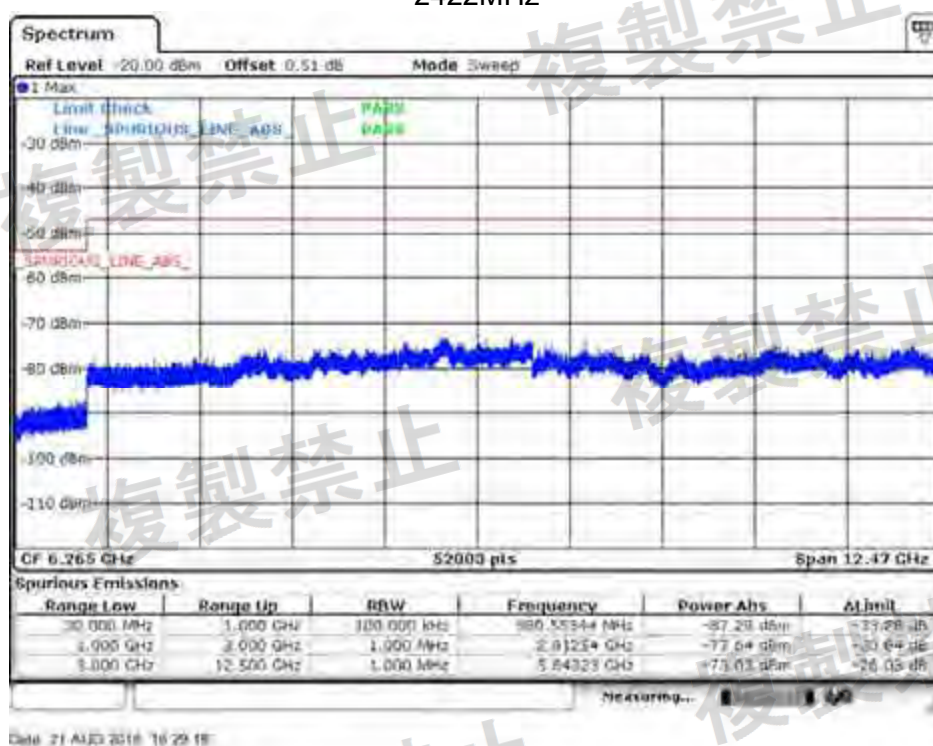
2472MHz



Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Receiver Spurious Emissions
 Test Mode : Mode 3: Receiver
 Test Date : 2018/08/21

Test Mode: 802.11ac (40MHz), ANT0	
Frequency (MHz)	Test Result
2422	PASS
2442	PASS
2462	PASS

2422MHz



Spectrum

Ref Level: -20.00 dBm Offset: 0.51 dB Mode: Sweep

1 Max

Limit Check

Line: 50000000 LINE_ABS

SPURIOUS LINE_ABS

CF: 6.265 GHz Span: 12.47 GHz

52000 pts

Range Low	Range Up	RBW	Frequency	Power Abs	Δlimit
30.000 MHz	1.000 GHz	100.000 kHz	671.52732 MHz	-87.18 dBm	-28.18 dB
1.000 GHz	2.000 GHz	1.000 MHz	2.49195 GHz	-77.15 dBm	-30.15 dB
3.000 GHz	12.500 GHz	1.000 MHz	6.78564 GHz	-72.63 dBm	-26.63 dB

Measuring...

Date: 21 AUG 2016 16:28:51

Spectrum

Ref Level: 20.00 dBm Offset: 0.51 dB Mode: Swept

1 Max

Limit: ON

Line: SPECTRUM LINE_ABS

SPS: 100000000

CF: 6.265 GHz 52000 pts Span: 12.47 GHz

Range Low	Range Up	RBW	Frequency	Power Abs	Δ Limit
30.000 MHz	1.000 GHz	100.000 kHz	710.39148 MHz	-87.69 dBm	-23.59 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.36275 GHz	-77.70 dBm	-30.70 dB
3.000 GHz	12.500 GHz	1.000 MHz	5.84768 GHz	-73.25 dBm	-26.25 dB

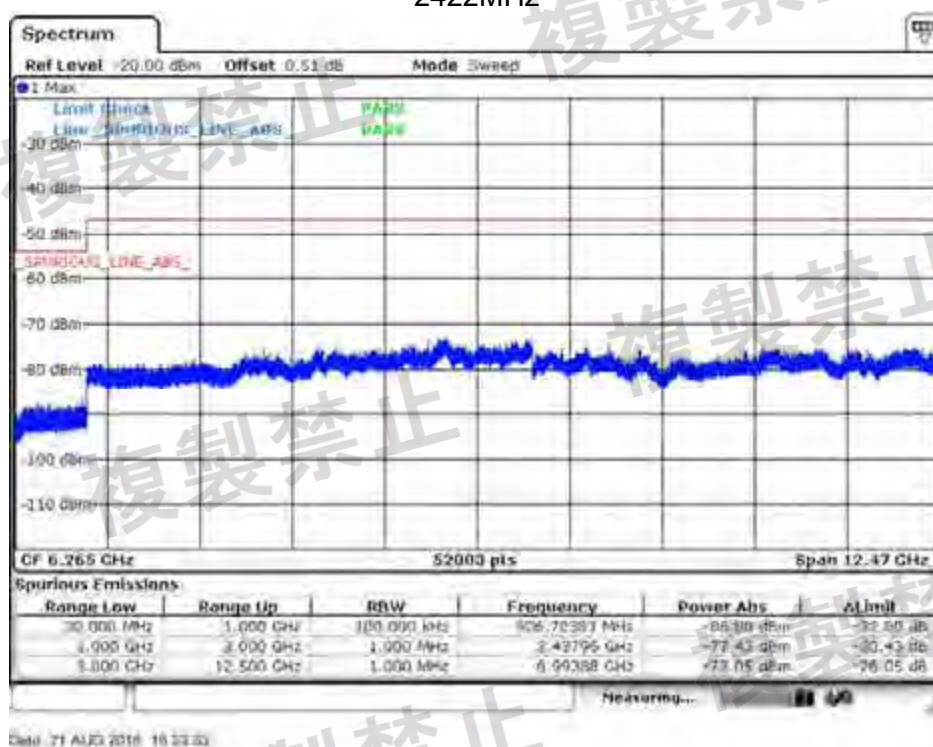
Measuring...

Date: 21 AUG 2016 16:30:30

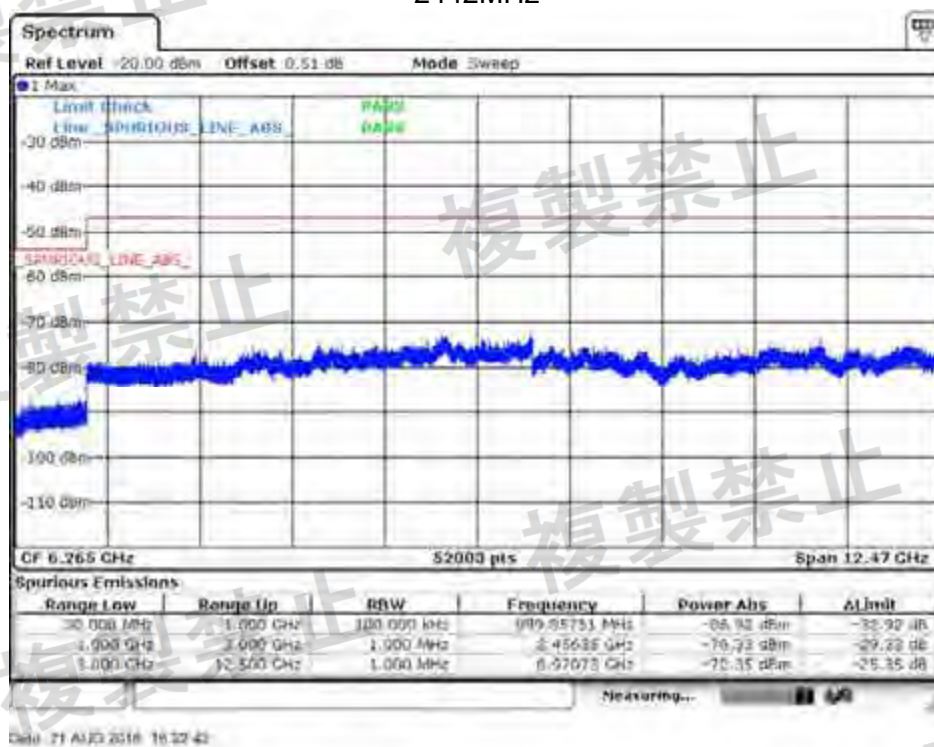
Product : Wireless-AC2200 Tri Band Gigabit Router
 Test Item : Receiver Spurious Emissions
 Test Mode : Mode 3: Receiver
 Test Date : 2018/08/21

Test Mode: 802.11ac (40MHz), ANT1	
Frequency (MHz)	Test Result
2422	PASS
2442	PASS
2462	PASS

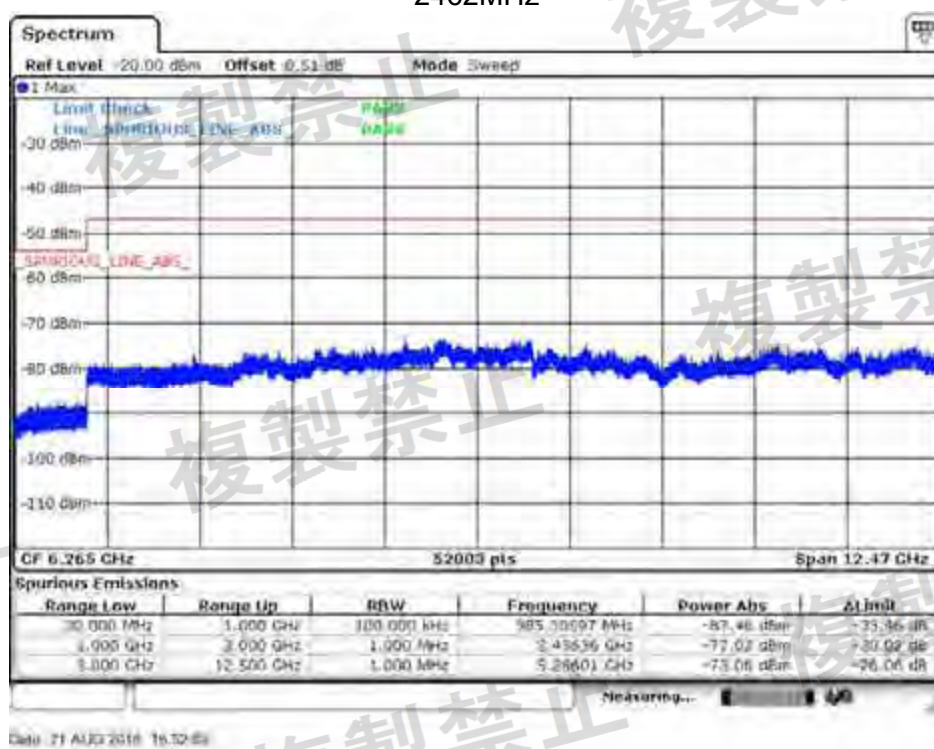
2422MHz



2442MHz

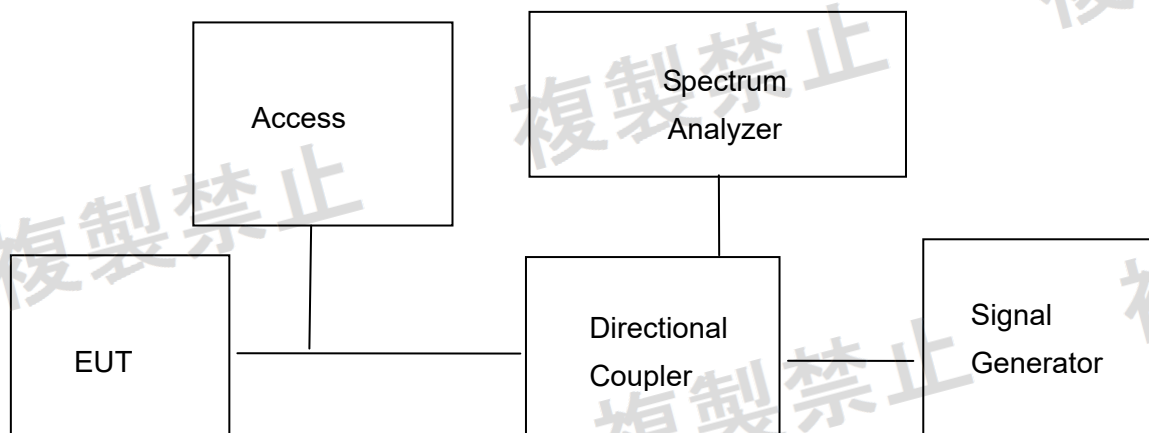


2462MHz



8. Carrier Sense

8.1. Test Setup



8.2. Test Procedure

- Link EUT and Access Point to Directional Coupler input port.
- Link Signal Generator and Spectrum Analyzer to test port and output port in the Directional Coupler separately.
- A positive Peak Detector function in Spectrum Analyzer must be used.
- Set the Span to Zero.
- Press the Signal Generator on and it will output the Carrier Signal. When the Link breaks off, wait a minute and press the Signal Generator off. After a while, reset the Link and done the test.

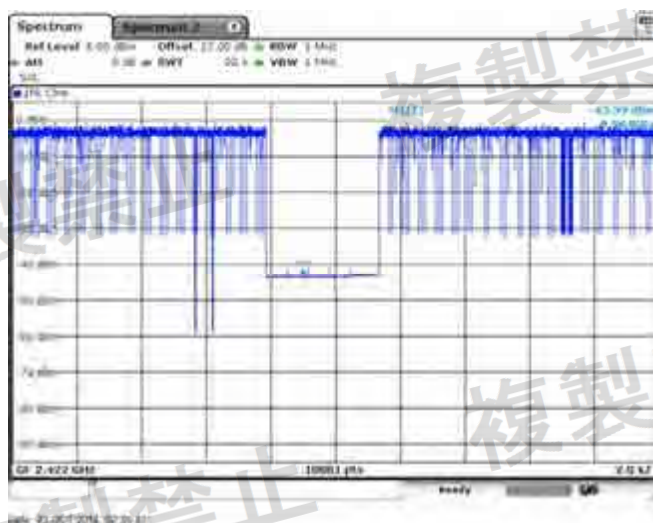
8.3. Limits

EUT shall not transmit radio wave when receiving over 100mW/m carriers.

8.4. Test Result of Carrier Sense

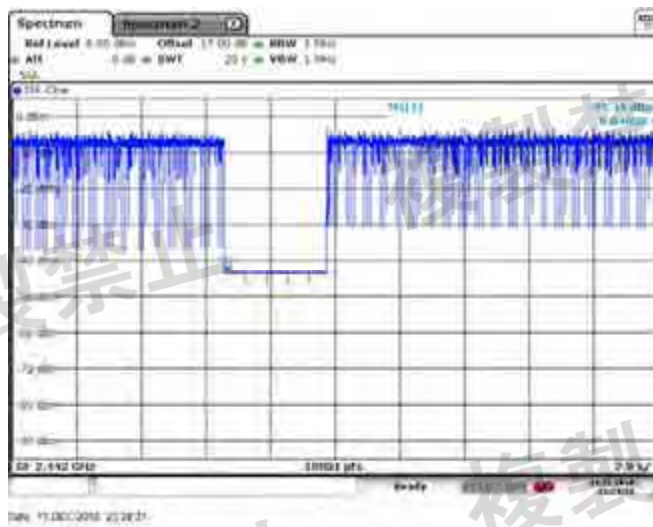
Product	:	Wireless-AC2200 Tri Band Gigabit Router
Test Item	:	Carrier Sense
Test Mode	:	Mode 1: Transmitter:
Test Date	:	2018/10/23

Center Frequency (MHz)	Test Result
2422	PASS



Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : Carrier Sense
Test Mode : Mode 1: Transmitter:
Test Date : 2018/12/11

Center Frequency (MHz)	Test Result
2442	PASS



Product : Wireless-AC2200 Tri Band Gigabit Router
Test Item : Carrier Sense
Test Mode : Mode 1: Transmitter:
Test Date : 2018/10/23

Center Frequency (MHz)	Test Result
2462	PASS

**Test Result**

Pass

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.