

# 5 GHz Band 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-RFJPP33V01

Report Version : V1.0

The test results relate only to the samples tested.

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# Test Report Certification

Issued Date: Dec. 12, 2018

Report No. : 1860341R-RFJPP33V01



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-T71 Ver. 6.1(2014.03.18)  
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Test Result : Complied

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Approved By :

  
( Roy Wang / Director )

**Revision History**

Report No.	Version	Description	Issued Date
1860341R-RFJPP33V01	V1.0	Initial issue of report	Dec. 12, 2018

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## 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 802.11a/ IEEE 802.11n	5180~5240MHz / 4 Channels 5260~5320MHz / 4 Channels 5500~5700MHz / 11Channels
	IEEE 802.11ac (40MHz)	5190~5230MHz / 2 Channels 5270~5310MHz / 2 Channels 5510~5670MHz / 5 Channels
	IEEE 802.11ac (80MHz)	5210~5210MHz / 1 Channel 5290~5290MHz / 1 Channel 5530~5610MHz / 2 Channel
Type of Modulation (IEEE 802.11a/n/ac)	Orthogonal Frequency Division Multiplexing (OFDM)	
Data Speed (IEEE 802.11a)	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	
Data Speed (IEEE 802.11ac)	Support a subset of the combination of GI, MCS 0~MCS 9 and bandwidth defined in 802.11ac	
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		
	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
IEEE802.11a	✓			✓		
IEEE802.11n	✓	✓		✓	✓	
IEEE802.11ac	✓	✓	✓	✓	✓	✓

## IEEE 802.11n

MCS Index	Modulation	R	N <sub>BPSCS</sub>	N <sub>CBPS</sub>		N <sub>DBPS</sub>		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 <sub>BPSCS</sub>	N <sub>CBPS</sub>		N <sub>DBPS</sub>		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

MCS Index	Modulation	R	N <sub>BPSCS</sub>	N <sub>CBPS</sub>		N <sub>DBPS</sub>		Data Rate(Mb/s)			
				20MHz	40MHz	20MHz	40MHz	800ns GI		400ns GI	
								20MHz	40MHz	20MHz	40MHz
16	BPSK	1/2	1	156	324	78	162	19.5	40.5	21.7	45.0
17	QPSK	1/2	2	312	648	156	324	39.0	81.0	43.3	90.0
18	QPSK	3/4	2	312	648	234	486	58.5	121.5	65.0	135.0
19	16-QAM	1/2	4	624	1296	312	648	78.0	162.0	86.7	180.0
20	16-QAM	3/4	4	624	1296	468	972	117.0	243.0	130.0	270.0
21	64-QAM	2/3	6	936	1944	624	1296	156.0	324.0	173.3	360.0
22	64-QAM	3/4	6	936	1944	702	1458	175.5	364.5	195.0	405.0
23	64-QAM	5/6	6	936	1944	780	1620	195.0	405.0	216.7	450.0

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

Table 3 – MCS parameters for TX Antenna number = 3

MCS Index	Modulation	R	N <sub>BPSCS</sub>	N <sub>CBPS</sub>		N <sub>DBPS</sub>		Data Rate(Mb/s)			
				20MHz	40MHz	20MHz	40MHz	800ns GI		400ns GI	
								20MHz	40MHz	20MHz	40MHz
24	BPSK	1/2	1	208	432	104	216	26.00	54.00	28.80	60.00
25	QPSK	1/2	2	416	864	208	432	52.00	108.00	57.60	120.00
26	QPSK	3/4	2	416	864	312	648	78.00	162.00	86.80	180.00
27	16-QAM	1/2	4	832	1728	416	864	104.00	216.00	115.60	240.00
28	16-QAM	3/4	4	832	1728	624	1296	156.00	324.00	172.20	360.00
29	64-QAM	2/3	6	1248	2592	832	1728	208.00	432.00	231.20	480.00
30	64-QAM	3/4	6	1248	2592	936	1944	234.00	486.00	260.00	540.00
31	64-QAM	5/6	6	1248	2592	1040	2040	260.00	540.00	288.80	600.00

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

Table 4 – MCS parameters for TX Antenna number = 4

Symbol	Explanation
R	Code rate
N <sub>BPSC</sub>	Number of coded bits per single carrier
N <sub>CBPS</sub>	Number of coded bits per symbol
N <sub>DBPS</sub>	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		160 MHz	
				Guard Interval		Guard Interval		Guard Interval		Guard Interval	
				800ns	400ns	800ns	400ns	800ns	400ns	800ns	400ns
1	0	BPSK	1/2	6.5	7.2	13.5	15	29.3	32.5	58.5	65
	1	QPSK	1/2	13	14.4	27	30	58.5	65	117	130
	2	QPSK	3/4	19.5	21.7	40.5	45	87.8	97.5	175.5	195
	3	16-QAM	1/2	26	28.9	54	60	117	130	234	260
	4	16-QAM	3/4	39	43.3	81	90	175.5	195	351	390
	5	64-QAM	2/3	52	57.8	108	120	234	260	468	520
	6	64-QAM	3/4	58.5	65	121.5	135	263.3	292.5	526.5	585
	7	64-QAM	5/6	65	72.2	135	150	292.5	325	585	650
	8	256-QAM	3/4	78	86.7	162	180	351	390	702	780
	9	256-QAM	5/6	N/A	N/A	180	200	390	433.3	780	866.7
2	0	BPSK	1/2	13	14.4	27	30	58.6	65	117	130
	1	QPSK	1/2	26	28.8	54	60	117	130	234	260
	2	QPSK	3/4	39	43.4	81	90	175.6	195	351	390
	3	16-QAM	1/2	52	57.8	108	120	234	260	468	520
	4	16-QAM	3/4	78	86.6	162	180	351	390	702	780
	5	64-QAM	2/3	104	115.6	216	240	468	520	936	1040
	6	64-QAM	3/4	117	130	243	270	526.6	585	1053	1170
	7	64-QAM	5/6	130	144.4	270	300	585	650	1170	1300
	8	256-QAM	3/4	156	173.4	324	360	702	780	1404	1560
	9	256-QAM	5/6	N/A	N/A	360	400	780	866.6	1560	1733.4

## IEEE 802.11a &amp; IEEE 802.11n/ac (20MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	40	5200MHz	44	5220MHz	48	5240MHz
52	5260MHz	56	5280MHz	60	5320MHz	64	5320MHz
100	5500MHz	104	5520MHz	108	5540MHz	112	5560MHz
116	5580MHz	120	5600MHz	124	5620MHz	128	5640MHz
132	5660MHz	136	5680MHz	140	5700MHz		

## IEEE 802.11n/ac (40MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz	54	5270MHz	62	5310MHz
102	5510MHz	110	5550MHz	118	5590MHz	126	5630MHz
134	5670MHz						

## IEEE 802.11ac (80MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210MHz	58	5290MHz	106	5530MHz	122	5610MHz



## 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:

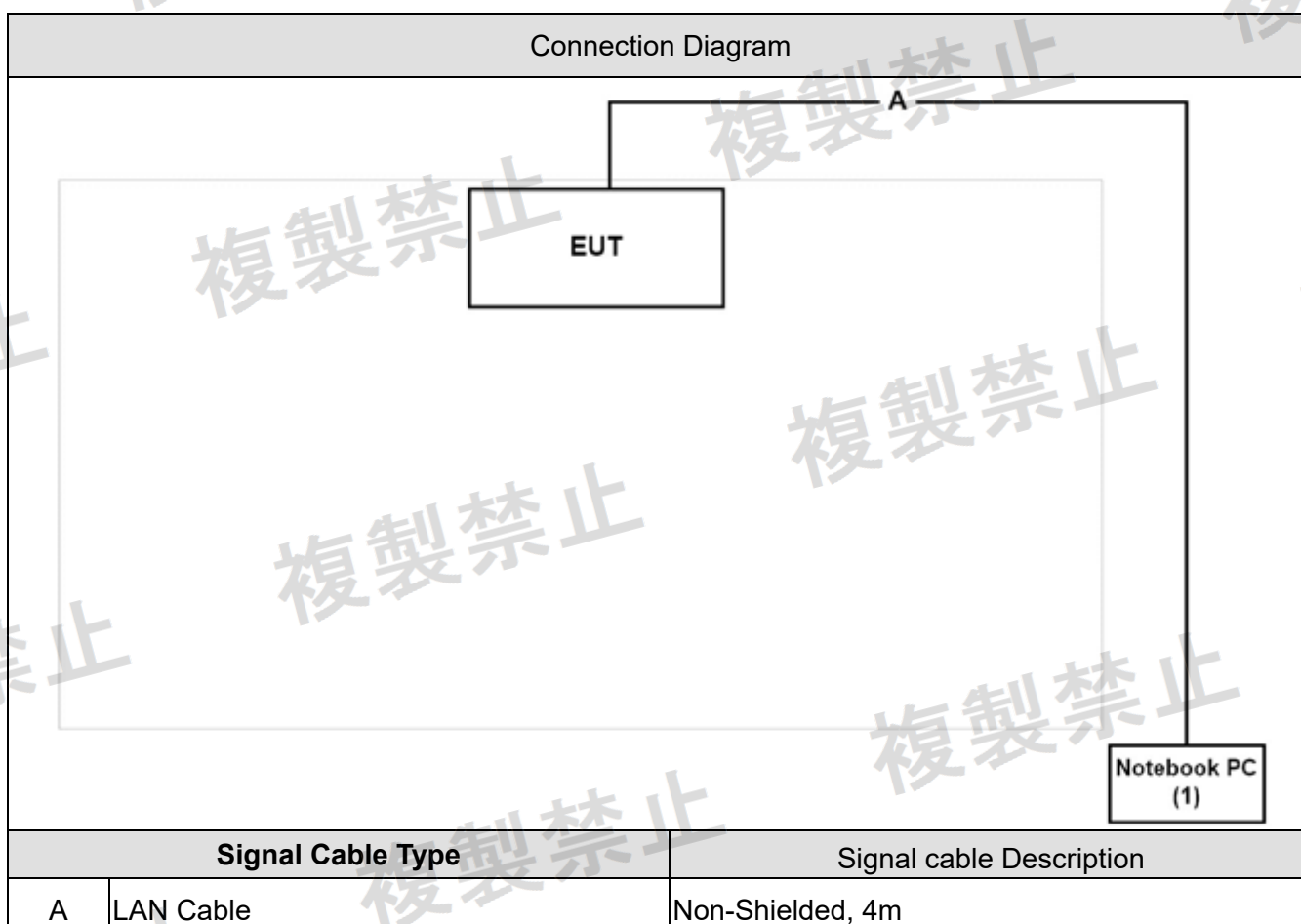
Test Mode
Mode 1: Transmitter (CCD Mode)
Mode 2: Transmitter (BF Mode)
Mode 3: Receiver

### 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-T71 Output Power 、 Output Power Density 、 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-T71 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-T71 Occupied Bandwidth	15 - 35	25	3
Humidity (%RH)		25 - 75	50	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T71 Frequency Tolerance	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T71 Adjacent Channel Emitted power and Out-Band Leakage Power	15 - 35	25	3
Humidity (%RH)		25 - 75	50	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T71 Transmitter Spurious Emissions	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T71 Receiver Spurious Emissions	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T71 Carrier Sense	15 - 35	25	3
Humidity (%RH)		25 - 75	65	
Barometric pressure mbar)		860 - 1060	950-1000	
Temperature (°C)	ARIB STD-T71 Transmitter Time	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](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:

- 1 No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)  
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## 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

### Adjacent Channel Emitted power and Out-Band Leakage Power / 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

## Transmitter Time / 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

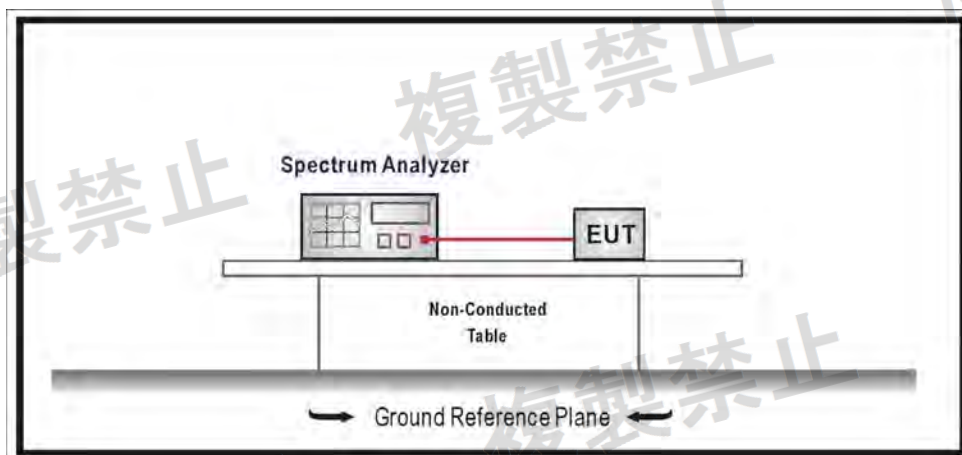
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

## 1.8. Measurement Uncertainty

Test Item	Uncertainty
Output Power 、 Output Power Density 、 Output Power Tolerance and E.I.R.P	$\pm 1.27$ dB
Spread Bandwidth and Spread Factor	$\pm 50$ KHz
Occupied Bandwidth	$\pm 50$ KHz
Frequency Tolerance	$\pm 50$ KHz
Adjacent Channel Emitted power and Out-Band Leakage Power	$\pm 0.58$ dB
Transmitter Spurious Emissions	$\pm 3.19$ dB
Receiver Spurious Emissions	$\pm 3.19$ dB
Carrier Sense	$\pm 1.27$ dB

## 2. Output Power、Output Power Density、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:  $\leq 5\text{mW/MHz}$

For 80MHz Bandwidth:  $\leq 2.5\text{mW/MHz}$

#### Output Power Tolerance:

For 20MHz, 40MHz and 80MHz Bandwidth in W52, W53 Bands: +20% to -80%

For 20MHz, 40MHz and 80MHz Bandwidth in W56 Band: +50% to -50%

#### EIRP:

For 20MHz Bandwidth in W52 Band:  $\leq 10\text{mW/MHz}$

For 20MHz Bandwidth in W53 Band:  $\leq 10\text{mW/MHz}$ (with TPC);  $\leq 5\text{mW/MHz}$ (without TPC)

For 20MHz Bandwidth in W56 Band:  $\leq 50\text{mW/MHz}$ (with TPC);  $\leq 25\text{mW/MHz}$ (without TPC)

For 40MHz Bandwidth in W52 Band:  $\leq 5\text{mW/MHz}$

For 40MHz Bandwidth in W53 Band:  $\leq 5\text{mW/MHz}$ (with TPC);  $\leq 2.5\text{mW/MHz}$ (without TPC)

For 40MHz Bandwidth in W56 Band:  $\leq 25\text{mW/MHz}$ (with TPC);  $\leq 12.5\text{mW/MHz}$ (without TPC)

For 80MHz Bandwidth in W52 Band:  $\leq 2.5\text{mW/MHz}$

For 80MHz Bandwidth in W53 Band:  $\leq 2.5\text{mW/MHz}$ (with TPC);  $\leq 1.25\text{mW/MHz}$ (without TPC)

For 80MHz Bandwidth in W56 Band:  $\leq 12.5\text{mW/MHz}$  (with TPC);  $\leq 6.25\text{mW/MHz}$ (without TPC)

## 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 : 2018/10/24

Test Mode: 802.11a, ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5180	3.939	2.477	10
5240	3.936	2.475	10
5260	3.762	2.378	10
5320	3.818	2.409	10
5500	6.734	4.714	10
5600	6.677	4.653	10
5700	6.898	4.896	10
Test Mode: 802.11a, ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5180	3.973	2.496	10
5240	3.913	2.462	10
5260	3.643	2.314	10
5320	3.756	2.375	10
5500	6.785	4.770	10
5600	6.671	4.646	10
5700	6.767	4.750	10
Test Mode: 802.11a, ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
5180	4.973		10
5240	4.937		10
5260	4.692		10
5320	4.783		10
5500	9.484		10
5600	9.299		10
5700	9.646		10



Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Output Power Density  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/10/24

Test Mode: 802.11ac (20MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5180	3.869	2.437	10
5240	3.645	2.315	10
5260	3.841	2.422	10
5320	3.652	2.318	10
5500	6.834	4.824	10
5600	6.877	4.872	10
5700	6.816	4.804	10
Test Mode: 802.11ac (20MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5180	3.741	2.366	10
5240	3.622	2.303	10
5260	3.798	2.398	10
5320	3.689	2.338	10
5500	6.868	4.862	10
5600	6.850	4.842	10
5700	6.896	4.893	10
Test Mode: 802.11ac (20MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
5180	4.804		10
5240	4.617		10
5260	4.819		10
5320	4.657		10
5500	9.686		10
5600	9.714		10
5700	9.697		10

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Output Power Density  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/10/24

Test Mode: 802.11ac (40MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5190	0.929	1.239	5
5230	0.724	1.181	5
5270	0.840	1.213	5
5310	0.827	1.210	5
5510	3.798	2.398	5
5590	3.673	2.330	5
5670	3.837	2.419	5
Test Mode: 802.11ac (40MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5190	0.936	1.241	5
5230	0.693	1.173	5
5270	0.742	1.186	5
5310	0.854	1.217	5
5510	3.843	2.423	5
5590	3.635	2.309	5
5670	3.819	2.409	5
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
5190	2.479		5
5230	2.355		5
5270	2.400		5
5310	2.427		5
5510	4.820		5
5590	4.639		5
5670	4.829		5

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Output Power Density  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/10/24

Test Mode: IEEE 802.11ac (80MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5210	-2.116	0.614	2.5
5290	-2.108	0.615	2.5
5530	0.841	1.214	2.5
5610	0.781	1.197	2.5
Test Mode: IEEE 802.11ac (80MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5210	-2.045	0.624	2.5
5290	-2.056	0.623	2.5
5530	0.843	1.214	2.5
5610	0.839	1.213	2.5
Test Mode: IEEE 802.11ac (80MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
1.239	1.239		2.5
1.238	1.238		2.5
2.428	2.428		2.5
2.410	2.410		2.5

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Output Power Density  
 Test Mode : Mode 2: Transmitter (BF Mode)  
 Test Date : 2018/10/24

Test Mode: 802.11ac (20MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5180	2.732	1.876	10
5240	2.663	1.846	10
5260	2.822	1.915	10
5320	2.798	1.905	10
5500	6.834	4.824	10
5600	6.877	4.872	10
5700	6.816	4.804	10
Test Mode: 802.11ac (20MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5180	2.724	1.872	10
5240	2.684	1.855	10
5260	2.753	1.885	10
5320	2.815	1.912	10
5500	6.868	4.862	10
5600	6.850	4.842	10
5700	6.896	4.893	10
Test Mode: 802.11ac (20MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
5180	3.748		10
5240	3.702		10
5260	3.800		10
5320	3.817		10
5500	9.686		10
5600	9.714		10
5700	9.697		10

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Output Power Density  
 Test Mode : Mode 2: Transmitter (BF Mode)  
 Test Date : 2018/10/24

Test Mode: 802.11ac (40MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5190	-0.528	0.886	5
5230	-0.140	0.968	5
5270	-0.364	0.920	5
5310	-0.491	0.893	5
5510	3.798	2.398	5
5590	3.673	2.330	5
5670	3.837	2.419	5
Test Mode: 802.11ac (40MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5190	-0.436	0.905	5
5230	-0.146	0.967	5
5270	-0.422	0.907	5
5310	-0.450	0.902	5
5510	3.843	2.423	5
5590	3.635	2.309	5
5670	3.819	2.409	5
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
5190	1.790		5
5230	1.935		5
5270	1.827		5
5310	1.795		5
5510	4.820		5
5590	4.639		5
5670	4.829		5



Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Output Power Density  
 Test Mode : Mode 2: Transmitter (BF Mode)  
 Test Date : 2018/10/24

Test Mode: IEEE 802.11ac (80MHz), ANT0			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5210	-3.582	0.438	2.5
5290	-3.561	0.440	2.5
5530	0.841	1.214	2.5
5610	0.781	1.197	2.5
Test Mode: IEEE 802.11ac (80MHz), ANT1			
Frequency (MHz)	Real Value (dBm/MHz)	Output Power (mW/MHz)	Limit (mW/MHz)
5210	-3.345	0.463	2.5
5290	-3.498	0.447	2.5
5530	0.843	1.214	2.5
5610	0.839	1.213	2.5
Test Mode: IEEE 802.11ac (80MHz), ANT0+1			
Frequency (MHz)	Output Power (mW/MHz)		Limit (mW/MHz)
5210	0.901		2.5
5290	0.887		2.5
5530	2.428		2.5
5610	2.410		2.5

<b>Test Result</b>	PASS
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## 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 : 2018/10/24

Test Mode: 802.11a, ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5180	5.000	4.973	-0.537%	+20% to -80%
5240	5.000	4.937	-1.256%	+20% to -80%
5260	5.000	4.692	-6.168%	+20% to -80%
5320	5.000	4.783	-4.331%	+20% to -80%
5500	10.000	9.484	-5.161%	+20% to -80%
5600	10.000	9.299	-7.011%	+20% to -80%
5700	10.000	9.646	-3.544%	+20% to -80%
Test Mode: 802.11ac (20MHz), ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5180	5.000	4.804	-3.926%	+20% to -80%
5240	5.000	4.617	-7.655%	+20% to -80%
5260	5.000	4.819	-3.614%	+20% to -80%
5320	5.000	4.657	-6.865%	+20% to -80%
5500	10.000	9.686	-3.142%	+20% to -80%
5600	10.000	9.714	-2.864%	+20% to -80%
5700	10.000	9.697	-3.028%	+20% to -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 1: Transmitter (CCD Mode)  
 Test Date : 2018/10/24

Test Mode: 802.11ac (40MHz), ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5190	2.500	2.479	-0.839%	+20% to -80%
5230	2.500	2.355	-5.817%	+20% to -80%
5270	2.500	2.400	-4.011%	+20% to -80%
5310	2.500	2.427	-2.924%	+20% to -80%
5510	5.000	4.820	-3.591%	+20% to -80%
5590	5.000	4.639	-7.218%	+20% to -80%
5670	5.000	4.829	-3.426%	+20% to -80%
Test Mode: IEEE 802.11ac (80MHz), ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5210	1.250	1.239	-0.898%	+20% to -80%
5290	1.250	1.238	-0.933%	+20% to -80%
5530	2.500	2.428	-2.889%	+20% to -80%
5610	2.500	2.410	-3.601%	+20% to -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 : 2018/10/24

Test Mode: 802.11ac (20MHz), ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5180	5.000	3.748	-25.035%	+20% to -80%
5240	5.000	3.702	-25.969%	+20% to -80%
5260	5.000	3.800	-23.998%	+20% to -80%
5320	5.000	3.817	-23.667%	+20% to -80%
5500	10.000	9.686	-3.142%	+20% to -80%
5600	10.000	9.714	-2.864%	+20% to -80%
5700	10.000	9.697	-3.028%	+20% to -80%
Test Mode: 802.11ac (40MHz), ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5190	2.500	1.790	-28.392%	+20% to -80%
5230	2.500	1.935	-22.587%	+20% to -80%
5270	2.500	1.827	-26.921%	+20% to -80%
5310	2.500	1.795	-28.213%	+20% to -80%
5510	5.000	4.820	-3.591%	+20% to -80%
5590	5.000	4.639	-7.218%	+20% to -80%
5670	5.000	4.829	-3.426%	+20% to -80%
Test Mode: IEEE 802.11ac (80MHz), ANT0+1				
Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit
5210	1.250	0.901	-27.901%	+20% to -80%
5290	1.250	0.887	-29.013%	+20% to -80%
5530	2.500	2.428	-2.884%	+20% to -80%
5610	2.500	2.410	-3.595%	+20% to -80%

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

Test Result	PASS
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## 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 : 2018/10/24

Test Mode: 802.11a, ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5180	6.966	9.512	10.000
5240	6.935	9.481	10.000
5260	6.713	9.259	10.000
5320	6.797	9.343	10.000
5500	9.770	12.491	16.980
5600	9.684	12.405	16.980
5700	9.843	12.564	16.980
Test Mode: 802.11ac (20MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5180	6.816	9.362	10.000
5240	6.644	9.190	10.000
5260	6.830	9.376	10.000
5320	6.681	9.227	10.000
5500	9.861	12.582	16.980
5600	9.874	12.595	16.980
5700	9.866	12.587	16.980
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5190	3.943	6.489	6.990
5230	3.719	6.265	6.990
5270	3.802	6.348	6.990
5310	3.851	6.397	6.990
5510	6.831	9.552	13.979
5590	6.664	9.385	13.979
5670	6.838	9.559	13.979
Test Mode: IEEE 802.11ac (80MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5210	0.930	3.476	3.979
5290	0.928	3.474	3.979
5530	3.852	6.573	10.969
5610	3.820	6.541	10.969

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 : 2018/10/24

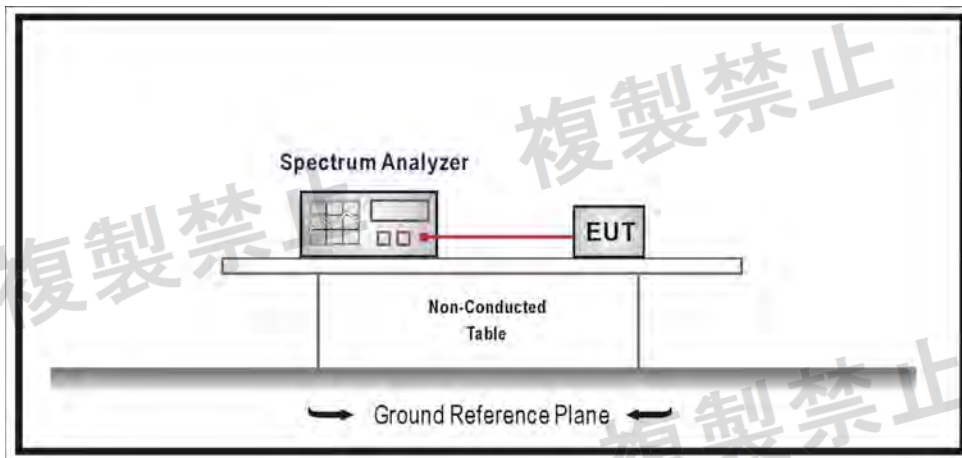
Test Mode: 802.11ac (20MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5180	5.738	9.304	10.000
5240	5.684	9.250	10.000
5260	5.798	9.364	10.000
5320	5.817	9.383	10.000
5500	9.861	13.602	16.980
5600	9.874	13.615	16.980
5700	9.866	13.607	16.980
Test Mode: 802.11ac (40MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5190	2.529	6.095	6.990
5230	2.868	6.434	6.990
5270	2.617	6.183	6.990
5310	2.540	6.106	6.990
5510	6.831	10.572	13.979
5590	6.664	10.405	13.979
5670	6.838	10.579	13.979
Test Mode: IEEE 802.11ac (80MHz), ANT0+1			
Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
5210	-0.452	3.114	3.979
5290	-0.519	3.047	3.979
5530	3.852	7.593	10.969
5610	3.820	7.561	10.969

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

<b>Test Result</b>	PASS
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### 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 positive peak detector function must be used.
- A measurement instrument with an integrated 90% power bandwidth function may be used to automate the test process.
- 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.
- 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

#### 3.3. Limits

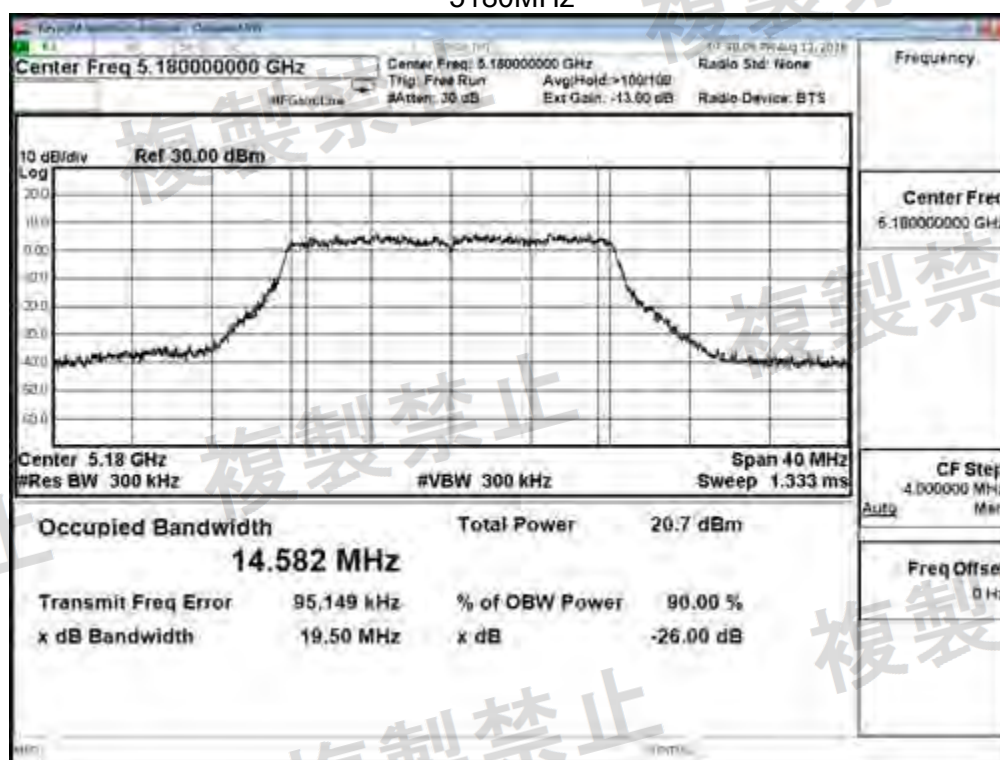
Spread Factor  $\geq 5$

### 3.4. Test Result of Spread Bandwidth and Spread Factor

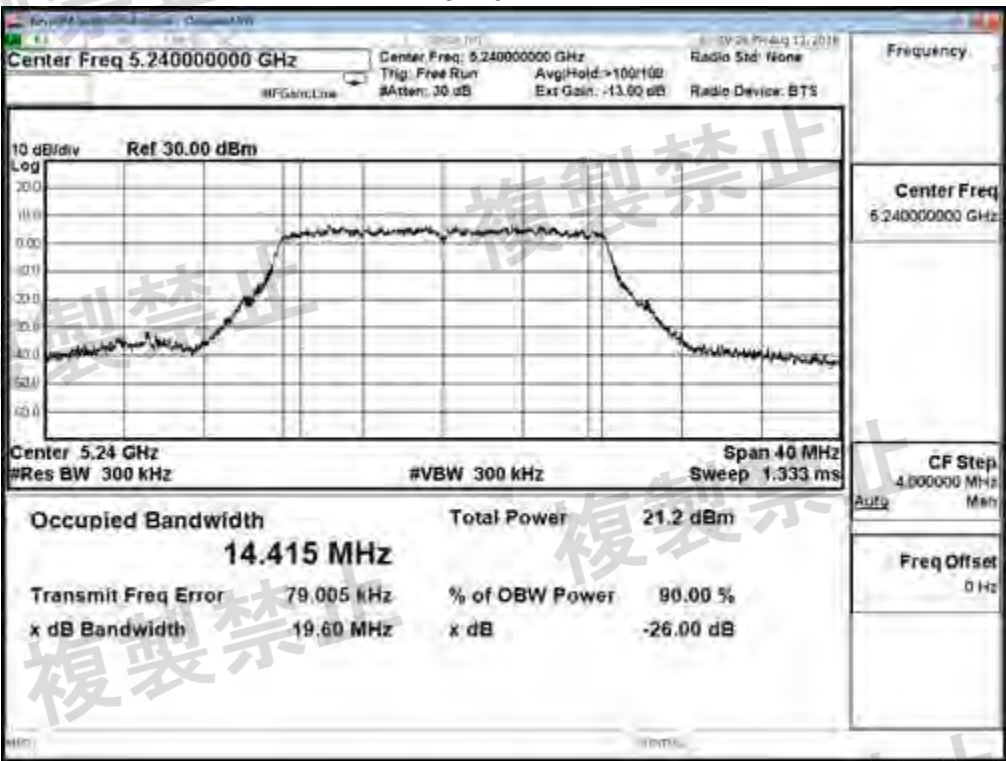
Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11a, ANT0		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5180	14.582	$\geq 500$
5240	14.415	$\geq 500$
5260	14.848	$\geq 500$
5320	14.821	$\geq 500$
5500	14.558	$\geq 500$
5600	14.496	$\geq 500$
5700	14.526	$\geq 500$

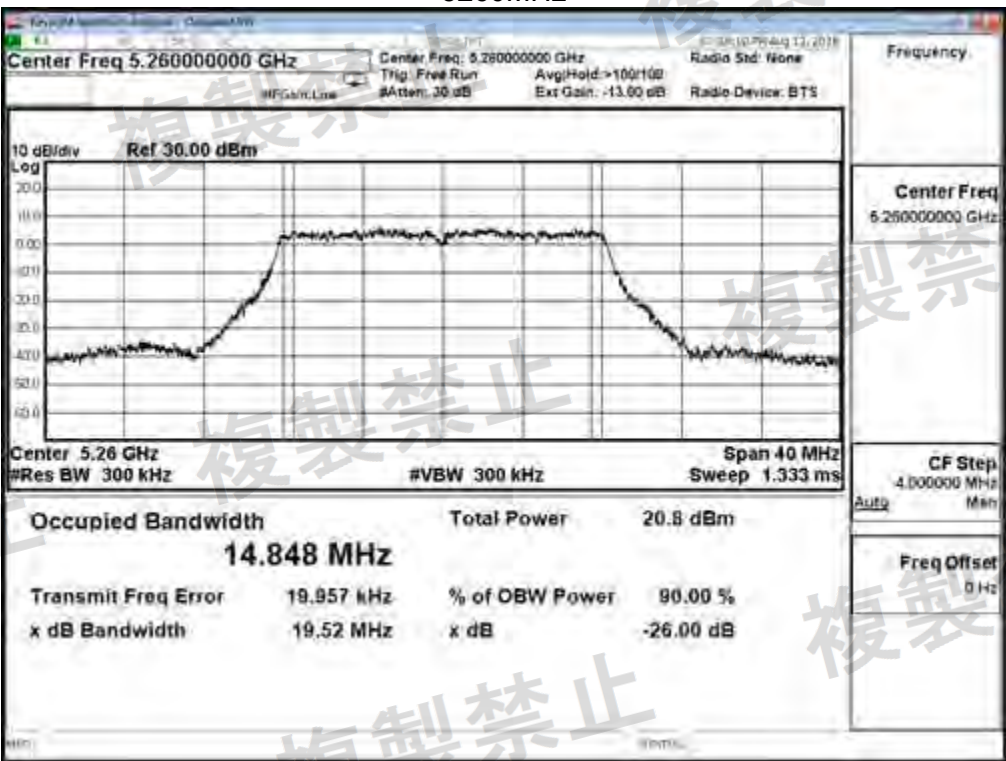
5180MHz



5240MHz

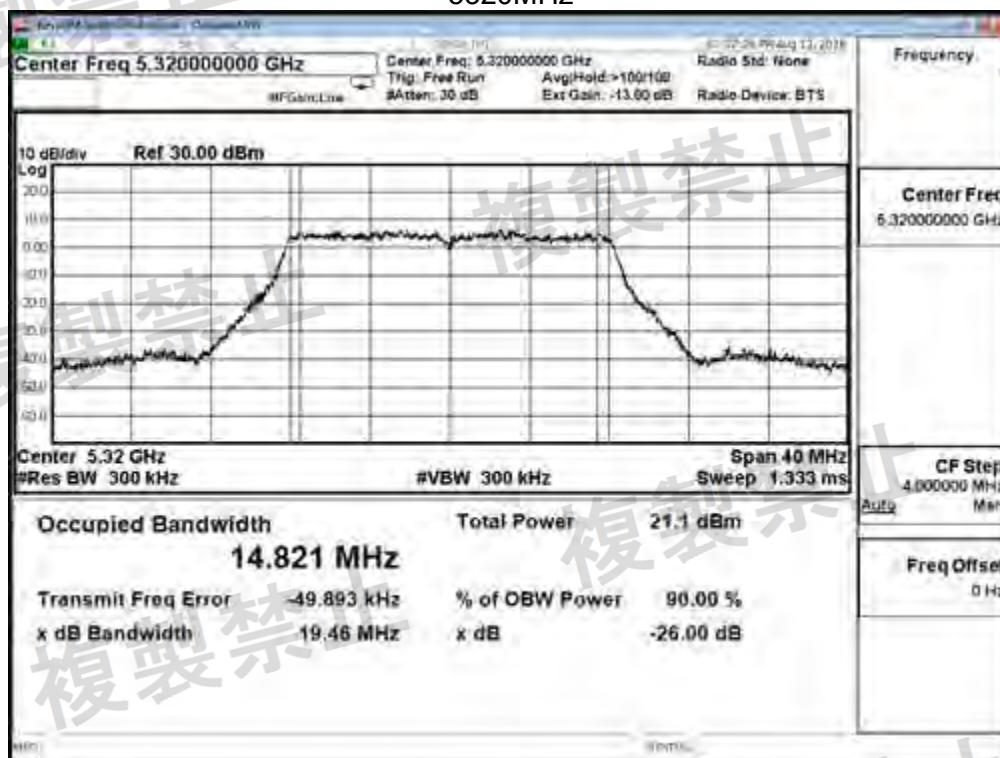


5260MHz





5320MHz

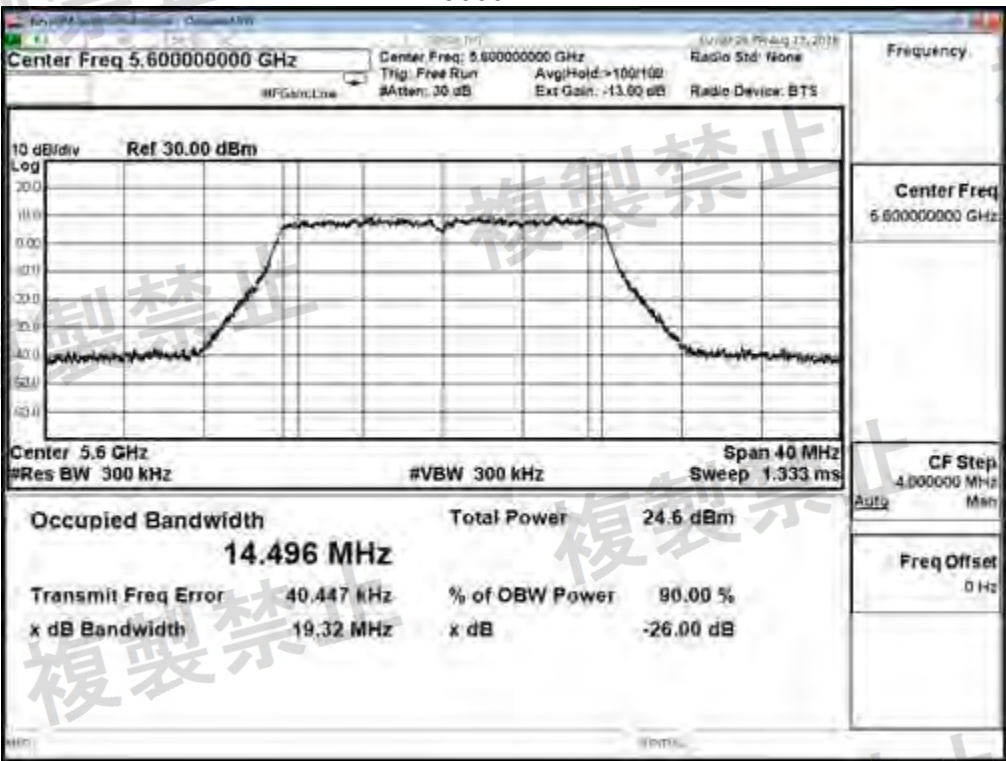


5500MHz

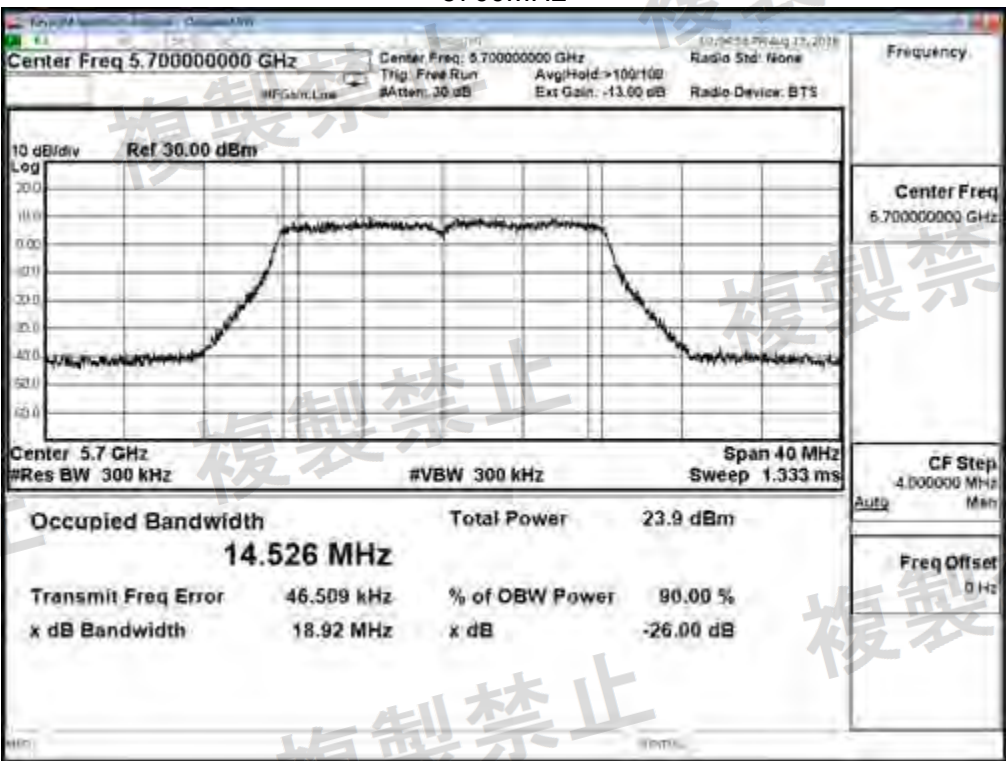




5600MHz



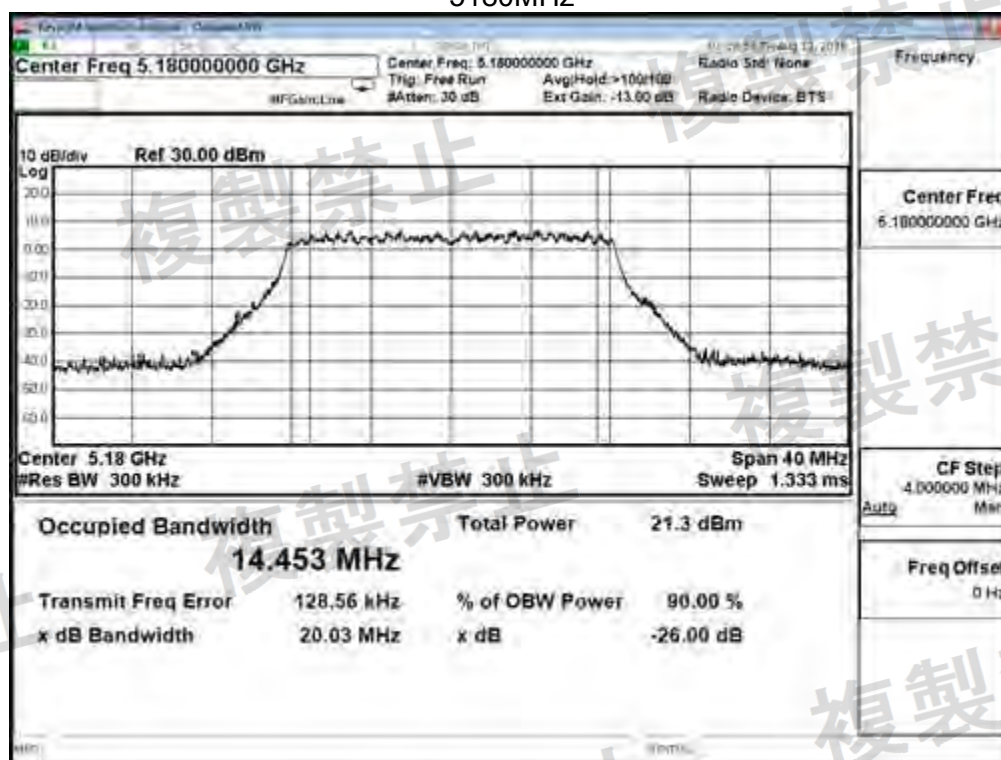
5700MHz



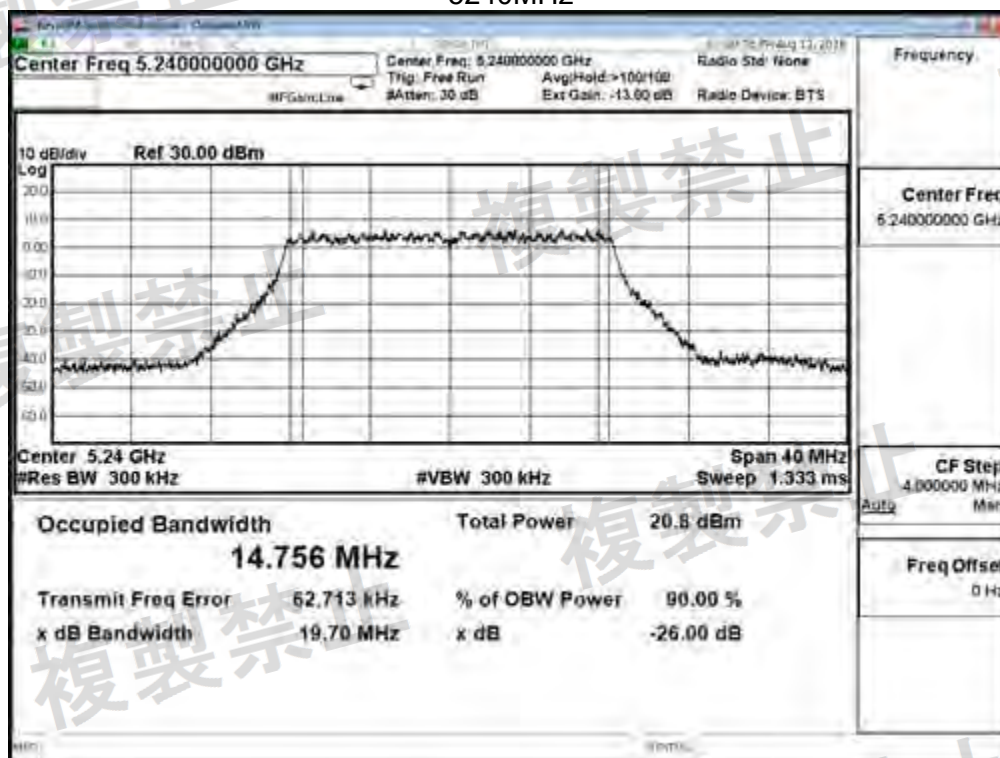
Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11a, ANT1		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5180	14.453	$\geq 500$
5240	14.756	$\geq 500$
5260	14.623	$\geq 500$
5320	14.685	$\geq 500$
5500	14.578	$\geq 500$
5600	14.292	$\geq 500$
5700	14.377	$\geq 500$

5180MHz



5240MHz

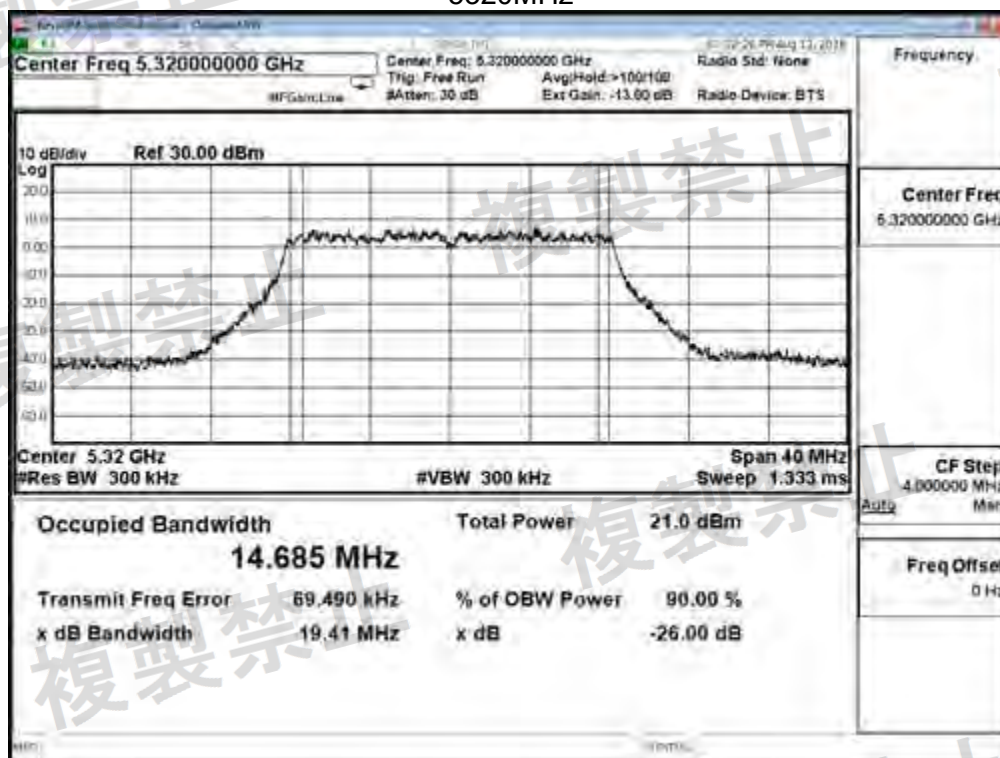


5260MHz





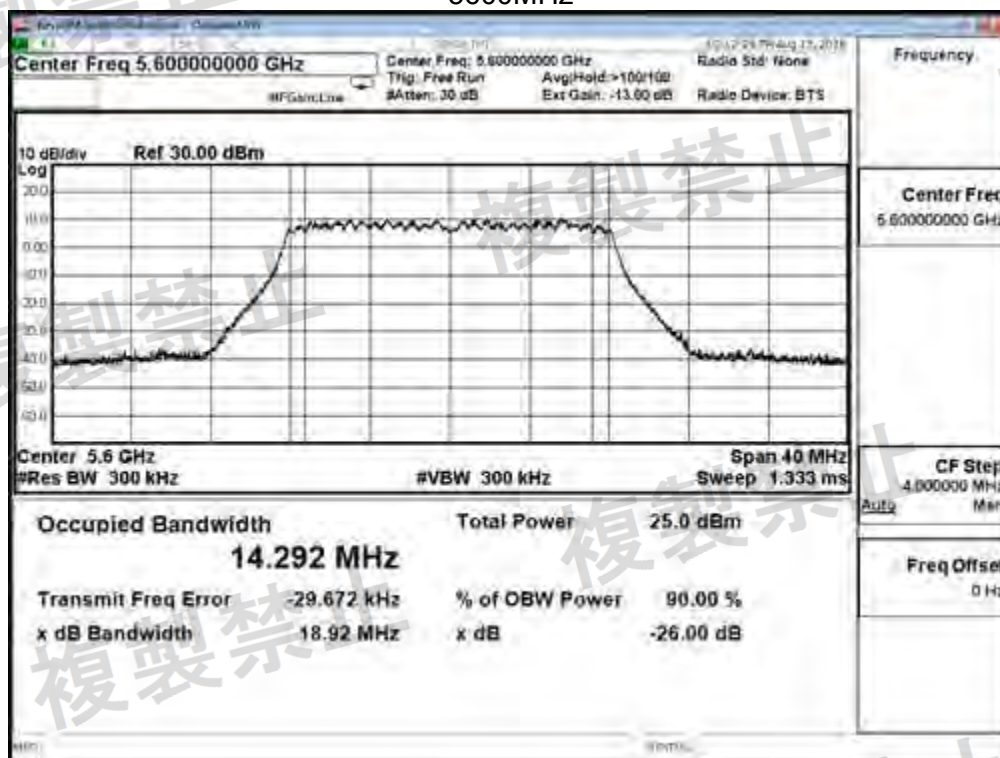
5320MHz



5500MHz



5600MHz



5700MHz

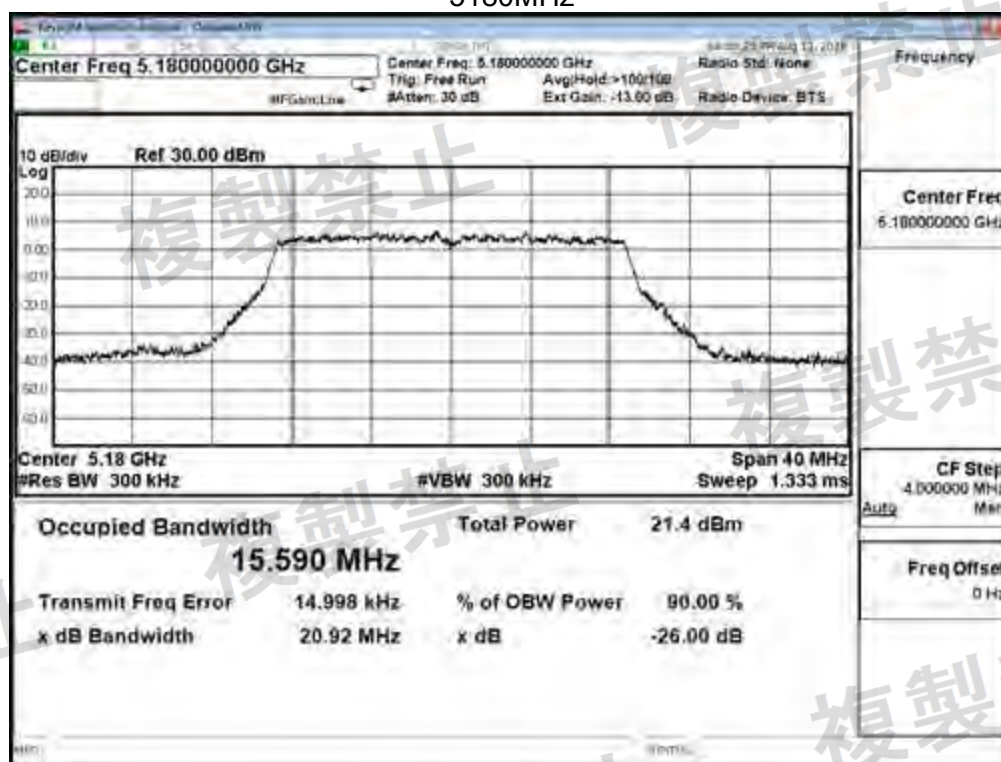




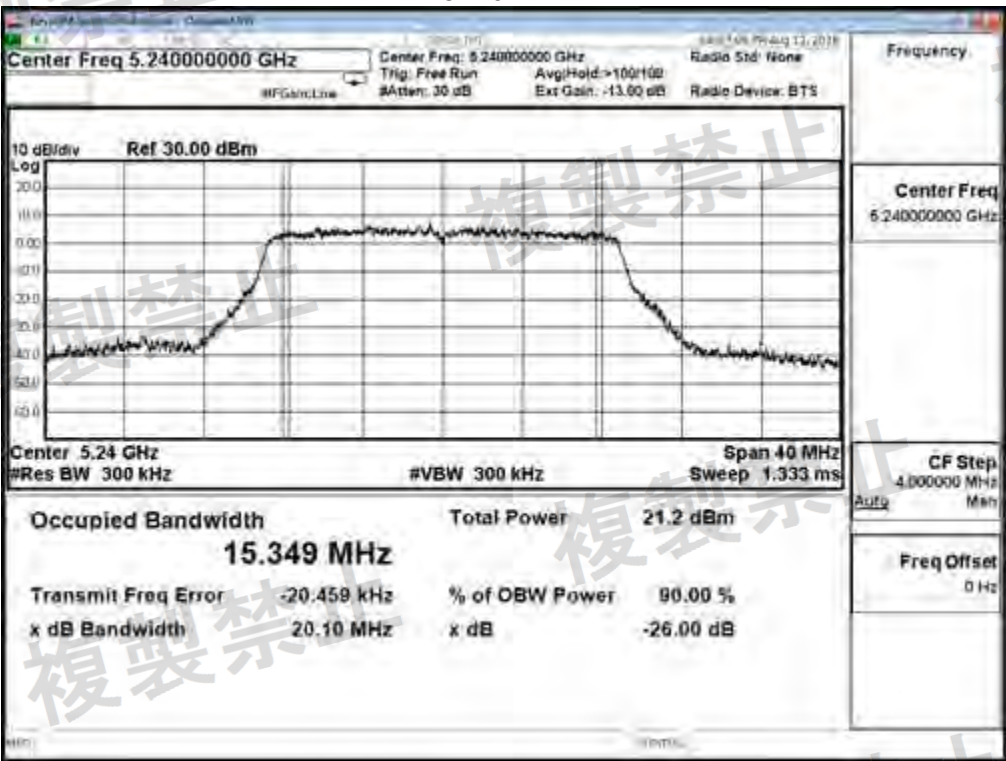
Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11ac (20MHz), ANT0		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5180	15.590	$\geq 500$
5240	15.349	$\geq 500$
5260	15.774	$\geq 500$
5320	15.348	$\geq 500$
5500	15.609	$\geq 500$
5600	15.610	$\geq 500$
5700	15.557	$\geq 500$

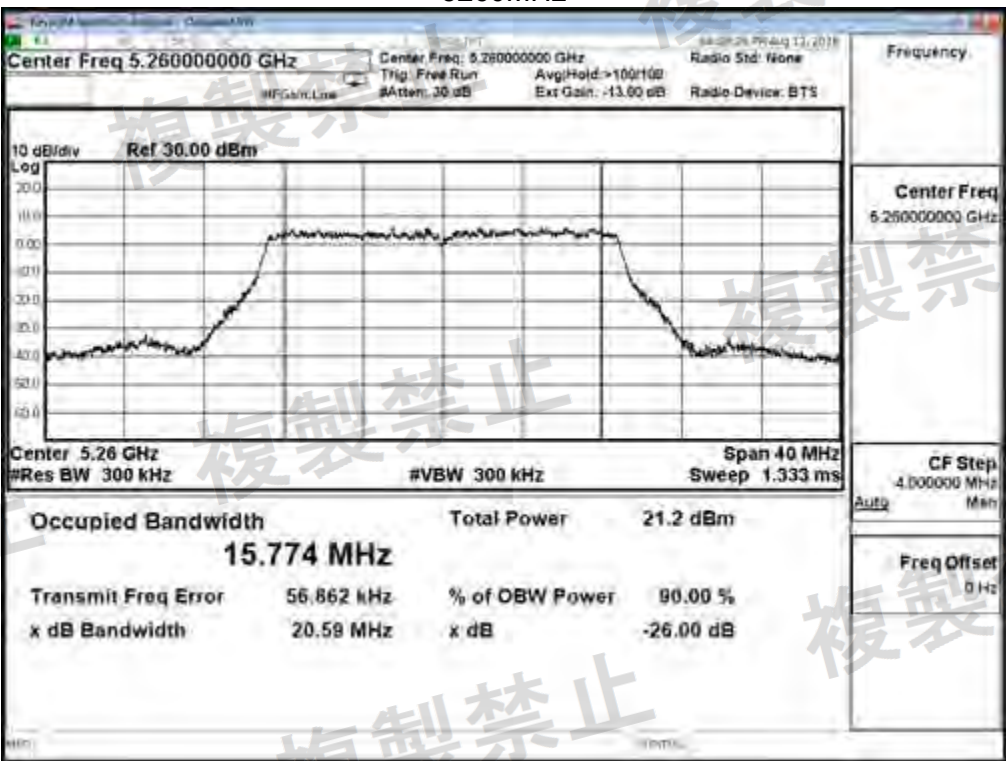
5180MHz



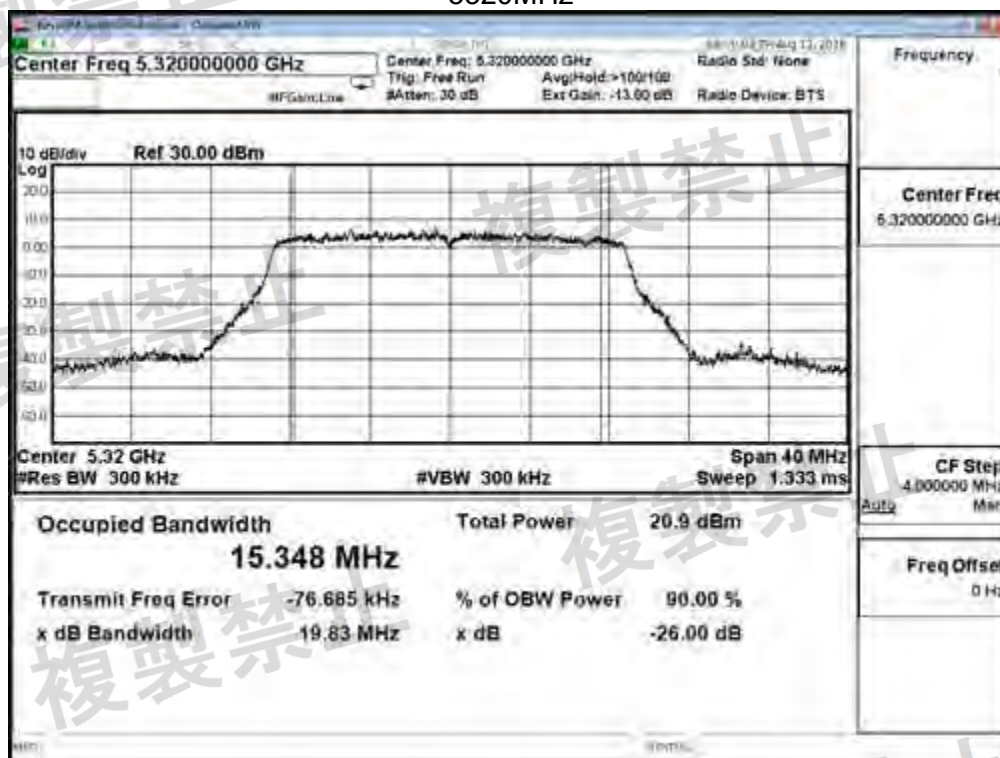
5240MHz



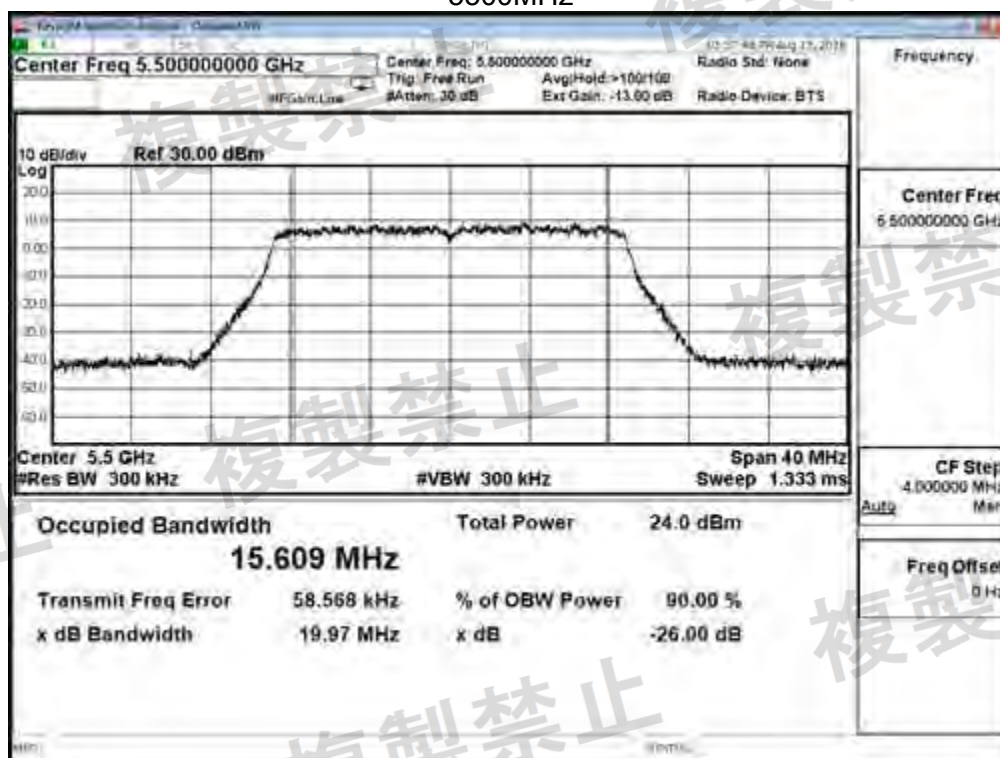
5260MHz



5320MHz

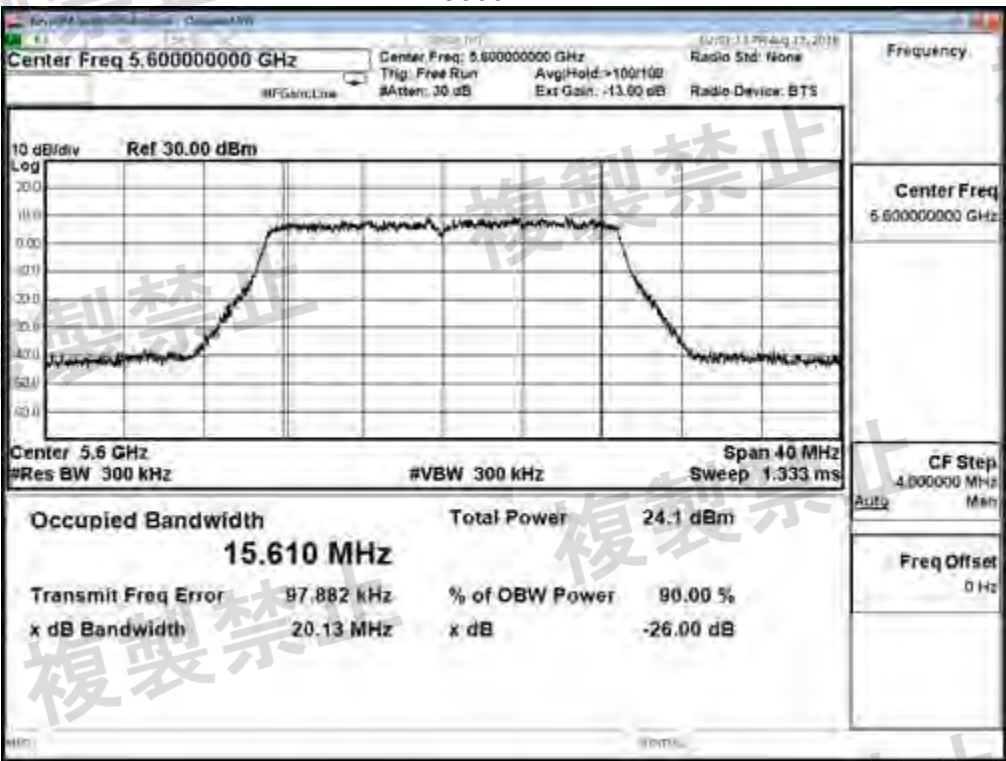


5500MHz

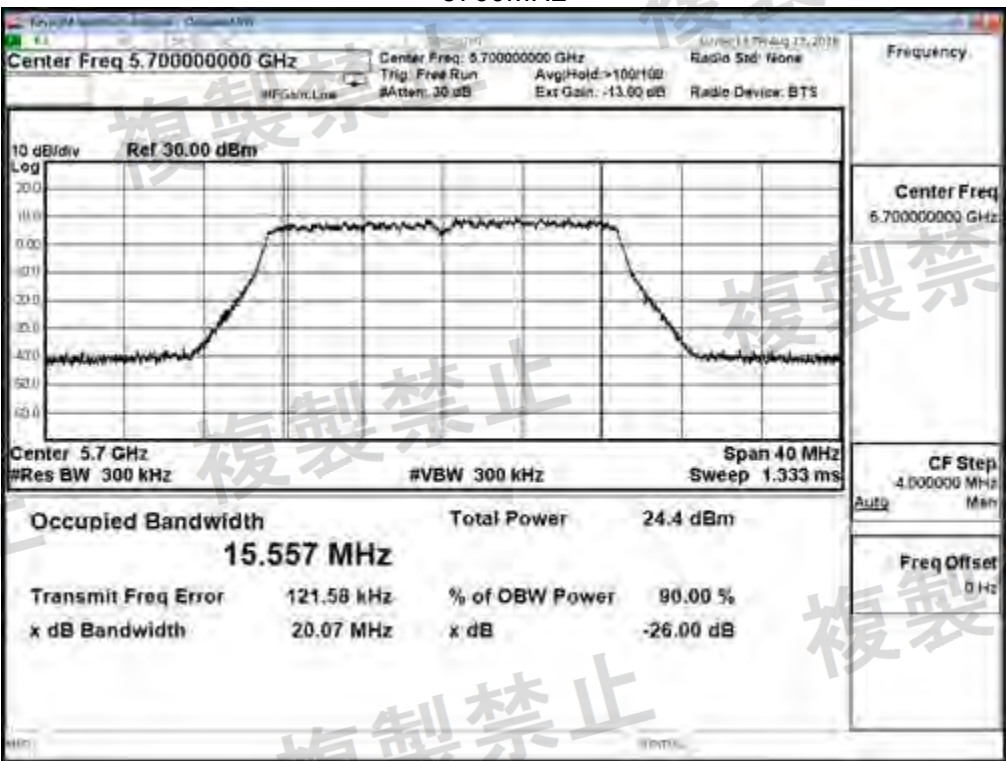




5600MHz



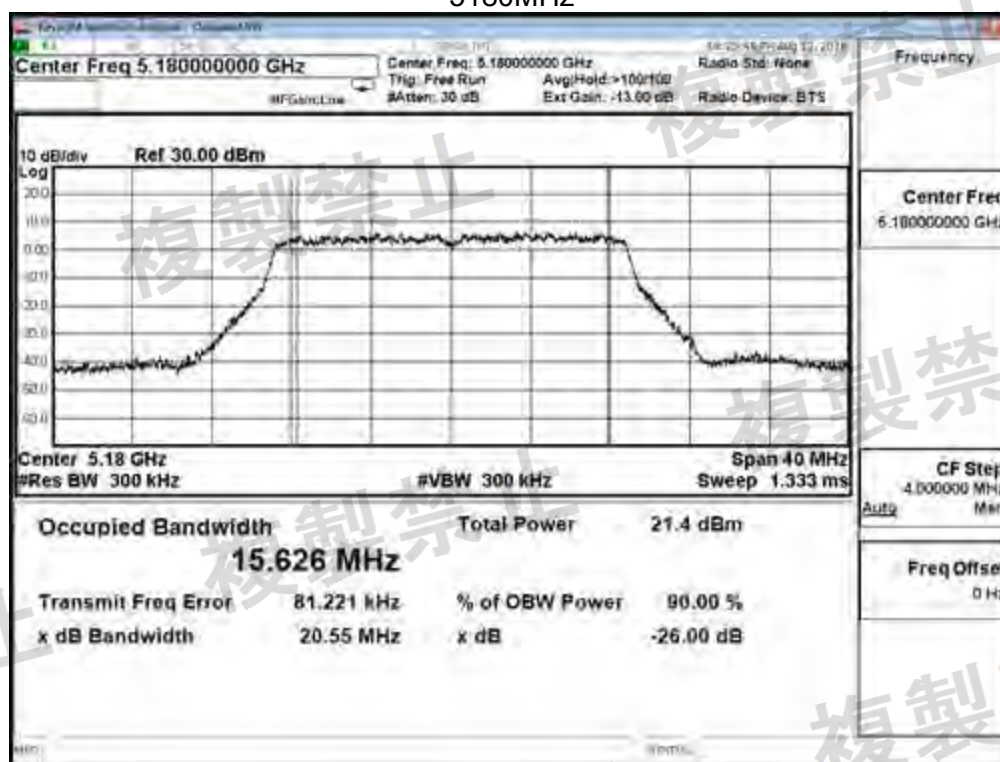
5700MHz



Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

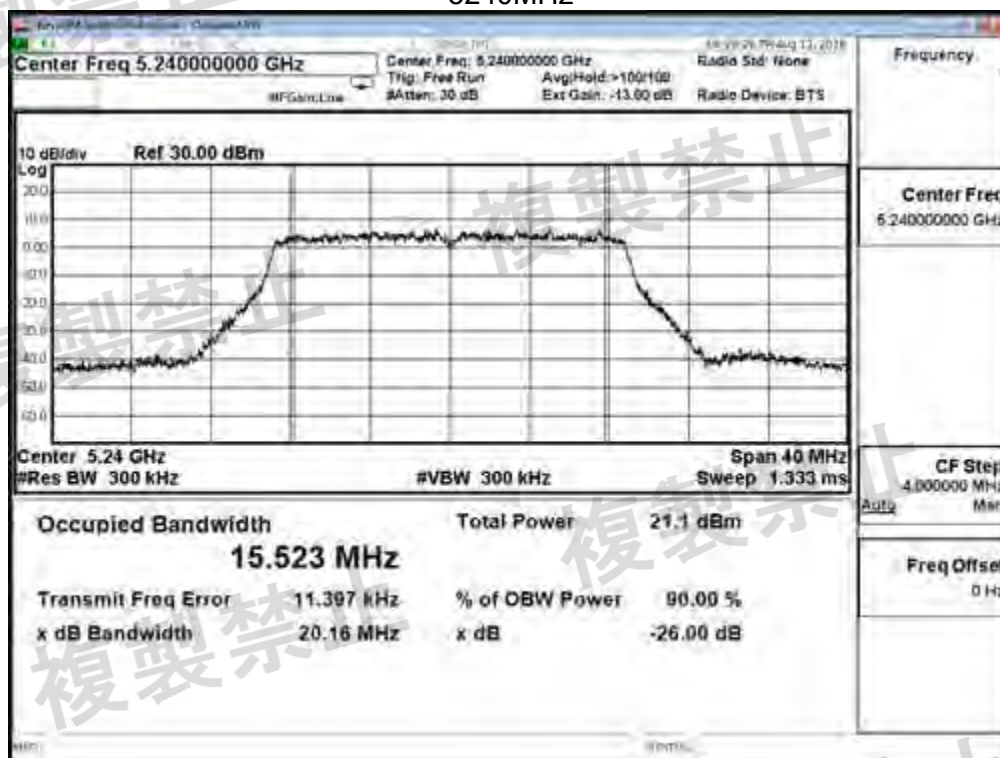
Test Mode: 802.11ac (20MHz), ANT1		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5180	15.626	$\geq 500$
5240	15.523	$\geq 500$
5260	15.636	$\geq 500$
5320	15.671	$\geq 500$
5500	15.456	$\geq 500$
5600	15.352	$\geq 500$
5700	15.419	$\geq 500$

5180MHz





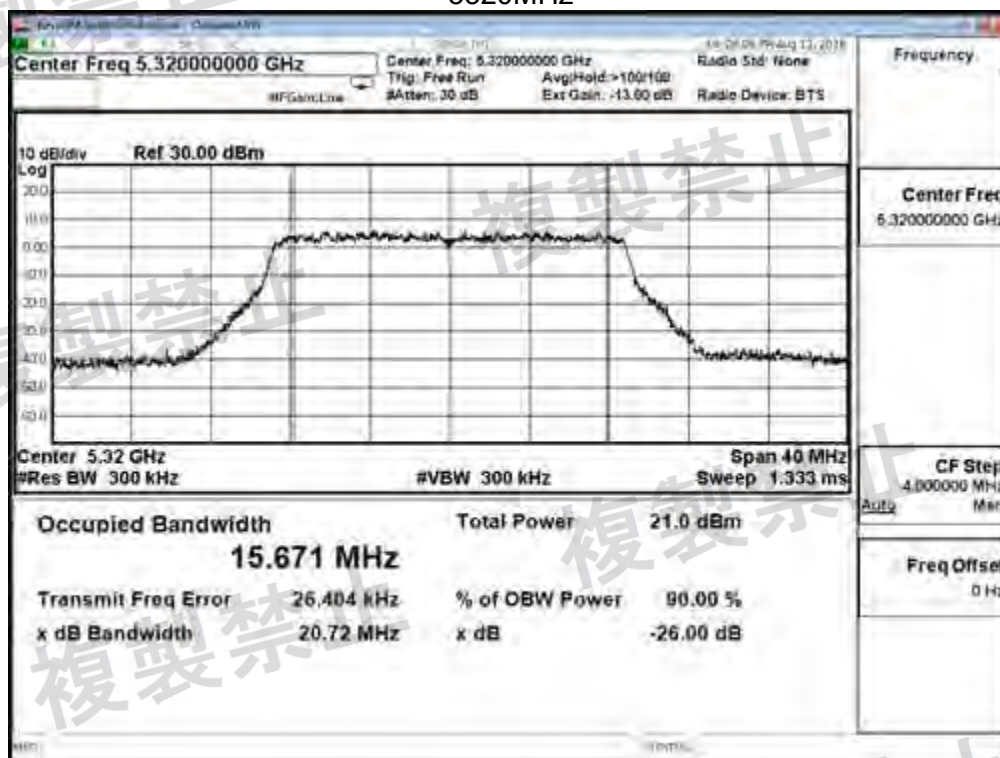
5240MHz



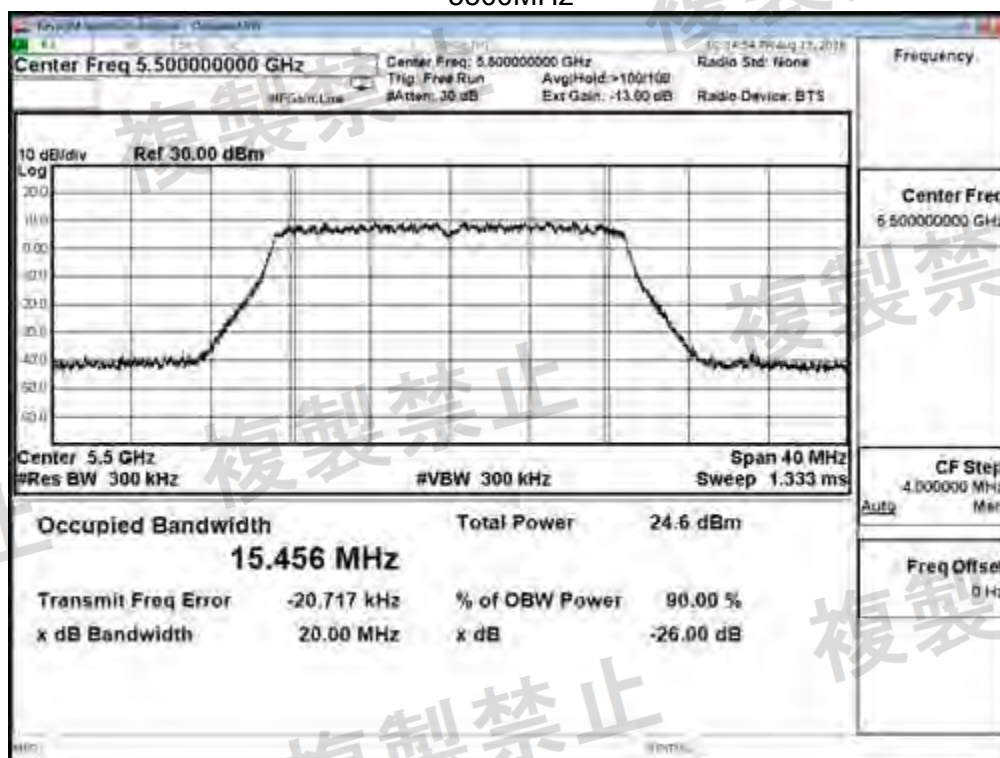
5260MHz



5320MHz

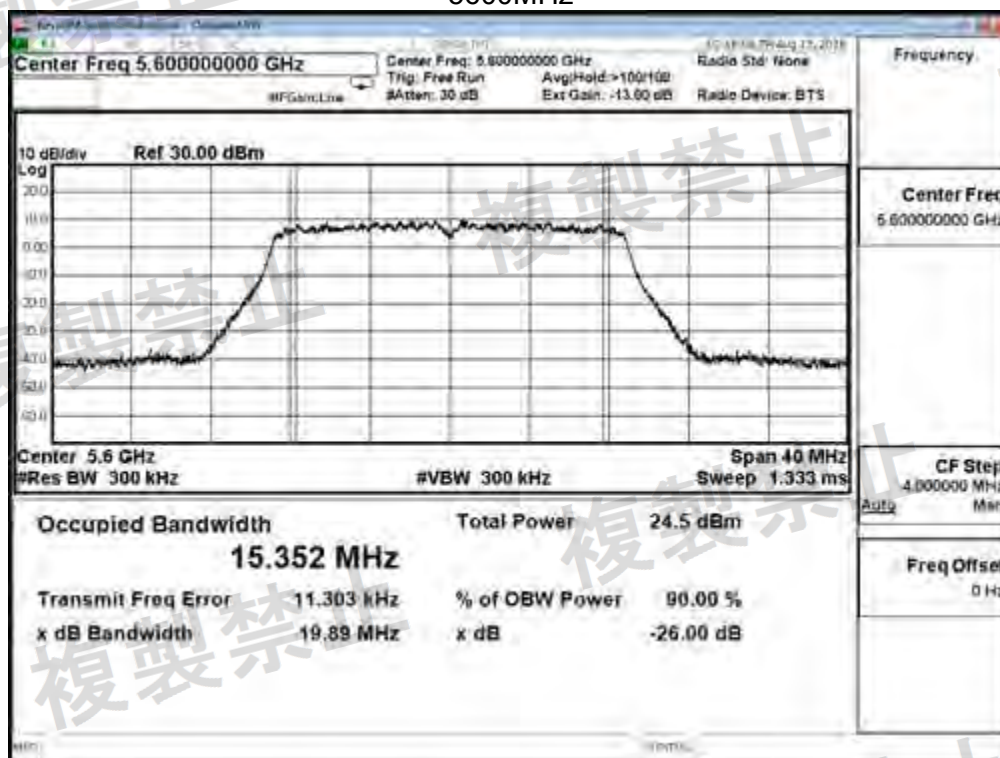


5500MHz





5600MHz



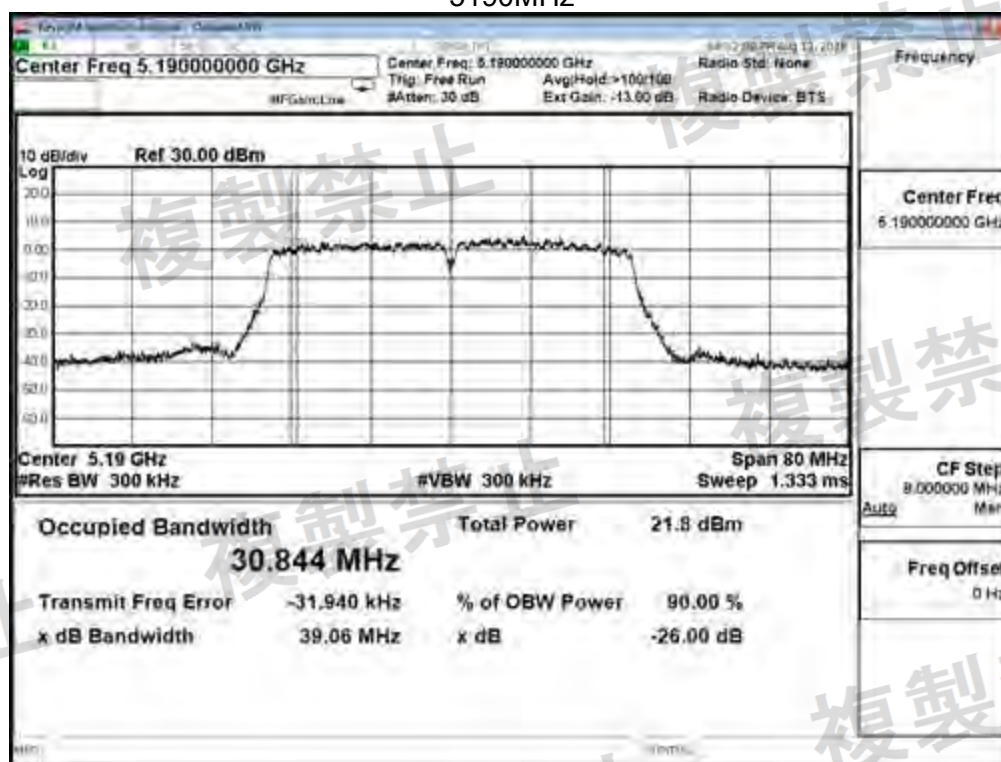
5700MHz



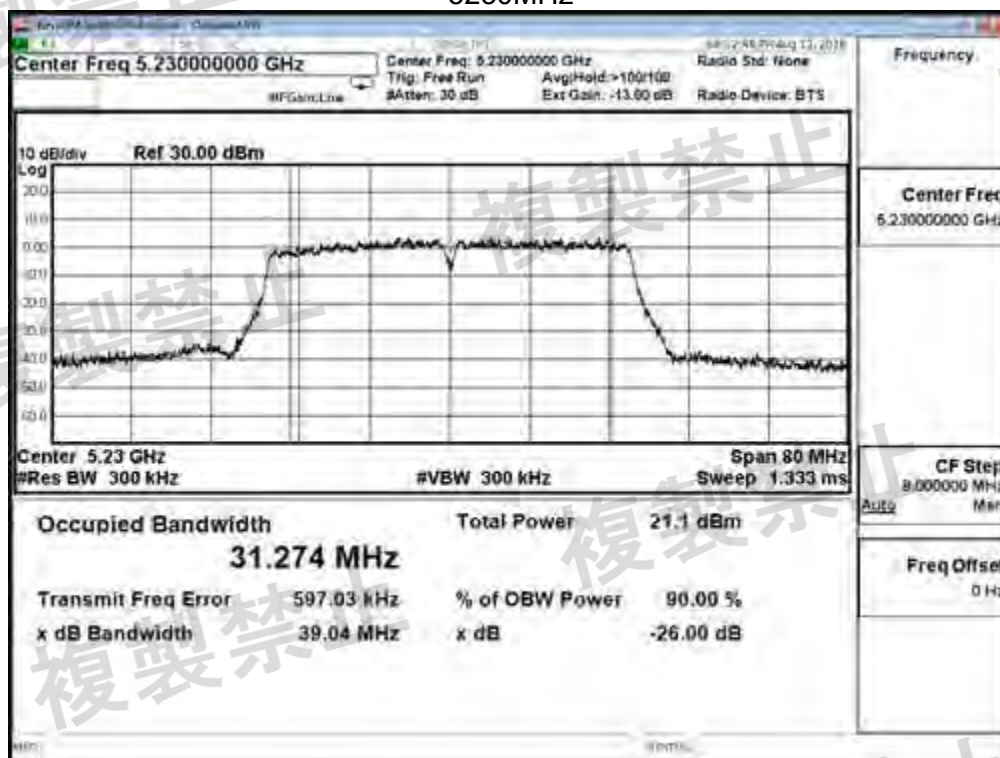
Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11ac (40MHz), ANT0		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5190	30.844	$\geq 500$
5230	31.274	$\geq 500$
5270	31.428	$\geq 500$
5310	31.245	$\geq 500$
5510	31.365	$\geq 500$
5590	31.643	$\geq 500$
5670	31.348	$\geq 500$

5190MHz



5230MHz

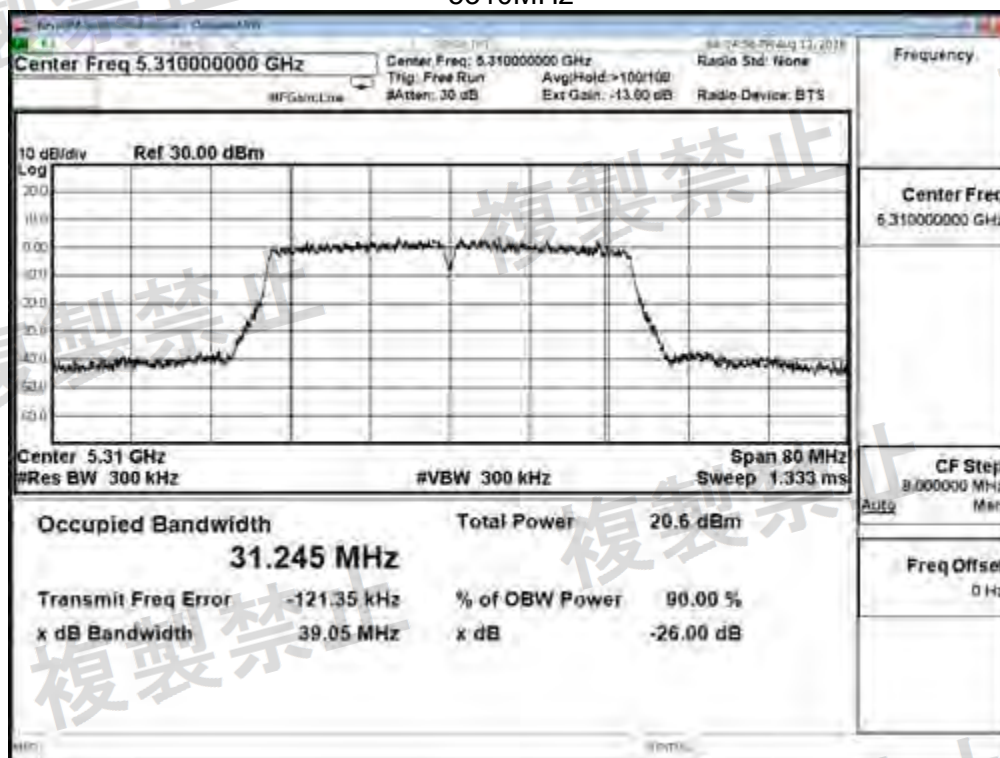


5270MHz

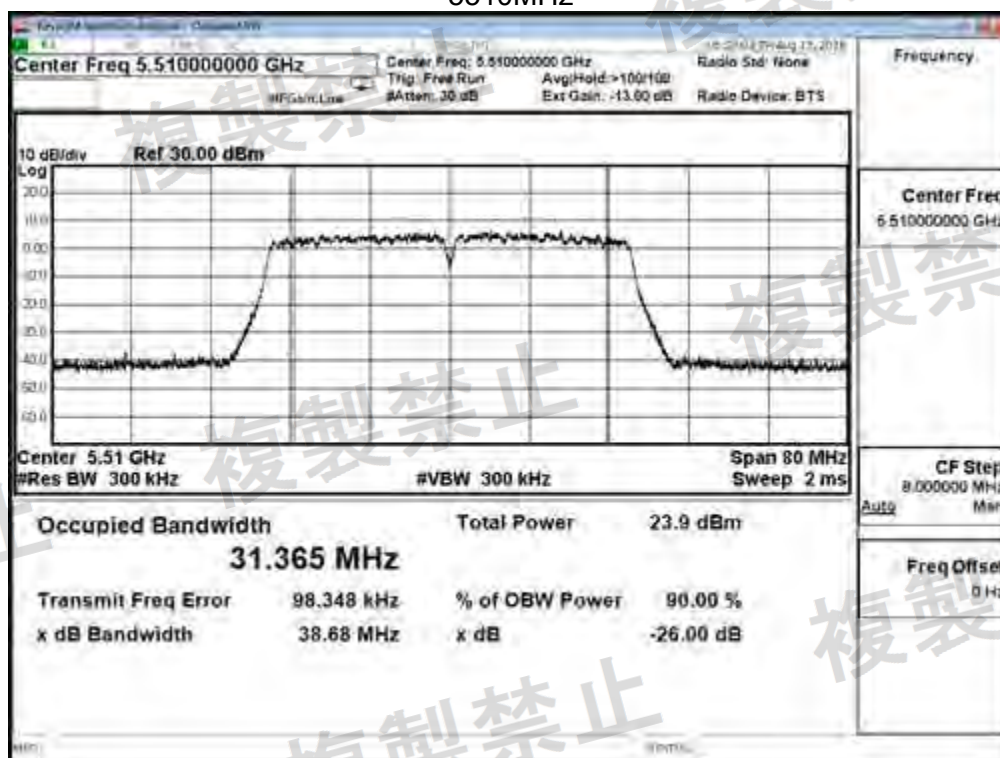




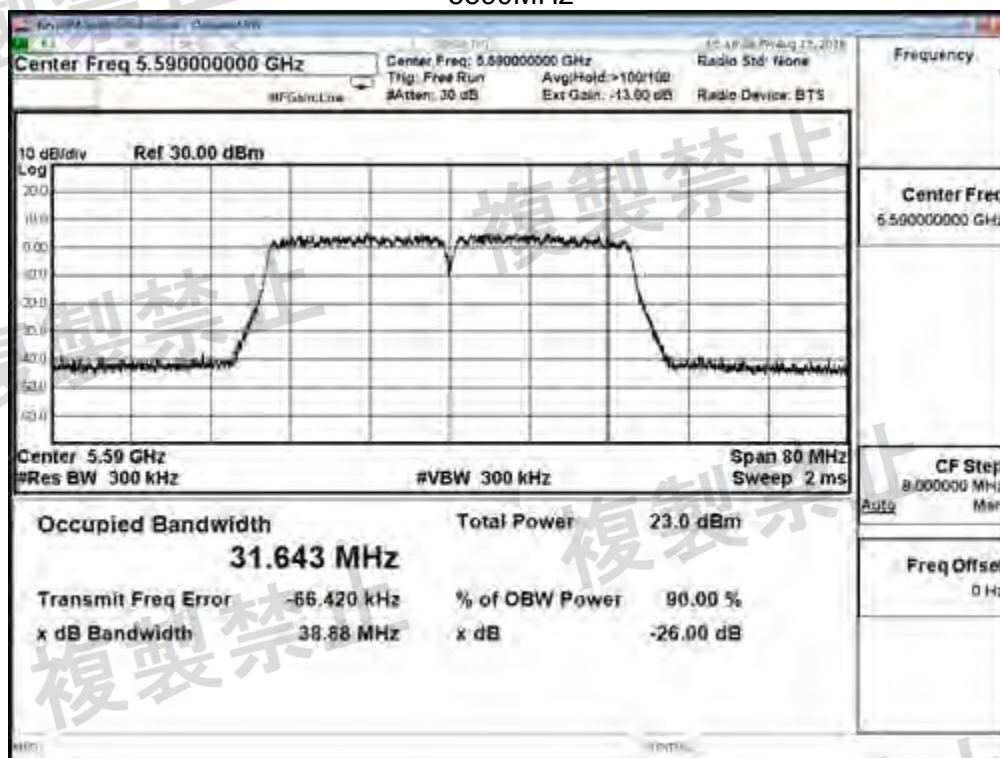
5310MHz



5510MHz



5590MHz



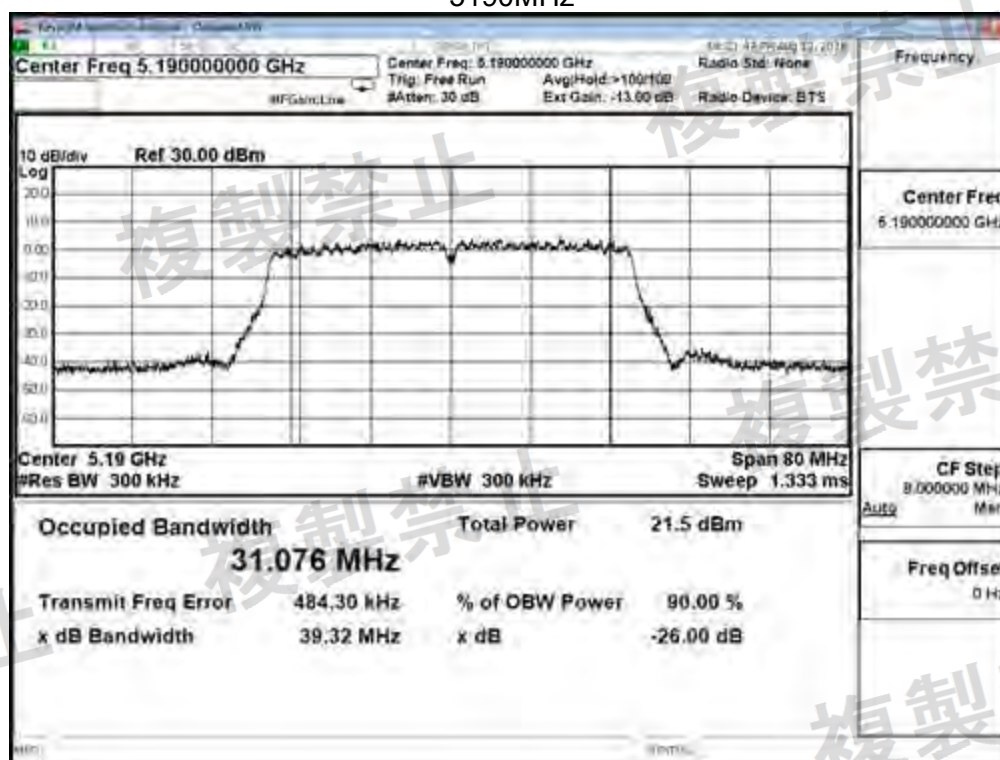
5670MHz



Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

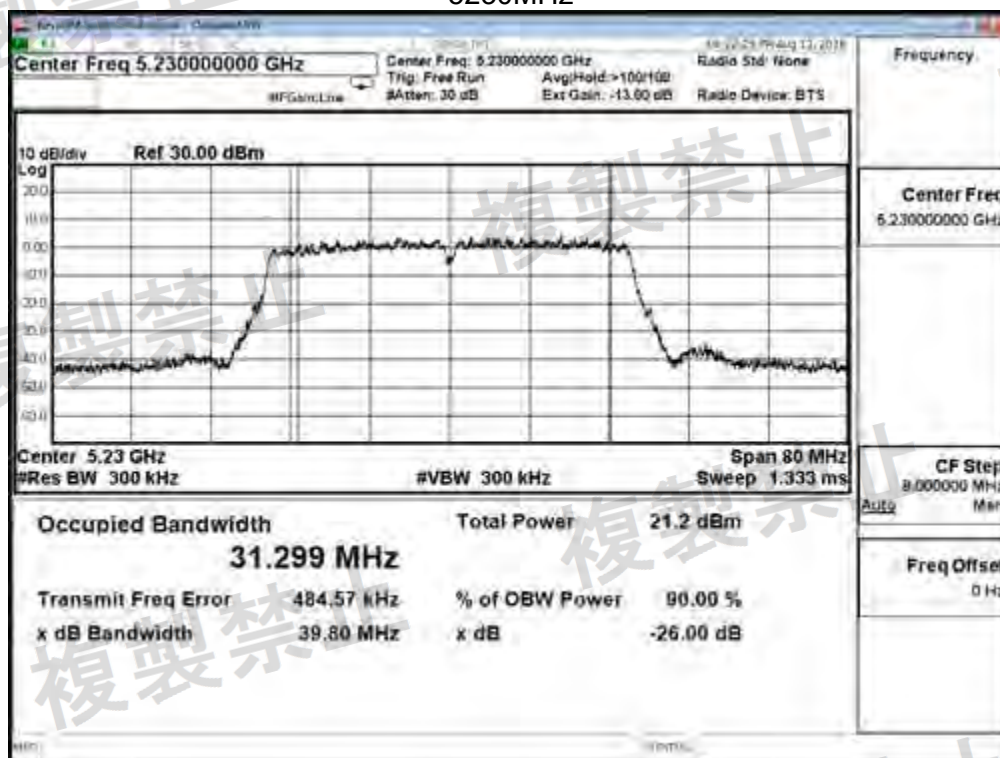
Test Mode: 802.11ac (40MHz), ANT1		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5190	31.076	$\geq 500$
5230	31.299	$\geq 500$
5270	31.147	$\geq 500$
5310	30.856	$\geq 500$
5510	31.144	$\geq 500$
5590	31.304	$\geq 500$
5670	31.760	$\geq 500$

5190MHz

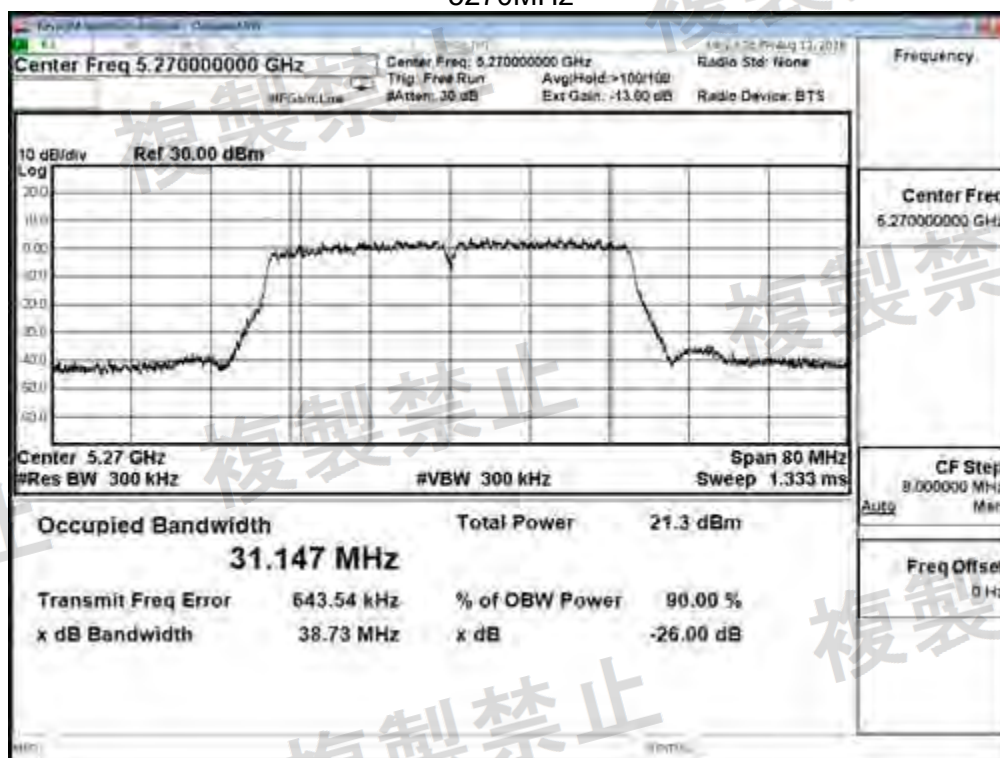




5230MHz

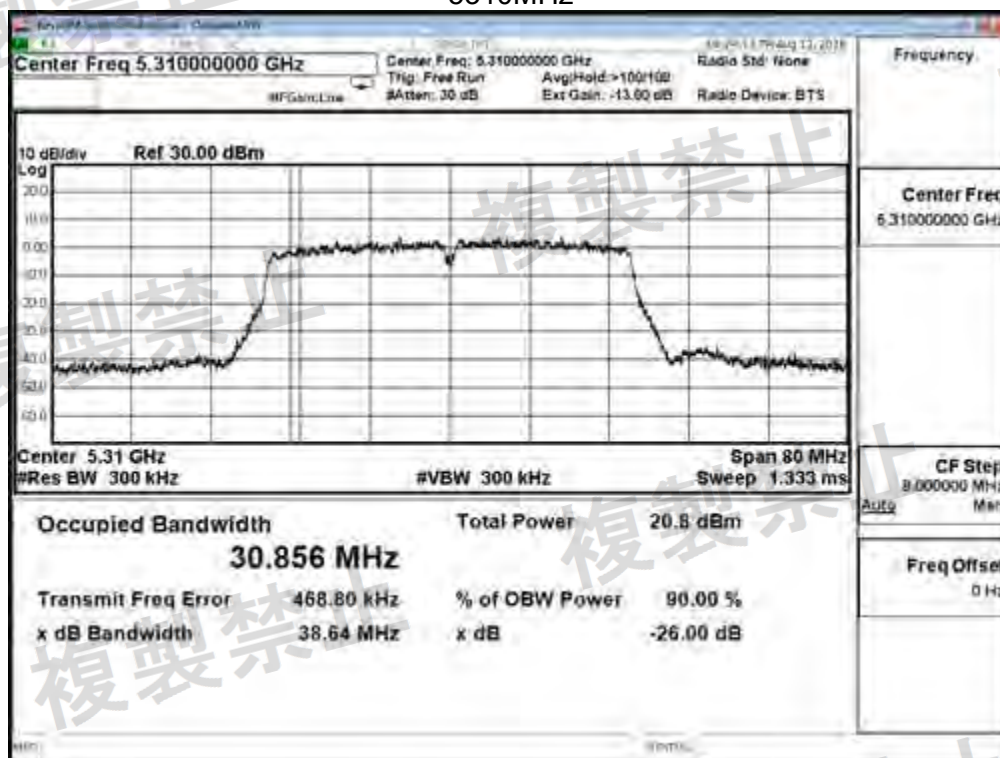


5270MHz





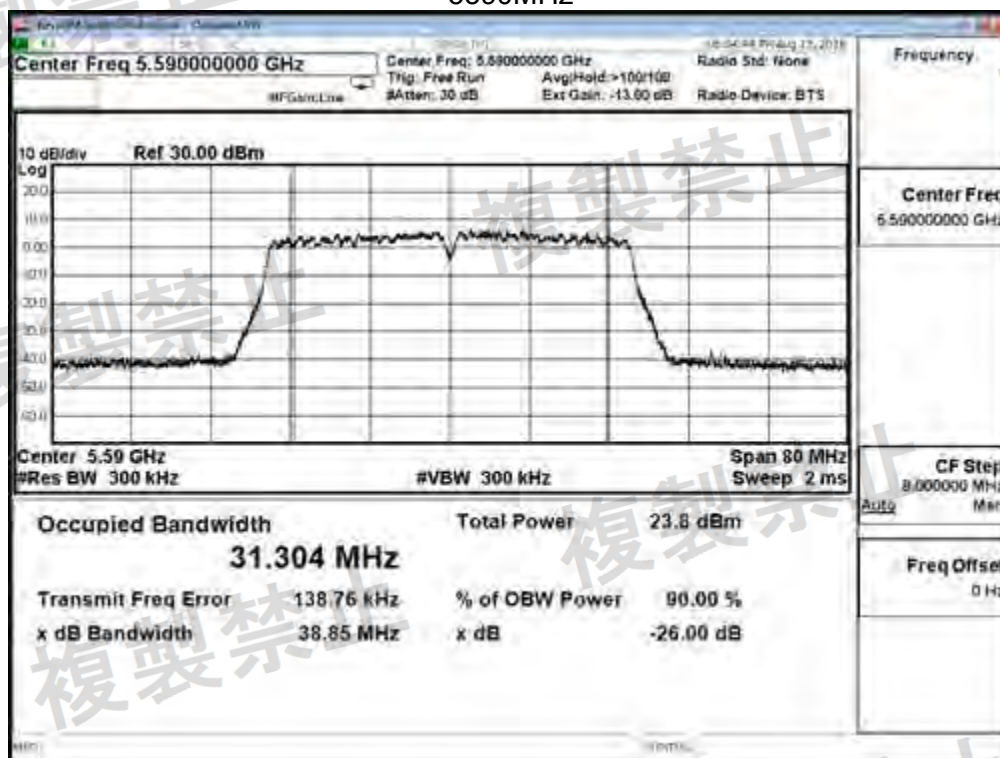
5310MHz



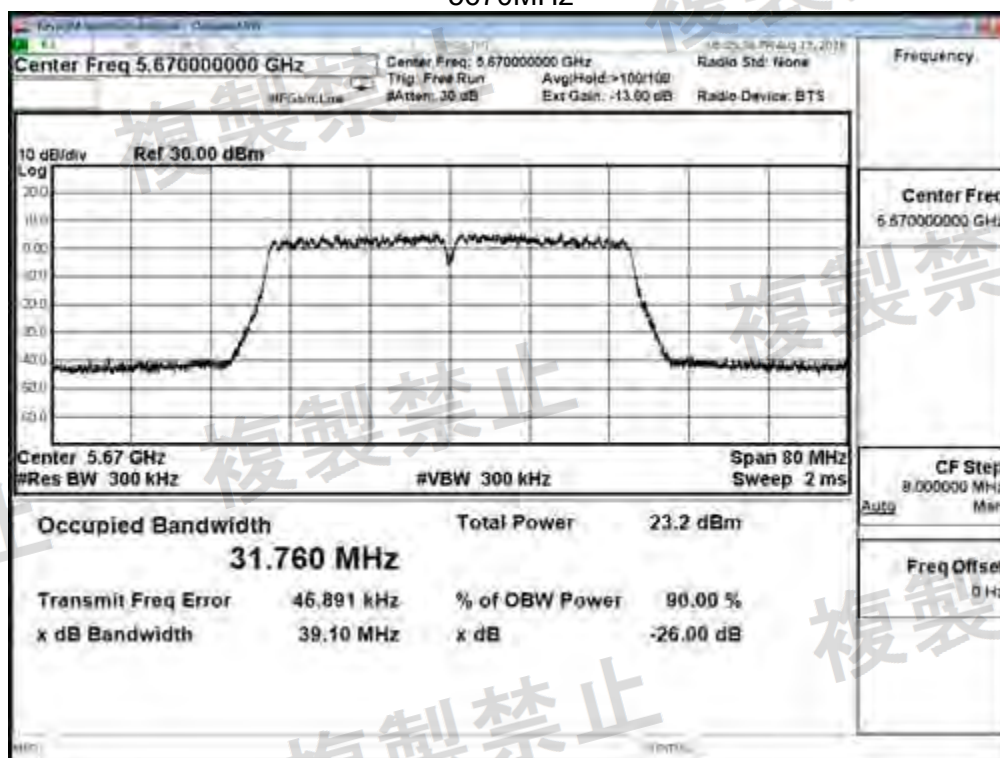
5510MHz



5590MHz



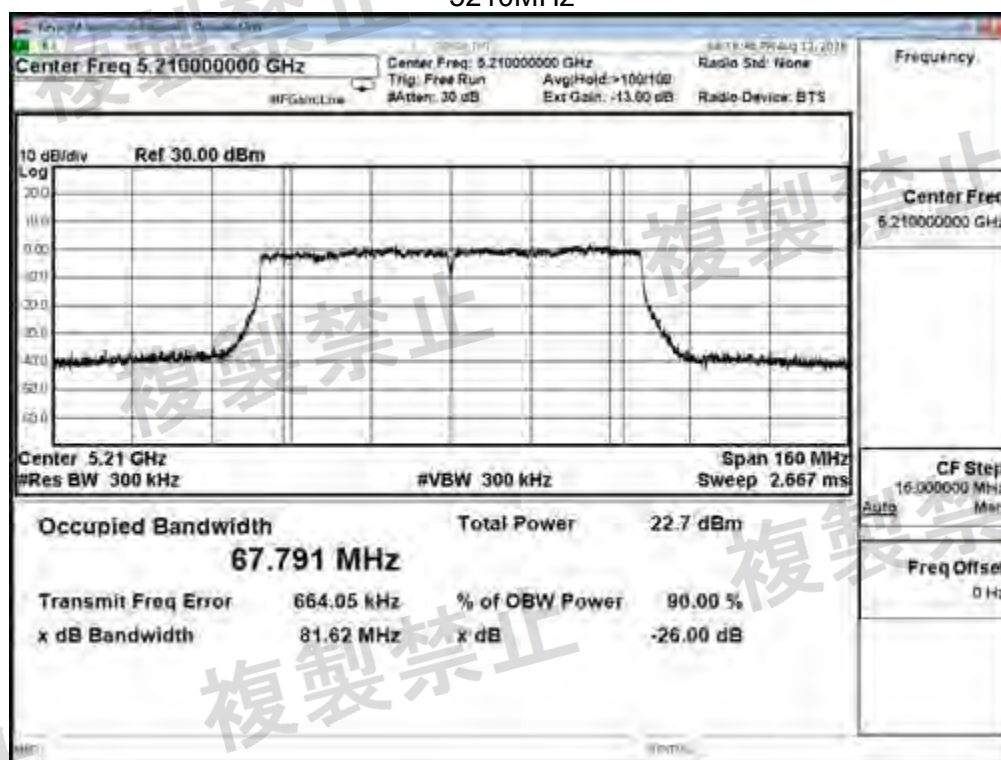
5670MHz



Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

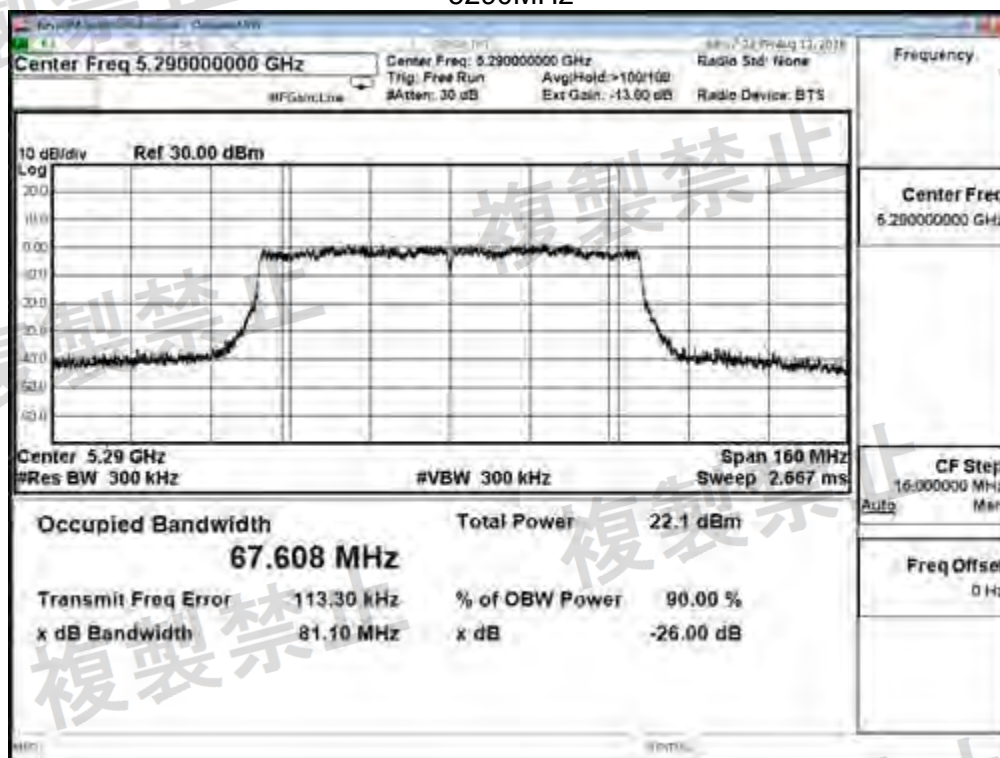
Test Mode: IEEE 802.11ac (80MHz), ANT0		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5210	67.791	$\geq 500$
5290	67.608	$\geq 500$
5530	67.522	$\geq 500$
5610	68.243	$\geq 500$

5210MHz

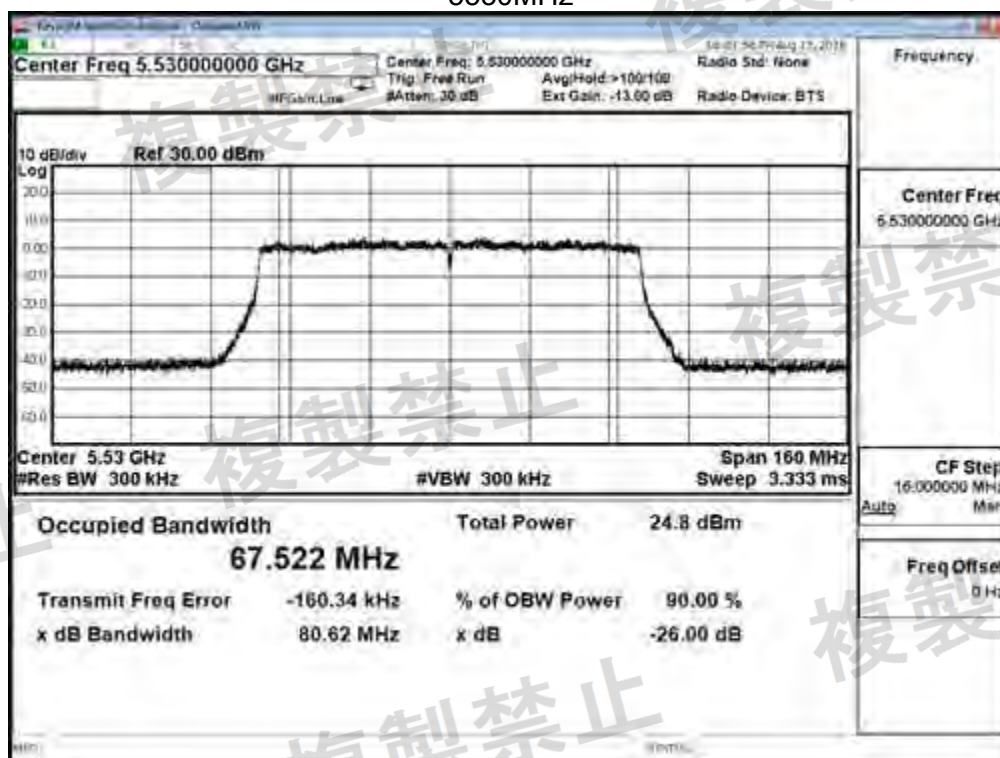




5290MHz

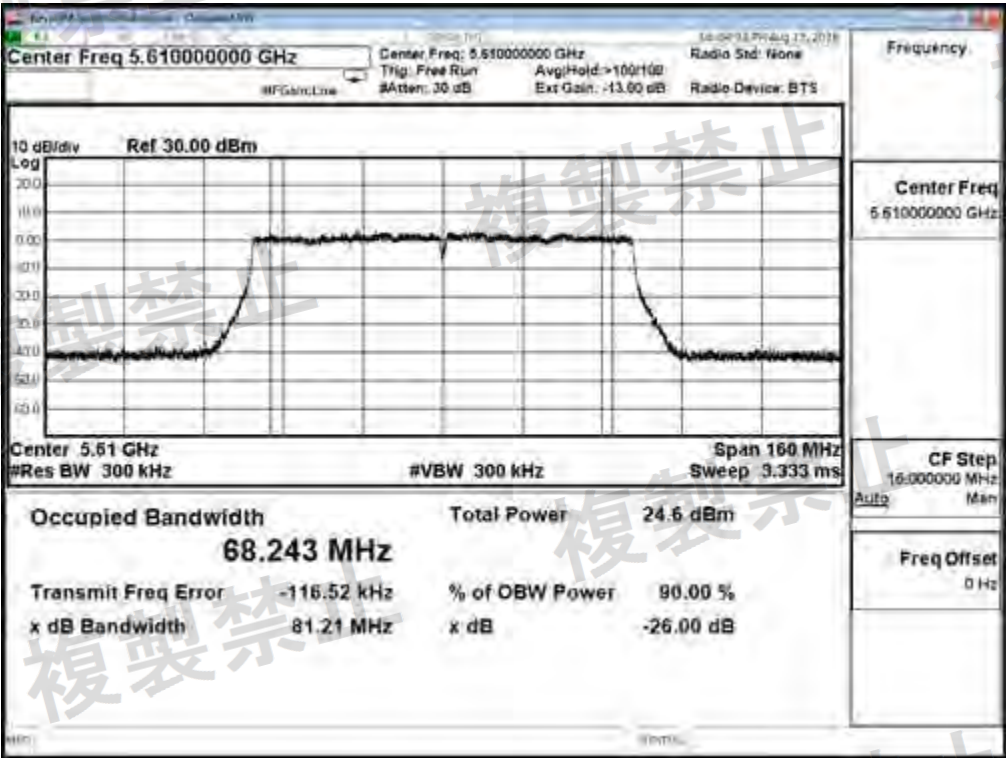


5530MHz





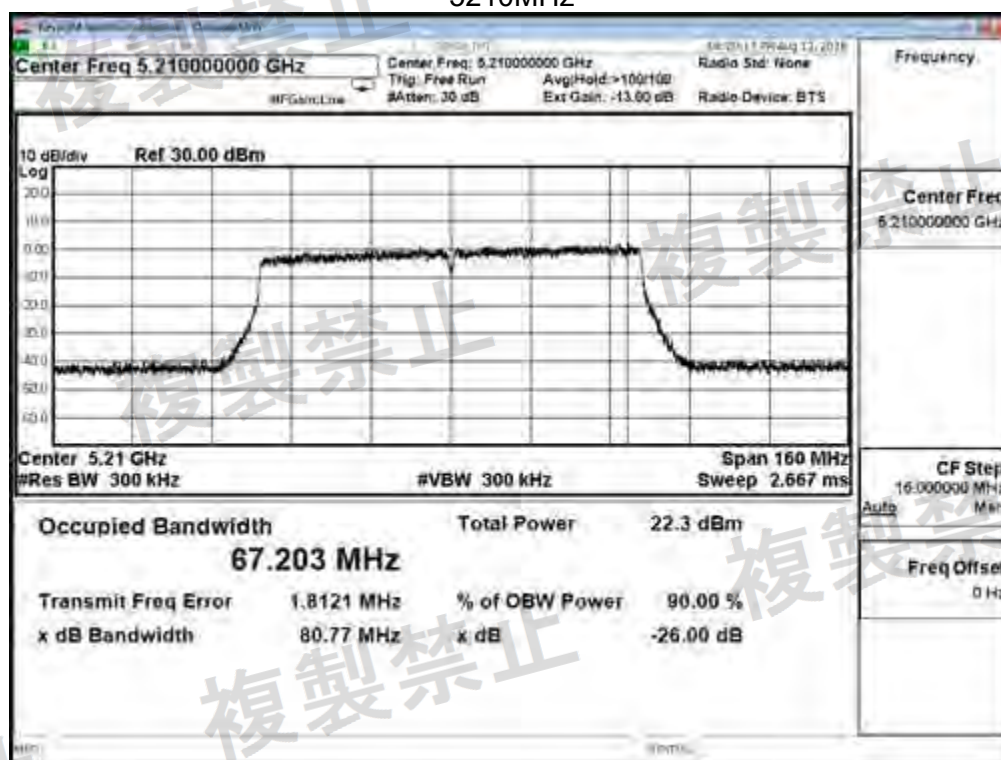
5610MHz



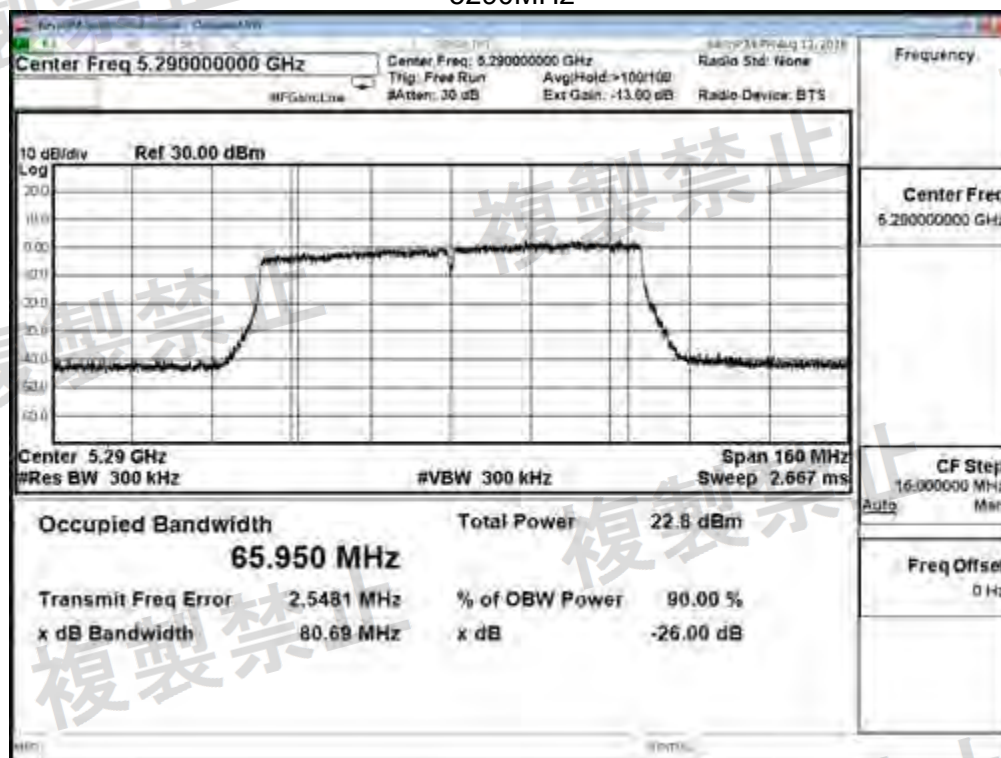
Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Bandwidth  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: IEEE 802.11ac (80MHz), ANT1		
Frequency (MHz)	Reading Value (MHz)	Limit (KHz)
5210	67.203	$\geq 500$
5290	65.950	$\geq 500$
5530	67.537	$\geq 500$
5610	68.195	$\geq 500$

5210MHz



5290MHz

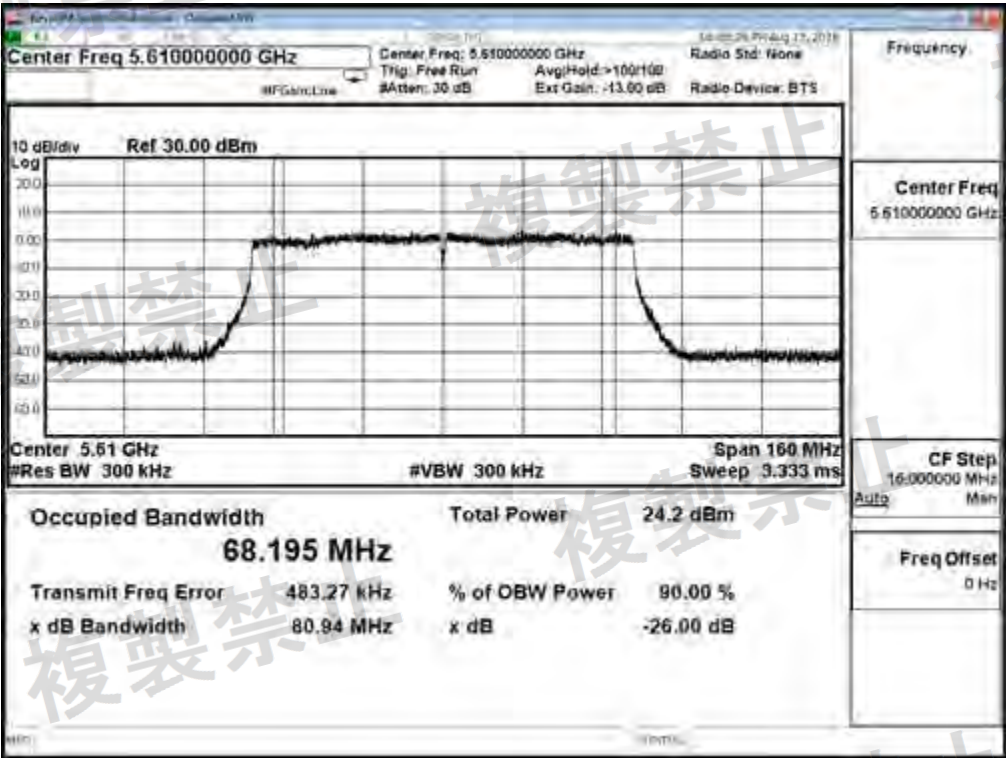


5530MHz





5610MHz





Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Factor  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11a. ANT0				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5180	14.582	1.375	10.605	$\geq 5$
5240	14.415	1.375	10.484	$\geq 5$
5260	14.848	1.375	10.799	$\geq 5$
5320	14.821	1.375	10.779	$\geq 5$
5500	14.558	1.375	10.588	$\geq 5$
5600	14.496	1.375	10.543	$\geq 5$
5700	14.526	1.375	10.564	$\geq 5$
Test Mode: 802.11a. ANT1				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5180	14.453	1.375	10.511	$\geq 5$
5240	14.756	1.375	10.732	$\geq 5$
5260	14.623	1.375	10.635	$\geq 5$
5320	14.685	1.375	10.680	$\geq 5$
5500	14.578	1.375	10.602	$\geq 5$
5600	14.292	1.375	10.394	$\geq 5$
5700	14.377	1.375	10.456	$\geq 5$

Calculation Method: Spread Factor

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

= (SBW)/ (1.375Mbps)

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Factor  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11ac (20MHz), ANT0				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5180	15.590	1.375	11.338	$\geq 5$
5240	15.349	1.375	11.163	$\geq 5$
5260	15.774	1.375	11.472	$\geq 5$
5320	15.348	1.375	11.162	$\geq 5$
5500	15.609	1.375	11.352	$\geq 5$
5600	15.610	1.375	11.353	$\geq 5$
5700	15.557	1.375	11.314	$\geq 5$
Test Mode: 802.11ac (20MHz), ANT1				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5180	15.626	1.375	11.364	$\geq 5$
5240	15.523	1.375	11.289	$\geq 5$
5260	15.636	1.375	11.372	$\geq 5$
5320	15.671	1.375	11.397	$\geq 5$
5500	15.456	1.375	11.241	$\geq 5$
5600	15.352	1.375	11.165	$\geq 5$
5700	15.419	1.375	11.214	$\geq 5$

Calculation Method: Spread Factor

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

= (SBW)/ (1.375Mbps)

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Factor  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: 802.11ac (40MHz), ANT0				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5190	30.844	1.375	22.432	$\geq 5$
5230	31.274	1.375	22.745	$\geq 5$
5270	31.428	1.375	22.857	$\geq 5$
5310	31.245	1.375	22.724	$\geq 5$
5510	31.365	1.375	22.811	$\geq 5$
5590	31.643	1.375	23.013	$\geq 5$
5670	31.348	1.375	22.799	$\geq 5$
Test Mode: 802.11ac (40MHz), ANT1				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5190	31.076	1.375	22.601	$\geq 5$
5230	31.299	1.375	22.763	$\geq 5$
5270	31.147	1.375	22.652	$\geq 5$
5310	30.856	1.375	22.441	$\geq 5$
5510	31.144	1.375	22.650	$\geq 5$
5590	31.304	1.375	22.767	$\geq 5$
5670	31.760	1.375	23.098	$\geq 5$

Calculation Method: Spread Factor

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

= (SBW)/ (1.375Mbps)

Product : Wireless-AC2200 Tri Band Gigabit Router  
 Test Item : Spread Factor  
 Test Mode : Mode 1: Transmitter (CCD Mode)  
 Test Date : 2018/08/13

Test Mode: IEEE 802.11ac (80MHz), ANT0				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5210	67.791	1.375	49.303	$\geq 5$
5290	67.608	1.375	49.169	$\geq 5$
5530	67.522	1.375	49.107	$\geq 5$
5610	68.243	1.375	49.631	$\geq 5$
Test Mode: IEEE 802.11ac (80MHz), ANT1				
Frequency (MHz)	Spread Bandwidth (MHz)	Symbol Rate (Mbps)	Spread Factor	Limit
5210	67.203	1.375	48.875	$\geq 5$
5290	65.950	1.375	47.964	$\geq 5$
5530	67.537	1.375	49.118	$\geq 5$
5610	68.195	1.375	49.596	$\geq 5$

Calculation Method: Spread Factor

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

= (SBW)/ (1.375Mbps)

<b>Test Result</b>	Pass
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