



# FCC TEST REPORT

**Application No:** ZR202040008  
**Applicant:** Samsung Electronics. Co., Ltd  
**Address of Applicant:** 19 Chapin Rd., Building D Pine Brook, NJ 07058  
**Manufacturer:** Samsung Electronics. Co., Ltd  
**Address of Manufacturer:** 19 Chapin Rd., Building D Pine Brook, NJ 07058  
**EUT Description:** Mobile Phone  
**Model No.:** SM-M115F/DS, SM-M115F  
**Trade Mark:** SAMSUNG  
**FCC ID:** ZCASM115F  
**Standards:** 47 CFR FCC Part 2, Subpart J  
47 CFR Part 15, Subpart C  
**Test Method:** KDB558074 D01 15.247 Meas Guidance v05r02  
ANSI C63.10 (2013)  
**Date of Receipt:** 2020/4/17  
**Date of Test:** 2020/4/19to 2020/4/24  
**Date of Issue:** 2021/5/3

|                     |               |
|---------------------|---------------|
| <b>Test Result:</b> | <b>PASS *</b> |
|---------------------|---------------|

. \* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Derek Yang  
Wireless Laboratory Manager



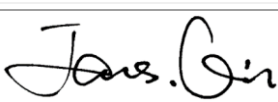
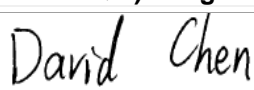
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## 1 Version

| Revision Record |         |           |           |  |
|-----------------|---------|-----------|-----------|--|
| Version         | Chapter | Date      | Modifier  | Remark   |
| 00              |         | 2020/5/11 |           | Original   |
| 02              |         | 2021/5/3  | James Qin | 1.Add test site Information<br>2.Modify data conversion error of antenna height<br>3.Update equipment list |
|                 |         |           |           |  |

This report supersedes our previous report ZR/2020/4000804, issued on 2020-05-11, which is hereby deemed null and void.

|                          |  |   |
|--------------------------|--|---|
| Authorized for issue by: |  |   |
| Prepared By              |  | <br>(James Qin) / Engineer  |
| Checked By               |  | <br>(David Chen) / Reviewer |

Remark:

Samsung Electronics Co., Ltd., declare that the “SM-A115F/DS” is the parent product of the “SM-M115F is in all relevant parts identical to the product

SM- M115F

HW version : REV1.0

SW version : M115F.001

is in all relevant parts identical to the product

SM- M115F/DS

HW version : REV1.0

SW version : M115F.001

**The only difference between the SM-M115F and the SM-M115F/DS is:**

**1.H/W: No change in RF**

**2.S/W: Single SIM model**



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## 2 Test Summary

| Test Item   | Test Requirement        | Test method         | Test Result    | Result | Test Lab* |
|---|-------------------------|---------------------|----------------|--------|-----------|
| AC Power Line<br>Conducted Emission                                     | 15.207                  | ANSI C63.10<br>2013 | Clause 4.2     | PASS   | B         |
| Duty Cycle  | --                      | --                  | Clause 4.3     | PASS   | A         |
| Conducted Output Power  | 15.247 (b)(3)           | ANSI C63.10<br>2013 | Clause 4.4     | PASS   | A         |
| DTS (6 dB) Bandwidth & 99%<br>Occupied Bandwidth                        | 15.247 (a)(2)           | ANSI C63.10<br>2013 | Clause 4.5     | PASS   | A         |
| Power Spectral Density  | 15.247 (e)              | ANSI C63.10<br>2013 | Clause 4.6     | PASS   | A         |
| Band-edge for RF<br>Conducted Emissions                                 | 15.247(d)               | ANSI C63.10<br>2013 | Clause 4.7     | PASS   | A         |
| RF Conducted Spurious<br>Emissions                                      | 15.247(d)               | ANSI C63.10<br>2013 | Clause 4.8     | PASS   | A         |
| Radiated Spurious<br>Emissions  | 15.247(d);15.205/15.209 | ANSI C63.10<br>2013 | Clause 4.9     | PASS   | B         |
| Restricted bands around<br>fundamental frequency<br>(Radiated Emission) | 15.247(d);15.205/15.209 | ANSI C63.10<br>2013 | Clause<br>4.10 | PASS   | B         |

All test were performed by Lab A and B.

Parts of test items above were subcontracted to Lab B.

Lab A: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Lab B: SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD



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### 3 General Information

#### 3.1 Client Information

|                          |  |
|--------------------------|--|
| Applicant:               | Samsung Electronics. Co., Ltd                  |
| Address of Applicant:    | 19 Chapin Rd., Building D Pine Brook, NJ 07058 |
| Manufacturer:            | Samsung Electronics. Co., Ltd                  |
| Address of Manufacturer: | 19 Chapin Rd., Building D Pine Brook, NJ 07058 |

#### 3.2 Test Location

##### Lab A:

|                |   |
|----------------|---|
| Company:       | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch                             |
| Address:       | No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China |
| Post code:     | 518057  |
| Test engineer: | Dee Zheng, Mike Hu  |

##### Lab B:

|                |  |
|----------------|--|
| Company:       | SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.   |
| Address:       | 1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China |
| Post code:     | 710086   |
| Test engineer: | Ben Huang, Leah Chen   |





### 3.3 Test Facility

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

#### Lab A:

##### • A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

##### • VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

##### • FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

##### • Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

#### Lab B:

##### A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

Designation Number: CN1271.



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### 3.4 General Description of EUT

|                                 |  |
|---------------------------------|--|
| EUT Description::               | Mobile Phone   |
| Model No.:                      | SM-M115F/DS, SM-M115F  |
| Trade Mark:                     | SAMSUNG  |
| Hardware Version:               | REV1.0   |
| Software Version:               | M115F.001  |
| IEEE 802.11 WLAN Mode Supported | <input checked="" type="checkbox"/> 802.11B (20 MHz channel bandwidth),<br><input checked="" type="checkbox"/> 802.11G (20 MHz channel bandwidth)<br><input checked="" type="checkbox"/> 802.11N (20 MHz channel bandwidth),<br><input checked="" type="checkbox"/> 802.11N (40 MHz channel bandwidth) |
| Operation Frequency:            | 2400 MHz -2483.5MHz<br>$f_c = 2407 \text{ MHz} + N * 5 \text{ MHz}$ , where:<br>- $f_c$ = "Operating Frequency" in MHz,<br>- $N$ = "Channel Number" with the range from 1 to 11 for the 20 MHz channel bandwidth, or 3 to 9 for the 40 MHz channel bandwidth.  |
| Type of Modulation:             | IEEE for 802.11B: DSSS<br>IEEE for 802.11G : OFDM<br>IEEE for 802.11N(HT20) : OFDM<br>IEEE for 802.11N(HT40) : OFDM  |
| Sample Type:                    | <input checked="" type="checkbox"/> Portable Device, <input type="checkbox"/> Module   |
| Antenna Type:                   | <input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated  |
| Antenna Ports                   | <input checked="" type="checkbox"/> Ant 1, <input type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3  |
| Smart System                    | <input checked="" type="checkbox"/> SISO (for 802.11B/G/N),<br><input type="checkbox"/> MIMO (for 802.11N): 2 Tx & 2 Rx,<br><input type="checkbox"/> Diversity (for 802.11B/G) : Tx & Rx   |
| Antenna Gain:                   | -1dBi  |
| Power Supply                    | <input checked="" type="checkbox"/> AC/DC Adapter; <input type="checkbox"/> Battery <input type="checkbox"/> PoE;; <input type="checkbox"/> Other:   |

#### Operation Frequency of each channel (802.11B/G/N HT20)

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|---------|-----------|
| 1       | 2412MHz   | 4       | 2427MHz   | 7       | 2442MHz   | 10      | 2457MHz   |
| 2       | 2417MHz   | 5       | 2432MHz   | 8       | 2447MHz   | 11      | 2462MHz   |
| 3       | 2422MHz   | 6       | 2437MHz   | 9       | 2452MHz   |         |           |

#### Operation Frequency of each channel (802.11N HT40)

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 3       | 2422MHz   | 6       | 2437MHz   | 9       | 2452MHz   |
| 4       | 2427MHz   | 7       | 2442MHz   |         |           |
| 5       | 2432MHz   | 8       | 2447MHz   |         |           |

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the



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middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel             | Frequency for 802.11B/G/N (HT20) | Frequency for 802.11N (HT40) |
|---------------------|----------------------------------|------------------------------|
| The Lowest channel  | 2412MHz                          | 2422MHz                      |
| The Middle channel  | 2437MHz                          | 2437MHz                      |
| The Highest channel | 2462MHz                          | 2452MHz                      |

### 3.5 Test Environment and Mode

| Operating Environment: |  |
|------------------------|--|
| Temperature:           | 25.0 °C  |
| Humidity:              | 50 % RH  |
| Atmospheric Pressure:  | 101.30 KPa   |
| Test mode:             |  |
| Transmitting mode:     | Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate. |

### 3.6 Description of Support Units

The EUT has been tested independent unit.



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

|  |  |
|--|--|
| <b>Standard requirement:</b>   | 47 CFR Part 15C Section 15.203 /247(c) |
| <p>15.203 requirement:</p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement:</p> <p>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> <p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -1dBi.</p> |  |



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## 4.2 AC Power Line Conducted Emissions

|  |   |              |           |
|--|---|--------------|-----------|
| Test Requirement:                                | 47 CFR Part 15C Section 15.207  |              |           |
| Test Method:                                     | ANSI C63.10: 2013   |              |           |
| Test Frequency Range:                            | 150kHz to 30MHz   |              |           |
| Limit:   | Frequency range (MHz)   | Limit (dBuV) |           |
|  |   | Quasi-peak   | Average   |
|  | 0.15-0.5  | 66 to 56*    | 56 to 46* |
|  | 0.5-5   | 56           | 46        |
|  | 5-30  | 60           | 50        |
| * Decreases with the logarithm of the frequency. |   |              |           |
| Test Procedure:                                  | <ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a <math>50\Omega/50\mu\text{H} + 5\Omega</math> linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol> |              |           |

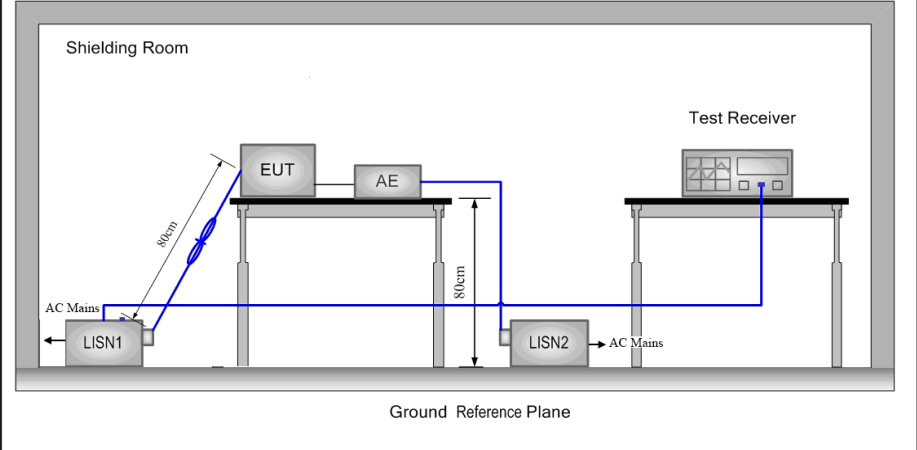


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|                        |  |
|------------------------|--|
| Test Setup:            |    |
| Exploratory Test Mode: | <p>Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.</p> <p>Charge + Transmitting mode.</p>   |
| Final Test Mode:       | <p>Through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case.</p> <p>Charge + Transmitting mode.</p> <p>Only the worst case is recorded in the report.</p> |
| Instruments Used:      | Refer to section 5.10 for details  |
| Test Results:          | Pass   |

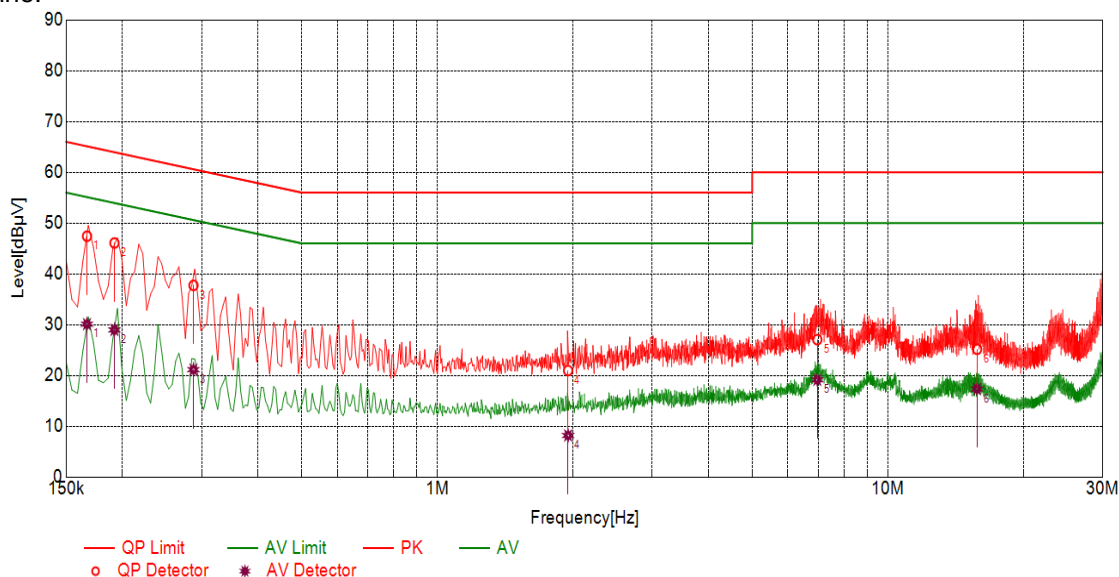


## Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

## Live Line:



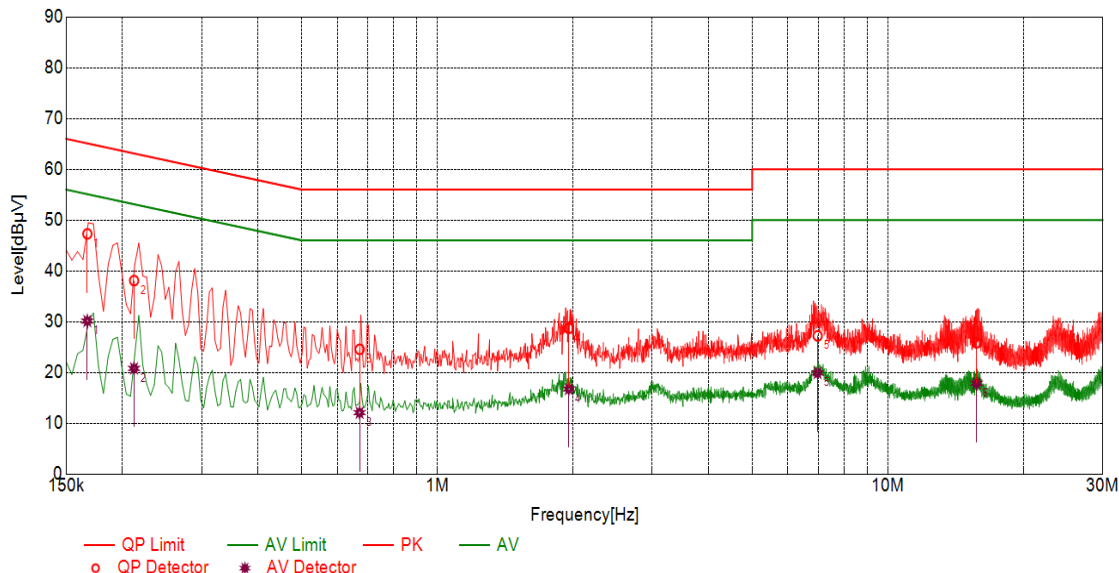
## Test Graph

| Final Data List |             |             |                 |                 |                |                 |                 |                |      |
|-----------------|-------------|-------------|-----------------|-----------------|----------------|-----------------|-----------------|----------------|------|
| NO.             | Freq. [MHz] | Factor [dB] | QP Value [dBμV] | QP Limit [dBμV] | QP Margin [dB] | AV Value [dBμV] | AV Limit [dBμV] | AV Margin [dB] | Type |
| 1               | 0.1669      | 10.10       | 47.41           | 65.11           | 17.70          | 30.09           | 55.11           | 25.02          | L    |
| 2               | 0.1920      | 10.10       | 46.08           | 63.95           | 17.87          | 28.96           | 53.95           | 24.99          | L    |
| 3               | 0.2876      | 10.10       | 37.74           | 60.59           | 22.85          | 21.14           | 50.59           | 29.45          | L    |
| 4               | 1.9511      | 10.10       | 20.96           | 56.00           | 35.04          | 8.18            | 46.00           | 37.82          | L    |
| 5               | 6.9730      | 10.10       | 27.06           | 60.00           | 32.94          | 19.14           | 50.00           | 30.86          | L    |
| 6               | 15.7769     | 10.11       | 25.17           | 60.00           | 34.83          | 17.32           | 50.00           | 32.68          | L    |





Neutral Line:



### Test Graph

| Final Data List |             |             |                 |                 |                |                 |                 |                |      |
|-----------------|-------------|-------------|-----------------|-----------------|----------------|-----------------|-----------------|----------------|------|
| NO.             | Freq. [MHz] | Factor [dB] | QP Value [dBμV] | QP Limit [dBμV] | QP Margin [dB] | AV Value [dBμV] | AV Limit [dBμV] | AV Margin [dB] | Type |
| 1               | 0.1672      | 10.10       | 47.29           | 65.10           | 17.81          | 30.12           | 55.10           | 24.98          | N    |
| 2               | 0.2123      | 10.10       | 38.09           | 63.11           | 25.02          | 20.79           | 53.11           | 32.32          | N    |
| 3               | 0.6724      | 10.10       | 24.56           | 56.00           | 31.44          | 12.08           | 46.00           | 33.92          | N    |
| 4               | 1.9582      | 10.10       | 28.69           | 56.00           | 27.31          | 16.75           | 46.00           | 29.25          | N    |
| 5               | 6.9852      | 10.10       | 27.20           | 60.00           | 32.80          | 19.90           | 50.00           | 30.10          | N    |
| 6               | 15.7410     | 10.11       | 25.85           | 60.00           | 34.15          | 17.86           | 50.00           | 32.14          | N    |

### Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



## 4.3 Duty Cycle

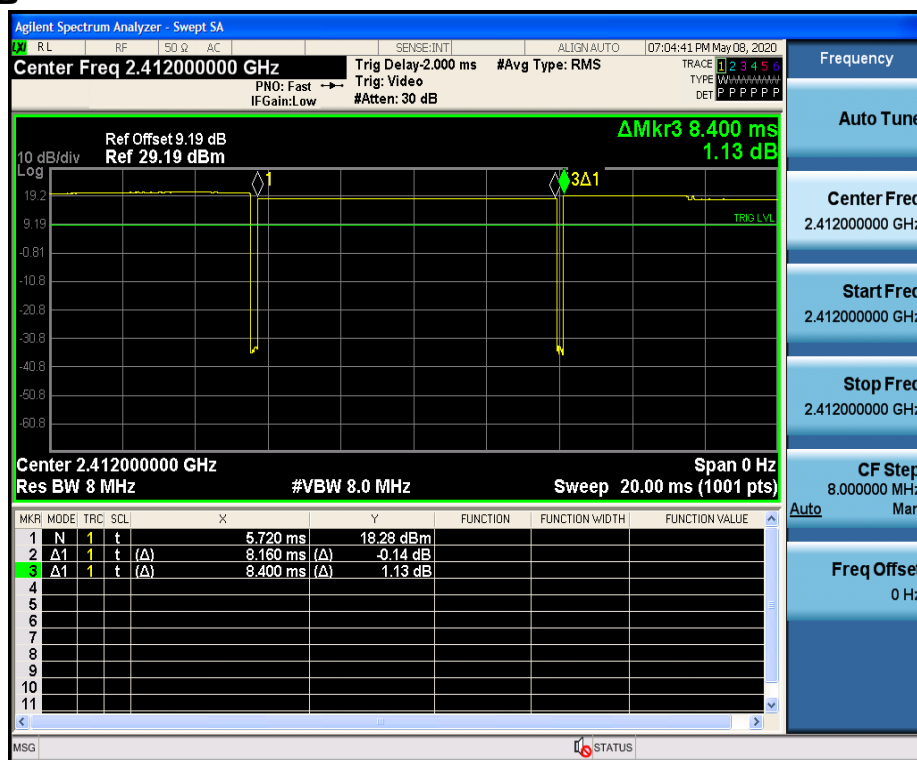
### 4.3.1 Test Results

| Test Mode | TX Freq. [MHz]      | Duty cycle [%] |
|-----------|---------------------|----------------|
| 11B       | Ant 1: CH1,CH6,CH11 | 97.14          |
| 11G       | Ant 1: CH1,CH6,CH11 | 88.04          |
| 11N20     | Ant 1: CH1,CH6,CH11 | 86.62          |
| 11N40     | Ant 1: CH3,CH6,CH9  | 75.69          |

### 4.3.1 Test Plots

#### 4.3.1.1 ANT1

##### 4.3.1.1.1 11B



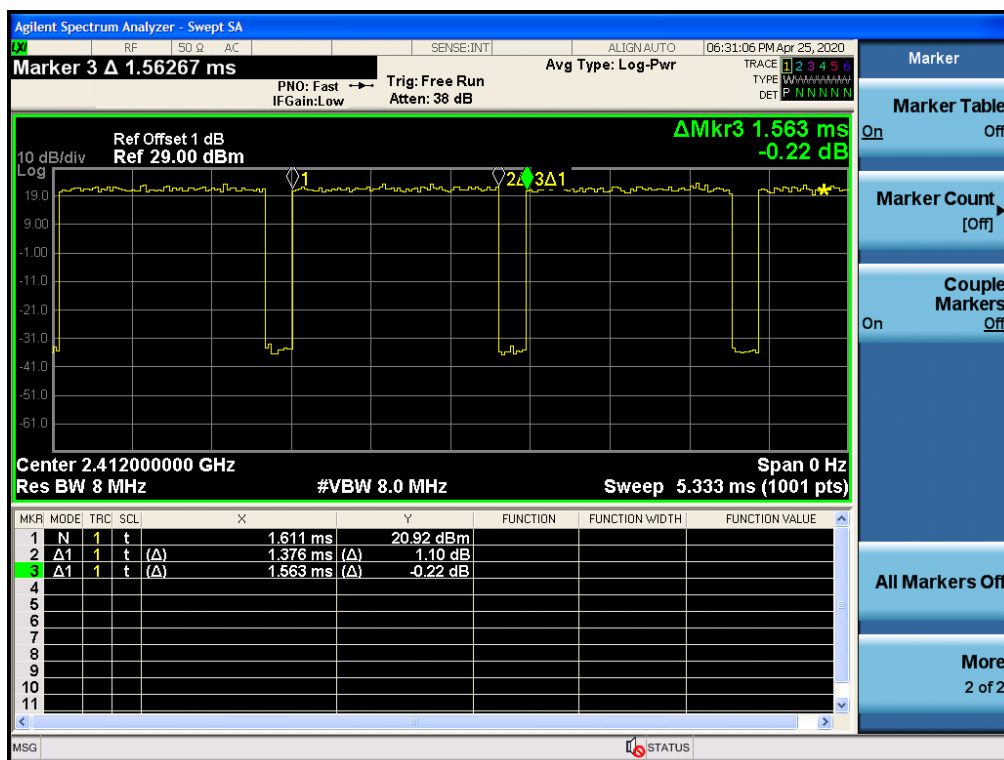
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#### 4.3.1.1.2 11G



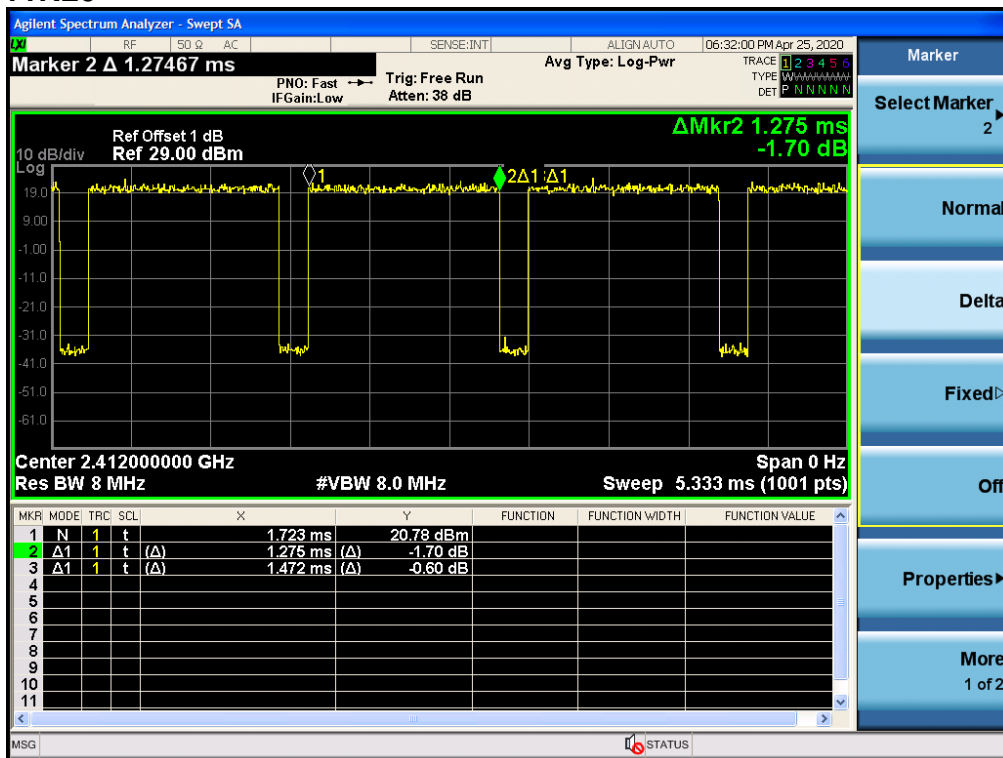
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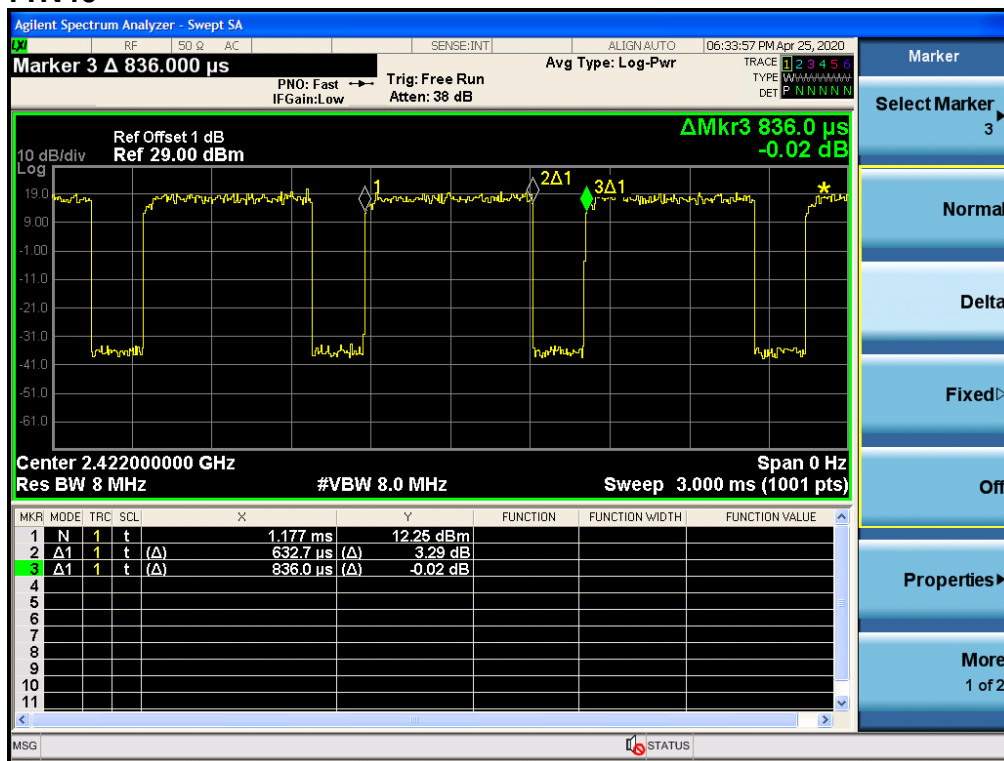
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#### 4.3.1.1.3 11N20





## 4.3.1.1.4 11N40



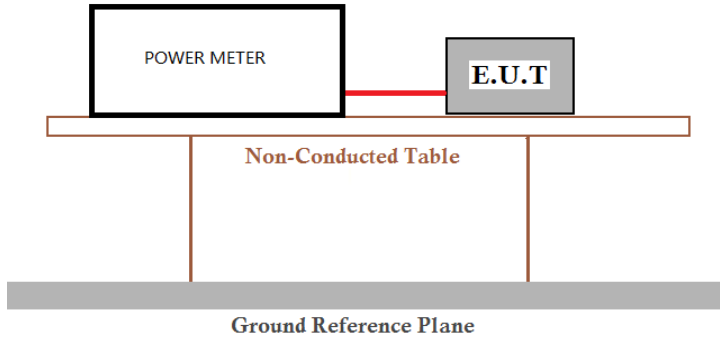
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## 4.4 Conducted Output Power

|                        |  |
|------------------------|--|
| Test Requirement:      | 47 CFR Part 15C Section 15.247 (b)(3)  |
| Test Method:           | ANSI C63.10 :2013 Section 11.9.1.3   |
| Test Setup:            |    |
| Test Instruments:      | Refer to section 5.10 for details  |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates  |
| Final Test Mode:       | Through Pre-scan, find the<br>1Mbps of rate is the worst case of 802.11B;<br>6Mbps of rate is the worst case of 802.11G ;<br>6.5Mbps of rate is the worst case of 802.11N(HT20);<br>13.5Mbps of rate is the worst case of 802.11N(HT40). |
| Limit:                 | 30dBm  |
| Test Results:          | Pass   |



## 4.4.1 Test Results

## Measurement Data of Average Power:

| Mode      | Test Channel | Average Output Power (dBm) | Result              |
|-----------|--------------|----------------------------|---------------------|
| 802.11B   | Lowest       | 17.05                      | Report purpose only |
|           | Middle       | 17.11                      | Report purpose only |
|           | Highest      | 17.24                      | Report purpose only |
| 802.11G   | Lowest       | 13.95                      | Report purpose only |
|           | Middle       | 14.41                      | Report purpose only |
|           | Highest      | 13.61                      | Report purpose only |
| 802.11N20 | Lowest       | 13.31                      | Report purpose only |
|           | Middle       | 14.43                      | Report purpose only |
|           | Highest      | 13.47                      | Report purpose only |
| 802.11N40 | Lowest       | 14.15                      | Report purpose only |
|           | Middle       | 14.21                      | Report purpose only |
|           | Highest      | 14.76                      | Report purpose only |

## Measurement Data of Peak Power:

| Mode      | Test Channel | Peak Output Power (dBm) | Limit (dBm) | Result |
|-----------|--------------|-------------------------|-------------|--------|
| 802.11B   | Lowest       | 25.06                   | 30.00       | Pass   |
|           | Middle       | 25.90                   | 30.00       | Pass   |
|           | Highest      | 25.63                   | 30.00       | Pass   |
| 802.11G   | Lowest       | 24.31                   | 30.00       | Pass   |
|           | Middle       | 24.32                   | 30.00       | Pass   |
|           | Highest      | 25.13                   | 30.00       | Pass   |
| 802.11N20 | Lowest       | 23.75                   | 30.00       | Pass   |
|           | Middle       | 24.65                   | 30.00       | Pass   |
|           | Highest      | 23.91                   | 30.00       | Pass   |
| 802.11N40 | Lowest       | 23.74                   | 30.00       | Pass   |
|           | Middle       | 24.29                   | 30.00       | Pass   |
|           | Highest      | 23.52                   | 30.00       | Pass   |



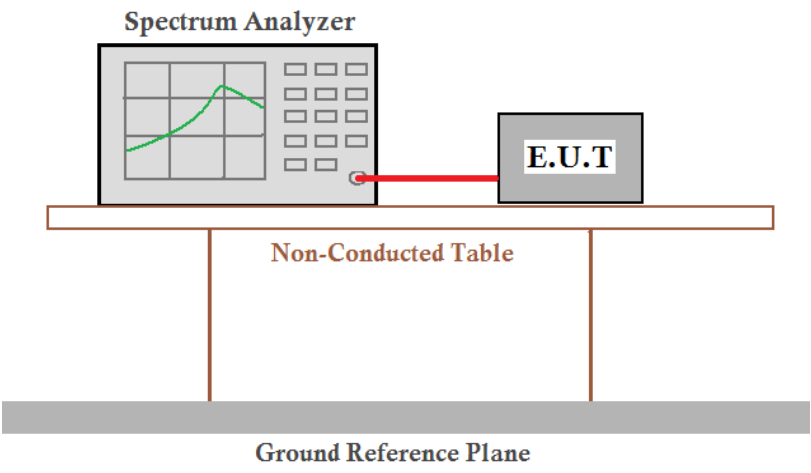
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## 4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

|                        |   |
|------------------------|---|
| Test Requirement:      | 47 CFR Part 15C Section 15.247 (a)(2)   |
| Test Method:           | ANSI C63.10: 2013 Section 11.8.1 Option 1   |
| Test Setup:            |   |
| Instruments Used:      | Refer to section 5.10 for details   |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates   |
| Final Test Mode:       | Through Pre-scan, find the<br>1Mbps of rate is the worst case of 802.11B;<br>6Mbps of rate is the worst case of 802.11G;<br>6.5Mbps of rate is the worst case of 802.11N(HT20);<br>13.5Mbps of rate is the worst case of 802.11N(HT40). |
| Limit:                 | ≥ 500 kHz   |
| Test Results:          | Pass  |

### 4.5.1 Test Results

| Mode      | Test Channel | Occupied Bandwidth (MHz) | 6dB Emission Bandwidth (MHz) | Limit (kHz) | Result |
|-----------|--------------|--------------------------|------------------------------|-------------|--------|
| 802.11B   | Lowest       | 13.731                   | 9.601                        | ≥500        | Pass   |
|           | Middle       | 13.599                   | 9.594                        | ≥500        | Pass   |
|           | Highest      | 13.907                   | 10.07                        | ≥500        | Pass   |
| 802.11G   | Lowest       | 16.458                   | 15.71                        | ≥500        | Pass   |
|           | Middle       | 16.526                   | 15.94                        | ≥500        | Pass   |
|           | Highest      | 16.408                   | 15.81                        | ≥500        | Pass   |
| 802.11N20 | Lowest       | 17.535                   | 16.08                        | ≥500        | Pass   |
|           | Middle       | 17.635                   | 16.34                        | ≥500        | Pass   |
|           | Highest      | 17.456                   | 15.75                        | ≥500        | Pass   |
| 802.11N40 | Lowest       | 36.126                   | 35.37                        | ≥500        | Pass   |
|           | Middle       | 36.353                   | 35.52                        | ≥500        | Pass   |
|           | Highest      | 36.158                   | 35.55                        | ≥500        | Pass   |



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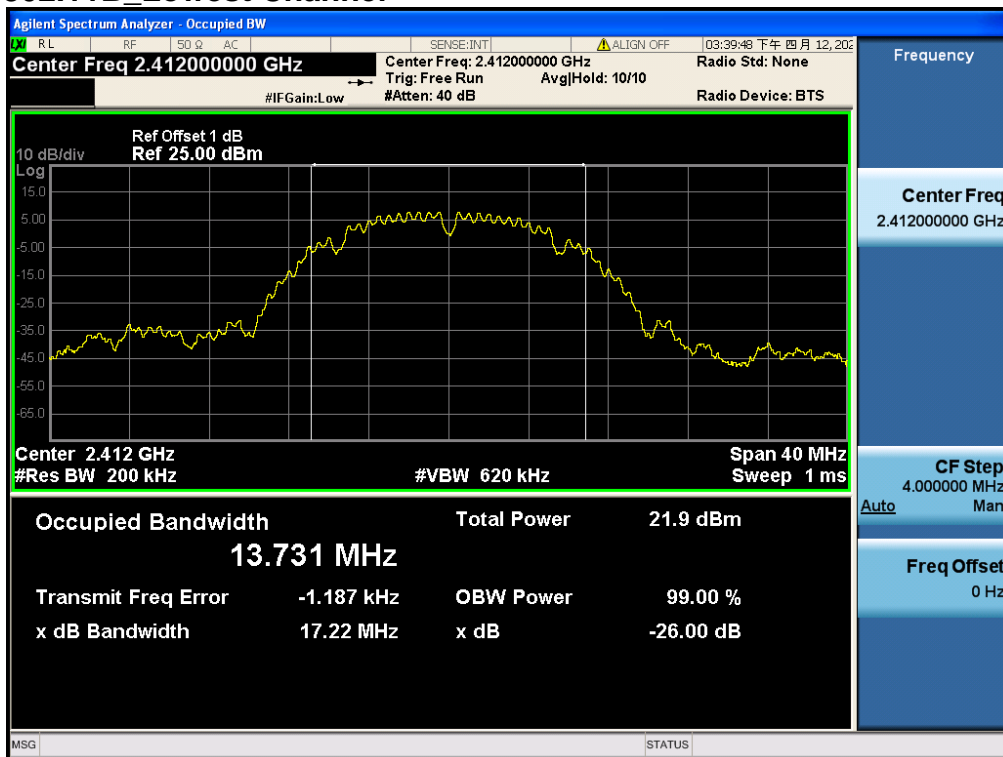
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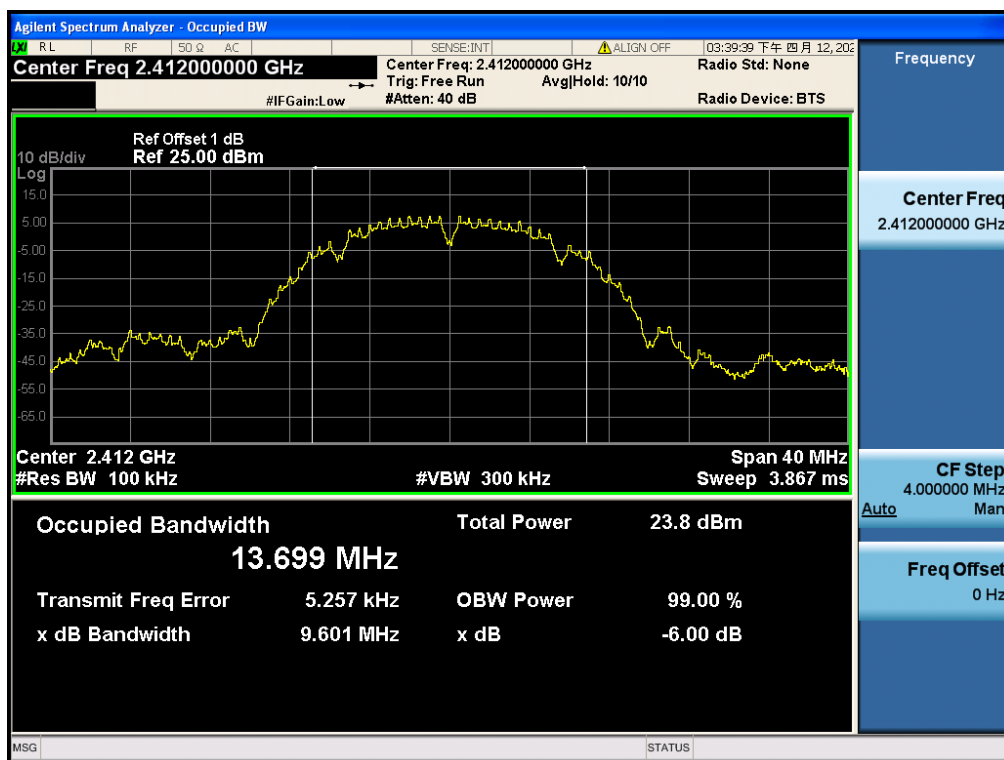


## 4.5.2 Test plots

## 4.5.2.1 ANT1

## 4.5.2.1.1 802.11B\_Lowest Channel





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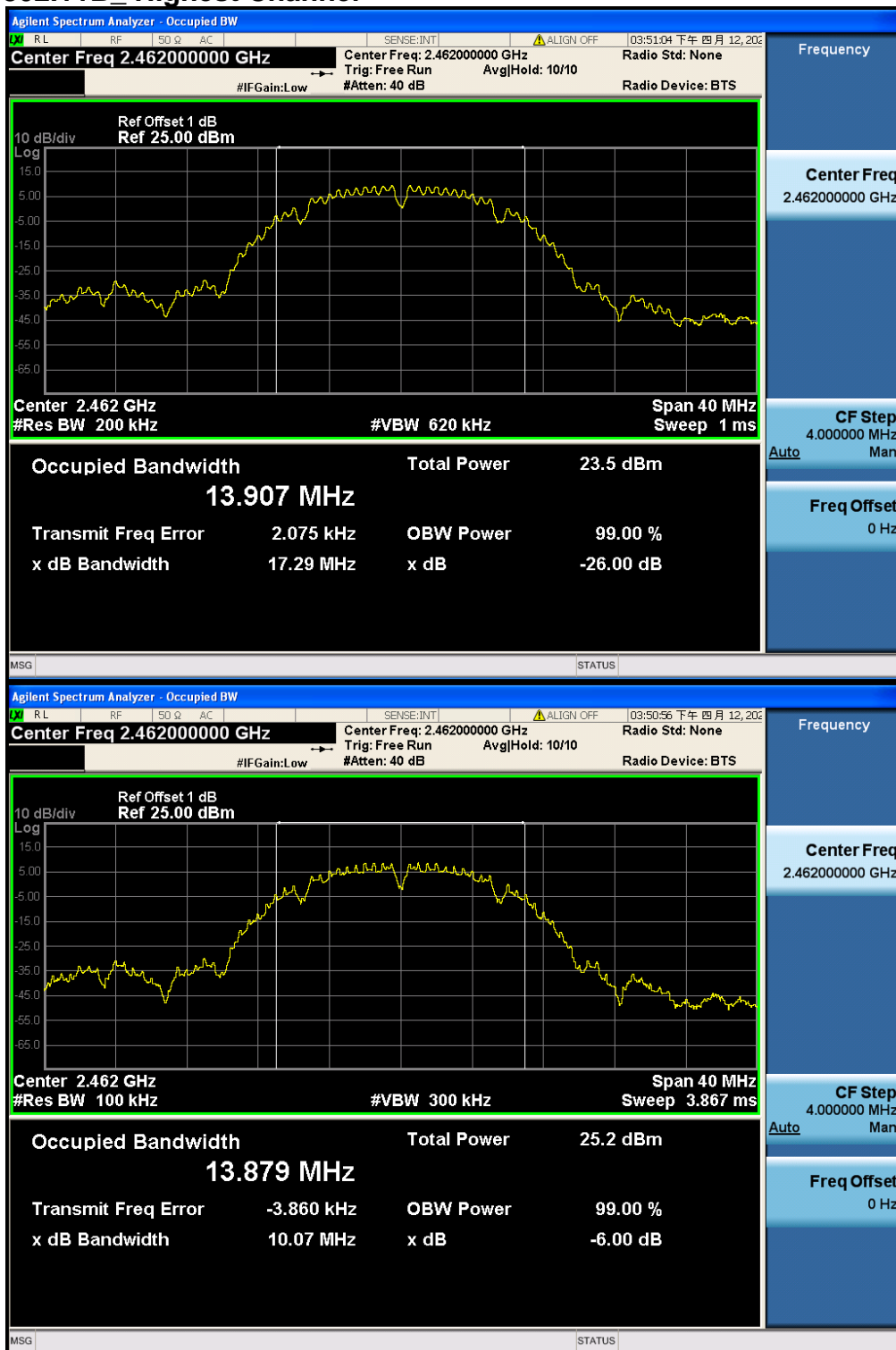
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## 4.5.2.1.2 802.11B\_Middle Channel

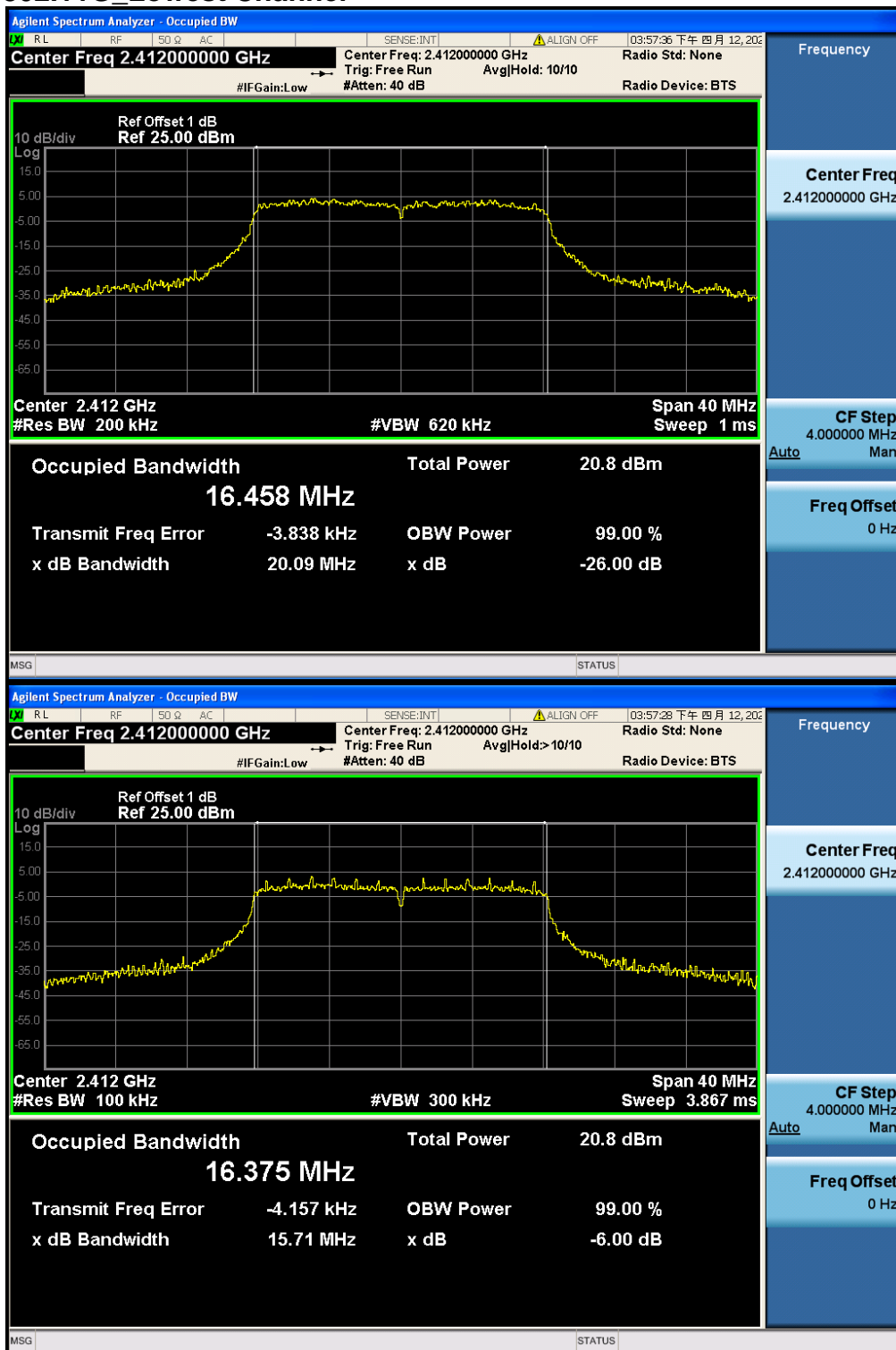


## 4.5.2.1.3 802.11B\_Highest Channel

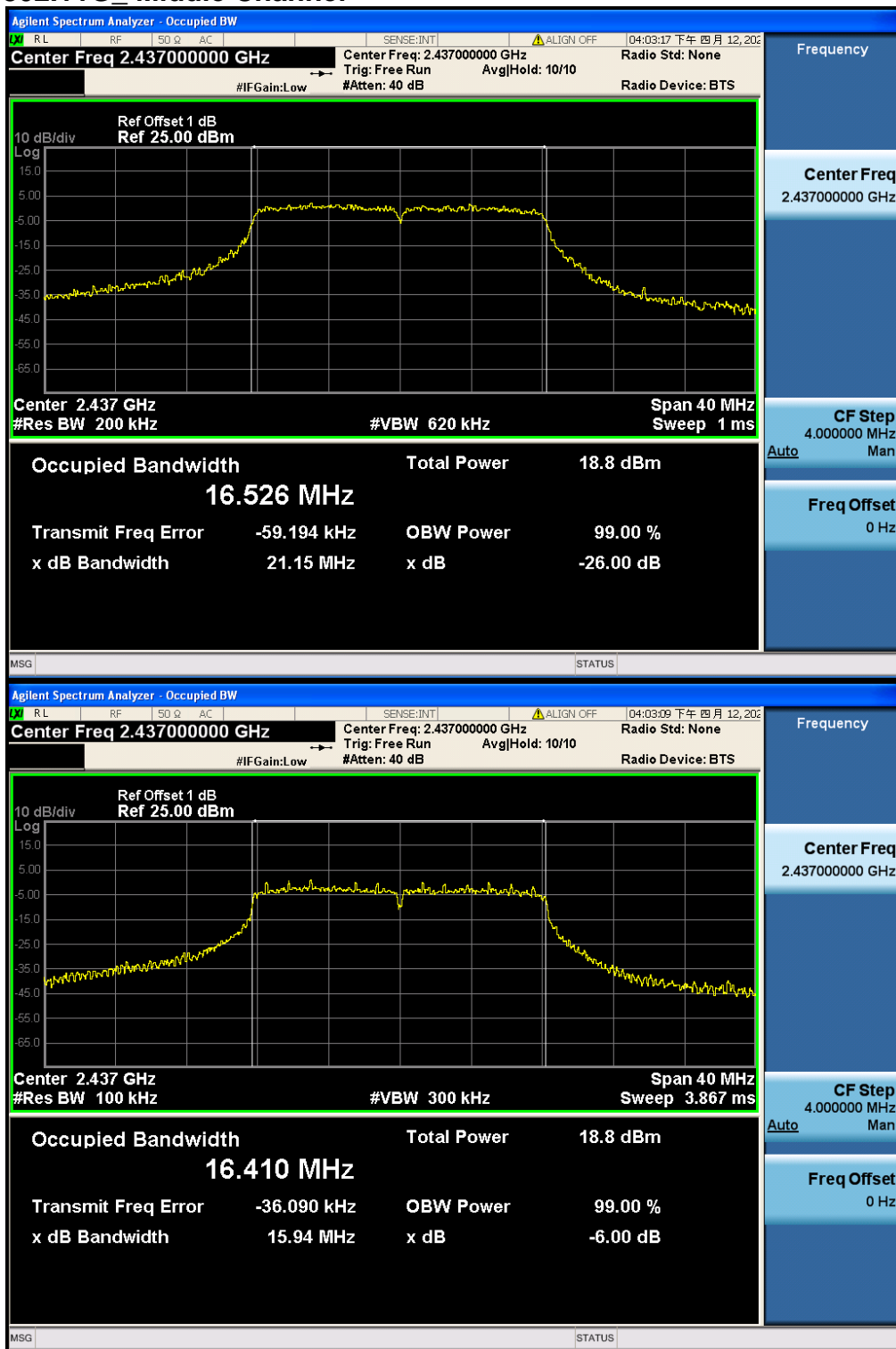




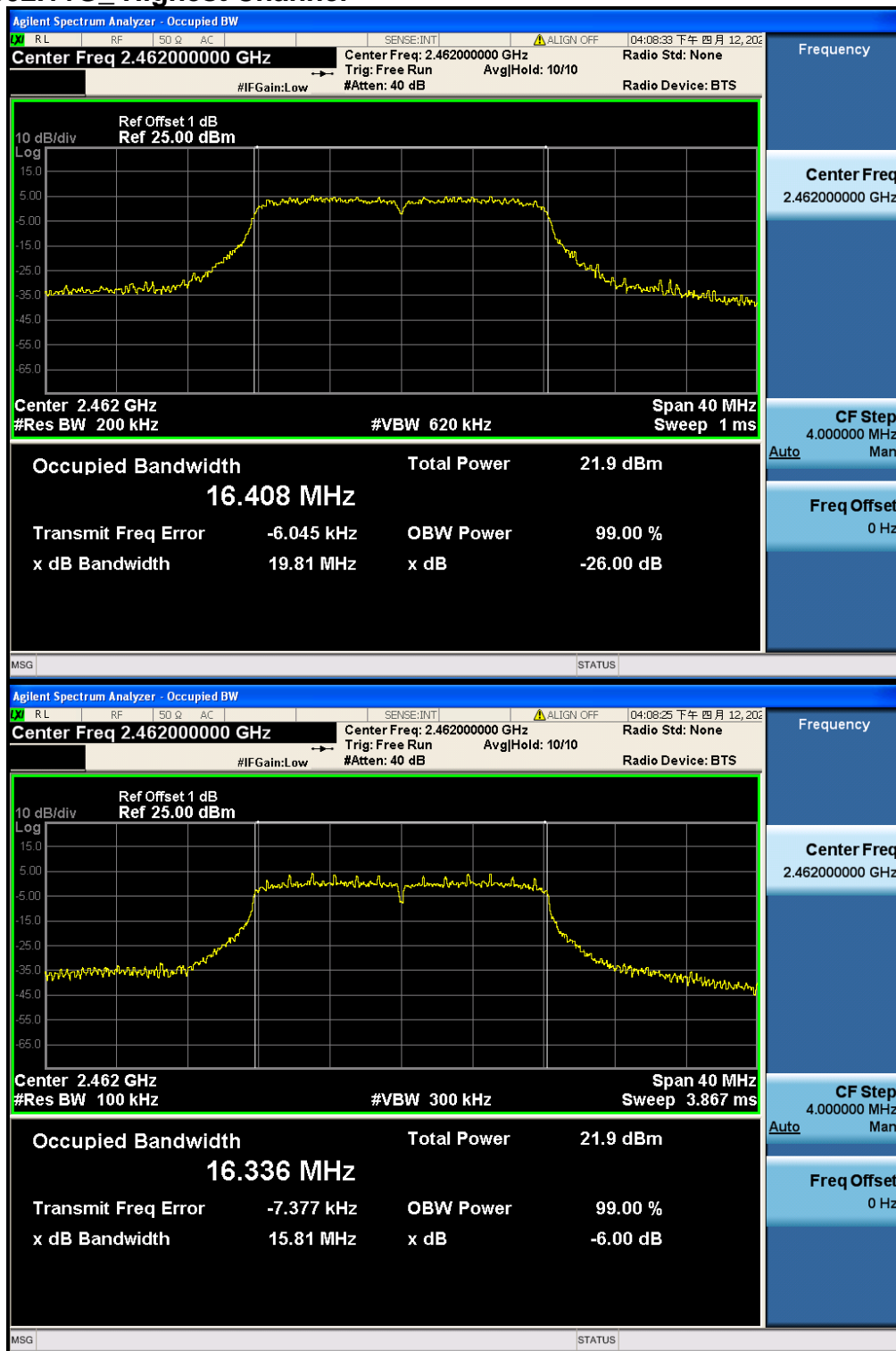
## 4.5.2.1.4 802.11G Lowest Channel



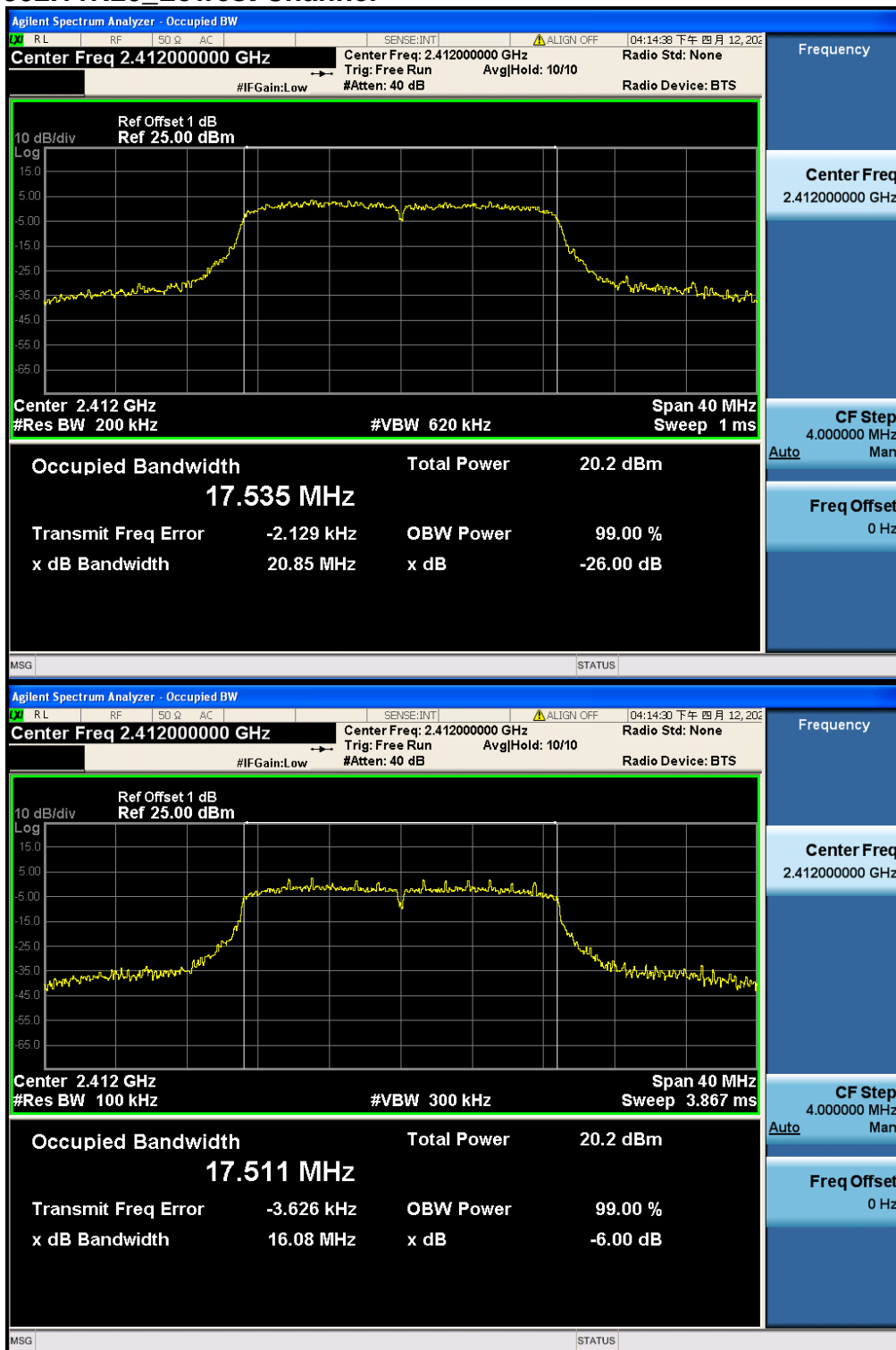
#### 4.5.2.1.5 802.11G\_Middle Channel



## 4.5.2.1.6 802.11G\_Highest Channel

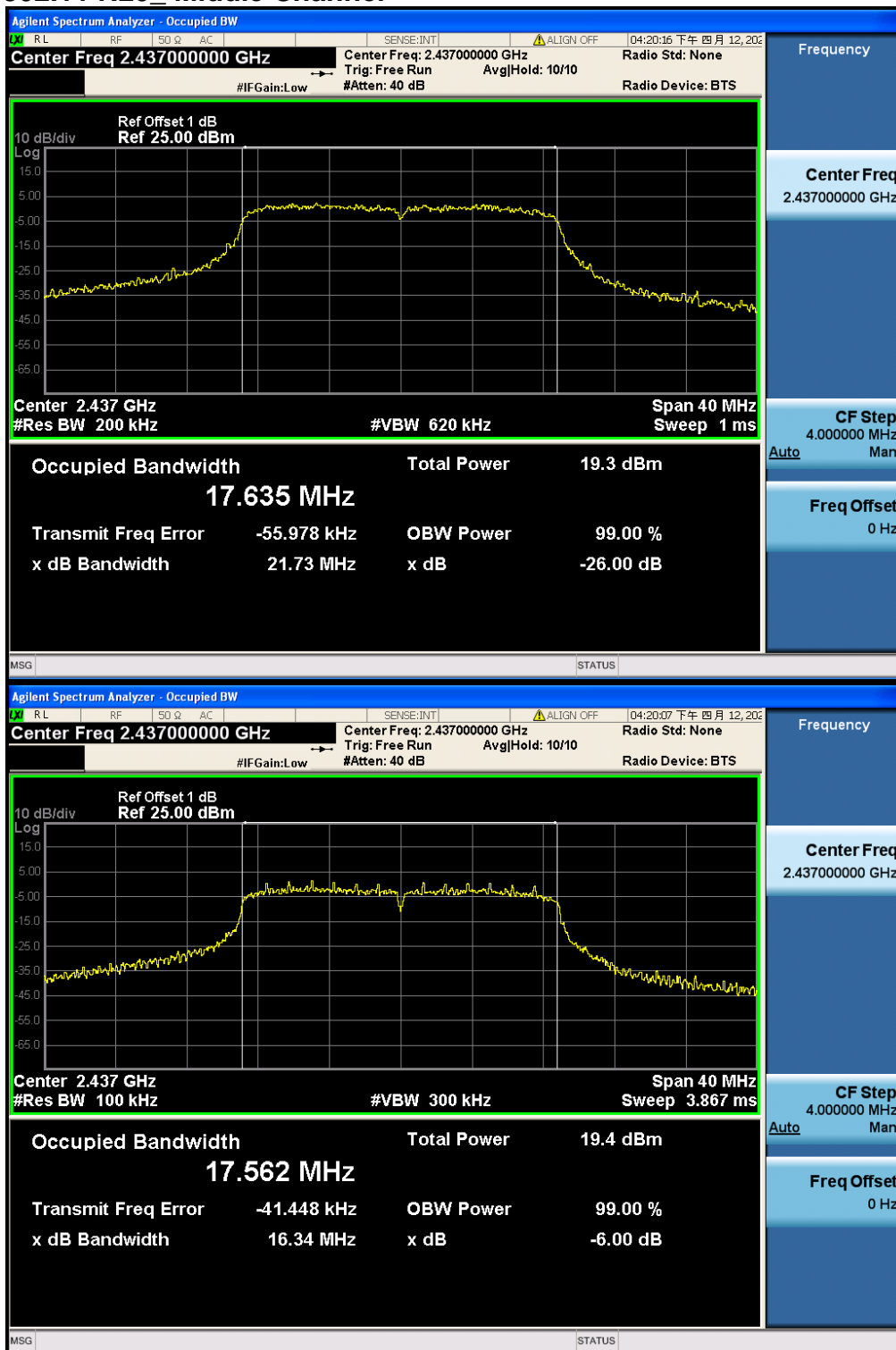


#### 4.5.2.1.7 802.11N20 Lowest Channel

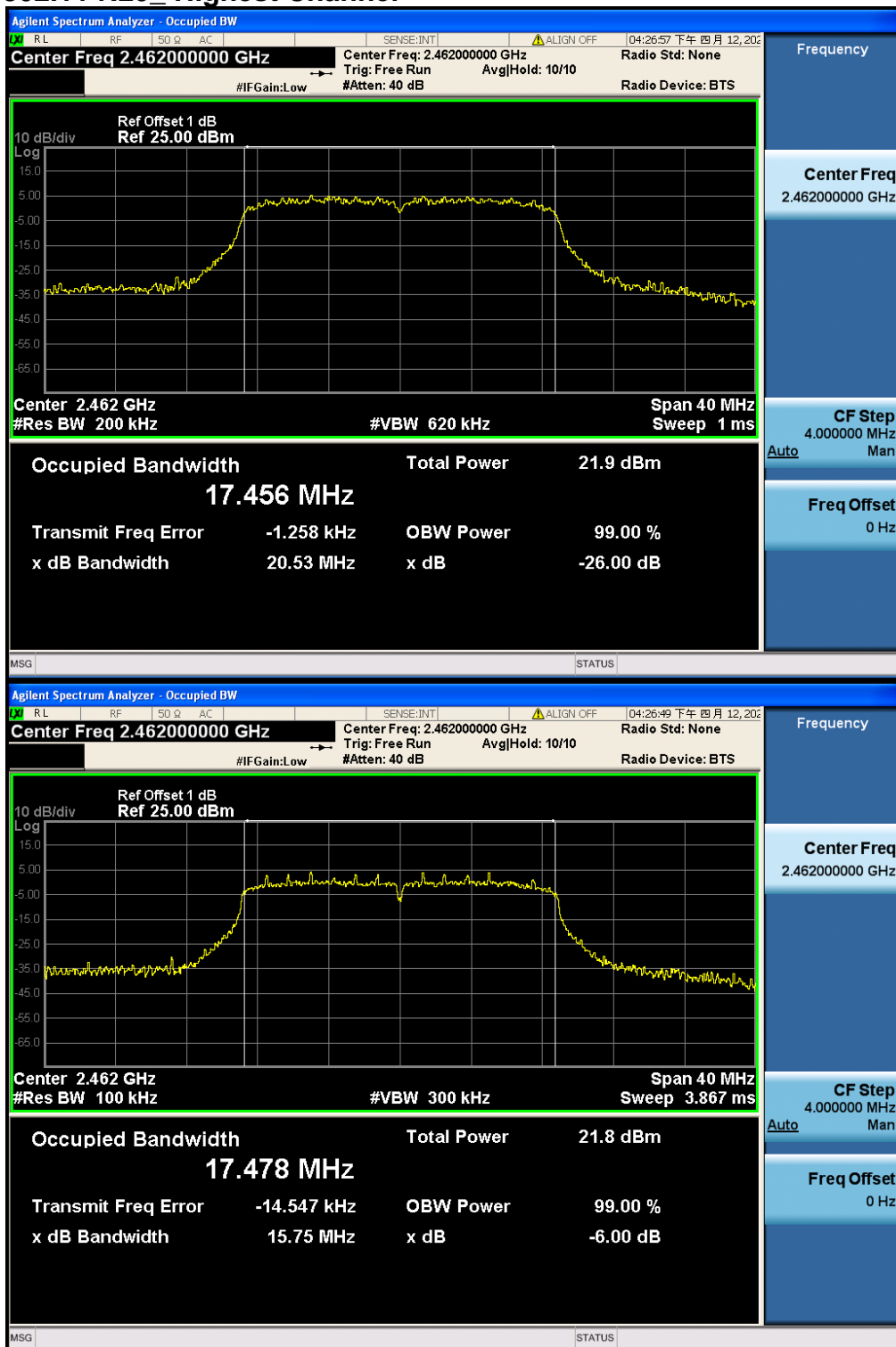




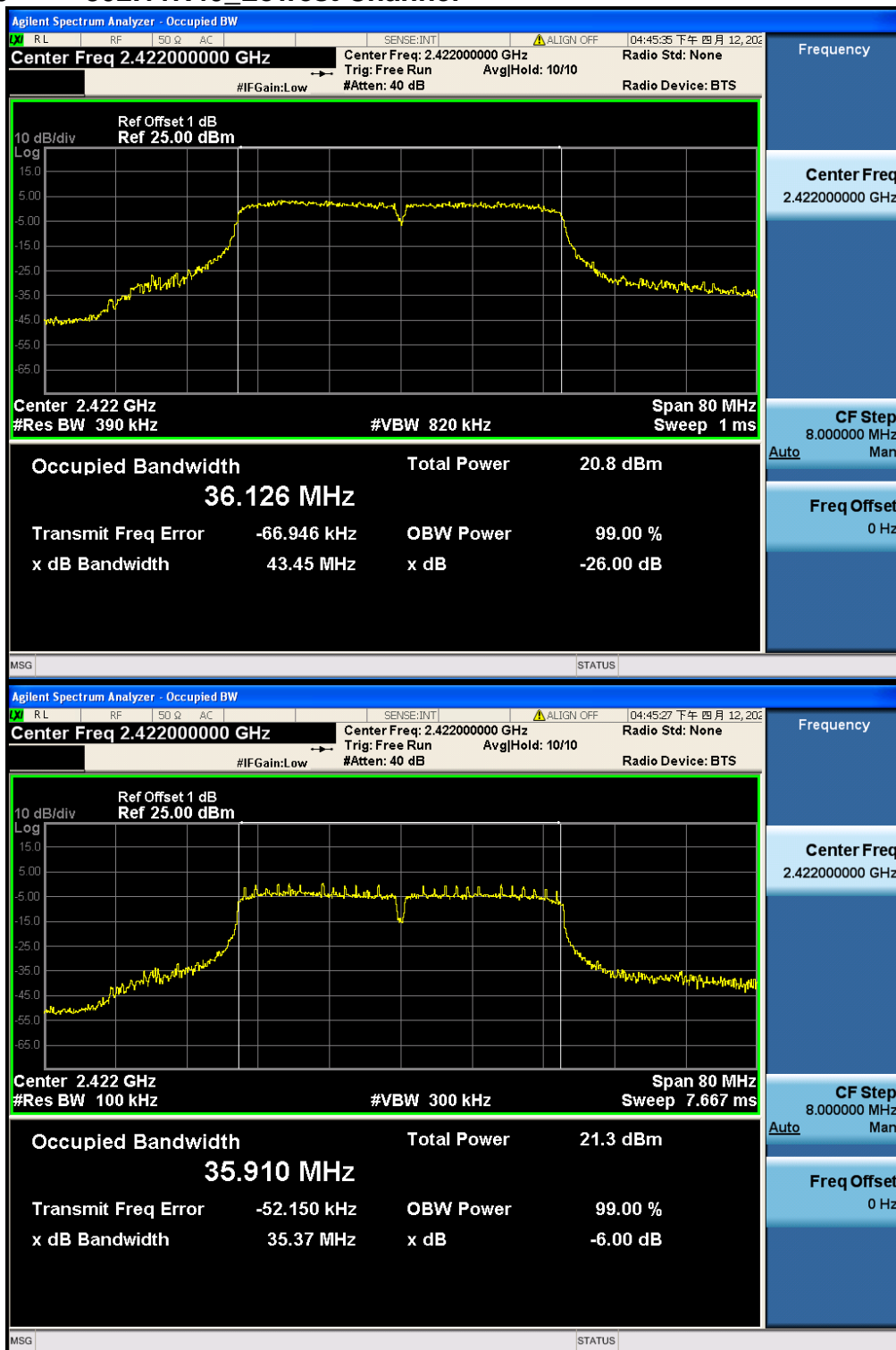
## 4.5.2.1.8 802.11 N20\_ Middle Channel



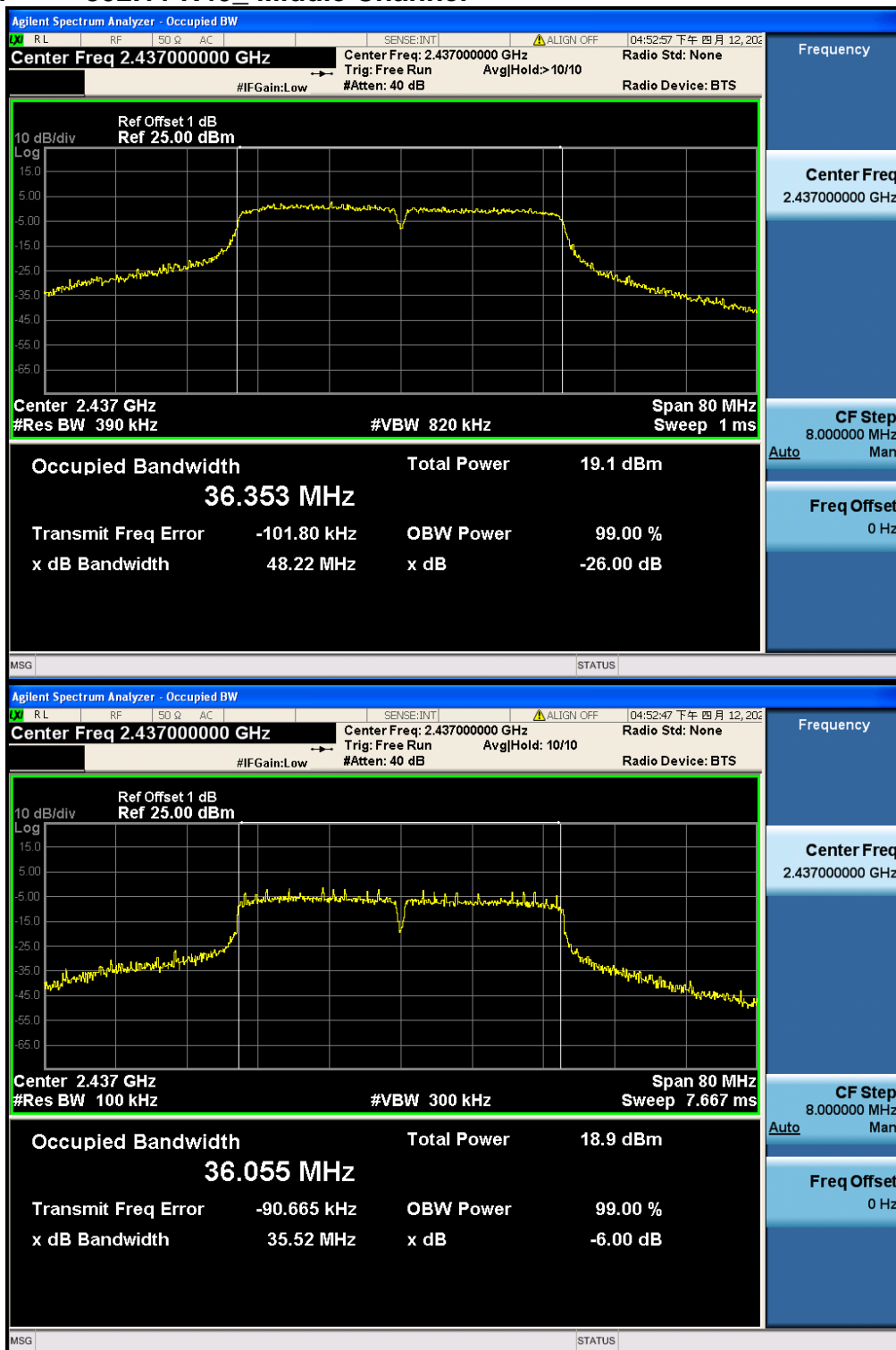
#### 4.5.2.1.9 802.11 N20\_ Highest Channel



## 4.5.2.1.10 802.11N40\_Lowest Channel

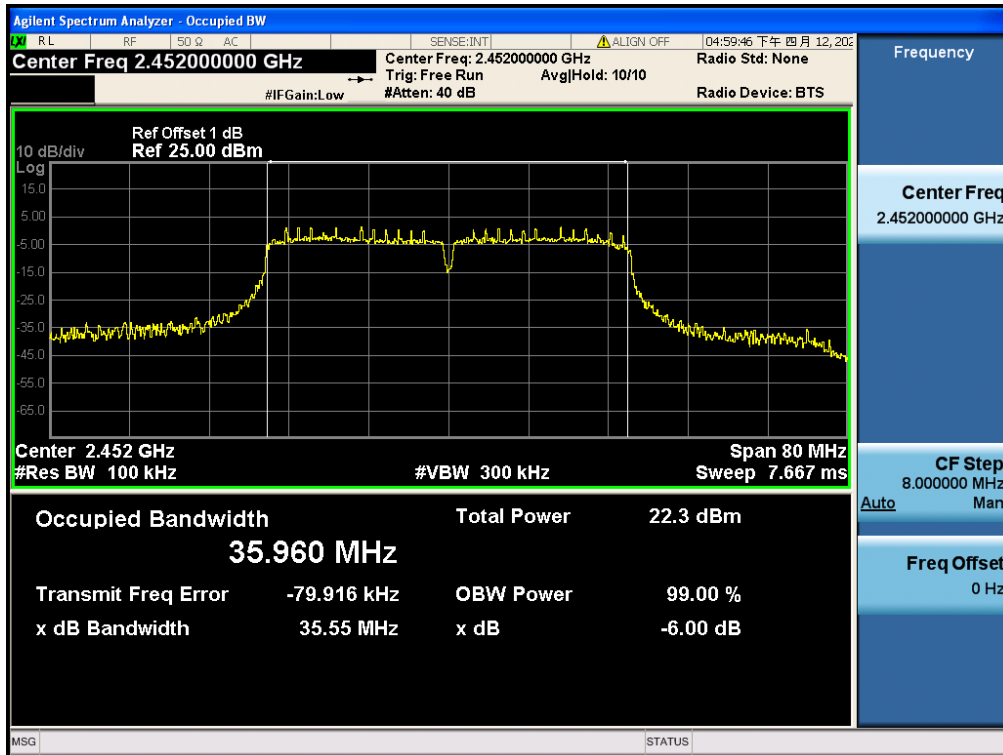
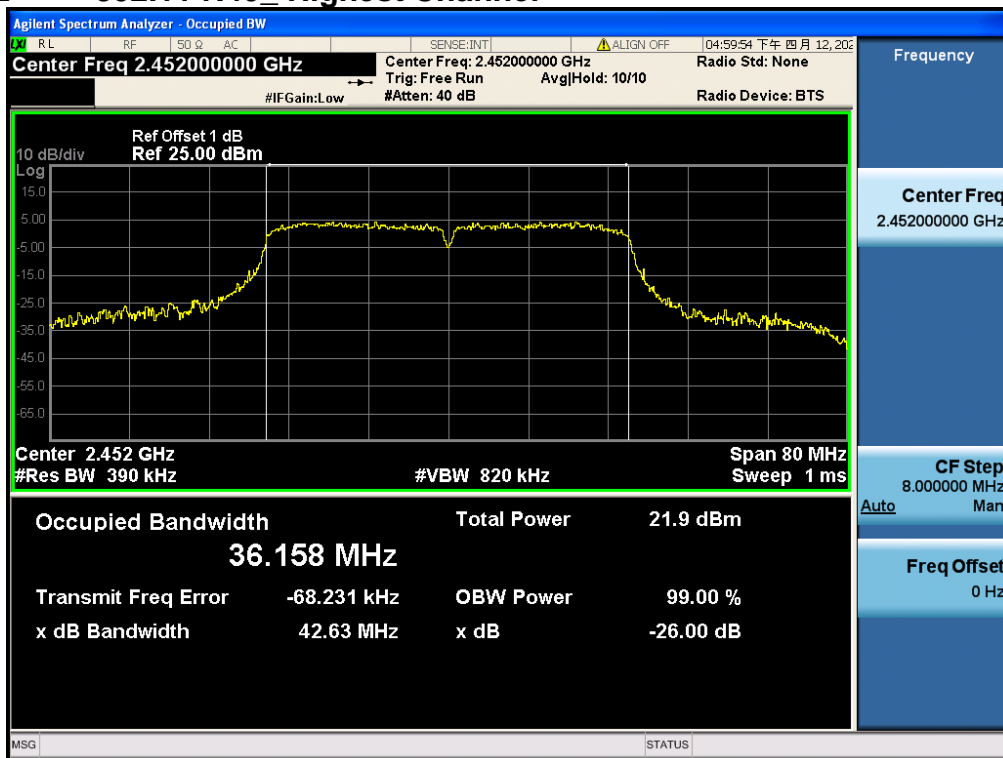


## 4.5.2.1.11 802.11 N40\_ Middle Channel

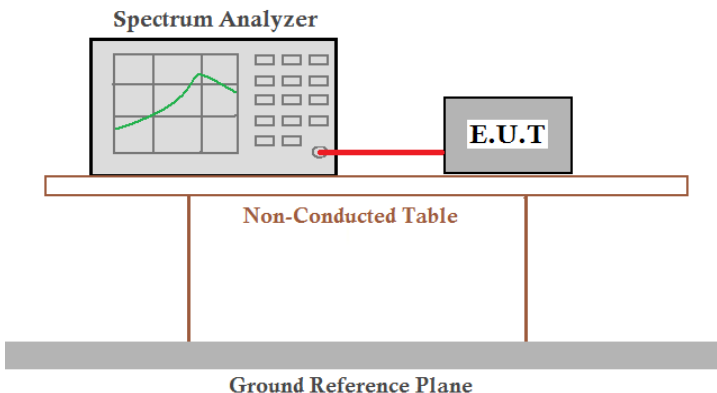




## 4.5.2.1.12 802.11 N40\_ Highest Channel



## 4.6 Power Spectral Density

|                        |  |
|------------------------|--|
| Test Requirement:      | 47 CFR Part 15C Section 15.247 (e)   |
| Test Method:           | ANSI C63.10 :2013 Section 11.10.2  |
| Test Setup:            |    |
| Test Instruments:      | Refer to section 5.10 for details  |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates  |
| Final Test Mode:       | Through Pre-scan, find the<br>1Mbps of rate is the worst case of 802.11B;<br>6Mbps of rate is the worst case of 802.11G ;<br>6.5Mbps of rate is the worst case of 802.11N(HT20);<br>13.5Mbps of rate is the worst case of 802.11N(HT40). |
| Limit:                 | ≤8.00dBm/3kHz  |
| Test Results:          | Pass   |

### 4.6.1 Test Results

| Mode      | Test Channel | Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|-----------|--------------|-----------------------------------|------------------|--------|
| 802.11B   | Lowest       | -2.90                             | ≤8.00            | Pass   |
|           | Middle       | -1.25                             | ≤8.00            | Pass   |
|           | Highest      | -1.20                             | ≤8.00            | Pass   |
| 802.11G   | Lowest       | -6.71                             | ≤8.00            | Pass   |
|           | Middle       | -5.64                             | ≤8.00            | Pass   |
|           | Highest      | -6.03                             | ≤8.00            | Pass   |
| 802.11N20 | Lowest       | -6.37                             | ≤8.00            | Pass   |
|           | Middle       | -6.89                             | ≤8.00            | Pass   |
|           | Highest      | -7.23                             | ≤8.00            | Pass   |
| 802.11N40 | Lowest       | -8.59                             | ≤8.00            | Pass   |
|           | Middle       | -8.95                             | ≤8.00            | Pass   |
|           | Highest      | -9.31                             | ≤8.00            | Pass   |



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## 4.6.2 Test plots

### 4.6.2.1 ANT1

#### 4.6.2.1.1 802.11B\_Lowest Channel



## 4.6.2.1.2 802.11B\_ Middle Channel

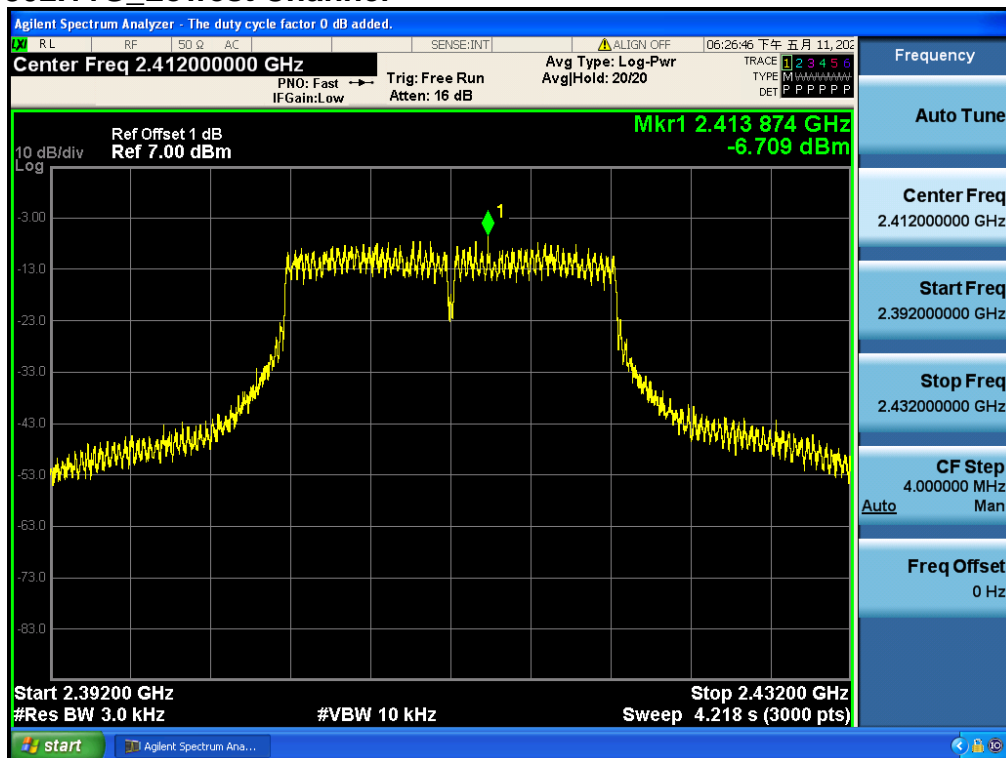


## 4.6.2.1.3 802.11B\_ Highest Channel

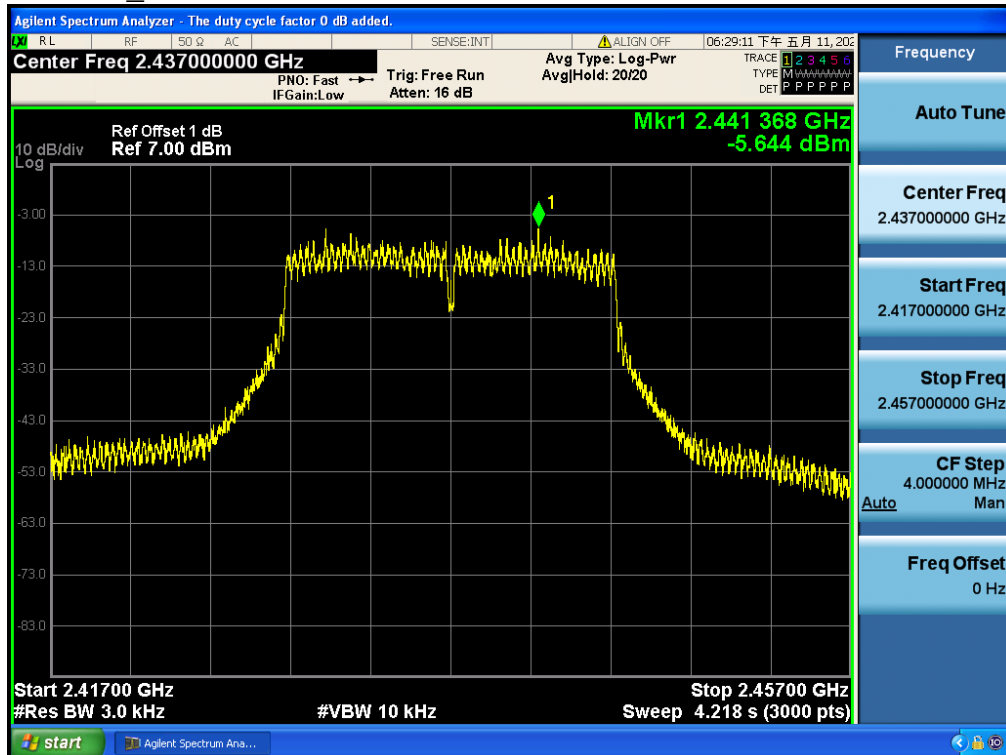




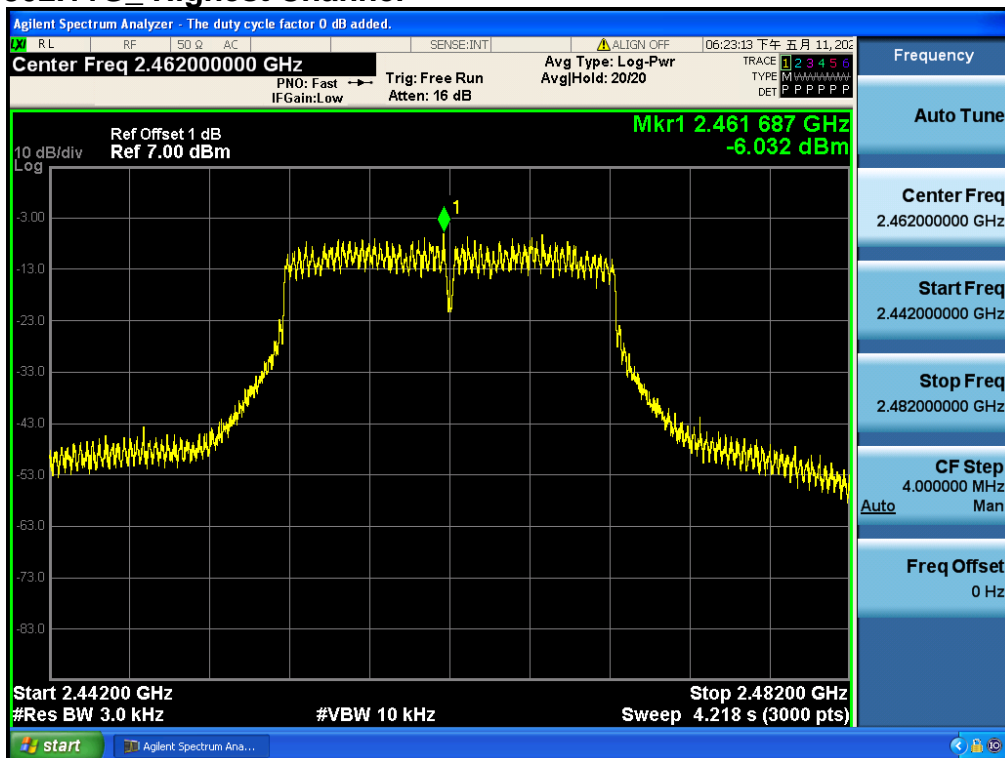
#### 4.6.2.1.4 802.11G\_Lowest Channel



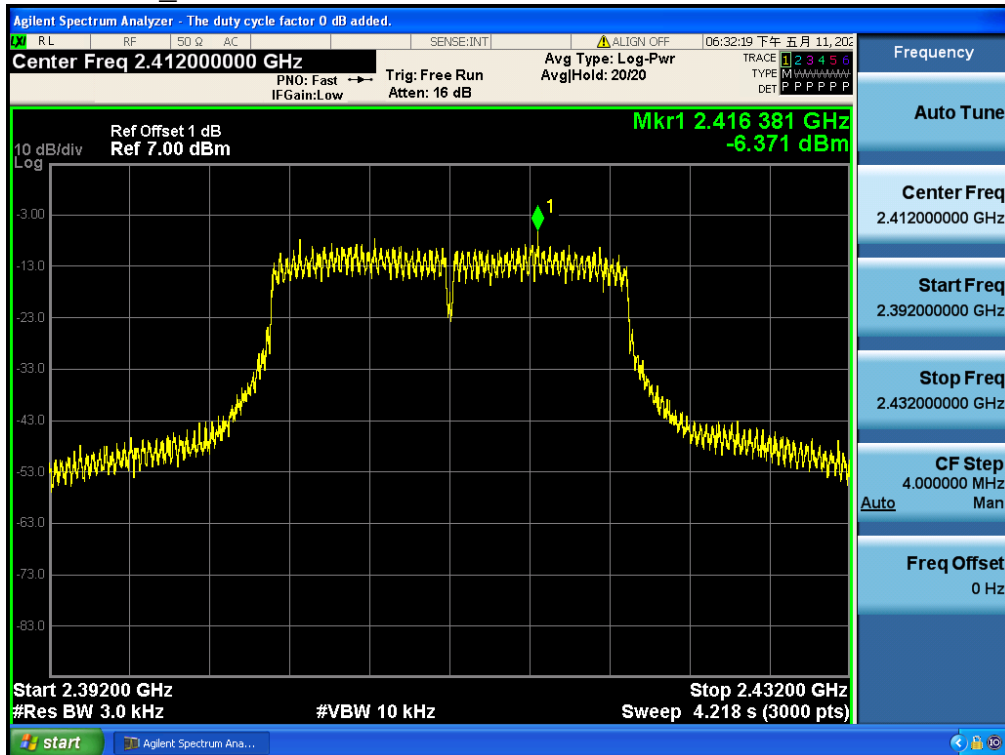
#### 4.6.2.1.5 802.11G\_Middle Channel



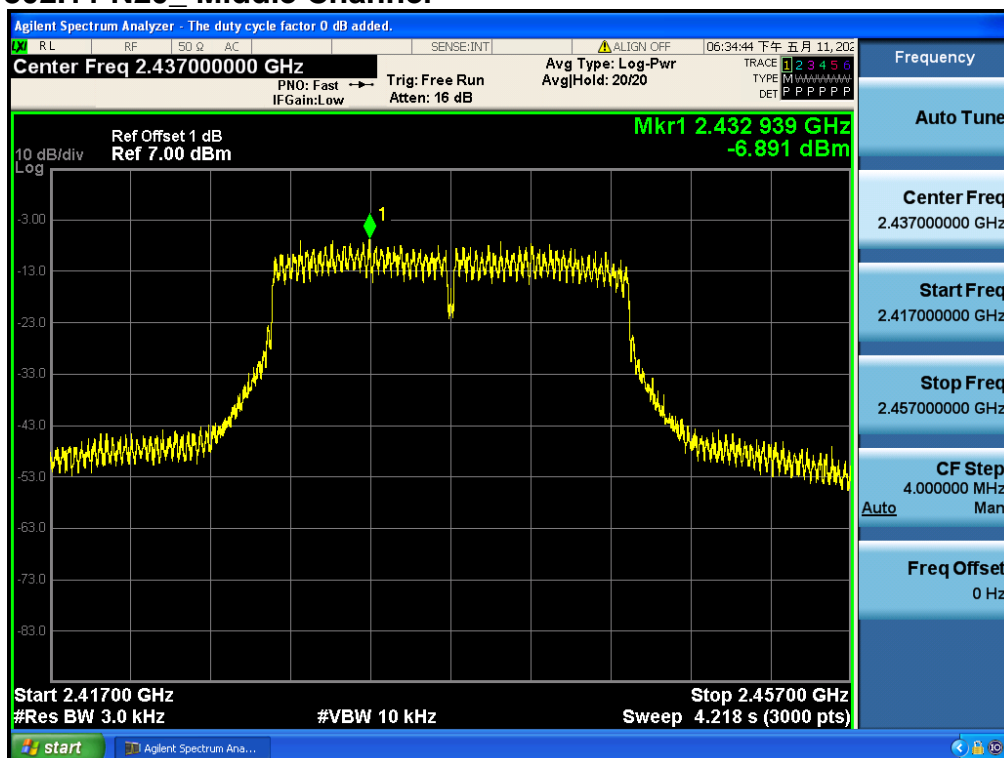
#### 4.6.2.1.6 802.11G\_Highest Channel



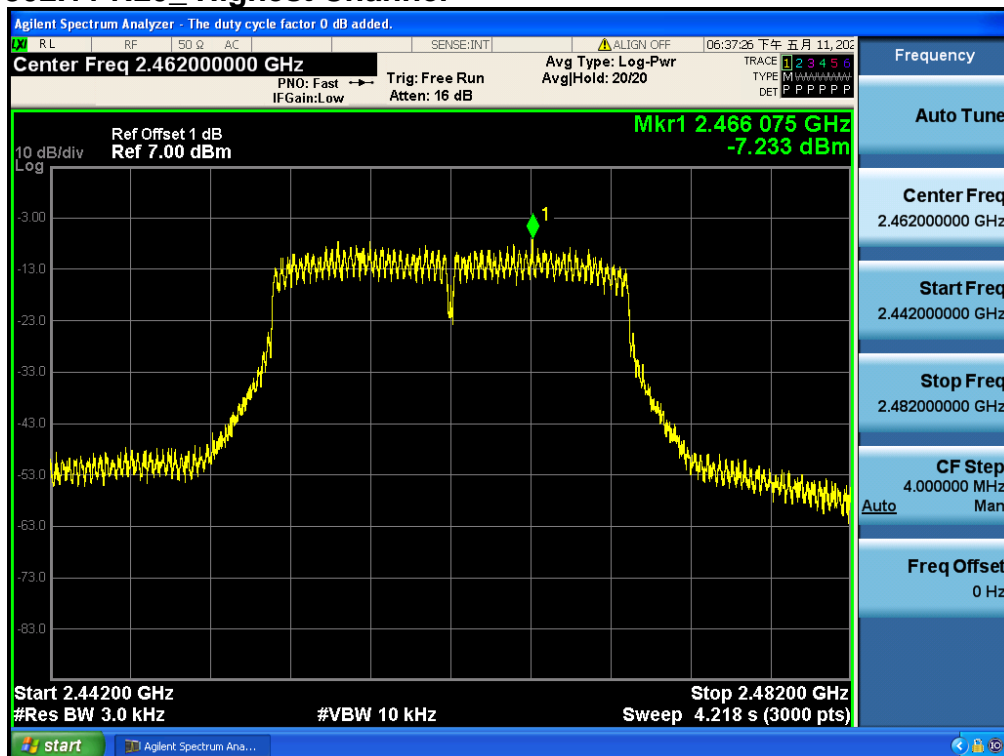
#### 4.6.2.1.7 802.11N20\_Lowest Channel



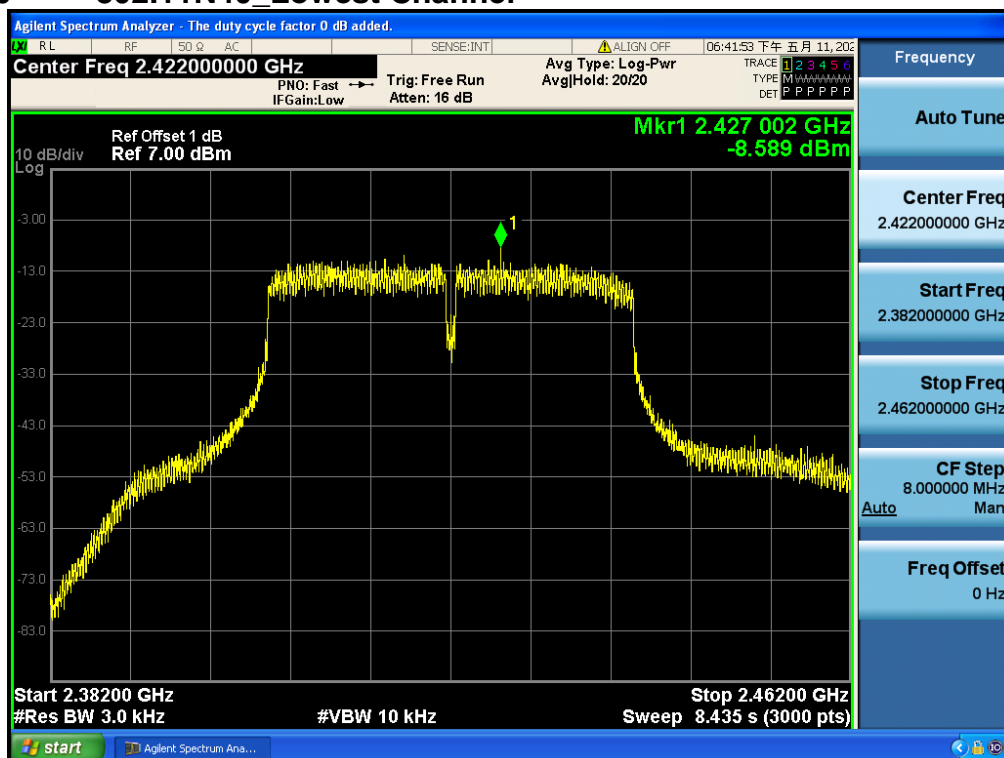
#### 4.6.2.1.8 802.11 N20\_ Middle Channel



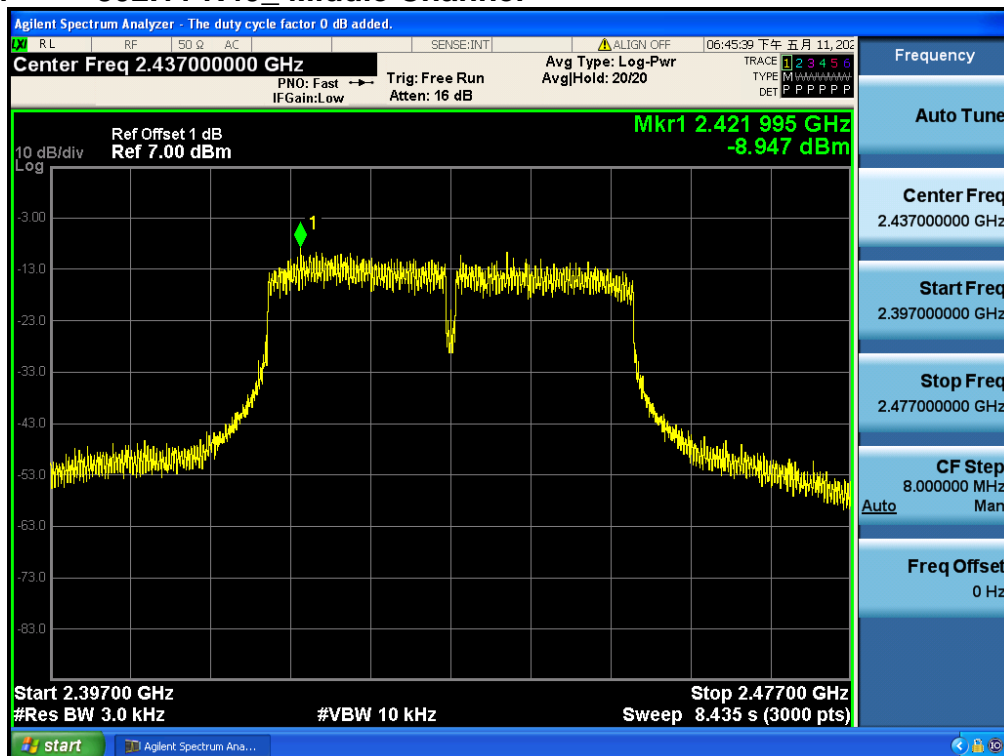
#### 4.6.2.1.9 802.11 N20\_ Highest Channel



#### 4.6.2.1.10 802.11N40 Lowest Channel



#### 4.6.2.1.11 802.11 N40\_Middle Channel



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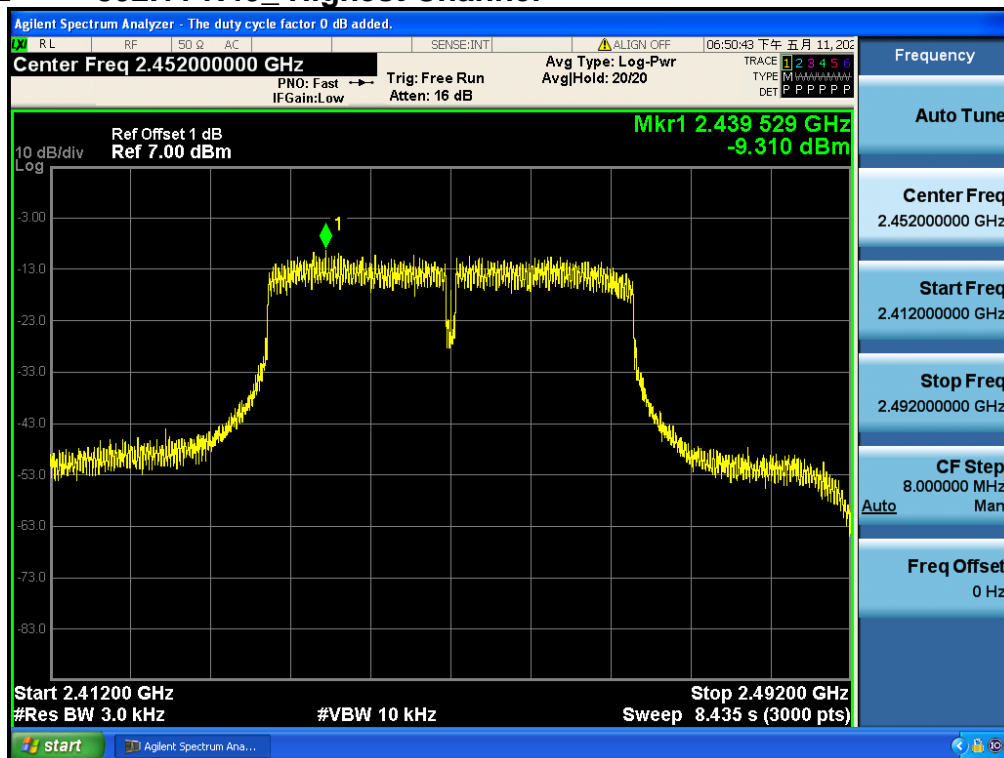
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#### 4.6.2.1.12 802.11 N40\_ Highest Channel



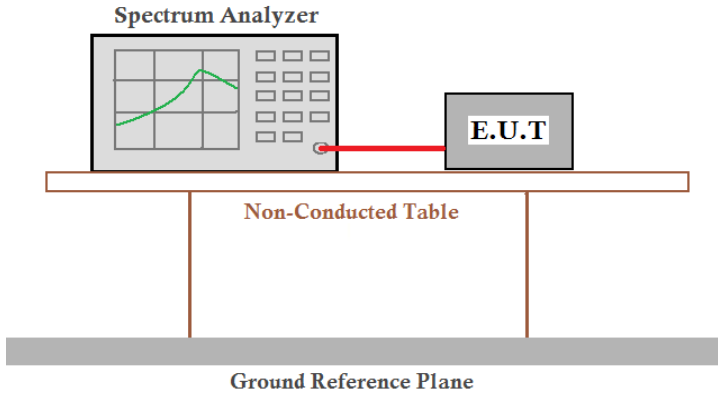
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#### 4.7 Band-edge for RF Conducted Emissions

|                        |   |
|------------------------|---|
| Test Requirement:      | 47 CFR Part 15C Section 15.247 (d)  |
| Test Method:           | ANSI C63.10: 2013 Section 11.13   |
| Test Setup:            |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>                              |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates   |
| Final Test Mode:       | Through Pre-scan, find the<br>1Mbps of rate is the worst case of 802.11B;<br>6Mbps of rate is the worst case of 802.11G ;<br>6.5Mbps of rate is the worst case of 802.11N(HT20) ;<br>13.5Mbps of rate is the worst case of 802.11N(HT40).   |
| Limit:                 | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Instruments Used:      | Refer to section 5.10 for details   |
| Test Results:          | Pass  |



## 4.7.1 Test plots

### 4.7.1.1 ANT1

#### 4.7.1.1.1 802.11B\_Lowest Channel



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## 4.7.1.1.2 802.11B\_Highest Channel



## 4.7.1.1.3 802.11G\_Lowest Channel

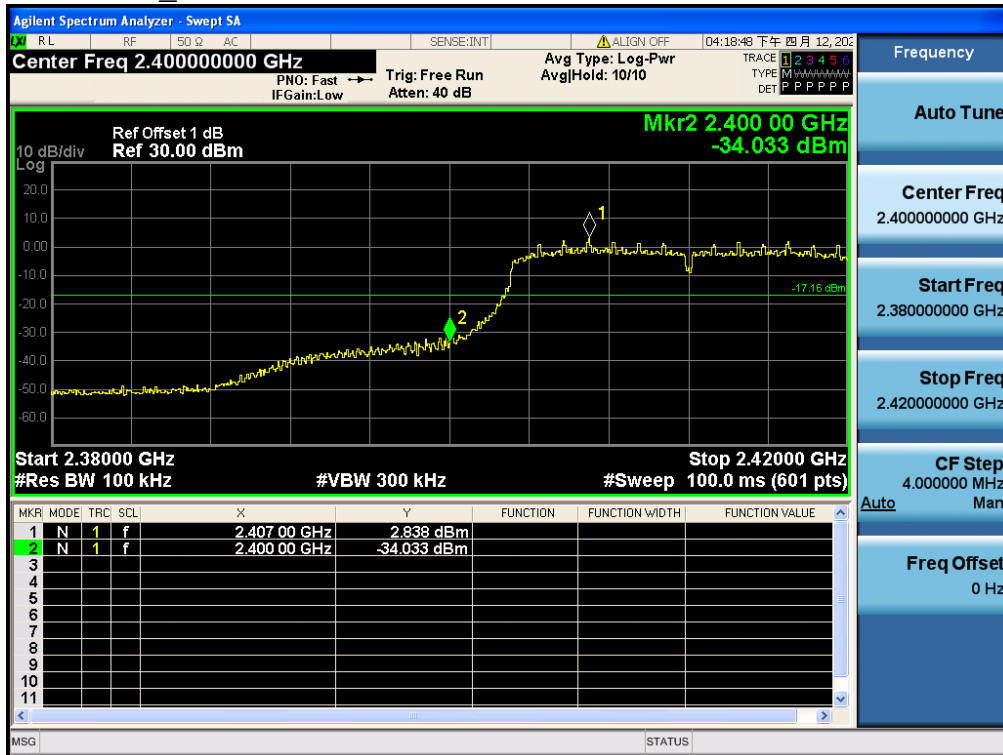




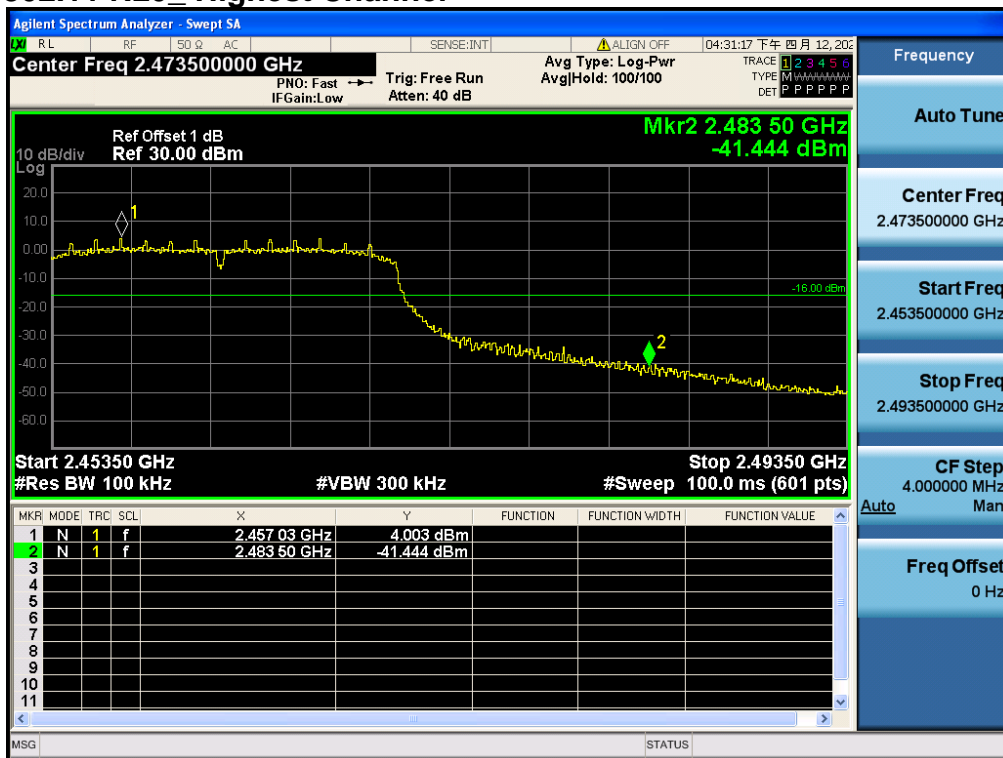
## 4.7.1.1.4 802.11G\_Highest Channel



## 4.7.1.1.5 802.11N20\_Lowest Channel



## 4.7.1.1.6 802.11 N20\_Highest Channel



## 4.7.1.1.7 802.11N40\_Lowest Channel

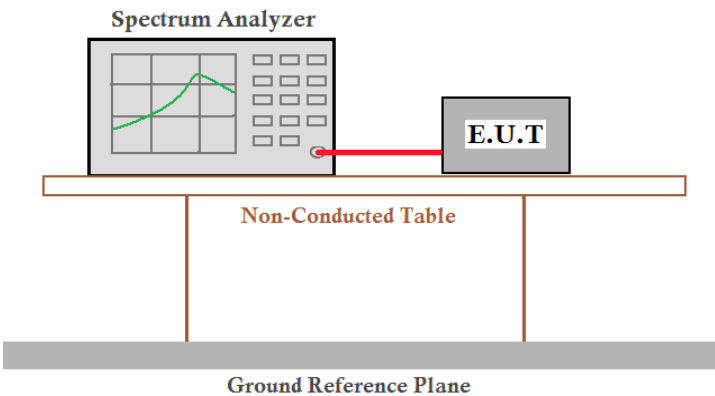




#### 4.7.1.1.8 802.11 N40\_ Highest Channel



## 4.8 RF Conducted Spurious Emissions

|                        |   |
|------------------------|---|
| Test Requirement:      | 47 CFR Part 15C Section 15.247 (d)  |
| Test Method:           | ANSI C63.10: 2013 Section 11.11   |
| Test Setup:            |   |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates   |
| Final Test Mode:       | <p>Through Pre-scan, find the</p> <p>1Mbps of rate is the worst case of 802.11B;</p> <p>6Mbps of rate is the worst case of 802.11G;</p> <p>6.5Mbps of rate is the worst case of 802.11N(HT20);</p> <p>13.5Mbps of rate is the worst case of 802.11N(HT40).</p>  |
| Limit:                 | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Instruments Used:      | Refer to section 5.10 for details   |
| Test Results:          | Pass  |



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## 4.8.1 Test plots

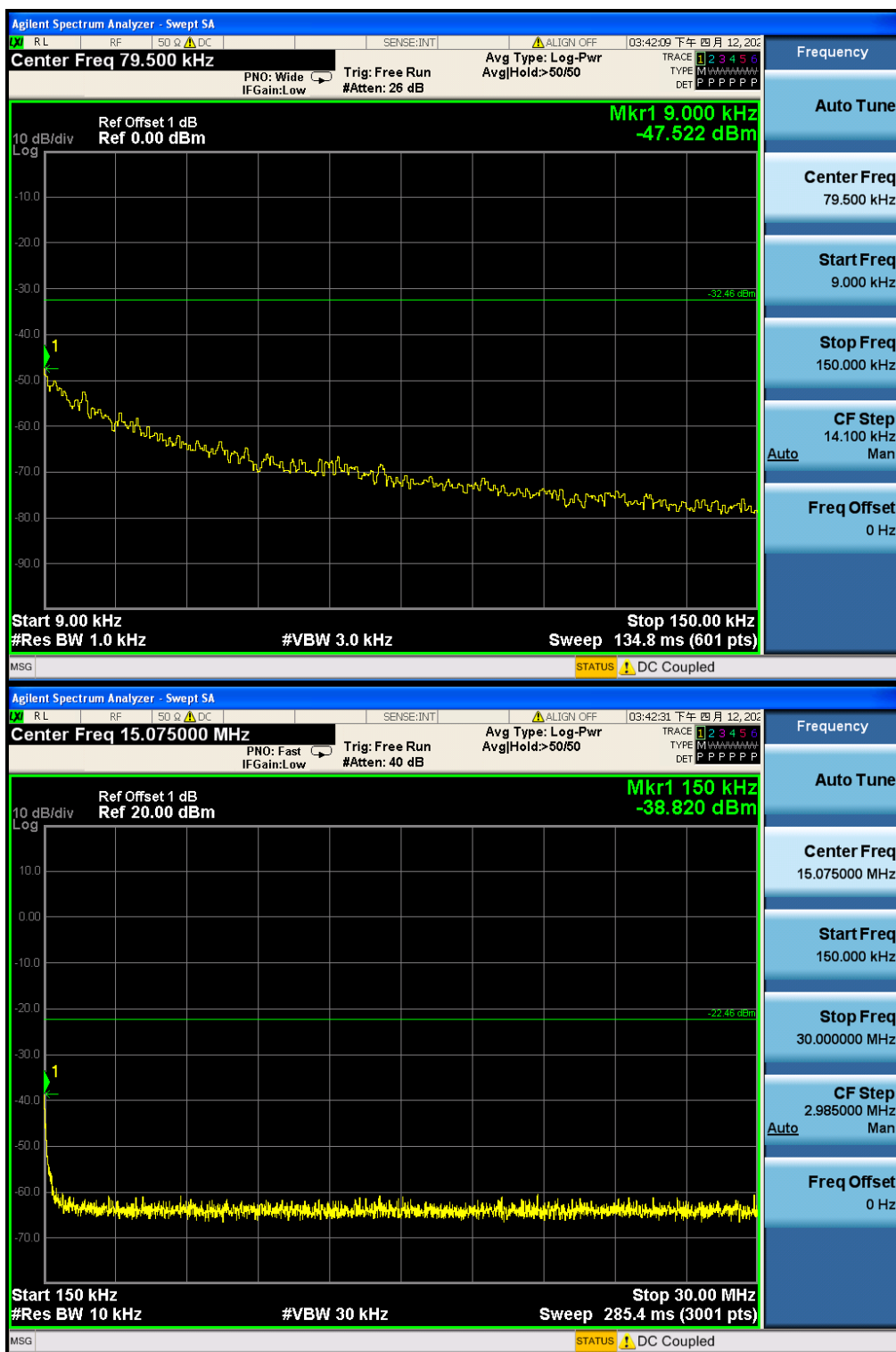
### 4.8.1.1 ANT1

#### 4.8.1.1.1 802.11B\_Lowest Channel



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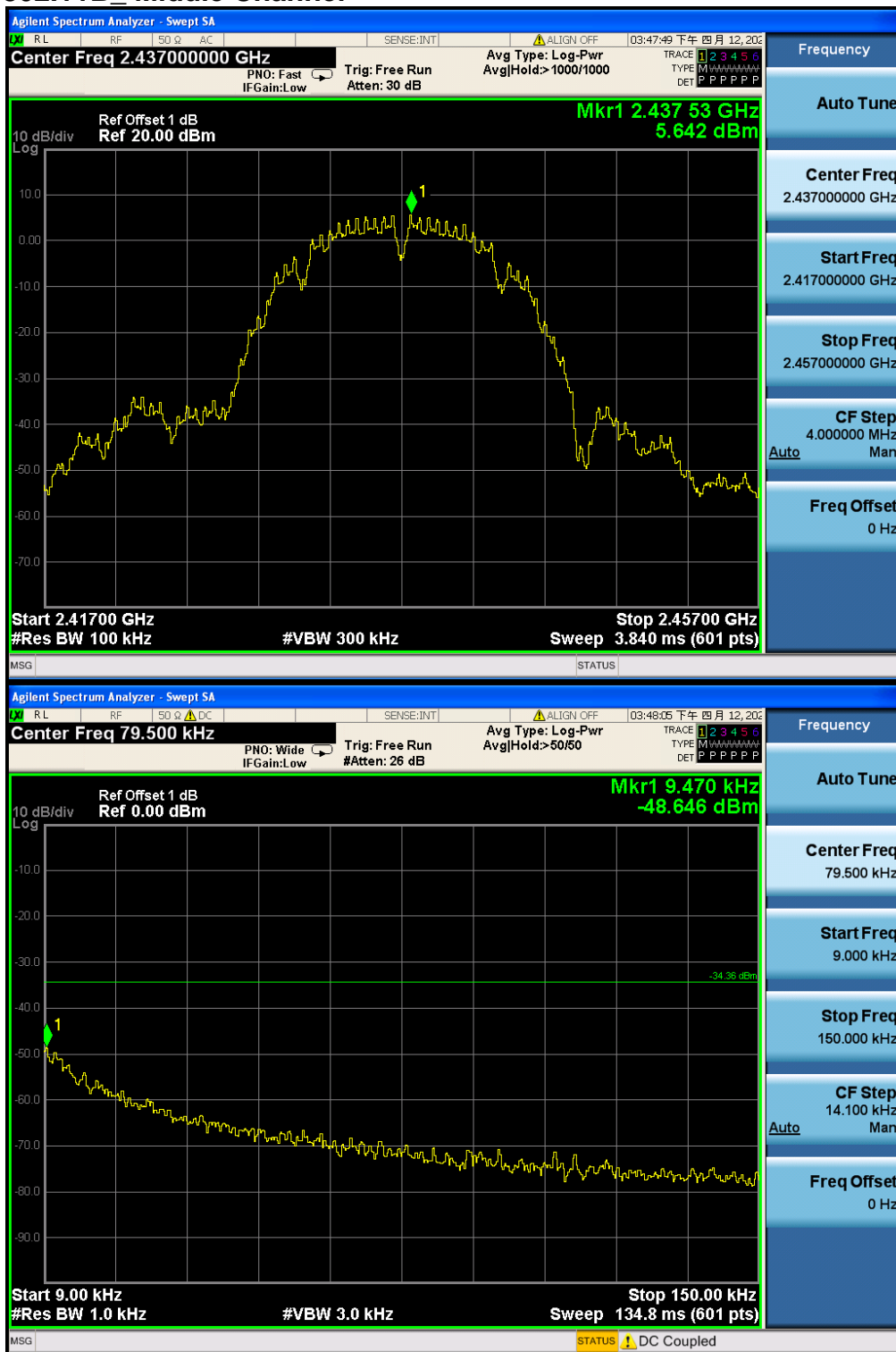


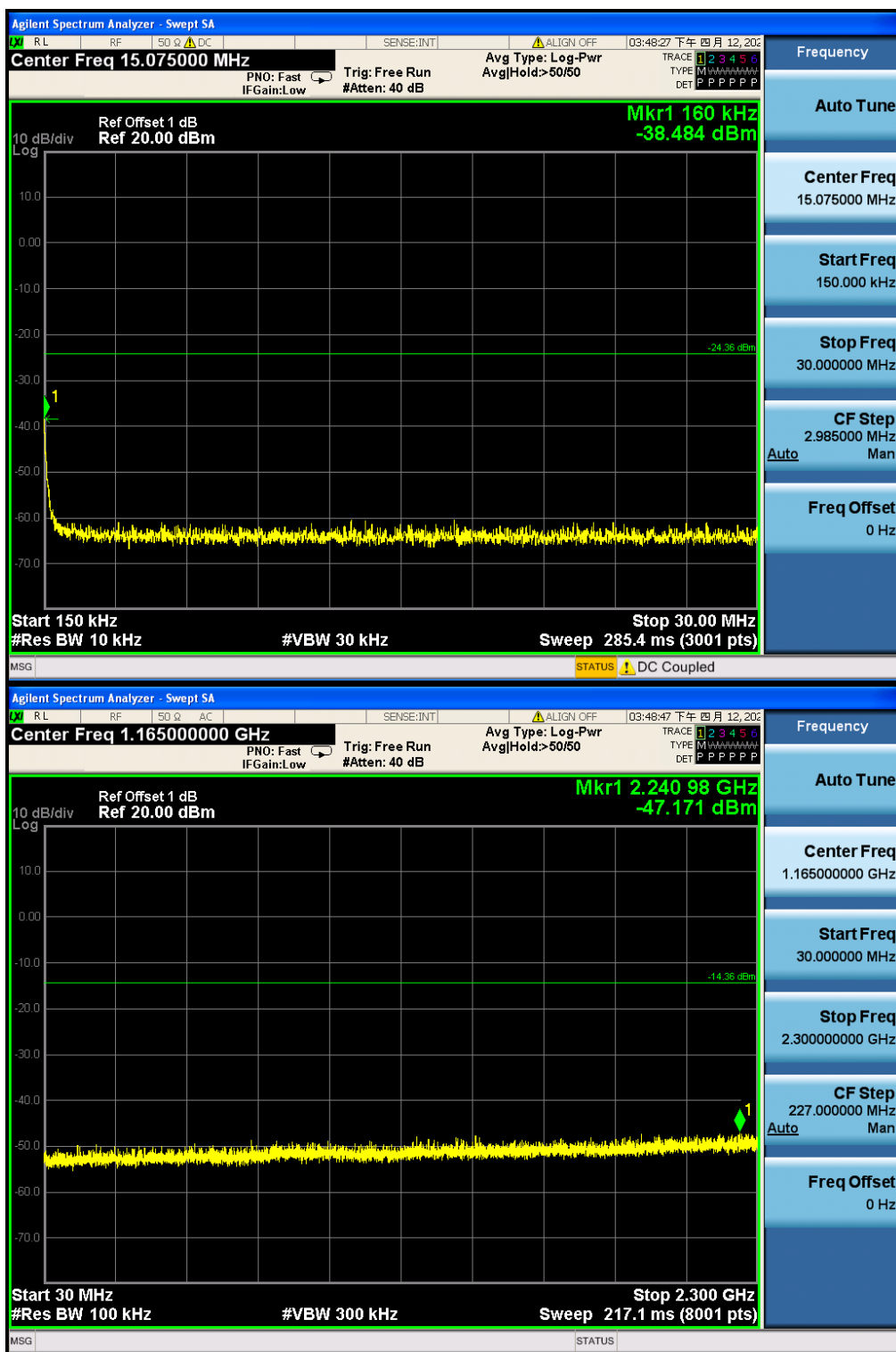




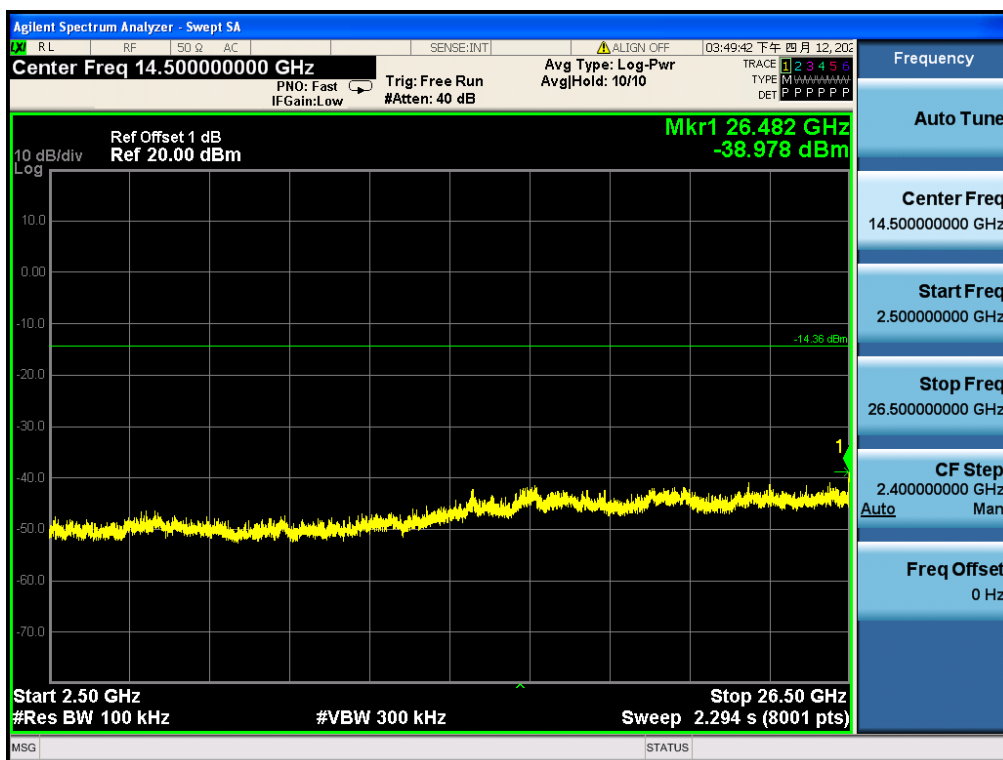


## 4.8.1.1.2 802.11B\_ Middle Channel









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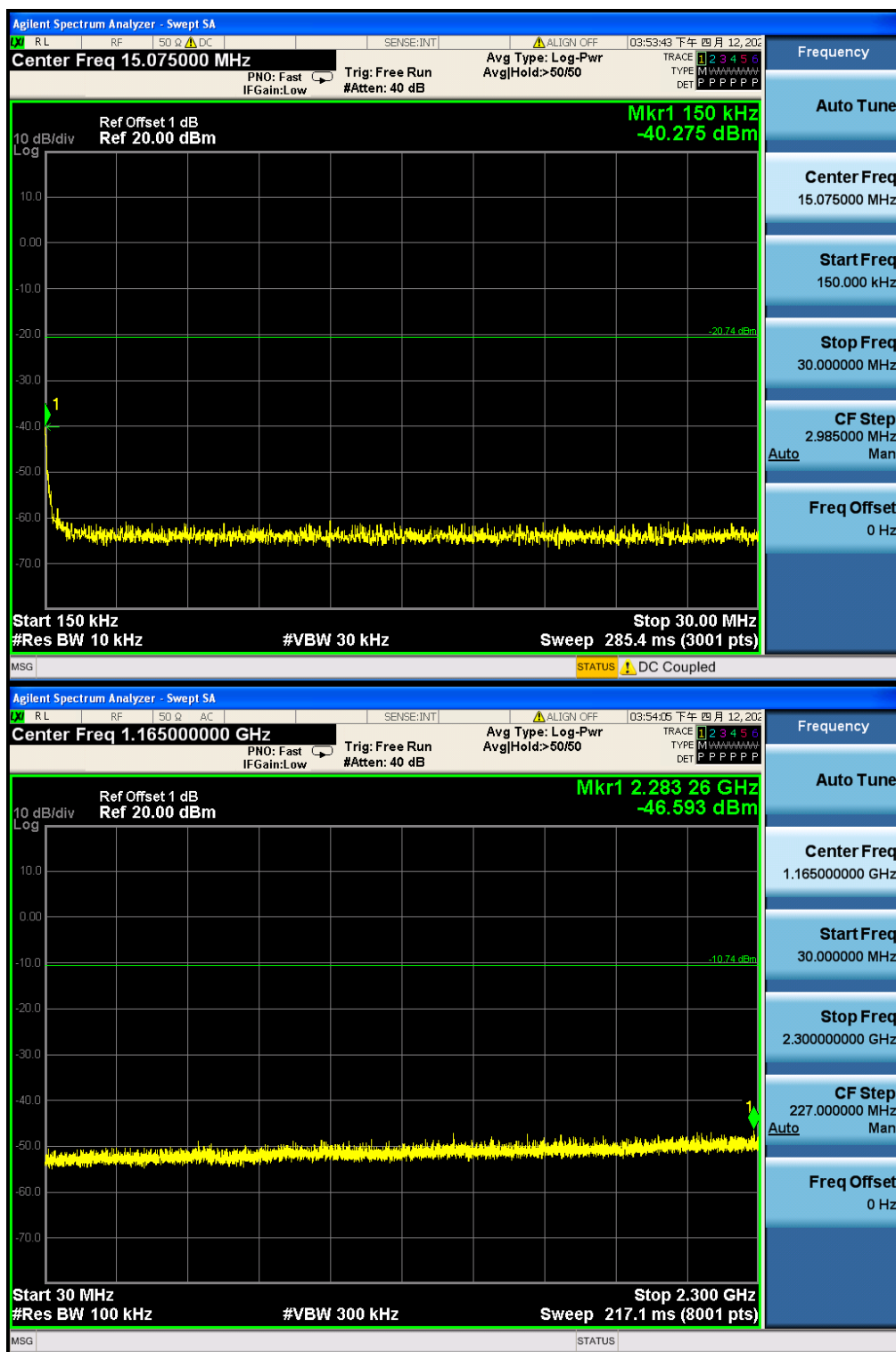
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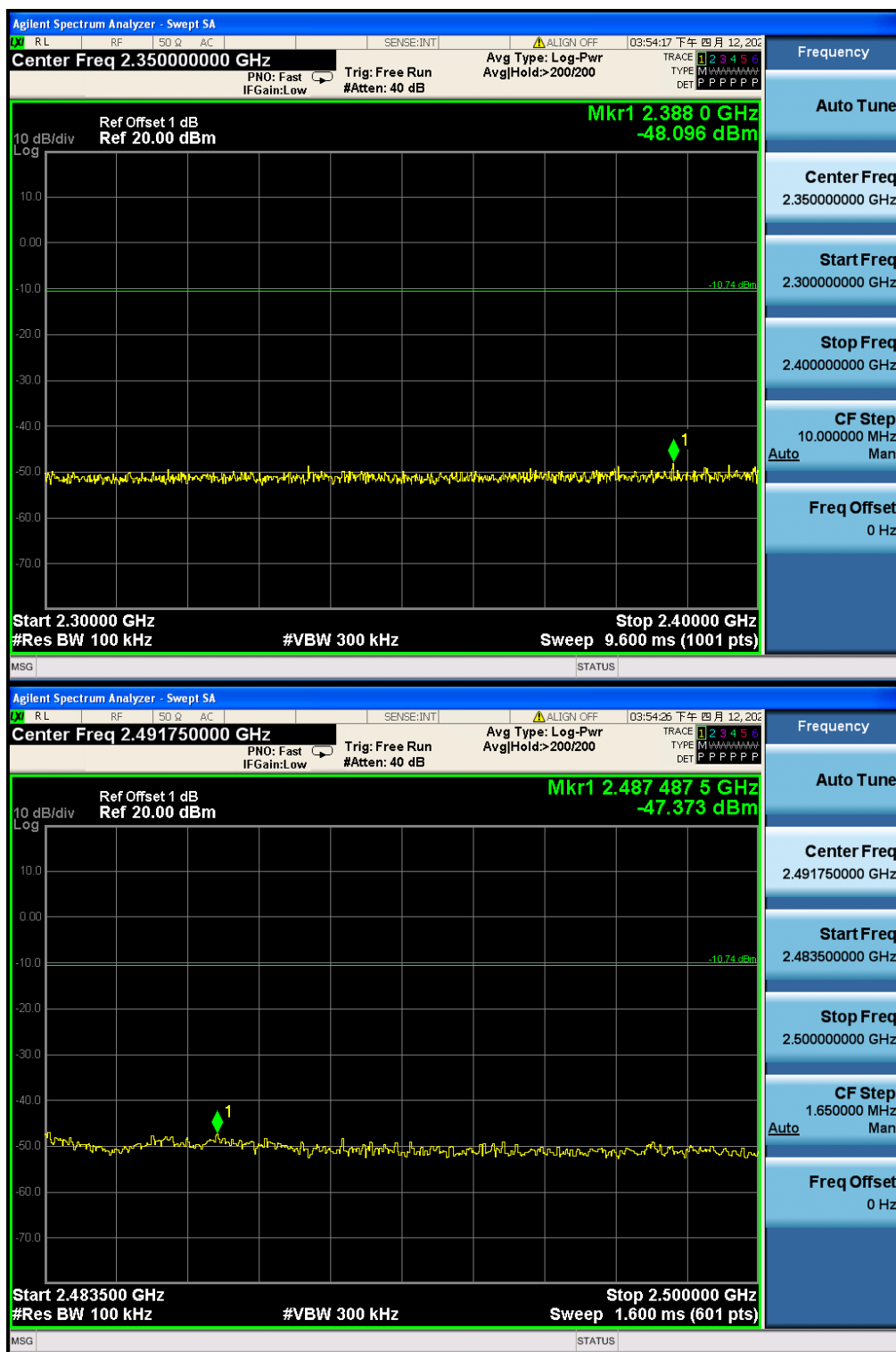
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## 4.8.1.1.3 802.11B\_Highest Channel





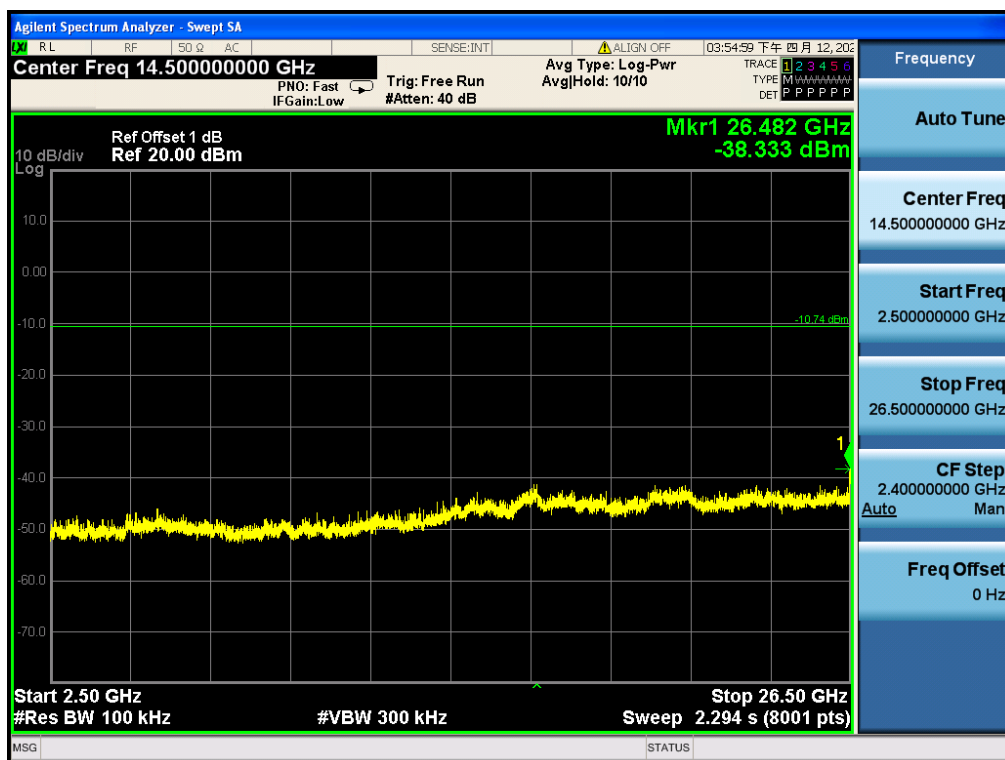


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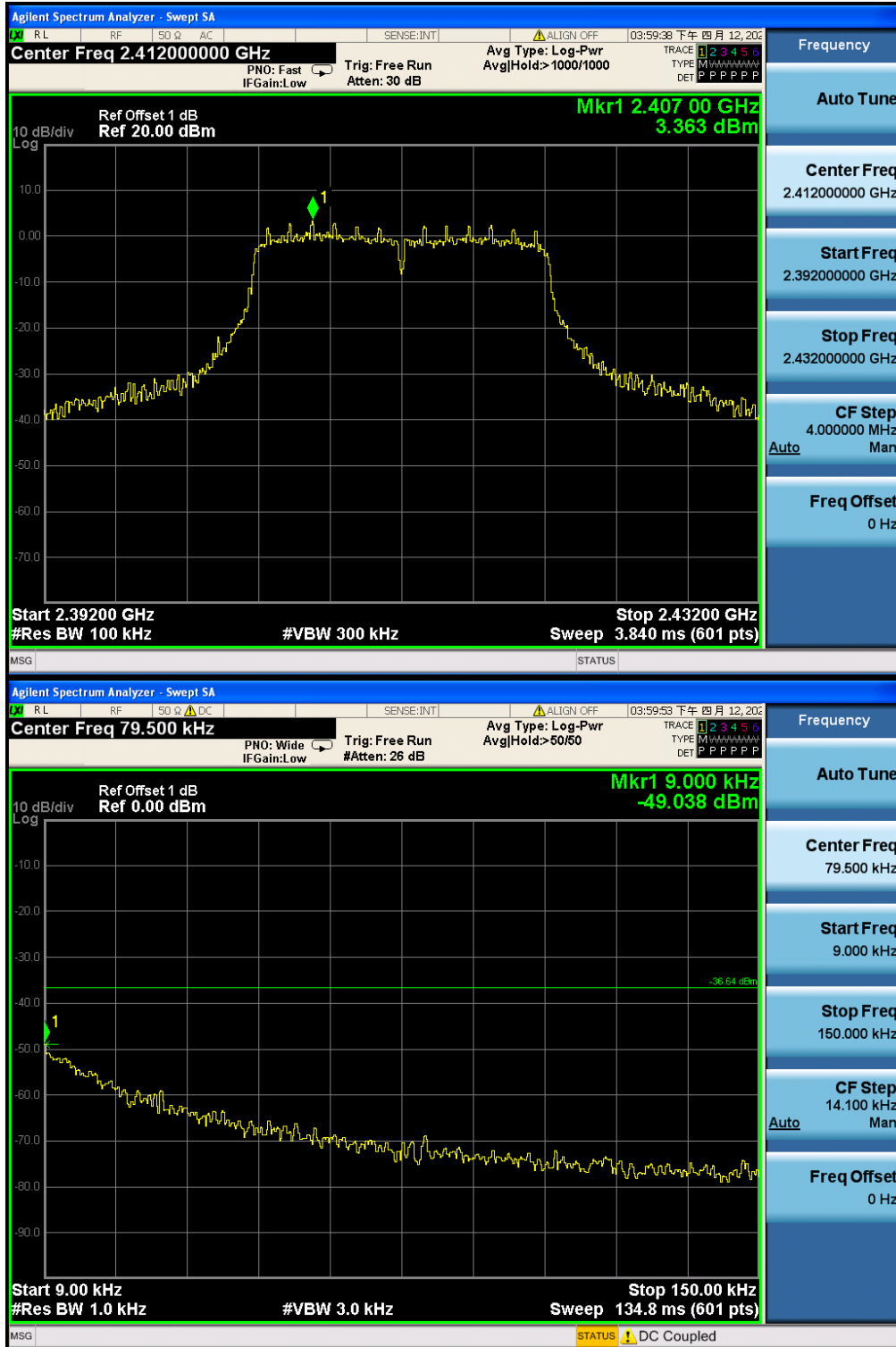
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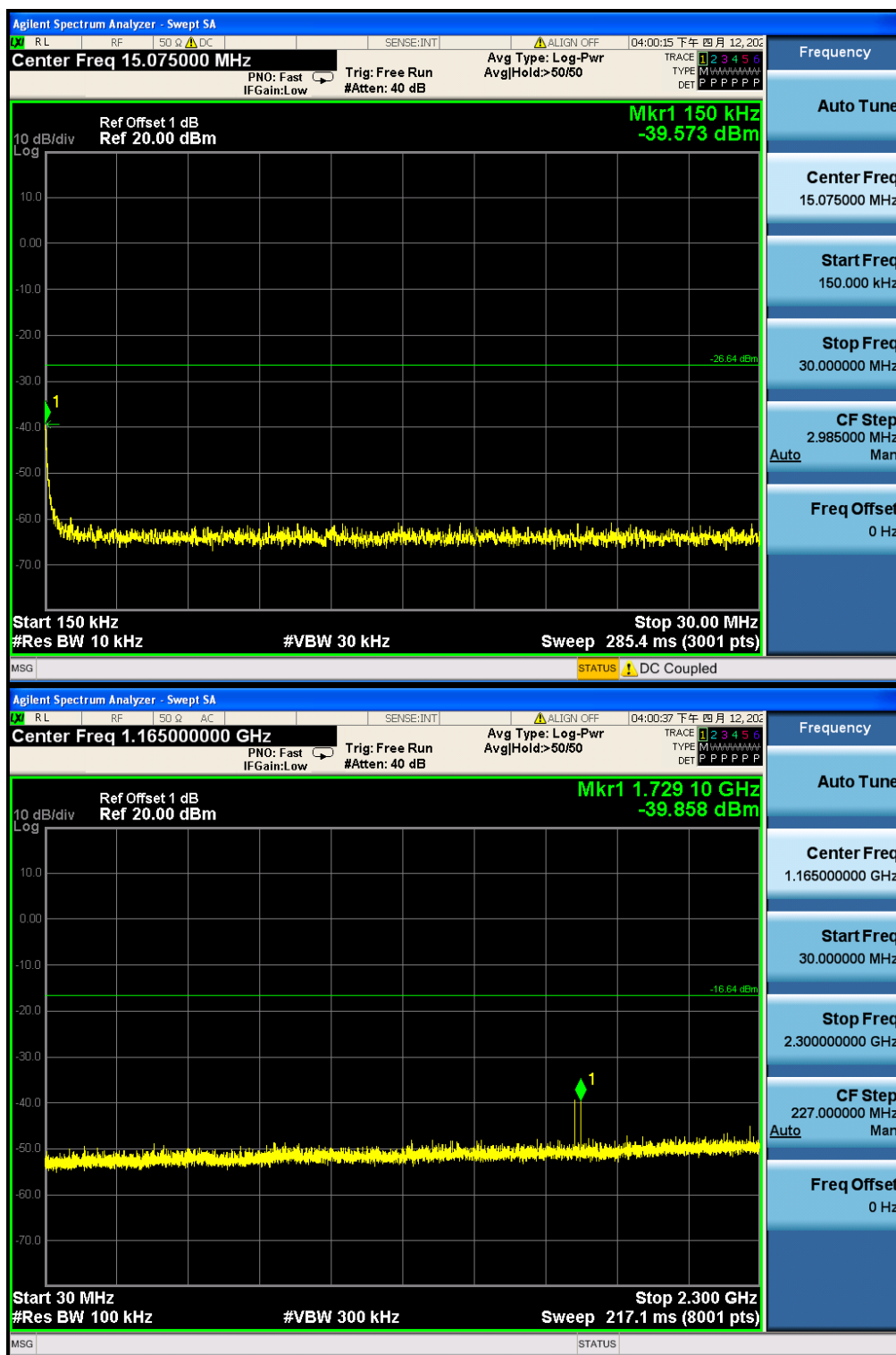
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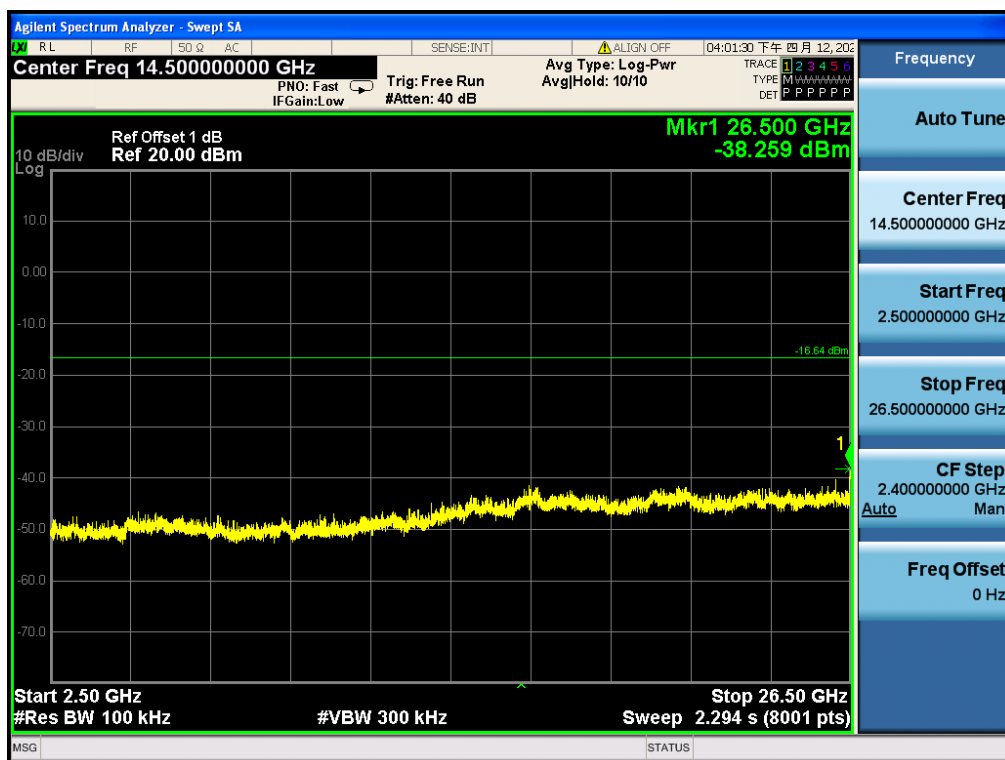


## 4.8.1.1.4 802.11G Lowest Channel









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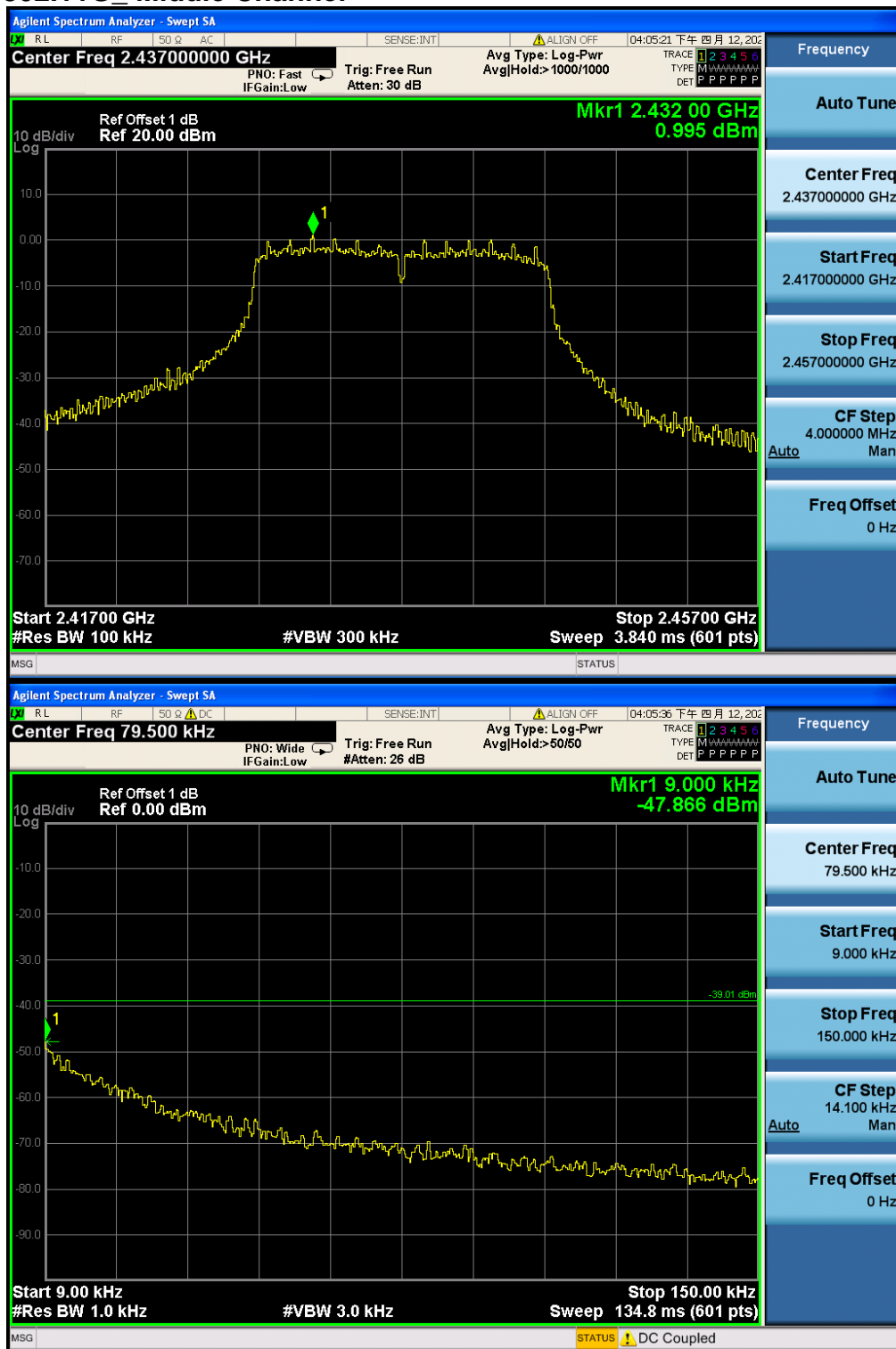
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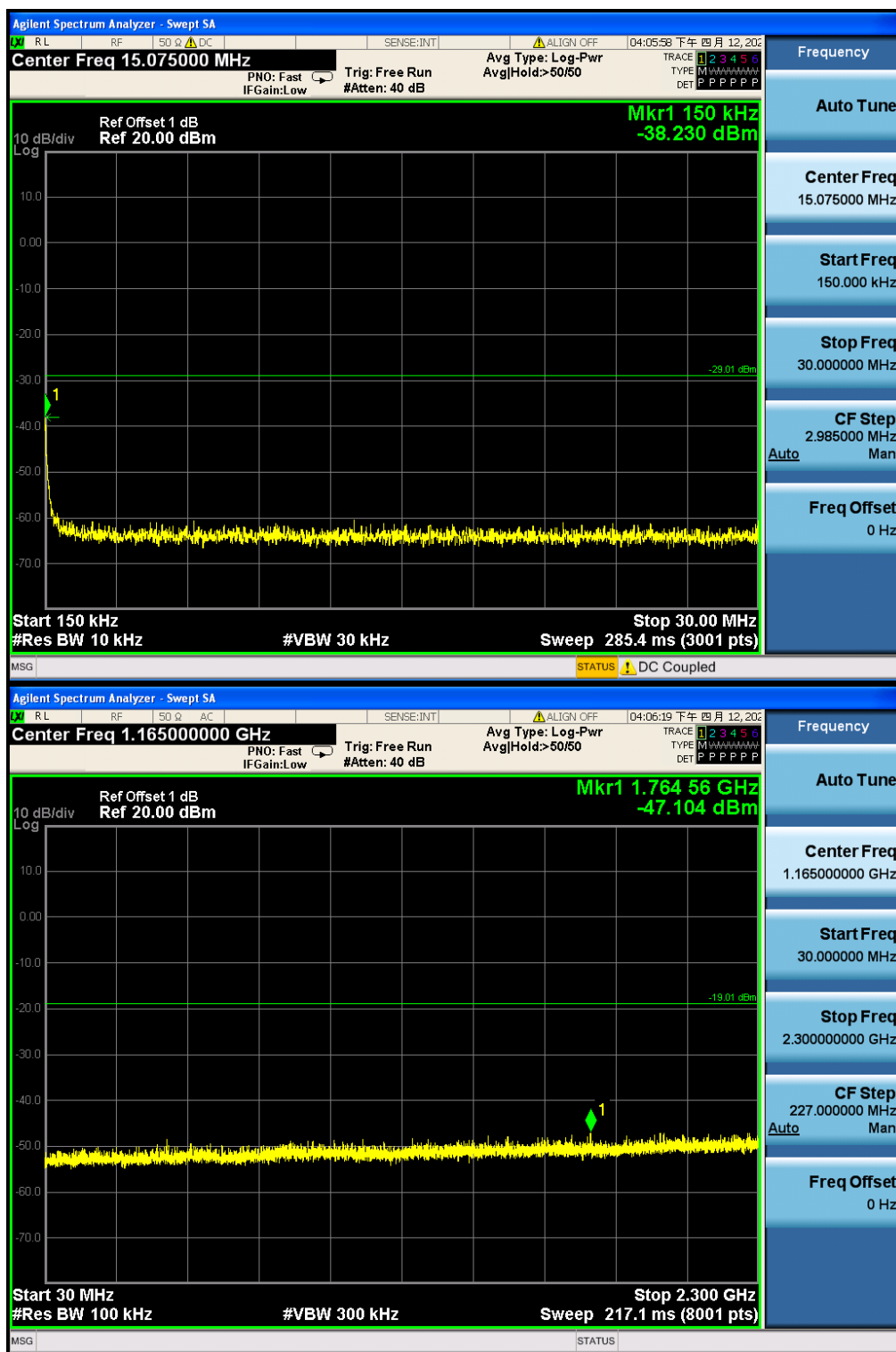
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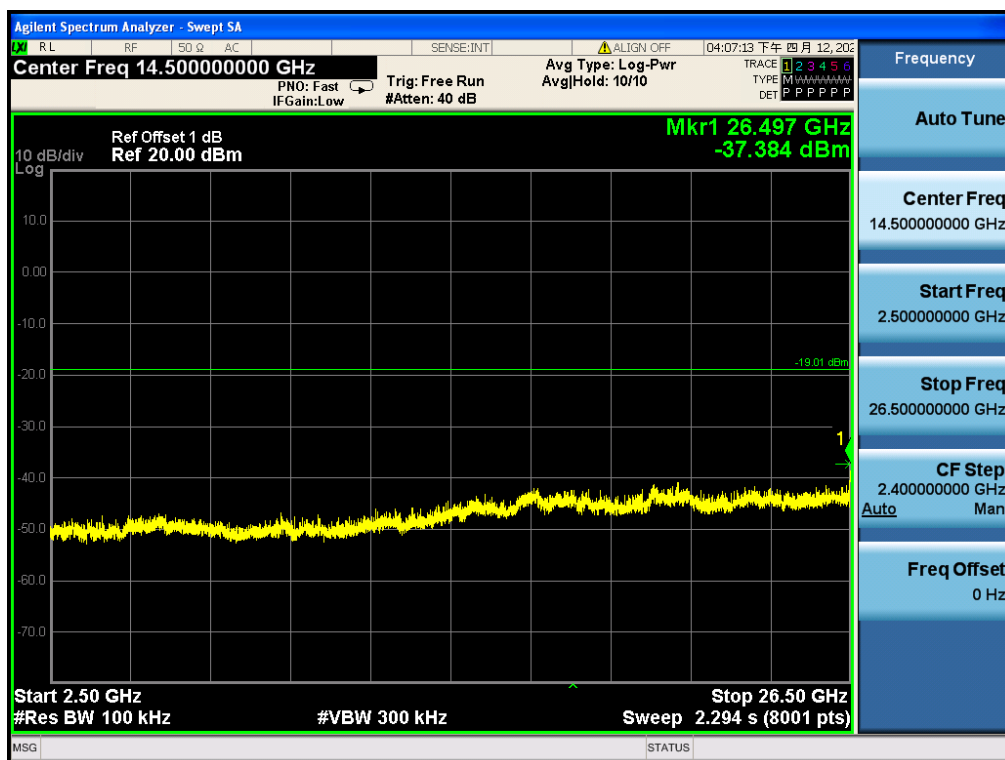


## 4.8.1.1.5 802.11G\_Middle Channel









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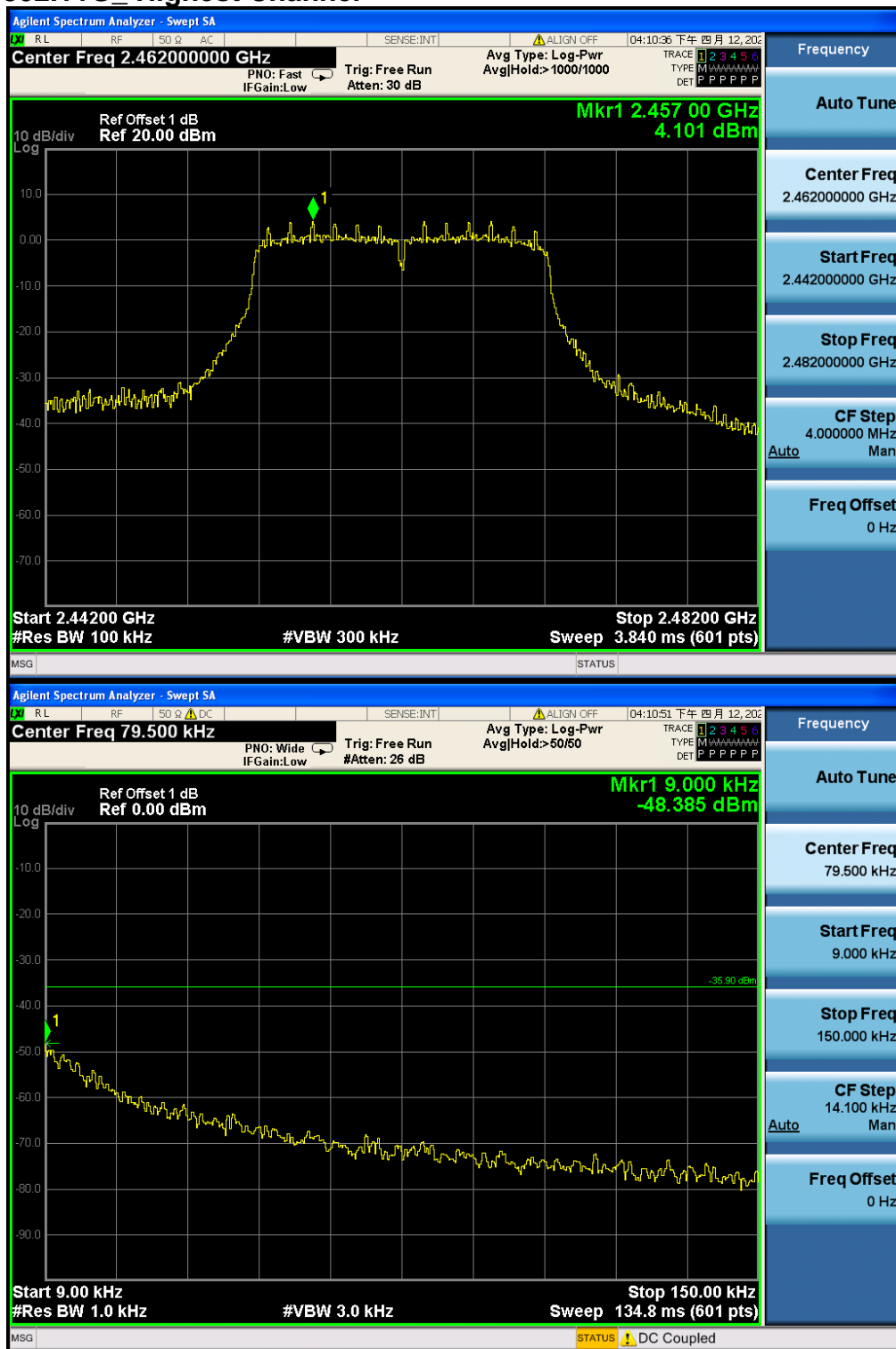
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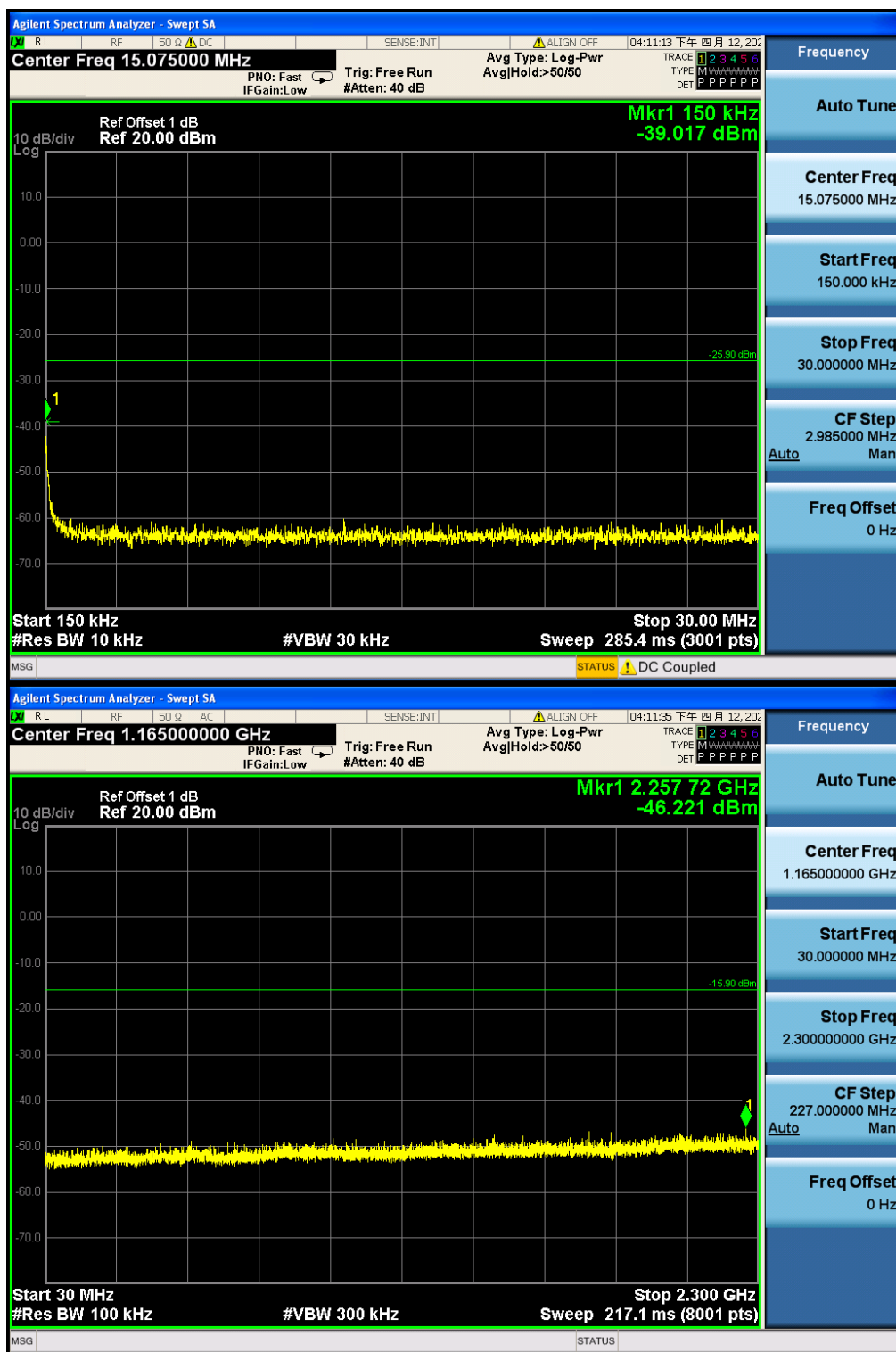
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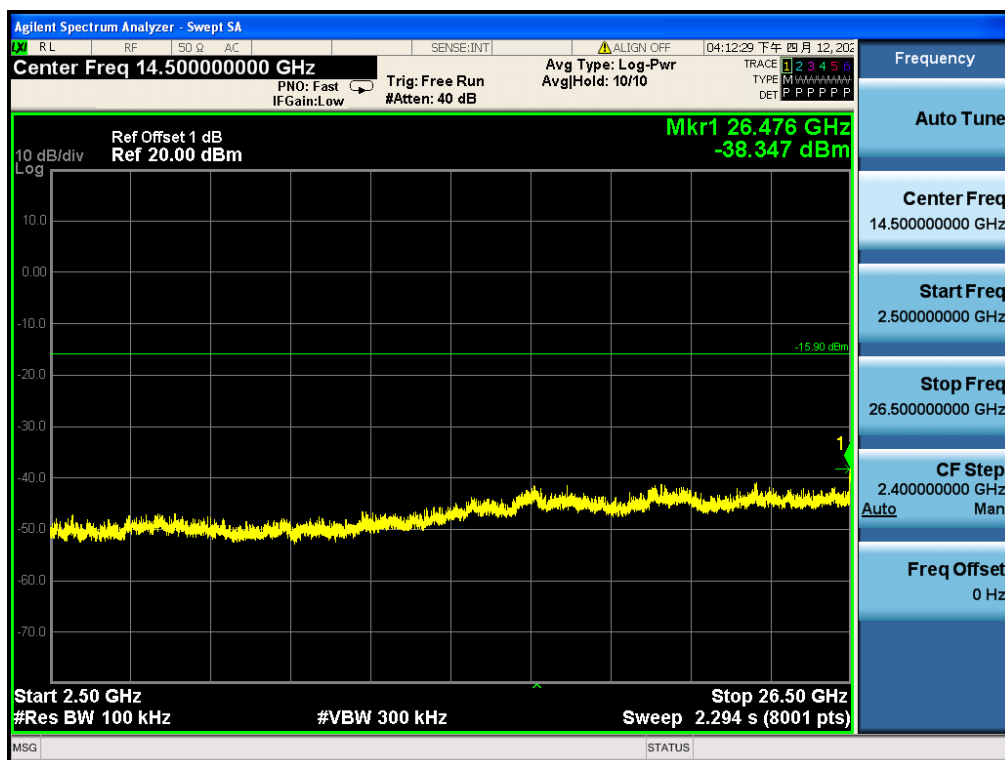


## 4.8.1.1.6 802.11G\_Highest Channel









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## 4.8.1.1.7 802.11N20 Lowest Channel

