

# RF MEASUREMENT REPORT

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**FCC ID:** XMR202211KG100S  
**Applicant:** Quectel Wireless Solutions Co., Ltd  
**Product:** Wireless Module for Amazon Sidewalk (900MHz & Bluetooth)  
**Model No.:** KG100S  
**Brand Name:** Quectel  
**FCC Classification:** FCC Part 15 Spread Spectrum Transmitter (DSS)  
**FCC Rule Part(s):** Part15 Subpart C (Section 15.247)  
**Result:** Complies  
**Received Date:** 2022-11-18  
**Test Date:** 2023-02-02 ~ 2023-03-18

**Reviewed By:**

\_\_\_\_\_  
Sunny Sun

**Approved By:**

\_\_\_\_\_  
Robin Wu



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 2211RSU051-U3 | V02     | Initial Report | 2023-03-25 | Valid |
|               |         |                |            |       |

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## 1. General Information

### 1.1. Applicant

Quectel Wireless Solutions Co., Ltd

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

### 1.2. Manufacturer

Quectel Wireless Solutions Co., Ltd

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

### 1.3. Testing Facility

|                                     |   |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <p><b>Test Site – MRT Suzhou Laboratory</b></p> <p><b>Laboratory Location (Suzhou - Wuzhong)</b><br/>D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China</p> <p><b>Laboratory Location (Suzhou - SIP)</b><br/>4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China</p> <p><b>Laboratory Accreditations</b></p> <p>A2LA: 3628.01 <span style="float: right;">CNAS: L10551</span><br/> FCC: CN1166 <span style="float: right;">ISED: CN0001</span></p> <p>VCCI: <input type="checkbox"/>R-20025      <input type="checkbox"/>G-20034      <input type="checkbox"/>C-20020      <input type="checkbox"/>T-20020<br/> <input type="checkbox"/>R-20141      <input type="checkbox"/>G-20134      <input type="checkbox"/>C-20103      <input type="checkbox"/>T-20104</p> |
| <input type="checkbox"/>            | <p><b>Test Site – MRT Shenzhen Laboratory</b></p> <p><b>Laboratory Location (Shenzhen)</b><br/>1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China</p> <p><b>Laboratory Accreditations</b></p> <p>A2LA: 3628.02 <span style="float: right;">CNAS: L10551</span><br/> FCC: CN1284 <span style="float: right;">ISED: CN0105</span></p>  |
| <input type="checkbox"/>            | <p><b>Test Site – MRT Taiwan Laboratory</b></p> <p><b>Laboratory Location (Taiwan)</b><br/>No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)</p> <p><b>Laboratory Accreditations</b></p> <p>TAF: L3261-190725<br/> FCC: 291082, TW3261 <span style="float: right;">ISED: TW3261</span></p>   |

#### 1.4. Product Information

|  |  |
|--|--|
| Product Name   | Wireless Module for Amazon Sidewalk (900MHz & Bluetooth)     |
| Model No.  | KG100S   |
| Serial No.   | D1N22JJ0E000231 (KG100SABMD)<br>P1N22LA23000016 (KG100SAAMD) |
| Bluetooth Specification  | BT 5.1 (LE only)   |
| LoRa Specification   | 902 ~ 928 MHz  |
| Working Voltage  | 3.0 ~ 3.6 V, nominal 3.3 V                                   |
| <p>Note:</p> <ol style="list-style-type: none"> <li>The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.</li> <li>The model differences of serial numbers are different for the duplexer, this report assessed two serial numbers.</li> </ol> |  |

#### 1.5. Radio Specification under Test

|  |  |
|--|--|
| Frequency Range  | 50kbps: 902.2 ~ 927.8MHz<br>150kbps: 902.4 ~ 927.6MHz<br>250kbps: 902.5 ~ 927.5MHz |
| Channel Number   | 50kbps: 129<br>150kbps: 64<br>250kbps: 51  |
| Type of modulation   | FHSS   |
| Antenna Type   | Dipole   |
| Antenna Gain   | 2.50 dBi   |
| <p>Note: The frequency range of the 50kbps data rate is the widest. Therefore, this report assesses the 50kbps data rate with the completion testing and spot-check with other data rates.</p> |  |

### 1.6. Working Frequencies

50kbps

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 1       | 902.2     | 34      | 908.8     | 67      | 915.4     |
| 2       | 902.4     | 35      | 909.0     | 68      | 915.6     |
| 3       | 902.6     | 36      | 909.2     | 69      | 915.8     |
| 4       | 902.8     | 37      | 909.4     | 70      | 916.0     |
| 5       | 903.0     | 38      | 909.6     | 71      | 916.2     |
| 6       | 903.2     | 39      | 909.8     | 72      | 916.4     |
| 7       | 903.4     | 40      | 910.0     | 73      | 916.6     |
| 8       | 903.6     | 41      | 910.2     | 74      | 916.8     |
| 9       | 903.8     | 42      | 910.4     | 75      | 917.0     |
| 10      | 904.0     | 43      | 910.6     | 76      | 917.2     |
| 11      | 904.2     | 44      | 910.8     | 77      | 917.4     |
| 12      | 904.4     | 45      | 911.0     | 78      | 917.6     |
| 13      | 904.6     | 46      | 911.2     | 79      | 917.8     |
| 14      | 904.8     | 47      | 911.4     | 80      | 918.0     |
| 15      | 905.0     | 48      | 911.6     | 81      | 918.2     |
| 16      | 905.2     | 49      | 911.8     | 82      | 918.4     |
| 17      | 905.4     | 50      | 912.0     | 83      | 918.6     |
| 18      | 905.6     | 51      | 912.2     | 84      | 918.8     |
| 19      | 905.8     | 52      | 912.4     | 85      | 919.0     |
| 20      | 906.0     | 53      | 912.6     | 86      | 919.2     |
| 21      | 906.2     | 54      | 912.8     | 87      | 919.4     |
| 22      | 906.4     | 55      | 913.0     | 88      | 919.6     |
| 23      | 906.6     | 56      | 913.2     | 89      | 919.8     |
| 24      | 906.8     | 57      | 913.4     | 90      | 920.0     |
| 25      | 907.0     | 58      | 913.6     | 91      | 920.2     |
| 26      | 907.2     | 59      | 913.8     | 92      | 920.4     |
| 27      | 907.4     | 60      | 914.0     | 93      | 920.6     |
| 28      | 907.6     | 61      | 914.2     | 94      | 920.8     |
| 29      | 907.8     | 62      | 914.4     | 95      | 921.0     |
| 30      | 908.0     | 63      | 914.6     | 96      | 921.2     |
| 31      | 908.2     | 64      | 914.8     | 97      | 921.4     |
| 32      | 908.4     | 65      | 915.0     | 98      | 921.6     |



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| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 33      | 908.6     | 66      | 915.2     | 99      | 921.8     |
| 100     | 922.0     | 110     | 924.0     | 120     | 926.0     |
| 101     | 922.2     | 111     | 924.2     | 121     | 926.2     |
| 102     | 922.4     | 112     | 924.4     | 122     | 926.4     |
| 103     | 922.6     | 113     | 924.6     | 123     | 926.6     |
| 104     | 922.8     | 114     | 924.8     | 124     | 926.8     |
| 105     | 923.0     | 115     | 925.0     | 125     | 927.0     |
| 106     | 923.2     | 116     | 925.2     | 126     | 927.2     |
| 107     | 923.4     | 117     | 925.4     | 127     | 927.4     |
| 108     | 923.6     | 118     | 925.6     | 128     | 927.6     |
| 109     | 923.8     | 119     | 925.8     | 129     | 927.8     |

150kbps

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 1       | 902.4     | 23      | 911.2     | 44      | 919.6     |
| 2       | 902.8     | 24      | 911.6     | 45      | 920.0     |
| 3       | 903.2     | 25      | 912.0     | 46      | 920.4     |
| 4       | 903.6     | 26      | 912.4     | 47      | 920.8     |
| 5       | 904.0     | 27      | 912.8     | 48      | 921.2     |
| 6       | 904.4     | 28      | 913.2     | 49      | 921.6     |
| 7       | 904.8     | 29      | 913.6     | 50      | 922.0     |
| 8       | 905.2     | 30      | 914.0     | 51      | 922.4     |
| 9       | 905.6     | 31      | 914.4     | 52      | 922.8     |
| 10      | 906.0     | 32      | 914.8     | 53      | 923.2     |
| 11      | 906.4     | 33      | 915.2     | 54      | 923.6     |
| 12      | 906.8     | 34      | 915.6     | 55      | 924.0     |
| 13      | 907.2     | 35      | 916.0     | 56      | 924.4     |
| 14      | 907.6     | 36      | 916.4     | 57      | 924.8     |
| 15      | 908.0     | 37      | 916.8     | 58      | 925.2     |
| 16      | 908.4     | 38      | 917.2     | 59      | 925.6     |
| 17      | 908.8     | 39      | 917.6     | 60      | 926.0     |
| 18      | 909.2     | 40      | 918.0     | 61      | 926.4     |
| 19      | 909.6     | 41      | 918.4     | 62      | 926.8     |
| 20      | 910.0     | 42      | 918.8     | 63      | 927.2     |
| 21      | 910.4     | 43      | 919.2     | 64      | 927.6     |
| 22      | 910.8     | --      | --        | --      | --        |

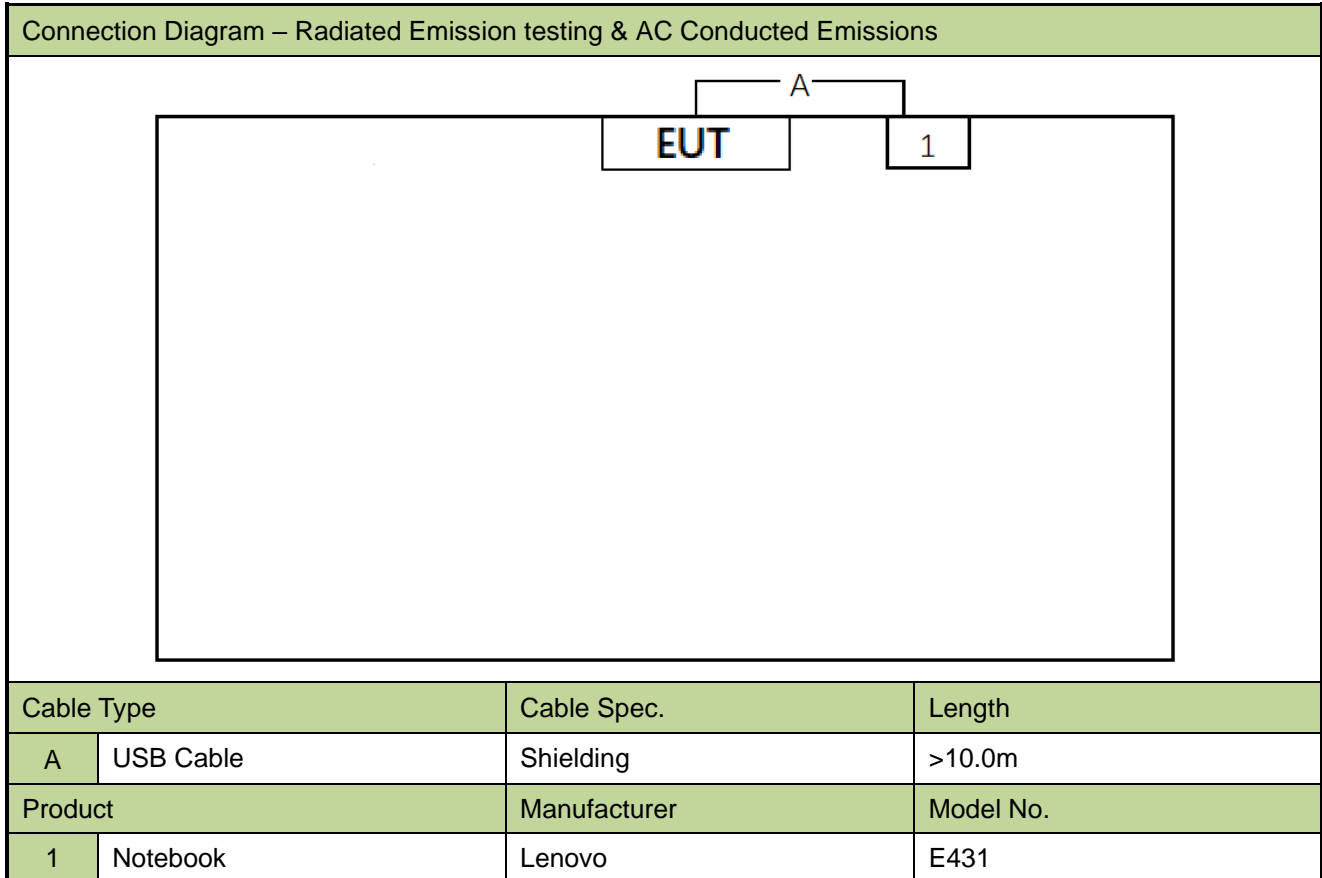
250kbps

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 1       | 902.5     | 18      | 911.0     | 35      | 919.5     |
| 2       | 903.0     | 19      | 911.5     | 36      | 920.0     |
| 3       | 903.5     | 20      | 912.0     | 37      | 920.5     |
| 4       | 904.0     | 21      | 912.5     | 38      | 921.0     |
| 5       | 904.5     | 22      | 913.0     | 39      | 921.5     |
| 6       | 905.0     | 23      | 913.5     | 40      | 922.0     |
| 7       | 905.5     | 24      | 914.0     | 41      | 922.5     |
| 8       | 906.0     | 25      | 914.5     | 42      | 923.0     |
| 9       | 906.5     | 26      | 915.0     | 43      | 923.5     |
| 10      | 907.0     | 27      | 915.5     | 44      | 924.0     |
| 11      | 907.5     | 28      | 916.0     | 45      | 924.5     |
| 12      | 908.0     | 29      | 916.5     | 46      | 925.0     |
| 13      | 908.5     | 30      | 917.0     | 47      | 925.5     |
| 14      | 909.0     | 31      | 917.5     | 48      | 926.0     |
| 15      | 909.5     | 32      | 918.0     | 49      | 926.5     |
| 16      | 910.0     | 33      | 918.5     | 50      | 927.0     |
| 17      | 910.5     | 34      | 919.0     | 51      | 927.5     |

## 2. Test Configuration

### 2.1. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.



### 2.2. Test Software

The test utility software used during testing was “QCOM”, and the version was 1.6.

### 2.3. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

### 2.4. Test Environment Condition

|                     |             |
|---------------------|-------------|
| Ambient Temperature | 15 ~ 35 °C  |
| Relative Humidity   | 20 ~ 75 %RH |

### 3. Antenna Requirement

**Excerpt from §15.203 of the FCC Rules/Regulations:**

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section.”

**Conclusion:**

The unit complies with the requirement of §15.203.

#### 4. Measuring Instrument

| Instrument         | Manufacturer | Model No.  | Asset No.   | Cali. Interval | Cali. Due Date | Test Site |
|--------------------|--------------|------------|-------------|----------------|----------------|-----------|
| EMI Test Receiver  | R&S          | ESR7       | MRTSUE06001 | 1 year         | 2023-12-28     | WZ-AC1    |
| Horn Antenna       | Schwarzbeck  | BBHA 9120D | MRTSUE06023 | 1 year         | 2023-08-22     | WZ-AC1    |
| Preamplifier       | Agilent      | 83017A     | MRTSUE06076 | 1 year         | 2023-05-08     | WZ-AC1    |
| TRILOG Antenna     | Schwarzbeck  | VULB 9168  | MRTSUE06172 | 1 year         | 2023-06-21     | WZ-AC1    |
| Anechoic Chamber   | TDK          | WZ-AC1     | MRTSUE06212 | 1 year         | 2023-04-21     | WZ-AC1    |
| Thermohygrometer   | testo        | 608-H1     | MRTSUE06403 | 1 year         | 2023-06-06     | WZ-AC1    |
| Signal Analyzer    | Keysight     | N9010B     | MRTSUE06607 | 1 year         | 2023-12-28     | WZ-AC1    |
| Thermohygrometer   | testo        | 608-H1     | MRTSUE11039 | 1 year         | 2023-11-01     | WZ-AC1    |
| Loop Antenna       | Schwarzbeck  | FMZB 1519  | MRTSUE06025 | 1 year         | 2023-09-29     | WZ-AC1    |
| Two-Line V-Network | R&S          | ENV216     | MRTSUE06002 | 1 year         | 2023-06-04     | WZ-SR2    |
| Shielding Room     | MIX-BEP      | WZ-SR2     | MRTSUE06215 | 5 years        | 2026-12-20     | WZ-SR2    |
| Thermohygrometer   | testo        | 608-H1     | MRTSUE06404 | 1 year         | 2023-06-06     | WZ-SR2    |
| EMI Test Receiver  | R&S          | ESR3       | MRTSUE06909 | 1 year         | 2023-10-27     | WZ-SR2    |
| Signal Analyzer    | Keysight     | N9010B     | MRTSUE06457 | 1 year         | 2023-06-04     | WZ-SR5    |
| Thermohygrometer   | testo        | 608-H1     | MRTSUE06402 | 1 year         | 2023-06-06     | WZ-SR5    |
| Shielding Room     | HUAMING      | WZ-SR5     | MRTSUE06442 | N/A            | N/A            | WZ-SR5    |
| USB Power Sensor   | Keysight     | U2021XA    | MRTSUE06446 | 1 year         | 2023-06-04     | WZ-SR5    |
| Attenuator         | MVE          | MVE2213    | MRTSUE11093 | 1 year         | 2023-06-09     | WZ-SR5    |
| Signal Analyzer    | Agilent      | N9020A     | MRTSUE06106 | 1 year         | 2023-04-06     | WZ-SR5    |

| Software             | Version | Function               |
|----------------------|---------|------------------------|
| EMI Software         | V3.0.0  | EMI Test Software      |
| BenchVue Power Meter | 2018.1  | Power                  |
| Controller_MF 7802   | 2.03C   | RE Antenna & Turntable |

## 5. Decision Rules and Measurement Uncertainty

### 5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

### 5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

|   |
|---|
| <b>AC Conducted Emission Measurement</b>  |
| The maximum measurement uncertainty is evaluated as:<br>9kHz~150kHz: 3.58dB<br>150kHz~30MHz: 3.20dB   |
| <b>Radiated Disturbance</b>   |
| The maximum measurement uncertainty is evaluated as:<br>Coaxial: 9kHz~30MHz: 2.59dB<br>Coplanar: 9kHz~30MHz: 2.60dB<br>Horizontal: 30MHz~200MHz: 3.85dB<br>200MHz~1GHz: 4.36dB<br>1GHz~10GHz: 4.98dB<br>Vertical: 30MHz~200MHz: 4.06dB<br>200MHz~1GHz: 5.28dB<br>1GHz~10GHz: 4.91dB |
| <b>Spurious Emissions, Conducted</b>  |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>2.30dB  |
| <b>Output Power</b>   |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>2.30dB  |
| <b>Occupied Bandwidth</b>   |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>3.20%   |



## 6. Test Result

### 6.1. Summary

| FCC Section(s)    | Test Description   | Test Condition | Verdict |
|-------------------|--|----------------|---------|
| 15.247(a)(1)      | 20dB Bandwidth   | Conducted      | Pass    |
| 15.247(b)(1)      | Peak Transmitter Output Power                                      |                | Pass    |
| 15.247(a)(1)      | Channel Separation   |                | Pass    |
| 15.247(a)(1)(iii) | Number of Channels   |                | Pass    |
| 15.247(a)(1)(iii) | Time of Occupancy  |                | Pass    |
| 15.247(d)         | Band Edge / Out- of-Band Emissions                                 |                | Pass    |
| 15.205, 15.209    | General Field Strength<br>(Restricted Bands and Radiated Emission) | Radiated       | Pass    |
| 15.207            | AC Conducted Emissions 150kHz - 30MHz                              | Line Conducted | Pass    |

#### Notes:

1. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.

## 6.2. 20dB Bandwidth Measurement

### 6.2.1. Test Limit

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

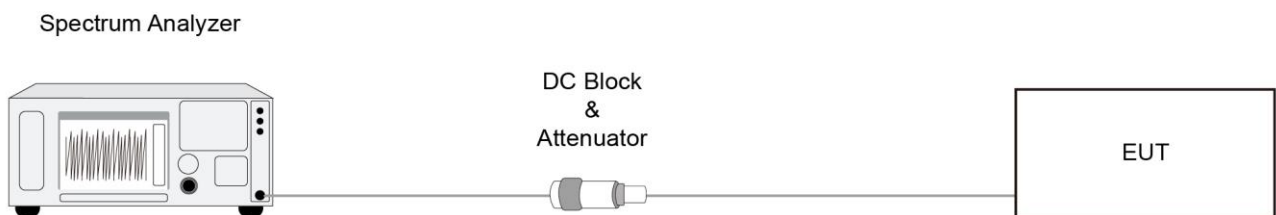
### 6.2.2. Test Procedure

ANSI C63.10-2013 - Section 6.9.2 (20dB Bandwidth)

### 6.2.3. Test Setting

1. Set RBW = 1% to 5% of the 20dB bandwidth
2. VBW = approximately three times RBW
3. Span = approximately 2 to 5 times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

### 6.2.4. Test Setup



### 6.2.5. Test Result

Refer to Appendix A.2.

### 6.3. Output Power Measurement

#### 6.3.1. Test Limit

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels

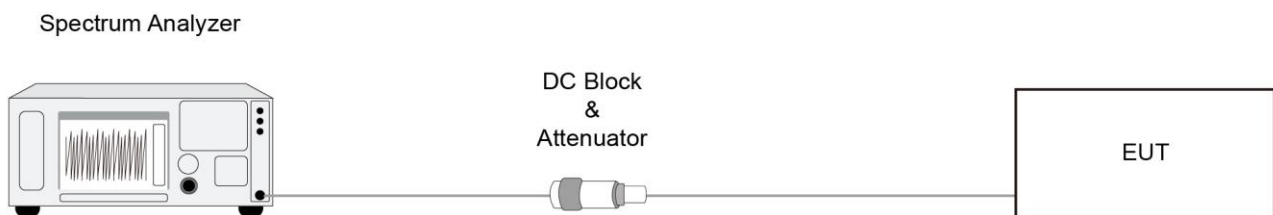
#### 6.3.2. Test Procedure

ANSI C63.10-2013 - Section 7.8.5

#### 6.3.3. Test Setting

1. Set RBW  $\geq$  the 20 dB bandwidth of the emission being measured.
2. VBW  $\geq$  RBW
3. Span = approximately five times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize, Use the marker-to-peak function to set the marker to the peak of the emission.  
The indicated level is the peak output power (don't forget added the external attenuation and cable loss)

#### 6.3.4. Test Setup



#### 6.3.5. Test Result

Refer to Appendix A.3.

## 6.4. Carrier Frequency Separation Measurement

### 6.4.1. Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

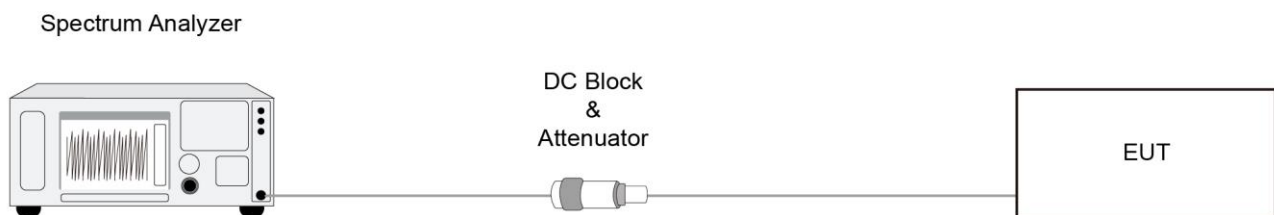
### 6.4.2. Test Procedure

ANSI C63.10-2013 - Section 7.8.2.

#### 6.4.3. Test Setting

1. Span = wide enough to capture the peaks of two adjacent channels.
2. Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. VBW  $\geq$  RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allowed the trace to stabilize
8. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

#### 6.4.4. Test Setup



#### 6.4.5. Test Result

Refer to Appendix A.4.

## 6.5. Number of Hopping Channels Measurement

### 6.5.1. Test Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

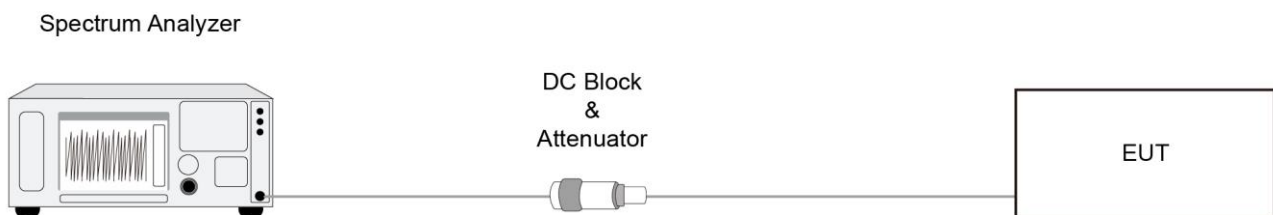
### 6.5.2. Test Procedure

ANSI C63.10-2013 - Section 7.8.3.

### 6.5.3. Test Setting

1. Span = the frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. VBW  $\geq$  RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allow the trace to stabilize

### 6.5.4. Test Setup



### 6.5.5. Test Result

Refer to Appendix A.5.

## 6.6. Time of Occupancy Measurement

### 6.6.1. Test Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

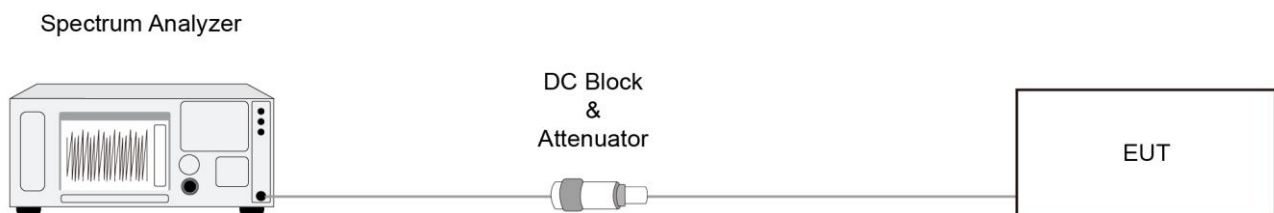
### 6.6.2. Test Procedure

ANSI C63.10-2013 - Section 7.8.4.

### 6.6.3. Test Setting

1. Span = zero span, centered on a hopping channel.
2. RBW shall be  $\leq$  channel spacing and where possible RBW should be set  $\gg 1 / T$ , where T is the expected dwell time per channel.
3. VBW  $\geq$  RBW
4. Sweep time = as necessary to capture the entire dwell time per hopping channel
5. Detector = Peak
6. Trace mode = max hold
7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

### 6.6.4. Test Setup



### 6.6.5. Test Result

Refer to Appendix A.6.

## 6.7. Band-edge Compliance Measurement

### 6.7.1. Test Limit

The maximum permissible emission level is 20dBc. Any emissions were lying outside of the emission bandwidth and in authorized band edges to a field strength limit specified in Section 15.209 of the Title 47 CFR.

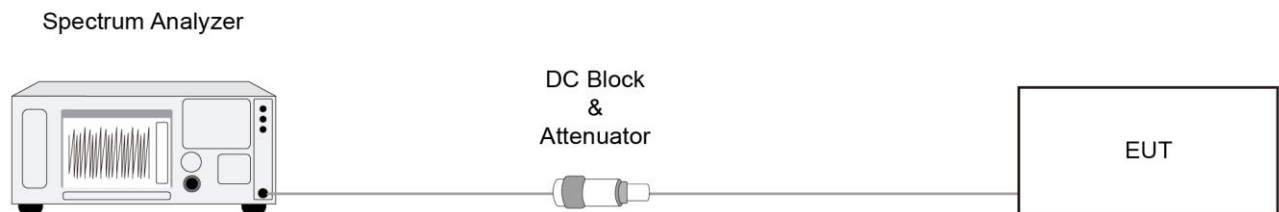
### 6.7.2. Test Procedure

ANSI C63.10-2013 - Section 6.10.4.

### 6.7.3. Test Setting

1. Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.

### 6.7.4. Test Setup



### 6.7.5. Test Result

Refer to Appendix A.7.

## 6.8. Conducted Spurious Emissions Measurement

### 6.8.1. Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

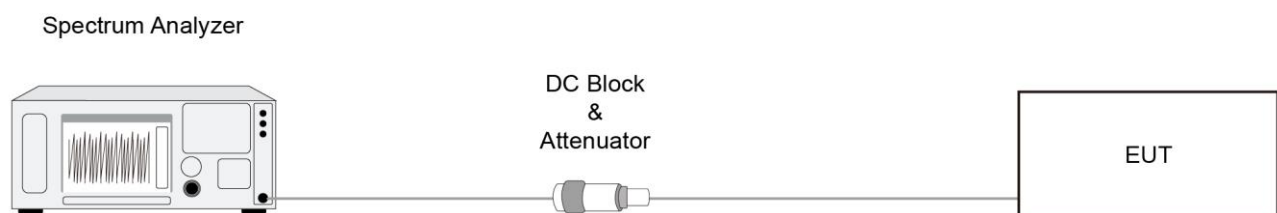
### 6.8.2. Test Procedure

ANSI C63.10-2013 - Section 7.8.8.

### 6.8.3. Test Setting

1. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

### 6.8.4. Test Setup





### **6.8.5. Test Result**

Refer to Appendix A.8.

## 6.9. Radiated Spurious Emission Measurement

### 6.9.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

| FCC Part 15 Subpart C Paragraph 15.209 |                          |                               |
|--|--------------------------|-------------------------------|
| Frequency<br>[MHz]                     | Field Strength<br>[uV/m] | Measured Distance<br>[Meters] |
| 0.009 - 0.490                          | 2400/F (kHz)             | 300                           |
| 0.490 - 1.705                          | 24000/F (kHz)            | 30                            |
| 1.705 - 30                             | 30                       | 30                            |
| 30 - 88                                | 100                      | 3                             |
| 88 - 216                               | 150                      | 3                             |
| 216 - 960                              | 200                      | 3                             |
| Above 960                              | 500                      | 3                             |

### 6.9.2. Test Procedure

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

### 6.9.3. Test Setting

**Table 1 - RBW as a function of frequency**

| Frequency     | RBW           |
|---------------|---------------|
| 9 ~ 150 kHz   | 200 ~ 300 Hz  |
| 0.15 ~ 30 MHz | 9 ~ 10 kHz    |
| 30 ~ 1000 MHz | 100 ~ 120 kHz |
| > 1000 MHz    | 1 MHz         |

**Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

**Peak Measurements above 1GHz**

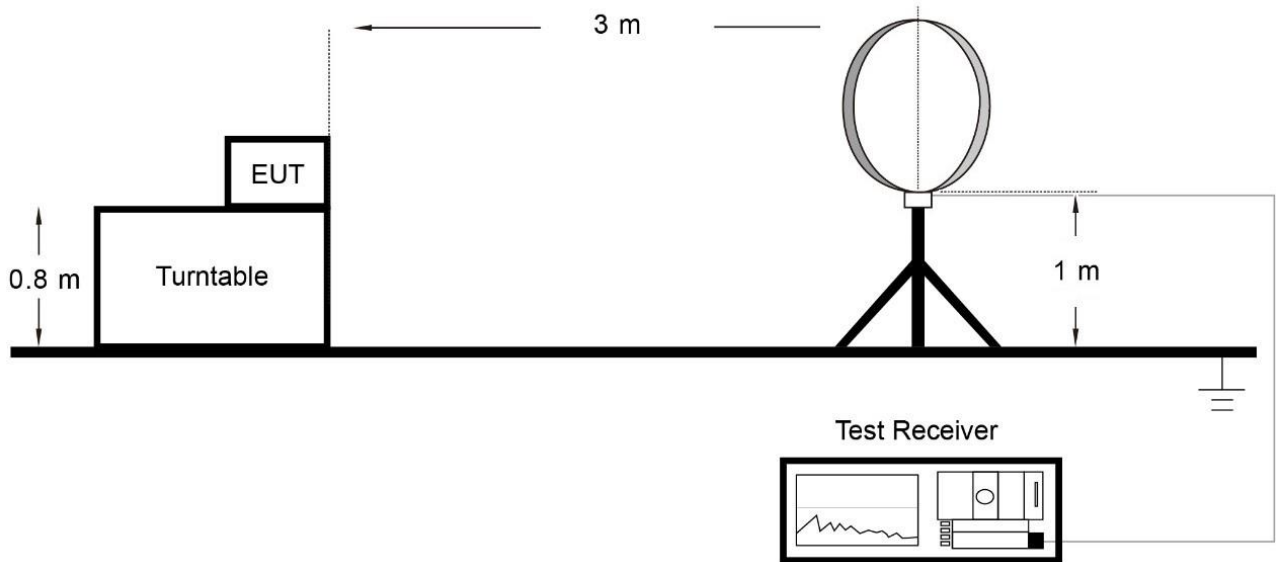
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Average Measurements above 1GHz (Method VB)**

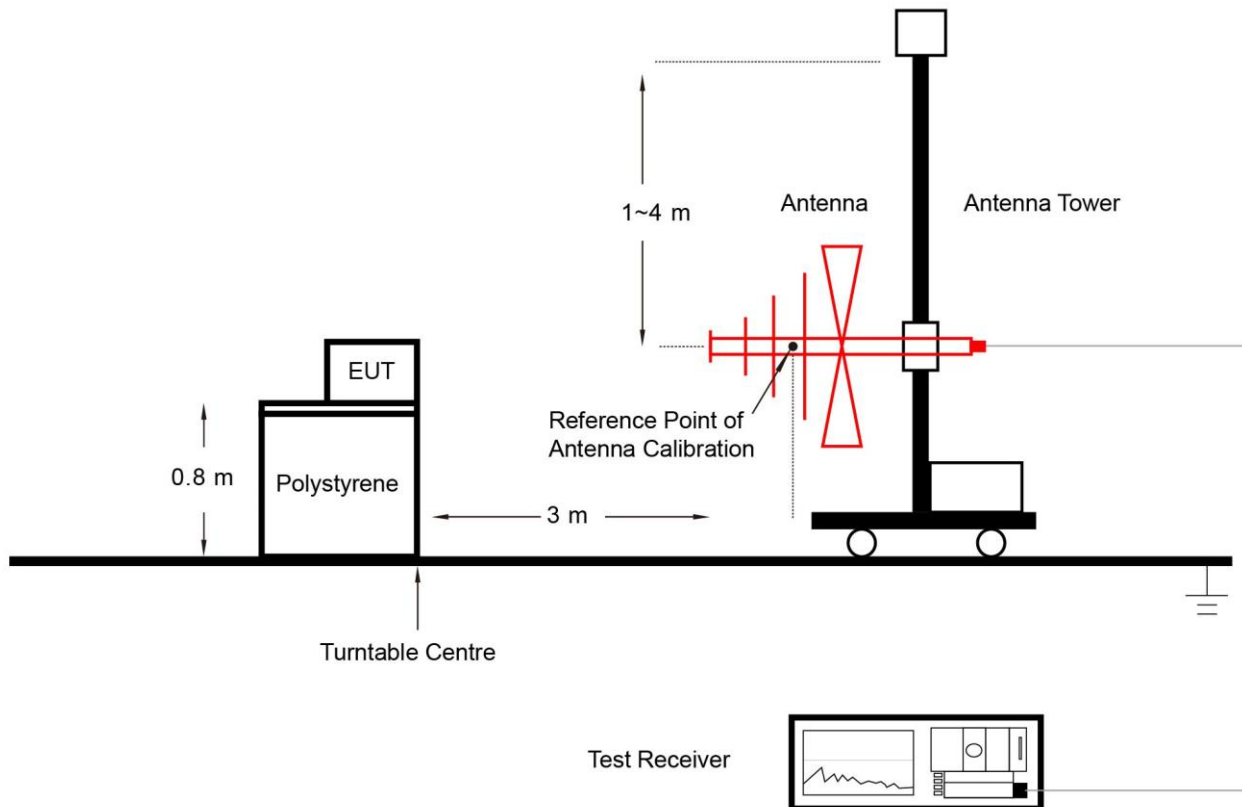
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10 Hz.  
If the EUT duty cycle is  $< 98\%$ , set VBW  $\geq 1/T$ . T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

### 6.9.4. Test Setup

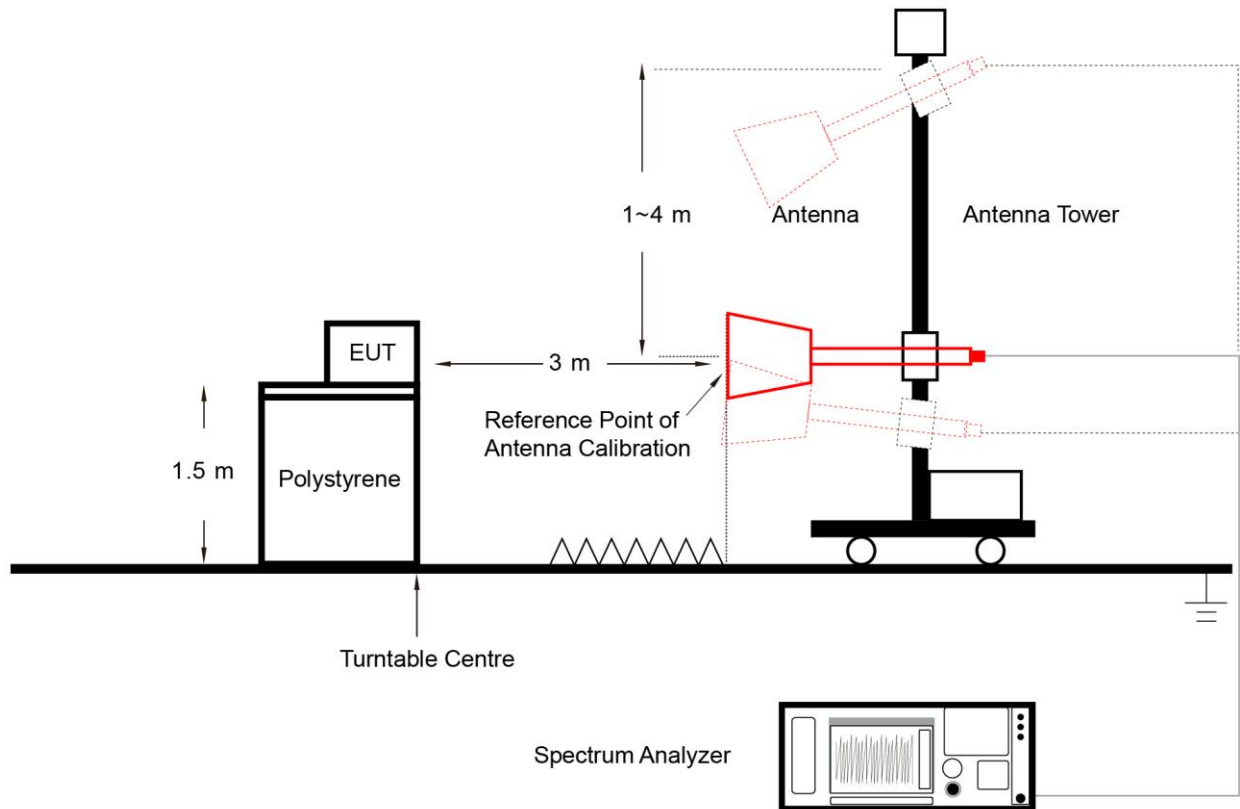
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



**6.9.5. Test Result**

Refer to Appendix A.9.

## 6.10. AC Conducted Emissions Measurement

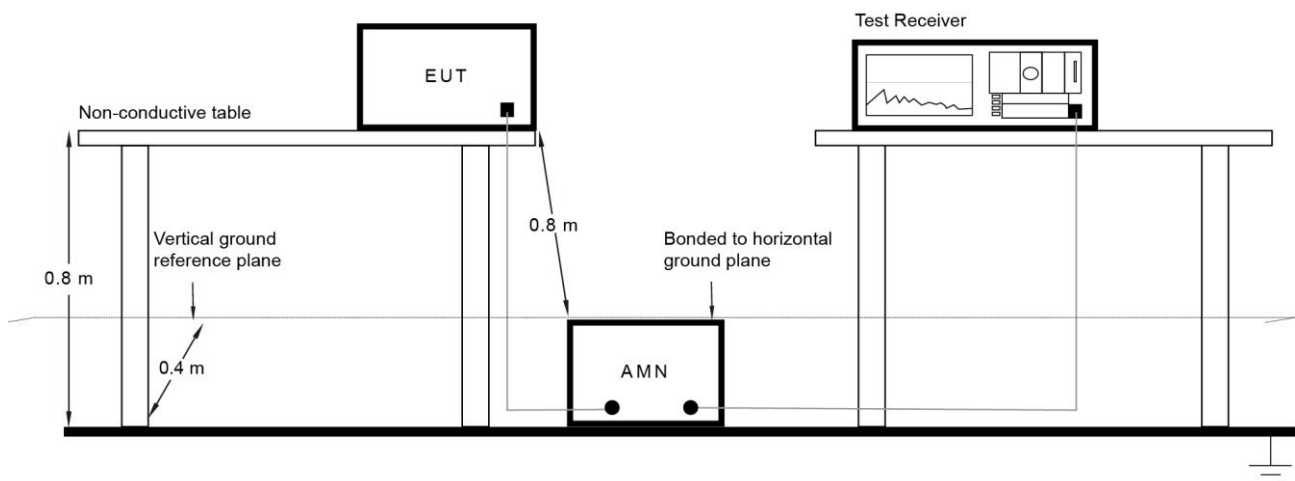
### 6.10.1. Test Limit

| FCC Part 15 Subpart C Paragraph 15.207 Limits |                 |                      |
|---|-----------------|----------------------|
| Frequency (MHz)                               | QP (dB $\mu$ V) | Average (dB $\mu$ V) |
| 0.15 - 0.50                                   | 66 - 56         | 56 - 46              |
| 0.50 - 5.0                                    | 56              | 46                   |
| 5.0 - 30                                      | 60              | 50                   |

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 6.10.2. Test Setup



### 6.10.3. Test Result

Refer to Appendix A.10.

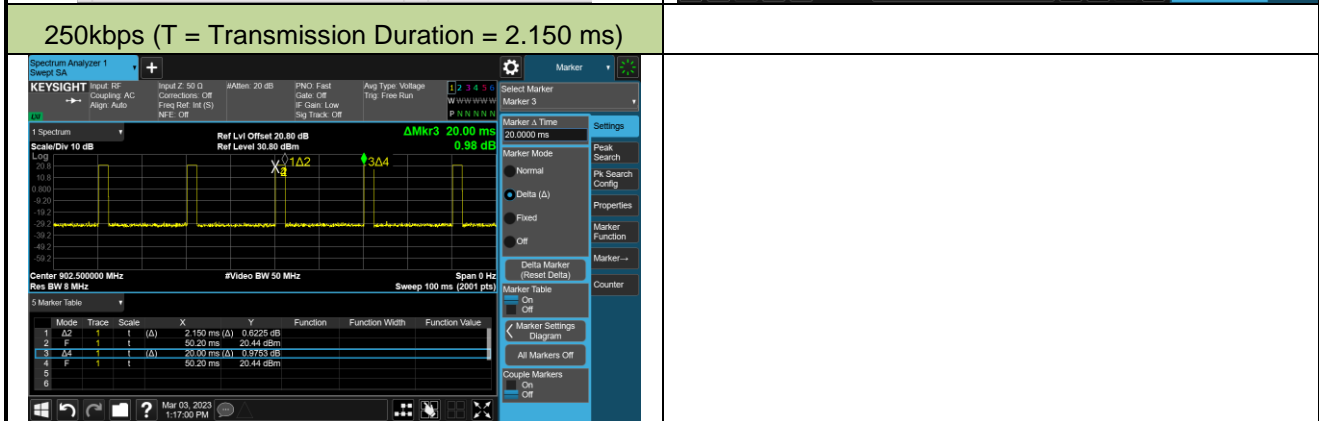
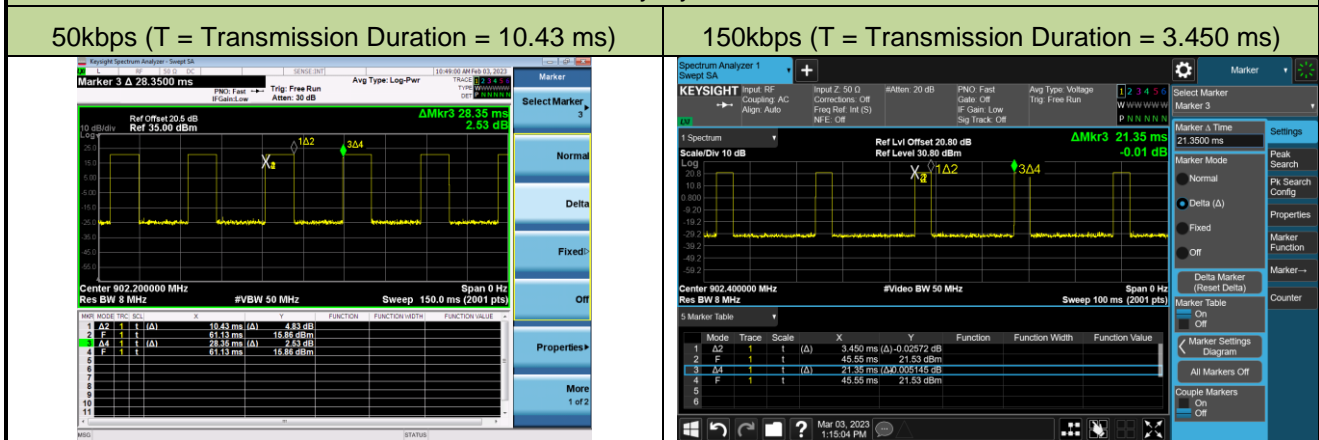
## Appendix A - Test Result

### A.1 Duty Cycle Test Result

|           |                         |               |           |
|-----------|-------------------------|---------------|-----------|
| Test Site | WZ-SR5                  | Test Engineer | Lynn Yang |
| Test Date | 2023-02-03 ~ 2023-03-03 |               |           |

| Duty Cycle |        |
|------------|--------|
| 50kbps     | 36.79% |
| 150kbps    | 16.16% |
| 250kbps    | 10.75% |

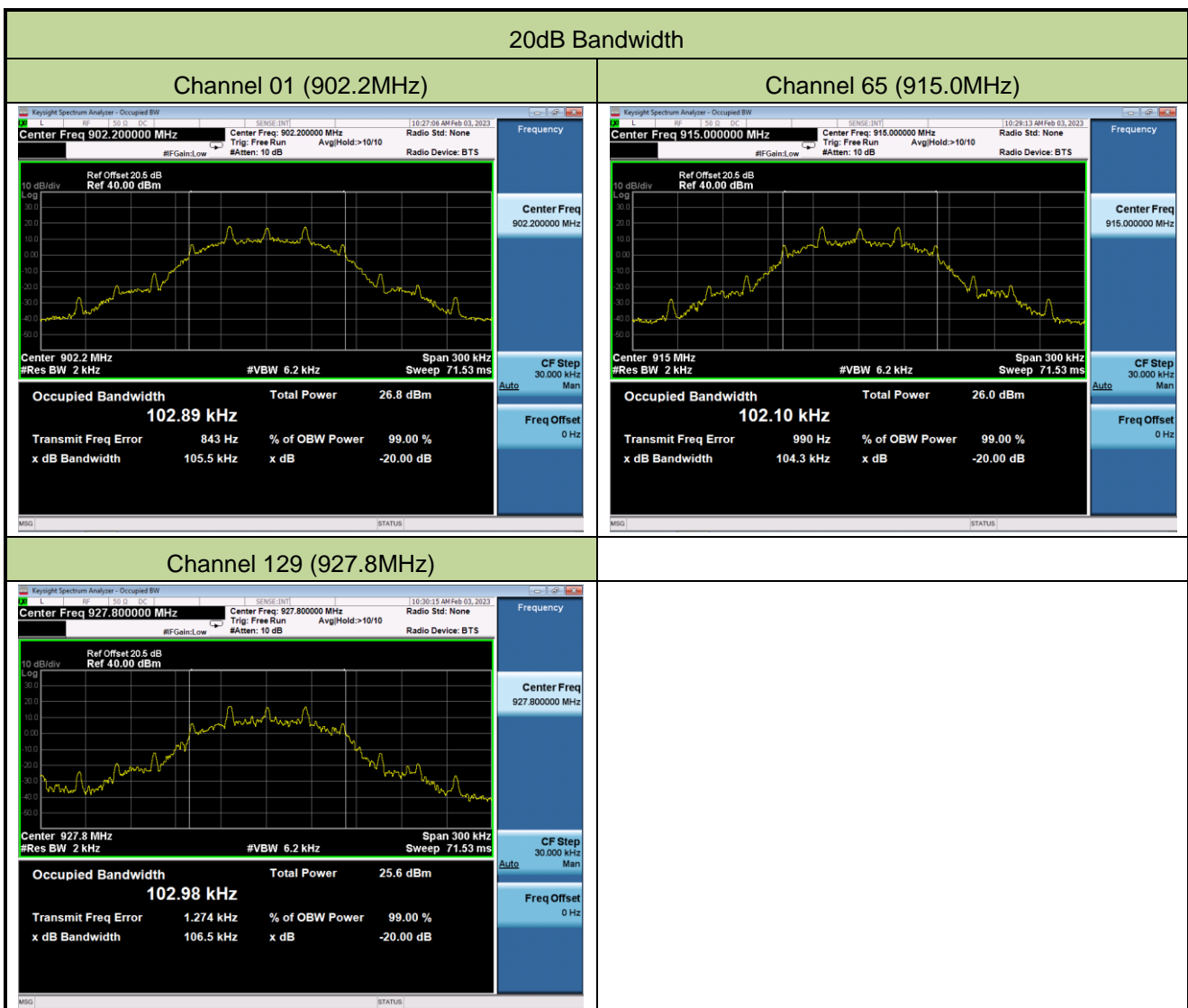
| Duty Cycle |  |
|------------|--|
|------------|--|



**A.2 20dB Bandwidth Test Result**

|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-02-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 50kbps     |                   |            |

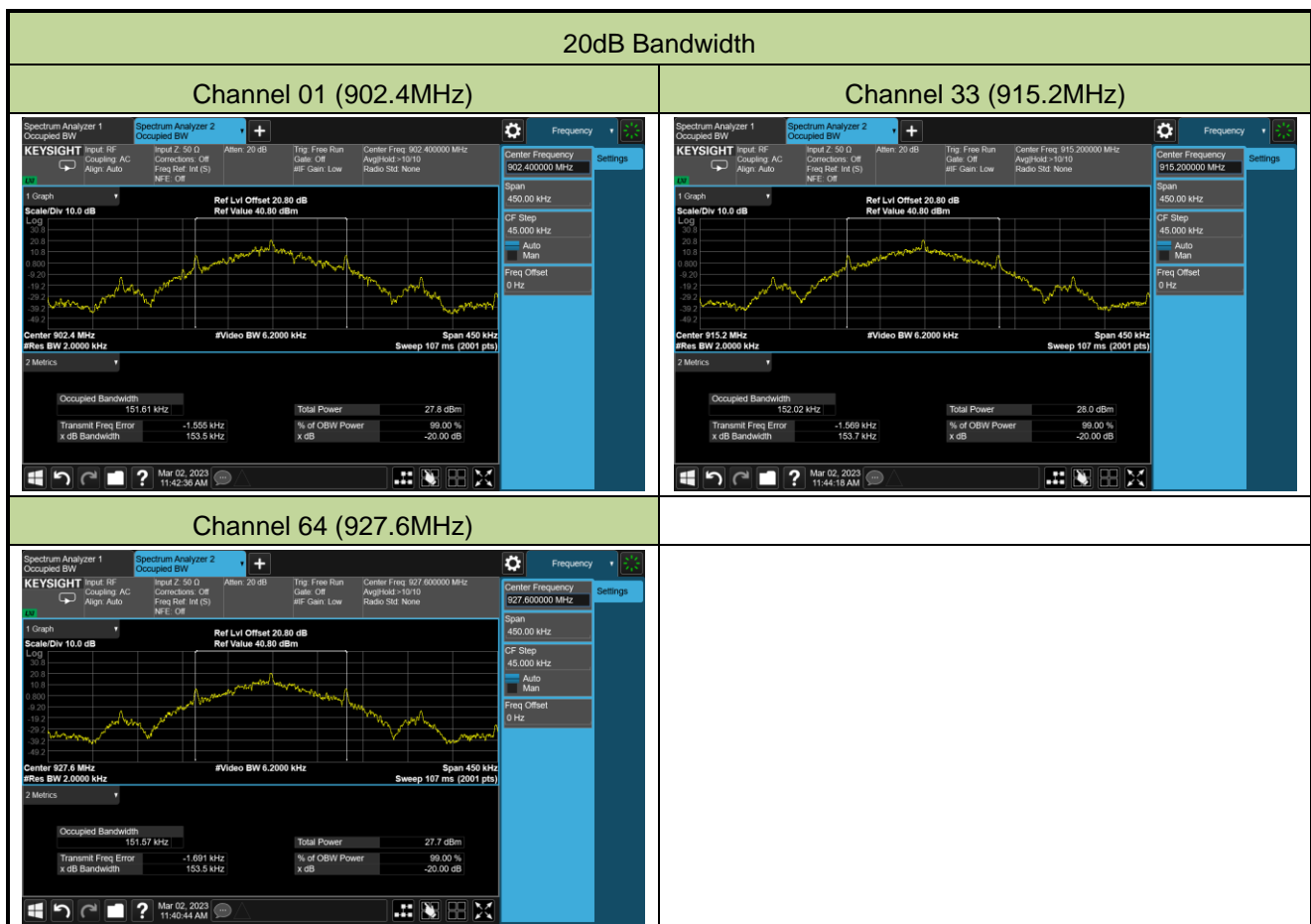
| Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | Limit (kHz) |
|-------------|-----------------|----------------------|-------------|
| 01          | 902.2           | 105.5                | ≤ 500       |
| 65          | 915.0           | 104.3                | ≤ 500       |
| 129         | 927.8           | 106.5                | ≤ 500       |





|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-02 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 150kbps    |                   |            |

| Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | Limit (kHz) |
|-------------|-----------------|----------------------|-------------|
| 01          | 902.4           | 153.5                | ≤ 500       |
| 33          | 915.2           | 153.7                | ≤ 500       |
| 64          | 927.6           | 153.5                | ≤ 500       |



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-02 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 250kbps    |                   |            |

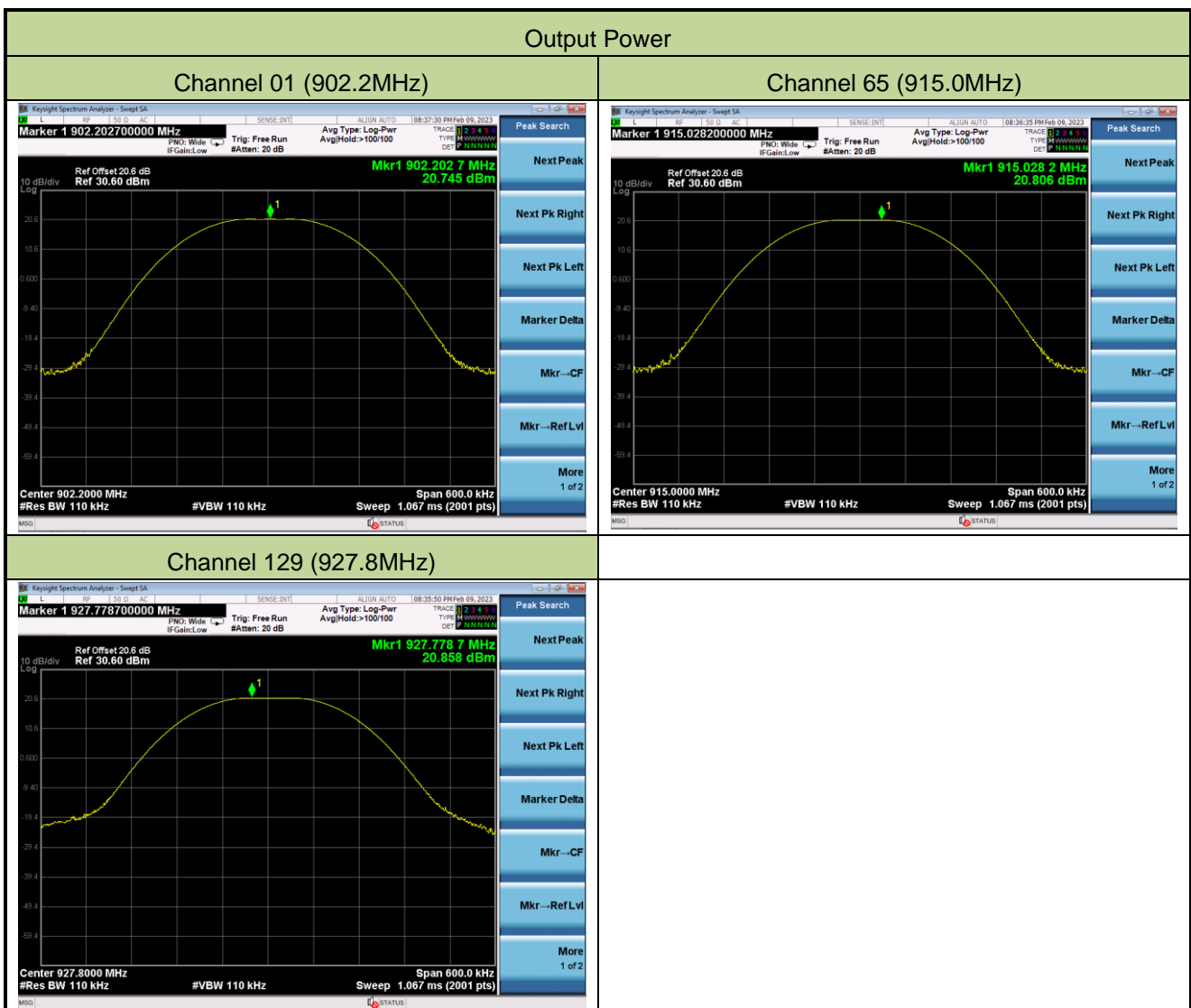
| Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | Limit (kHz) |
|-------------|-----------------|----------------------|-------------|
| 01          | 902.5           | 112.1                | ≤ 500       |
| 26          | 915.0           | 113.6                | ≤ 500       |
| 51          | 927.5           | 115.1                | ≤ 500       |



### A.3 Output Power Test Result

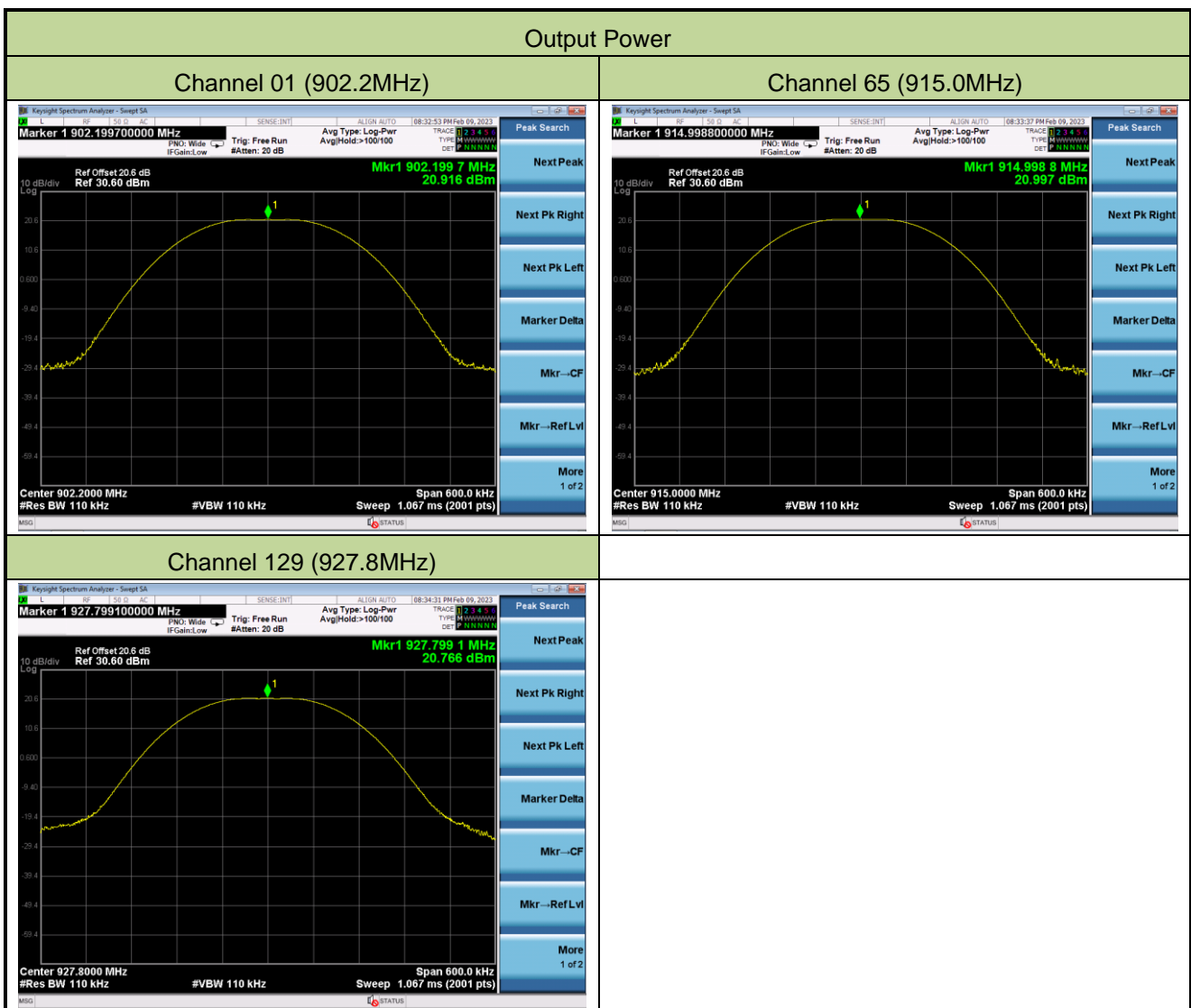
|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-02-09 | Duplexer Type No. | KG100SABMD |
| Data Rate | 50kbps     |                   |            |

| Channel No. | Frequency (MHz) | Output Power (dBm) | Power Limit (dBm) |
|-------------|-----------------|--------------------|-------------------|
| 01          | 902.2           | 20.745             | ≤ 30.00           |
| 65          | 915.0           | 20.806             | ≤ 30.00           |
| 129         | 927.8           | 20.858             | ≤ 30.00           |



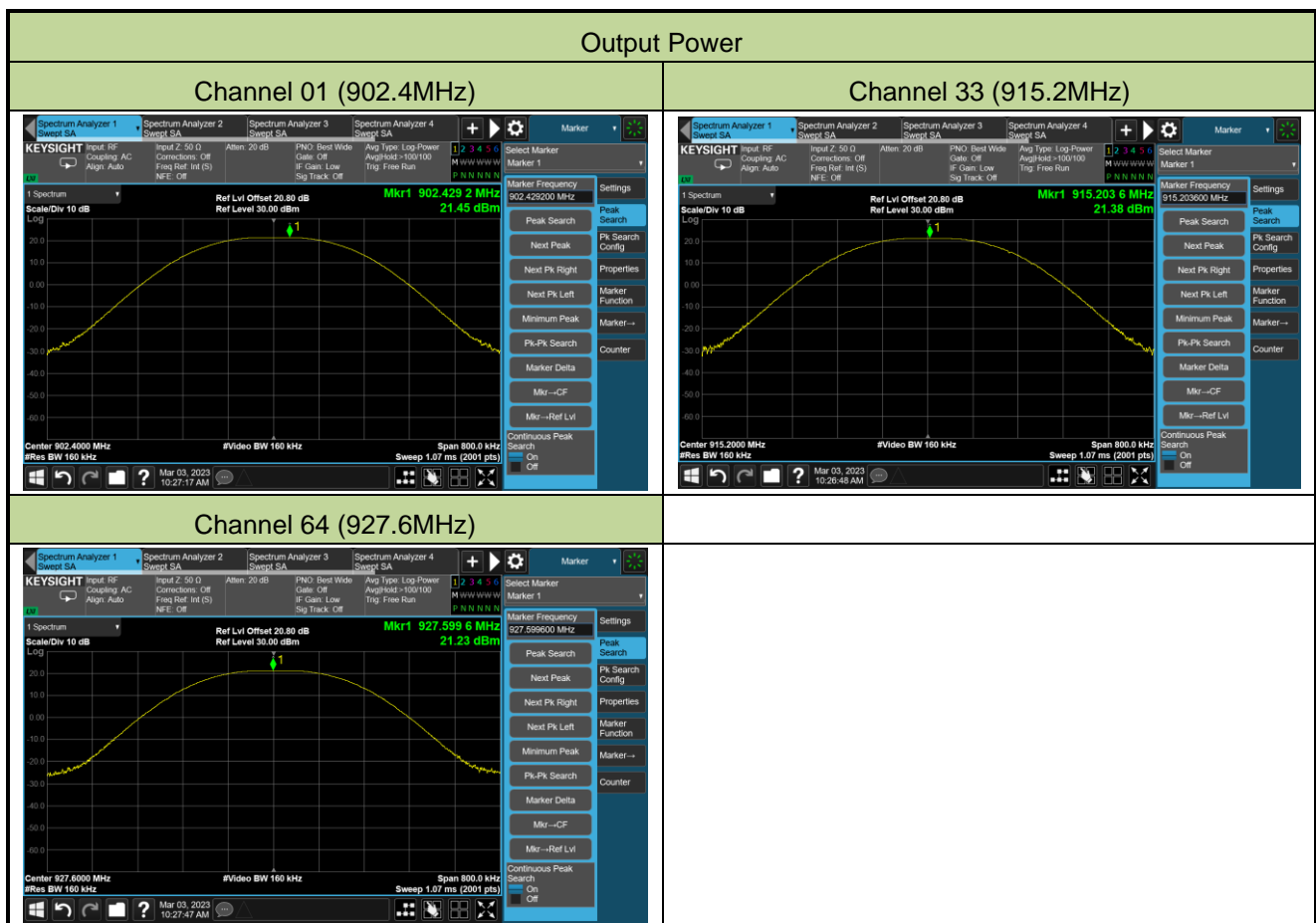
|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-02-09 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 50kbps     |                   |            |

| Channel No. | Frequency (MHz) | Output Power (dBm) | Power Limit (dBm) |
|-------------|-----------------|--------------------|-------------------|
| 01          | 902.2           | 20.916             | ≤ 30.00           |
| 65          | 915.0           | 20.997             | ≤ 30.00           |
| 129         | 927.8           | 20.766             | ≤ 30.00           |



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-03 | Duplexer Type No. | KG100SABMD |
| Data Rate | 150kbps    |                   |            |

| Channel No. | Frequency (MHz) | Output Power (dBm) | Power Limit (dBm) |
|-------------|-----------------|--------------------|-------------------|
| 01          | 902.4           | 21.45              | ≤ 30.00           |
| 33          | 915.2           | 21.38              | ≤ 30.00           |
| 64          | 927.6           | 21.23              | ≤ 30.00           |



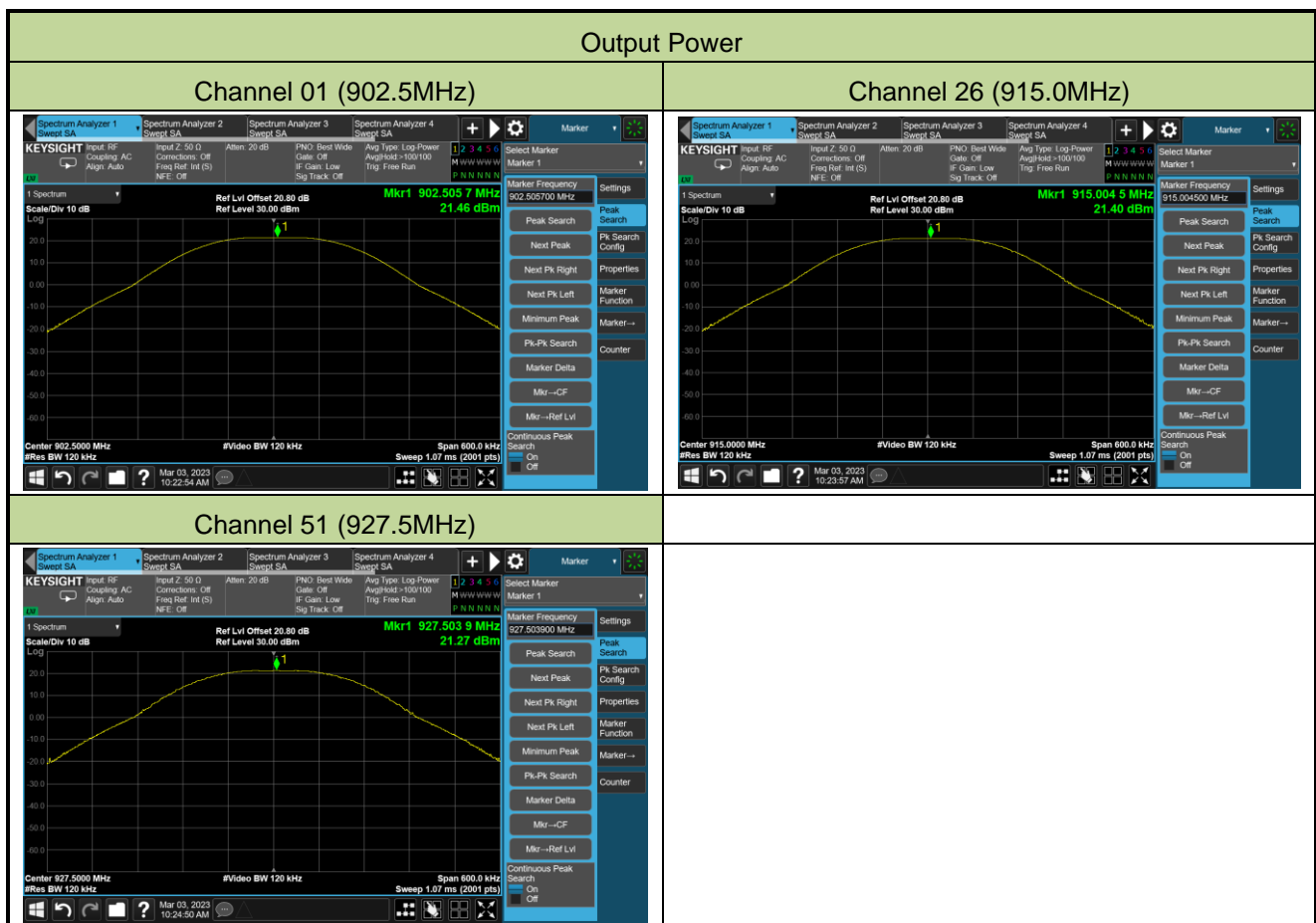
|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-02 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 150kbps    |                   |            |

| Channel No. | Frequency (MHz) | Output Power (dBm) | Power Limit (dBm) |
|-------------|-----------------|--------------------|-------------------|
| 01          | 902.4           | 21.61              | ≤ 30.00           |
| 33          | 915.2           | 21.70              | ≤ 30.00           |
| 64          | 927.6           | 21.47              | ≤ 30.00           |



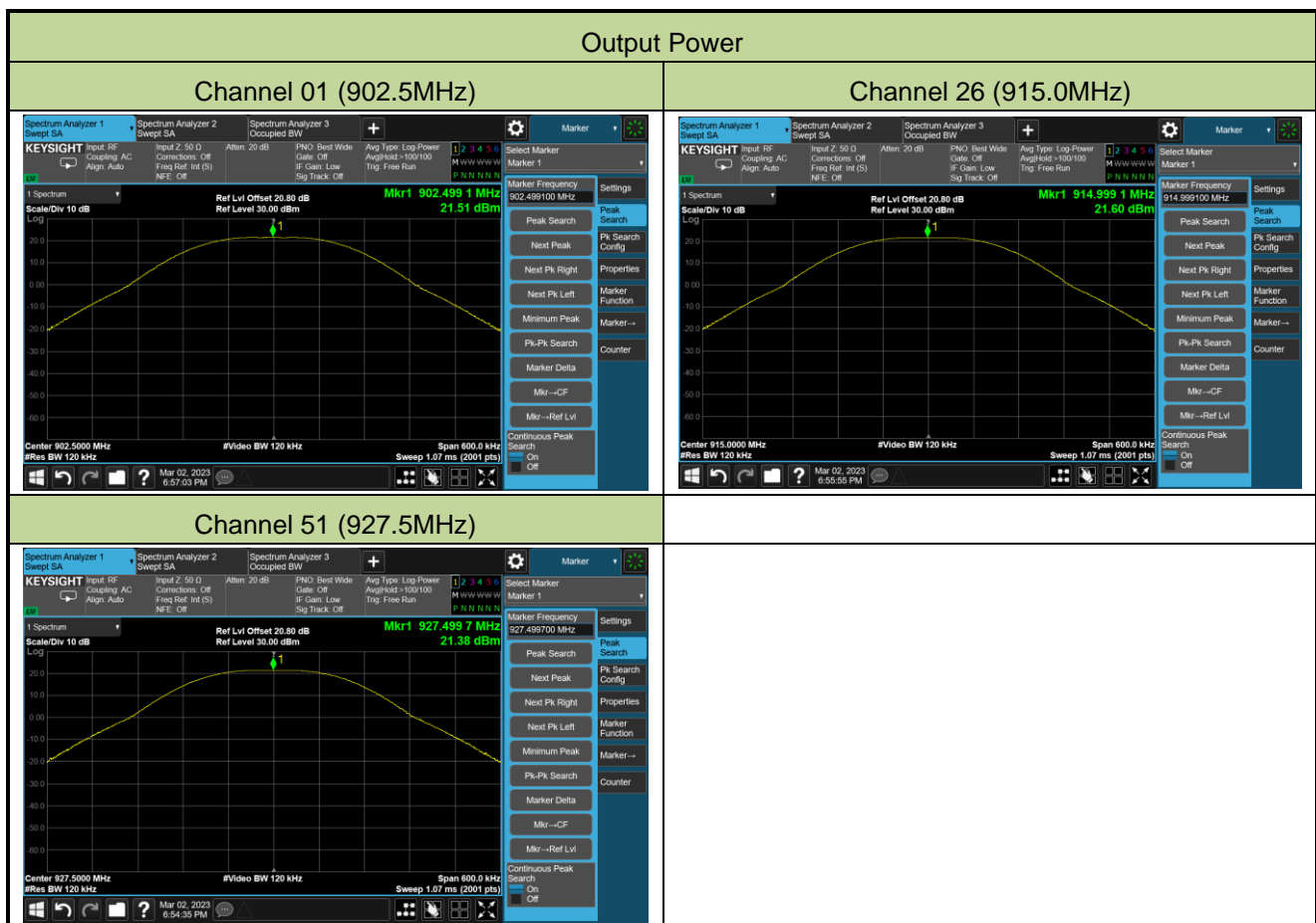
|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-03 | Duplexer Type No. | KG100SABMD |
| Data Rate | 250kbps    |                   |            |

| Channel No. | Frequency (MHz) | Output Power (dBm) | Power Limit (dBm) |
|-------------|-----------------|--------------------|-------------------|
| 01          | 902.5           | 21.46              | ≤ 30.00           |
| 26          | 915.0           | 21.40              | ≤ 30.00           |
| 51          | 927.5           | 21.27              | ≤ 30.00           |



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-02 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 250kbps    |                   |            |

| Channel No. | Frequency (MHz) | Output Power (dBm) | Power Limit (dBm) |
|-------------|-----------------|--------------------|-------------------|
| 01          | 902.5           | 21.51              | ≤ 30.00           |
| 26          | 915.0           | 21.60              | ≤ 30.00           |
| 51          | 927.5           | 21.38              | ≤ 30.00           |



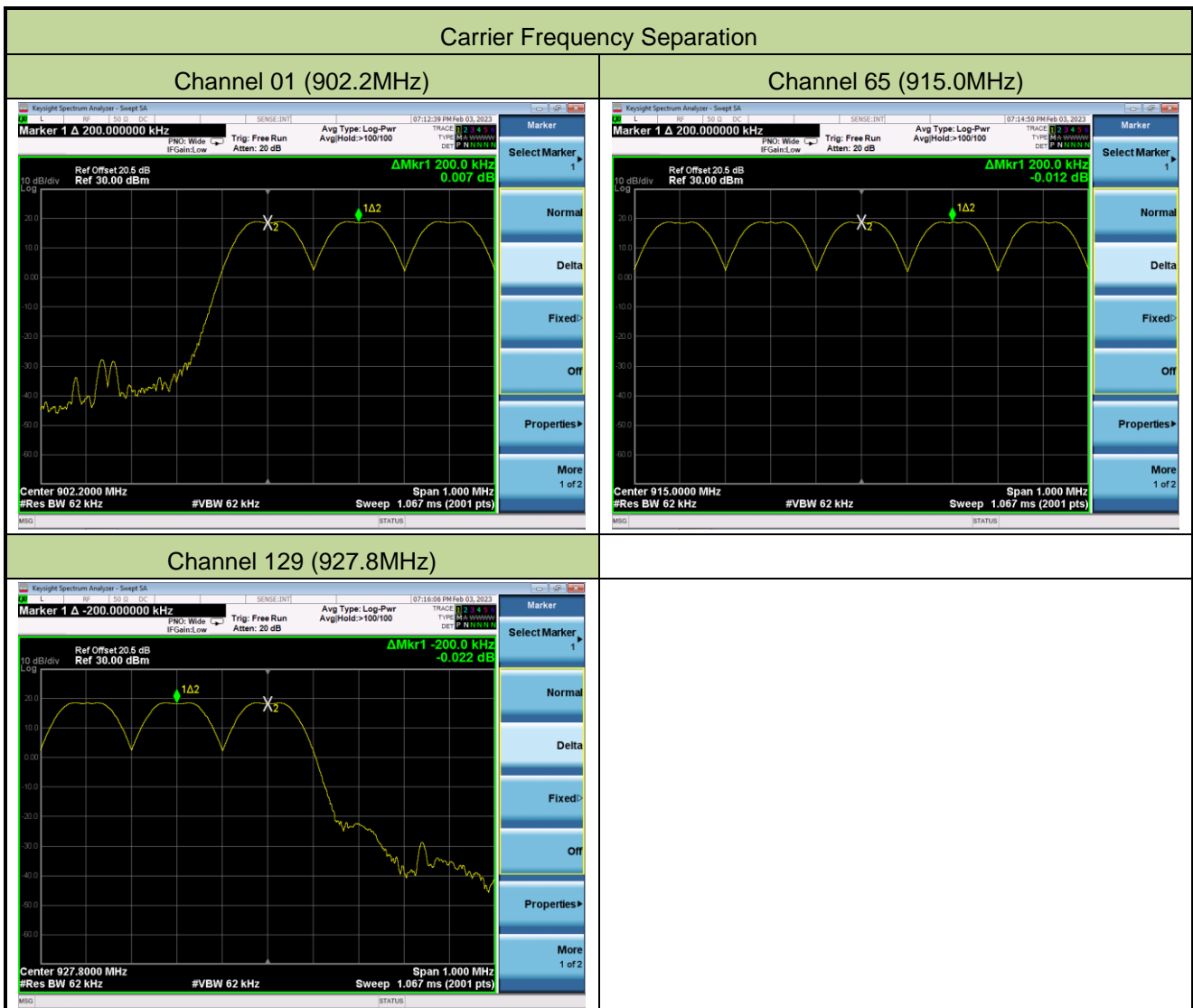


### A.4 Carrier Frequency Separation Test Result

|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-02-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 50kbps     |                   |            |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------------|-------------|--------|
| 01          | 902.2           | 200                                | ≥105.5      | Pass   |
| 65          | 915.0           | 200                                | ≥104.3      | Pass   |
| 129         | 927.8           | 200                                | ≥106.5      | Pass   |

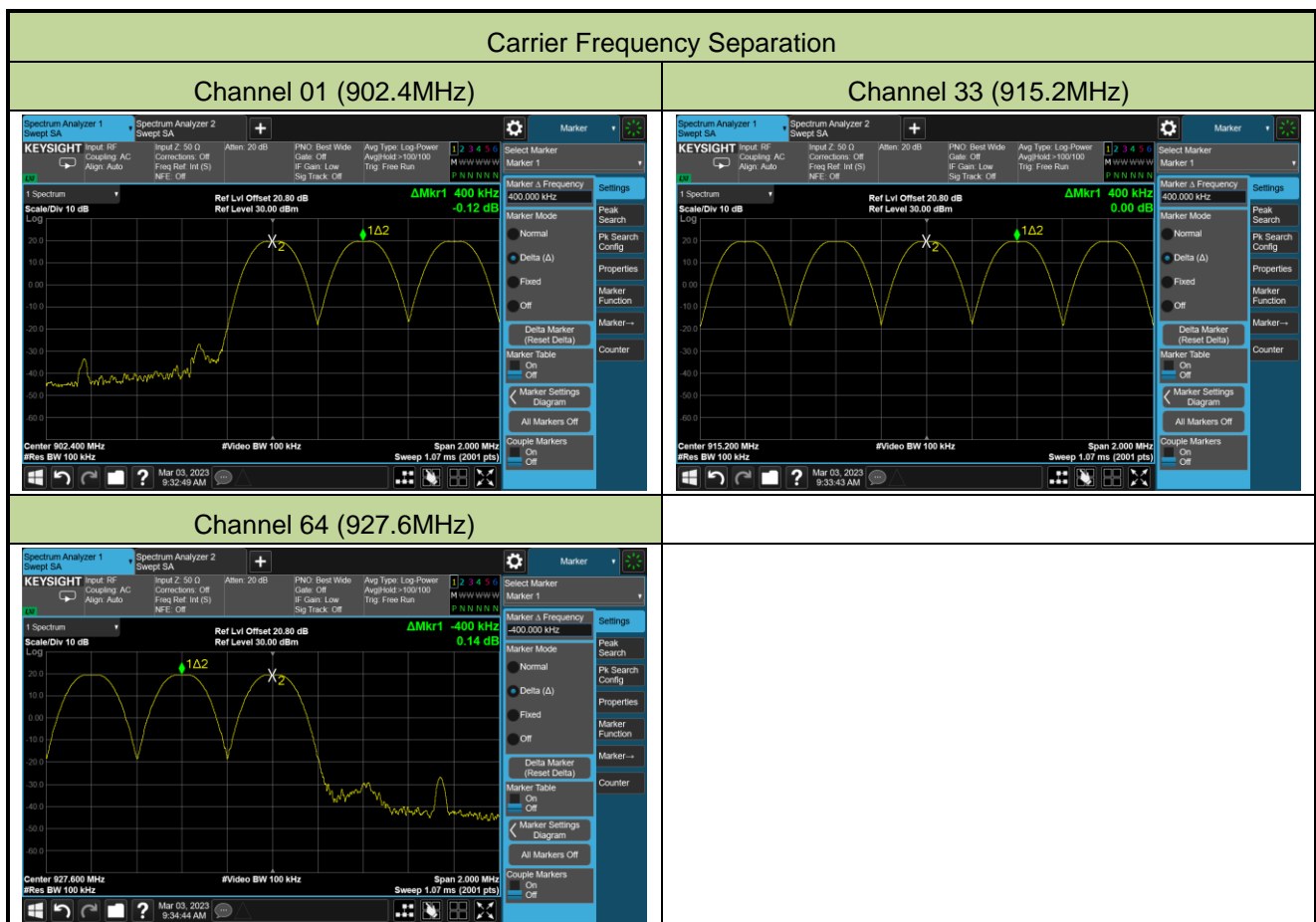
Note: The Limit is the value of the 20dB BW.



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 150kbps    |                   |            |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------------|-------------|--------|
| 01          | 902.4           | 400                                | ≥153.5      | Pass   |
| 33          | 915.2           | 400                                | ≥153.7      | Pass   |
| 64          | 927.6           | 400                                | ≥153.5      | Pass   |

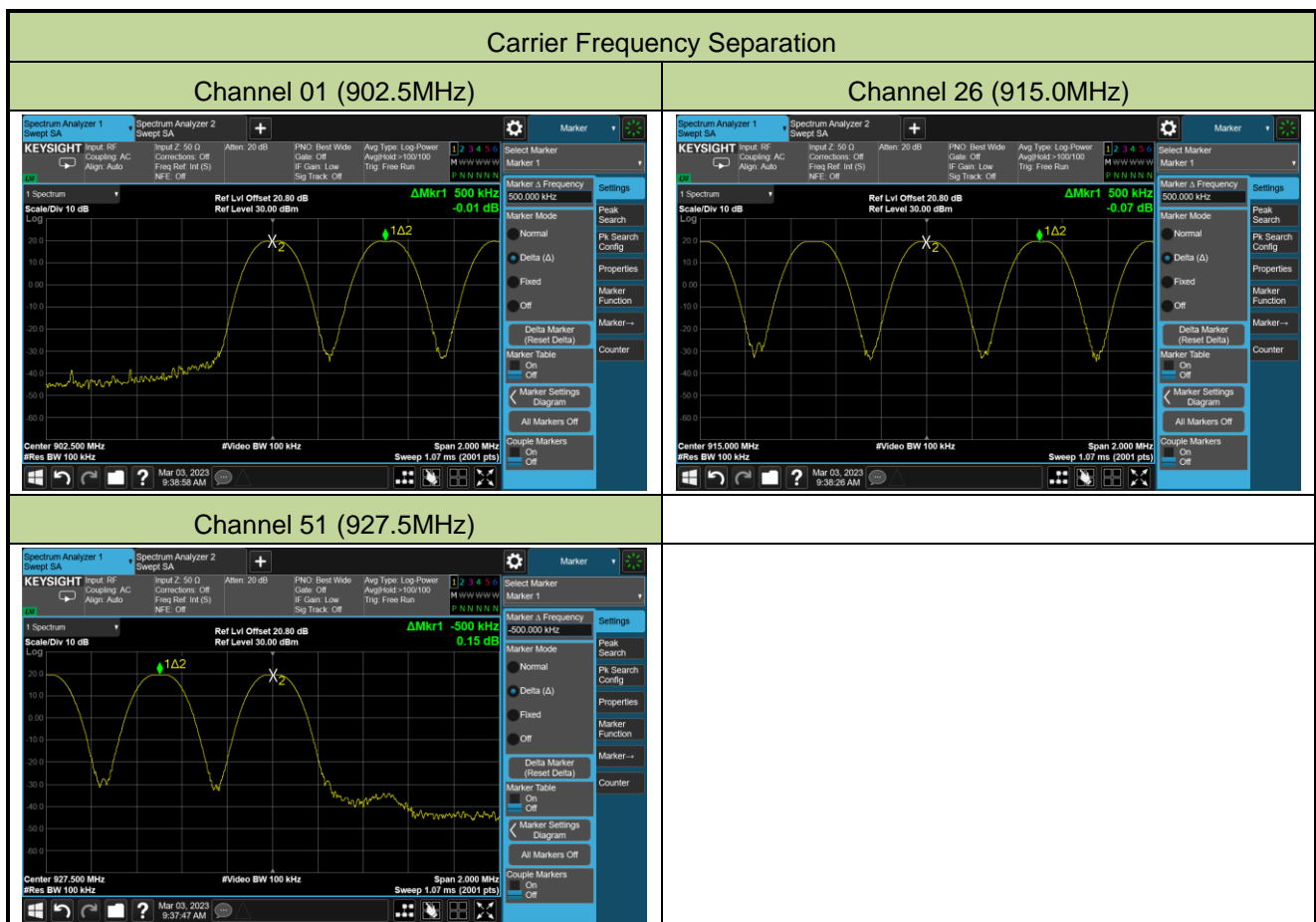
Note: The Limit is the value of the 20dB BW.



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 250kbps    |                   |            |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------------|-------------|--------|
| 01          | 902.5           | 500                                | ≥112.1      | Pass   |
| 26          | 915.0           | 500                                | ≥113.6      | Pass   |
| 51          | 927.5           | 500                                | ≥115.1      | Pass   |

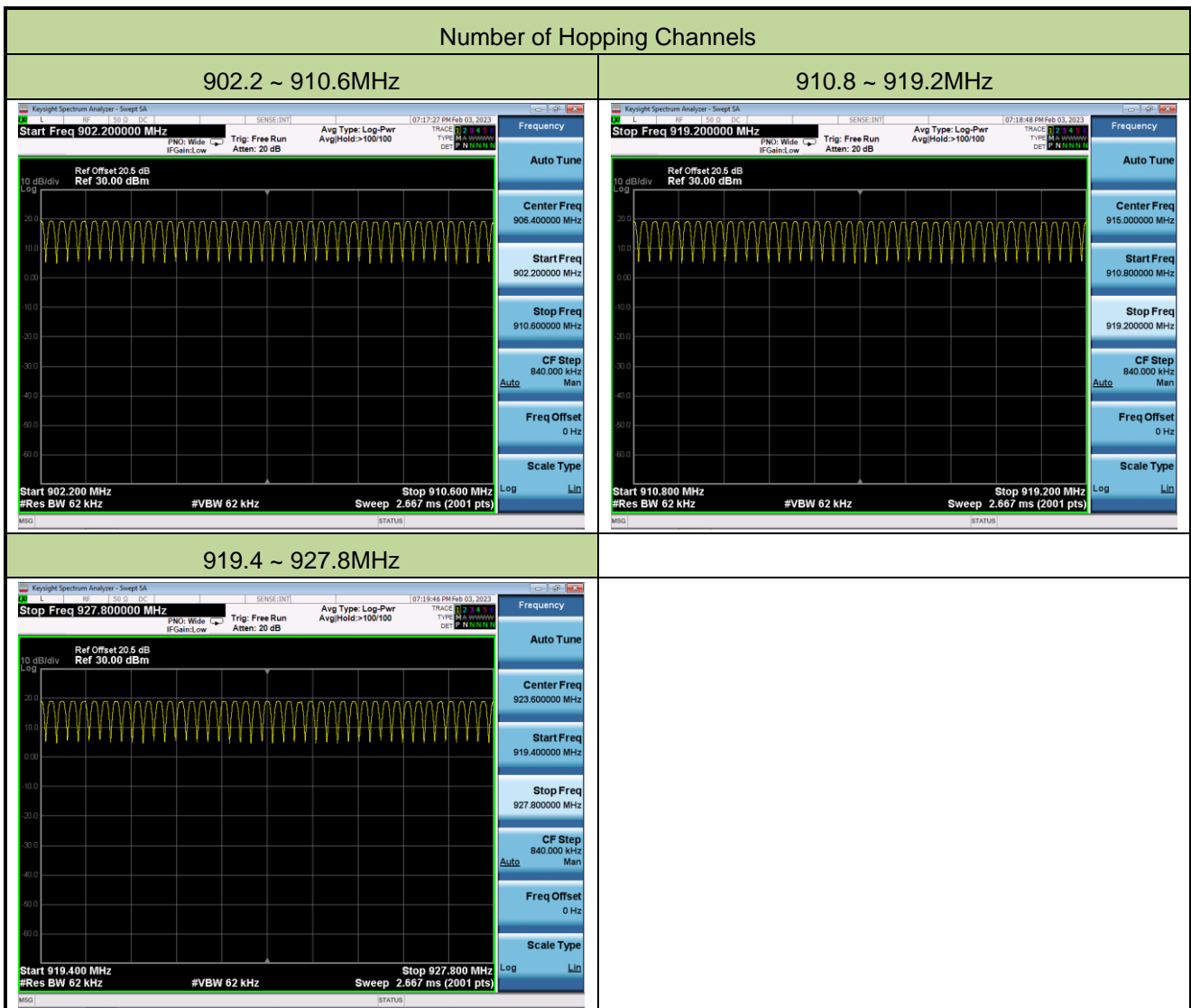
Note: The Limit is the value of the 20dB BW.



**A.5 Number of Hopping Channels Test Result**

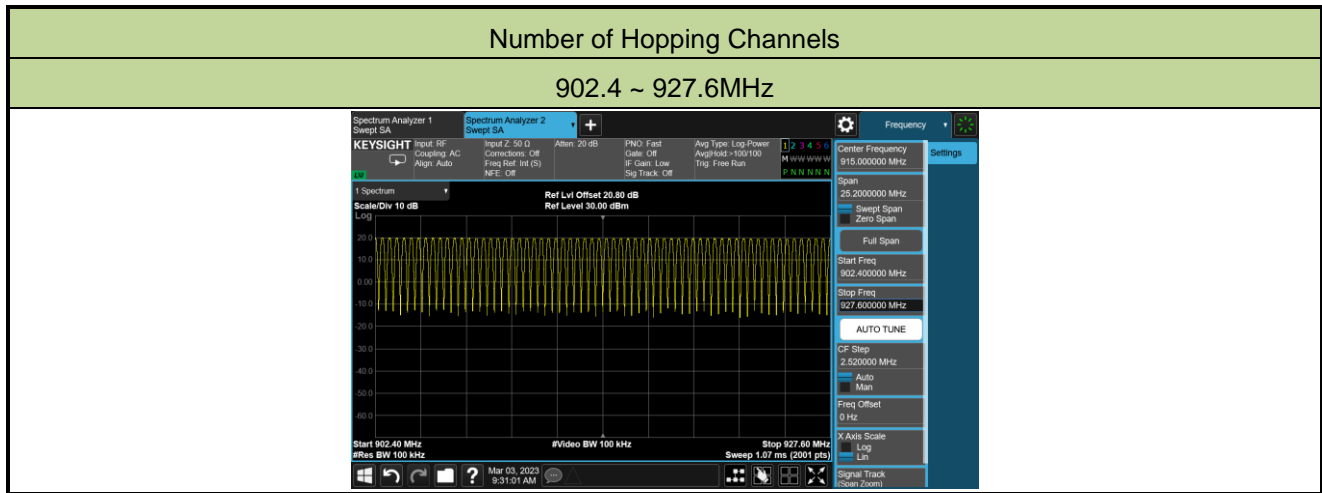
|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-02-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 50kbps     |                   |            |

| Channel Numbers | Frequency (MHz) | Limit (Hopping Channels) | Result |
|-----------------|-----------------|--------------------------|--------|
| 129             | 902.2~927.8     | ≥ 50                     | Pass   |



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 150kbps    |                   |            |

| Channel Numbers | Frequency (MHz) | Limit (Hopping Channels) | Result |
|-----------------|-----------------|--------------------------|--------|
| 64              | 902.4~927.6     | ≥ 50                     | Pass   |



|           |            |                   |            |
|-----------|------------|-------------------|------------|
| Test Site | WZ-SR5     | Test Engineer     | Lynn Yang  |
| Test Date | 2023-03-03 | Duplexer Type No. | KG100SAAMD |
| Data Rate | 250kbps    |                   |            |

| Channel Numbers | Frequency (MHz) | Limit (Hopping Channels) | Result |
|-----------------|-----------------|--------------------------|--------|
| 51              | 902.5~927.5     | ≥ 50                     | Pass   |

