

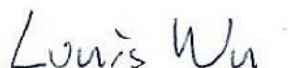


# FCC RADIO TEST REPORT

FCC ID : A4RGB62Z  
Equipment : Phone  
Model Name : GB62Z  
Applicant : Google LLC  
1600 Amphitheatre Parkway,  
Mountain View, California, 94043 USA  
Standard : FCC Part 15 Subpart C §15.247

The product was received on Nov. 11, 2021 and testing was performed from Nov. 15, 2021 to Dec. 20, 2021. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.



Approved by: Louis Wu

**Sporton International Inc. Wensan Laboratory**

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



## Table of Contents

|                                                                 |            |
|-----------------------------------------------------------------|------------|
| <b>History of this test report.....</b>                         | <b>3</b>   |
| <b>Summary of Test Result.....</b>                              | <b>4</b>   |
| <b>1 General Description.....</b>                               | <b>5</b>   |
| 1.1 Product Feature of Equipment Under Test.....                | 5          |
| 1.2 Product Specification of Equipment Under Test.....          | 6          |
| 1.3 Modification of EUT .....                                   | 6          |
| 1.4 Testing Location .....                                      | 7          |
| 1.5 Applicable Standards.....                                   | 7          |
| <b>2 Test Configuration of Equipment Under Test.....</b>        | <b>8</b>   |
| 2.1 Carrier Frequency Channel .....                             | 8          |
| 2.2 Test Mode.....                                              | 9          |
| 2.3 Connection Diagram of Test System.....                      | 10         |
| 2.4 Support Unit used in test configuration and system .....    | 11         |
| 2.5 EUT Operation Test Setup .....                              | 11         |
| 2.6 Measurement Results Explanation Example.....                | 12         |
| <b>3 Test Result.....</b>                                       | <b>13</b>  |
| 3.1 Number of Channel Measurement .....                         | 13         |
| 3.2 Hopping Channel Separation Measurement .....                | 18         |
| 3.3 Dwell Time Measurement.....                                 | 31         |
| 3.4 20dB and 99% Bandwidth Measurement .....                    | 36         |
| 3.5 Output Power Measurement.....                               | 61         |
| 3.6 Conducted Band Edges Measurement.....                       | 62         |
| 3.7 Conducted Spurious Emission Measurement .....               | 79         |
| 3.8 Radiated Band Edges and Spurious Emission Measurement ..... | 104        |
| 3.9 AC Conducted Emission Measurement.....                      | 108        |
| 3.10 Antenna Requirements.....                                  | 110        |
| <b>4 List of Measuring Equipment .....</b>                      | <b>111</b> |
| <b>5 Uncertainty of Evaluation.....</b>                         | <b>113</b> |
| <b>Appendix A. Conducted Test Results</b>                       |            |
| <b>Appendix B. AC Conducted Emission Test Result</b>            |            |
| <b>Appendix C. Radiated Spurious Emission</b>                   |            |
| <b>Appendix D. Radiated Spurious Emission Plots</b>             |            |
| <b>Appendix E. Duty Cycle Plots</b>                             |            |



## History of this test report

| Report No.   | Version | Description                                                | Issue Date    |
|--------------|---------|------------------------------------------------------------|---------------|
| FR161608-03A | 01      | Initial issue of report                                    | Jan. 26, 2022 |
| FR161608-03A | 02      | 1. Revise test mode in section 2.2<br>2. Revise appendix C | Feb. 15, 2022 |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |
|              |         |                                                            |               |

## Summary of Test Result

| Report Clause | Ref Std. Clause    | Test Items                                         | Result (PASS/FAIL) | Remark                                |
|---------------|--------------------|----------------------------------------------------|--------------------|---------------------------------------|
| 3.1           | 15.247(a)(1)       | Number of Channels                                 | Pass               | -                                     |
| 3.2           | 15.247(a)(1)       | Hopping Channel Separation                         | Pass               | -                                     |
| 3.3           | 15.247(a)(1)       | Dwell Time of Each Channel                         | Pass               | -                                     |
| 3.4           | 15.247(a)(1)       | 20dB Bandwidth                                     | Pass               | -                                     |
| 3.4           | 2.1049             | 99% Occupied Bandwidth                             | Reporting only     | -                                     |
| 3.5           | 15.247(b)(1)       | Peak Output Power                                  | Pass               | -                                     |
| 3.6           | 15.247(d)          | Conducted Band Edges                               | Pass               | -                                     |
| 3.7           | 15.247(d)          | Conducted Spurious Emission                        | Pass               | -                                     |
| 3.8           | 15.247(d)          | Radiated Band Edges and Radiated Spurious Emission | Pass               | 7.68 dB under the limit at 34.850 MHz |
| 3.9           | 15.207             | AC Conducted Emission                              | Pass               | 7.66 dB under the limit at 0.184 MHz  |
| 3.10          | 15.203 & 15.247(b) | Antenna Requirement                                | Pass               | -                                     |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: William Chen**

**Report Producer: Cindy Liu**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

| Product Feature                 |                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment                       | Phone                                                                                                                                                                               |
| Model Name                      | GB62Z                                                                                                                                                                               |
| FCC ID                          | A4RGB62Z                                                                                                                                                                            |
| EUT supports Radios application | GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/NFC/GNSS<br>WLAN 11b/g/n HT20<br>WLAN 11a/n HT20/HT40<br>WLAN 11ac VHT20/VHT40/VHT80/VHT160<br>WLAN 11ax HE20/HE40/HE80/HE160<br>Bluetooth BR/EDR/LE |

**Remark:** The above EUT's information was declared by manufacturer.

| EUT Information List             |                            |
|----------------------------------|----------------------------|
| S/N                              | Performed Test Item        |
| 1A261FQGR00043                   | RF Conducted Measurement   |
| 1B011FQGR00012<br>1B011FQGR00008 | Radiated Spurious Emission |
| 1B011FQGR00006                   | Conducted Emission         |

## 1.2 Product Specification of Equipment Under Test

| Product Specification subjective to this standard |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |               |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|
| <b>Tx/Rx Frequency Range</b>                      | 2402 MHz ~ 2480 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |               |
| <b>Number of Channels</b>                         | 79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |               |
| <b>Carrier Frequency of Each Channel</b>          | 2402+n*1 MHz; n=0~78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |               |
| <b>Maximum Output Power to Antenna</b>            | <b>&lt;Ant. 4&gt;</b><br>Bluetooth BR(1Mbps) : 20.42 dBm (0.1102 W)<br>Bluetooth EDR (2Mbps) : 20.56 dBm (0.1138 W)<br>Bluetooth EDR (3Mbps) : 20.95 dBm (0.1245 W)<br><b>&lt;Ant. 3&gt;</b><br>Bluetooth BR(1Mbps) : 20.95 dBm (0.1245 W)<br>Bluetooth EDR (2Mbps) : 20.15 dBm (0.1035 W)<br>Bluetooth EDR (3Mbps) : 20.87 dBm (0.1222 W)<br><b>MIMO &lt;Ant. 4+3&gt;:</b><br>Bluetooth BR(1Mbps) : 20.85 dBm (0.1216 W)<br>Bluetooth EDR (2Mbps) : 20.33 dBm (0.1079 W)<br>Bluetooth EDR (3Mbps) : 20.68 dBm (0.1169 W)                                      |               |               |
| <b>99% Occupied Bandwidth</b>                     | <b>&lt;Ant. 4&gt;</b><br>Bluetooth BR(1Mbps) : 0.906 MHz<br>Bluetooth EDR (2Mbps) : 1.184 MHz<br>Bluetooth EDR (3Mbps) : 1.164 MHz<br><b>&lt;Ant. 3&gt;</b><br>Bluetooth BR(1Mbps) : 0.905 MHz<br>Bluetooth EDR (2Mbps) : 1.184 MHz<br>Bluetooth EDR (3Mbps) : 1.161 MHz<br><b>MIMO &lt;Ant. 4&gt;</b><br>Bluetooth BR(1Mbps) : 0.905 MHz<br>Bluetooth EDR (2Mbps) : 1.184 MHz<br>Bluetooth EDR (3Mbps) : 1.161 MHz<br><b>MIMO &lt;Ant. 3&gt;</b><br>Bluetooth BR(1Mbps) : 0.912 MHz<br>Bluetooth EDR (2Mbps) : 1.181 MHz<br>Bluetooth EDR (3Mbps) : 1.158 MHz |               |               |
| <b>Antenna Type / Gain</b>                        | <b>&lt;Ant. 4&gt;</b> : IFA Antenna with gain -2.7 dBi<br><b>&lt;Ant. 3&gt;</b> : IFA Antenna with gain -0.2 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |               |
| <b>Type of Modulation</b>                         | Bluetooth BR (1Mbps) : GFSK<br>Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK<br>Bluetooth EDR (3Mbps) : 8-DPSK                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |               |
| <b>Antenna Function Description</b>               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Ant. 4</b> | <b>Ant. 3</b> |
|                                                   | Bluetooth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | V             | V             |
|                                                   | Bluetooth MIMO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | V             | V             |

**Remark:**

1. MIMO Ant. 4+3 is a calculated result from sum of the power MIMO Ant. 4 and MIMO Ant. 3.
2. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

## 1.3 Modification of EUT

No modifications made to the EUT during the testing.

## 1.4 Testing Location

|                           |                                                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>          | Sporton International Inc. EMC & Wireless Communications Laboratory                                                       |
| <b>Test Site Location</b> | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City 333, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b><br>CO05-HY (TAF Code: 1190)                                                                       |
| <b>Remark</b>             | The AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory  |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

|                           |                                                                                                                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>          | Sporton International Inc. Wensan Laboratory                                                                                                     |
| <b>Test Site Location</b> | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City 333010, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b><br>TH05-HY; 03CH15-HY                                                                                                    |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW3786

## 1.5 Applicable Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

### Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



## 2 Test Configuration of Equipment Under Test

### 2.1 Carrier Frequency Channel

| Frequency Band  | Channel | Freq.<br>(MHz) | Channel | Freq.<br>(MHz) | Channel | Freq.<br>(MHz) |
|-----------------|---------|----------------|---------|----------------|---------|----------------|
| 2400-2483.5 MHz | 0       | 2402           | 27      | 2429           | 54      | 2456           |
|                 | 1       | 2403           | 28      | 2430           | 55      | 2457           |
|                 | 2       | 2404           | 29      | 2431           | 56      | 2458           |
|                 | 3       | 2405           | 30      | 2432           | 57      | 2459           |
|                 | 4       | 2406           | 31      | 2433           | 58      | 2460           |
|                 | 5       | 2407           | 32      | 2434           | 59      | 2461           |
|                 | 6       | 2408           | 33      | 2435           | 60      | 2462           |
|                 | 7       | 2409           | 34      | 2436           | 61      | 2463           |
|                 | 8       | 2410           | 35      | 2437           | 62      | 2464           |
|                 | 9       | 2411           | 36      | 2438           | 63      | 2465           |
|                 | 10      | 2412           | 37      | 2439           | 64      | 2466           |
|                 | 11      | 2413           | 38      | 2440           | 65      | 2467           |
|                 | 12      | 2414           | 39      | 2441           | 66      | 2468           |
|                 | 13      | 2415           | 40      | 2442           | 67      | 2469           |
|                 | 14      | 2416           | 41      | 2443           | 68      | 2470           |
|                 | 15      | 2417           | 42      | 2444           | 69      | 2471           |
|                 | 16      | 2418           | 43      | 2445           | 70      | 2472           |
|                 | 17      | 2419           | 44      | 2446           | 71      | 2473           |
|                 | 18      | 2420           | 45      | 2447           | 72      | 2474           |
|                 | 19      | 2421           | 46      | 2448           | 73      | 2475           |
|                 | 20      | 2422           | 47      | 2449           | 74      | 2476           |
|                 | 21      | 2423           | 48      | 2450           | 75      | 2477           |
|                 | 22      | 2424           | 49      | 2451           | 76      | 2478           |
|                 | 23      | 2425           | 50      | 2452           | 77      | 2479           |
|                 | 24      | 2426           | 51      | 2453           | 78      | 2480           |
|                 | 25      | 2427           | 52      | 2454           | -       | -              |
|                 | 26      | 2428           | 53      | 2455           | -       | -              |

## 2.2 Test Mode

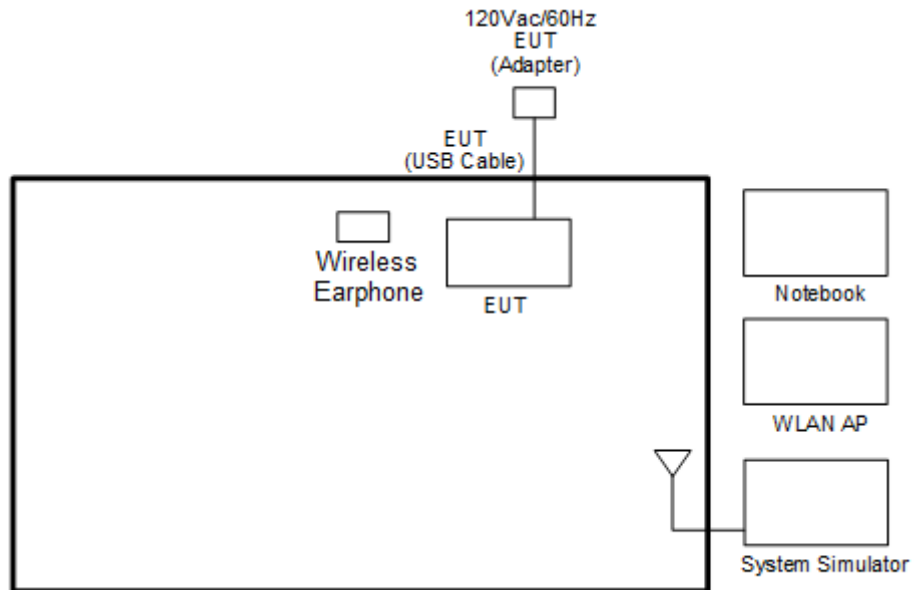
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape) and accessory (Adapter or Earphone), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane with Adapter for Ant. 3 and Ant. 4; X plane with Notebook for MIMO <Ant. 4+3> as worst plane, and the worst mode of radiated spurious emissions is Bluetooth 1Mbps mode, and recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

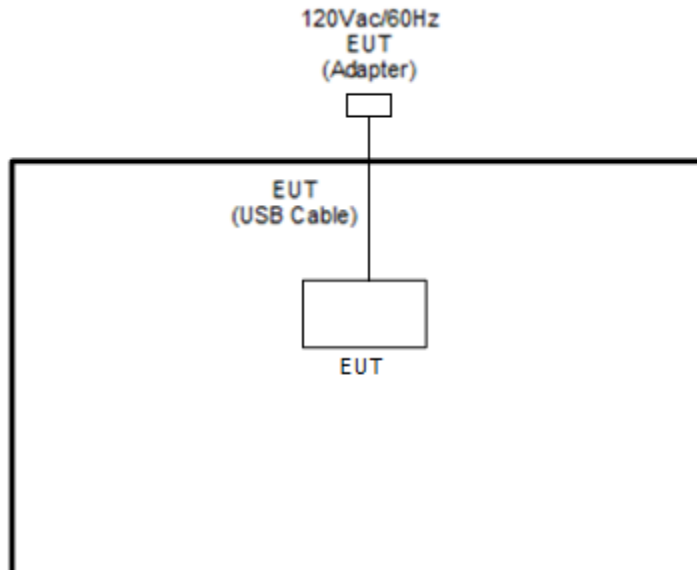
| Summary table of Test Cases                                                                                                                                                                                                                                                                                                                |                                                                                                          |                                    |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------|
| Test Item                                                                                                                                                                                                                                                                                                                                  | Data Rate / Modulation                                                                                   |                                    |                            |
| Conducted Test Cases                                                                                                                                                                                                                                                                                                                       | Bluetooth BR 1Mbps GFSK                                                                                  | Bluetooth EDR 2Mbps $\pi/4$ -DQPSK | Bluetooth EDR 3Mbps 8-DPSK |
|                                                                                                                                                                                                                                                                                                                                            | Mode 1: CH00_2402 MHz                                                                                    | Mode 4: CH00_2402 MHz              | Mode 7: CH00_2402 MHz      |
|                                                                                                                                                                                                                                                                                                                                            | Mode 2: CH39_2441 MHz                                                                                    | Mode 5: CH39_2441 MHz              | Mode 8: CH39_2441 MHz      |
|                                                                                                                                                                                                                                                                                                                                            | Mode 3: CH78_2480 MHz                                                                                    | Mode 6: CH78_2480 MHz              | Mode 9: CH78_2480 MHz      |
| Radiated Test Cases                                                                                                                                                                                                                                                                                                                        | Bluetooth BR 1Mbps GFSK                                                                                  |                                    |                            |
|                                                                                                                                                                                                                                                                                                                                            | Mode 1: CH00_2402 MHz                                                                                    |                                    |                            |
|                                                                                                                                                                                                                                                                                                                                            | Mode 2: CH39_2441 MHz                                                                                    |                                    |                            |
|                                                                                                                                                                                                                                                                                                                                            | Mode 3: CH78_2480 MHz                                                                                    |                                    |                            |
| AC Conducted Emission                                                                                                                                                                                                                                                                                                                      | Mode 1 : GSM850 Idle + WLAN (2.4GHz) Link + Bluetooth Link + USB Cable 2<br>(Charging from AC Adapter 1) |                                    |                            |
| <b>Remark:</b>                                                                                                                                                                                                                                                                                                                             |                                                                                                          |                                    |                            |
| 1. For Radiated Test Cases, the worst mode data rate 1Mbps was reported only since the highest RF output power in the preliminary tests. The conducted spurious emissions and conducted band edge measurement for other data rates were not worse than 1Mbps, and no other significantly frequencies found in conducted spurious emission. |                                                                                                          |                                    |                            |
| 2. For Radiated Test Cases, the tests were performed with Adapter 1 and USB Cable 2.                                                                                                                                                                                                                                                       |                                                                                                          |                                    |                            |

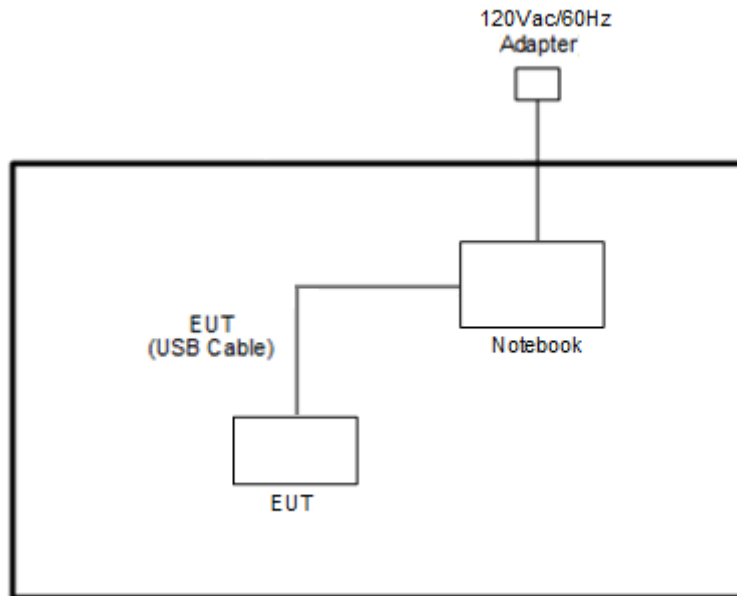
## 2.3 Connection Diagram of Test System

### <AC Conducted Emission Mode>



### <Bluetooth Tx with Adapter Mode>



**<Bluetooth Tx with Notebook Mode>**

**2.4 Support Unit used in test configuration and system**

| Item | Equipment         | Brand Name | Model Name     | FCC ID                | Data Cable | Power Cord                                                 |
|------|-------------------|------------|----------------|-----------------------|------------|------------------------------------------------------------|
| 1.   | System Simulator  | Anritsu    | MT8820C        | N/A                   | N/A        | Unshielded, 1.8m                                           |
| 2.   | Wireless Earphone | Google     | G1007/G1008    | A4RG1007/<br>A4RG1008 | N/A        | N/A                                                        |
| 3.   | WLAN AP           | NETGEAR64  | RAXE500        | N/A                   | N/A        | Unshielded, 1.8 m                                          |
| 4.   | Notebook          | Dell       | Latitude E3400 | FCC DoC               | N/A        | AC I/P :<br>Unshielded, 1.2m<br>DC O/P :<br>Shielded, 1.8m |

**2.5 EUT Operation Test Setup**

The RF test items, utility “Command v10.0.17134.134” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



## 2.6 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

### 3 Test Result

#### 3.1 Number of Channel Measurement

##### 3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

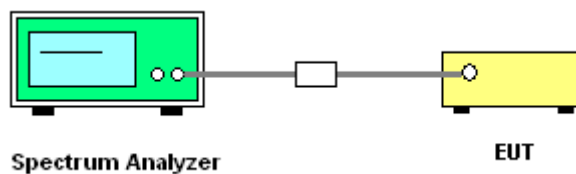
##### 3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

##### 3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation;  
RBW = 300 kHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

##### 3.1.4 Test Setup

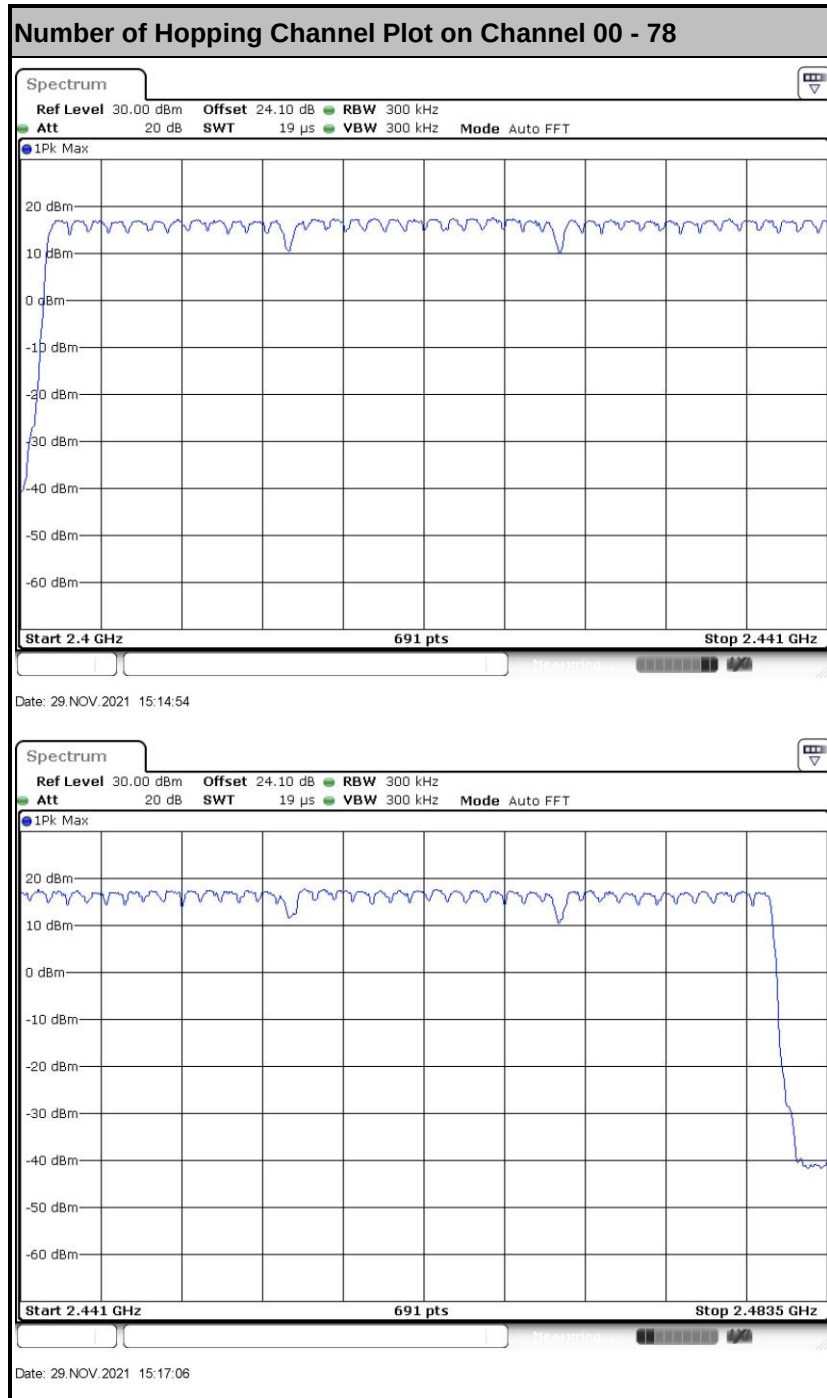


##### 3.1.5 Test Result of Number of Hopping Frequency

Please refer to Appendix A.

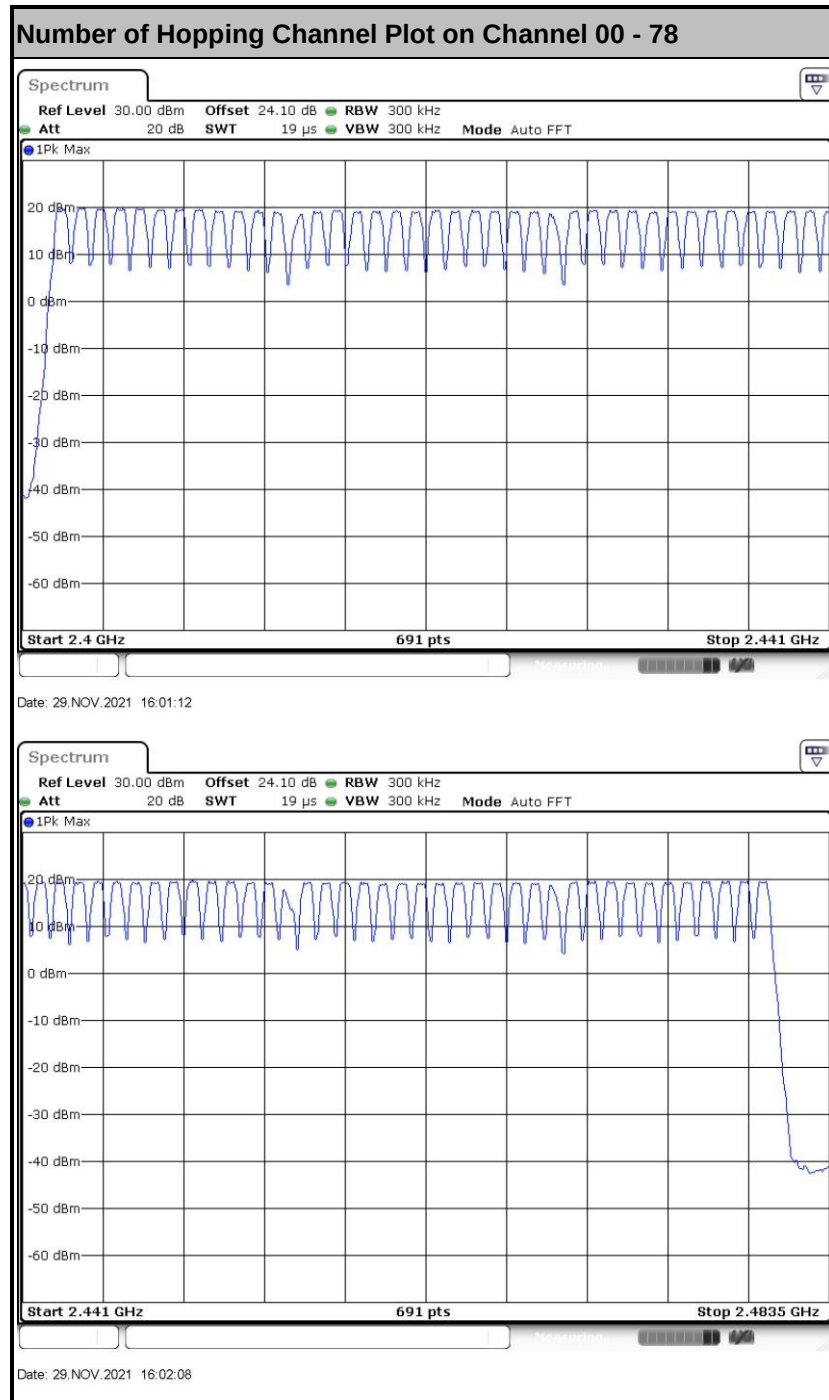


<Ant. 4>



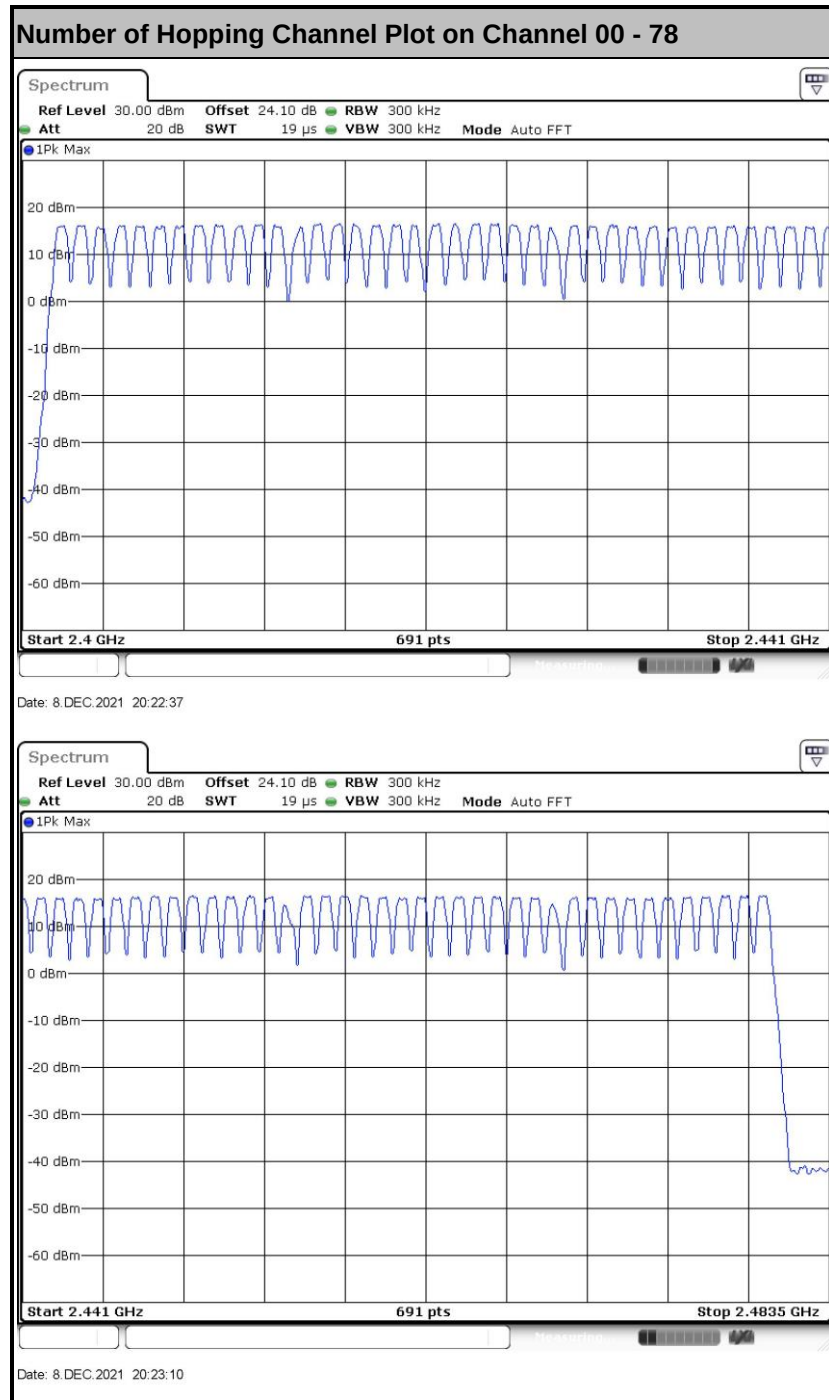


<Ant. 3>



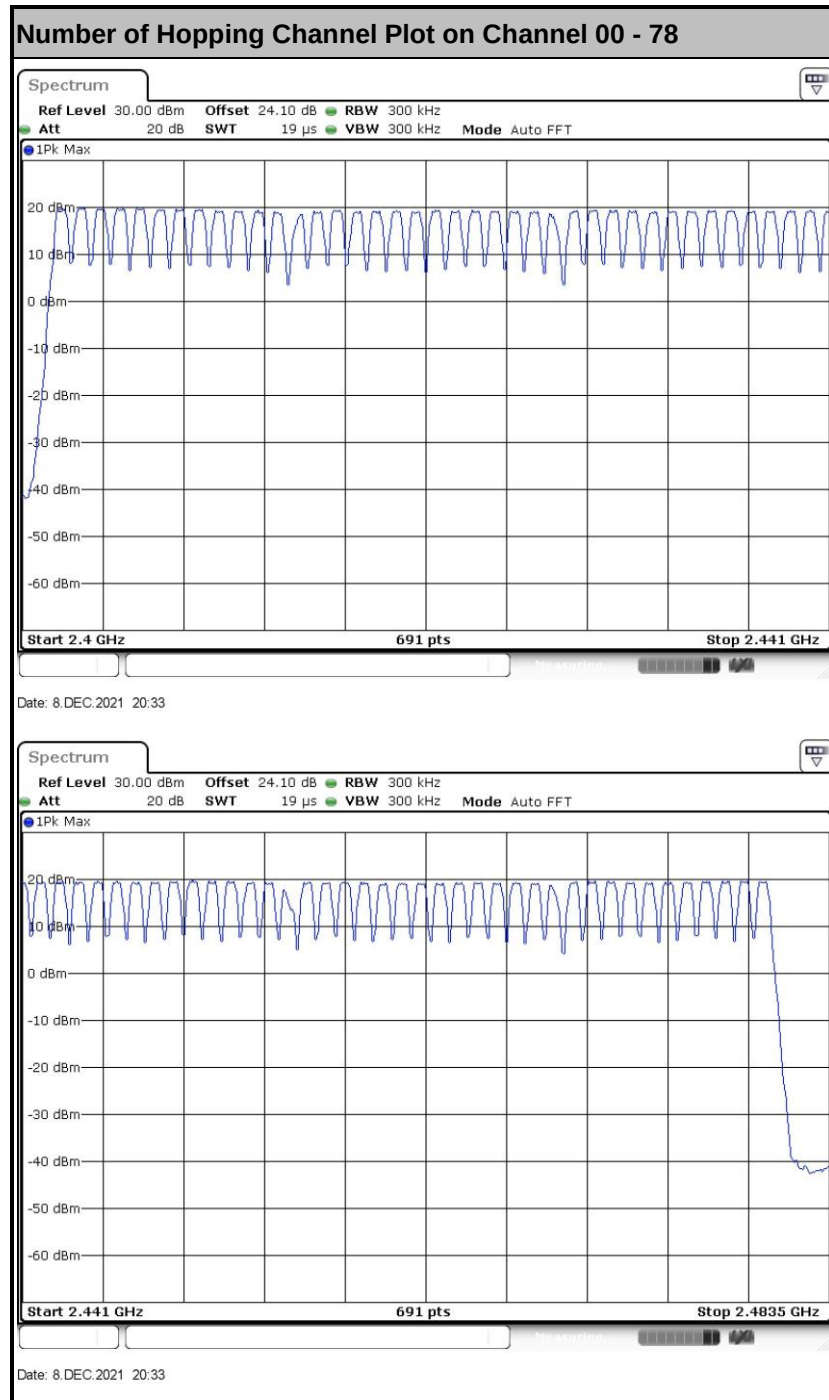


MIMO <Ant. 4>





MIMO <Ant. 3>



## 3.2 Hopping Channel Separation Measurement

### 3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

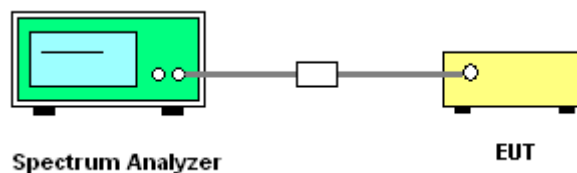
### 3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

### 3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:  
Span = wide enough to capture the peaks of two adjacent channels;  
RBW = 300 kHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Hopping Channel Separation

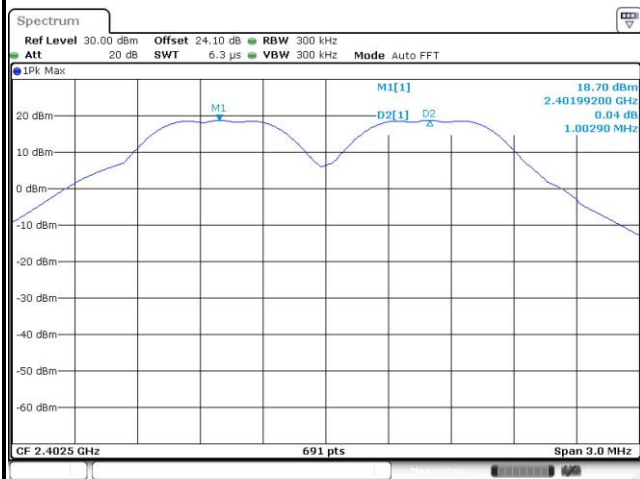
Please refer to Appendix A.



&lt;Ant. 4&gt;

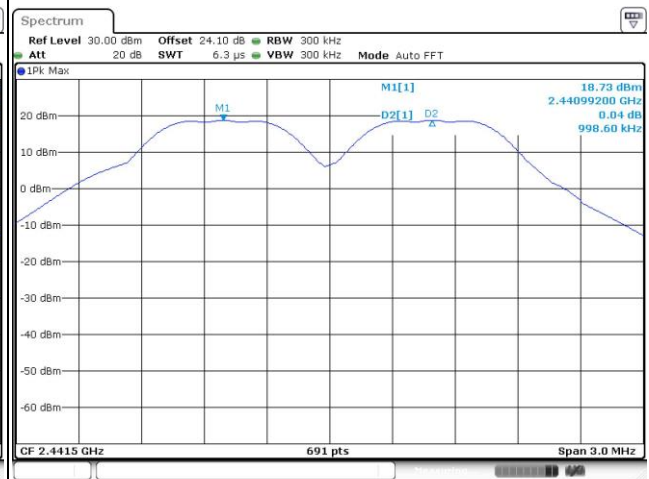
&lt;1Mbps&gt;

Channel Separation Plot on Channel 00 - 01



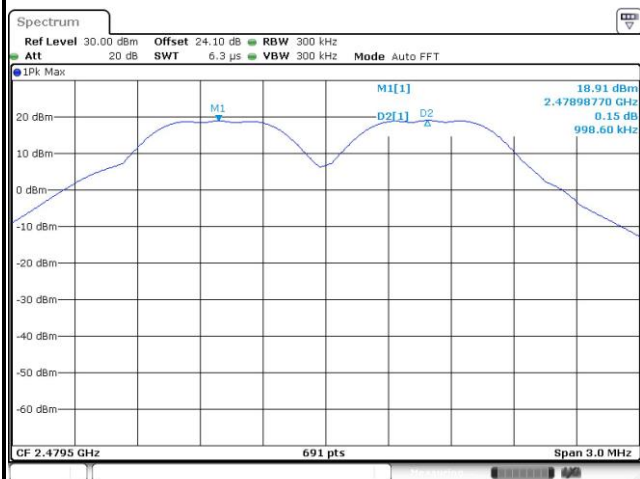
Date: 29 NOV. 2021 16:16:09

Channel Separation Plot on Channel 39 - 40



Date: 29 NOV. 2021 16:18:01

Channel Separation Plot on Channel 77 - 78

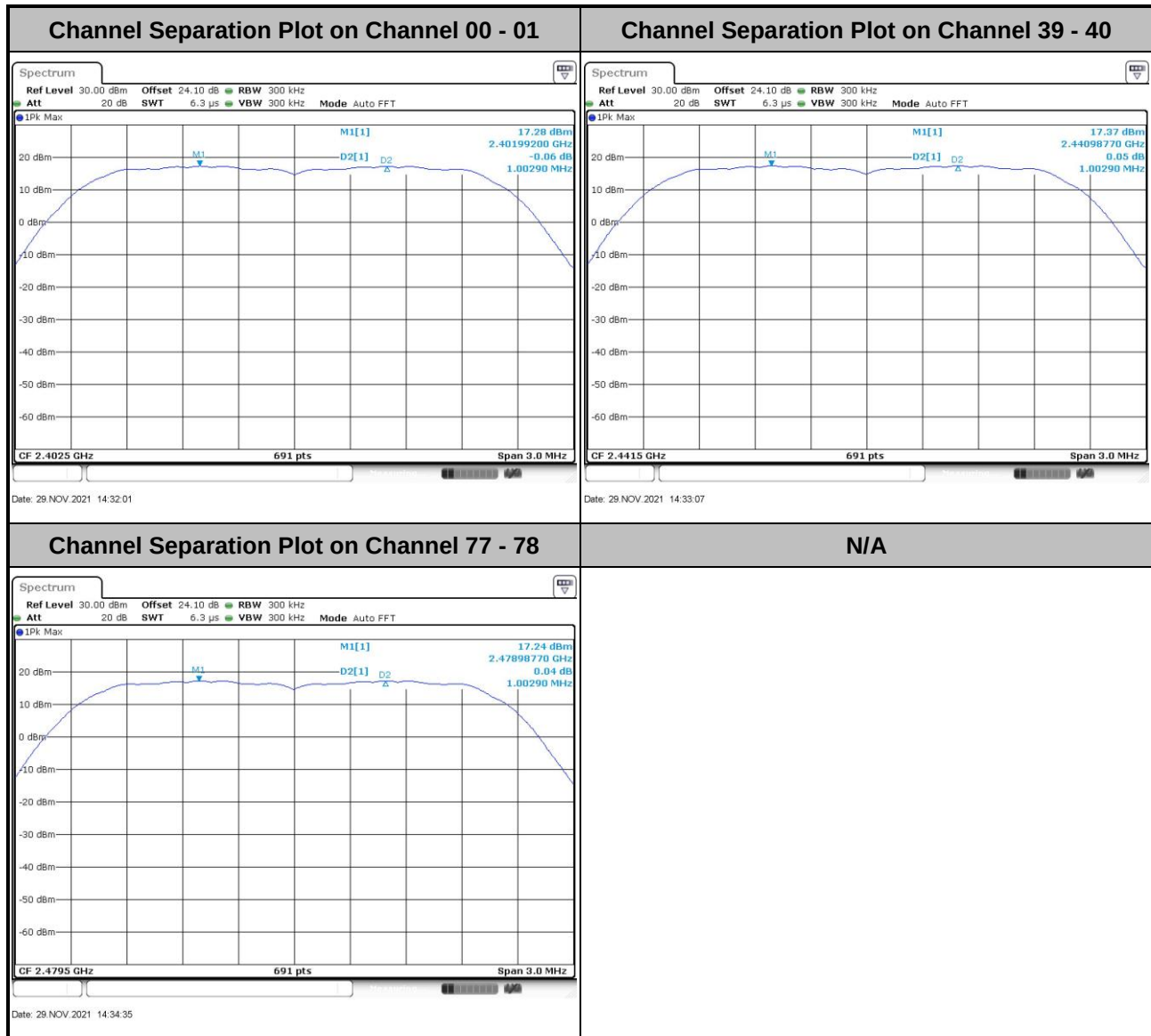


Date: 29 NOV. 2021 16:19:19

N/A

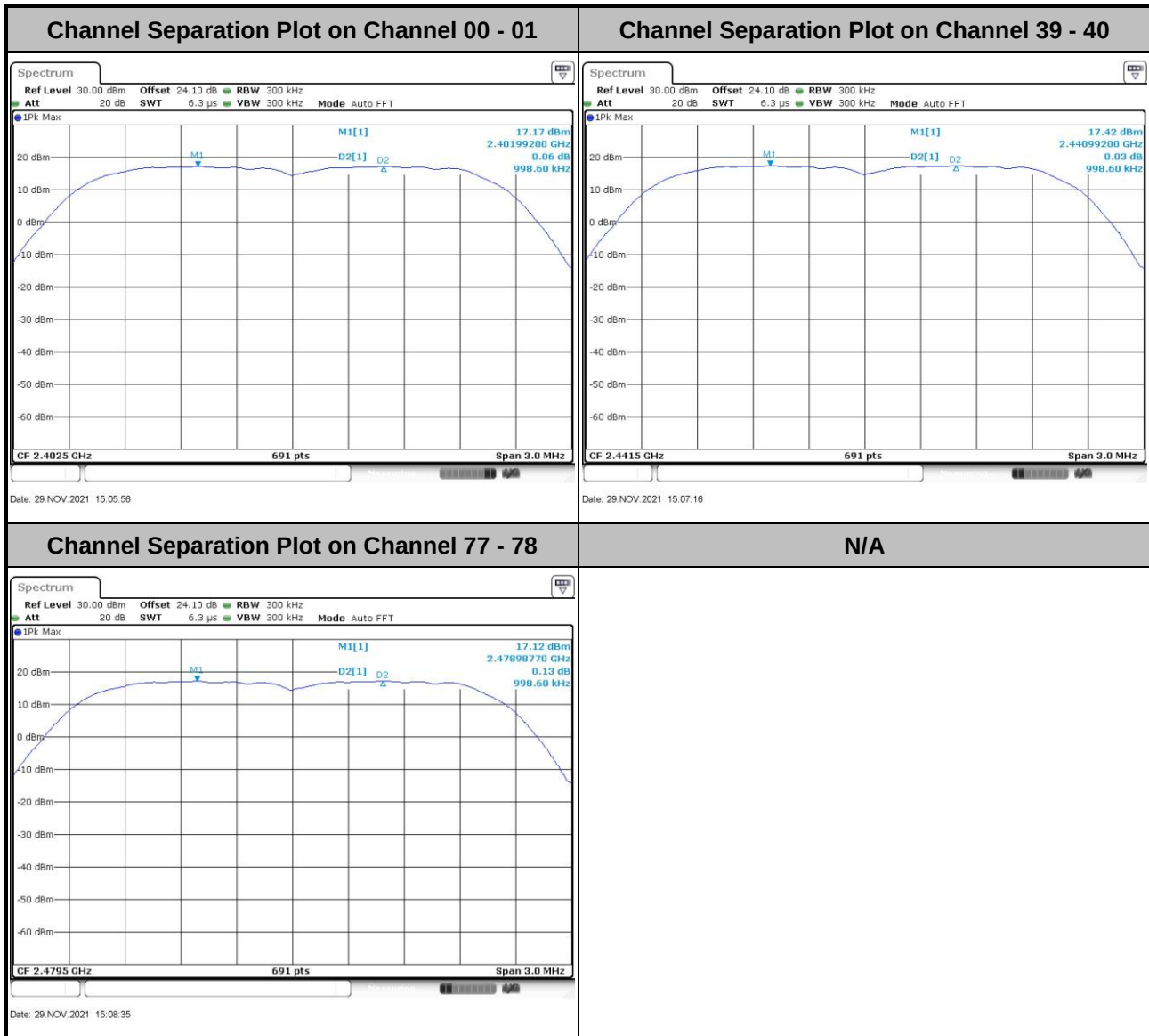


&lt;2Mbps&gt;



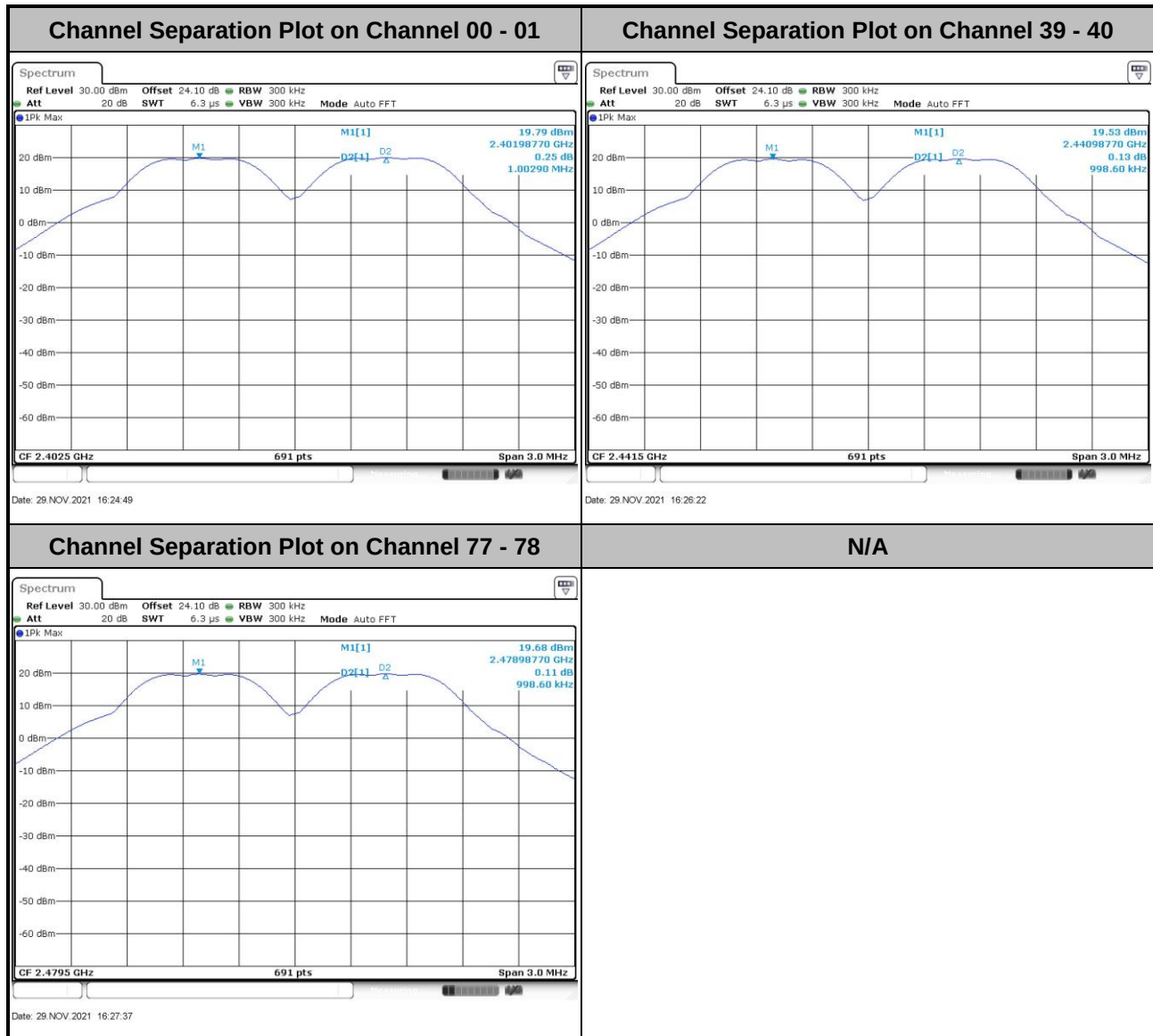


&lt;3Mbps&gt;



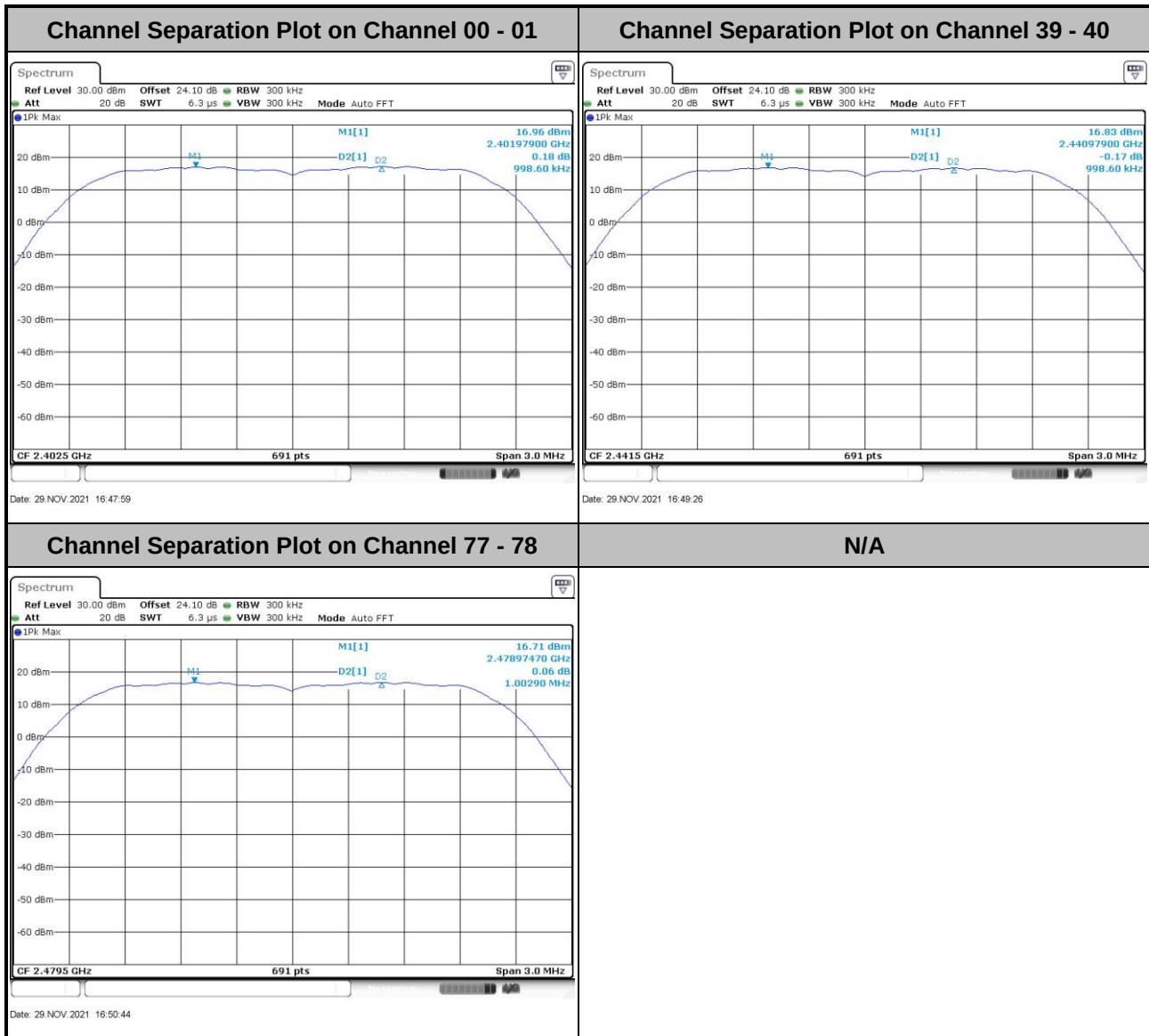
**<Ant. 3>**

**<1Mbps>**



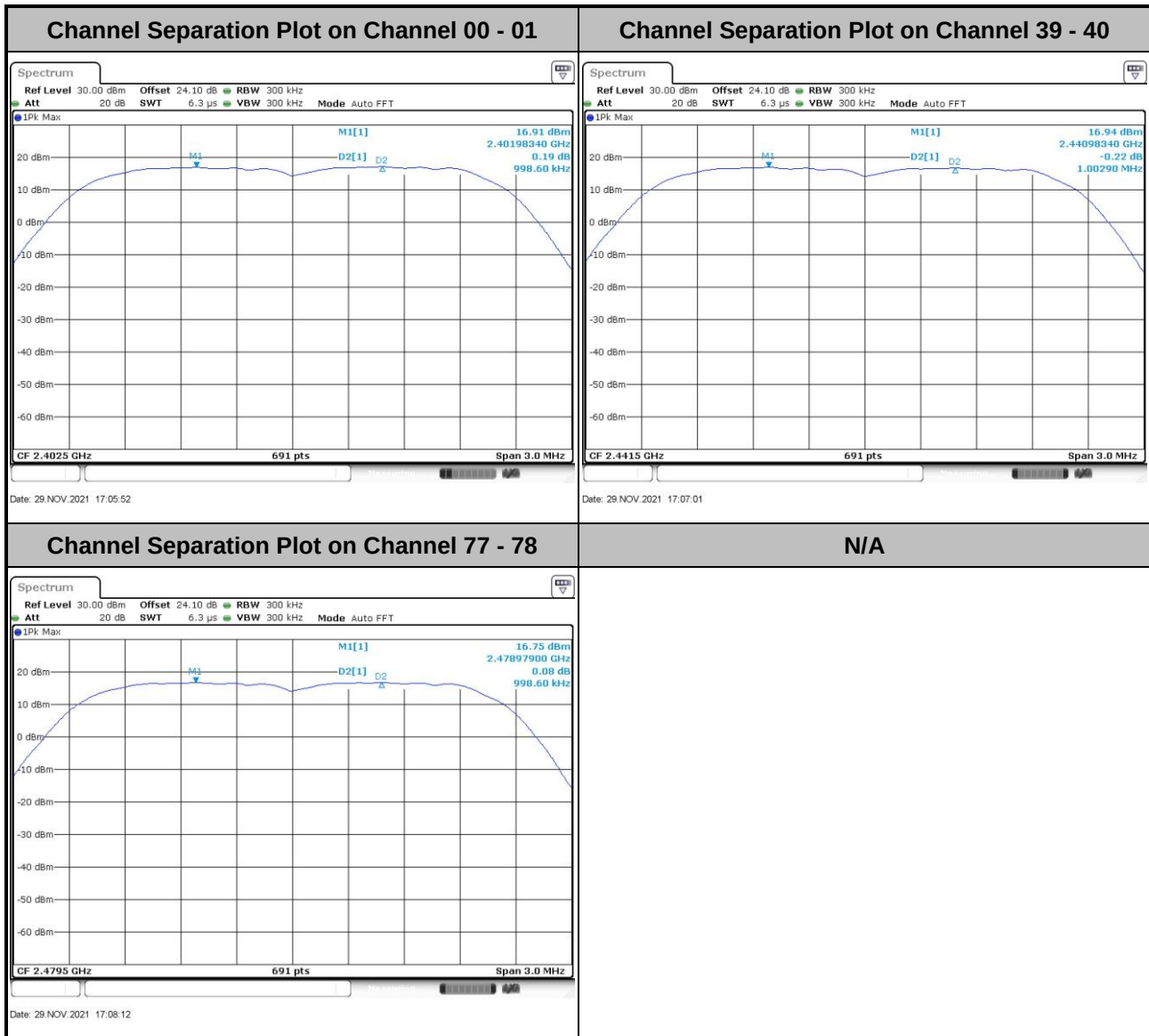


&lt;2Mbps&gt;





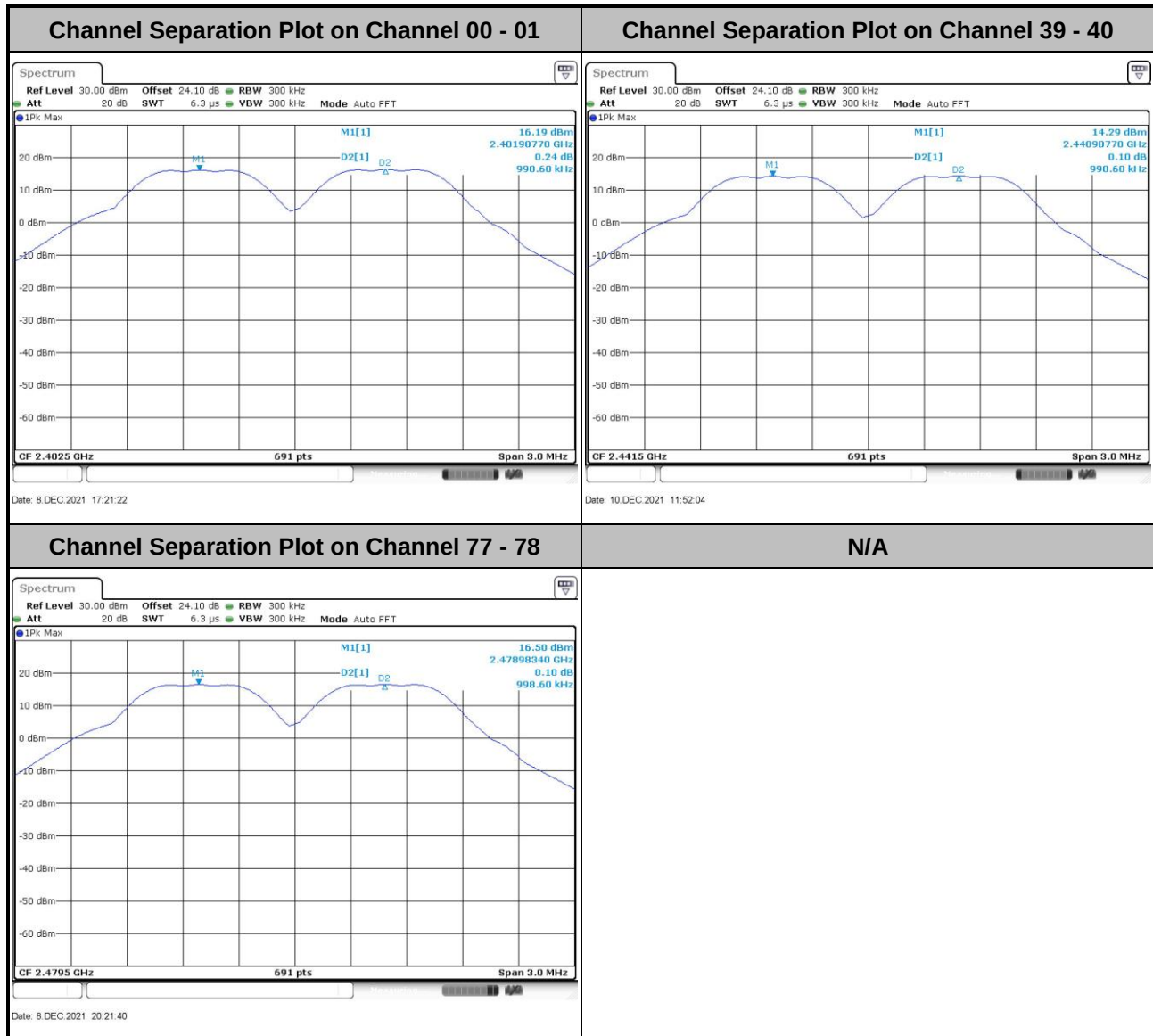
&lt;3Mbps&gt;





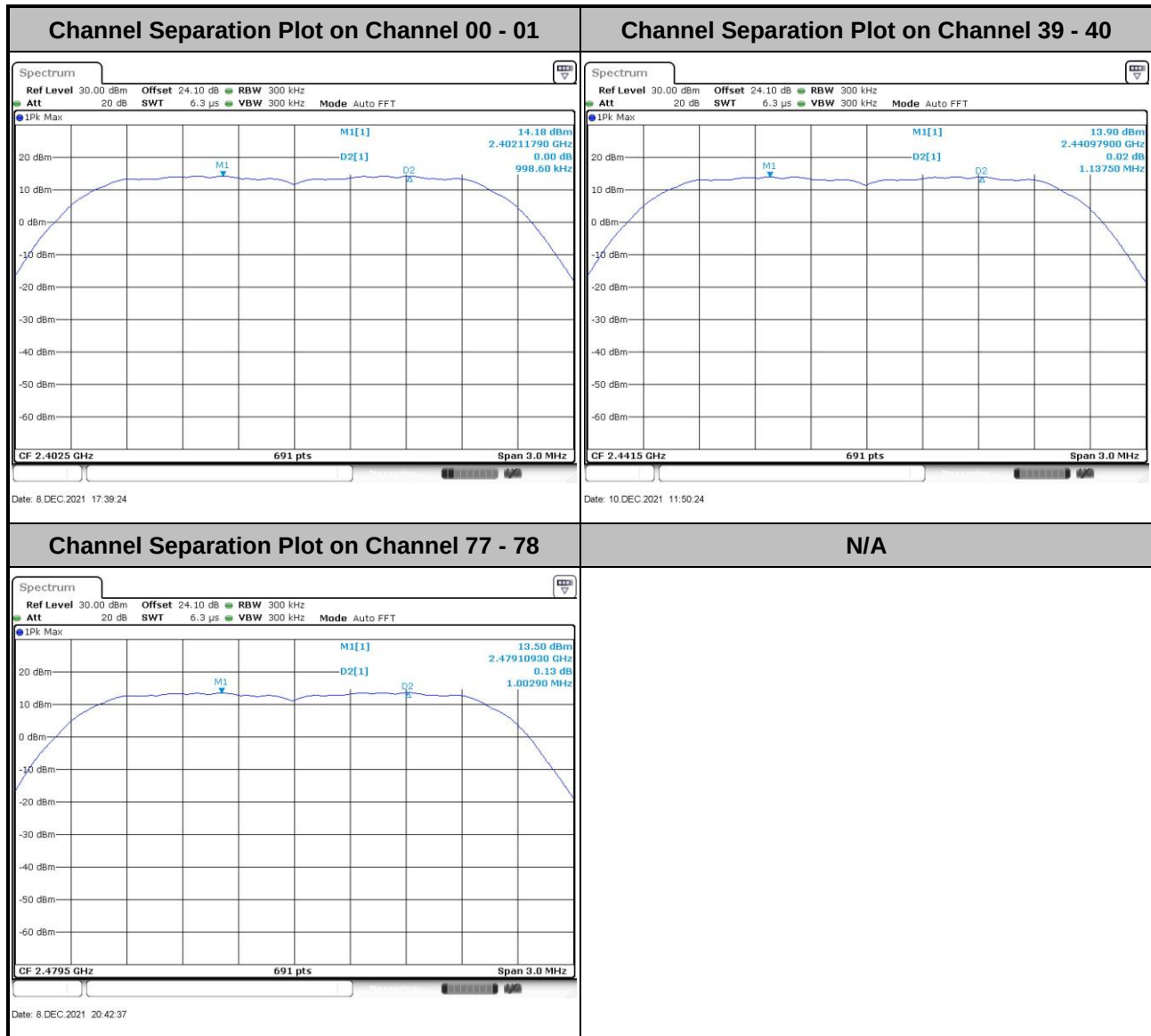
MIMO &lt;Ant. 4&gt;

&lt;1Mbps&gt;





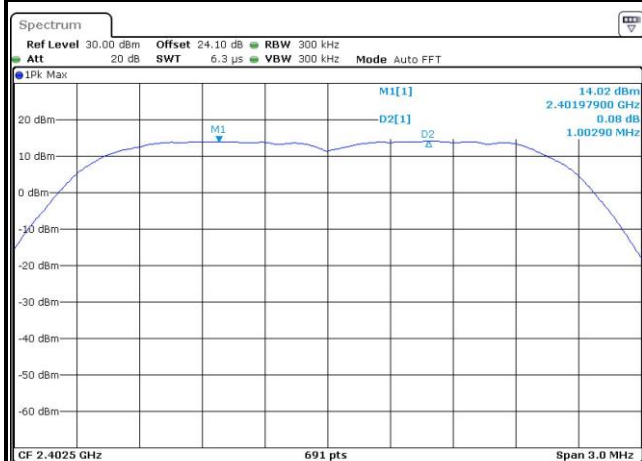
&lt;2Mbps&gt;





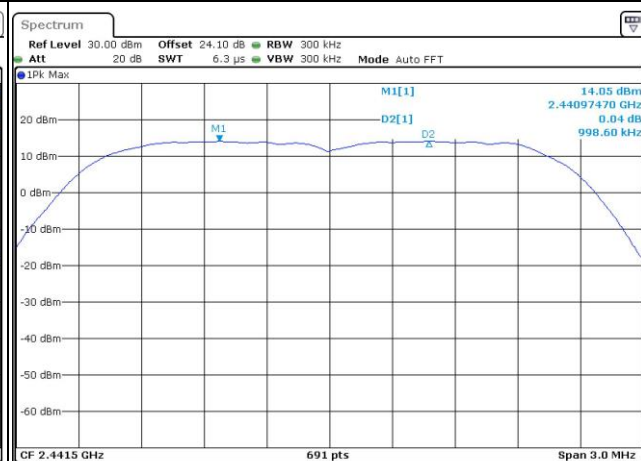
&lt;3Mbps&gt;

Channel Separation Plot on Channel 00 - 01



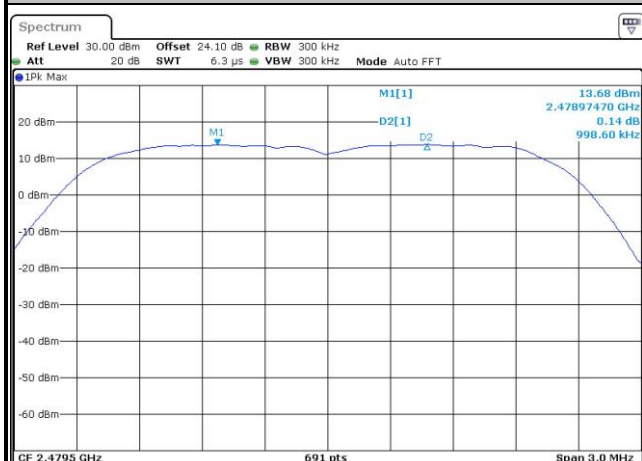
Date: 8 DEC 2021 18:47:15

Channel Separation Plot on Channel 39 - 40



Date: 8 DEC 2021 20:08:41

Channel Separation Plot on Channel 77 - 78



Date: 8 DEC 2021 20:49:57

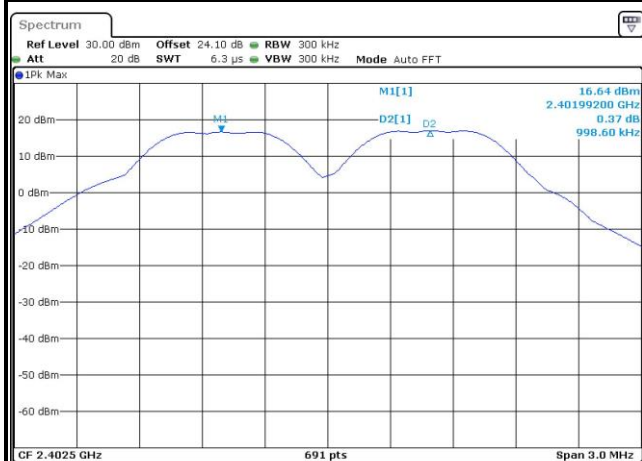
N/A



MIMO &lt;Ant. 3&gt;

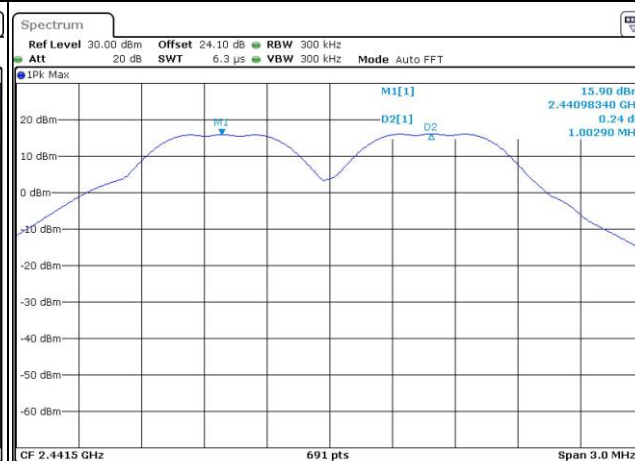
&lt;1Mbps&gt;

Channel Separation Plot on Channel 00 - 01



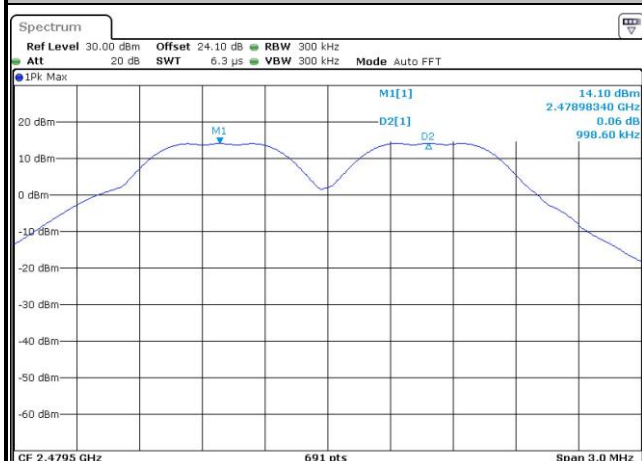
Date: 8 DEC.2021 19:20:36

Channel Separation Plot on Channel 39 - 40



Date: 8 DEC.2021 19:55:04

Channel Separation Plot on Channel 77 - 78



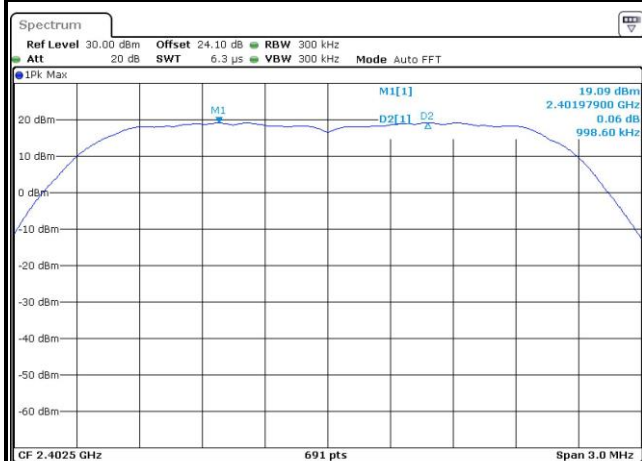
Date: 8 DEC.2021 21:03:51

N/A



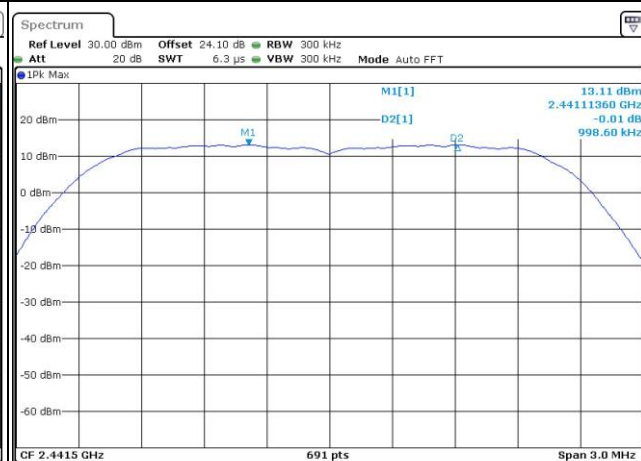
&lt;2Mbps&gt;

Channel Separation Plot on Channel 00 - 01



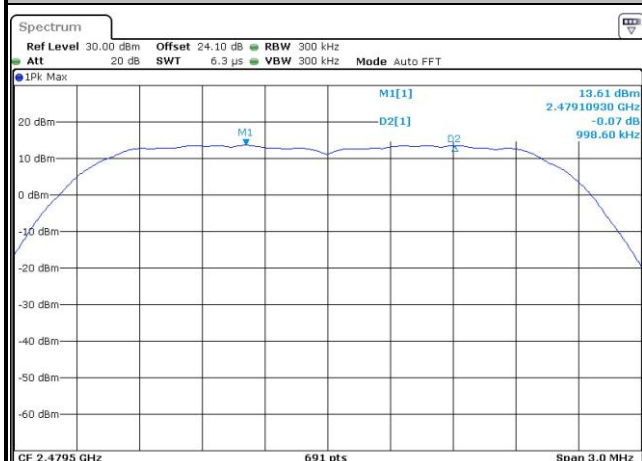
Date: 10 DEC 2021 11:08:52

Channel Separation Plot on Channel 39 - 40



Date: 10 DEC 2021 11:46:16

Channel Separation Plot on Channel 77 - 78

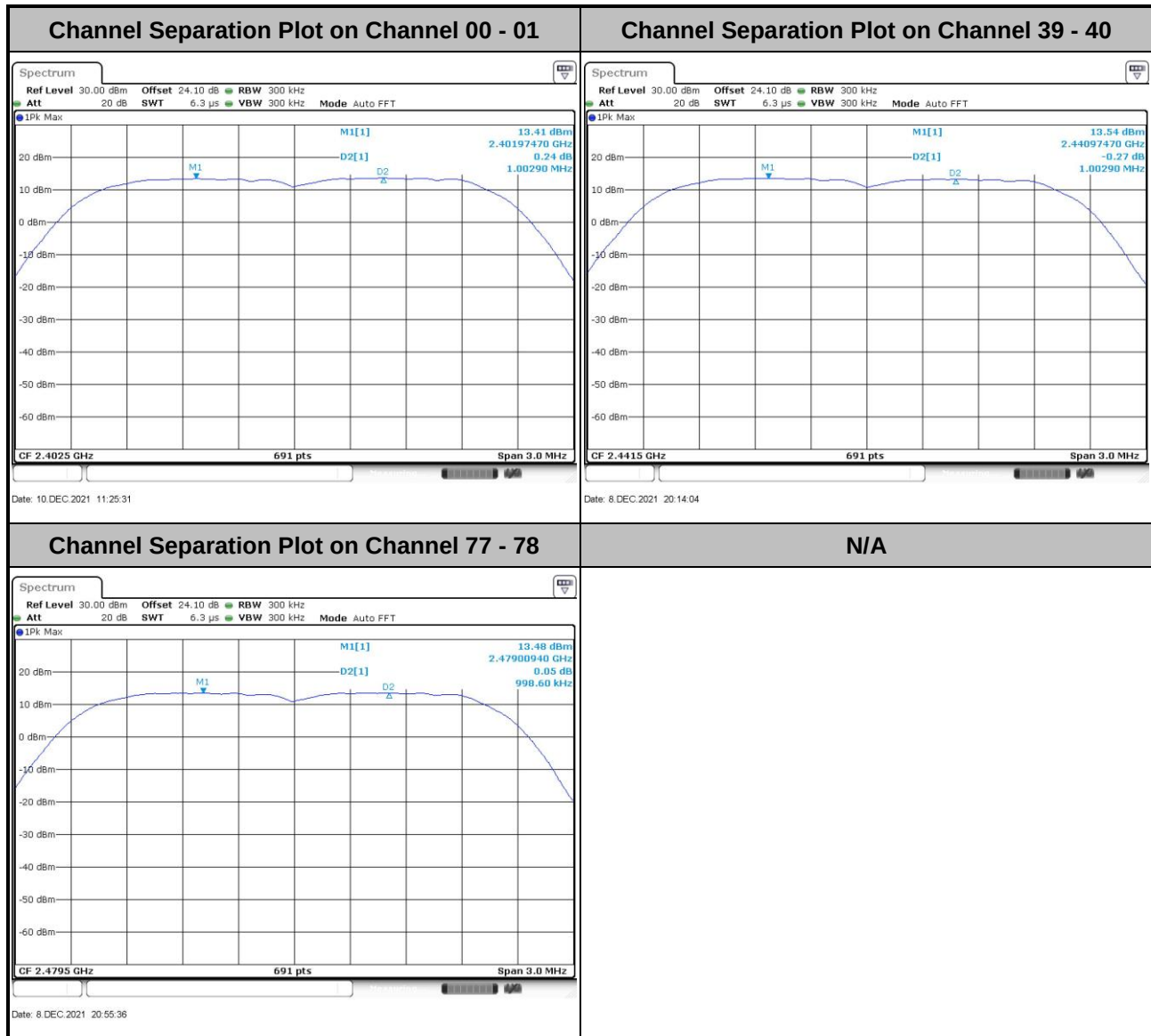


Date: 8 DEC 2021 20:45:04

N/A



&lt;3Mbps&gt;



### 3.3 Dwell Time Measurement

#### 3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

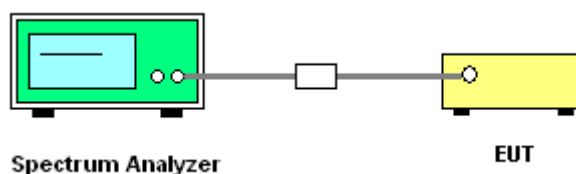
#### 3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

#### 3.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.4.
2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW  $\geq$  RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

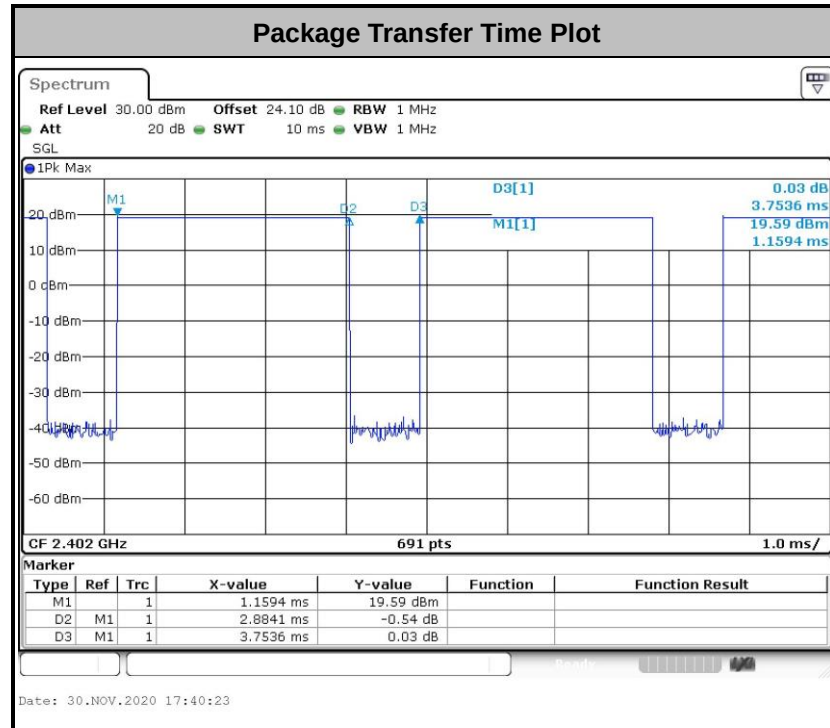
#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Dwell Time

Please refer to Appendix A.

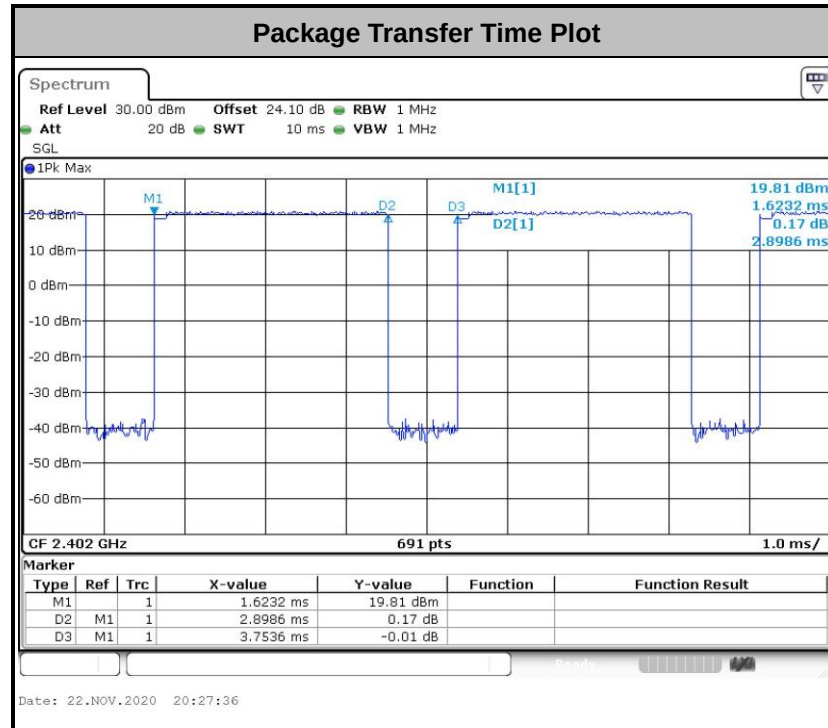
<Ant. 4>



**Remark:**

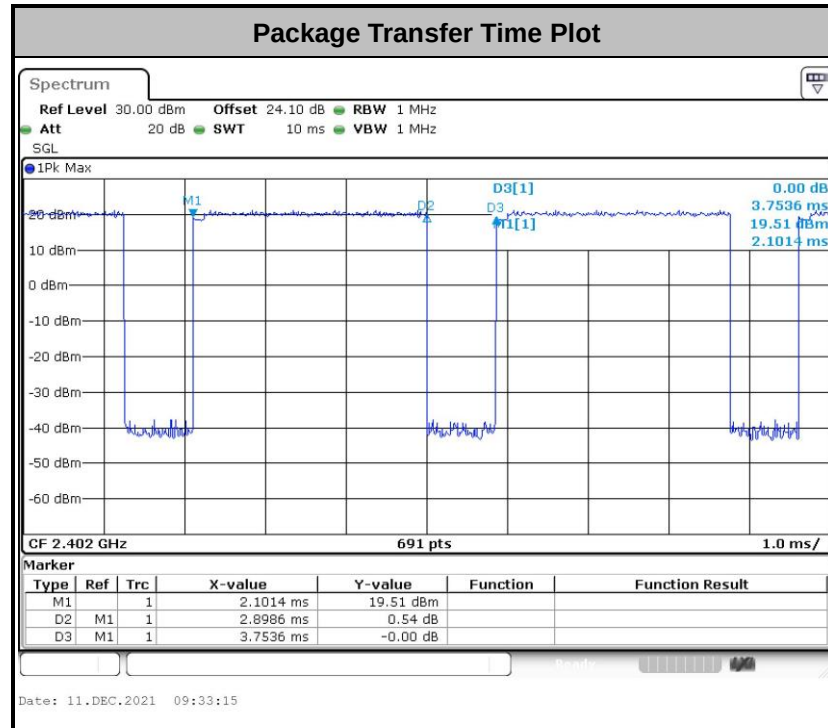
1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s), Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

<Ant. 3>

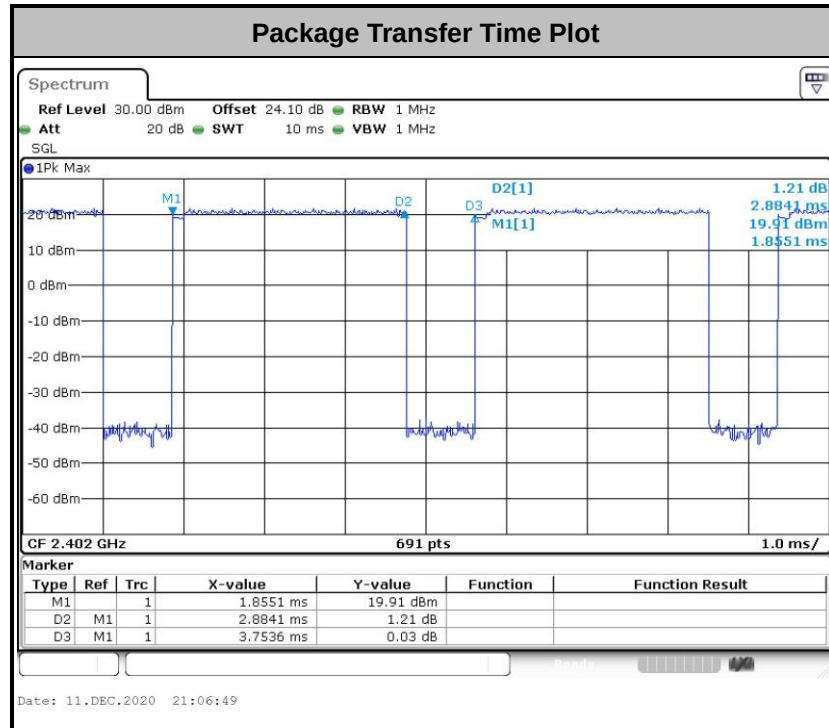


**Remark:**

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s), Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

**MIMO <Ant. 4>**

**Remark:**

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate  $(1600 / 6 / 79)$  in Occupancy Time Limit  $(0.4 \times 79)$  (s), Hops Over Occupancy Time comes to  $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$  hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate  $(800 / 6 / 20)$  in Occupancy Time Limit  $(0.4 \times 20)$  (s), Hops Over Occupancy Time comes to  $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$  hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

**MIMO <Ant. 3>**

**Remark:**

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate  $(1600 / 6 / 79)$  in Occupancy Time Limit  $(0.4 \times 79)$  (s), Hops Over Occupancy Time comes to  $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$  hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate  $(800 / 6 / 20)$  in Occupancy Time Limit  $(0.4 \times 20)$  (s), Hops Over Occupancy Time comes to  $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$  hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

### 3.4 20dB and 99% Bandwidth Measurement

#### 3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

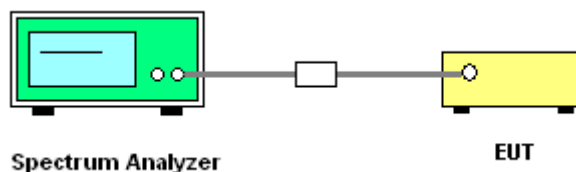
#### 3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

#### 3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Use the following spectrum analyzer settings for 20 dB Bandwidth measurement.  
Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;  
RBW  $\geq$  1% of the 20 dB bandwidth; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak;  
Trace = max hold.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.  
Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;  
RBW  $\geq$  1-5% of the 99% bandwidth; VBW  $\geq$  3 \* RBW; Sweep = auto; Detector function = peak;  
Trace = max hold.
6. Measure and record the results in the test report.

#### 3.4.4 Test Setup



#### 3.4.5 Test Result of 20dB Bandwidth

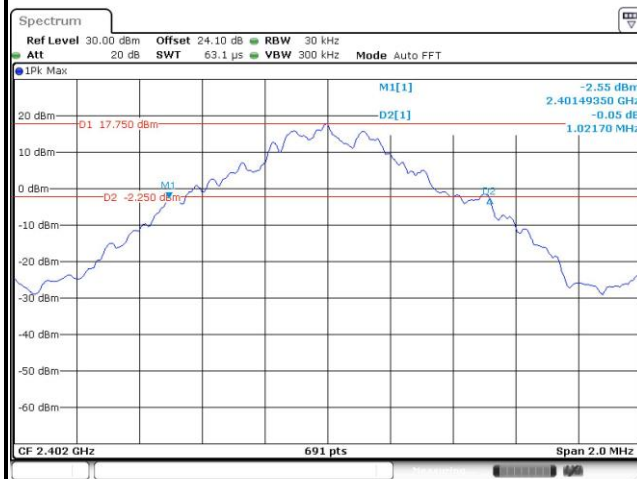
Please refer to Appendix A.



&lt;Ant. 4&gt;

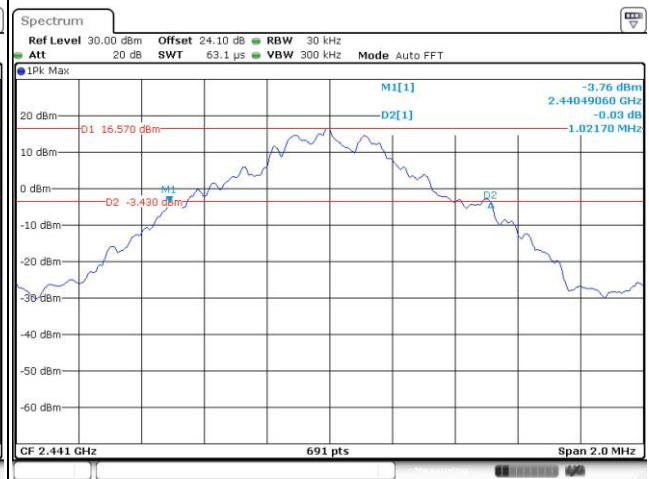
&lt;1Mbps&gt;

20 dB Bandwidth Plot on Channel 00



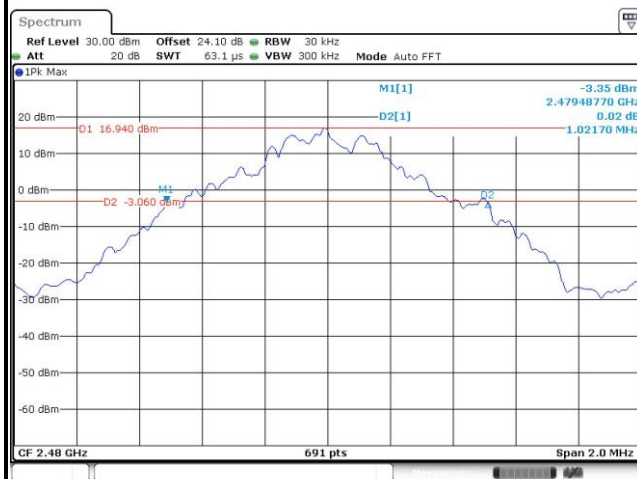
Date: 29 NOV. 2021 16:04:10

20 dB Bandwidth Plot on Channel 39



Date: 29 NOV. 2021 14:04:55

20 dB Bandwidth Plot on Channel 78

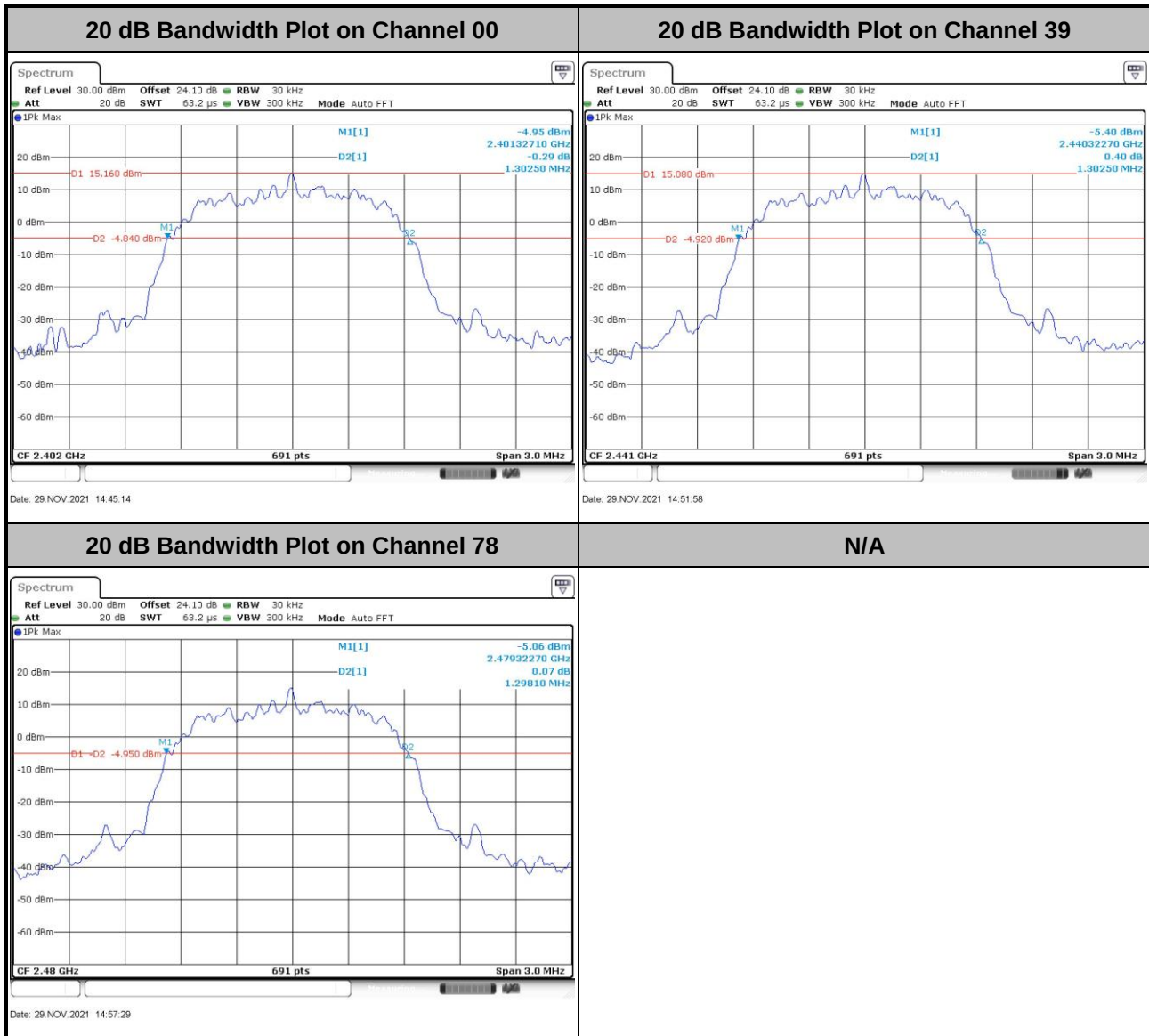


Date: 29 NOV. 2021 14:07:28

N/A

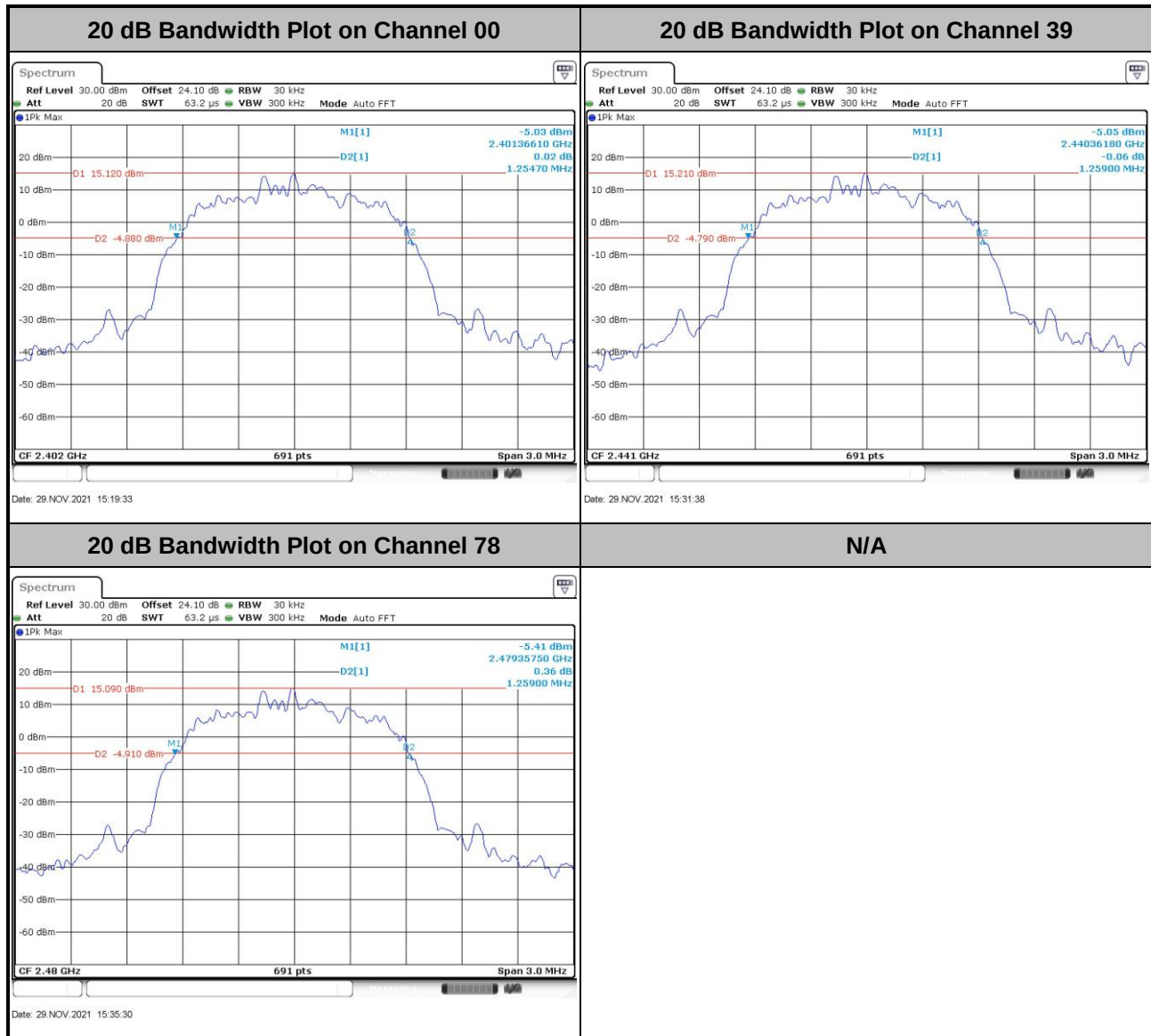


&lt;2Mbps&gt;





&lt;3Mbps&gt;

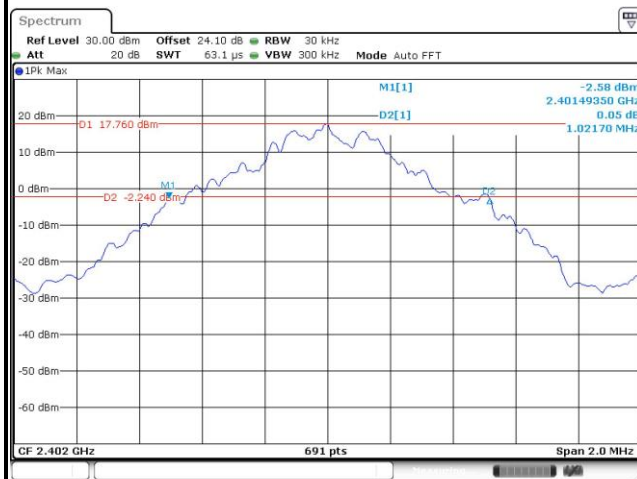




&lt;Ant. 3&gt;

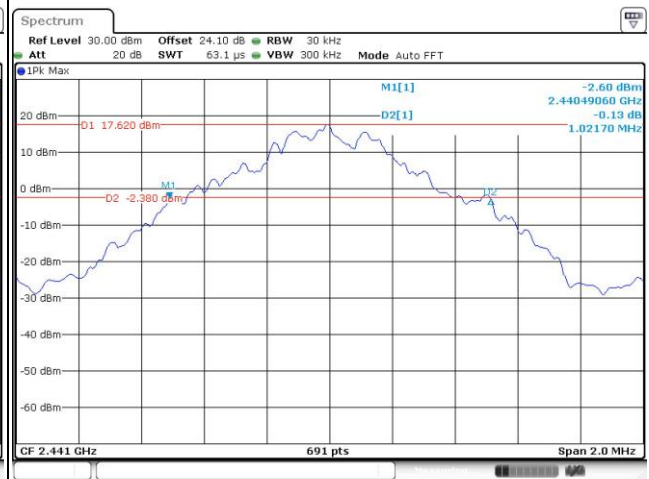
&lt;1Mbps&gt;

20 dB Bandwidth Plot on Channel 00



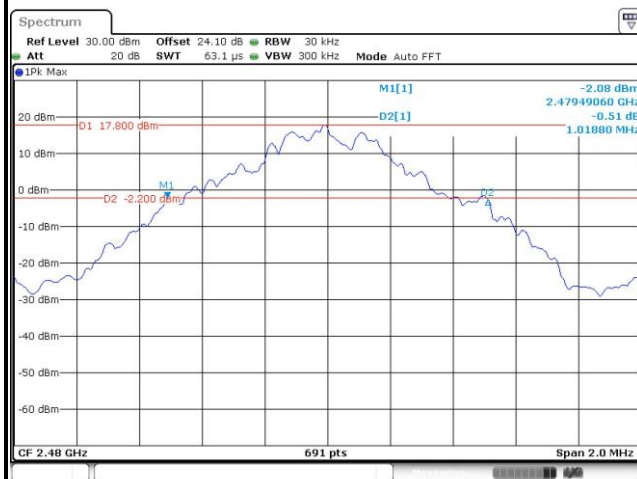
Date: 29 NOV. 2021 16:41:31

20 dB Bandwidth Plot on Channel 39



Date: 29 NOV. 2021 16:37:44

20 dB Bandwidth Plot on Channel 78

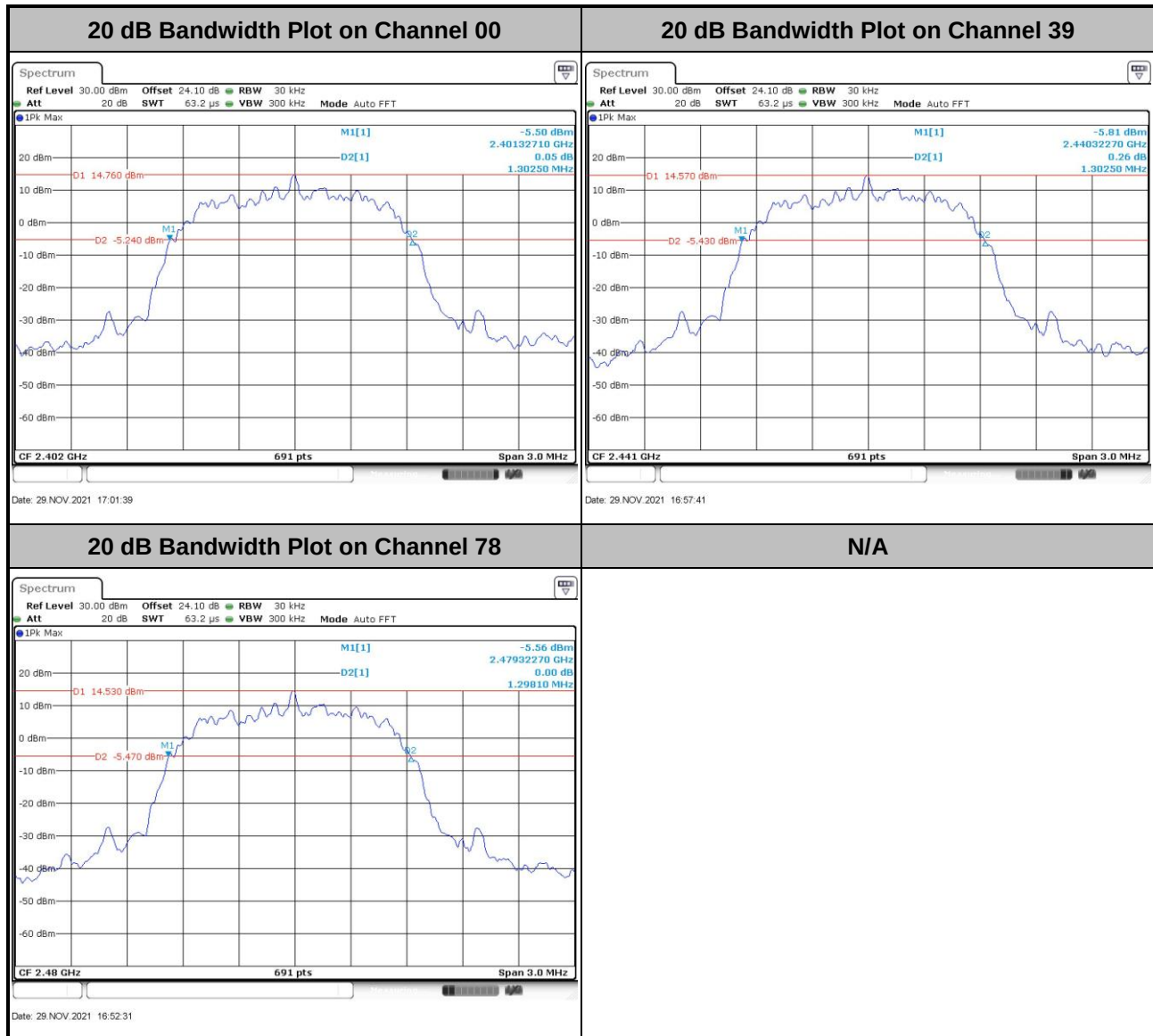


Date: 29 NOV. 2021 16:30:57

N/A

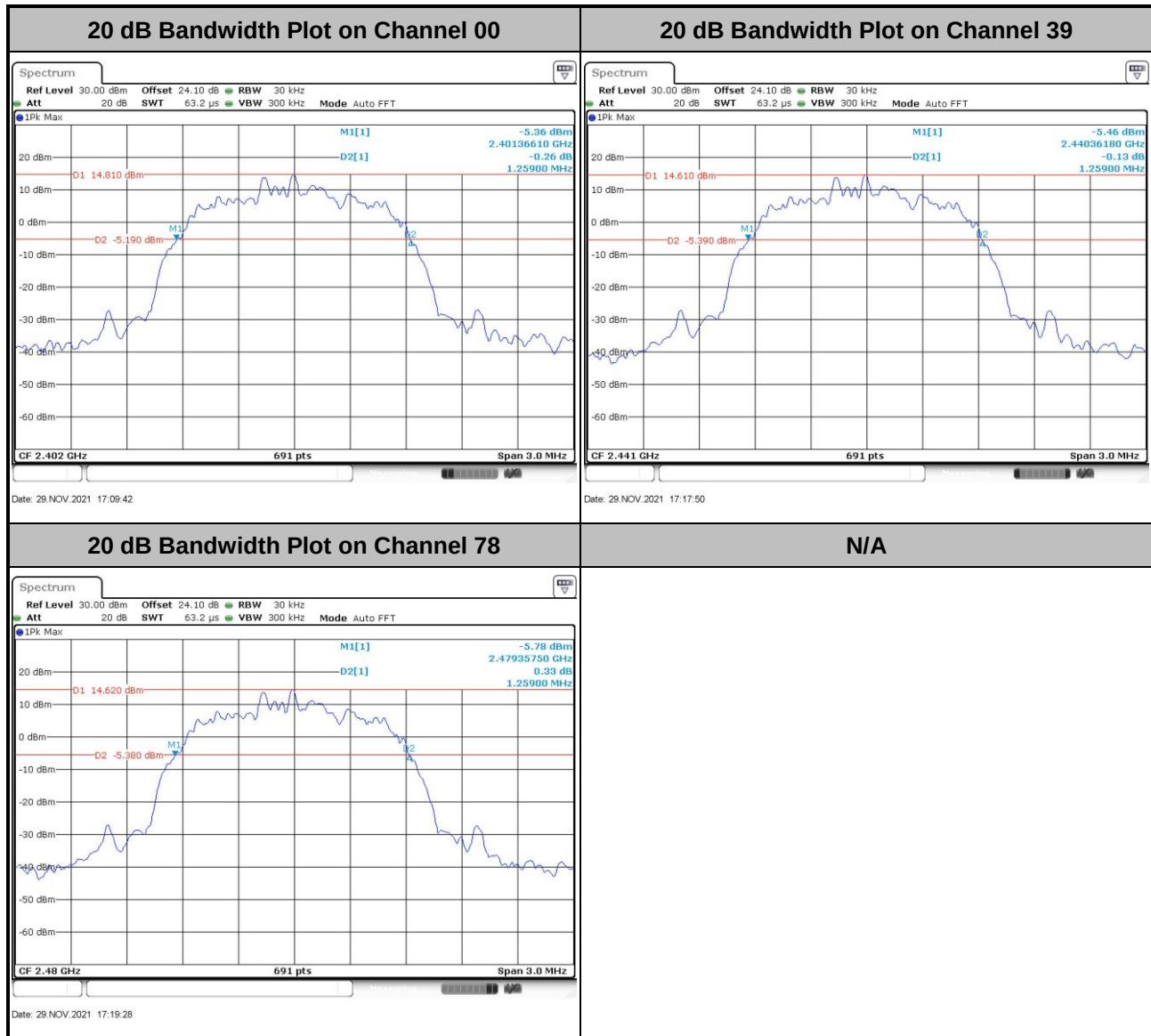


&lt;2Mbps&gt;





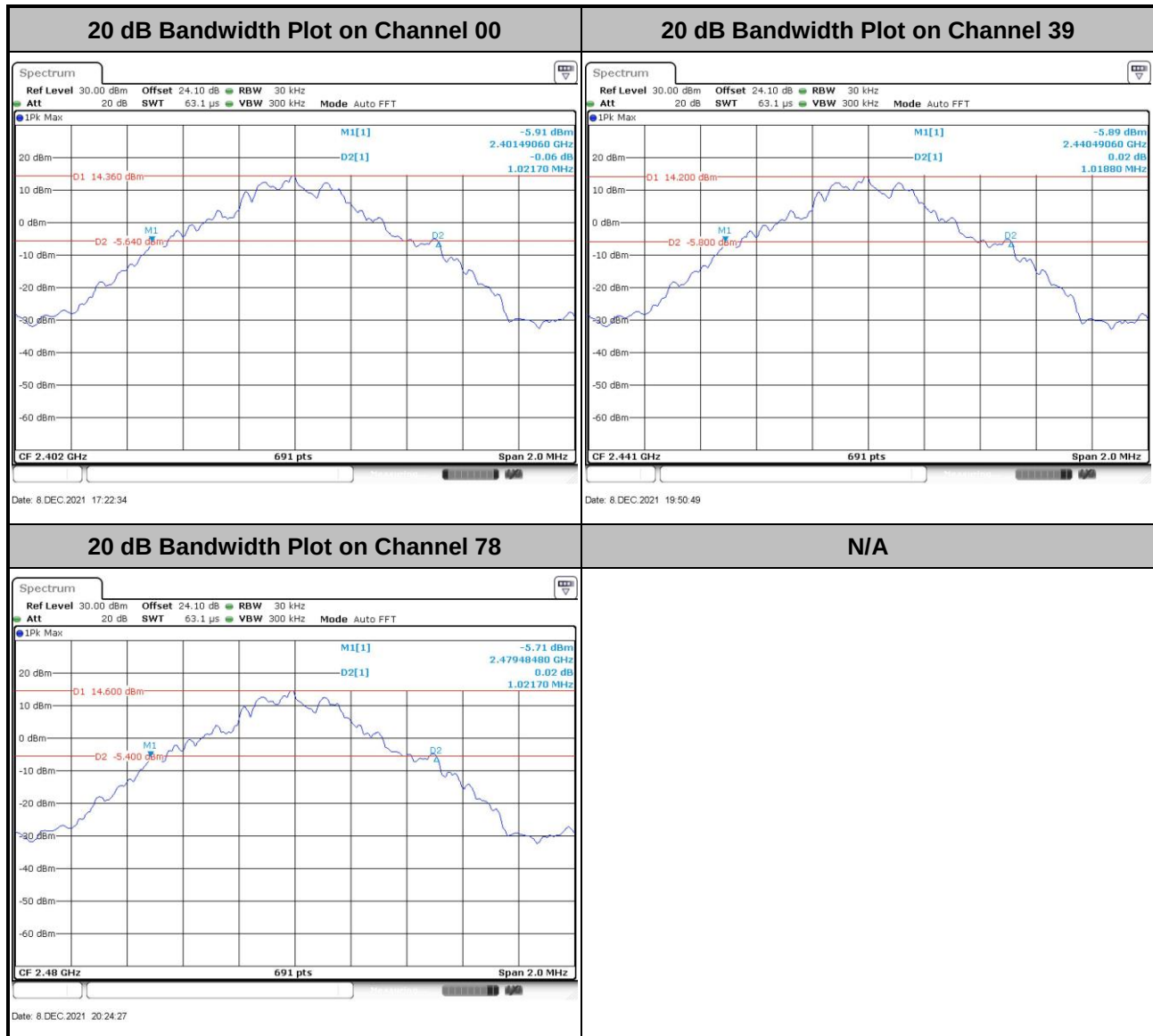
&lt;3Mbps&gt;





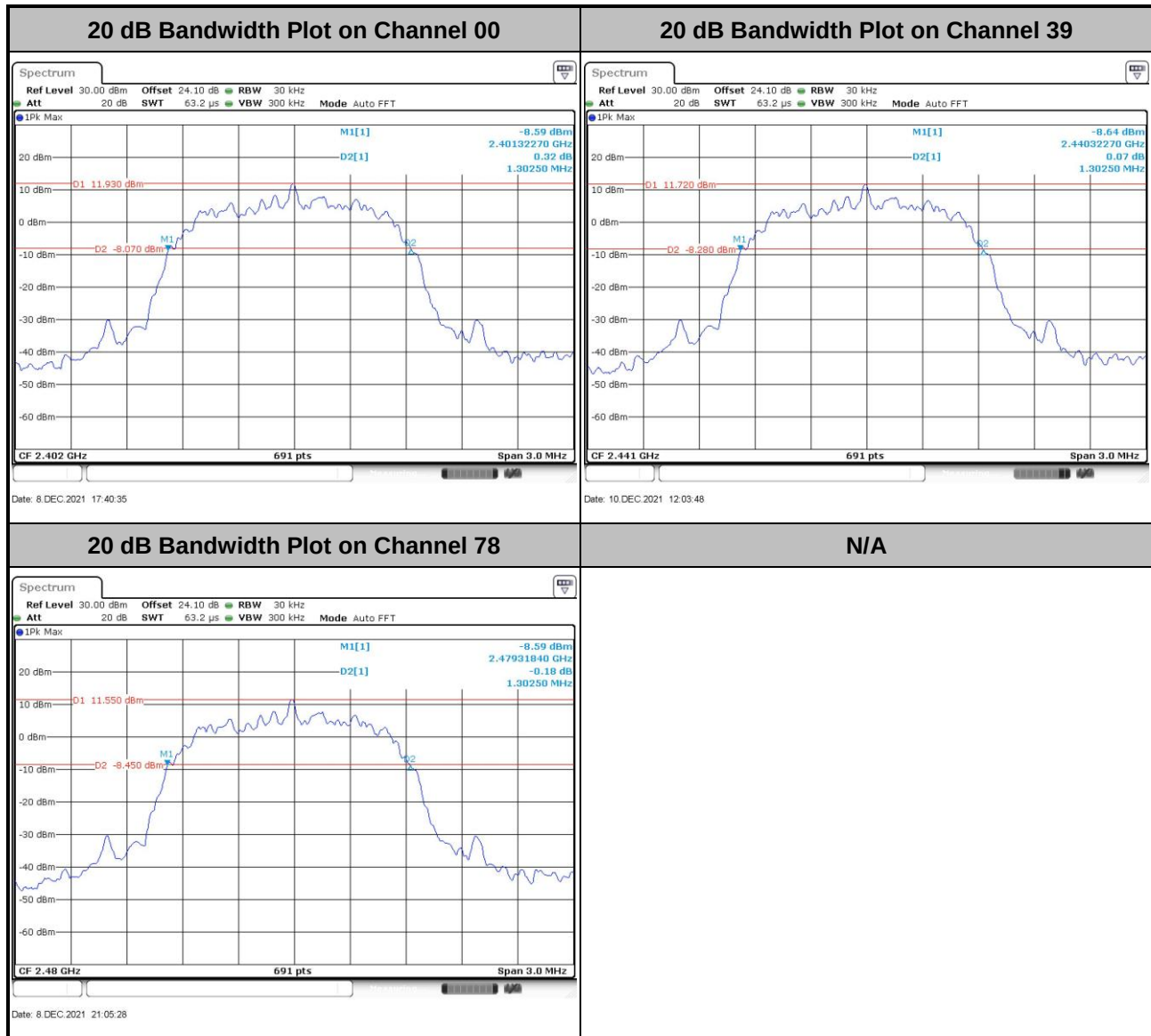
MIMO &lt;Ant. 4&gt;

&lt;1Mbps&gt;



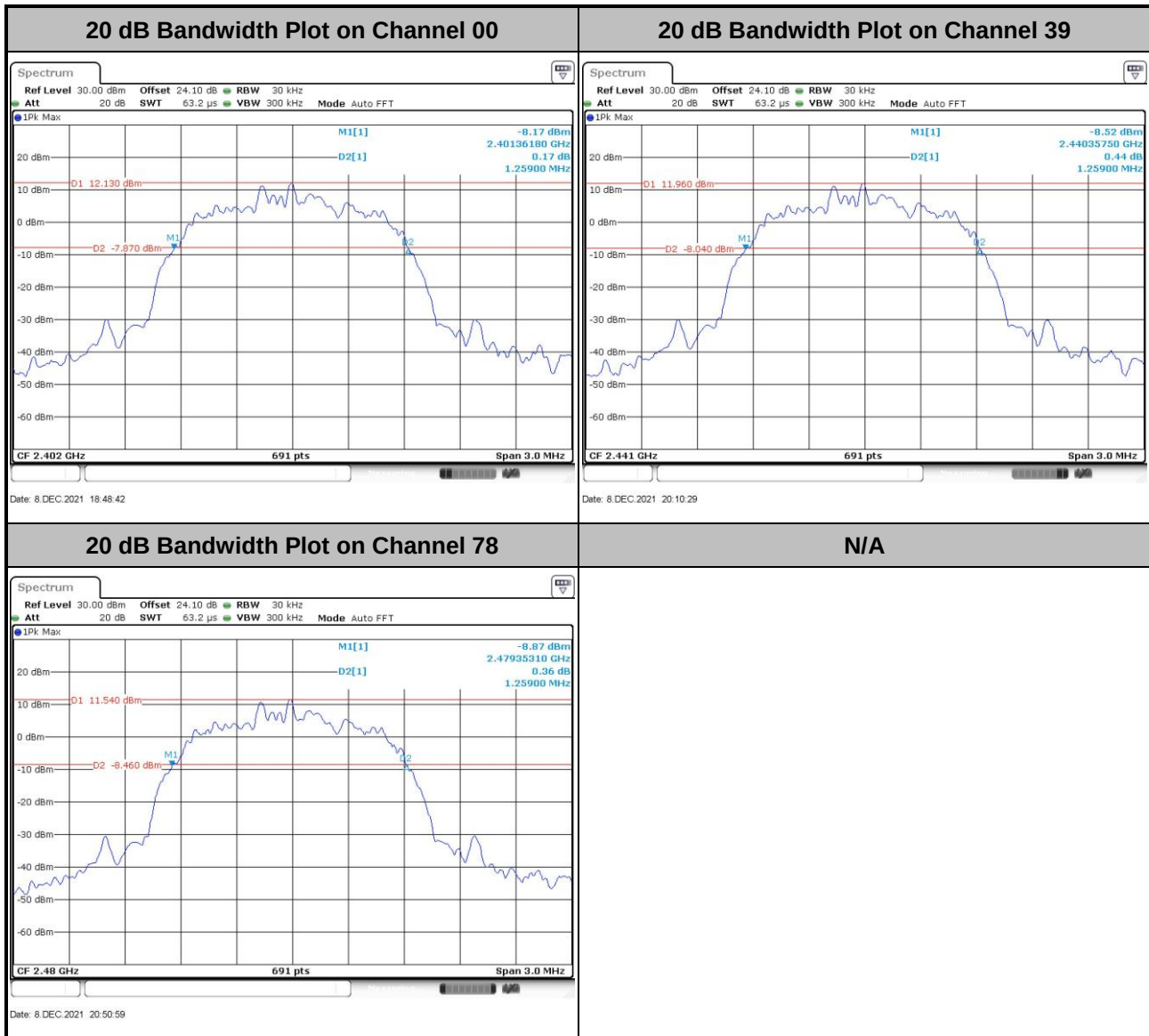


&lt;2Mbps&gt;





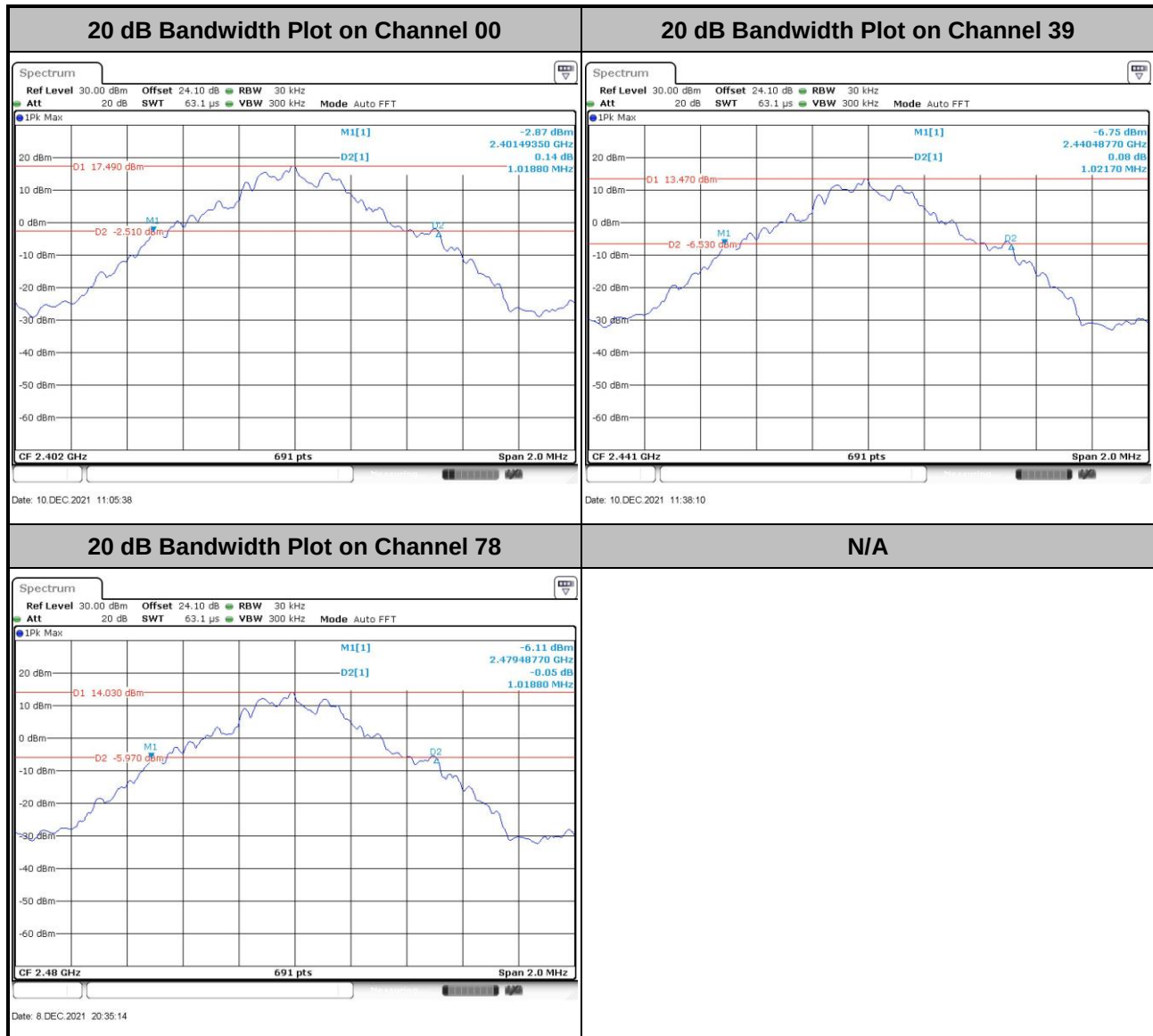
&lt;3Mbps&gt;





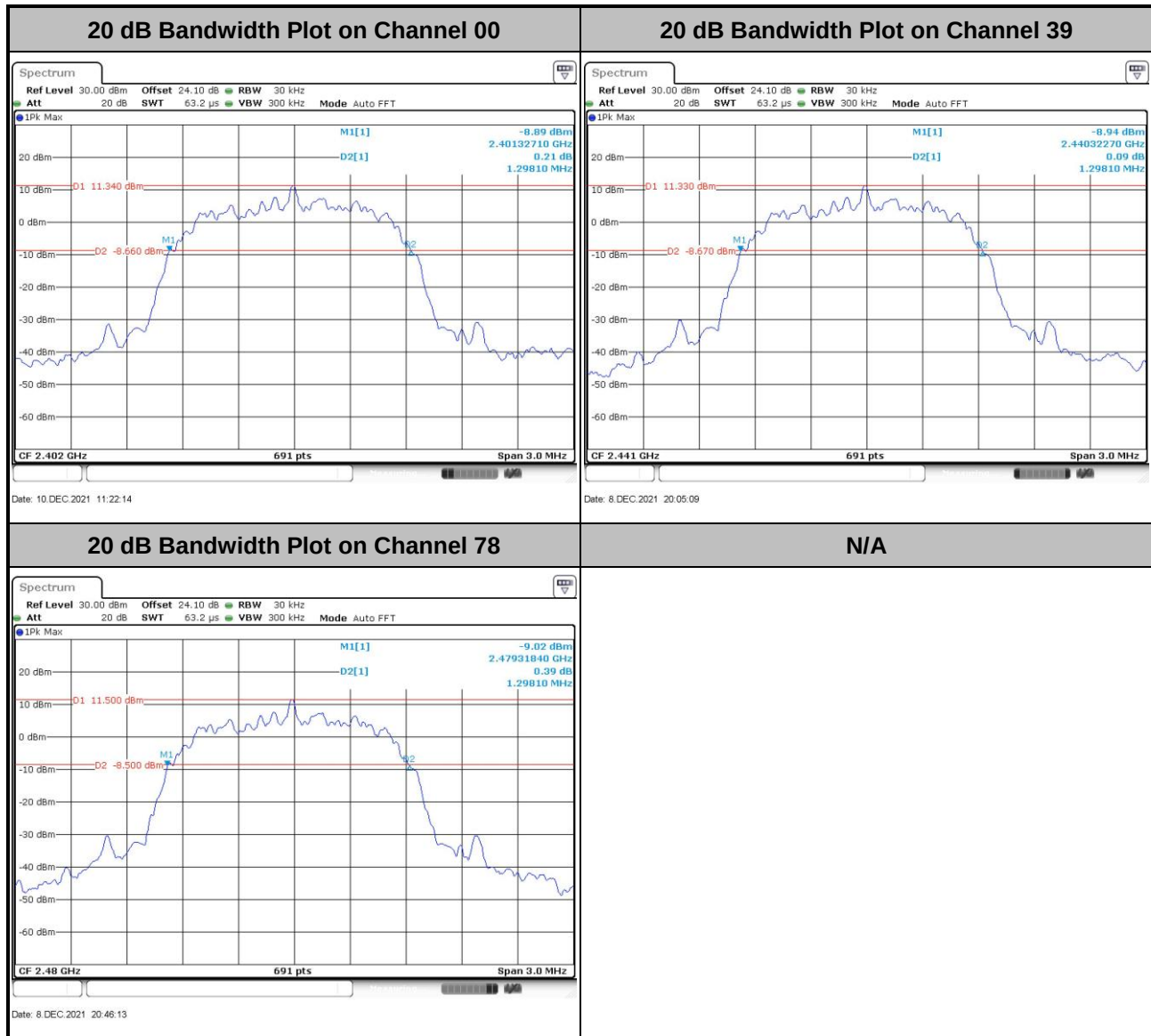
MIMO &lt;Ant. 3&gt;

&lt;1Mbps&gt;



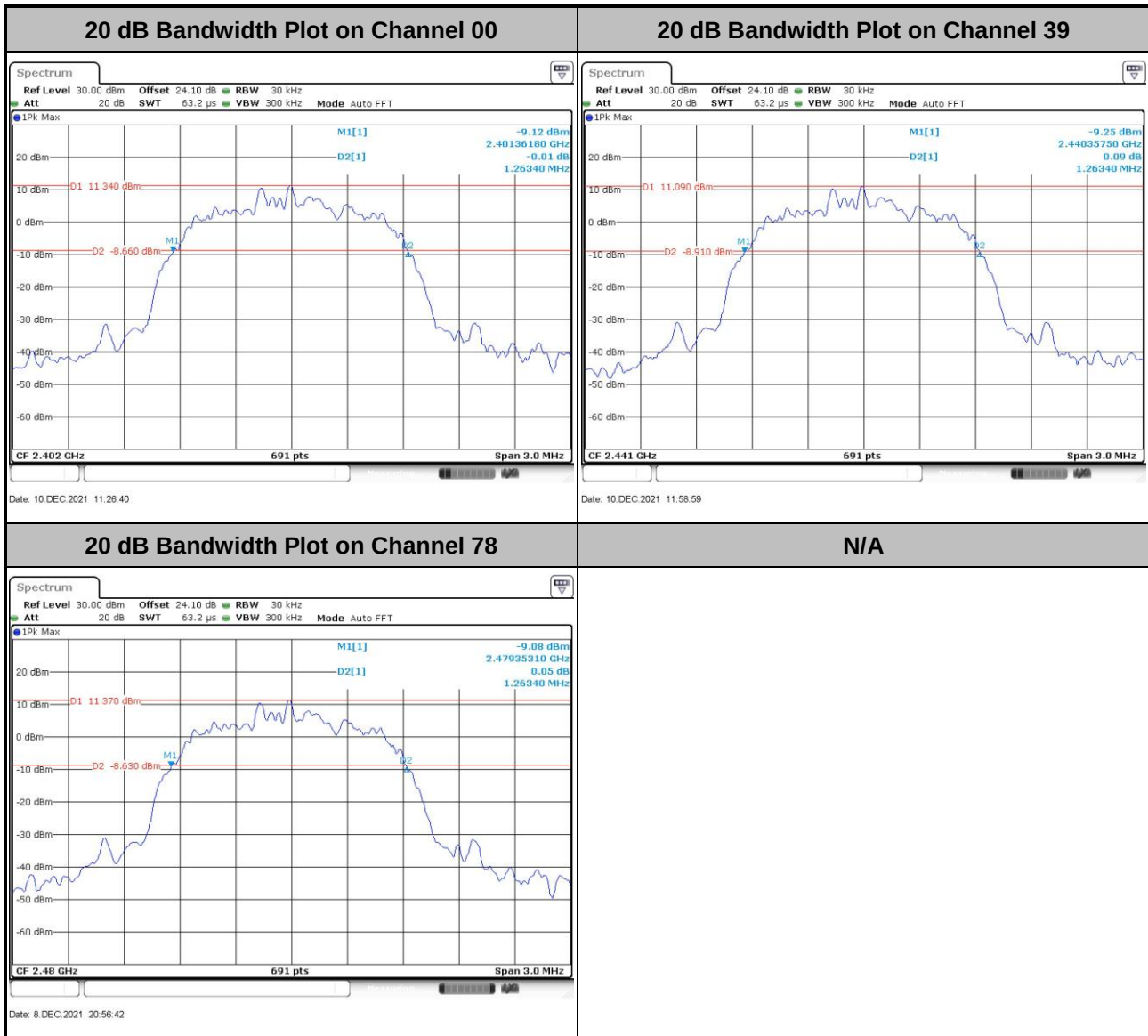


&lt;2Mbps&gt;





&lt;3Mbps&gt;



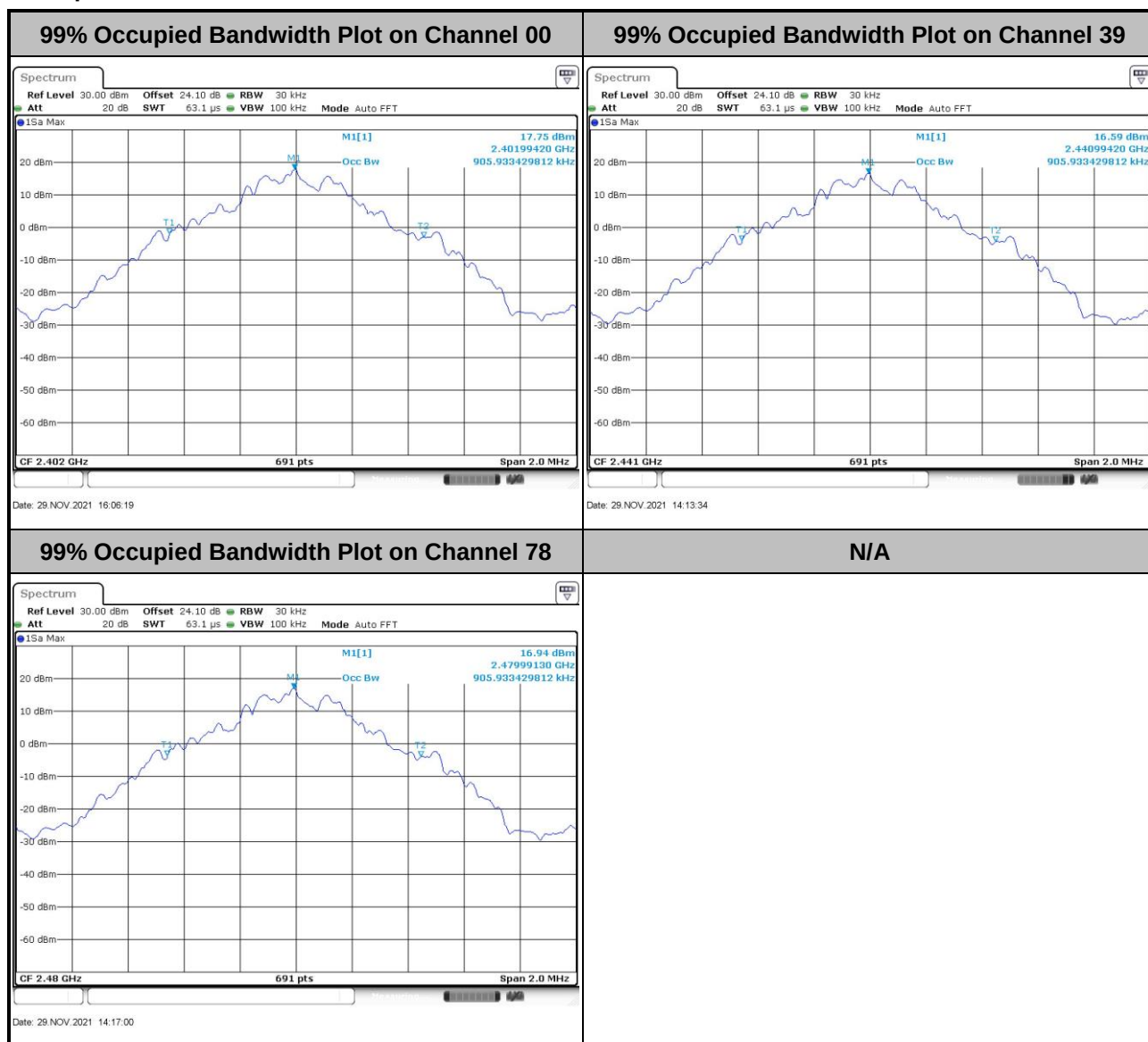


### 3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

<Ant. 4>

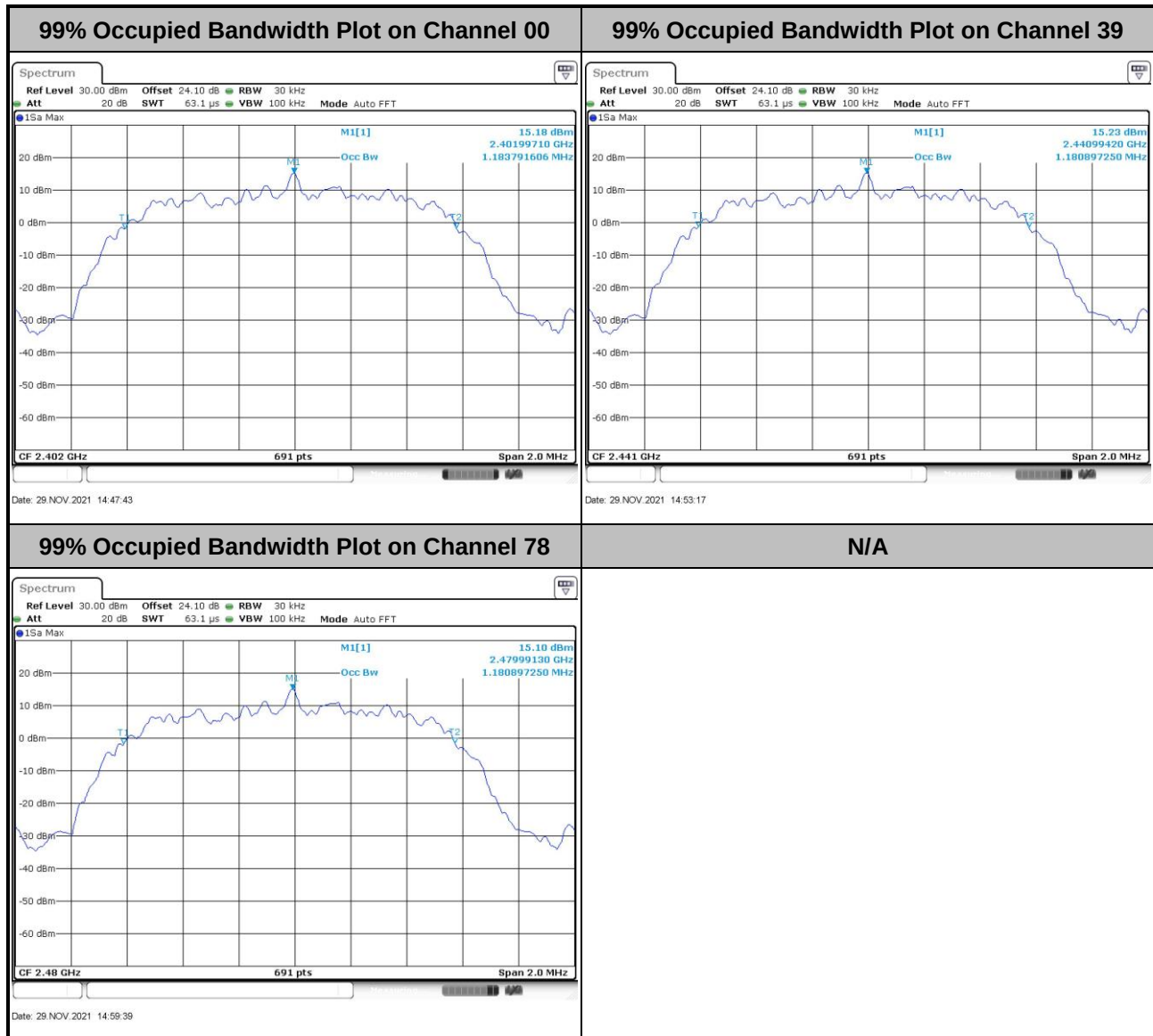
<1Mbps>



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



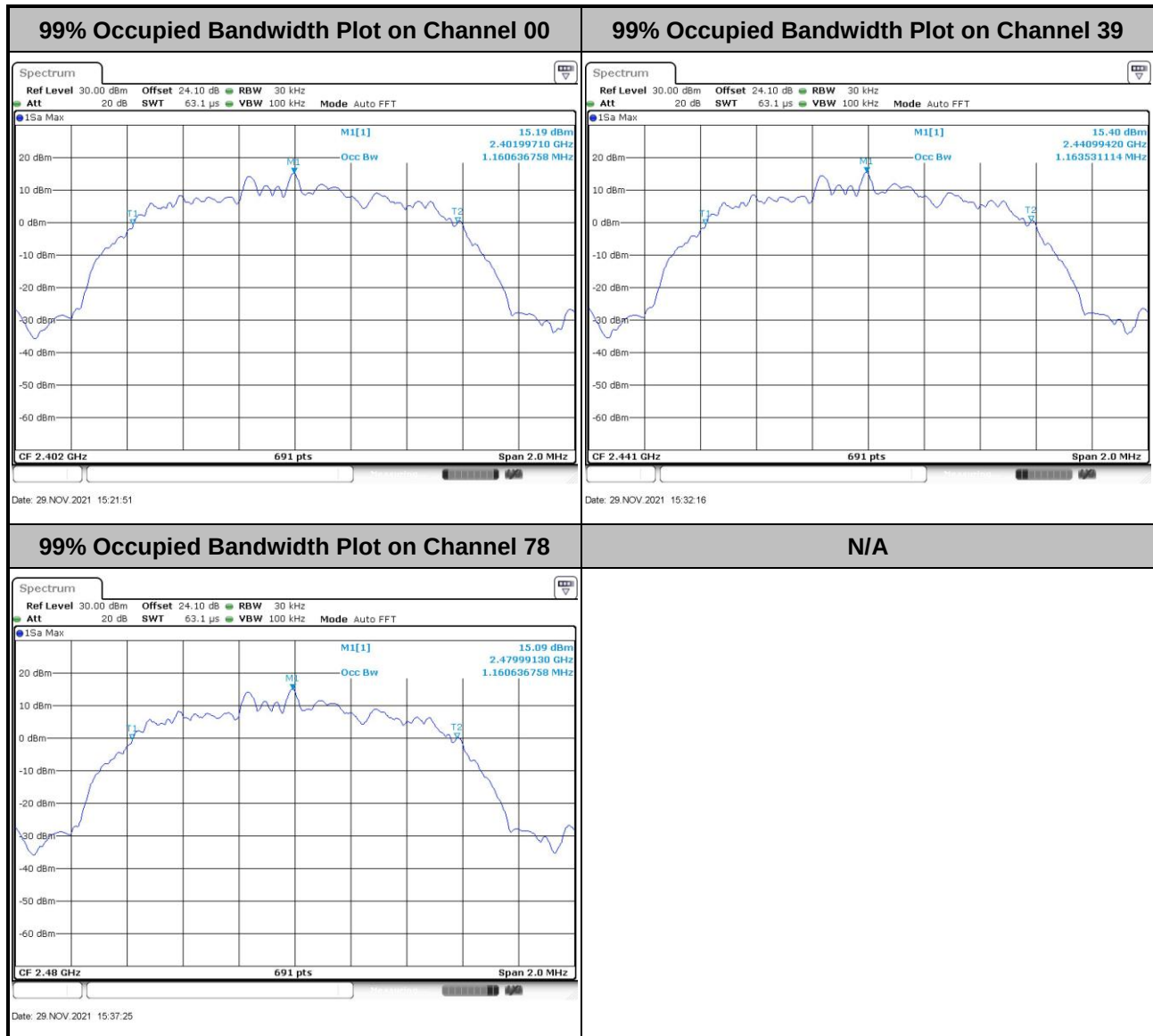
&lt;2Mbps&gt;



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



&lt;3Mbps&gt;

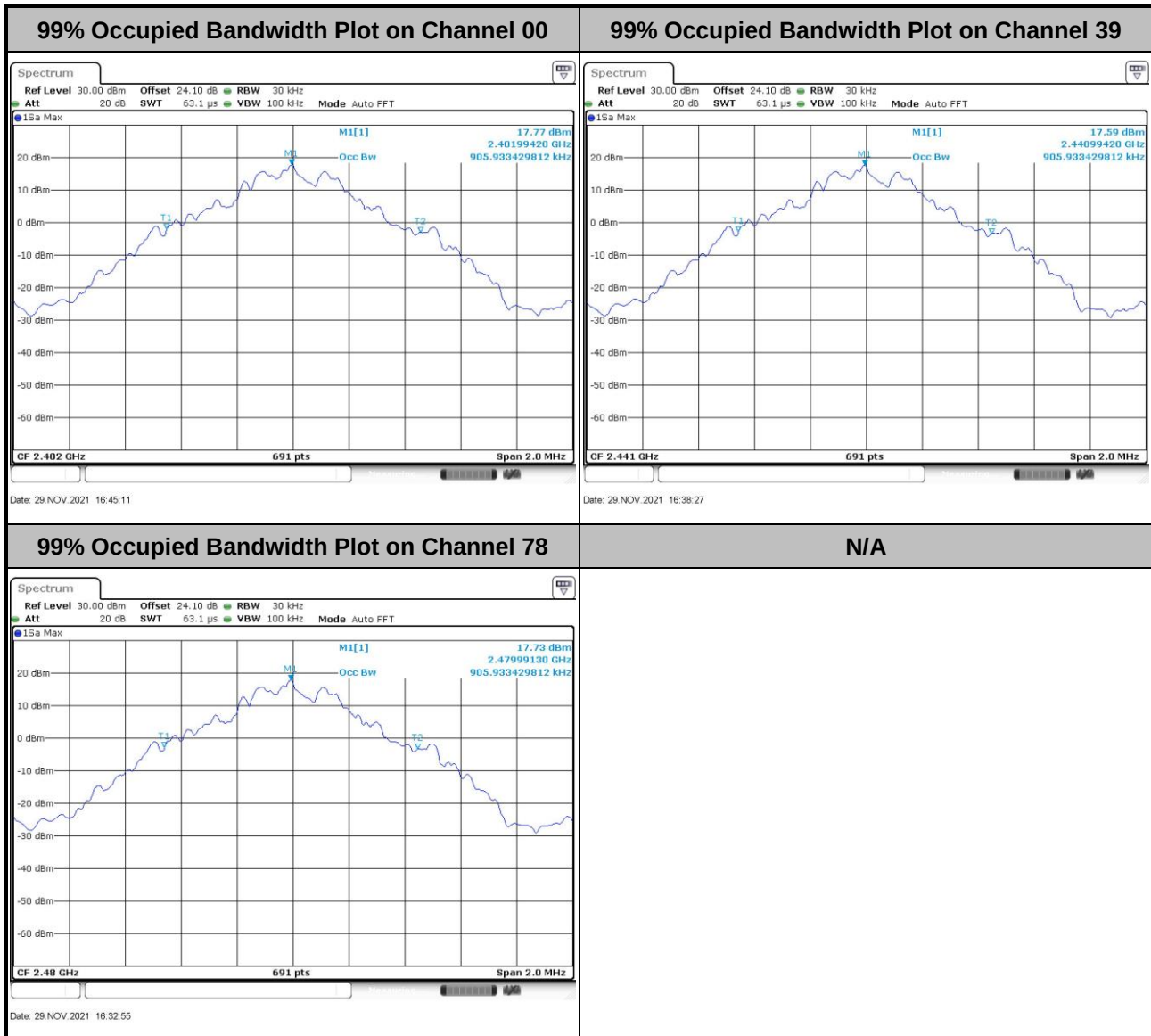


**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



&lt;Ant. 3&gt;

&lt;1Mbps&gt;



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.