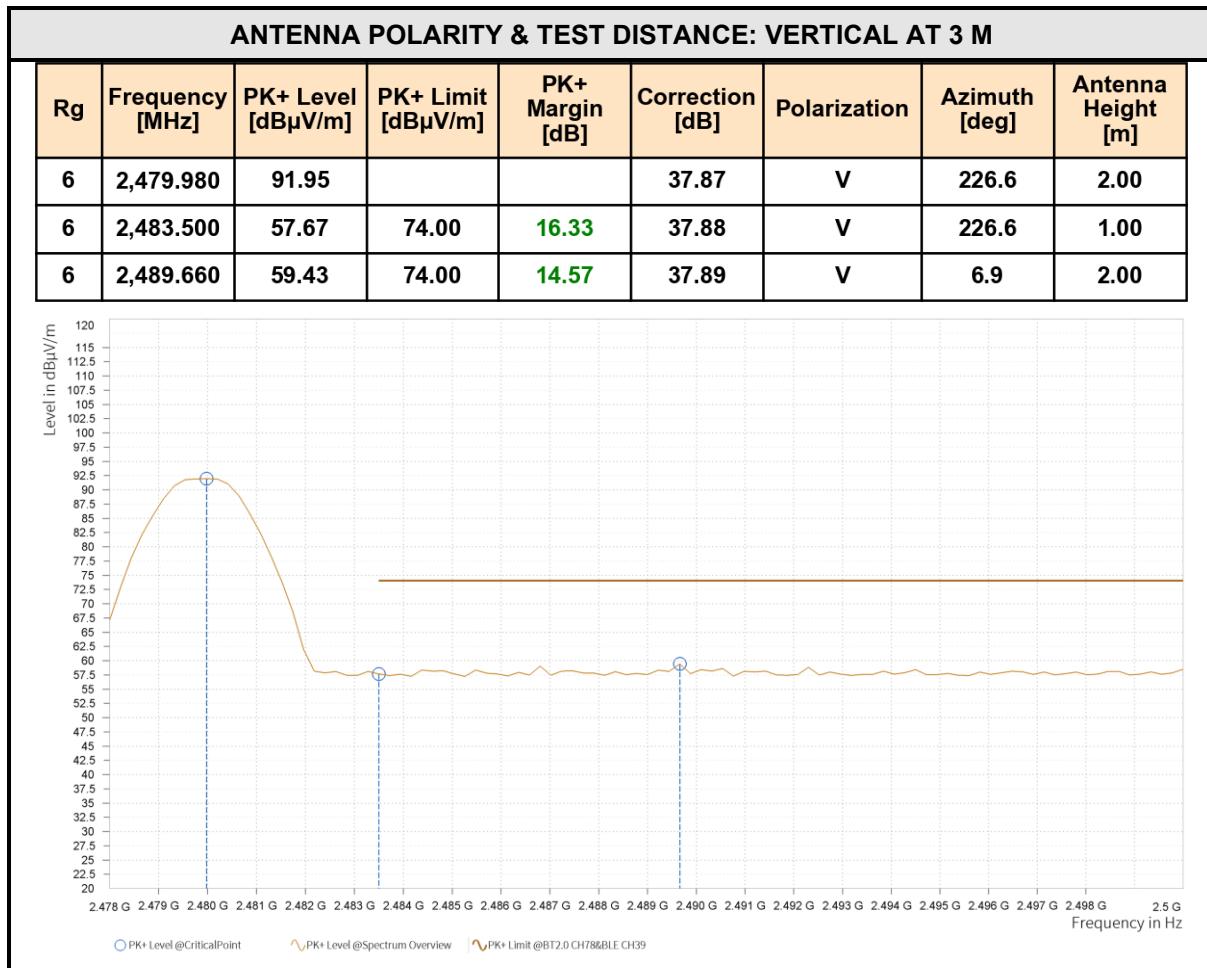




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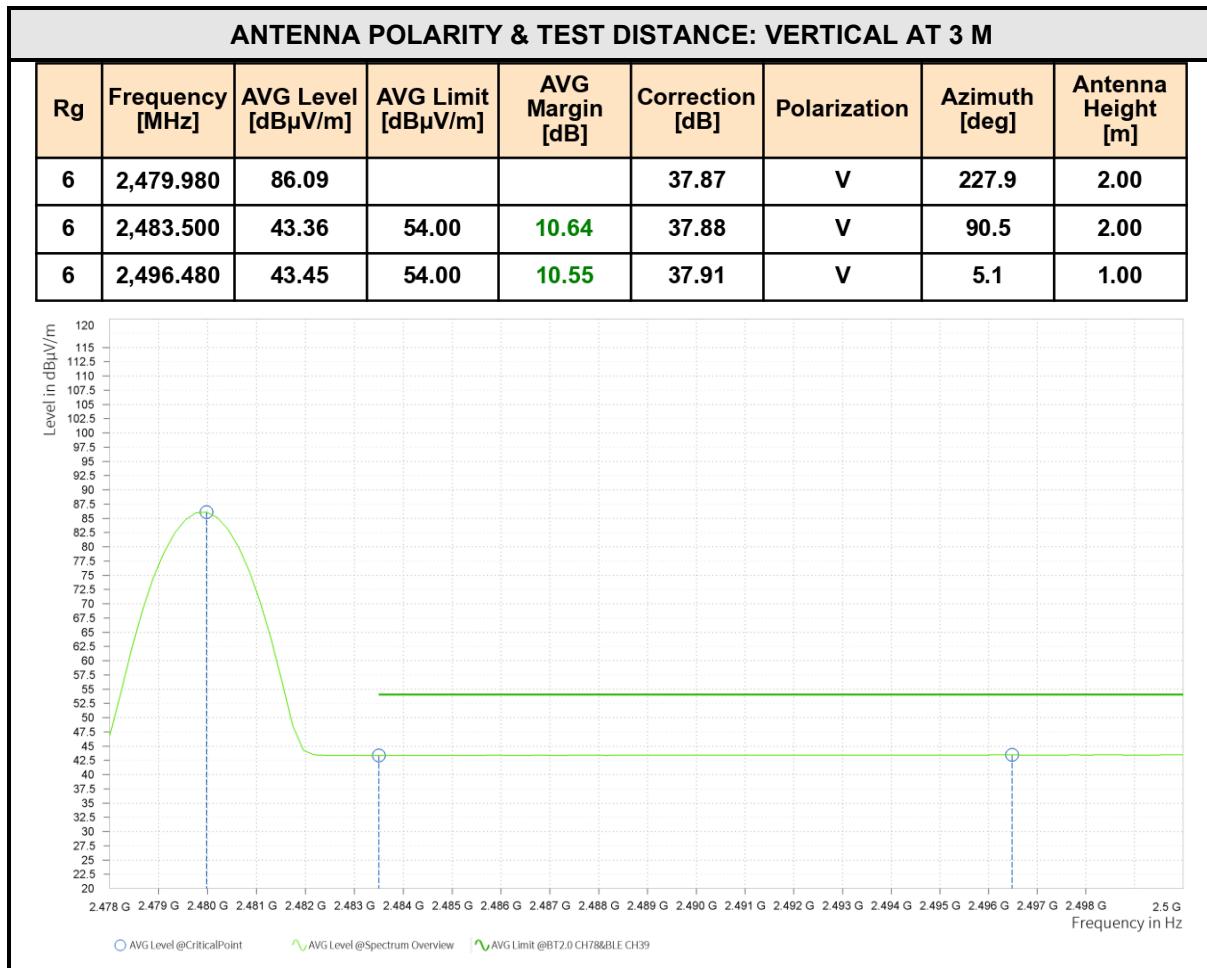
Test Report No.: PSU-QSU2503210311RF05





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#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
2. Margin value = Limit value – Emission level.
3. 2402MHz: Fundamental frequency.

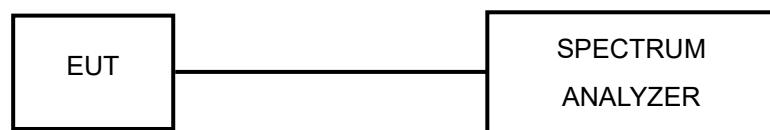


### 3.3 NUMBER OF HOPPING FREQUENCY USED

#### 3.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

#### 3.3.2 TEST SETUP





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### 3.3.3 TEST INSTRUMENTS

| Equipment                          | Manufacturer | Model No.       | Serial No.     | Last Cal. | Next Cal. |
|------------------------------------|--------------|-----------------|----------------|-----------|-----------|
| EMI Test Receiver                  | R&S          | ESW 44          | 101973         | Mar.28,24 | Mar.27,26 |
| Open Switch and Control Unit       | R&S          | OSP-B157W8      | 100836         | N/A       | N/A       |
| Vector Signal Generator            | R&S          | SMBV100B        | 102176         | Mar.29,24 | Mar.28,26 |
| Signal Generator                   | R&S          | SMB100A03       | 182185         | Mar.29,24 | Mar.28,26 |
| WIDEBANDRADIO COMMUNICATION TESTER | R&S          | CMW500          | 169399         | Jun.19,24 | Jun.18,26 |
| Hygrothermograph                   | DELI         | 20210528        | SZ015          | Sep.06,23 | Sep.05,25 |
| PC                                 | LENOVO       | E14             | HRSW0024       | N/A       | N/A       |
| CABLE                              | R&S          | J12J103539-00-1 | SEP-03-20-069  | Apr.27,24 | Apr.26,25 |
| CABLE                              | R&S          | J12J103539-00-1 | SEP-03-20-069  | Apr.26,25 | Apr.25,26 |
| CABLE                              | R&S          | J12J103539-00-1 | SEP-03-20-070  | Apr.27,24 | Apr.26,25 |
| CABLE                              | R&S          | J12J103539-00-1 | SEP-03-20-070  | Apr.26,25 | Apr.25,26 |
| Test Software                      | EMC32        | EMC32           | N/A            | N/A       | N/A       |
| Temperature Chamber                | votsch       | VT4002          | 58566078100050 | May.30,24 | May.29,26 |
| Power Meter                        | R&S          | NRX             | 102380         | Mar.28,24 | Mar.27,26 |
| Power Meter probe                  | R&S          | NRP6A           | 102942         | Mar.28,24 | Mar.27,26 |

#### NOTE:

1. The calibration interval of the above test instruments is 12 /24 months and the calibrations are traceable to CEPREI/CHINA, GRRG/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.



### 3.3.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were completed.

### 3.3.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.3.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

Please Refer to Appendix of this test report.

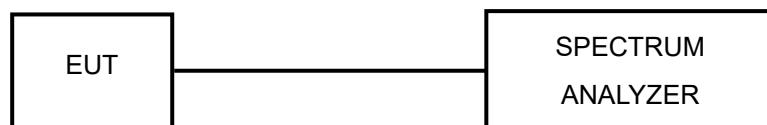


### 3.4 DWELL TIME ON EACH CHANNEL

#### 3.4.1 LIMIT OF DWELL TIME USED

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.

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.4.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency to be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.



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### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.4.6 TEST RESULTS

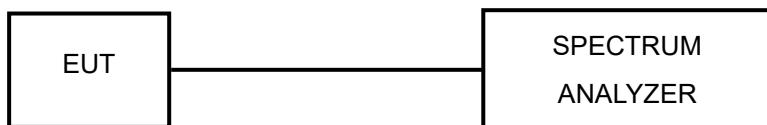
Please Refer to Appendix of this test report

### 3.5 CHANNEL BANDWIDTH

#### 3.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

#### 3.5.2 TEST SETUP



#### 3.5.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.5.4 TEST PROCEDURE

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

#### 3.5.5 DEVIATION FROM TEST STANDARD

No deviation.



### 3.5.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 3.5.7 TEST RESULTS

Please Refer to Appendix of this test report.



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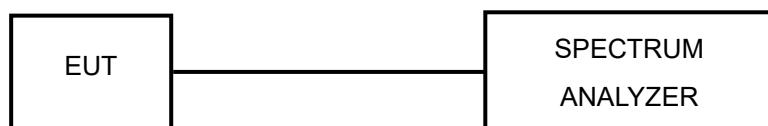
Test Report No.: PSU-QSU2503210311RF05

### 3.6 HOPPING CHANNEL SEPARATION

#### 3.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

#### 3.6.2 TEST SETUP



#### 3.6.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.6.4 TEST PROCEDURES

- 1 Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2 Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- 3 By using the MaxHold function record the separation of two adjacent channels.
- 4 Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- 5 Repeat above procedures until all frequencies measured were complete.

#### 3.6.1 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.6.2 TEST RESULTS

Please Refer to Appendix of this test report.

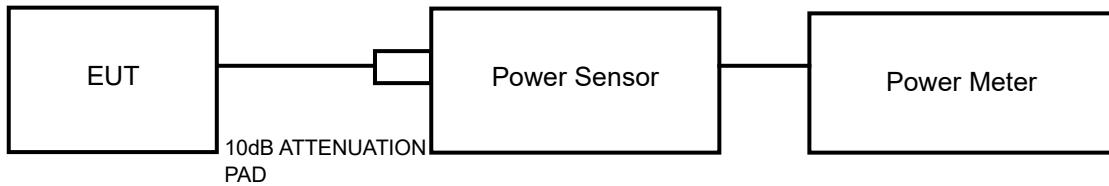


### 3.7 MAXIMUM OUTPUT POWER

#### 3.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

#### 3.7.2 TEST SETUP



#### 3.7.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.7.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.



### 3.7.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.7.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 3.7.7 TEST RESULTS

#### 3.7.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix of this test report.

#### 3.7.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

Please Refer to Appendix of this test report.



### **3.8 OUT OF BAND MEASUREMENT**

#### **3.8.1 LIMITS OF OUT OF BAND MEASUREMENT**

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

#### **3.8.2 TEST INSTRUMENTS**

Refer to section 3.3.3 to get information of above instrument.

#### **3.8.3 TEST PROCEDURE**

The transmitter output was connected to the spectrum analyzer via a low loss cable. Spectrum Analyzer was set RBW to 100 kHz and VBW to 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. Detector = PEAK and Trace mode = Max Hold. The band edges was measured and recorded.

#### **3.8.4 DEVIATION FROM TEST STANDARD**

No deviation.

#### **3.8.5 EUT OPERATING CONDITION**

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### **3.8.6 TEST RESULTS**

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

Please Refer to Appendix of this test report.



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## **4 PHOTOGRAPHS OF THE TEST CONFIGURATION**

Please refer to the attached file (Test Setup Photo).



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## **5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.



## 6 Appendix

### 20DB EMISSION BANDWIDTH

### TEST RESULT

| TestMode | Antenna | Channel | 20db<br>EBW[MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|----------|---------|---------|------------------|----------|----------|------------|---------|
| DH5      | ANT1    | 2402    | 0.802            | 2401.591 | 2402.393 | ---        | PASS    |
|          |         | 2441    | 0.802            | 2440.591 | 2441.393 | ---        | PASS    |
|          |         | 2480    | 0.802            | 2479.591 | 2480.393 | ---        | PASS    |
| 2DH5     | ANT1    | 2402    | 1.233            | 2401.386 | 2402.619 | ---        | PASS    |
|          |         | 2441    | 1.213            | 2440.386 | 2441.599 | ---        | PASS    |
|          |         | 2480    | 1.213            | 2479.386 | 2480.599 | ---        | PASS    |
| 3DH5     | ANT1    | 2402    | 1.263            | 2401.356 | 2402.619 | ---        | PASS    |
|          |         | 2441    | 1.253            | 2440.361 | 2441.614 | ---        | PASS    |
|          |         | 2480    | 1.248            | 2479.366 | 2480.614 | ---        | PASS    |



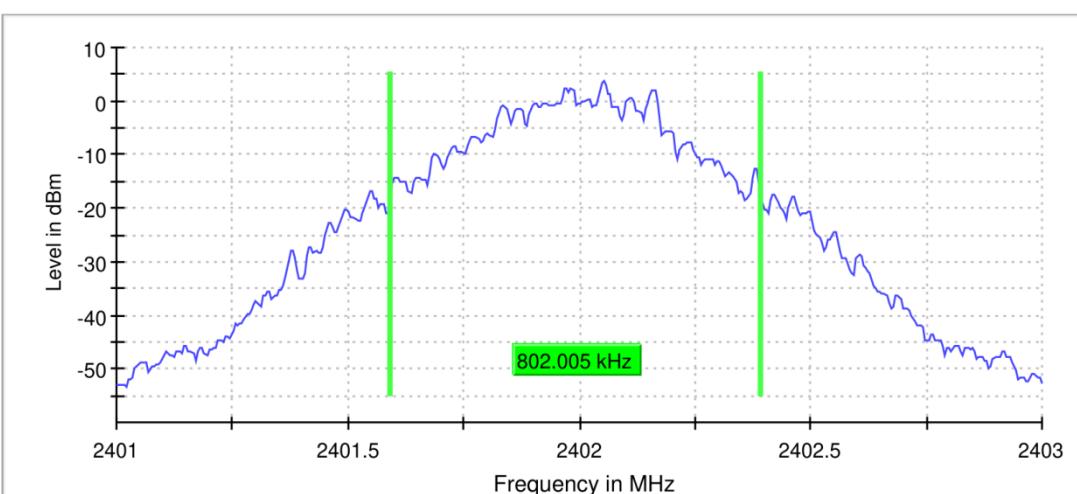
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Test Report No.: PSU-QSU2503210311RF05

## TEST GRAPHS

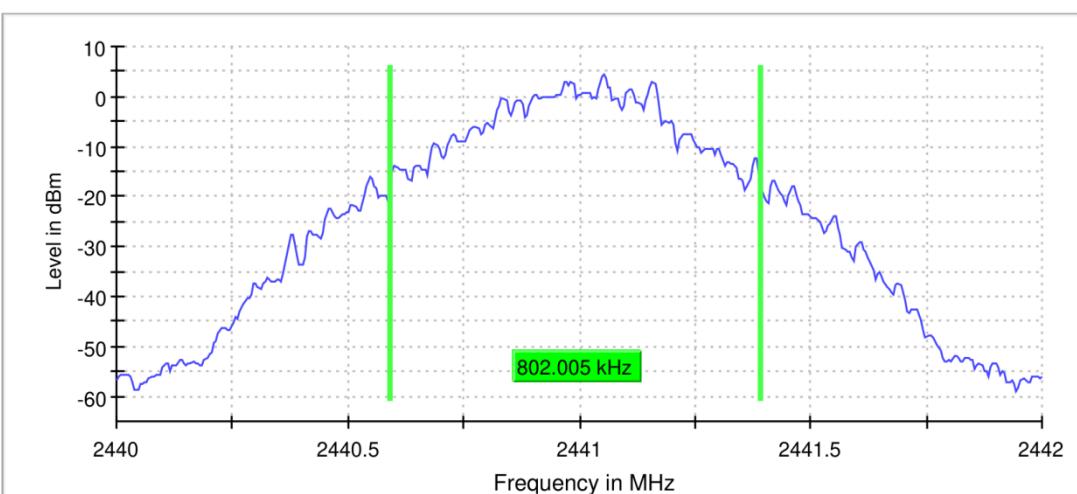
DH5\_ANT1\_2402

20 dB Bandwidth



DH5\_ANT1\_2441

20 dB Bandwidth



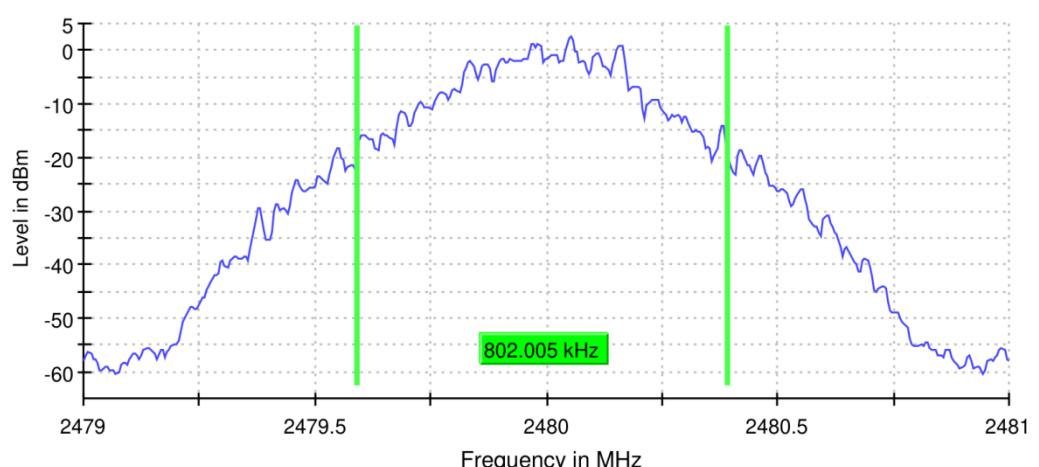
DH5\_ANT1\_2480



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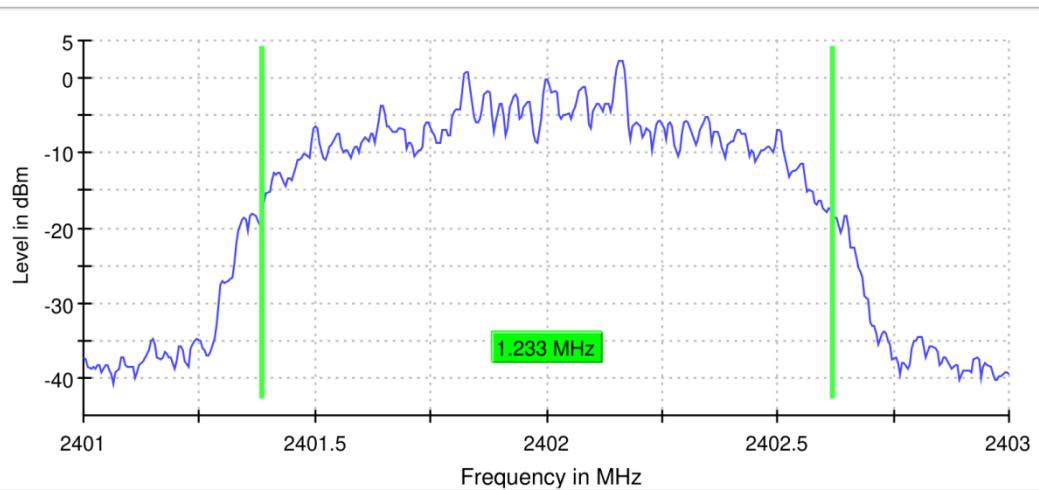
Test Report No.: PSU-QSU2503210311RF05

20 dB Bandwidth



2DH5\_ANT1\_2402

20 dB Bandwidth



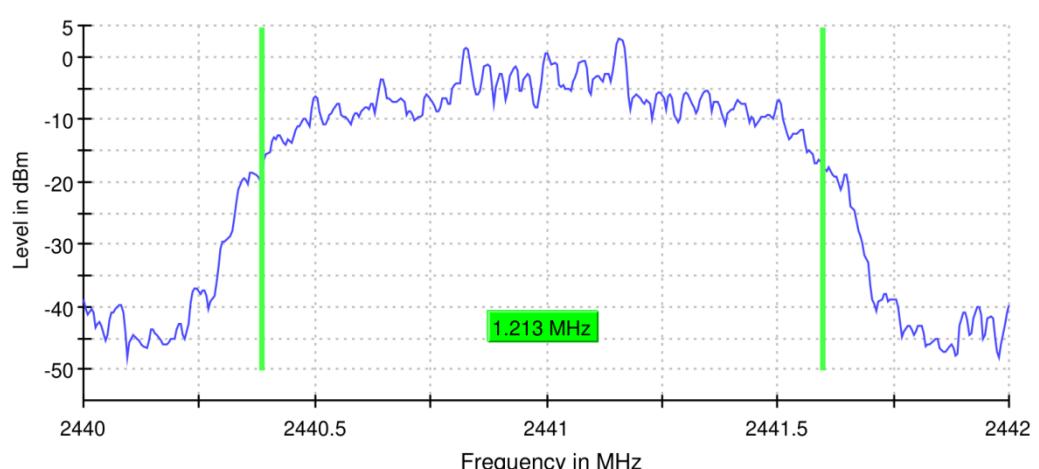
2DH5\_ANT1\_2441



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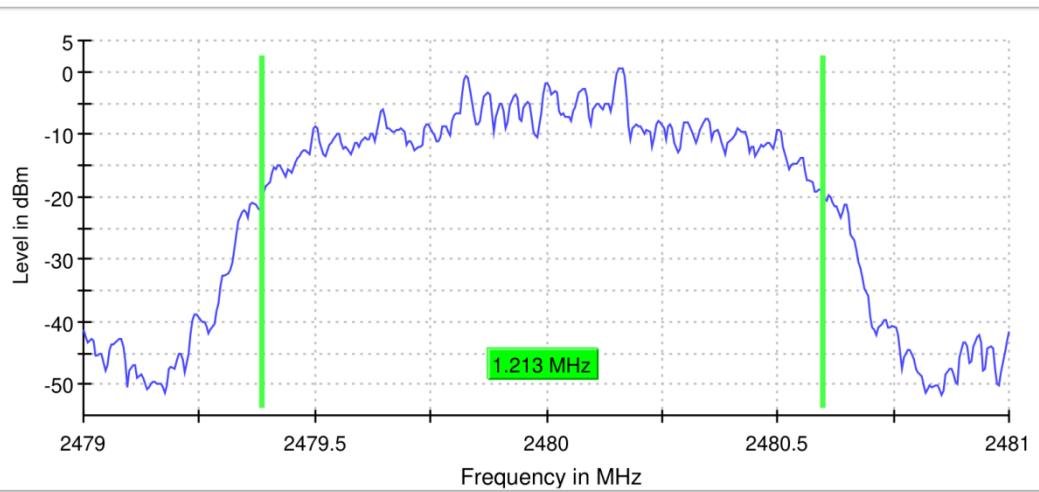
Test Report No.: PSU-QSU2503210311RF05

20 dB Bandwidth



2DH5\_ANT1\_2480

20 dB Bandwidth



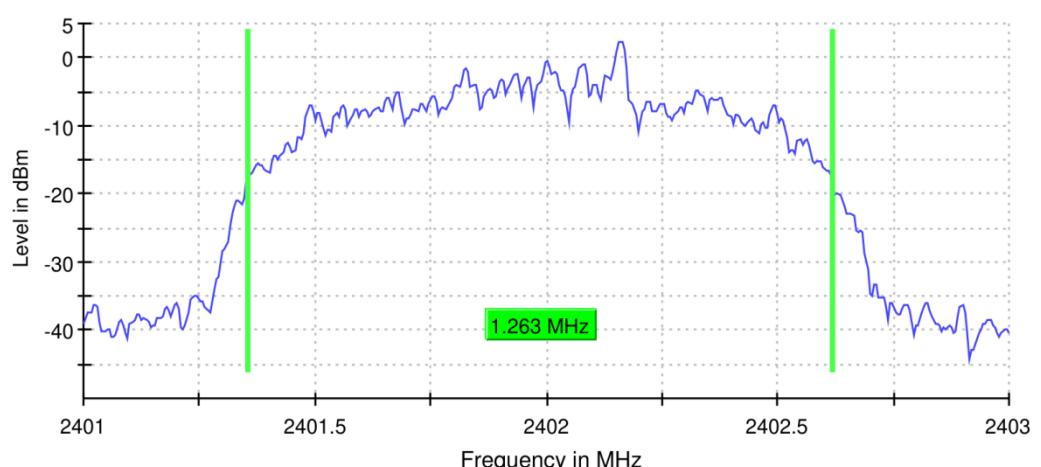
3DH5\_ANT1\_2402



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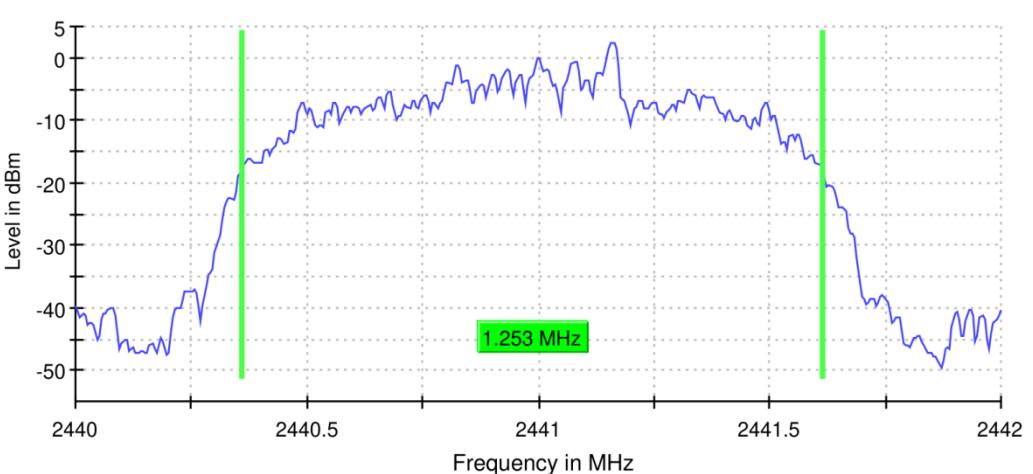
Test Report No.: PSU-QSU2503210311RF05

20 dB Bandwidth



3DH5\_ANT1\_2441

20 dB Bandwidth



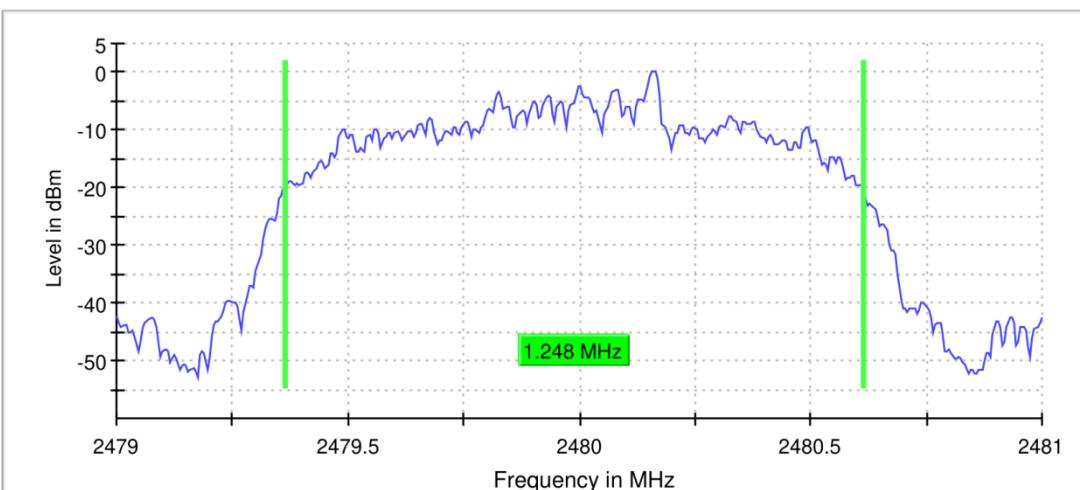
3DH5\_ANT1\_2480



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Test Report No.: PSU-QSU2503210311RF05

20 dB Bandwidth



RBW 30.000 kHz

VBW 100.000 kHz



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Test Report No.: PSU-QSU2503210311RF05

## OCCUPIED CHANNEL BANDWIDTH

### TEST RESULT

| TestMode | Antenna | Channel | OCB [MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|----------|---------|---------|-----------|----------|----------|------------|---------|
| DH5      | ANT1    | 2402    | 0.777     | 2401.607 | 2402.383 | ---        | PASS    |
|          |         | 2441    | 0.762     | 2440.617 | 2441.378 | ---        | PASS    |
|          |         | 2480    | 0.762     | 2479.617 | 2480.378 | ---        | PASS    |
| 2DH5     | ANT1    | 2402    | 1.163     | 2401.411 | 2402.574 | ---        | PASS    |
|          |         | 2441    | 1.143     | 2440.416 | 2441.559 | ---        | PASS    |
|          |         | 2480    | 1.138     | 2479.421 | 2480.559 | ---        | PASS    |
| 3DH5     | ANT1    | 2402    | 1.168     | 2401.406 | 2402.574 | ---        | PASS    |
|          |         | 2441    | 1.158     | 2440.411 | 2441.569 | ---        | PASS    |
|          |         | 2480    | 1.153     | 2479.416 | 2480.569 | ---        | PASS    |



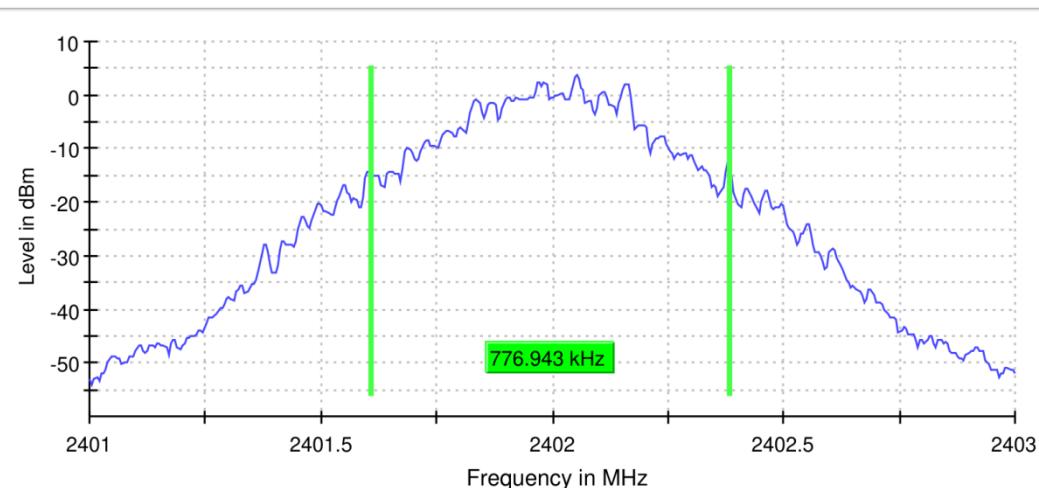
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Test Report No.: PSU-QSU2503210311RF05

## TEST GRAPHS

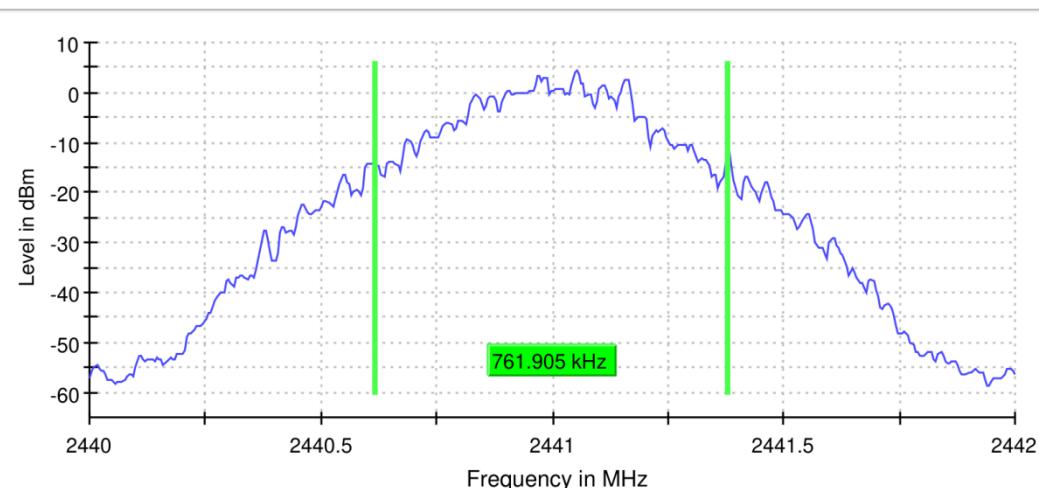
### DH5\_ANT1\_2402

99 % Bandwidth



### DH5\_ANT1\_2441

99 % Bandwidth



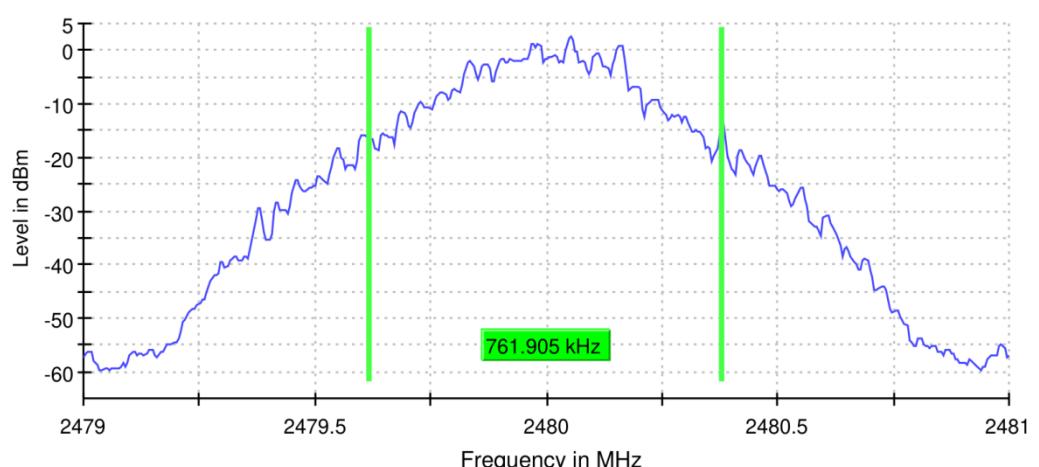
### DH5\_ANT1\_2480



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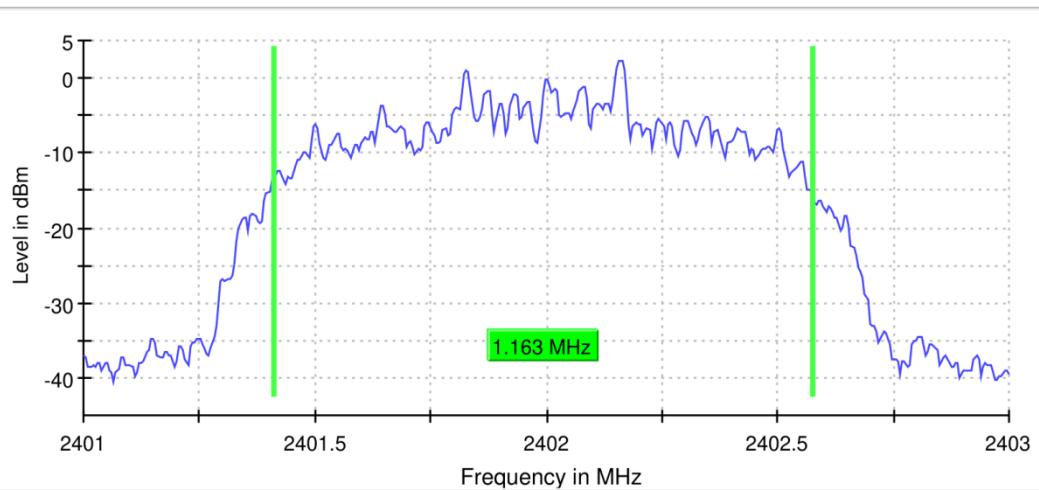
Test Report No.: PSU-QSU2503210311RF05

99 % Bandwidth



2DH5\_ANT1\_2402

99 % Bandwidth



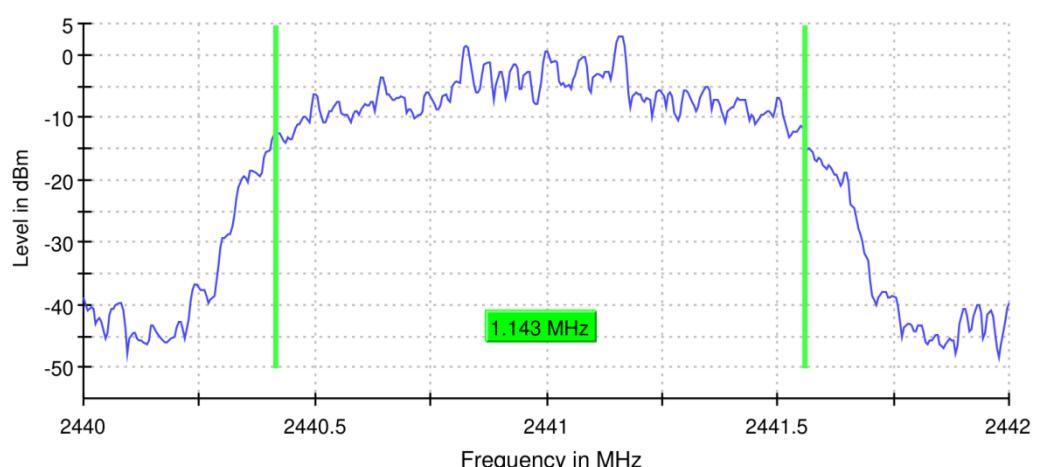
2DH5\_ANT1\_2441



BUREAU  
VERITAS

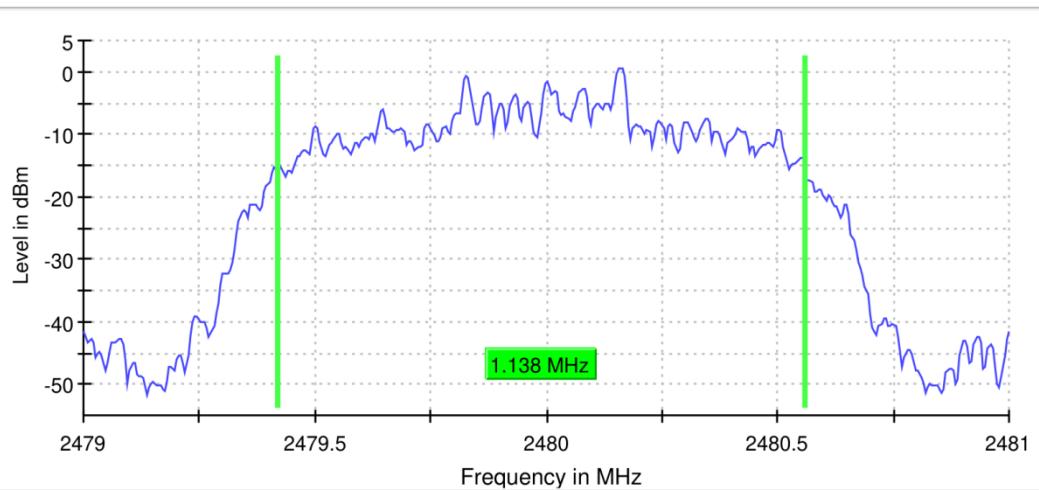
Test Report No.: PSU-QSU2503210311RF05

99 % Bandwidth



2DH5\_ANT1\_2480

99 % Bandwidth



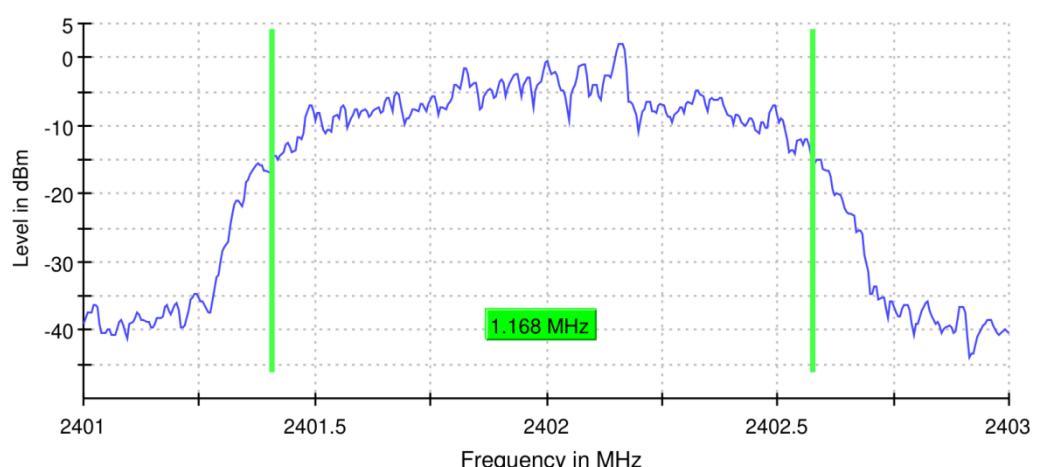
3DH5\_ANT1\_2402



BUREAU  
VERITAS

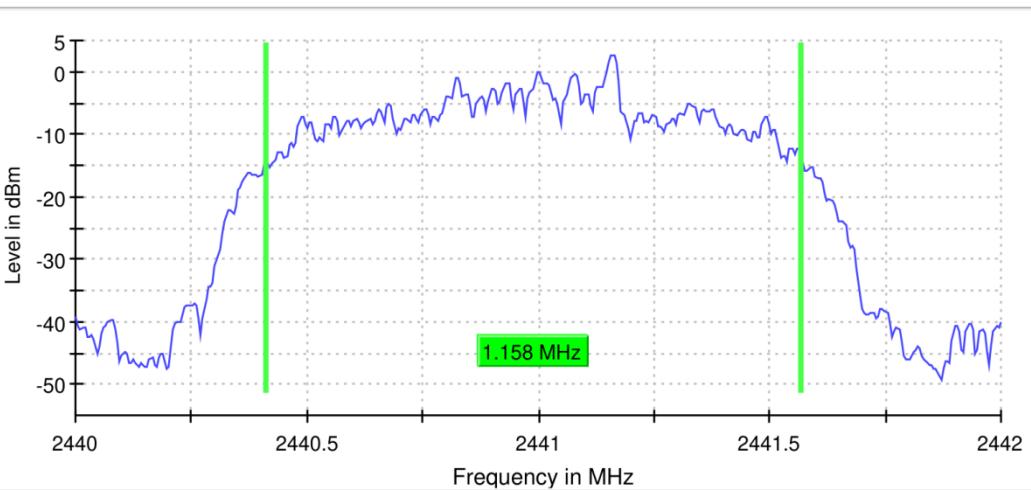
Test Report No.: PSU-QSU2503210311RF05

99 % Bandwidth



3DH5\_ANT1\_2441

99 % Bandwidth



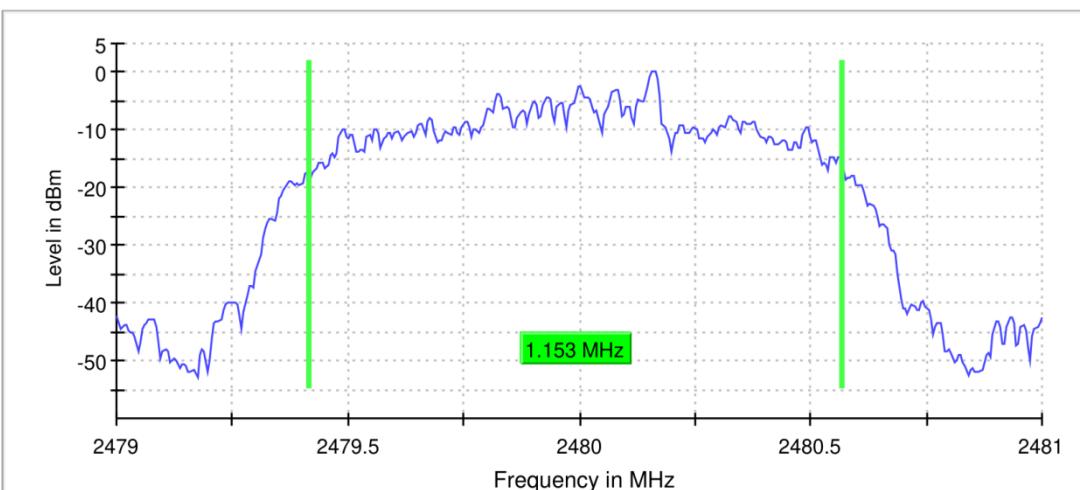
3DH5\_ANT1\_2480



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Test Report No.: PSU-QSU2503210311RF05

99 % Bandwidth



RBW 30.000 kHz

VBW 100.000 kHz



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VERITAS

Test Report No.: PSU-QSU2503210311RF05

## MAXIMUM CONDUCTED OUTPUT POWER

### TEST RESULT

| TestMode | Antenna | Frequency<br>[MHz] | Average<br>power<br>[dBm] | Peak<br>Power<br>[dBm] | Peak<br>Power<br>[mw] | Conducted<br>Limit<br>[dBm] | Verdict |
|----------|---------|--------------------|---------------------------|------------------------|-----------------------|-----------------------------|---------|
| DH5      | Ant1    | 2402               | 9.12                      | 10.01                  | 10.02                 | ≤20.97                      | PASS    |
|          |         | 2441               | 9.43                      | 10.11                  | 10.26                 | ≤20.97                      | PASS    |
|          |         | 2480               | 9.85                      | 10.59                  | 11.46                 | ≤20.97                      | PASS    |
| 2DH5     | Ant1    | 2402               | 6.38                      | 9.39                   | 8.69                  | ≤20.97                      | PASS    |
|          |         | 2441               | 6.32                      | 9.48                   | 8.87                  | ≤20.97                      | PASS    |
|          |         | 2480               | 6.57                      | 9.77                   | 9.48                  | ≤20.97                      | PASS    |
| 3DH5     | Ant1    | 2402               | 4.48                      | 7.36                   | 5.45                  | ≤20.97                      | PASS    |
|          |         | 2441               | 4.63                      | 7.79                   | 6.01                  | ≤20.97                      | PASS    |
|          |         | 2480               | 5.83                      | 8.97                   | 7.89                  | ≤20.97                      | PASS    |



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Test Report No.: PSU-QSU2503210311RF05

## CARRIER FREQUENCY SEPARATION

### TEST RESULT

| TestMode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|---------|-------------|------------|---------|
| DH5      | ANT1    | Hop     | 0.990       | ≥0.5347    | PASS    |
| 2DH5     | ANT1    | Hop     | 0.990       | ≥0.8087    | PASS    |
| 3DH5     | ANT1    | Hop     | 0.990       | ≥0.8320    | PASS    |



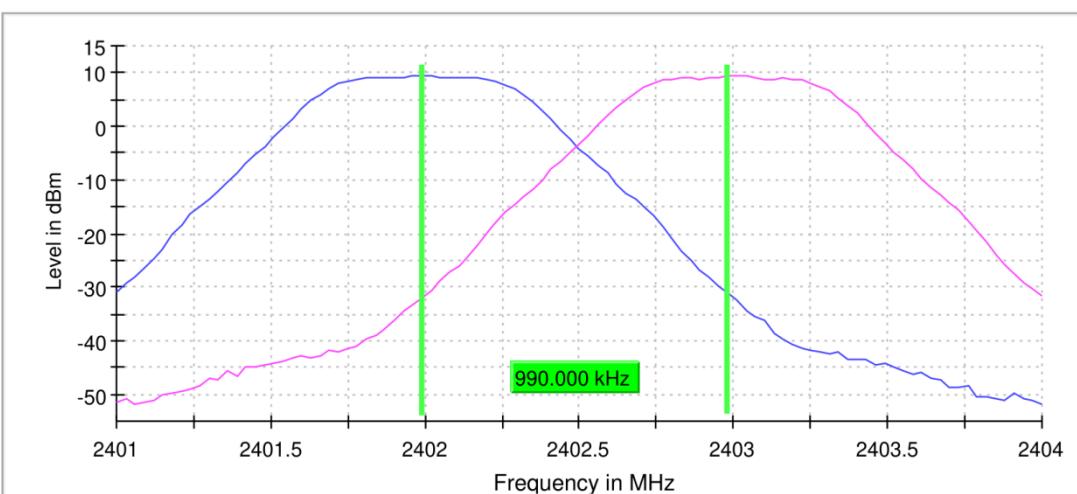
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Test Report No.: PSU-QSU2503210311RF05

## TEST GRAPHS

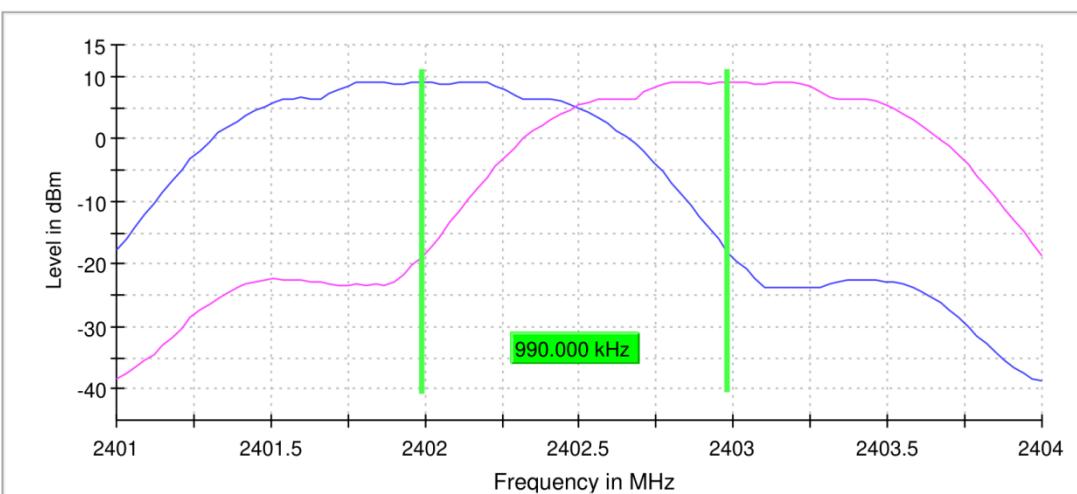
### DH5\_ANT1\_Hop

CFS



### 2DH5\_ANT1\_Hop

CFS



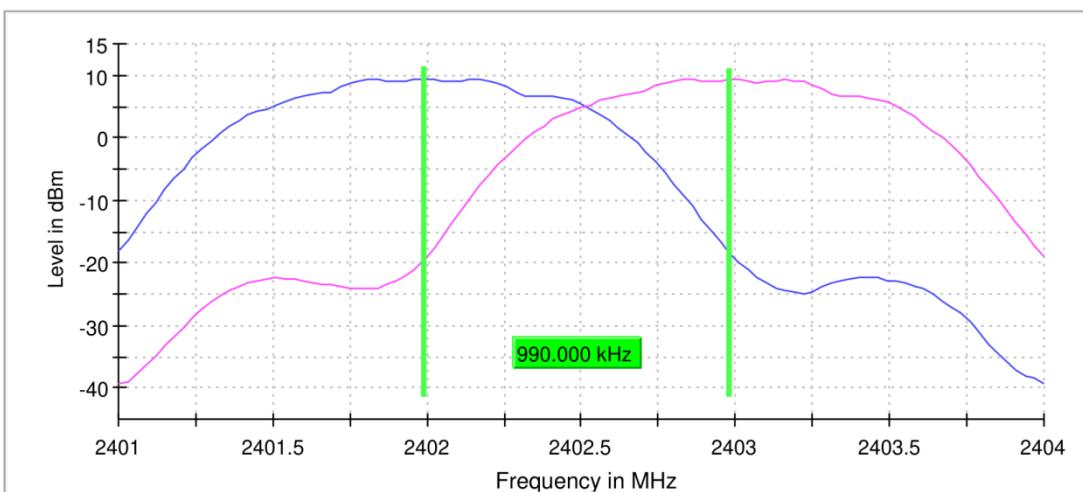
### 3DH5\_ANT1\_Hop



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Test Report No.: PSU-QSU2503210311RF05

CFS



RBW 300.000 kHz

VBW 300.000 kHz



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Test Report No.: PSU-QSU2503210311RF05

## TIME OF OCCUPANCY

## TEST RESULT

| TestMode | Antenna | Channel | BurstWidth<br>[ms] | TotalHops<br>[Num] | Result[s] | Limit[s]   | Verdict |
|----------|---------|---------|--------------------|--------------------|-----------|------------|---------|
| DH1      | ANT1    | Hop     | 0.376              | 301                | 0.113     | $\leq 0.4$ | PASS    |
| DH3      | ANT1    | Hop     | 1.632              | 145                | 0.237     | $\leq 0.4$ | PASS    |
| DH5      | ANT1    | Hop     | 2.880              | 98                 | 0.283     | $\leq 0.4$ | PASS    |
| 2DH1     | ANT1    | Hop     | 0.384              | 303                | 0.116     | $\leq 0.4$ | PASS    |
| 2DH3     | ANT1    | Hop     | 1.640              | 149                | 0.244     | $\leq 0.4$ | PASS    |
| 2DH5     | ANT1    | Hop     | 2.888              | 110                | 0.318     | $\leq 0.4$ | PASS    |
| 3DH1     | ANT1    | Hop     | 0.384              | 312                | 0.120     | $\leq 0.4$ | PASS    |
| 3DH3     | ANT1    | Hop     | 1.640              | 165                | 0.271     | $\leq 0.4$ | PASS    |
| 3DH5     | ANT1    | Hop     | 2.888              | 108                | 0.312     | $\leq 0.4$ | PASS    |

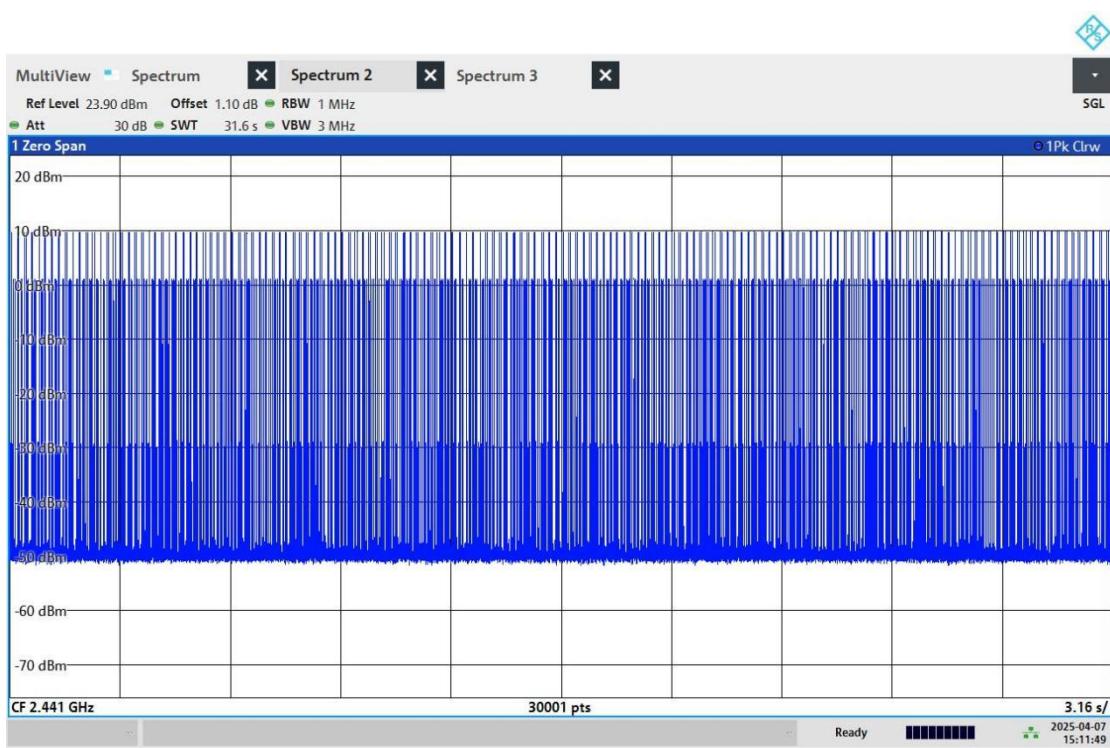


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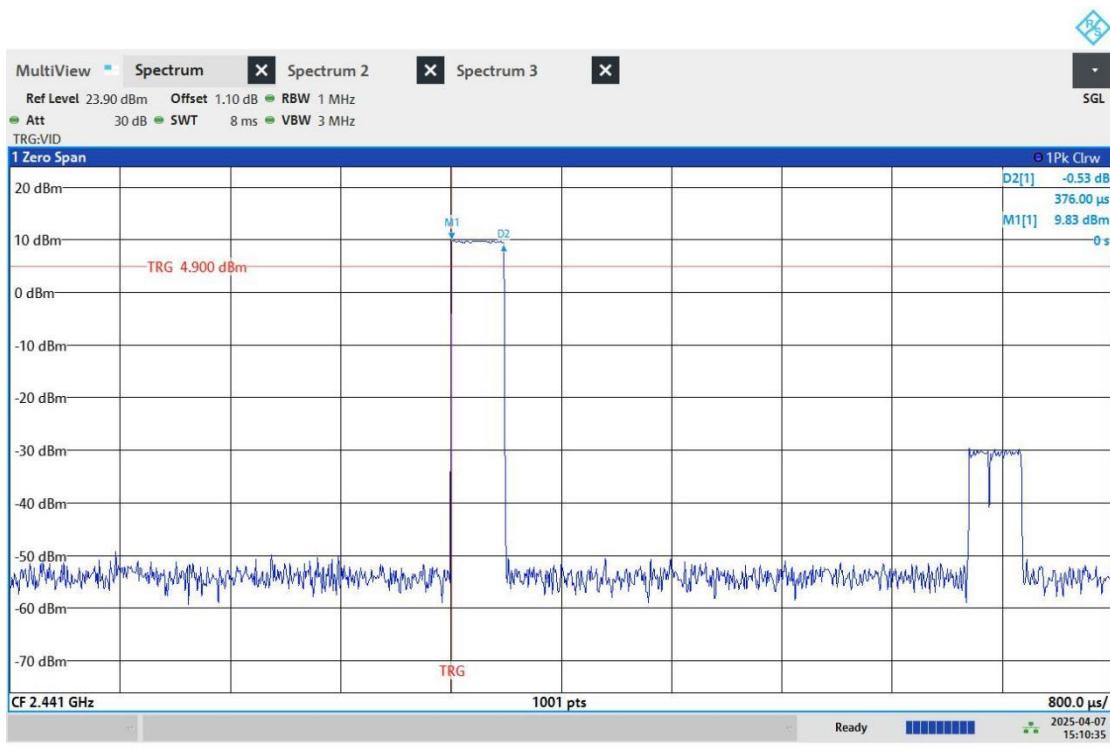
Test Report No.: PSU-QSU2503210311RF05

## TEST GRAPHS

### DH1\_ANT1\_Hop



### DH1\_ANT1\_Hop



### DH3\_ANT1\_Hop

Huarui 7layers High Technology  
(Suzhou) Co., Ltd.

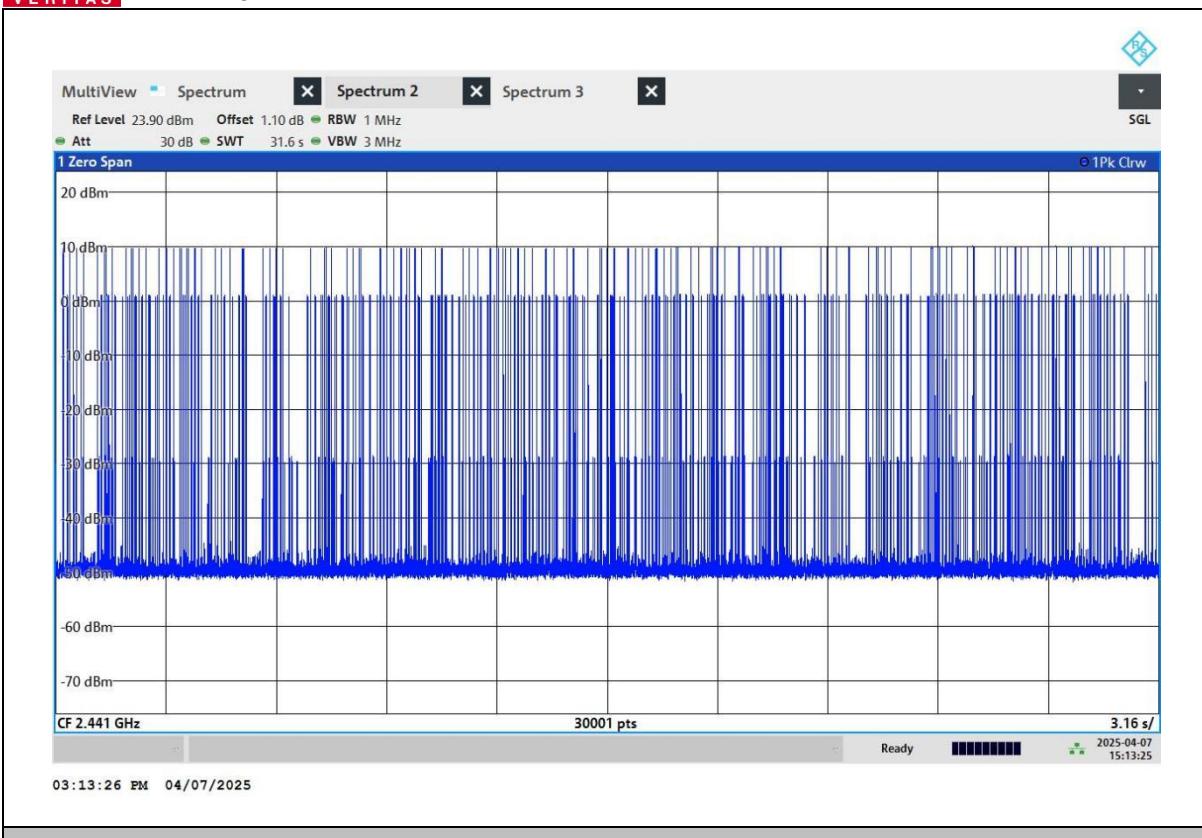
Tower N, Innovation Center, 88 Zuyi Road, High-tech  
District, Suzhou City, Anhui Province, China

Tel: +86 (0557) 368 1008

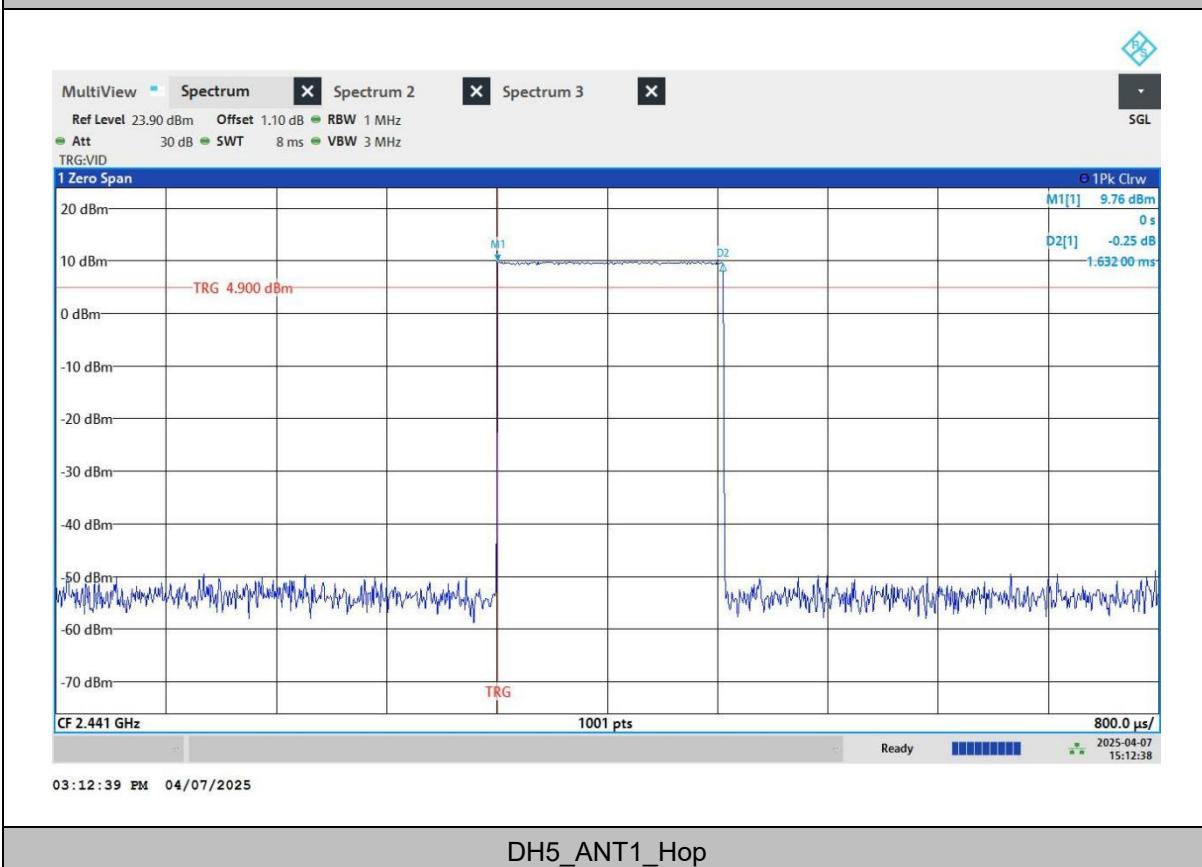


BUREAU  
VERITAS

Test Report No.: PSU-QSU2503210311RF05



DH3\_ANT1\_Hop

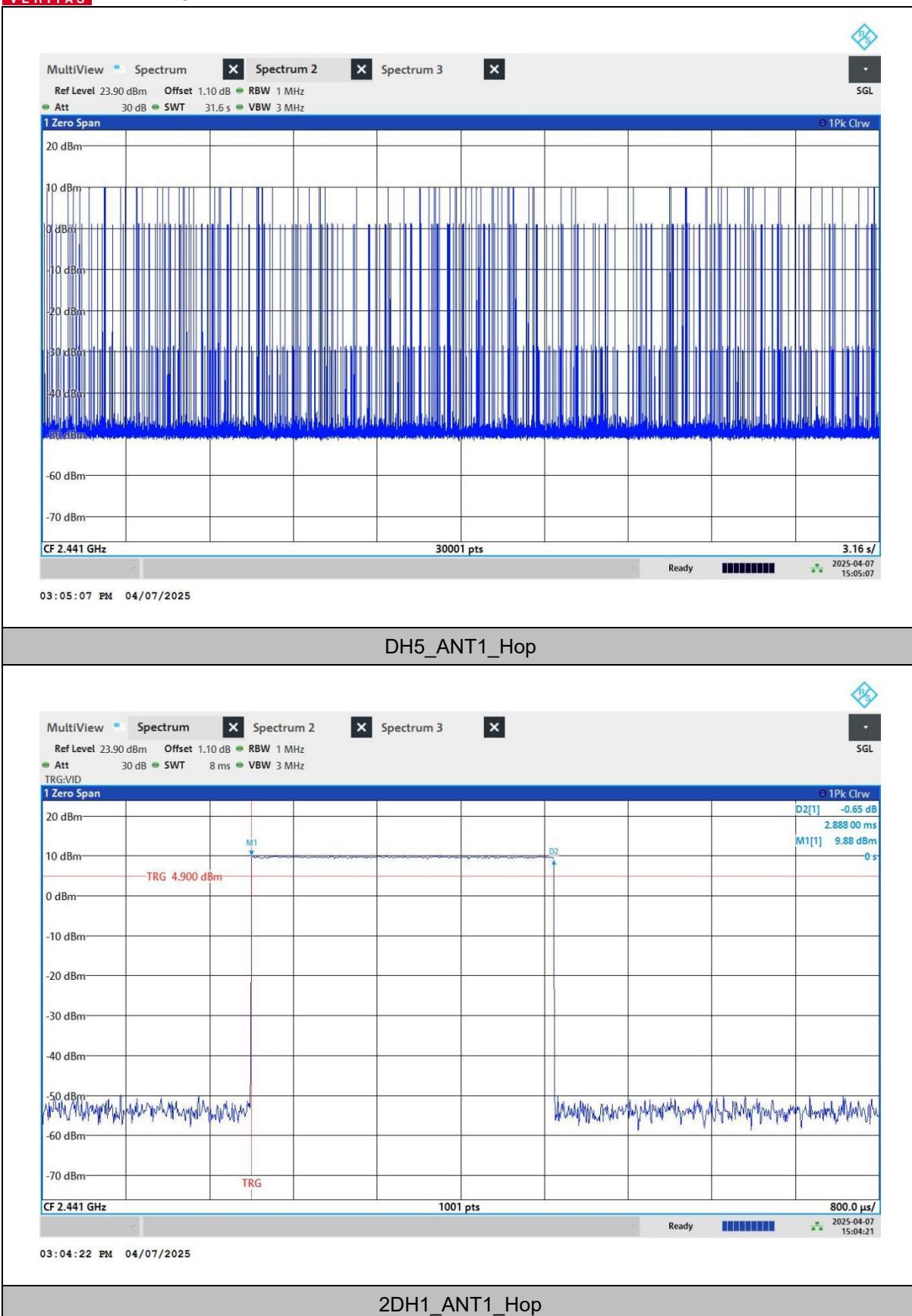


DH5\_ANT1\_Hop



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VERITAS

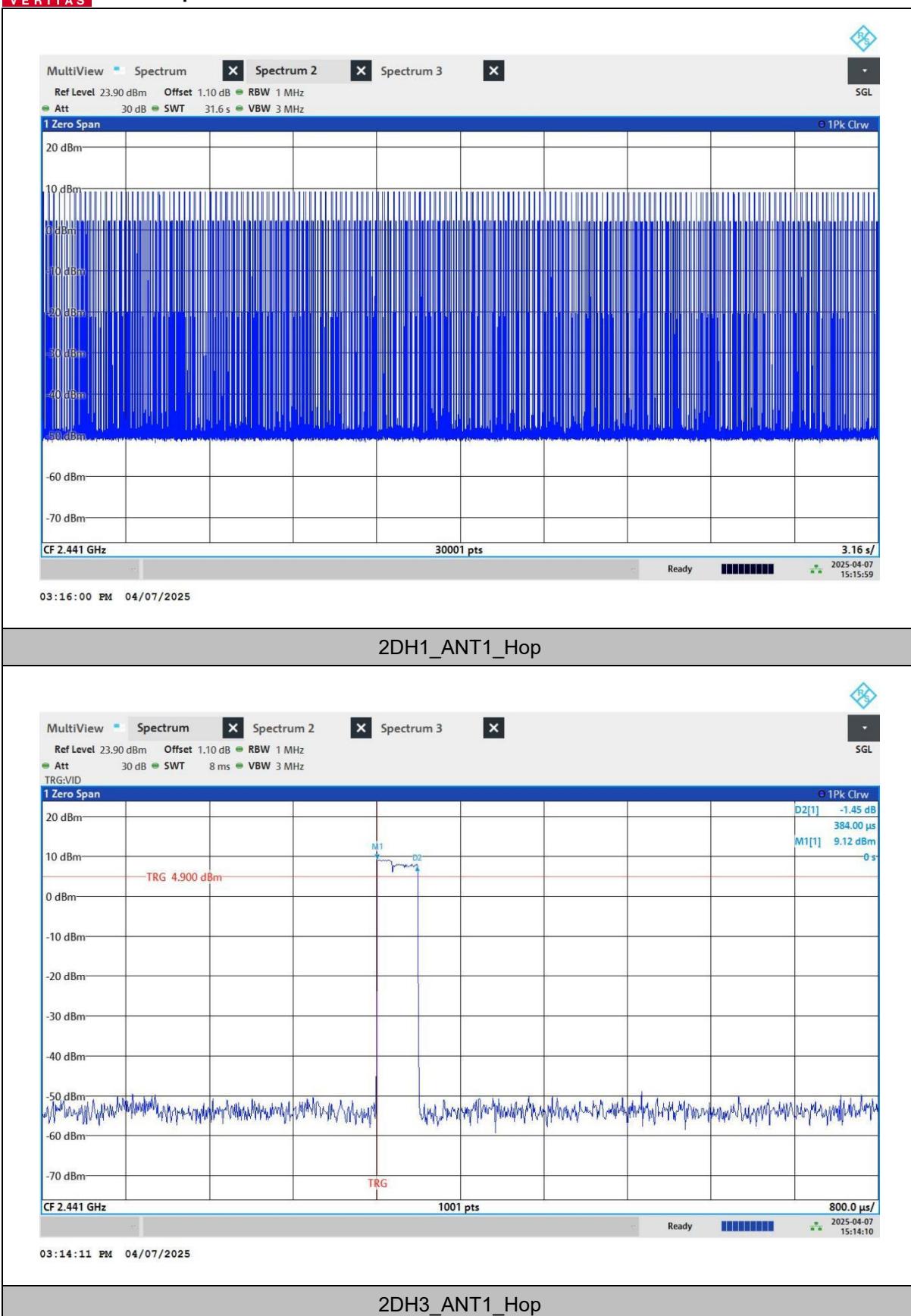
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VERITAS

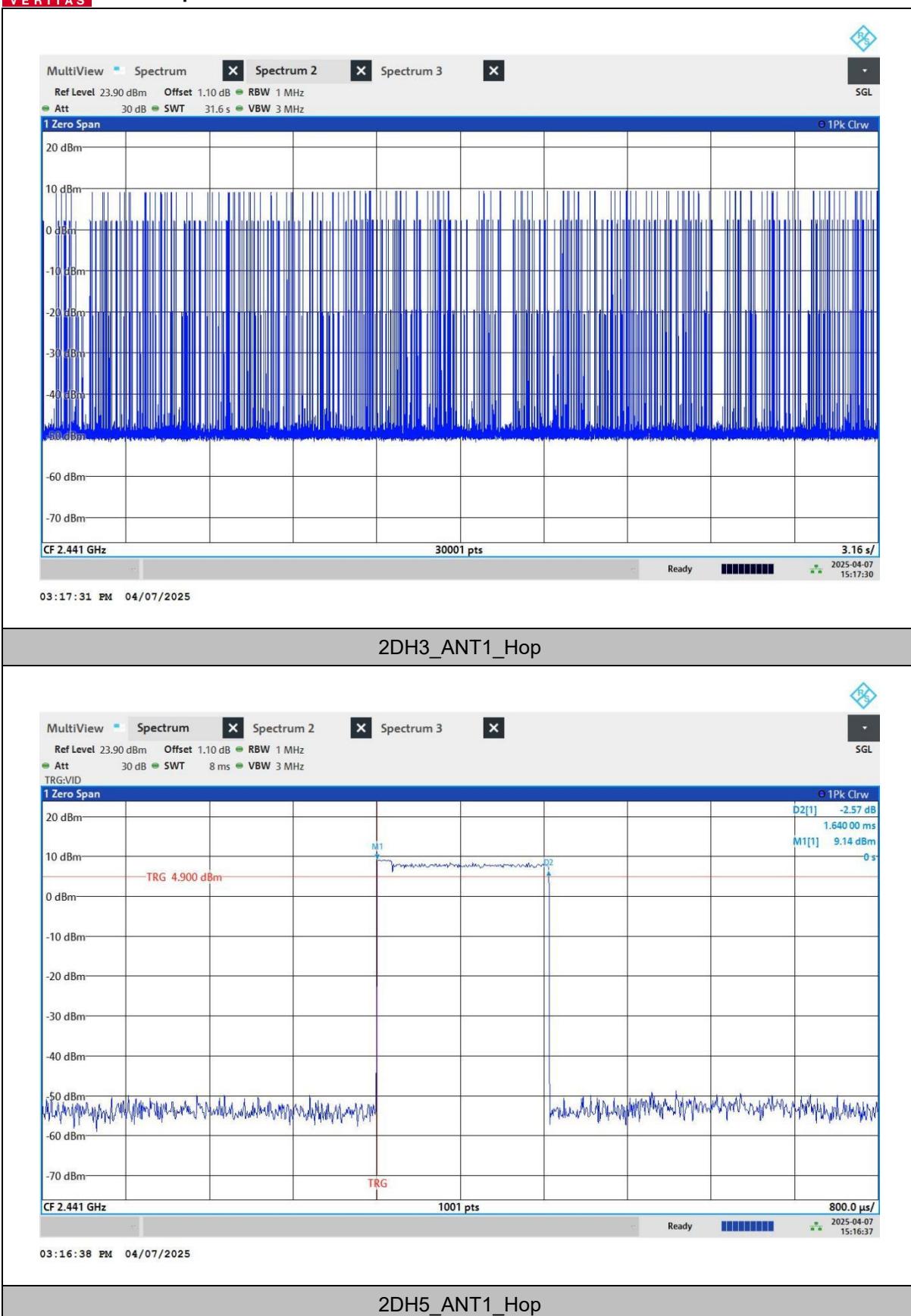
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VERITAS

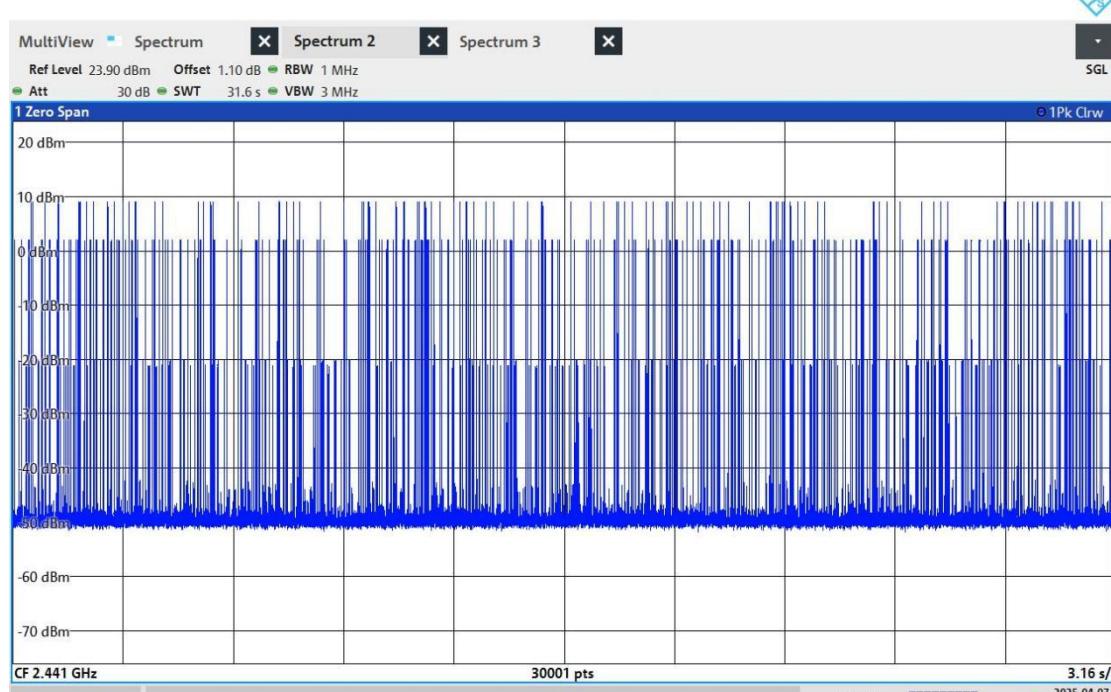
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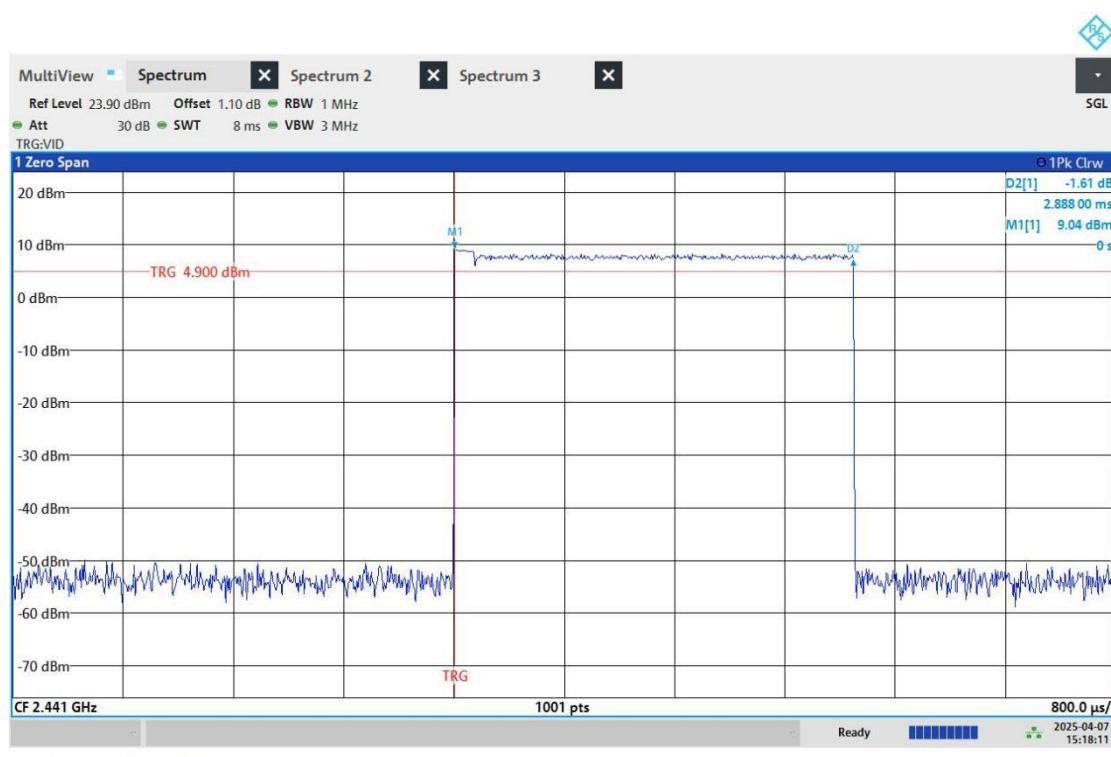


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VERITAS

Test Report No.: PSU-QSU2503210311RF05



### 2DH5\_ANT1\_Hop

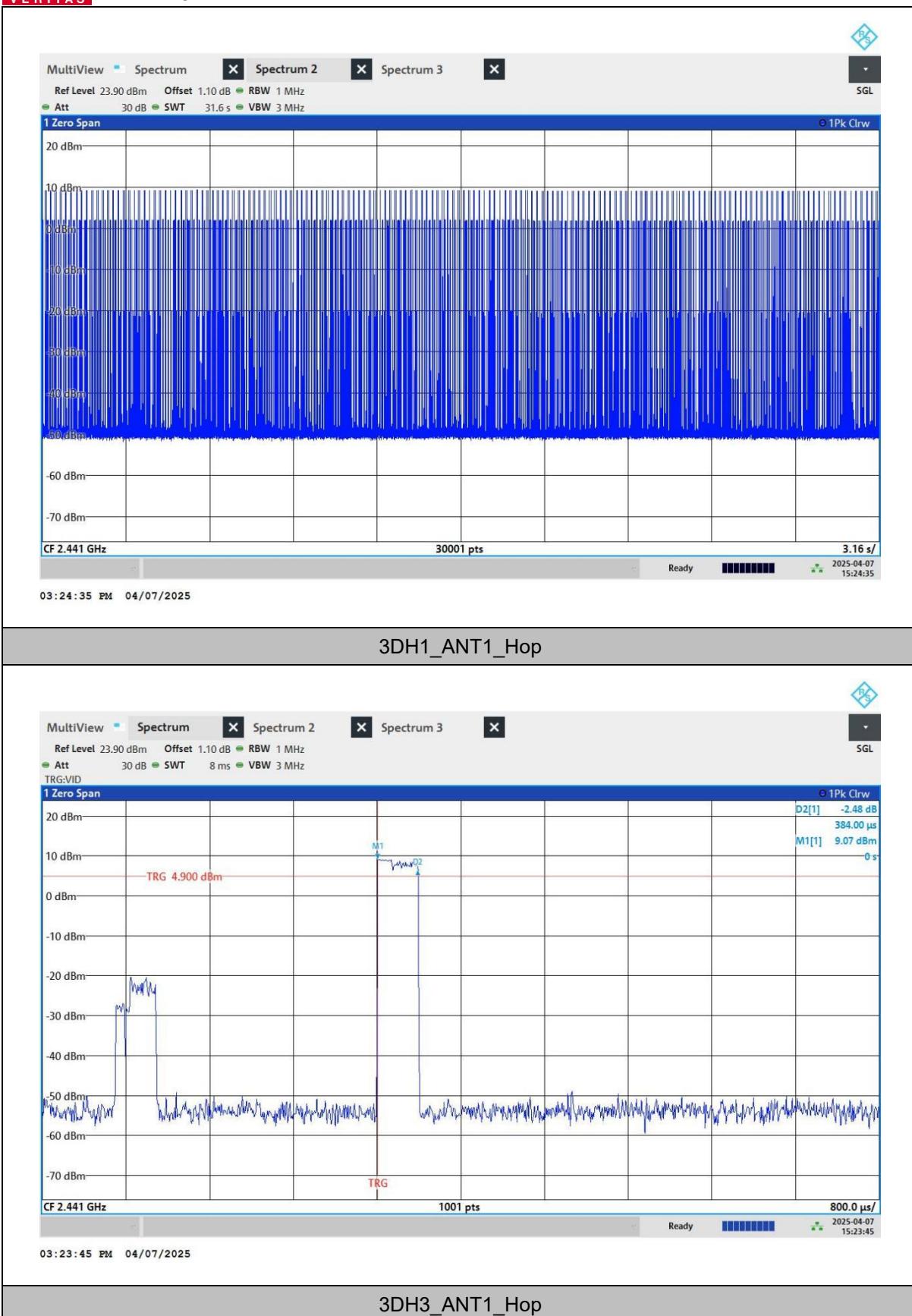


### 3DH1\_ANT1\_Hop



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VERITAS

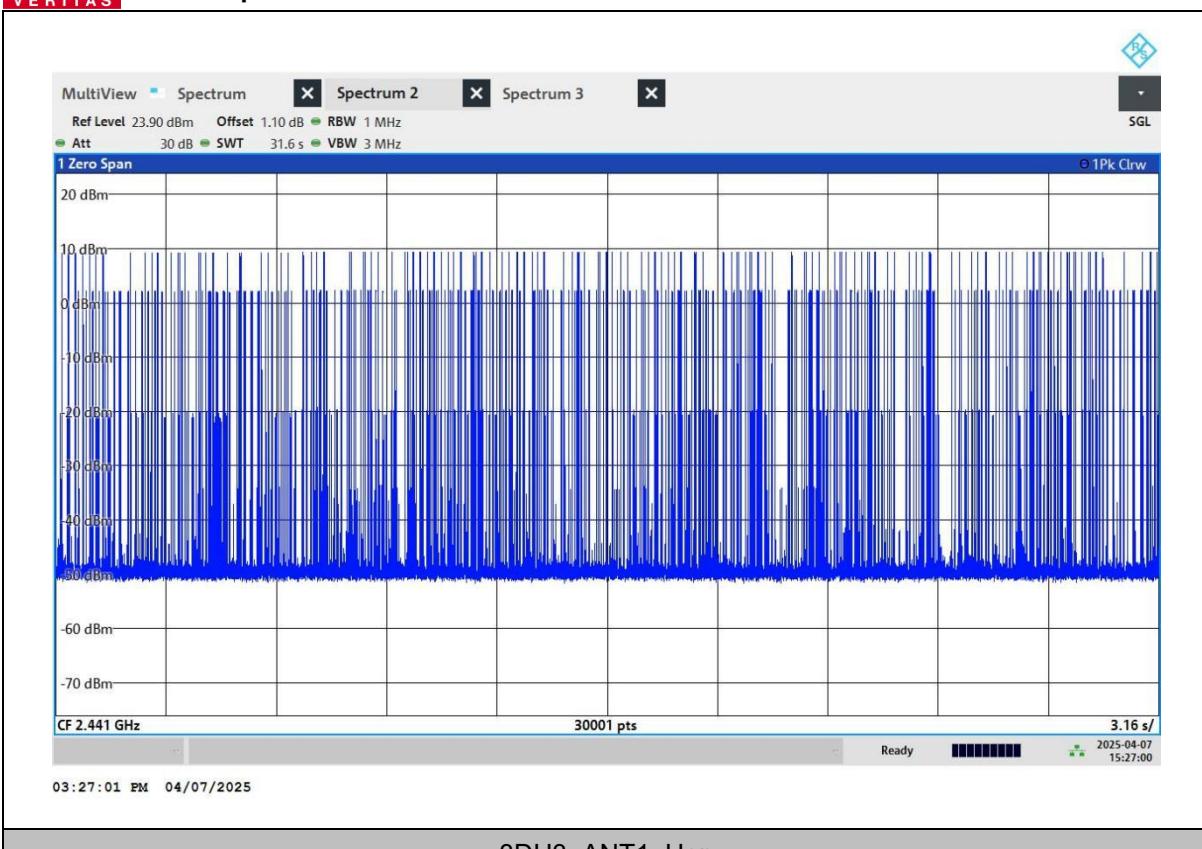
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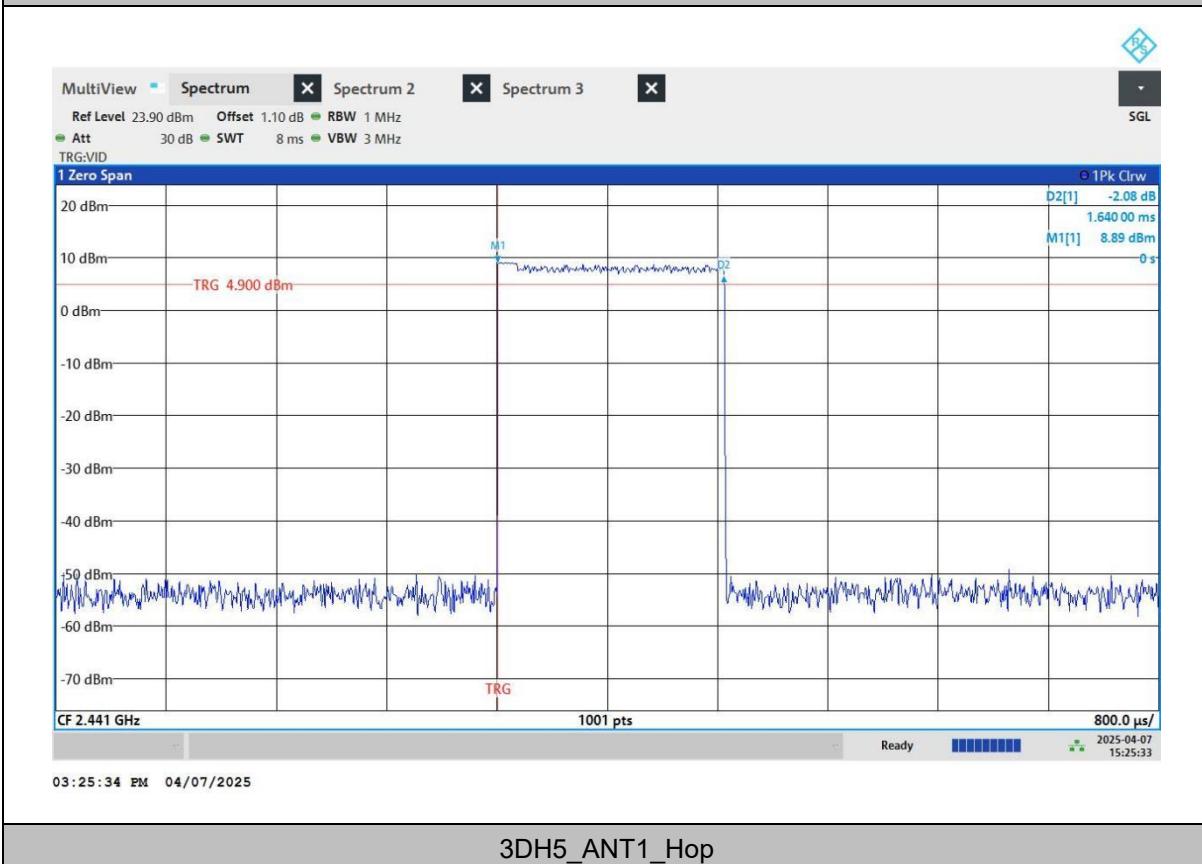


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VERITAS

Test Report No.: PSU-QSU2503210311RF05



3DH3\_ANT1\_Hop

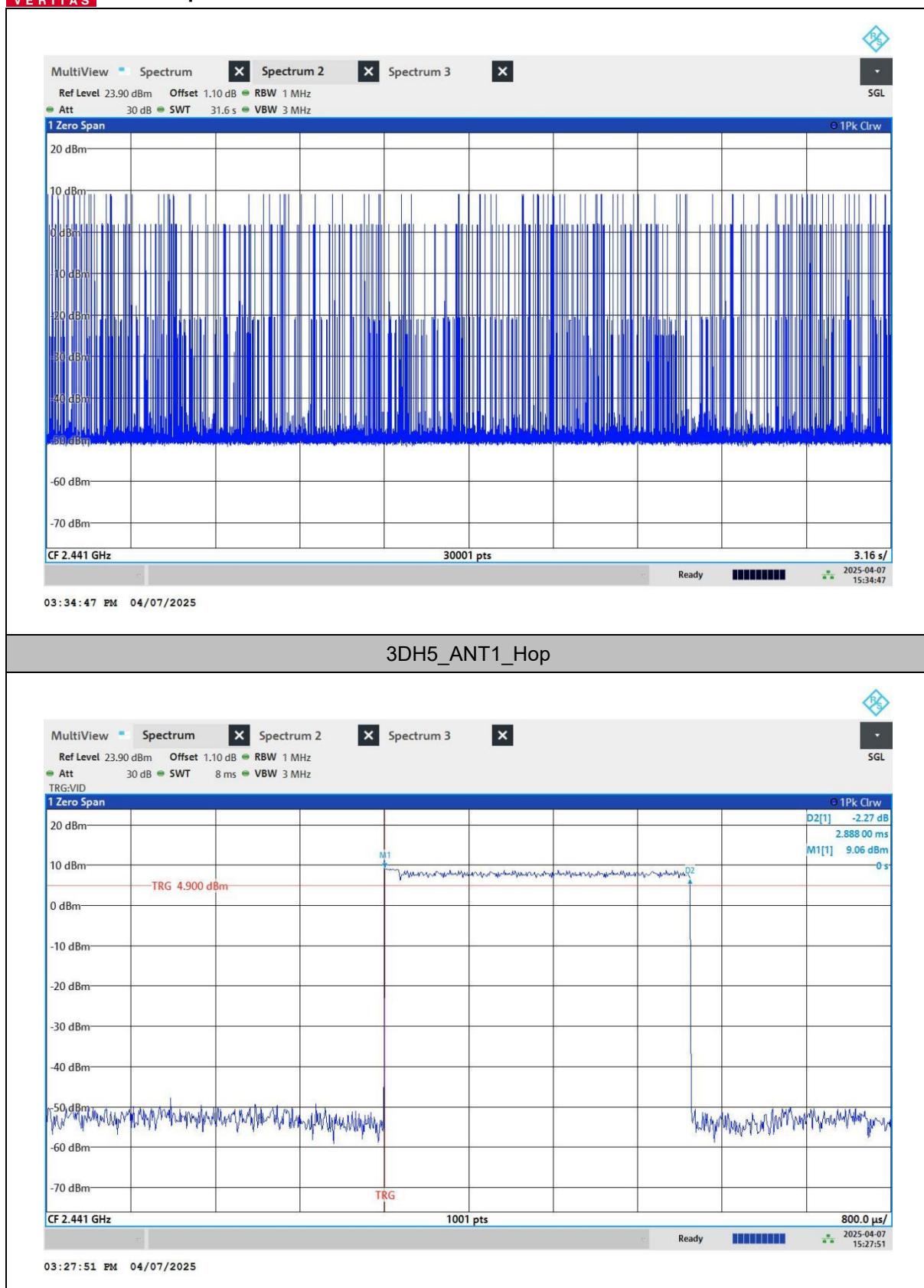


3DH5\_ANT1\_Hop



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VERITAS

Test Report No.: PSU-QSU2503210311RF05





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VERITAS      Test Report No.: PSU-QSU2503210311RF05

## NUMBER OF HOPPING CHANNELS

### TEST RESULT

| TestMode | Antenna | Channel | Result[Num] | Limit[Num] | Verdict |
|----------|---------|---------|-------------|------------|---------|
| DH5      | ANT1    | Hop     | 79          | ≥15        | PASS    |
| 2DH5     | ANT1    | Hop     | 79          | ≥15        | PASS    |
| 3DH5     | ANT1    | Hop     | 79          | ≥15        | PASS    |



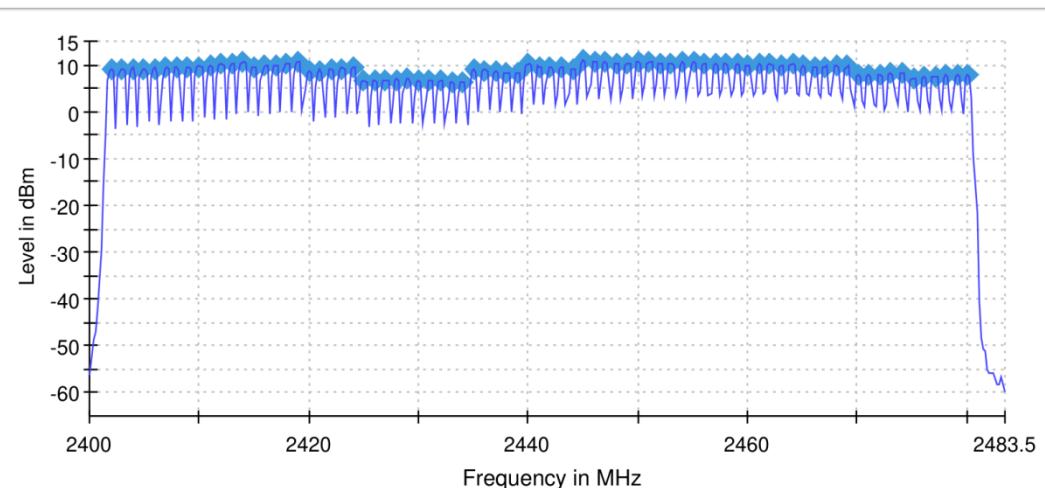
BUREAU  
VERITAS

Test Report No.: PSU-QSU2503210311RF05

## TEST GRAPHS

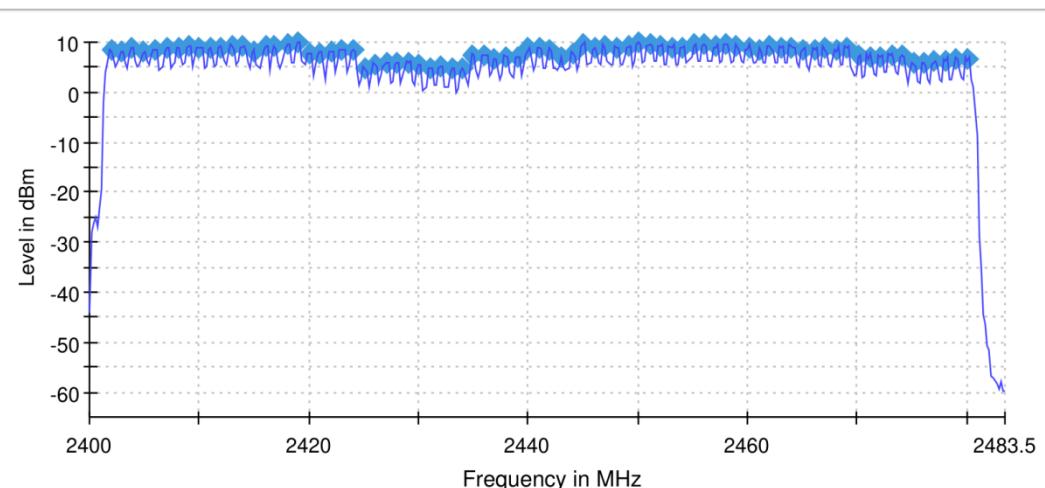
### DH5\_ANT1\_Hop

Sequence



### 2DH5\_ANT1\_Hop

Sequence



### 3DH5\_ANT1\_Hop