



Shenzhen CTL Testing Technology Co., Ltd.

Fl. A1, Bldg. A3, No. 2533 GuanGuang Road, Fenghuang Community

Fenghuang Street, Guangming District Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

## Annex for Bluetooth

Test Report No.: CTL2605098027-WF01

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FCC ID: 2ACH3-GPRGBSBR

## 1. Bandwidth

### 1.1 Test Result

#### 1.1.1 OBW

| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | 99% Occupied Bandwidth (MHz) |       | Verdict |
|-----------|---------|-----------------|-------------|-----|------------------------------|-------|---------|
|           |         |                 |             |     | Result                       | Limit |         |
| GFSK      | SISO    | 2402            | DH5         | 1   | 0.848                        | /     | Pass    |
|           |         | 2441            | DH5         | 1   | 0.863                        | /     | Pass    |
|           |         | 2480            | DH5         | 1   | 0.865                        | /     | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | 1.193                        | /     | Pass    |
|           |         | 2441            | 2DH5        | 1   | 1.196                        | /     | Pass    |
|           |         | 2480            | 2DH5        | 1   | 1.197                        | /     | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | 1.193                        | /     | Pass    |
|           |         | 2441            | 3DH5        | 1   | 1.187                        | /     | Pass    |
|           |         | 2480            | 3DH5        | 1   | 1.195                        | /     | Pass    |

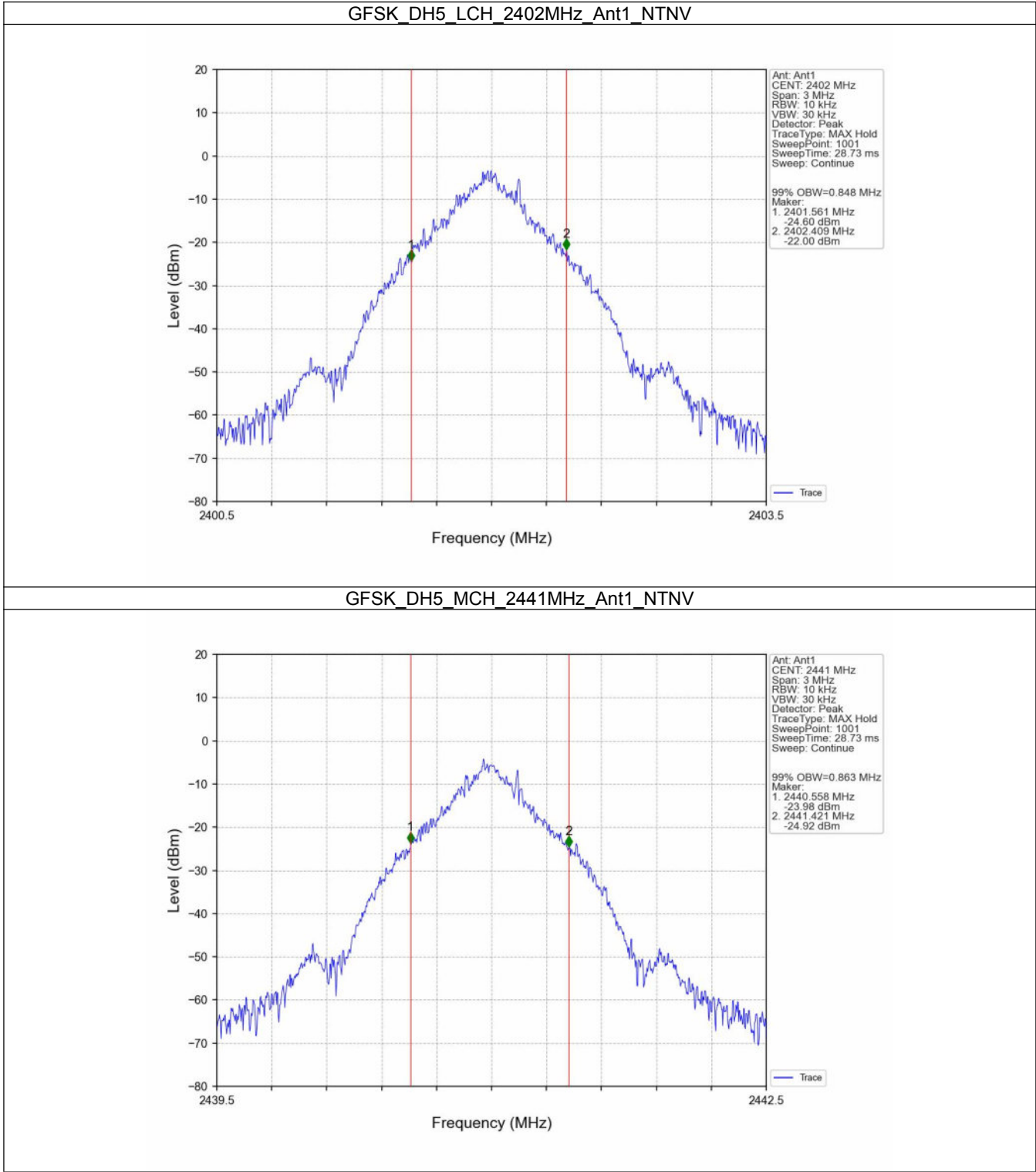
#### 1.1.2 20dB BW

| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | 20dB Bandwidth (MHz) |       | Verdict |
|-----------|---------|-----------------|-------------|-----|----------------------|-------|---------|
|           |         |                 |             |     | Result               | Limit |         |
| GFSK      | SISO    | 2402            | DH5         | 1   | 0.948                | /     | Pass    |
|           |         | 2441            | DH5         | 1   | 0.943                | /     | Pass    |
|           |         | 2480            | DH5         | 1   | 0.922                | /     | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | 1.312                | /     | Pass    |
|           |         | 2441            | 2DH5        | 1   | 1.308                | /     | Pass    |
|           |         | 2480            | 2DH5        | 1   | 1.317                | /     | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | 1.302                | /     | Pass    |
|           |         | 2441            | 3DH5        | 1   | 1.275                | /     | Pass    |
|           |         | 2480            | 3DH5        | 1   | 1.293                | /     | Pass    |

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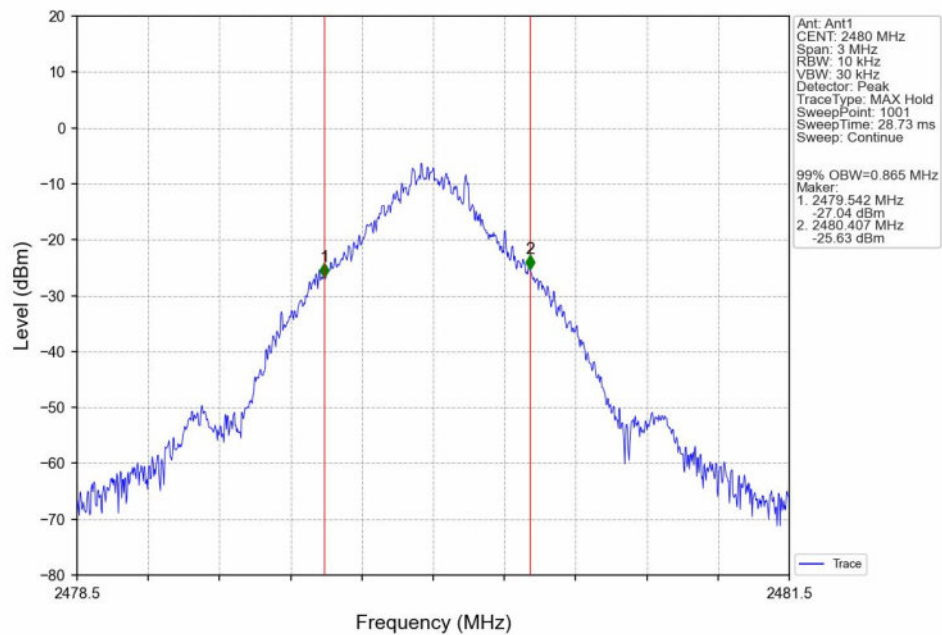
1.2 Test Graph

1.2.1 OBW

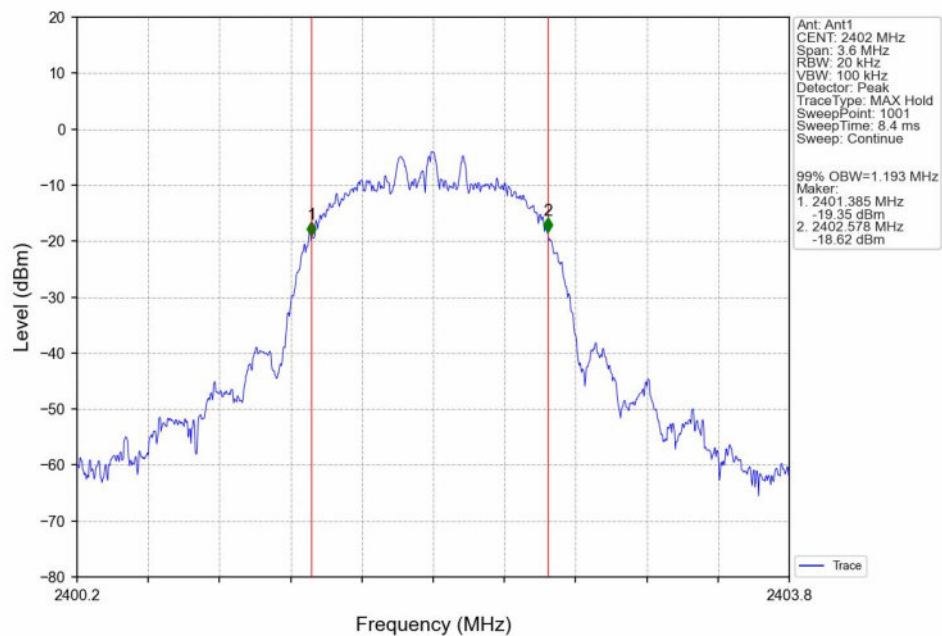


FCC ID: 2ACH3-GPRGBSBAR

GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV

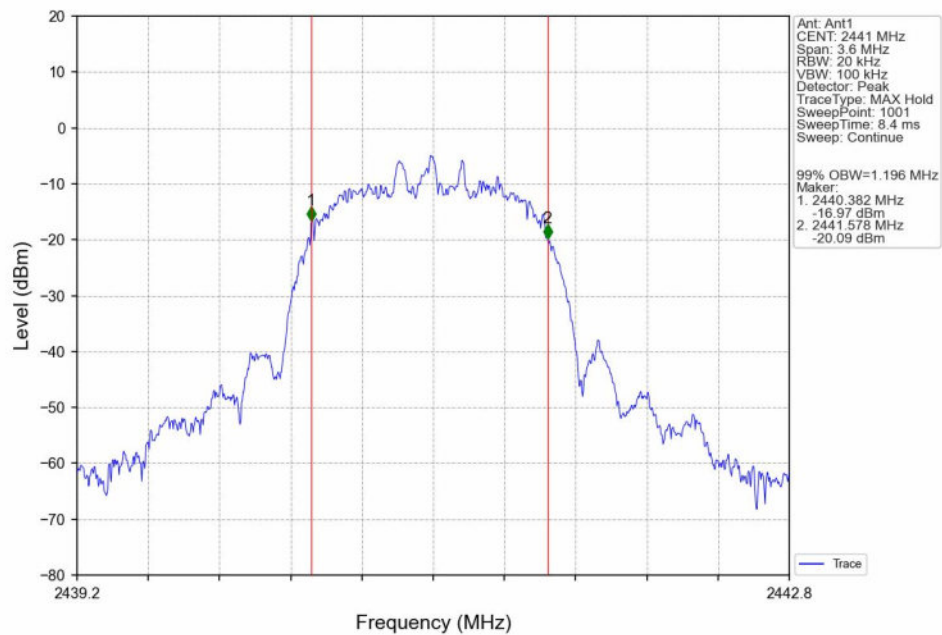


Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV

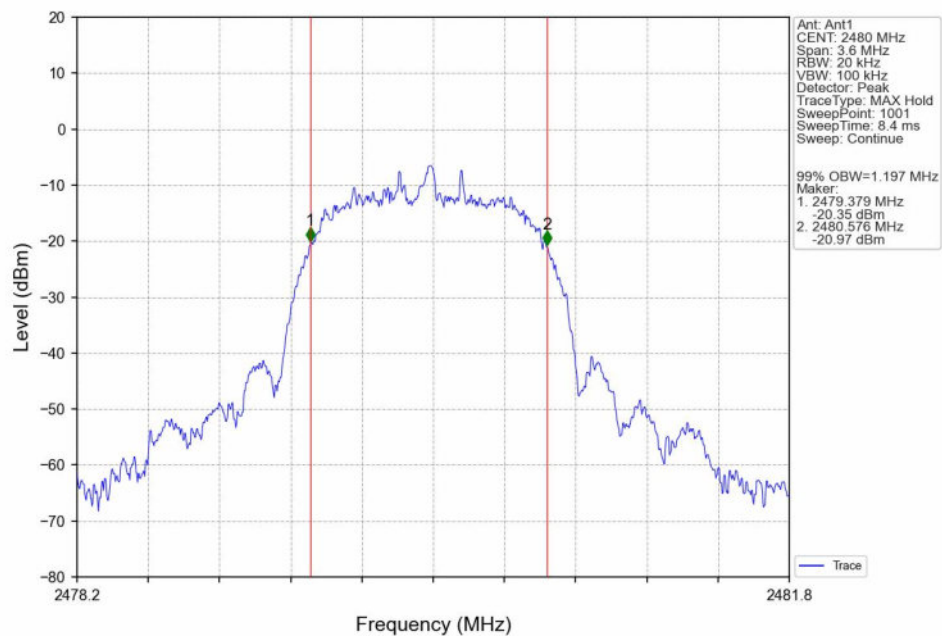


FCC ID: 2ACH3-GPRGBSBAR

Pi/4DQPSK\_2DH5\_MCH\_2441MHz\_Ant1\_NTNV

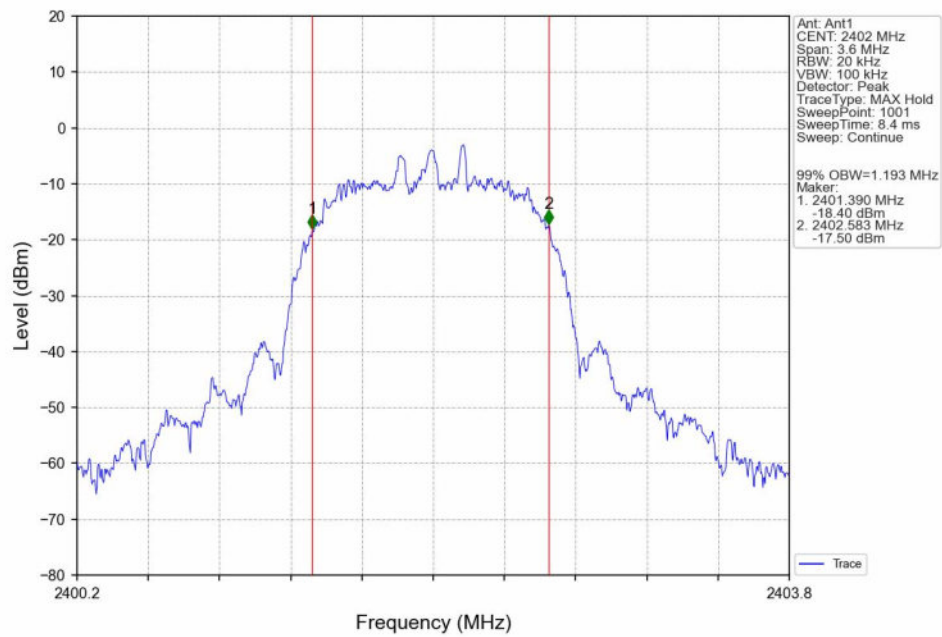


Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV

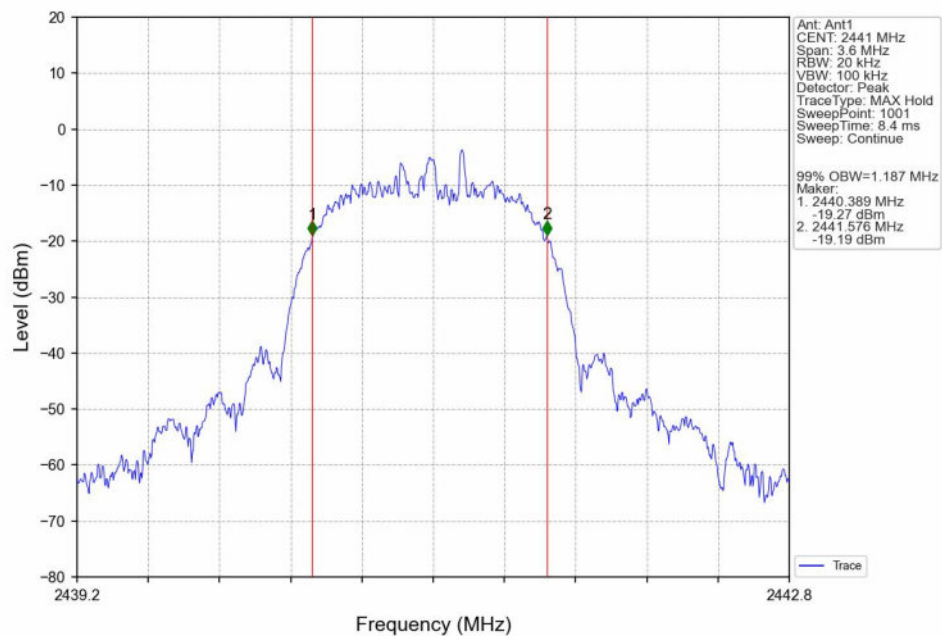


FCC ID: 2ACH3-GPRGBSBAR

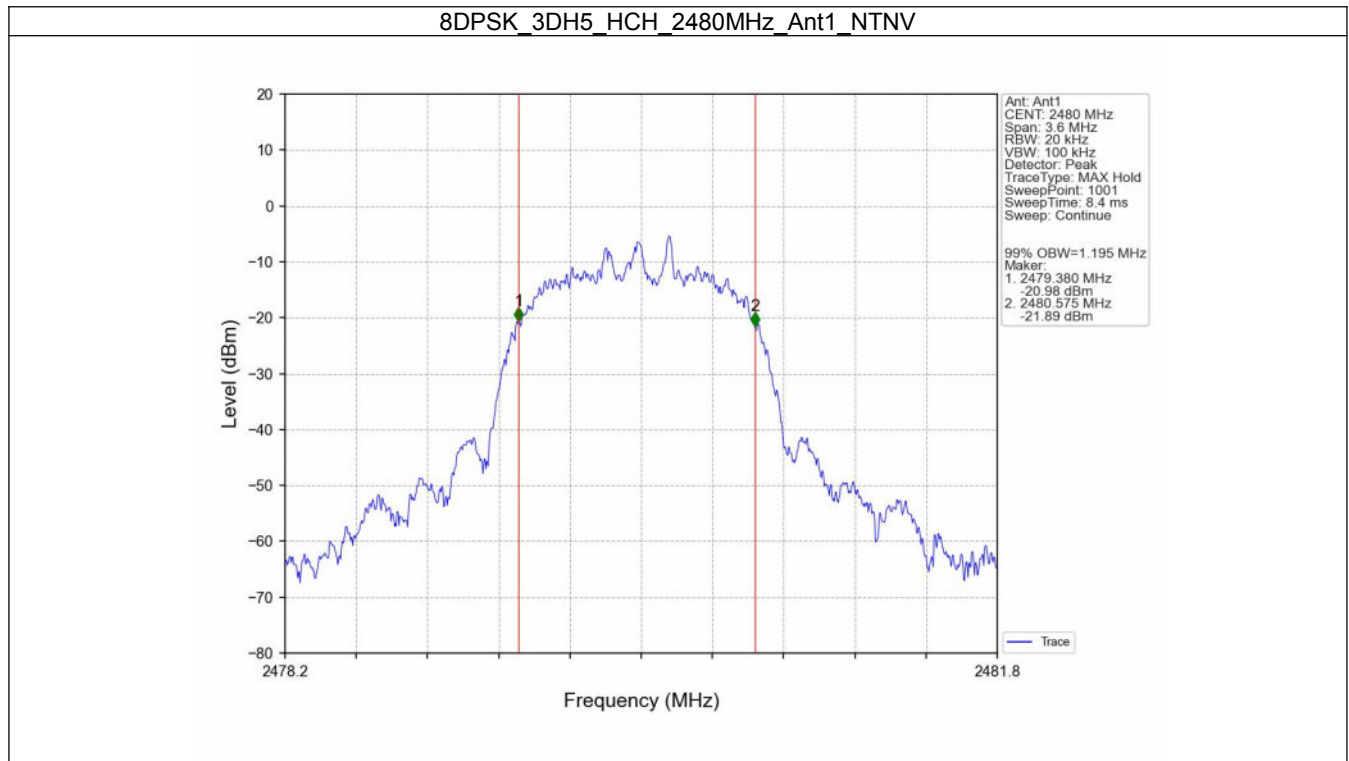
8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



8DPSK\_3DH5\_MCH\_2441MHz\_Ant1\_NTNV

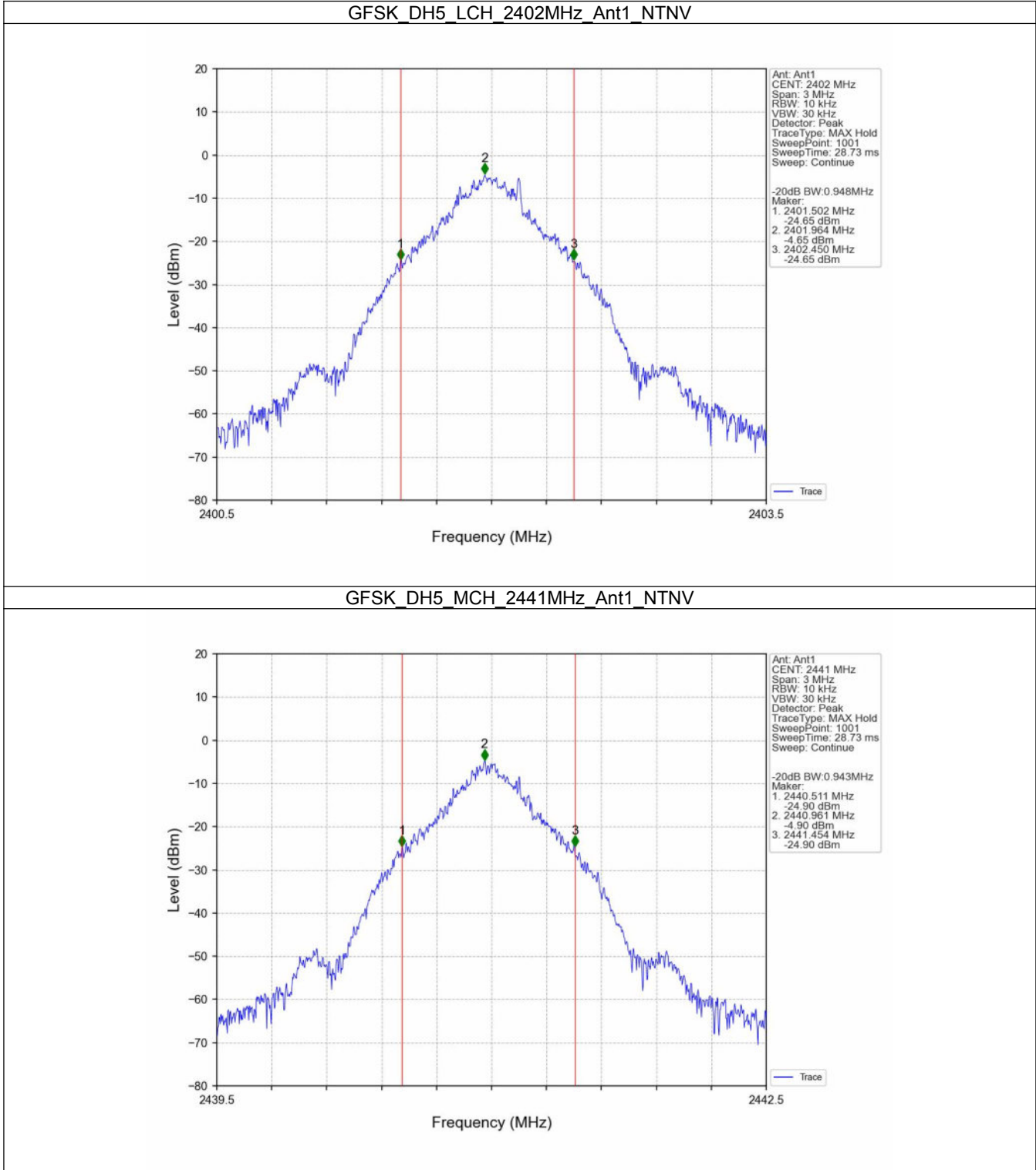


FCC ID: 2ACH3-GPRGBSBAR



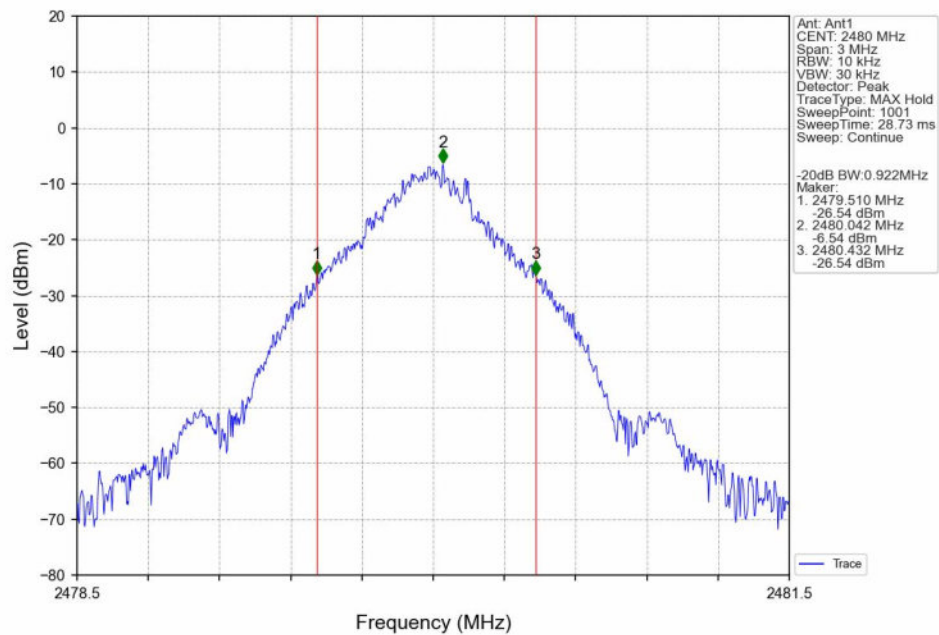
FCC ID: 2ACH3-GPRGBSBAR

1.2.2 20dB BW

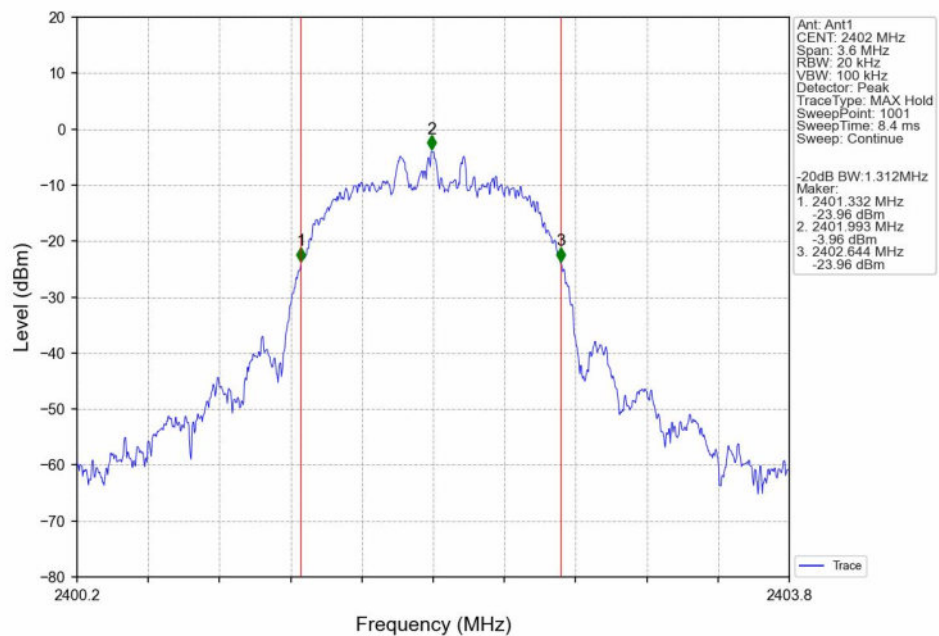


FCC ID: 2ACH3-GPRGBSBAR

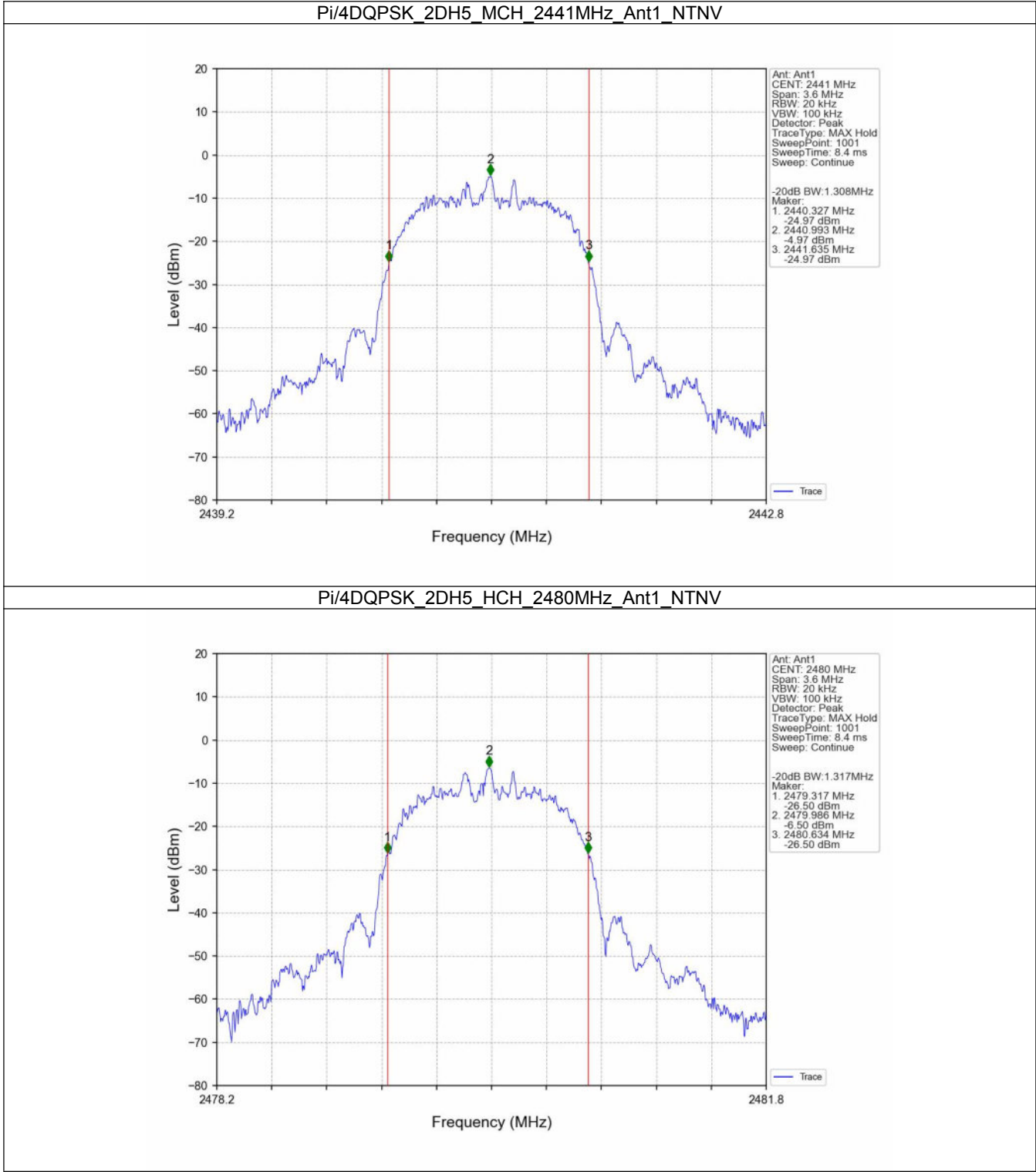
## GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



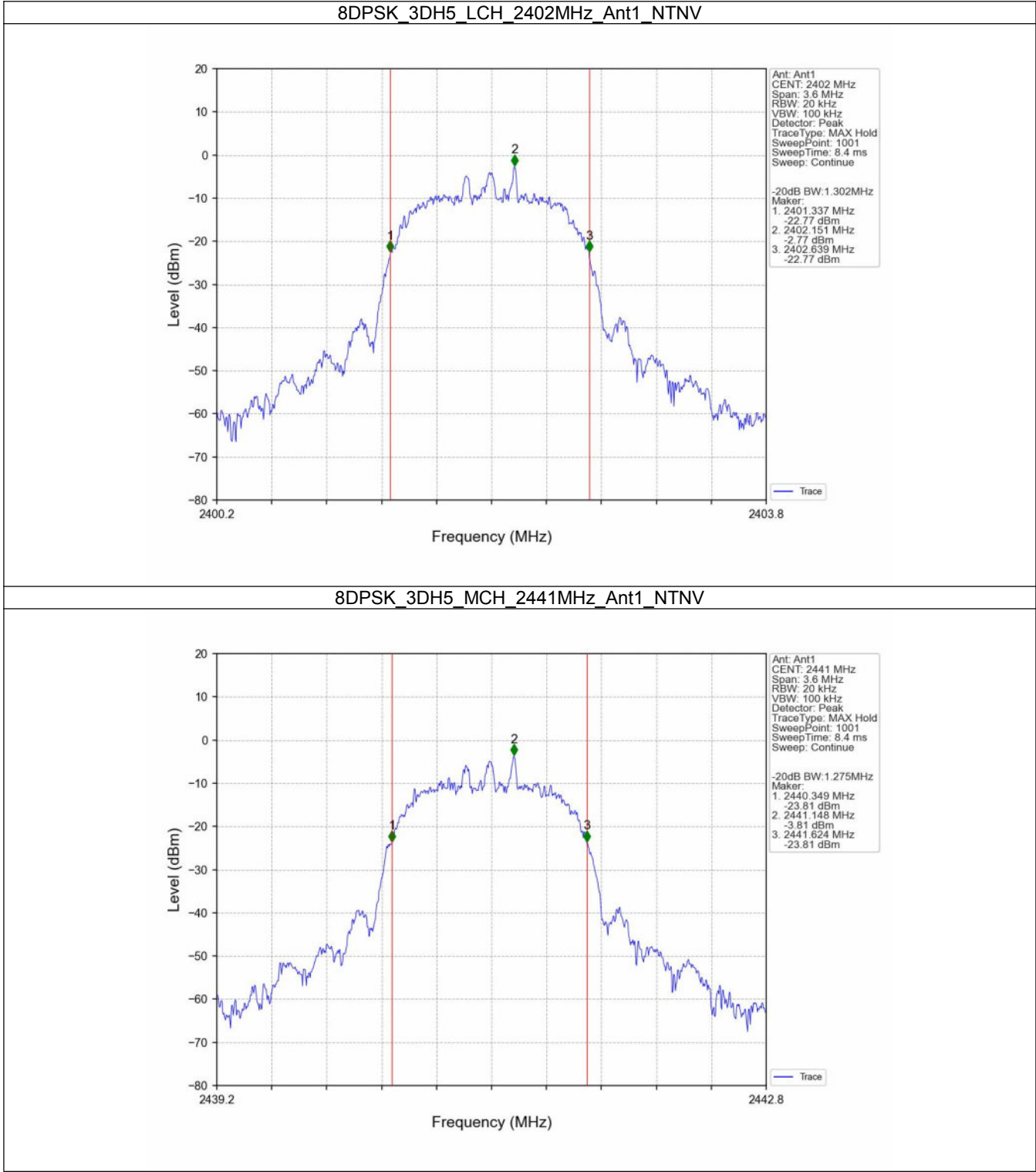
## Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



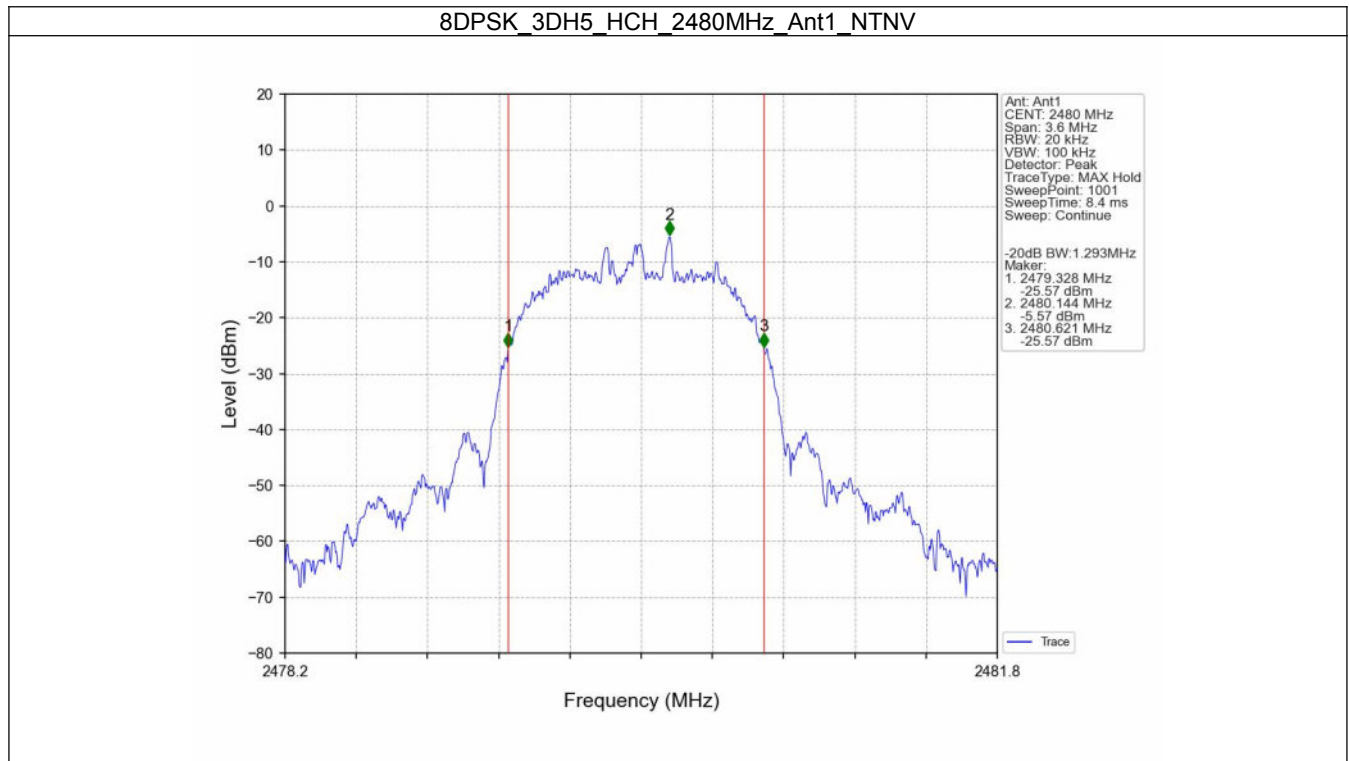
FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR

## 2. Maximum Conducted Output Power

### 2.1 Test Result

#### 2.1.1 Power

| Mode      | TX Type | Frequency (MHz) | Packet Type | Maximum Peak Conducted Output Power (dBm) |         | Verdict |
|-----------|---------|-----------------|-------------|-------------------------------------------|---------|---------|
|           |         |                 |             | ANT1                                      | Limit   |         |
| GFSK      | SISO    | 2402            | DH5         | 1.01                                      | <=30    | Pass    |
|           |         | 2441            | DH5         | 0.05                                      | <=30    | Pass    |
|           |         | 2480            | DH5         | -1.52                                     | <=30    | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1.07                                      | <=20.97 | Pass    |
|           |         | 2441            | 2DH5        | 0.09                                      | <=20.97 | Pass    |
|           |         | 2480            | 2DH5        | -1.47                                     | <=20.97 | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1.43                                      | <=20.97 | Pass    |
|           |         | 2441            | 3DH5        | 0.39                                      | <=20.97 | Pass    |
|           |         | 2480            | 3DH5        | -1.19                                     | <=20.97 | Pass    |

Note1: Antenna Gain: Ant1: 1.08dBi;

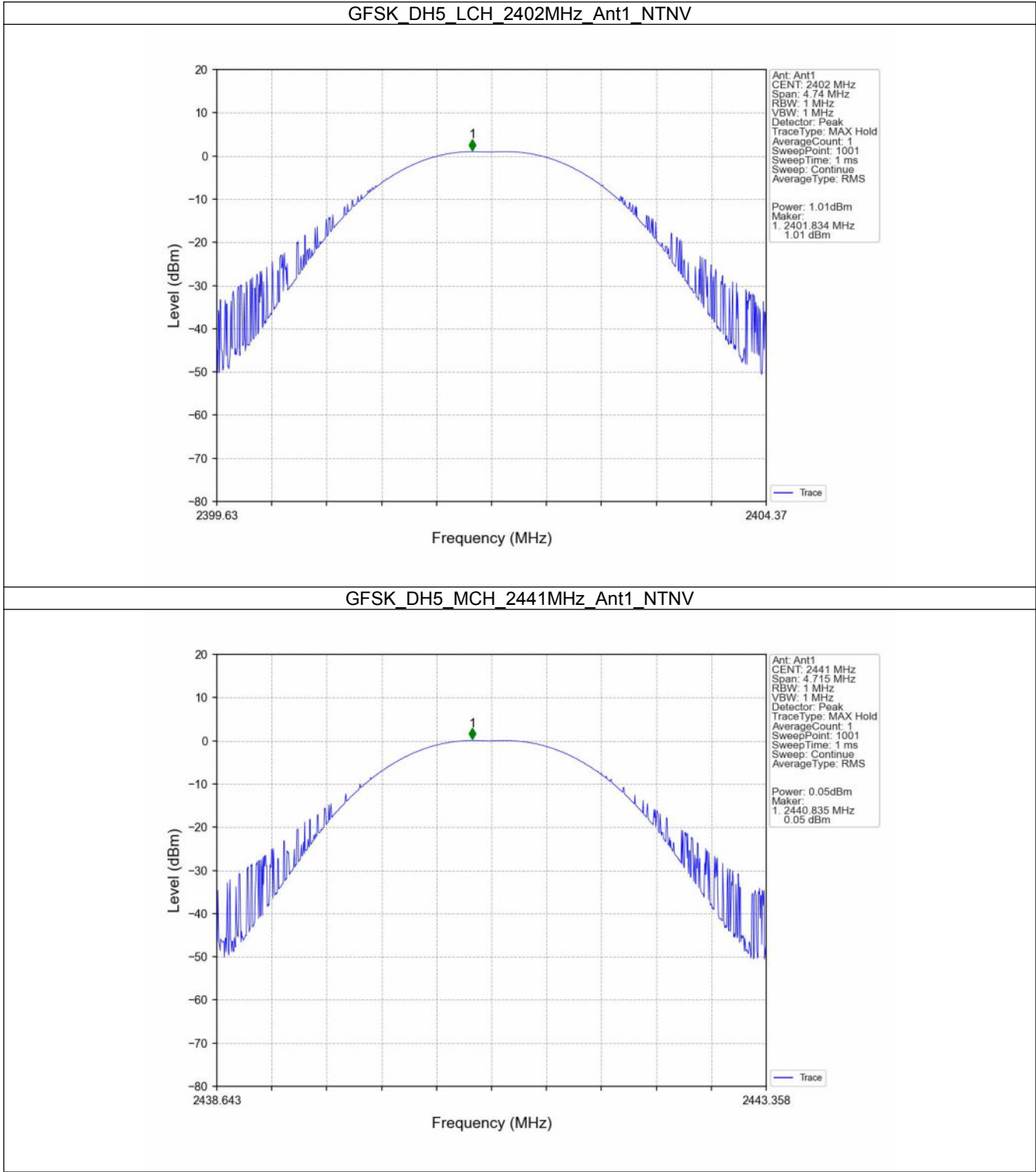
Note2: RF Cable loss=0.5dB

Note3: The test results include RF Cable loss.

FCC ID: 2ACH3-GPRGBSBAR

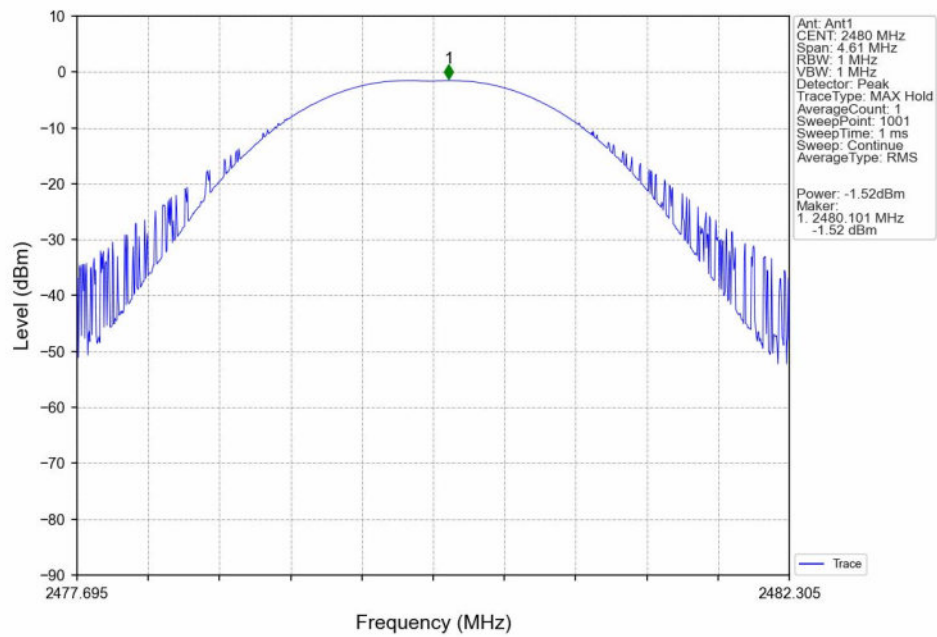
2.2 Test Graph

2.2.1 Power

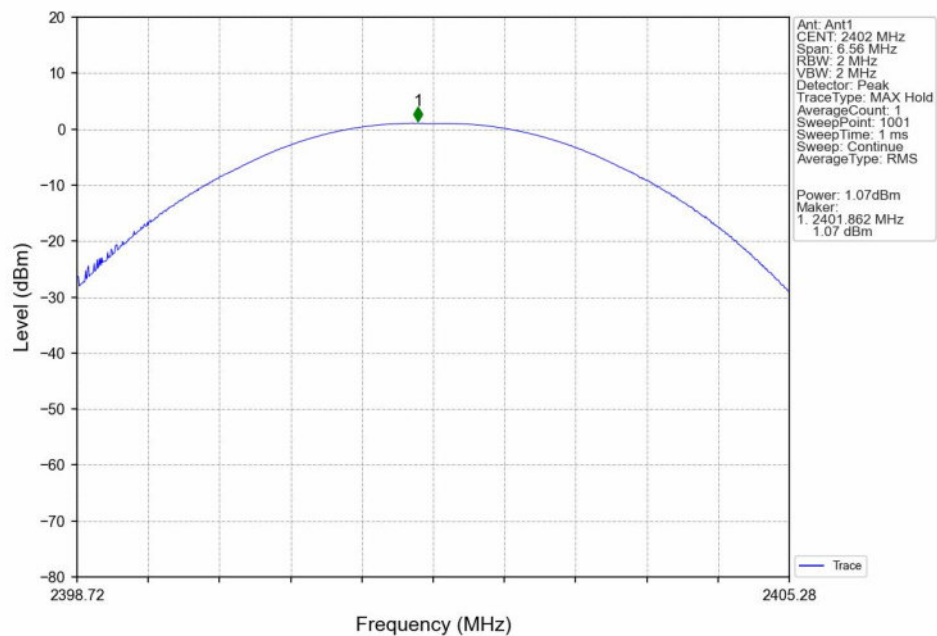


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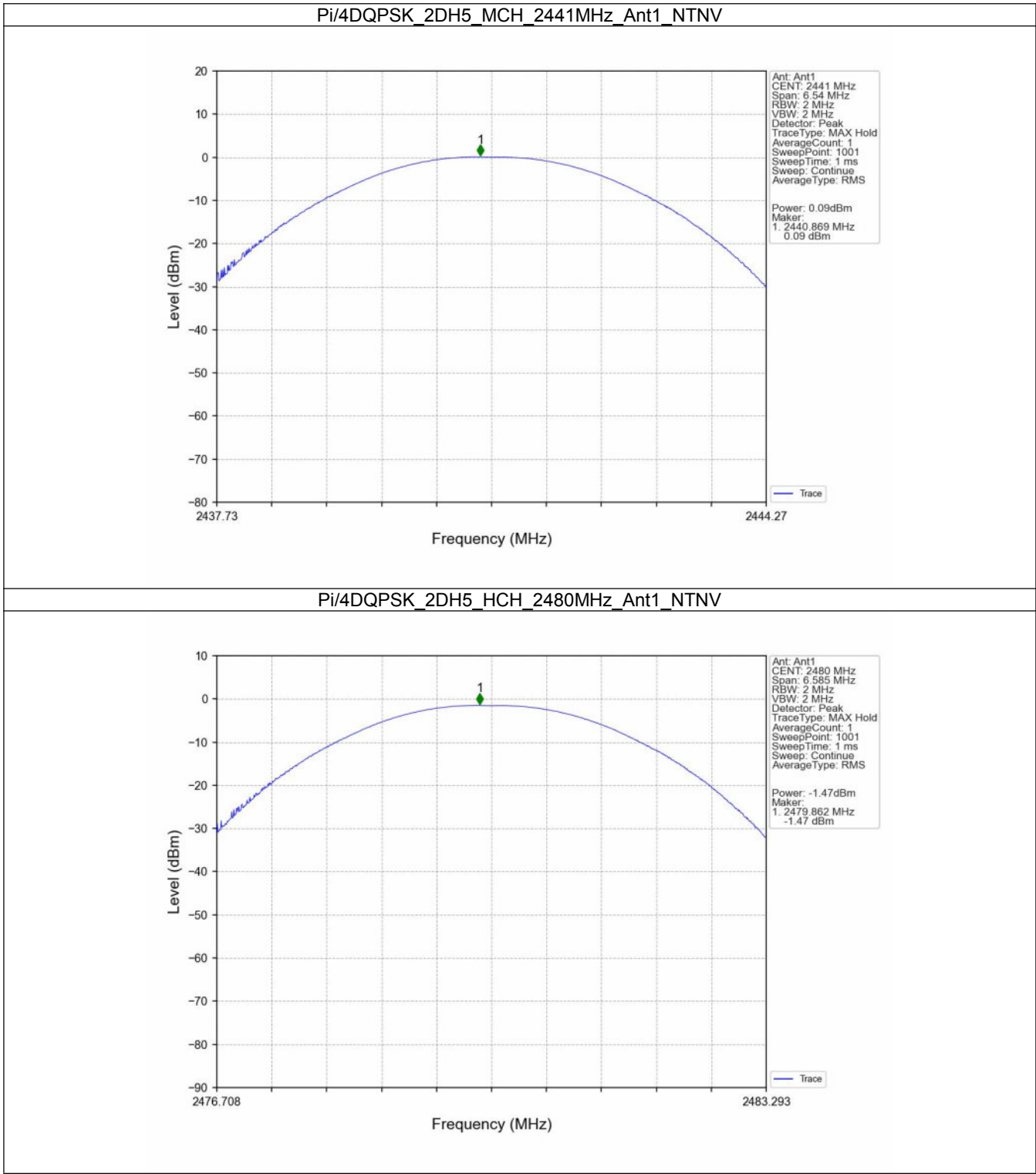
GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



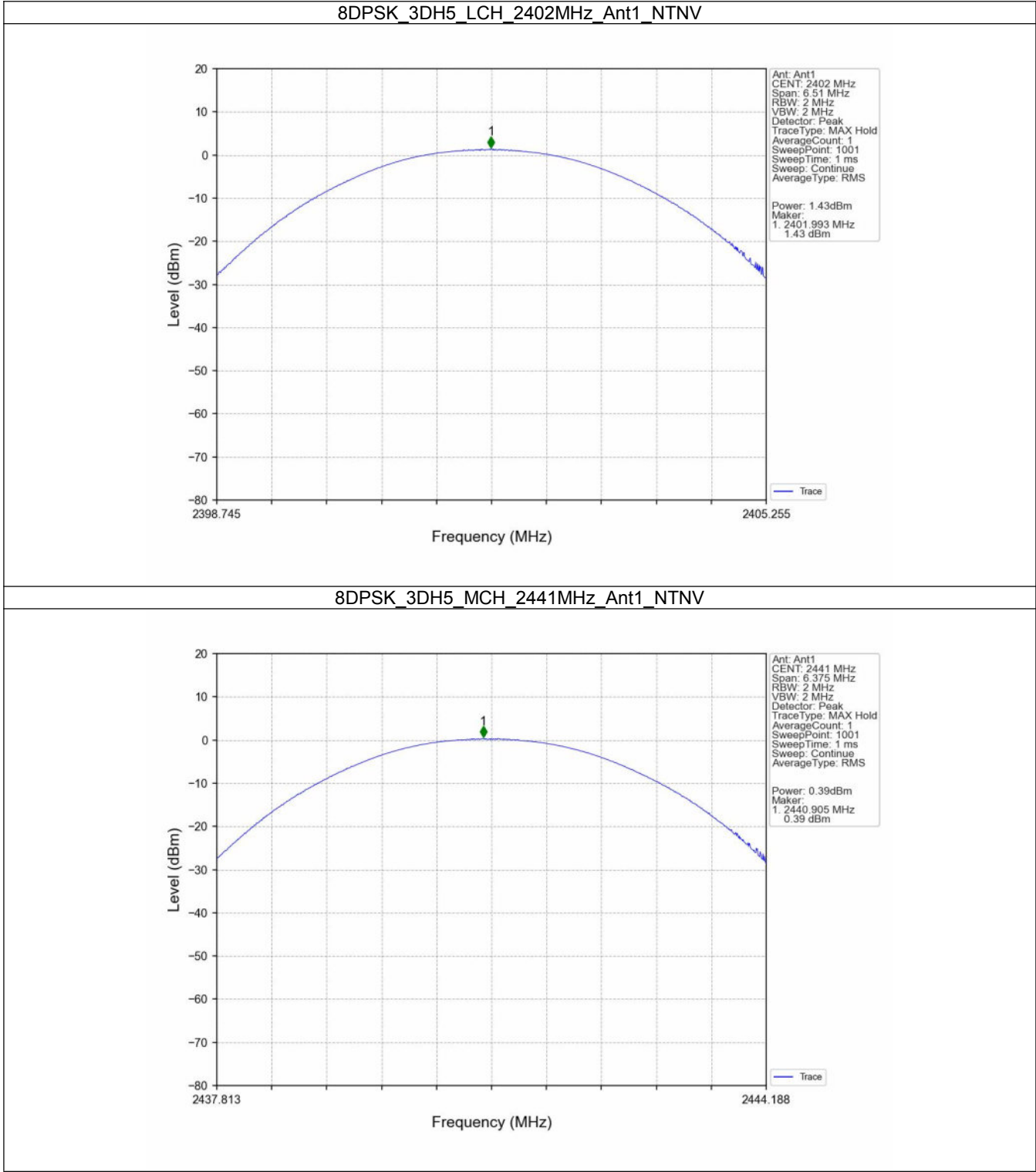
Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



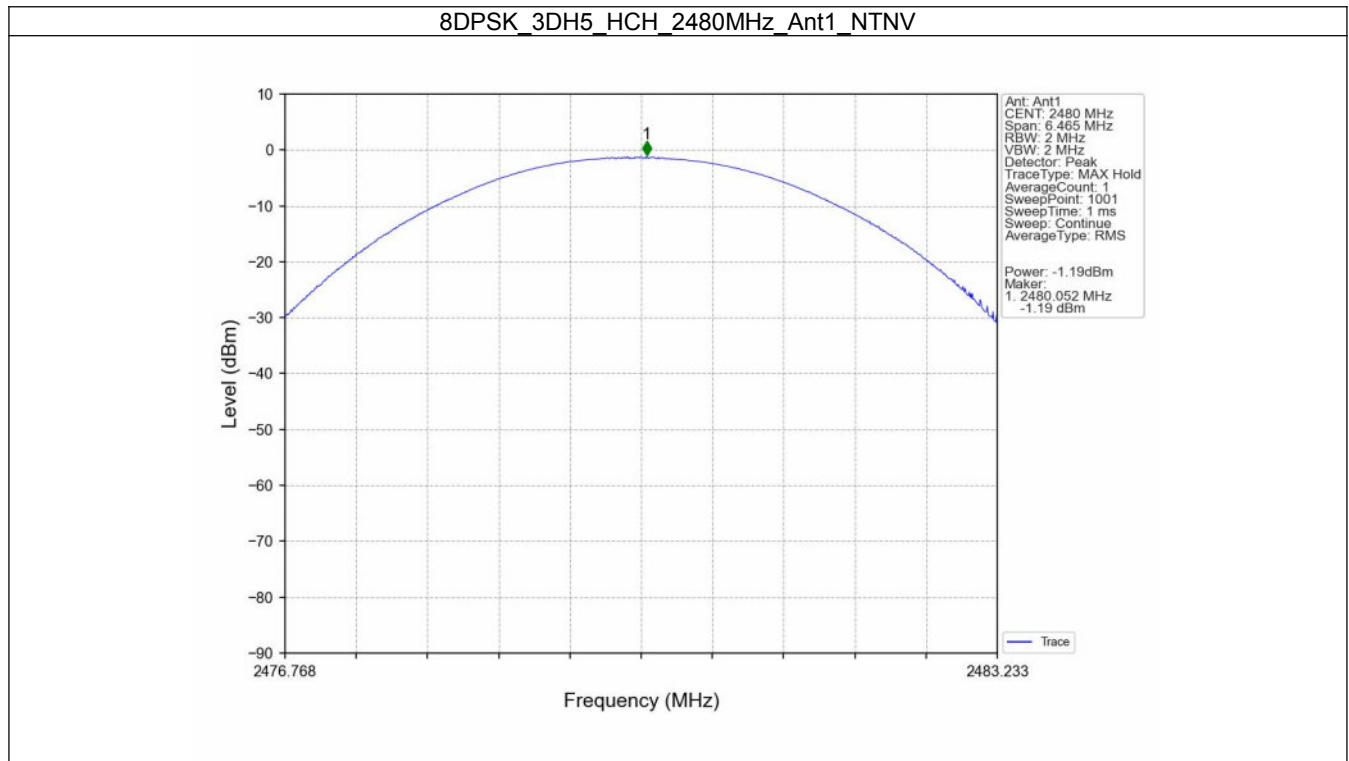
FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR

### 3. Carrier Frequency Separation

#### 3.1 Test Result

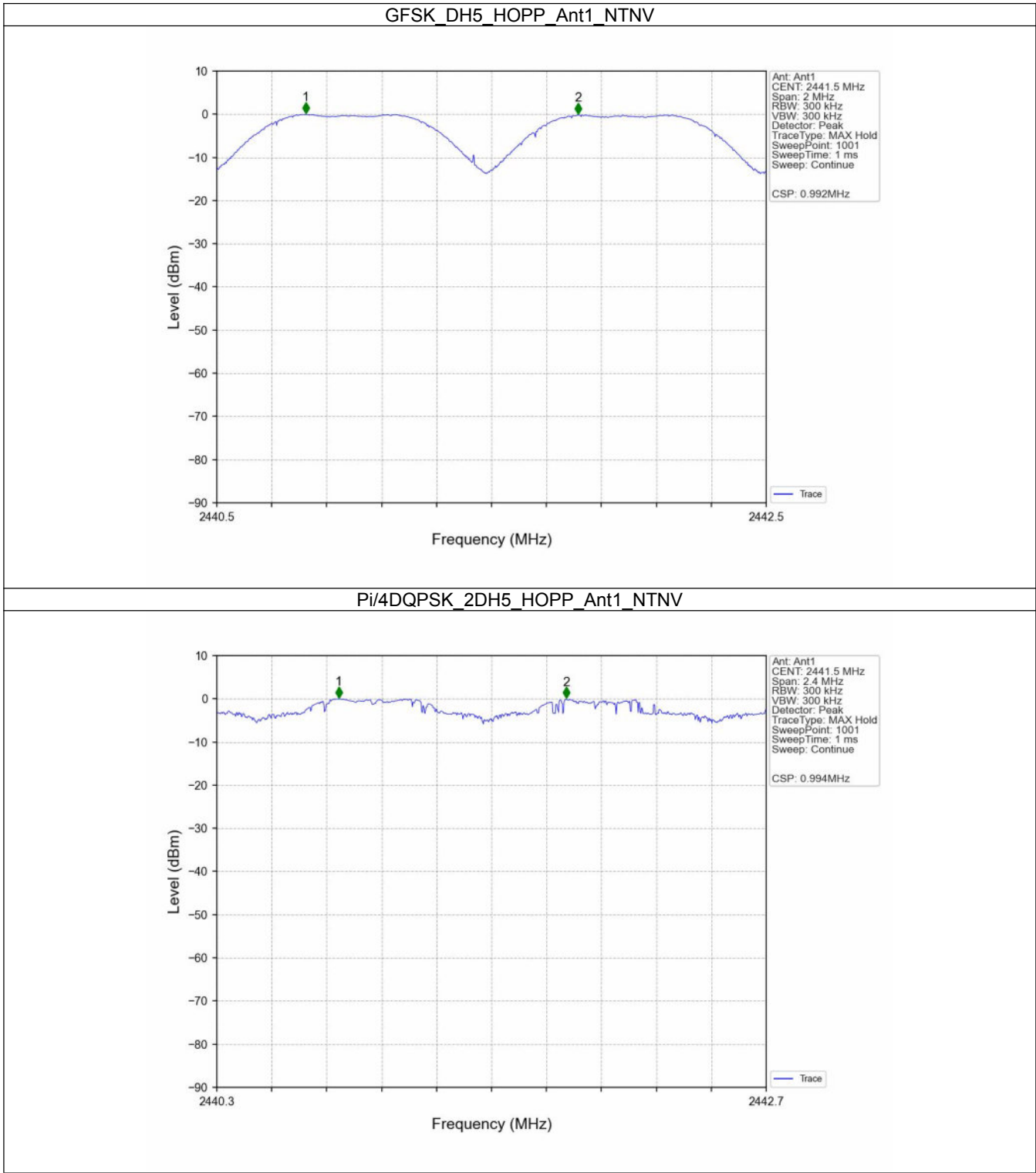
##### 3.1.1 Ant1

| Ant1      |         |                 |             |                          |                      |              |         |
|-----------|---------|-----------------|-------------|--------------------------|----------------------|--------------|---------|
| Mode      | TX Type | Frequency (MHz) | Packet Type | Channel Separation (MHz) | 20dB Bandwidth (MHz) | Limit (MHz)  | Verdict |
| GFSK      | SISO    | HOPP            | DH5         | 0.992                    | 0.948                | $\geq 0.948$ | Pass    |
| Pi/4DQPSK | SISO    | HOPP            | 2DH5        | 0.994                    | 1.317                | $\geq 0.878$ | Pass    |
| 8DPSK     | SISO    | HOPP            | 3DH5        | 1.034                    | 1.302                | $\geq 0.868$ | Pass    |

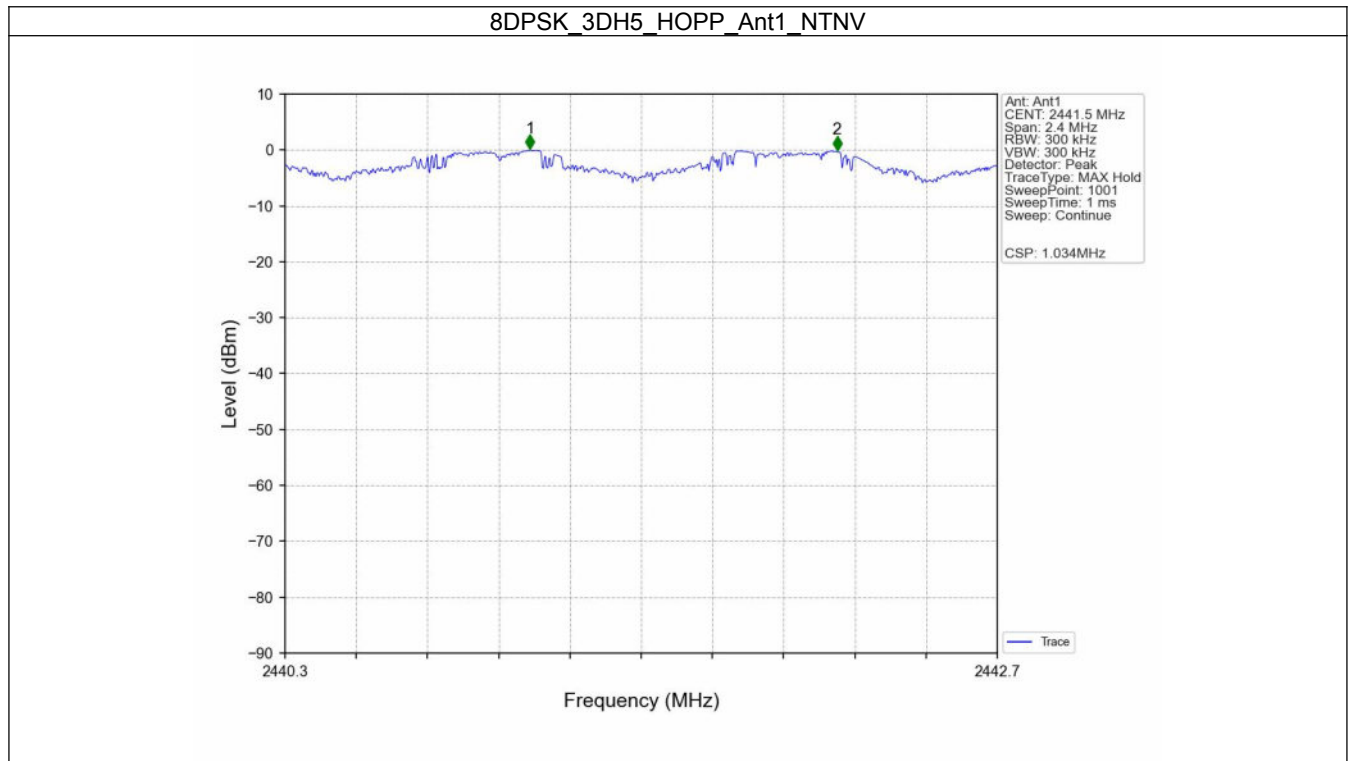
FCC ID: 2ACH3-GPRGBSBAR

3.2 Test Graph

3.2.1 Ant1



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR

## 4. Number of Hopping Frequencies

### 4.1 Test Result

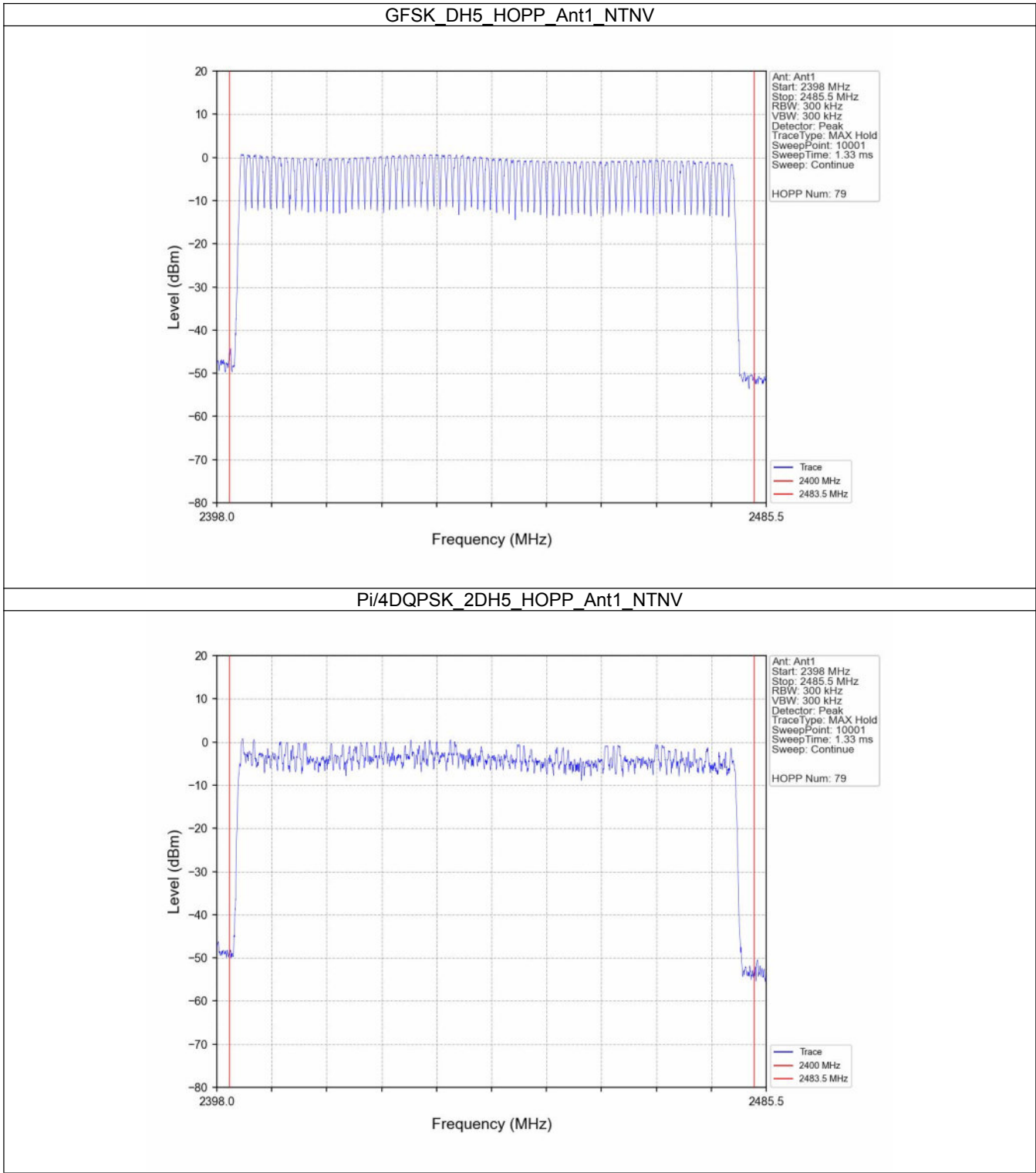
#### 4.1.1 HoppNum

| Mode      | TX Type | Frequency (MHz) | Packet Type | Num of Hopping Frequencies |           | Verdict |
|-----------|---------|-----------------|-------------|----------------------------|-----------|---------|
|           |         |                 |             | ANT1                       | Limit     |         |
| GFSK      | SISO    | HOPP            | DH5         | 79                         | $\geq 15$ | Pass    |
| Pi/4DQPSK | SISO    | HOPP            | 2DH5        | 79                         | $\geq 15$ | Pass    |
| 8DPSK     | SISO    | HOPP            | 3DH5        | 79                         | $\geq 15$ | Pass    |

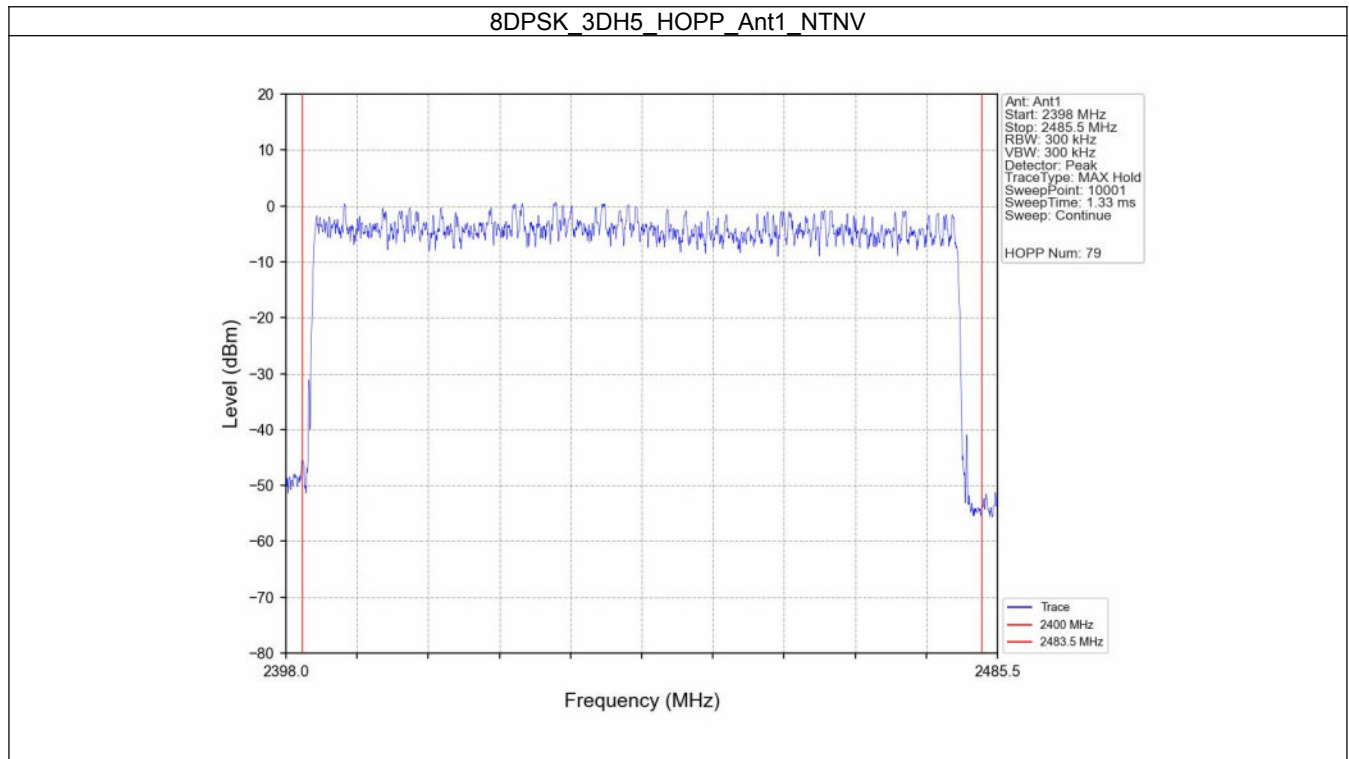
FCC ID: 2ACH3-GPRGBSBAR

4.2 Test Graph

4.2.1 HoppNum



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR

## 5. Time of Occupancy (Dwell Time)

### 5.1 Test Result

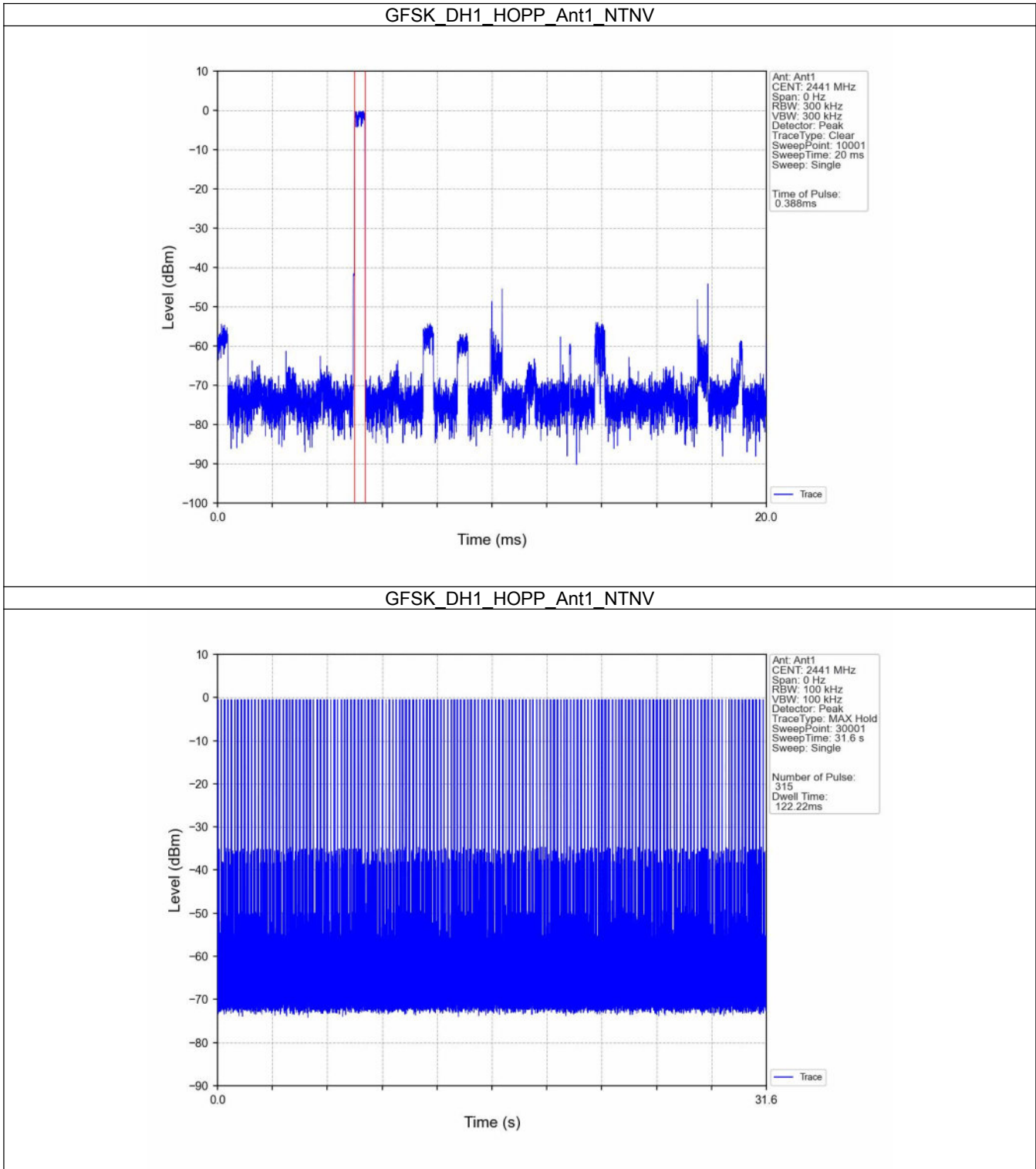
#### 5.1.1 Ant1

| Ant1      |         |                 |             |                               |                        |                                    |                 |            |         |
|-----------|---------|-----------------|-------------|-------------------------------|------------------------|------------------------------------|-----------------|------------|---------|
| Mode      | TX Type | Frequency (MHz) | Packet Type | Duration of Single Pulse (ms) | Observation Period (s) | Num of Pulse in Observation Period | Dwell Time (ms) | Limit (ms) | Verdict |
| GFSK      | SISO    | HOPP            | DH1         | 0.388                         | 31.600                 | 315                                | 122.220         | <=400      | Pass    |
|           |         |                 | DH3         | 1.696                         | 31.600                 | 173                                | 293.408         | <=400      | Pass    |
|           |         |                 | DH5         | 2.946                         | 31.600                 | 96                                 | 282.816         | <=400      | Pass    |
| Pi/4DQPSK | SISO    | HOPP            | 2DH1        | 0.450                         | 31.600                 | 314                                | 141.300         | <=400      | Pass    |
|           |         |                 | 2DH3        | 1.696                         | 31.600                 | 172                                | 291.712         | <=400      | Pass    |
|           |         |                 | 2DH5        | 2.950                         | 31.600                 | 95                                 | 280.250         | <=400      | Pass    |
| 8DPSK     | SISO    | HOPP            | 3DH1        | 0.392                         | 31.600                 | 314                                | 123.088         | <=400      | Pass    |
|           |         |                 | 3DH3        | 1.642                         | 31.600                 | 173                                | 284.066         | <=400      | Pass    |
|           |         |                 | 3DH5        | 2.946                         | 31.600                 | 92                                 | 271.032         | <=400      | Pass    |

FCC ID: 2ACH3-GPRGBSBAR

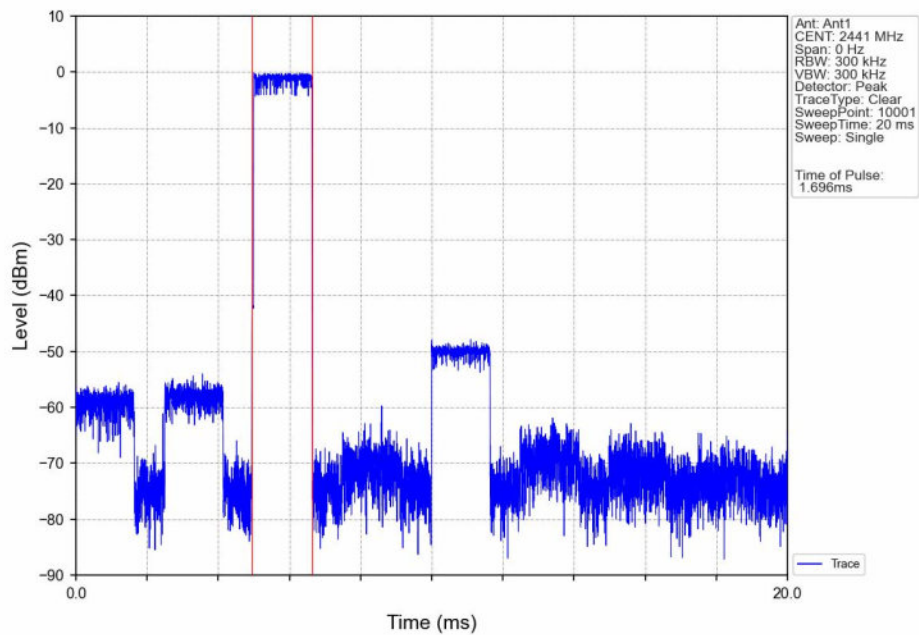
5.2 Test Graph

5.2.1 Ant1

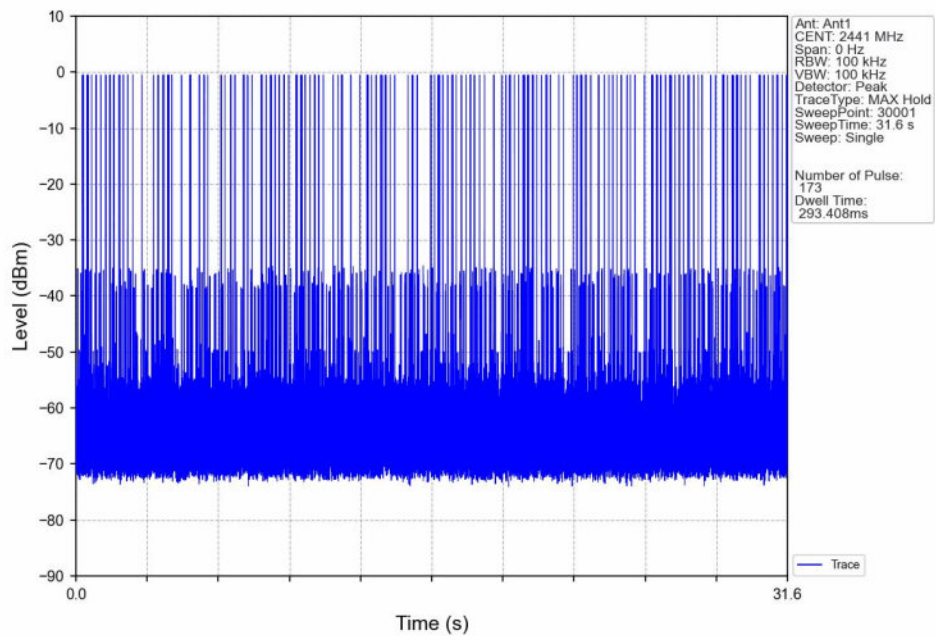


FCC ID: 2ACH3-GPRGBSBAR

GFSK\_DH3\_HOPP\_Ant1\_NTNV

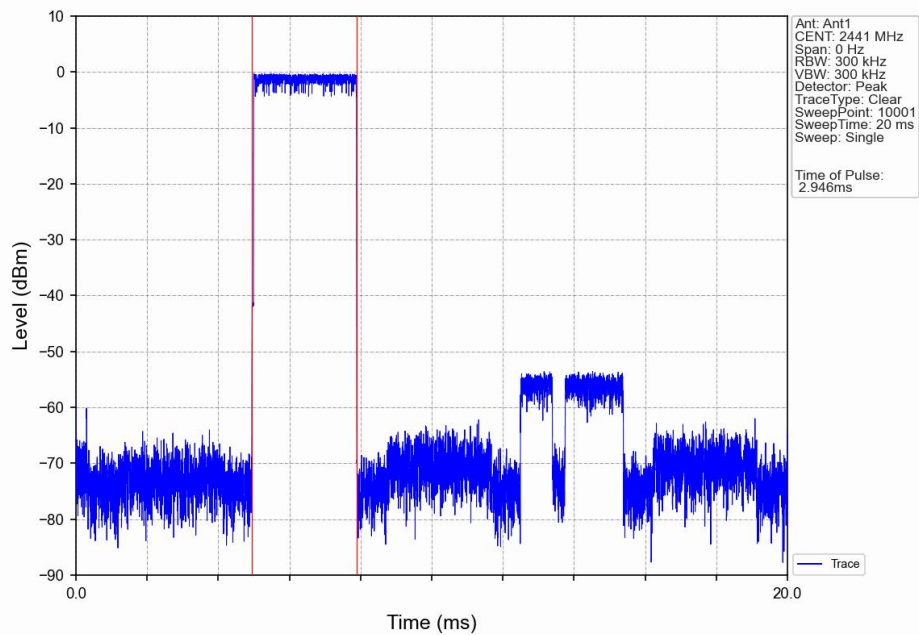


GFSK\_DH3\_HOPP\_Ant1\_NTNV

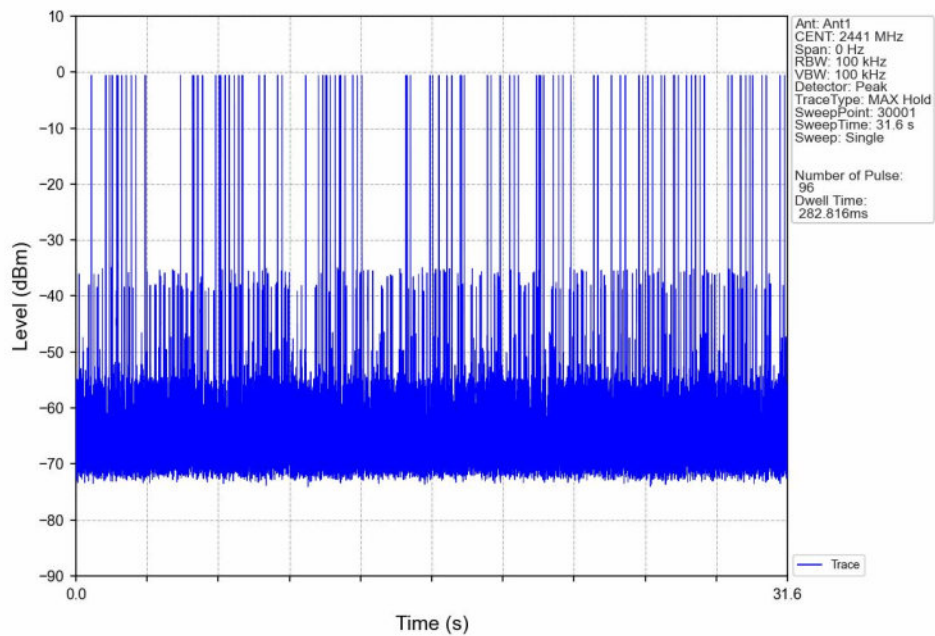


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GFSK\_DH5\_HOPP\_Ant1\_NTNV

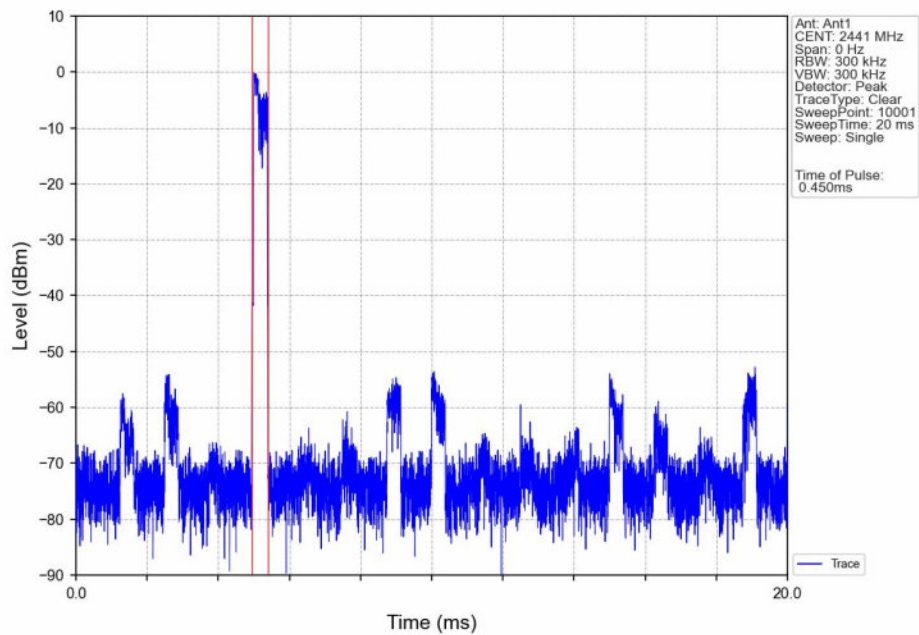


GFSK\_DH5\_HOPP\_Ant1\_NTNV

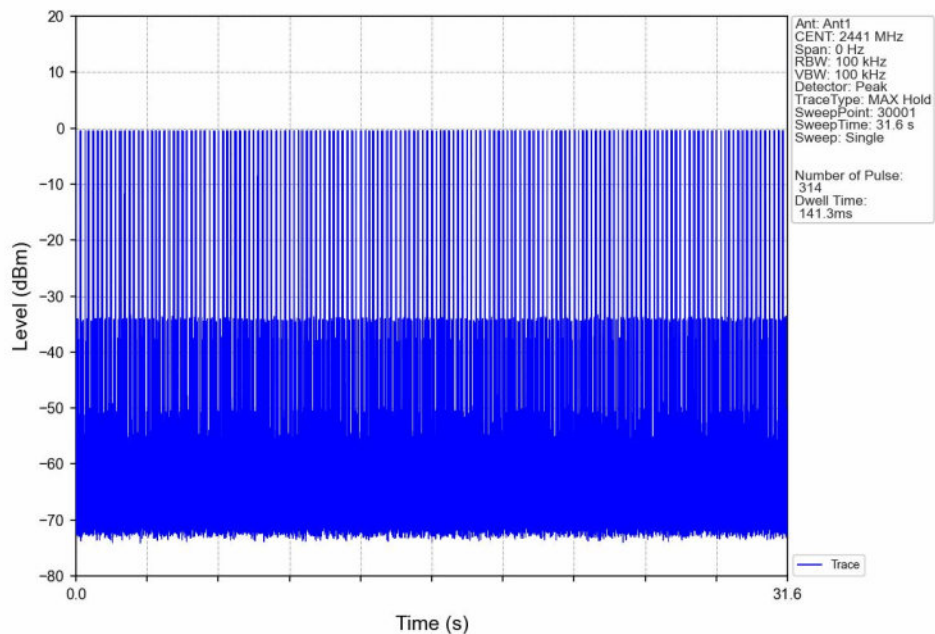


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Pi/4DQPSK\_2DH1\_HOPP\_Ant1\_NTNV

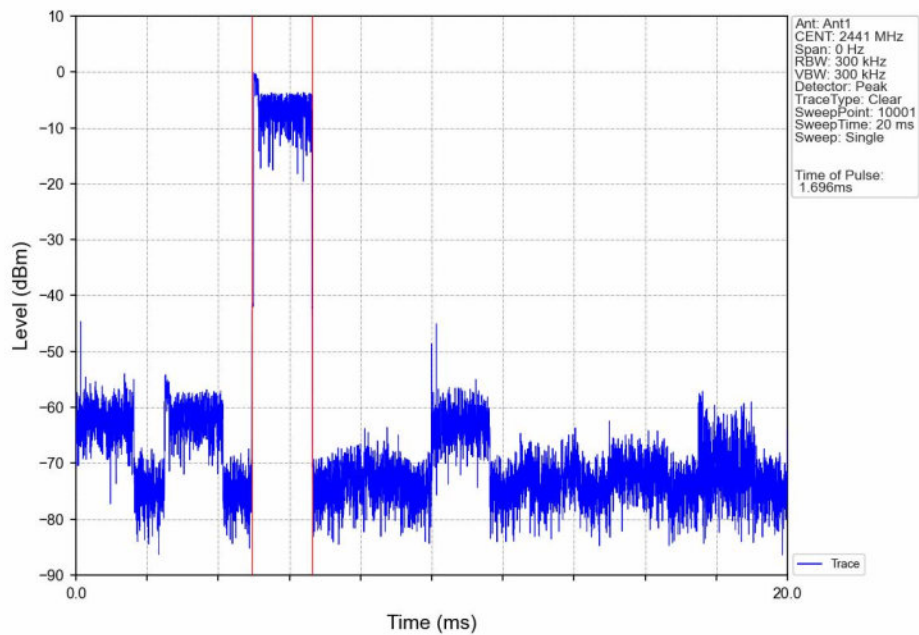


Pi/4DQPSK\_2DH1\_HOPP\_Ant1\_NTNV

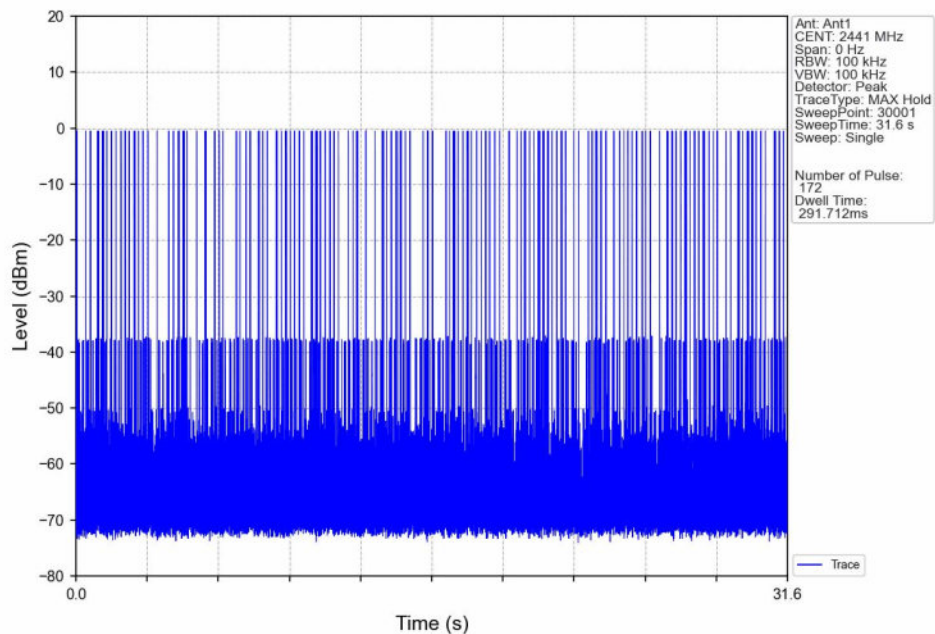


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Pi/4DQPSK\_2DH3\_HOPP\_Ant1\_NTNV

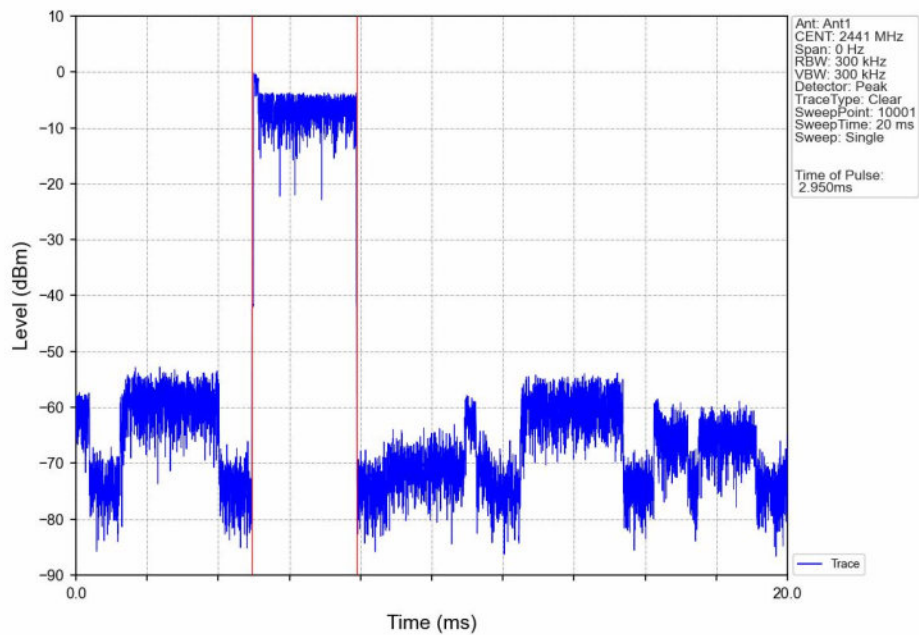


Pi/4DQPSK\_2DH3\_HOPP\_Ant1\_NTNV

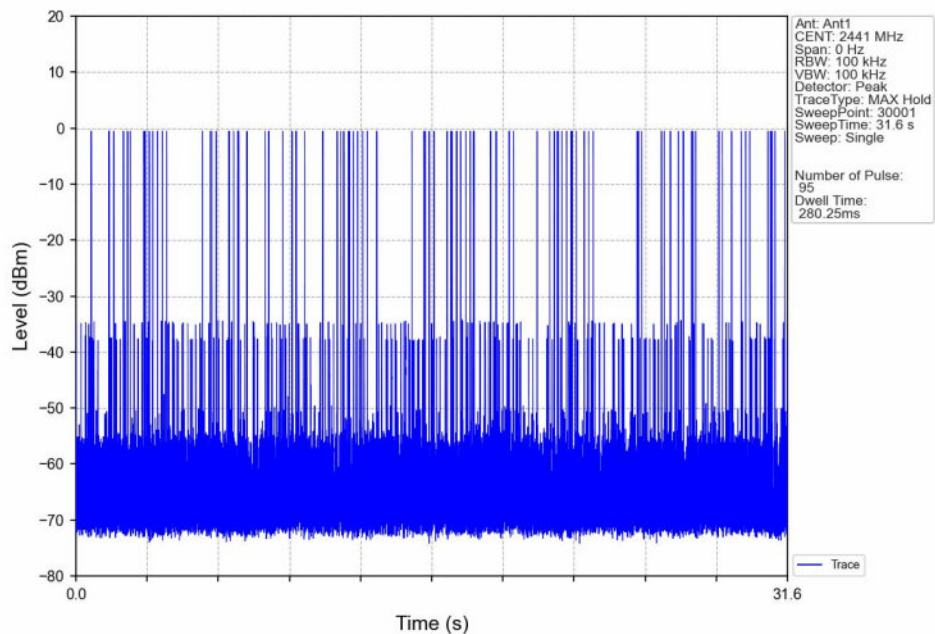


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Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV

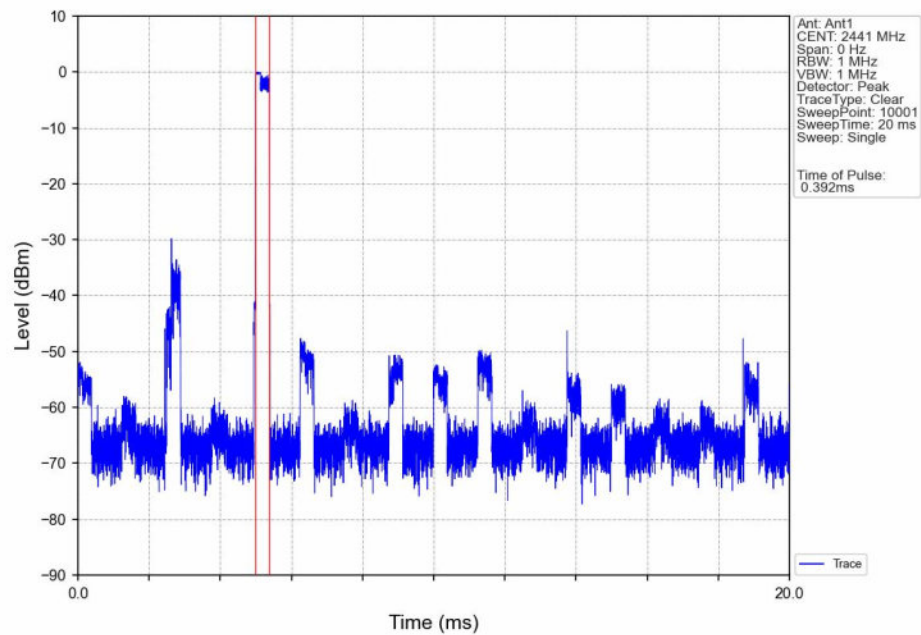


Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV

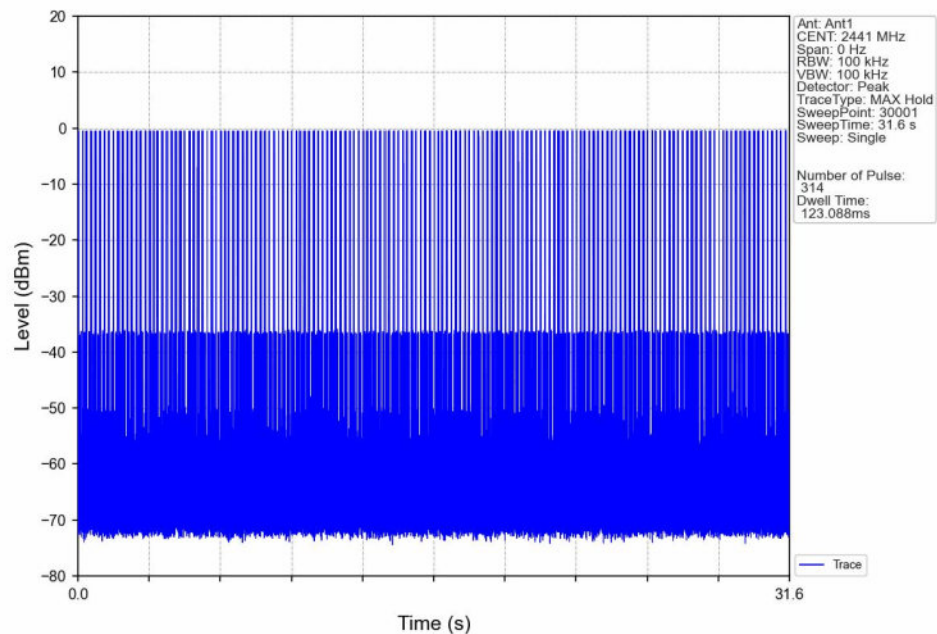


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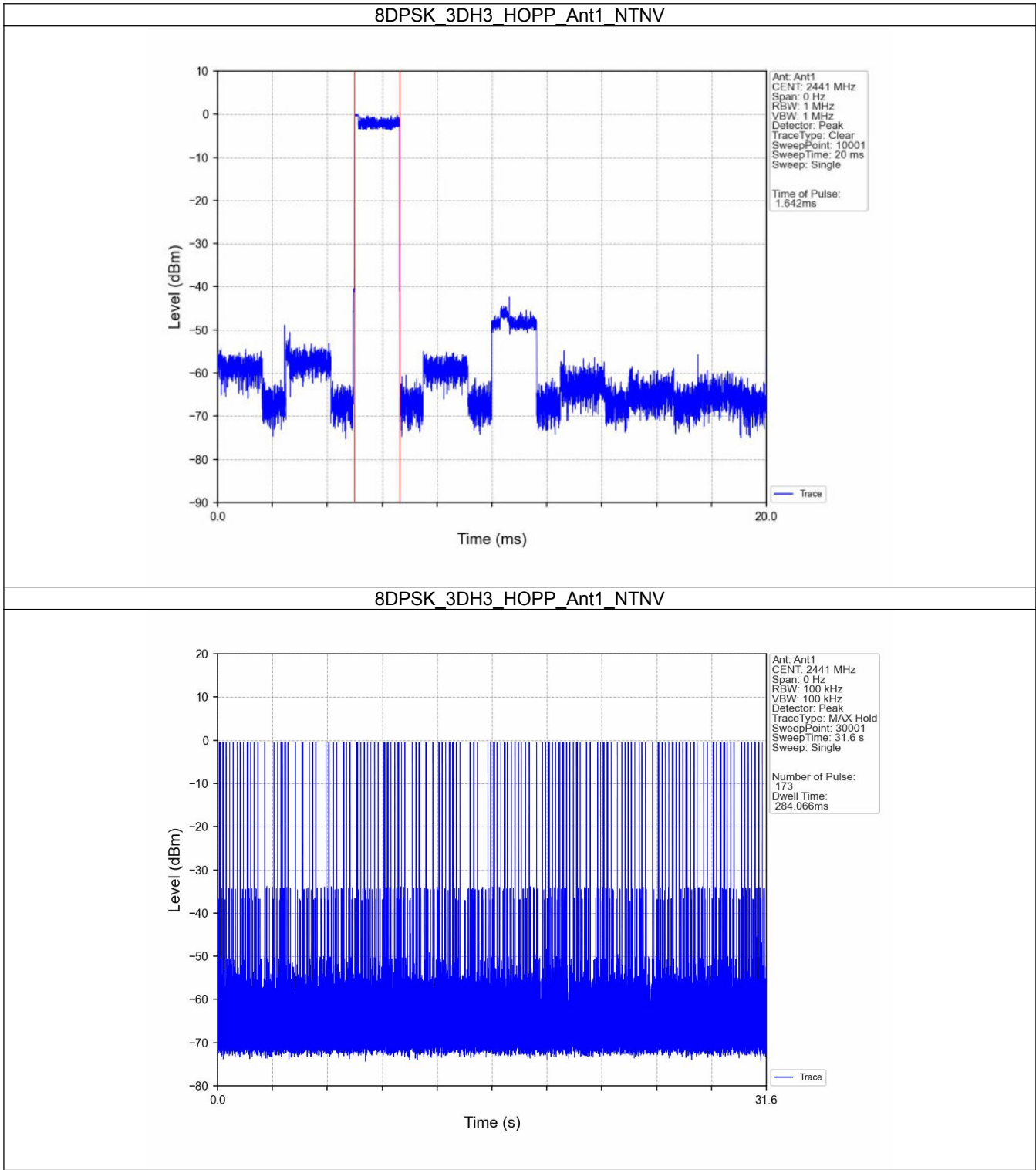
8DPSK\_3DH1\_HOPP\_Ant1\_NTNV



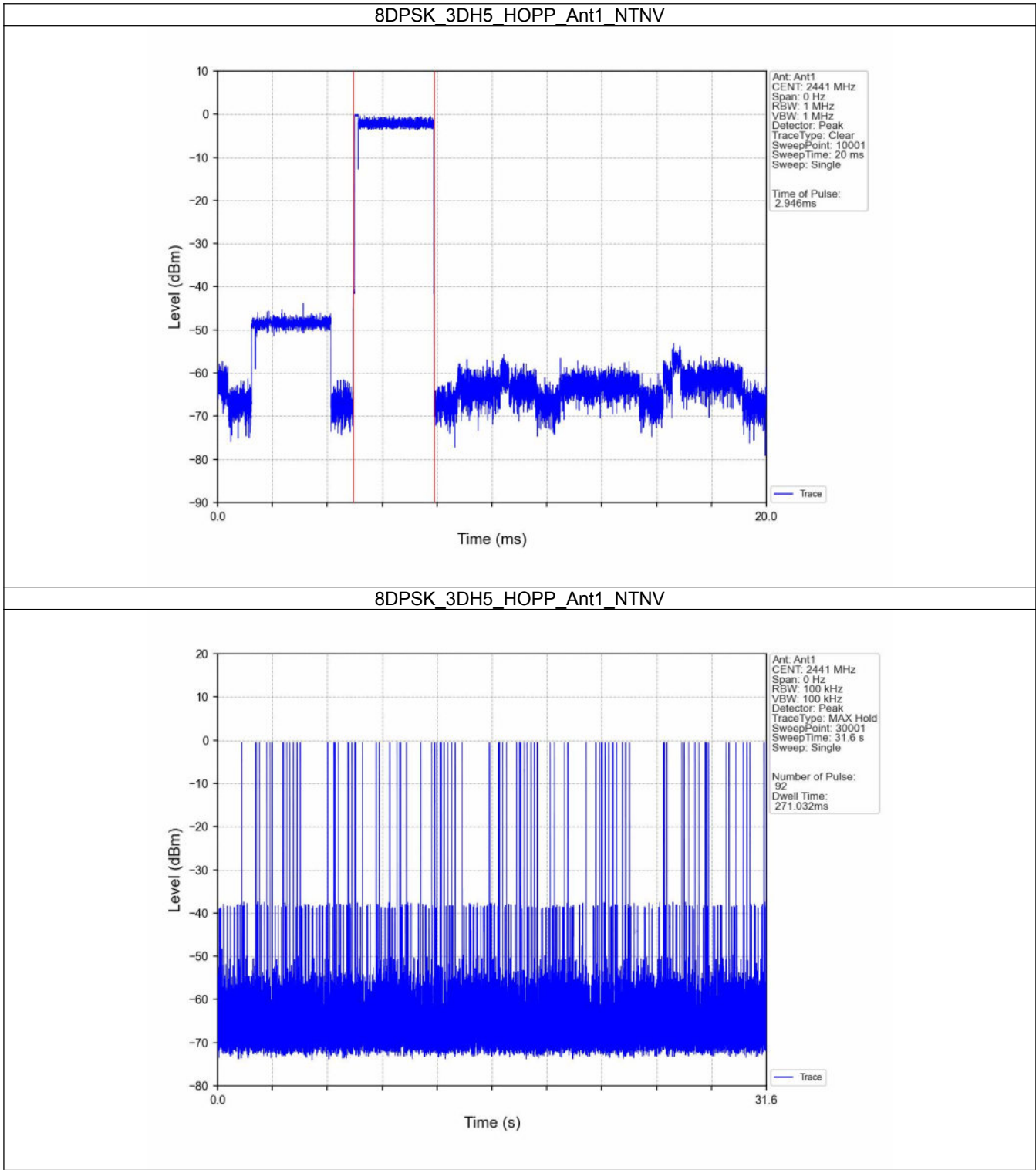
8DPSK\_3DH1\_HOPP\_Ant1\_NTNV



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR



FCC ID: 2ACH3-GPRGBSBAR

## 6. Unwanted Emissions In Non-restricted Frequency Bands

### 6.1 Test Result

#### 6.1.1 Ref

| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | Level of Reference (dBm) |
|-----------|---------|-----------------|-------------|-----|--------------------------|
| GFSK      | SISO    | 2402            | DH5         | 1   | 0.81                     |
|           |         | 2441            | DH5         | 1   | -0.13                    |
|           |         | 2480            | DH5         | 1   | -1.71                    |
|           |         | HOPP            | DH5         | 1   | 0.33                     |
|           |         |                 |             |     | 0.33                     |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | 0.87                     |
|           |         | 2441            | 2DH5        | 1   | -0.20                    |
|           |         | 2480            | 2DH5        | 1   | -1.75                    |
|           |         | HOPP            | 2DH5        | 1   | 0.39                     |
|           |         |                 |             |     | 0.39                     |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | 0.88                     |
|           |         | 2441            | 3DH5        | 1   | -0.10                    |
|           |         | 2480            | 3DH5        | 1   | -1.72                    |
|           |         | HOPP            | 3DH5        | 1   | 0.26                     |
|           |         |                 |             |     | 0.26                     |

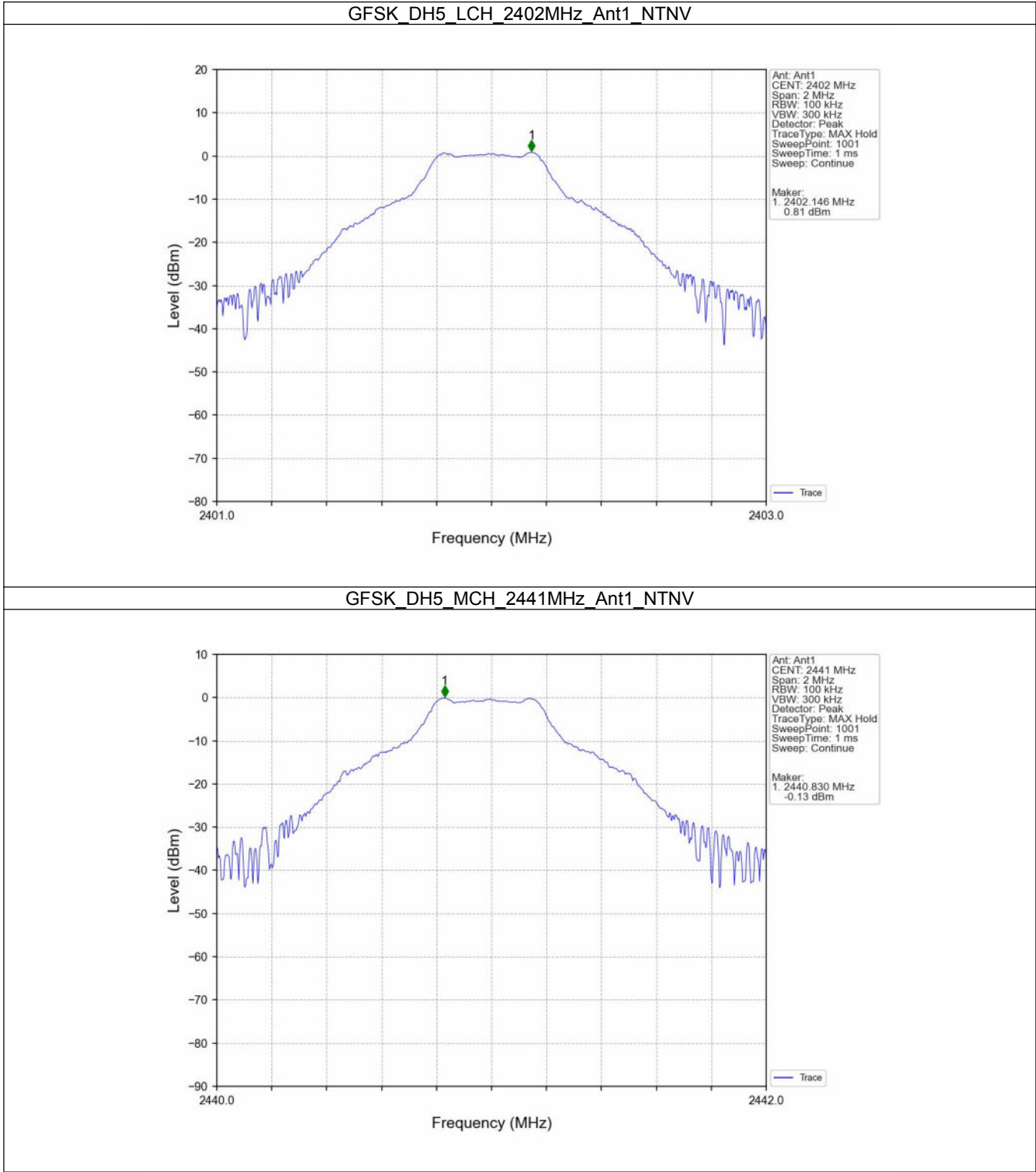
#### 6.1.2 CSE

| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | Level of Reference (dBm) | Limit (dBm) | Verdict |
|-----------|---------|-----------------|-------------|-----|--------------------------|-------------|---------|
| GFSK      | SISO    | 2402            | DH5         | 1   | 0.81                     | -19.19      | Pass    |
|           |         | 2441            | DH5         | 1   | -0.13                    | -20.13      | Pass    |
|           |         | 2480            | DH5         | 1   | -1.71                    | -21.71      | Pass    |
|           |         | HOPP            | DH5         | 1   | 0.33                     | -19.67      | Pass    |
|           |         |                 |             |     | 0.33                     | -19.67      | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | 0.87                     | -19.13      | Pass    |
|           |         | 2441            | 2DH5        | 1   | -0.20                    | -20.20      | Pass    |
|           |         | 2480            | 2DH5        | 1   | -1.75                    | -21.75      | Pass    |
|           |         | HOPP            | 2DH5        | 1   | 0.39                     | -19.61      | Pass    |
|           |         |                 |             |     | 0.39                     | -19.61      | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | 0.88                     | -19.12      | Pass    |
|           |         | 2441            | 3DH5        | 1   | -0.10                    | -20.10      | Pass    |
|           |         | 2480            | 3DH5        | 1   | -1.72                    | -21.72      | Pass    |
|           |         | HOPP            | 3DH5        | 1   | 0.26                     | -19.74      | Pass    |
|           |         |                 |             |     | 0.26                     | -19.74      | Pass    |

FCC ID: 2ACH3-GPRGBSBAR

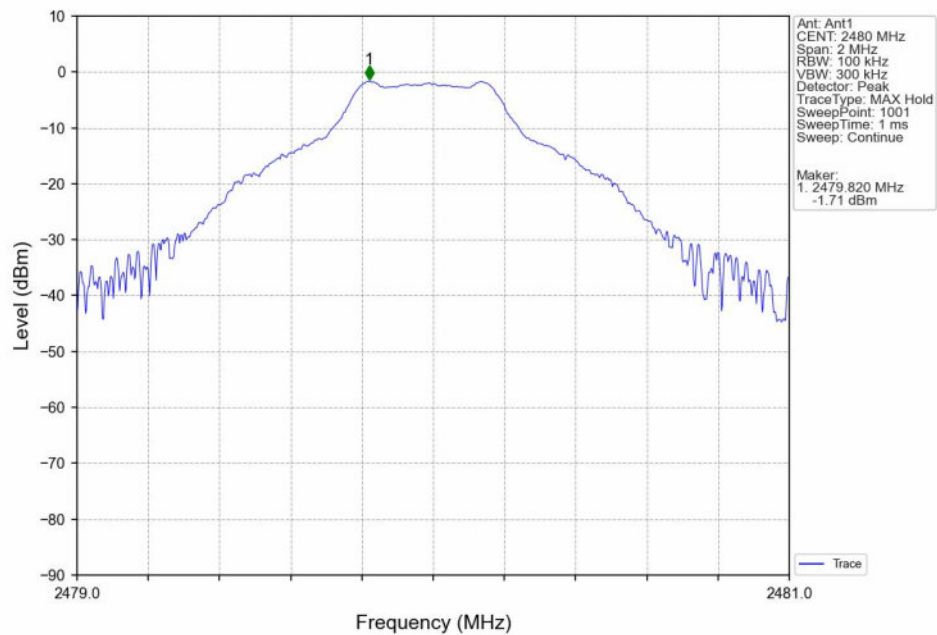
6.2 Test Graph

6.2.1 Ref

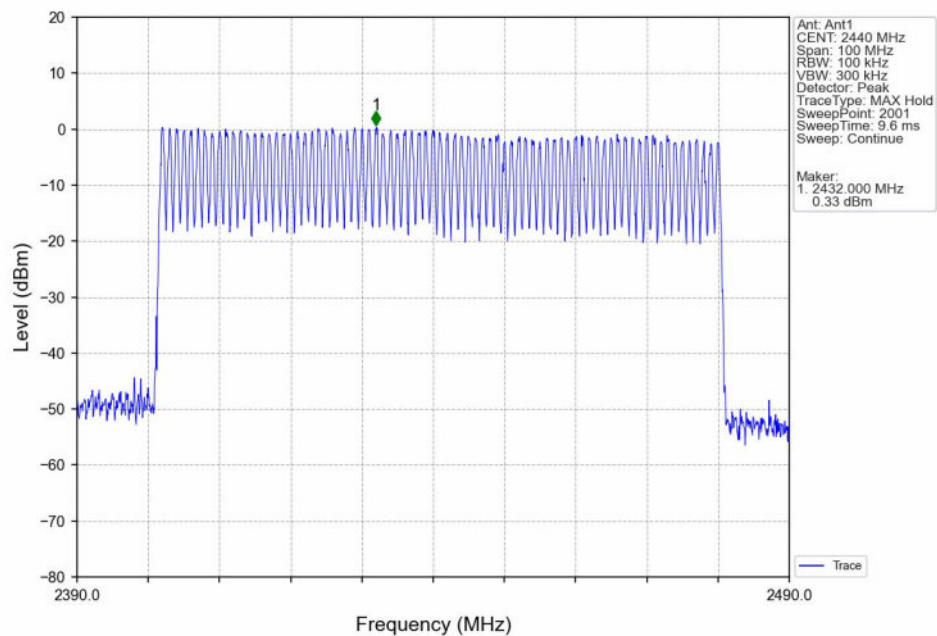


FCC ID: 2ACH3-GPRGBSBAR

GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV

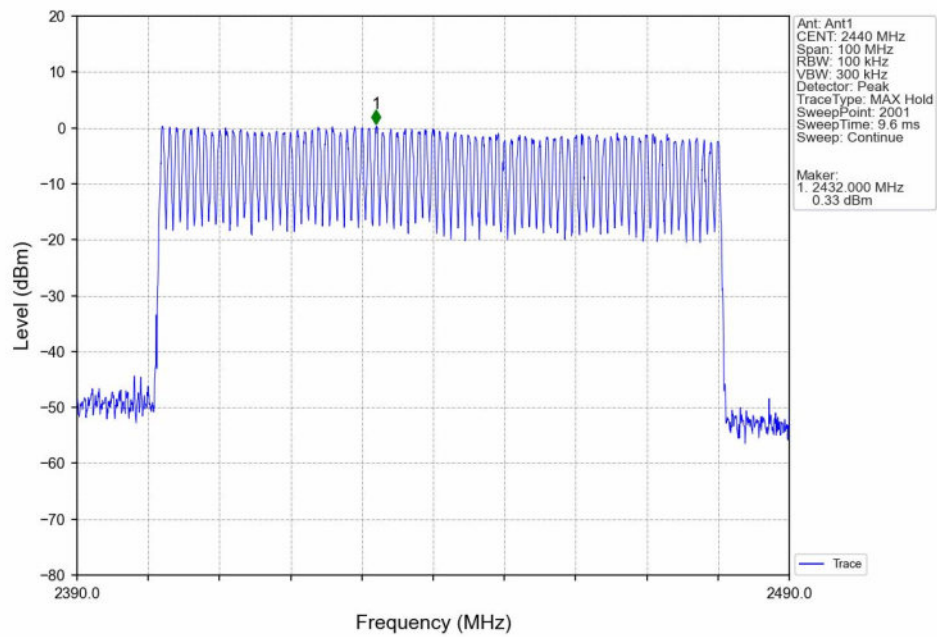


GFSK\_DH5\_HOPP\_Ant1\_NTNV

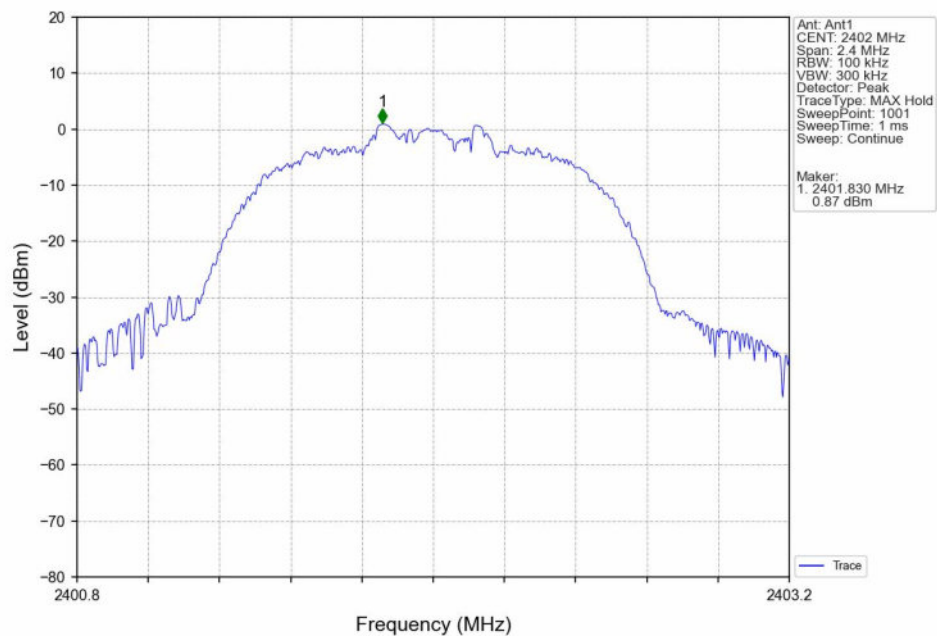


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GFSK\_DH5\_HOPP\_Ant1\_NTNV

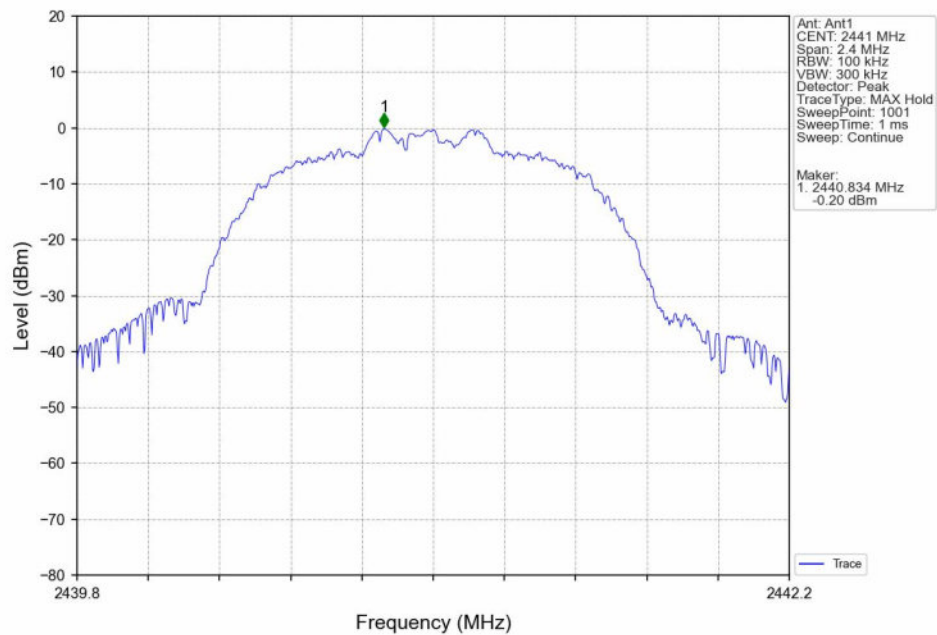


Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV

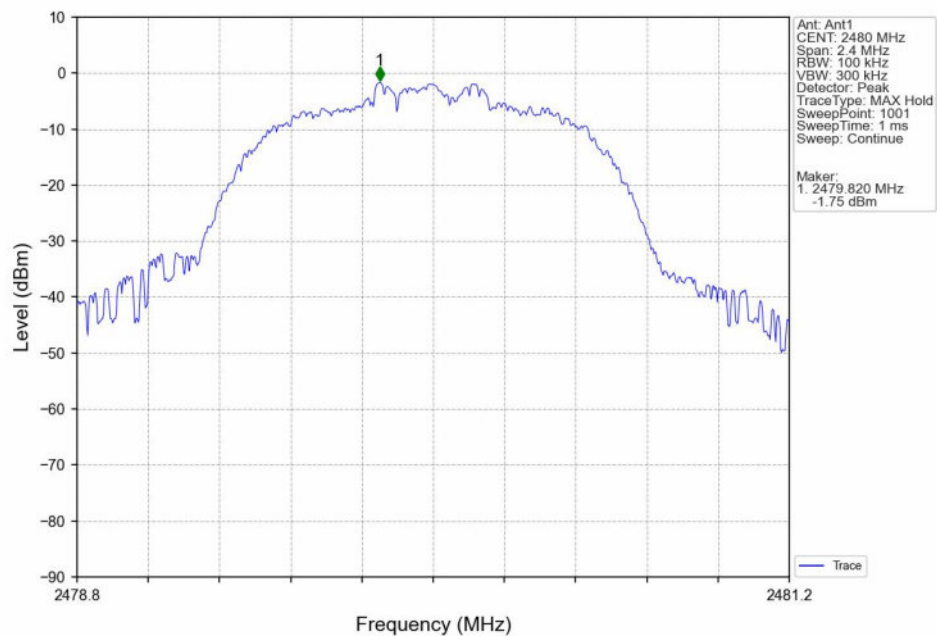


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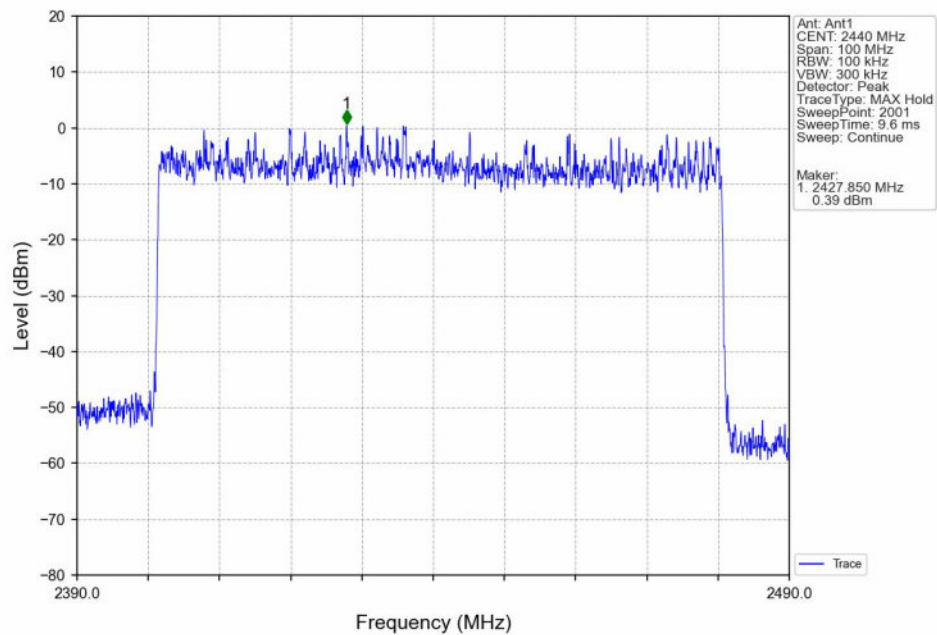


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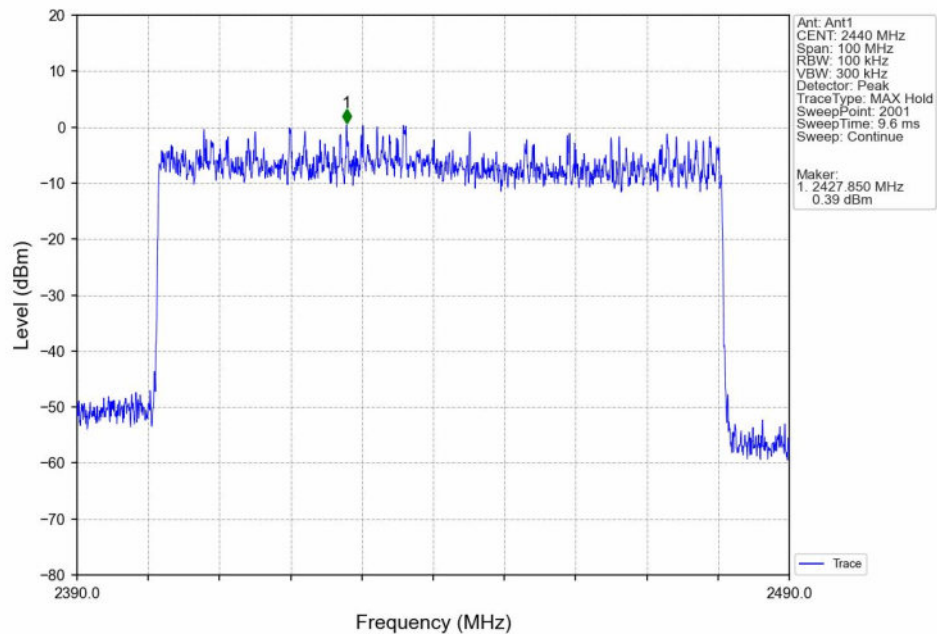


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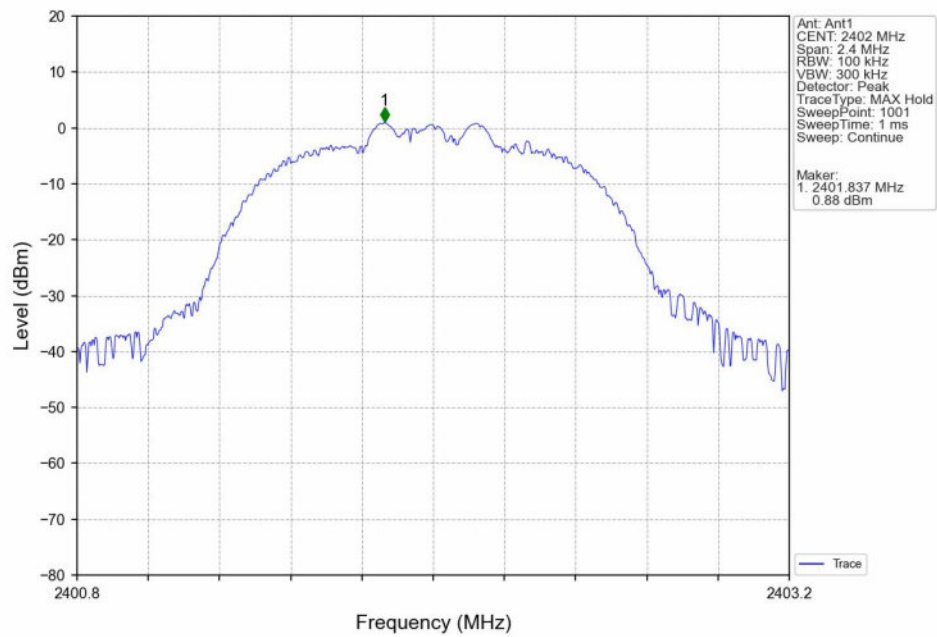


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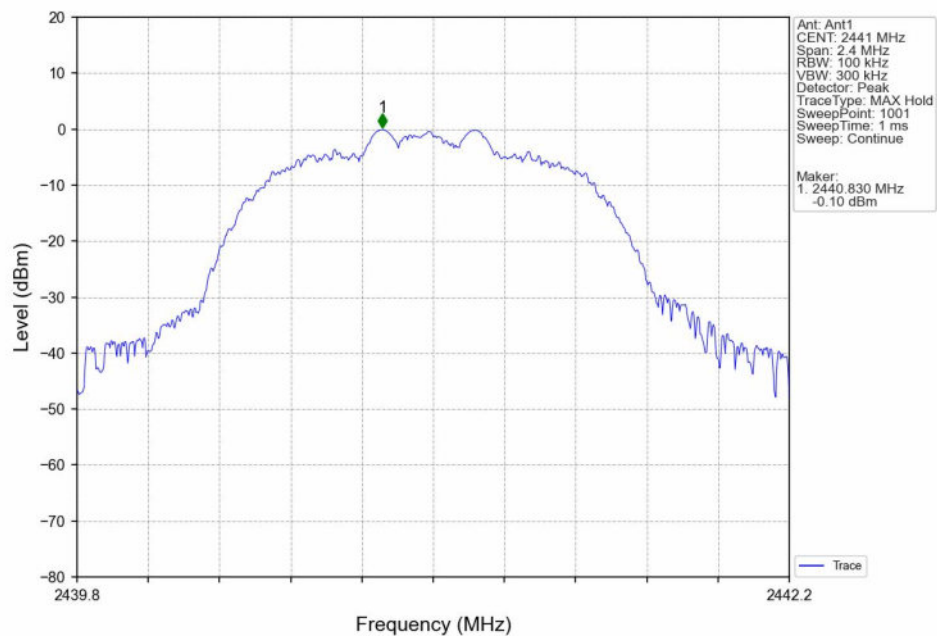


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8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV

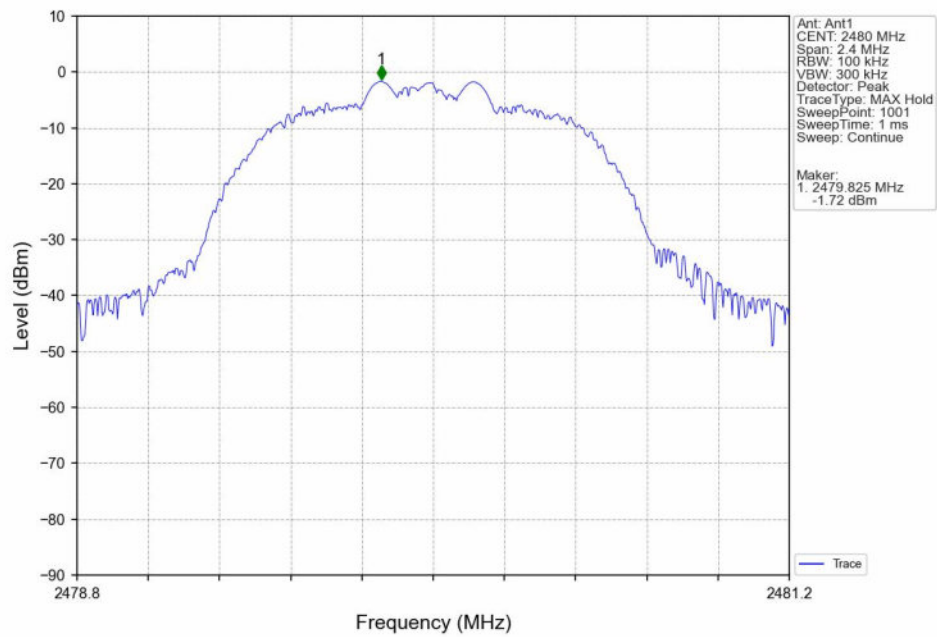


8DPSK\_3DH5\_MCH\_2441MHz\_Ant1\_NTNV

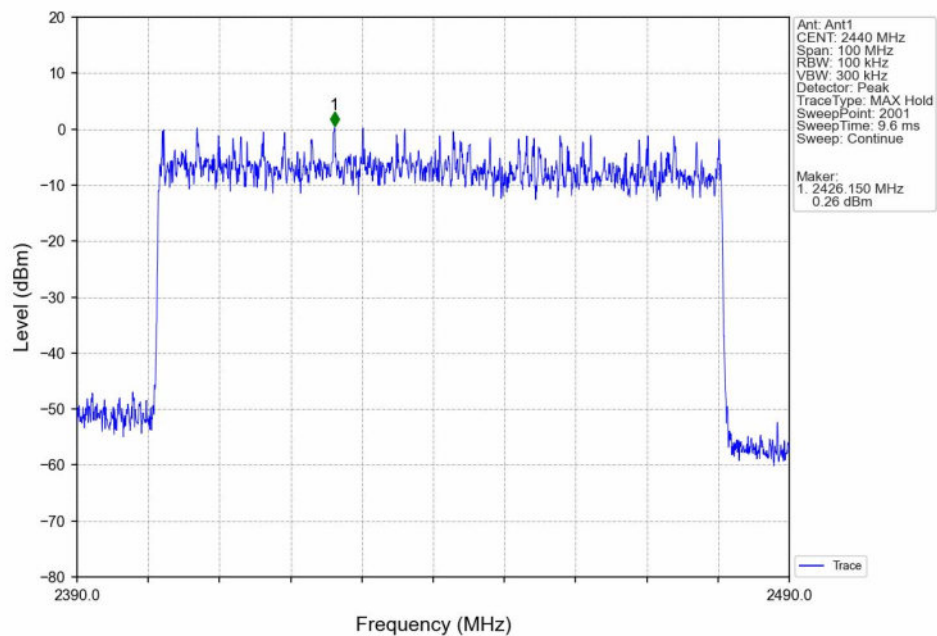


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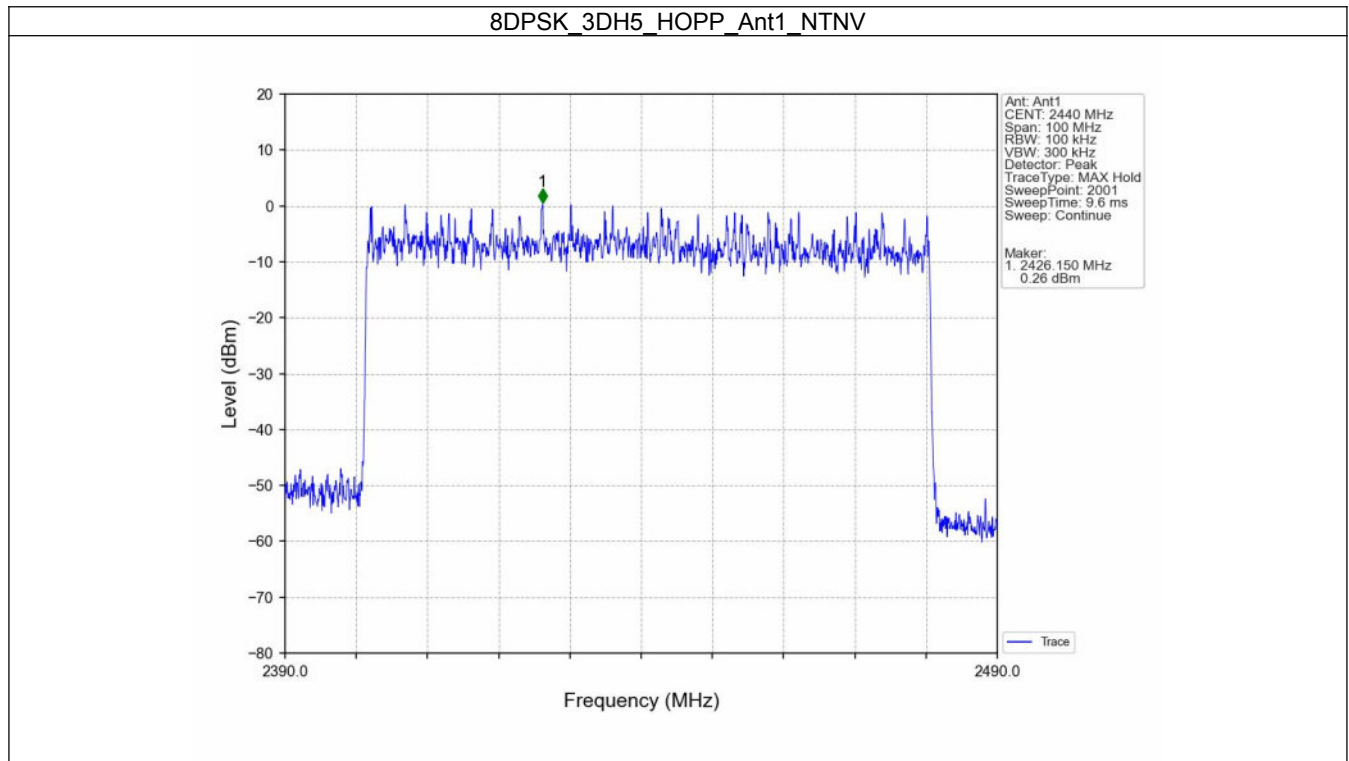
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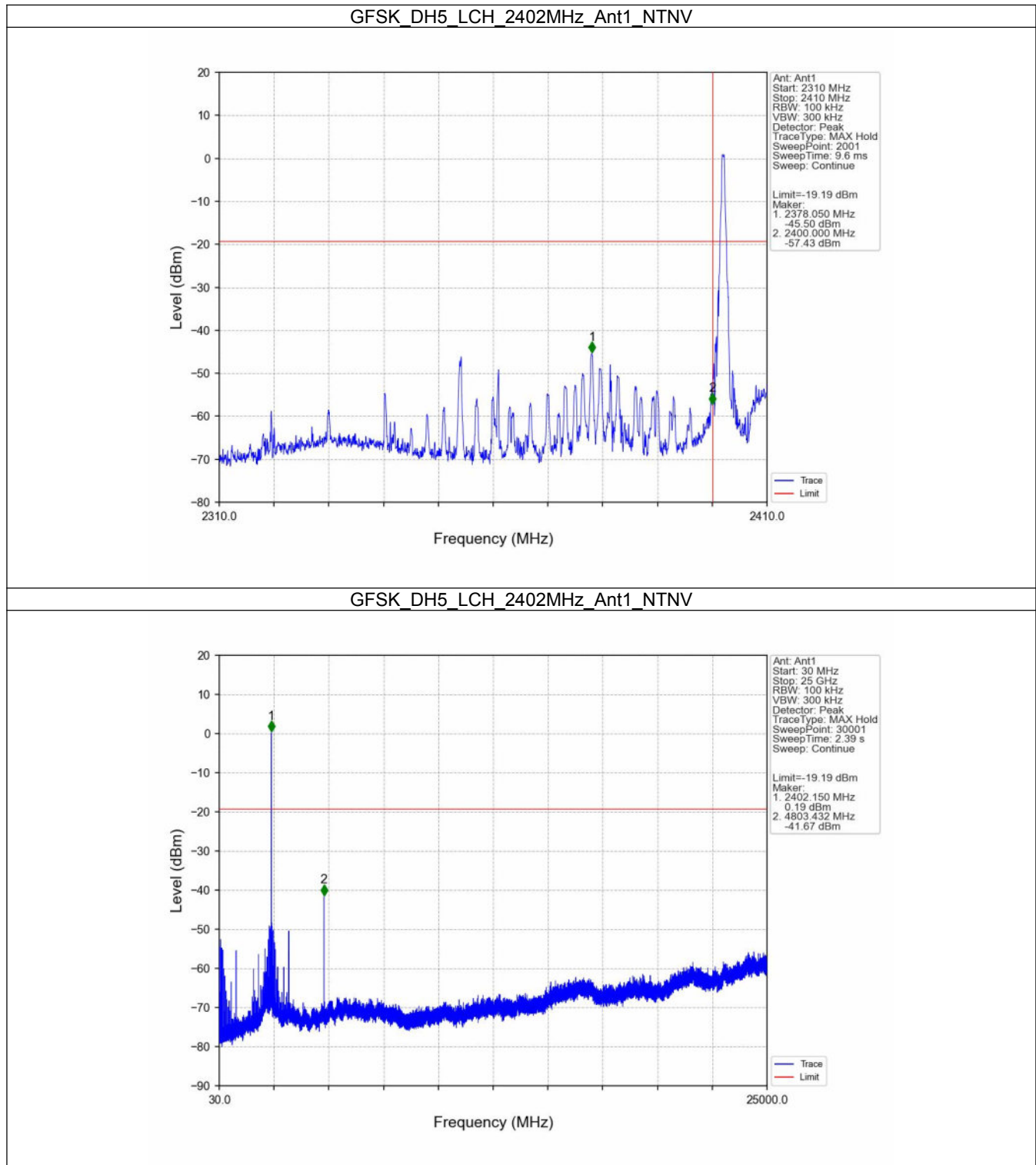
8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



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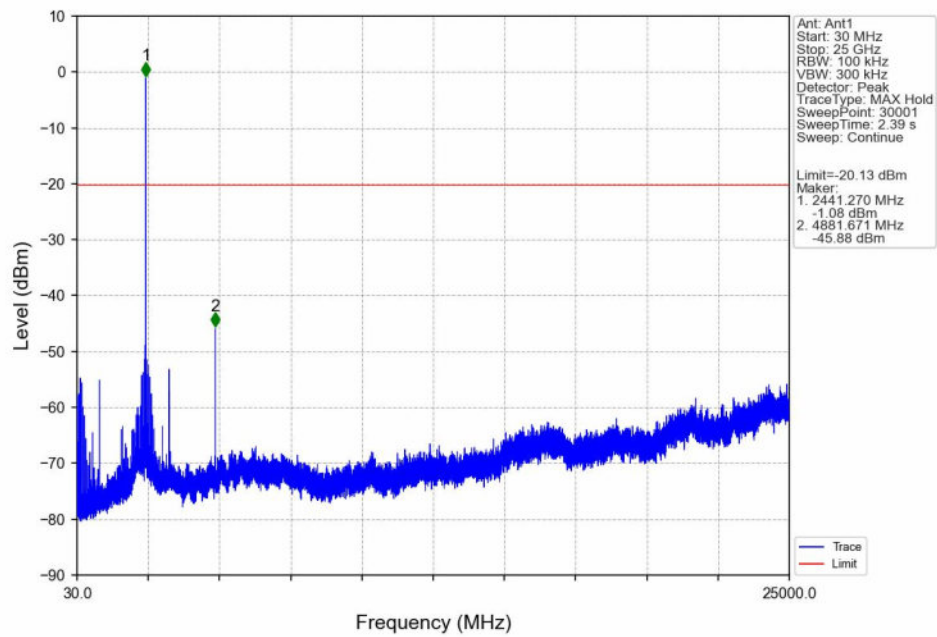


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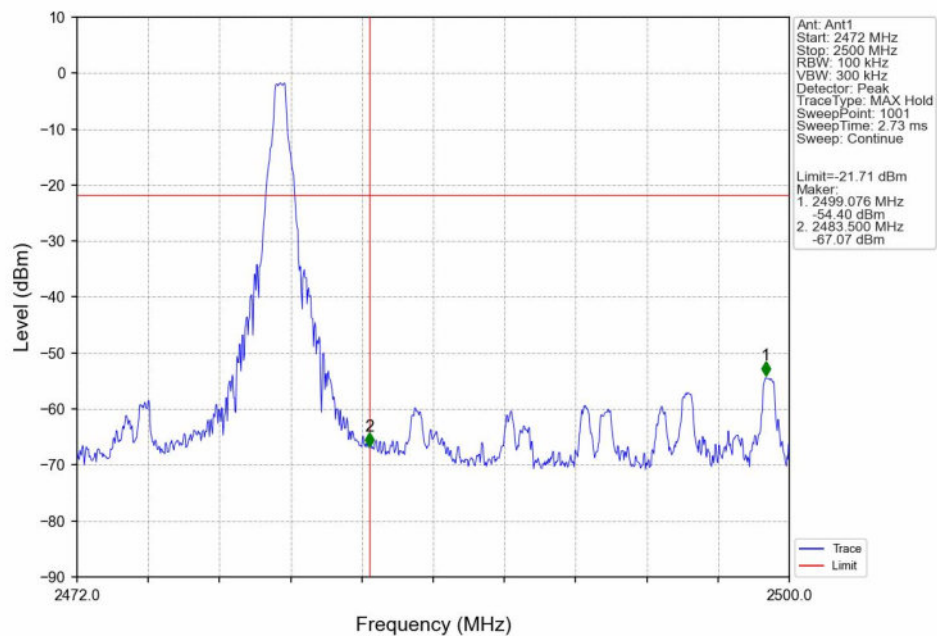
**6.2.2 CSE**

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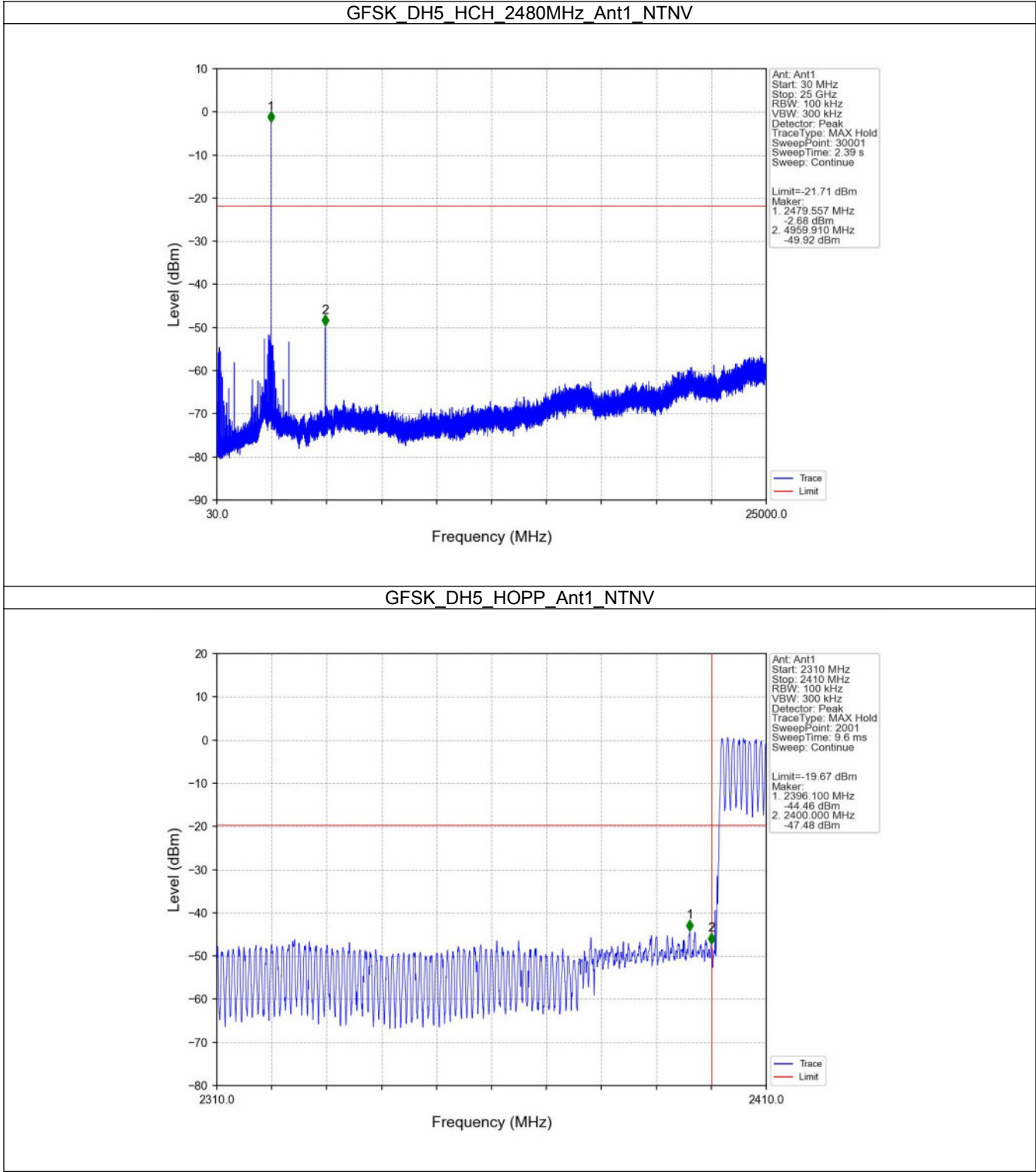
GFSK\_DH5\_MCH\_2441MHz\_Ant1\_NTNV



GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV

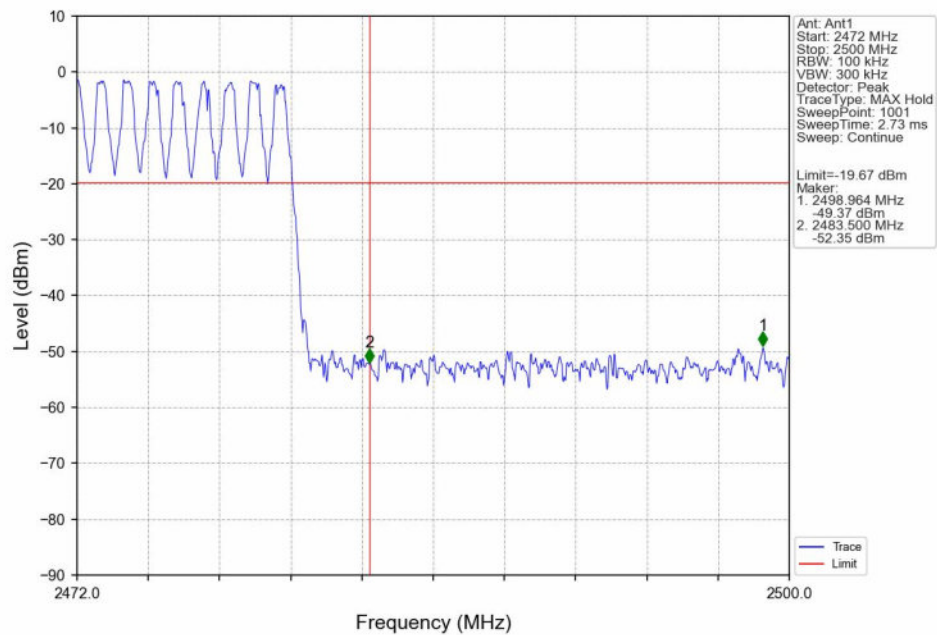


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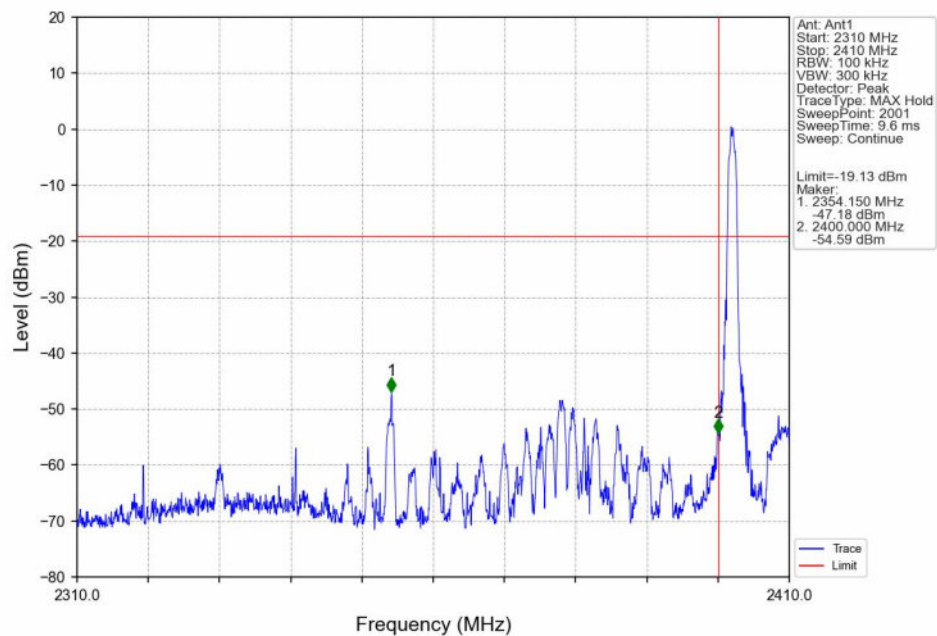


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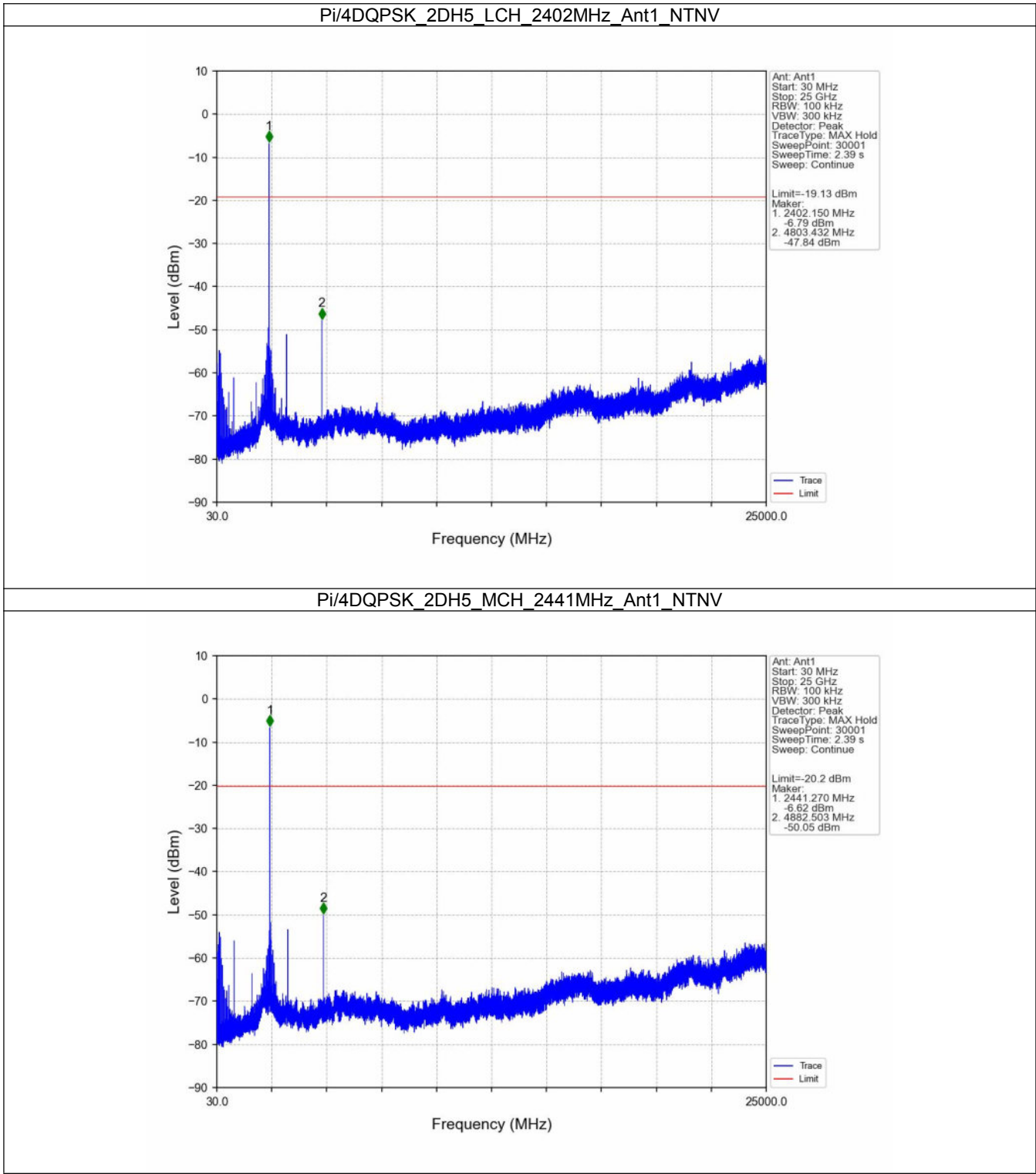
## GFSK\_DH5\_HOPP\_Ant1\_NTNV



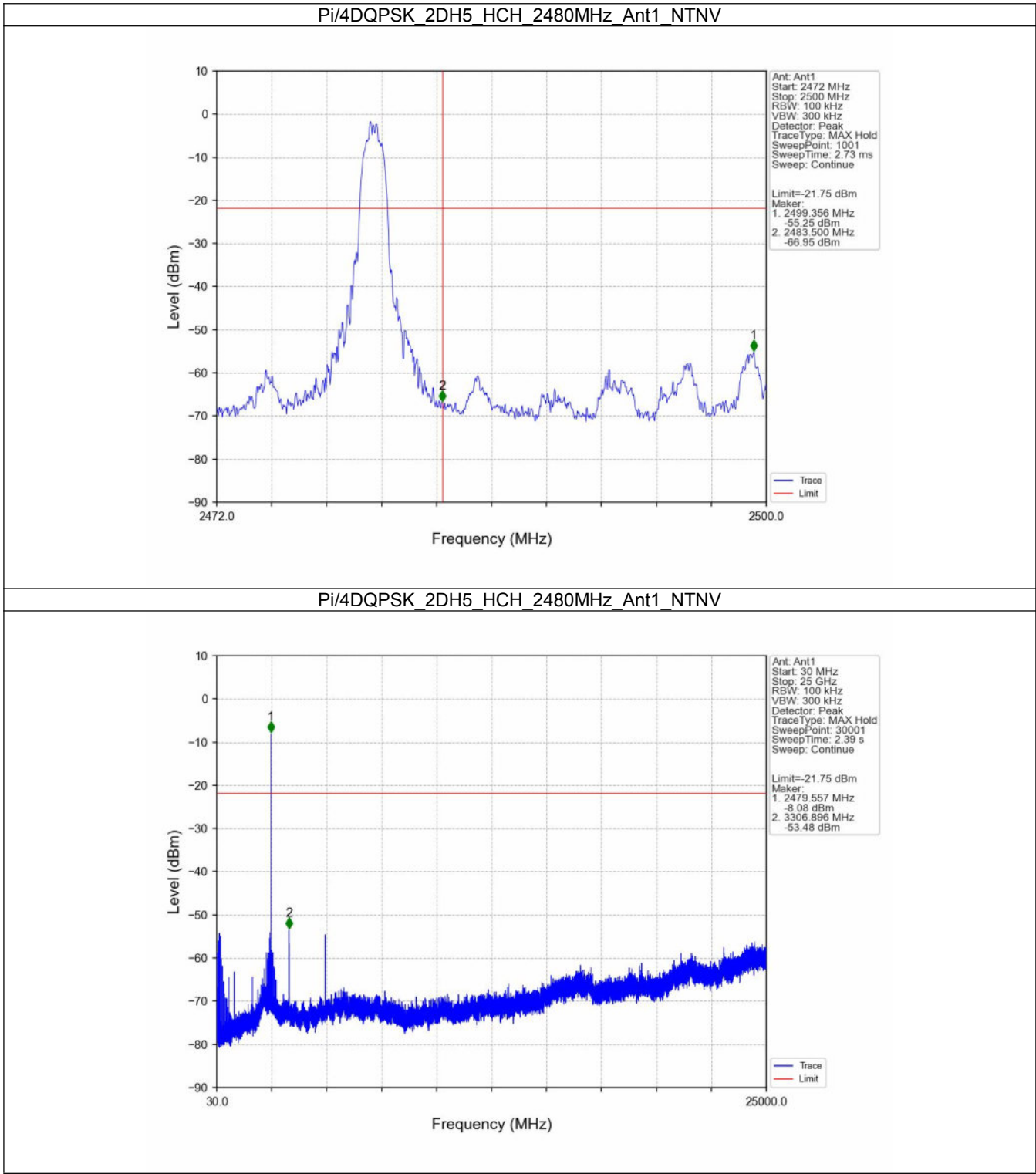
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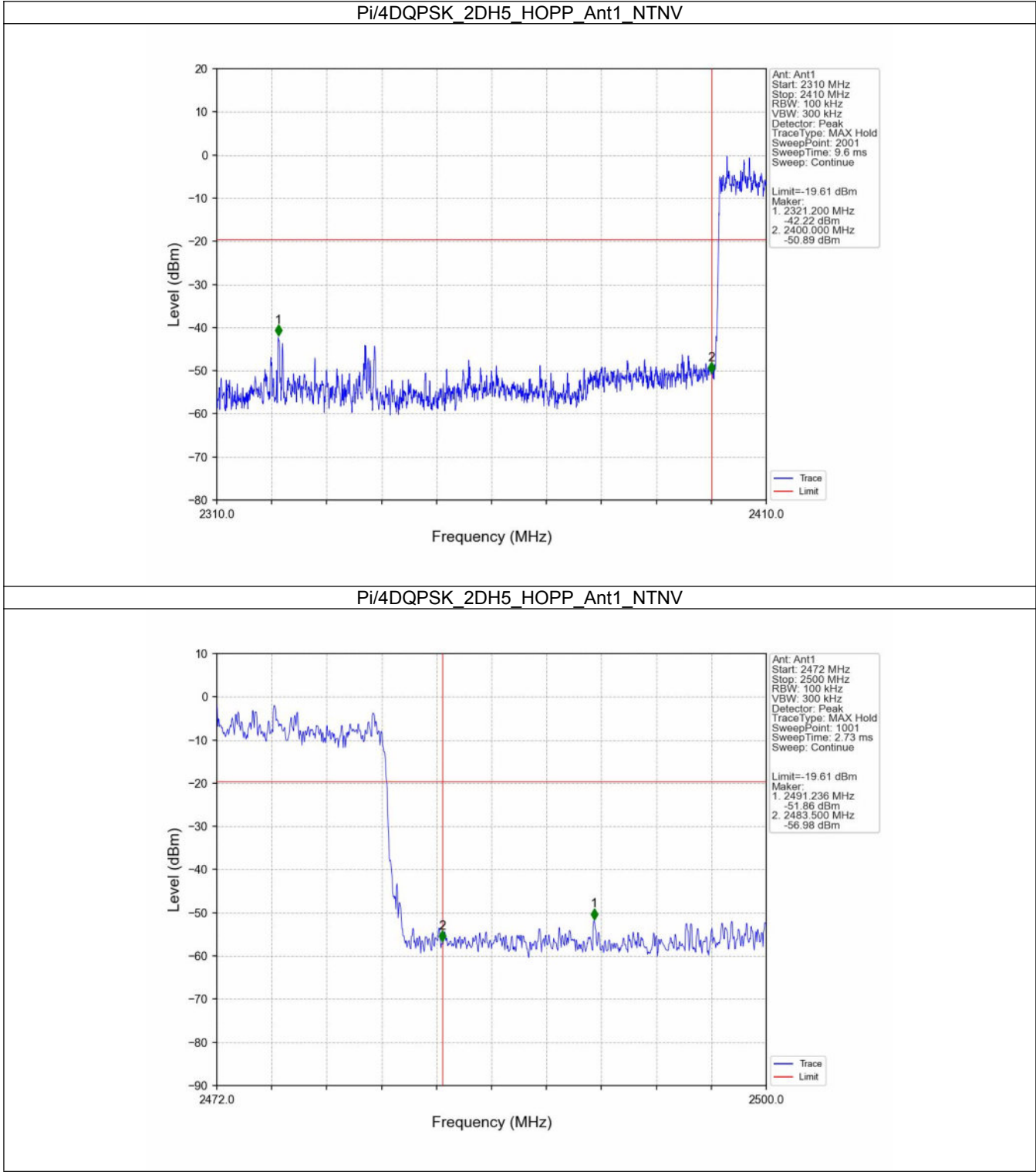
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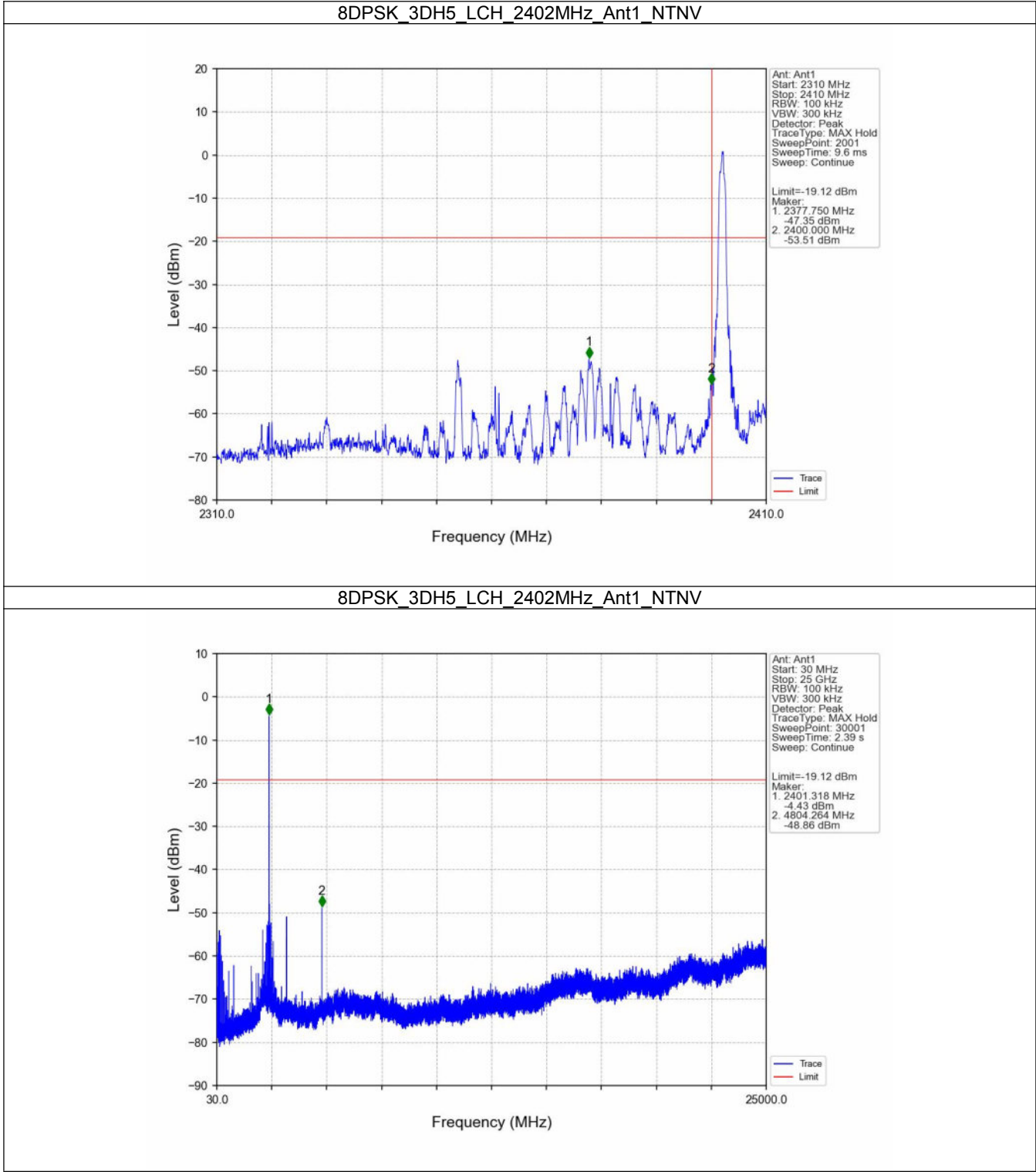
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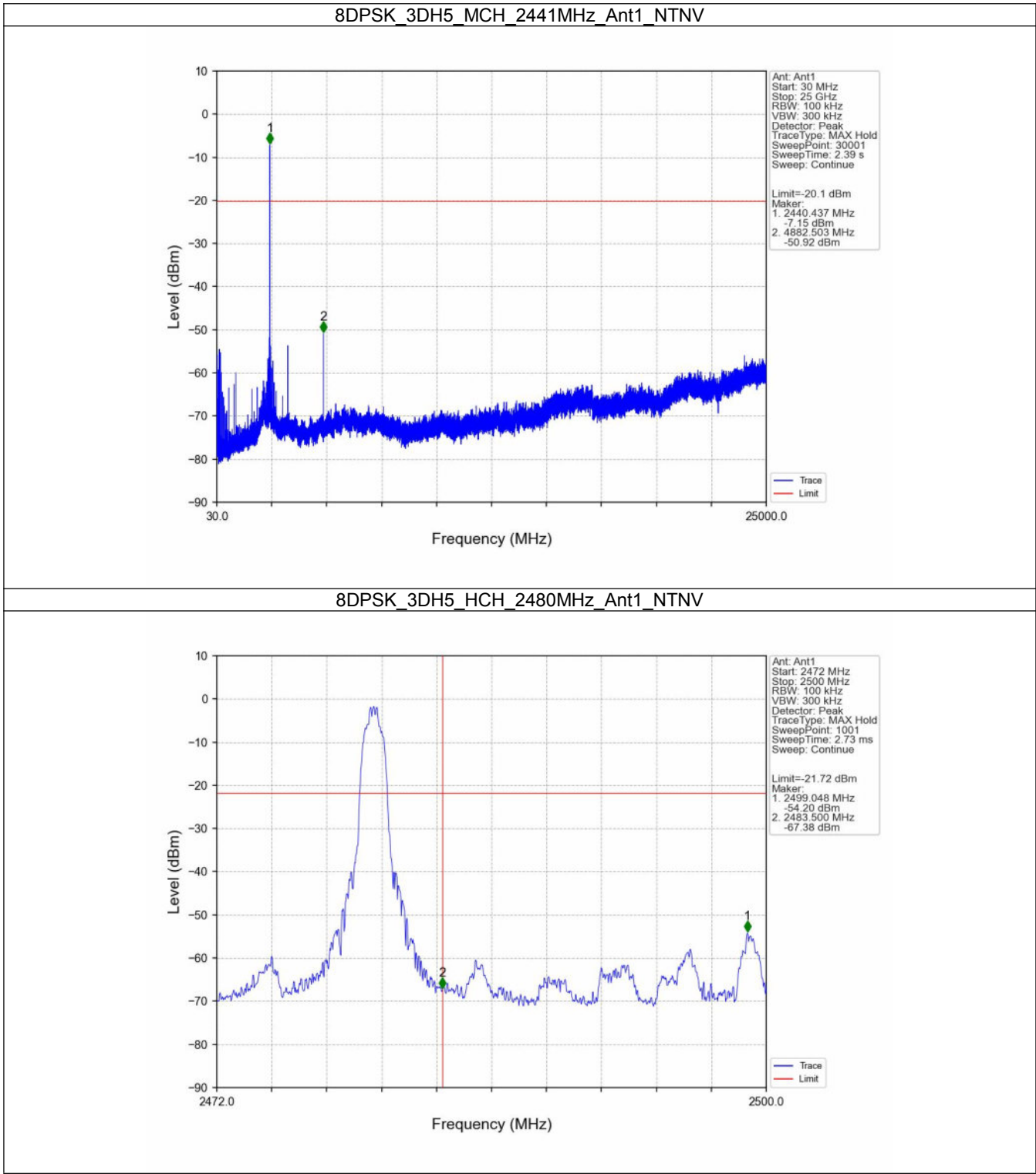
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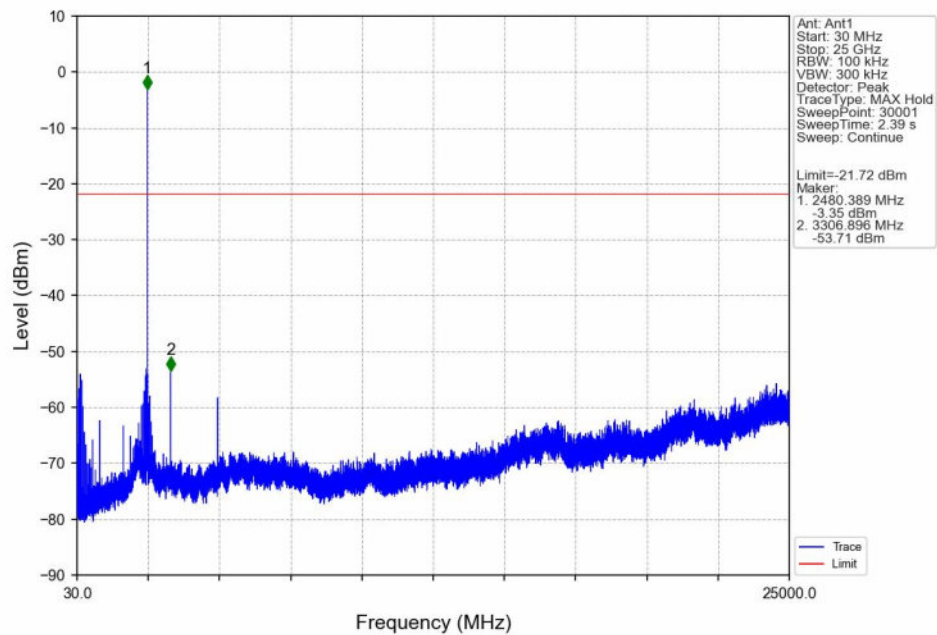


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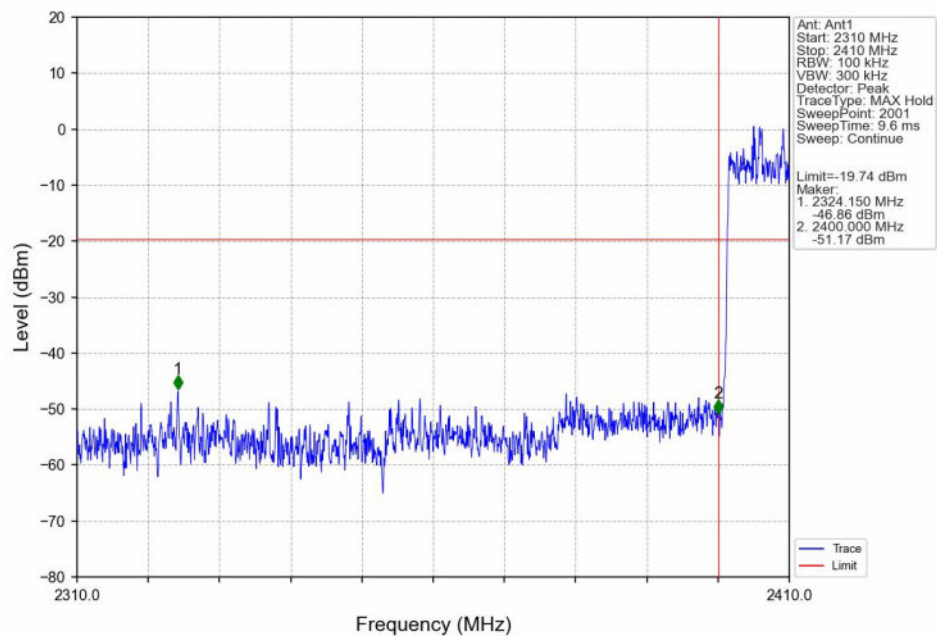


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## 8DPSK\_3DH5\_HCH\_2480MHz\_Ant1\_NTNV



## 8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



FCC ID: 2ACH3-GPRGBSBAR

