

## **Appendix RF Test Data for BT**

**Company:** : Lantian New Technology R&D (Shenzhen) Co., Ltd.

**EUT** : CASTJOY

**FCC ID:** : 2BYMC-X1

**Model Number** : X1

**Report No.** : HTT202609298F02

**Reviewed By** : Heber He

# 1. Duty Cycle

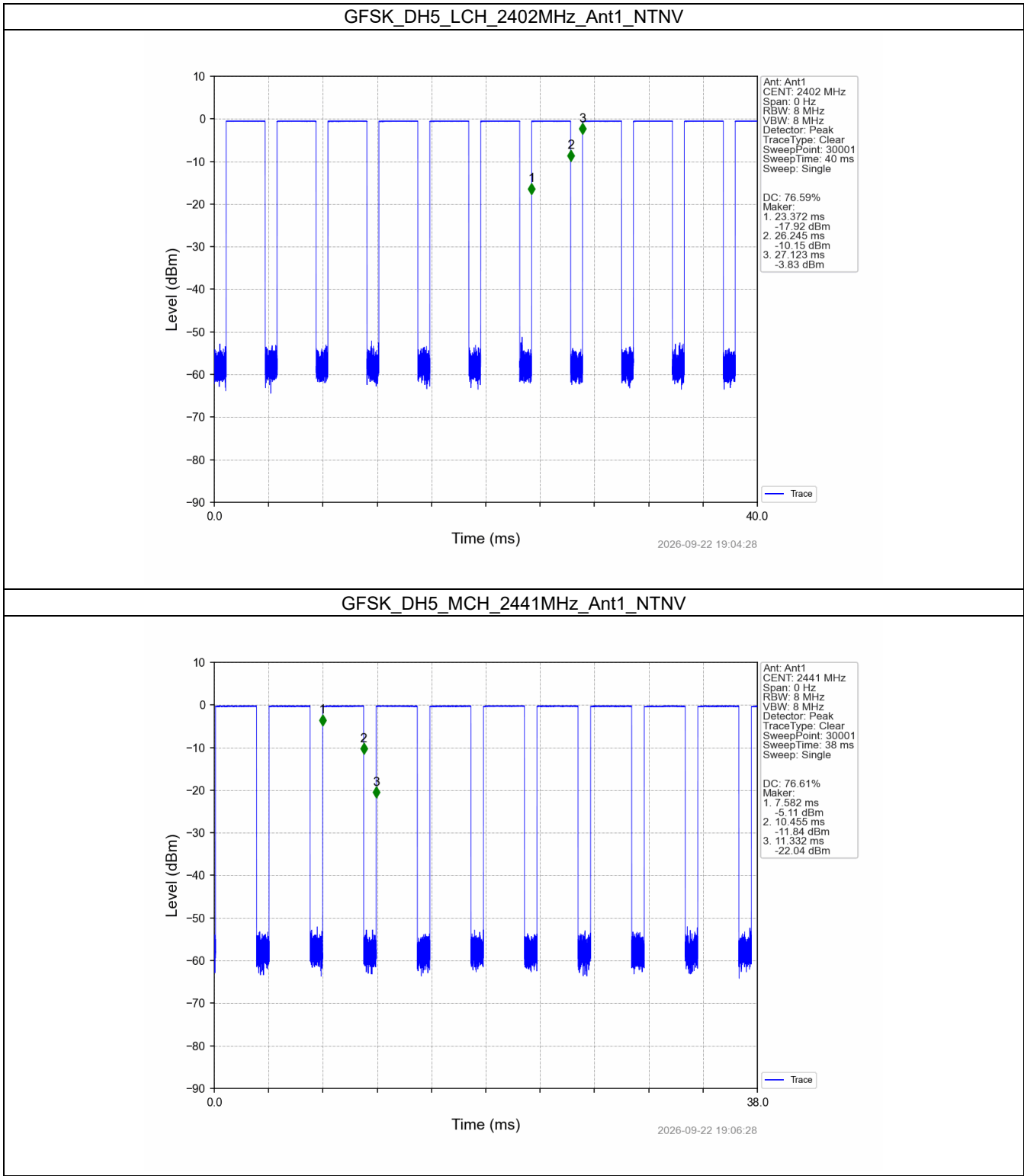
## 1.1 Test Result

### 1.1.1 Ant1

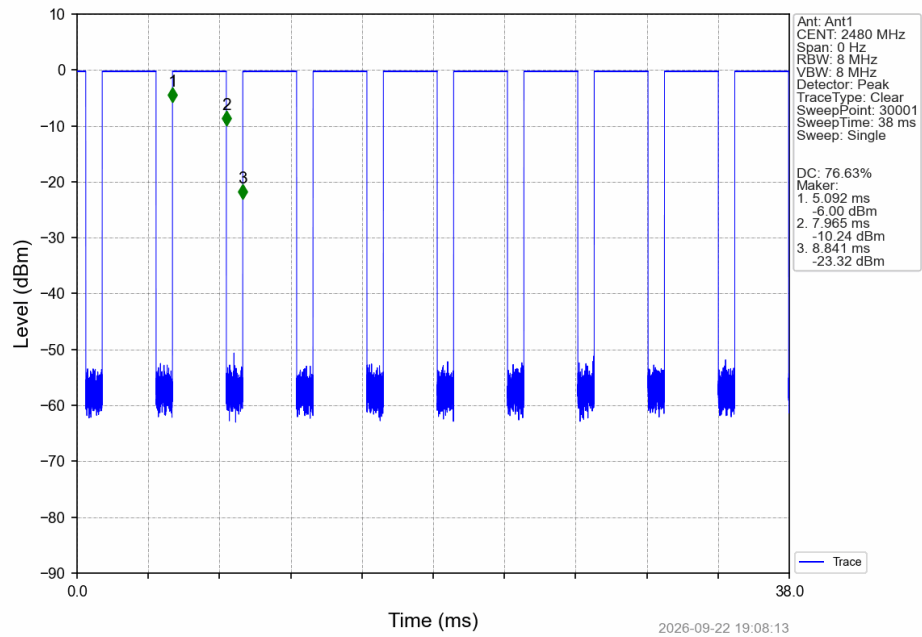
| Ant1      |         |                 |             |           |             |                |                                   |                       |
|-----------|---------|-----------------|-------------|-----------|-------------|----------------|-----------------------------------|-----------------------|
| Mode      | TX Type | Frequency (MHz) | Packet Type | T_on (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | Max. DC Variation (%) |
| GFSK      | SISO    | 2402            | DH5         | 2.873     | 3.751       | 76.59          | 1.16                              | 0.04                  |
|           |         | 2441            | DH5         | 2.873     | 3.750       | 76.61          | 1.16                              | 0.01                  |
|           |         | 2480            | DH5         | 2.873     | 3.749       | 76.63          | 1.16                              | 0.01                  |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 2.879     | 3.750       | 76.77          | 1.15                              | 0.03                  |
|           |         | 2441            | 2DH5        | 2.879     | 3.751       | 76.75          | 1.15                              | 0.03                  |
|           |         | 2480            | 2DH5        | 2.879     | 3.750       | 76.77          | 1.15                              | 0.01                  |
| 8DPSK     | SISO    | 2402            | 3DH5        | 2.880     | 3.749       | 76.82          | 1.15                              | 0.03                  |
|           |         | 2441            | 3DH5        | 2.880     | 3.749       | 76.82          | 1.15                              | 0.03                  |
|           |         | 2480            | 3DH5        | 2.881     | 3.751       | 76.81          | 1.15                              | 0.04                  |

# 1.2 Test Graph

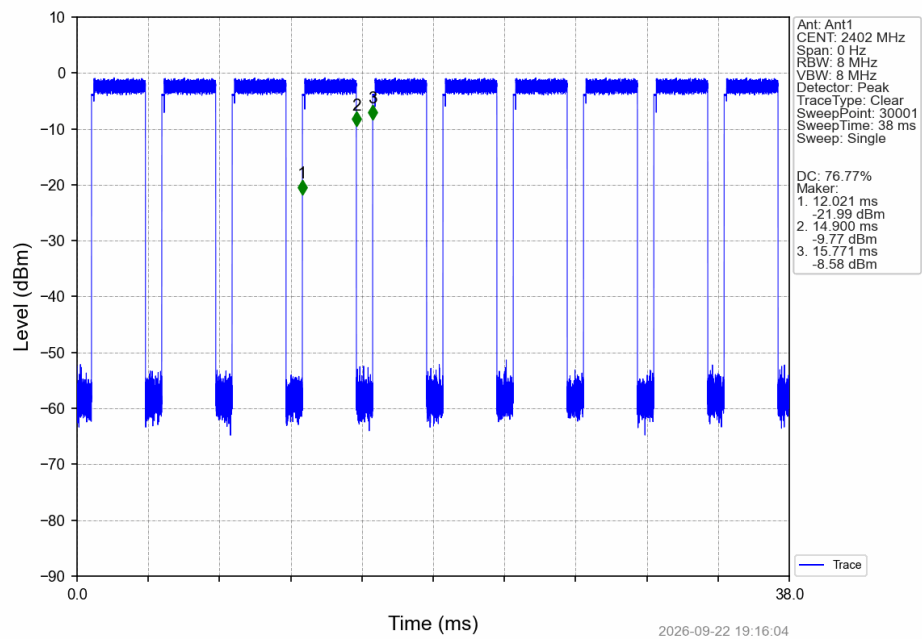
## 1.2.1 Ant1



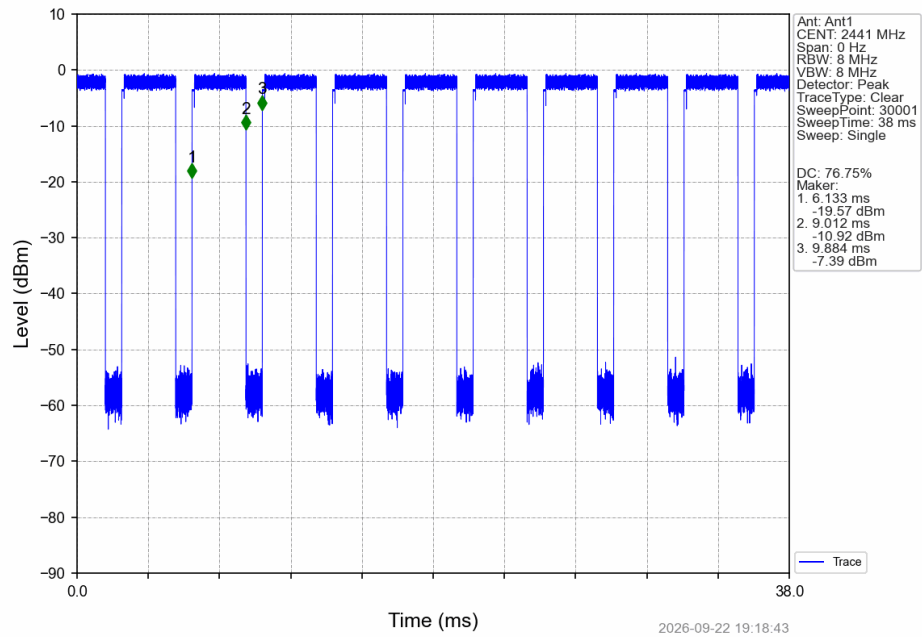
# GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



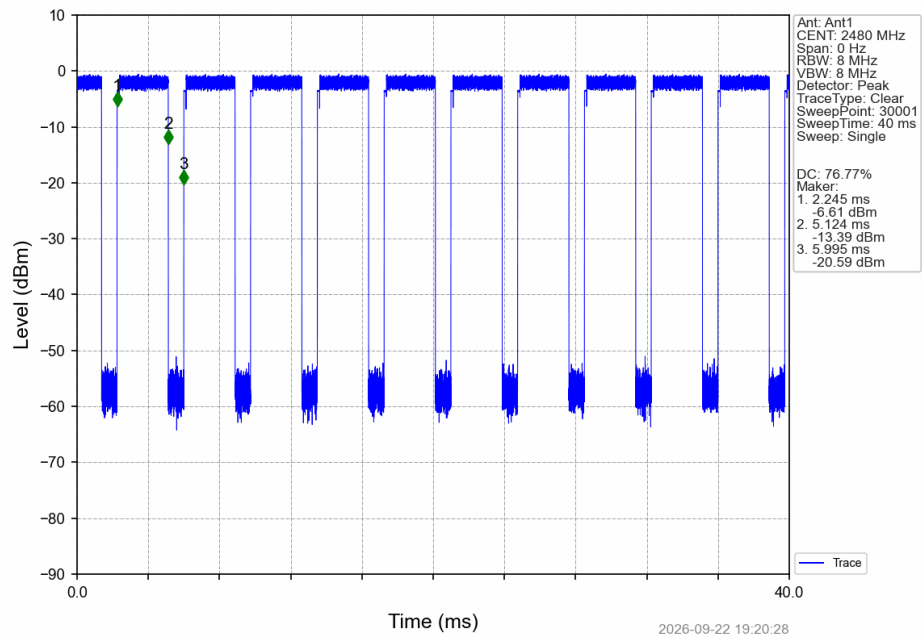
# Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



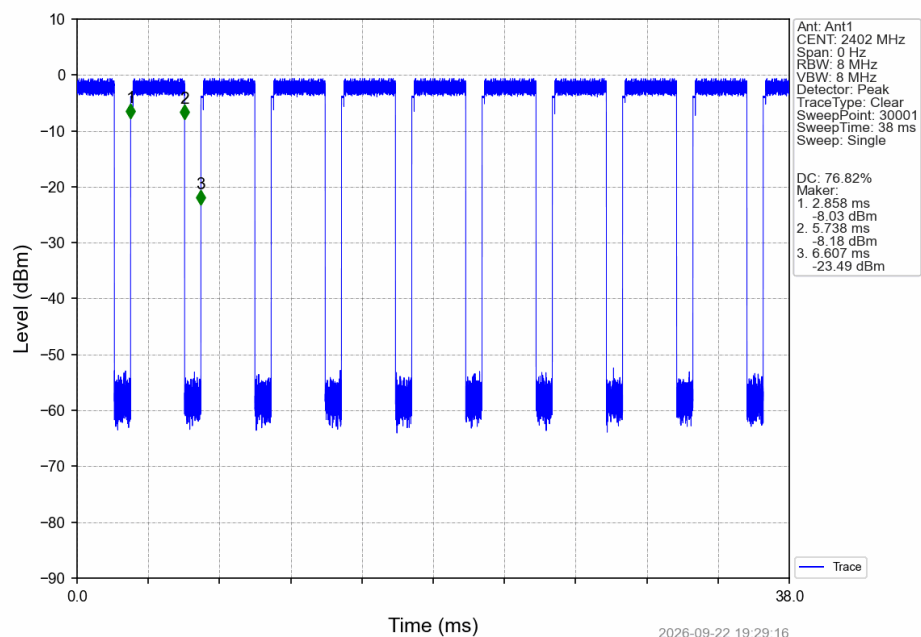
# Pi/4DQPSK\_2DH5\_MCH\_2441MHz\_Ant1\_NTNV



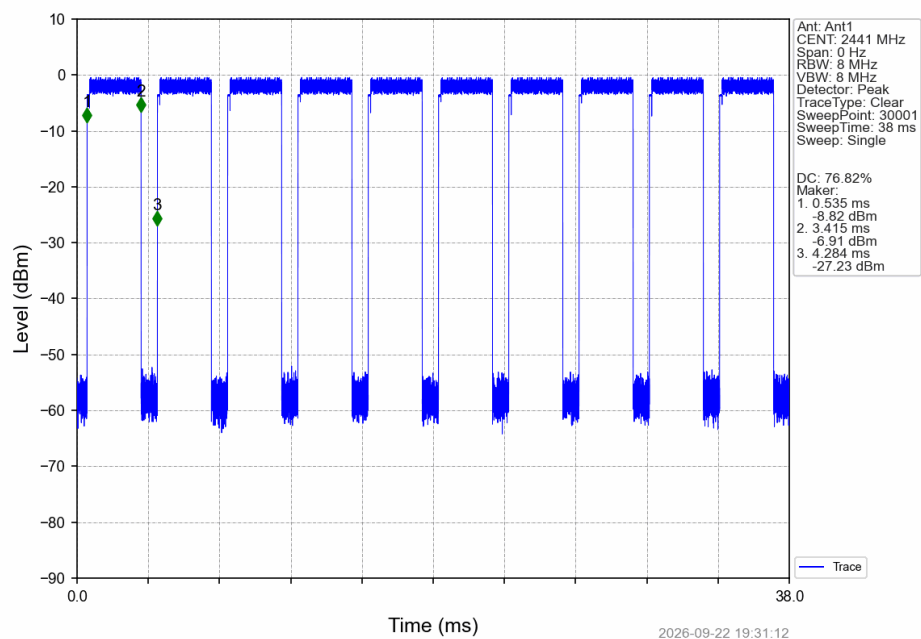
# Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV



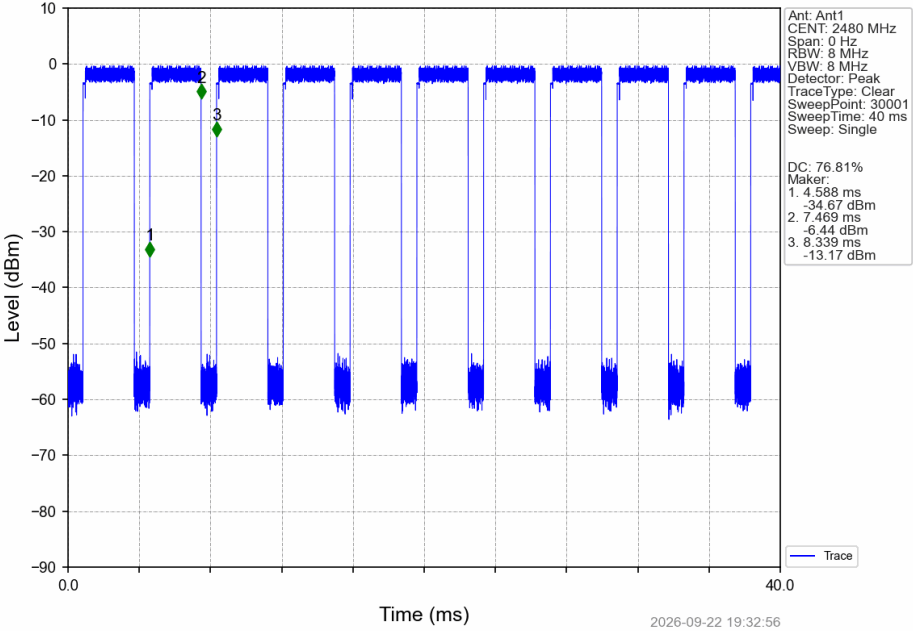
# 8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



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



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



## 2. Bandwidth

### 2.1 Test Result

#### 2.1.1 OBW

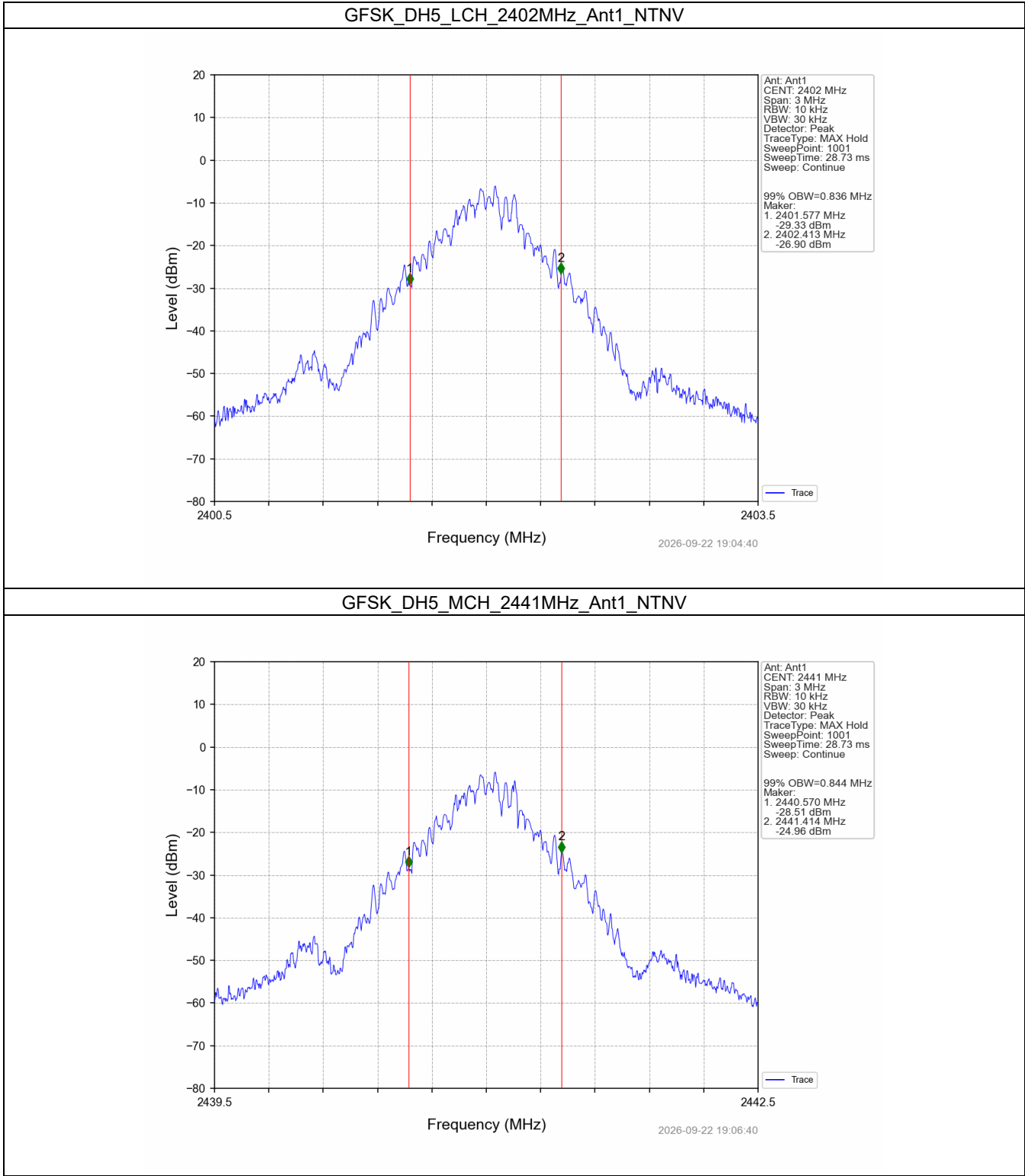
| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | 99% Occupied Bandwidth (MHz) |       | Verdict |
|-----------|---------|-----------------|-------------|-----|------------------------------|-------|---------|
|           |         |                 |             |     | Result                       | Limit |         |
| GFSK      | SISO    | 2402            | DH5         | 1   | 0.836                        | /     | Pass    |
|           |         | 2441            | DH5         | 1   | 0.844                        | /     | Pass    |
|           |         | 2480            | DH5         | 1   | 0.838                        | /     | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | 1.207                        | /     | Pass    |
|           |         | 2441            | 2DH5        | 1   | 1.203                        | /     | Pass    |
|           |         | 2480            | 2DH5        | 1   | 1.191                        | /     | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | 1.209                        | /     | Pass    |
|           |         | 2441            | 3DH5        | 1   | 1.207                        | /     | Pass    |
|           |         | 2480            | 3DH5        | 1   | 1.200                        | /     | Pass    |

#### 2.1.2 20dB BW

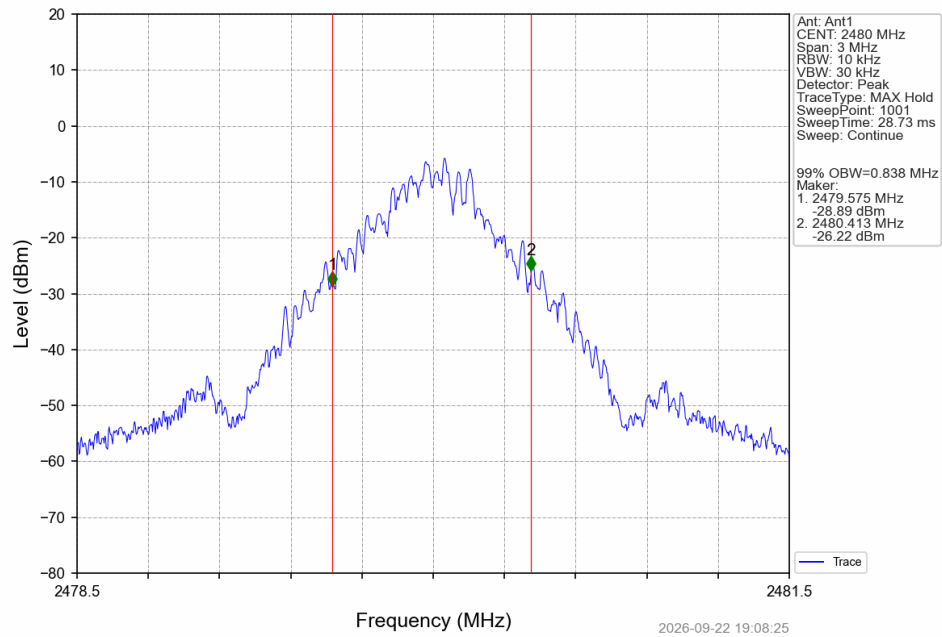
| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | 20dB Bandwidth (MHz) |       | Verdict |
|-----------|---------|-----------------|-------------|-----|----------------------|-------|---------|
|           |         |                 |             |     | Result               | Limit |         |
| GFSK      | SISO    | 2402            | DH5         | 1   | 0.883                | /     | Pass    |
|           |         | 2441            | DH5         | 1   | 0.884                | /     | Pass    |
|           |         | 2480            | DH5         | 1   | 0.884                | /     | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | 1.329                | /     | Pass    |
|           |         | 2441            | 2DH5        | 1   | 1.320                | /     | Pass    |
|           |         | 2480            | 2DH5        | 1   | 1.326                | /     | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | 1.281                | /     | Pass    |
|           |         | 2441            | 3DH5        | 1   | 1.303                | /     | Pass    |
|           |         | 2480            | 3DH5        | 1   | 1.296                | /     | Pass    |

# 2.2 Test Graph

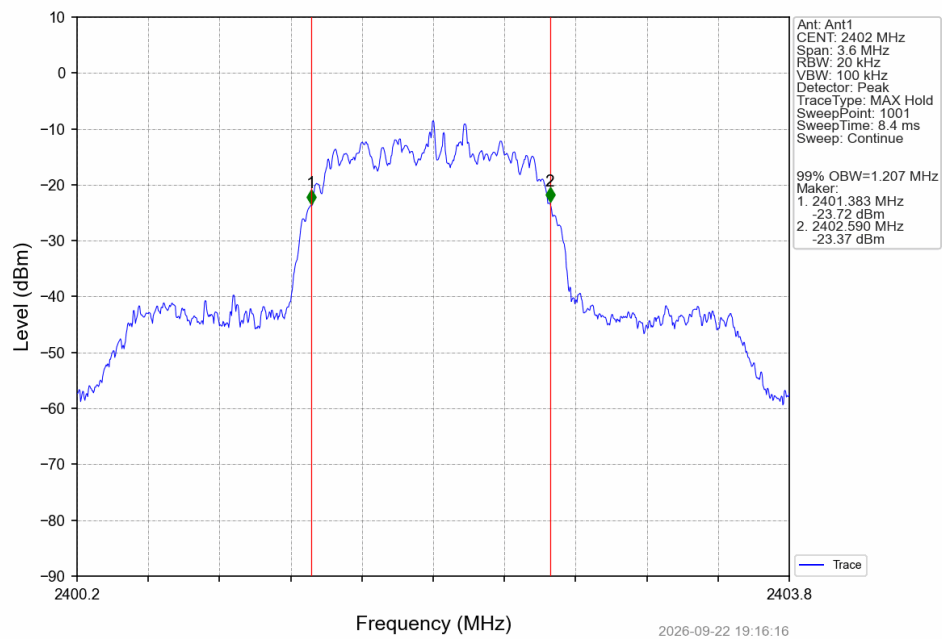
## 2.2.1 OBW



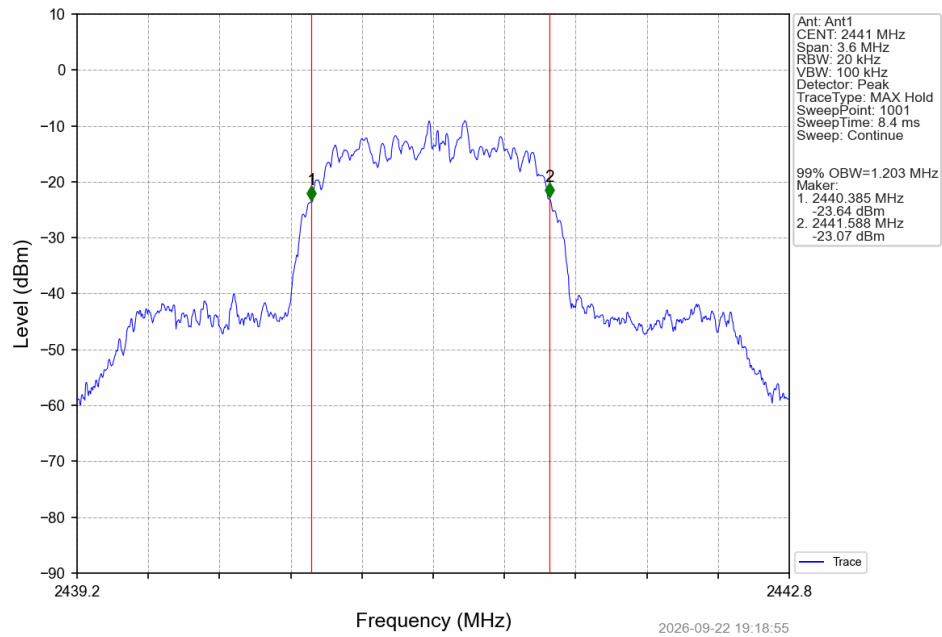
# GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



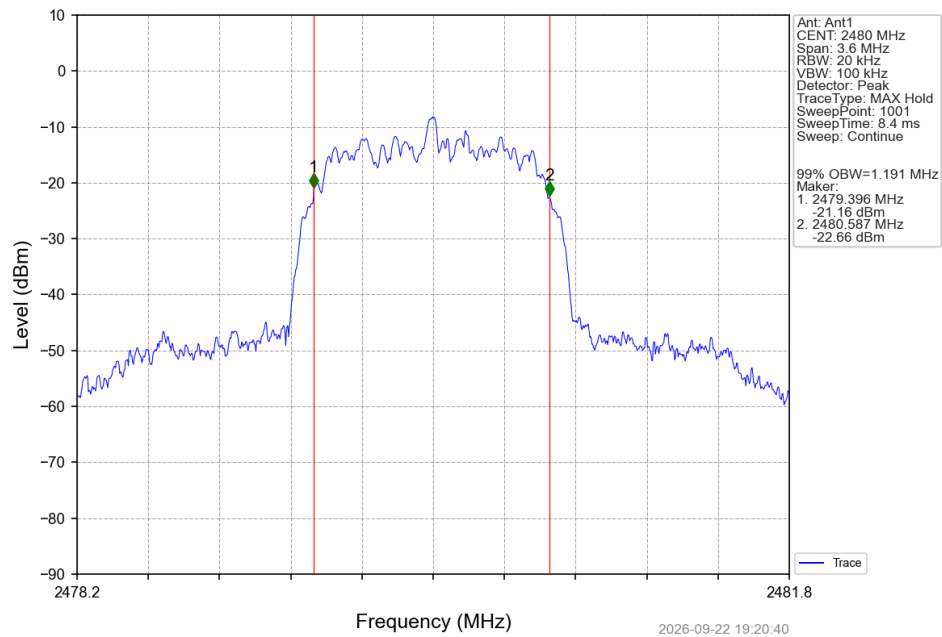
# Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



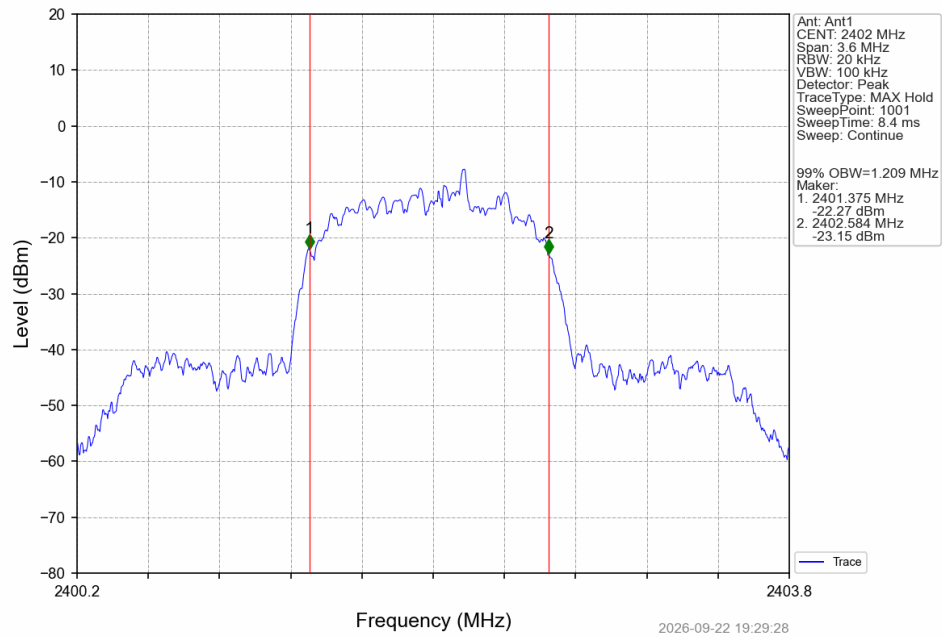
# Pi/4DQPSK\_2DH5\_MCH\_2441MHz\_Ant1\_NTNV



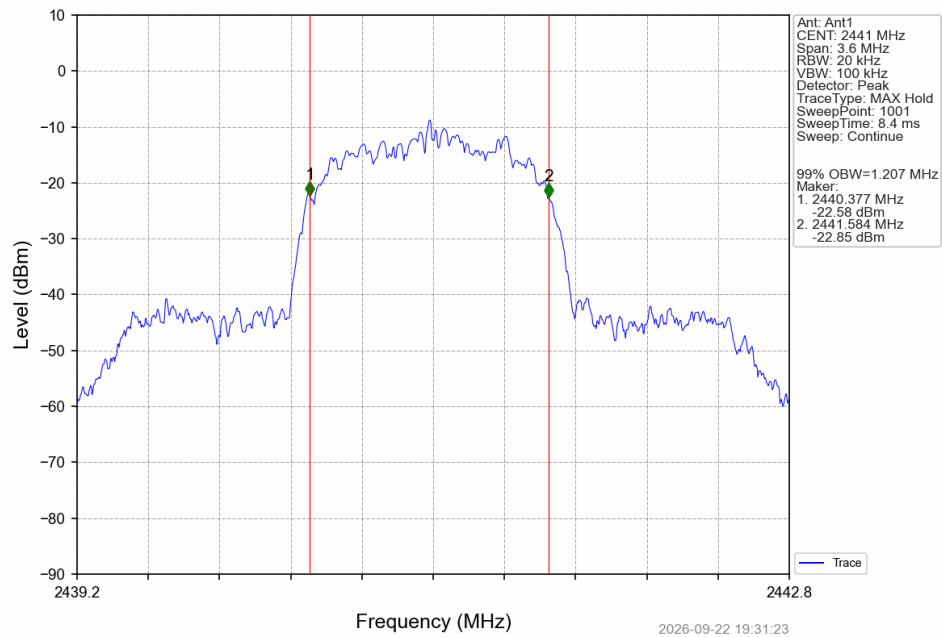
# Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV



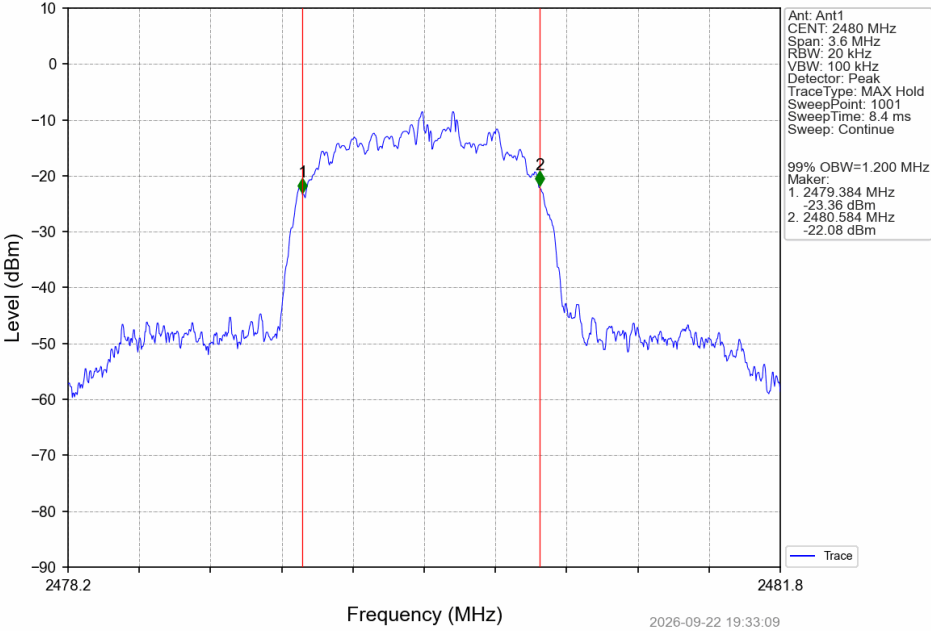
# 8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



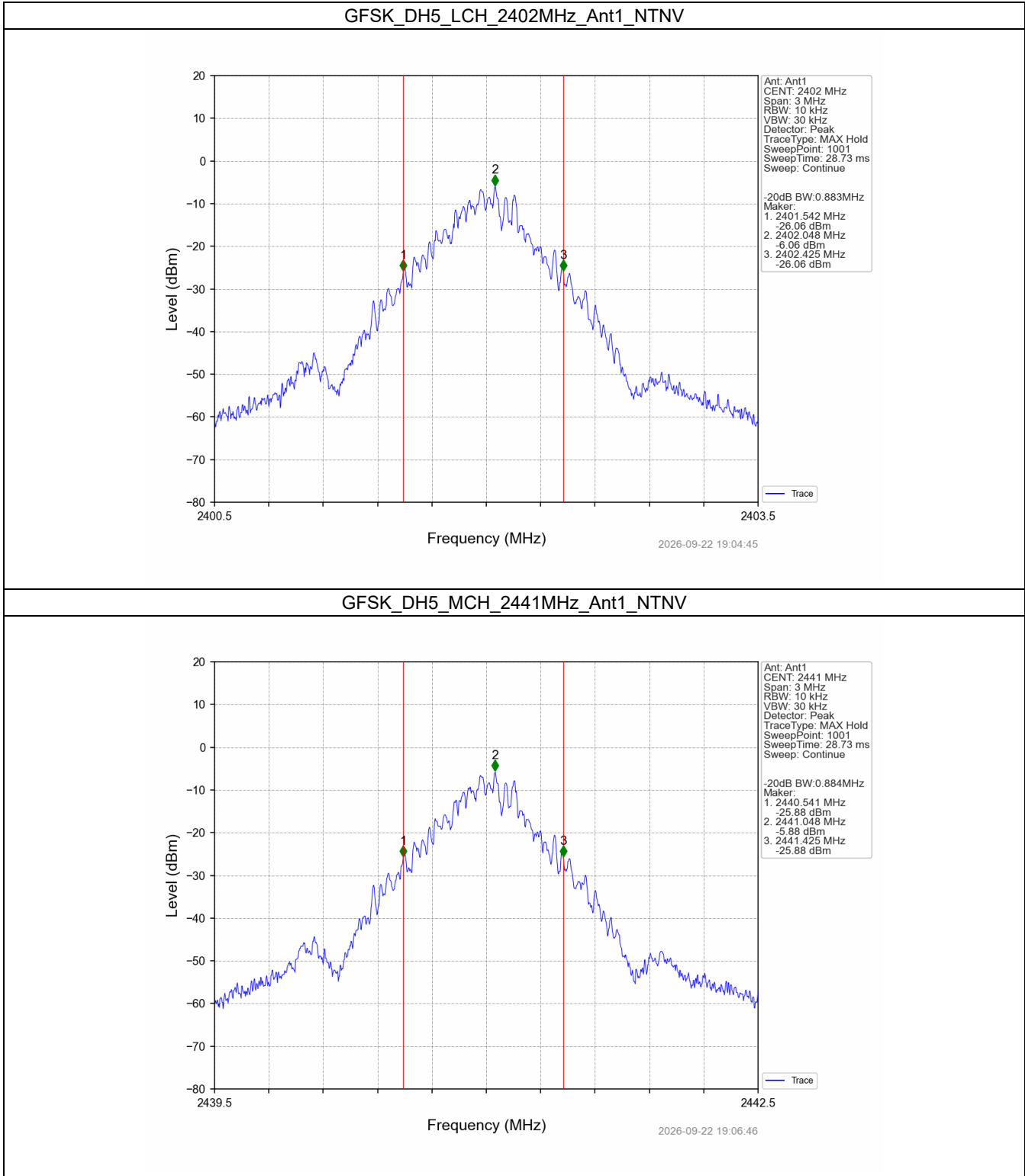
# 8DPSK\_3DH5\_MCH\_2441MHz\_Ant1\_NTNV



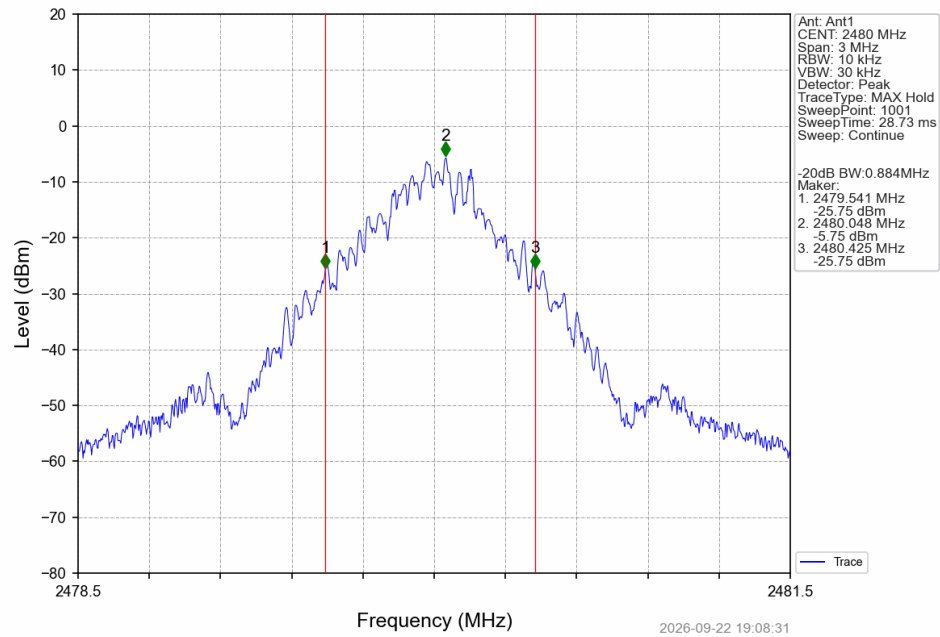
8DPSK\_3DH5\_HCH\_2480MHz\_Ant1\_NTNV



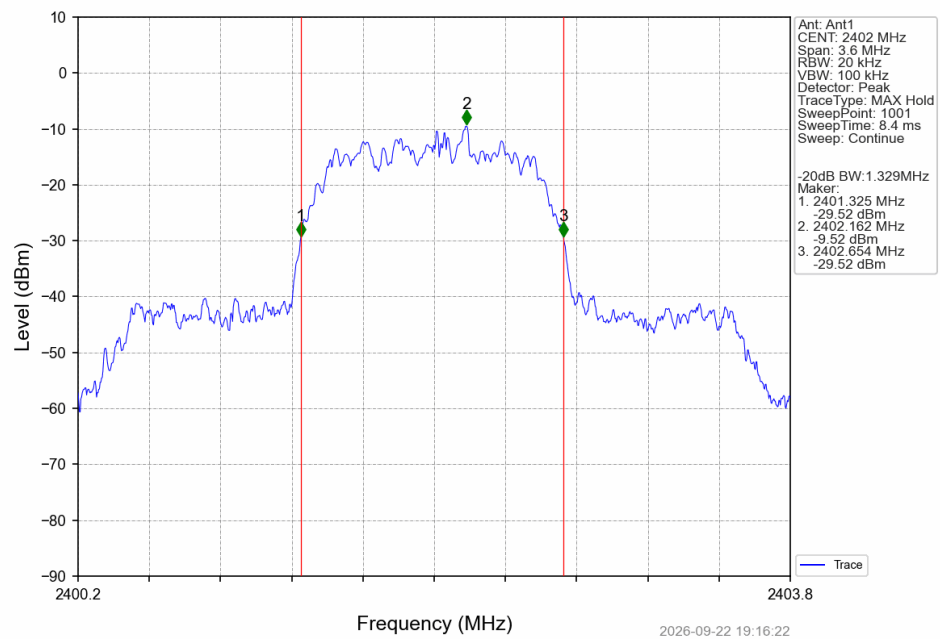
2.2.2 20dB BW



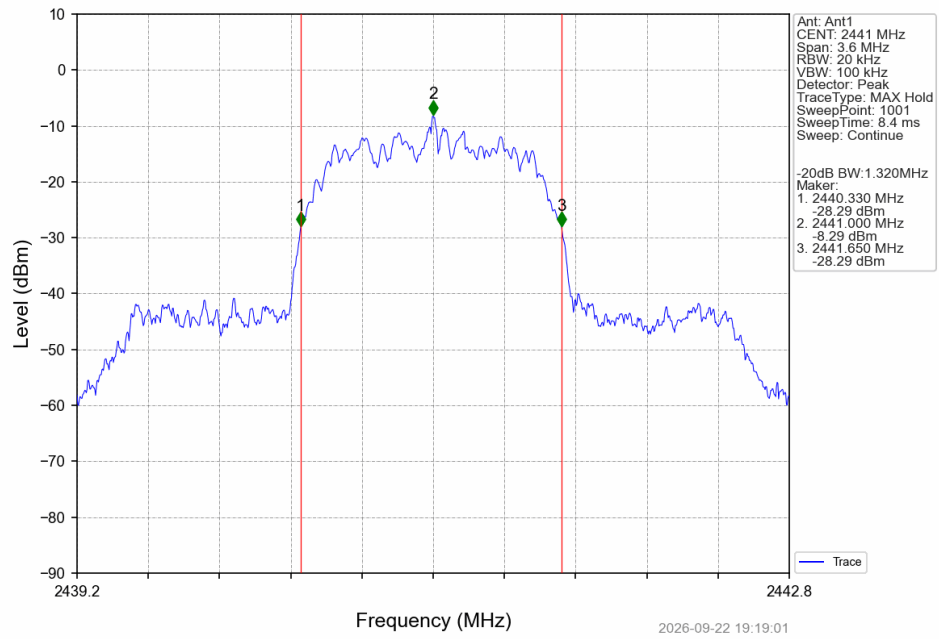
# GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



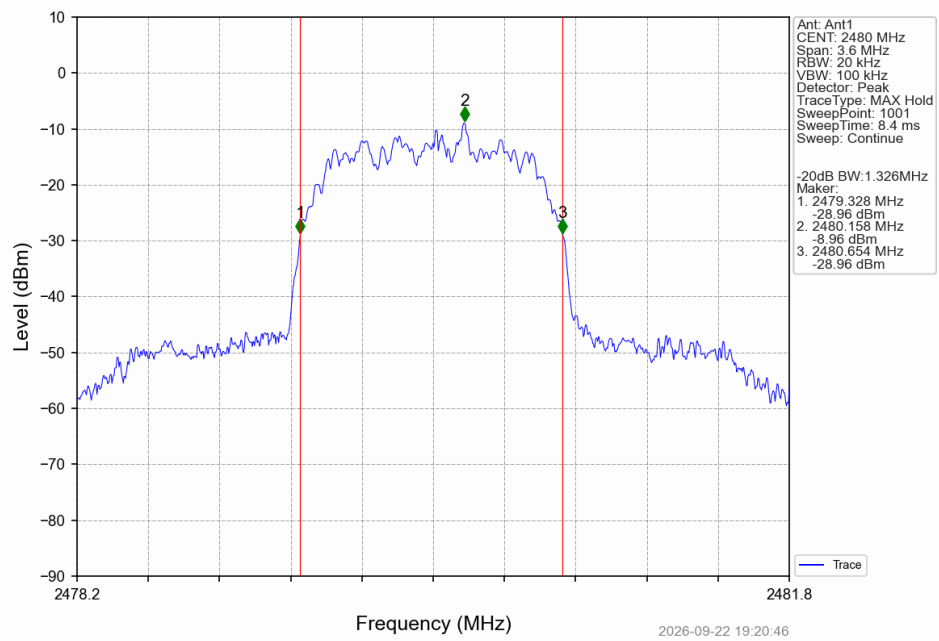
# Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



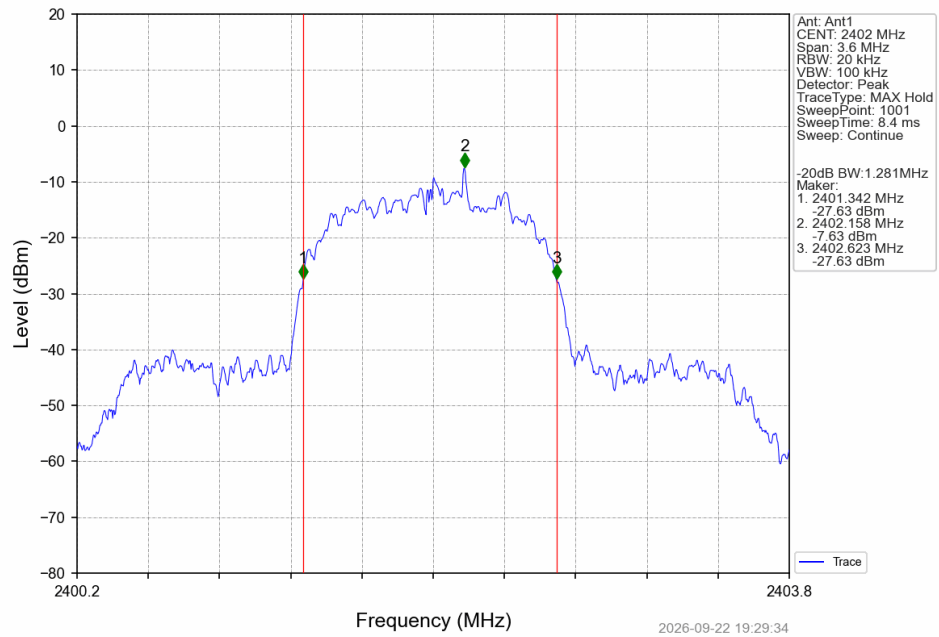
# Pi/4DQPSK\_2DH5\_MCH\_2441MHz\_Ant1\_NTNV



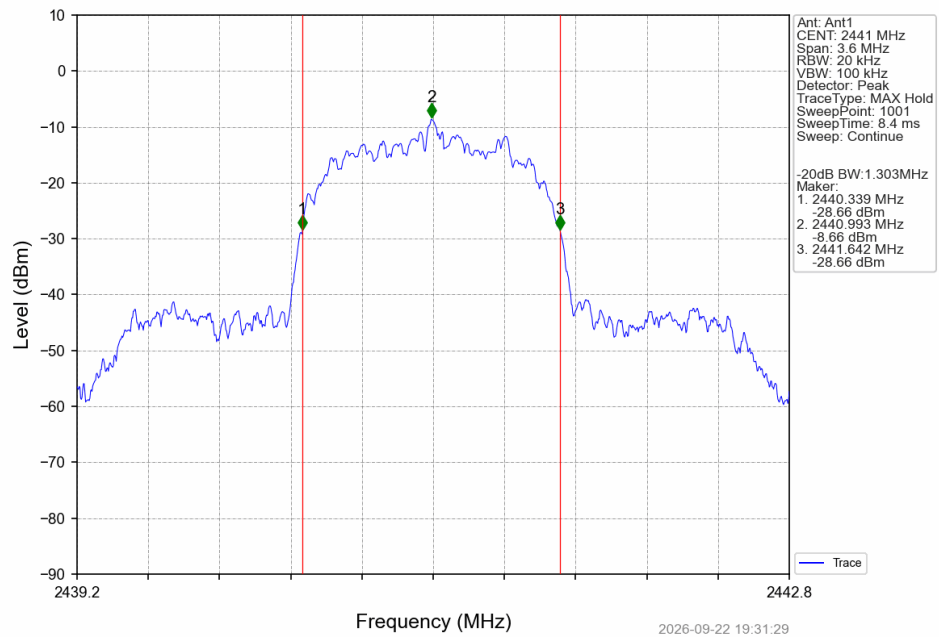
# Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV



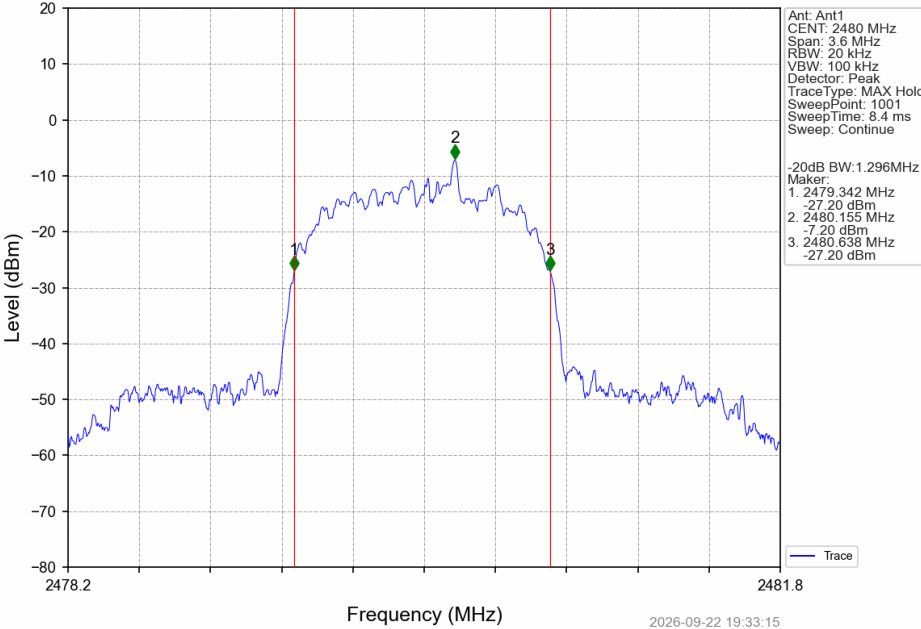
# 8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



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



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



### 3. Maximum Conducted Output Power

#### 3.1 Test Result

##### 3.1.1 Power

| Mode      | TX Type | Frequency (MHz) | Packet Type | Maximum Peak Conducted Output Power (dBm) |         | Verdict |
|-----------|---------|-----------------|-------------|-------------------------------------------|---------|---------|
|           |         |                 |             | ANT1                                      | Limit   |         |
| GFSK      | SISO    | 2402            | DH5         | -0.50                                     | <=30    | Pass    |
|           |         | 2441            | DH5         | -0.29                                     | <=30    | Pass    |
|           |         | 2480            | DH5         | -0.20                                     | <=30    | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | -1.06                                     | <=20.97 | Pass    |
|           |         | 2441            | 2DH5        | -0.88                                     | <=20.97 | Pass    |
|           |         | 2480            | 2DH5        | -0.72                                     | <=20.97 | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | -0.81                                     | <=20.97 | Pass    |
|           |         | 2441            | 3DH5        | -0.60                                     | <=20.97 | Pass    |
|           |         | 2480            | 3DH5        | -0.47                                     | <=20.97 | Pass    |

## 4. Carrier Frequency Separation

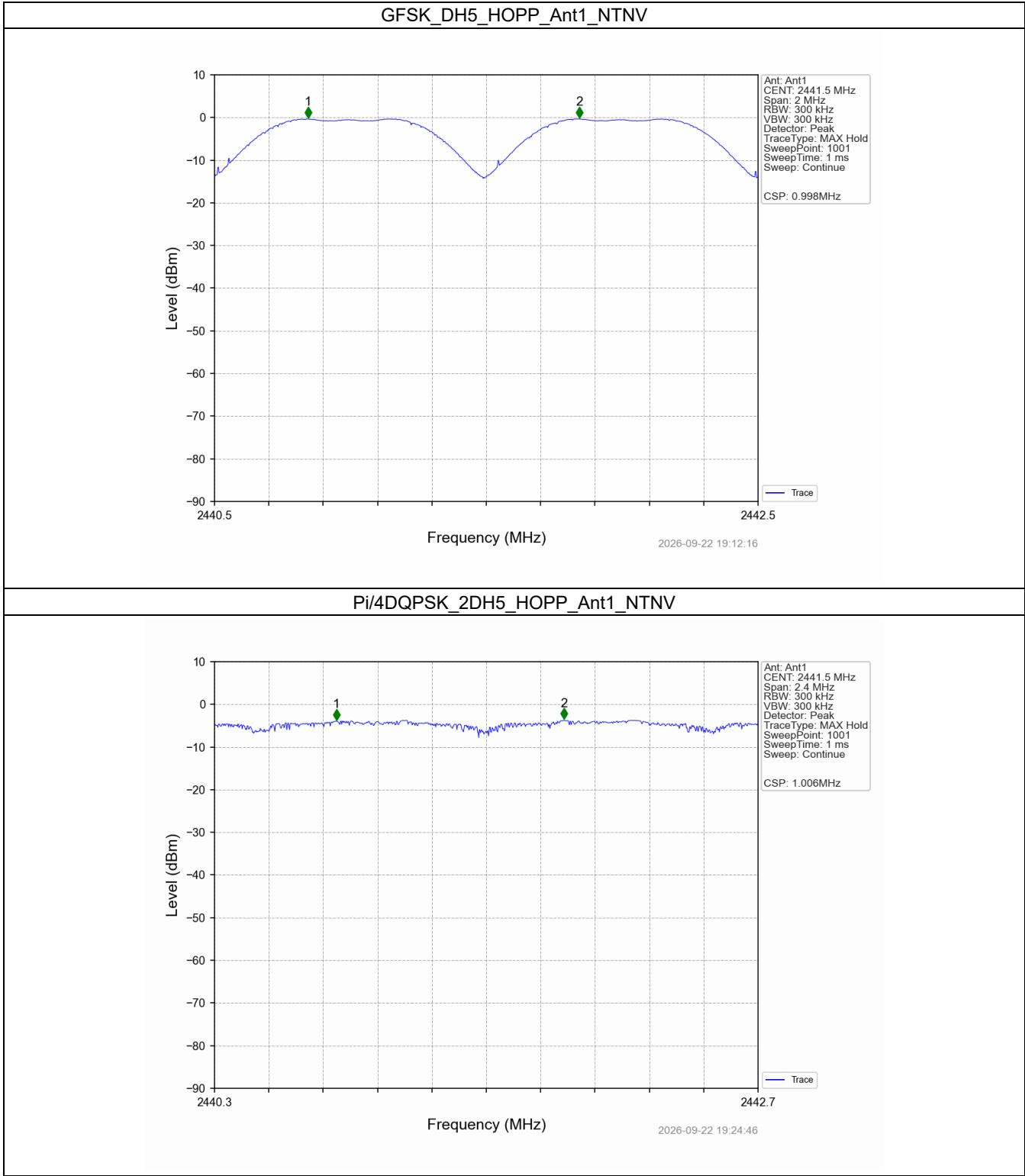
### 4.1 Test Result

#### 4.1.1 Ant1

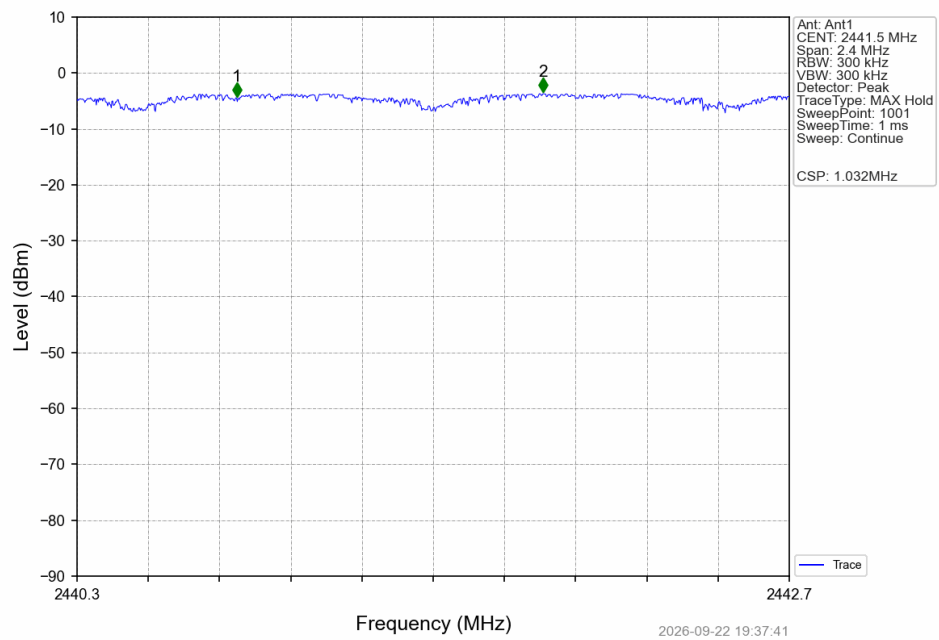
| Ant1      |         |                 |             |                          |                      |              |         |
|-----------|---------|-----------------|-------------|--------------------------|----------------------|--------------|---------|
| Mode      | TX Type | Frequency (MHz) | Packet Type | Channel Separation (MHz) | 20dB Bandwidth (MHz) | Limit (MHz)  | Verdict |
| GFSK      | SISO    | HOPP            | DH5         | 0.998                    | 0.884                | $\geq 0.884$ | Pass    |
| Pi/4DQPSK | SISO    | HOPP            | 2DH5        | 1.006                    | 1.329                | $\geq 0.886$ | Pass    |
| 8DPSK     | SISO    | HOPP            | 3DH5        | 1.032                    | 1.303                | $\geq 0.869$ | Pass    |

# 4.2 Test Graph

## 4.2.1 Ant1



8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



## 5. Number of Hopping Frequencies

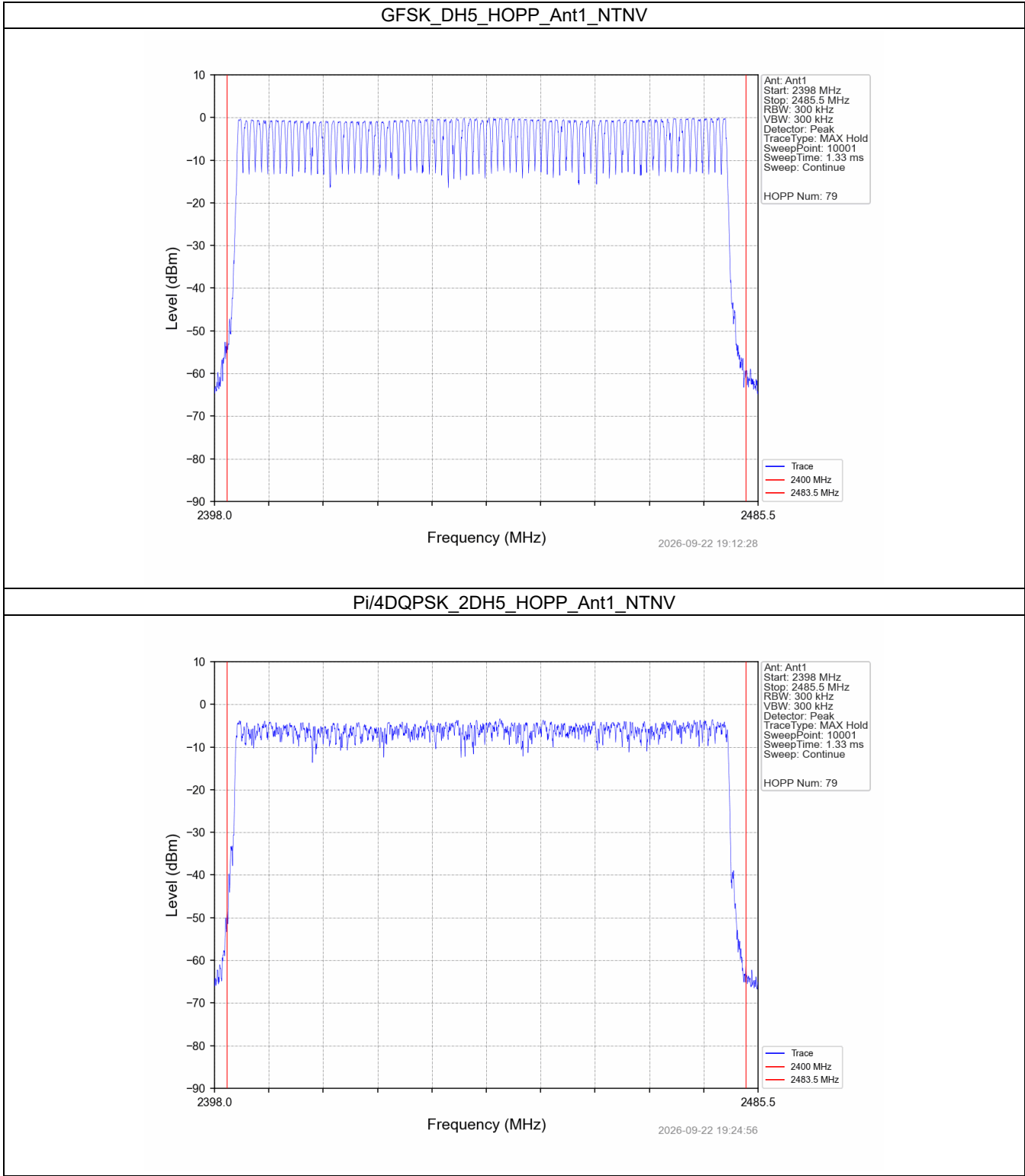
### 5.1 Test Result

#### 5.1.1 HoppNum

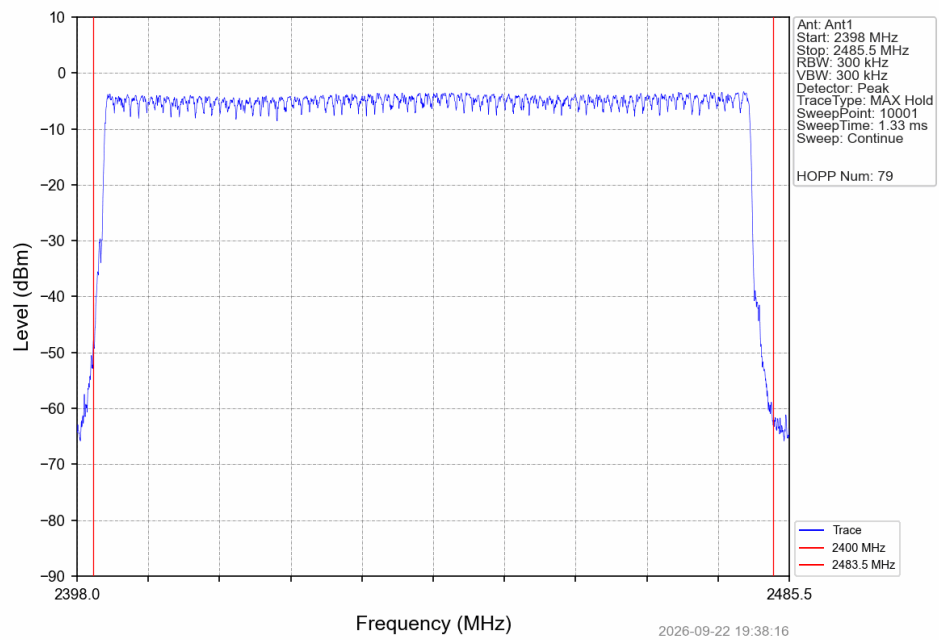
| Mode      | TX Type | Frequency (MHz) | Packet Type | Num of Hopping Frequencies |           | Verdict |
|-----------|---------|-----------------|-------------|----------------------------|-----------|---------|
|           |         |                 |             | ANT1                       | Limit     |         |
| 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    |

# 5.2 Test Graph

## 5.2.1 HoppNum



8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



## 6. Time of Occupancy (Dwell Time)

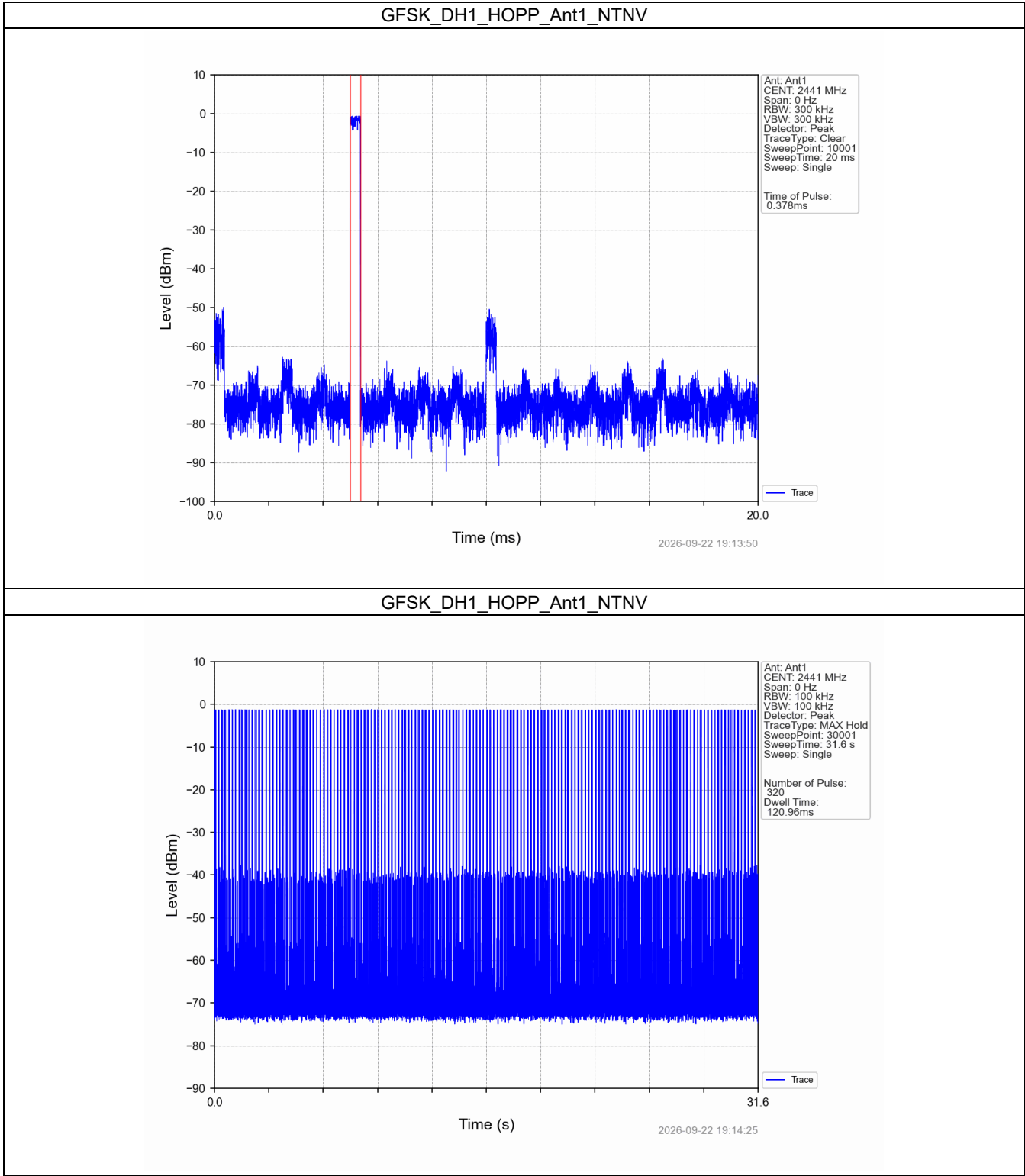
### 6.1 Test Result

#### 6.1.1 Ant1

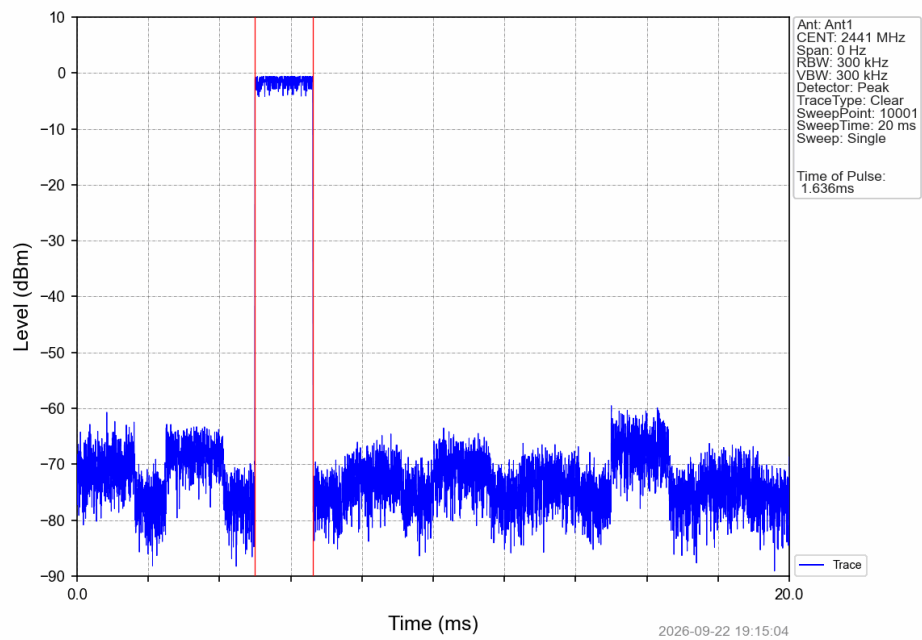
| Ant1      |         |                 |             |                               |                        |                                    |                 |            |         |
|-----------|---------|-----------------|-------------|-------------------------------|------------------------|------------------------------------|-----------------|------------|---------|
| 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         | 0.378                         | 31.600                 | 320                                | 120.960         | <=400      | Pass    |
|           |         |                 | DH3         | 1.636                         | 31.600                 | 167                                | 273.212         | <=400      | Pass    |
|           |         |                 | DH5         | 2.884                         | 31.600                 | 118                                | 340.312         | <=400      | Pass    |
| Pi/4DQPSK | SISO    | HOPP            | 2DH1        | 0.380                         | 31.600                 | 319                                | 121.220         | <=400      | Pass    |
|           |         |                 | 2DH3        | 1.634                         | 31.600                 | 150                                | 245.100         | <=400      | Pass    |
|           |         |                 | 2DH5        | 2.882                         | 31.600                 | 116                                | 334.312         | <=400      | Pass    |
| 8DPSK     | SISO    | HOPP            | 3DH1        | 0.382                         | 31.600                 | 320                                | 122.240         | <=400      | Pass    |
|           |         |                 | 3DH3        | 0.268                         | 31.600                 | 320                                | 85.760          | <=400      | Pass    |
|           |         |                 | 3DH5        | 2.884                         | 31.600                 | 107                                | 308.588         | <=400      | Pass    |

6.2 Test Graph

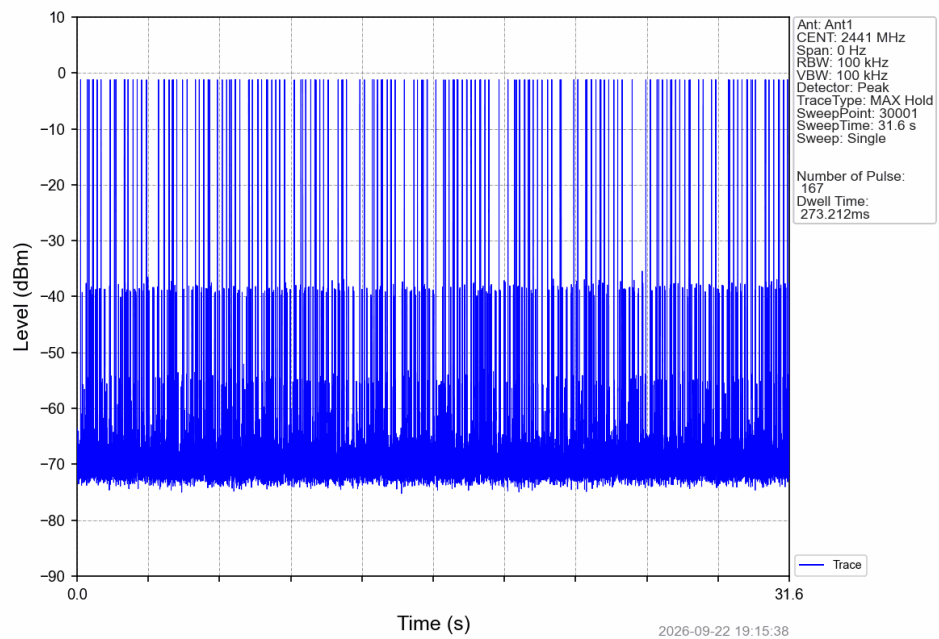
6.2.1 Ant1



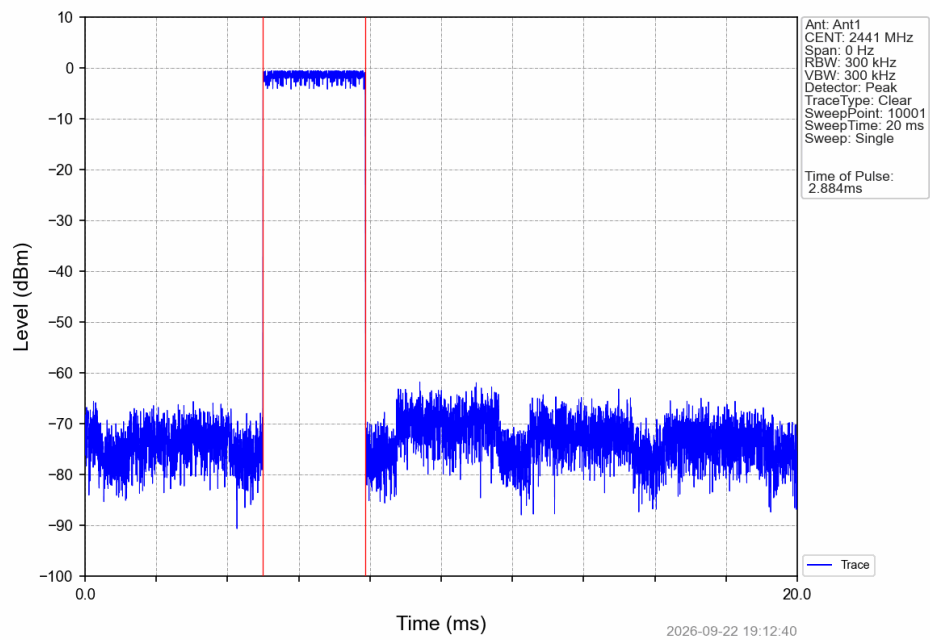
# GFSK\_DH3\_HOPP\_Ant1\_NTNV



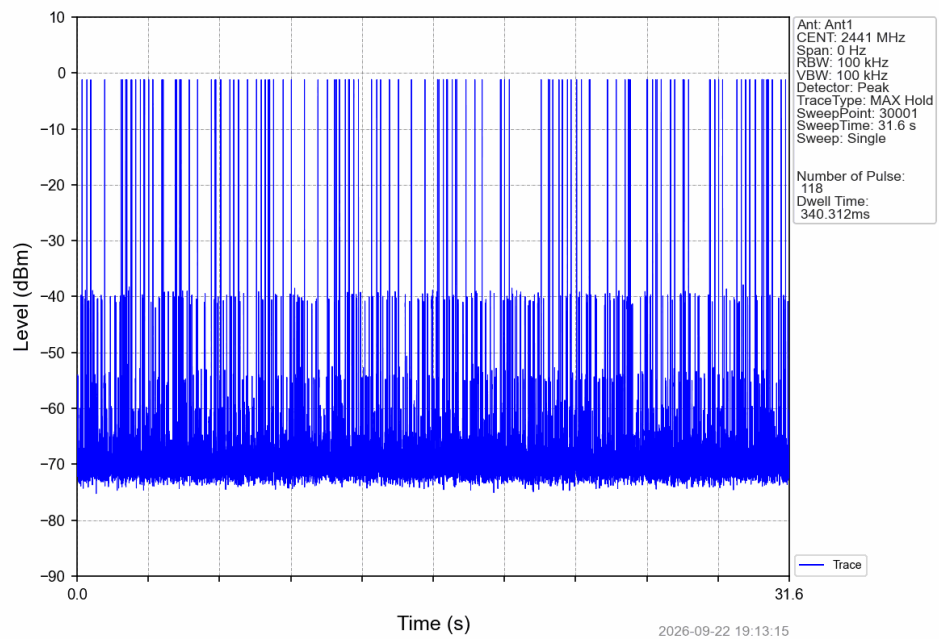
# GFSK\_DH3\_HOPP\_Ant1\_NTNV



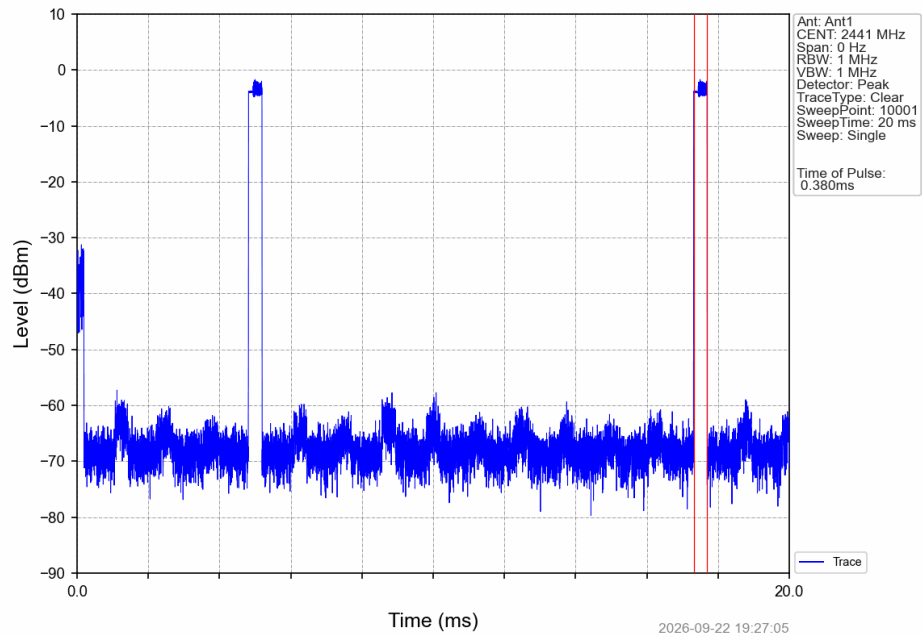
# GFSK\_DH5\_HOPP\_Ant1\_NTNV



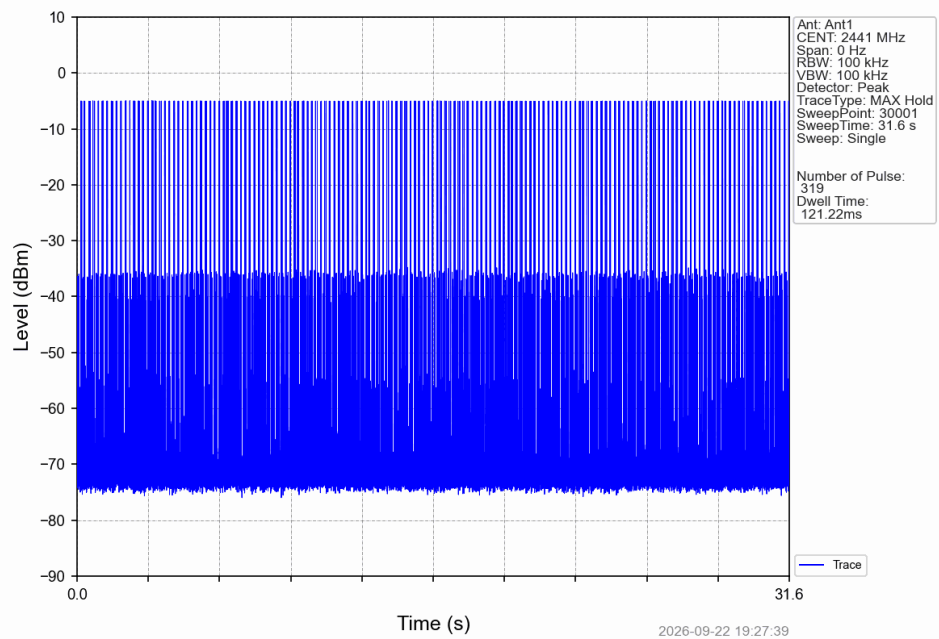
# GFSK\_DH5\_HOPP\_Ant1\_NTNV



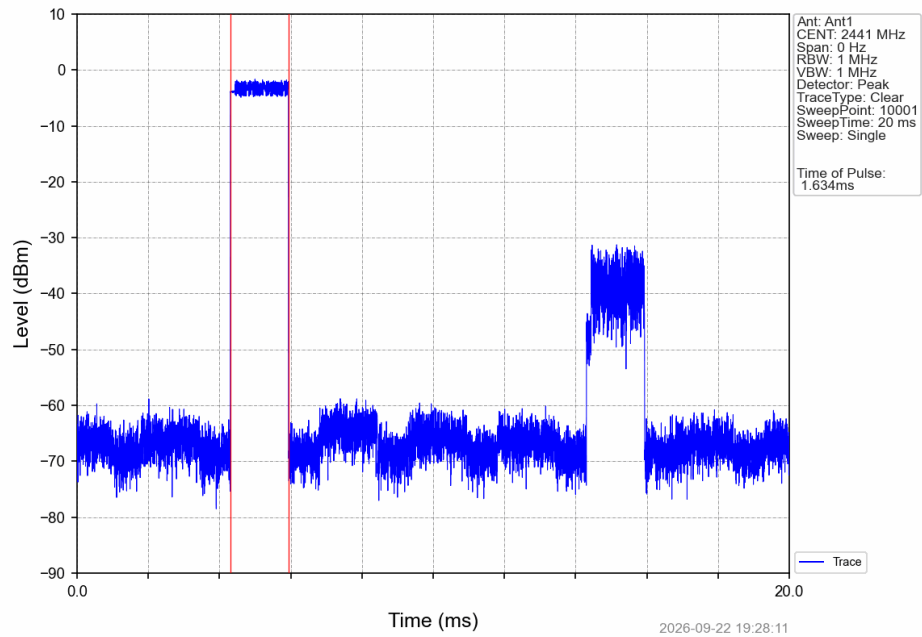
# Pi/4DQPSK\_2DH1\_HOPP\_Ant1\_NTNV



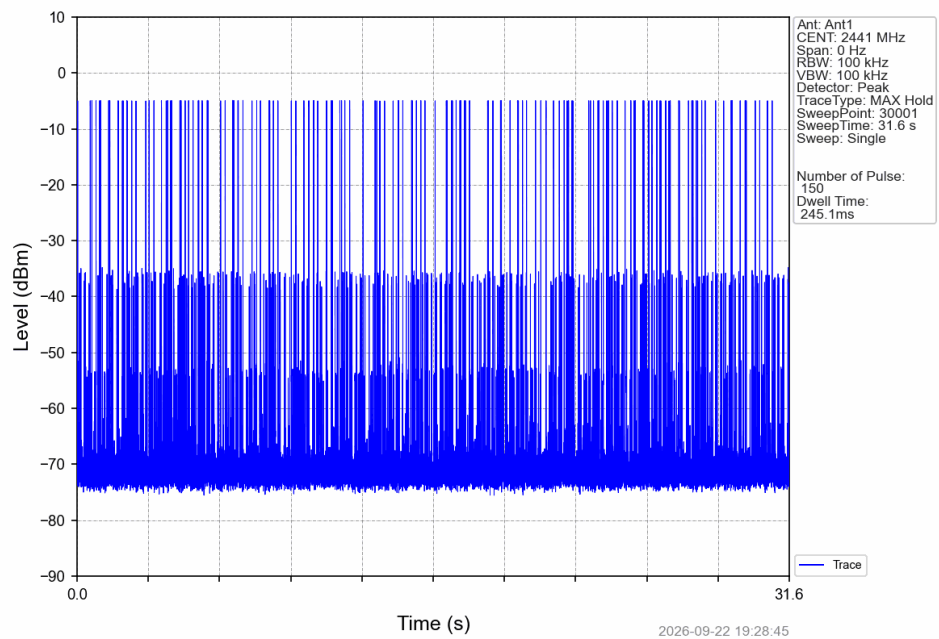
# Pi/4DQPSK\_2DH1\_HOPP\_Ant1\_NTNV



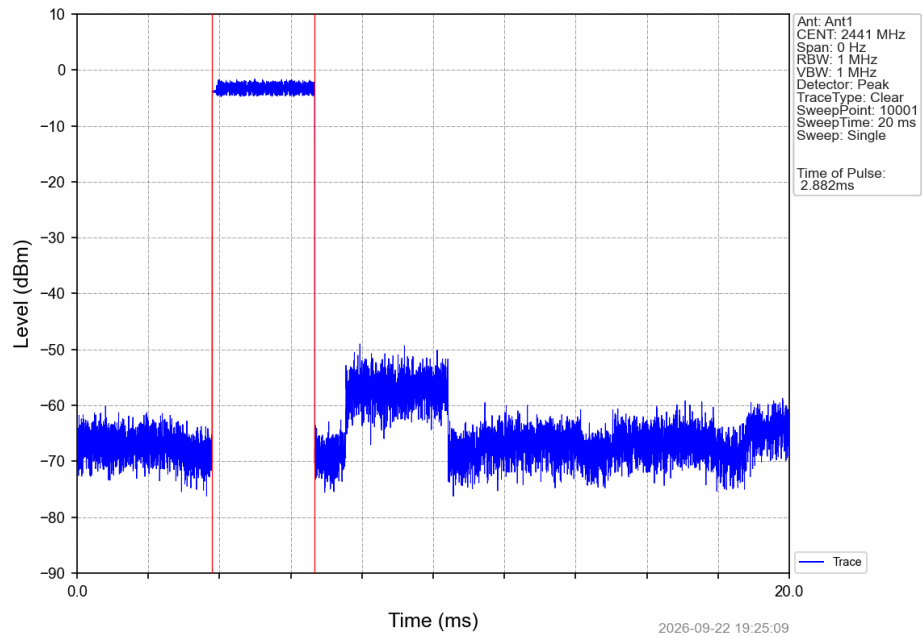
# Pi/4DQPSK\_2DH3\_HOPP\_Ant1\_NTNV



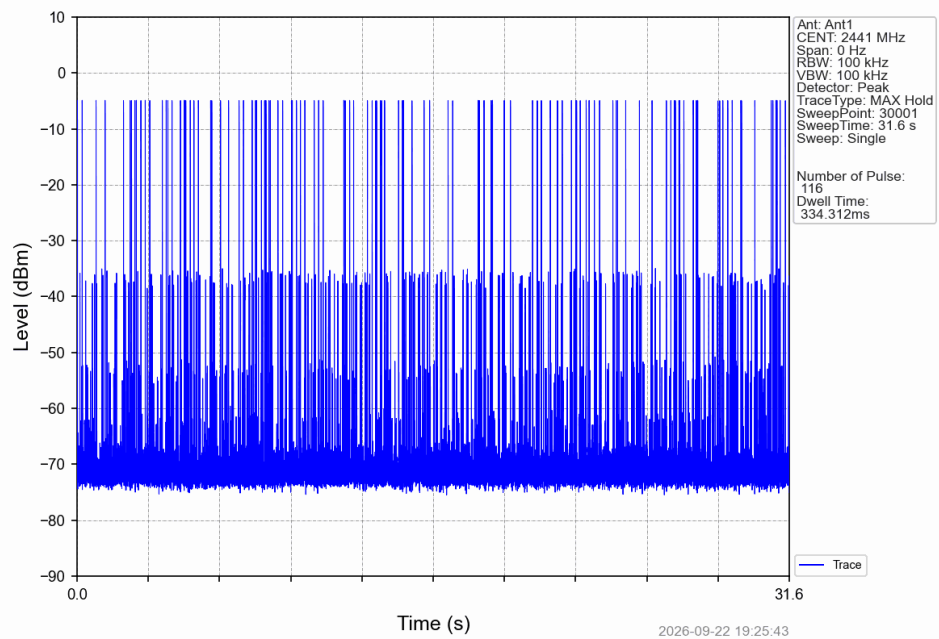
# Pi/4DQPSK\_2DH3\_HOPP\_Ant1\_NTNV



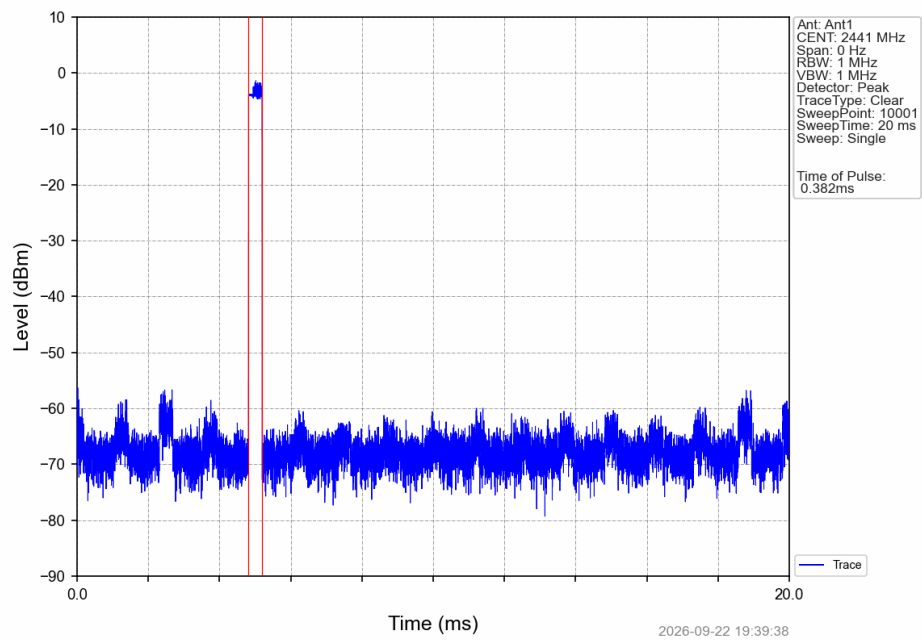
# Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV



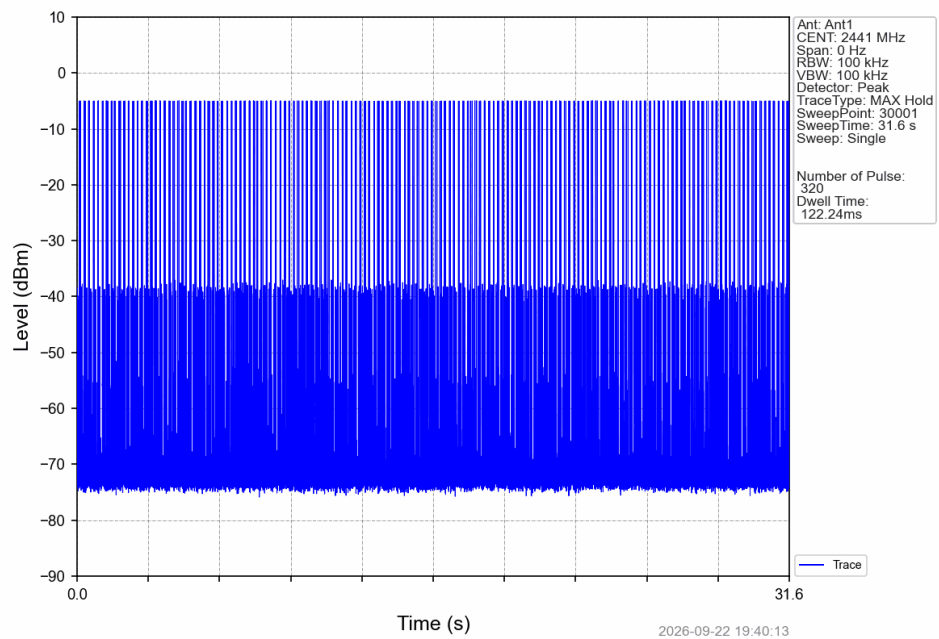
# Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV



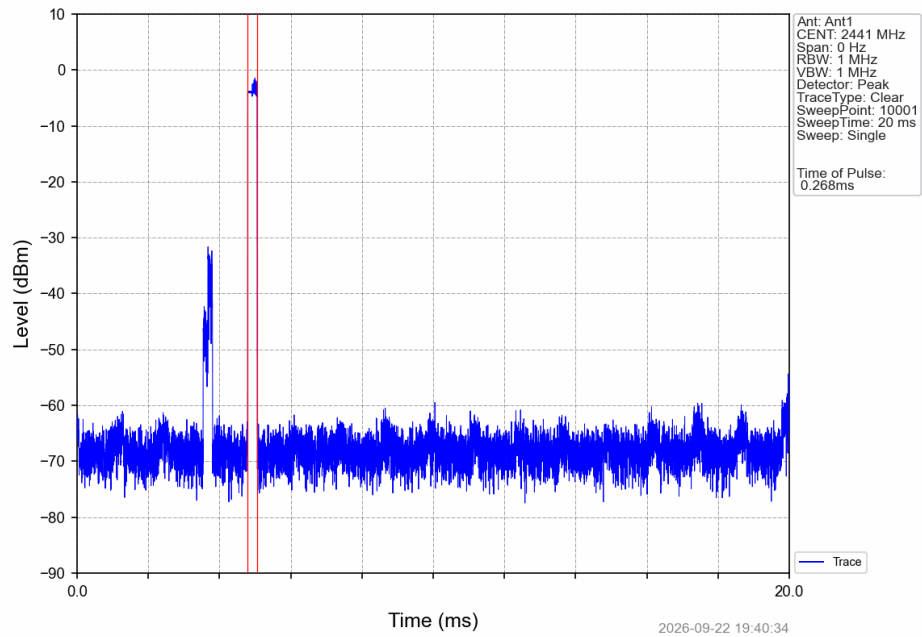
8DPSK\_3DH1\_HOPP\_Ant1\_NTNV



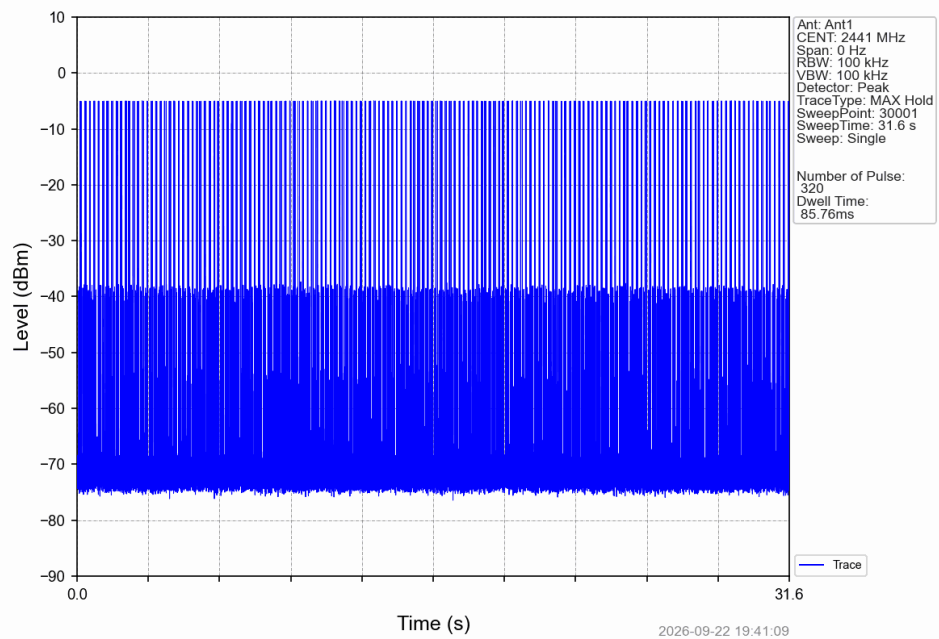
8DPSK\_3DH1\_HOPP\_Ant1\_NTNV



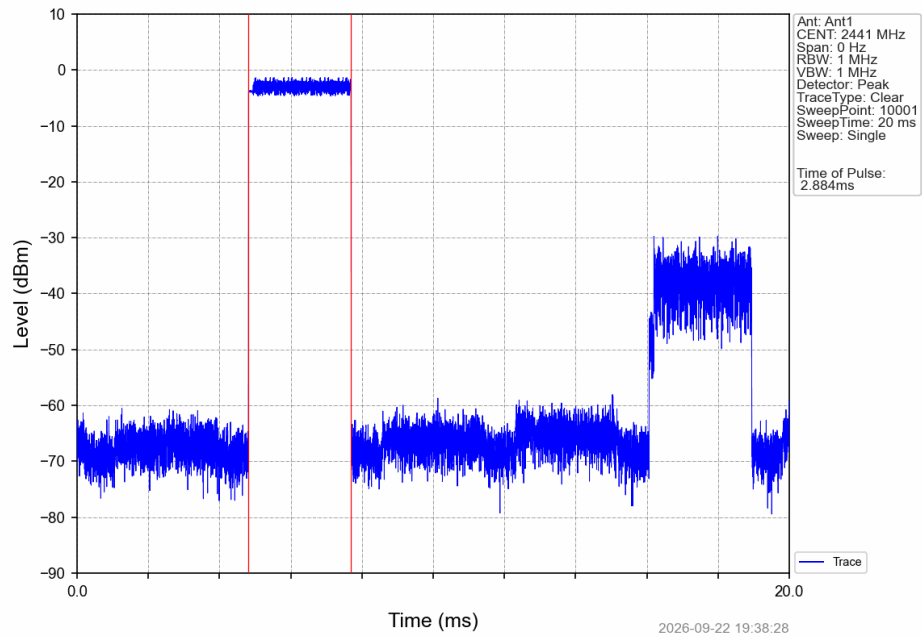
8DPSK\_3DH3\_HOPP\_Ant1\_NTNV



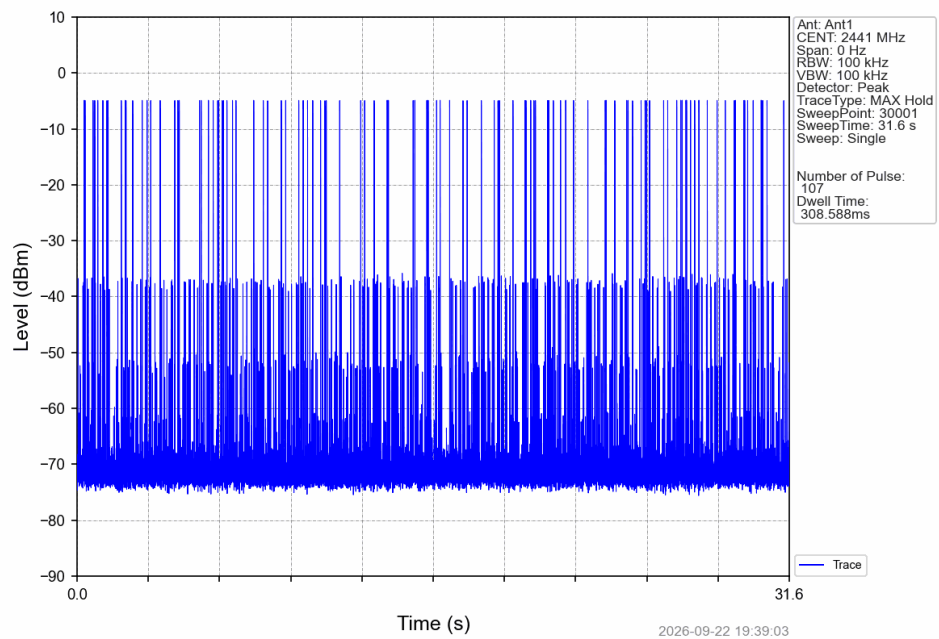
8DPSK\_3DH3\_HOPP\_Ant1\_NTNV



8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



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

### 7.1 Test Result

#### 7.1.1 Ref

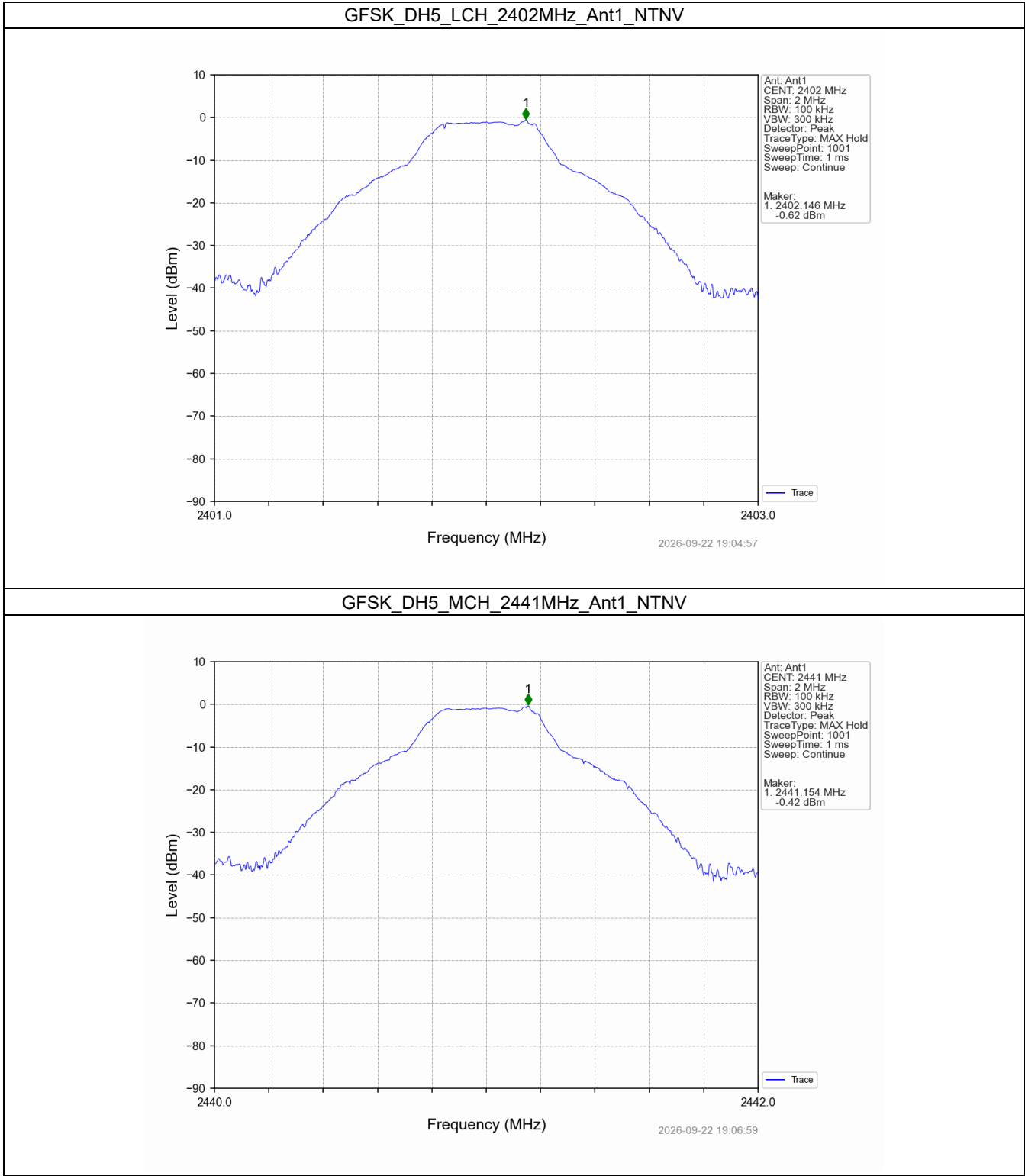
| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | Level of Reference (dBm) |
|-----------|---------|-----------------|-------------|-----|--------------------------|
| GFSK      | SISO    | 2402            | DH5         | 1   | -0.62                    |
|           |         | 2441            | DH5         | 1   | -0.42                    |
|           |         | 2480            | DH5         | 1   | -0.30                    |
|           |         | HOPP            | DH5         | 1   | -0.54                    |
|           |         |                 |             |     | -0.54                    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | -4.13                    |
|           |         | 2441            | 2DH5        | 1   | -3.97                    |
|           |         | 2480            | 2DH5        | 1   | -3.67                    |
|           |         | HOPP            | 2DH5        | 1   | -3.76                    |
|           |         |                 |             |     | -3.76                    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | -4.45                    |
|           |         | 2441            | 3DH5        | 1   | -3.76                    |
|           |         | 2480            | 3DH5        | 1   | -4.34                    |
|           |         | HOPP            | 3DH5        | 1   | -4.14                    |
|           |         |                 |             |     | -4.14                    |

#### 7.1.2 CSE

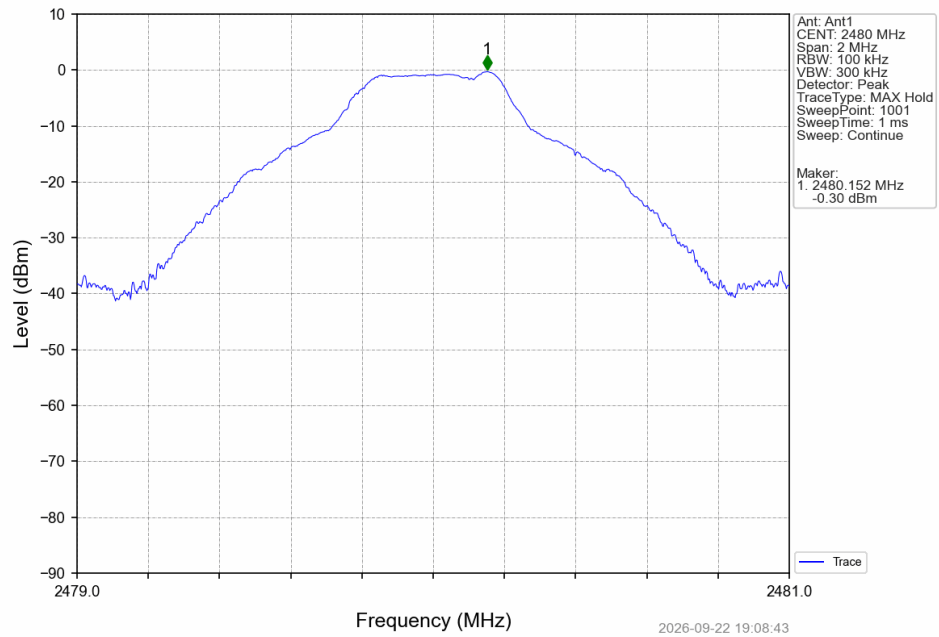
| Mode      | TX Type | Frequency (MHz) | Packet Type | ANT | Level of Reference (dBm) | Limit (dBm) | Verdict |
|-----------|---------|-----------------|-------------|-----|--------------------------|-------------|---------|
| GFSK      | SISO    | 2402            | DH5         | 1   | -0.62                    | -20.62      | Pass    |
|           |         | 2441            | DH5         | 1   | -0.42                    | -20.42      | Pass    |
|           |         | 2480            | DH5         | 1   | -0.30                    | -20.30      | Pass    |
|           |         | HOPP            | DH5         | 1   | -0.54                    | -20.54      | Pass    |
|           |         |                 |             |     | -0.54                    | -20.54      | Pass    |
| Pi/4DQPSK | SISO    | 2402            | 2DH5        | 1   | -4.13                    | -24.13      | Pass    |
|           |         | 2441            | 2DH5        | 1   | -3.97                    | -23.97      | Pass    |
|           |         | 2480            | 2DH5        | 1   | -3.67                    | -23.67      | Pass    |
|           |         | HOPP            | 2DH5        | 1   | -3.76                    | -23.76      | Pass    |
|           |         |                 |             |     | -3.76                    | -23.76      | Pass    |
| 8DPSK     | SISO    | 2402            | 3DH5        | 1   | -4.45                    | -24.45      | Pass    |
|           |         | 2441            | 3DH5        | 1   | -3.76                    | -23.76      | Pass    |
|           |         | 2480            | 3DH5        | 1   | -4.34                    | -24.34      | Pass    |
|           |         | HOPP            | 3DH5        | 1   | -4.14                    | -24.14      | Pass    |
|           |         |                 |             |     | -4.14                    | -24.14      | Pass    |

7.2 Test Graph

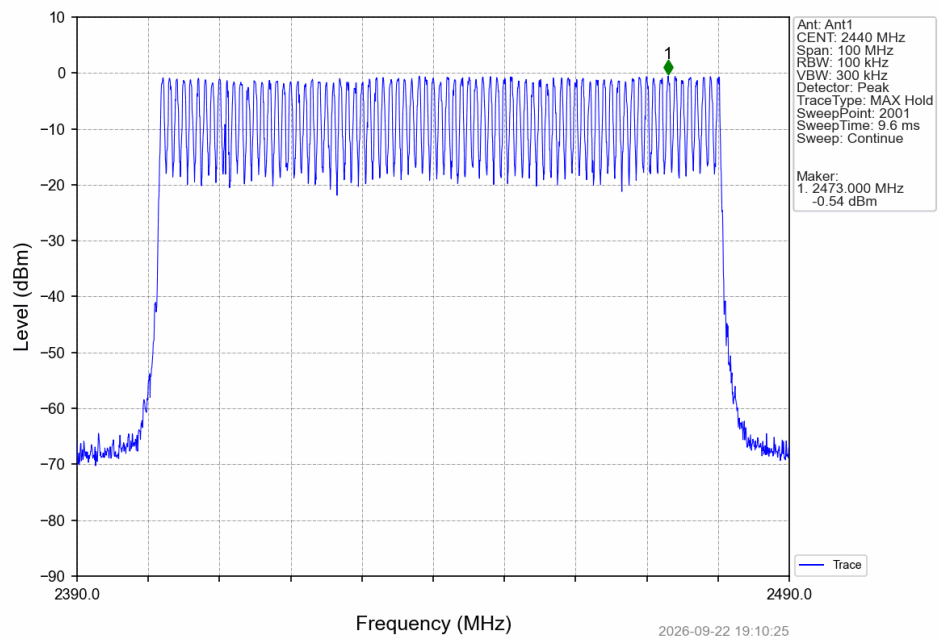
7.2.1 Ref



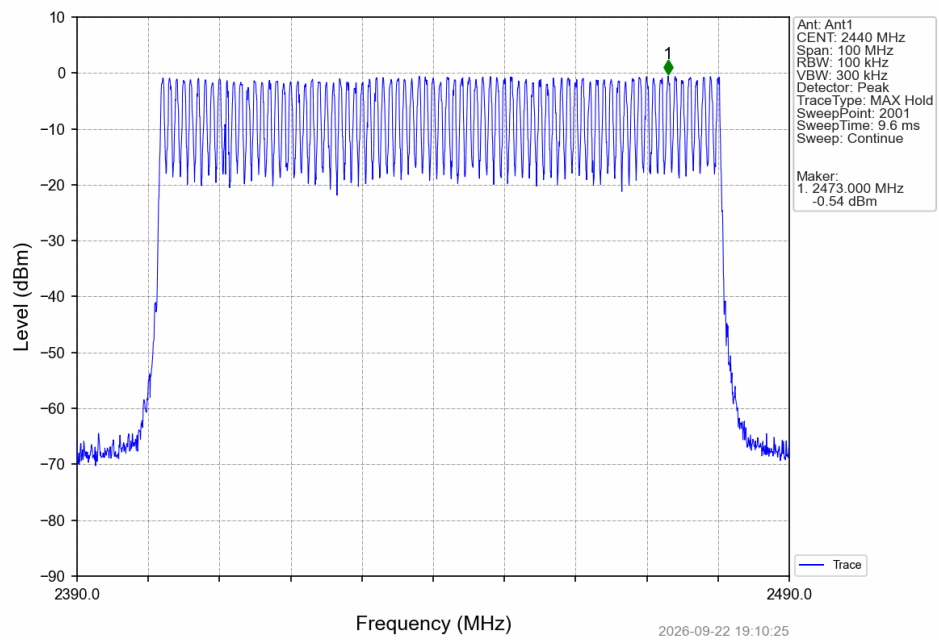
# GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



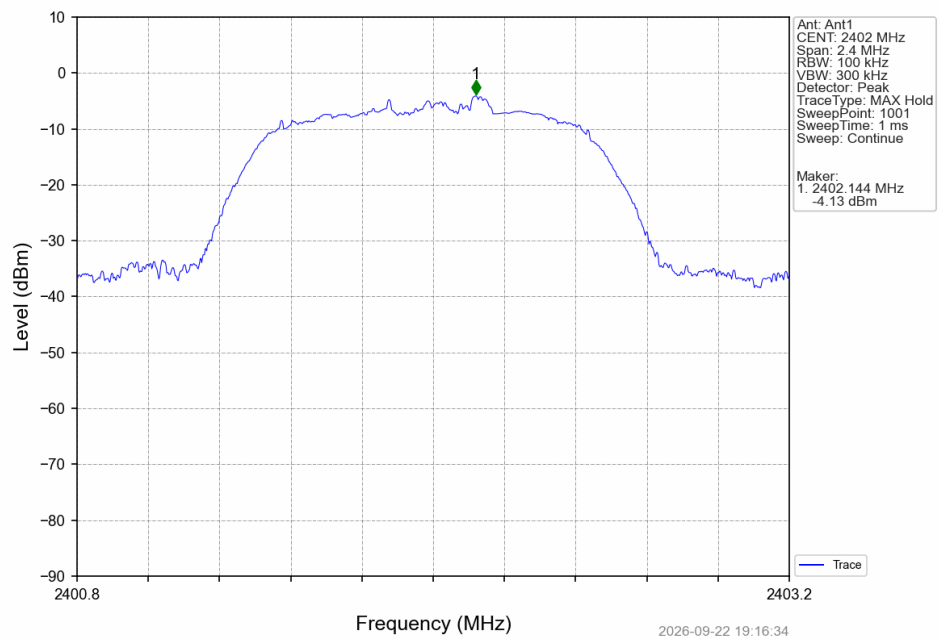
# GFSK\_DH5\_HOPP\_2440MHz\_Ant1\_NTNV



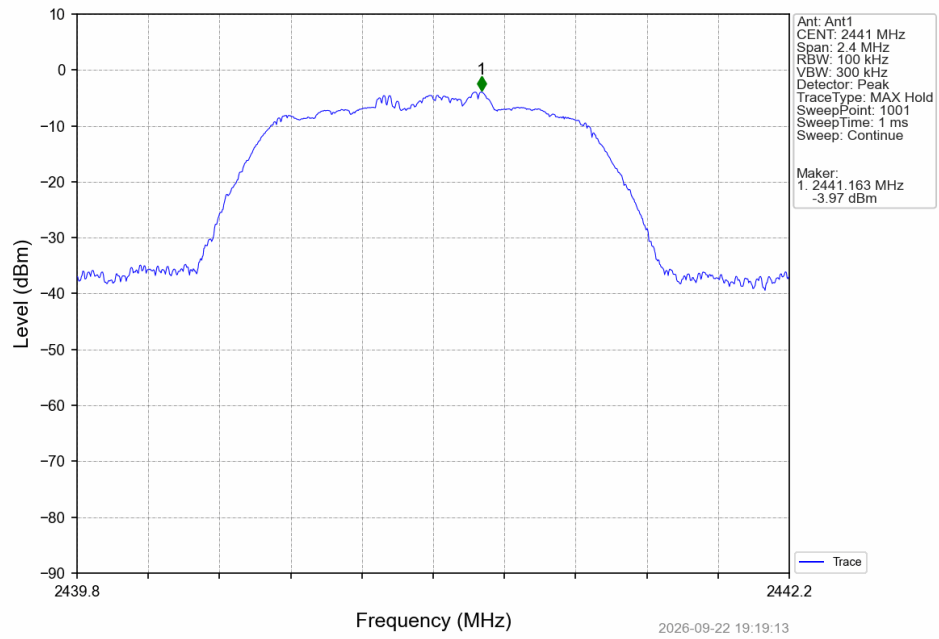
# GFSK\_DH5\_HOPP\_Ant1\_NTNV



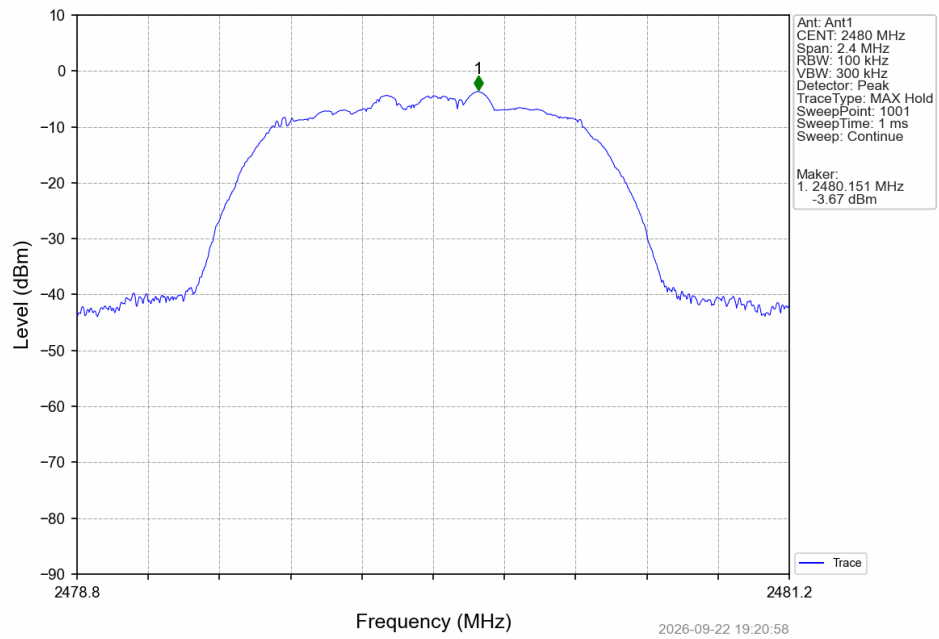
# Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



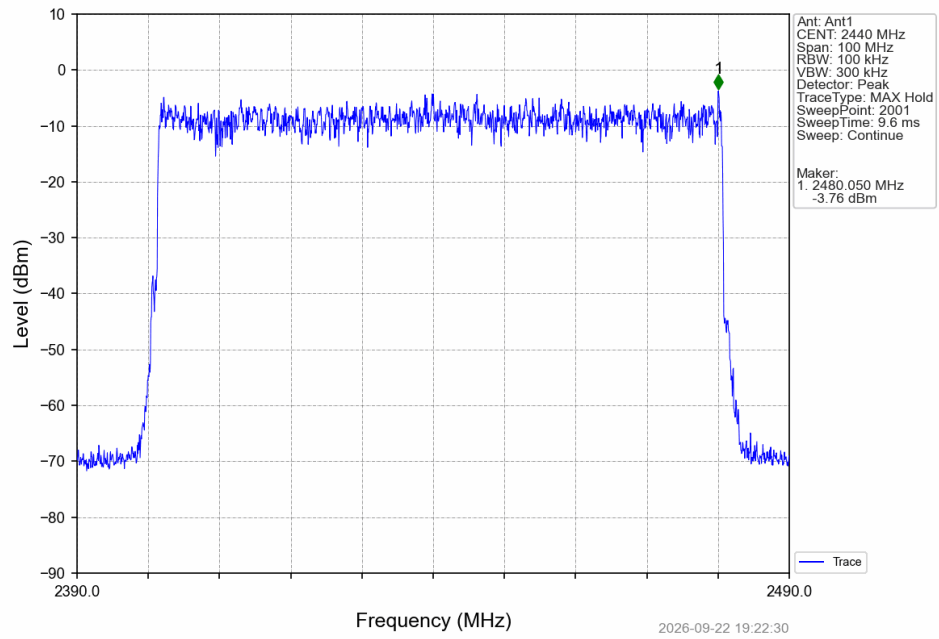
# Pi/4DQPSK\_2DH5\_MCH\_2441MHz\_Ant1\_NTNV



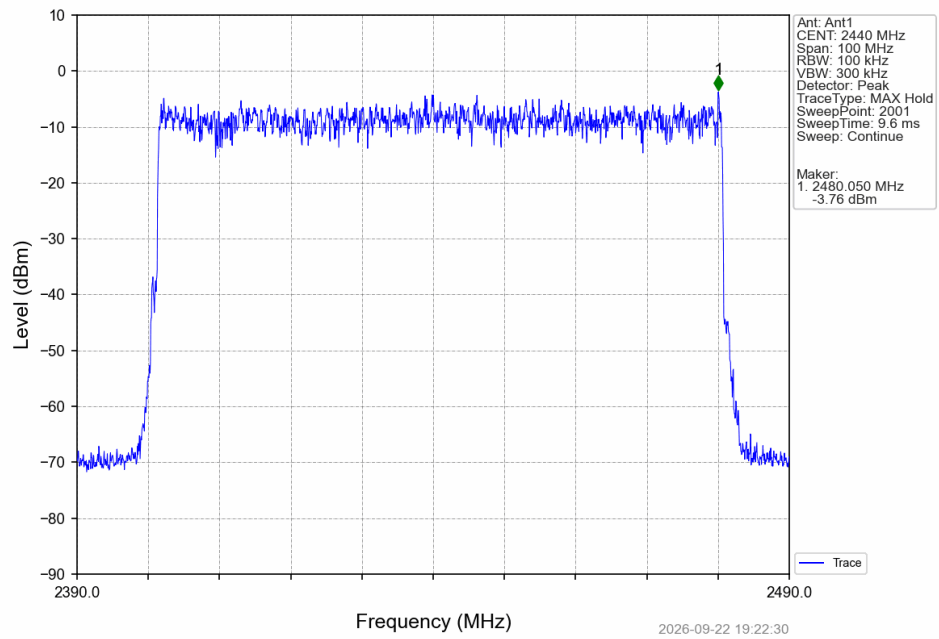
# Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV



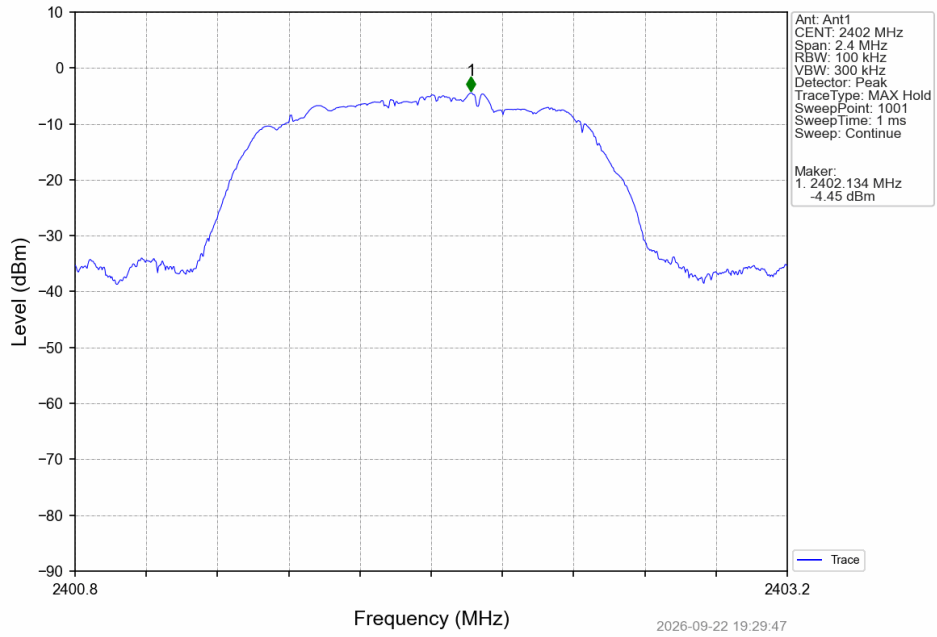
# Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV



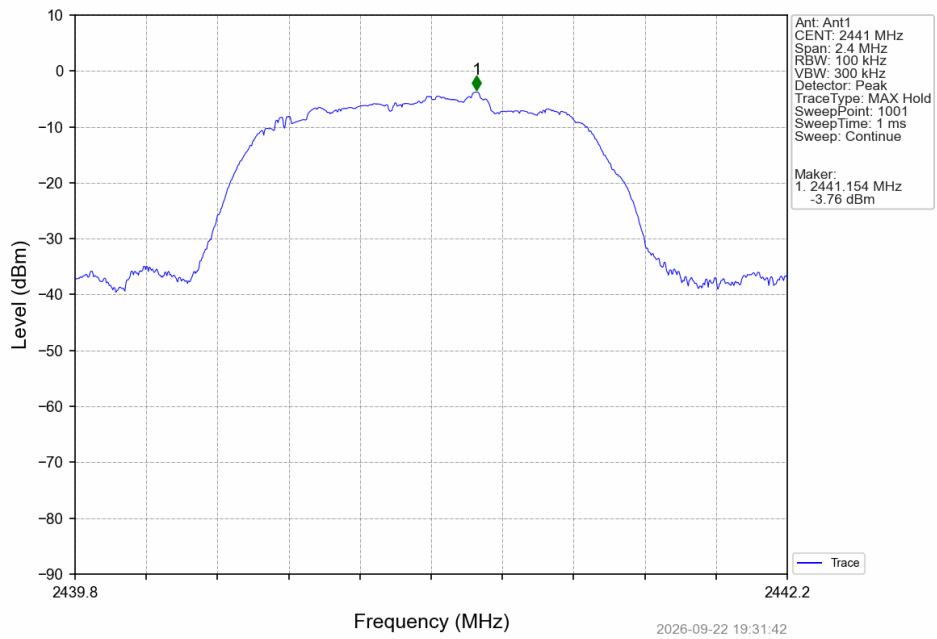
# Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV



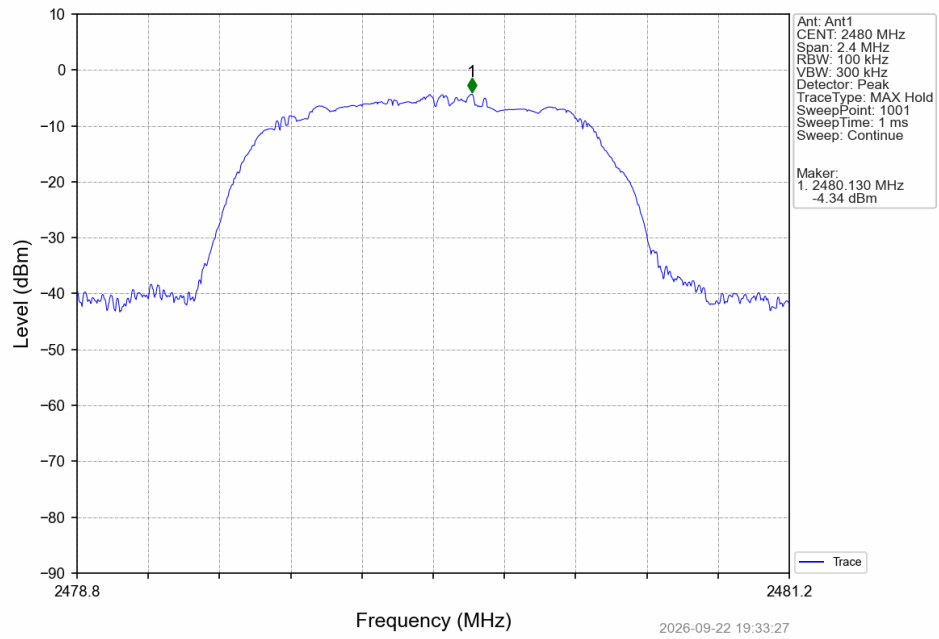
# 8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



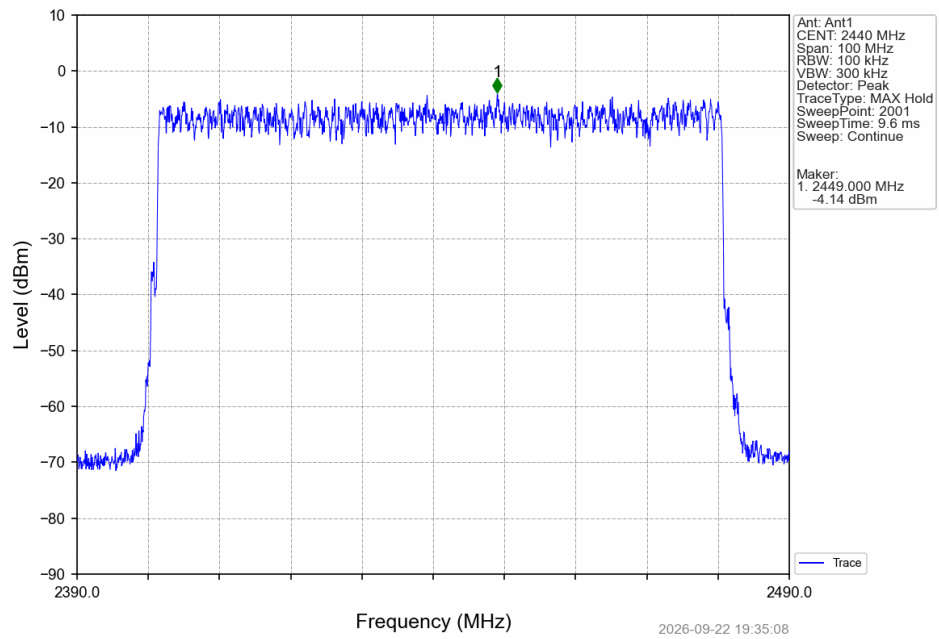
# 8DPSK\_3DH5\_MCH\_2441MHz\_Ant1\_NTNV



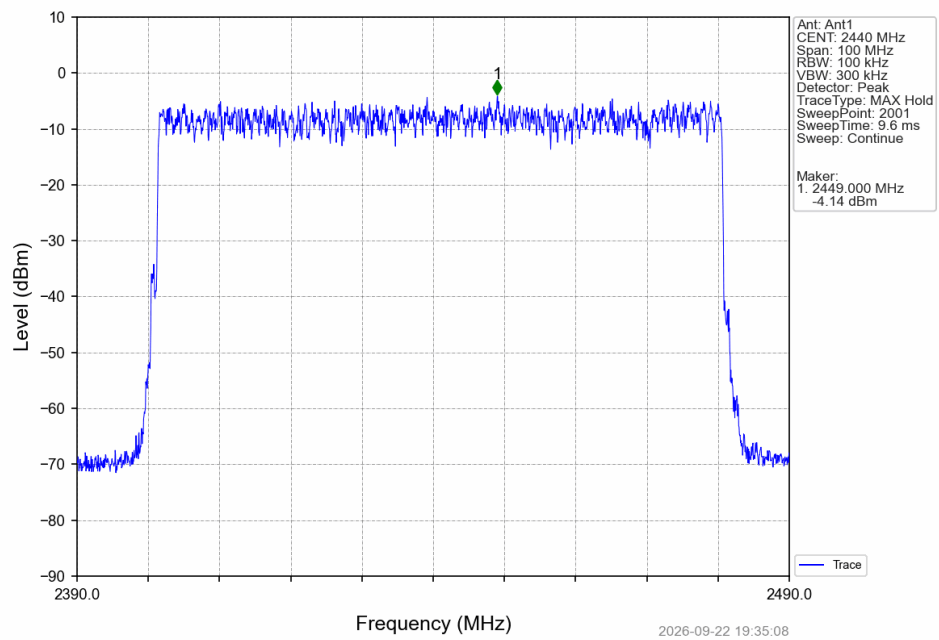
# 8DPSK\_3DH5\_HCH\_2480MHz\_Ant1\_NTNV



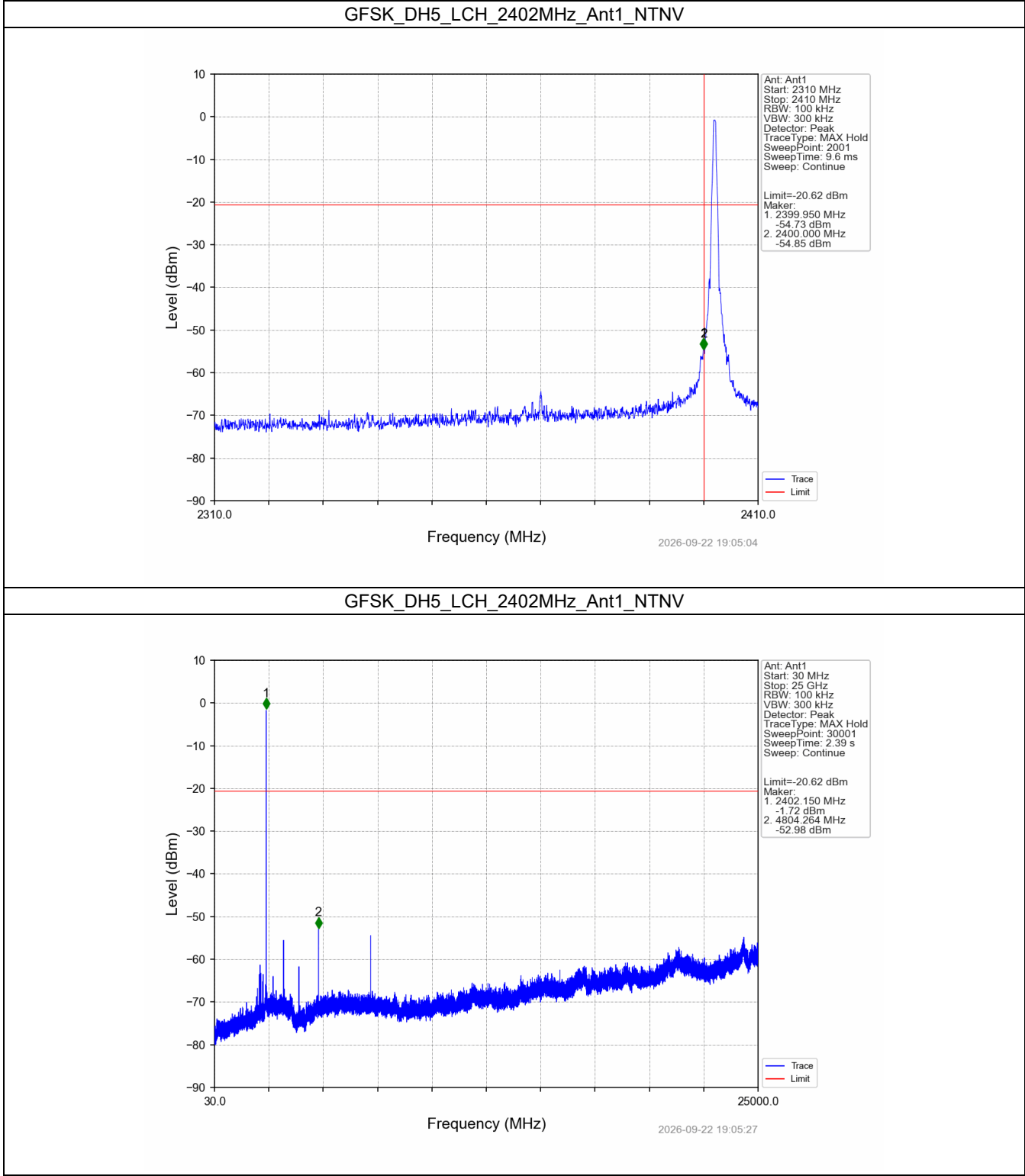
# 8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



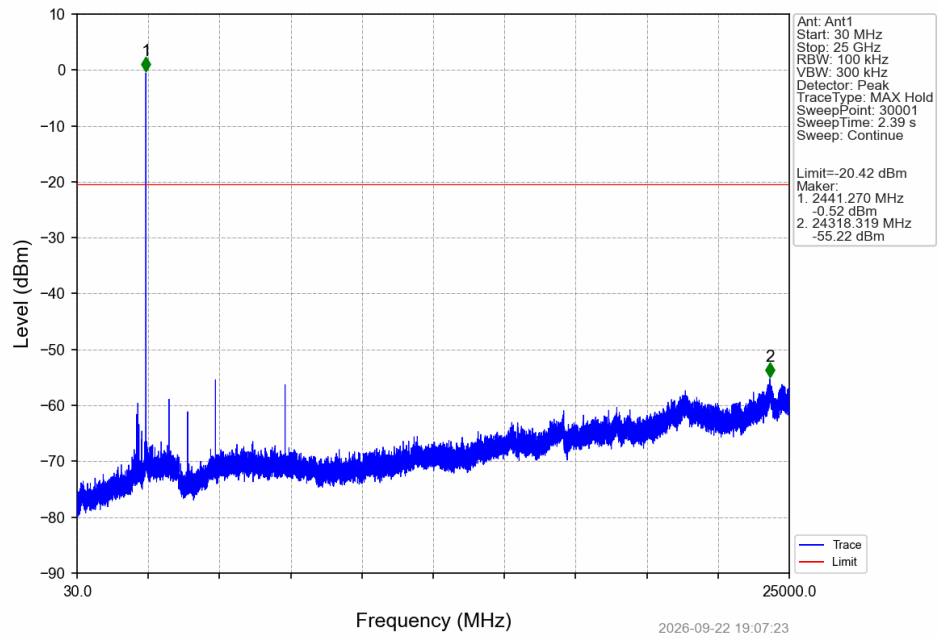
8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



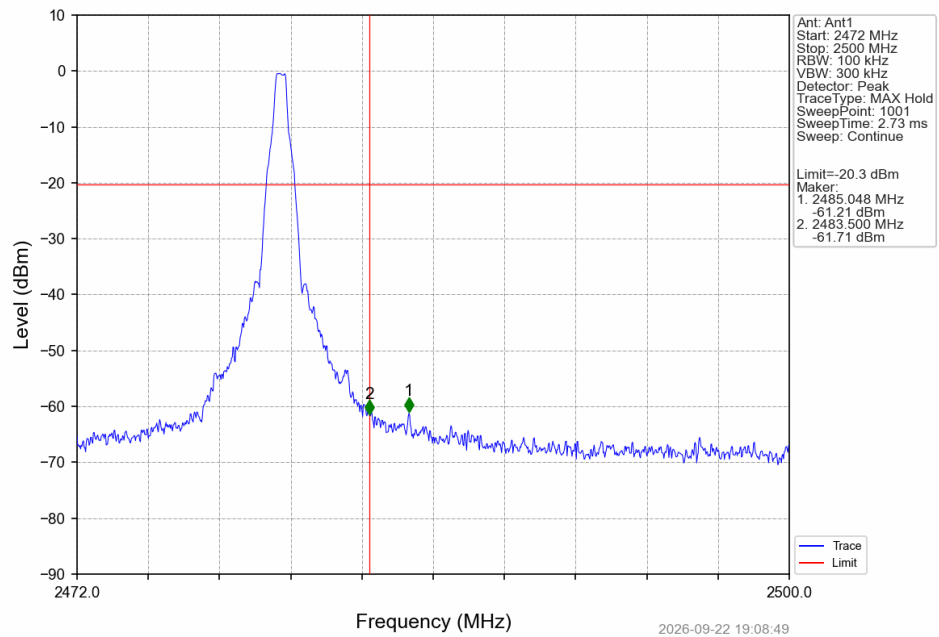
7.2.2 CSE



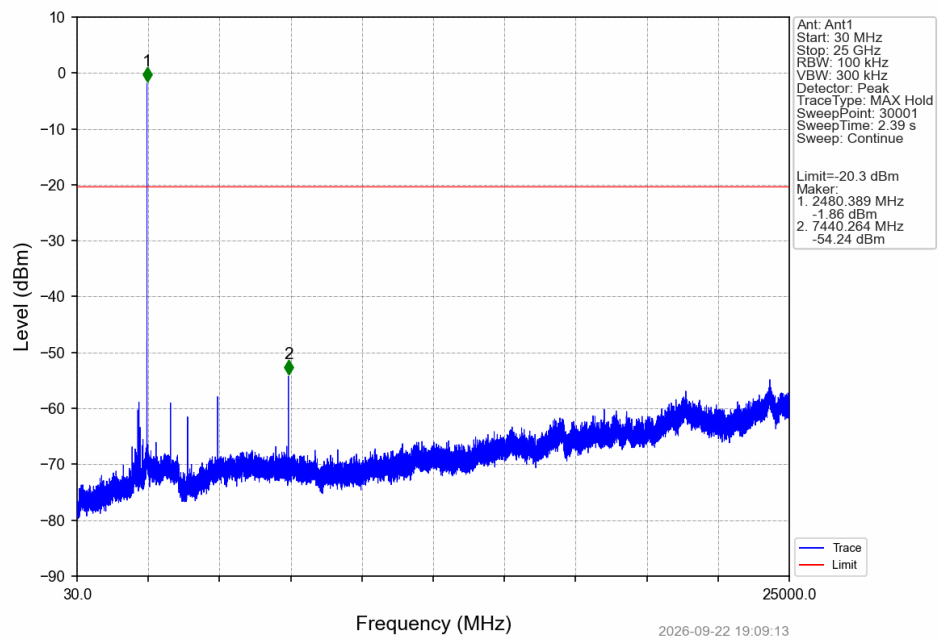
# GFSK\_DH5\_MCH\_2441MHz\_Ant1\_NTNV



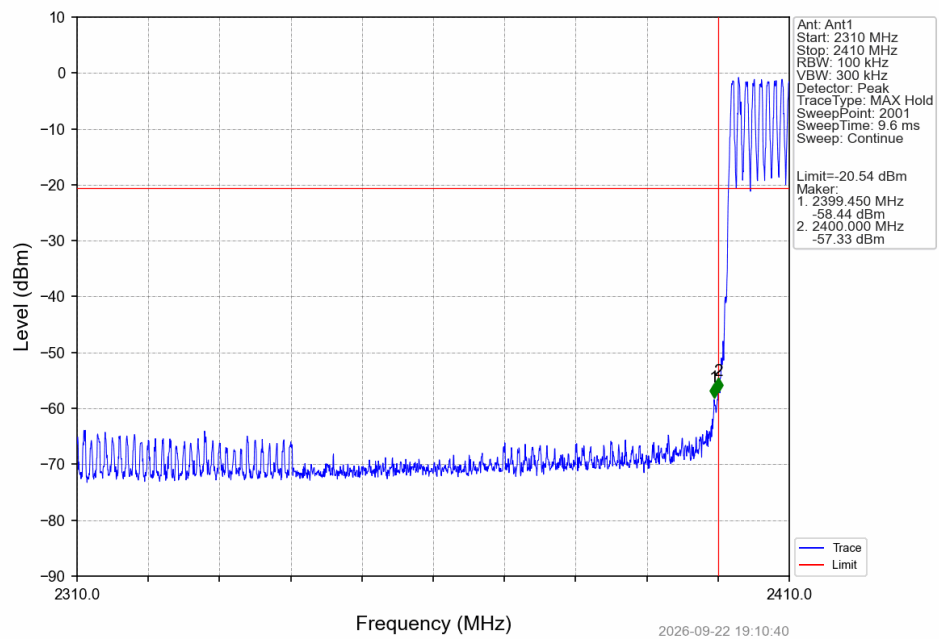
# GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



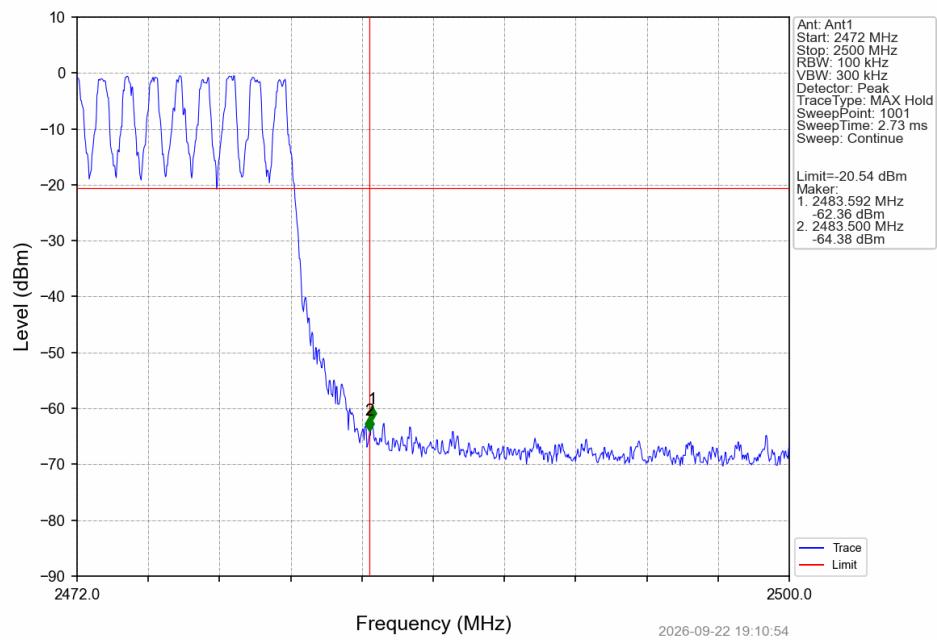
# GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV



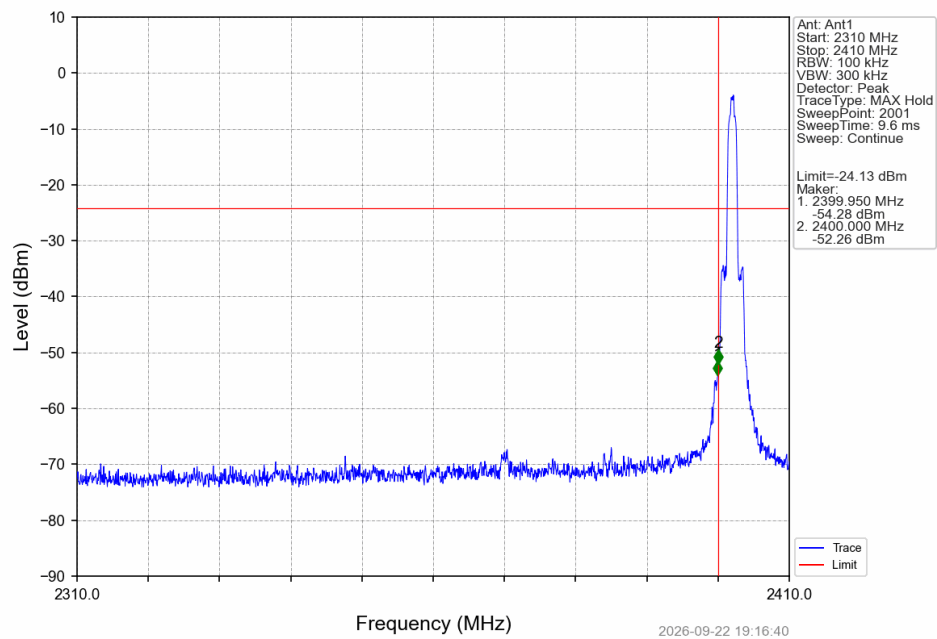
# GFSK\_DH5\_HOPP\_Ant1\_NTNV



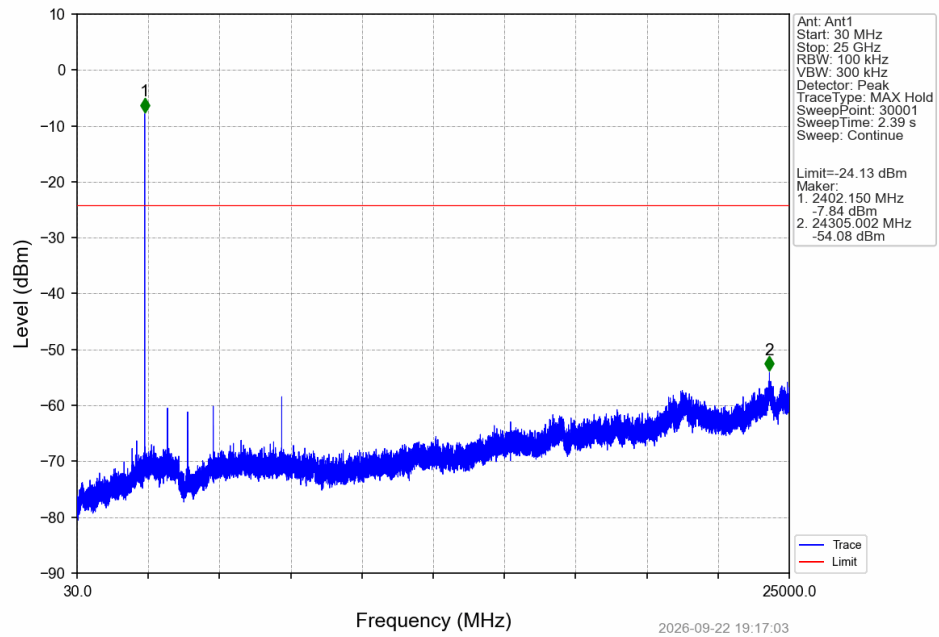
# GFSK\_DH5\_HOPP\_Ant1\_NTNV



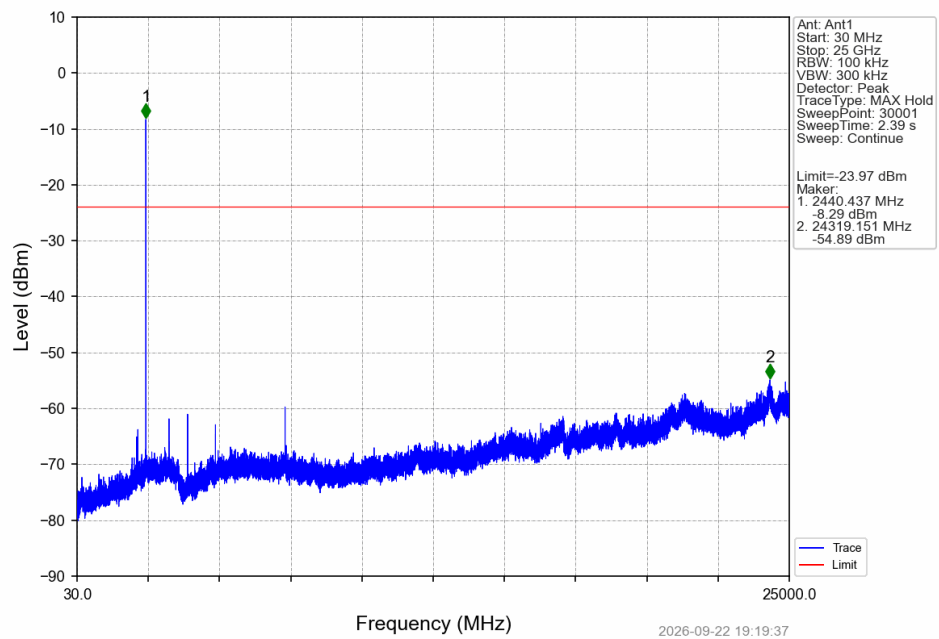
# Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



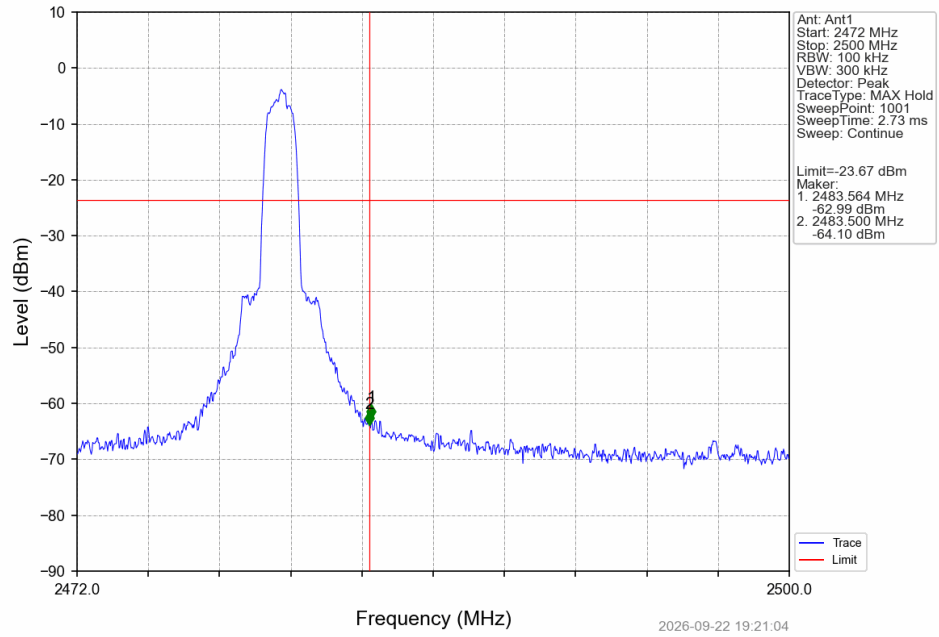
# Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV



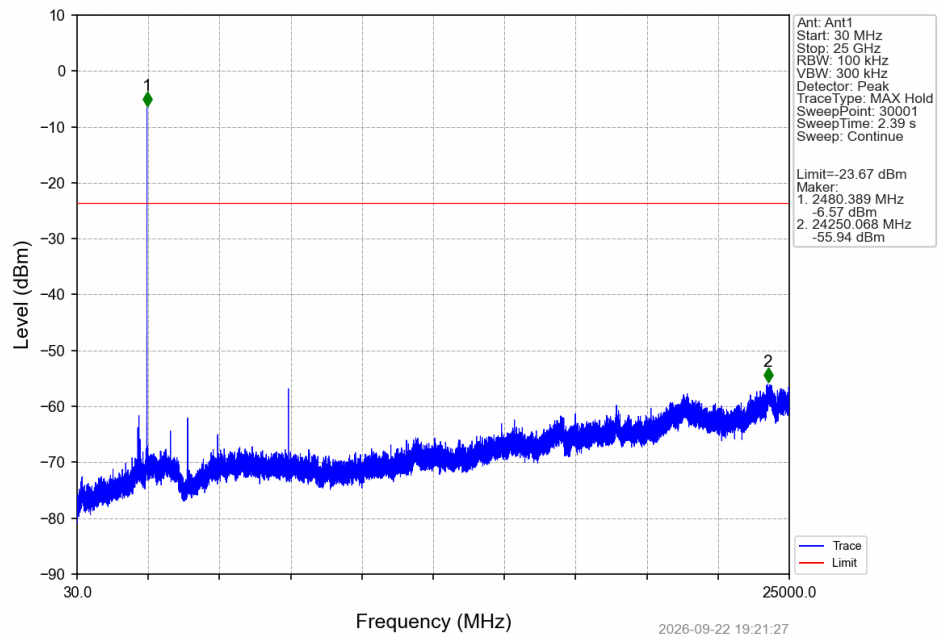
# Pi/4DQPSK\_2DH5\_MCH\_2441MHz\_Ant1\_NTNV



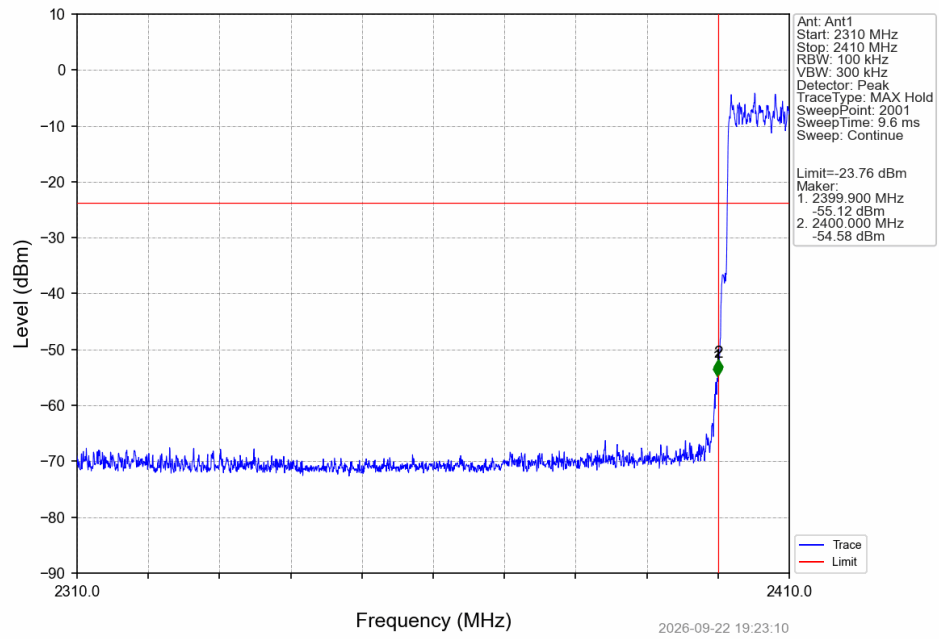
# Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV



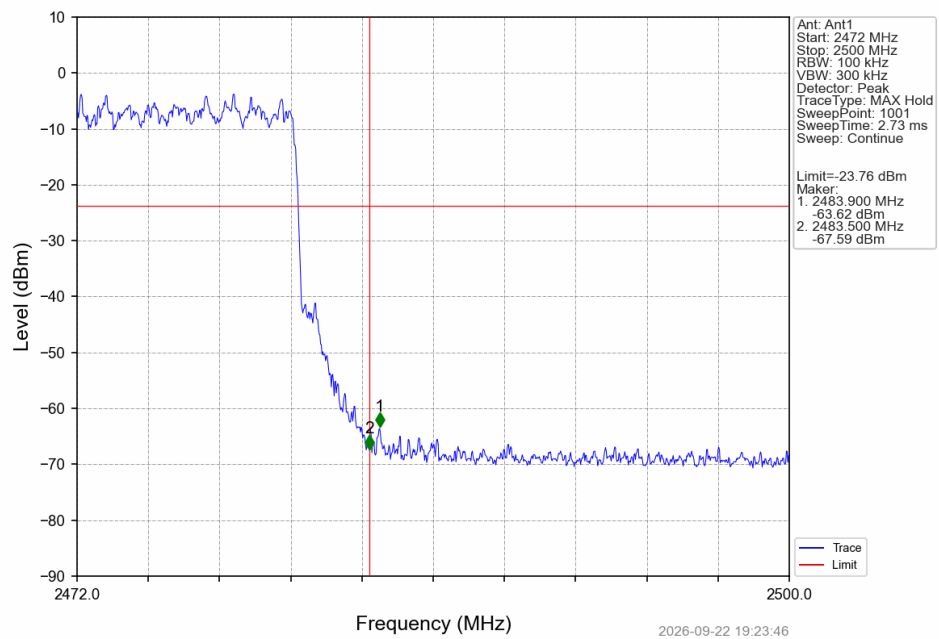
# Pi/4DQPSK\_2DH5\_HCH\_2480MHz\_Ant1\_NTNV



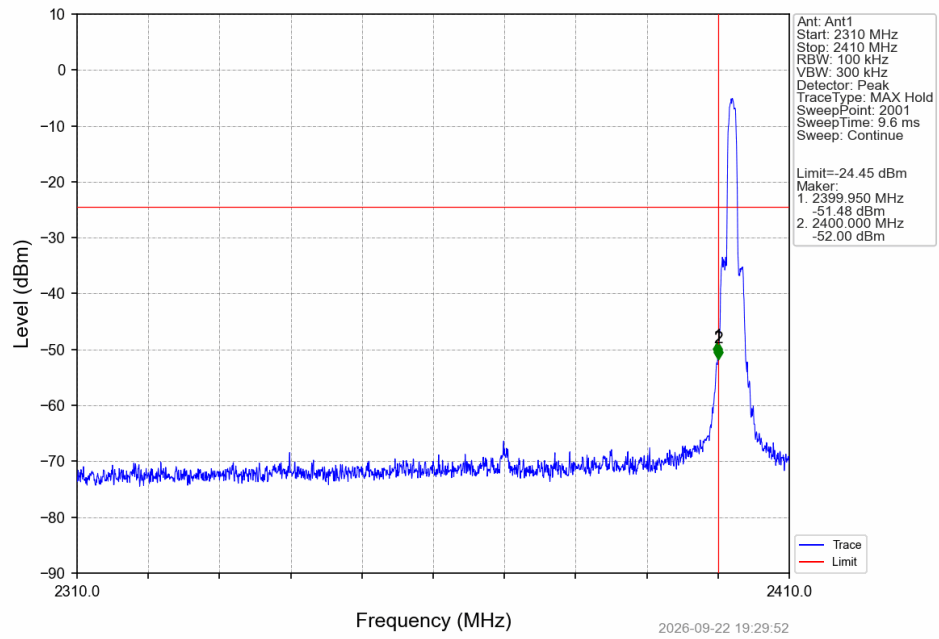
# Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV



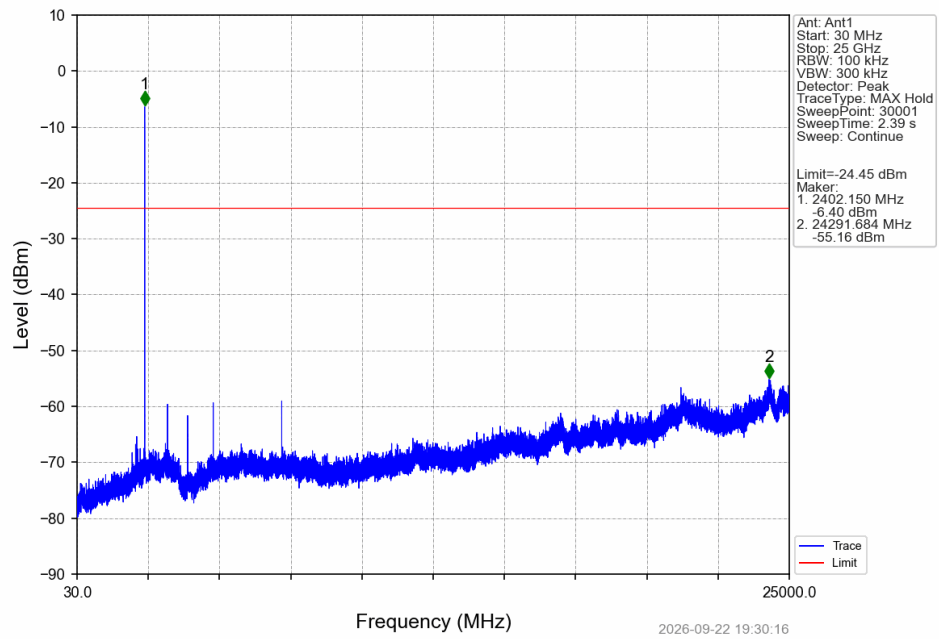
# Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV



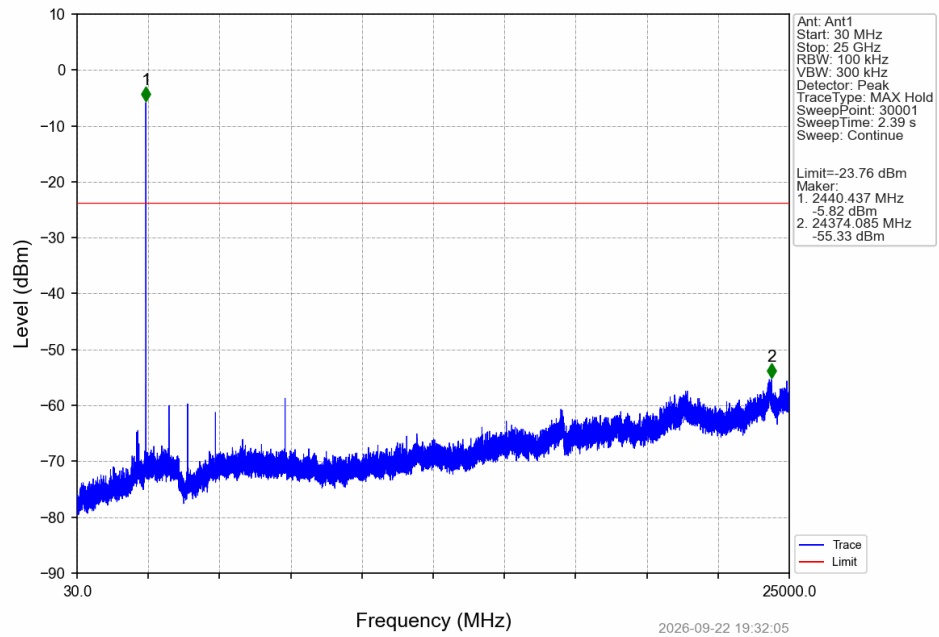
# 8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



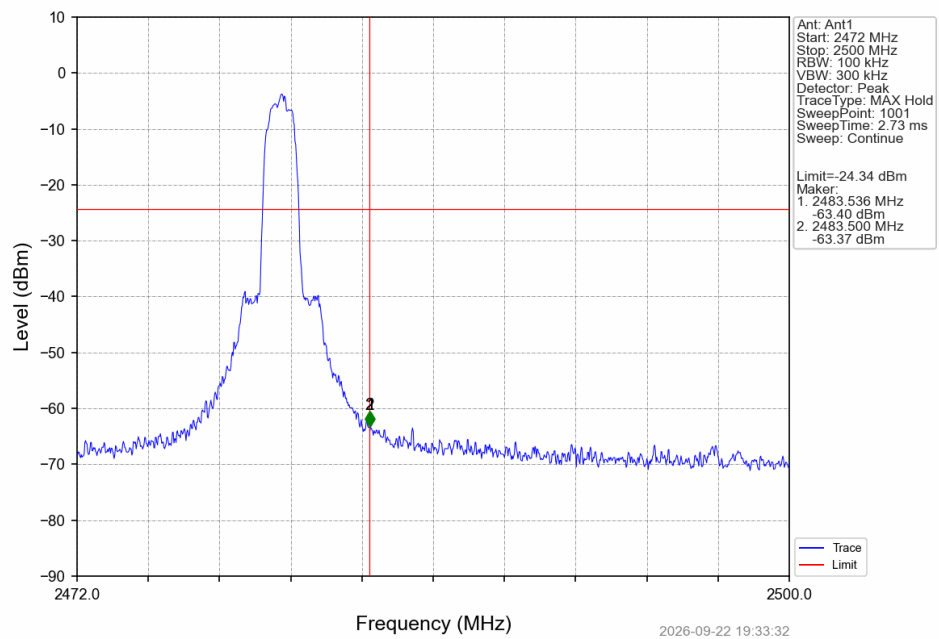
# 8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV



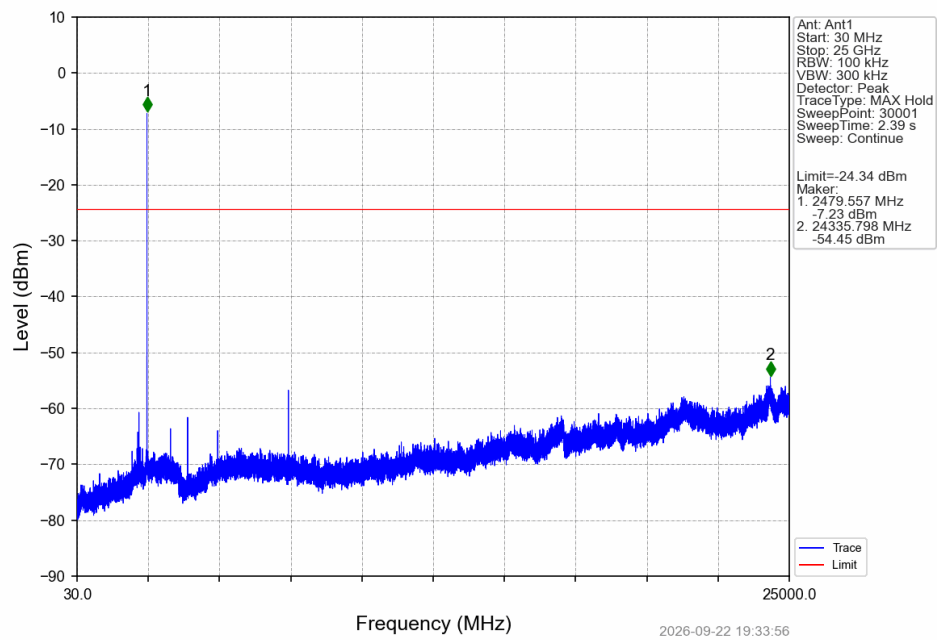
# 8DPSK\_3DH5\_MCH\_2441MHz\_Ant1\_NTNV



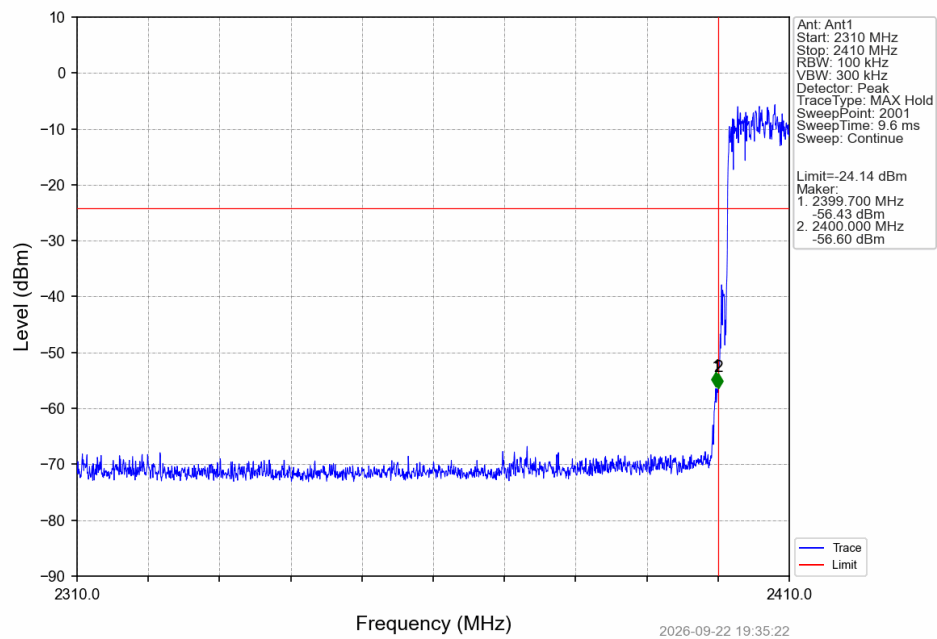
# 8DPSK\_3DH5\_HCH\_2480MHz\_Ant1\_NTNV



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



8DPSK\_3DH5\_HOPP\_Ant1\_NTNV



8DPSK\_3DH5\_HOPP\_Ant1\_NTNV

