

# Appendix Report

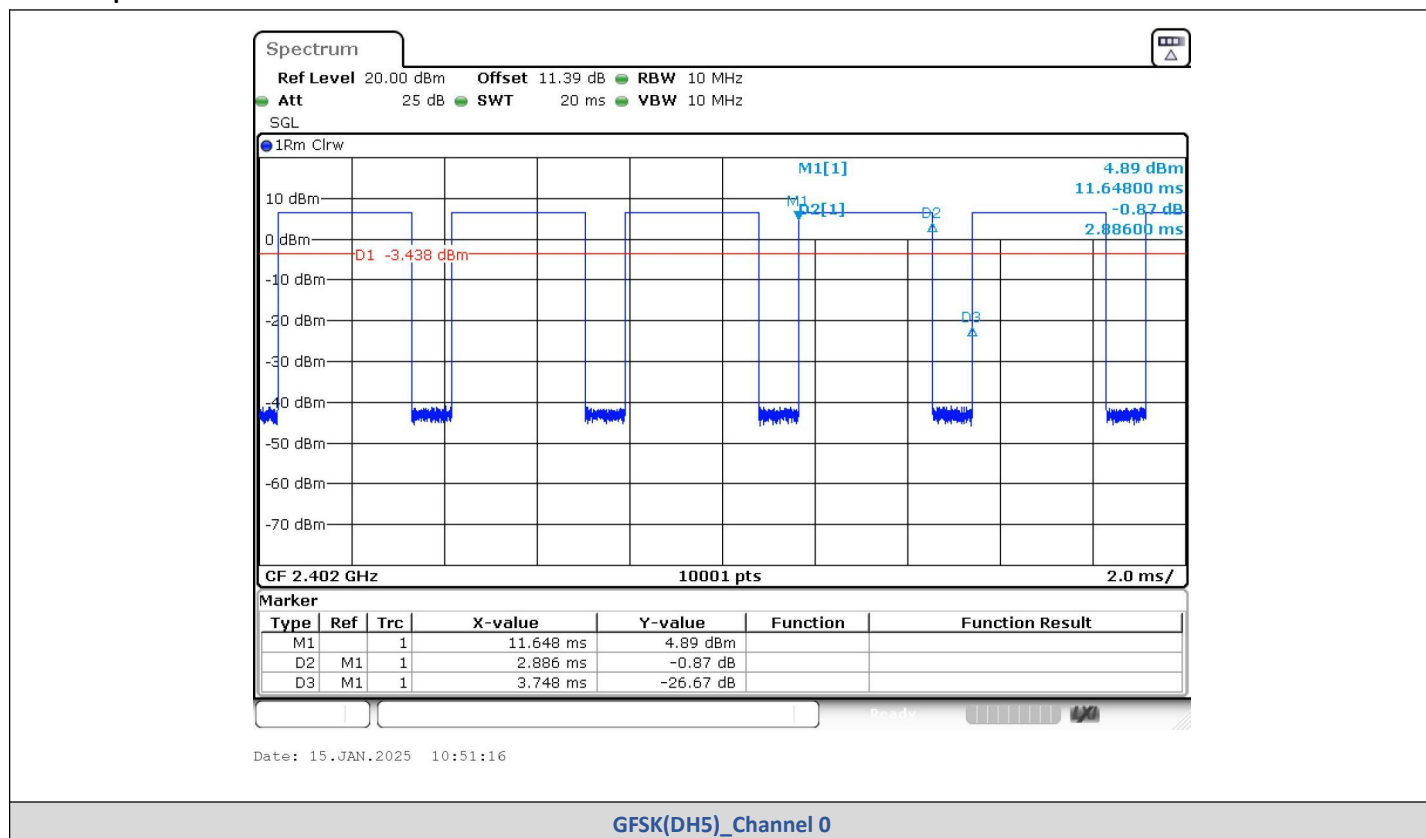
|                |                  |
|----------------|------------------|
| Report No.:    | CISRR25011008409 |
| Test Engineer: | Mark Fu          |
| Supervised by: | Rory Huang       |

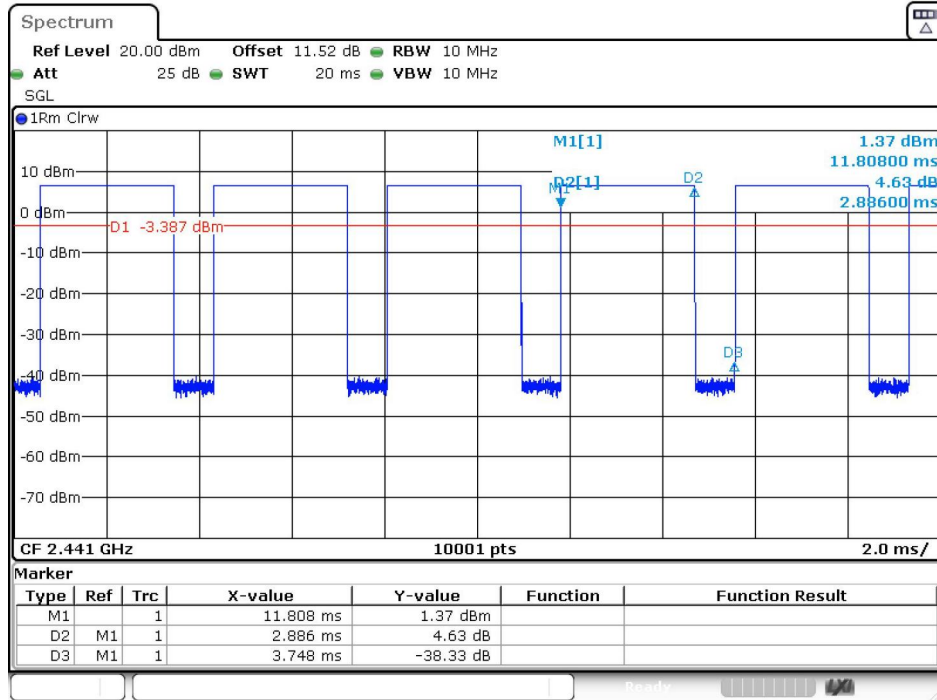
# 1) Duty Cycle

## Test Result

| Modulation    | Packets | Channel | On Time (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle (linear) | Duty Cycle Factor (dB) | 1/T    |
|---------------|---------|---------|--------------|-------------|----------------|---------------------|------------------------|--------|
| GFSK          | DH5     | 0       | 2.886        | 3.748       | 77.00          | 0.7700              | 1.1351                 | 0.3465 |
|               |         | 39      | 2.886        | 3.748       | 77.00          | 0.7700              | 1.1351                 | 0.3465 |
|               |         | 78      | 2.886        | 3.748       | 77.00          | 0.7700              | 1.1351                 | 0.3465 |
| $\pi/4$ DQPSK | 2-DH5   | 0       | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 39      | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 78      | 2.890        | 3.748       | 77.11          | 0.7711              | 1.1289                 | 0.3460 |
| 8DPSK         | 3-DH5   | 0       | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 39      | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 78      | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |

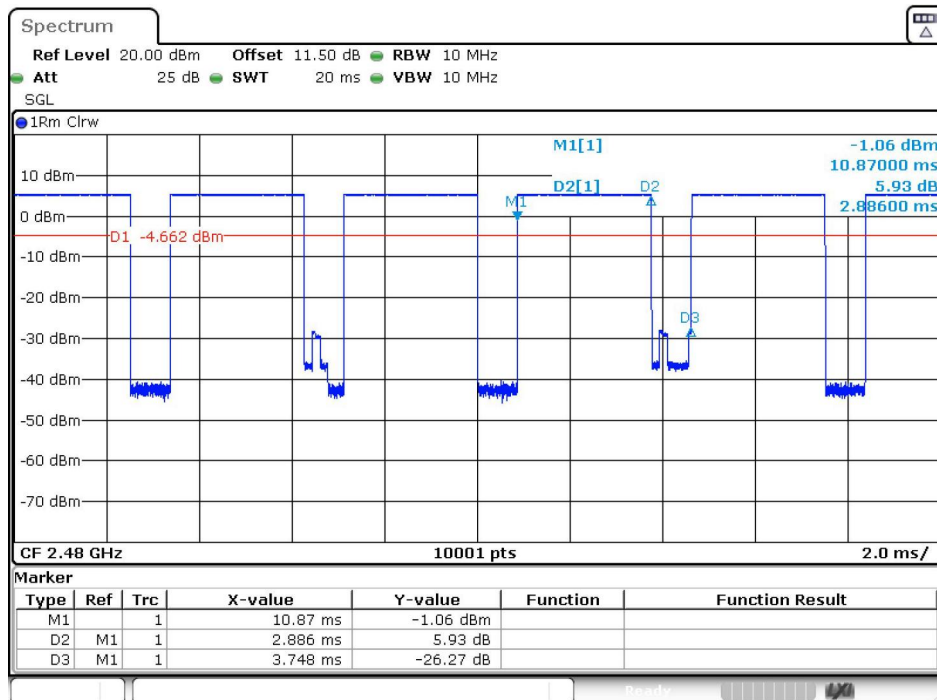
## Test Graphs





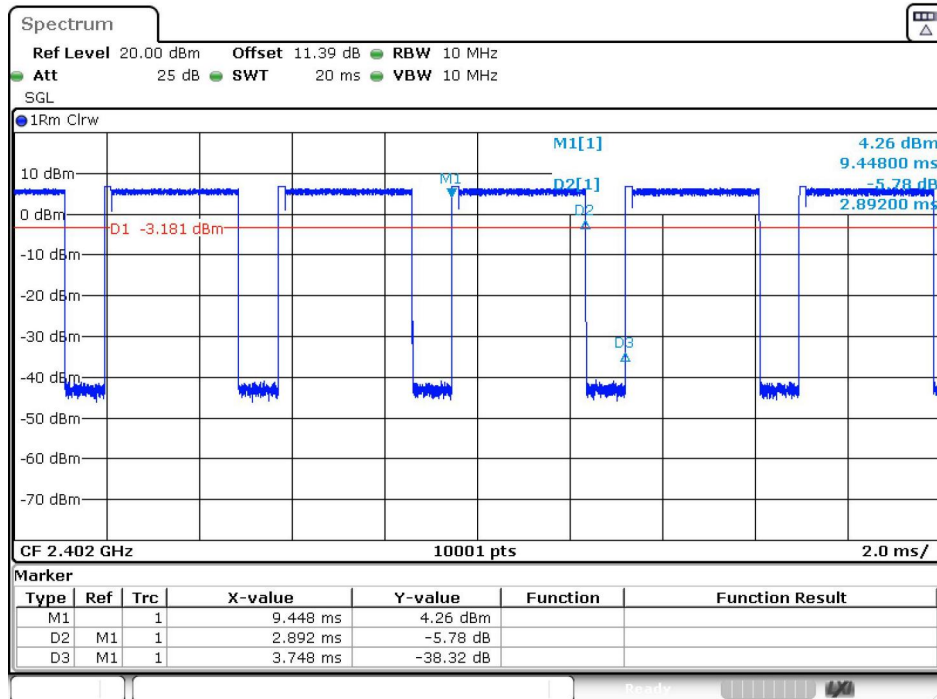
Date: 15, JAN, 2025 11:17:46

### GFSK(DH5)\_Channel 39



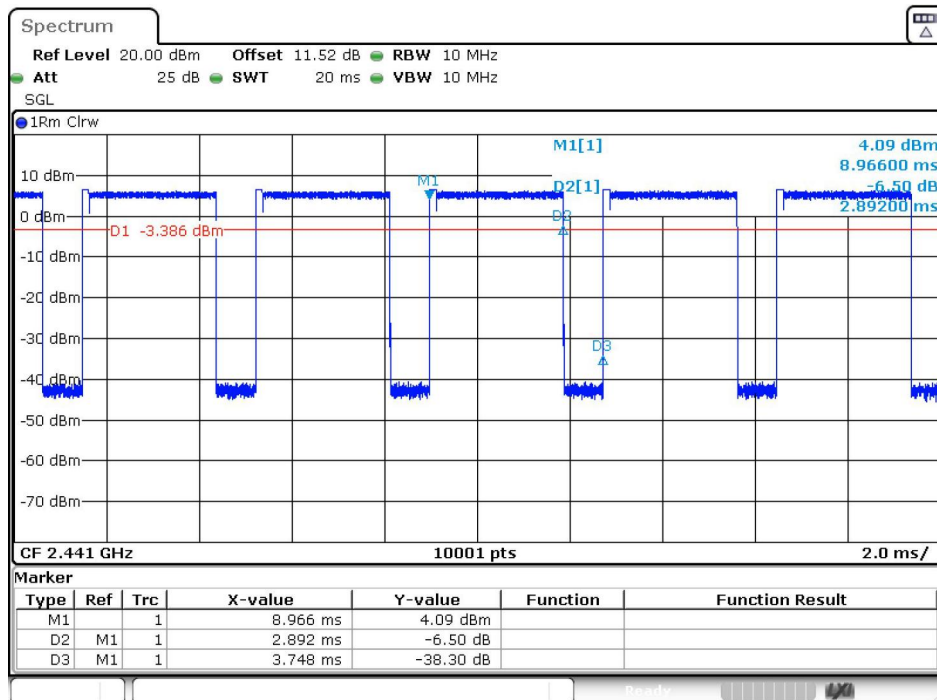
Date: 15, JAN, 2025 11:19:25

### GFSK(DH5)\_Channel 78



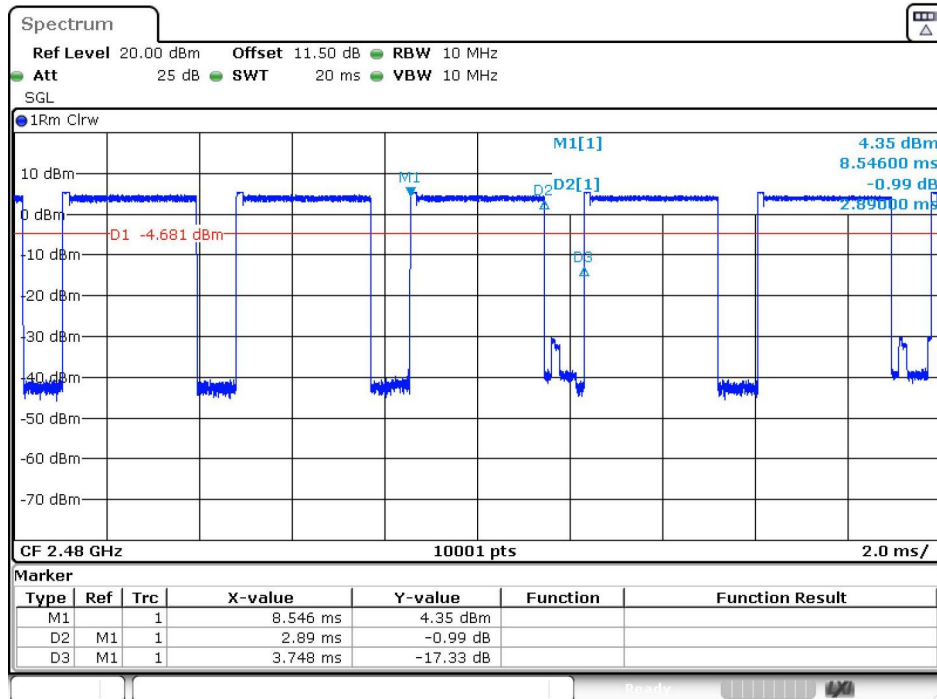
Date: 15, JAN, 2025 11:21:15

$\pi/4$ QPSK(2-DH5)\_Channel 0



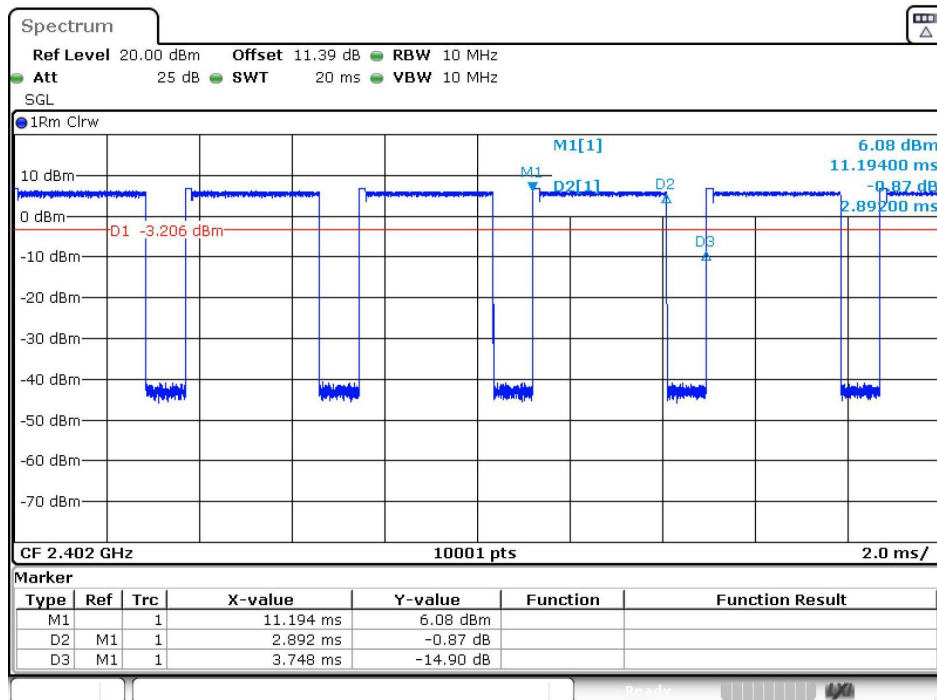
Date: 15, JAN, 2025 11:27:06

$\pi/4$ QPSK(2-DH5)\_Channel 39



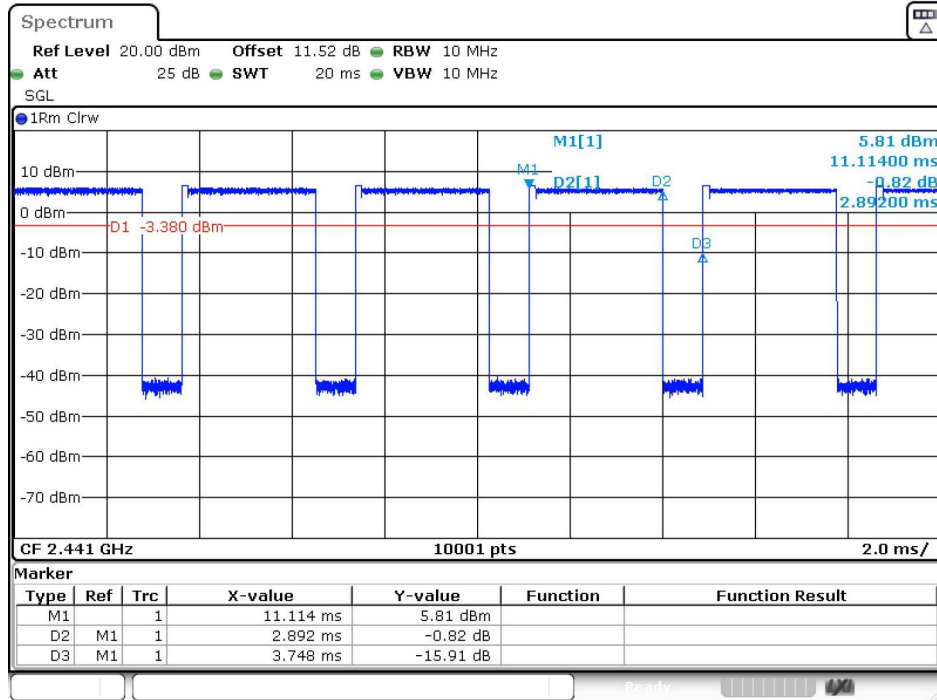
Date: 15, JAN, 2025 11:29:33

**$\pi/4$ DQPSK(2-DH5)\_Channel 78**



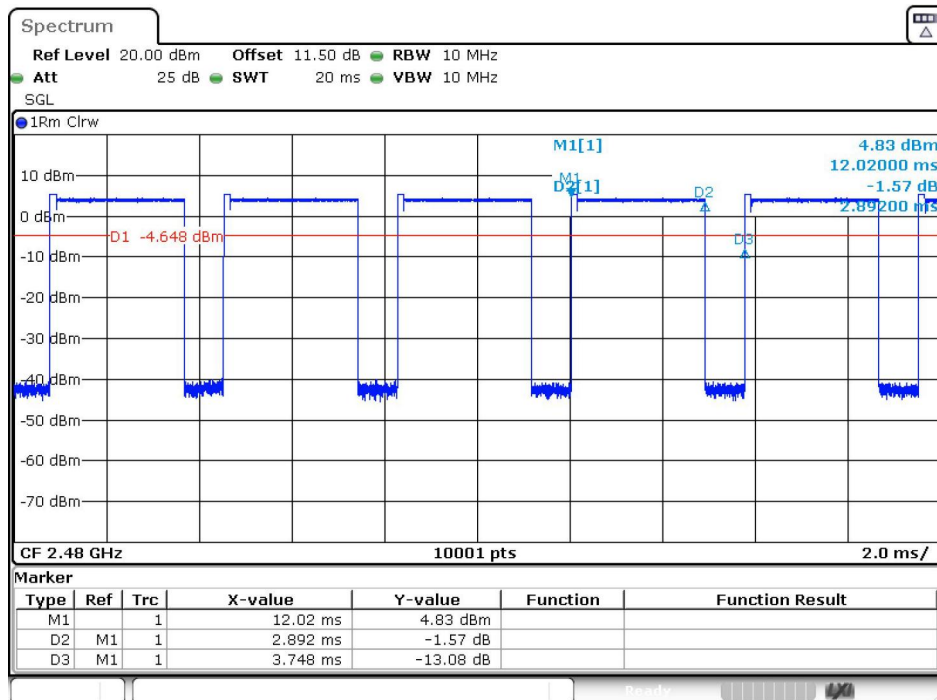
Date: 15, JAN, 2025 11:31:50

**8DPSK(3-DH5)\_Channel 0**



Date: 15, JAN, 2025 11:40:02

### 8DPSK(3-DH5)\_Channel 39



Date: 15, JAN, 2025 11:41:42

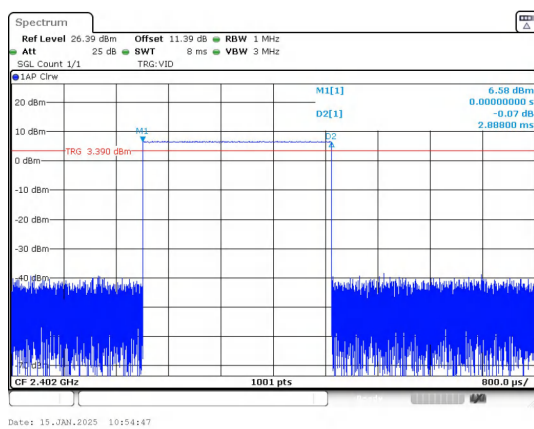
### 8DPSK(3-DH5)\_Channel 78

## 2) Dwell Time

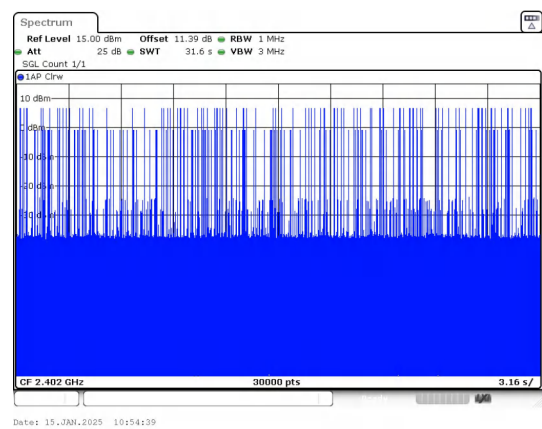
### Test Result

| Modulation    | Packet | Channel          | Pulse Width (ms) | Number of Pulses in 31.6 seconds | Dwell Time (ms) | Limit (ms) | Result |
|---------------|--------|------------------|------------------|----------------------------------|-----------------|------------|--------|
| GFSK          | DH5    | CH0<br>(2402MHz) | 2.888            | 98                               | 283.02          | < 400      | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |                  | 2.896            | 105                              | 304.08          |            | PASS   |
| 8DPSK         | 3-DH5  |                  | 2.896            | 104                              | 301.18          |            | PASS   |

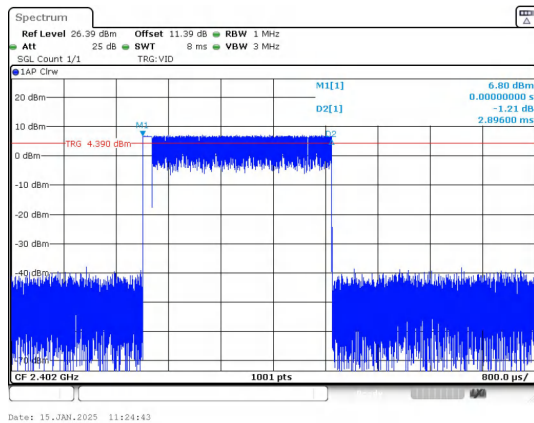
### Test Graphs



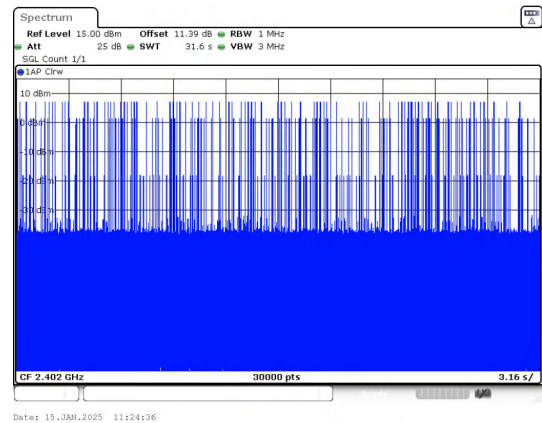
Pulse Width  
GFSK\_DH5



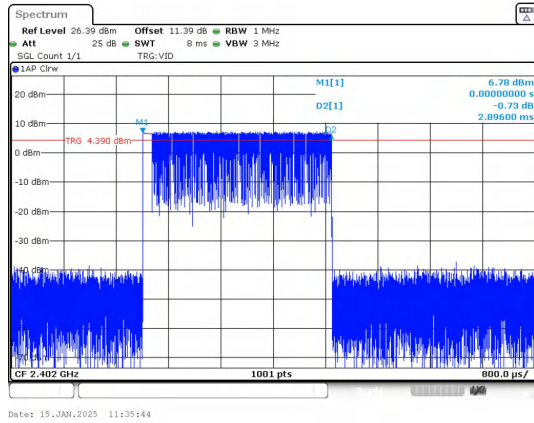
Number of Pulses in 31.6 seconds  
GFSK\_DH5



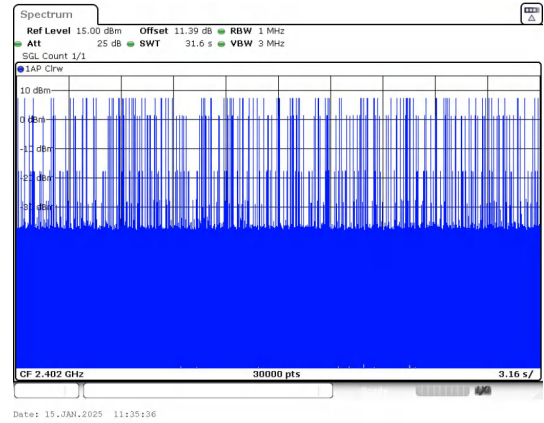
Pulse Width  
 $\pi/4$ DQPSK\_2-DH5



Number of Pulses in 31.6 seconds  
 $\pi/4$ DQPSK\_2-DH5



Pulse Width  
8DPSK\_3-DH5



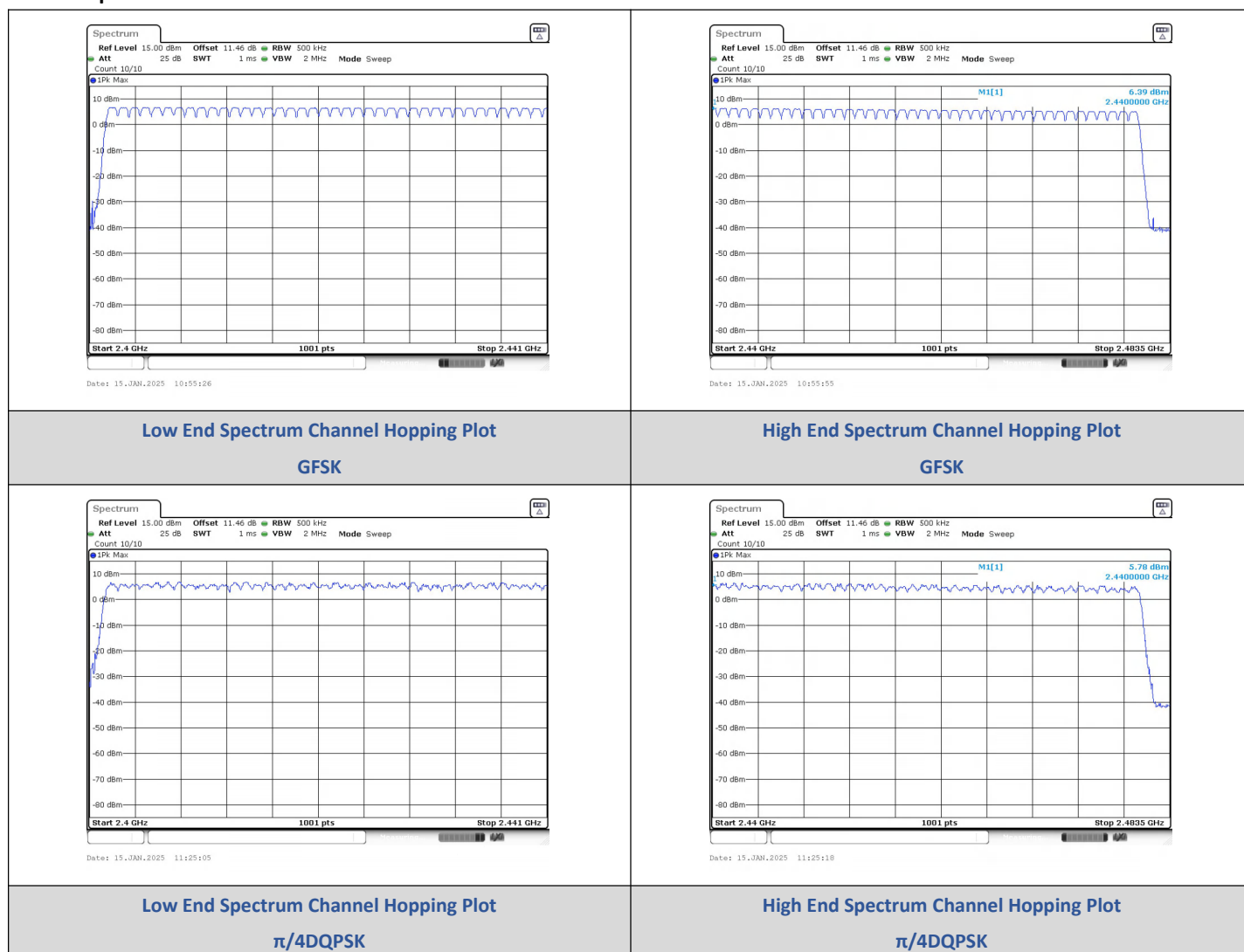
Number of Pulses in 31.6 seconds  
8DPSK\_3-DH5

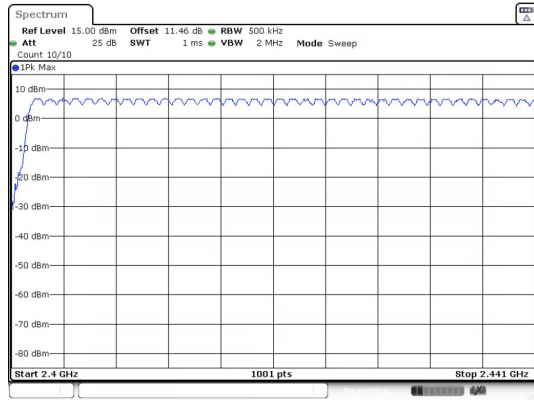
### 3) Number Of Hopping Channel

#### Test Result

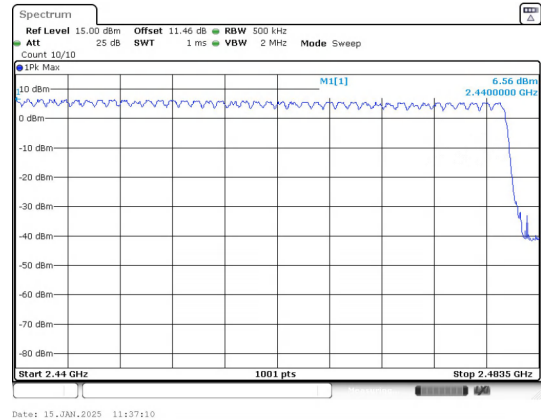
| Modulation    | Packet | Number of Hopping Channel | Limit | Result |
|---------------|--------|---------------------------|-------|--------|
| GFSK          | DH5    | 79                        | 15    | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 79                        | 15    | PASS   |
| 8DPSK         | 3-DH5  | 79                        | 15    | PASS   |

#### Test Graphs





Low End Spectrum Channel Hopping Plot  
8DPSK



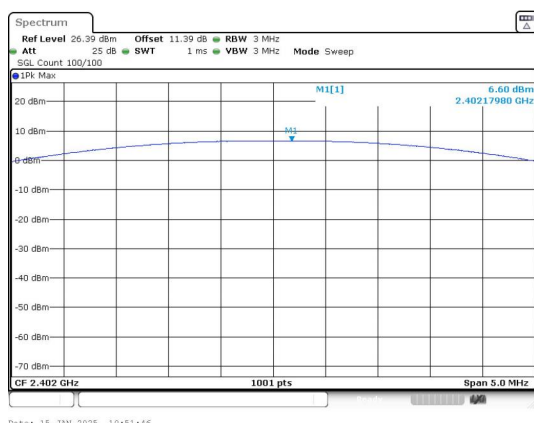
High End Spectrum Channel Hopping Plot  
8DPSK

## 4) Conducted Output Power

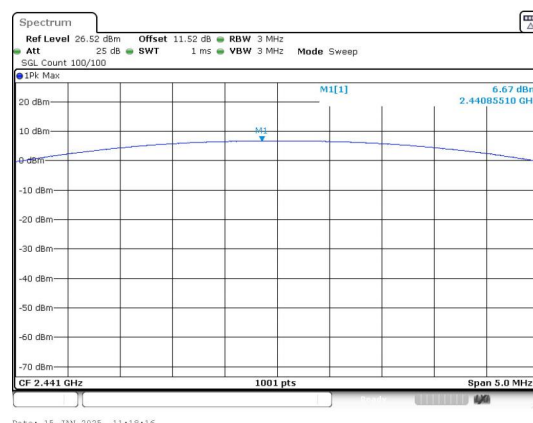
### Test Result

| Modulation    | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (dBm) | Result |
|---------------|-------------|---------|-------------------------|------------------------|-------------|--------|
| GFSK          | DH5         | 0       | 6.60                    | 4.57                   | ≤30         | PASS   |
|               |             | 39      | 6.67                    | 4.65                   |             | PASS   |
|               |             | 78      | 5.38                    | 3.45                   |             | PASS   |
| $\pi/4$ DQPSK | 2-DH5       | 0       | 7.42                    | 5.52                   | ≤20.97      | PASS   |
|               |             | 39      | 7.28                    | 5.35                   |             | PASS   |
|               |             | 78      | 6.03                    | 4.01                   |             | PASS   |
| 8DPSK         | 3-DH5       | 0       | 7.59                    | 5.74                   |             | PASS   |
|               |             | 39      | 7.52                    | 5.65                   |             | PASS   |
|               |             | 78      | 6.34                    | 4.31                   |             | PASS   |

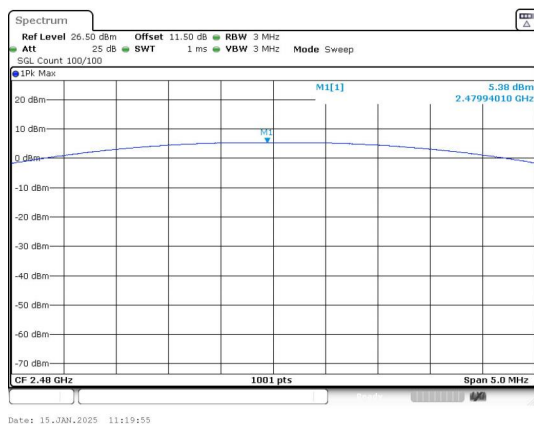
### Test Graphs



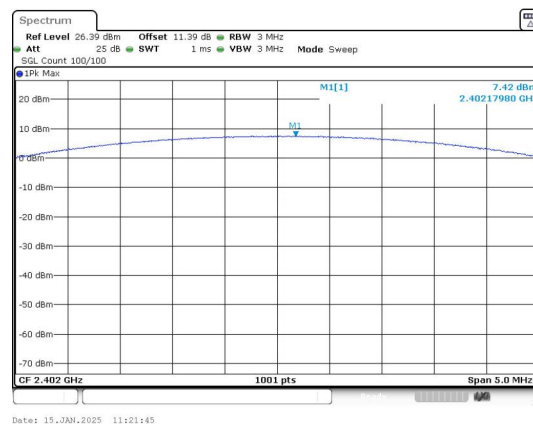
Peak Output Power  
GFSK\_Channel 0



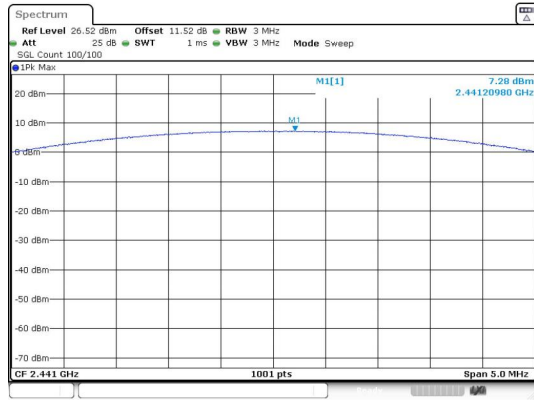
Peak Output Power  
GFSK\_Channel 39



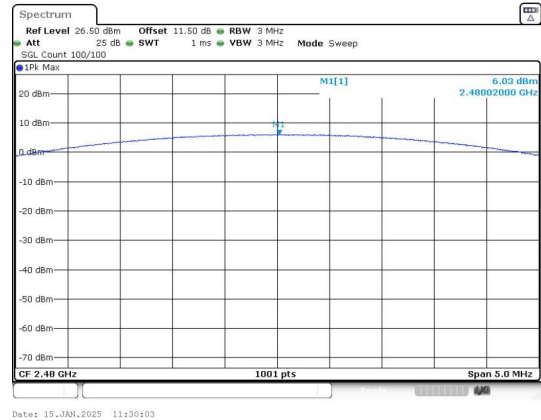
Peak Output Power  
GFSK\_Channel 78



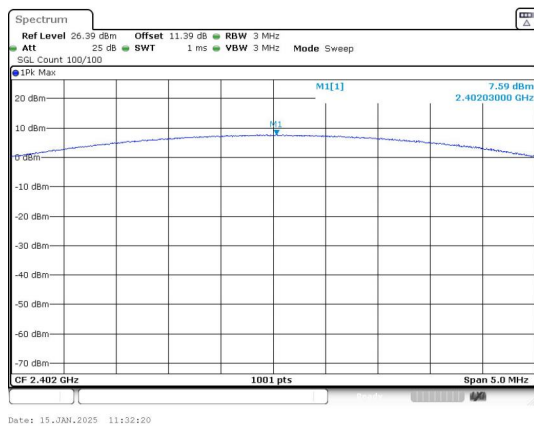
Peak Output Power  
 $\pi/4$ DQPSK\_Channel 0



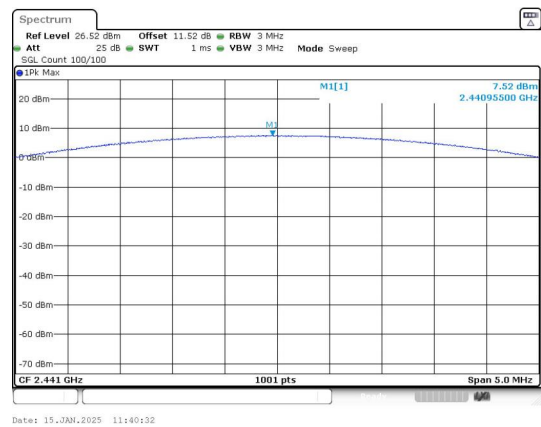
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 39**



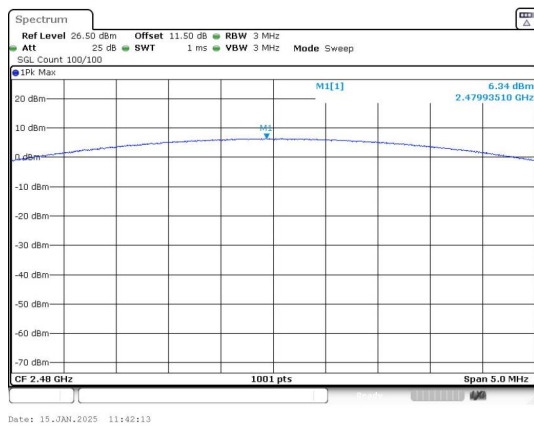
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 78**



**Peak Output Power**  
**8DPSK\_Channel 0**



**Peak Output Power**  
**8DPSK\_Channel 39**



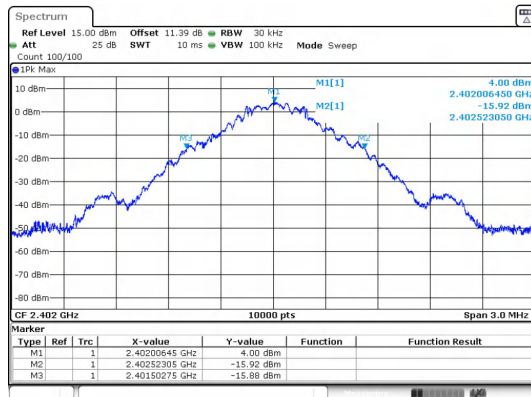
**Peak Output Power**  
**8DPSK\_Channel 78**

## 5) 20dB Bandwidth

### Test Result

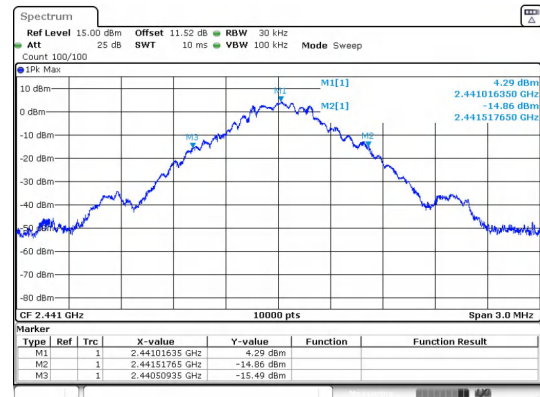
| Modulation    | Channel | Center Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---------------|---------|------------------------|-----------------------|
| GFSK          | 0       | 2402 MHz               | 1.020                 |
|               | 39      | 2441 MHz               | 1.010                 |
|               | 78      | 2480 MHz               | 1.000                 |
| $\pi/4$ DQPSK | 0       | 2402 MHz               | 1.310                 |
|               | 39      | 2441 MHz               | 1.320                 |
|               | 78      | 2480 MHz               | 1.310                 |
| 8DPSK         | 0       | 2402 MHz               | 1.290                 |
|               | 39      | 2441 MHz               | 1.300                 |
|               | 78      | 2480 MHz               | 1.290                 |

### Test Graphs



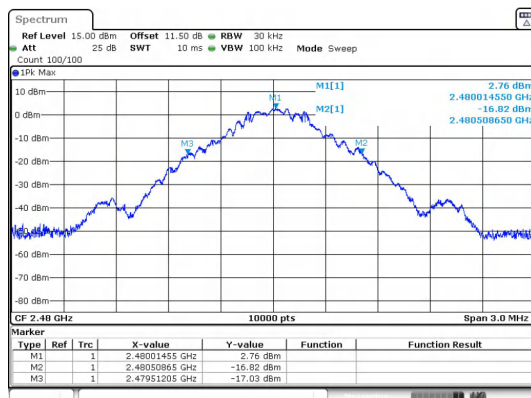
Date: 15.JAN.2025 10:15:134

GFSK\_DH5\_Channel 0



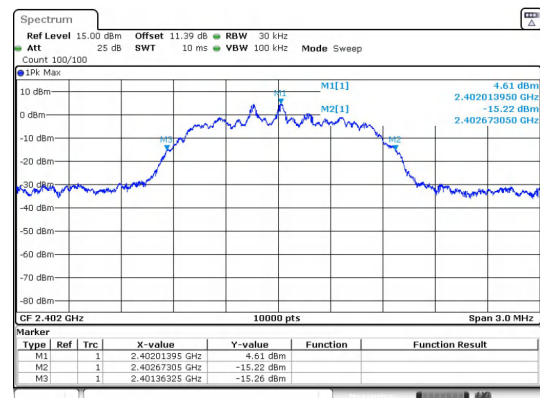
Date: 15.JAN.2025 11:18:03

GFSK\_DH5\_Channel 39



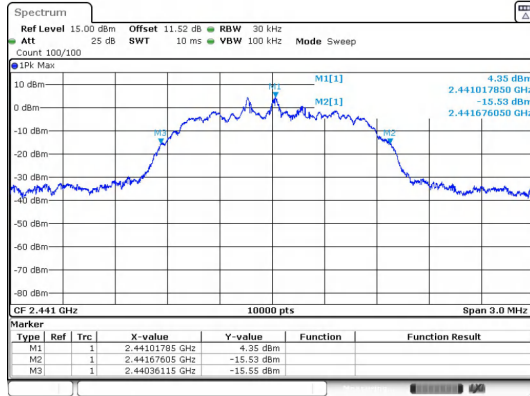
Date: 15.JAN.2025 11:19:43

GFSK\_DH5\_Channel 78

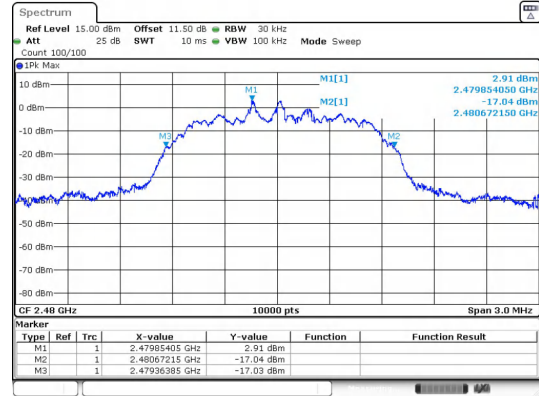


Date: 15.JAN.2025 11:21:33

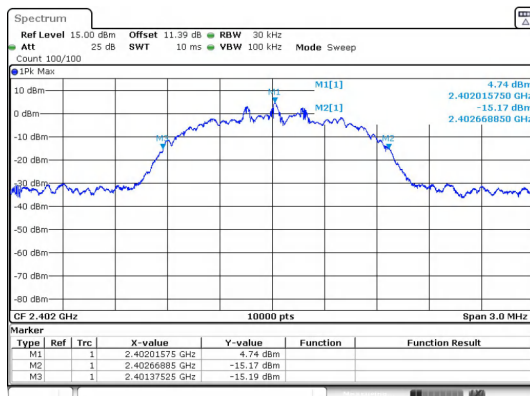
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



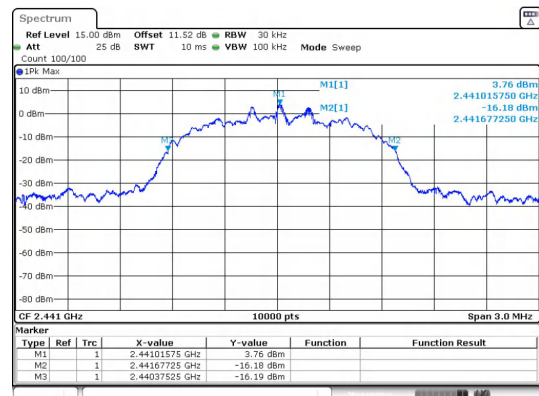
$\pi/4$ DQPSK\_2-DH5\_Channel 39



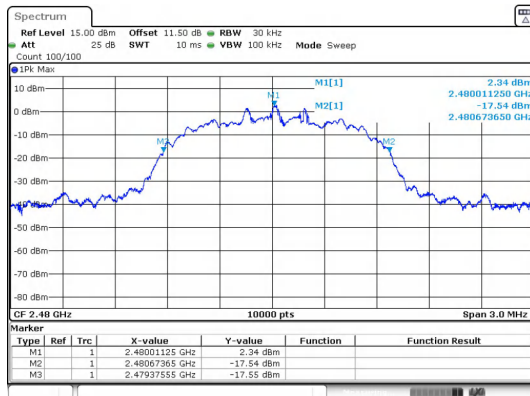
$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



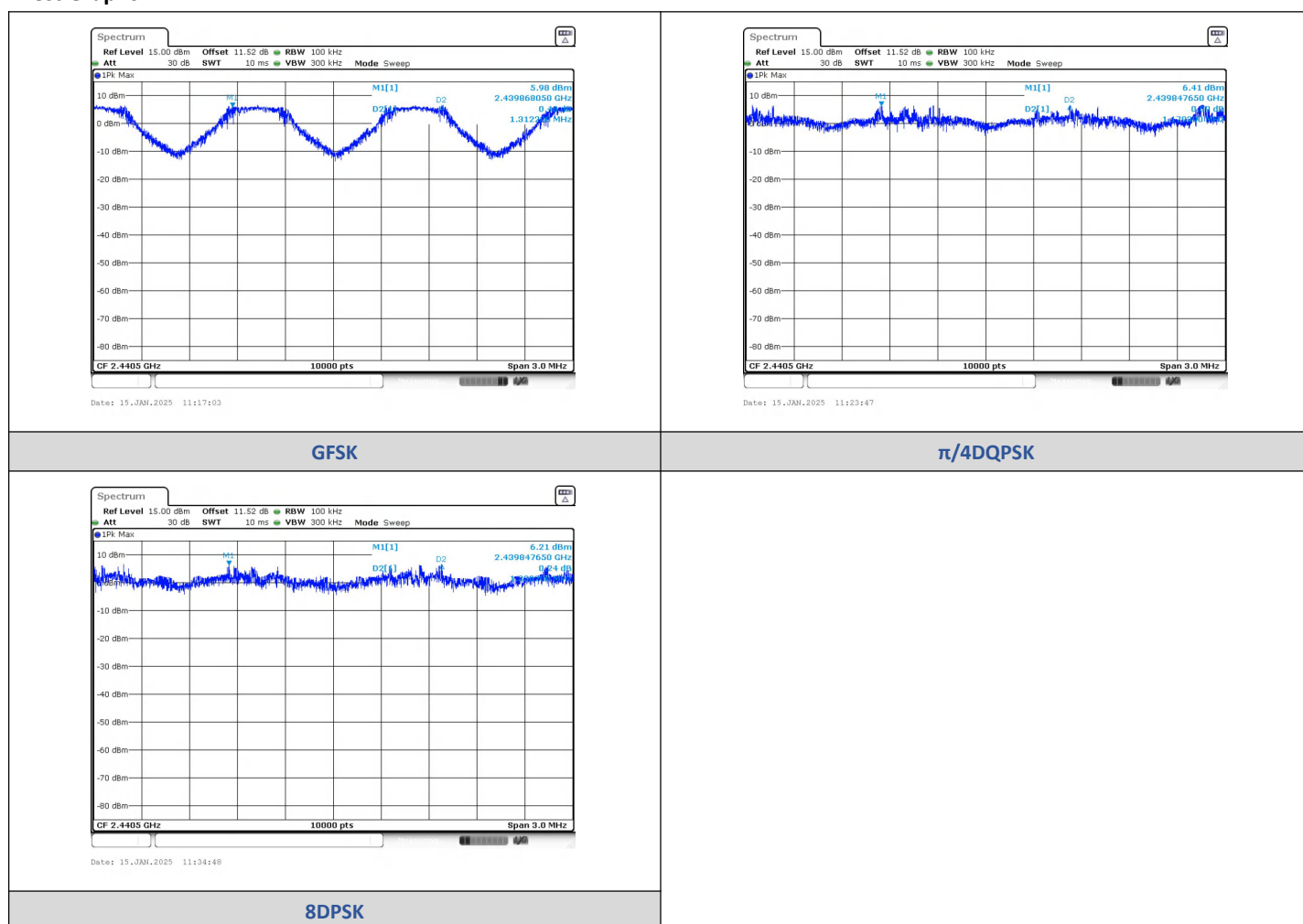
8DPSK\_3-DH5\_Channel 78

## 6) Carrier Frequencies Separation

### Test Result

| Modulation    | Packet | Left Center frequency (MHz) | Right Center frequency (MHz) | Hopping Frequency Separation (MHz) | Limit (MHz) | Result |
|---------------|--------|-----------------------------|------------------------------|------------------------------------|-------------|--------|
| GFSK          | DH5    | 2439.8681                   | 2441.1802                    | 1.3122                             | 1.02        | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2439.8477                   | 2441.0269                    | 1.1793                             | 0.873       | PASS   |
| 8DPSK         | 3-DH5  | 2439.8477                   | 2441.1779                    | 1.3302                             | 0.86        | PASS   |

### Test Graphs



## 7) Conducted Out Of Band Emission

### Test Result

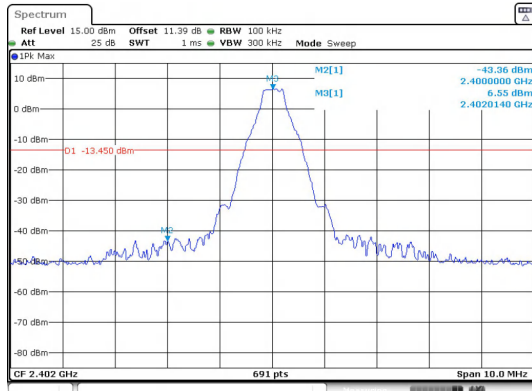
#### Non-Hopping

| Modulation    | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---------------|--------|---------|------------------------------|--------------------------|-------------|-----------------|--------|
| GFSK          | DH5    | 0       | 2400.00                      | -43.360                  | -13.45      | -29.910         | PASS   |
|               |        |         | 4803.85                      | -40.451                  | -13.45      | -27.001         | PASS   |
|               |        | 39      | 9763.72                      | -40.206                  | -13.52      | -26.686         | PASS   |
|               |        | 78      | 2483.50                      | -50.060                  | -14.72      | -35.340         | PASS   |
|               |        |         | 9920.20                      | -37.455                  | -14.72      | -22.735         | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 0       | 2400.00                      | -43.570                  | -13.22      | -30.350         | PASS   |
|               |        |         | 9608.08                      | -41.431                  | -13.22      | -28.211         | PASS   |
|               |        | 39      | 9763.72                      | -39.910                  | -13.46      | -26.450         | PASS   |
|               |        | 78      | 2483.50                      | -50.380                  | -14.74      | -35.640         | PASS   |
|               |        |         | 9920.20                      | -37.279                  | -14.74      | -22.539         | PASS   |
| 8DPSK         | 3-DH5  | 0       | 2400.00                      | -44.330                  | -13.39      | -30.940         | PASS   |
|               |        |         | 9608.08                      | -40.969                  | -13.39      | -27.579         | PASS   |
|               |        | 39      | 9763.72                      | -39.864                  | -13.88      | -25.984         | PASS   |
|               |        | 78      | 2483.50                      | -49.960                  | -14.77      | -35.190         | PASS   |
|               |        |         | 9920.20                      | -37.467                  | -14.77      | -22.697         | PASS   |

#### Hopping

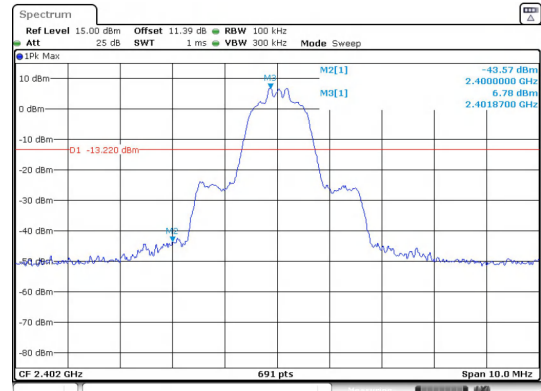
| Modulation | Packet | Channel | OOB Emission<br>Frequency<br>(MHz) | OOB Emission<br>Level<br>(dBm) | Limit<br>(dBm) | Over Limit<br>(dB) | Result |
|------------|--------|---------|------------------------------------|--------------------------------|----------------|--------------------|--------|
| GFSK       | DH5    | Hopping | 2400.00                            | -45.530                        | -13.37         | -32.160            | PASS   |
|            |        |         | 2483.50                            | -50.240                        | -15.0          | -35.240            | PASS   |
| π/4DQPSK   | 2-DH5  |         | 2395.40                            | -46.994                        | -14.85         | -32.144            | PASS   |
|            |        |         | 2400.00                            | -48.310                        | -14.85         | -33.460            | PASS   |
|            |        |         | 2483.50                            | -50.620                        | -14.71         | -35.910            | PASS   |
| 8DPSK      | 3-DH5  |         | 2400.00                            | -43.850                        | -13.92         | -29.930            | PASS   |
|            |        |         | 2483.50                            | -50.010                        | -15.08         | -34.930            | PASS   |

### Test Graphs



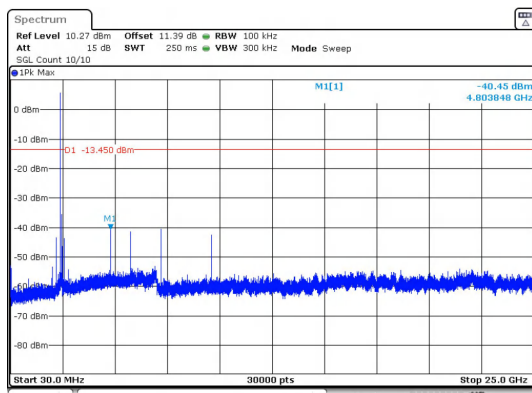
Date: 15.JAN.2025 10:52:08

Out Of Band Emission  
GFSK\_DH5\_Channel 0



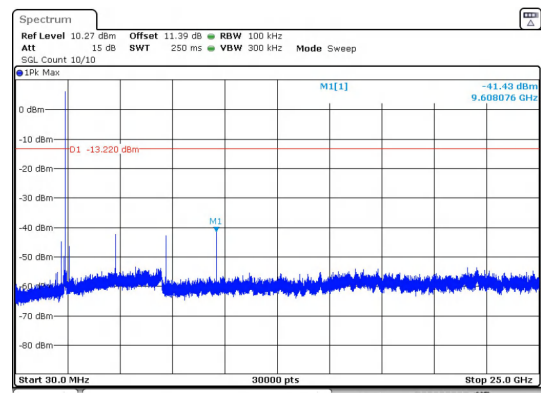
Date: 15.JAN.2025 11:22:06

Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



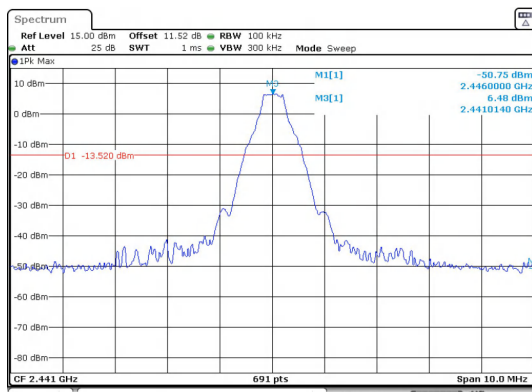
Date: 15.JAN.2025 10:52:30

30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 0



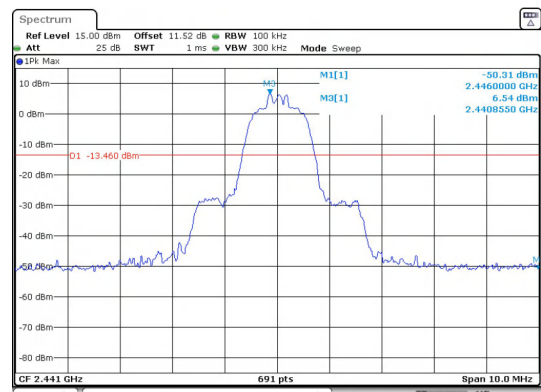
Date: 15.JAN.2025 11:22:28

30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



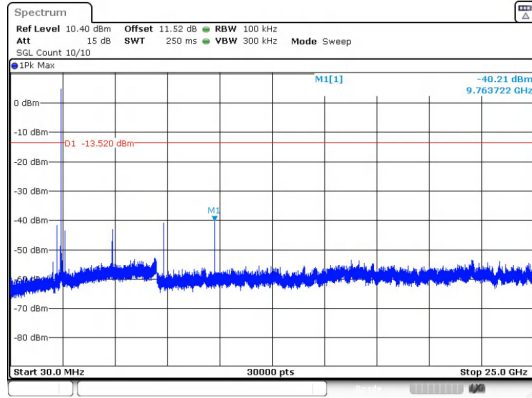
Date: 15.JAN.2025 11:18:32

Out Of Band Emission  
GFSK\_DH5\_Channel 39

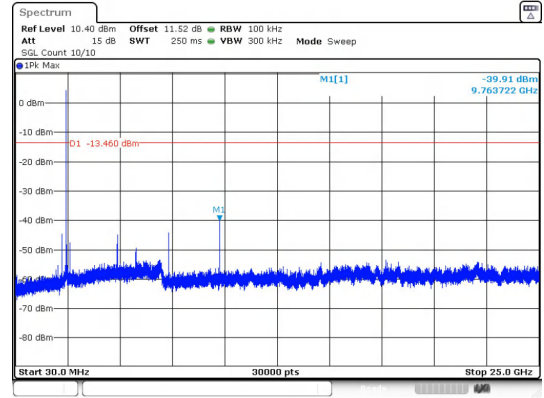


Date: 15.JAN.2025 11:27:53

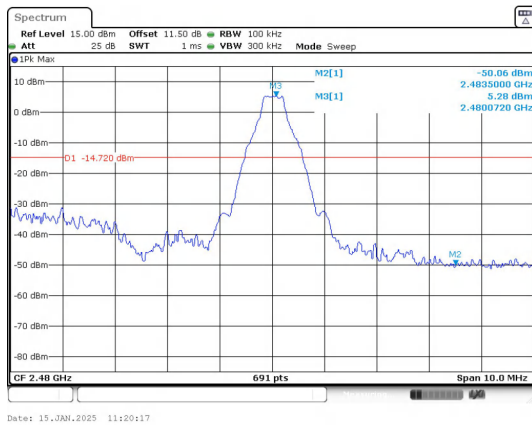
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



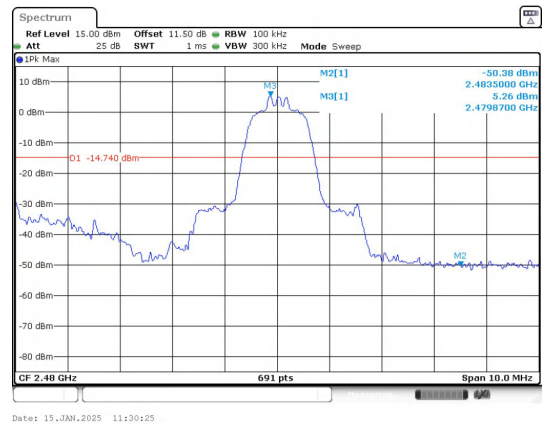
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 39



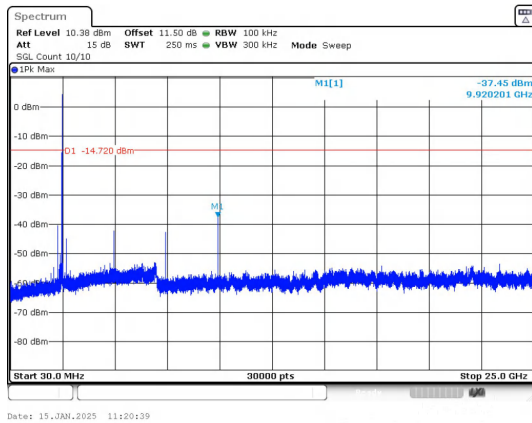
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



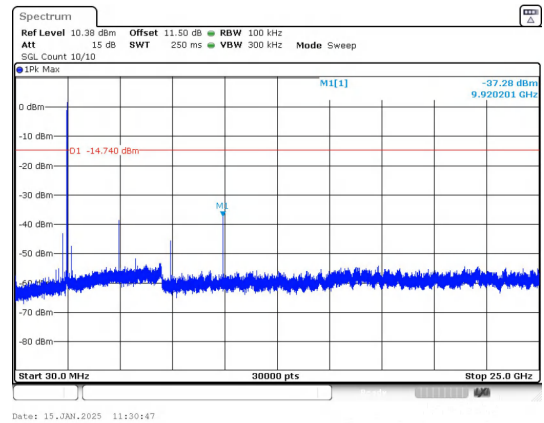
Out Of Band Emission  
GFSK\_DH5\_Channel 78



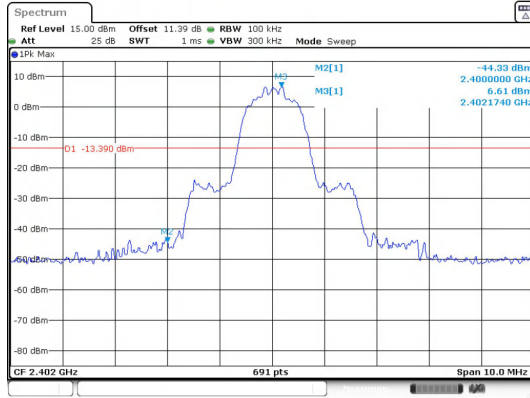
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



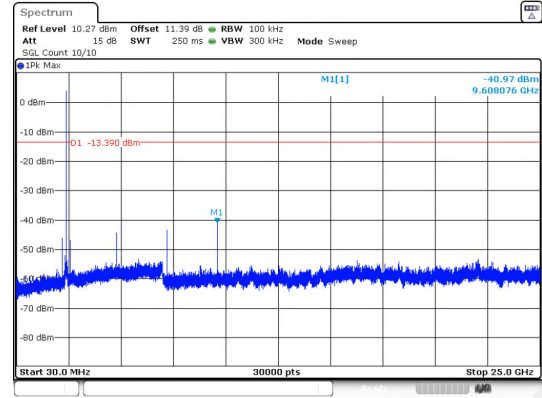
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 78



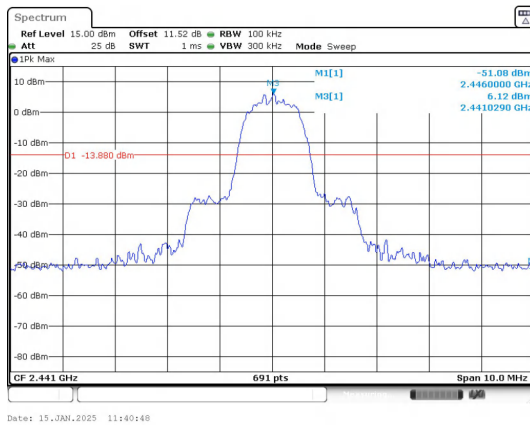
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



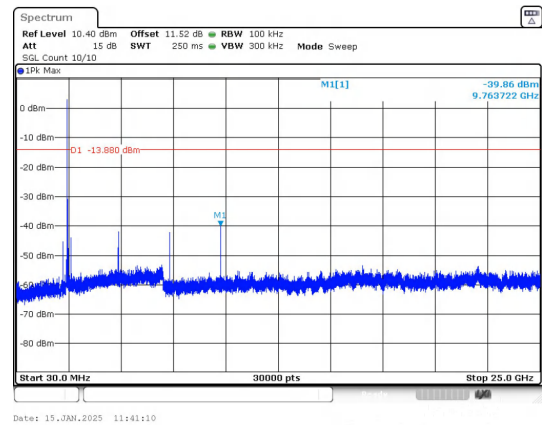
**Out Of Band Emission**  
**8DPSK\_3-DH5\_Channel 0**



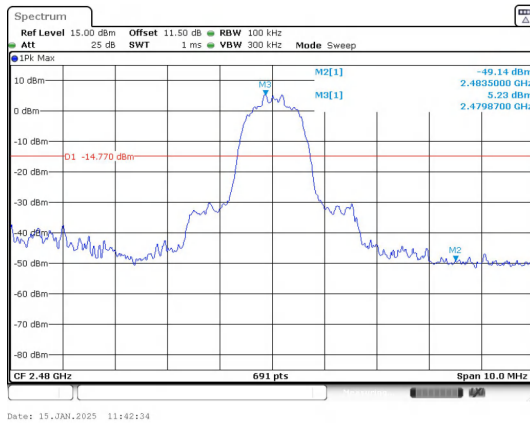
**30.0 MHz - 25000.0 MHz**  
**8DPSK\_3-DH5\_Channel 0**



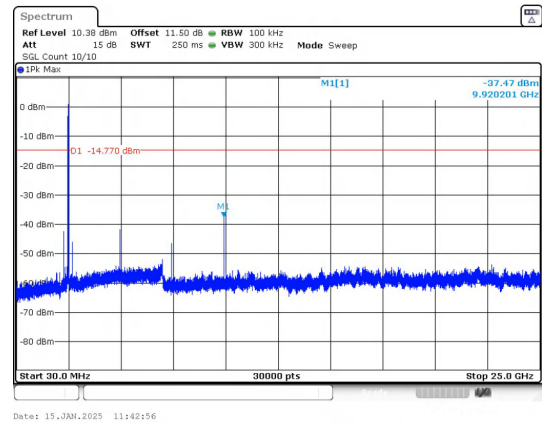
**Out Of Band Emission**  
**8DPSK\_3-DH5\_Channel 39**



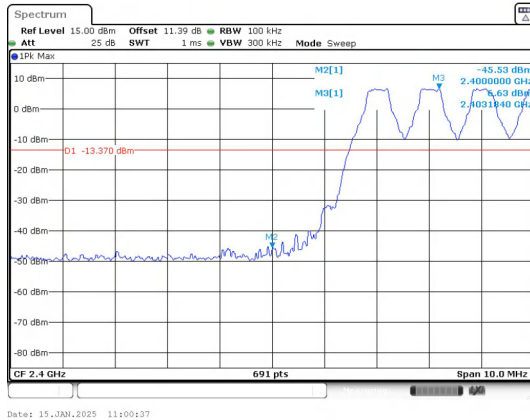
**30.0 MHz - 25000.0 MHz**  
**8DPSK\_3-DH5\_Channel 39**



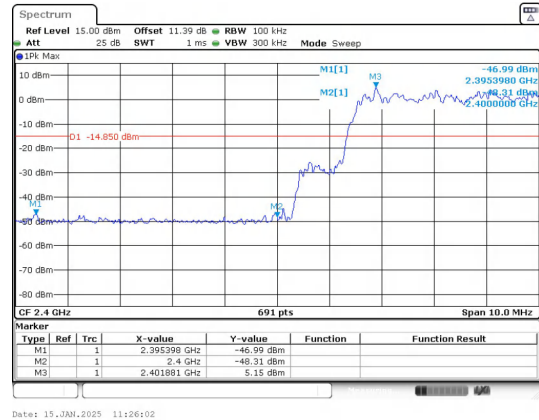
**Out Of Band Emission**  
**8DPSK\_3-DH5\_Channel 78**



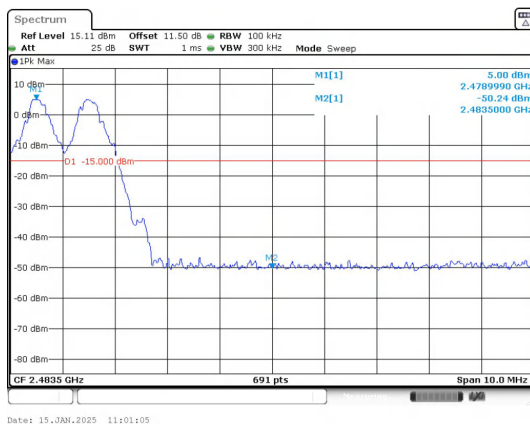
**30.0 MHz - 25000.0 MHz**  
**8DPSK\_3-DH5\_Channel 78**



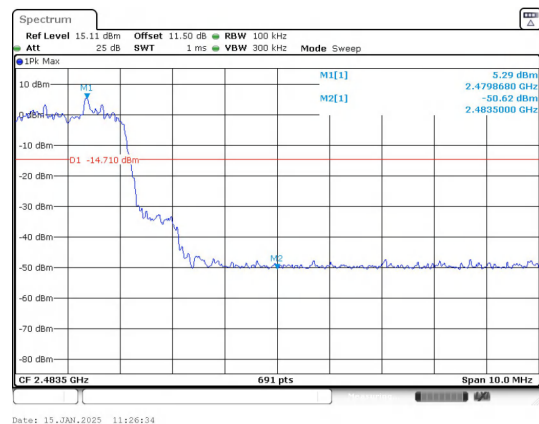
Out Of Band Emission(Left)  
GFSK\_DH5\_Channel Hopping



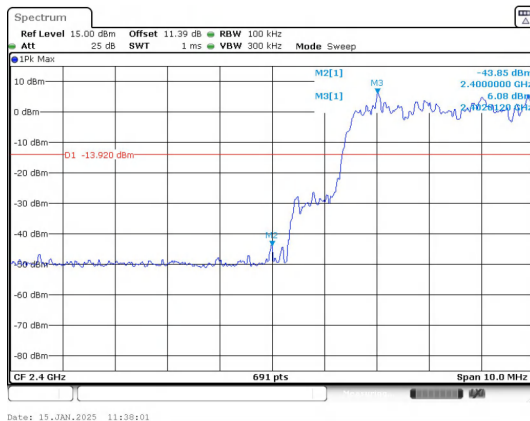
Out Of Band Emission(Left)  
 $\pi/4$ DQPSK\_2-DH5\_Channel Hopping



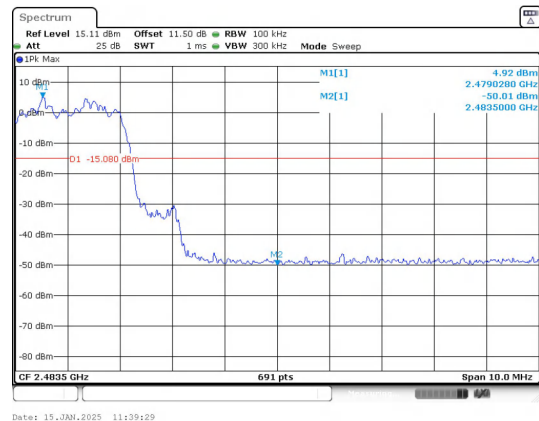
Out Of Band Emission(Right)  
GFSK\_DH5\_Channel Hopping



Out Of Band Emission(Right)  
 $\pi/4$ DQPSK\_2-DH5\_Channel Hopping



Out Of Band Emission(Left)  
8DPSK\_3-DH5\_Channel Hopping



Out Of Band Emission(Right)  
8DPSK\_3-DH5\_Channel Hopping

-----End of the report-----