

# Appendix Report

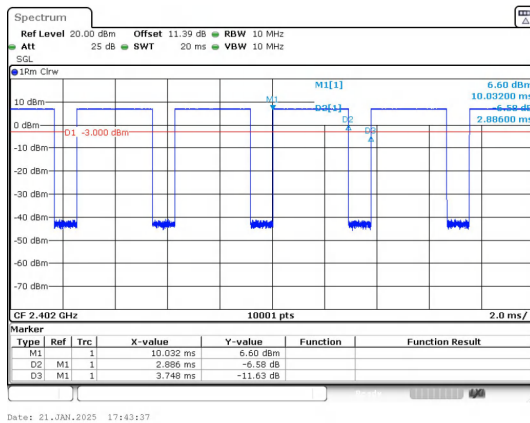
|                |                  |
|----------------|------------------|
| Report No.:    | CISRR25011715304 |
| Test Engineer: | Mark Fu          |
| Supervised by: | Rory Huang       |

# 1) Duty Cycle

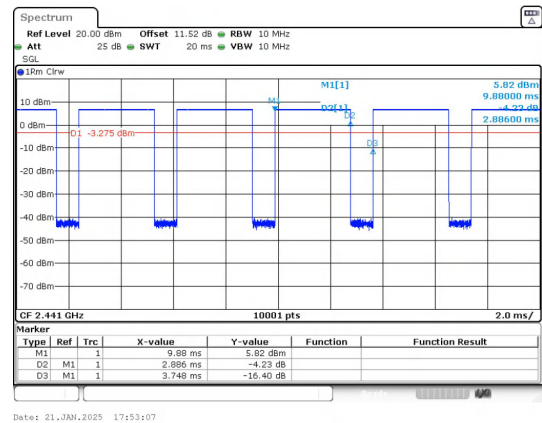
## Test Result

| 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       | 2.890        | 3.748       | 77.11          | 0.7711              | 1.1289                 | 0.3460 |
|               |         | 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        | 3.746       | 77.20          | 0.7720              | 1.1238                 | 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



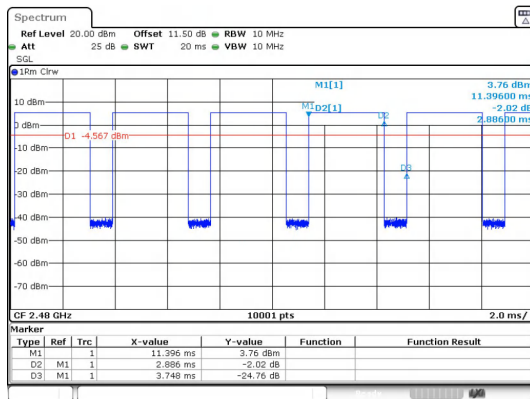
Date: 21.JAN.2025 17:43:17



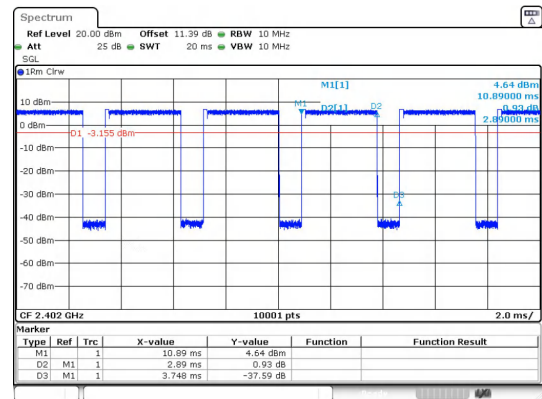
Date: 21.JAN.2025 17:53:07

GFSK(DH5)\_Channel 0

GFSK(DH5)\_Channel 39



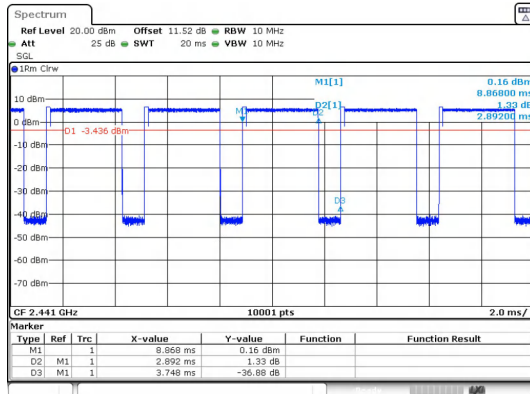
Date: 21.JAN.2025 17:54:59



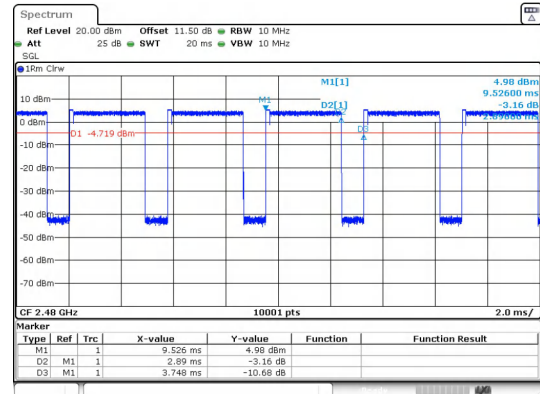
Date: 21.JAN.2025 17:56:54

GFSK(DH5)\_Channel 78

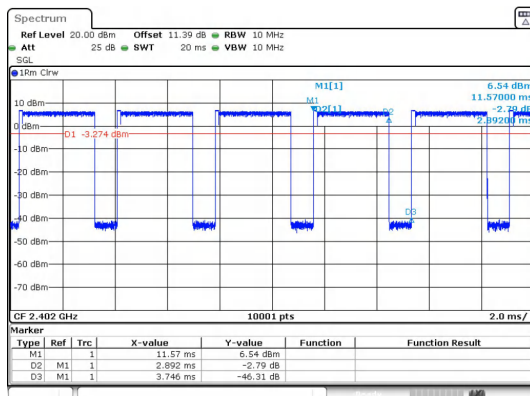
 $\pi/4$ DQPSK(2-DH5)\_Channel 0



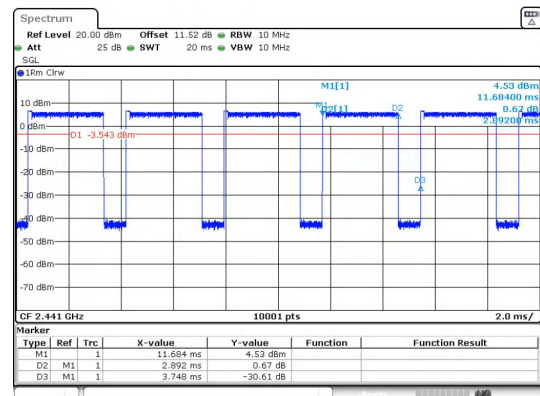
$\pi/4$ DQPSK(2-DH5)\_Channel 39



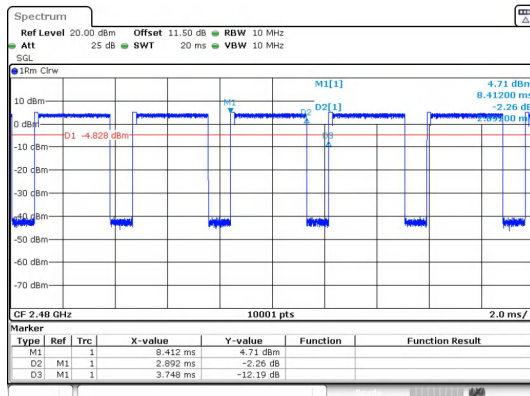
$\pi/4$ DQPSK(2-DH5)\_Channel 78



8DPSK(3-DH5)\_Channel 0



8DPSK(3-DH5)\_Channel 39



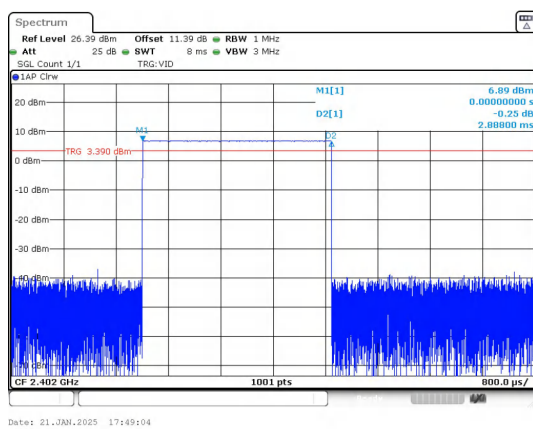
8DPSK(3-DH5)\_Channel 78

## 2) Dwell Time

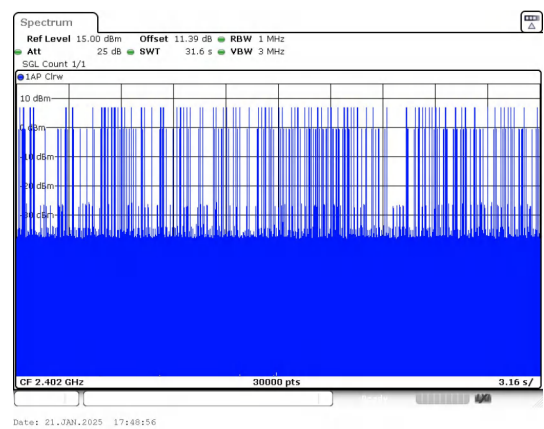
### Test Result

| 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            | 109                              | 314.79          | < 400      | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |                  | 2.896            | 94                               | 272.22          |            | PASS   |
| 8DPSK         | 3-DH5  |                  | 2.896            | 105                              | 304.08          |            | PASS   |

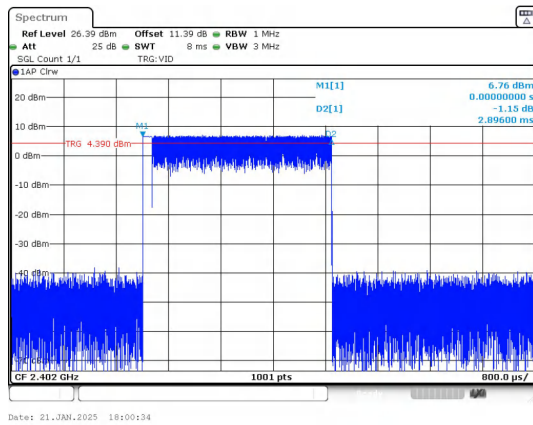
### Test Graphs



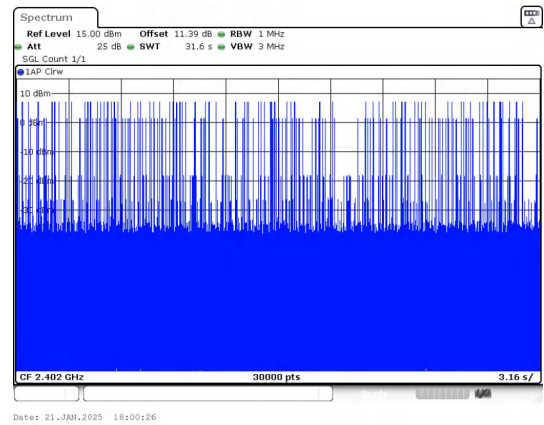
Pulse Width  
GFSK\_DH5



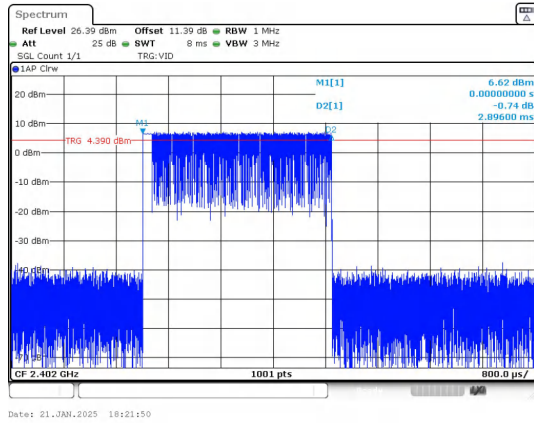
Number of Pulses in 31.6 seconds  
GFSK\_DH5



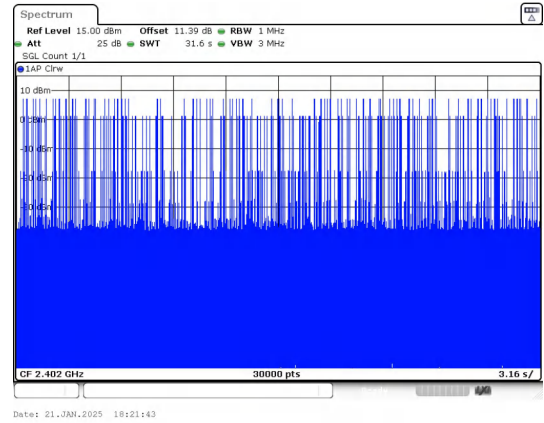
Pulse Width  
 $\pi/4$ DQPSK\_2-DH5



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



Pulse Width  
8DPSK\_3-DH5



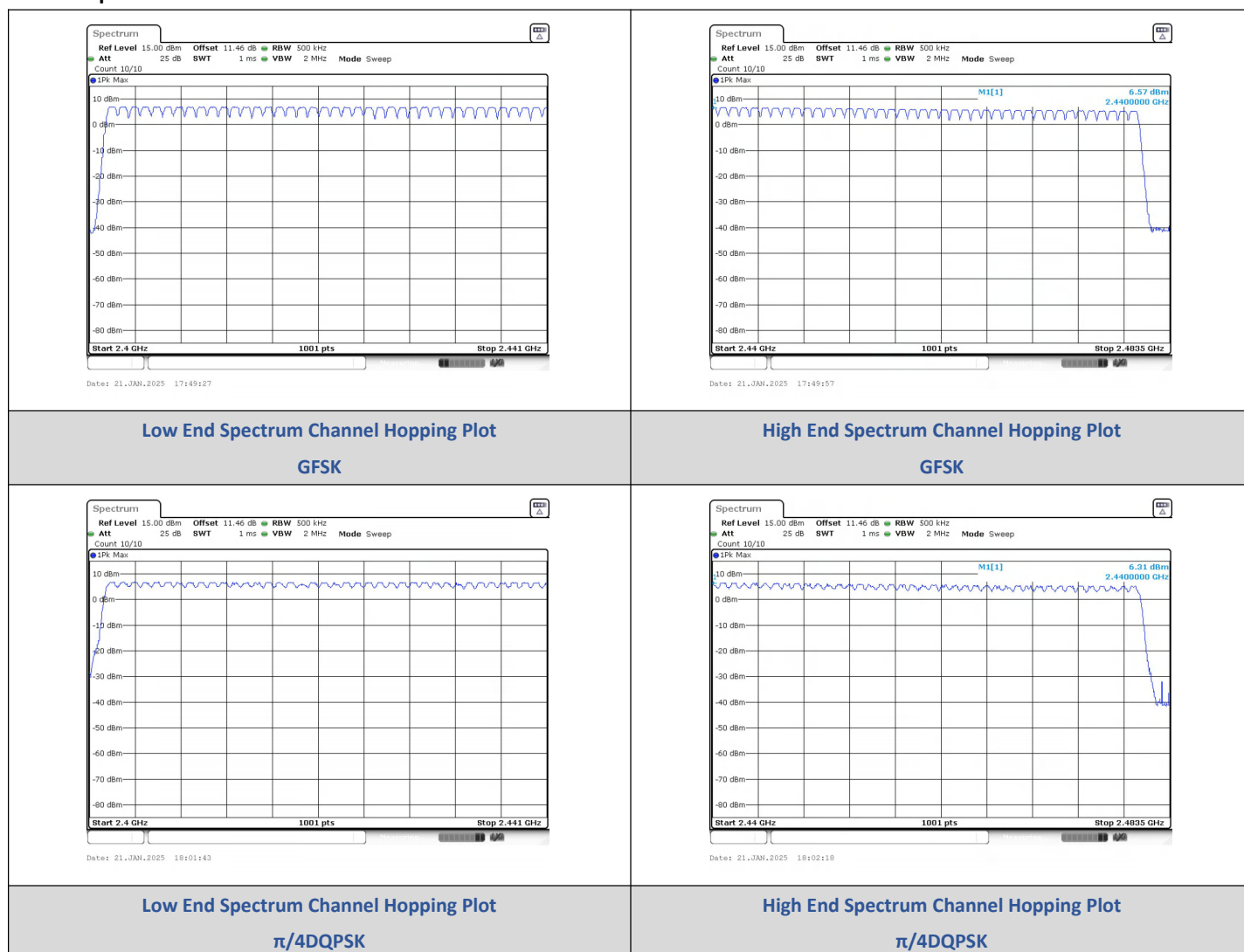
Number of Pulses in 31.6 seconds  
8DPSK\_3-DH5

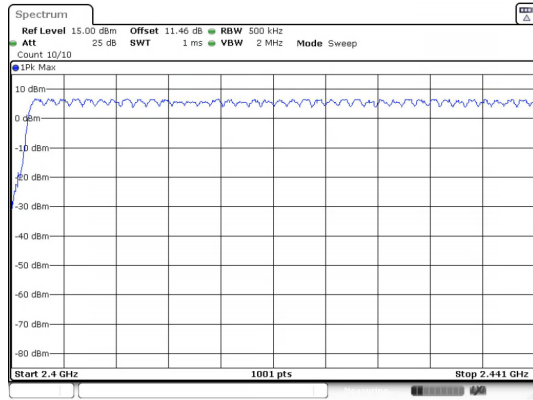
### 3) Number Of Hopping Channel

#### Test Result

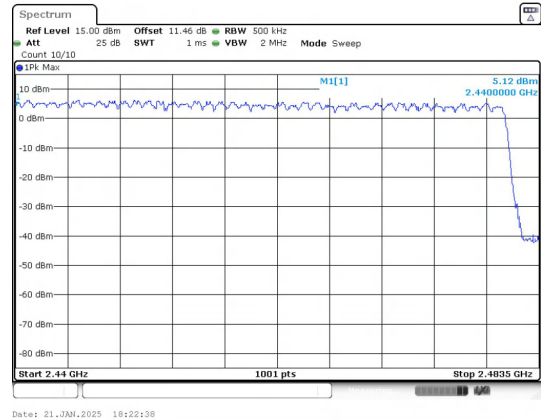
| Modulation    | Packet | Number of Hopping Channel | Limit | Result |
|---------------|--------|---------------------------|-------|--------|
| GFSK          | DH5    | 79                        | 15    | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 79                        | 15    | PASS   |
| 8DPSK     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

#### Test Graphs





**Low End Spectrum Channel Hopping Plot**  
**8DPSK**



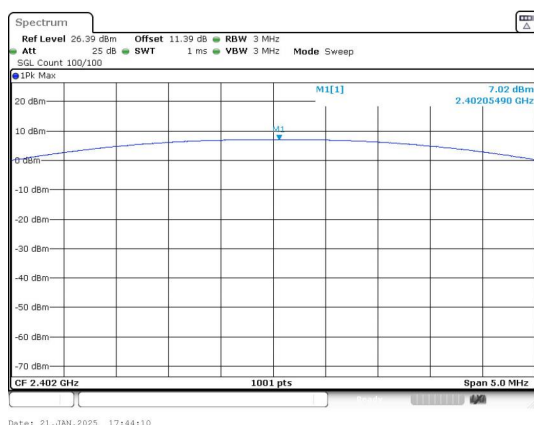
**High End Spectrum Channel Hopping Plot**  
**8DPSK**

## 4) Conducted Output Power

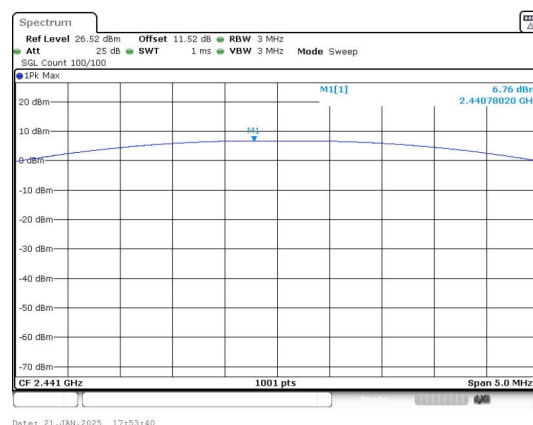
### Test Result

| Modulation    | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (dBm) | Result |
|---------------|-------------|---------|-------------------------|------------------------|-------------|--------|
| GFSK          | DH5         | 0       | 7.02                    | 5.04                   | ≤30         | PASS   |
|               |             | 39      | 6.76                    | 4.74                   |             | PASS   |
|               |             | 78      | 5.45                    | 3.51                   |             | PASS   |
| $\pi/4$ DQPSK | 2-DH5       | 0       | 7.44                    | 5.55                   | ≤20.97      | PASS   |
|               |             | 39      | 7.23                    | 5.28                   |             | PASS   |
|               |             | 78      | 6.02                    | 4.00                   |             | PASS   |
| 8DPSK         | 3-DH5       | 0       | 7.52                    | 5.65                   |             | PASS   |
|               |             | 39      | 7.34                    | 5.42                   |             | PASS   |
|               |             | 78      | 6.15                    | 4.12                   |             | PASS   |

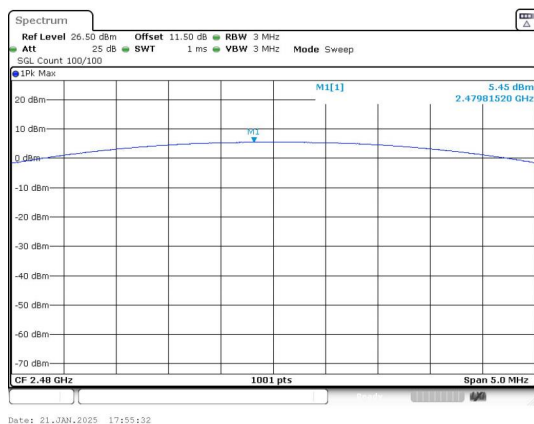
### Test Graphs



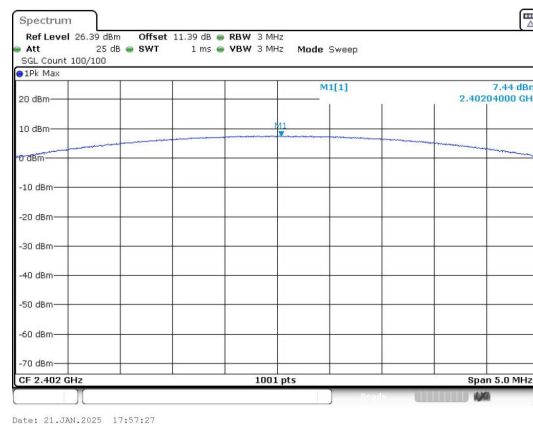
Peak Output Power  
GFSK\_Channel 0



Peak Output Power  
GFSK\_Channel 39

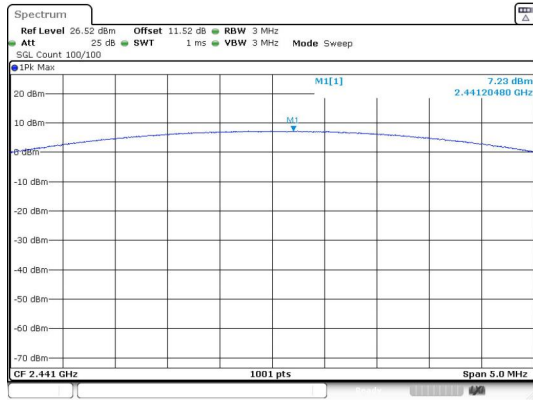


Peak Output Power  
GFSK\_Channel 78

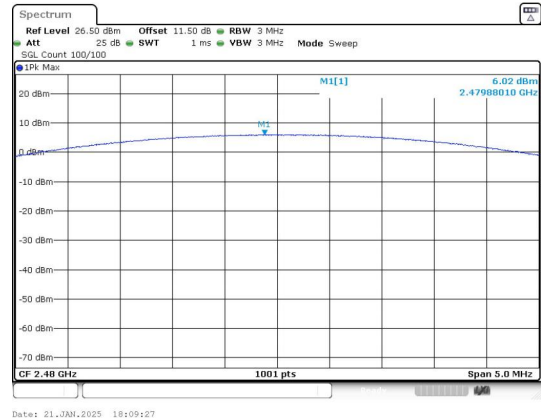


Peak Output Power  
 $\pi/4$ DQPSK\_Channel 0

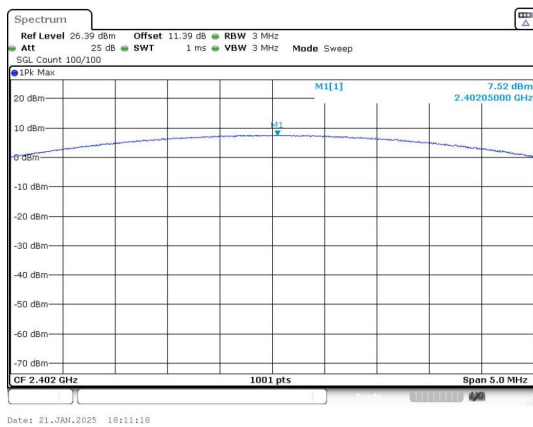




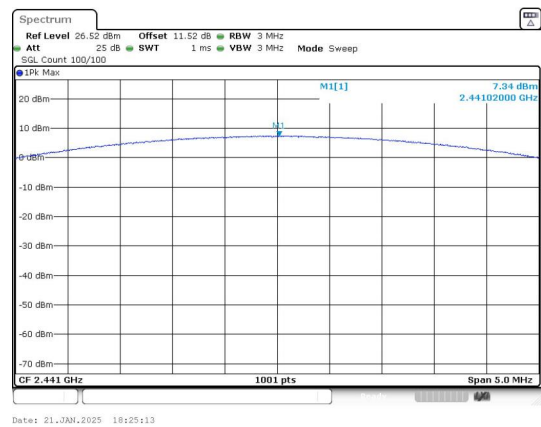
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 39**



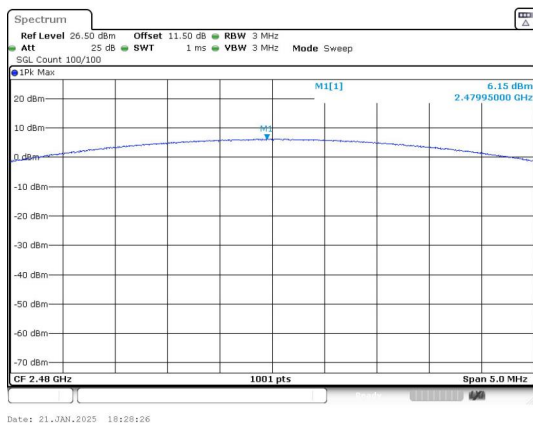
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 78**



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



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



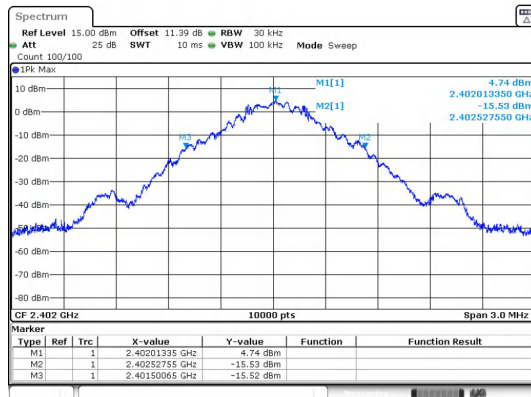
**Peak Output Power**  
**8DPSK\_Channel 78**

## 5) 20dB Bandwidth

### Test Result

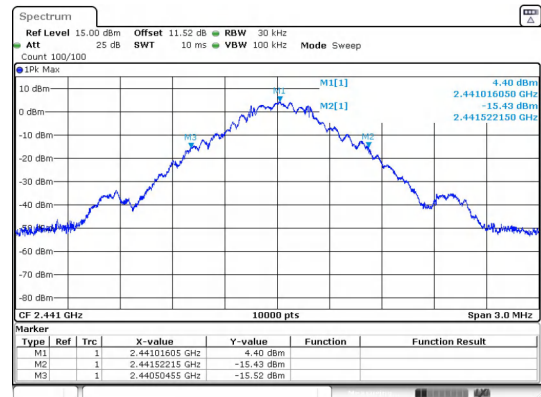
| Modulation    | Channel | Center Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---------------|---------|------------------------|-----------------------|
| GFSK          | 0       | 2402 MHz               | 1.030                 |
|               | 39      | 2441 MHz               | 1.020                 |
|               | 78      | 2480 MHz               | 1.020                 |
| $\pi$ /4DQPSK | 0       | 2402 MHz               | 1.310                 |
|               | 39      | 2441 MHz               | 1.310                 |
|               | 78      | 2480 MHz               | 1.310                 |
| 8DPSK         | 0       | 2402 MHz               | 1.300                 |
|               | 39      | 2441 MHz               | 1.300                 |
|               | 78      | 2480 MHz               | 1.300                 |

### Test Graphs



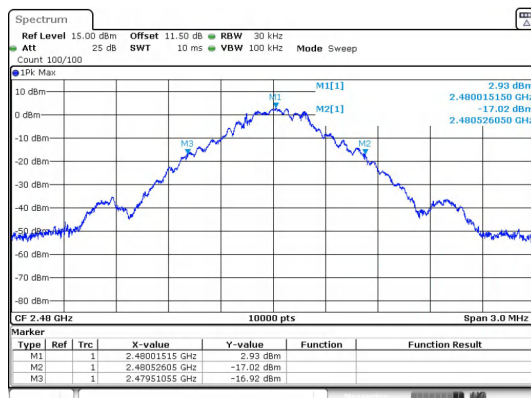
Date: 21.JAN.2025 17:43:156

GFSK\_DH5\_Channel 0



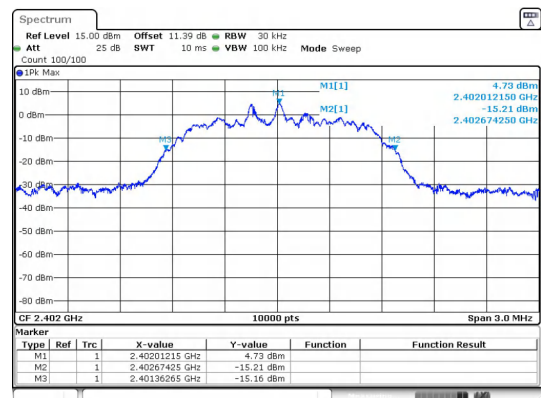
Date: 21.JAN.2025 17:53:126

GFSK\_DH5\_Channel 39



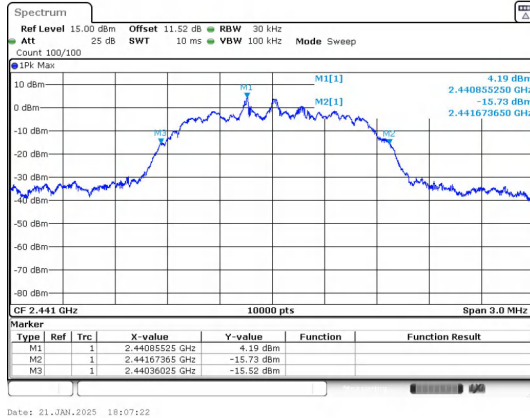
Date: 21.JAN.2025 17:55:118

GFSK\_DH5\_Channel 78

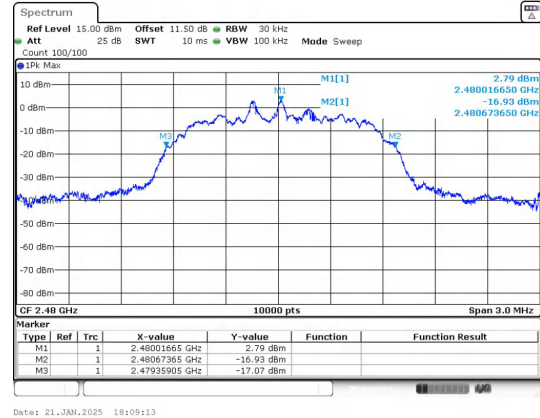


Date: 21.JAN.2025 17:57:113

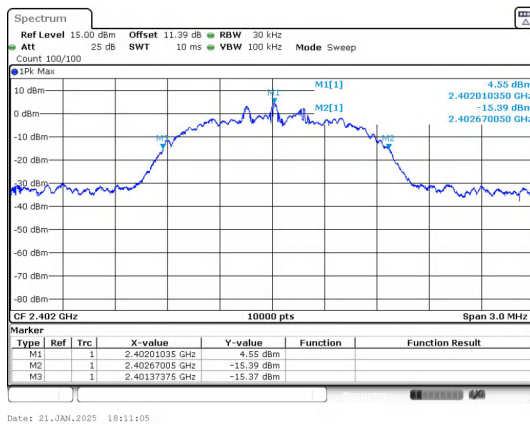
 $\pi$ /4DQPSK\_2-DH5\_Channel 0



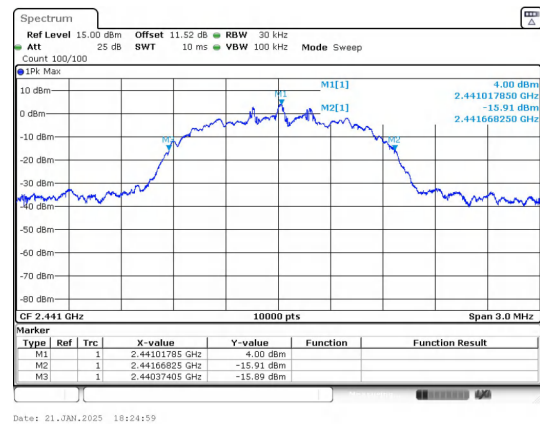
$\pi/4$ DQPSK\_2-DH5\_Channel 39



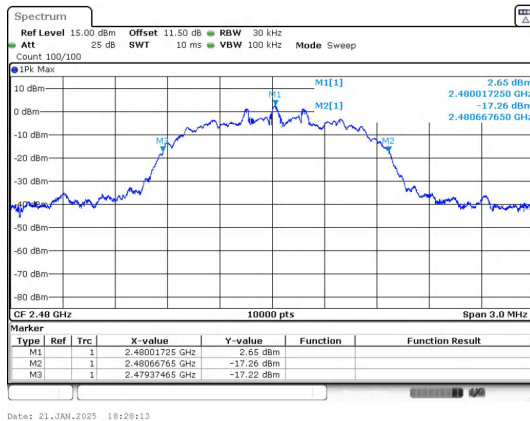
$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



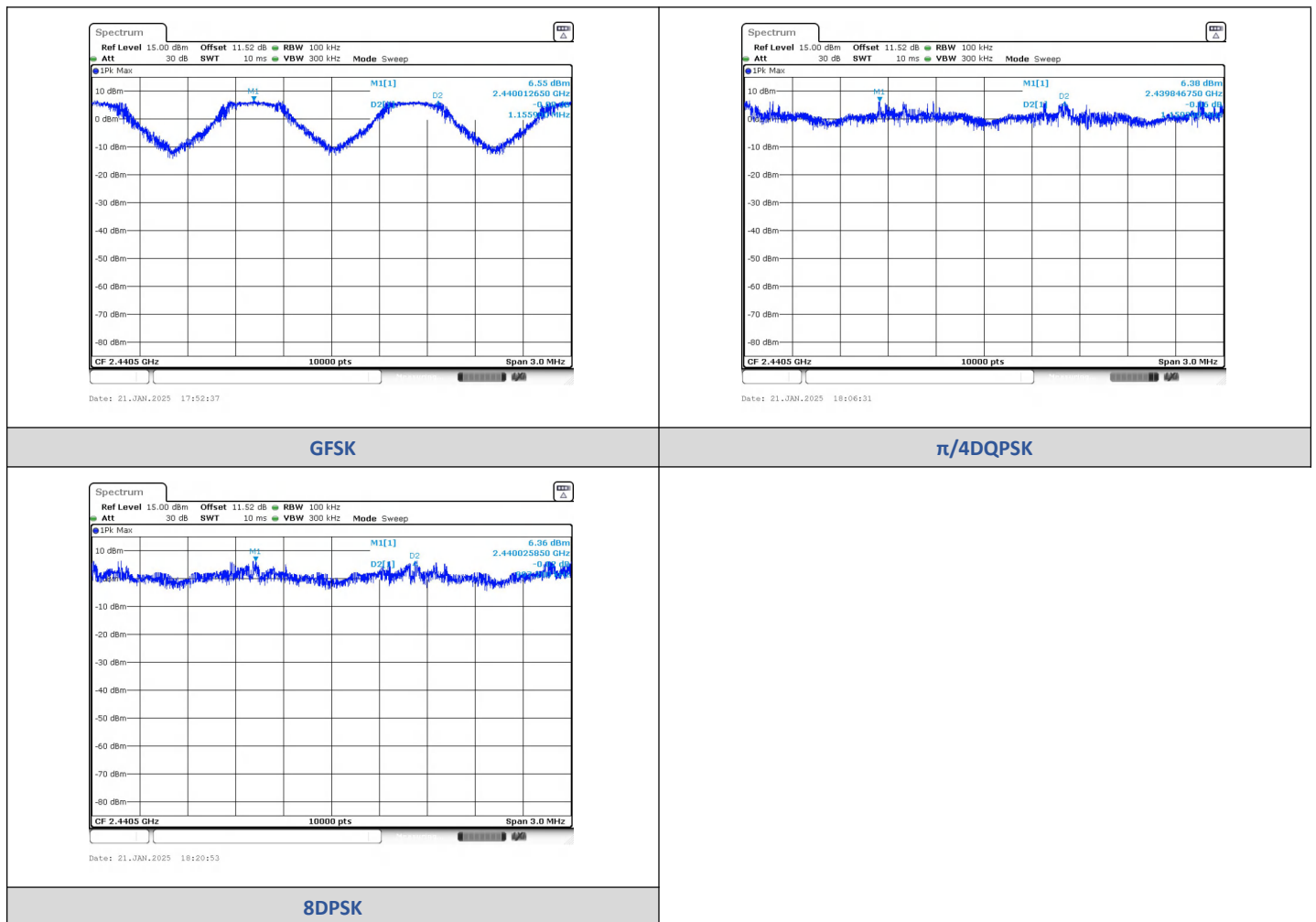
8DPSK\_3-DH5\_Channel 78

## 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    | 2440.0127                   | 2441.1685                    | 1.1559                             | 1.03        | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2439.8468                   | 2441.006                     | 1.1592                             | 0.873       | PASS   |
| 8DPSK         | 3-DH5  | 2440.0258                   | 2441.023                     | 0.9972                             | 0.867       | PASS   |

### Test Graphs



## 7) Conducted Out Of Band Emission

### Test Result

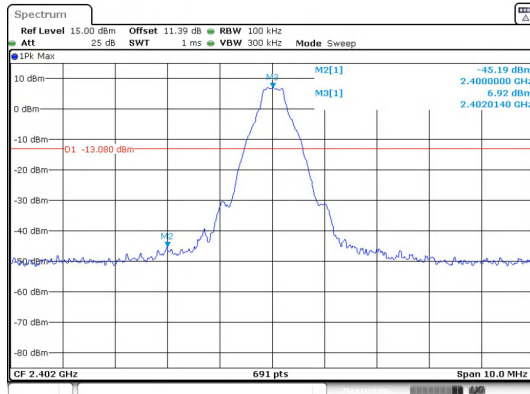
#### Non-Hopping

| Modulation    | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---------------|--------|---------|------------------------------|--------------------------|-------------|-----------------|--------|
| GFSK          | DH5    | 0       | 2400.00                      | -45.190                  | -13.08      | -32.110         | PASS   |
|               |        |         | 7205.96                      | -40.765                  | -13.08      | -27.685         | PASS   |
|               |        | 39      | 4882.09                      | -40.308                  | -13.37      | -26.938         | PASS   |
|               |        | 78      | 2483.50                      | -49.640                  | -14.7       | -34.940         | PASS   |
|               |        |         | 9920.20                      | -38.645                  | -14.7       | -23.945         | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 0       | 2400.00                      | -43.540                  | -13.36      | -30.180         | PASS   |
|               |        |         | 7205.96                      | -42.322                  | -13.36      | -28.962         | PASS   |
|               |        | 39      | 9763.72                      | -41.950                  | -13.54      | -28.410         | PASS   |
|               |        | 78      | 2483.50                      | -49.730                  | -14.87      | -34.860         | PASS   |
|               |        |         | 9920.20                      | -38.698                  | -14.87      | -23.828         | PASS   |
| 8DPSK         | 3-DH5  | 0       | 1747.52                      | -36.547                  | -13.45      | -23.097         | PASS   |
|               |        |         | 2400.00                      | -43.730                  | -13.45      | -30.280         | PASS   |
|               |        | 39      | 2248.58                      | -41.167                  | -13.86      | -27.307         | PASS   |
|               |        | 78      | 2483.50                      | -50.570                  | -14.99      | -35.580         | PASS   |
|               |        |         | 9920.20                      | -38.959                  | -14.99      | -23.969         | PASS   |

#### Hopping

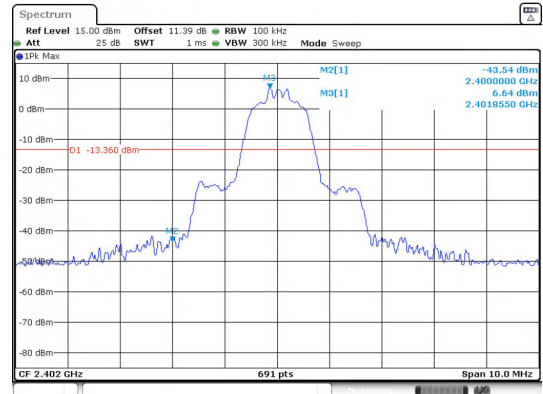
| Modulation | Packet | Channel | OOB Emission<br>Frequency<br>(MHz) | OOB Emission<br>Level<br>(dBm) | Limit<br>(dBm) | Over Limit<br>(dB) | Result |
|------------|--------|---------|------------------------------------|--------------------------------|----------------|--------------------|--------|
| GFSK       | DH5    | Hopping | 2396.48                            | -48.016                        | -13.48         | -34.536            | PASS   |
|            |        |         | 2400.00                            | -48.900                        | -13.48         | -35.420            | PASS   |
|            |        |         | 2483.50                            | -50.430                        | -14.92         | -35.510            | PASS   |
| π/4DQPSK   | 2-DH5  |         | 2400.00                            | -43.650                        | -13.4          | -30.250            | PASS   |
|            |        |         | 2483.50                            | -49.690                        | -16.02         | -33.670            | PASS   |
| 8DPSK      | 3-DH5  |         | 2395.34                            | -47.389                        | -14.03         | -33.359            | PASS   |
|            |        |         | 2400.00                            | -50.500                        | -14.03         | -36.470            | PASS   |
|            |        |         | 2483.50                            | -48.760                        | -16.34         | -32.420            | PASS   |

### Test Graphs



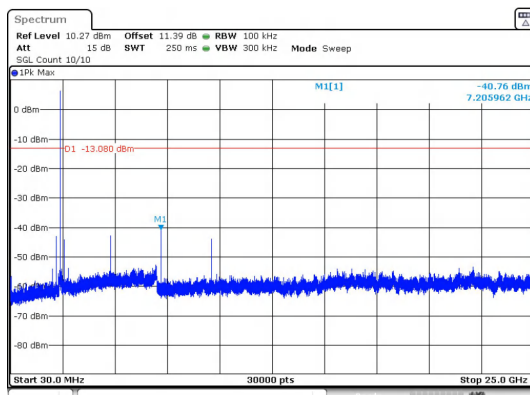
Date: 21.JAN.2025 17:44:33

Out Of Band Emission  
GFSK\_DH5\_Channel 0



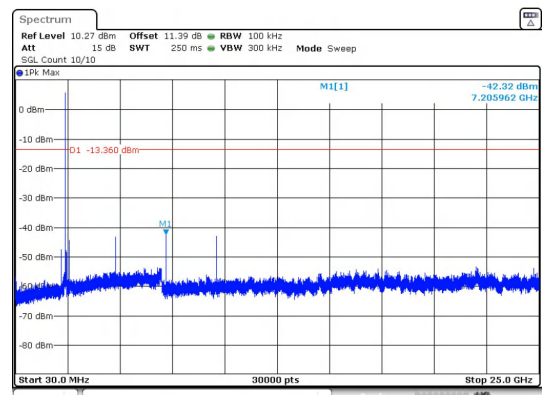
Date: 21.JAN.2025 17:57:50

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



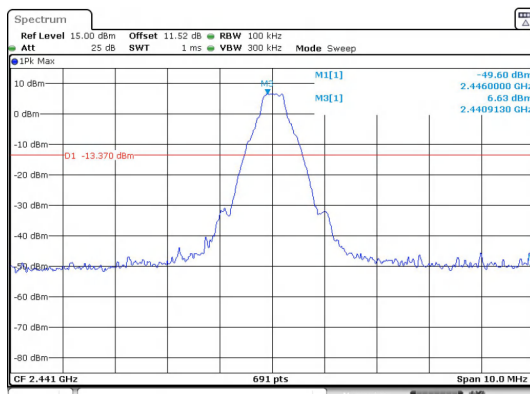
Date: 21.JAN.2025 17:44:55

30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 0



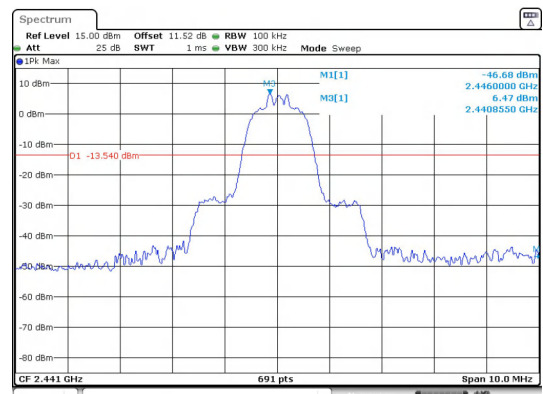
Date: 21.JAN.2025 17:58:12

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



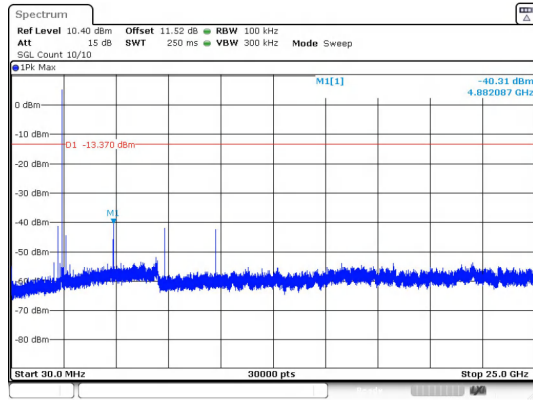
Date: 21.JAN.2025 17:53:57

Out Of Band Emission  
GFSK\_DH5\_Channel 39

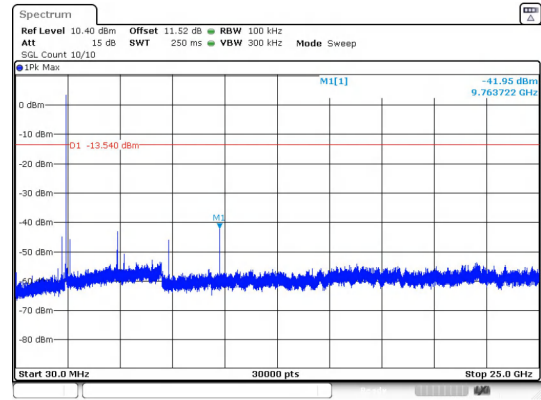


Date: 21.JAN.2025 18:07:58

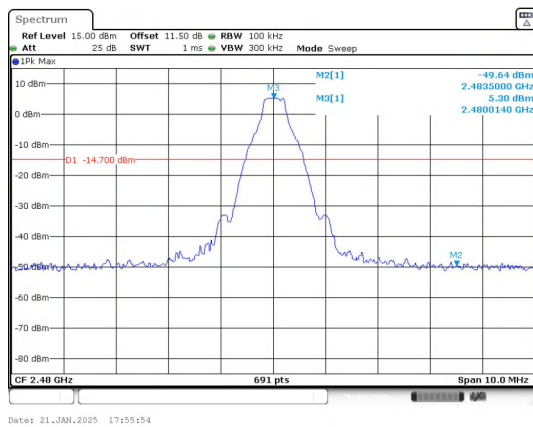
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



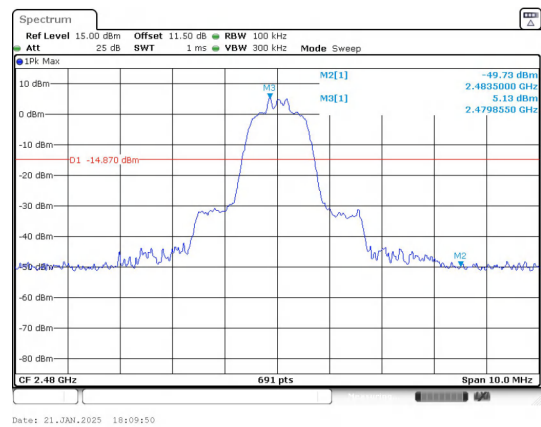
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 39



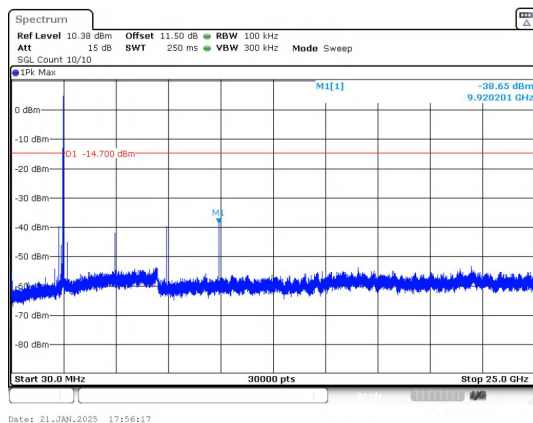
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



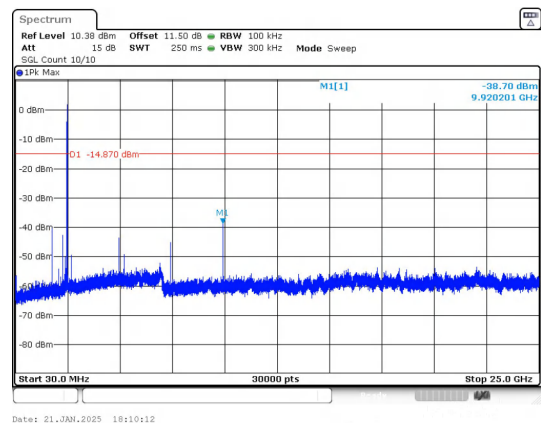
Out Of Band Emission  
GFSK\_DH5\_Channel 78



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

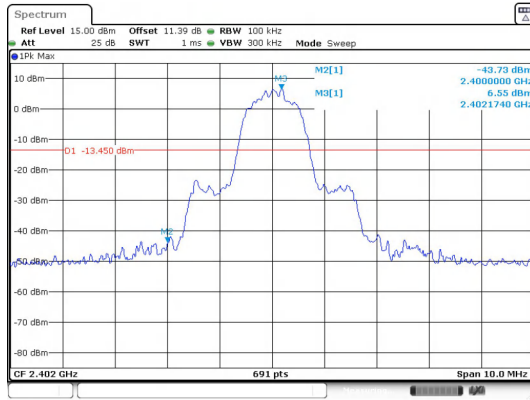


30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 78

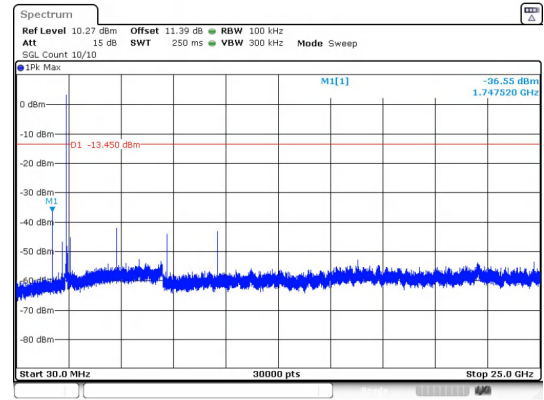


30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78

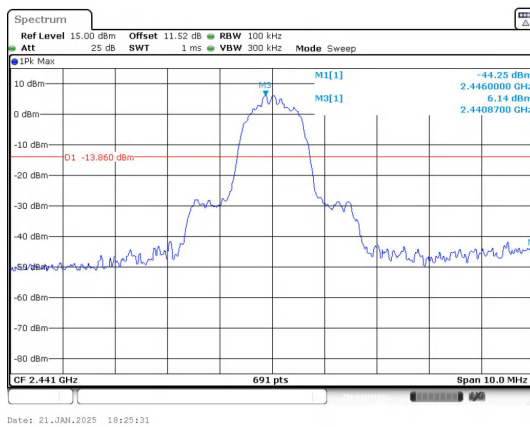




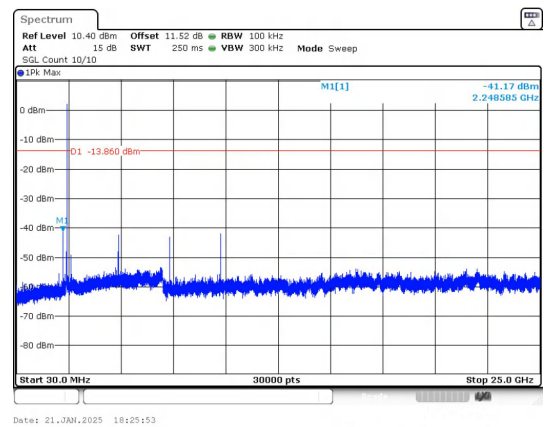
Out Of Band Emission  
8DPSK\_3-DH5\_Channel 0



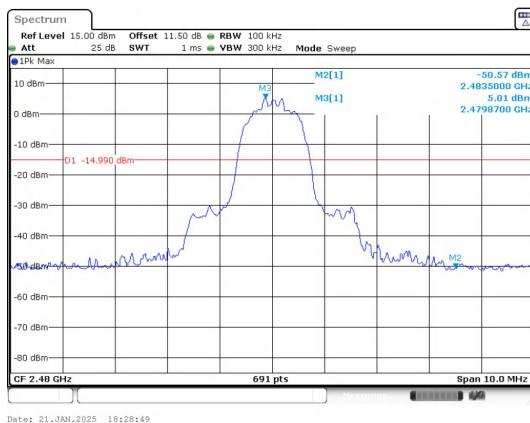
30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 0



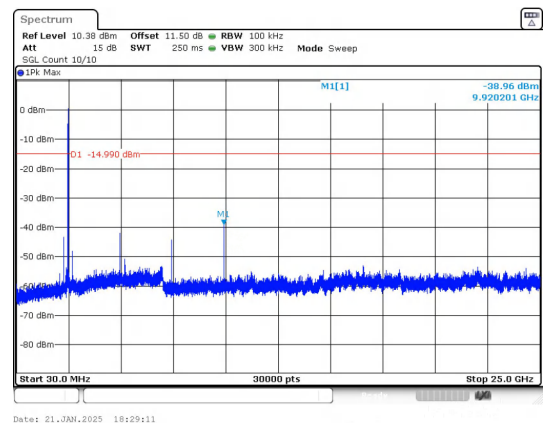
Out Of Band Emission  
8DPSK\_3-DH5\_Channel 39



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

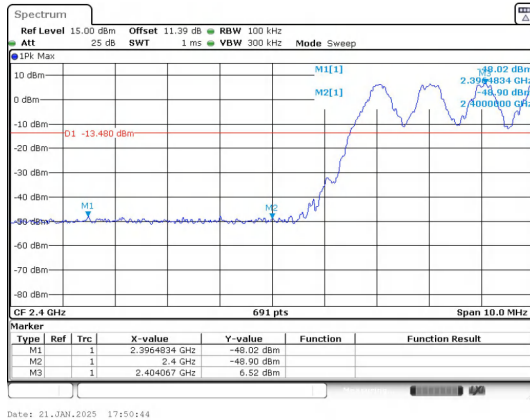


Out Of Band Emission  
8DPSK\_3-DH5\_Channel 78

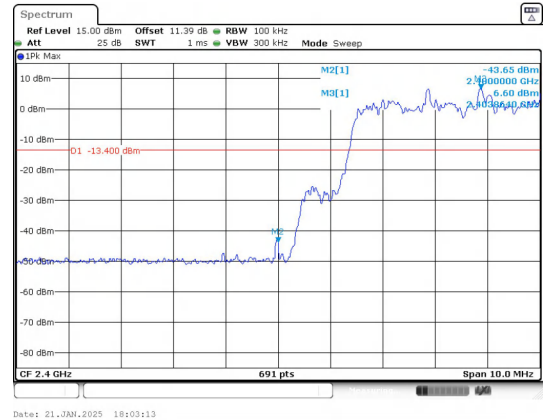


30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 78

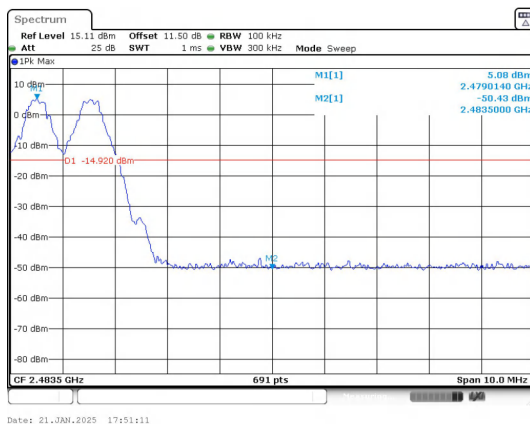




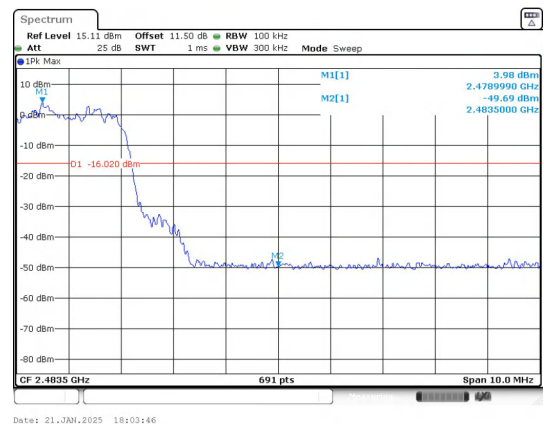
Out Of Band Emission(Left)  
GFSK\_DH5\_Channel Hopping



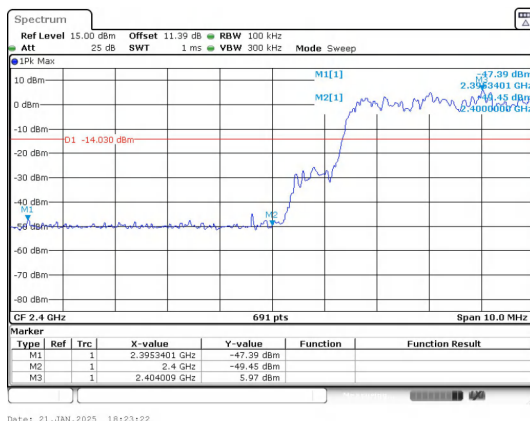
Out Of Band Emission(Left)  
 $\pi/4$ DQPSK\_2-DH5\_Channel Hopping



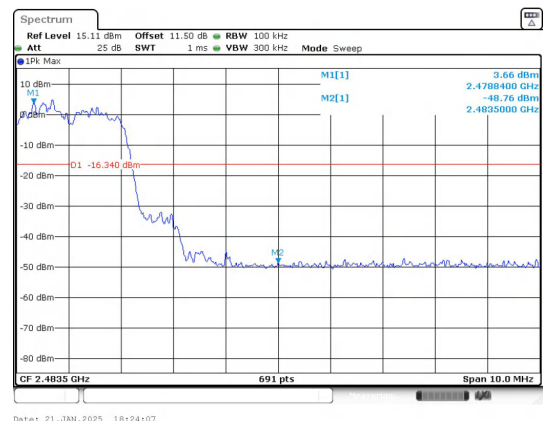
Out Of Band Emission(Right)  
GFSK\_DH5\_Channel Hopping



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-----