

# Appendix Report

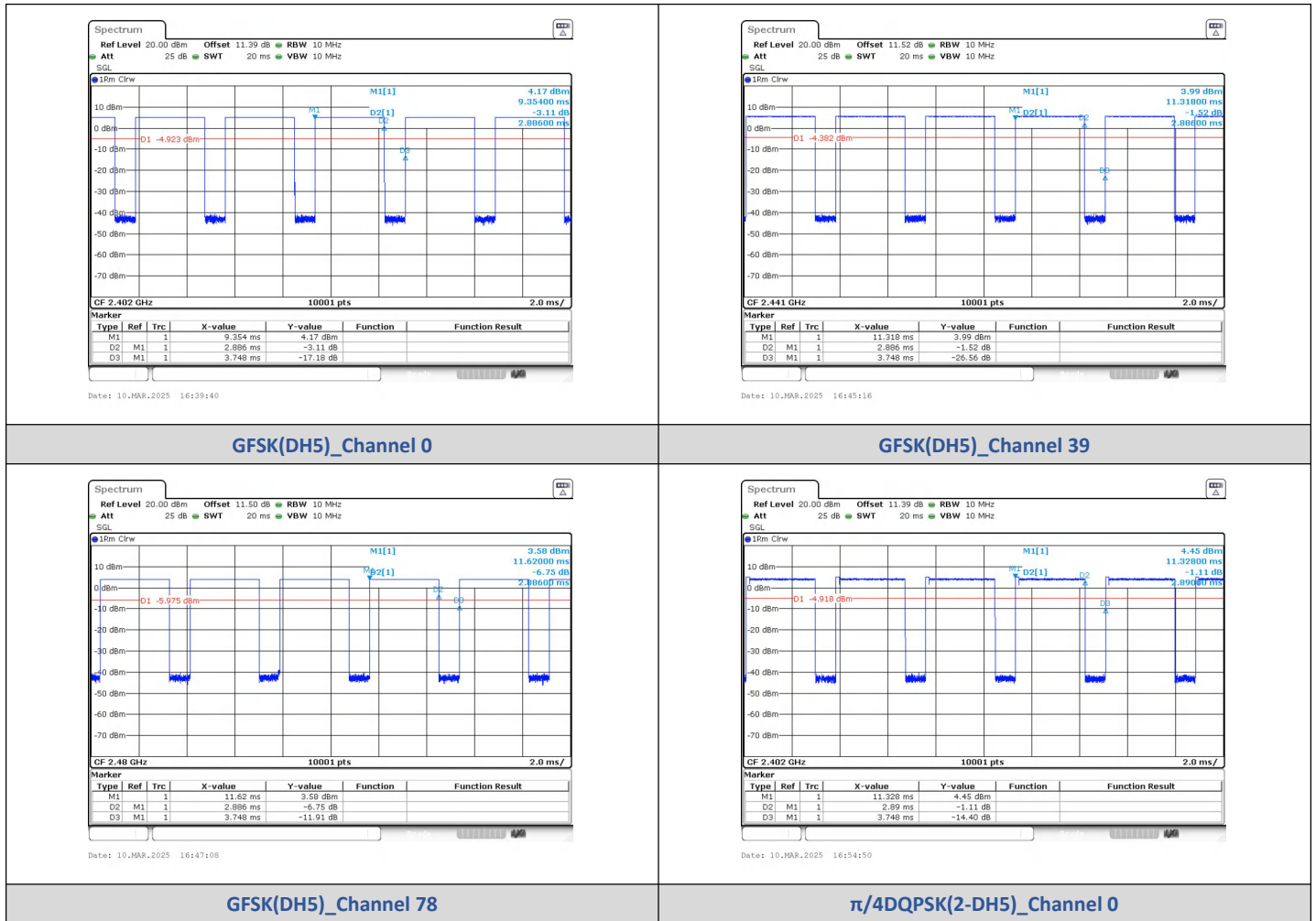
|                |                  |
|----------------|------------------|
| Report No.:    | CISRR25030706004 |
| Test Engineer: | Mark Fu          |
| Supervised by: | Rory Huang       |

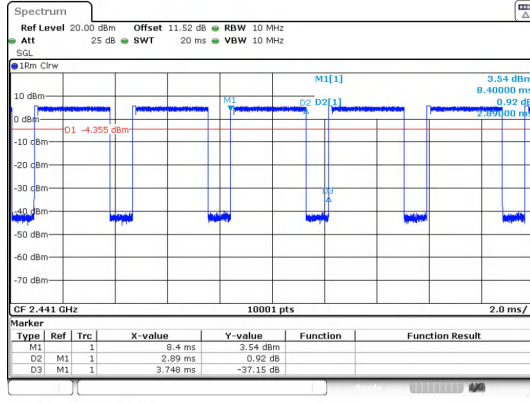
# 1) Duty Cycle

## Test Result

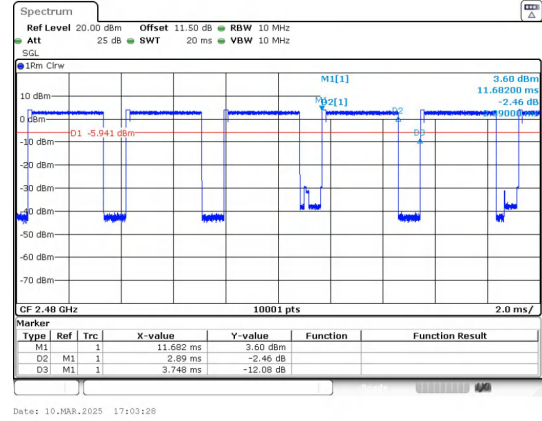
| Modulation    | Packets | Channel | On Time (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle (linear) | Duty Cycle Factor (dB) | 1/T    |
|---------------|---------|---------|--------------|-------------|----------------|---------------------|------------------------|--------|
| GFSK          | DH5     | 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      | 2.890        | 3.748       | 77.11          | 0.7711              | 1.1289                 | 0.3460 |
|               |         | 78      | 2.890        | 3.748       | 77.11          | 0.7711              | 1.1289                 | 0.3460 |
| 8DPSK         | 3-DH5   | 0       | 2.894        | 3.748       | 77.21          | 0.7721              | 1.1233                 | 0.3455 |
|               |         | 39      | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 78      | 2.894        | 3.748       | 77.21          | 0.7721              | 1.1233                 | 0.3455 |

## Test Graphs

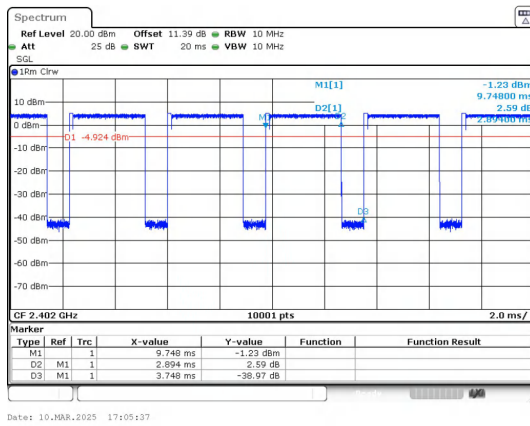




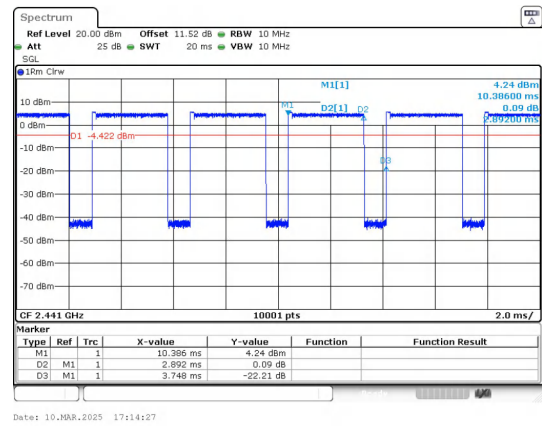
$\pi/4$ DQPSK(2-DH5)\_Channel 39



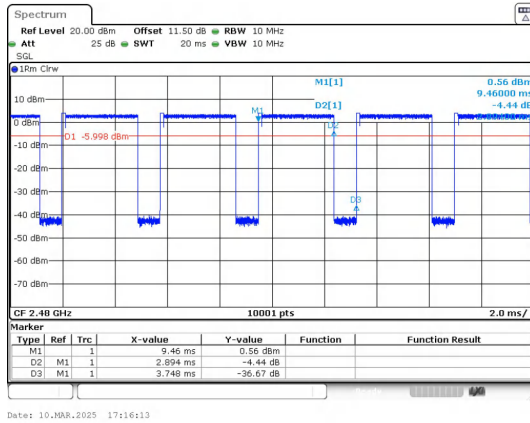
$\pi/4$ DQPSK(2-DH5)\_Channel 78



8DPSK(3-DH5)\_Channel 0



8DPSK(3-DH5)\_Channel 39



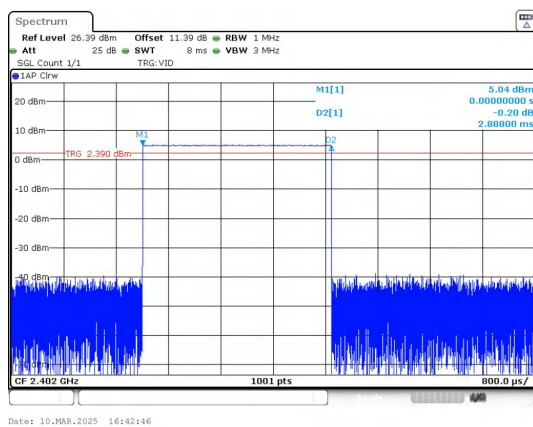
8DPSK(3-DH5)\_Channel 78

## 2) Dwell Time

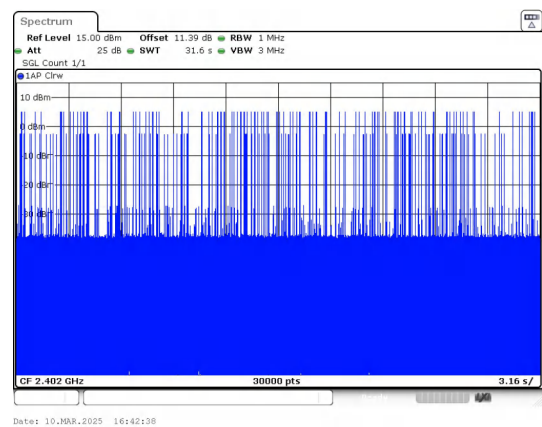
### Test Result

| 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            | 114                              | 329.23          | < 400      | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |                  | 2.896            | 101                              | 292.5           |            | PASS   |
| 8DPSK         | 3-DH5  |                  | 2.896            | 104                              | 301.18          |            | PASS   |

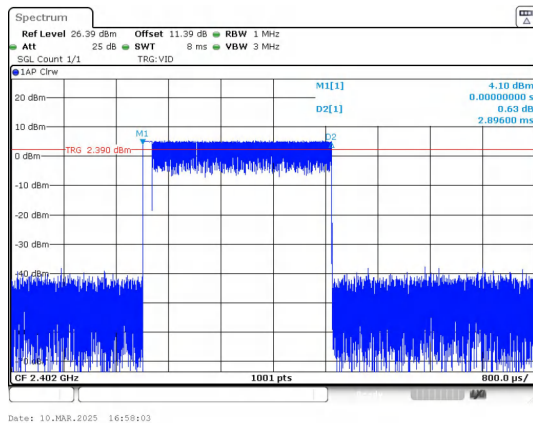
### Test Graphs



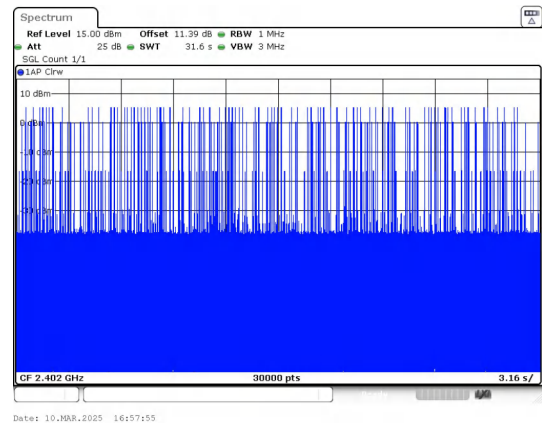
Pulse Width  
GFSK\_DH5



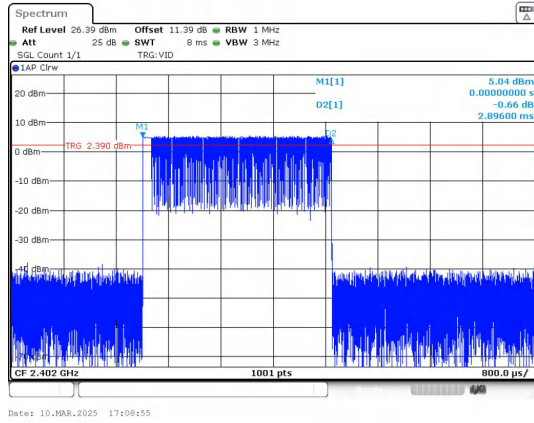
Number of Pulses in 31.6 seconds  
GFSK\_DH5



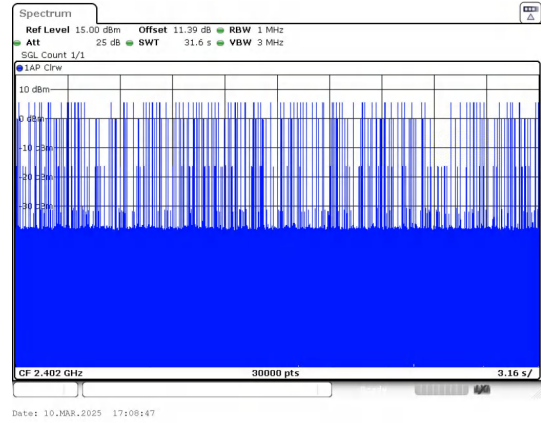
Pulse Width  
 $\pi/4$ DQPSK\_2-DH5



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



Pulse Width  
8DPSK\_3-DH5



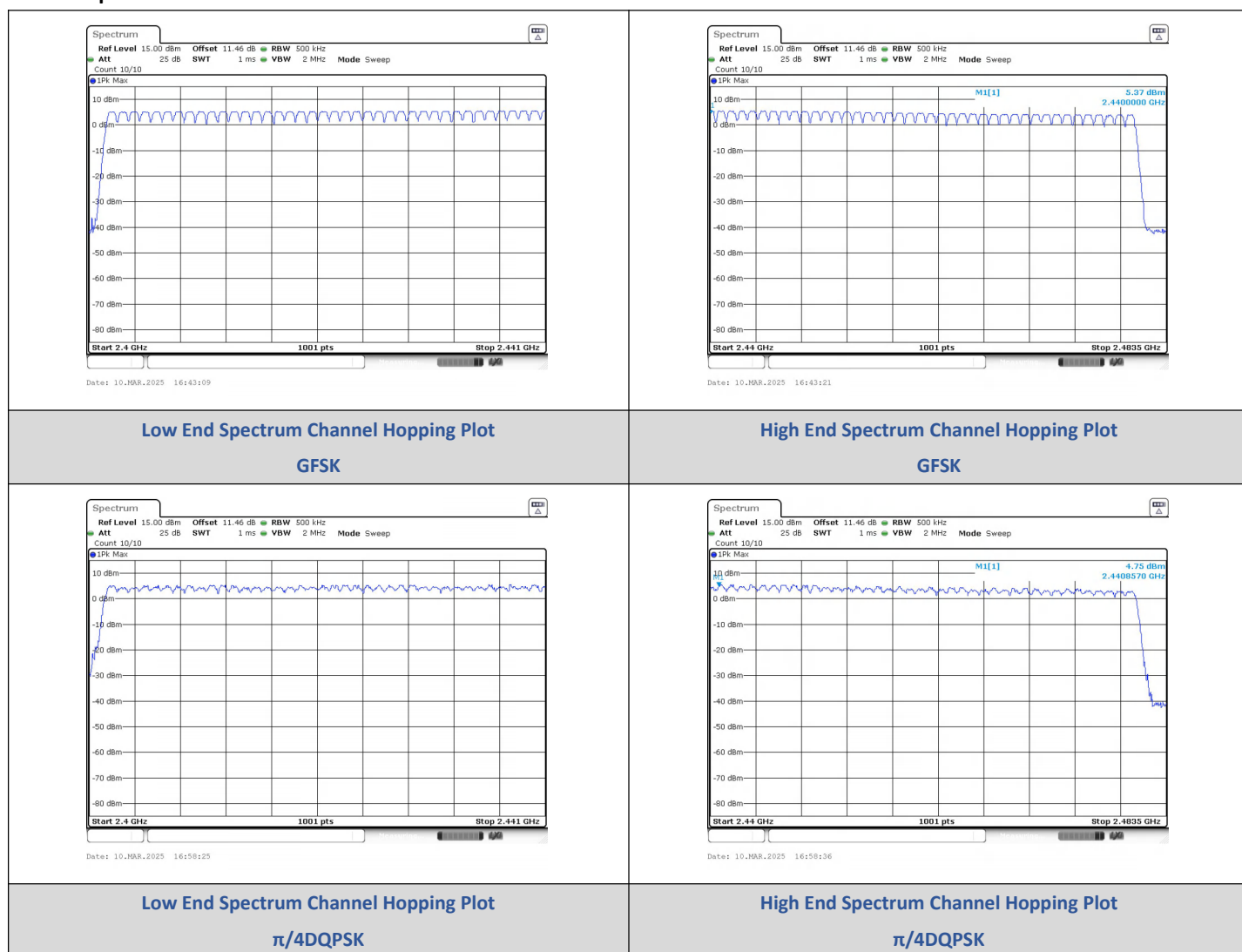
Number of Pulses in 31.6 seconds  
8DPSK\_3-DH5

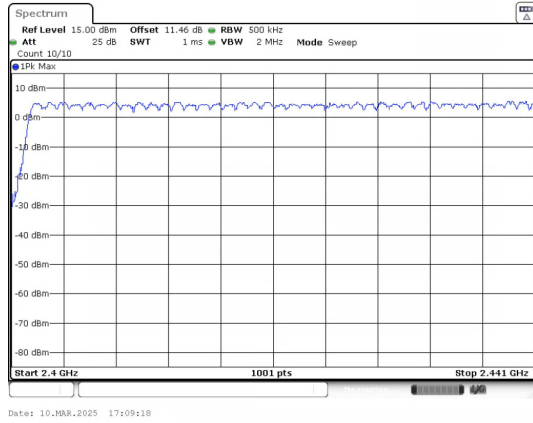
### 3) Number Of Hopping Channel

#### Test Result

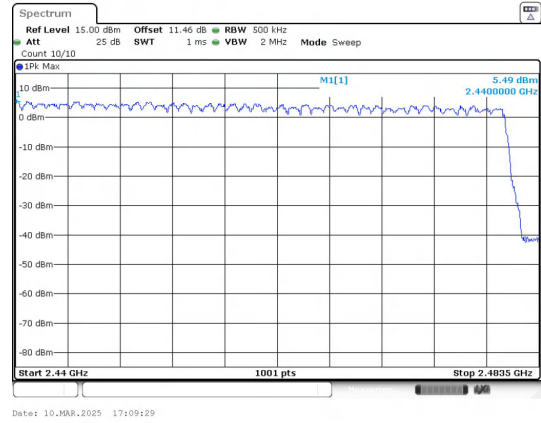
| Modulation    | Packet | Number of Hopping Channel | Limit | Result |
|---------------|--------|---------------------------|-------|--------|
| GFSK          | DH5    | 79                        | 15    | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 79                        | 15    | PASS   |
| 8DPSK     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

#### Test Graphs





Low End Spectrum Channel Hopping Plot  
8DPSK



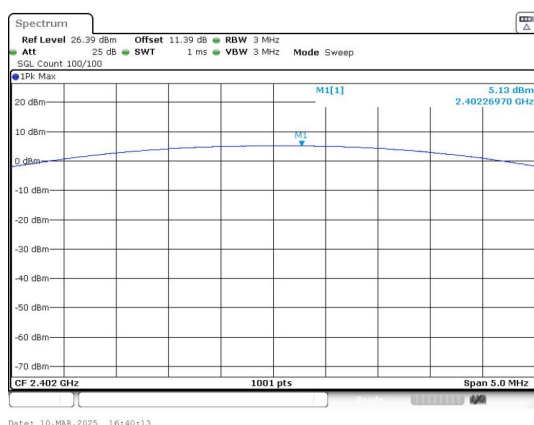
High End Spectrum Channel Hopping Plot  
8DPSK

## 4) Conducted Output Power

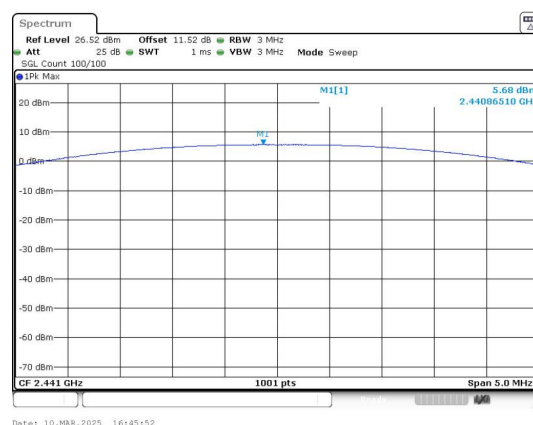
### Test Result

| Modulation    | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (dBm) | Result |
|---------------|-------------|---------|-------------------------|------------------------|-------------|--------|
| GFSK          | DH5         | 0       | 5.13                    | 3.26                   | ≤30         | PASS   |
|               |             | 39      | 5.68                    | 3.70                   |             | PASS   |
|               |             | 78      | 4.08                    | 2.56                   |             | PASS   |
| $\pi/4$ DQPSK | 2-DH5       | 0       | 5.62                    | 3.65                   | ≤20.97      | PASS   |
|               |             | 39      | 6.21                    | 4.18                   |             | PASS   |
|               |             | 78      | 4.73                    | 2.97                   |             | PASS   |
| 8DPSK         | 3-DH5       | 0       | 5.73                    | 3.74                   |             | PASS   |
|               |             | 39      | 6.34                    | 4.31                   |             | PASS   |
|               |             | 78      | 4.87                    | 3.07                   |             | PASS   |

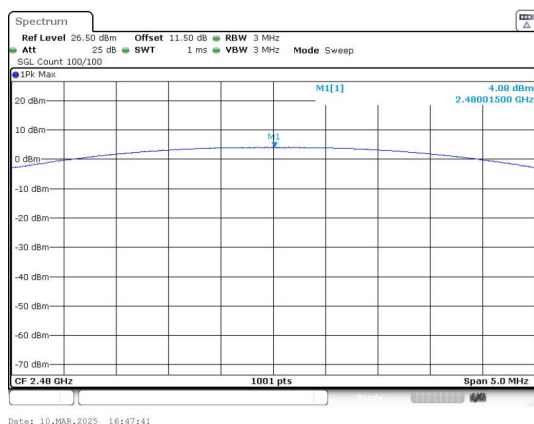
### Test Graphs



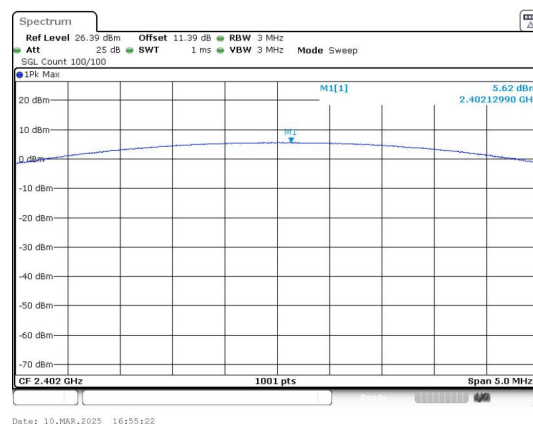
Peak Output Power  
GFSK\_Channel 0



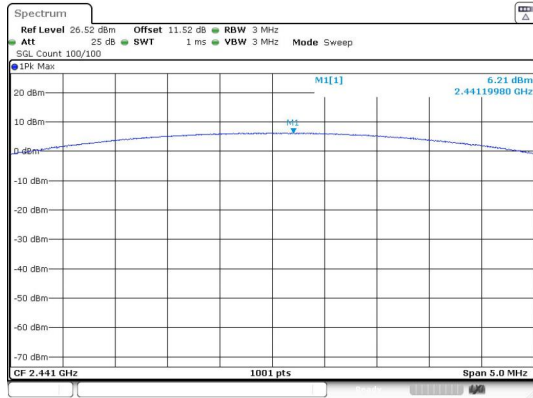
Peak Output Power  
GFSK\_Channel 39



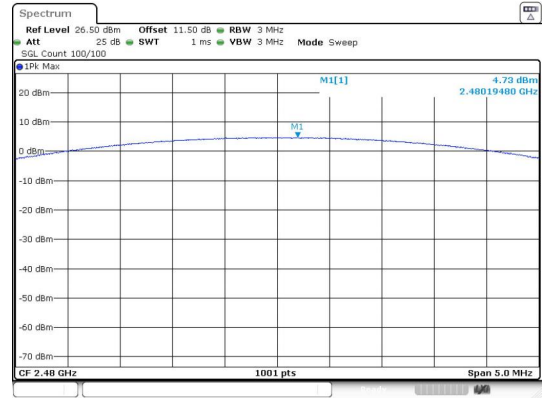
Peak Output Power  
GFSK\_Channel 78



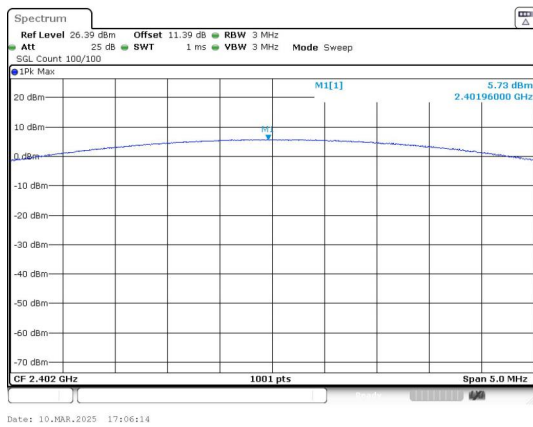
Peak Output Power  
 $\pi/4$ DQPSK\_Channel 0



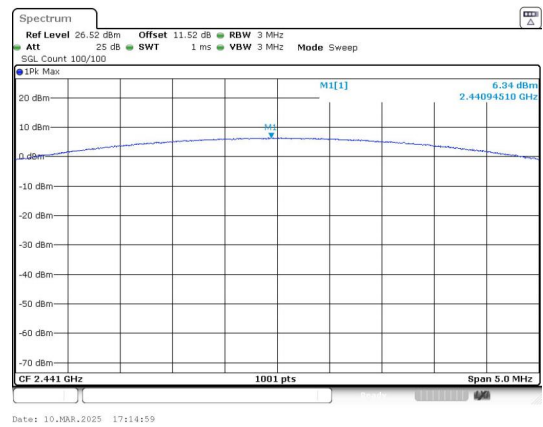
**Peak Output Power**  
 **$\pi/4$ QPSK\_Channel 39**



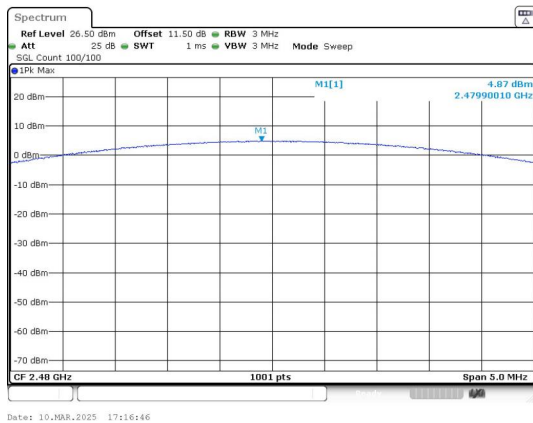
**Peak Output Power**  
 **$\pi/4$ QPSK\_Channel 78**



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



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



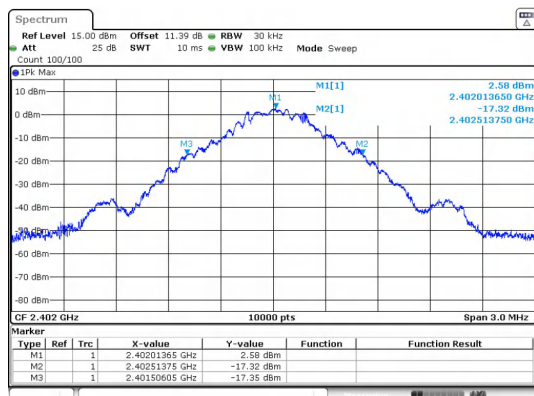
**Peak Output Power**  
**8DPSK\_Channel 78**

## 5) 20dB Bandwidth

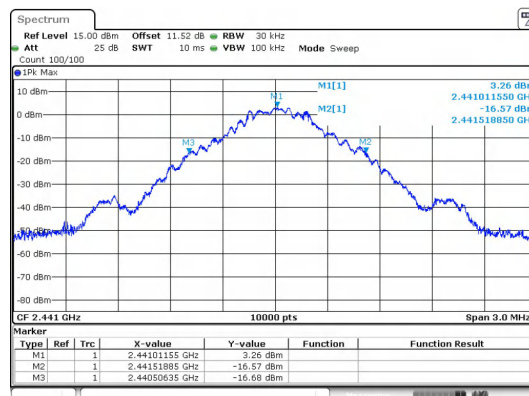
### Test Result

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

### Test Graphs



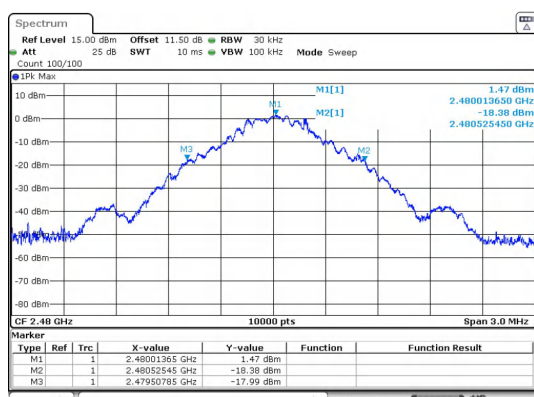
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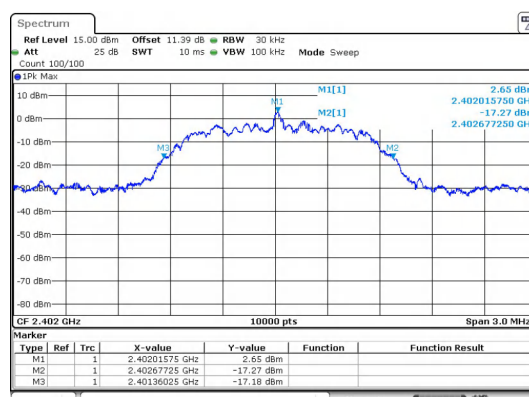
Date: 10/MAR/2025 16:14:35

GFSK\_DH5\_Channel 0

GFSK\_DH5\_Channel 39



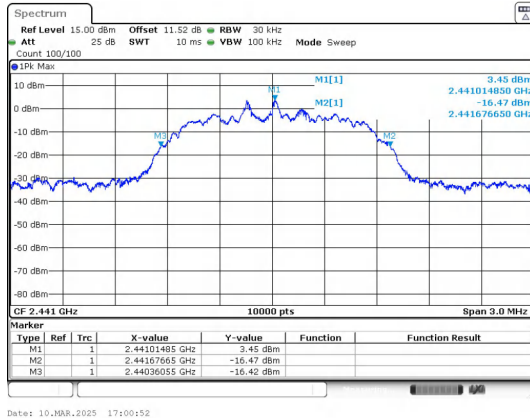
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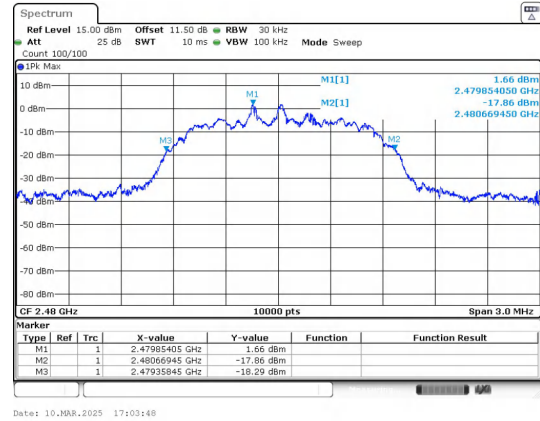
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GFSK\_DH5\_Channel 78

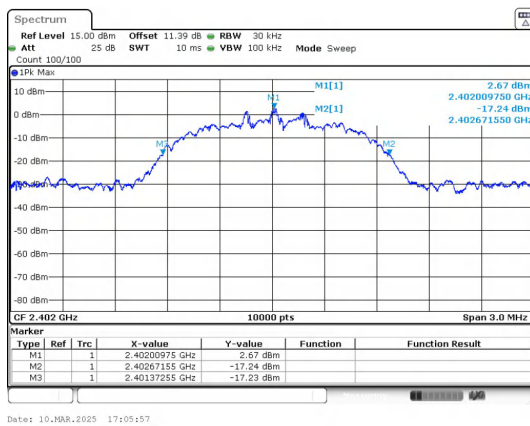
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



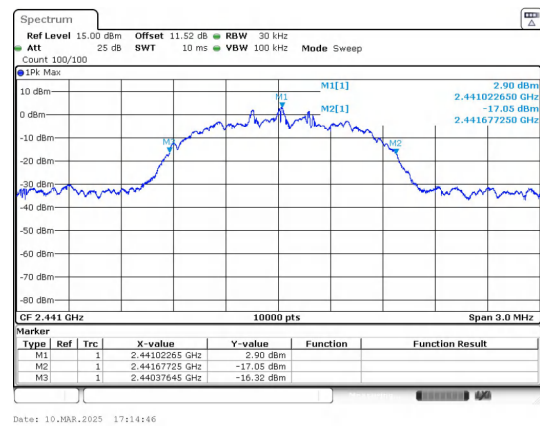
$\pi/4$ DQPSK\_2-DH5\_Channel 39



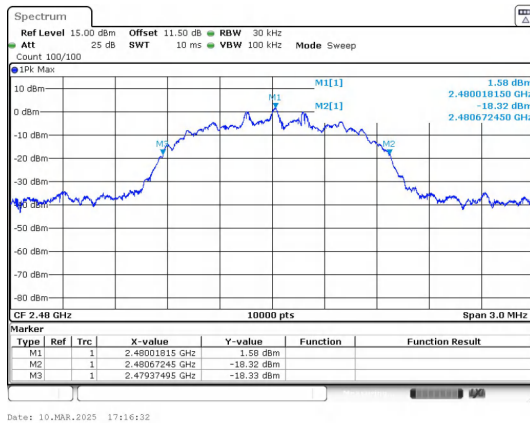
$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



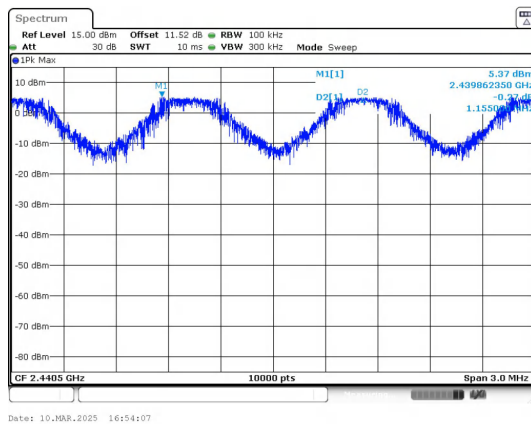
8DPSK\_3-DH5\_Channel 78

## 6) Carrier Frequencies Separation

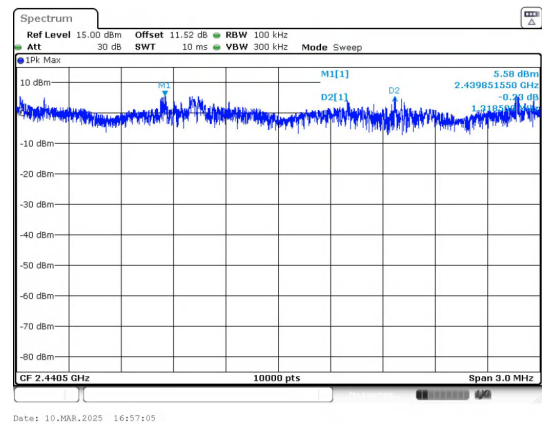
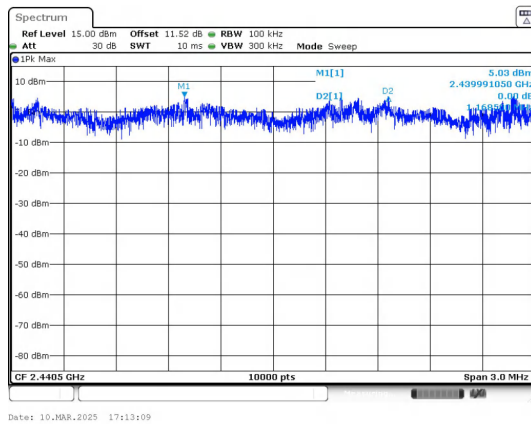
### Test Result

| Modulation    | Packet | Left Center frequency (MHz) | Right Center frequency (MHz) | Hopping Frequency Separation (MHz) | Limit (MHz) | Result |
|---------------|--------|-----------------------------|------------------------------|------------------------------------|-------------|--------|
| GFSK          | DH5    | 2439.8623                   | 2441.0174                    | 1.1550                             | 1.02        | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2439.8515                   | 2441.1701                    | 1.3185                             | 0.88        | PASS   |
| 8DPSK         | 3-DH5  | 2439.9911                   | 2441.1595                    | 1.1685                             | 0.867       | PASS   |

### Test Graphs



GFSK


 $\pi/4$ DQPSK


8DPSK

## 7) Conducted Out Of Band Emission

### Test Result

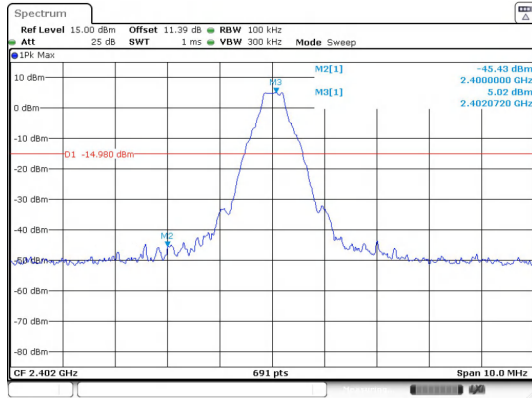
#### Non-Hopping

| Modulation    | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---------------|--------|---------|------------------------------|--------------------------|-------------|-----------------|--------|
| GFSK          | DH5    | 0       | 2400.00                      | -45.430                  | -14.98      | -30.450         | PASS   |
|               |        |         | 7206.79                      | -37.168                  | -14.98      | -22.188         | PASS   |
|               |        | 39      | 9763.72                      | -39.273                  | -14.46      | -24.813         | PASS   |
|               |        | 78      | 2483.50                      | -50.440                  | -16.04      | -34.400         | PASS   |
|               |        |         | 9920.20                      | -37.295                  | -16.04      | -21.255         | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 0       | 2400.00                      | -41.880                  | -15.01      | -26.870         | PASS   |
|               |        |         | 7205.96                      | -39.210                  | -15.01      | -24.200         | PASS   |
|               |        | 39      | 9763.72                      | -39.471                  | -14.39      | -25.081         | PASS   |
|               |        | 78      | 2483.50                      | -50.310                  | -16.01      | -34.300         | PASS   |
|               |        |         | 9920.20                      | -36.764                  | -16.01      | -20.754         | PASS   |
| 8DPSK         | 3-DH5  | 0       | 2400.00                      | -40.480                  | -14.83      | -25.650         | PASS   |
|               |        |         | 7205.96                      | -32.894                  | -14.83      | -18.064         | PASS   |
|               |        | 39      | 9763.72                      | -39.432                  | -14.57      | -24.862         | PASS   |
|               |        | 78      | 2483.50                      | -50.100                  | -16.14      | -33.960         | PASS   |
|               |        |         | 9920.20                      | -37.209                  | -16.14      | -21.069         | PASS   |

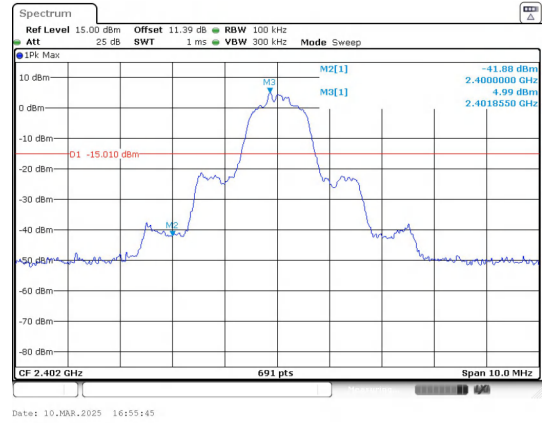
#### Hopping

| 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 | 2397.80                            | -47.249                        | -15.34         | -31.909            | PASS   |
|               |        |         | 2400.00                            | -49.200                        | -15.34         | -33.860            | PASS   |
|               |        |         | 2483.50                            | -50.340                        | -16.47         | -33.870            | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |         | 2400.00                            | -43.980                        | -15.54         | -28.440            | PASS   |
|               |        |         | 2483.50                            | -49.930                        | -18.72         | -31.210            | PASS   |
| 8DPSK         | 3-DH5  |         | 2400.00                            | -42.130                        | -16.28         | -25.850            | PASS   |
|               |        |         | 2483.50                            | -49.890                        | -17.39         | -32.500            | PASS   |

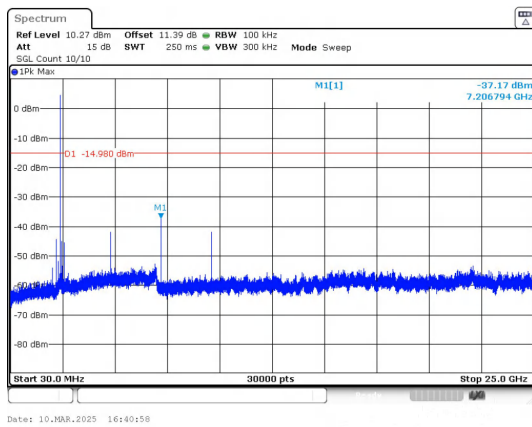
### Test Graphs



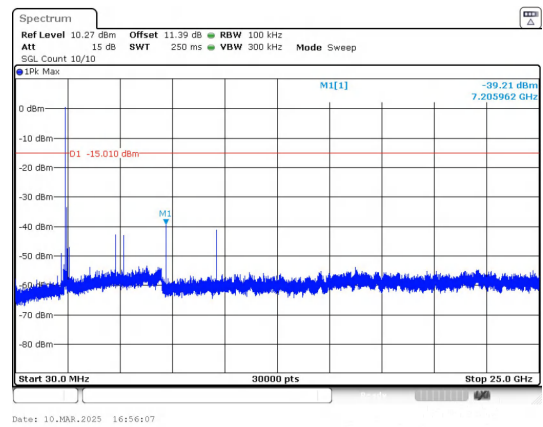
Out Of Band Emission  
GFSK\_DH5\_Channel 0



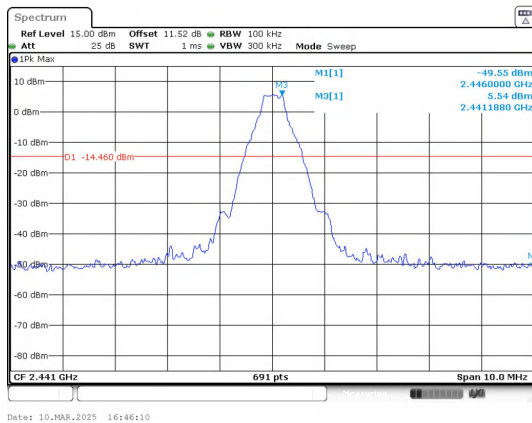
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



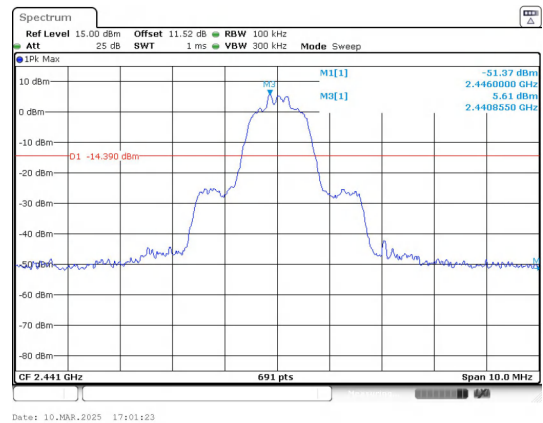
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 0



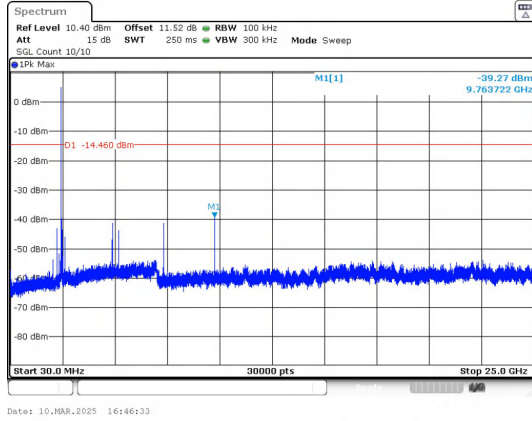
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



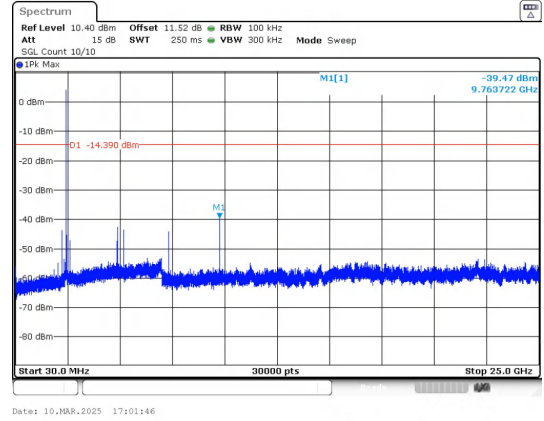
Out Of Band Emission  
GFSK\_DH5\_Channel 39



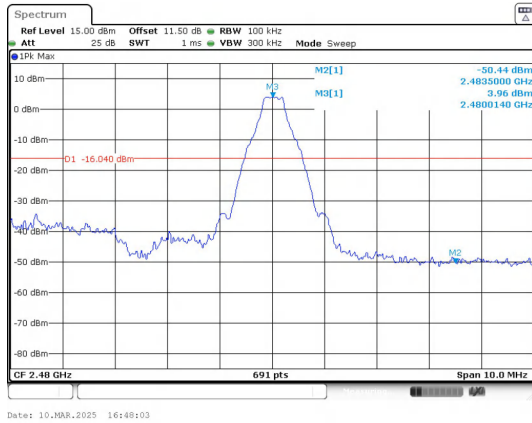
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



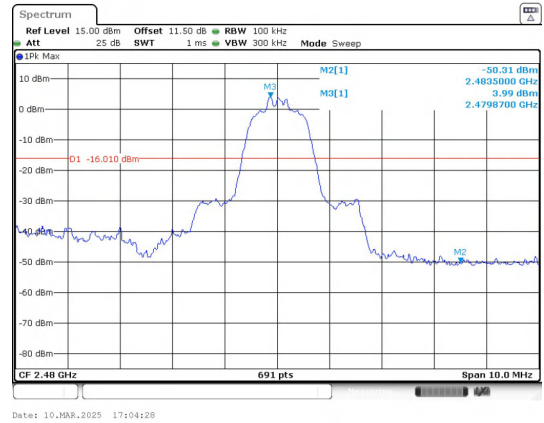
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 39



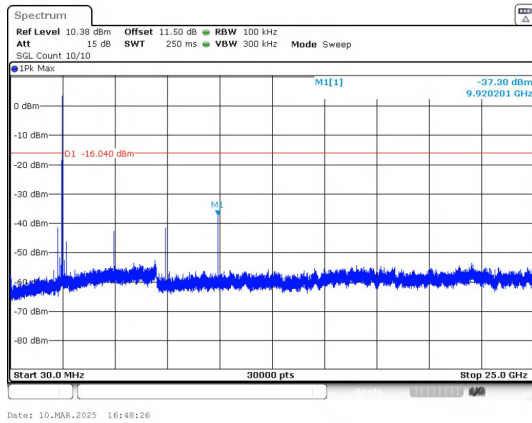
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



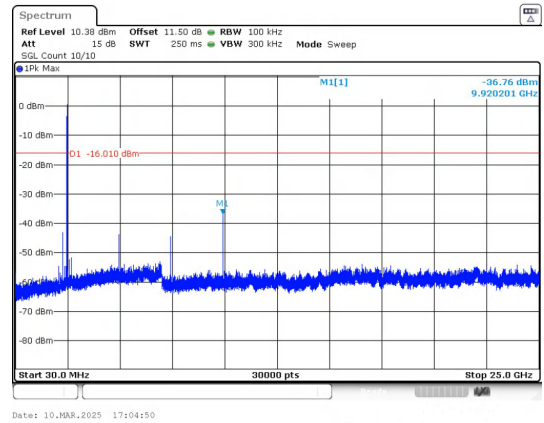
Out Of Band Emission  
GFSK\_DH5\_Channel 78



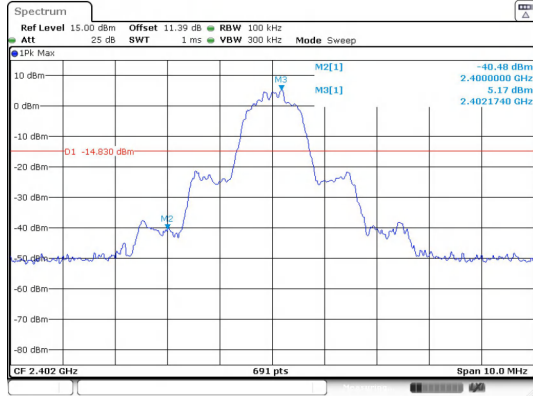
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



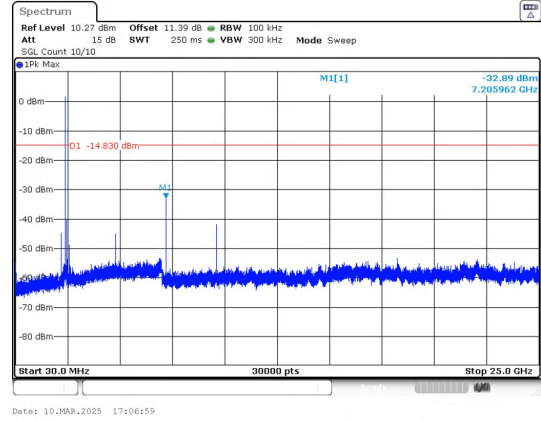
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 78



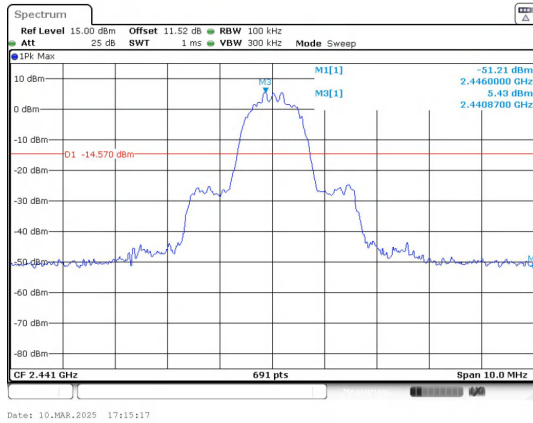
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



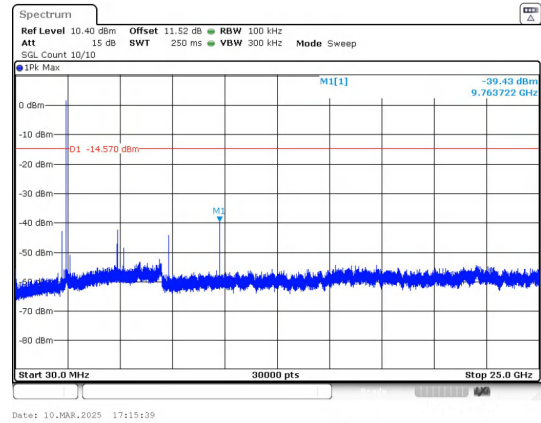
**Out Of Band Emission**  
**8DPSK\_3-DH5\_Channel 0**



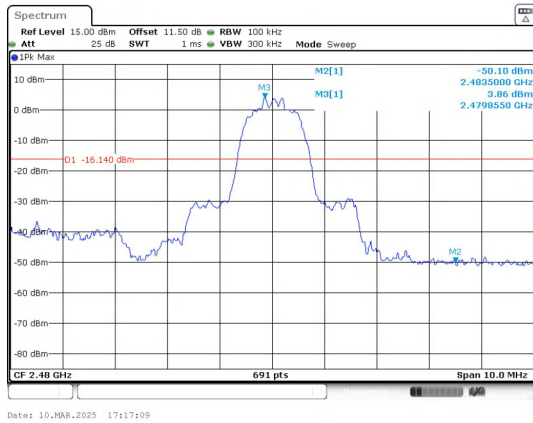
**30.0 MHz - 25000.0 MHz**  
**8DPSK\_3-DH5\_Channel 0**



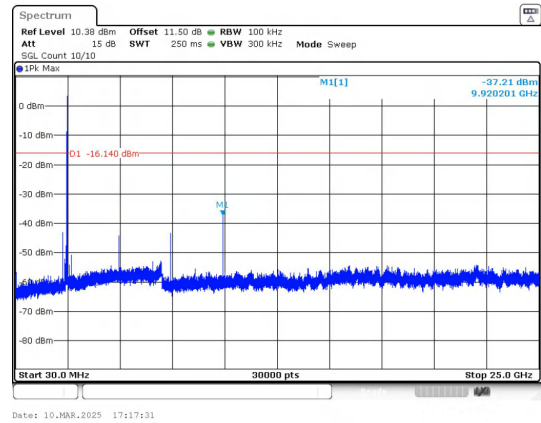
**Out Of Band Emission**  
**8DPSK\_3-DH5\_Channel 39**



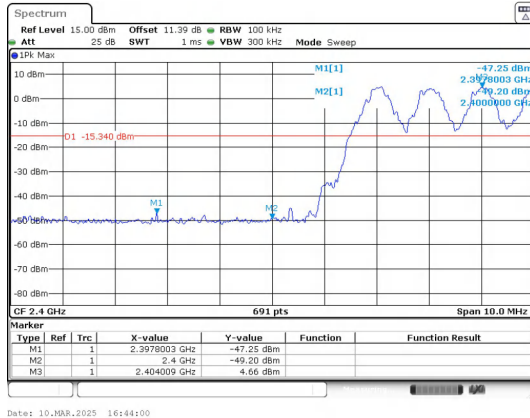
**30.0 MHz - 25000.0 MHz**  
**8DPSK\_3-DH5\_Channel 39**



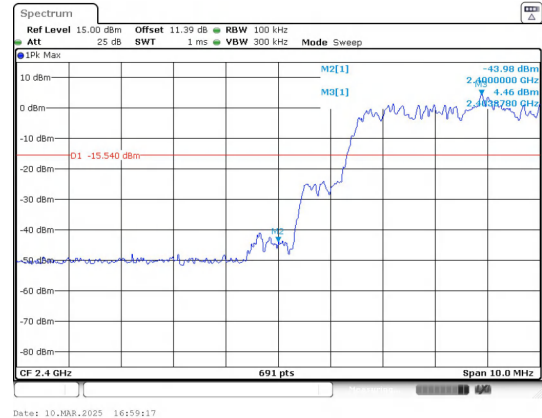
**Out Of Band Emission**  
**8DPSK\_3-DH5\_Channel 78**



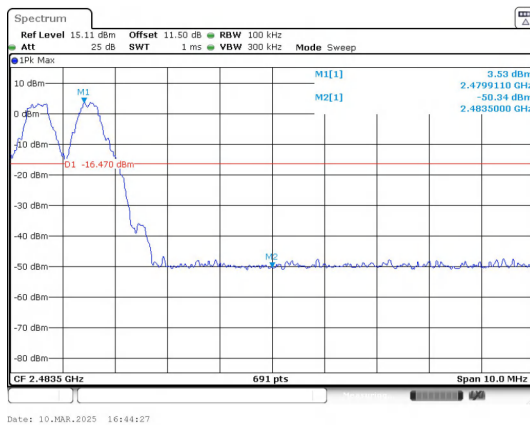
**30.0 MHz - 25000.0 MHz**  
**8DPSK\_3-DH5\_Channel 78**



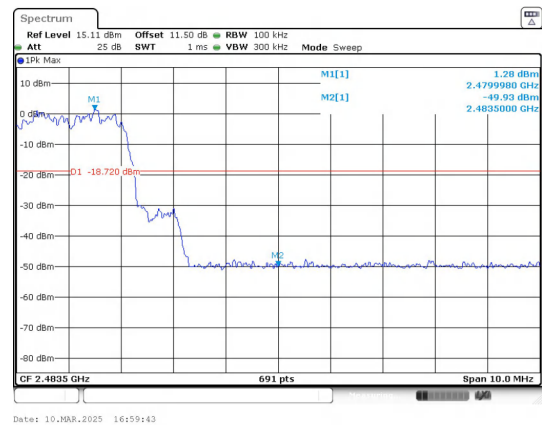
Out Of Band Emission(Left)  
GFSK\_DH5\_Channel Hopping



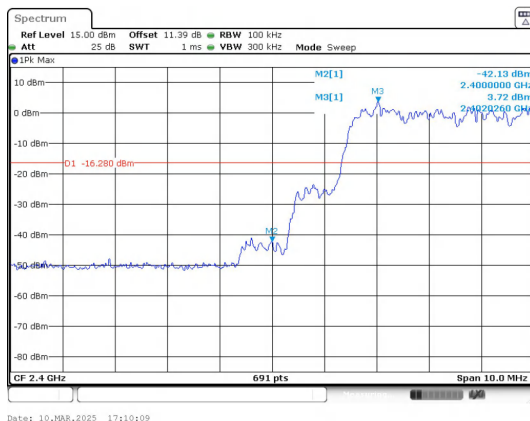
Out Of Band Emission(Left)  
 $\pi/4$ DQPSK\_2-DH5\_Channel Hopping



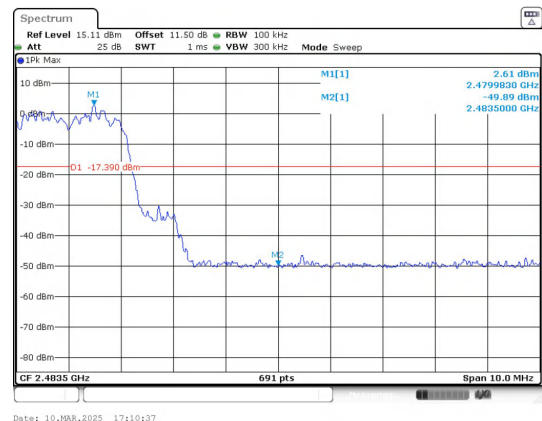
Out Of Band Emission(Right)  
GFSK\_DH5\_Channel Hopping



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-----