

# Appendix Report

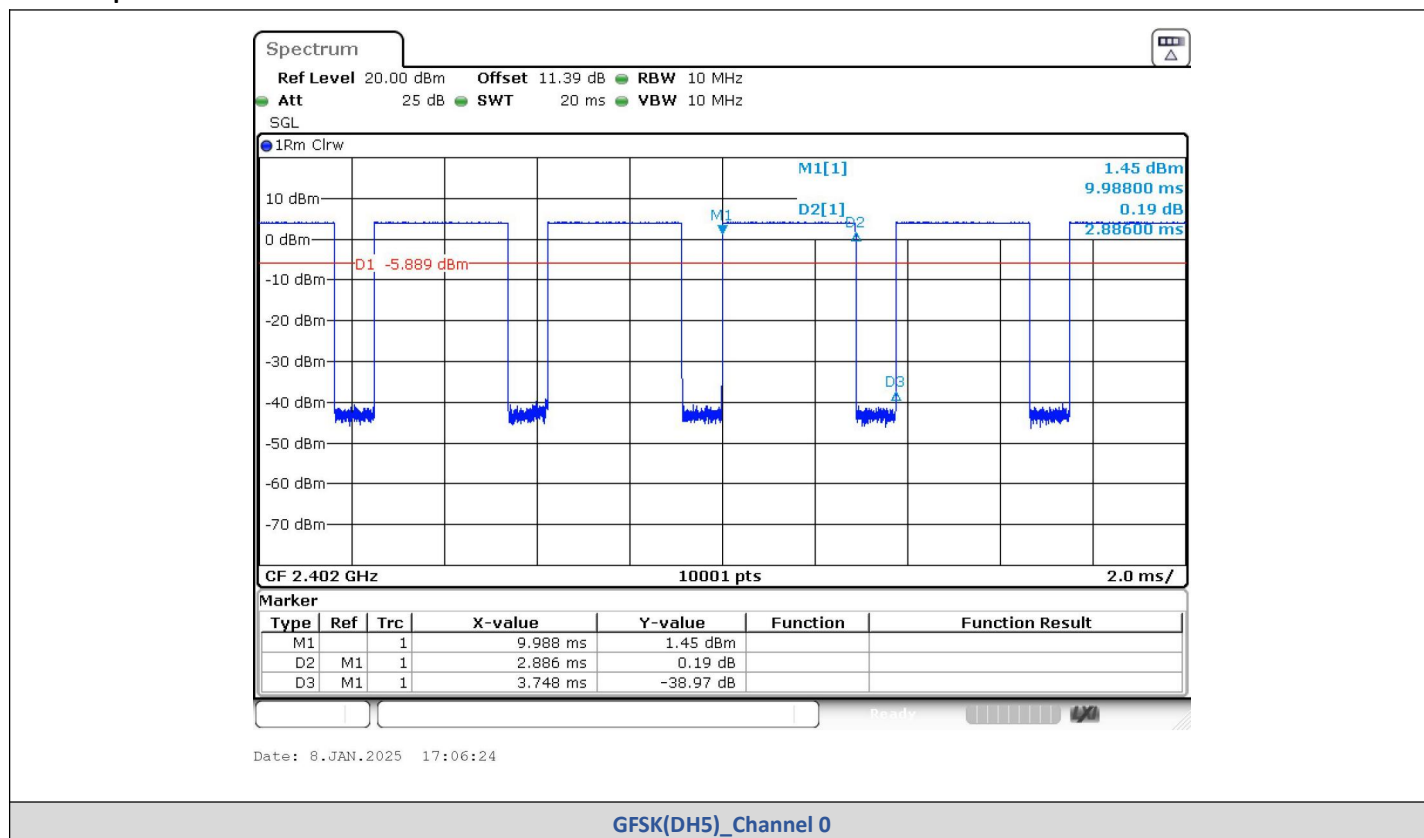
|                |                |
|----------------|----------------|
| Report No.:    | CISRR250107023 |
| Test Engineer: | Mark Fu        |
| Supervised by: | Rory Huang     |

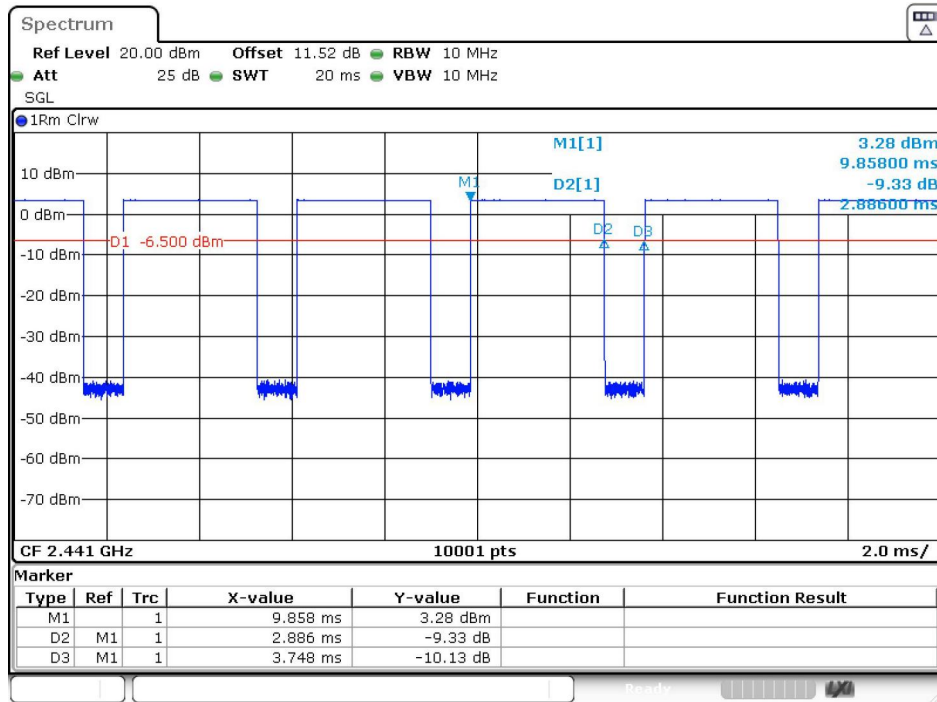
# 1) Duty Cycle

## 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        | 3.746       | 77.15          | 0.7715              | 1.1266                 | 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       | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 39      | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 78      | 2.894        | 3.748       | 77.21          | 0.7721              | 1.1233                 | 0.3455 |

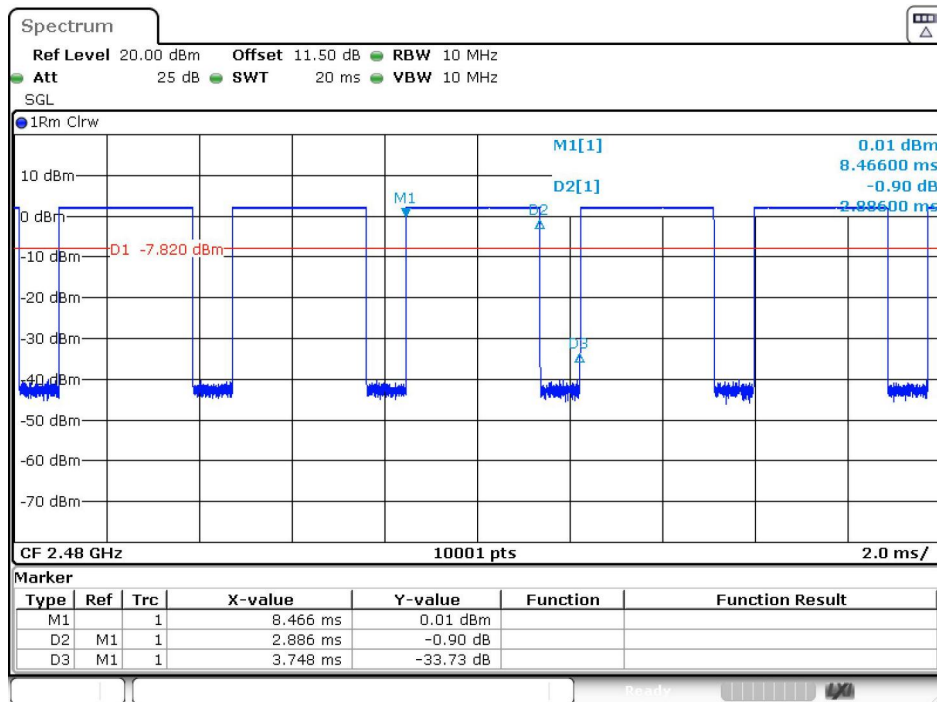
## Test Graphs





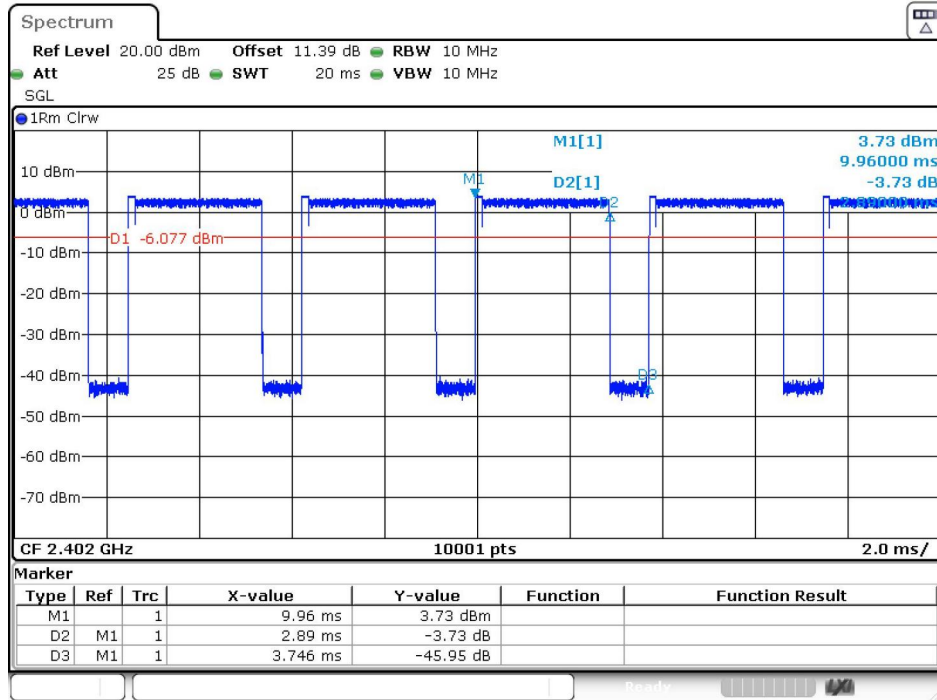
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### GFSK(DH5)\_Channel 39



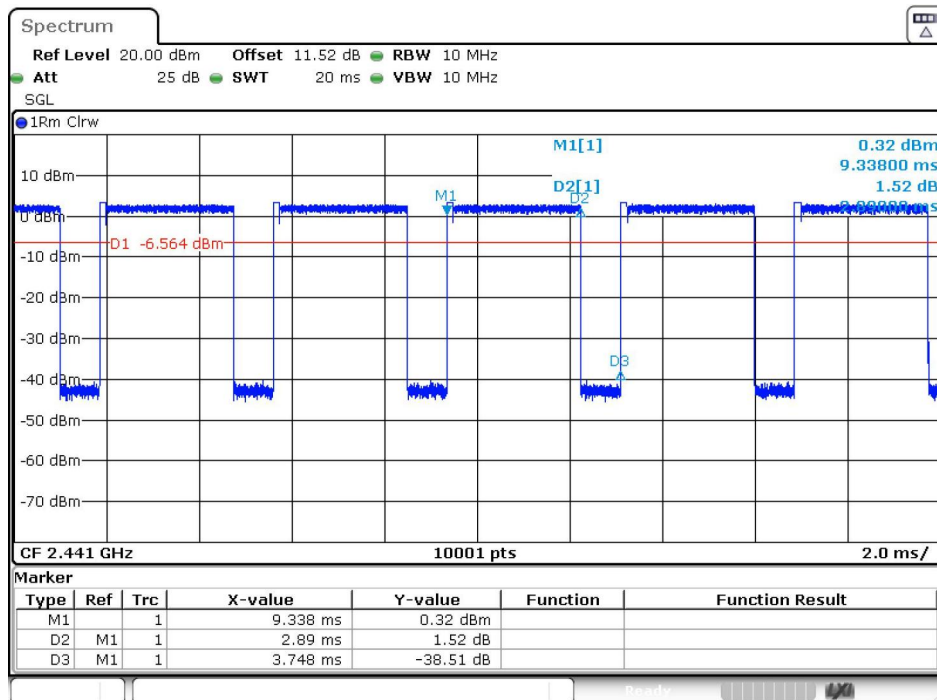
Date: 8.JAN.2025 17:30:24

### GFSK(DH5)\_Channel 78



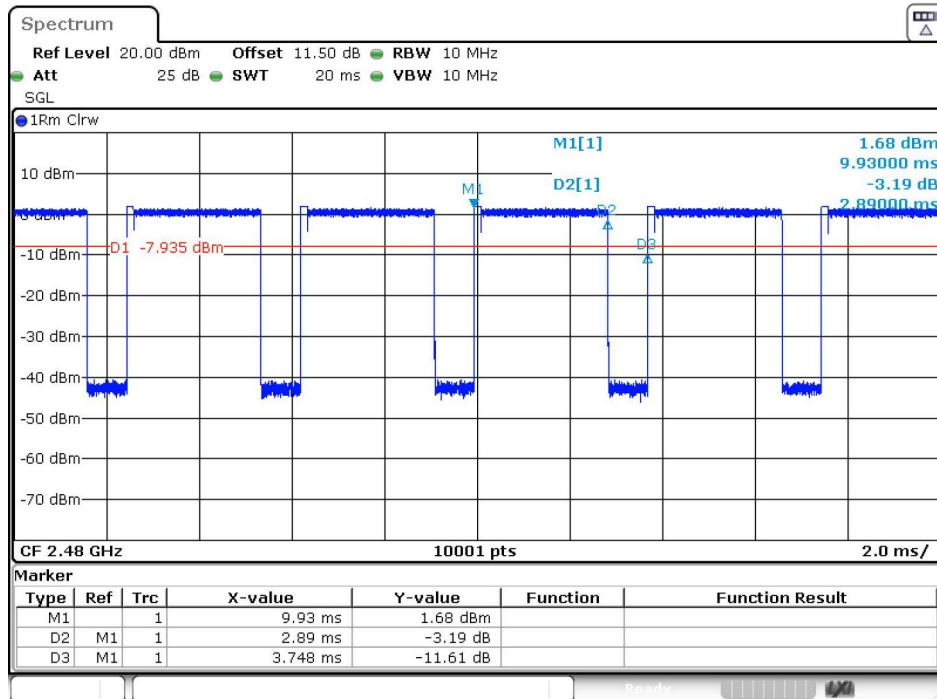
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$\pi/4$ DQPSK(2-DH5)\_Channel 0



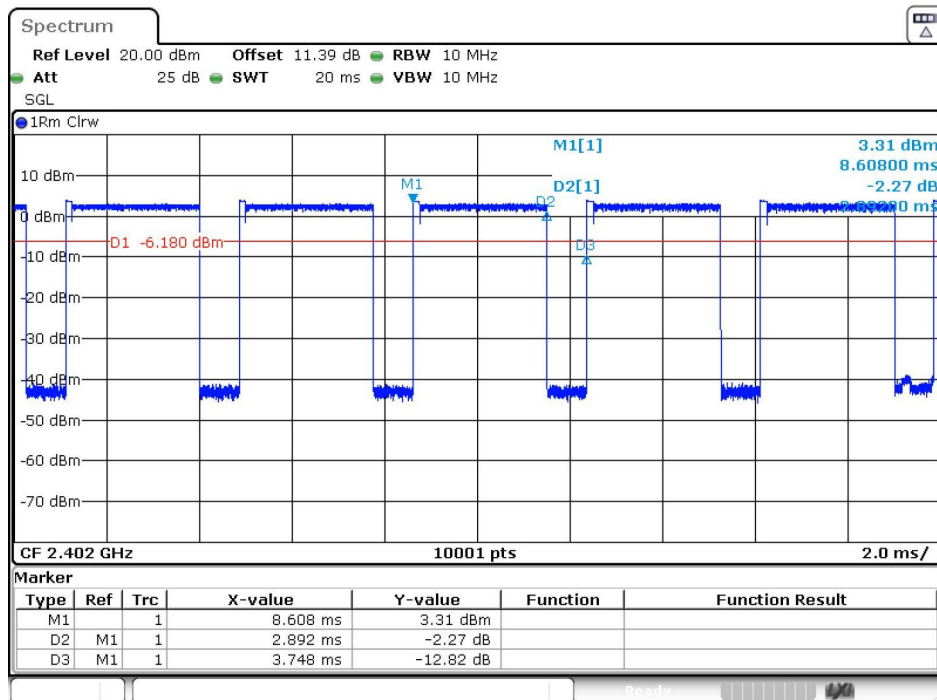
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$\pi/4$ DQPSK(2-DH5)\_Channel 39



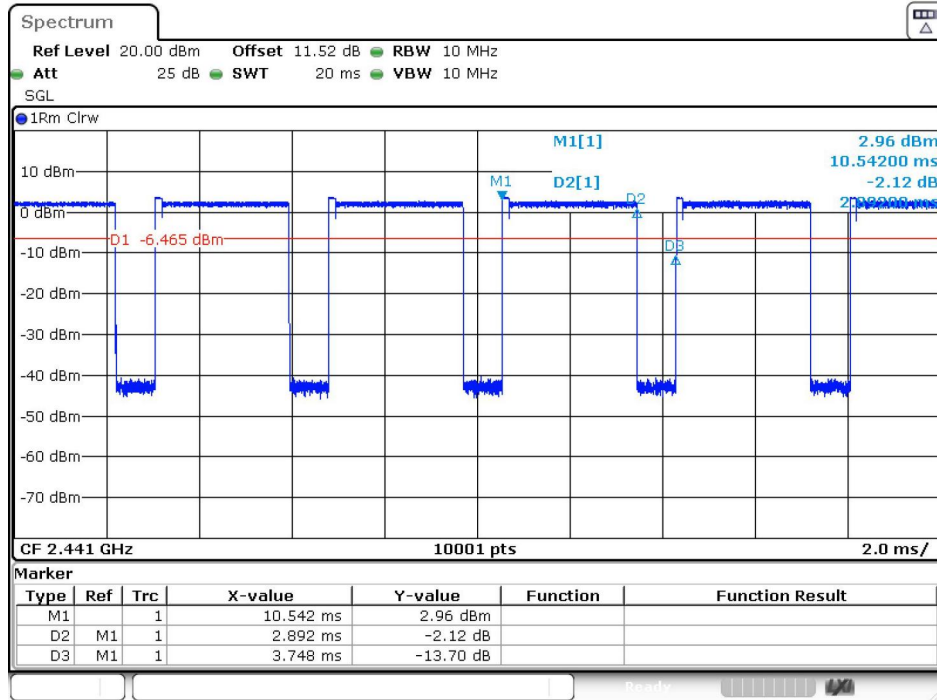
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$\pi/4$ DQPSK(2-DH5)\_Channel 78



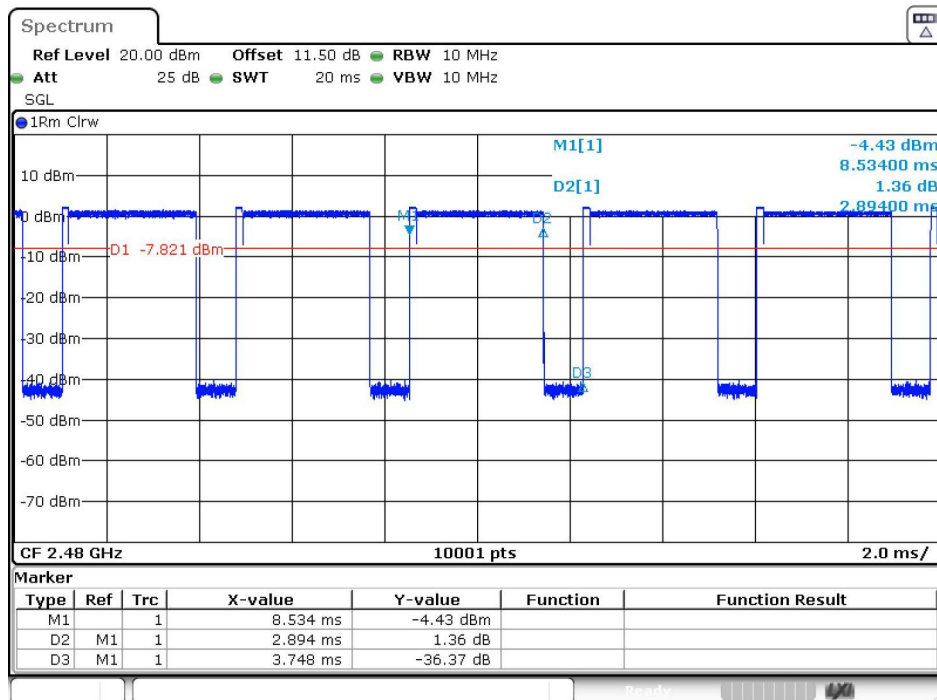
Date: 8.JAN.2025 17:47:17

8DPSK(3-DH5)\_Channel 0



Date: 8.JAN.2025 17:56:49

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



Date: 8.JAN.2025 17:58:26

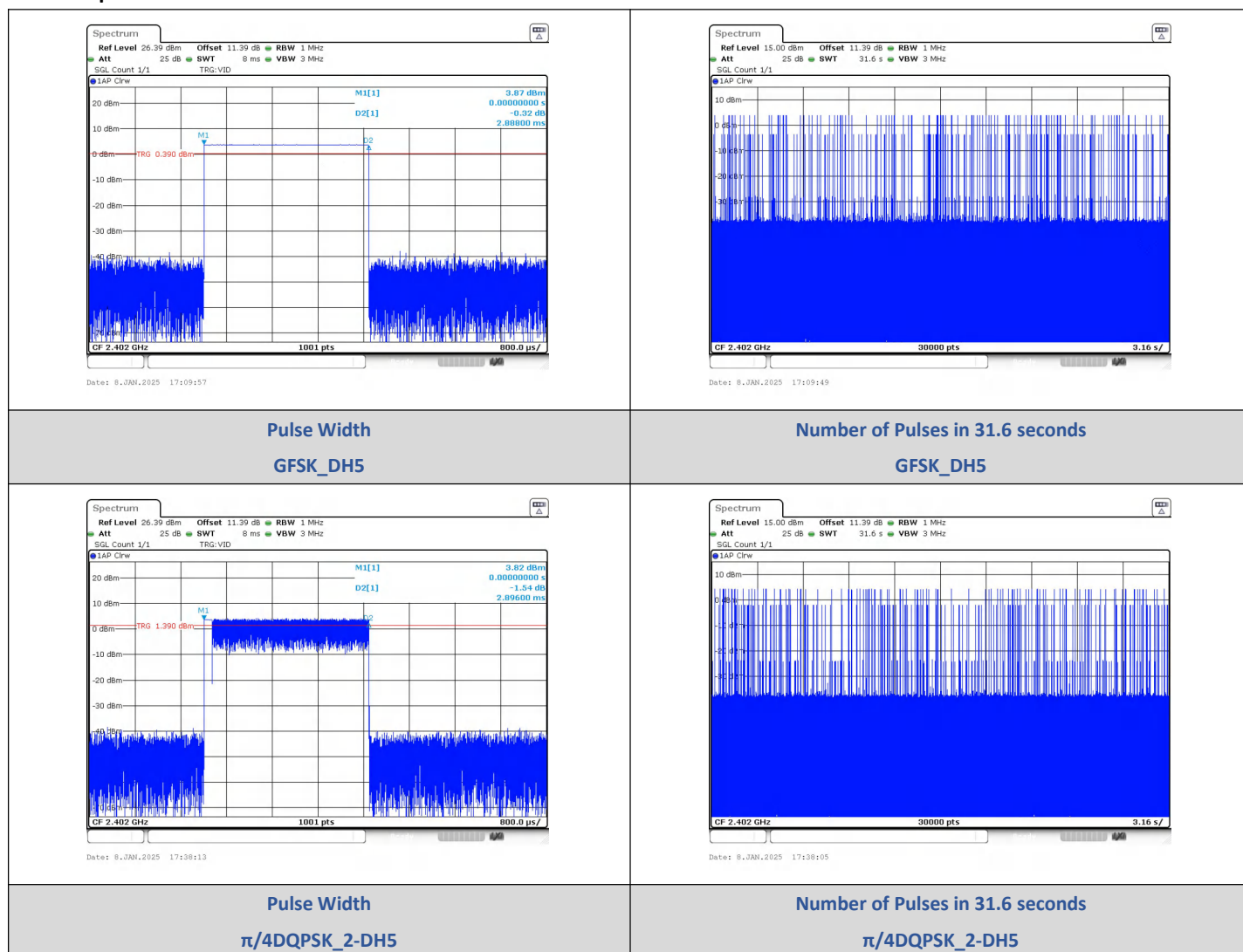
### 8DPSK(3-DH5)\_Channel 78

## 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            | 113                              | 326.34          | < 400      | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |                  | 2.896            | 111                              | 321.46          |            | PASS   |
| 8DPSK         | 3-DH5  |                  | 2.896            | 103                              | 298.29          |            | PASS   |

### Test Graphs





## Pulse Width

## 8DPSK 3-DH5



### Number of Pulses in 31.6 seconds

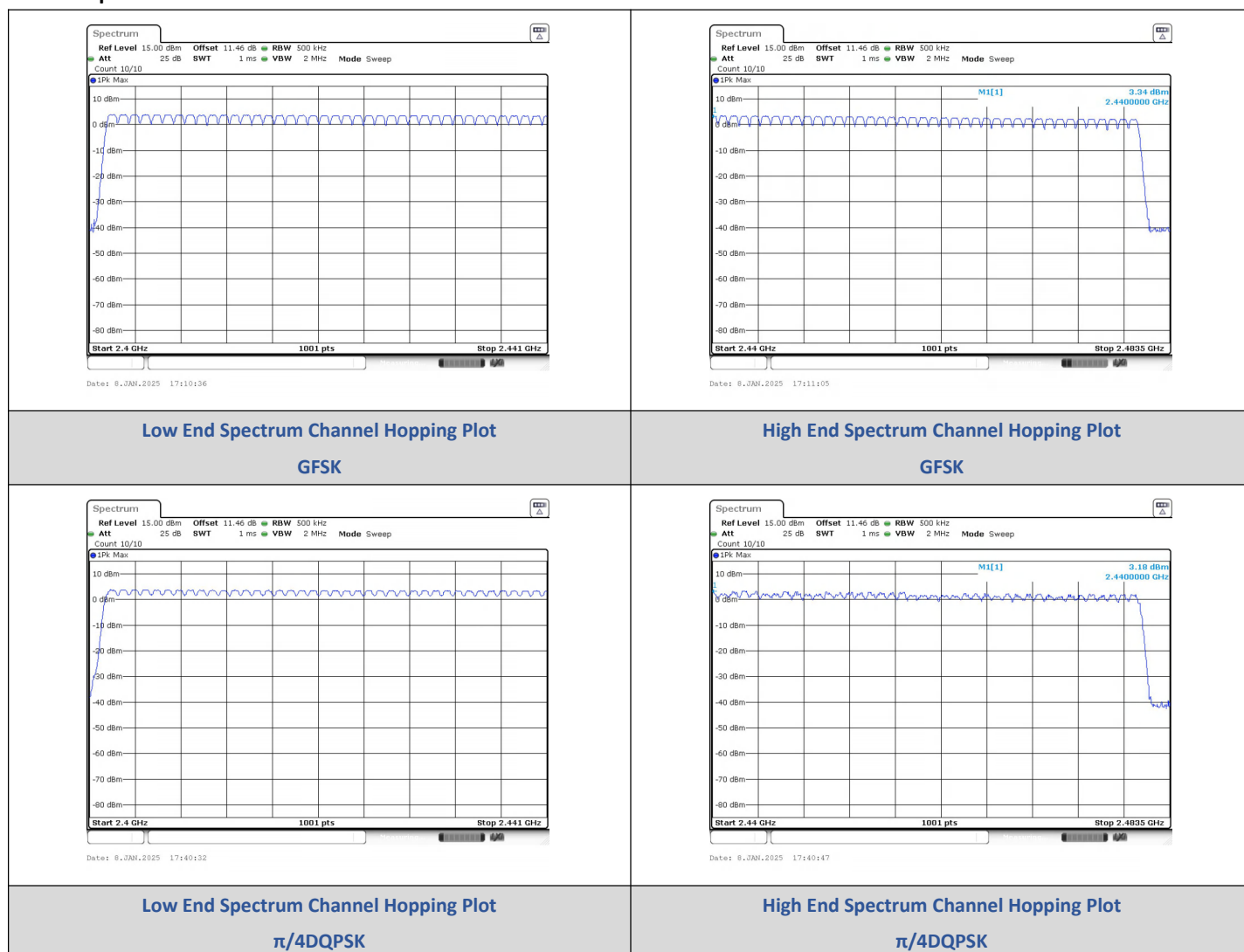
## 8DPSK 3-DH5

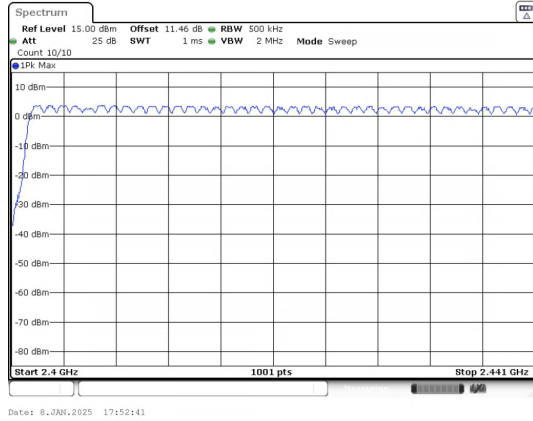
### 3) Number Of Hopping Channel

#### Test Result

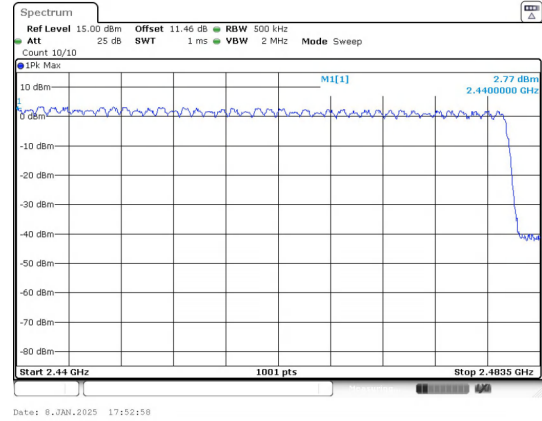
| Modulation    | Packet | Number of Hopping Channel | Limit | Result |
|---------------|--------|---------------------------|-------|--------|
| GFSK          | DH5    | 79                        | 15    | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 79                        | 15    | PASS   |
| 8DPSK     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

#### Test Graphs





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



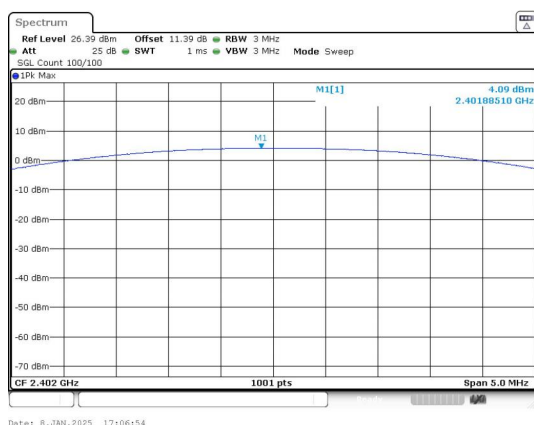
**High End Spectrum Channel Hopping Plot**  
**8DPSK**

## 4) Conducted Output Power

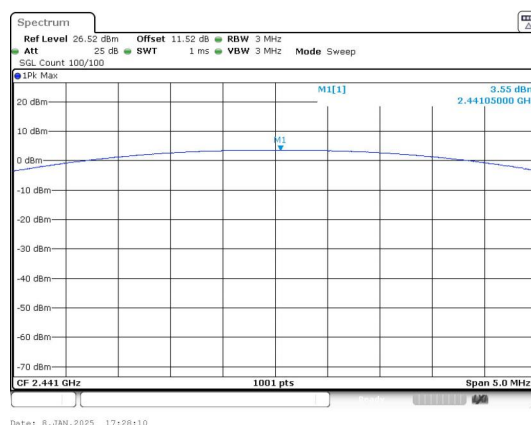
### Test Result

| Modulation    | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (dBm) | Result |
|---------------|-------------|---------|-------------------------|------------------------|-------------|--------|
| GFSK          | DH5         | 0       | 4.09                    | 2.56                   | ≤30         | PASS   |
|               |             | 39      | 3.55                    | 2.26                   |             | PASS   |
|               |             | 78      | 2.22                    | 1.67                   |             | PASS   |
| $\pi/4$ DQPSK | 2-DH5       | 0       | 4.71                    | 2.96                   | ≤20.97      | PASS   |
|               |             | 39      | 4.32                    | 2.70                   |             | PASS   |
|               |             | 78      | 2.92                    | 1.96                   |             | PASS   |
| 8DPSK         | 3-DH5       | 0       | 4.90                    | 3.09                   |             | PASS   |
|               |             | 39      | 4.74                    | 2.98                   |             | PASS   |
|               |             | 78      | 3.43                    | 2.20                   |             | PASS   |

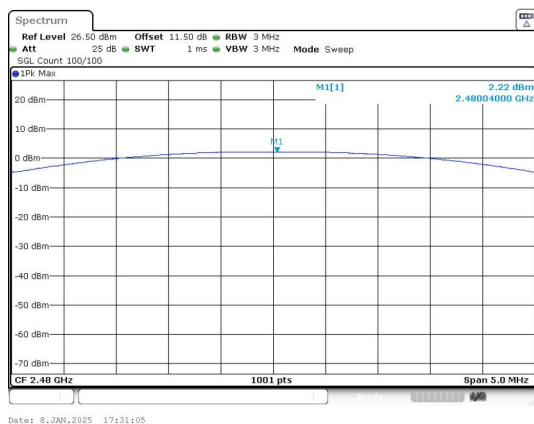
### Test Graphs



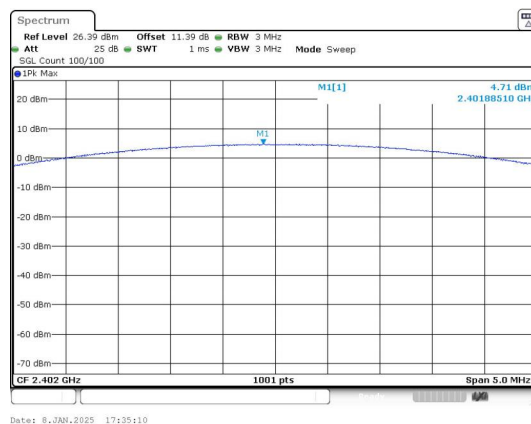
Peak Output Power  
GFSK\_Channel 0



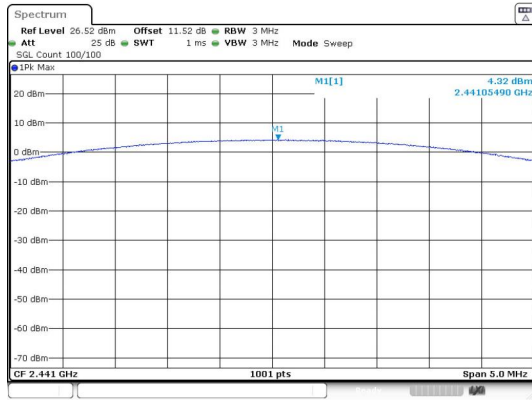
Peak Output Power  
GFSK\_Channel 39



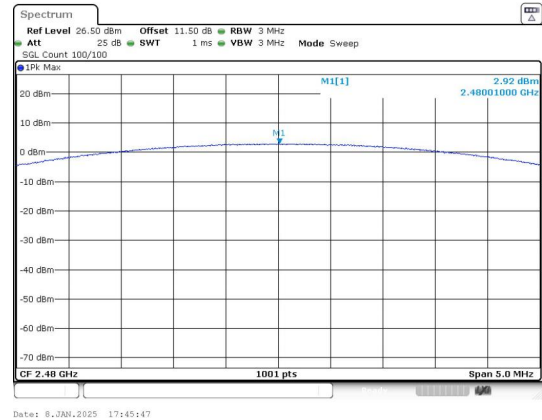
Peak Output Power  
GFSK\_Channel 78



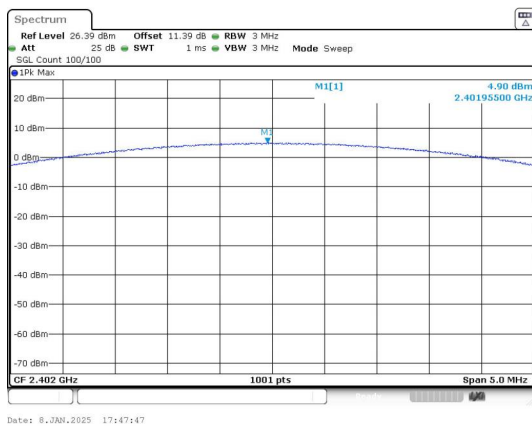
Peak Output Power  
 $\pi/4$ DQPSK\_Channel 0



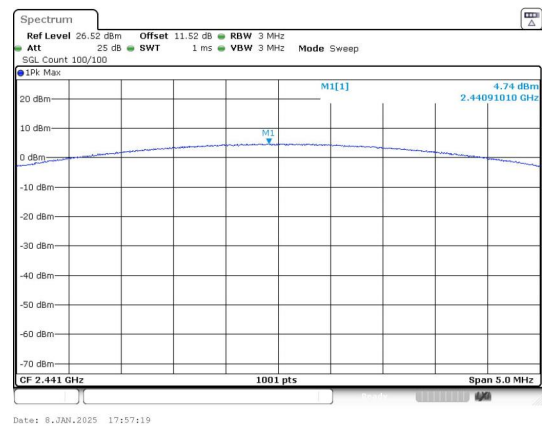
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 39**



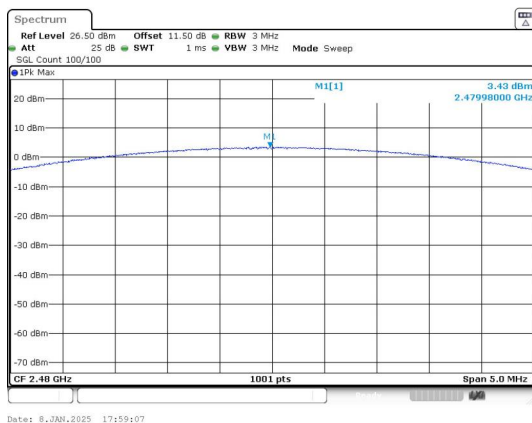
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 78**



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



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



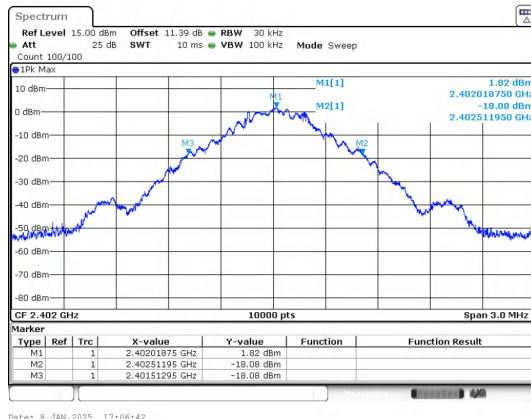
**Peak Output Power**  
**8DPSK\_Channel 78**

## 5) 20dB Bandwidth

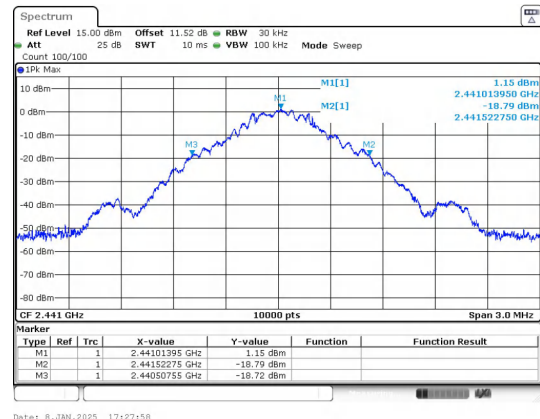
### Test Result

| Modulation    | Channel | Center Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---------------|---------|------------------------|-----------------------|
| GFSK          | 0       | 2402 MHz               | 1.000                 |
|               | 39      | 2441 MHz               | 1.010                 |
|               | 78      | 2480 MHz               | 1.010                 |
| $\pi/4$ DQPSK | 0       | 2402 MHz               | 1.280                 |
|               | 39      | 2441 MHz               | 1.320                 |
|               | 78      | 2480 MHz               | 1.280                 |
| 8DPSK         | 0       | 2402 MHz               | 1.290                 |
|               | 39      | 2441 MHz               | 1.290                 |
|               | 78      | 2480 MHz               | 1.290                 |

### Test Graphs



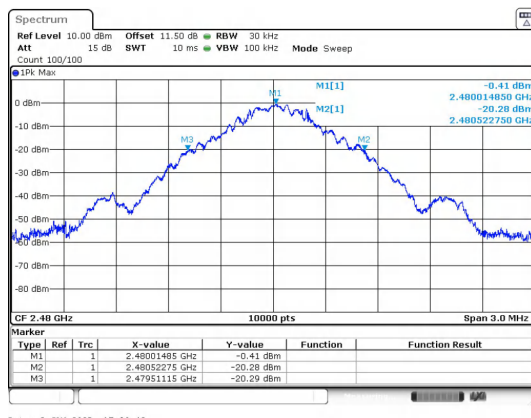
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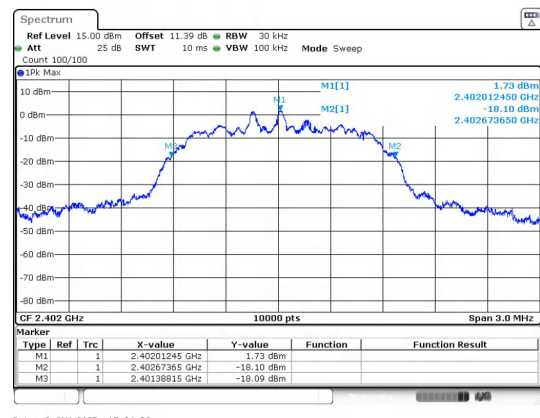
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GFSK\_DH5\_Channel 0

GFSK\_DH5\_Channel 39



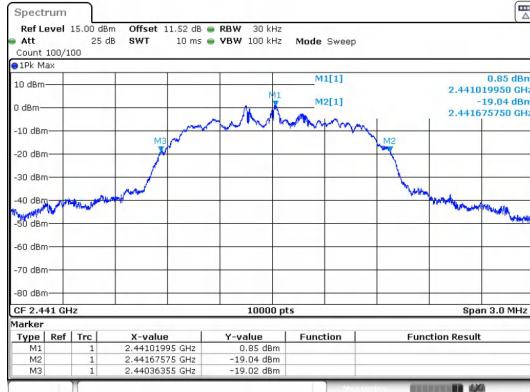
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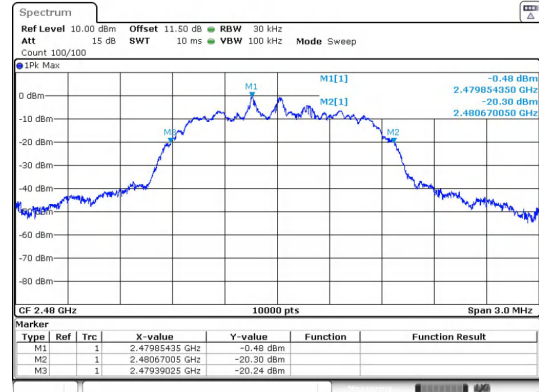
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GFSK\_DH5\_Channel 78

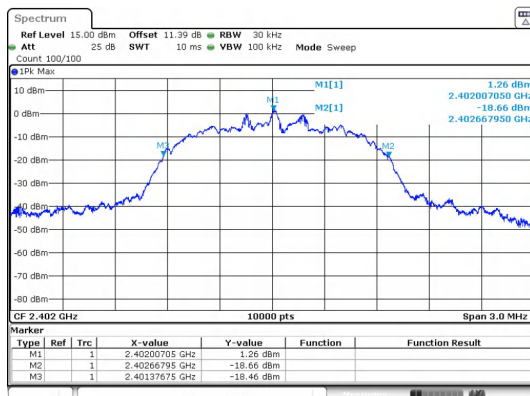
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



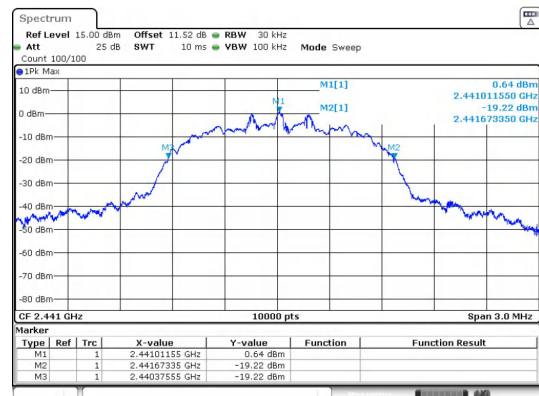
$\pi/4$ DQPSK\_2-DH5\_Channel 39



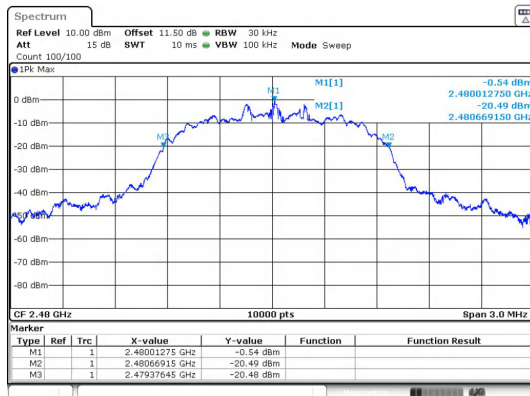
$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



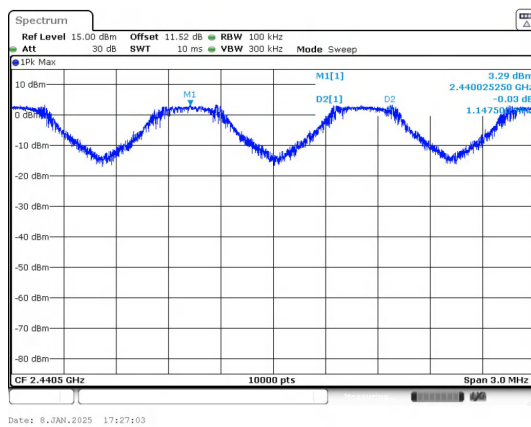
8DPSK\_3-DH5\_Channel 78

## 6) Carrier Frequencies Separation

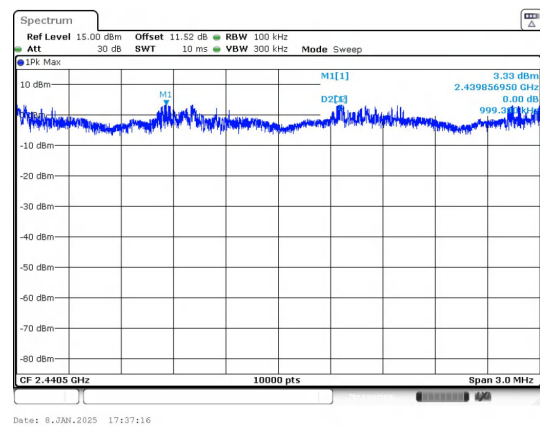
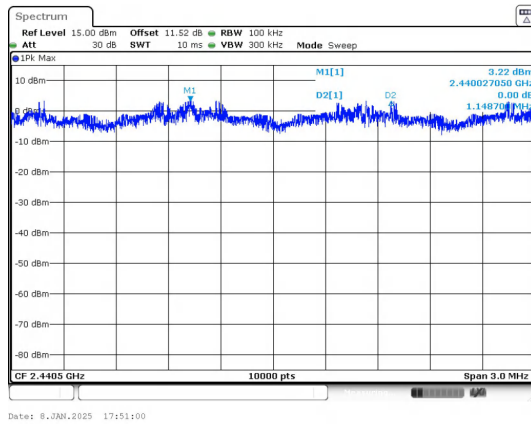
### Test Result

| Modulation   | Packet | Left Center frequency (MHz) | Right Center frequency (MHz) | Hopping Frequency Separation (MHz) | Limit (MHz) | Result |
|--------------|--------|-----------------------------|------------------------------|------------------------------------|-------------|--------|
| GFSK         | DH5    | 2440.0253                   | 2441.1728                    | 1.1475                             | 1.0         | PASS   |
| $\pi/4$ QPSK | 2-DH5  | 2439.8569                   | 2440.8562                    | 0.9993                             | 0.853       | PASS   |
| 8DPSK        | 3-DH5  | 2440.0271                   | 2441.1757                    | 1.1487                             | 0.86        | PASS   |

### Test Graphs



GFSK


 $\pi/4$ QPSK


8DPSK

## 7) Conducted Out Of Band Emission

### Test Result

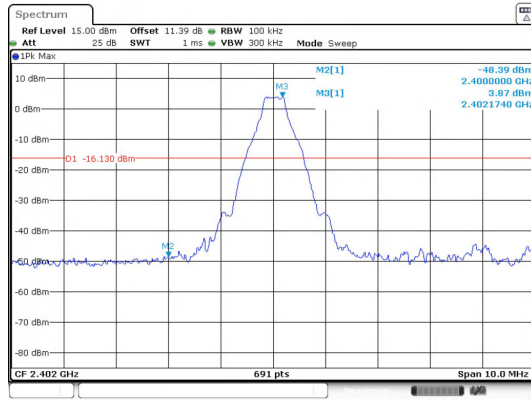
#### Non-Hopping

| Modulation    | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---------------|--------|---------|------------------------------|--------------------------|-------------|-----------------|--------|
| GFSK          | DH5    | 0       | 2400.00                      | -48.570                  | -16.13      | -32.440         | PASS   |
|               |        |         | 9608.08                      | -43.520                  | -16.13      | -27.390         | PASS   |
|               |        | 39      | 9763.72                      | -42.079                  | -16.67      | -25.409         | PASS   |
|               |        | 78      | 2483.50                      | -50.700                  | -17.92      | -32.780         | PASS   |
|               |        |         | 9920.20                      | -39.212                  | -17.92      | -21.292         | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 0       | 908.53                       | -28.838                  | -16.16      | -12.678         | PASS   |
|               |        |         | 2400.00                      | -46.140                  | -16.16      | -29.980         | PASS   |
|               |        | 39      | 9763.72                      | -41.660                  | -16.71      | -24.950         | PASS   |
|               |        | 78      | 2483.50                      | -51.090                  | -18.16      | -32.930         | PASS   |
|               |        |         | 9920.20                      | -39.575                  | -18.16      | -21.415         | PASS   |
| 8DPSK         | 3-DH5  | 0       | 2400.00                      | -45.840                  | -16.48      | -29.360         | PASS   |
|               |        |         | 9608.08                      | -43.458                  | -16.48      | -26.978         | PASS   |
|               |        | 39      | 905.20                       | -36.838                  | -16.63      | -20.208         | PASS   |
|               |        | 78      | 906.03                       | -33.822                  | -18.04      | -15.782         | PASS   |
|               |        |         | 2483.50                      | -49.840                  | -18.04      | -31.800         | PASS   |

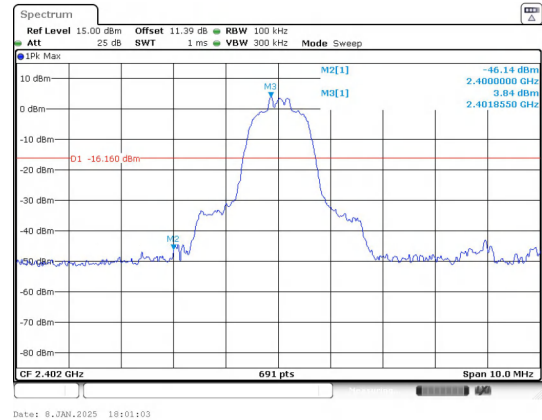
#### Hopping

| 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 | 2398.26                            | -47.177                        | -16.29         | -30.887            | PASS   |
|            |        |         | 2400.00                            | -48.730                        | -16.29         | -32.440            | PASS   |
|            |        |         | 2483.50                            | -50.360                        | -18.33         | -32.030            | PASS   |
| π/4DQPSK   | 2-DH5  |         | 2398.74                            | -48.308                        | -17.0          | -31.308            | PASS   |
|            |        |         | 2400.00                            | -50.840                        | -17.0          | -33.840            | PASS   |
|            |        |         | 2483.50                            | -49.060                        | -18.28         | -30.780            | PASS   |
| 8DPSK      | 3-DH5  |         | 2400.00                            | -47.060                        | -17.96         | -29.100            | PASS   |
|            |        |         | 2483.50                            | -49.590                        | -18.11         | -31.480            | PASS   |

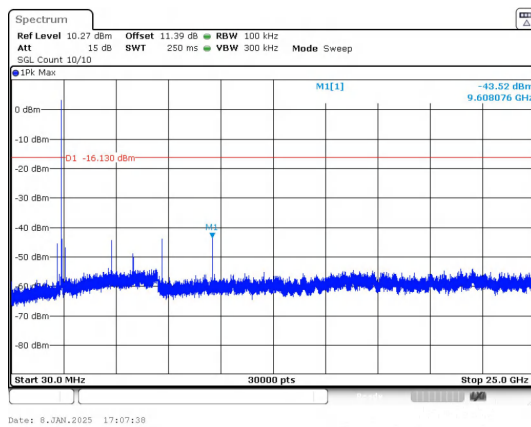
### Test Graphs



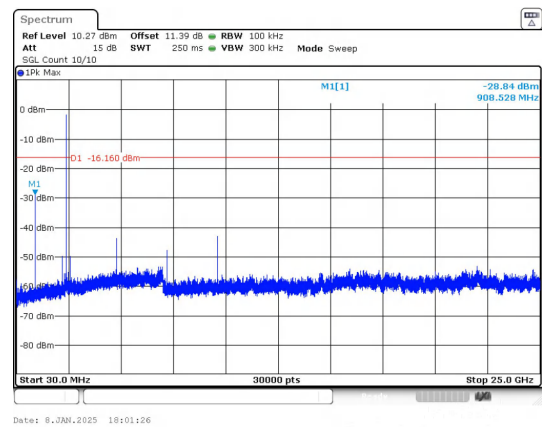
Out Of Band Emission  
GFSK\_DH5\_Channel 0



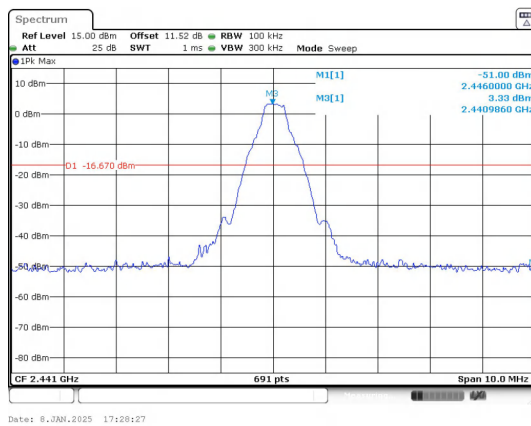
Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



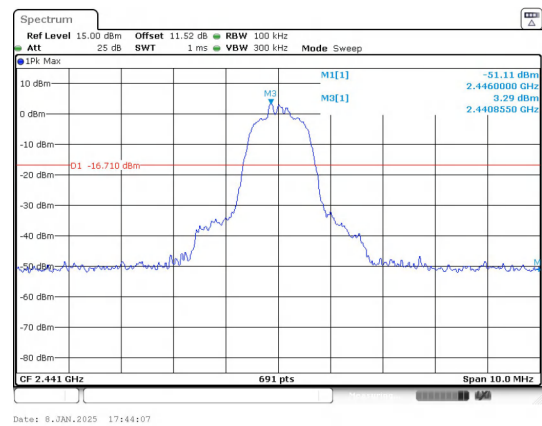
30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 0



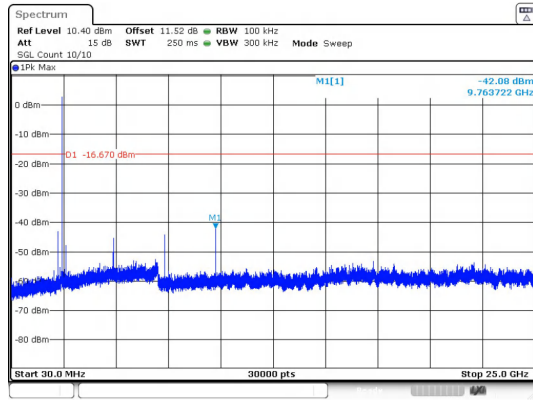
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 0



Out Of Band Emission  
GFSK\_DH5\_Channel 39

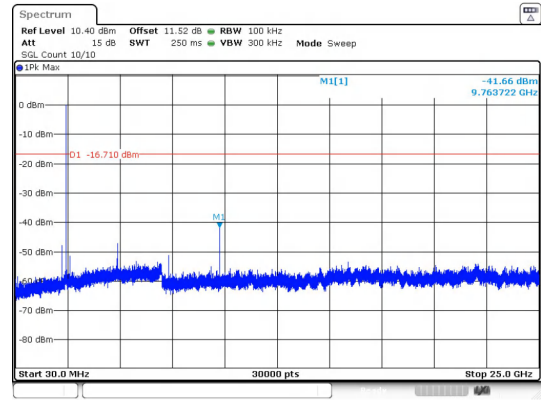


Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



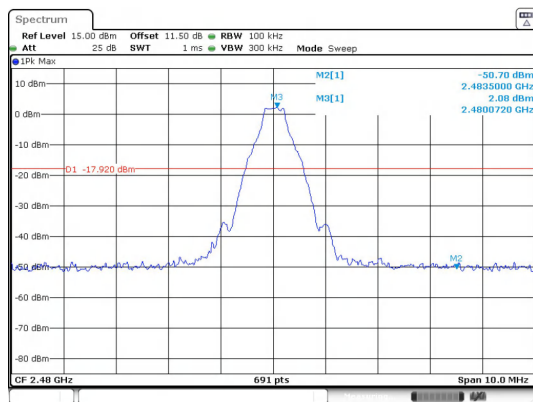
Date: 8.JAN.2025 17:28:49

30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 39



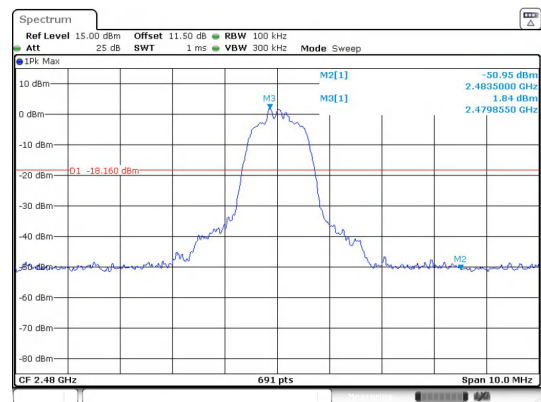
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30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



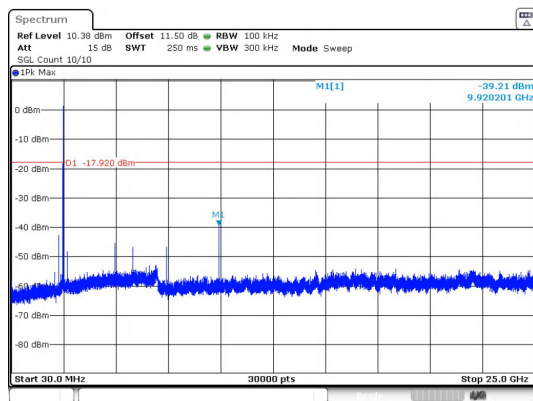
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Out Of Band Emission  
GFSK\_DH5\_Channel 78



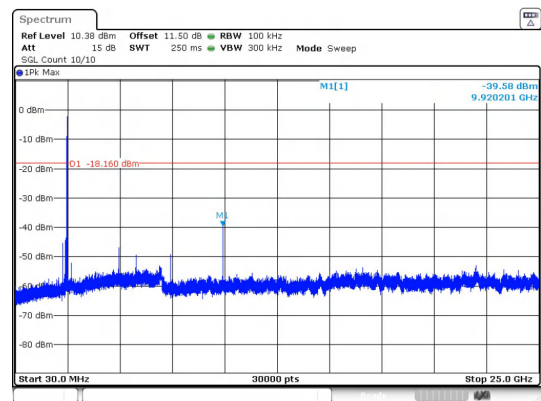
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Out Of Band Emission  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



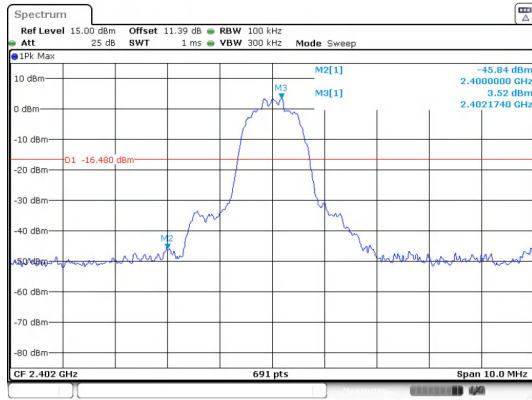
Date: 8.JAN.2025 17:31:49

30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 78

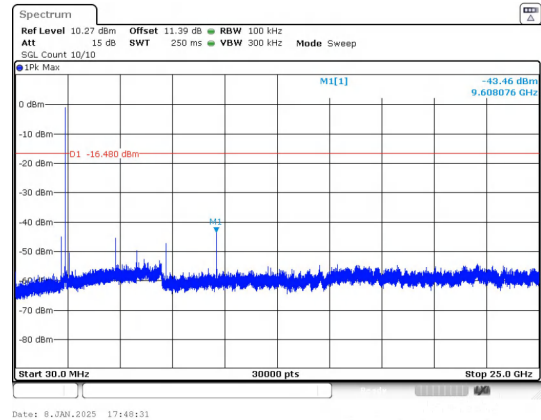


Date: 8.JAN.2025 17:46:30

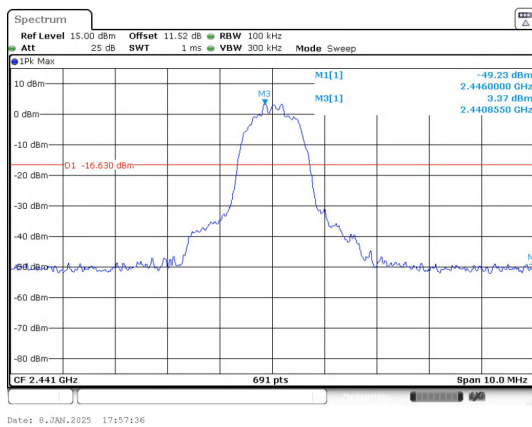
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



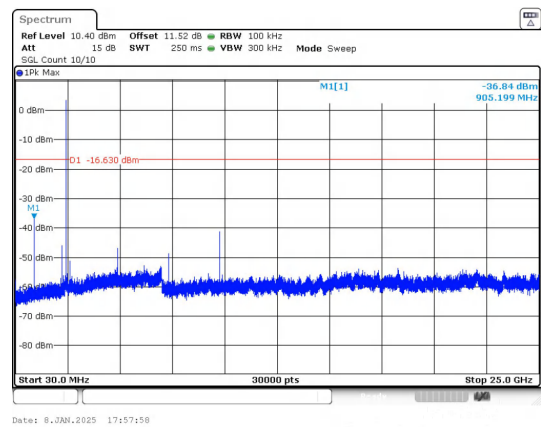
Out Of Band Emission  
8DPSK\_3-DH5\_Channel 0



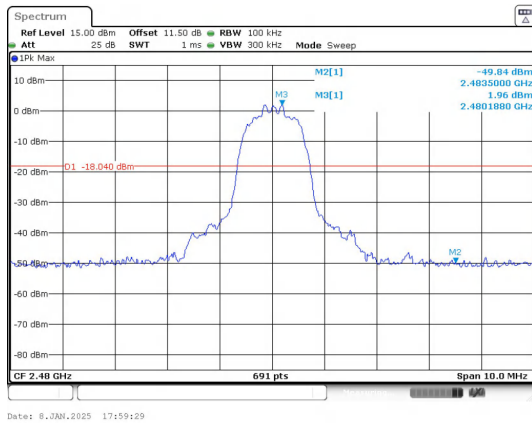
30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 0



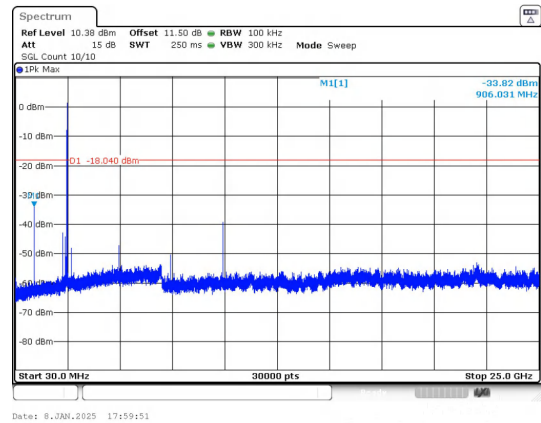
Out Of Band Emission  
8DPSK\_3-DH5\_Channel 39



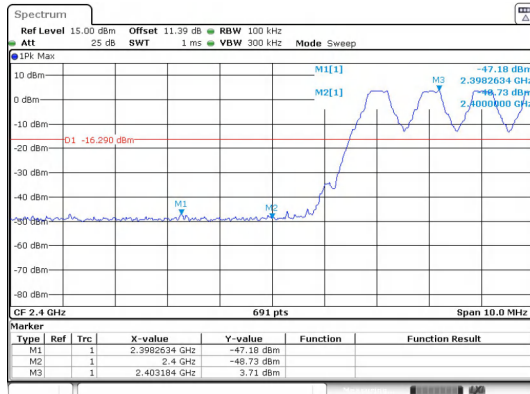
30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 39



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

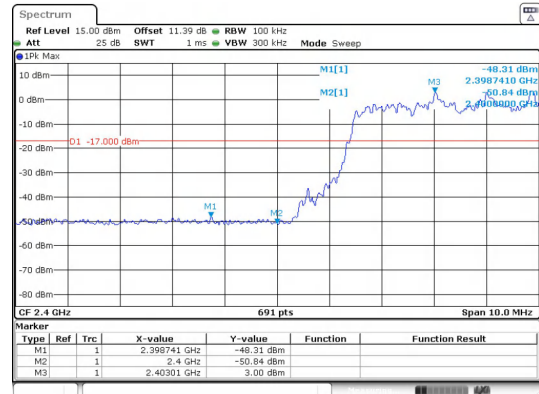


30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 78



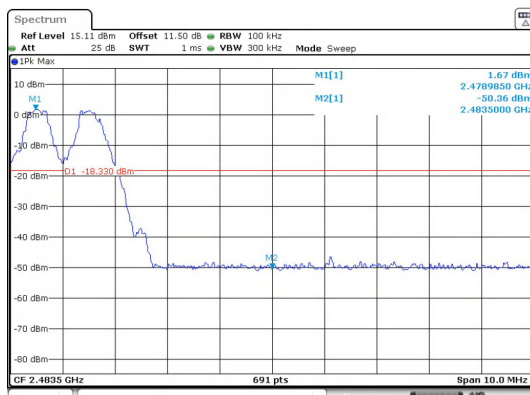
Date: 8.JAN.2025 17:16:51

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



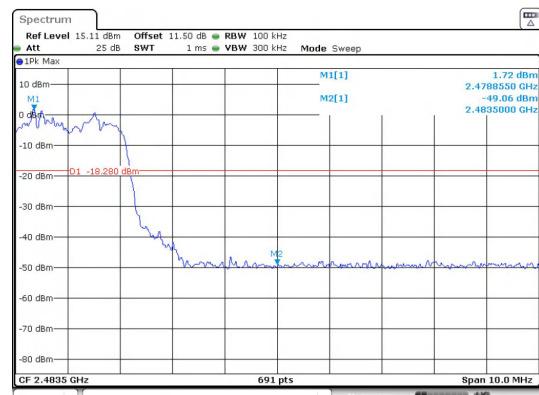
Date: 8.JAN.2025 17:41:36

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



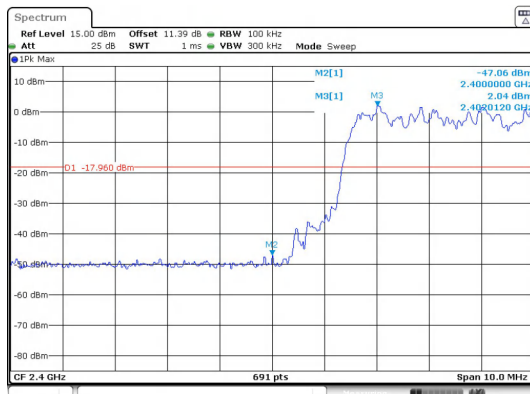
Date: 8.JAN.2025 17:17:21

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



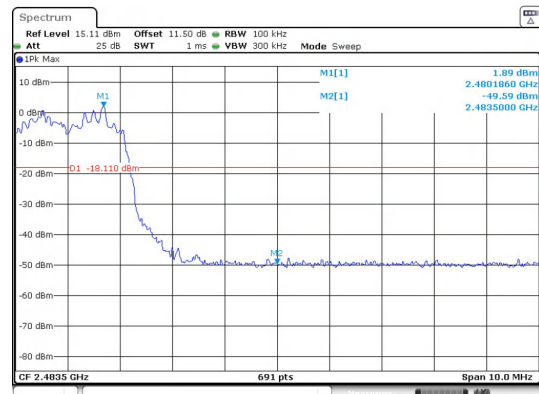
Date: 8.JAN.2025 17:42:46

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



Date: 8.JAN.2025 17:53:37

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



Date: 8.JAN.2025 17:54:06

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

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