

# Appendix Report

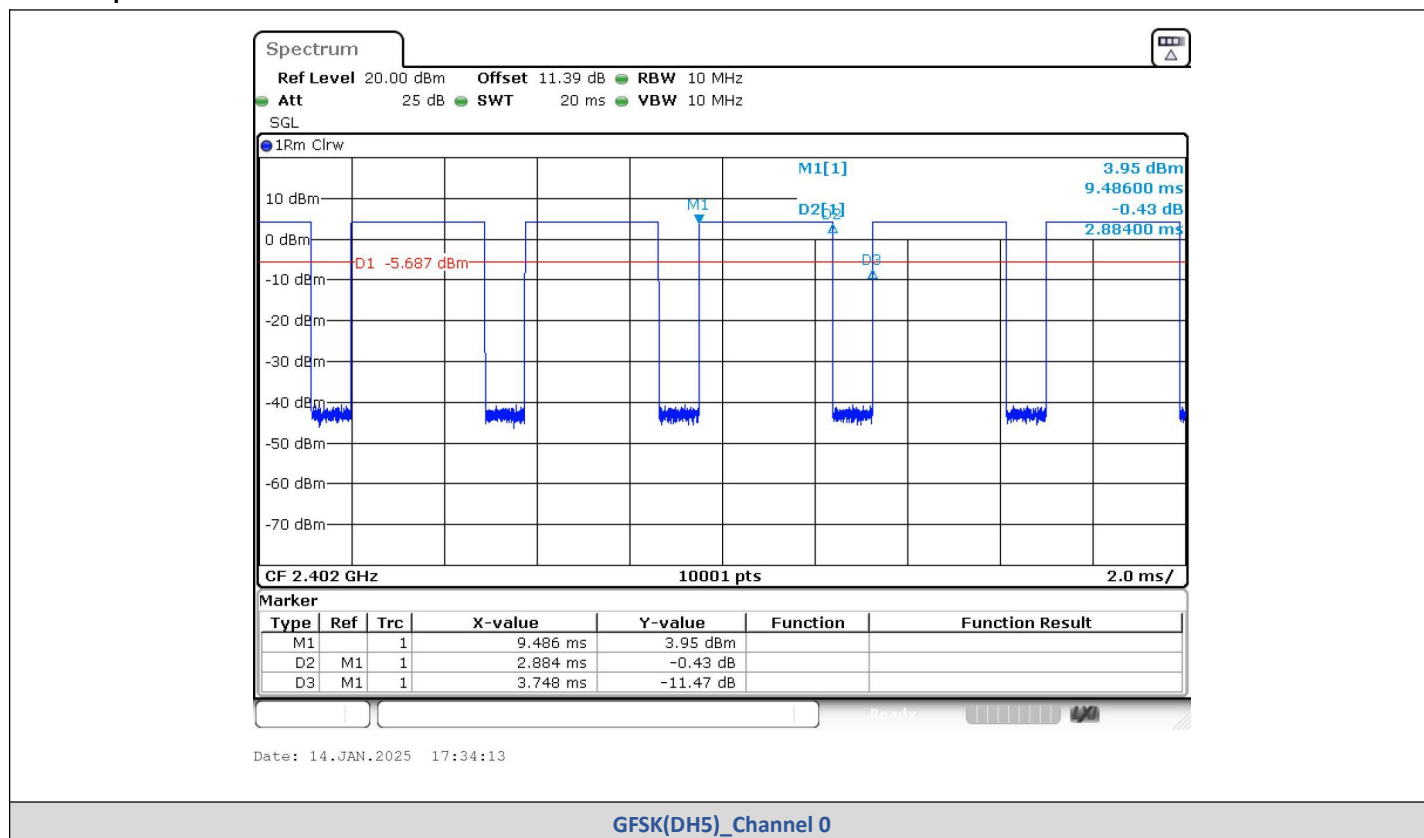
|                |                |
|----------------|----------------|
| Report No.:    | CISRR250109066 |
| Test Engineer: | Mark Fu        |
| Supervised by: | Rory Huang     |

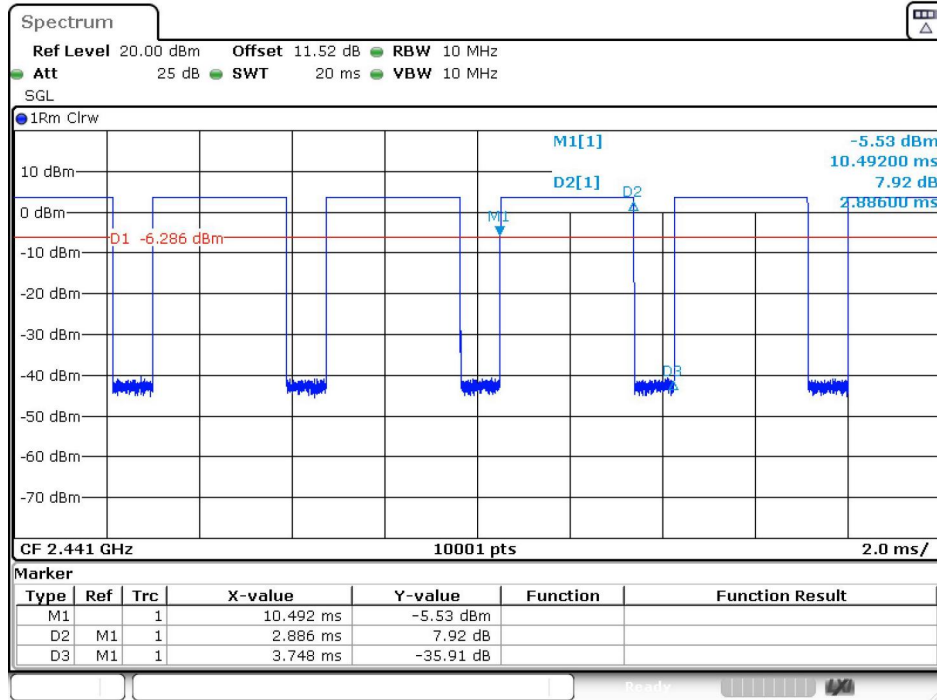
# 1) Duty Cycle

## Test Result

| Modulation    | Packets | Channel | On Time (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle (linear) | Duty Cycle Factor (dB) | 1/T    |
|---------------|---------|---------|--------------|-------------|----------------|---------------------|------------------------|--------|
| GFSK          | DH5     | 0       | 2.884        | 3.748       | 76.95          | 0.7695              | 1.1379                 | 0.3467 |
|               |         | 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      | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
| 8DPSK         | 3-DH5   | 0       | 2.892        | 3.748       | 77.16          | 0.7716              | 1.1261                 | 0.3458 |
|               |         | 39      | 2.894        | 3.748       | 77.21          | 0.7721              | 1.1233                 | 0.3455 |
|               |         | 78      | 2.892        | 3.746       | 77.20          | 0.7720              | 1.1238                 | 0.3458 |

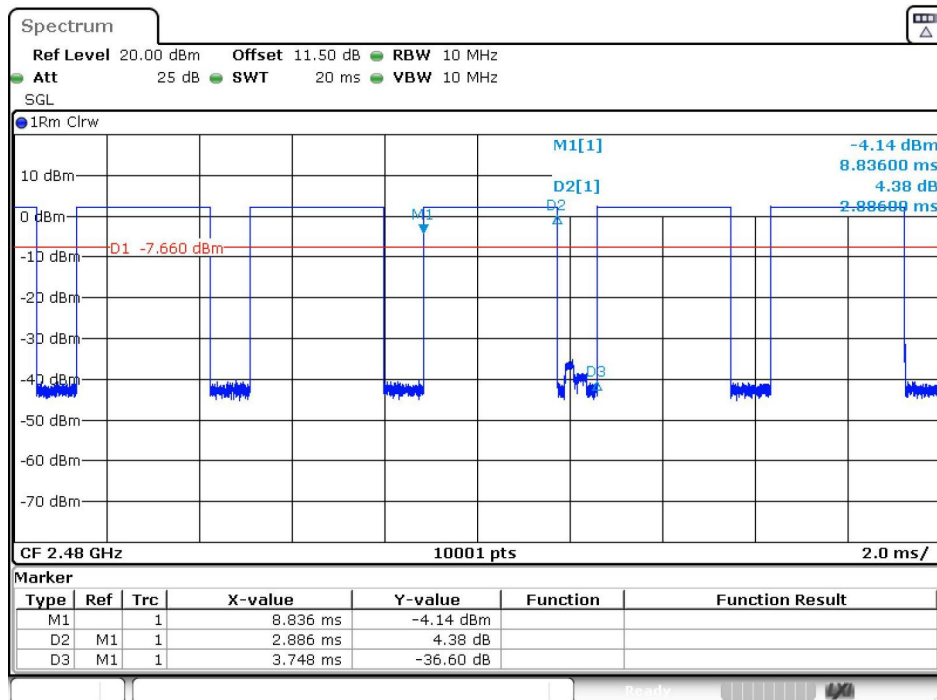
## Test Graphs





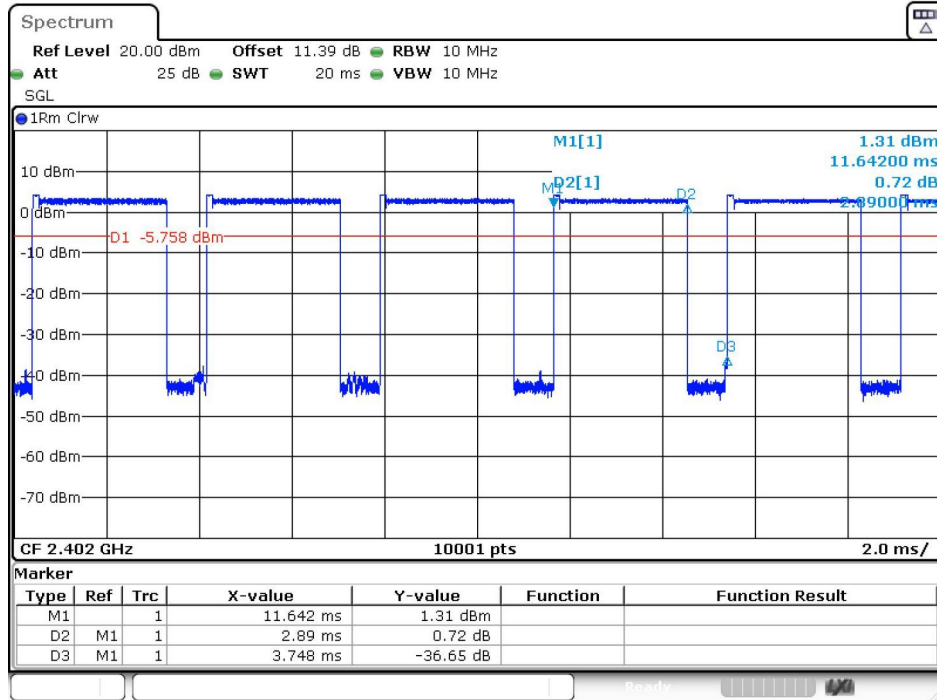
Date: 14.JAN.2025 17:51:05

### GFSK(DH5)\_Channel 39



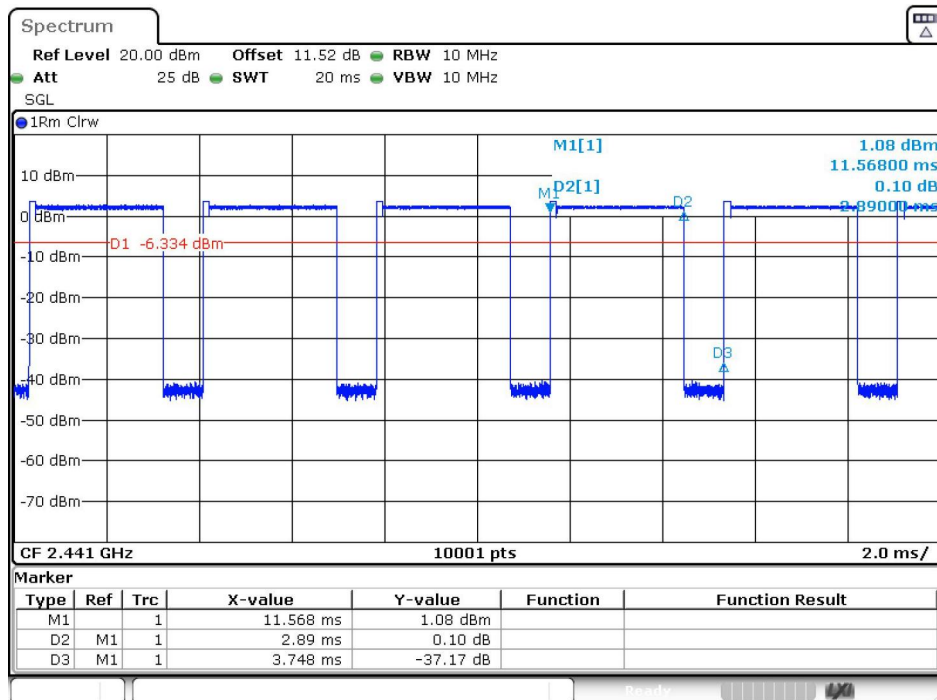
Date: 14.JAN.2025 17:52:47

### GFSK(DH5)\_Channel 78



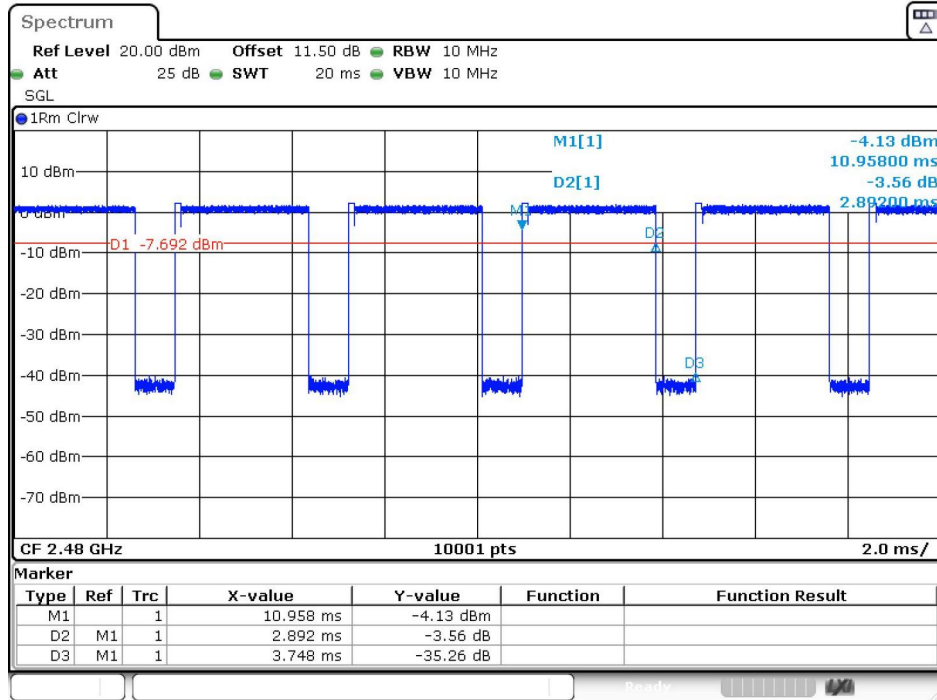
Date: 14, JAN, 2025 17:54:42

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



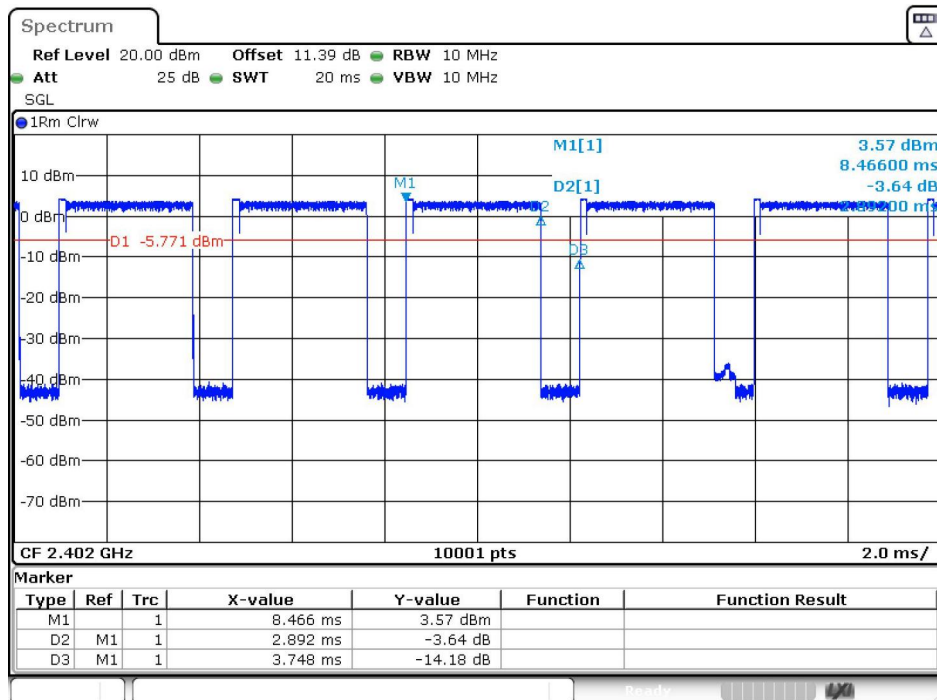
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$\pi/4$ DQPSK(2-DH5)\_Channel 39



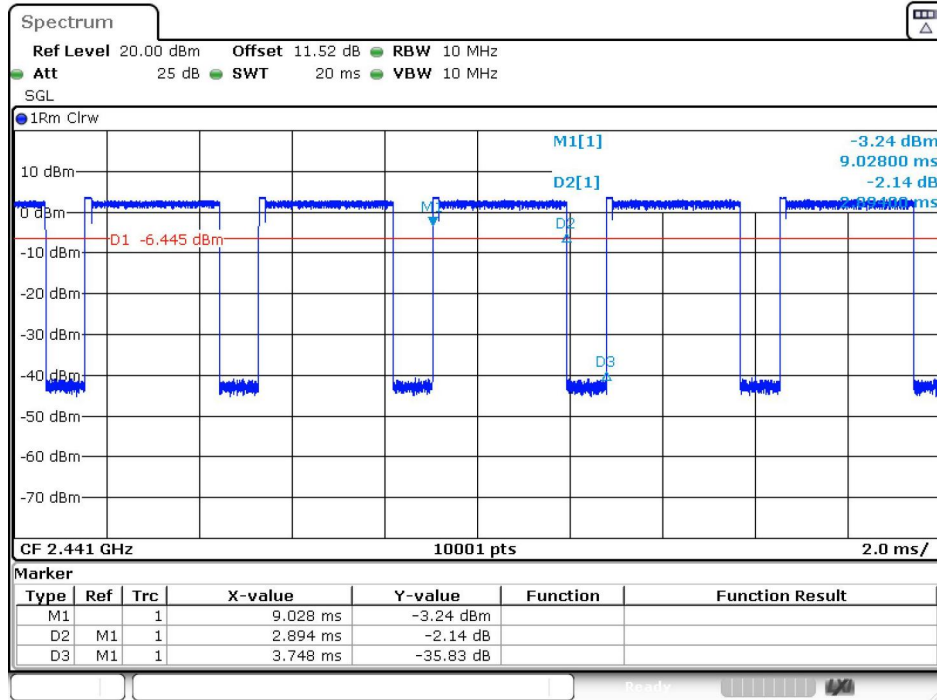
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$\pi/4$ DQPSK(2-DH5)\_Channel 78



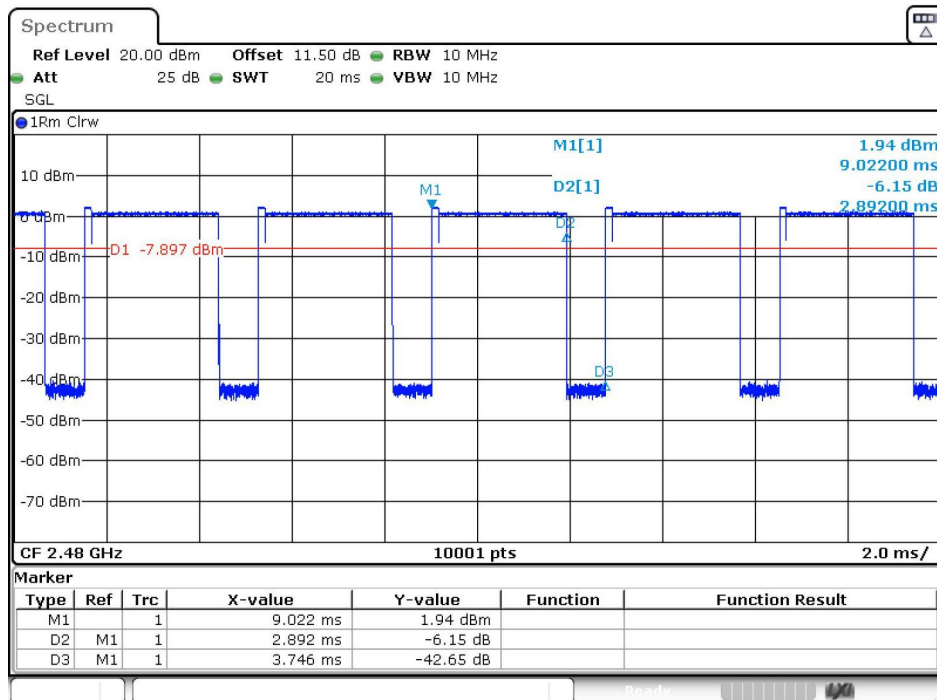
Date: 14.JAN.2025 18:07:12

8DPSK(3-DH5)\_Channel 0



Date: 14.JAN.2025 19:17:07

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



Date: 14.JAN.2025 19:22:53

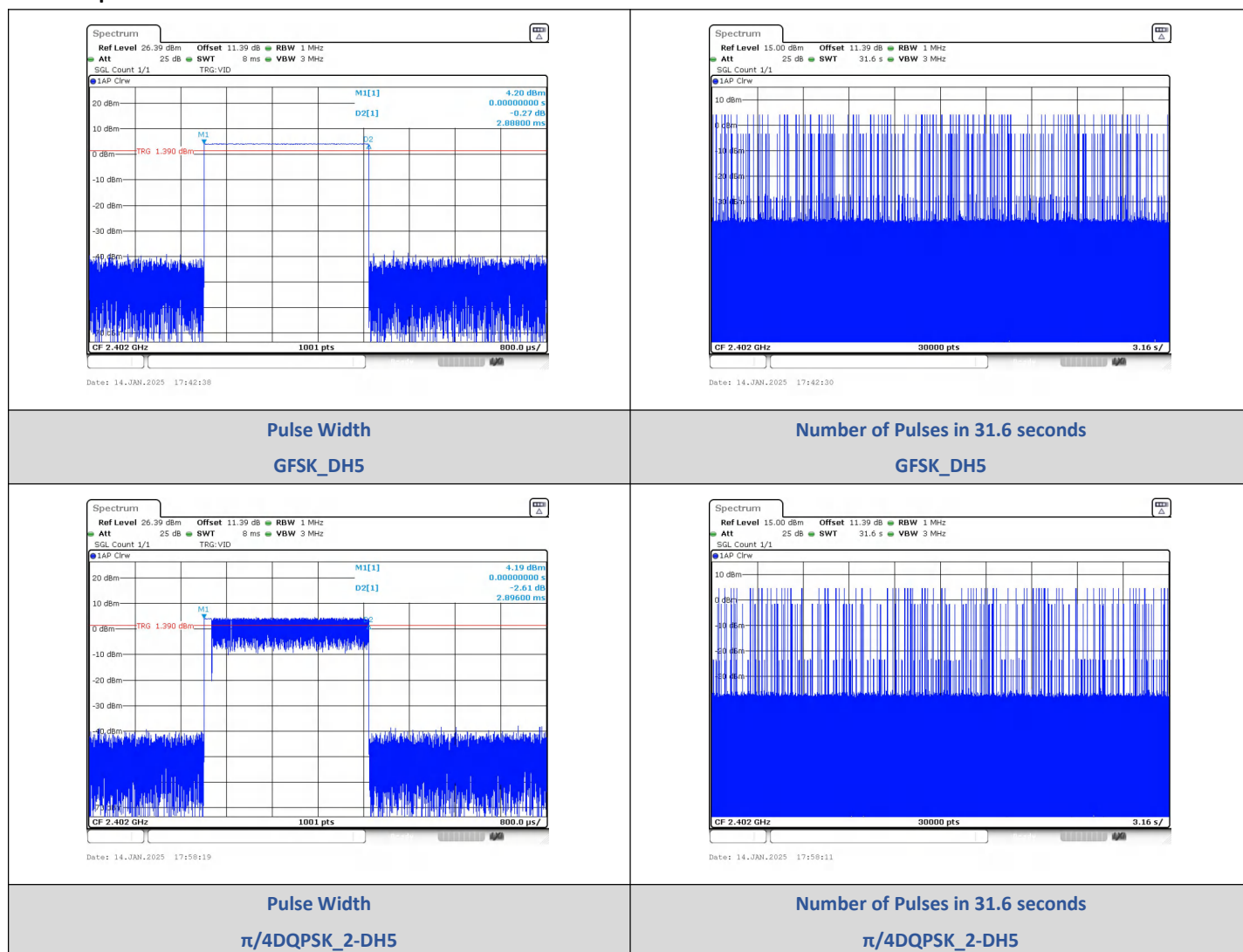
### 8DPSK(3-DH5)\_Channel 78

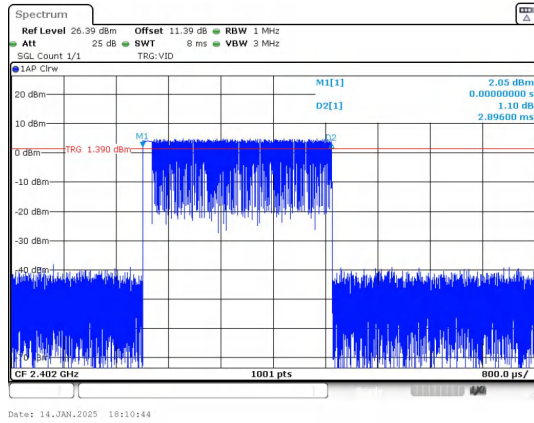
## 2) Dwell Time

### Test Result

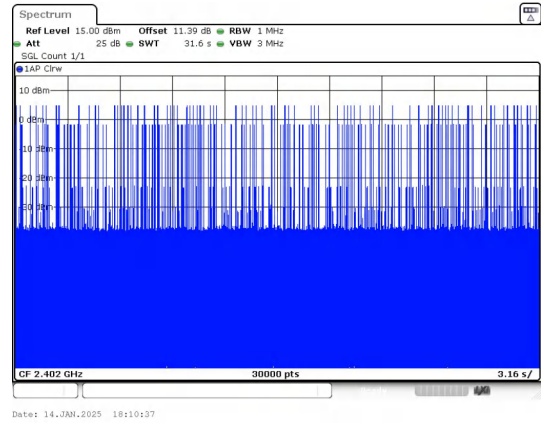
| Modulation    | Packet | Channel          | Pulse Width (ms) | Number of Pulses in 31.6 seconds | Dwell Time (ms) | Limit (ms) | Result |
|---------------|--------|------------------|------------------|----------------------------------|-----------------|------------|--------|
| GFSK          | DH5    | CH0<br>(2402MHz) | 2.888            | 108                              | 311.9           | < 400      | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |                  | 2.896            | 100                              | 289.6           |            | PASS   |
| 8DPSK         | 3-DH5  |                  | 2.896            | 105                              | 304.08          |            | PASS   |

### Test Graphs





Pulse Width  
8DPSK\_3-DH5



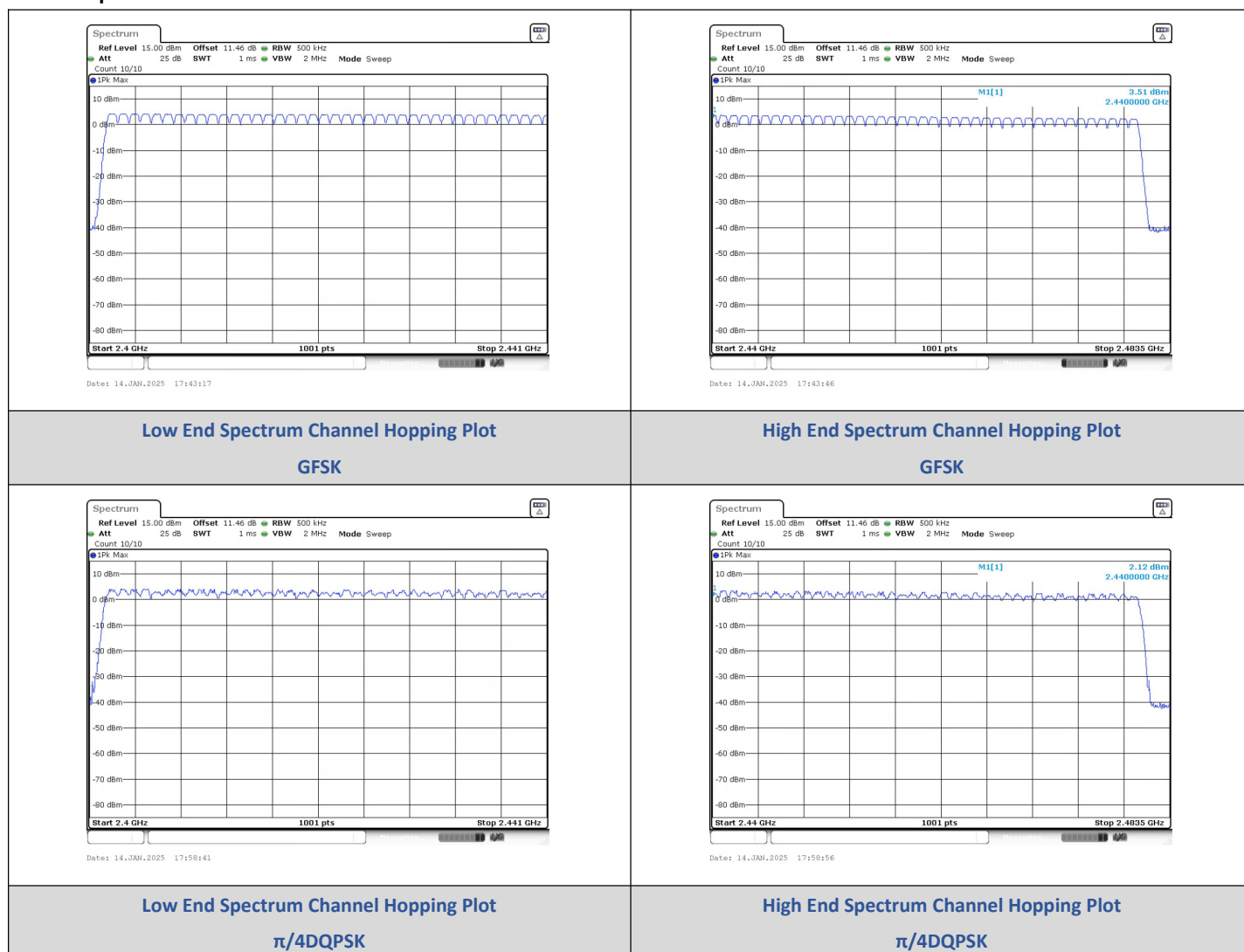
Number of Pulses in 31.6 seconds  
8DPSK\_3-DH5

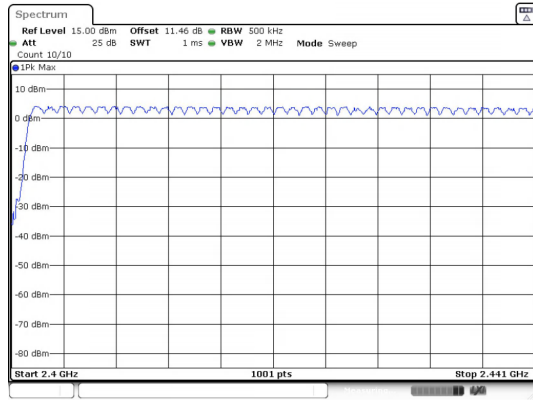
### 3) Number Of Hopping Channel

#### Test Result

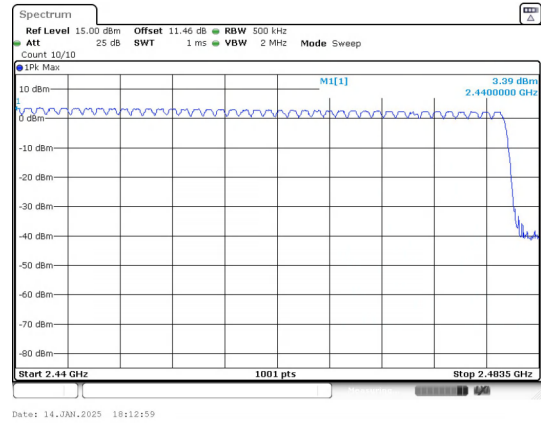
| Modulation    | Packet | Number of Hopping Channel | Limit | Result |
|---------------|--------|---------------------------|-------|--------|
| GFSK          | DH5    | 79                        | 15    | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 79                        | 15    | PASS   |
| 8DPSK     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

#### Test Graphs





Low End Spectrum Channel Hopping Plot  
8DPSK



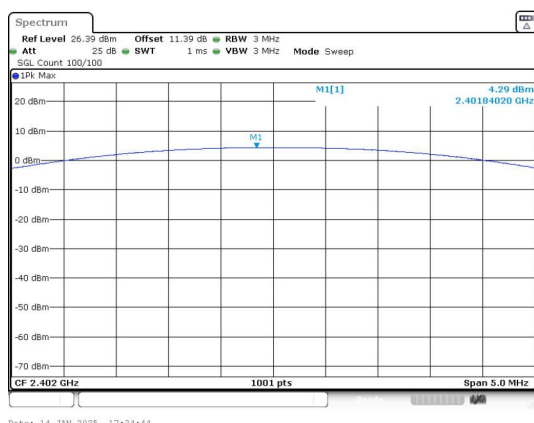
High End Spectrum Channel Hopping Plot  
8DPSK

## 4) Conducted Output Power

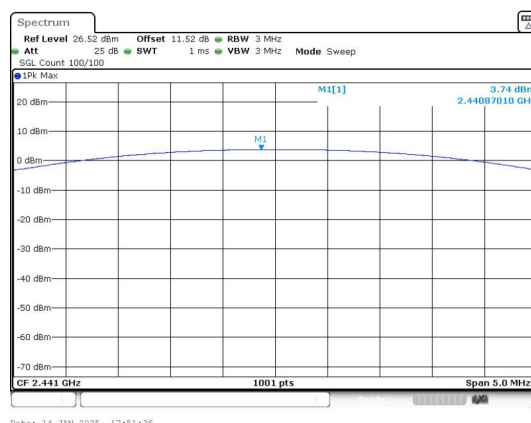
### Test Result

| Modulation    | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (dBm) | Result |
|---------------|-------------|---------|-------------------------|------------------------|-------------|--------|
| GFSK          | DH5         | 0       | 4.29                    | 2.69                   | ≤30         | PASS   |
|               |             | 39      | 3.74                    | 2.37                   |             | PASS   |
|               |             | 78      | 2.45                    | 1.76                   |             | PASS   |
| $\pi/4$ DQPSK | 2-DH5       | 0       | 5.03                    | 3.18                   | ≤20.97      | PASS   |
|               |             | 39      | 4.55                    | 2.85                   |             | PASS   |
|               |             | 78      | 3.23                    | 2.10                   |             | PASS   |
| 8DPSK         | 3-DH5       | 0       | 5.32                    | 3.40                   |             | PASS   |
|               |             | 39      | 4.70                    | 2.95                   |             | PASS   |
|               |             | 78      | 3.35                    | 2.16                   |             | PASS   |

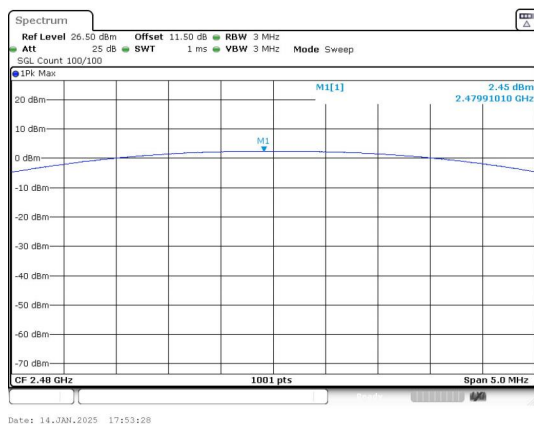
### Test Graphs



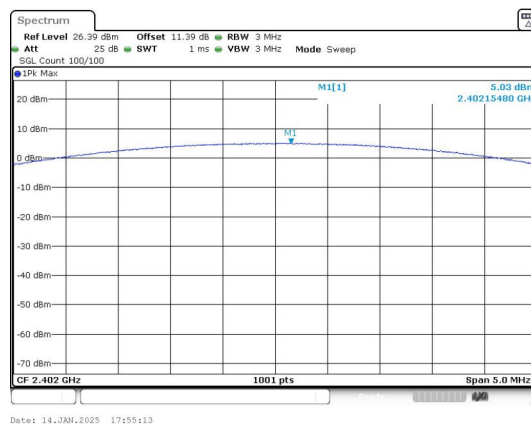
Peak Output Power  
GFSK\_Channel 0



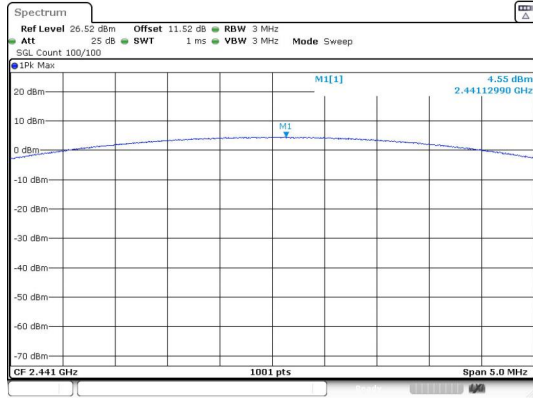
Peak Output Power  
GFSK\_Channel 39



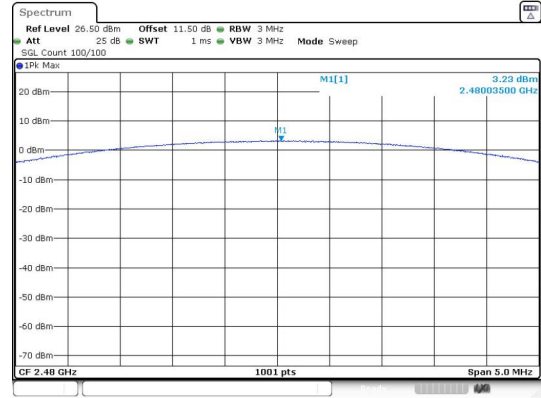
Peak Output Power  
GFSK\_Channel 78



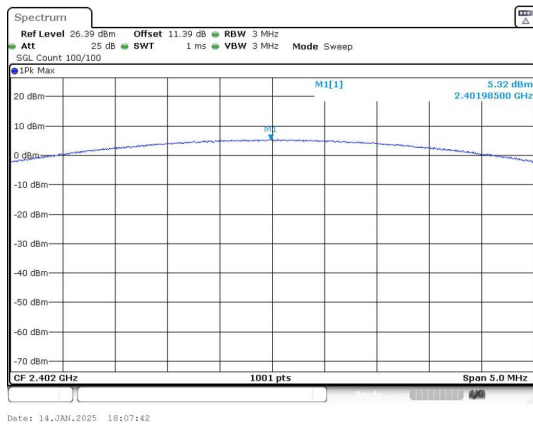
Peak Output Power  
 $\pi/4$ DQPSK\_Channel 0



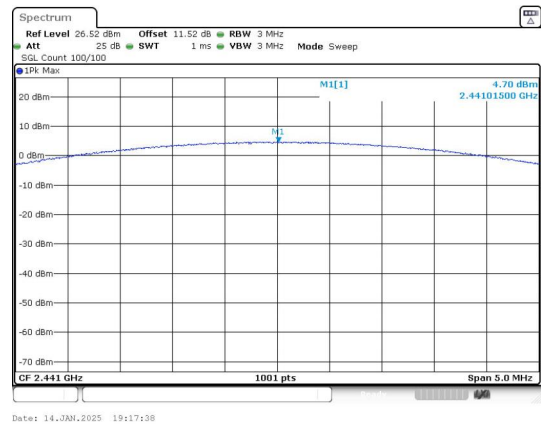
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 39**



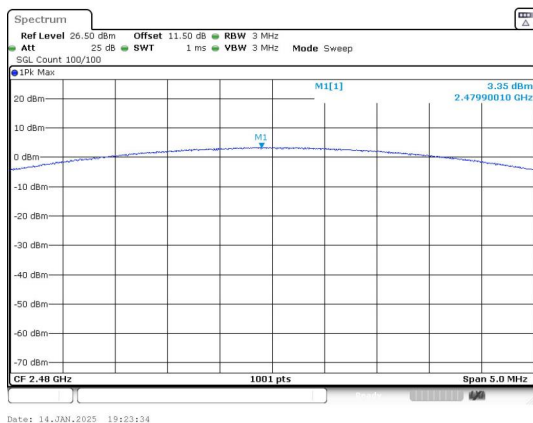
**Peak Output Power**  
 **$\pi/4$ DQPSK\_Channel 78**



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



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



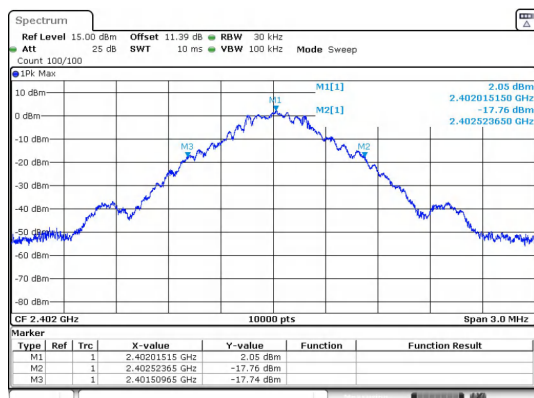
**Peak Output Power**  
**8DPSK\_Channel 78**

## 5) 20dB Bandwidth

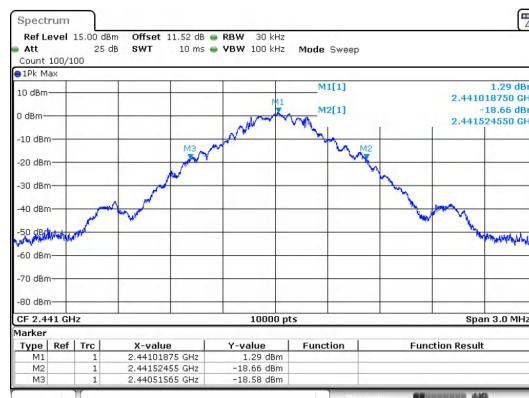
### Test Result

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

### Test Graphs



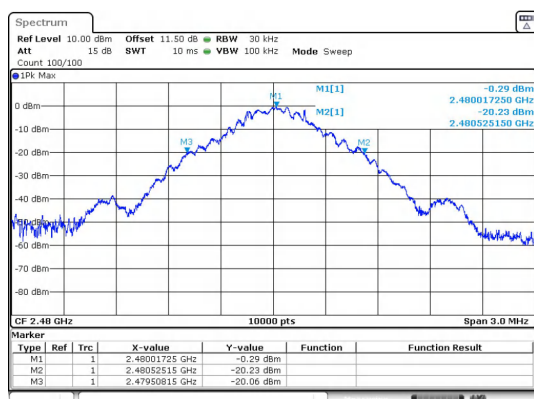
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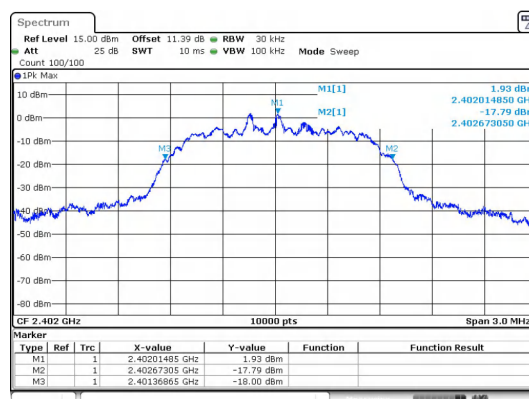
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GFSK\_DH5\_Channel 0

GFSK\_DH5\_Channel 39



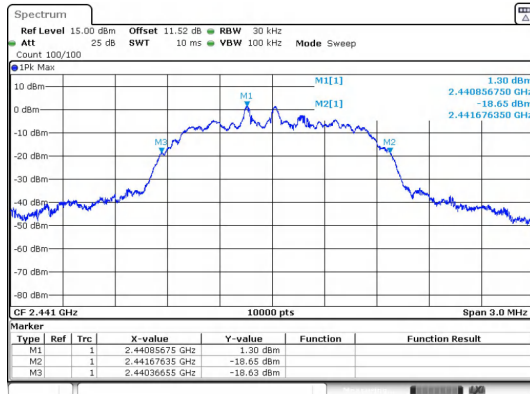
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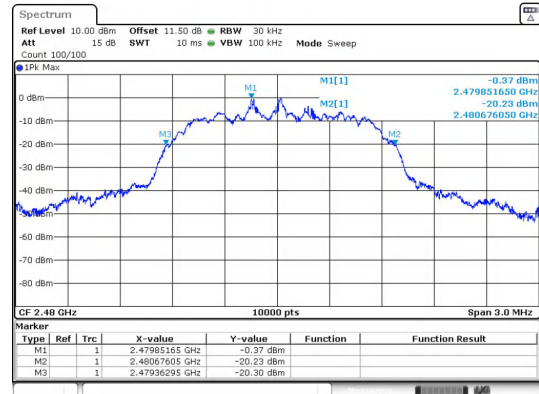
Date: 14.JAN.2025 17:15:100

GFSK\_DH5\_Channel 78

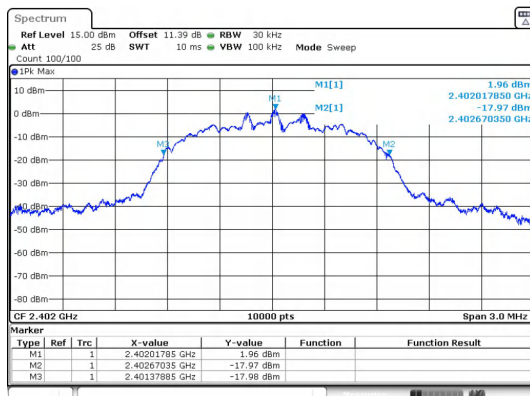
 $\pi$ /4DQPSK\_2-DH5\_Channel 0



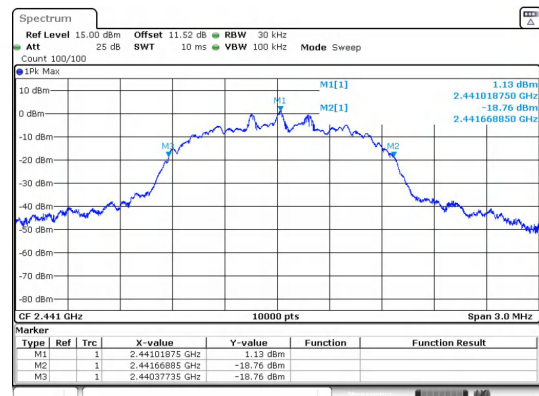
$\pi/4$ DQPSK\_2-DH5\_Channel 39



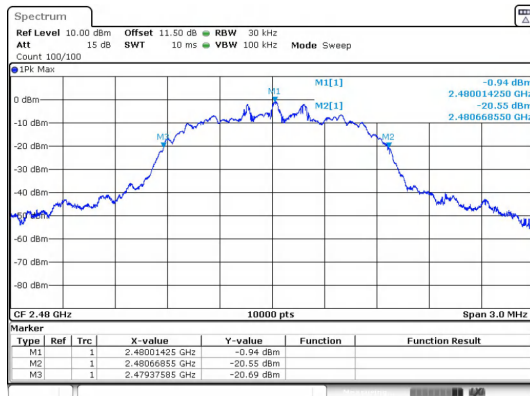
$\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



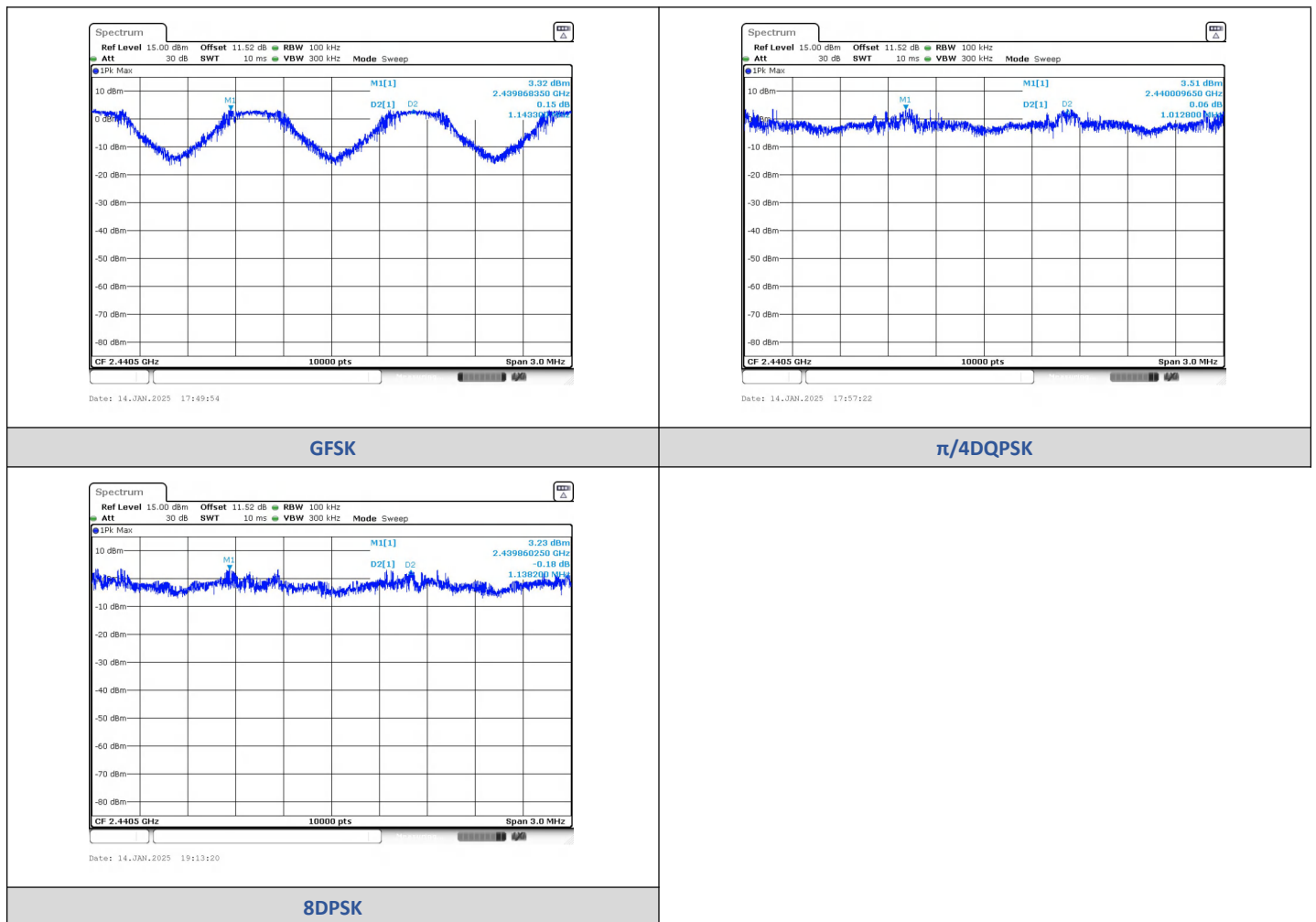
8DPSK\_3-DH5\_Channel 78

## 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    | 2439.8684                   | 2441.0116                    | 1.1433                             | 1.01        | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 2440.0096                   | 2441.0224                    | 1.0128                             | 0.867       | PASS   |
| 8DPSK         | 3-DH5  | 2439.8603                   | 2440.9985                    | 1.1382                             | 0.86        | PASS   |

### Test Graphs



## 7) Conducted Out Of Band Emission

### Test Result

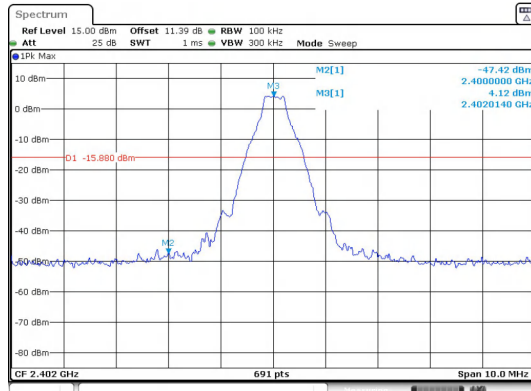
#### Non-Hopping

| Modulation    | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---------------|--------|---------|------------------------------|--------------------------|-------------|-----------------|--------|
| GFSK          | DH5    | 0       | 2400.00                      | -47.420                  | -15.88      | -31.540         | PASS   |
|               |        |         | 7205.96                      | -42.062                  | -15.88      | -26.182         | PASS   |
|               |        | 39      | 9763.72                      | -41.888                  | -16.41      | -25.478         | PASS   |
|               |        | 78      | 2483.50                      | -50.480                  | -17.78      | -32.700         | PASS   |
|               |        |         | 9920.20                      | -38.236                  | -17.78      | -20.456         | PASS   |
| $\pi/4$ DQPSK | 2-DH5  | 0       | 2400.00                      | -48.020                  | -15.94      | -32.080         | PASS   |
|               |        |         | 9608.08                      | -42.348                  | -15.94      | -26.408         | PASS   |
|               |        | 39      | 9763.72                      | -41.296                  | -16.48      | -24.816         | PASS   |
|               |        | 78      | 2483.50                      | -49.350                  | -17.76      | -31.590         | PASS   |
|               |        |         | 9920.20                      | -38.411                  | -17.76      | -20.651         | PASS   |
| 8DPSK         | 3-DH5  | 0       | 2400.00                      | -45.140                  | -15.93      | -29.210         | PASS   |
|               |        |         | 9608.08                      | -42.958                  | -15.93      | -27.028         | PASS   |
|               |        | 39      | 9763.72                      | -41.267                  | -16.65      | -24.617         | PASS   |
|               |        | 78      | 2483.50                      | -50.560                  | -18.06      | -32.500         | PASS   |
|               |        |         | 9920.20                      | -38.602                  | -18.06      | -20.542         | PASS   |

#### Hopping

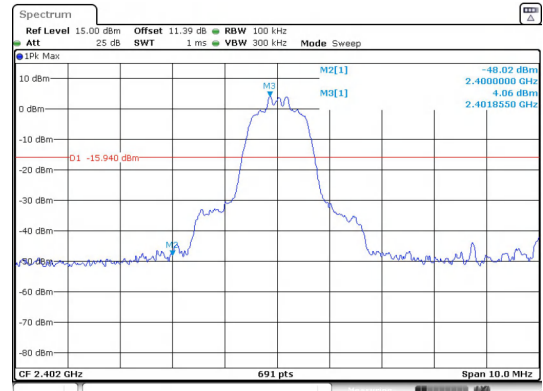
| Modulation    | Packet | Channel | OOB Emission<br>Frequency<br>(MHz) | OOB Emission<br>Level<br>(dBm) | Limit<br>(dBm) | Over Limit<br>(dB) | Result |
|---------------|--------|---------|------------------------------------|--------------------------------|----------------|--------------------|--------|
| GFSK          | DH5    | Hopping | 2395.27                            | -48.120                        | -16.07         | -32.050            | PASS   |
|               |        |         | 2400.00                            | -49.130                        | -16.07         | -33.060            | PASS   |
|               |        |         | 2483.50                            | -50.470                        | -18.01         | -32.460            | PASS   |
| $\pi/4$ DQPSK | 2-DH5  |         | 2397.63                            | -47.285                        | -16.45         | -30.835            | PASS   |
|               |        |         | 2400.00                            | -49.290                        | -16.45         | -32.840            | PASS   |
|               |        |         | 2483.50                            | -50.150                        | -18.01         | -32.140            | PASS   |
| 8DPSK         | 3-DH5  |         | 2400.00                            | -46.600                        | -16.43         | -30.170            | PASS   |
|               |        |         | 2483.50                            | -49.000                        | -18.2          | -30.800            | PASS   |

### Test Graphs



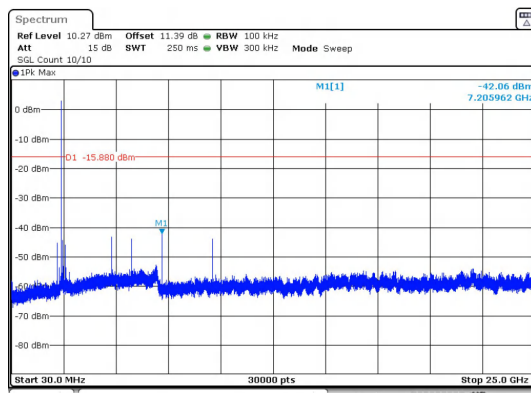
Date: 14.JAN.2025 17:35:105

Out Of Band Emission  
GFSK\_DH5\_Channel 0



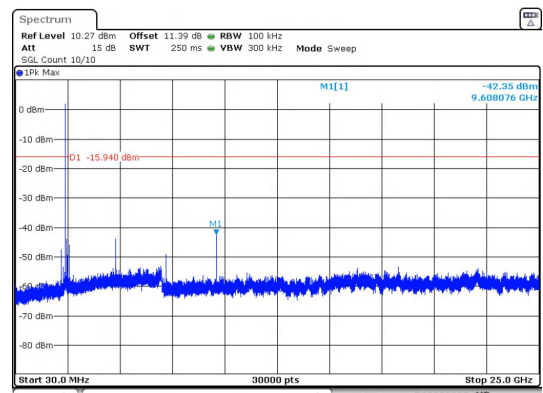
Date: 14.JAN.2025 17:55:135

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



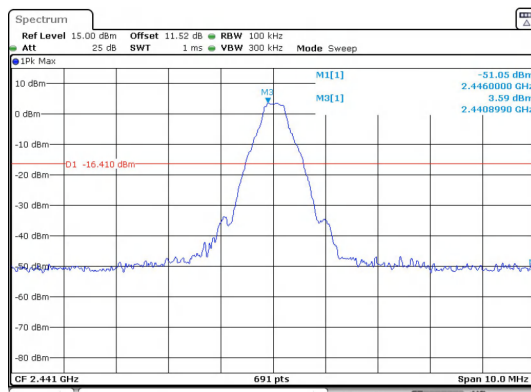
Date: 14.JAN.2025 17:35:128

30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 0



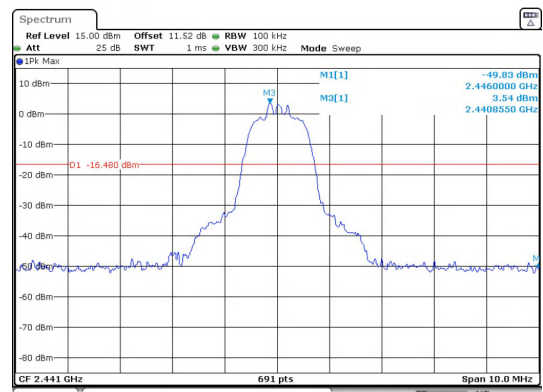
Date: 14.JAN.2025 17:55:157

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



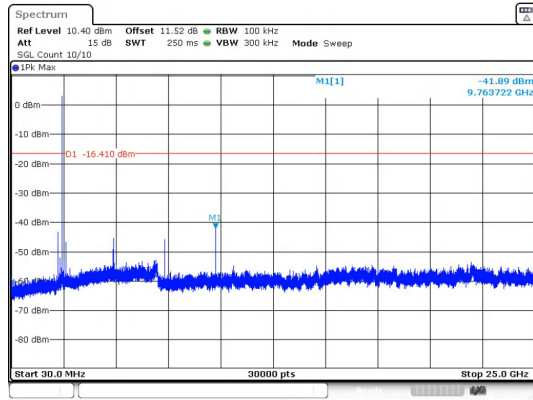
Date: 14.JAN.2025 17:51:153

Out Of Band Emission  
GFSK\_DH5\_Channel 39



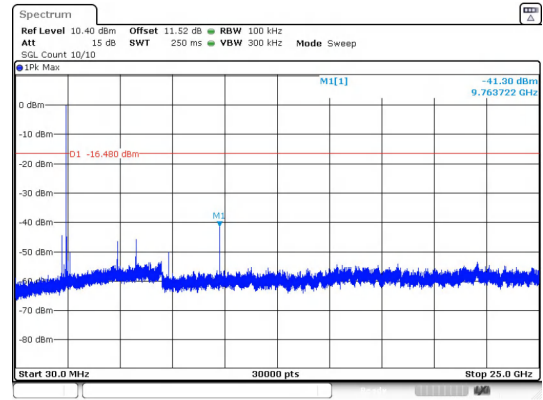
Date: 14.JAN.2025 18:01:145

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



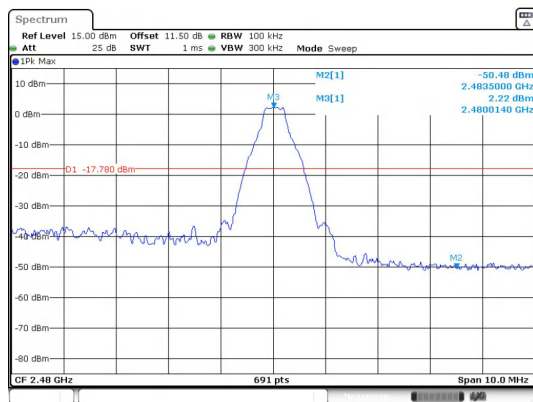
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30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 39



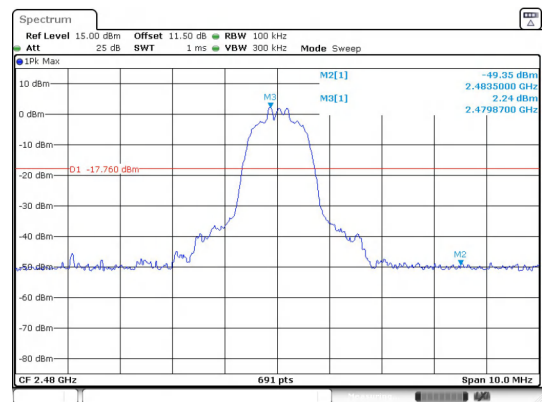
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30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 39



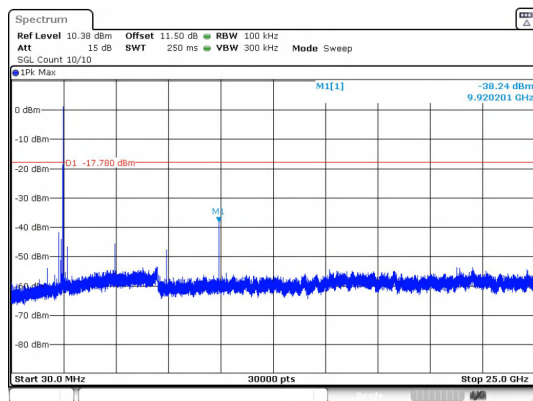
Date: 14.JAN.2025 17:53:50

Out Of Band Emission  
GFSK\_DH5\_Channel 78



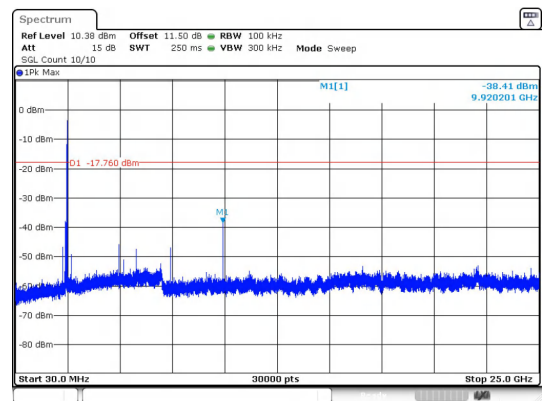
Date: 14.JAN.2025 18:06:18

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



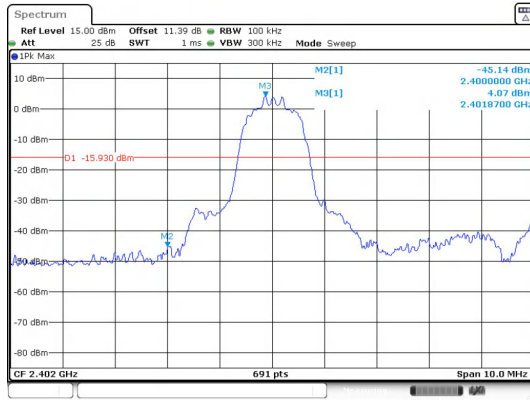
Date: 14.JAN.2025 17:54:12

30.0 MHz - 25000.0 MHz  
GFSK\_DH5\_Channel 78

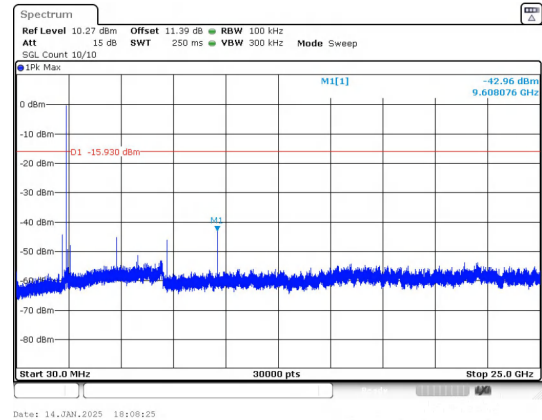


Date: 14.JAN.2025 18:06:40

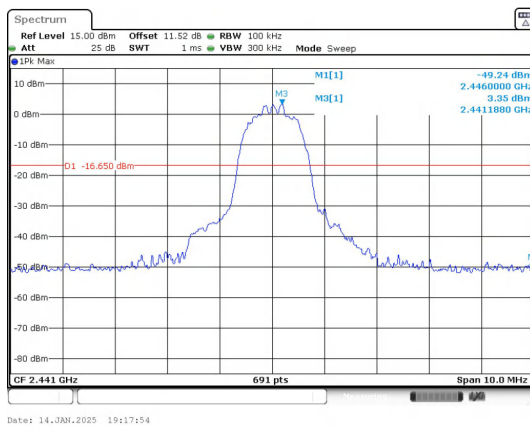
30.0 MHz - 25000.0 MHz  
 $\pi/4$ DQPSK\_2-DH5\_Channel 78



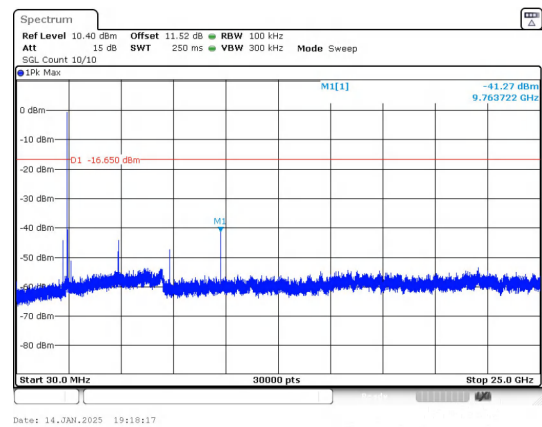
Out Of Band Emission  
8DPSK\_3-DH5\_Channel 0



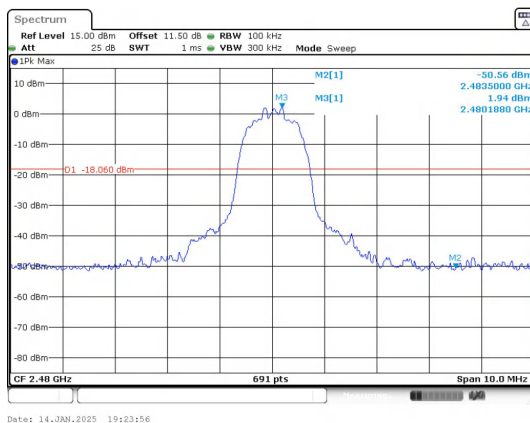
30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 0



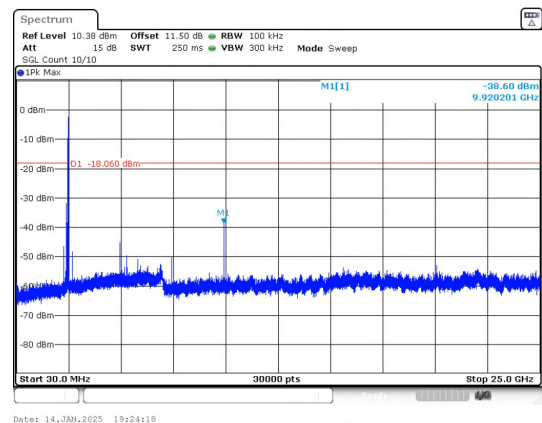
Out Of Band Emission  
8DPSK\_3-DH5\_Channel 39



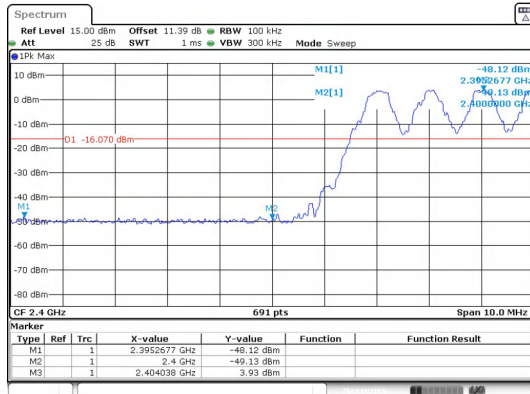
30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 39



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

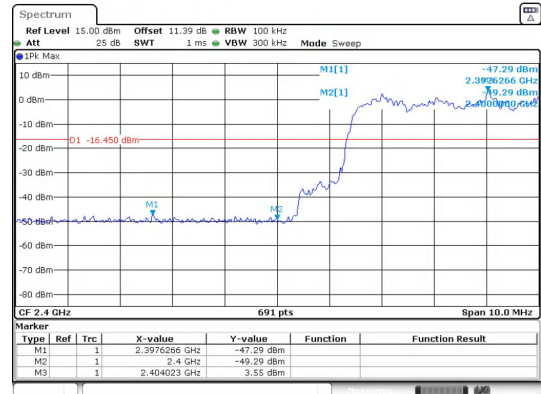


30.0 MHz - 25000.0 MHz  
8DPSK\_3-DH5\_Channel 78



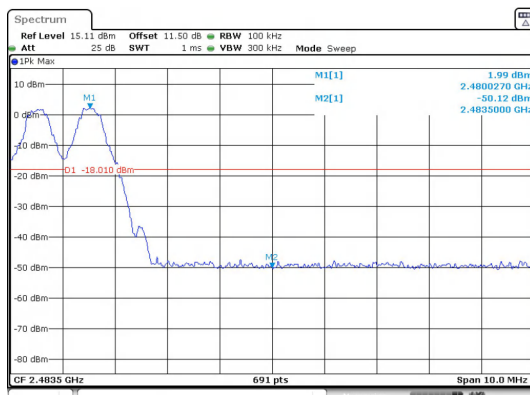
Date: 14.JAN.2025 17:45:09

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



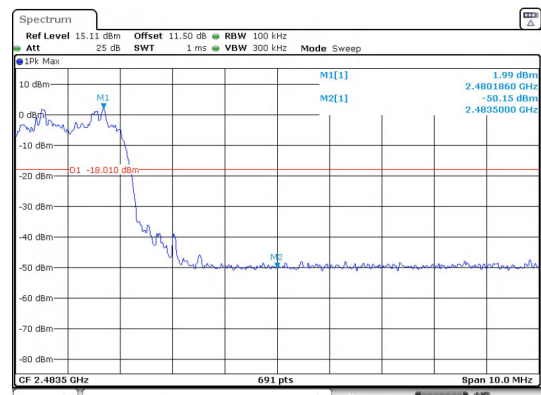
Date: 14.JAN.2025 17:59:56

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



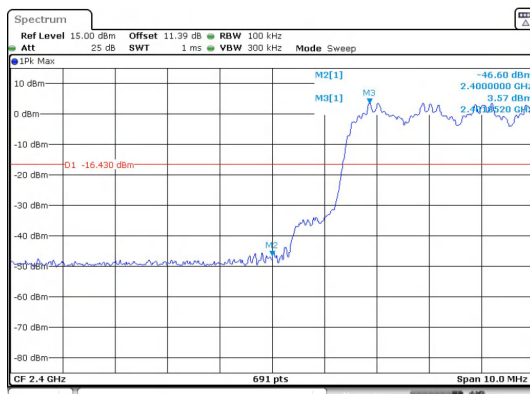
Date: 14.JAN.2025 17:46:01

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



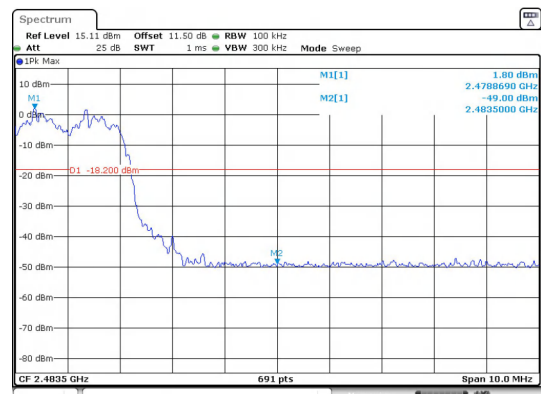
Date: 14.JAN.2025 18:00:25

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



Date: 14.JAN.2025 19:09:31

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



Date: 14.JAN.2025 19:10:39

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

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