# Appendix A

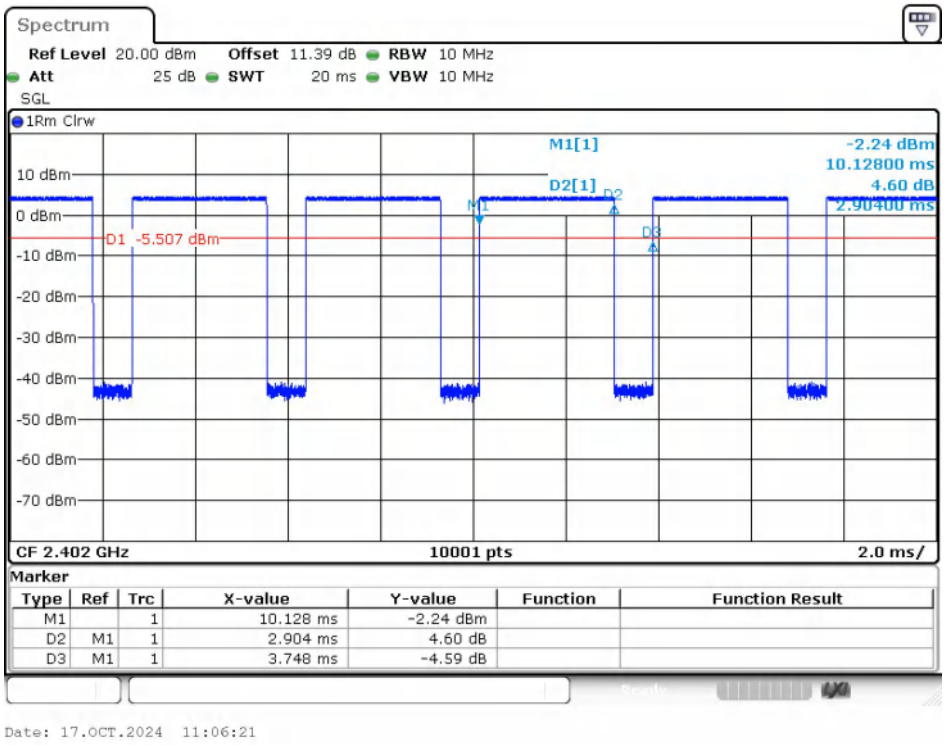
| | |
|---|---|
| Report No.: | CISRR241012048 |
| FCC ID: | 2BFNQM41 |
| Product Name: | TWS wireless Bluetooth headset |
| Model No.: | M41 |
| Test Engineer: | Lucas Huang |
| Supervised by: | Rory Huang |

# 1) Duty Cycle

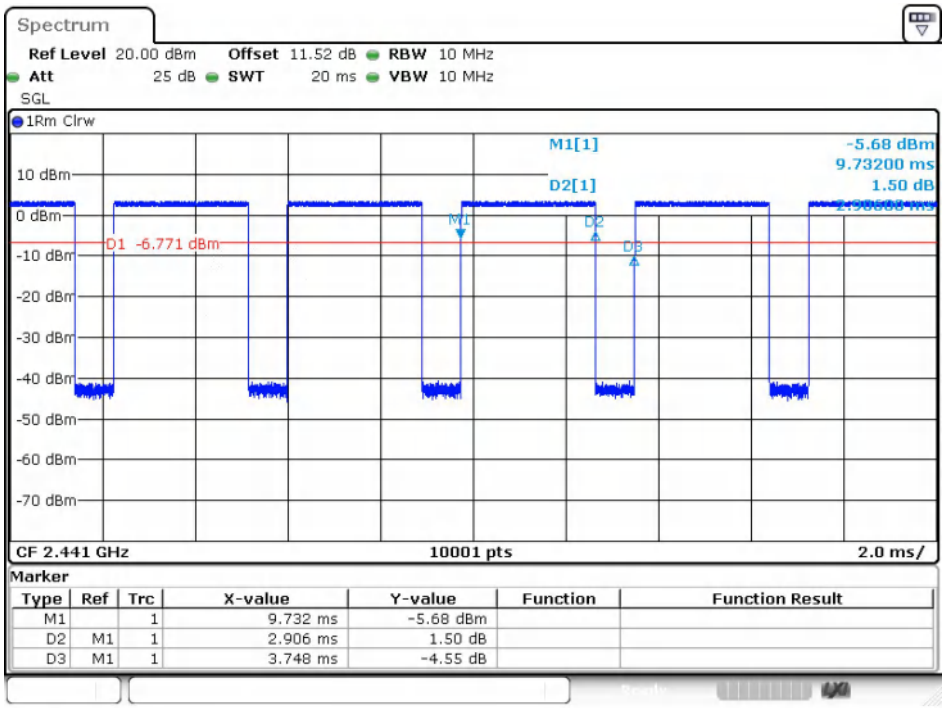
**Test Result**

| Modulation | Packets | Channel | On Time (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle (linear) | Duty Cycle Factor (dB) | 1/T |
|---|---|---|---|---|---|---|---|---|
| GFSK | DH5 | 0 | 2.904 | 3.748 | 77.48 | 0.7748 | 1.1081 | 0.34 |
| | | 39 | 2.906 | 3.748 | 77.53 | 0.7753 | 1.1053 | 0.34 |
| | | 78 | 2.906 | 3.748 | 77.53 | 0.7753 | 1.1053 | 0.34 |
| π/4DQPSK | 2-DH5 | 0 | 2.912 | 3.748 | 77.69 | 0.7769 | 1.0963 | 0.34 |
| | | 39 | 2.910 | 3.748 | 77.64 | 0.7764 | 1.0991 | 0.34 |
| | | 78 | 2.910 | 3.748 | 77.64 | 0.7764 | 1.0991 | 0.34 |
| 8DPSK | 3-DH5 | 0 | 2.914 | 3.748 | 77.75 | 0.7775 | 1.093 | 0.34 |
| | | 39 | 2.912 | 3.748 | 77.69 | 0.7769 | 1.0963 | 0.34 |
| | | 78 | 2.912 | 3.748 | 77.69 | 0.7769 | 1.0963 | 0.34 |

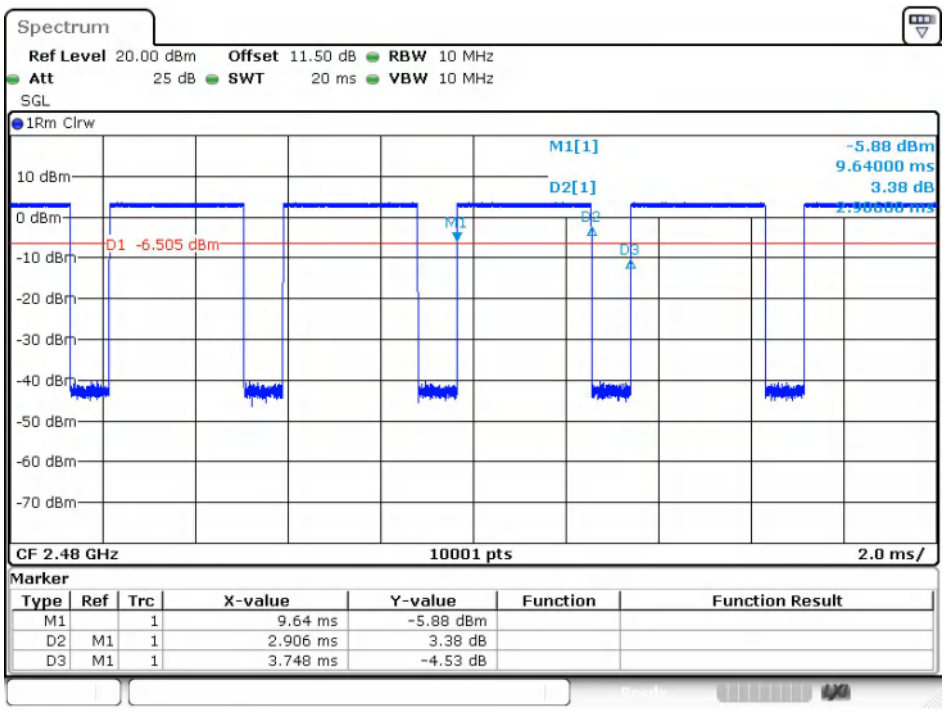
**Test Graphs**



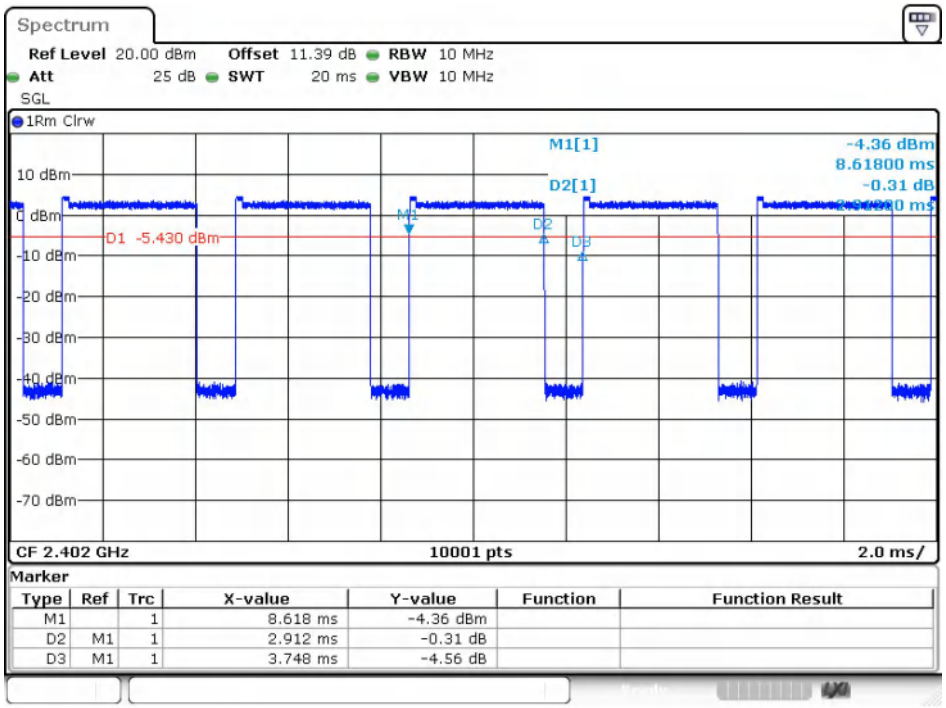

GFSK(DH5)_Channel 0



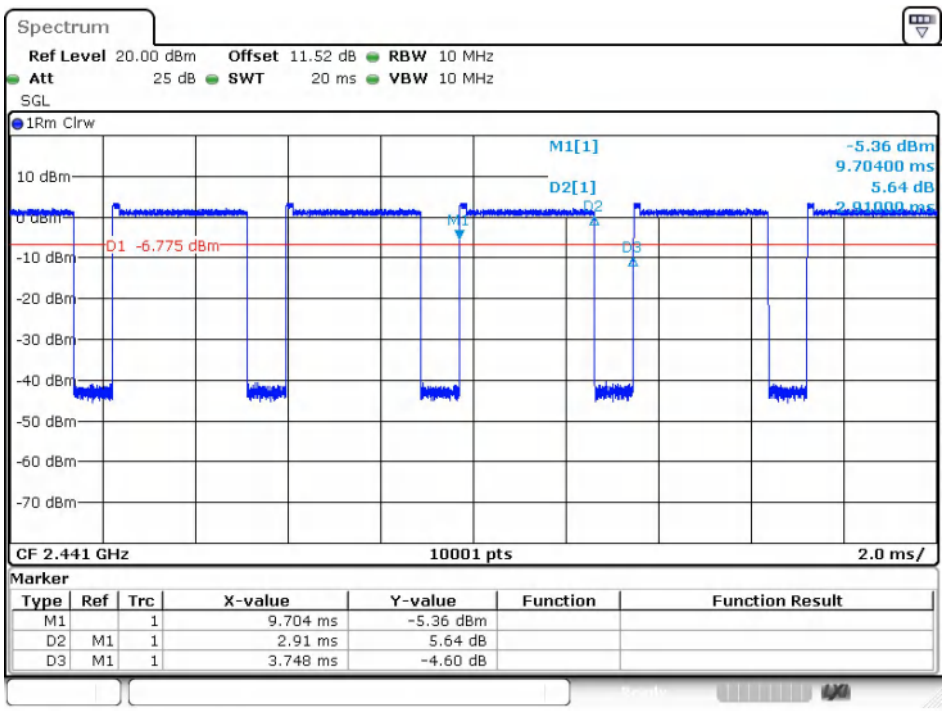

GFSK(DH5)_Channel 39



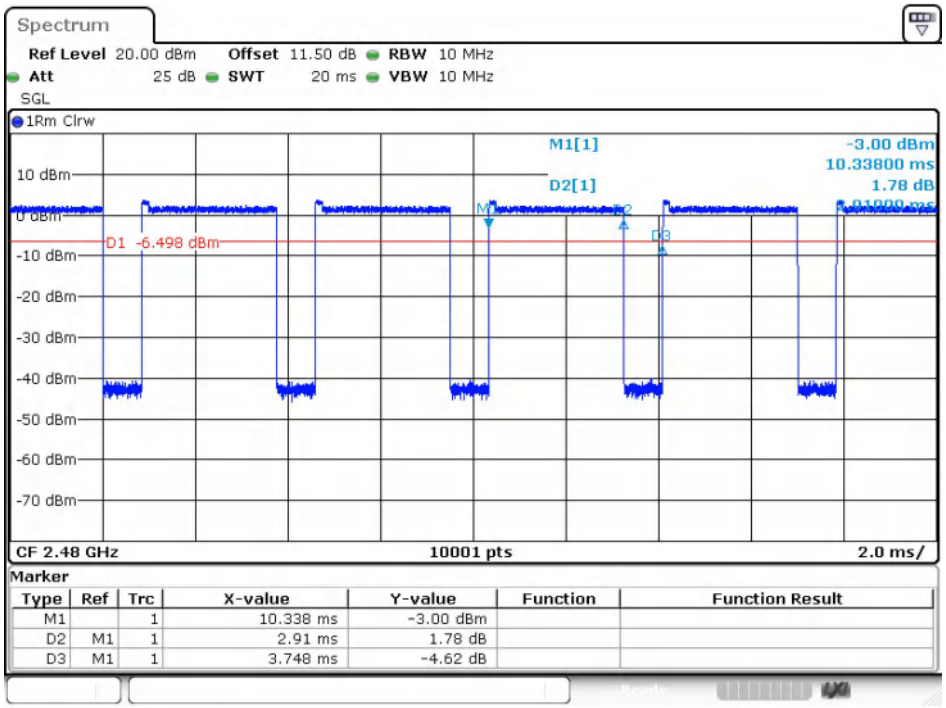

GFSK(DH5)_Channel 78



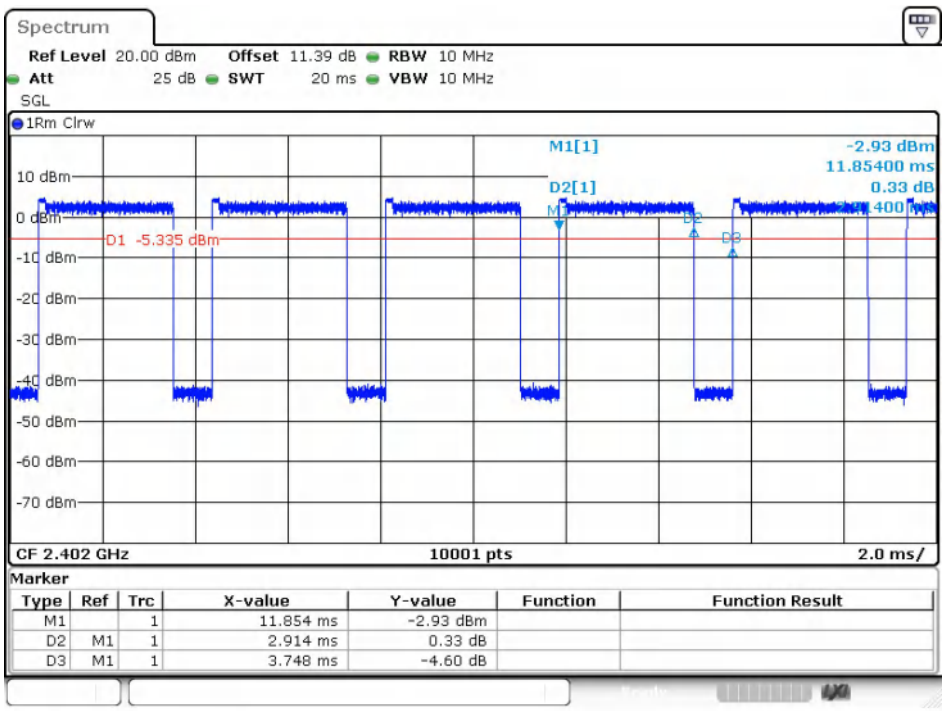

π/4DQPSK(2-DH5)_Channel 0



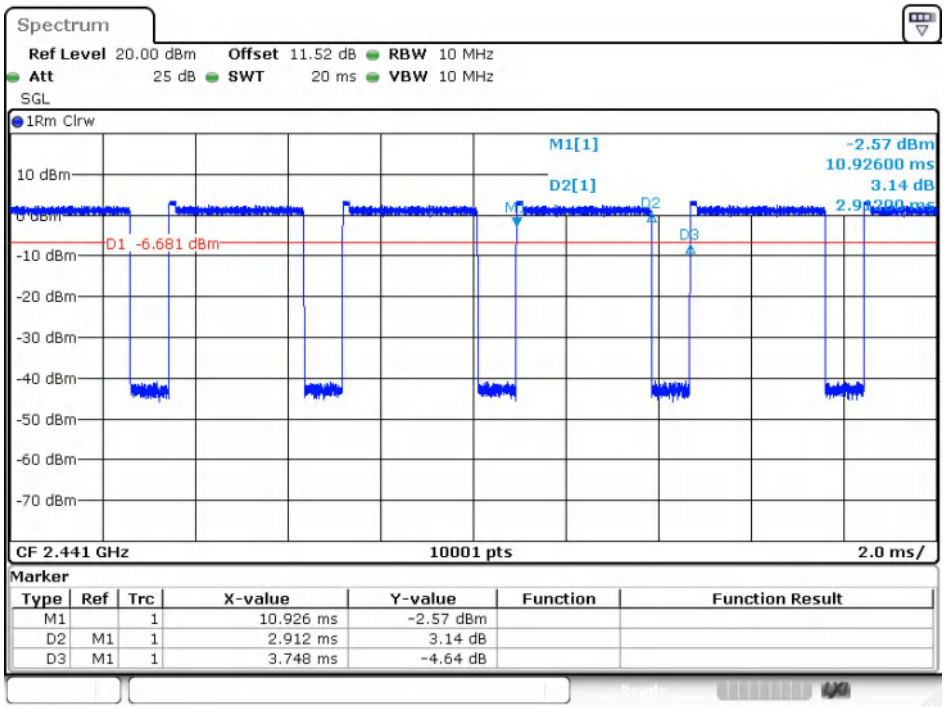

π/4DQPSK(2-DH5)_Channel 39



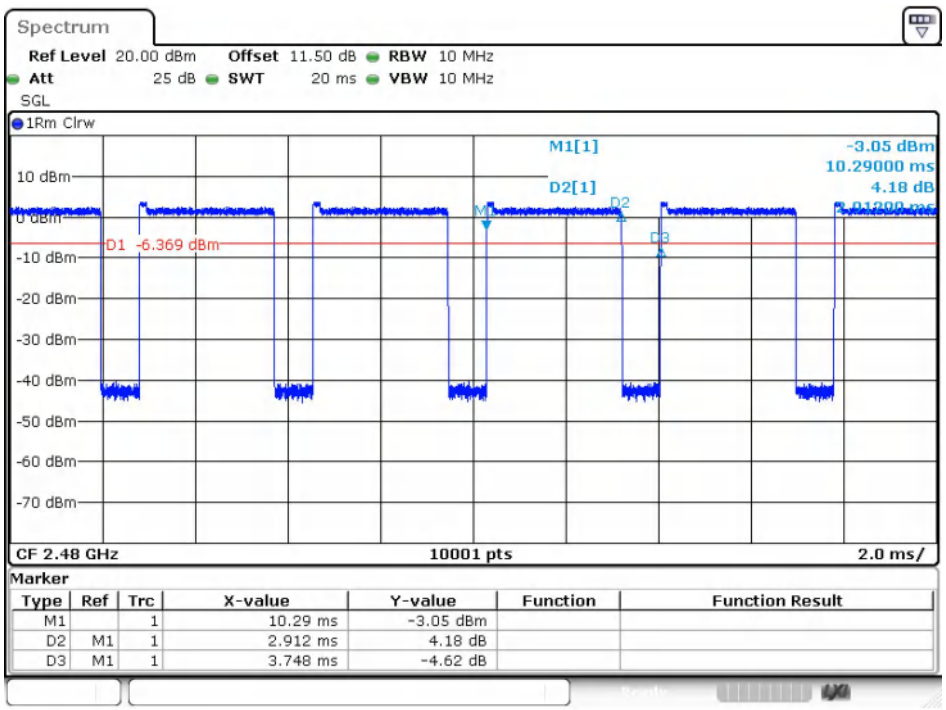

π/4DQPSK(2-DH5)_Channel 78




8DPSK(3-DH5)_Channel 0




8DPSK(3-DH5)_Channel 39



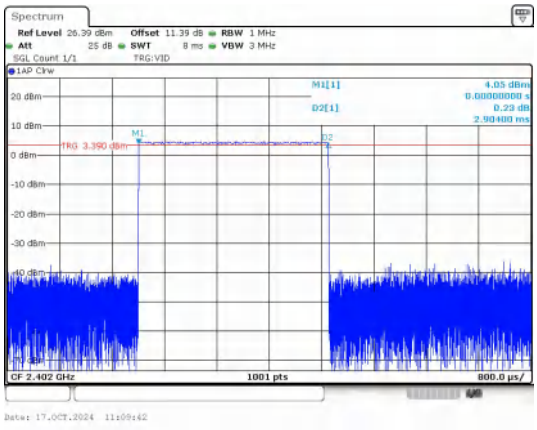

8DPSK(3-DH5)_Channel 78

# 2) Dwell Time

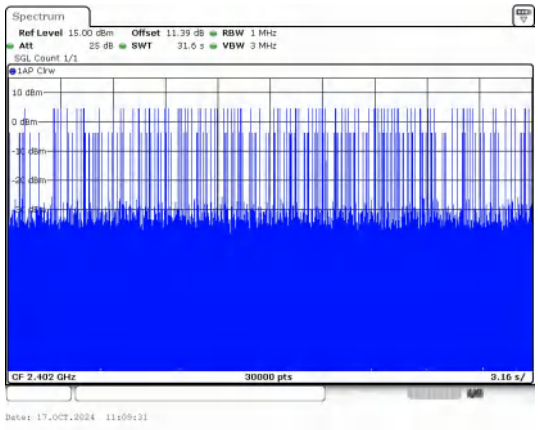
**Test Result**

| Modulation | Packet | Channel | Pulse Width (ms) | Number of Pulses in 31.6 seconds | Dwell Time (ms) | Limit (ms) | Result |
|---|---|---|---|---|---|---|---|
| GFSK | DH5 | CH0 (2402MHz) | 2.904 | 103 | 299.11 | < 400 | PASS |
| π/4DQPSK | 2-DH5 | | 2.904 | 111 | 322.34 | | PASS |
| 8DPSK | 3-DH5 | | 2.920 | 103 | 300.76 | | PASS |

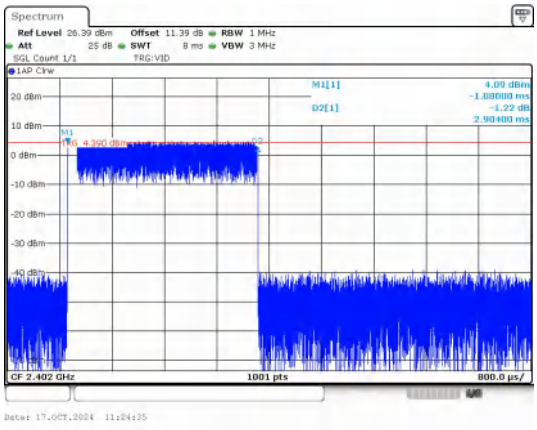
**Test Graphs**



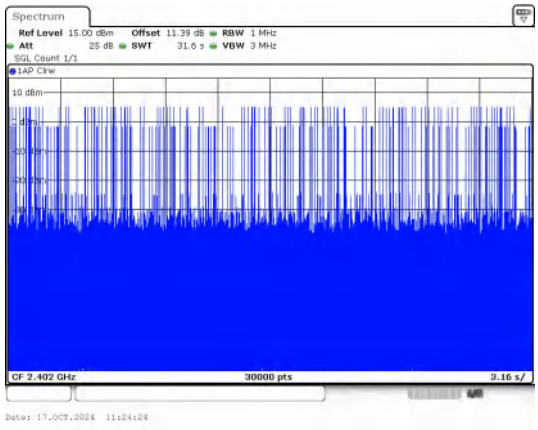

Pulse Width
GFSK_DH5



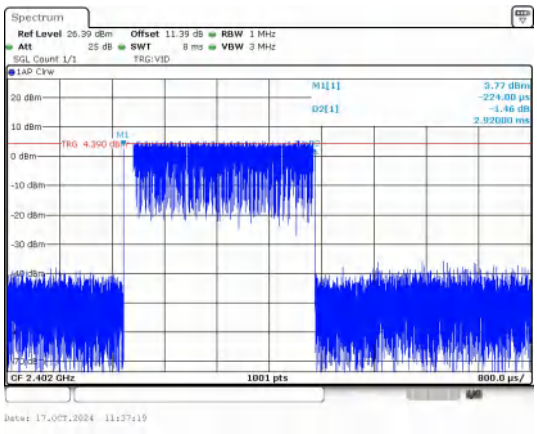
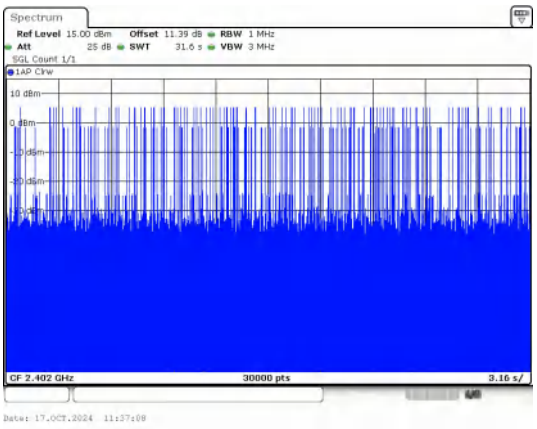

Number of Pulses in 31.6 seconds
GFSK_DH5




Pulse Width
π/4DQPSK_2-DH5




Number of Pulses in 31.6 seconds
π/4DQPSK_2-DH5

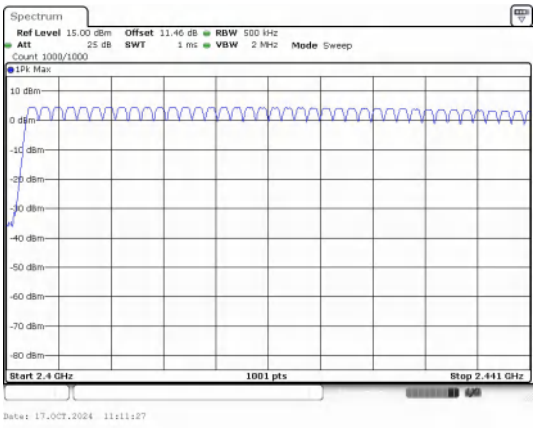
| | |
|---|---|
|  |  |
| **Pulse Width**<br>**8DPSK_3-DH5** | **Number of Pulses in 31.6 seconds**<br>**8DPSK_3-DH5** |

# 3) Number Of Hopping Channel

**Test Result**

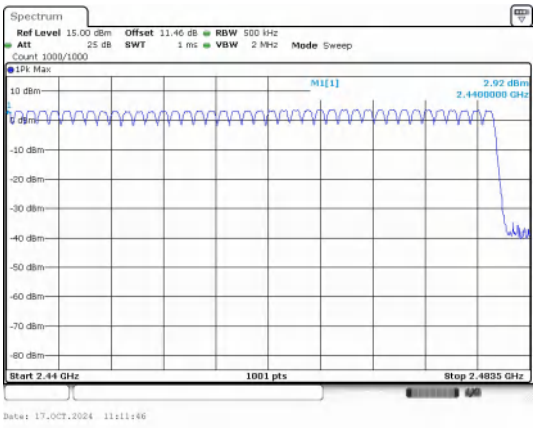
| Modulation | Packet | Number of Hopping Channel | Limit | Result |
|---|---|---|---|---|
| GFSK | DH5 | 79 | 15 | PASS |
| π/4DQPSK | 2-DH5 | 79 | 15 | PASS |
| 8DPSK | 3-DH5 | 79 | 15 | PASS |

**Test Graphs**



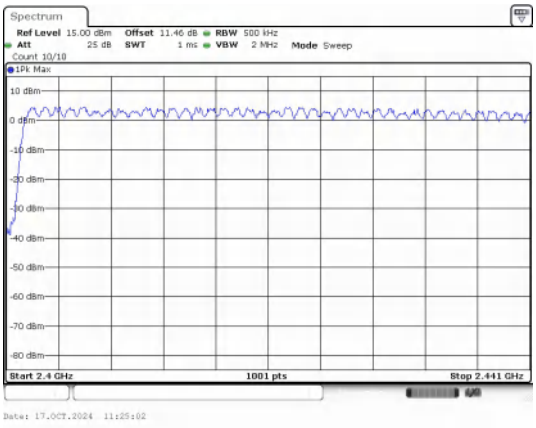

Low End Spectrum Channel Hopping Plot

GFSK



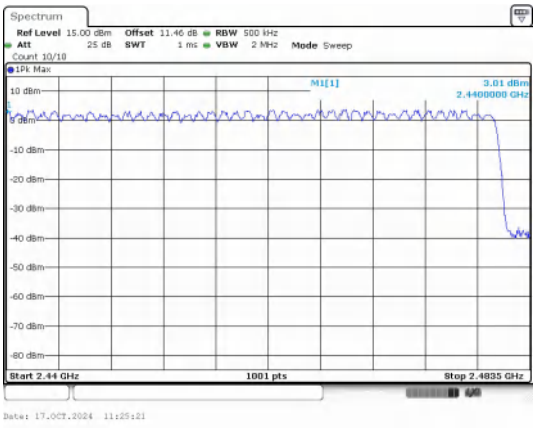

High End Spectrum Channel Hopping Plot

GFSK



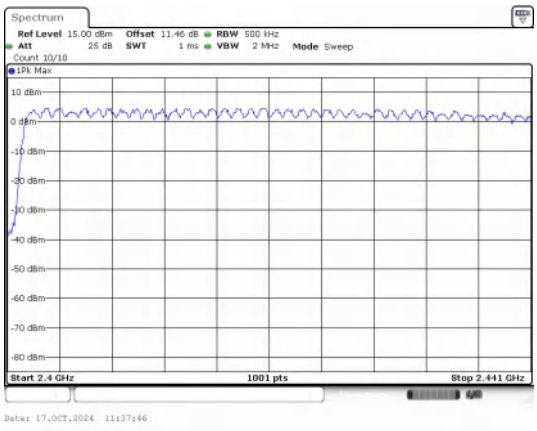
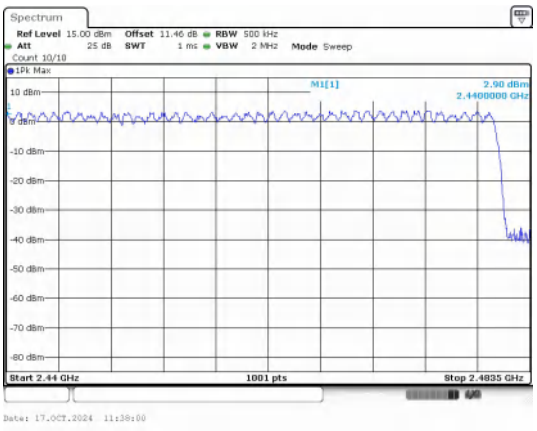

Low End Spectrum Channel Hopping Plot

π/4DQPSK




High End Spectrum Channel Hopping Plot

π/4DQPSK

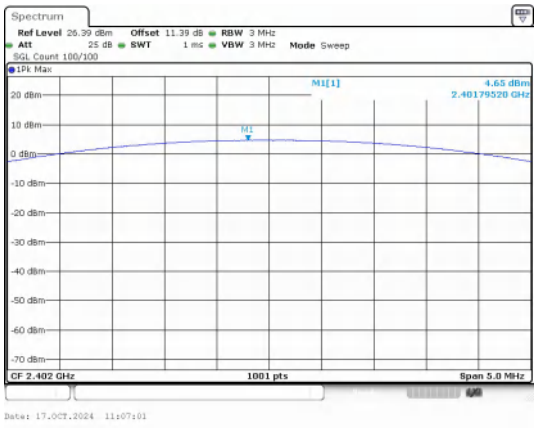
| | |
|---|---|
|  |  |
| **Low End Spectrum Channel Hopping Plot**<br>**8DPSK** | **High End Spectrum Channel Hopping Plot**<br>**8DPSK** |

# 4) Conducted Peak Output Power

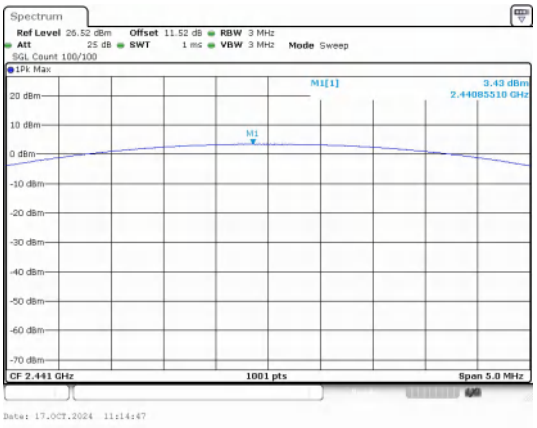
**Test Result**

| Modulation | Packet Type | Channel | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| GFSK | DH5 | 0 | 4.65 | 2.92 | ≤30 | PASS |
| | | 39 | 3.43 | 2.20 | | PASS |
| | | 78 | 3.70 | 2.34 | | PASS |
| π/4DQPSK | 2-DH5 | 0 | 5.49 | 3.54 | ≤20.97 | PASS |
| | | 39 | 4.21 | 2.64 | | PASS |
| | | 78 | 4.48 | 2.80 | | PASS |
| 8DPSK | 3-DH5 | 0 | 5.80 | 3.80 | | PASS |
| | | 39 | 4.50 | 2.82 | | PASS |
| | | 78 | 4.74 | 2.98 | | PASS |

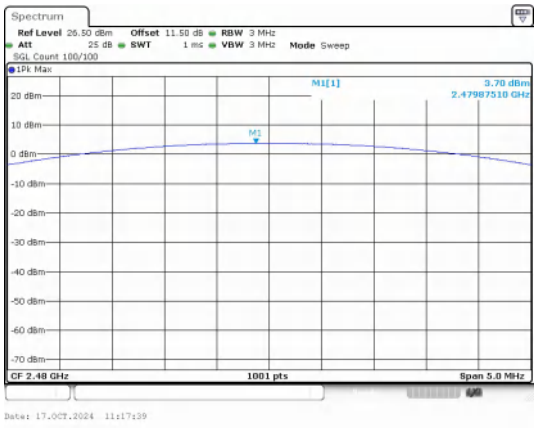
**Test Graphs**



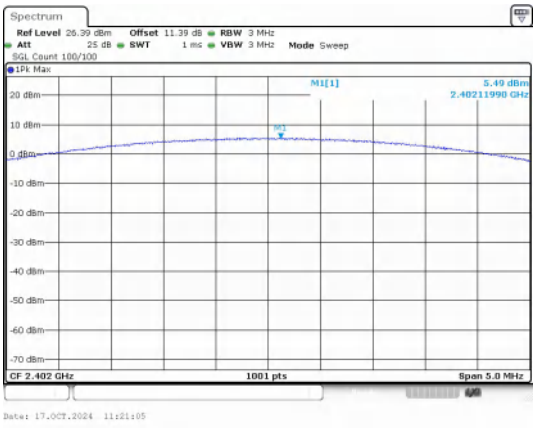

Peak Output Power
GFSK_Channel 0



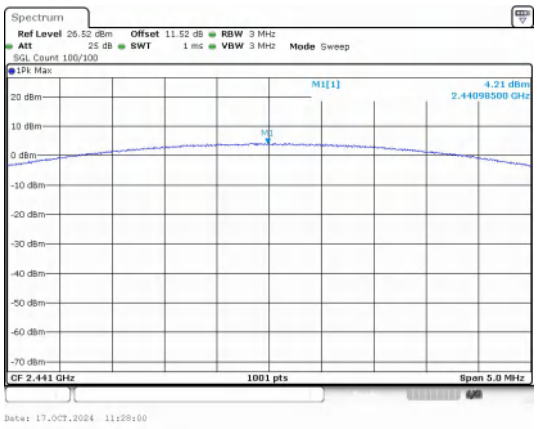

Peak Output Power
GFSK_Channel 39




Peak Output Power
GFSK_Channel 78

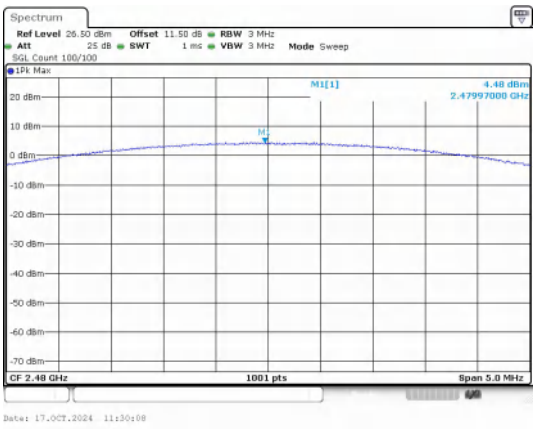



Peak Output Power
π/4DQPSK_Channel 0



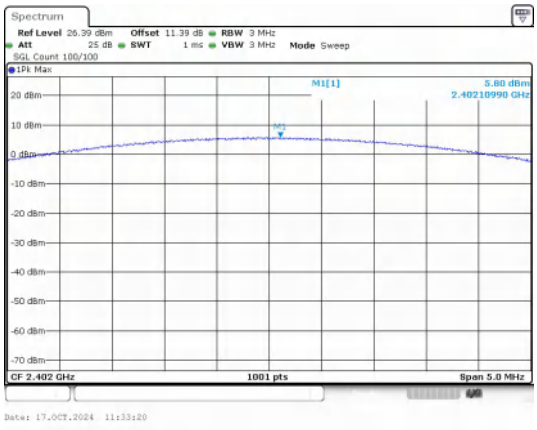

Peak Output Power

π/4DQPSK_Channel 39



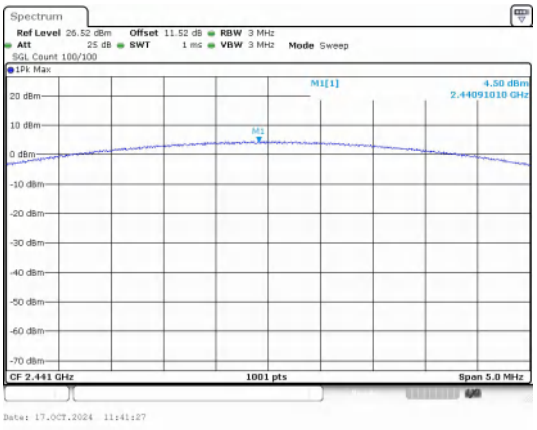

Peak Output Power

π/4DQPSK_Channel 78



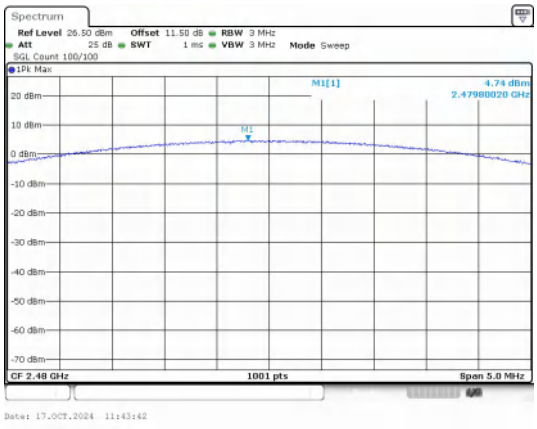

Peak Output Power

8DPSK_Channel 0




Peak Output Power

8DPSK_Channel 39




Peak Output Power

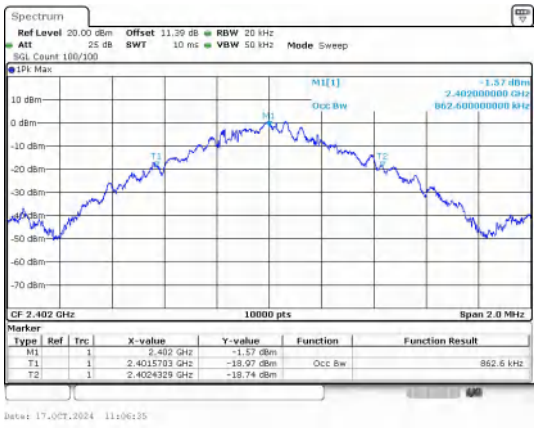
8DPSK_Channel 78

# 5) 99% Bandwidth

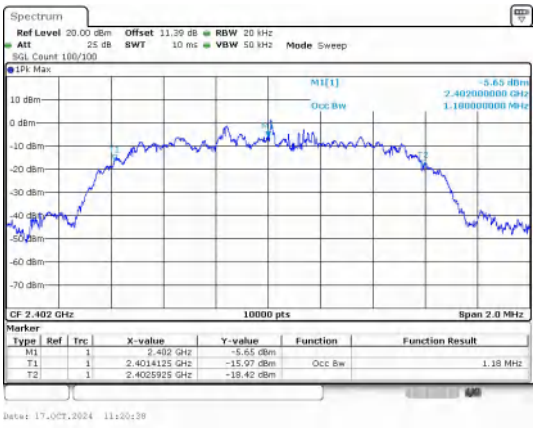
**Test Result**

| Modulation | Channel | Center Frequency (MHz) | 99% BW (MHz) |
|---|---|---|---|
| GFSK | 0 | 2402 | 0.86260 |
| | 39 | 2441 | 0.86720 |
| | 78 | 2480 | 0.85980 |
| π/4DQPSK | 0 | 2402 | 1.1800 |
| | 39 | 2441 | 1.1716 |
| | 78 | 2480 | 1.1810 |
| 8DPSK | 0 | 2402 | 1.1822 |
| | 39 | 2441 | 1.1736 |
| | 78 | 2480 | 1.1762 |

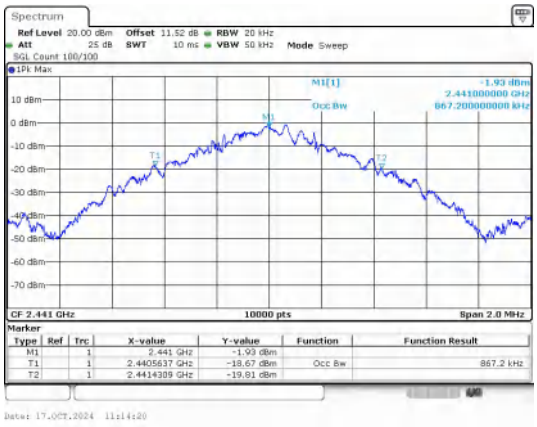
**Test Graphs**



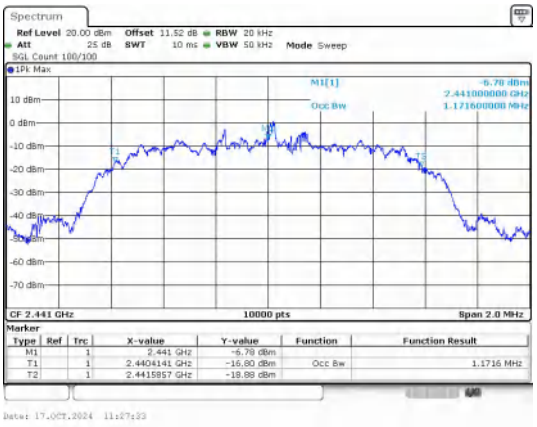

GFSK_DH5_Channel 0



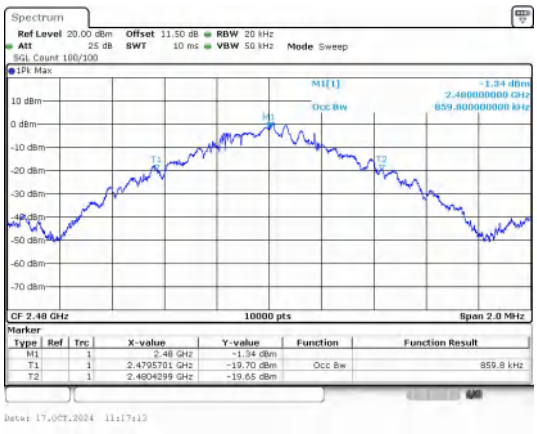

π/4DQPSK_2-DH5_Channel 0



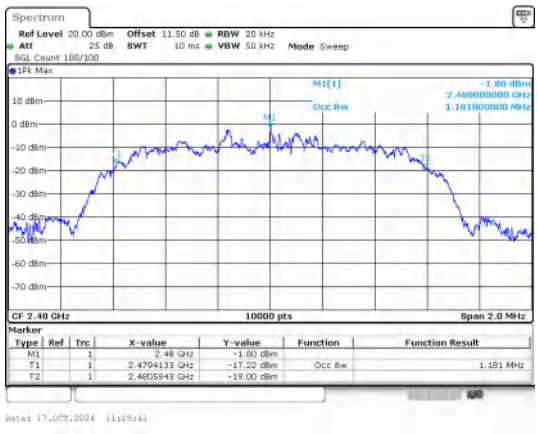

GFSK_DH5_Channel 39



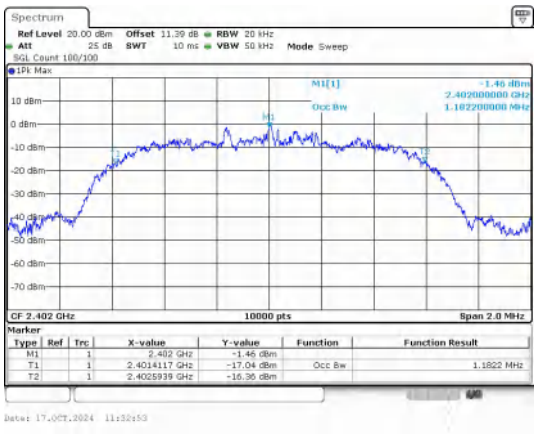

π/4DQPSK_2-DH5_Channel 39



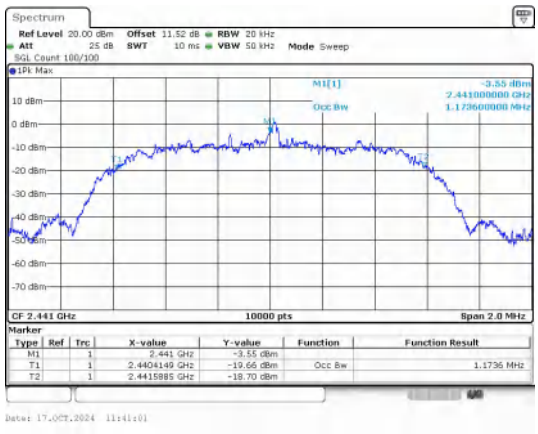

GFSK_DH5_Channel 78



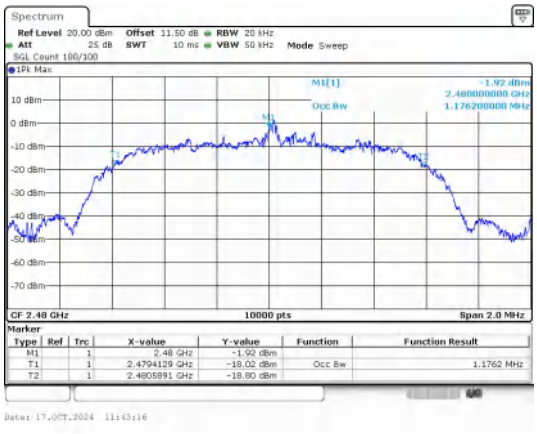

π/4DQPSK_2-DH5_Channel 78




8DPSK_3-DH5_Channel 0




8DPSK_3-DH5_Channel 39



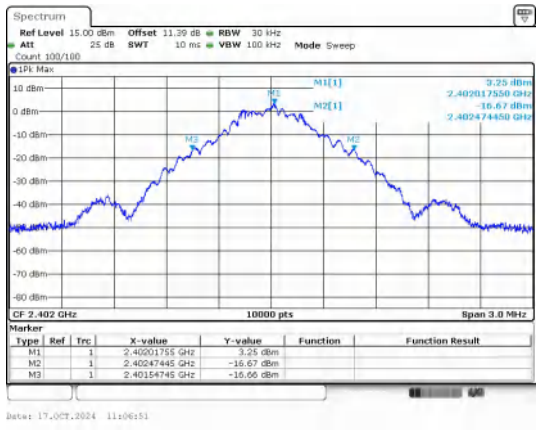

8DPSK_3-DH5_Channel 78

# 6) 20dB Bandwidth

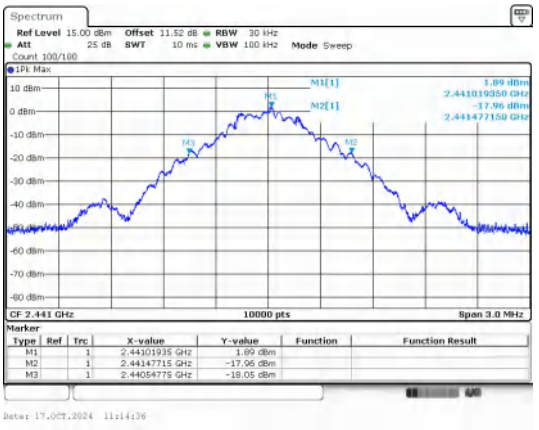
**Test Result**

| Modulation | Channel | Center Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---|---|---|---|
| GFSK | 0 | 2402 MHz | 0.9200 |
| | 39 | 2441 MHz | 0.9300 |
| | 78 | 2480 MHz | 0.9200 |
| π/4DQPSK | 0 | 2402 MHz | 1.230 |
| | 39 | 2441 MHz | 1.210 |
| | 78 | 2480 MHz | 1.230 |
| 8DPSK | 0 | 2402 MHz | 1.250 |
| | 39 | 2441 MHz | 1.260 |
| | 78 | 2480 MHz | 1.250 |

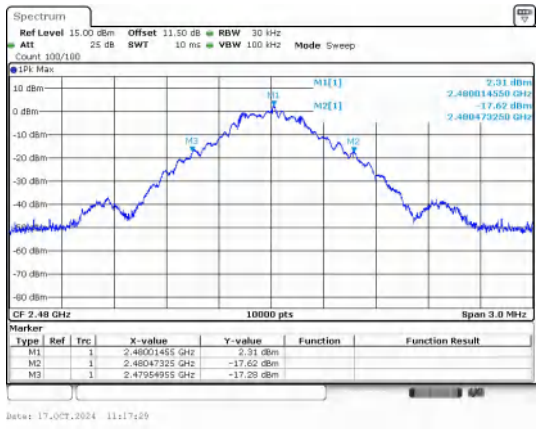
**Test Graphs**



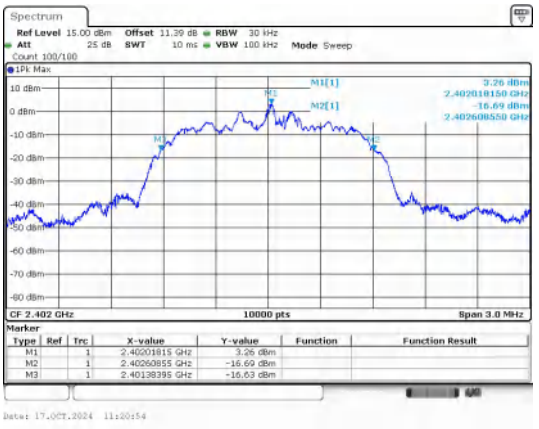

GFSK_DH5_Channel 0



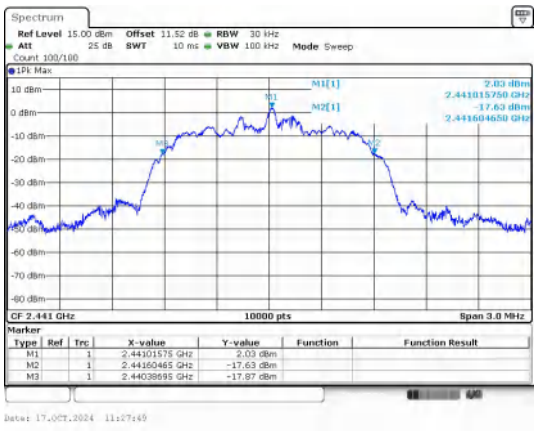

GFSK_DH5_Channel 39



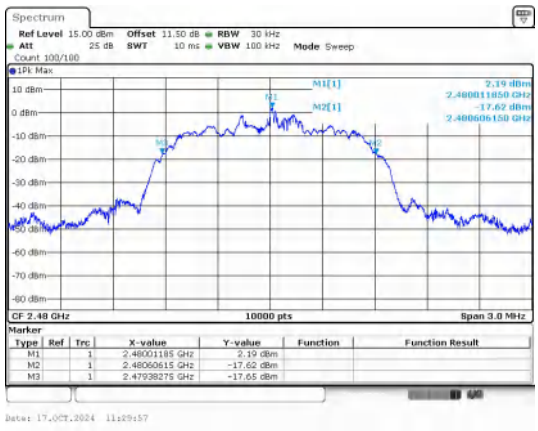

GFSK_DH5_Channel 78



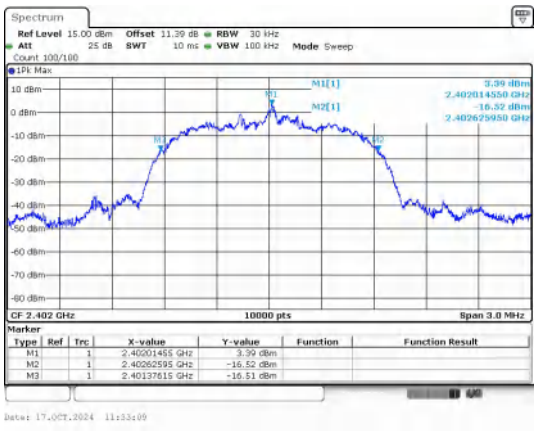

π/4DQPSK_2-DH5_Channel 0



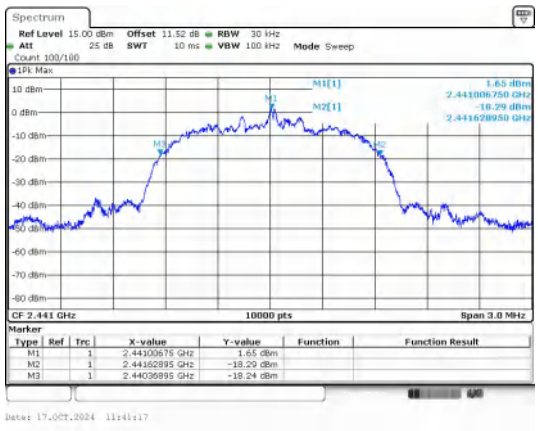

π/4DQPSK_2-DH5_Channel 39



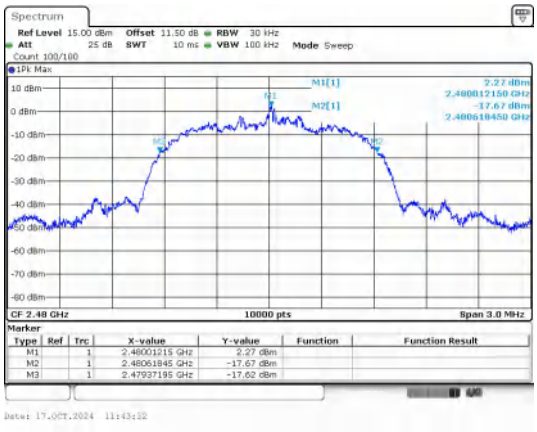

π/4DQPSK_2-DH5_Channel 78




8DPSK_3-DH5_Channel 0




8DPSK_3-DH5_Channel 39



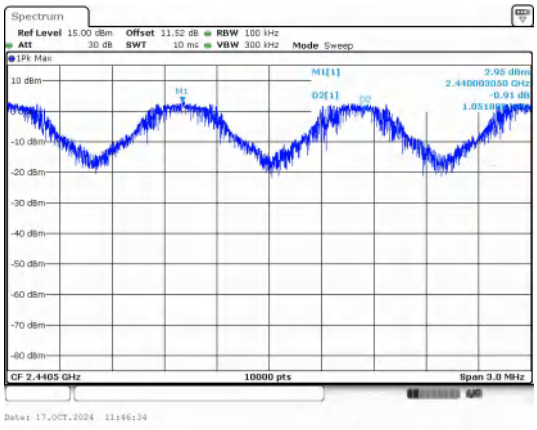

8DPSK_3-DH5_Channel 78

# 7) Carrier Frequencies Separation

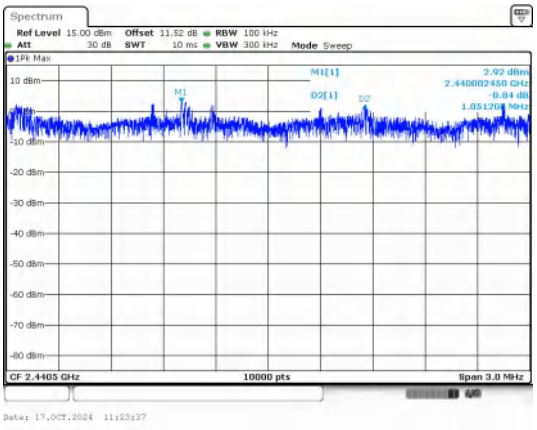
**Test Result**

| Modulation | Packet | Left Center frequency (MHz) | Right Center frequency (MHz) | Hopping Frequency Separation (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|---|---|
| GFSK | DH5 | 2440.003 | 2441.0548 | 1.0518 | 0.93 | PASS |
| π/4DQPSK | 2-DH5 | 2440.0024 | 2441.0536 | 1.0512 | 0.82 | PASS |
| 8DPSK | 3-DH5 | 2440.0001 | 2441.1712 | 1.1712 | 0.84 | PASS |

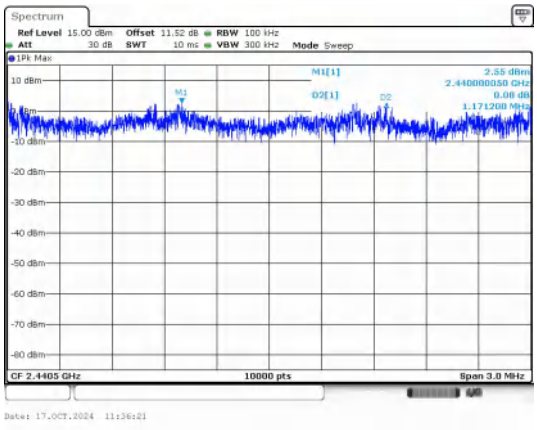
**Test Graphs**




GFSK




π/4DQPSK




8DPSK

# 8) Conducted Out Of Band Emission

**Test Result**

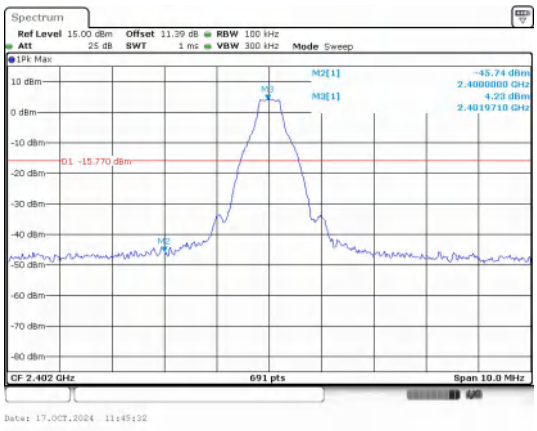
Non-Hopping

| Modulation | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---|---|---|---|---|---|---|---|
| GFSK | DH5 | 0 | 2400.00 | -45.742 | -15.77 | -29.972 | PASS |
| | | | 4803.85 | -37.622 | -15.77 | -21.852 | PASS |
| | | 39 | 4882.09 | -36.991 | -17.01 | -19.981 | PASS |
| | | 78 | 2483.50 | -47.530 | -16.68 | -30.850 | PASS |
| | | | 4960.33 | -40.884 | -16.68 | -24.204 | PASS |
| π/4DQPSK | 2-DH5 | 0 | 2400.00 | -46.135 | -15.64 | -30.495 | PASS |
| | | | 4803.85 | -41.259 | -15.64 | -25.619 | PASS |
| | | 39 | 4882.09 | -42.529 | -17.33 | -25.199 | PASS |
| | | 78 | 2483.50 | -48.514 | -16.66 | -31.854 | PASS |
| | | | 4960.33 | -46.682 | -16.66 | -30.022 | PASS |
| 8DPSK | 3-DH5 | 0 | 2400.00 | -45.468 | -15.66 | -29.808 | PASS |
| | | | 4804.68 | -41.648 | -15.66 | -25.988 | PASS |
| | | 39 | 4882.09 | -36.707 | -16.95 | -19.757 | PASS |
| | | 78 | 2483.50 | -48.092 | -16.65 | -31.442 | PASS |
| | | | 4960.33 | -44.360 | -16.65 | -27.710 | PASS |

Hopping

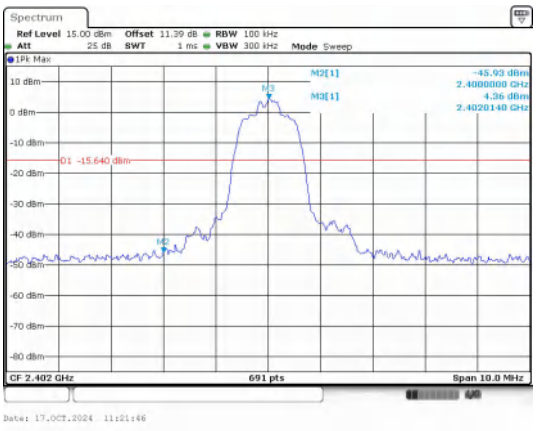
| Modulation | Packet | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---|---|---|---|---|---|---|---|
| GFSK | DH5 | Hopping | 2396.99 | -44.384 | -16.28 | -28.104 | PASS |
| | | | 2400.00 | -44.427 | -16.28 | -28.147 | PASS |
| | | | 2483.50 | -47.481 | -17.13 | -30.351 | PASS |
| π/4DQPSK | 2-DH5 | | 2396.60 | -45.969 | -17.55 | -28.419 | PASS |
| | | | 2400.00 | -47.826 | -17.55 | -30.276 | PASS |
| | | | 2483.50 | -49.856 | -20.22 | -29.636 | PASS |
| 8DPSK | 3-DH5 | | 2398.02 | -44.695 | -16.03 | -28.665 | PASS |
| | | | 2400.00 | -46.880 | -16.03 | -30.849 | PASS |
| | | | 2483.50 | -48.520 | -18.3 | -30.220 | PASS |

**Test Graphs**



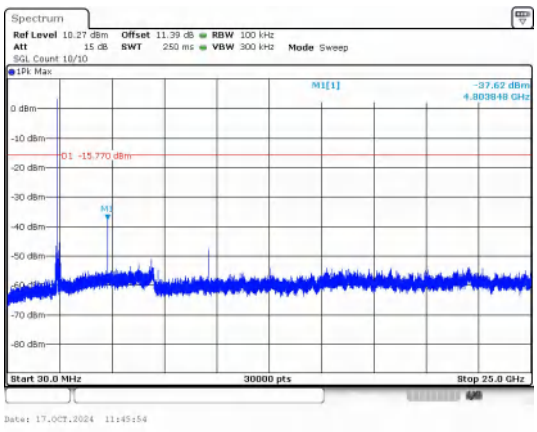

**Out Of Band Emission**

**GFSK_DH5_Channel 0**



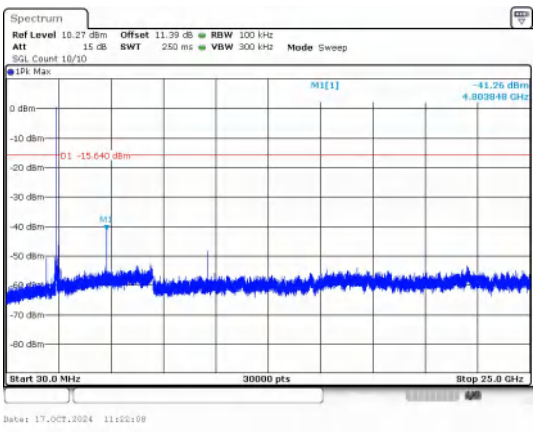

**Out Of Band Emission**

**π/4DQPSK_2-DH5_Channel 0**



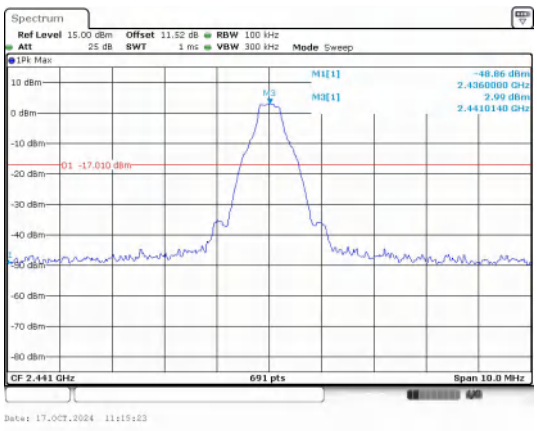

**30.0 MHz - 25000.0 MHz**

**GFSK_DH5_Channel 0**



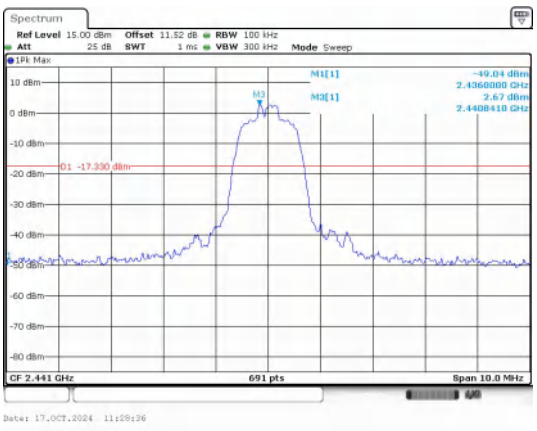

**30.0 MHz - 25000.0 MHz**

**π/4DQPSK_2-DH5_Channel 0**



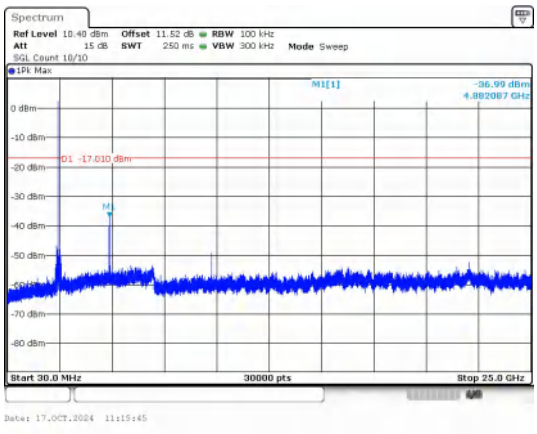

**Out Of Band Emission**

**GFSK_DH5_Channel 39**



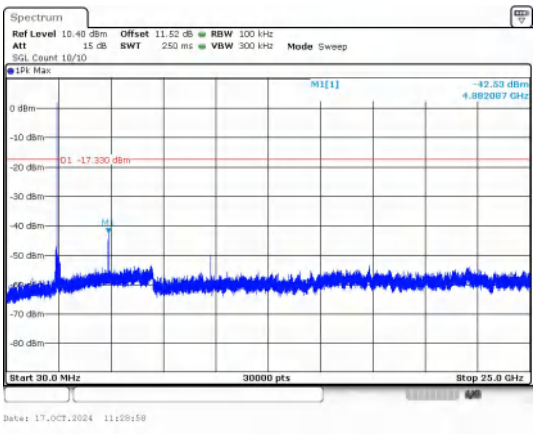

**Out Of Band Emission**

**π/4DQPSK_2-DH5_Channel 39**



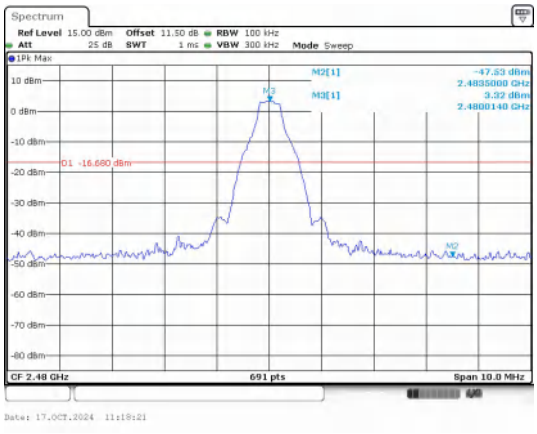

30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



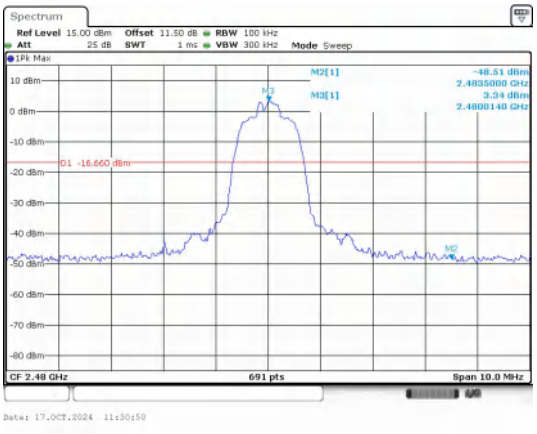

30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



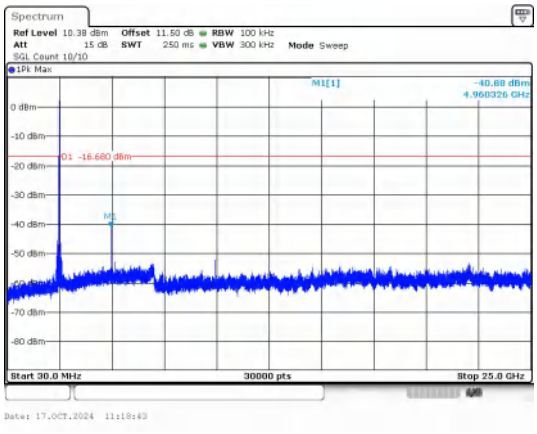

Out Of Band Emission

GFSK_DH5_Channel 78



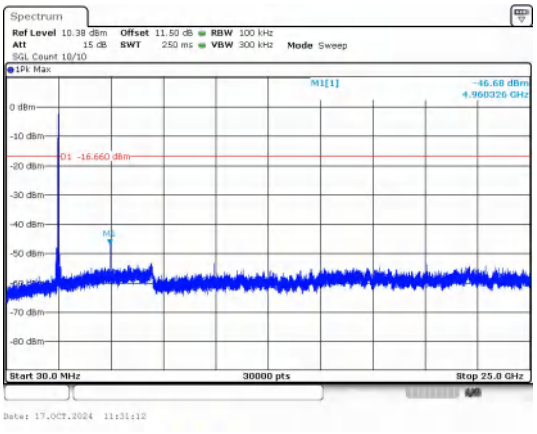

Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



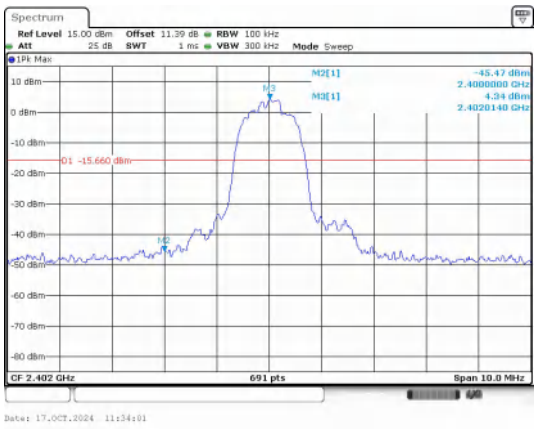

30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 78



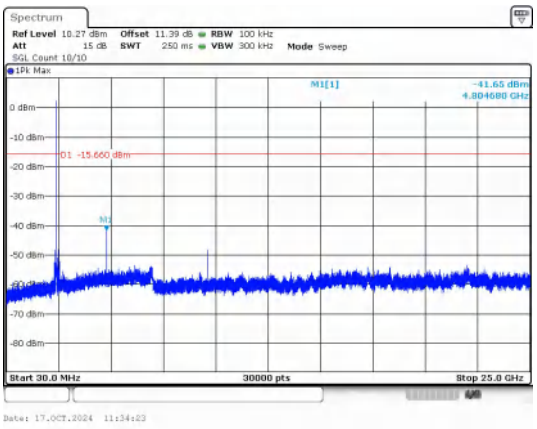

30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 78



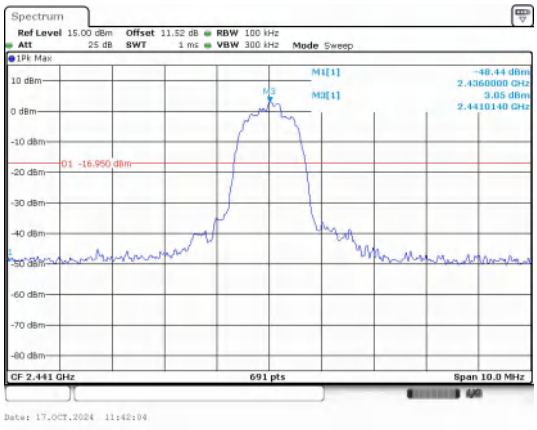

**Out Of Band Emission**

**8DPSK_3-DH5_Channel 0**



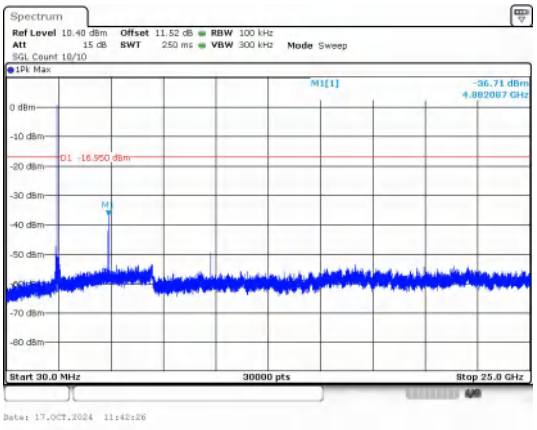

**30.0 MHz - 25000.0 MHz**

**8DPSK_3-DH5_Channel 0**



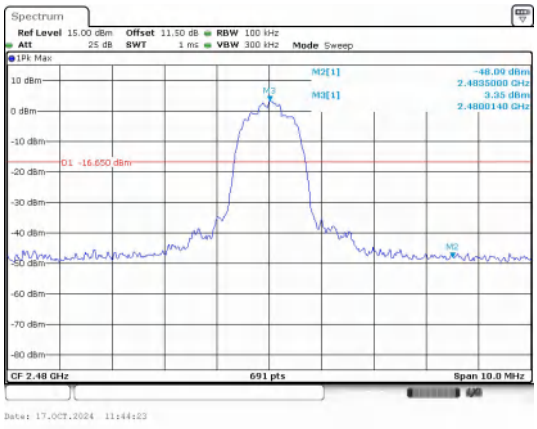

**Out Of Band Emission**

**8DPSK_3-DH5_Channel 39**



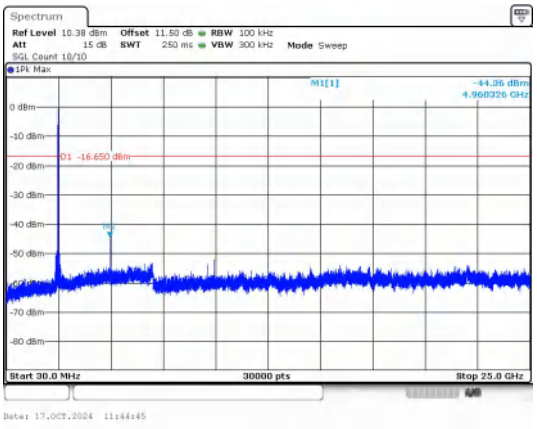

**30.0 MHz - 25000.0 MHz**

**8DPSK_3-DH5_Channel 39**



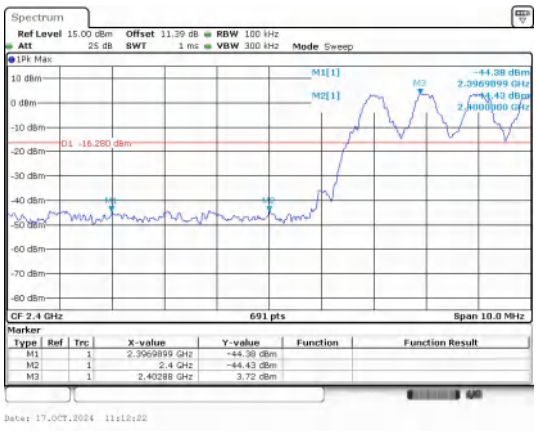

**Out Of Band Emission**

**8DPSK_3-DH5_Channel 78**



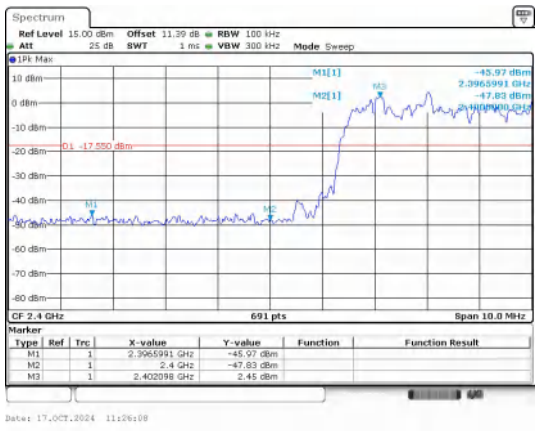

**30.0 MHz - 25000.0 MHz**

**8DPSK_3-DH5_Channel 78**



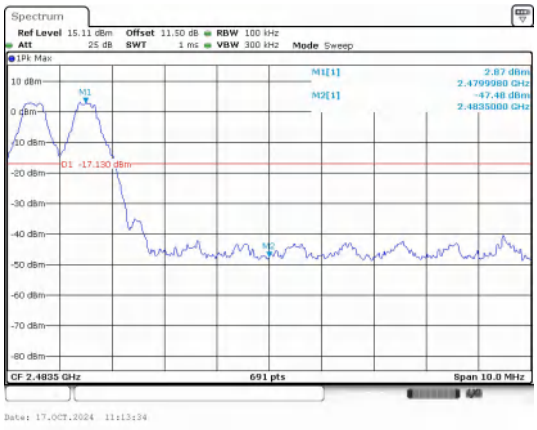

Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



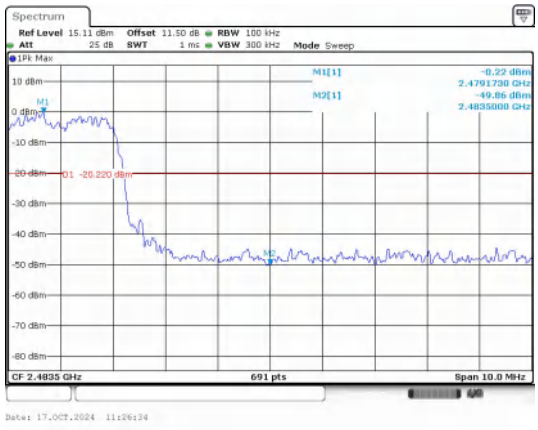

Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



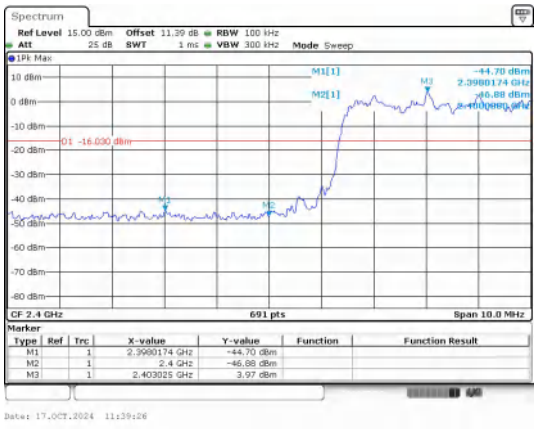

Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



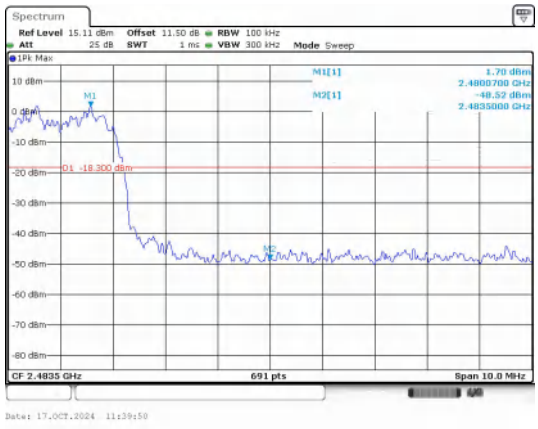

Out Of Band Emission(Right)

π/4DQPSK_2-DH5_Channel Hopping




Out Of Band Emission(Left)

8DPSK_3-DH5_Channel Hopping




Out Of Band Emission(Right)

8DPSK_3-DH5_Channel Hopping