Appendix Report

Report No.:	CISRR250218061
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

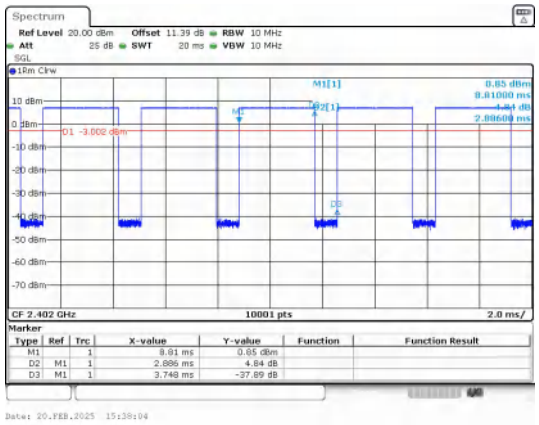
1) Duty Cycle

Test Result

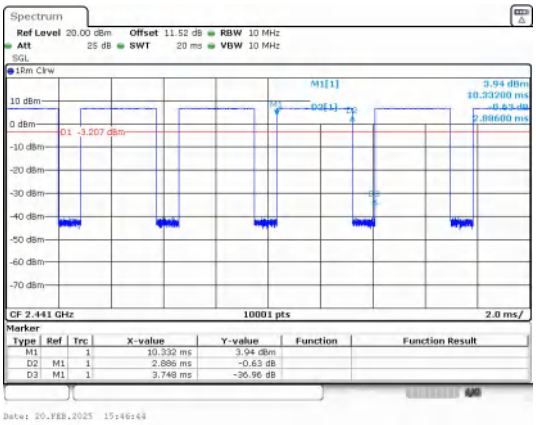
Left:

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
π/4DQPSK	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	2.892	3.748	77.16	0.7716	1.1261	0.3458
		78	2.892	3.748	77.16	0.7716	1.1261	0.3458

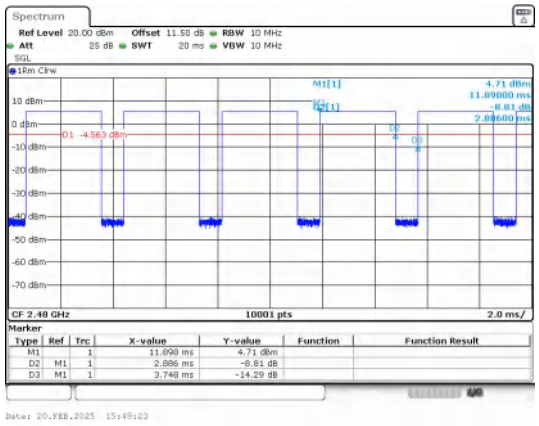
Test Graphs



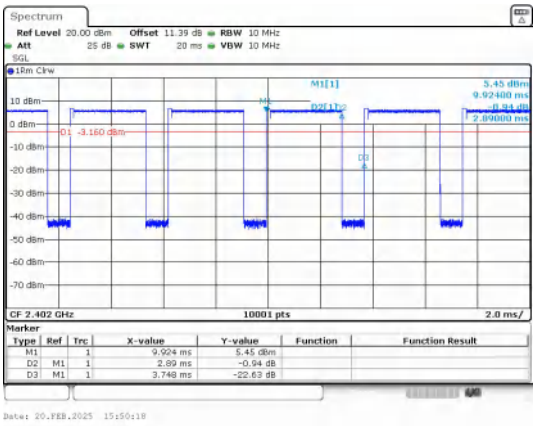
GFSK(DH5)_Channel 0



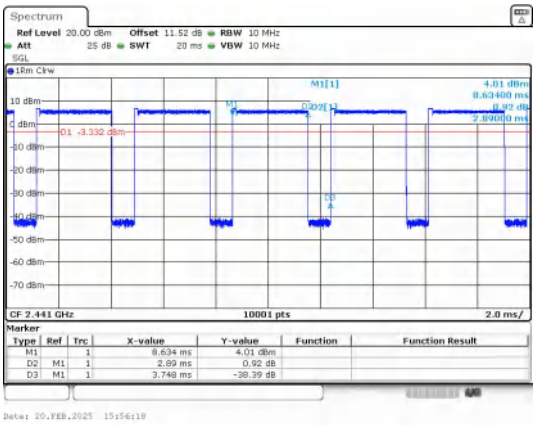
GFSK(DH5)_Channel 39



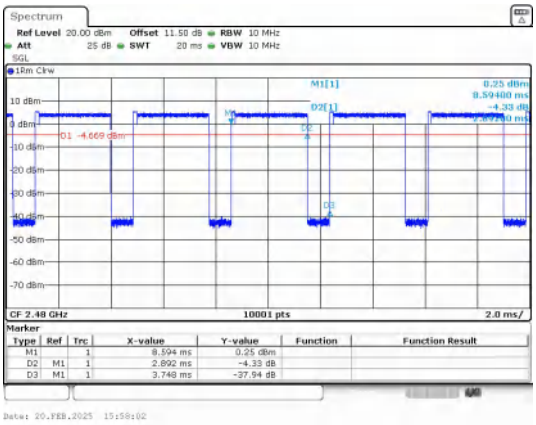
GFSK(DH5)_Channel 78



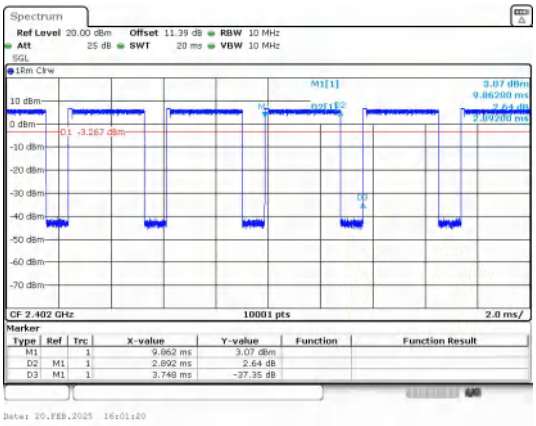
π/4DQPSK(2-DH5)_Channel 0



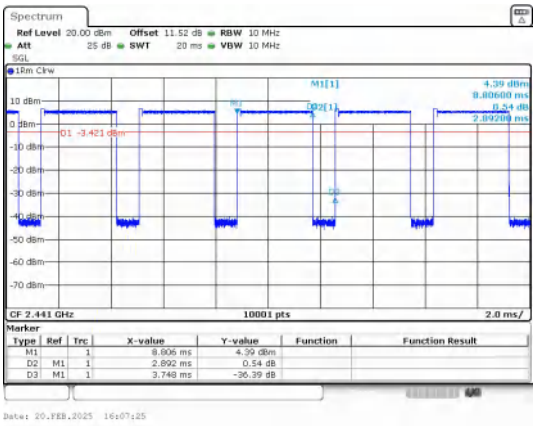
π/4DQPSK(2-DH5)_Channel 39



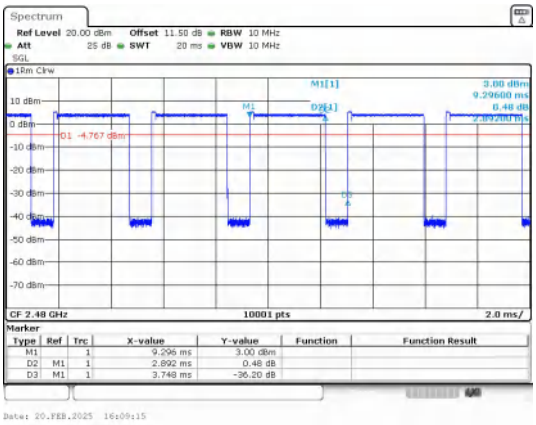
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



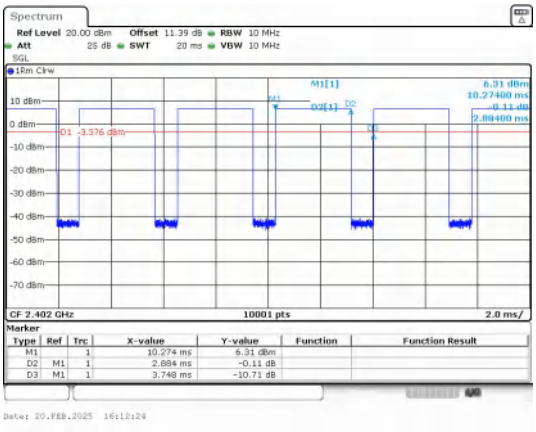
8DPSK(3-DH5)_Channel 78

Right:

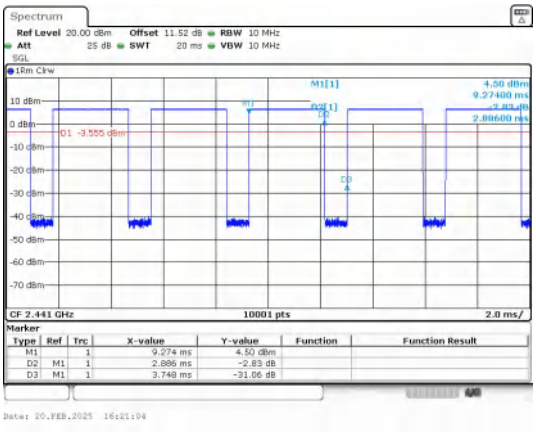
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.884	3.748	76.95	0.7695	1.1379	0.3467
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
π/4DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.3460
		39	2.892	3.748	77.16	0.7716	1.1261	0.3458
		78	2.892	3.748	77.16	0.7716	1.1261	0.3458

8DPSK	3-DH5	0	2.894	3.748	77.21	0.7721	1.1233	0.3455
		39	2.894	3.748	77.21	0.7721	1.1233	0.3455
		78	2.892	3.748	77.16	0.7716	1.1261	0.3458

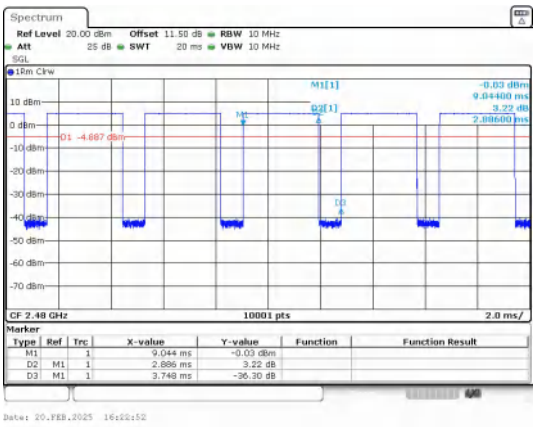
Test Graphs



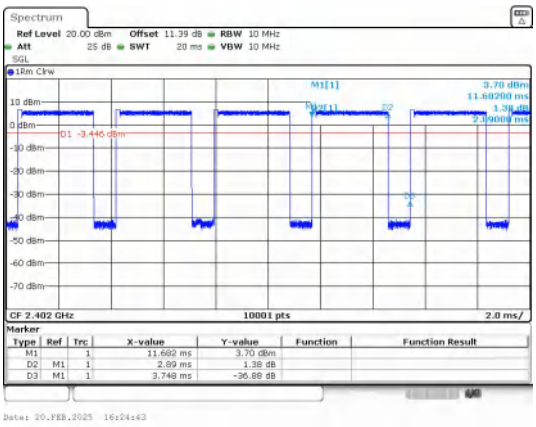
GFSK(DH5)_Channel 0



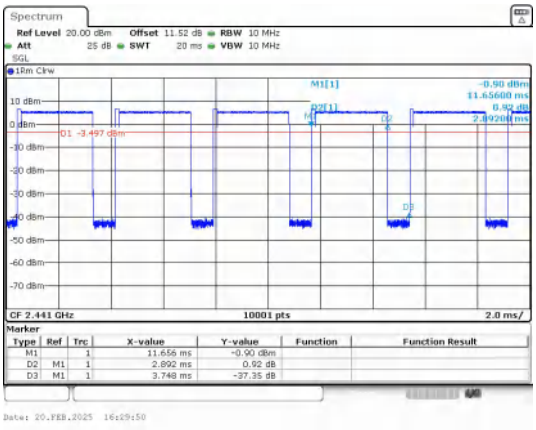
GFSK(DH5)_Channel 39



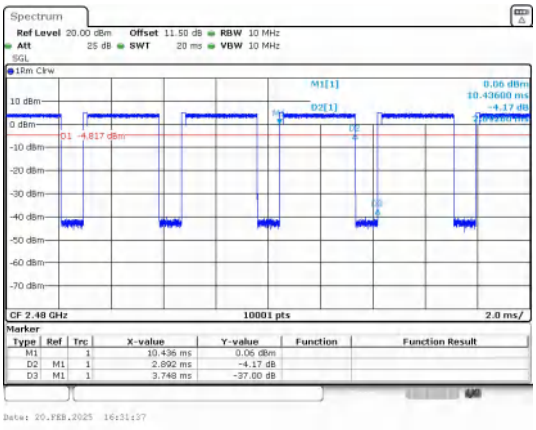
GFSK(DH5)_Channel 78



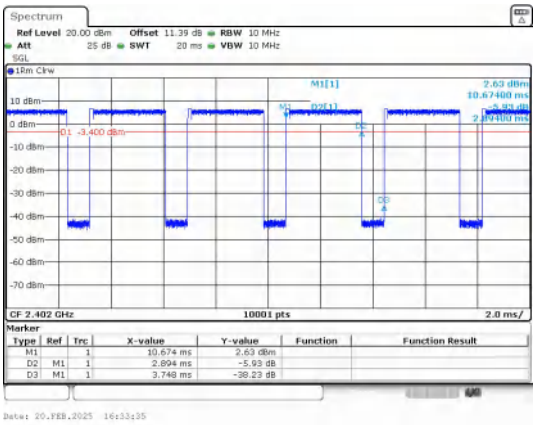
π/4DQPSK(2-DH5)_Channel 0



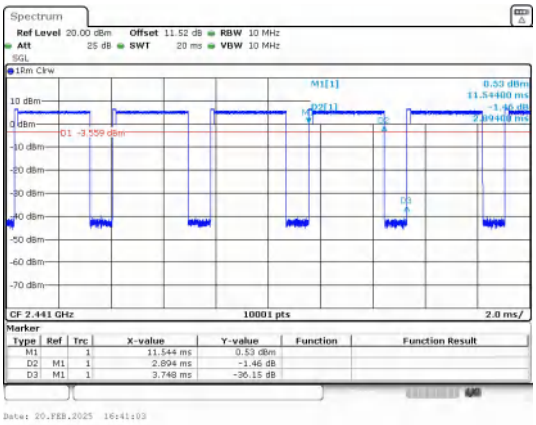
π/4DQPSK(2-DH5)_Channel 39



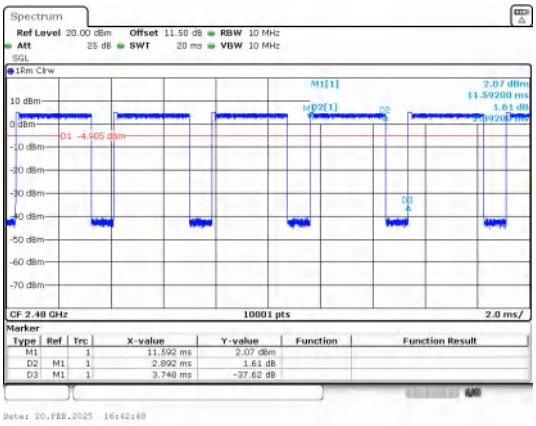
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

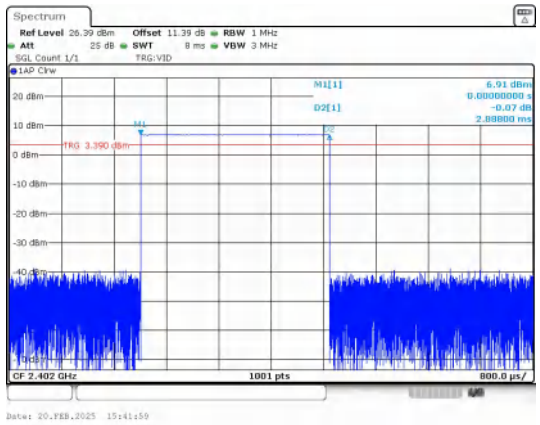
2) Dwell Time

Test Result

Left:

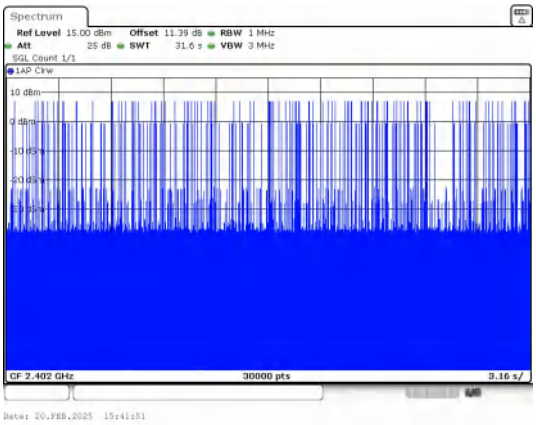
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	100	288.8	< 400	PASS
π/4DQPSK	2-DH5		2.896	125	362.0		PASS
8DPSK	3-DH5		2.896	104	301.18		PASS

Test Graphs



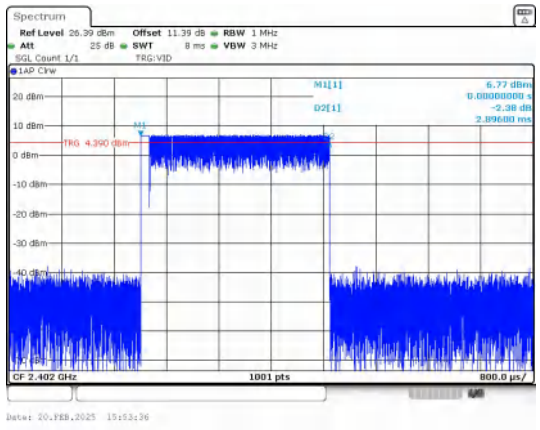
Pulse Width

GFSK_DH5



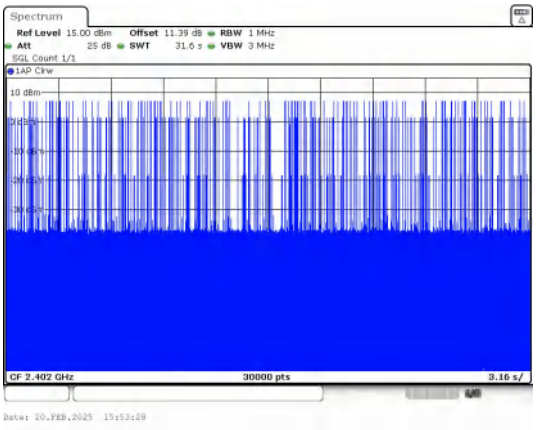
Number of Pulses in 31.6 seconds

GFSK_DH5



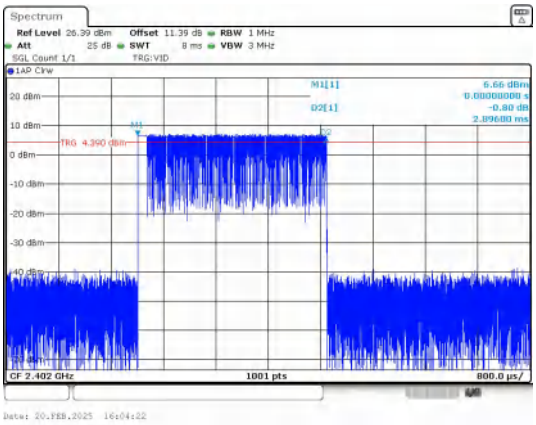
Pulse Width

π/4DQPSK_2-DH5



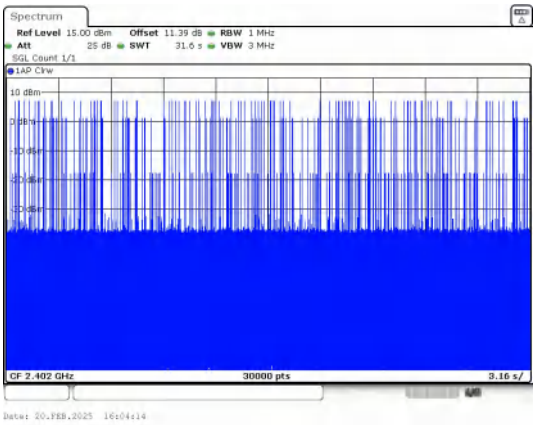
Number of Pulses in 31.6 seconds

π/4DQPSK_2-DH5



Pulse Width

8DPSK_3-DH5



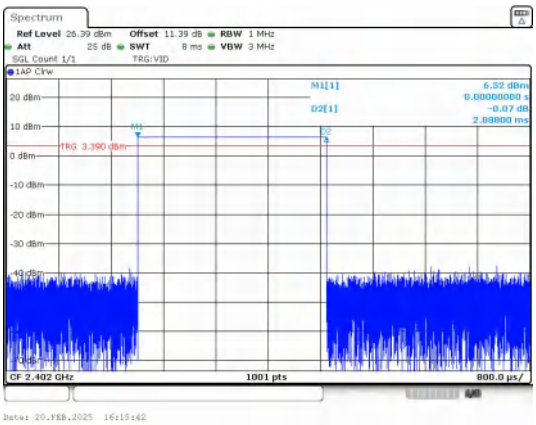
Number of Pulses in 31.6 seconds

8DPSK_3-DH5

Right：

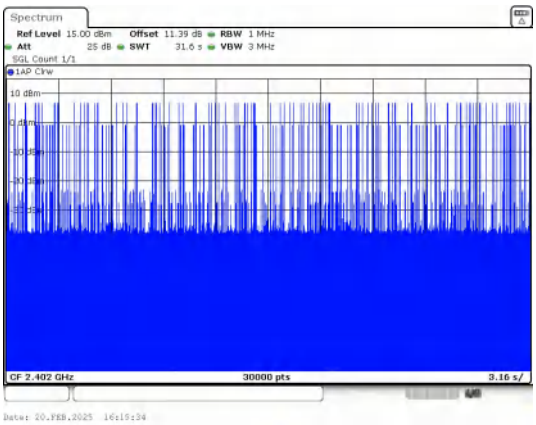
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	103	297.46	< 400	PASS
π/4DQPSK	2-DH5		2.896	104	301.18		PASS
8DPSK	3-DH5		2.896	92	266.43		PASS

Test Graphs



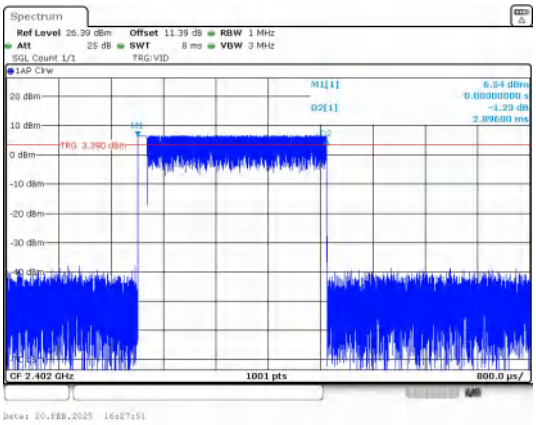
Pulse Width

GFSK_DH5



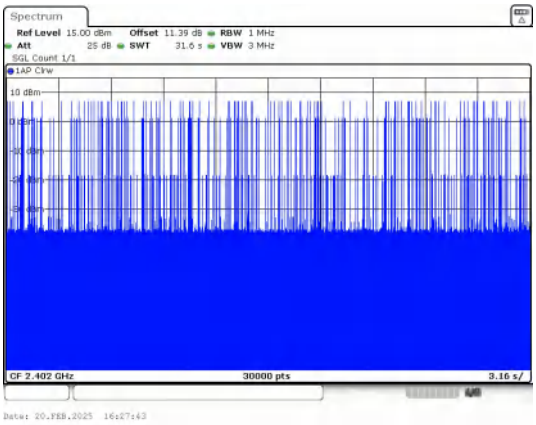
Number of Pulses in 31.6 seconds

GFSK_DH5



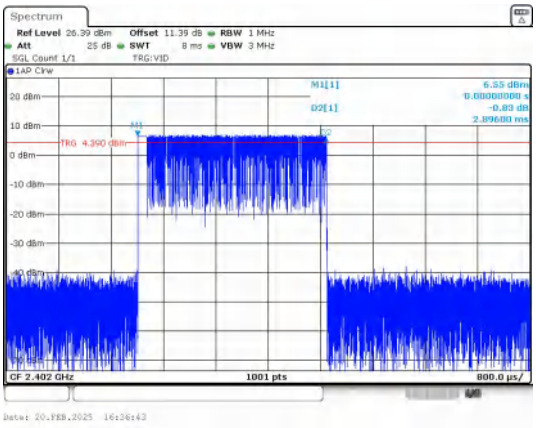
Pulse Width

π/4DQPSK_2-DH5



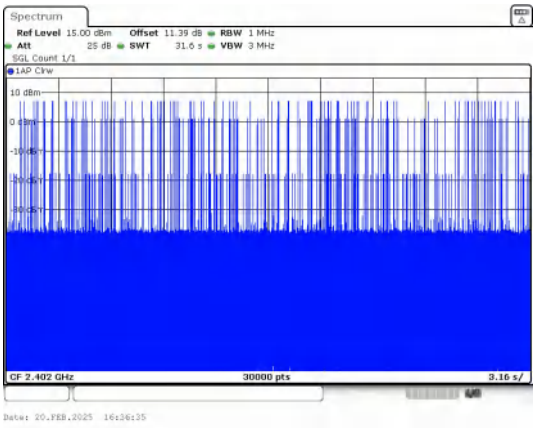
Number of Pulses in 31.6 seconds

π/4DQPSK_2-DH5



Pulse Width

8DPSK_3-DH5



Number of Pulses in 31.6 seconds

8DPSK_3-DH5

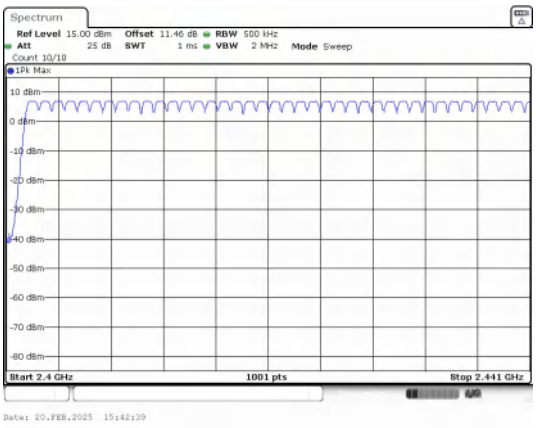
3) Number Of Hopping Channel

Test Result

Left:

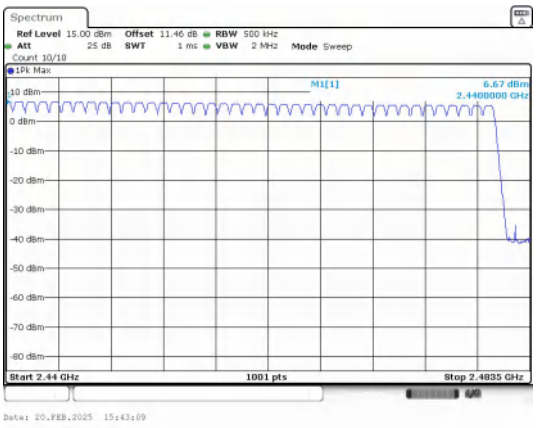
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
π/4DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



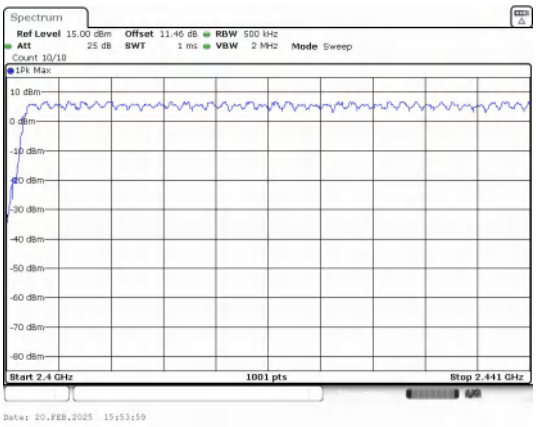
Low End Spectrum Channel Hopping Plot

GFSK



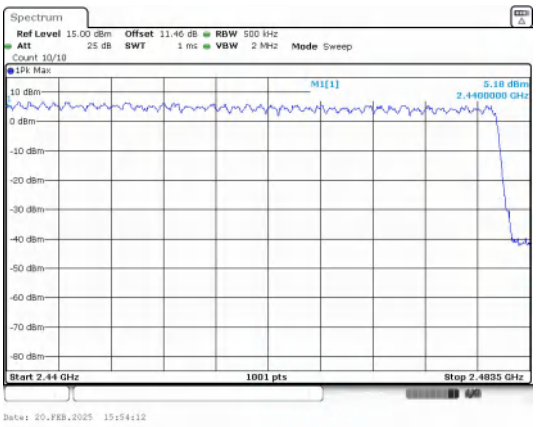
High End Spectrum Channel Hopping Plot

GFSK



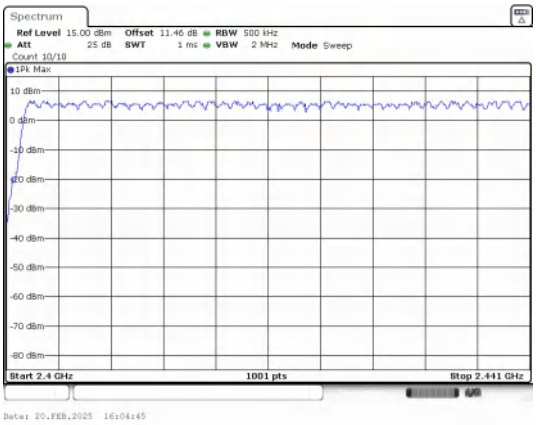
Low End Spectrum Channel Hopping Plot

π/4DQPSK



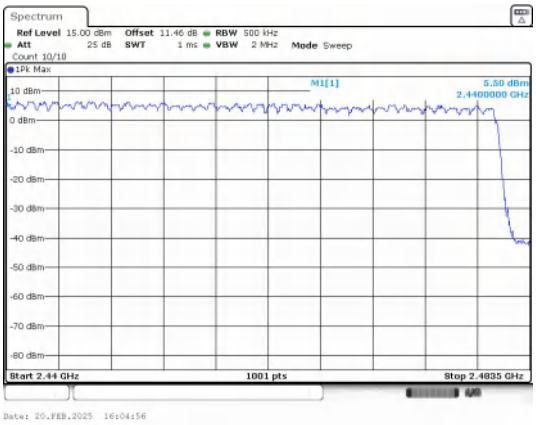
High End Spectrum Channel Hopping Plot

π/4DQPSK



Low End Spectrum Channel Hopping Plot

8DPSK



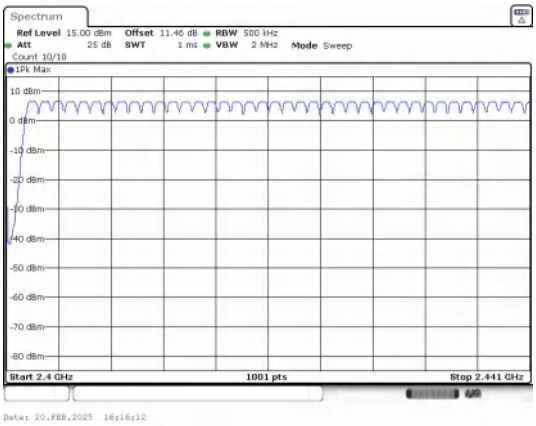
High End Spectrum Channel Hopping Plot

8DPSK

Right：

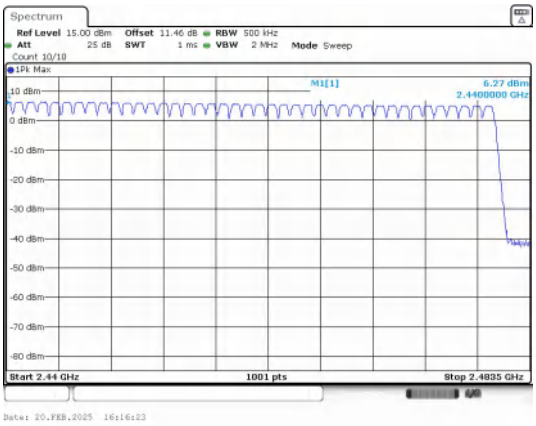
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
π/4DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



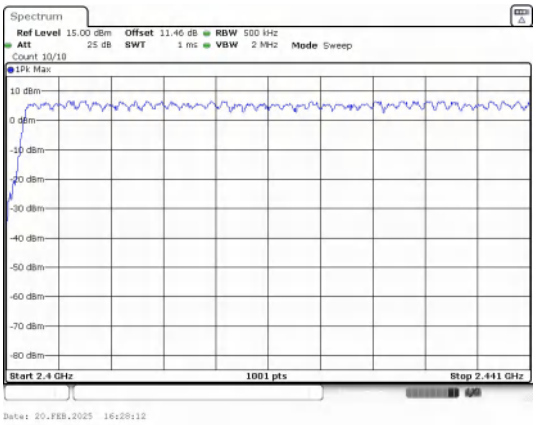
Low End Spectrum Channel Hopping Plot

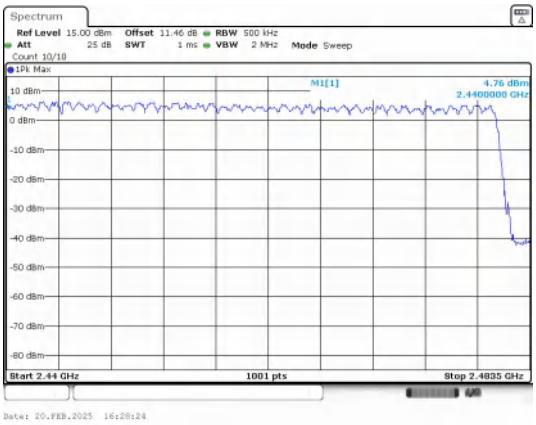
GFSK

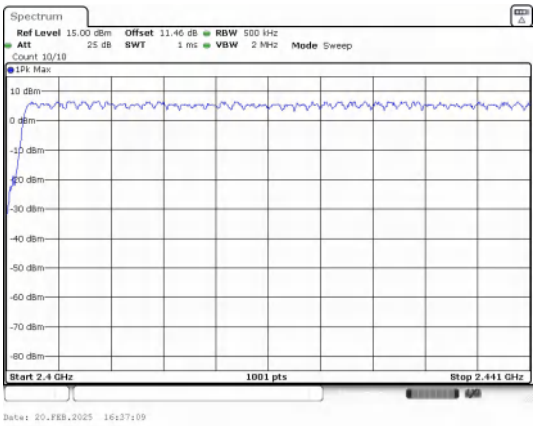
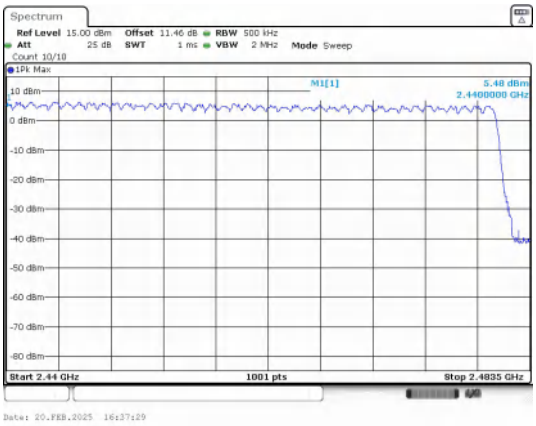


High End Spectrum Channel Hopping Plot

GFSK





Low End Spectrum Channel Hopping Plot π/4DQPSK	High End Spectrum Channel Hopping Plot π/4DQPSK
	
Low End Spectrum Channel Hopping Plot 8DPSK	High End Spectrum Channel Hopping Plot 8DPSK

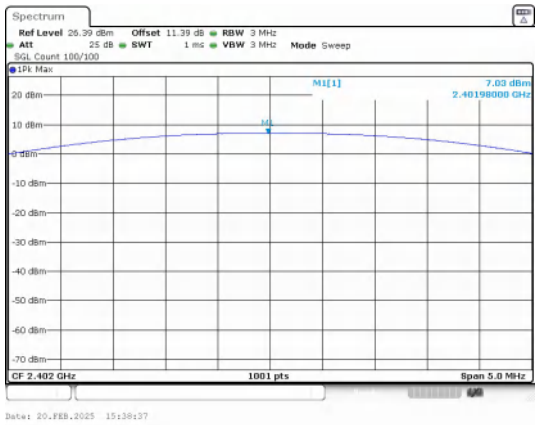
4) Conducted Peak Output Power

Test Result

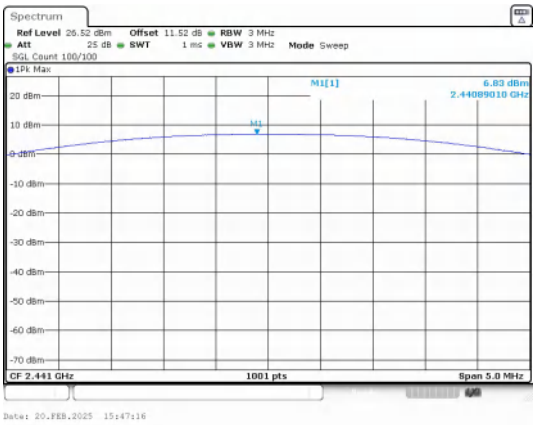
Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	7.03	5.05	≤30	PASS
		39	6.83	4.82		PASS
		78	5.47	3.52		PASS
π/4DQPSK	2-DH5	0	7.45	5.56	≤20.97	PASS
		39	7.35	5.43		PASS
		78	6.04	4.02		PASS
8DPSK	3-DH5	0	7.53	5.66		PASS
		39	7.46	5.57		PASS
		78	6.15	4.12		PASS

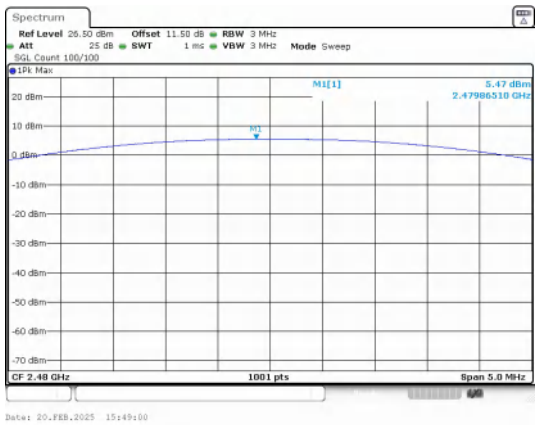
Test Graphs



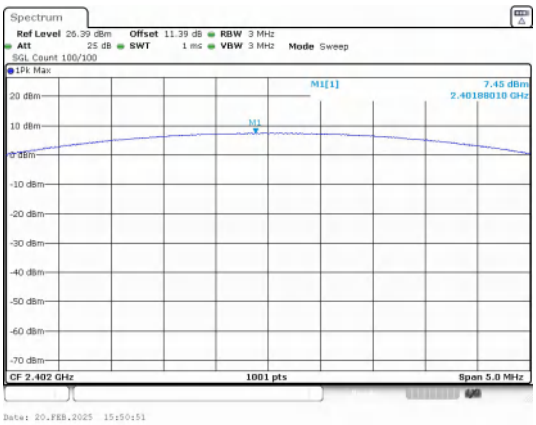
Peak Output Power
GFSK_Channel 0



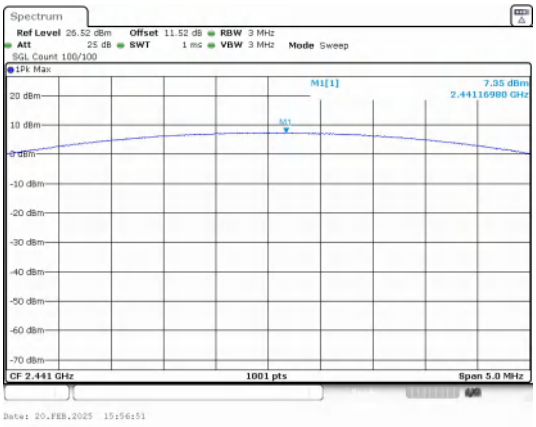
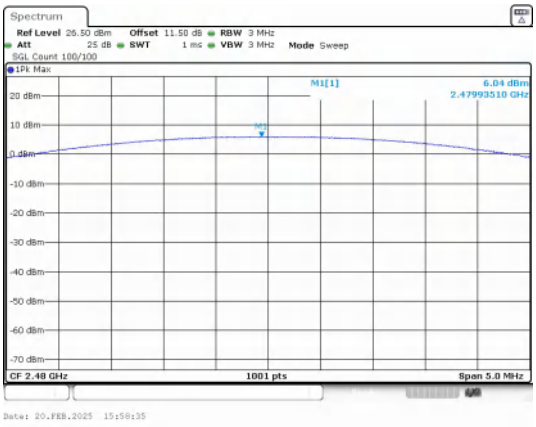
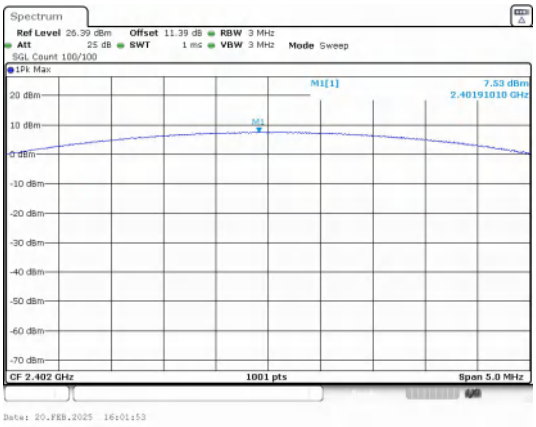
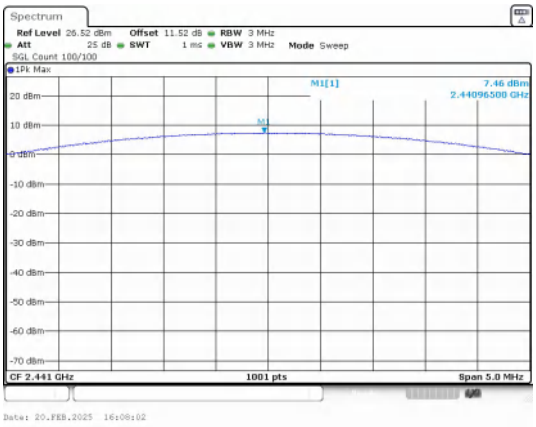
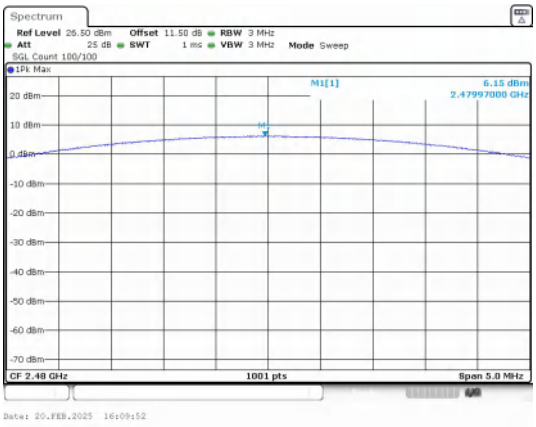
Peak Output Power
GFSK_Channel 39



Peak Output Power



Peak Output Power

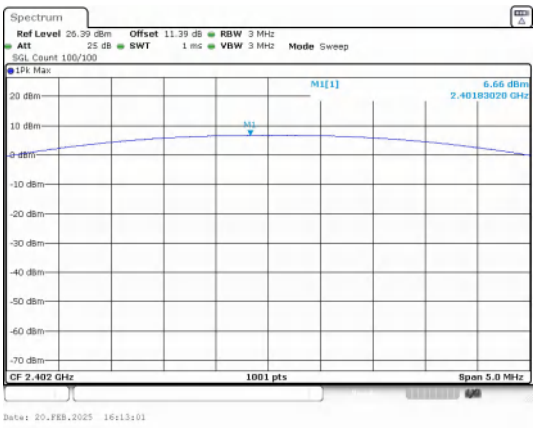
GFSK_Channel 78	π/4DQPSK_Channel 0
	
Peak Output Power π/4DQPSK_Channel 39	Peak Output Power π/4DQPSK_Channel 78
	
Peak Output Power 8DPSK_Channel 0	Peak Output Power 8DPSK_Channel 39
	
Peak Output Power 8DPSK_Channel 78	

Right:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	6.66	4.63	≤30	PASS

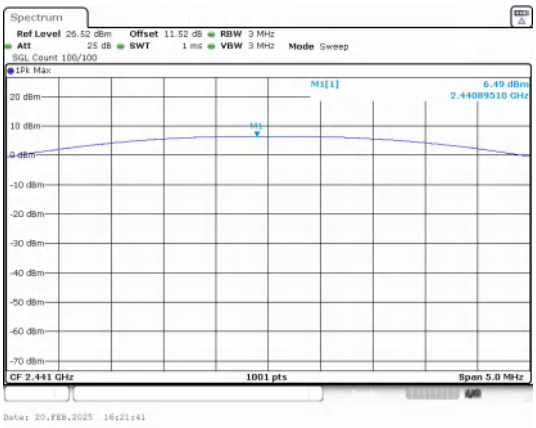
		39	6.49	4.46		PASS
		78	5.16	3.28		PASS
π/4DQPSK	2-DH5	0	7.17	5.21	≤20.97	PASS
		39	7.22	5.27		PASS
		78	5.90	3.89		PASS
8DPSK	3-DH5	0	7.40	5.50		PASS
		39	7.32	5.40		PASS
		78	6.02	4.00		PASS

Test Graphs



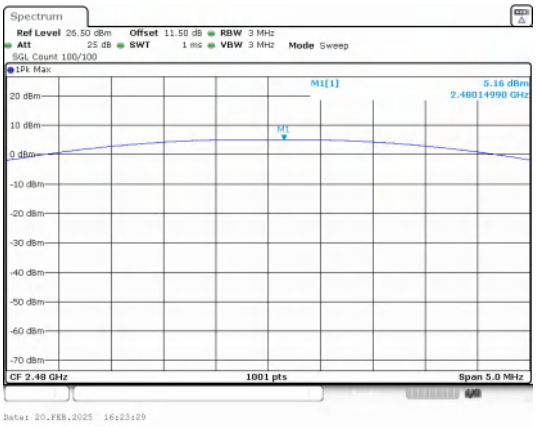
Peak Output Power

GFSK_Channel 0



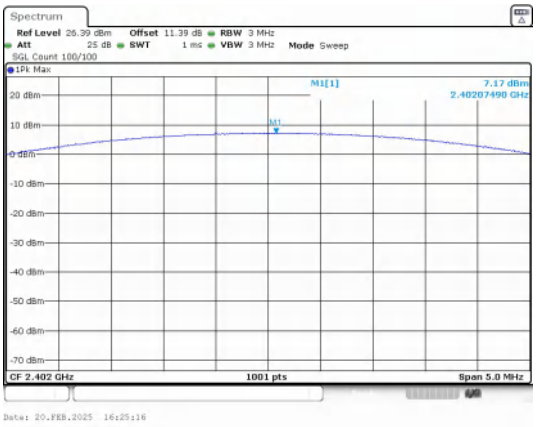
Peak Output Power

GFSK_Channel 39



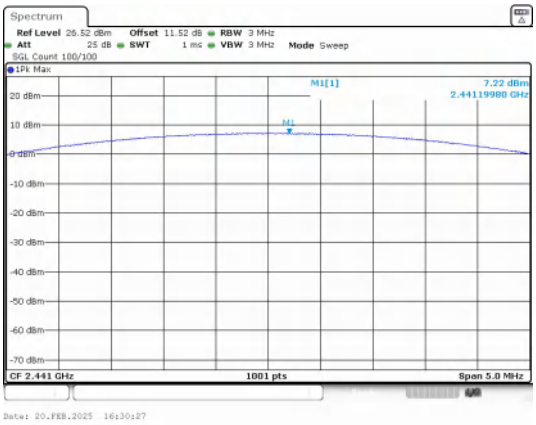
Peak Output Power

GFSK_Channel 78



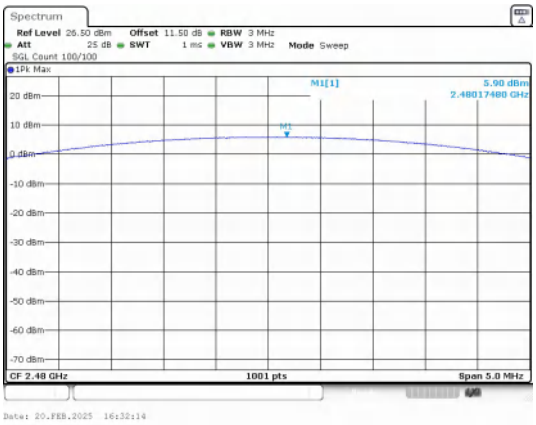
Peak Output Power

π/4DQPSK_Channel 0



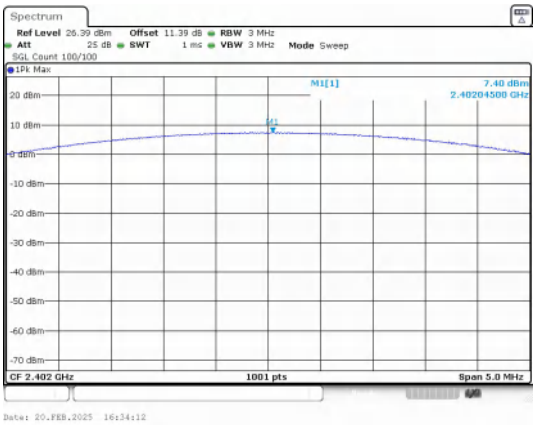
Peak Output Power

π/4DQPSK_Channel 39



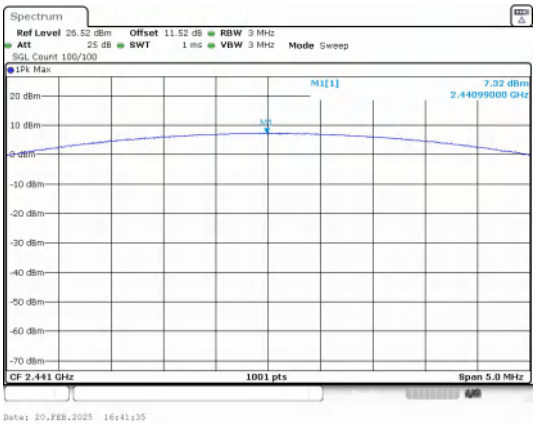
Peak Output Power

π/4DQPSK_Channel 78



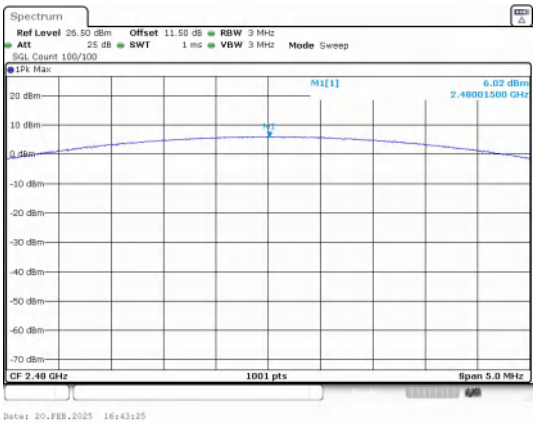
Peak Output Power

8DPSK_Channel 0



Peak Output Power

8DPSK_Channel 39



Peak Output Power

8DPSK_Channel 78

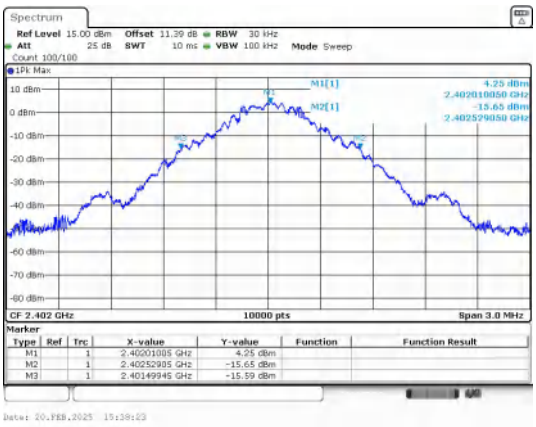
5) 20dB Bandwidth

Test Result

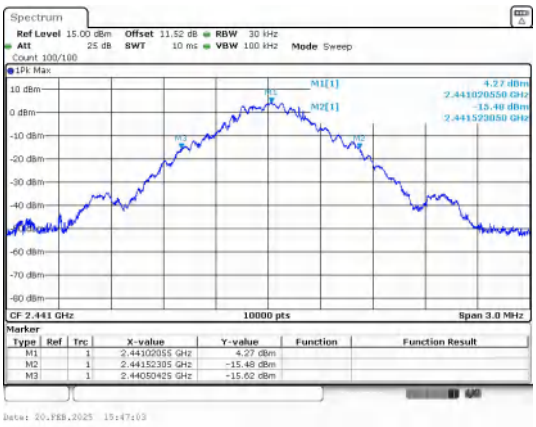
Left:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.030
	39	2441 MHz	1.020
	78	2480 MHz	1.010
π/4DQPSK	0	2402 MHz	1.320
	39	2441 MHz	1.310
	78	2480 MHz	1.310
8DPSK	0	2402 MHz	1.300
	39	2441 MHz	1.300
	78	2480 MHz	1.300

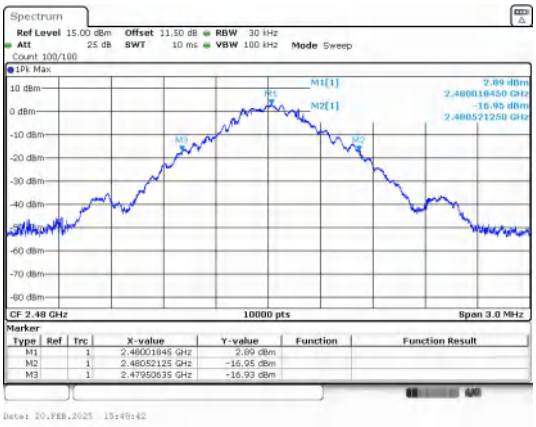
Test Graphs



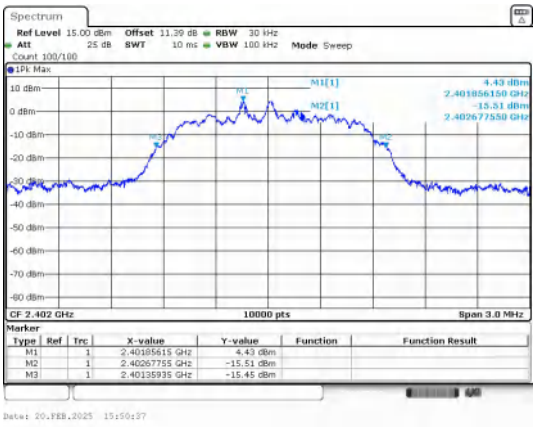
GFSK_DH5_Channel 0



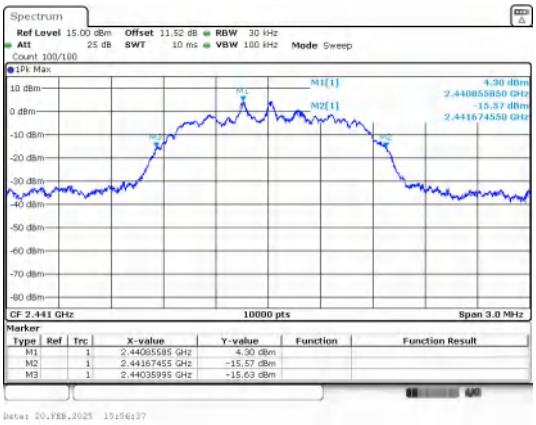
GFSK_DH5_Channel 39



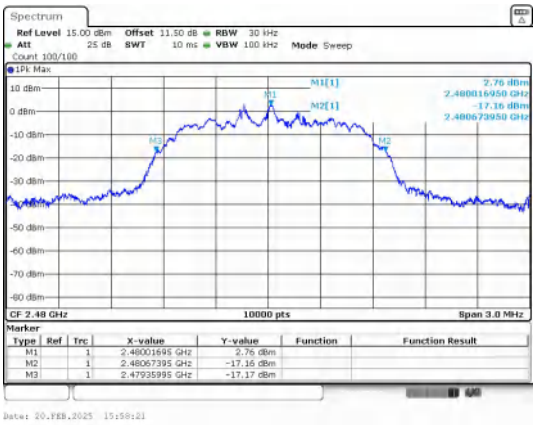
GFSK_DH5_Channel 78



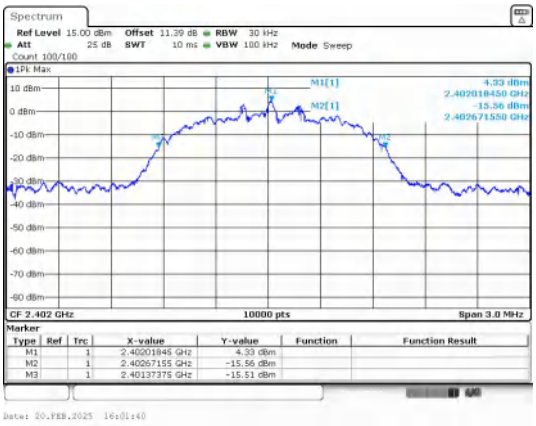
π/4DQPSK_2-DH5_Channel 0



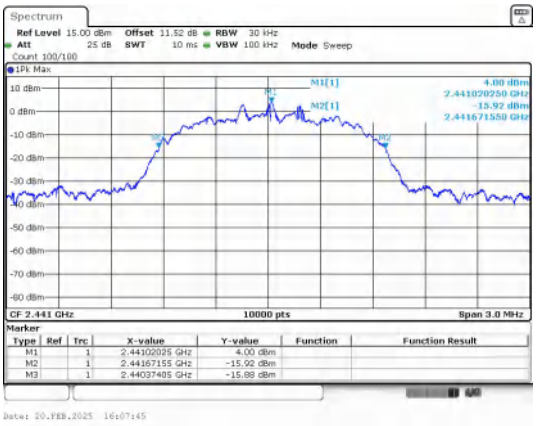
π/4DQPSK_2-DH5_Channel 39



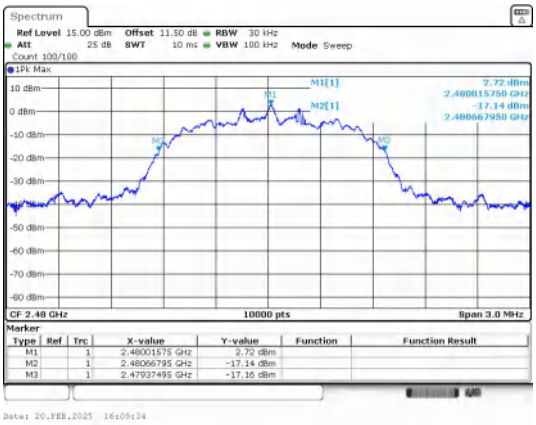
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



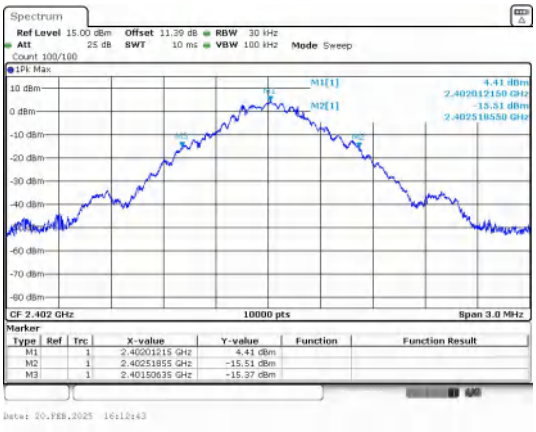
8DPSK_3-DH5_Channel 78

Right:

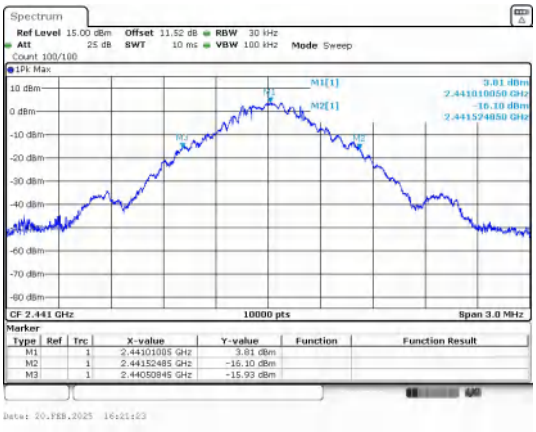
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.010
	39	2441 MHz	1.010
	78	2480 MHz	1.020
π/4DQPSK	0	2402 MHz	1.300
	39	2441 MHz	1.310
	78	2480 MHz	1.300

8DPSK	0	2402 MHz	1.300
	39	2441 MHz	1.300
	78	2480 MHz	1.300

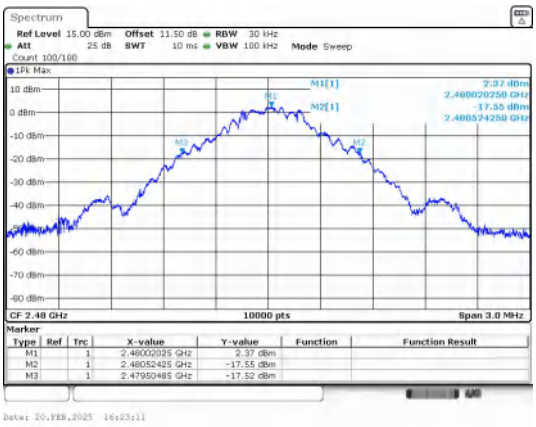
Test Graphs



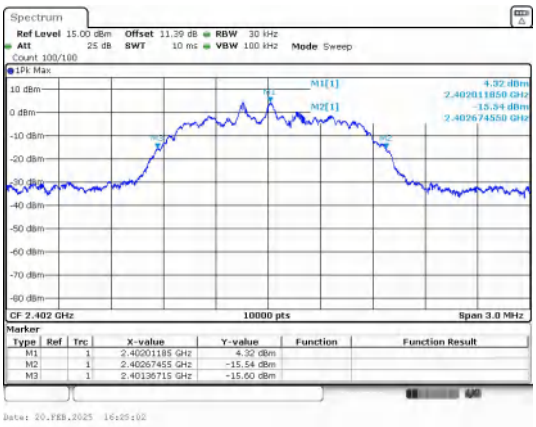
GFSK_DH5_Channel 0



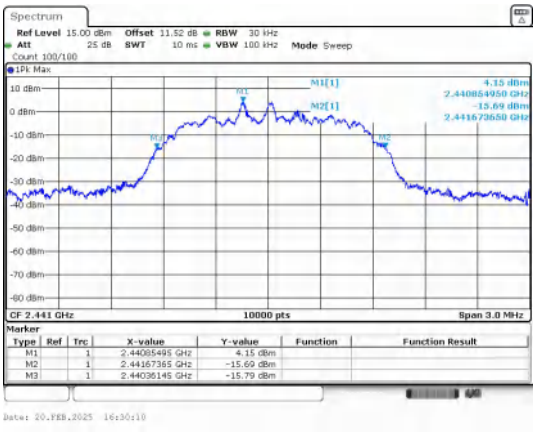
GFSK_DH5_Channel 39



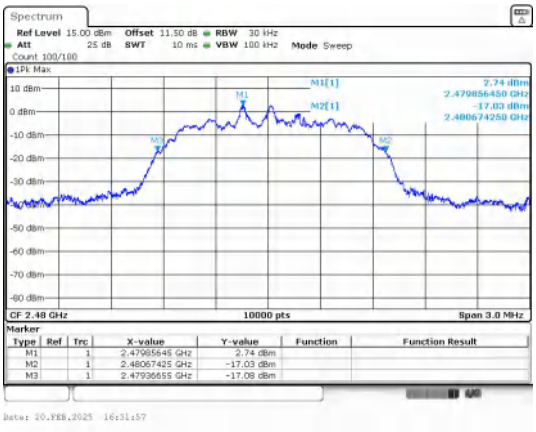
GFSK_DH5_Channel 78



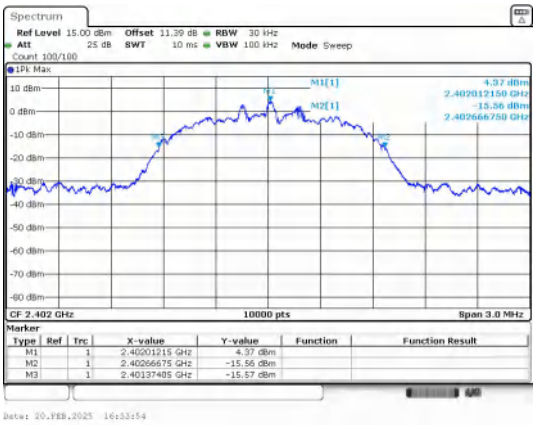
π/4DQPSK_2-DH5_Channel 0



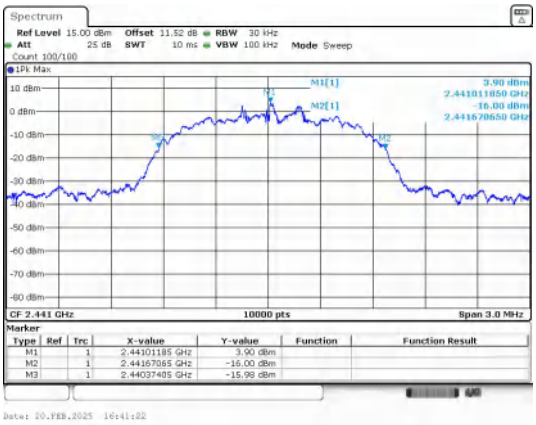
π/4DQPSK_2-DH5_Channel 39



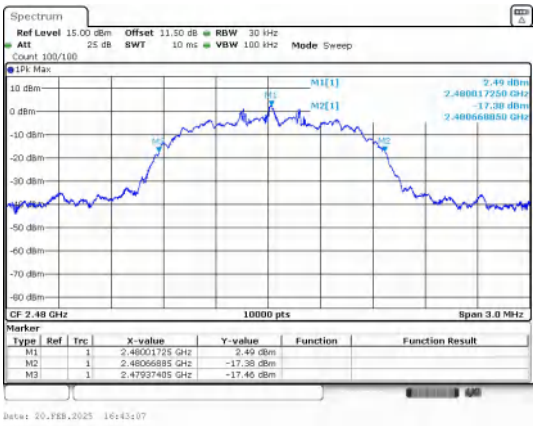
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

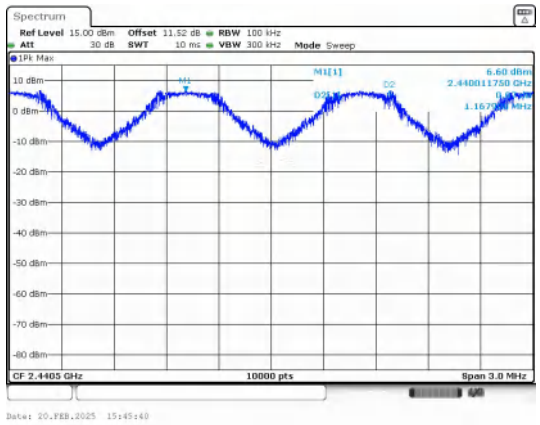
6) Carrier Frequencies Separation

Test Result

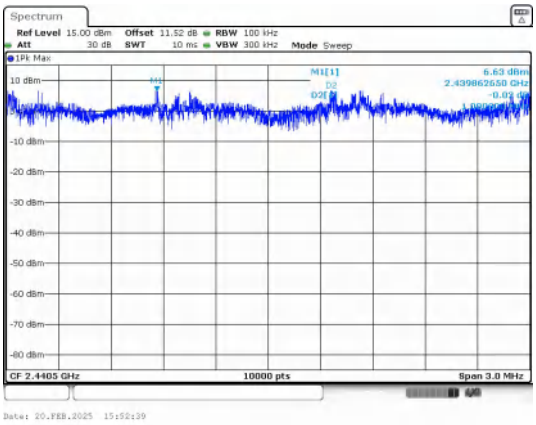
Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.0118	2441.1797	1.1679	1.03	PASS
π/4DQPSK	2-DH5	2439.8627	2440.8634	1.0008	0.88	PASS
8DPSK	3-DH5	2439.9871	2441.032	1.0449	0.867	PASS

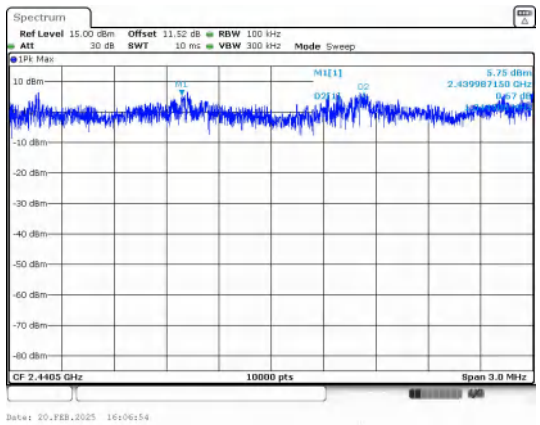
Test Graphs



GFSK



π/4DQPSK

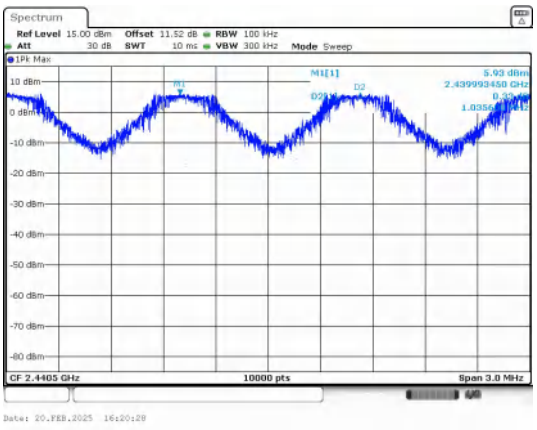


8DPSK

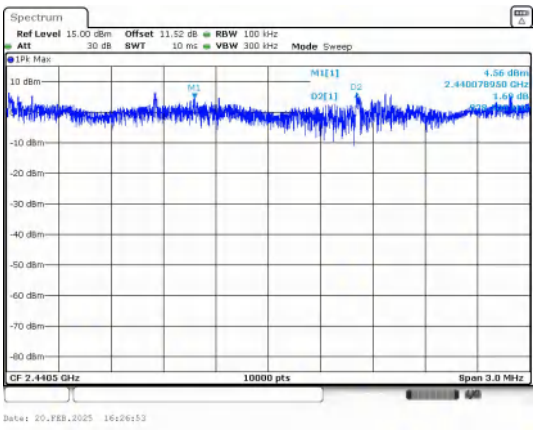
Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.9934	2441.0291	1.0356	1.01	PASS
π/4DQPSK	2-DH5	2440.079	2441.0075	0.9285	0.867	PASS
8DPSK	3-DH5	2440.0228	2441.0266	1.0038	0.867	PASS

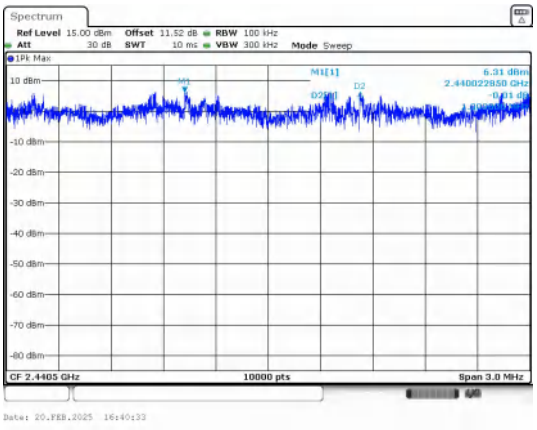
Test Graphs



GFSK



π/4DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left:

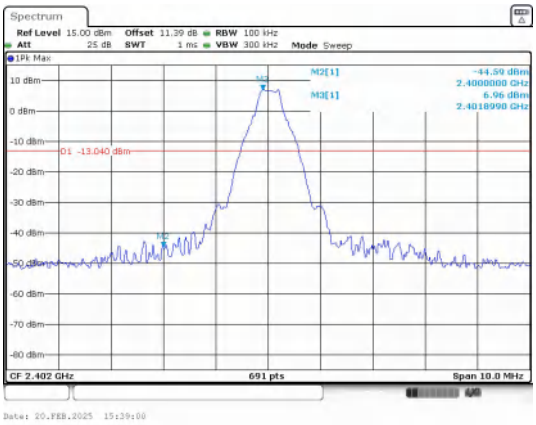
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-44.590	-13.04	-31.550	PASS
			7205.96	-37.696	-13.04	-24.656	PASS
		39	9763.72	-39.738	-13.28	-26.458	PASS
		78	2483.50	-50.390	-14.59	-35.800	PASS
			9920.20	-36.992	-14.59	-22.402	PASS
π/4DQPSK	2-DH5	0	2400.00	-43.440	-13.26	-30.180	PASS
			9608.08	-41.188	-13.26	-27.928	PASS
		39	9763.72	-39.682	-13.46	-26.222	PASS
		78	2483.50	-49.920	-14.76	-35.160	PASS
			9920.20	-36.834	-14.76	-22.074	PASS
8DPSK	3-DH5	0	1784.14	-31.398	-13.52	-17.878	PASS
			2400.00	-42.670	-13.52	-29.150	PASS
		39	9763.72	-39.588	-13.54	-26.048	PASS
		78	2483.50	-50.190	-14.95	-35.240	PASS
			9920.20	-37.280	-14.95	-22.330	PASS

Hopping

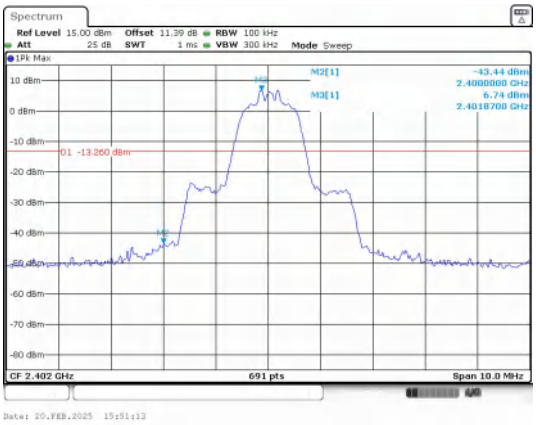
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2400.00	-47.680	-13.15	-34.530	PASS
			2483.50	-49.330	-14.59	-34.740	PASS
π/4DQPSK	2-DH5		2395.33	-47.983	-13.39	-34.593	PASS
			2400.00	-49.090	-13.39	-35.700	PASS
			2483.50	-48.630	-17.33	-31.300	PASS
8DPSK	3-DH5		2396.25	-47.344	-13.38	-33.964	PASS
			2400.00	-48.210	-13.38	-34.830	PASS
			2483.50	-50.230	-17.89	-32.340	PASS

Test Graphs



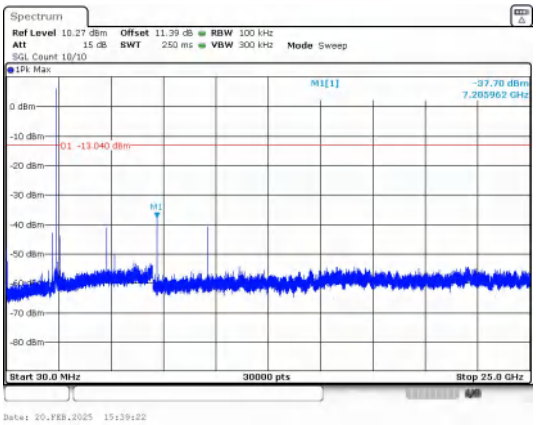
Out Of Band Emission

GFSK_DH5_Channel 0



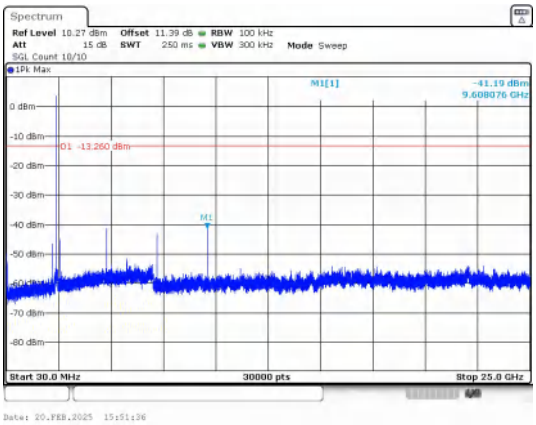
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 0



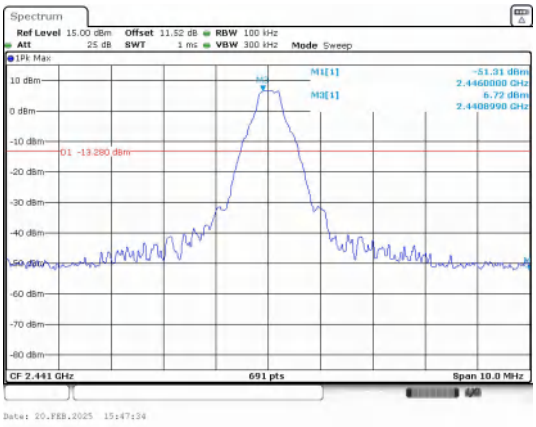
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



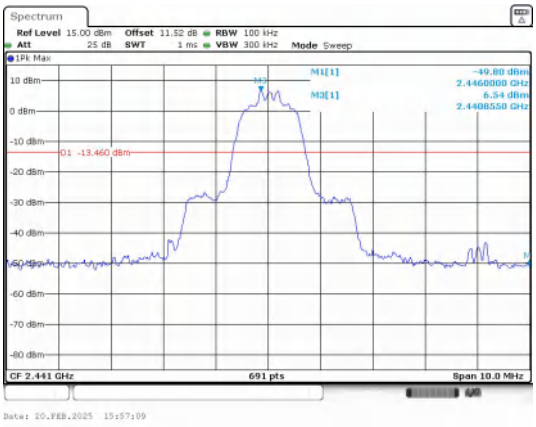
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



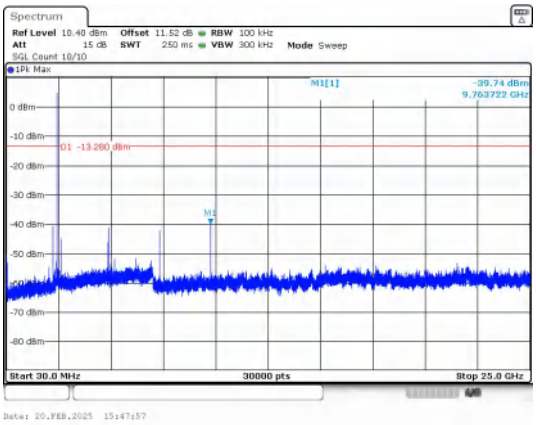
Out Of Band Emission

GFSK_DH5_Channel 39



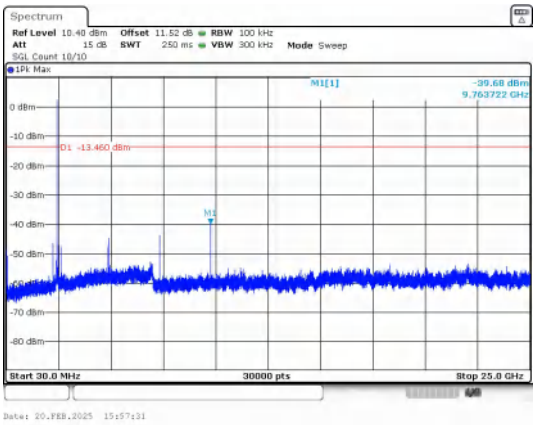
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



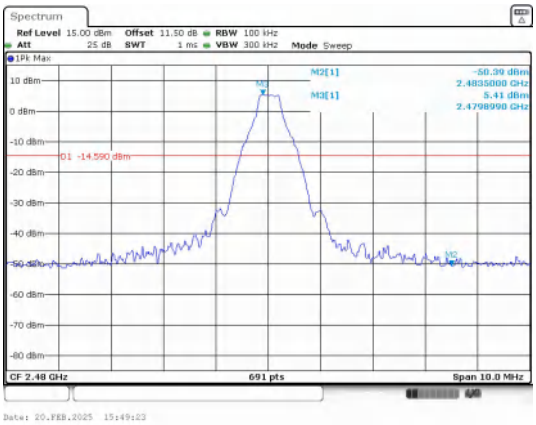
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



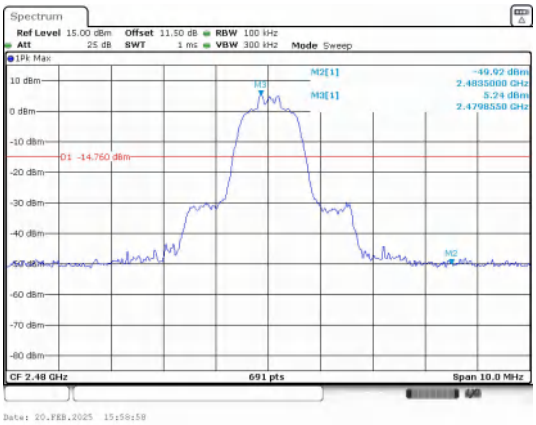
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



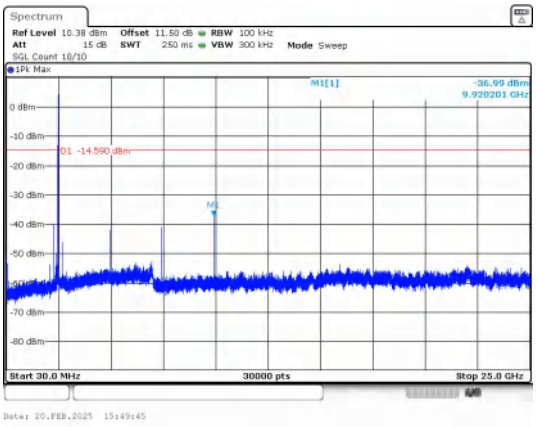
Out Of Band Emission

GFSK_DH5_Channel 78



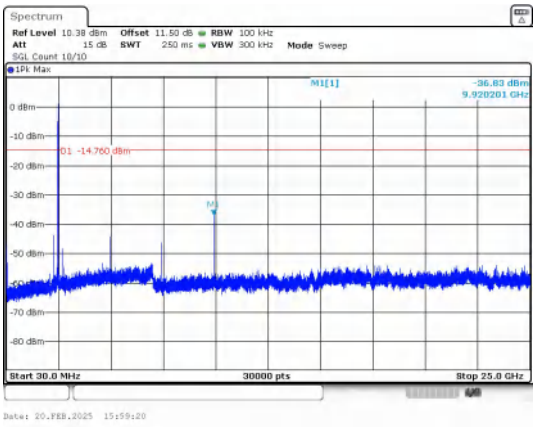
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



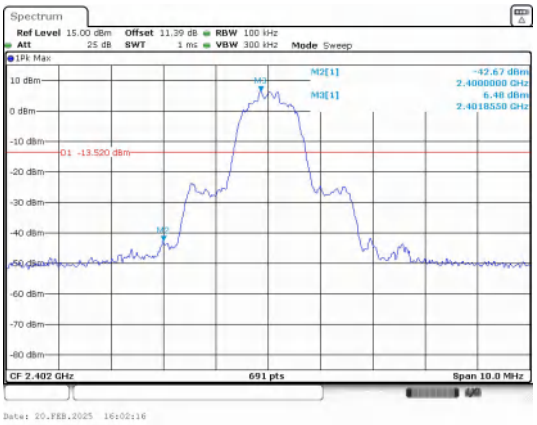
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 78



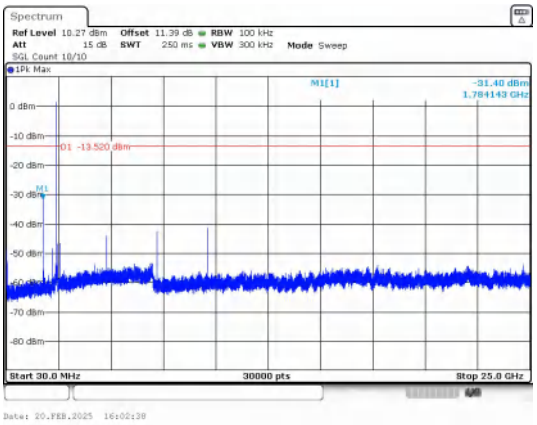
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 78



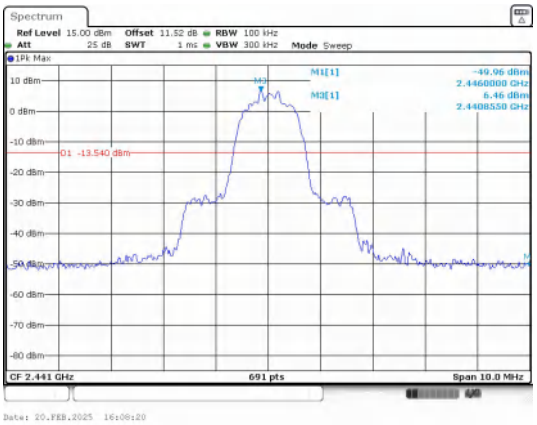
Out Of Band Emission

8DPSK_3-DH5_Channel 0



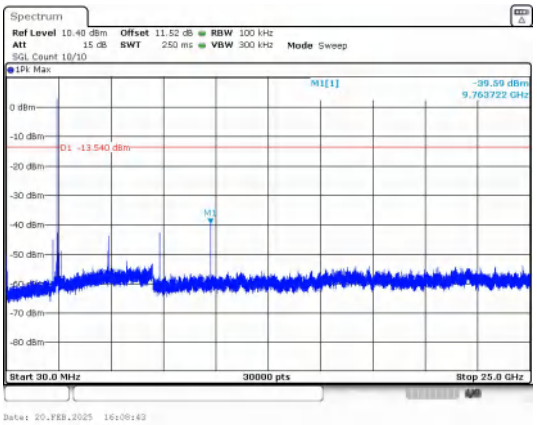
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 0



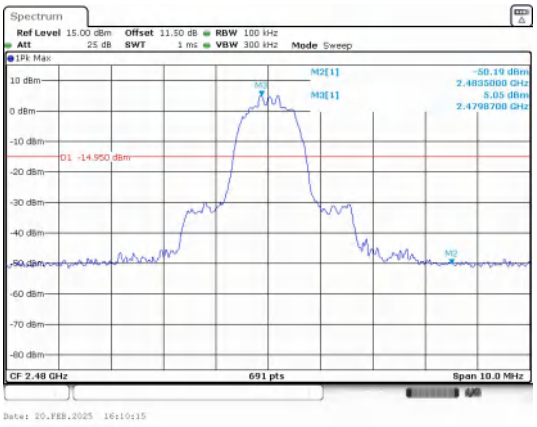
Out Of Band Emission

8DPSK_3-DH5_Channel 39



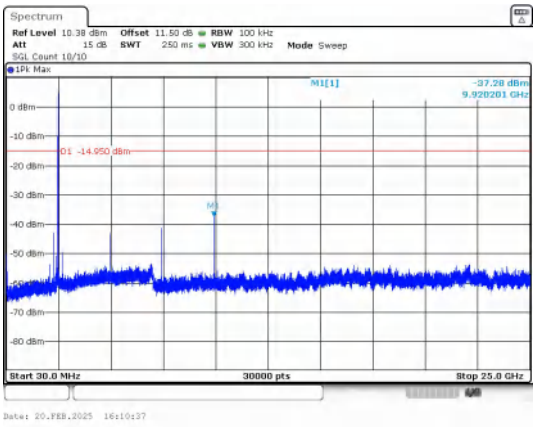
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 39



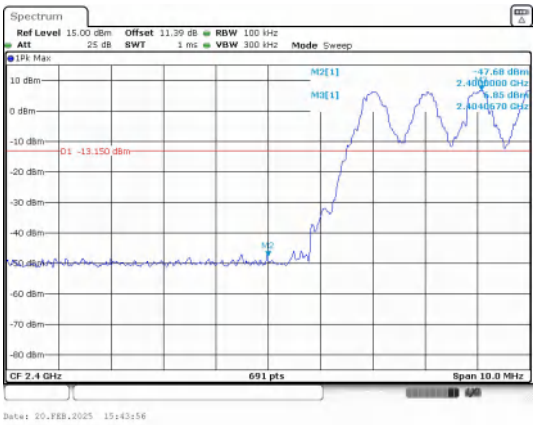
Out Of Band Emission

8DPSK_3-DH5_Channel 78



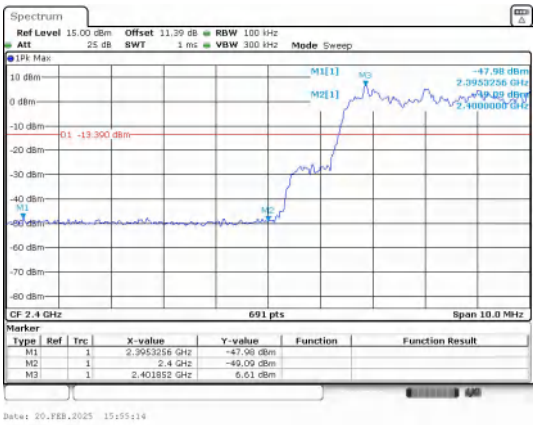
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 78



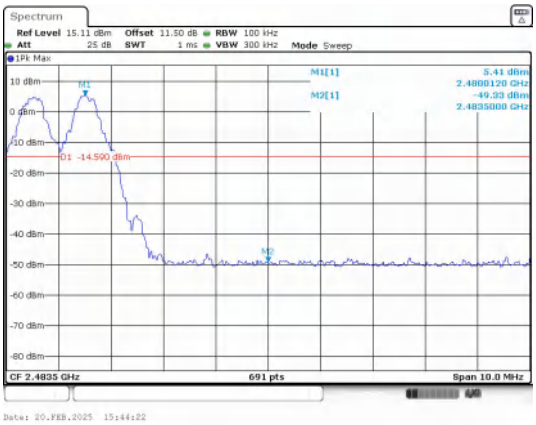
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



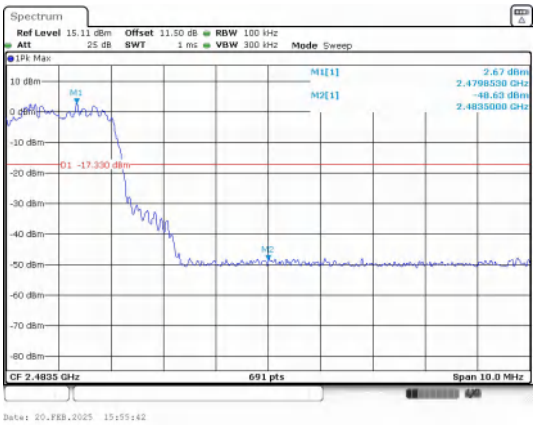
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



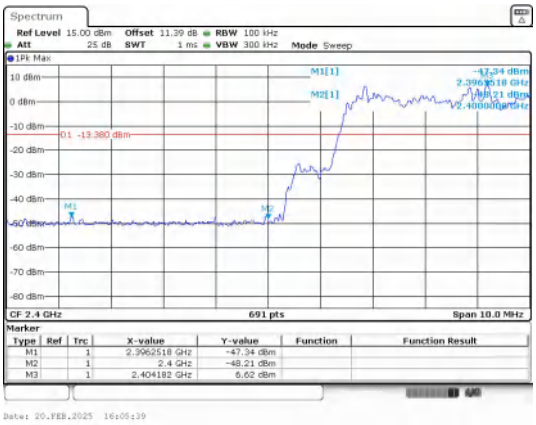
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



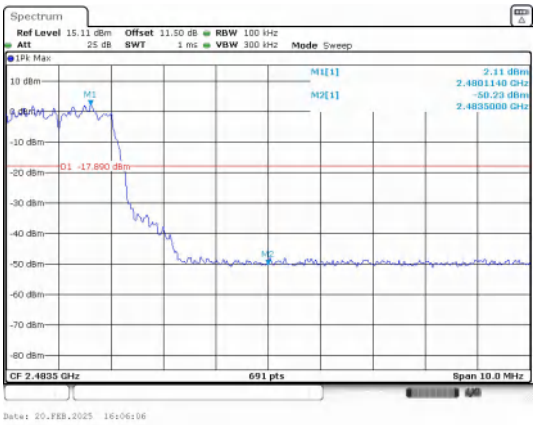
Out Of Band Emission(Right)

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

Right:

Non-Hopping

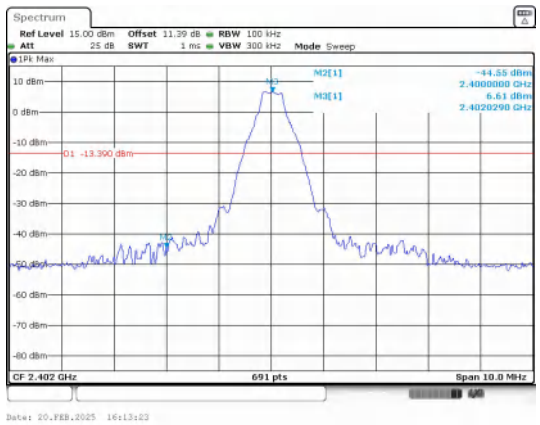
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result

GFSK	DH5	0	2400.00	-44.550	-13.39	-31.160	PASS
			7205.96	-39.842	-13.39	-26.452	PASS
		39	9763.72	-40.172	-13.72	-26.452	PASS
		78	1784.14	-33.359	-15.01	-18.349	PASS
			2483.50	-48.220	-15.01	-33.210	PASS
π/4DQPSK	2-DH5	0	2400.00	-44.550	-13.52	-31.030	PASS
			9608.08	-41.309	-13.52	-27.789	PASS
		39	9763.72	-39.439	-13.76	-25.679	PASS
		78	2483.50	-48.910	-14.89	-34.020	PASS
			9920.20	-37.167	-14.89	-22.277	PASS
8DPSK	3-DH5	0	2400.00	-46.570	-13.47	-33.100	PASS
			7205.96	-39.183	-13.47	-25.713	PASS
		39	9763.72	-39.694	-13.73	-25.964	PASS
		78	2483.50	-50.710	-15.08	-35.630	PASS
			9920.20	-37.419	-15.08	-22.339	PASS

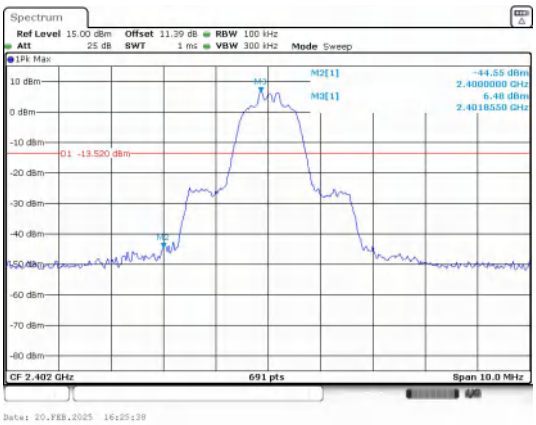
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.91	-47.704	-13.73	-33.974	PASS
			2400.00	-48.470	-13.73	-34.740	PASS
			2483.50	-49.720	-15.21	-34.510	PASS
π/4DQPSK	2-DH5		2396.64	-48.279	-16.5	-31.779	PASS
			2400.00	-49.270	-16.5	-32.770	PASS
			2483.50	-50.240	-16.46	-33.780	PASS
8DPSK	3-DH5		2396.05	-48.377	-13.64	-34.737	PASS
			2400.00	-50.030	-13.64	-36.390	PASS
			2483.50	-49.960	-17.37	-32.590	PASS

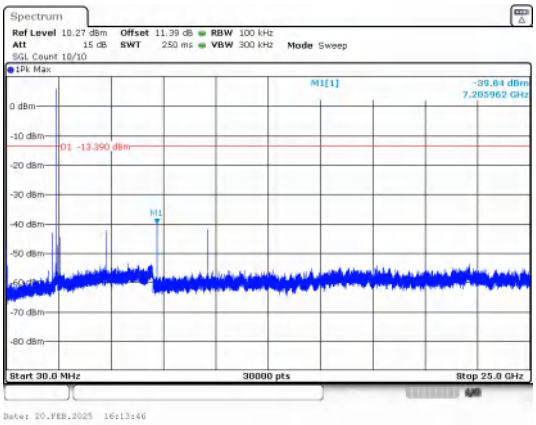
Test Graphs



Out Of Band Emission
GFSK_DH5_Channel 0

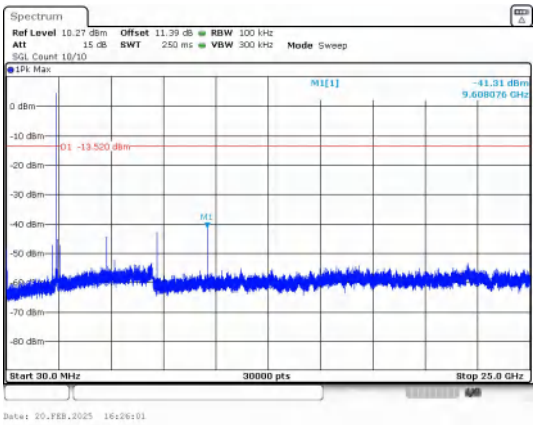


Out Of Band Emission
π/4DQPSK_2-DH5_Channel 0



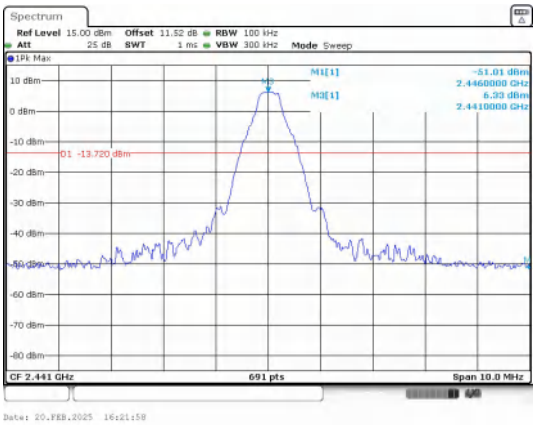
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



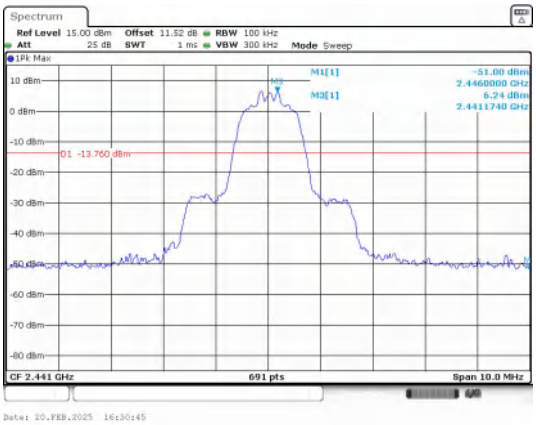
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



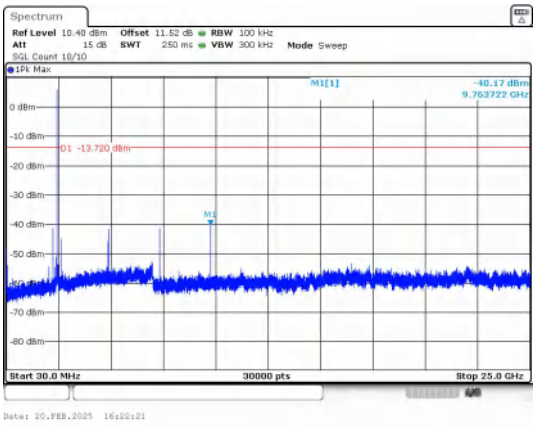
Out Of Band Emission

GFSK_DH5_Channel 39



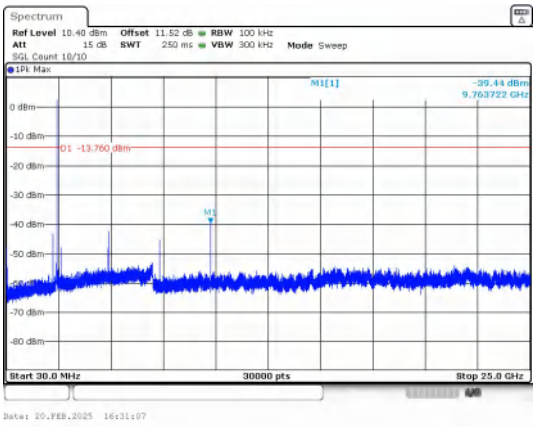
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



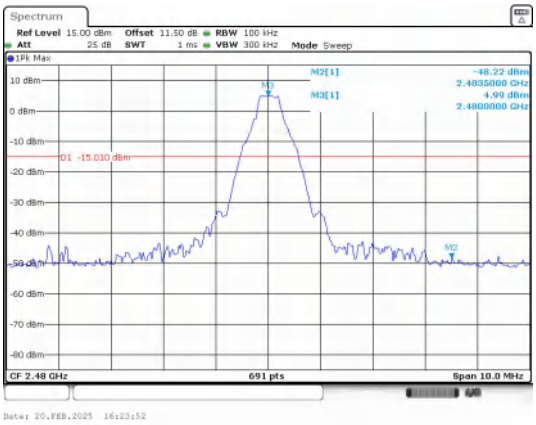
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



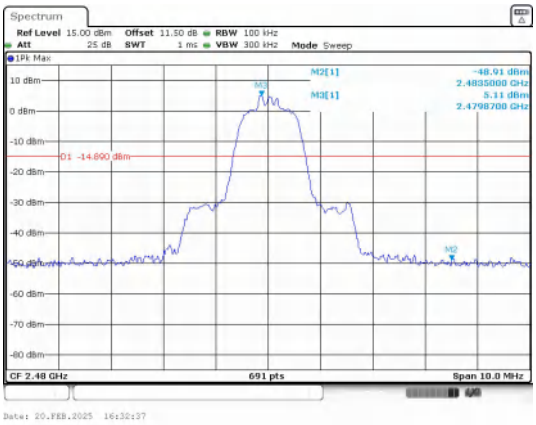
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



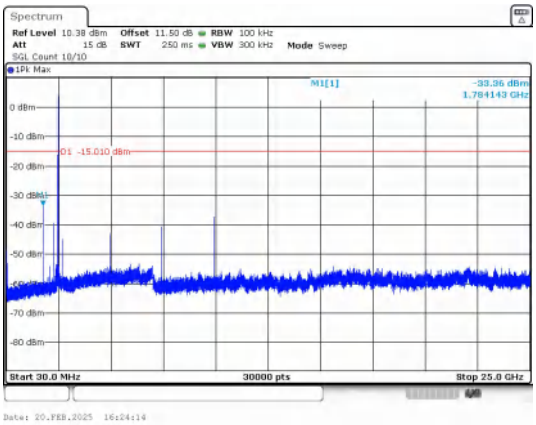
Out Of Band Emission

GFSK_DH5_Channel 78



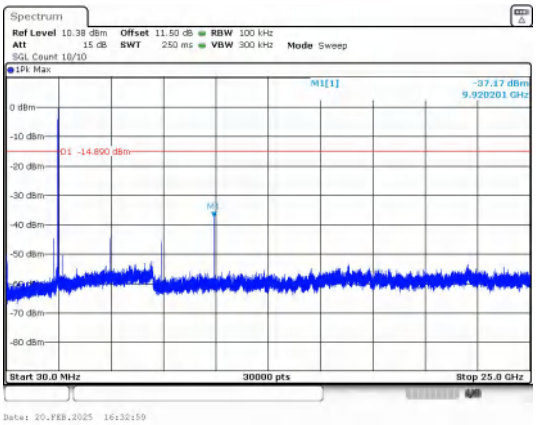
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



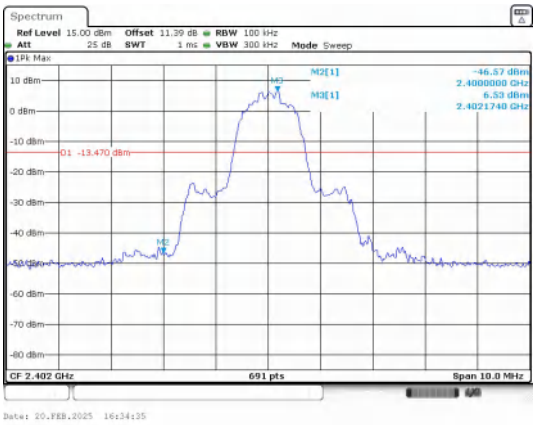
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 78



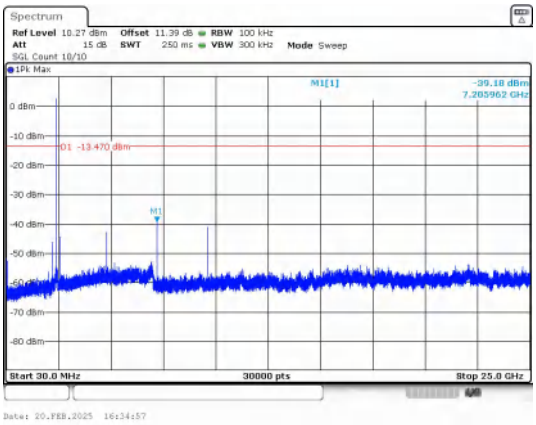
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 78



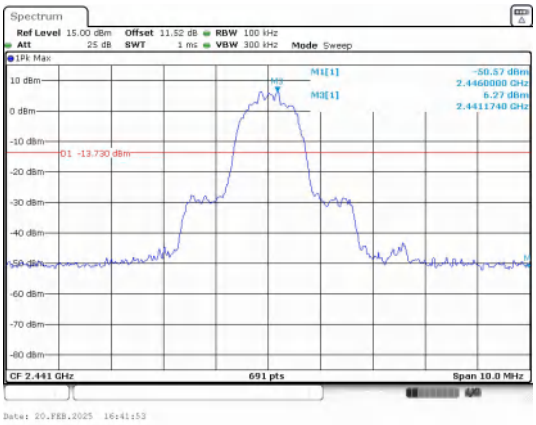
Out Of Band Emission

8DPSK_3-DH5_Channel 0



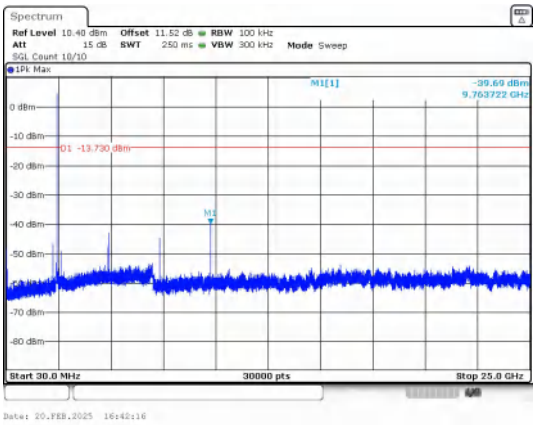
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 0



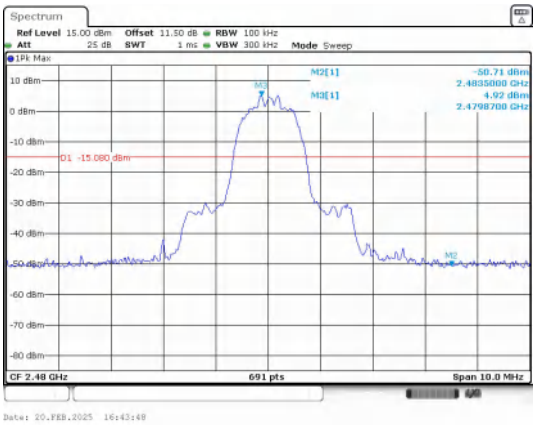
Out Of Band Emission

8DPSK_3-DH5_Channel 39



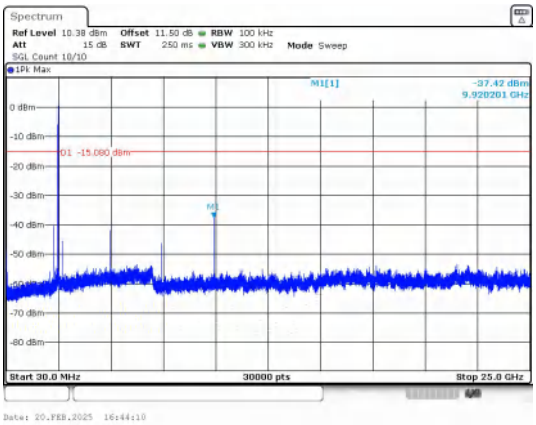
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 39



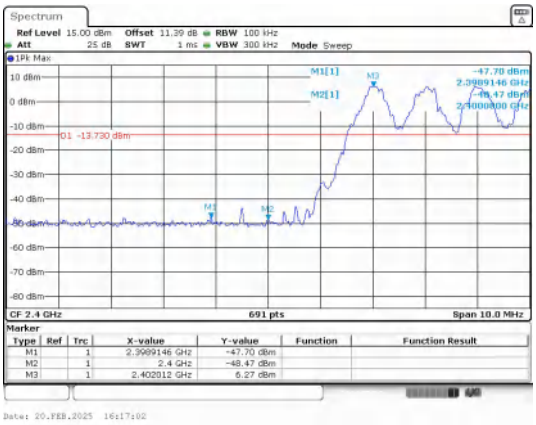
Out Of Band Emission

8DPSK_3-DH5_Channel 78



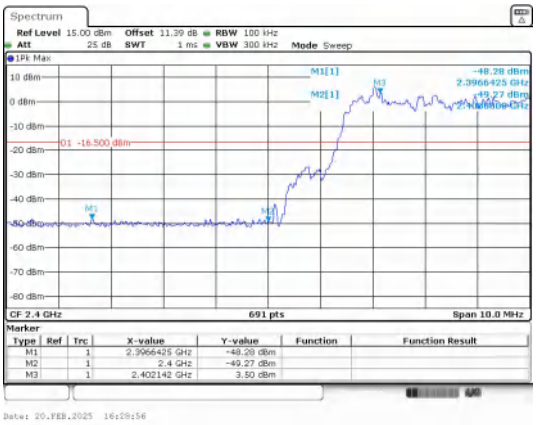
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 78



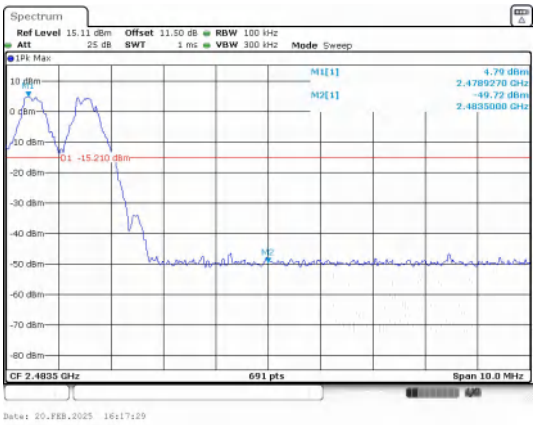
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



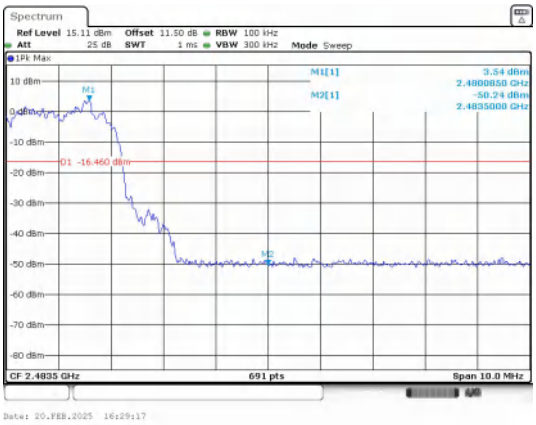
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



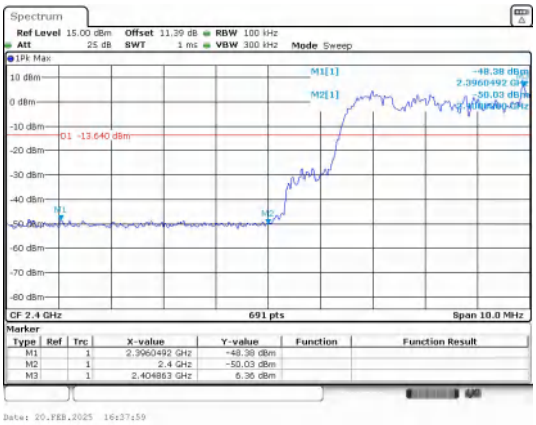
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



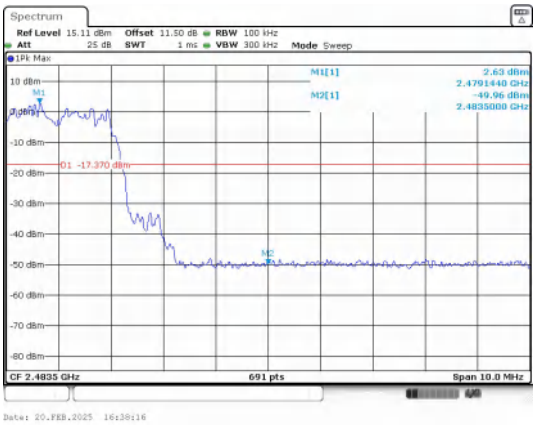
Out Of Band Emission(Right)

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

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