

Appendix Project

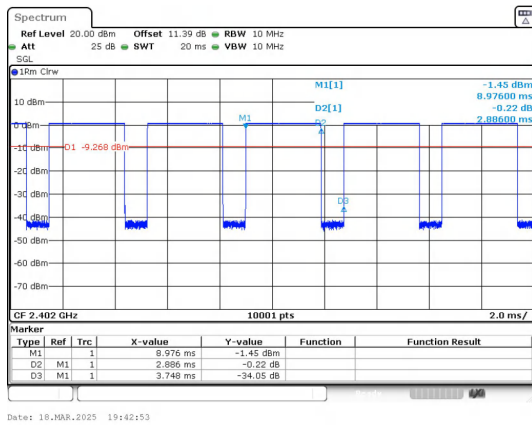
Project No.:	CISR250318133
Test Engineer:	Mark Fu
Supervised by:	Rory Huang

1) Duty Cycle

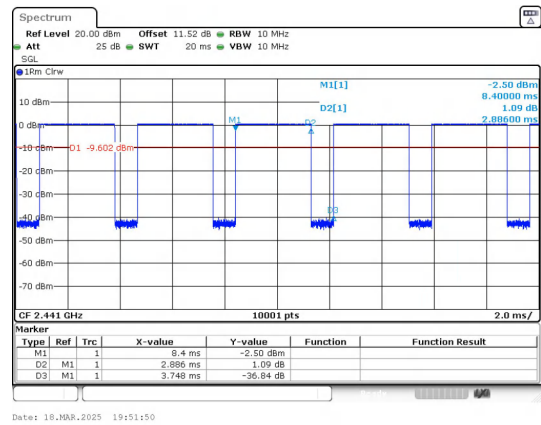
Test Result

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	3.748	77.00	0.7700	1.1351	0.3465
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
$\pi/4$ DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.3460
		39	2.890	3.748	77.11	0.7711	1.1289	0.3460
		78	2.892	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	2.894	3.748	77.21	0.7721	1.1233	0.3455

Test Graphs



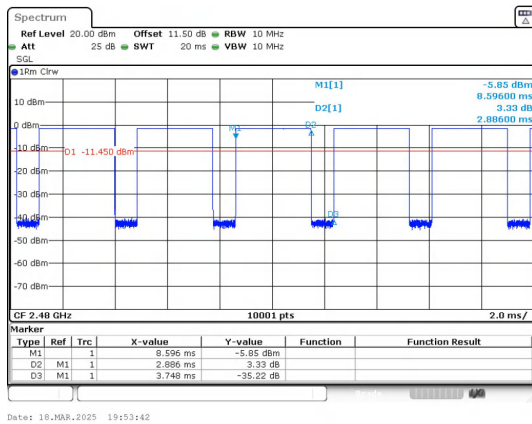
Date: 18.MAR.2025 19:42:53



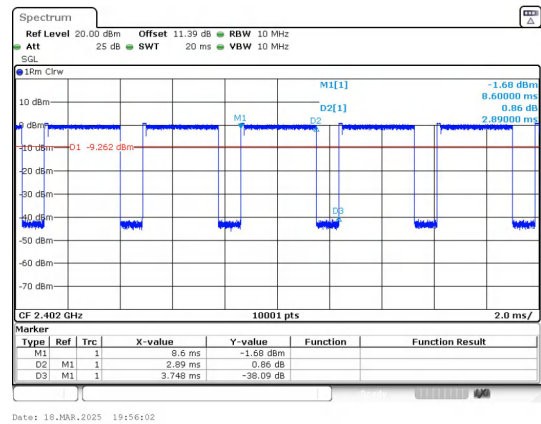
Date: 18.MAR.2025 19:51:50

GFSK(DH5)_Channel 0

GFSK(DH5)_Channel 39



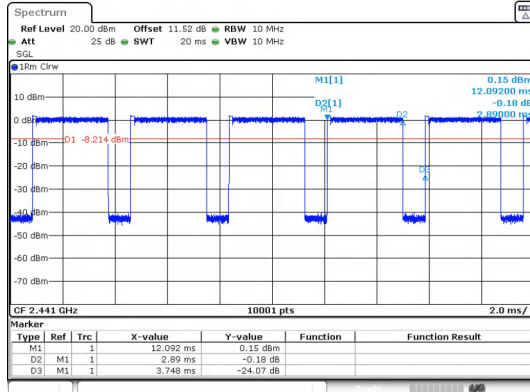
Date: 18.MAR.2025 19:53:42



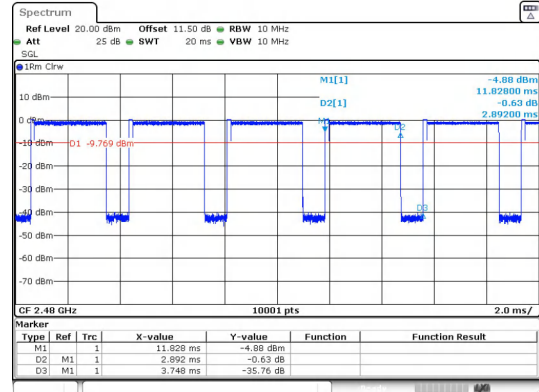
Date: 18.MAR.2025 19:56:02

GFSK(DH5)_Channel 78

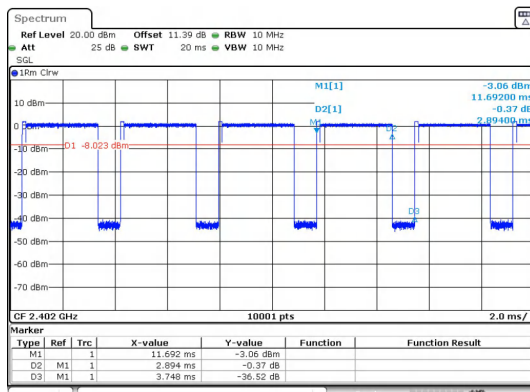
 $\pi/4$ DQPSK(2-DH5)_Channel 0



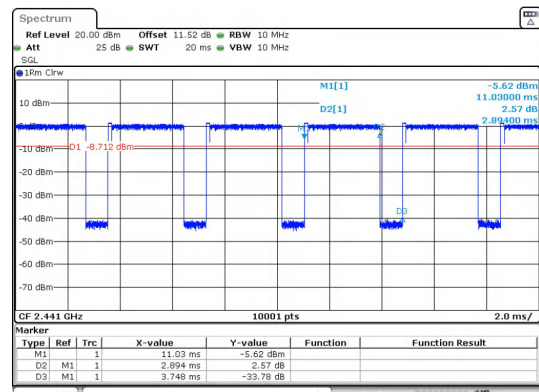
$\pi/4$ DQPSK(2-DH5)_Channel 39



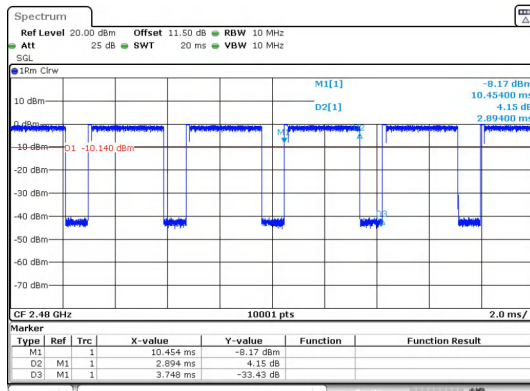
$\pi/4$ DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



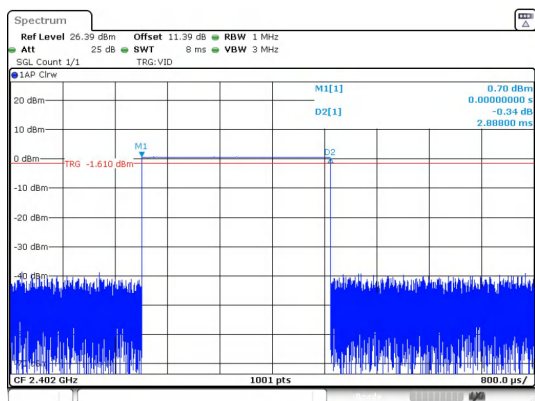
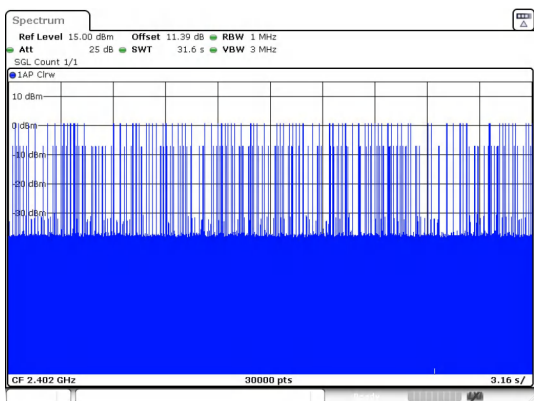
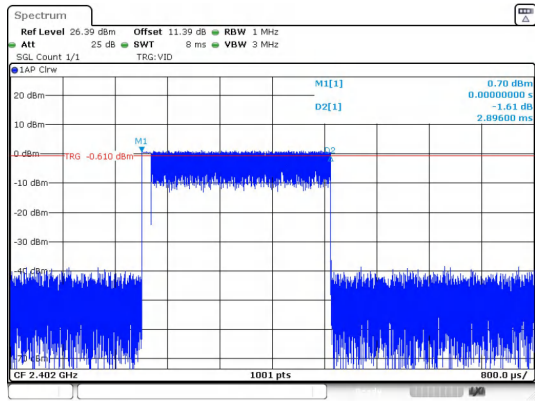
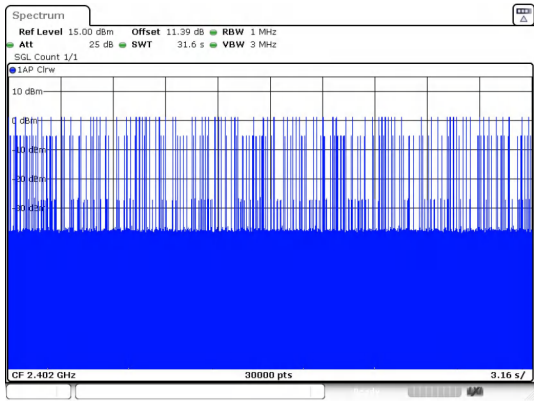
8DPSK(3-DH5)_Channel 78

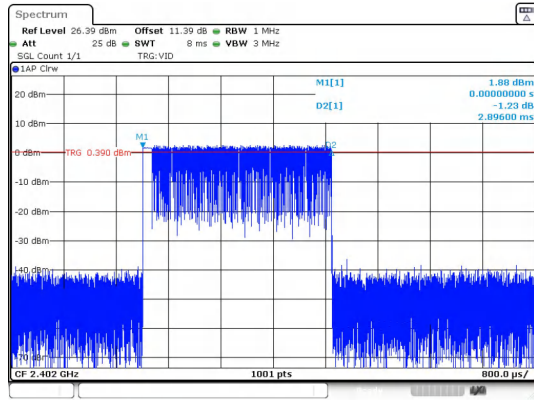
2) Dwell Time

Test Result

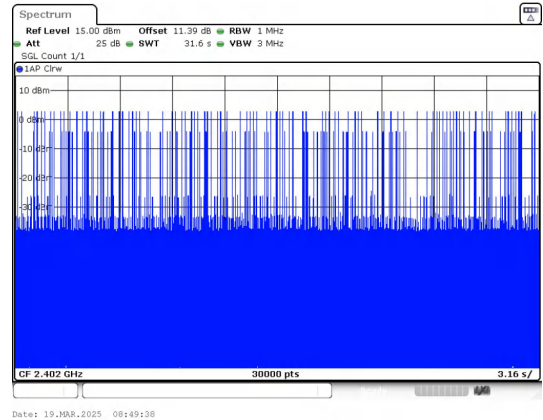
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	107	309.02	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.896	98	283.81		PASS
8DPSK	3-DH5		2.896	112	324.35		PASS

Test Graphs

 Date: 18.MAR.2025 19:46:12	 Date: 18.MAR.2025 19:46:04
Pulse Width GFSK_DH5	Number of Pulses in 31.6 seconds GFSK_DH5
 Date: 18.MAR.2025 19:59:22	 Date: 18.MAR.2025 19:59:14
Pulse Width $\pi/4$DQPSK_2-DH5	Number of Pulses in 31.6 seconds $\pi/4$DQPSK_2-DH5



Pulse Width
8DPSK_3-DH5



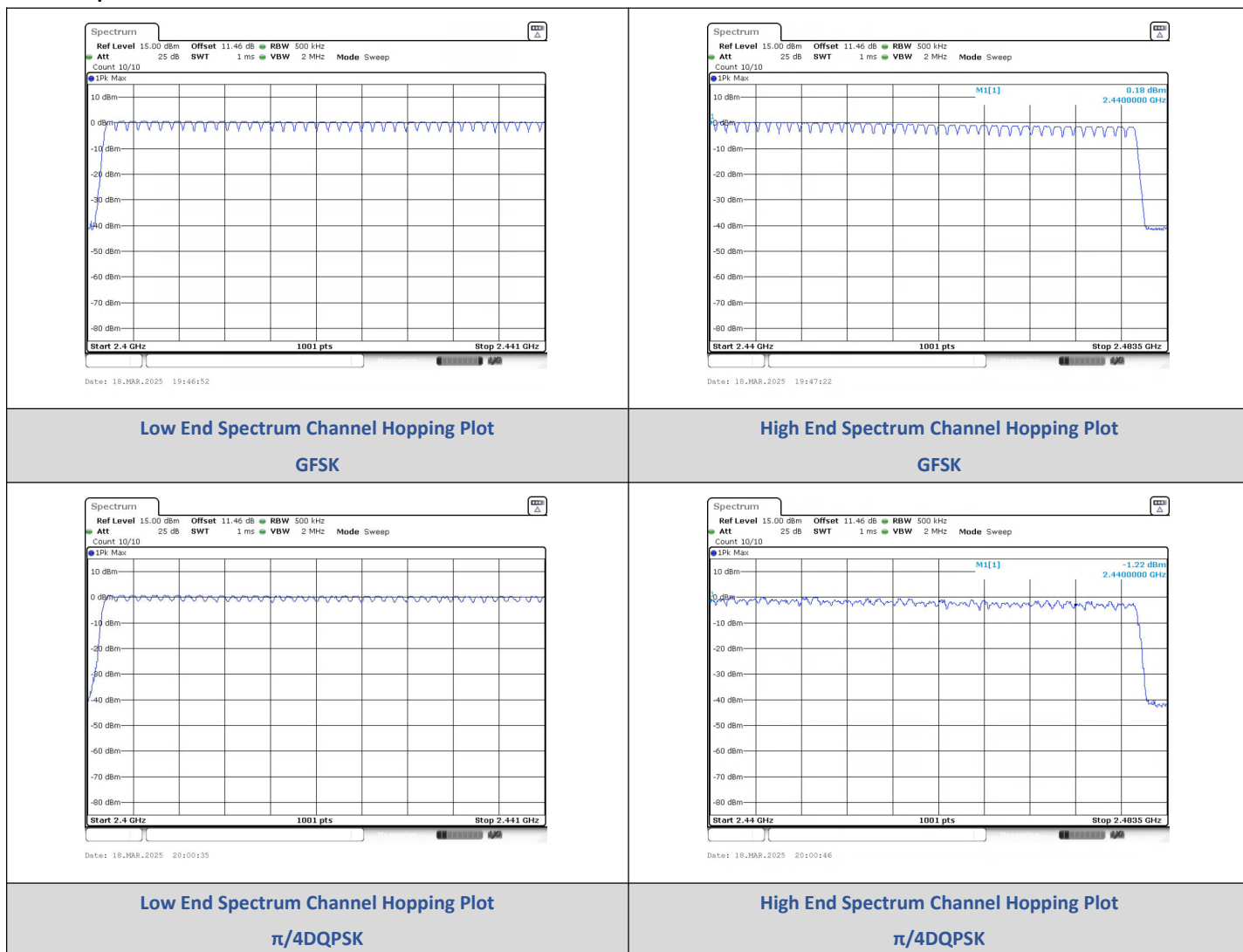
Number of Pulses in 31.6 seconds
8DPSK_3-DH5

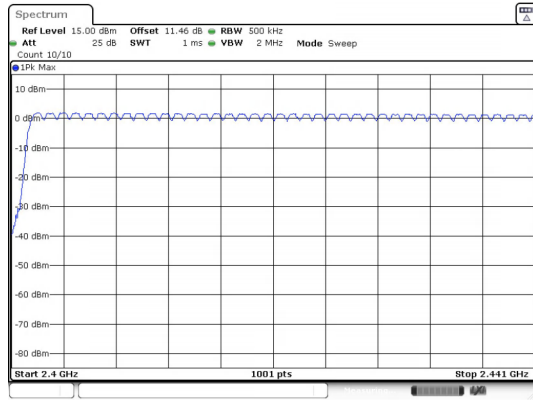
3) Number Of Hopping Channel

Test Result

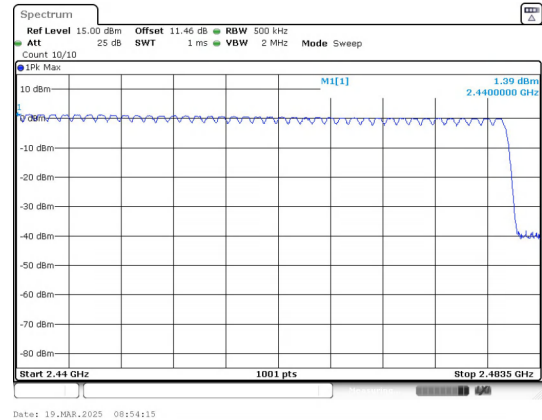
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs





Low End Spectrum Channel Hopping Plot
8DPSK



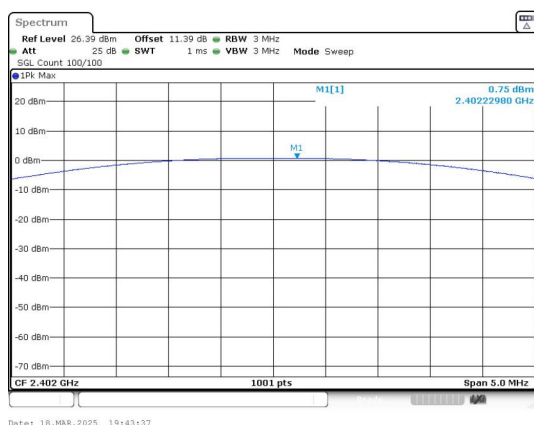
High End Spectrum Channel Hopping Plot
8DPSK

4) Conducted Output Power

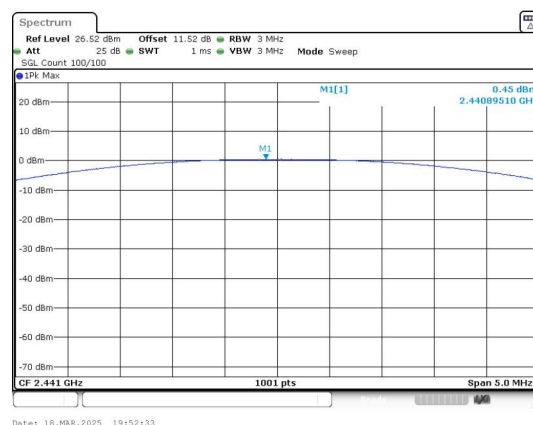
Test Result

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	0.75	1.19	≤30	PASS
		39	0.45	1.11		PASS
		78	-1.39	0.73		PASS
$\pi/4$ DQPSK	2-DH5	0	1.55	1.43	≤20.97	PASS
		39	2.64	1.84		PASS
		78	1.07	1.28		PASS
8DPSK	3-DH5	0	3.17	2.07		PASS
		39	2.54	1.79		PASS
		78	1.11	1.29		PASS

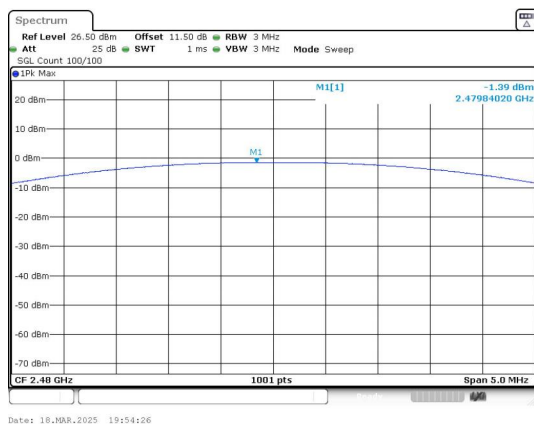
Test Graphs



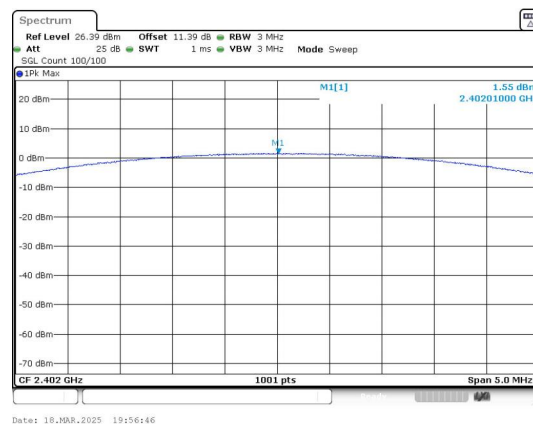
Peak Output Power
GFSK_Channel 0



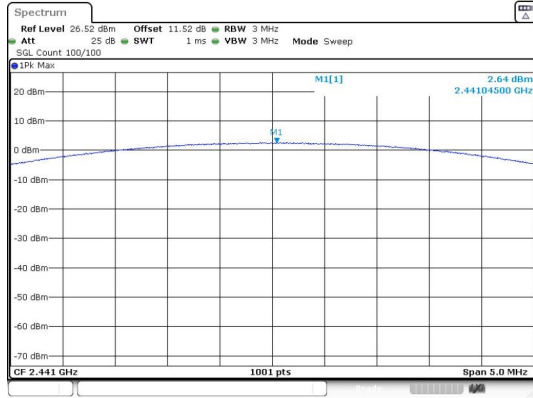
Peak Output Power
GFSK_Channel 39



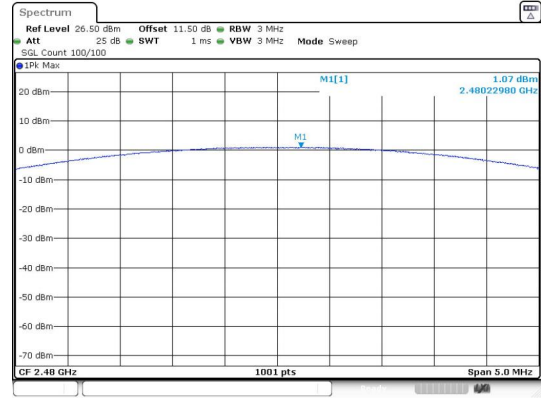
Peak Output Power
GFSK_Channel 78



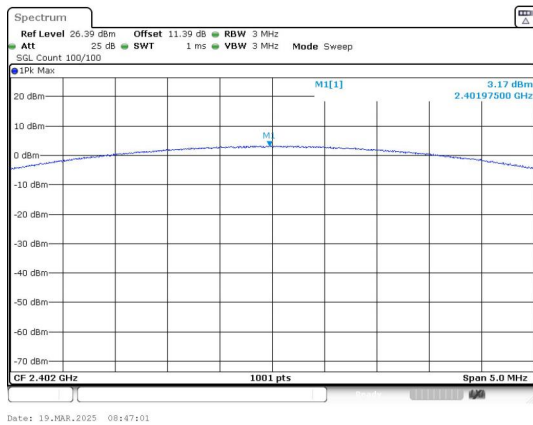
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



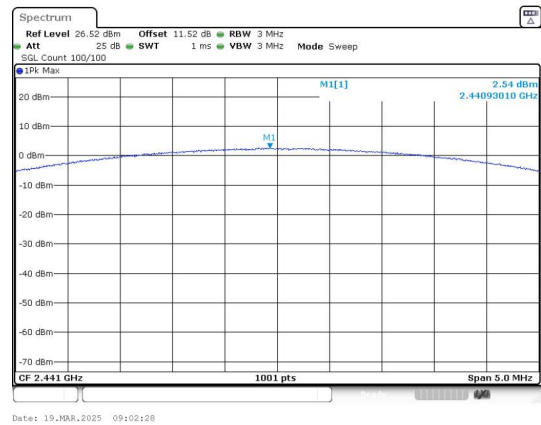
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



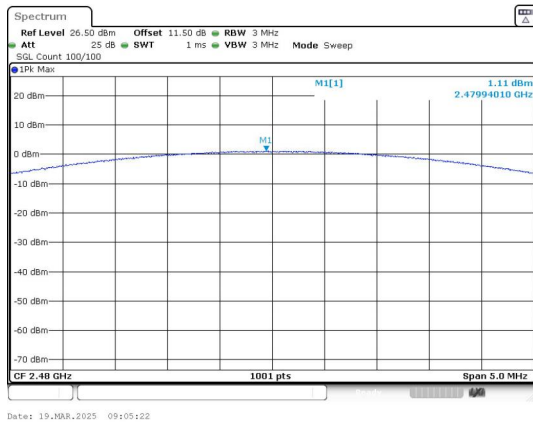
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



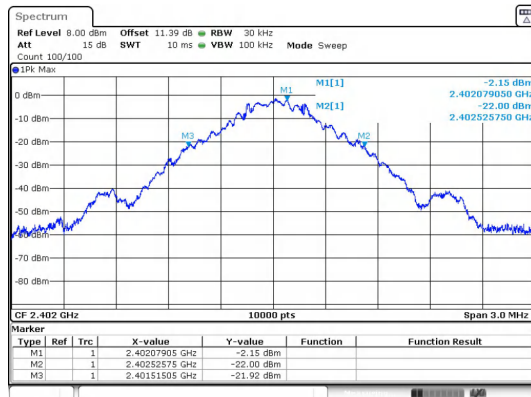
Peak Output Power
8DPSK_Channel 78

5) 20dB Bandwidth

Test Result

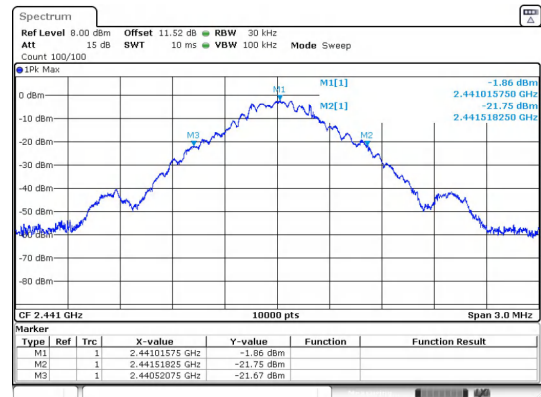
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.010
	39	2441 MHz	1.000
	78	2480 MHz	0.9800
$\pi/4$ DQPSK	0	2402 MHz	1.320
	39	2441 MHz	1.290
	78	2480 MHz	1.310
8DPSK	0	2402 MHz	1.280
	39	2441 MHz	1.290
	78	2480 MHz	1.290

Test Graphs



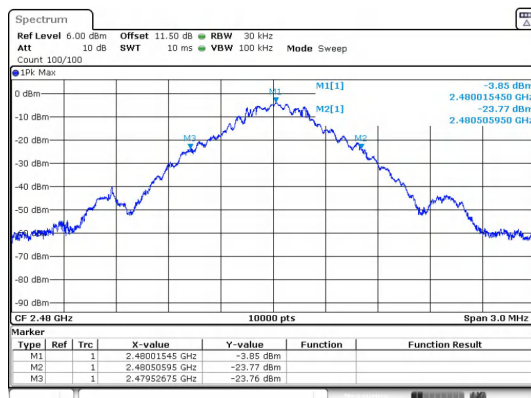
Date: 18.MAR.2025 19:43:19

GFSK_DH5_Channel 0



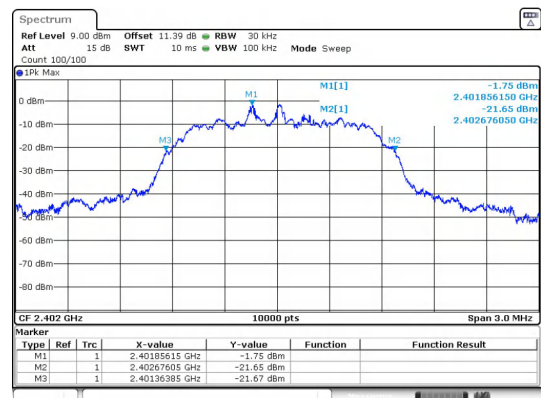
Date: 18.MAR.2025 19:52:15

GFSK_DH5_Channel 39



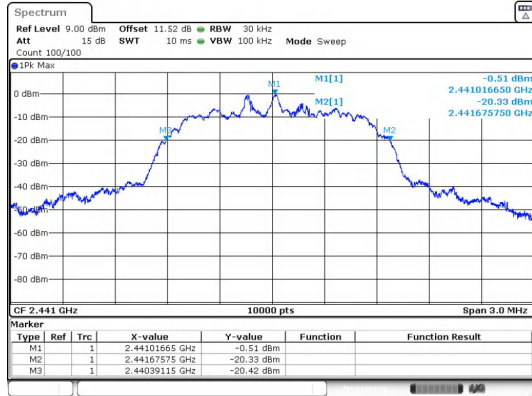
Date: 18.MAR.2025 19:54:08

GFSK_DH5_Channel 78

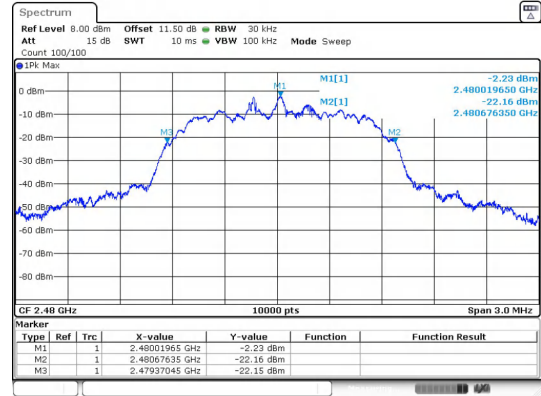


Date: 18.MAR.2025 19:56:28

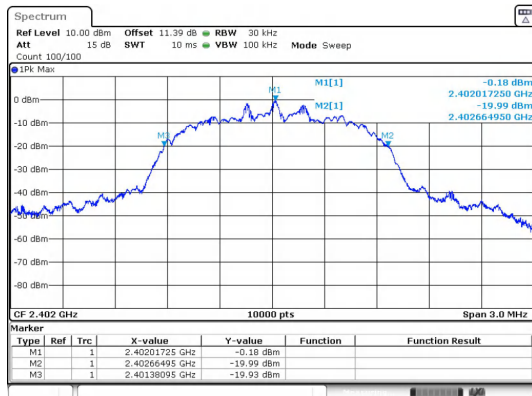
 $\pi/4$ DQPSK_2-DH5_Channel 0



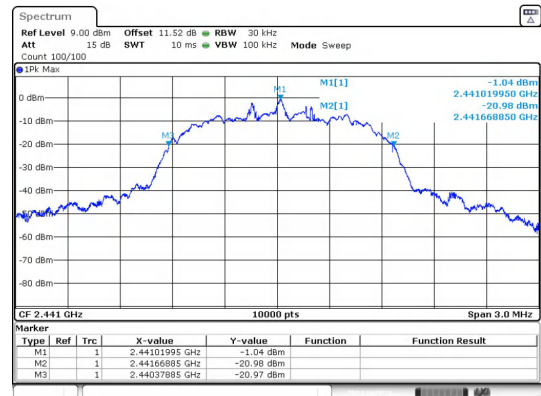
$\pi/4$ DQPSK_2-DH5_Channel 39



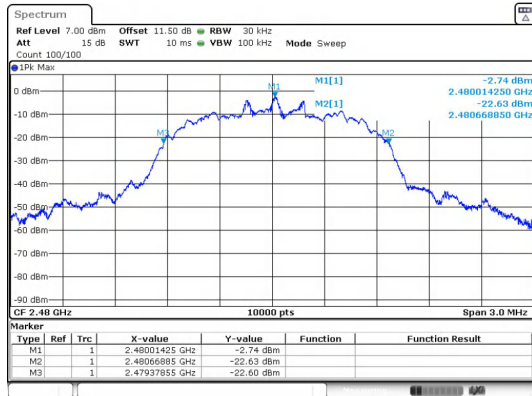
$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



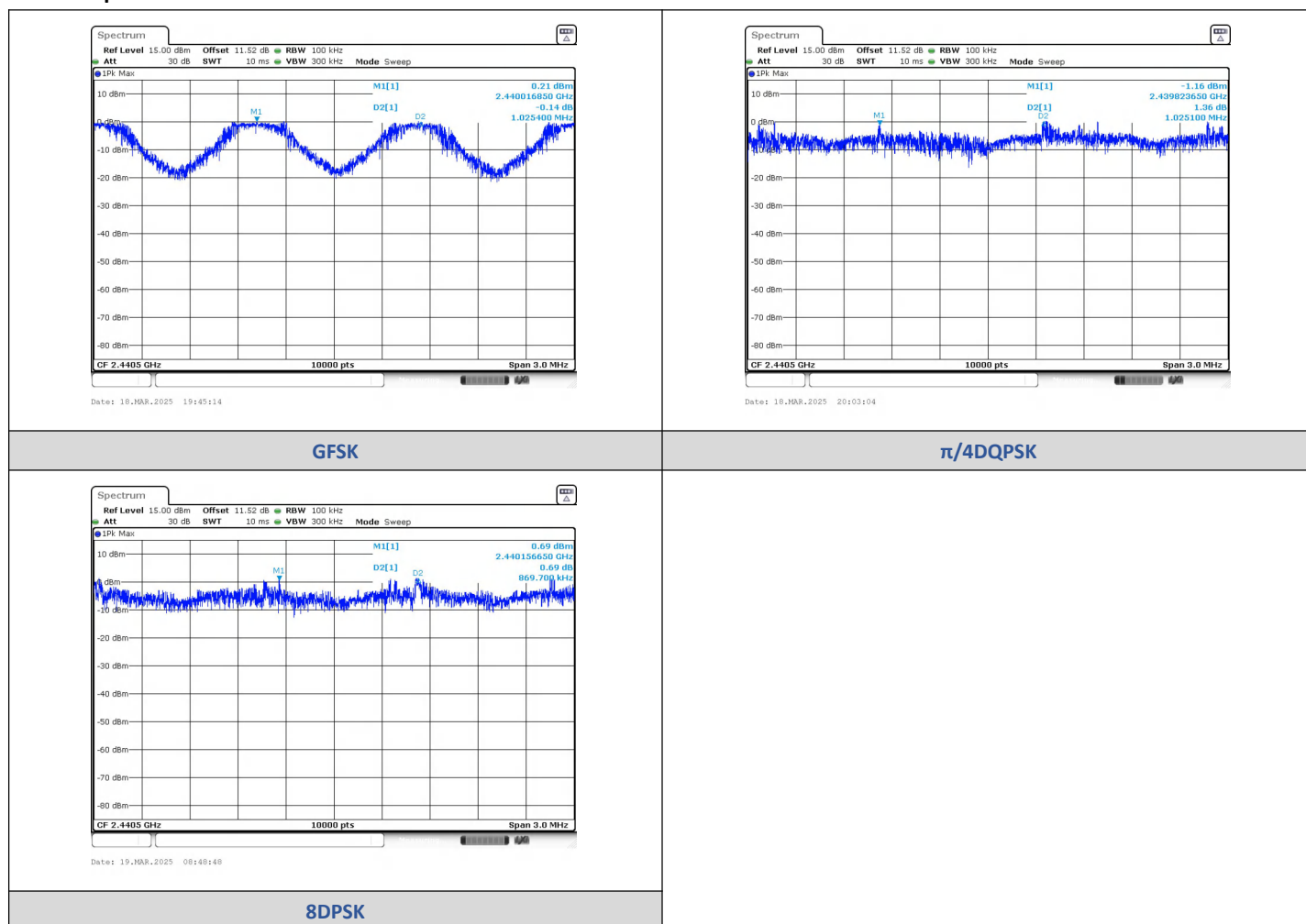
8DPSK_3-DH5_Channel 78

6) Carrier Frequencies Separation

Test Result

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.0168	2441.0422	1.0254	1.01	PASS
$\pi/4$ DQPSK	2-DH5	2439.8236	2440.8488	1.0251	0.88	PASS
8DPSK	3-DH5	2440.1566	2441.0264	0.8697	0.853	PASS

Test Graphs



7) Conducted Out Of Band Emission

Test Result

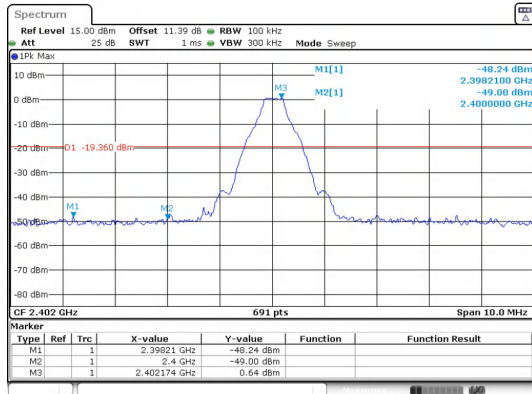
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2398.21	-48.245	-19.36	-28.885	PASS
			2400.00	-49.000	-19.36	-29.640	PASS
			9608.10	-43.278	-19.36	-23.918	PASS
		39	5819.29	-41.044	-19.67	-21.374	PASS
		78	2483.50	-50.850	-21.59	-29.260	PASS
			9920.20	-39.088	-21.59	-17.498	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-48.050	-19.38	-28.670	PASS
			9608.08	-43.998	-19.38	-24.618	PASS
		39	9763.72	-42.375	-18.36	-24.015	PASS
		78	2483.50	-50.220	-19.91	-30.310	PASS
			9920.20	-39.029	-19.91	-19.119	PASS
8DPSK	3-DH5	0	2400.00	-46.620	-18.68	-27.940	PASS
			9608.08	-44.127	-18.68	-25.447	PASS
		39	9763.72	-42.732	-18.85	-23.882	PASS
		78	2483.50	-49.670	-20.25	-29.420	PASS
			9920.20	-39.303	-20.25	-19.053	PASS

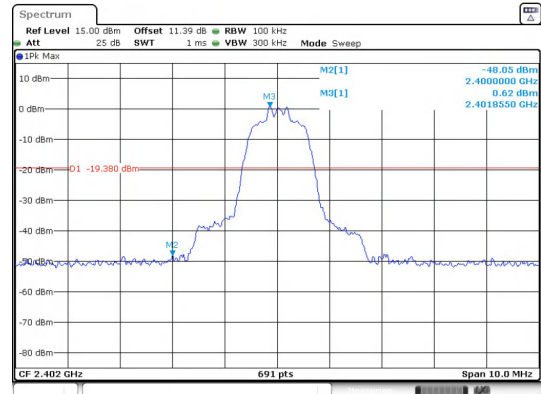
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2397.21	-47.889	-19.44	-28.449	PASS
			2400.00	-50.010	-19.44	-30.570	PASS
			2483.50	-49.710	-21.6	-28.110	PASS
$\pi/4$ DQPSK	2-DH5		2397.47	-48.548	-19.37	-29.178	PASS
			2400.00	-49.960	-19.37	-30.590	PASS
			2483.50	-48.940	-23.0	-25.940	PASS
8DPSK	3-DH5		2396.14	-47.021	-18.39	-28.631	PASS
			2400.00	-48.930	-18.39	-30.540	PASS
			2483.50	-49.960	-21.88	-28.080	PASS

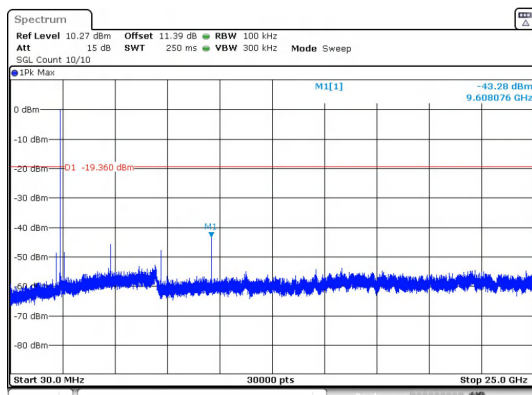
Test Graphs



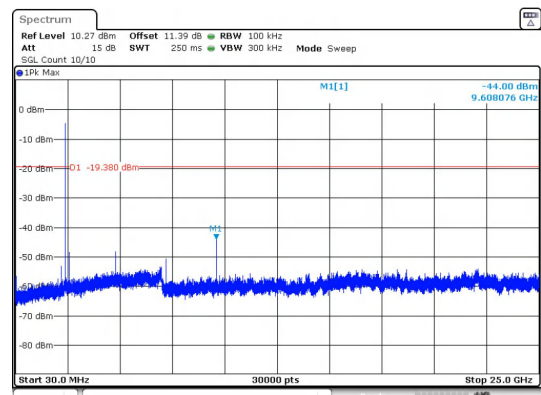
Out Of Band Emission
GFSK_DH5_Channel 0



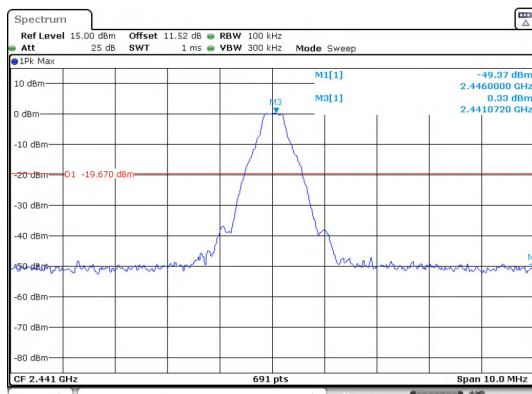
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0



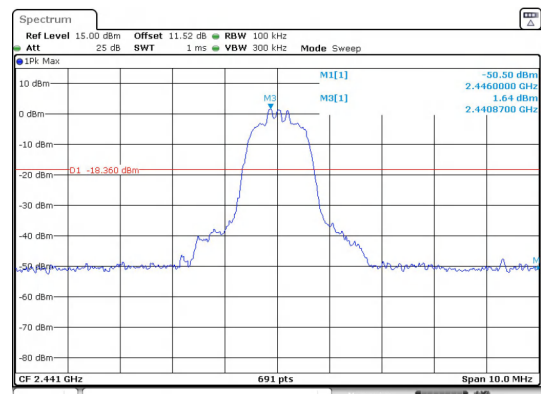
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



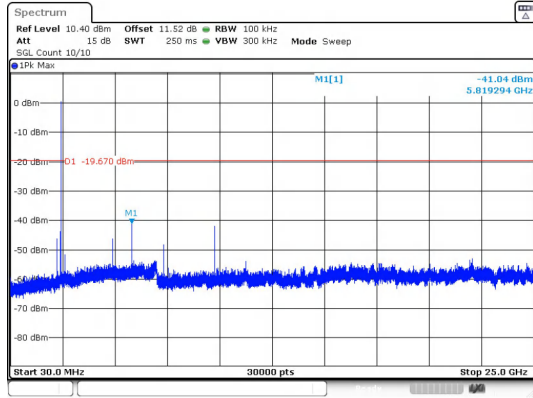
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



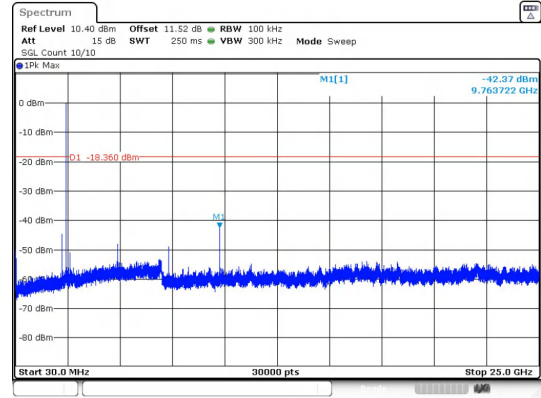
Out Of Band Emission
GFSK_DH5_Channel 39



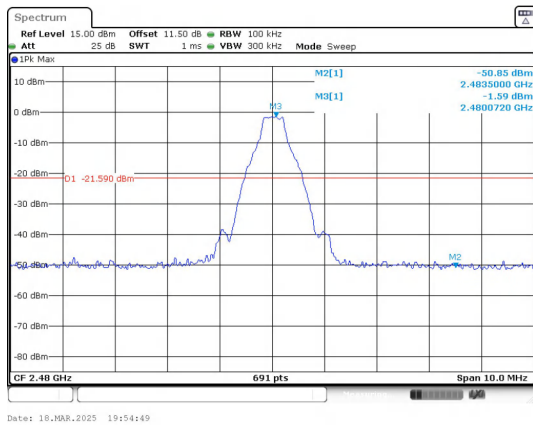
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



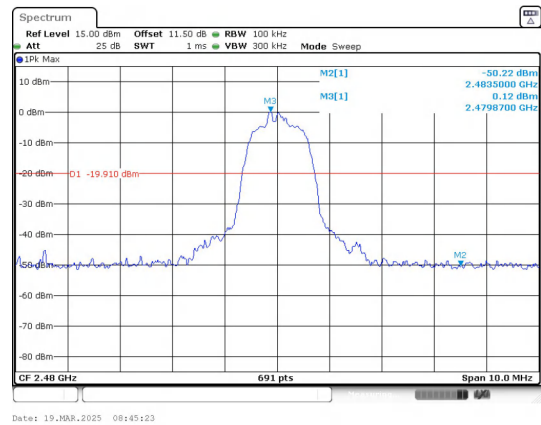
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



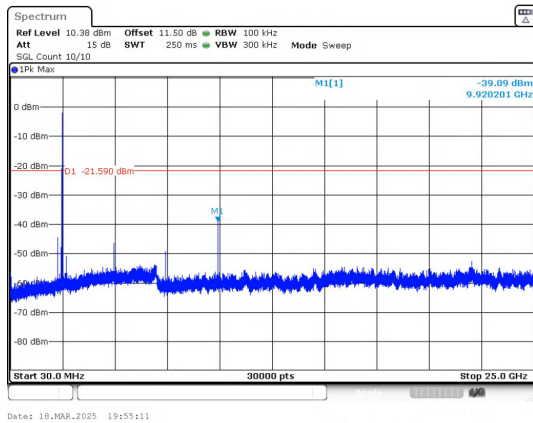
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



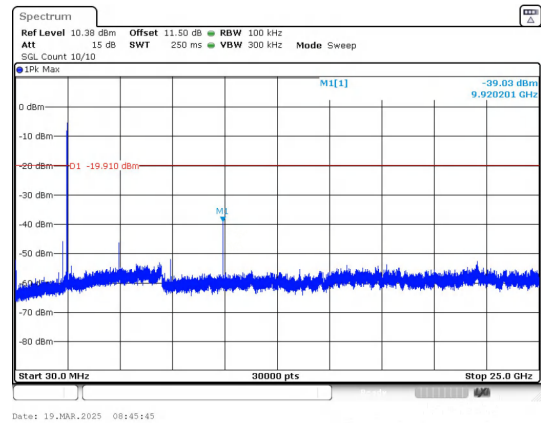
Out Of Band Emission
GFSK_DH5_Channel 78



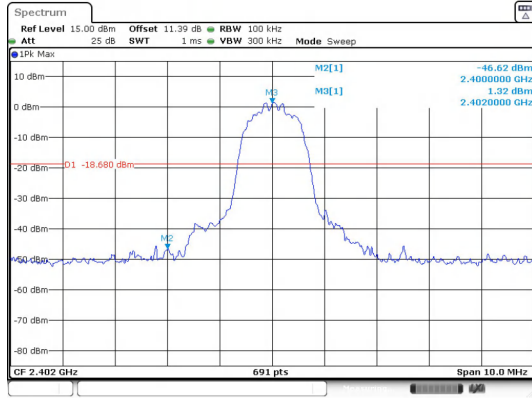
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



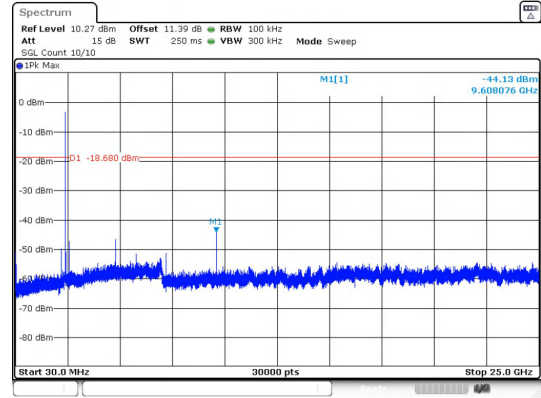
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



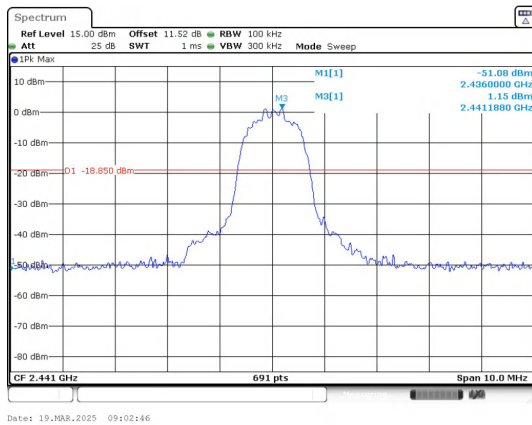
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



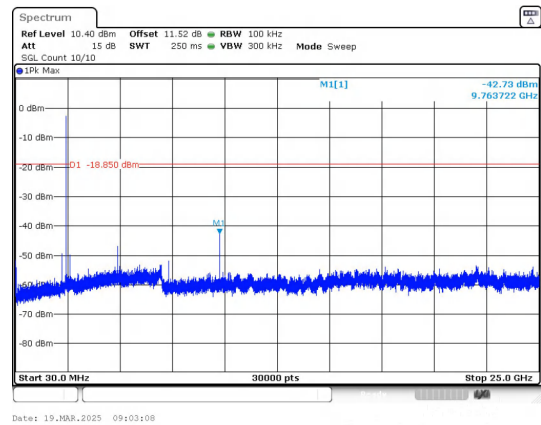
Out Of Band Emission
8DPSK_3-DH5_Channel 0



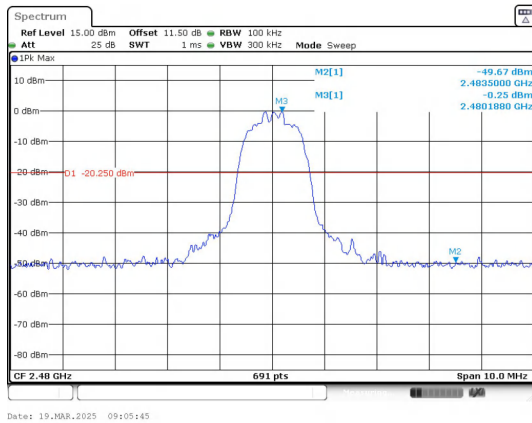
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



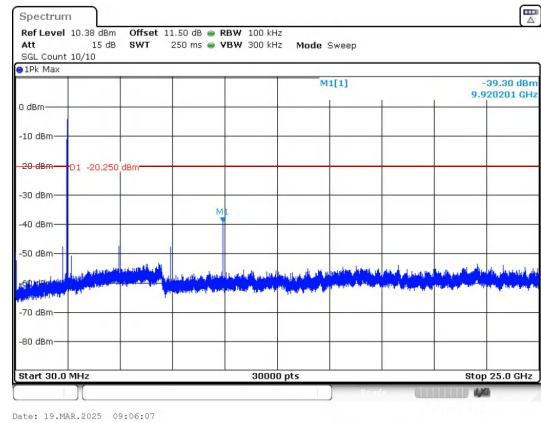
Out Of Band Emission
8DPSK_3-DH5_Channel 39



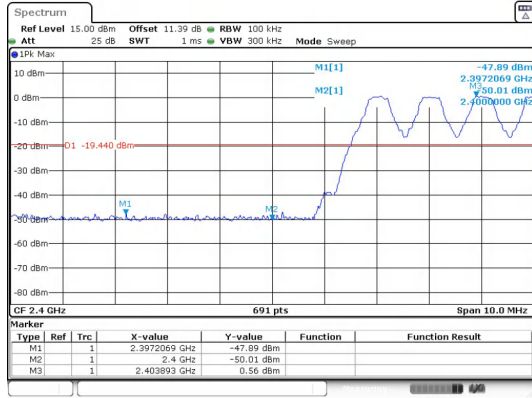
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



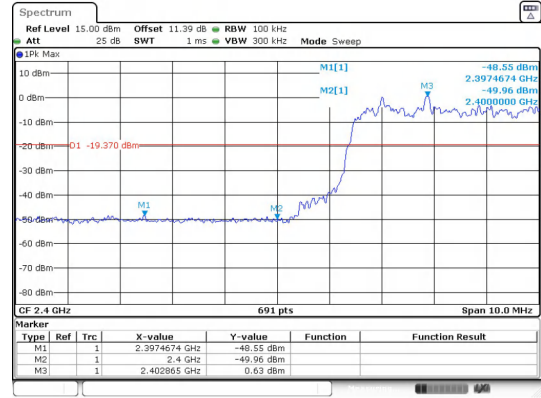
Out Of Band Emission
8DPSK_3-DH5_Channel 78



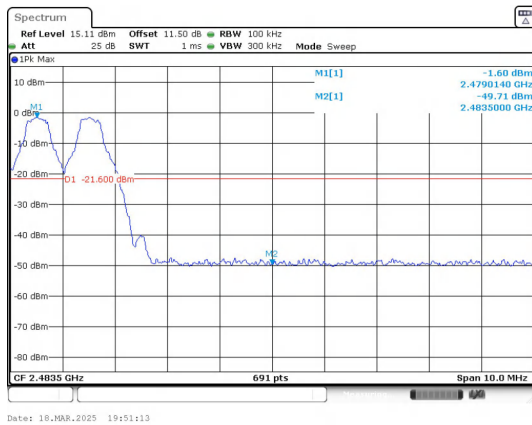
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



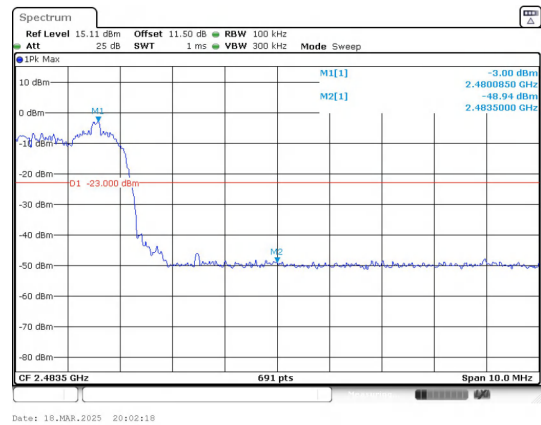
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



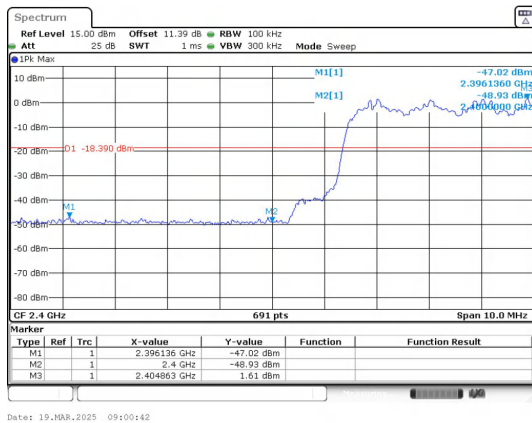
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



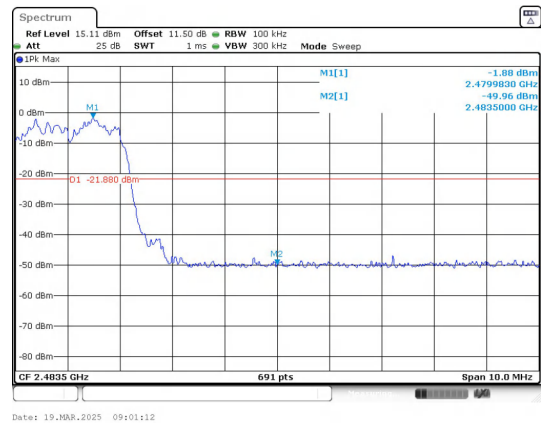
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



Out Of Band Emission(Right)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



Out Of Band Emission(Left)
8DPSK_3-DH5_Channel Hopping



Out Of Band Emission(Right)
8DPSK_3-DH5_Channel Hopping

-----End of the Project-----