Appendix Report

Project No.:	CISR250528167
Test Engineer:	James Wang
Supervised by:	Rory Huang

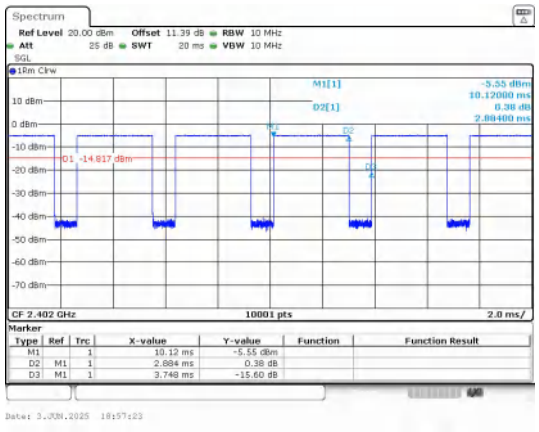
1) Duty Cycle

Test Result

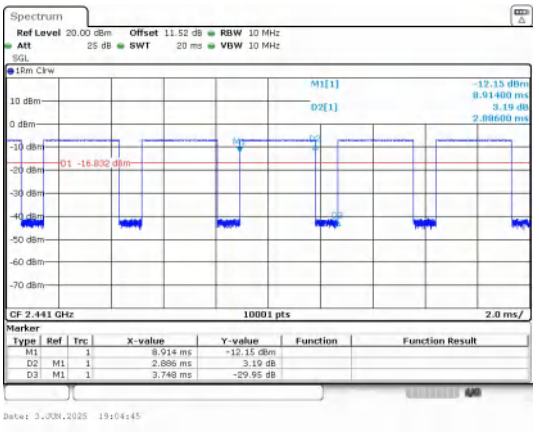
Left：

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.884	3.748	76.95	0.7695	1.1379	0.3467
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465
		78	2.884	3.748	76.95	0.7695	1.1379	0.3467
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	2.890	3.748	77.11	0.7711	1.1289	0.3460
8DPSK	3-DH5	0	2.360	3.748	62.97	0.6297	2.0087	0.4237
		39	2.362	3.750	62.99	0.6299	2.0073	0.4234
		78	2.360	3.748	62.97	0.6297	2.0087	0.4237

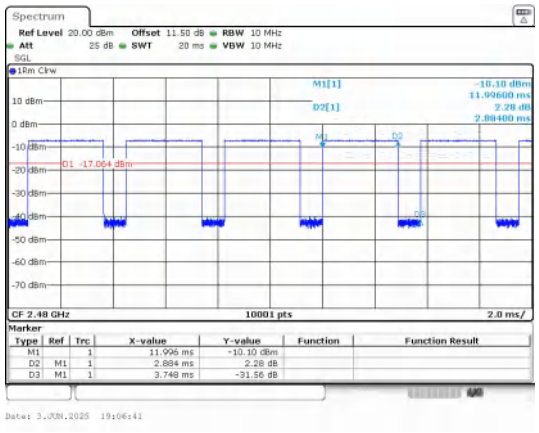
Test Graphs



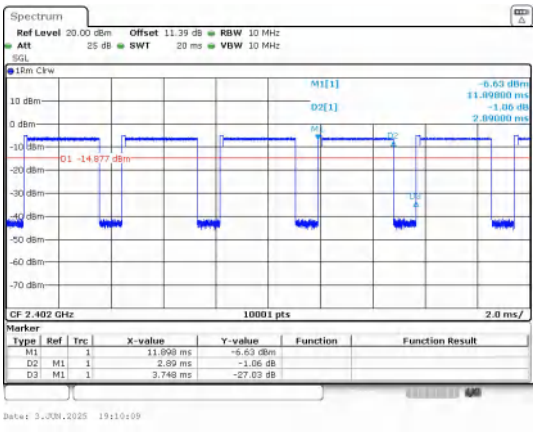
GFSK(DH5)_Channel 0



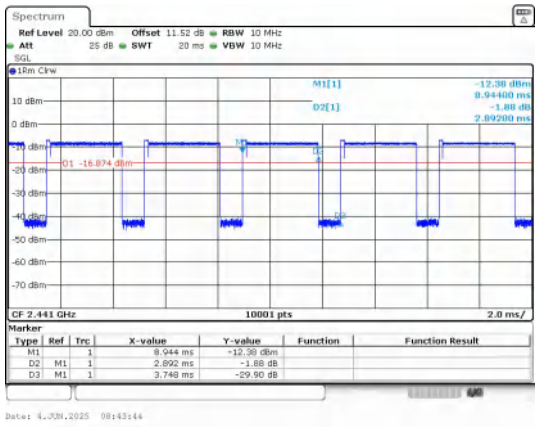
GFSK(DH5)_Channel 39



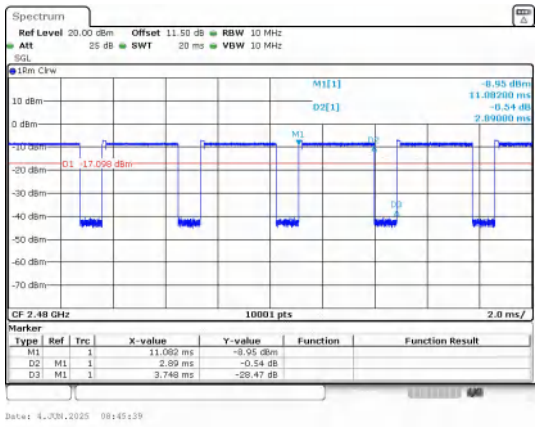
GFSK(DH5)_Channel 78



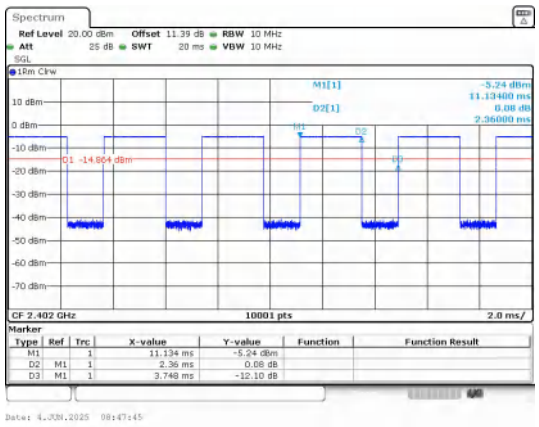
π/4DQPSK(2-DH5)_Channel 0



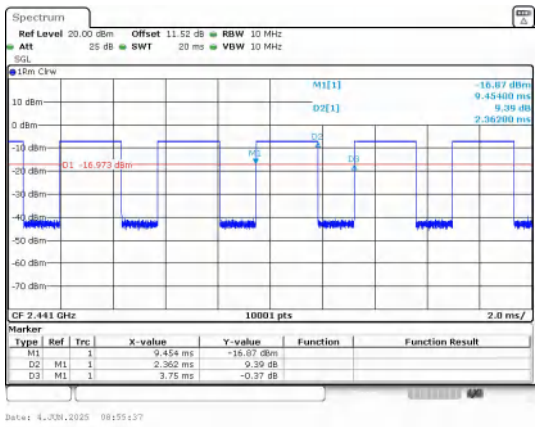
π/4DQPSK(2-DH5)_Channel 39



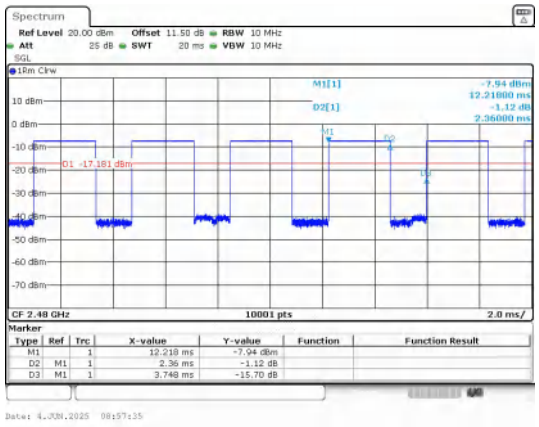
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



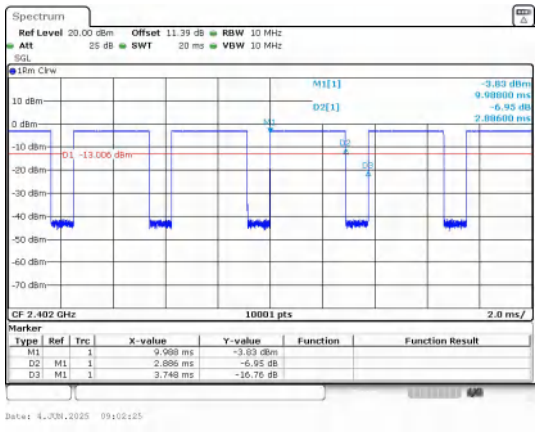
8DPSK(3-DH5)_Channel 78

Right:

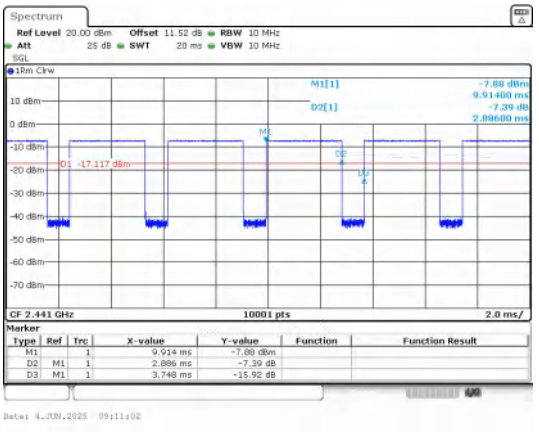
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	3.748	77.00	0.7700	1.1351	0.3465
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
π/4DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.3460
		39	2.890	3.748	77.11	0.7711	1.1289	0.3460
		78	2.890	3.748	77.11	0.7711	1.1289	0.3460

8DPSK	3-DH5	0	2.362	3.748	63.02	0.6302	2.0052	0.4234
		39	2.362	3.748	63.02	0.6302	2.0052	0.4234
		78	2.362	3.748	63.02	0.6302	2.0052	0.4234

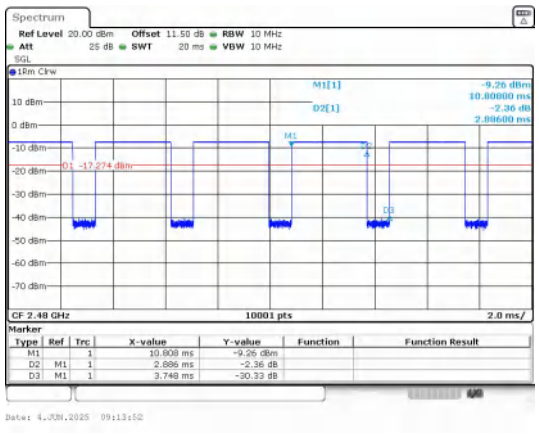
Test Graphs



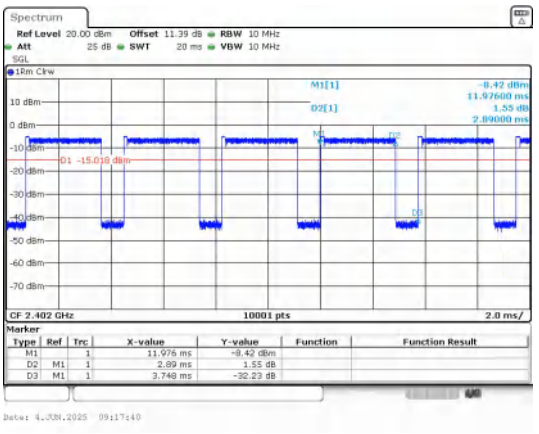
GFSK(DH5)_Channel 0



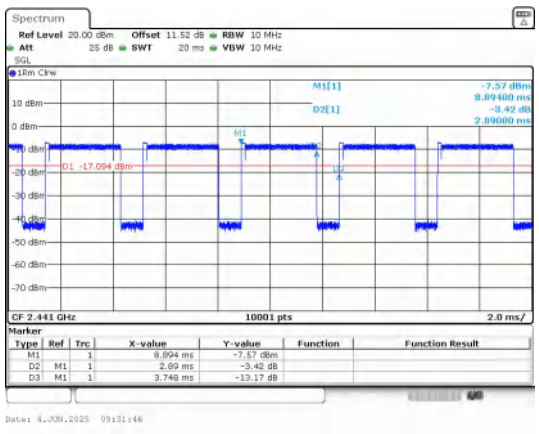
GFSK(DH5)_Channel 39



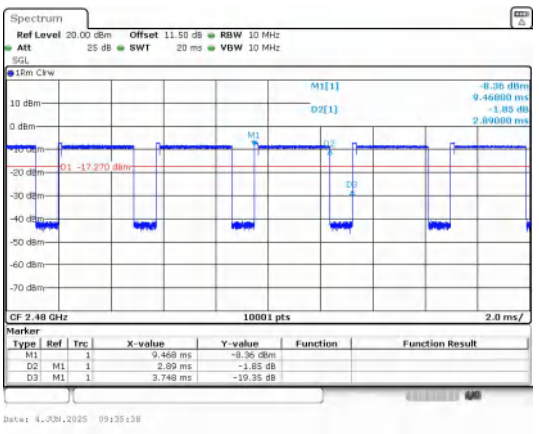
GFSK(DH5)_Channel 78



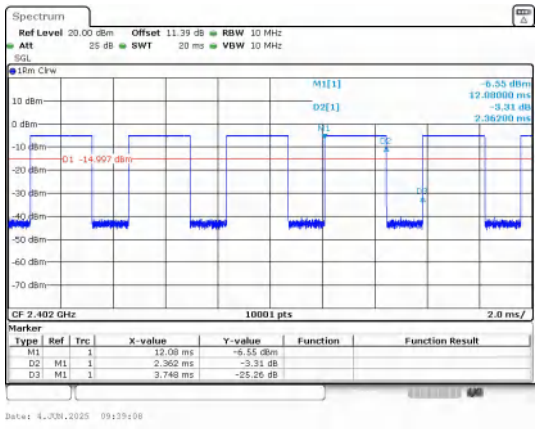
π/4DQPSK(2-DH5)_Channel 0



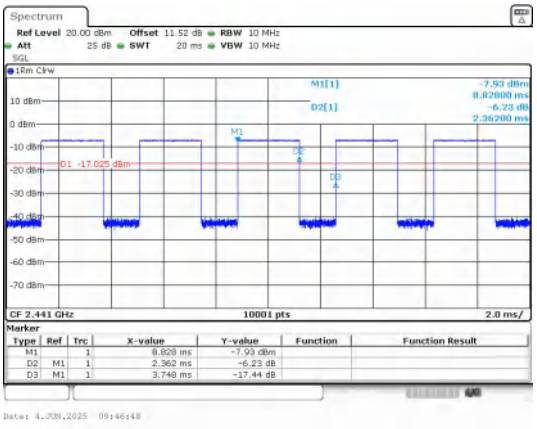
π/4DQPSK(2-DH5)_Channel 39



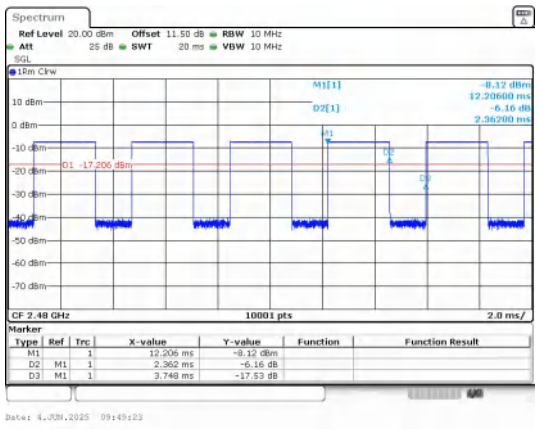
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

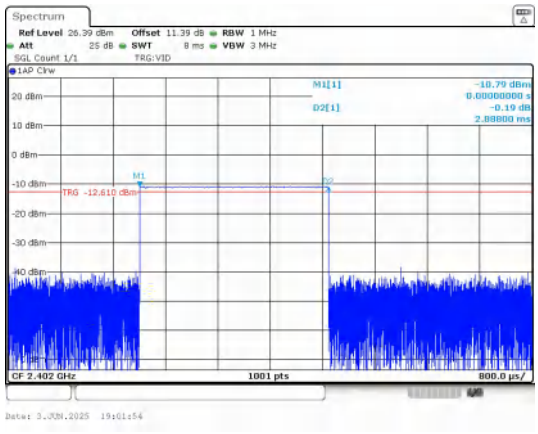
2) Dwell Time

Test Result

Left：

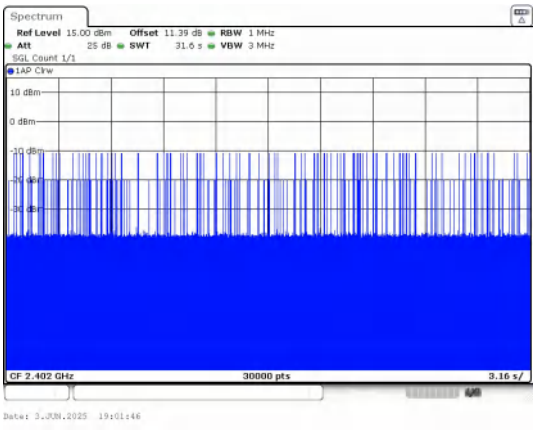
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	107	309.02	< 400	PASS
π/4DQPSK	2-DH5		2.896	101	292.5		PASS
8DPSK	3-DH5		2.368	101	239.17		PASS

Test Graphs



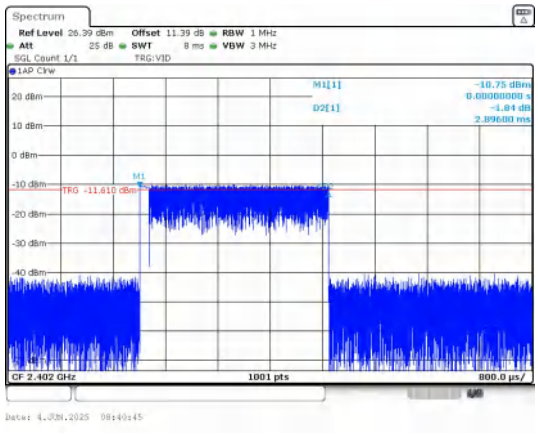
Pulse Width

GFSK_DH5



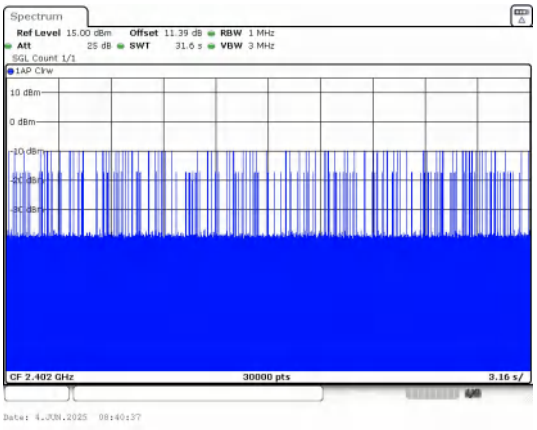
Number of Pulses in 31.6 seconds

GFSK_DH5



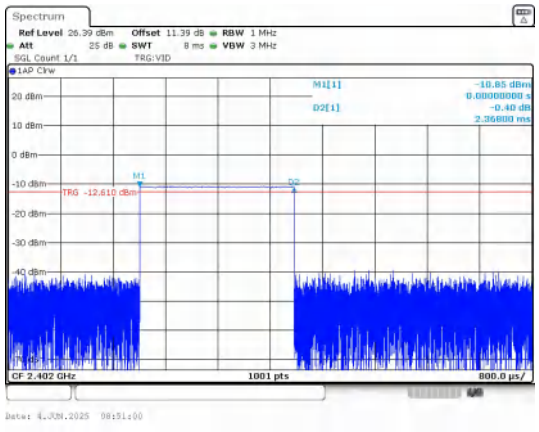
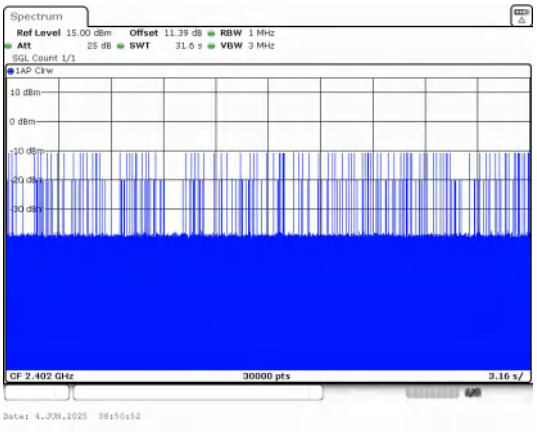
Pulse Width

π/4DQPSK_2-DH5



Number of Pulses in 31.6 seconds

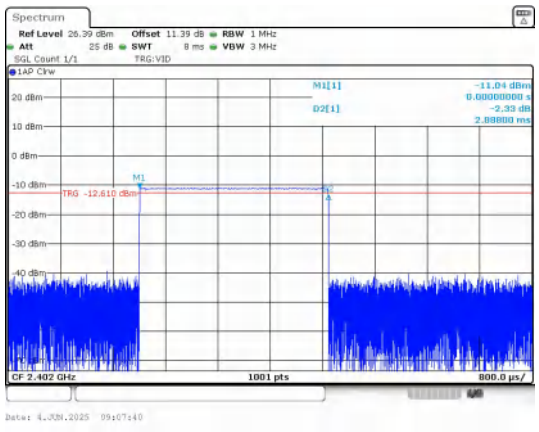
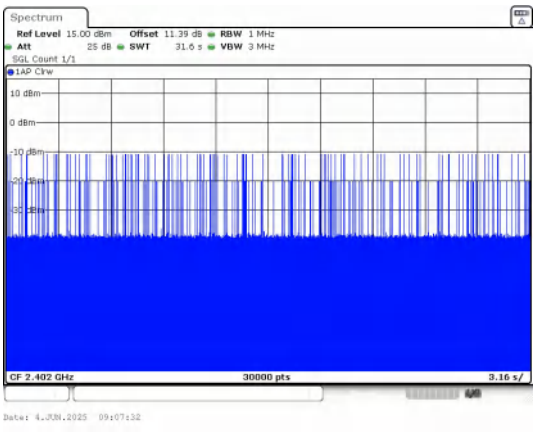
π/4DQPSK_2-DH5

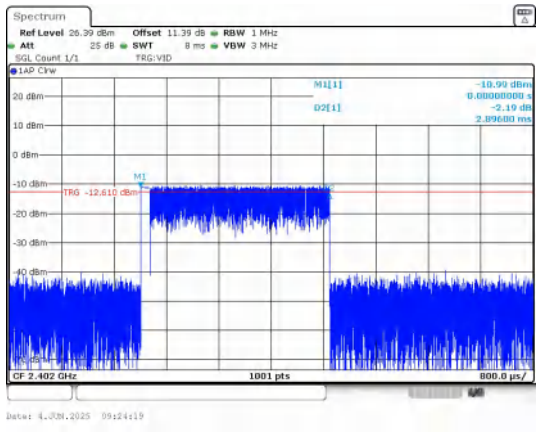
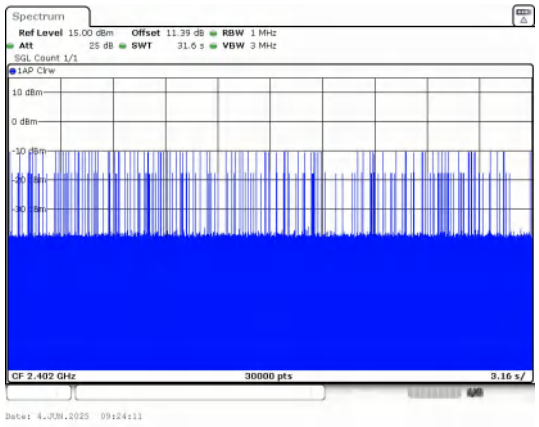
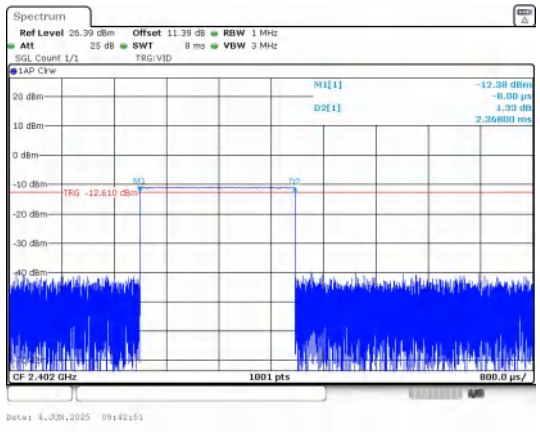
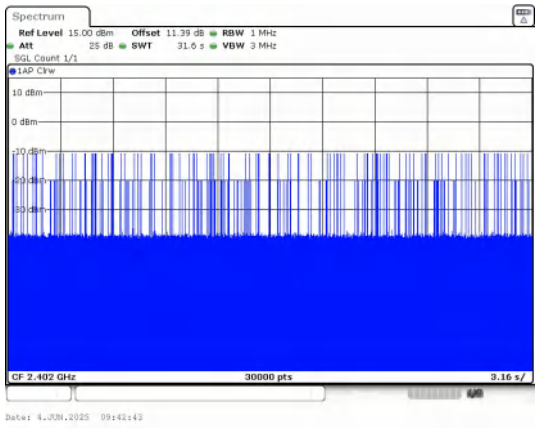
	
Pulse Width 8DPSK_3-DH5	Number of Pulses in 31.6 seconds 8DPSK_3-DH5

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	106	306.13	< 400	PASS
π/4DQPSK	2-DH5		2.896	95	275.12		PASS
8DPSK	3-DH5		2.368	111	262.85		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

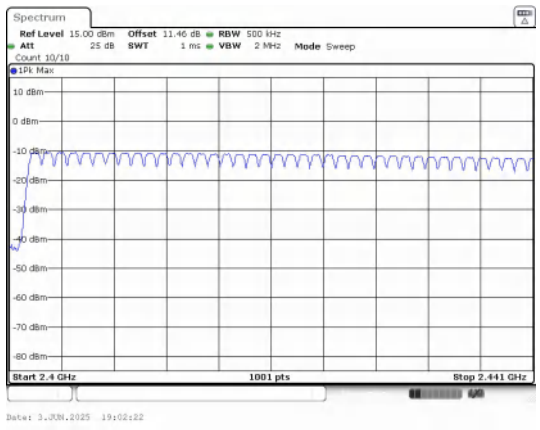
3) Number Of Hopping Channel

Test Result

Left：

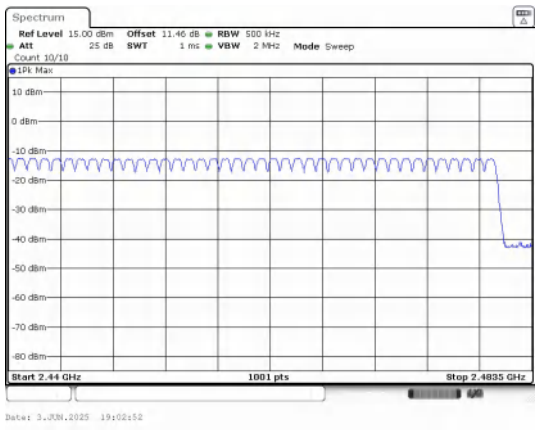
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
π/4DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



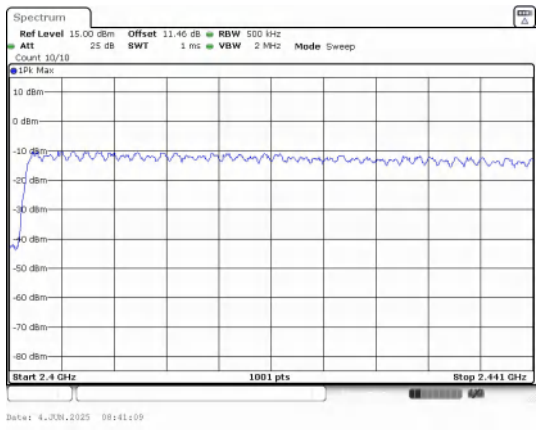
Low End Spectrum Channel Hopping Plot

GFSK



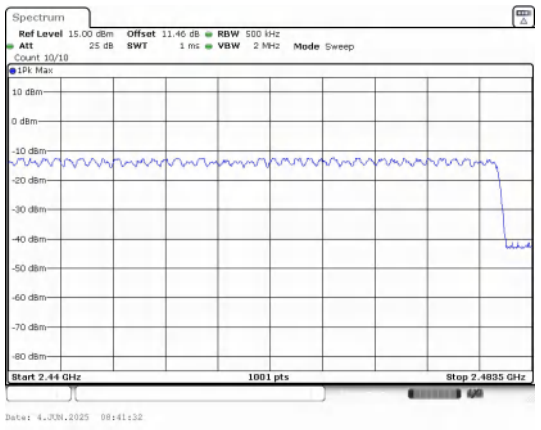
High End Spectrum Channel Hopping Plot

GFSK



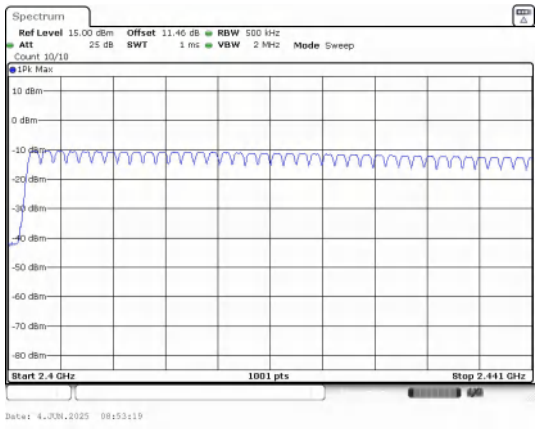
Low End Spectrum Channel Hopping Plot

π/4DQPSK



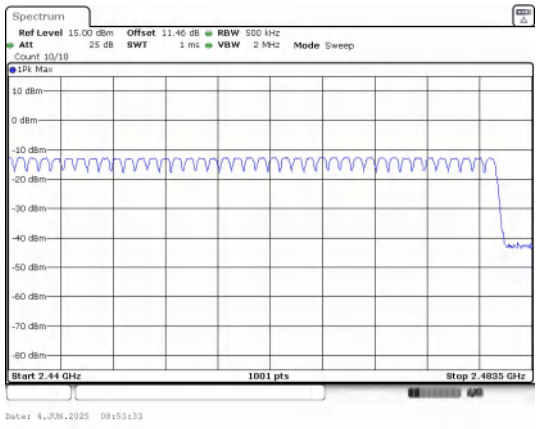
High End Spectrum Channel Hopping Plot

π/4DQPSK



Low End Spectrum Channel Hopping Plot

8DPSK



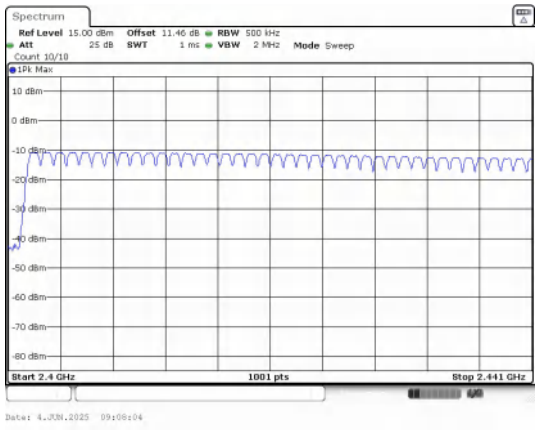
High End Spectrum Channel Hopping Plot

8DPSK

Right：

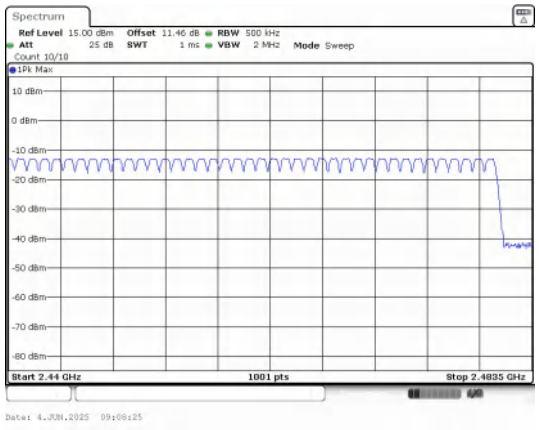
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
π/4DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



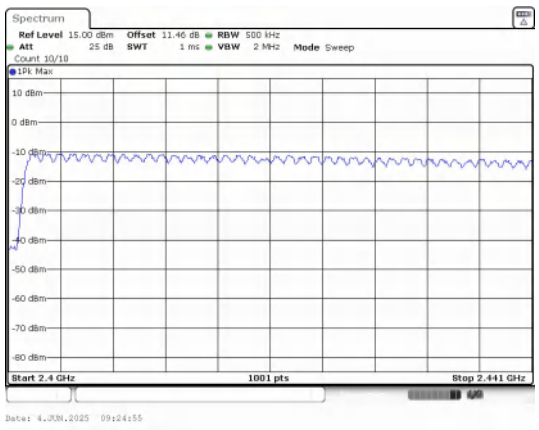
Low End Spectrum Channel Hopping Plot

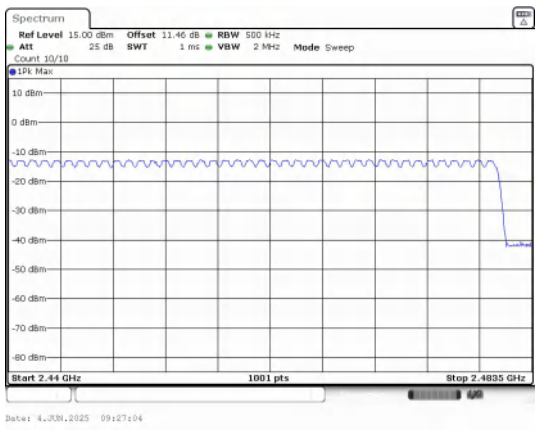
GFSK

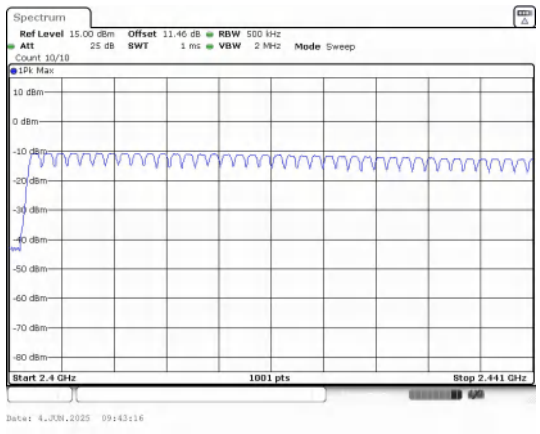
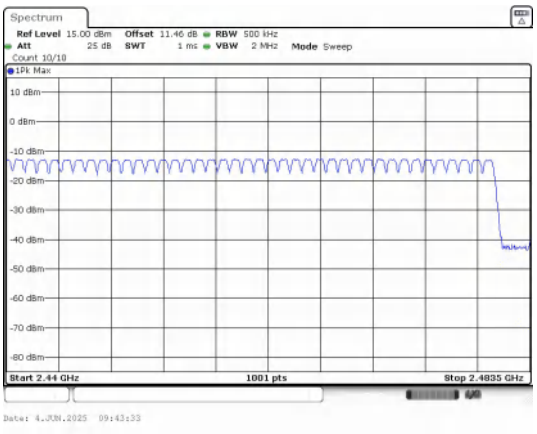


High End Spectrum Channel Hopping Plot

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

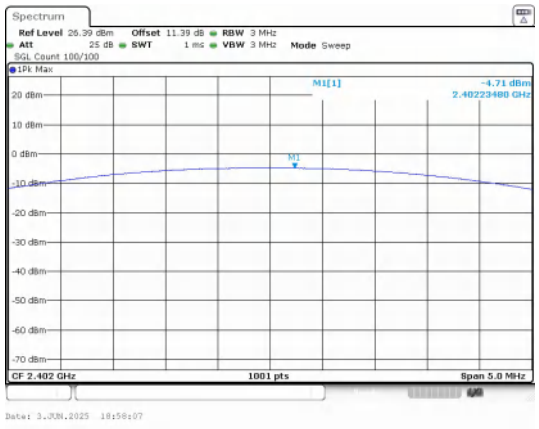
4) Conducted Peak Output Power

Test Result

Left：

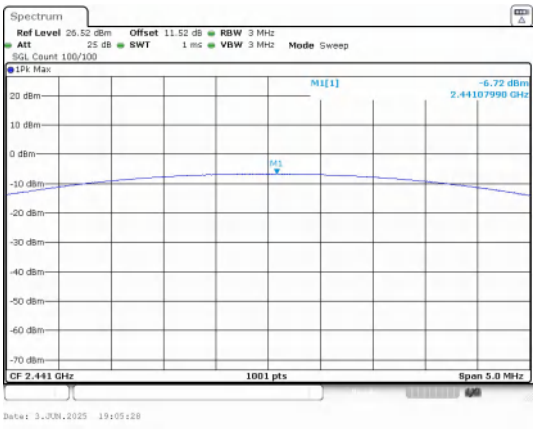
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	-4.71	0.34	≤30	PASS
		39	-6.72	0.21		PASS
		78	-6.94	0.20		PASS
π/4DQPSK	2-DH5	0	-3.79	0.42	≤20.97	PASS
		39	-5.85	0.26		PASS
		78	-6.09	0.25		PASS
8DPSK	3-DH5	0	-4.77	0.33		PASS
		39	-6.85	0.21		PASS
		78	-7.07	0.20		PASS

Test Graphs



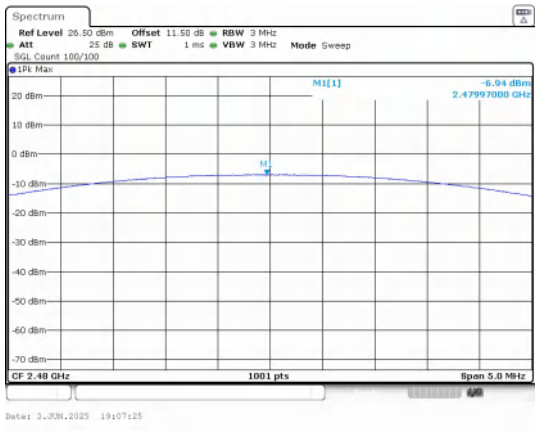
Peak Output Power

GFSK_Channel 0

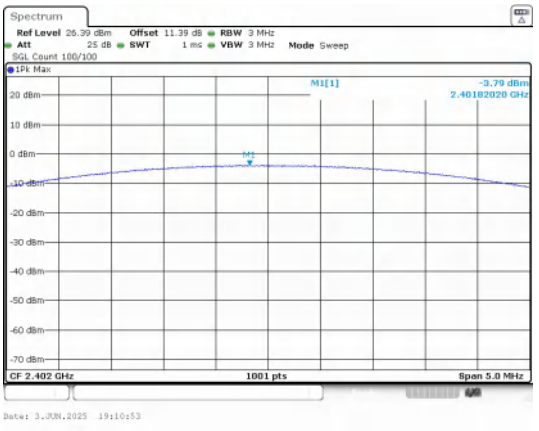


Peak Output Power

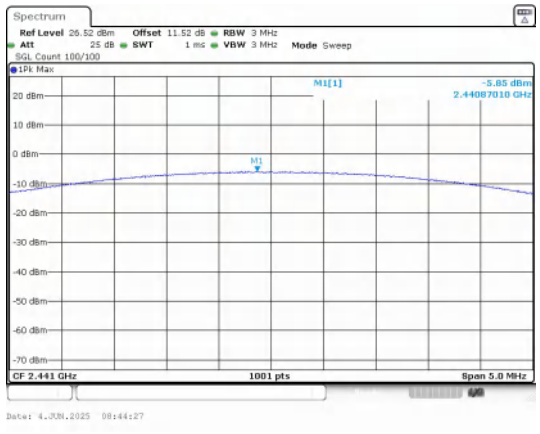
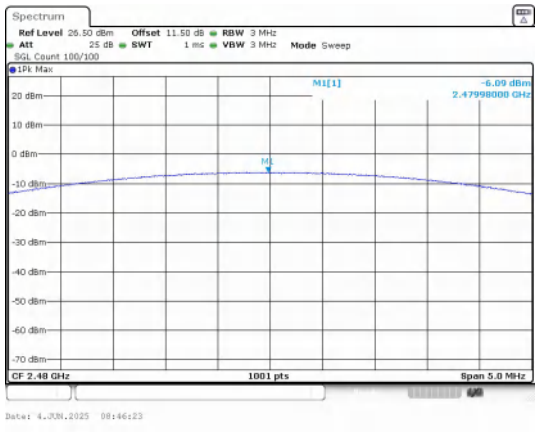
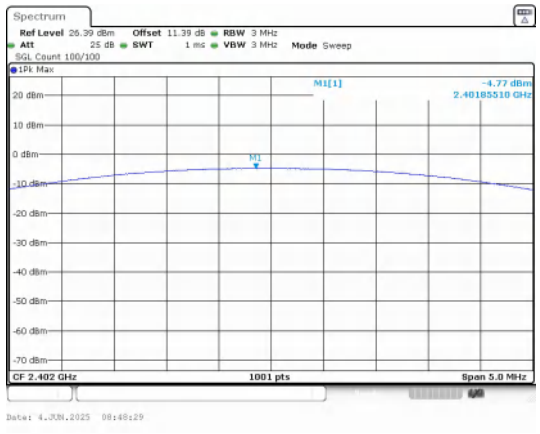
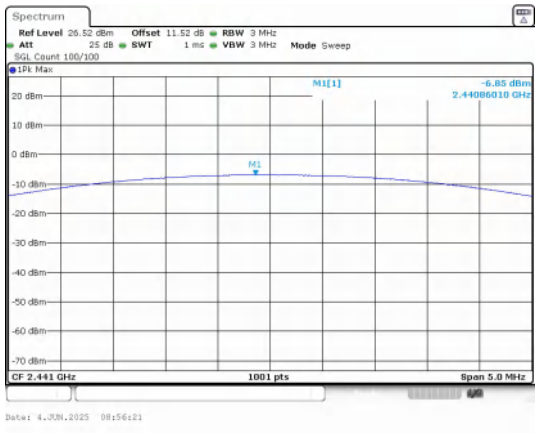
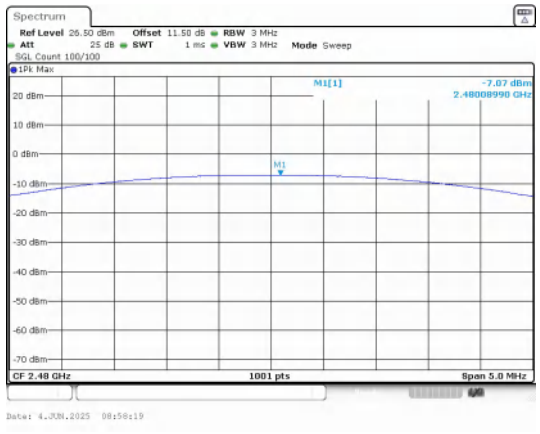
GFSK_Channel 39



Peak Output Power



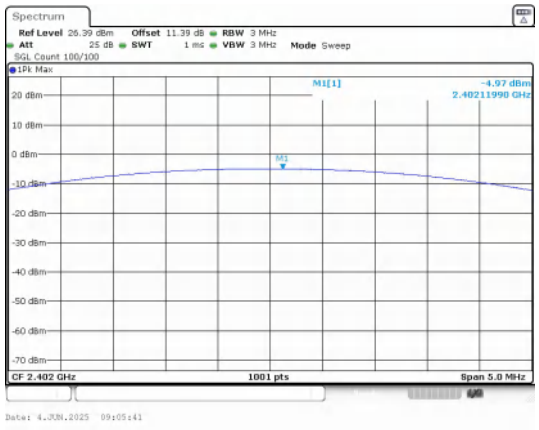
Peak Output Power

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**	

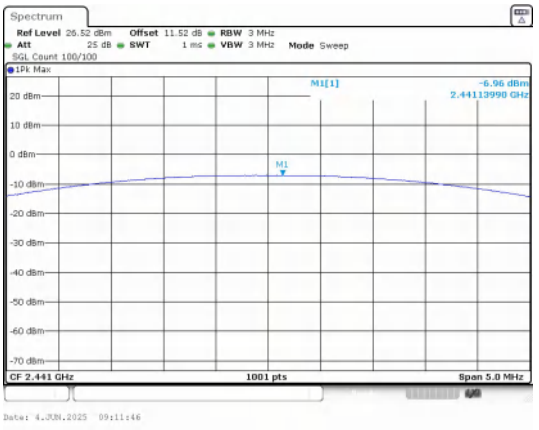
Right：

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	-4.97	0.32	≤30	PASS
		39	-6.96	0.20		PASS
		78	-7.10	0.19		PASS
π/4DQPSK	2-DH5	0	-3.98	0.40	≤20.97	PASS
		39	-6.05	0.25		PASS
		78	-6.24	0.24		PASS
8DPSK	3-DH5	0	-4.86	0.33		PASS
		39	-6.93	0.20		PASS
		78	-7.07	0.20		PASS

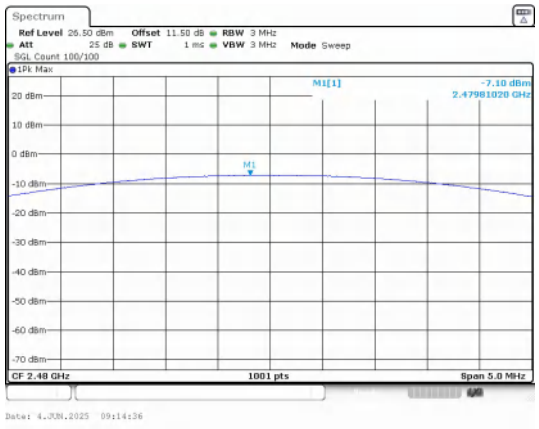
Test Graphs



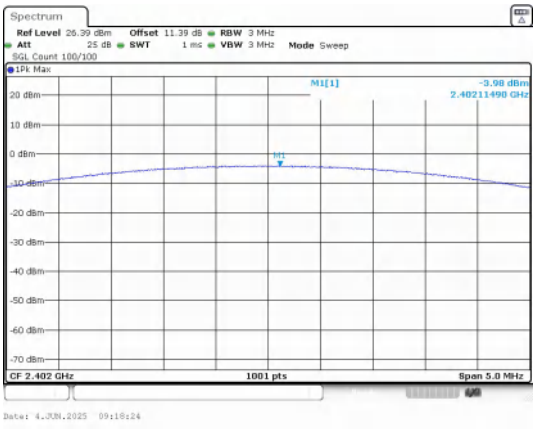
Peak Output Power
GFSK_Channel 0



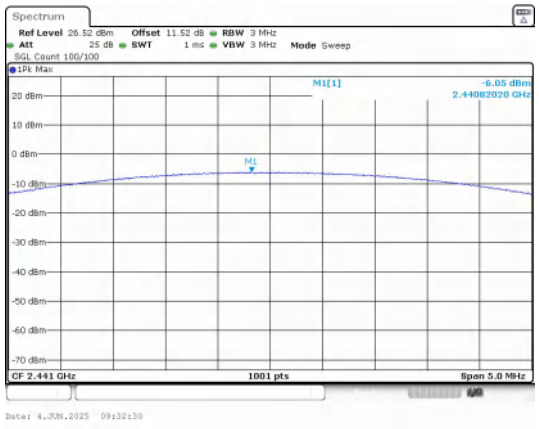
Peak Output Power
GFSK_Channel 39



Peak Output Power
GFSK_Channel 78

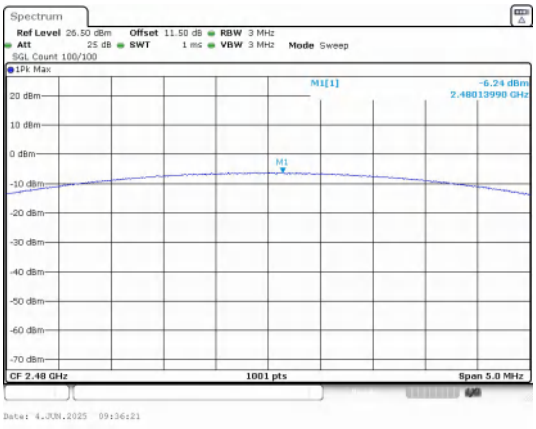


Peak Output Power
π/4DQPSK_Channel 0



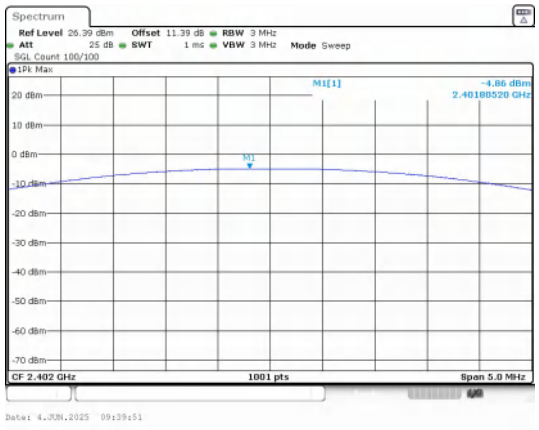
Peak Output Power

π/4DQPSK_Channel 39



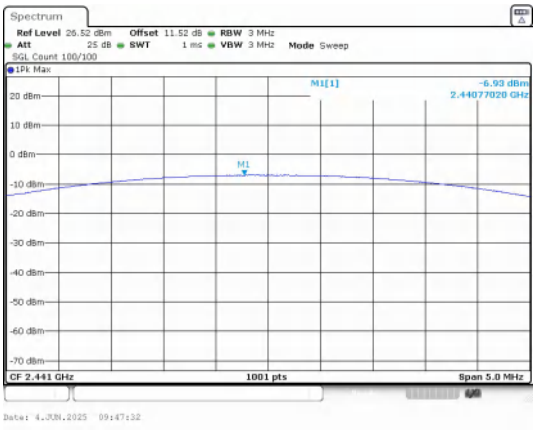
Peak Output Power

π/4DQPSK_Channel 78



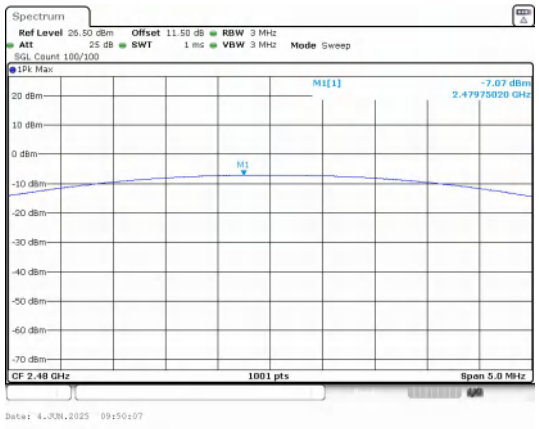
Peak Output Power

8DPSK_Channel 0



Peak Output Power

8DPSK_Channel 39



Peak Output Power

8DPSK_Channel 78

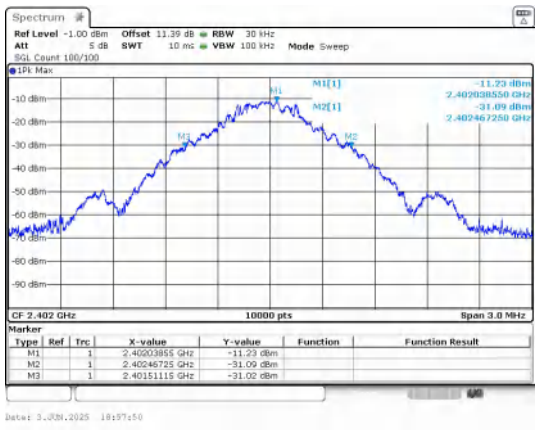
5) 20dB Bandwidth

Test Result

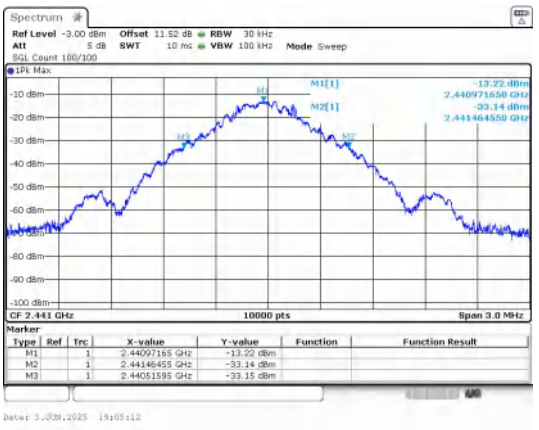
Left：

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9600
	39	2441 MHz	0.9400
	78	2480 MHz	0.9500
π/4DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.280
	78	2480 MHz	1.290
8DPSK	0	2402 MHz	0.9700
	39	2441 MHz	0.9900
	78	2480 MHz	0.9800

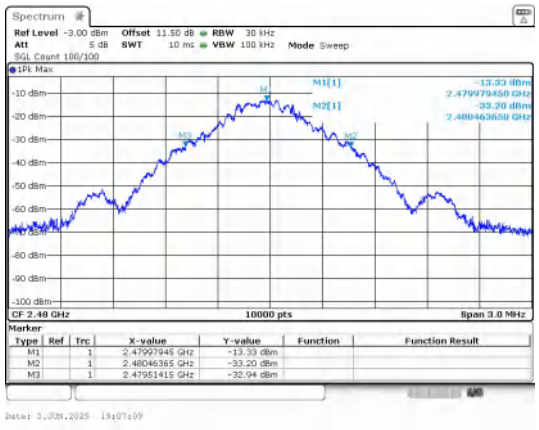
Test Graphs



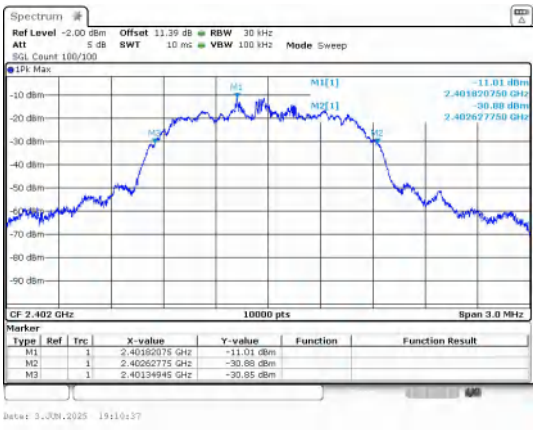
GFSK_DH5_Channel 0



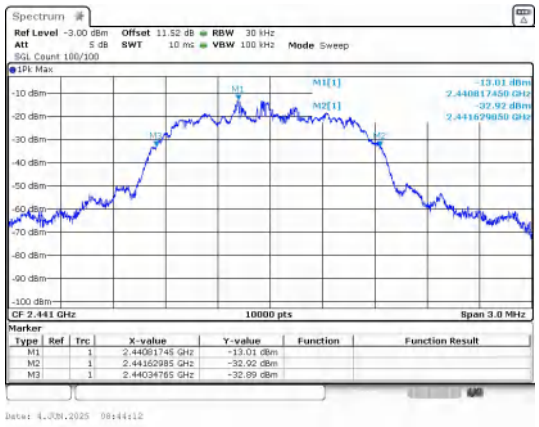
GFSK_DH5_Channel 39



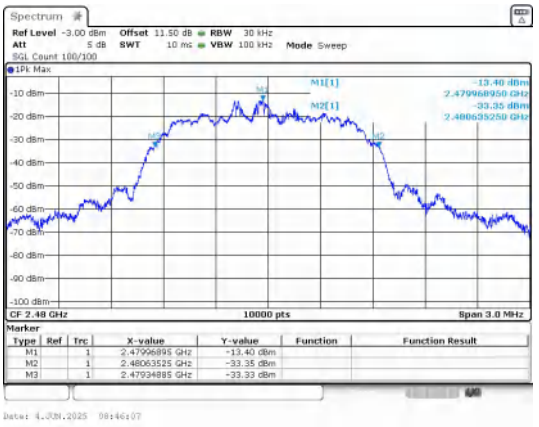
GFSK_DH5_Channel 78



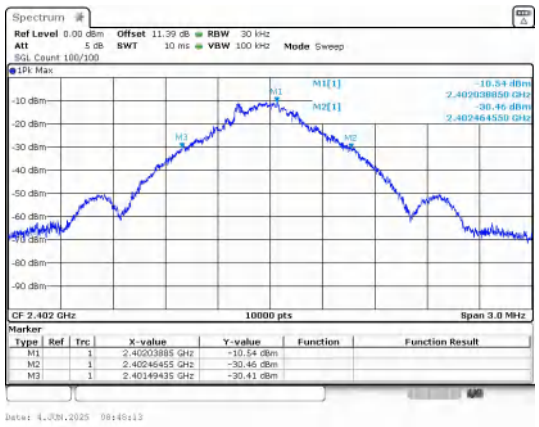
π/4DQPSK_2-DH5_Channel 0



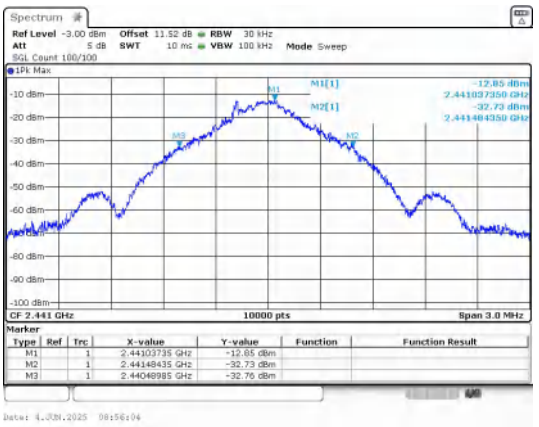
π/4DQPSK_2-DH5_Channel 39



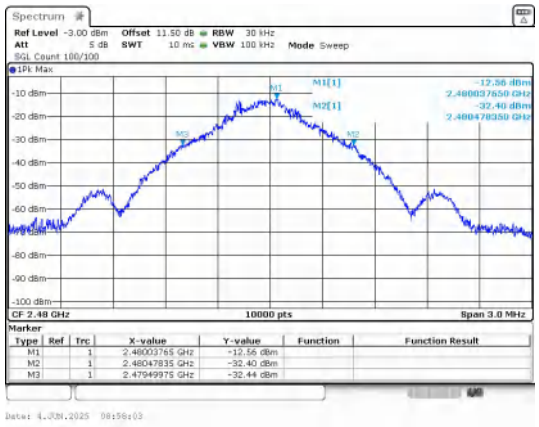
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



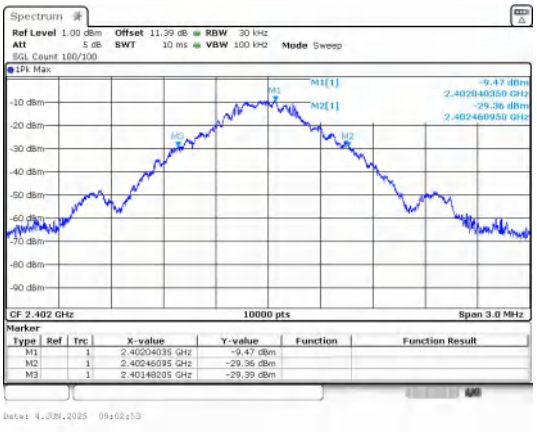
8DPSK_3-DH5_Channel 78

Right：

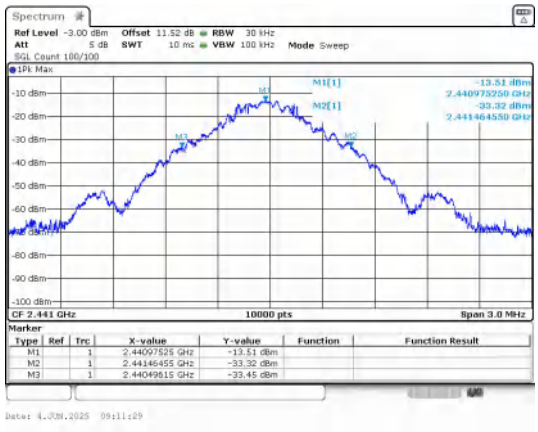
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9800
	39	2441 MHz	0.9600
	78	2480 MHz	0.9400
π/4DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.280
	78	2480 MHz	1.310

8DPSK	0	2402 MHz	0.9800
	39	2441 MHz	1.000
	78	2480 MHz	0.9700

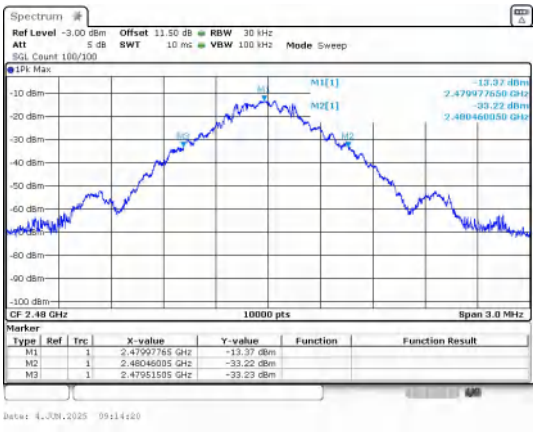
Test Graphs



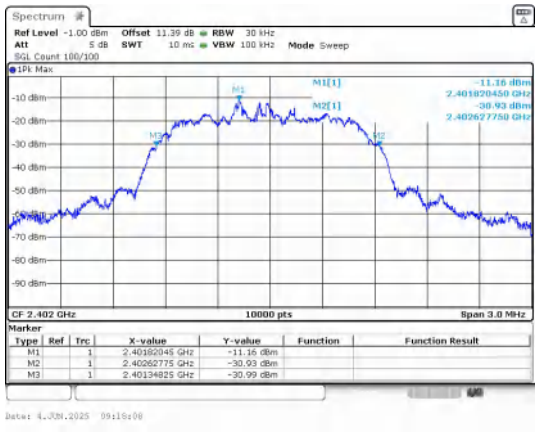
GFSK_DH5_Channel 0



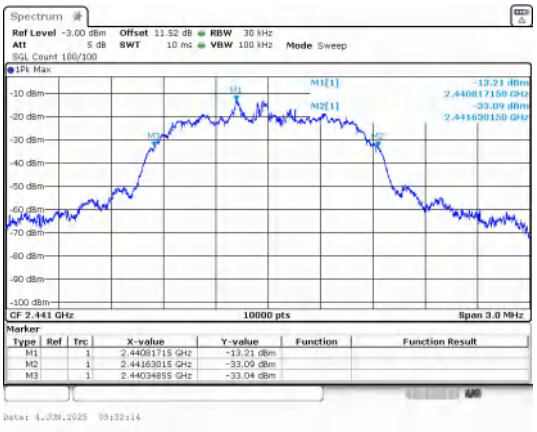
GFSK_DH5_Channel 39



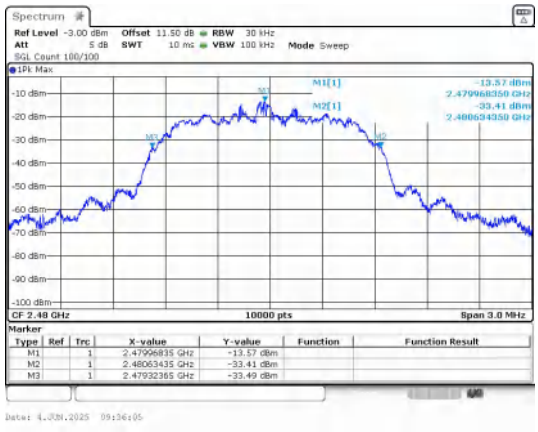
GFSK_DH5_Channel 78



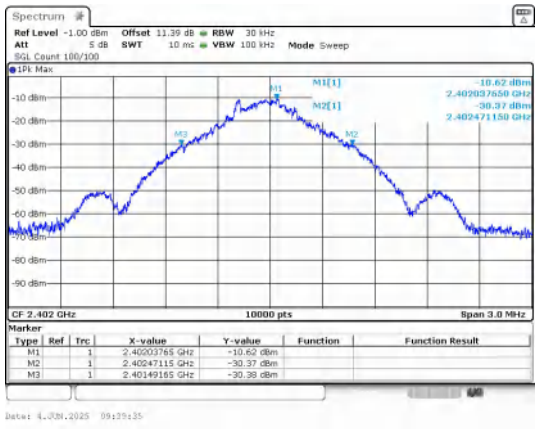
π/4DQPSK_2-DH5_Channel 0



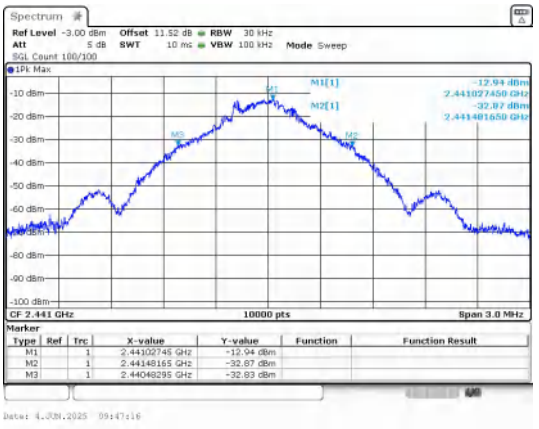
π/4DQPSK_2-DH5_Channel 39



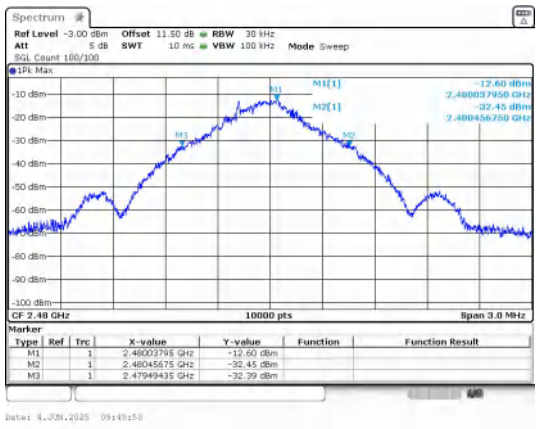
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

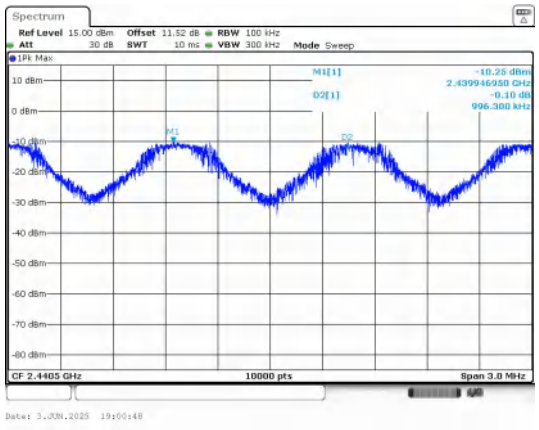
6) Carrier Frequencies Separation

Test Result

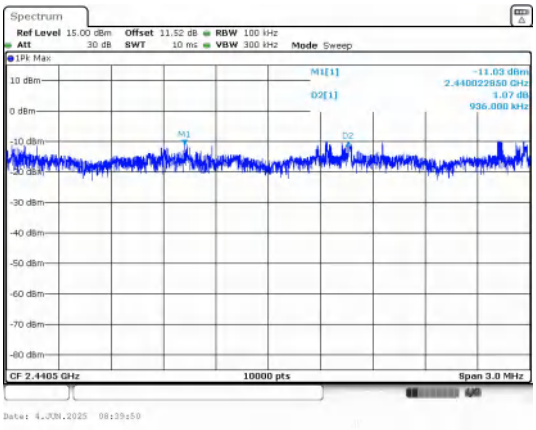
Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.947	2440.9432	0.9963	0.96	PASS
π/4DQPSK	2-DH5	2440.0228	2440.9588	0.9360	0.853	PASS
8DPSK	3-DH5	2439.9767	2440.966	0.9894	0.647	PASS

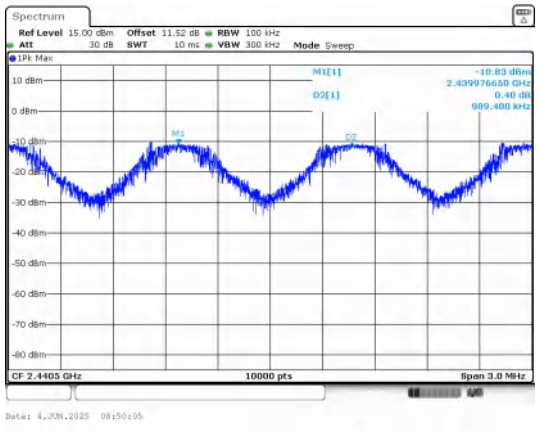
Test Graphs



GFSK



π/4DQPSK

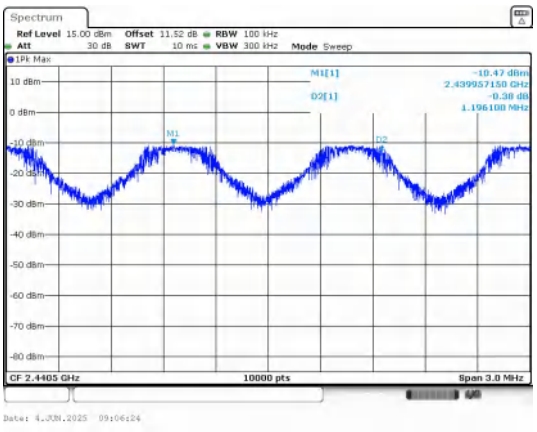


8DPSK

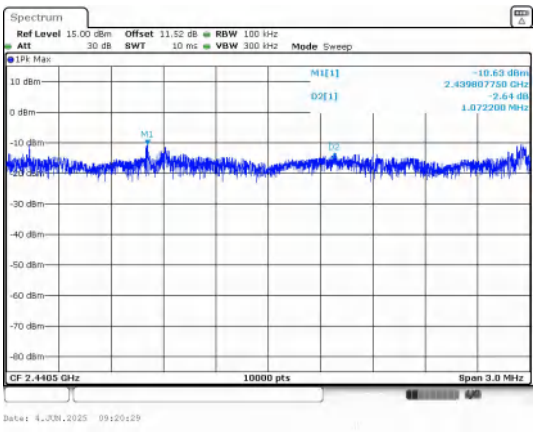
Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.9572	2441.1532	1.1961	0.98	PASS
π/4DQPSK	2-DH5	2439.8077	2440.88	1.0722	0.86	PASS
8DPSK	3-DH5	2439.8063	2440.9772	1.1709	0.66	PASS

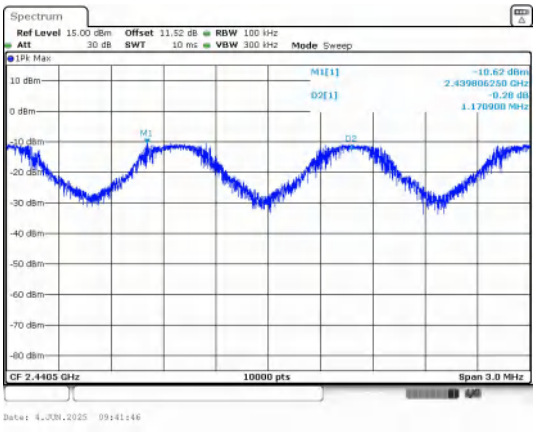
Test Graphs



GFSK



π/4DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left:

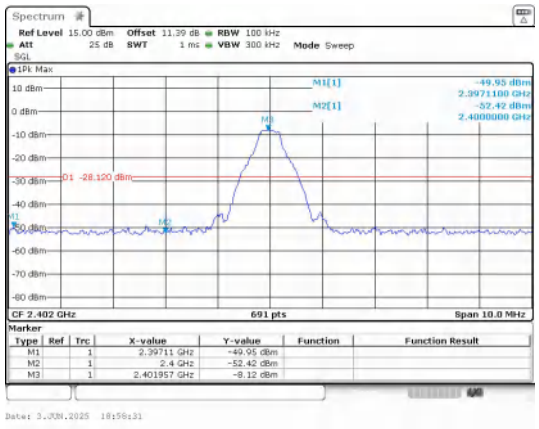
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2397.11	-49.949	-28.12	-21.829	PASS
			2400.00	-52.420	-28.12	-24.300	PASS
			9608.10	-42.478	-28.12	-14.358	PASS
		39	9763.72	-41.538	-29.93	-11.608	PASS
		78	2483.50	-50.720	-30.24	-20.480	PASS
			9920.20	-37.653	-30.24	-7.413	PASS
π/4DQPSK	2-DH5	0	2398.18	-49.540	-27.9	-21.640	PASS
			2400.00	-51.920	-27.9	-24.020	PASS
			9608.10	-42.162	-27.9	-14.262	PASS
		39	9763.72	-41.175	-30.35	-10.825	PASS
		78	2483.50	-51.240	-30.25	-20.990	PASS
			9920.20	-37.898	-30.25	-7.648	PASS
8DPSK	3-DH5	0	2397.35	-50.573	-27.91	-22.663	PASS
			2400.00	-51.080	-27.91	-23.170	PASS
			9608.10	-42.228	-27.91	-14.318	PASS
		39	9763.72	-41.114	-30.36	-10.754	PASS
		78	2483.50	-51.740	-30.25	-21.490	PASS
			9920.20	-37.923	-30.25	-7.673	PASS

Hopping

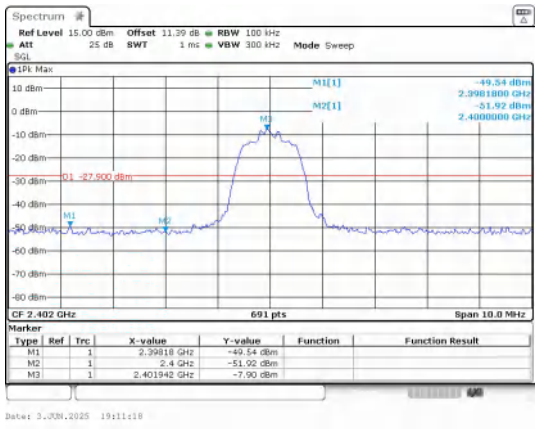
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.31	-49.301	-28.21	-21.091	PASS
			2400.00	-51.160	-28.21	-22.950	PASS
			2483.50	-50.670	-31.02	-19.650	PASS
π/4DQPSK	2-DH5		2397.96	-49.689	-30.81	-18.879	PASS
			2400.00	-51.330	-30.81	-20.520	PASS
			2483.50	-51.370	-30.38	-20.990	PASS
8DPSK	3-DH5		2398.18	-49.885	-28.22	-21.665	PASS
			2400.00	-51.220	-28.22	-23.000	PASS
			2483.50	-49.970	-30.7	-19.270	PASS

Test Graphs



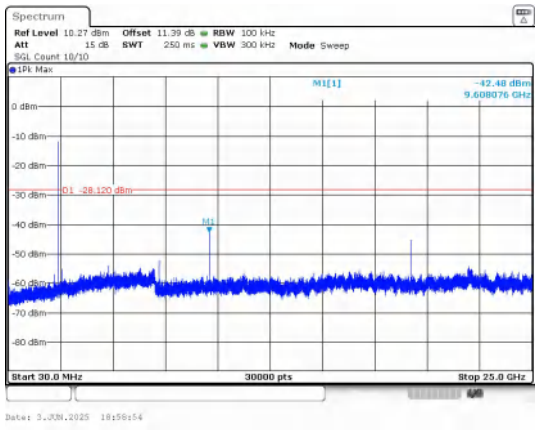
Out Of Band Emission

GFSK_DH5_Channel 0



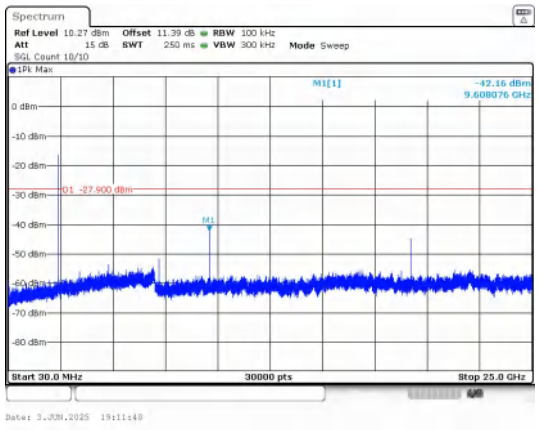
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 0



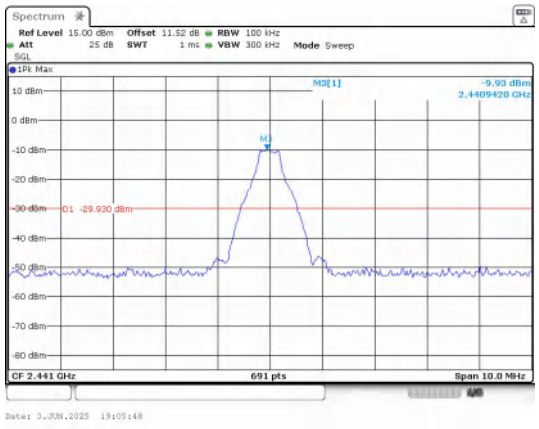
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



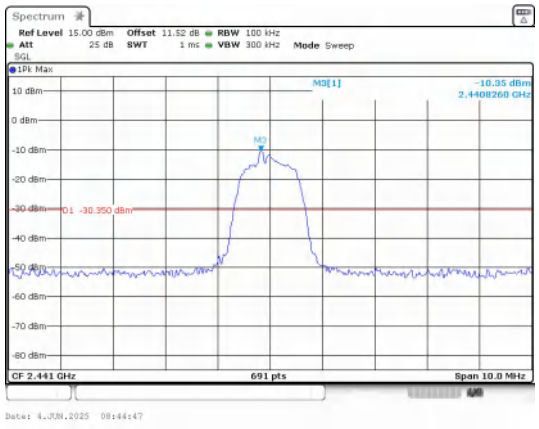
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



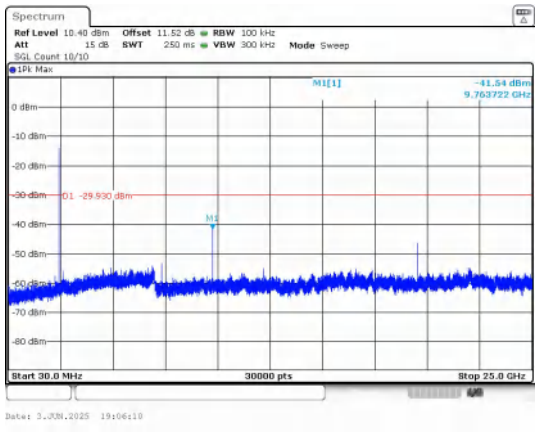
Out Of Band Emission

GFSK_DH5_Channel 39



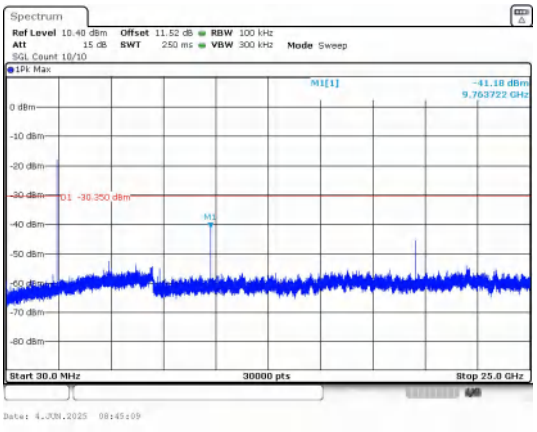
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



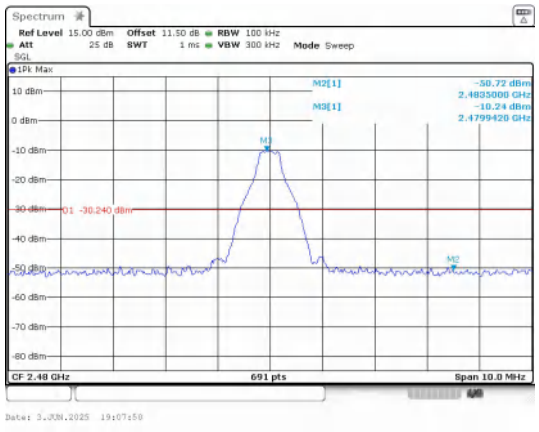
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



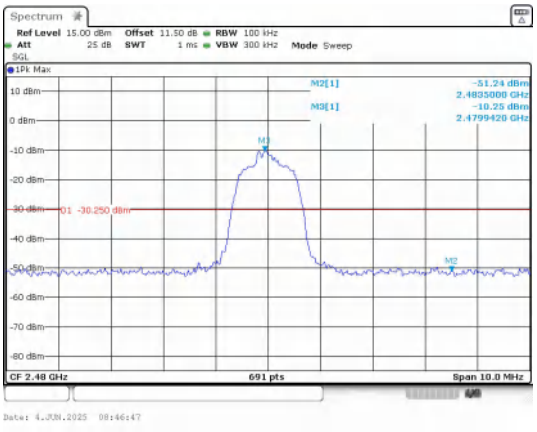
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



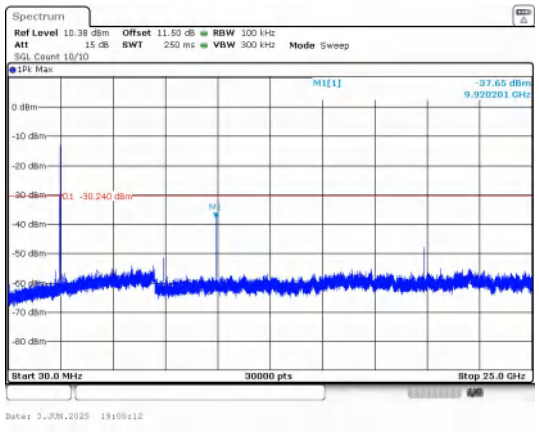
Out Of Band Emission

GFSK_DH5_Channel 78



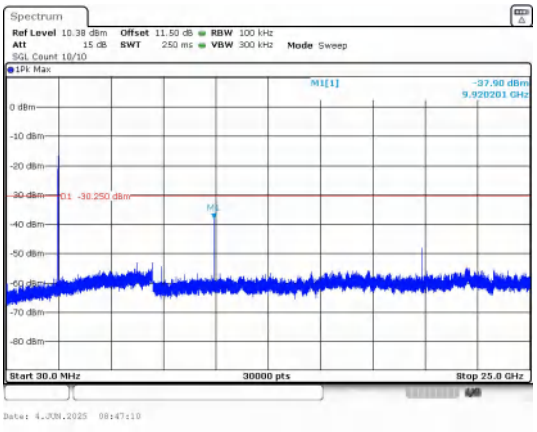
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



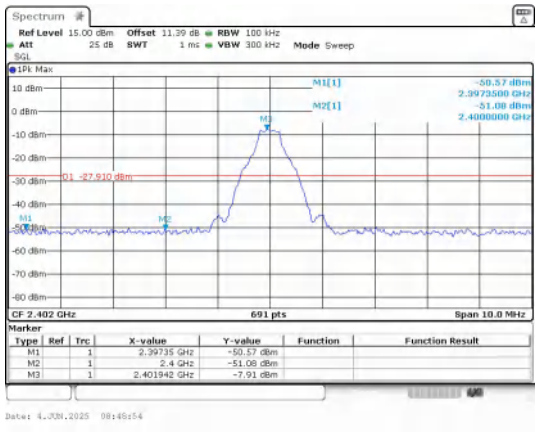
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 78



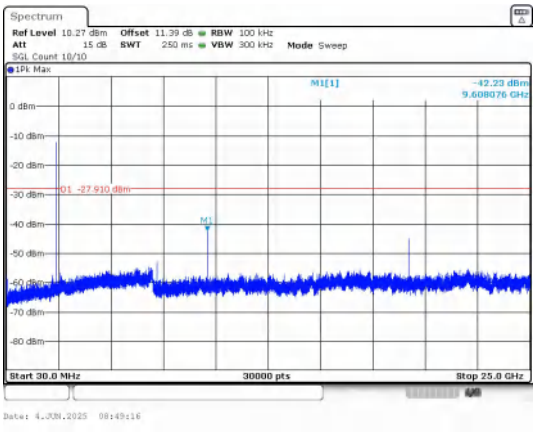
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 78



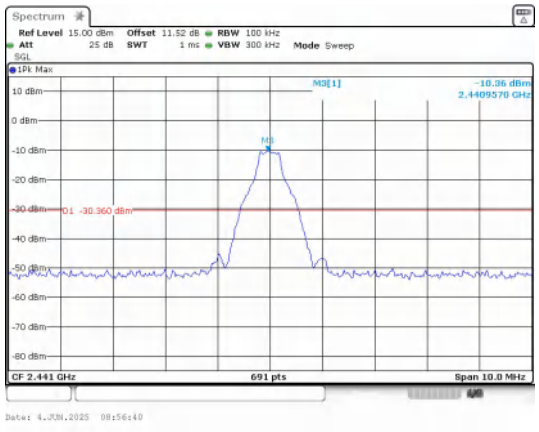
Out Of Band Emission

8DPSK_3-DH5_Channel 0



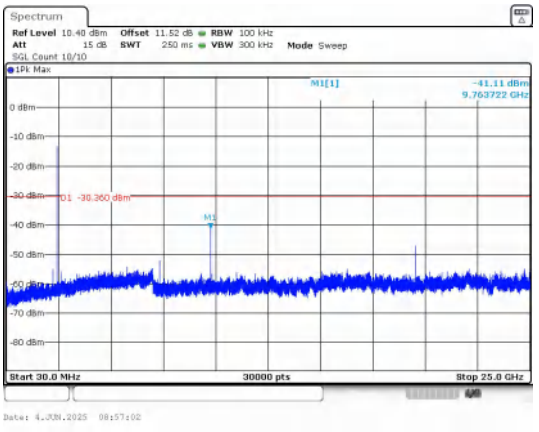
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 0



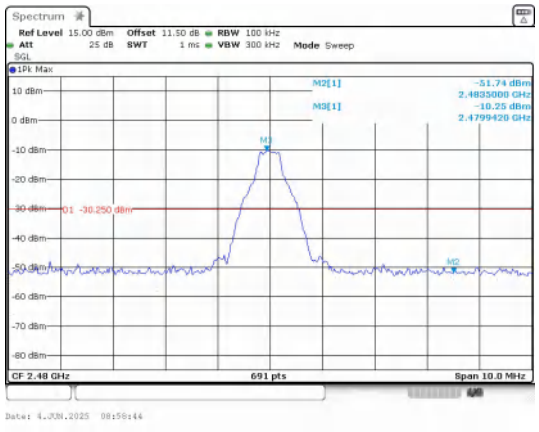
Out Of Band Emission

8DPSK_3-DH5_Channel 39



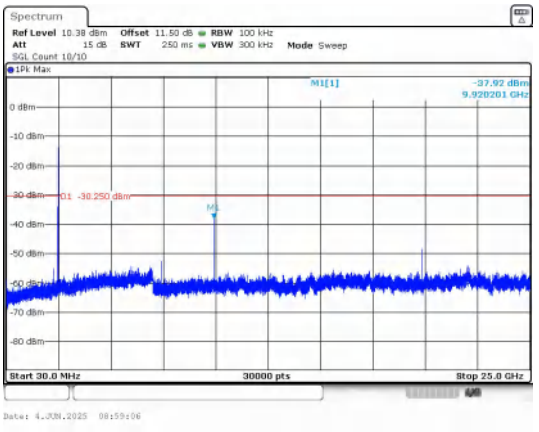
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 39



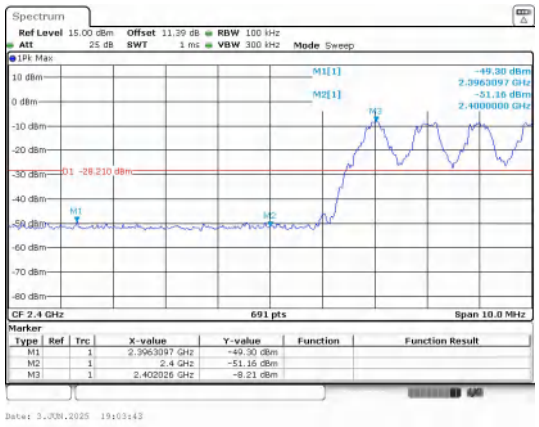
Out Of Band Emission

8DPSK_3-DH5_Channel 78



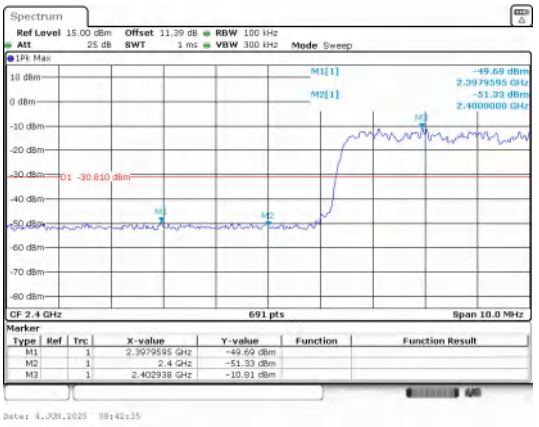
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 78



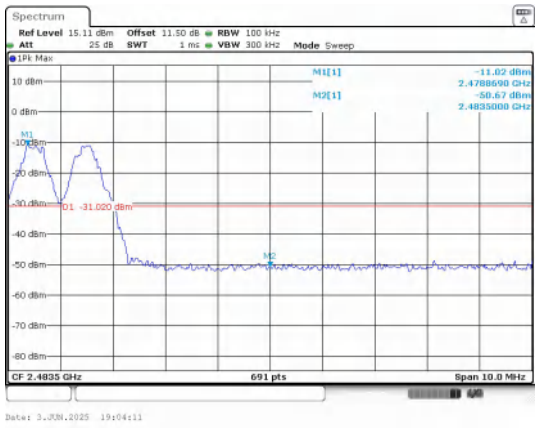
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



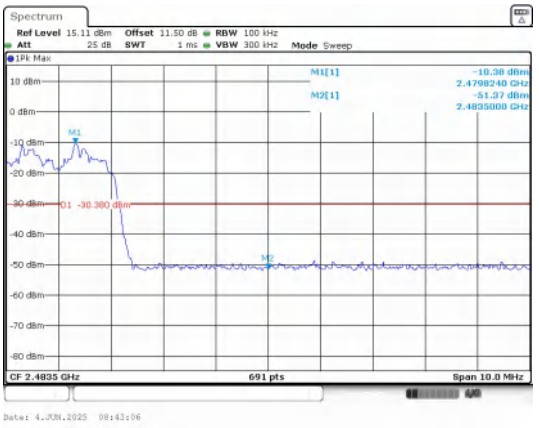
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



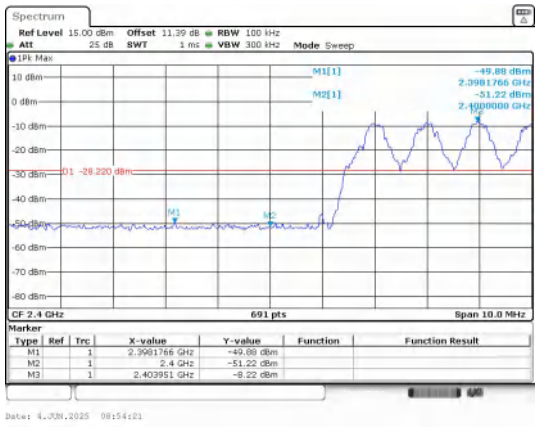
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



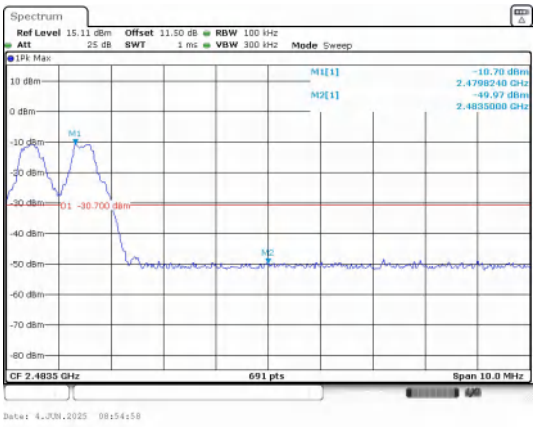
Out Of Band Emission(Right)

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

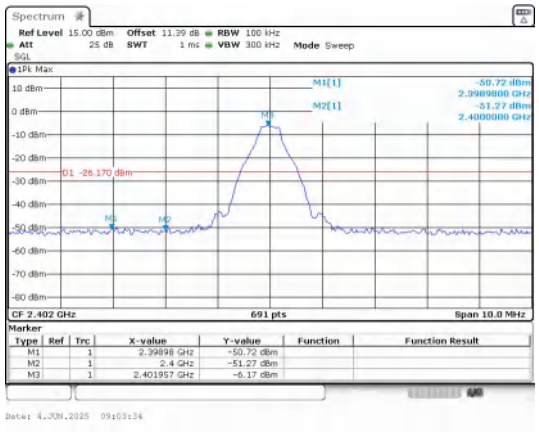
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result

GFSK	DH5	0	2398.98	-50.720	-26.17	-24.550	PASS
			2400.00	-51.270	-26.17	-25.100	PASS
			9608.10	-41.176	-26.17	-15.006	PASS
		39	9763.72	-41.226	-30.52	-10.706	PASS
		78	2483.50	-51.620	-30.33	-21.290	PASS
			9920.20	-37.828	-30.33	-7.498	PASS
π/4DQPSK	2-DH5	0	2398.98	-50.482	-28.22	-22.262	PASS
			2400.00	-51.940	-28.22	-23.720	PASS
			9608.10	-42.456	-28.22	-14.236	PASS
		39	9763.72	-41.363	-30.45	-10.913	PASS
		78	2483.50	-52.410	-30.34	-22.070	PASS
			9920.20	-37.450	-30.34	-7.110	PASS
8DPSK	3-DH5	0	2398.50	-50.093	-27.97	-22.123	PASS
			2400.00	-51.110	-27.97	-23.140	PASS
			9608.10	-42.406	-27.97	-14.436	PASS
		39	9763.72	-41.312	-30.03	-11.282	PASS
		78	2483.50	-51.190	-30.43	-20.760	PASS
			9920.20	-37.803	-30.43	-7.373	PASS

Hopping

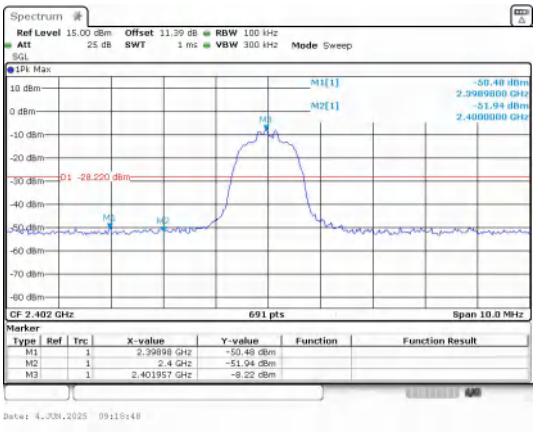
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2397.89	-48.879	-28.58	-20.299	PASS
			2400.00	-50.540	-28.58	-21.960	PASS
			2483.50	-50.810	-30.81	-20.000	PASS
π/4DQPSK	2-DH5		2396.79	-49.180	-28.0	-21.180	PASS
			2400.00	-50.650	-28.0	-22.650	PASS
			2483.50	-50.830	-30.69	-20.140	PASS
8DPSK	3-DH5		2398.80	-48.862	-28.39	-20.472	PASS
			2400.00	-51.930	-28.39	-23.540	PASS
			2483.50	-50.270	-30.47	-19.800	PASS

Test Graphs



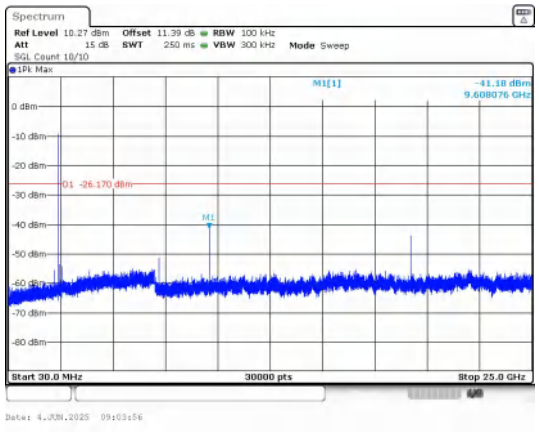
Out Of Band Emission

GFSK_DH5_Channel 0



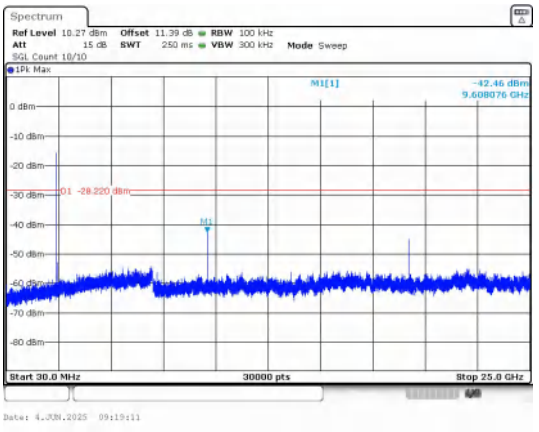
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 0



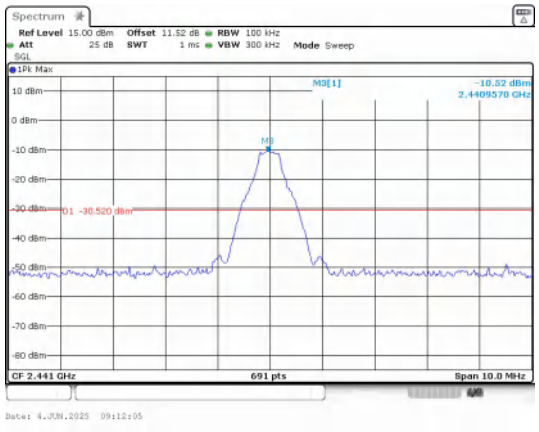
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



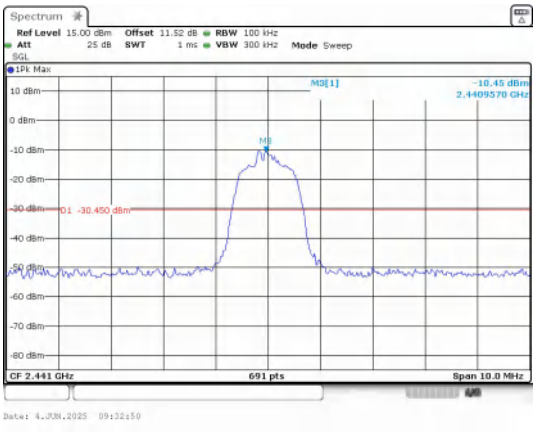
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



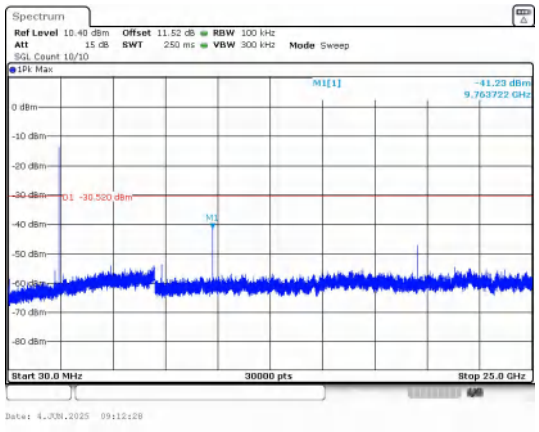
Out Of Band Emission

GFSK_DH5_Channel 39



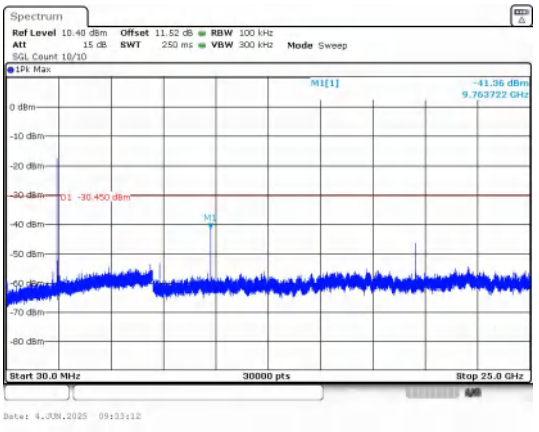
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



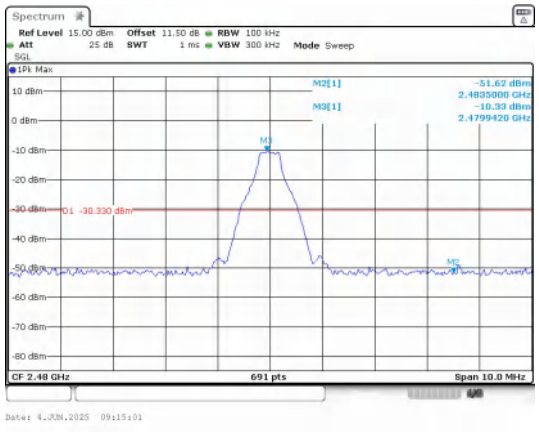
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



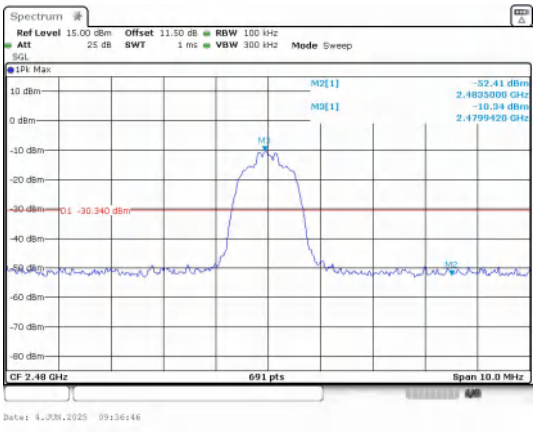
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



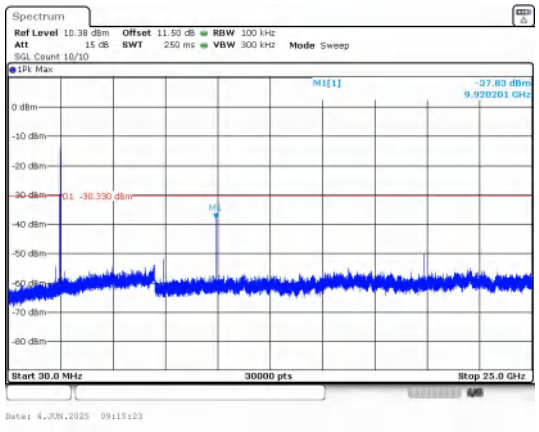
Out Of Band Emission

GFSK_DH5_Channel 78



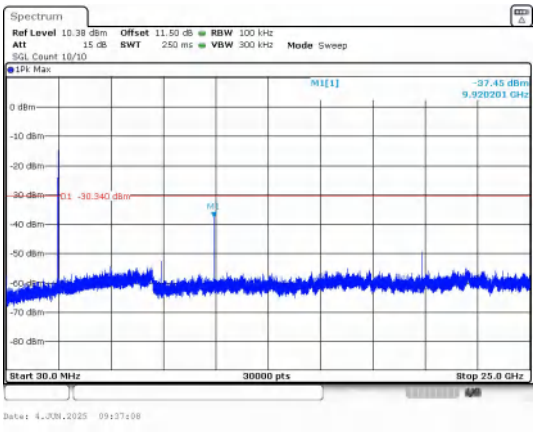
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



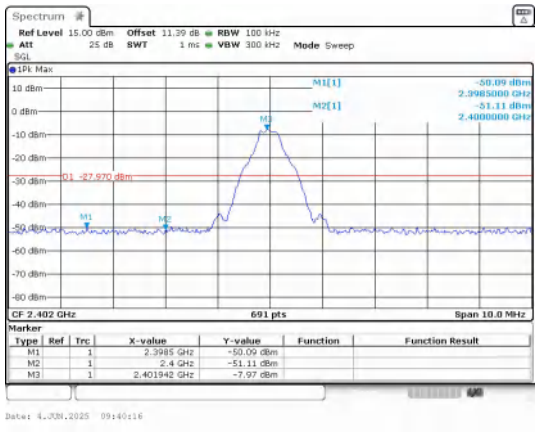
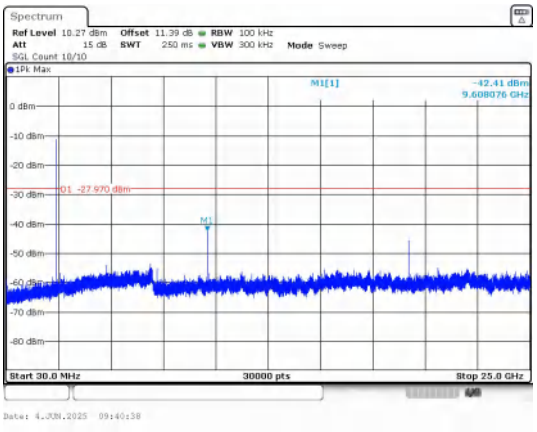
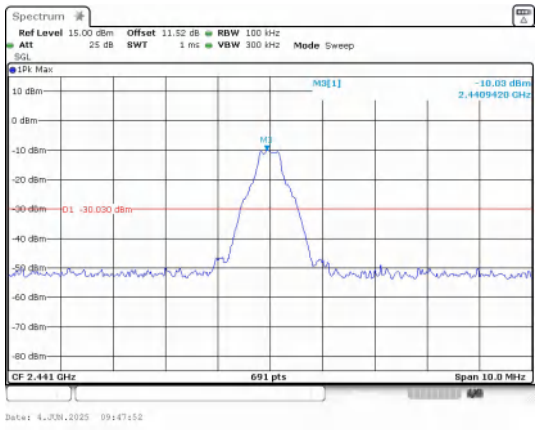
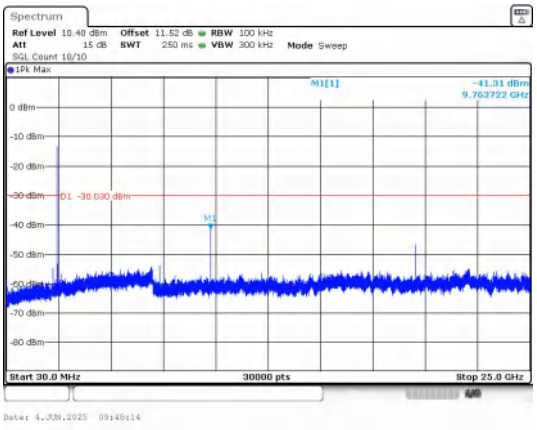
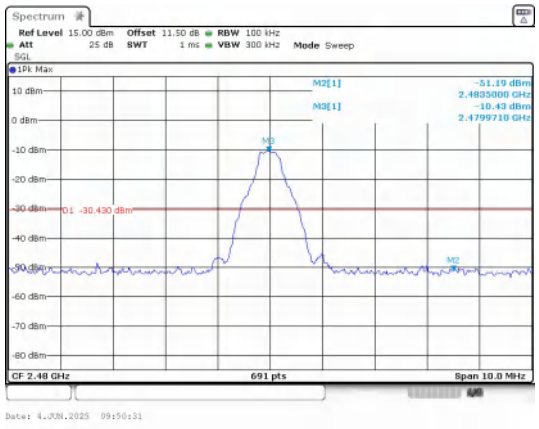
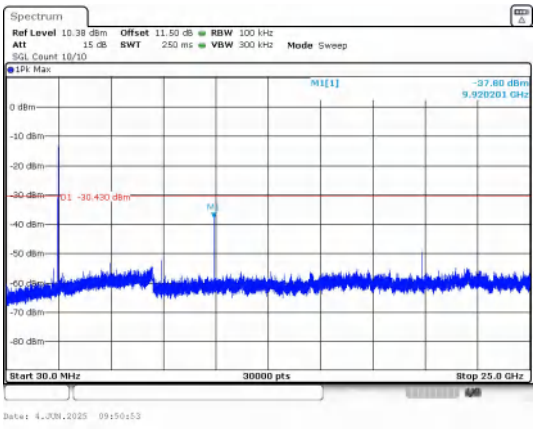
30.0 MHz - 25000.0 MHz

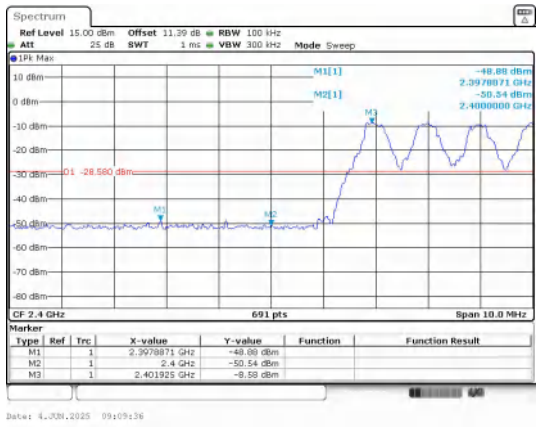
GFSK_DH5_Channel 78



30.0 MHz - 25000.0 MHz

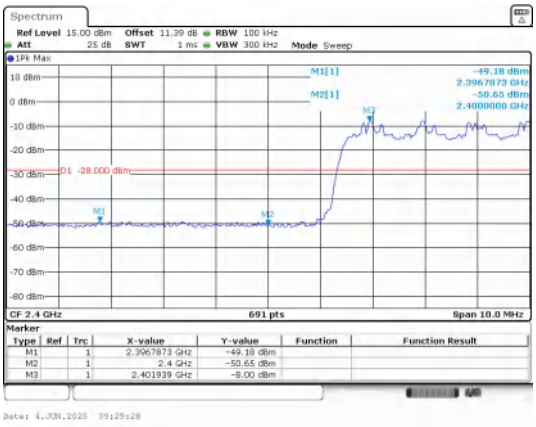
π/4DQPSK_2-DH5_Channel 78

	
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**



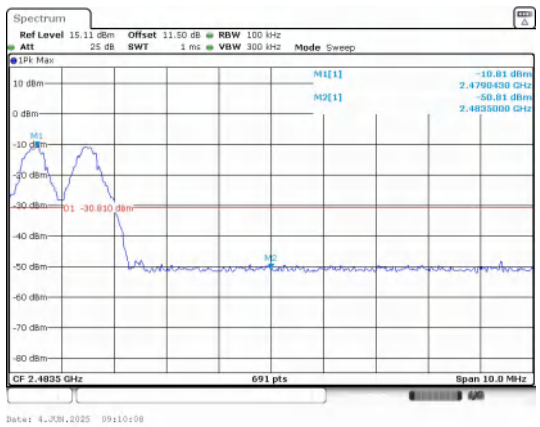
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



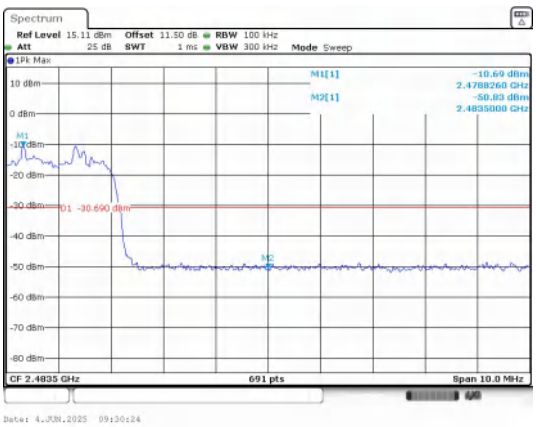
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



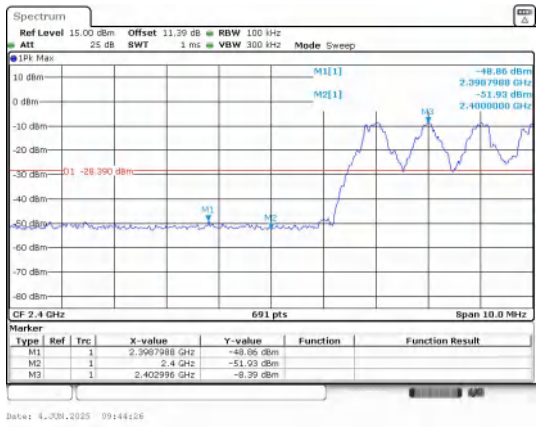
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



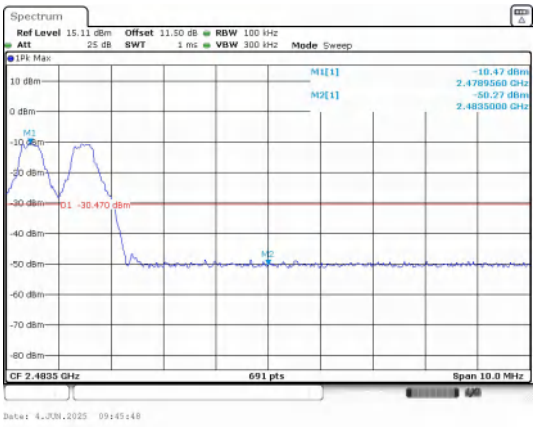
Out Of Band Emission(Right)

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-----