Appendix Report

Project No.:	CISR250403052
Test Engineer:	James Wang
Supervised by:	Rory Huang

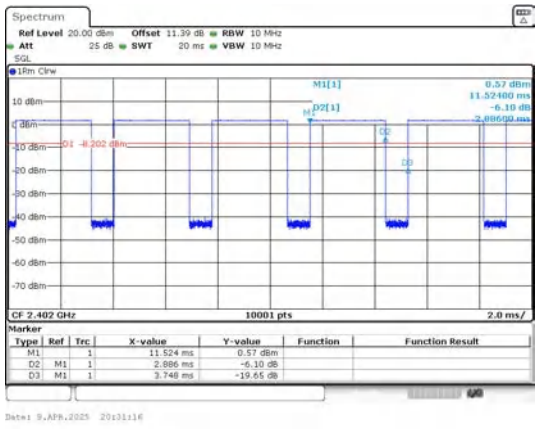
1) Duty Cycle

Test Result

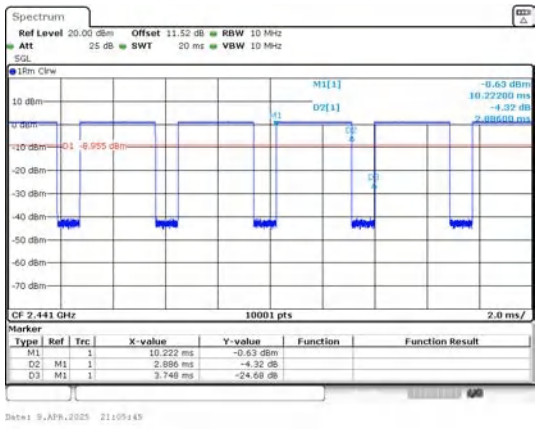
Left：

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	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	2.892	3.748	77.16	0.7716	1.1261	0.3458
		39	2.894	3.748	77.21	0.7721	1.1233	0.3455
		78	2.892	3.748	77.16	0.7716	1.1261	0.3458

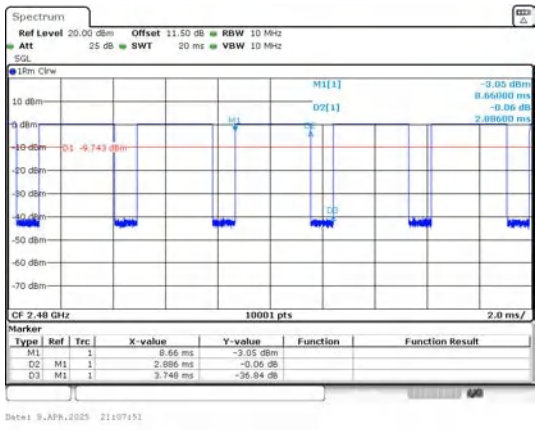
Test Graphs



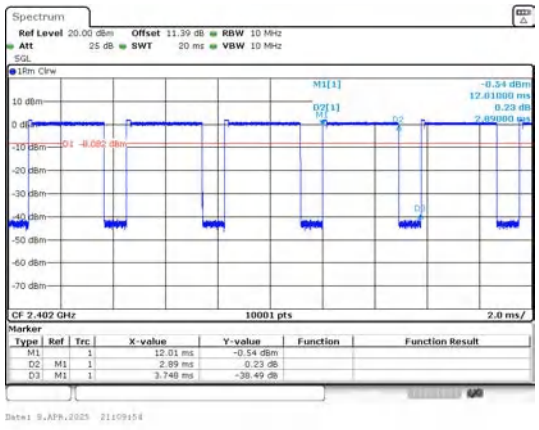
GFSK(DH5)_Channel 0



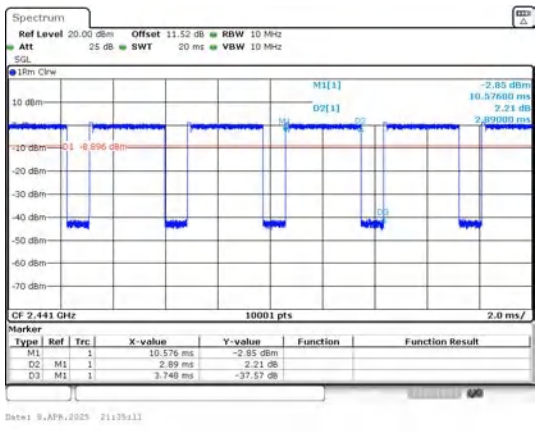
GFSK(DH5)_Channel 39



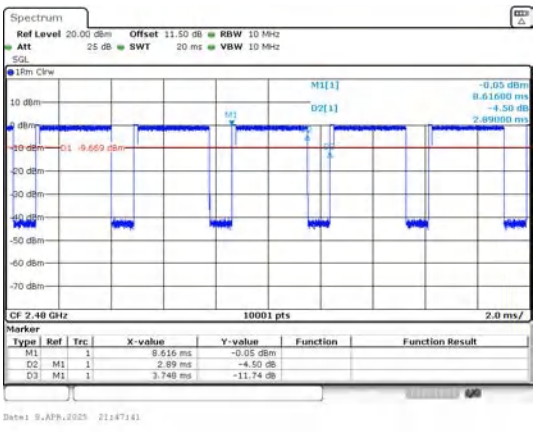
GFSK(DH5)_Channel 78



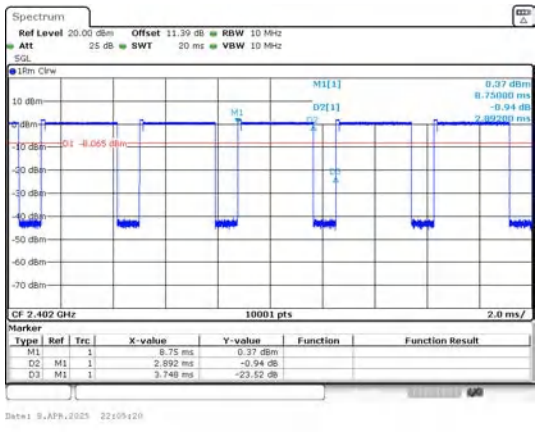
π/4DQPSK(2-DH5)_Channel 0



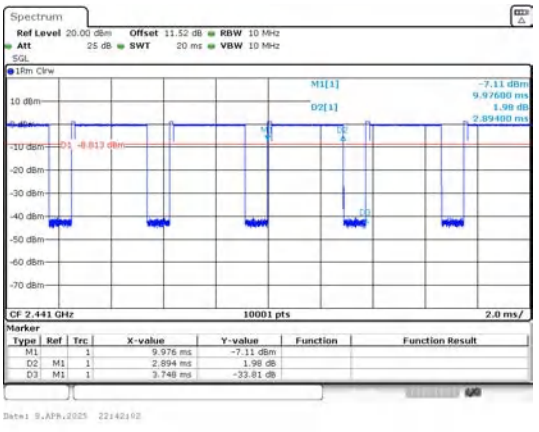
π/4DQPSK(2-DH5)_Channel 39



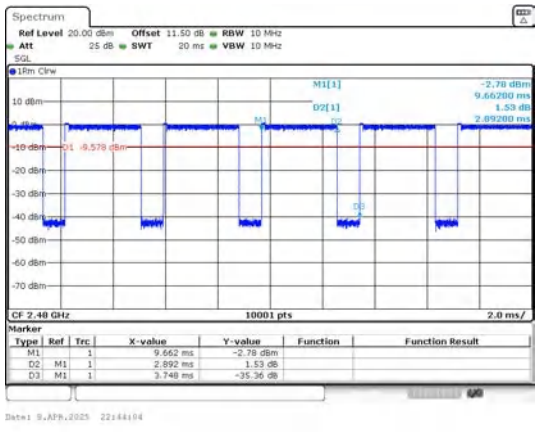
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39

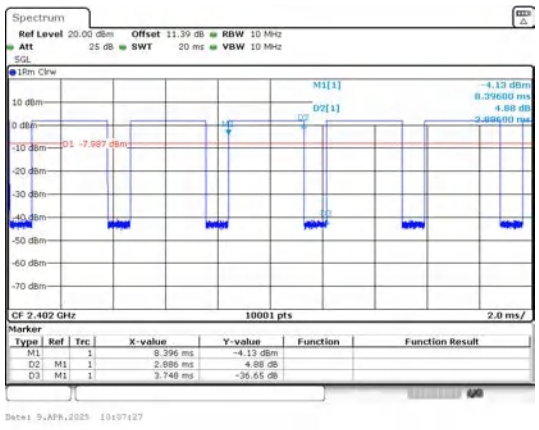


8DPSK(3-DH5)_Channel 78

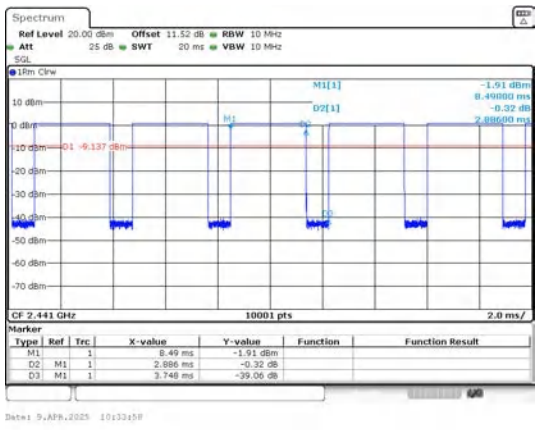
Right：

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	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	2.892	3.748	77.16	0.7716	1.1261	0.3458
		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	2.894	3.748	77.21	0.7721	1.1233	0.3455
		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

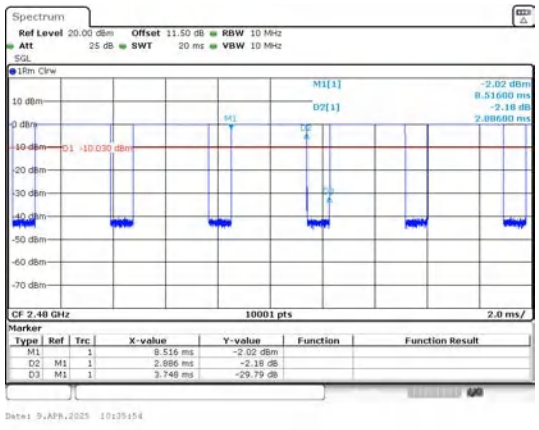
Test Graphs



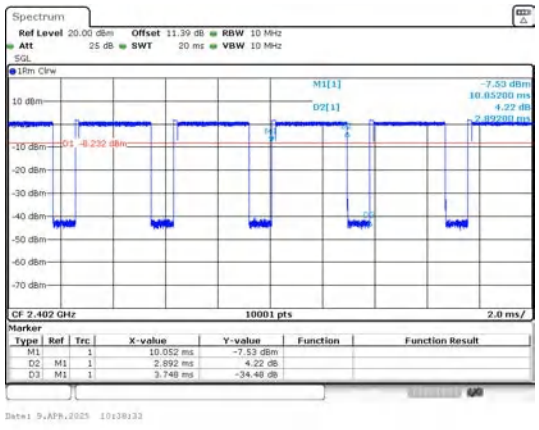
GFSK(DH5)_Channel 0



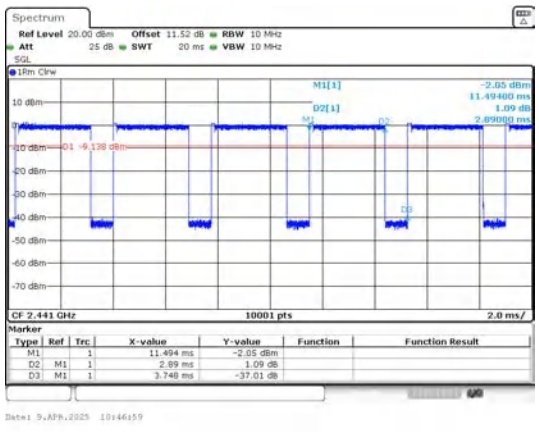
GFSK(DH5)_Channel 39



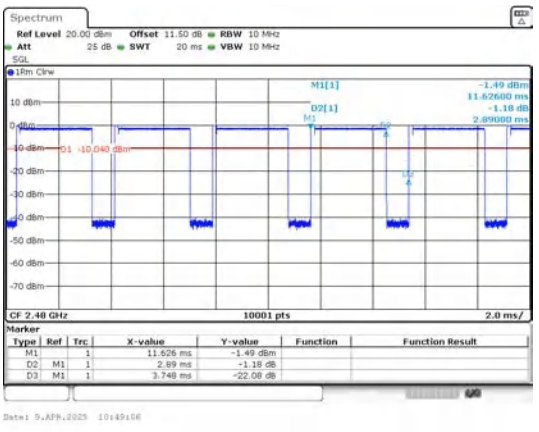
GFSK(DH5)_Channel 78



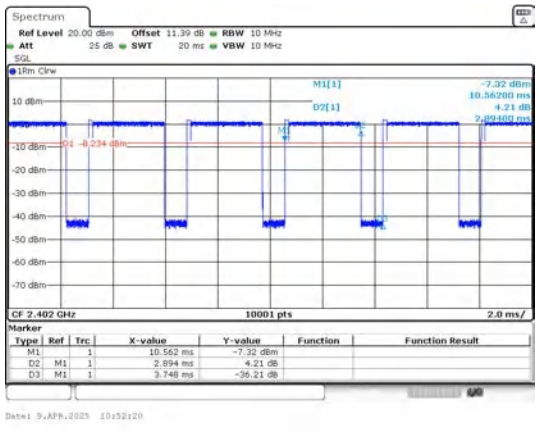
π/4DQPSK(2-DH5)_Channel 0



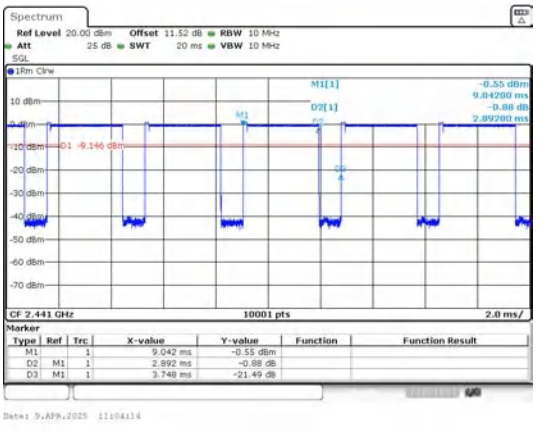
π/4DQPSK(2-DH5)_Channel 39



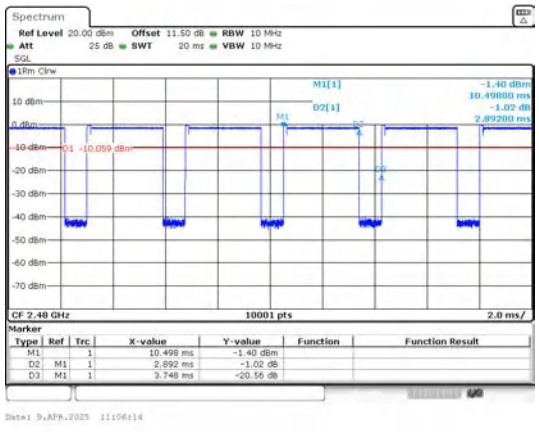
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

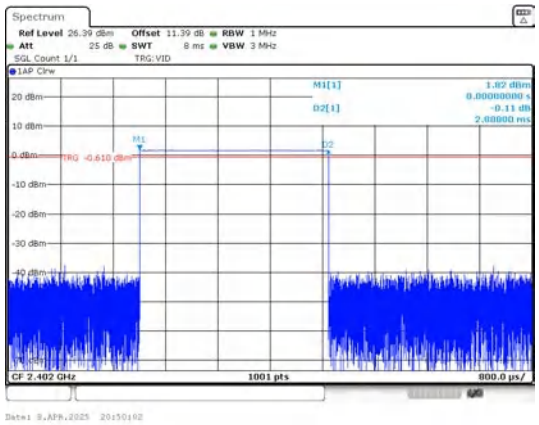
2) Dwell Time

Test Result

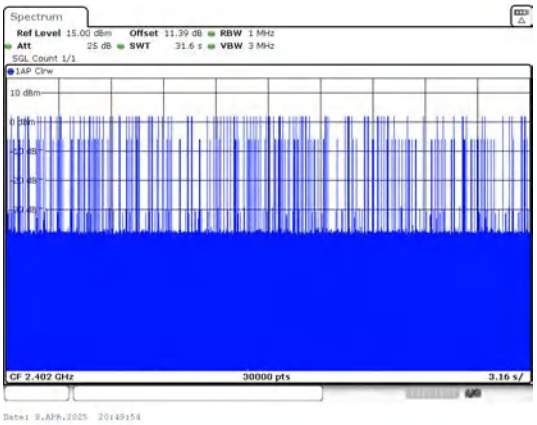
Left：

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	113	326.34	< 400	PASS
π/4DQPSK	2-DH5		2.896	99	286.7		PASS
8DPSK	3-DH5		2.888	112	323.46		PASS

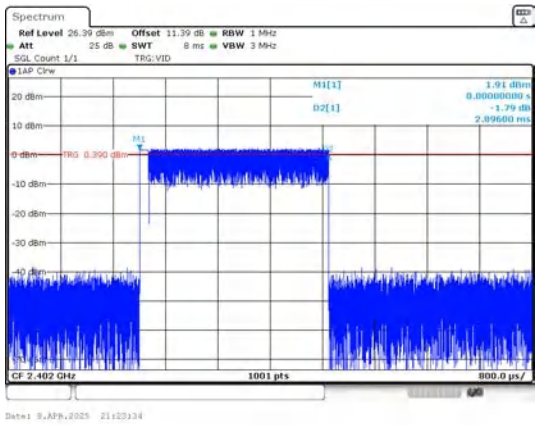
Test Graphs



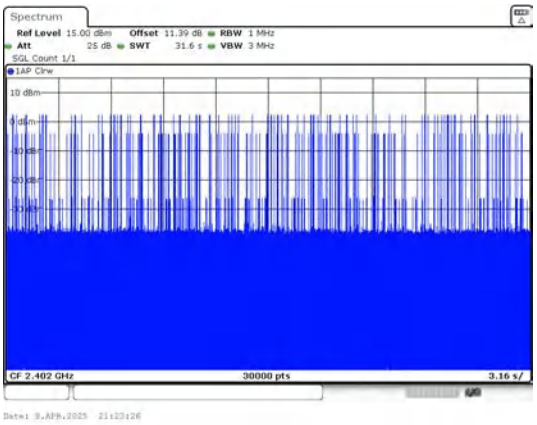
Pulse Width
GFSK_DH5



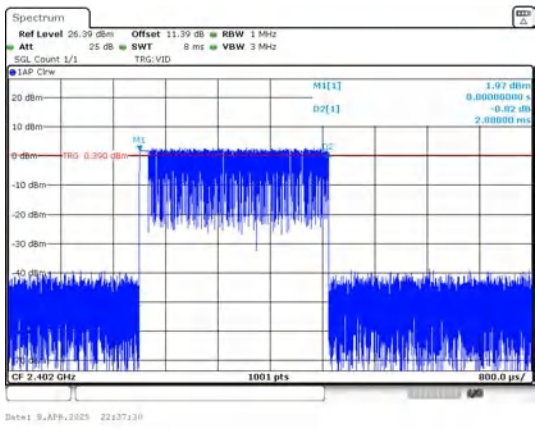
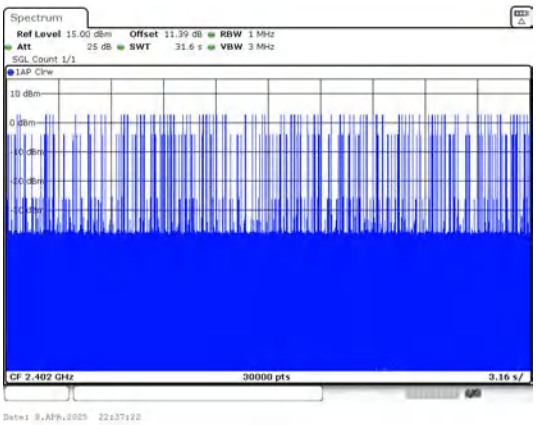
Number of Pulses in 31.6 seconds
GFSK_DH5



Pulse Width
π/4DQPSK_2-DH5



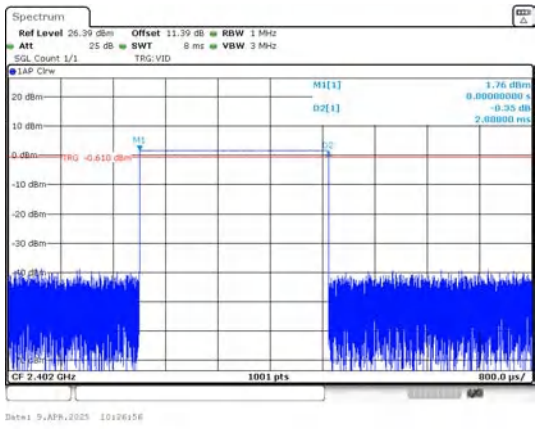
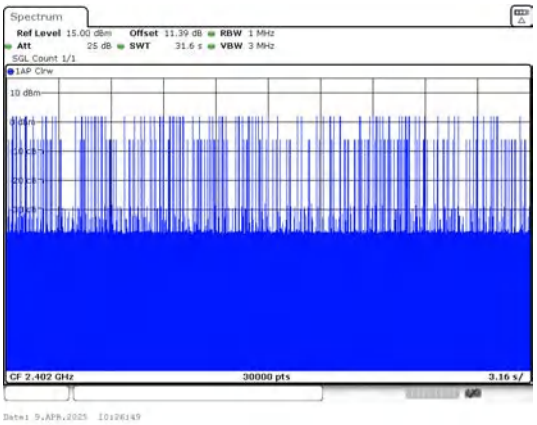
Number of Pulses in 31.6 seconds
π/4DQPSK_2-DH5

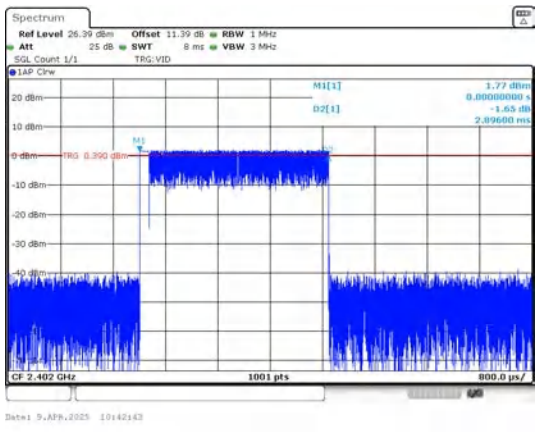
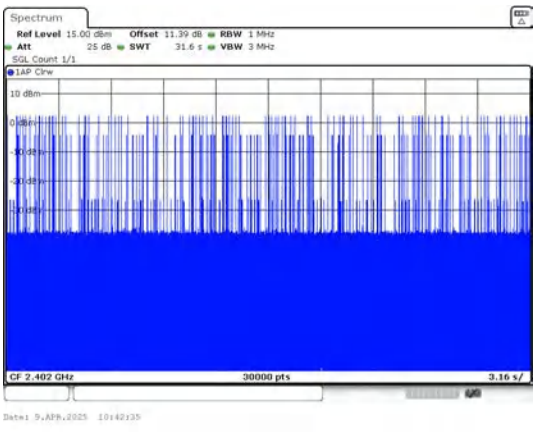
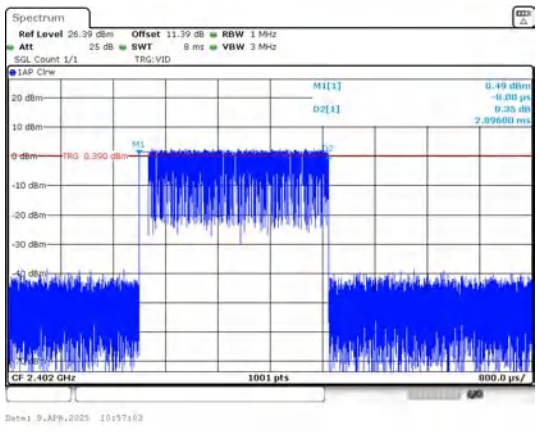
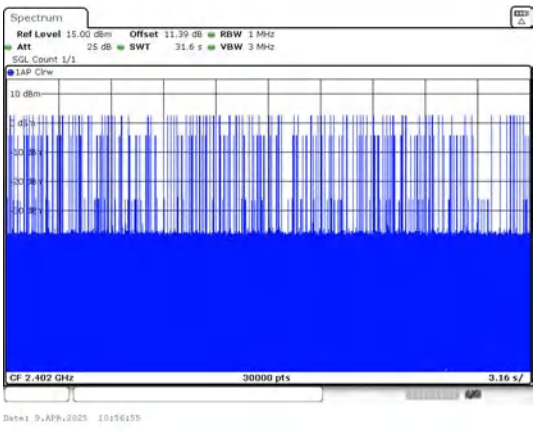
	
Pulse Width 8DPSK_3-DH5	Number of Pulses in 31.6 seconds 8DPSK_3-DH5

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	100	288.8	< 400	PASS
π/4DQPSK	2-DH5		2.896	103	298.29		PASS
8DPSK	3-DH5		2.896	114	330.14		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**

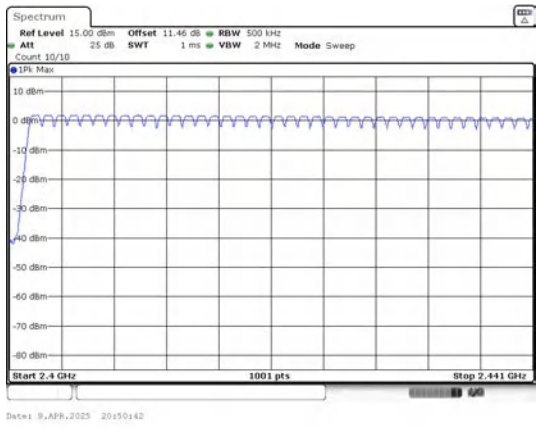
3) Number Of Hopping Channel

Test Result

Left：

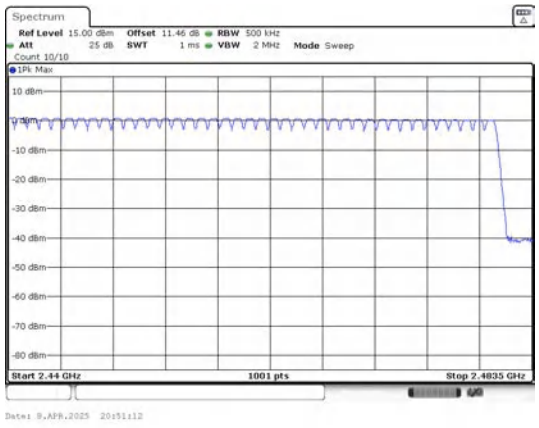
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
π/4DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



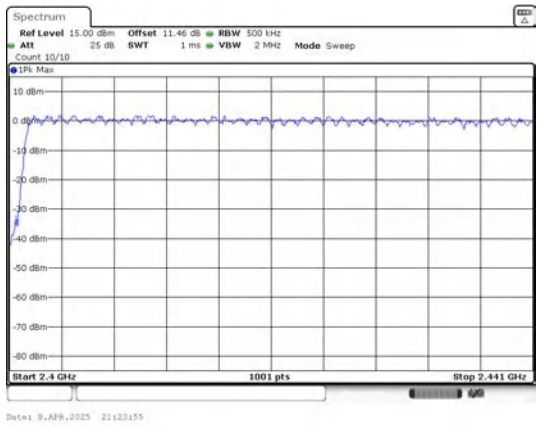
Low End Spectrum Channel Hopping Plot

GFSK



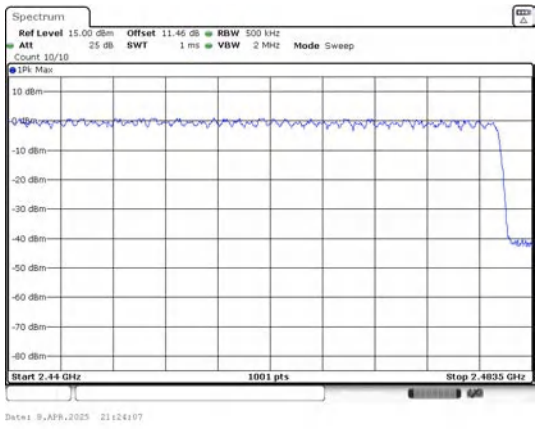
High End Spectrum Channel Hopping Plot

GFSK



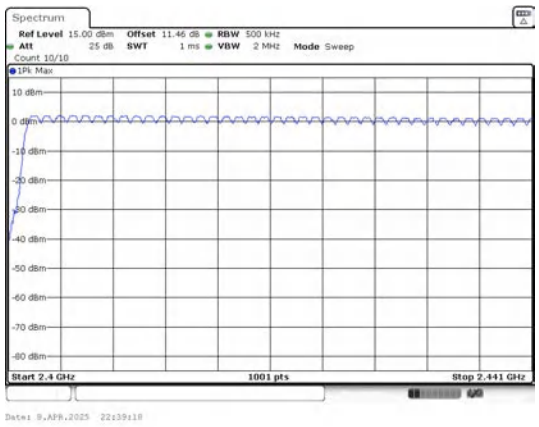
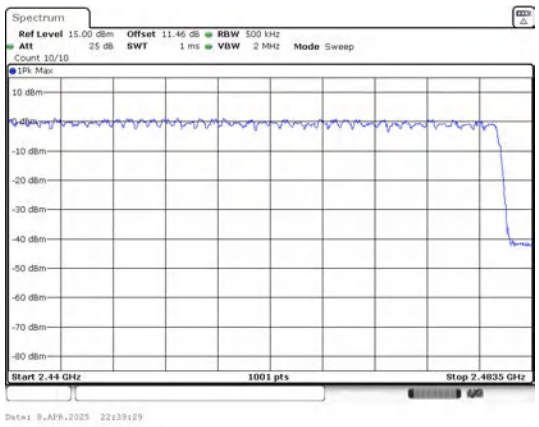
Low End Spectrum Channel Hopping Plot

π/4DQPSK



High End Spectrum Channel Hopping Plot

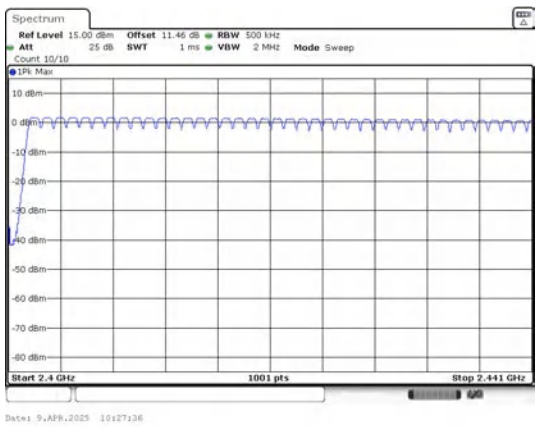
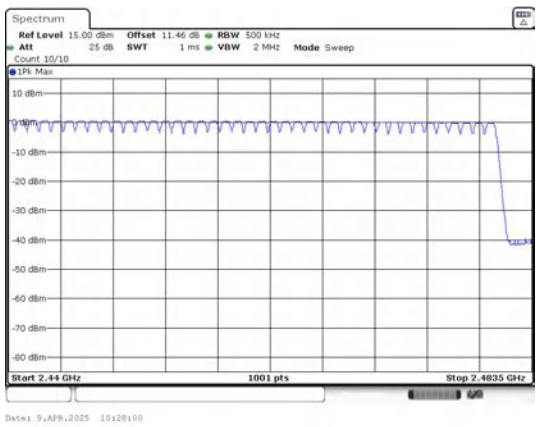
π/4DQPSK

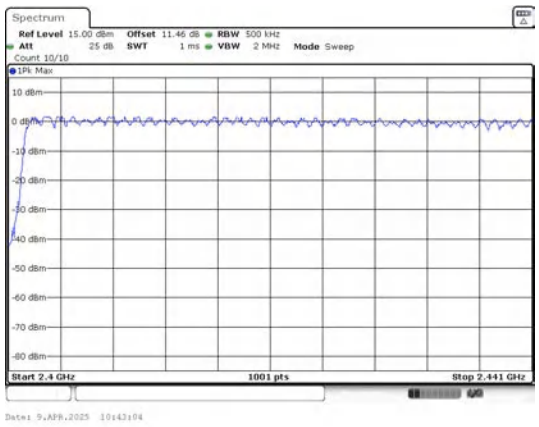
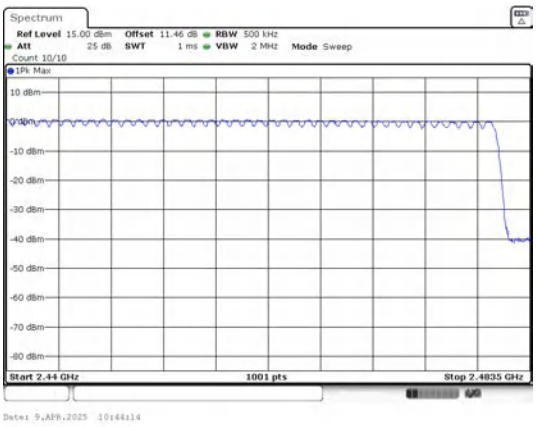
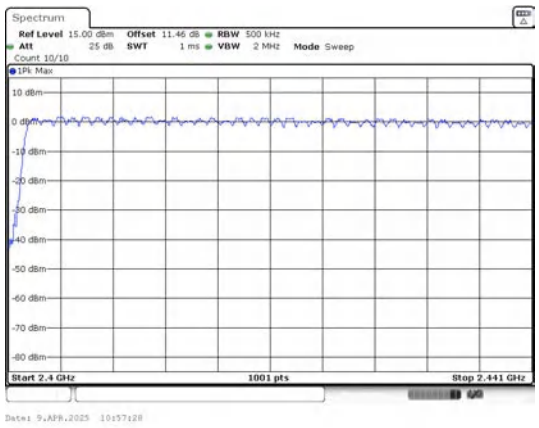
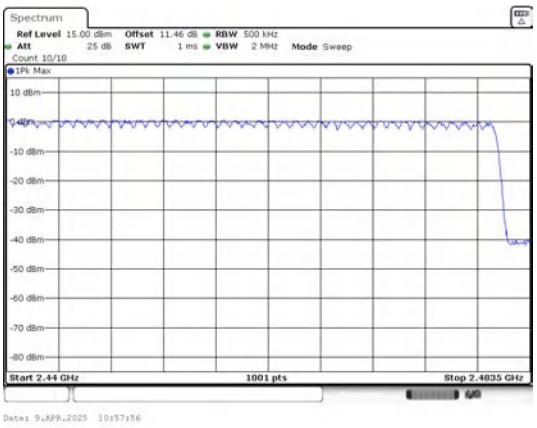
	
Low End Spectrum Channel Hopping Plot 8DPSK	High End Spectrum Channel Hopping Plot 8DPSK

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**

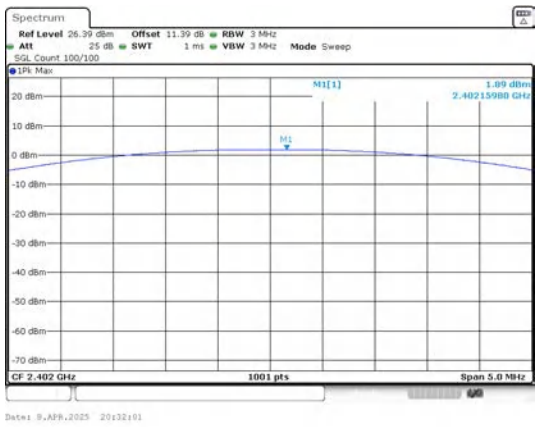
4) Conducted Peak Output Power

Test Result

Left：

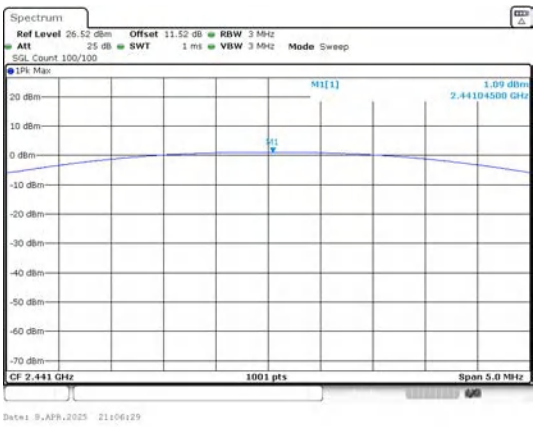
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	1.89	1.55	≤30	PASS
		39	1.09	1.29		PASS
		78	0.37	1.09		PASS
π/4DQPSK	2-DH5	0	2.81	1.91	≤20.97	PASS
		39	1.95	1.57		PASS
		78	1.22	1.32		PASS
8DPSK	3-DH5	0	3.14	2.06		PASS
		39	2.40	1.74		PASS
		78	1.66	1.47		PASS

Test Graphs



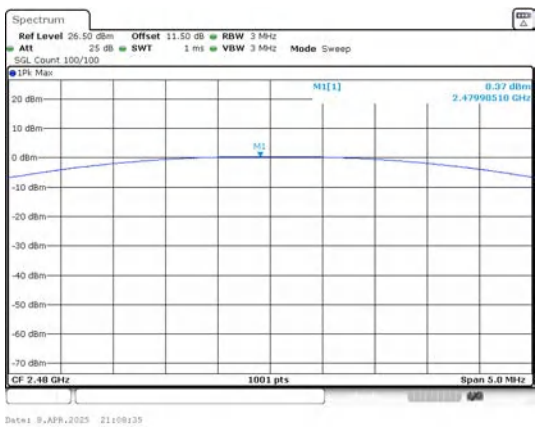
Peak Output Power

GFSK_Channel 0

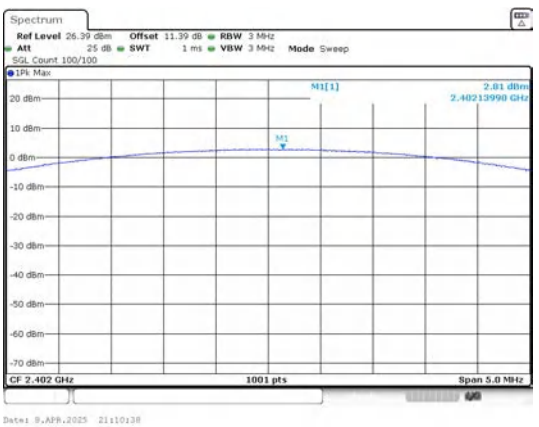


Peak Output Power

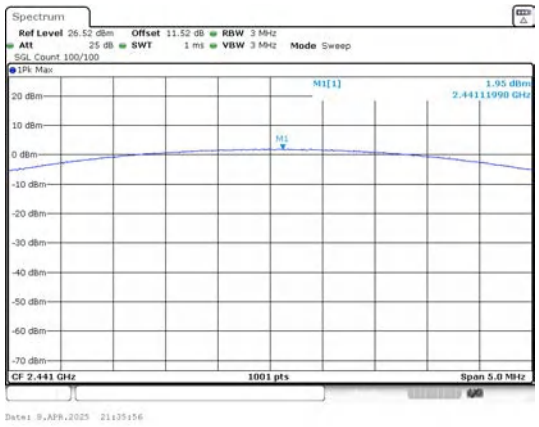
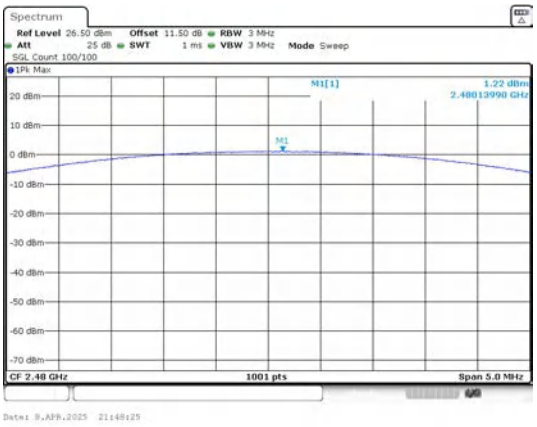
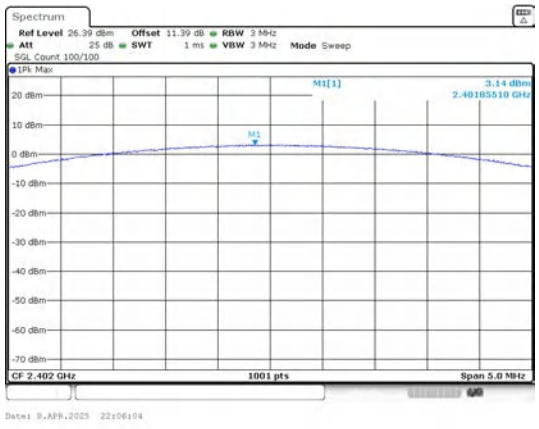
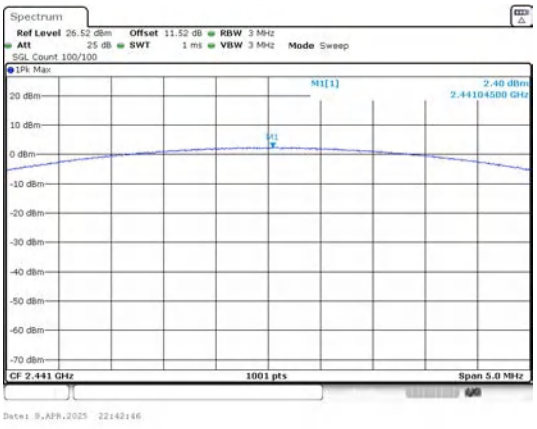
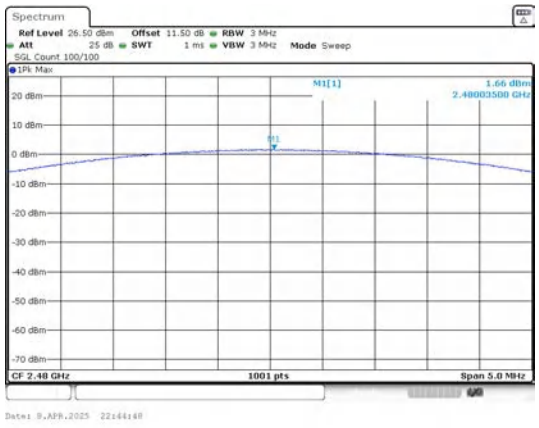
GFSK_Channel 39



Peak Output Power



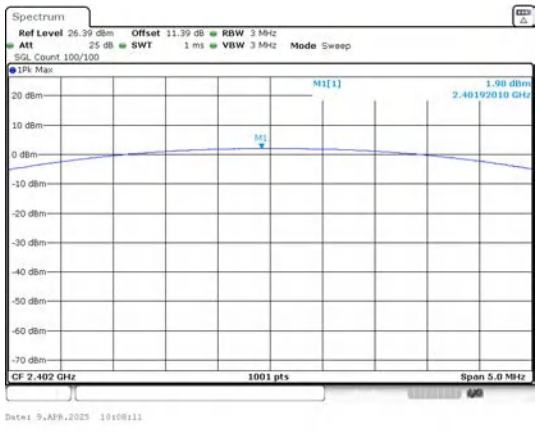
Peak Output Power

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

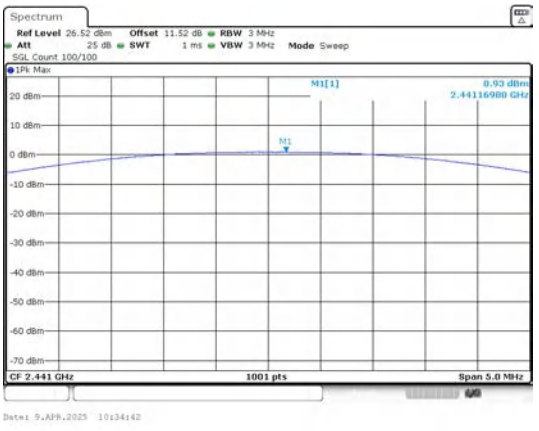
Right：

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	1.98	1.58	≤30	PASS
		39	0.93	1.24		PASS
		78	0.05	1.01		PASS
π/4DQPSK	2-DH5	0	2.66	1.85	≤20.97	PASS
		39	1.75	1.50		PASS
		78	0.90	1.23		PASS
8DPSK	3-DH5	0	2.93	1.96		PASS
		39	2.08	1.61		PASS
		78	1.16	1.31		PASS

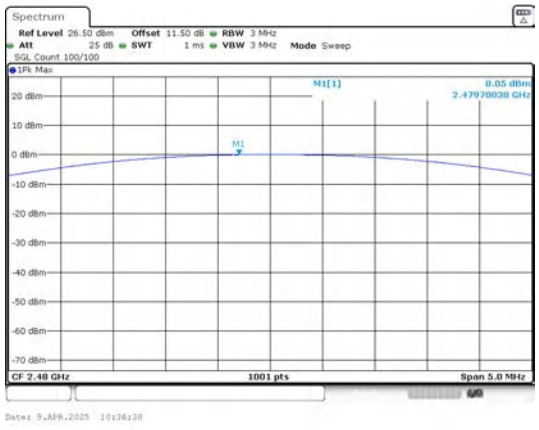
Test Graphs



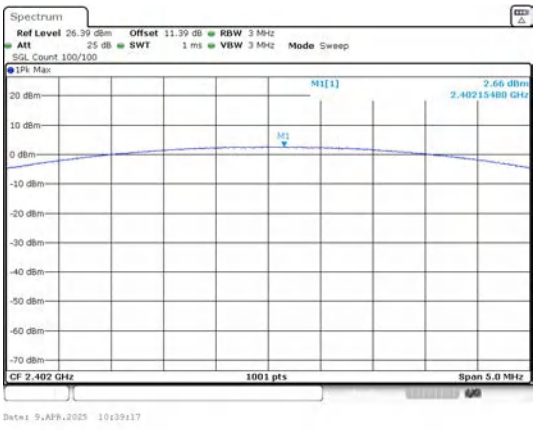
Peak Output Power
GFSK_Channel 0



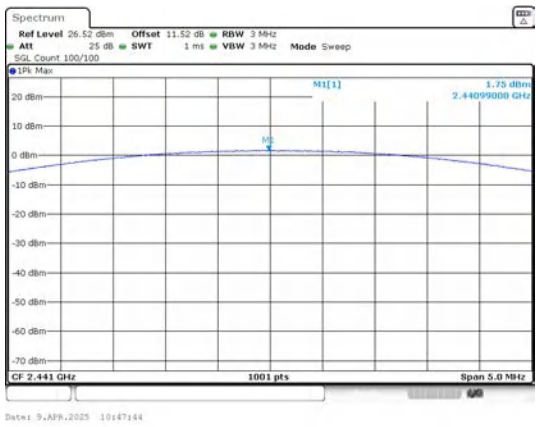
Peak Output Power
GFSK_Channel 39



Peak Output Power
GFSK_Channel 78

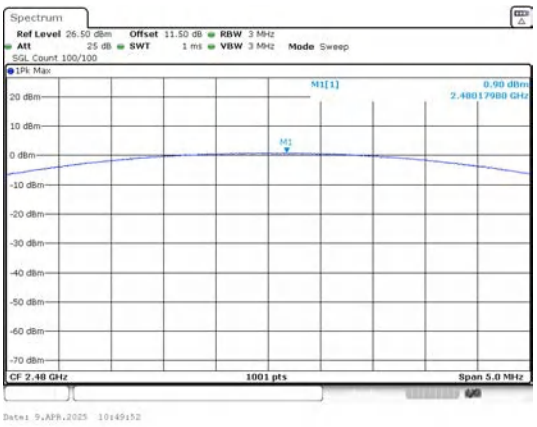


Peak Output Power
π/4DQPSK_Channel 0



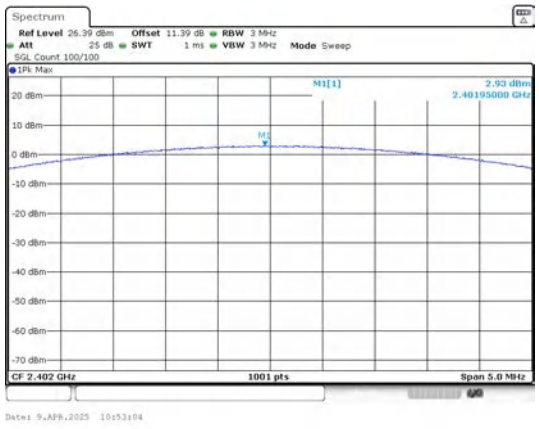
Peak Output Power

π/4DQPSK_Channel 39



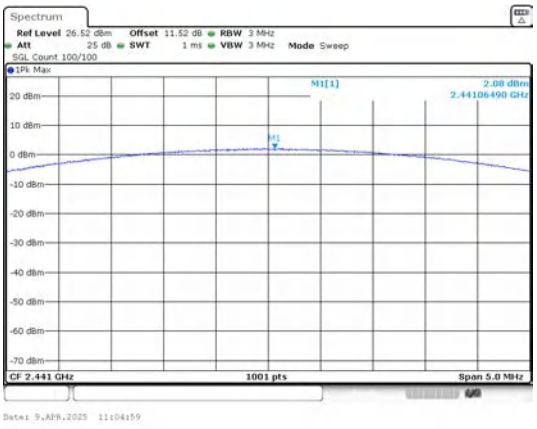
Peak Output Power

π/4DQPSK_Channel 78



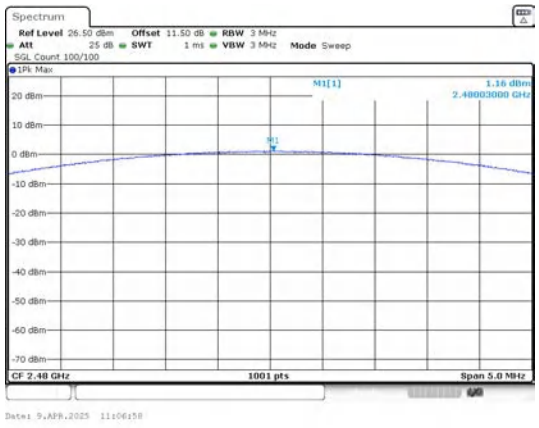
Peak Output Power

8DPSK_Channel 0



Peak Output Power

8DPSK_Channel 39



Peak Output Power

8DPSK_Channel 78

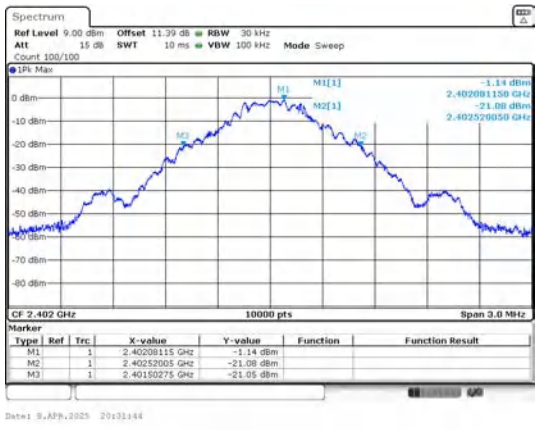
5) 20dB Bandwidth

Test Result

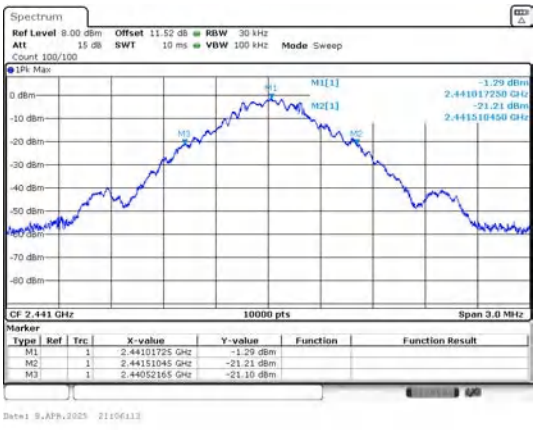
Left：

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.02
	39	2441 MHz	1.02
	78	2480 MHz	1.02
π/4DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.290
	78	2480 MHz	1.280
8DPSK	0	2402 MHz	1.280
	39	2441 MHz	1.290
	78	2480 MHz	1.290

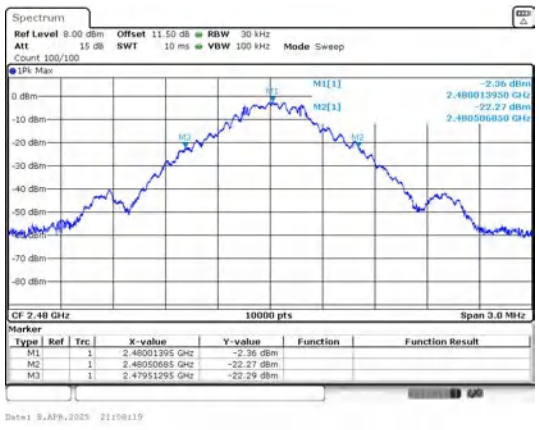
Test Graphs



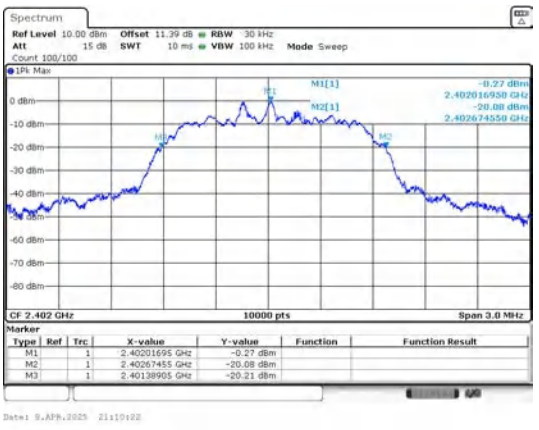
GFSK_DH5_Channel 0



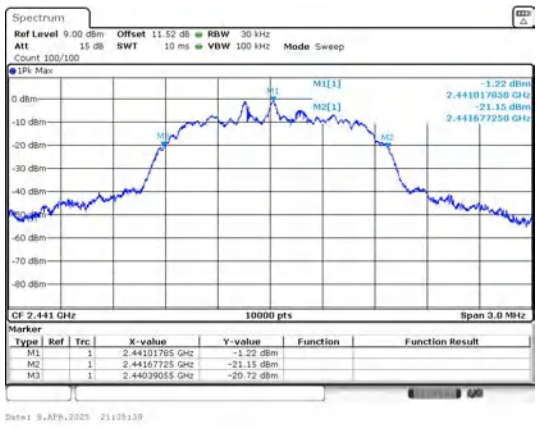
GFSK_DH5_Channel 39



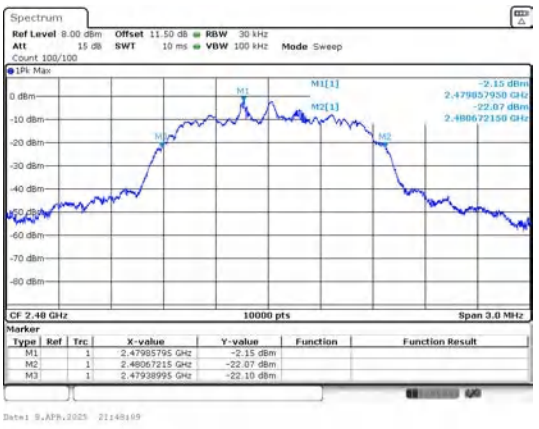
GFSK_DH5_Channel 78



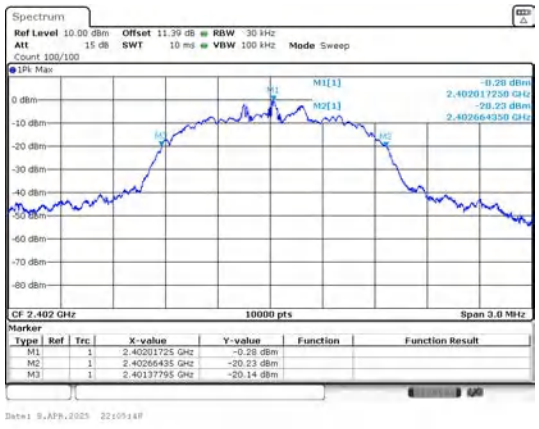
π/4DQPSK_2-DH5_Channel 0



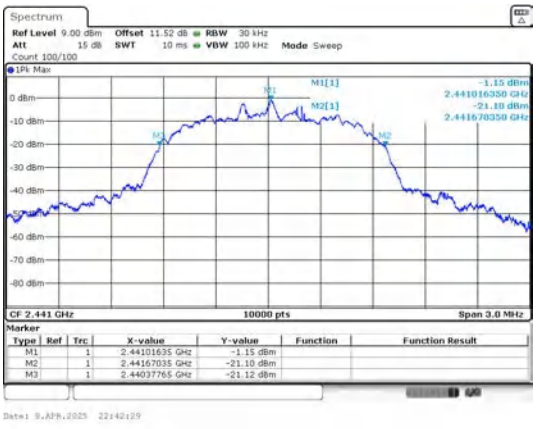
π/4DQPSK_2-DH5_Channel 39



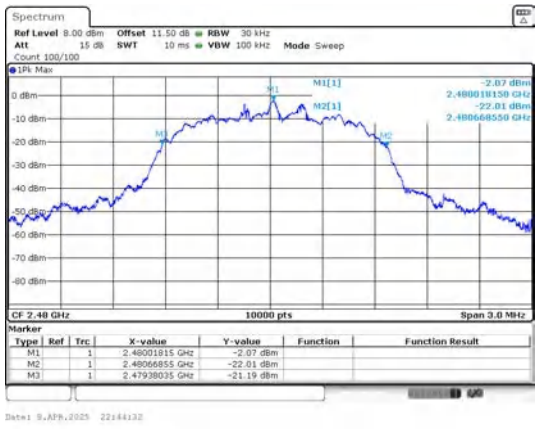
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39

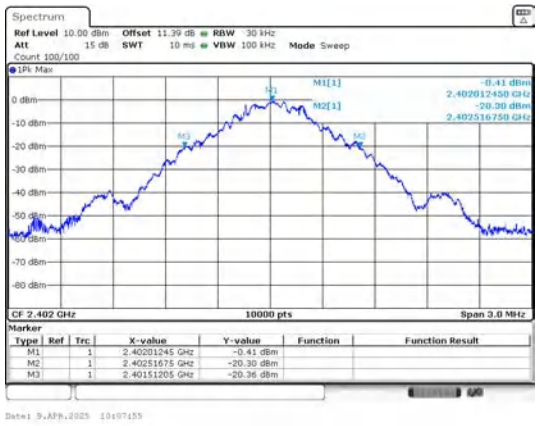


8DPSK_3-DH5_Channel 78

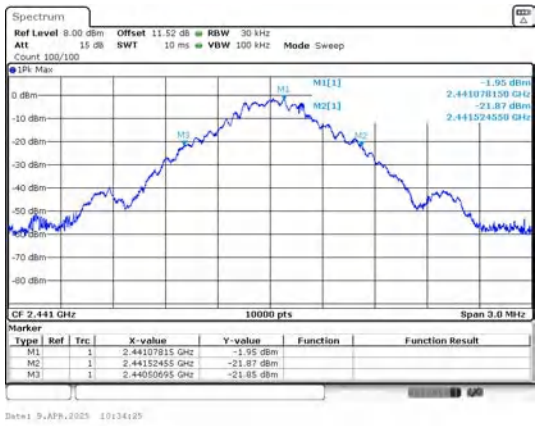
Right：

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.01
	39	2441 MHz	1.01
	78	2480 MHz	1.01
π/4DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.300
	78	2480 MHz	1.300
8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.290
	78	2480 MHz	1.290

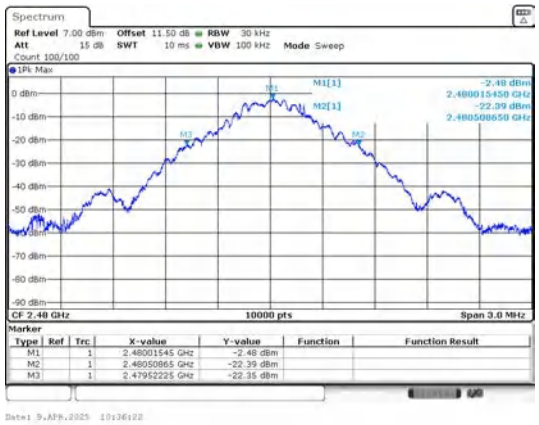
Test Graphs



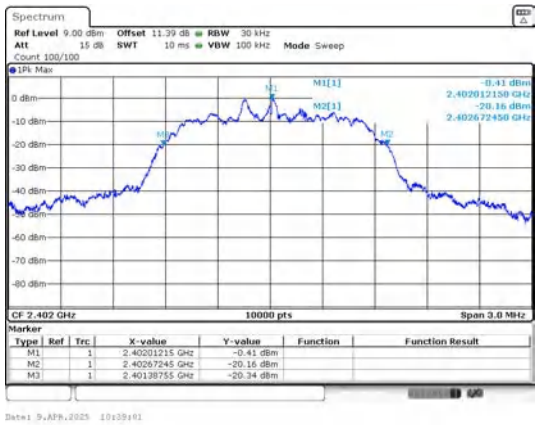
GFSK_DH5_Channel 0



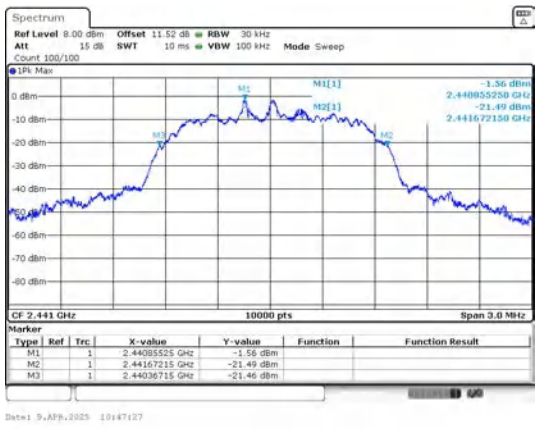
GFSK_DH5_Channel 39



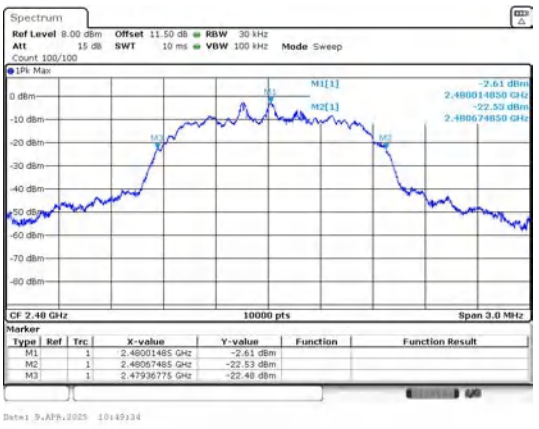
GFSK_DH5_Channel 78



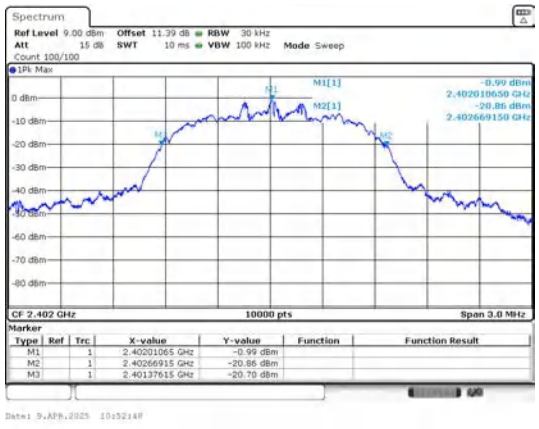
π/4DQPSK_2-DH5_Channel 0



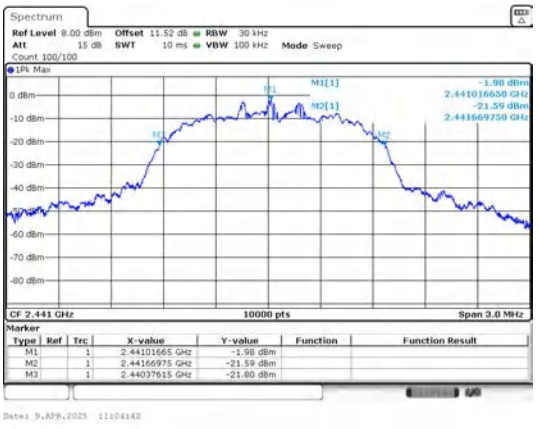
π/4DQPSK_2-DH5_Channel 39



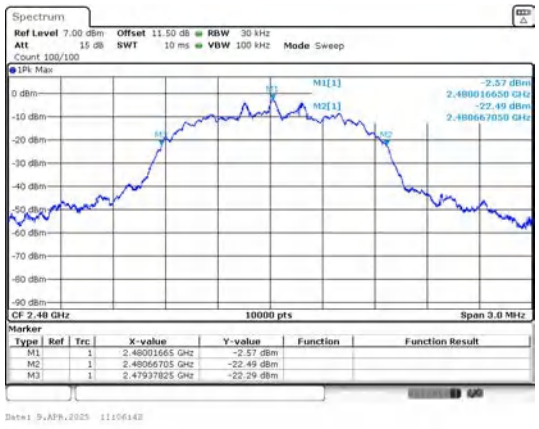
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

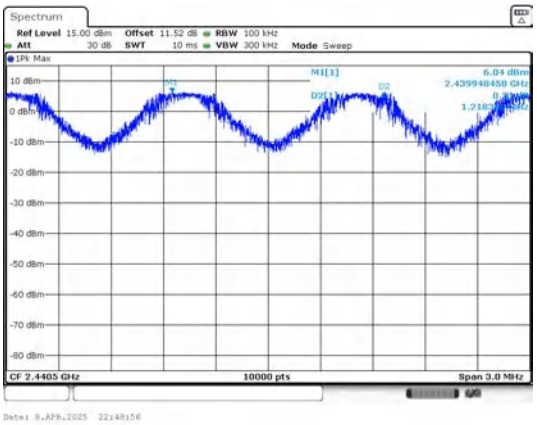
6) Carrier Frequencies Separation

Test Result

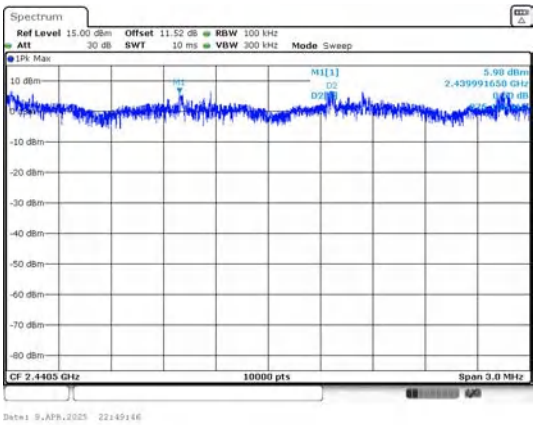
Left：

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.9484	2441.1667	1.2183	1.02	PASS
π/4DQPSK	2-DH5	2439.9916	2440.8668	0.8751	0.86	PASS
8DPSK	3-DH5	2440.0466	2441.0338	0.9873	0.853	PASS

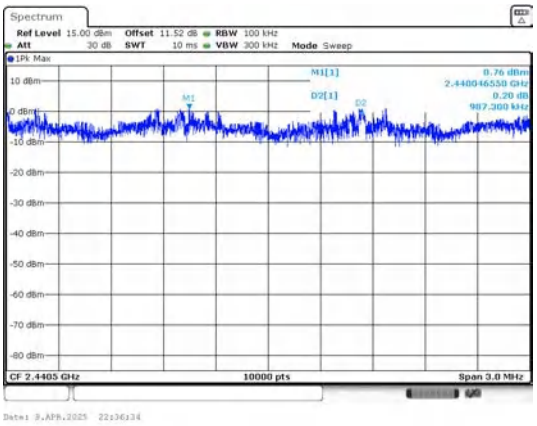
Test Graphs



GFSK



π/4DQPSK

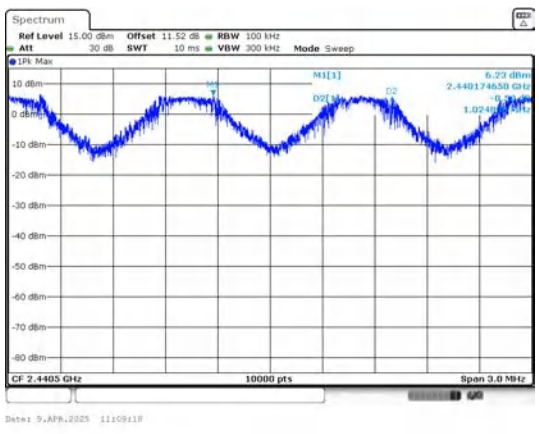


8DPSK

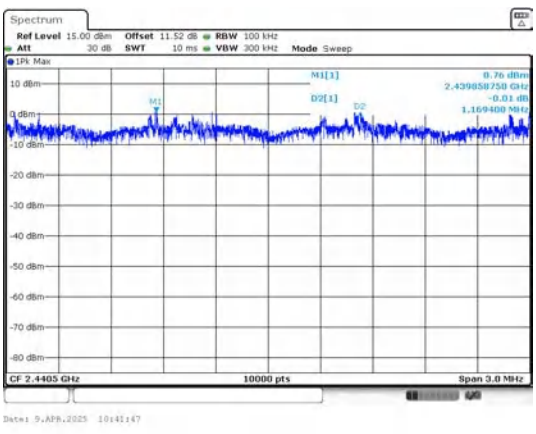
Right：

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.1746	2441.1995	1.0248	1.01	PASS
π/4DQPSK	2-DH5	2439.8587	2441.0282	1.1694	0.853	PASS
8DPSK	3-DH5	2440.0403	2441.1761	1.1358	0.86	PASS

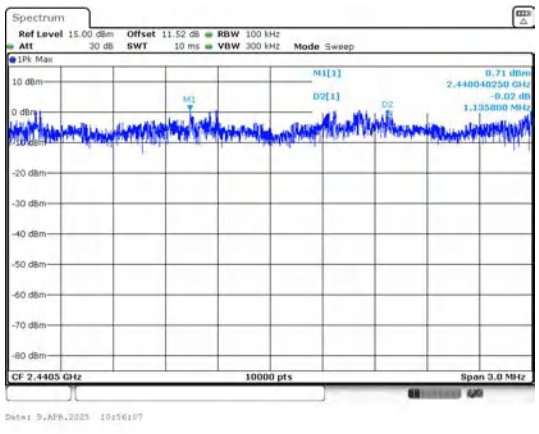
Test Graphs



GFSK



π/4DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left:

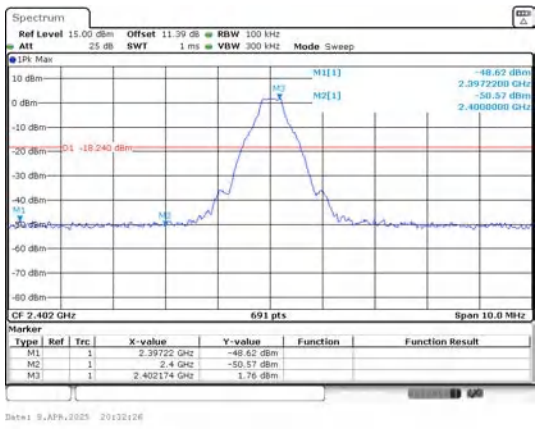
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2397.22	-48.620	-18.24	-30.380	PASS
			2400.00	-50.570	-18.24	-32.330	PASS
			4803.80	-44.681	-18.24	-26.441	PASS
		39	9763.72	-42.545	-19.06	-23.485	PASS
		78	2483.50	-51.220	-19.79	-31.430	PASS
			9920.20	-39.687	-19.79	-19.897	PASS
π/4DQPSK	2-DH5	0	2397.09	-49.062	-18.13	-30.932	PASS
			2400.00	-50.160	-18.13	-32.030	PASS
			9608.10	-44.564	-18.13	-26.434	PASS
		39	9763.72	-41.928	-19.07	-22.858	PASS
		78	2483.50	-50.400	-19.77	-30.630	PASS
			9920.20	-39.367	-19.77	-19.597	PASS
8DPSK	3-DH5	0	2400.00	-46.870	-18.36	-28.510	PASS
			9608.08	-44.366	-18.36	-26.006	PASS
		39	9763.72	-41.285	-19.02	-22.265	PASS
		78	2483.50	-50.520	-19.7	-30.820	PASS
			9920.20	-39.384	-19.7	-19.684	PASS

Hopping

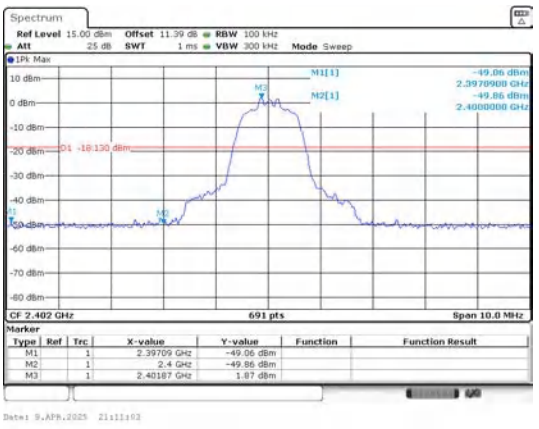
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.56	-47.316	-18.18	-29.136	PASS
			2400.00	-47.600	-18.18	-29.420	PASS
			2483.50	-48.860	-20.03	-28.830	PASS
π/4DQPSK	2-DH5		2395.75	-48.398	-18.64	-29.758	PASS
			2400.00	-50.320	-18.64	-31.680	PASS
			2483.50	-50.090	-20.01	-30.080	PASS
8DPSK	3-DH5		2397.89	-47.725	-19.76	-27.965	PASS
			2400.00	-50.560	-19.76	-30.800	PASS
			2483.50	-49.850	-21.08	-28.770	PASS

Test Graphs



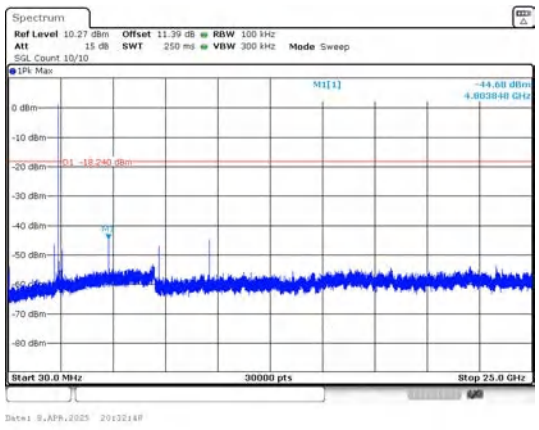
Out Of Band Emission

GFSK_DH5_Channel 0



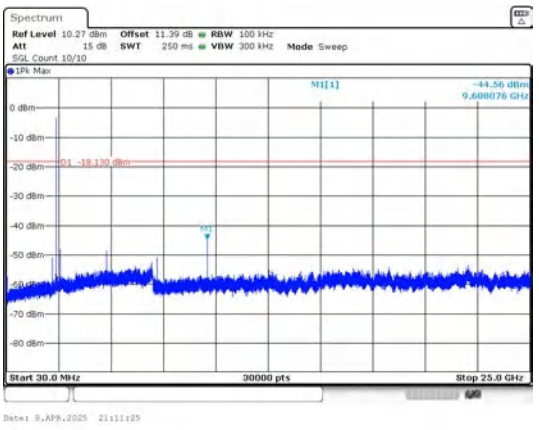
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 0



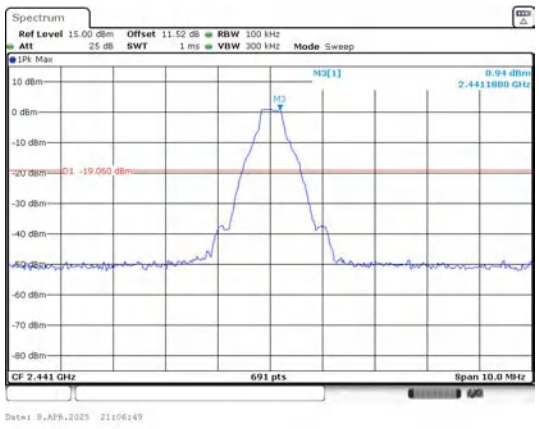
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



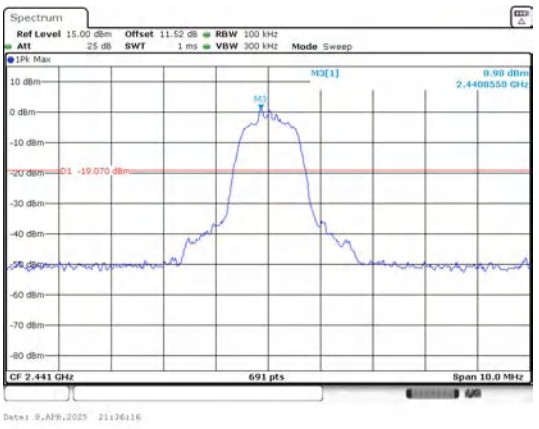
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



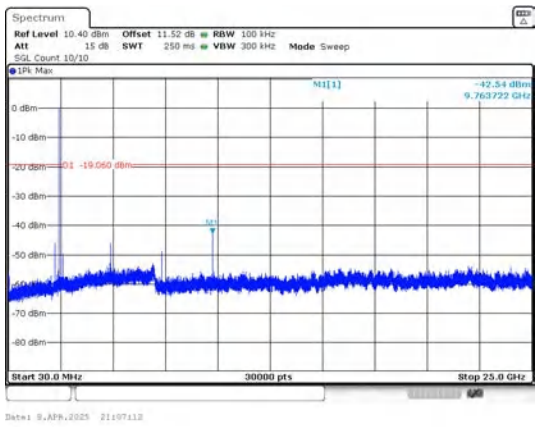
Out Of Band Emission

GFSK_DH5_Channel 39



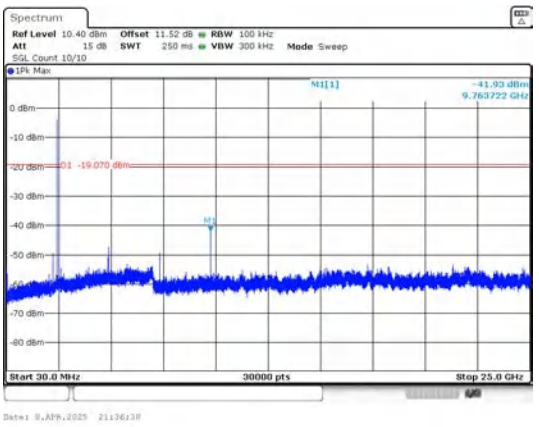
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



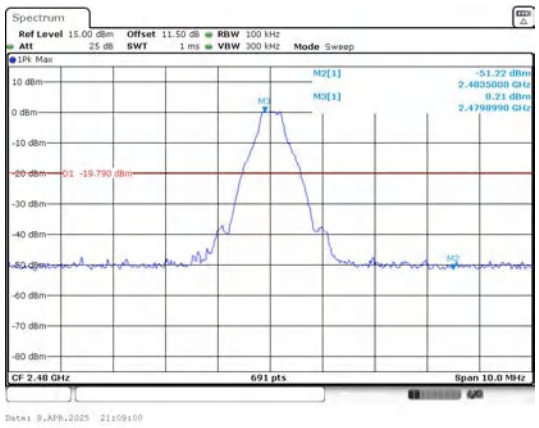
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



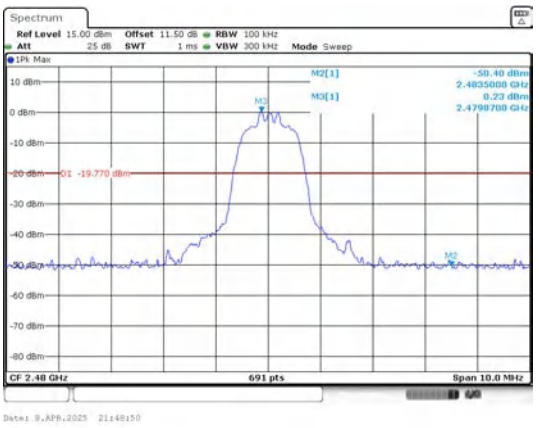
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



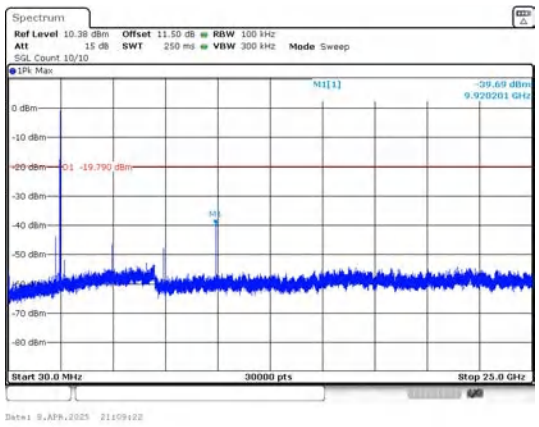
Out Of Band Emission

GFSK_DH5_Channel 78



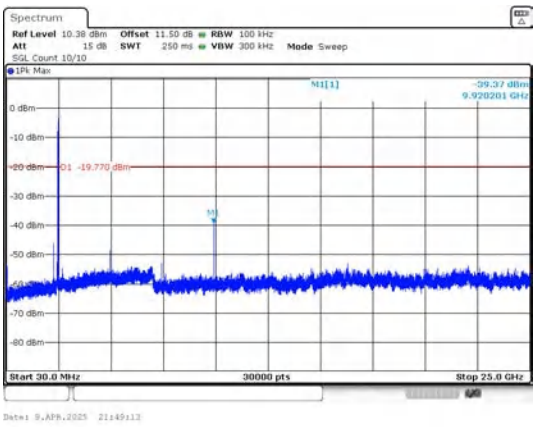
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



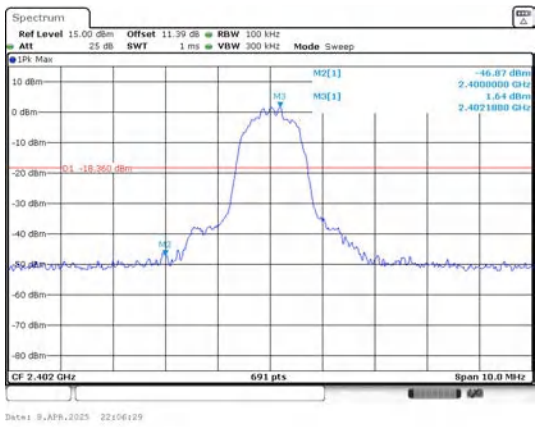
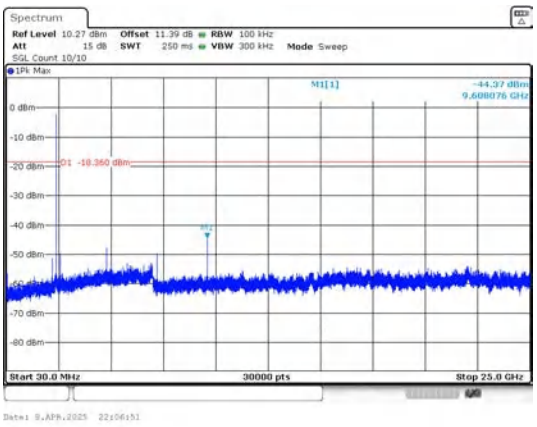
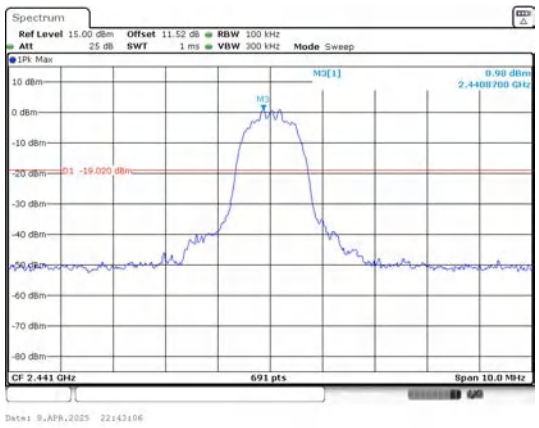
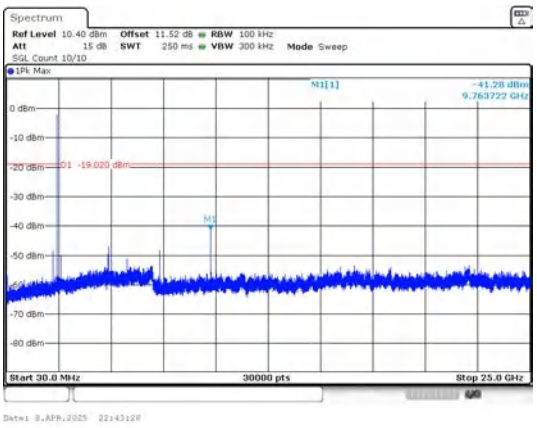
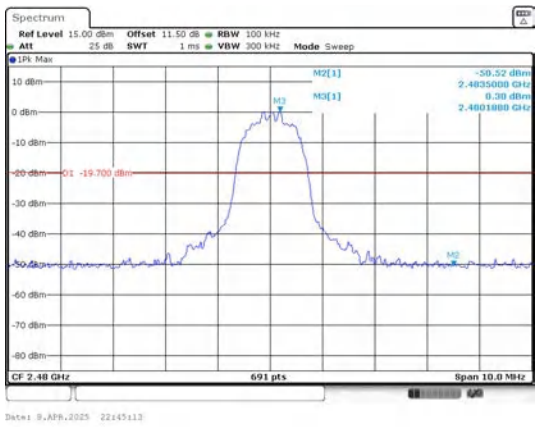
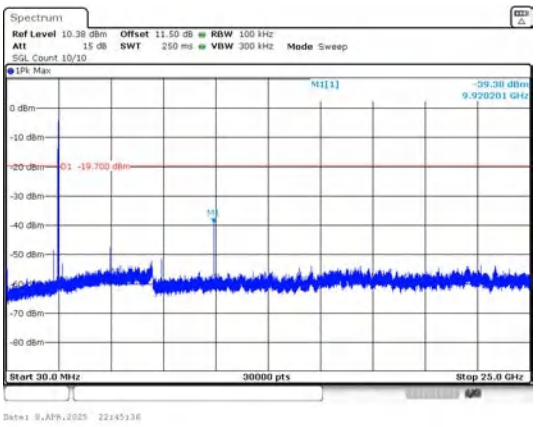
30.0 MHz - 25000.0 MHz

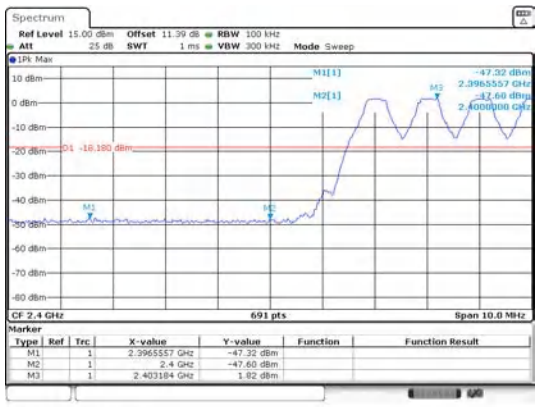
GFSK_DH5_Channel 78



30.0 MHz - 25000.0 MHz

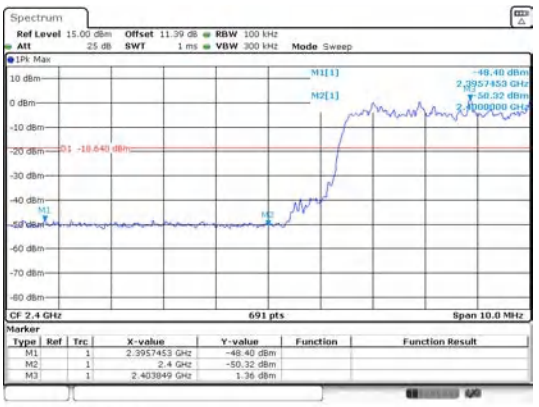
π/4DQPSK_2-DH5_Channel 78

	
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**



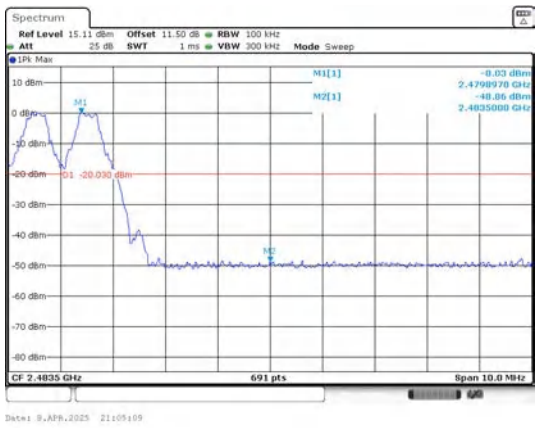
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



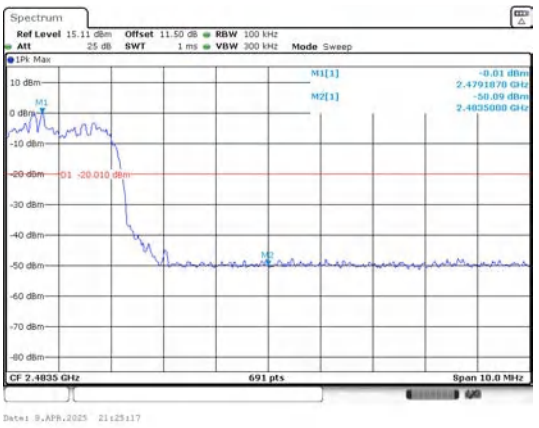
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



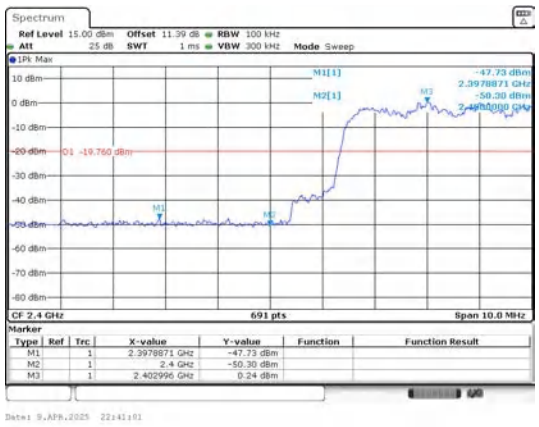
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



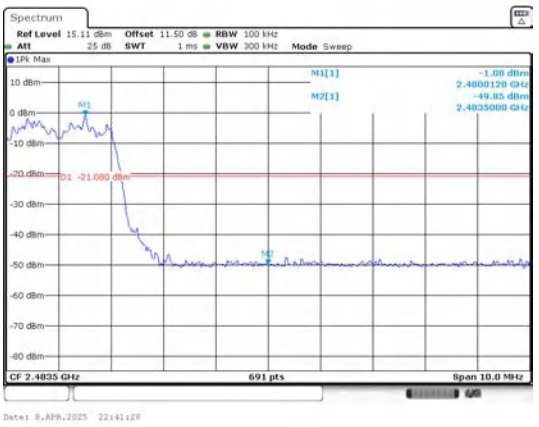
Out Of Band Emission(Right)

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：

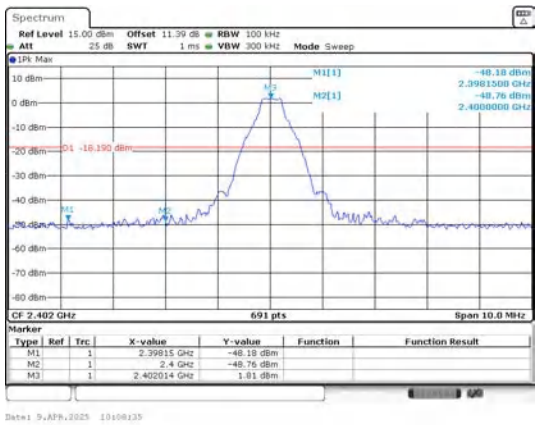
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2398.15	-48.178	-18.19	-29.988	PASS
			2400.00	-48.760	-18.19	-30.570	PASS
			9608.10	-45.042	-18.19	-26.852	PASS
		39	9763.72	-42.223	-19.22	-23.003	PASS
		78	2483.50	-50.270	-20.13	-30.140	PASS
			9920.20	-39.835	-20.13	-19.705	PASS
π/4DQPSK	2-DH5	0	2400.00	-48.600	-18.32	-30.280	PASS
			9608.08	-43.659	-18.32	-25.339	PASS
		39	9763.72	-41.995	-19.25	-22.745	PASS
		78	2483.50	-51.070	-20.13	-30.940	PASS
			9920.20	-39.156	-20.13	-19.026	PASS
8DPSK	3-DH5	0	2399.00	-47.928	-18.33	-29.598	PASS
			2400.00	-49.620	-18.33	-31.290	PASS
			9608.10	-43.519	-18.33	-25.189	PASS
		39	9763.72	-42.353	-19.31	-23.043	PASS
		78	2483.50	-50.800	-20.19	-30.610	PASS
			9920.20	-39.552	-20.19	-19.362	PASS

Hopping

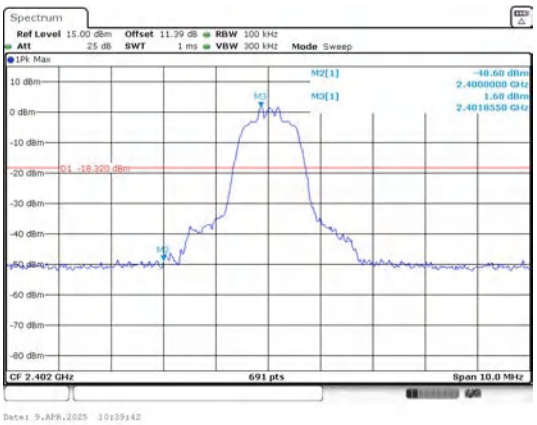
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.99	-47.405	-18.34	-29.065	PASS
			2400.00	-47.920	-18.34	-29.580	PASS
			2483.50	-49.240	-20.07	-29.170	PASS
π/4DQPSK	2-DH5		2397.32	-49.018	-18.71	-30.308	PASS
			2400.00	-49.230	-18.71	-30.520	PASS
			2483.50	-48.670	-20.87	-27.800	PASS
8DPSK	3-DH5		2395.72	-47.709	-18.36	-29.349	PASS
			2400.00	-48.480	-18.36	-30.120	PASS
			2483.50	-50.160	-20.62	-29.540	PASS

Test Graphs



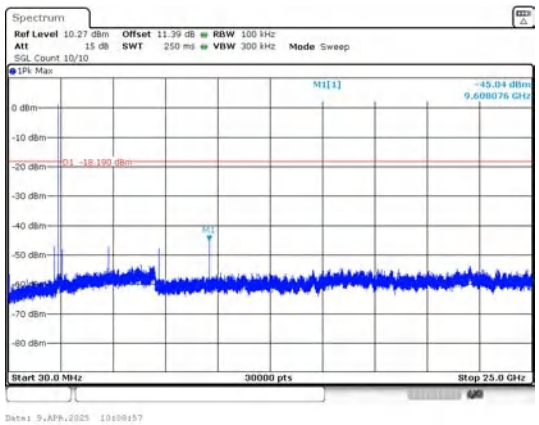
Out Of Band Emission

GFSK_DH5_Channel 0



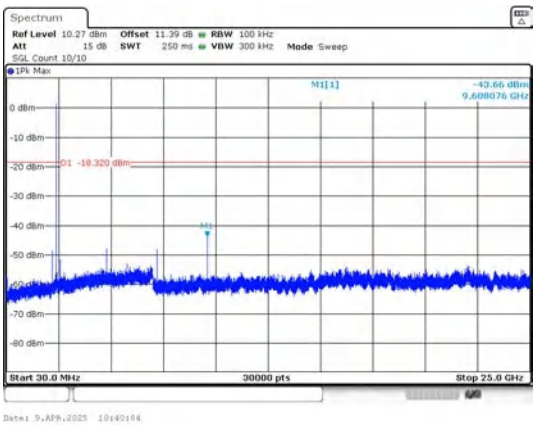
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 0



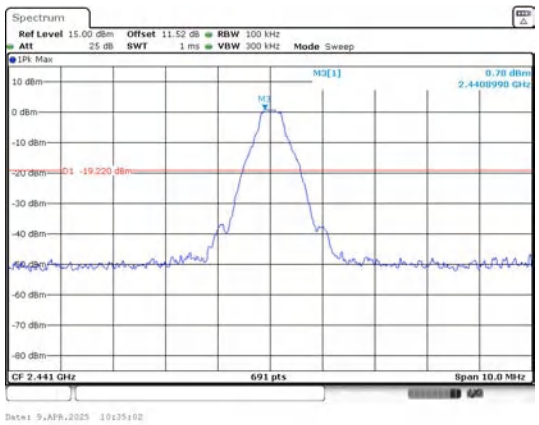
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



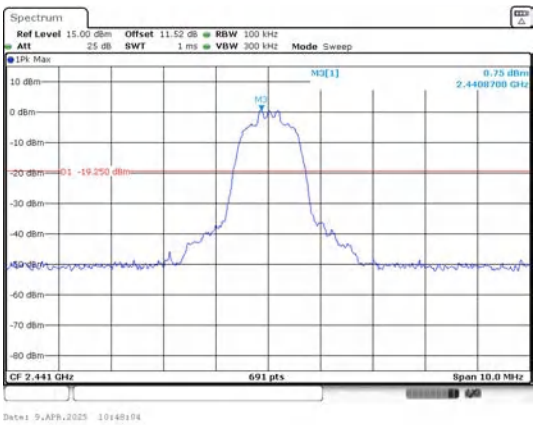
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



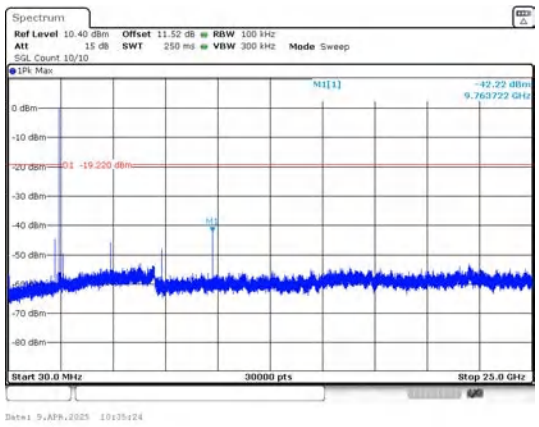
Out Of Band Emission

GFSK_DH5_Channel 39



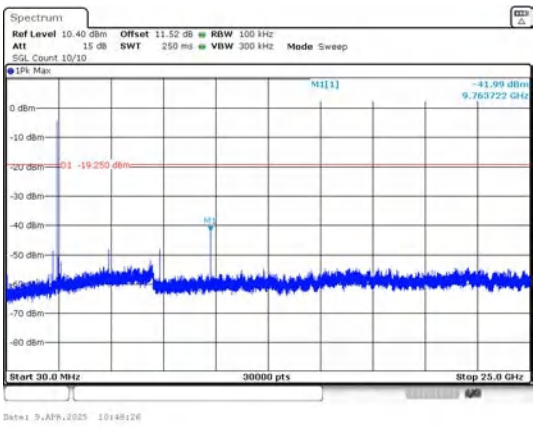
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



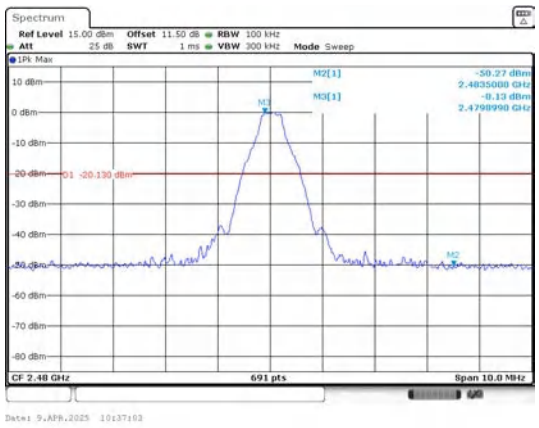
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



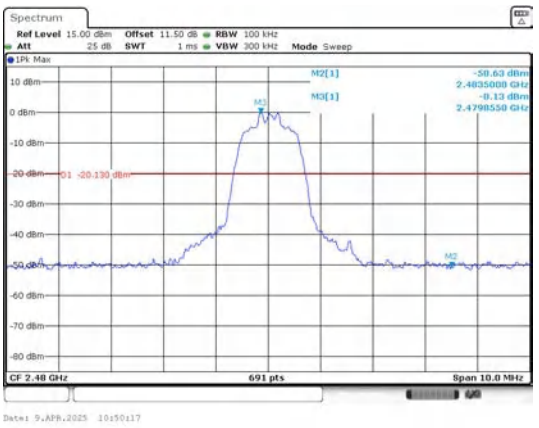
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



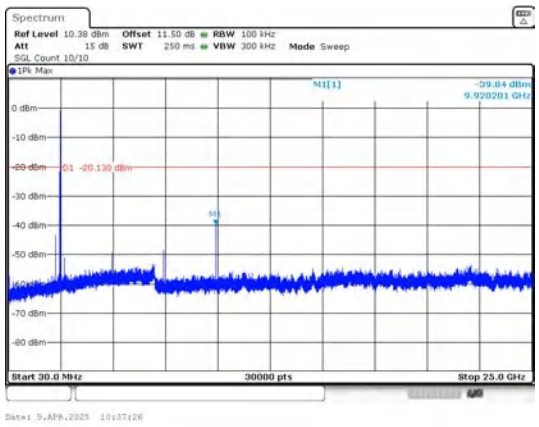
Out Of Band Emission

GFSK_DH5_Channel 78



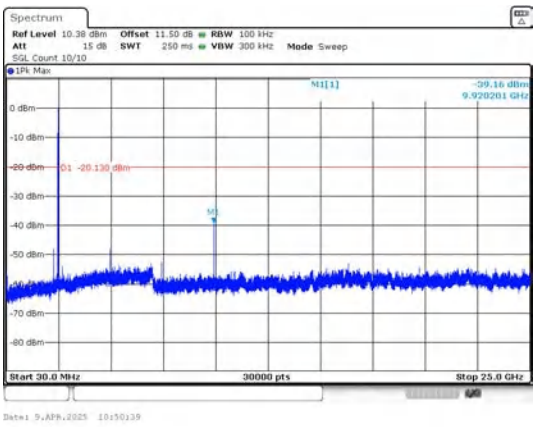
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



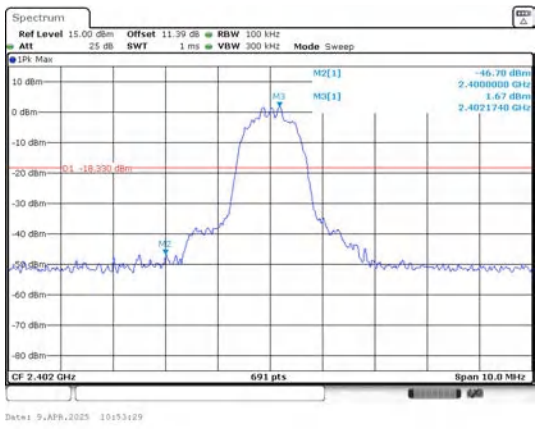
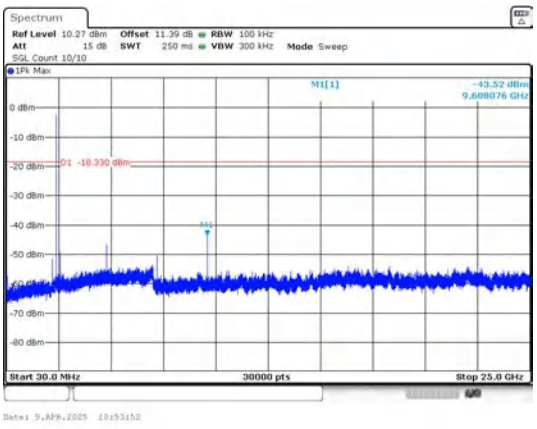
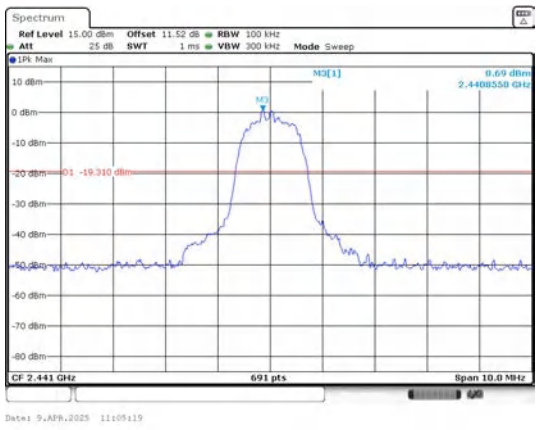
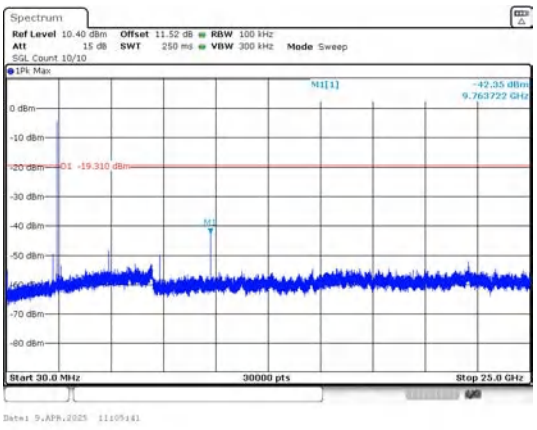
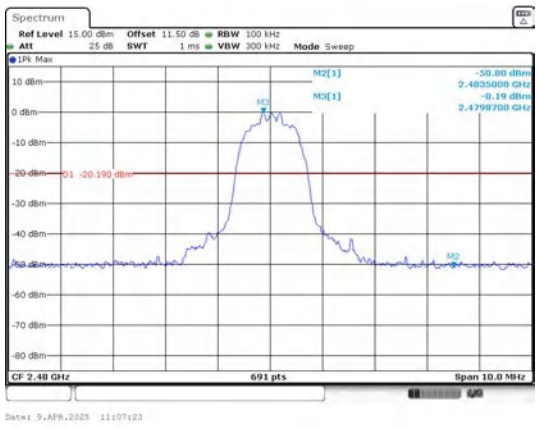
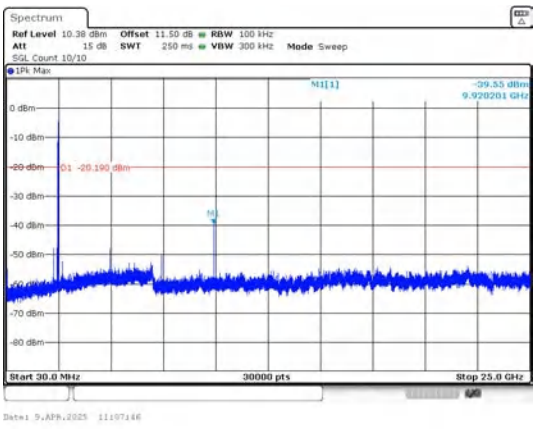
30.0 MHz - 25000.0 MHz

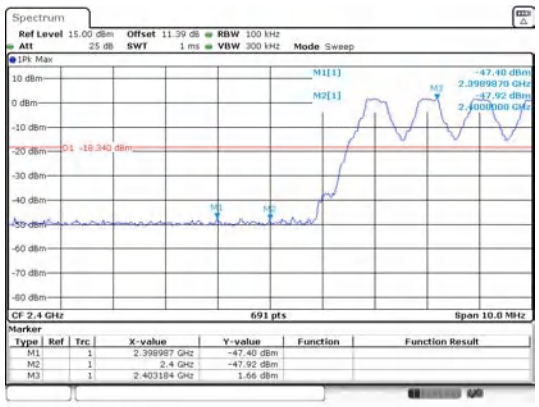
GFSK_DH5_Channel 78



30.0 MHz - 25000.0 MHz

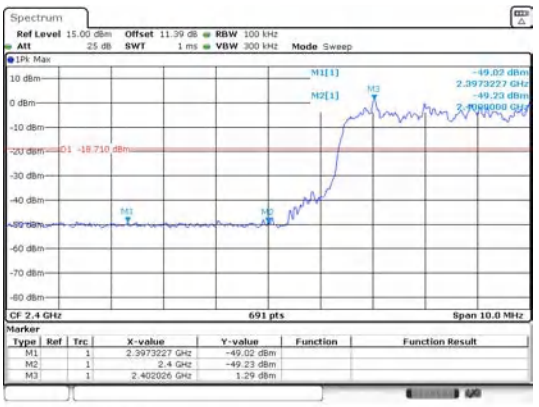
π/4DQPSK_2-DH5_Channel 78

	
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



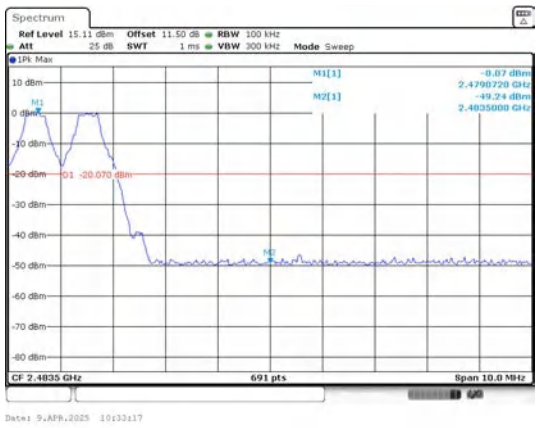
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



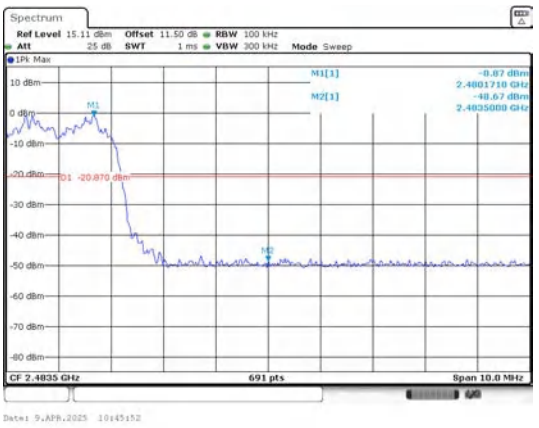
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



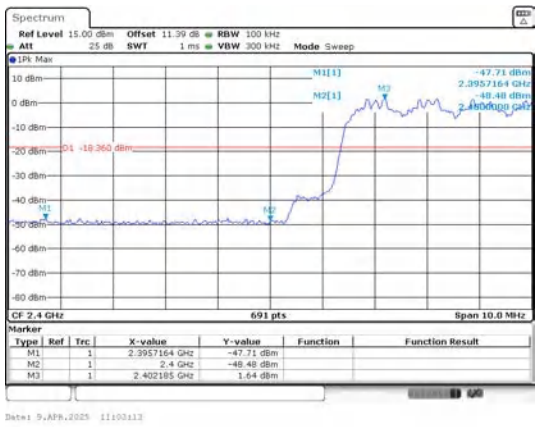
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



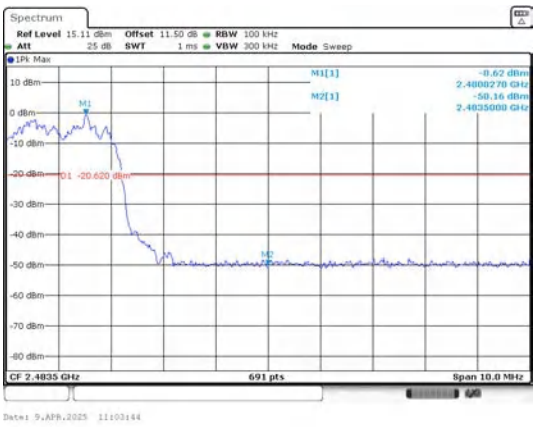
Out Of Band Emission(Right)

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-----