Appendix Report

Report No.:	CISRR241225218
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

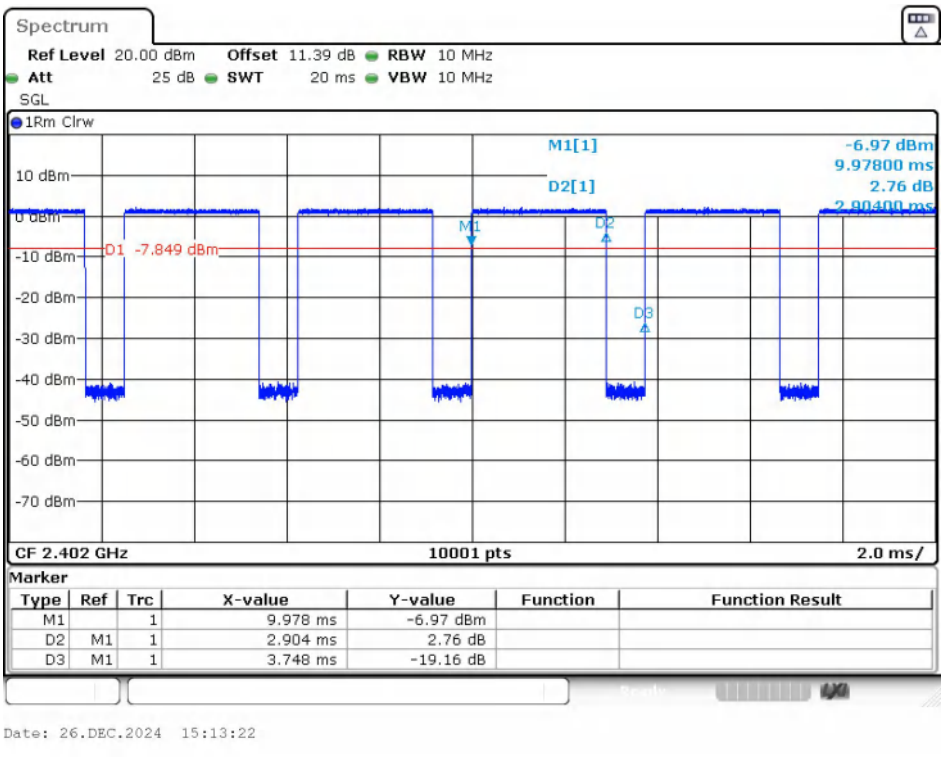
1) Duty Cycle

Test Result

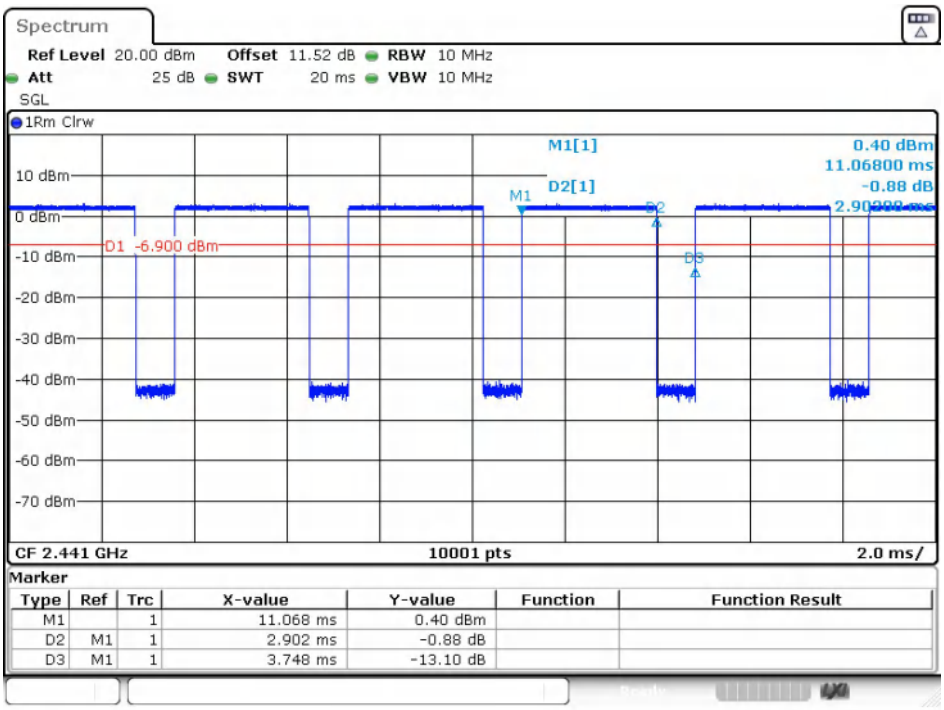
Left：

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.904	3.748	77.48	0.7748	1.1081	0.3444
		39	2.902	3.748	77.43	0.7743	1.1109	0.3446
		78	2.902	3.748	77.43	0.7743	1.1109	0.3446
π/4DQPSK	2-DH5	0	2.910	3.748	77.64	0.7764	1.0991	0.3436
		39	2.908	3.748	77.59	0.7759	1.1019	0.3439
		78	2.908	3.748	77.59	0.7759	1.1019	0.3439
8DPSK	3-DH5	0	2.910	3.748	77.64	0.7764	1.0991	0.3436
		39	2.910	3.748	77.64	0.7764	1.0991	0.3436
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436

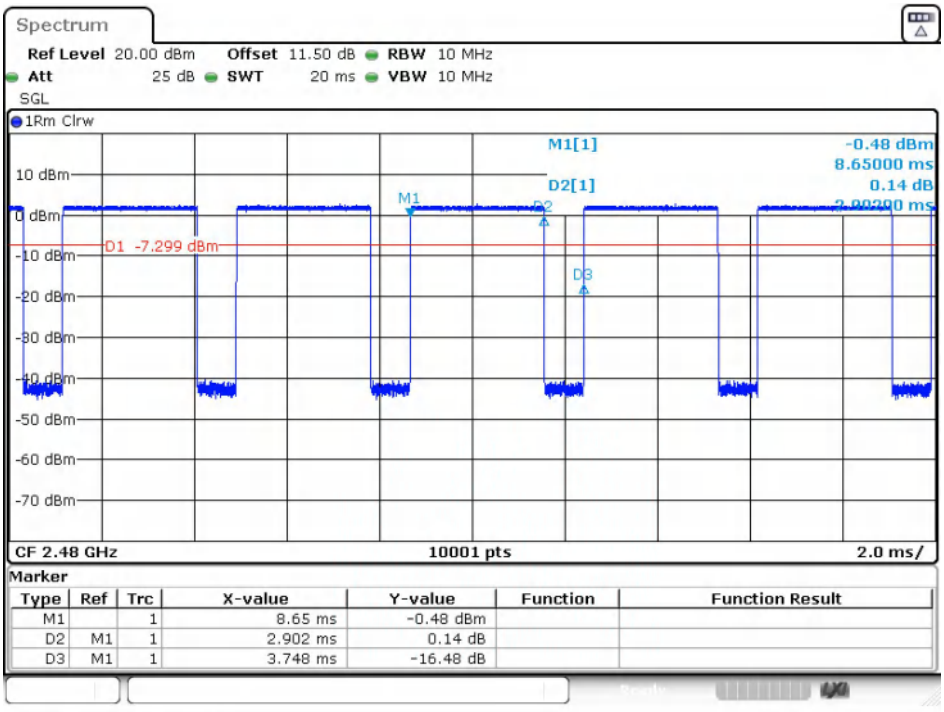
Test Graphs



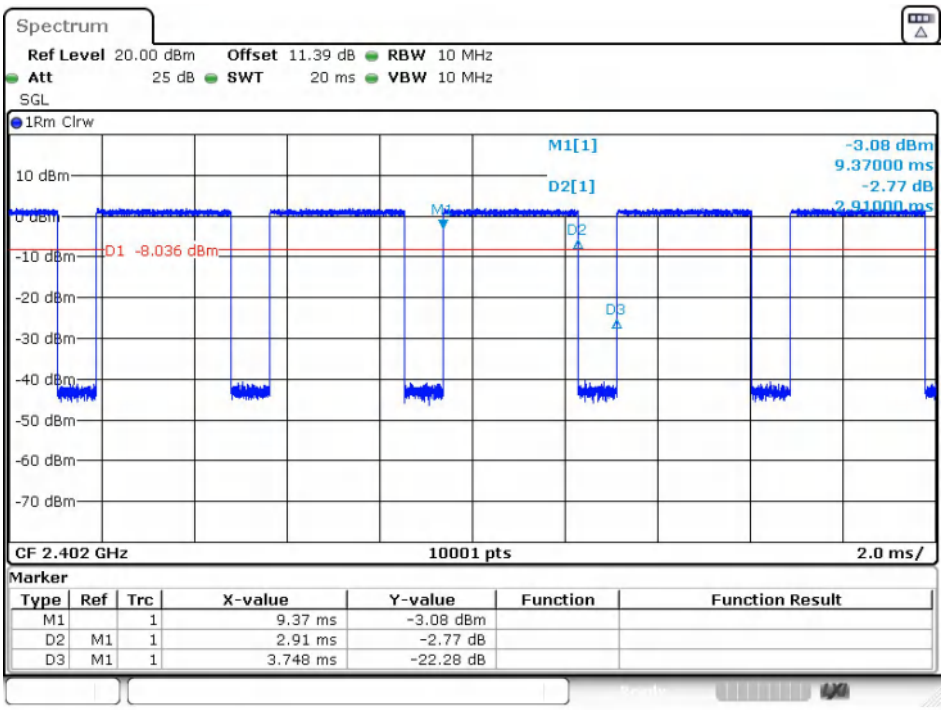
GFSK(DH5)_Channel 0



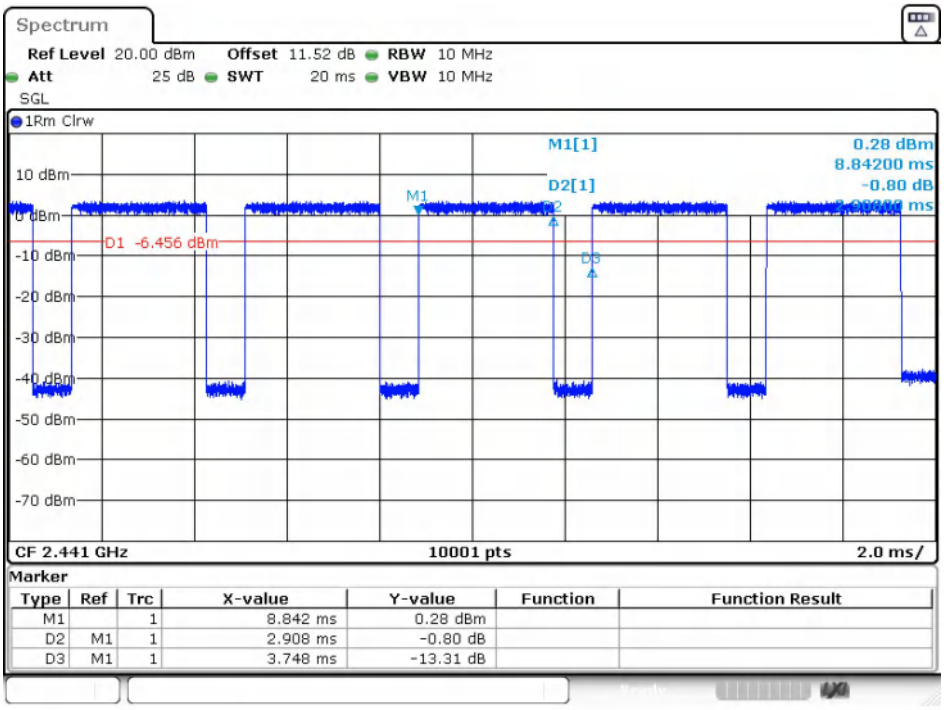
GFSK(DH5)_Channel 39



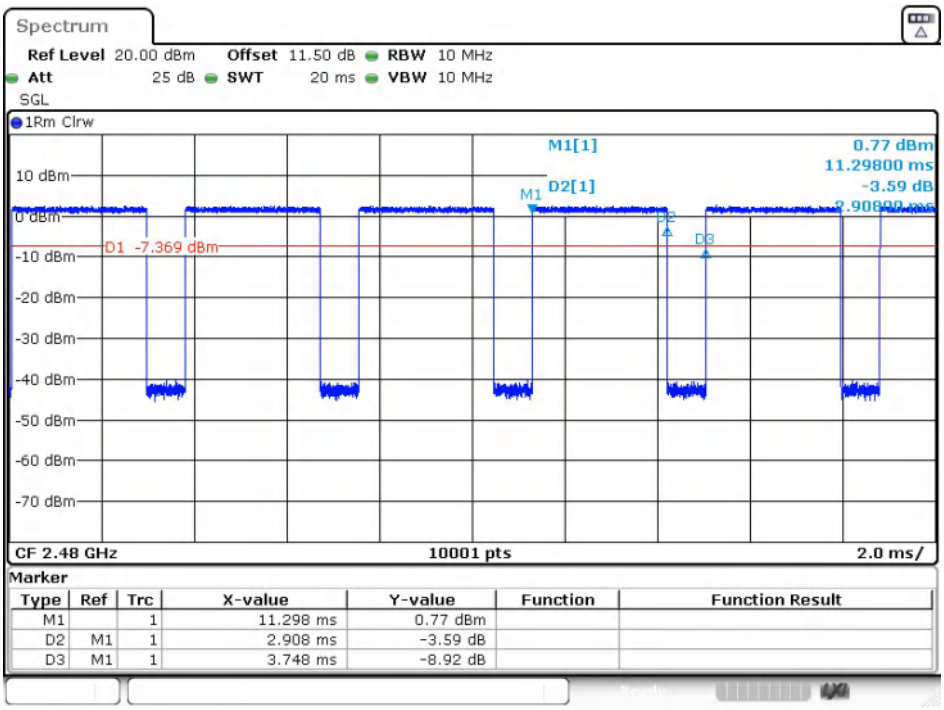
GFSK(DH5)_Channel 78



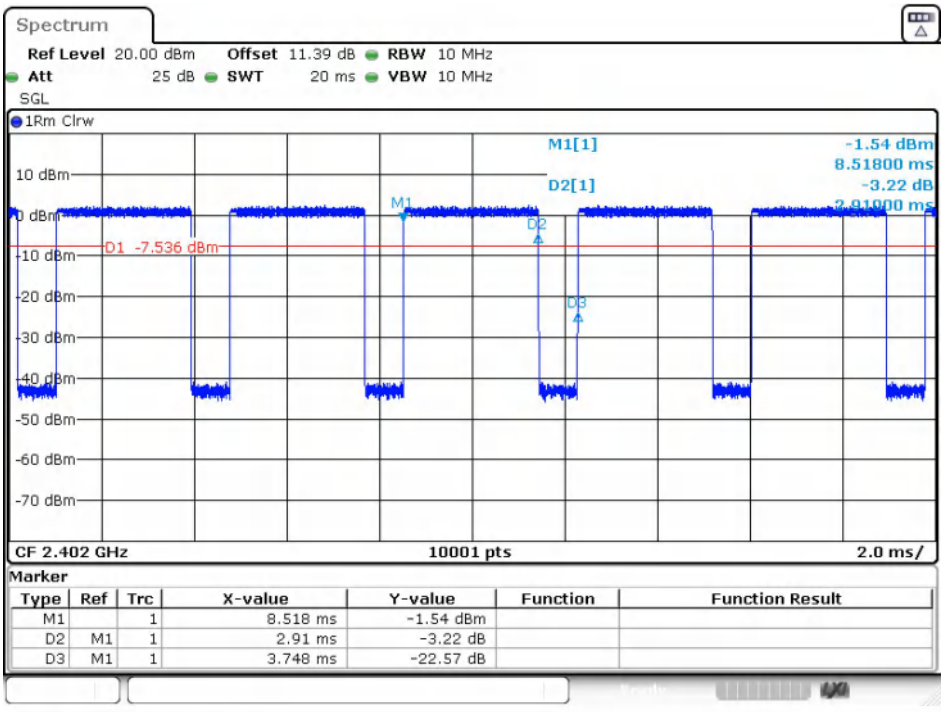
π/4DQPSK(2-DH5)_Channel 0



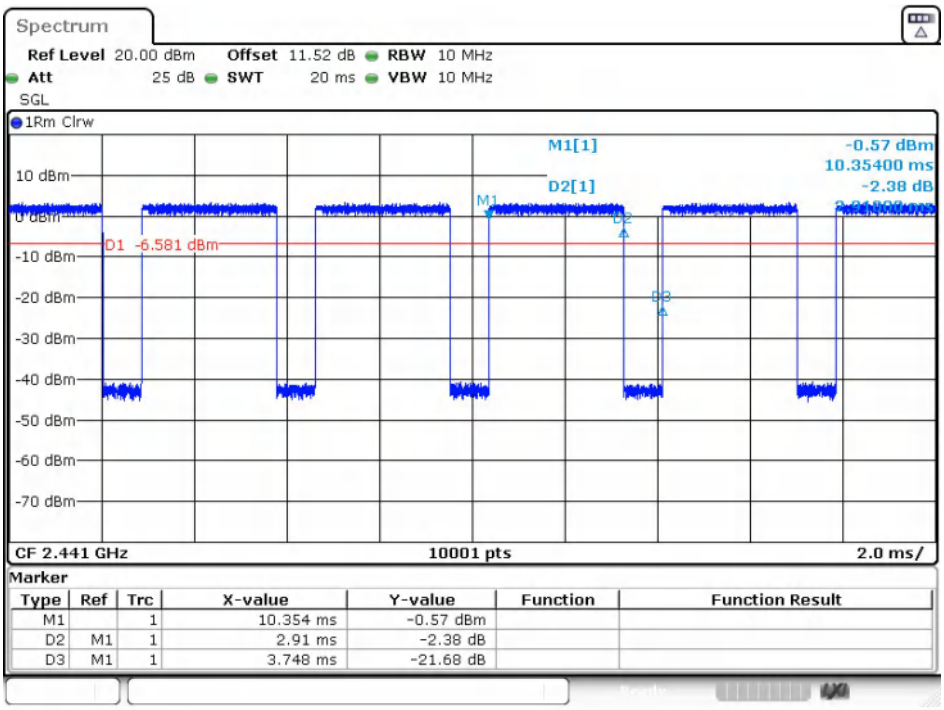
π/4DQPSK(2-DH5)_Channel 39



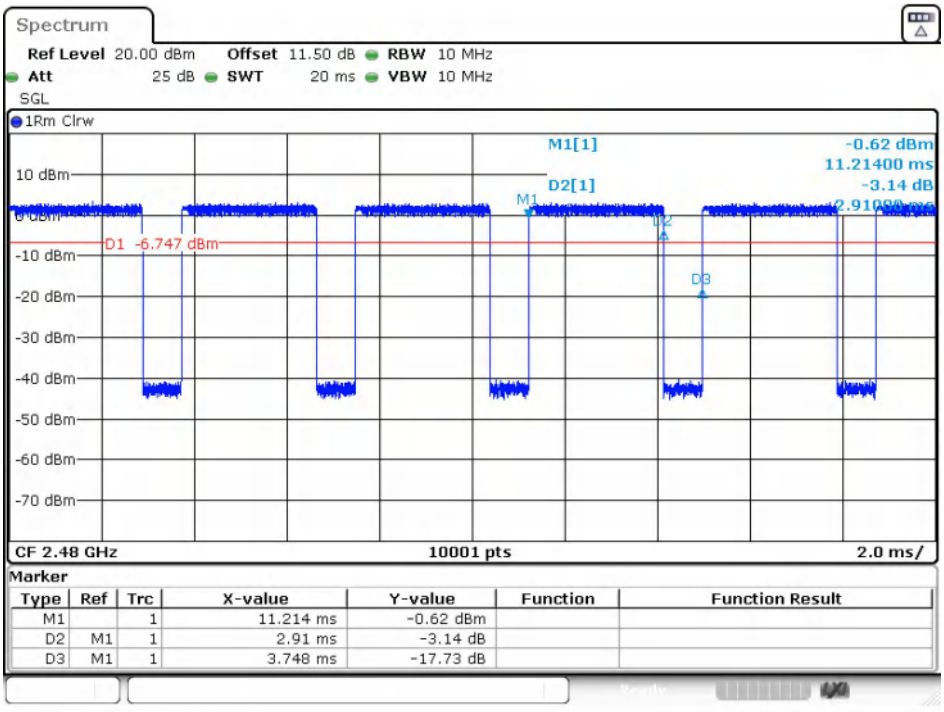
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



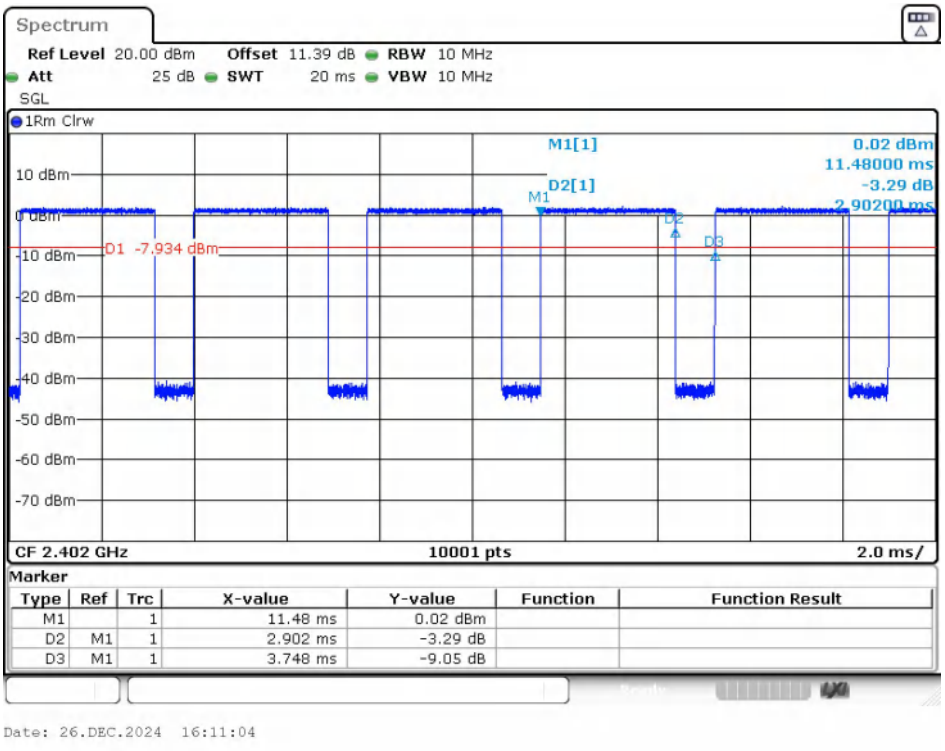
8DPSK(3-DH5)_Channel 78

Right:

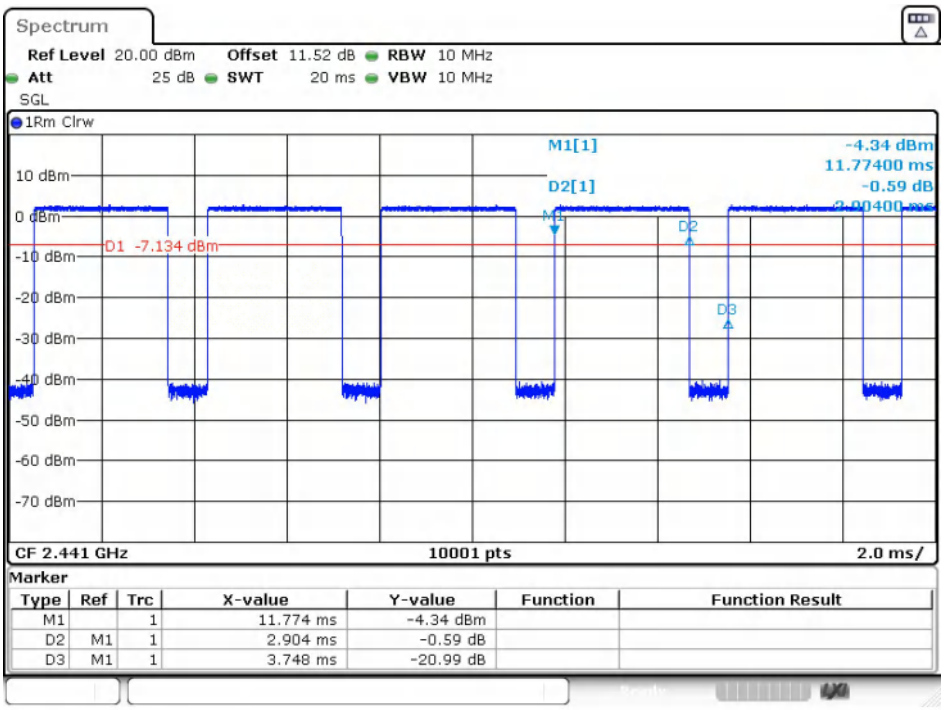
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.902	3.748	77.43	0.7743	1.1109	0.3446
		39	2.904	3.748	77.48	0.7748	1.1081	0.3444

		78	2.902	3.748	77.43	0.7743	1.1109	0.3446
π/4DQPSK	2-DH5	0	2.908	3.748	77.59	0.7759	1.1019	0.3439
		39	2.908	3.748	77.59	0.7759	1.1019	0.3439
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436
8DPSK	3-DH5	0	2.910	3.748	77.64	0.7764	1.0991	0.3436
		39	2.910	3.748	77.64	0.7764	1.0991	0.3436
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436

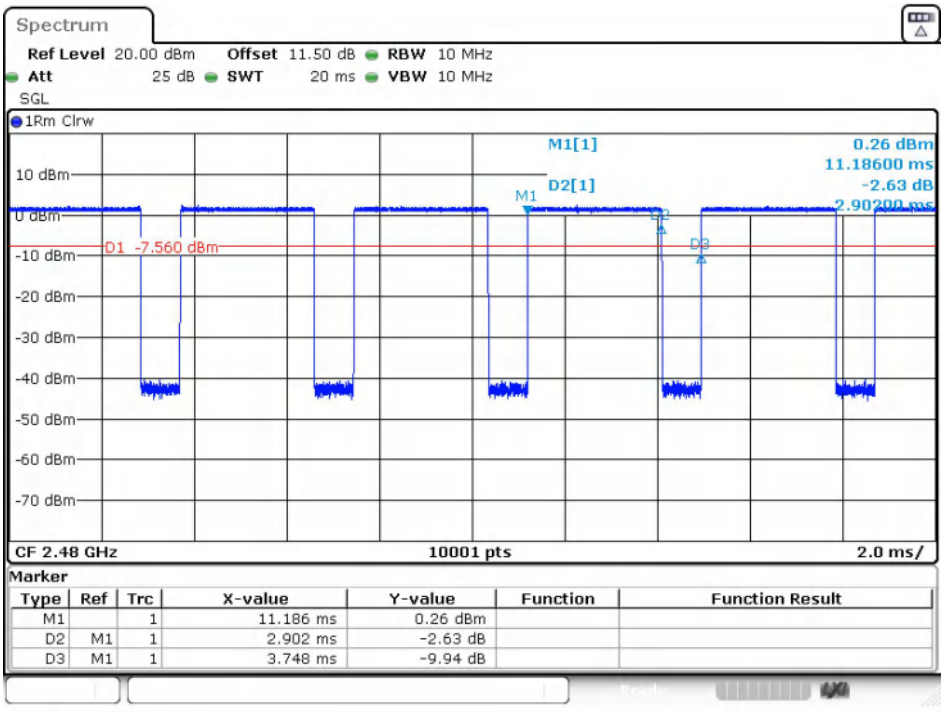
Test Graphs



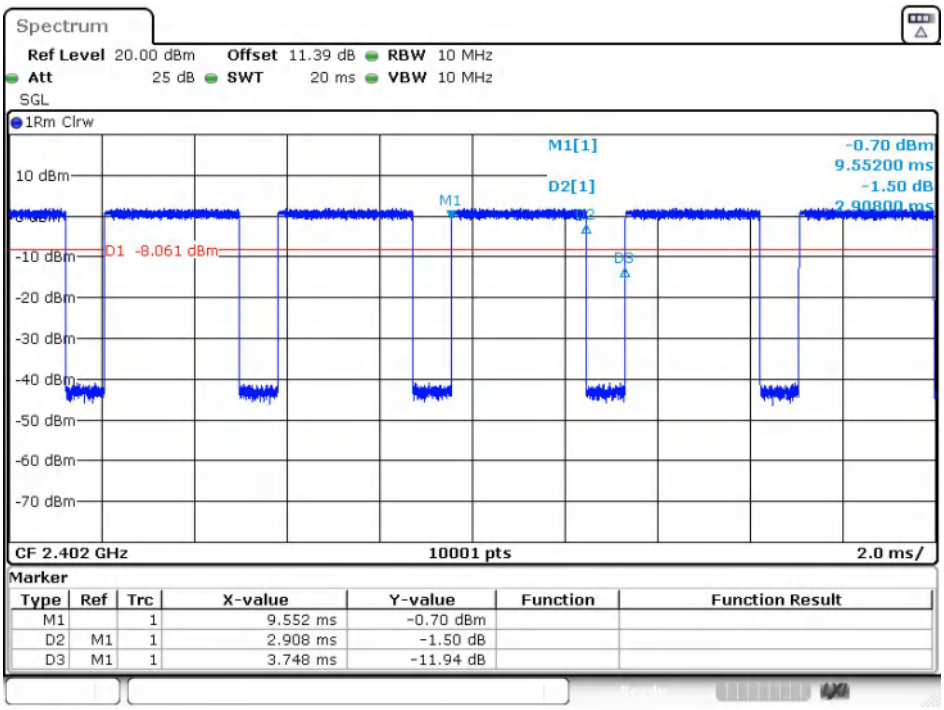
GFSK(DH5)_Channel 0



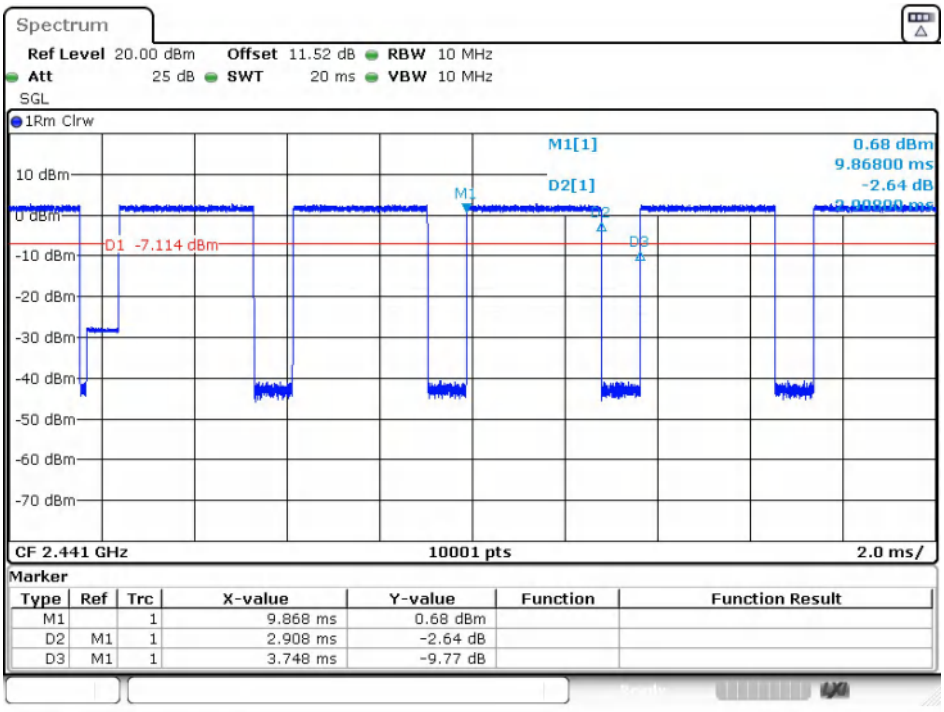
GFSK(DH5)_Channel 39



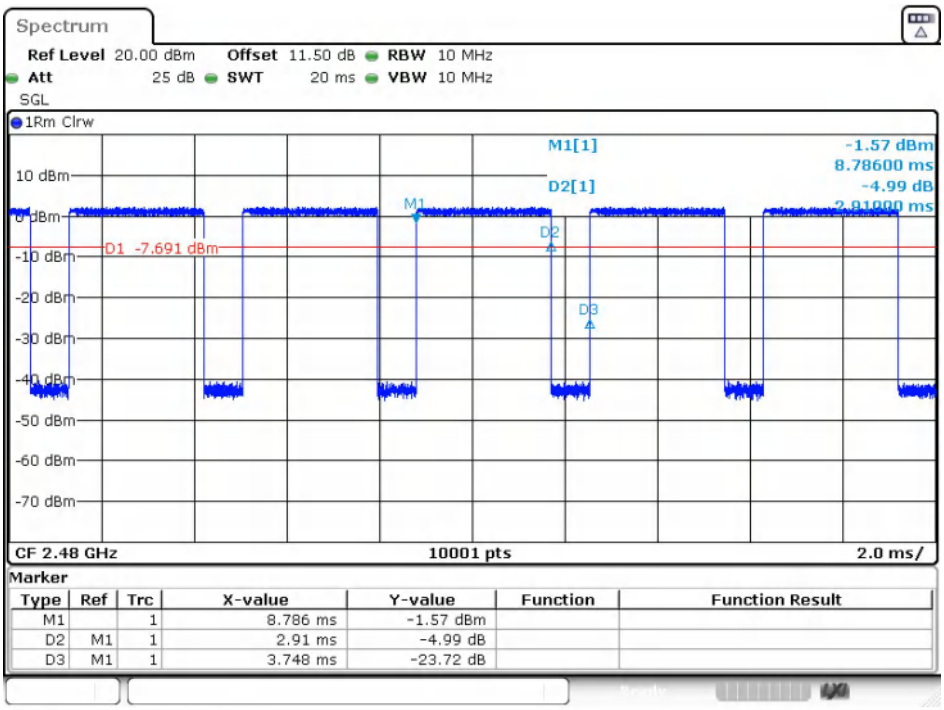
GFSK(DH5)_Channel 78



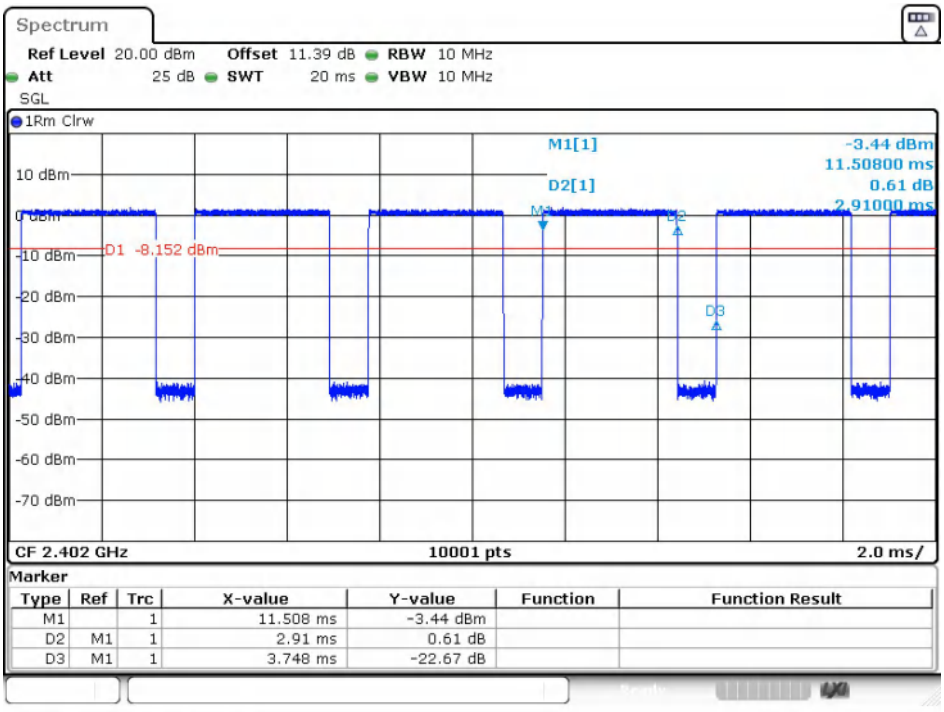
π/4DQPSK(2-DH5)_Channel 0



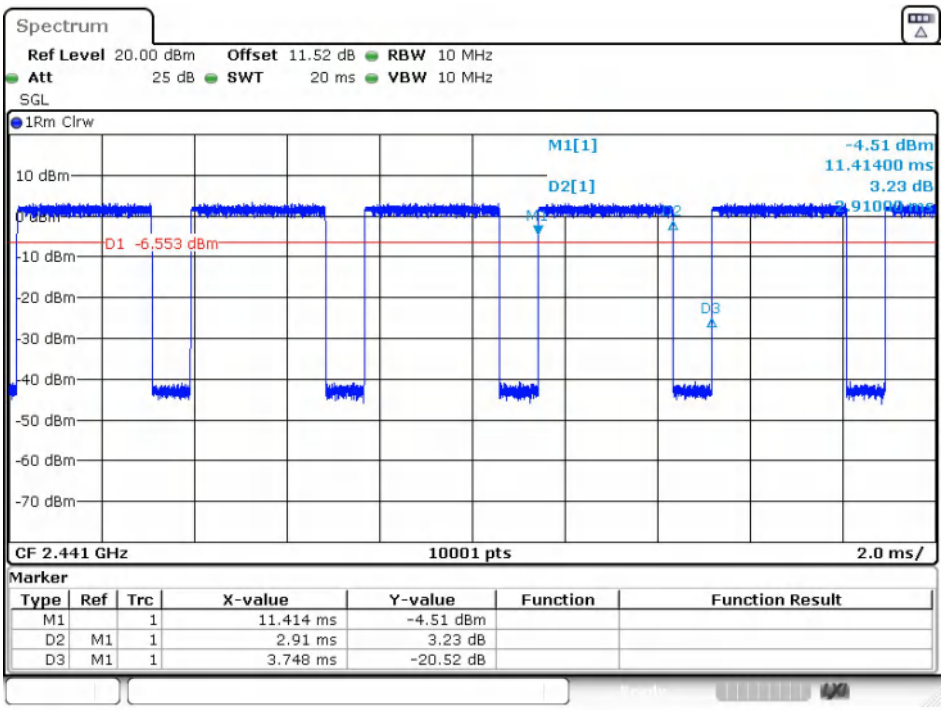
π/4DQPSK(2-DH5)_Channel 39



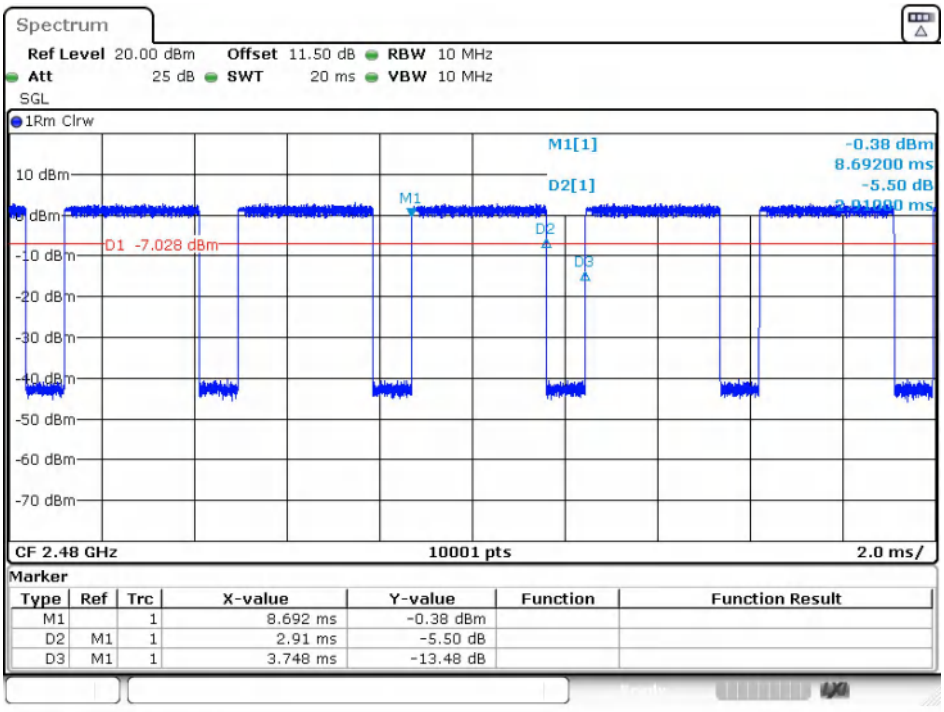
π/4DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

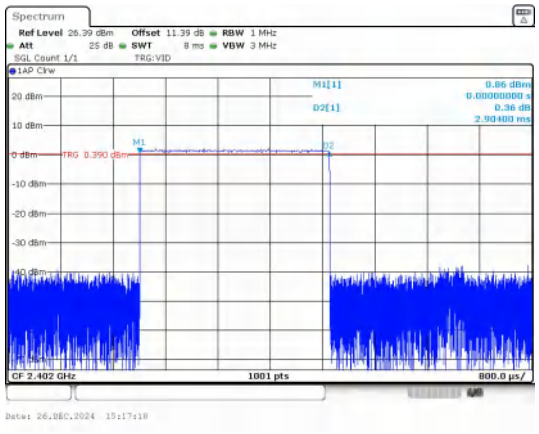
2) Dwell Time

Test Result

Left：

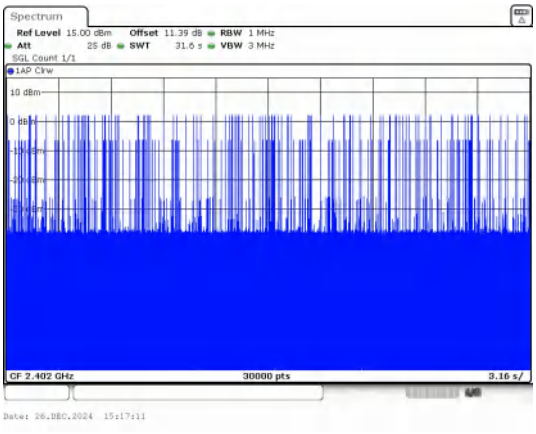
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.904	109	316.54	< 400	PASS
π/4DQPSK	2-DH5		2.912	115	334.88		PASS
8DPSK	3-DH5		2.912	96	279.55		PASS

Test Graphs



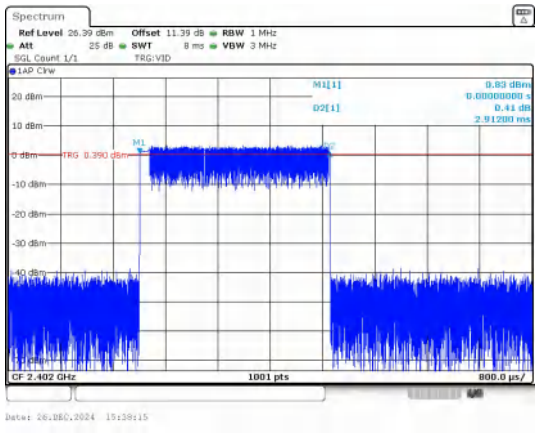
Pulse Width

GFSK_DH5



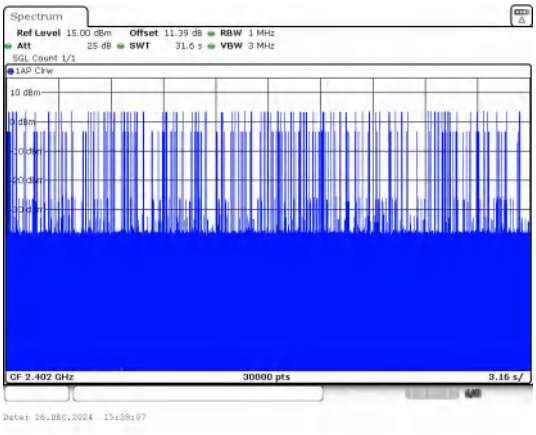
Number of Pulses in 31.6 seconds

GFSK_DH5



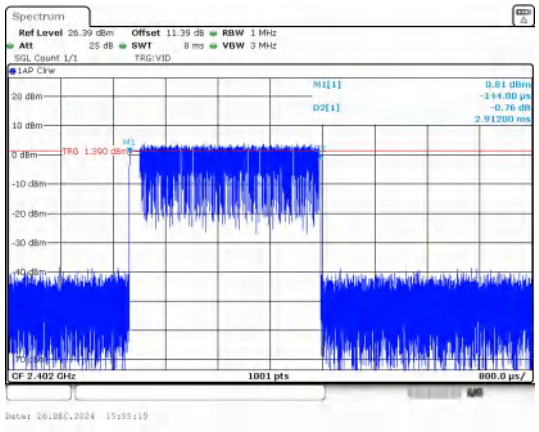
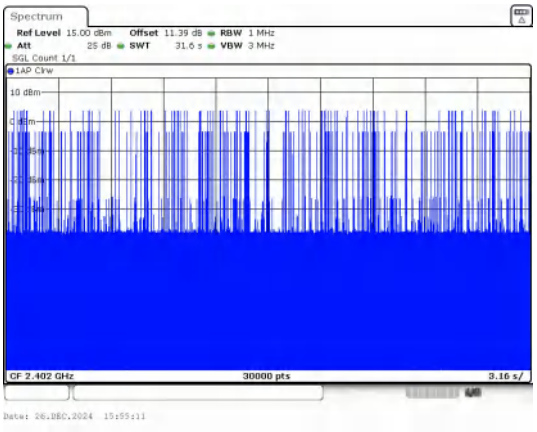
Pulse Width

π/4DQPSK_2-DH5



Number of Pulses in 31.6 seconds

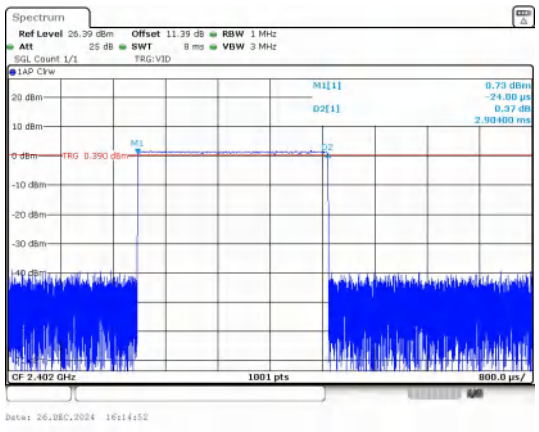
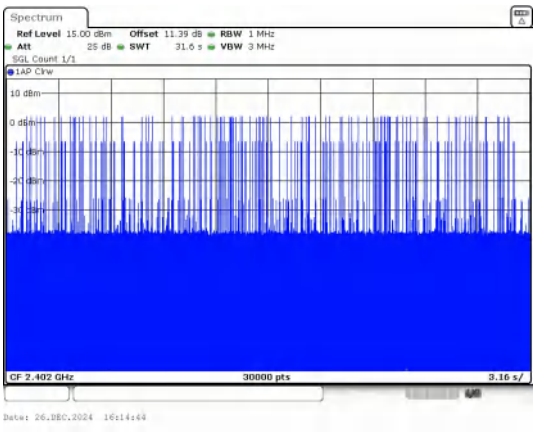
π/4DQPSK_2-DH5

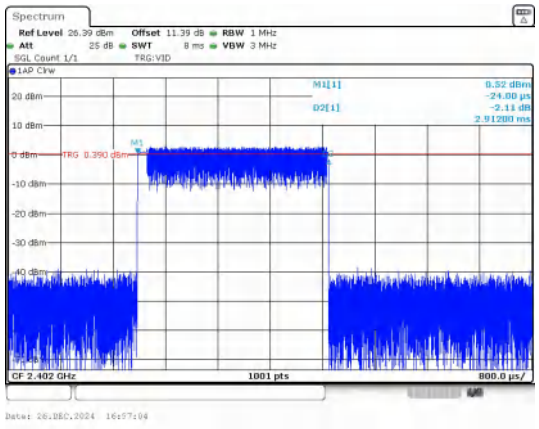
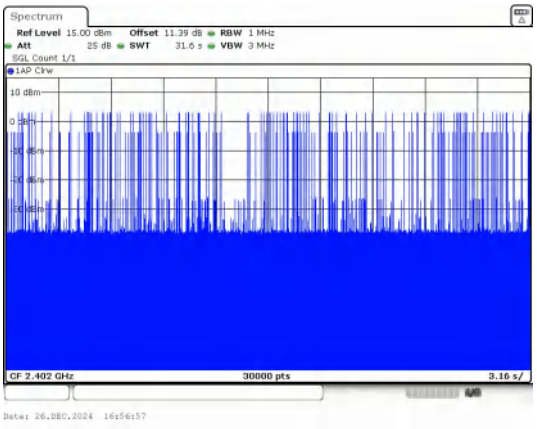
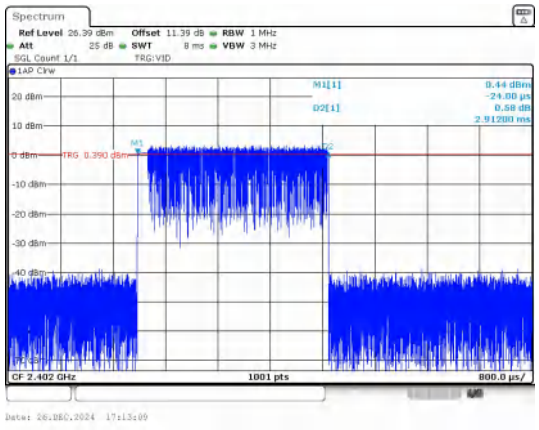
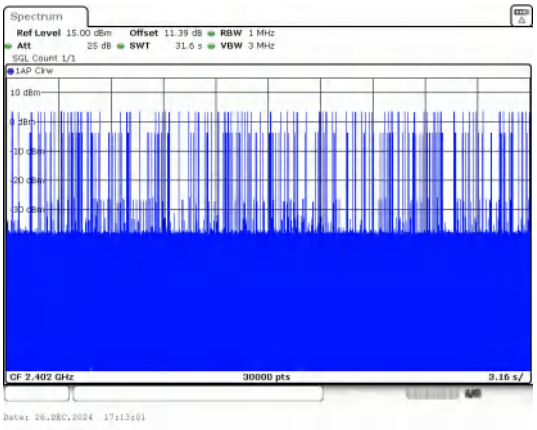
	
Pulse Width 8DPSK_3-DH5	Number of Pulses in 31.6 seconds 8DPSK_3-DH5

Right：

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.904	99	287.5	< 400	PASS
π/4DQPSK	2-DH5		2.912	108	314.5		PASS
8DPSK	3-DH5		2.912	110	320.32		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**

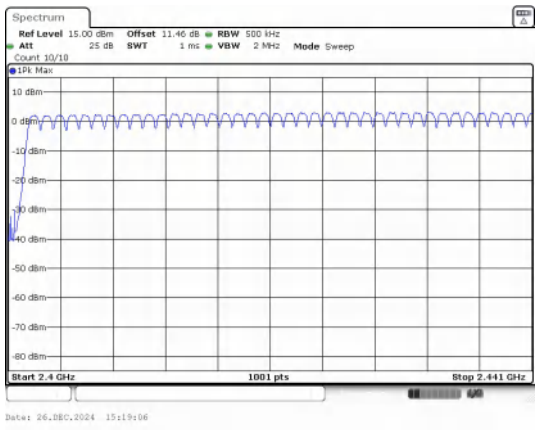
3) Number Of Hopping Channel

Test Result

Left：

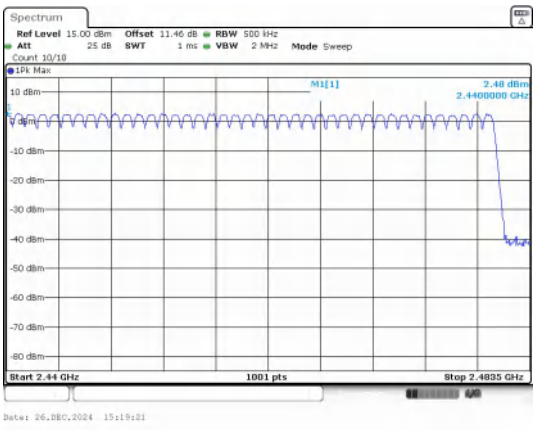
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
π/4DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



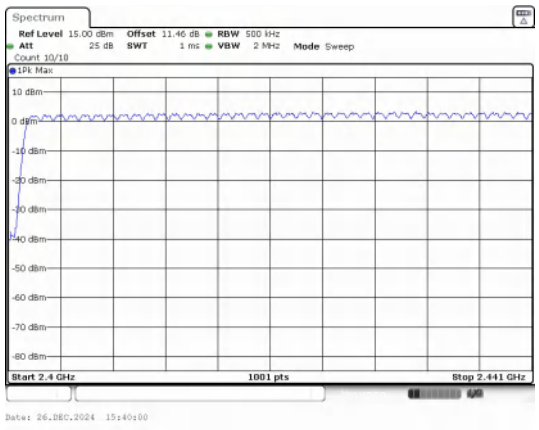
Low End Spectrum Channel Hopping Plot

GFSK



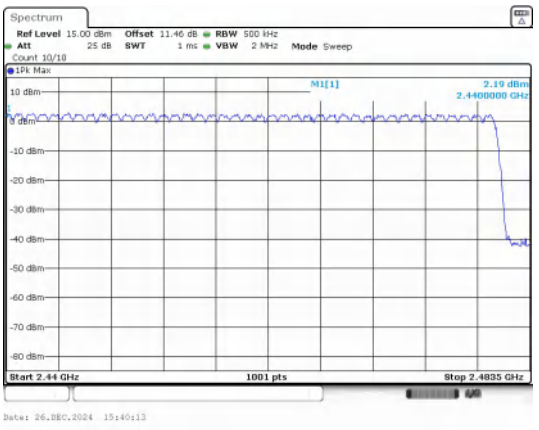
High End Spectrum Channel Hopping Plot

GFSK



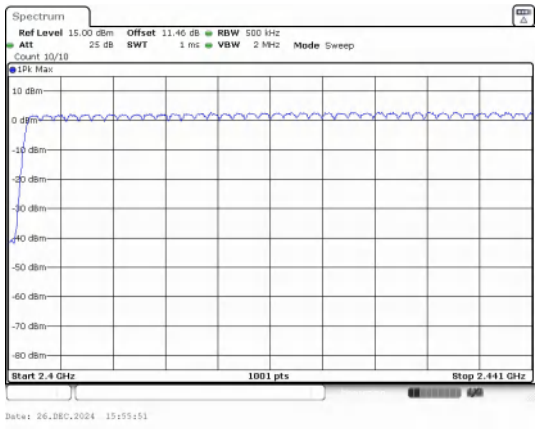
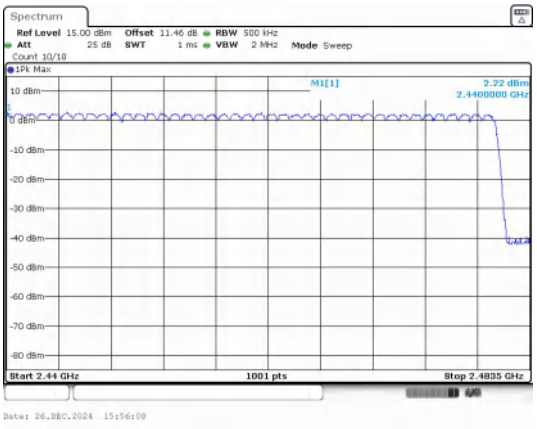
Low End Spectrum Channel Hopping Plot

π/4DQPSK



High End Spectrum Channel Hopping Plot

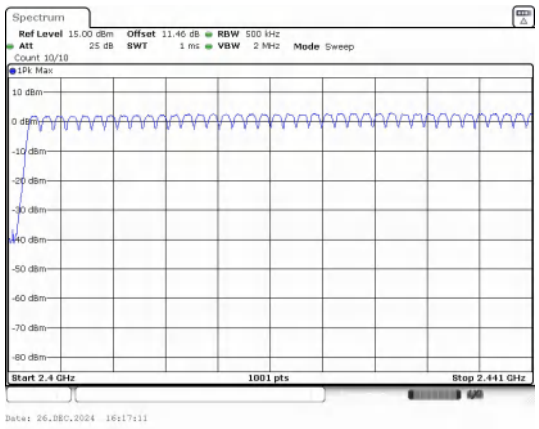
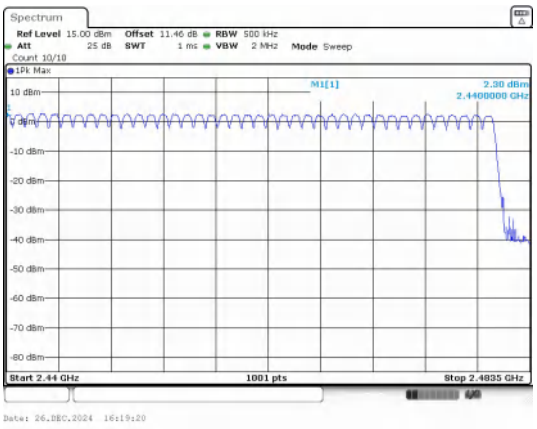
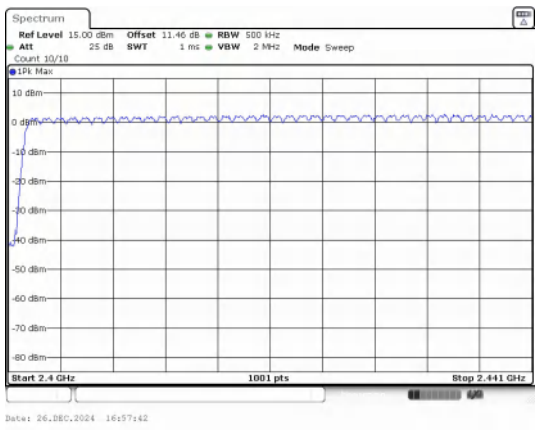
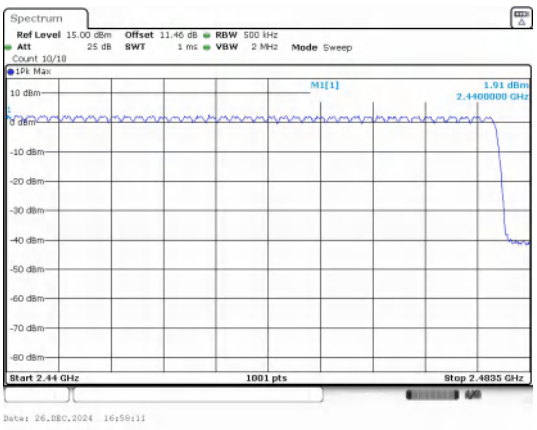
π/4DQPSK

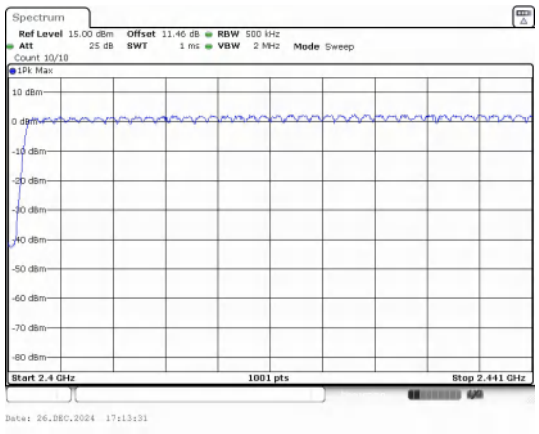
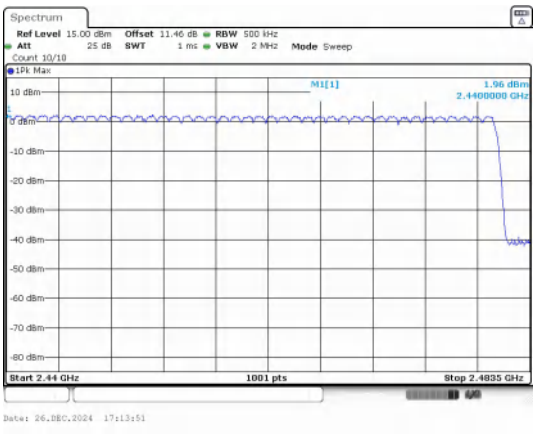
	
Low End Spectrum Channel Hopping Plot 8DPSK	High End Spectrum Channel Hopping Plot 8DPSK

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

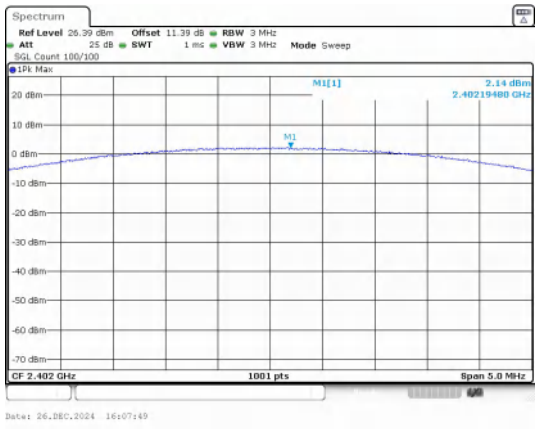
4) Conducted Peak Output Power

Test Result

Left：

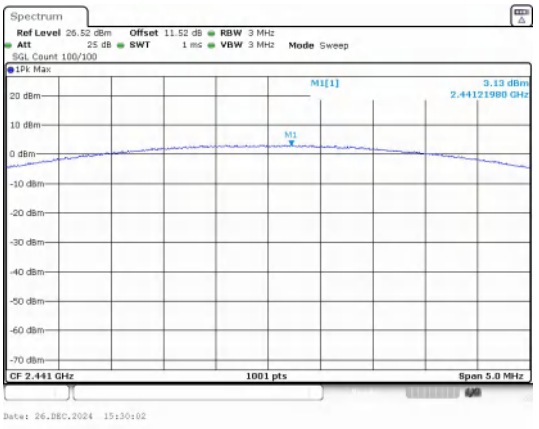
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.14	1.64	≤30	PASS
		39	3.13	2.06		PASS
		78	2.74	1.88		PASS
π/4DQPSK	2-DH5	0	3.93	2.47	≤20.97	PASS
		39	5.21	3.32		PASS
		78	4.62	2.90		PASS
8DPSK	3-DH5	0	4.28	2.68		PASS
		39	5.26	3.36		PASS
		78	4.89	3.08		PASS

Test Graphs



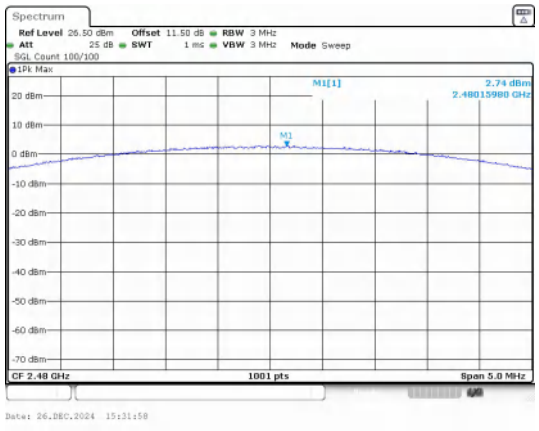
Peak Output Power

GFSK_Channel 0

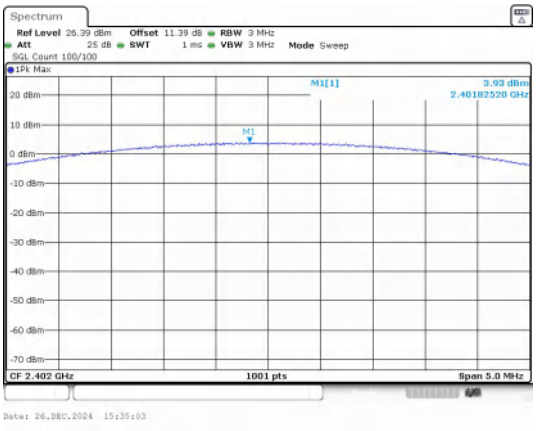


Peak Output Power

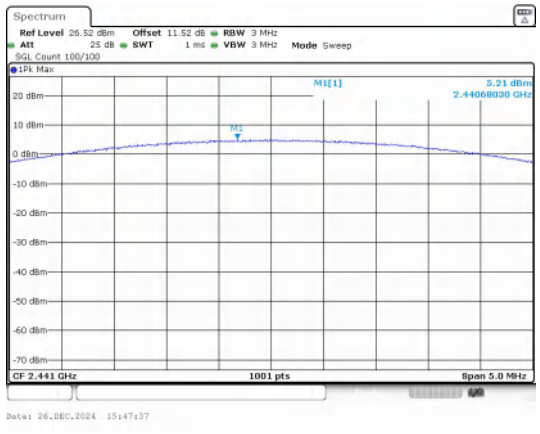
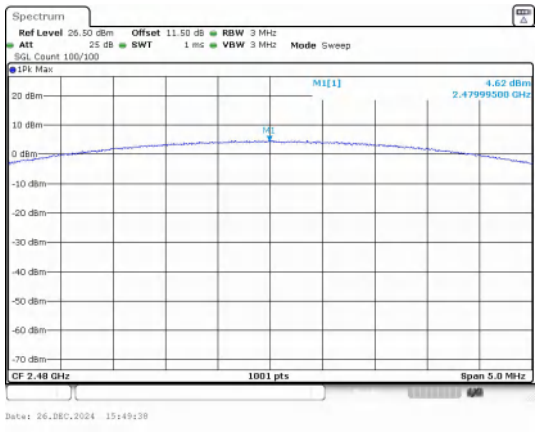
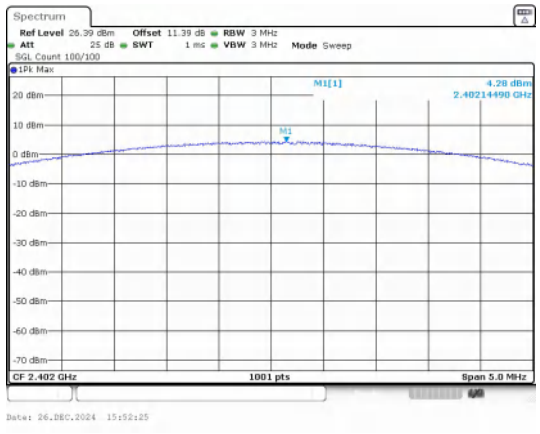
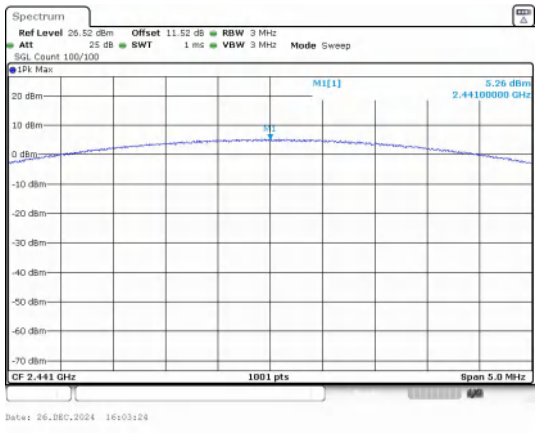
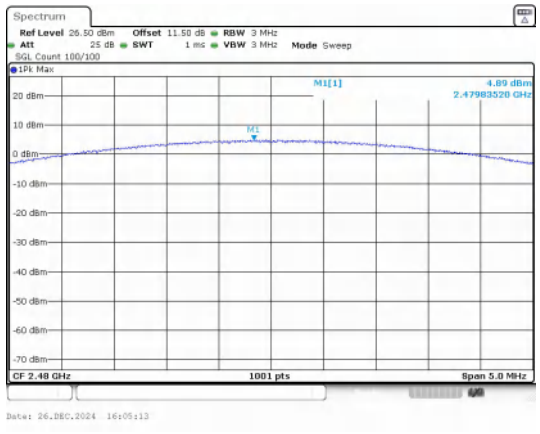
GFSK_Channel 39



Peak Output Power



Peak Output Power

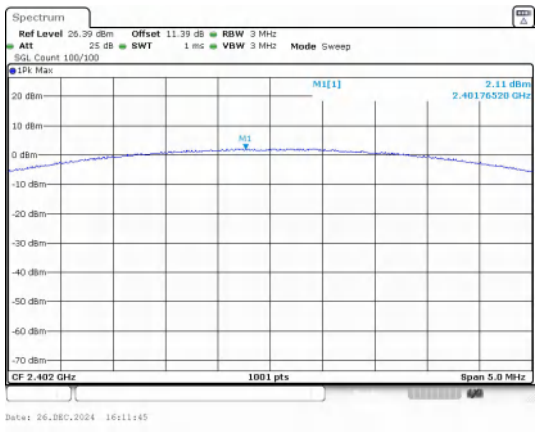
GFSK_Channel 78	π/4DQPSK_Channel 0
	
Peak Output Power **π/4DQPSK_Channel 39**	**Peak Output Power** **π/4DQPSK_Channel 78**
	
Peak Output Power **8DPSK_Channel 0**	**Peak Output Power** **8DPSK_Channel 39**
	
Peak Output Power **8DPSK_Channel 78**	

Right：

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.11	1.63	≤30	PASS

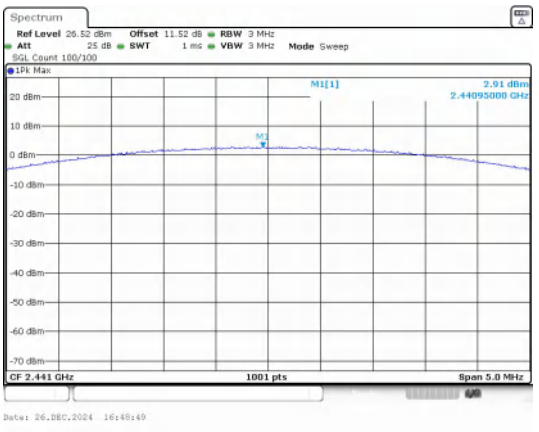
		39	2.91	1.95		PASS
		78	2.49	1.77		PASS
π/4DQPSK	2-DH5	0	3.87	2.44	≤20.97	PASS
		39	4.79	3.01		PASS
		78	4.29	2.69		PASS
8DPSK	3-DH5	0	3.96	2.49		PASS
		39	5.01	3.17		PASS
		78	4.59	2.88		PASS

Test Graphs



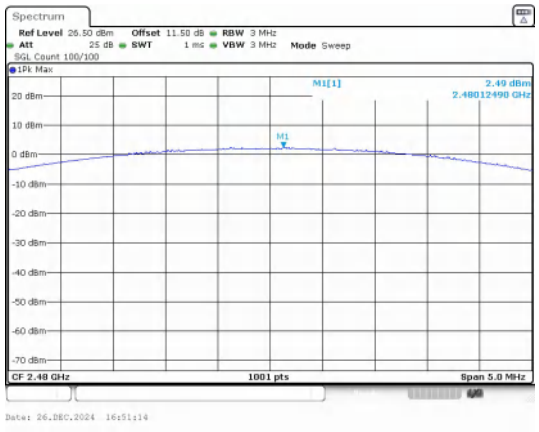
Peak Output Power

GFSK_Channel 0



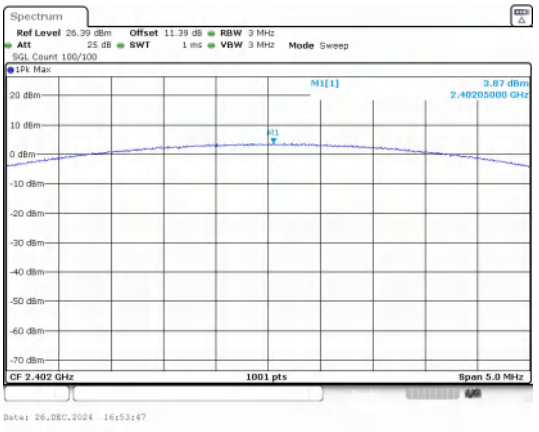
Peak Output Power

GFSK_Channel 39



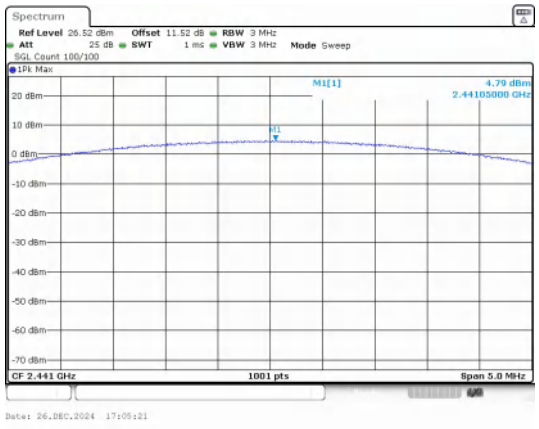
Peak Output Power

GFSK_Channel 78



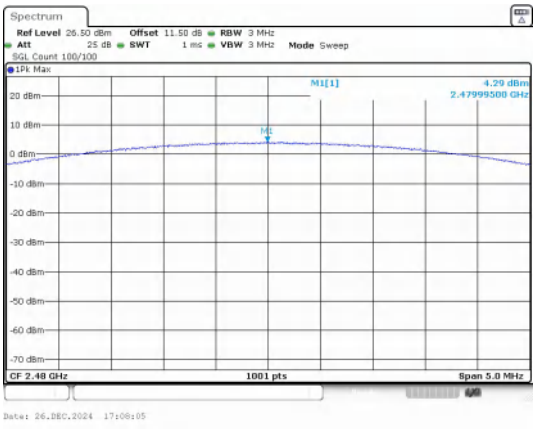
Peak Output Power

π/4DQPSK_Channel 0



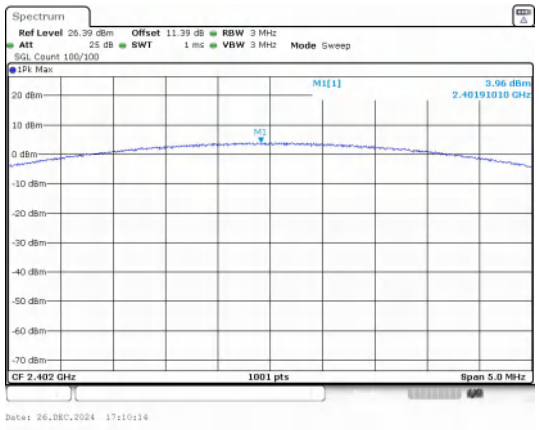
Peak Output Power

π/4DQPSK_Channel 39



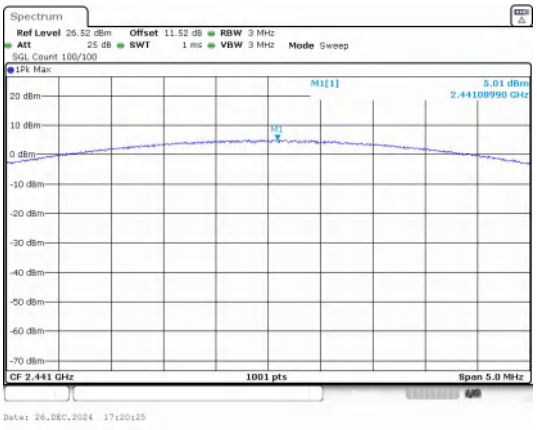
Peak Output Power

π/4DQPSK_Channel 78



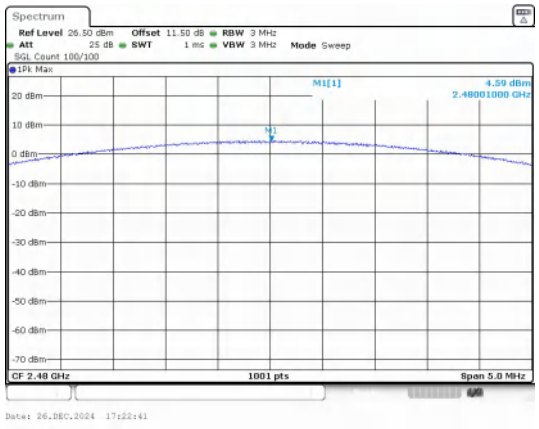
Peak Output Power

8DPSK_Channel 0



Peak Output Power

8DPSK_Channel 39



Peak Output Power

8DPSK_Channel 78

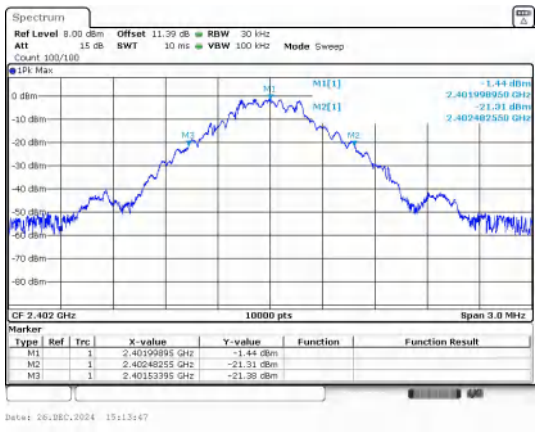
5) 20dB Bandwidth

Test Result

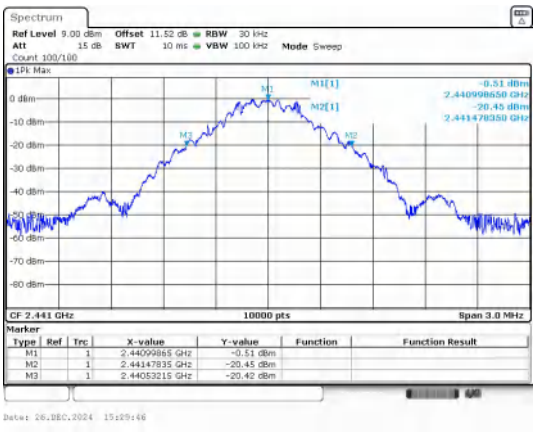
Left：

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9500
	39	2441 MHz	0.9500
	78	2480 MHz	0.9500
π/4DQPSK	0	2402 MHz	1.310
	39	2441 MHz	1.310
	78	2480 MHz	1.310
8DPSK	0	2402 MHz	1.300
	39	2441 MHz	1.290
	78	2480 MHz	1.300

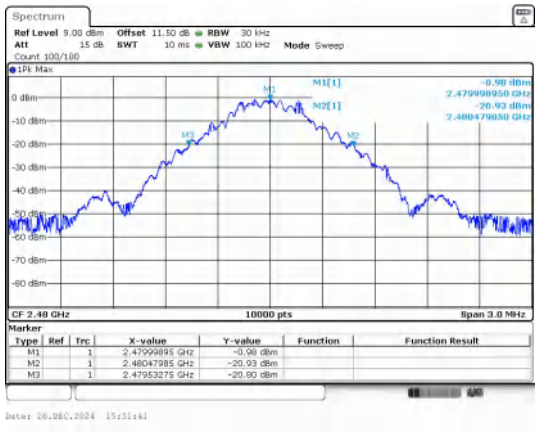
Test Graphs



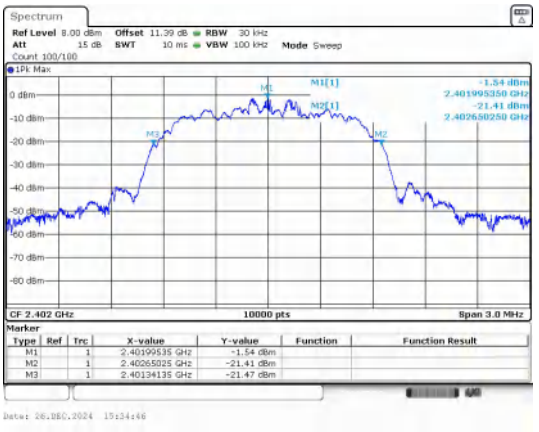
GFSK_DH5_Channel 0



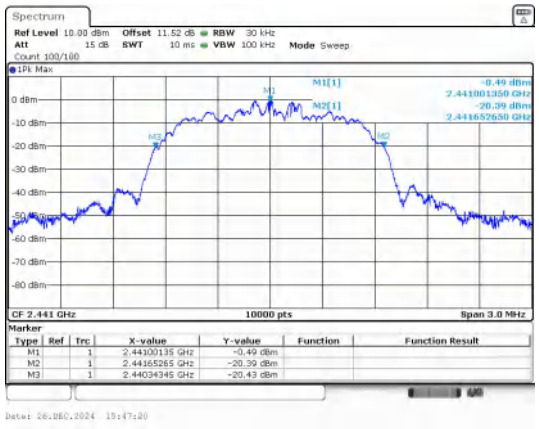
GFSK_DH5_Channel 39



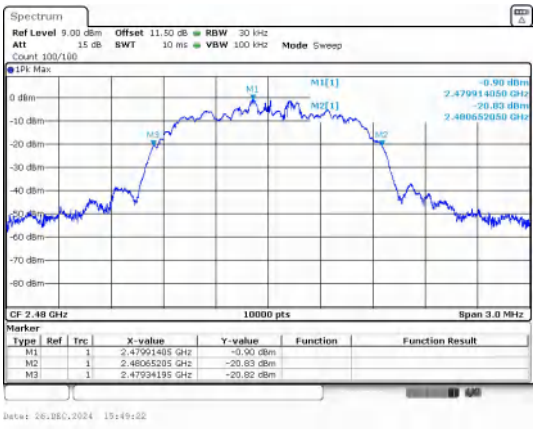
GFSK_DH5_Channel 78



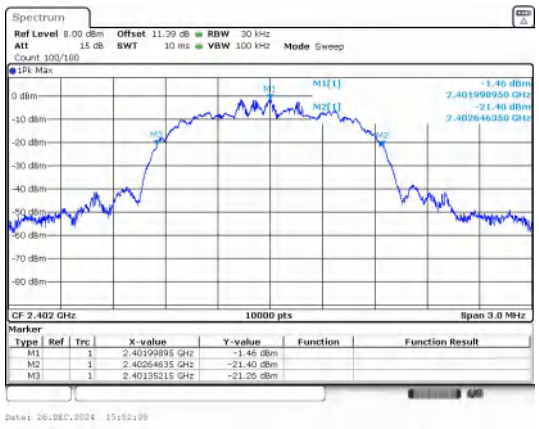
π/4DQPSK_2-DH5_Channel 0



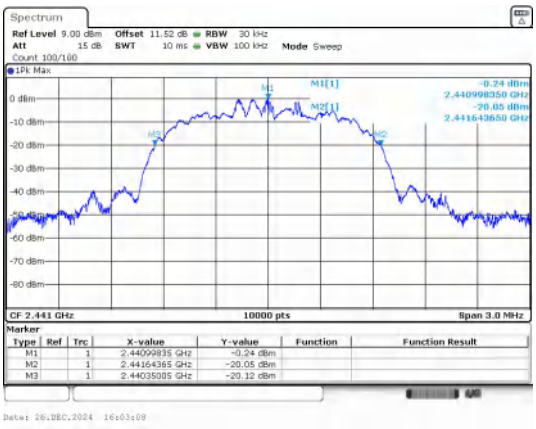
π/4DQPSK_2-DH5_Channel 39



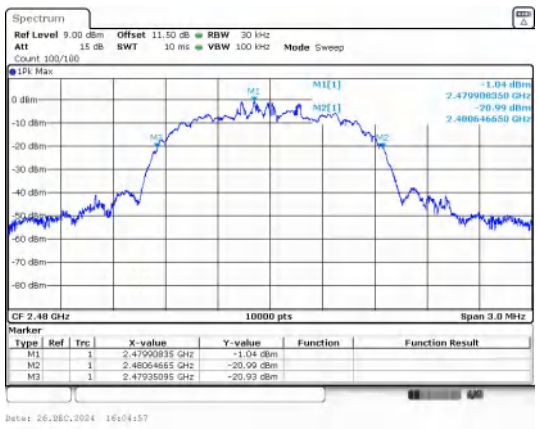
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



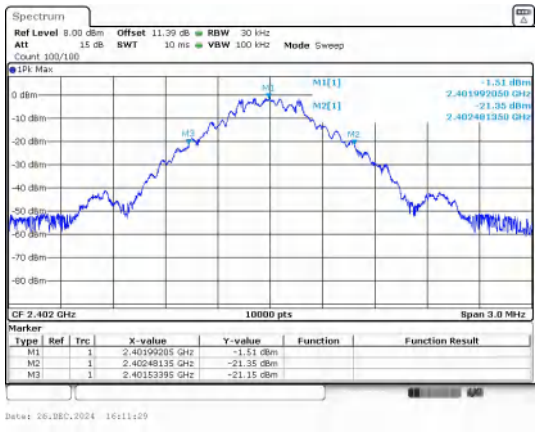
8DPSK_3-DH5_Channel 78

Right：

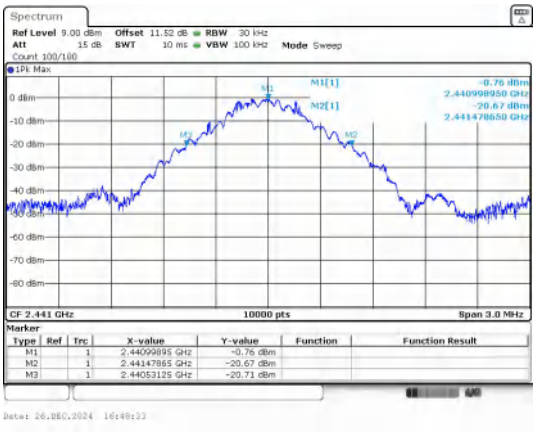
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9500
	39	2441 MHz	0.9500
	78	2480 MHz	0.9500
π/4DQPSK	0	2402 MHz	1.310
	39	2441 MHz	1.310
	78	2480 MHz	1.310

8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.290
	78	2480 MHz	1.300

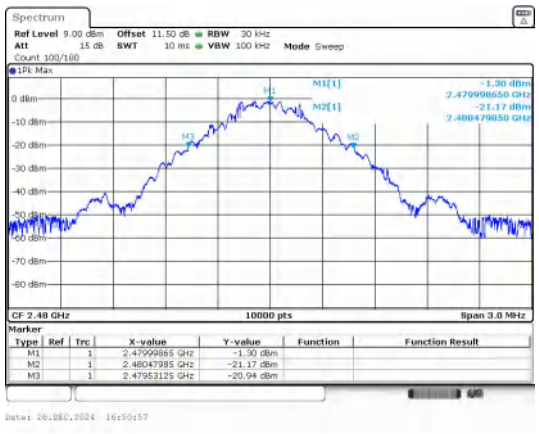
Test Graphs



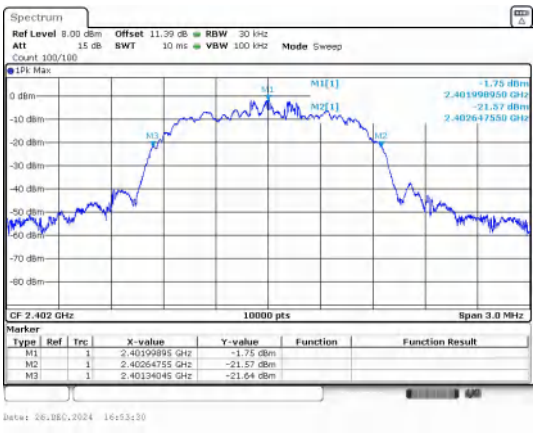
GFSK_DH5_Channel 0



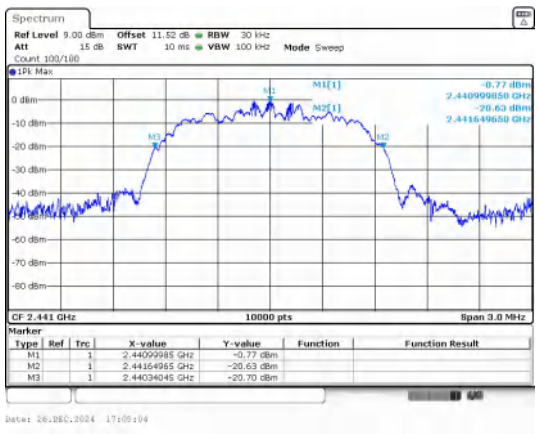
GFSK_DH5_Channel 39



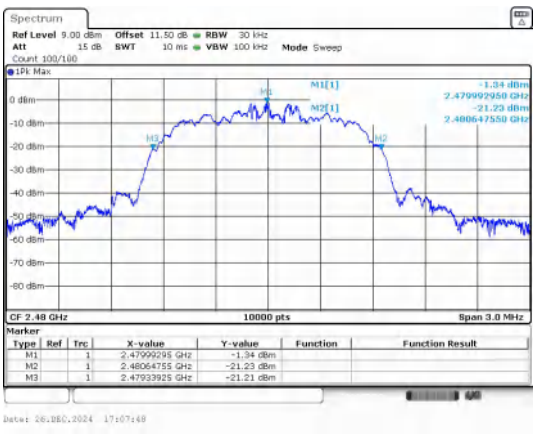
GFSK_DH5_Channel 78



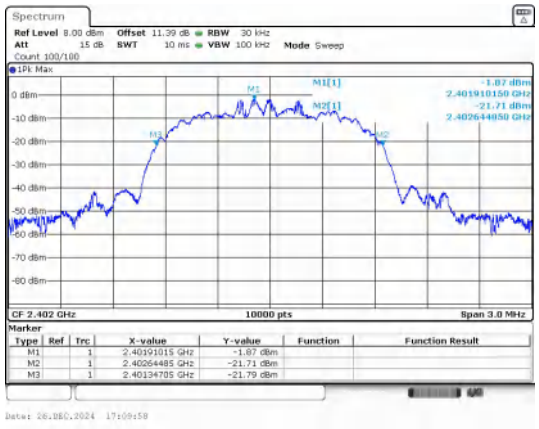
π/4DQPSK_2-DH5_Channel 0



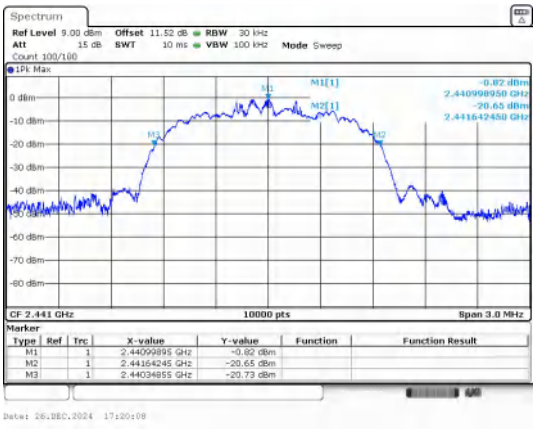
π/4DQPSK_2-DH5_Channel 39



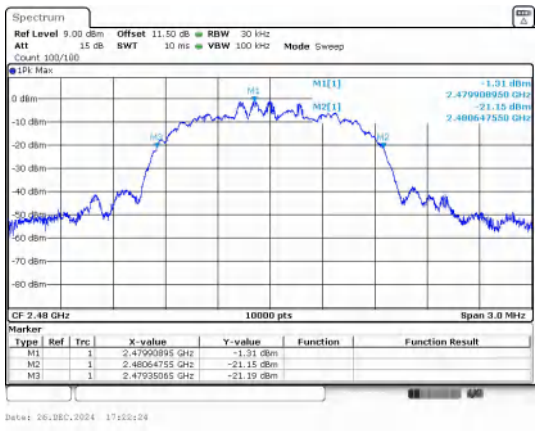
π/4DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

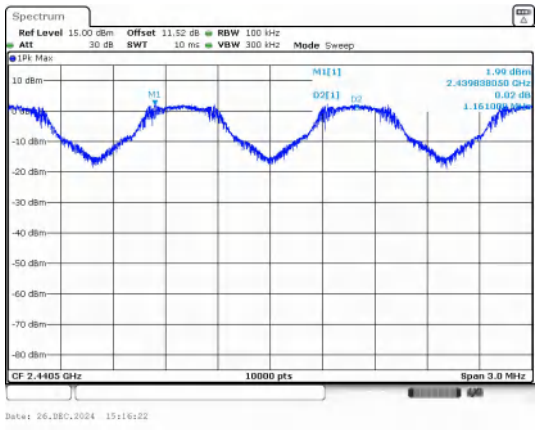
6) Carrier Frequencies Separation

Test Result

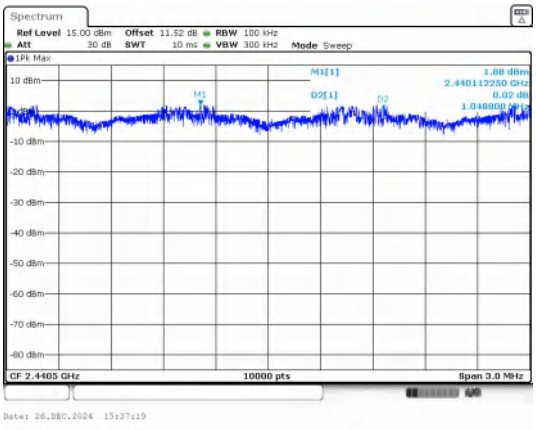
Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.838	2440.999	1.1610	0.95	PASS
π/4DQPSK	2-DH5	2440.1123	2441.1611	1.0488	0.873	PASS
8DPSK	3-DH5	2439.8248	2440.838	1.0131	0.867	PASS

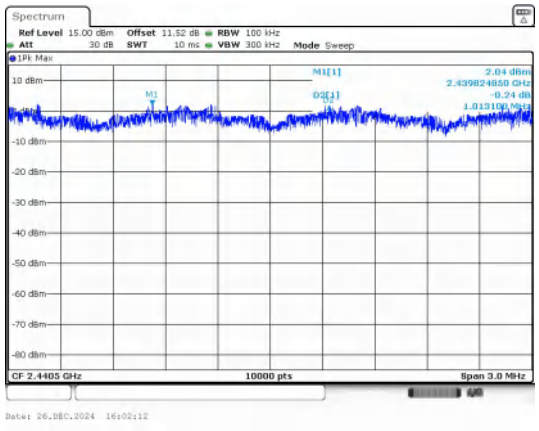
Test Graphs



GFSK



π/4DQPSK

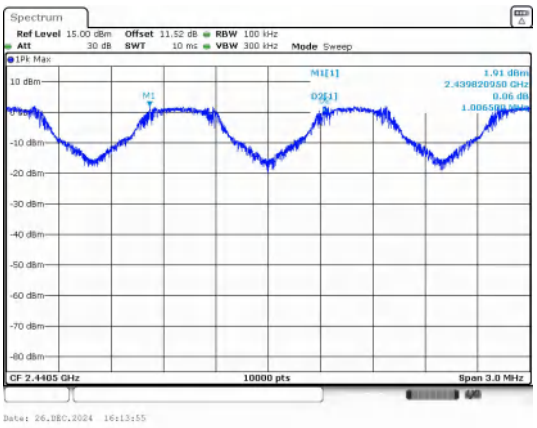


8DPSK

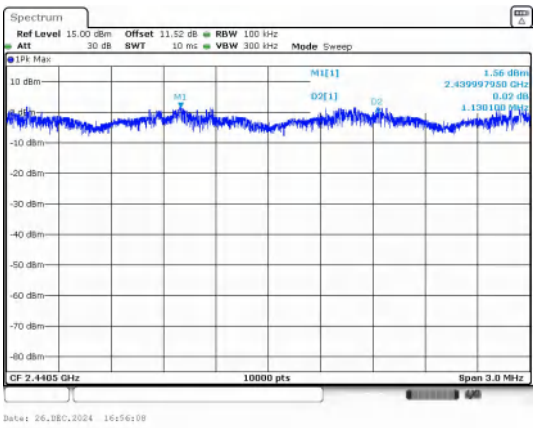
Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8209	2440.8275	1.0065	0.95	PASS
π/4DQPSK	2-DH5	2439.9979	2441.128	1.1301	0.873	PASS
8DPSK	3-DH5	2439.9866	2441.003	1.0164	0.86	PASS

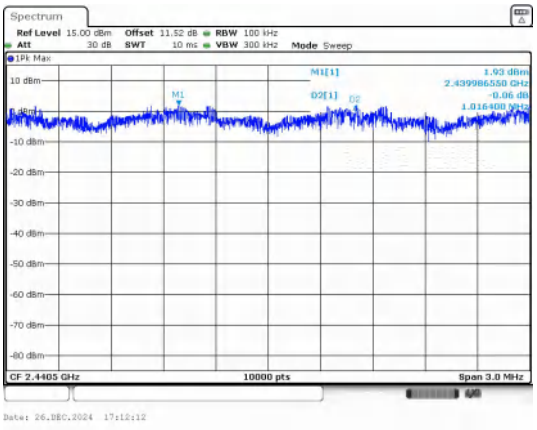
Test Graphs



GFSK



π/4DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left：

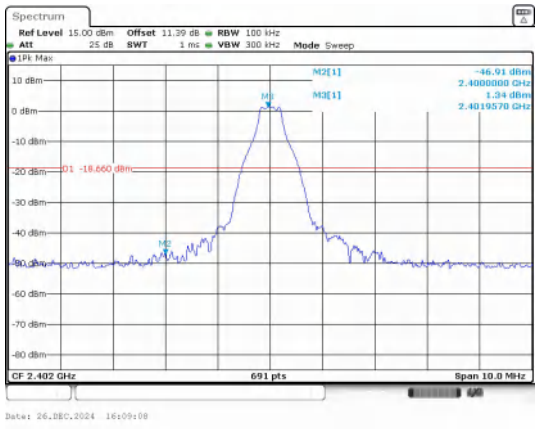
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-46.910	-18.66	-28.250	PASS
			4803.85	-49.708	-18.66	-31.048	PASS
		39	4882.09	-47.019	-17.72	-29.299	PASS
		78	2483.50	-50.540	-18.1	-32.440	PASS
			4960.33	-49.760	-18.1	-31.660	PASS
π/4DQPSK	2-DH5	0	2400.00	-46.440	-19.04	-27.400	PASS
			4803.85	-51.163	-19.04	-32.123	PASS
		39	4882.09	-45.213	-18.07	-27.143	PASS
		78	2483.50	-49.250	-18.34	-30.910	PASS
			6981.23	-53.375	-18.34	-35.035	PASS
8DPSK	3-DH5	0	2400.00	-46.160	-18.66	-27.500	PASS
			4803.85	-50.656	-18.66	-31.996	PASS
		39	4882.09	-49.290	-17.37	-31.920	PASS
		78	2483.50	-50.910	-18.15	-32.760	PASS
			4960.33	-50.832	-18.15	-32.682	PASS

Hopping

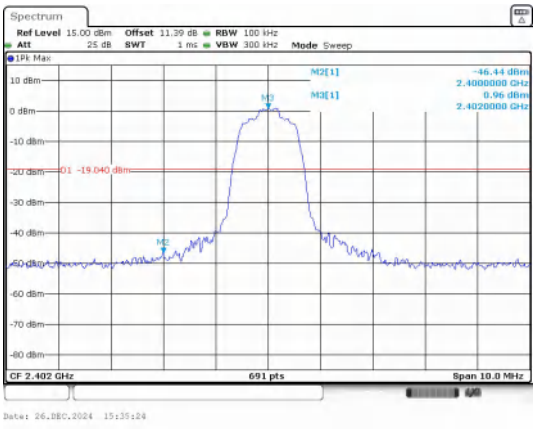
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.49	-47.549	-18.5	-29.049	PASS
			2400.00	-49.110	-18.5	-30.610	PASS
			2483.50	-47.970	-17.97	-30.000	PASS
π/4DQPSK	2-DH5		2398.19	-47.610	-18.85	-28.760	PASS
			2400.00	-49.870	-18.85	-31.020	PASS
			2483.50	-48.810	-18.47	-30.340	PASS
8DPSK	3-DH5		2397.44	-48.116	-18.61	-29.506	PASS
			2400.00	-49.700	-18.61	-31.090	PASS
			2483.50	-48.480	-18.22	-30.260	PASS

Test Graphs



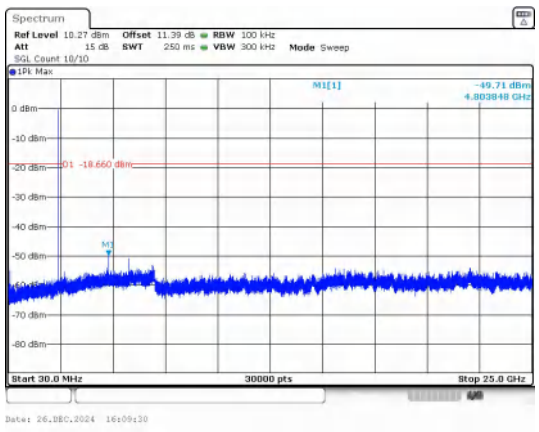
Out Of Band Emission

GFSK_DH5_Channel 0



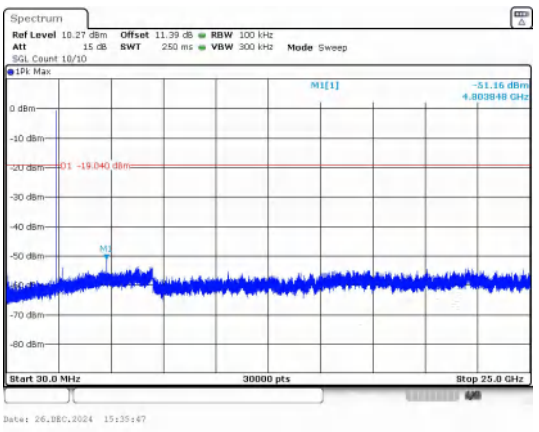
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 0



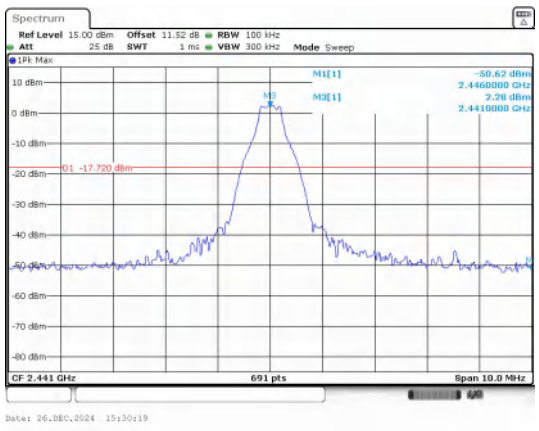
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



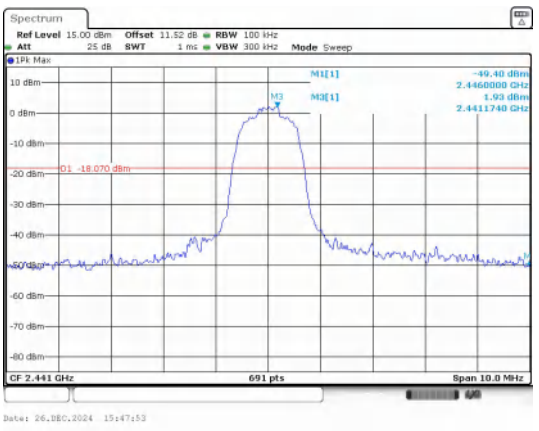
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



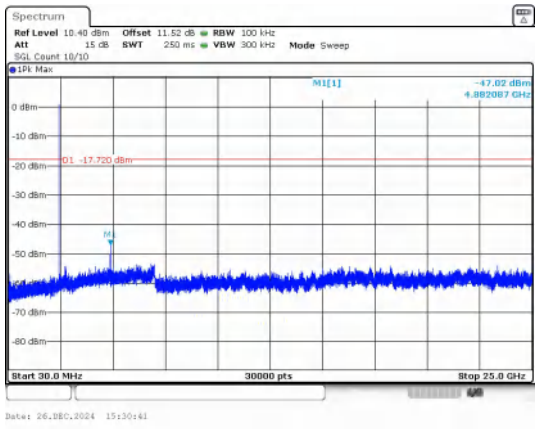
Out Of Band Emission

GFSK_DH5_Channel 39



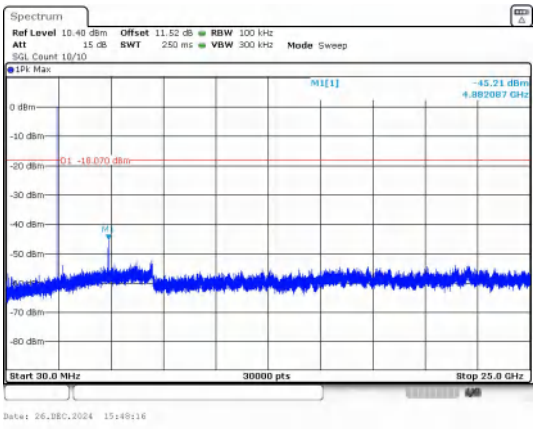
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



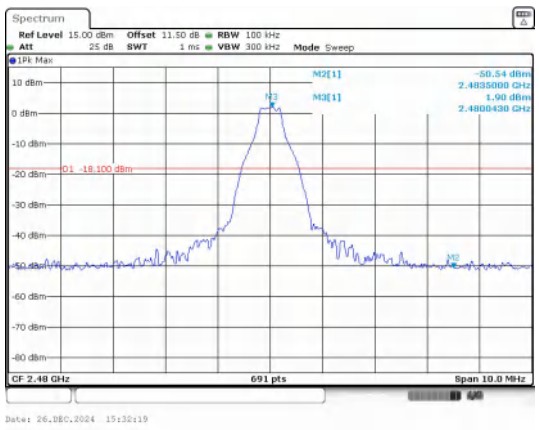
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



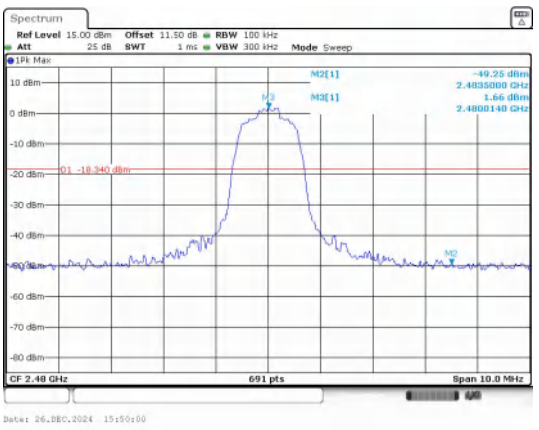
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



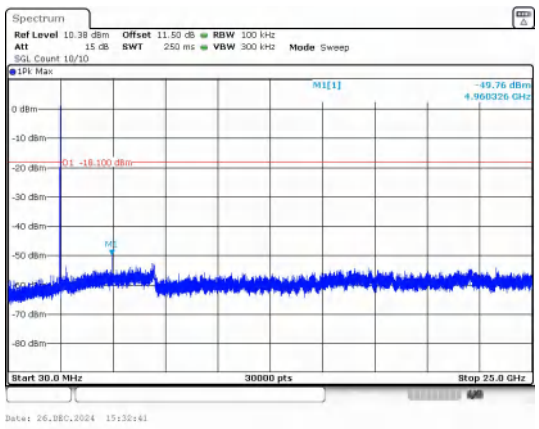
Out Of Band Emission

GFSK_DH5_Channel 78



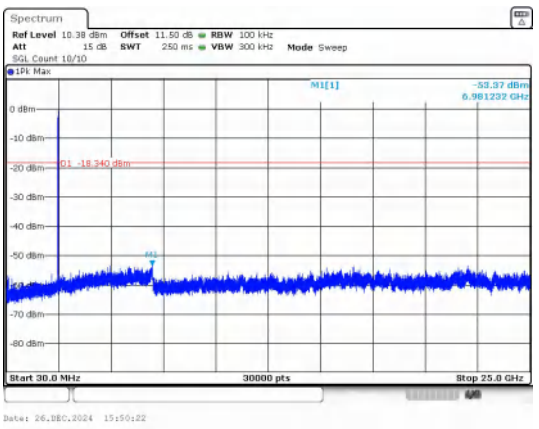
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



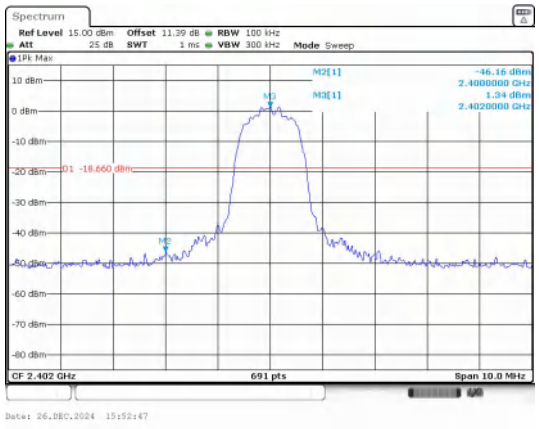
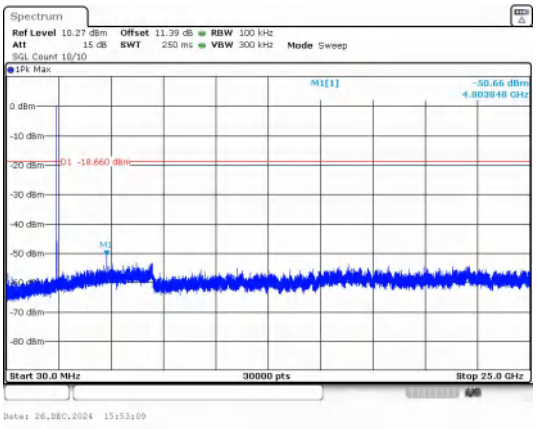
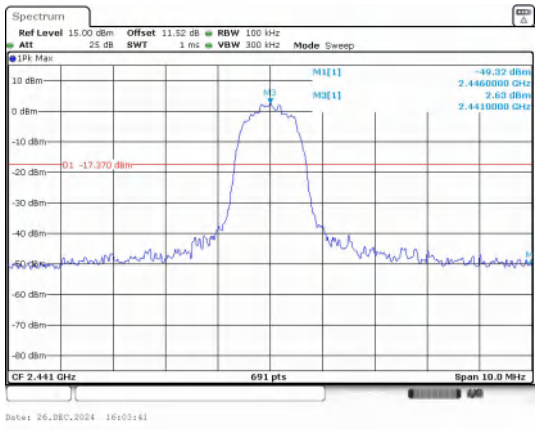
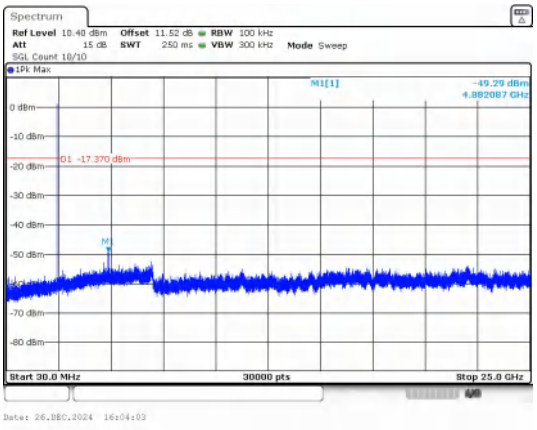
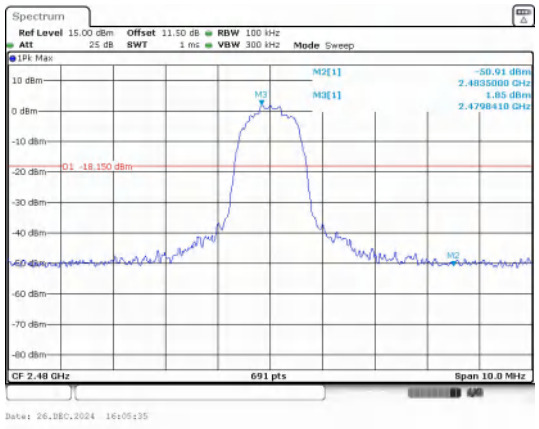
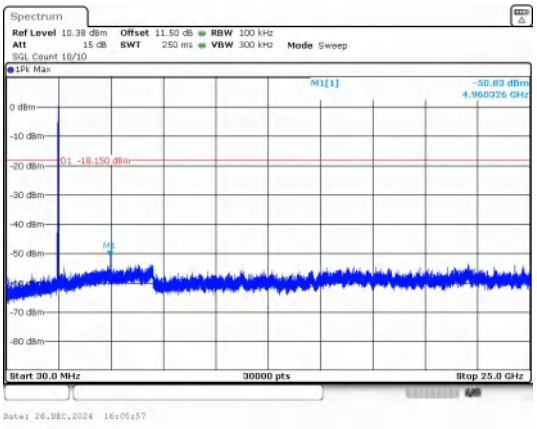
30.0 MHz - 25000.0 MHz

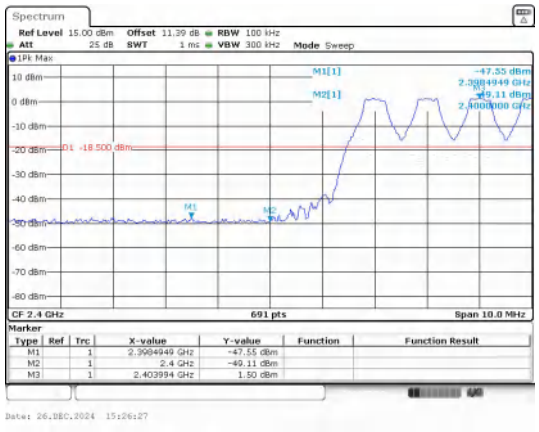
GFSK_DH5_Channel 78



30.0 MHz - 25000.0 MHz

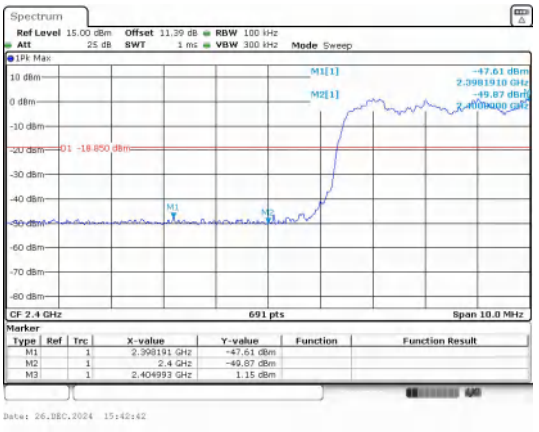
π/4DQPSK_2-DH5_Channel 78

	
Out Of Band Emission **8DPSK_3-DH5_Channel 0**	**30.0 MHz - 25000.0 MHz** **8DPSK_3-DH5_Channel 0**
	
Out Of Band Emission **8DPSK_3-DH5_Channel 39**	**30.0 MHz - 25000.0 MHz** **8DPSK_3-DH5_Channel 39**
	
Out Of Band Emission **8DPSK_3-DH5_Channel 78**	**30.0 MHz - 25000.0 MHz** **8DPSK_3-DH5_Channel 78**



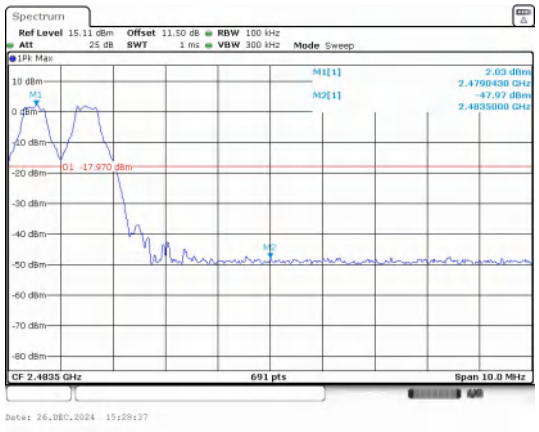
Out Of Band Emission(Left)

GFSK_DH5_Channel Hopping



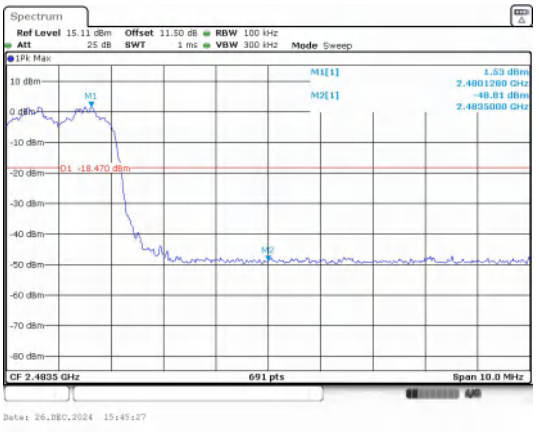
Out Of Band Emission(Left)

π/4DQPSK_2-DH5_Channel Hopping



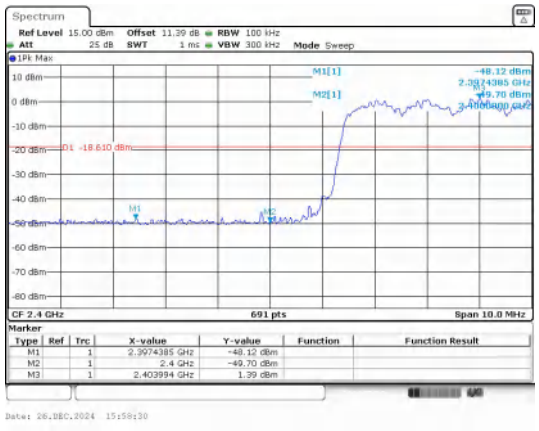
Out Of Band Emission(Right)

GFSK_DH5_Channel Hopping



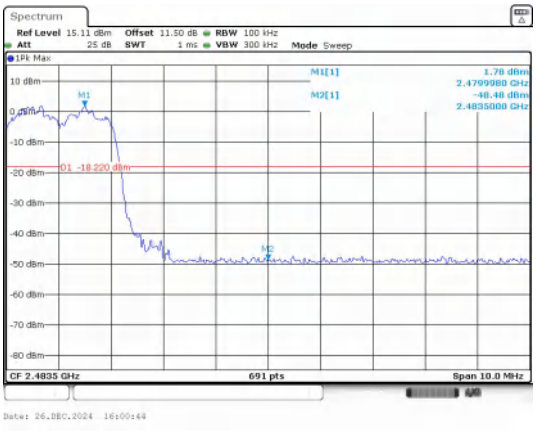
Out Of Band Emission(Right)

π/4DQPSK_2-DH5_Channel Hopping



Out Of Band Emission(Left)

8DPSK_3-DH5_Channel Hopping



Out Of Band Emission(Right)

8DPSK_3-DH5_Channel Hopping

Right:

Non-Hopping

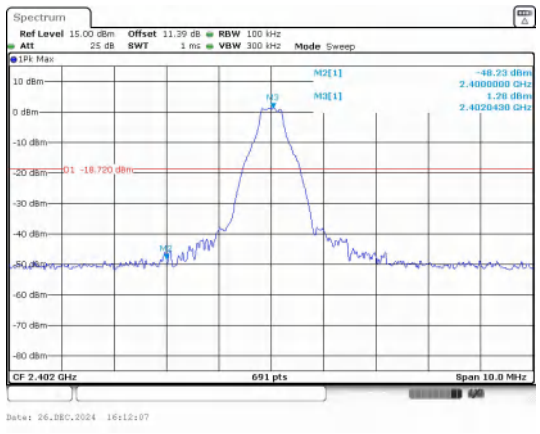
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result

GFSK	DH5	0	2400.00	-48.230	-18.72	-29.510	PASS
			4803.85	-47.895	-18.72	-29.175	PASS
		39	4882.09	-47.185	-17.92	-29.265	PASS
		78	836.95	-49.788	-18.46	-31.328	PASS
			2483.50	-49.180	-18.46	-30.720	PASS
π/4DQPSK	2-DH5	0	2400.00	-47.960	-19.33	-28.630	PASS
			4803.85	-49.802	-19.33	-30.472	PASS
		39	4882.09	-49.376	-18.4	-30.976	PASS
		78	2483.50	-50.560	-18.79	-31.770	PASS
			6973.74	-53.122	-18.79	-34.332	PASS
8DPSK	3-DH5	0	2400.00	-48.890	-18.99	-29.900	PASS
			5893.37	-51.468	-18.99	-32.478	PASS
		39	4882.09	-48.104	-18.21	-29.894	PASS
		78	2483.50	-51.000	-18.37	-32.630	PASS
			4960.33	-53.134	-18.37	-34.764	PASS

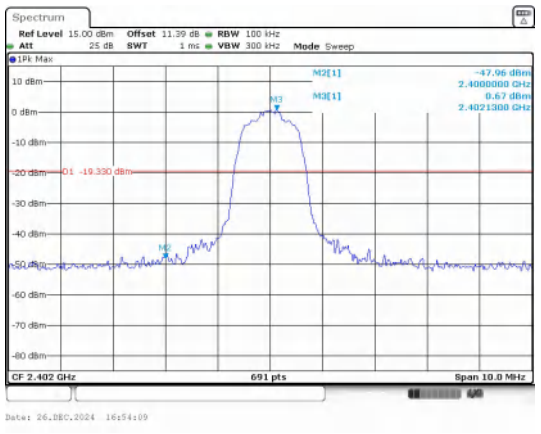
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.90	-47.491	-18.63	-28.861	PASS
			2400.00	-48.200	-18.63	-29.570	PASS
			2483.50	-48.450	-18.31	-30.140	PASS
π/4DQPSK	2-DH5		2398.38	-48.122	-19.27	-28.852	PASS
			2400.00	-50.090	-19.27	-30.820	PASS
			2483.50	-49.140	-18.8	-30.340	PASS
8DPSK	3-DH5		2400.00	-45.460	-19.31	-26.150	PASS
			2483.50	-48.650	-18.8	-29.850	PASS

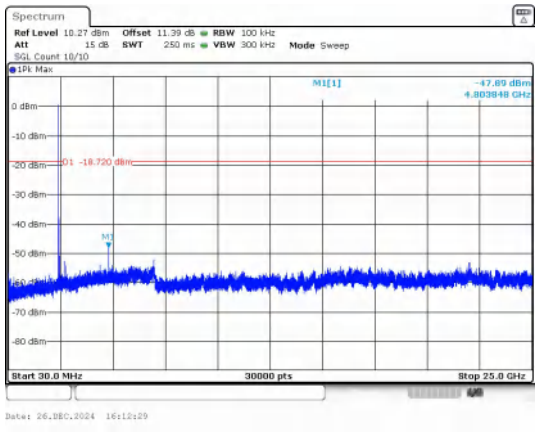
Test Graphs



Out Of Band Emission
GFSK_DH5_Channel 0

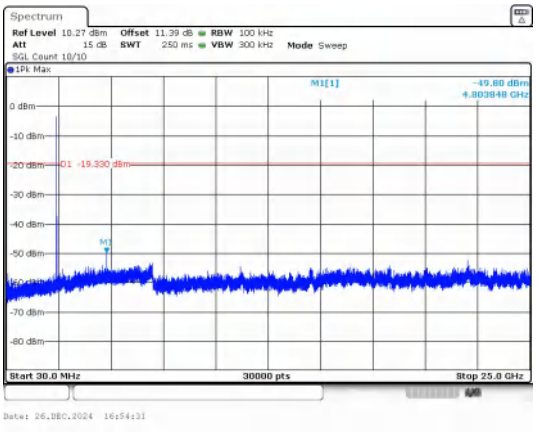


Out Of Band Emission
π/4DQPSK_2-DH5_Channel 0



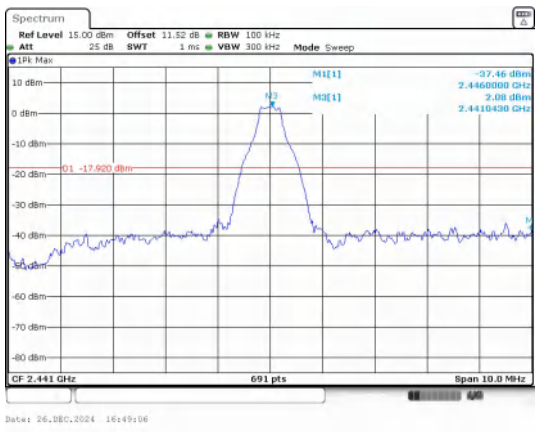
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 0



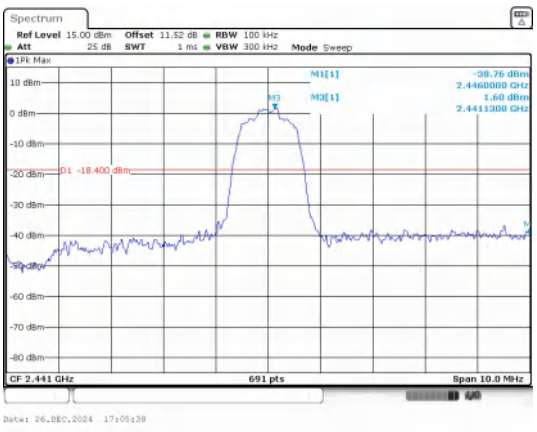
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 0



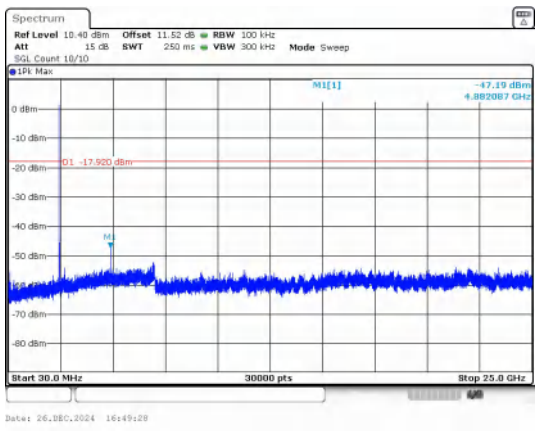
Out Of Band Emission

GFSK_DH5_Channel 39



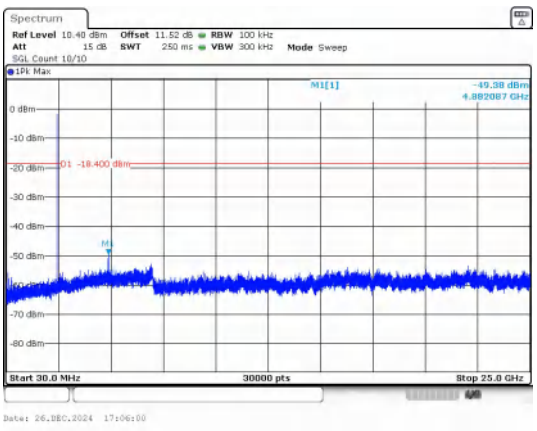
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 39



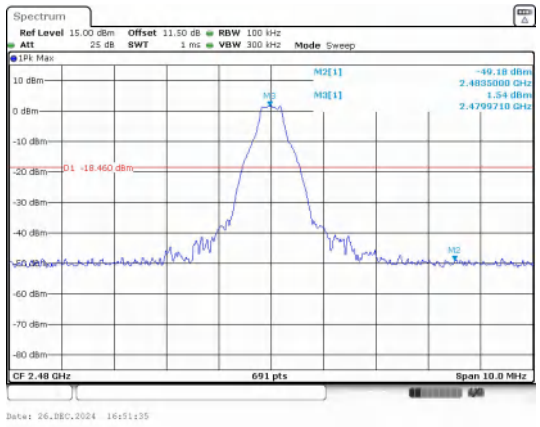
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 39



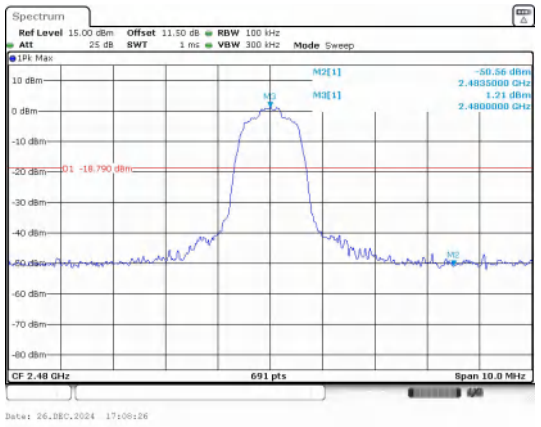
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 39



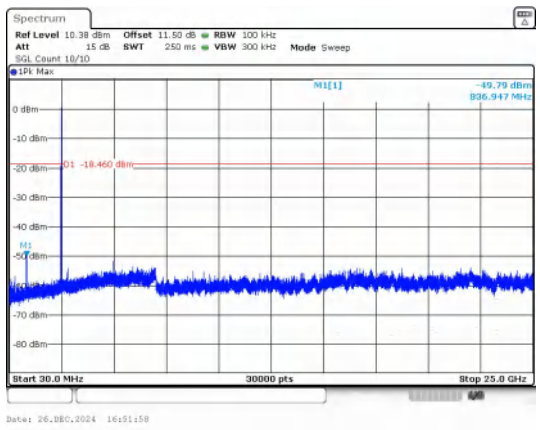
Out Of Band Emission

GFSK_DH5_Channel 78



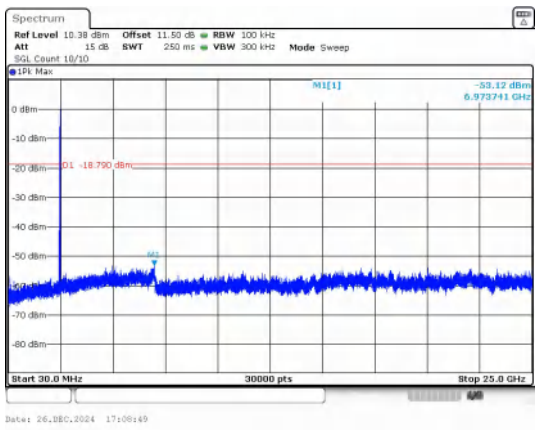
Out Of Band Emission

π/4DQPSK_2-DH5_Channel 78



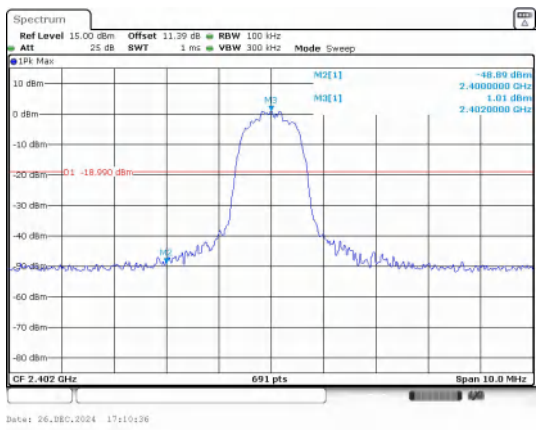
30.0 MHz - 25000.0 MHz

GFSK_DH5_Channel 78



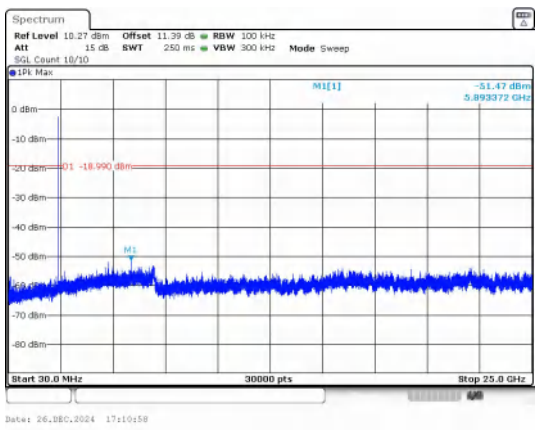
30.0 MHz - 25000.0 MHz

π/4DQPSK_2-DH5_Channel 78



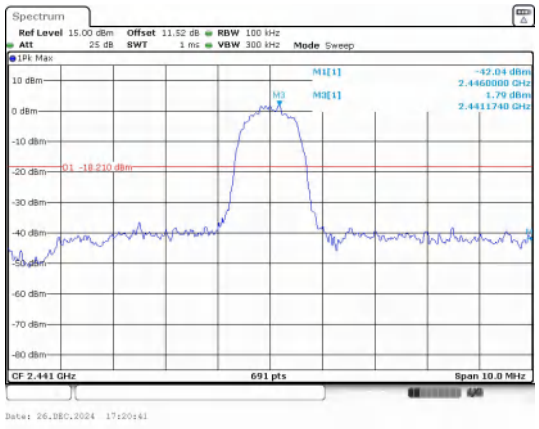
Out Of Band Emission

8DPSK_3-DH5_Channel 0



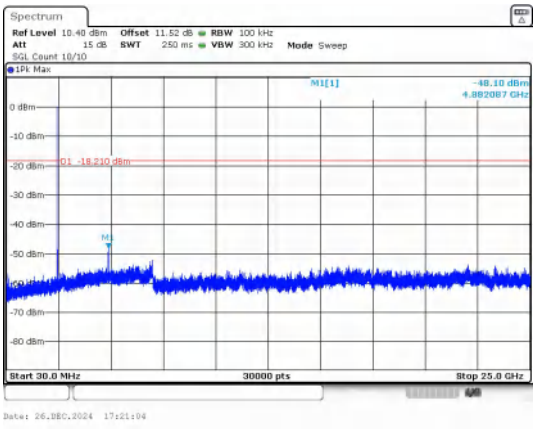
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 0



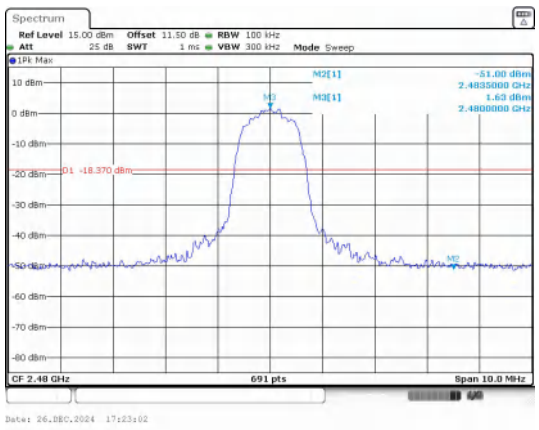
Out Of Band Emission

8DPSK_3-DH5_Channel 39



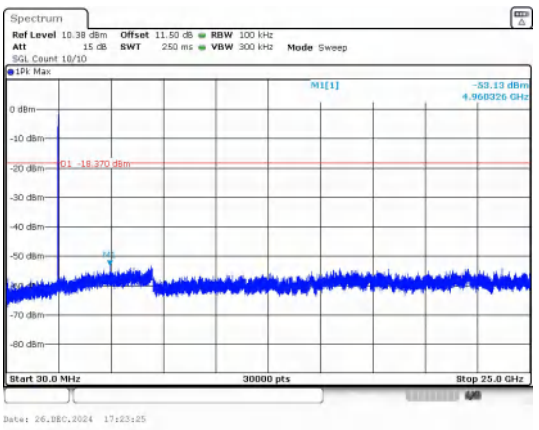
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 39



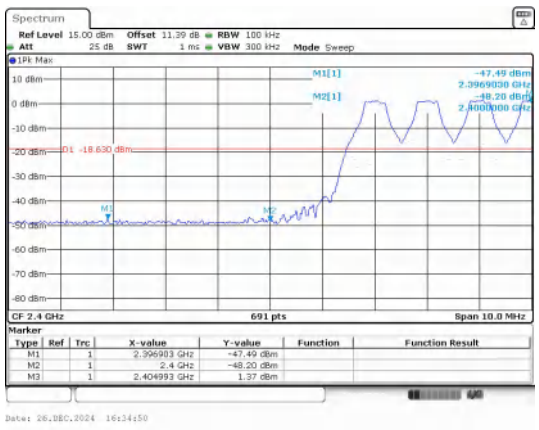
Out Of Band Emission

8DPSK_3-DH5_Channel 78



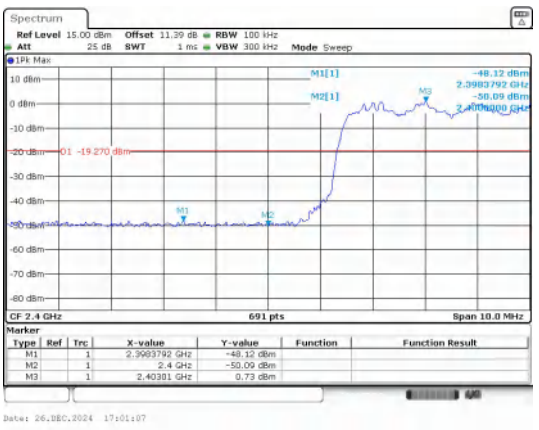
30.0 MHz - 25000.0 MHz

8DPSK_3-DH5_Channel 78



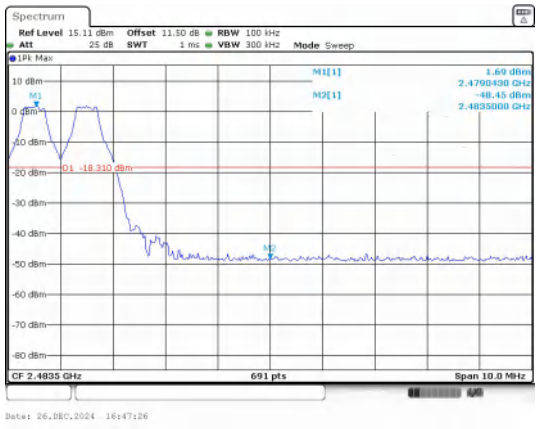
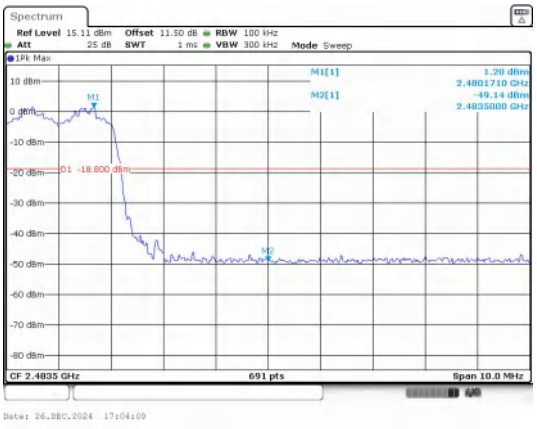
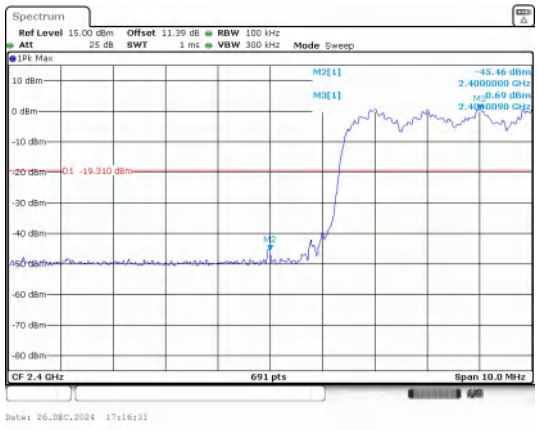
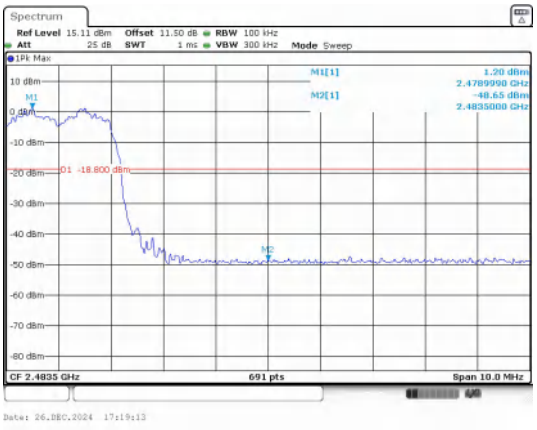
Out Of Band Emission(Left)

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-----