

Appendix Report

Project No.:	CISR250410097
Test Engineer:	James Wang
Supervised by:	Rory Huang

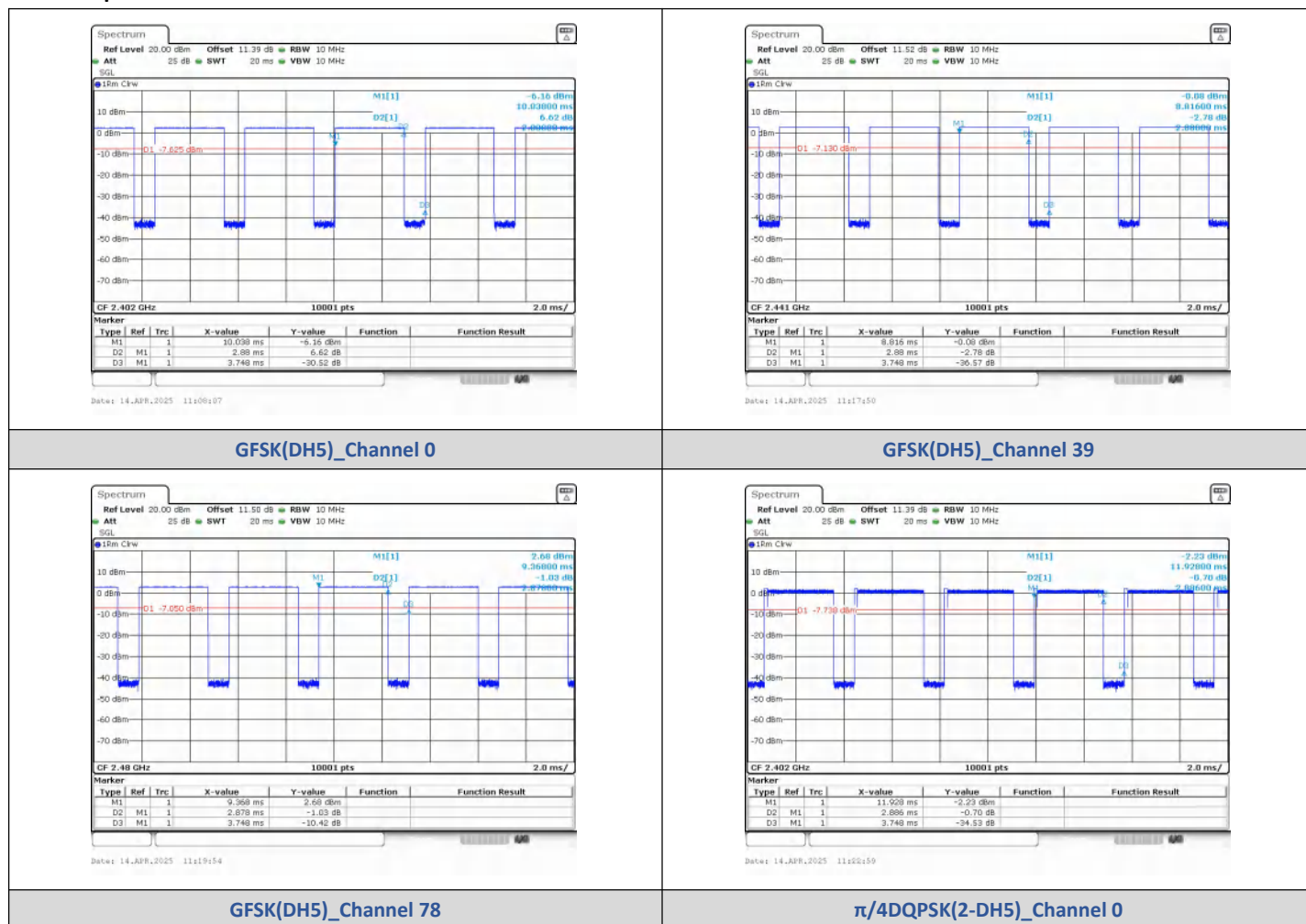
1) Duty Cycle

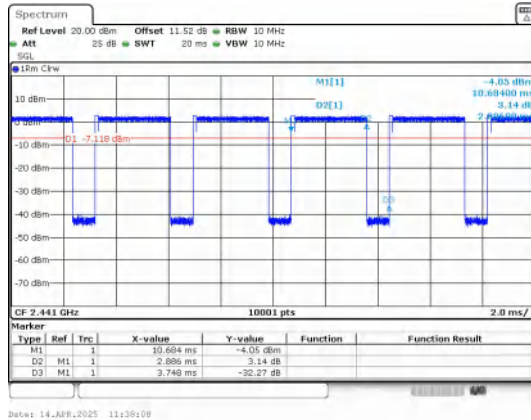
Test Result

Left:

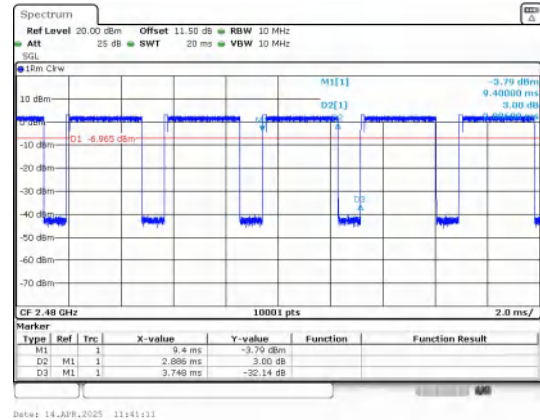
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.880	3.748	76.84	0.7684	1.1441	0.3472
		39	2.880	3.748	76.84	0.7684	1.1441	0.3472
		78	2.878	3.748	76.79	0.7679	1.147	0.3475
π /4DQPSK	2-DH5	0	2.886	3.748	77.00	0.7700	1.1351	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
8DPSK	3-DH5	0	2.888	3.748	77.05	0.7705	1.1323	0.3463
		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

Test Graphs

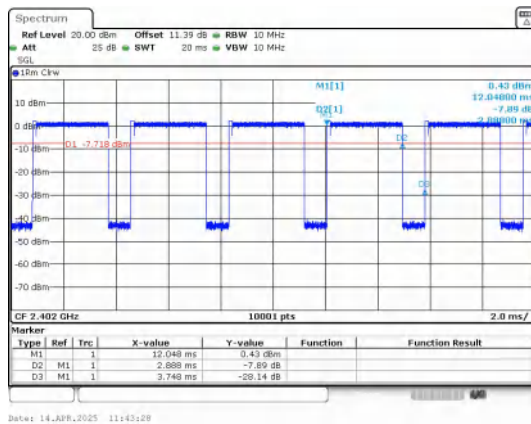




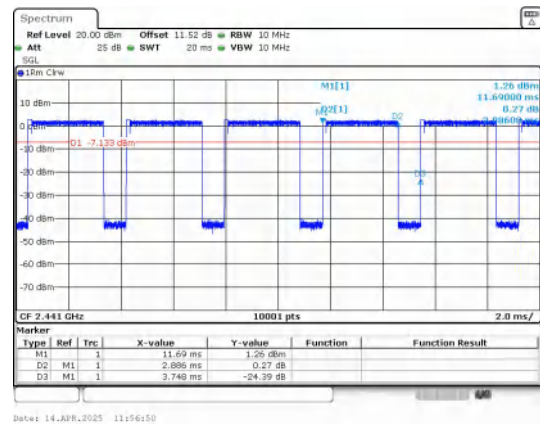
$\pi/4$ DQPSK(2-DH5)_Channel 39



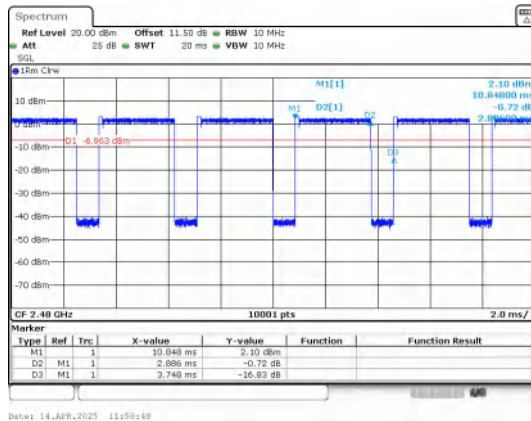
$\pi/4$ DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39

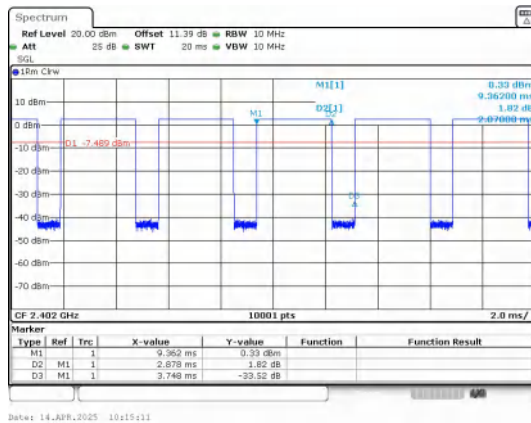


8DPSK(3-DH5)_Channel 78

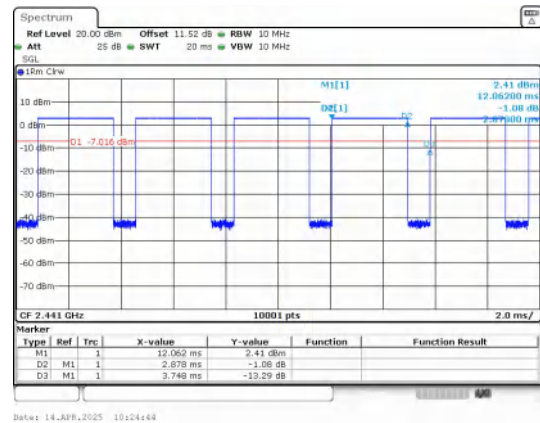
Right:

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.878	3.748	76.79	0.7679	1.147	0.3475
		39	2.878	3.748	76.79	0.7679	1.147	0.3475
		78	2.880	3.748	76.84	0.7684	1.1441	0.3472
$\pi/4$ DQPSK	2-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
8DPSK	3-DH5	0	2.888	3.748	77.05	0.7705	1.1323	0.3463
		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

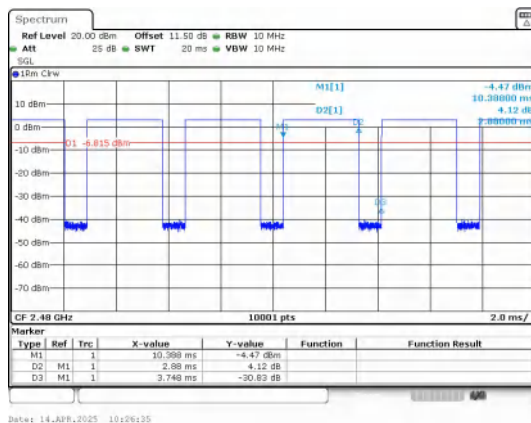
Test Graphs



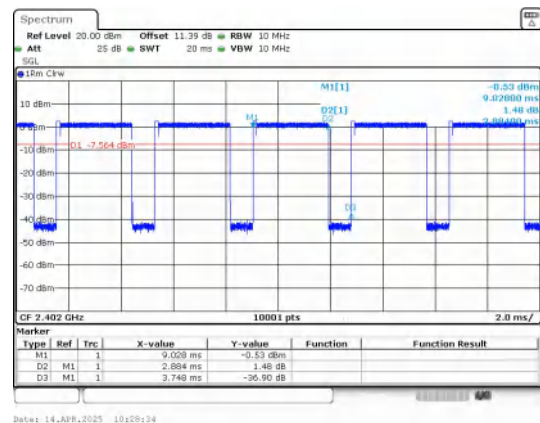
GFSK(DH5)_Channel 0



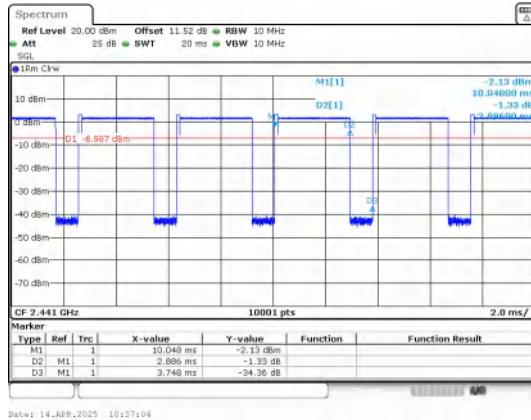
GFSK(DH5)_Channel 39



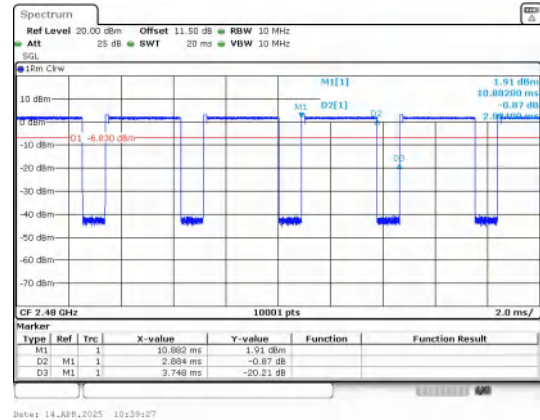
GFSK(DH5)_Channel 78



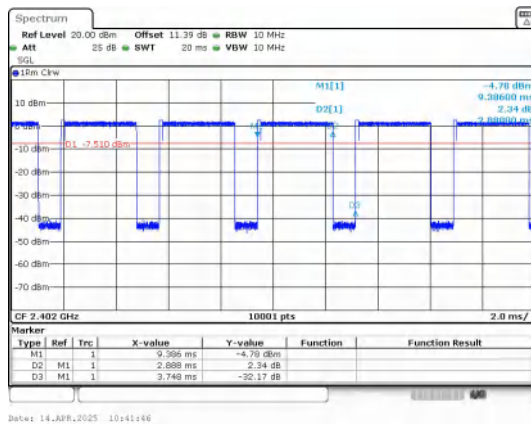
$\pi/4$ DQPSK(2-DH5)_Channel 0



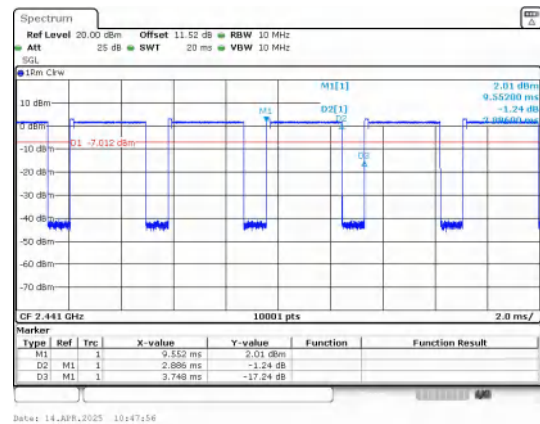
$\pi/4$ DQPSK(2-DH5)_Channel 39



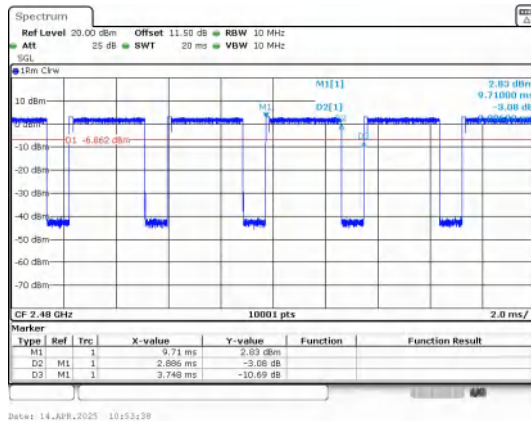
$\pi/4$ DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

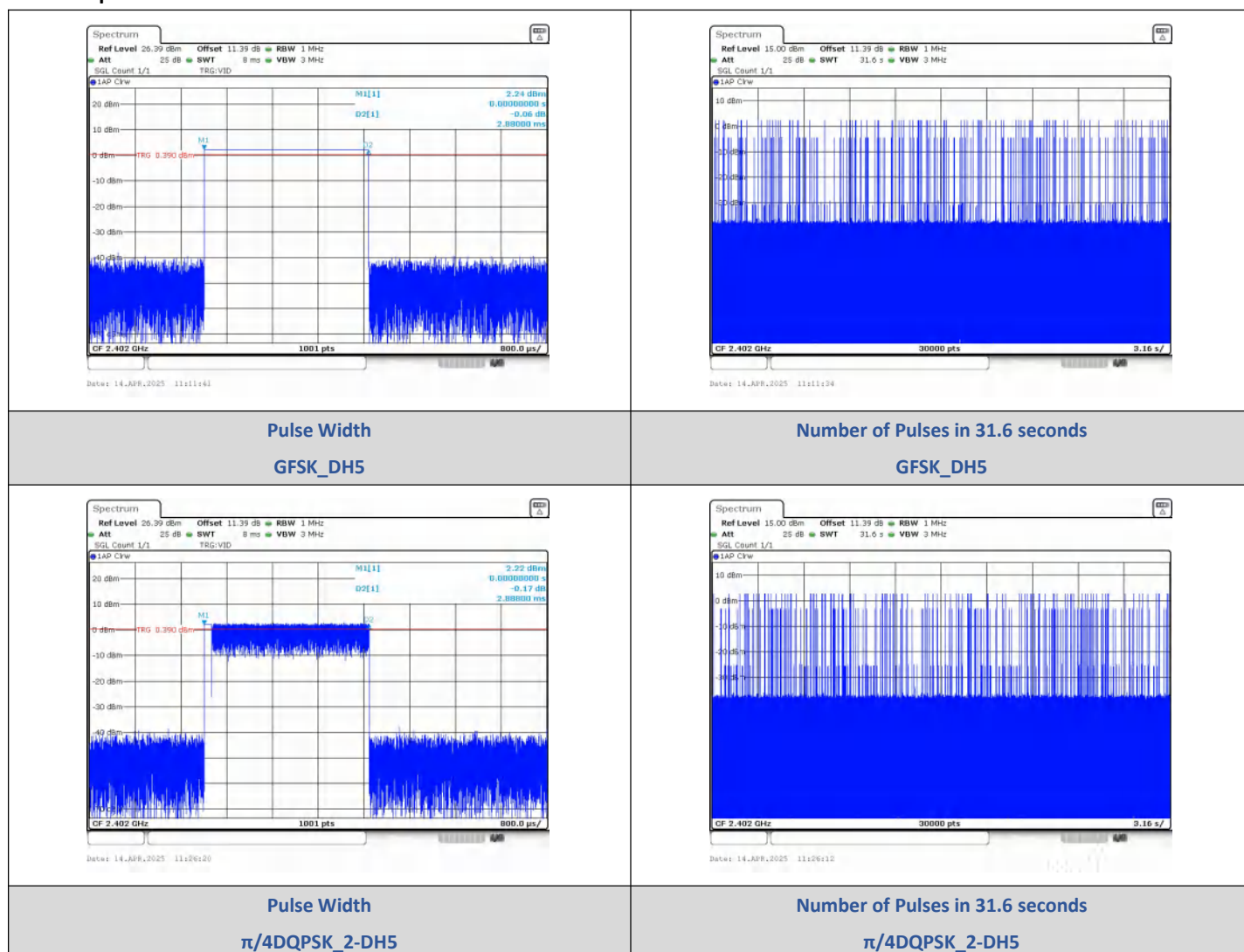
2) Dwell Time

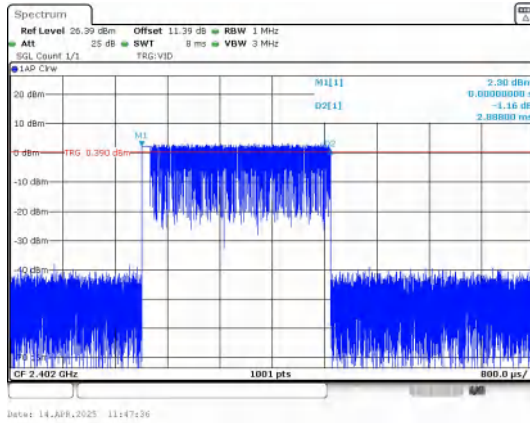
Test Result

Left:

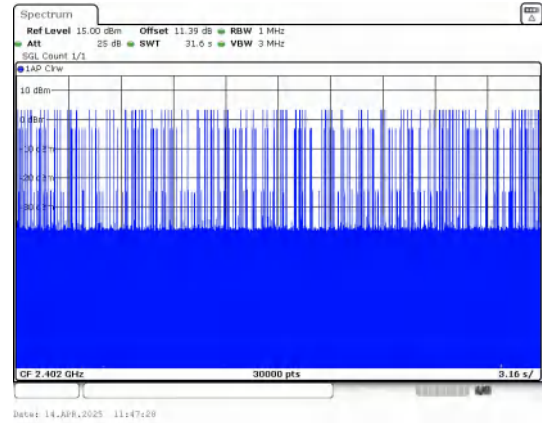
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.880	100	288.0	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.888	109	314.79		PASS
8DPSK	3-DH5		2.888	114	329.23		PASS

Test Graphs





Pulse Width
8DPSK_3-DH5

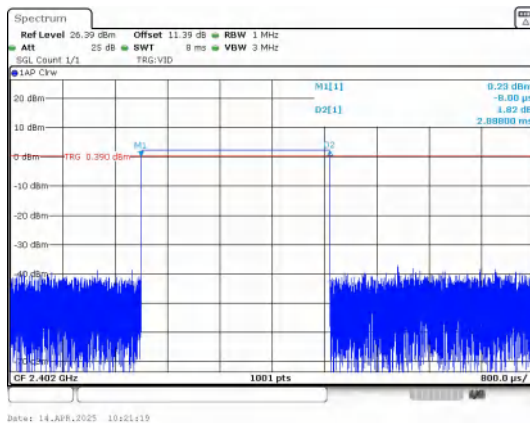


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

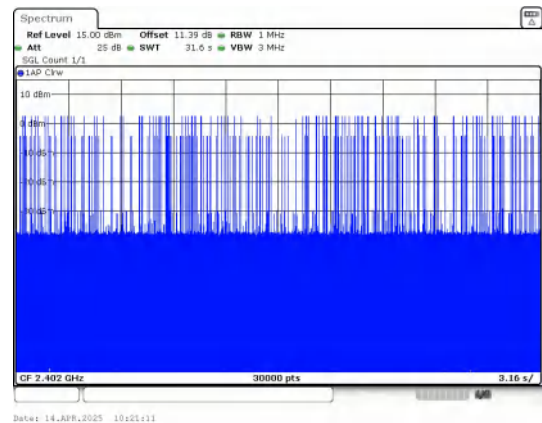
Right:

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	113	326.34	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.888	89	257.03		PASS
8DPSK	3-DH5		2.888	113	326.34		PASS

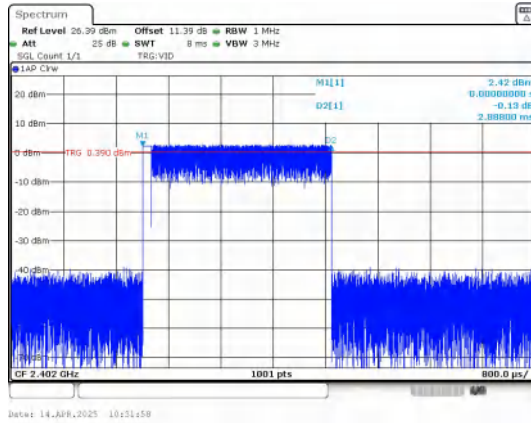
Test Graphs



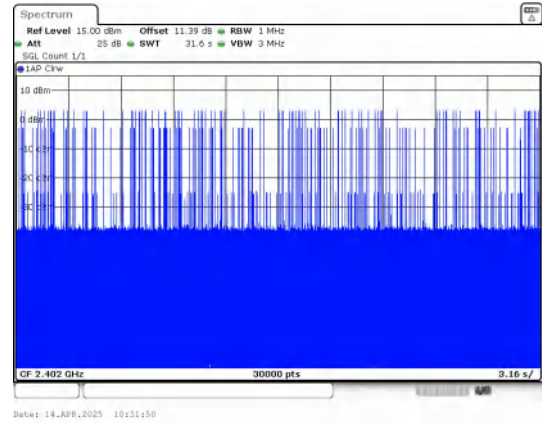
Pulse Width
GFSK_DH5



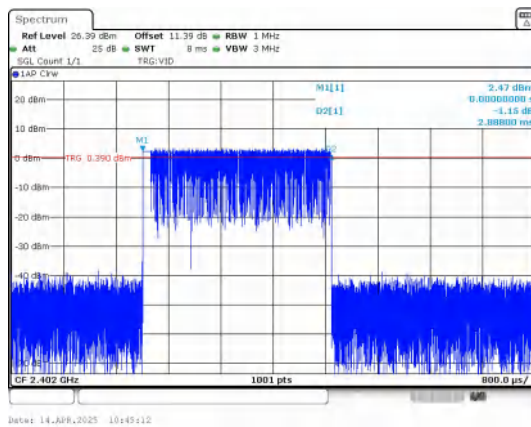
Number of Pulses in 31.6 seconds
GFSK_DH5



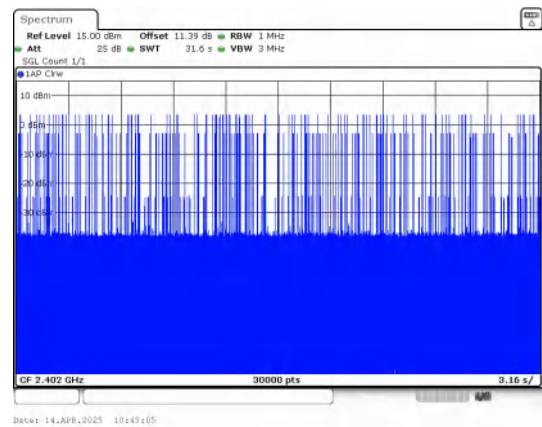
Pulse Width
 $\pi/4$ DQPSK_2-DH5



Number of Pulses in 31.6 seconds
 $\pi/4$ DQPSK_2-DH5



Pulse Width
8DPSK_3-DH5



Number of Pulses in 31.6 seconds
8DPSK_3-DH5

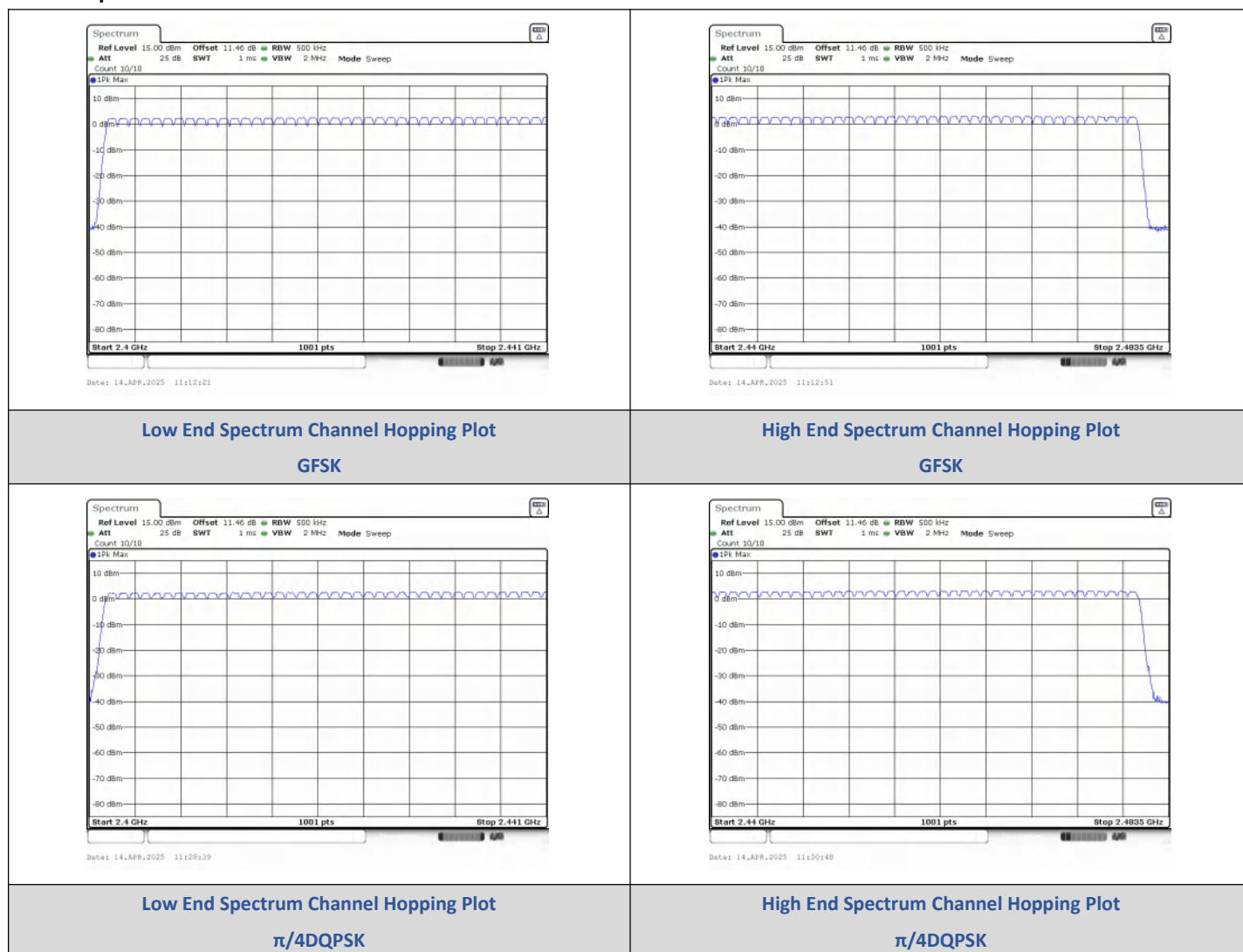
3) Number Of Hopping Channel

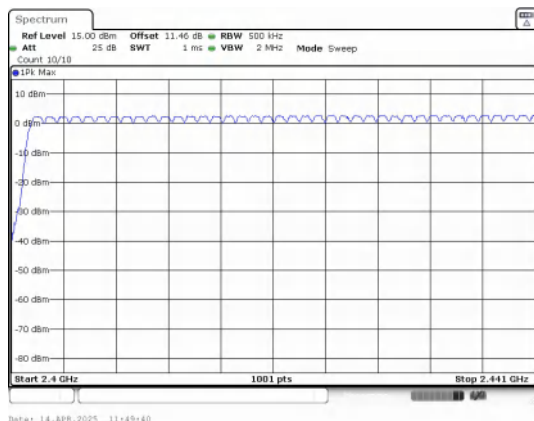
Test Result

Left:

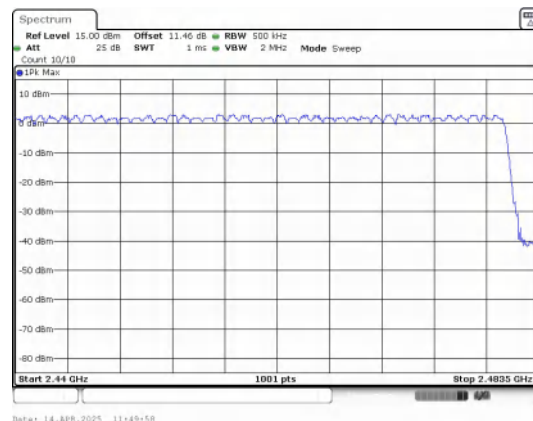
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs





Low End Spectrum Channel Hopping Plot
8DPSK

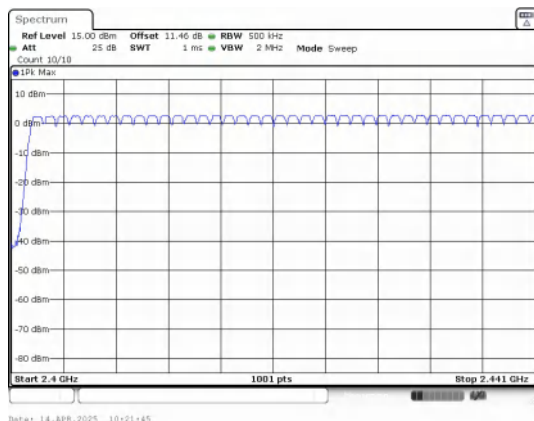


High End Spectrum Channel Hopping Plot
8DPSK

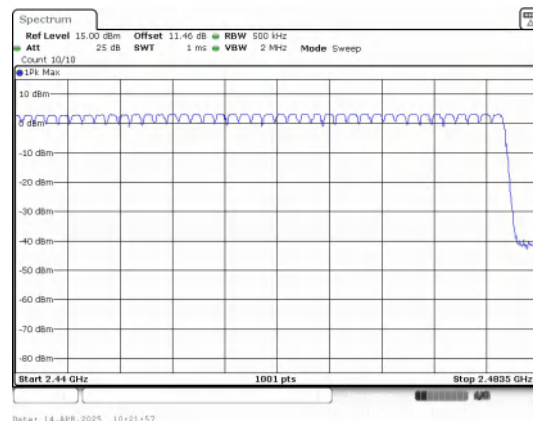
Right:

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

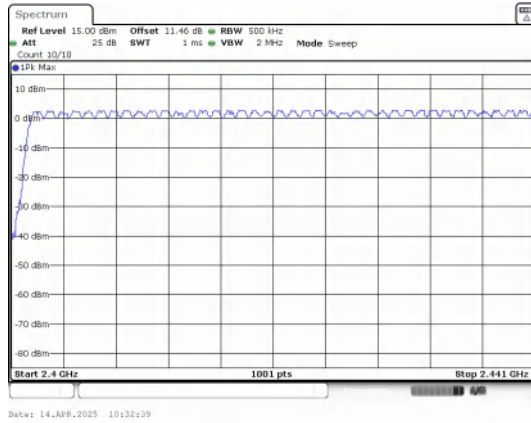
Test Graphs



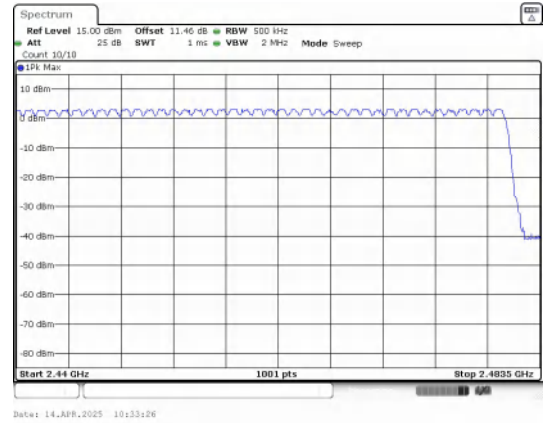
Low End Spectrum Channel Hopping Plot
GFSK



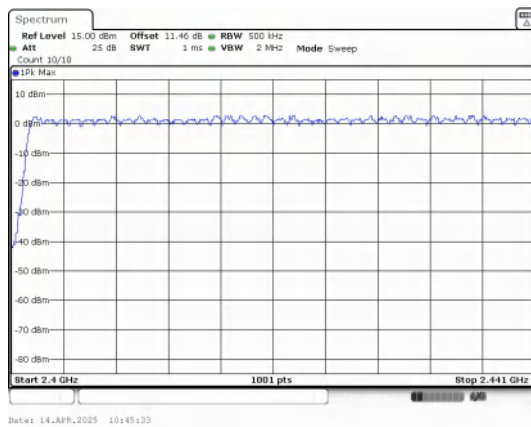
High End Spectrum Channel Hopping Plot
GFSK



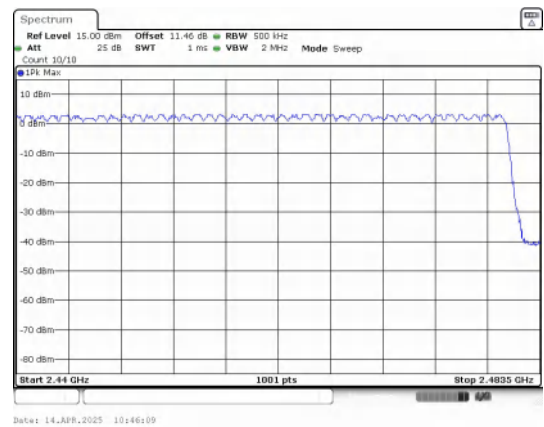
Low End Spectrum Channel Hopping Plot
 $\pi/4$ DQPSK



High End Spectrum Channel Hopping Plot
 $\pi/4$ DQPSK



Low End Spectrum Channel Hopping Plot
8DPSK



High End Spectrum Channel Hopping Plot
8DPSK

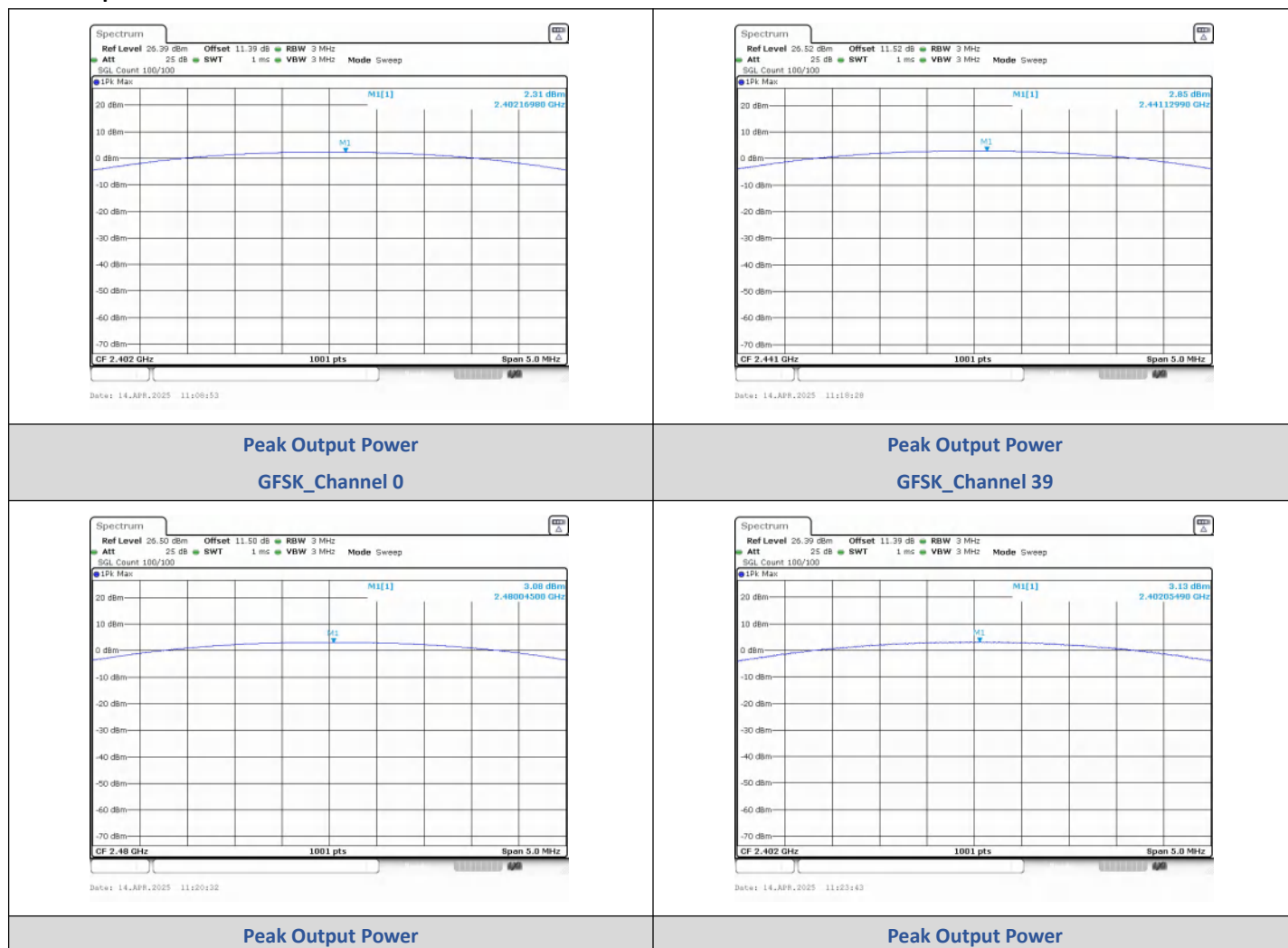
4) Conducted Peak Output Power

Test Result

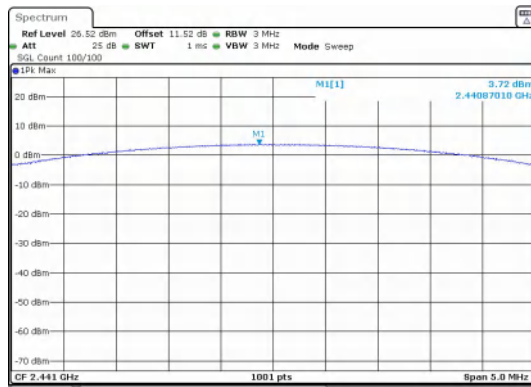
Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.31	1.70	≤30	PASS
		39	2.85	1.93		PASS
		78	3.08	2.03		PASS
$\pi/4$ DQPSK	2-DH5	0	3.13	2.06	≤20.97	PASS
		39	3.72	2.36		PASS
		78	3.85	2.43		PASS
8DPSK	3-DH5	0	3.59	2.29		PASS
		39	4.08	2.56		PASS
		78	4.30	2.69		PASS

Test Graphs

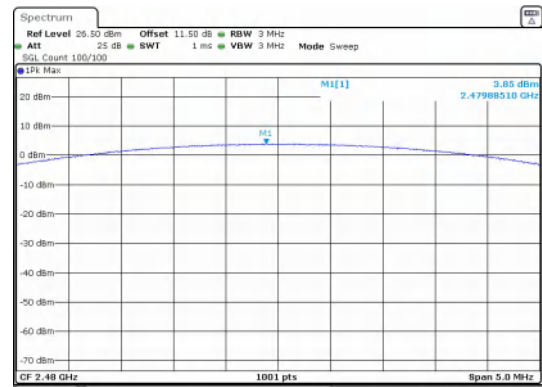


GFSK_Channel 78



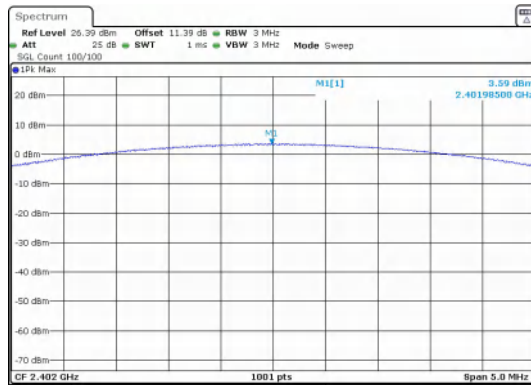
Date: 14, APR, 2025 11:38:53

$\pi/4$ DQPSK_Channel 0



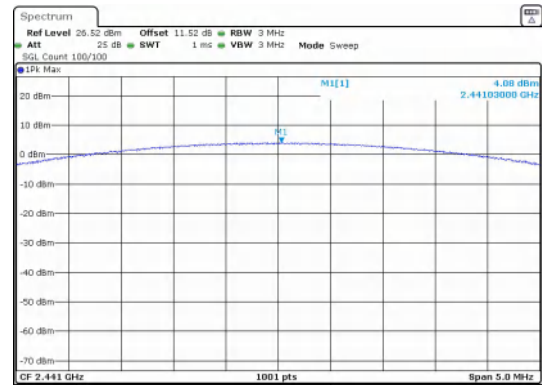
Date: 14, APR, 2025 11:41:55

Peak Output Power
 $\pi/4$ DQPSK_Channel 39



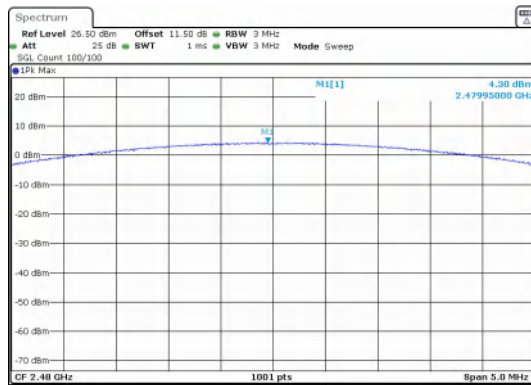
Date: 14, APR, 2025 11:44:12

Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Date: 14, APR, 2025 11:57:28

Peak Output Power
8DPSK_Channel 0



Date: 14, APR, 2025 11:59:26

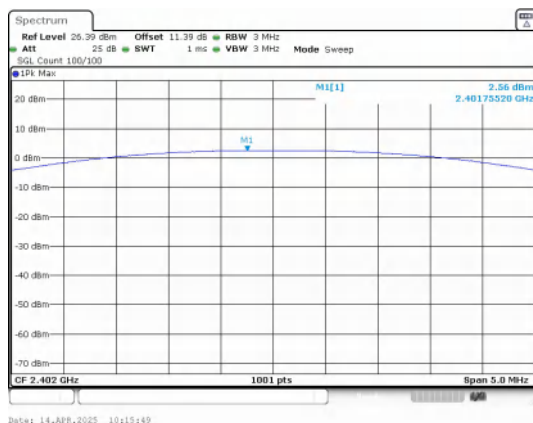
Peak Output Power
8DPSK_Channel 39

Peak Output Power
8DPSK_Channel 78

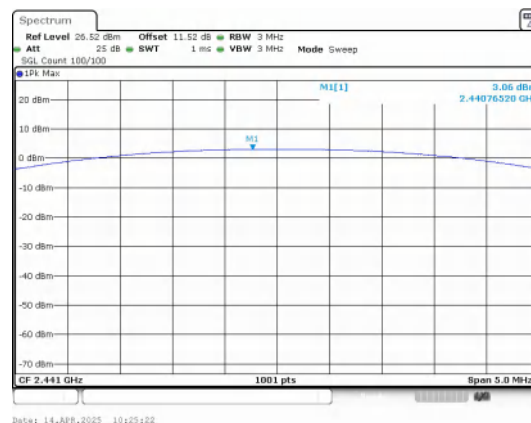
Right:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.56	1.80	≤30	PASS
		39	3.06	2.02		PASS
		78	3.23	2.10		PASS
$\pi/4$ DQPSK	2-DH5	0	3.34	2.16	≤20.97	PASS
		39	3.87	2.44		PASS
		78	4.06	2.55		PASS
8DPSK	3-DH5	0	3.75	2.37		PASS
		39	4.27	2.67		PASS
		78	4.41	2.76		PASS

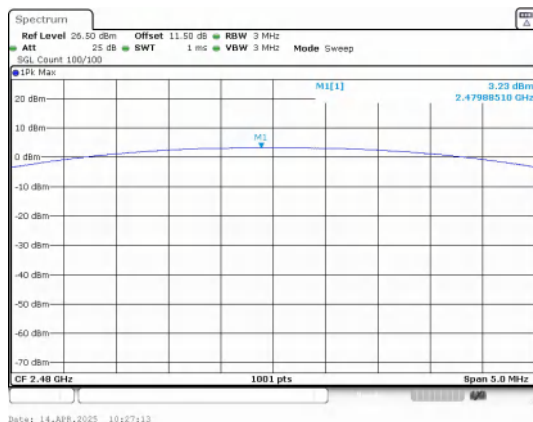
Test Graphs



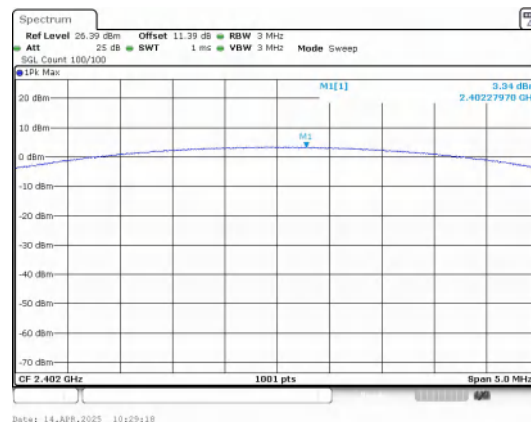
Peak Output Power
GFSK_Channel 0



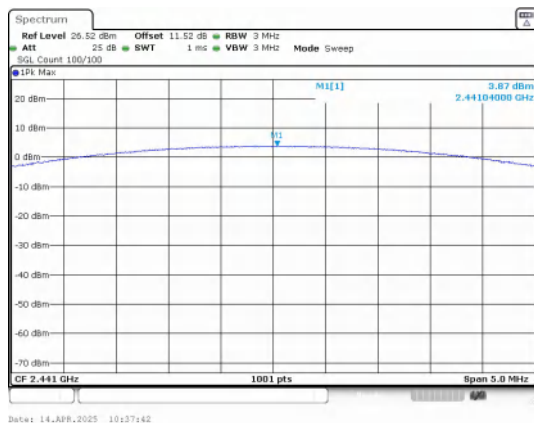
Peak Output Power
GFSK_Channel 39



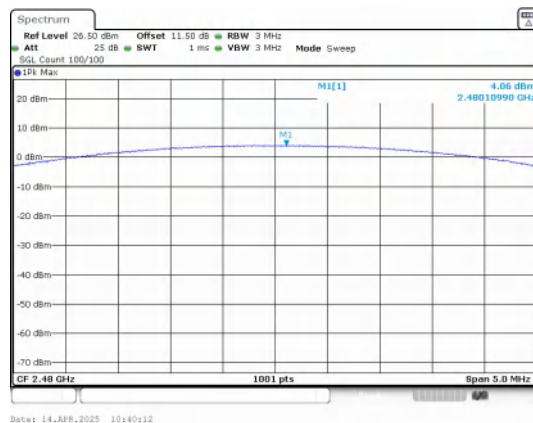
Peak Output Power
GFSK_Channel 78



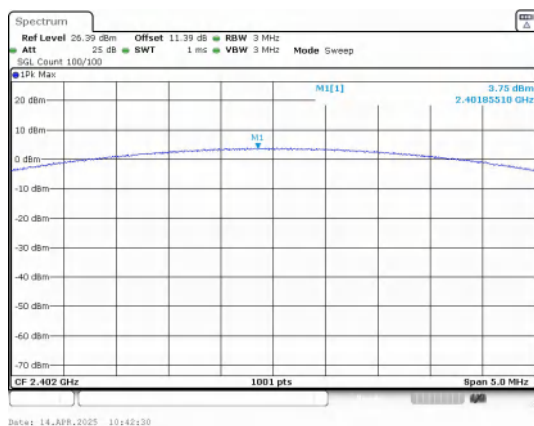
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



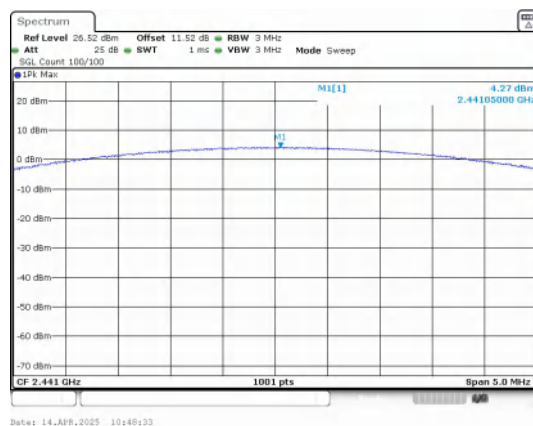
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



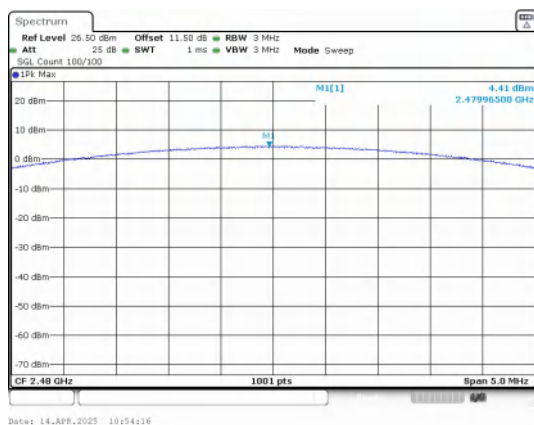
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

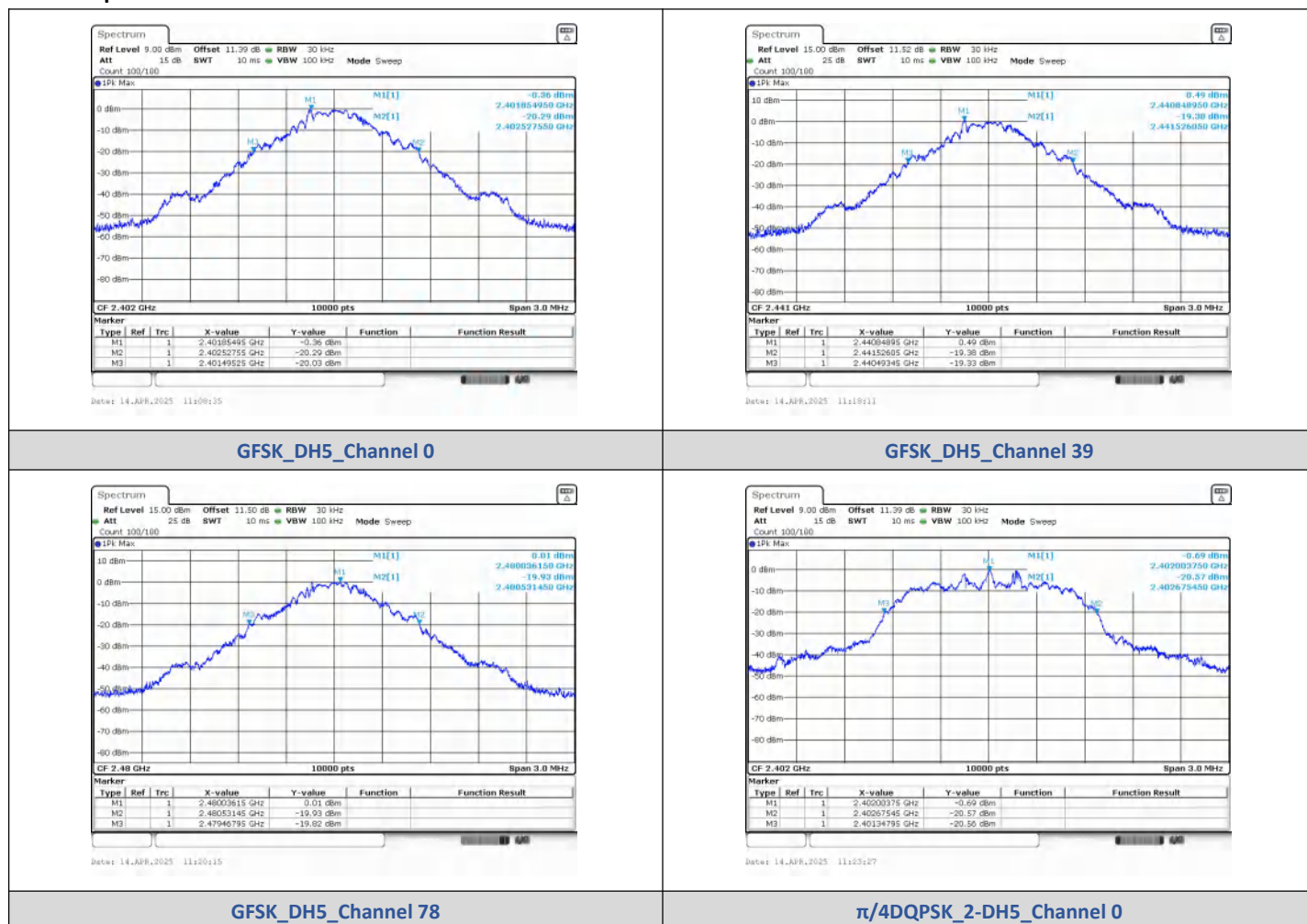
5) 20dB Bandwidth

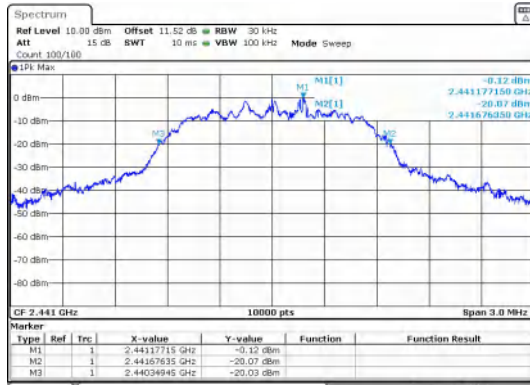
Test Result

Left:

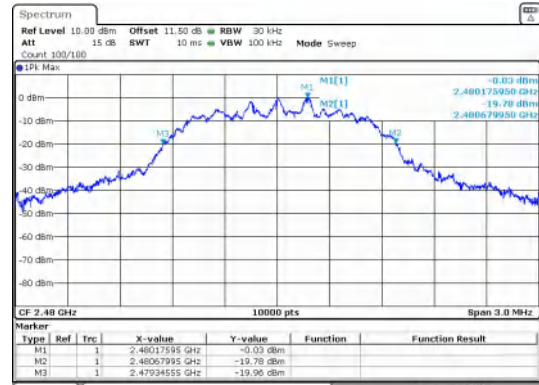
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.06
	39	2441 MHz	1.06
	78	2480 MHz	1.06
$\pi/4$ DQPSK	0	2402 MHz	1.330
	39	2441 MHz	1.330
	78	2480 MHz	1.330
8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.290
	78	2480 MHz	1.280

Test Graphs

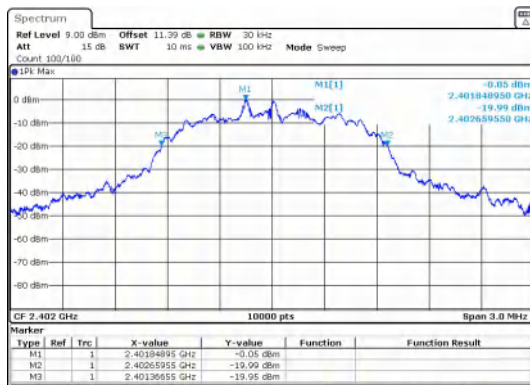




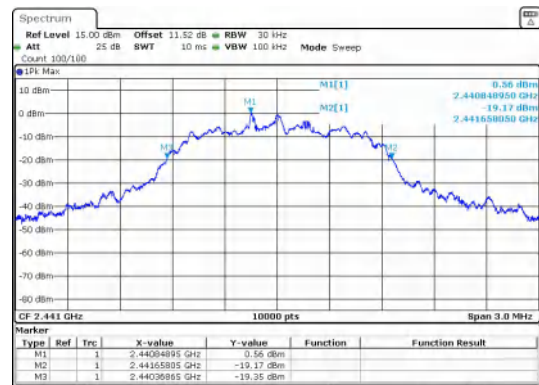
$\pi/4$ DQPSK_2-DH5_Channel 39



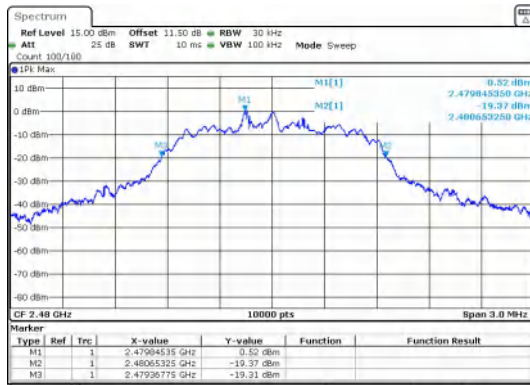
$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39

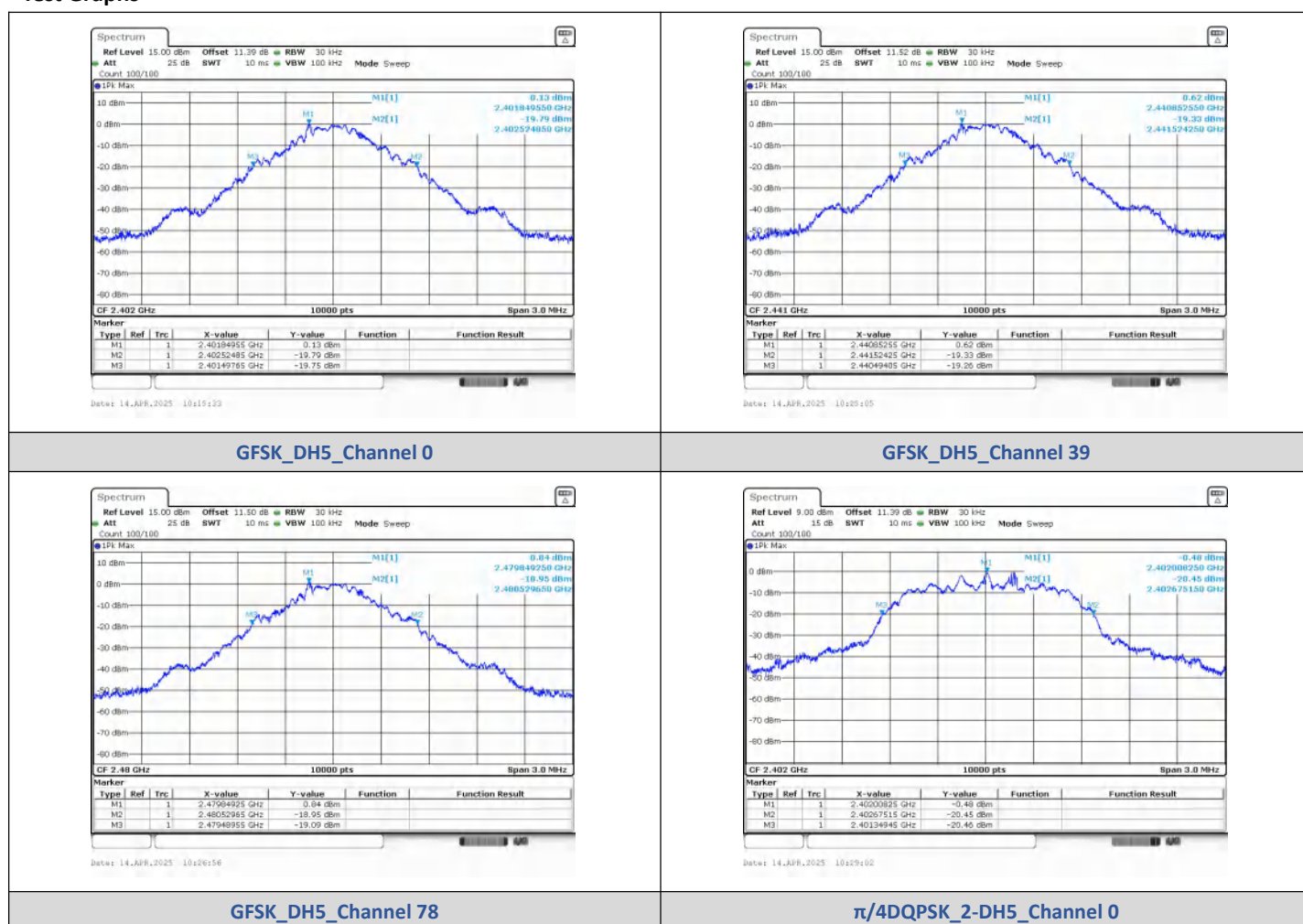


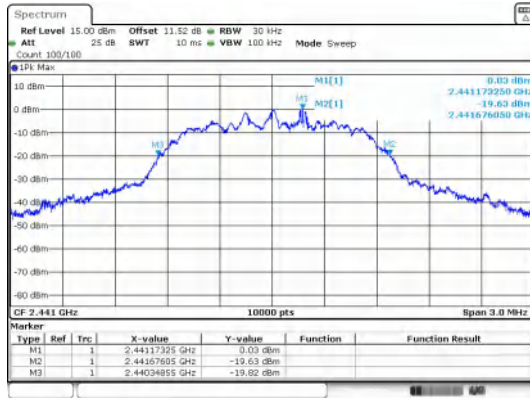
8DPSK_3-DH5_Channel 78

Right:

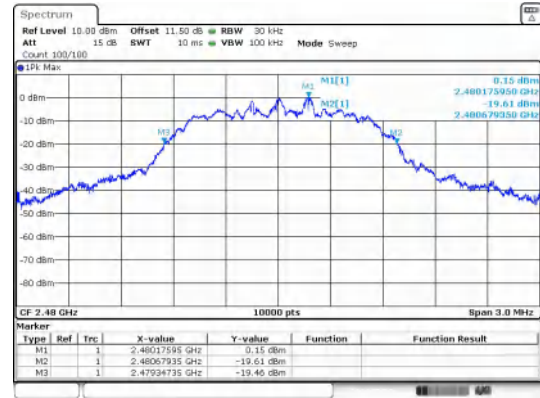
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.02
	39	2441 MHz	1.02
	78	2480 MHz	1.02
$\pi/4$ DQPSK	0	2402 MHz	1.330
	39	2441 MHz	1.330
	78	2480 MHz	1.330
8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.290
	78	2480 MHz	1.280

Test Graphs

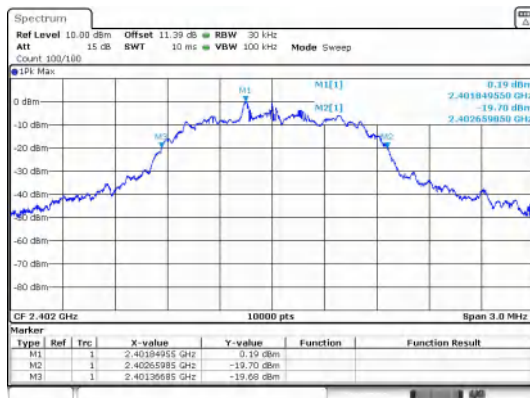




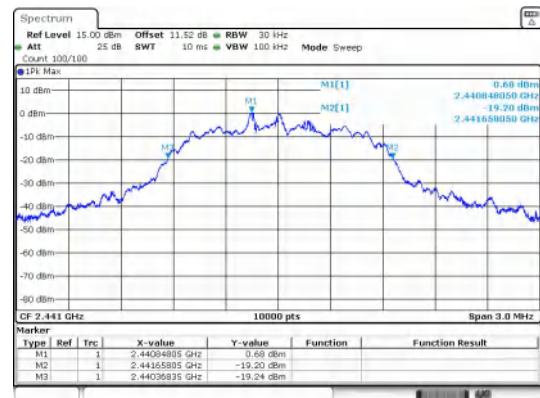
$\pi/4$ DQPSK_2-DH5_Channel 39



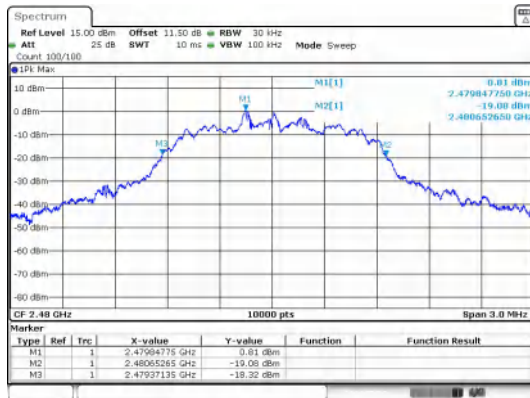
$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39

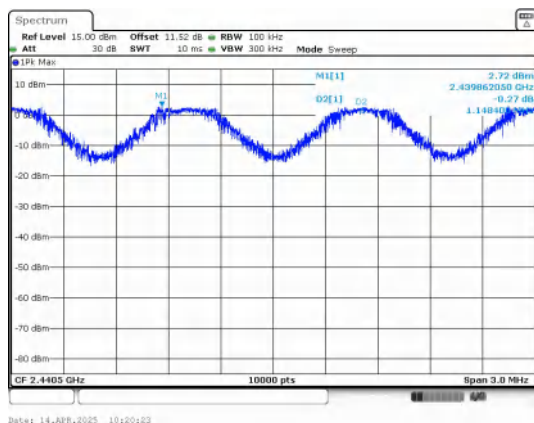


8DPSK_3-DH5_Channel 78

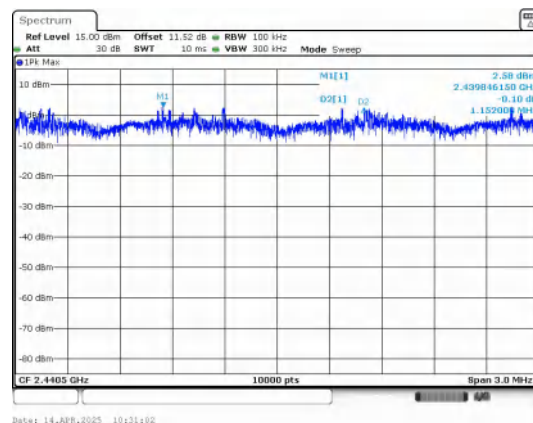
Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8621	2441.0105	1.1484	1.02	PASS
$\pi/4$ DQPSK	2-DH5	2439.8461	2440.9981	1.1520	0.887	PASS
8DPSK	3-DH5	2439.851	2441.0314	1.1805	0.86	PASS

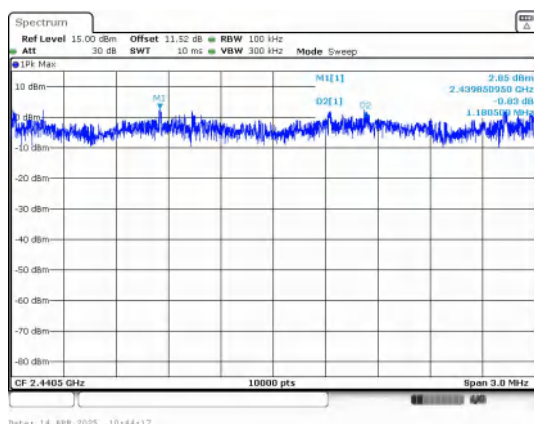
Test Graphs



GFSK



$\pi/4$ DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left:

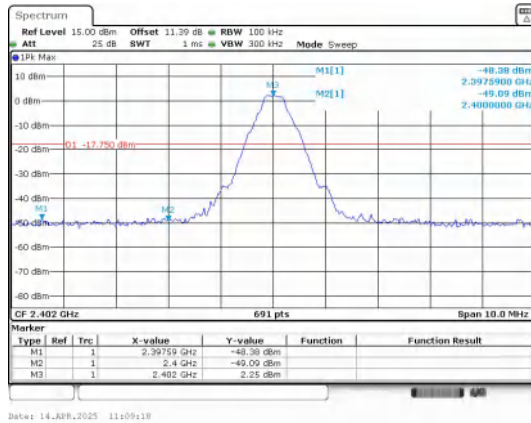
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2397.59	-48.385	-17.75	-30.635	PASS
			2400.00	-50.110	-17.75	-32.360	PASS
			9608.10	-42.559	-17.75	-24.809	PASS
		39	9763.72	-42.797	-17.17	-25.627	PASS
		78	2483.50	-49.610	-17.0	-32.610	PASS
			9920.20	-45.345	-17.0	-28.345	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-48.390	-17.85	-30.540	PASS
			9608.08	-41.067	-17.85	-23.217	PASS
		39	9763.72	-42.242	-17.32	-24.922	PASS
		78	2483.50	-49.860	-17.17	-32.690	PASS
			9920.20	-43.416	-17.17	-26.246	PASS
8DPSK	3-DH5	0	2400.00	-46.280	-17.81	-28.470	PASS
			9608.08	-40.519	-17.81	-22.709	PASS
		39	9763.72	-42.978	-17.25	-25.728	PASS
		78	2483.50	-50.770	-17.18	-33.590	PASS
			9920.20	-42.009	-17.18	-24.829	PASS

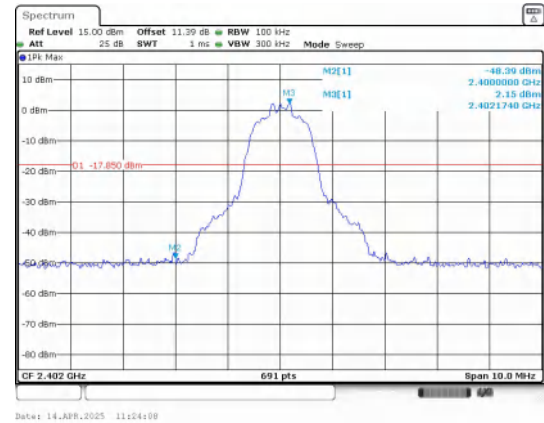
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.41	-47.947	-17.72	-30.227	PASS
			2400.00	-49.750	-17.72	-32.030	PASS
			2483.50	-49.250	-17.04	-32.210	PASS
$\pi/4$ DQPSK	2-DH5		2395.64	-47.302	-17.81	-29.492	PASS
			2400.00	-49.410	-17.81	-31.600	PASS
			2483.50	-49.790	-18.43	-31.360	PASS
8DPSK	3-DH5		2396.24	-48.474	-17.84	-30.634	PASS
			2400.00	-50.250	-17.84	-32.410	PASS
			2483.50	-48.320	-17.44	-30.880	PASS

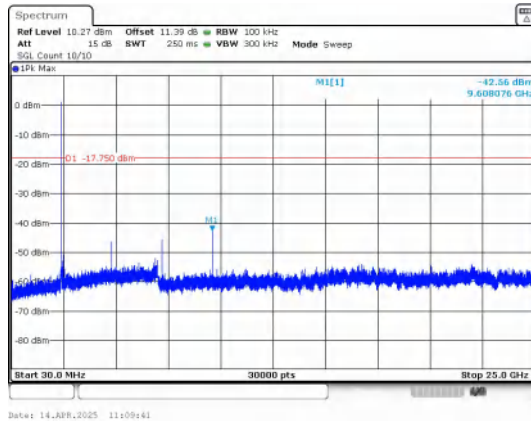
Test Graphs



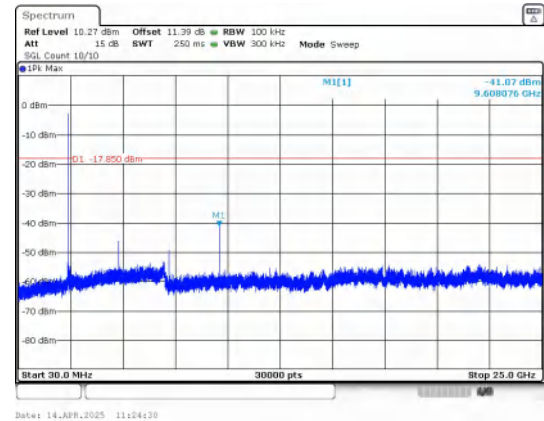
Out Of Band Emission
GFSK_DH5_Channel 0



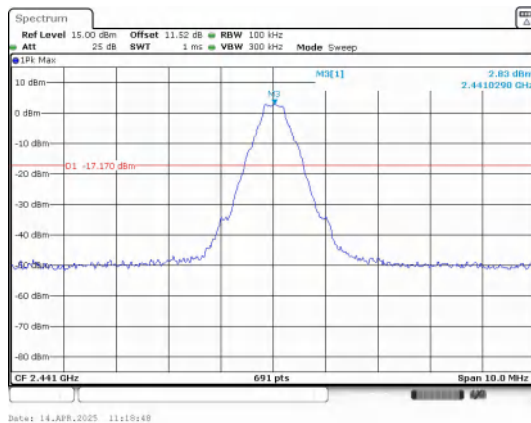
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0



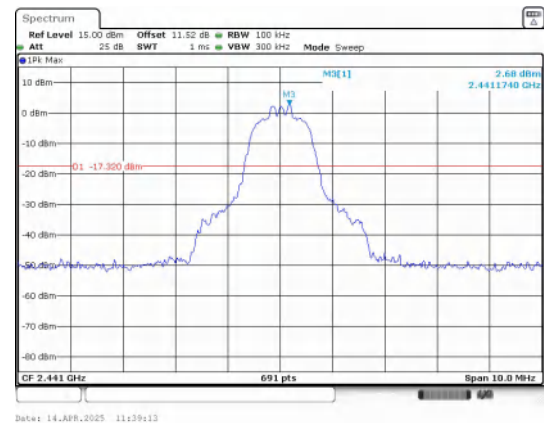
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



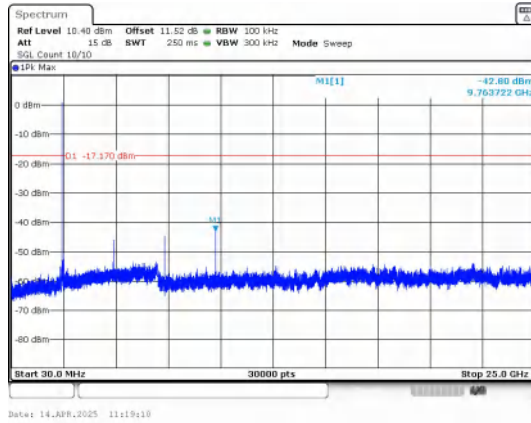
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



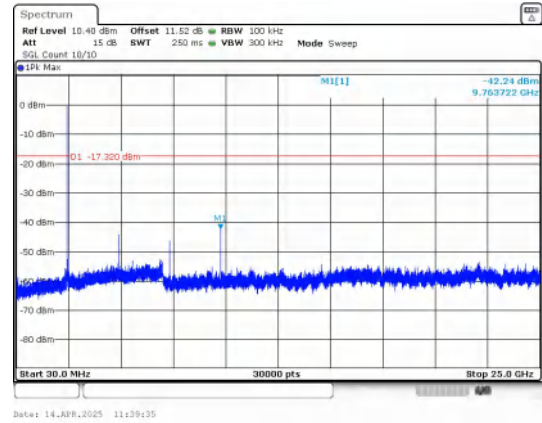
Out Of Band Emission
GFSK_DH5_Channel 39



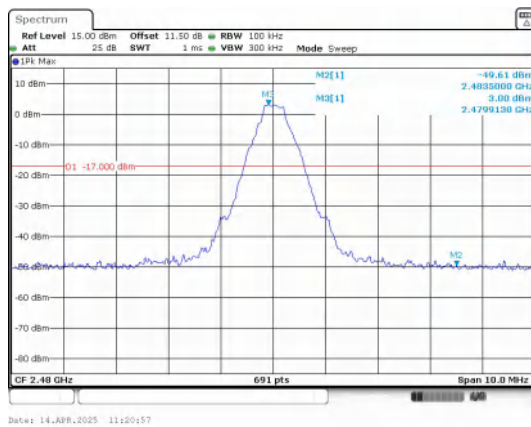
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



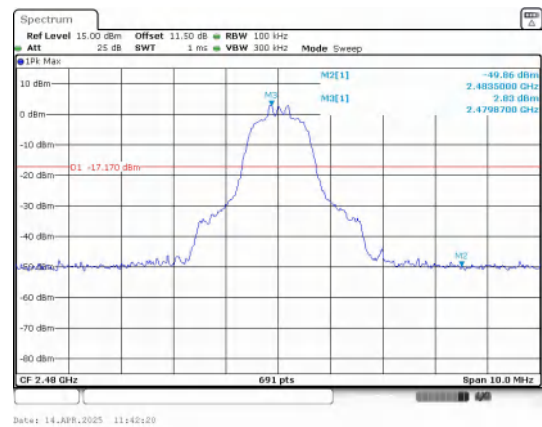
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



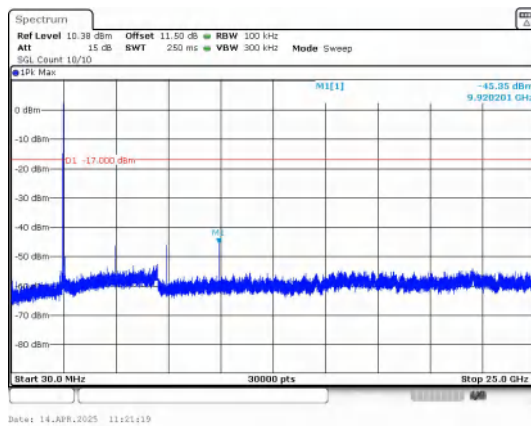
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



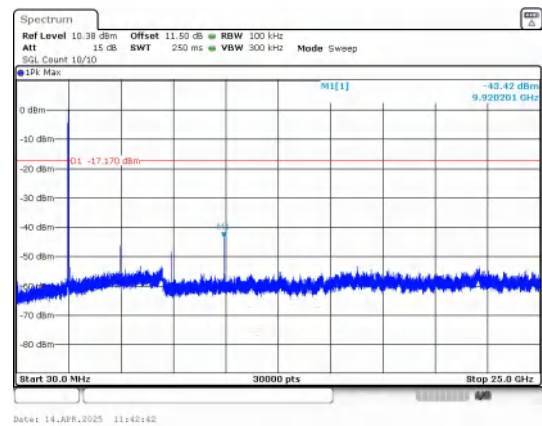
Out Of Band Emission
GFSK_DH5_Channel 78



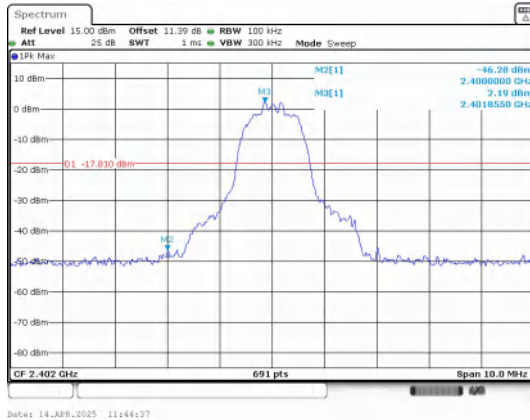
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



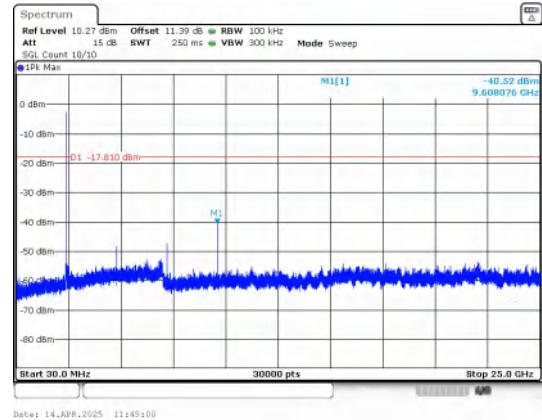
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



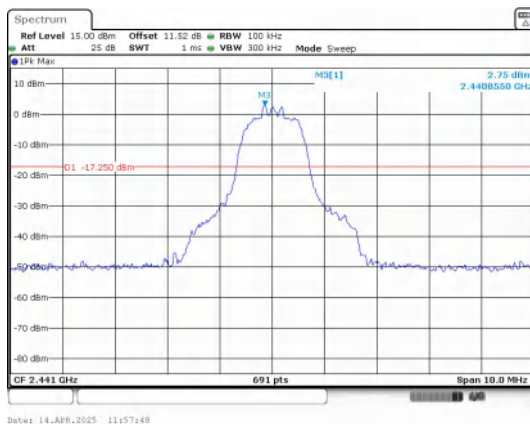
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



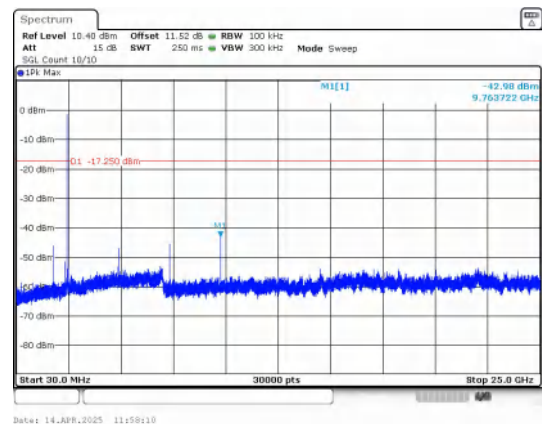
Out Of Band Emission
8DPSK_3-DH5_Channel 0



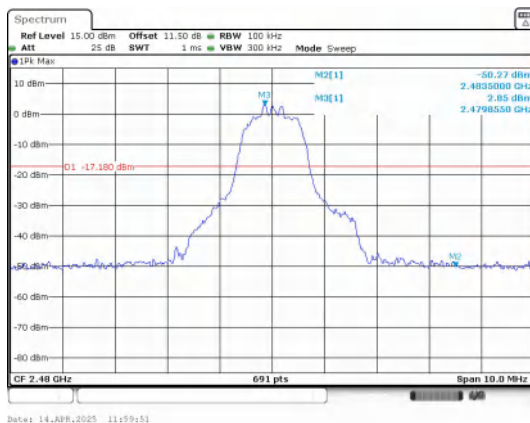
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



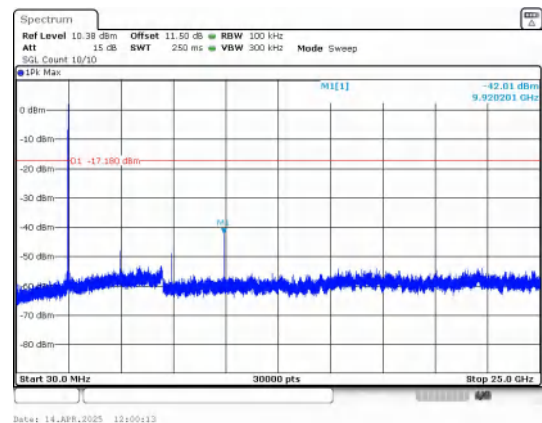
Out Of Band Emission
8DPSK_3-DH5_Channel 39



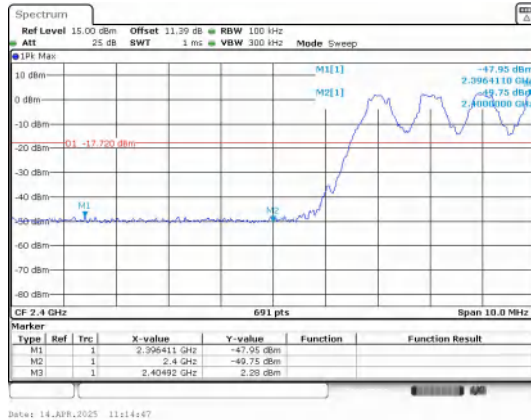
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



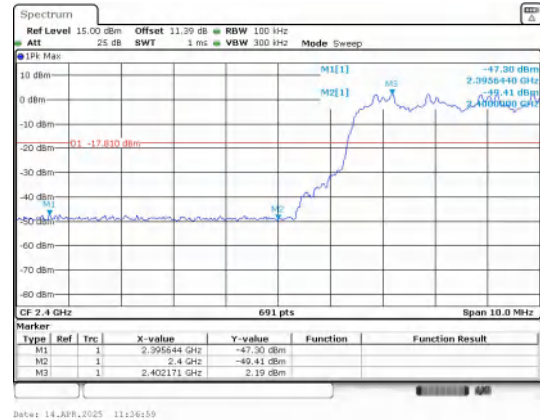
Out Of Band Emission
8DPSK_3-DH5_Channel 78



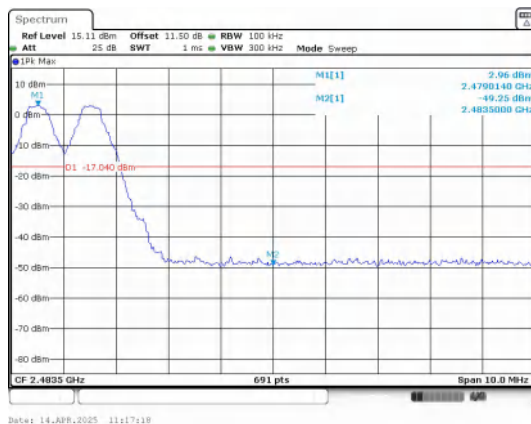
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



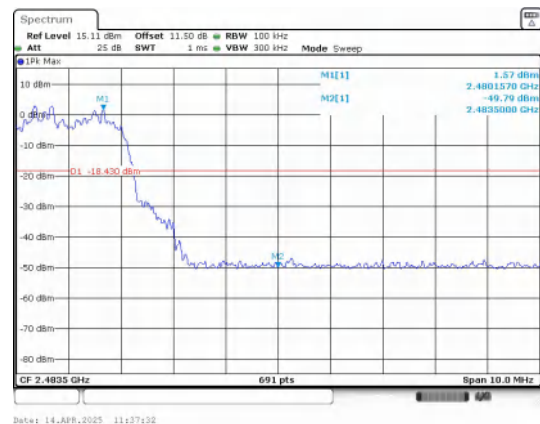
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



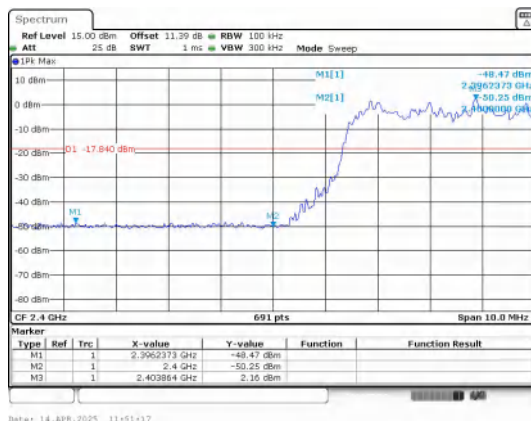
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



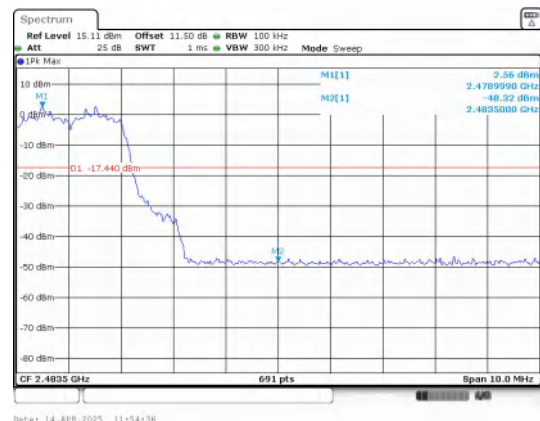
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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



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



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

Right:

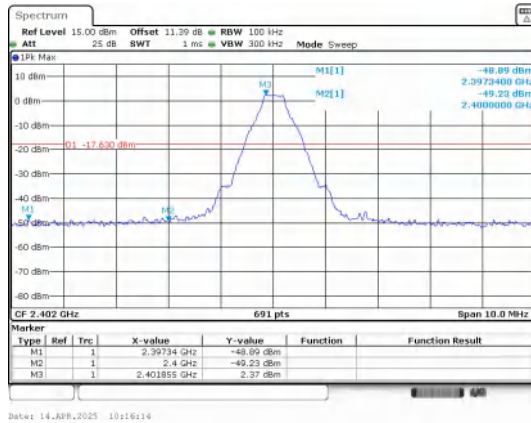
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2397.34	-48.890	-17.63	-31.260	PASS
			2400.00	-49.230	-17.63	-31.600	PASS
			9608.10	-42.688	-17.63	-25.058	PASS
		39	9763.72	-44.074	-17.11	-26.964	PASS
		78	2483.50	-50.240	-16.8	-33.440	PASS
			9920.20	-44.253	-16.8	-27.453	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-46.580	-17.61	-28.970	PASS
			9608.08	-41.667	-17.61	-24.057	PASS
		39	9763.72	-43.037	-17.16	-25.877	PASS
		78	2483.50	-49.280	-17.14	-32.140	PASS
			9920.20	-43.166	-17.14	-26.026	PASS
8DPSK	3-DH5	0	2398.50	-49.186	-17.57	-31.616	PASS
			2400.00	-49.580	-17.57	-32.010	PASS
			9608.10	-41.792	-17.57	-24.222	PASS
		39	9763.72	-42.545	-17.91	-24.635	PASS
		78	2483.50	-50.200	-17.21	-32.990	PASS
			9920.20	-42.374	-17.21	-25.164	PASS

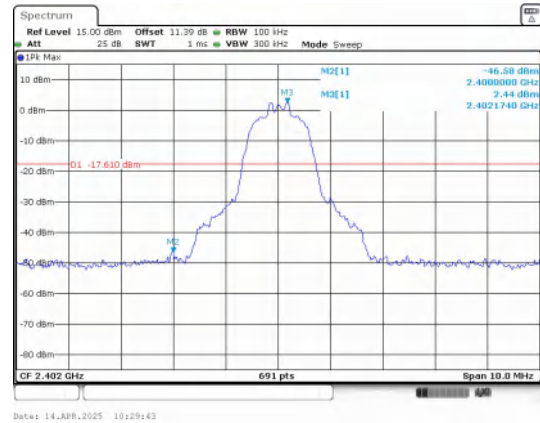
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.90	-47.618	-17.5	-30.118	PASS
			2400.00	-49.410	-17.5	-31.910	PASS
			2483.50	-50.070	-17.36	-32.710	PASS
$\pi/4$ DQPSK	2-DH5		2397.19	-47.737	-17.69	-30.047	PASS
			2400.00	-49.880	-17.69	-32.190	PASS
			2483.50	-48.170	-17.63	-30.540	PASS
8DPSK	3-DH5		2397.95	-48.184	-18.36	-29.824	PASS
			2400.00	-49.770	-18.36	-31.410	PASS
			2483.50	-50.460	-17.29	-33.170	PASS

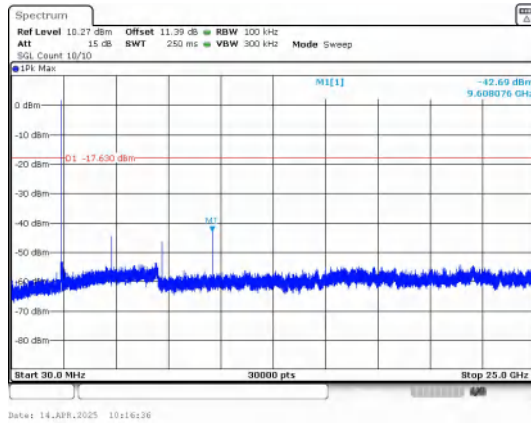
Test Graphs



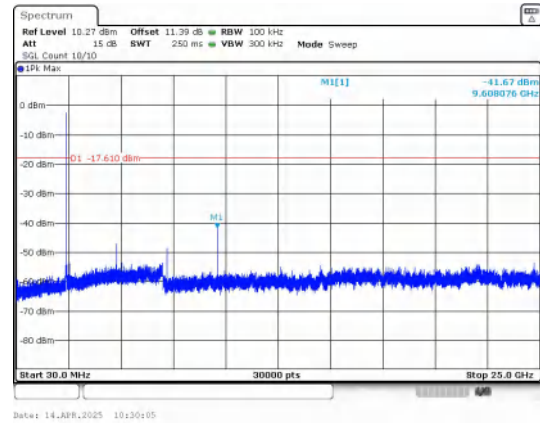
Out Of Band Emission
GFSK_DH5_Channel 0



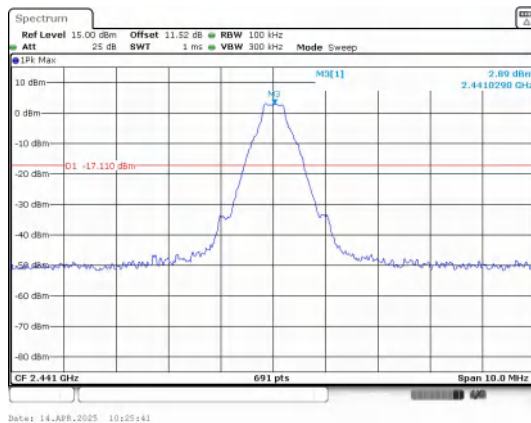
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0



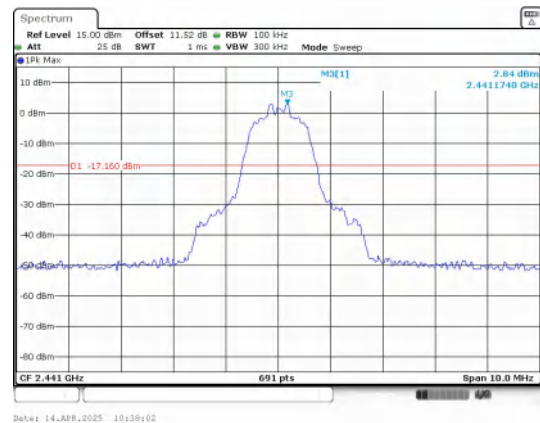
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



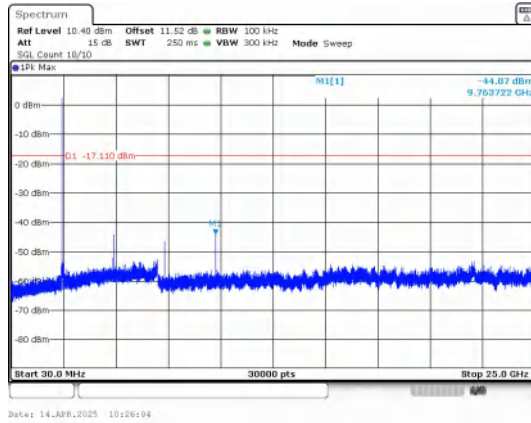
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



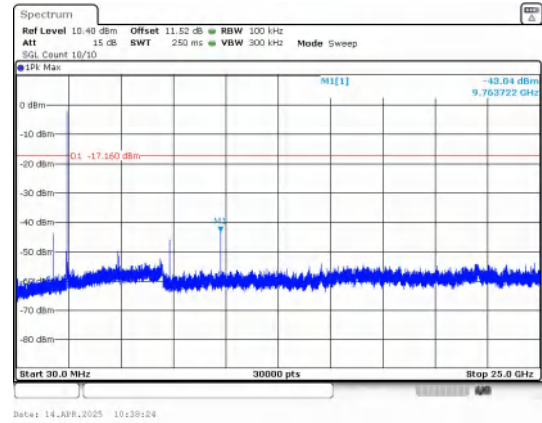
Out Of Band Emission
GFSK_DH5_Channel 39



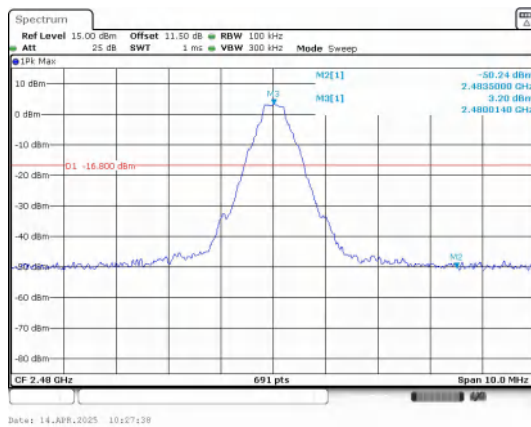
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



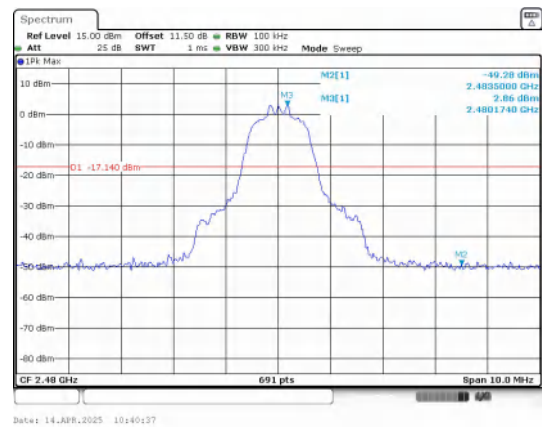
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



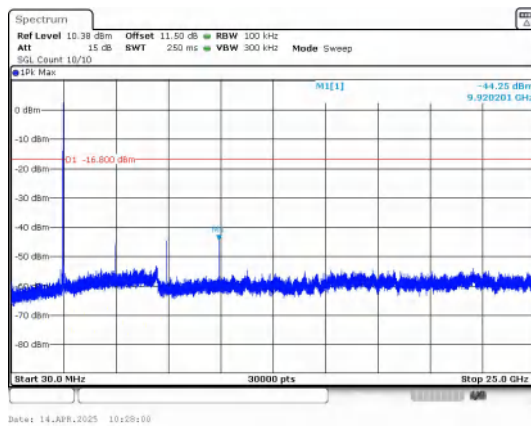
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



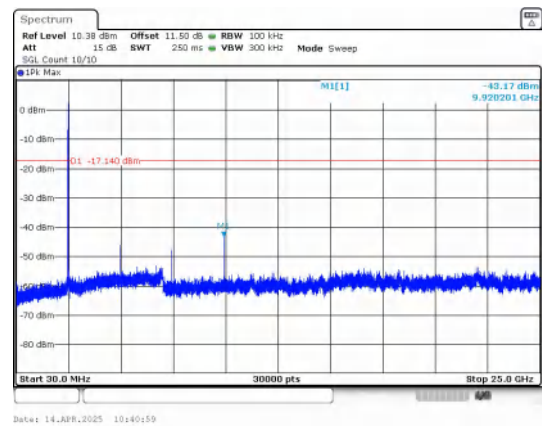
Out Of Band Emission
GFSK_DH5_Channel 78



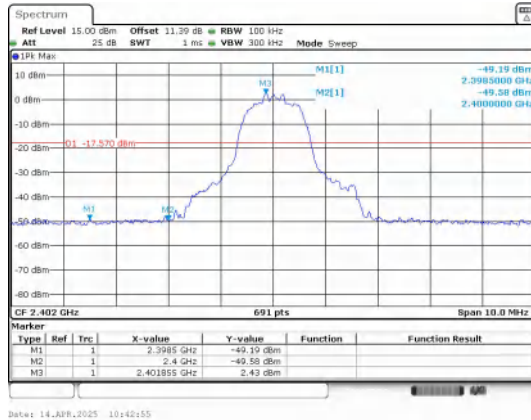
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



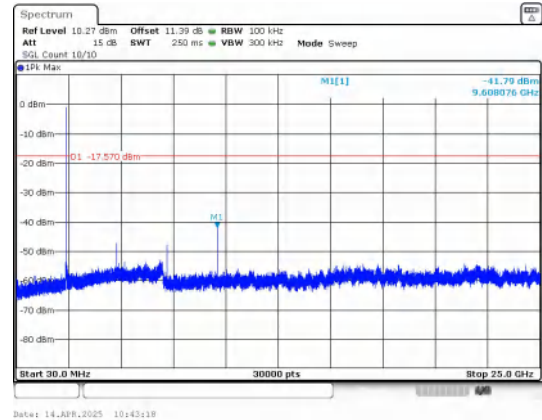
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



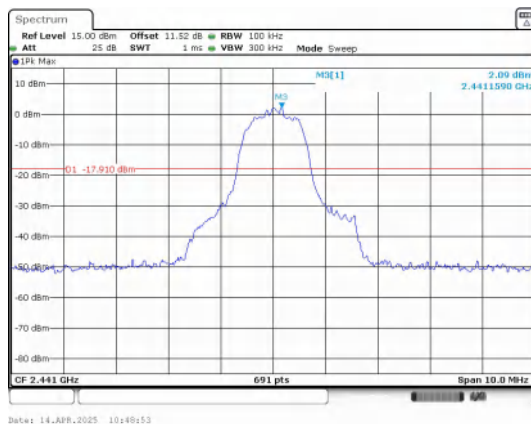
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



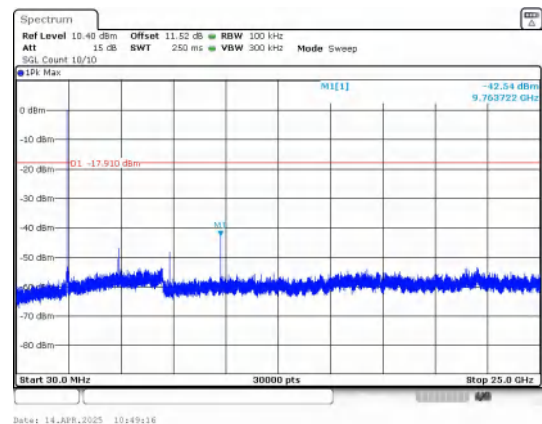
Out Of Band Emission
8DPSK_3-DH5_Channel 0



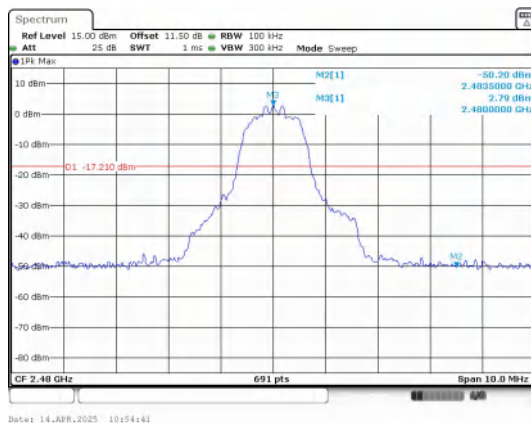
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



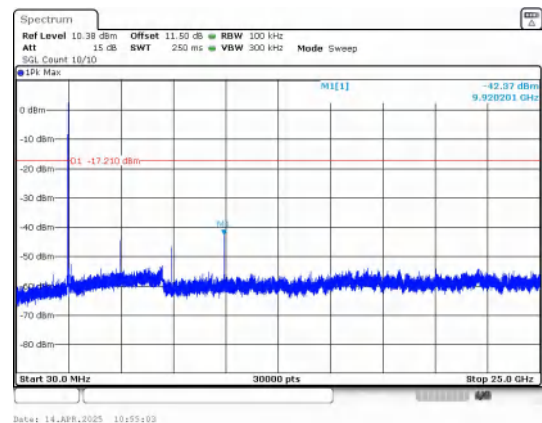
Out Of Band Emission
8DPSK_3-DH5_Channel 39



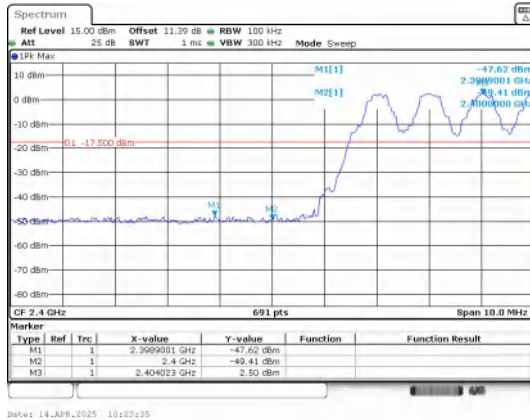
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



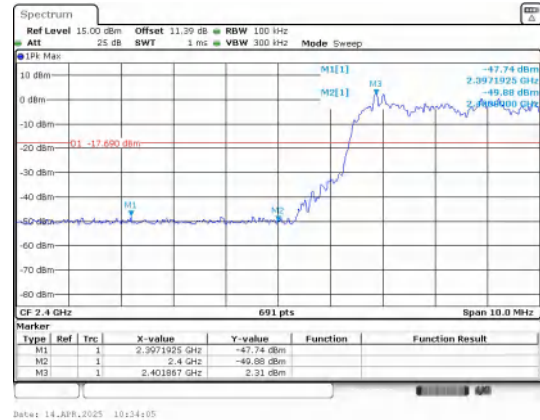
Out Of Band Emission
8DPSK_3-DH5_Channel 78



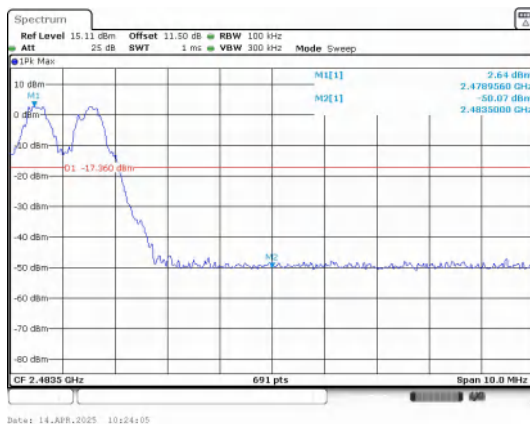
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



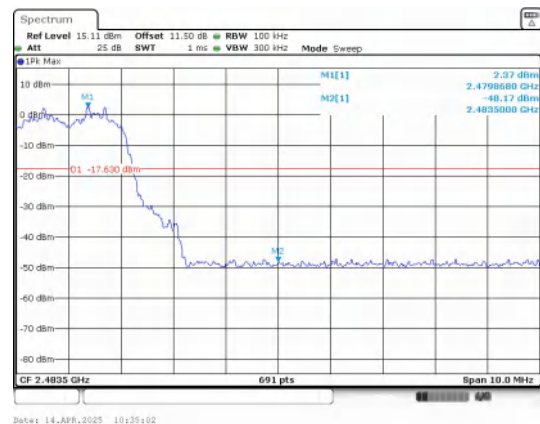
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



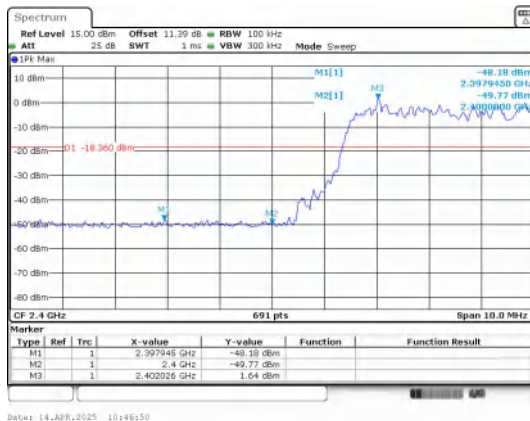
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



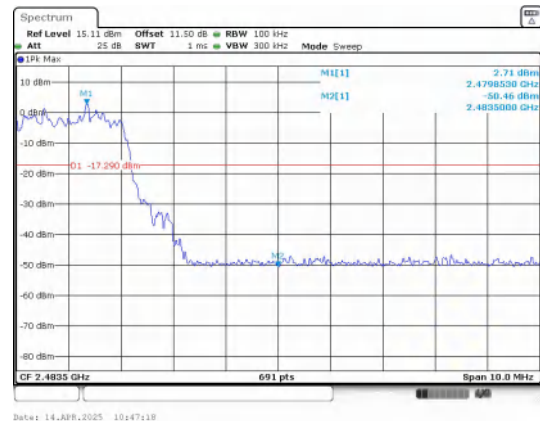
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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



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



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

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