

Appendix Report

Report No.:	CISRR25010401704
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

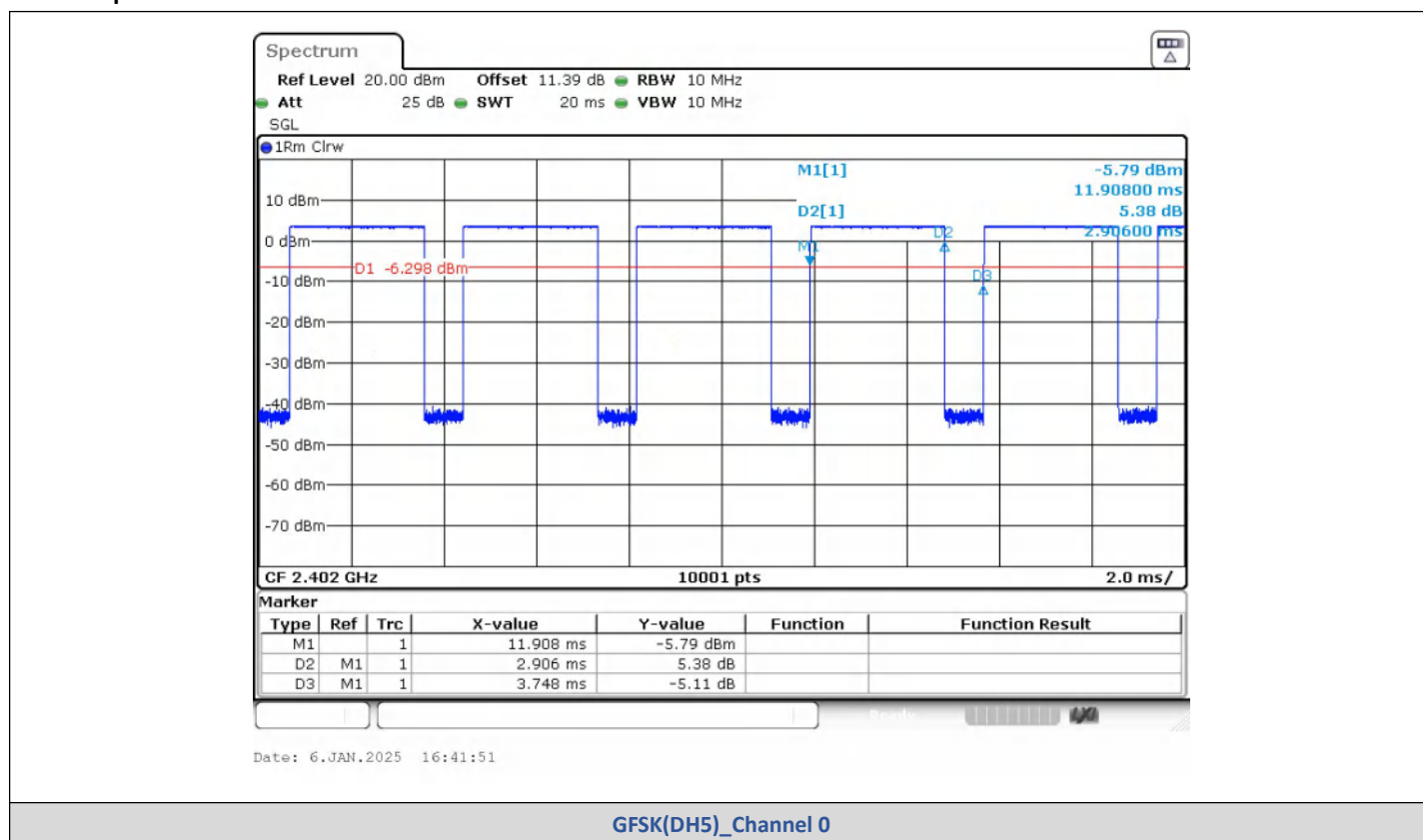
1) Duty Cycle

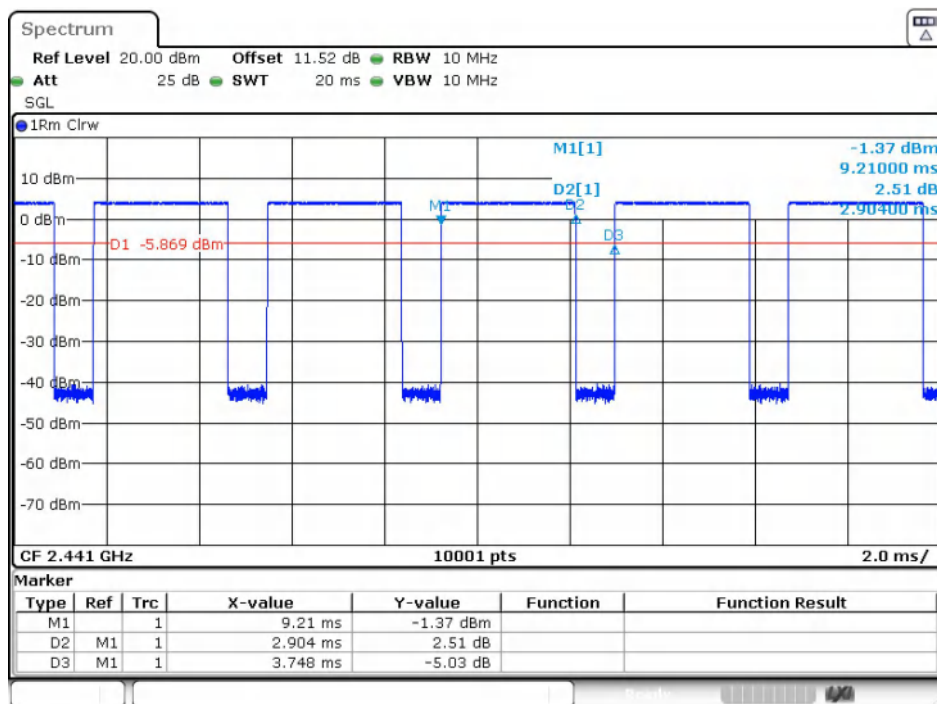
Test Result

Left:

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.906	3.748	77.53	0.7753	1.1053	0.3441
		39	2.904	3.748	77.48	0.7748	1.1081	0.3444
		78	2.904	3.748	77.48	0.7748	1.1081	0.3444
$\pi/4$ DQPSK	2-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	2.912	3.748	77.69	0.7769	1.0963	0.3434
8DPSK	3-DH5	0	2.914	3.748	77.75	0.7775	1.093	0.3432
		39	2.912	3.748	77.69	0.7769	1.0963	0.3434
		78	2.914	3.748	77.75	0.7775	1.093	0.3432

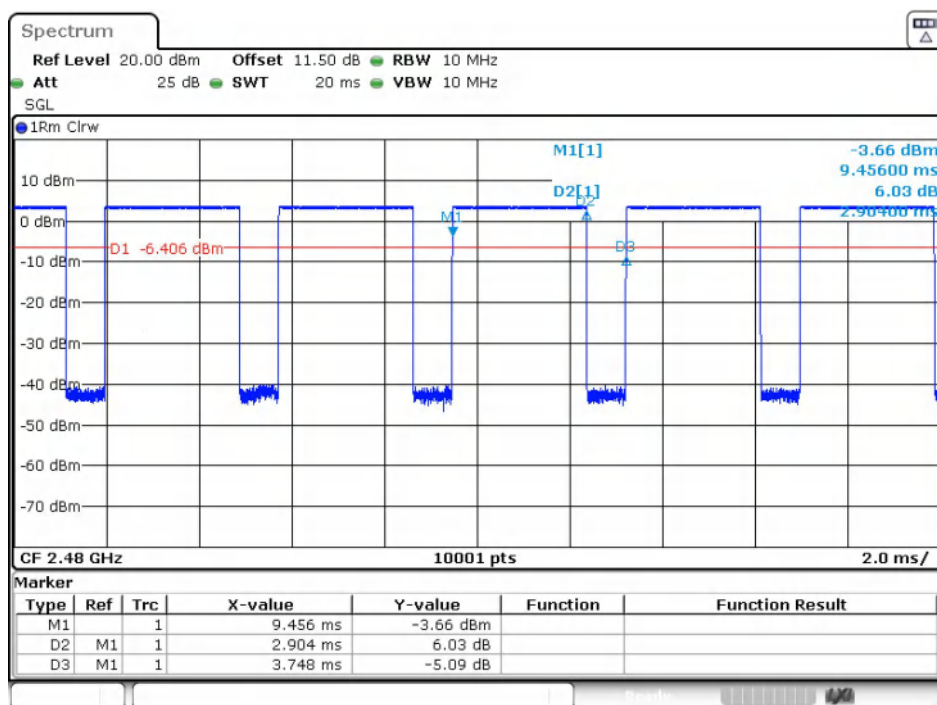
Test Graphs





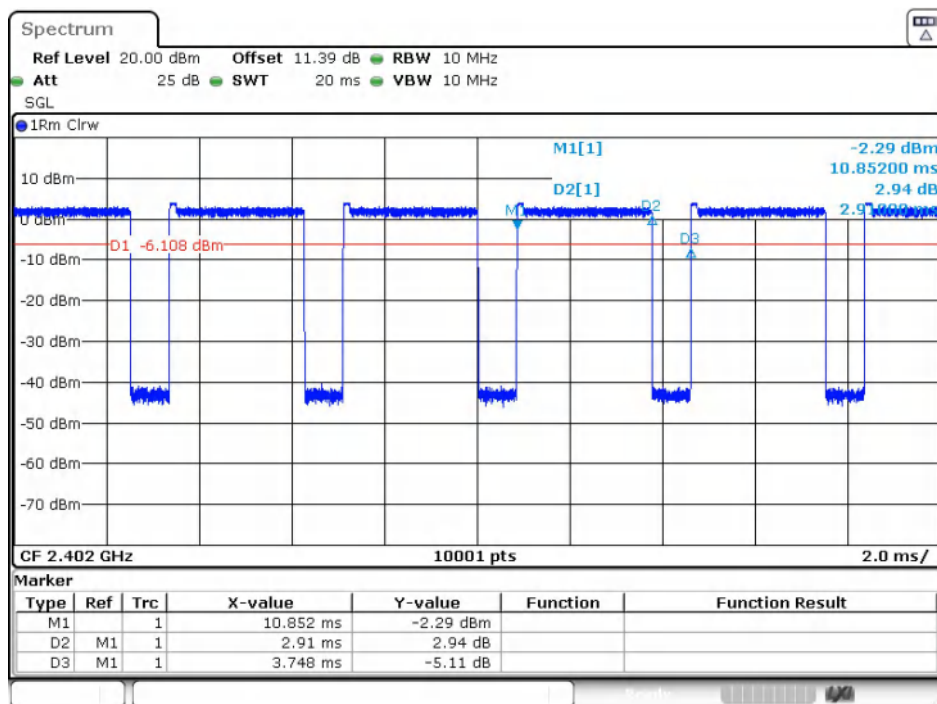
Date: 6,JAN.2025 16:58:33

GFSK(DH5)_Channel 39



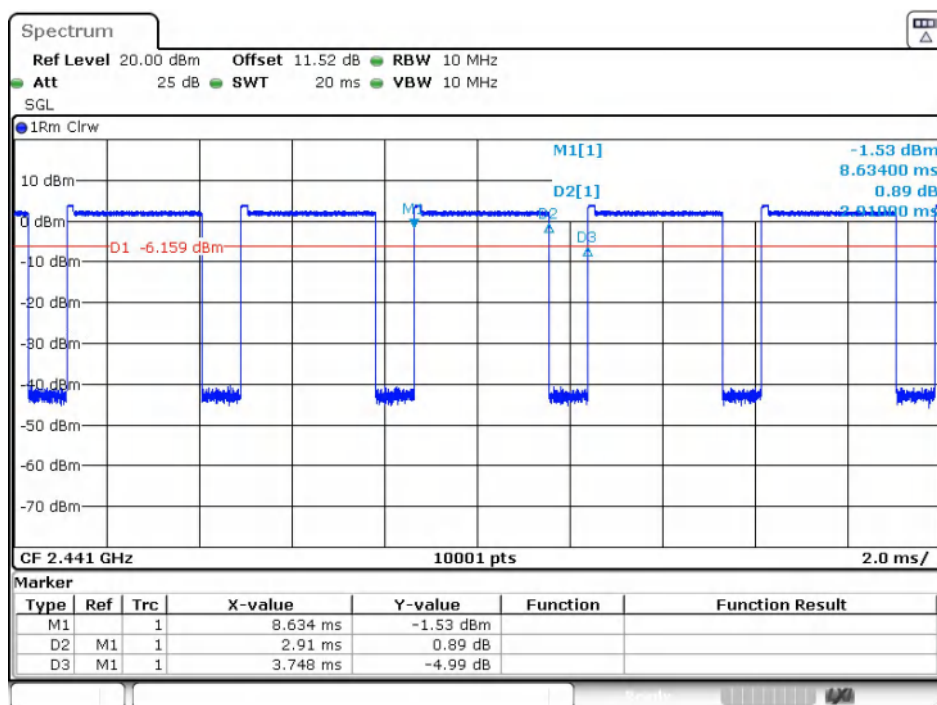
Date: 6,JAN.2025 17:00:15

GFSK(DH5)_Channel 78



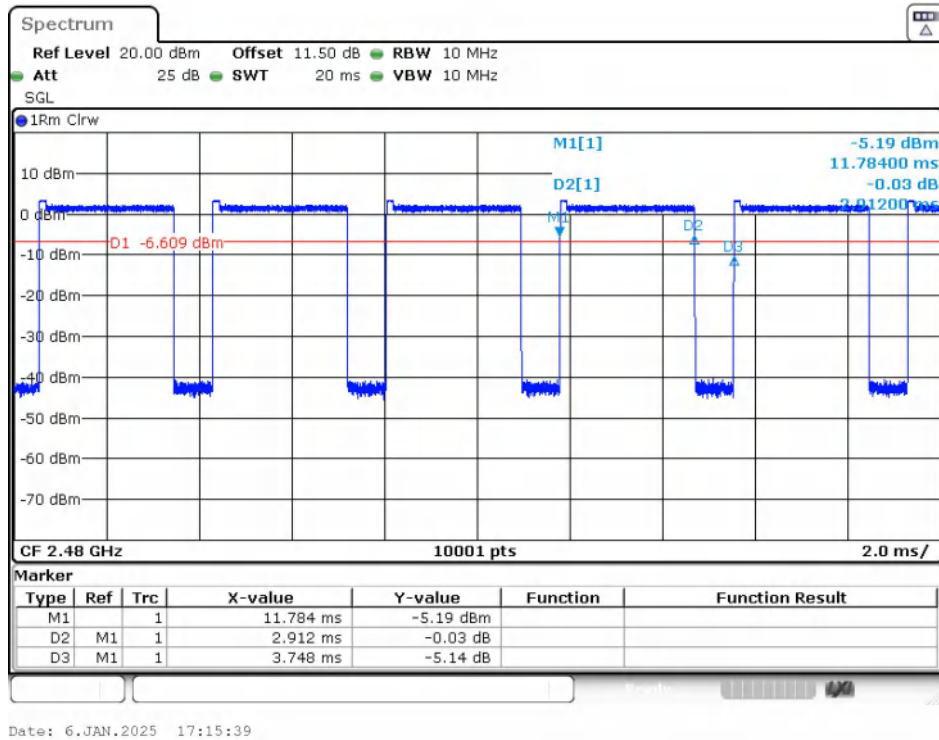
Date: 6, JAN. 2025 17:02:04

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

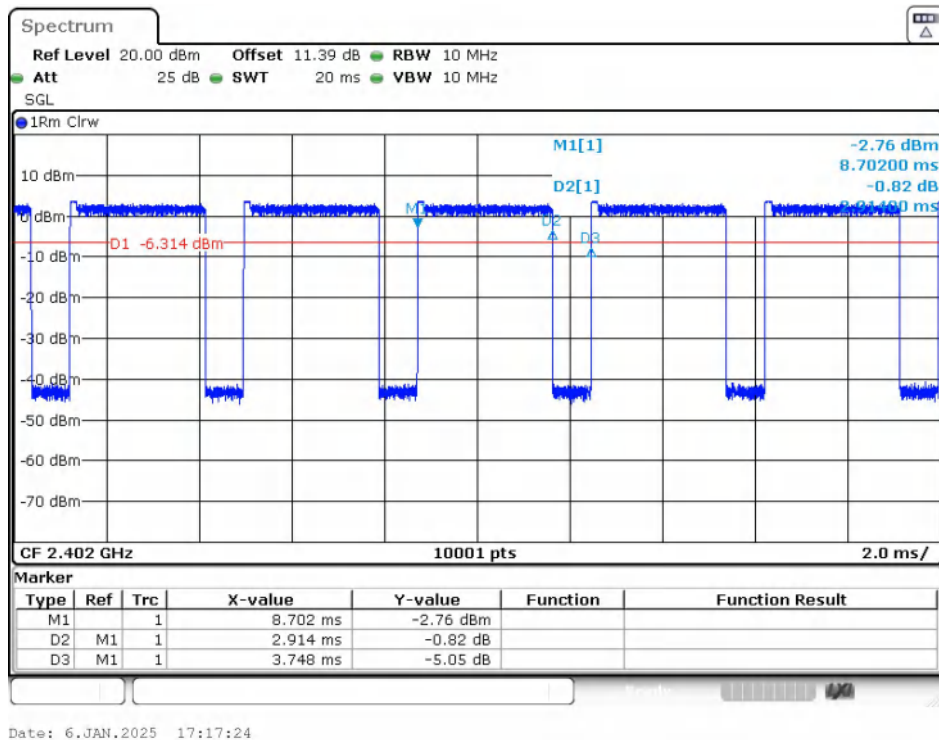


Date: 6, JAN. 2025 17:14:01

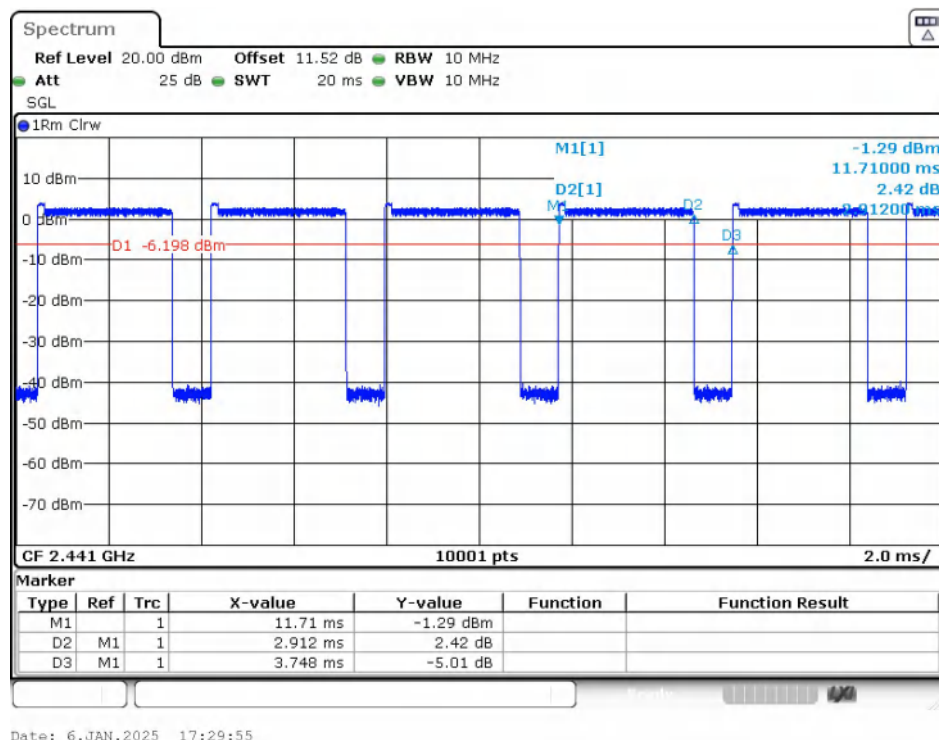
$\pi/4$ DQPSK(2-DH5)_Channel 39



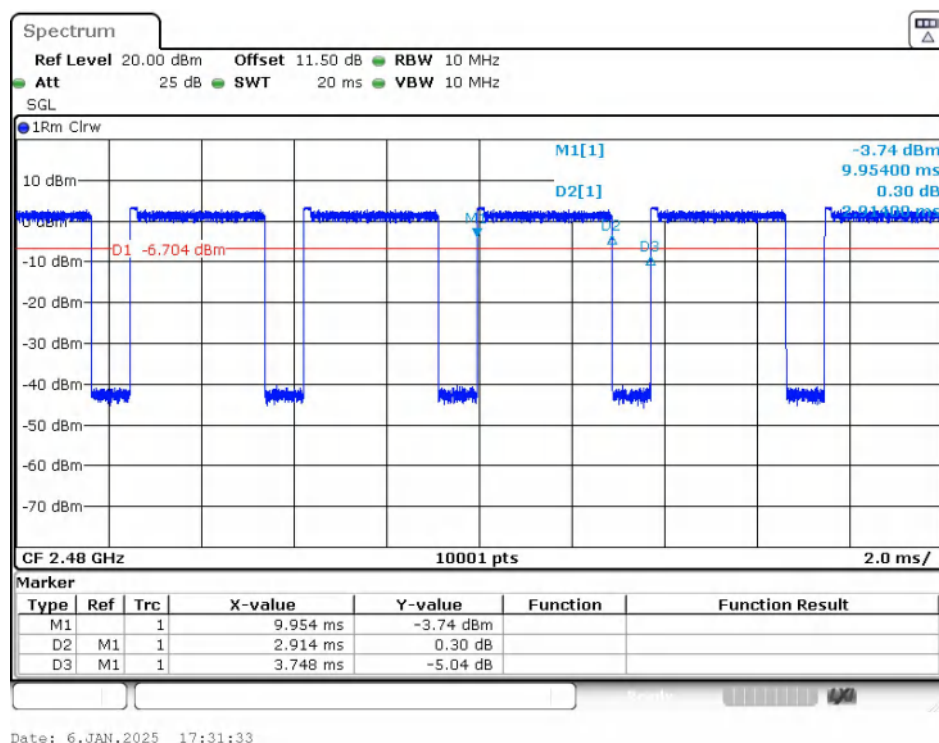
$\pi/4$ DQPSK(2-DH5)_Channel 78



8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



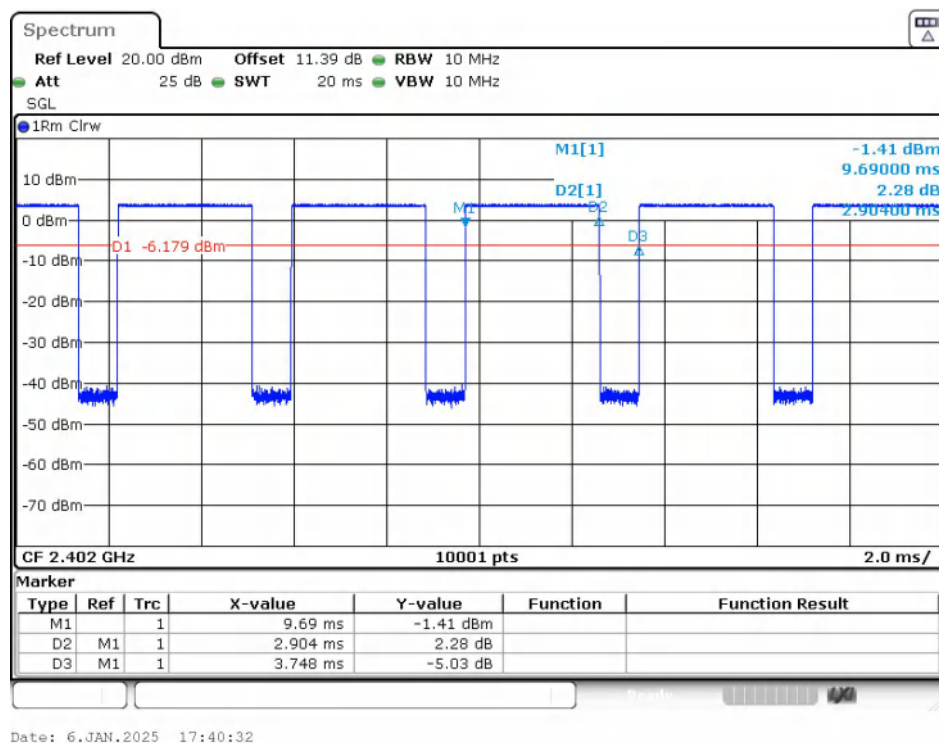
8DPSK(3-DH5)_Channel 78

Right:

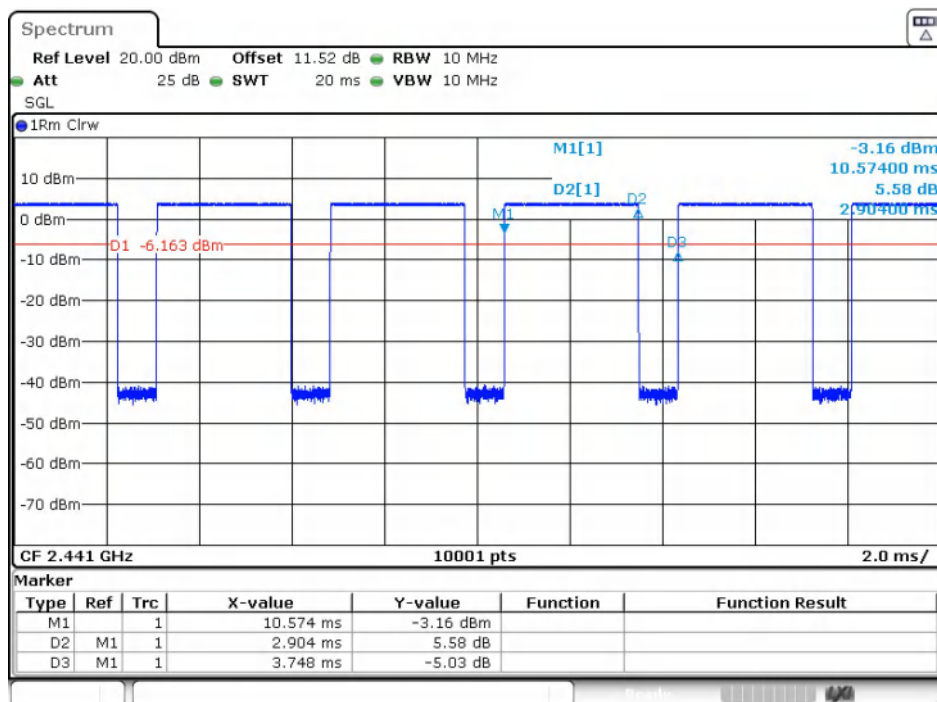
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.904	3.748	77.48	0.7748	1.1081	0.3444
		39	2.904	3.748	77.48	0.7748	1.1081	0.3444

		78	2.904	3.748	77.48	0.7748	1.1081	0.3444
$\pi/4$ DQPSK	2-DH5	0	2.910	3.748	77.64	0.7764	1.0991	0.3436
		39	2.912	3.748	77.69	0.7769	1.0963	0.3434
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436
8DPSK	3-DH5	0	2.912	3.748	77.69	0.7769	1.0963	0.3434
		39	2.914	3.748	77.75	0.7775	1.093	0.3432
		78	2.914	3.748	77.75	0.7775	1.093	0.3432

Test Graphs

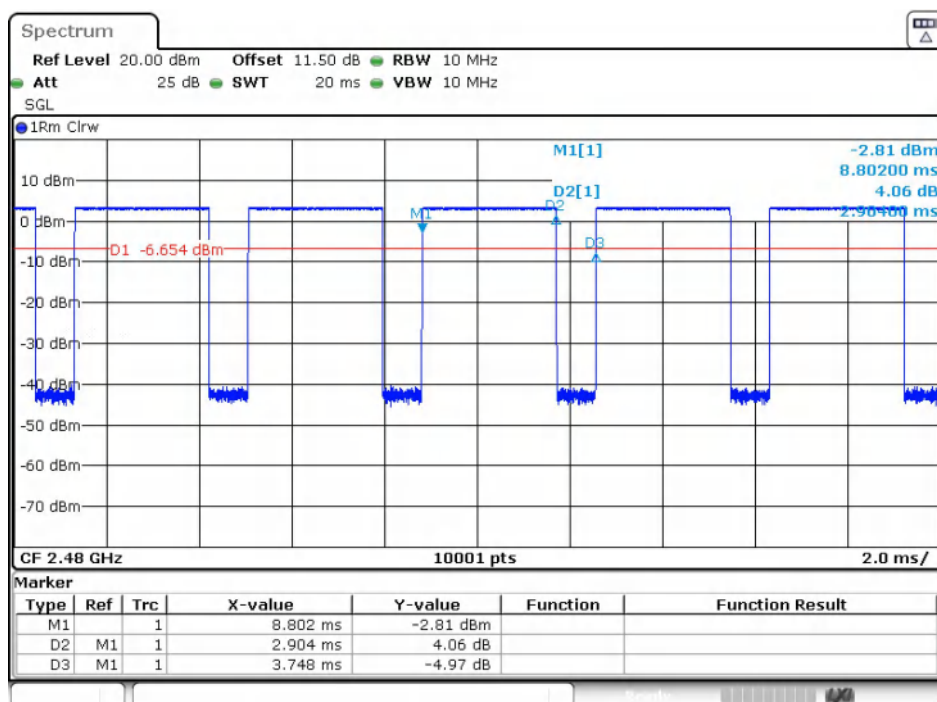


GFSK(DH5)_Channel 0



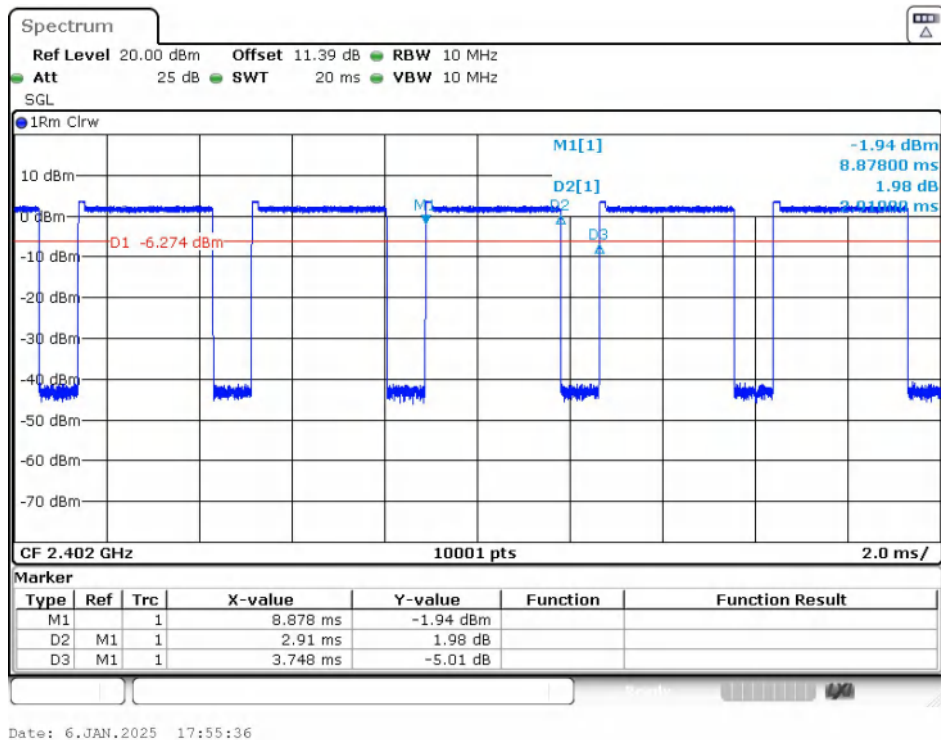
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GFSK(DH5)_Channel 39

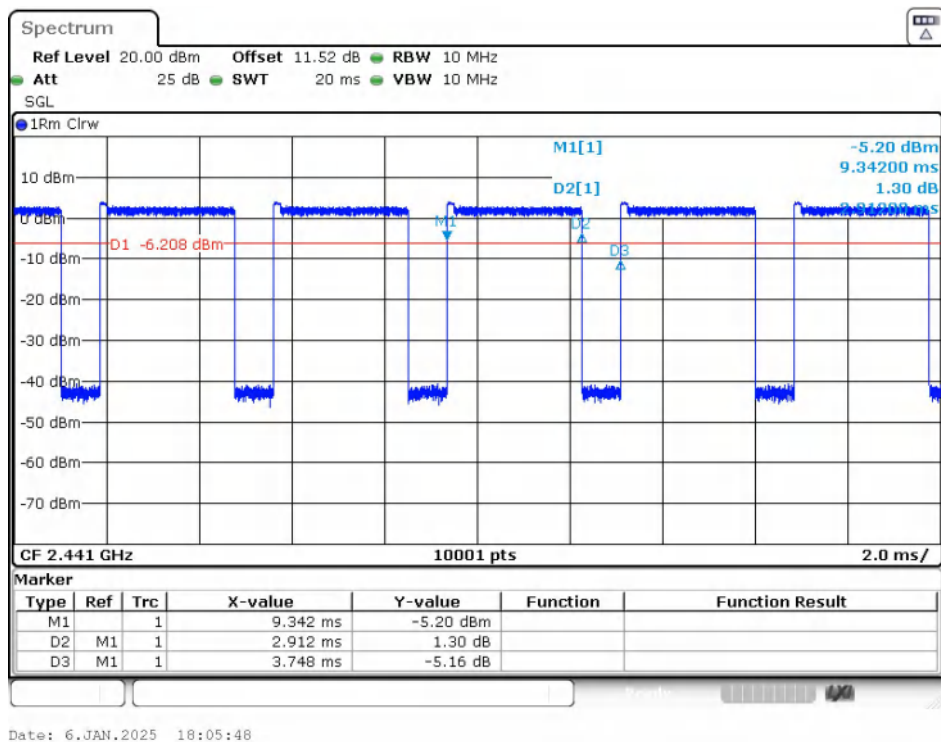


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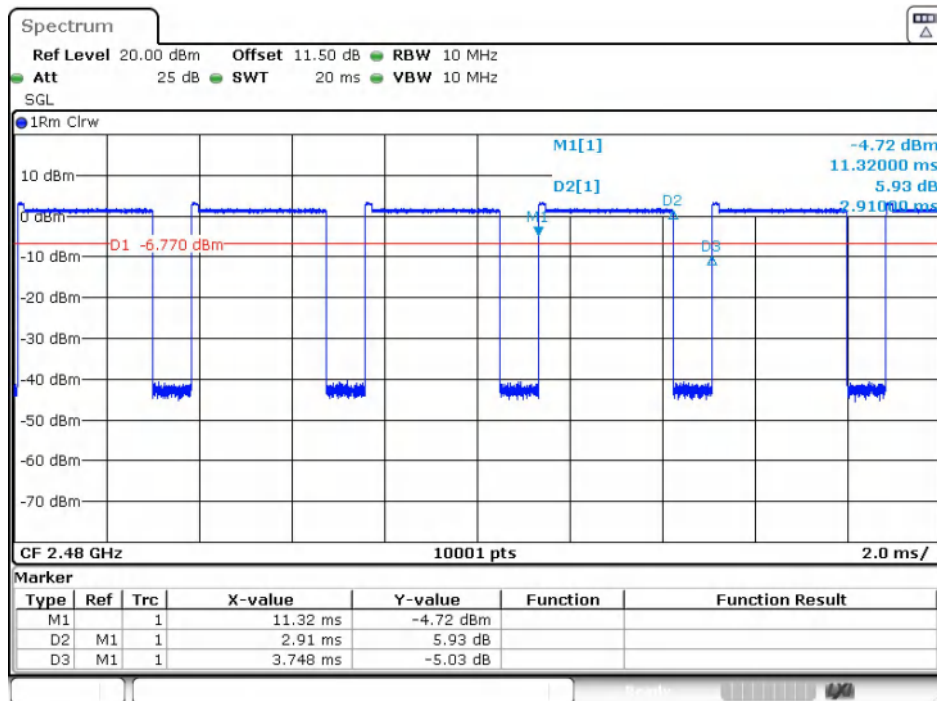
GFSK(DH5)_Channel 78



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

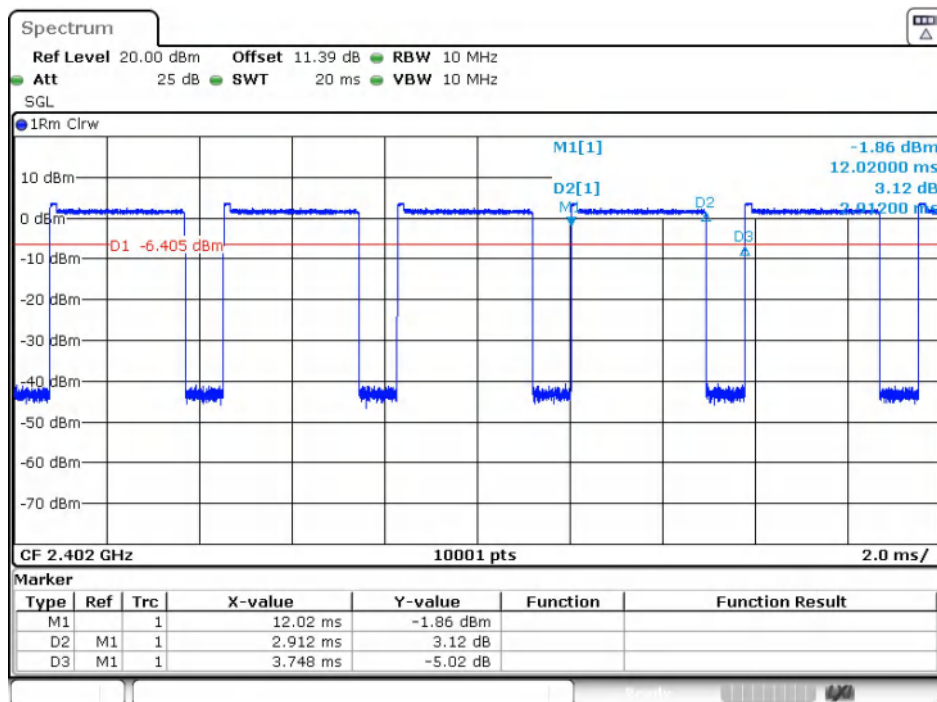


$\pi/4$ DQPSK(2-DH5)_Channel 39



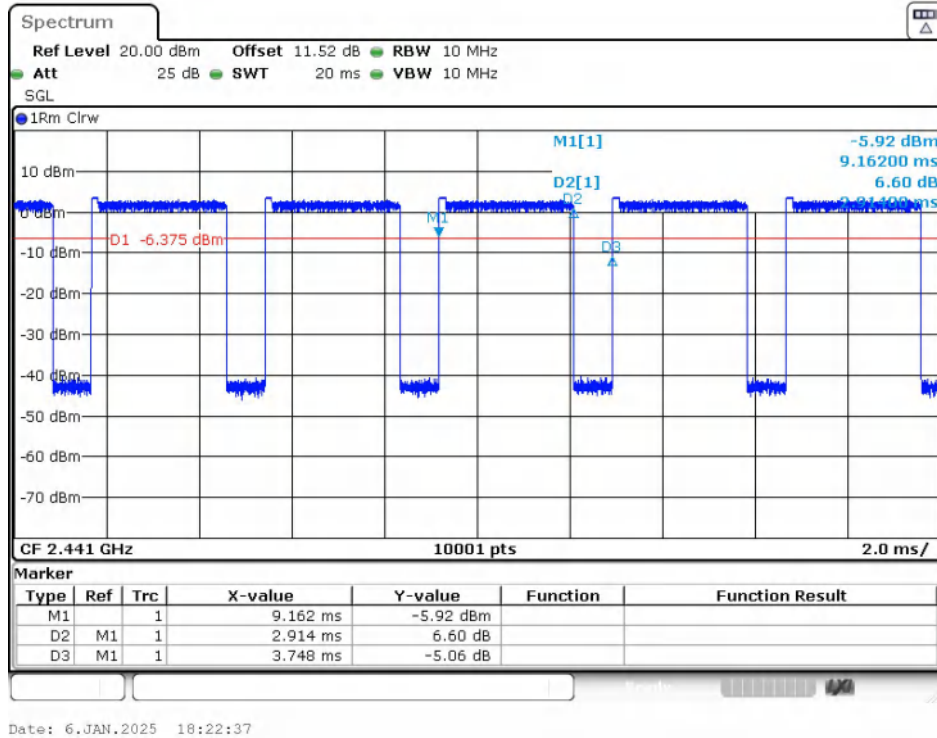
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$\pi/4$ DQPSK(2-DH5)_Channel 78

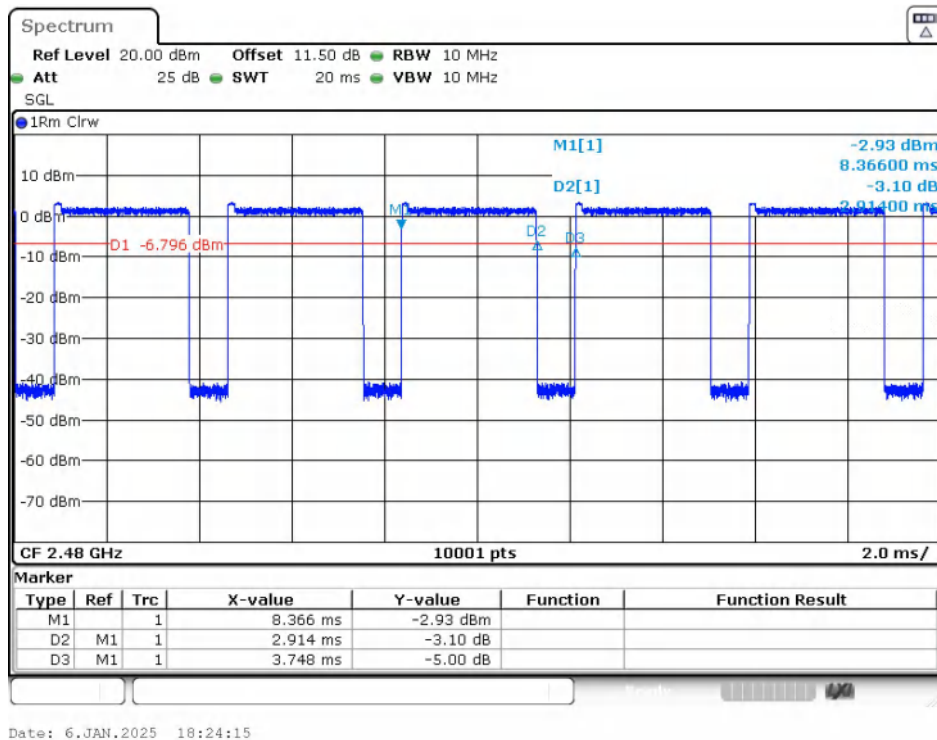


Date: 6, JAN. 2025 18:10:47

8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

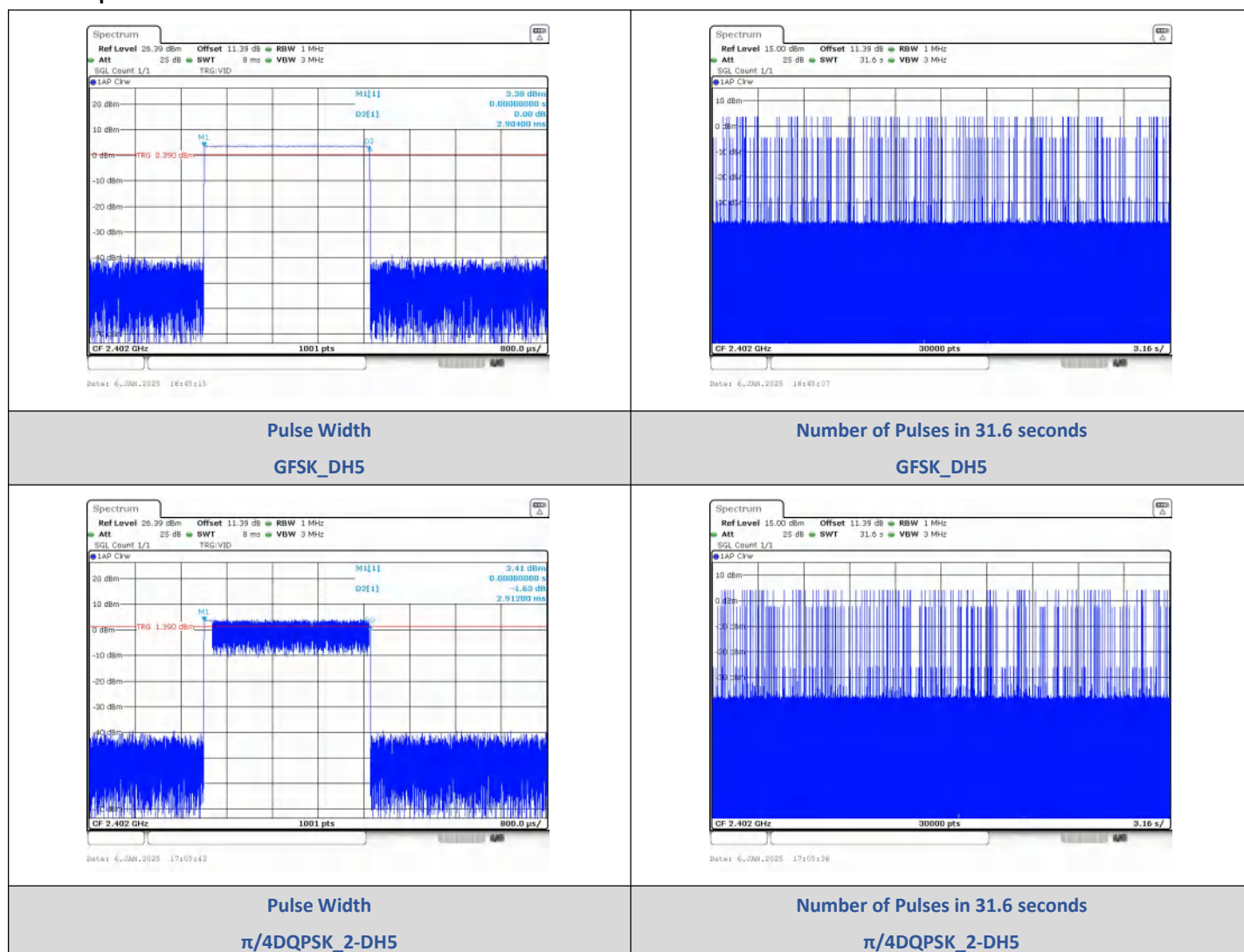
2) Dwell Time

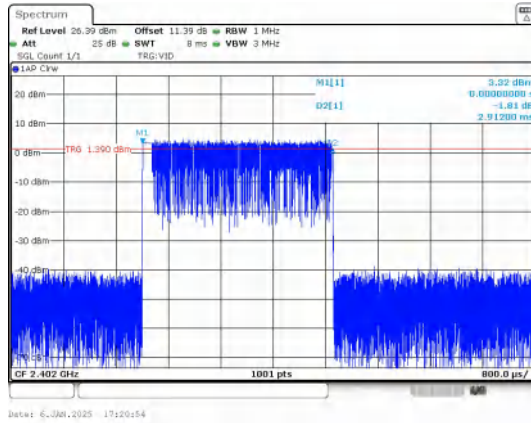
Test Result

Left:

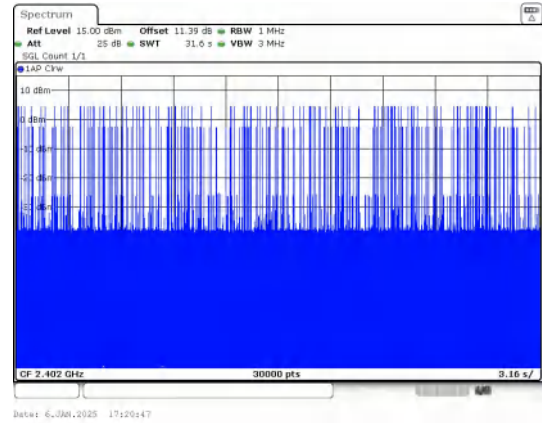
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.904	103	299.11	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	109	317.41		PASS
8DPSK	3-DH5		2.912	107	311.58		PASS

Test Graphs





Pulse Width
8DPSK_3-DH5

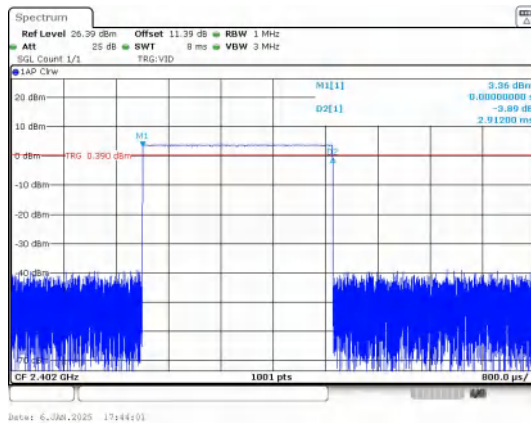


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

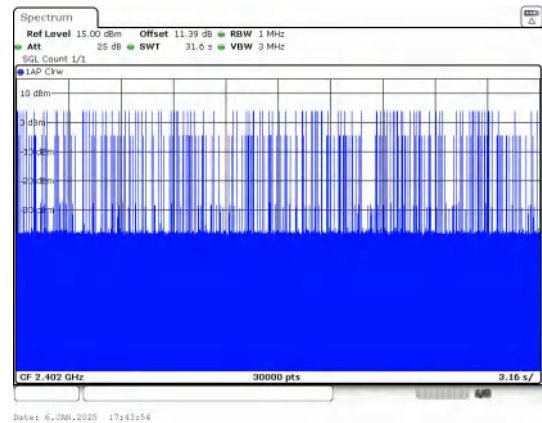
Right:

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.912	109	317.41	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	102	297.02		PASS
8DPSK	3-DH5		2.920	110	321.2		PASS

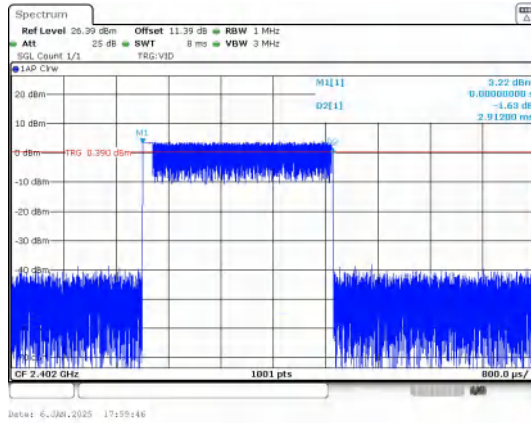
Test Graphs



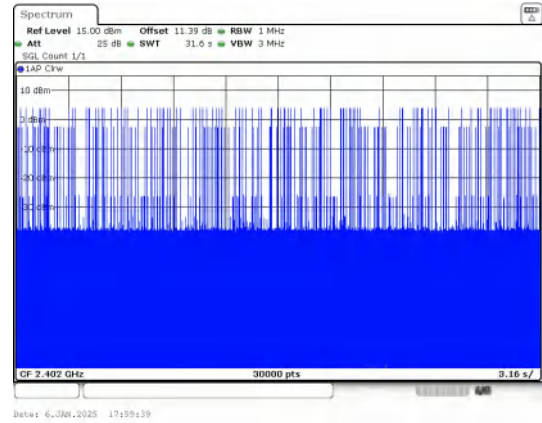
Pulse Width
GFSK_DH5



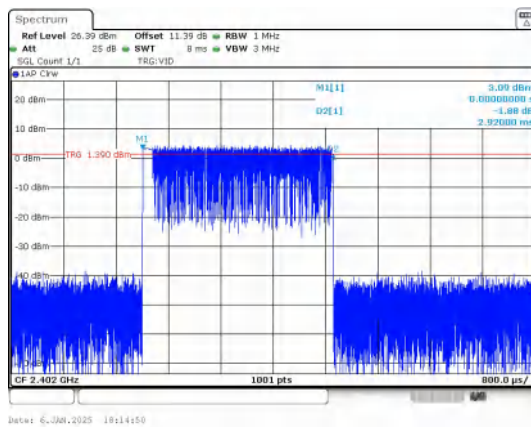
Number of Pulses in 31.6 seconds
GFSK_DH5



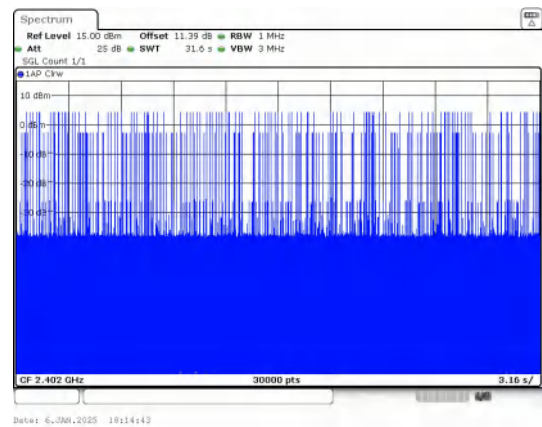
Pulse Width
 $\pi/4$ DQPSK_2-DH5



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

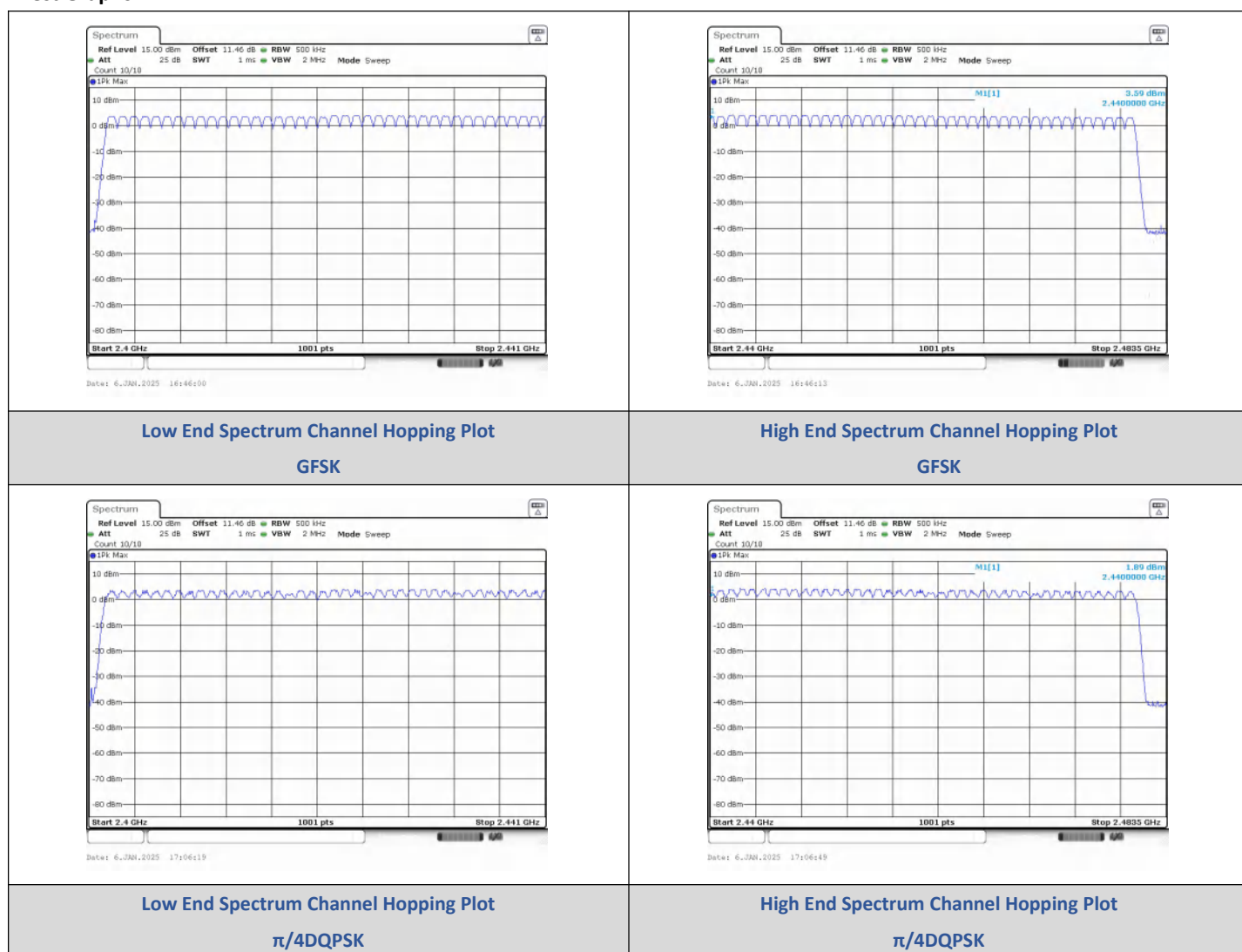
3) Number Of Hopping Channel

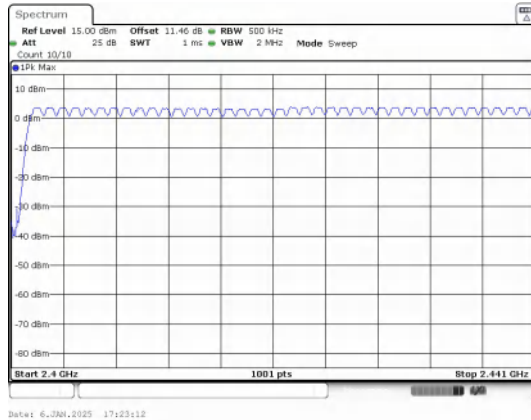
Test Result

Left:

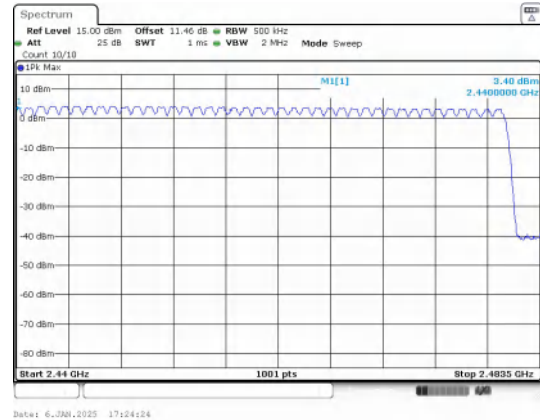
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs





Low End Spectrum Channel Hopping Plot
8DPSK



High End Spectrum Channel Hopping Plot
8DPSK

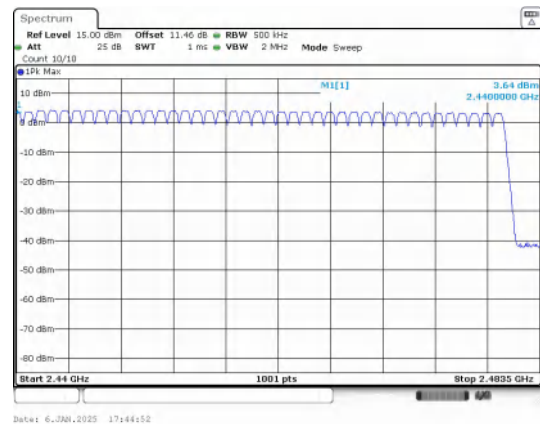
Right:

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

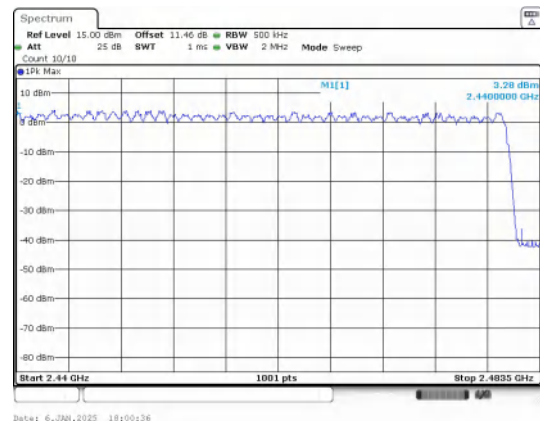
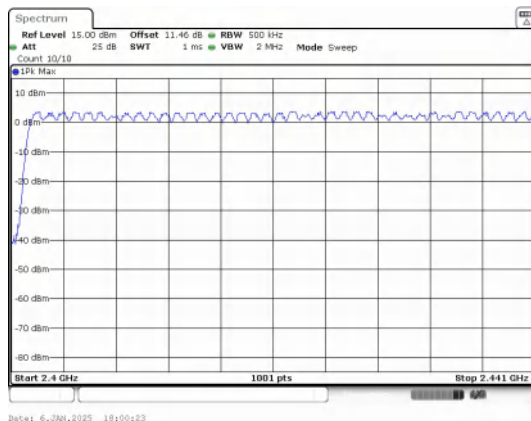
Test Graphs



Low End Spectrum Channel Hopping Plot
GFSK

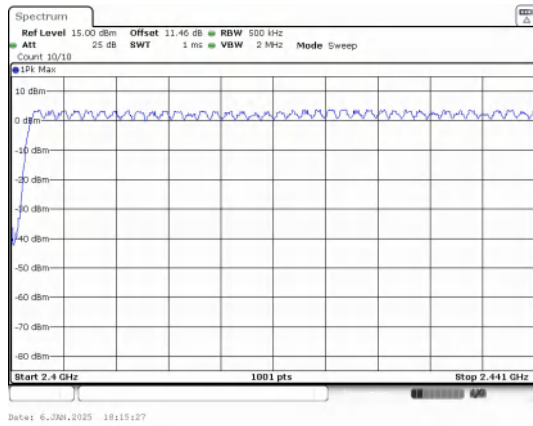


High End Spectrum Channel Hopping Plot
GFSK



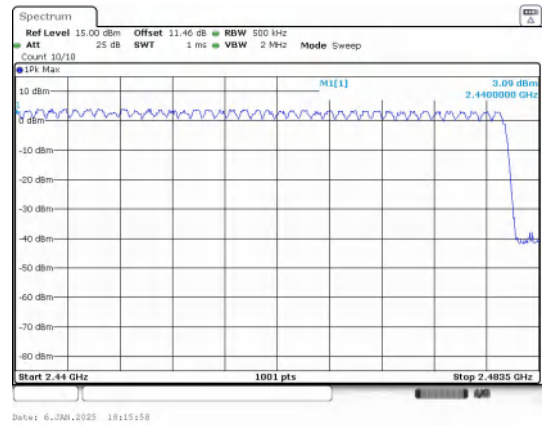
Low End Spectrum Channel Hopping Plot

$\pi/4$ 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

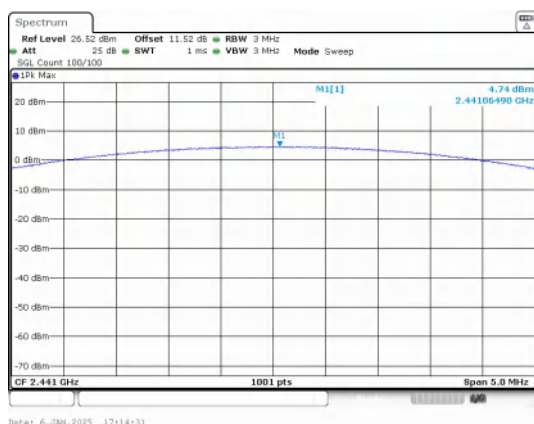
Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	3.76	2.38	≤30	PASS
		39	4.18	2.62		PASS
		78	3.61	2.30		PASS
$\pi/4$ DQPSK	2-DH5	0	4.75	2.99	≤20.97	PASS
		39	4.74	2.98		PASS
		78	4.21	2.64		PASS
8DPSK	3-DH5	0	5.09	3.23		PASS
		39	5.19	3.30		PASS
		78	4.72	2.96		PASS

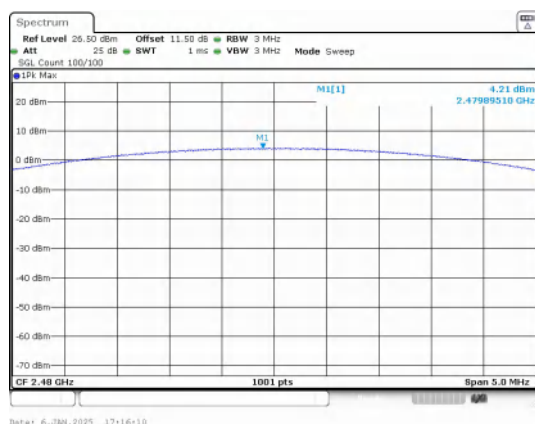
Test Graphs



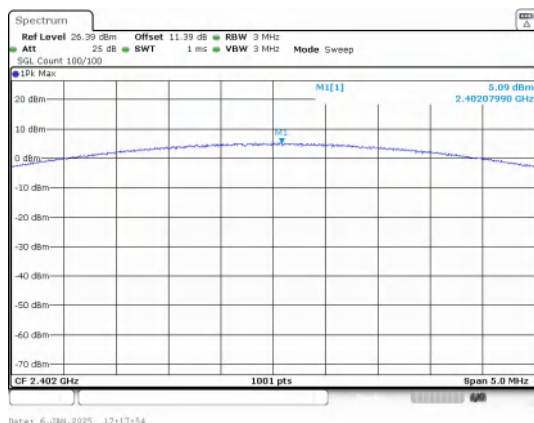
GFSK_Channel 78



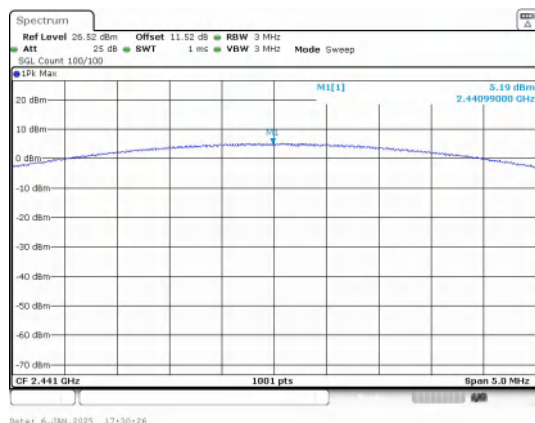
$\pi/4$ DQPSK_Channel 0



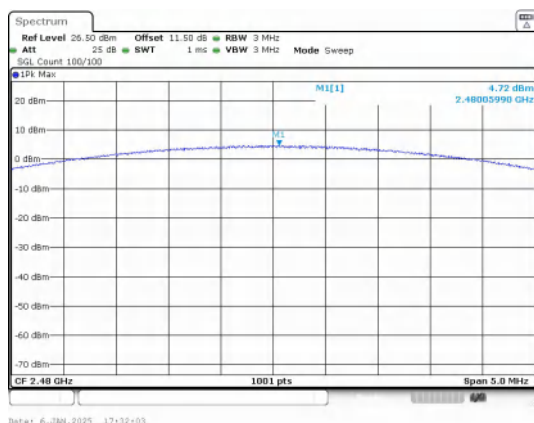
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39

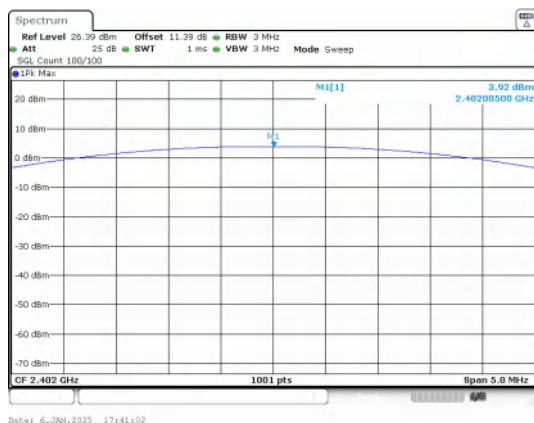
Peak Output Power
8DPSK_Channel 78

Right:

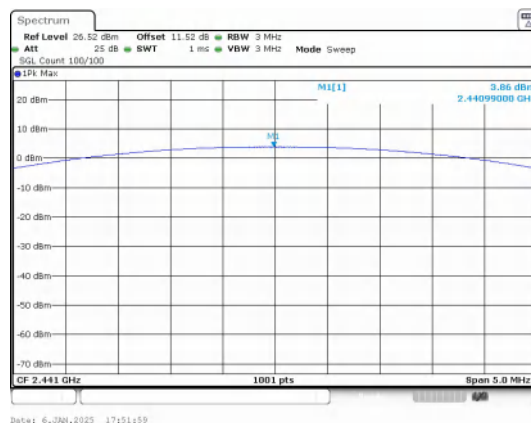
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	3.92	2.47	≤30	PASS

		39	3.86	2.43		PASS
		78	3.41	2.19		PASS
		0	4.51	2.82		PASS
$\pi/4$ DQPSK	2-DH5	39	4.59	2.88	≤ 20.97	PASS
		78	4.05	2.54		PASS
		0	4.99	3.16		PASS
8DPSK	3-DH5	39	5.03	3.18		PASS
		78	4.56	2.86		PASS
						PASS

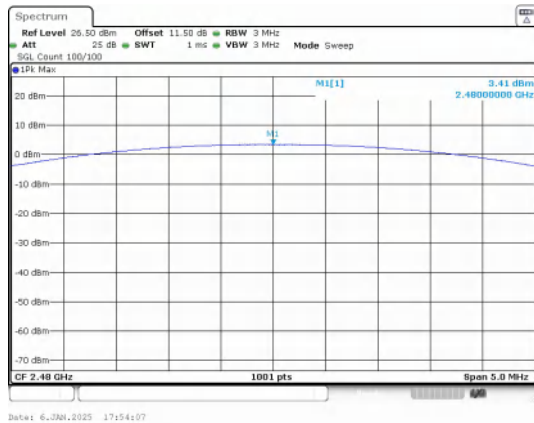
Test Graphs



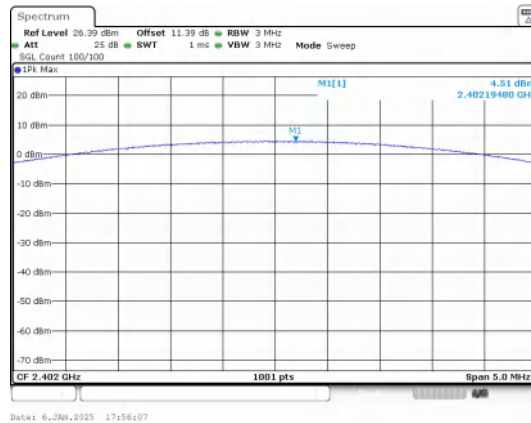
Peak Output Power
GFSK_Channel 0



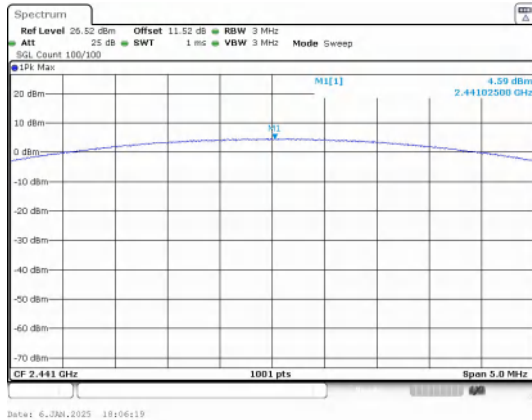
Peak Output Power
GFSK_Channel 39



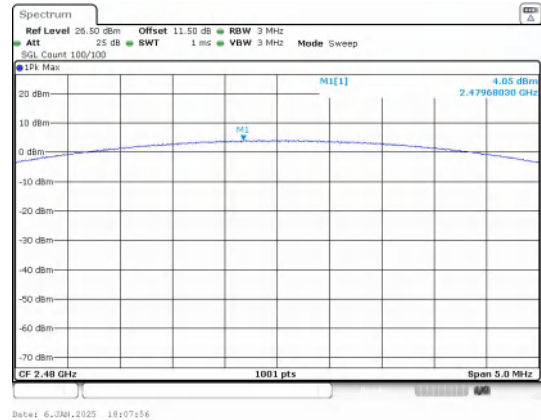
Peak Output Power
GFSK_Channel 78



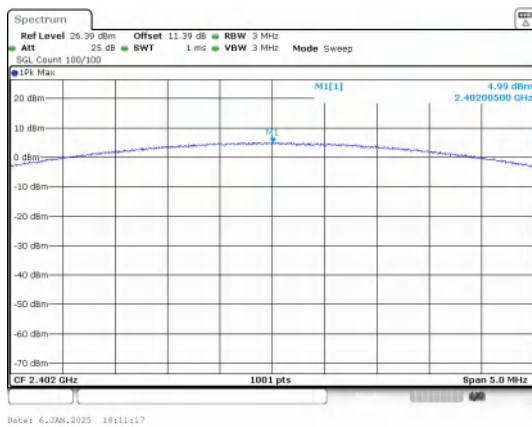
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



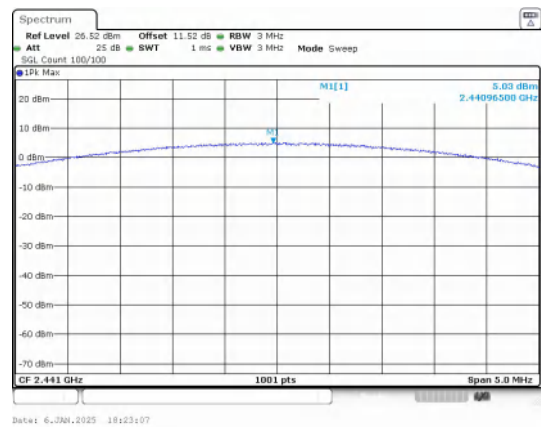
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



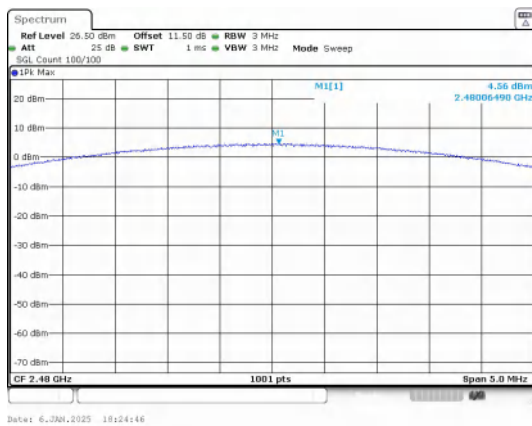
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

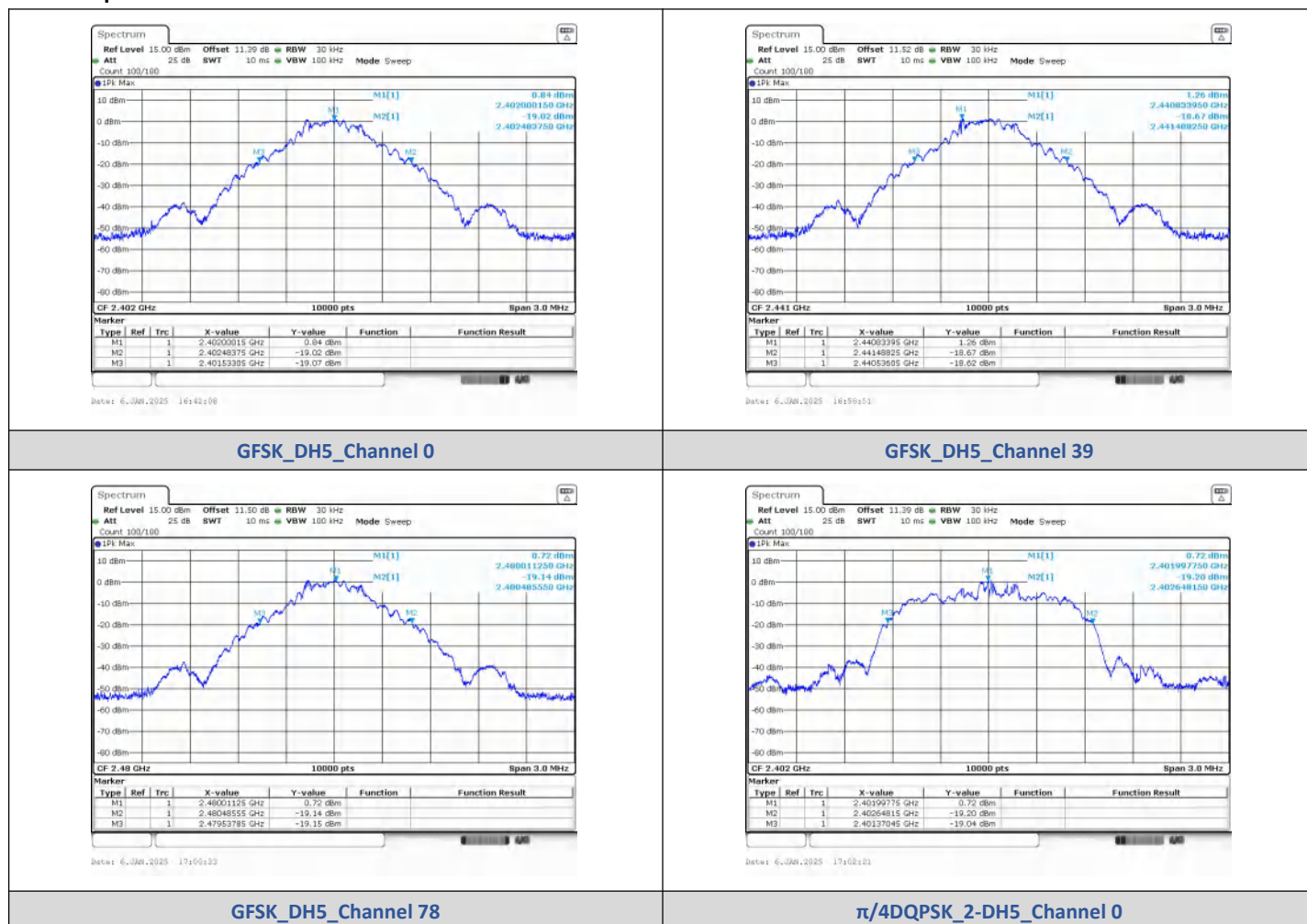
5) 20dB Bandwidth

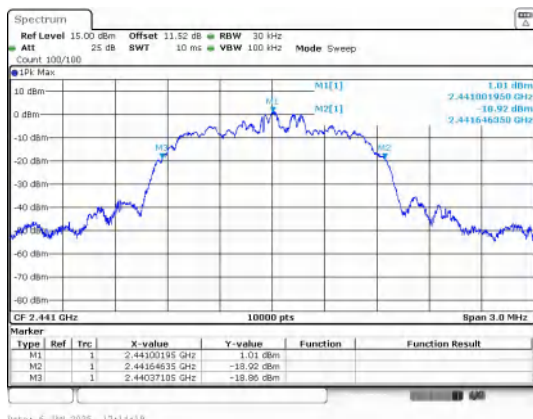
Test Result

Left:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9500
	39	2441 MHz	0.9500
	78	2480 MHz	0.9500
$\pi/4$ DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.280
	78	2480 MHz	1.280
8DPSK	0	2402 MHz	1.270
	39	2441 MHz	1.280
	78	2480 MHz	1.280

Test Graphs





Date: 6-Jun-2025 17:14:19

$\pi/4$ DQPSK_2-DH5_Channel 39



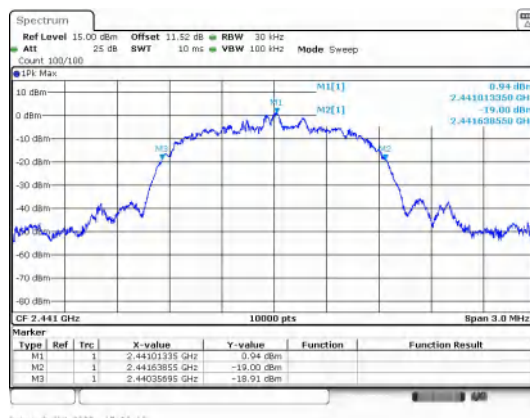
Date: 6-Jun-2025 17:15:57

$\pi/4$ DQPSK_2-DH5_Channel 78



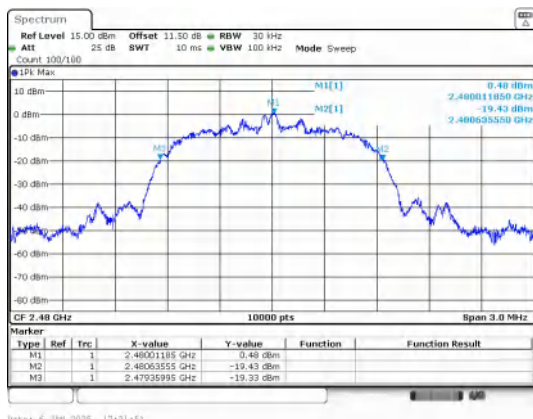
Date: 6-Jun-2025 17:17:42

8DPSK_3-DH5_Channel 0



Date: 6-Jun-2025 17:19:13

8DPSK_3-DH5_Channel 39



Date: 6-Jun-2025 17:31:51

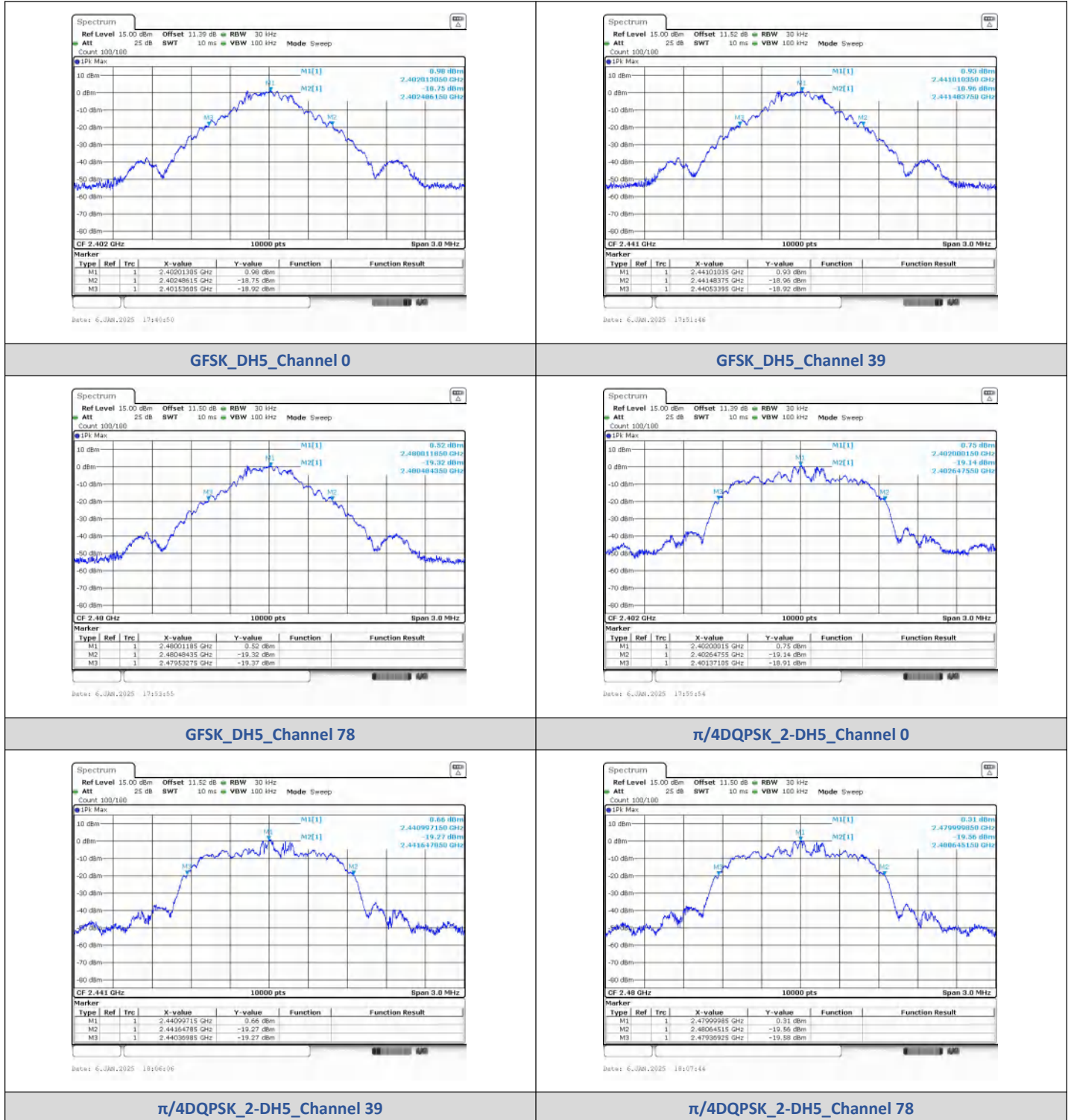
8DPSK_3-DH5_Channel 78

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
$\pi/4$ DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.280
	78	2480 MHz	1.280

8DPSK	0	2402 MHz	1.270
	39	2441 MHz	1.270
	78	2480 MHz	1.280

Test Graphs

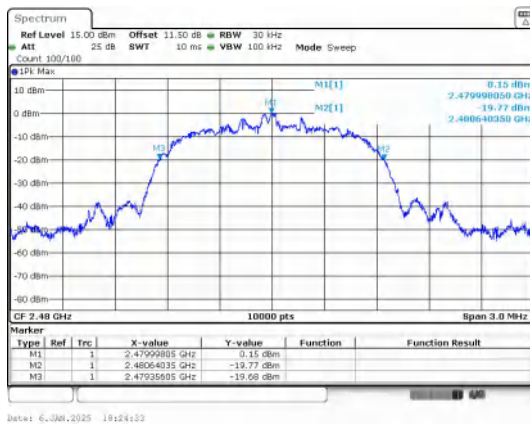




8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

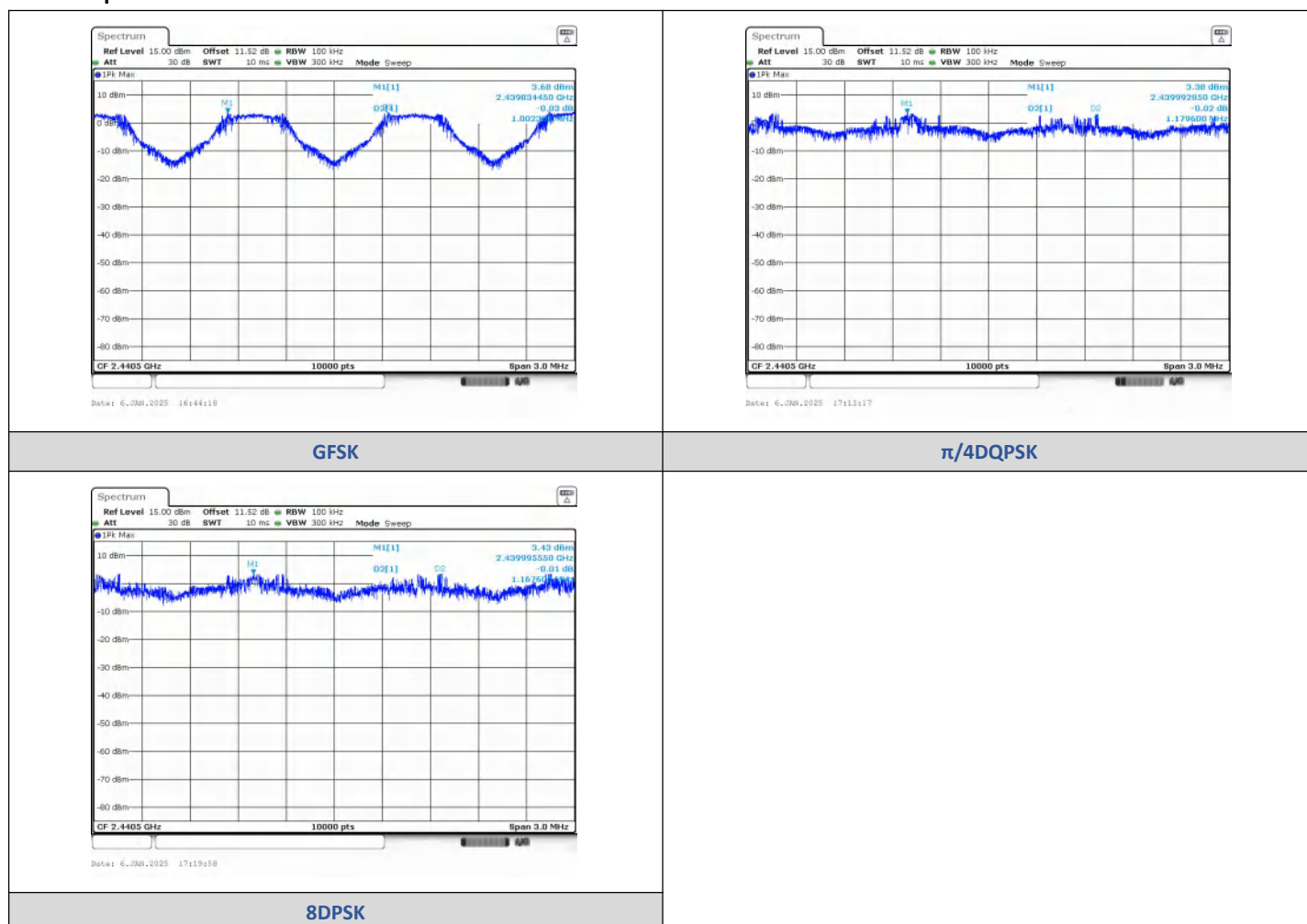
6) Carrier Frequencies Separation

Test Result

Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8344	2440.8367	1.0023	0.95	PASS
$\pi/4$ DQPSK	2-DH5	2439.9929	2441.1725	1.1796	0.853	PASS
8DPSK	3-DH5	2439.9956	2441.1631	1.1676	0.847	PASS

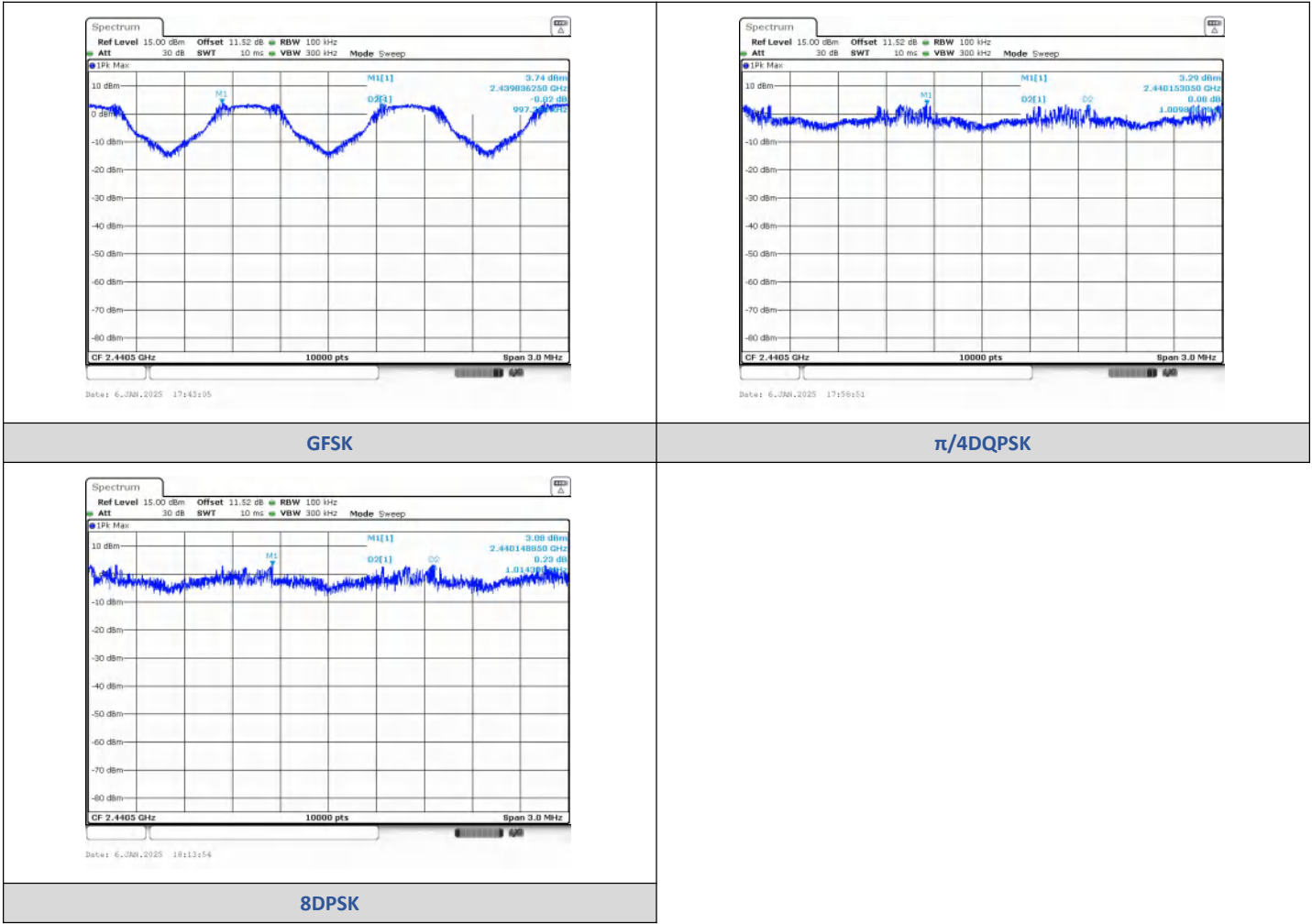
Test Graphs



Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8362	2440.8335	0.9972	0.95	PASS
$\pi/4$ DQPSK	2-DH5	2440.153	2441.1629	1.0098	0.853	PASS
8DPSK	3-DH5	2440.1489	2441.1631	1.0143	0.847	PASS

Test Graphs



7) Conducted Out Of Band Emission

Test Result

Left:

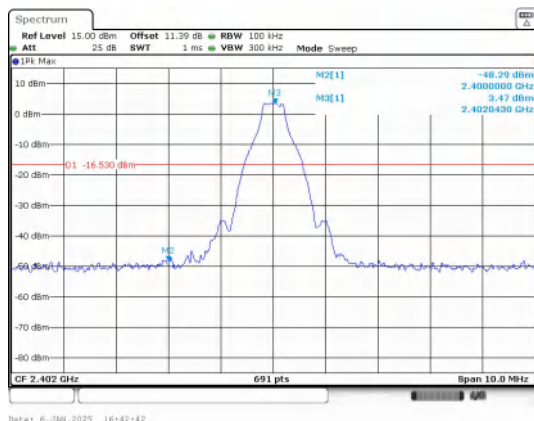
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-48.290	-16.53	-31.760	PASS
			7205.13	-50.994	-16.53	-34.464	PASS
		39	7323.32	-51.768	-16.12	-35.648	PASS
		78	835.28	-46.471	-16.59	-29.881	PASS
			2483.50	-48.790	-16.59	-32.200	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-48.660	-16.48	-32.180	PASS
			4803.85	-52.007	-16.48	-35.527	PASS
		39	6226.31	-52.853	-16.23	-36.623	PASS
		78	2483.50	-48.710	-16.82	-31.890	PASS
			7439.85	-51.510	-16.82	-34.690	PASS
8DPSK	3-DH5	0	2400.00	-46.470	-16.6	-29.870	PASS
			9608.08	-52.202	-16.6	-35.602	PASS
		39	6987.89	-52.609	-16.43	-36.179	PASS
		78	2483.50	-50.010	-16.91	-33.100	PASS
			5902.53	-52.791	-16.91	-35.881	PASS

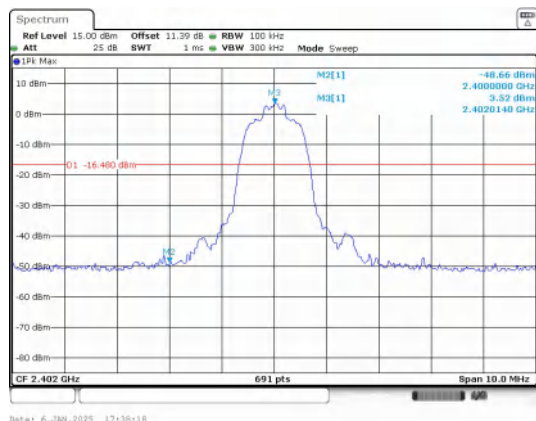
Hopping

Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2400.00	-46.970	-16.41	-30.560	PASS
			2483.50	-49.080	-16.59	-32.490	PASS
$\pi/4$ DQPSK	2-DH5		2396.21	-47.331	-16.44	-30.891	PASS
			2400.00	-49.130	-16.44	-32.690	PASS
			2483.50	-49.330	-16.87	-32.460	PASS
8DPSK	3-DH5		2398.44	-48.282	-16.54	-31.742	PASS
			2400.00	-49.670	-16.54	-33.130	PASS
			2483.50	-49.250	-17.42	-31.830	PASS

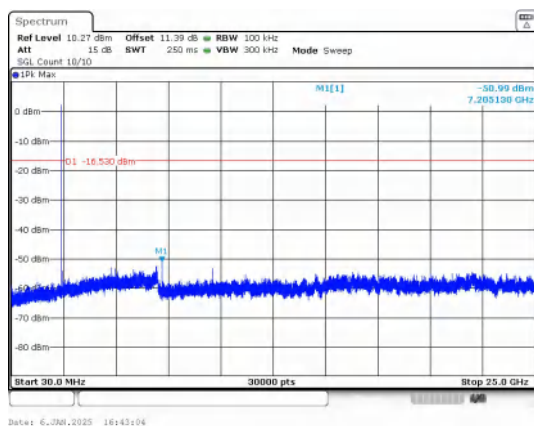
Test Graphs



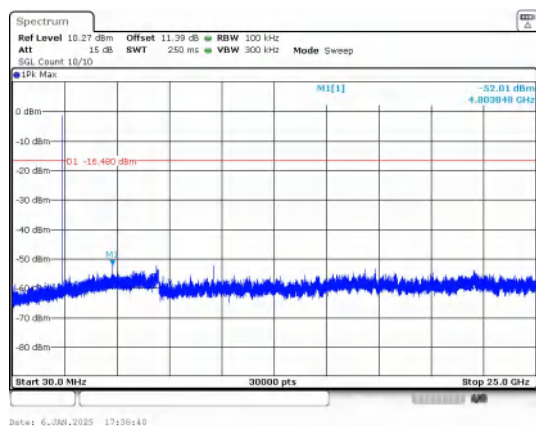
Out Of Band Emission
GFSK_DH5_Channel 0



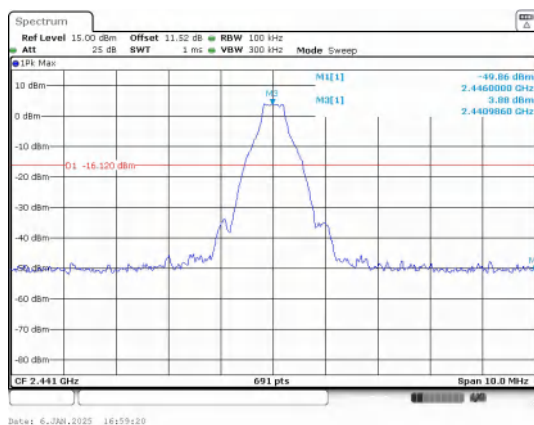
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 0



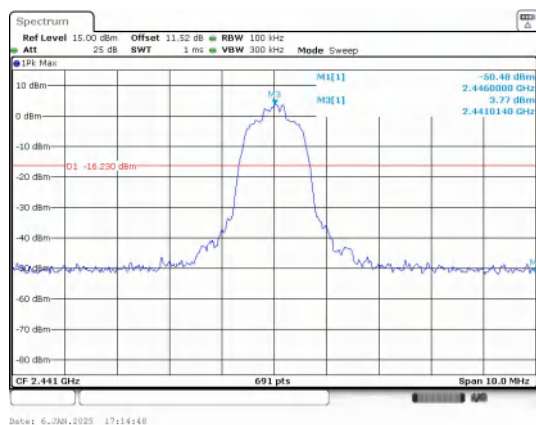
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



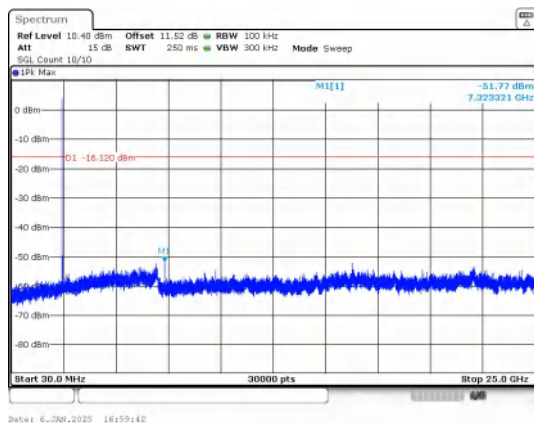
30.0 MHz - 25000.0 MHz
 $\pi/4$ QPSK_2-DH5_Channel 0



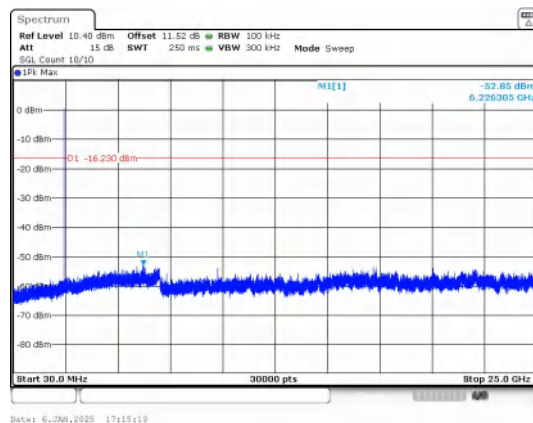
Out Of Band Emission
GFSK_DH5_Channel 39



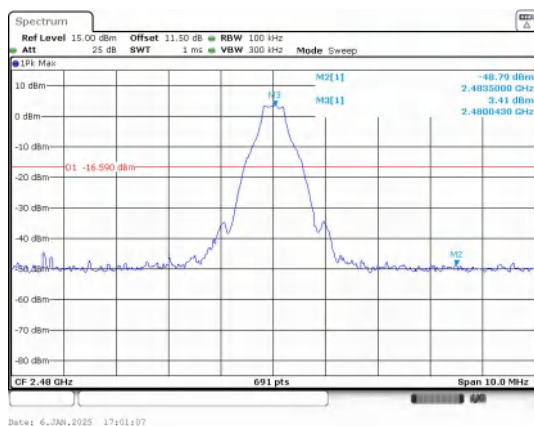
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 39



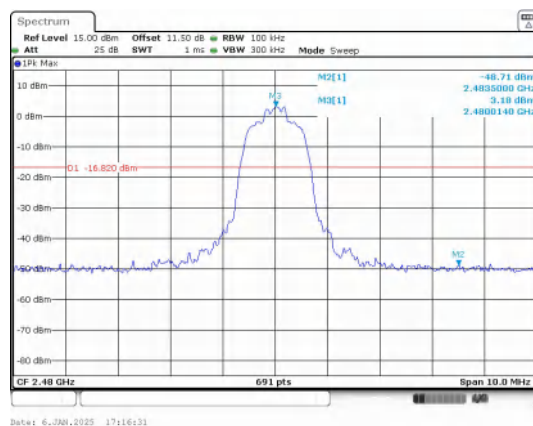
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



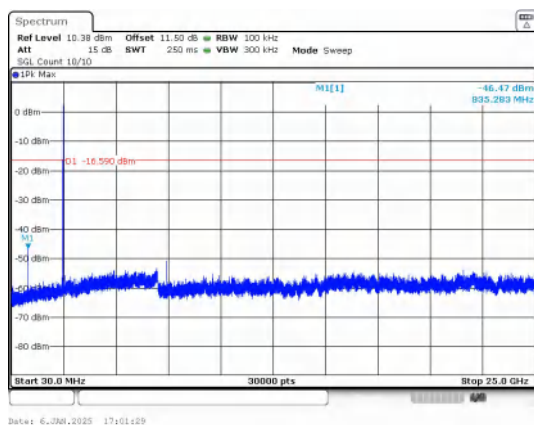
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



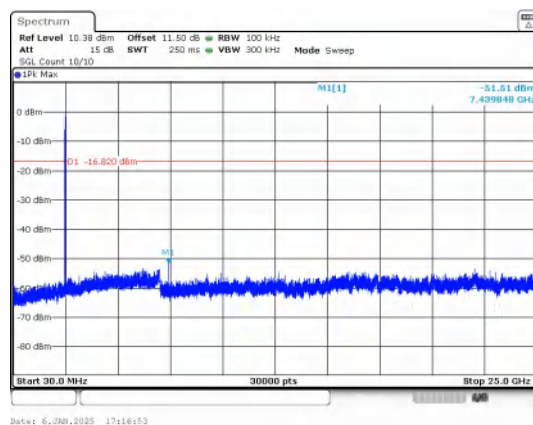
Out Of Band Emission
GFSK_DH5_Channel 78



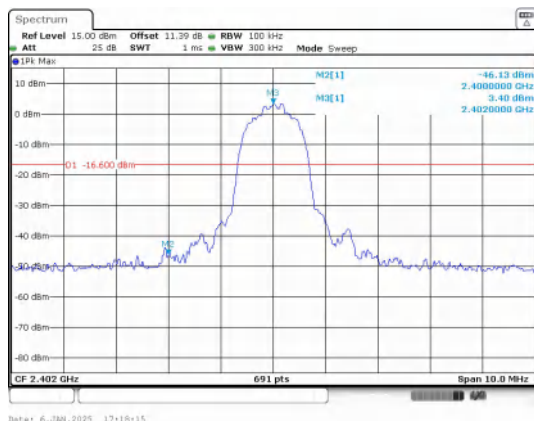
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



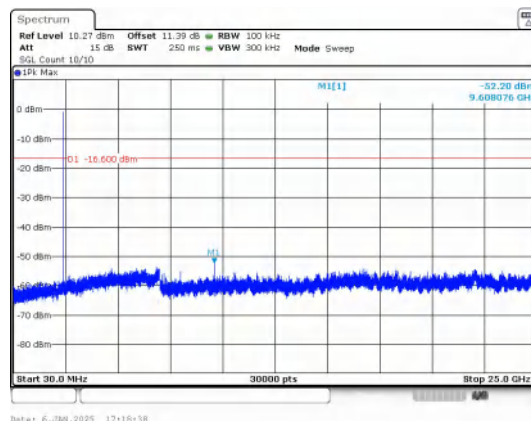
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



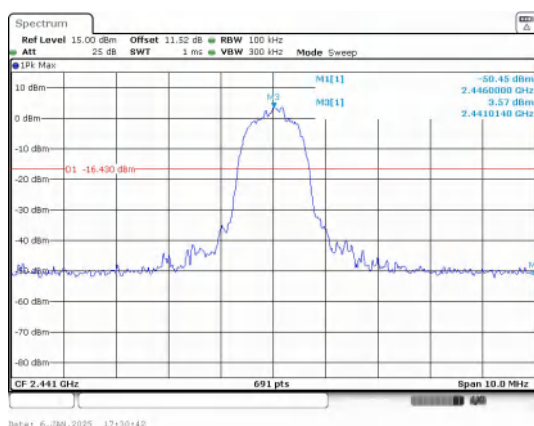
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



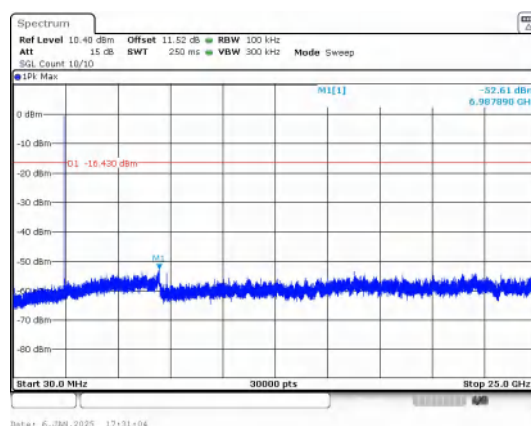
Out Of Band Emission
8DPSK_3-DH5_Channel 0



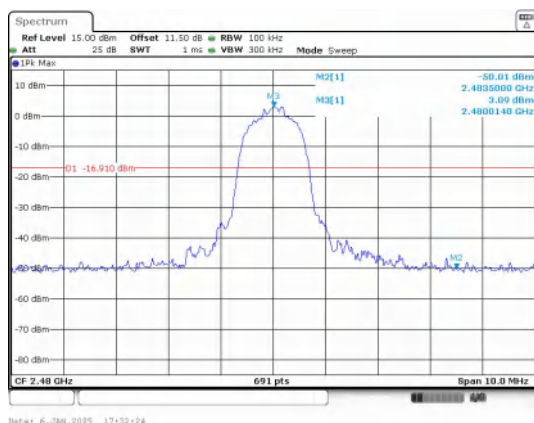
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



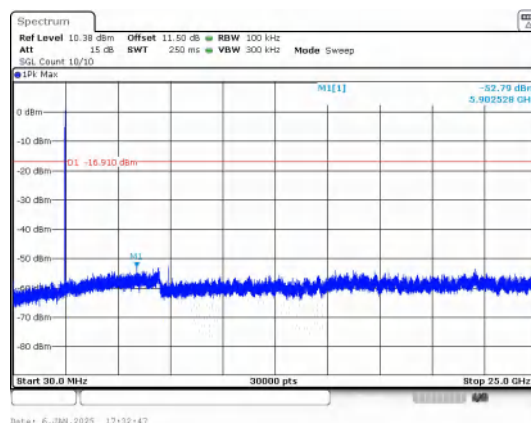
Out Of Band Emission
8DPSK_3-DH5_Channel 39



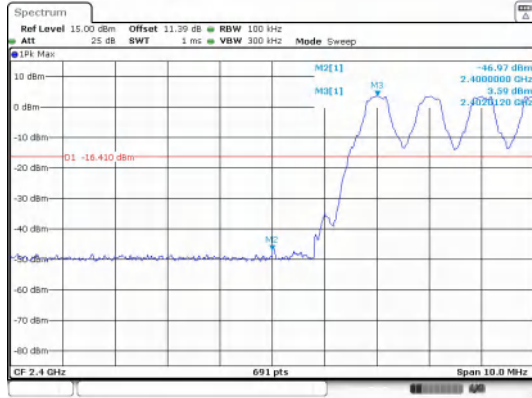
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



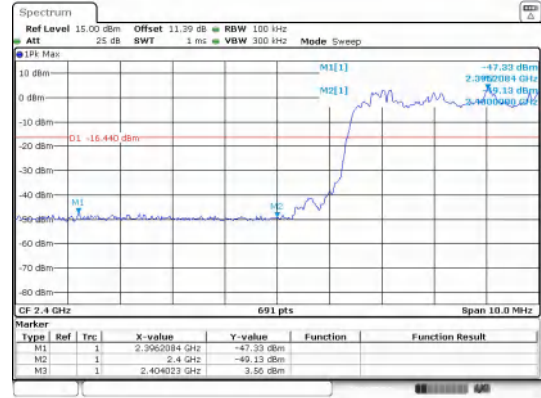
Out Of Band Emission
8DPSK_3-DH5_Channel 78



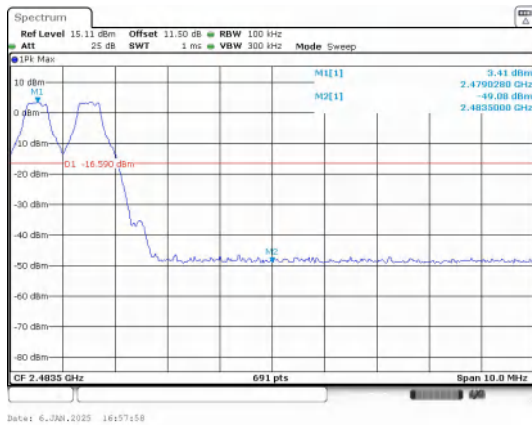
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



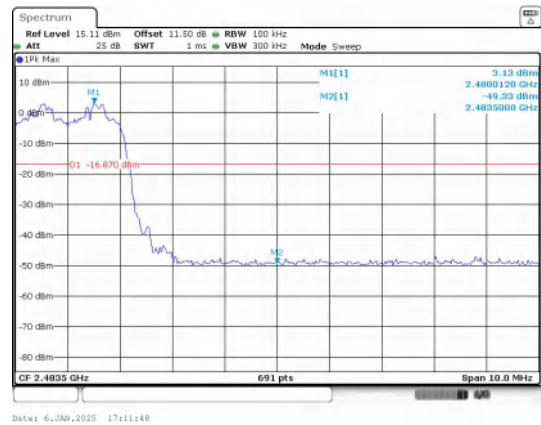
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



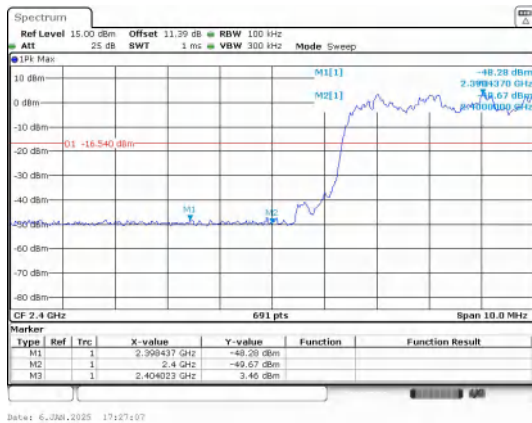
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



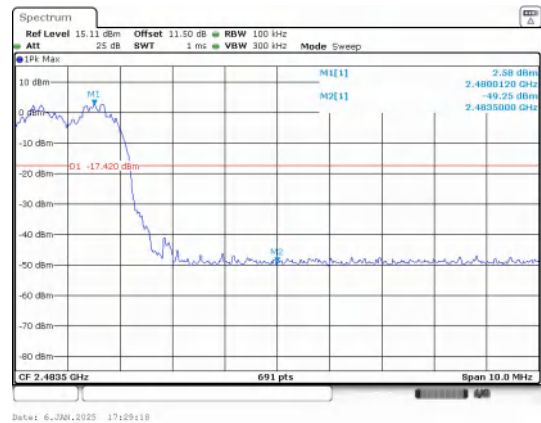
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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

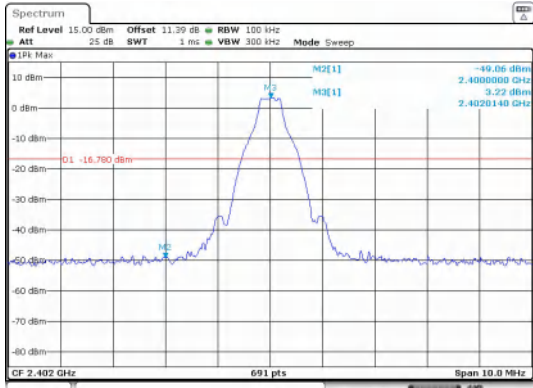
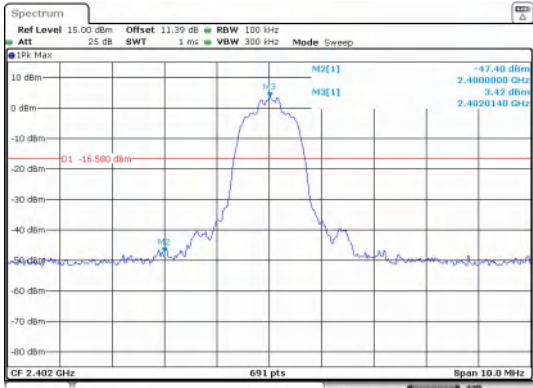
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
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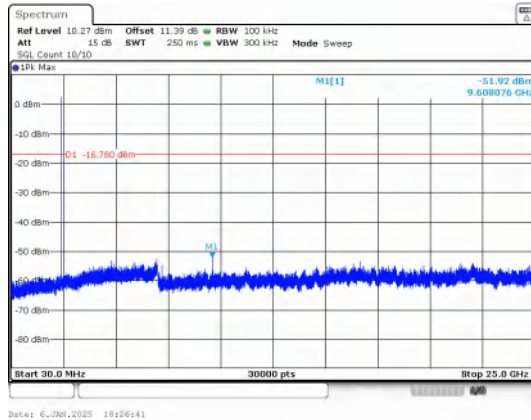
GFSK	DH5	0	2400.00	-49.060	-16.78	-32.280	PASS
			9608.08	-51.922	-16.78	-35.142	PASS
		39	7323.32	-52.729	-16.34	-36.389	PASS
		78	2483.50	-50.170	-16.84	-33.330	PASS
			7439.85	-49.777	-16.84	-32.937	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-47.400	-16.58	-30.820	PASS
			9608.08	-51.763	-16.58	-35.183	PASS
		39	6952.93	-52.221	-16.46	-35.761	PASS
		78	2483.50	-50.410	-16.93	-33.480	PASS
			22024.0	-53.580	-16.93	-36.650	PASS
8DPSK	3-DH5	0	2400.00	-47.100	-16.77	-30.330	PASS
			7205.96	-51.238	-16.77	-34.468	PASS
		39	22095.6	-53.058	-16.68	-36.378	PASS
		78	2483.50	-50.730	-17.06	-33.670	PASS
			6973.74	-52.519	-17.06	-35.459	PASS

Hopping

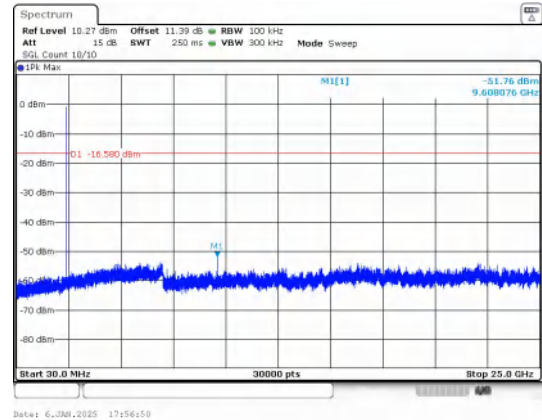
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2397.68	-47.062	-16.53	-30.532	PASS
			2400.00	-48.210	-16.53	-31.680	PASS
			2483.50	-49.490	-16.75	-32.740	PASS
$\pi/4$ DQPSK	2-DH5		2398.08	-48.057	-16.54	-31.517	PASS
			2400.00	-49.110	-16.54	-32.570	PASS
			2483.50	-49.450	-17.57	-31.880	PASS
8DPSK	3-DH5		2395.27	-47.624	-16.59	-31.034	PASS
			2400.00	-48.680	-16.59	-32.090	PASS
			2483.50	-49.750	-17.76	-31.990	PASS

Test Graphs

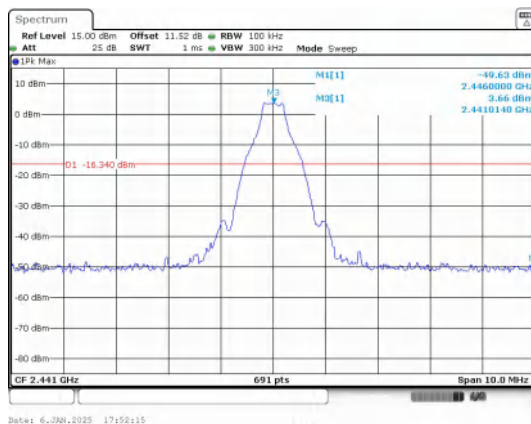
 Out Of Band Emission GFSK_DH5_Channel 0	 Out Of Band Emission $\pi/4$DQPSK_2-DH5_Channel 0
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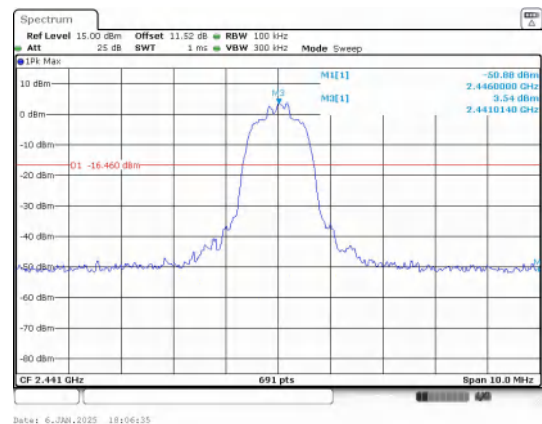
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



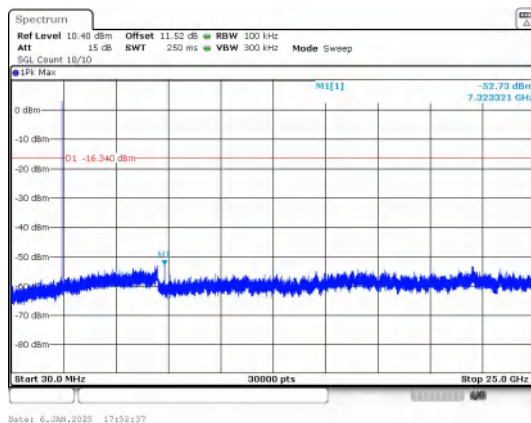
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



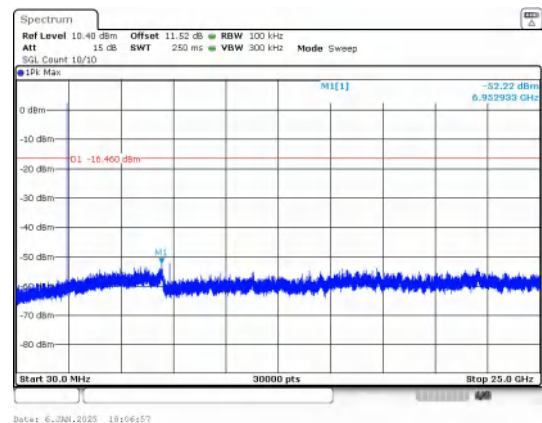
Out Of Band Emission
GFSK_DH5_Channel 39



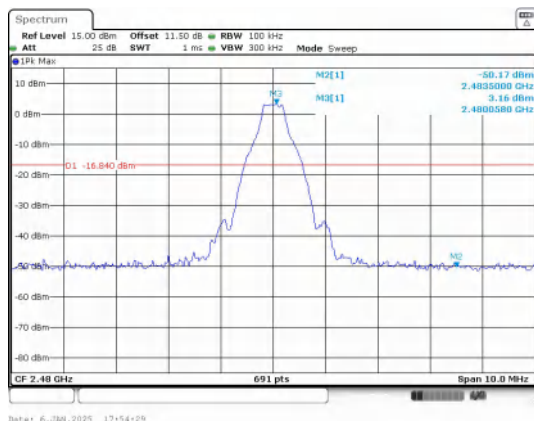
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



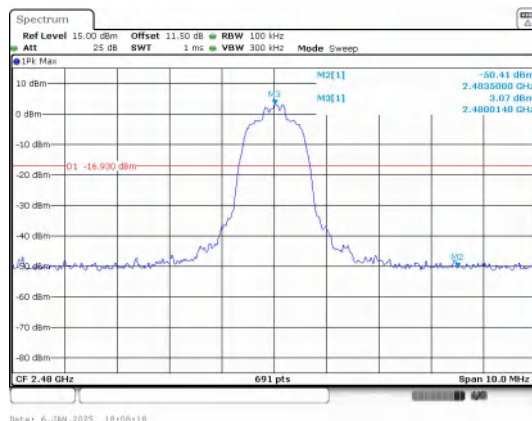
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



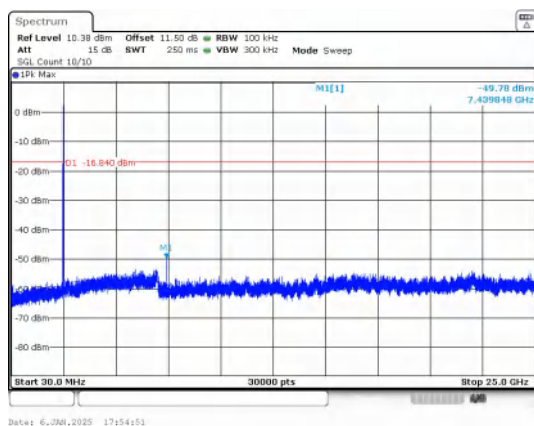
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



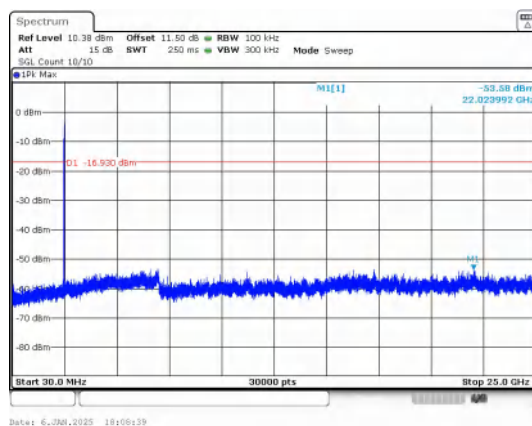
Out Of Band Emission
GFSK_DH5_Channel 78



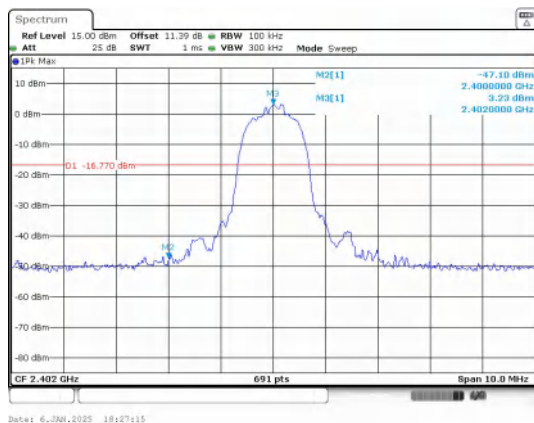
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



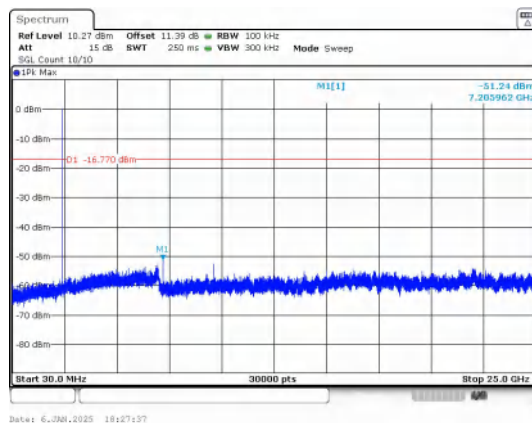
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



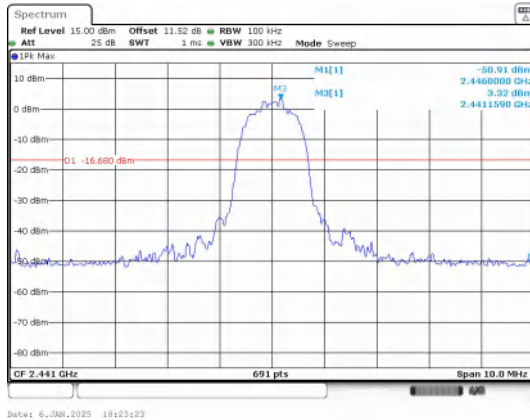
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



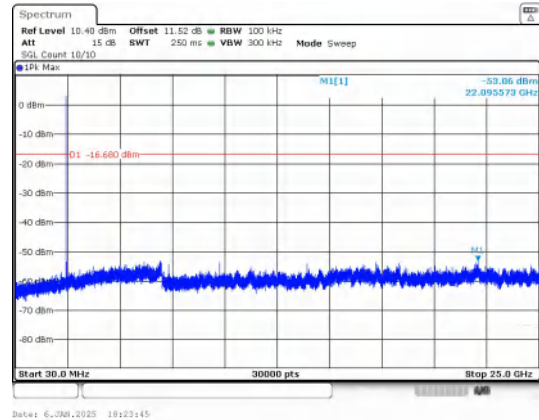
Out Of Band Emission
8DPSK_3-DH5_Channel 0



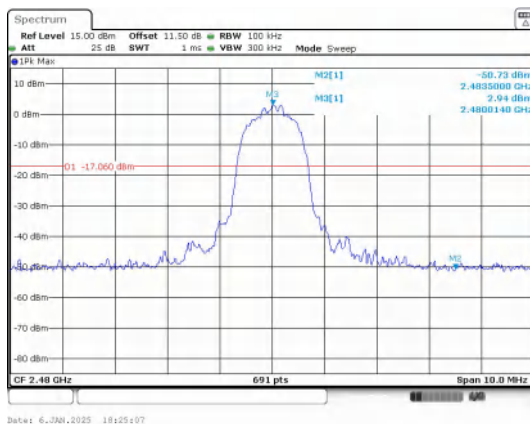
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



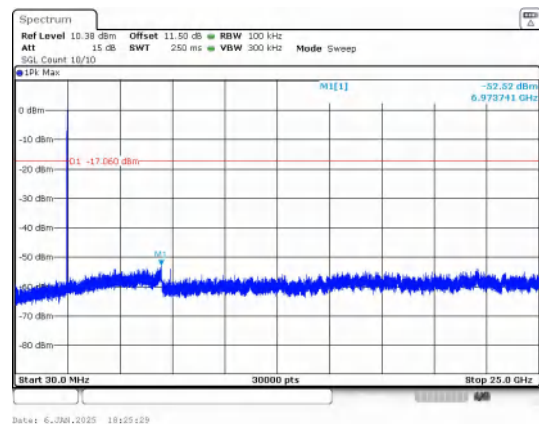
Out Of Band Emission
8DPSK_3-DH5_Channel 39



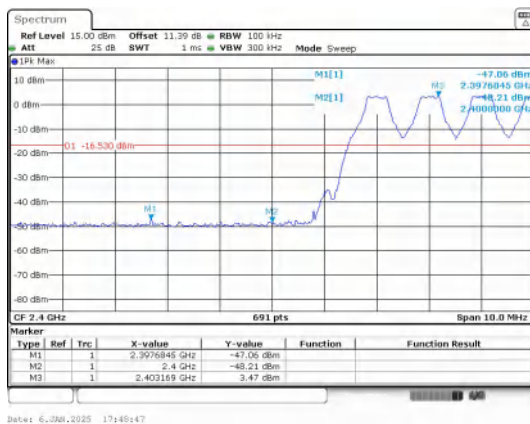
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



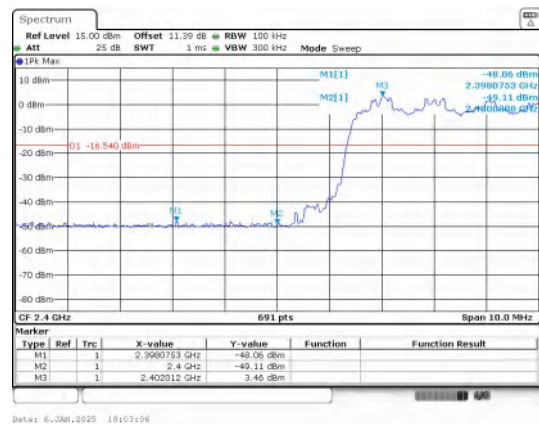
Out Of Band Emission
8DPSK_3-DH5_Channel 78



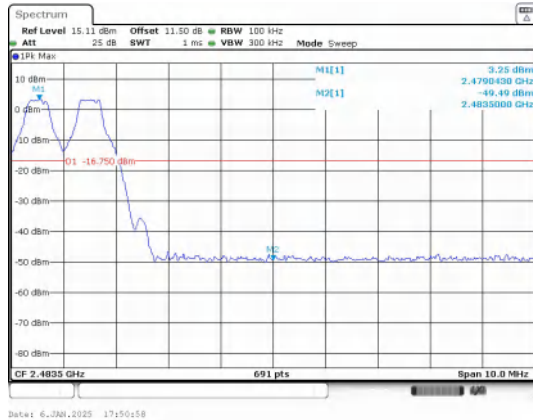
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



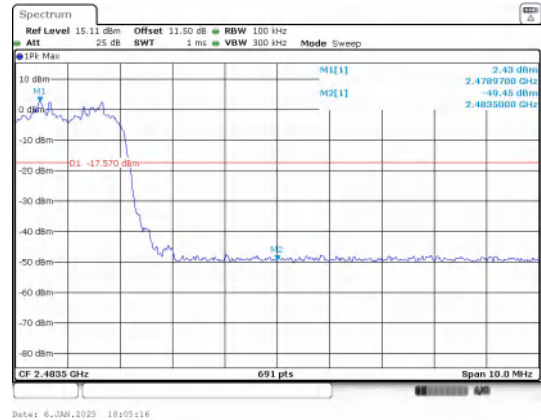
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



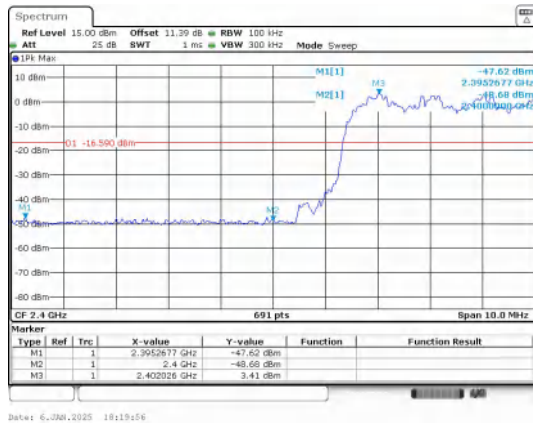
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



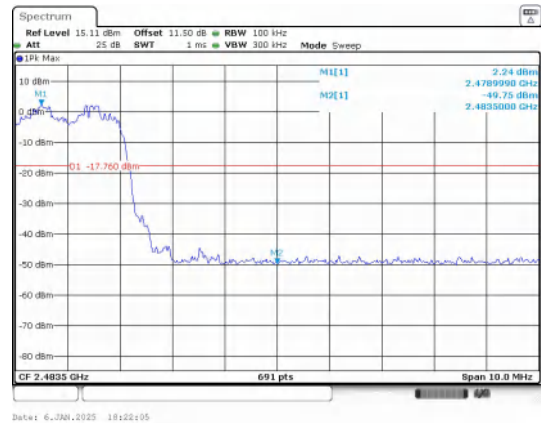
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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-----