

Appendix Report

Report No.:	CISRR24123023704
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

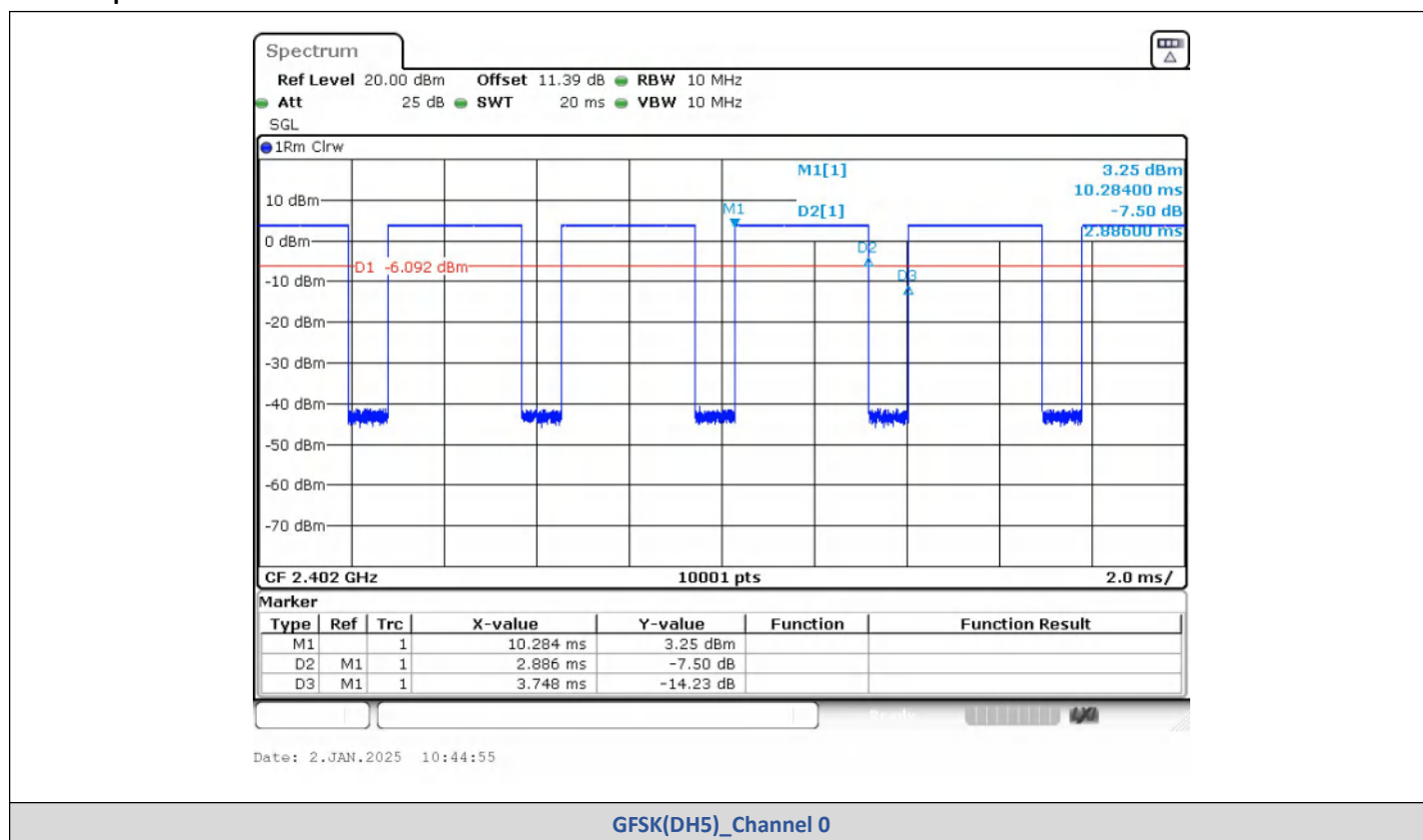
1) Duty Cycle

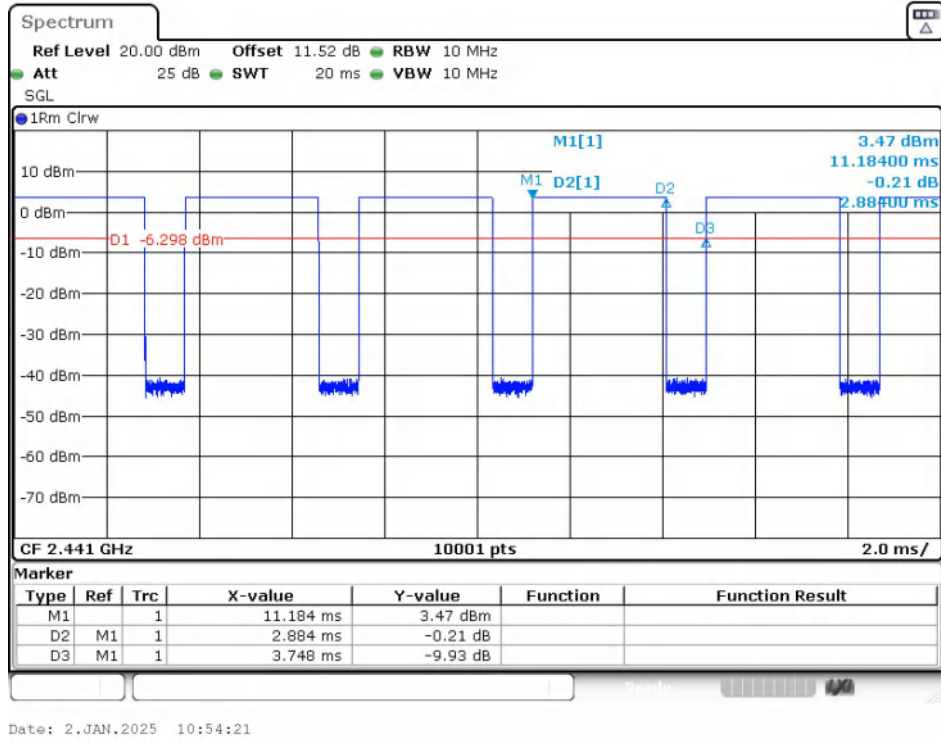
Test Result

Left:

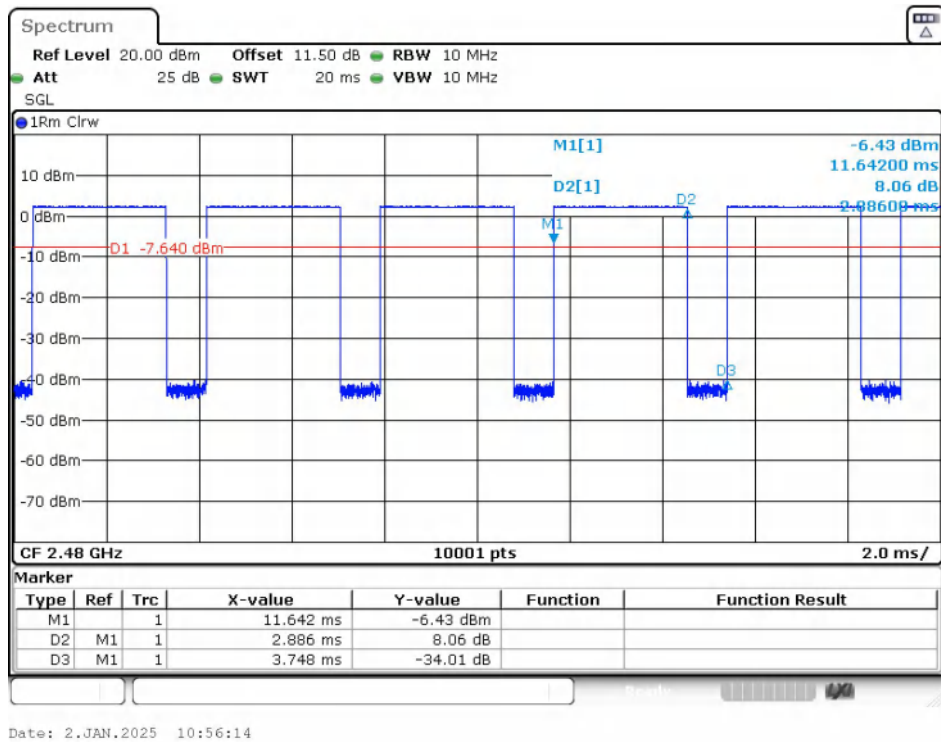
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	3.748	77.00	0.7700	1.1351	0.3465
		39	2.884	3.748	76.95	0.7695	1.1379	0.3467
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
$\pi/4$ DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.3460
		39	2.890	3.748	77.11	0.7711	1.1289	0.3460
		78	2.890	3.748	77.11	0.7711	1.1289	0.3460
8DPSK	3-DH5	0	2.892	3.748	77.16	0.7716	1.1261	0.3458
		39	2.892	3.748	77.16	0.7716	1.1261	0.3458
		78	2.894	3.748	77.21	0.7721	1.1233	0.3455

Test Graphs

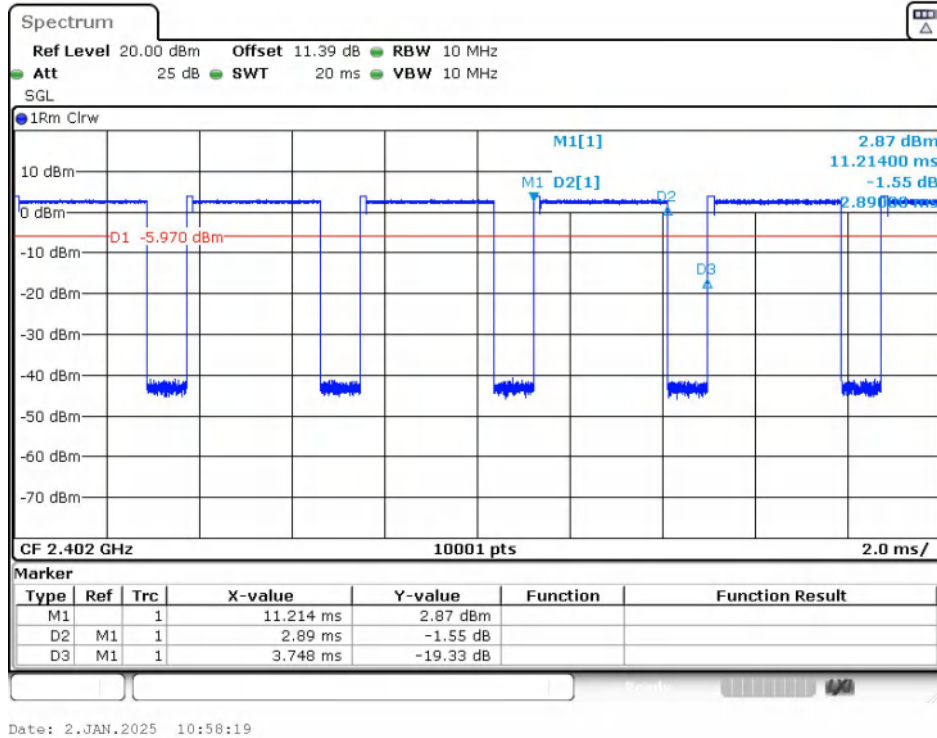




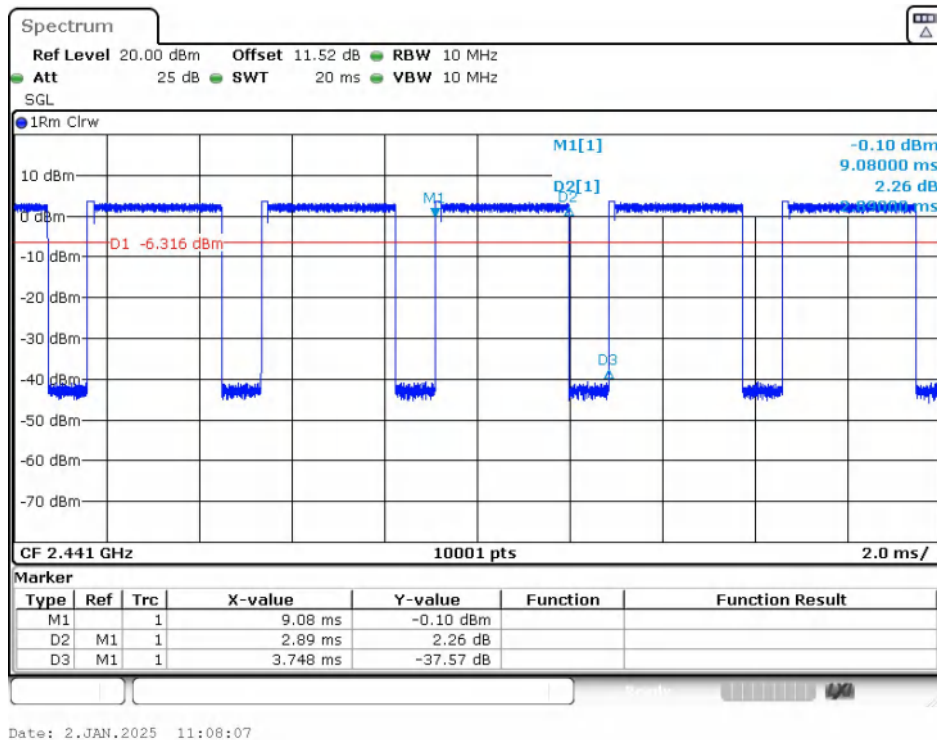
GFSK(DH5)_Channel 39



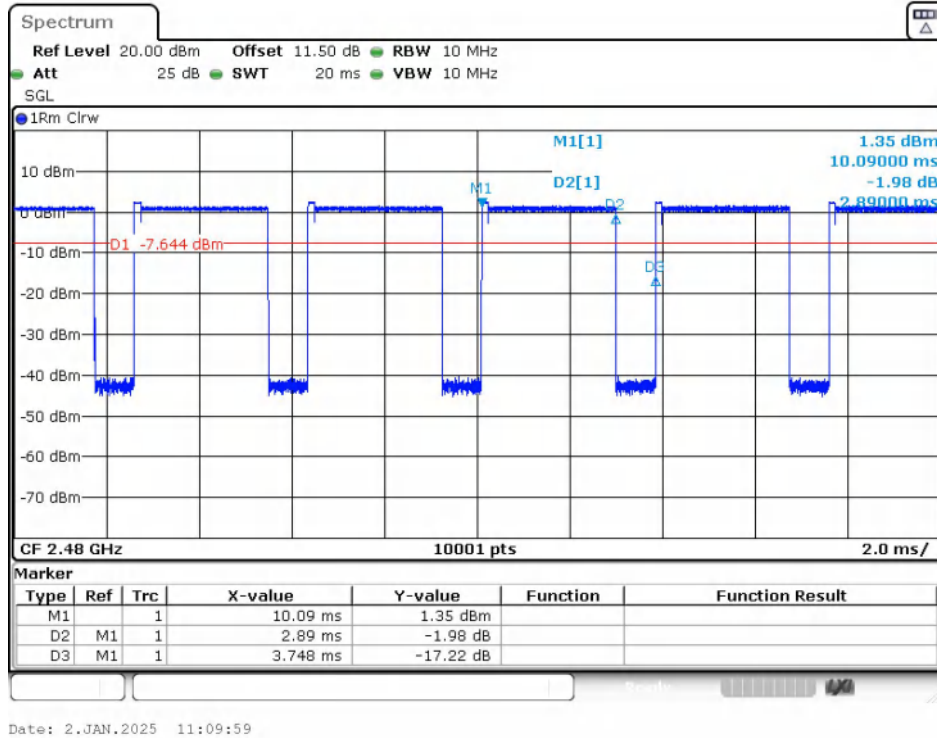
GFSK(DH5)_Channel 78



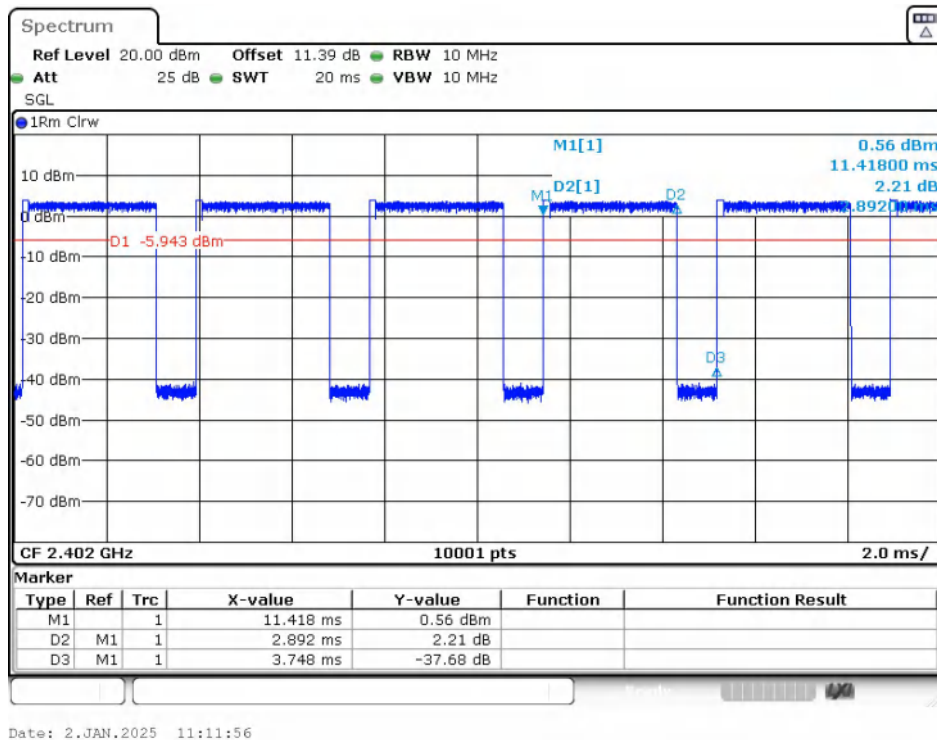
$\pi/4$ DQPSK(2-DH5)_Channel 0



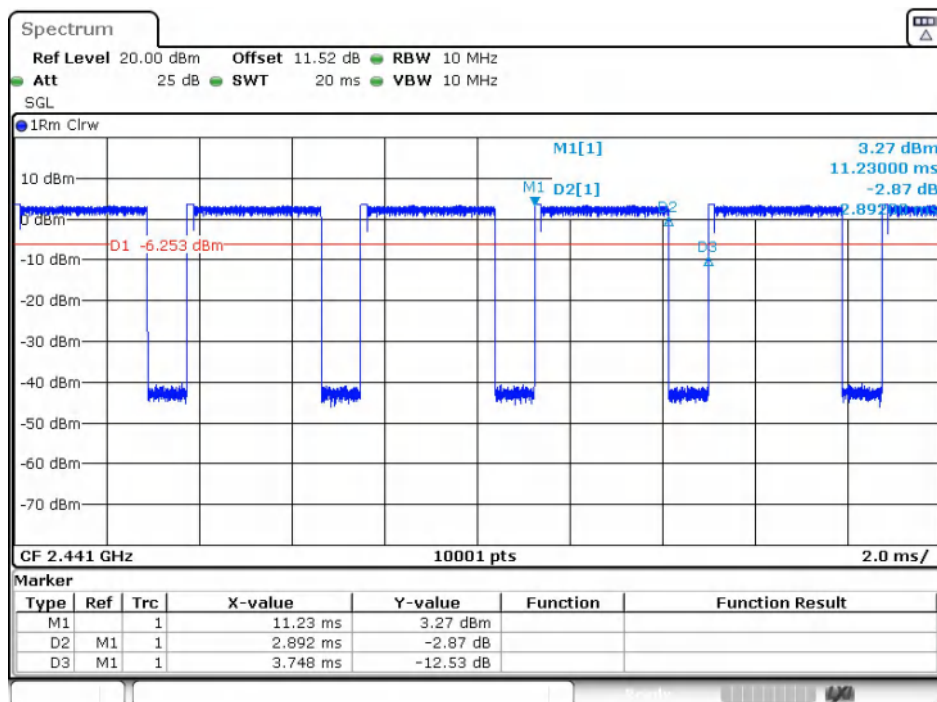
$\pi/4$ DQPSK(2-DH5)_Channel 39



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

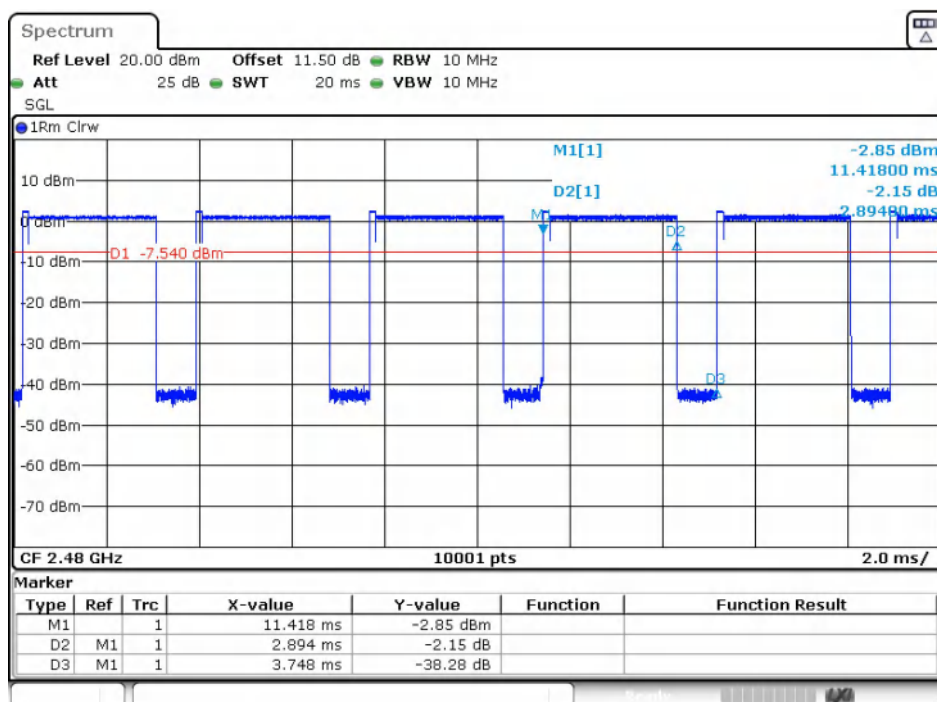


8DPSK(3-DH5)_Channel 0



Date: 2.JAN.2025 11:25:45

8DPSK(3-DH5)_Channel 39



Date: 2.JAN.2025 11:27:22

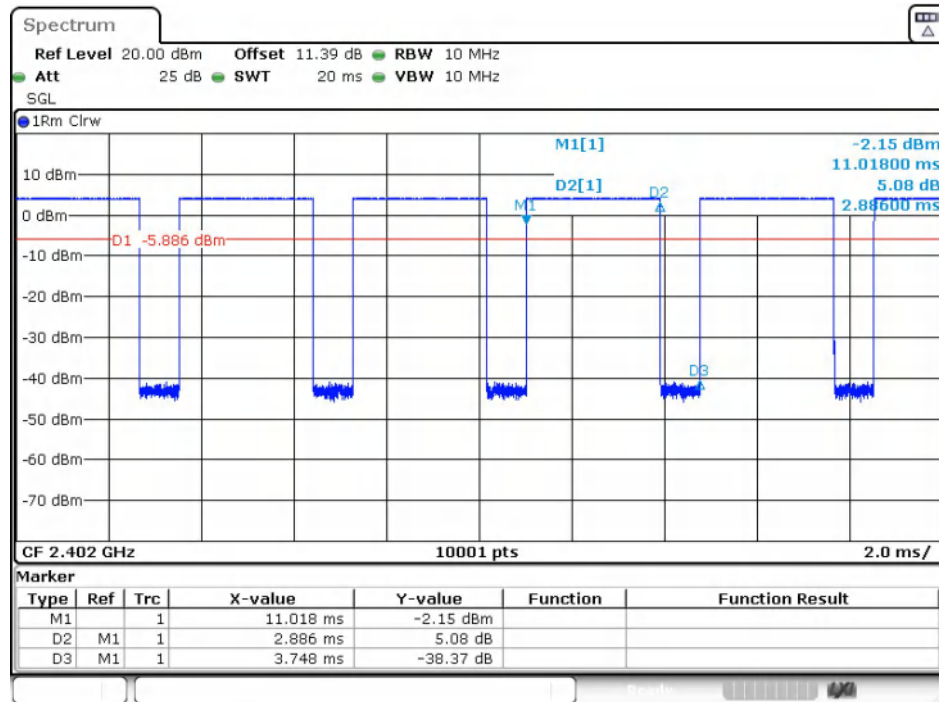
8DPSK(3-DH5)_Channel 78

Right:

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	3.748	77.00	0.7700	1.1351	0.3465
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465

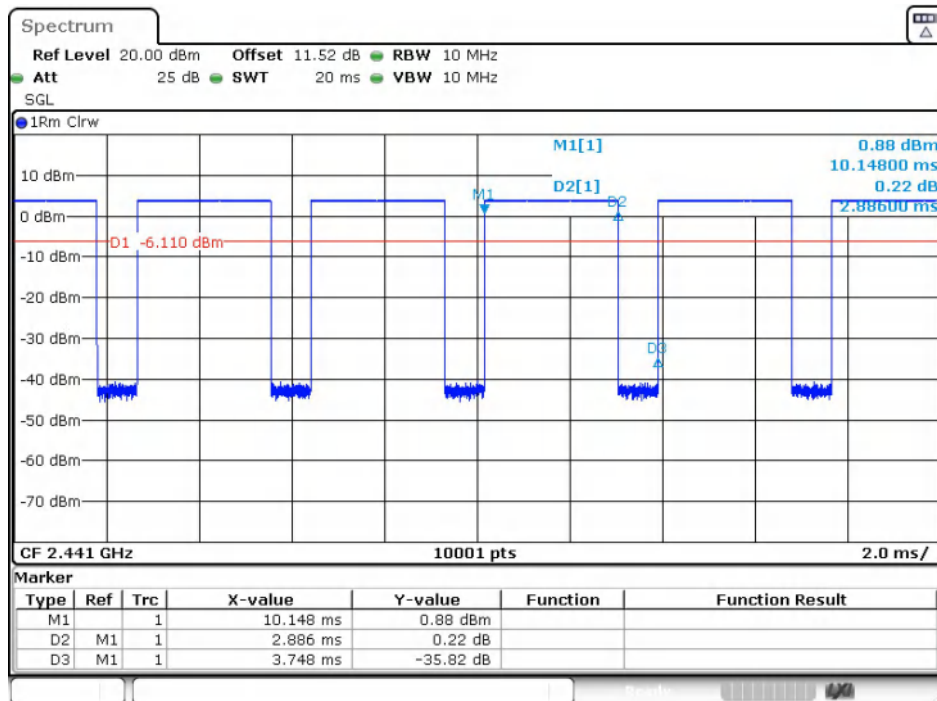
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
$\pi/4$ DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.3460
		39	2.890	3.748	77.11	0.7711	1.1289	0.3460
		78	2.890	3.748	77.11	0.7711	1.1289	0.3460
8DPSK	3-DH5	0	2.892	3.748	77.16	0.7716	1.1261	0.3458
		39	2.894	3.748	77.21	0.7721	1.1233	0.3455
		78	2.894	3.748	77.21	0.7721	1.1233	0.3455

Test Graphs



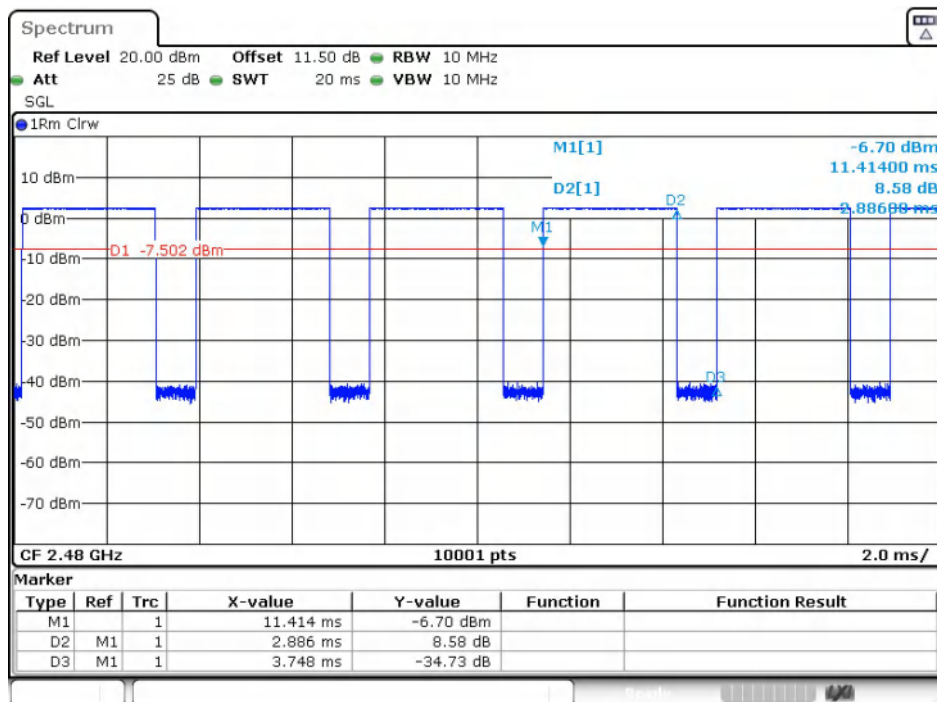
Date: 2, JAN, 2025 11:32:46

GFSK(DH5)_Channel 0



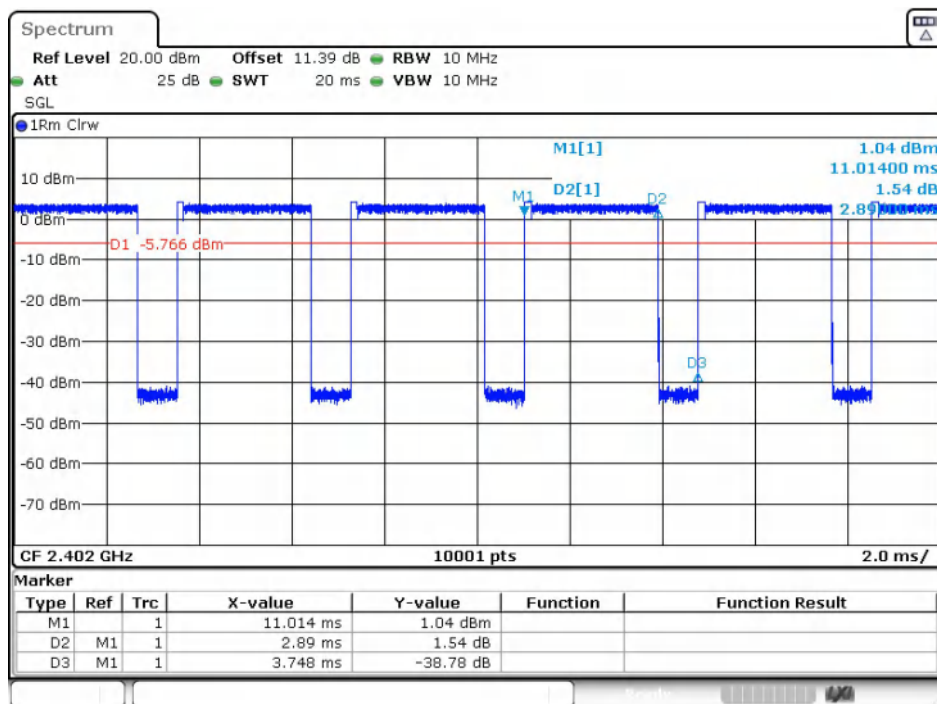
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GFSK(DH5)_Channel 39



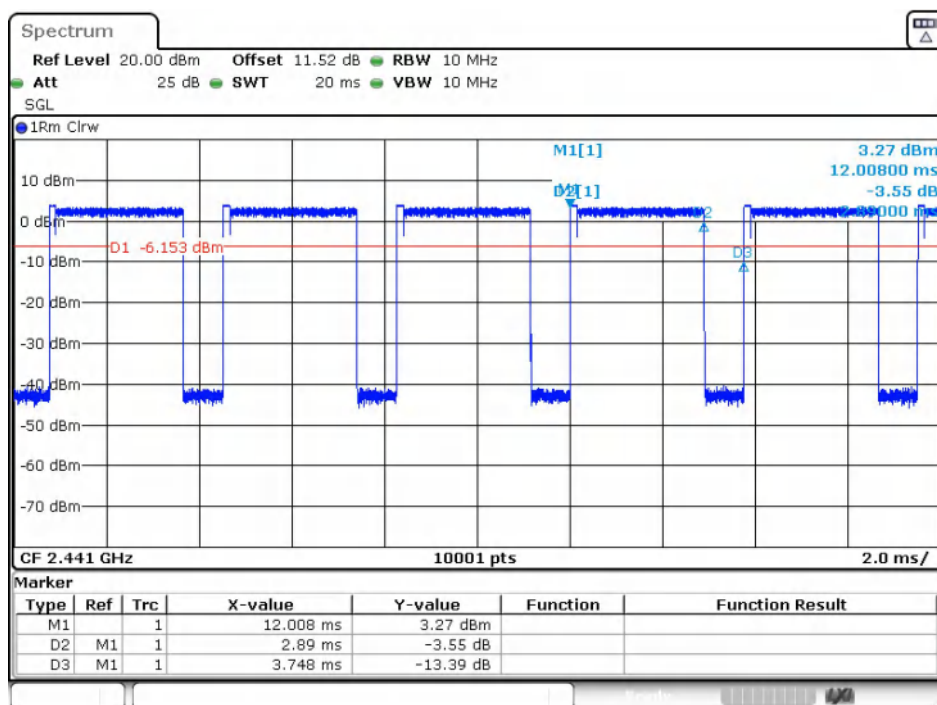
Date: 2.JAN.2025 11:55:49

GFSK(DH5)_Channel 78



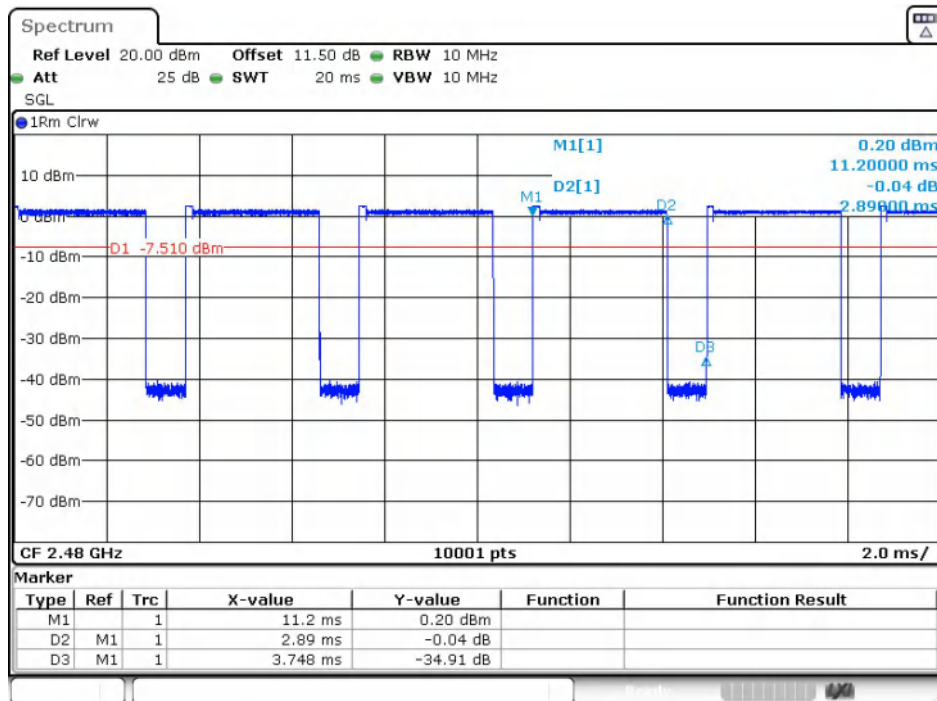
Date: 2.JAN.2025 11:58:11

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



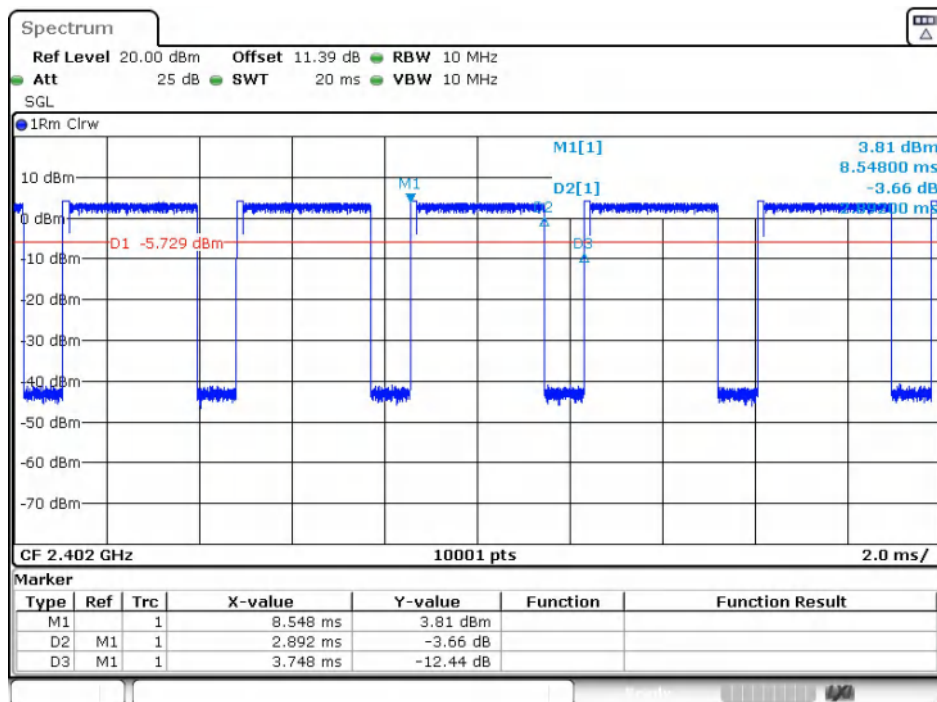
Date: 2.JAN.2025 14:14:30

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



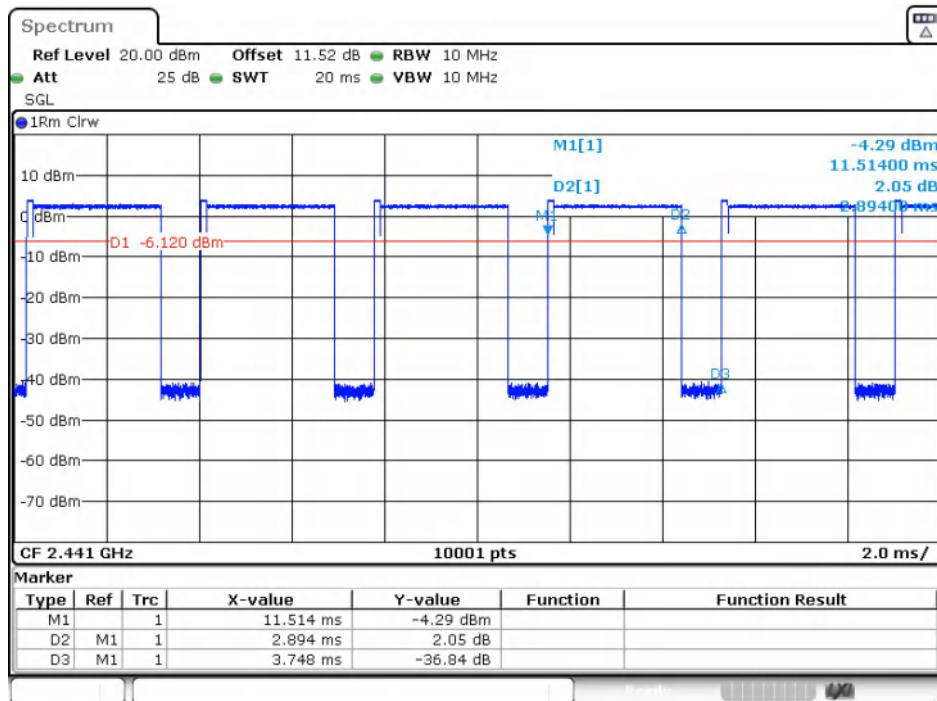
Date: 2.JAN.2025 14:17:49

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



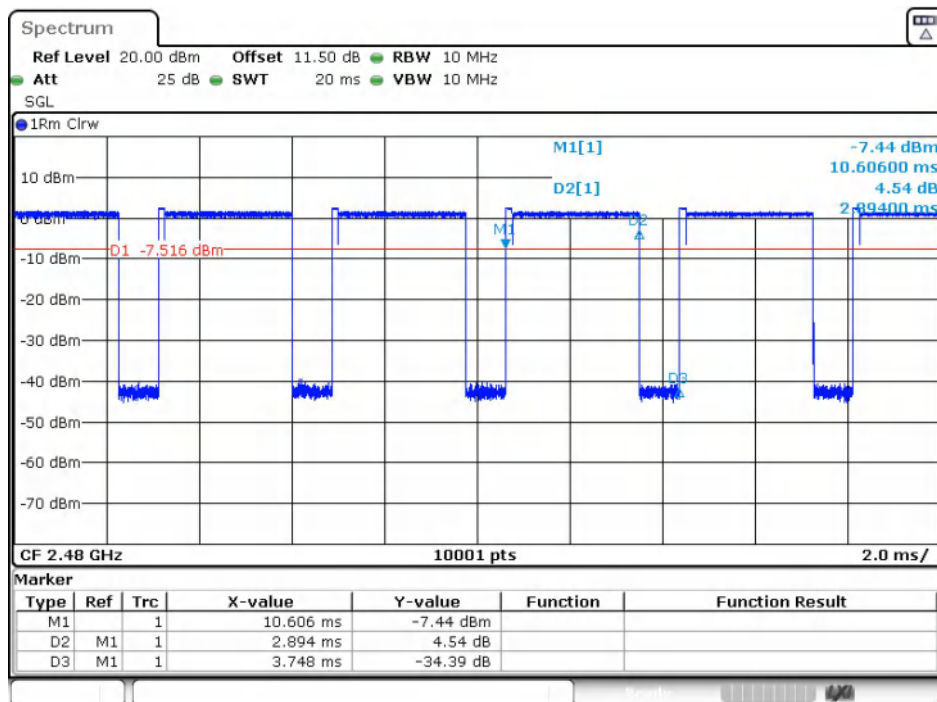
Date: 2.JAN.2025 14:23:52

8DPSK(3-DH5)_Channel 0



Date: 2.JAN.2025 14:36:36

8DPSK(3-DH5)_Channel 39



Date: 2.JAN.2025 14:38:31

8DPSK(3-DH5)_Channel 78

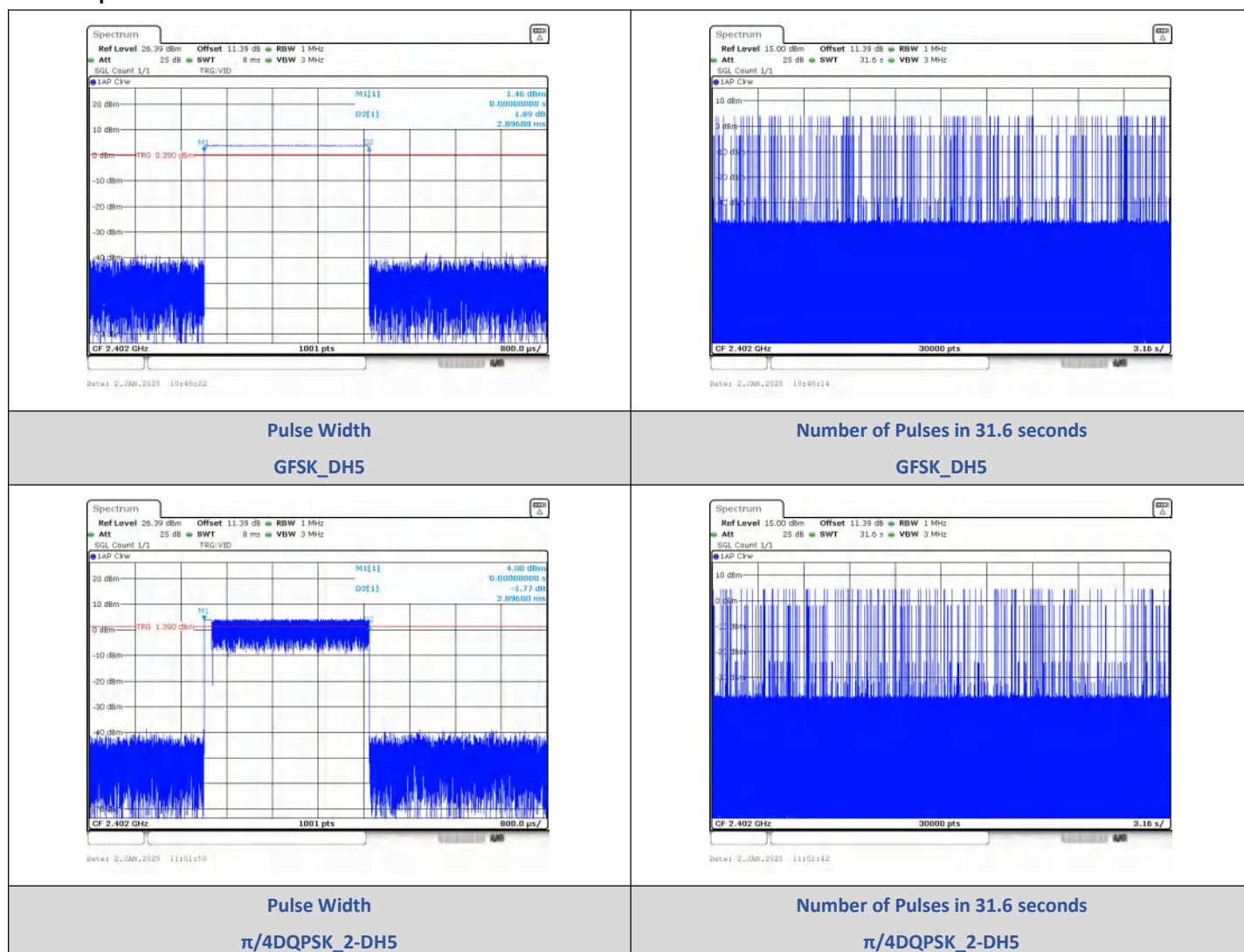
2) Dwell Time

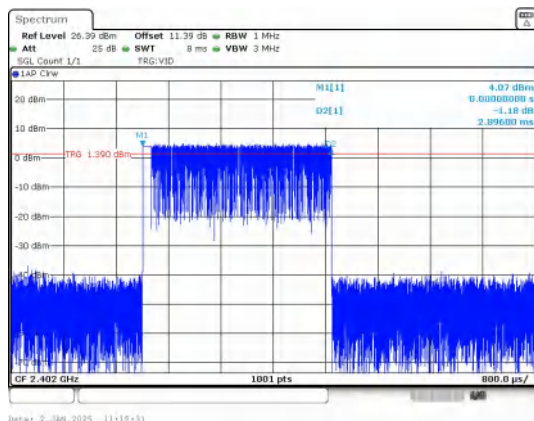
Test Result

Left:

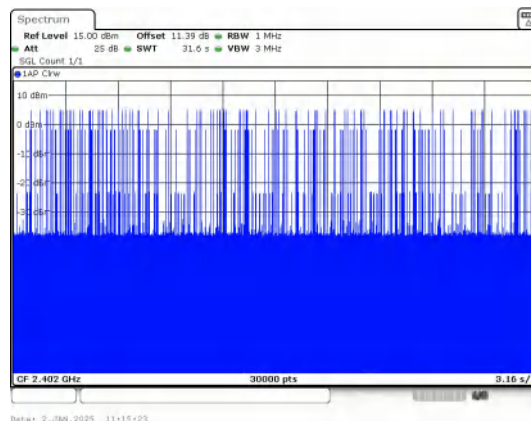
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.896	117	338.83	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.896	108	312.77		PASS
8DPSK	3-DH5		2.896	100	289.6		PASS

Test Graphs





Pulse Width
8DPSK_3-DH5

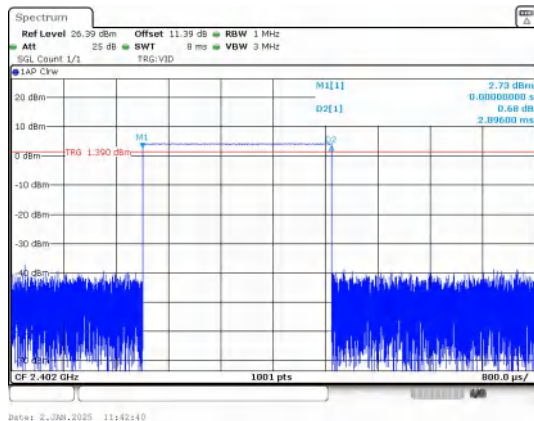


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

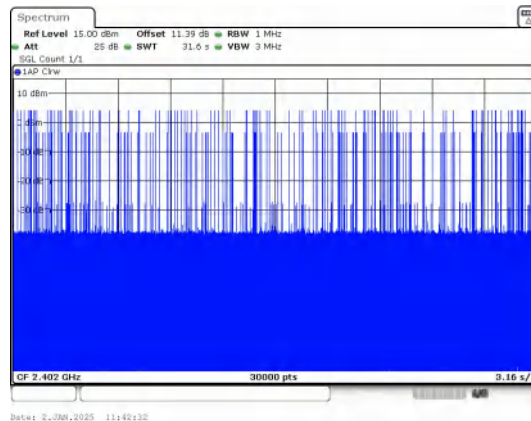
Right:

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.896	109	315.66	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.896	99	286.7		PASS
8DPSK	3-DH5		2.896	103	298.29		PASS

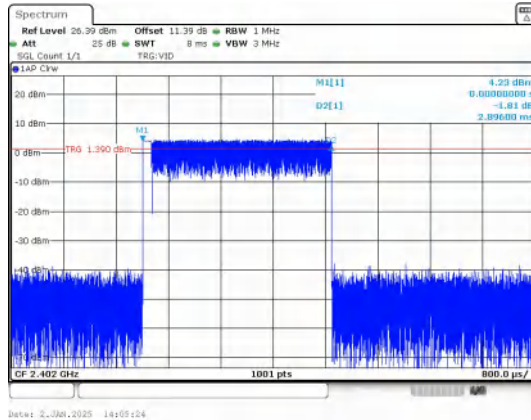
Test Graphs



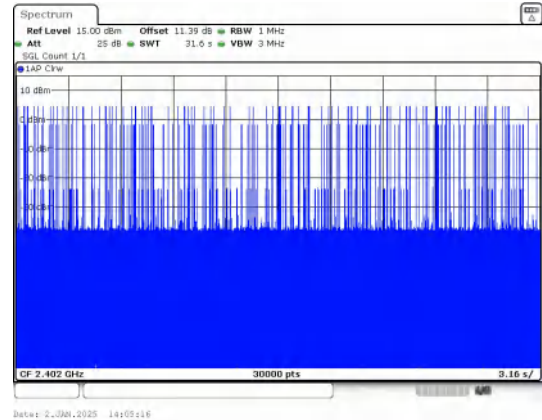
Pulse Width
GFSK_DH5



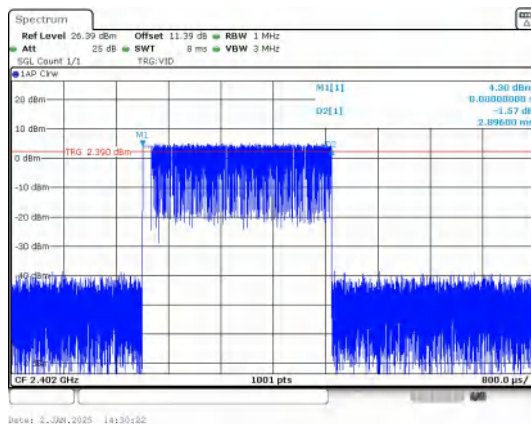
Number of Pulses in 31.6 seconds
GFSK_DH5



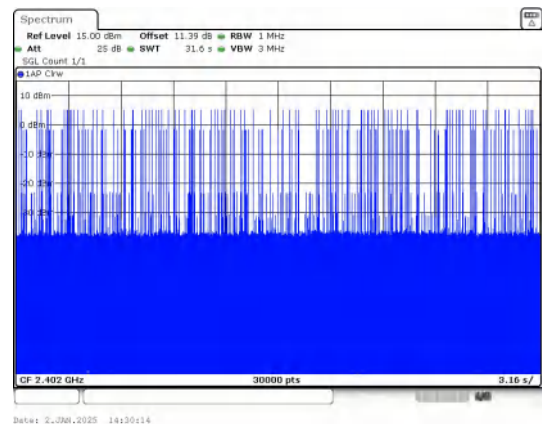
Pulse Width
 $\pi/4$ DQPSK_2-DH5



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

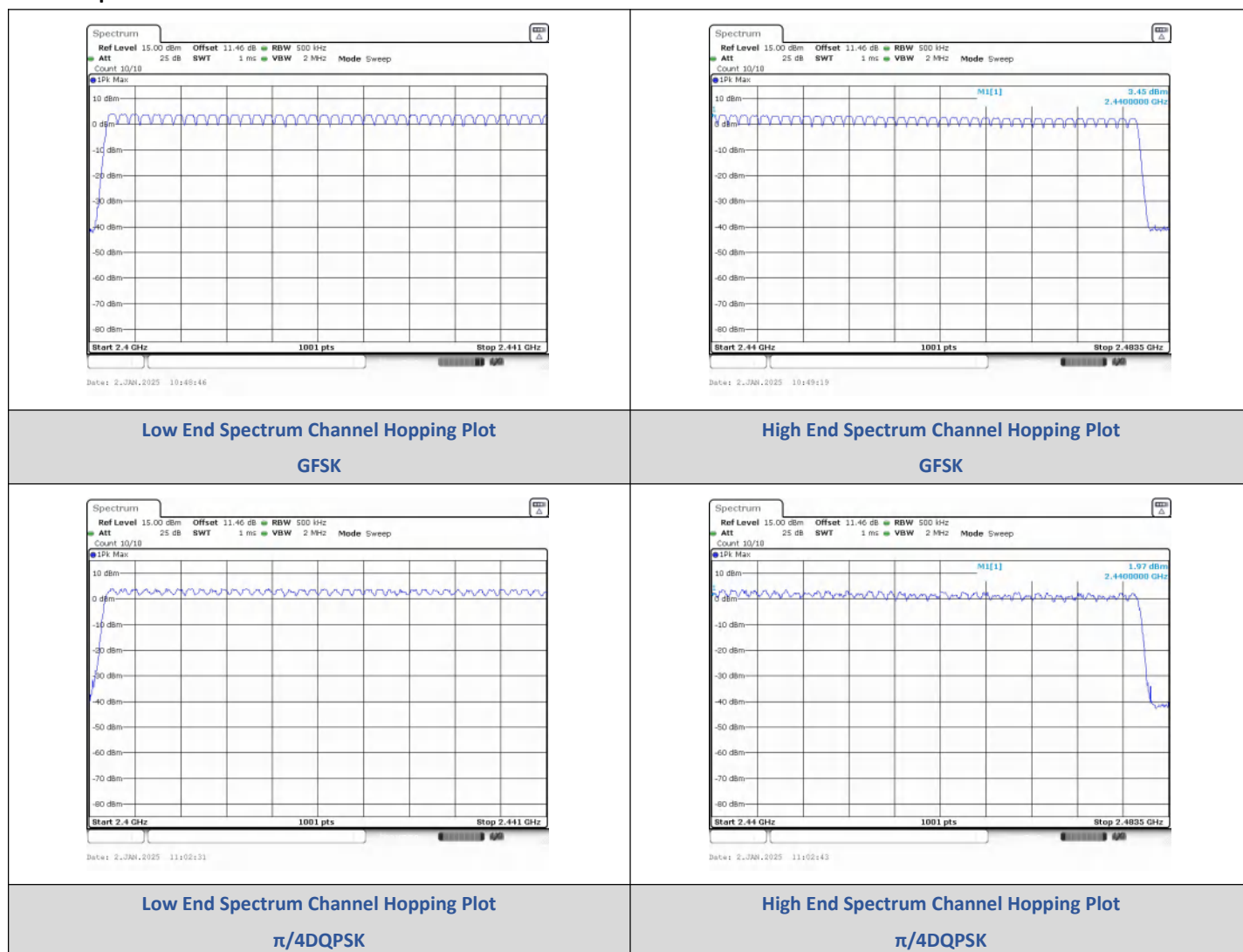
3) Number Of Hopping Channel

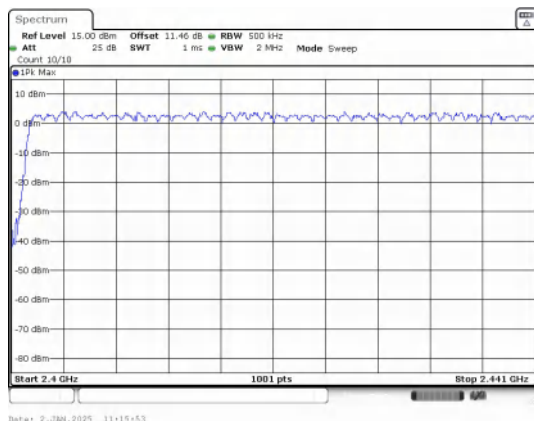
Test Result

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

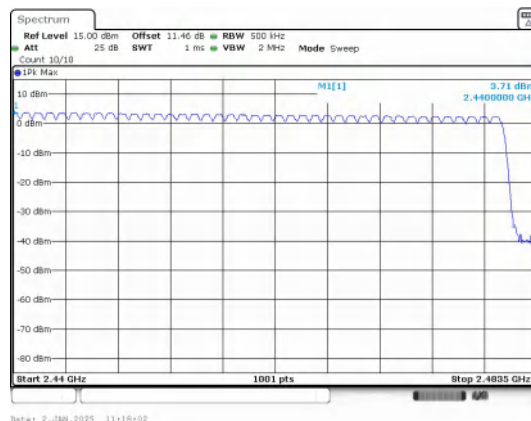
Test Graphs





Low End Spectrum Channel Hopping Plot

8DPSK



High End Spectrum Channel Hopping Plot

8DPSK

Right:

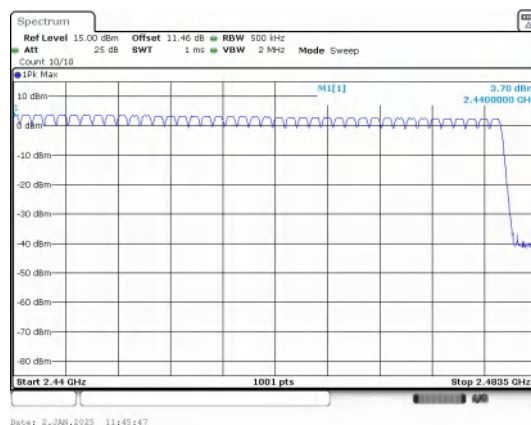
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



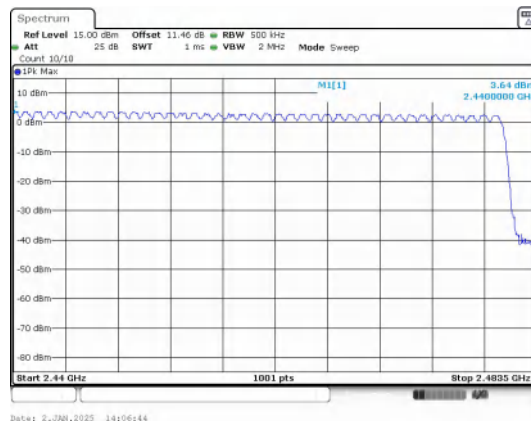
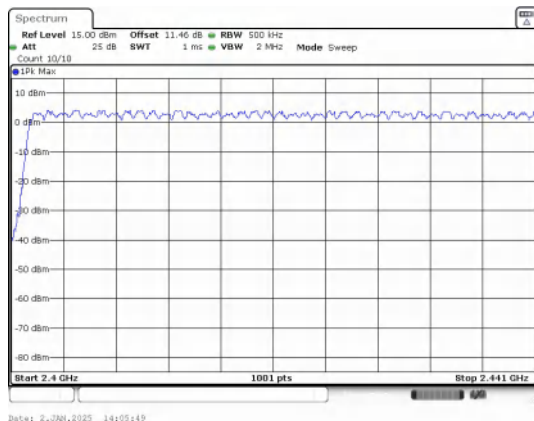
Low End Spectrum Channel Hopping Plot

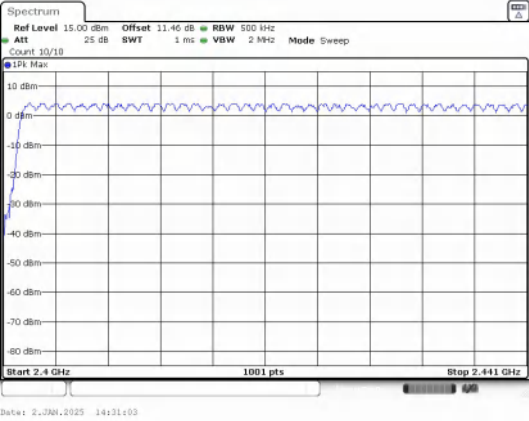
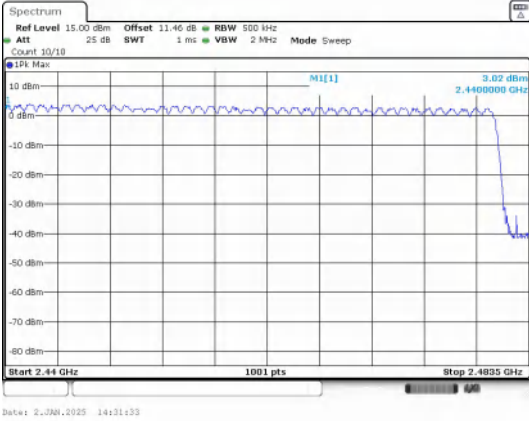
GFSK



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

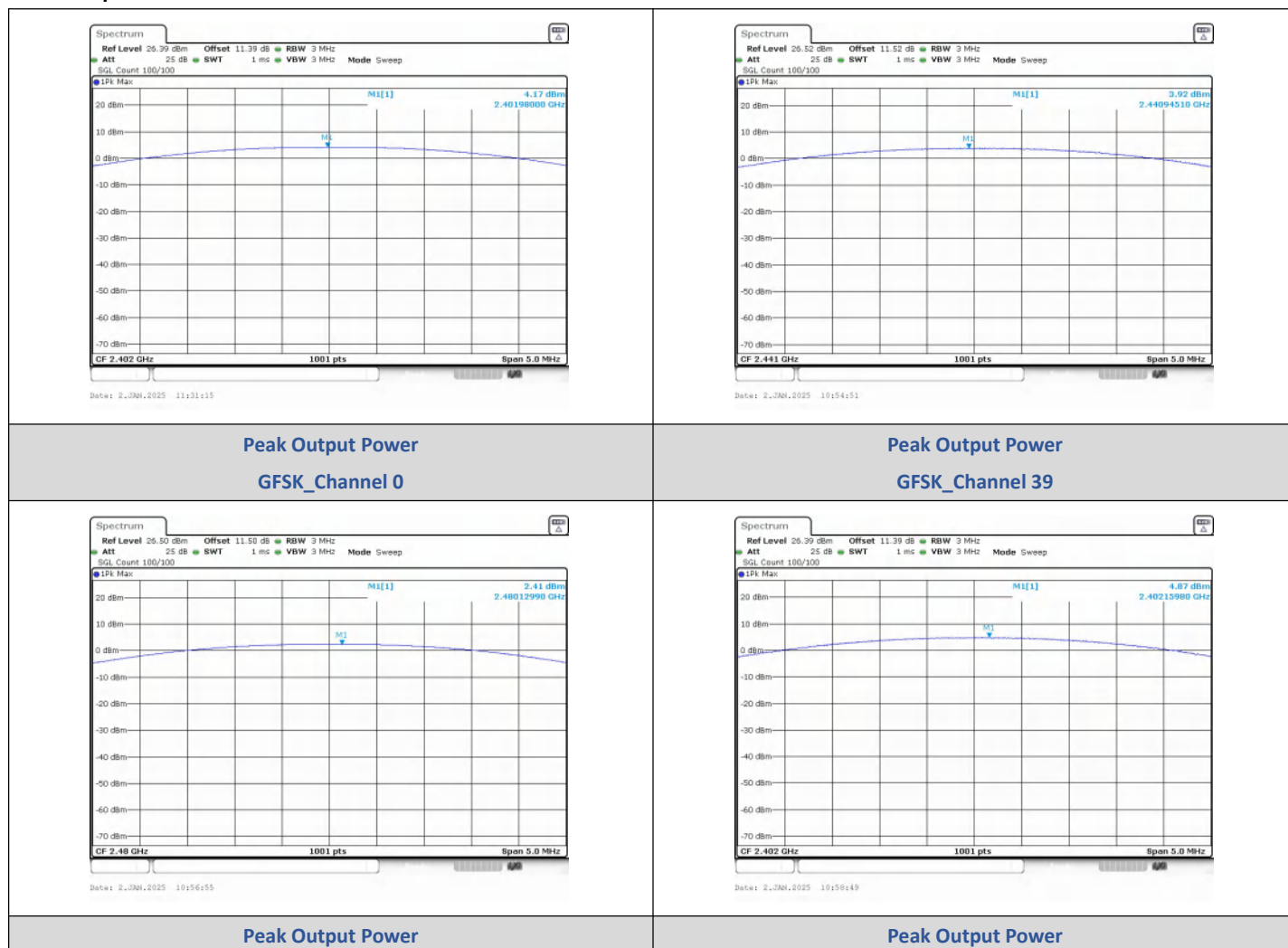
4) Conducted Peak Output Power

Test Result

Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	4.17	2.61	≤30	PASS
		39	3.92	2.47		PASS
		78	2.41	1.74		PASS
$\pi/4$ DQPSK	2-DH5	0	4.87	3.07	≤20.97	PASS
		39	4.49	2.81		PASS
		78	3.26	2.12		PASS
8DPSK	3-DH5	0	5.21	3.32		PASS
		39	4.87	3.07		PASS
		78	3.64	2.31		PASS

Test Graphs



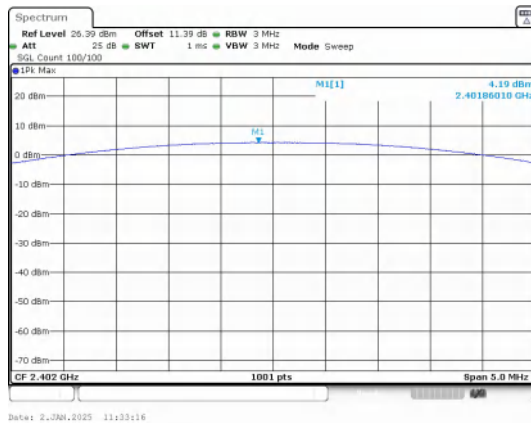


Right:

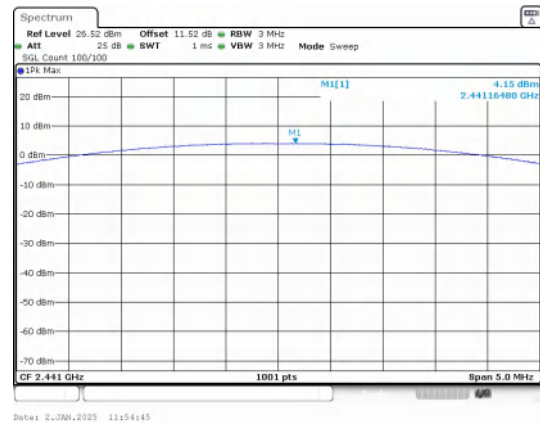
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	4.19	2.62	≤30	PASS

$\pi/4$ DQPSK	2-DH5	39	4.15	2.60	≤ 20.97	PASS
		78	2.56	1.80		PASS
		0	5.04	3.19		PASS
		39	4.74	2.98		PASS
		78	3.36	2.17		PASS
		0	5.41	3.48		PASS
8DPSK	3-DH5	39	4.95	3.13		PASS
		78	3.71	2.35		PASS

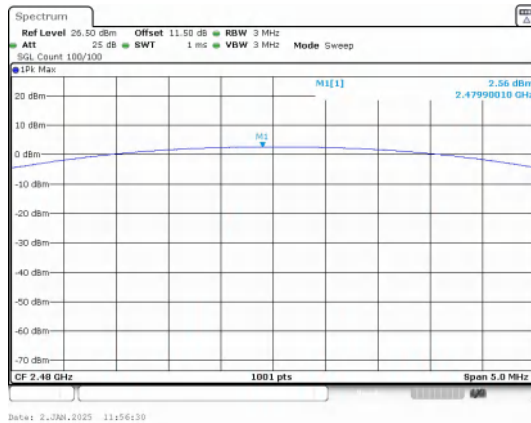
Test Graphs



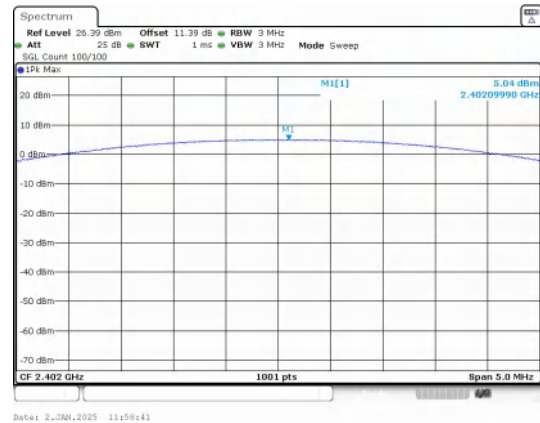
Peak Output Power
GFSK_Channel 0



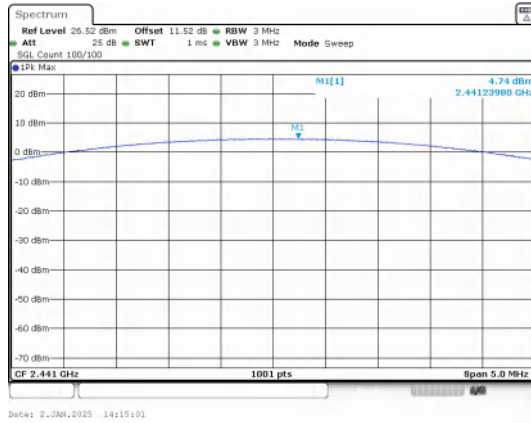
Peak Output Power
GFSK_Channel 39



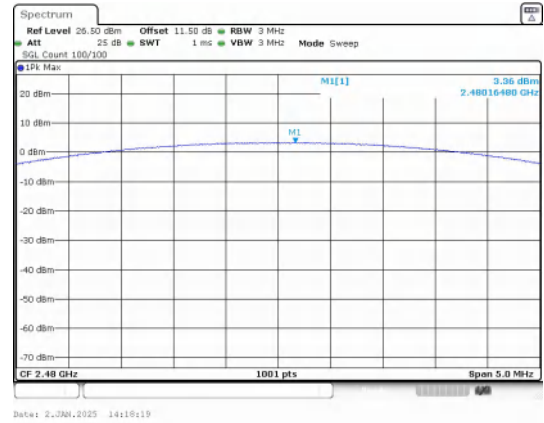
Peak Output Power
GFSK_Channel 78



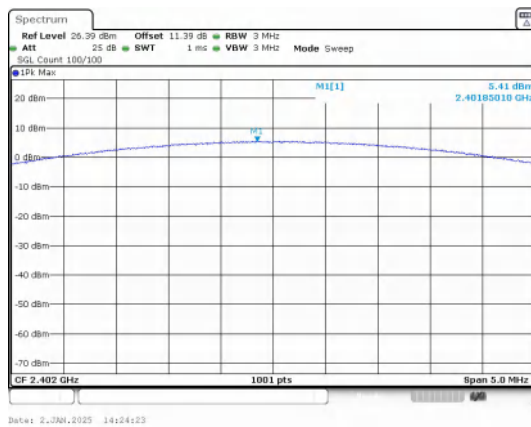
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



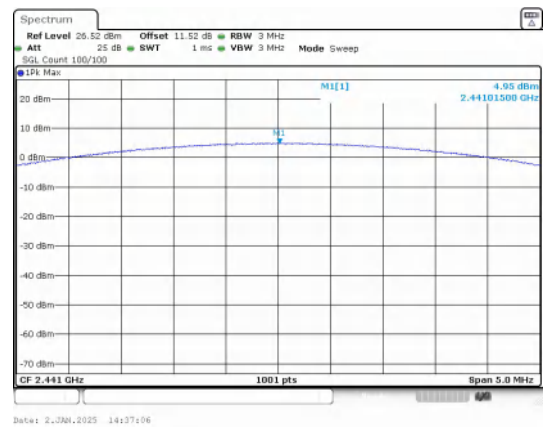
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



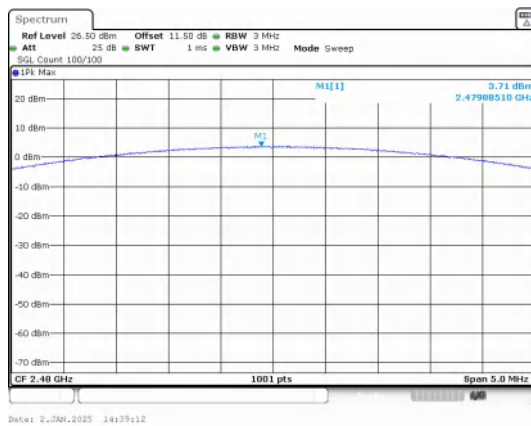
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

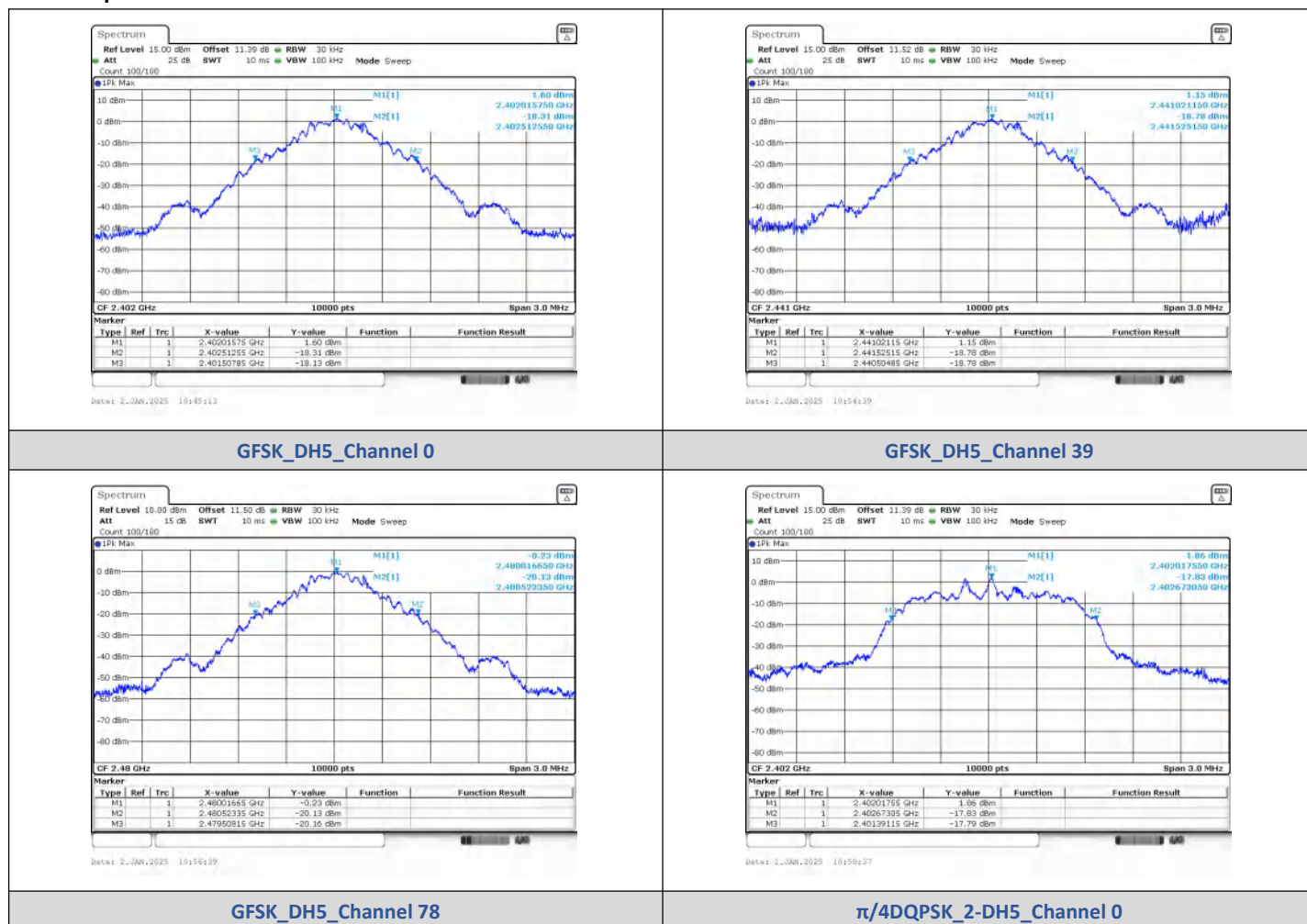
5) 20dB Bandwidth

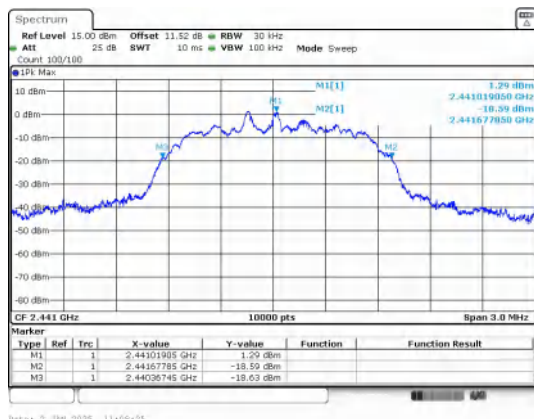
Test Result

Left:

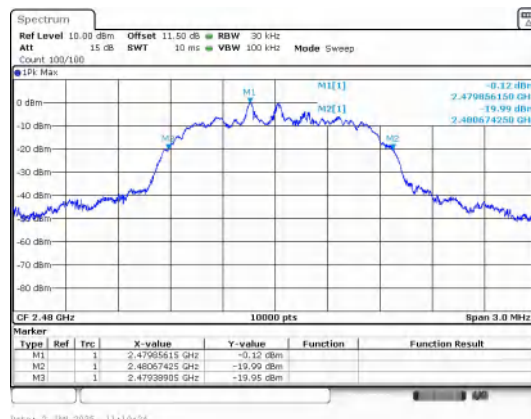
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.000
	39	2441 MHz	1.030
	78	2480 MHz	1.010
$\pi/4$ DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.310
	78	2480 MHz	1.280
8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.300
	78	2480 MHz	1.290

Test Graphs

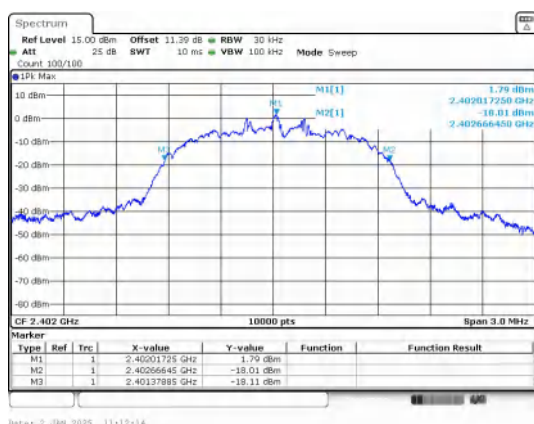




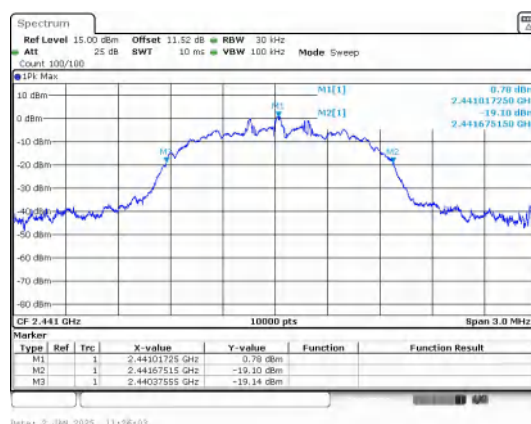
$\pi/4$ DQPSK_2-DH5_Channel 39



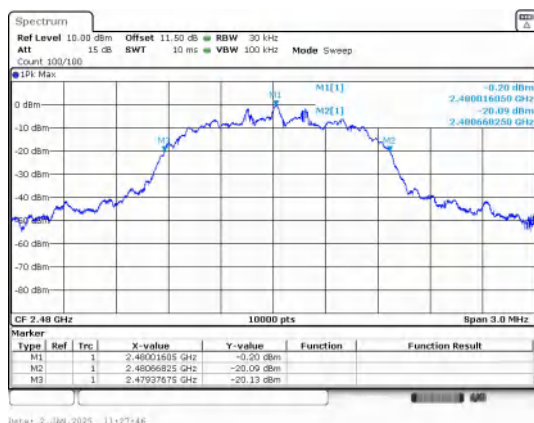
$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



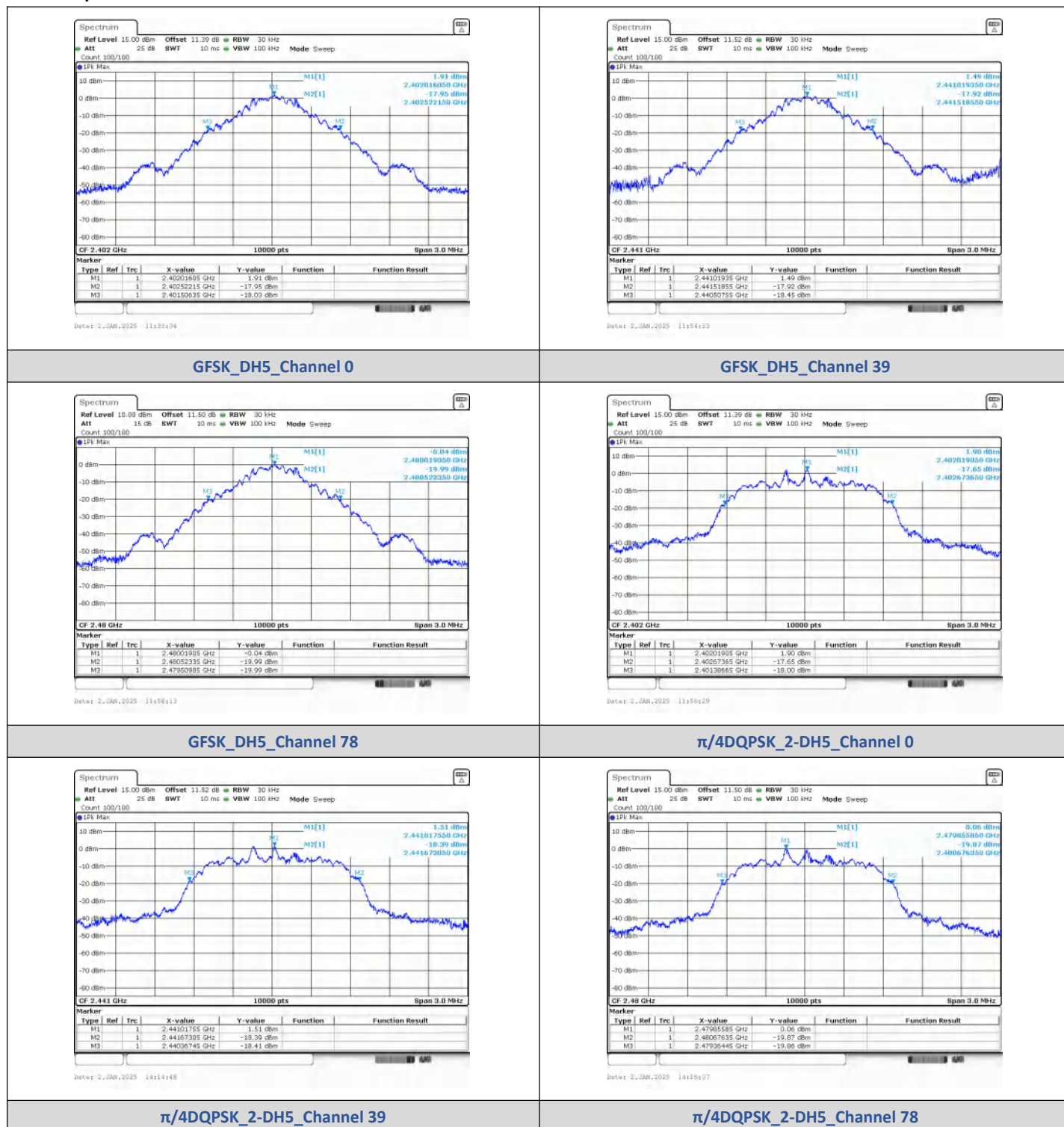
8DPSK_3-DH5_Channel 78

Right:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.010
	39	2441 MHz	1.010
	78	2480 MHz	1.010
$\pi/4$ DQPSK	0	2402 MHz	1.280
	39	2441 MHz	1.300
	78	2480 MHz	1.320

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

Test Graphs

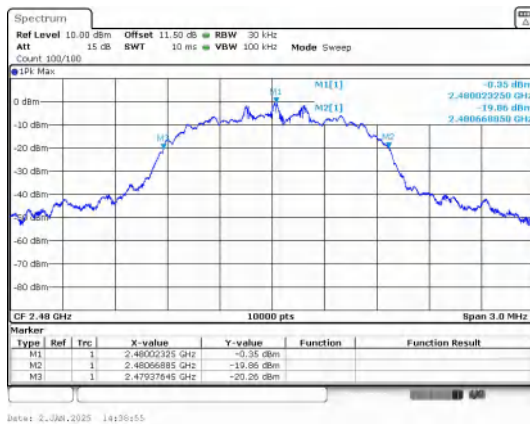




8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

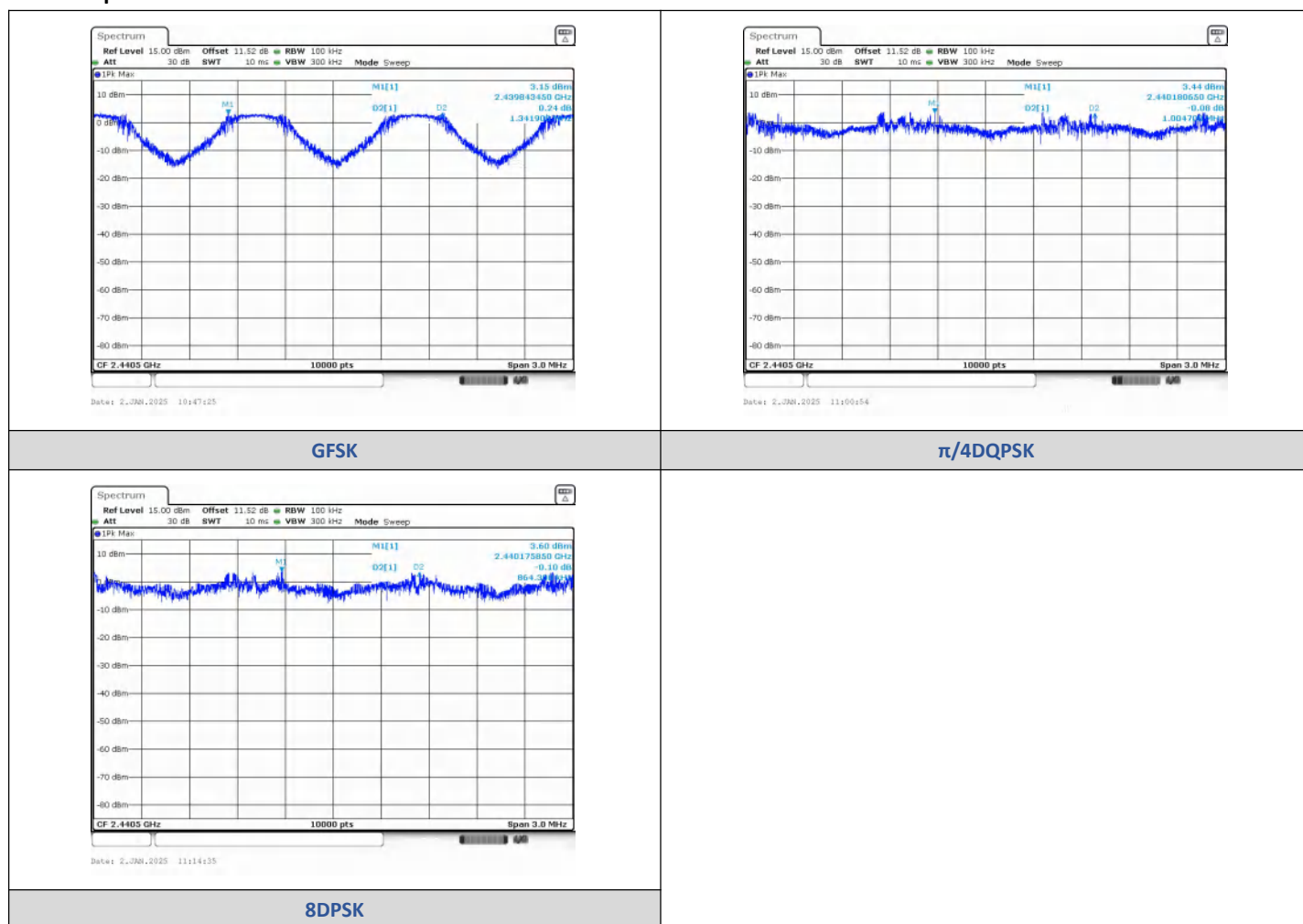
6) Carrier Frequencies Separation

Test Result

Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8434	2441.1854	1.3419	1.0	PASS
$\pi/4$ DQPSK	2-DH5	2440.1806	2441.1854	1.0047	0.853	PASS
8DPSK	3-DH5	2440.1759	2441.0401	0.8643	0.86	PASS

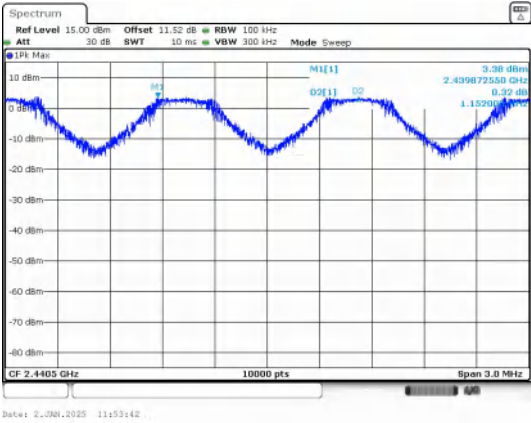
Test Graphs



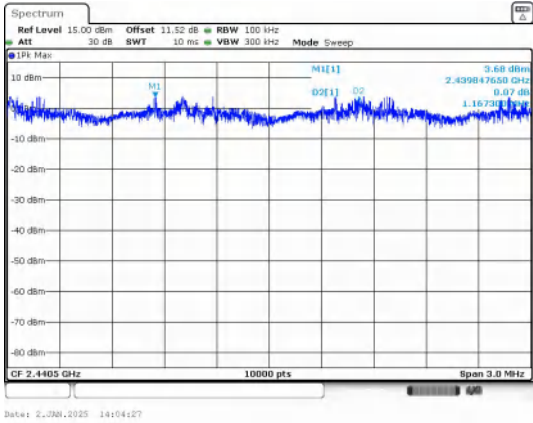
Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8726	2441.0246	1.1520	1.01	PASS
$\pi/4$ DQPSK	2-DH5	2439.8477	2441.015	1.1673	0.853	PASS
8DPSK	3-DH5	2440.0276	2441.0341	1.0065	0.86	PASS

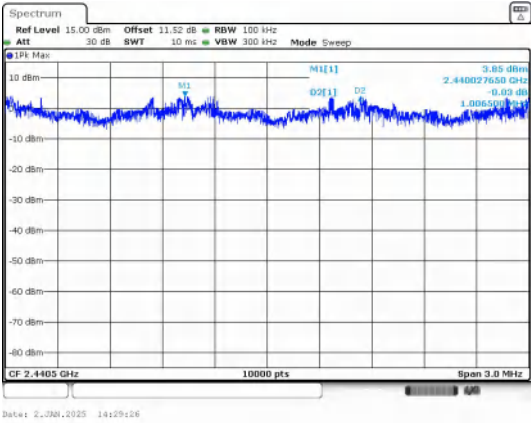
Test Graphs



GFSK



$\pi/4$ DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left:

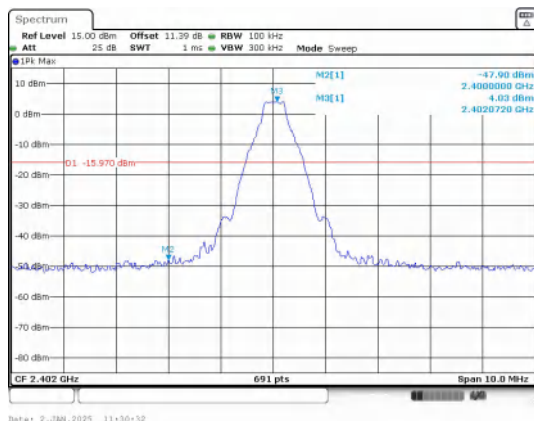
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-47.900	-15.97	-31.930	PASS
			4803.85	-43.878	-15.97	-27.908	PASS
		39	9763.72	-40.537	-16.4	-24.137	PASS
		78	837.78	-34.975	-17.71	-17.265	PASS
			2483.50	-50.700	-17.71	-32.990	PASS
$\pi/4$ DQPSK	2-DH5	0	827.79	-38.563	-16.15	-22.413	PASS
			2400.00	-46.290	-16.15	-30.140	PASS
		39	9764.55	-41.002	-16.34	-24.662	PASS
		78	2483.50	-50.160	-17.68	-32.480	PASS
			9920.20	-40.481	-17.68	-22.801	PASS
8DPSK	3-DH5	0	2400.00	-45.040	-16.2	-28.840	PASS
			9608.08	-44.552	-16.2	-28.352	PASS
		39	9763.72	-40.658	-16.37	-24.288	PASS
		78	2483.50	-50.440	-17.75	-32.690	PASS
			9920.20	-40.225	-17.75	-22.475	PASS

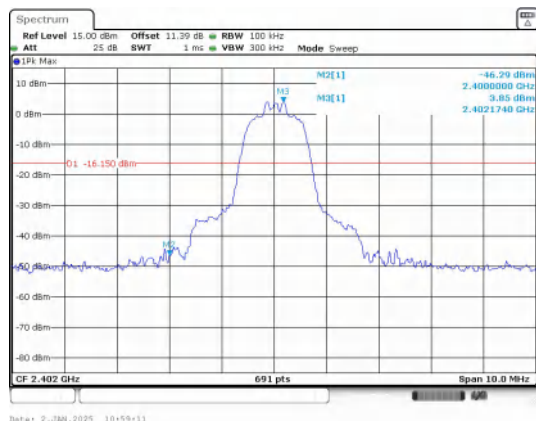
Hopping

Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.32	-47.911	-16.06	-31.851	PASS
			2400.00	-49.250	-16.06	-33.190	PASS
			2483.50	-48.720	-17.73	-30.990	PASS
$\pi/4$ DQPSK	2-DH5		2398.02	-47.678	-16.46	-31.218	PASS
			2400.00	-49.370	-16.46	-32.910	PASS
			2483.50	-49.280	-17.95	-31.330	PASS
8DPSK	3-DH5		2400.00	-45.920	-16.03	-29.890	PASS
			2483.50	-49.950	-17.77	-32.180	PASS

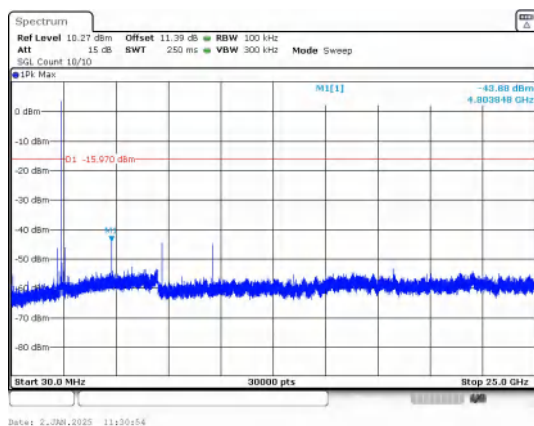
Test Graphs



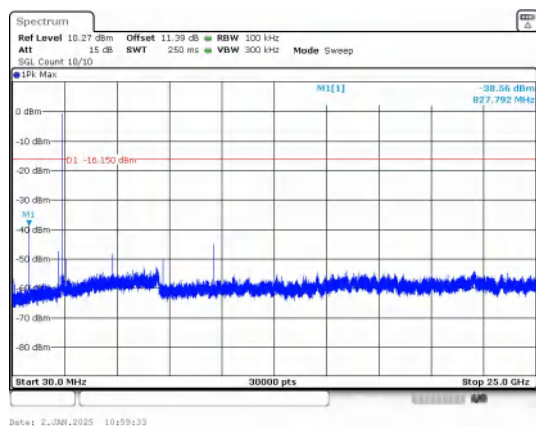
Out Of Band Emission
GFSK_DH5_Channel 0



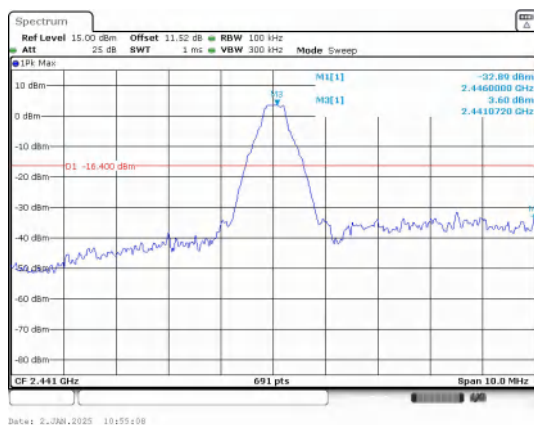
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0



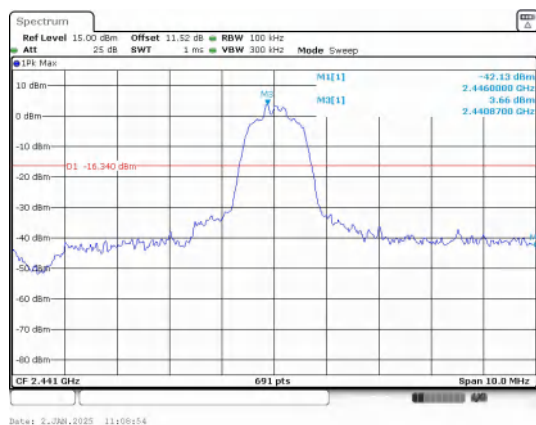
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



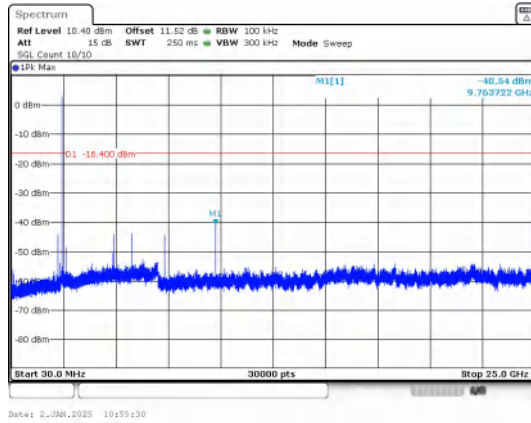
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



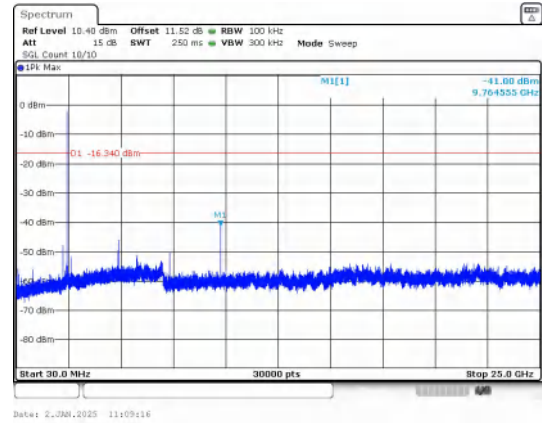
Out Of Band Emission
GFSK_DH5_Channel 39



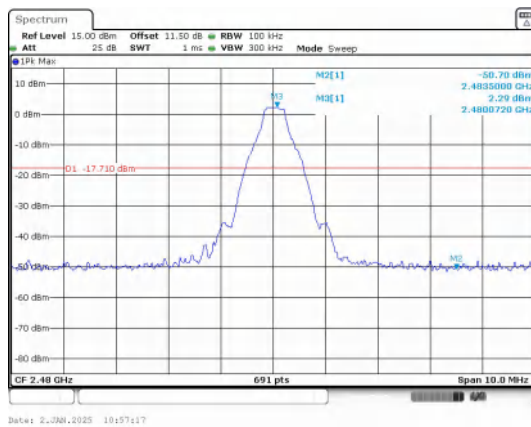
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



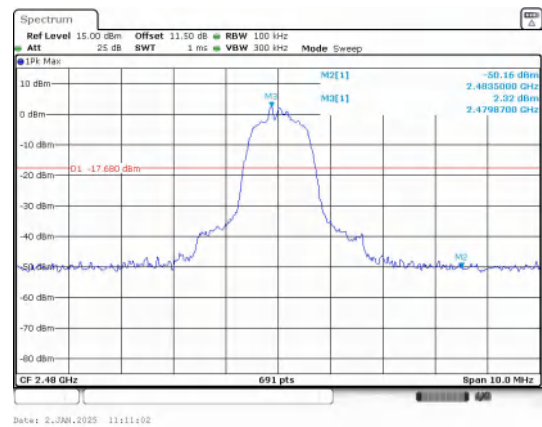
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



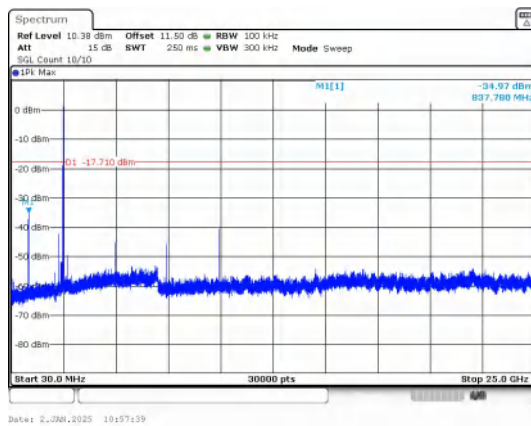
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 $\pi/4$ DQPSK_2-DH5_Channel 39



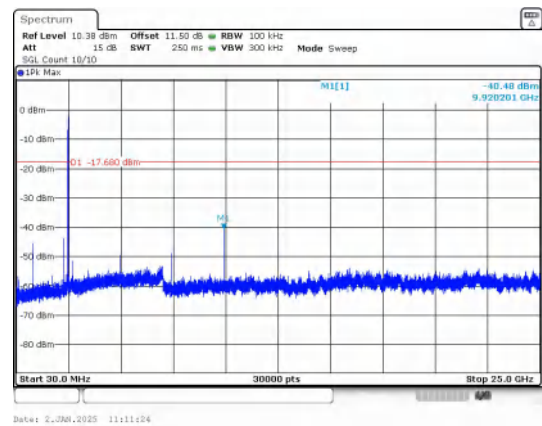
Out Of Band Emission
GFSK_DH5_Channel 78



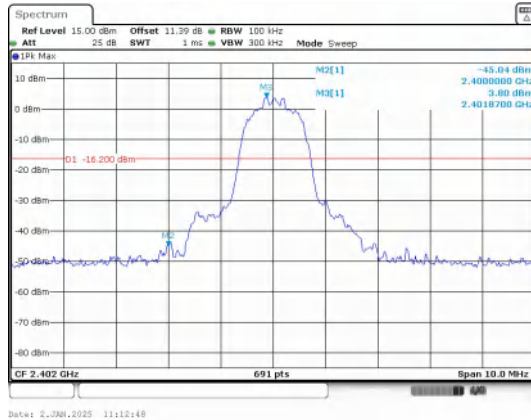
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



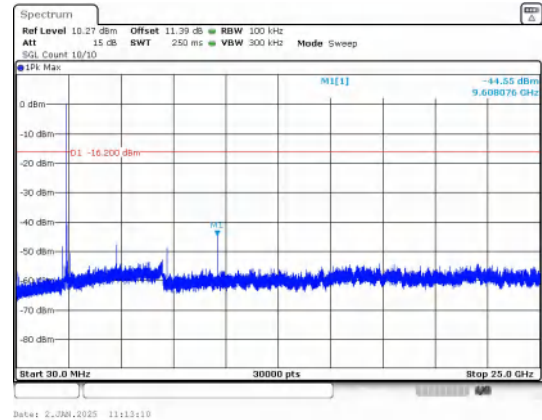
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



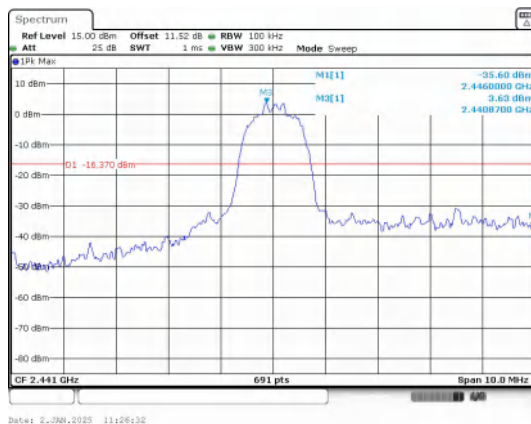
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



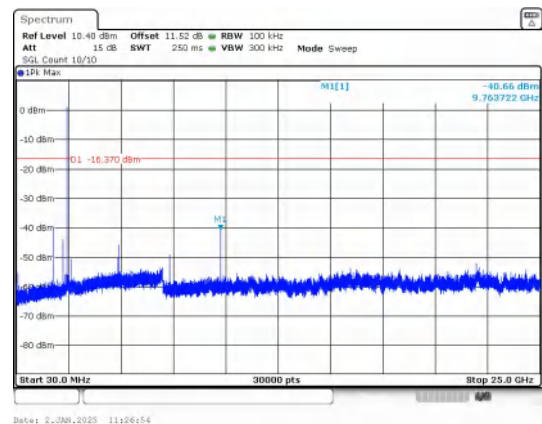
Out Of Band Emission
8DPSK_3-DH5_Channel 0



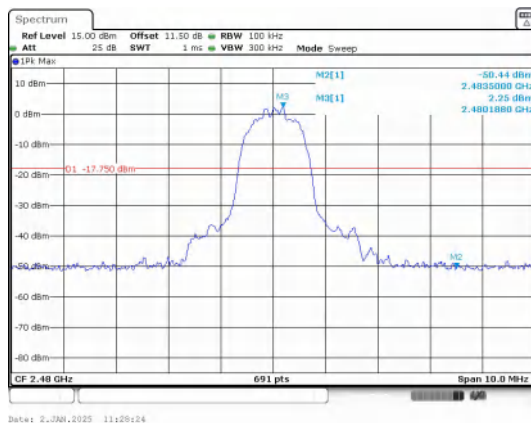
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



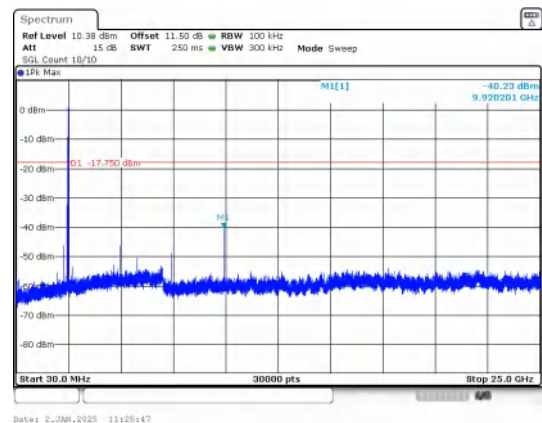
Out Of Band Emission
8DPSK_3-DH5_Channel 39



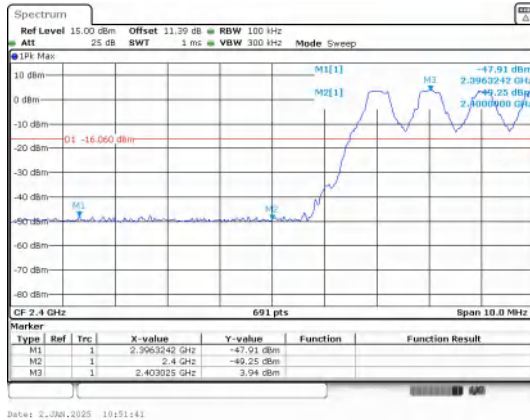
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



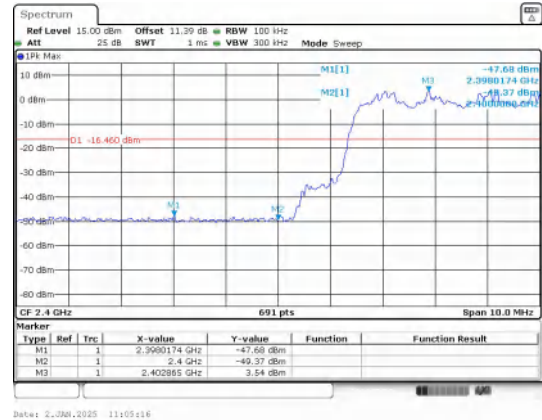
Out Of Band Emission
8DPSK_3-DH5_Channel 78



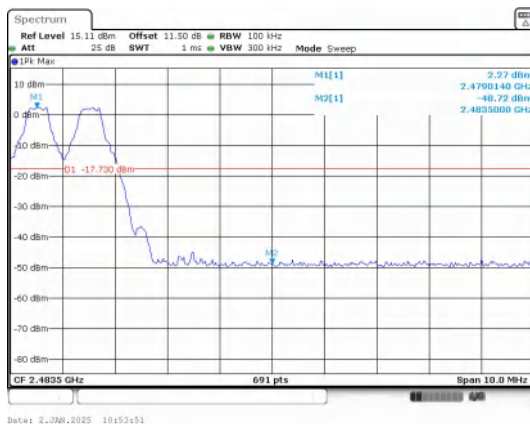
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



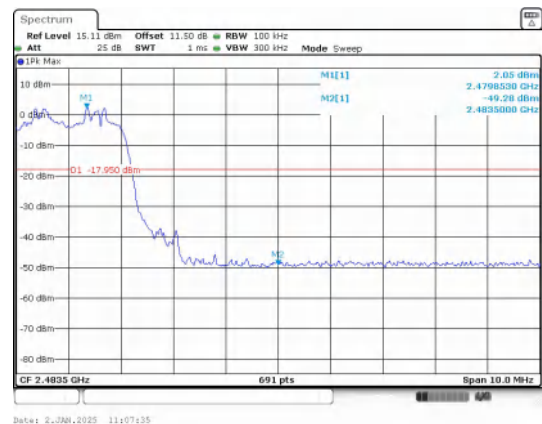
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



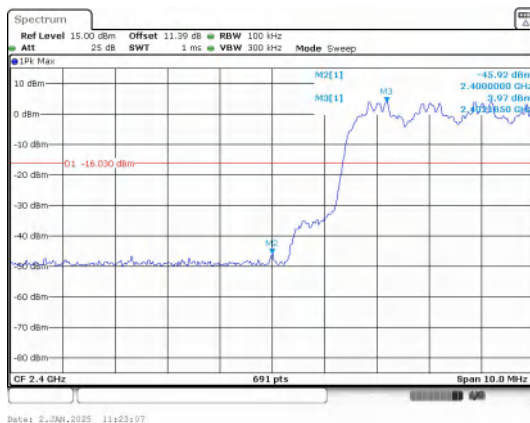
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



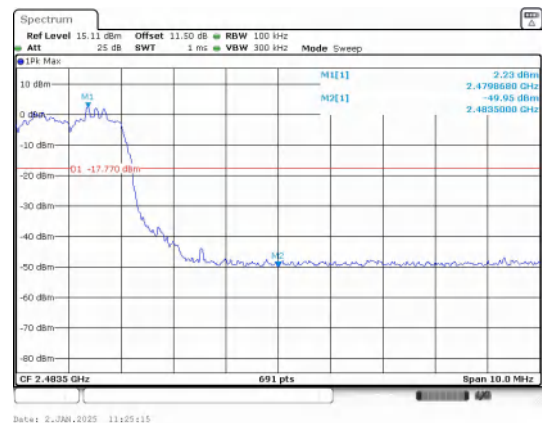
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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

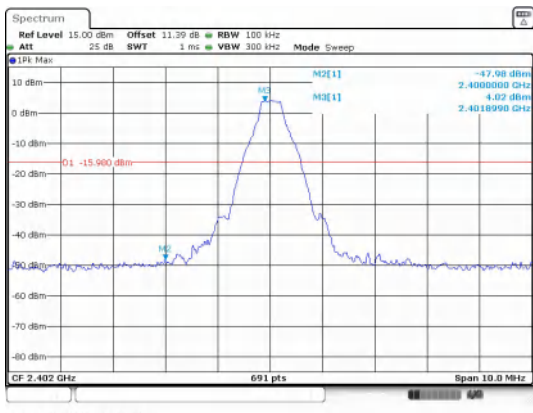
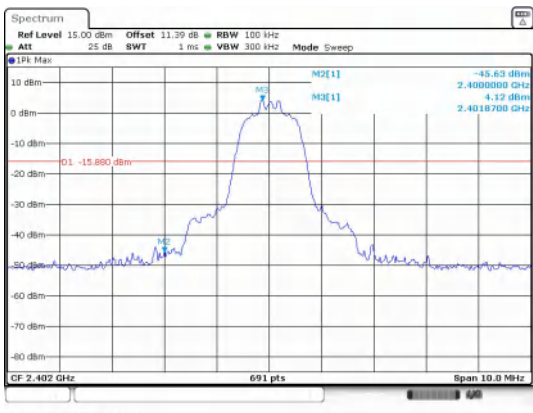
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
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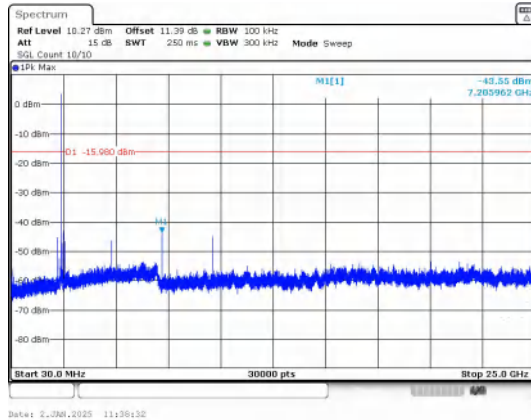
GFSK	DH5	0	2400.00	-47.980	-15.98	-32.000	PASS
			7205.96	-43.554	-15.98	-27.574	PASS
		39	9763.72	-40.777	-16.23	-24.547	PASS
		78	2483.50	-49.470	-17.56	-31.910	PASS
			9920.20	-40.060	-17.56	-22.500	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-45.630	-15.88	-29.750	PASS
			9608.08	-43.953	-15.88	-28.073	PASS
		39	9763.72	-40.884	-16.31	-24.574	PASS
		78	2483.50	-50.400	-17.59	-32.810	PASS
			9920.20	-40.328	-17.59	-22.738	PASS
8DPSK	3-DH5	0	2400.00	-45.960	-16.1	-29.860	PASS
			9608.08	-44.274	-16.1	-28.174	PASS
		39	9763.72	-40.234	-16.28	-23.954	PASS
		78	2483.50	-50.330	-17.65	-32.680	PASS
			9920.20	-40.219	-17.65	-22.569	PASS

Hopping

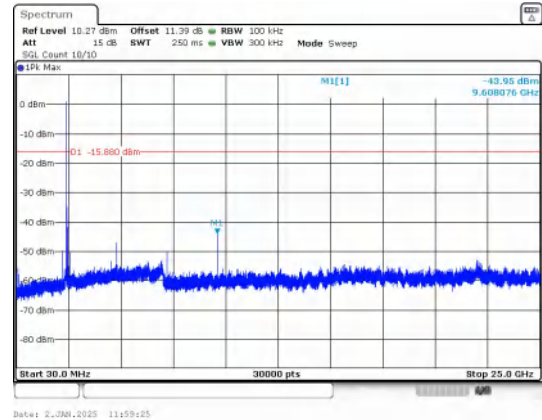
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.15	-47.829	-15.9	-31.929	PASS
			2400.00	-48.480	-15.9	-32.580	PASS
			2483.50	-49.870	-17.64	-32.230	PASS
$\pi/4$ DQPSK	2-DH5		2395.56	-47.407	-16.16	-31.247	PASS
			2400.00	-48.320	-16.16	-32.160	PASS
			2483.50	-49.490	-17.55	-31.940	PASS
8DPSK	3-DH5		2400.00	-47.300	-16.24	-31.060	PASS
			2483.50	-49.350	-17.69	-31.660	PASS

Test Graphs

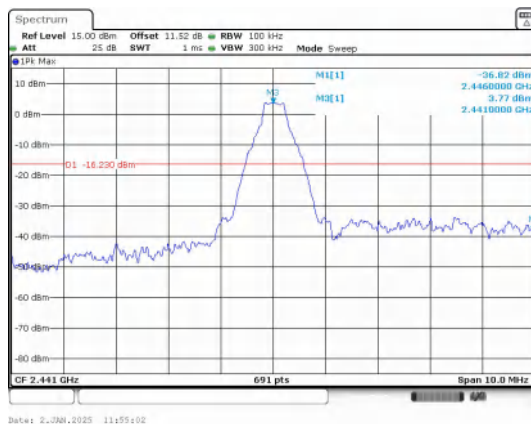
 Out Of Band Emission GFSK_DH5_Channel 0	 Out Of Band Emission $\pi/4$DQPSK_2-DH5_Channel 0
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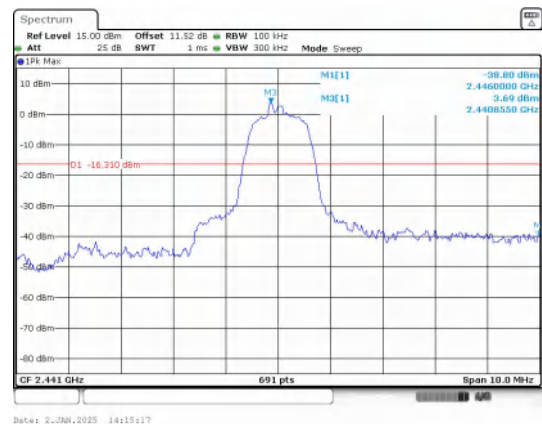
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



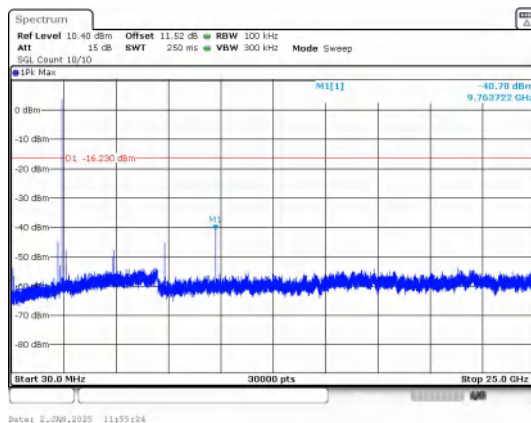
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



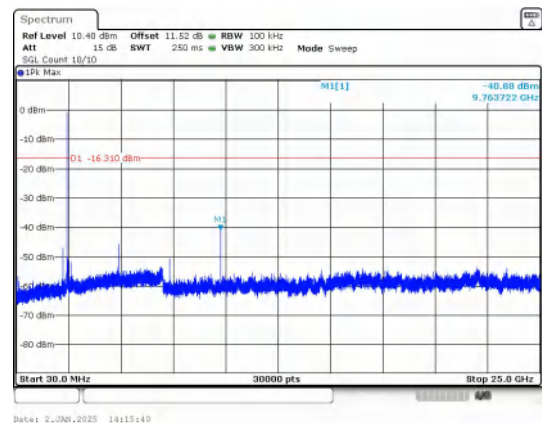
Out Of Band Emission
GFSK_DH5_Channel 39



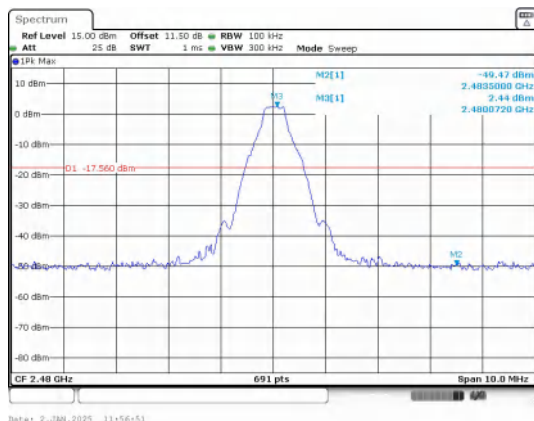
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



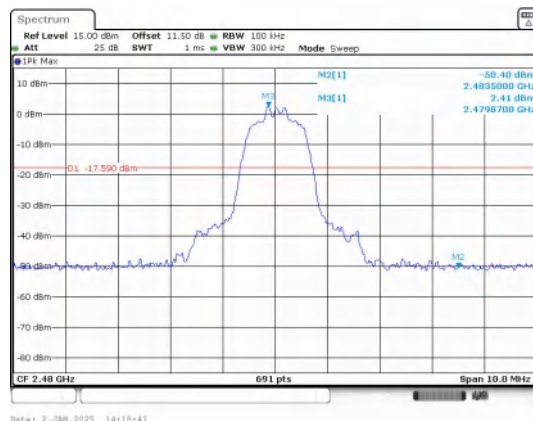
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



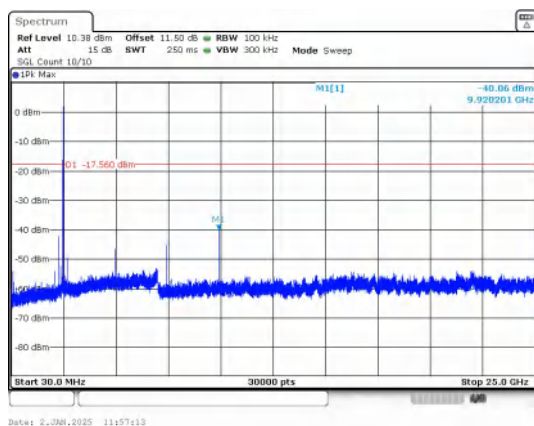
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



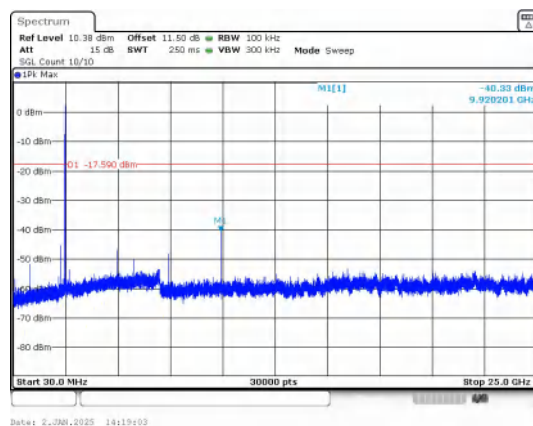
Out Of Band Emission
GFSK_DH5_Channel 78



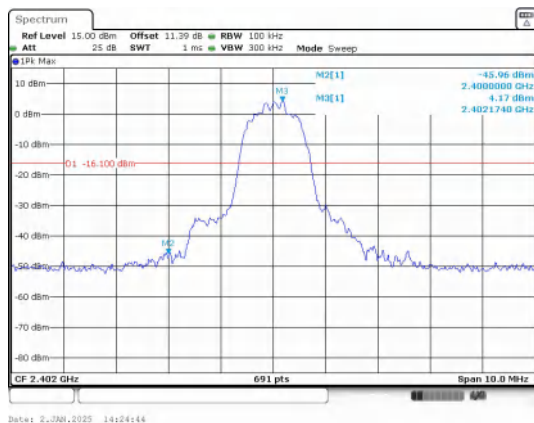
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



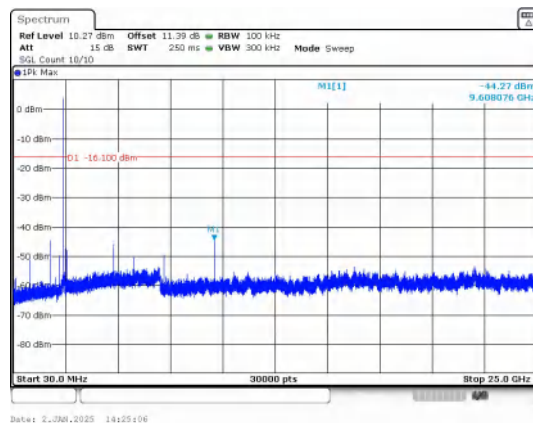
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



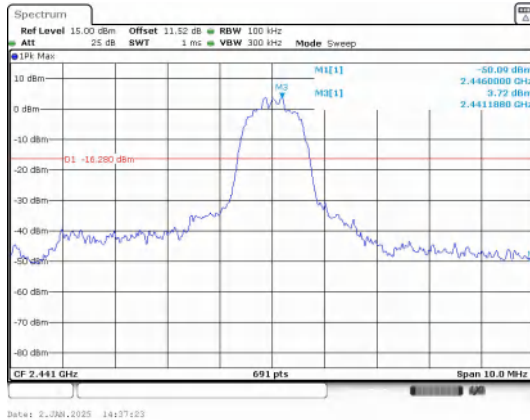
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



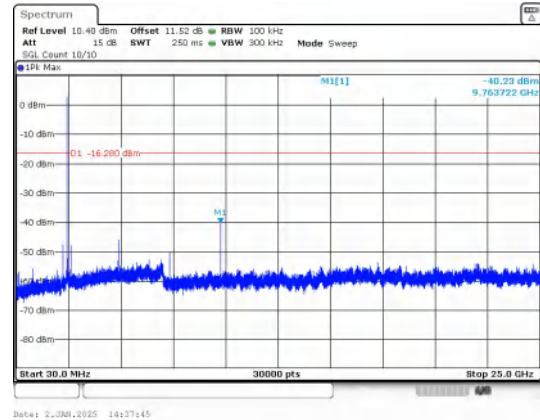
Out Of Band Emission
8DPSK_3-DH5_Channel 0



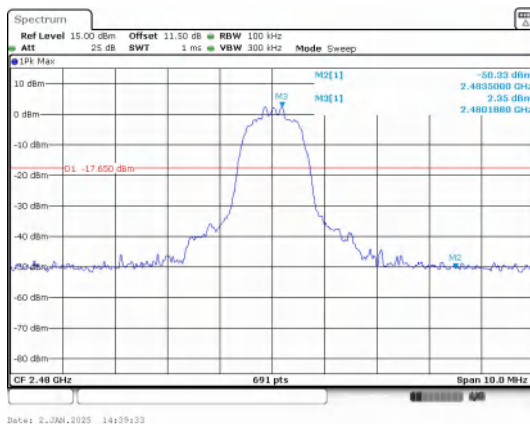
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



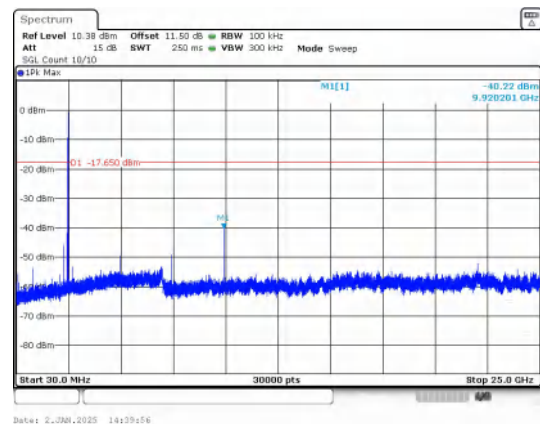
Out Of Band Emission
8DPSK_3-DH5_Channel 39



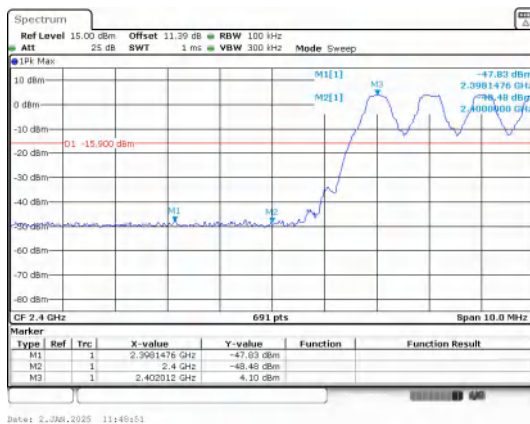
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



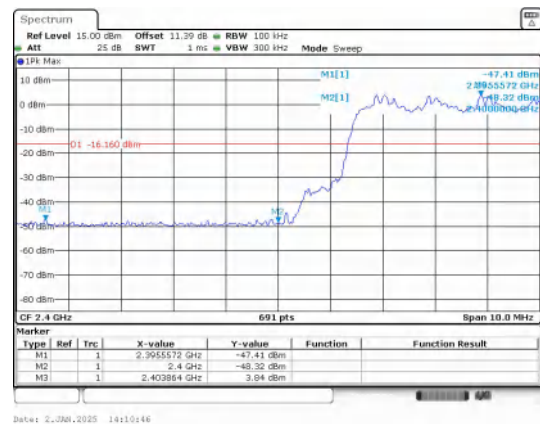
Out Of Band Emission
8DPSK_3-DH5_Channel 78



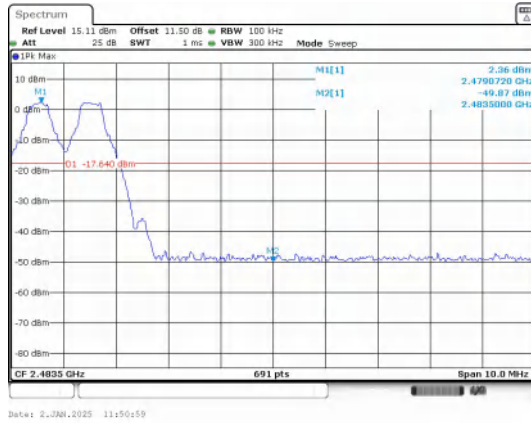
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



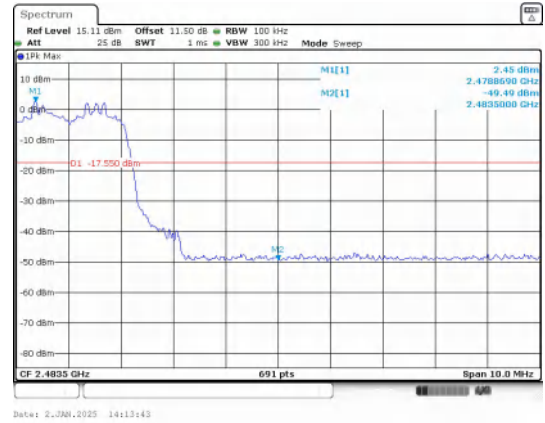
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



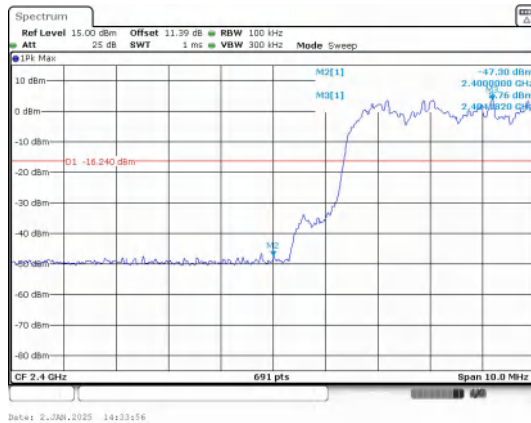
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



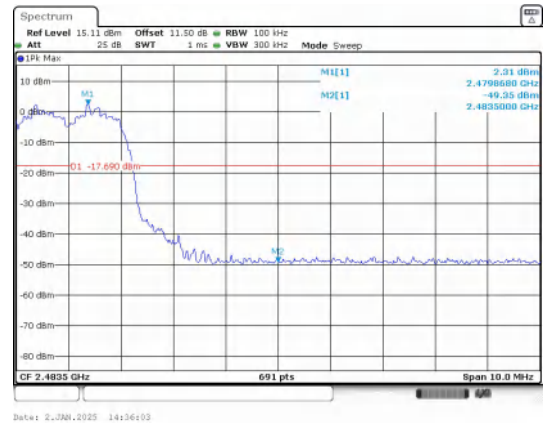
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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-----