

Appendix Report

Report No.:	CISRR25010602104
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

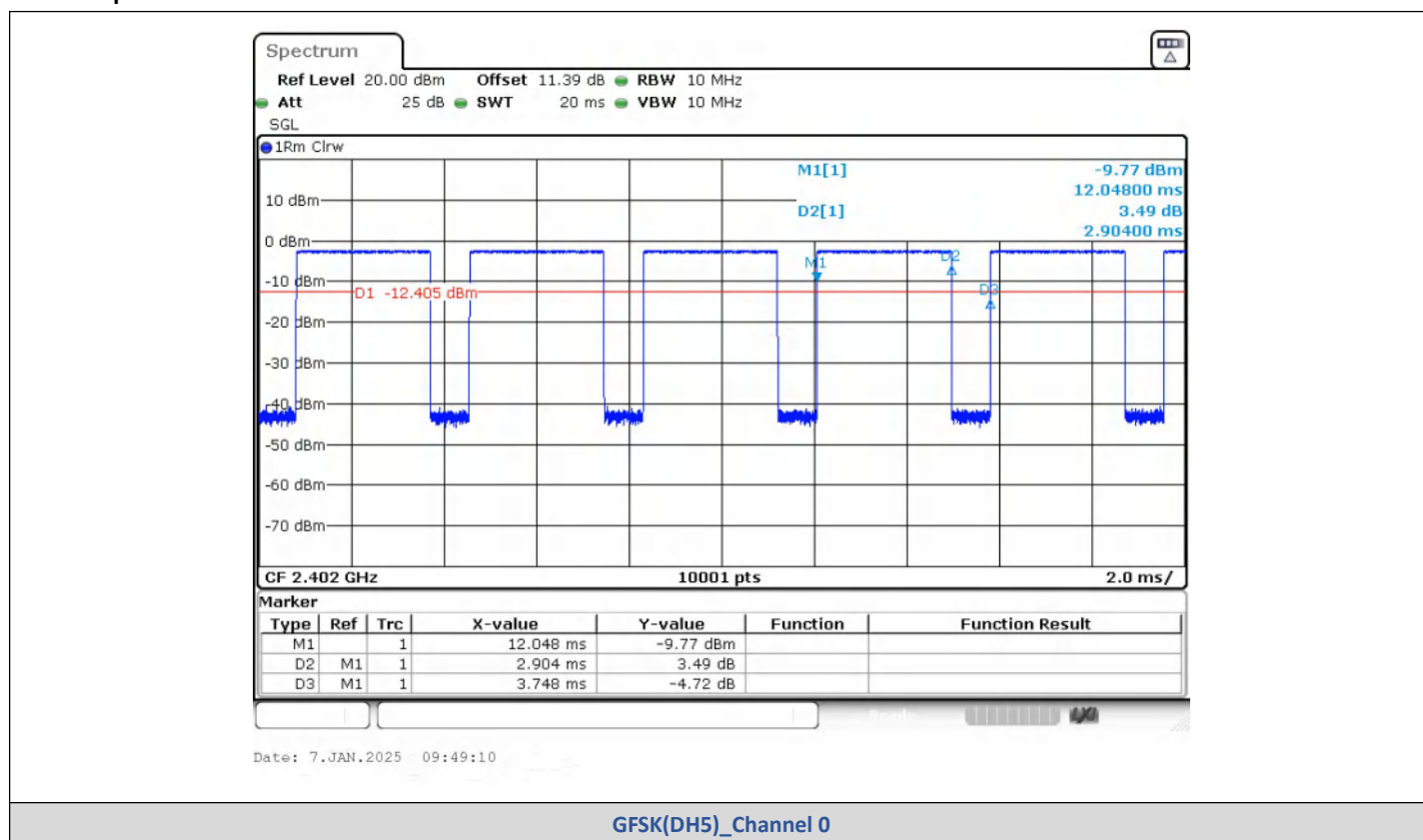
1) Duty Cycle

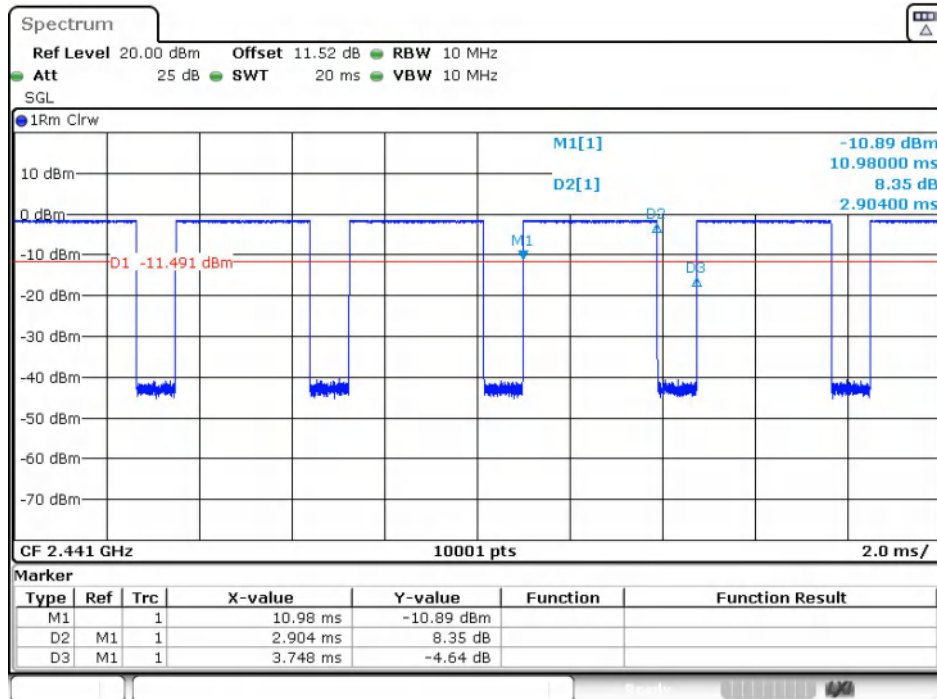
Test Result

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	2.904	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	2.908	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	2.914	3.748	77.75	0.7775	1.093	0.3432
		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

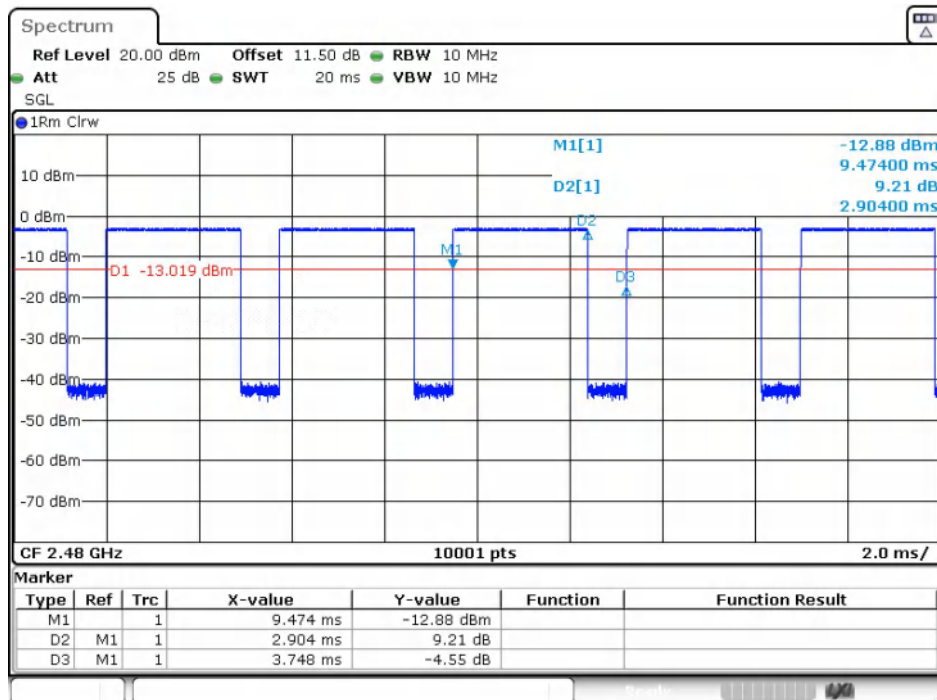
Test Graphs





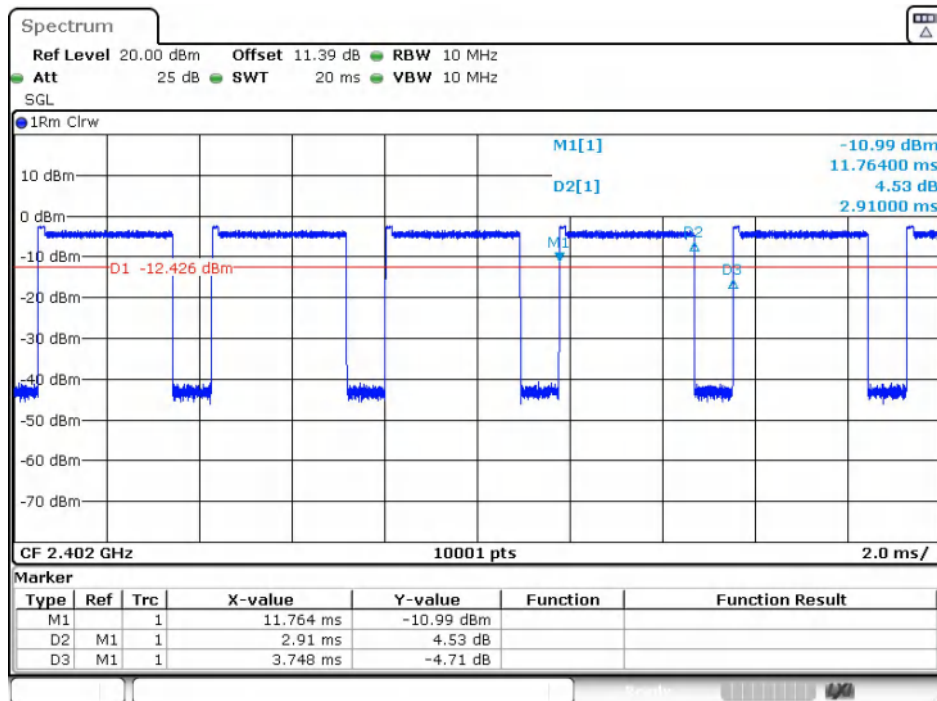
Date: 7, JAN. 2025 09:56:13

GFSK(DH5)_Channel 39



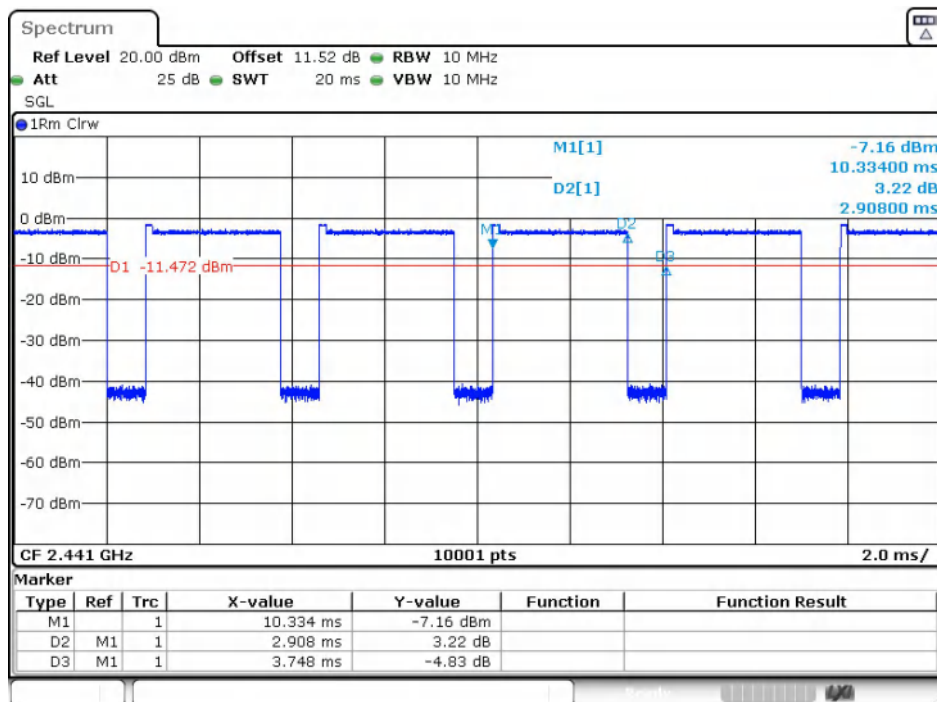
Date: 7, JAN. 2025 09:58:04

GFSK(DH5)_Channel 78



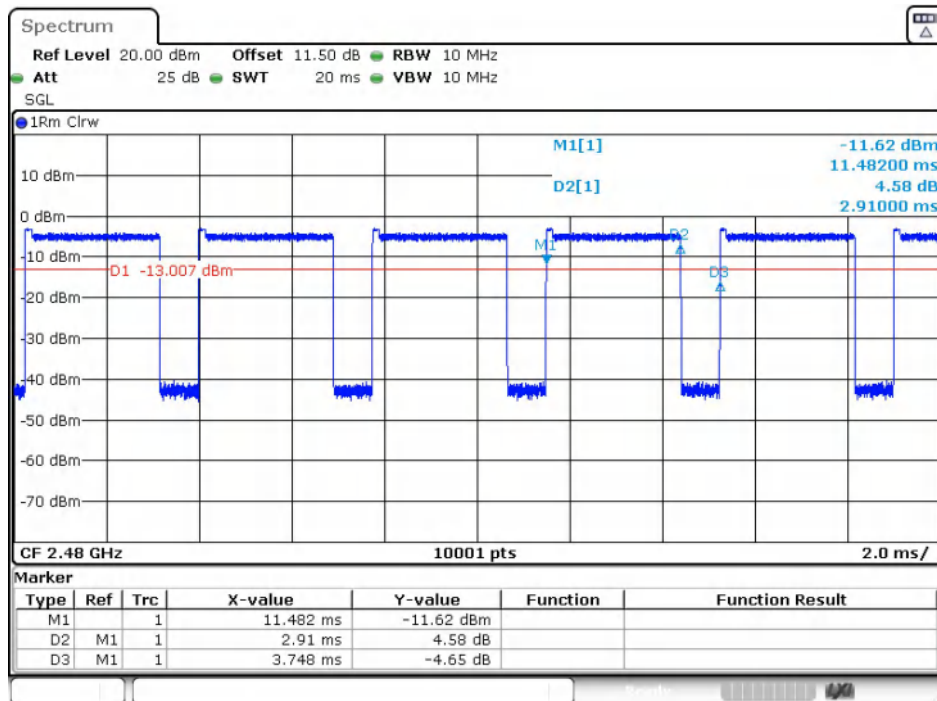
Date: 7, JAN. 2025 10:00:00

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



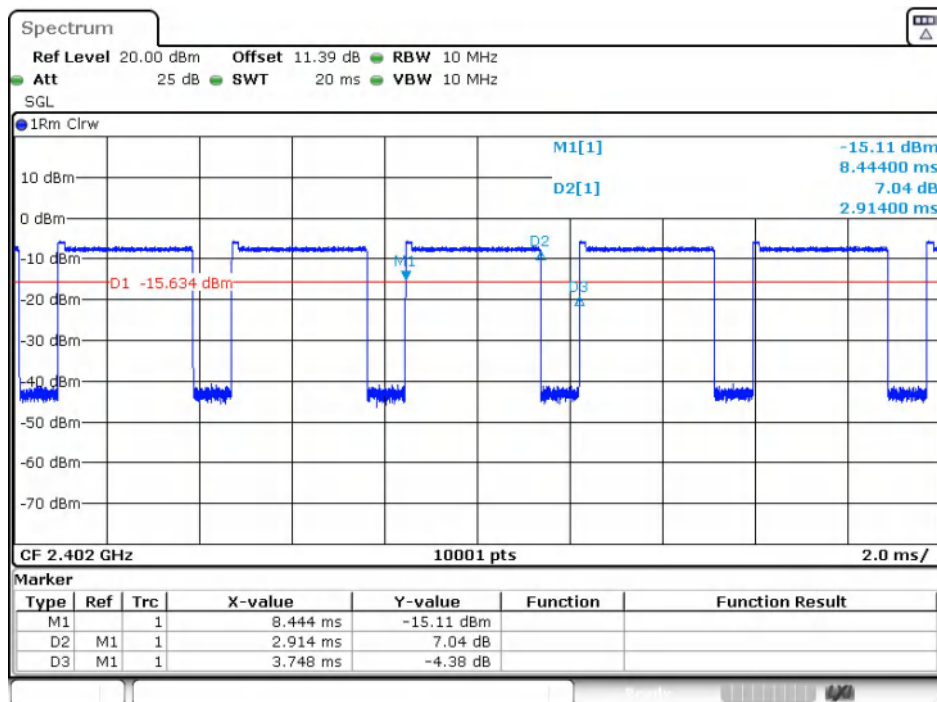
Date: 7, JAN. 2025 10:13:47

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



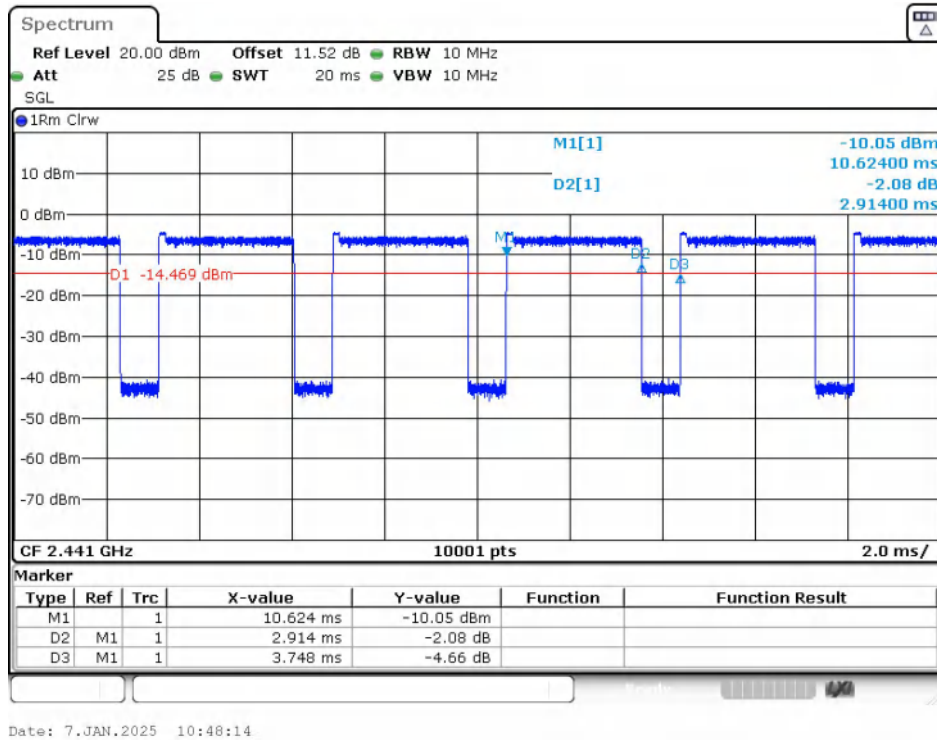
Date: 7, JAN. 2025 10:19:04

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

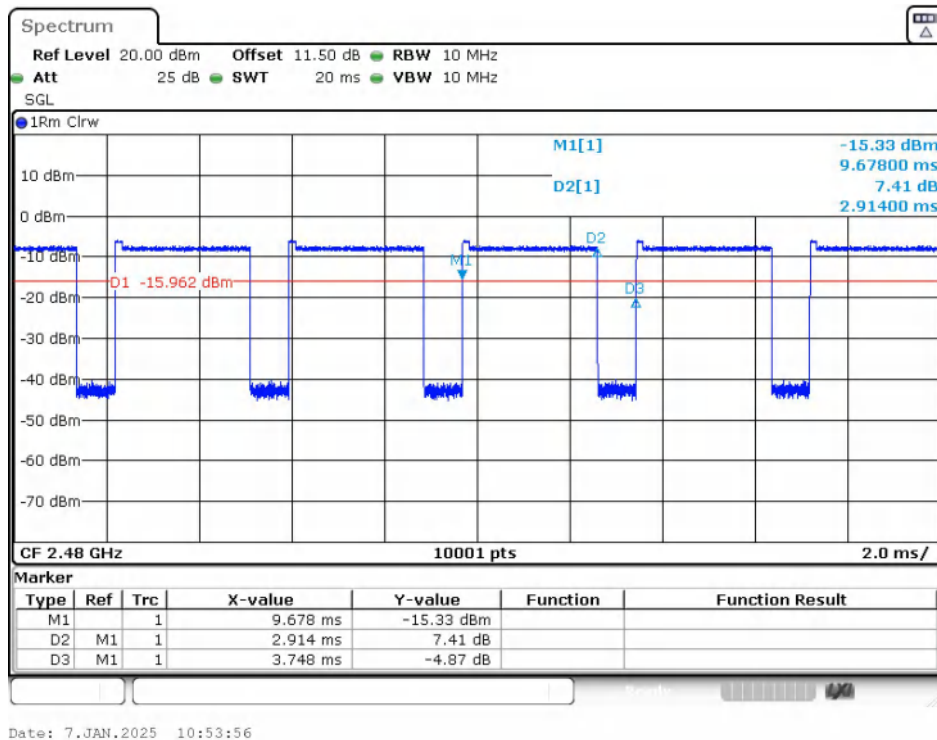


Date: 7, JAN. 2025 10:23:35

8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



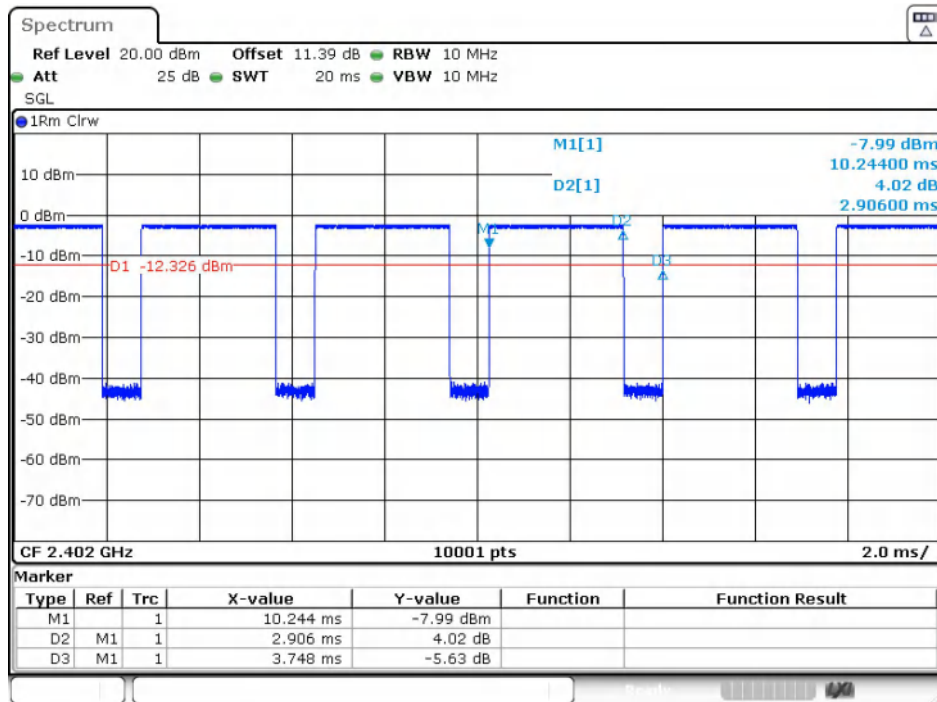
8DPSK(3-DH5)_Channel 78

Right:

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.906	3.748	77.53	0.7753	1.1053	0.3441
		39	2.908	3.748	77.59	0.7759	1.1019	0.3439

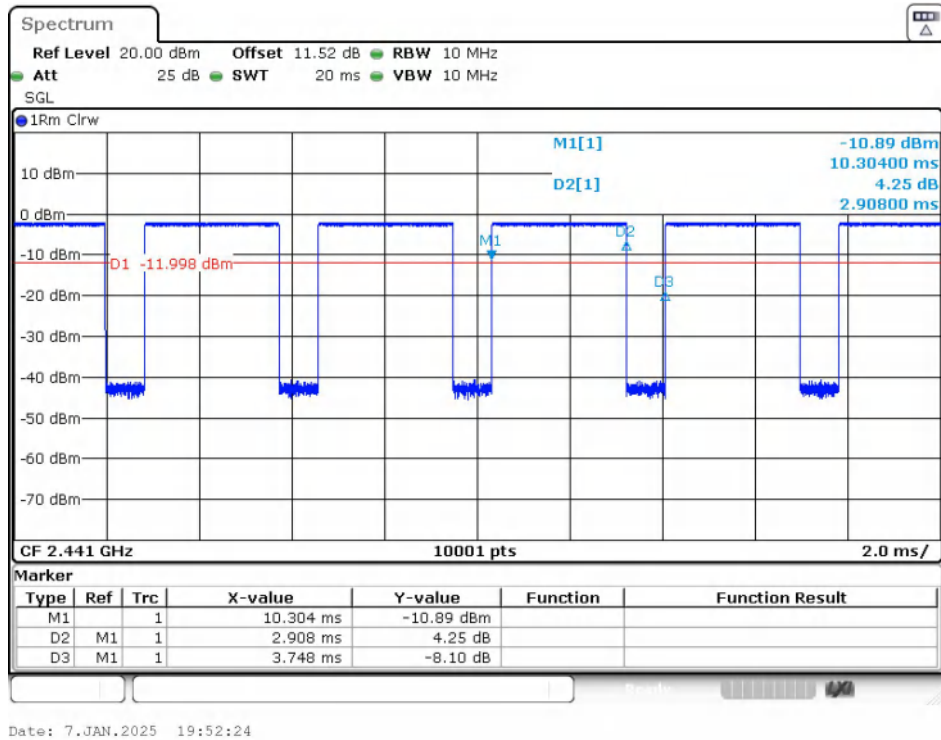
		78	2.906	3.748	77.53	0.7753	1.1053	0.3441
$\pi/4$ DQPSK	2-DH5	0	2.912	3.748	77.69	0.7769	1.0963	0.3434
		39	2.914	3.748	77.75	0.7775	1.093	0.3432
		78	2.914	3.748	77.75	0.7775	1.093	0.3432
8DPSK	3-DH5	0	2.916	3.748	77.80	0.7780	1.0902	0.3429
		39	2.916	3.748	77.80	0.7780	1.0902	0.3429
		78	2.916	3.748	77.80	0.7780	1.0902	0.3429

Test Graphs

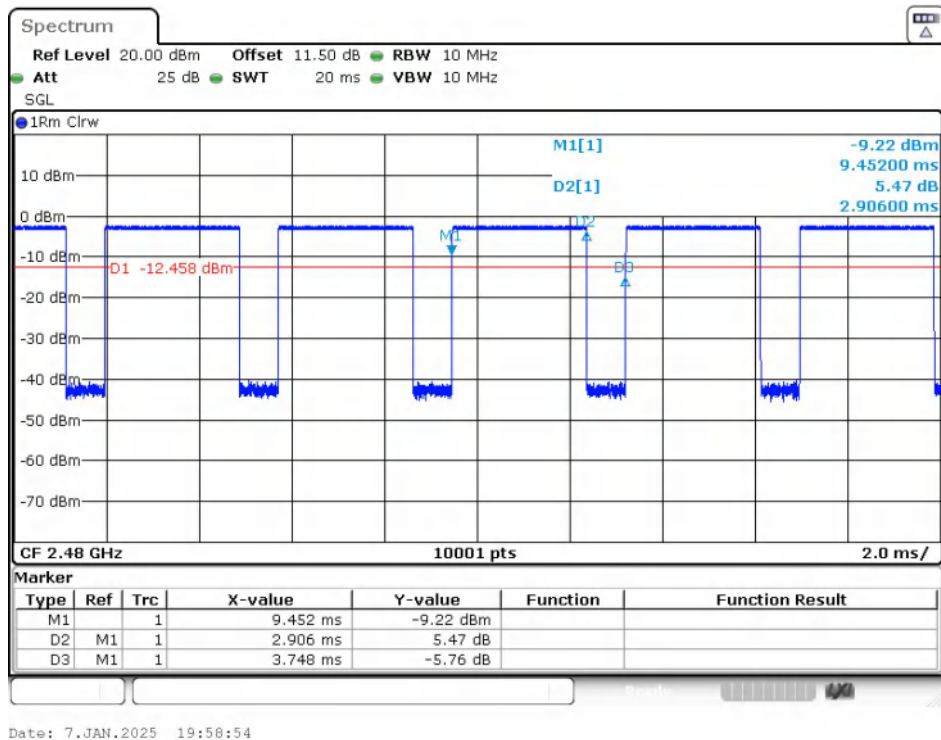


Date: 7, JAN, 2025 19:42:45

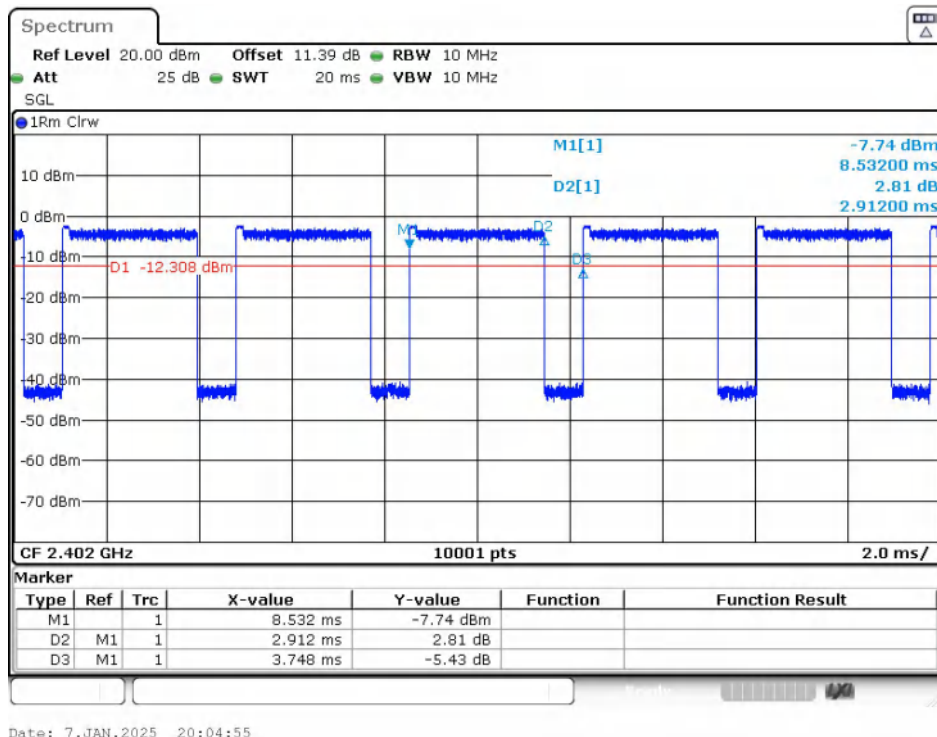
GFSK(DH5)_Channel 0



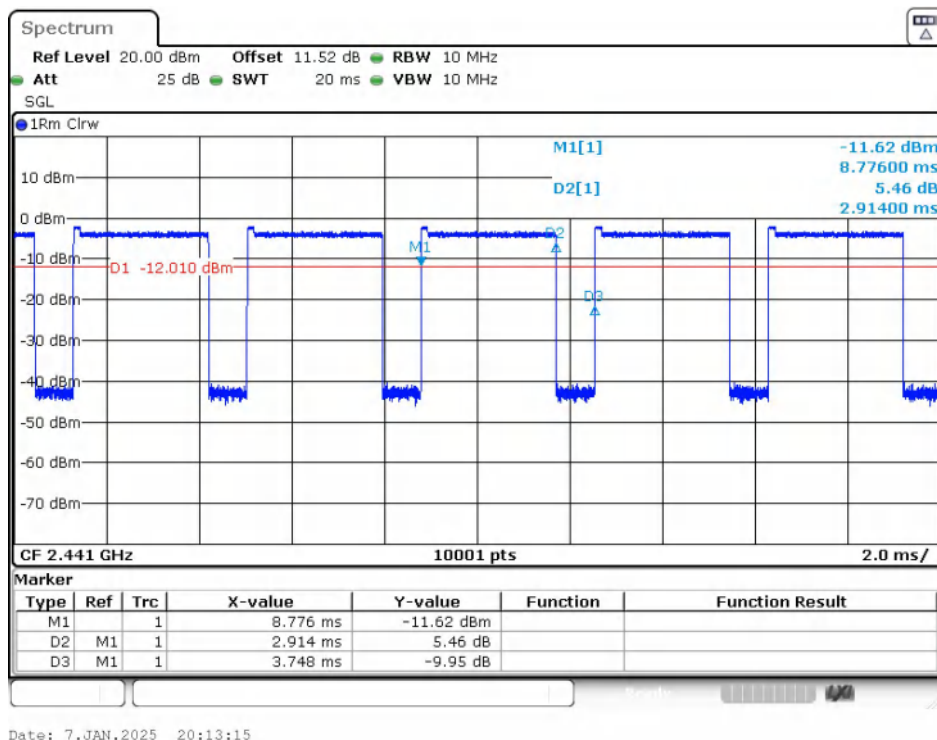
GFSK(DH5)_Channel 39



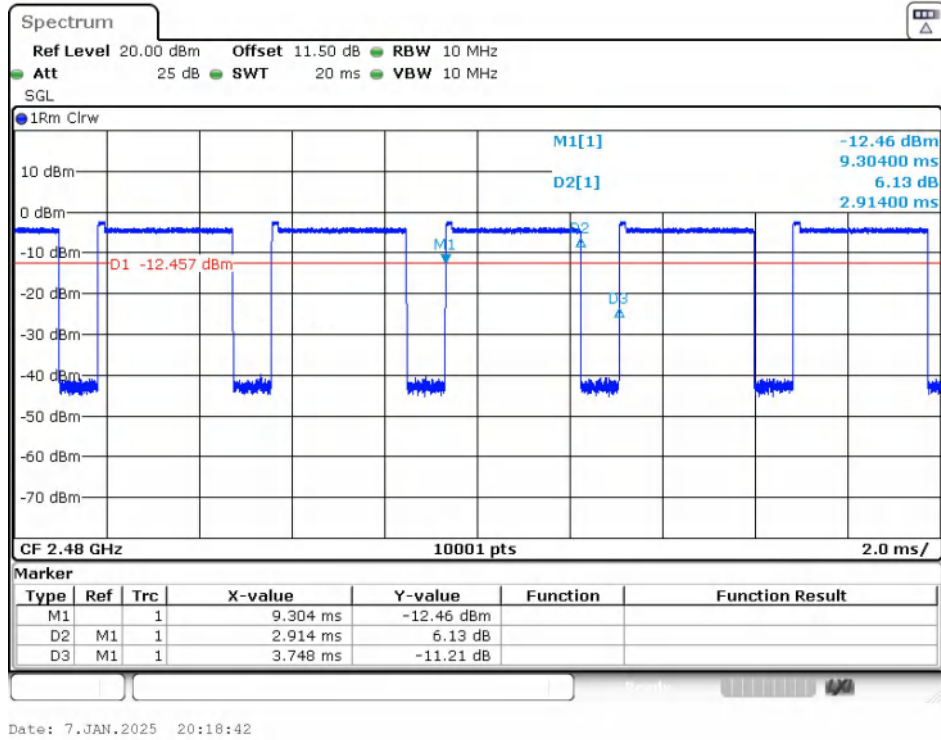
GFSK(DH5)_Channel 78



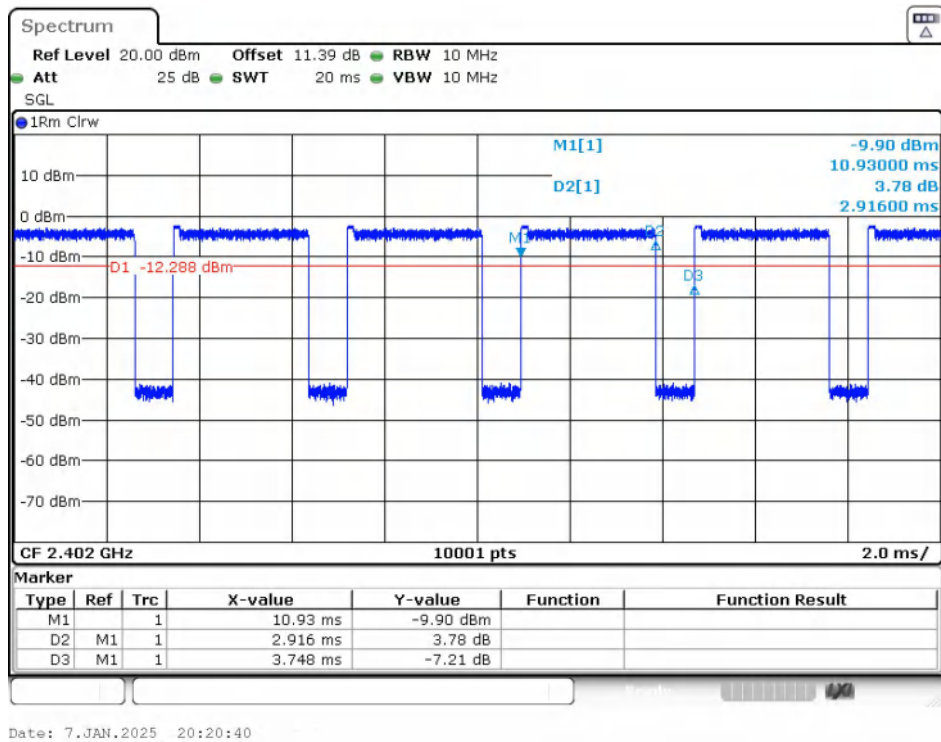
$\pi/4$ DQPSK(2-DH5)_Channel 0



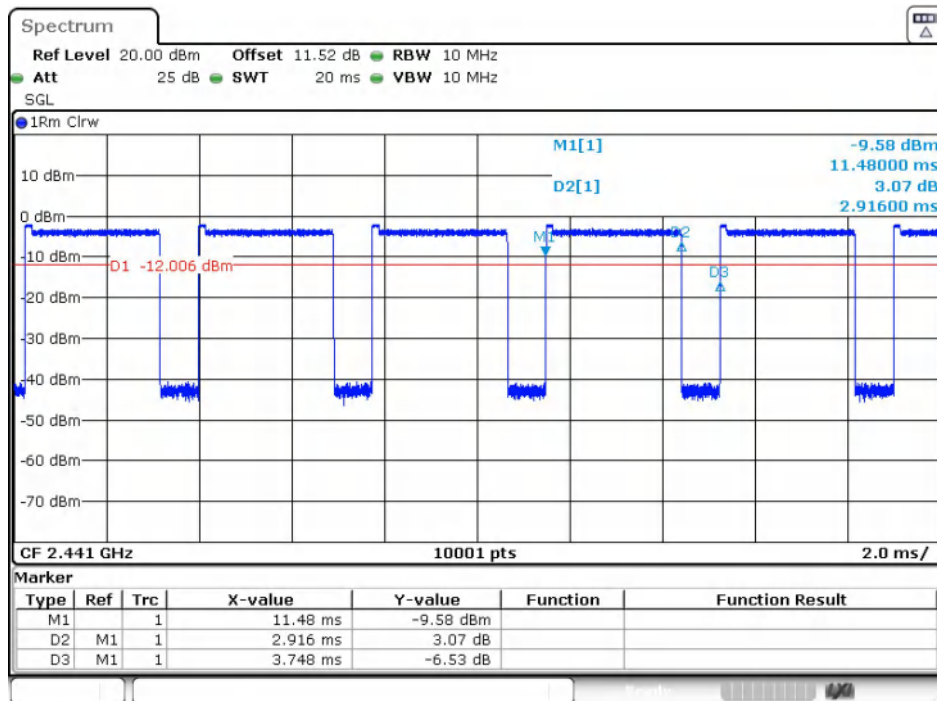
$\pi/4$ DQPSK(2-DH5)_Channel 39



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

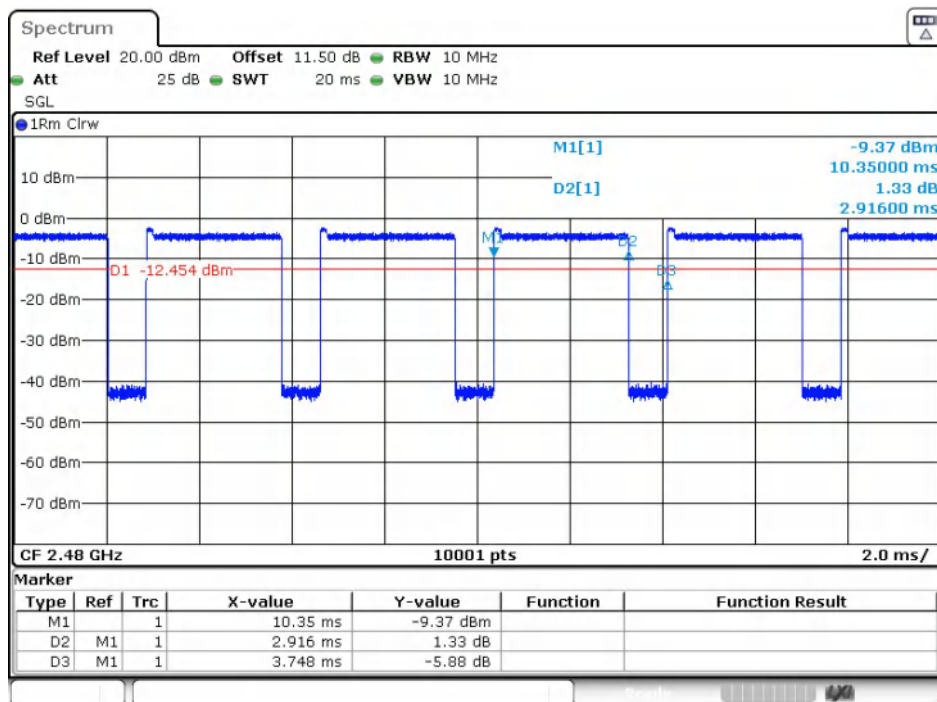


8DPSK(3-DH5)_Channel 0



Date: 7, JAN. 2025 20:29:44

8DPSK(3-DH5)_Channel 39



Date: 7, JAN. 2025 20:31:33

8DPSK(3-DH5)_Channel 78

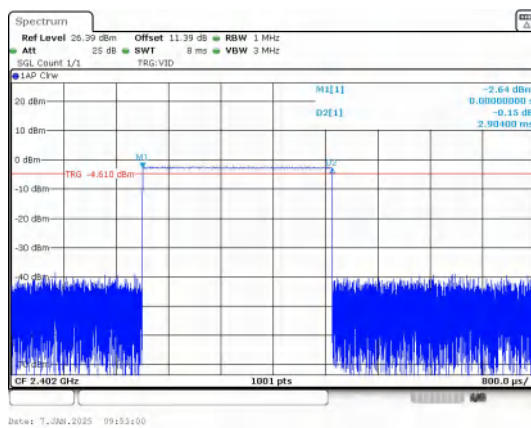
2) Dwell Time

Test Result

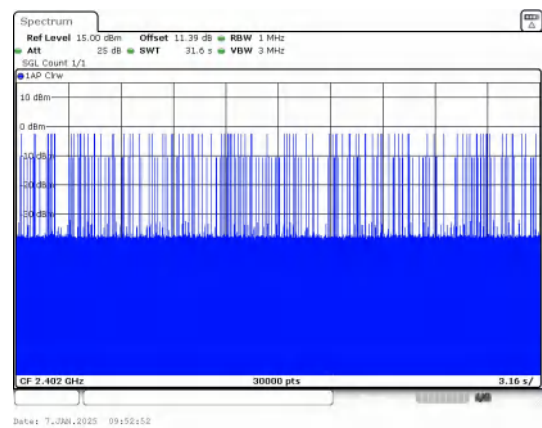
Left:

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	100	290.4	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	95	276.64		PASS
8DPSK	3-DH5		2.912	101	294.11		PASS

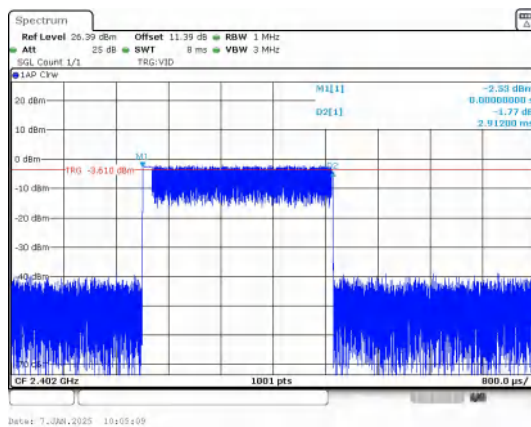
Test Graphs



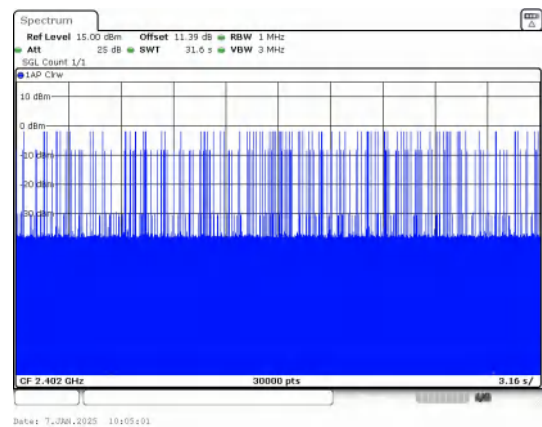
Pulse Width
GFSK_DH5



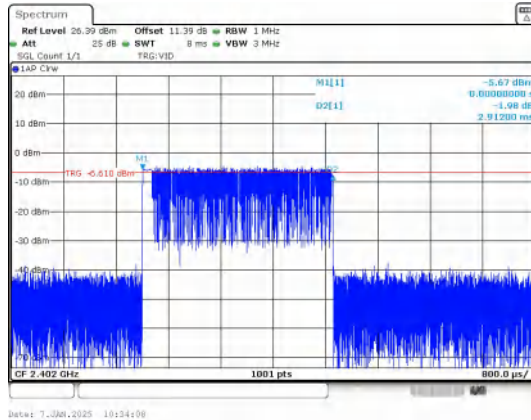
Number of Pulses in 31.6 seconds
GFSK_DH5



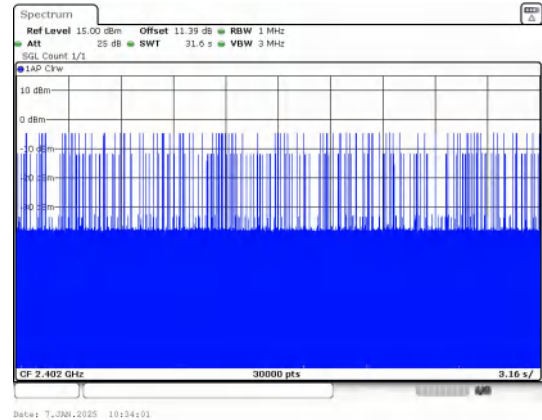
Pulse Width
 $\pi/4$ DQPSK_2-DH5



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



Pulse Width
8DPSK_3-DH5

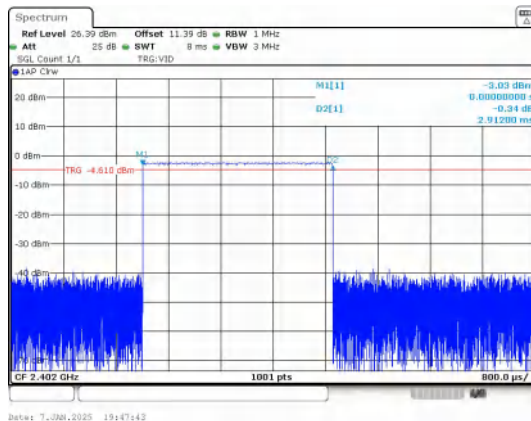


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

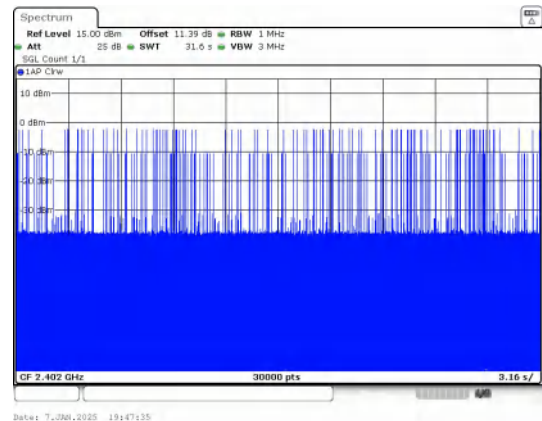
Right:

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	97	282.46	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.920	108	315.36		PASS
8DPSK	3-DH5		2.920	102	297.84		PASS

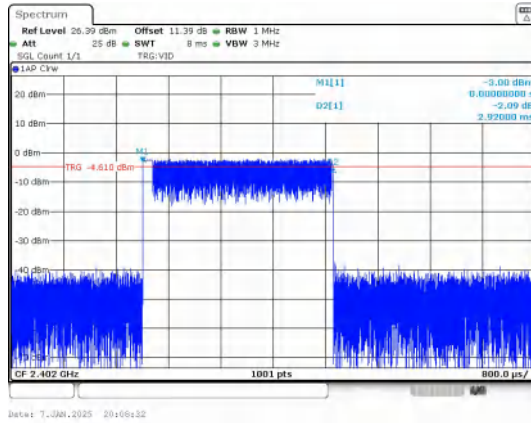
Test Graphs



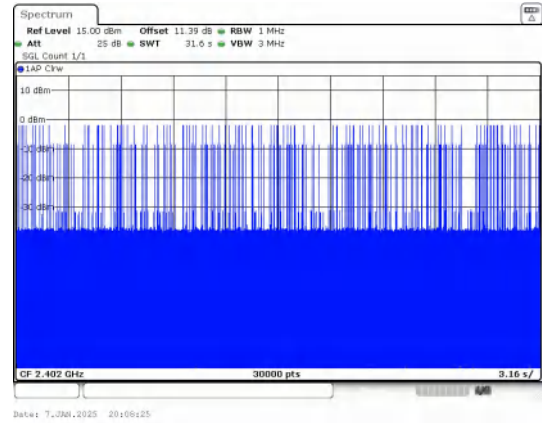
Pulse Width
GFSK_DH5



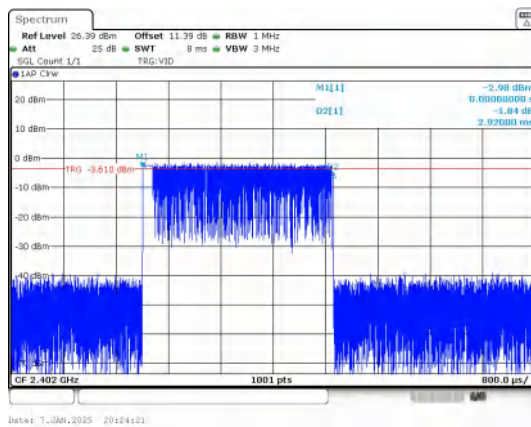
Number of Pulses in 31.6 seconds
GFSK_DH5



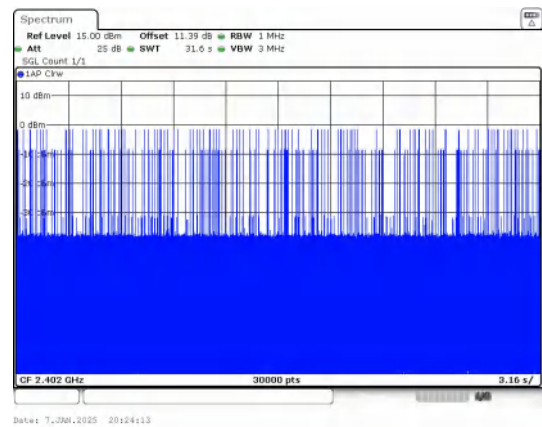
Pulse Width
 $\pi/4$ DQPSK_2-DH5



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

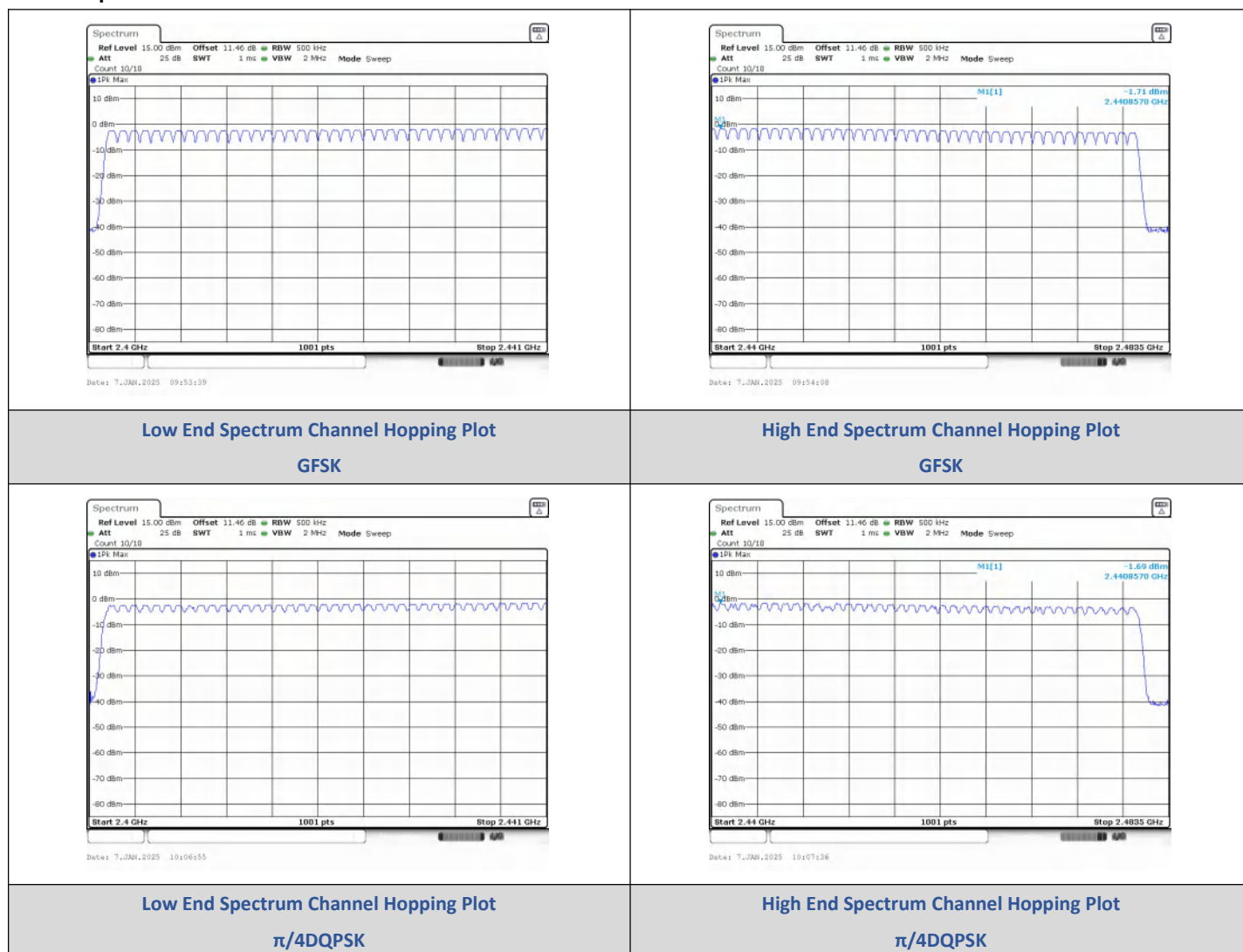
3) Number Of Hopping Channel

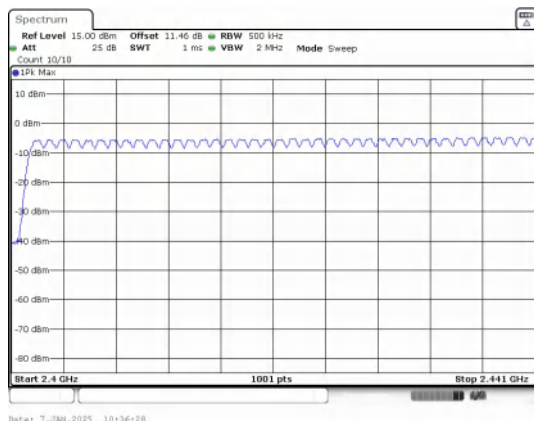
Test Result

Left:

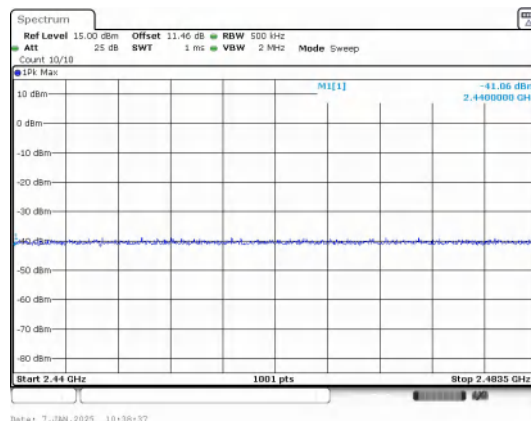
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs





Low End Spectrum Channel Hopping Plot
8DPSK

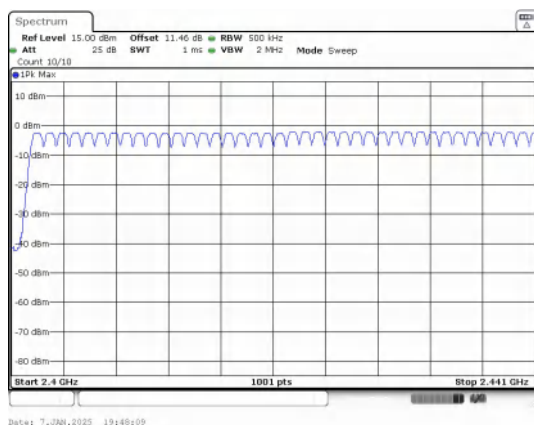


High End Spectrum Channel Hopping Plot
8DPSK

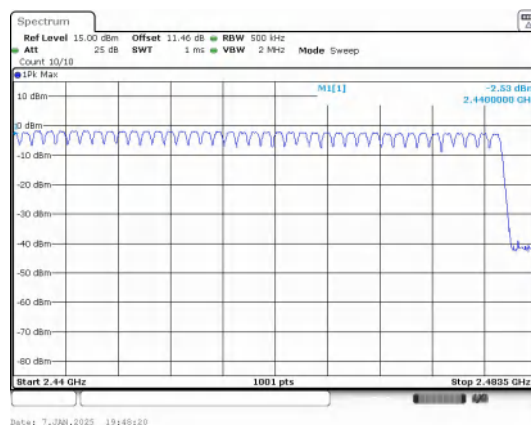
Right:

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

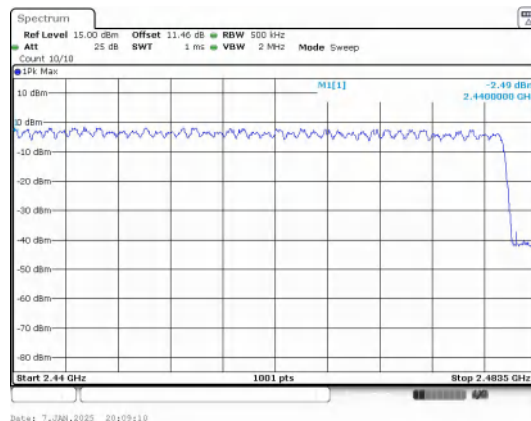
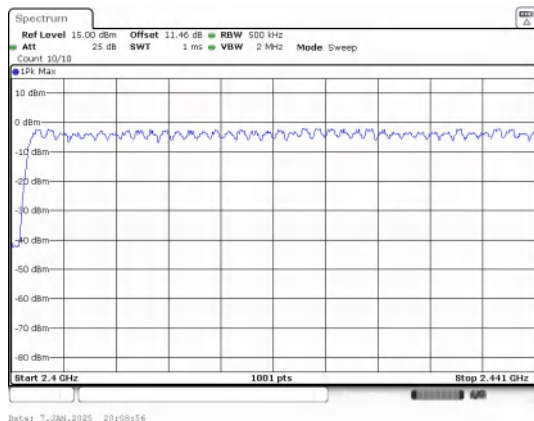
Test Graphs

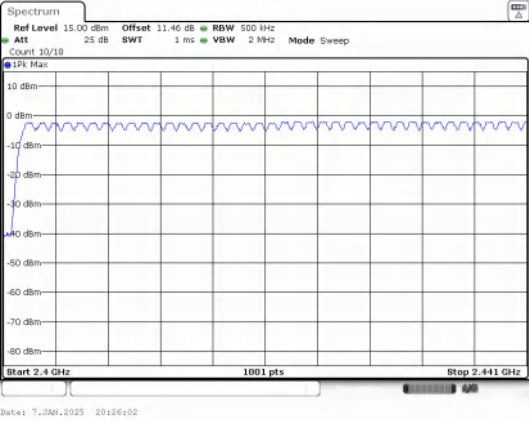
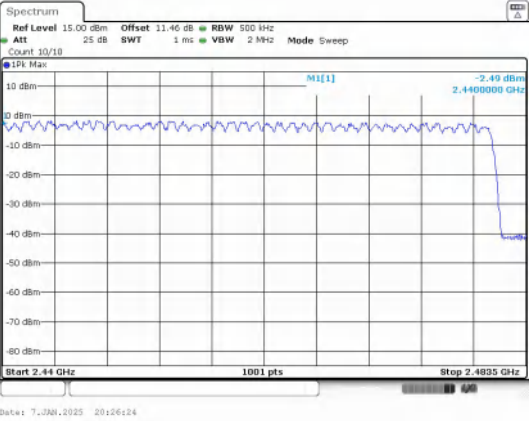


Low End Spectrum Channel Hopping Plot
GFSK



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

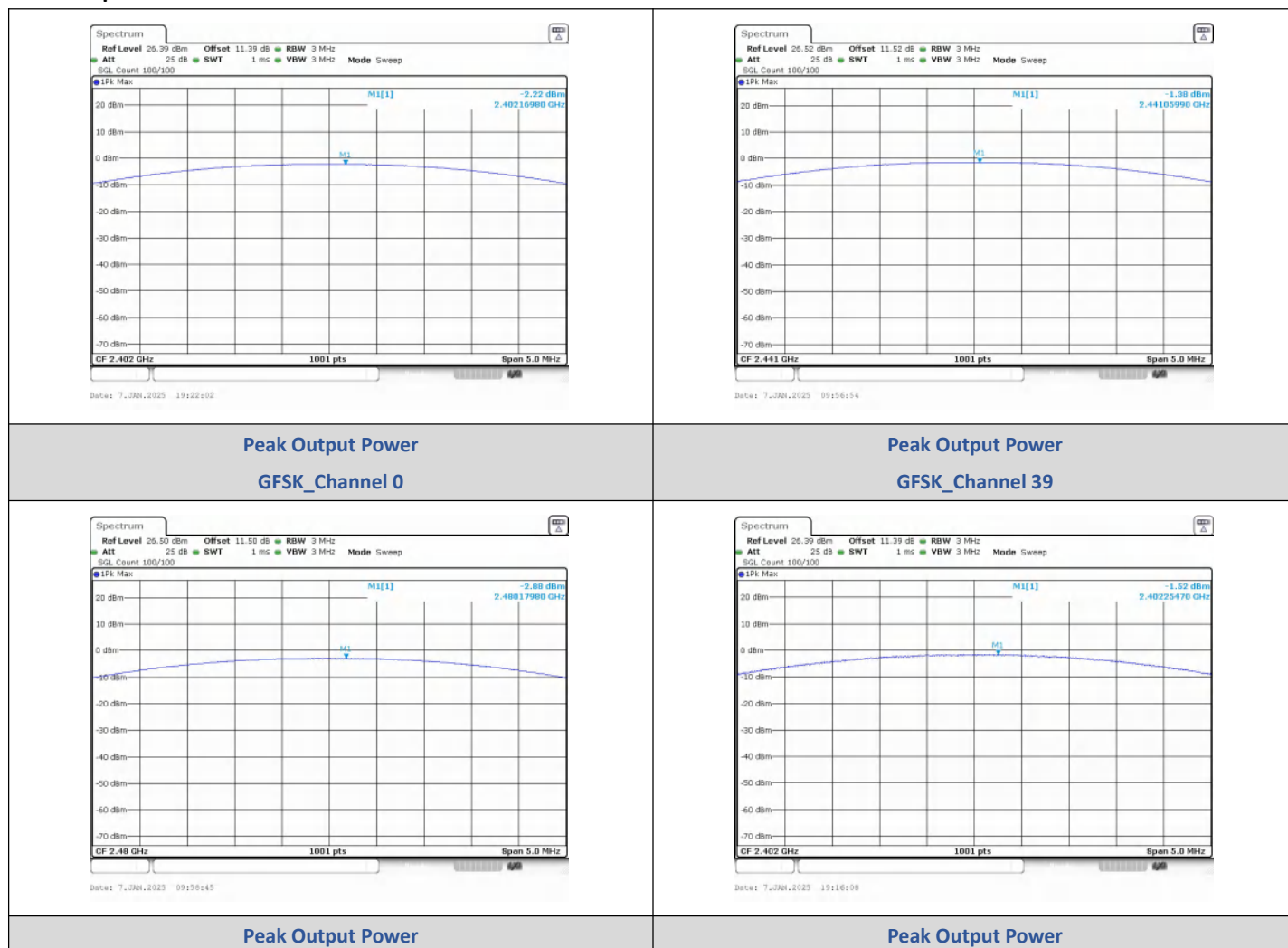
4) Conducted Peak Output Power

Test Result

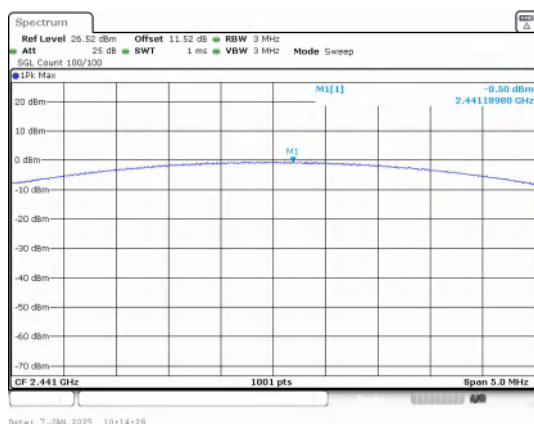
Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	-2.22	0.60	≤30	PASS
		39	-1.38	0.73		PASS
		78	-2.88	0.52		PASS
$\pi/4$ DQPSK	2-DH5	0	-1.52	0.70	≤20.97	PASS
		39	-0.50	0.89		PASS
		78	-2.04	0.63		PASS
8DPSK	3-DH5	0	-0.99	0.80		PASS
		39	-2.94	0.51		PASS
		78	-4.35	0.37		PASS

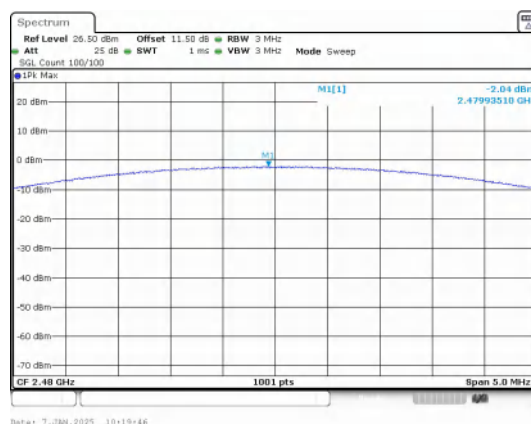
Test Graphs



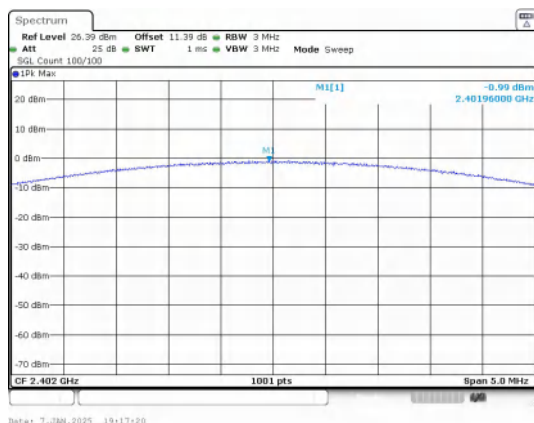
GFSK_Channel 78



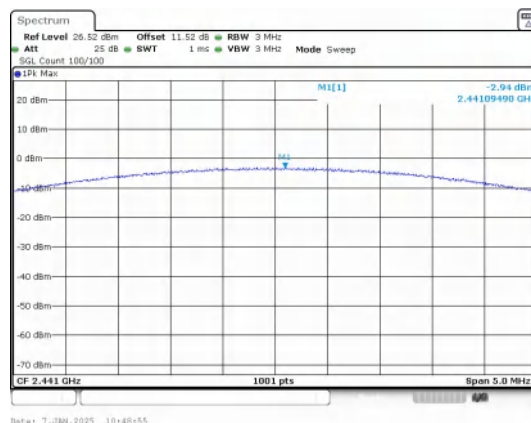
π /4DQPSK_Channel 0



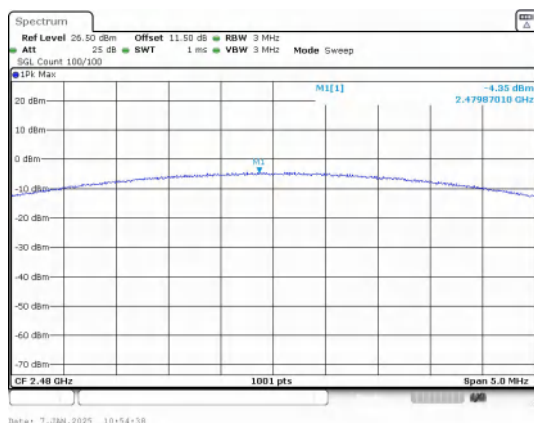
Peak Output Power
 π /4DQPSK_Channel 39



Peak Output Power
 π /4DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39

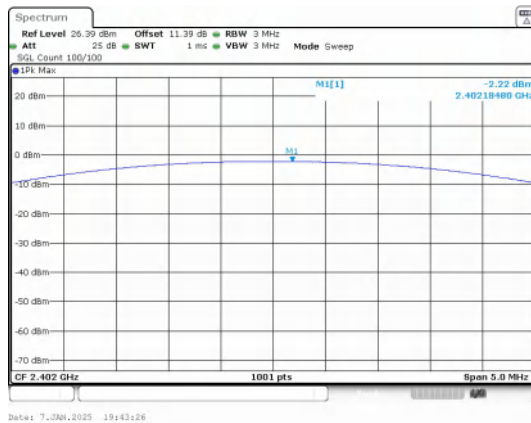
Peak Output Power
8DPSK_Channel 78

Right:

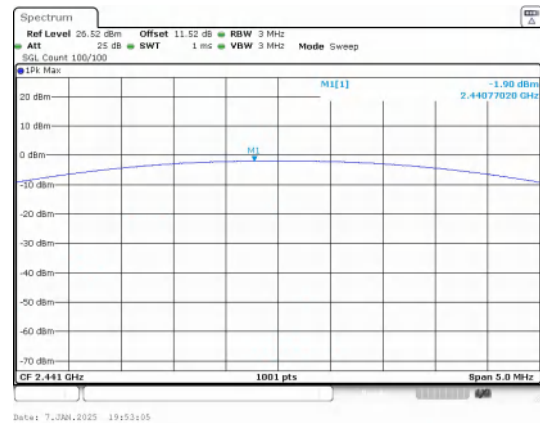
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	-2.22	0.60	≤ 30	PASS

		39	-1.90	0.65		PASS
		78	-2.37	0.58		PASS
		0	-1.57	0.70		PASS
$\pi/4$ DQPSK	2-DH5	39	-1.22	0.76	≤ 20.97	PASS
		78	-1.67	0.68		PASS
		0	-0.94	0.81		PASS
8DPSK	3-DH5	39	-0.73	0.85		PASS
		78	-1.18	0.76		PASS
						PASS

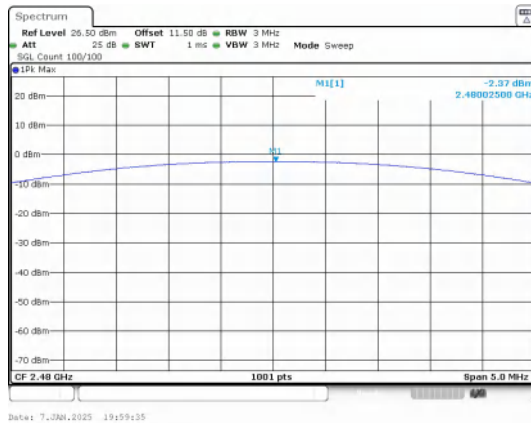
Test Graphs



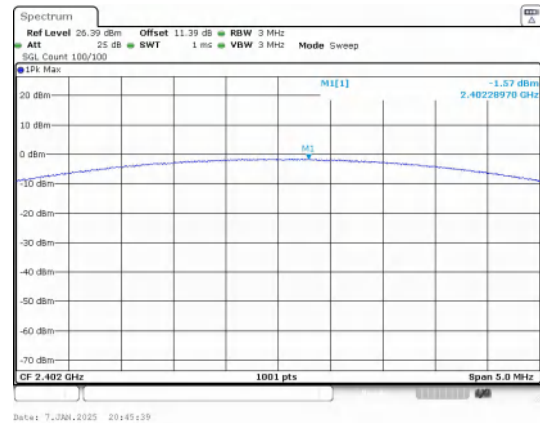
Peak Output Power
GFSK_Channel 0



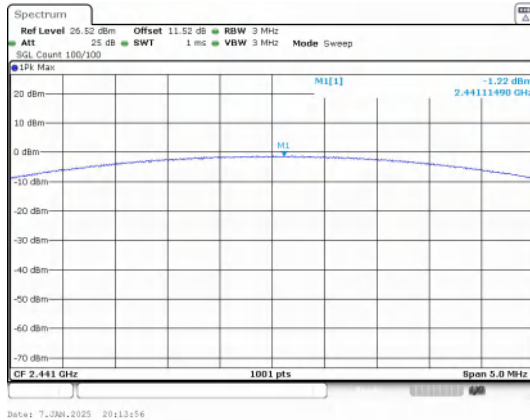
Peak Output Power
GFSK_Channel 39



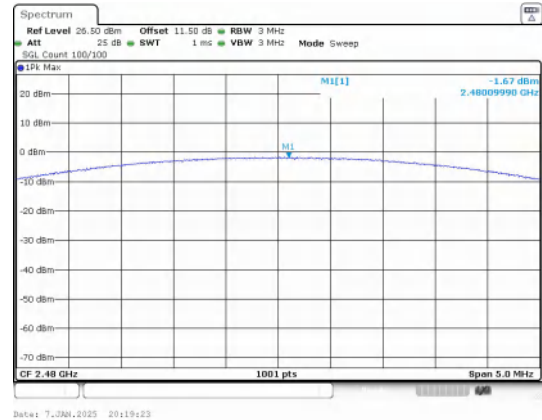
Peak Output Power
GFSK_Channel 78



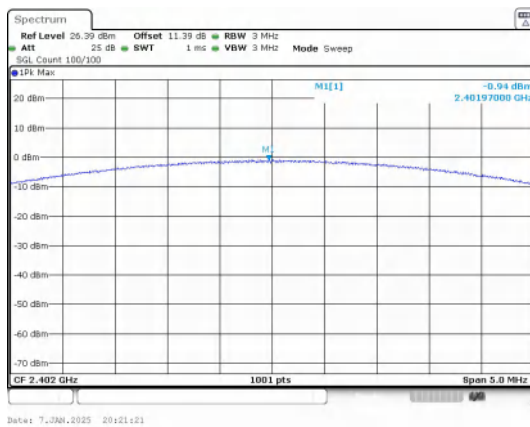
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



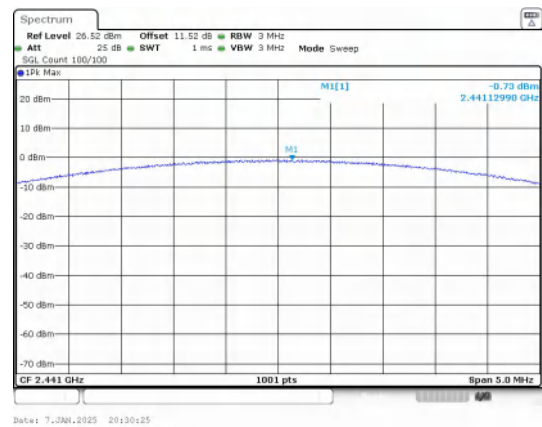
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



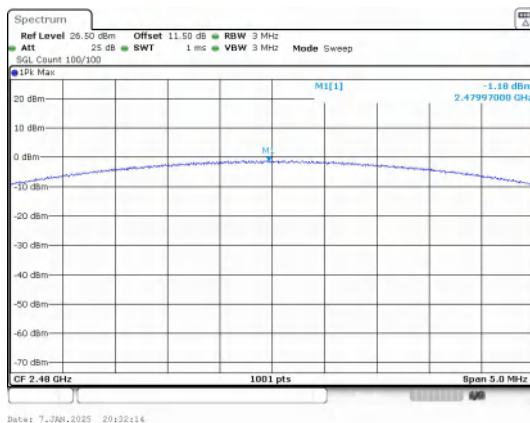
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

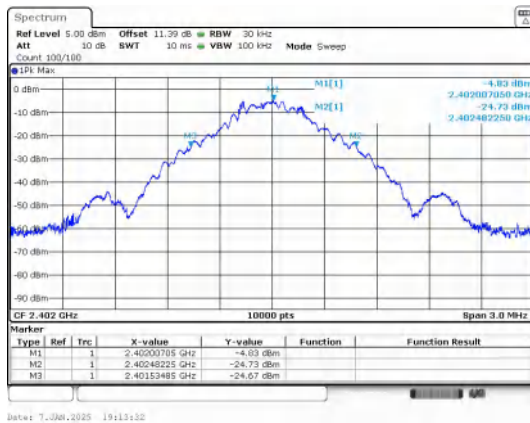
5) 20dB Bandwidth

Test Result

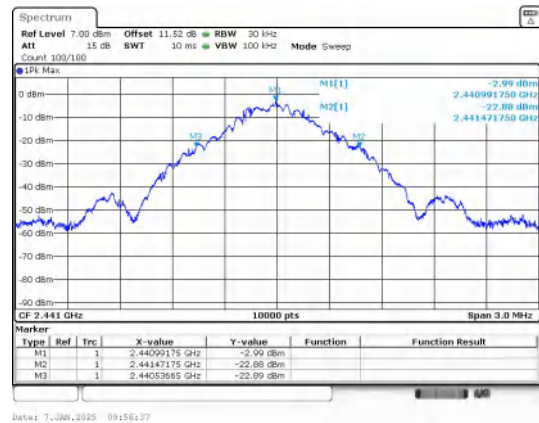
Left:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9500
	39	2441 MHz	0.9300
	78	2480 MHz	0.9300
$\pi/4$ QPSK	0	2402 MHz	1.230
	39	2441 MHz	1.230
	78	2480 MHz	1.240
8DPSK	0	2402 MHz	1.250
	39	2441 MHz	1.260
	78	2480 MHz	1.260

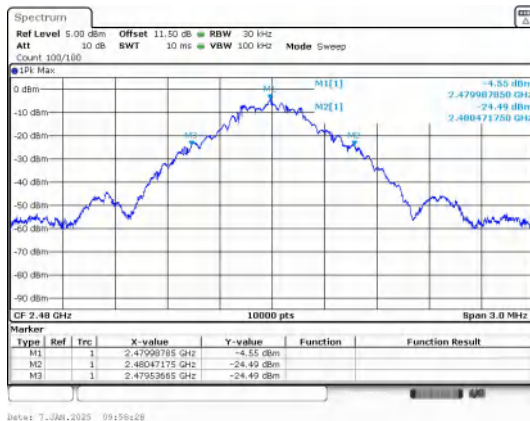
Test Graphs



GFSK_DH5_Channel 0



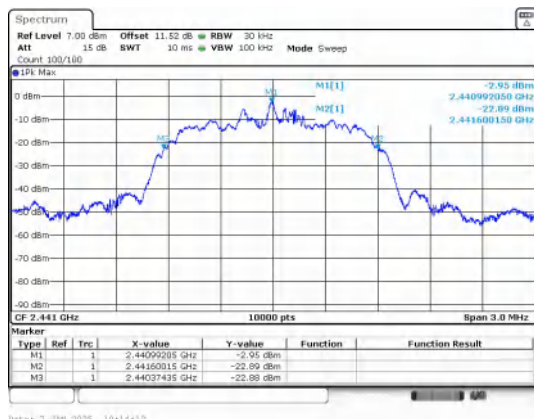
GFSK_DH5_Channel 39



GFSK_DH5_Channel 78

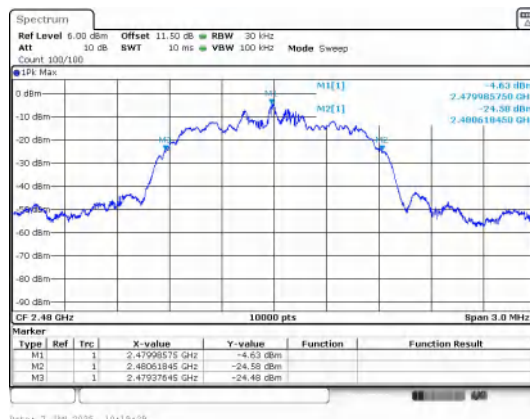


$\pi/4$ QPSK_2-DH5_Channel 0



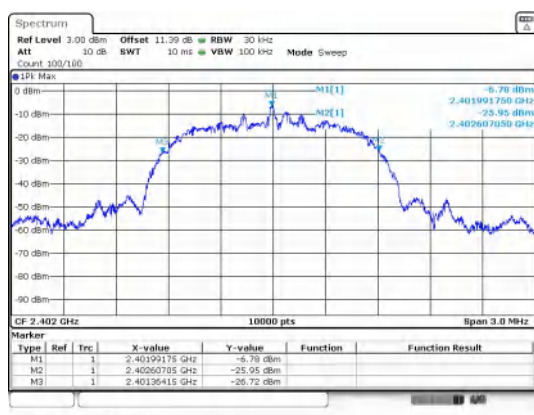
Date: 7-Jan-2025 10:14:12

$\pi/4$ DQPSK_2-DH5_Channel 39



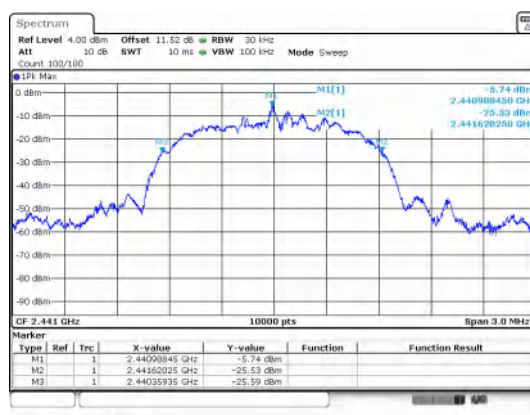
Date: 7-Jan-2025 10:18:29

$\pi/4$ DQPSK_2-DH5_Channel 78



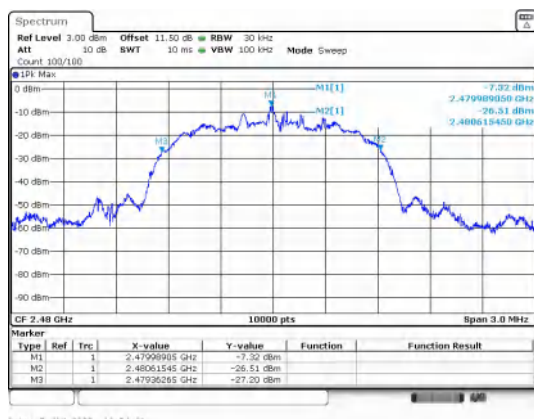
Date: 7-Jan-2025 10:15:59

8DPSK_3-DH5_Channel 0



Date: 7-Jan-2025 10:16:39

8DPSK_3-DH5_Channel 39



Date: 7-Jan-2025 10:15:43

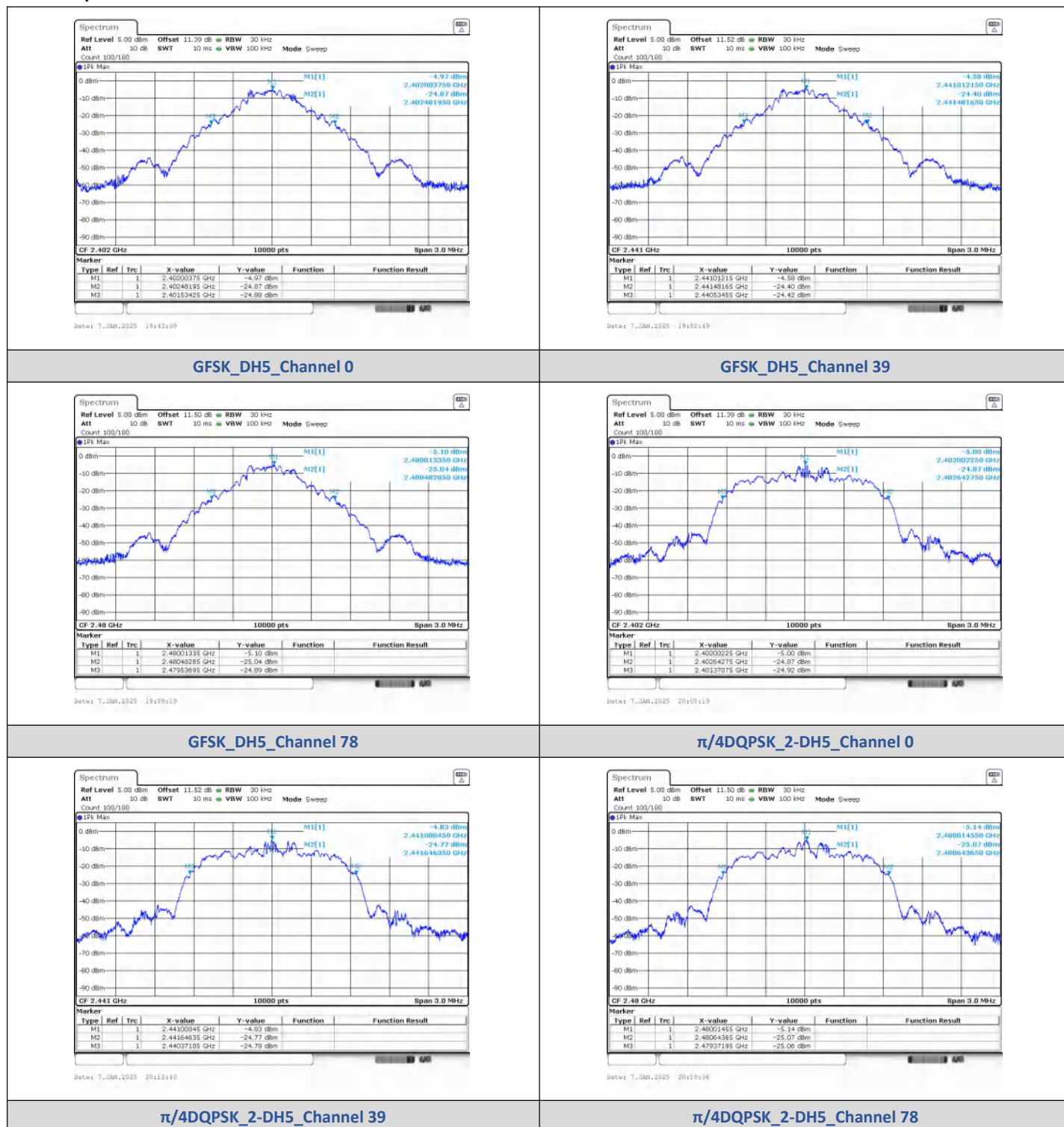
8DPSK_3-DH5_Channel 78

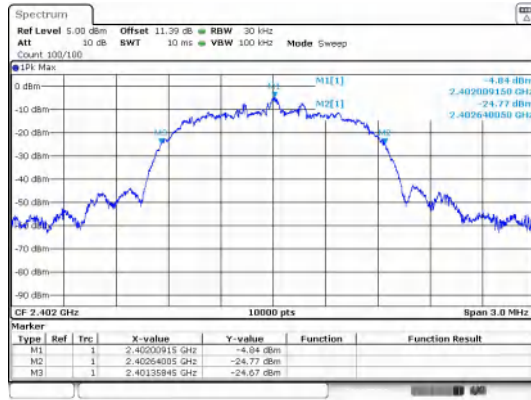
Right:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9500
	39	2441 MHz	0.9500
	78	2480 MHz	0.9400
$\pi/4$ DQPSK	0	2402 MHz	1.270
	39	2441 MHz	1.280
	78	2480 MHz	1.270

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

Test Graphs

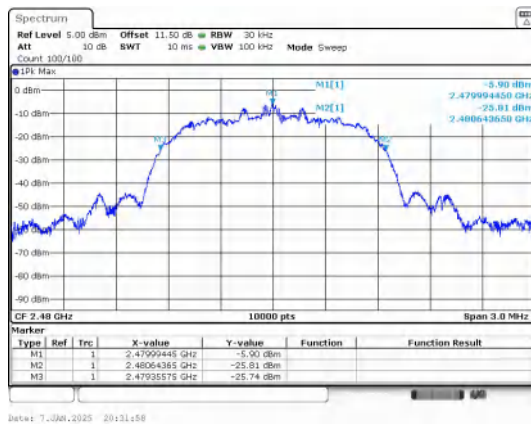




8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

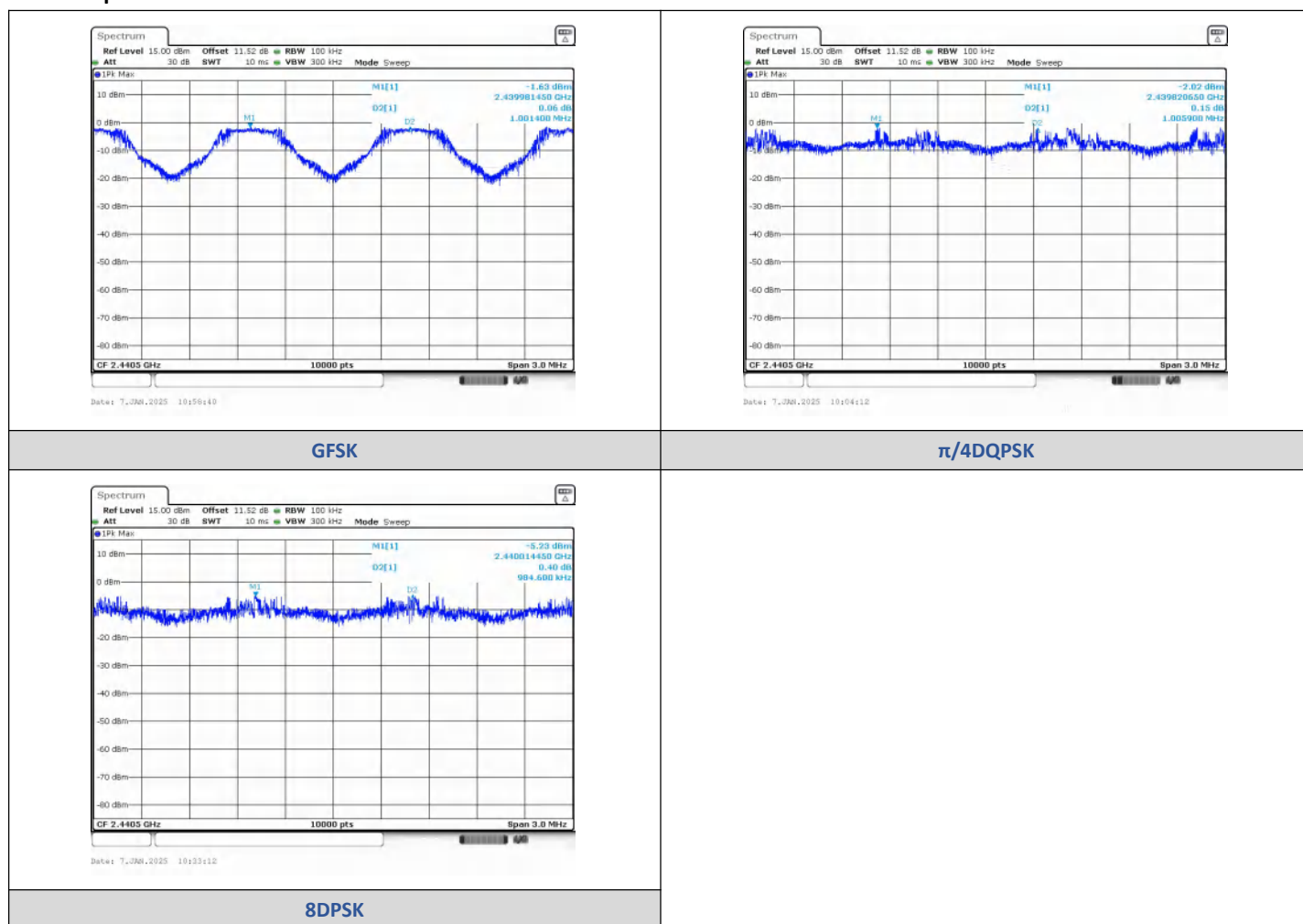
6) Carrier Frequencies Separation

Test Result

Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.9815	2440.9828	1.0014	0.93	PASS
$\pi/4$ DQPSK	2-DH5	2439.8207	2440.8266	1.0059	0.82	PASS
8DPSK	3-DH5	2440.0145	2440.999	0.9846	0.833	PASS

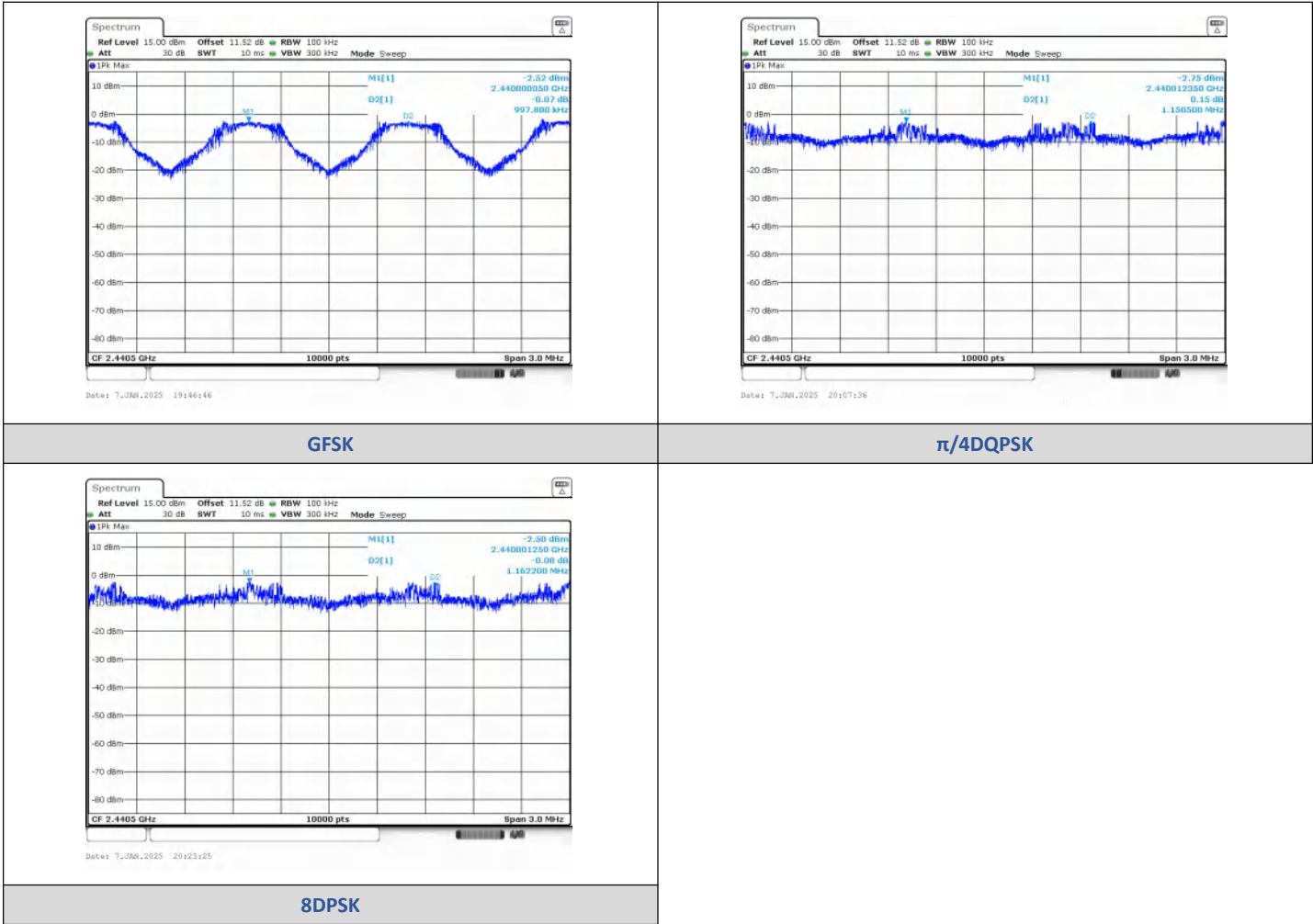
Test Graphs



Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.0001	2440.9979	0.9978	0.95	PASS
$\pi/4$ DQPSK	2-DH5	2440.0123	2441.1629	1.1505	0.847	PASS
8DPSK	3-DH5	2440.0012	2441.1635	1.1622	0.853	PASS

Test Graphs



7) Conducted Out Of Band Emission

Test Result

Left:

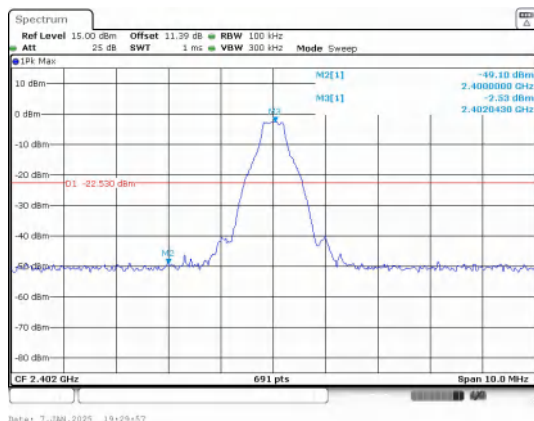
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-49.100	-22.53	-26.570	PASS
			6990.39	-53.214	-22.53	-30.684	PASS
		39	4882.09	-23.745	-21.86	-1.885	PASS
		78	2483.50	-49.770	-23.26	-26.510	PASS
			4960.33	-25.662	-23.26	-2.402	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-49.040	-22.67	-26.370	PASS
			6943.78	-52.892	-22.67	-30.222	PASS
		39	4881.25	-22.490	-21.95	-0.540	PASS
		78	2483.50	-49.840	-23.32	-26.520	PASS
			4959.49	-29.938	-23.32	-6.618	PASS
8DPSK	3-DH5	0	2399.00	-48.492	-22.84	-25.652	PASS
			2400.00	-50.230	-22.84	-27.390	PASS
			22037.3	-52.835	-22.84	-29.995	PASS
		39	4882.09	-33.191	-24.98	-8.211	PASS
		78	2483.50	-50.410	-26.25	-24.160	PASS
			4960.33	-33.824	-26.25	-7.574	PASS

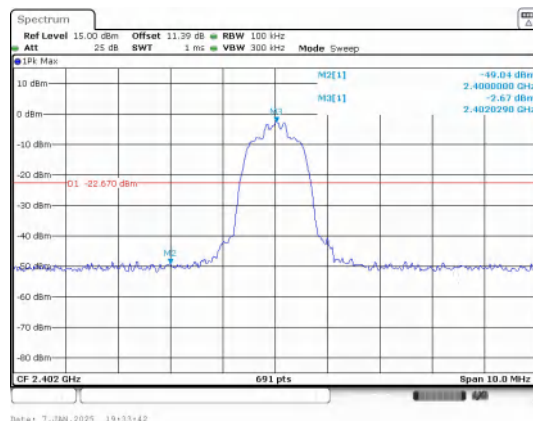
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2397.60	-48.977	-22.8	-26.177	PASS
			2400.00	-51.210	-22.8	-28.410	PASS
			2483.50	-49.450	-23.52	-25.930	PASS
$\pi/4$ DQPSK	2-DH5		2396.64	-48.058	-22.7	-25.358	PASS
			2400.00	-49.200	-22.7	-26.500	PASS
			2483.50	-48.990	-23.28	-25.710	PASS
8DPSK	3-DH5		2397.48	-47.344	-25.72	-21.624	PASS
			2400.00	-49.660	-25.72	-23.940	PASS
			2483.50	-50.480	-28.64	-21.840	PASS

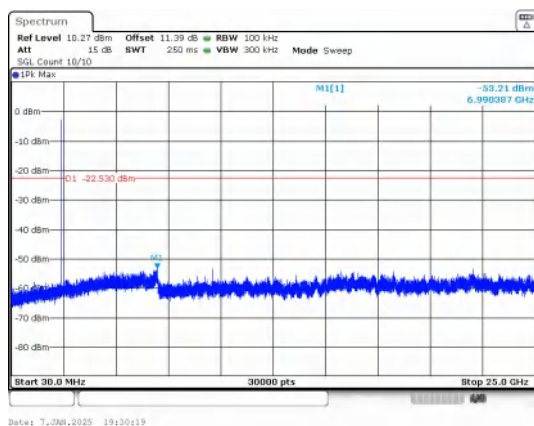
Test Graphs



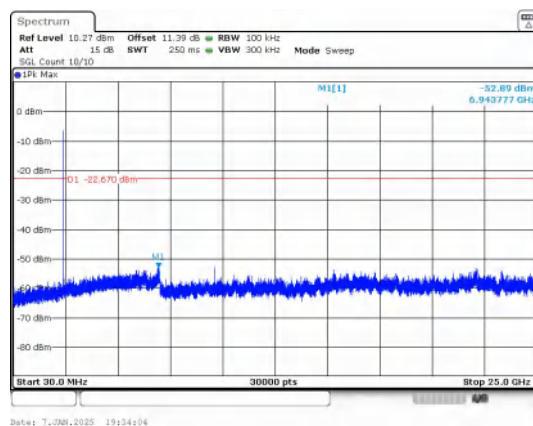
Out Of Band Emission
GFSK_DH5_Channel 0



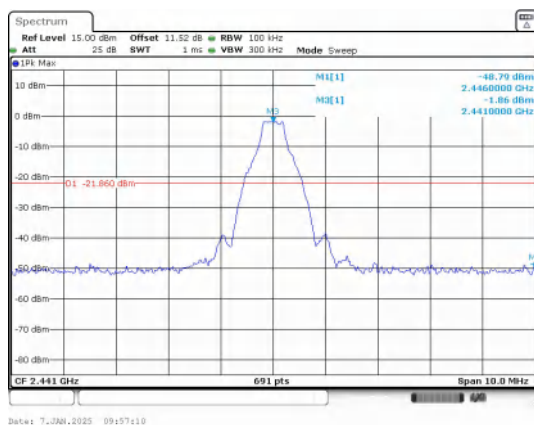
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 0



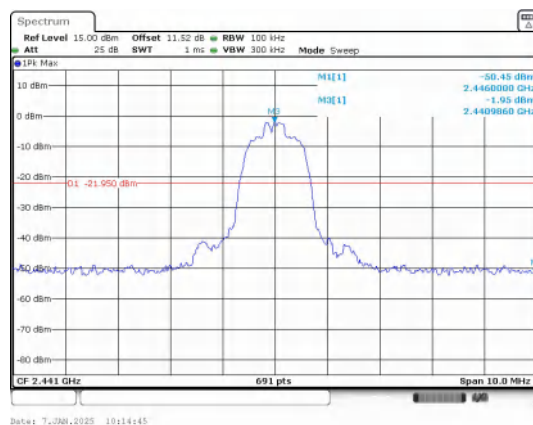
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



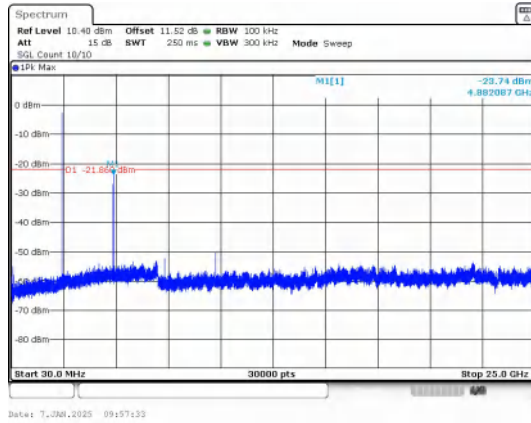
30.0 MHz - 25000.0 MHz
 $\pi/4$ QPSK_2-DH5_Channel 0



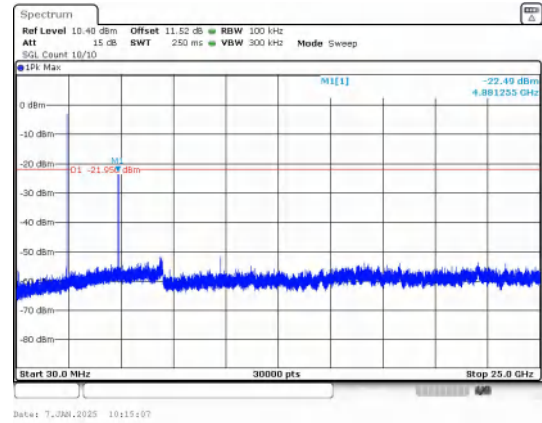
Out Of Band Emission
GFSK_DH5_Channel 39



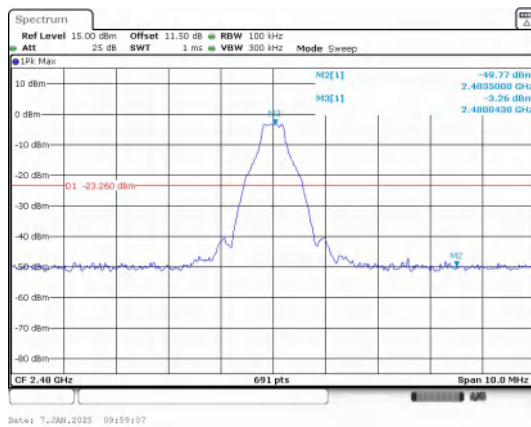
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 39



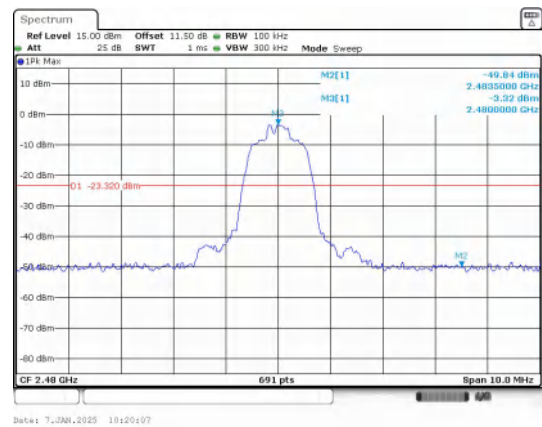
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



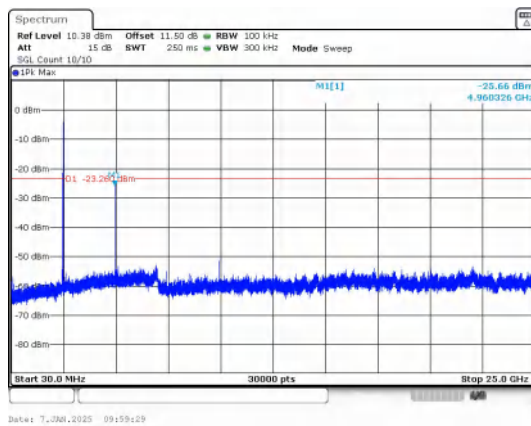
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



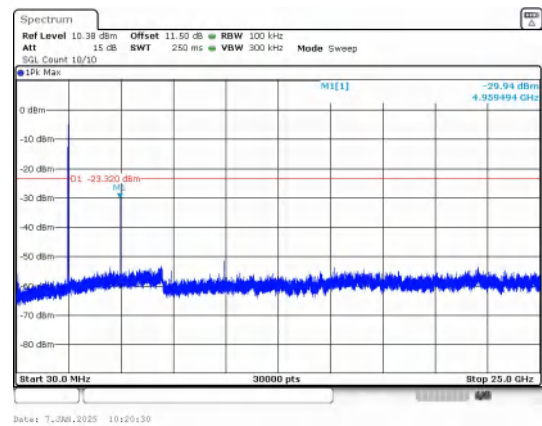
Out Of Band Emission
GFSK_DH5_Channel 78



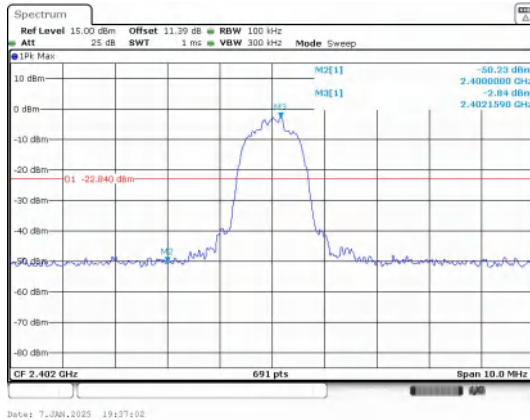
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



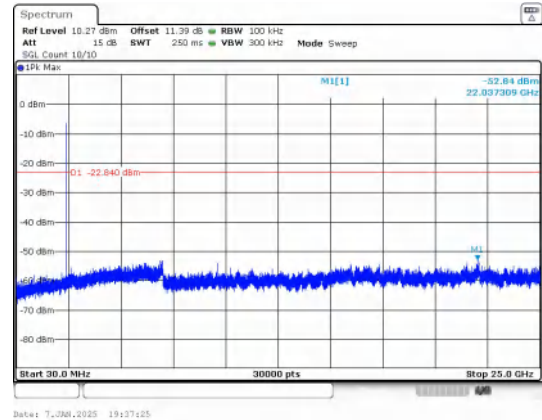
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



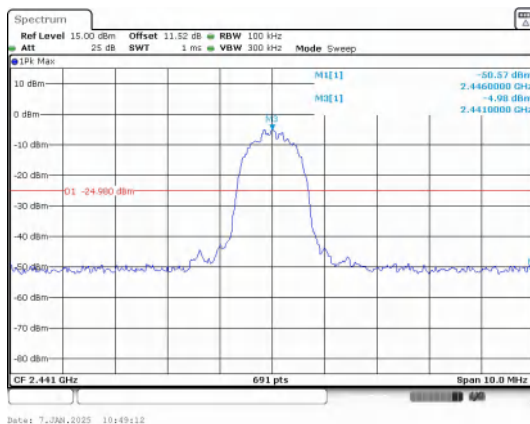
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



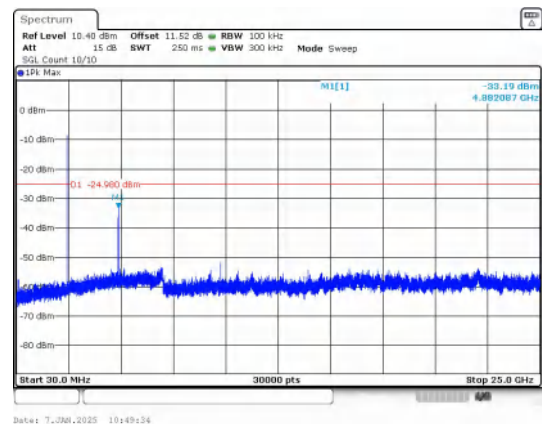
Out Of Band Emission
8DPSK_3-DH5_Channel 0



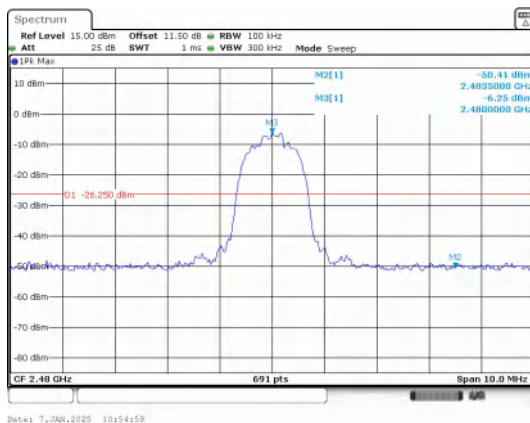
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



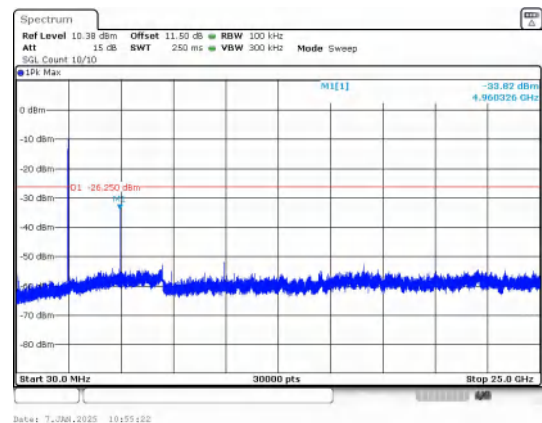
Out Of Band Emission
8DPSK_3-DH5_Channel 39



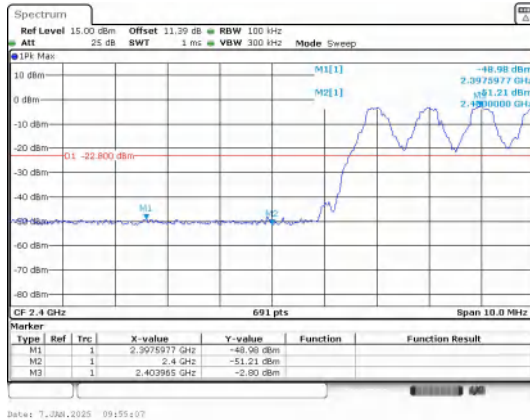
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



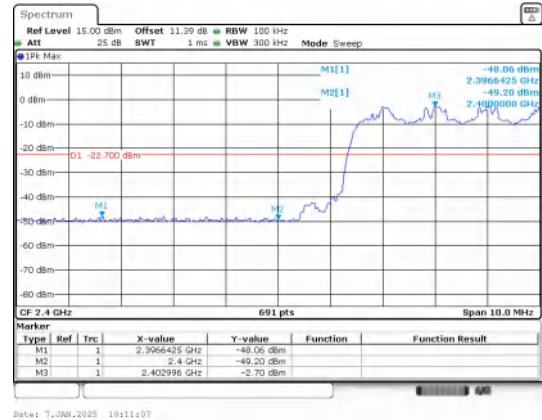
Out Of Band Emission
8DPSK_3-DH5_Channel 78



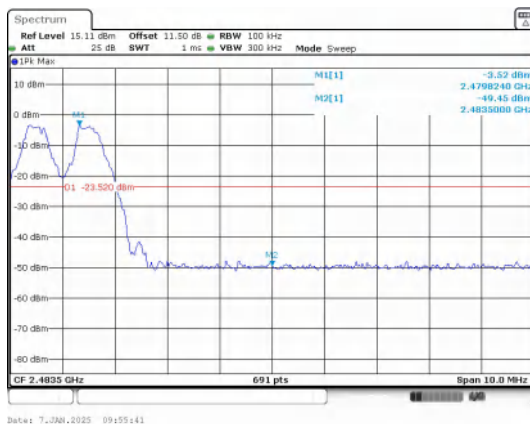
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



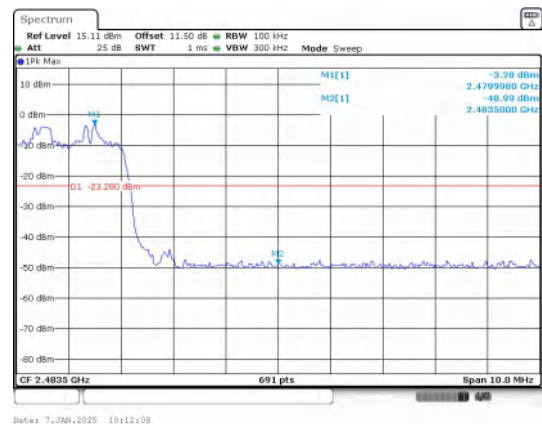
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



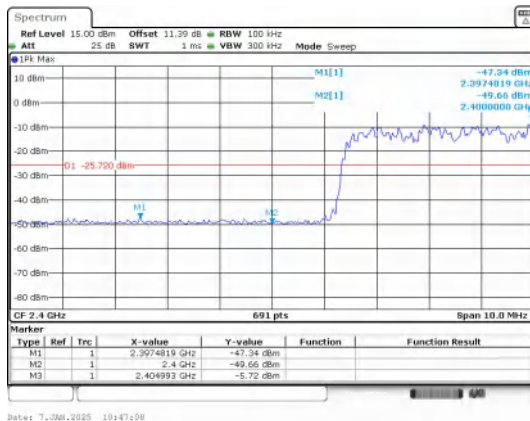
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



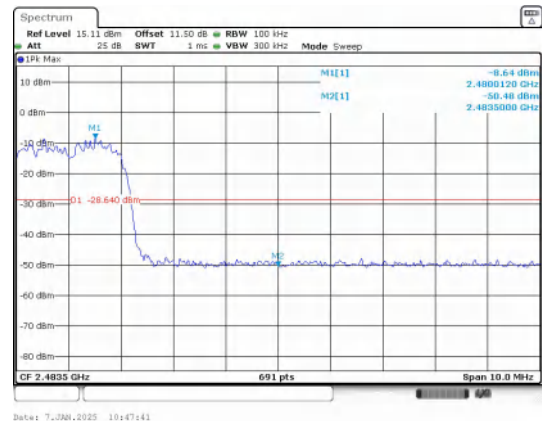
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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

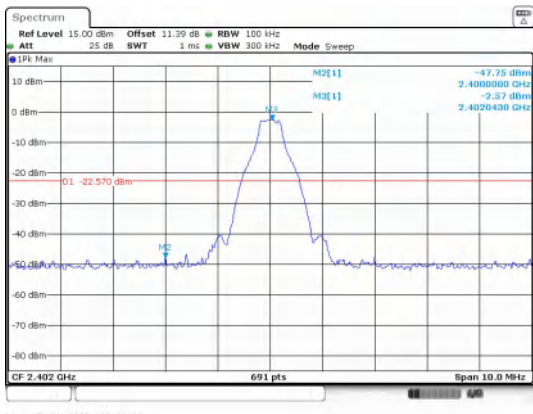
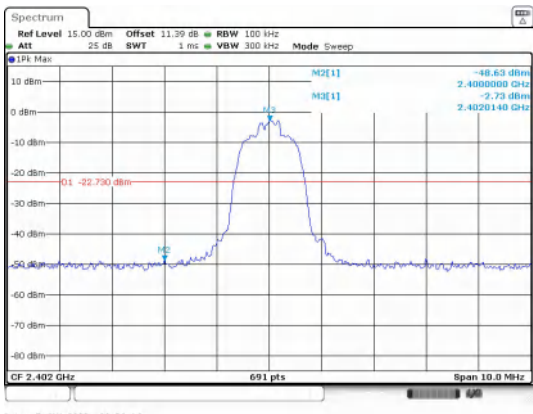
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
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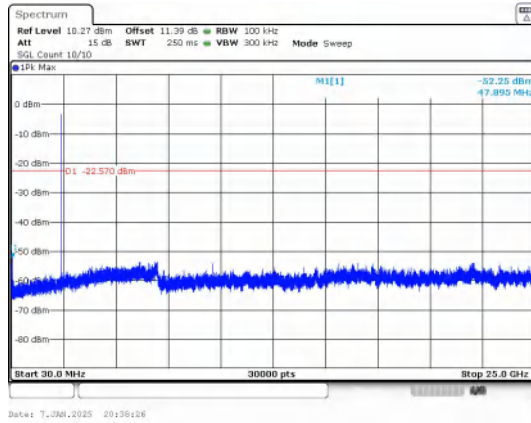
GFSK	DH5	0	47.90	-52.248	-22.57	-29.678	PASS
			2400.00	-47.750	-22.57	-25.180	PASS
		39	22062.3	-52.943	-22.24	-30.703	PASS
		78	2483.50	-50.920	-22.66	-28.260	PASS
			6800.62	-52.417	-22.66	-29.757	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-48.630	-22.73	-25.900	PASS
			9608.08	-52.683	-22.73	-29.953	PASS
		39	6927.96	-52.375	-22.3	-30.075	PASS
		78	2483.50	-50.400	-23.05	-27.350	PASS
			6883.02	-52.498	-23.05	-29.448	PASS
8DPSK	3-DH5	0	2400.00	-46.520	-22.78	-23.740	PASS
			9608.08	-52.857	-22.78	-30.077	PASS
		39	47.90	-52.572	-22.57	-30.002	PASS
		78	2483.50	-49.410	-22.93	-26.480	PASS
			22071.4	-52.911	-22.93	-29.981	PASS

Hopping

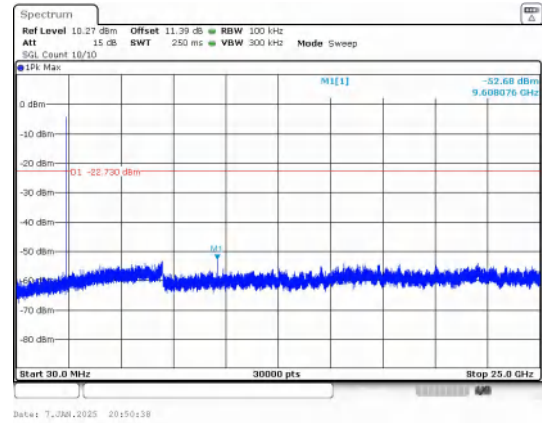
Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2395.25	-47.760	-22.58	-25.180	PASS
			2400.00	-49.990	-22.58	-27.410	PASS
			2483.50	-49.810	-22.94	-26.870	PASS
$\pi/4$ DQPSK	2-DH5		2397.89	-48.030	-22.8	-25.230	PASS
			2400.00	-50.460	-22.8	-27.660	PASS
			2483.50	-48.930	-23.2	-25.730	PASS
8DPSK	3-DH5		2397.53	-48.101	-22.66	-25.441	PASS
			2400.00	-49.440	-22.66	-26.780	PASS
			2483.50	-48.780	-23.01	-25.770	PASS

Test Graphs

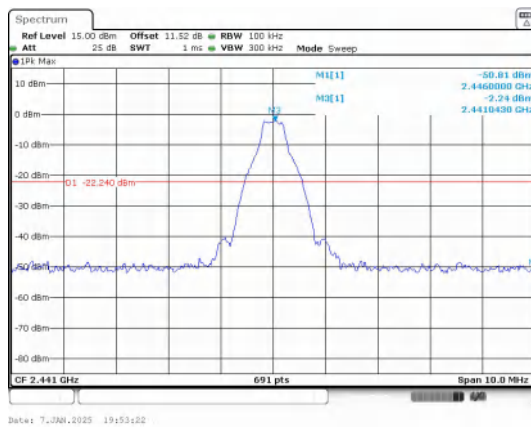
 Out Of Band Emission GFSK_DH5_Channel 0	 Out Of Band Emission $\pi/4$DQPSK_2-DH5_Channel 0
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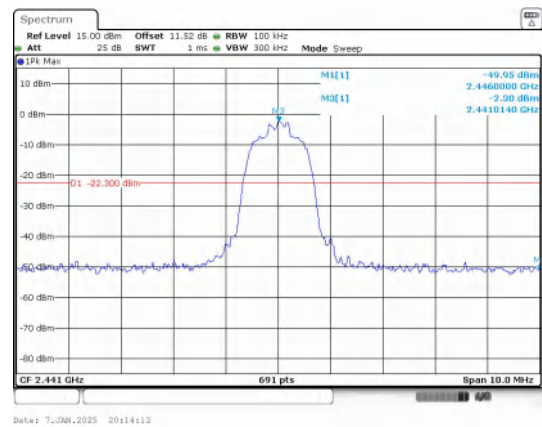
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



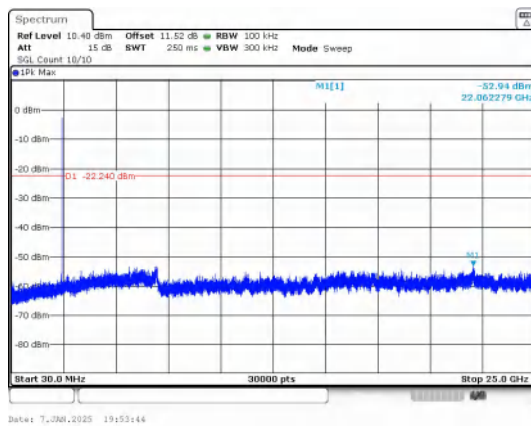
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



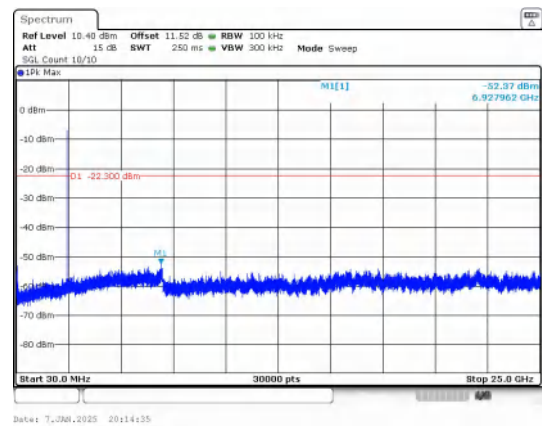
Out Of Band Emission
GFSK_DH5_Channel 39



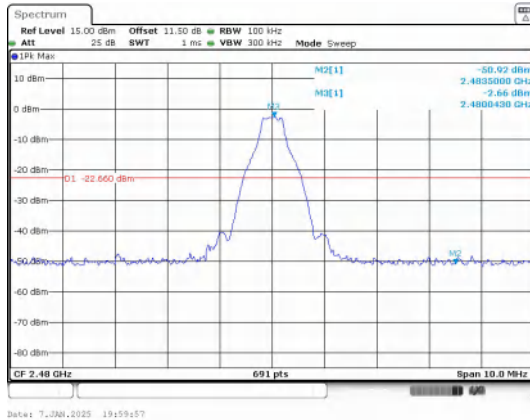
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



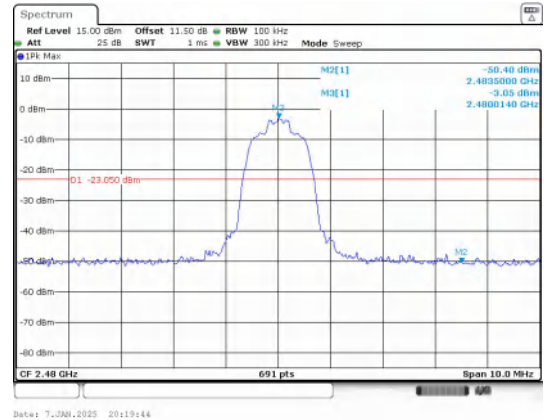
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



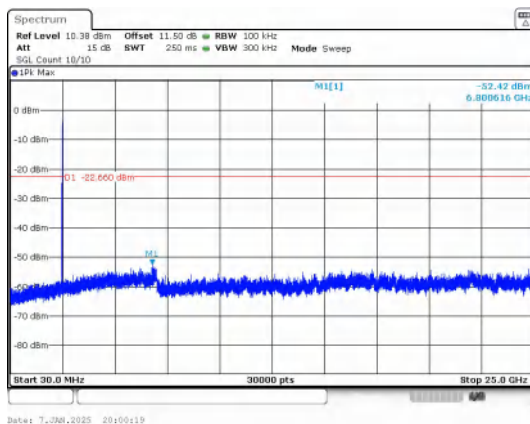
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



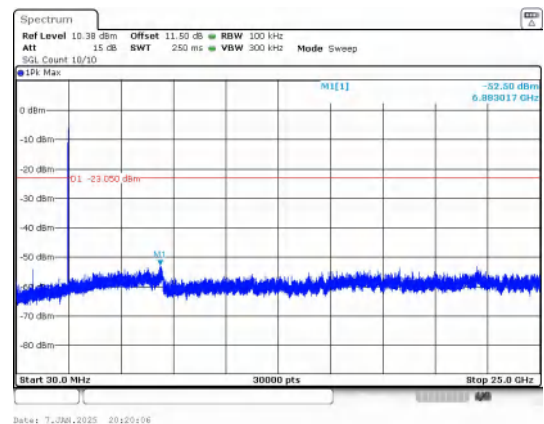
Out Of Band Emission
GFSK_DH5_Channel 78



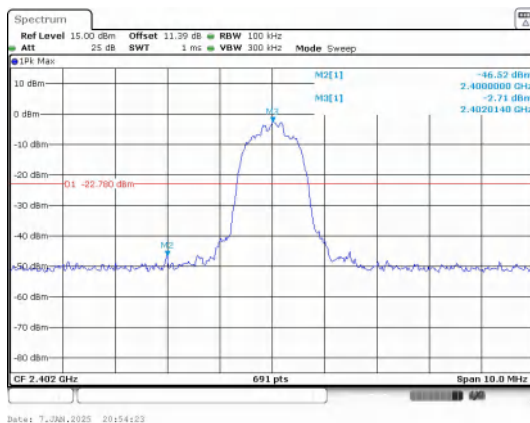
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 78



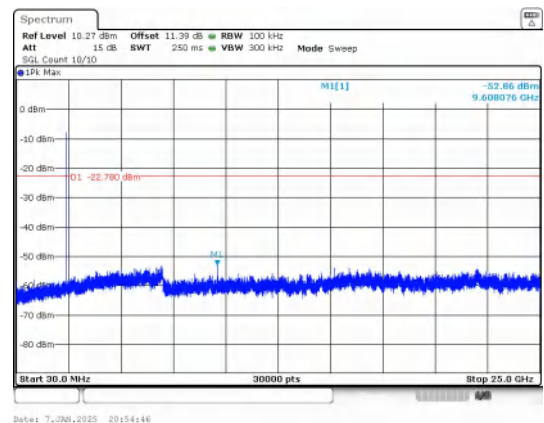
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



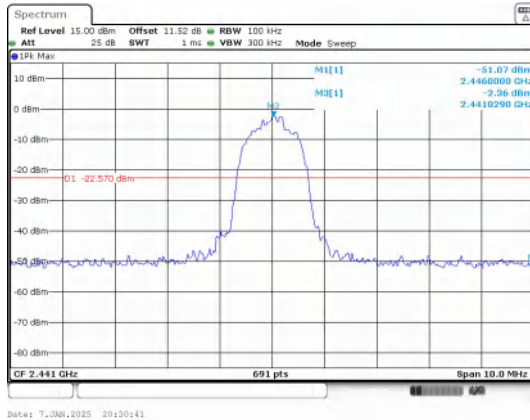
30.0 MHz - 25000.0 MHz
 $\pi/4$ QPSK_2-DH5_Channel 78



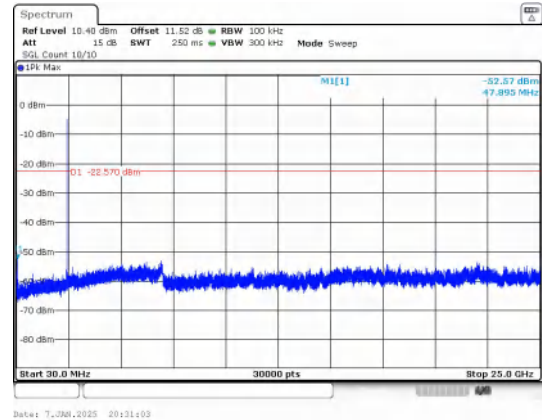
Out Of Band Emission
8DPSK_3-DH5_Channel 0



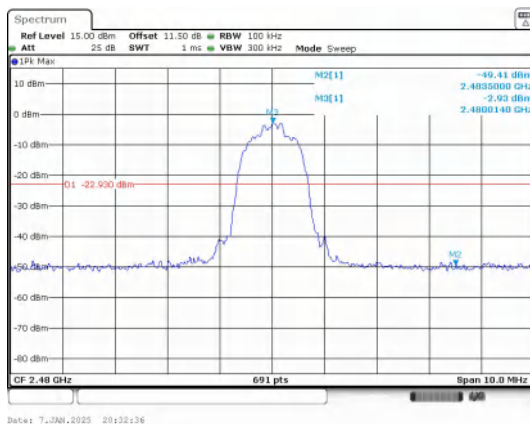
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



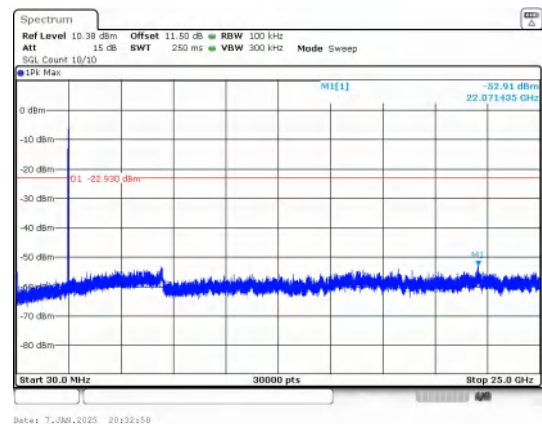
Out Of Band Emission
8DPSK_3-DH5_Channel 39



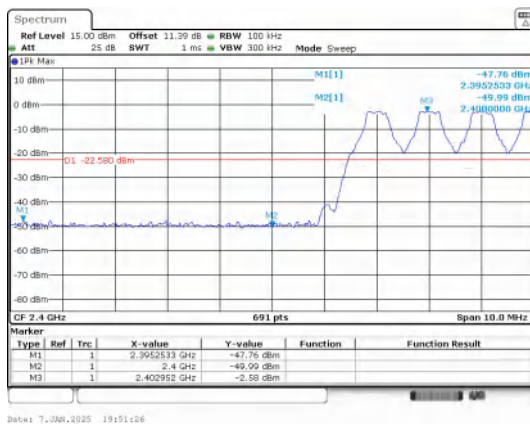
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



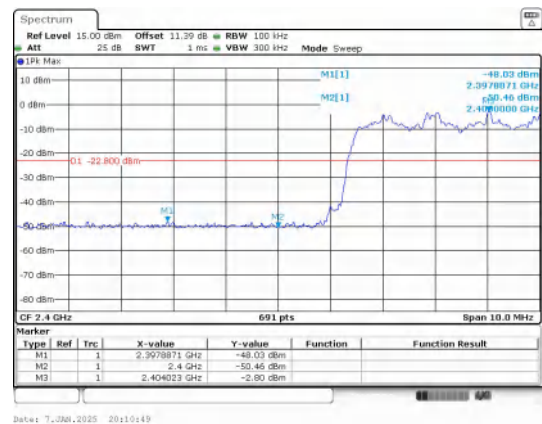
Out Of Band Emission
8DPSK_3-DH5_Channel 78



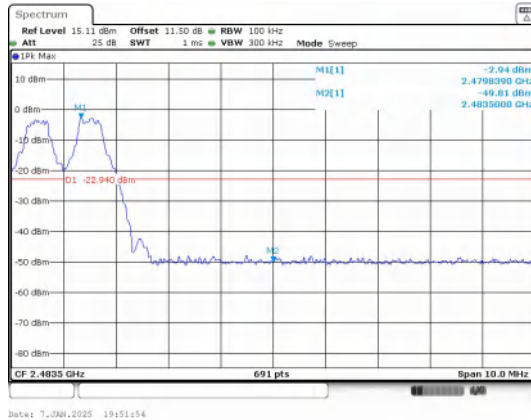
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



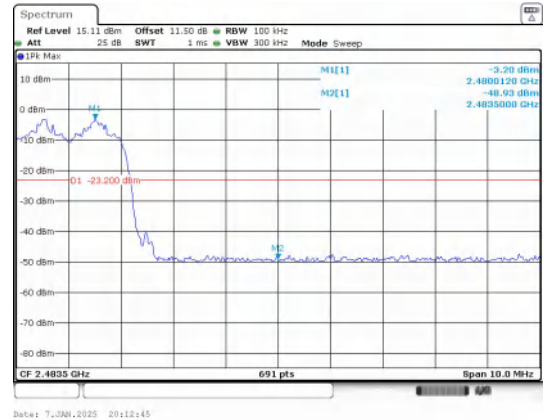
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



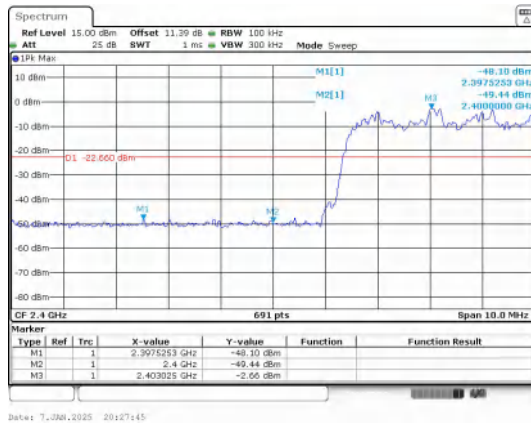
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



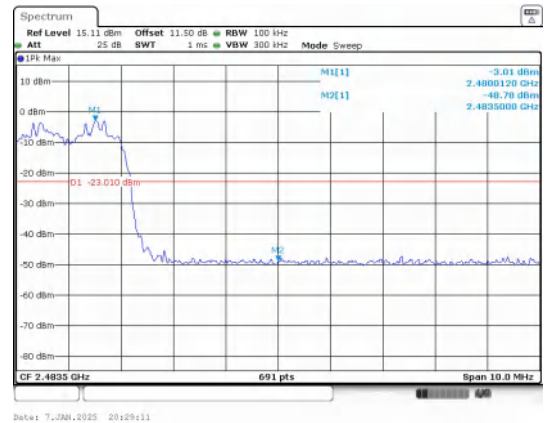
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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-----