

Appendix A

Report No.:	CISRR24012514501
FCC ID:	2BET5-I31PRO
Product Name:	TWS Bluetooth earphones
Model No.:	i31pro
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

1) Conducted Peak Output Power

Test Result

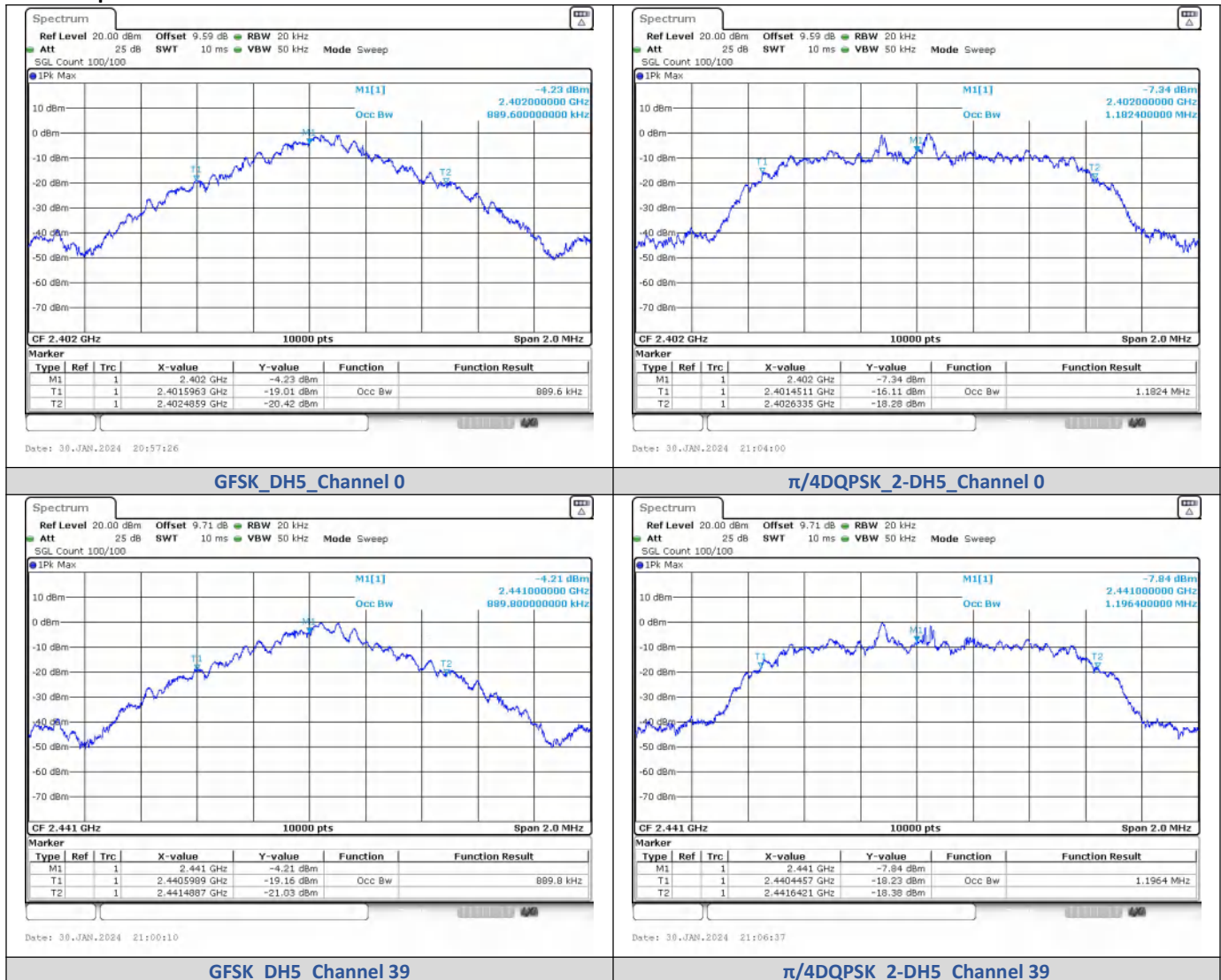
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	3.080	2.032	30	PASS
		39	3.344	2.160		PASS
		78	2.976	1.984		PASS
$\pi/4$ DQPSK	2-DH5	0	3.910	2.460	20.97	PASS
		39	4.018	2.522		PASS
		78	3.739	2.365		PASS
8DPSK	3-DH5	0	4.375	2.739		PASS
		39	4.298	2.690		PASS
		78	3.997	2.510		PASS

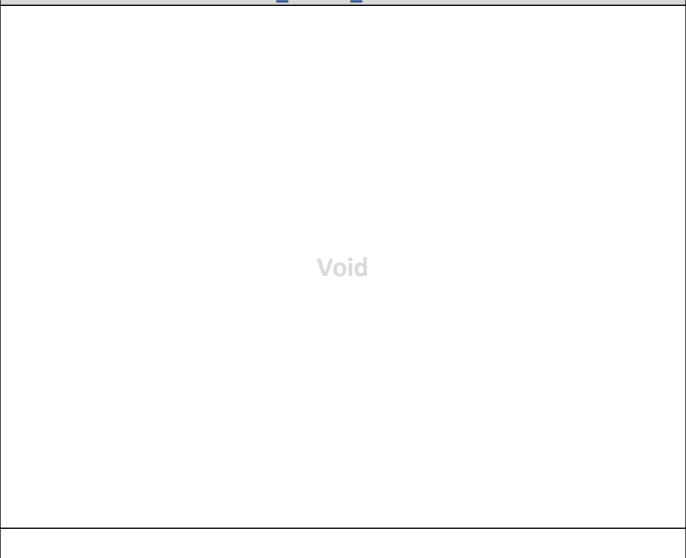
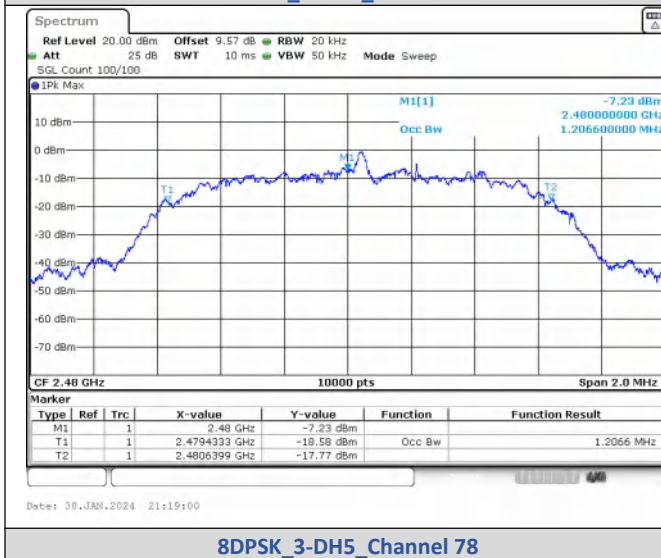
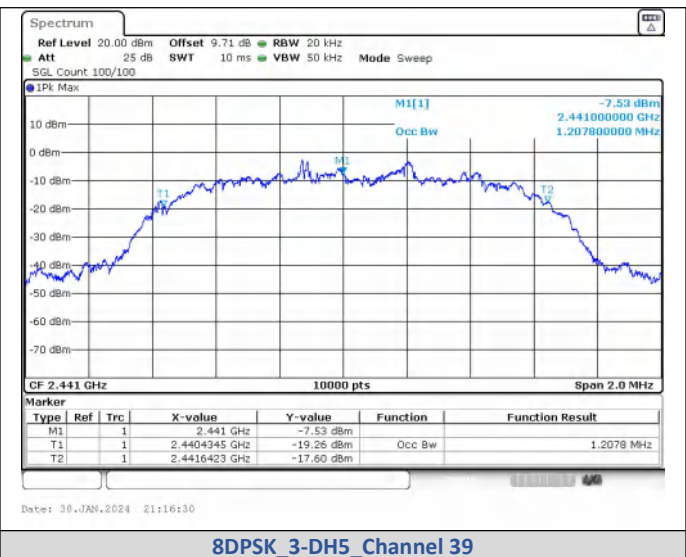
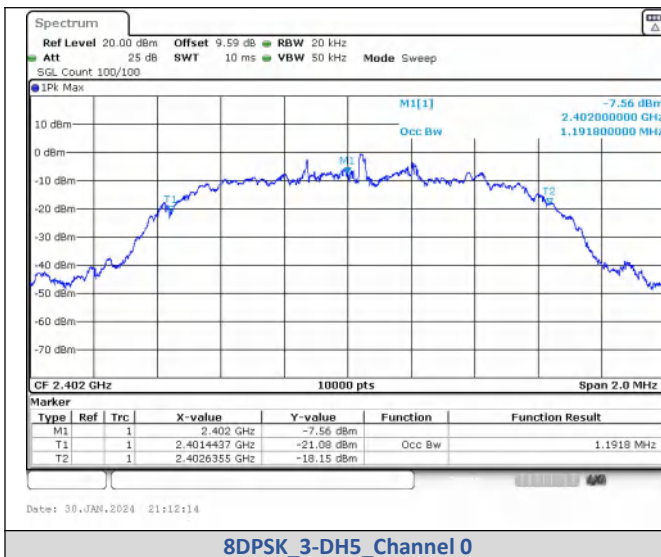
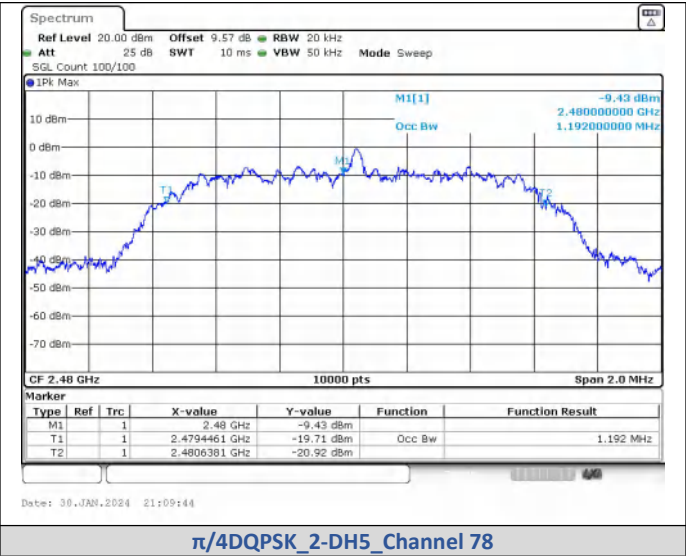
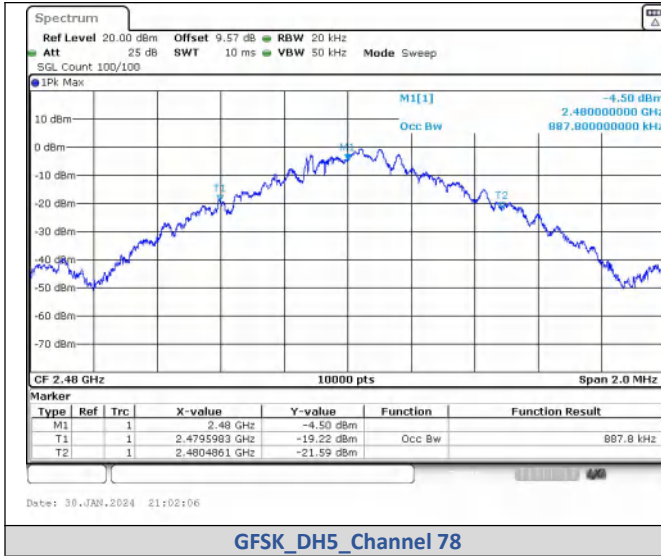
2) 99% Bandwidth

Test Result

Modulation	Channel	99% BW (MHz)
GFSK	0	0.88960
	39	0.88980
	78	0.88780
$\pi/4$ DQPSK	0	1.1820
	39	1.1960
	78	1.1920
8DPSK	0	1.1920
	39	1.2080
	78	1.2070

Test Graphs





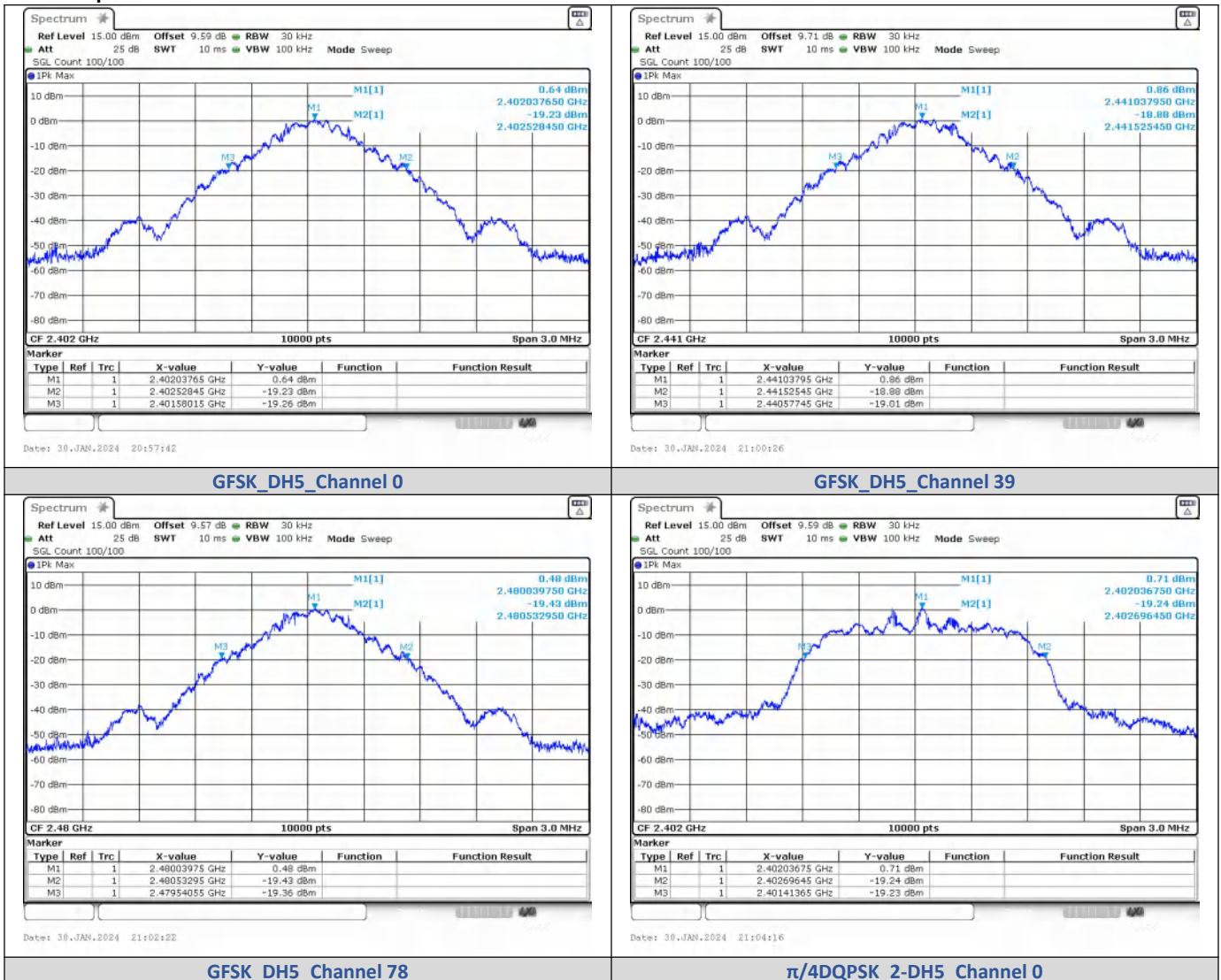
Void

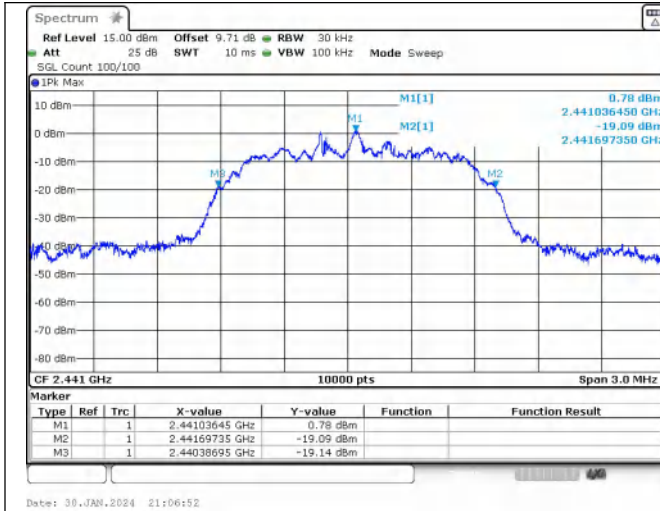
3) 20dB Bandwidth

Test Result

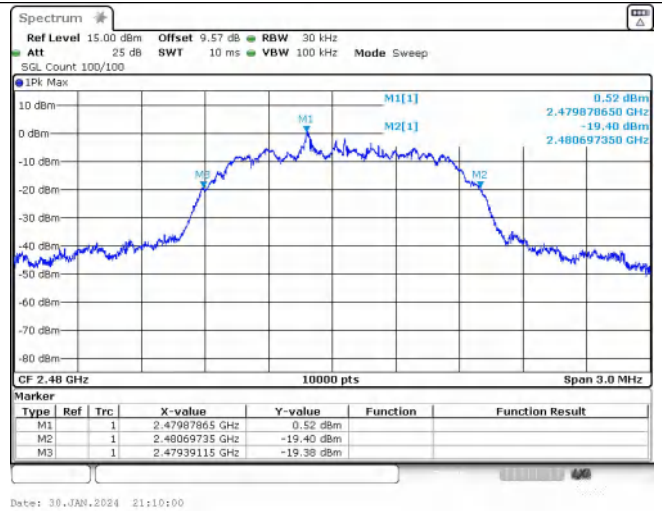
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9500
	39	2441 MHz	0.9500
	78	2480 MHz	0.9900
$\pi/4$ DQPSK	0	2402 MHz	1.290
	39	2441 MHz	1.310
	78	2480 MHz	1.310
8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.290
	78	2480 MHz	1.300

Test Graphs

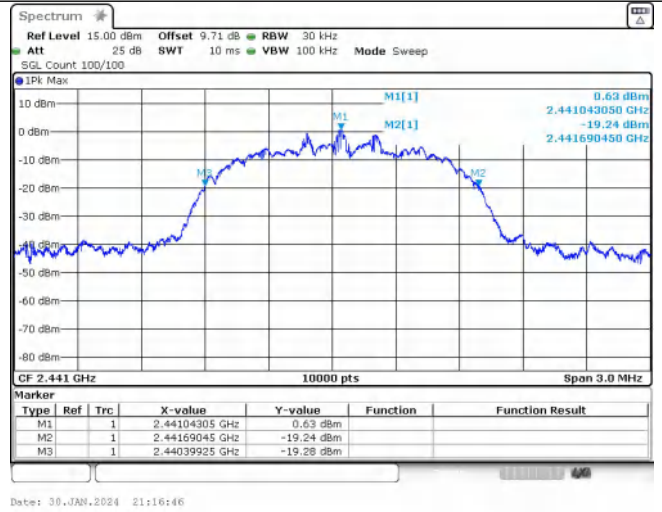
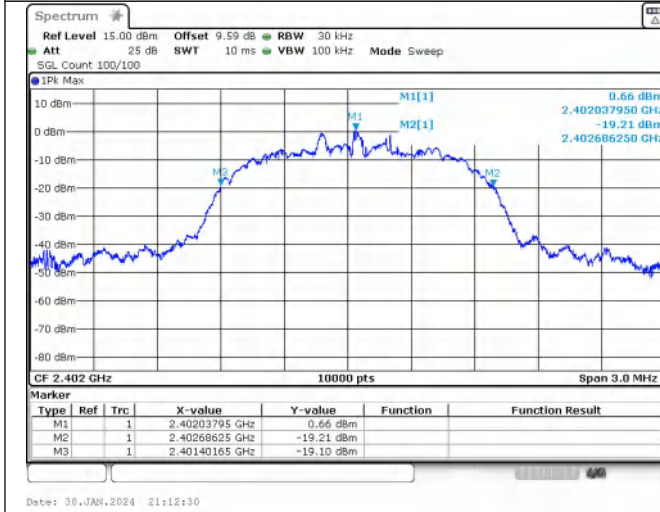




$\pi/4$ DQPSK_2-DH5_Channel 39

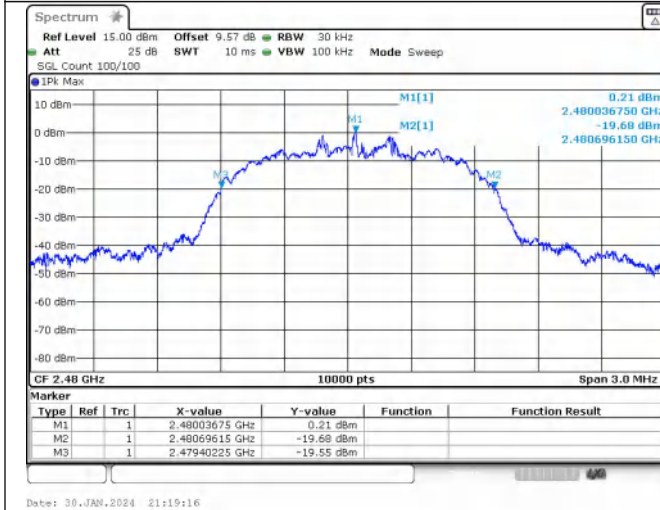


$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0

8DPSK_3-DH5_Channel 39



Void

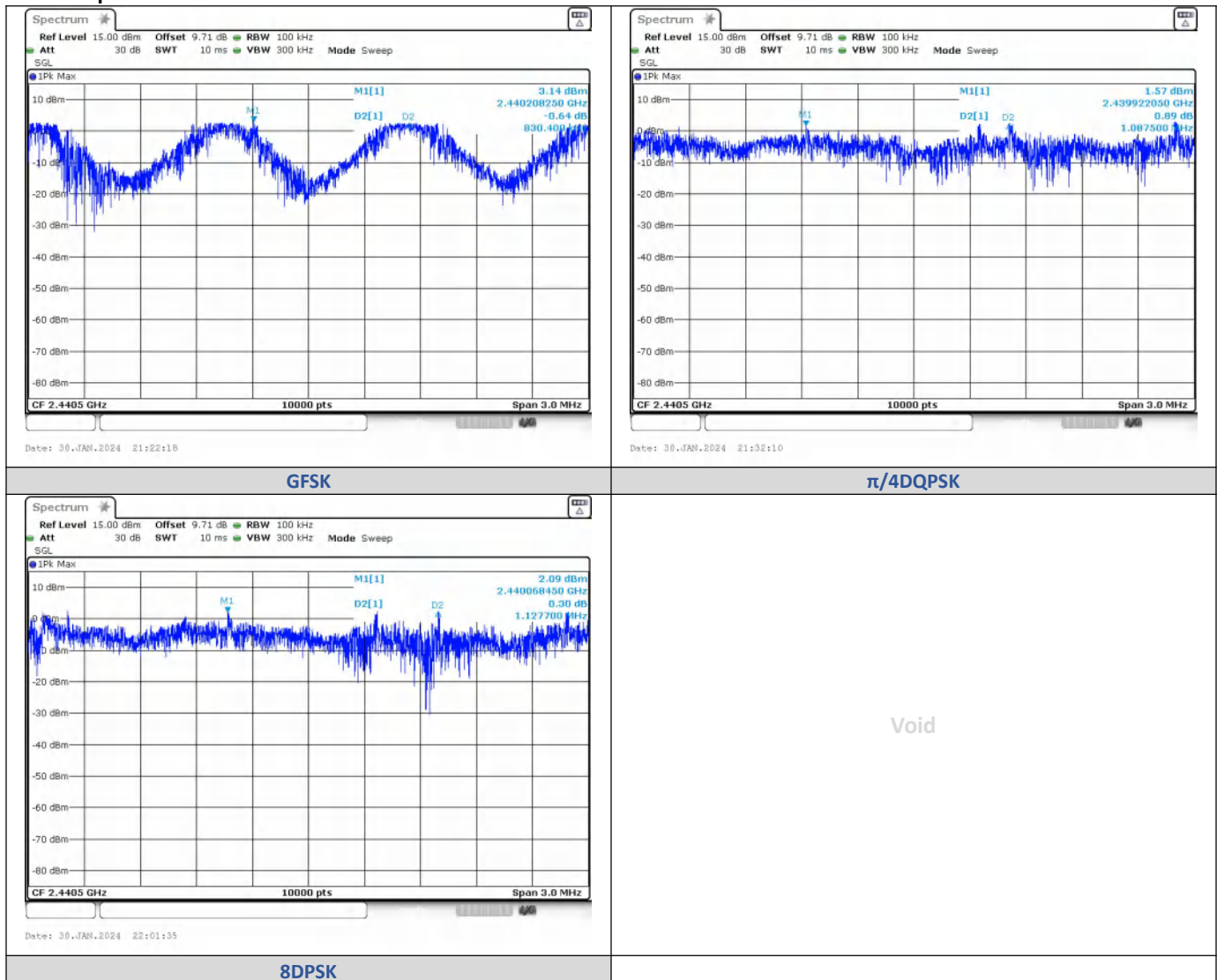
8DPSK_3-DH5_Channel 78

4) Carrier Frequencies Separation

Test Result

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.2083	2441.0386	0.8304	0.633	PASS
$\pi/4$ DQPSK	2-DH5	2439.9221	2441.0096	1.0875	0.86	PASS
8DPSK	3-DH5	2440.0685	2441.1962	1.1277	0.86	PASS

Test Graphs



5) Conducted Out Of Band Emission

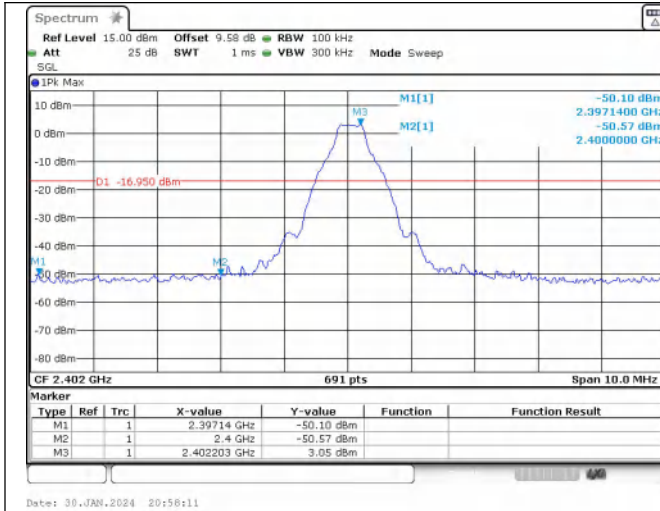
Test Result Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-50.566	-16.95	-33.616	PASS
			2397.14	-50.099	-16.95	-33.149	PASS
			7206.00	-42.782	-16.95	-25.832	PASS
		39	9764.55	-40.095	-16.72	-23.375	PASS
		78	2483.50	-51.982	-17.18	-34.802	PASS
			9920.20	-42.360	-17.18	-25.180	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-50.144	-17.0	-33.144	PASS
			9608.08	-44.092	-17.0	-27.092	PASS
		39	9764.55	-40.063	-17.3	-22.763	PASS
		78	2483.50	-52.614	-17.12	-35.494	PASS
			9920.20	-42.277	-17.12	-25.157	PASS
8DPSK	3-DH5	0	2400.00	-48.423	-16.95	-31.473	PASS
			9608.08	-43.854	-16.95	-26.904	PASS
		39	9764.55	-40.349	-16.84	-23.509	PASS
		78	2483.50	-51.320	-17.18	-34.140	PASS
			9920.20	-42.139	-17.18	-24.959	PASS

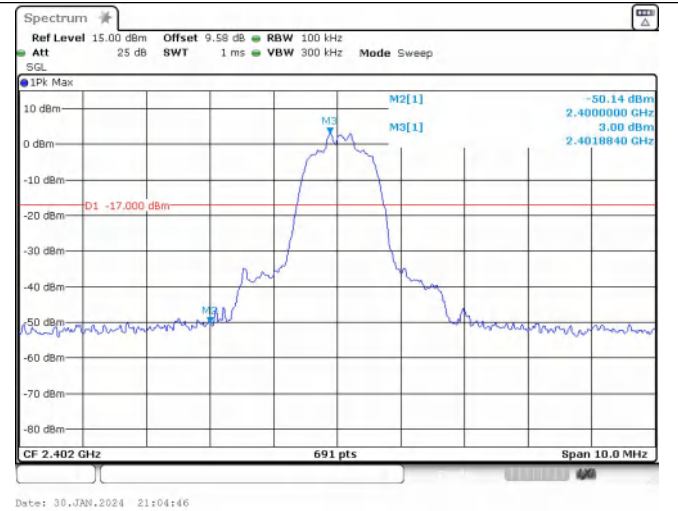
Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2397.37	-49.036	-17.12	-31.916	PASS
			2400.00	-50.974	-17.12	-33.854	PASS
			2483.50	-51.397	-17.35	-34.047	PASS
			2397.64	-50.230	-17.09	-33.140	PASS
			2400.00	-51.260	-17.09	-34.170	PASS
			2483.50	-50.920	-17.25	-33.670	PASS
π /4DQPSK	2-DH5		2395.73	-49.963	-18.65	-31.313	PASS
			2400.00	-52.142	-18.65	-33.492	PASS
			2483.50	-51.554	-18.13	-33.424	PASS
			2397.63	-49.614	-17.61	-32.004	PASS
			2400.00	-51.992	-17.61	-34.382	PASS
			2483.50	-52.002	-18.78	-33.222	PASS
8DPSK	3-DH5		2398.23	-49.898	-20.33	-29.568	PASS
			2400.00	-52.223	-20.33	-31.893	PASS
			2483.50	-51.210	-17.61	-33.600	PASS
			2396.82	-50.334	-20.43	-29.904	PASS
			2400.00	-52.561	-20.43	-32.131	PASS
			2483.50	-51.789	-18.26	-33.529	PASS

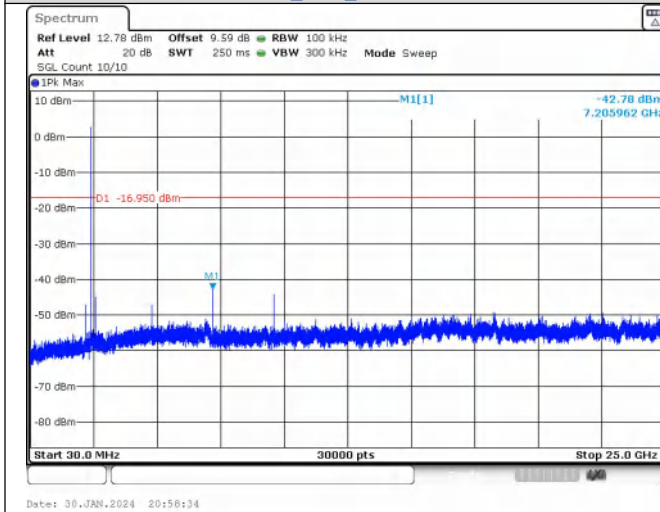
Test Graphs



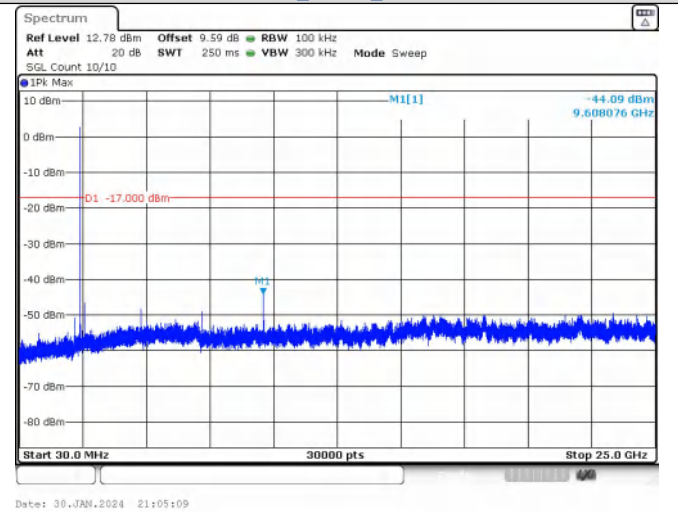
Out Of Band Emission
GFSK_DH5_Channel 0



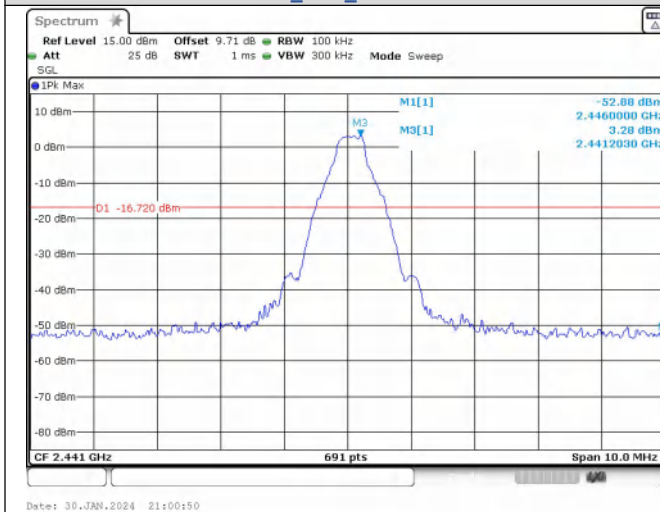
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0



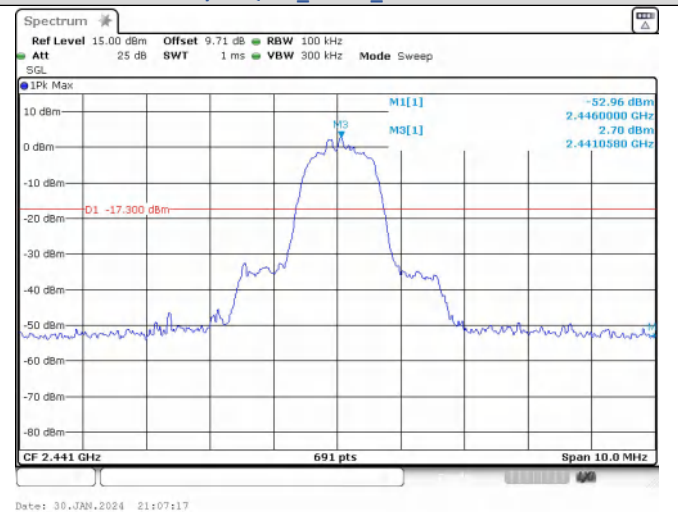
Spurious Emission
GFSK_DH5_Channel 0



Spurious Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0

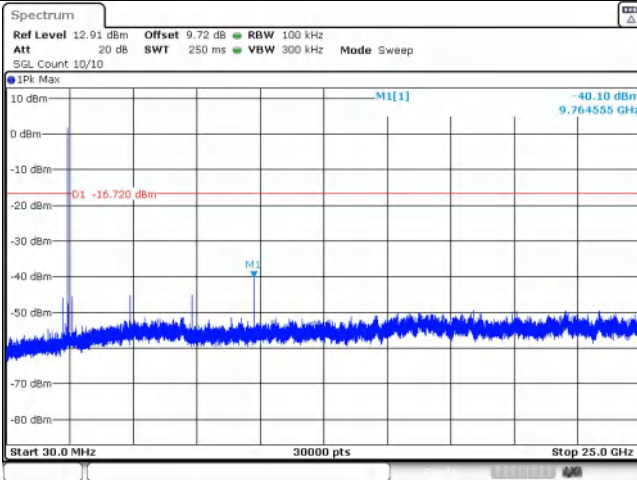


Out Of Band Emission



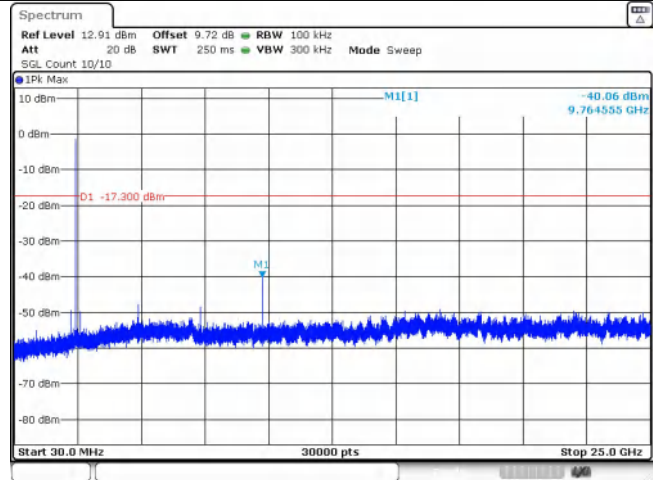
Out Of Band Emission

GFSK_DH5_Channel 39



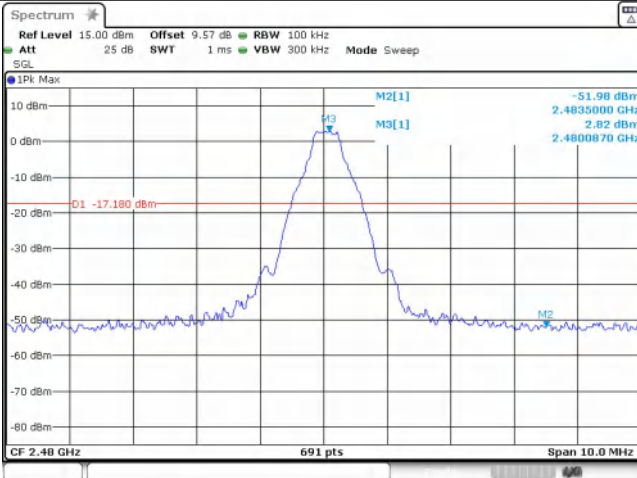
Date: 30.JAN.2024 21:01:13

$\pi/4$ QPSK_2-DH5_Channel 39



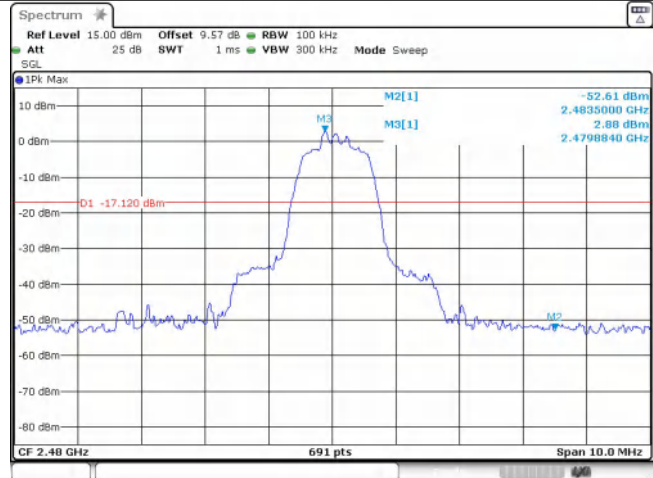
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Spurious Emissions GFSK_DH5_Channel 39



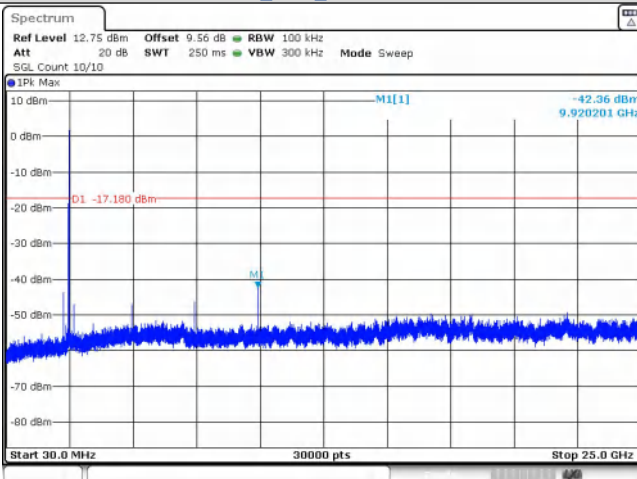
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Spurious Emissions $\pi/4$ QPSK_2-DH5_Channel 39



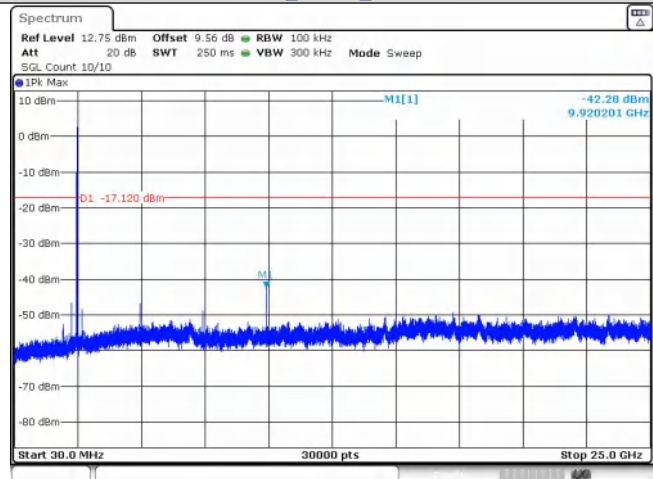
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Out Of Band Emission GFSK_DH5_Channel 78



Date: 30.JAN.2024 21:03:14

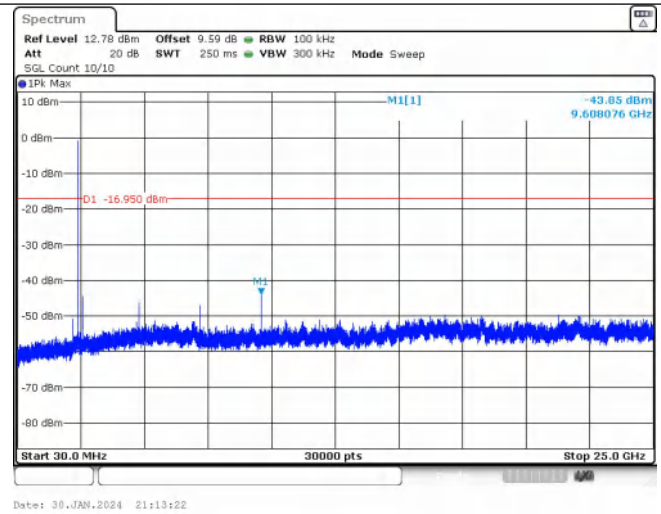
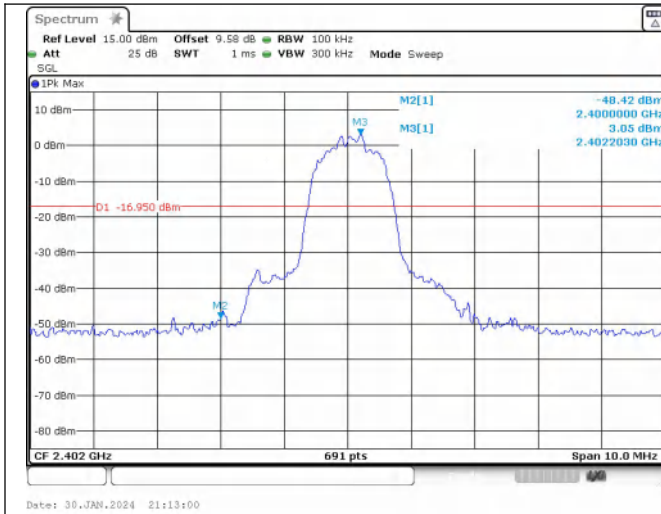
Out Of Band Emission $\pi/4$ QPSK_2-DH5_Channel 78



Date: 30.JAN.2024 21:10:52

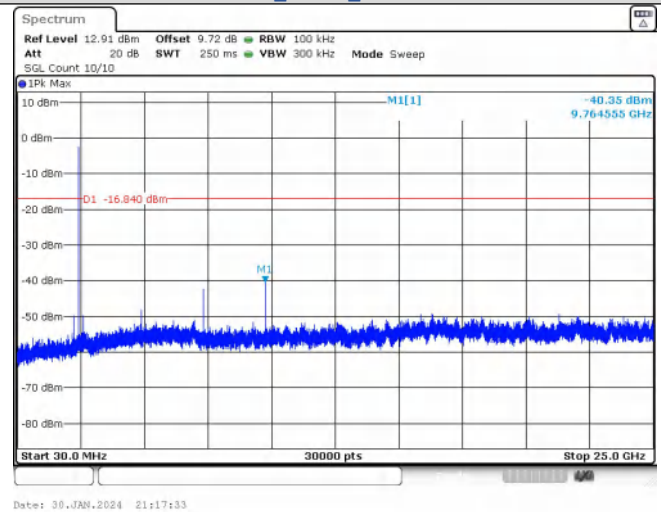
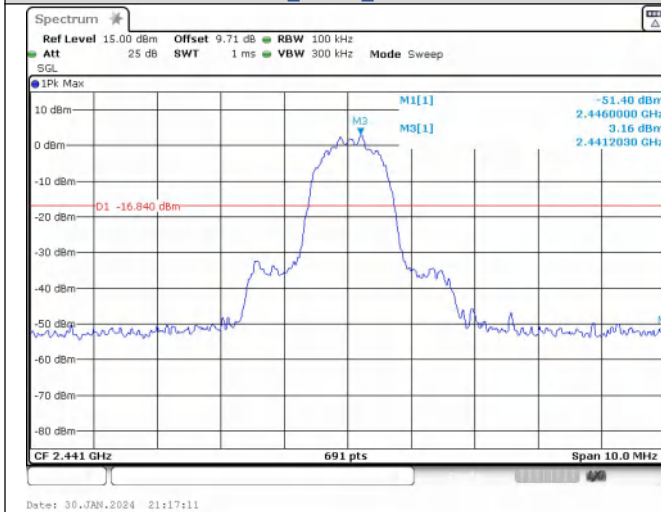
Spurious Emission
GFSK_DH5_Channel 78

Spurious Emission
 $\pi/4$ QPSK_2-DH5_Channel 78



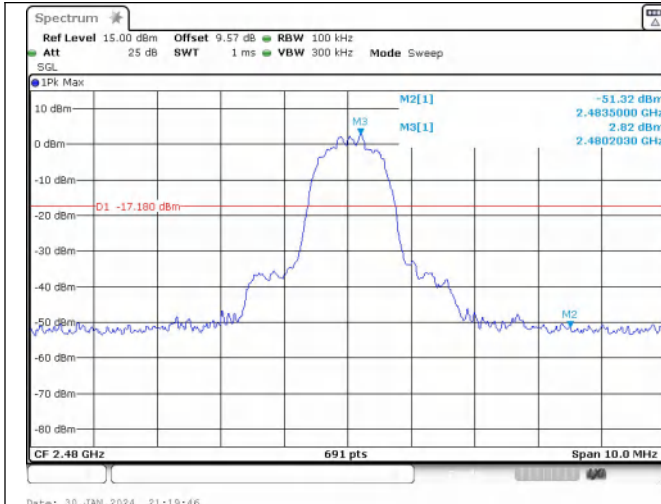
Out Of Band Emission
8DPSK_3-DH5_Channel 0

Spurious Emission
8DPSK_3-DH5_Channel 0



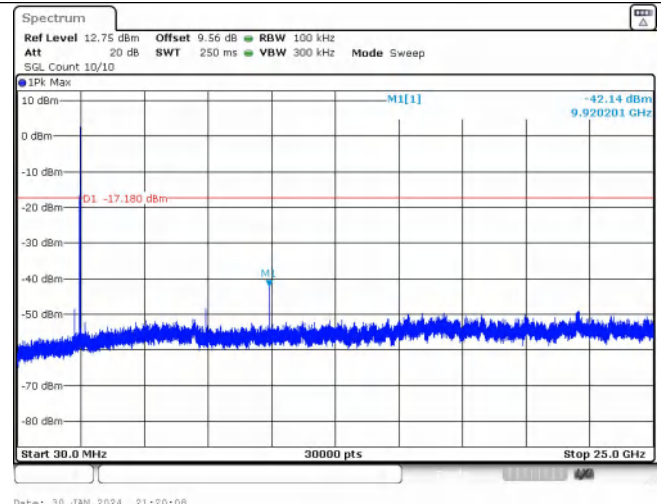
Out Of Band Emission
8DPSK_3-DH5_Channel 39

Spurious Emissions
8DPSK_3-DH5_Channel 39



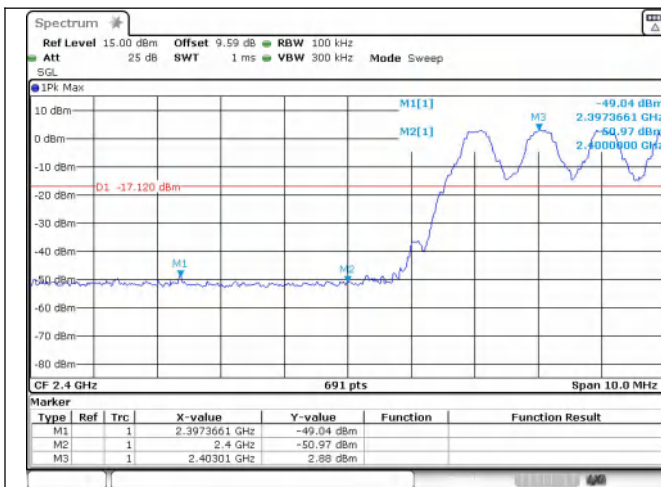
Date: 30.JAN.2024 21:19:46

Out Of Band Emission
8DPSK_3-DH5_Channel 78



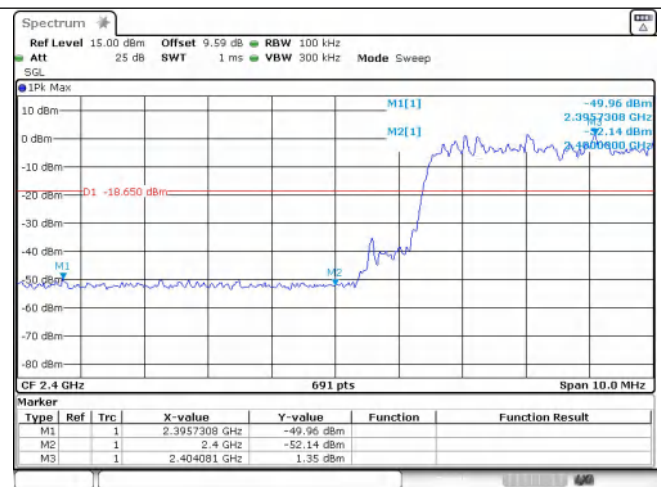
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Spurious Emission
8DPSK_3-DH5_Channel 78



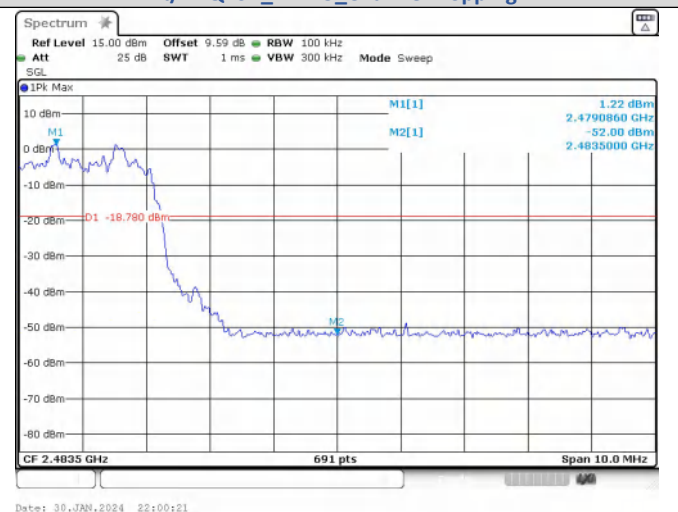
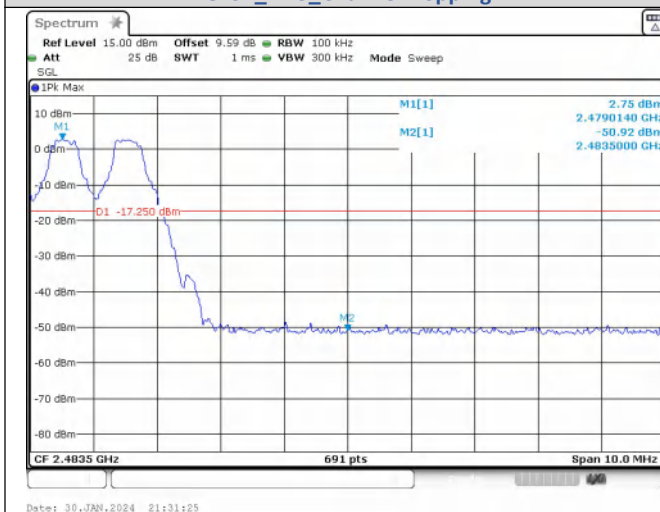
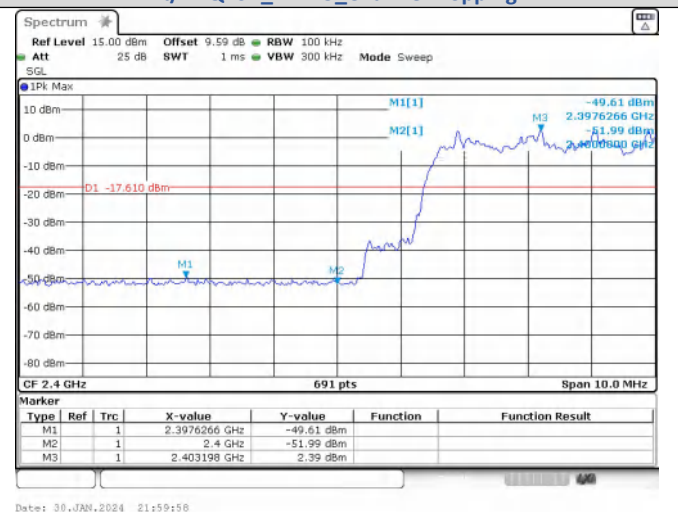
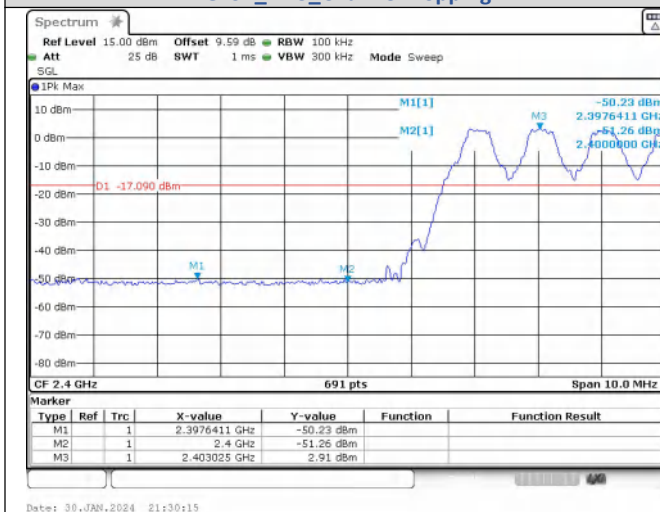
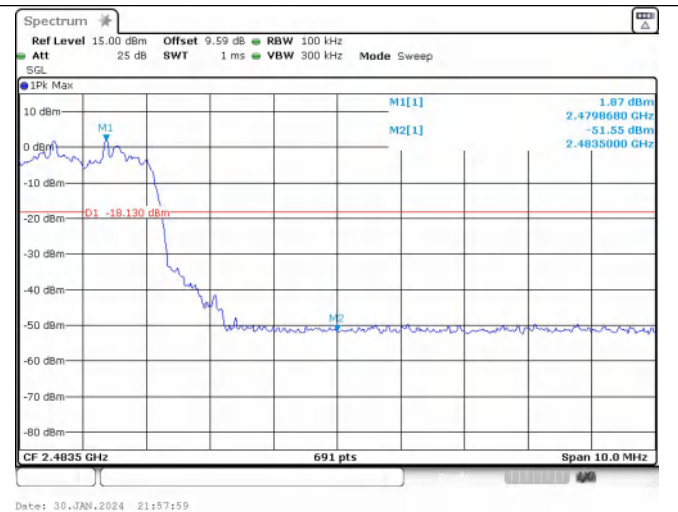
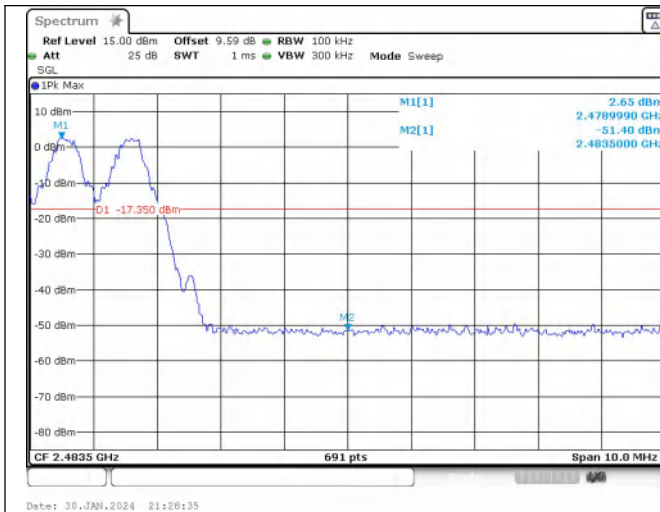
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Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping

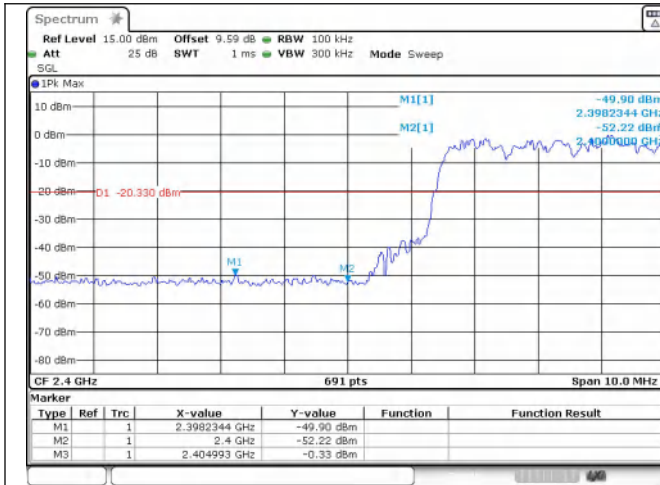


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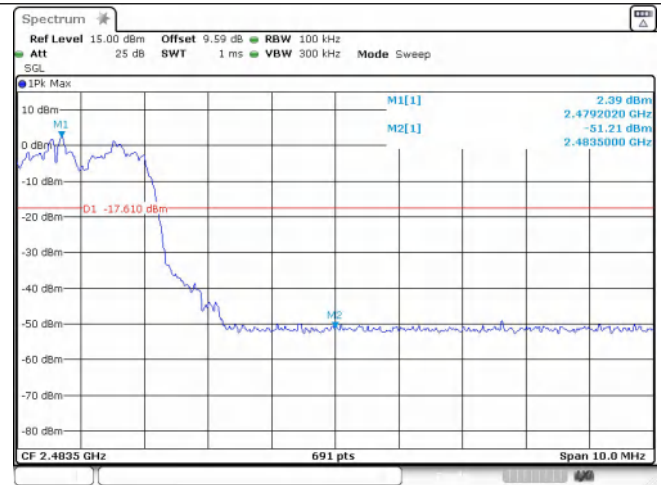
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



GFSK_DH5_Channel Hopping

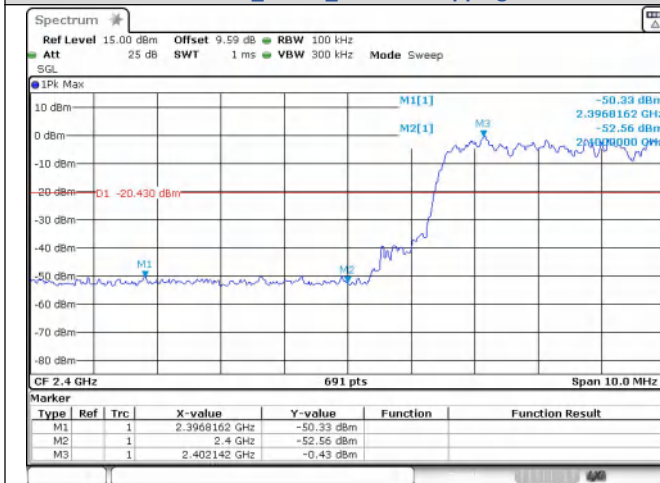
 $\pi/4$ QPSK_2-DH5_Channel Hopping


Date: 30.JAN.2024 22:04:01

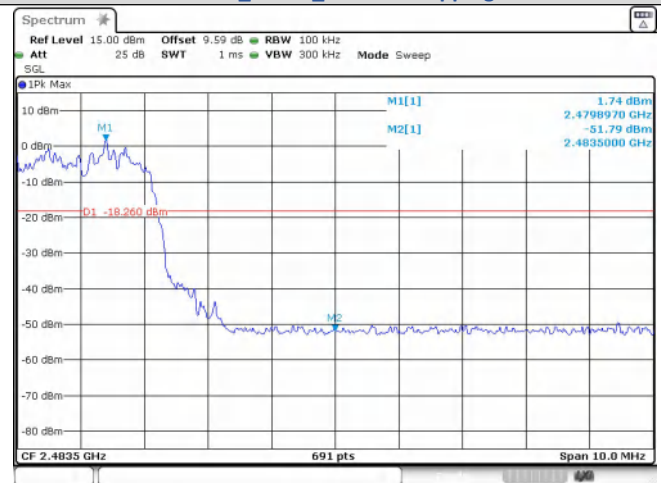


Date: 30.JAN.2024 22:04:36

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

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


Date: 30.JAN.2024 22:05:16



Date: 30.JAN.2024 22:05:37

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

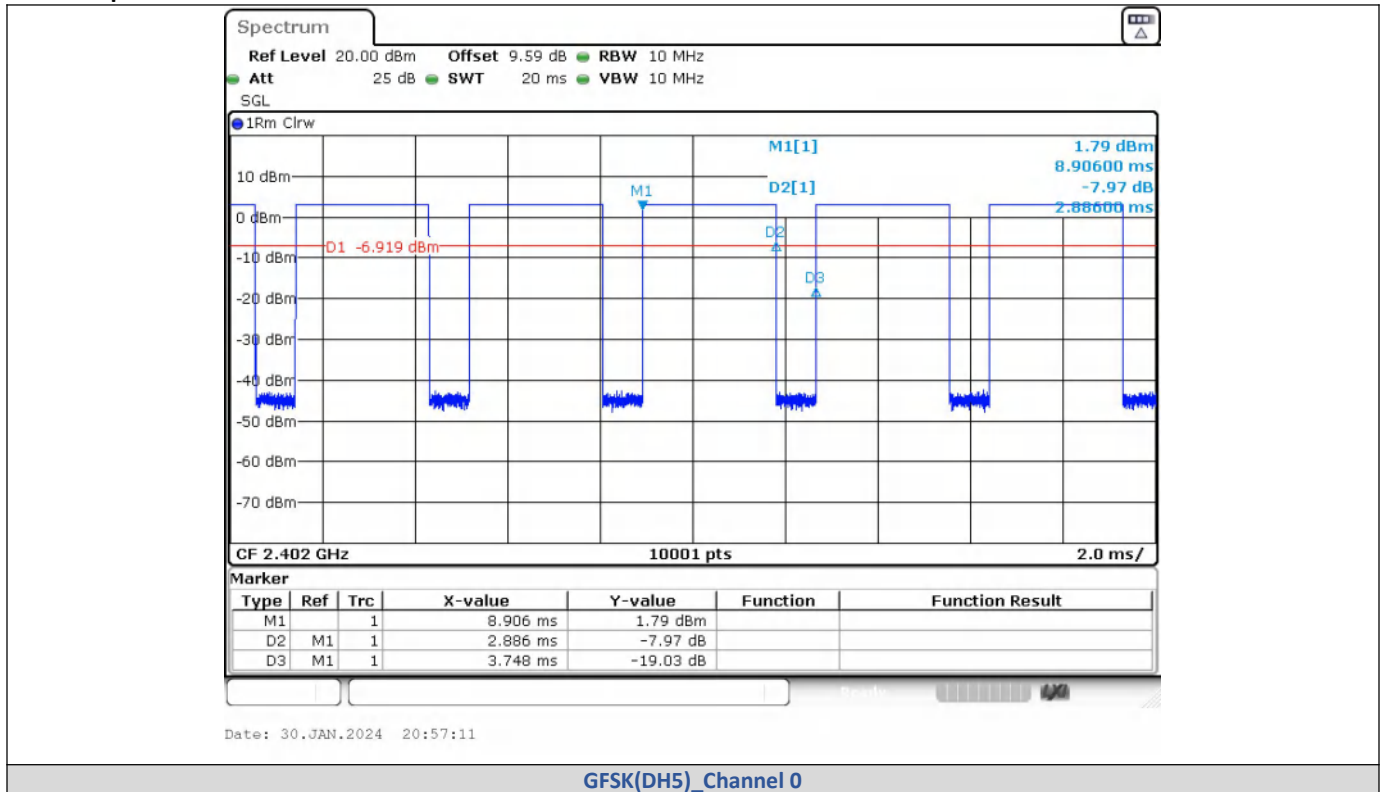
Out Of Band Emission(Right)
8DPSK_3-DH5_Channel Hopping

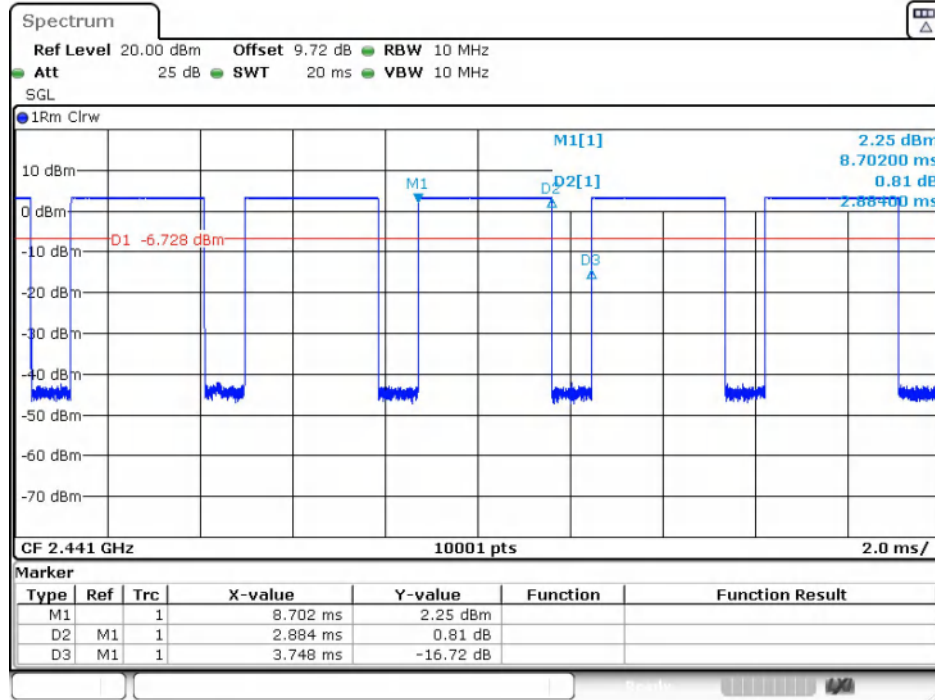
6) Duty Cycle

Test Result

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	0.35
		39	2.884	3.748	76.95	0.7695	1.1379	0.35
		78	2.886	3.748	77.00	0.7700	1.1351	0.35
$\pi/4$ DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.35
		39	2.890	3.748	77.11	0.7711	1.1289	0.35
		78	2.890	3.748	77.11	0.7711	1.1289	0.35
8DPSK	3-DH5	0	2.892	3.748	77.16	0.7716	1.1261	0.35
		39	2.894	3.748	77.21	0.7721	1.1233	0.35
		78	2.892	3.748	77.16	0.7716	1.1261	0.35

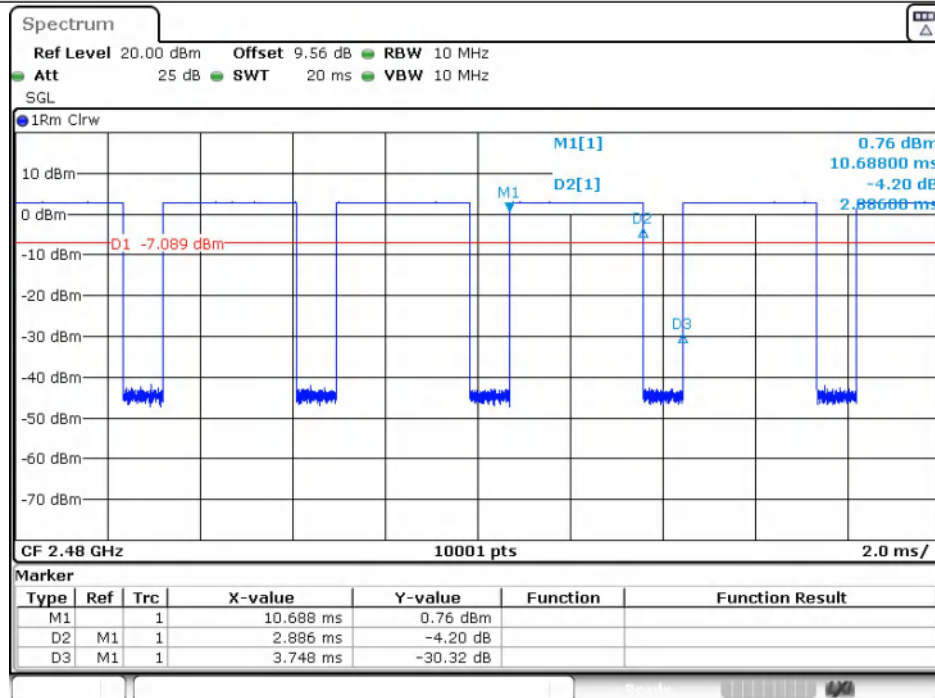
Test Graphs





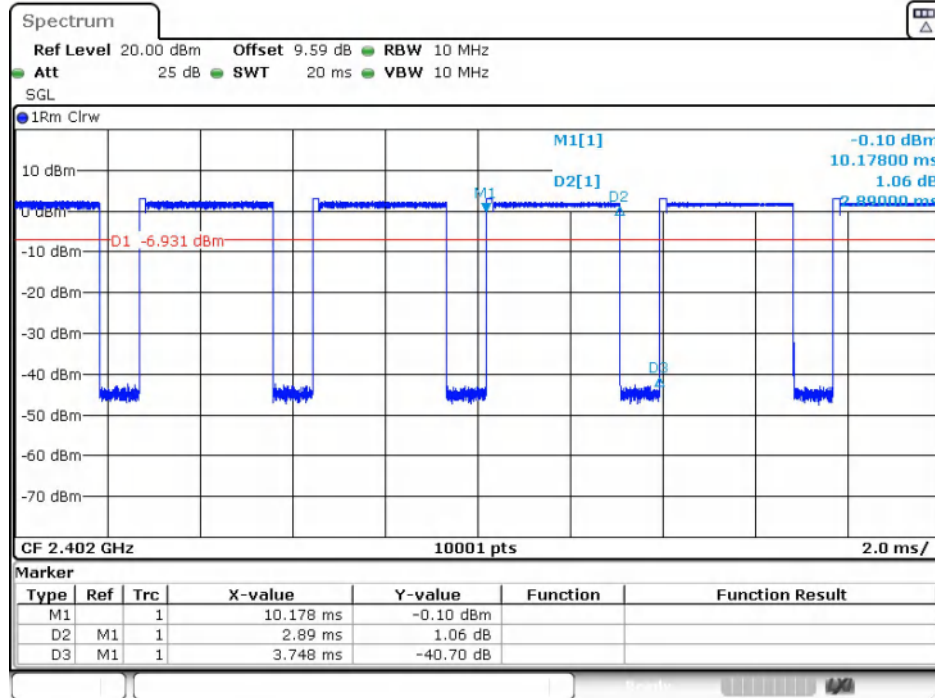
Date: 30.JAN.2024 20:59:55

GFSK(DH5)_Channel 39



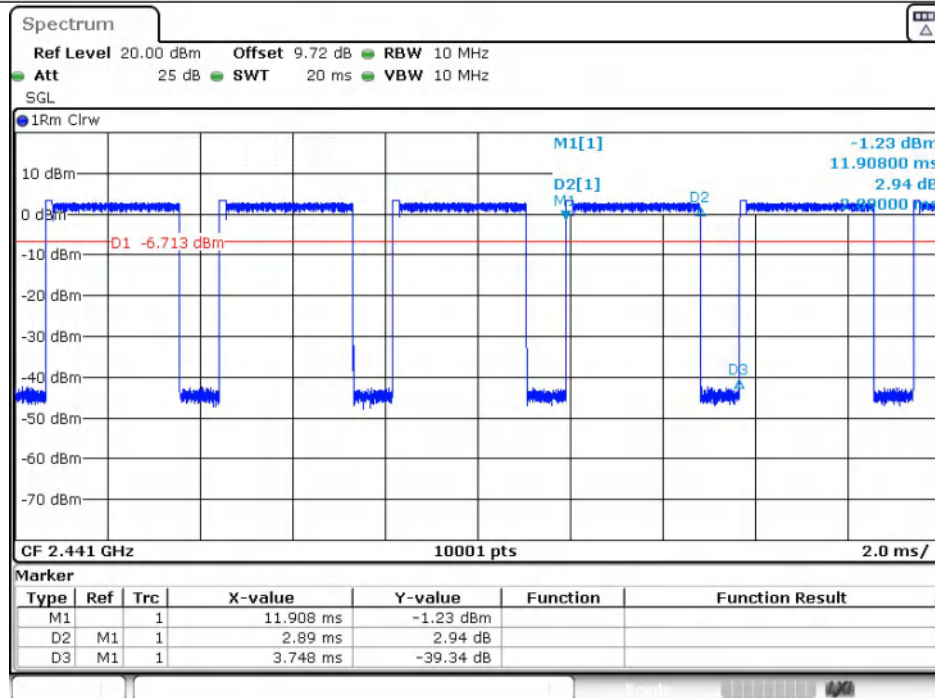
Date: 30.JAN.2024 21:01:51

GFSK(DH5)_Channel 78



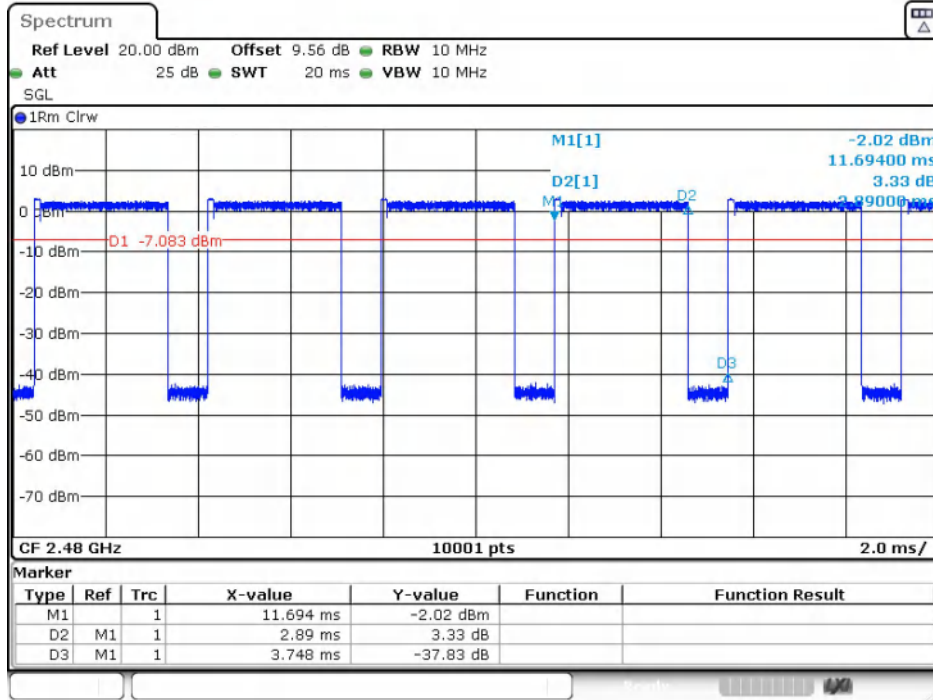
Date: 30.JAN.2024 21:03:46

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



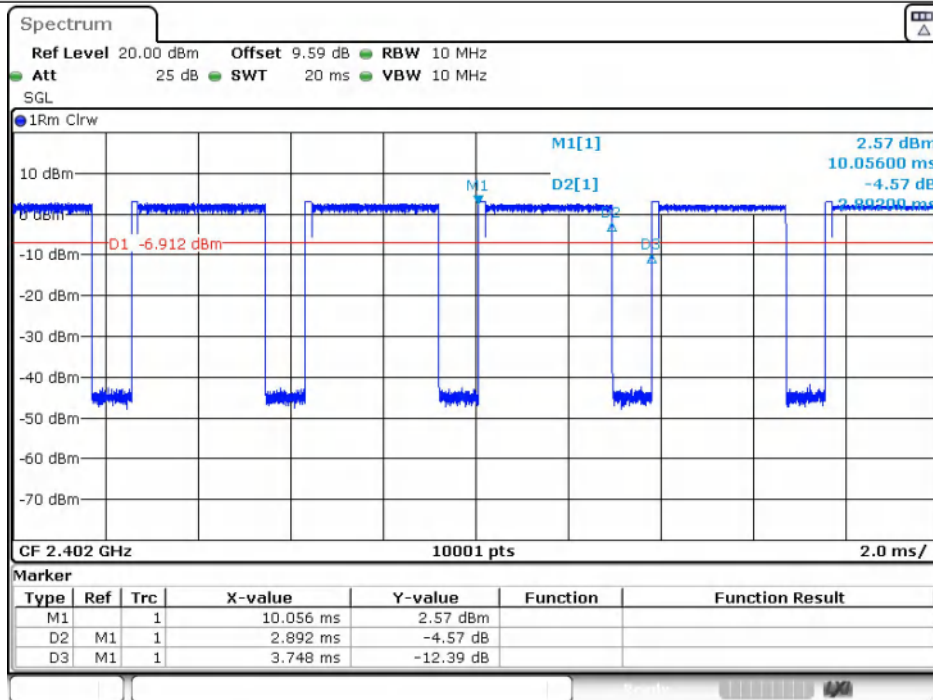
Date: 30.JAN.2024 21:06:22

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



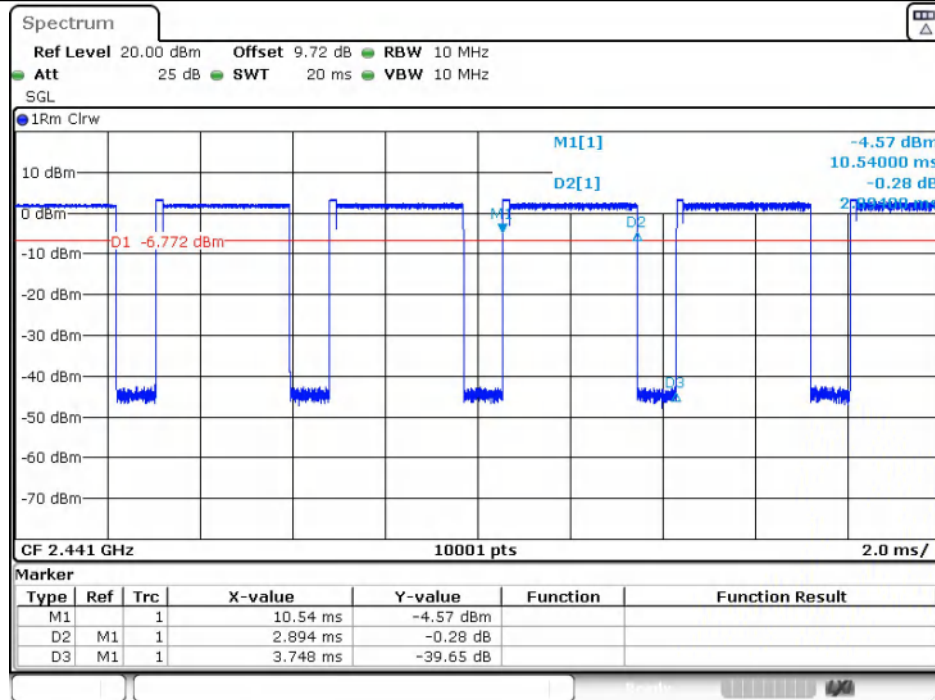
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π /4DQPSK(2-DH5)_Channel 78



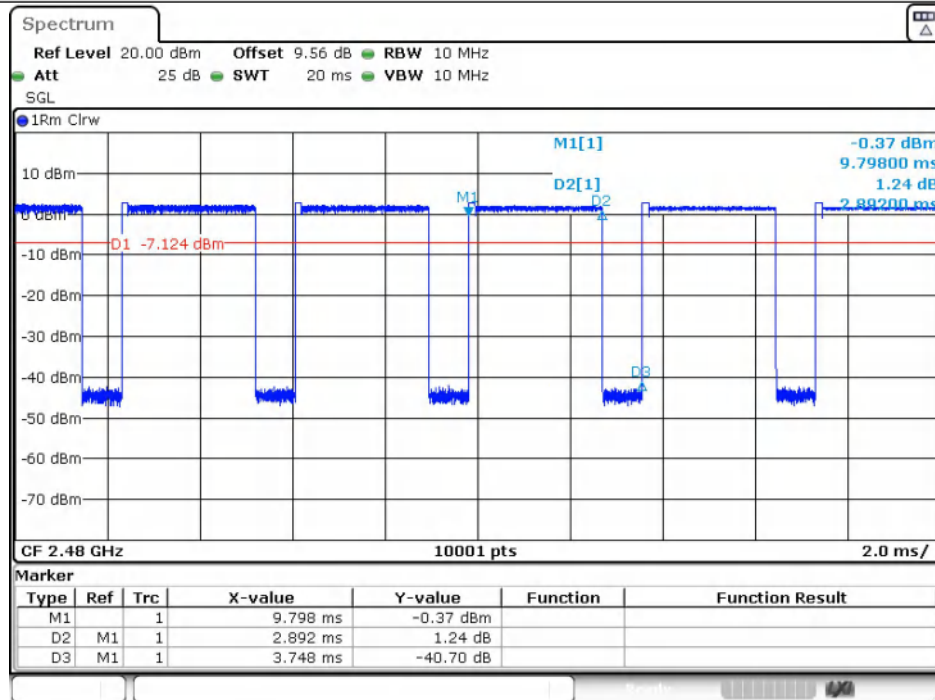
Date: 30.JAN.2024 21:11:59

8DPSK(3-DH5)_Channel 0



Date: 30.JAN.2024 21:16:16

8DPSK(3-DH5)_Channel 39



Date: 30.JAN.2024 21:18:46

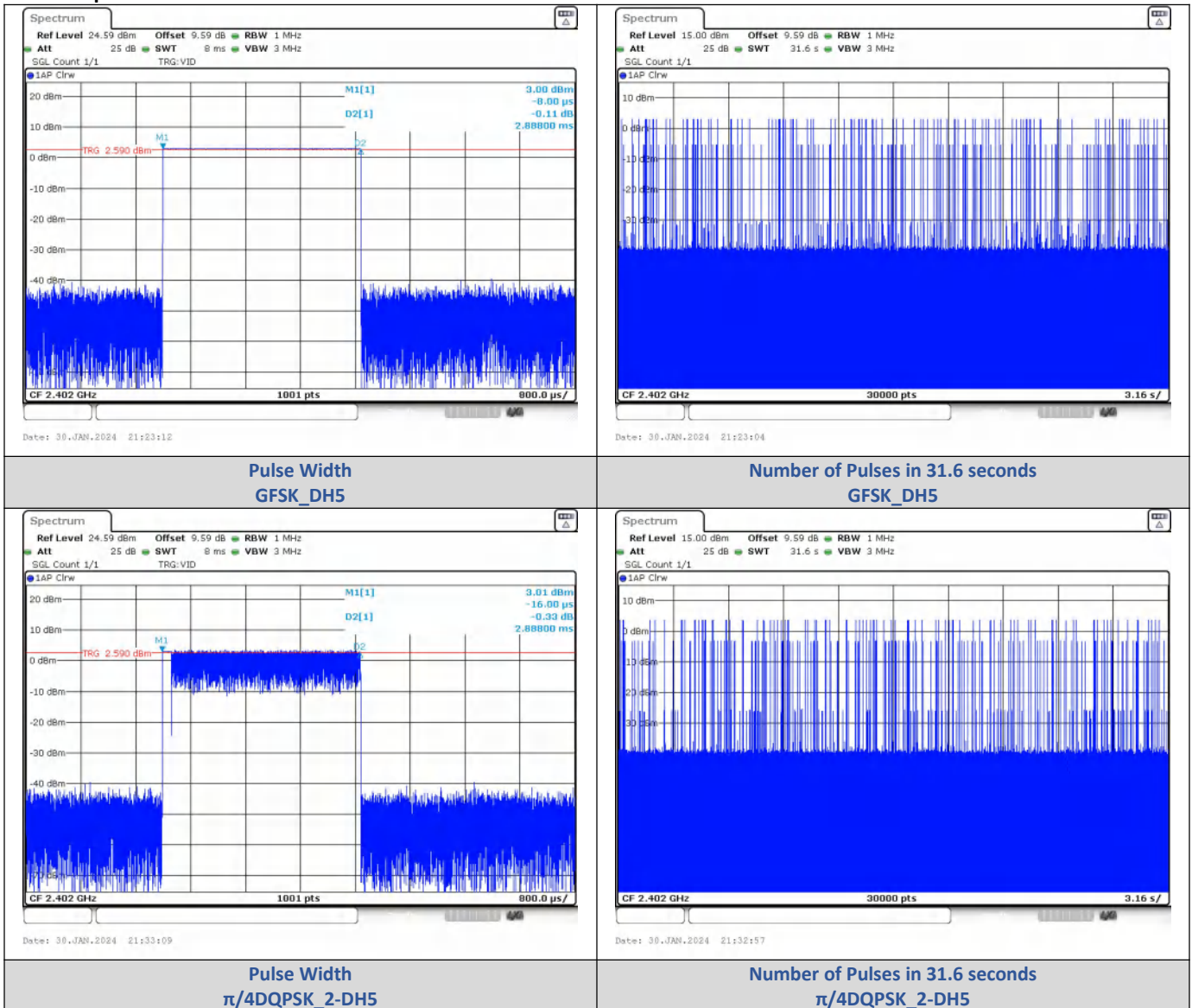
8DPSK(3-DH5)_Channel 78

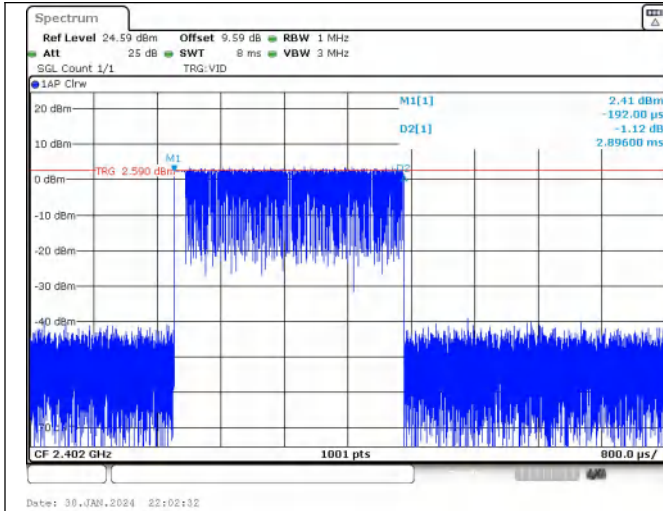
7) Dwell Time

Test Result

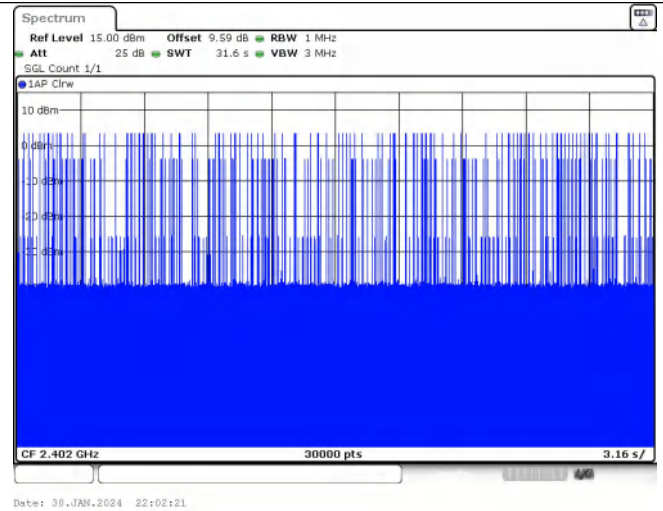
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	107	309.02	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.888	96	277.25		PASS
8DPSK	3-DH5		2.896	120	347.52		PASS

Test Graphs





Pulse Width
8DPSK_3-DH5



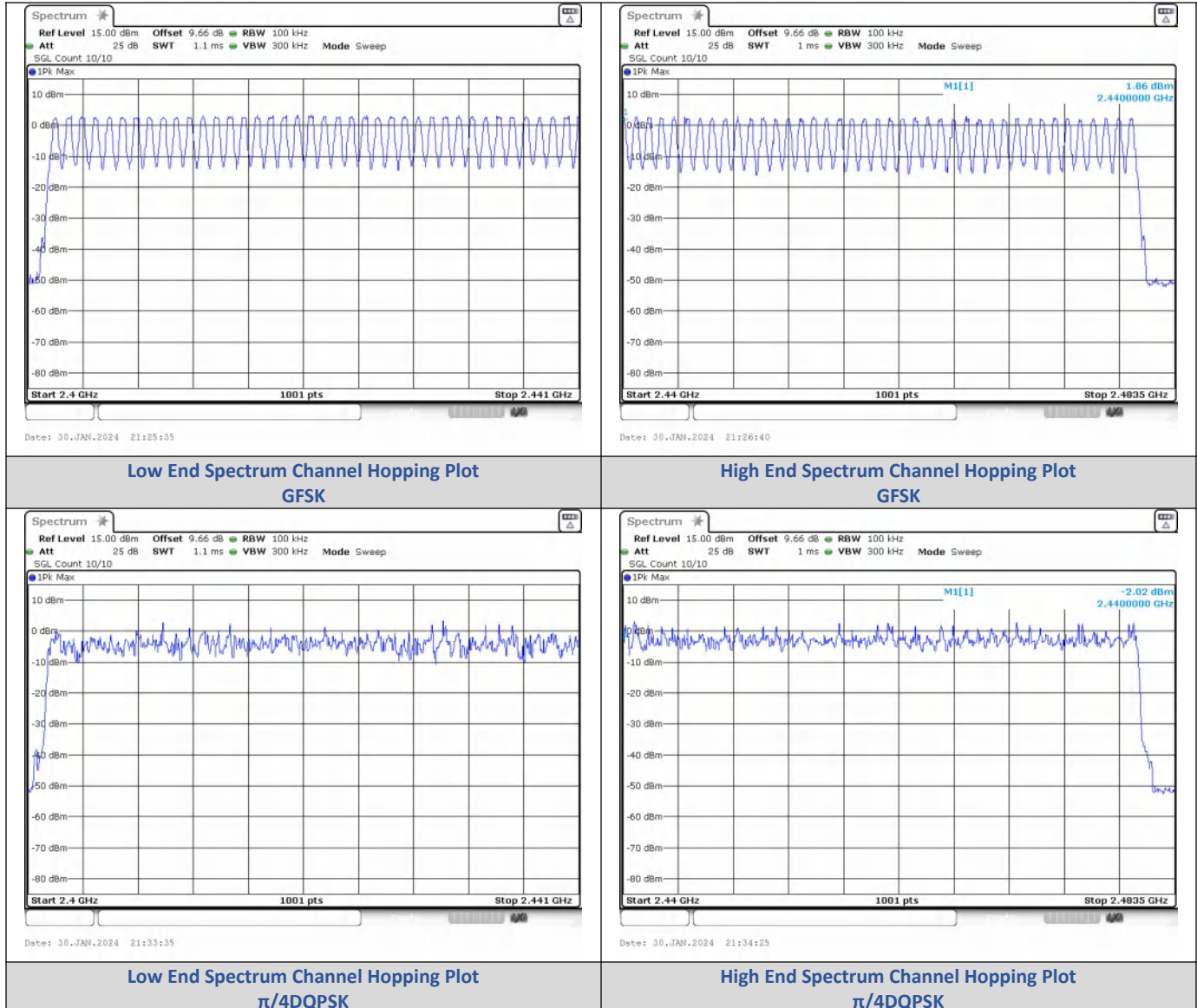
Number of Pulses in 31.6 seconds
8DPSK_3-DH5

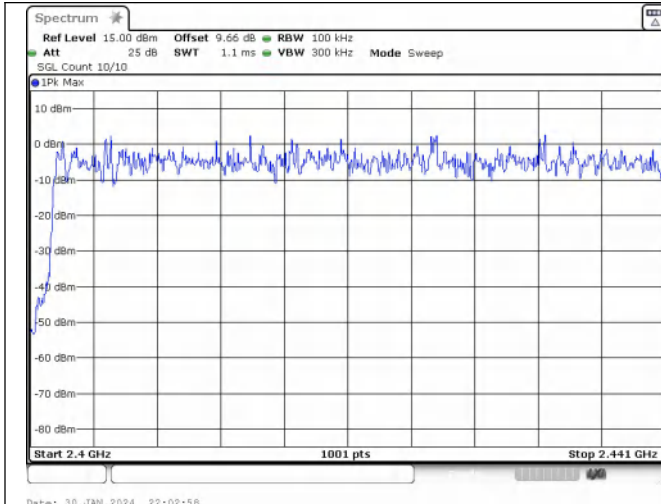
8) Number Of Hopping Channel

Test Result

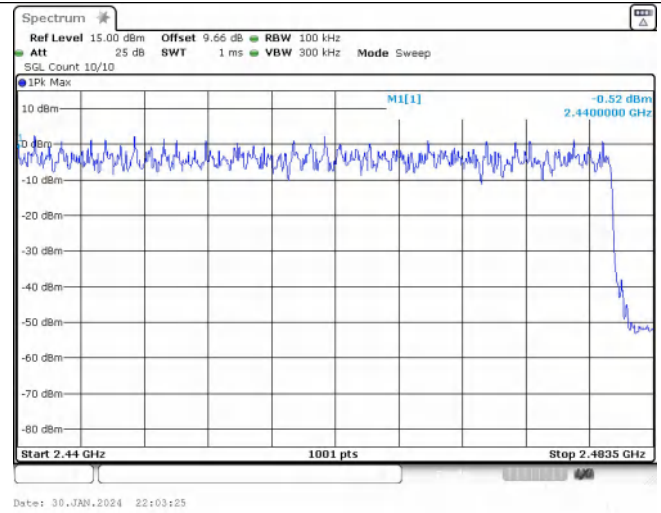
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs





Low End Spectrum Channel Hopping Plot
8DPSK



High End Spectrum Channel Hopping Plot
8DPSK