

Appendix A

Report No.:	CISRR24042516201
FCC ID:	2BF5C-MMA4019
Product Name:	BLUETOOTH SPEAKER
Model No.:	MMA4019
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

1) Conducted Peak Output Power

Test Result

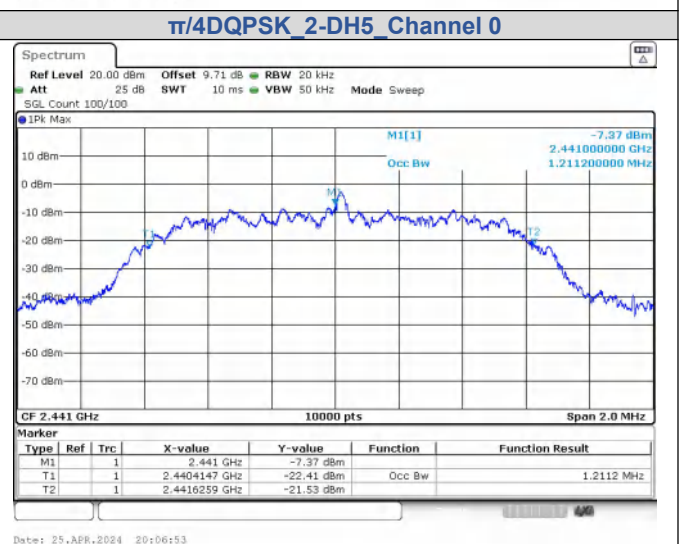
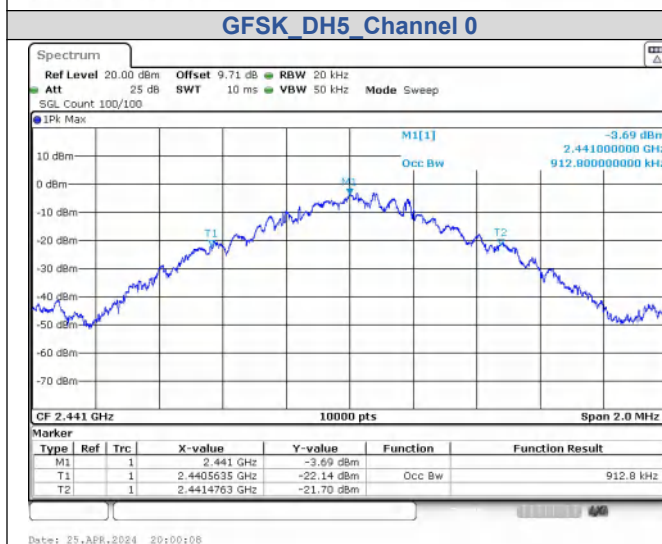
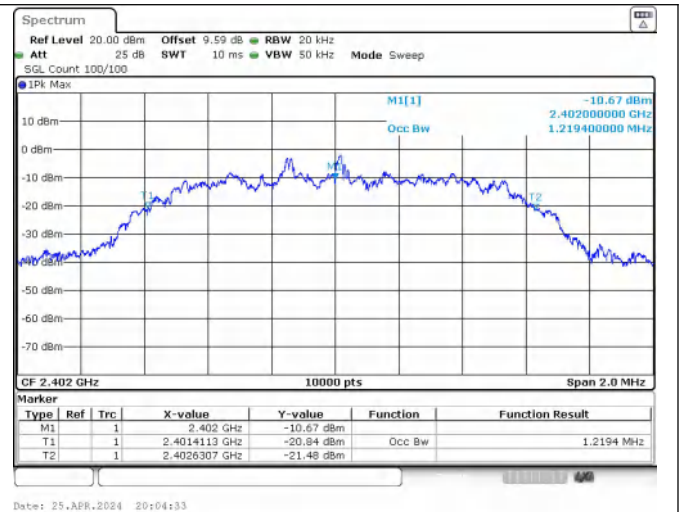
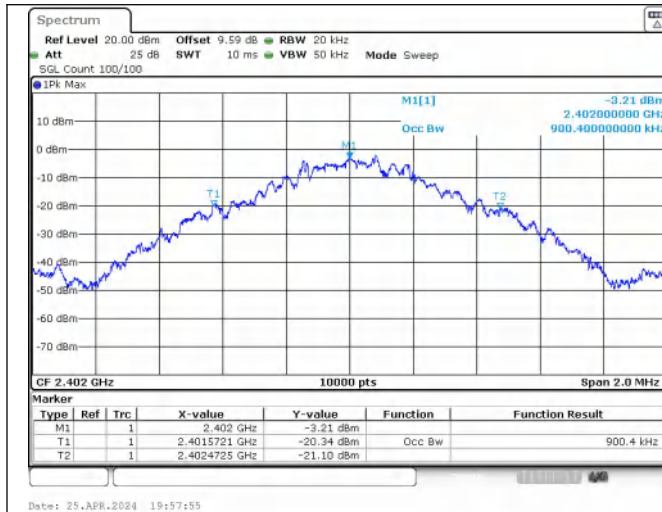
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.051	1.604	30	PASS
		39	1.567	1.435		PASS
		78	1.687	1.475		PASS
$\pi/4$ DQPSK	2-DH5	0	1.924	1.557	20.97	PASS
		39	1.376	1.373		PASS
		78	1.480	1.406		PASS
8DPSK	3-DH5	0	1.503	1.413		PASS
		39	1.819	1.520		PASS
		78	1.866	1.537		PASS

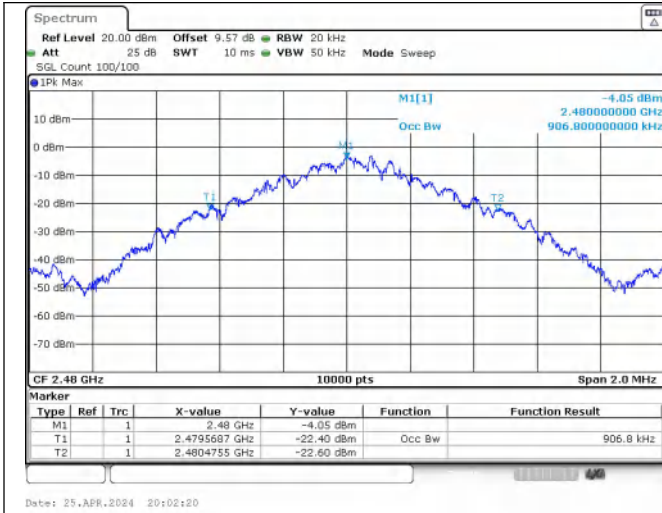
2) 99% Bandwidth

Test Result

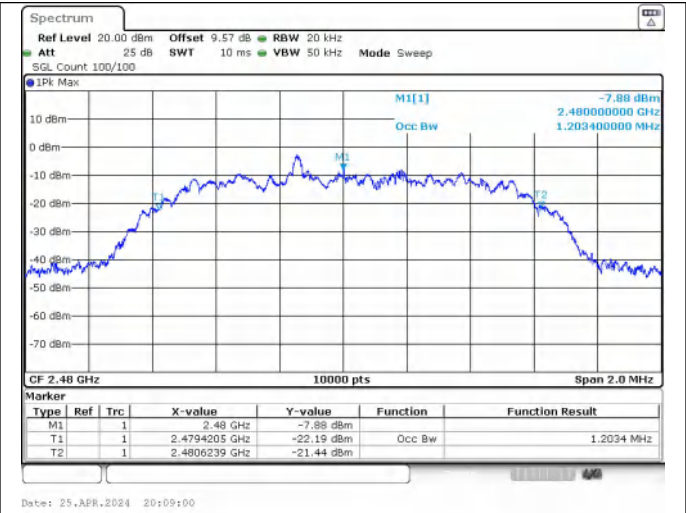
Modulation	Channel	99% BW (MHz)
GFSK	0	0.90040
	39	0.91280
	78	0.90680
$\pi/4$ DQPSK	0	1.2190
	39	1.2110
	78	1.2030
8DPSK	0	1.2220
	39	1.2200
	78	1.2060

Test Graphs

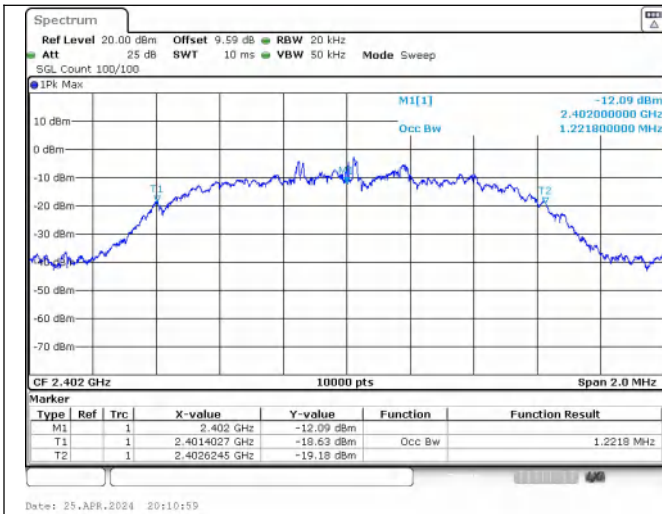




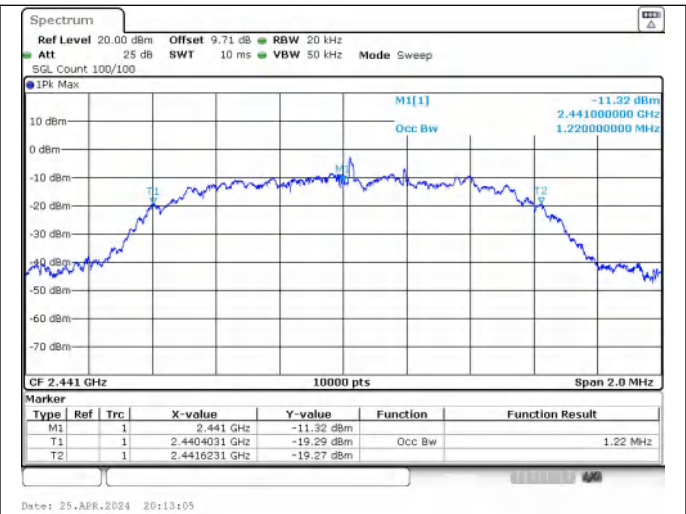
GFSK_DH5_Channel 78



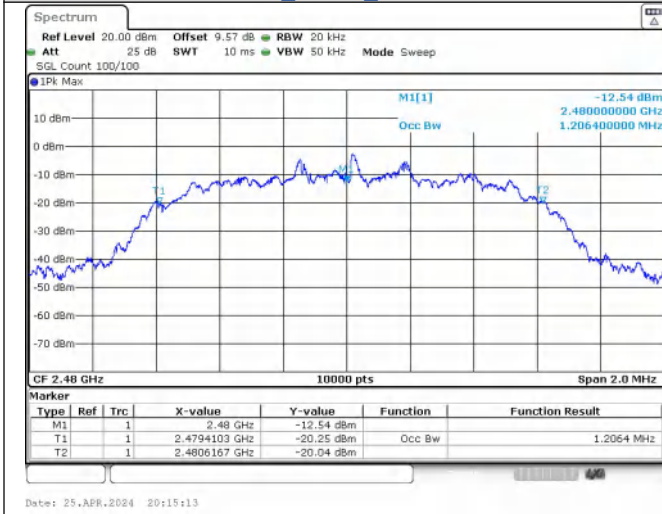
$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



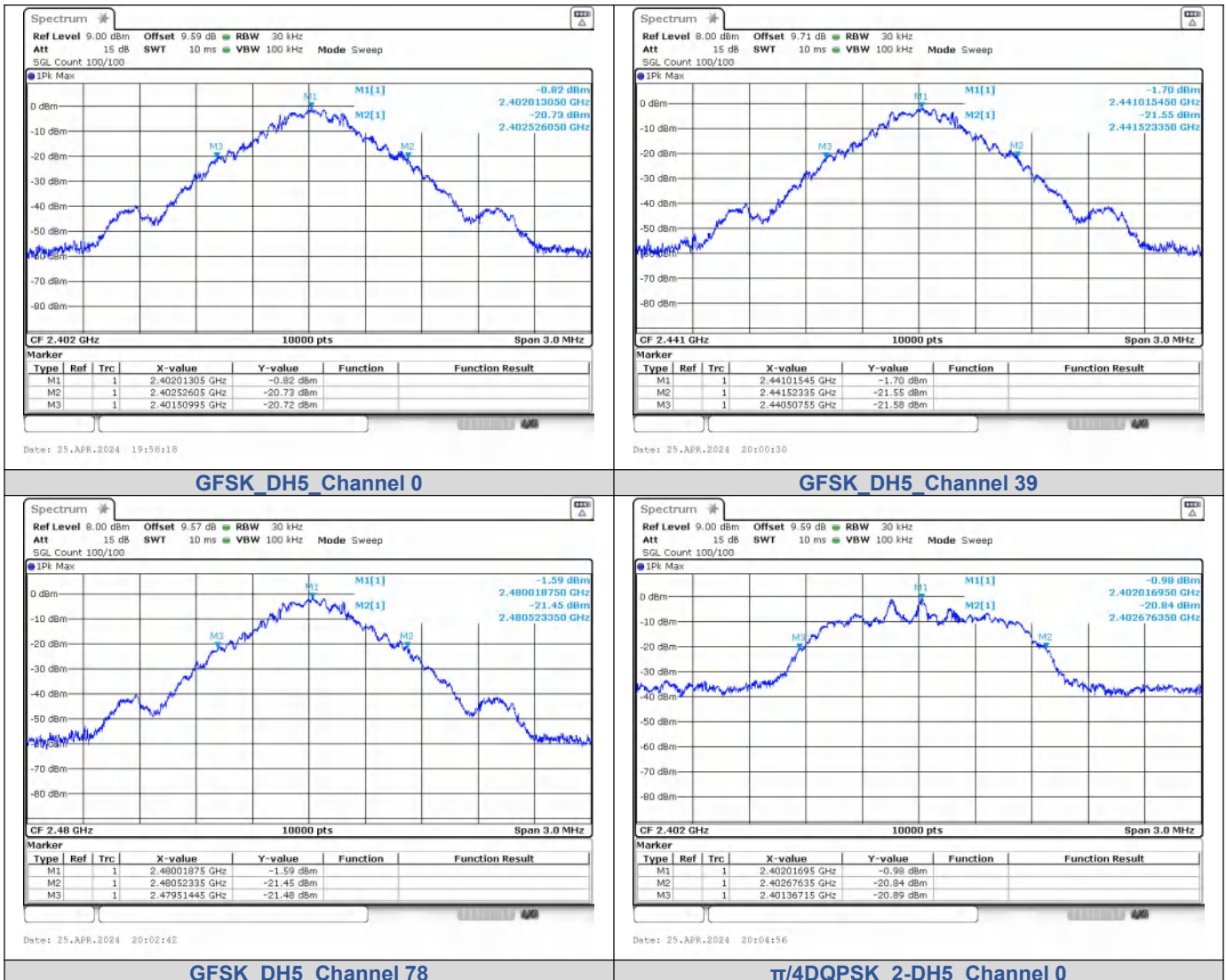
8DPSK_3-DH5_Channel 78

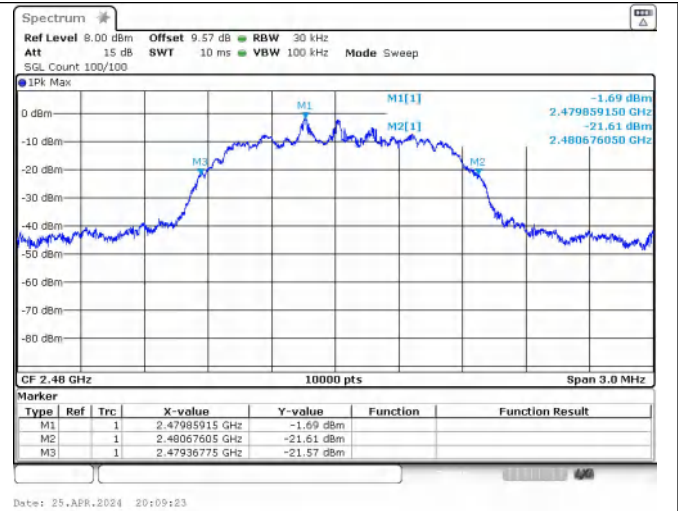
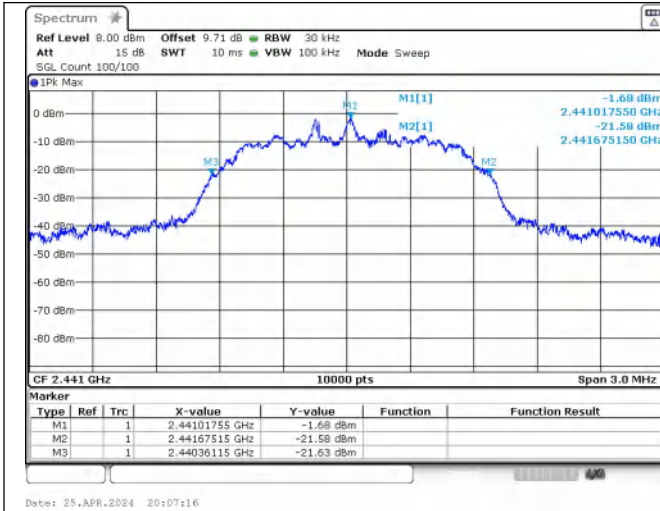
20dB Bandwidth

Test Result

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.020
	39	2441 MHz	1.010
	78	2480 MHz	1.010
$\pi/4$ DQPSK	0	2402 MHz	1.310
	39	2441 MHz	1.320
	78	2480 MHz	1.310
8DPSK	0	2402 MHz	1.300
	39	2441 MHz	1.290
	78	2480 MHz	1.290

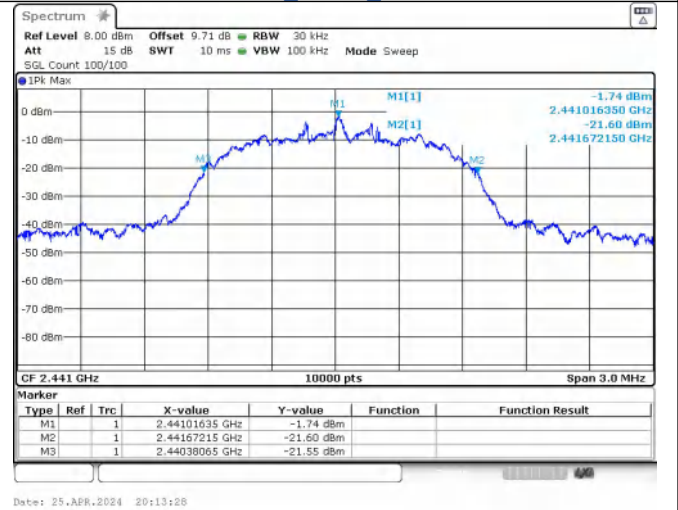
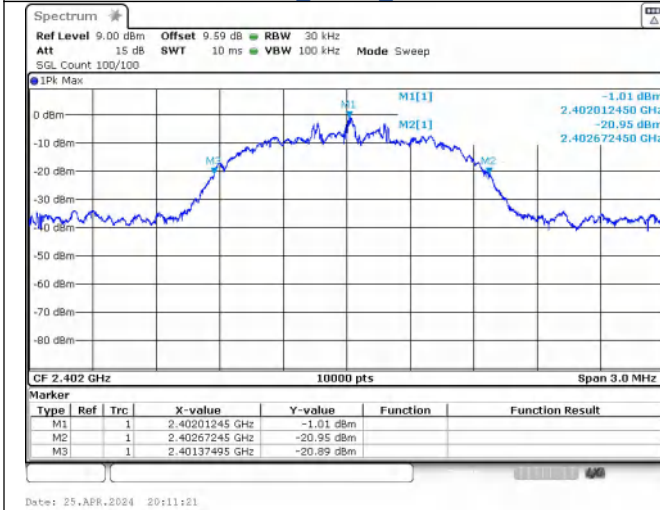
Test Graphs





$\pi/4$ DQPSK_2-DH5_Channel 39

$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0

8DPSK_3-DH5_Channel 39



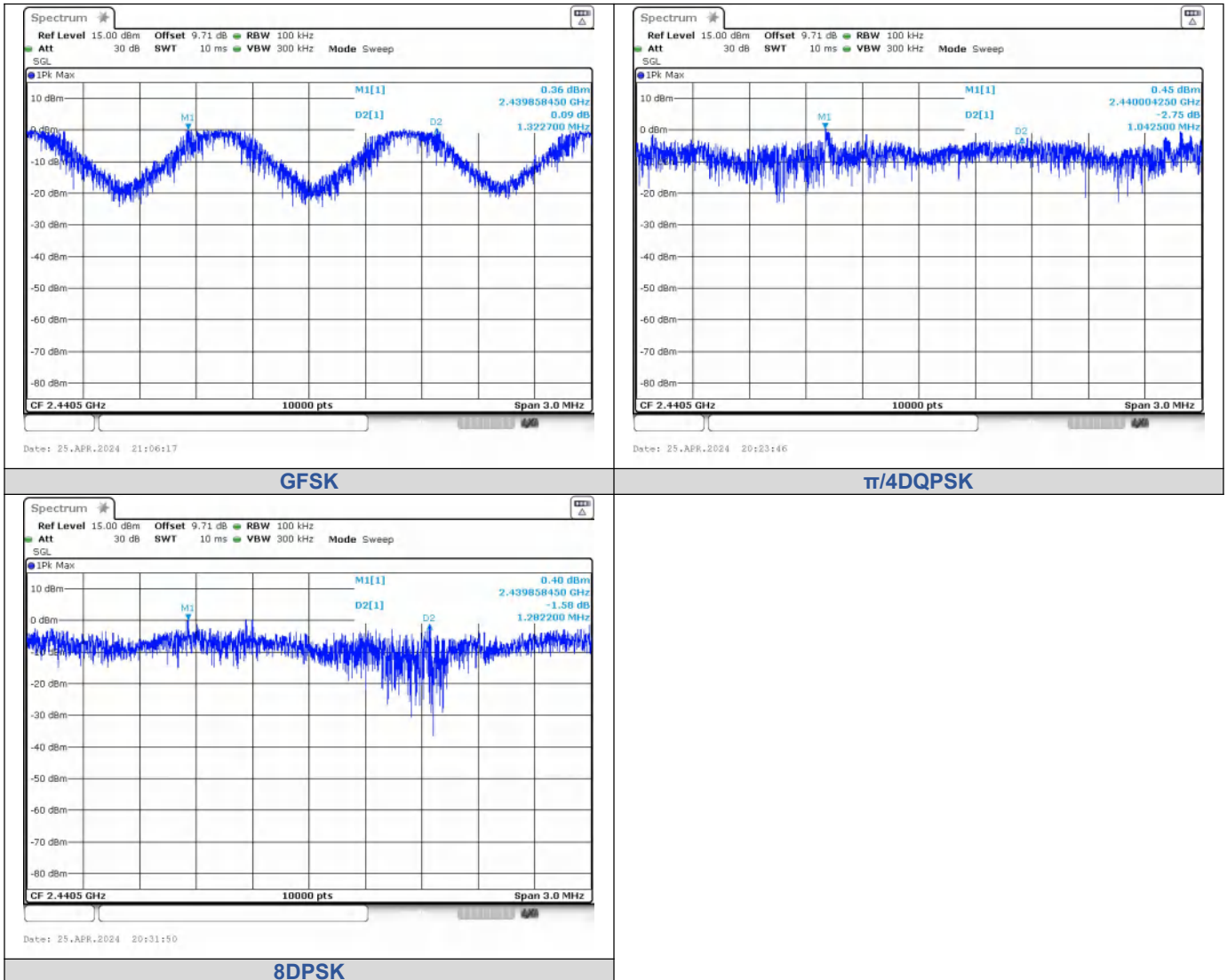
8DPSK_3-DH5_Channel 78

Carrier Frequencies Separation

Test Result

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8585	2441.1811	1.3227	0.68	PASS
$\pi/4$ DQPSK	2-DH5	2440.0042	2441.0467	1.0425	0.873	PASS
8DPSK	3-DH5	2439.8585	2441.1406	1.2822	0.867	PASS

Test Graphs



Conducted Out Of Band Emission

Test Result

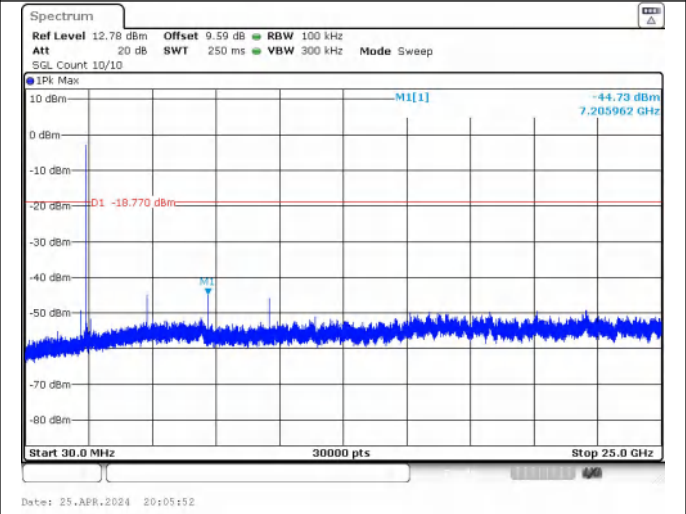
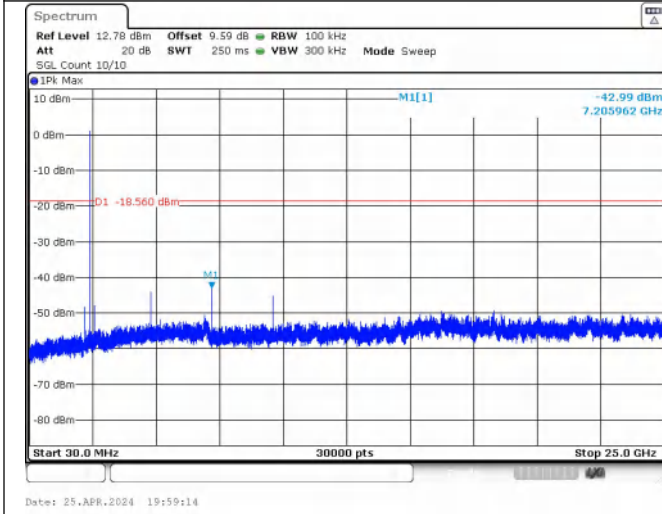
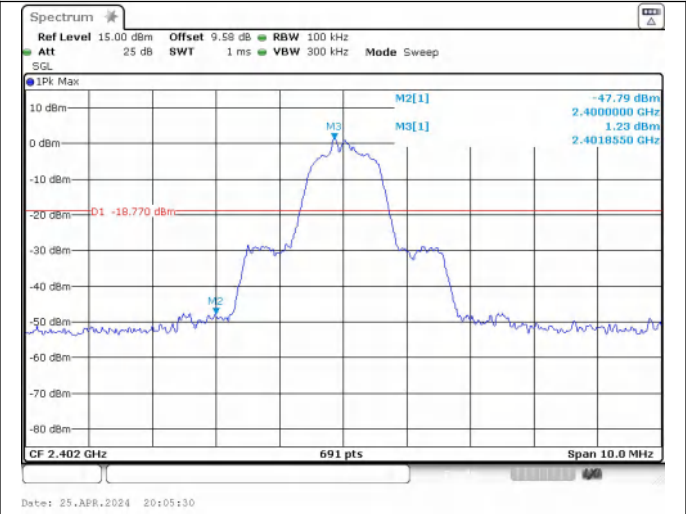
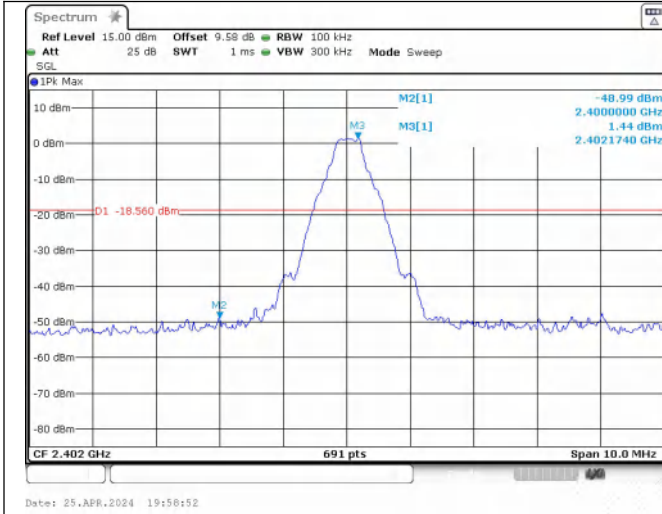
Non-Hopping

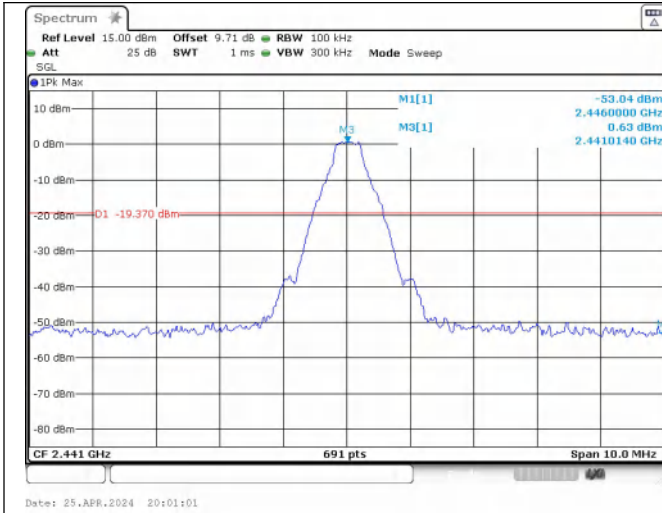
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	
GFSK	DH5	0	2400.00	-48.994	-18.56	-30.434	PASS	
			7205.96	-42.992	-18.56	-24.432	PASS	
		39	9764.55	-42.127	-19.37	-22.757	PASS	
			78	2483.50	-51.195	-19.29	-31.905	PASS
				9920.20	-40.410	-19.29	-21.120	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-47.792	-18.77	-29.022	PASS	
			7205.96	-44.730	-18.77	-25.960	PASS	
		39	9763.72	-42.364	-19.4	-22.964	PASS	
			78	2483.50	-50.217	-19.36	-30.857	PASS
				9920.20	-40.369	-19.36	-21.009	PASS
8DPSK	3-DH5	0	2400.00	-48.330	-18.82	-29.510	PASS	
			7205.96	-44.294	-18.82	-25.474	PASS	
		39	9763.72	-42.161	-19.65	-22.511	PASS	
			78	2483.50	-52.308	-19.36	-32.948	PASS
				9920.20	-40.259	-19.36	-20.899	PASS

Hopping

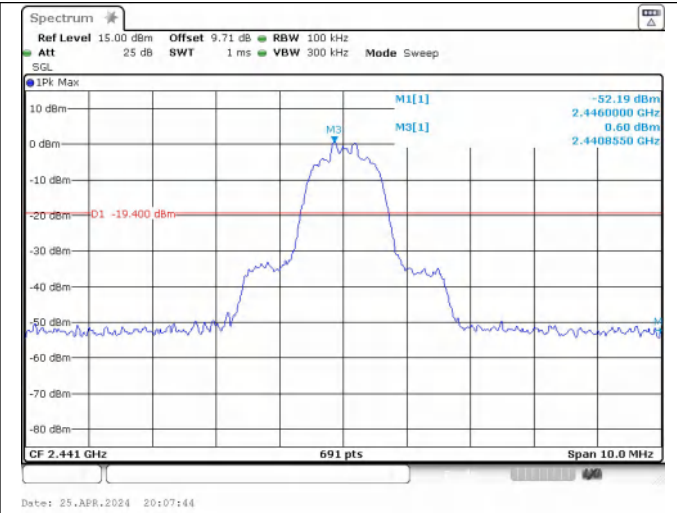
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.74	-50.585	-18.82	-31.765	PASS
			2400.00	-52.203	-18.82	-33.383	PASS
			2483.50	-52.554	-19.32	-33.234	PASS
			2397.67	-49.676	-18.95	-30.726	PASS
			2400.00	-52.942	-18.95	-33.992	PASS
			2483.50	-52.584	-19.36	-33.224	PASS
$\pi/4$ DQPSK	2-DH5		2398.05	-49.769	-22.83	-26.939	PASS
			2400.00	-52.449	-22.83	-29.619	PASS
			2483.50	-51.889	-19.3	-32.589	PASS
			2400.00	-48.892	-20.27	-28.622	PASS
8DPSK	3-DH5		2483.50	-51.382	-19.39	-31.992	PASS
			2398.26	-49.572	-21.07	-28.502	PASS
		2400.00	-51.715	-21.07	-30.645	PASS	
		2483.50	-49.729	-19.42	-30.309	PASS	
		2400.00	-49.999	-19.01	-30.989	PASS	
		2483.50	-51.315	-19.69	-31.625	PASS	

Test Graphs

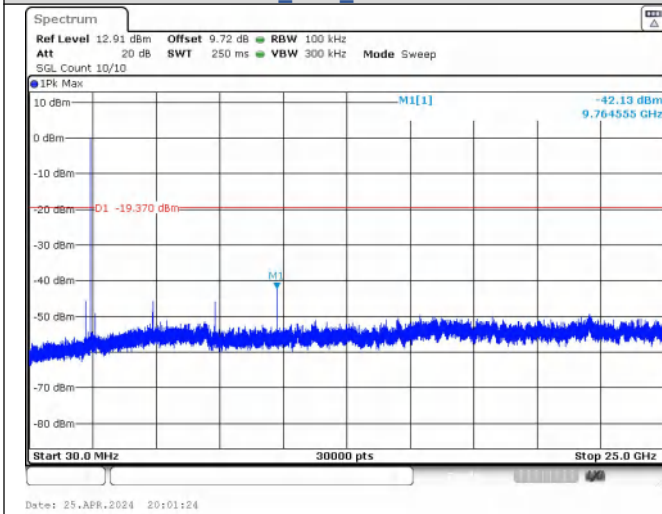




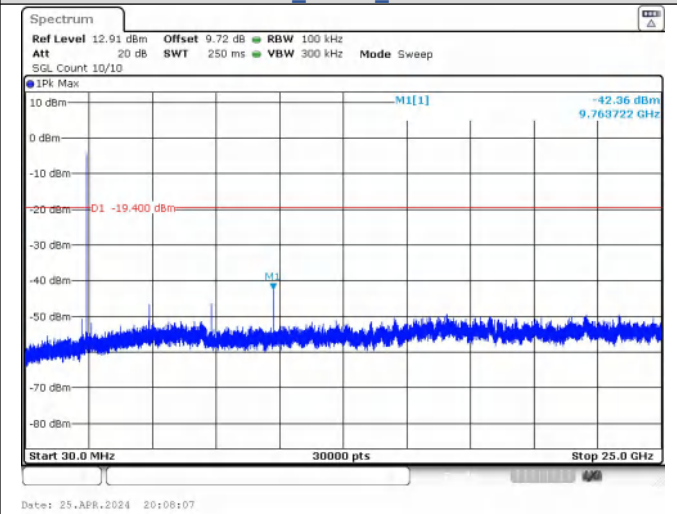
**Out Of Band Emission
GFSK_DH5_Channel 39**



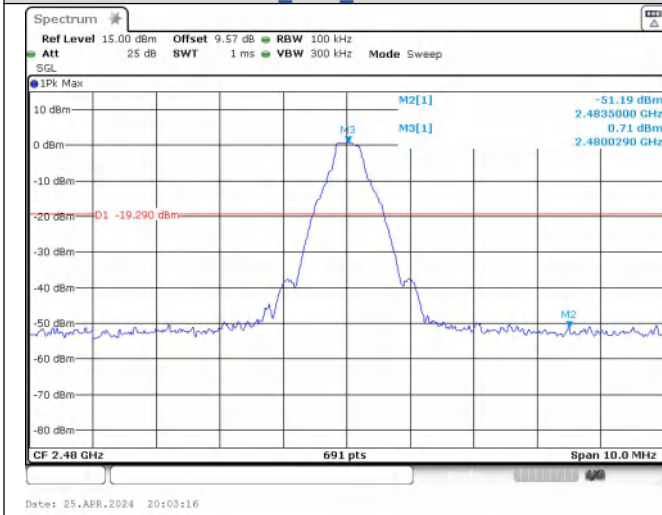
**Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39**



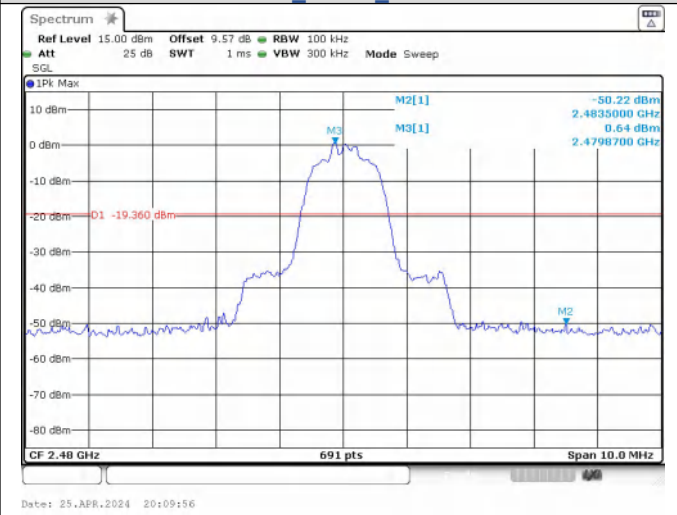
**Spurious Emissions
GFSK_DH5_Channel 39**



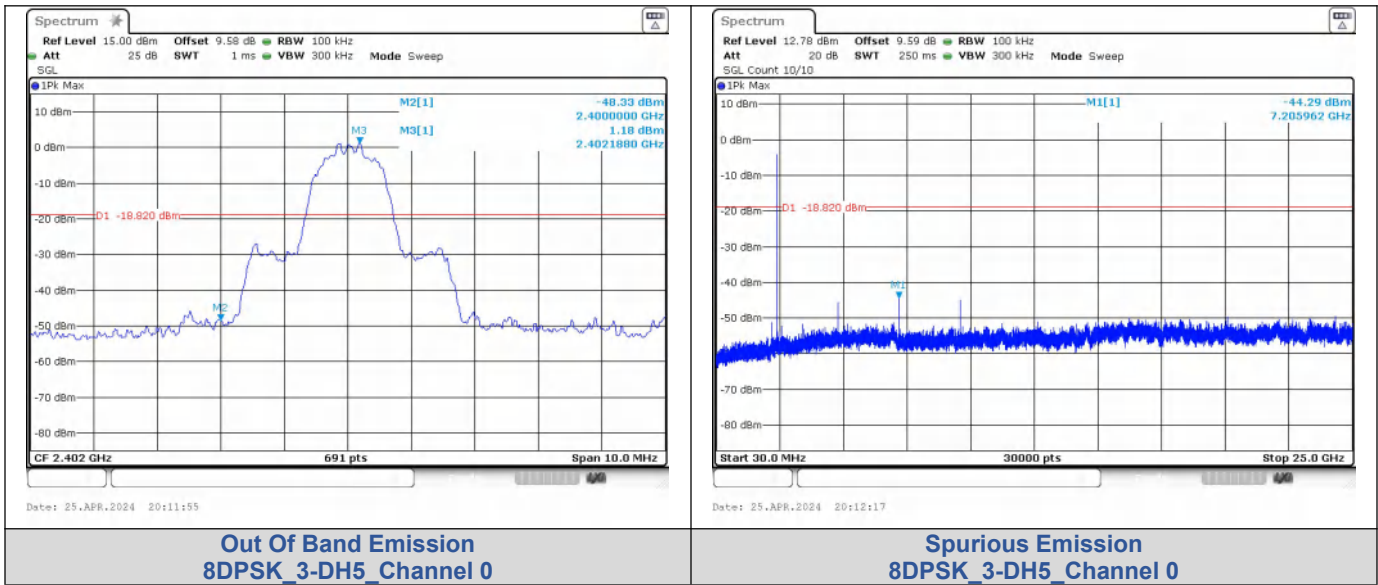
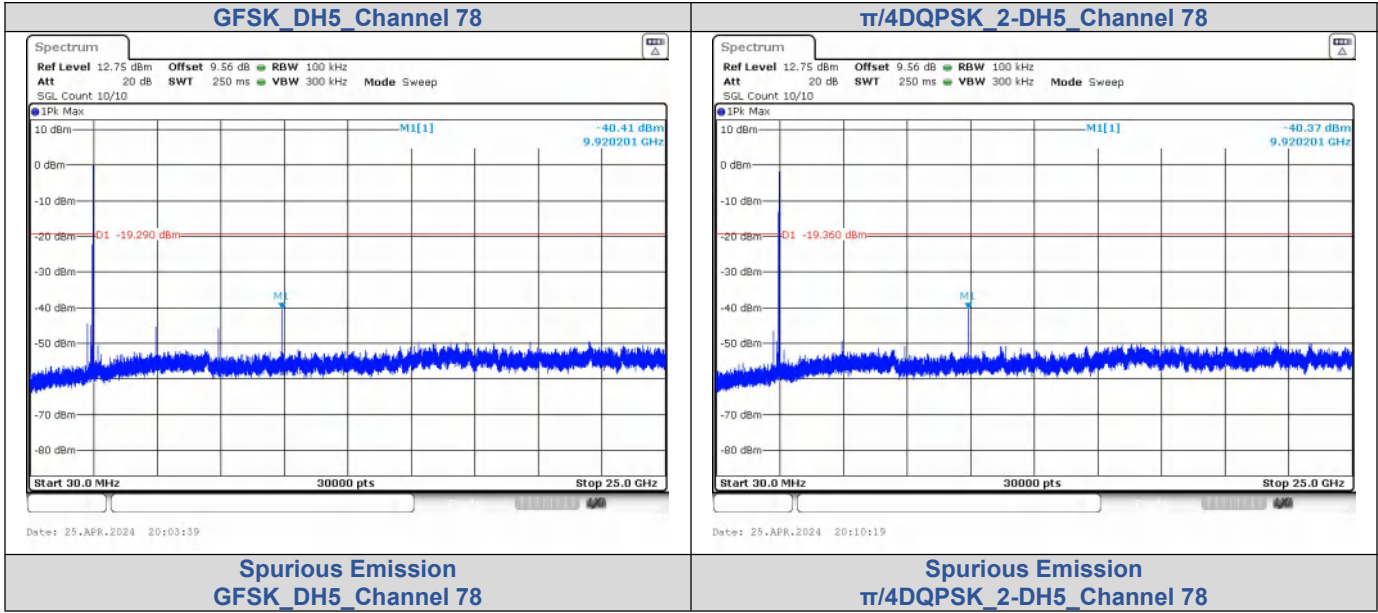
**Spurious Emissions
 $\pi/4$ DQPSK_2-DH5_Channel 39**

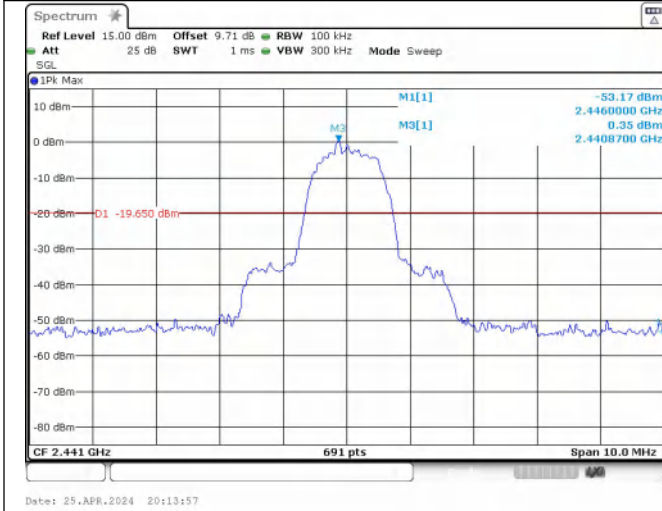


Out Of Band Emission

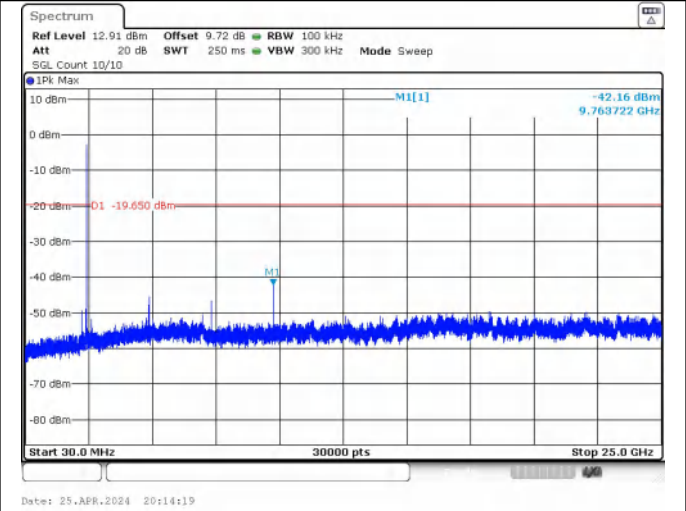


Out Of Band Emission

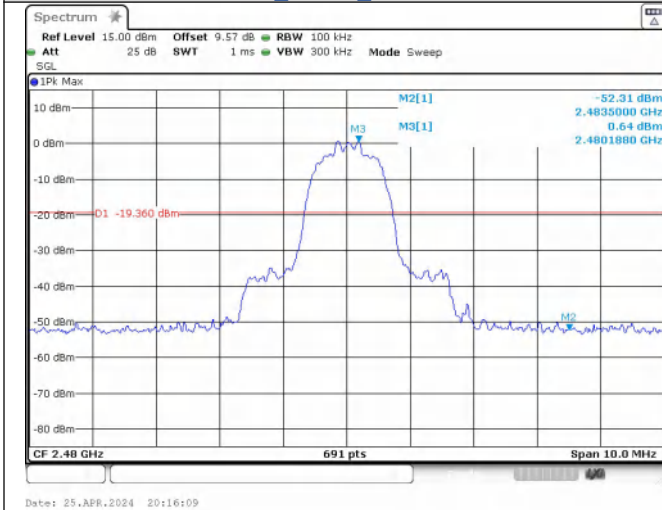




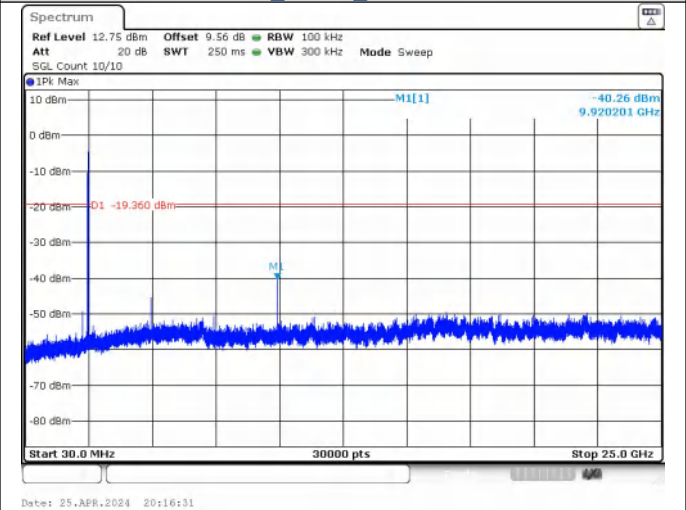
**Out Of Band Emission
8DPSK_3-DH5_Channel 39**



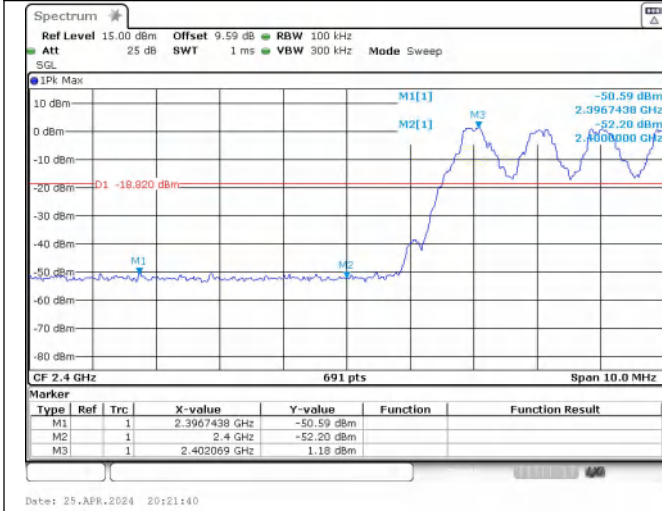
**Spurious Emissions
8DPSK_3-DH5_Channel 39**



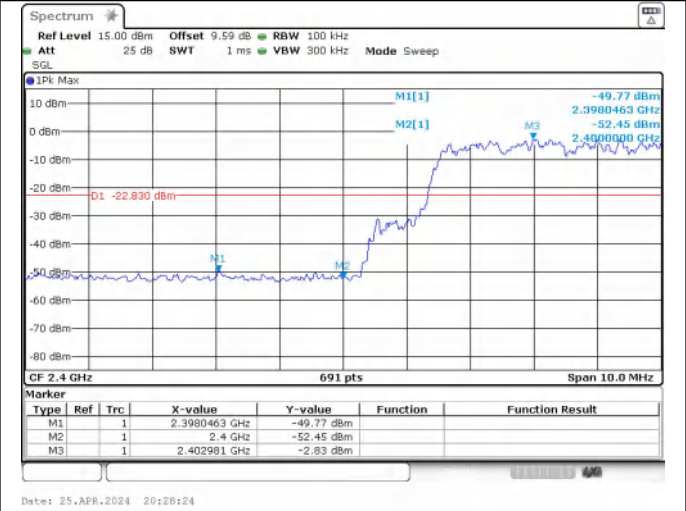
**Out Of Band Emission
8DPSK_3-DH5_Channel 78**



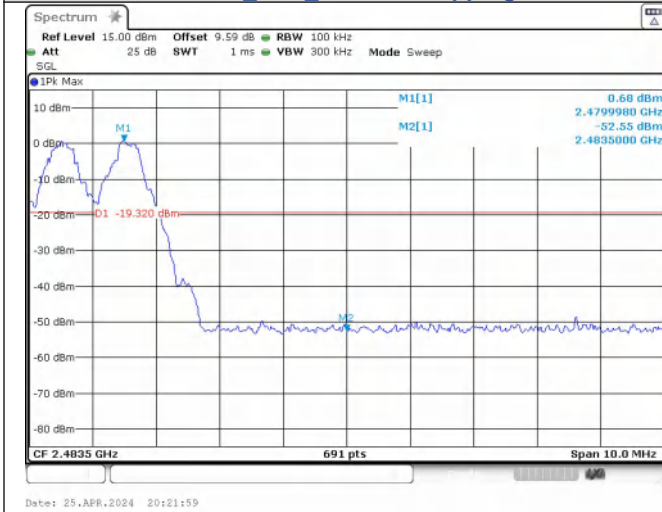
**Spurious Emission
8DPSK_3-DH5_Channel 78**



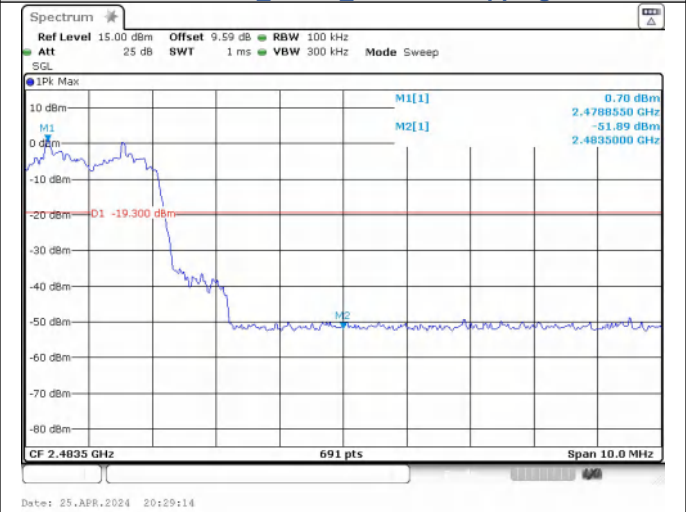
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



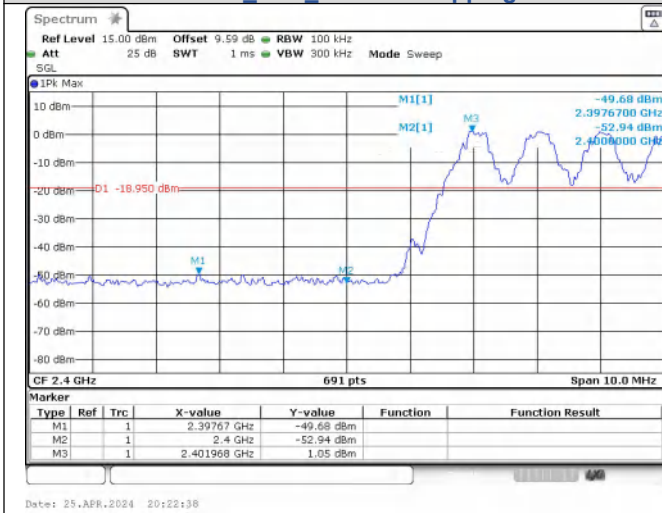
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



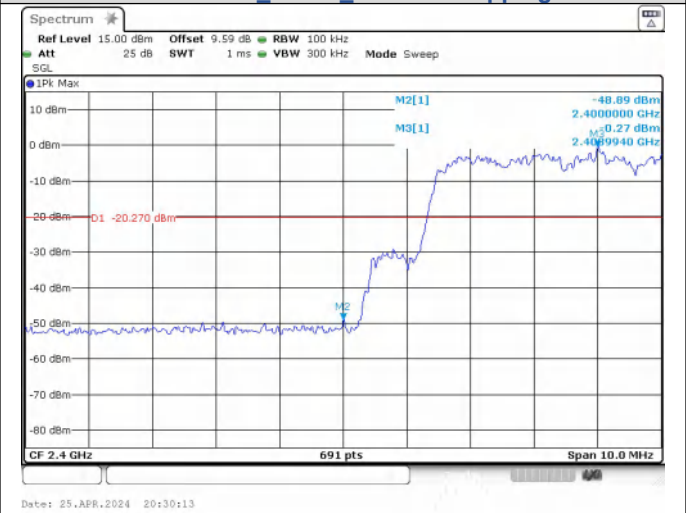
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



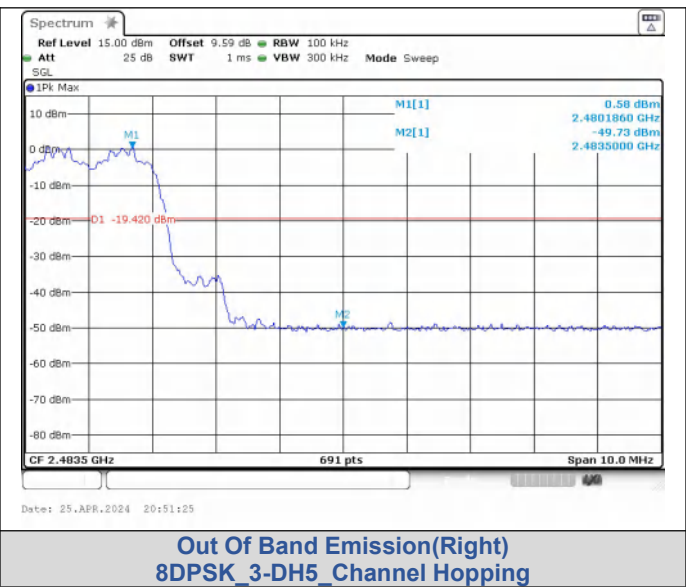
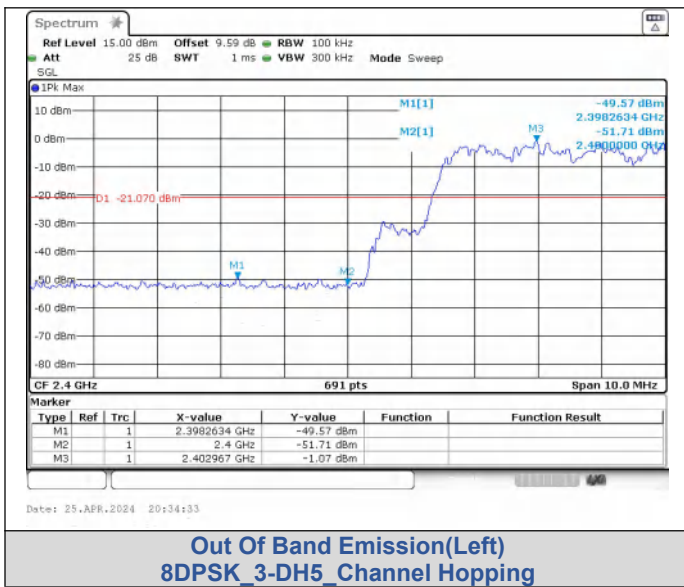
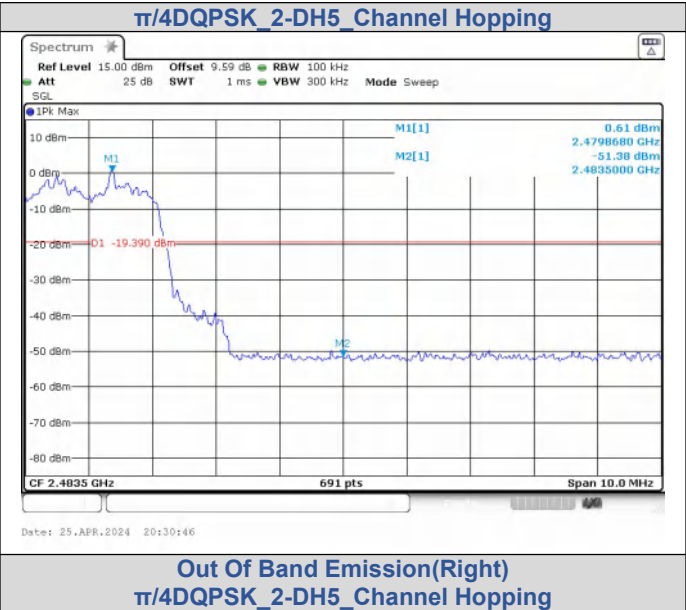
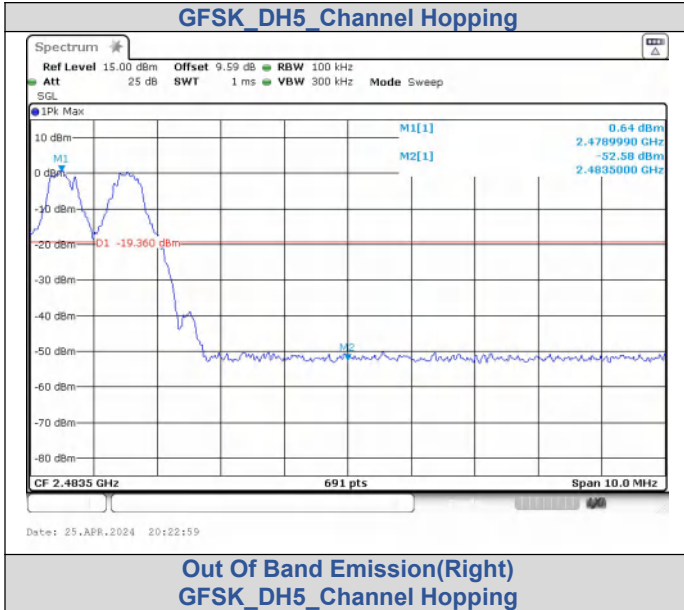
Out Of Band Emission(Right)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping

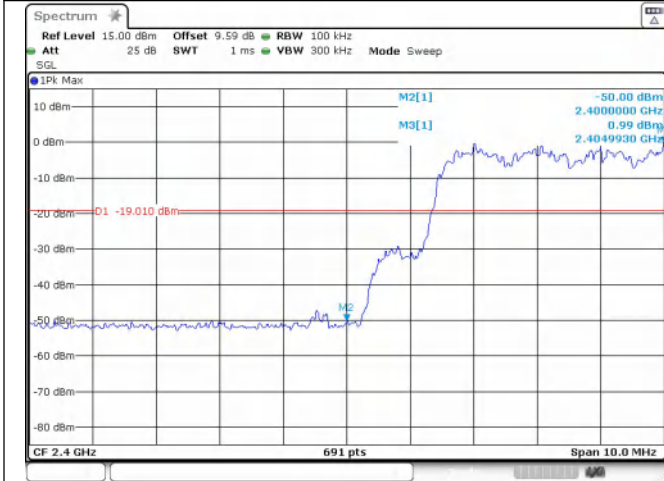


Out Of Band Emission(Left)



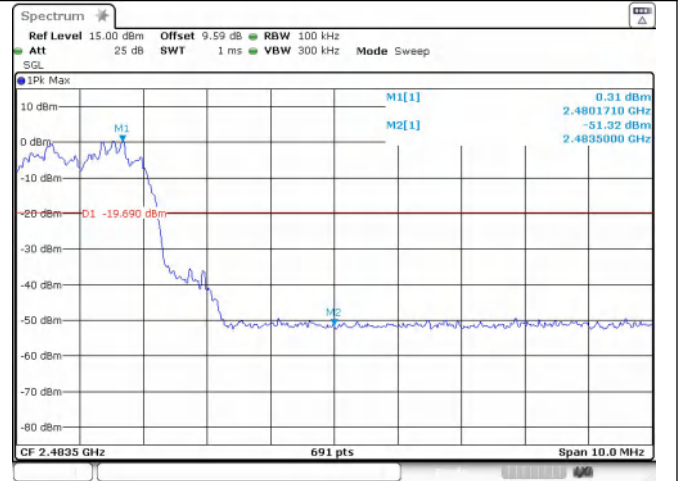
Out Of Band Emission(Left)





Date: 25.APR.2024 21:04:32

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



Date: 25.APR.2024 21:05:25

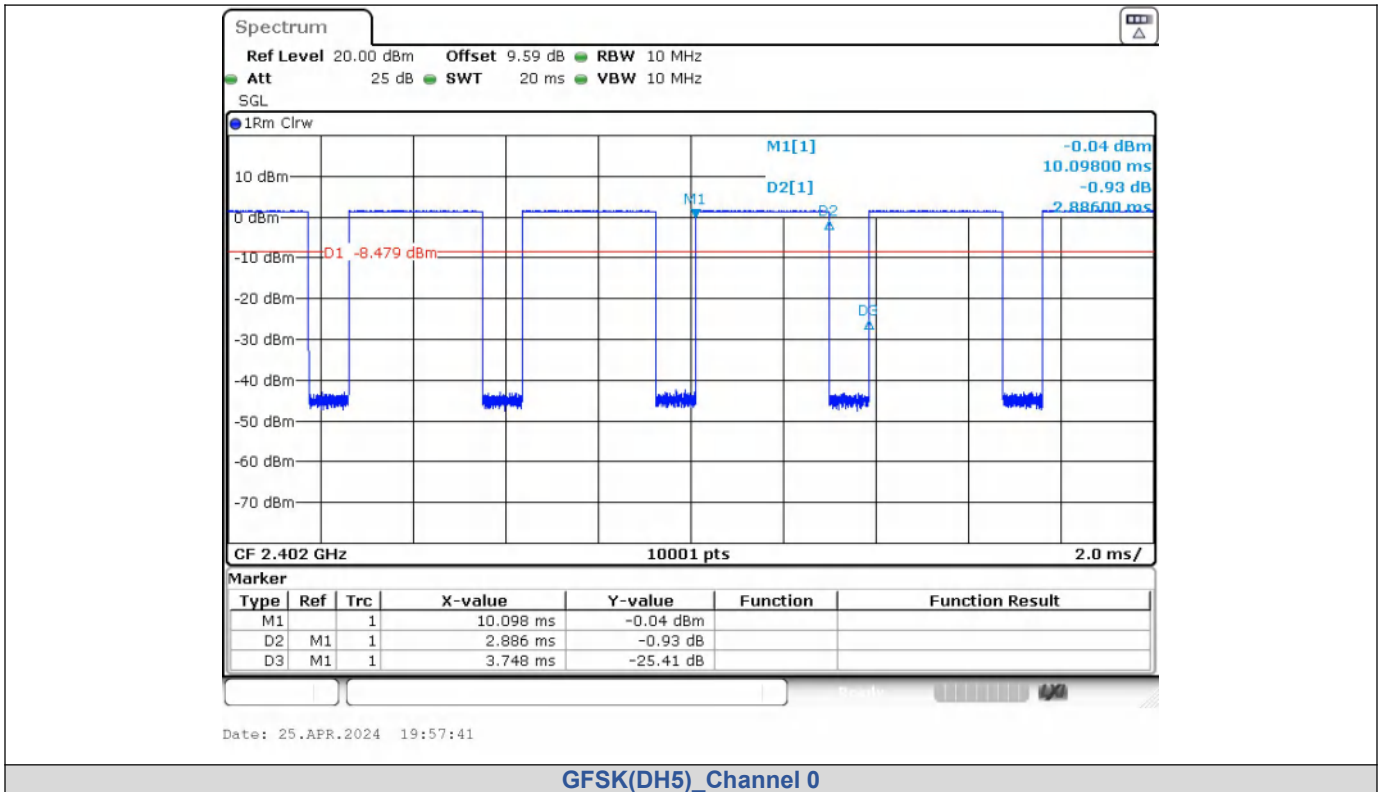
**Out Of Band Emission(Right)
8DPSK_3-DH5_Channel Hopping**

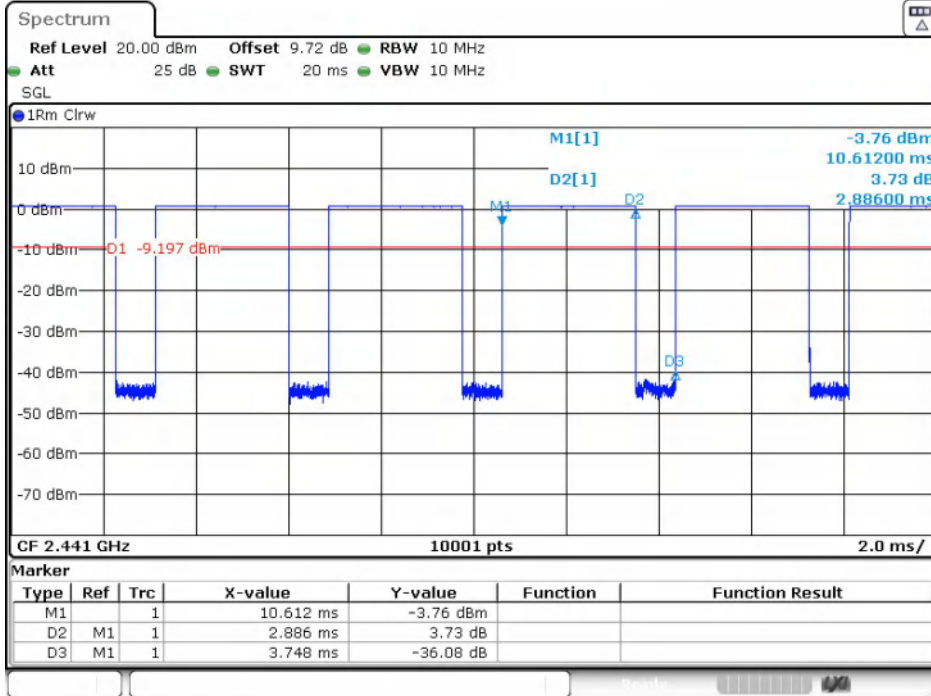
Duty Cycle

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	2.886	3.748	77.00	0.7700	1.1351	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	2.892	3.748	77.16	0.7716	1.1261	0.35
8DPSK	3-DH5	0	2.894	3.748	77.21	0.7721	1.1233	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

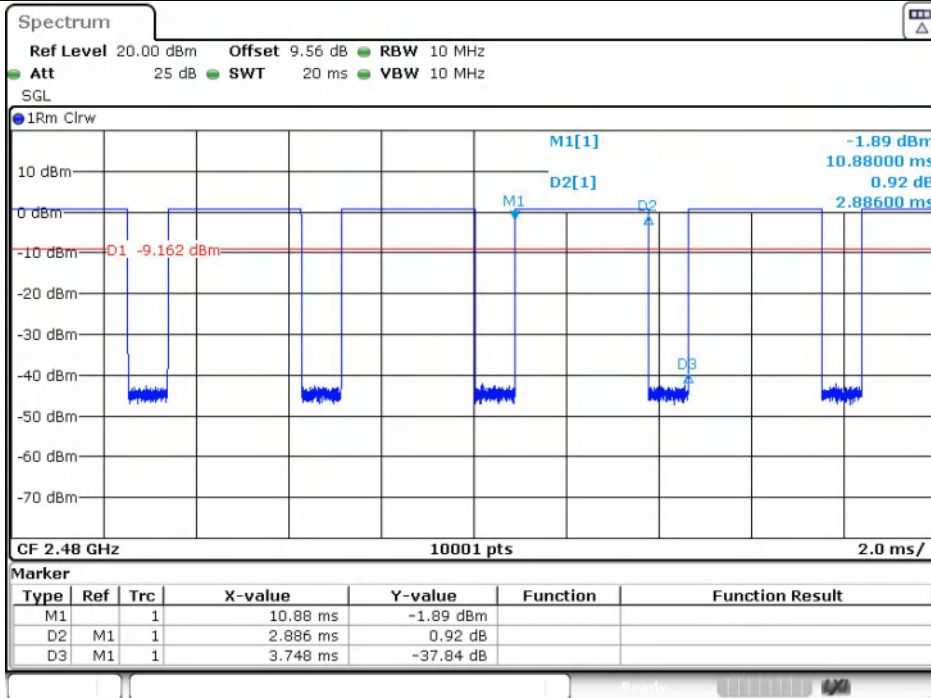
Test Graphs





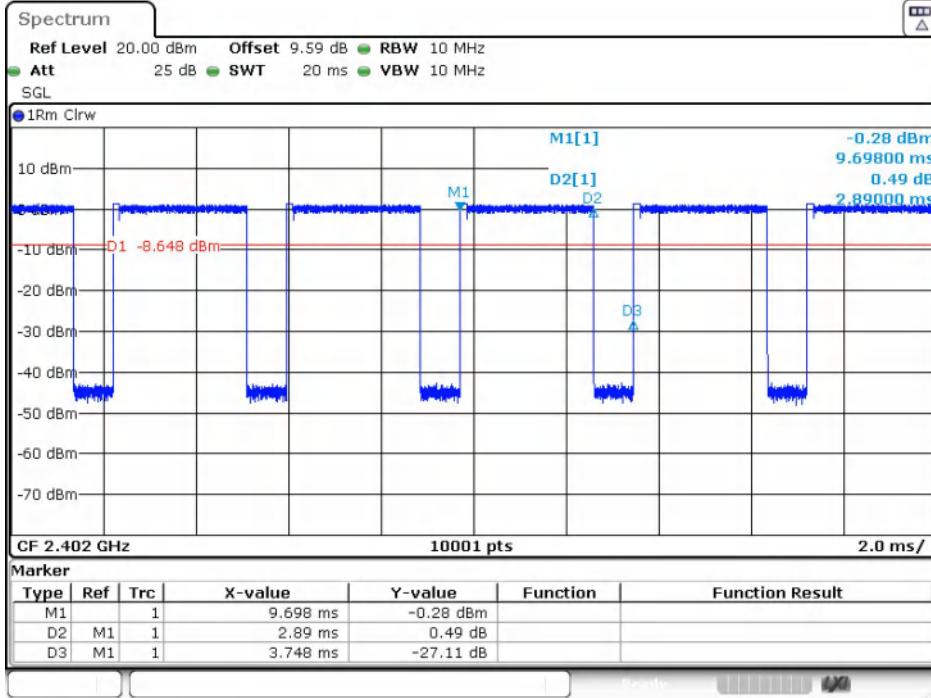
Date: 25.APR.2024 19:59:54

GFSK(DH5)_Channel 39



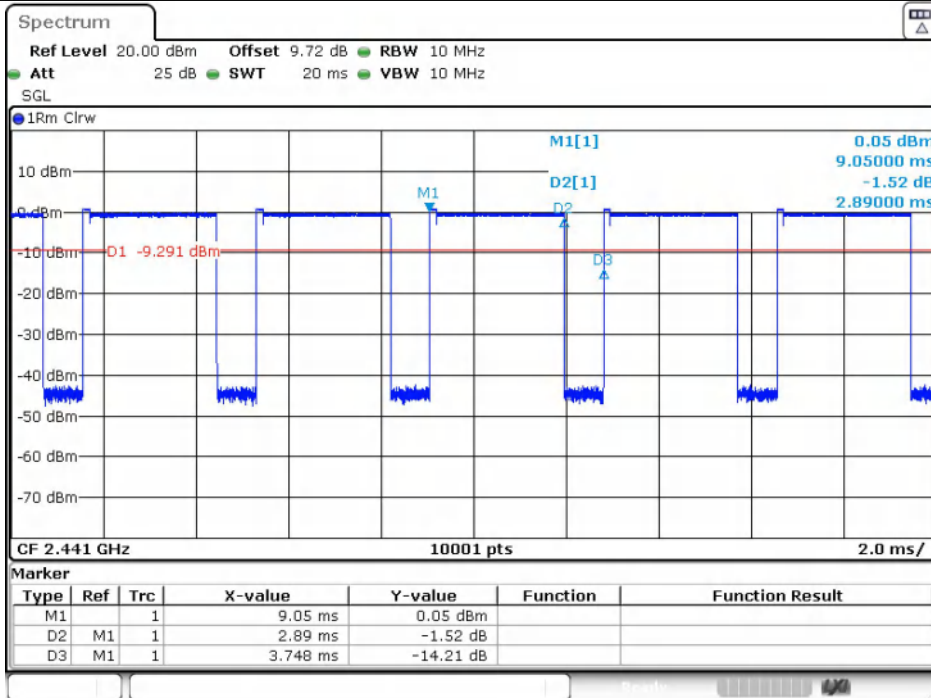
Date: 25.APR.2024 20:02:05

GFSK(DH5)_Channel 78



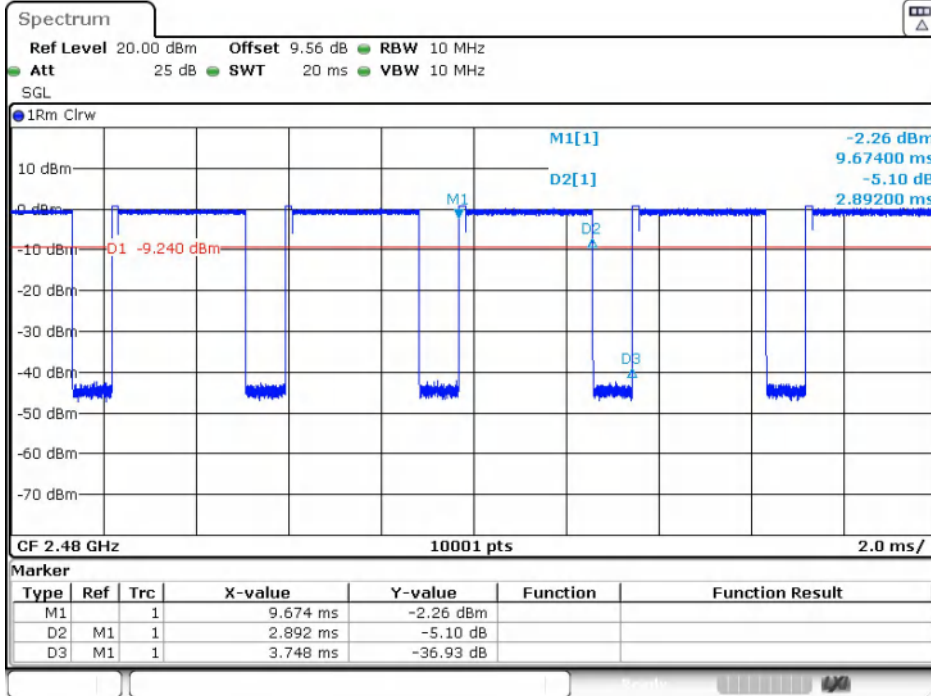
Date: 25.APR.2024 20:04:19

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



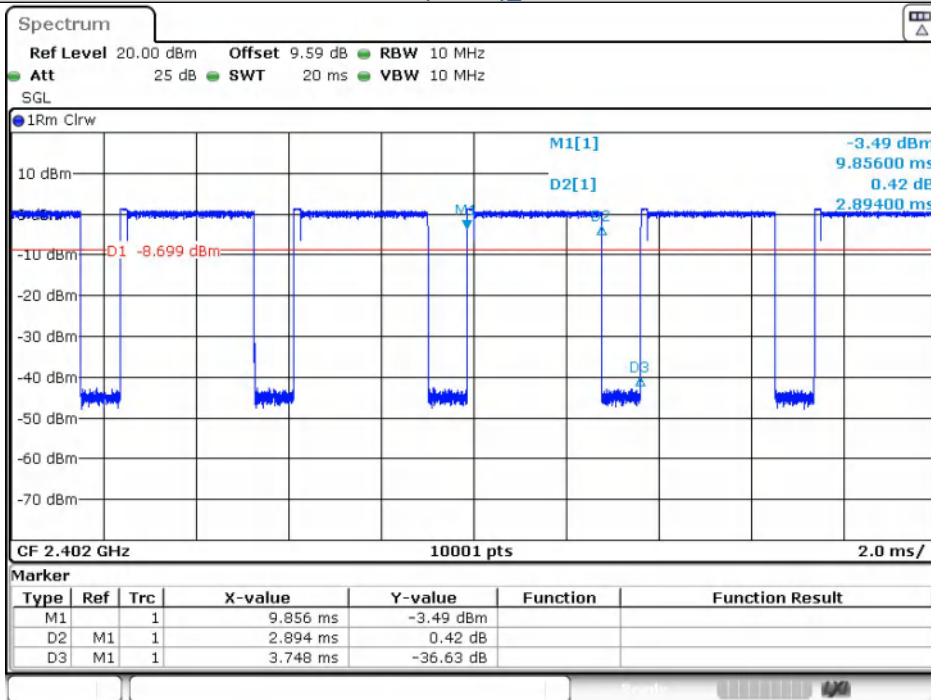
Date: 25.APR.2024 20:06:39

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



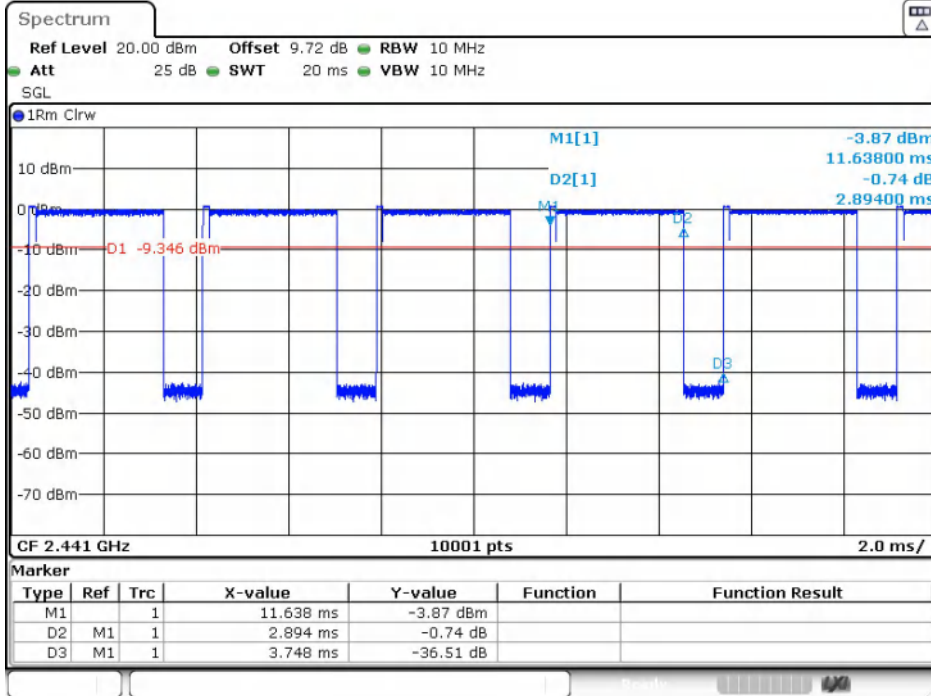
Date: 25.APR.2024 20:08:46

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



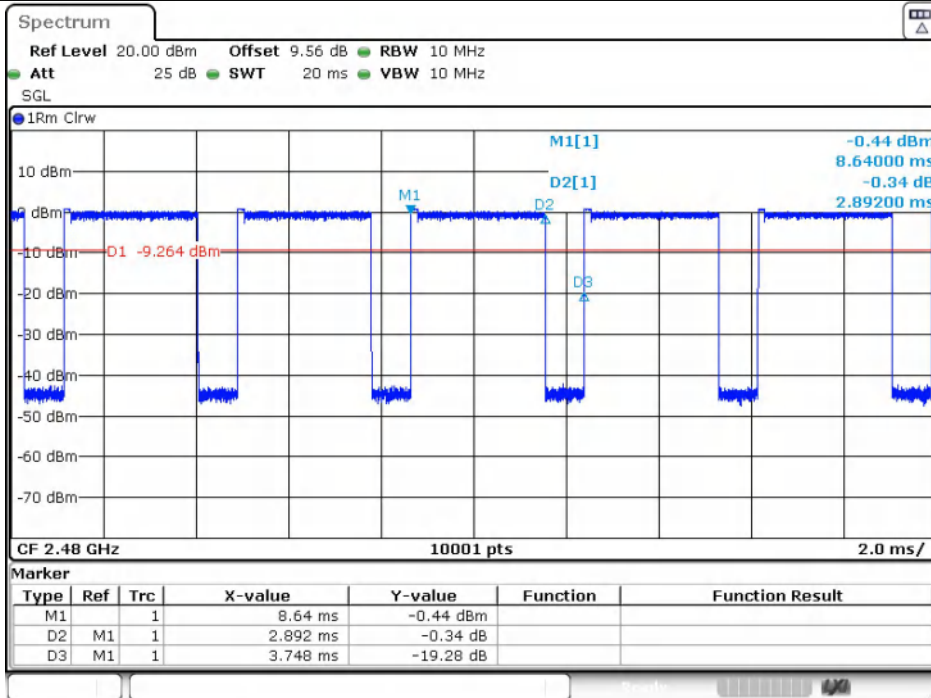
Date: 25.APR.2024 20:10:44

8DPSK(3-DH5)_Channel 0



Date: 25.APR.2024 20:12:51

8DPSK(3-DH5)_Channel 39



Date: 25.APR.2024 20:14:59

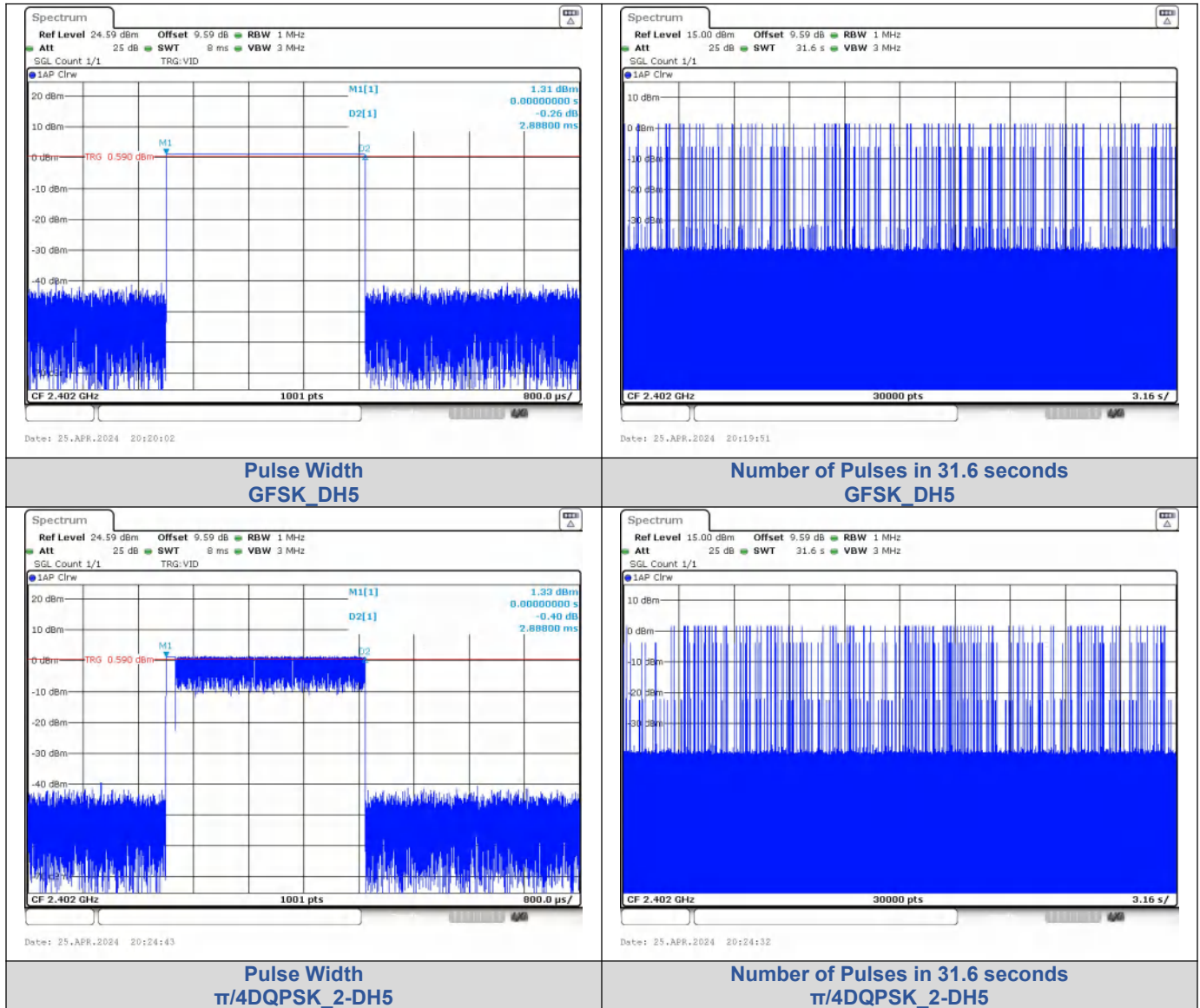
8DPSK(3-DH5)_Channel 78

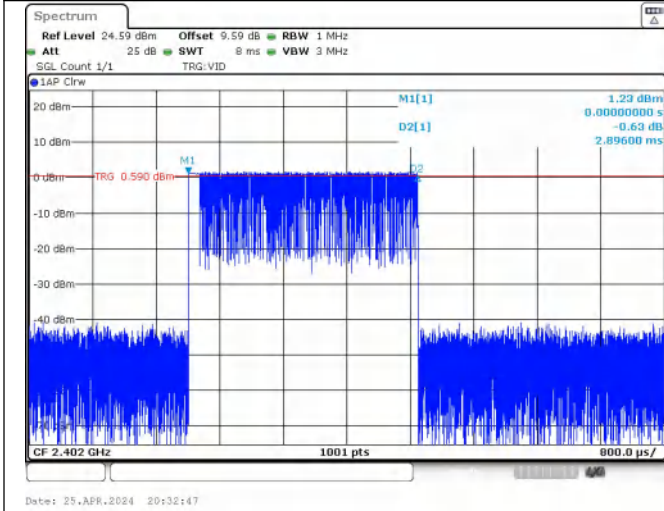
Dwell Time

Test Result

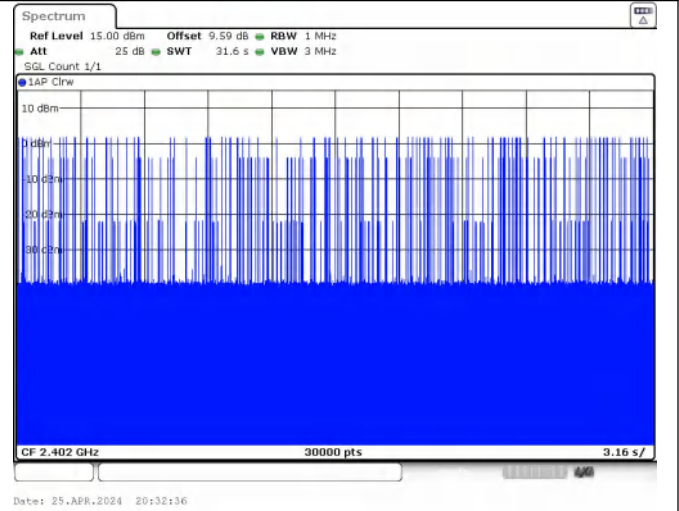
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	102	294.58	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.888	124	358.11		PASS
8DPSK	3-DH5		2.896	113	327.25		PASS

Test Graphs





**Pulse Width
8DPSK_3-DH5**



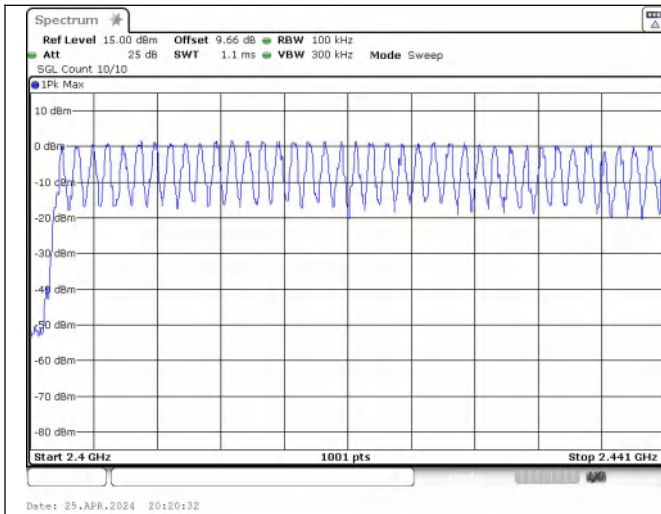
**Number of Pulses in 31.6 seconds
8DPSK_3-DH5**

Number Of Hopping Channel

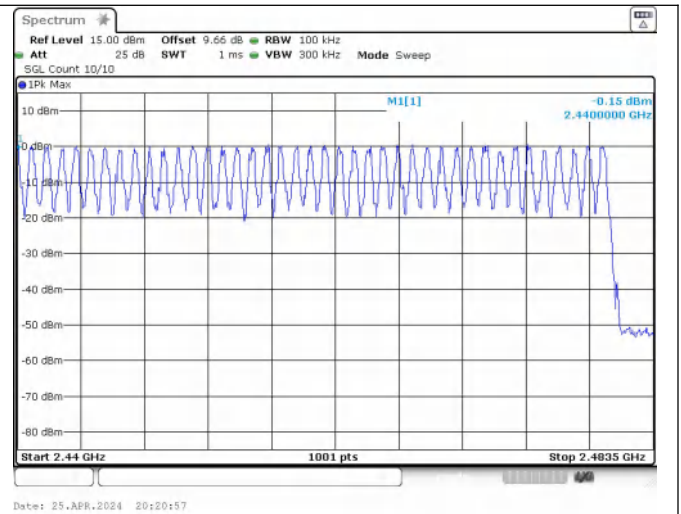
Test Result

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

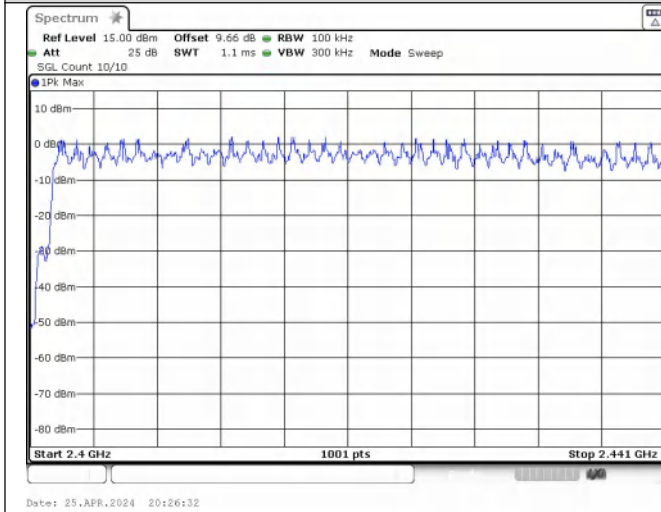
Test Graphs



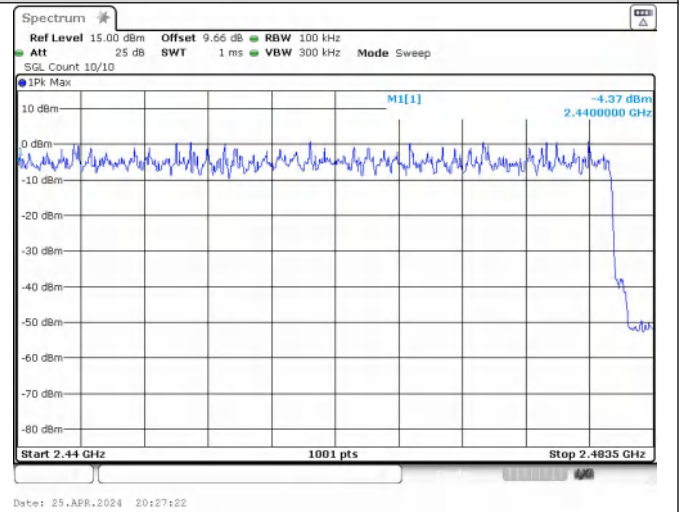
Low End Spectrum Channel Hopping Plot
GFSK



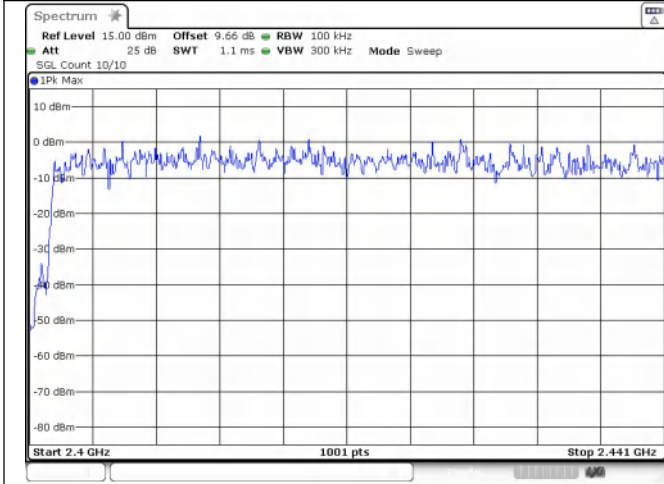
High End Spectrum Channel Hopping Plot
GFSK



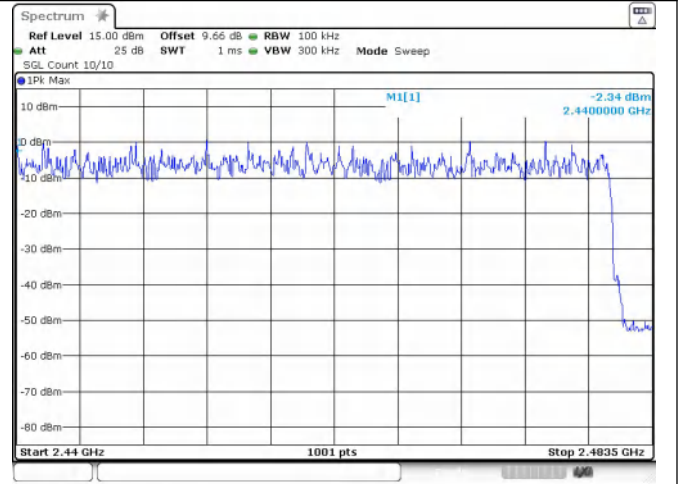
Low End Spectrum Channel Hopping Plot
 $\pi/4$ DQPSK



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



**Low End Spectrum Channel Hopping Plot
8DPSK**



**High End Spectrum Channel Hopping Plot
8DPSK**