

Appendix

Report No.:	CISRR24112317004
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

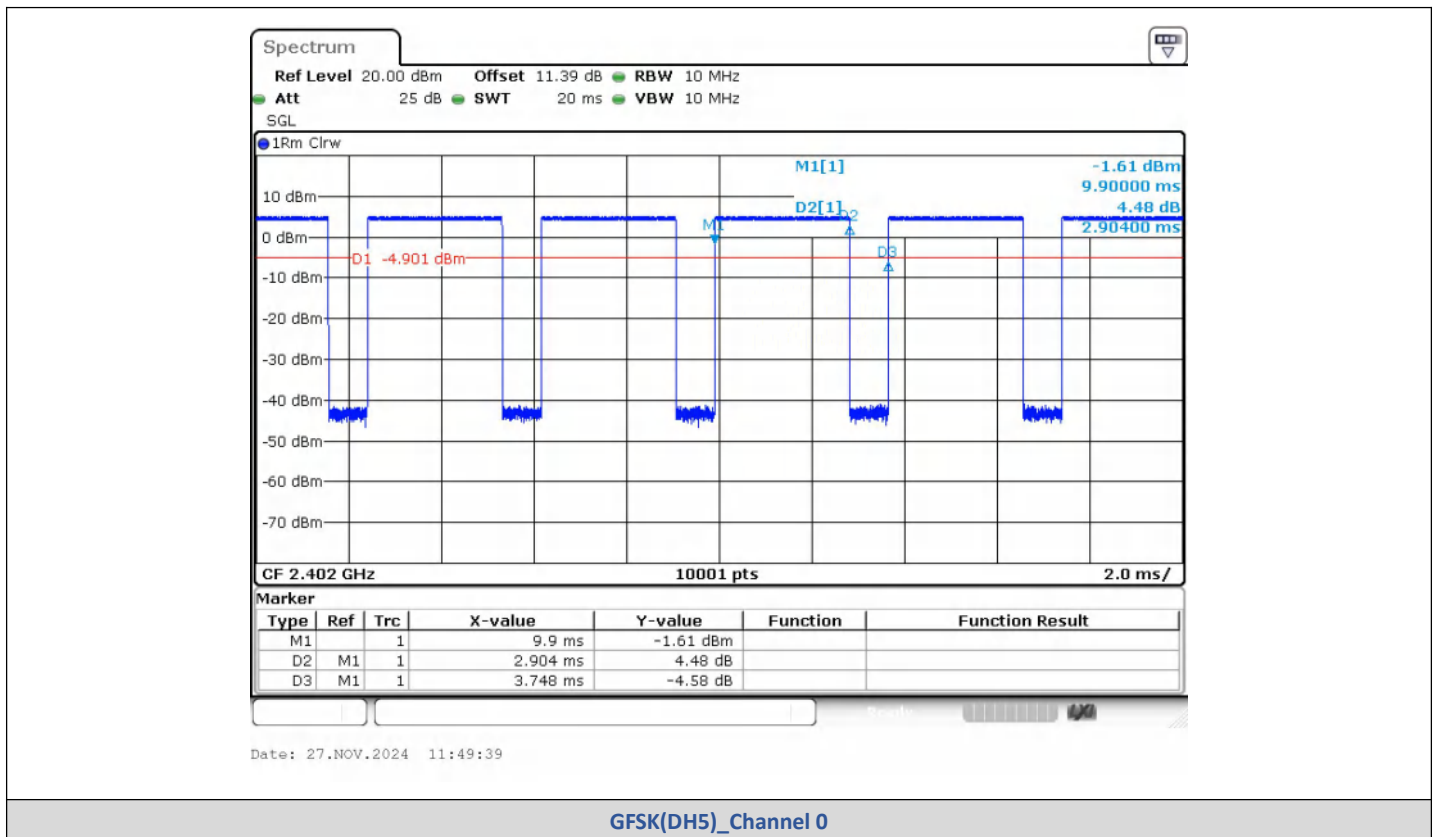
1) Duty Cycle

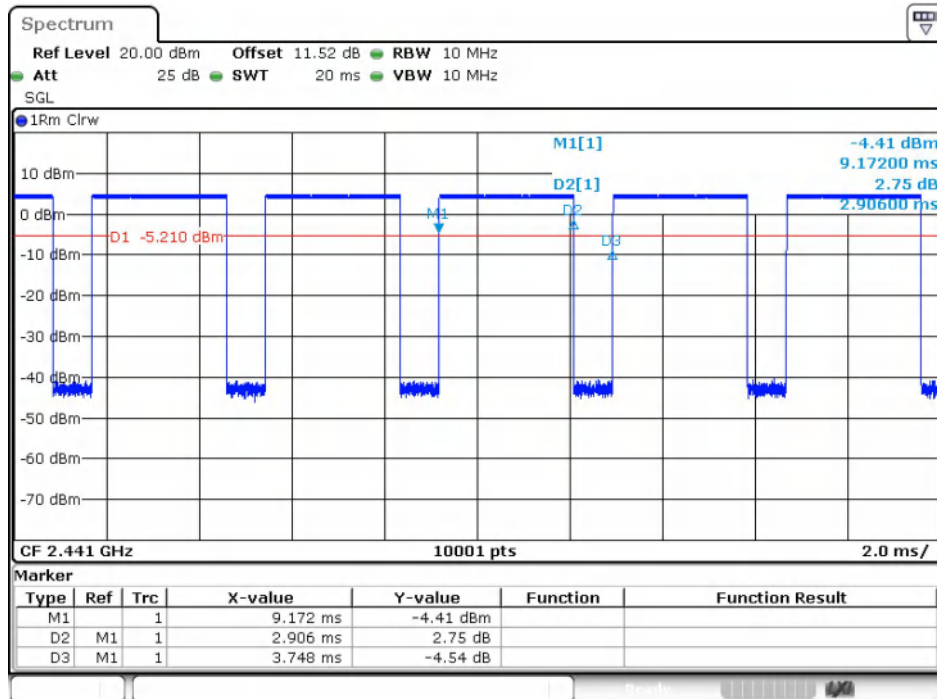
Test Result

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	2.906	3.748	77.53	0.7753	1.1053	0.3441
		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	2.912	3.748	77.69	0.7769	1.0963	0.3434
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436
8DPSK	3-DH5	0	2.914	3.748	77.75	0.7775	1.093	0.3432
		39	2.912	3.748	77.69	0.7769	1.0963	0.3434
		78	2.914	3.748	77.75	0.7775	1.093	0.3432

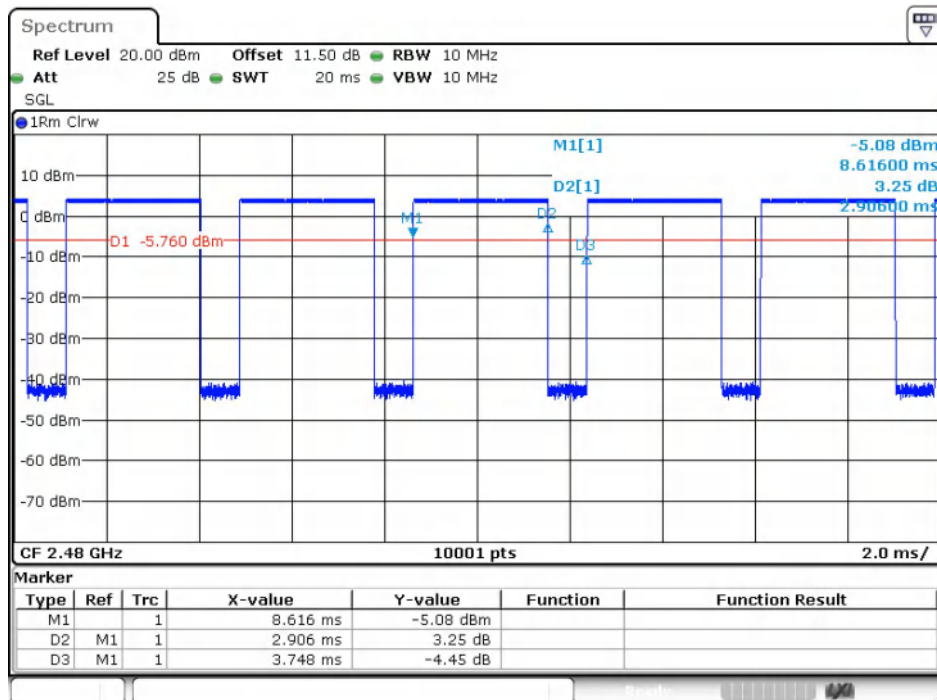
Test Graphs





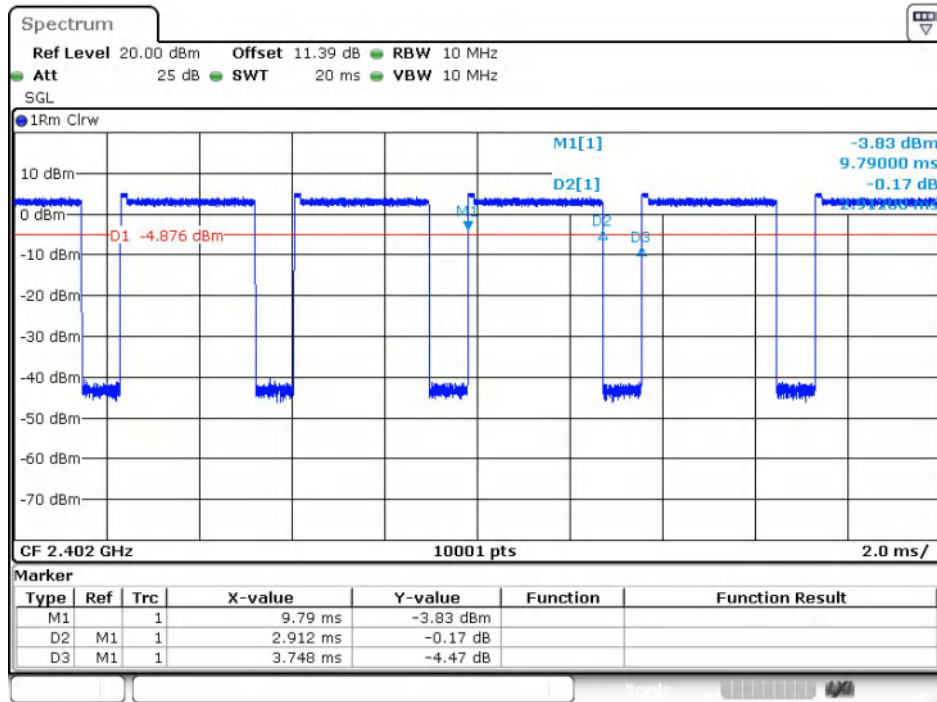
Date: 27.NOV.2024 14:15:13

GFSK(DH5)_Channel 39



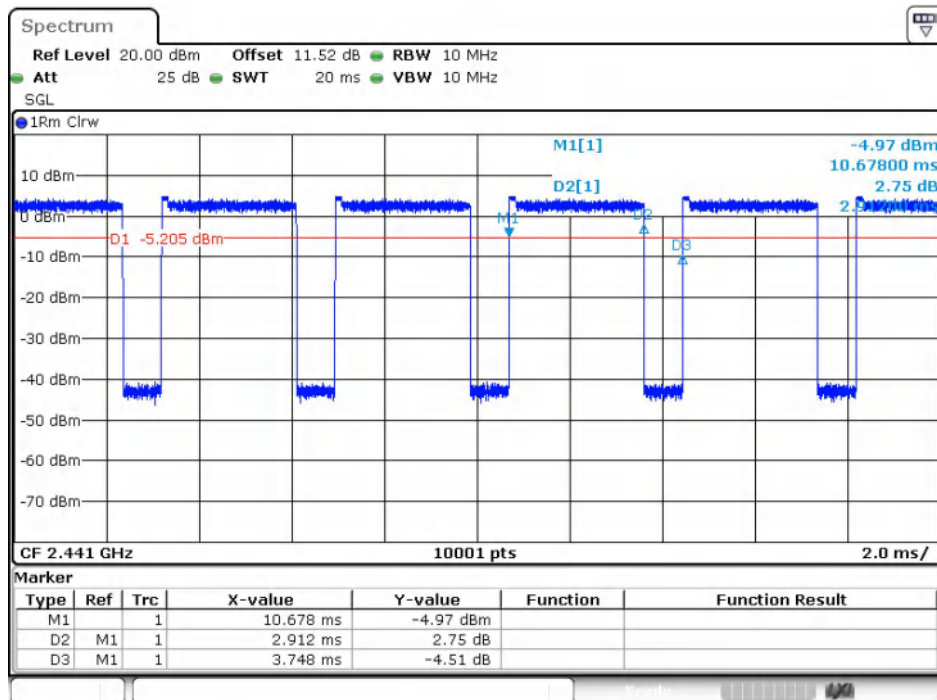
Date: 27.NOV.2024 14:18:01

GFSK(DH5)_Channel 78



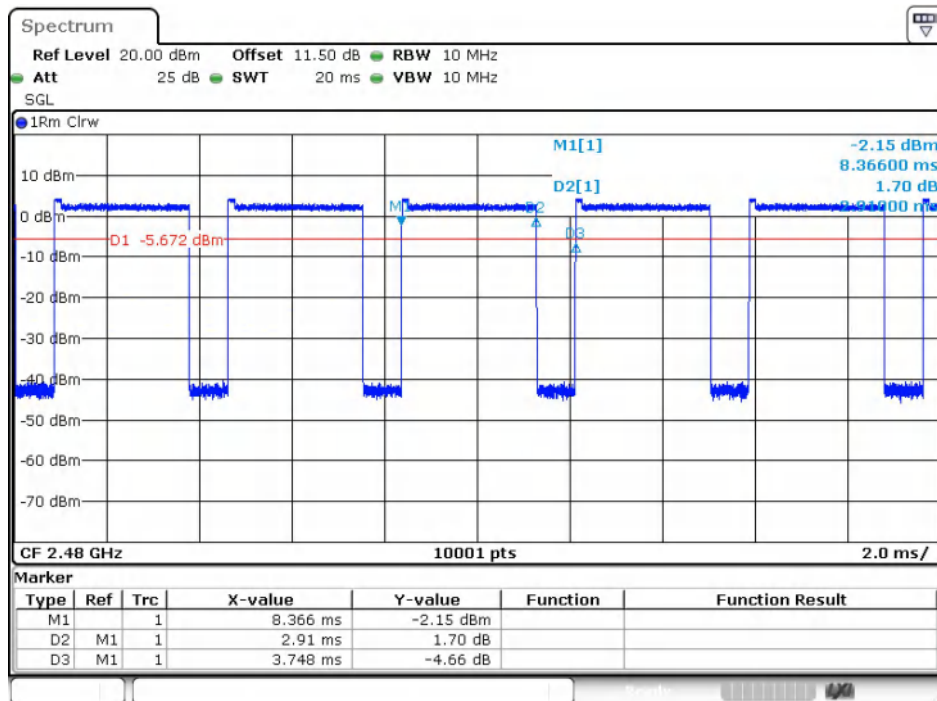
Date: 27,NOV,2024 14:20:07

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



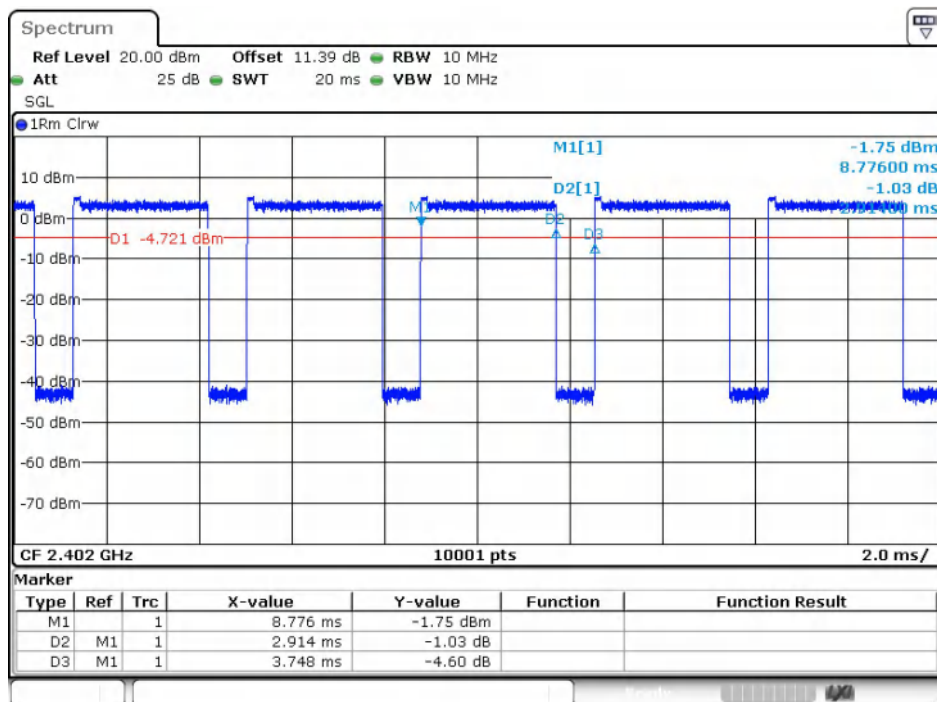
Date: 27,NOV,2024 14:25:55

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



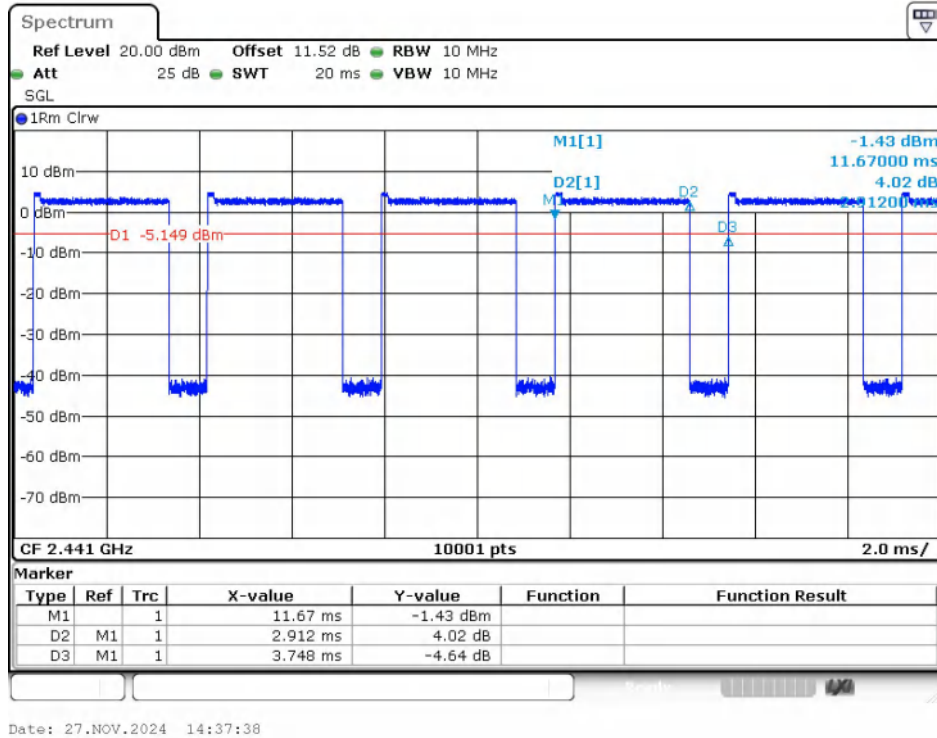
Date: 27,NOV,2024 14:28:18

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

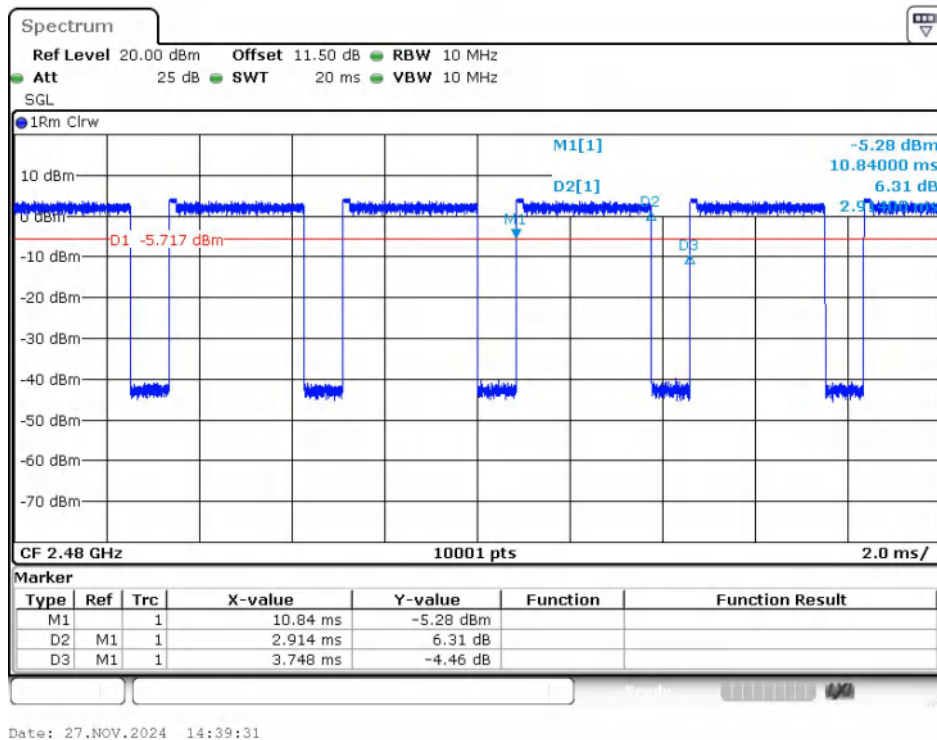


Date: 27,NOV,2024 14:30:20

8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



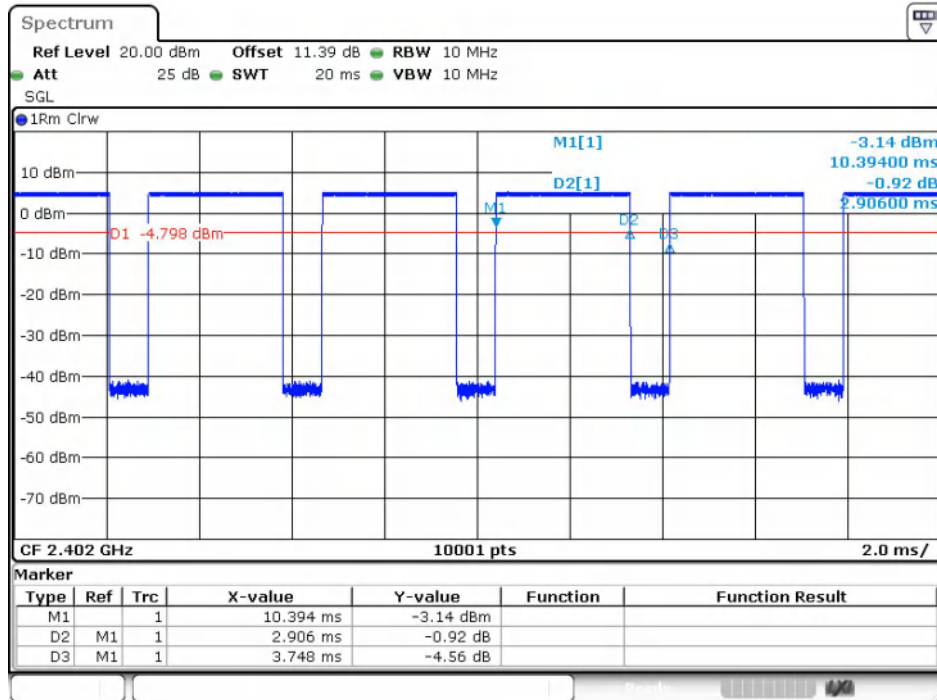
8DPSK(3-DH5)_Channel 78

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	2.906	3.748	77.53	0.7753	1.1053	0.3441

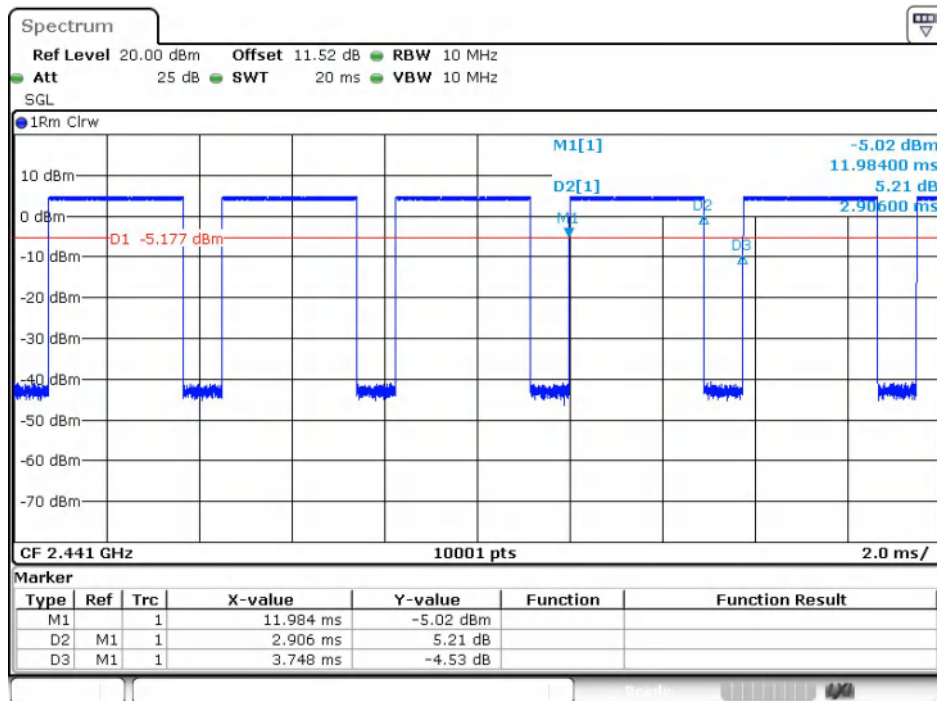
		78	2.904	3.748	77.48	0.7748	1.1081	0.3444
$\pi/4$ DQPSK	2-DH5	0	2.910	3.748	77.64	0.7764	1.0991	0.3436
		39	2.910	3.748	77.64	0.7764	1.0991	0.3436
		78	2.912	3.748	77.69	0.7769	1.0963	0.3434
8DPSK	3-DH5	0	2.914	3.748	77.75	0.7775	1.093	0.3432
		39	2.914	3.748	77.75	0.7775	1.093	0.3432
		78	2.914	3.748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

Test Graphs



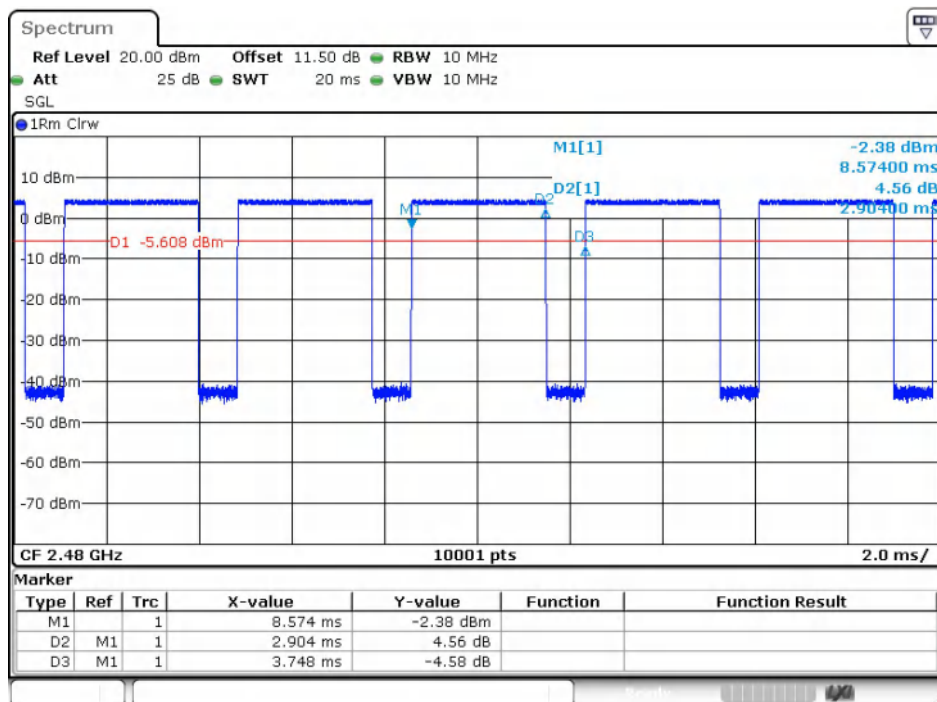
Date: 27.NOV.2024 14:55:08

GFSK(DH5)_Channel 0



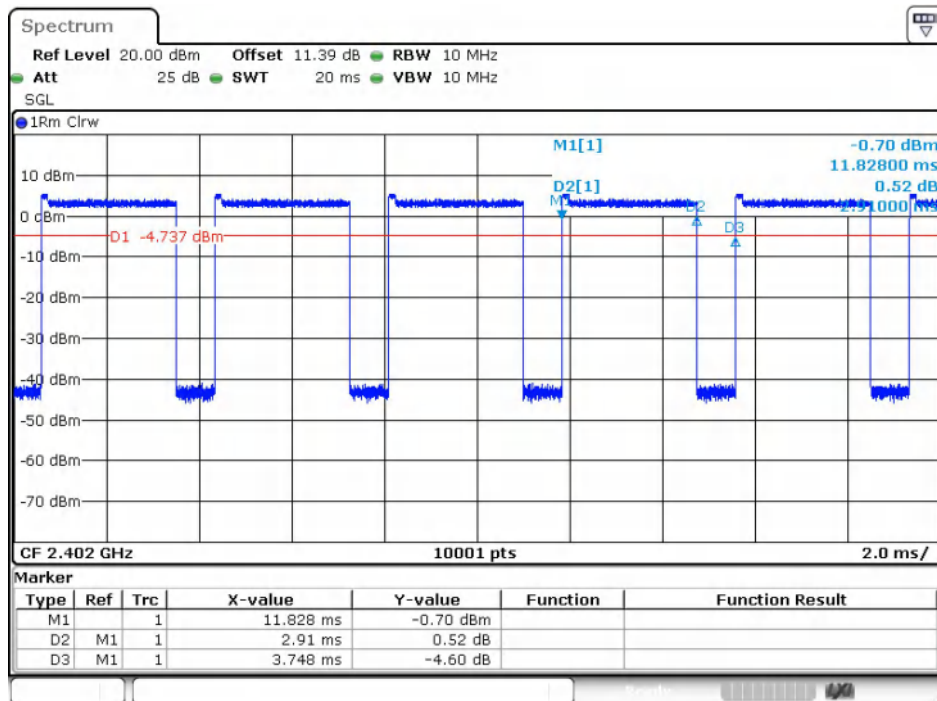
Date: 27.NOV.2024 15:04:18

GFSK(DH5)_Channel 39



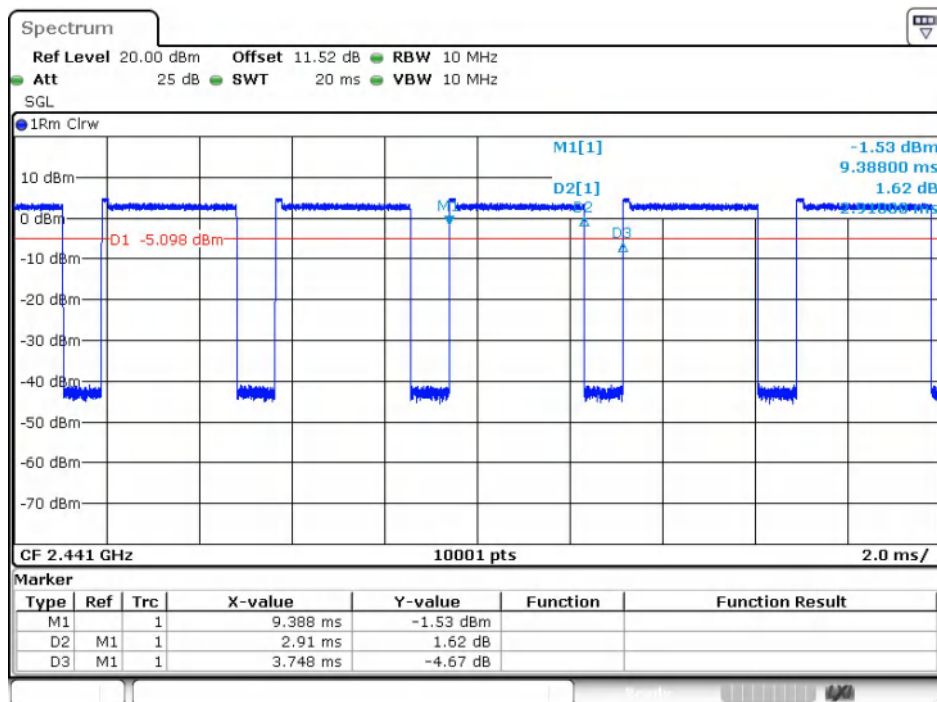
Date: 27.NOV.2024 15:06:55

GFSK(DH5)_Channel 78



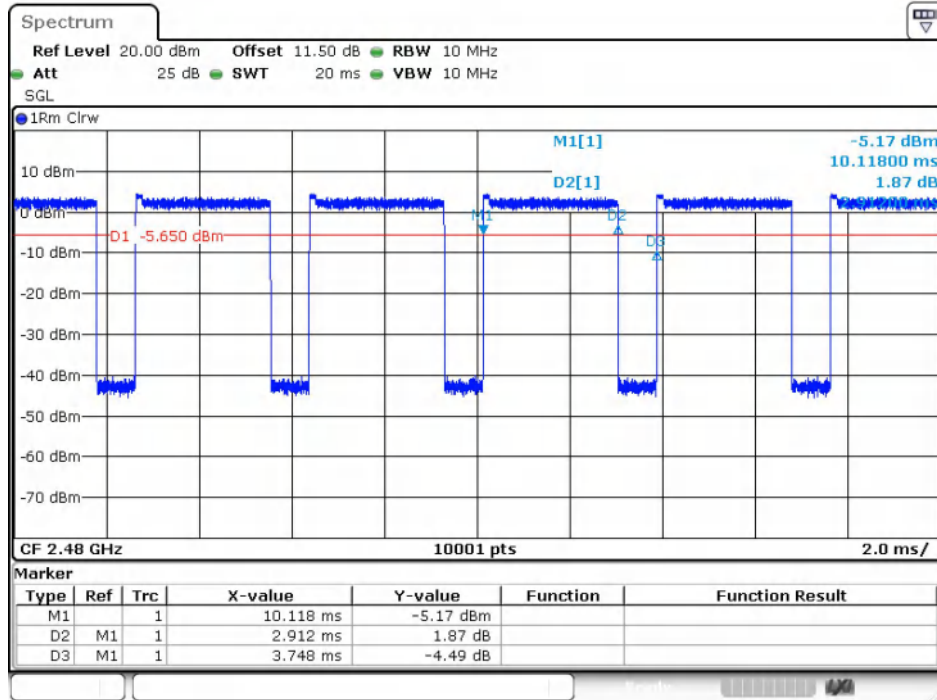
Date: 27.NOV.2024 15:09:01

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



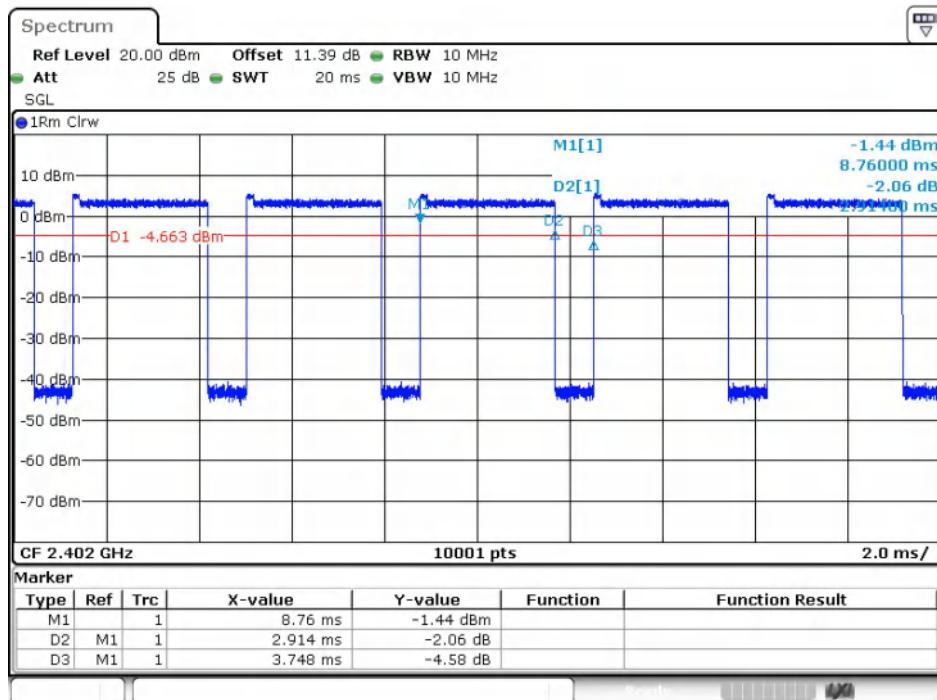
Date: 27.NOV.2024 15:14:44

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



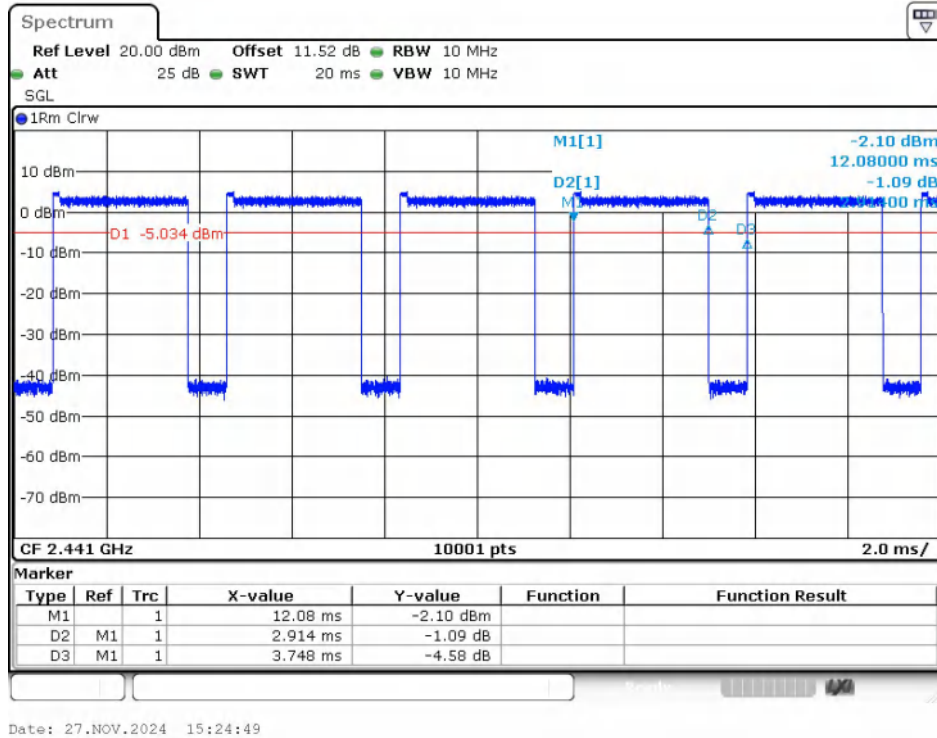
Date: 27,NOV,2024 15:17:06

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

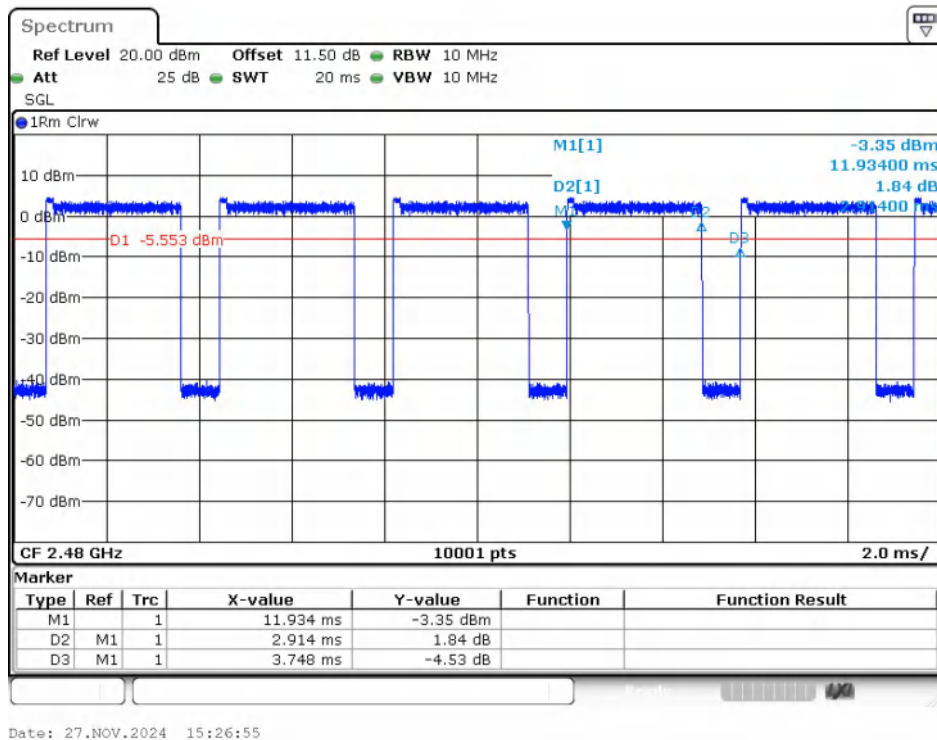


Date: 27,NOV,2024 15:19:09

8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

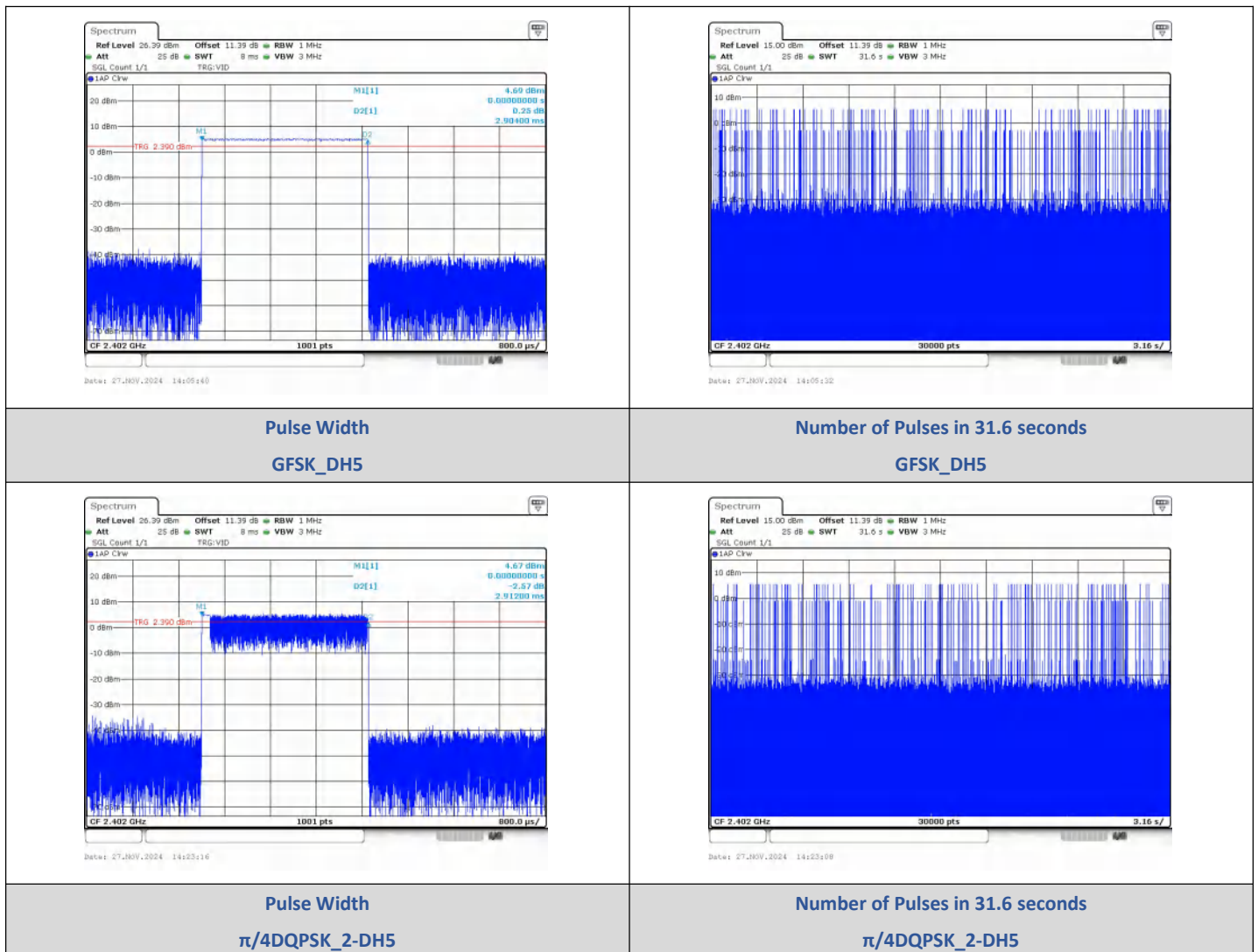
2) Dwell Time

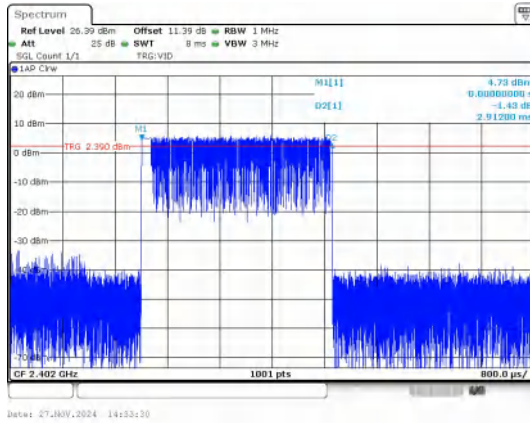
Test Result

Left:

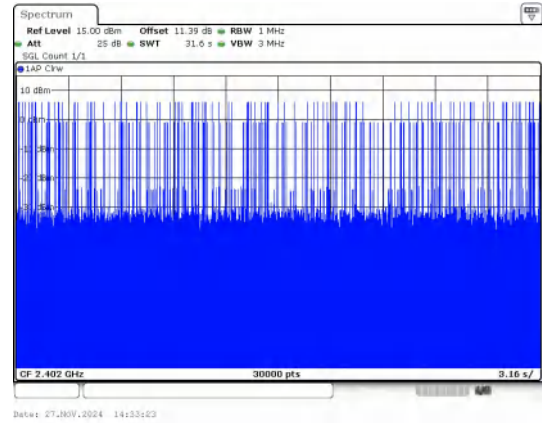
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.904	107	310.73	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	104	302.85		PASS
8DPSK	3-DH5		2.912	108	314.5		PASS

Test Graphs





Pulse Width
8DPSK_3-DH5

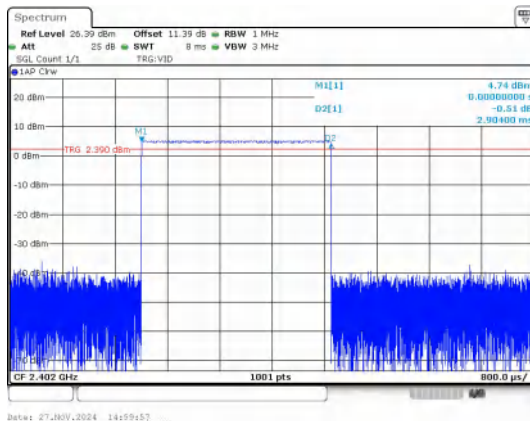


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

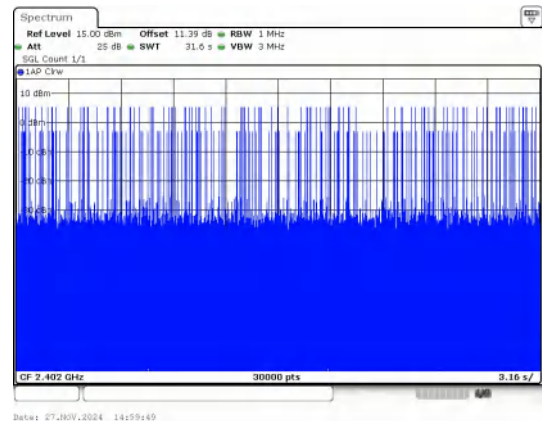
Right:

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.904	106	307.82	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	107	311.58		PASS
8DPSK	3-DH5		2.912	104	302.85		PASS

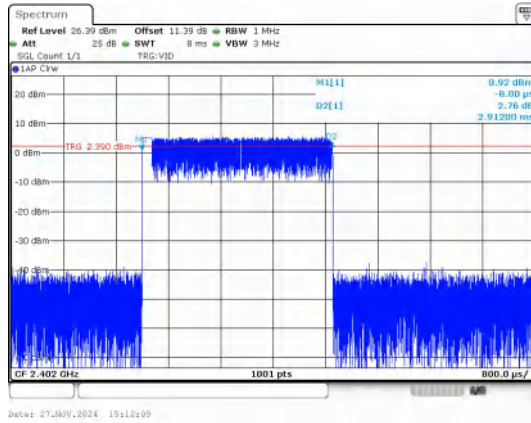
Test Graphs



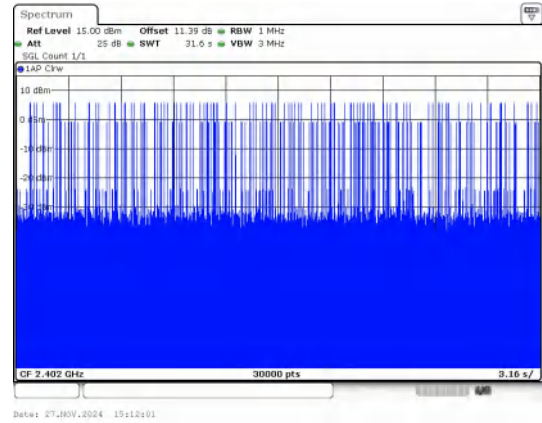
Pulse Width
GFSK_DH5



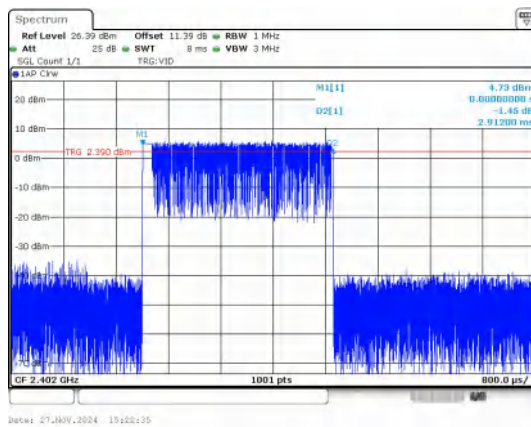
Number of Pulses in 31.6 seconds
GFSK_DH5



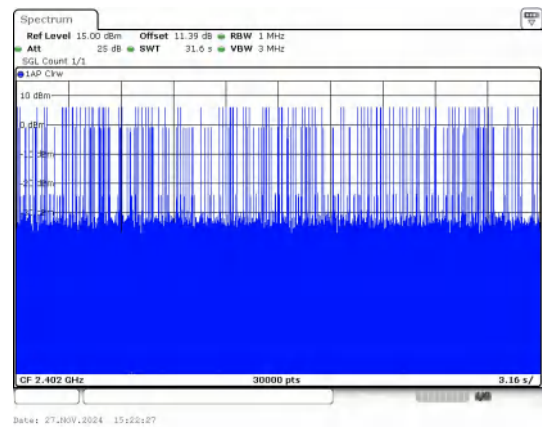
Pulse Width
 $\pi/4$ DQPSK_2-DH5



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

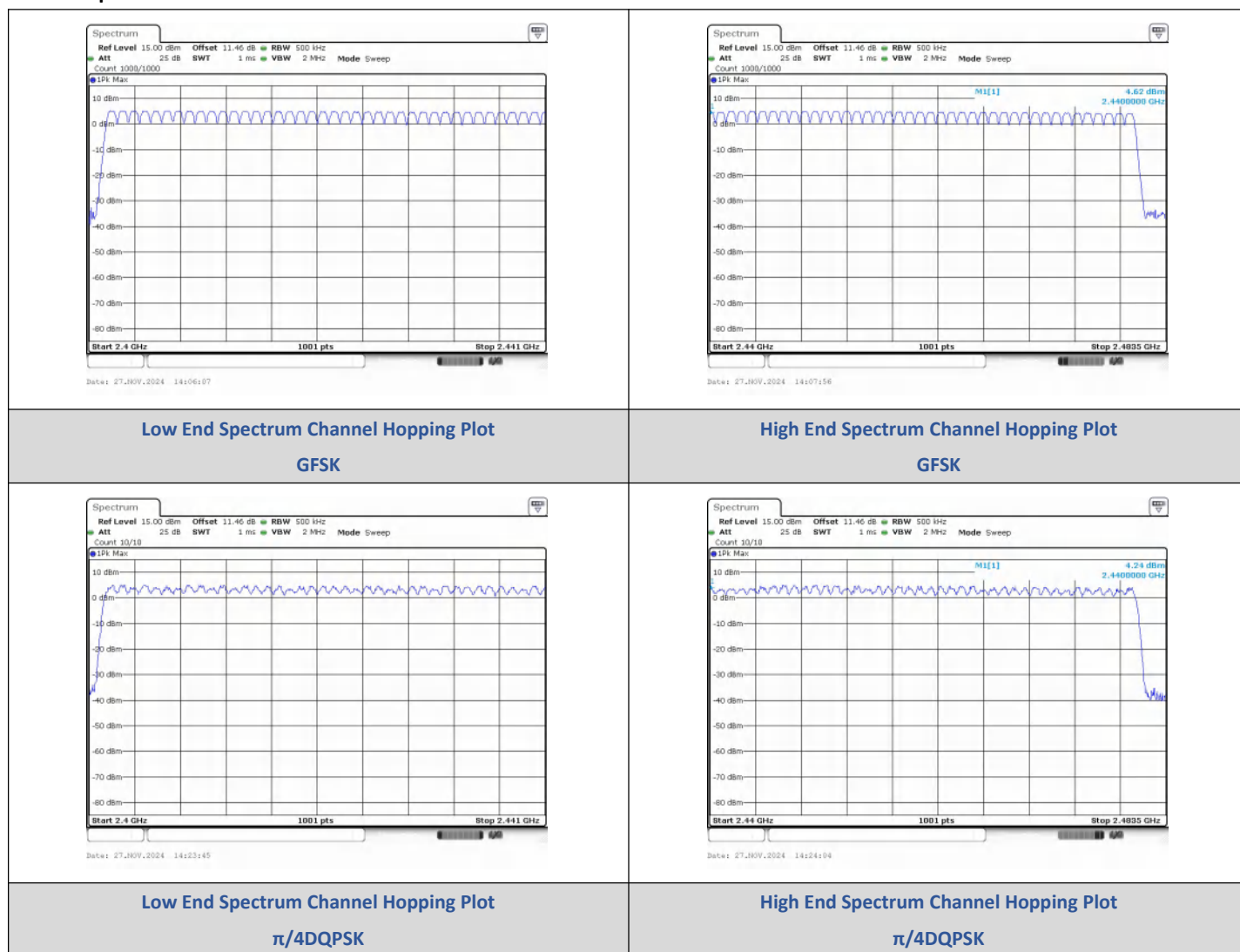
3) Number Of Hopping Channel

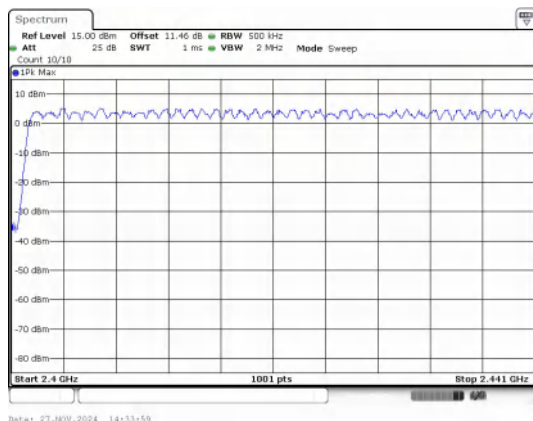
Test Result

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

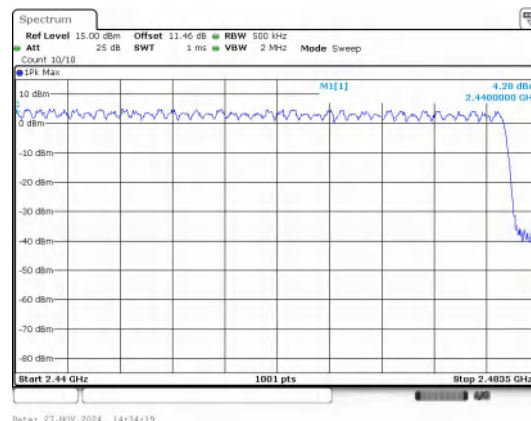
Test Graphs





Low End Spectrum Channel Hopping Plot

8DPSK



High End Spectrum Channel Hopping Plot

8DPSK

Right:

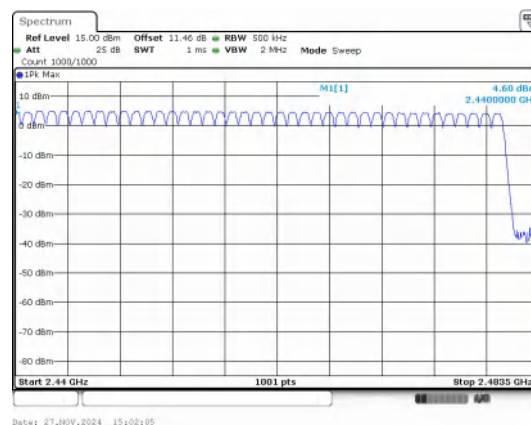
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs



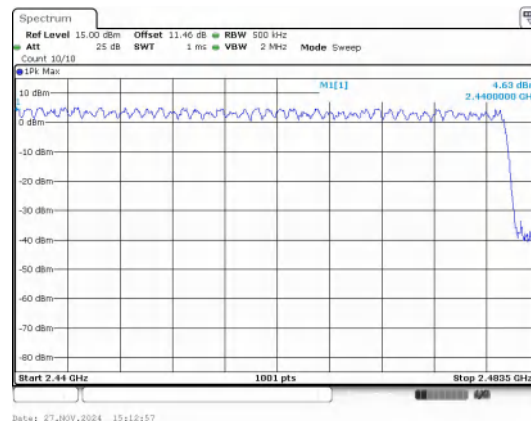
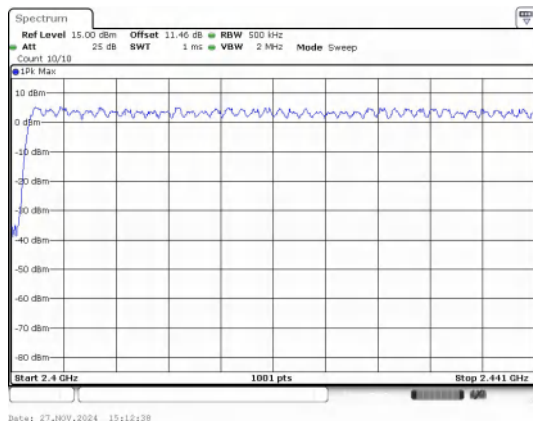
Low End Spectrum Channel Hopping Plot

GFSK



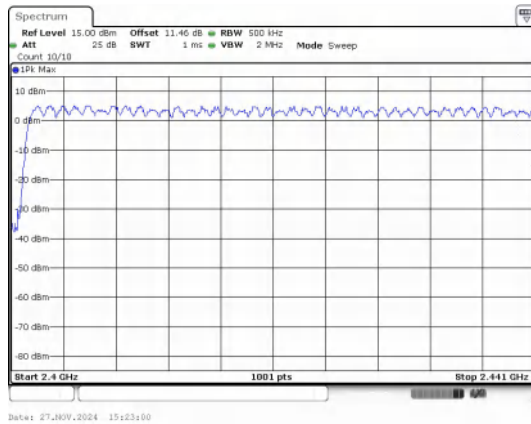
High End Spectrum Channel Hopping Plot

GFSK



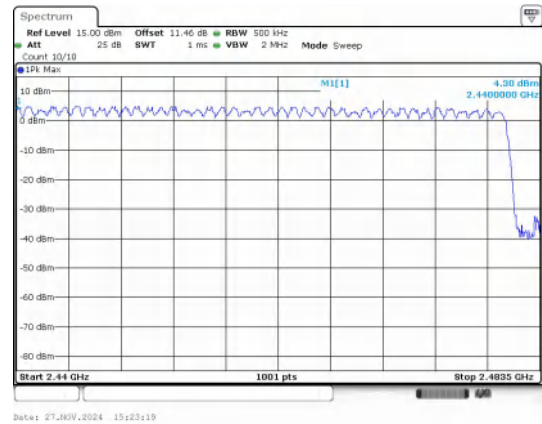
Low End Spectrum Channel Hopping Plot

$\pi/4$ 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

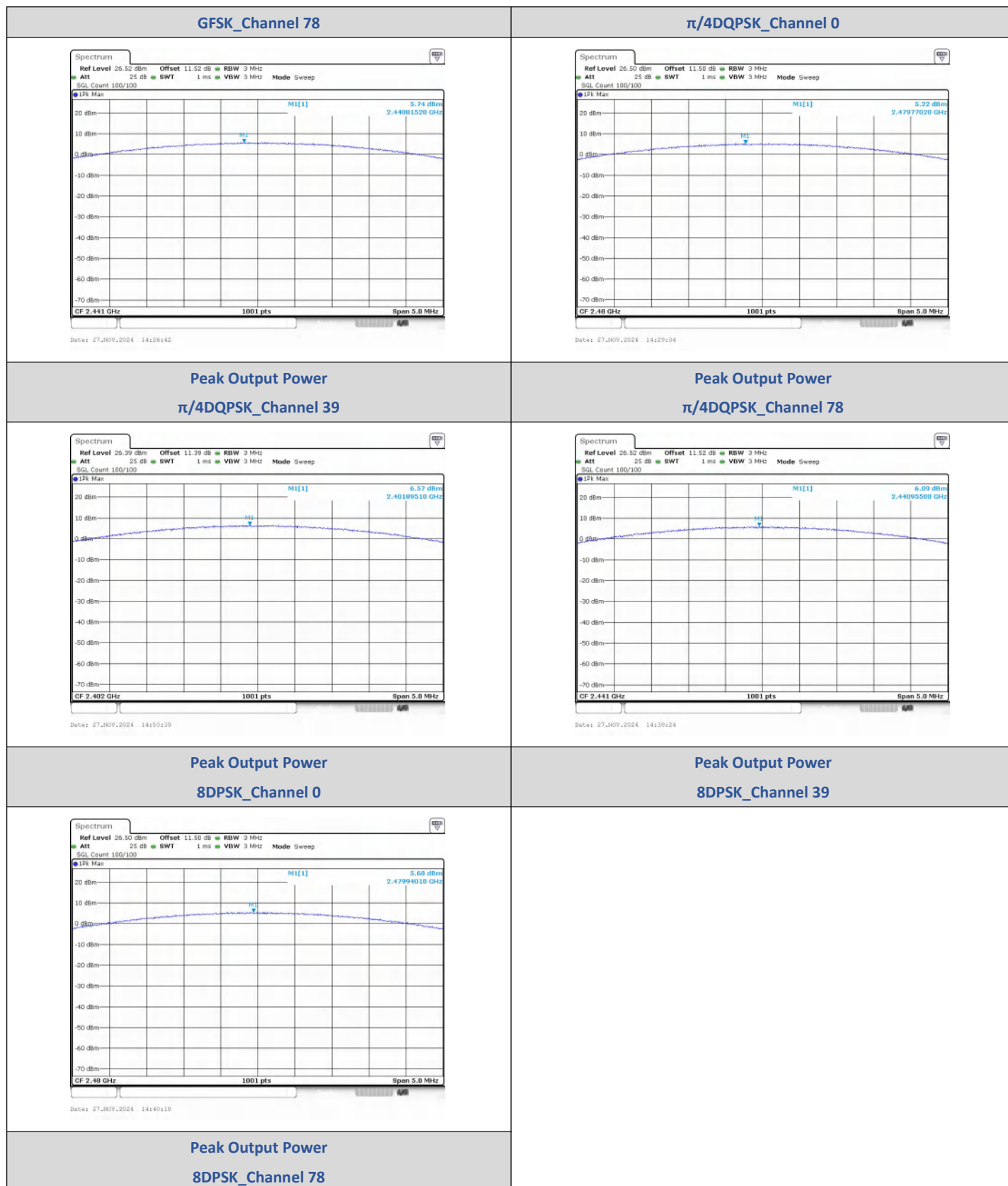
Test Result

Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	5.37	3.44	≤30	PASS
		39	4.95	3.13		PASS
		78	4.41	2.76		PASS
$\pi/4$ DQPSK	2-DH5	0	6.04	4.02	≤20.97	PASS
		39	5.74	3.75		PASS
		78	5.22	3.33		PASS
8DPSK	3-DH5	0	6.57	4.54		PASS
		39	6.09	4.06		PASS
		78	5.60	3.63		PASS

Test Graphs



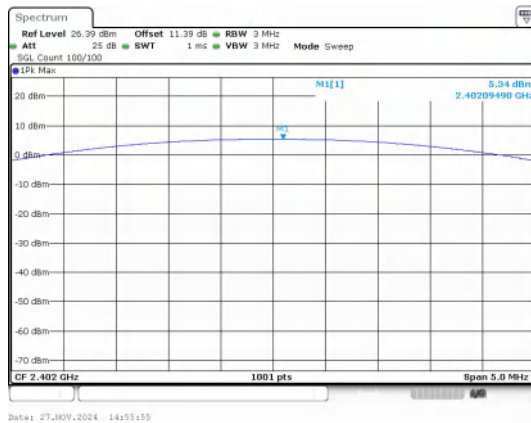


Right:

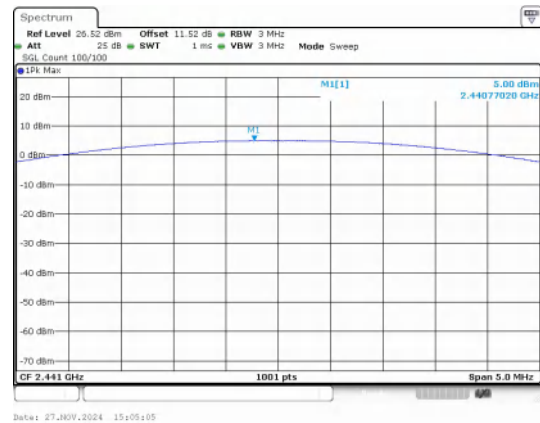
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	5.34	3.42	≤30	PASS

		39	5.00	3.16		PASS
		78	4.55	2.85		PASS
		0	6.20	4.17		PASS
$\pi/4$ DQPSK	2-DH5	39	5.84	3.84	≤ 20.97	PASS
		78	5.31	3.40		PASS
		0	6.54	4.51		PASS
8DPSK	3-DH5	39	6.20	4.17		PASS
		78	5.67	3.69		PASS
						PASS

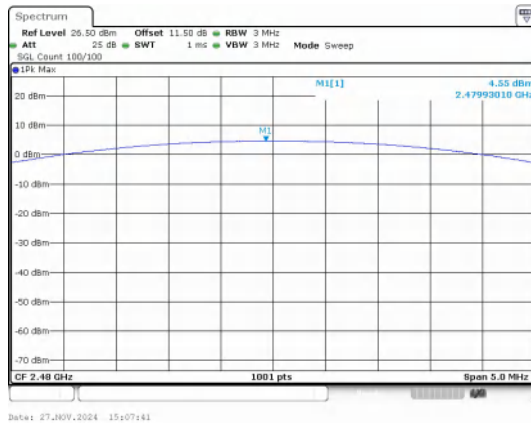
Test Graphs



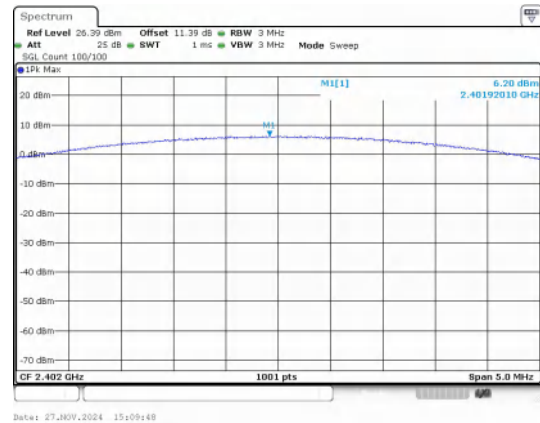
Peak Output Power
GFSK_Channel 0



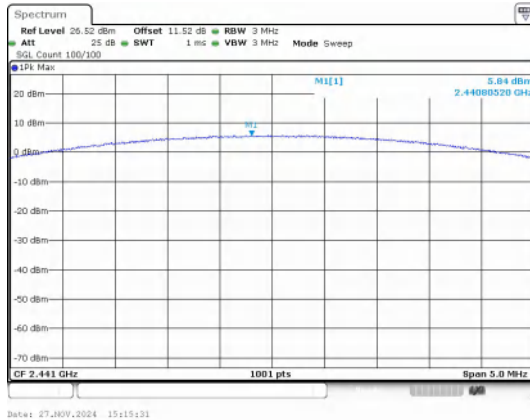
Peak Output Power
GFSK_Channel 39



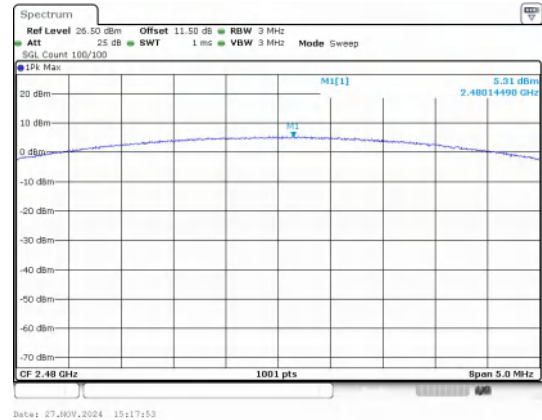
Peak Output Power
GFSK_Channel 78



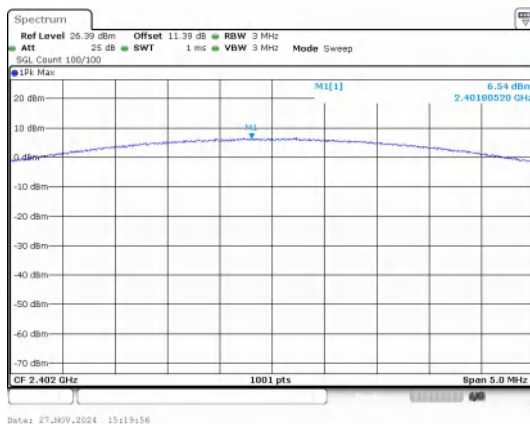
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



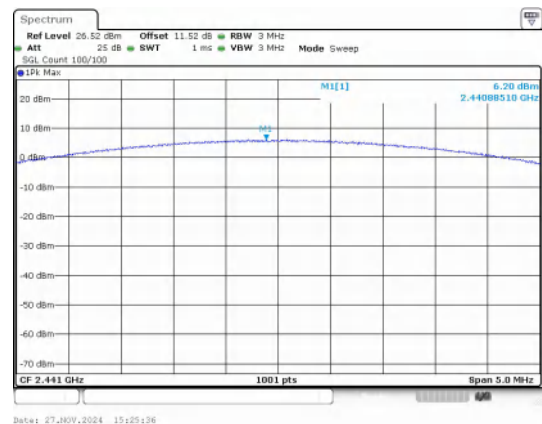
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



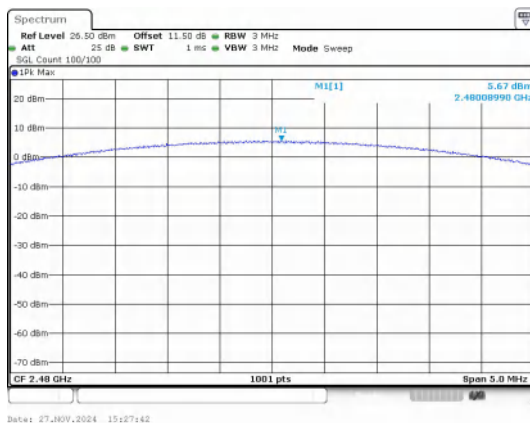
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

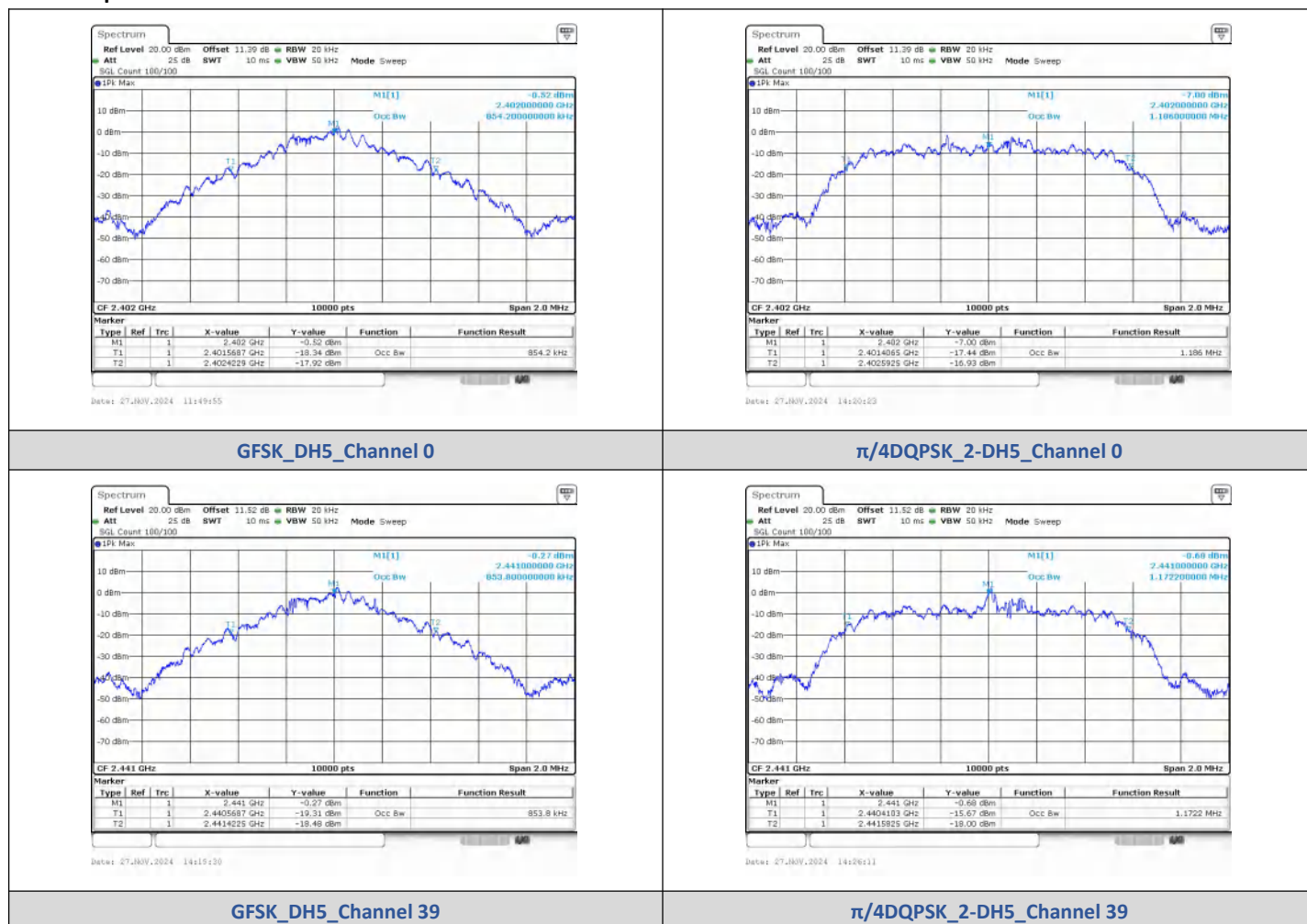
5) 99% Bandwidth

Test Result

Left:

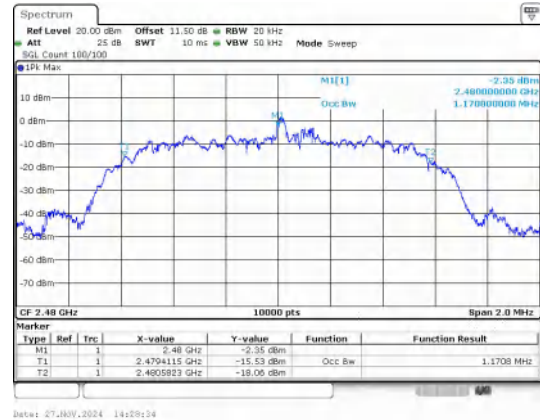
Modulation	Channel	Center Frequency (MHz)	99% BW (MHz)
GFSK	0	2402	0.85420
	39	2441	0.85380
	78	2480	0.85380
$\pi/4$ DQPSK	0	2402	1.1860
	39	2441	1.1722
	78	2480	1.1708
8DPSK	0	2402	1.1940
	39	2441	1.1964
	78	2480	1.1772

Test Graphs

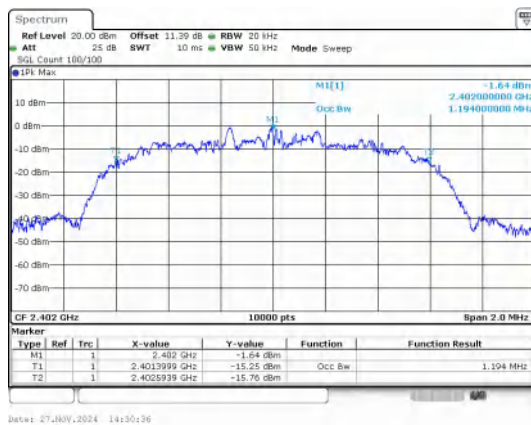




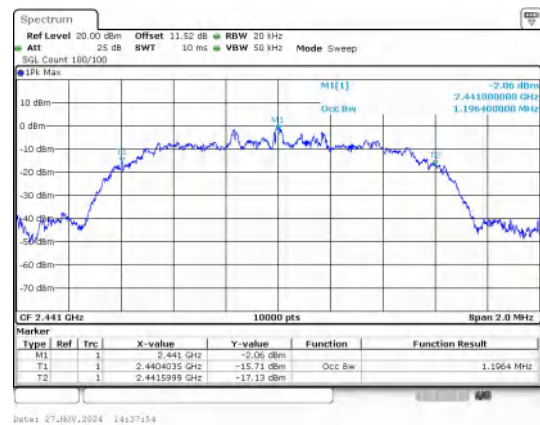
GFSK_DH5_Channel 78



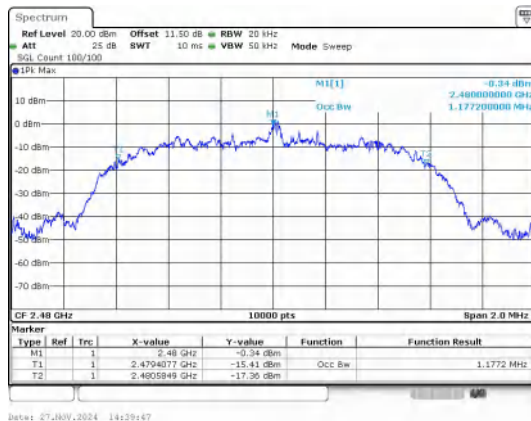
$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



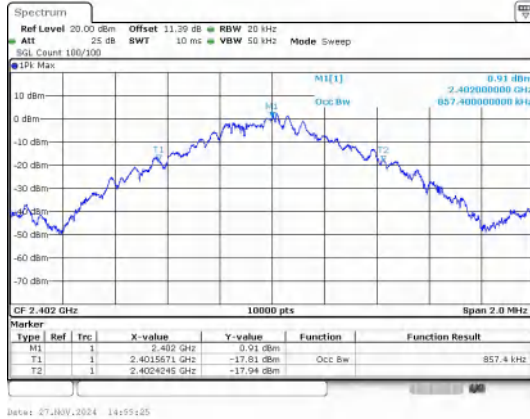
8DPSK_3-DH5_Channel 78

Right:

Modulation	Channel	Center Frequency (MHz)	99% BW (MHz)
GFSK	0	2402	0.85740
	39	2441	0.86240
	78	2480	0.86200
$\pi/4$ DQPSK	0	2402	1.1692
	39	2441	1.1854

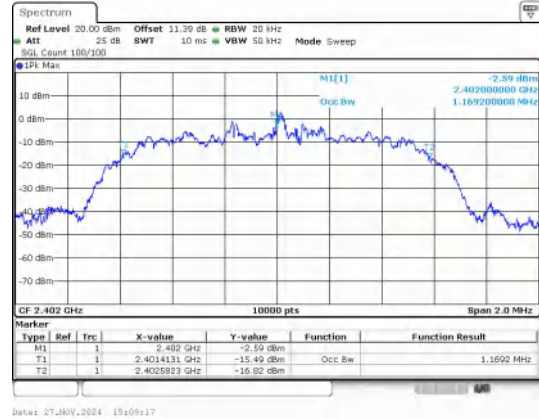
	78	2480	1.1842
8DPSK	0	2402	1.2016
	39	2441	1.1758
	78	2480	1.1828

Test Graphs



Date: 27.JANV.2024 14:59:25

GFSK_DH5_Channel 0

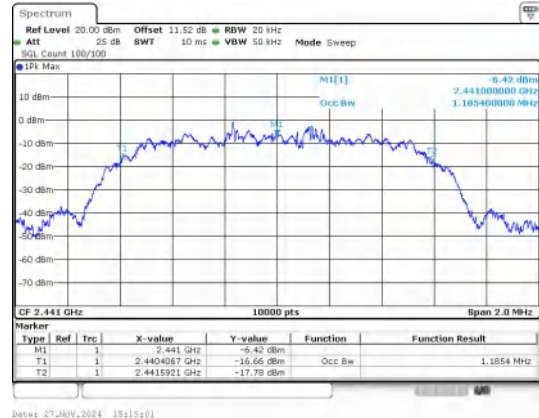


Date: 27.JANV.2024 15:09:17

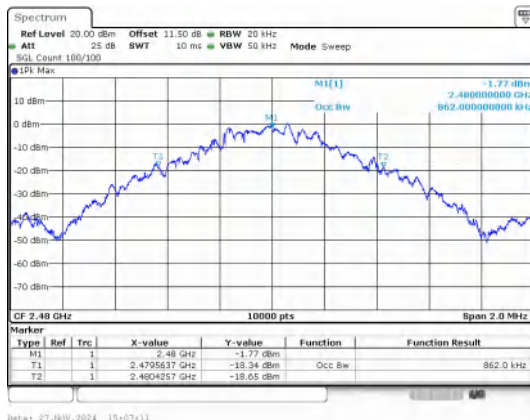
 $\pi/4$ DQPSK_2-DH5_Channel 0


Date: 27.JANV.2024 15:04:24

GFSK_DH5_Channel 39

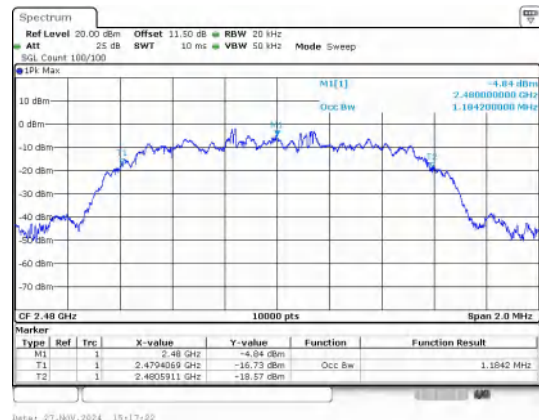


Date: 27.JANV.2024 15:15:01

 $\pi/4$ DQPSK_2-DH5_Channel 39


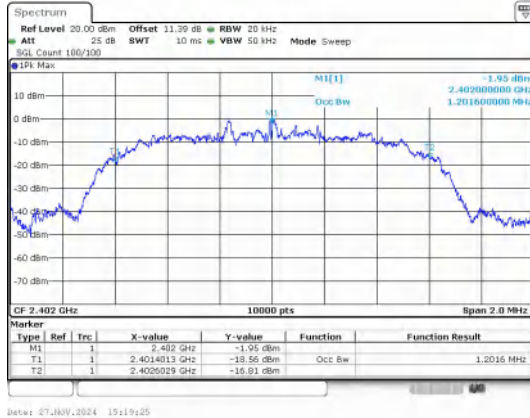
Date: 27.JANV.2024 15:07:11

GFSK_DH5_Channel 78

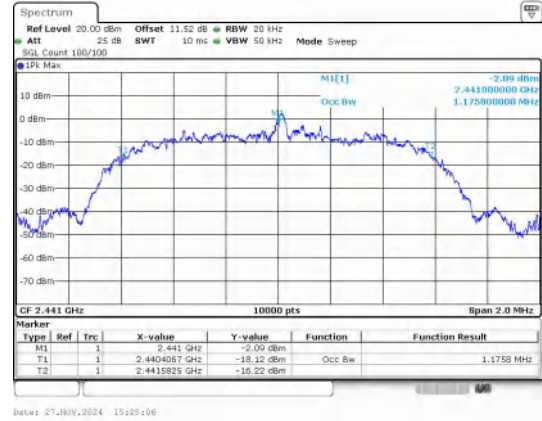


Date: 27.JANV.2024 15:17:22

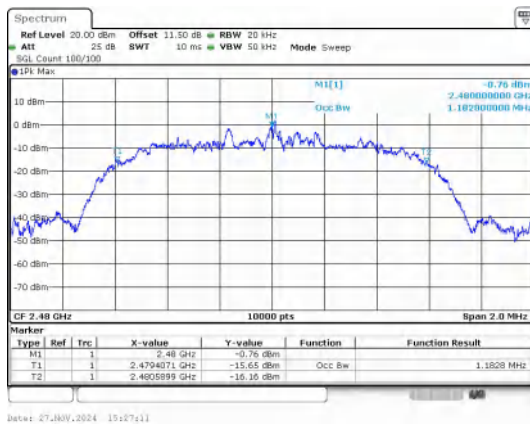
 $\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

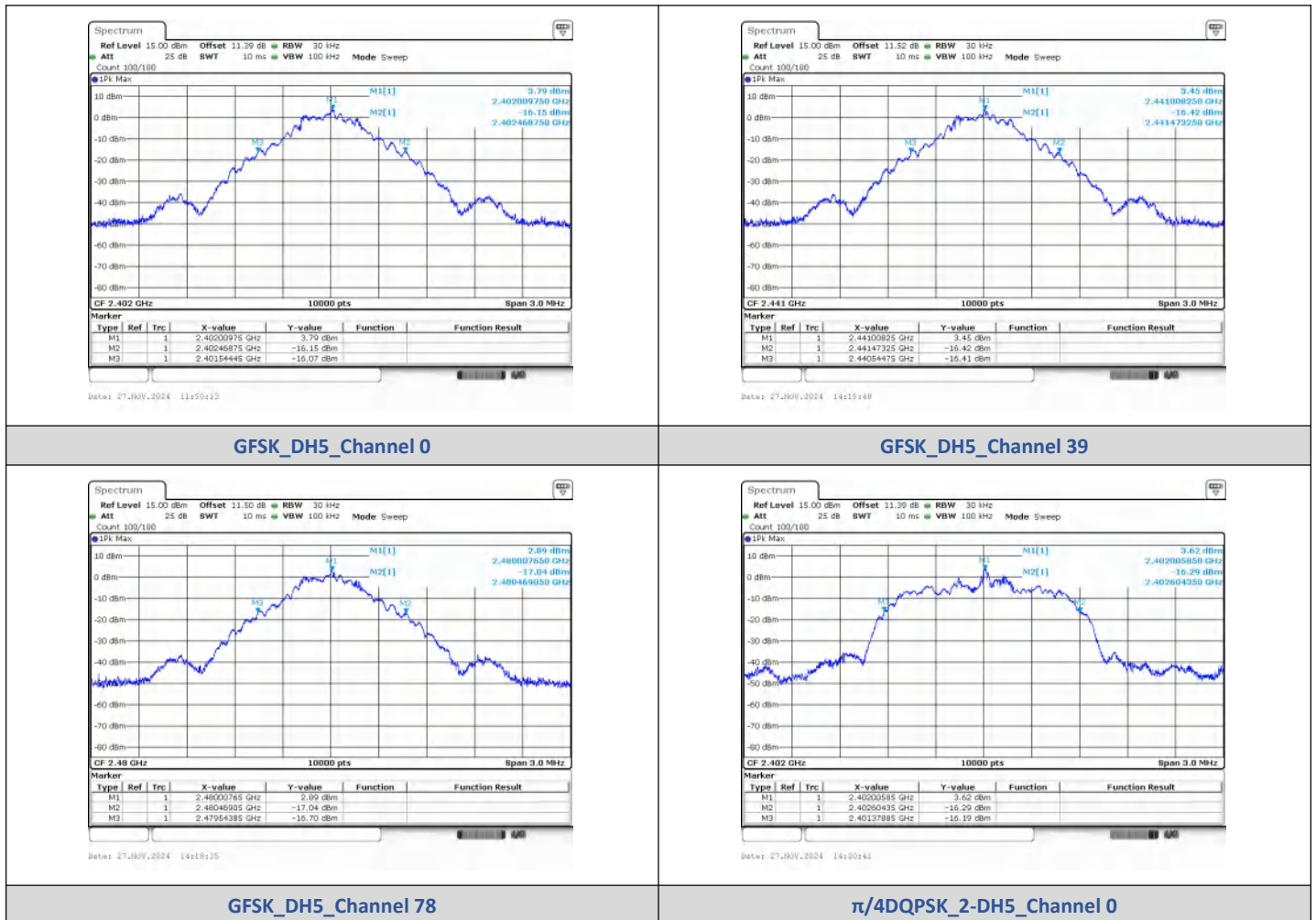
6) 20dB Bandwidth

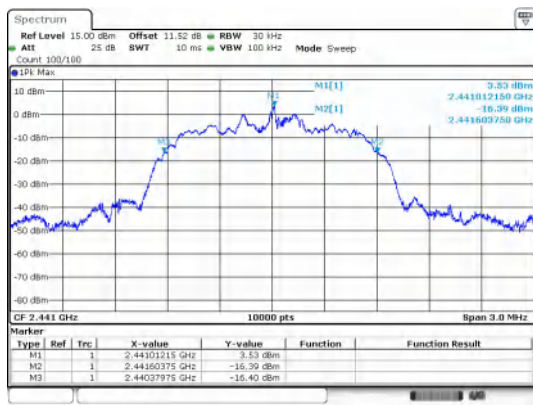
Test Result

Left:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9300
	39	2441 MHz	0.9300
	78	2480 MHz	0.9300
$\pi/4$ DQPSK	0	2402 MHz	1.220
	39	2441 MHz	1.220
	78	2480 MHz	1.220
8DPSK	0	2402 MHz	1.290
	39	2441 MHz	1.260
	78	2480 MHz	1.270

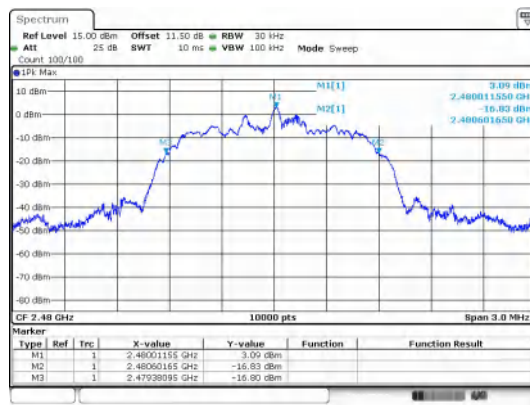
Test Graphs





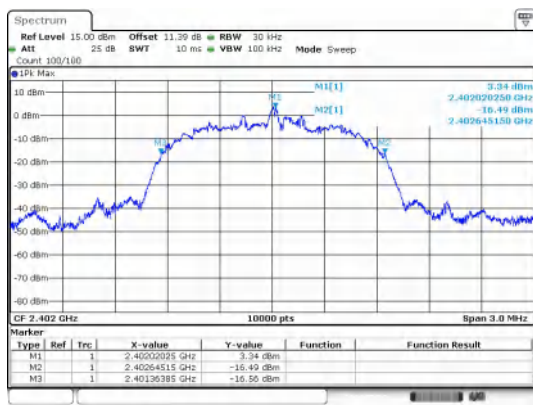
Date: 27,NOV,2024 14:29:29

$\pi/4$ DQPSK_2-DH5_Channel 39



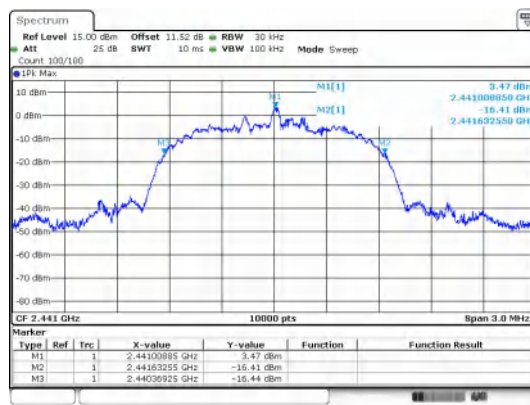
Date: 27,NOV,2024 14:29:52

$\pi/4$ DQPSK_2-DH5_Channel 78



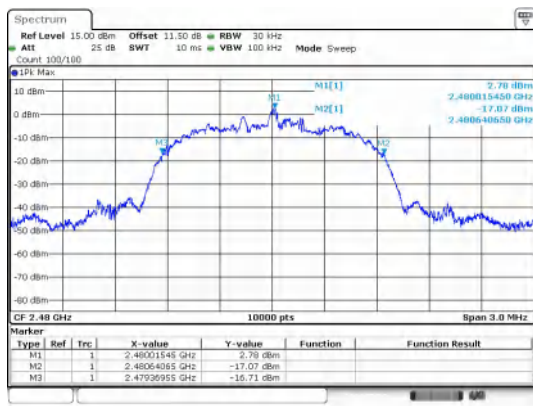
Date: 27,NOV,2024 14:30:54

8DPSK_3-DH5_Channel 0



Date: 27,NOV,2024 14:30:12

8DPSK_3-DH5_Channel 39



Date: 27,NOV,2024 14:40:05

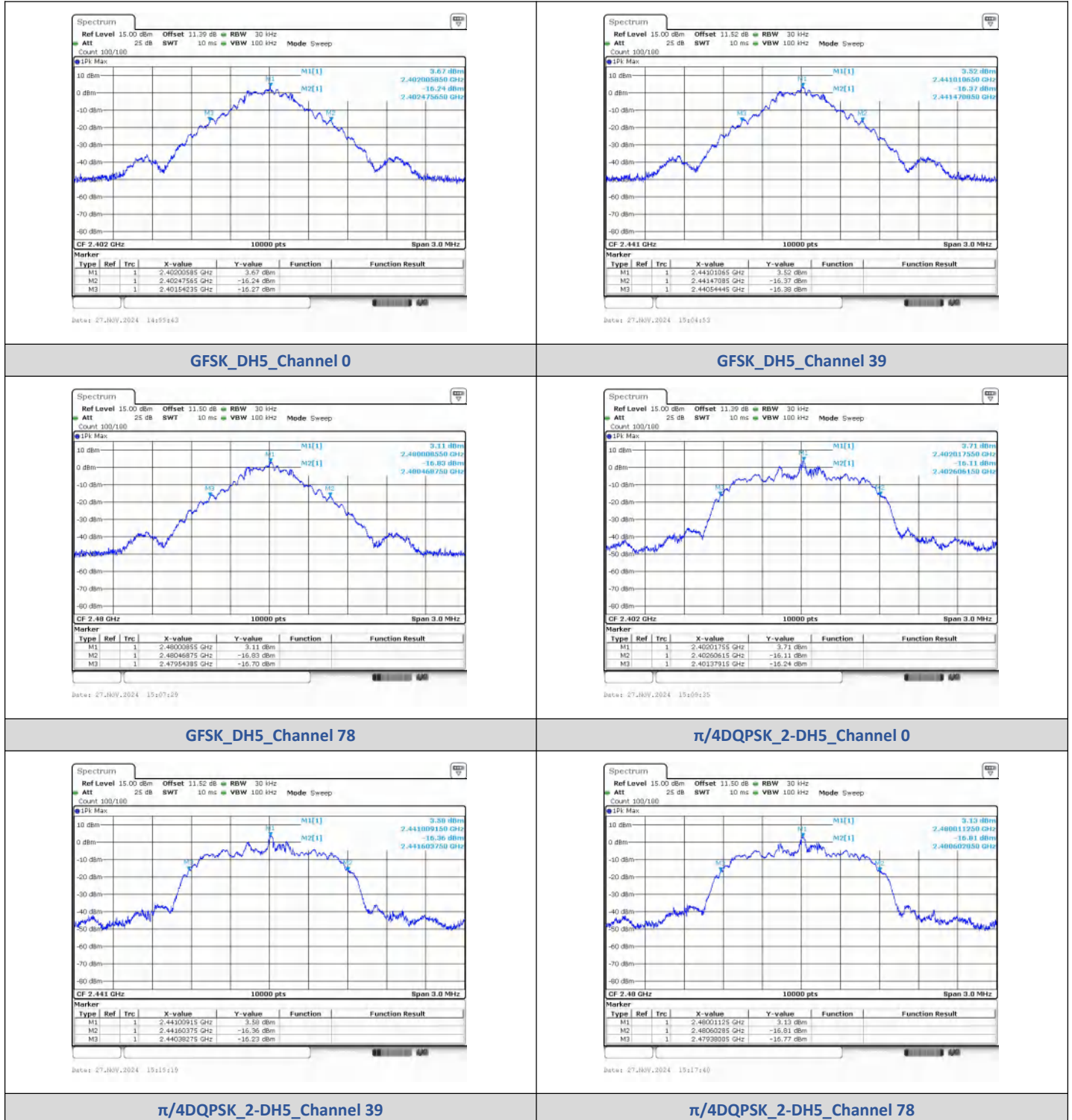
8DPSK_3-DH5_Channel 78

Right:

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	0.9400
	39	2441 MHz	0.9300
	78	2480 MHz	0.9300
$\pi/4$ DQPSK	0	2402 MHz	1.230
	39	2441 MHz	1.220
	78	2480 MHz	1.220

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

Test Graphs

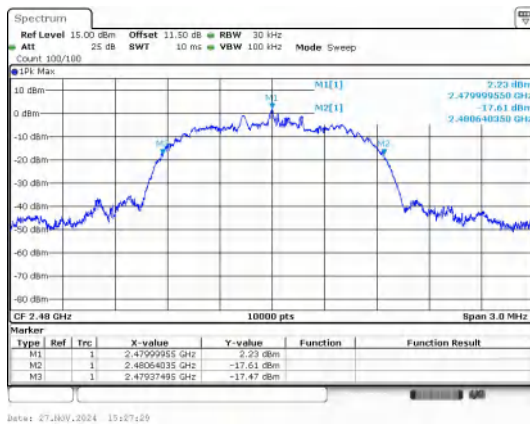




8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

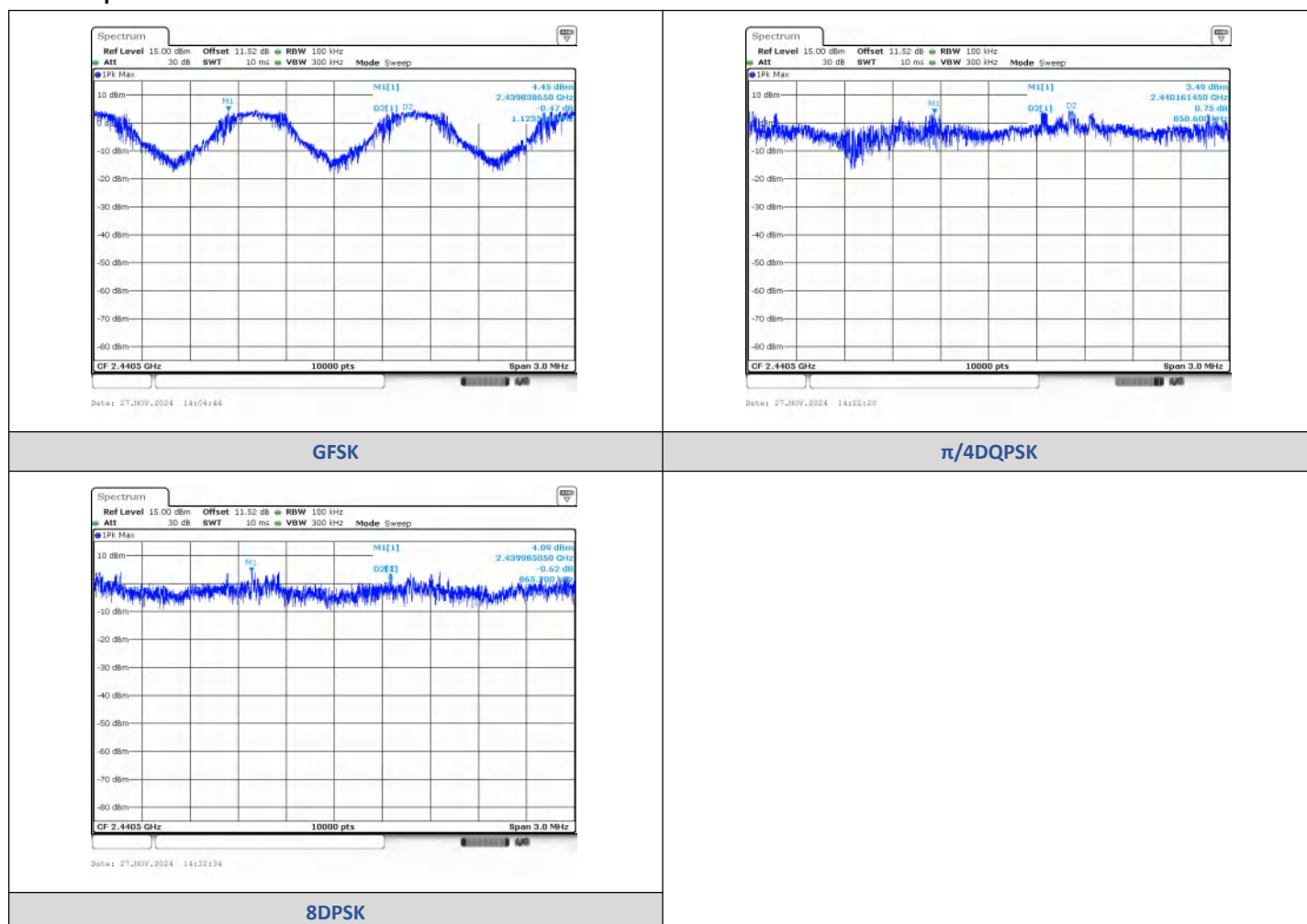
7) Carrier Frequencies Separation

Test Result

Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8387	2440.9621	1.1235	0.93	PASS
$\pi/4$ DQPSK	2-DH5	2440.1615	2441.0201	0.8586	0.813	PASS
8DPSK	3-DH5	2439.985	2440.8502	0.8652	0.86	PASS

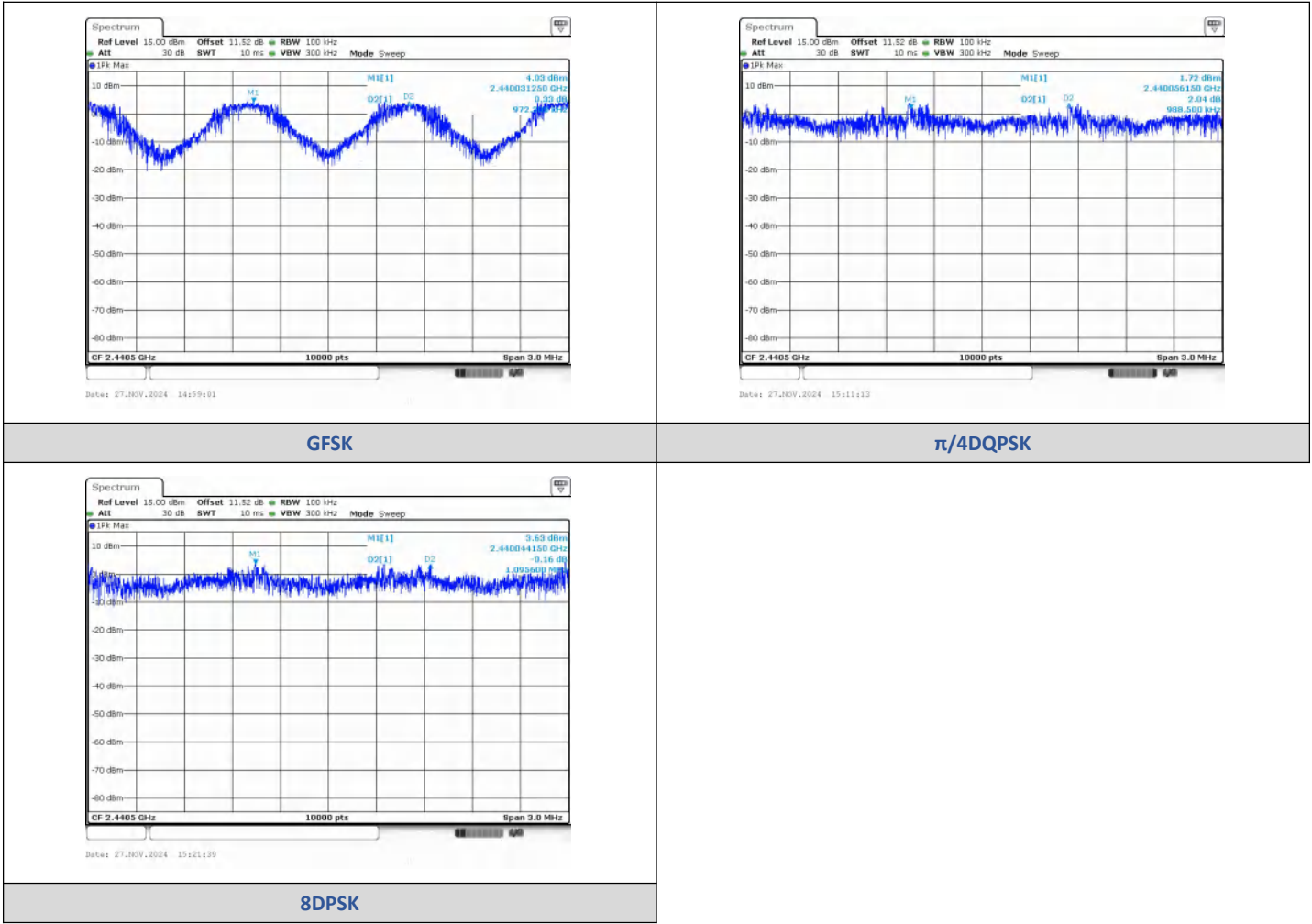
Test Graphs



Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.0312	2441.0035	0.9723	0.94	PASS
$\pi/4$ DQPSK	2-DH5	2440.0561	2441.0446	0.9885	0.82	PASS
8DPSK	3-DH5	2440.0442	2441.1397	1.0956	0.847	PASS

Test Graphs



8) Conducted Out Of Band Emission

Test Result

Left:

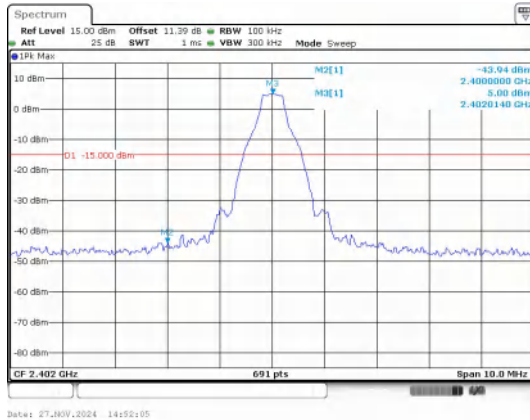
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-43.940	-15.0	-28.940	PASS
			4803.85	-37.149	-15.0	-22.149	PASS
		39	4882.09	-41.361	-15.43	-25.931	PASS
		78	2483.50	-45.760	-16.0	-29.760	PASS
			4960.33	-44.070	-16.0	-28.070	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-44.170	-15.2	-28.970	PASS
			4804.68	-37.891	-15.2	-22.691	PASS
		39	2389.25	-46.401	-15.54	-30.861	PASS
		78	2483.50	-47.470	-16.0	-31.470	PASS
			4960.33	-48.001	-16.0	-32.001	PASS
8DPSK	3-DH5	0	2400.00	-45.410	-14.99	-30.420	PASS
			4803.85	-39.670	-14.99	-24.680	PASS
		39	4881.25	-46.743	-15.94	-30.803	PASS
		78	2483.50	-47.450	-16.04	-31.410	PASS
			4960.33	-45.318	-16.04	-29.278	PASS

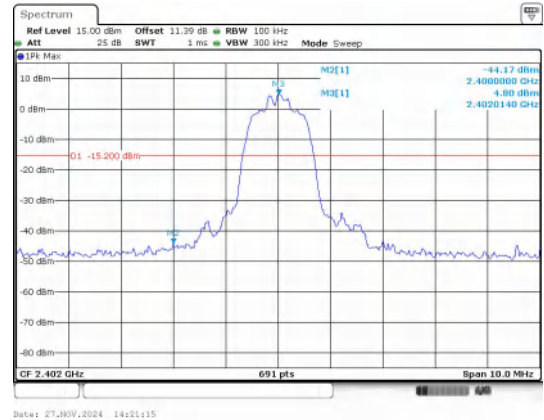
Hopping

Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2397.95	-32.803	-15.19	-17.613	PASS
			2400.00	-43.600	-15.19	-28.410	PASS
			2483.50	-47.350	-16.02	-31.330	PASS
$\pi/4$ DQPSK	2-DH5		2396.01	-43.993	-16.5	-27.493	PASS
			2400.00	-48.190	-16.5	-31.690	PASS
			2483.50	-49.740	-16.2	-33.540	PASS
8DPSK	3-DH5		2396.01	-44.079	-15.14	-28.939	PASS
			2400.00	-44.720	-15.14	-29.580	PASS
			2483.50	-48.650	-19.78	-28.870	PASS

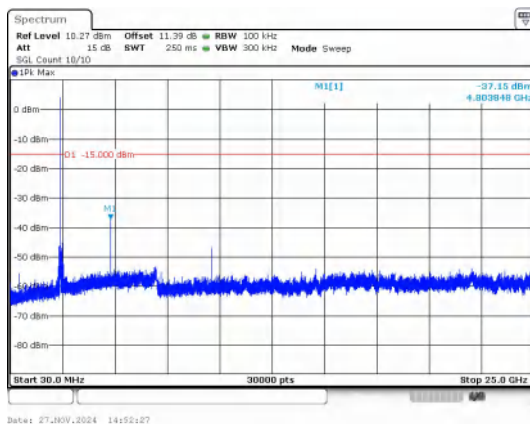
Test Graphs



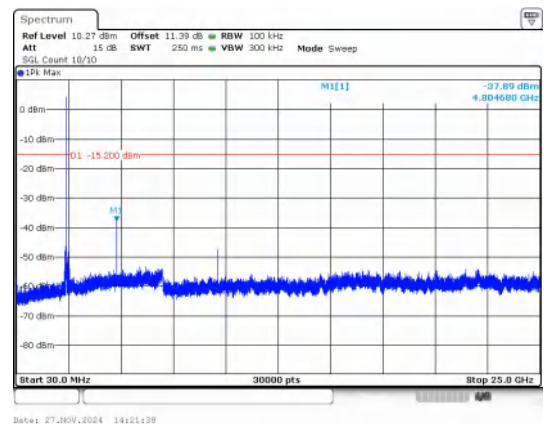
Out Of Band Emission
GFSK_DH5_Channel 0



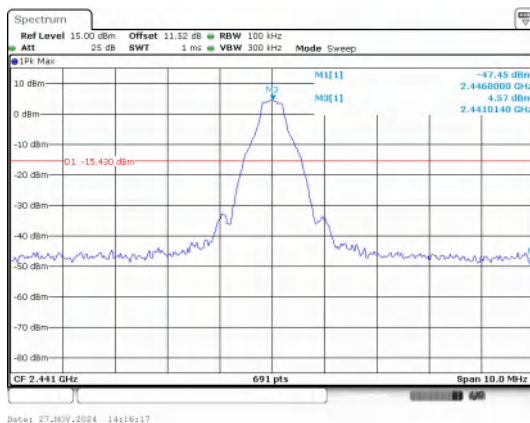
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 0



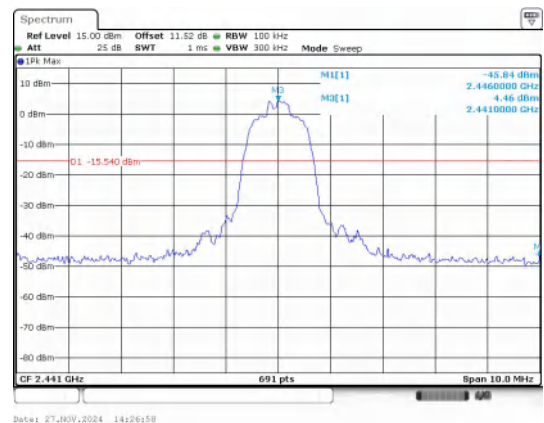
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



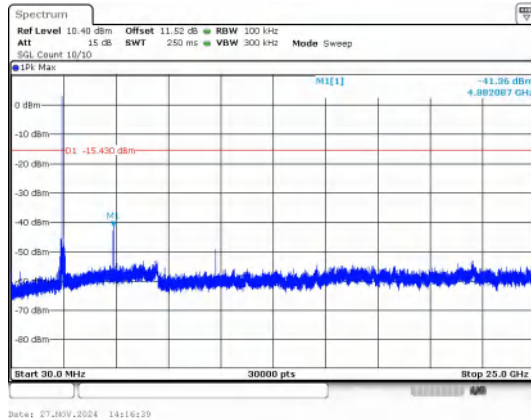
30.0 MHz - 25000.0 MHz
 $\pi/4$ QPSK_2-DH5_Channel 0



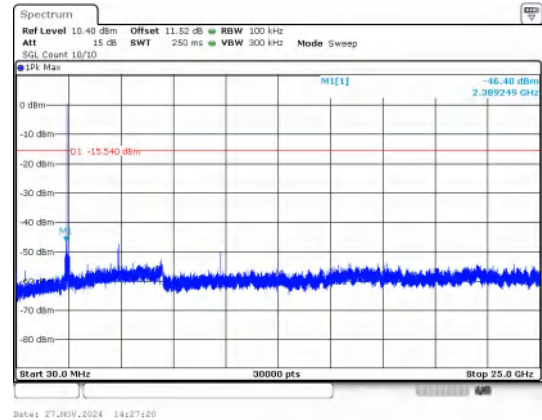
Out Of Band Emission
GFSK_DH5_Channel 39



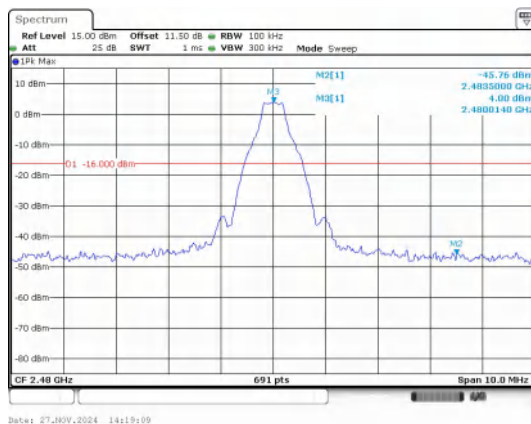
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 39



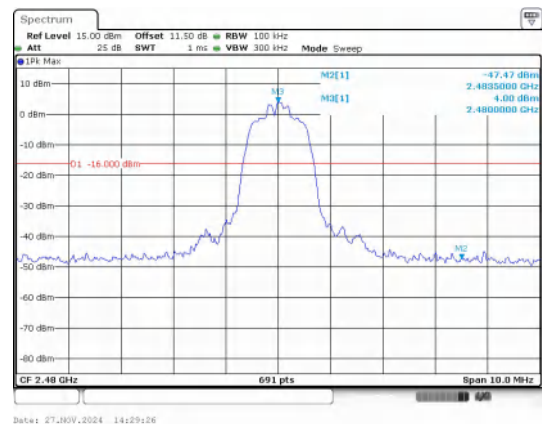
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



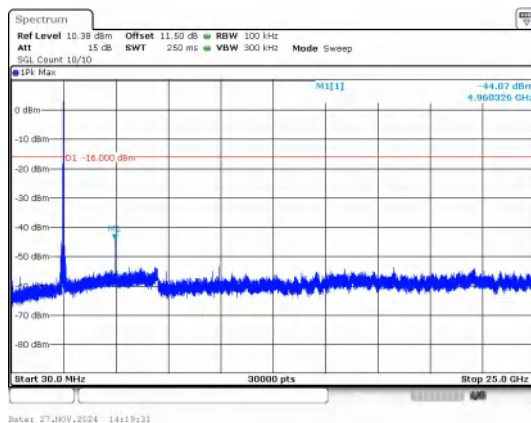
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



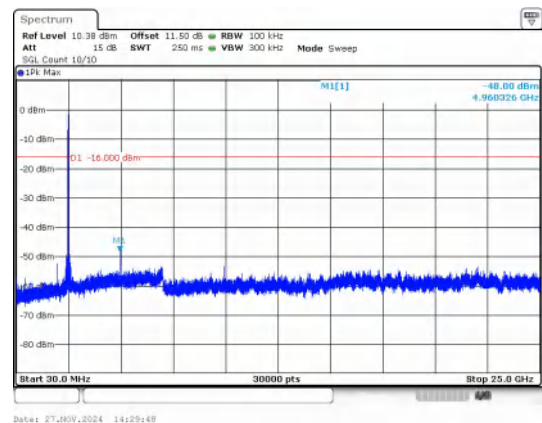
Out Of Band Emission
GFSK_DH5_Channel 78



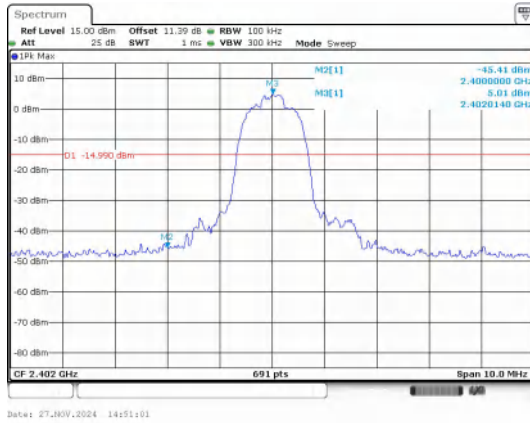
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



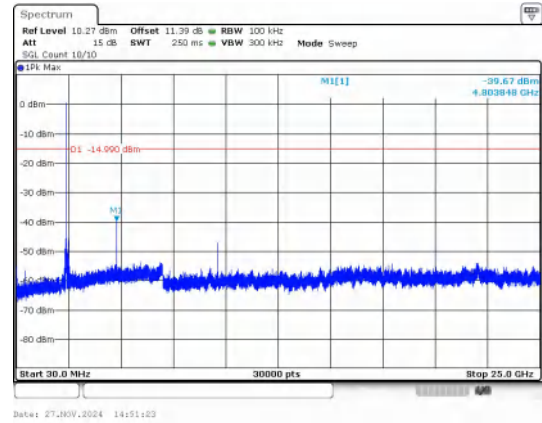
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



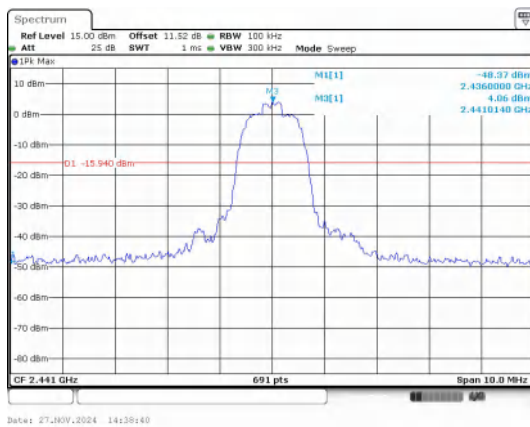
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



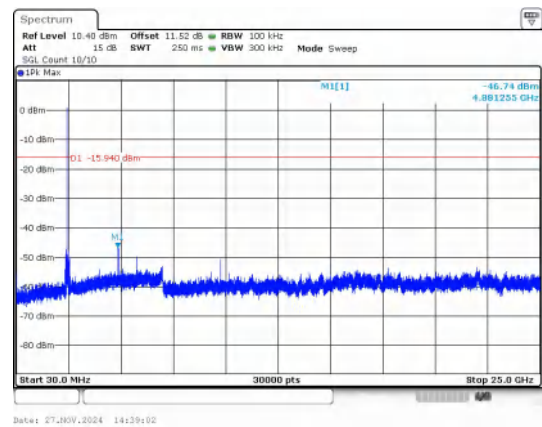
Out Of Band Emission
8DPSK_3-DH5_Channel 0



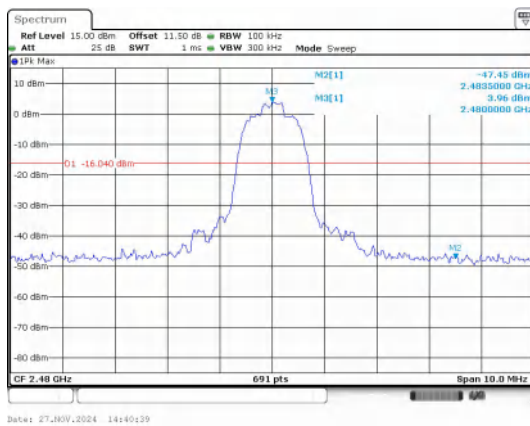
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



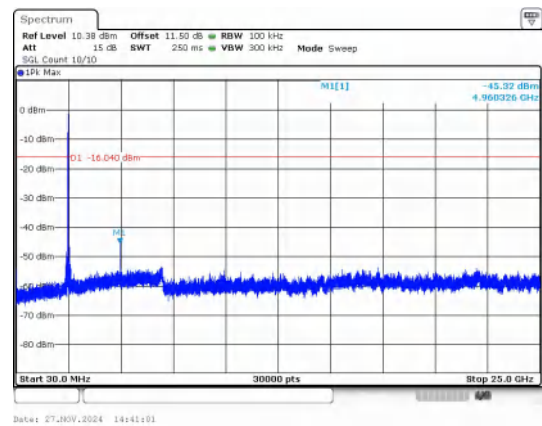
Out Of Band Emission
8DPSK_3-DH5_Channel 39



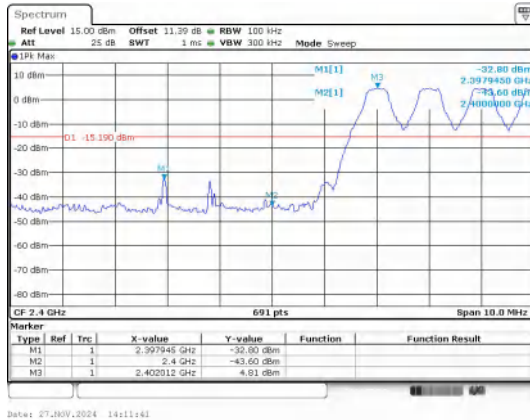
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



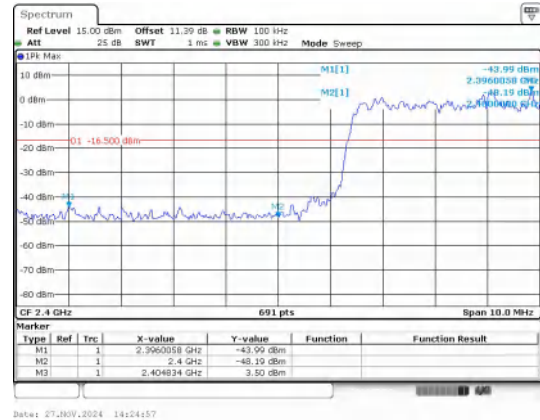
Out Of Band Emission
8DPSK_3-DH5_Channel 78



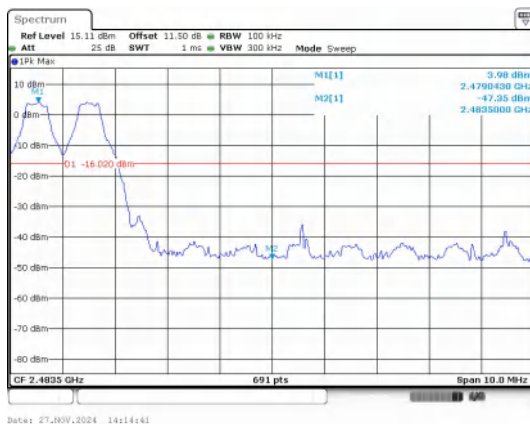
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



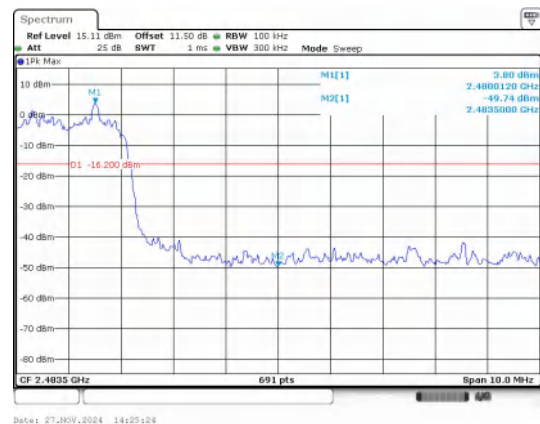
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



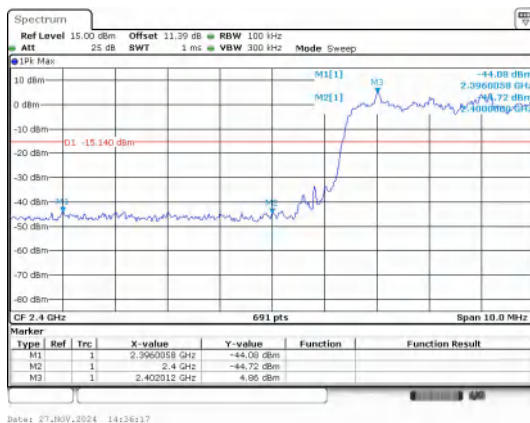
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



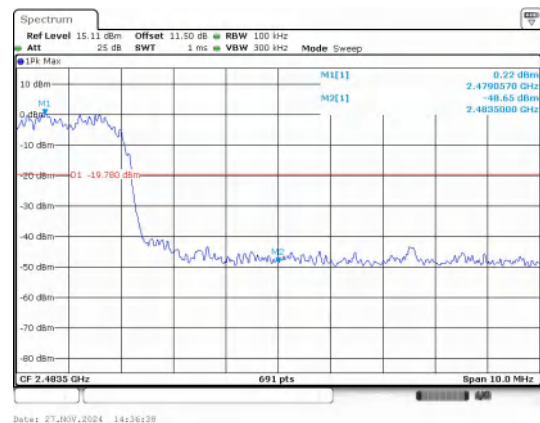
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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

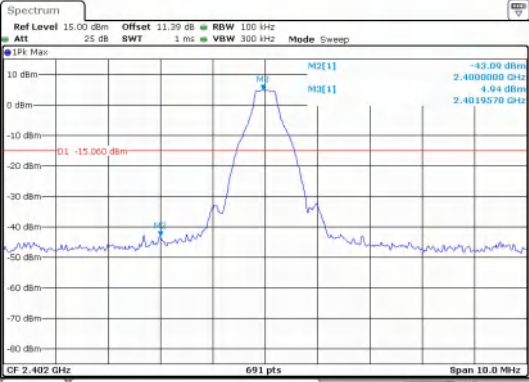
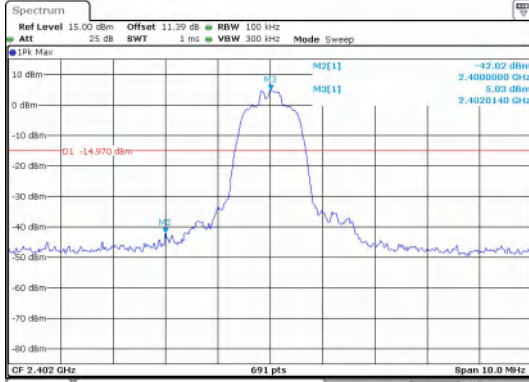
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
------------	--------	---------	------------------------------------	--------------------------------	----------------	--------------------	--------

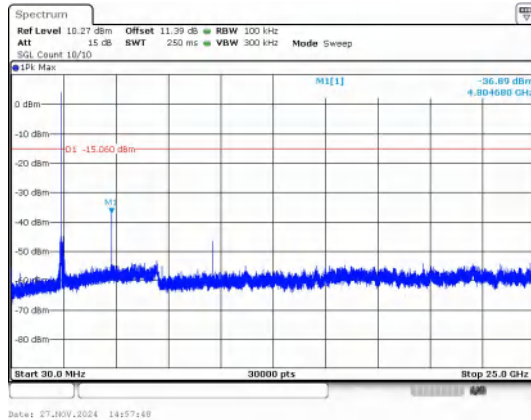
GFSK	DH5	0	2400.00	-43.090	-15.06	-28.030	PASS
			4804.68	-36.893	-15.06	-21.833	PASS
		39	4882.09	-39.536	-15.56	-23.976	PASS
		78	2483.50	-47.250	-15.9	-31.350	PASS
			4959.49	-42.567	-15.9	-26.667	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-42.020	-14.97	-27.050	PASS
			4803.85	-40.053	-14.97	-25.083	PASS
		39	5744.38	-44.816	-15.39	-29.426	PASS
		78	2483.50	-48.340	-15.89	-32.450	PASS
			4960.33	-46.652	-15.89	-30.762	PASS
8DPSK	3-DH5	0	2400.00	-45.560	-14.99	-30.570	PASS
			4803.85	-41.122	-14.99	-26.132	PASS
		39	4882.09	-45.329	-15.36	-29.969	PASS
		78	2483.50	-47.890	-16.09	-31.800	PASS
			4959.49	-45.992	-16.09	-29.902	PASS

Hopping

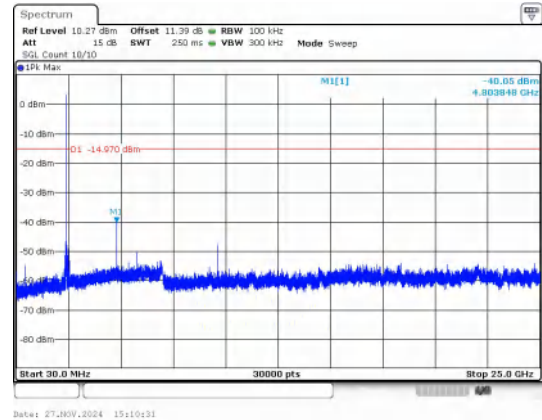
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.15	-43.418	-15.17	-28.248	PASS
			2400.00	-43.910	-15.17	-28.740	PASS
			2483.50	-48.390	-16.06	-32.330	PASS
$\pi/4$ DQPSK	2-DH5		2398.86	-43.621	-15.61	-28.011	PASS
			2400.00	-45.200	-15.61	-29.590	PASS
			2483.50	-48.090	-16.4	-31.690	PASS
8DPSK	3-DH5		2395.34	-44.287	-16.68	-27.607	PASS
			2400.00	-45.600	-16.68	-28.920	PASS
			2483.50	-49.390	-17.36	-32.030	PASS

Test Graphs

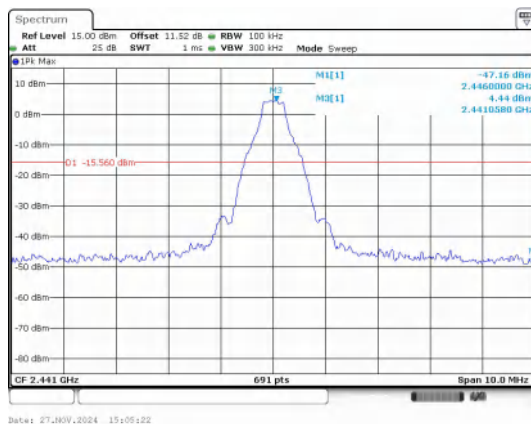
 Out Of Band Emission GFSK_DH5_Channel 0	 Out Of Band Emission $\pi/4$DQPSK_2-DH5_Channel 0
--	--



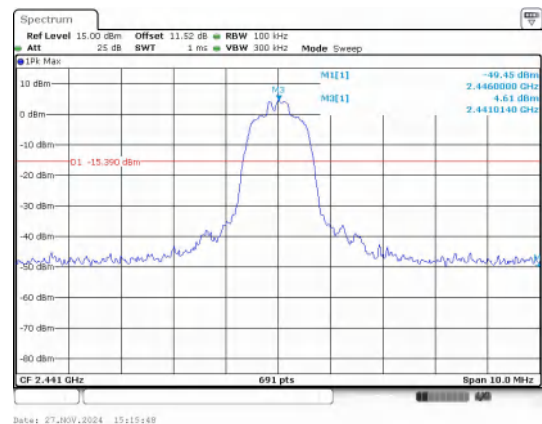
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



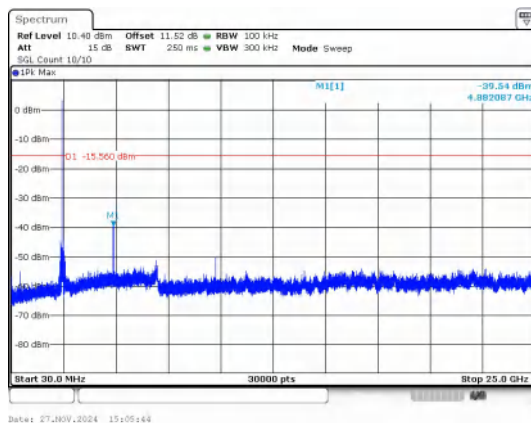
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



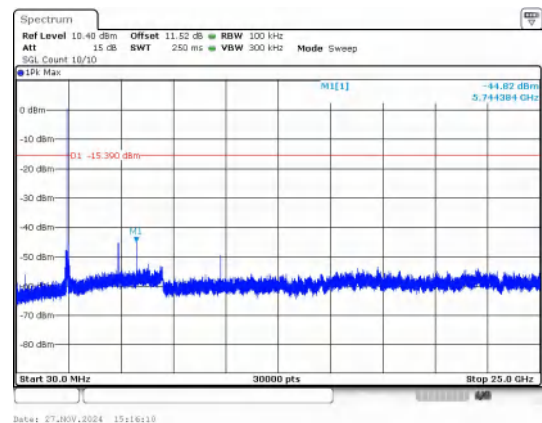
Out Of Band Emission
GFSK_DH5_Channel 39



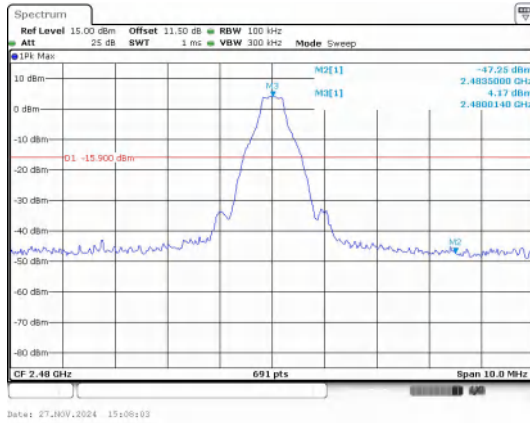
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



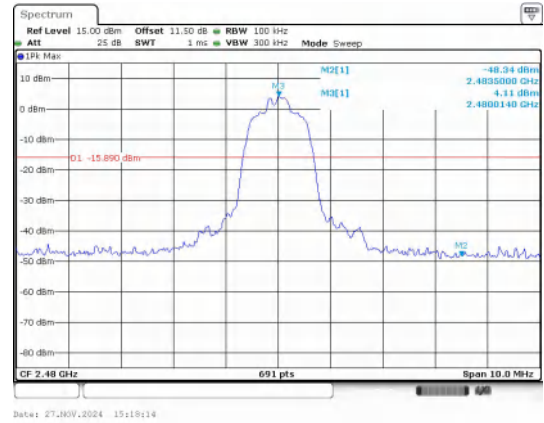
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



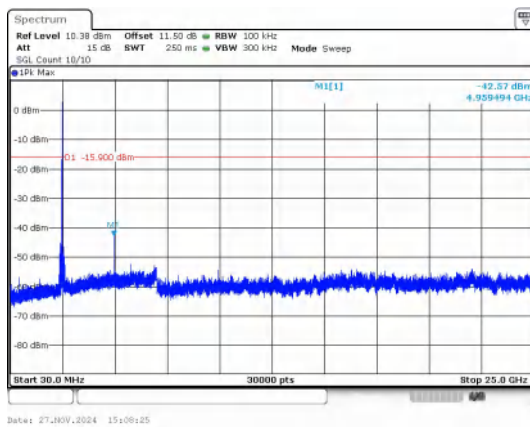
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



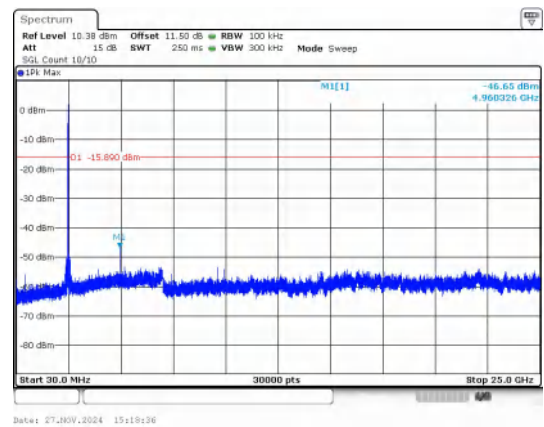
Out Of Band Emission
GFSK_DH5_Channel 78



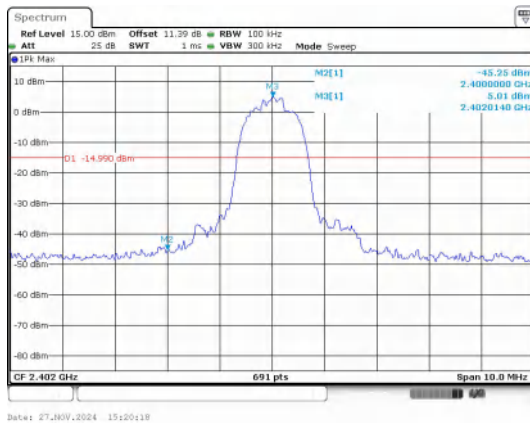
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



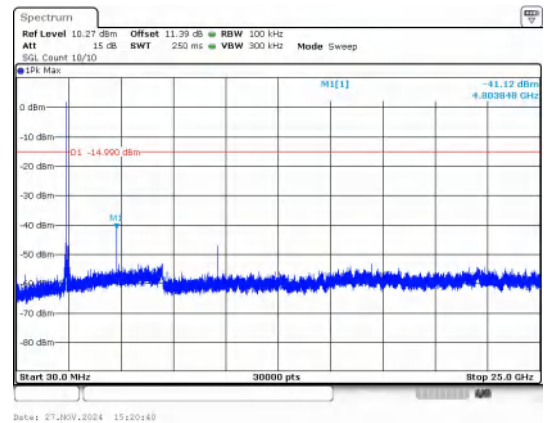
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



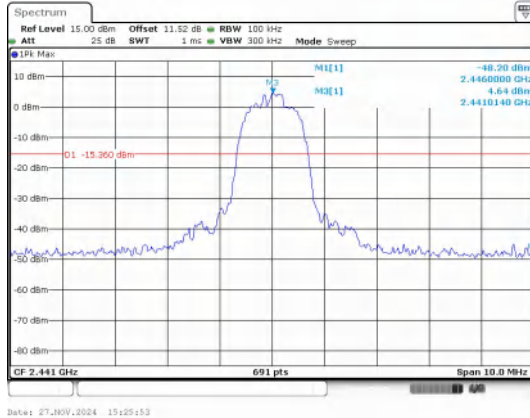
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



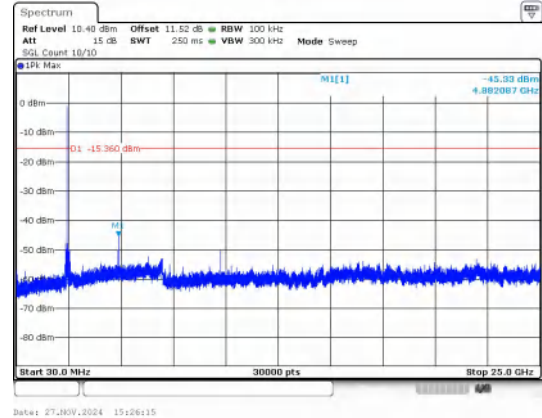
Out Of Band Emission
8DPSK_3-DH5_Channel 0



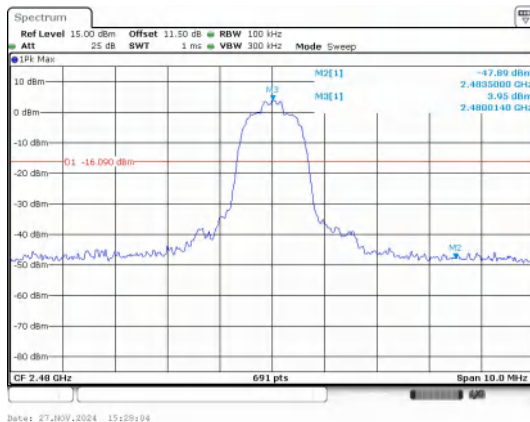
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



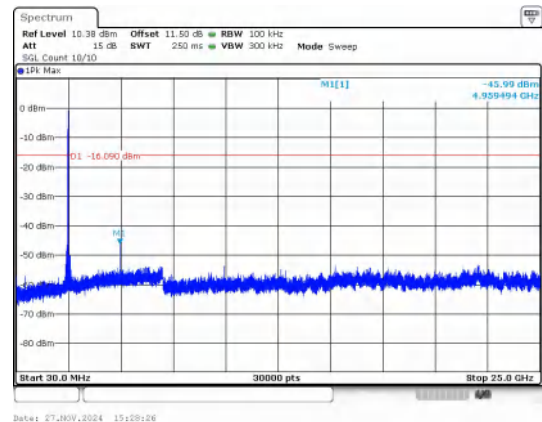
Out Of Band Emission
8DPSK_3-DH5_Channel 39



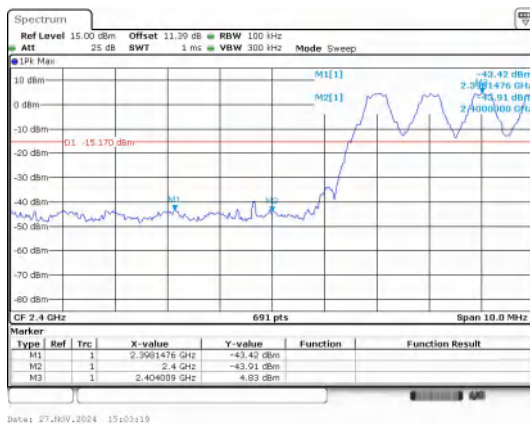
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



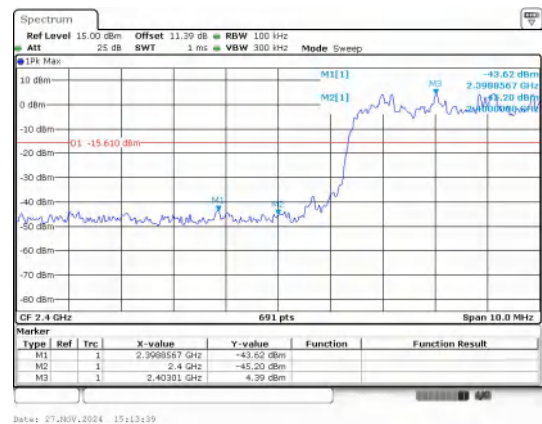
Out Of Band Emission
8DPSK_3-DH5_Channel 78



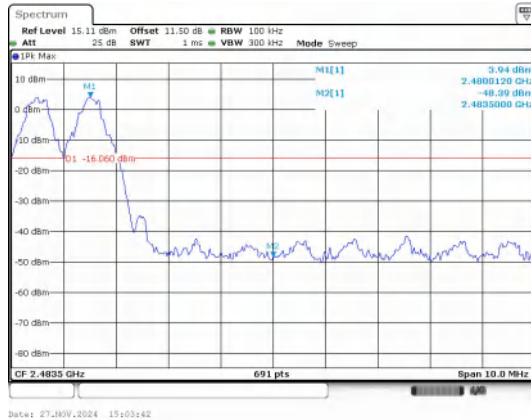
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



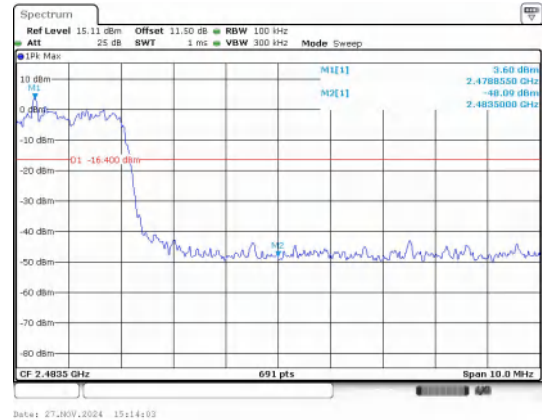
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



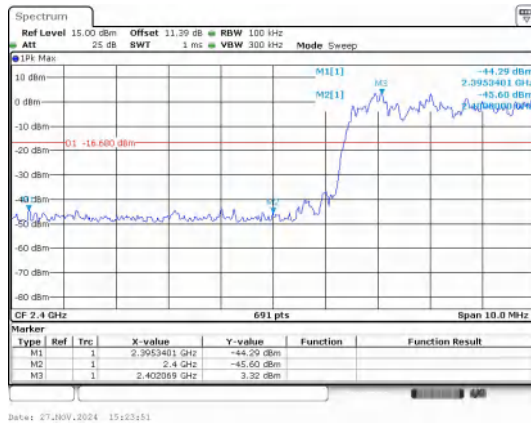
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



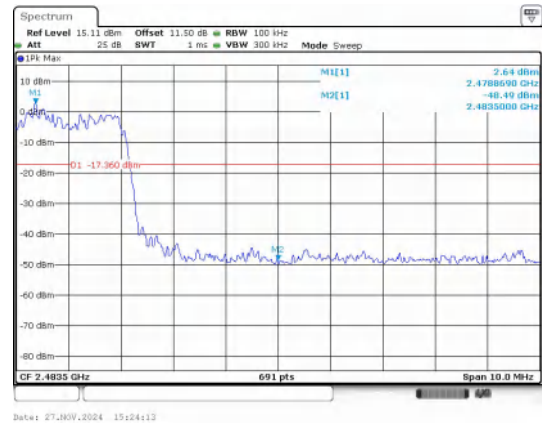
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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-----