

Appendix Report

Report No.:	CISRR241225218
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

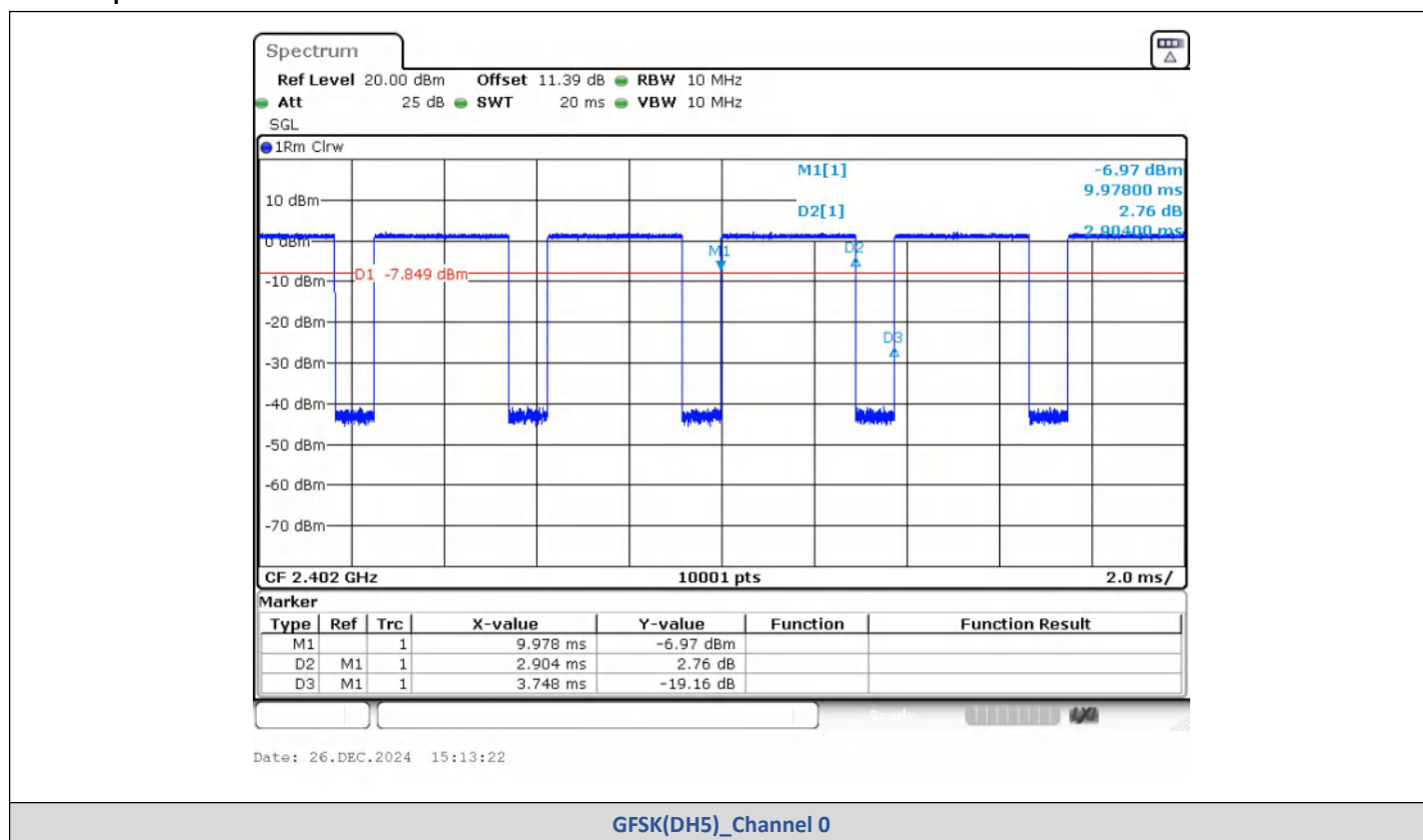
1) Duty Cycle

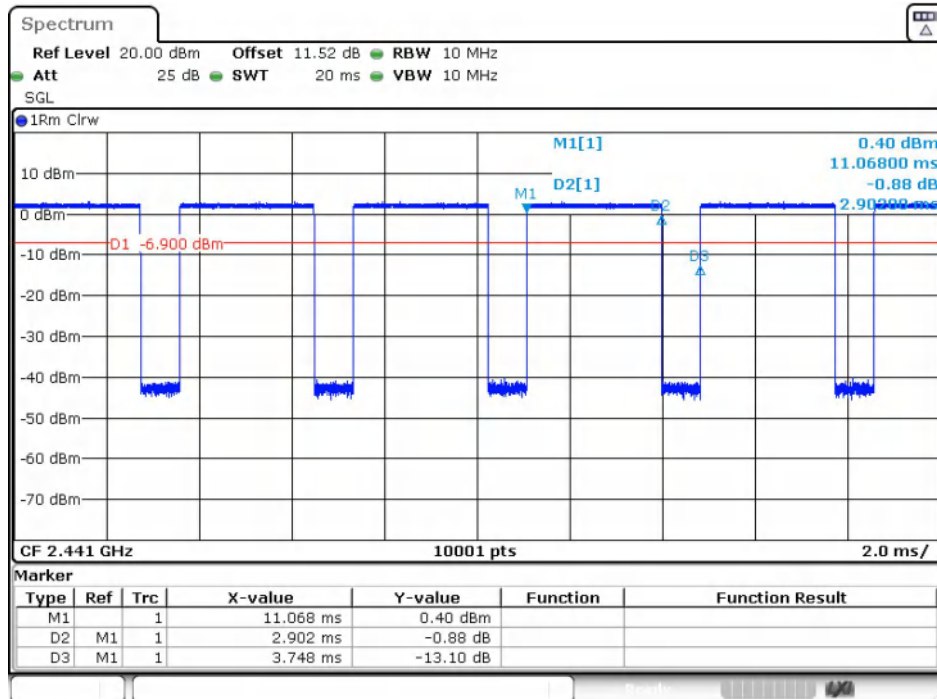
Test Result

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	2.902	3.748	77.43	0.7743	1.1109	0.3446
		78	2.902	3.748	77.43	0.7743	1.1109	0.3446
$\pi/4$ 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	2.908	3.748	77.59	0.7759	1.1019	0.3439
8DPSK	3-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	2.910	3.748	77.64	0.7764	1.0991	0.3436

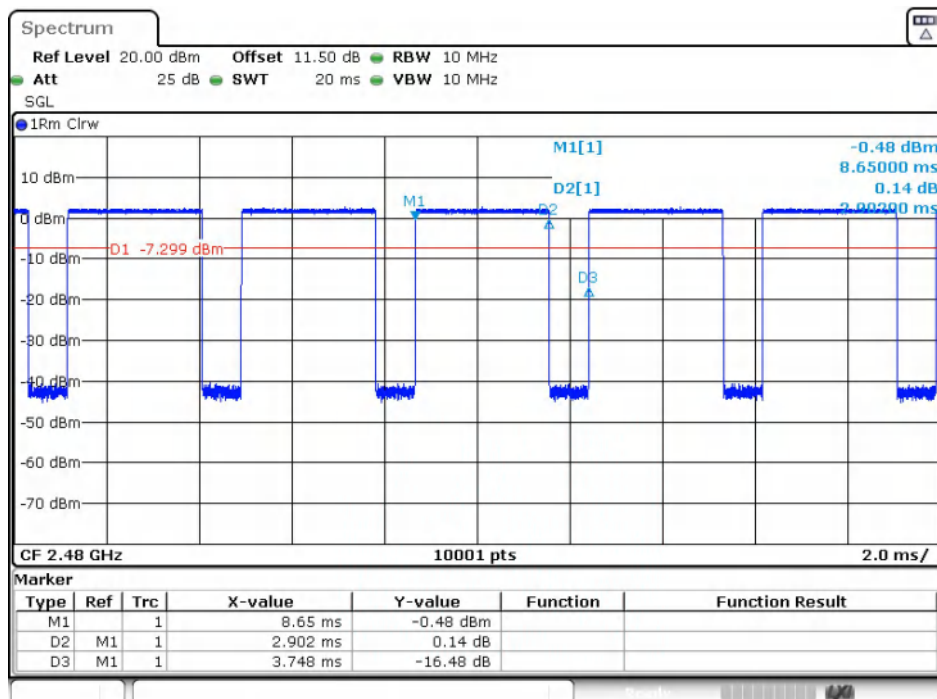
Test Graphs





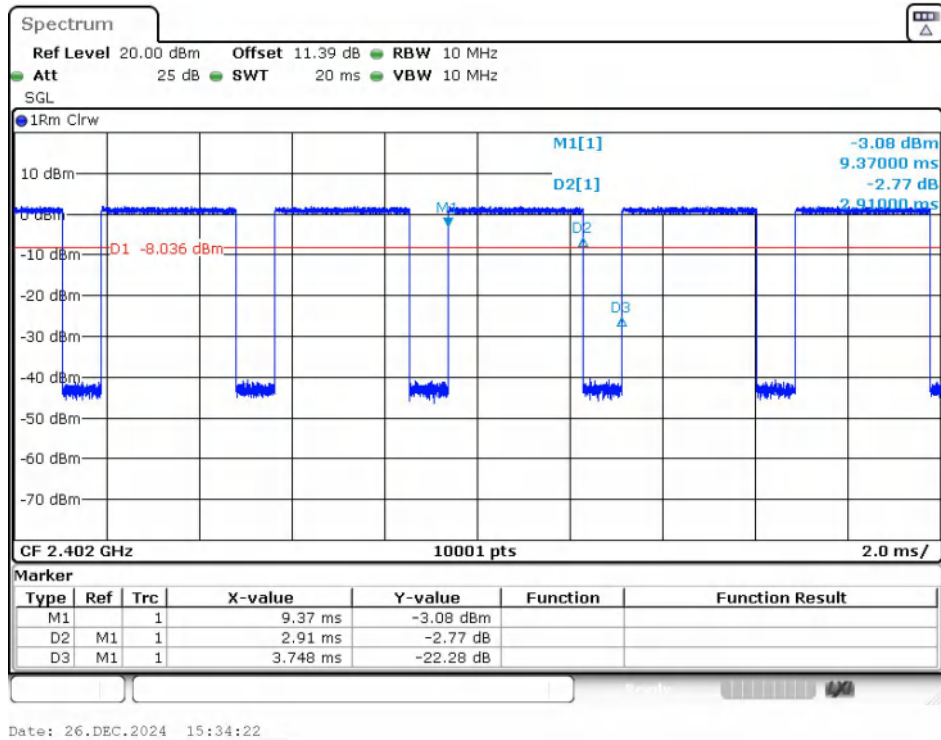
Date: 26,DEC,2024 15:29:21

GFSK(DH5)_Channel 39

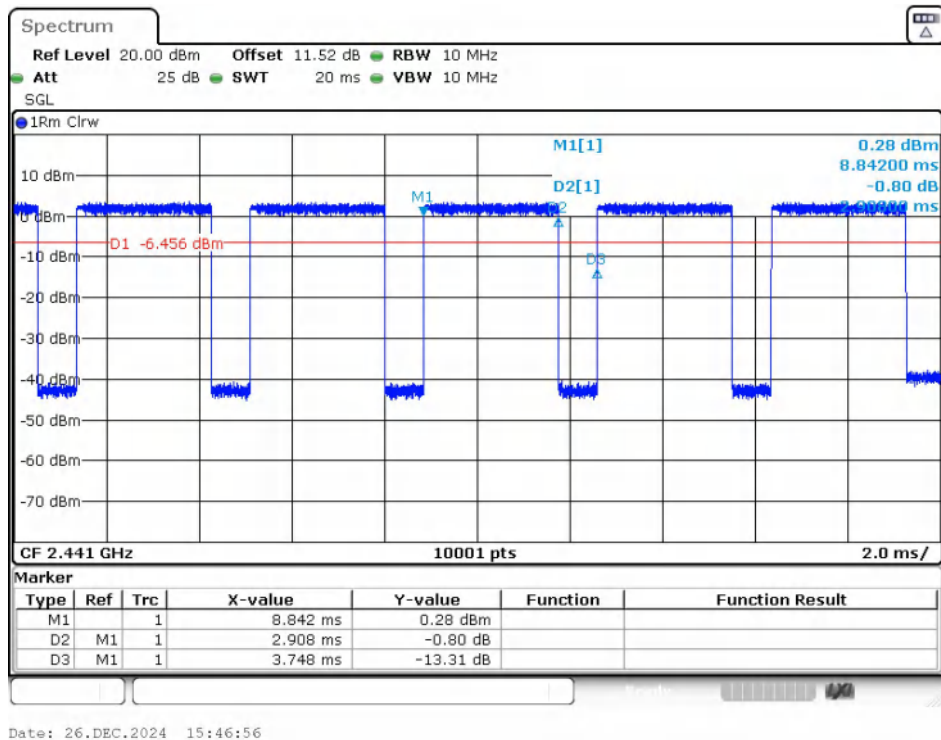


Date: 26,DEC,2024 15:31:17

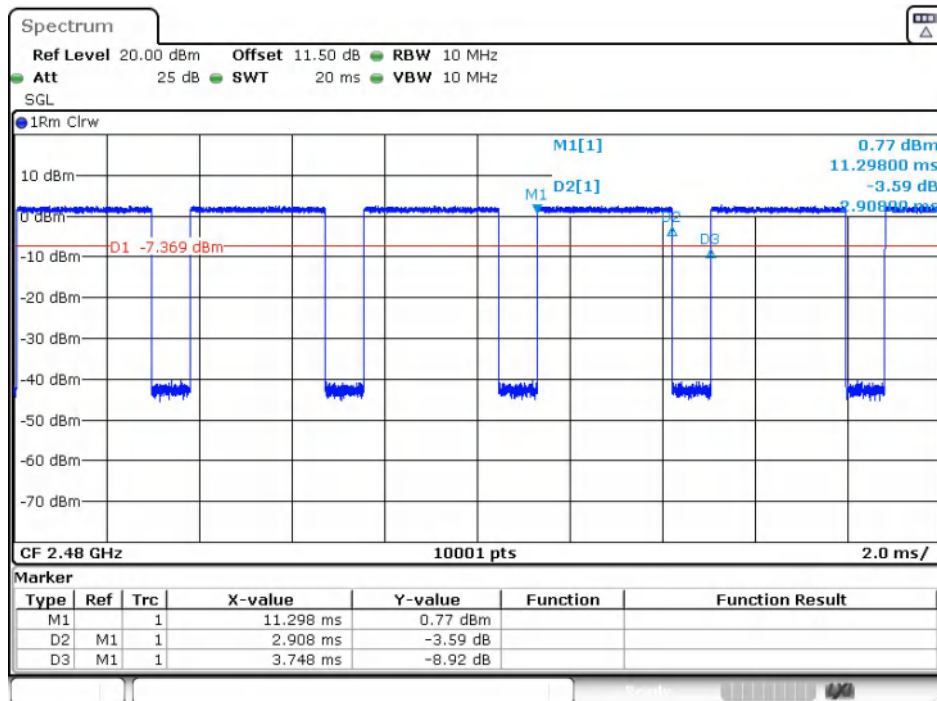
GFSK(DH5)_Channel 78



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

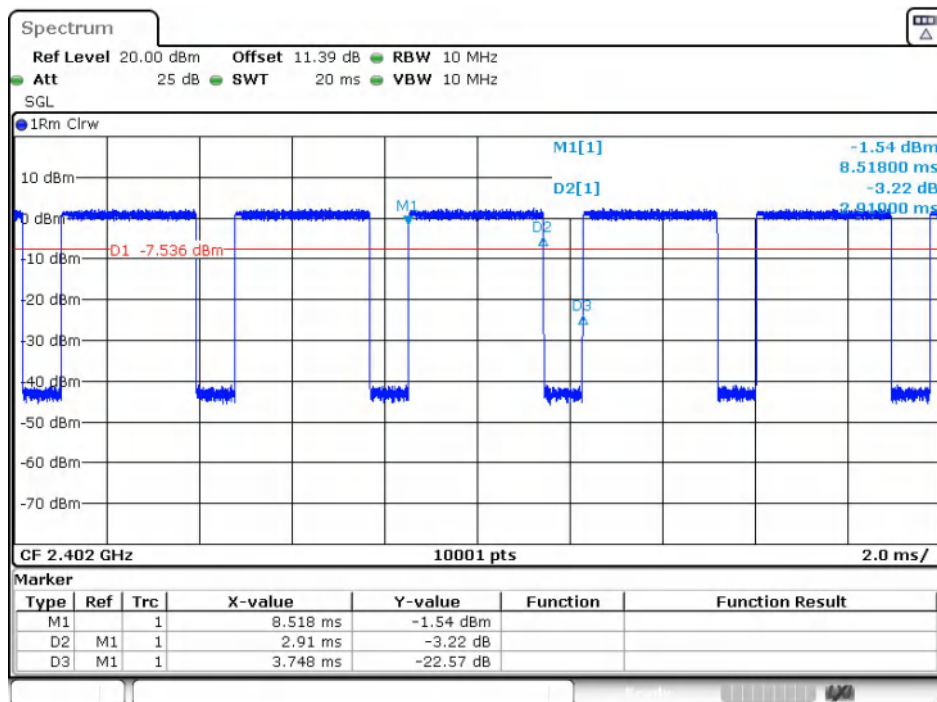


$\pi/4$ DQPSK(2-DH5)_Channel 39



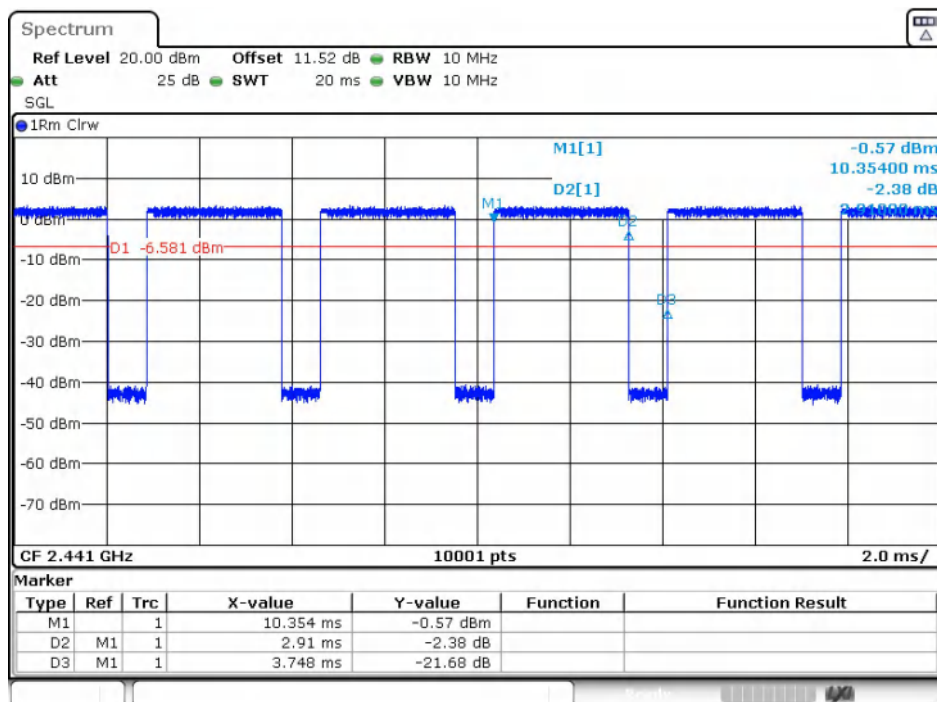
Date: 26,DEC,2024 15:48:57

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



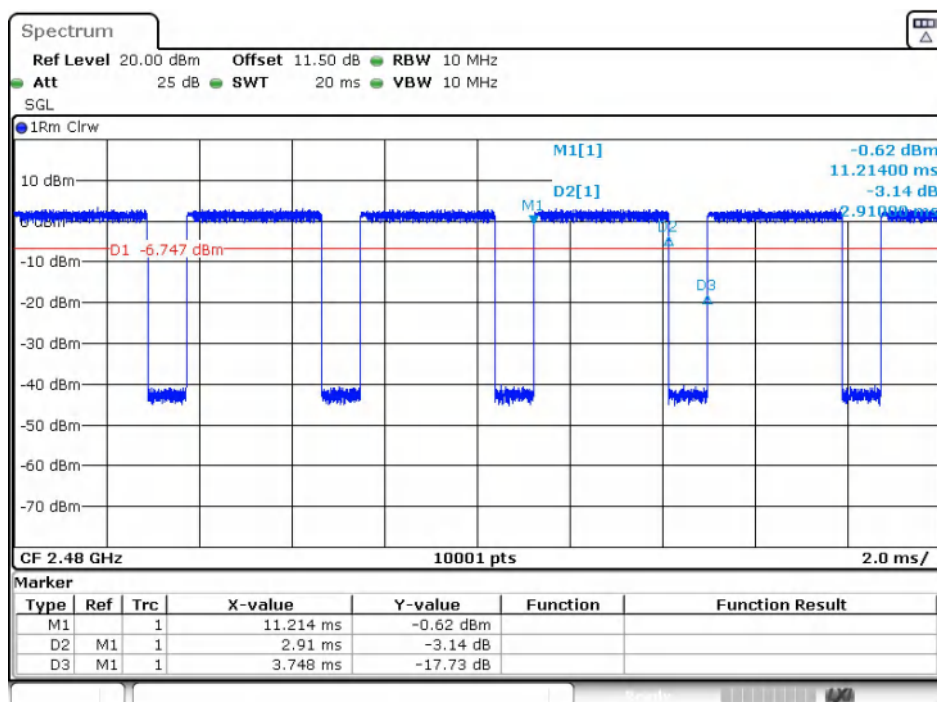
Date: 26,DEC,2024 15:51:44

8DPSK(3-DH5)_Channel 0



Date: 26,DEC,2024 16:02:43

8DPSK(3-DH5)_Channel 39



Date: 26,DEC,2024 16:04:32

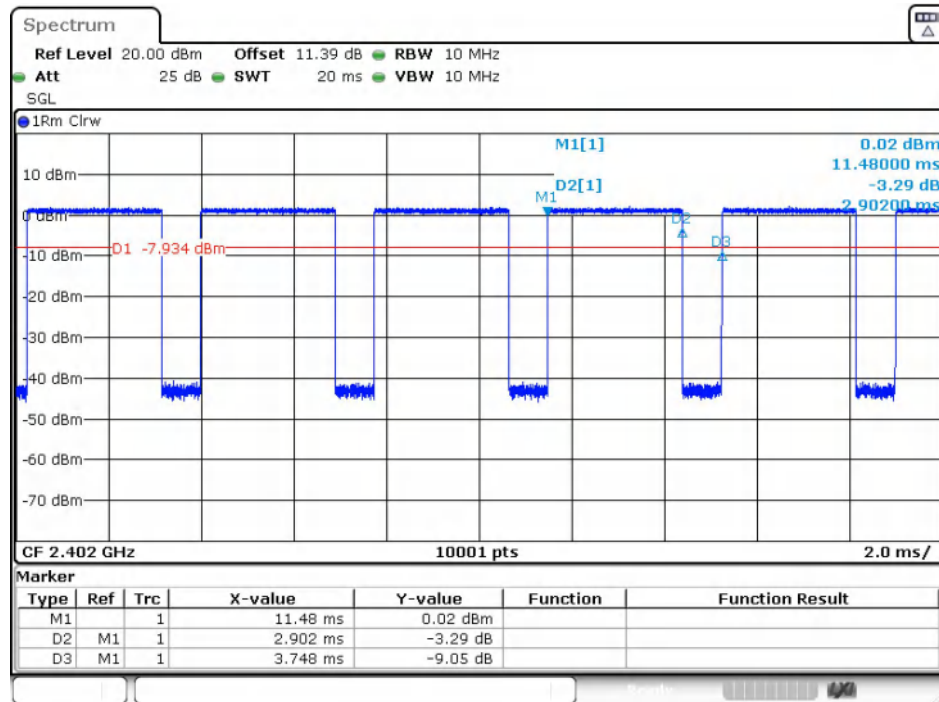
8DPSK(3-DH5)_Channel 78

Right:

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.902	3.748	77.43	0.7743	1.1109	0.3446
		39	2.904	3.748	77.48	0.7748	1.1081	0.3444

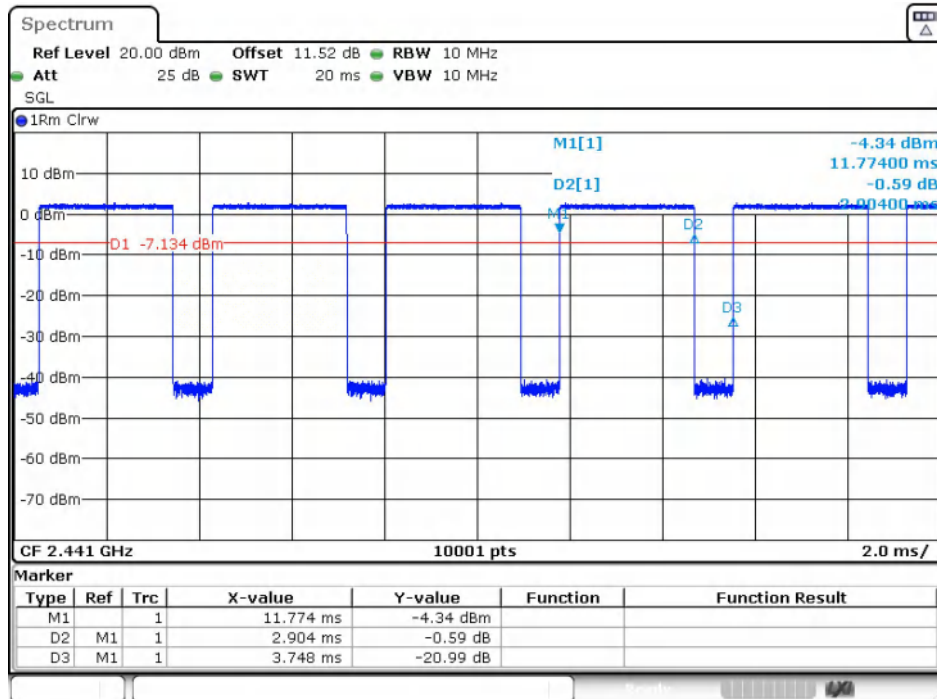
		78	2.902	3.748	77.43	0.7743	1.1109	0.3446
$\pi/4$ DQPSK	2-DH5	0	2.908	3.748	77.59	0.7759	1.1019	0.3439
		39	2.908	3.748	77.59	0.7759	1.1019	0.3439
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436
8DPSK	3-DH5	0	2.910	3.748	77.64	0.7764	1.0991	0.3436
		39	2.910	3.748	77.64	0.7764	1.0991	0.3436
		78	2.910	3.748	77.64	0.7764	1.0991	0.3436

Test Graphs



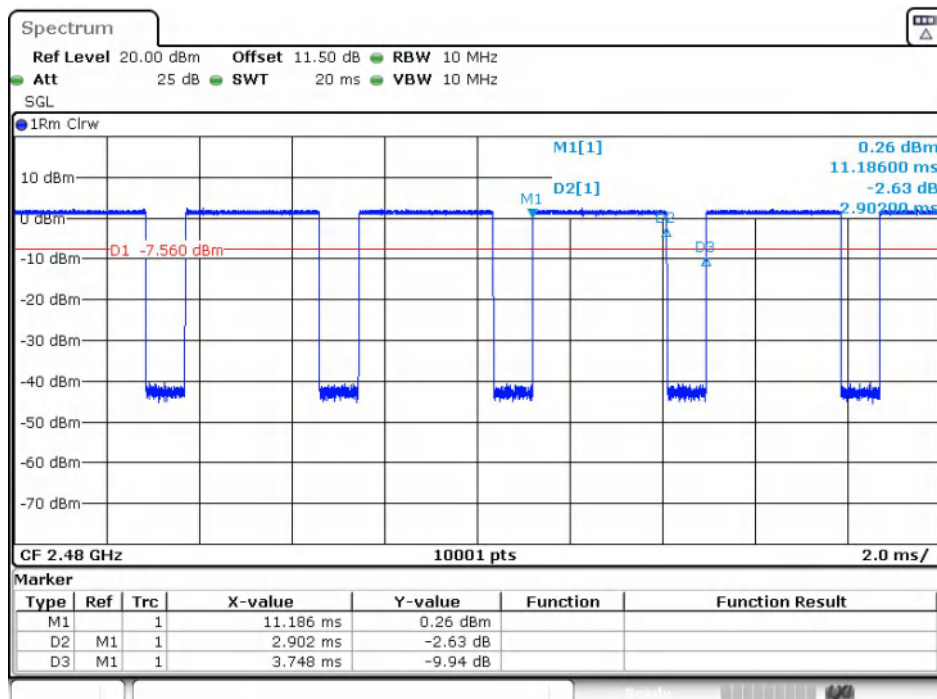
Date: 26.DEC.2024 16:11:04

GFSK(DH5)_Channel 0



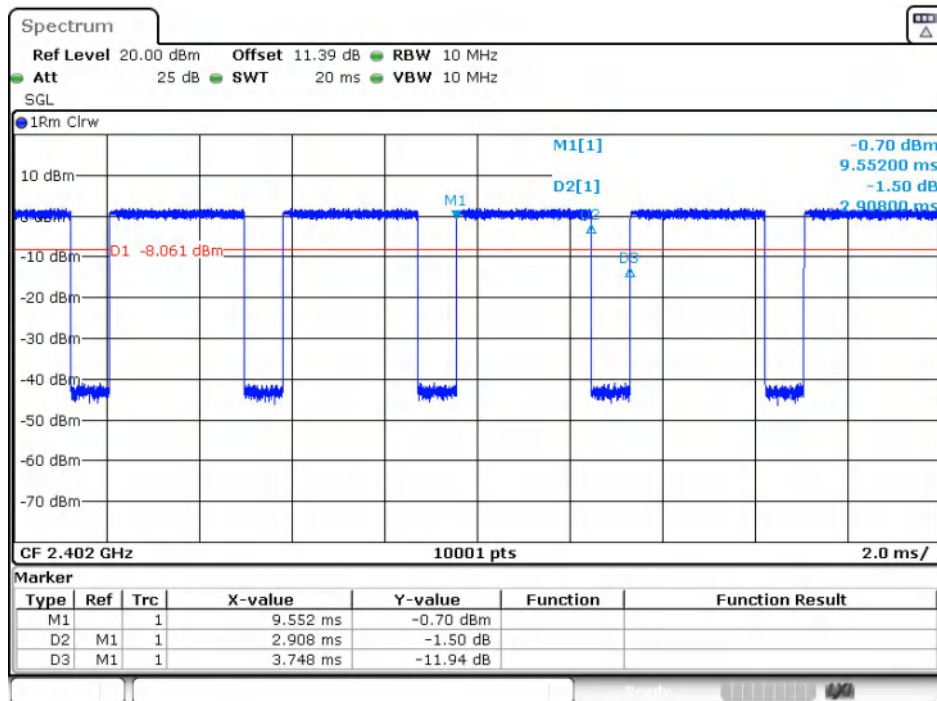
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GFSK(DH5)_Channel 39



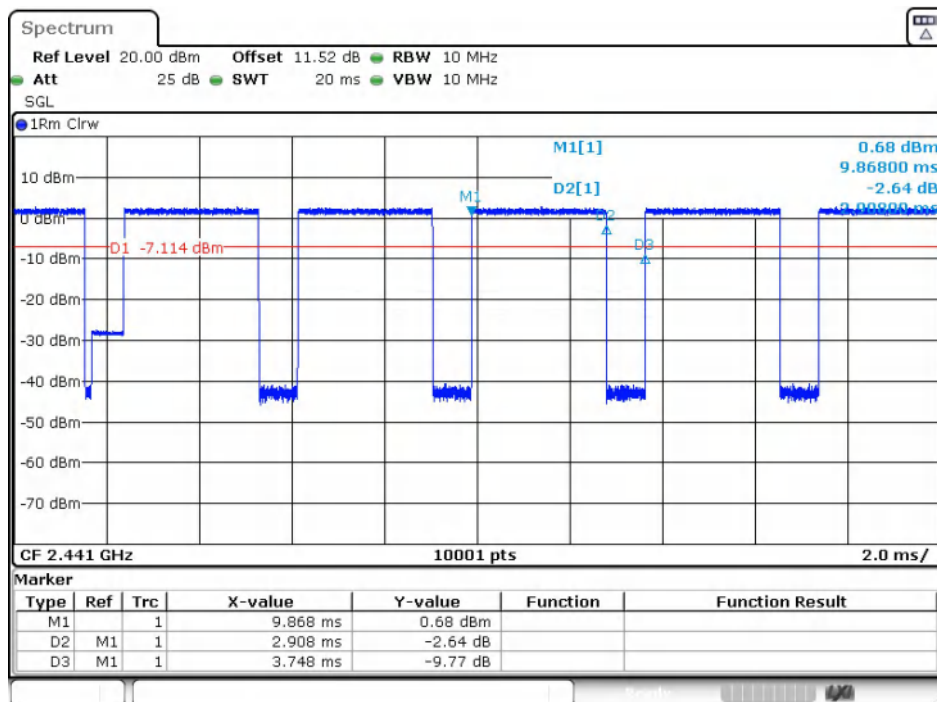
Date: 26,DEC,2024 16:50:33

GFSK(DH5)_Channel 78



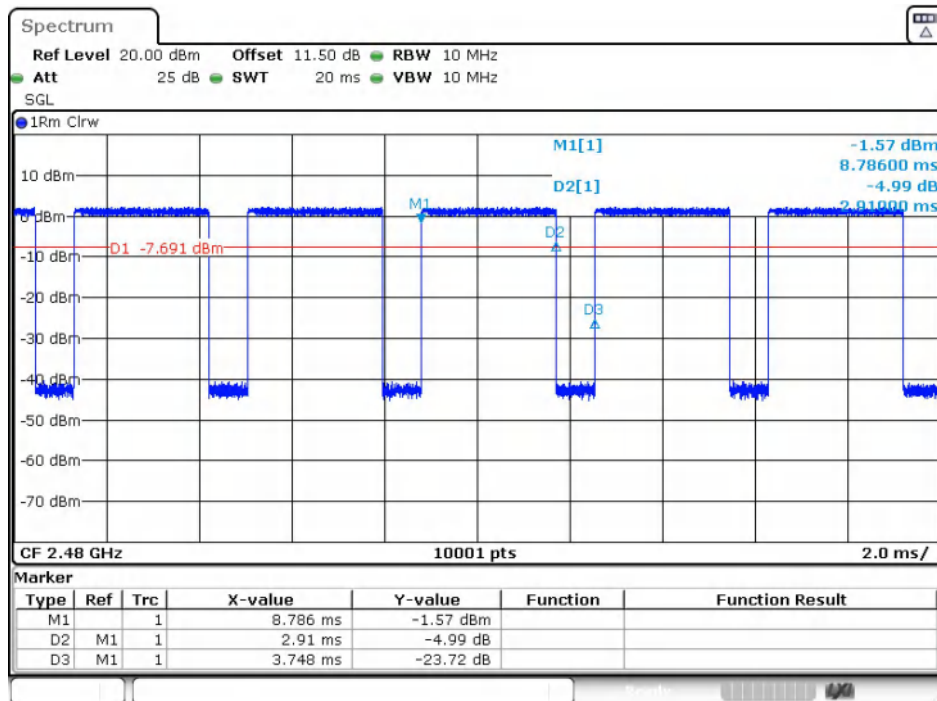
Date: 26,DEC,2024 16:53:06

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



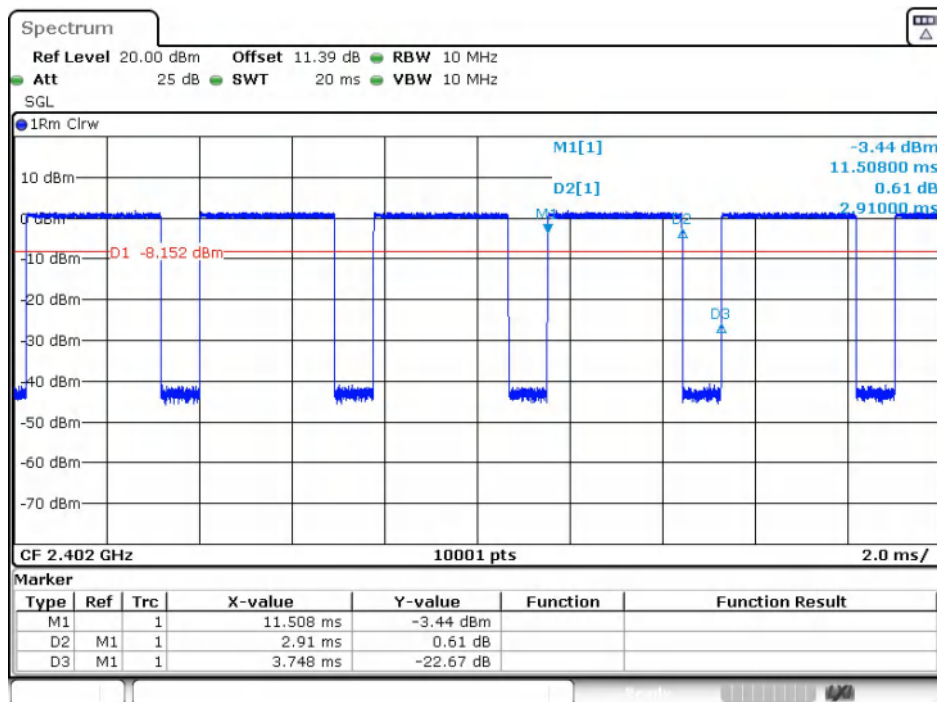
Date: 26,DEC,2024 17:04:40

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



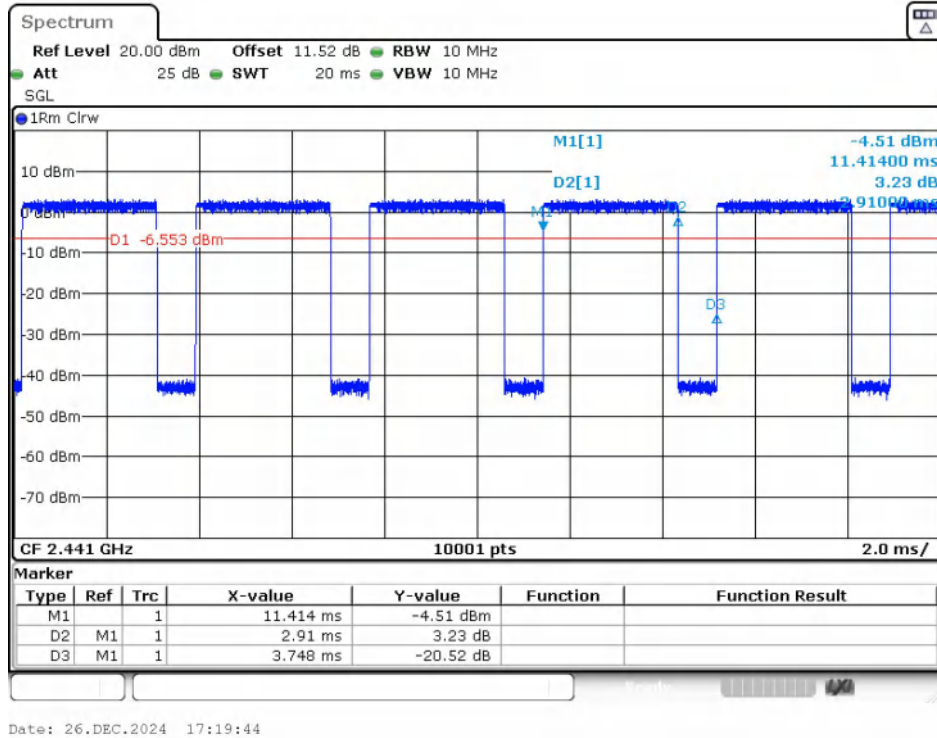
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$\pi/4$ DQPSK(2-DH5)_Channel 78

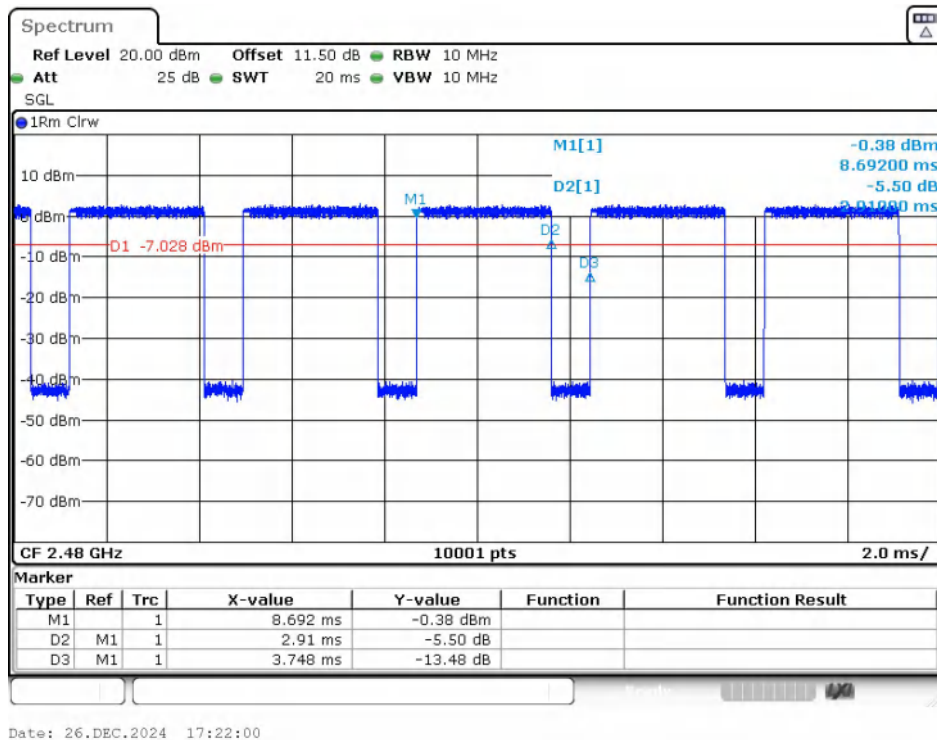


Date: 26,DEC,2024 17:09:34

8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



8DPSK(3-DH5)_Channel 78

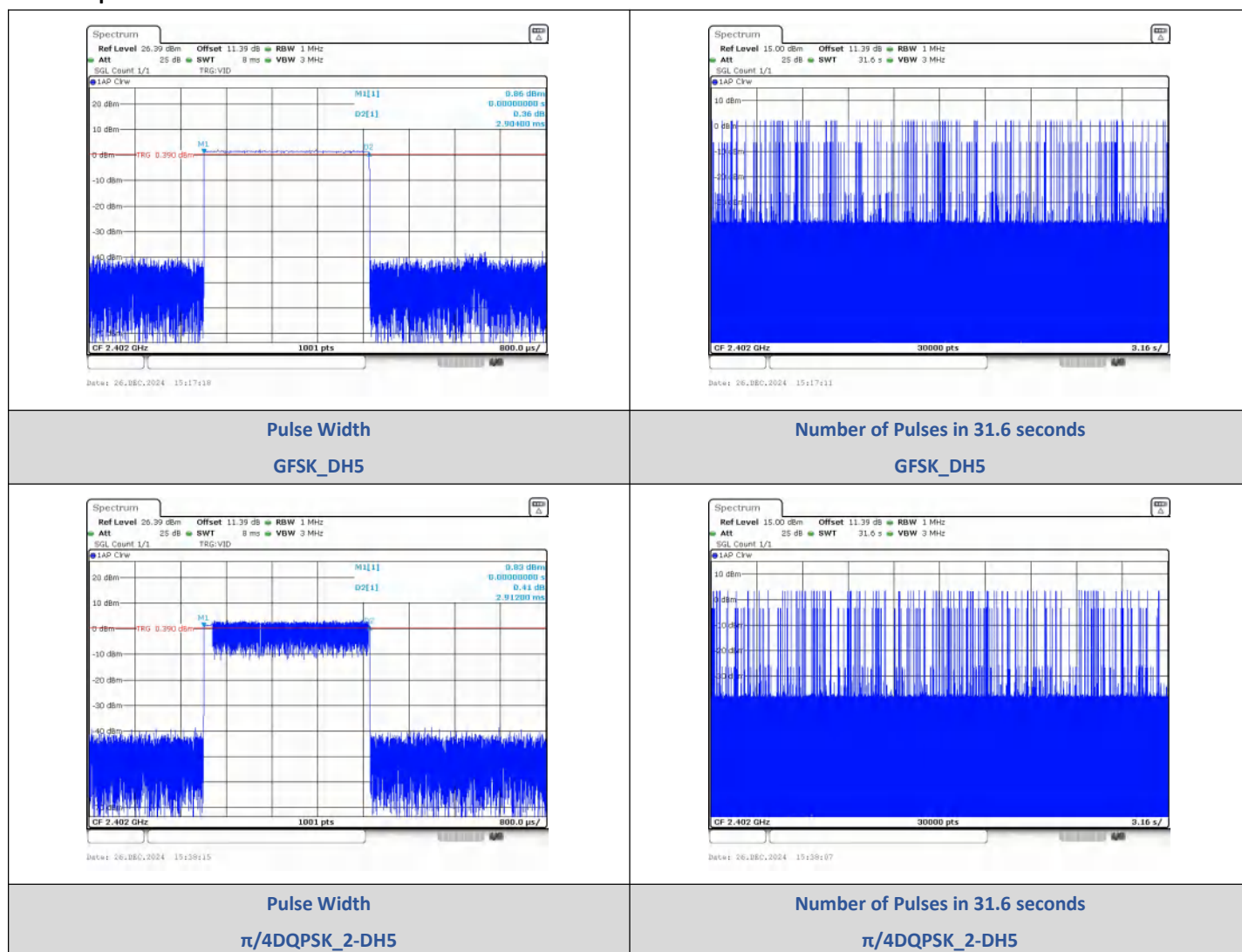
2) Dwell Time

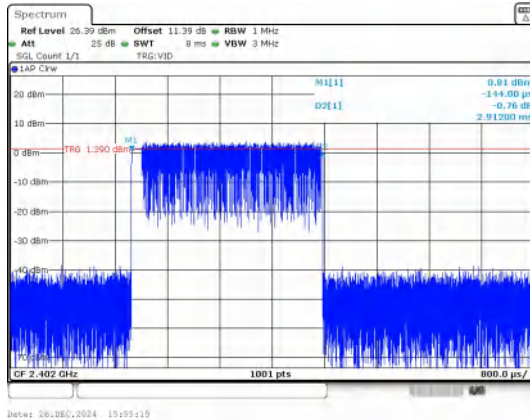
Test Result

Left:

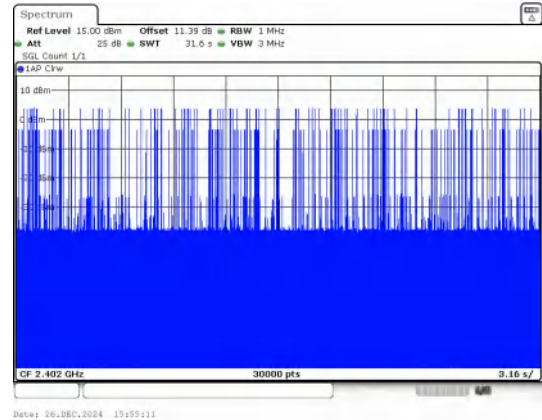
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.904	109	316.54	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	115	334.88		PASS
8DPSK	3-DH5		2.912	96	279.55		PASS

Test Graphs





Pulse Width
8DPSK_3-DH5

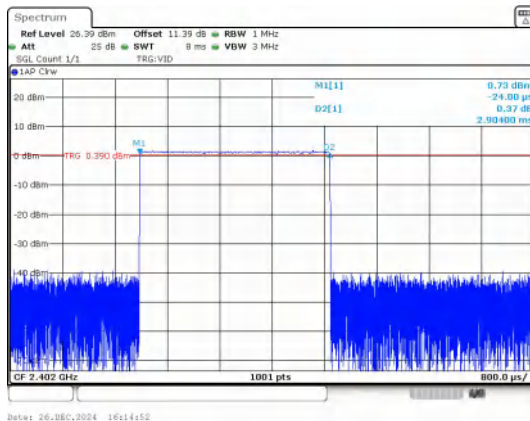


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

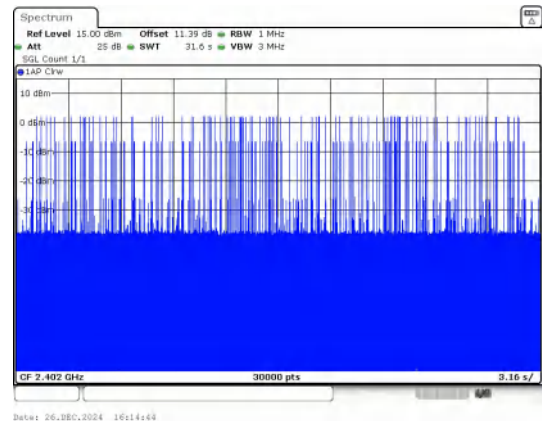
Right:

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	99	287.5	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.912	108	314.5		PASS
8DPSK	3-DH5		2.912	110	320.32		PASS

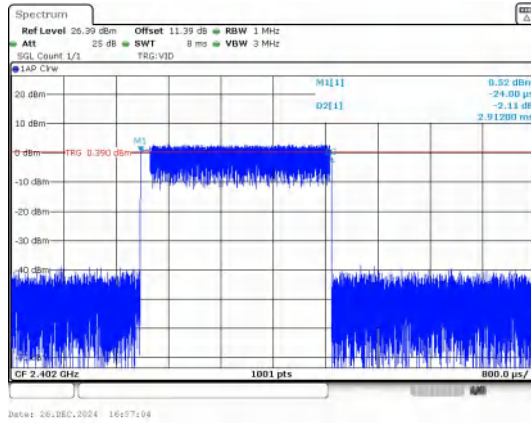
Test Graphs



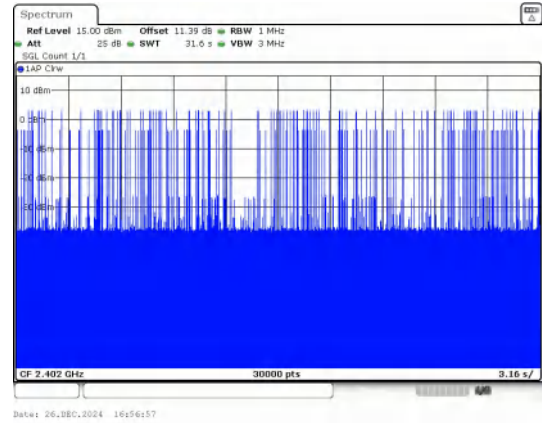
Pulse Width
GFSK_DH5



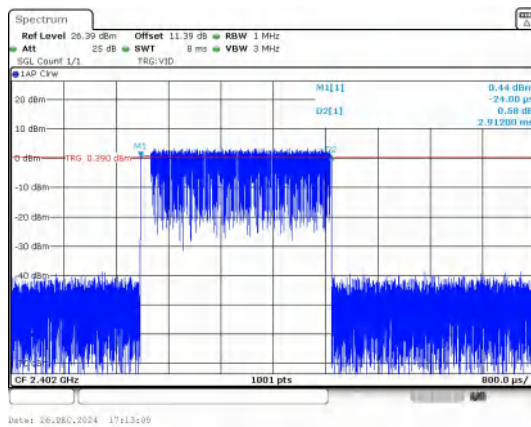
Number of Pulses in 31.6 seconds
GFSK_DH5



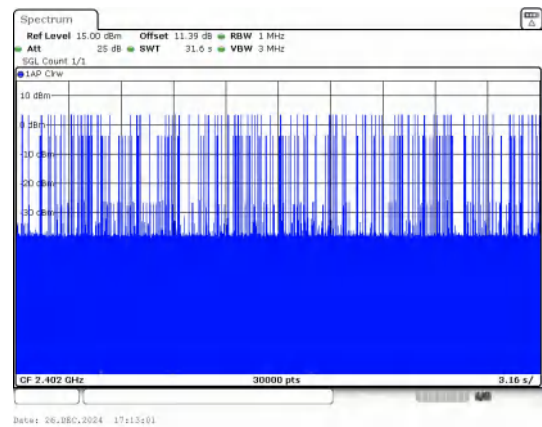
Pulse Width
 $\pi/4$ DQPSK_2-DH5



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

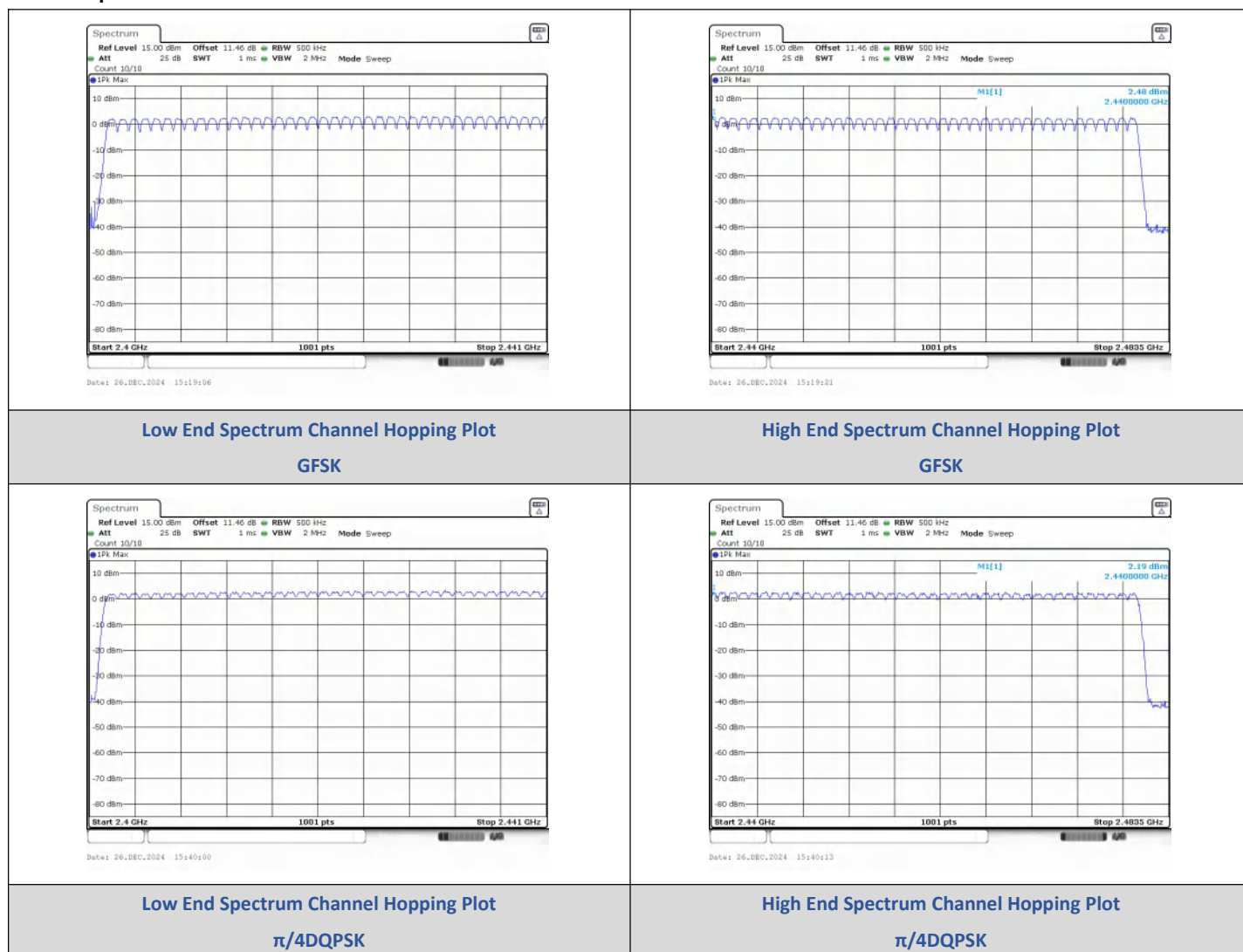
3) Number Of Hopping Channel

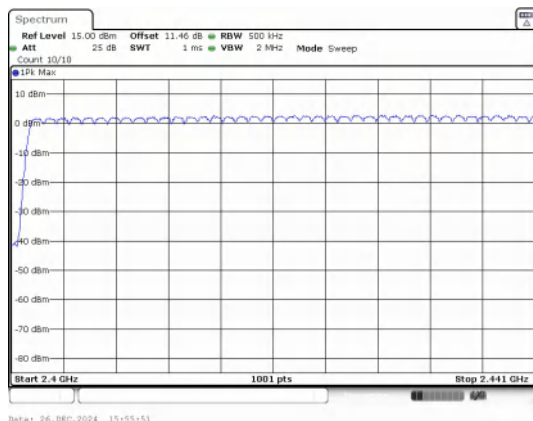
Test Result

Left:

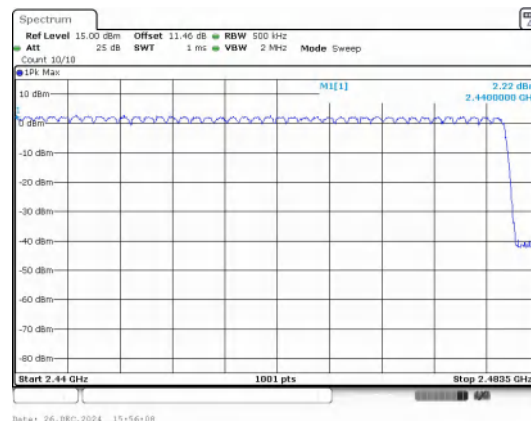
Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
$\pi/4$ DQPSK	2-DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

Test Graphs





Low End Spectrum Channel Hopping Plot
8DPSK

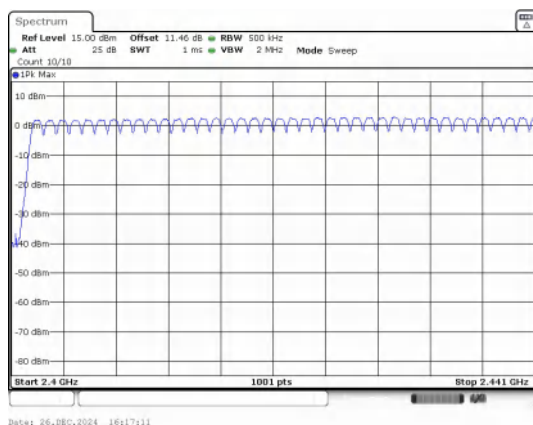


High End Spectrum Channel Hopping Plot
8DPSK

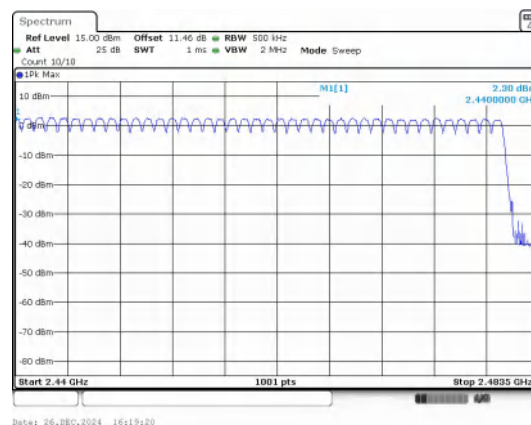
Right:

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

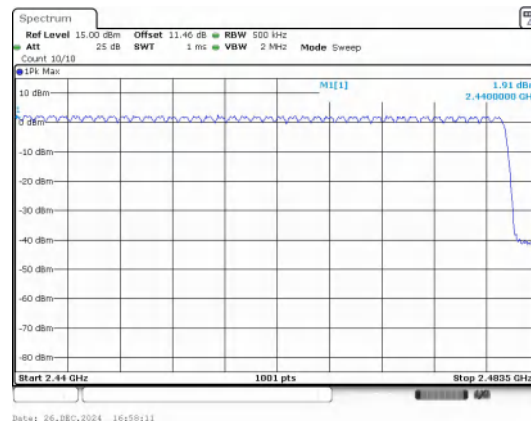
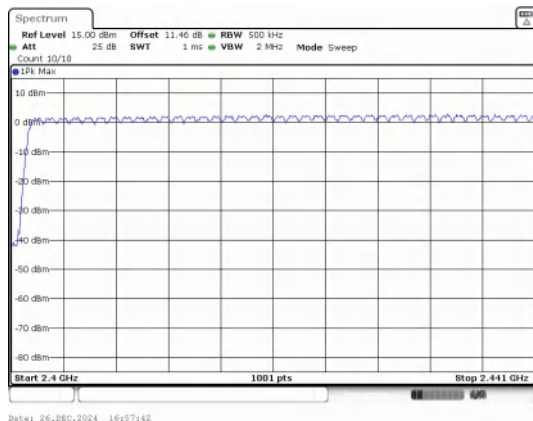
Test Graphs

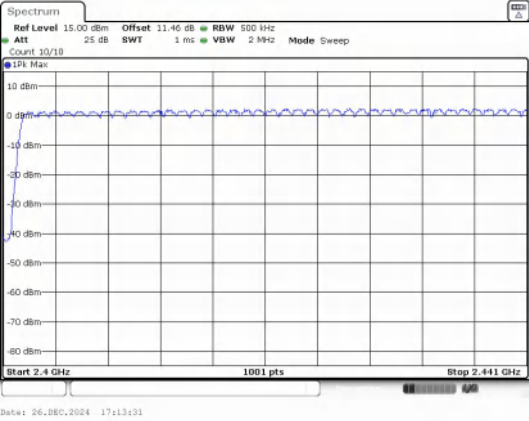
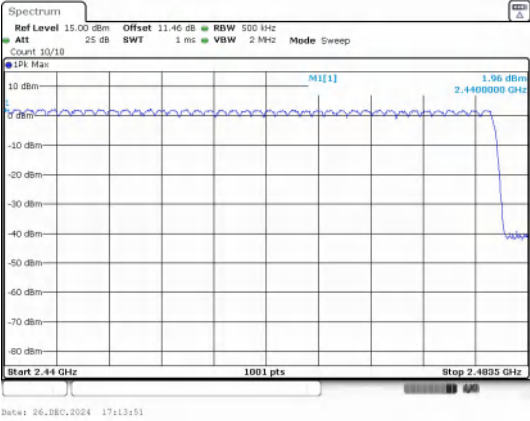


Low End Spectrum Channel Hopping Plot
GFSK



High End Spectrum Channel Hopping Plot
GFSK



Low End Spectrum Channel Hopping Plot $\pi/4$DQPSK  Date: 26.DEC.2024 17:13:31	High End Spectrum Channel Hopping Plot $\pi/4$DQPSK  Date: 26.DEC.2024 17:13:51
Low End Spectrum Channel Hopping Plot 8DPSK	High End Spectrum Channel Hopping Plot 8DPSK

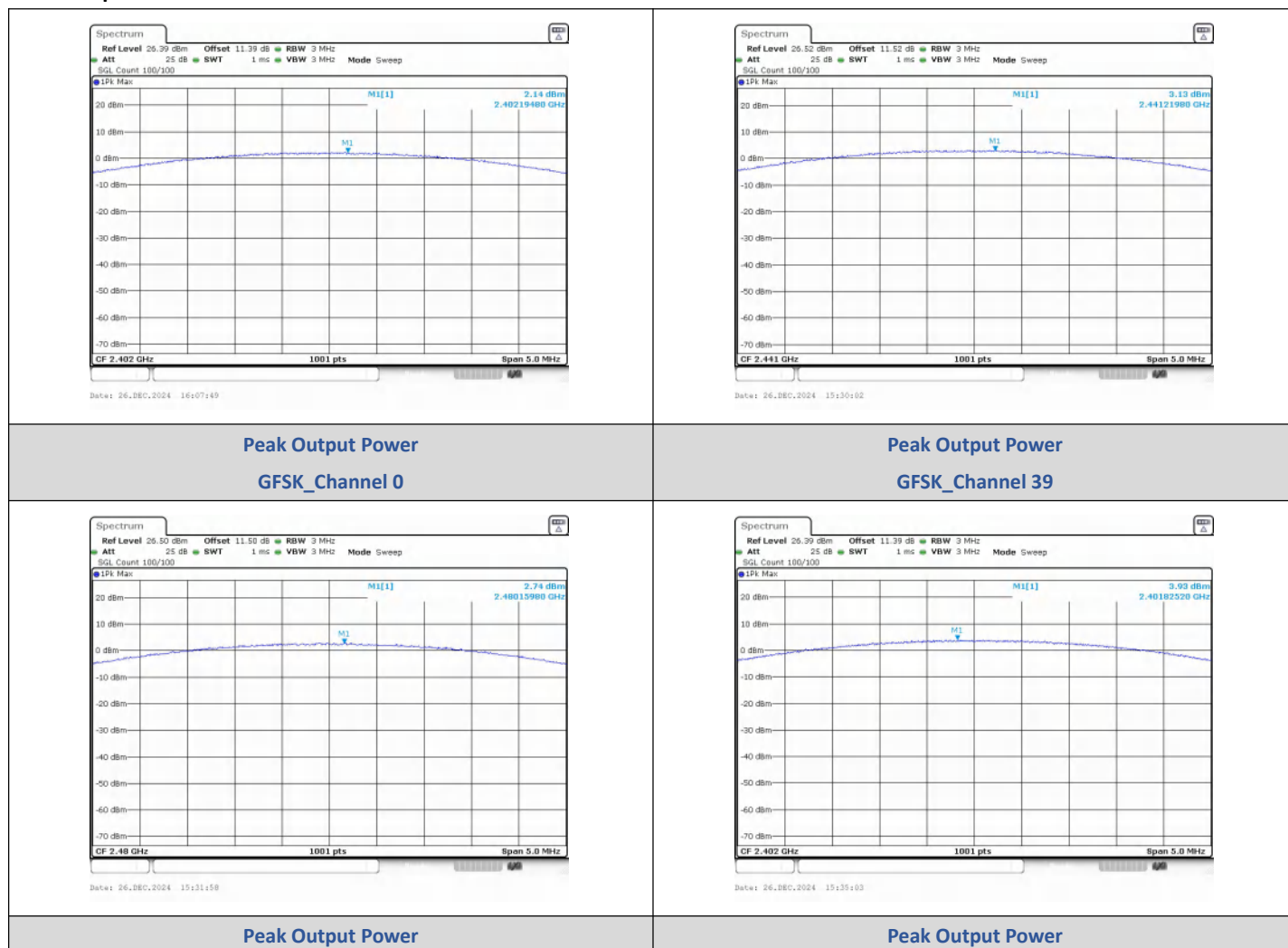
4) Conducted Peak Output Power

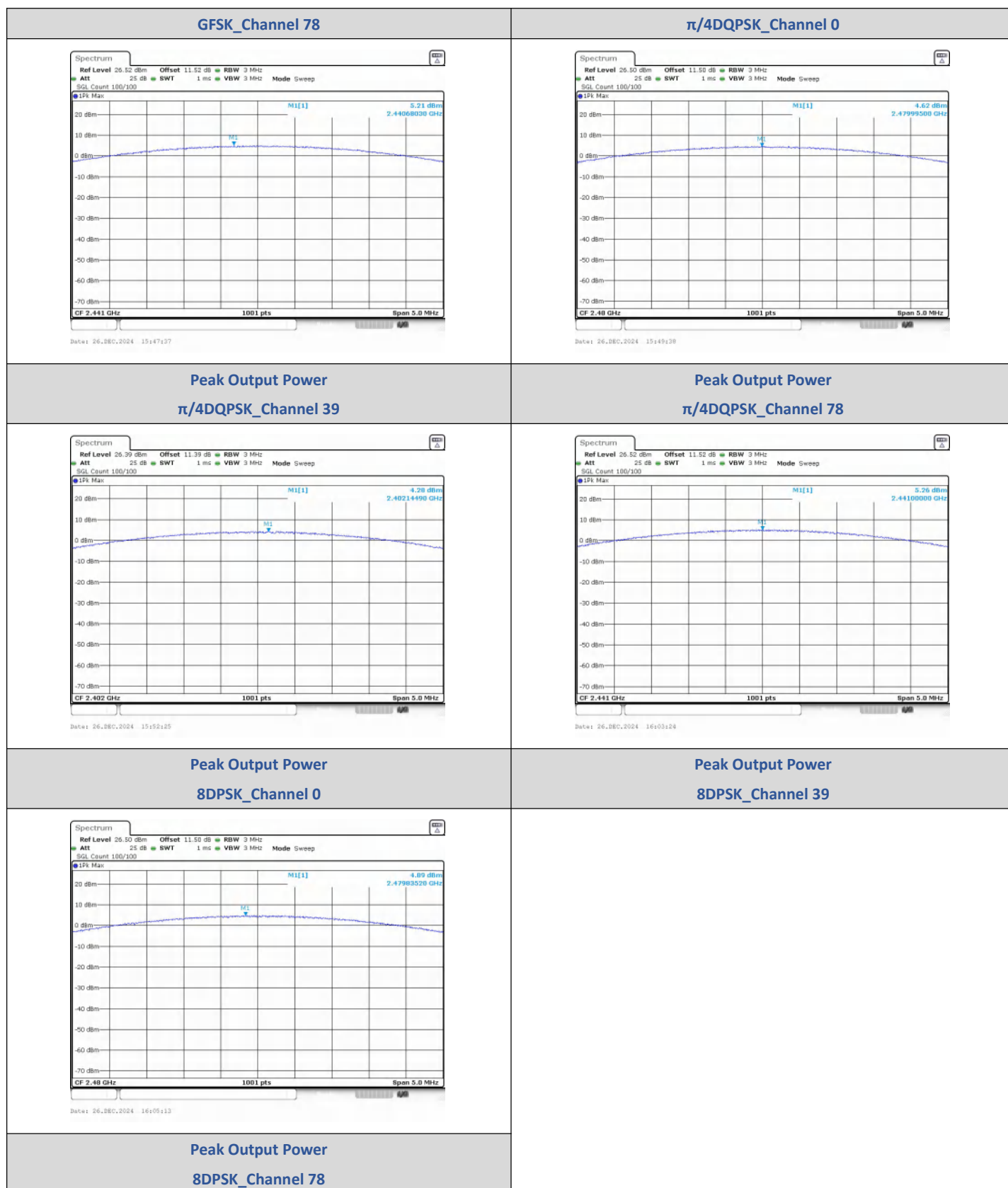
Test Result

Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.14	1.64	≤30	PASS
		39	3.13	2.06		PASS
		78	2.74	1.88		PASS
$\pi/4$ DQPSK	2-DH5	0	3.93	2.47	≤20.97	PASS
		39	5.21	3.32		PASS
		78	4.62	2.90		PASS
8DPSK	3-DH5	0	4.28	2.68		PASS
		39	5.26	3.36		PASS
		78	4.89	3.08		PASS

Test Graphs



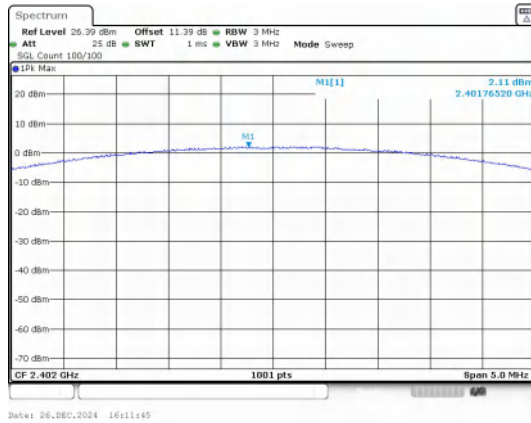


Right:

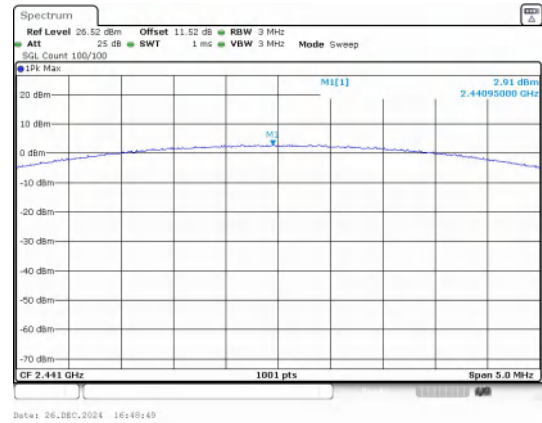
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	2.11	1.63	≤30	PASS

		39	2.91	1.95		PASS
		78	2.49	1.77		PASS
		0	3.87	2.44		PASS
$\pi/4$ DQPSK	2-DH5	39	4.79	3.01	≤ 20.97	PASS
		78	4.29	2.69		PASS
		0	3.96	2.49		PASS
8DPSK	3-DH5	39	5.01	3.17		PASS
		78	4.59	2.88		PASS
						PASS

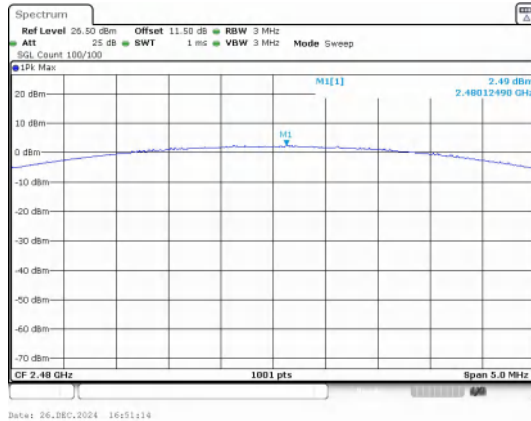
Test Graphs



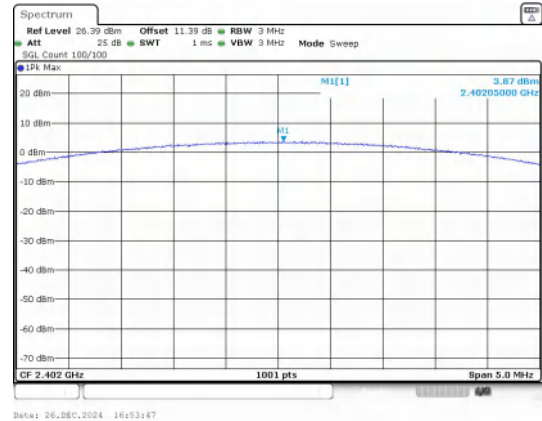
Peak Output Power
GFSK_Channel 0



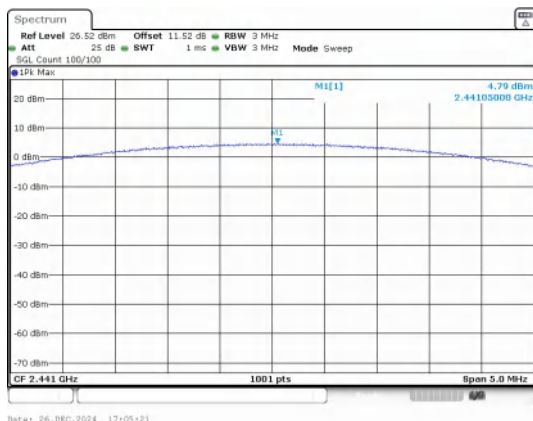
Peak Output Power
GFSK_Channel 39



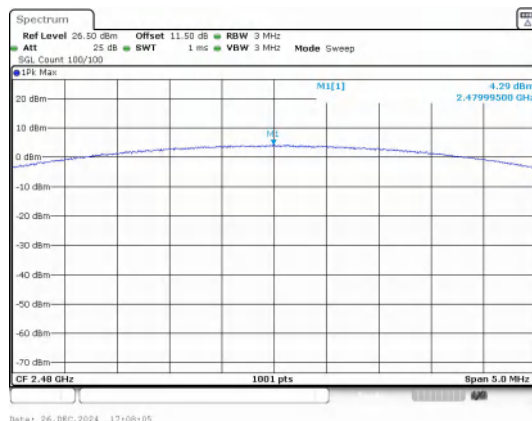
Peak Output Power
GFSK_Channel 78



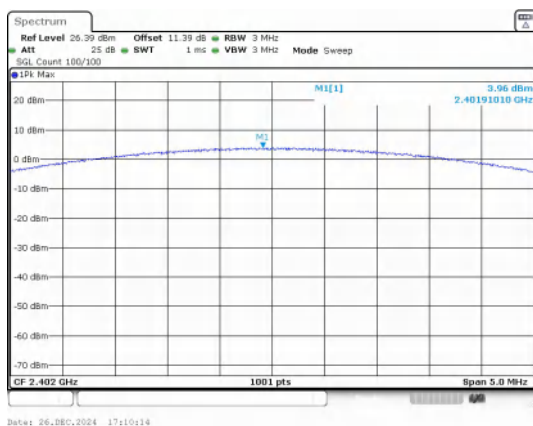
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



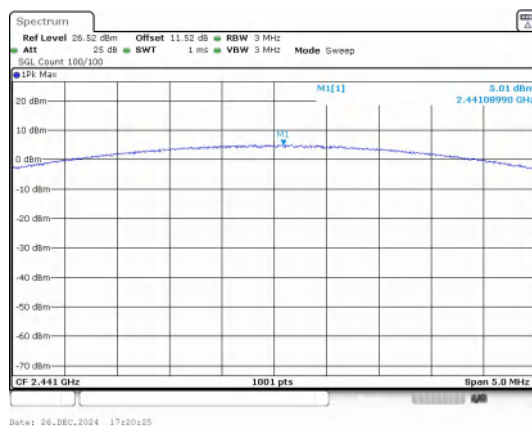
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



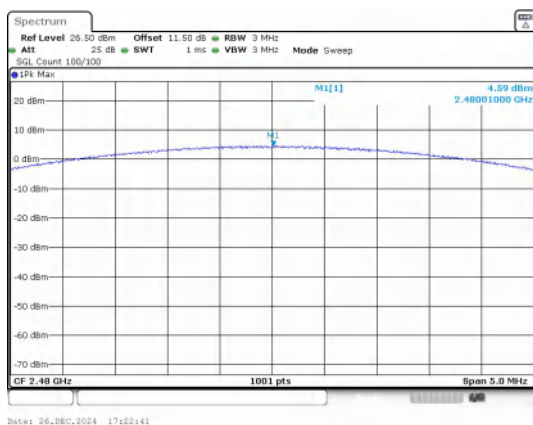
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

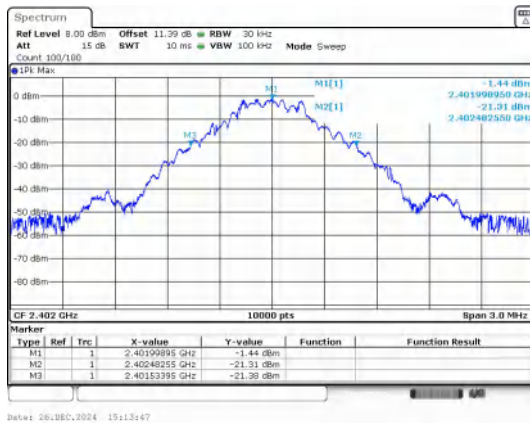
5) 20dB Bandwidth

Test Result

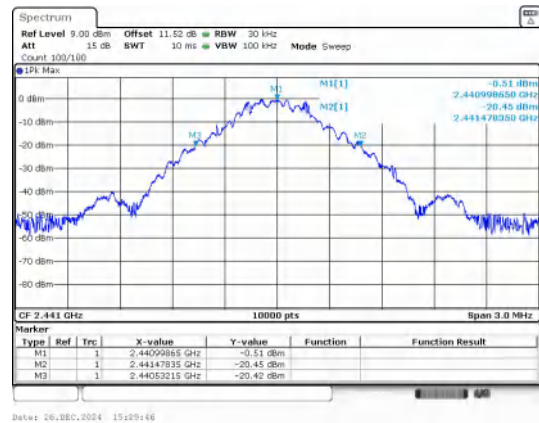
Left:

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

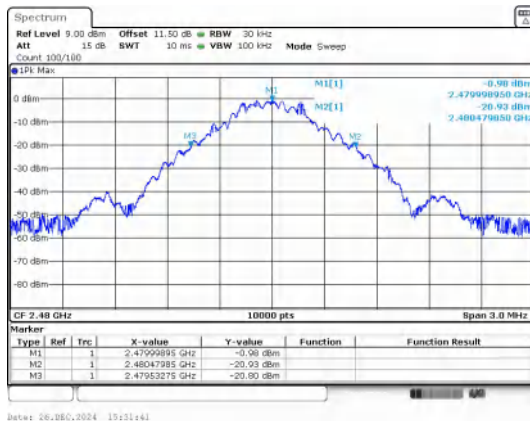
Test Graphs



GFSK_DH5_Channel 0



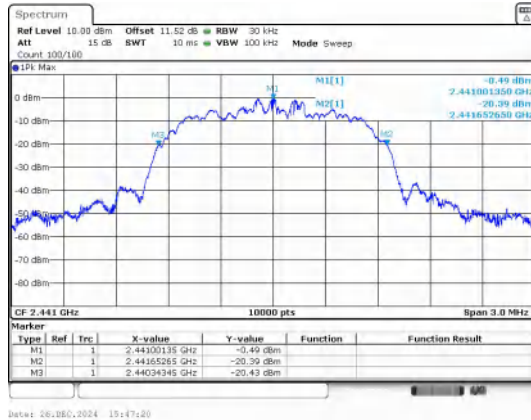
GFSK_DH5_Channel 39



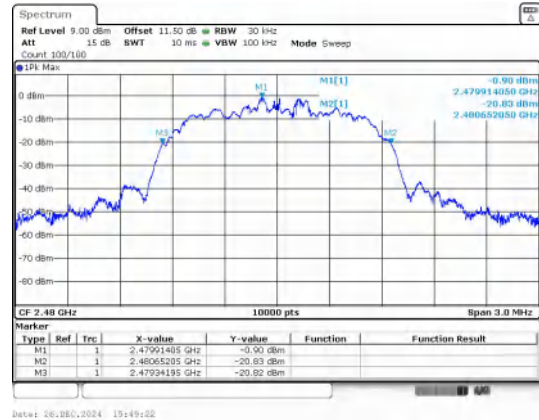
GFSK_DH5_Channel 78



$\pi/4$ DQPSK_2-DH5_Channel 0



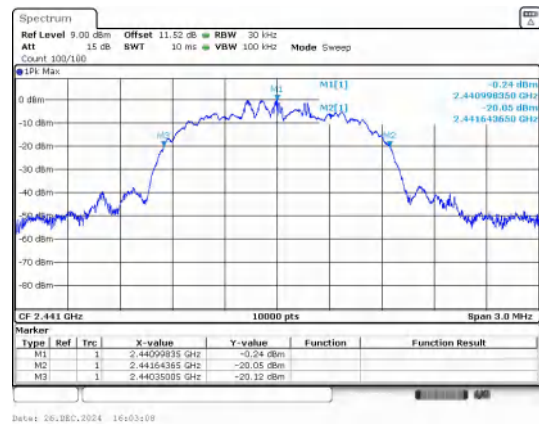
$\pi/4$ DQPSK_2-DH5_Channel 39



$\pi/4$ DQPSK_2-DH5_Channel 78



8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



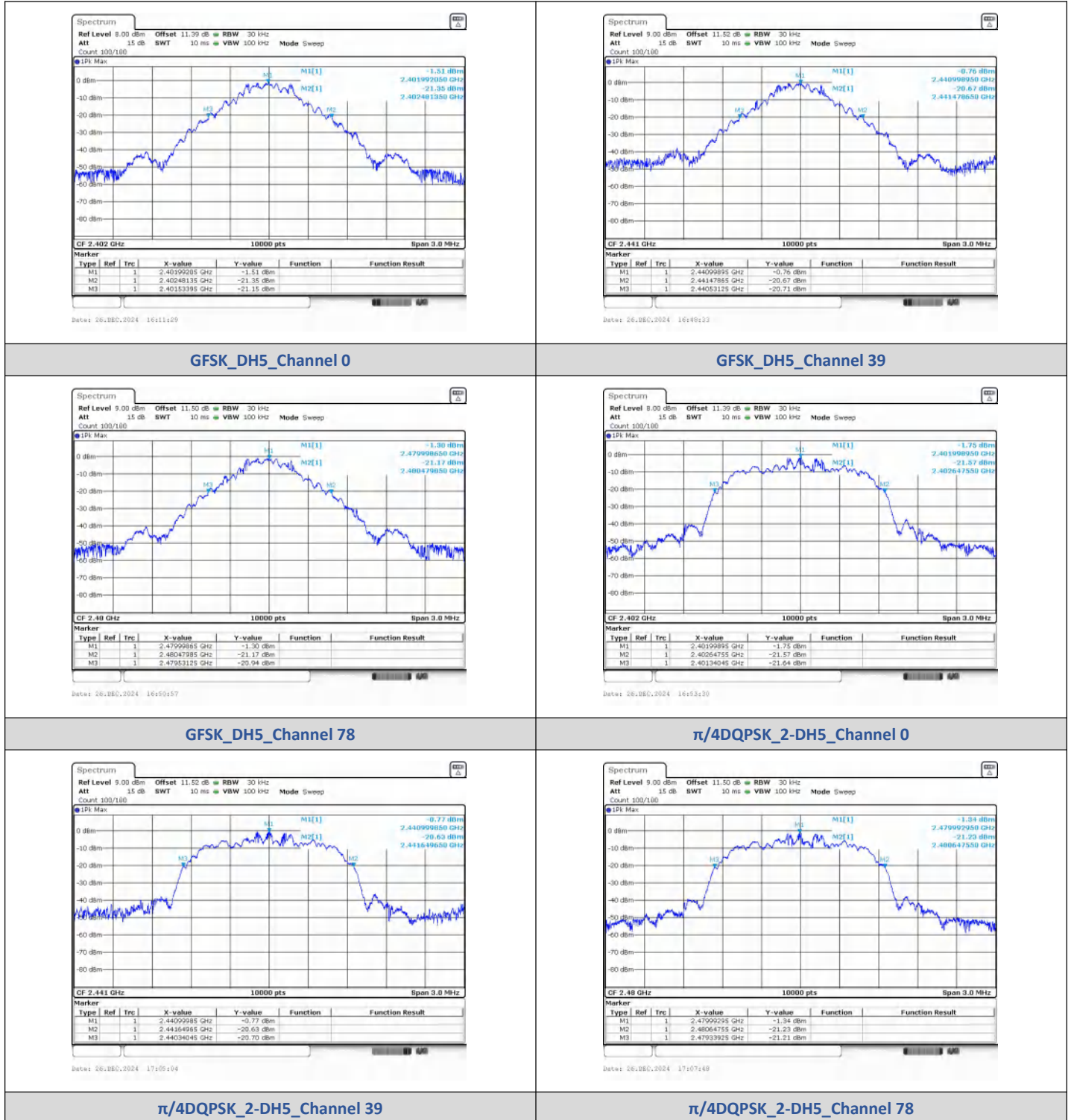
8DPSK_3-DH5_Channel 78

Right:

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

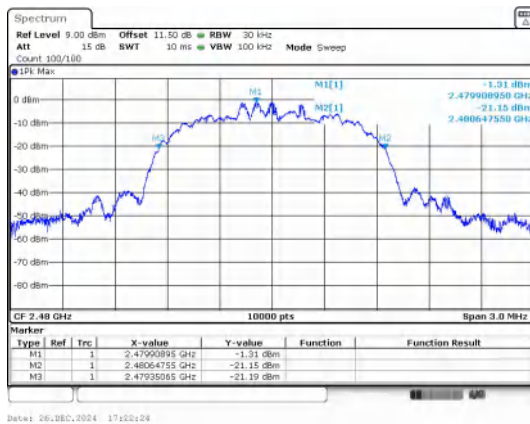




8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



8DPSK_3-DH5_Channel 78

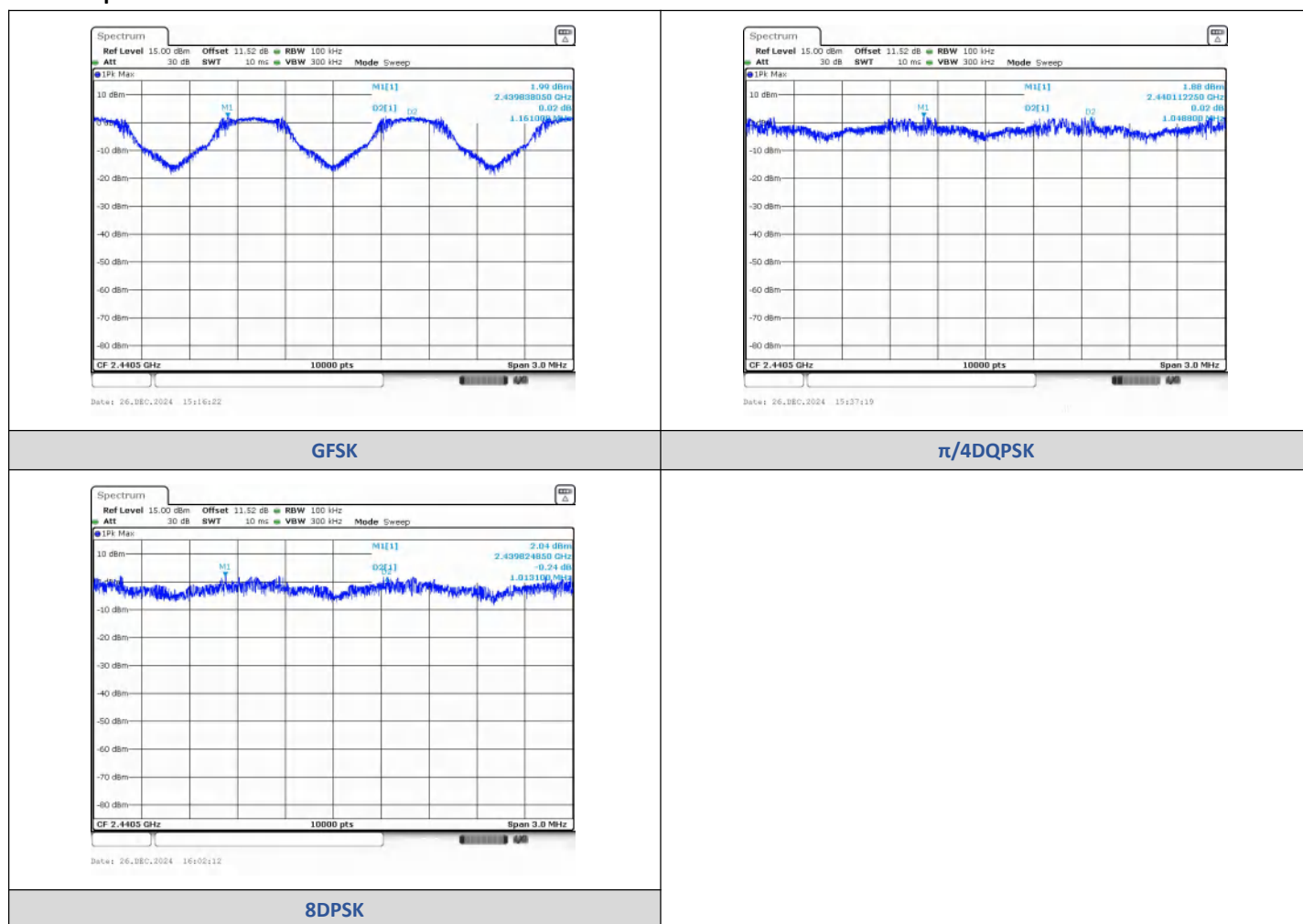
6) Carrier Frequencies Separation

Test Result

Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.838	2440.999	1.1610	0.95	PASS
$\pi/4$ DQPSK	2-DH5	2440.1123	2441.1611	1.0488	0.873	PASS
8DPSK	3-DH5	2439.8248	2440.838	1.0131	0.867	PASS

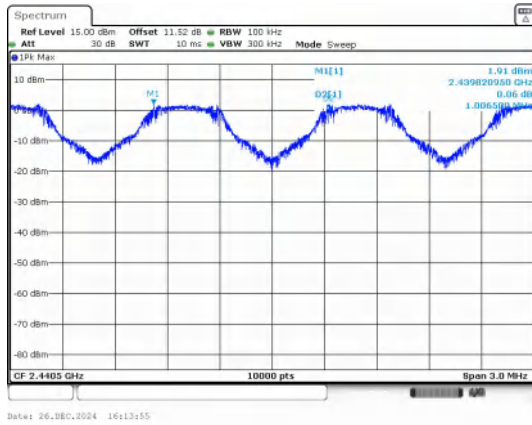
Test Graphs



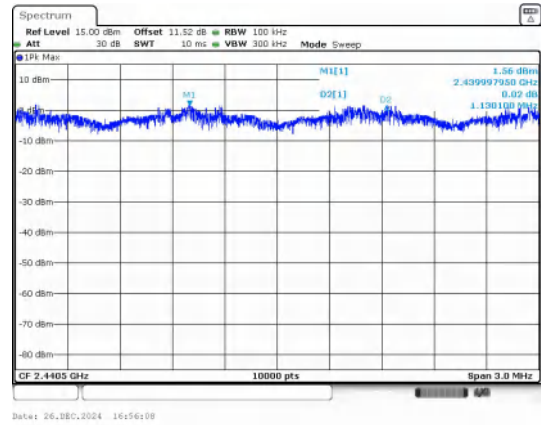
Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8209	2440.8275	1.0065	0.95	PASS
$\pi/4$ DQPSK	2-DH5	2439.9979	2441.128	1.1301	0.873	PASS
8DPSK	3-DH5	2439.9866	2441.003	1.0164	0.86	PASS

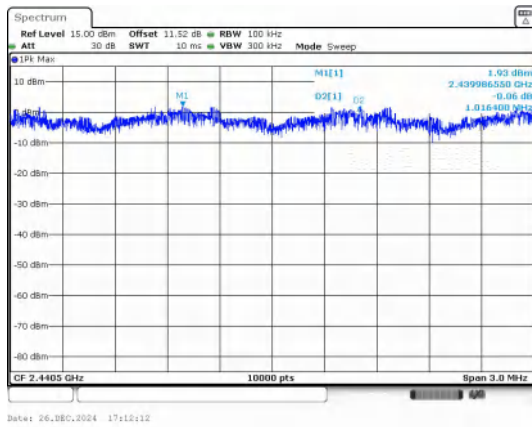
Test Graphs



GFSK



$\pi/4$ DQPSK



8DPSK

7) Conducted Out Of Band Emission

Test Result

Left:

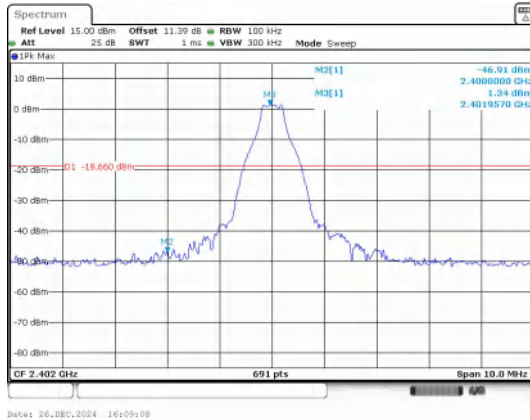
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-46.910	-18.66	-28.250	PASS
			4803.85	-49.708	-18.66	-31.048	PASS
		39	4882.09	-47.019	-17.72	-29.299	PASS
		78	2483.50	-50.540	-18.1	-32.440	PASS
			4960.33	-49.760	-18.1	-31.660	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-46.440	-19.04	-27.400	PASS
			4803.85	-51.163	-19.04	-32.123	PASS
		39	4882.09	-45.213	-18.07	-27.143	PASS
		78	2483.50	-49.250	-18.34	-30.910	PASS
			6981.23	-53.375	-18.34	-35.035	PASS
8DPSK	3-DH5	0	2400.00	-46.160	-18.66	-27.500	PASS
			4803.85	-50.656	-18.66	-31.996	PASS
		39	4882.09	-49.290	-17.37	-31.920	PASS
		78	2483.50	-50.910	-18.15	-32.760	PASS
			4960.33	-50.832	-18.15	-32.682	PASS

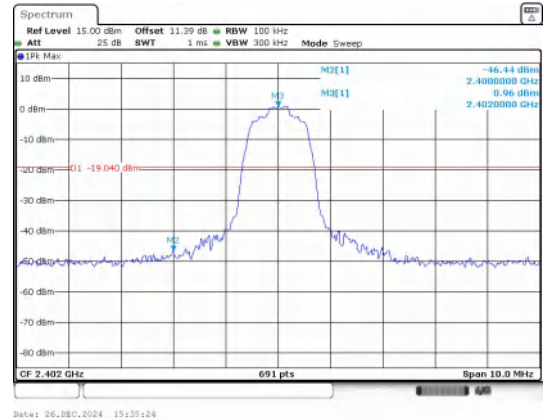
Hopping

Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2398.49	-47.549	-18.5	-29.049	PASS
			2400.00	-49.110	-18.5	-30.610	PASS
			2483.50	-47.970	-17.97	-30.000	PASS
$\pi/4$ DQPSK	2-DH5		2398.19	-47.610	-18.85	-28.760	PASS
			2400.00	-49.870	-18.85	-31.020	PASS
			2483.50	-48.810	-18.47	-30.340	PASS
8DPSK	3-DH5		2397.44	-48.116	-18.61	-29.506	PASS
			2400.00	-49.700	-18.61	-31.090	PASS
			2483.50	-48.480	-18.22	-30.260	PASS

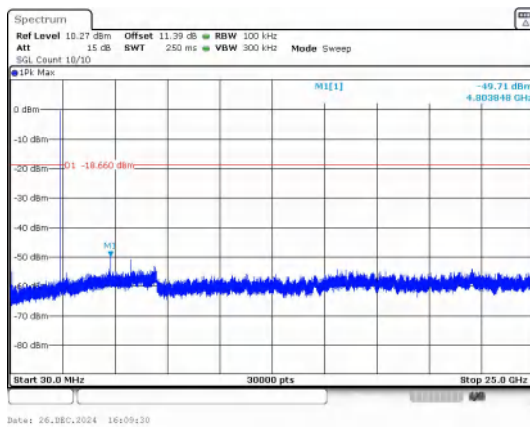
Test Graphs



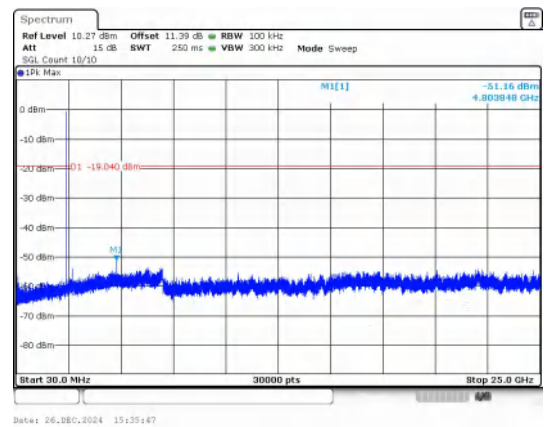
Out Of Band Emission
GFSK_DH5_Channel 0



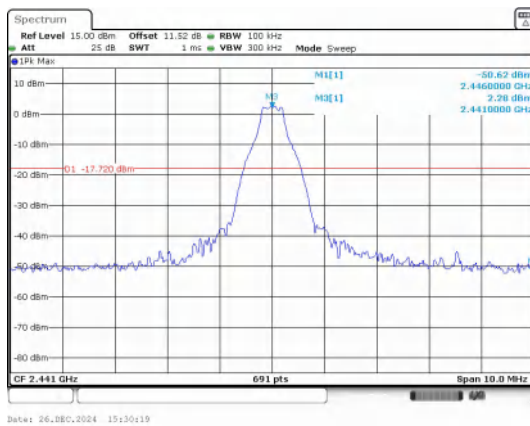
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 0



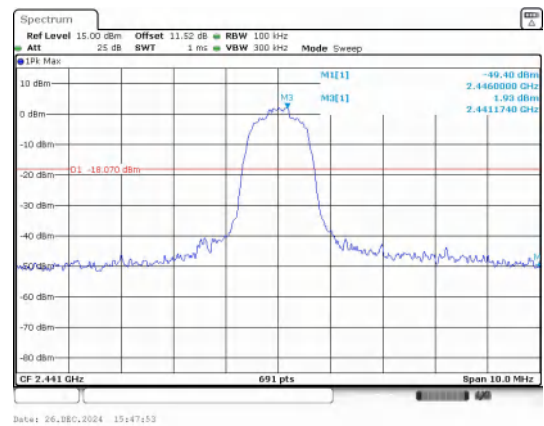
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



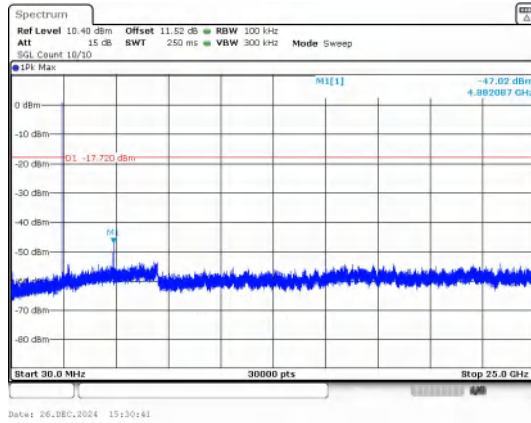
30.0 MHz - 25000.0 MHz
 $\pi/4$ QPSK_2-DH5_Channel 0



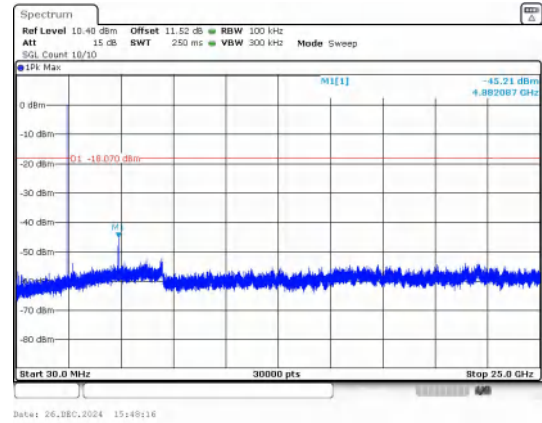
Out Of Band Emission
GFSK_DH5_Channel 39



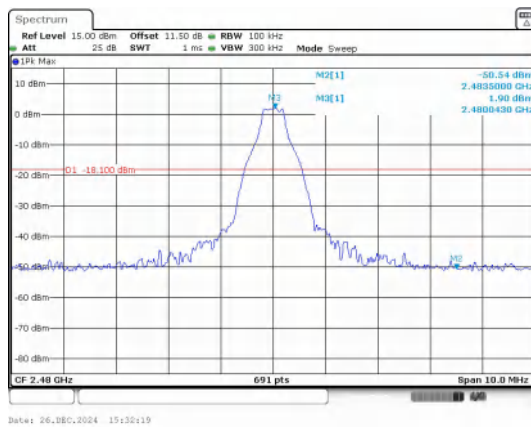
Out Of Band Emission
 $\pi/4$ QPSK_2-DH5_Channel 39



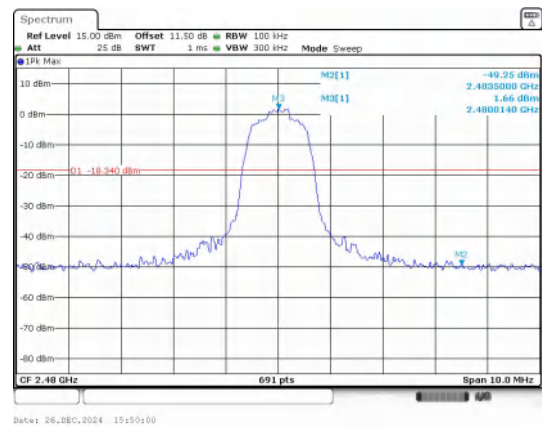
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



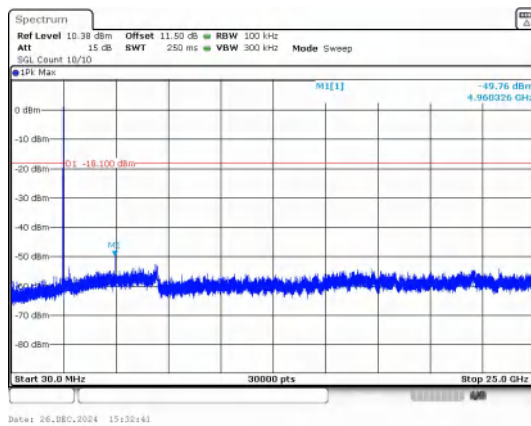
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



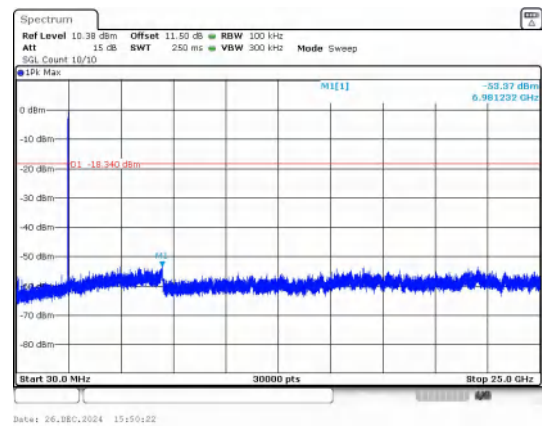
Out Of Band Emission
GFSK_DH5_Channel 78



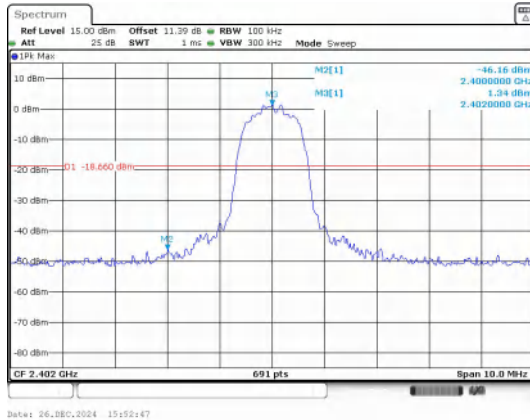
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



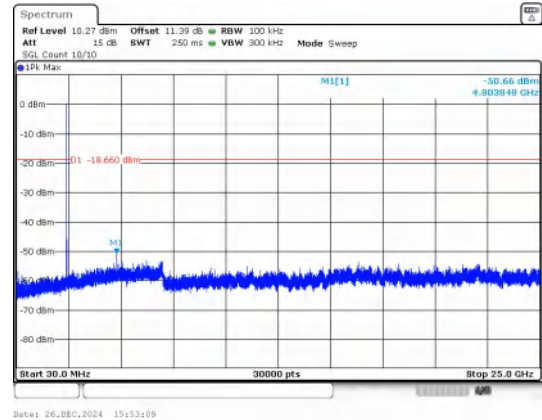
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



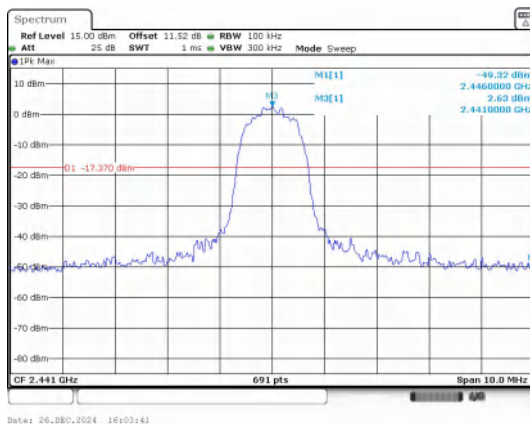
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



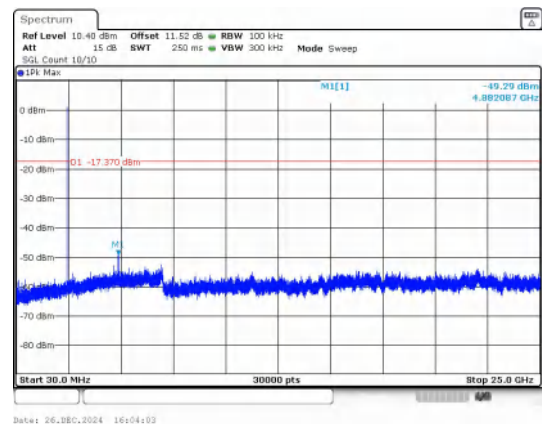
Out Of Band Emission
8DPSK_3-DH5_Channel 0



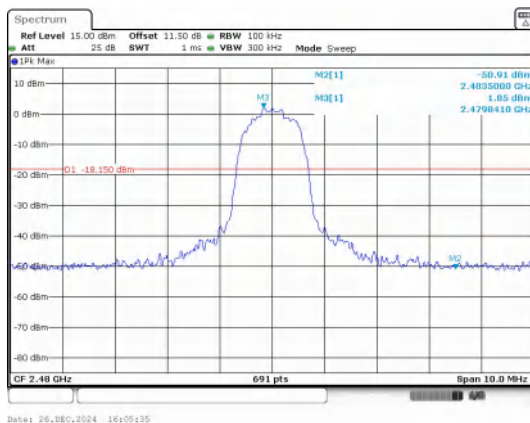
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



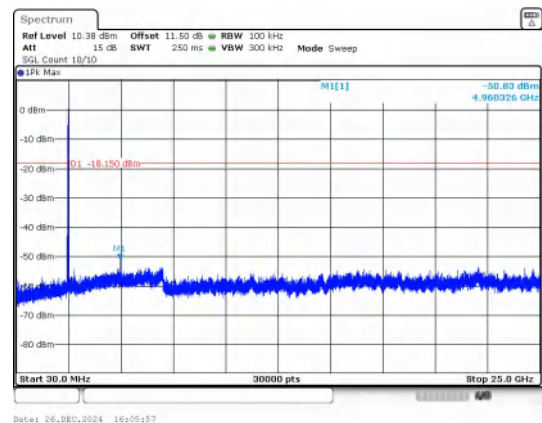
Out Of Band Emission
8DPSK_3-DH5_Channel 39



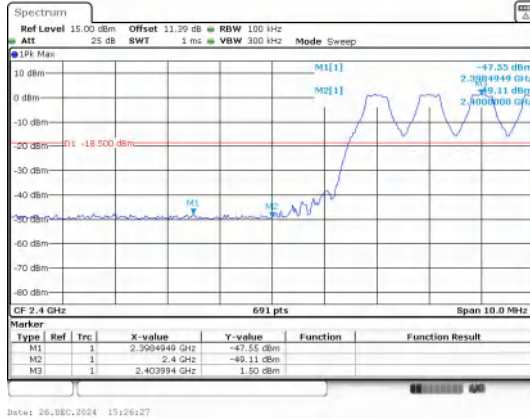
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



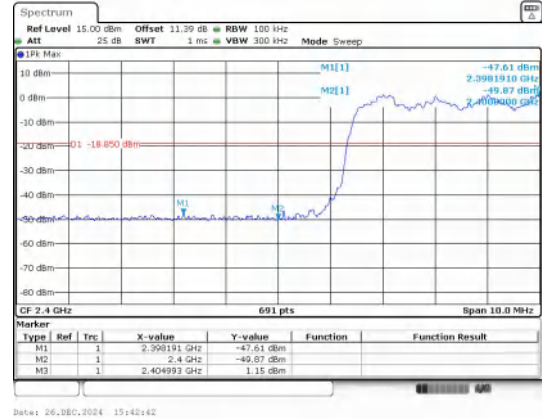
Out Of Band Emission
8DPSK_3-DH5_Channel 78



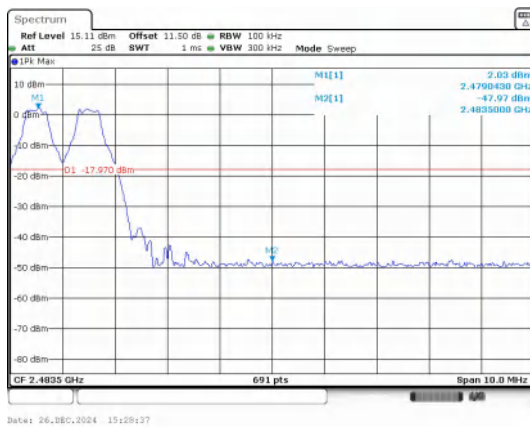
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



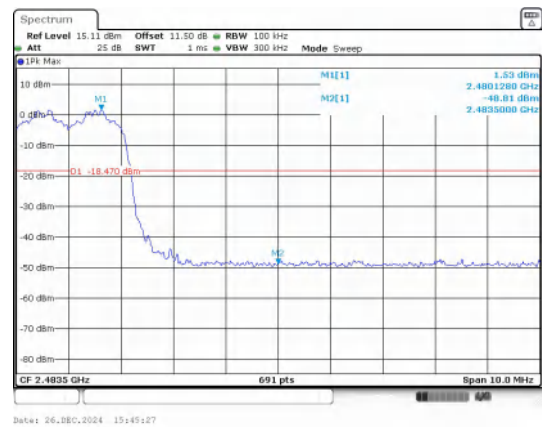
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



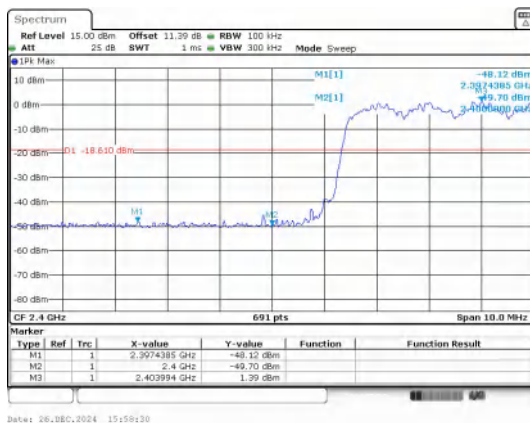
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



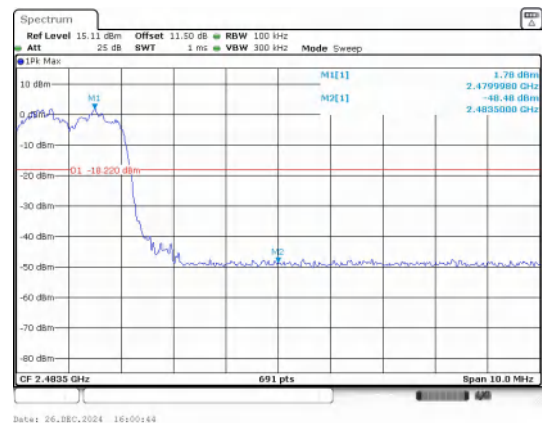
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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

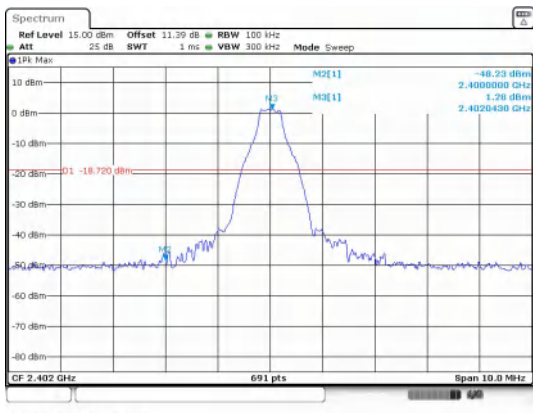
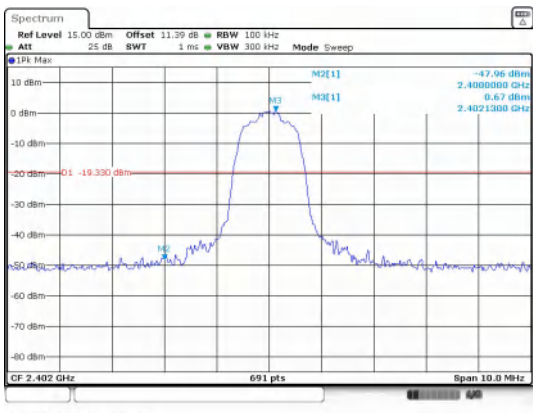
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
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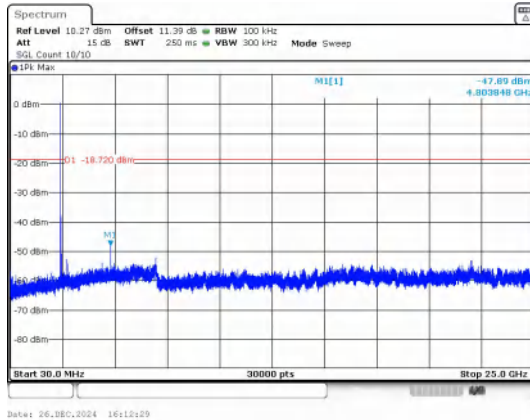
GFSK	DH5	0	2400.00	-48.230	-18.72	-29.510	PASS
			4803.85	-47.895	-18.72	-29.175	PASS
		39	4882.09	-47.185	-17.92	-29.265	PASS
		78	836.95	-49.788	-18.46	-31.328	PASS
			2483.50	-49.180	-18.46	-30.720	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-47.960	-19.33	-28.630	PASS
			4803.85	-49.802	-19.33	-30.472	PASS
		39	4882.09	-49.376	-18.4	-30.976	PASS
		78	2483.50	-50.560	-18.79	-31.770	PASS
			6973.74	-53.122	-18.79	-34.332	PASS
8DPSK	3-DH5	0	2400.00	-48.890	-18.99	-29.900	PASS
			5893.37	-51.468	-18.99	-32.478	PASS
		39	4882.09	-48.104	-18.21	-29.894	PASS
		78	2483.50	-51.000	-18.37	-32.630	PASS
			4960.33	-53.134	-18.37	-34.764	PASS

Hopping

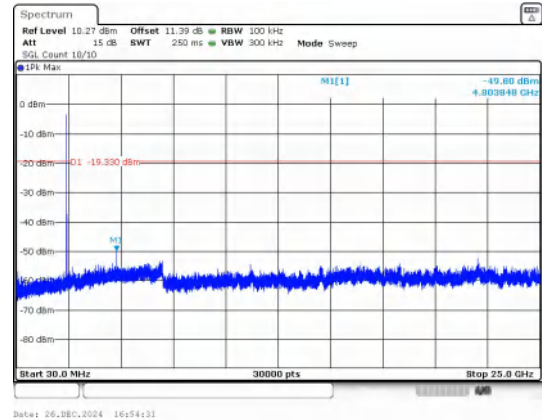
Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.90	-47.491	-18.63	-28.861	PASS
			2400.00	-48.200	-18.63	-29.570	PASS
			2483.50	-48.450	-18.31	-30.140	PASS
$\pi/4$ DQPSK	2-DH5		2398.38	-48.122	-19.27	-28.852	PASS
			2400.00	-50.090	-19.27	-30.820	PASS
			2483.50	-49.140	-18.8	-30.340	PASS
8DPSK	3-DH5		2400.00	-45.460	-19.31	-26.150	PASS
			2483.50	-48.650	-18.8	-29.850	PASS

Test Graphs

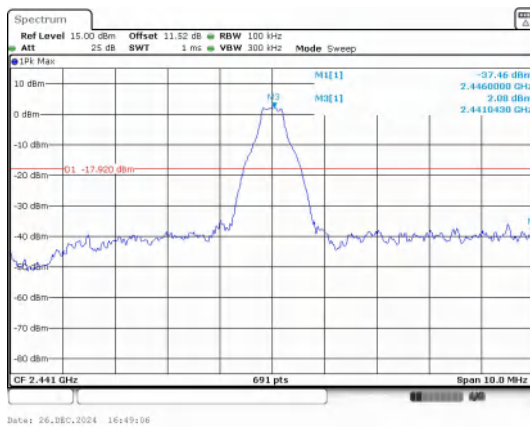
 Out Of Band Emission GFSK_DH5_Channel 0	 Out Of Band Emission $\pi/4$DQPSK_2-DH5_Channel 0
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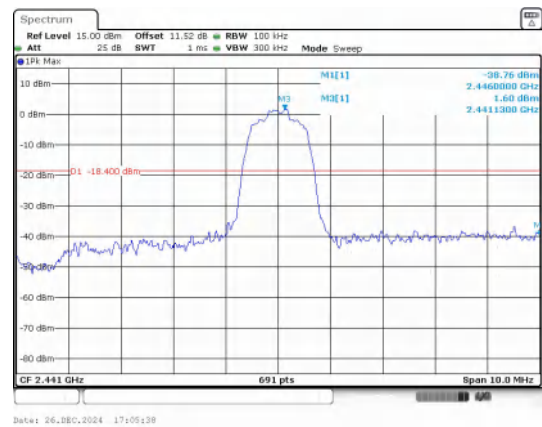
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



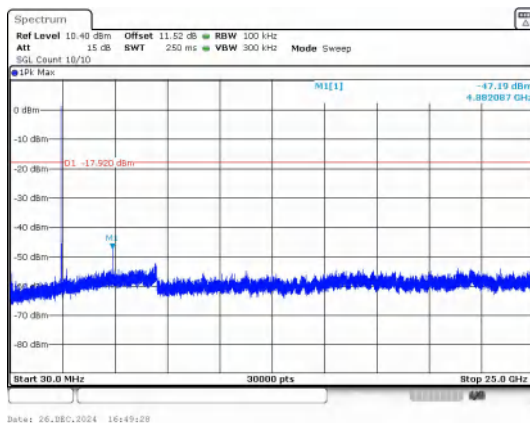
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



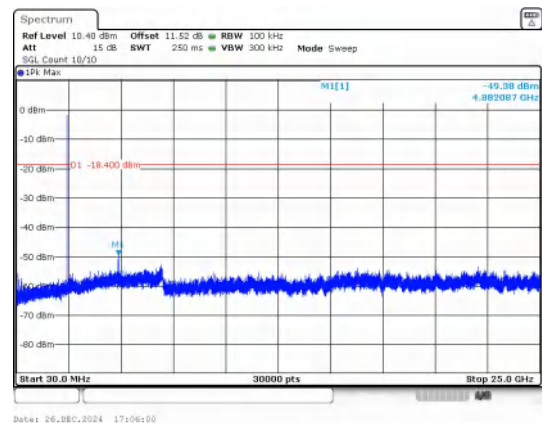
Out Of Band Emission
GFSK_DH5_Channel 39



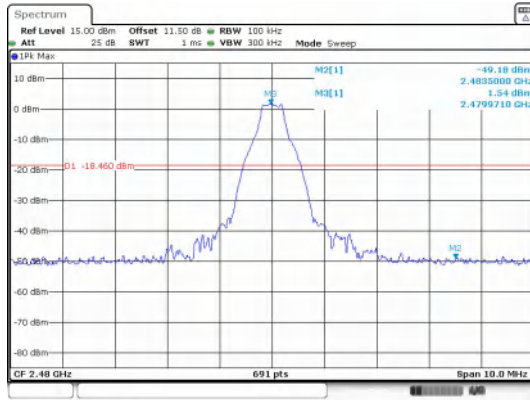
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



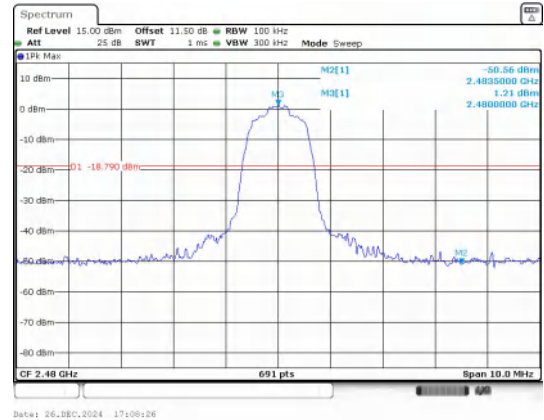
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



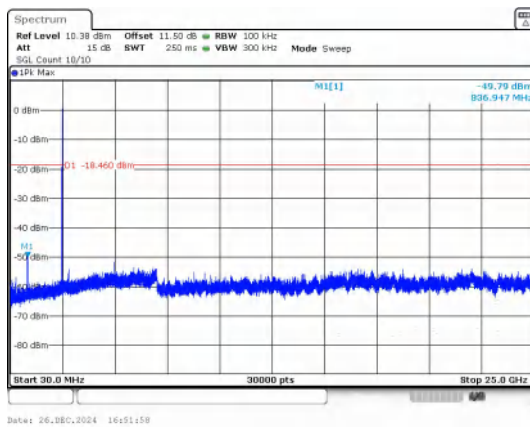
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



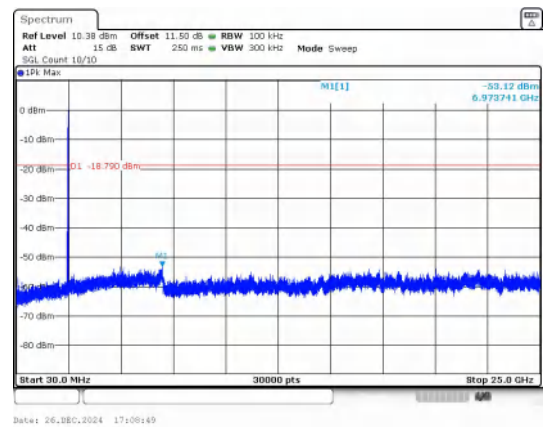
Out Of Band Emission
GFSK_DH5_Channel 78



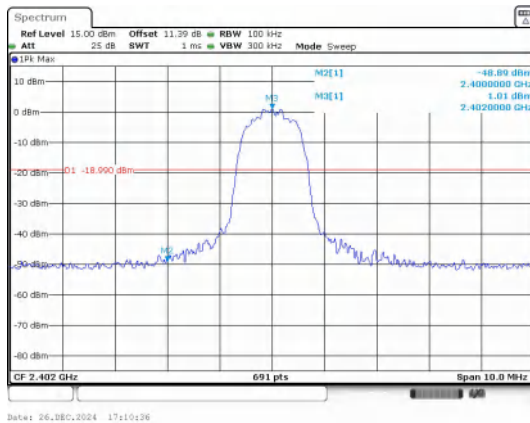
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



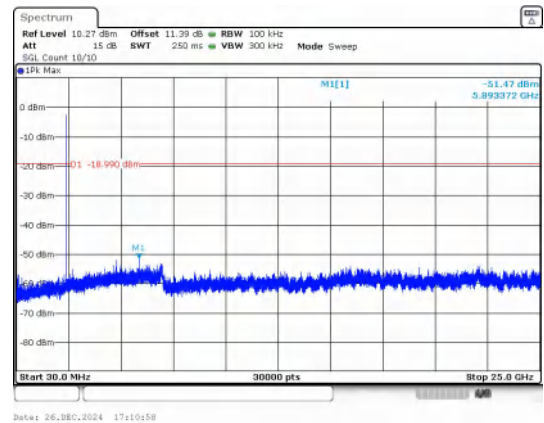
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



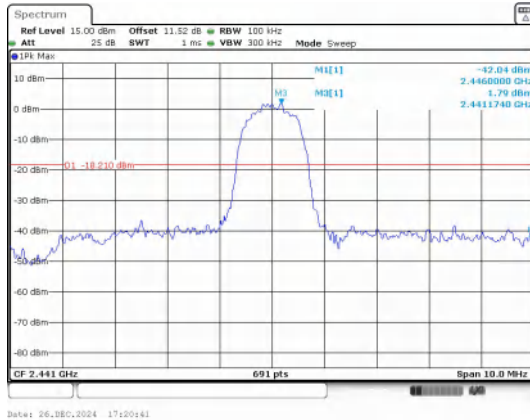
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



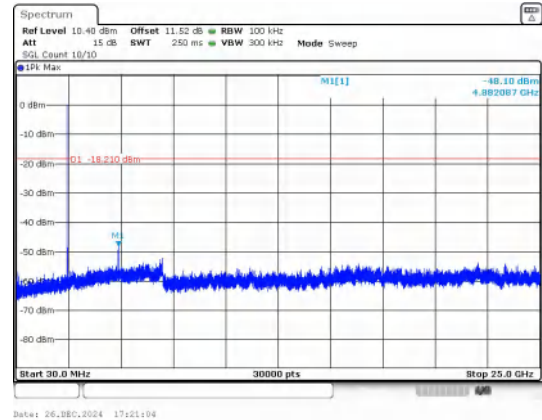
Out Of Band Emission
8DPSK_3-DH5_Channel 0



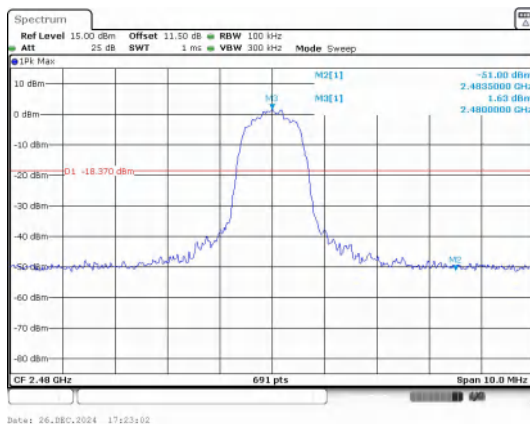
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



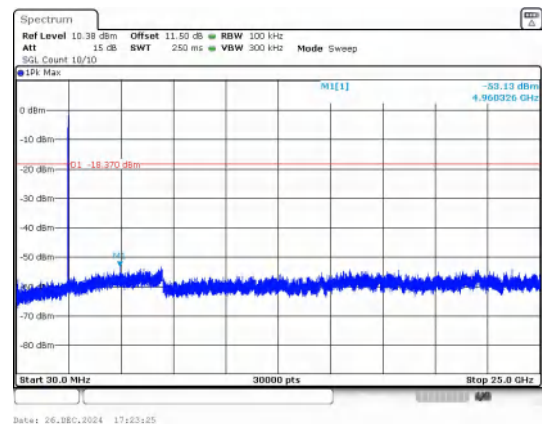
Out Of Band Emission
8DPSK_3-DH5_Channel 39



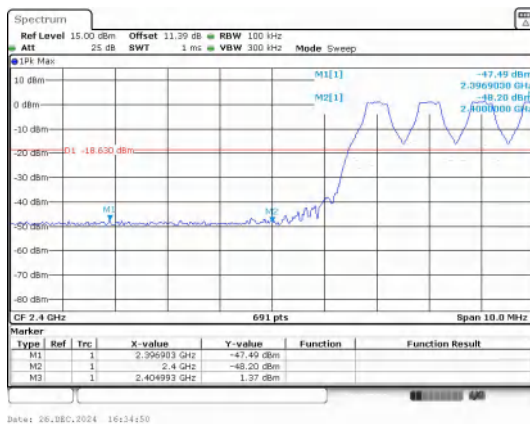
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



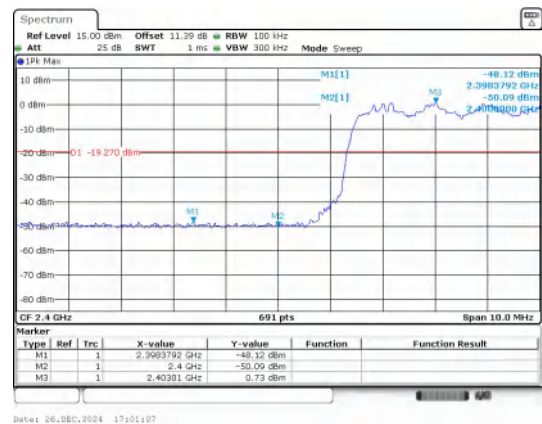
Out Of Band Emission
8DPSK_3-DH5_Channel 78



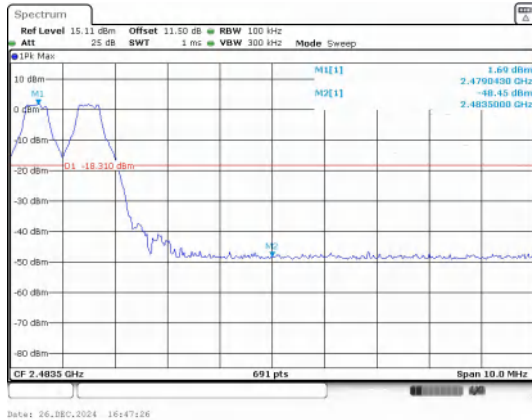
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



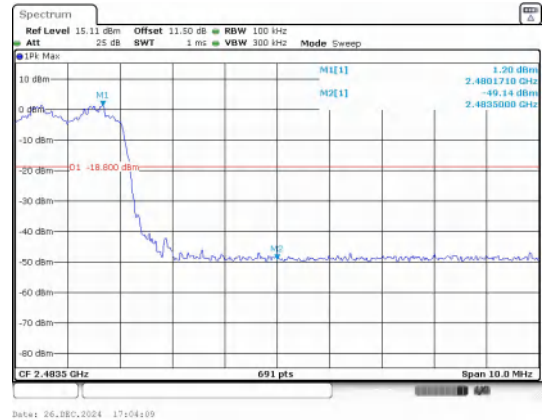
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



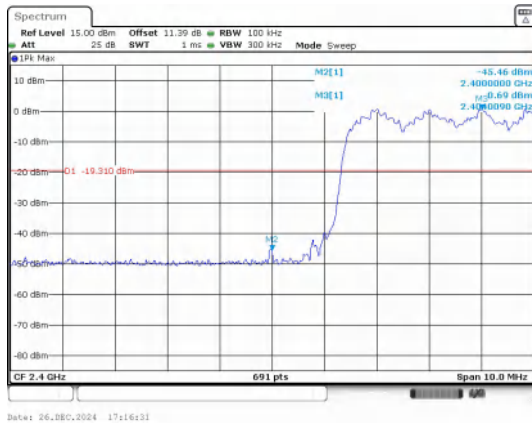
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



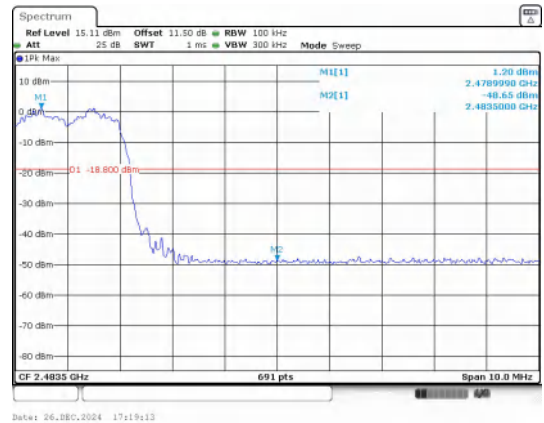
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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



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



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

-----End of the report-----