

Appendix Report

Report No.:	CISRR25022815405
Test Engineer:	Lucas Huang
Supervised by:	Rory Huang

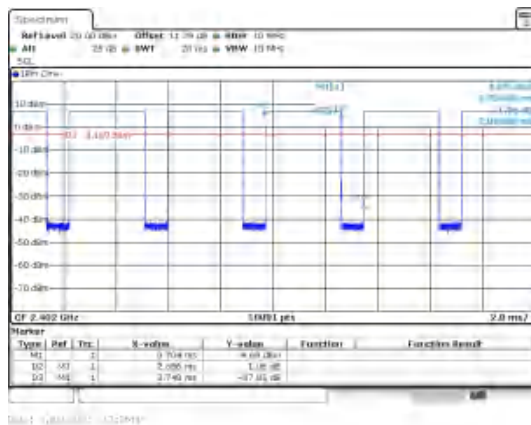
1) Duty Cycle

Test Result

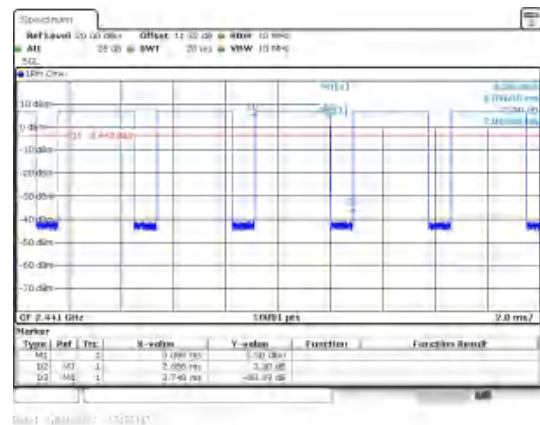
Left:

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.886	3.748	77.00	0.7700	1.1351	0.3465
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
$\pi/4$ DQPSK	2-DH5	0	2.892	3.748	77.16	0.7716	1.1261	0.3458
		39	2.890	3.748	77.11	0.7711	1.1289	0.3460
		78	2.892	3.748	77.16	0.7716	1.1261	0.3458
8DPSK	3-DH5	0	2.894	3.748	77.21	0.7721	1.1233	0.3455
		39	2.894	3.748	77.21	0.7721	1.1233	0.3455
		78	2.894	3.748	77.21	0.7721	1.1233	0.3455

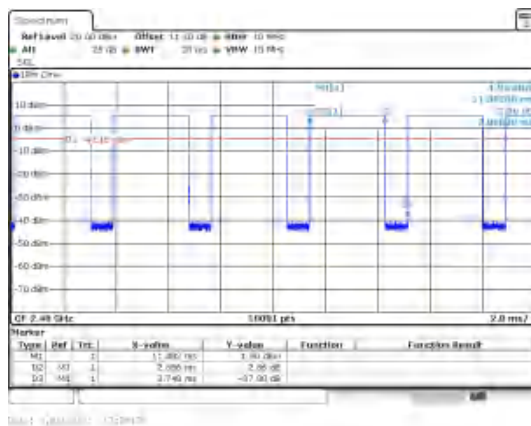
Test Graphs



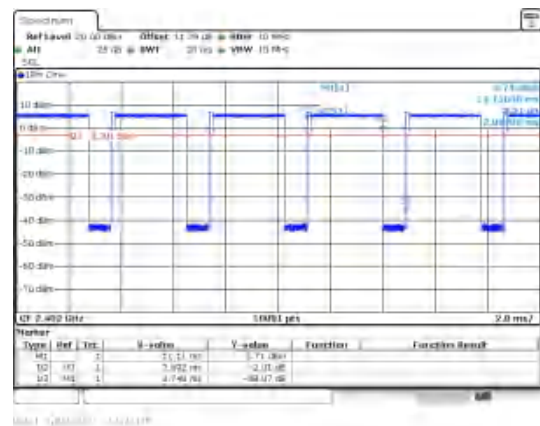
GFSK(DH5)_Channel 0



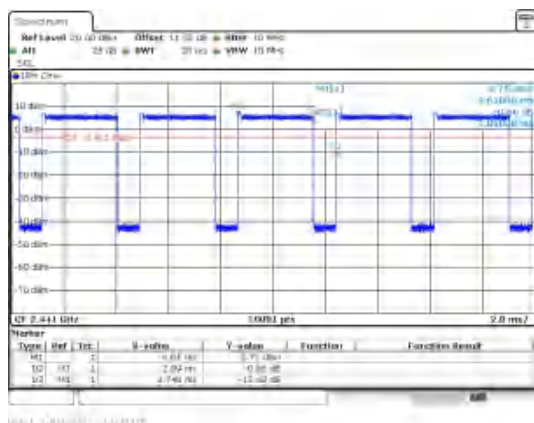
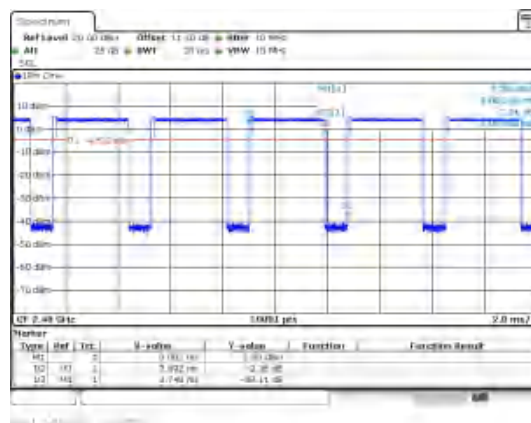
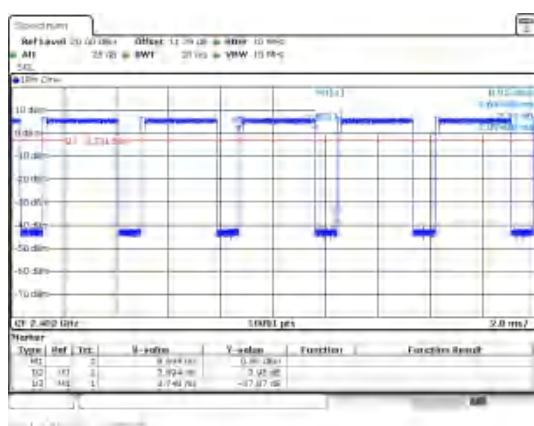
GFSK(DH5)_Channel 39



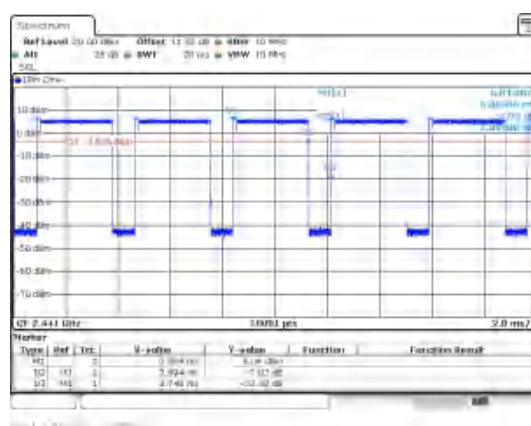
GFSK(DH5)_Channel 78



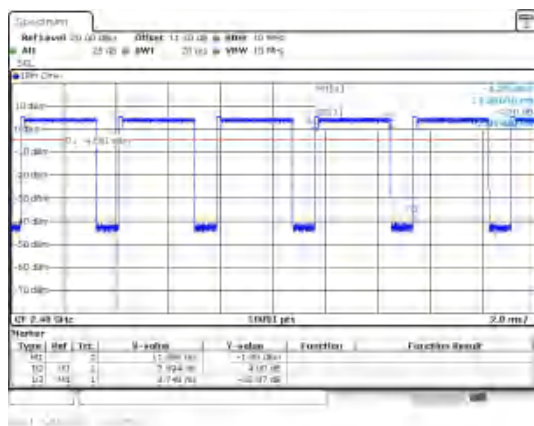
$\pi/4$ DQPSK(2-DH5)_Channel 0


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

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


8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39



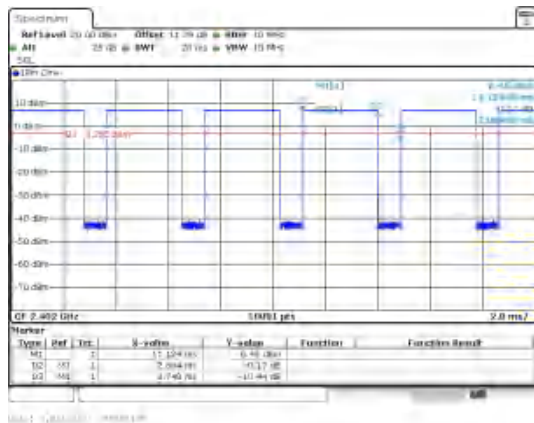
8DPSK(3-DH5)_Channel 78

Right:

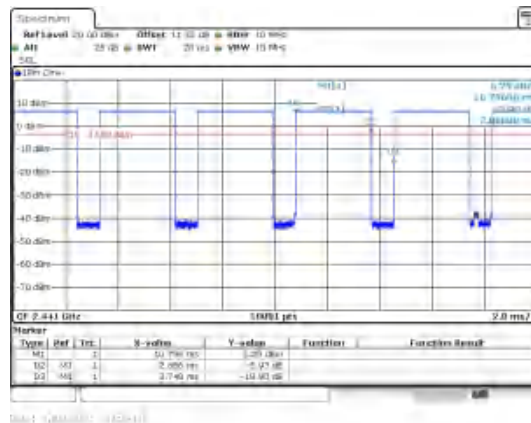
Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
GFSK	DH5	0	2.884	3.748	76.95	0.7695	1.1379	0.3467
		39	2.886	3.748	77.00	0.7700	1.1351	0.3465
		78	2.886	3.748	77.00	0.7700	1.1351	0.3465
$\pi/4$ DQPSK	2-DH5	0	2.890	3.748	77.11	0.7711	1.1289	0.3460
		39	2.890	3.748	77.11	0.7711	1.1289	0.3460
		78	2.890	3.748	77.11	0.7711	1.1289	0.3460

8DPSK	3-DH5	0	2.894	3.748	77.21	0.7721	1.1233	0.3455
		39	2.892	3.748	77.16	0.7716	1.1261	0.3458
		78	2.892	3.748	77.16	0.7716	1.1261	0.3458

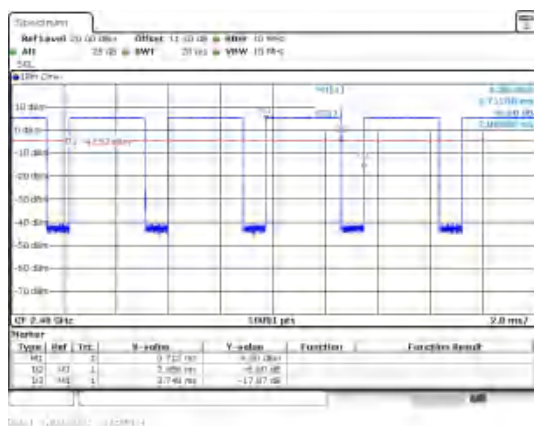
Test Graphs



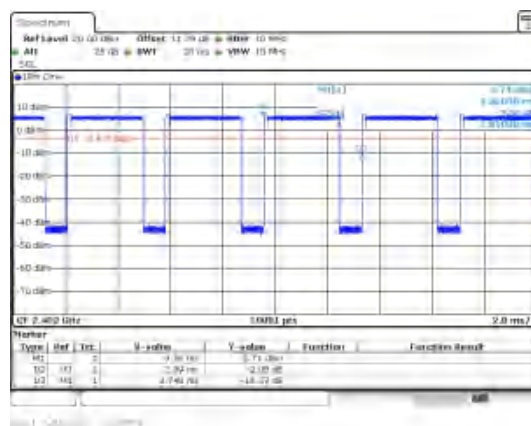
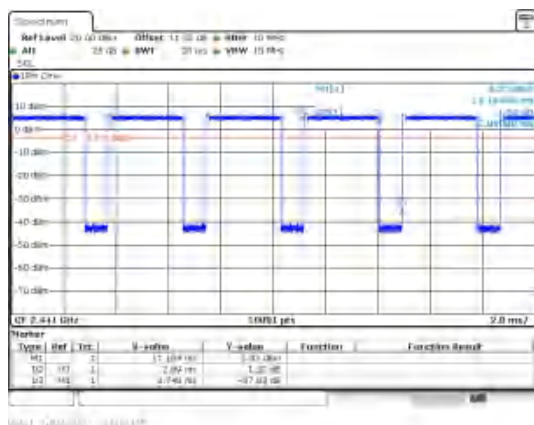
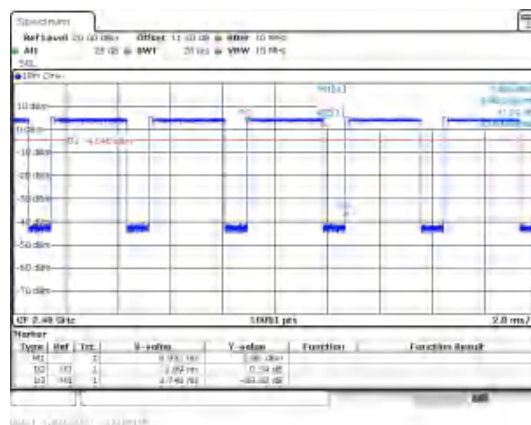
GFSK(DH5)_Channel 0



GFSK(DH5)_Channel 39

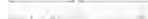


GFSK(DH5)_Channel 78


 $\pi/4$ 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

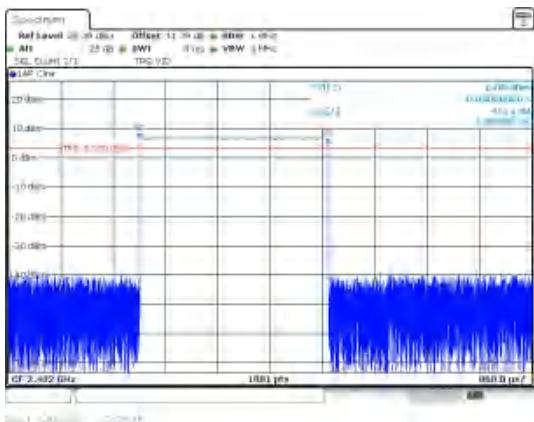
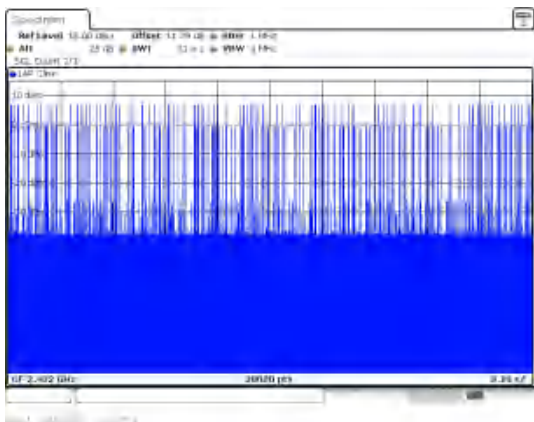
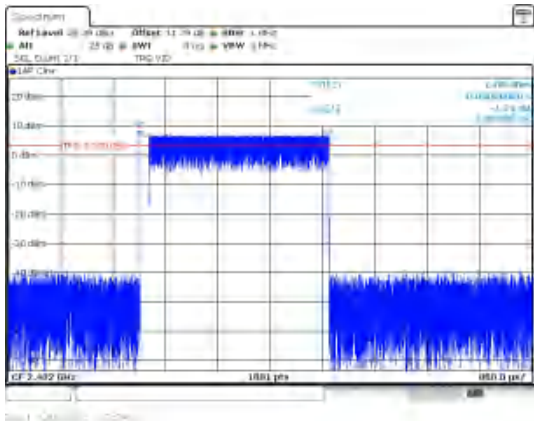
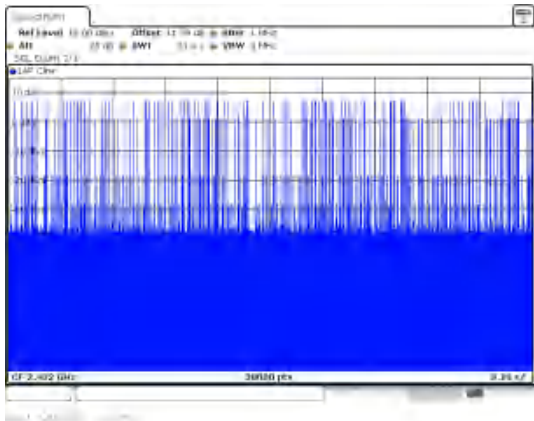
2) Dwell Time

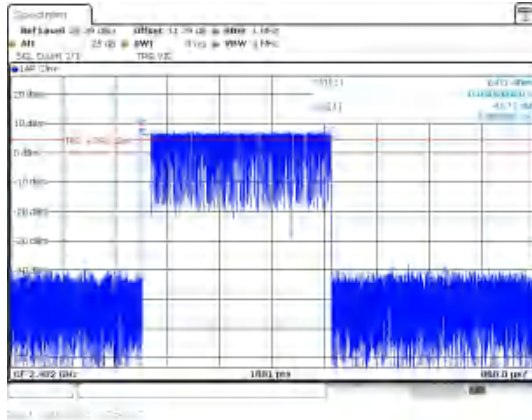
Test Result

Left:

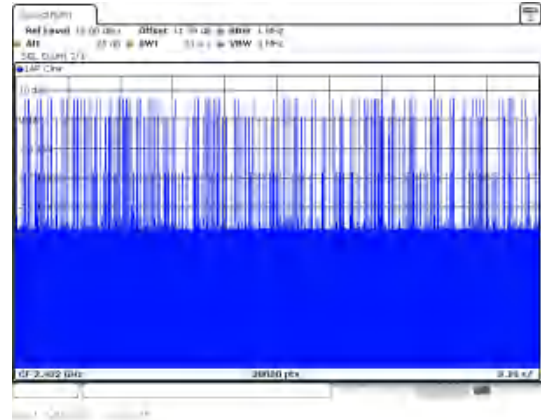
Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	109	314.79	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.896	107	309.87		PASS
8DPSK	3-DH5		2.896	102	295.39		PASS

Test Graphs

	
Pulse Width GFSK_DH5	Number of Pulses in 31.6 seconds GFSK_DH5
	
Pulse Width $\pi/4$ DQPSK_2-DH5	Number of Pulses in 31.6 seconds $\pi/4$ DQPSK_2-DH5



Pulse Width
8DPSK_3-DH5

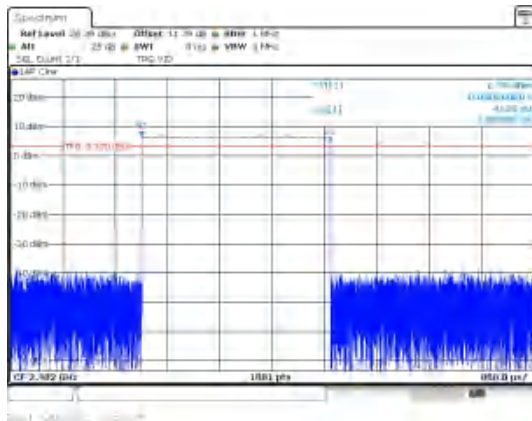


Number of Pulses in 31.6 seconds
8DPSK_3-DH5

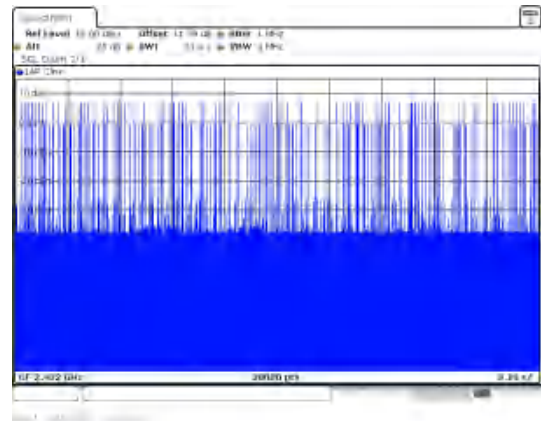
Right:

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	CH0 (2402MHz)	2.888	98	283.02	< 400	PASS
$\pi/4$ DQPSK	2-DH5		2.896	107	309.87		PASS
8DPSK	3-DH5		2.896	121	350.42		PASS

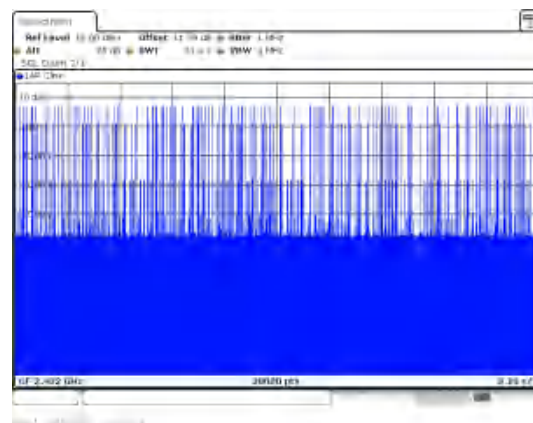
Test Graphs



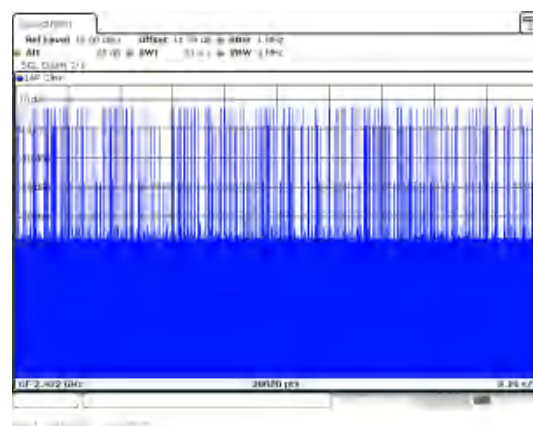
Pulse Width
GFSK_DH5



Number of Pulses in 31.6 seconds
GFSK_DH5



Number of Pulses in 31.6 seconds



Number of Pulses in 31.6 seconds

8DPSK 3-DH5

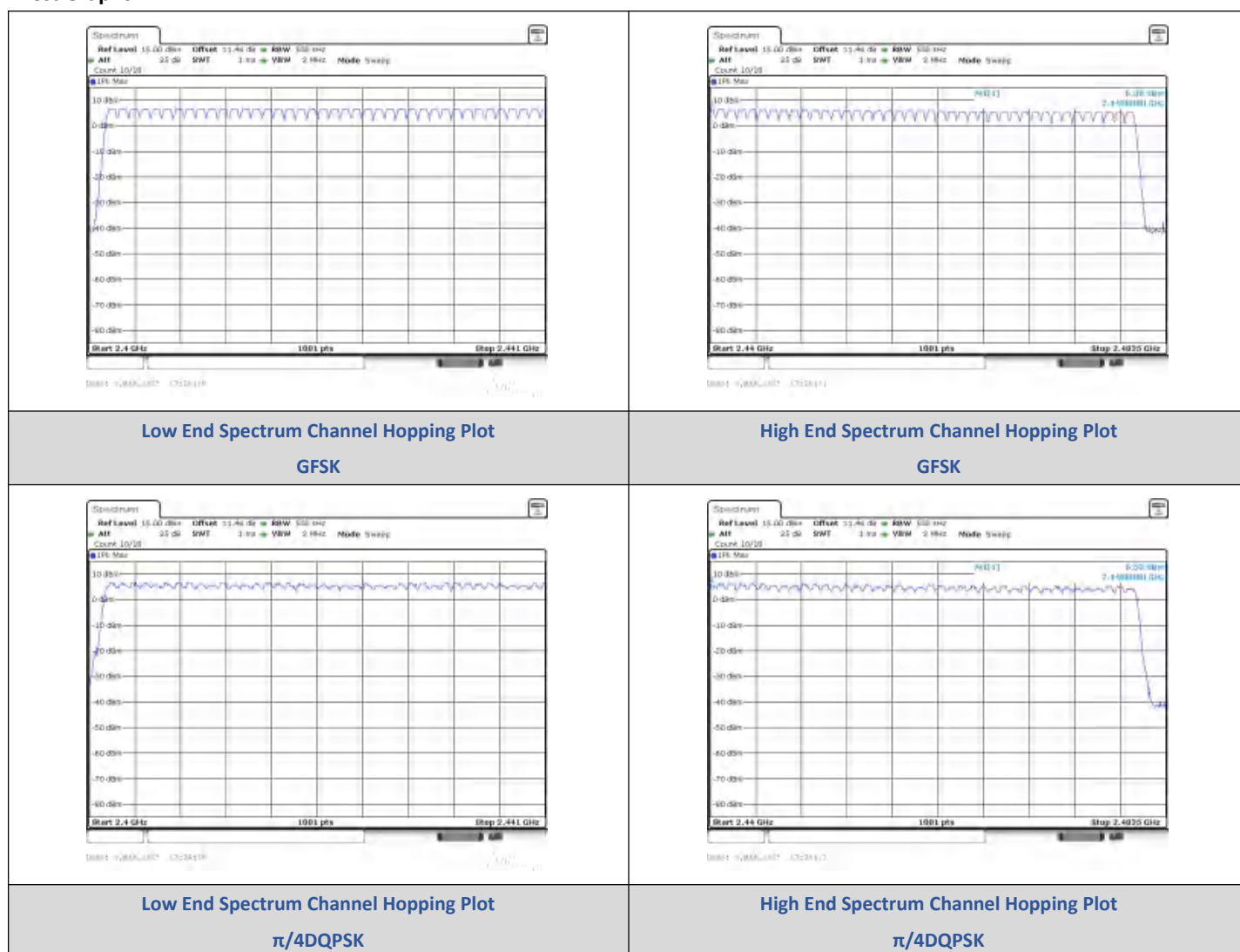
3) Number Of Hopping Channel

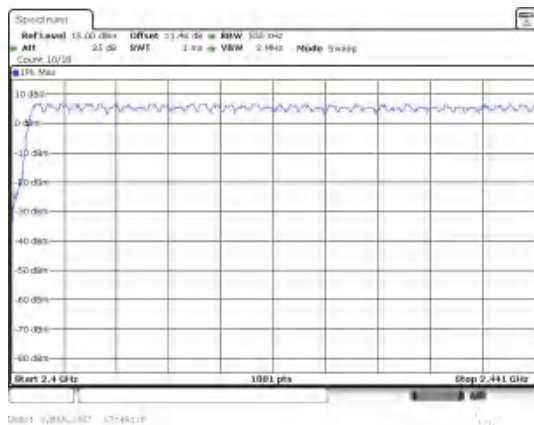
Test Result

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

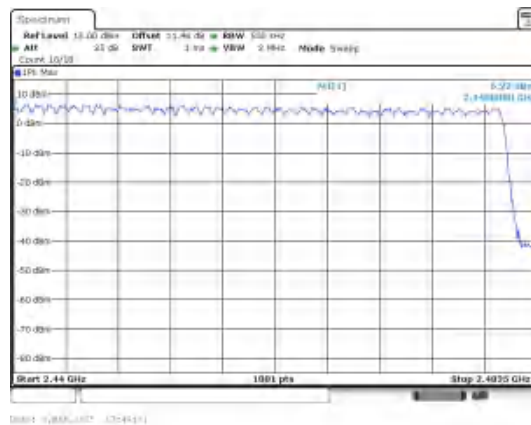
Test Graphs





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



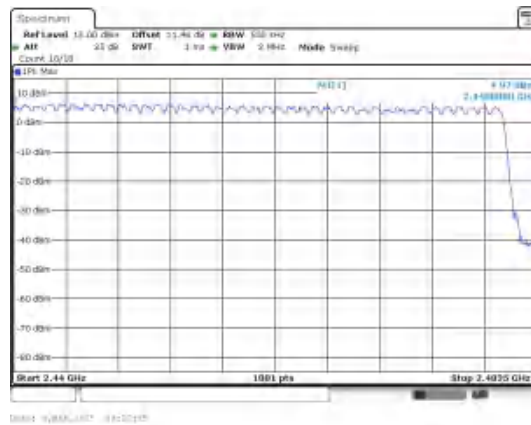
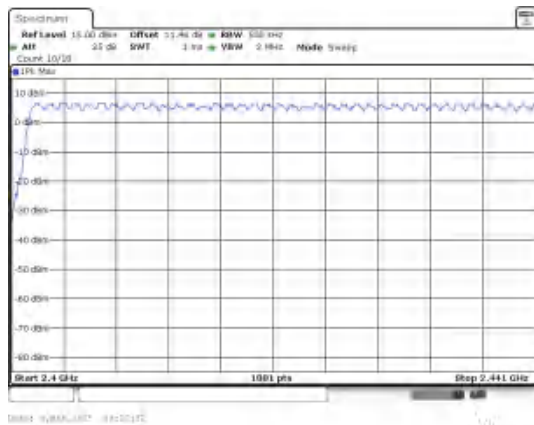
Low End Spectrum Channel Hopping Plot

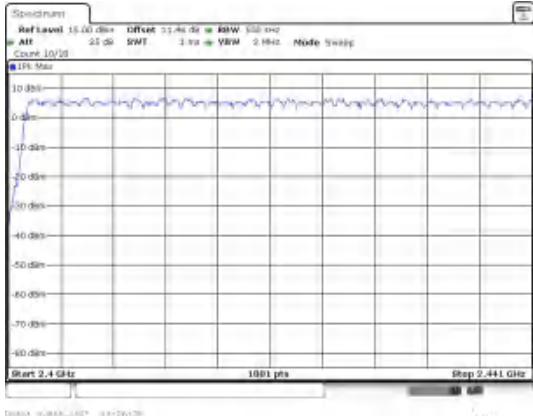
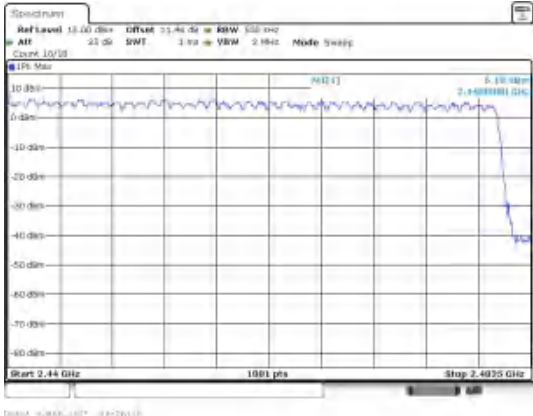
GFSK



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

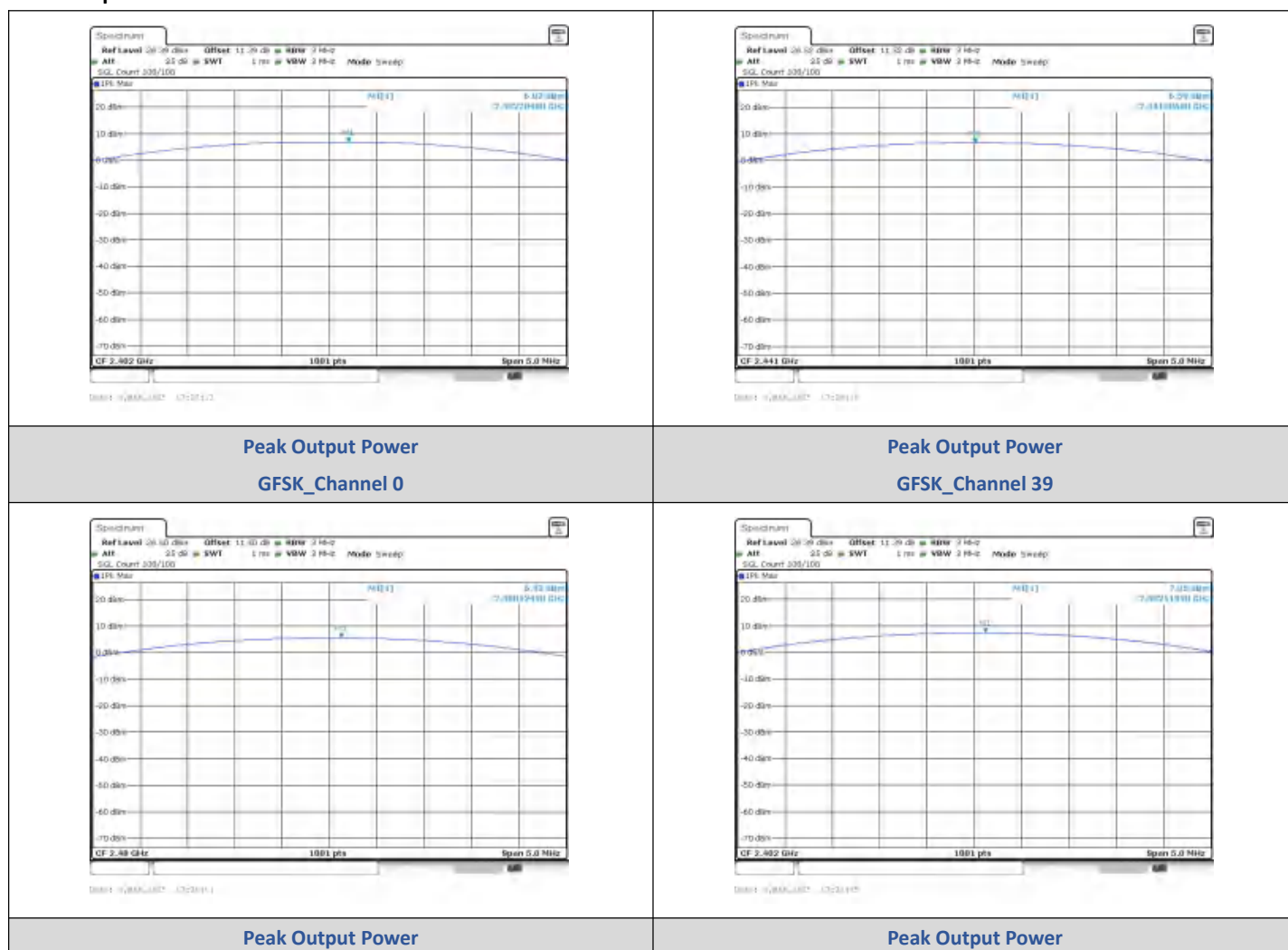
4) Conducted Peak Output Power

Test Result

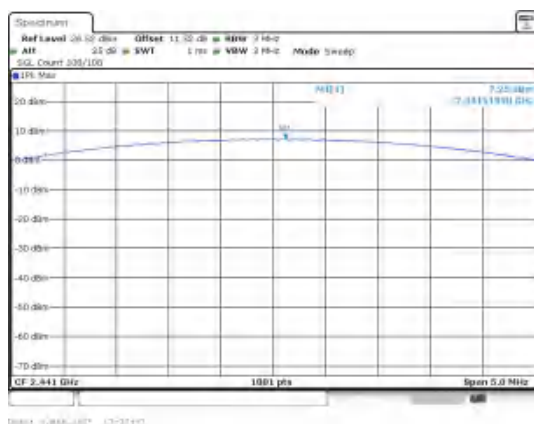
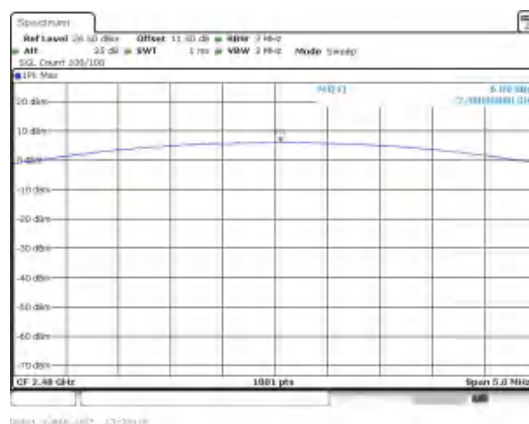
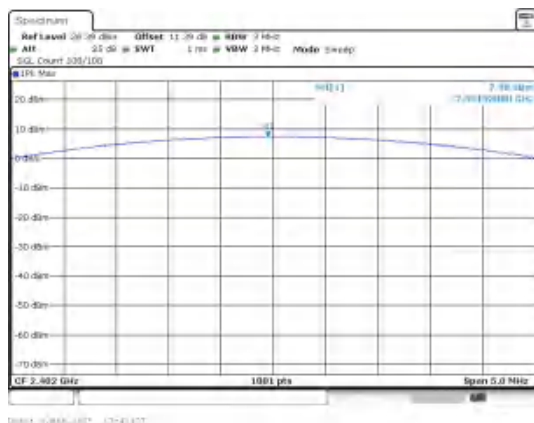
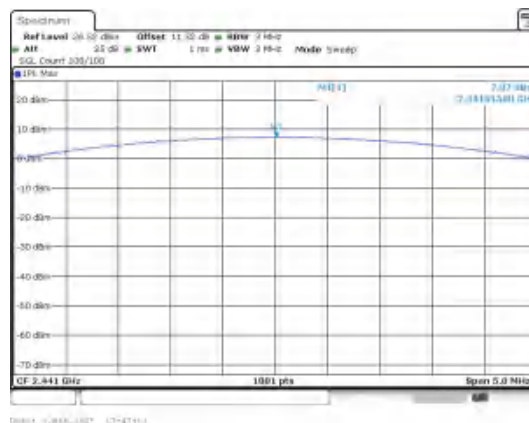
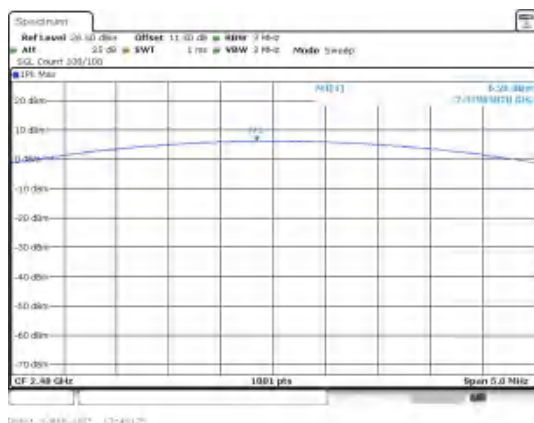
Left:

Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	6.82	4.81	≤30	PASS
		39	6.59	4.56		PASS
		78	5.43	3.49		PASS
$\pi/4$ DQPSK	2-DH5	0	7.35	5.43	≤20.97	PASS
		39	7.25	5.31		PASS
		78	6.08	4.06		PASS
8DPSK	3-DH5	0	7.48	5.60		PASS
		39	7.37	5.46		PASS
		78	6.26	4.23		PASS

Test Graphs



GFSK_Channel 78


 π /4DQPSK_Channel 0

Peak Output Power
 π /4DQPSK_Channel 39

Peak Output Power
 π /4DQPSK_Channel 78

Peak Output Power
8DPSK_Channel 0

Peak Output Power
8DPSK_Channel 39

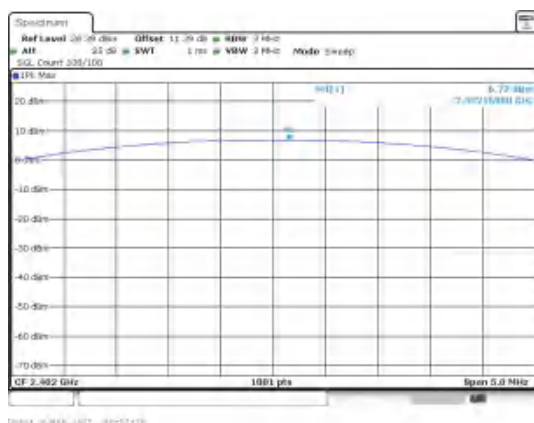
Peak Output Power
8DPSK_Channel 78

Right:

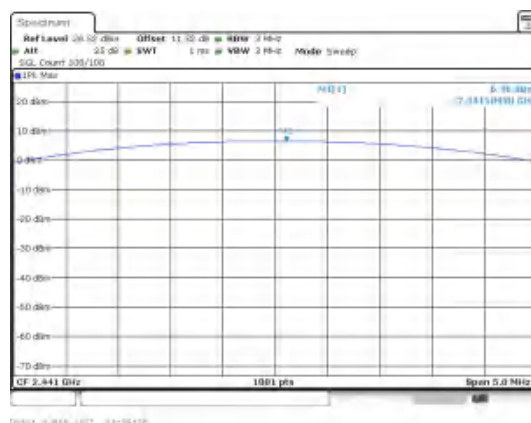
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK	DH5	0	6.72	4.70	≤30	PASS

		39	6.46	4.43		PASS
		78	5.41	3.48		PASS
		0	7.19	5.24		PASS
$\pi/4$ DQPSK	2-DH5	39	7.10	5.13	≤ 20.97	PASS
		78	6.06	4.04		PASS
		0	7.40	5.50		PASS
8DPSK	3-DH5	39	7.32	5.40		PASS
		78	6.37	4.34		PASS
						PASS

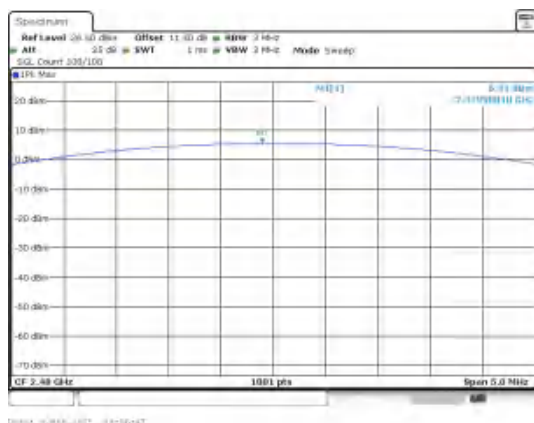
Test Graphs



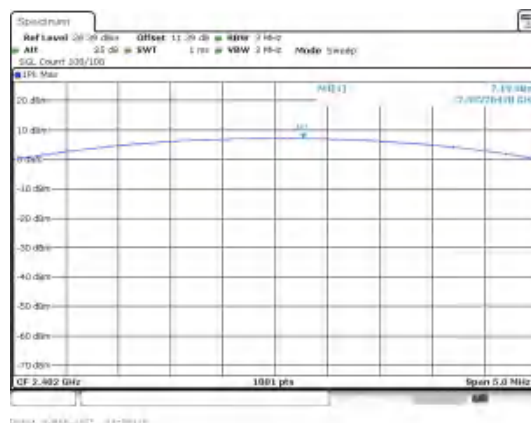
Peak Output Power
GFSK_Channel 0



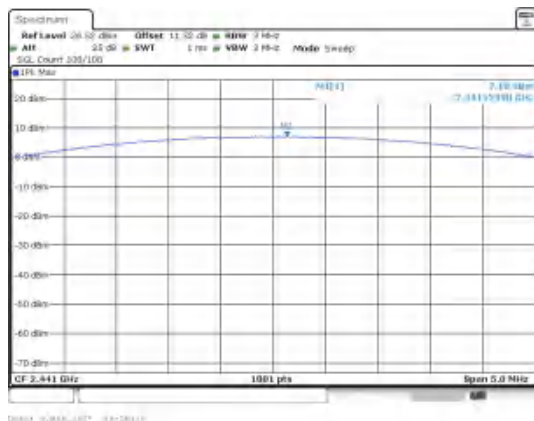
Peak Output Power
GFSK_Channel 39



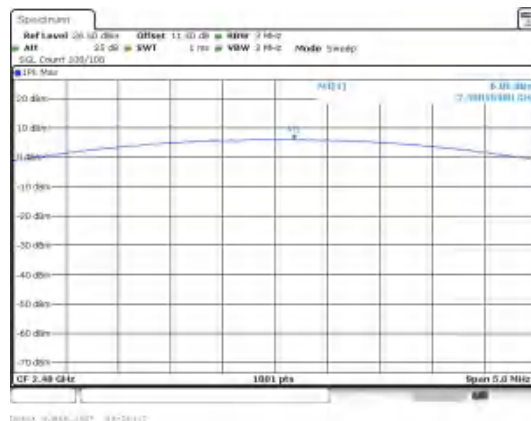
Peak Output Power
GFSK_Channel 78



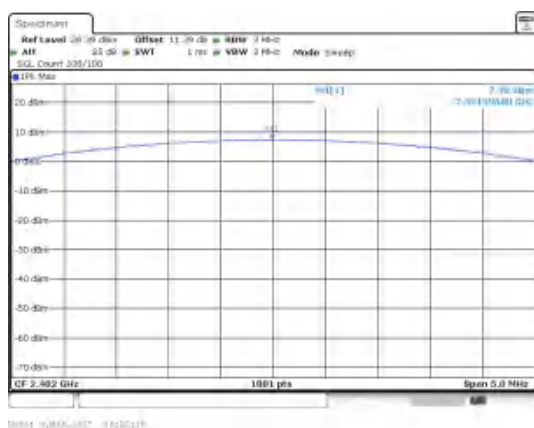
Peak Output Power
 $\pi/4$ DQPSK_Channel 0



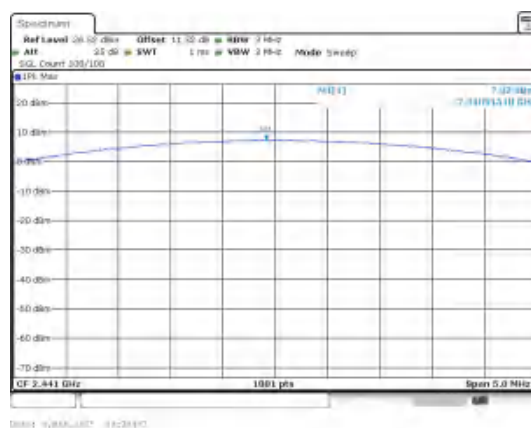
Peak Output Power
 $\pi/4$ DQPSK_Channel 39



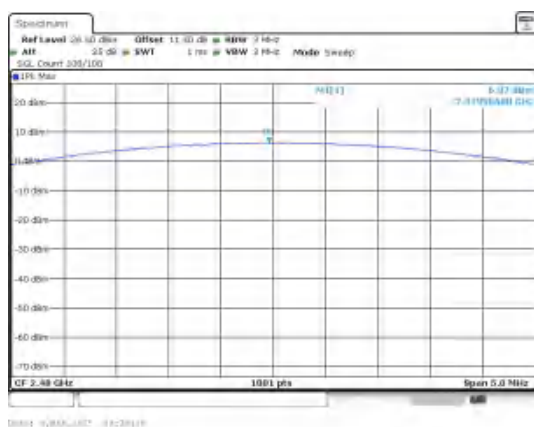
Peak Output Power
 $\pi/4$ DQPSK_Channel 78



Peak Output Power
8DPSK_Channel 0



Peak Output Power
8DPSK_Channel 39



Peak Output Power
8DPSK_Channel 78

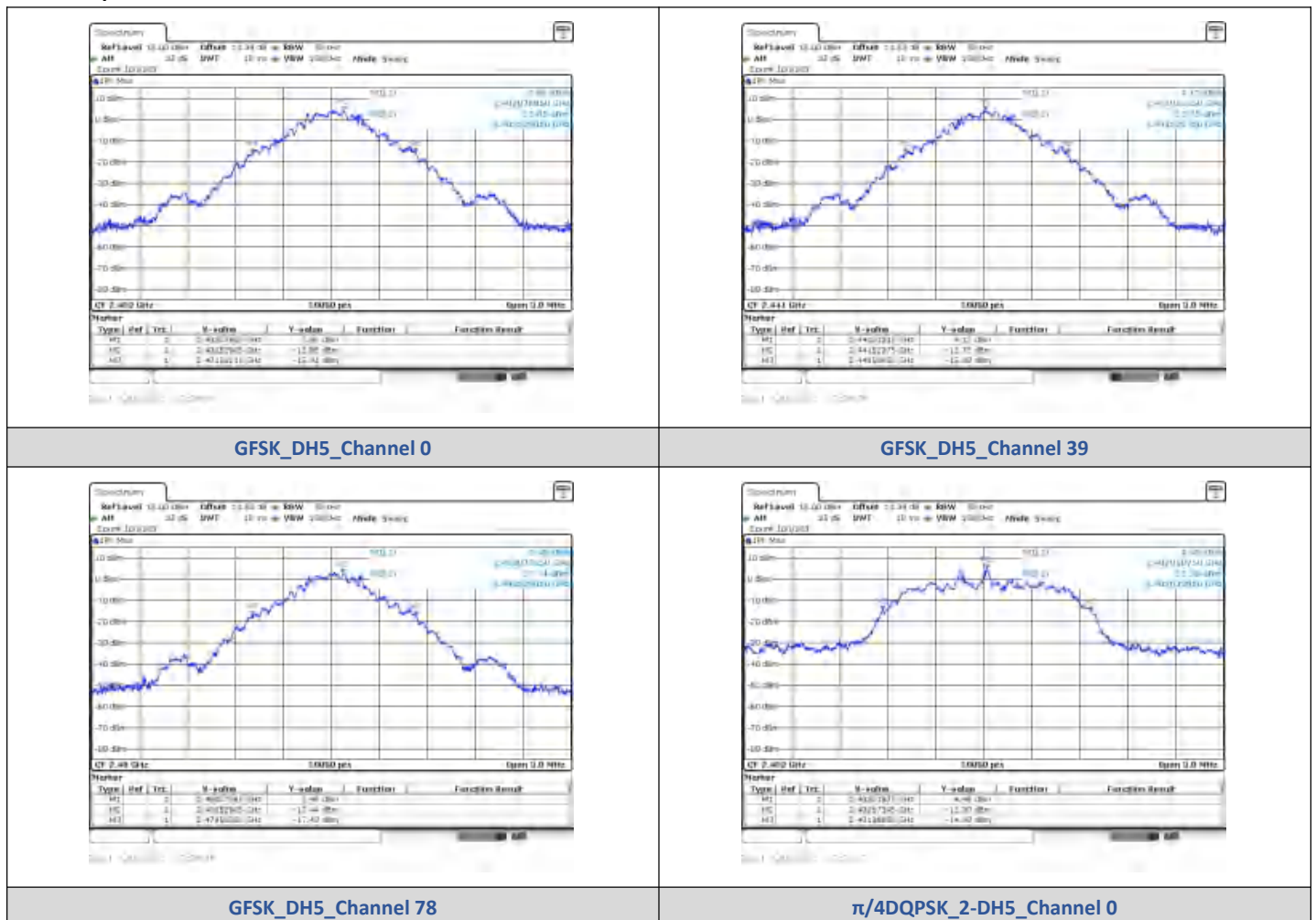
5) 20dB Bandwidth

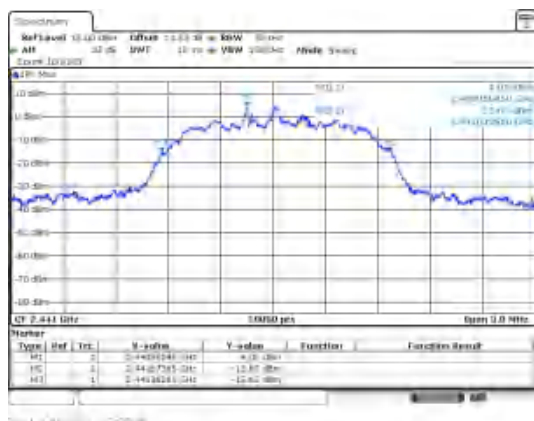
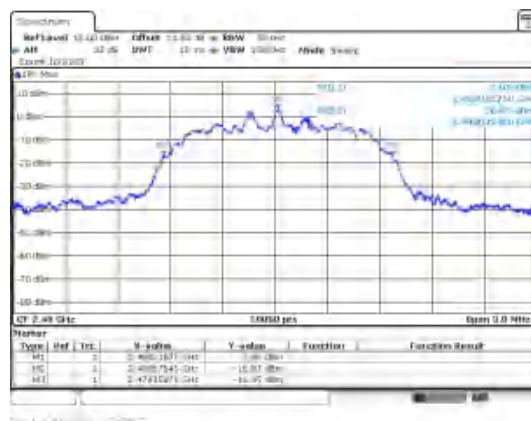
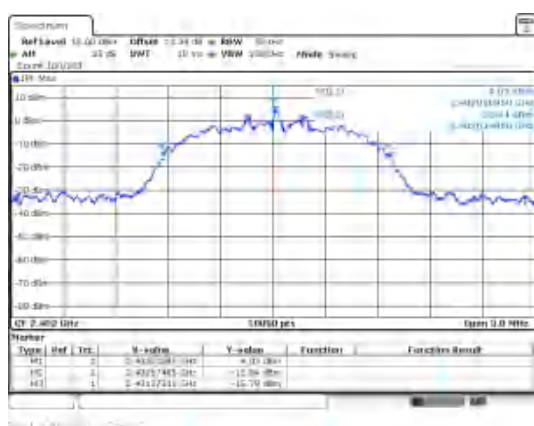
Test Result

Left:

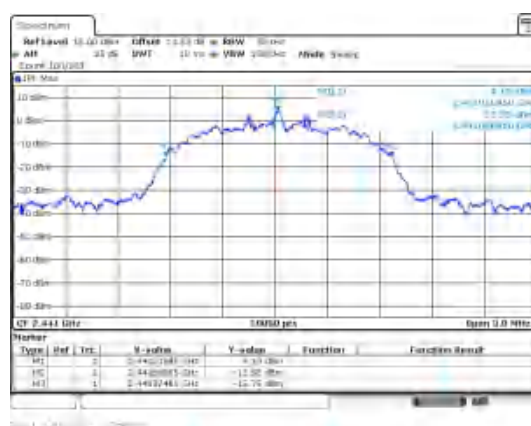
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.030
	39	2441 MHz	1.010
	78	2480 MHz	1.030
$\pi/4$ DQPSK	0	2402 MHz	1.300
	39	2441 MHz	1.310
	78	2480 MHz	1.320
8DPSK	0	2402 MHz	1.300
	39	2441 MHz	1.300
	78	2480 MHz	1.290

Test Graphs

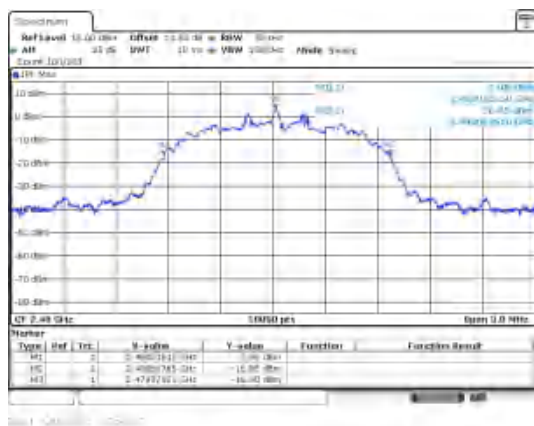



 $\pi/4$ DQPSK_2-DH5_Channel 39

 $\pi/4$ DQPSK_2-DH5_Channel 78


8DPSK_3-DH5_Channel 0



8DPSK_3-DH5_Channel 39



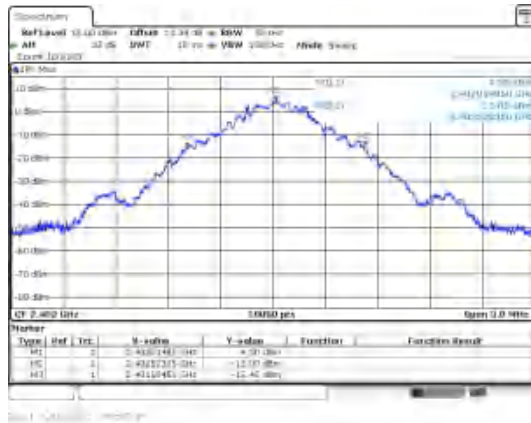
8DPSK_3-DH5_Channel 78

Right:

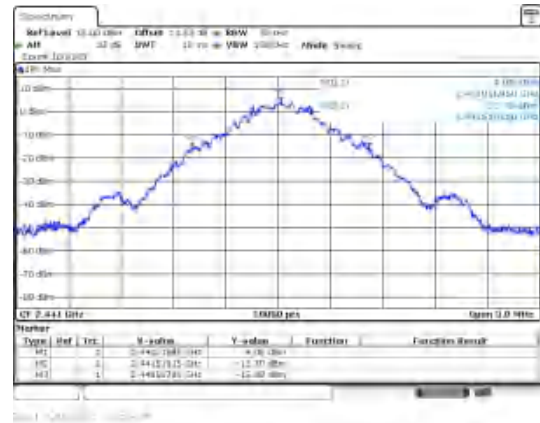
Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	0	2402 MHz	1.020
	39	2441 MHz	1.010
	78	2480 MHz	1.000
$\pi/4$ DQPSK	0	2402 MHz	1.320
	39	2441 MHz	1.320
	78	2480 MHz	1.320

8DPSK	0	2402 MHz	1.310
	39	2441 MHz	1.290
	78	2480 MHz	1.290

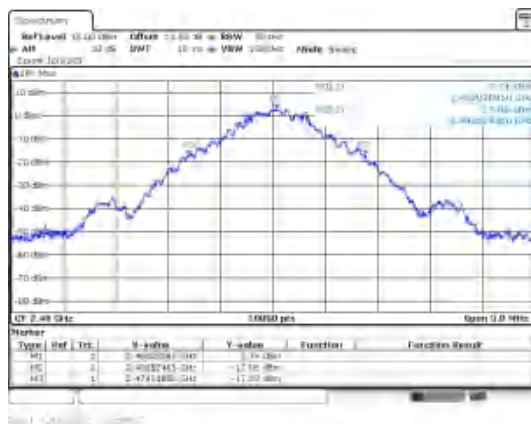
Test Graphs



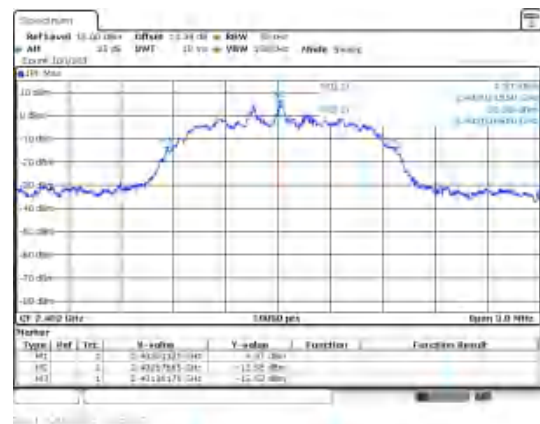
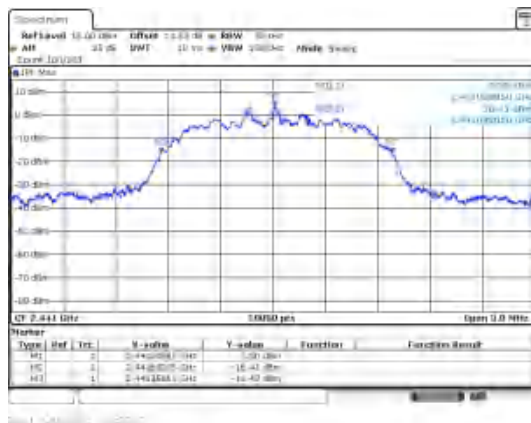
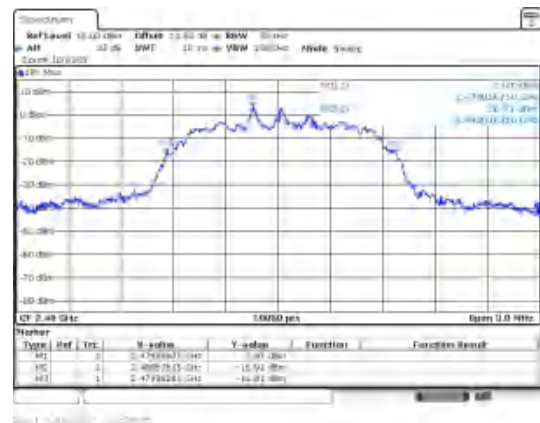
GFSK_DH5_Channel 0

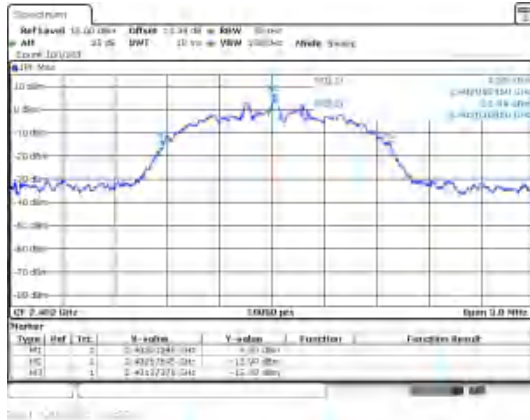


GFSK_DH5_Channel 39

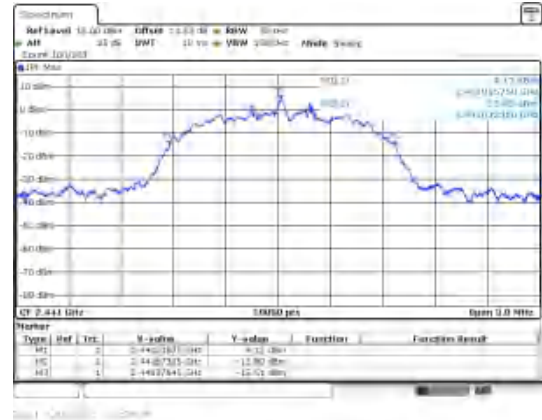


GFSK_DH5_Channel 78

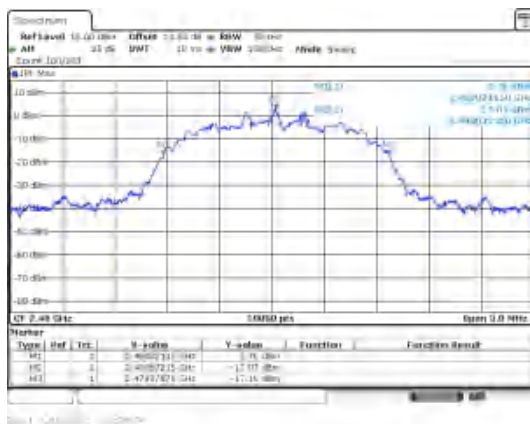

 $\pi/4$ DQPSK_2-DH5_Channel 0

 $\pi/4$ 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

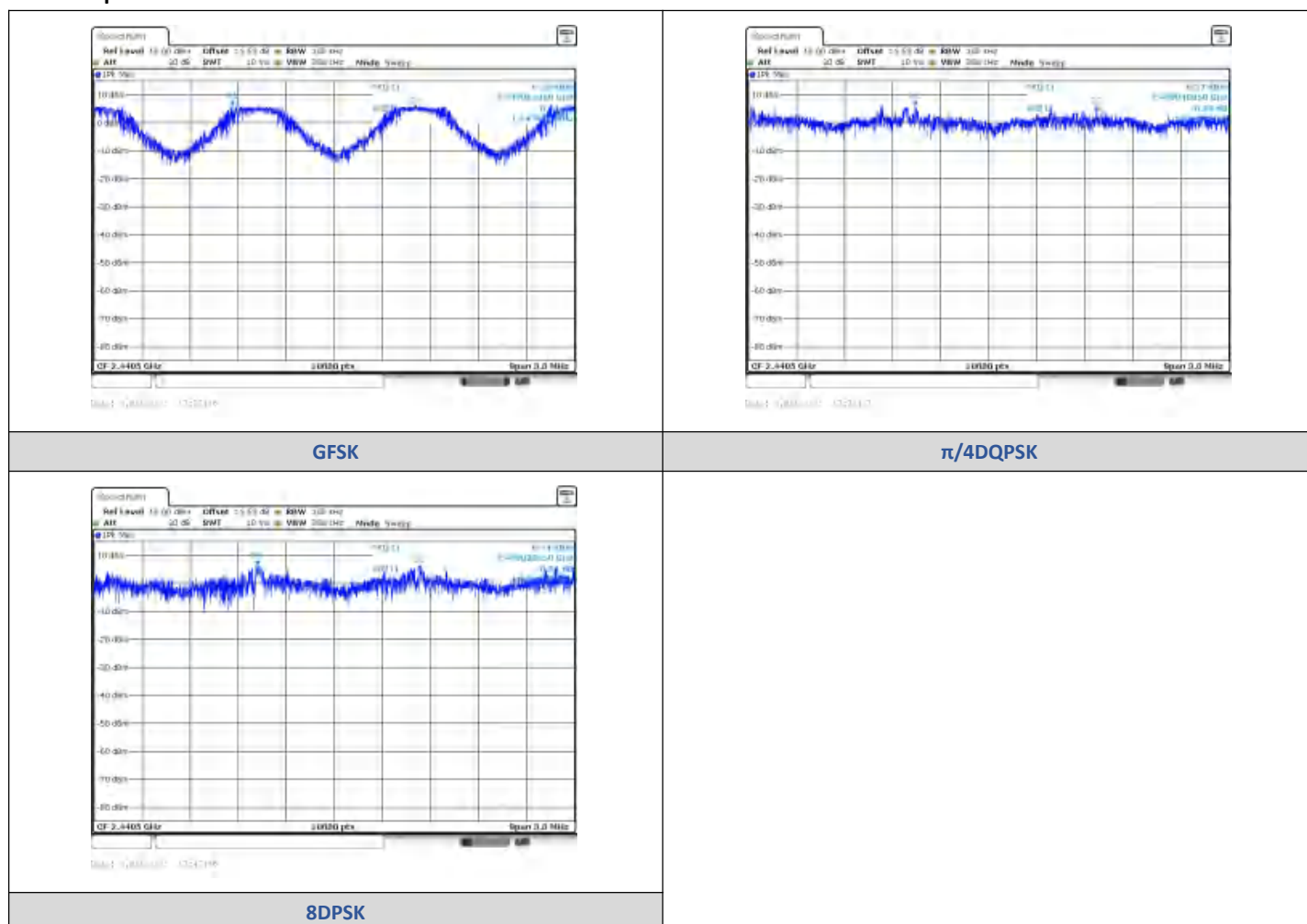
6) Carrier Frequencies Separation

Test Result

Left:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.8623	2441.0102	1.1478	1.03	PASS
$\pi/4$ DQPSK	2-DH5	2440.0408	2441.1743	1.1334	0.867	PASS
8DPSK	3-DH5	2440.0231	2441.0323	1.0092	0.867	PASS

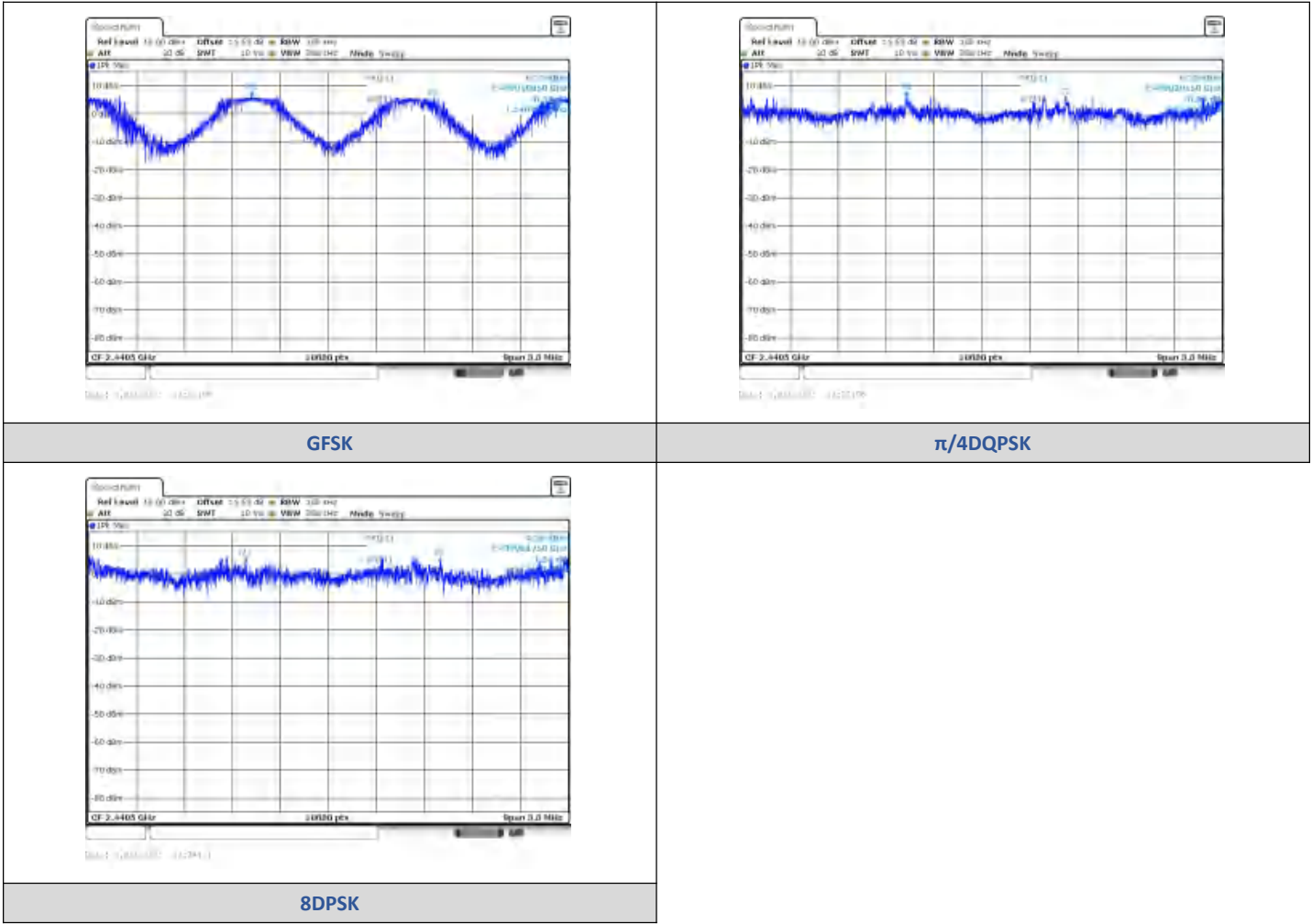
Test Graphs



Right:

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2440.0199	2441.1608	1.1409	1.02	PASS
$\pi/4$ DQPSK	2-DH5	2440.0291	2441.0224	0.9933	0.88	PASS
8DPSK	3-DH5	2439.9817	2441.1991	1.2174	0.873	PASS

Test Graphs



7) Conducted Out Of Band Emission

Test Result

Left:

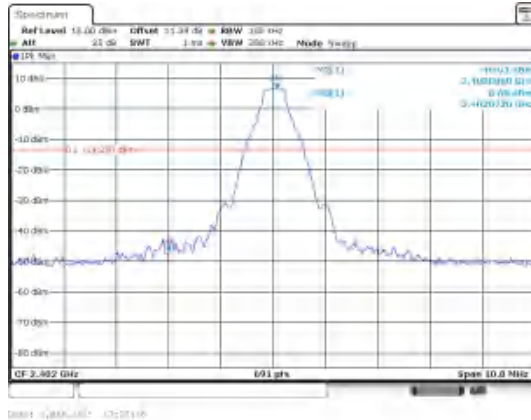
Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	0	2400.00	-47.070	-13.32	-33.750	PASS
			7205.96	-38.510	-13.32	-25.190	PASS
		39	9763.72	-40.711	-13.56	-27.151	PASS
		78	2483.50	-50.040	-14.74	-35.300	PASS
			9920.20	-37.289	-14.74	-22.549	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-43.470	-13.36	-30.110	PASS
			9608.08	-41.416	-13.36	-28.056	PASS
		39	9763.72	-40.985	-13.71	-27.275	PASS
		78	2483.50	-50.220	-14.73	-35.490	PASS
			9920.20	-36.995	-14.73	-22.265	PASS
8DPSK	3-DH5	0	831.95	-40.648	-13.53	-27.118	PASS
			2400.00	-45.700	-13.53	-32.170	PASS
		39	9763.72	-41.312	-13.63	-27.682	PASS
		78	2483.50	-50.540	-14.8	-35.740	PASS
			9920.20	-37.232	-14.8	-22.432	PASS

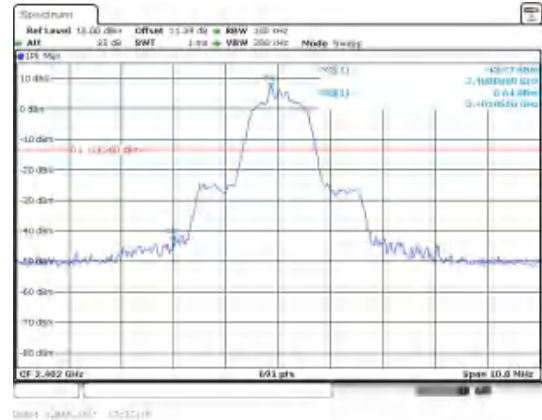
Hopping

Hopping							
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2395.08	-47.375	-13.47	-33.905	PASS
			2400.00	-49.970	-13.47	-36.500	PASS
			2483.50	-50.110	-14.81	-35.300	PASS
$\pi/4$ DQPSK	2-DH5		2398.31	-47.570	-13.36	-34.210	PASS
			2400.00	-50.350	-13.36	-36.990	PASS
			2483.50	-49.710	-17.49	-32.220	PASS
8DPSK	3-DH5		2396.47	-48.130	-14.34	-33.790	PASS
			2400.00	-49.570	-14.34	-35.230	PASS
			2483.50	-49.720	-14.99	-34.730	PASS

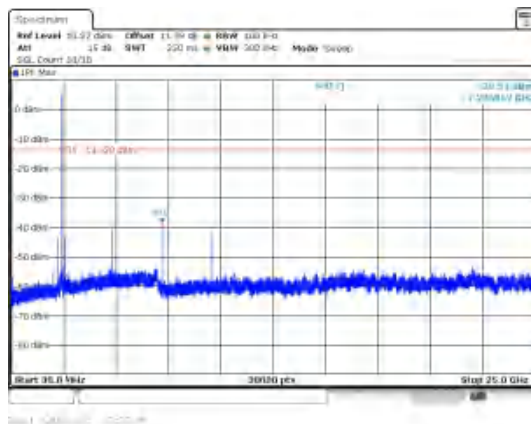
Test Graphs



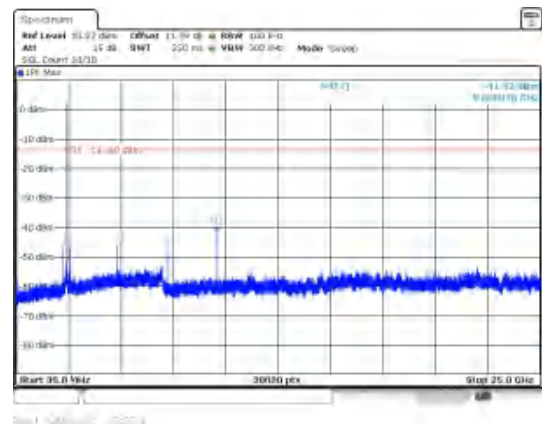
Out Of Band Emission
GFSK_DH5_Channel 0



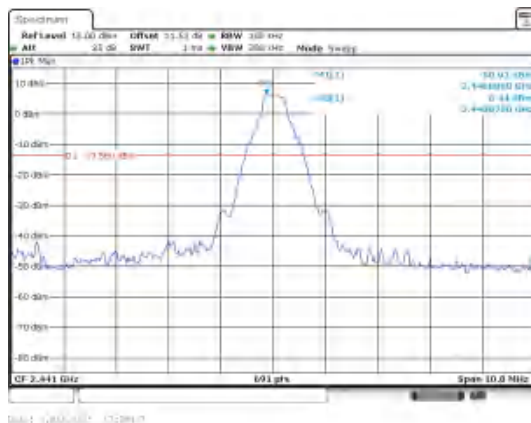
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 0



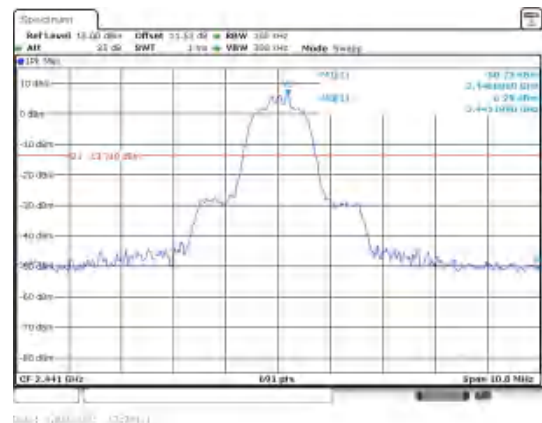
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



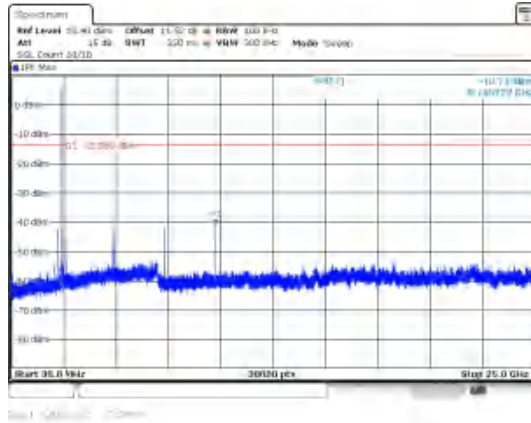
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



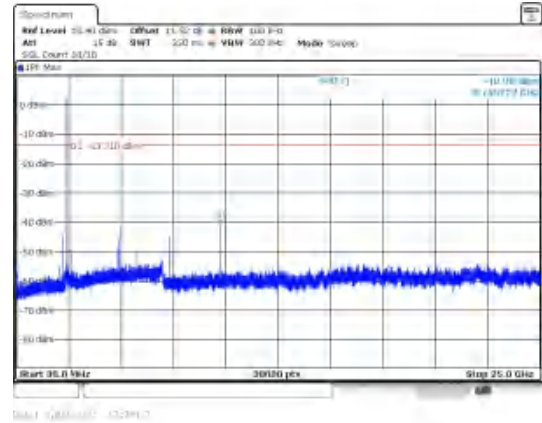
Out Of Band Emission
GFSK_DH5_Channel 39



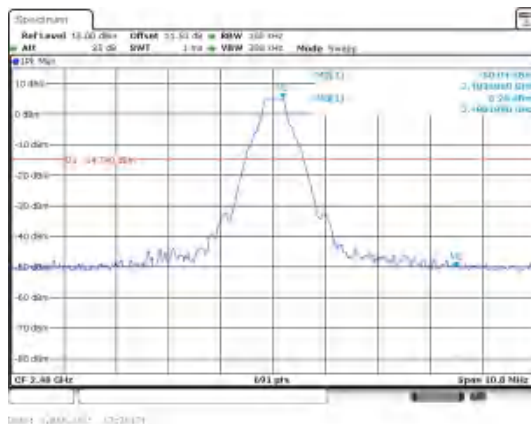
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



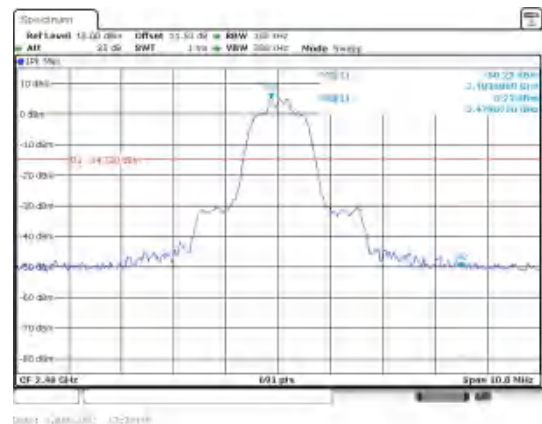
30.0 MHz - 25000.0 MHz
 GFSK_DH5_Channel 39



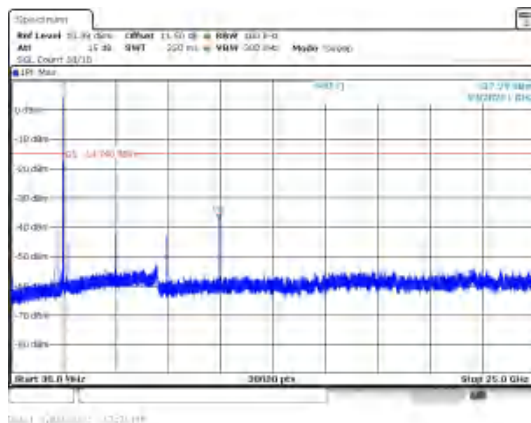
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



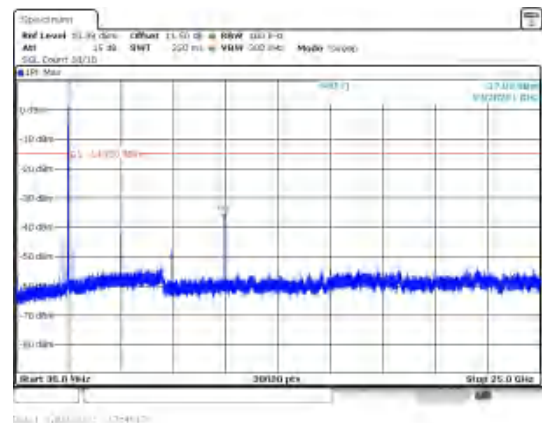
Out Of Band Emission
 GFSK_DH5_Channel 78



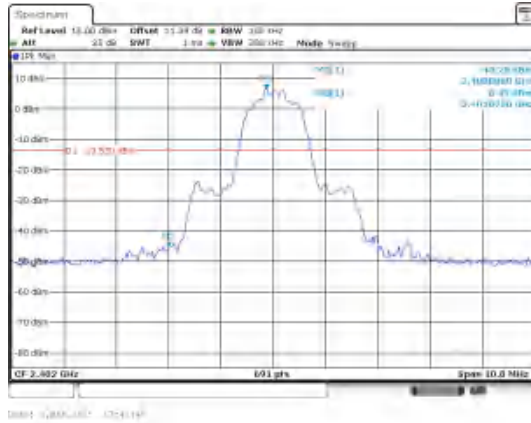
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



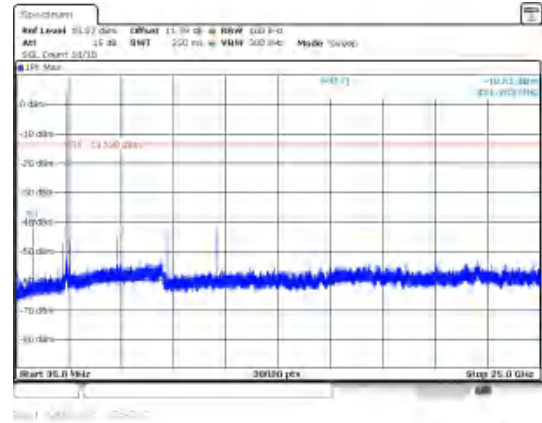
30.0 MHz - 25000.0 MHz
 GFSK_DH5_Channel 78



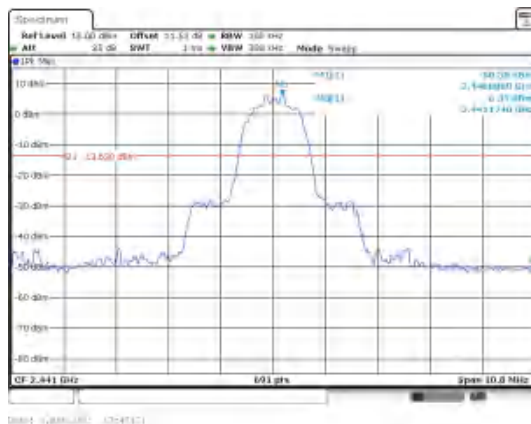
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



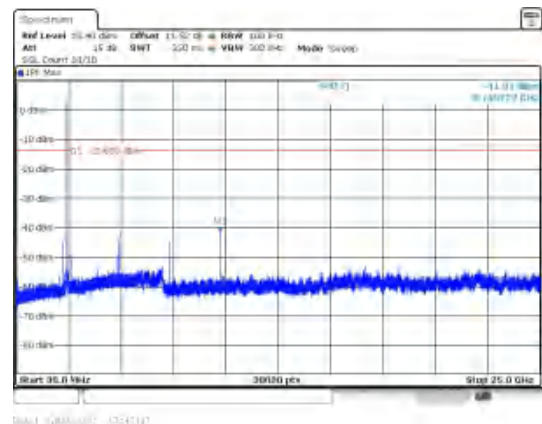
Out Of Band Emission
8DPSK_3-DH5_Channel 0



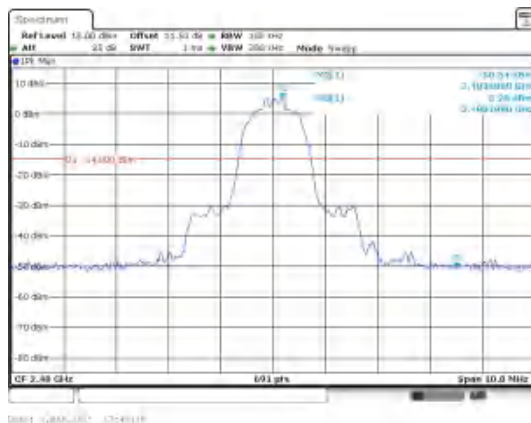
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



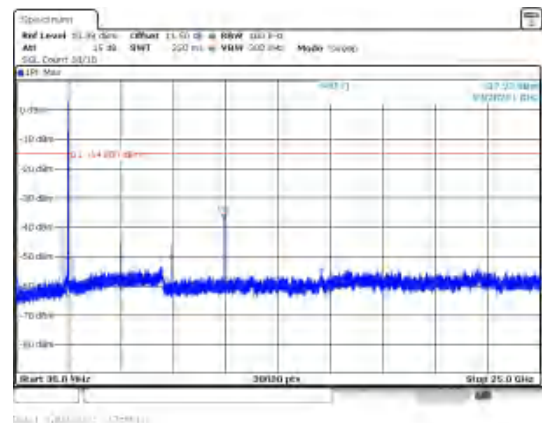
Out Of Band Emission
8DPSK_3-DH5_Channel 39



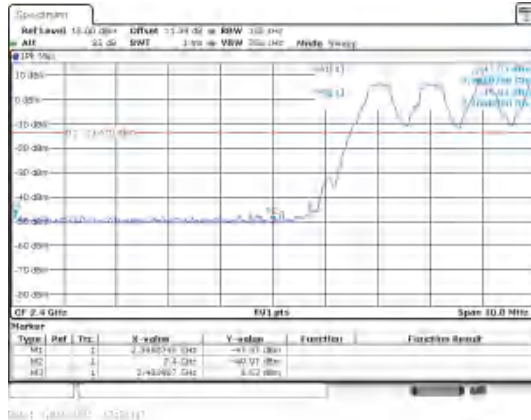
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



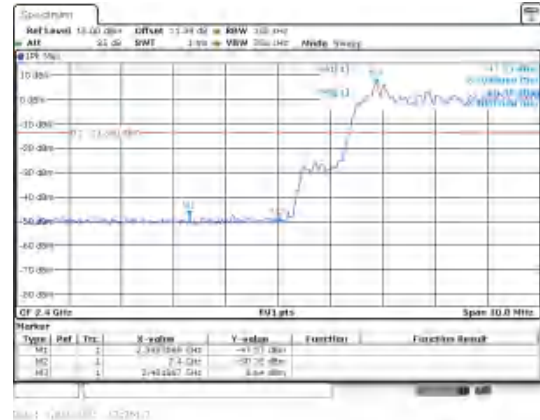
Out Of Band Emission
8DPSK_3-DH5_Channel 78



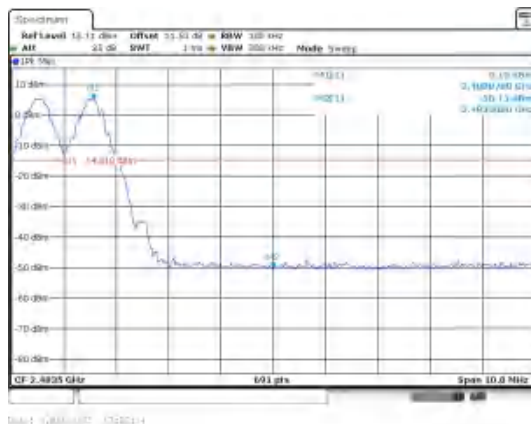
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



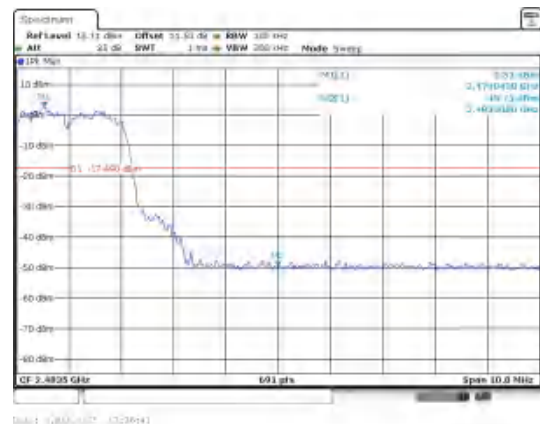
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



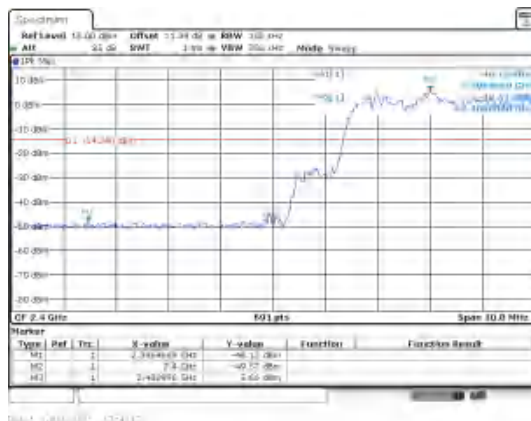
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



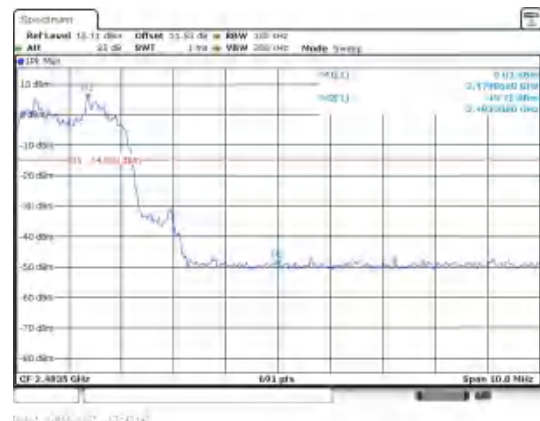
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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

Right:
Non-Hopping

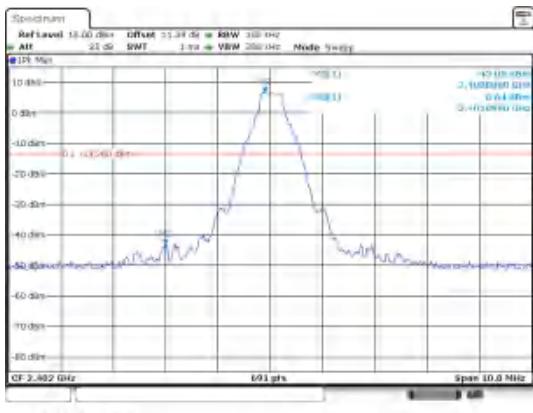
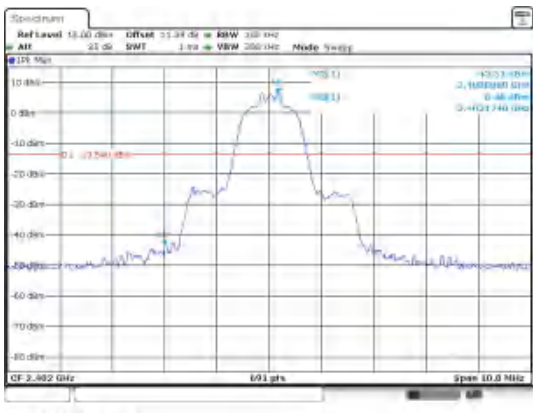
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
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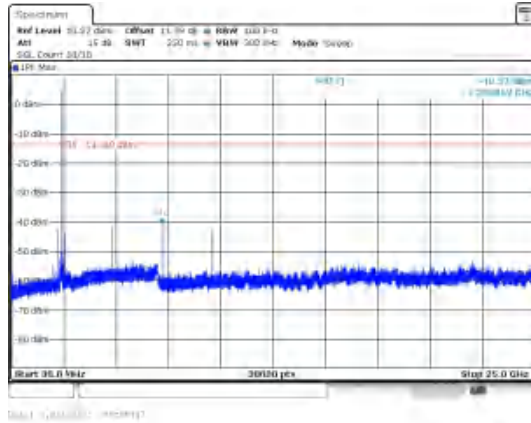
GFSK	DH5	0	2400.00	-43.050	-13.36	-29.690	PASS
			7205.96	-40.565	-13.36	-27.205	PASS
		39	9763.72	-40.754	-13.65	-27.104	PASS
		78	2483.50	-47.460	-14.71	-32.750	PASS
			9920.20	-37.329	-14.71	-22.619	PASS
$\pi/4$ DQPSK	2-DH5	0	2400.00	-43.510	-13.54	-29.970	PASS
			7206.79	-42.106	-13.54	-28.566	PASS
		39	4882.09	-38.667	-13.59	-25.077	PASS
		78	2483.50	-49.180	-14.87	-34.310	PASS
			9920.20	-37.242	-14.87	-22.372	PASS
8DPSK	3-DH5	0	2400.00	-46.660	-13.42	-33.240	PASS
			9608.08	-42.600	-13.42	-29.180	PASS
		39	4882.09	-39.591	-13.67	-25.921	PASS
		78	2483.50	-50.300	-14.73	-35.570	PASS
			9920.20	-37.177	-14.73	-22.447	PASS

Hopping

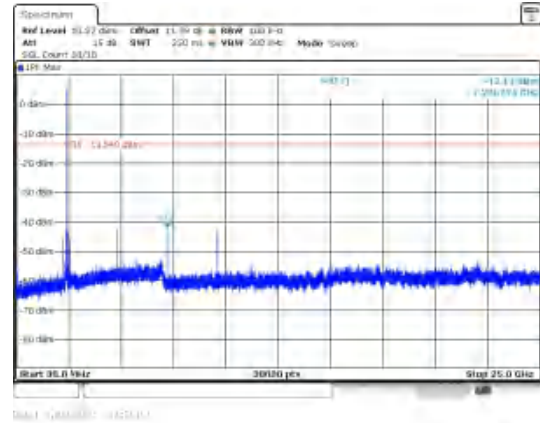
Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	Hopping	2396.92	-47.970	-13.58	-34.390	PASS
			2400.00	-50.600	-13.58	-37.020	PASS
			2483.50	-48.770	-15.07	-33.700	PASS
$\pi/4$ DQPSK	2-DH5		2400.00	-47.370	-13.58	-33.790	PASS
			2483.50	-48.870	-14.71	-34.160	PASS
8DPSK	3-DH5		2395.48	-48.138	-14.29	-33.848	PASS
			2400.00	-48.990	-14.29	-34.700	PASS
			2483.50	-50.100	-15.87	-34.230	PASS

Test Graphs

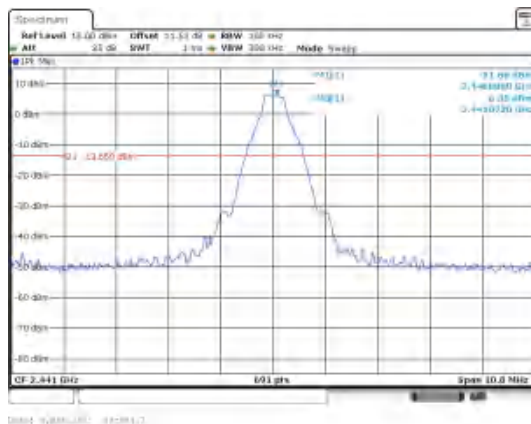
	
Out Of Band Emission GFSK_DH5_Channel 0	Out Of Band Emission $\pi/4$DQPSK_2-DH5_Channel 0



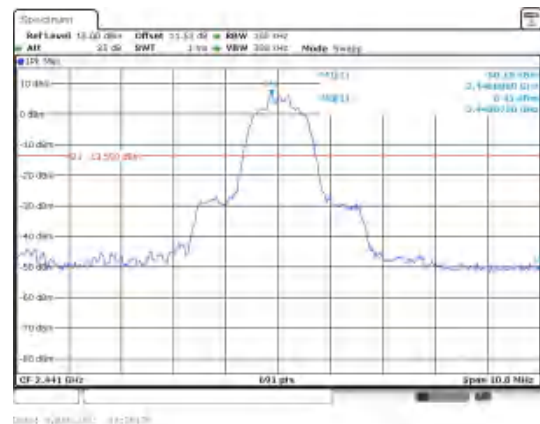
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 0



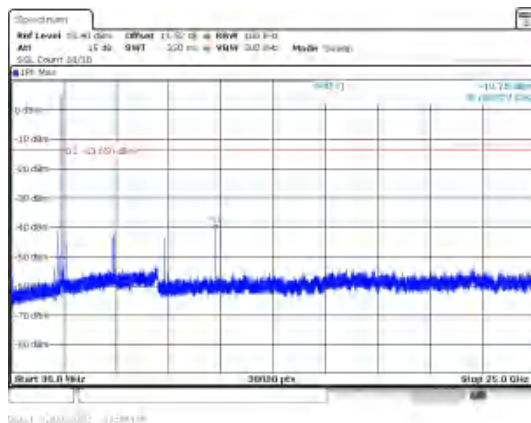
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 0



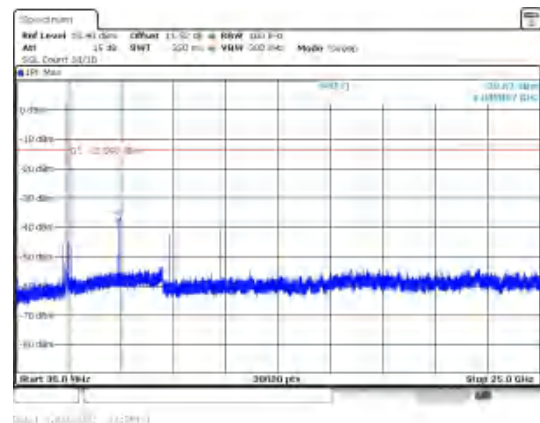
Out Of Band Emission
GFSK_DH5_Channel 39



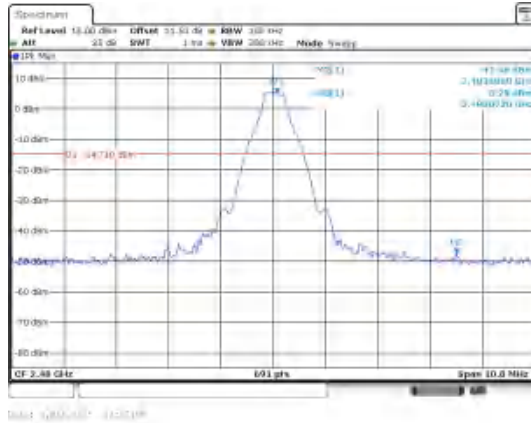
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 39



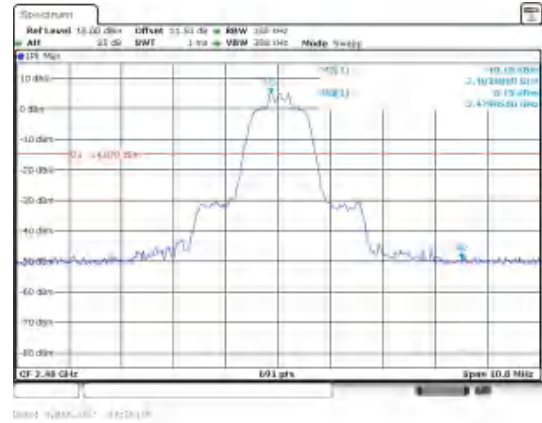
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 39



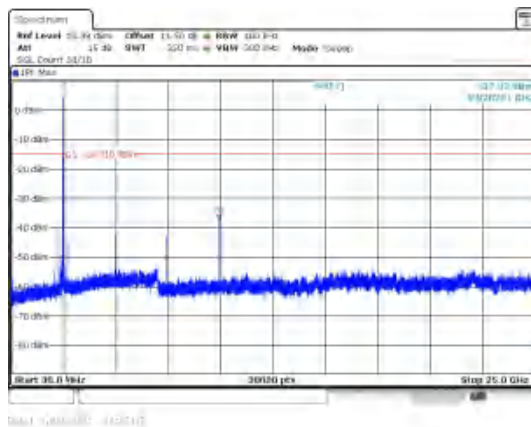
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 39



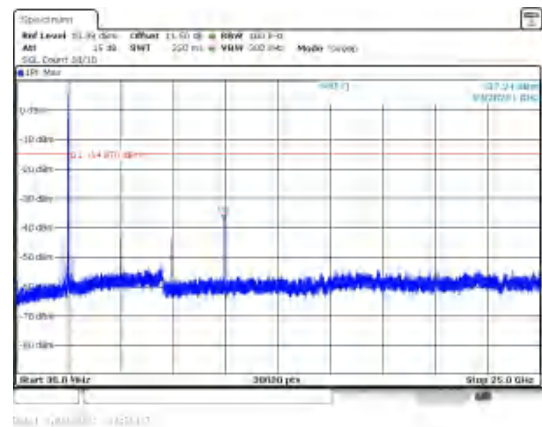
Out Of Band Emission
GFSK_DH5_Channel 78



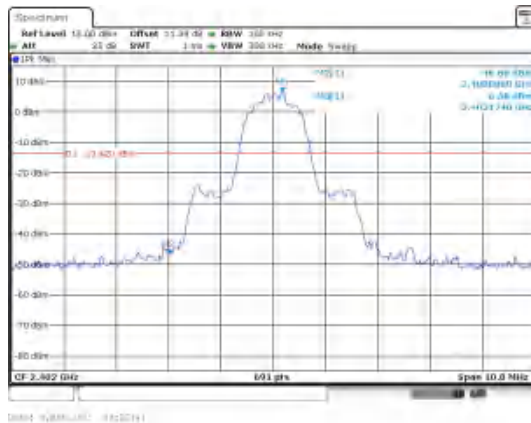
Out Of Band Emission
 $\pi/4$ DQPSK_2-DH5_Channel 78



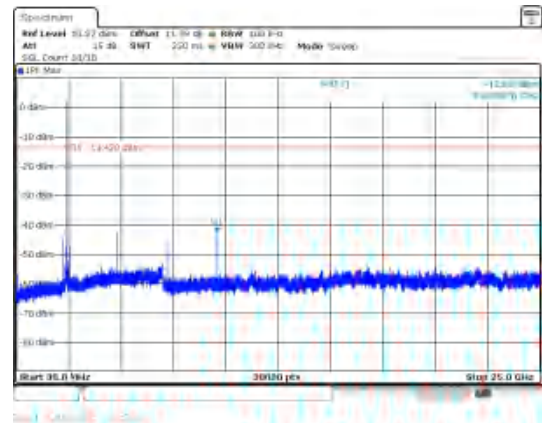
30.0 MHz - 25000.0 MHz
GFSK_DH5_Channel 78



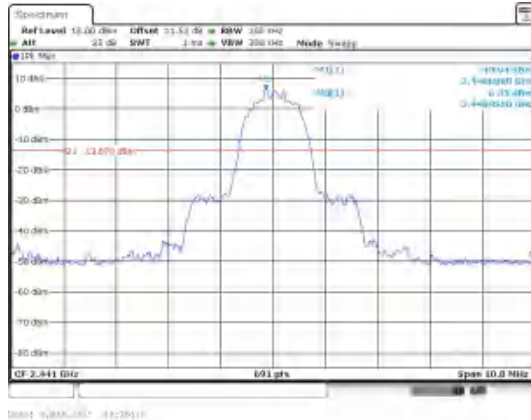
30.0 MHz - 25000.0 MHz
 $\pi/4$ DQPSK_2-DH5_Channel 78



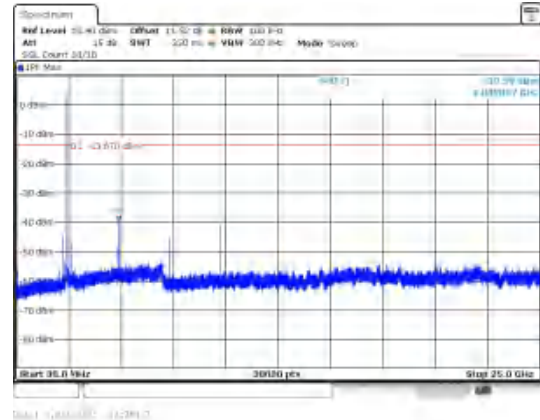
Out Of Band Emission
8DPSK_3-DH5_Channel 0



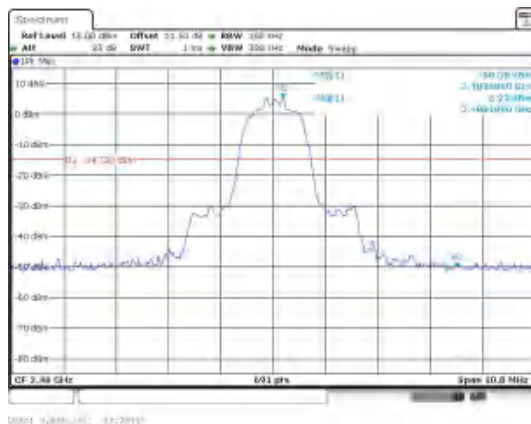
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 0



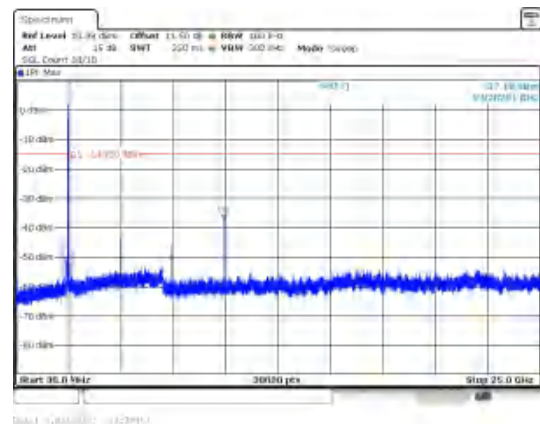
Out Of Band Emission
8DPSK_3-DH5_Channel 39



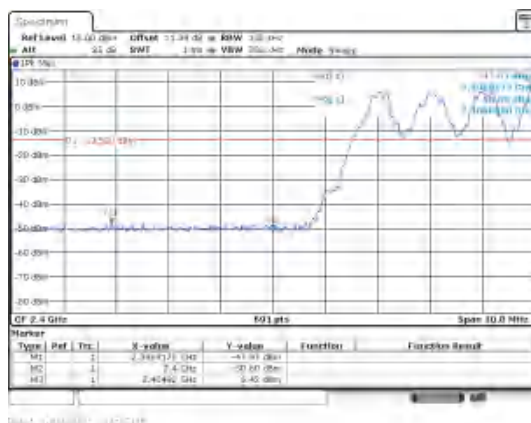
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 39



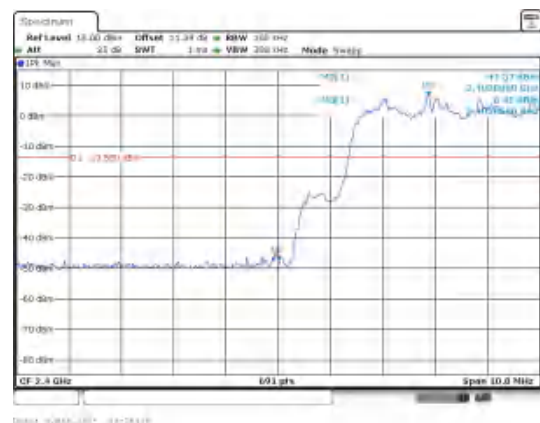
Out Of Band Emission
8DPSK_3-DH5_Channel 78



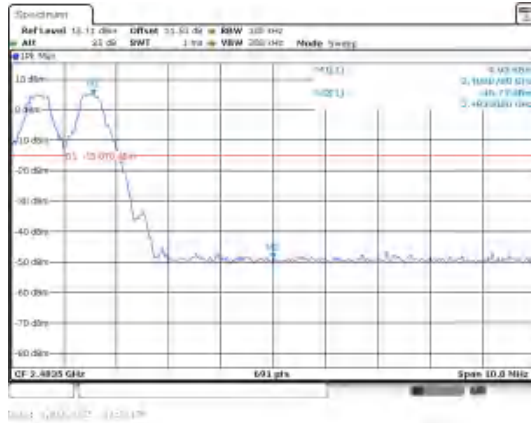
30.0 MHz - 25000.0 MHz
8DPSK_3-DH5_Channel 78



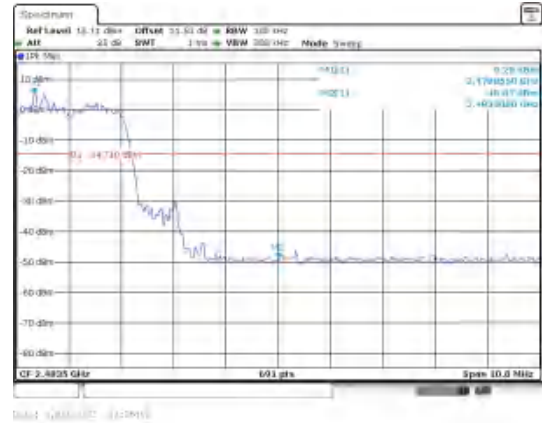
Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



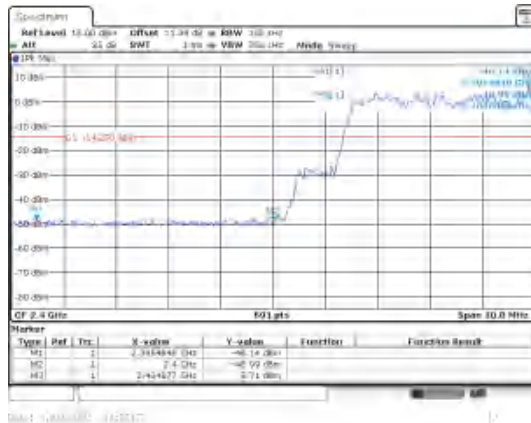
Out Of Band Emission(Left)
 $\pi/4$ DQPSK_2-DH5_Channel Hopping



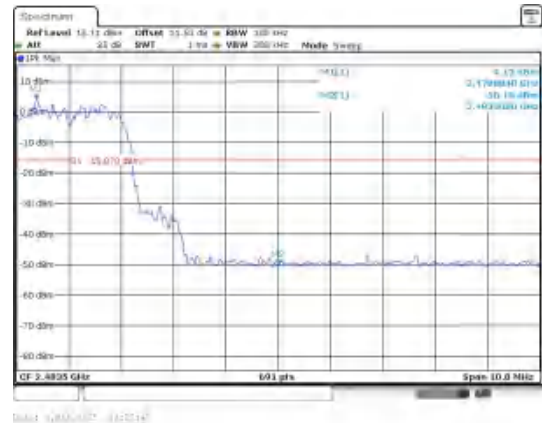
Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



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-----