Appendix A

RF Test Data for BT(BDR/EDR) (Conducted Measurement)

Product Name: 2.1CH soundbar

Trade Mark: VAENSONG

Test Model: LK-M819-44

Environmental Conditions

Temperature:	25.2℃
Relative Humidity:	54.2%
ATM Pressure:	101Kpa
Test Engineer:	Emiya lin
Supervised by:	Simba Haung

Contents

Page

COVER PAGE

1 Duty Cycle 3
1.1 Test Result 3
1.2 Test Graphs 4
2 Maximum Conducted Peak Output Power 9
2.1 Test Result 9
2.2 Test Graphs 10
3 20dB Bandwidth 15
3.1 Test Result 15
3.2 Test Graphs 16
4 Carrier Frequency Separation 21
4.1 Test Result 21
4.2 Test Graphs 22
5 Hopping Channel Number 24
5.1 Test Result 24
5.2 Test Graphs 25
6 Dwell Time 27
6.1 Test Result 27
6.2 Test Graphs 28
7 RF Conducted Spurious Emissions 31
7.1 Test Result 31
7.2 Test Graphs 32
8 Band-edge for RF Conducted Emissions 41
8.1 Test Result 41
8.2 Test Graphs 42
9 Restrict-band band-edge measurements 54
9.1 Test Result 54
9.2 Test Graphs 56

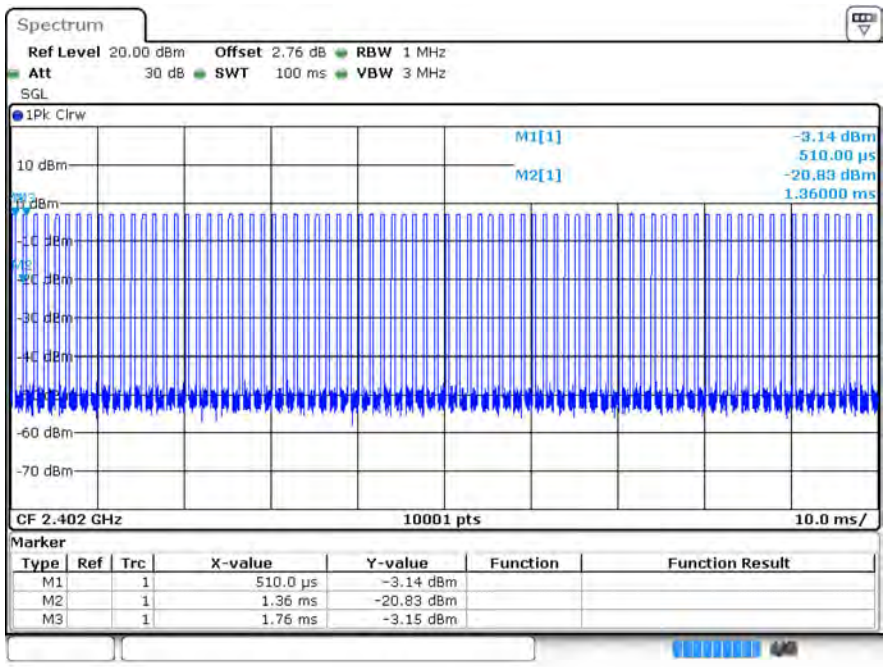
1 Duty Cycle

1.1 Test Result

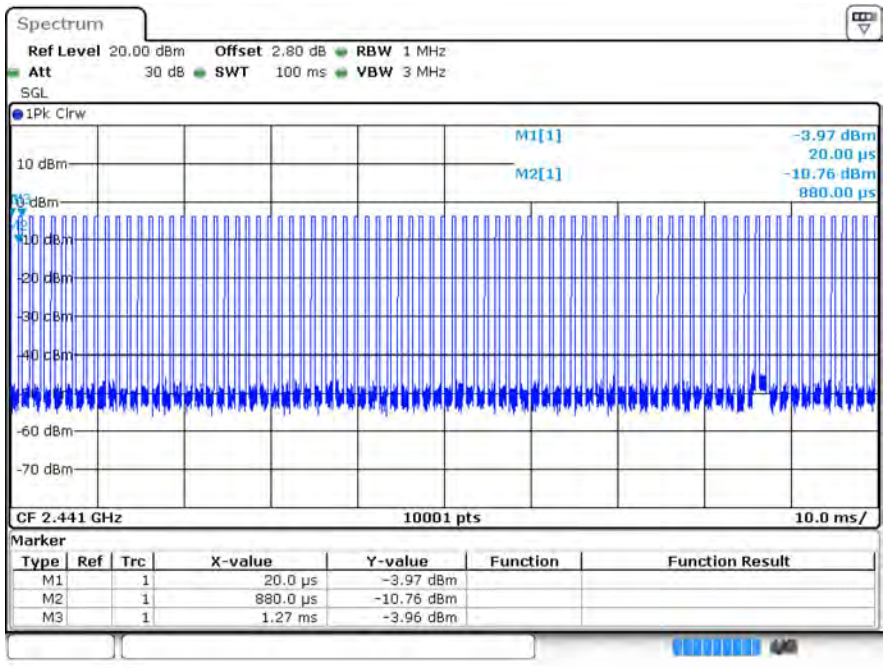
Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor	1/T (kHz)
1-DH1	2402	32.8	4.84	2.5
1-DH1	2441	32.32	4.91	2.56
1-DH1	2480	32.01	4.95	2.56
2-DH1	2402	33.6	4.74	2.44
2-DH1	2441	32.94	4.82	2.5
2-DH1	2480	33.35	4.77	2.44
3-DH1	2402	33.6	4.74	2.44
3-DH1	2441	33.6	4.74	2.44
3-DH1	2480	33.61	4.74	2.44

1.2 Test Graphs

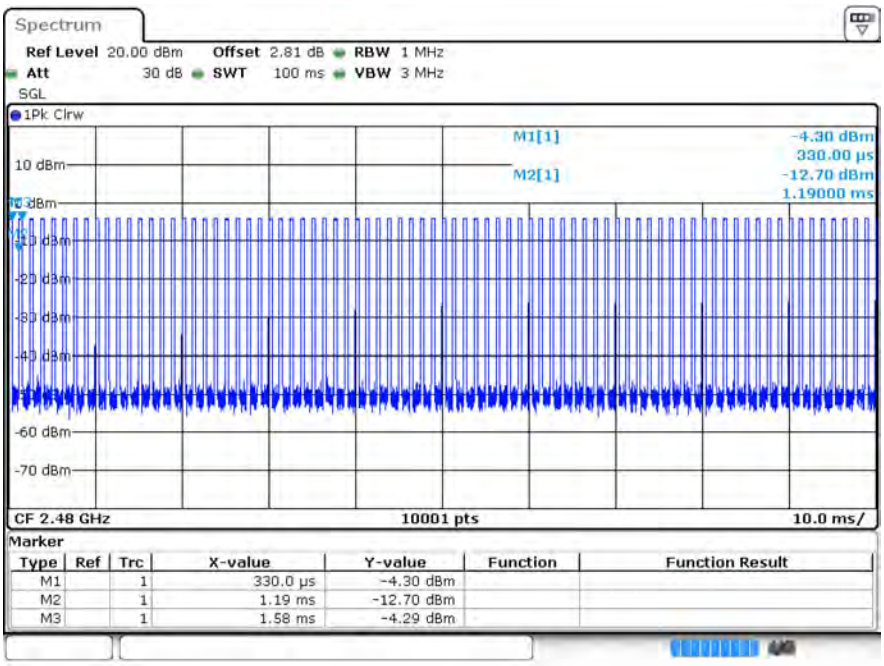
Test Graphs
1-DH1 2402MHz



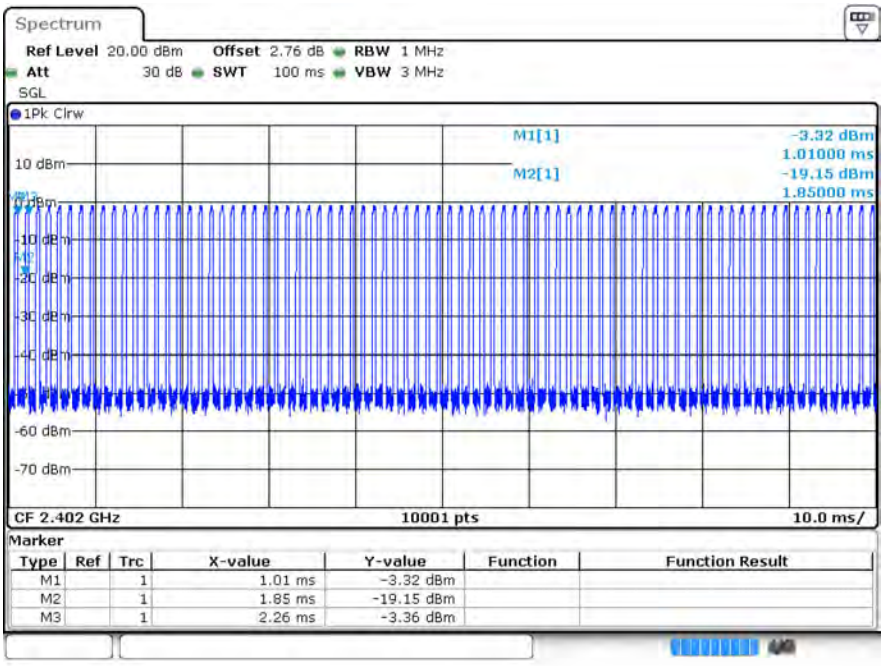
1-DH1 2441MHz



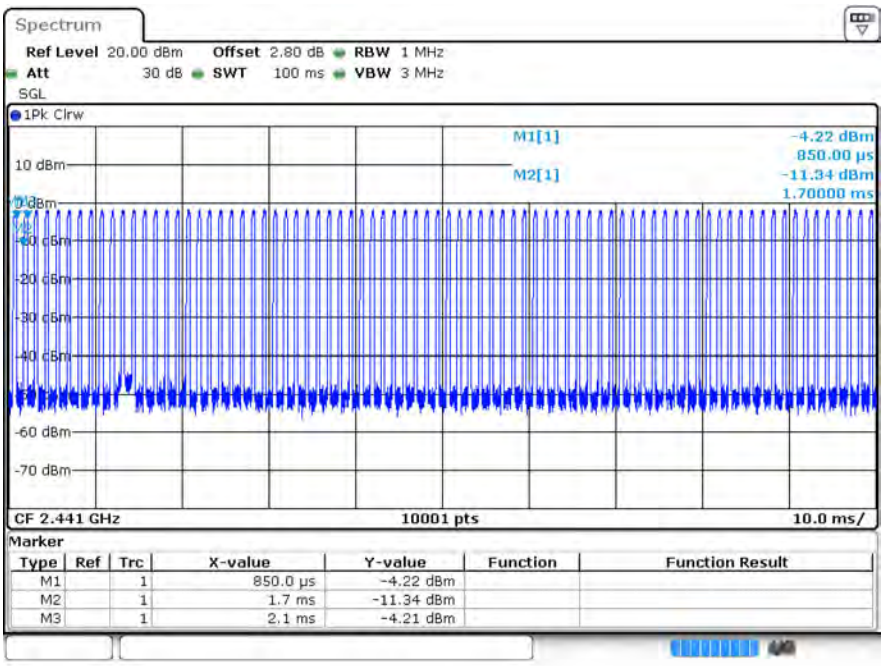
1-DH1 2480MHz



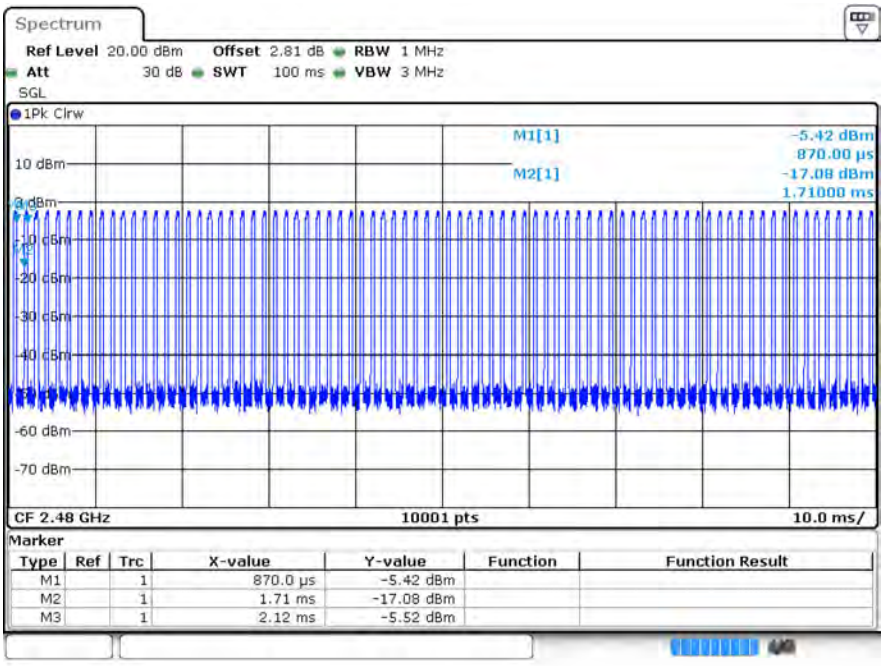
2-DH1 2402MHz



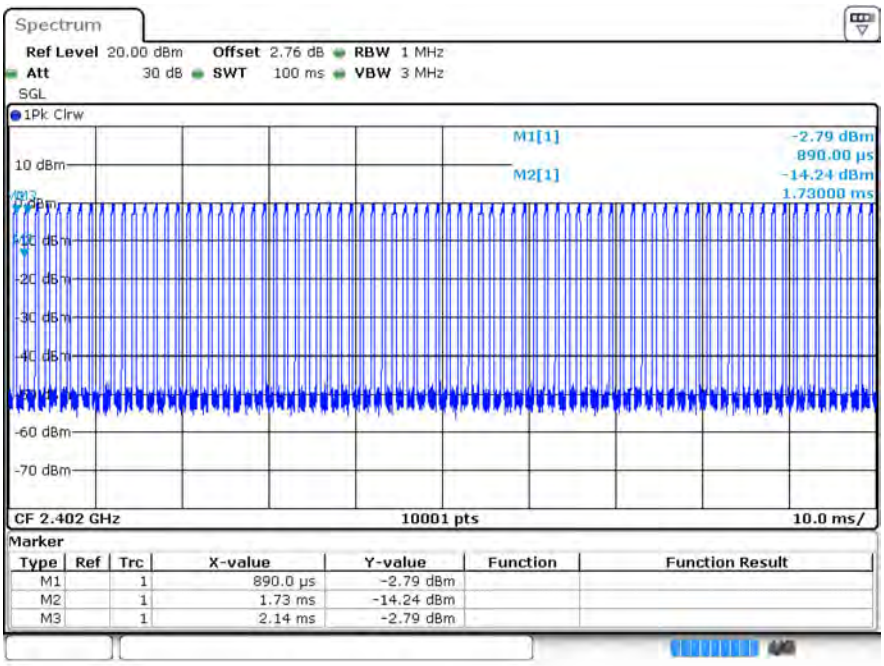
2-DH1 2441MHz



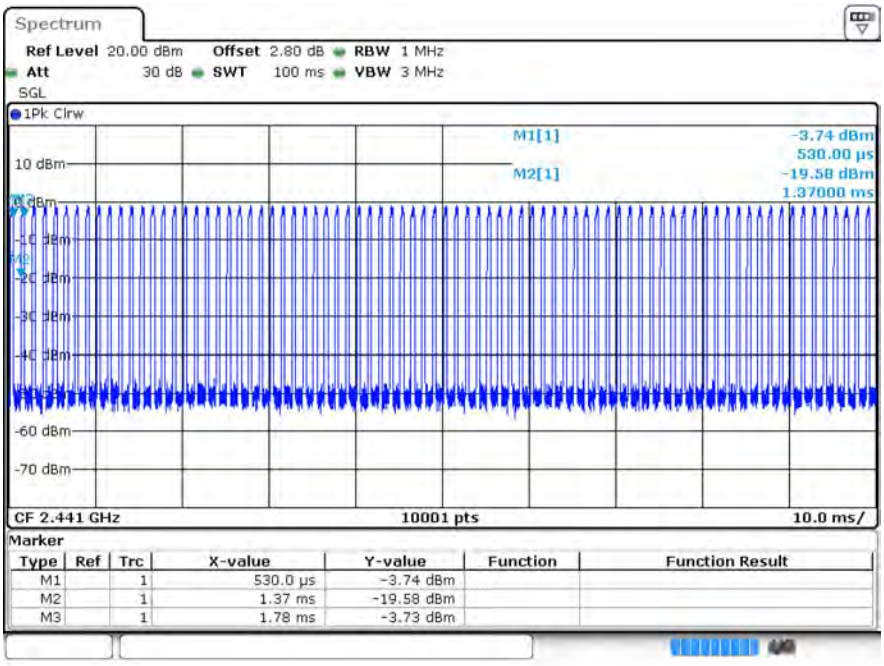
2-DH1 2480MHz



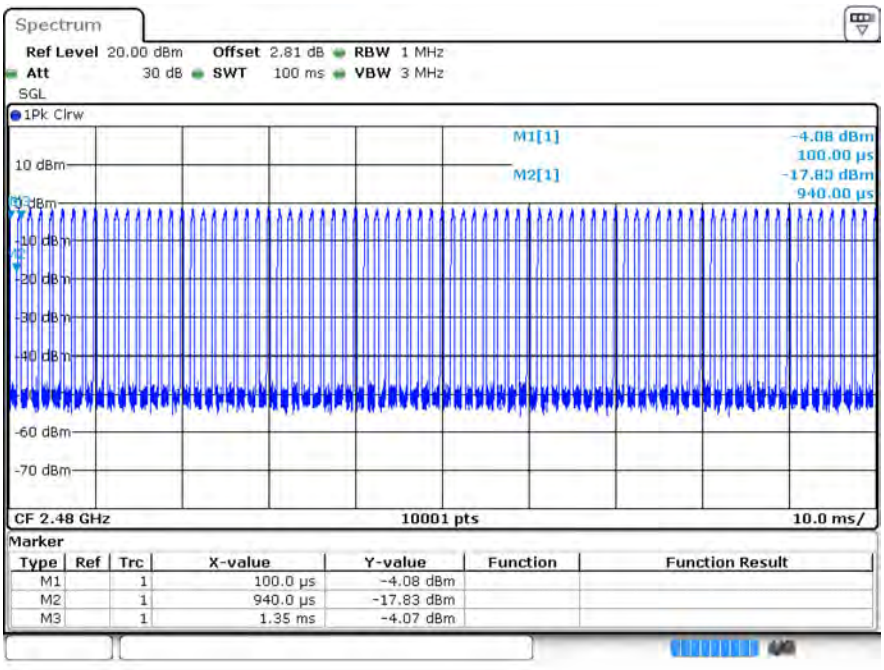
3-DH1 2402MHz



3-DH1 2441MHz



3-DH1 2480MHz

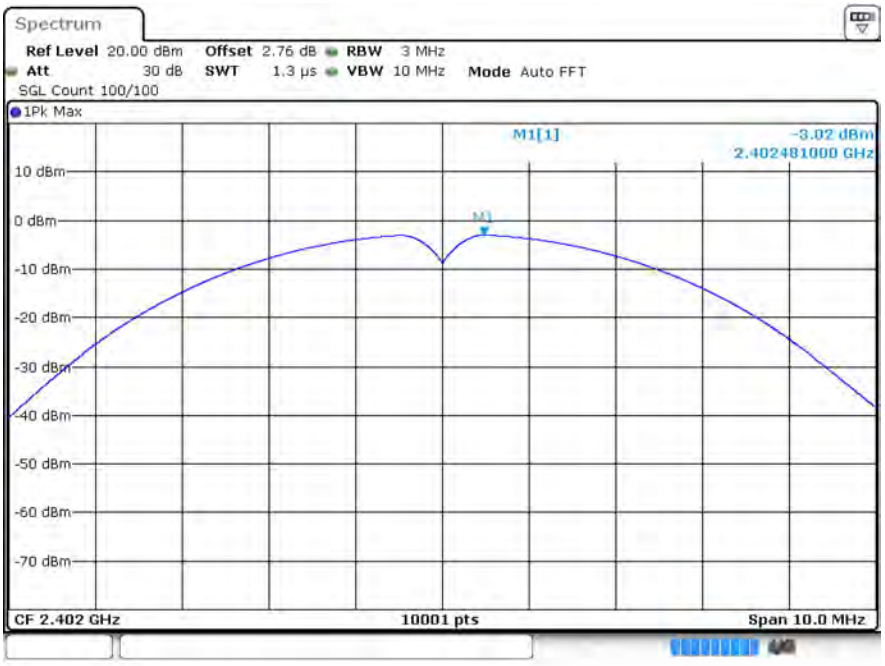
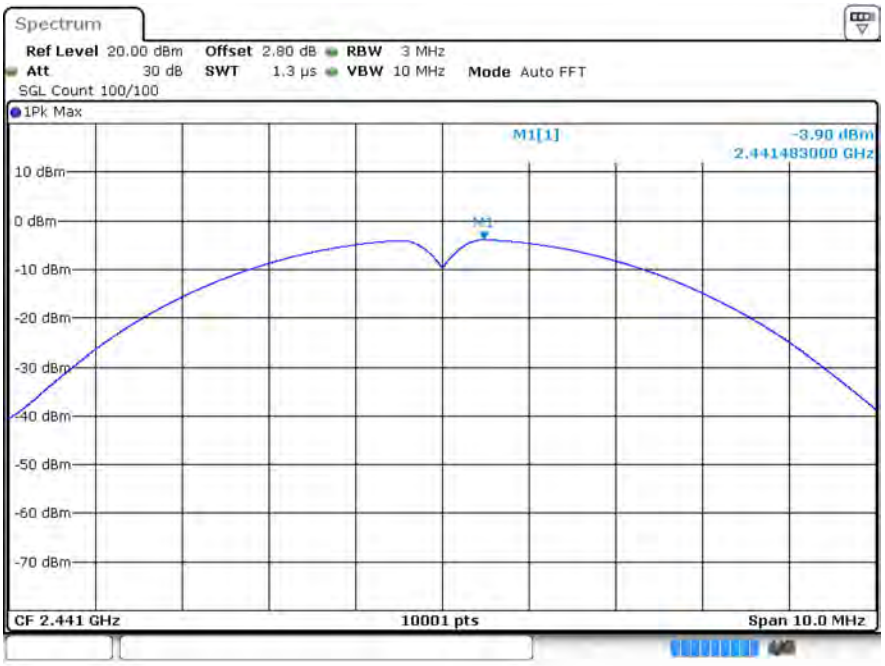


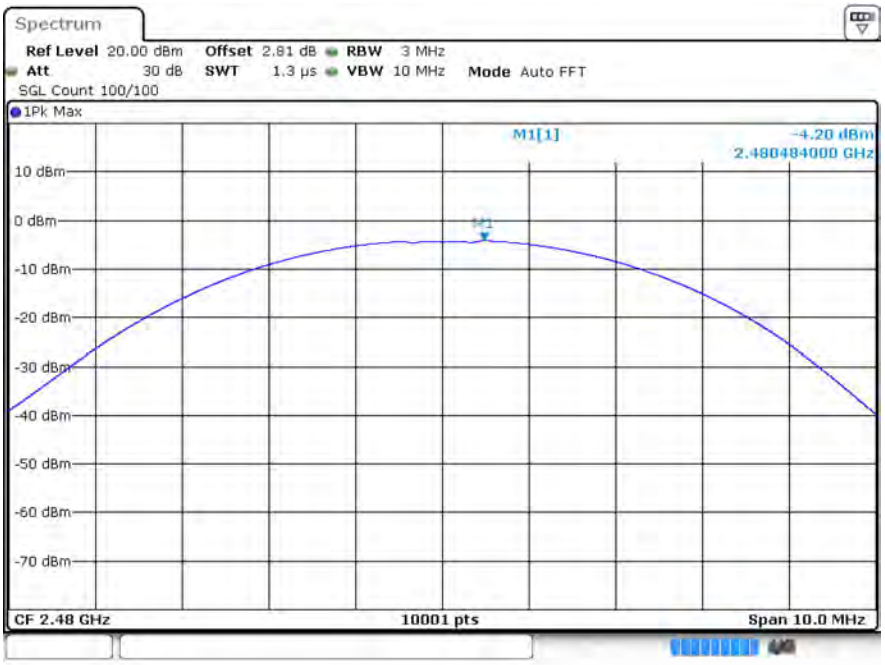
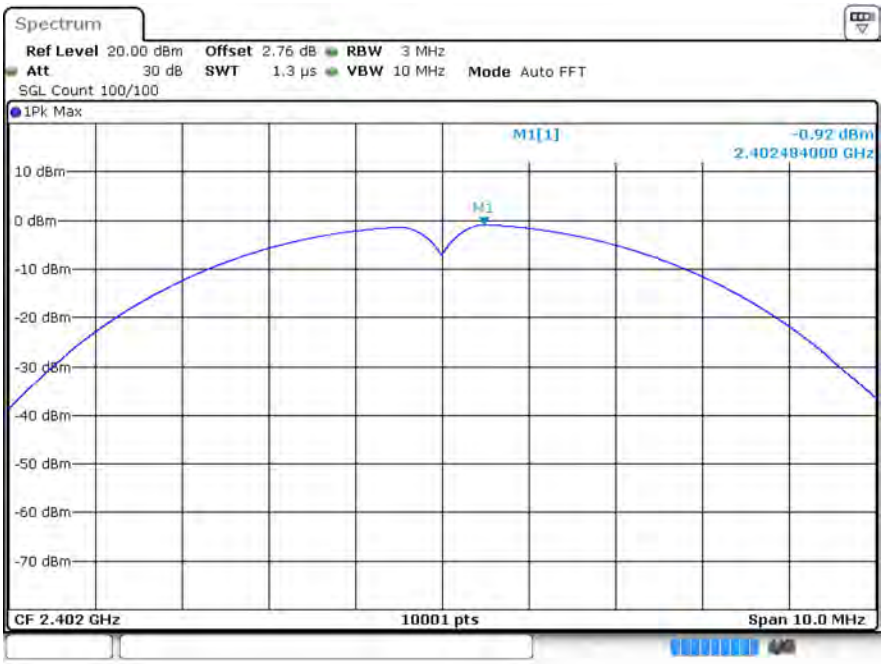
2 Maximum Conducted Peak Output Power

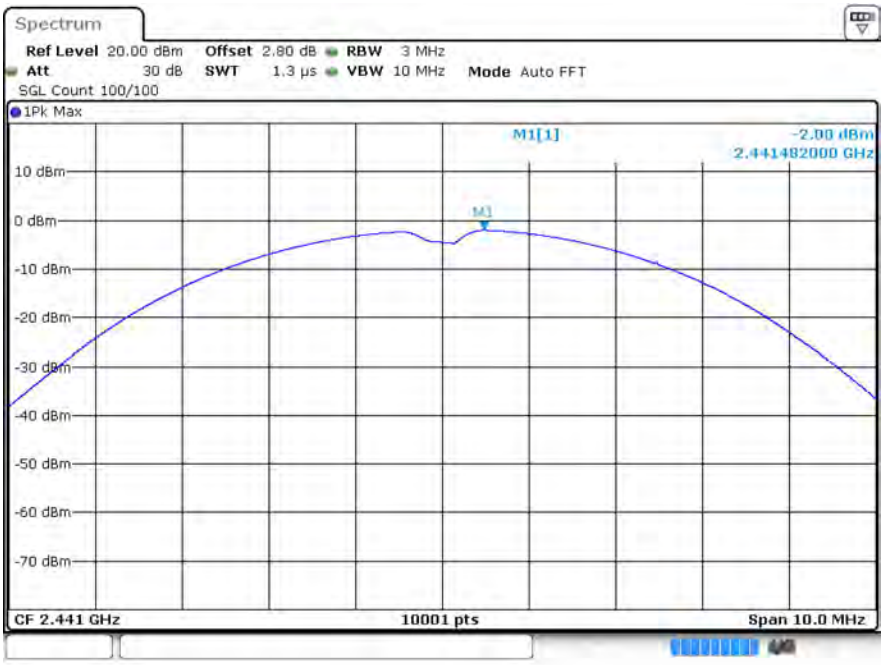
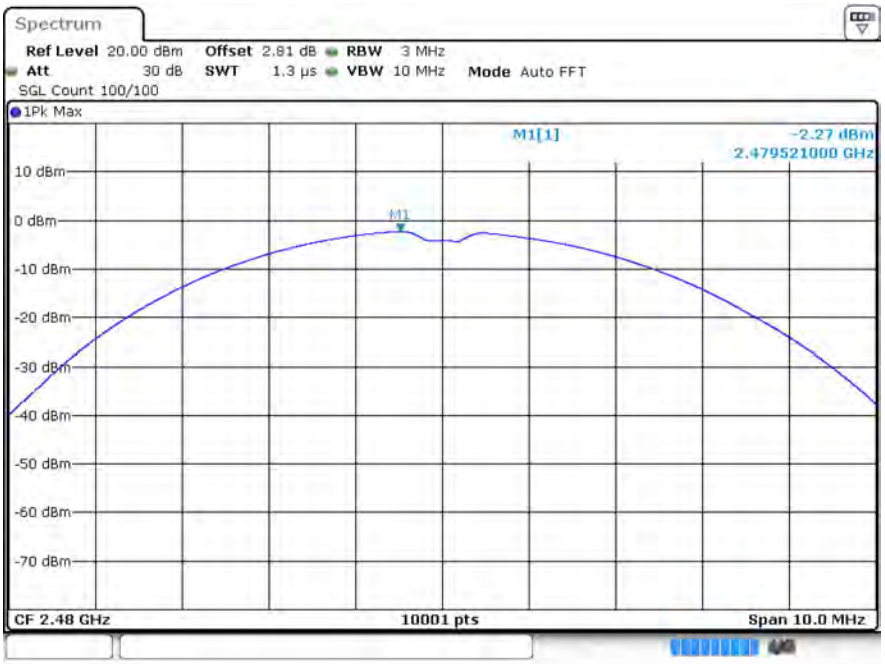
2.1 Test Result

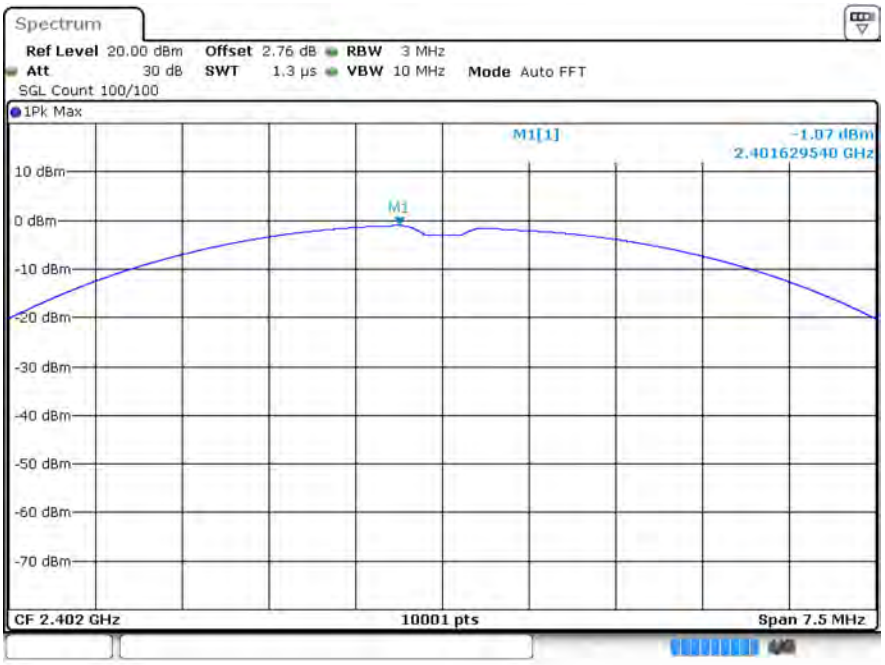
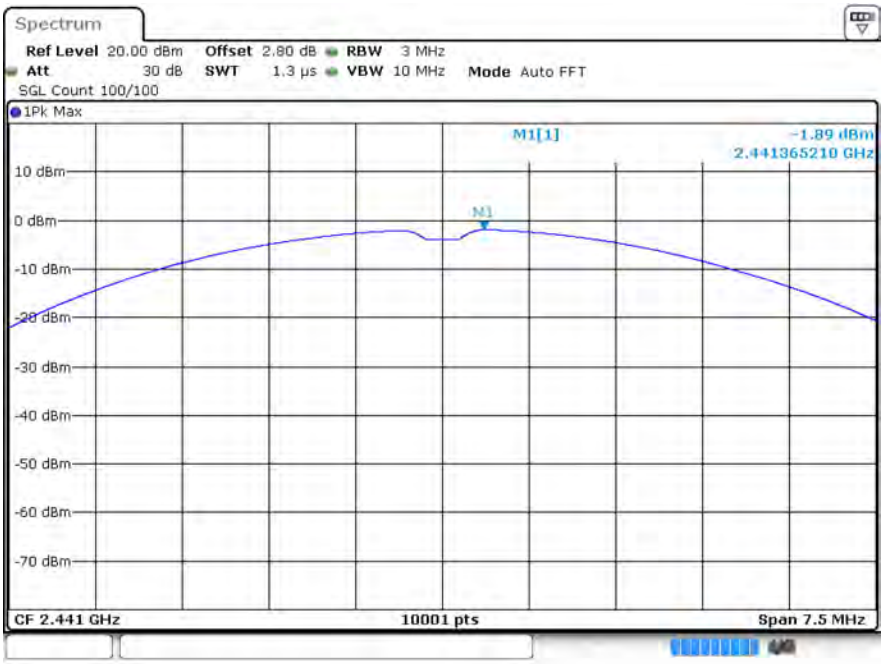
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-3.02	21	Pass
	MCH	-3.9	21	Pass
	HCH	-4.2	21	Pass
π/4DQPSK	LCH	-0.92	21	Pass
	MCH	-2	21	Pass
	HCH	-2.27	21	Pass
8DPSK	LCH	-1.07	21	Pass
	MCH	-1.89	21	Pass
	HCH	-1.81	21	Pass

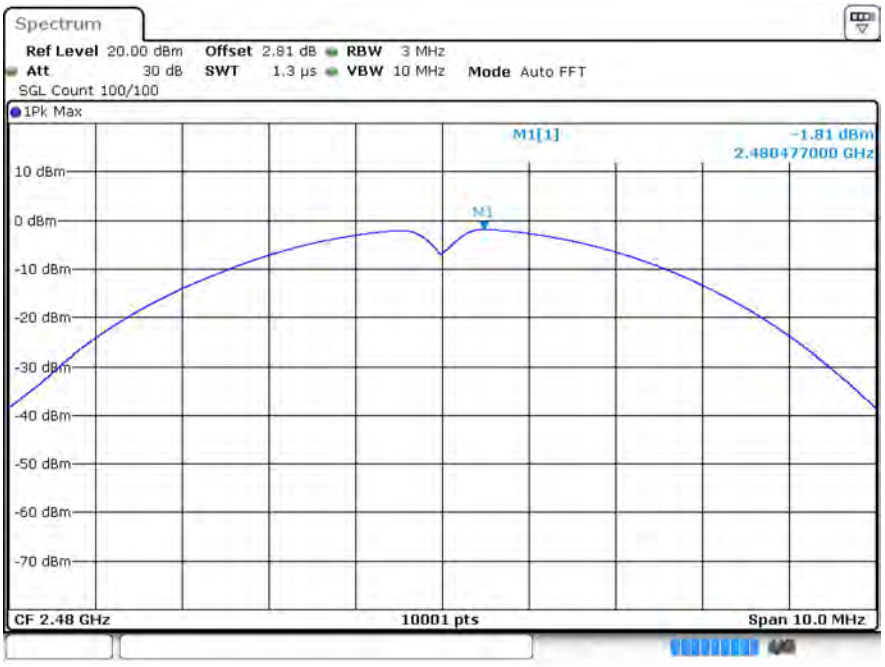
2.2 Test Graphs

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	

8DPSK/HCH	 Spectrum Ref Level 20.00 dBm Offset 2.81 dB RBW 3 MHz Att 30 dB SWT 1.3 µs VBW 10 MHz Mode Auto FFT SGL Count 100/100 1Pk Max M1[1] -1.81 dBm 2.480477000 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1 CF 2.48 GHz 10001 pts Span 10.0 MHz

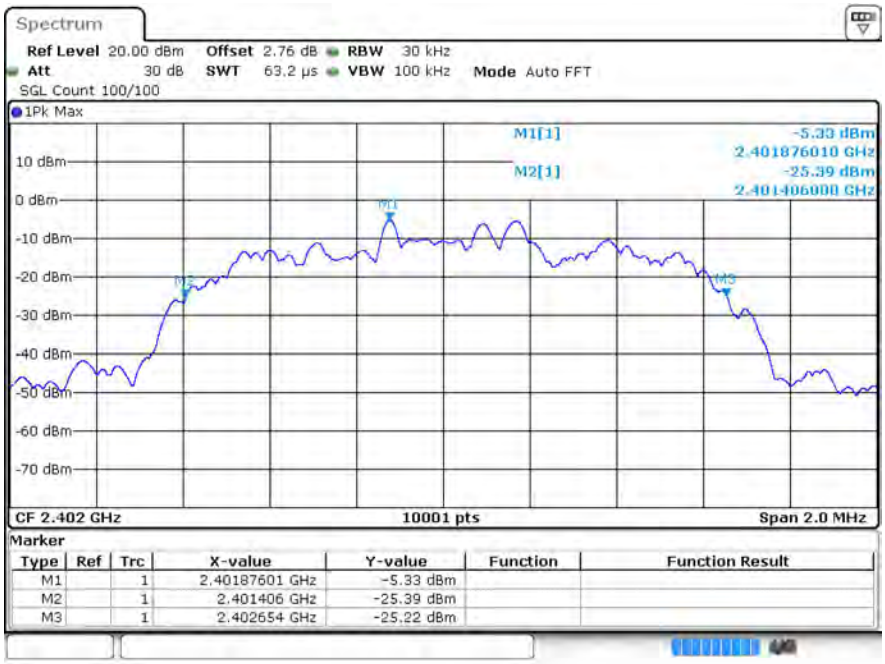
3 20dB Bandwidth

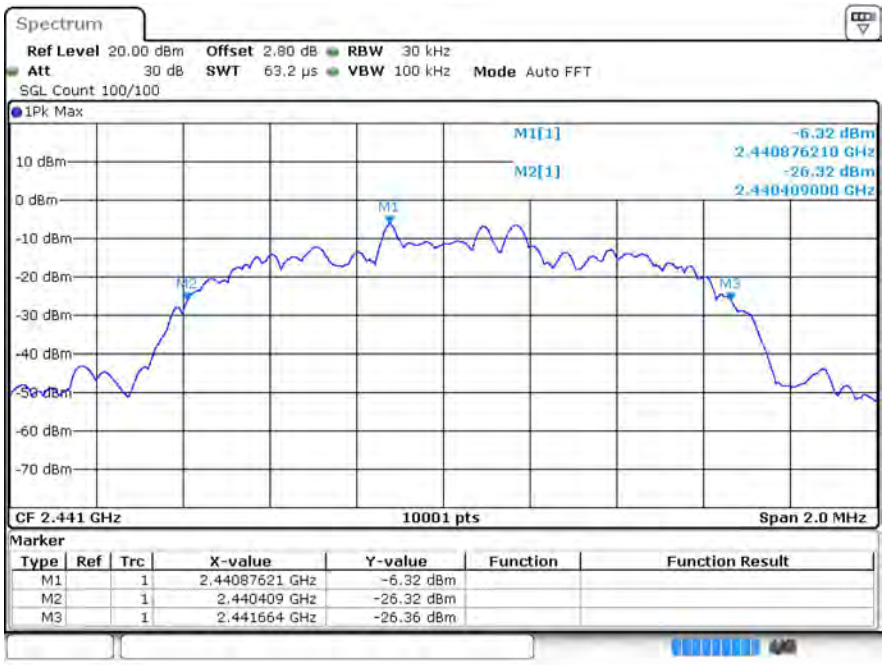
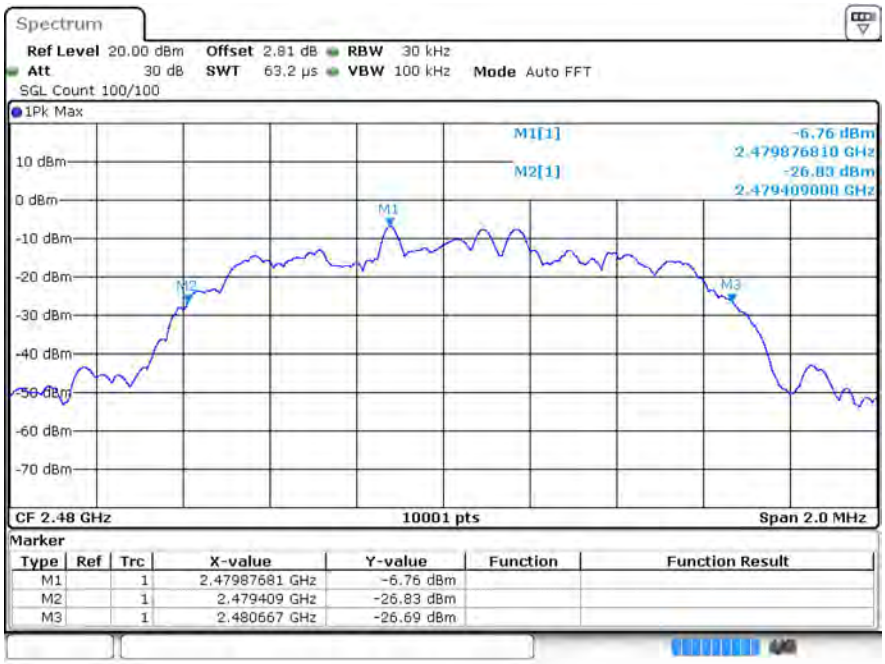
3.1 Test Result

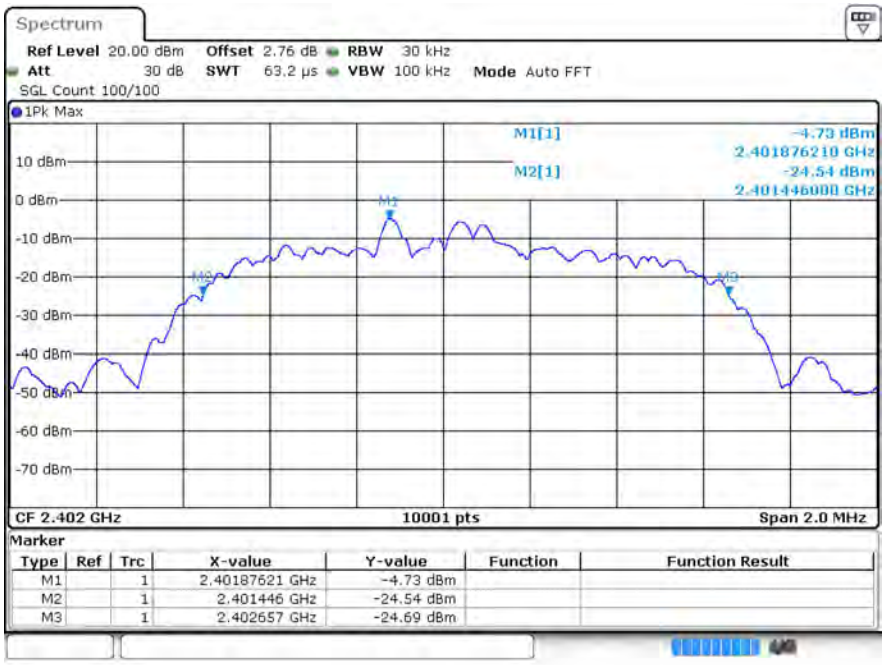
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.927	Not Specified	Pass
	MCH	0.79	Not Specified	Pass
	HCH	0.833	Not Specified	Pass
π/4DQPSK	LCH	1.248	Not Specified	Pass
	MCH	1.255	Not Specified	Pass
	HCH	1.258	Not Specified	Pass
8DPSK	LCH	1.211	Not Specified	Pass
	MCH	1.201	Not Specified	Pass
	HCH	1.209	Not Specified	Pass

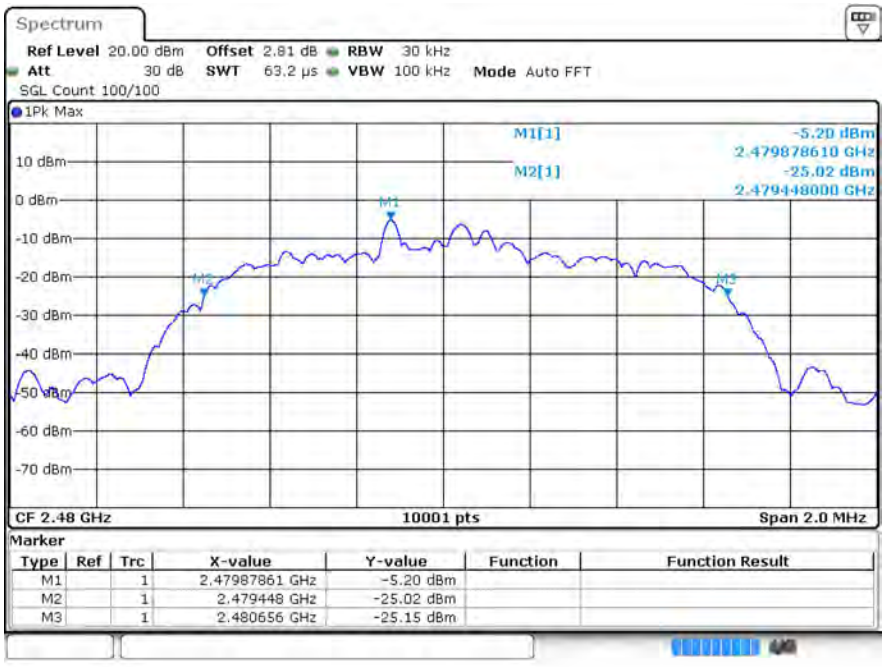
3.2 Test Graphs

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	

8DPSK/HCH	

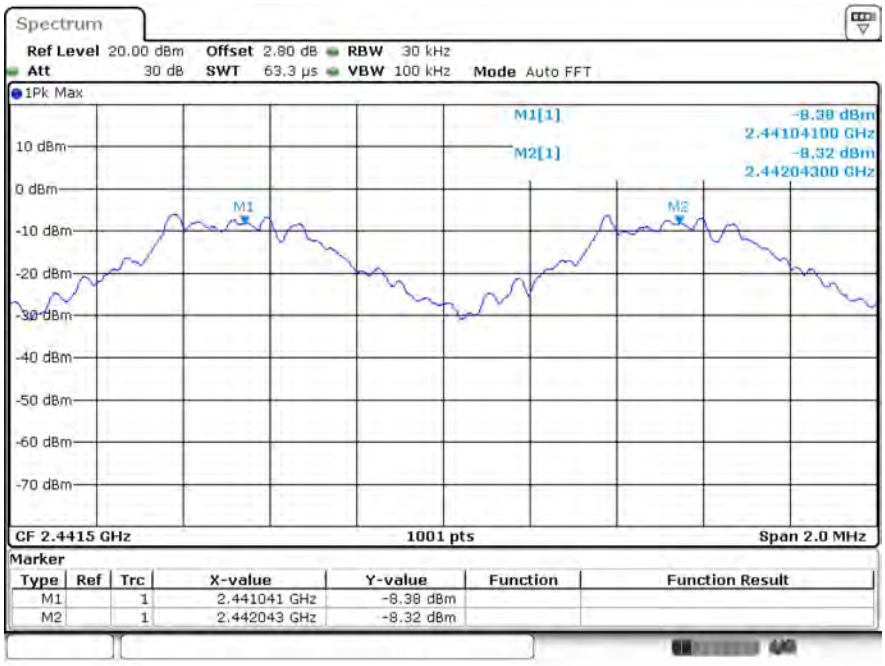
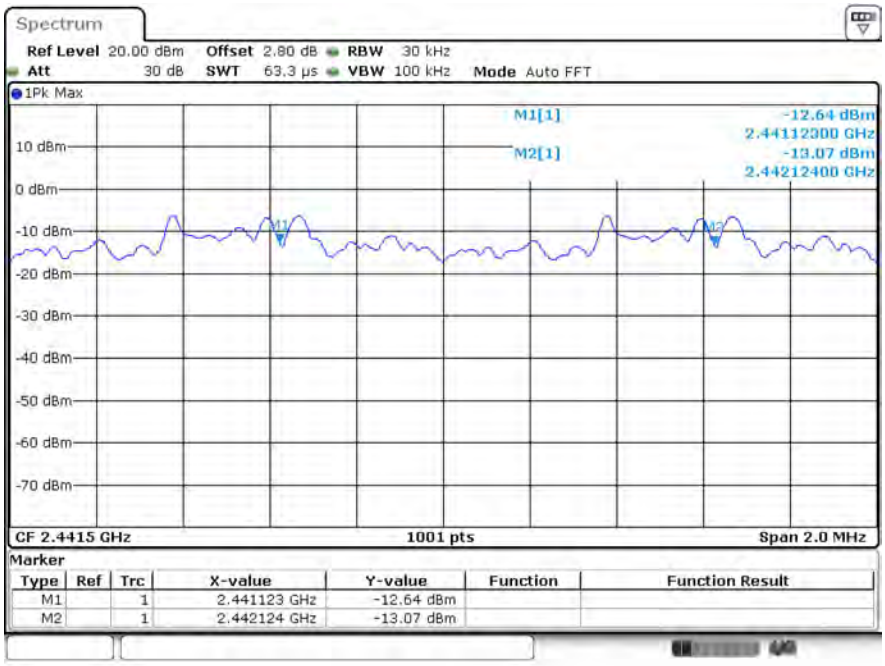
Spectrum
Ref Level 20.00 dBm Offset 2.81 dB RBW 30 kHz
Att 30 dB SWT 63.2 µs VBW 100 kHz Mode Auto FFT
SGL Count 100/100
1Pk Max
M1[1] -5.20 dBm
2.479878610 GHz
M2[1] -25.02 dBm
2.479448000 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.48 GHz
10001 pts
Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47987861 GHz -5.20 dBm
M2 1 2.479448 GHz -25.02 dBm
M3 1 2.480656 GHz -25.15 dBm

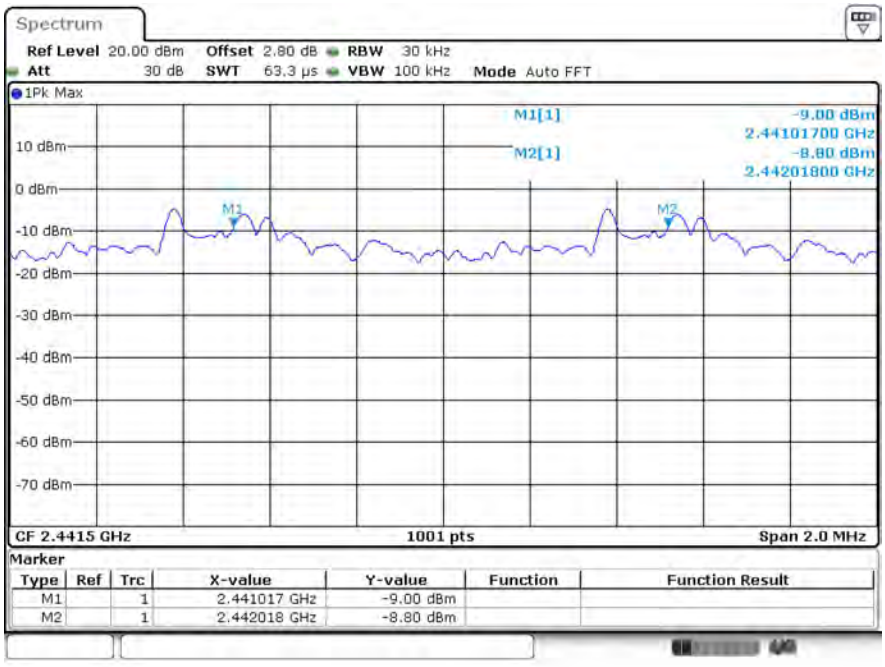
4 Carrier Frequency Separation

4.1 Test Result

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	MCH	1.002	0.527	Pass
π/4DQPSK	MCH	1.001	0.837	Pass
8DPSK	MCH	1.001	0.801	Pass

4.2 Test Graphs

Test Graphs	
GFSK/MCH	
π/4DQPSK/MCH	

8DPSK/MCH	

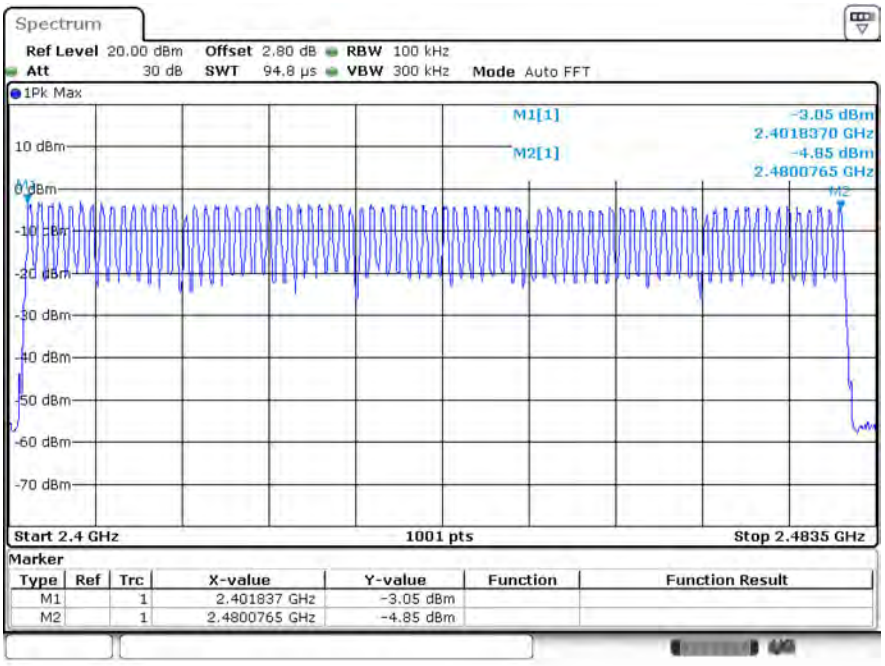
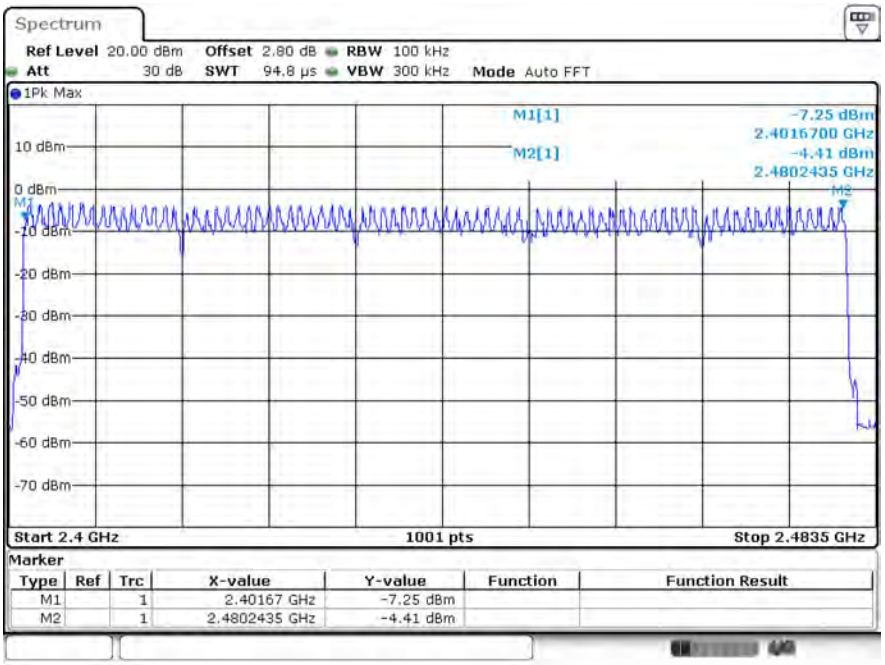
Spectrum
Ref Level 20.00 dBm Offset 2.80 dB RBW 30 kHz
Att 30 dB SWT 63.3 µs VBW 100 kHz Mode Auto FFT
1Pk Max
M1[1] -9.00 dBm
2.44101700 GHz
M2[1] -8.80 dBm
2.44201800 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
CF 2.4415 GHz
1001 pts
Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.441017 GHz -9.00 dBm
M2 1 2.442018 GHz -8.80 dBm

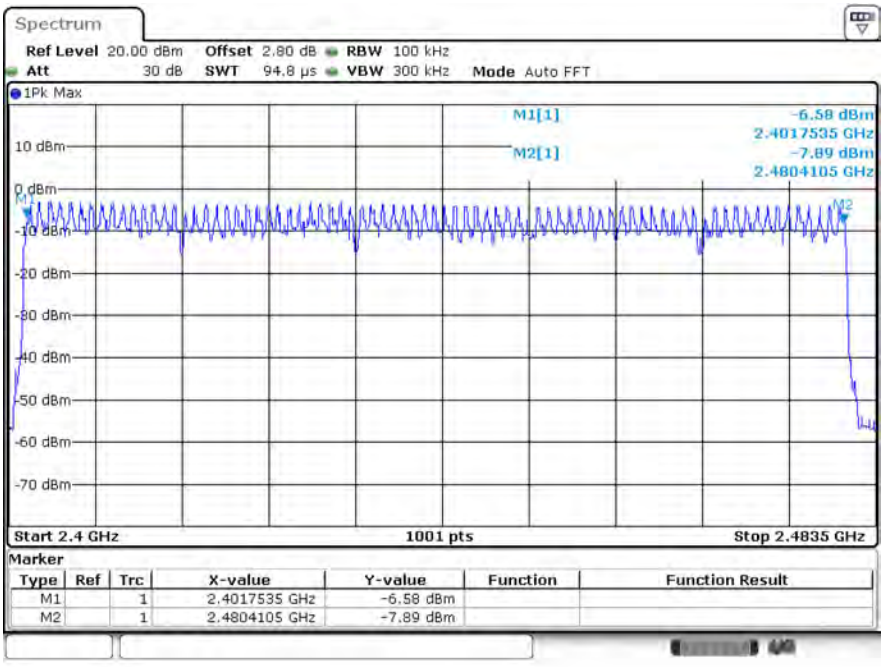
5 Hopping Channel Number

5.1 Test Result

Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

5.2 Test Graphs

Test Graphs	
GFSK/Hop	
π/4DQPSK/Hop	

8DPSK/Hop	

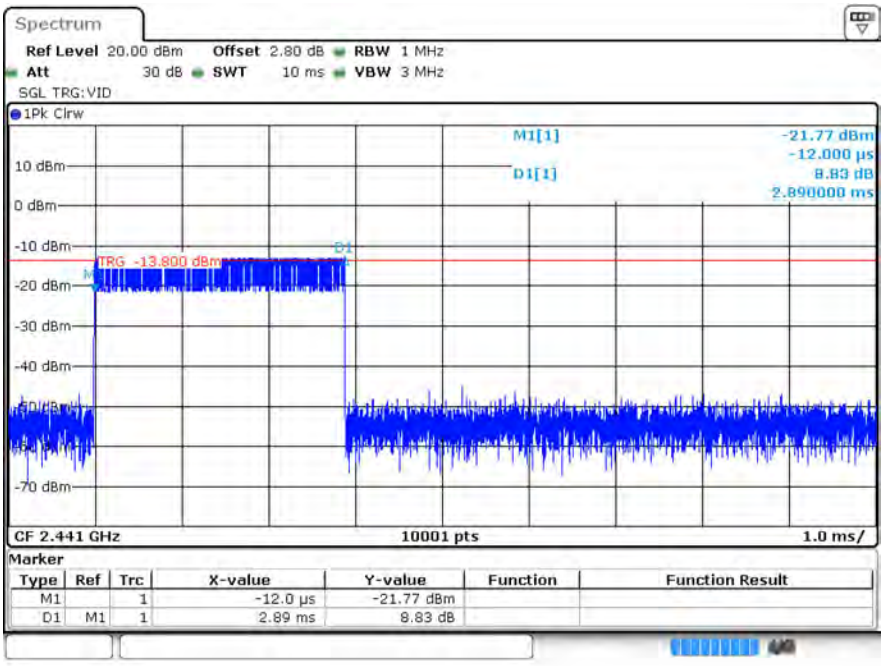
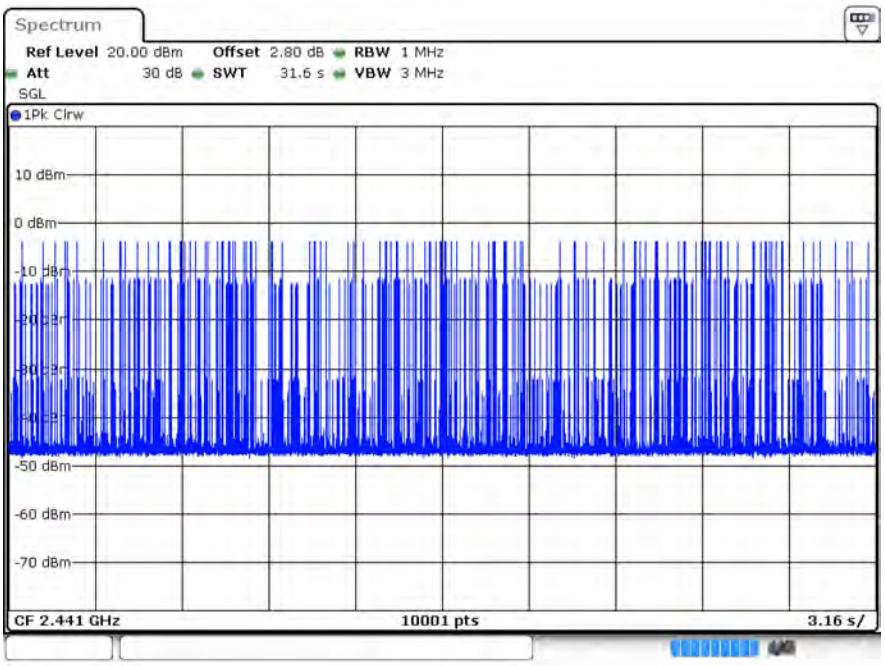
Spectrum
Ref Level 20.00 dBm Offset 2.80 dB RBW 100 kHz
Att 30 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -6.58 dBm
2.4017535 GHz
M2[1] -7.89 dBm
2.4804105 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
Start 2.4 GHz
1001 pts
Stop 2.4835 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4017535 GHz -6.58 dBm
M2 1 2.4804105 GHz -7.89 dBm

6 Dwell Time

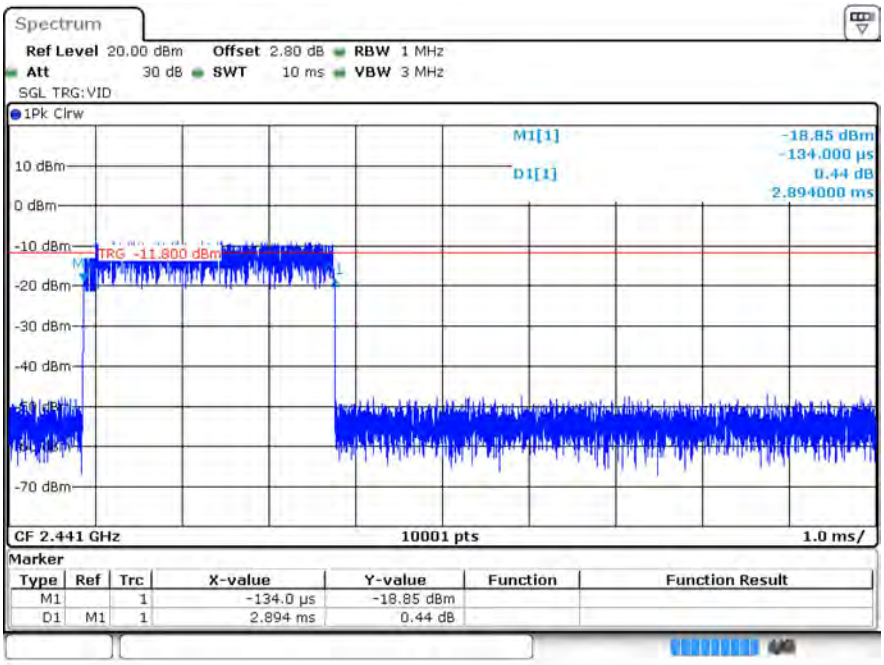
6.1 Test Result

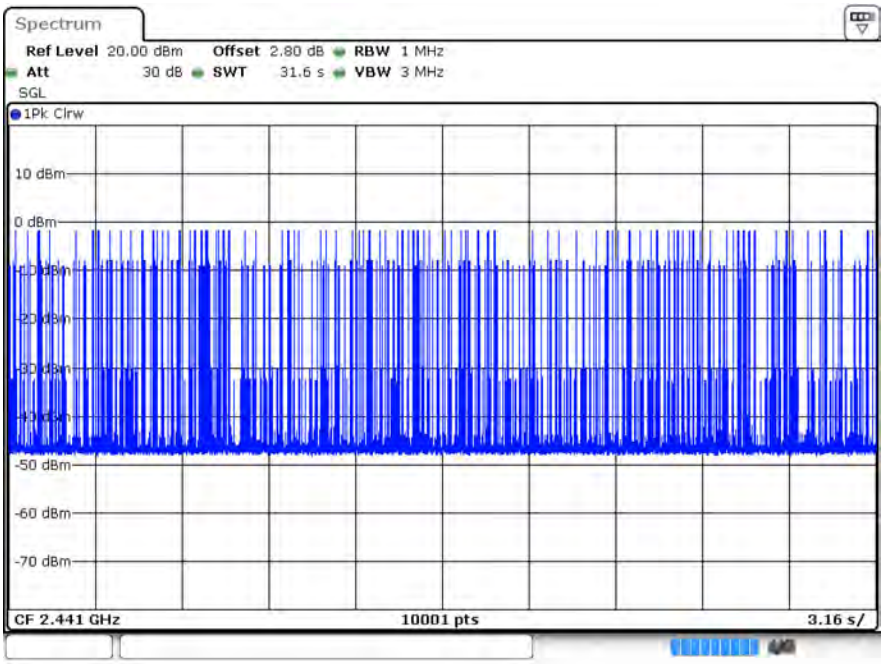
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Limit [s]	Verdict
GFSK	DH5	MCH	2.89	116	335.24	0.4	Pass
π/4DQPSK	2DH5	MCH	2.894	117	338.598	0.4	Pass
8DPSK	3DH5	MCH	2.9	115	333.5	0.4	Pass

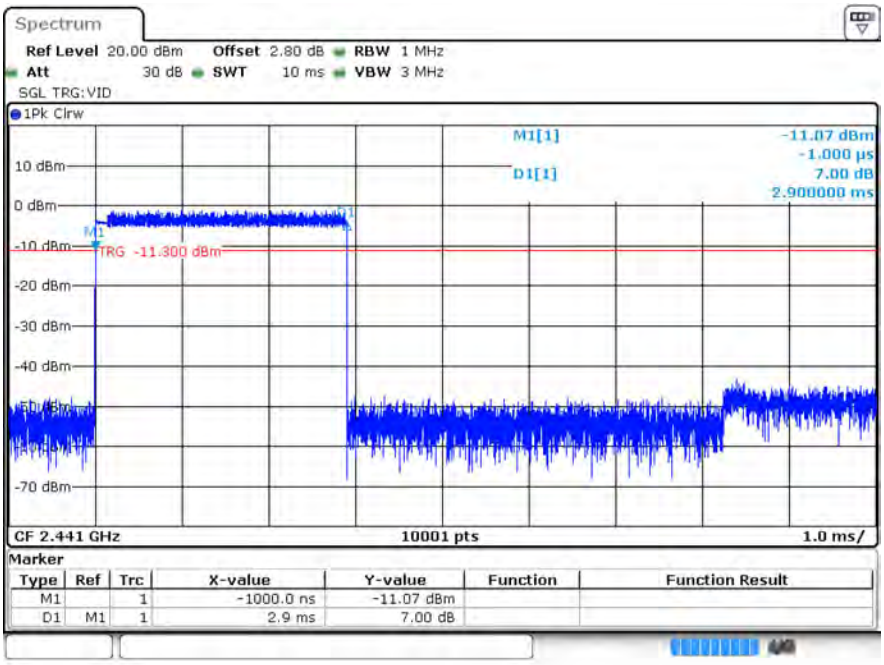
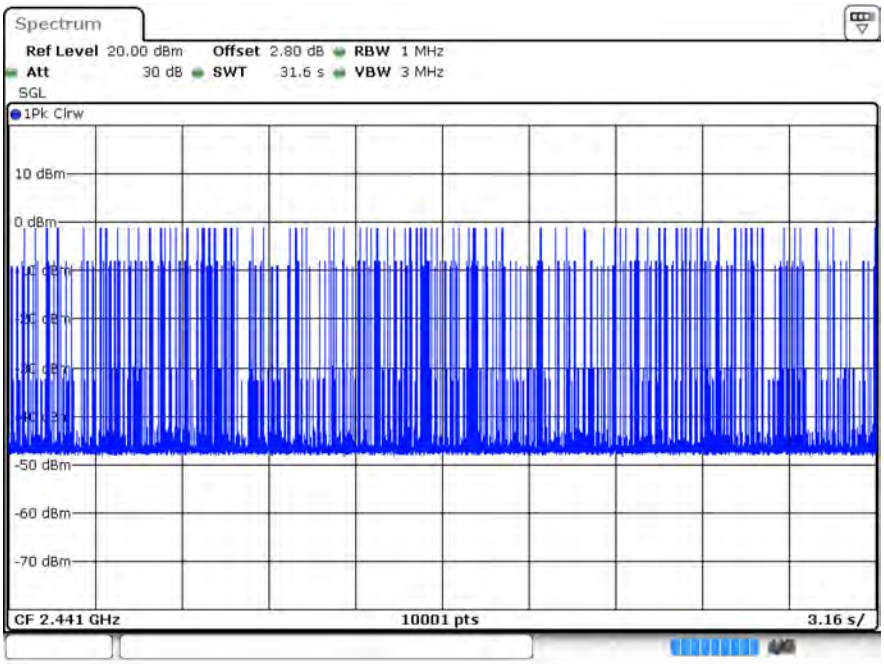
6.2 Test Graphs

Test Graphs	
GFSK_DH5/MCH	 

π/4DQPSK
_2DH5/MCH





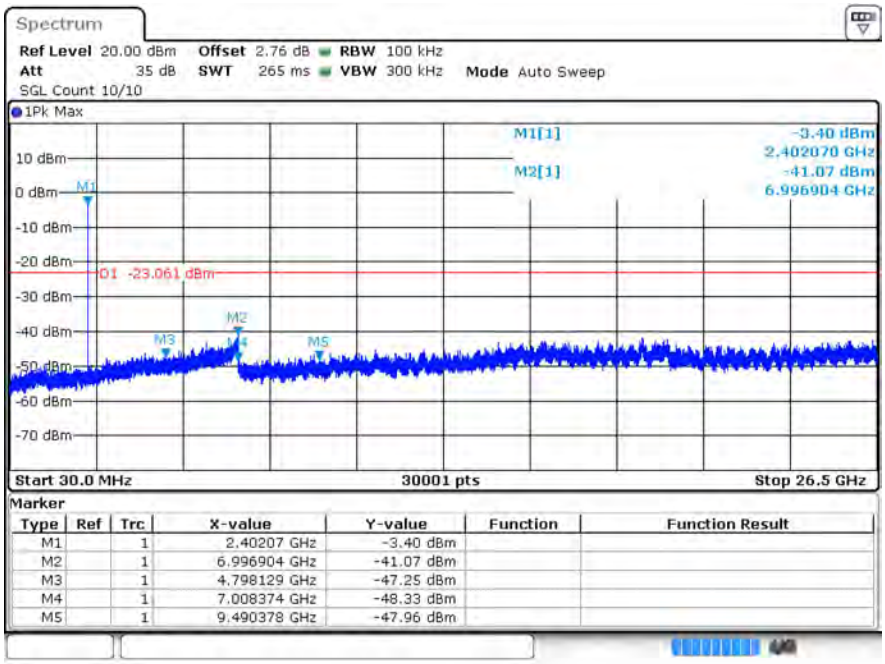
8DPSK _3DH5/MCH	 

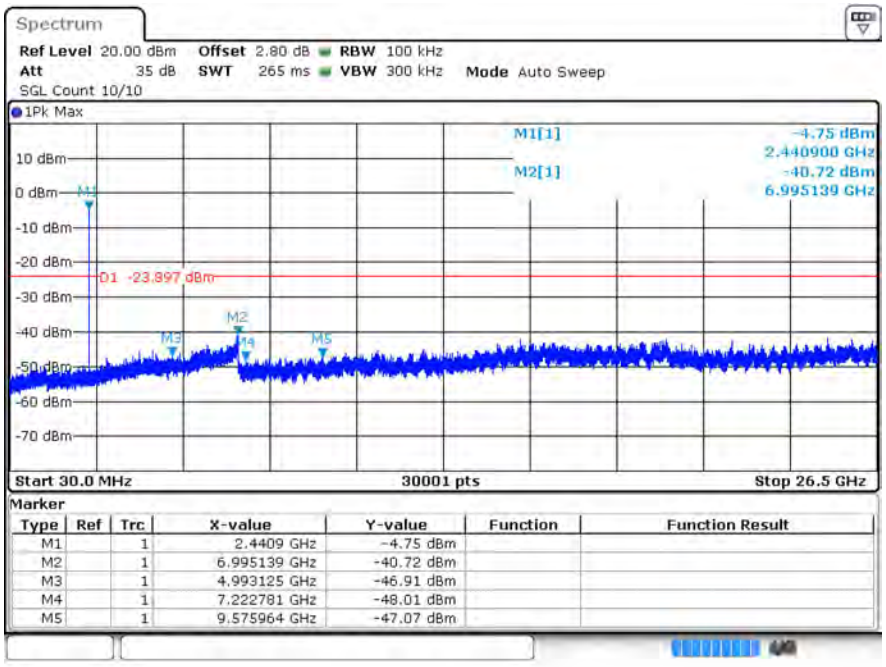
7 RF Conducted Spurious Emissions

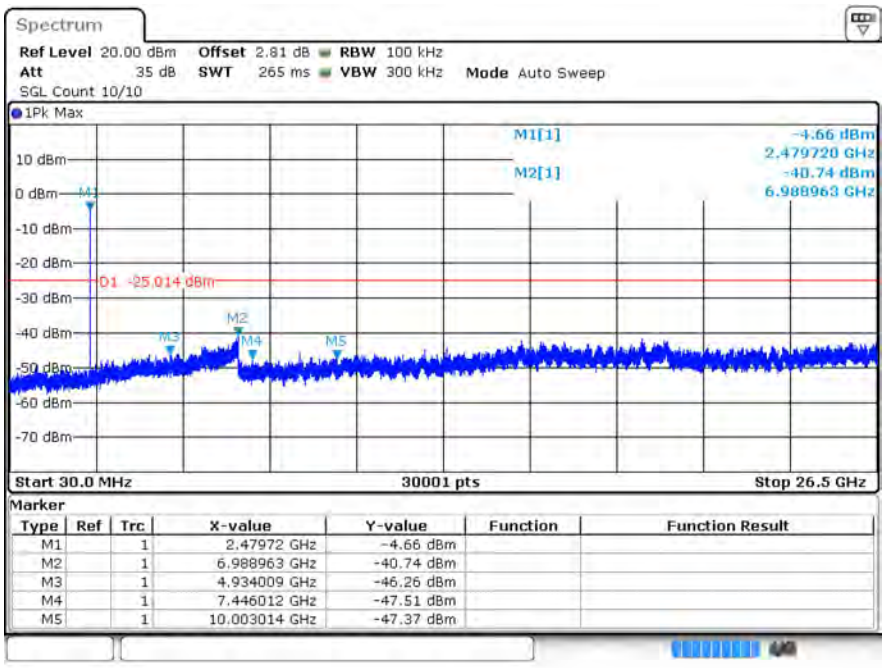
7.1 Test Result

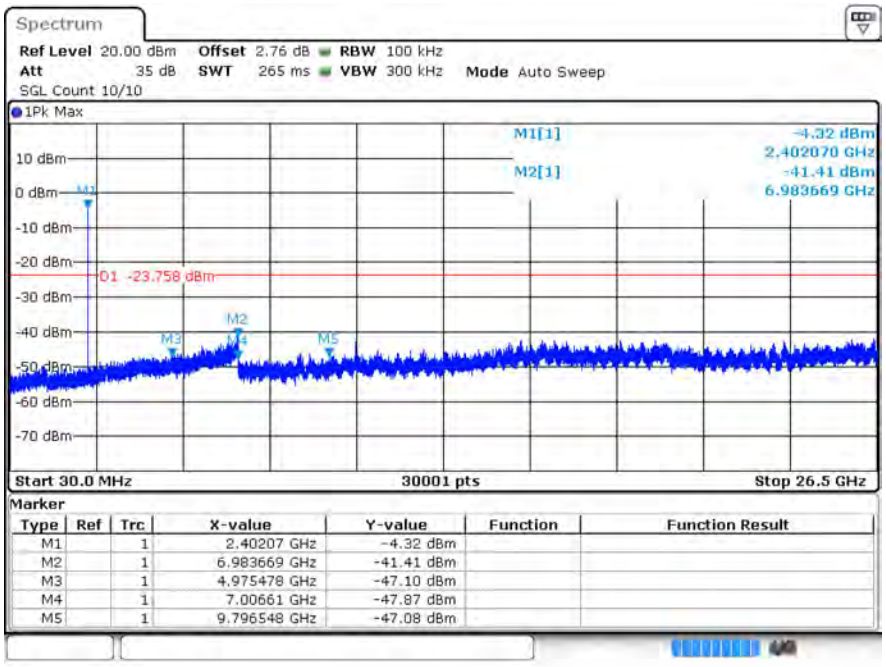
Mode	Channel	Max. Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	-38	-20	Pass
	MCH	-36.82	-20	Pass
	HCH	-35.73	-20	Pass
π/4DQPSK	LCH	-37.65	-20	Pass
	MCH	-37.81	-20	Pass
	HCH	-36.15	-20	Pass
8DPSK	LCH	-38.54	-20	Pass
	MCH	-38.08	-20	Pass
	HCH	-37.08	-20	Pass

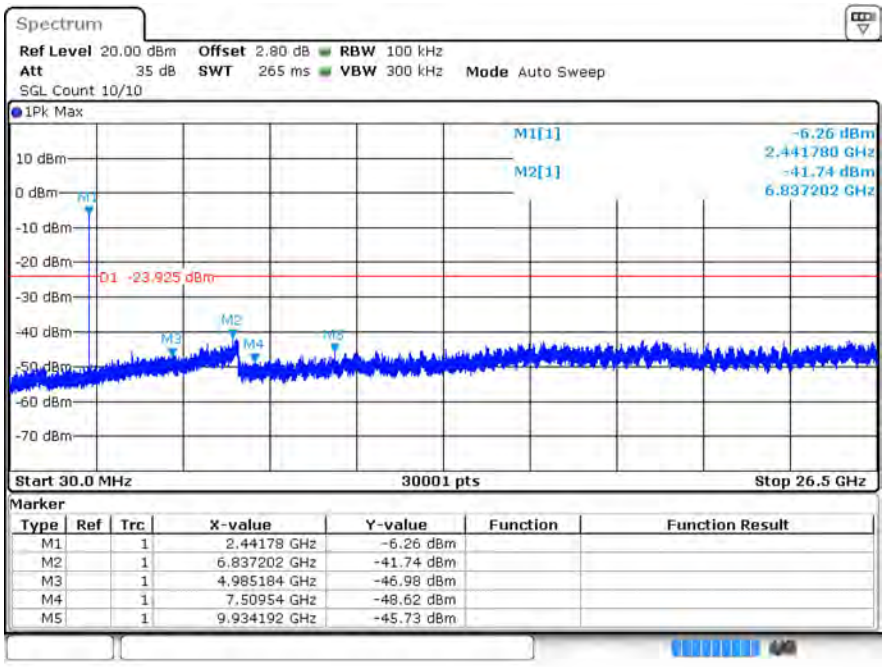
7.2 Test Graphs

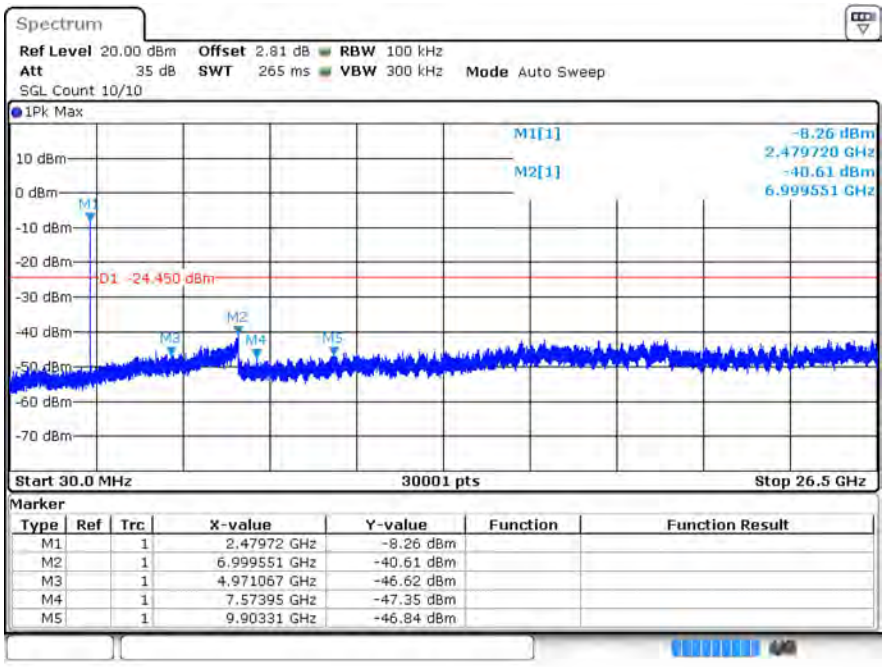
GFSK_LCH_Graphs	
Pref	
Puw	

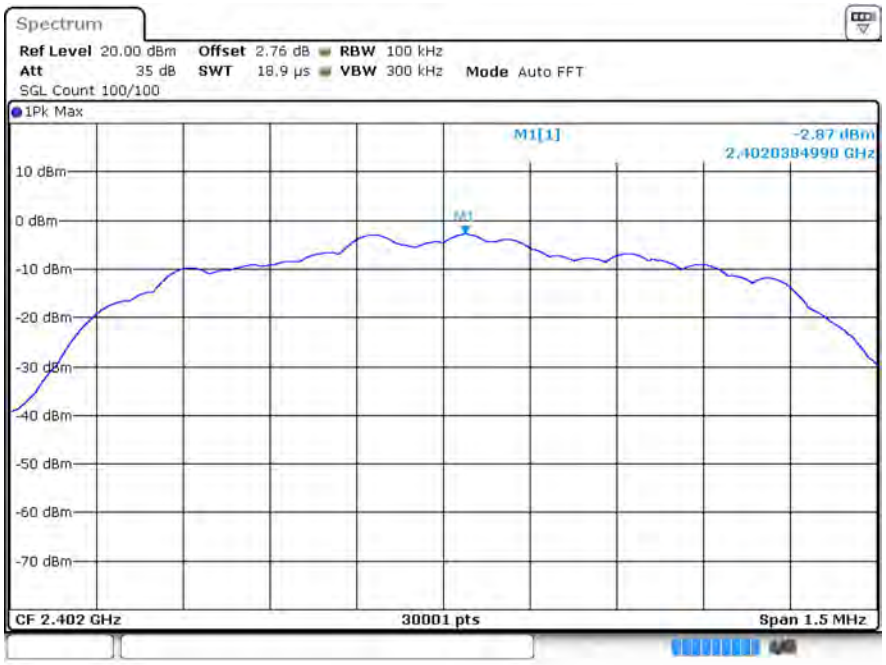
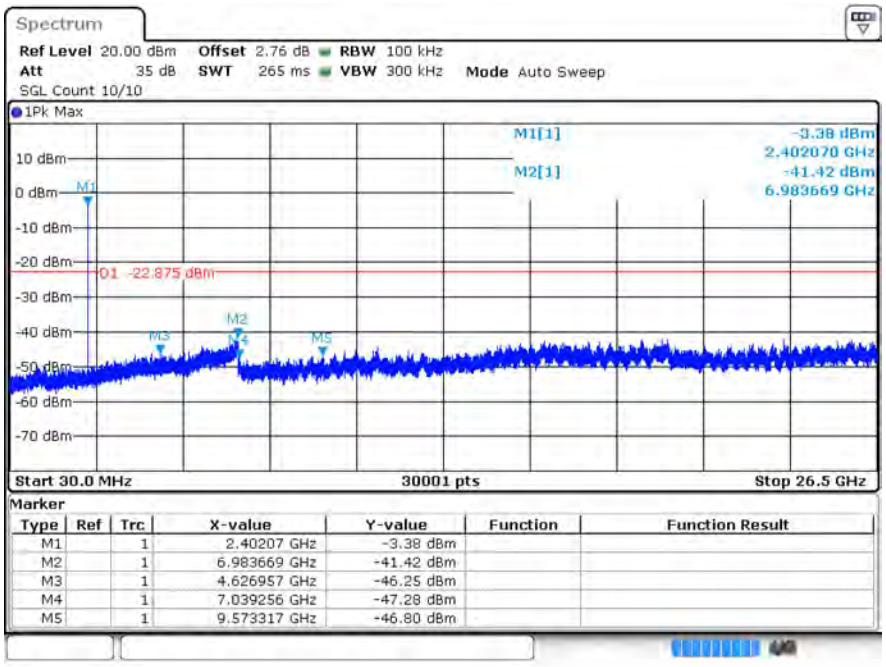
GFSK_MCH_Graphs	
Pref	
Puw	

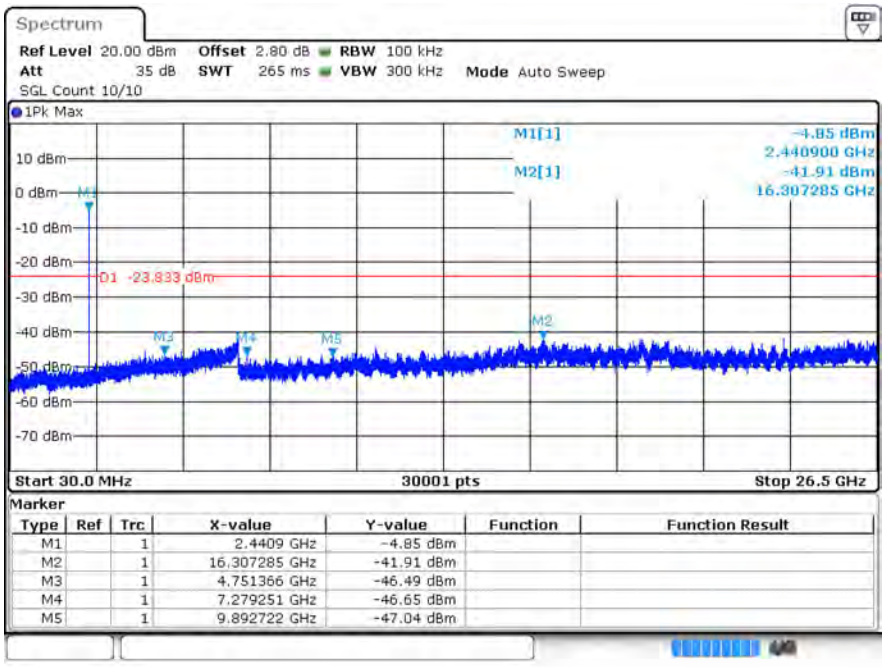
GFSK_HCH_Graphs	
Pref	
Puw	

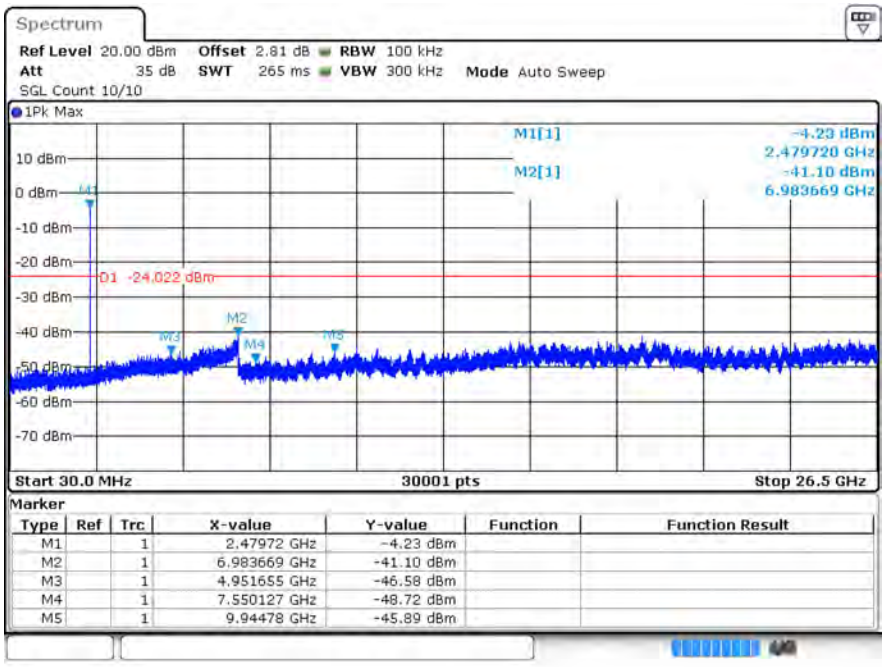
π/4DQPSK_LCH_Graphs	
Pref	
Puw	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.40207 GHz -4.32 dBm M2 1 6.983669 GHz -41.41 dBm M3 1 4.975478 GHz -47.10 dBm M4 1 7.00661 GHz -47.87 dBm M5 1 9.796548 GHz -47.08 dBm

π/4DQPSK_MCH_Graphs	
Pref	
Puw	 Marker Type | Ref | Trc | X-value | Y-value | Function | Function Result M1 | 1 | 2.44178 GHz | -6.26 dBm M2 | 1 | 6.837202 GHz | -41.74 dBm M3 | 1 | 4.985184 GHz | -46.98 dBm M4 | 1 | 7.50954 GHz | -48.62 dBm M5 | 1 | 9.934192 GHz | -45.73 dBm

π/4DQPSK_HCH_Graphs	
Pref	
Puw	

8DPSK_LCH_Graphs	
Pref	
Puw	

8DPSK_MCH_Graphs	
Pref	
Puw	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.4409 GHz -4.85 dBm M2 1 16.307285 GHz -41.91 dBm M3 1 4.751366 GHz -46.49 dBm M4 1 7.279251 GHz -46.65 dBm M5 1 9.892722 GHz -47.04 dBm

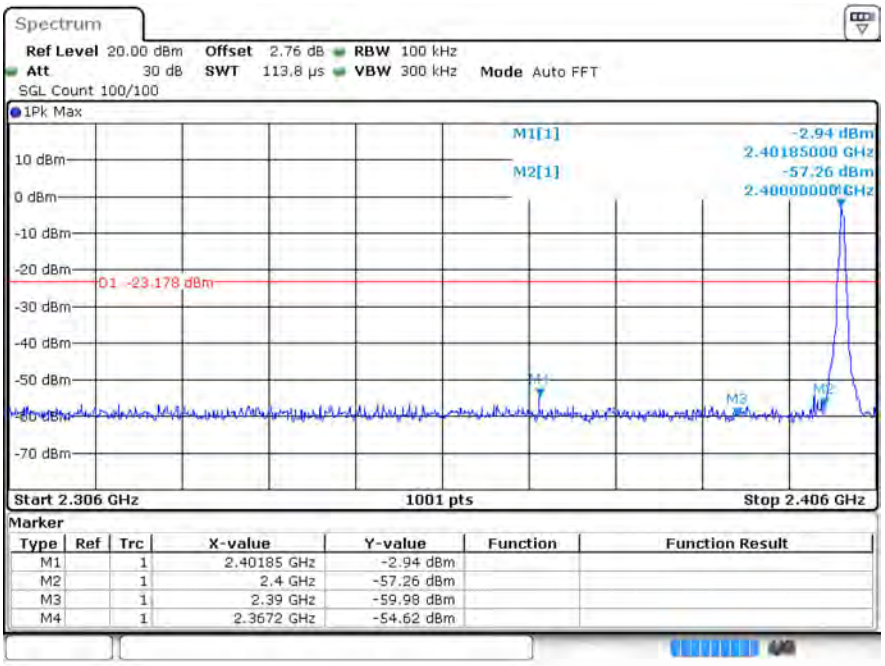
8DPSK_HCH_Graphs	
Pref	
Puw	

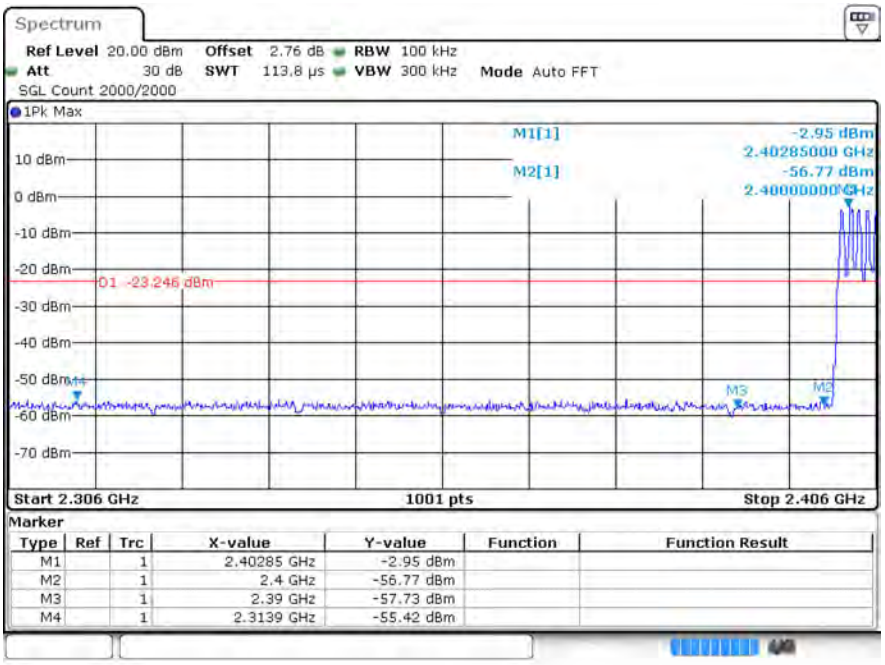
8 Band-edge for RF Conducted Emissions

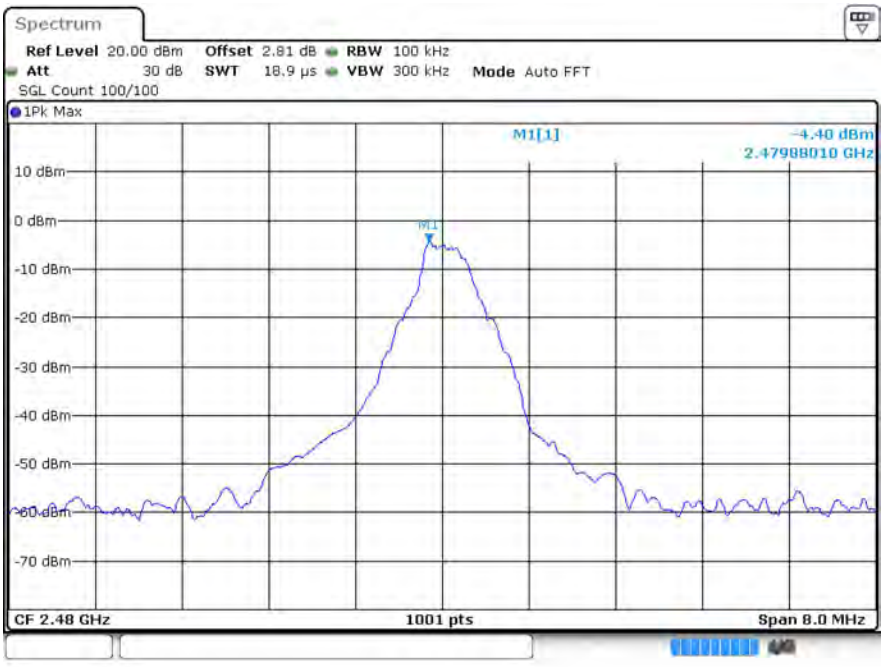
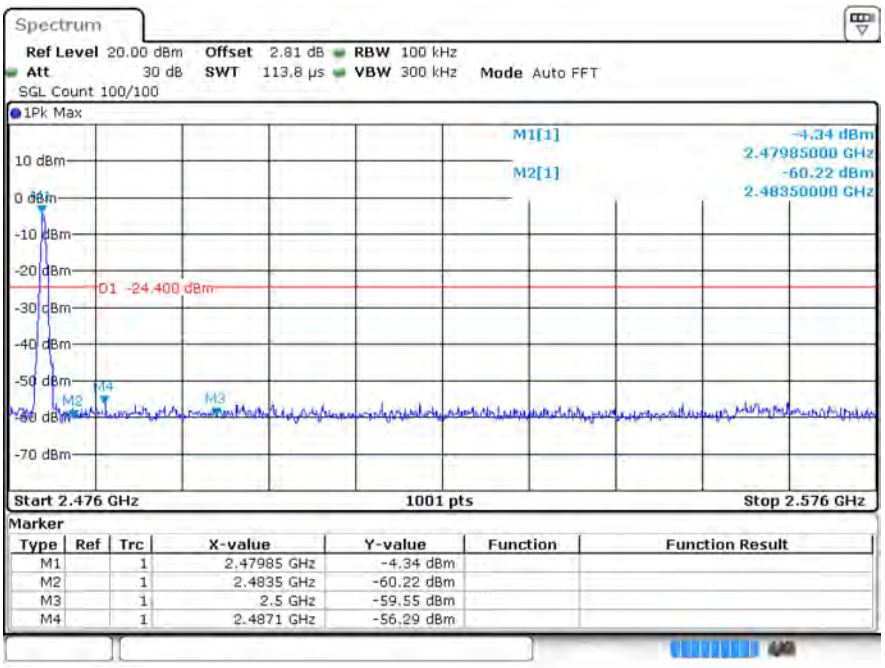
8.1 Test Result

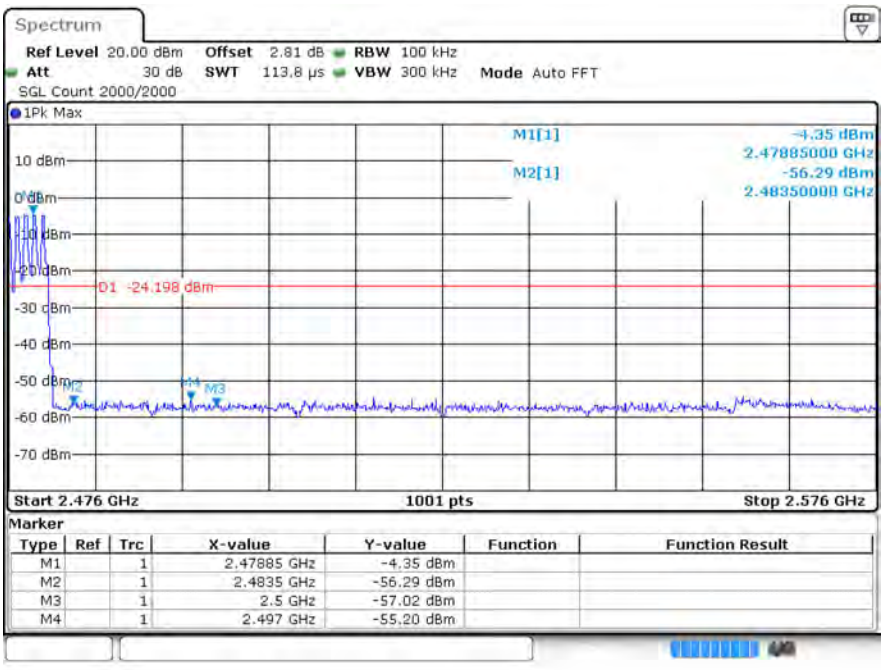
Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Max Spurious Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	2402	Off	-51.44	-20	Pass
			On	-52.17	-20	Pass
	HCH	2480	Off	-51.89	-20	Pass
			On	-51	-20	Pass
π/4DQPSK	LCH	2402	Off	-52.57	-20	Pass
			On	-51.78	-20	Pass
	HCH	2480	Off	-52.19	-20	Pass
			On	-50.39	-20	Pass
8DPSK	LCH	2402	Off	-53.1	-20	Pass
			On	-50.93	-20	Pass
	HCH	2480	Off	-52.41	-20	Pass
			On	-51.13	-20	Pass

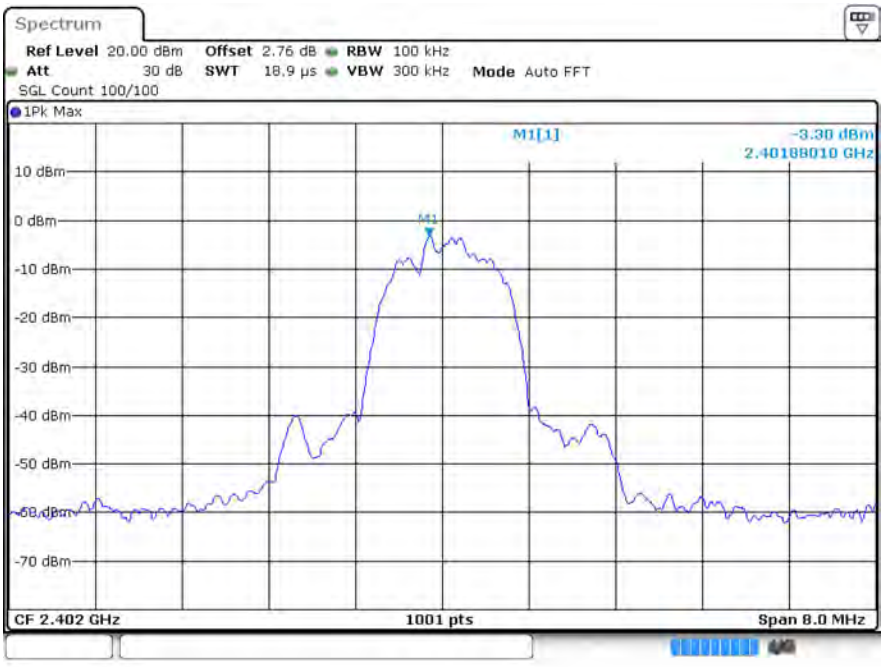
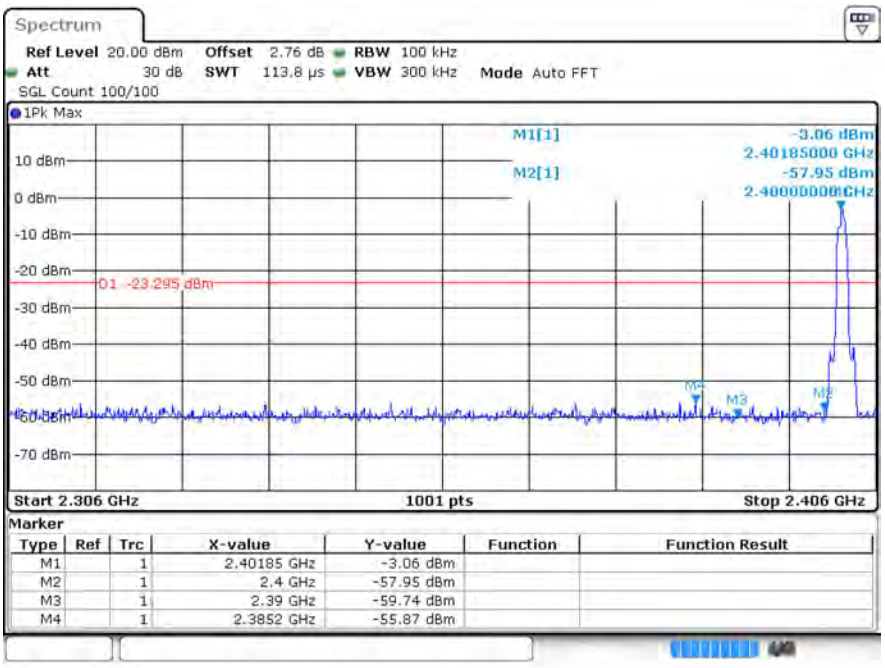
8.2 Test Graphs

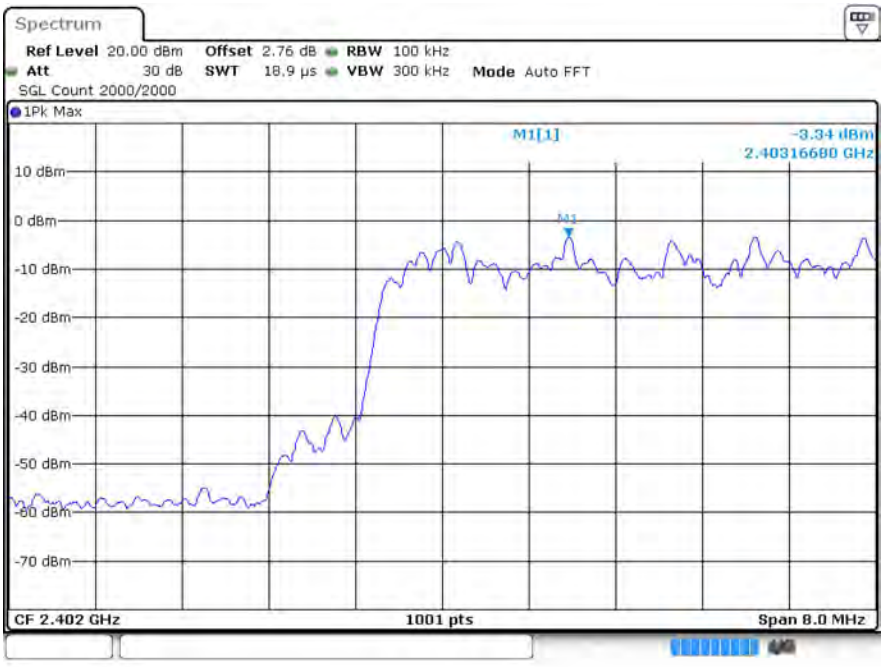
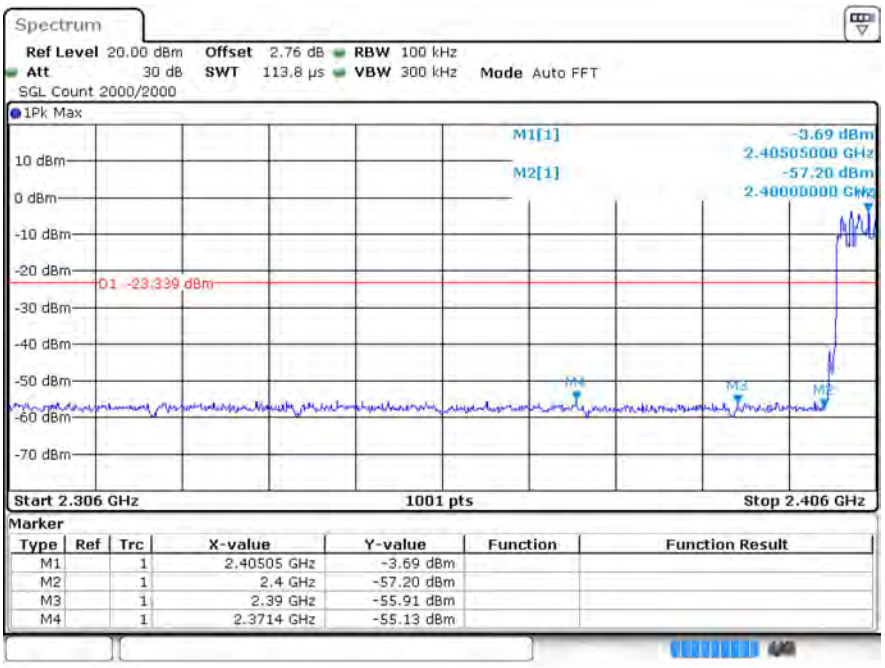
Test Graphs	
Pref	
GFSK/LCH/No Hop	

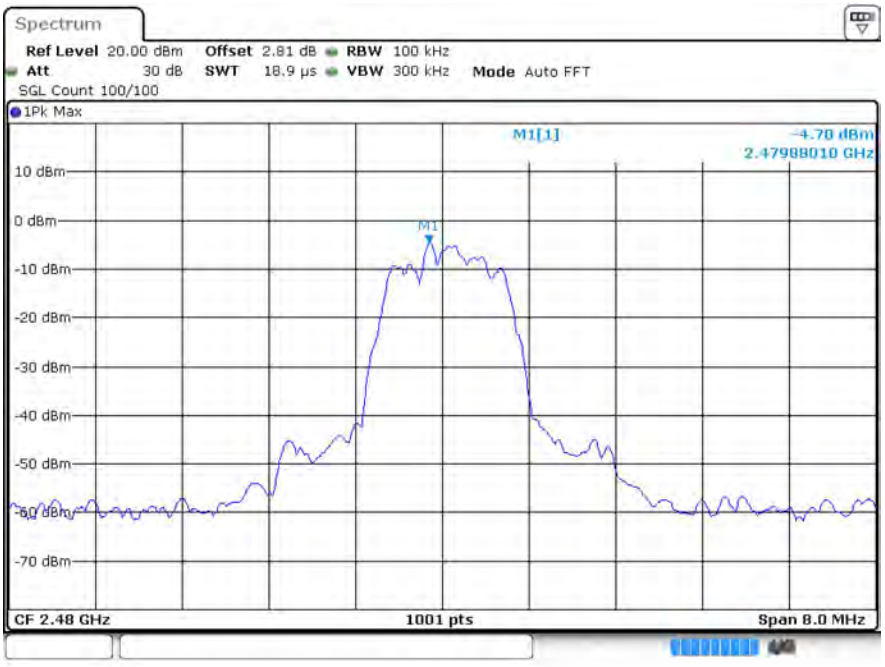
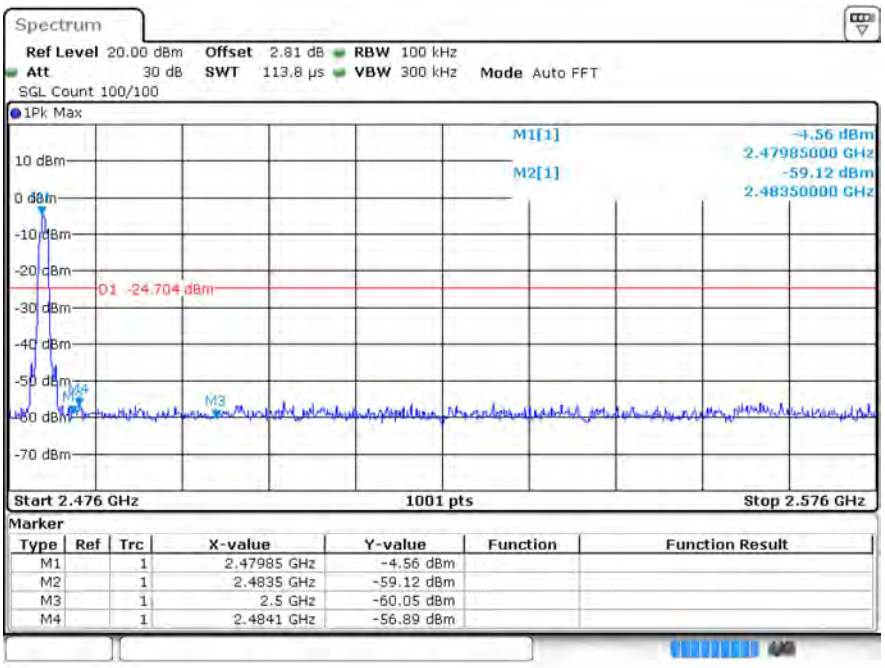
Ref	
GFSK/LCH/Hop	 Marker Type | Ref | Trc | X-value | Y-value | Function | Function Result M1 | | 1 | 2.40285 GHz | -2.95 dBm M2 | | 1 | 2.4 GHz | -56.77 dBm M3 | | 1 | 2.39 GHz | -57.73 dBm M4 | | 1 | 2.3139 GHz | -55.42 dBm

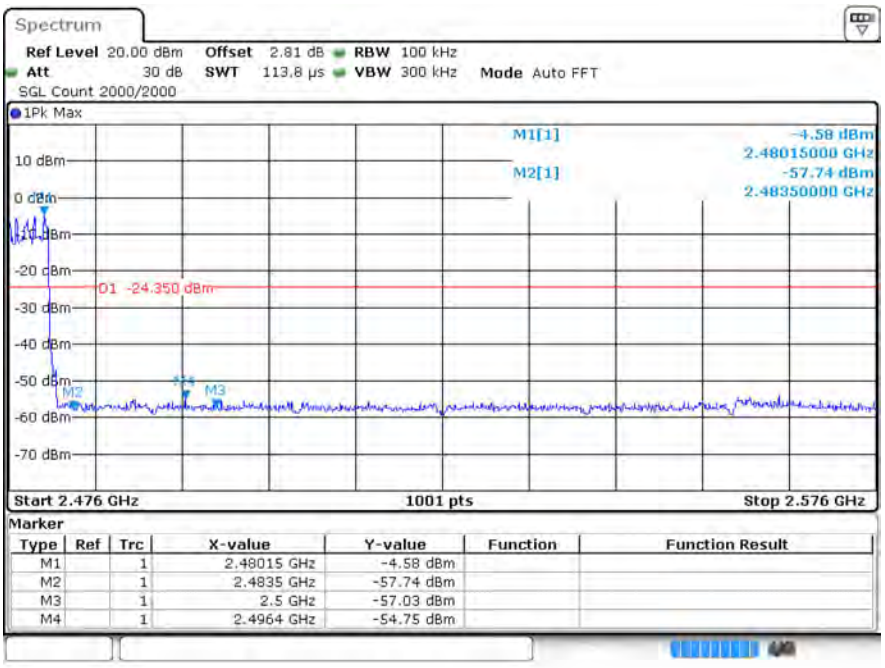
Ref	
GFSK/HCH/No Hop	

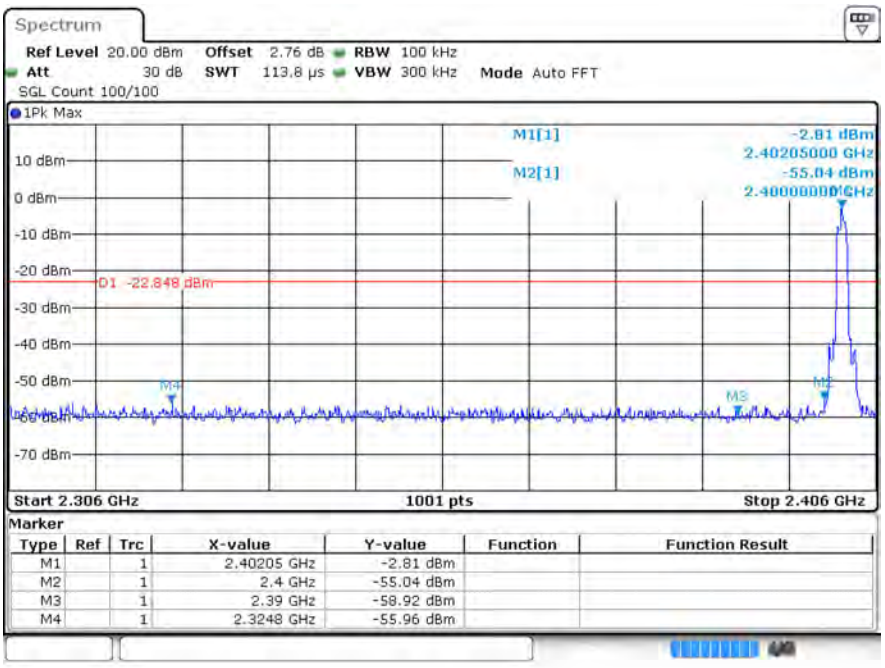
Ref.	
GFSK/HCH/Hop	

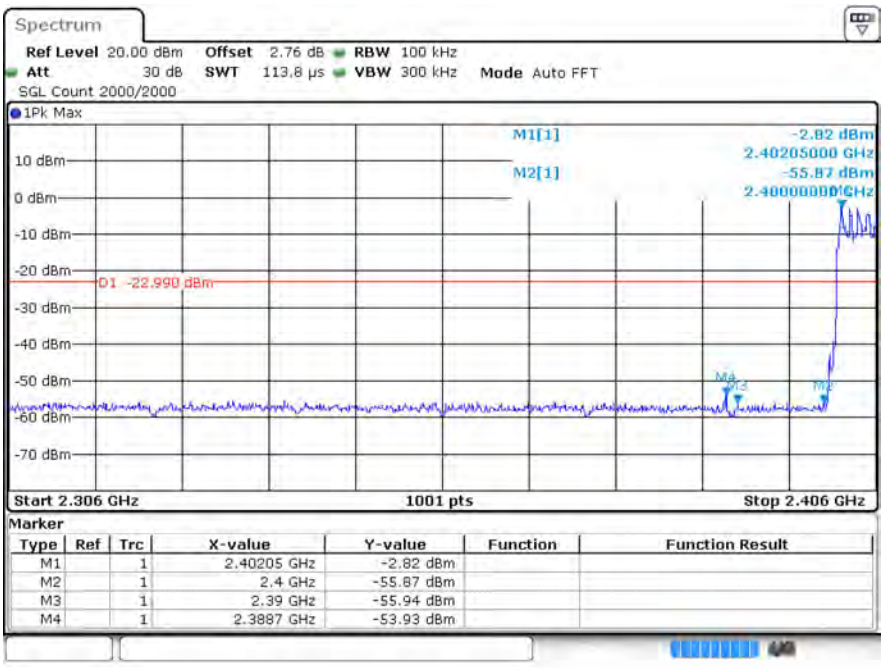
Ref	
π/4DQPSK/LCH/No Hop	

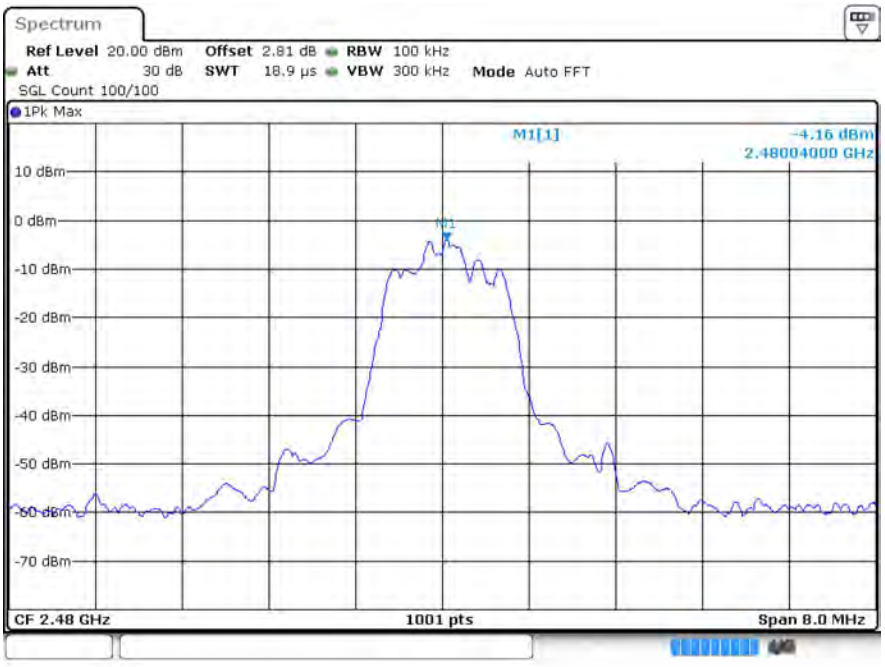
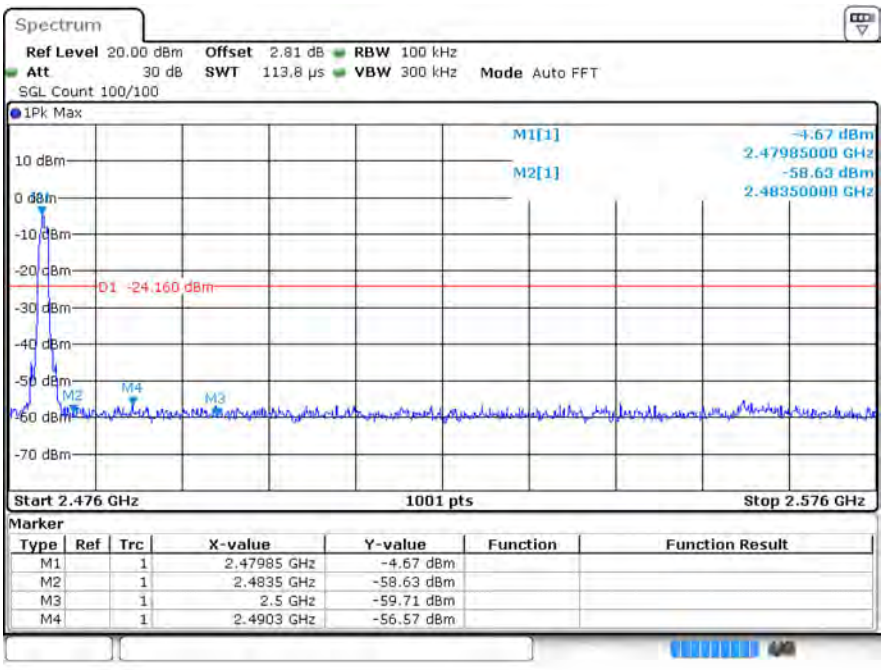
Ref	
π/4DQPSK/LCH/Hop	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.40505 GHz -3.69 dBm M2 1 2.4 GHz -57.20 dBm M3 1 2.39 GHz -55.91 dBm M4 1 2.3714 GHz -55.13 dBm

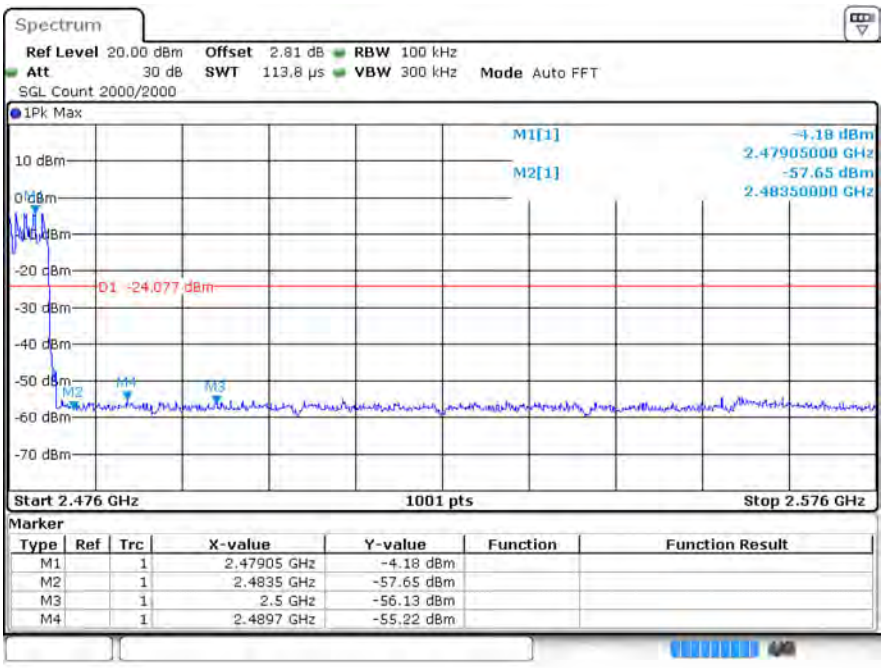
Ref	
π/4DQPSK/HCH/No Hop	

Ref	
π/4DQPSK/HCH/Hop	

Ref	
8DPSK/LCH/No Hop	

Ref	
8DPSK/LCH/Hop	

Ref	
8DPSK/HCH/No Hop	

Ref	
8DPSK/HCH/Hop	

9 Restrict-band band-edge measurements

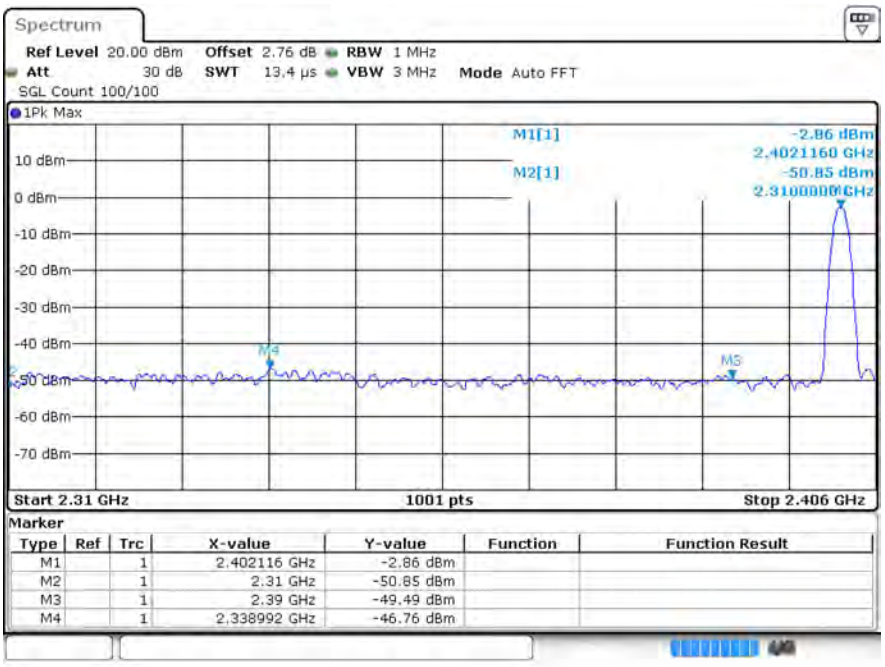
9.1 Test Result

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Duty Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-50.85	2	-	46.41	PEAK	74	Pass
	Off	2310.0	-57.01	2	4.84	45.09	AV	54	Pass
	Off	2338.992	-46.75	2	-	50.51	PEAK	74	Pass
	Off	2337.936	-54.29	2	4.84	47.81	AV	54	Pass
	Off	2390.0	-49.49	2	-	47.77	PEAK	74	Pass
	Off	2390.0	-57.14	2	4.84	44.96	AV	54	Pass
	Off	2483.5	-48.58	2	-	48.68	PEAK	74	Pass
	Off	2483.5	-55.87	2	4.95	46.34	AV	54	Pass
	Off	2498.536	-46.98	2	-	50.28	PEAK	74	Pass
	Off	2483.512	-55.87	2	4.95	46.34	AV	54	Pass
	Off	2500.0	-48.5	2	-	48.76	PEAK	74	Pass
	Off	2500.0	-56.21	2	4.95	46	AV	54	Pass
π/4DQPSK	Off	2310.0	-49.89	2	-	47.37	PEAK	74	Pass
	Off	2310.0	-57.2	2	4.74	44.8	AV	54	Pass
	Off	2339.376	-45.46	2	-	51.8	PEAK	74	Pass
	Off	2341.296	-54.88	2	4.74	47.12	AV	54	Pass
	Off	2390.0	-50.22	2	-	47.04	PEAK	74	Pass
	Off	2390.0	-57.85	2	4.74	44.15	AV	54	Pass
	Off	2483.5	-49.49	2	-	47.77	PEAK	74	Pass
	Off	2483.5	-55.86	2	4.77	46.17	AV	54	Pass
	Off	2489.368	-47.39	2	-	49.87	PEAK	74	Pass
	Off	2483.752	-55.75	2	4.77	46.28	AV	54	Pass
	Off	2500.0	-49.38	2	-	47.88	PEAK	74	Pass
	Off	2500.0	-56.68	2	4.77	45.35	AV	54	Pass
8DPSK	Off	2310.0	-48.6	2	-	48.66	PEAK	74	Pass
	Off	2310.0	-56.48	2	4.74	45.52	AV	54	Pass
	Off	2338.992	-45.41	2	-	51.85	PEAK	74	Pass
	Off	2343.312	-55.02	2	4.74	46.98	AV	54	Pass

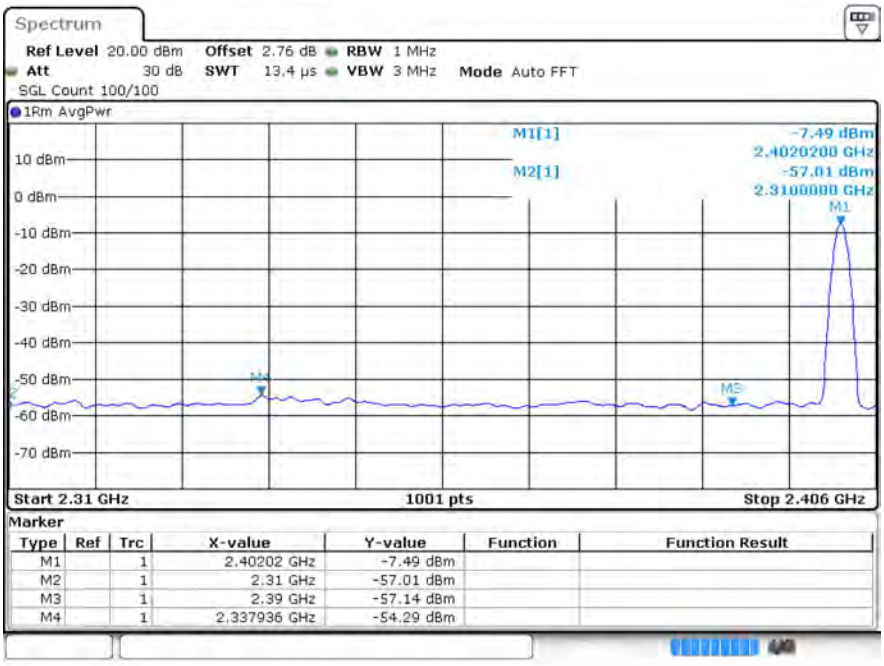
	Off	2390.0	-49.12	2	-	48.14	PEAK	74	Pass
	Off	2390.0	-57.73	2	4.74	44.27	AV	54	Pass
	Off	2483.5	-48.82	2	-	48.44	PEAK	74	Pass
	Off	2483.5	-57.12	2	4.74	44.88	AV	54	Pass
	Off	2488.504	-48.27	2	-	48.99	PEAK	74	Pass
	Off	2492.296	-55.68	2	4.74	46.32	AV	54	Pass
	Off	2500.0	-49.89	2	-	47.37	PEAK	74	Pass
	Off	2500.0	-56.82	2	4.74	45.18	AV	54	Pass

9.2 Test Graphs

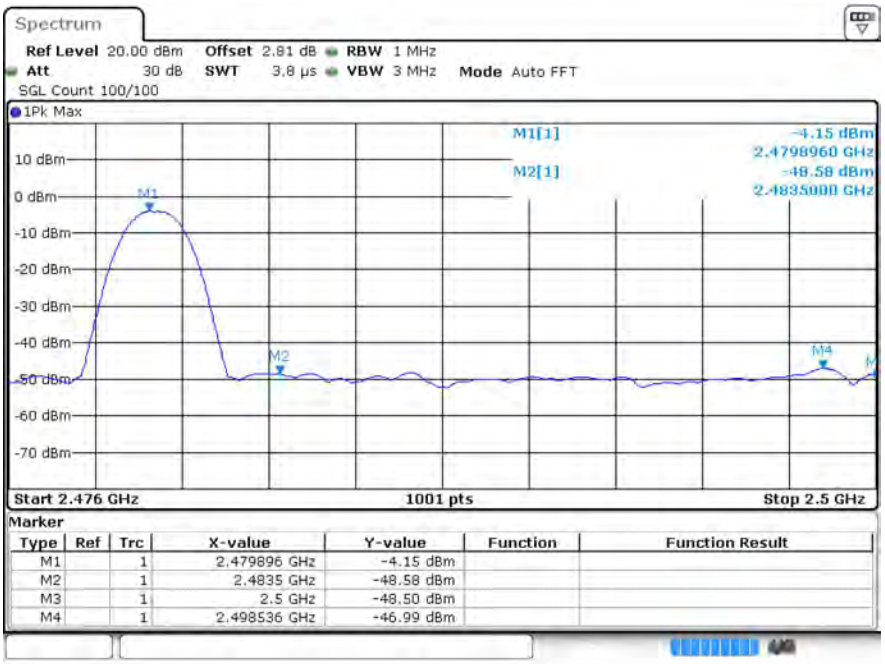
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



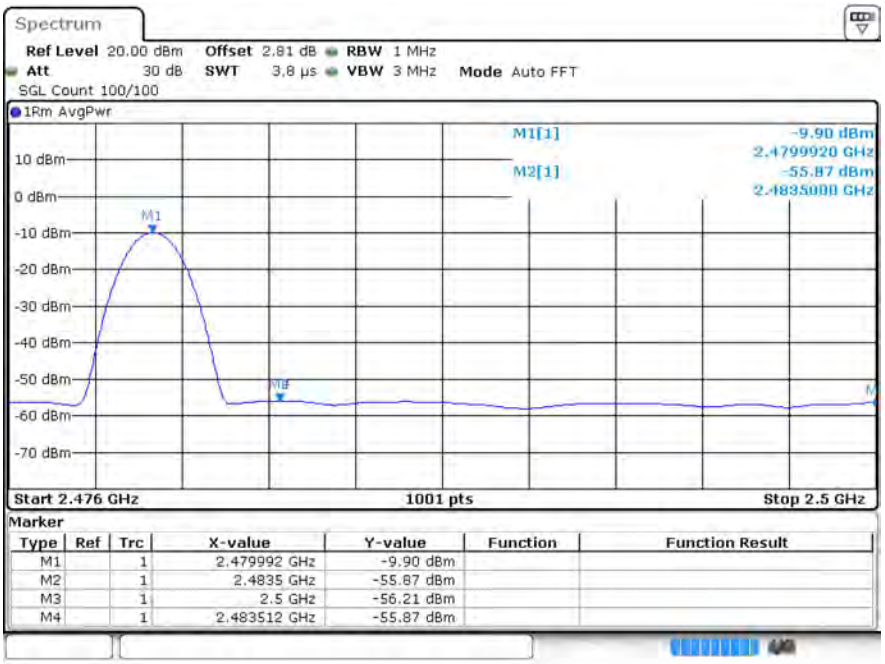
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



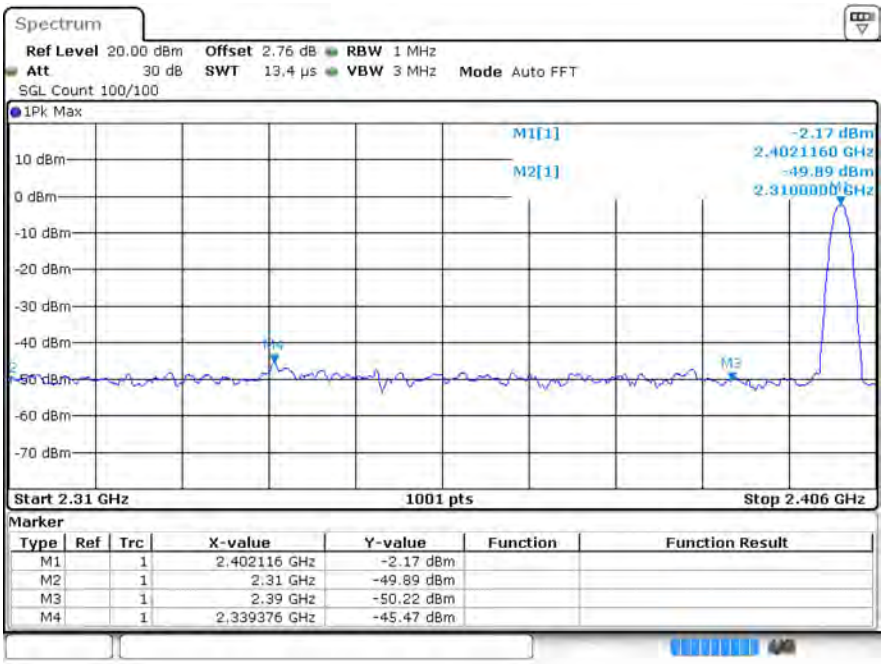
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



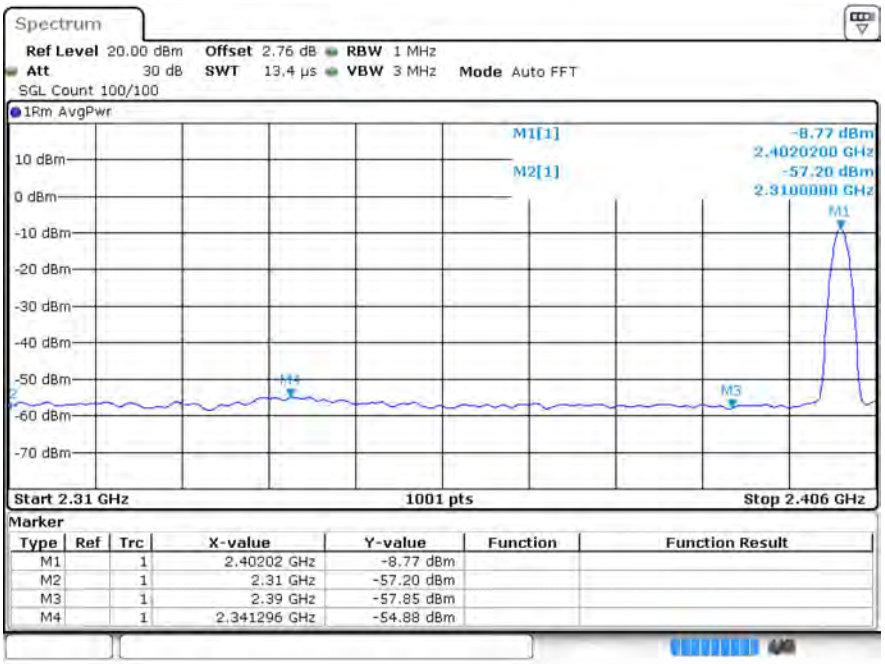
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



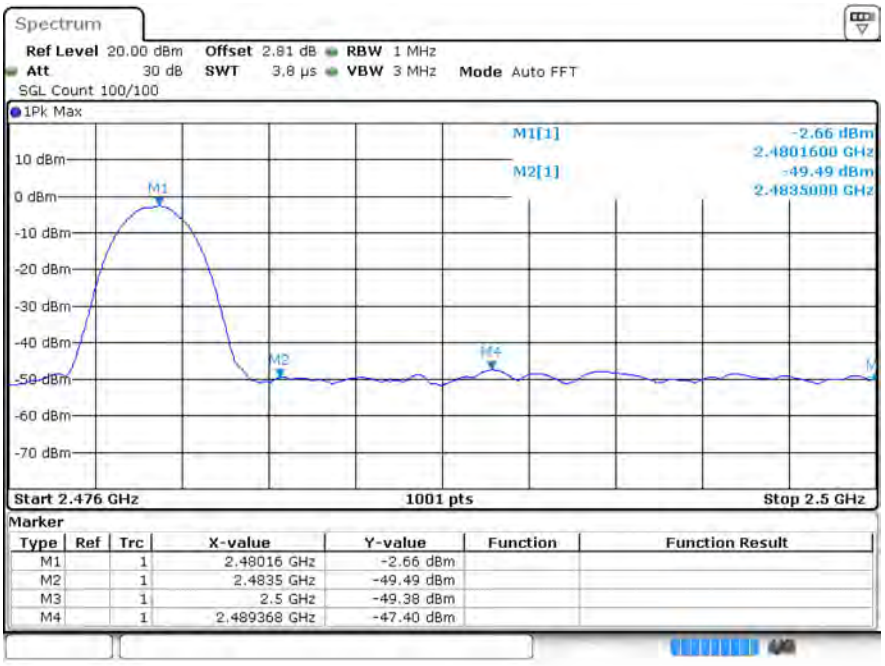
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



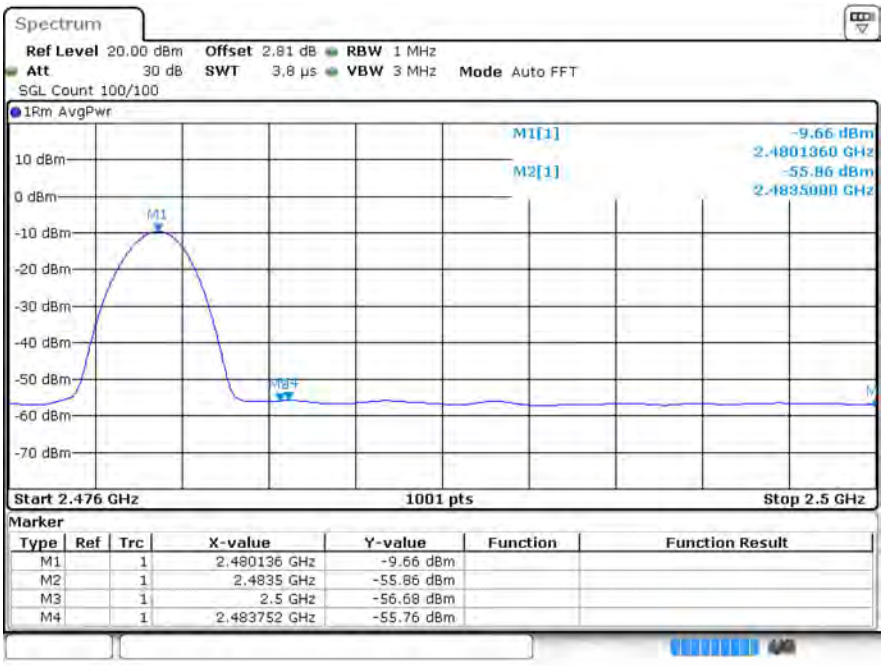
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



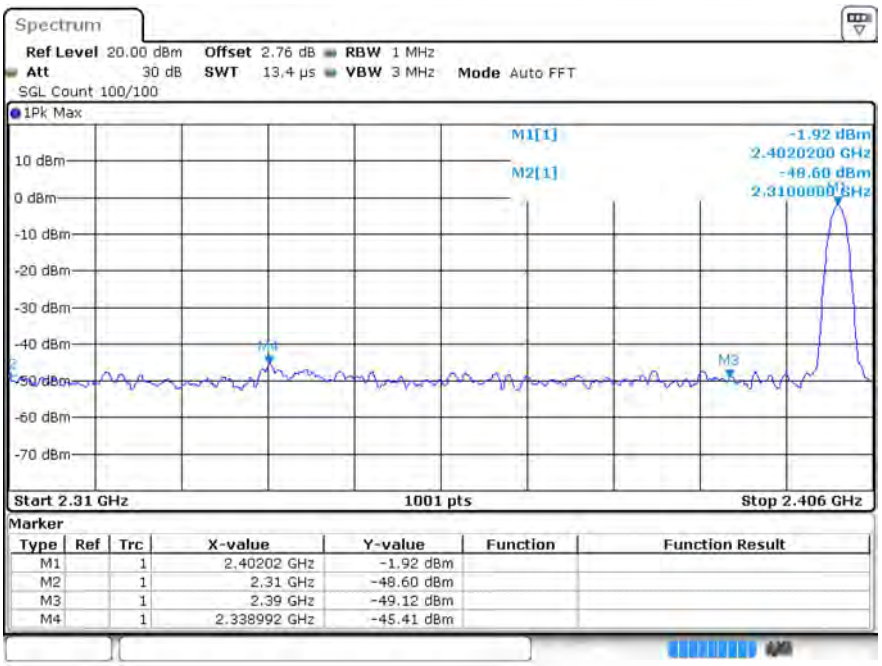
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



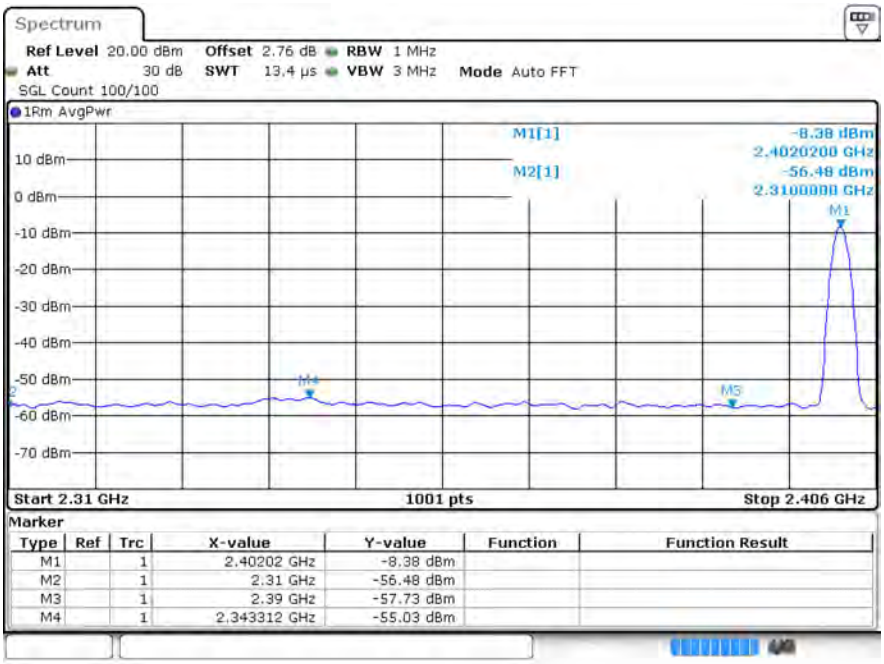
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



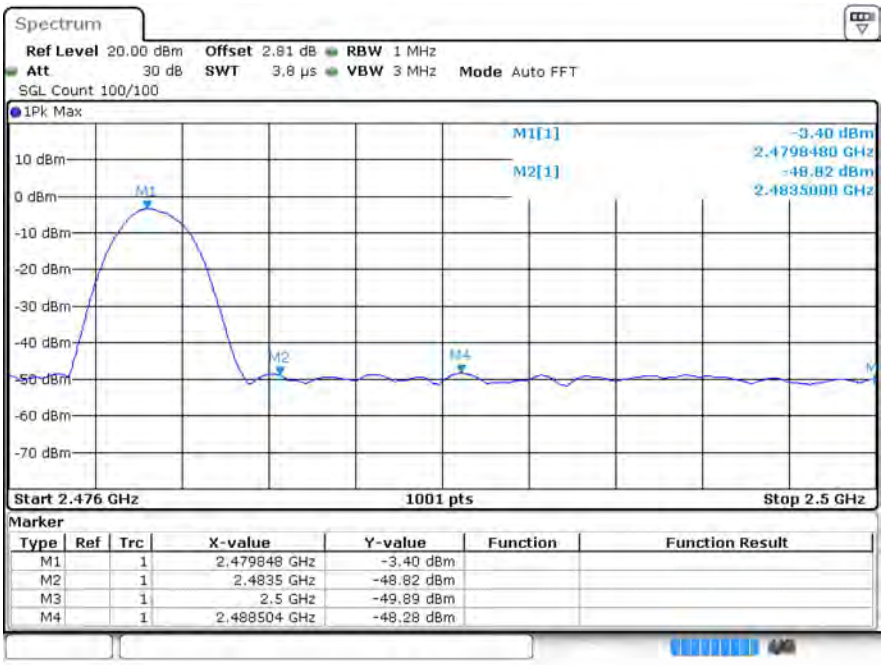
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



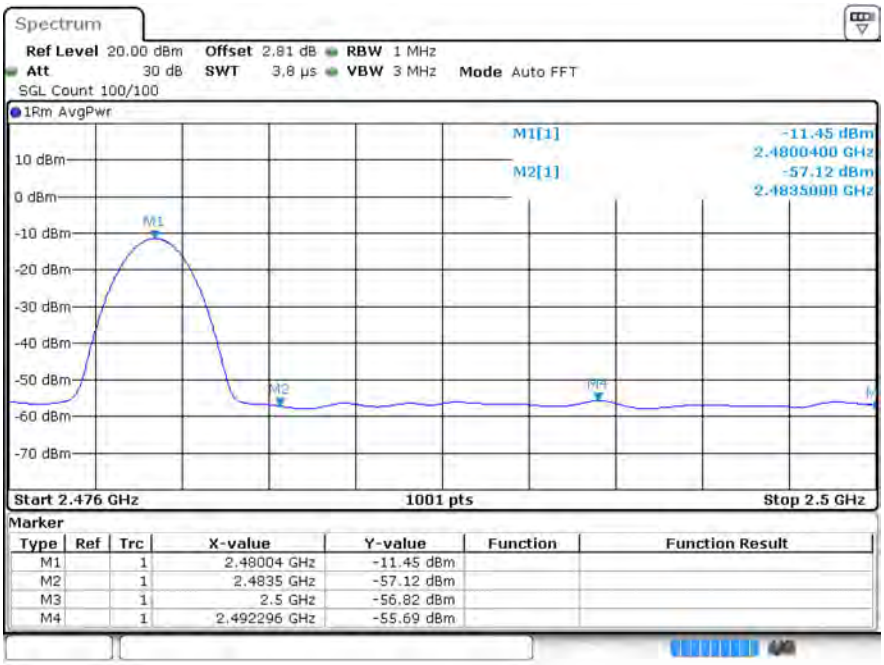
Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (High Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)



---The End---