Appendix A

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

Product Name: bluetooth speaker

Trade Mark: N/A

Test Model: K28

Environmental Conditions

Temperature:	26.5℃
Relative Humidity:	52.4%
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

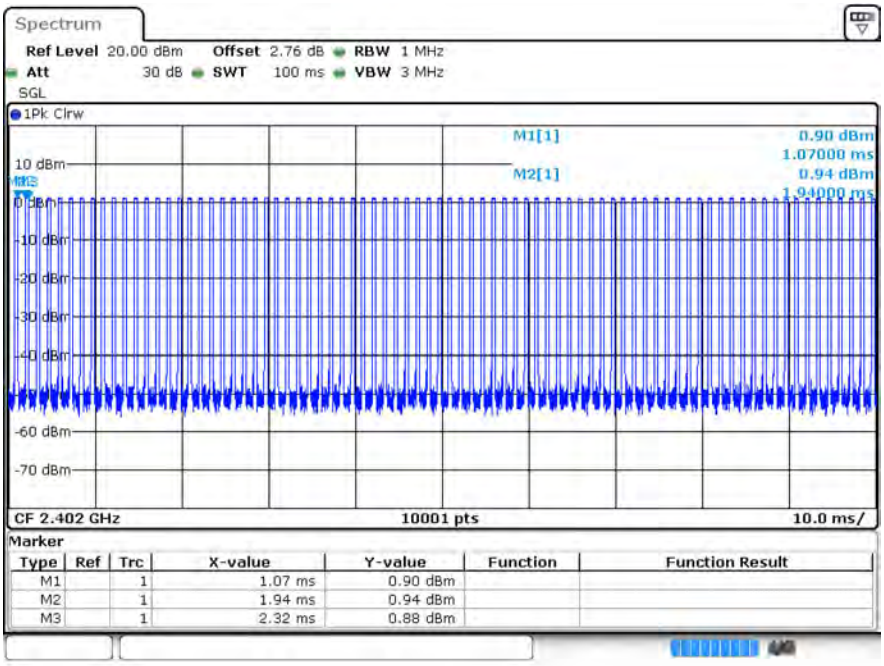
1.1 Test Result

Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor	1/T (kHz)
1-DH1	2402	31.2	5.06	2.63
1-DH1	2441	31.21	5.06	2.63
1-DH1	2480	31.83	4.97	2.63
2-DH1	2402	32.01	4.95	2.56
2-DH1	2441	32.01	4.95	2.56
2-DH1	2480	32.01	4.95	2.56
3-DH1	2402	32.01	4.95	2.56
3-DH1	2441	32.01	4.95	2.56
3-DH1	2480	31.9	4.96	2.56

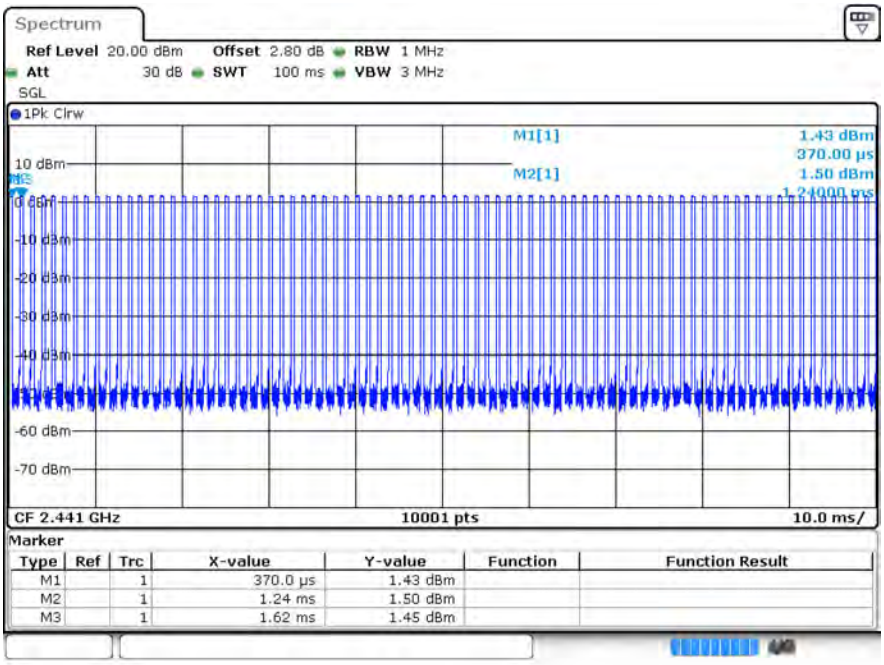
1.2 Test Graphs

Test Graphs

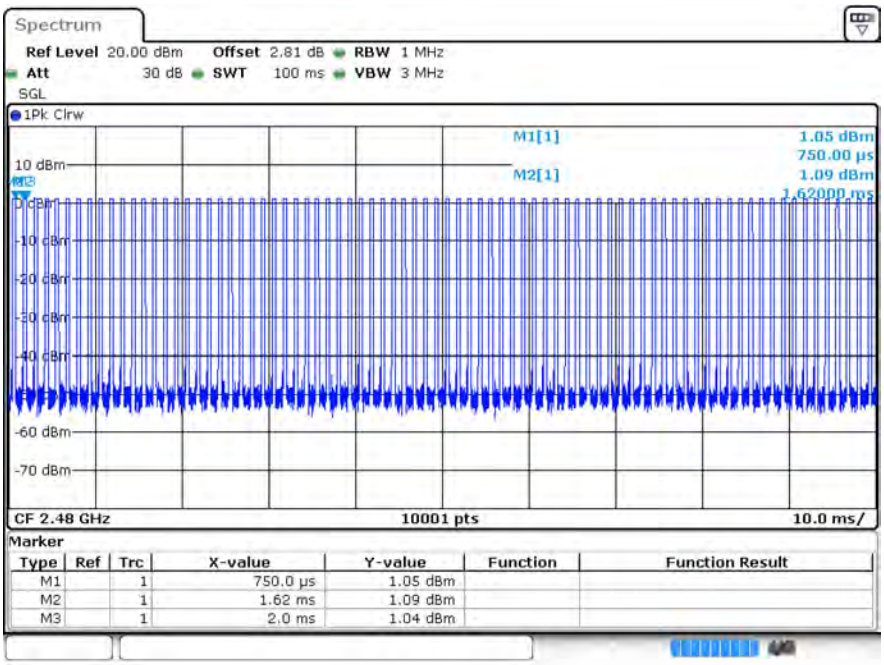
1-DH1 2402MHz



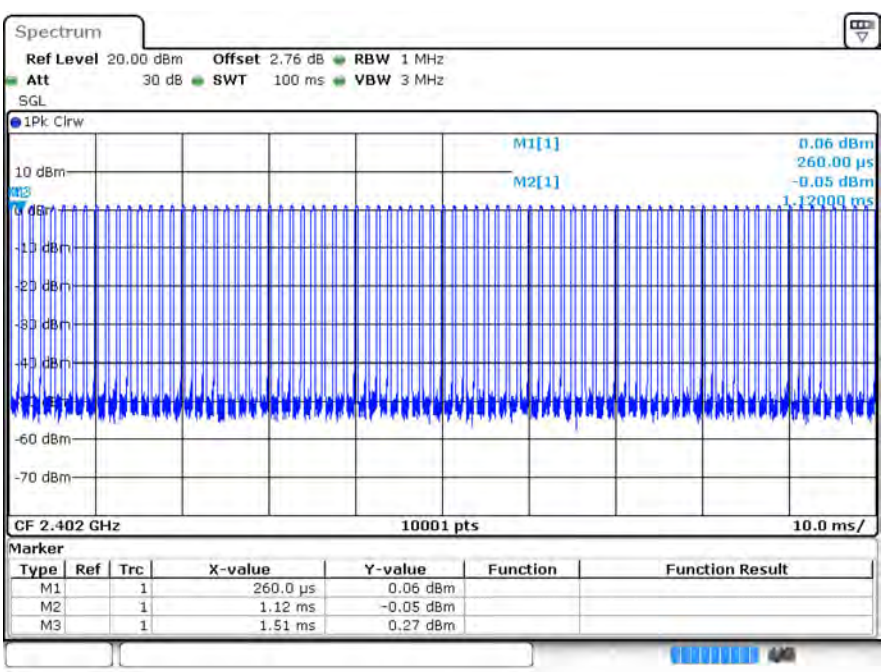
1-DH1 2441MHz



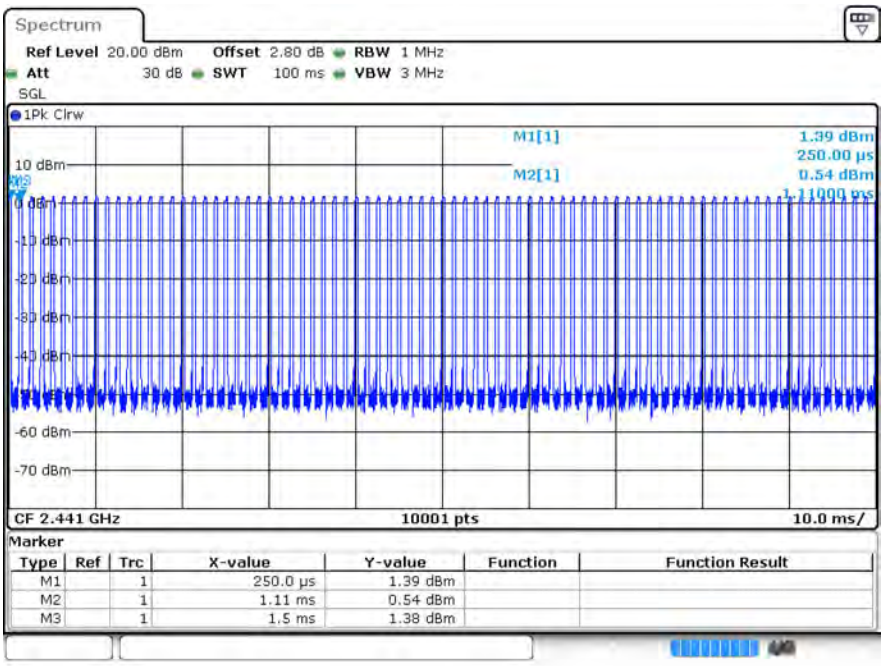
1-DH1 2480MHz



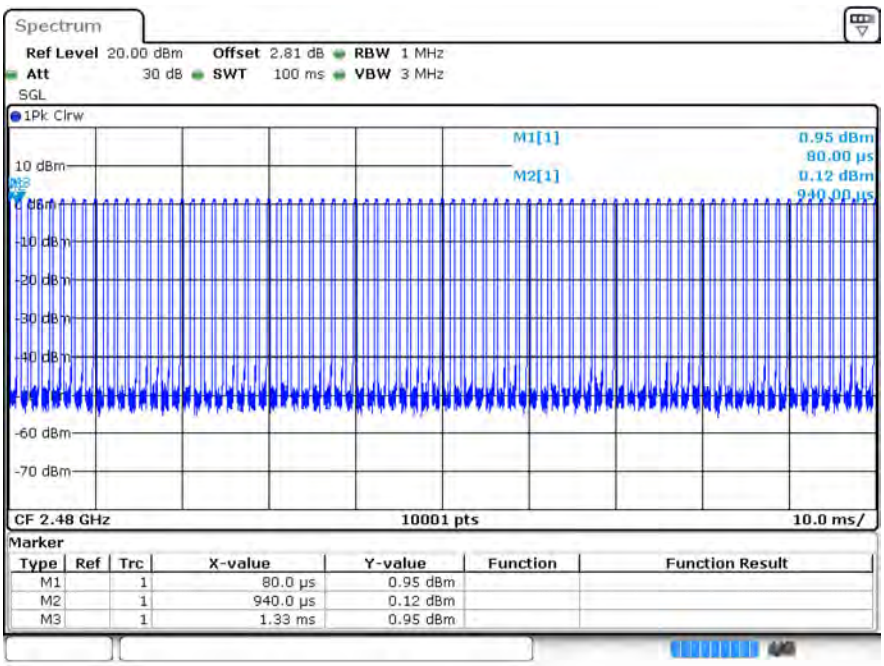
2-DH1 2402MHz



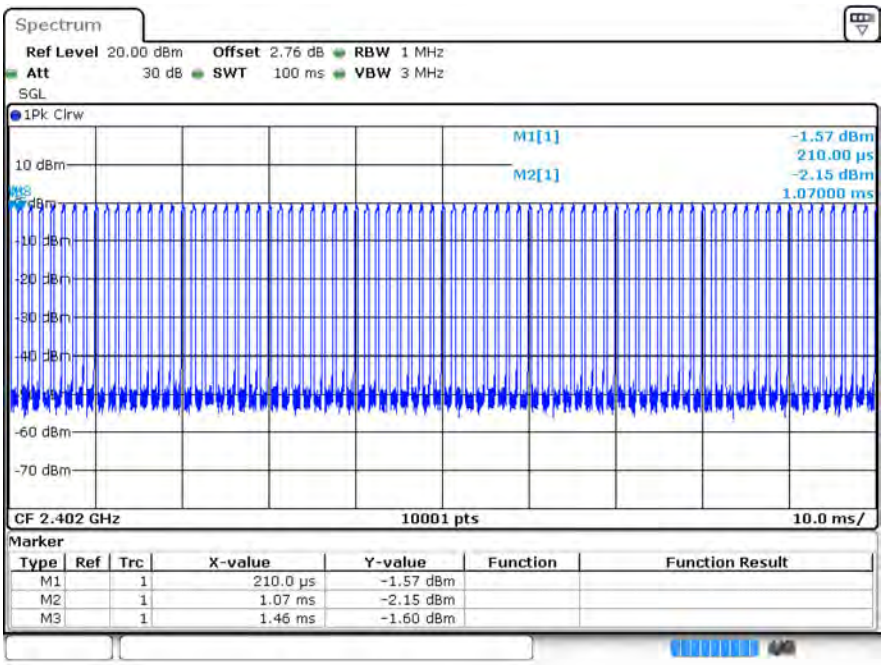
2-DH1 2441MHz



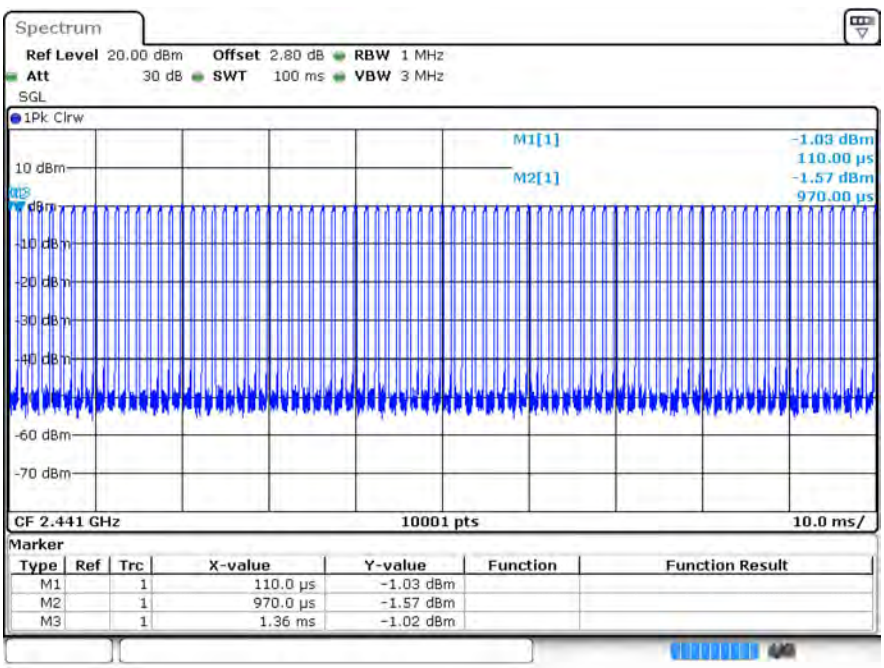
2-DH1 2480MHz



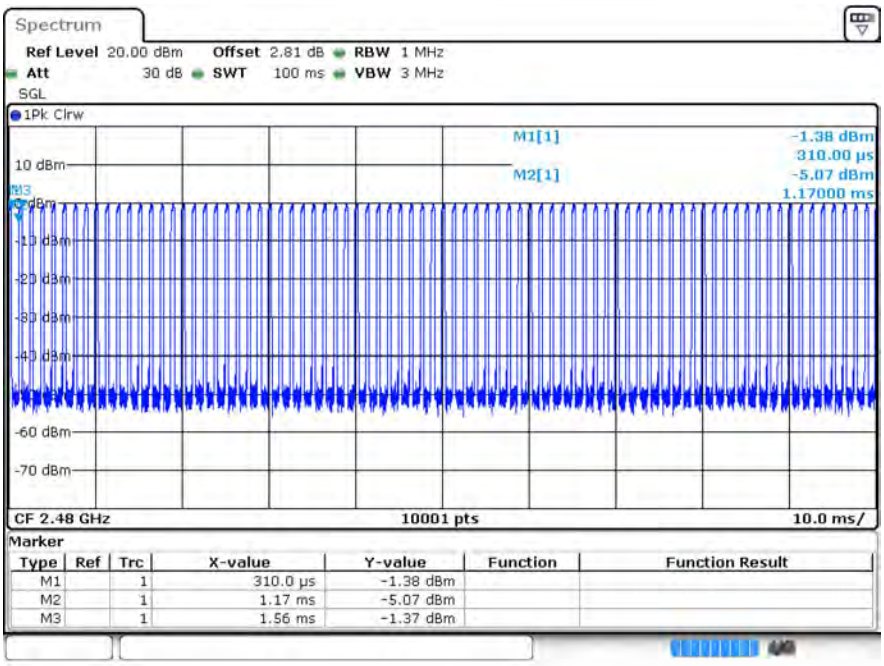
3-DH1 2402MHz



3-DH1 2441MHz



3-DH1 2480MHz

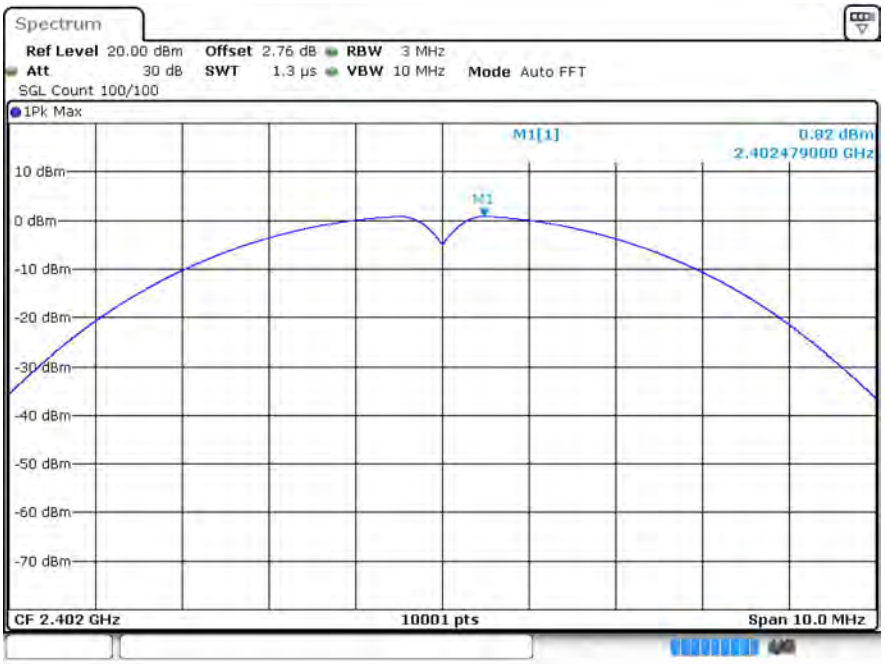
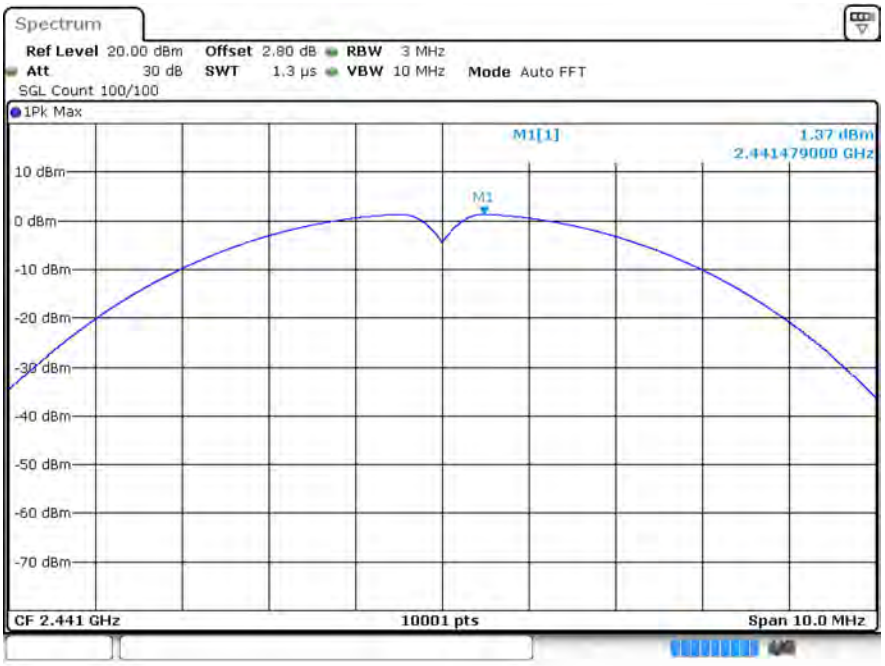


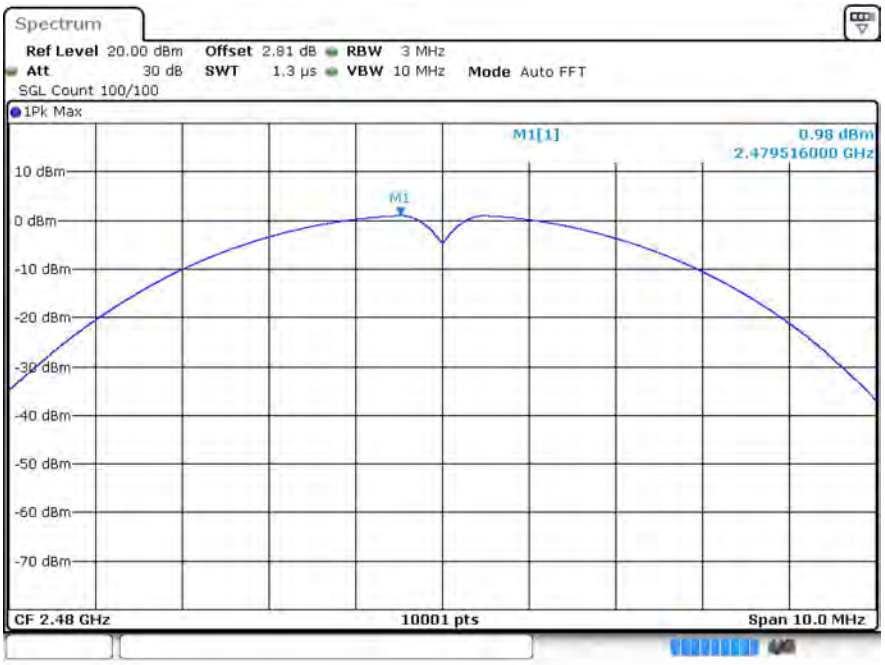
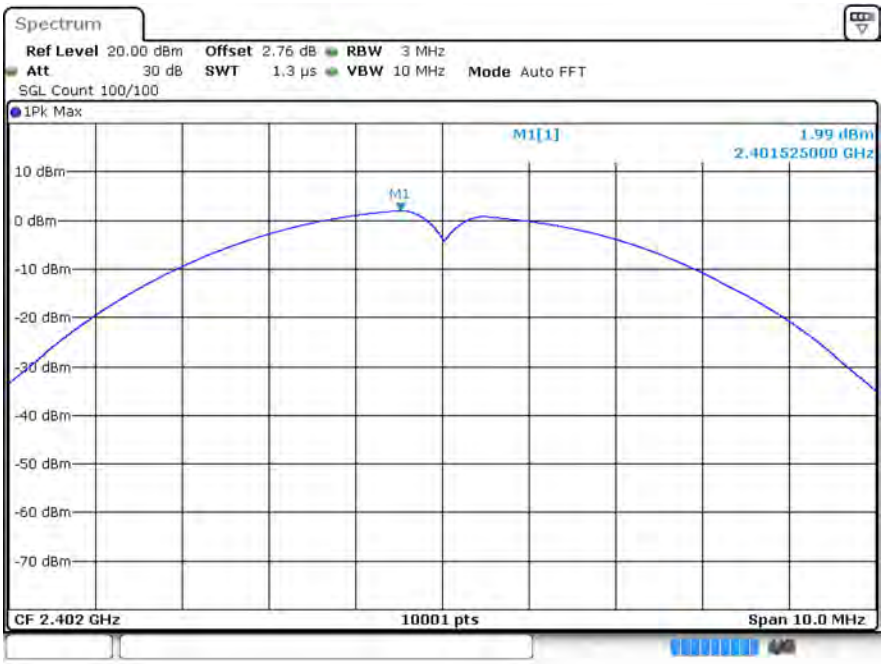
2 Maximum Conducted Peak Output Power

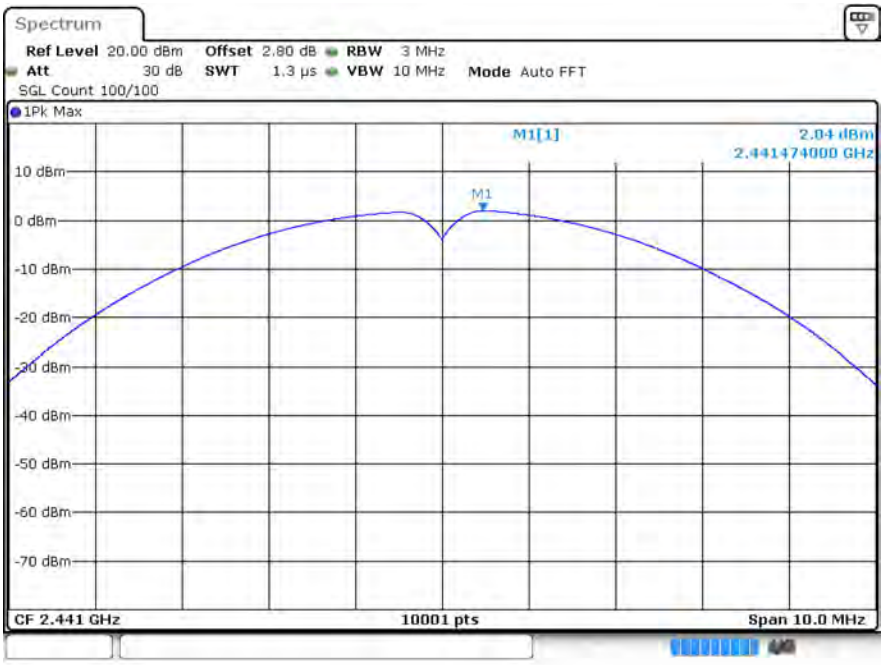
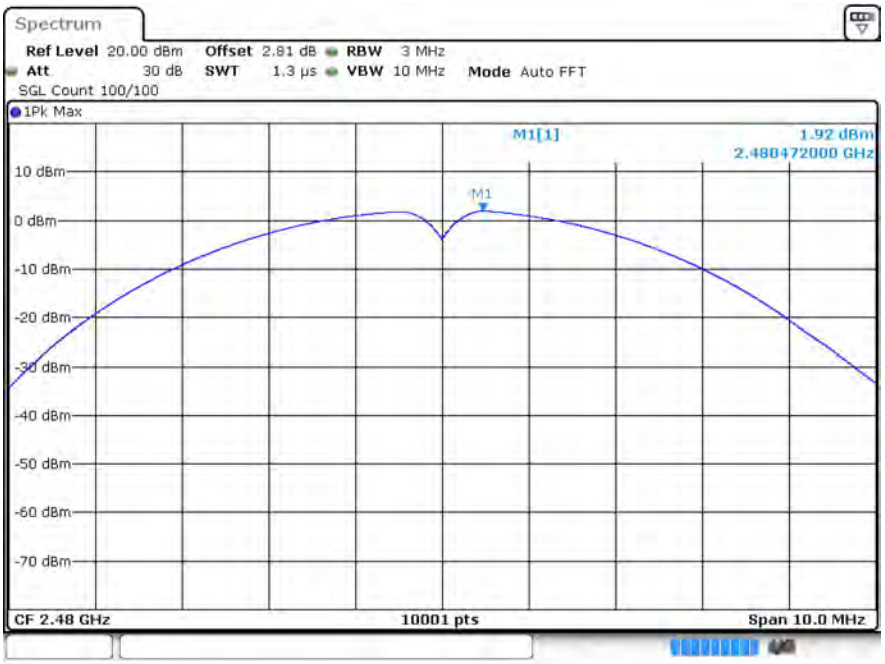
2.1 Test Result

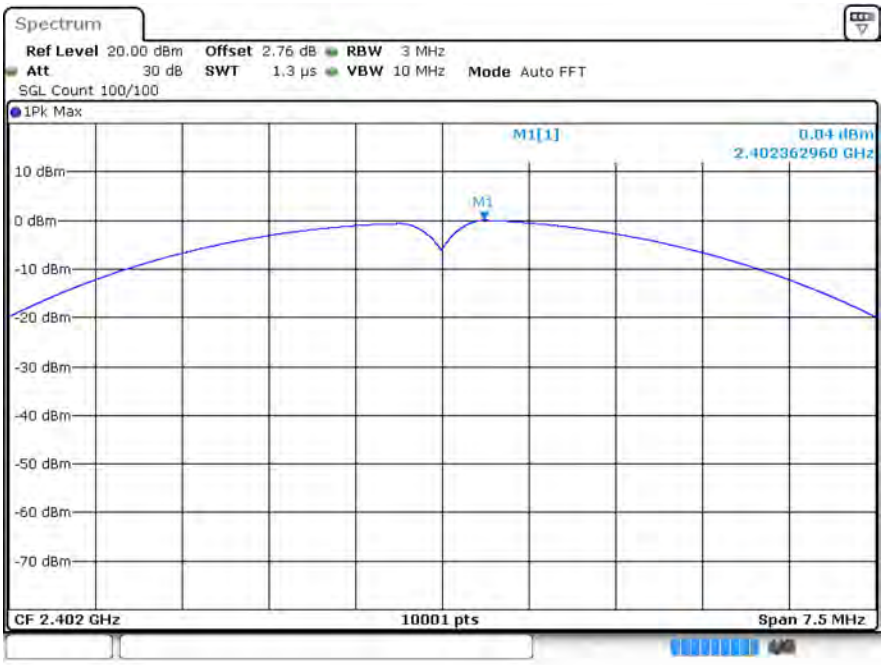
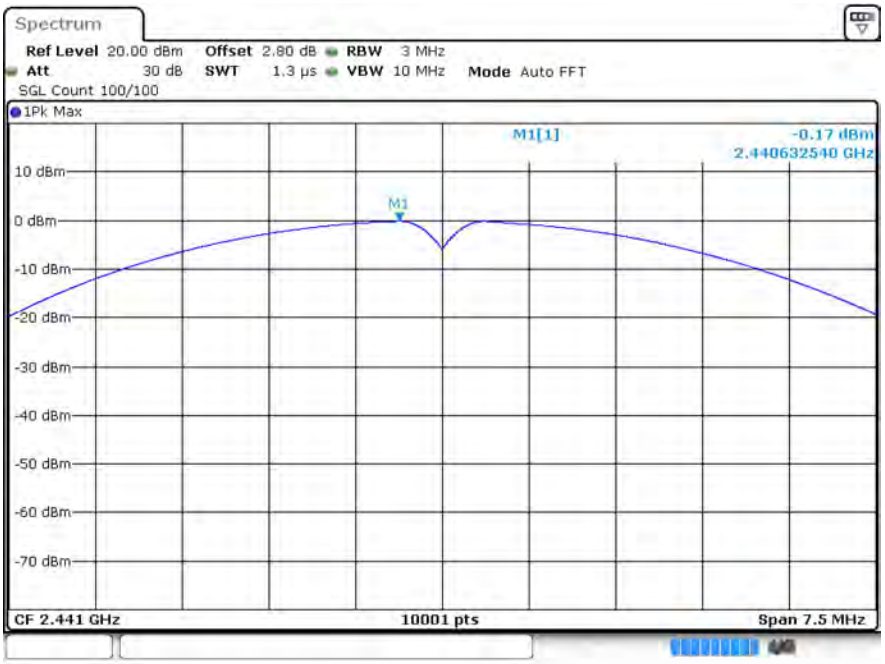
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.82	21	Pass
	MCH	1.37	21	Pass
	HCH	0.98	21	Pass
π/4DQPSK	LCH	1.99	21	Pass
	MCH	2.04	21	Pass
	HCH	1.92	21	Pass
8DPSK	LCH	0.04	21	Pass
	MCH	-0.17	21	Pass
	HCH	0.15	21	Pass

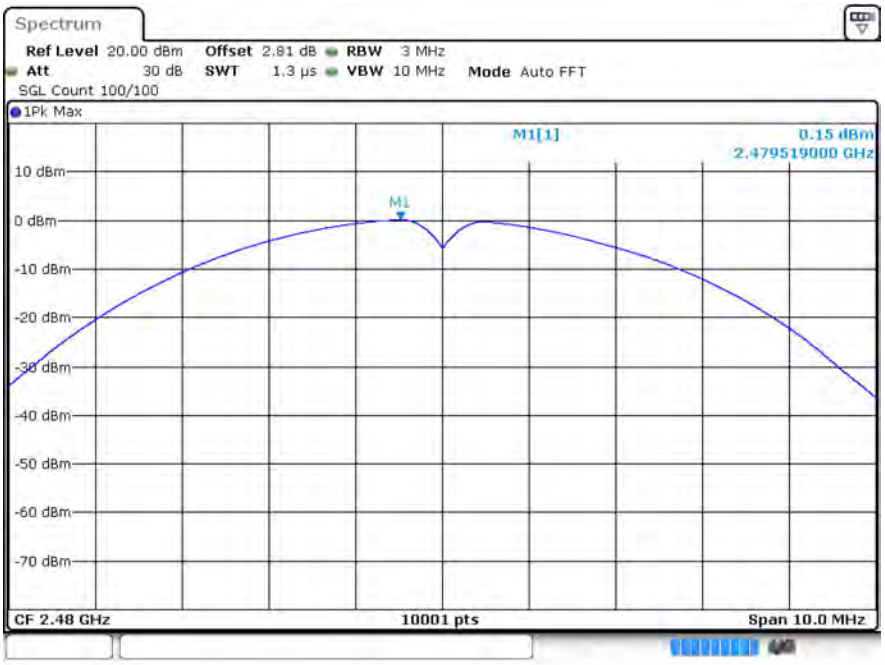
2.2 Test Graphs

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	

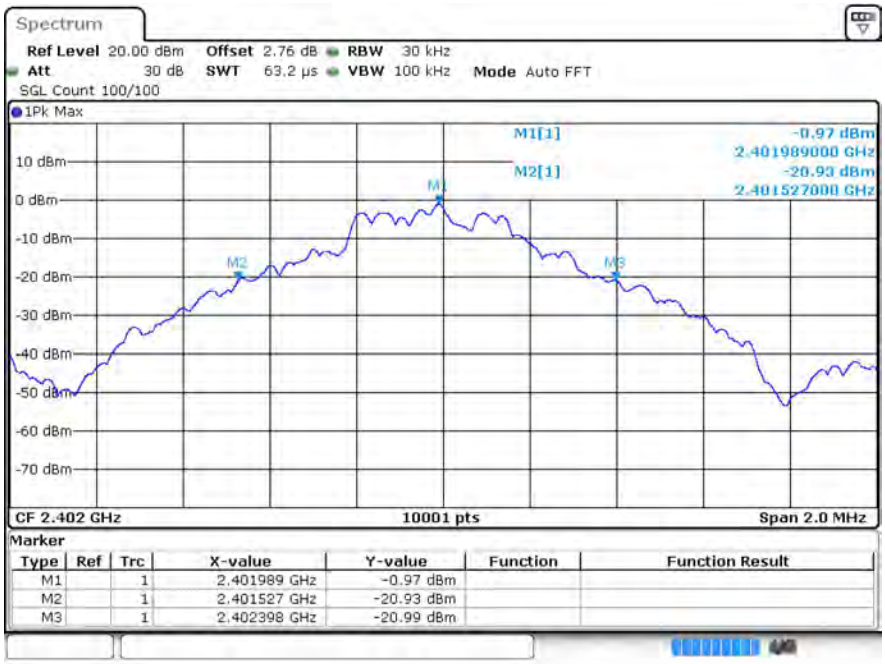
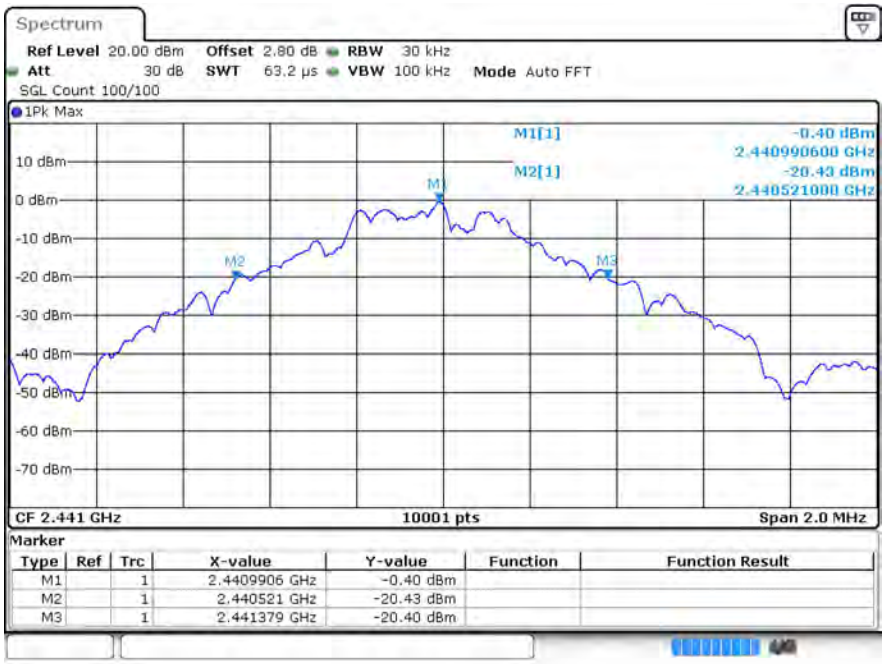
8DPSK/HCH	 Spectrum Ref Level 20.00 dBm Offset 2.81 dB RBW 3 MHz Att 30 dB SWT 1.3 µs VBW 10 MHz Mode Auto FFT SGL Count 100/100 1Pk Max M1[1] 0.15 dBm 2.479519000 GHz M1 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 10001 pts Span 10.0 MHz

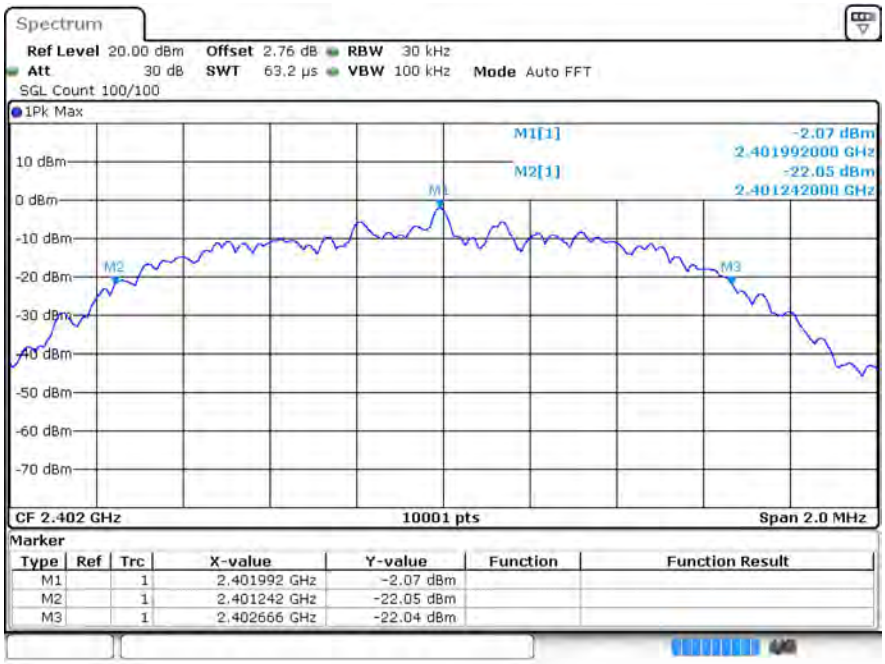
3 20dB Bandwidth

3.1 Test Result

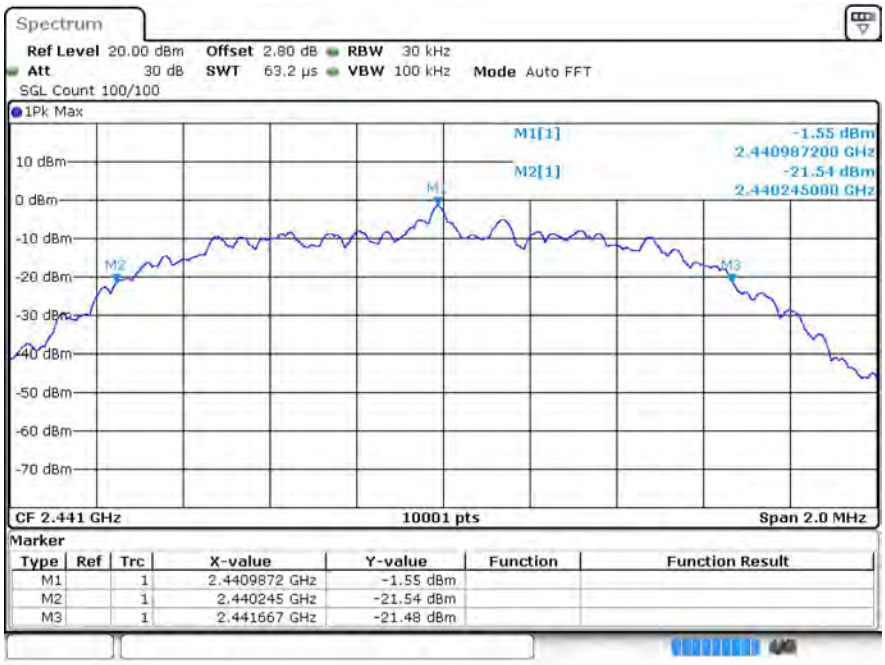
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.871	Not Specified	Pass
	MCH	0.857	Not Specified	Pass
	HCH	0.848	Not Specified	Pass
π/4DQPSK	LCH	1.424	Not Specified	Pass
	MCH	1.422	Not Specified	Pass
	HCH	1.423	Not Specified	Pass
8DPSK	LCH	1.421	Not Specified	Pass
	MCH	1.44	Not Specified	Pass
	HCH	1.437	Not Specified	Pass

3.2 Test Graphs

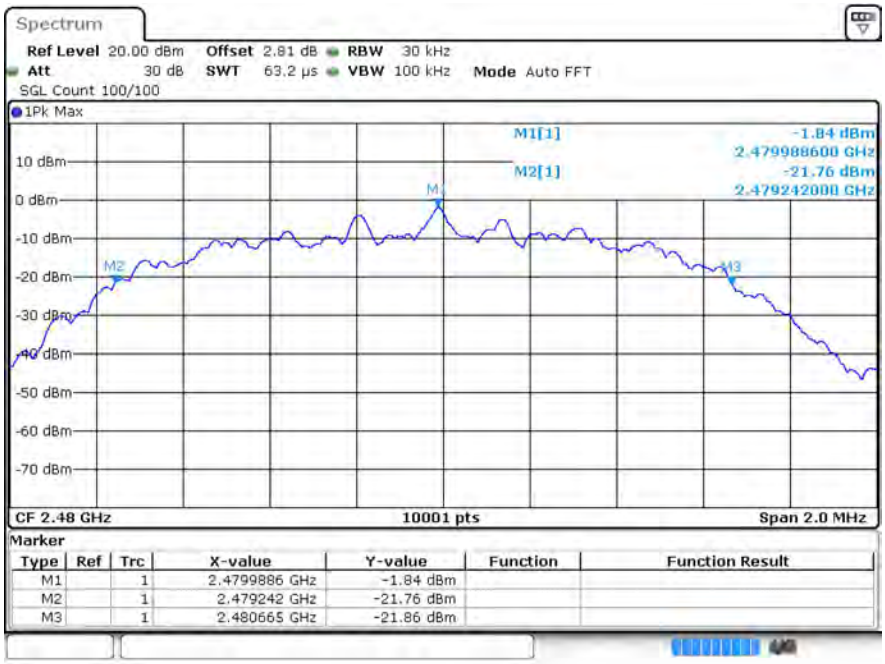
Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH

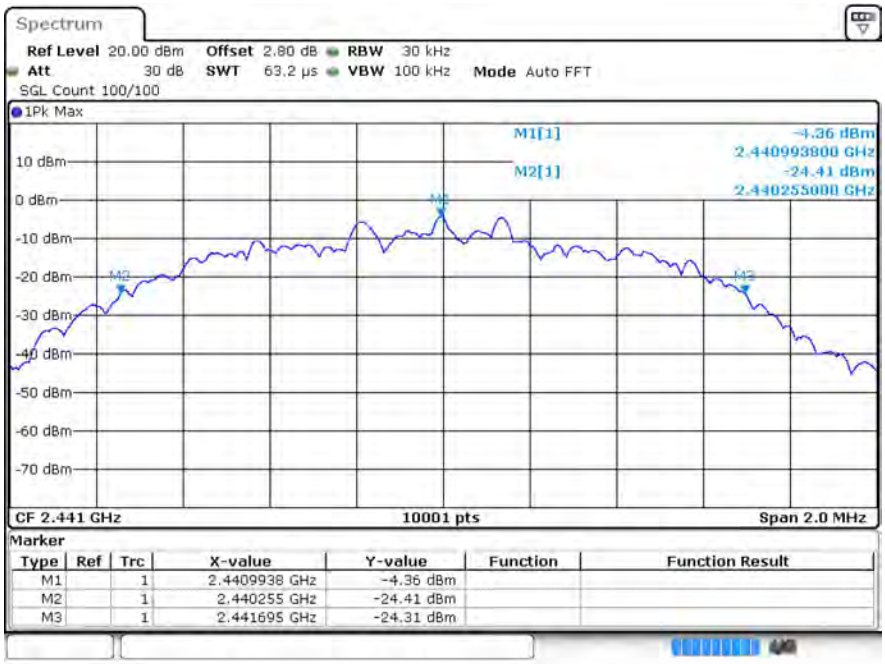


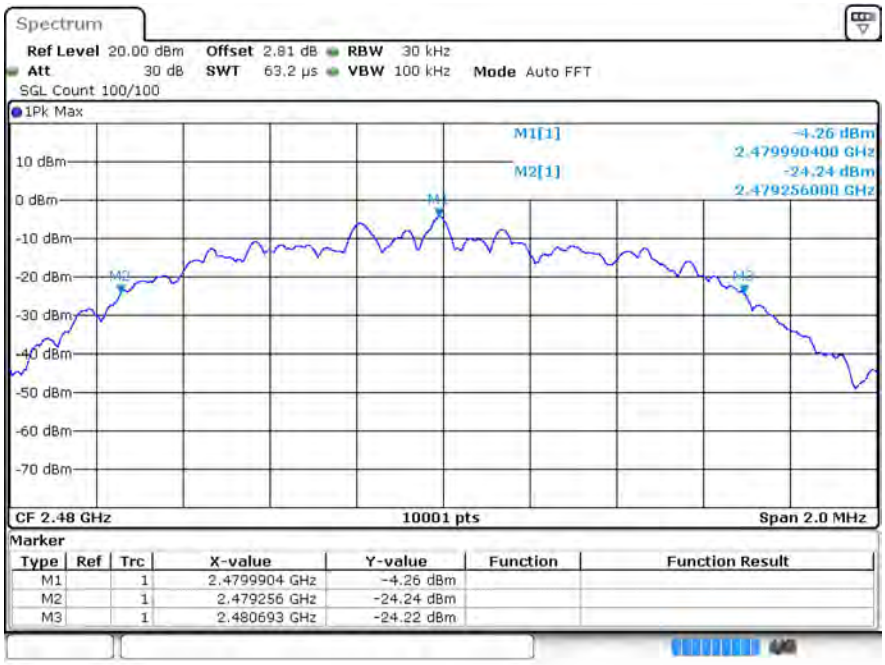
π/4DQPSK/HCH



8DPSK/LCH

8DPSK/MCH



8DPSK/HCH	

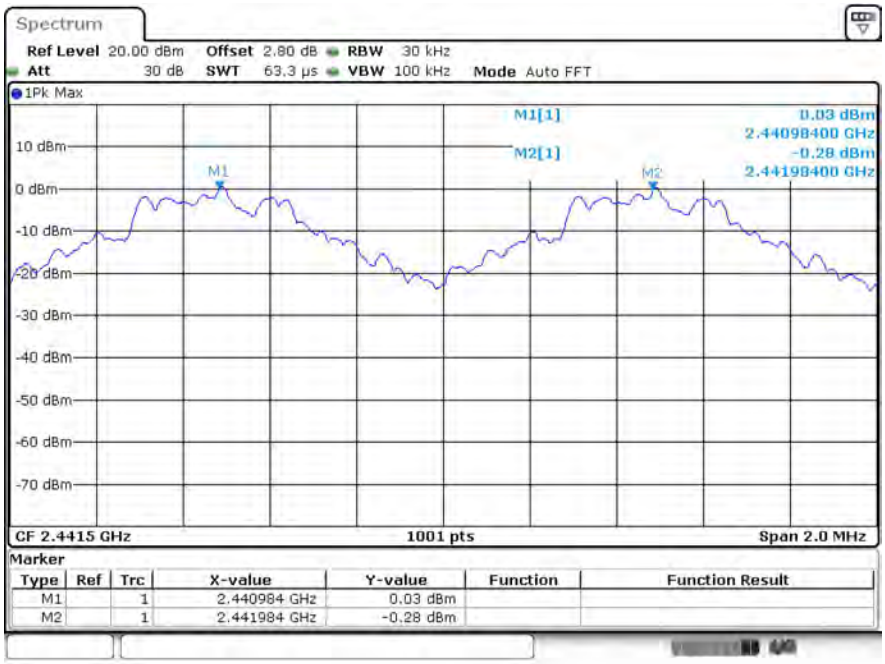
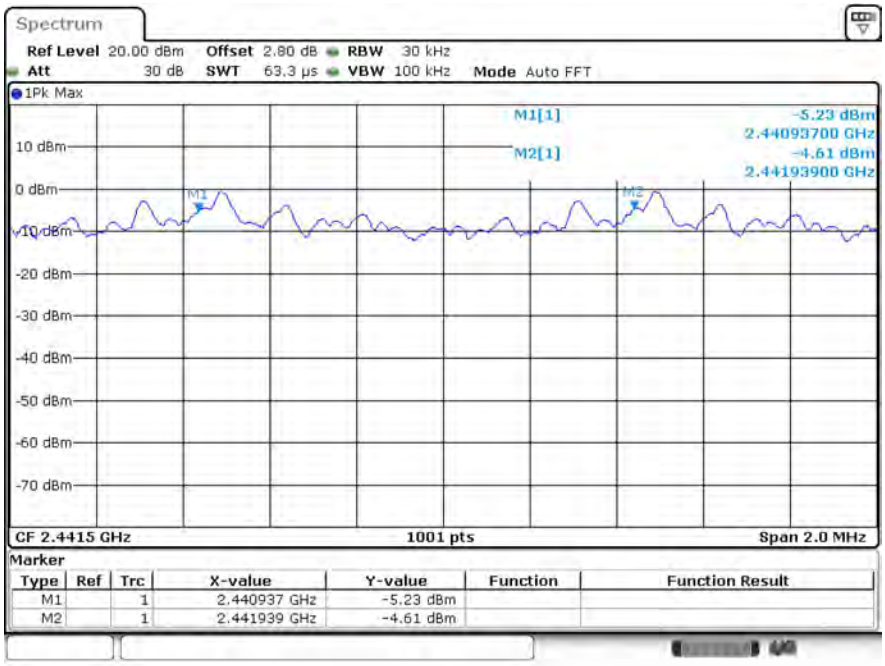
Spectrum
Ref Level 20.00 dBm Offset 2.81 dB RBW 30 kHz
Att 30 dB SWT 63.2 µs VBW 100 kHz Mode Auto FFT
SGL Count 100/100
1Pk Max
M1[1] -4.26 dBm 2.479990400 GHz
M2[1] -24.24 dBm 2.479256000 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.48 GHz
10001 pts
Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4799904 GHz -4.26 dBm
M2 1 2.479256 GHz -24.24 dBm
M3 1 2.480693 GHz -24.22 dBm

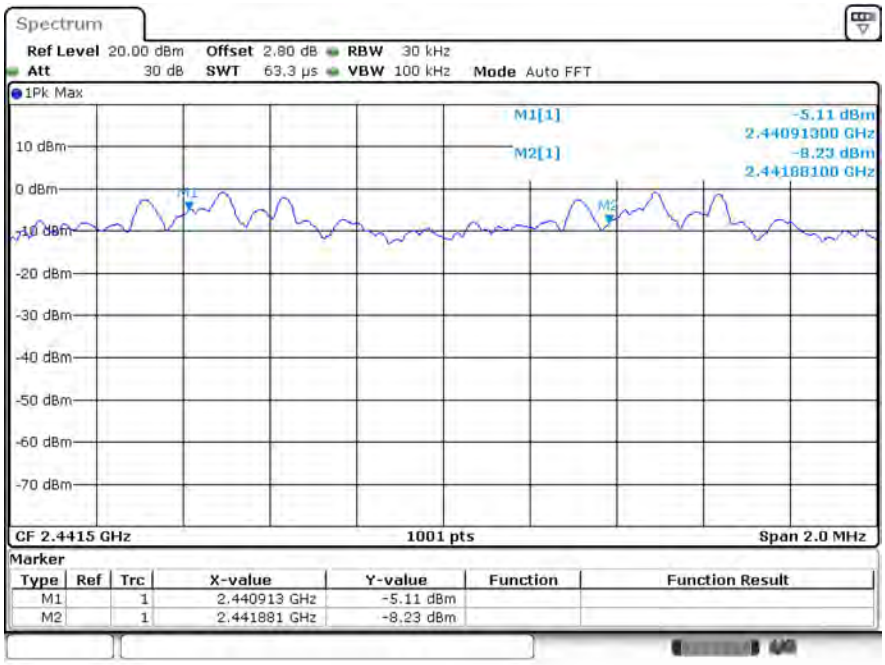
4 Carrier Frequency Separation

4.1 Test Result

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	MCH	1	0.571	Pass
π/4DQPSK	MCH	1.002	0.948	Pass
8DPSK	MCH	0.968	0.96	Pass

4.2 Test Graphs

Test Graphs	
GFSK/MCH	
π/4DQPSK/MCH	

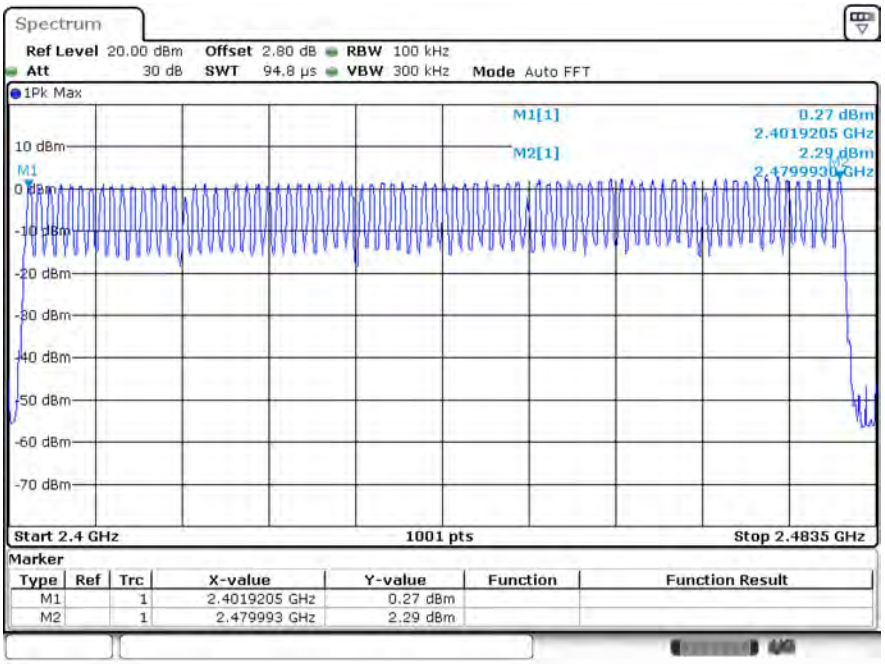
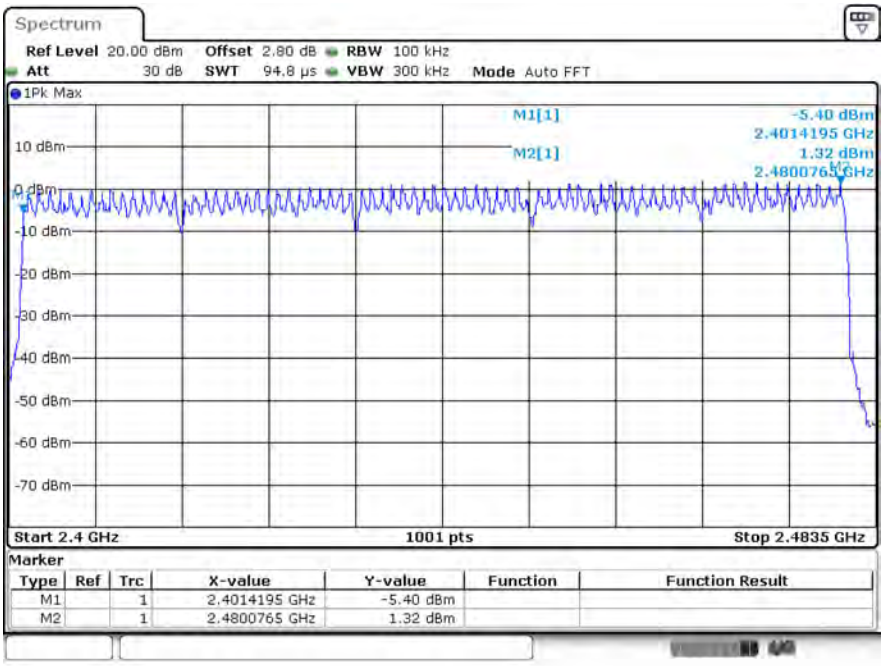
8DPSK/MCH	 Spectrum Ref Level 20.00 dBm Offset 2.80 dB RBW 30 kHz Att 30 dB SWT 63.3 µs VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -5.11 dBm 2.44091300 GHz M2[1] -8.23 dBm 2.44168100 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.4415 GHz 1001 pts Span 2.0 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.440913 GHz -5.11 dBm M2 1 2.441881 GHz -8.23 dBm

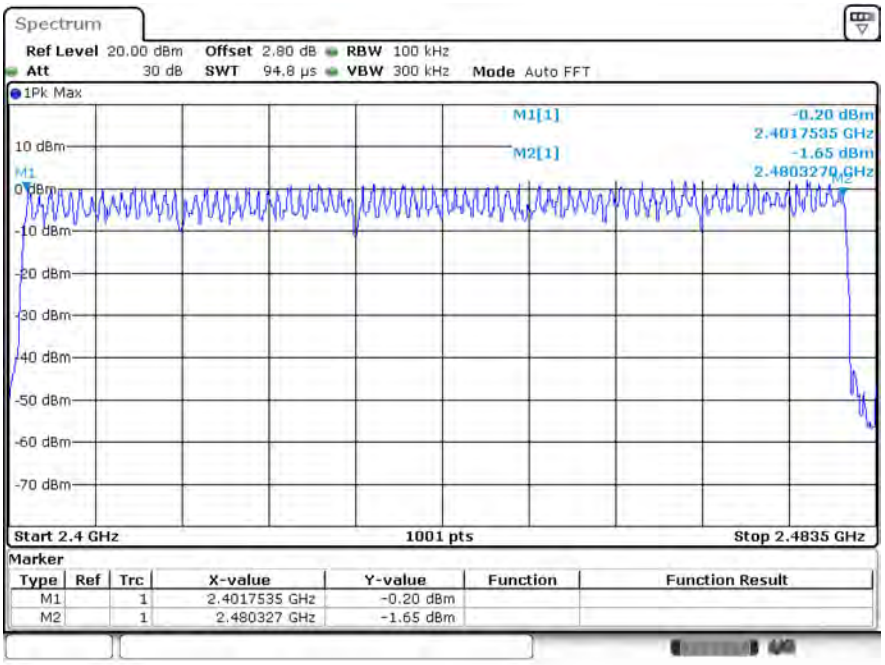
5 Hopping Channel Number

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	

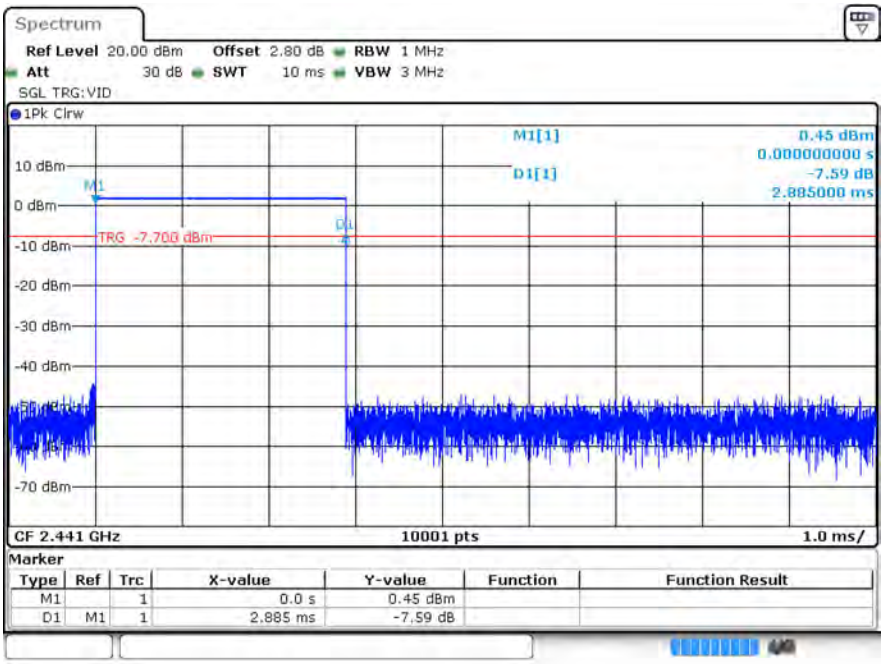
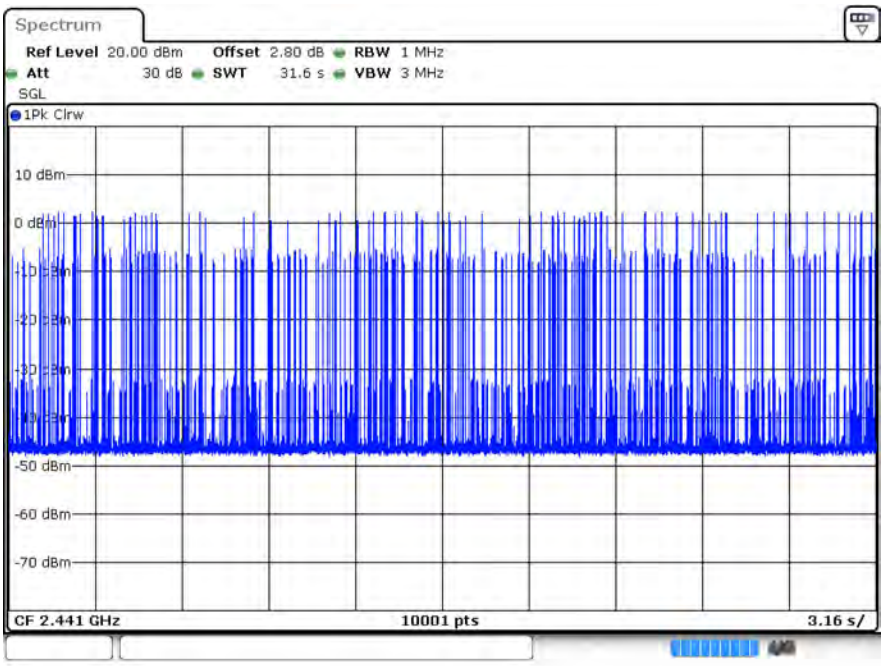
Spectrum
Ref Level 20.00 dBm Offset 2.80 dB RBW 100 kHz
Att 30 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -0.20 dBm 2.4017535 GHz
M2[1] -1.65 dBm 2.4803270 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
Start 2.4 GHz 1001 pts Stop 2.4835 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4017535 GHz -0.20 dBm
M2 1 2.480327 GHz -1.65 dBm

6 Dwell Time

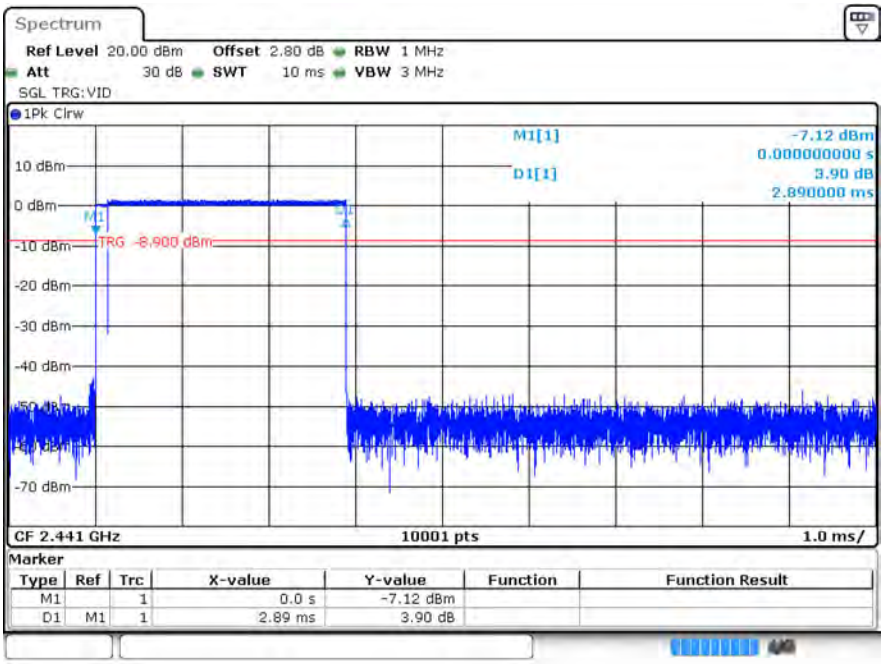
6.1 Test Result

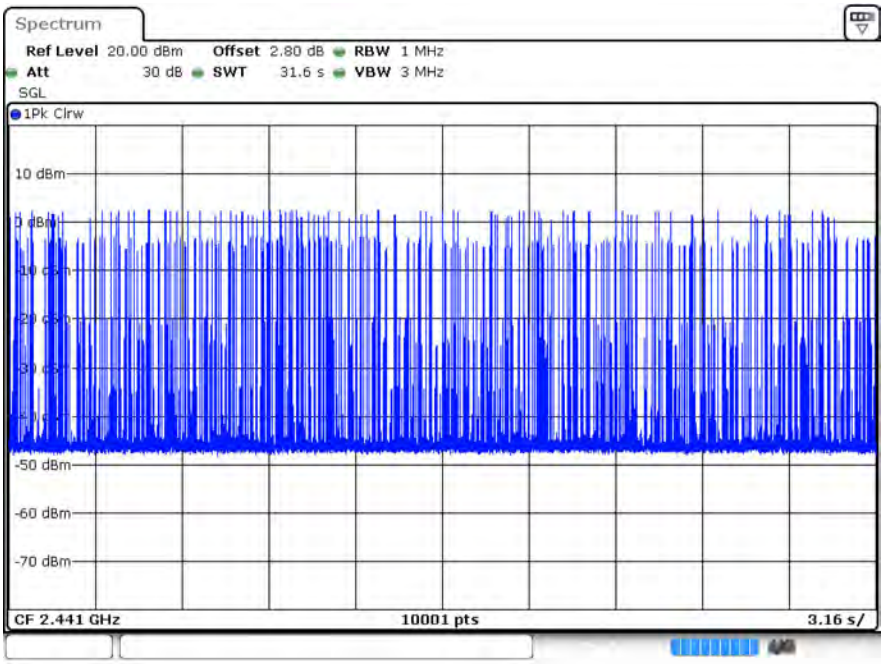
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Limit [s]	Verdict
GFSK	DH5	MCH	2.885	95	274.075	0.4	Pass
π/4DQPSK	2DH5	MCH	2.89	110	317.9	0.4	Pass
8DPSK	3DH5	MCH	2.891	102	294.882	0.4	Pass

6.2 Test Graphs

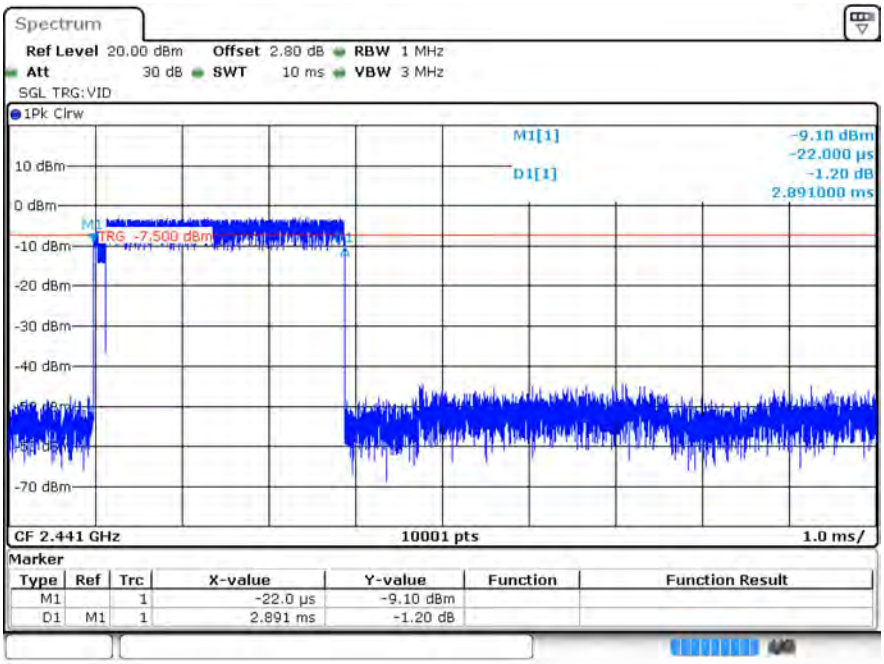
Test Graphs	
GFSK_DH5/MCH	 

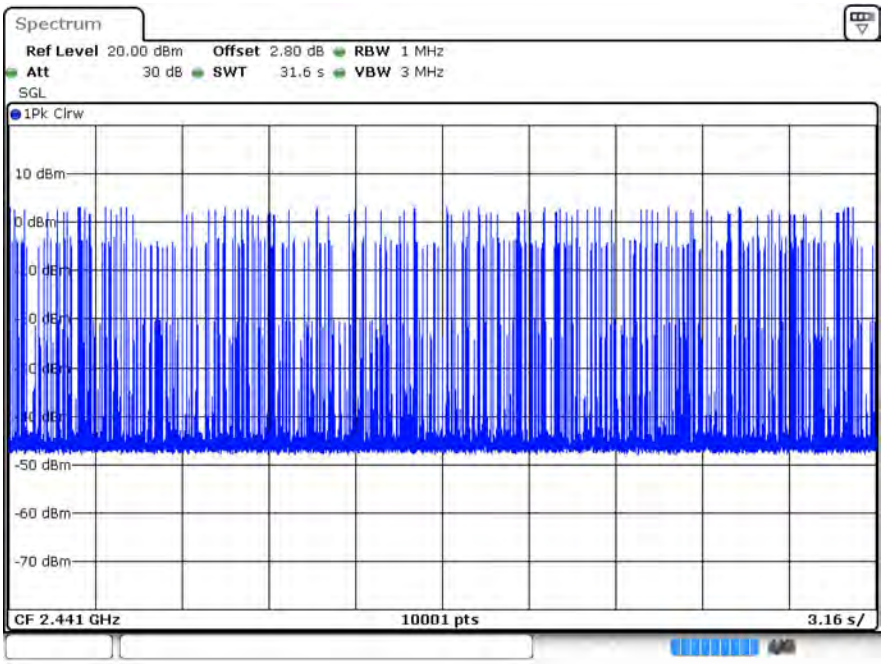
π/4DQPSK
_2DH5/MCH





8DPSK _3DH5/MCH



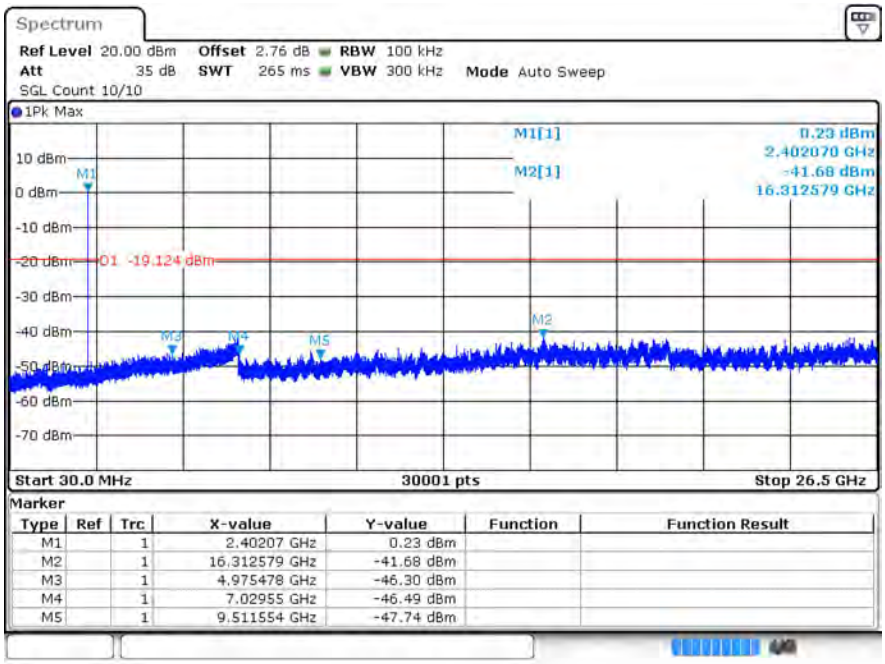


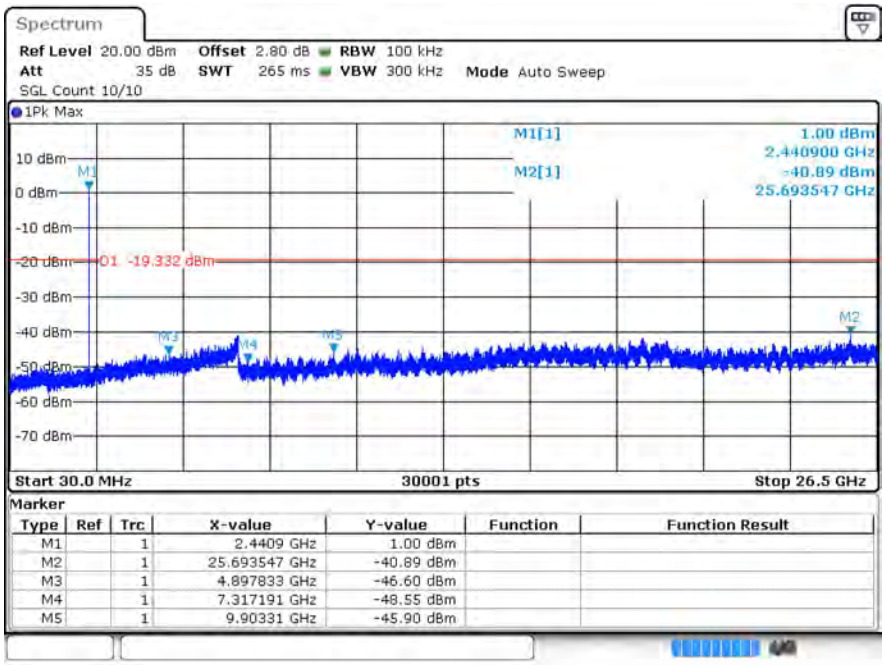
7 RF Conducted Spurious Emissions

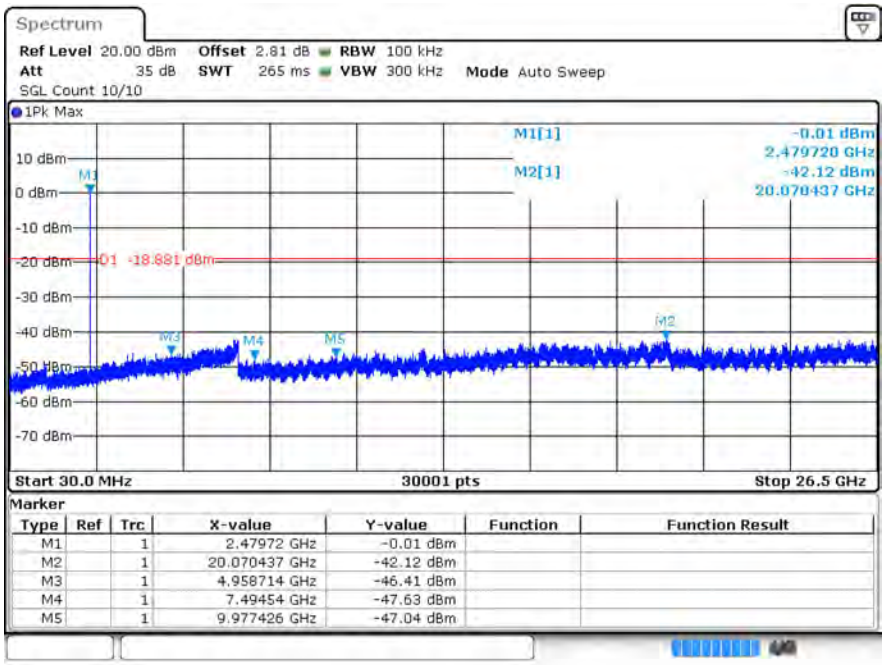
7.1 Test Result

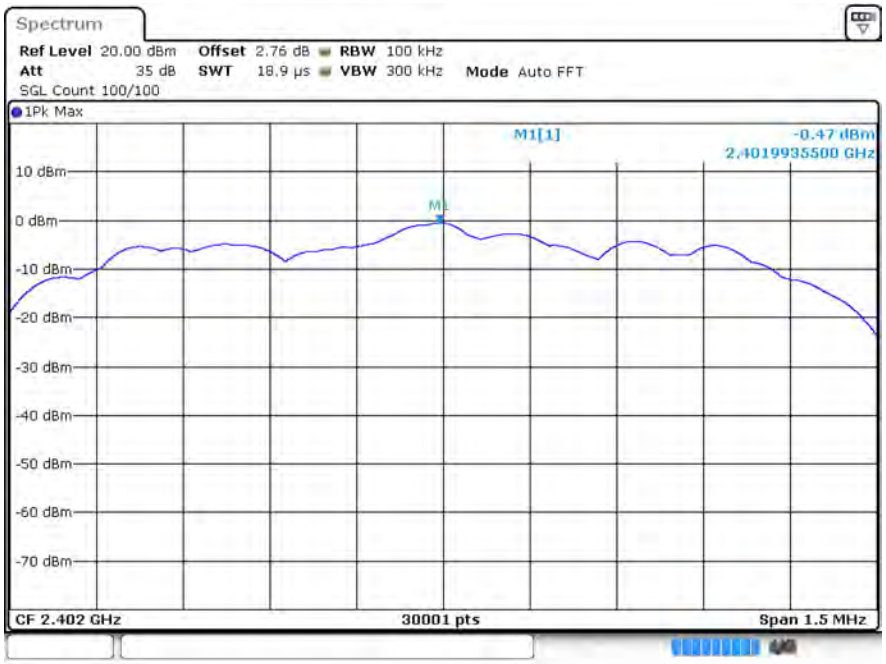
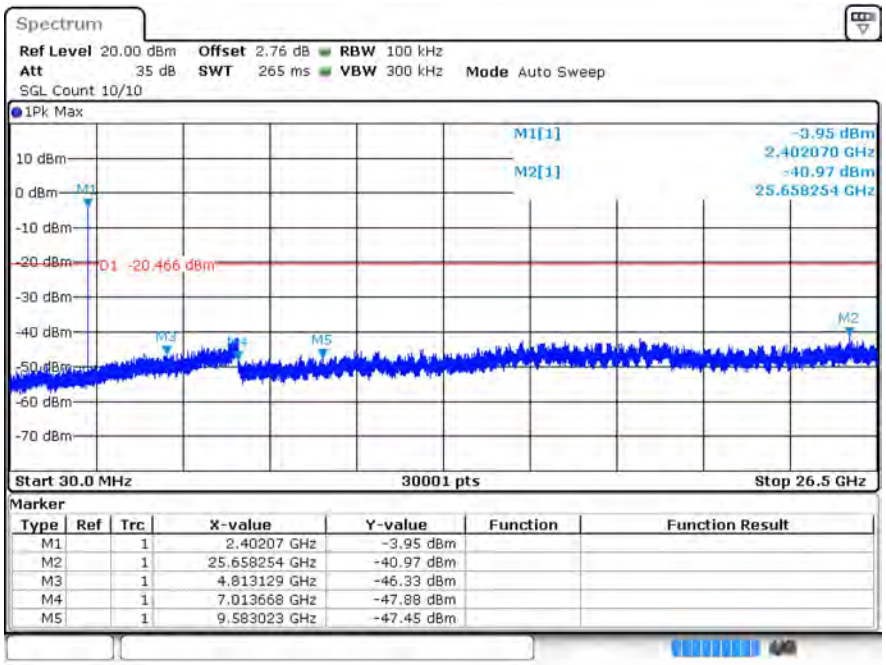
Mode	Channel	Max. Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	-42.55	-20	Pass
	MCH	-41.56	-20	Pass
	HCH	-43.24	-20	Pass
π/4DQPSK	LCH	-40.49	-20	Pass
	MCH	-41.2	-20	Pass
	HCH	-40.48	-20	Pass
8DPSK	LCH	-38.96	-20	Pass
	MCH	-38.29	-20	Pass
	HCH	-39.53	-20	Pass

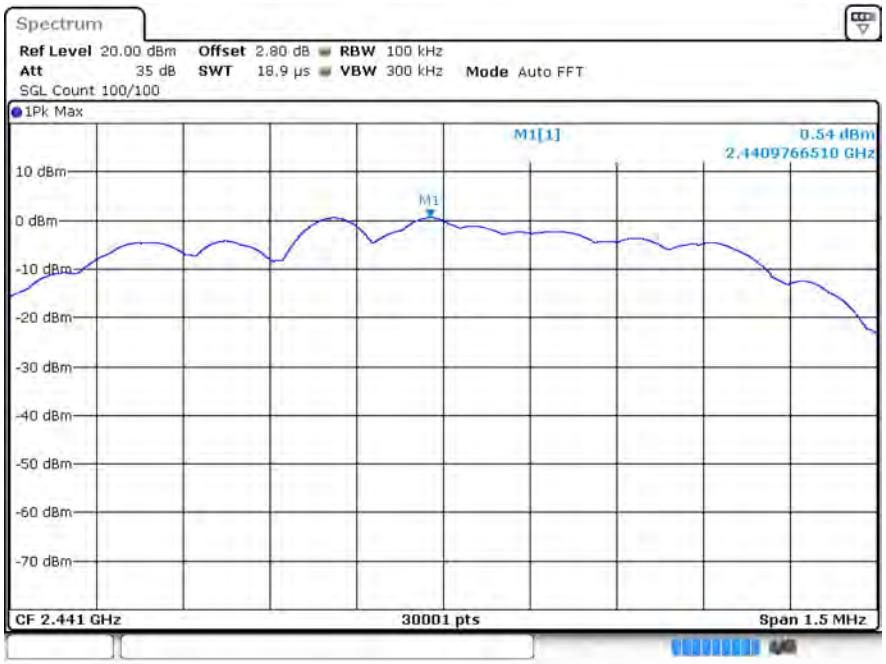
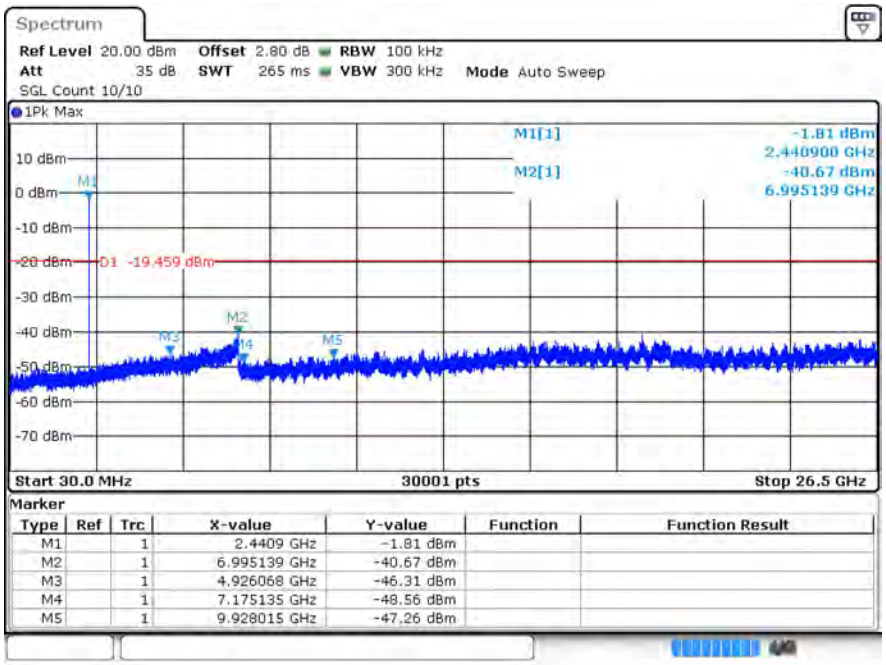
7.2 Test Graphs

GFSK_LCH_Graphs	
Pref	
Puw	

GFSK_MCH_Graphs	
Pref	
Puw	

GFSK_HCH_Graphs	
Pref	
Puw	

π/4DQPSK_LCH_Graphs	
Pref	
Puw	

π/4DQPSK_MCH_Graphs	
Pref	
Puw	

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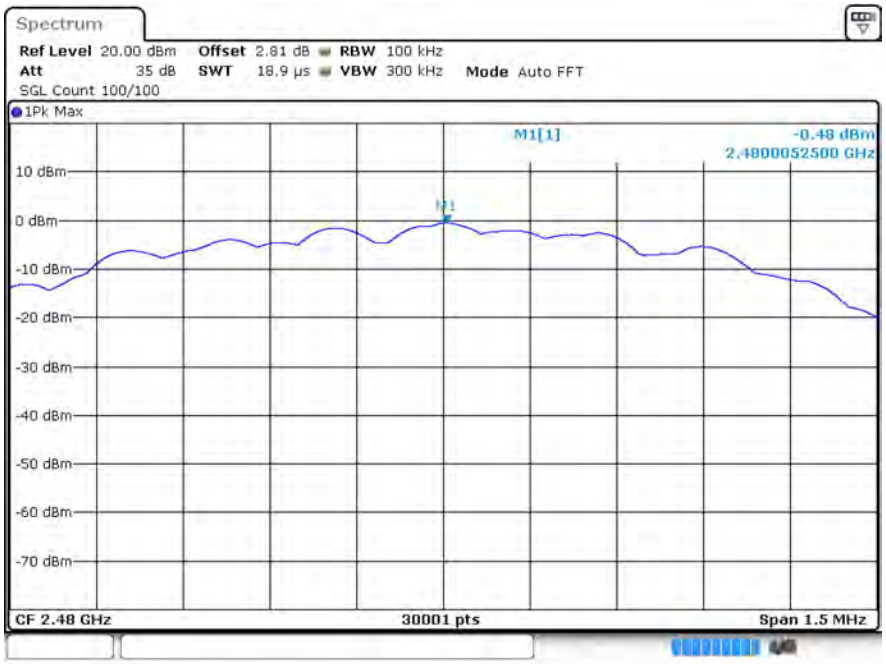
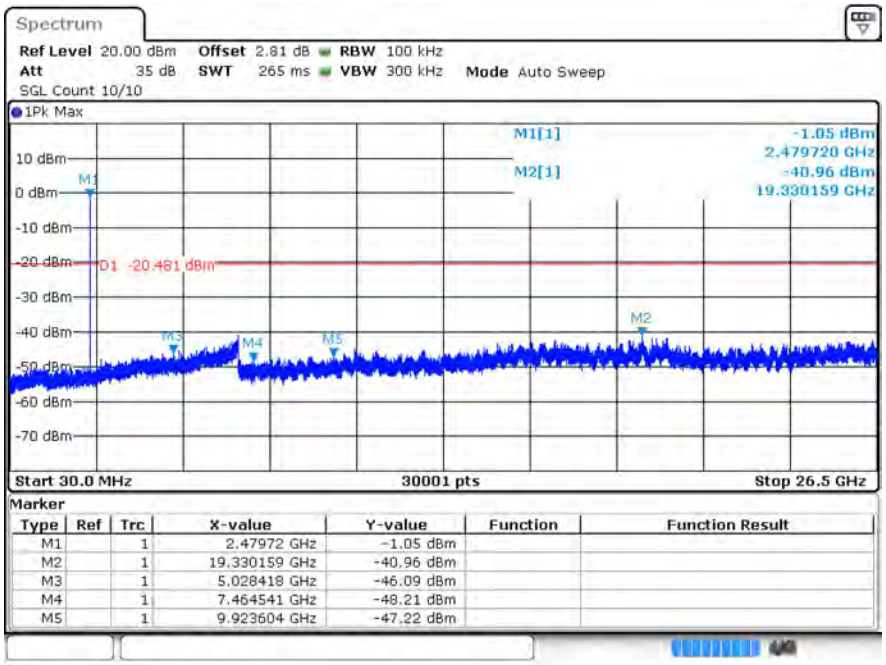
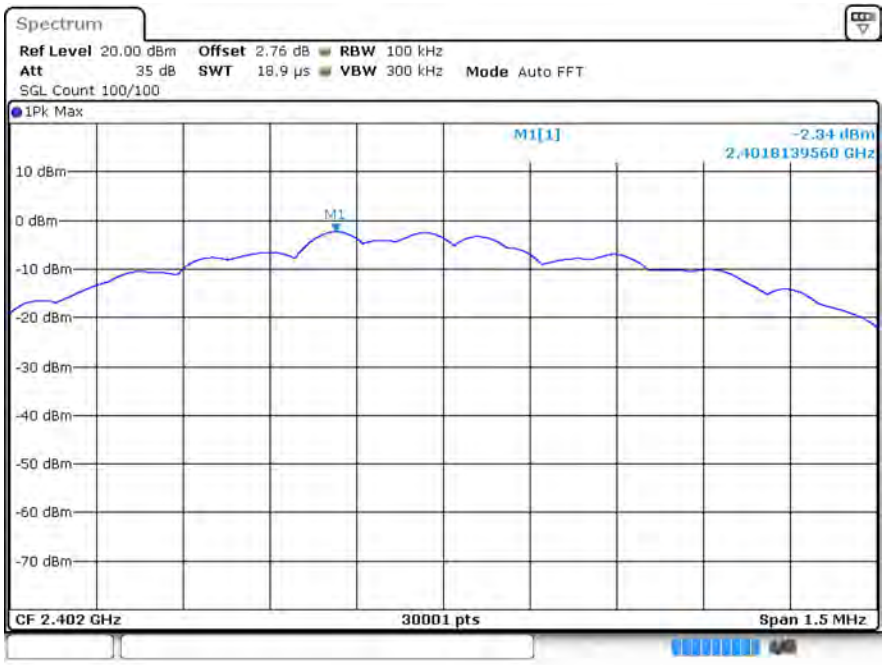
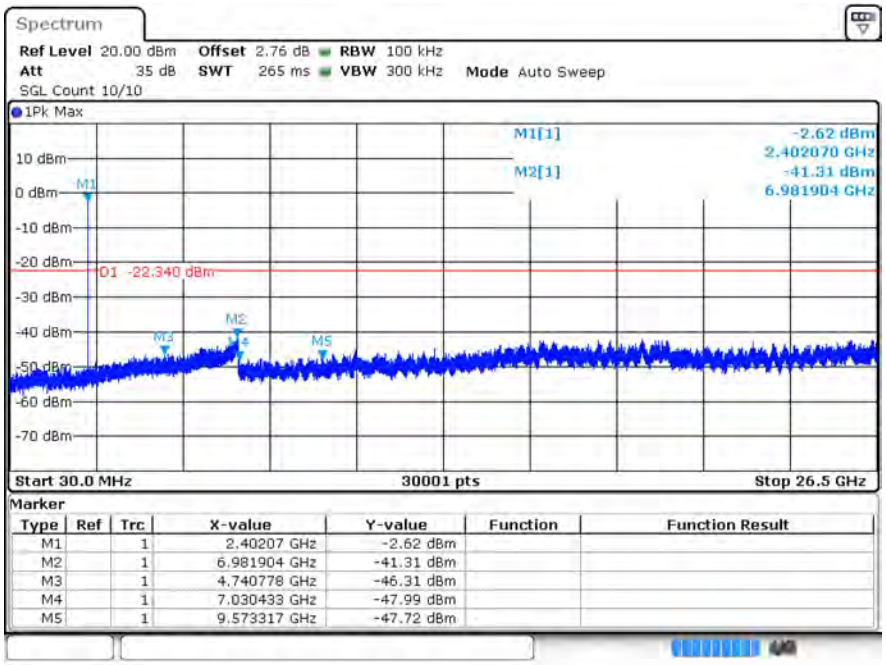
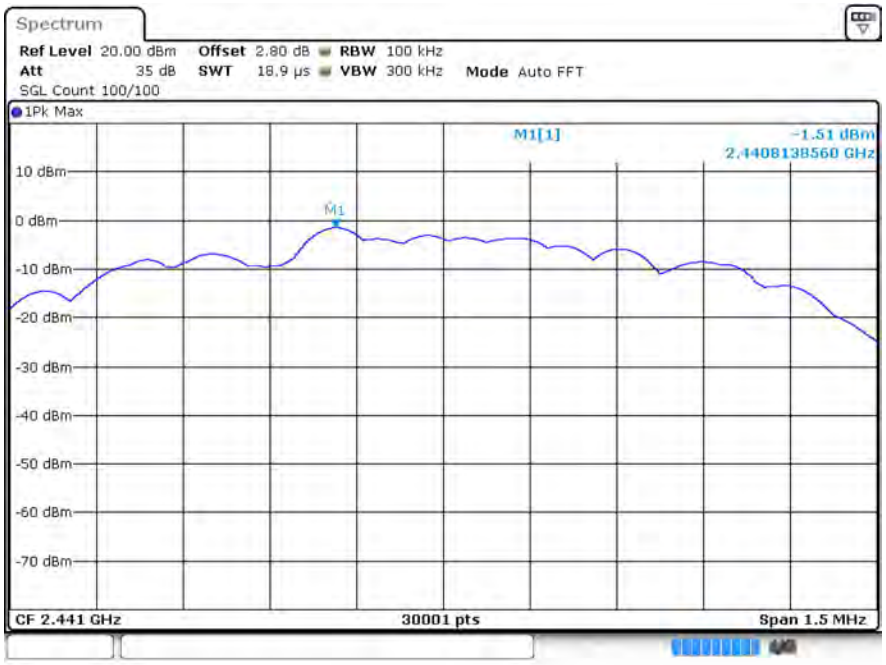
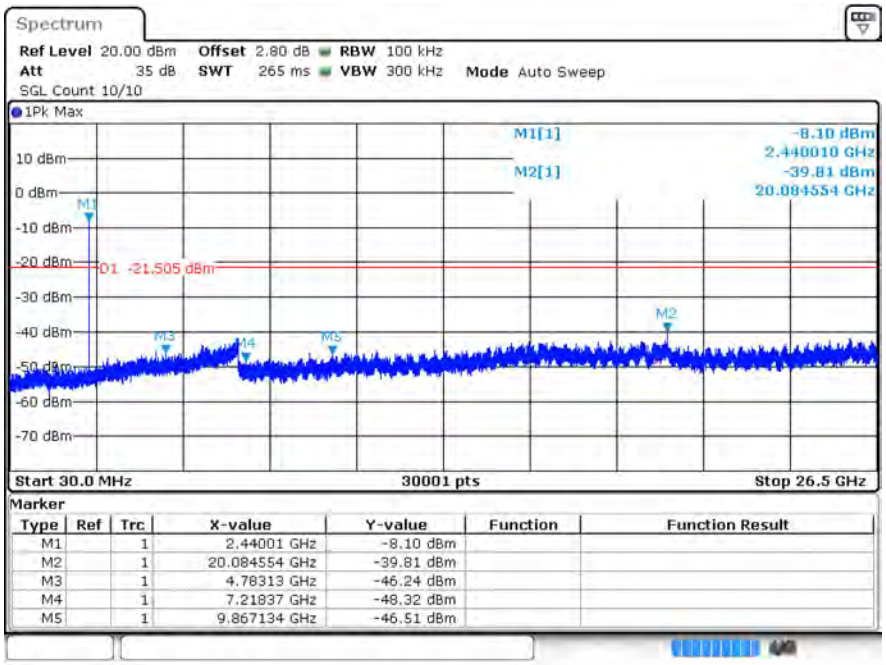
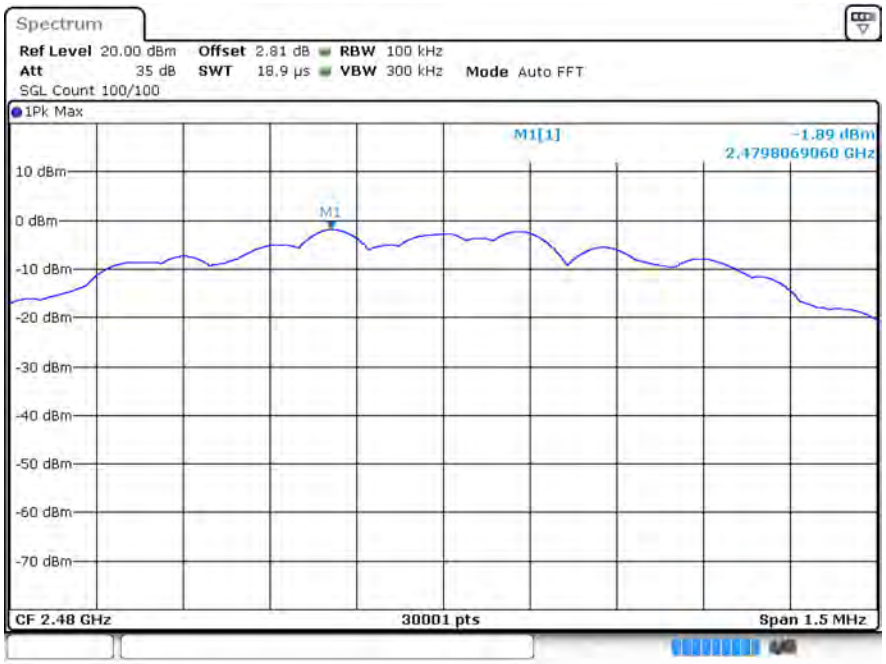
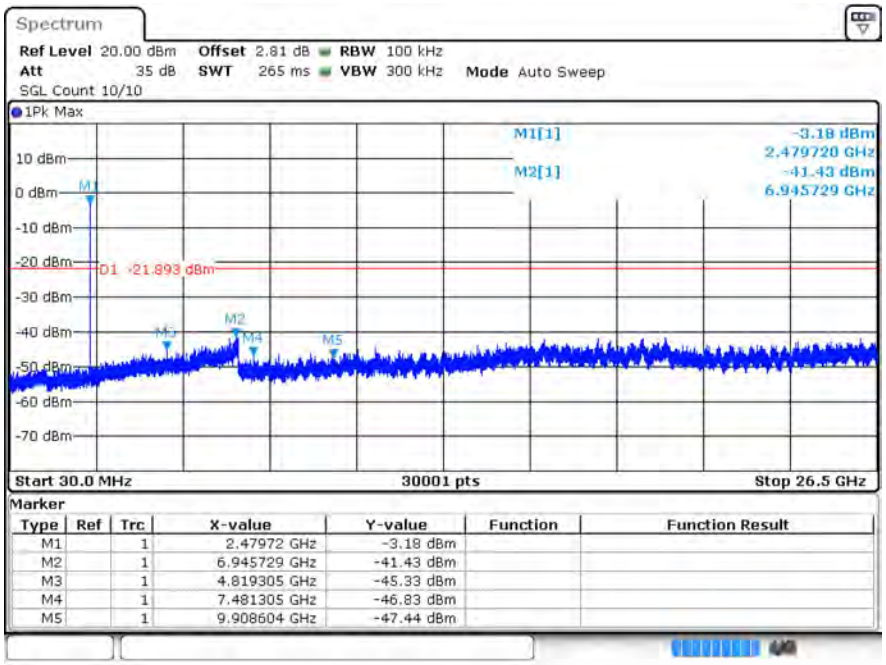
Pref	
Puw	

8DPSK_LCH_Graphs	
Pref	
Puw	

8DPSK_MCH_Graphs	
Pref	
Puw	

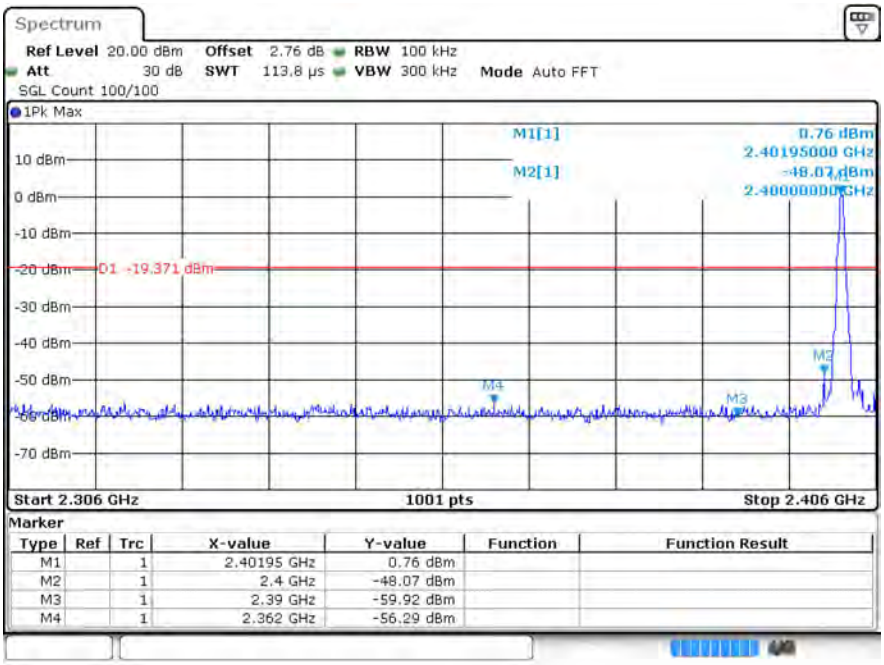
8DPSK_HCH_Graphs	
Pref	
Puw	

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	-56.91	-20	Pass
			On	-55	-20	Pass
	HCH	2480	Off	-47.3	-20	Pass
			On	-51.25	-20	Pass
π/4DQPSK	LCH	2402	Off	-55.11	-20	Pass
			On	-54.35	-20	Pass
	HCH	2480	Off	-46.92	-20	Pass
			On	-46.58	-20	Pass
8DPSK	LCH	2402	Off	-53.54	-20	Pass
			On	-54.64	-20	Pass
	HCH	2480	Off	-47.8	-20	Pass
			On	-48.87	-20	Pass

8.2 Test Graphs

Test Graphs	
Pref	
GFSK/LCH/No Hop	

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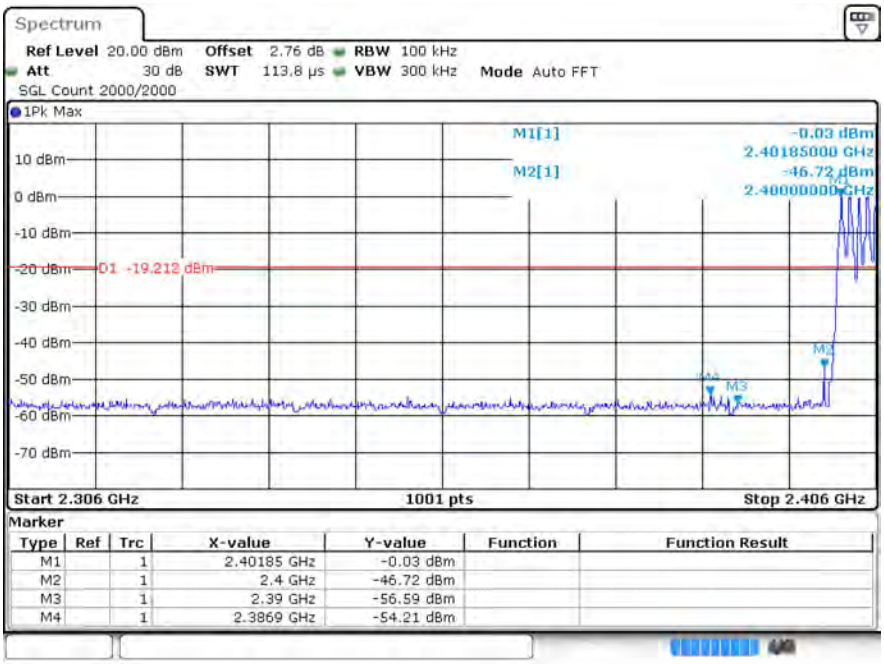
GFSK/LCH/Hop	

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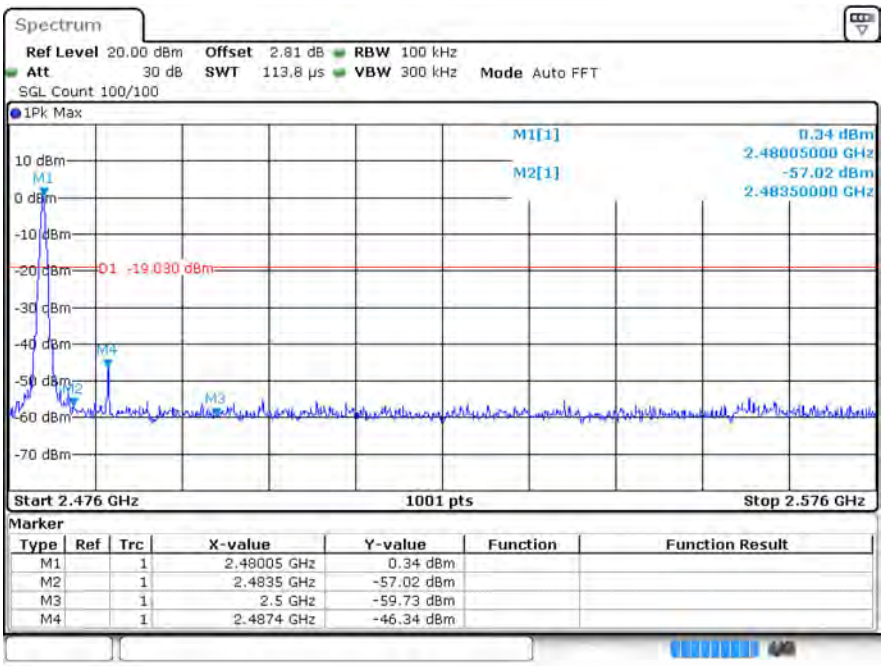
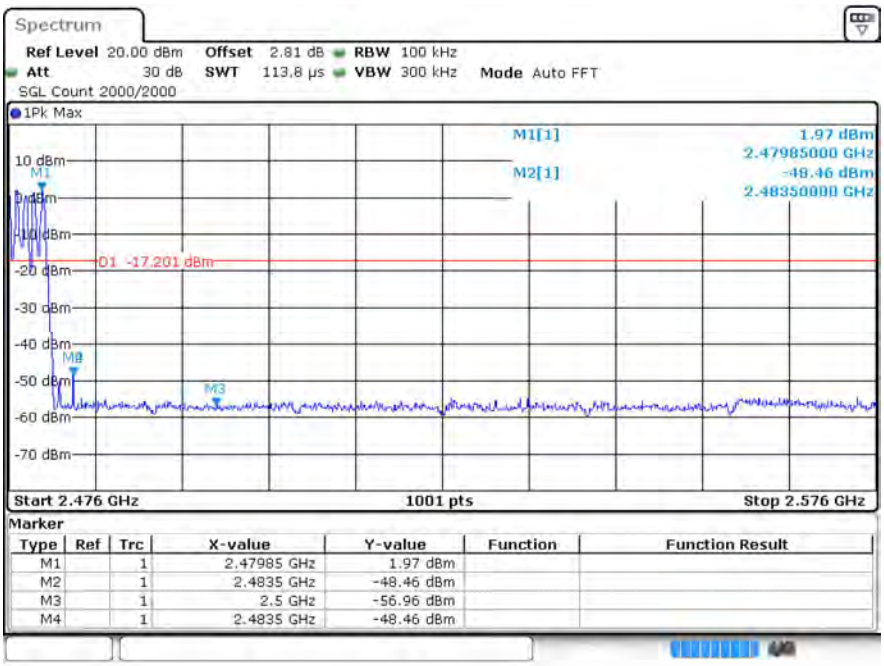
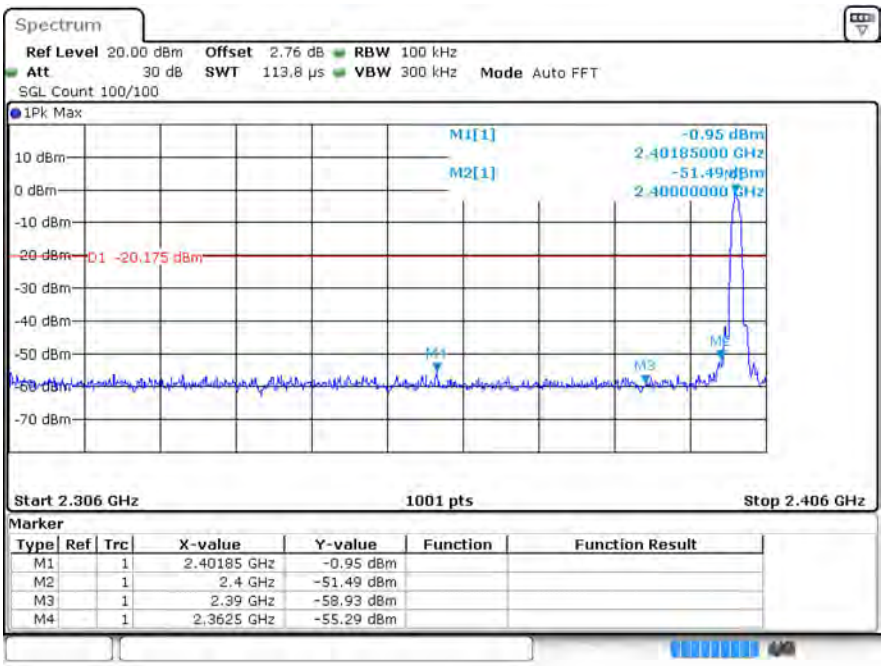
GFSK/HCH/No Hop	

Ref.	
GFSK/HCH/Hop	

Ref	
π/4DQPSK/LCH/No Hop	

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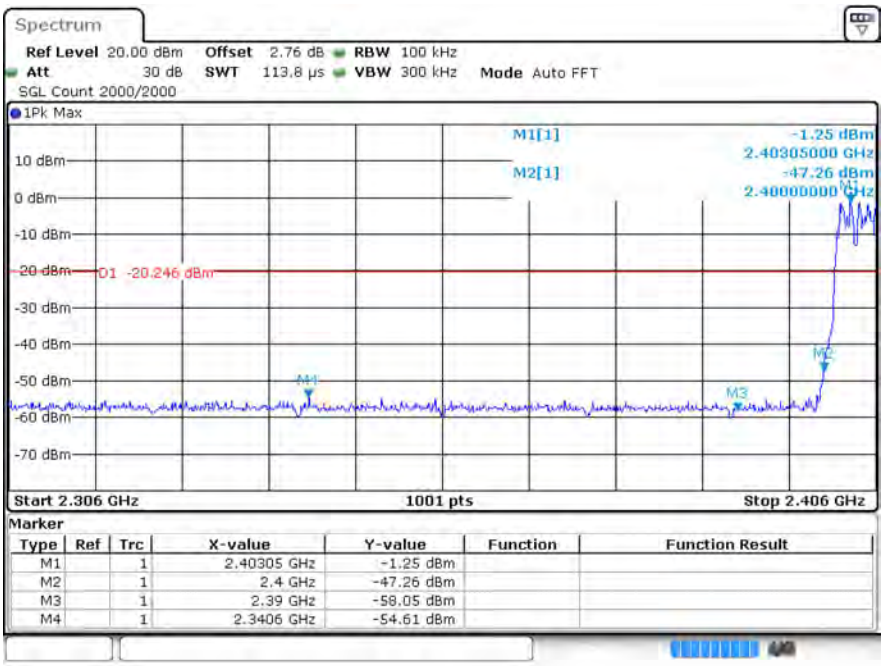
π/4DQPSK/LCH/Hop	

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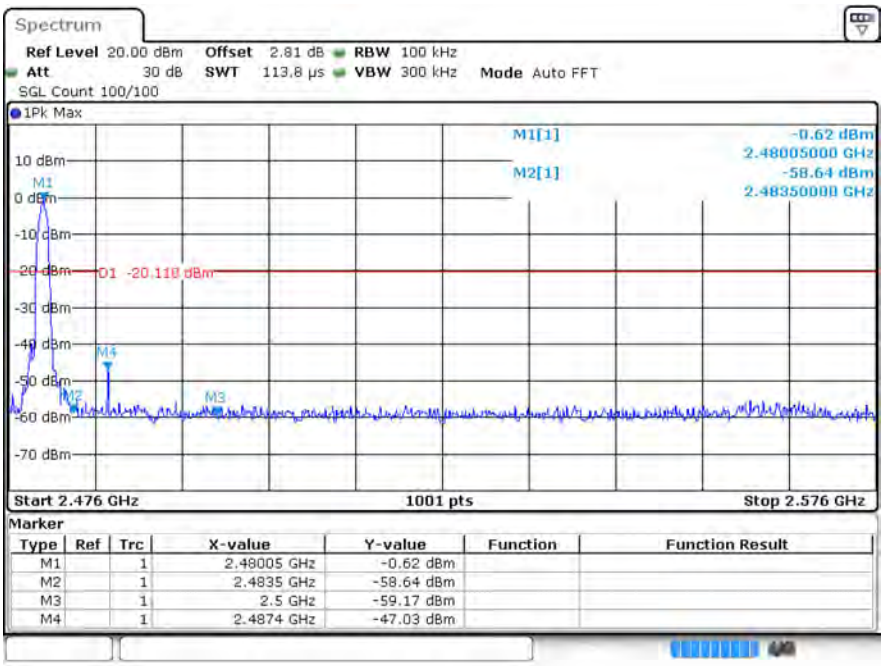
π/4DQPSK/HCH/No Hop	

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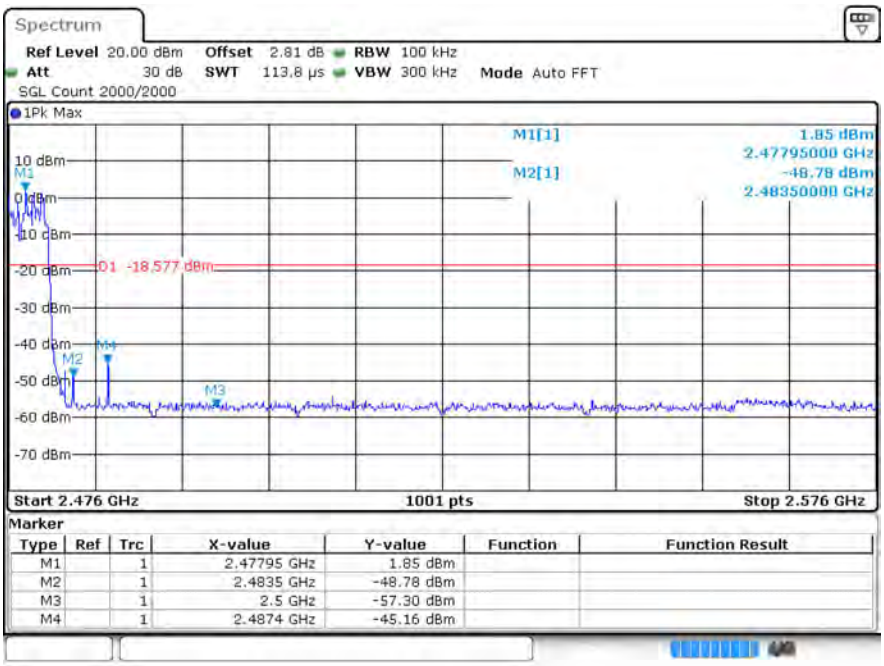
π/4DQPSK/HCH/Hop	

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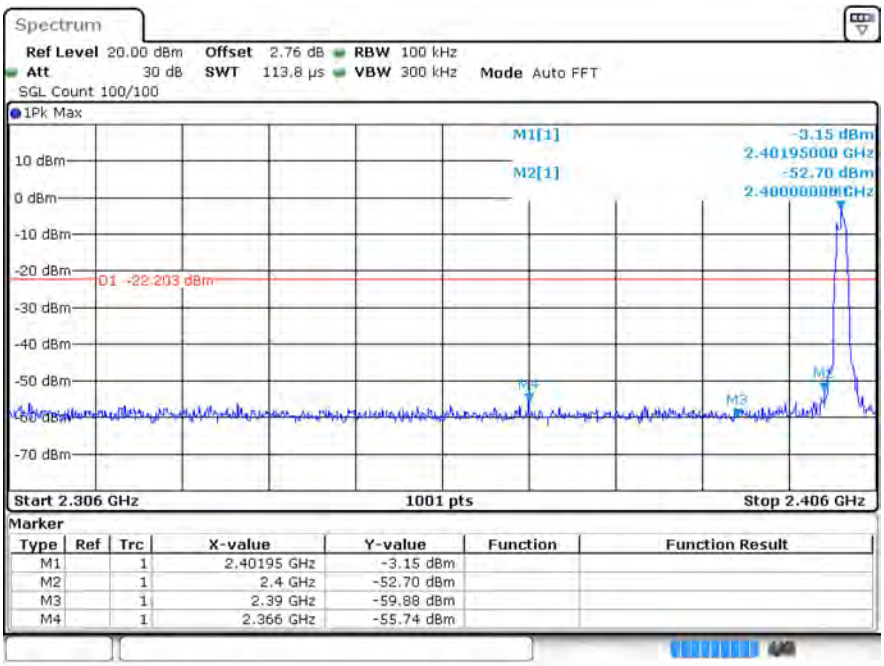
8DPSK/LCH/No Hop	

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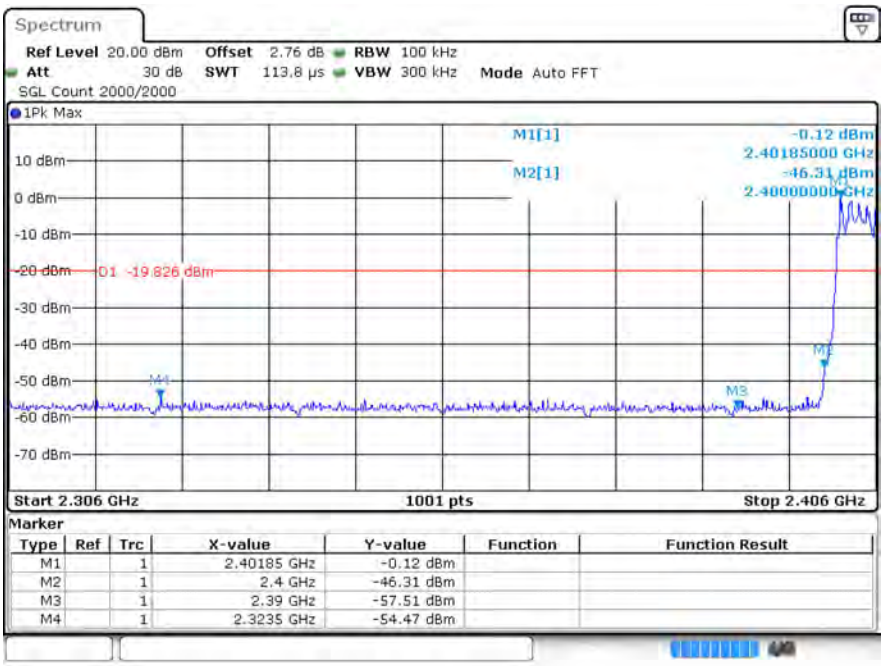
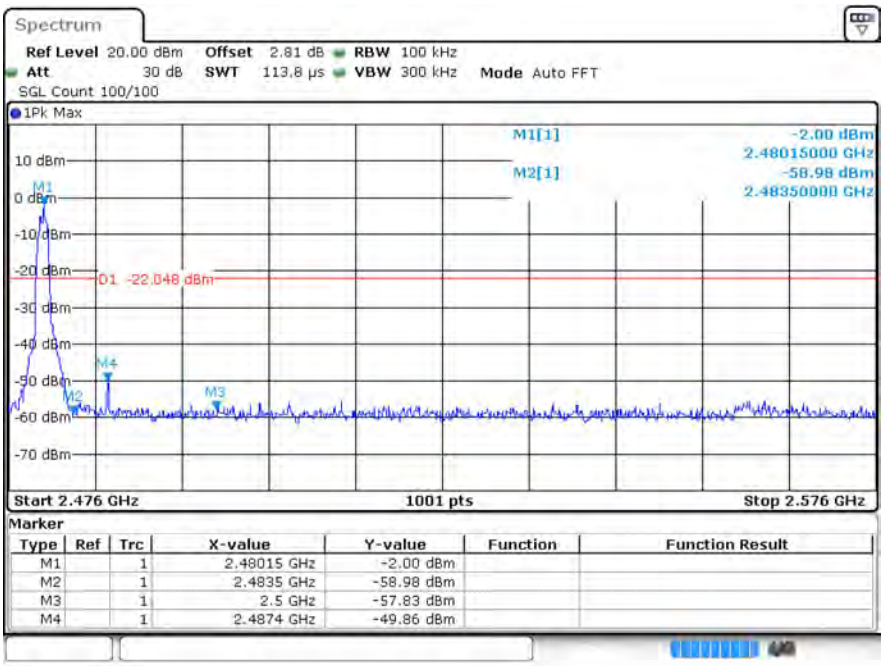
8DPSK/LCH/Hop	

Ref	
8DPSK/HCH/No Hop	

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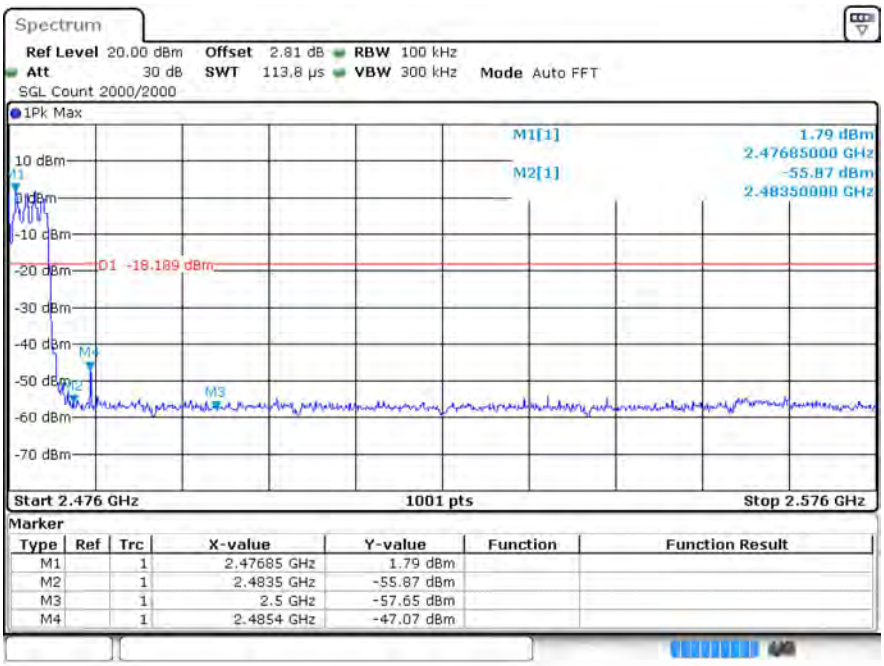
8DPSK/HCH/Hop	

9 Restrict-band band-edge measurements

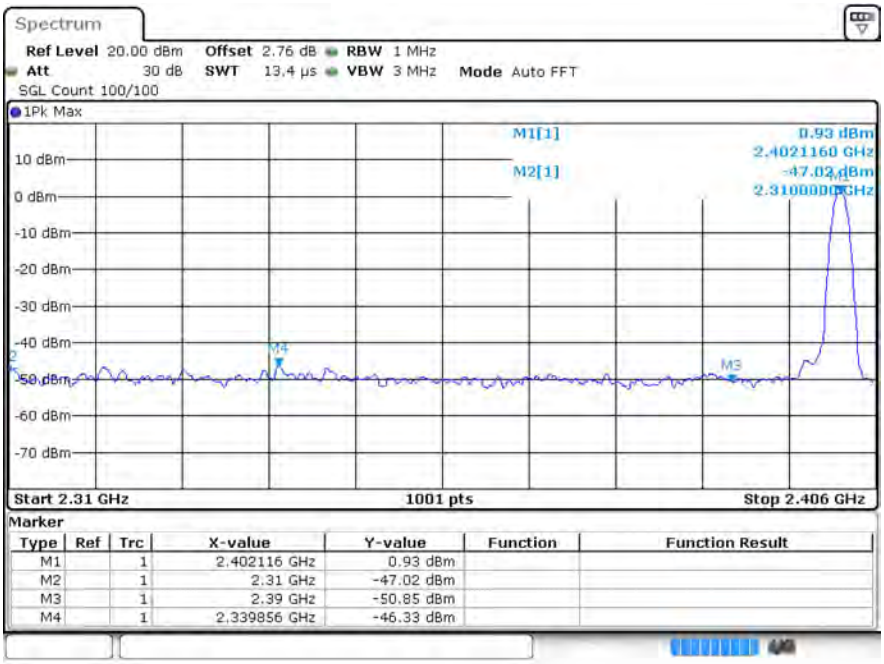
9.1 Test Result

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Duty Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-47.02	2	-	50.24	PEAK	74	Pass
	Off	2310.0	-56.36	2	5.06	45.96	AV	54	Pass
	Off	2339.856	-46.33	2	-	50.93	PEAK	74	Pass
	Off	2338.224	-54.02	2	5.06	48.3	AV	54	Pass
	Off	2390.0	-50.85	2	-	46.41	PEAK	74	Pass
	Off	2390.0	-57.28	2	5.06	45.04	AV	54	Pass
	Off	2483.5	-48.93	2	-	48.33	PEAK	74	Pass
	Off	2483.5	-56.9	2	4.97	45.33	AV	54	Pass
	Off	2492.728	-47.87	2	-	49.39	PEAK	74	Pass
	Off	2500	-56.03	2	4.97	46.2	AV	54	Pass
	Off	2500.0	-48.1	2	-	49.16	PEAK	74	Pass
	Off	2500.0	-56.04	2	4.97	46.19	AV	54	Pass
π/4DQPSK	Off	2310.0	-50.61	2	-	46.65	PEAK	74	Pass
	Off	2310.0	-57.05	2	4.95	45.16	AV	54	Pass
	Off	2346.768	-46.86	2	-	50.4	PEAK	74	Pass
	Off	2337.936	-54.24	2	4.95	47.97	AV	54	Pass
	Off	2390.0	-50.99	2	-	46.27	PEAK	74	Pass
	Off	2390.0	-57.12	2	4.95	45.09	AV	54	Pass
	Off	2483.5	-48.32	2	-	48.94	PEAK	74	Pass
	Off	2483.5	-56.18	2	4.95	46.03	AV	54	Pass
	Off	2494.528	-46.9	2	-	50.36	PEAK	74	Pass
	Off	2486.248	-55.35	2	4.95	46.86	AV	54	Pass
	Off	2500.0	-50.67	2	-	46.59	PEAK	74	Pass
	Off	2500.0	-56.45	2	4.95	45.76	AV	54	Pass
8DPSK	Off	2310.0	-49.55	2	-	47.71	PEAK	74	Pass
	Off	2310.0	-56.51	2	4.95	45.7	AV	54	Pass
	Off	2338.128	-46.19	2	-	51.07	PEAK	74	Pass
	Off	2338.128	-54.3	2	4.95	47.91	AV	54	Pass

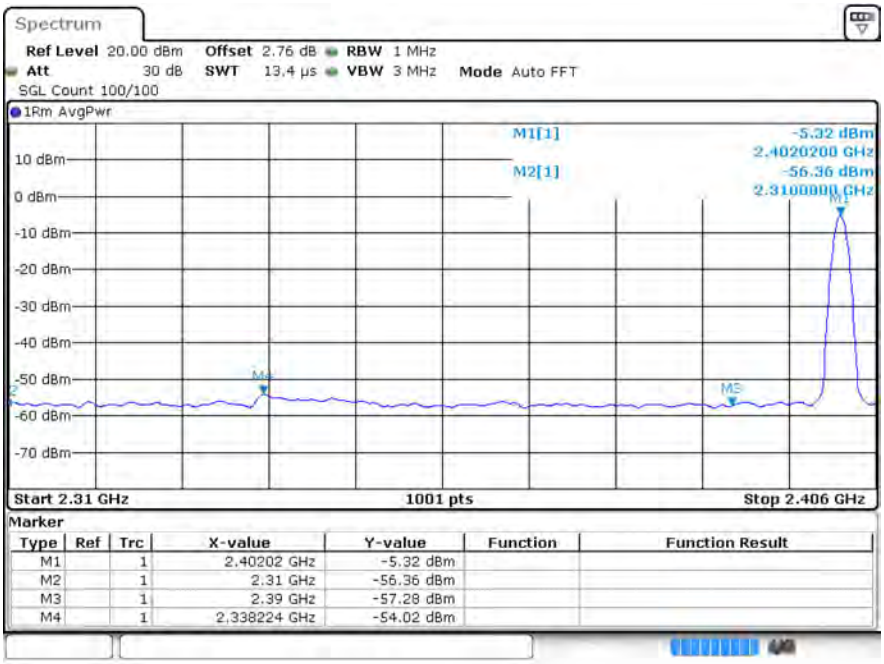
	Off	2390.0	-50.68	2	-	46.58	PEAK	74	Pass
	Off	2390.0	-56.05	2	4.95	46.16	AV	54	Pass
	Off	2483.5	-48.43	2	-	48.83	PEAK	74	Pass
	Off	2483.5	-56.22	2	4.96	46	AV	54	Pass
	Off	2484.232	-46.4	2	-	50.86	PEAK	74	Pass
	Off	2484.928	-55.48	2	4.96	46.74	AV	54	Pass
	Off	2500.0	-49.55	2	-	47.71	PEAK	74	Pass
	Off	2500.0	-56.8	2	4.96	45.42	AV	54	Pass

9.2 Test Graphs

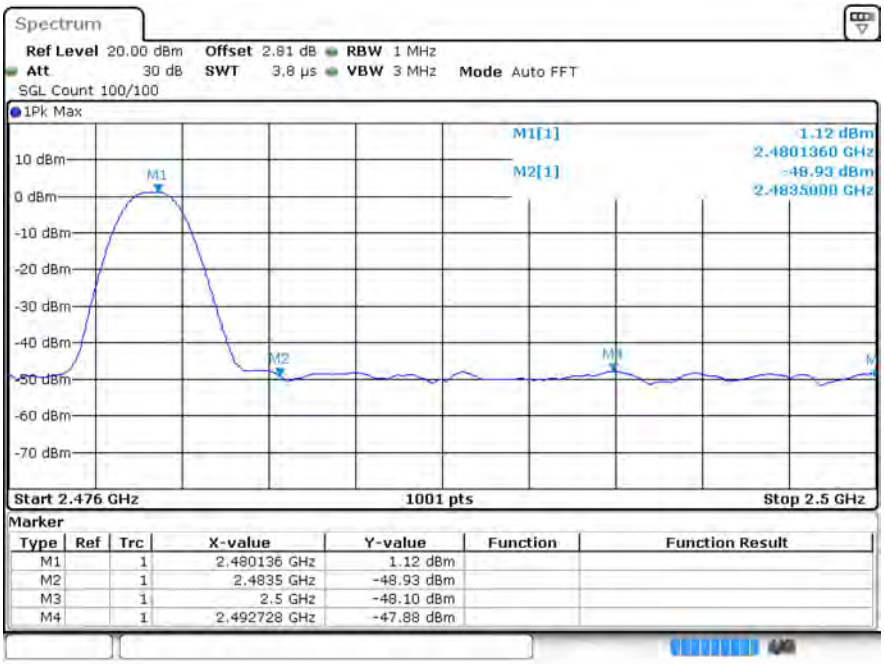
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



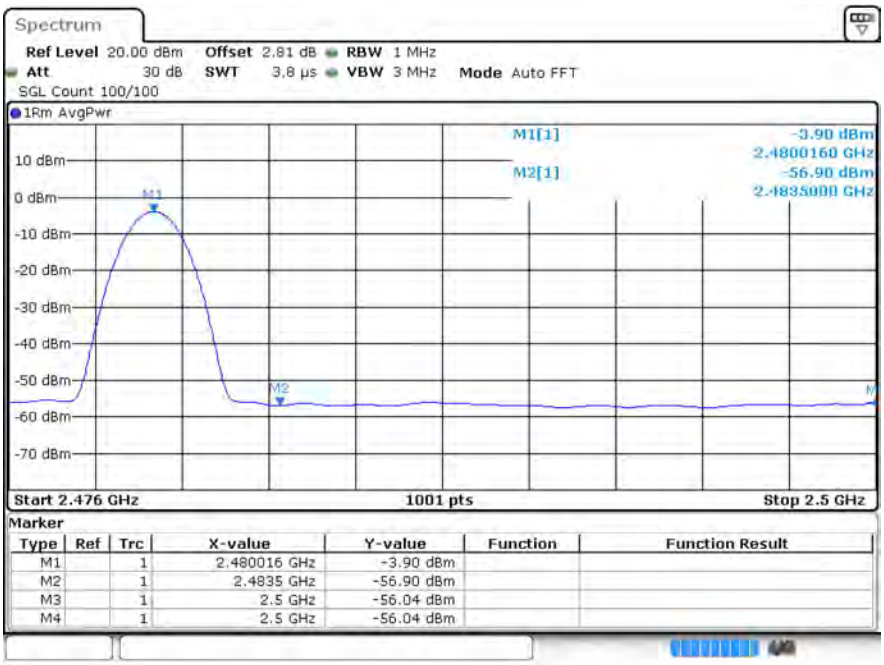
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



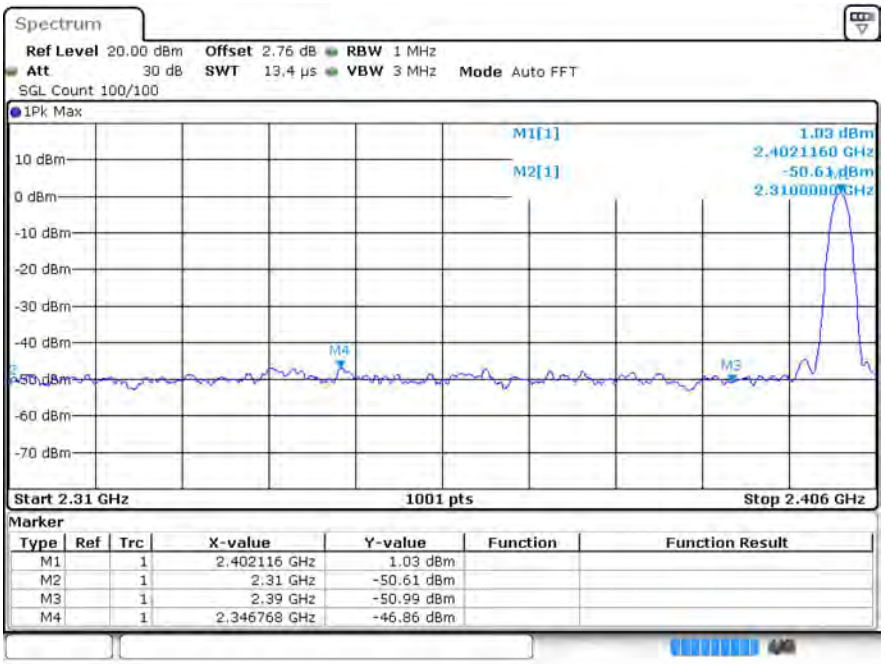
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



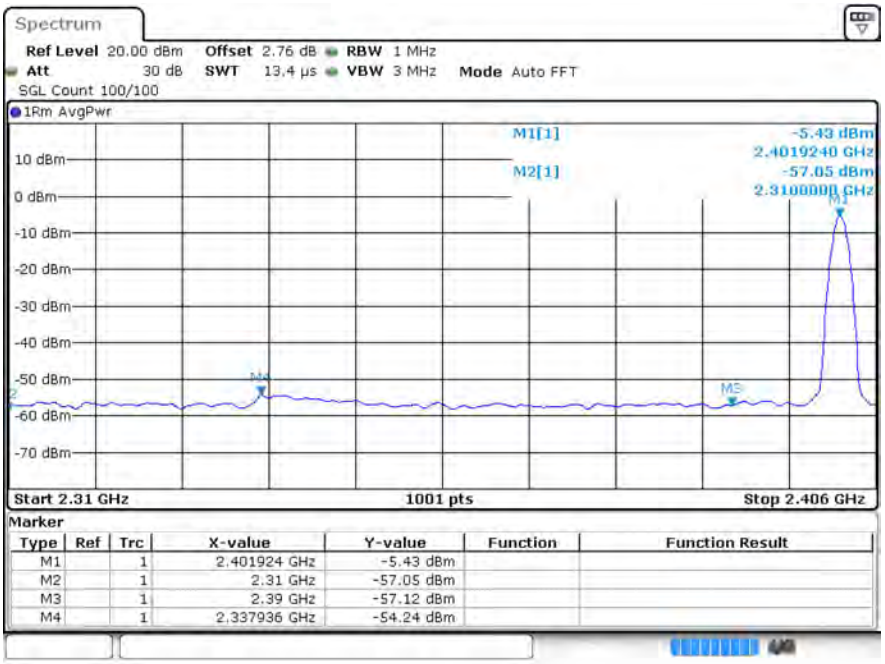
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



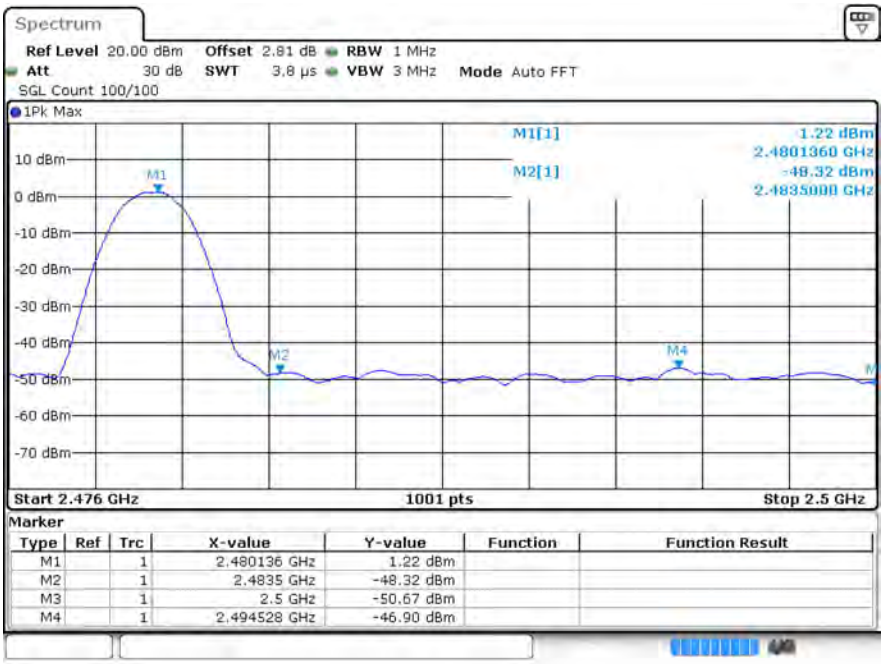
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



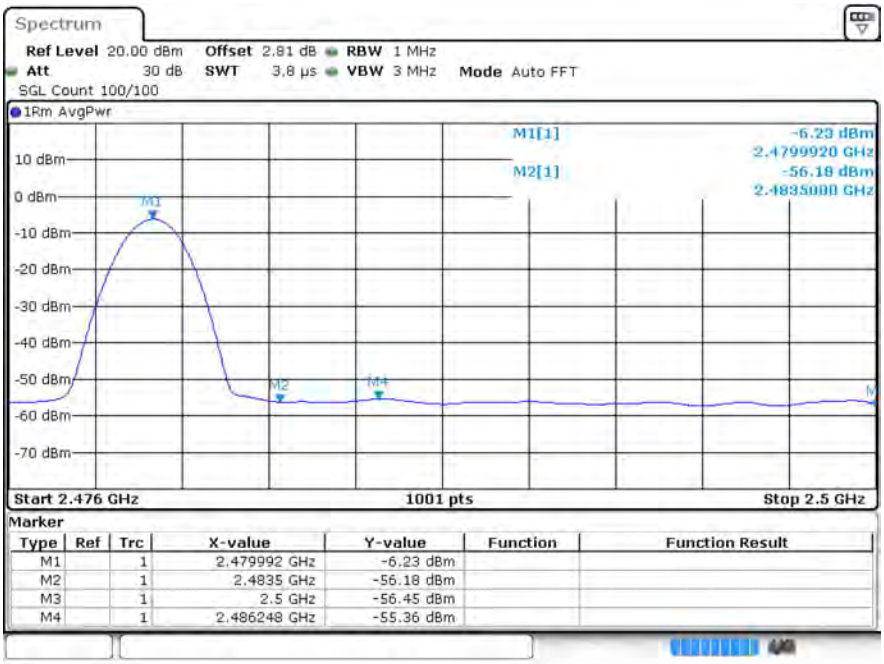
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



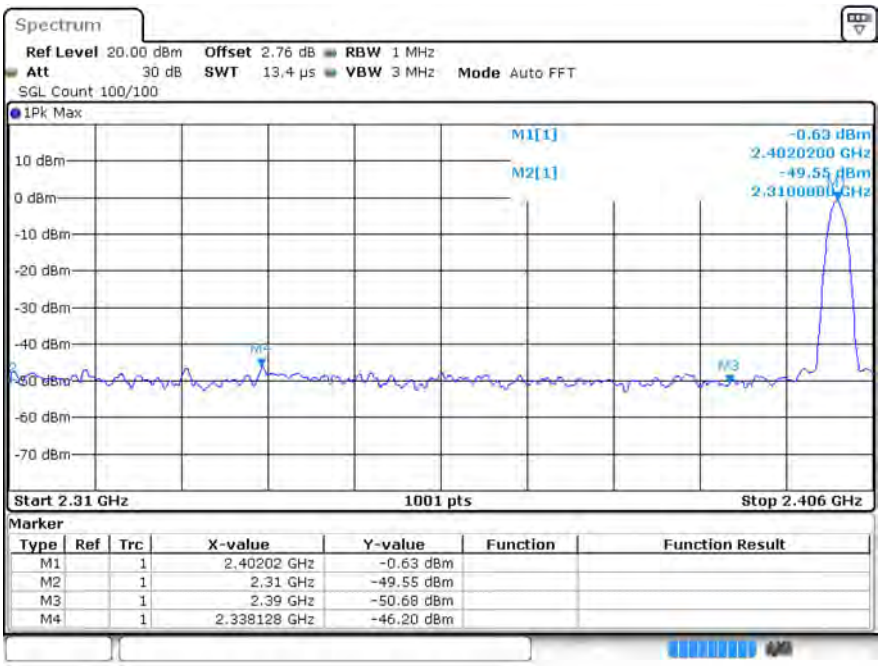
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



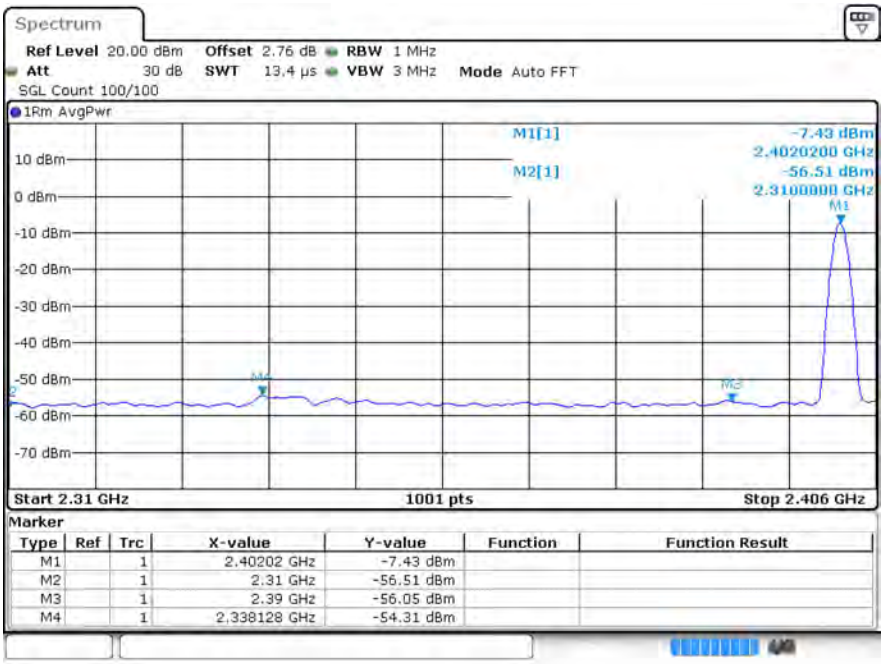
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



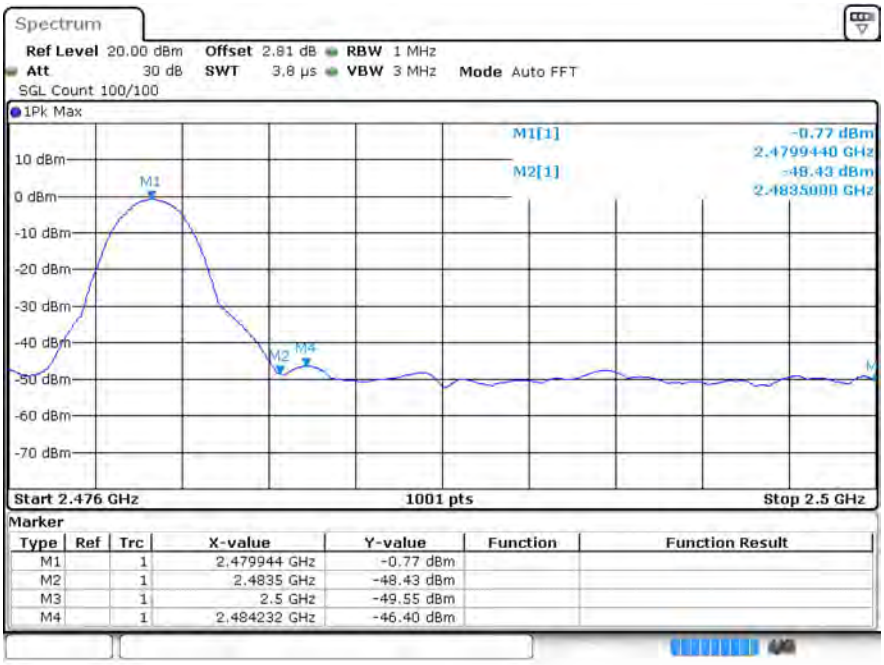
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



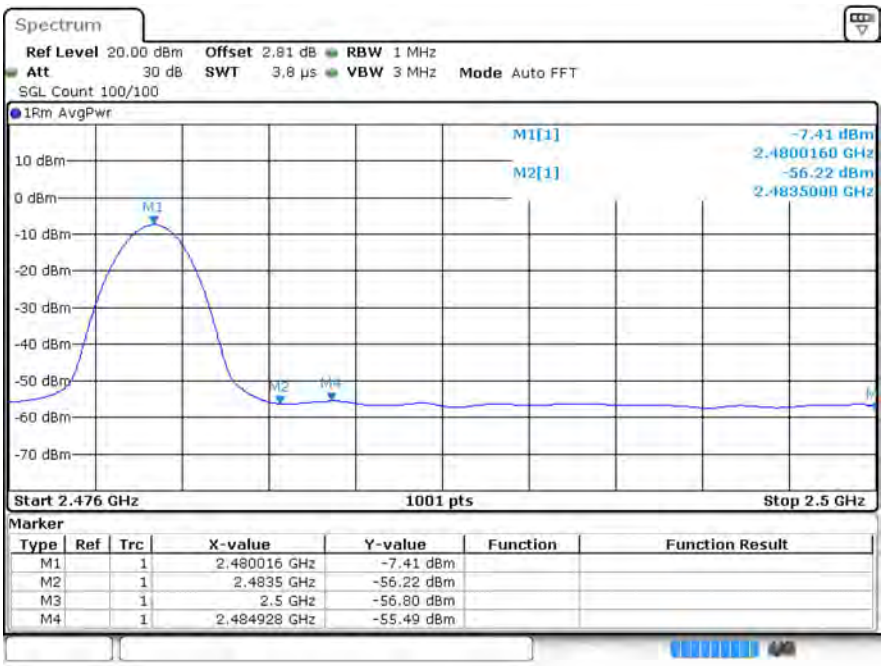
Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



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



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



---The End---