Appendix A

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

Product Name: ICBricks Coding Robot Kit

Trade Mark: N/A

Test Model: ICA1026

Environmental Conditions

Temperature:	24.6° C
Relative Humidity:	52.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Emiya lin
Supervised by:	Simba Haung

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1 Duty Cycle

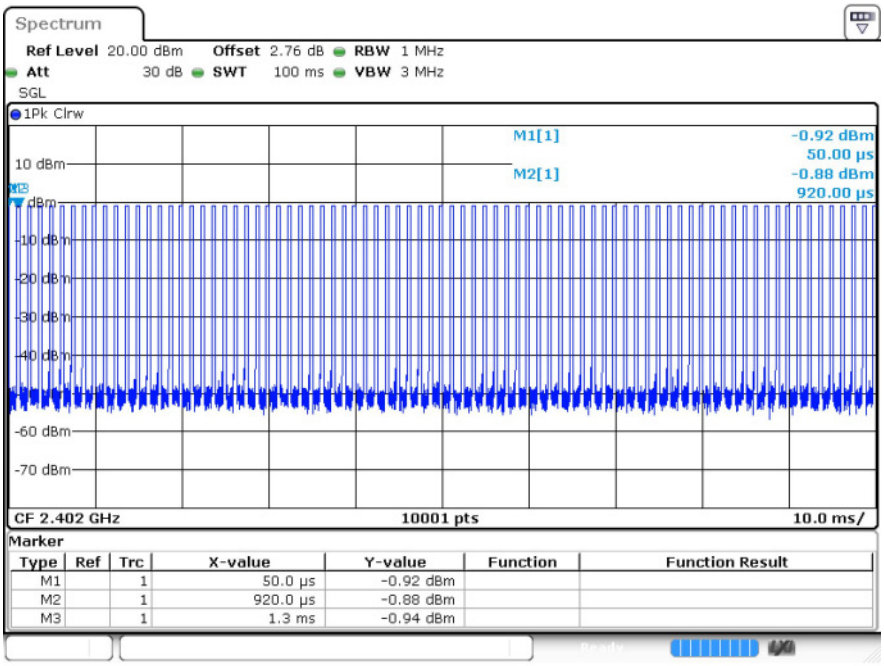
1.1 Test Result

Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor	1/T (kHz)
1-DH1	2402	31.21	5.06	2.63
1-DH1	2441	31.91	4.96	2.56
1-DH1	2480	31.54	5.01	2.63
2-DH1	2402	32	4.95	2.56
2-DH1	2441	32	4.95	2.56
2-DH1	2480	32	4.95	2.56
3-DH1	2402	32.02	4.95	2.56
3-DH1	2441	32	4.95	2.56
3-DH1	2480	31.92	4.96	2.56

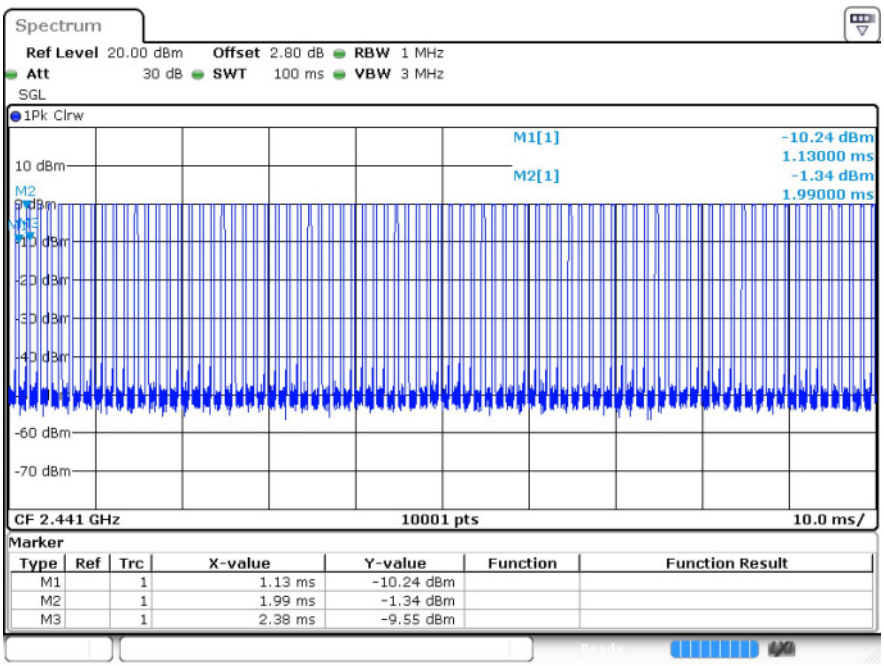
1.2 Test Graphs

Test Graphs

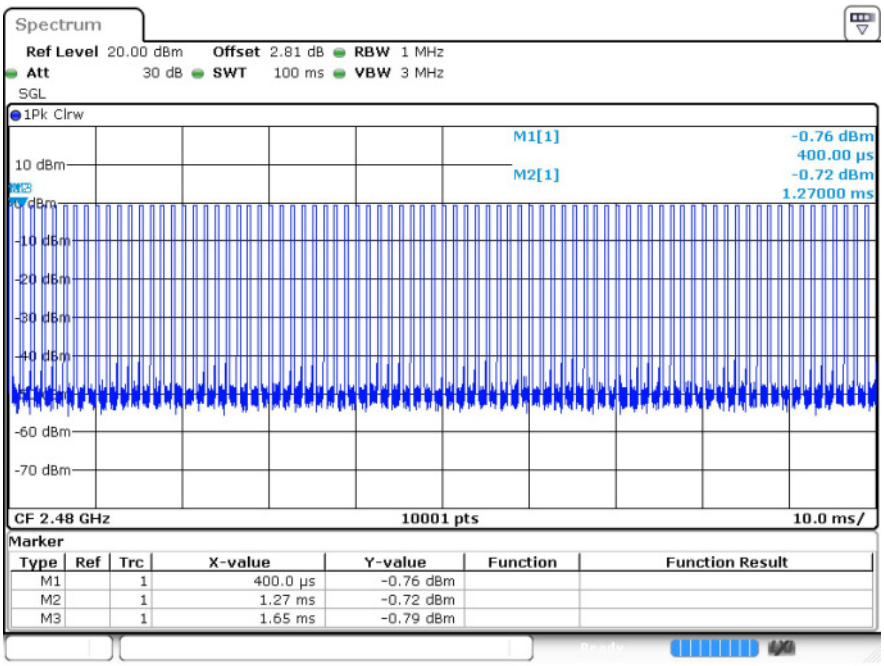
1-DH1 2402MHz



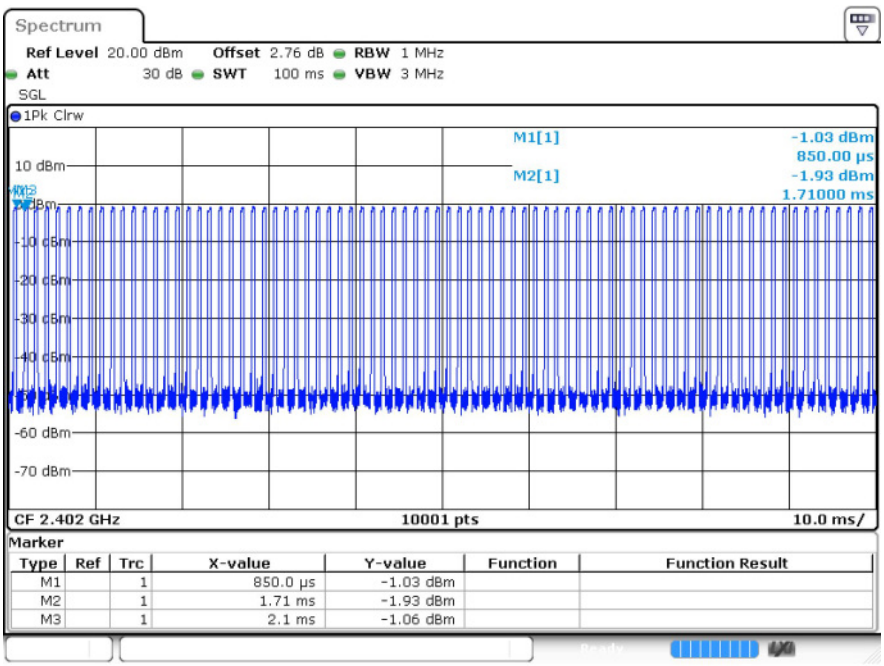
1-DH1 2441MHz



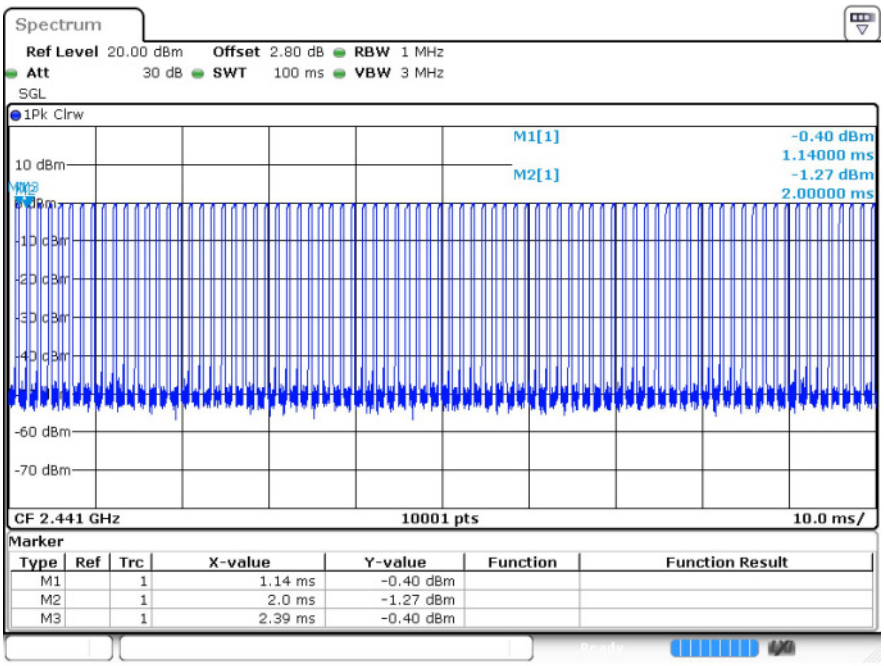
1-DH1 2480MHz



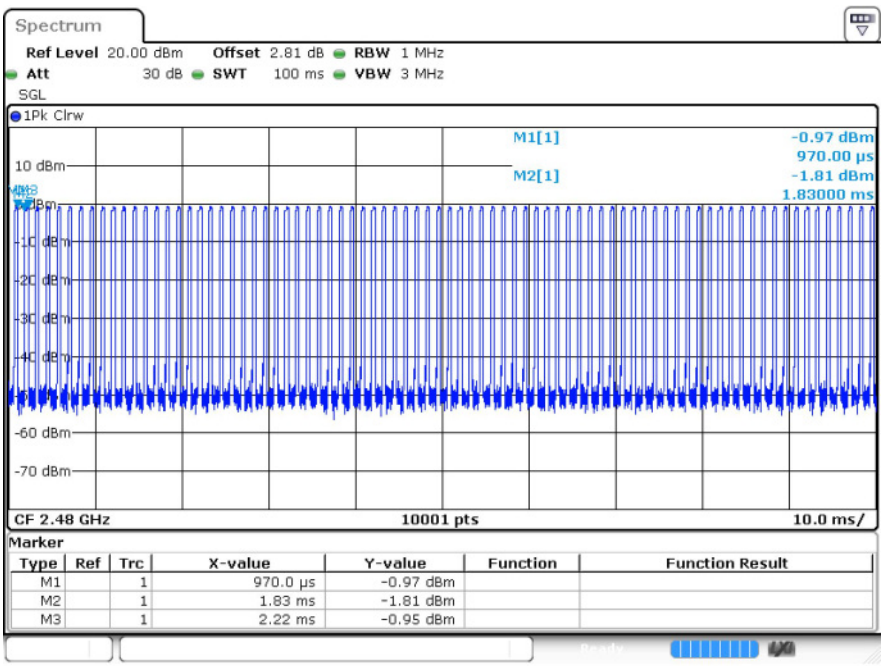
2-DH1 2402MHz



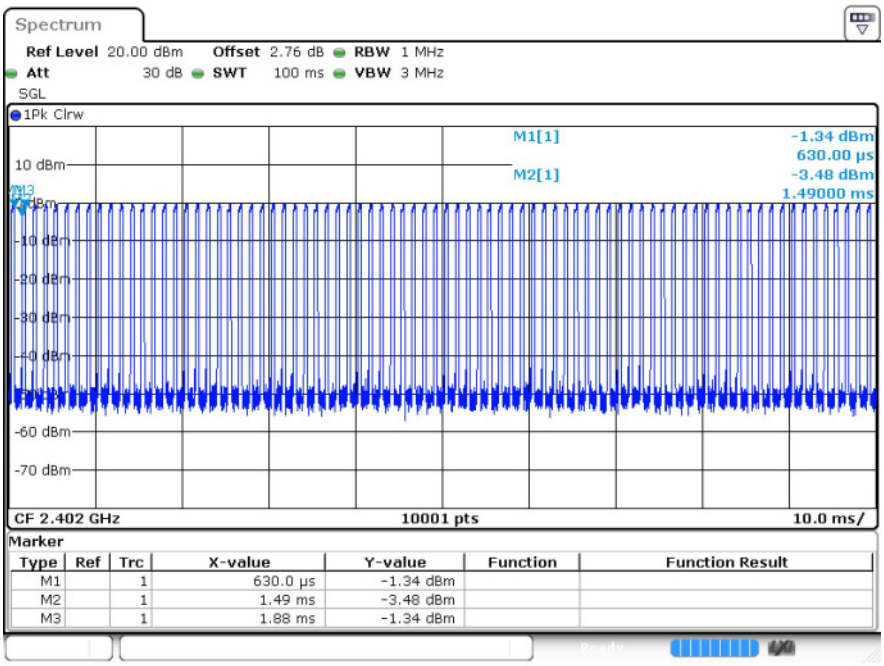
2-DH1 2441MHz



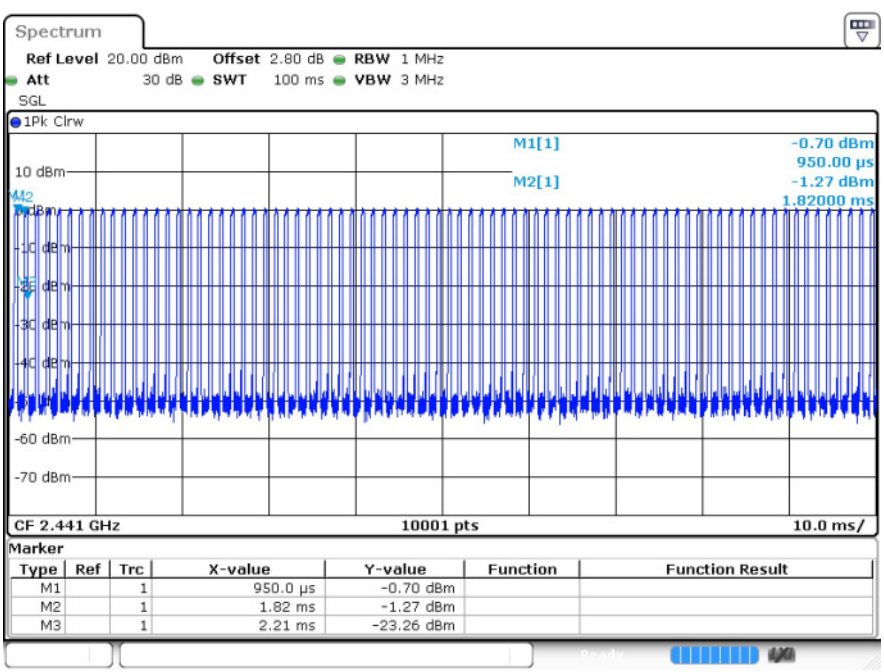
2-DH1 2480MHz



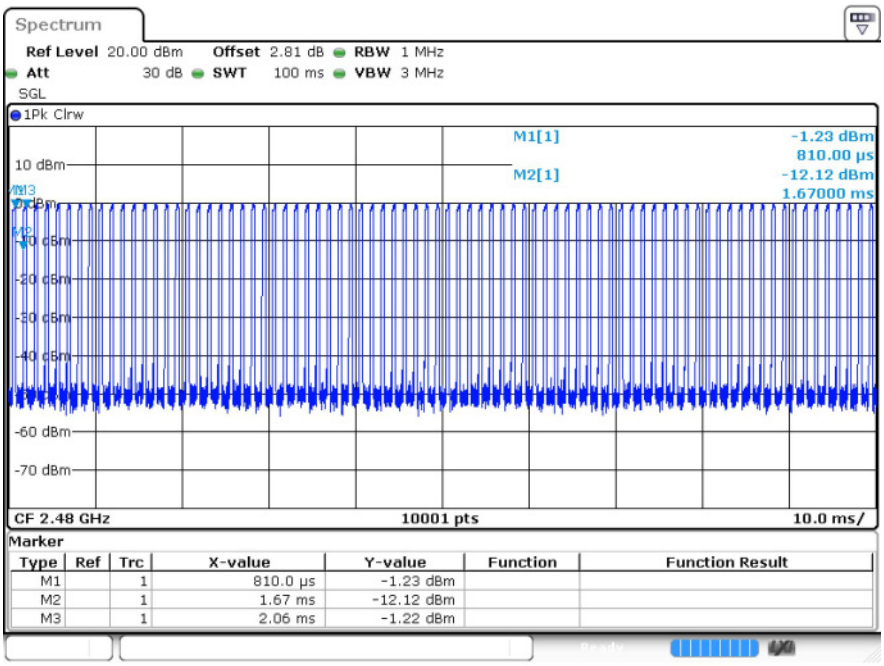
3-DH1 2402MHz



3-DH1 2441MHz



3-DH1 2480MHz

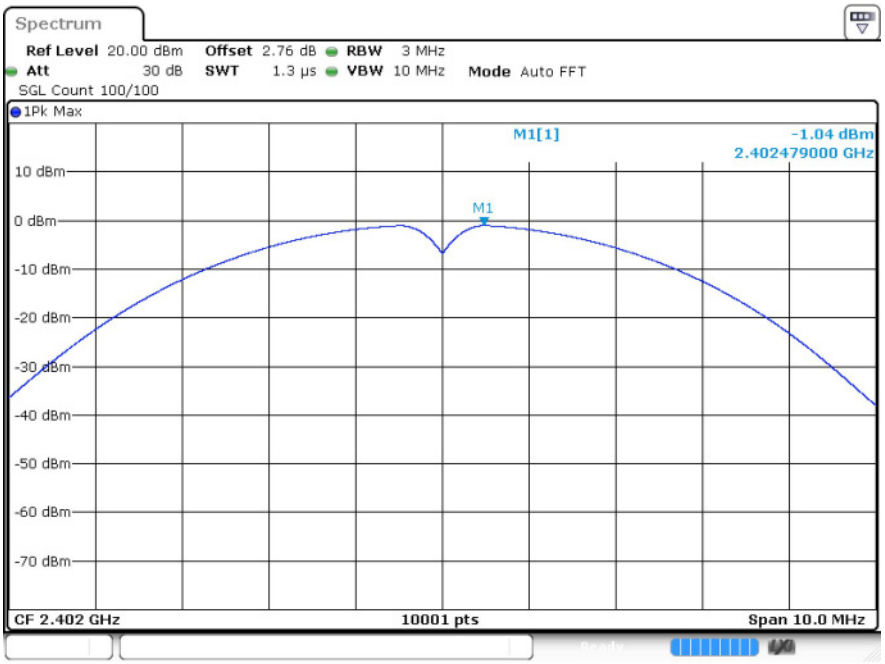
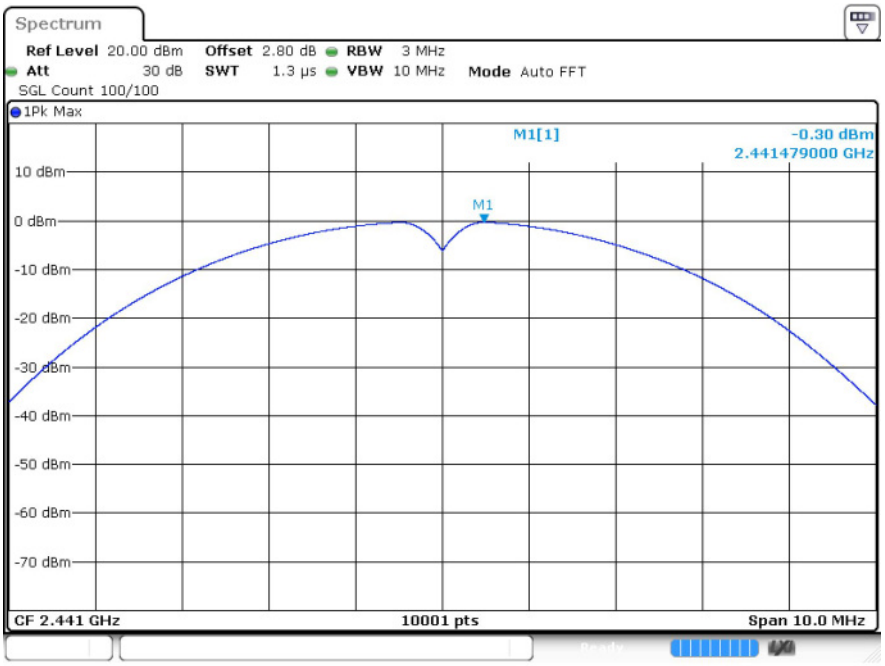


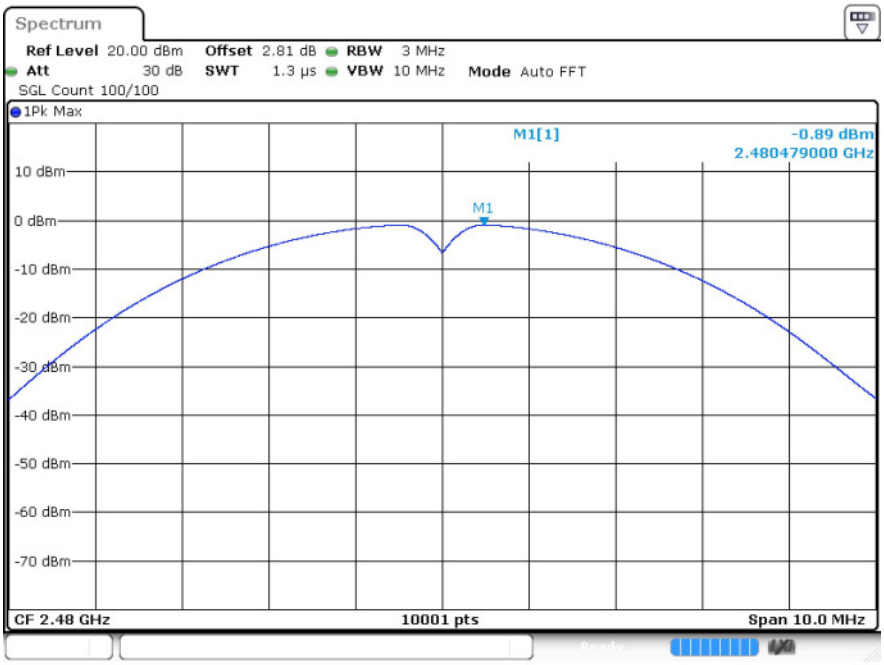
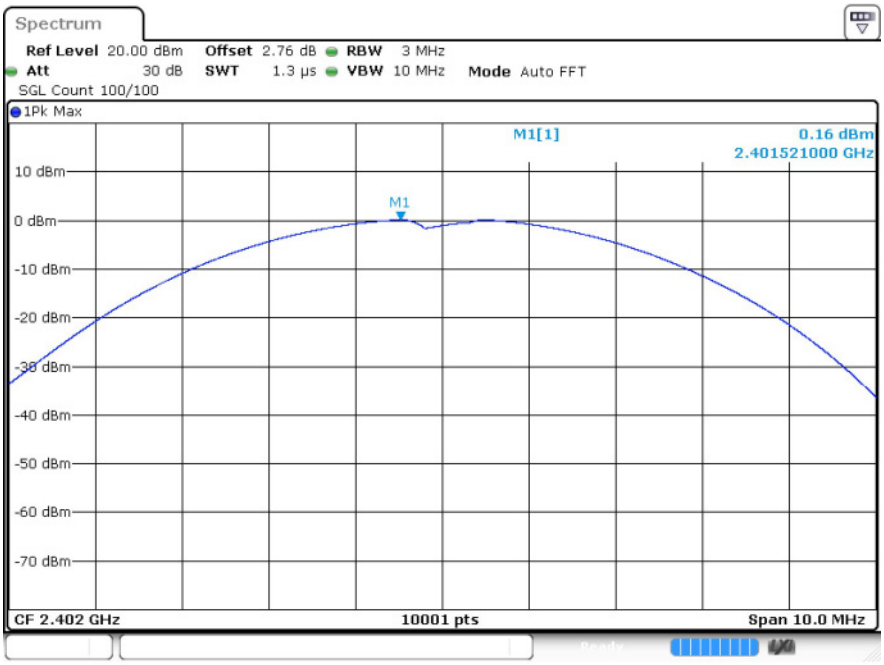
2 Maximum Conducted Peak Output Power

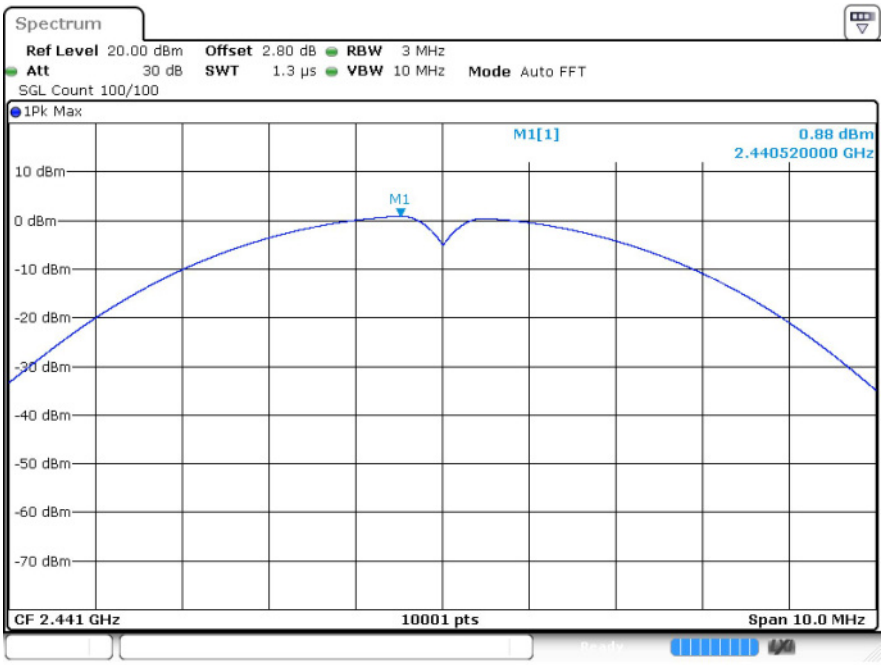
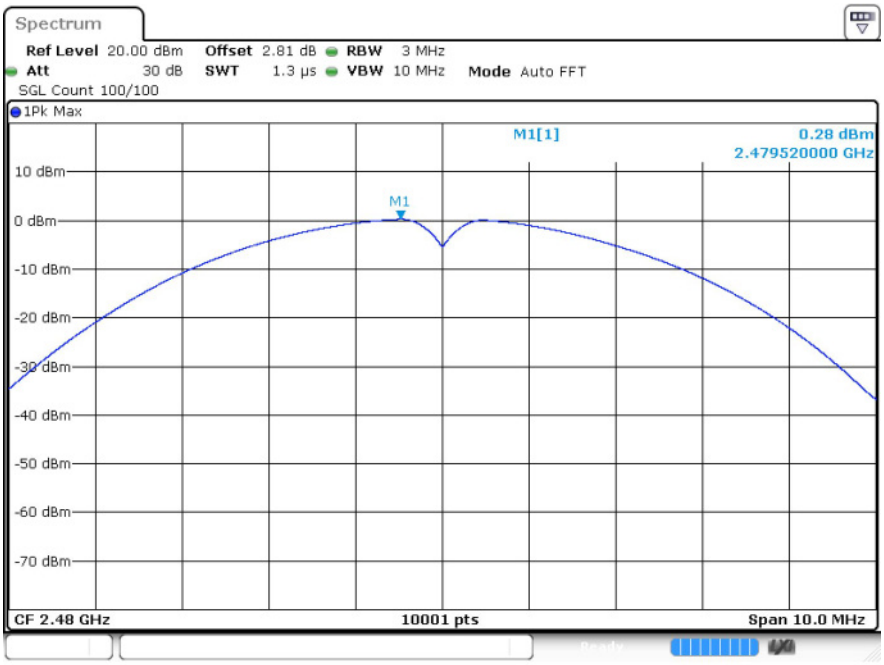
2.1 Test Result

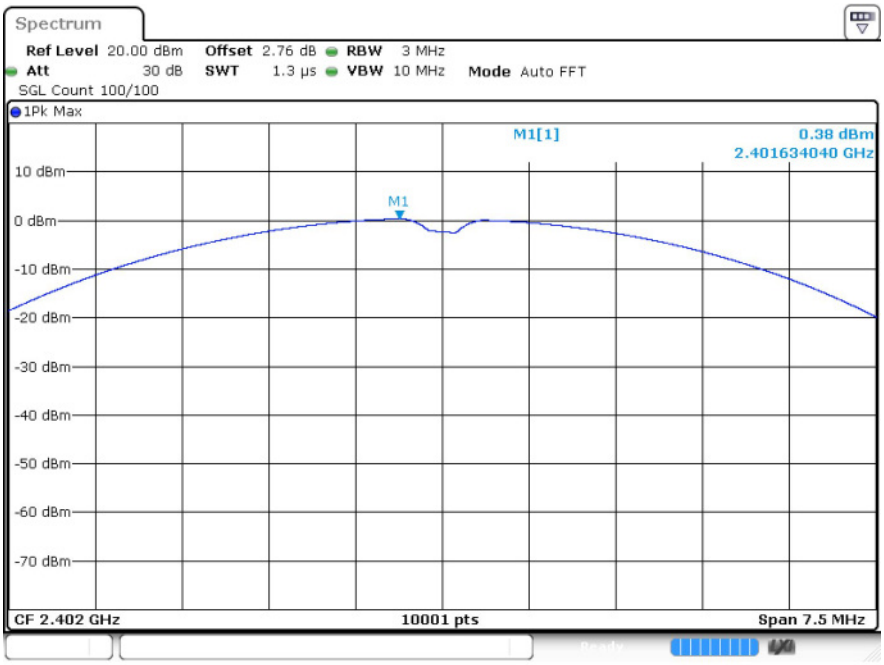
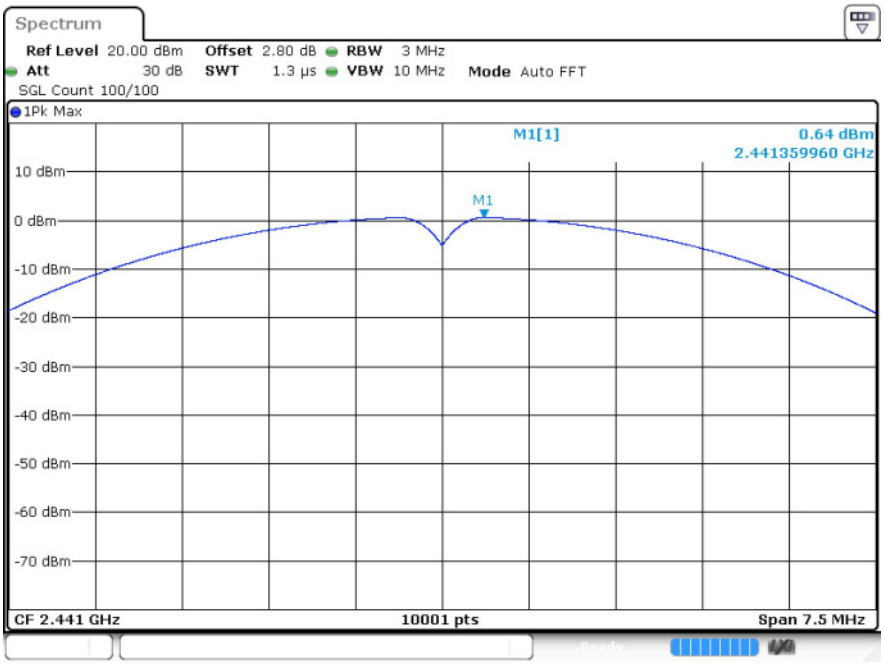
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.04	21	Pass
	MCH	-0.3	21	Pass
	HCH	-0.89	21	Pass
π/4DQPSK	LCH	0.16	21	Pass
	MCH	0.88	21	Pass
	HCH	0.28	21	Pass
8DPSK	LCH	0.38	21	Pass
	MCH	0.64	21	Pass
	HCH	-0.05	21	Pass

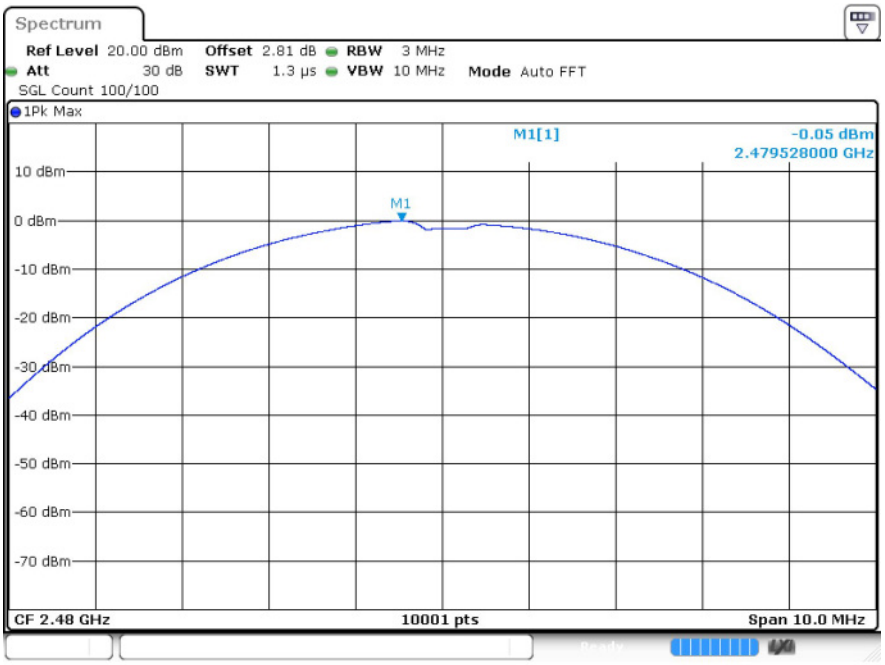
2.2 Test Graphs

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	

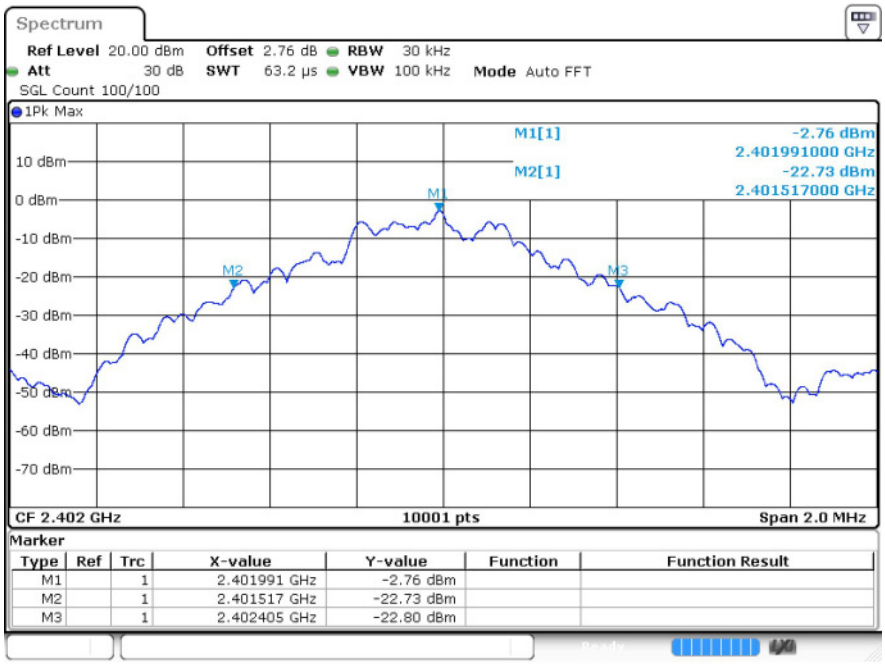
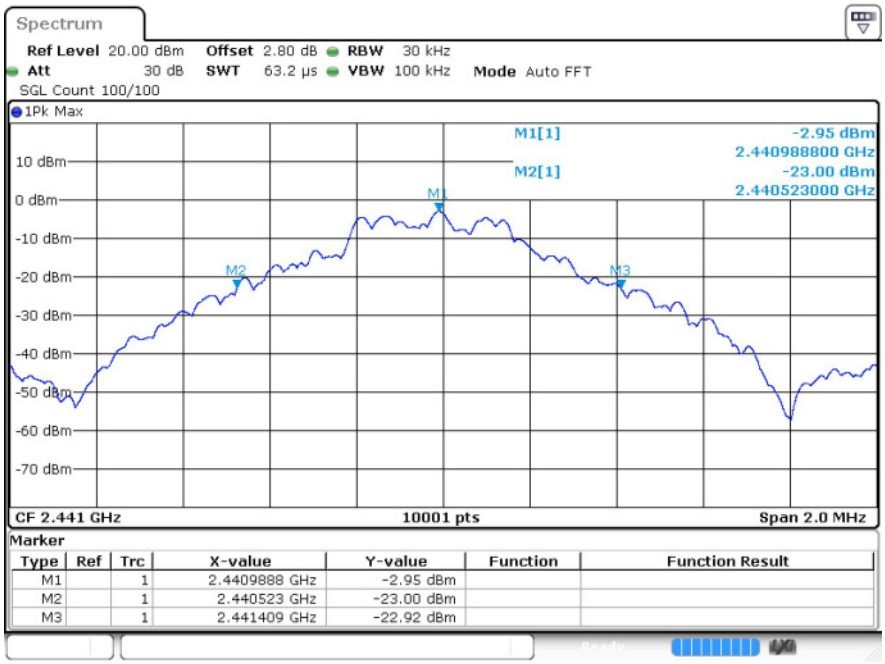
8DPSK/HCH	 Spectrum Ref Level 20.00 dBm Offset 2.81 dB RBW 3 MHz Att 30 dB SWT 1.3 µs VBW 10 MHz Mode Auto FFT SGL Count 100/100 1Pk Max M1[1] -0.05 dBm 2.479528000 GHz M1 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 10001 pts Span 10.0 MHz

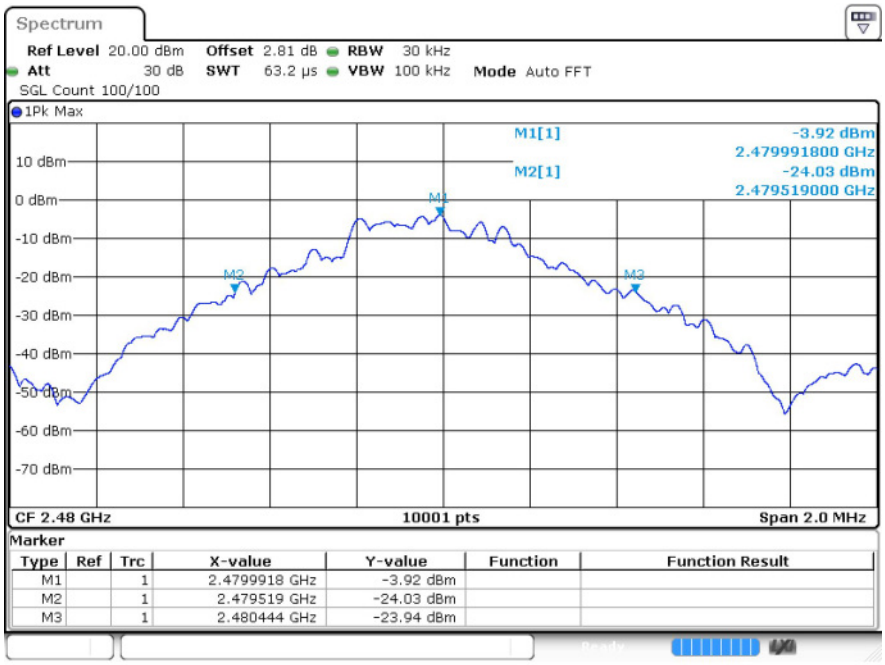
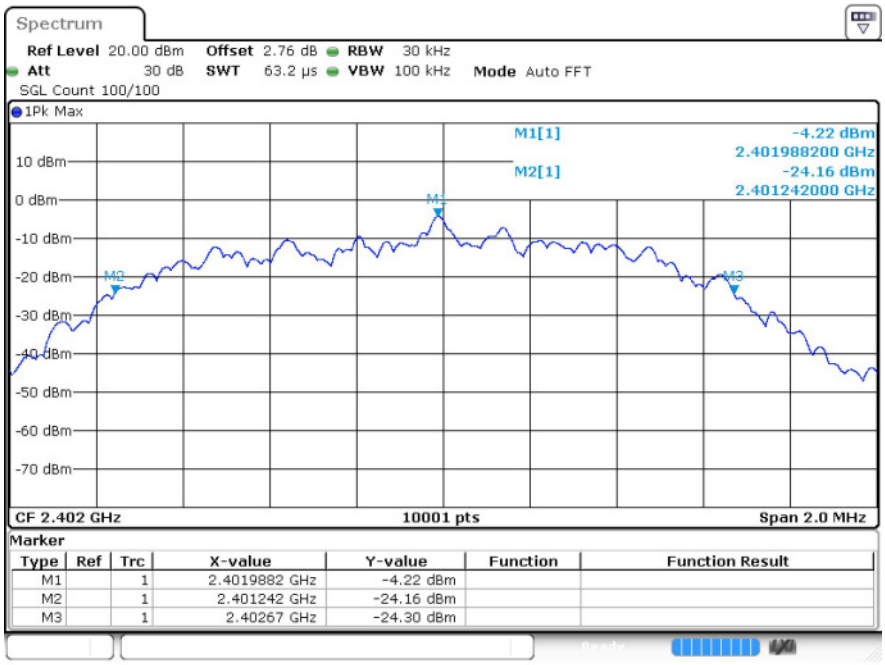
3 20dB Bandwidth

3.1 Test Result

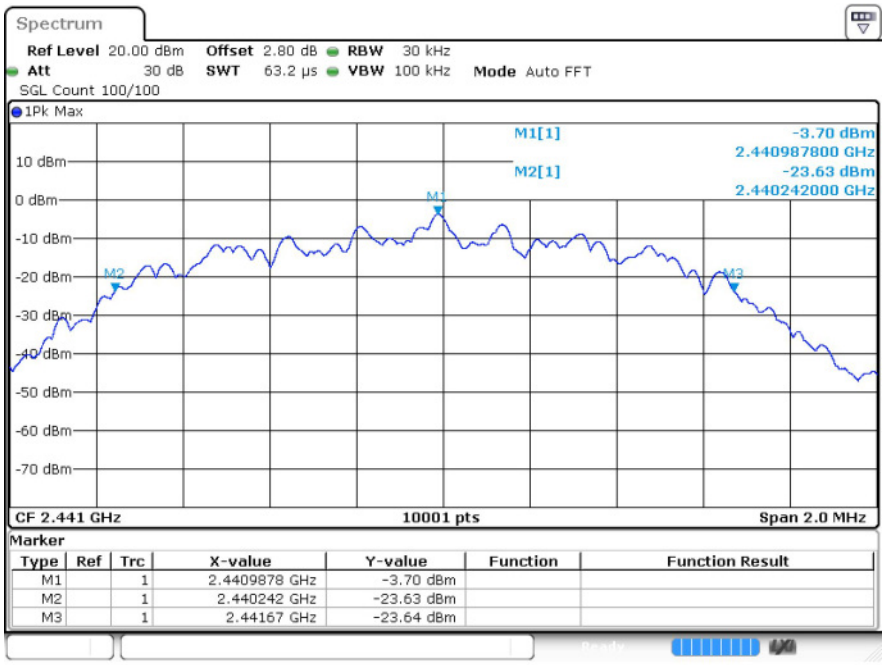
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.888	Not Specified	Pass
	MCH	0.886	Not Specified	Pass
	HCH	0.924	Not Specified	Pass
π/4DQPSK	LCH	1.428	Not Specified	Pass
	MCH	1.429	Not Specified	Pass
	HCH	1.397	Not Specified	Pass
8DPSK	LCH	1.404	Not Specified	Pass
	MCH	1.426	Not Specified	Pass
	HCH	1.412	Not Specified	Pass

3.2 Test Graphs

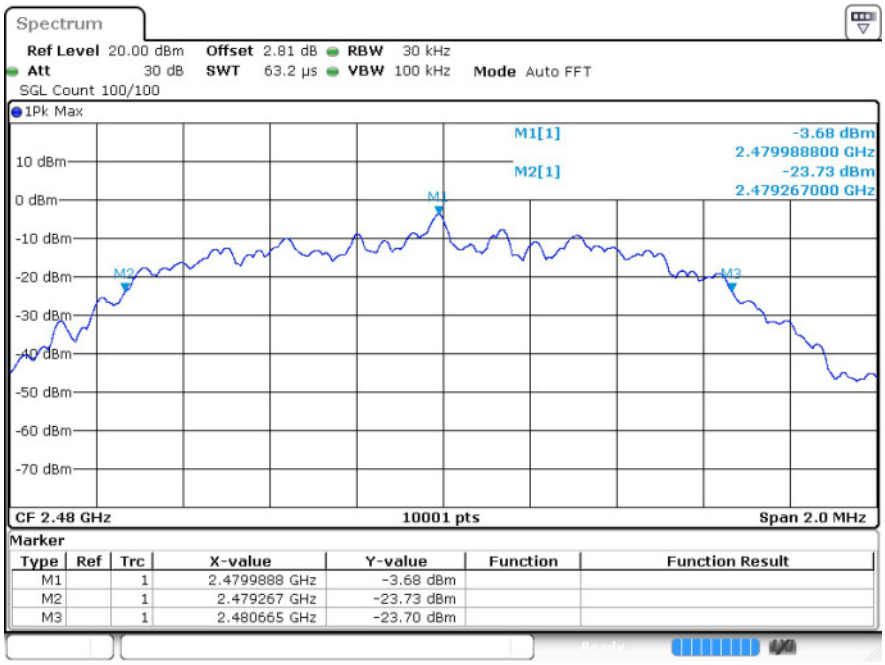
Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

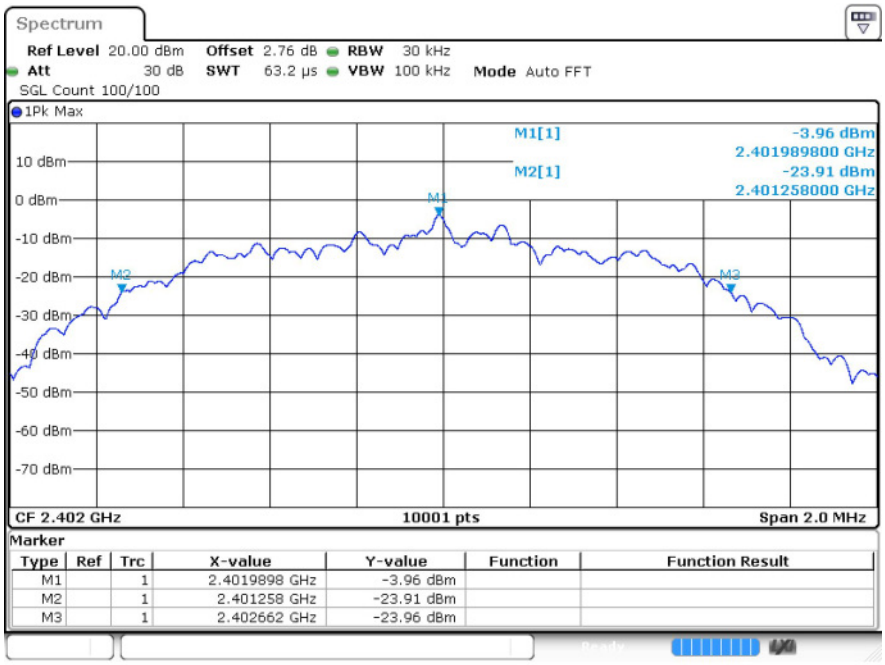
π/4DQPSK/MCH



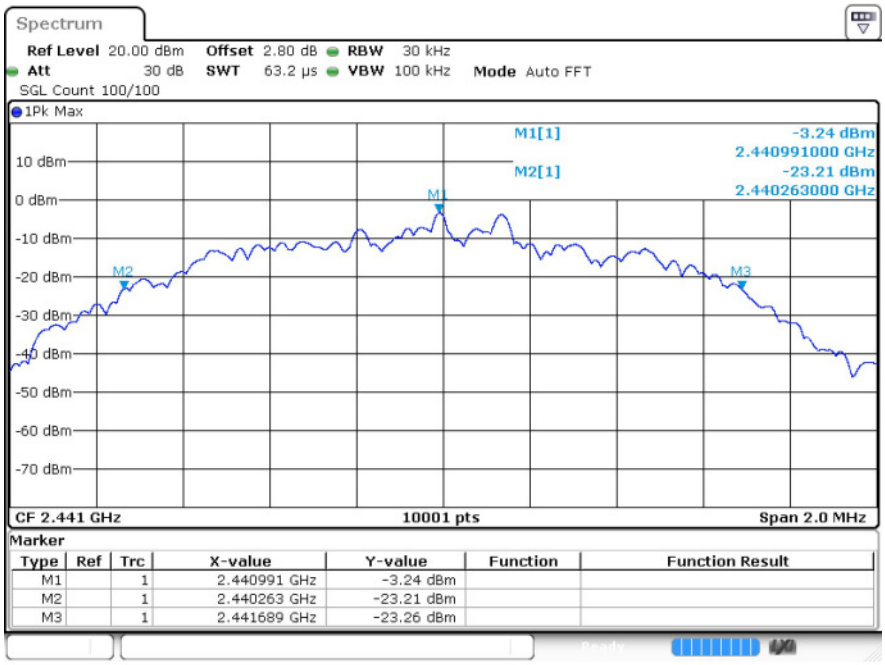
π/4DQPSK/HCH

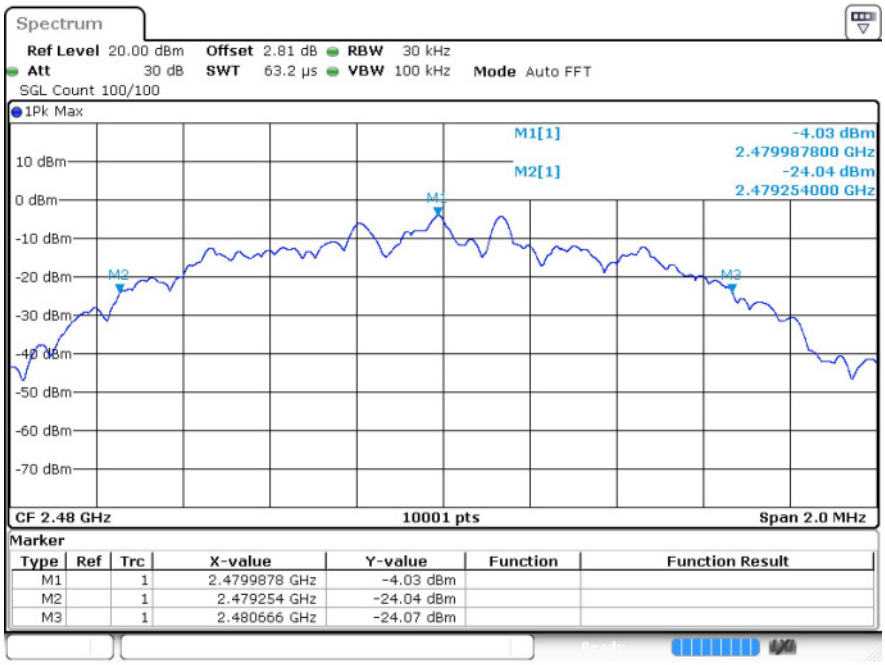


8DPSK/LCH



8DPSK/MCH



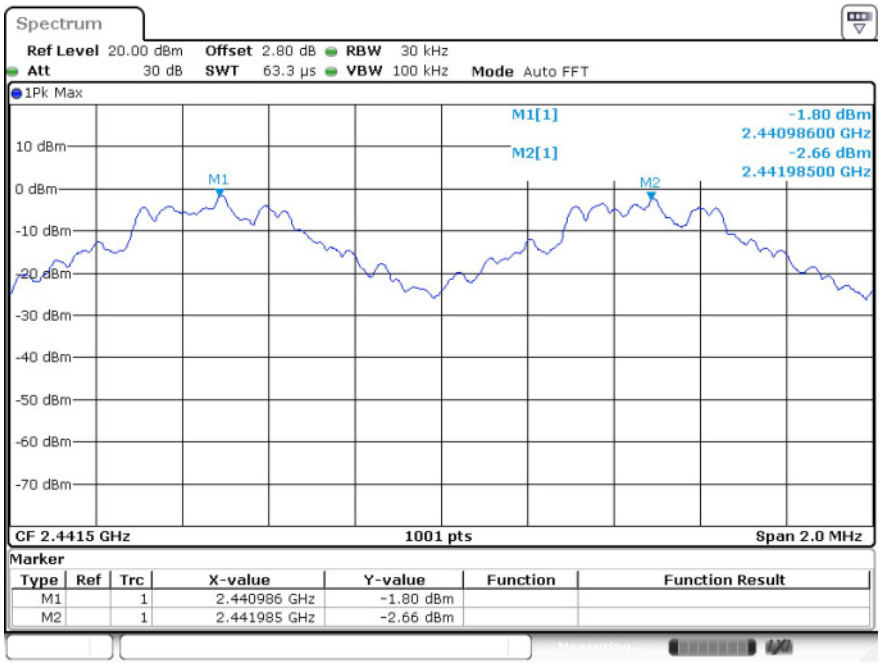
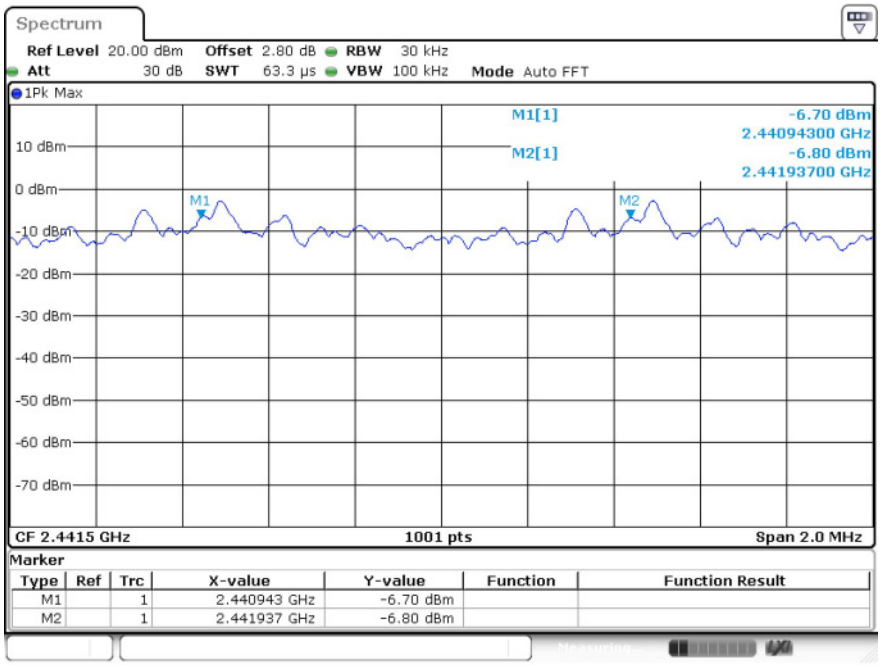
8DPSK/HCH	 Spectrum Ref Level 20.00 dBm Offset 2.81 dB RBW 30 kHz Att 30 dB SWT 63.2 µs VBW 100 kHz Mode Auto FFT SGL Count 100/100 1Pk Max M1[1] -4.03 dBm 2.479987800 GHz M2[1] -24.04 dBm 2.479254000 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 10001 pts Span 2.0 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.4799878 GHz -4.03 dBm M2 1 2.479254 GHz -24.04 dBm M3 1 2.480666 GHz -24.07 dBm

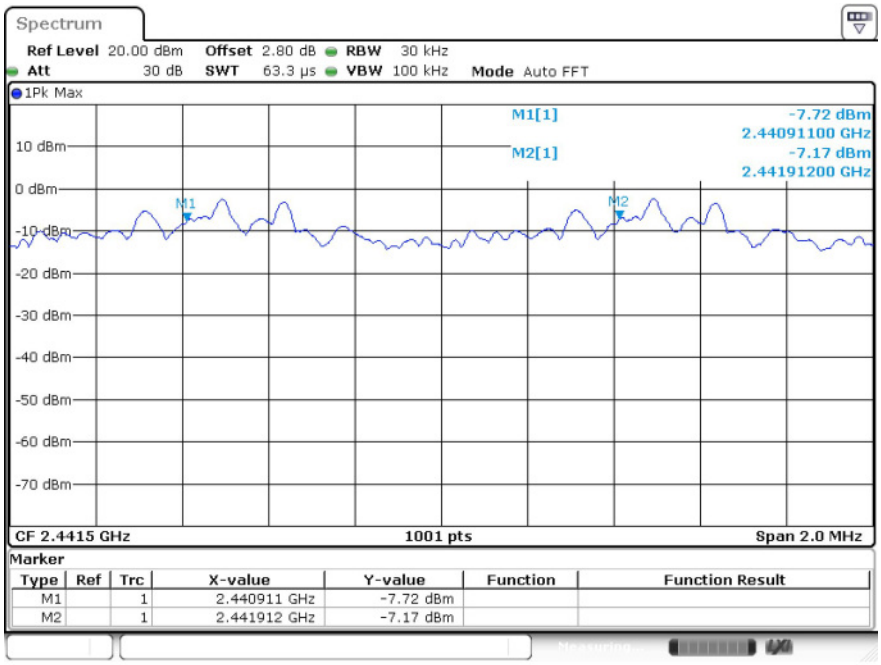
4 Carrier Frequency Separation

4.1 Test Result

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	MCH	0.999	0.591	Pass
π/4DQPSK	MCH	0.994	0.953	Pass
8DPSK	MCH	1.001	0.951	Pass

4.2 Test Graphs

Test Graphs	
GFSK/MCH	
π/4DQPSK/MCH	

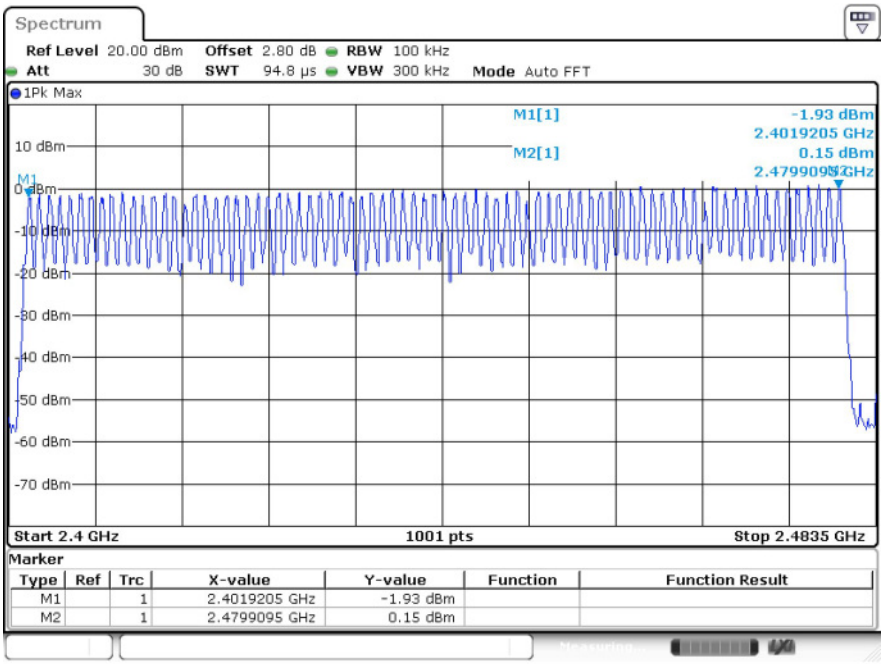
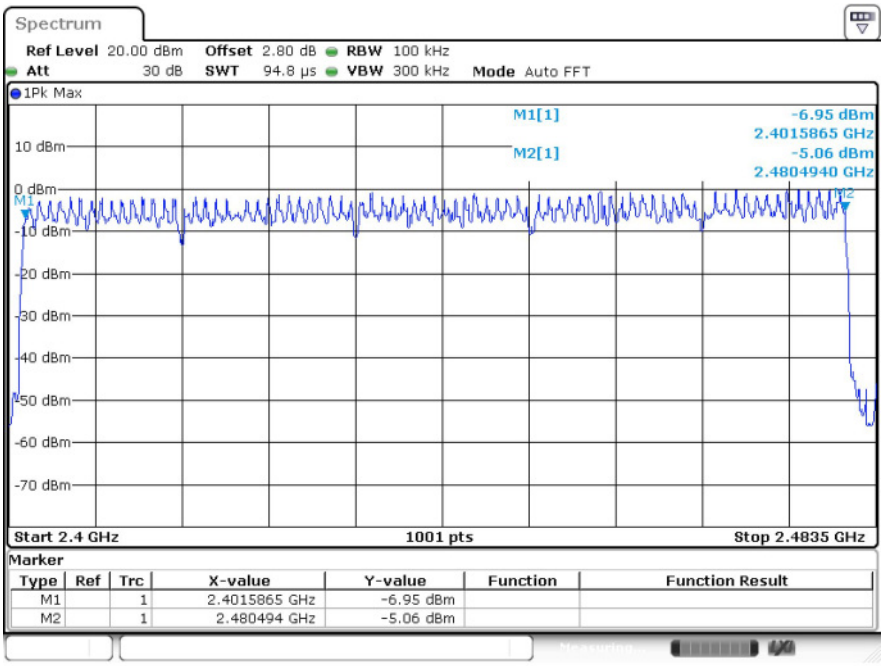
8DPSK/MCH	 Spectrum Ref Level 20.00 dBm Offset 2.80 dB RBW 30 kHz Att 30 dB SWT 63.3 µs VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -7.72 dBm 2.44091100 GHz M2[1] -7.17 dBm 2.44191200 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1 M2 CF 2.4415 GHz 1001 pts Span 2.0 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.440911 GHz -7.72 dBm M2 1 2.441912 GHz -7.17 dBm

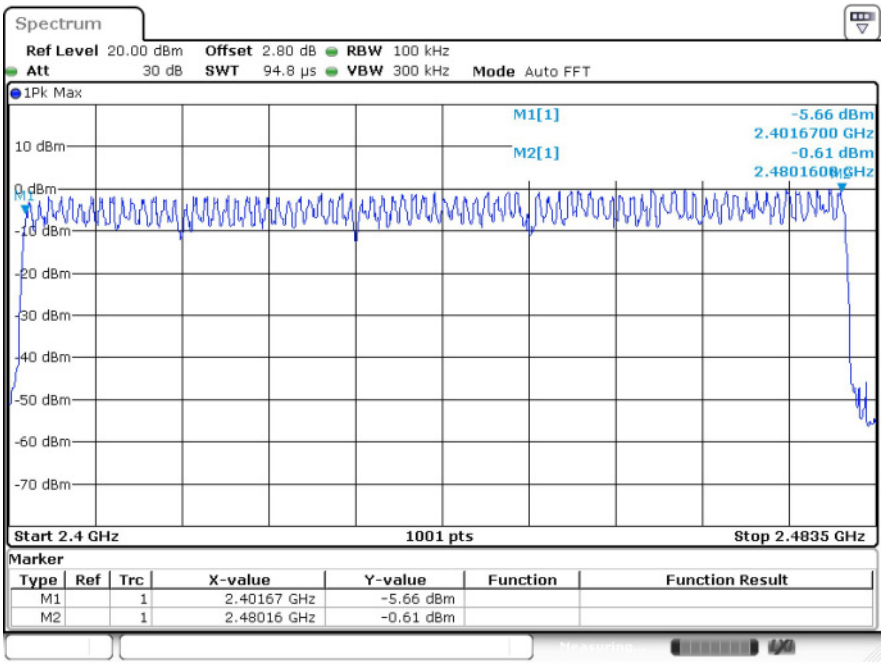
5 Hopping Channel Number

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	

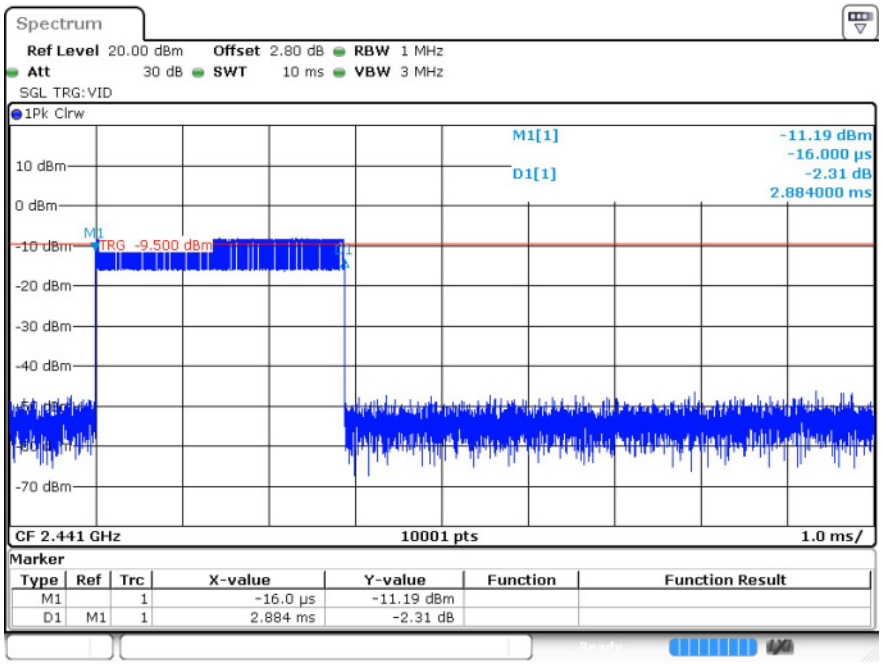
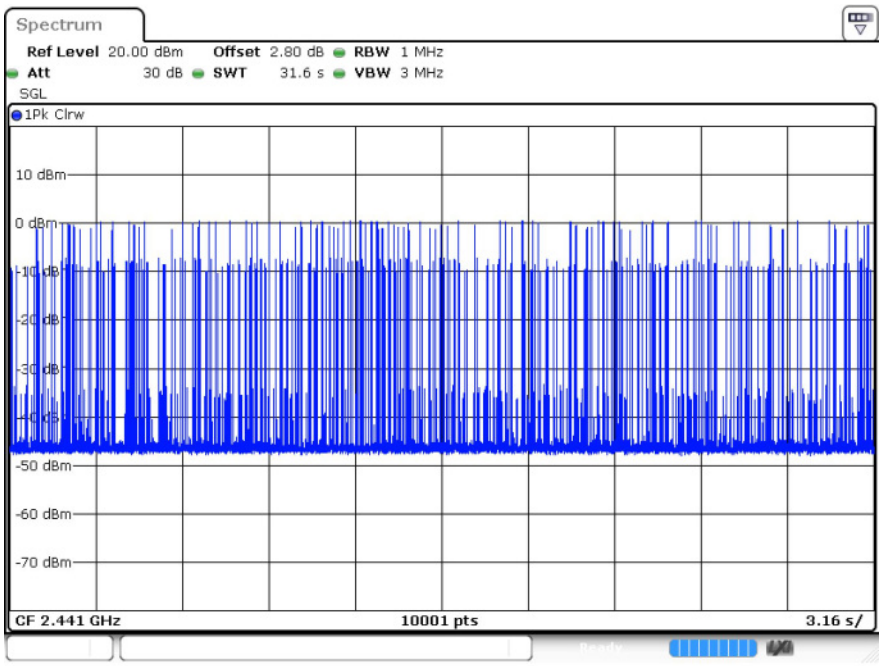
8DPSK/Hop	 Spectrum Ref Level 20.00 dBm Offset 2.80 dB RBW 100 kHz Att 30 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT 1Pk Max M1[1] -5.66 dBm 2.4016700 GHz M2[1] -0.61 dBm 2.4801600 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm Start 2.4 GHz 1001 pts Stop 2.4835 GHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.40167 GHz -5.66 dBm M2 1 2.48016 GHz -0.61 dBm

6 Dwell Time

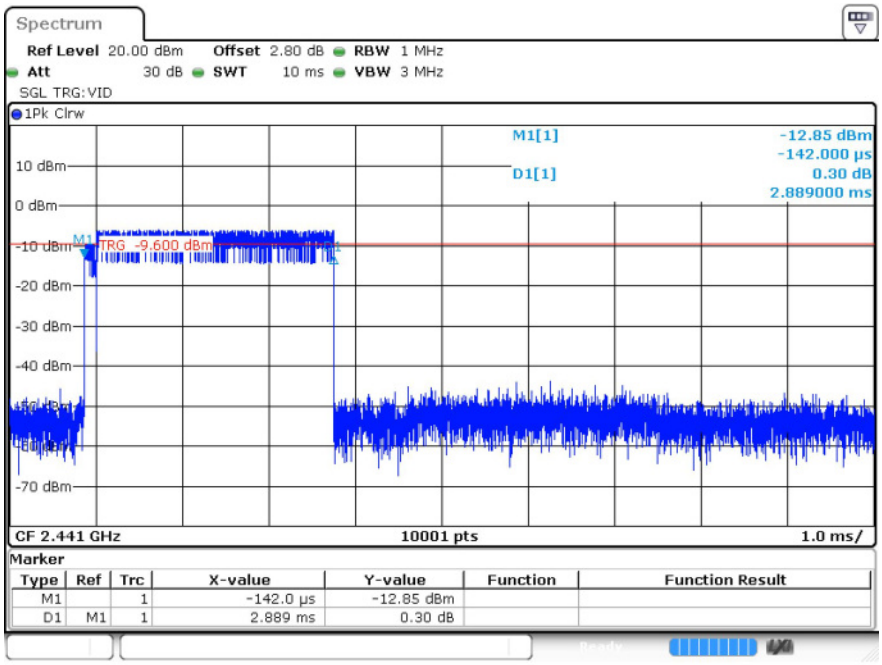
6.1 Test Result

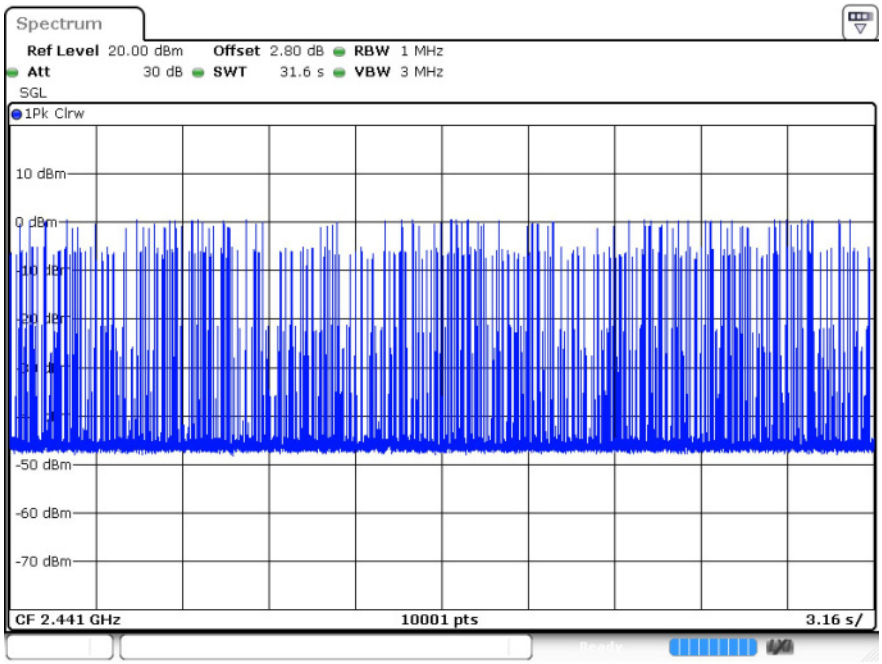
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Limit [s]	Verdict
GFSK	DH5	MCH	2.884	115	331.66	0.4	Pass
π/4DQPSK	2DH5	MCH	2.889	99	286.011	0.4	Pass
8DPSK	3DH5	MCH	2.892	101	292.092	0.4	Pass

6.2 Test Graphs

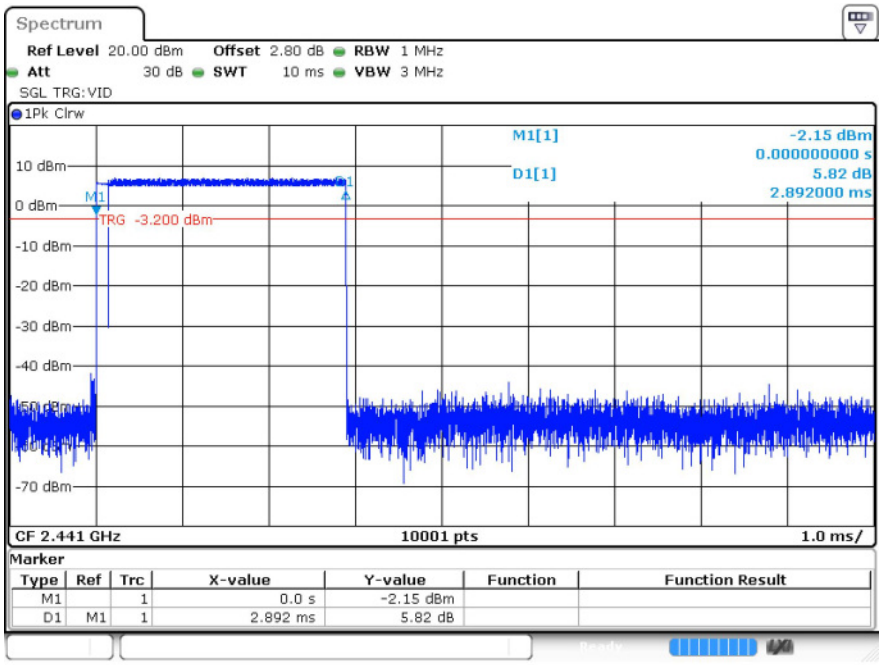
Test Graphs	
GFSK_DH5/MCH	 

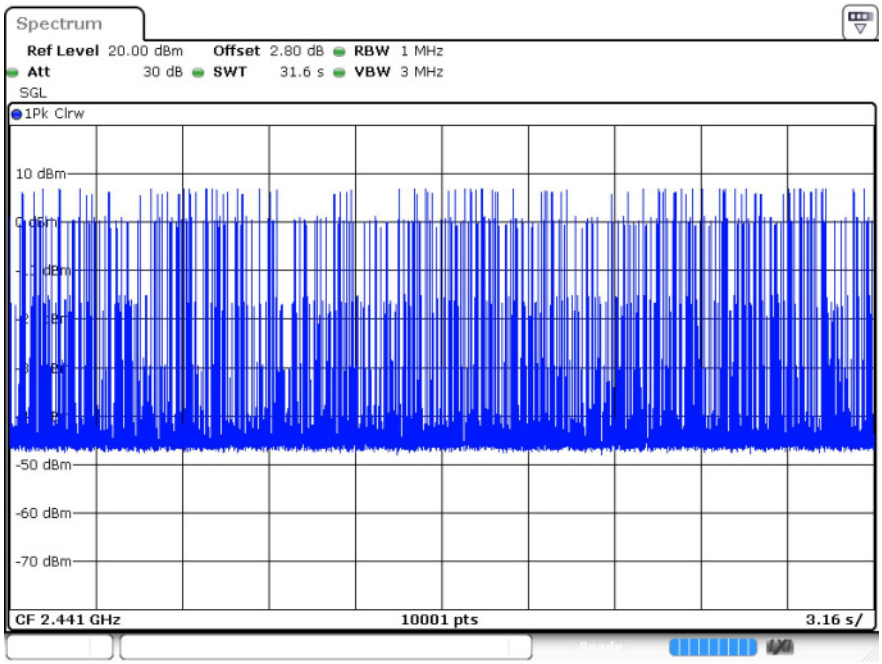
π/4DQPSK
_2DH5/MCH





8DPSK _3DH5/MCH



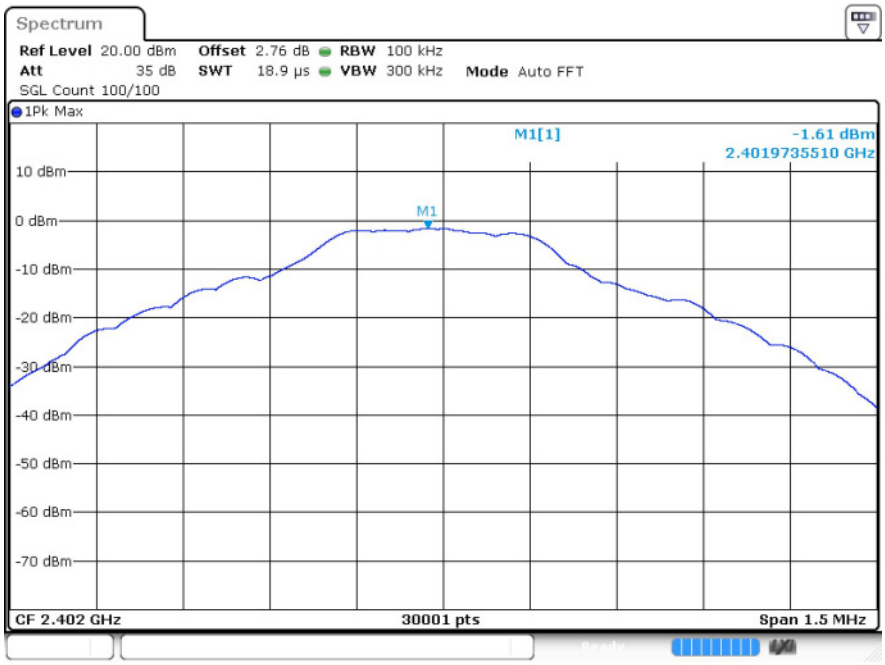
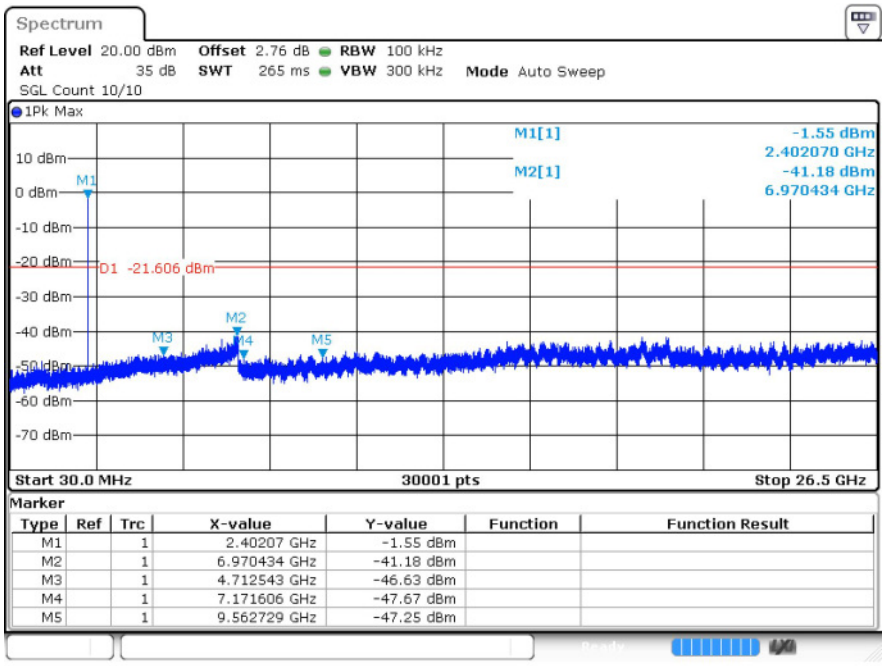


7 RF Conducted Spurious Emissions

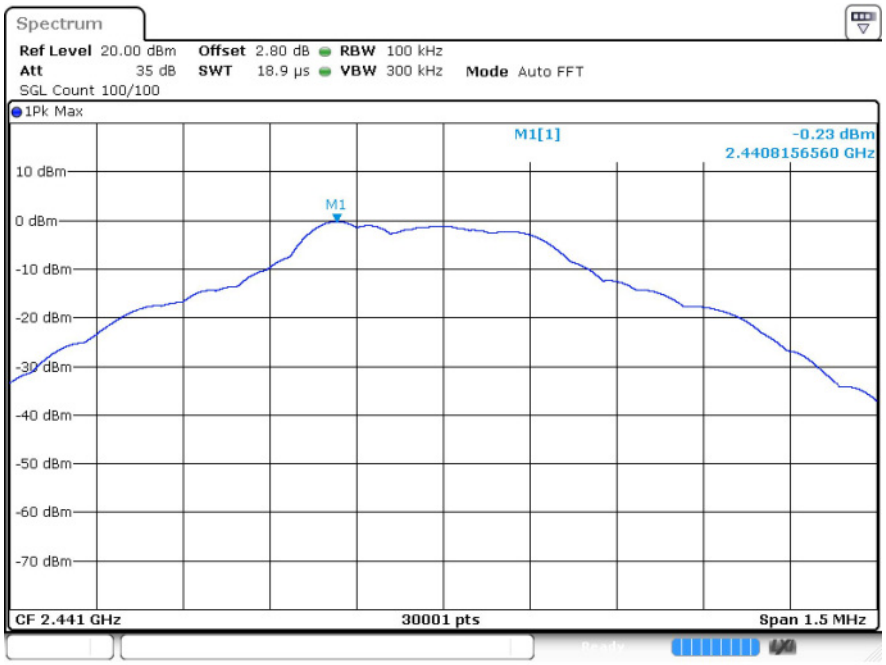
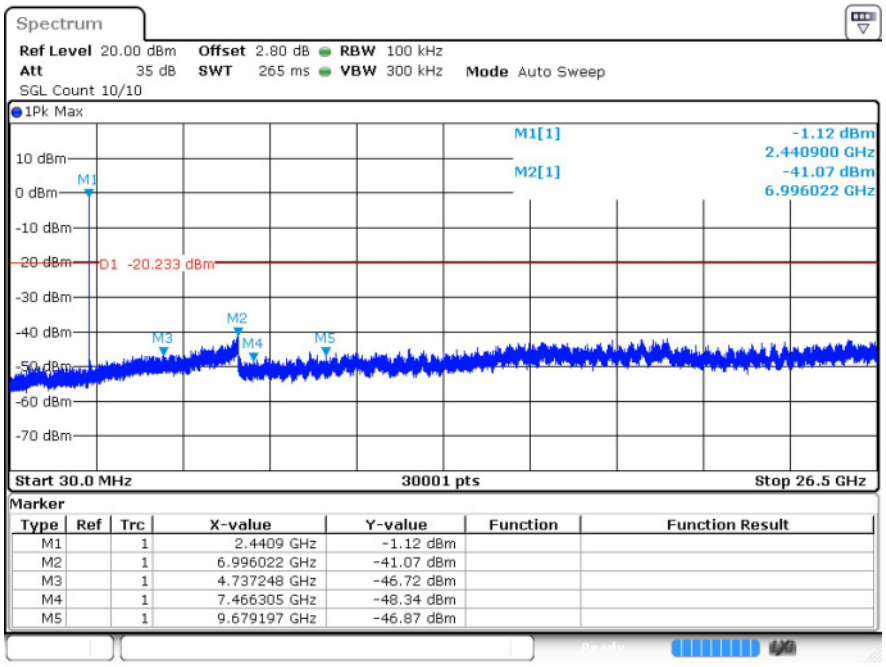
7.1 Test Result

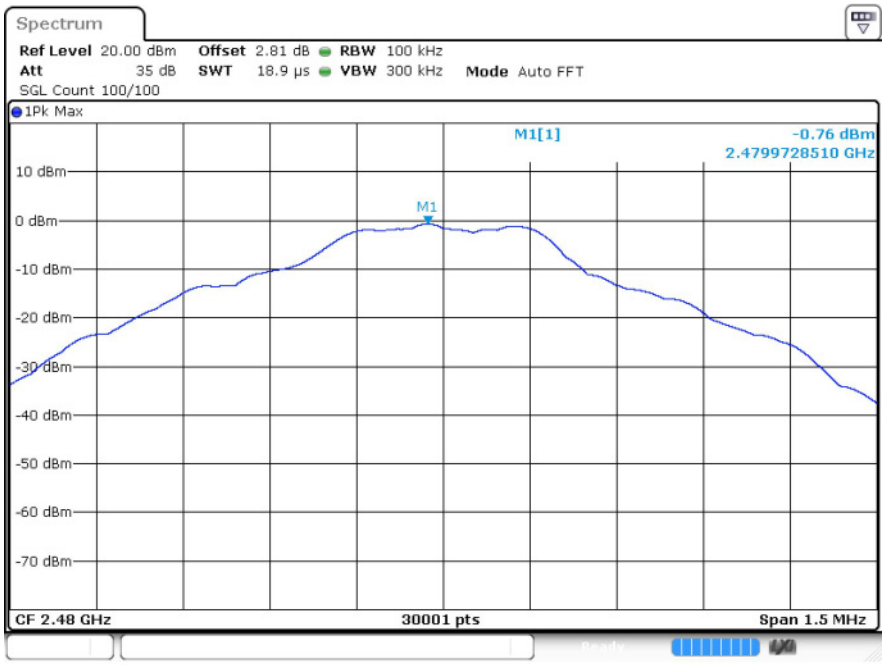
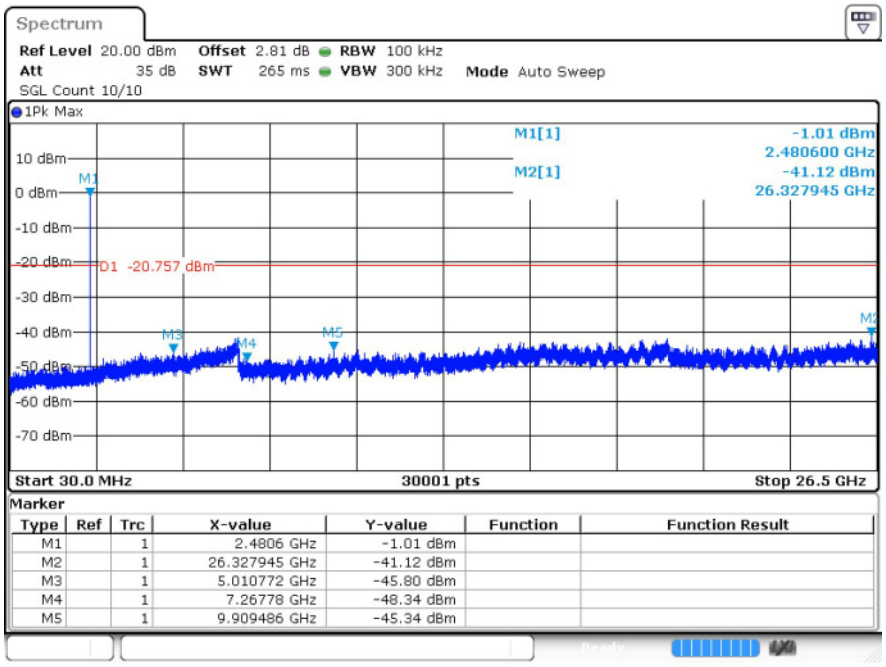
Mode	Channel	Max. Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	-39.57	-20	Pass
	MCH	-40.83	-20	Pass
	HCH	-40.36	-20	Pass
π/4DQPSK	LCH	-37.98	-20	Pass
	MCH	-39.27	-20	Pass
	HCH	-39.96	-20	Pass
8DPSK	LCH	-38.33	-20	Pass
	MCH	-39.72	-20	Pass
	HCH	-38.72	-20	Pass

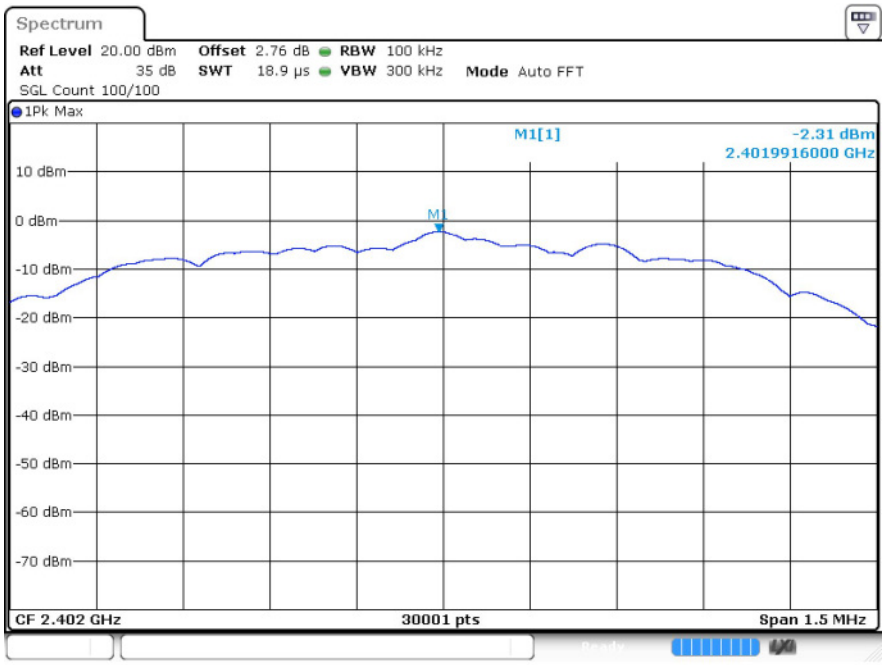
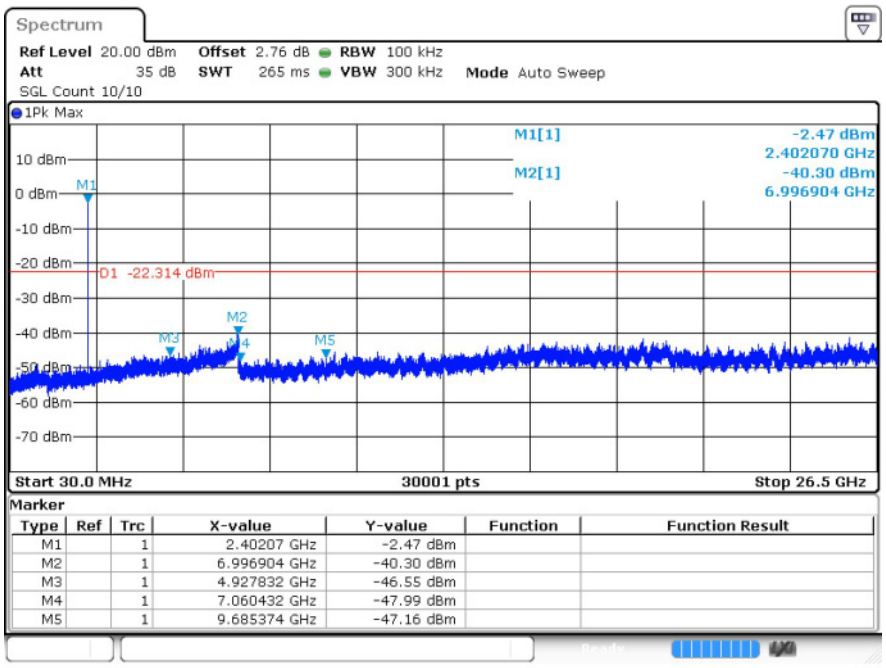
7.2 Test Graphs

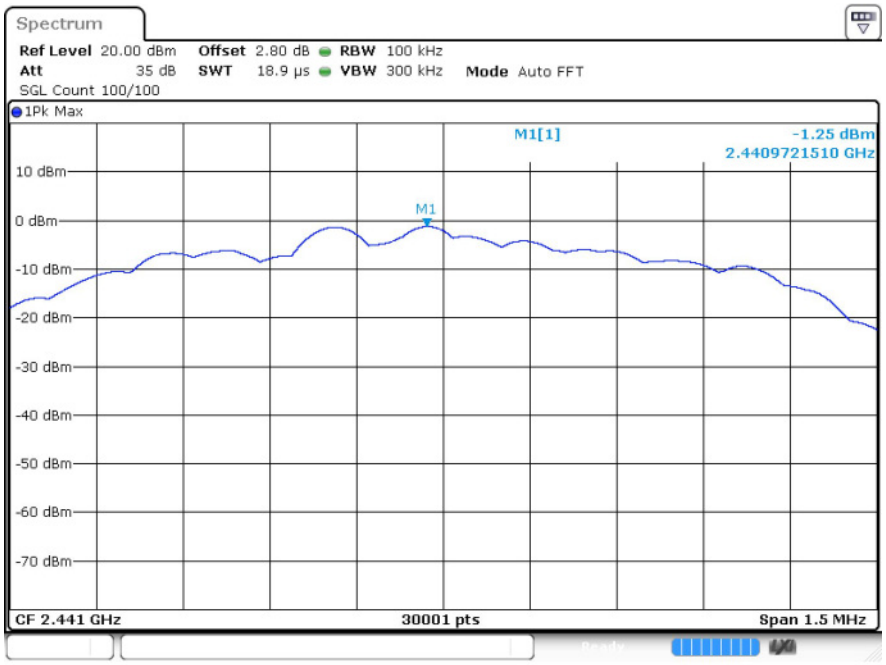
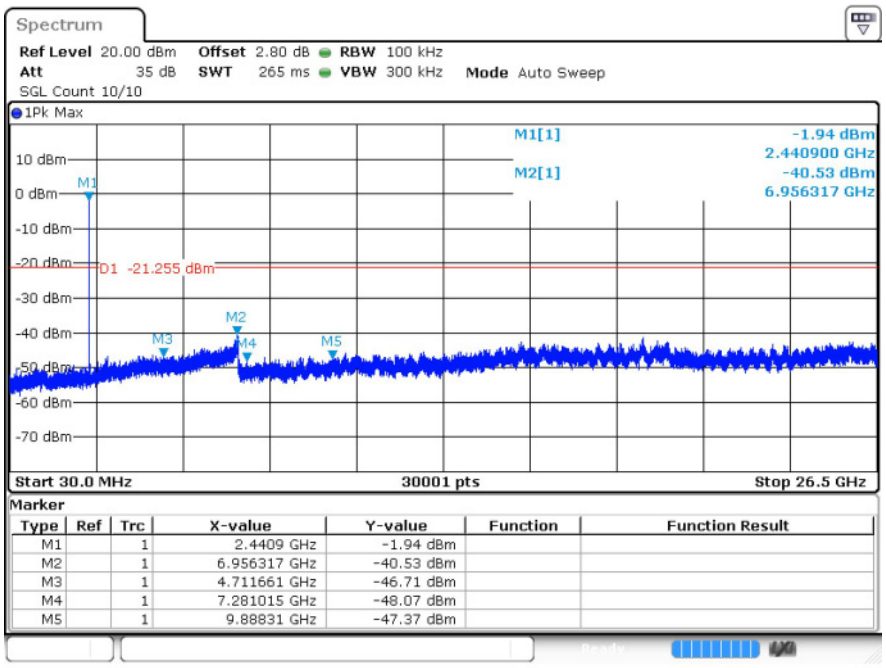
GFSK_LCH_Graphs	
Pref	
Puw	

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40207 GHz	-1.55 dBm		
M2		1	6.970434 GHz	-41.18 dBm		
M3		1	4.712543 GHz	-46.63 dBm		
M4		1	7.171606 GHz	-47.67 dBm		
M5		1	9.562729 GHz	-47.25 dBm		

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 | -2.47 dBm M2 | 1 | 6.996904 GHz | -40.30 dBm M3 | 1 | 4.927832 GHz | -46.55 dBm M4 | 1 | 7.060432 GHz | -47.99 dBm M5 | 1 | 9.685374 GHz | -47.16 dBm

π/4DQPSK_MCH_Graphs	
Pref	
Puw	

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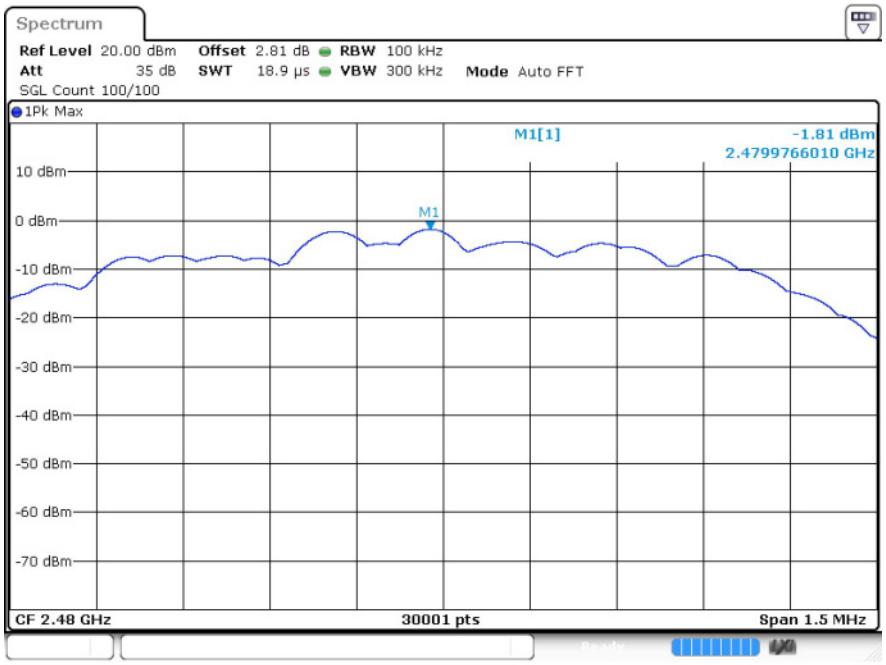
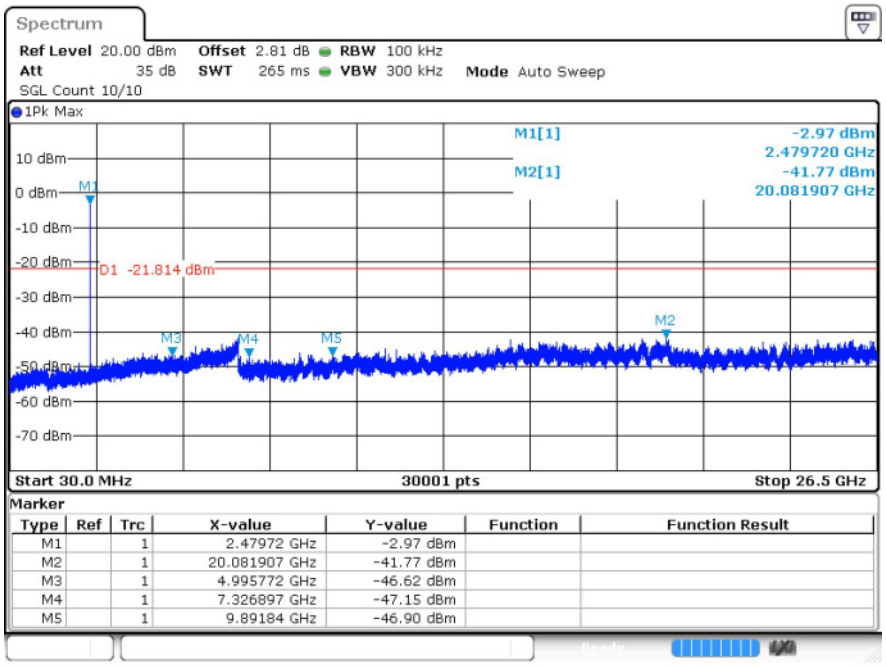
Pref	
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