



Appendix A

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

Product Name: ELEGOO ESP-32 Development Board

Trade Mark: ELEGOO

Test Model: EL-SM-009

Environmental Conditions

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



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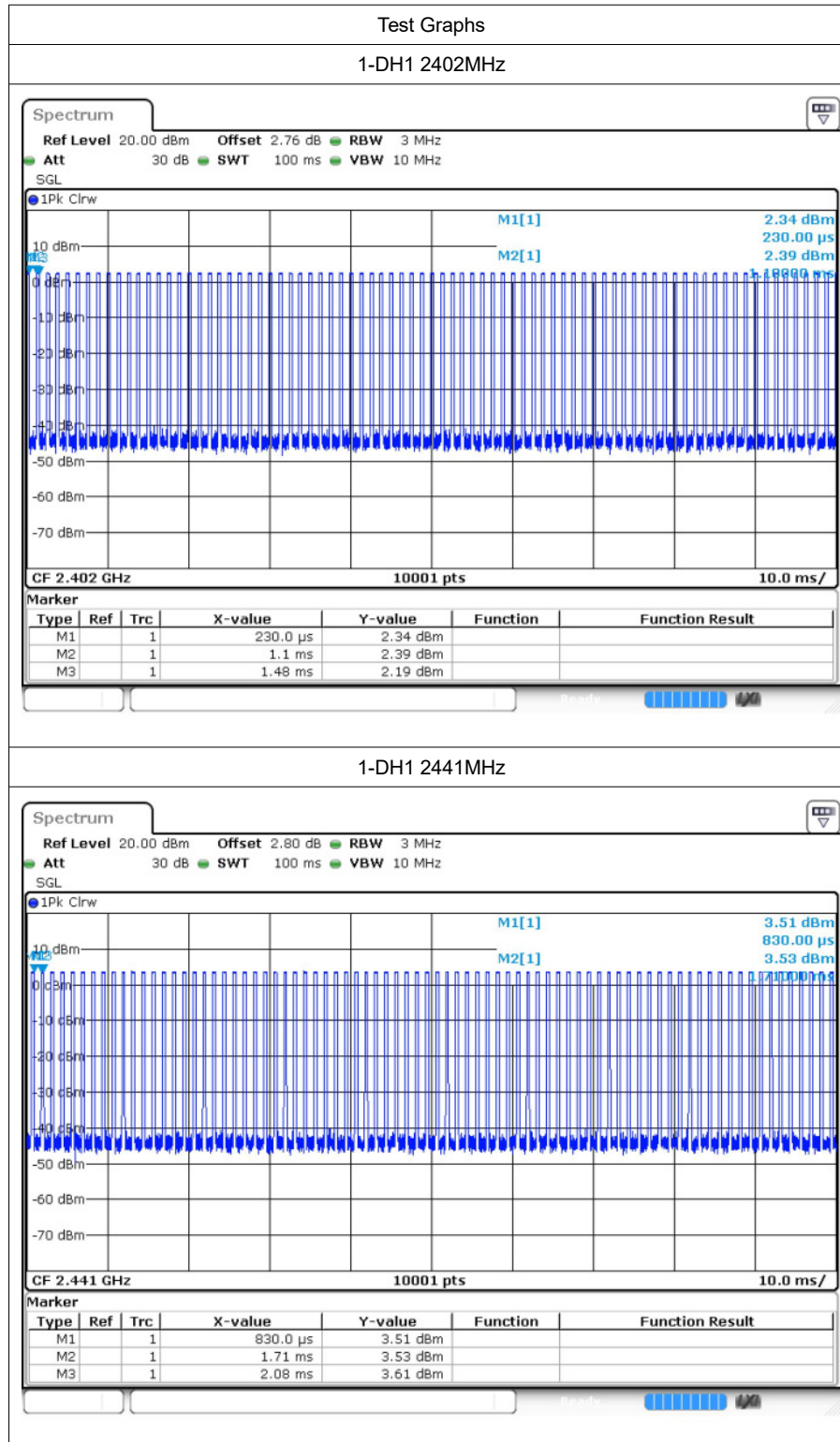
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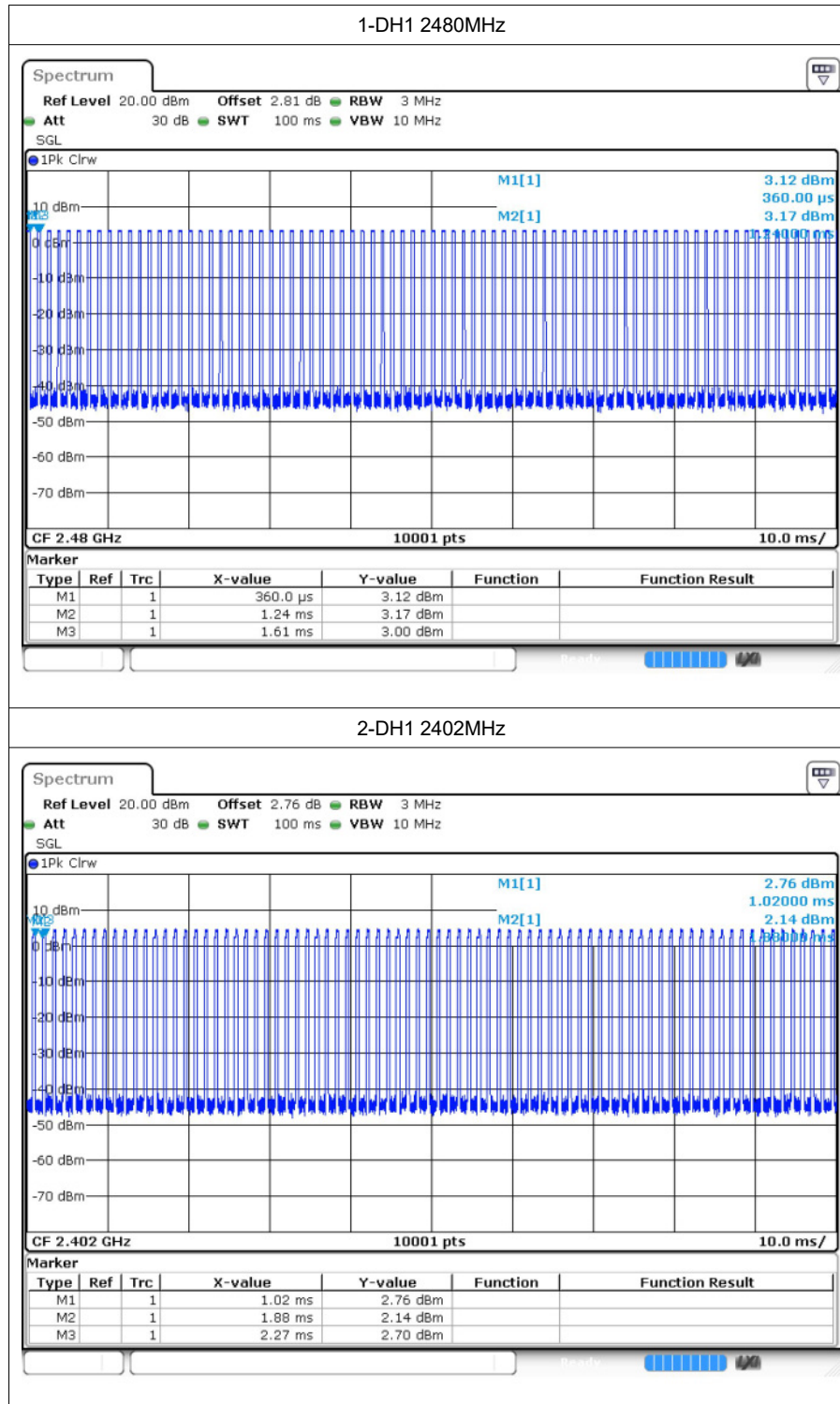
1 Duty Cycle

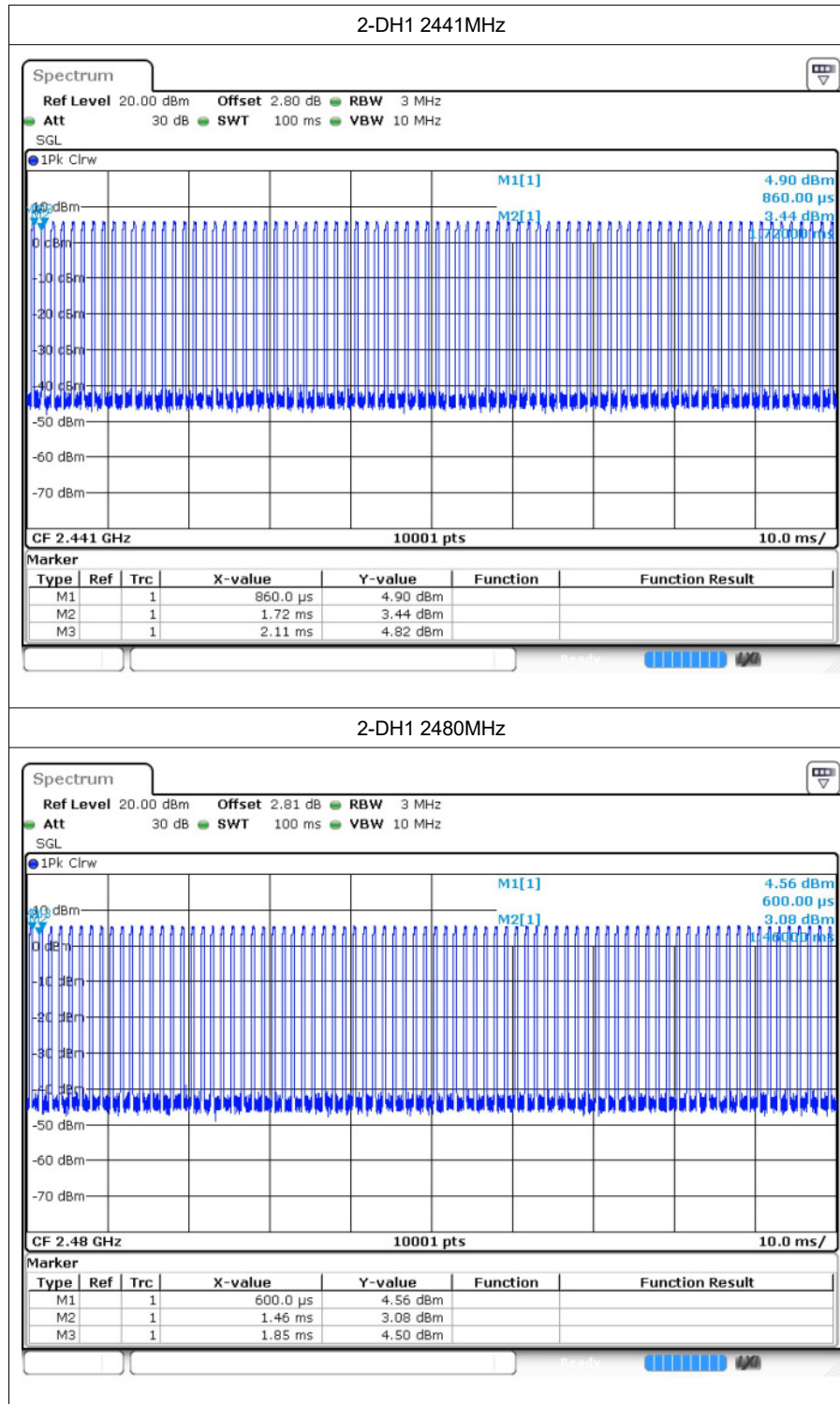
1.1 Test Result

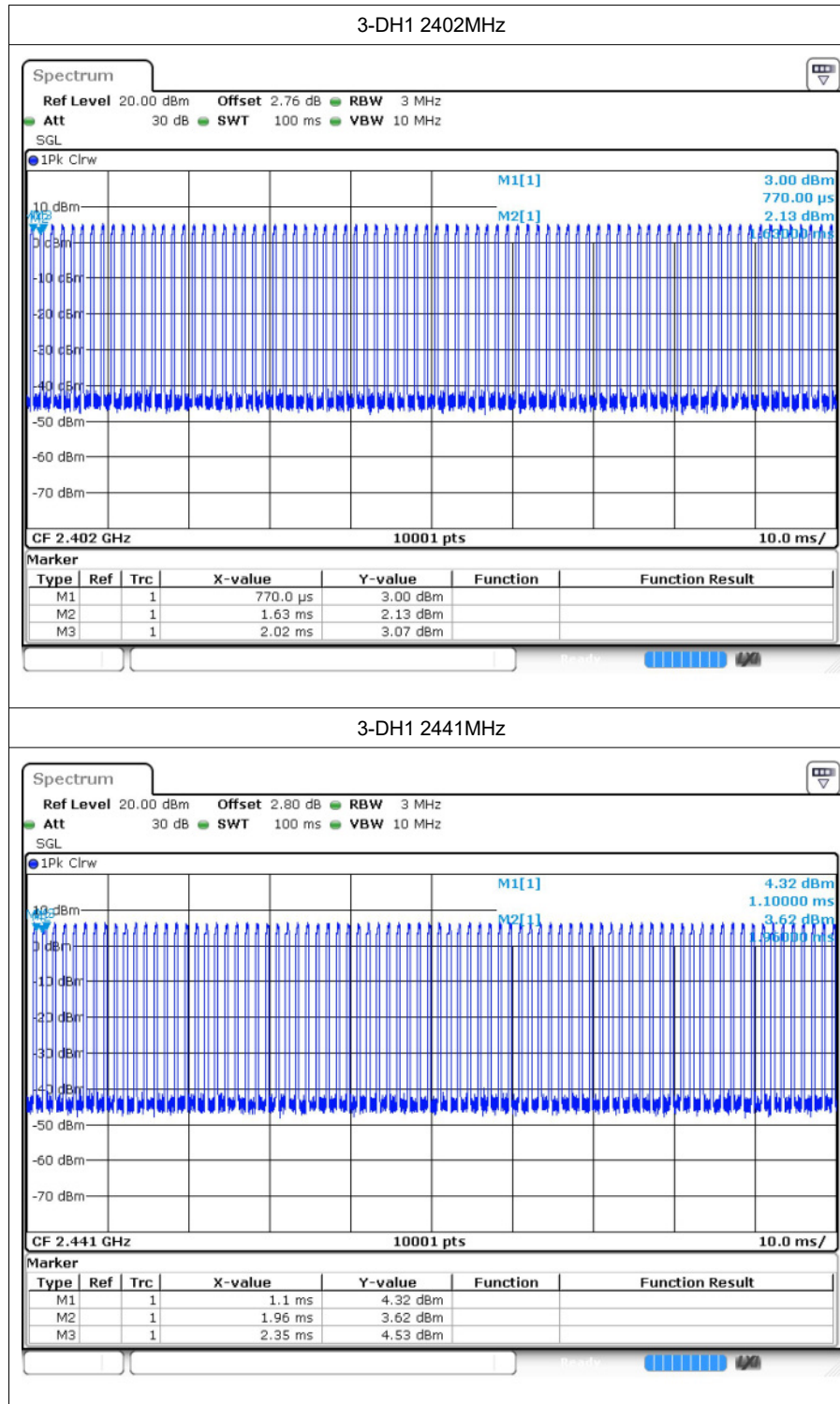
Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor	1/T (kHz)
1-DH1	2402	31.21	5.06	2.63
1-DH1	2441	30.57	5.15	2.7
1-DH1	2480	30.73	5.12	2.7
2-DH1	2402	32	4.95	2.56
2-DH1	2441	32	4.95	2.56
2-DH1	2480	32	4.95	2.56
3-DH1	2402	32	4.95	2.56
3-DH1	2441	32	4.95	2.56
3-DH1	2480	32.23	4.92	2.56

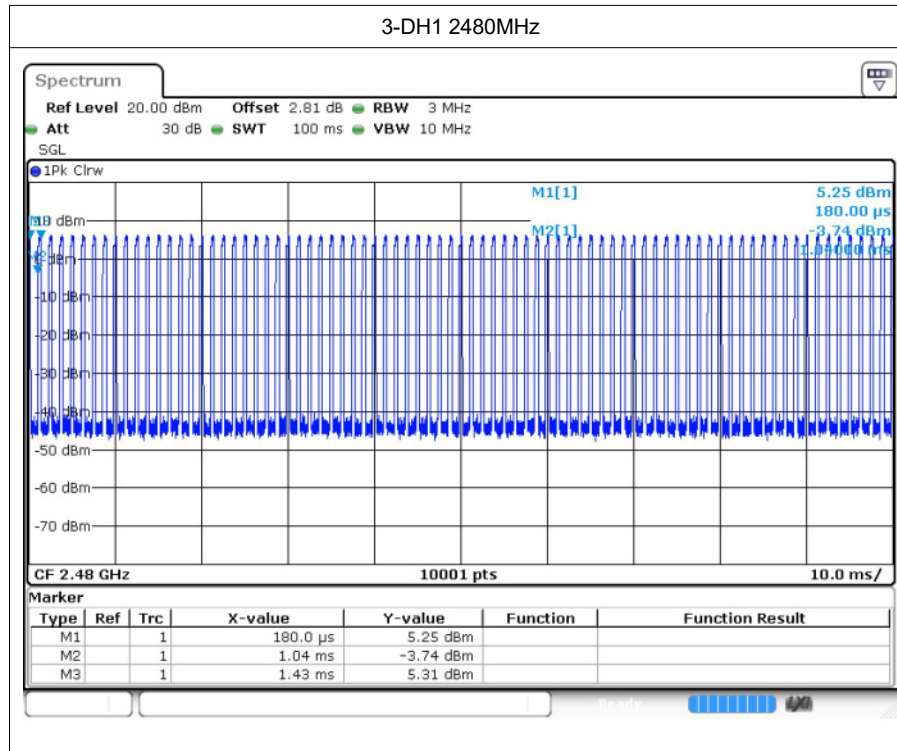
1.2 Test Graphs









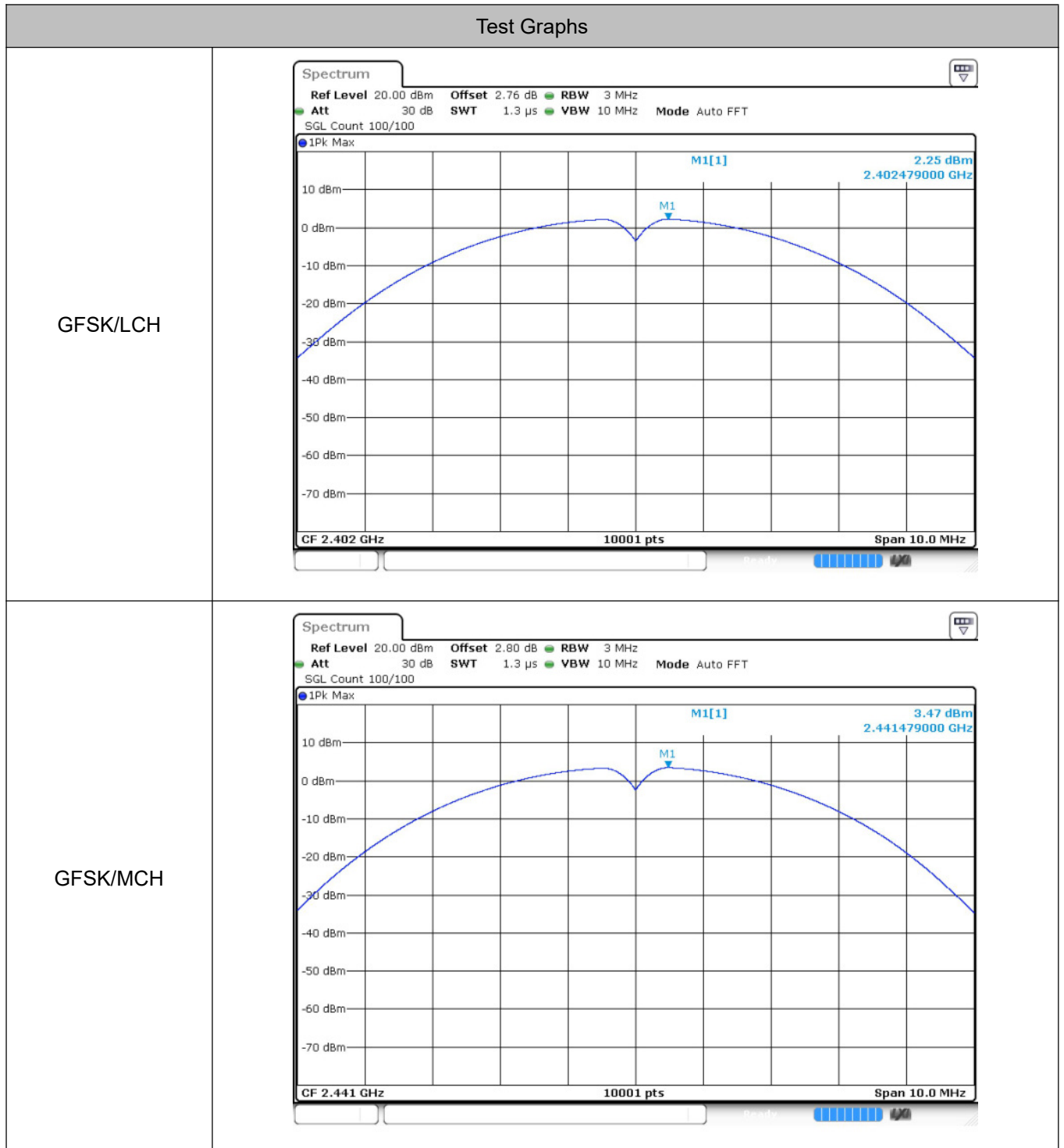


2 Maximum Conducted Peak Output Power

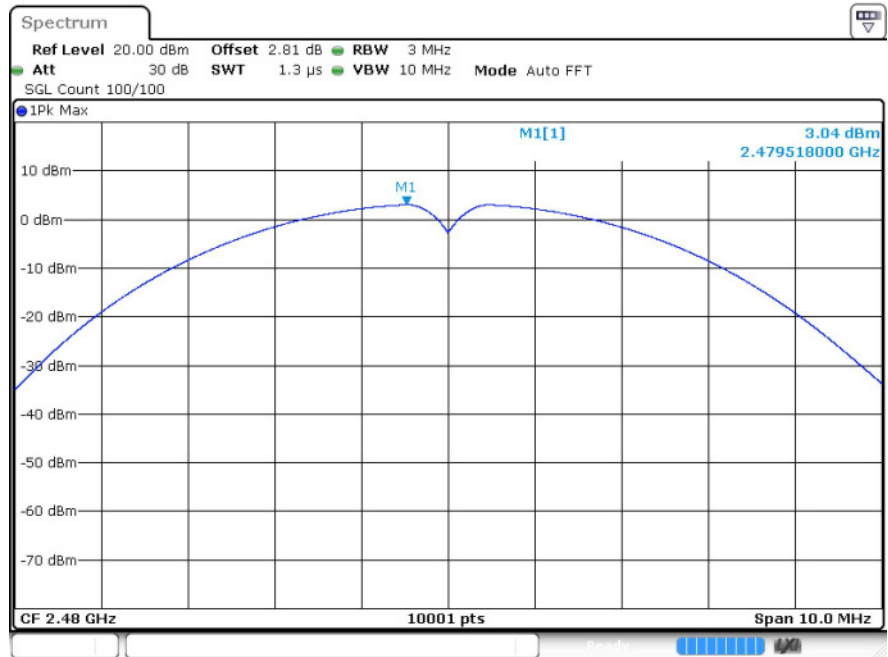
2.1 Test Result

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.25	21	Pass
	MCH	3.47	21	Pass
	HCH	3.04	21	Pass
$\pi/4$ DQPSK	LCH	3.86	21	Pass
	MCH	5.32	21	Pass
	HCH	4.89	21	Pass
8DPSK	LCH	4.51	21	Pass
	MCH	5.51	21	Pass
	HCH	5.73	21	Pass

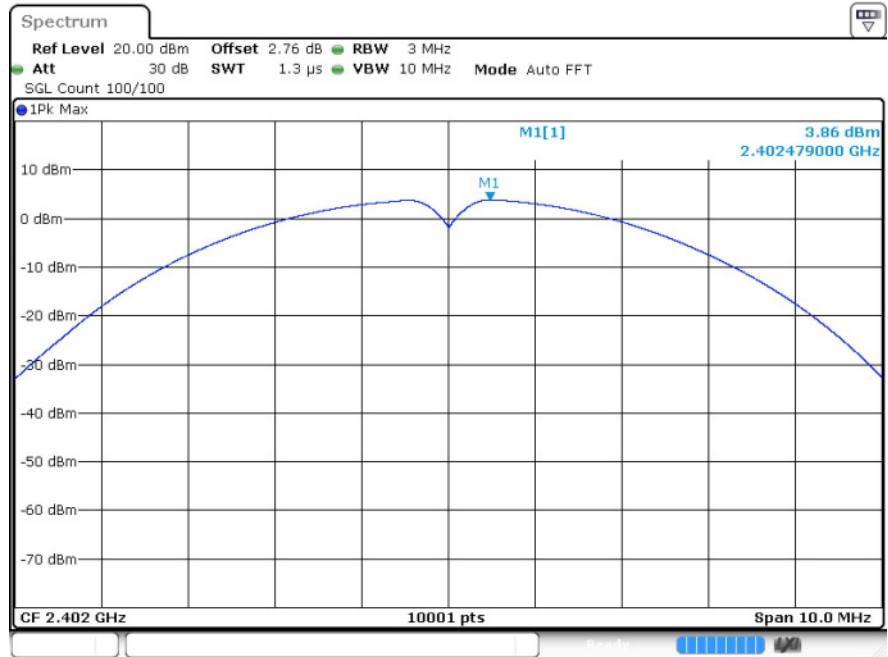
2.2 Test Graphs



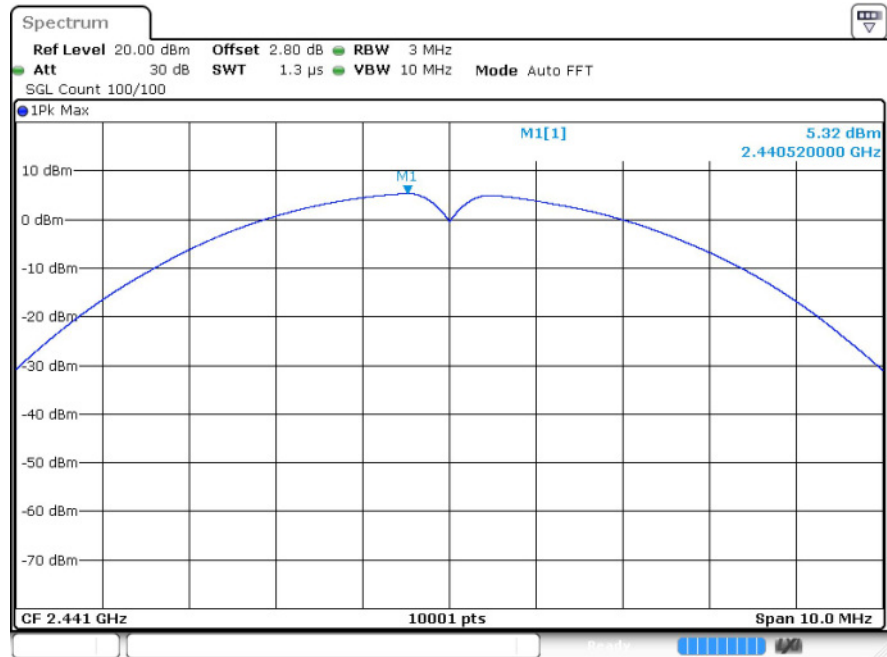
GFSK/HCH



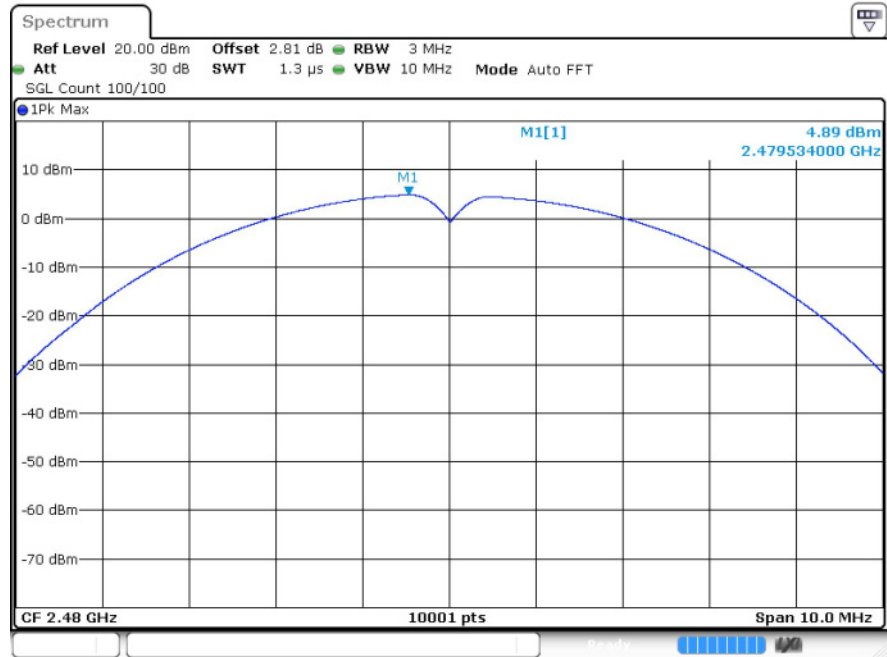
$\pi/4$ DQPSK/LCH



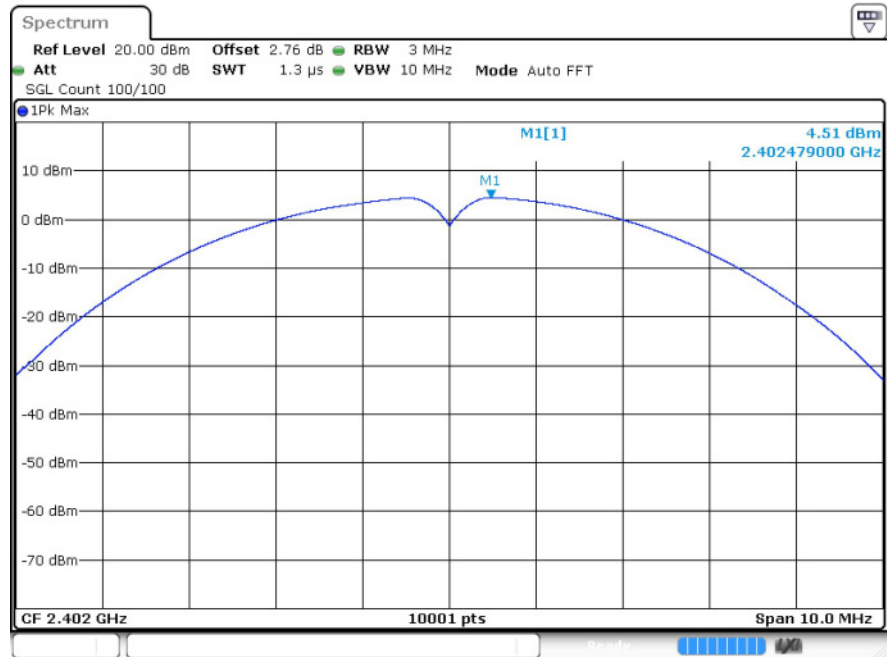
$\pi/4$ DQPSK/MCH



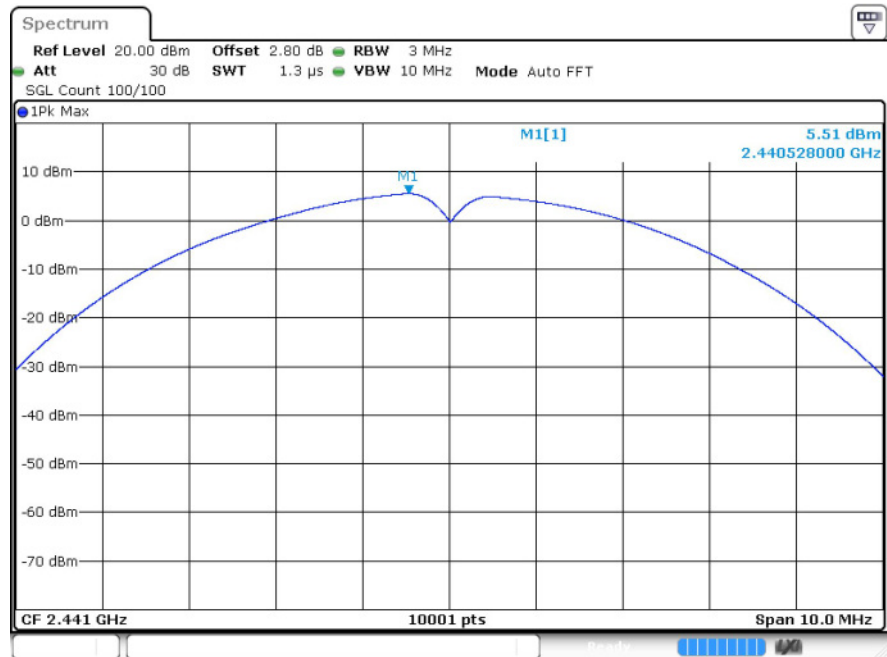
$\pi/4$ DQPSK/HCH



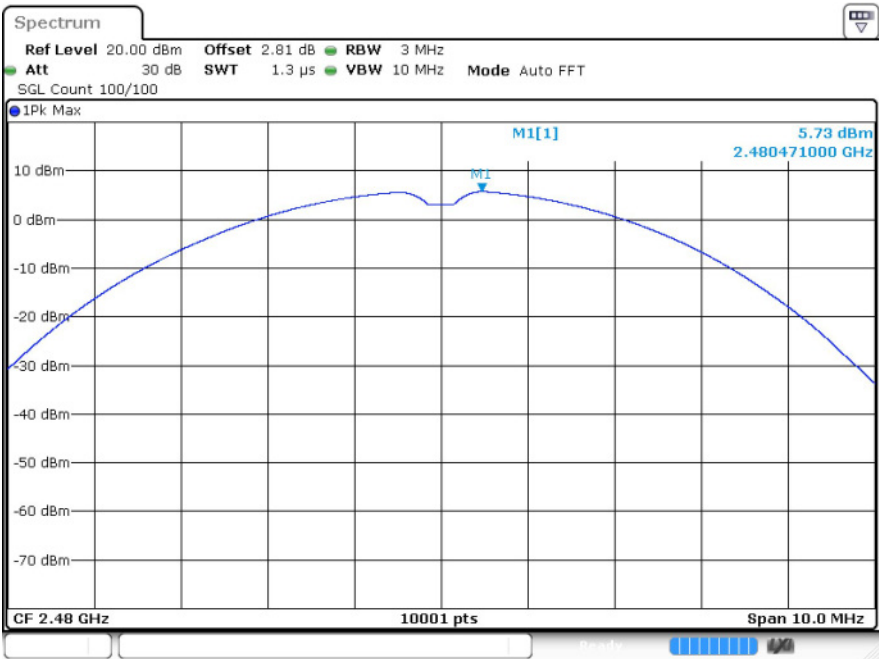
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

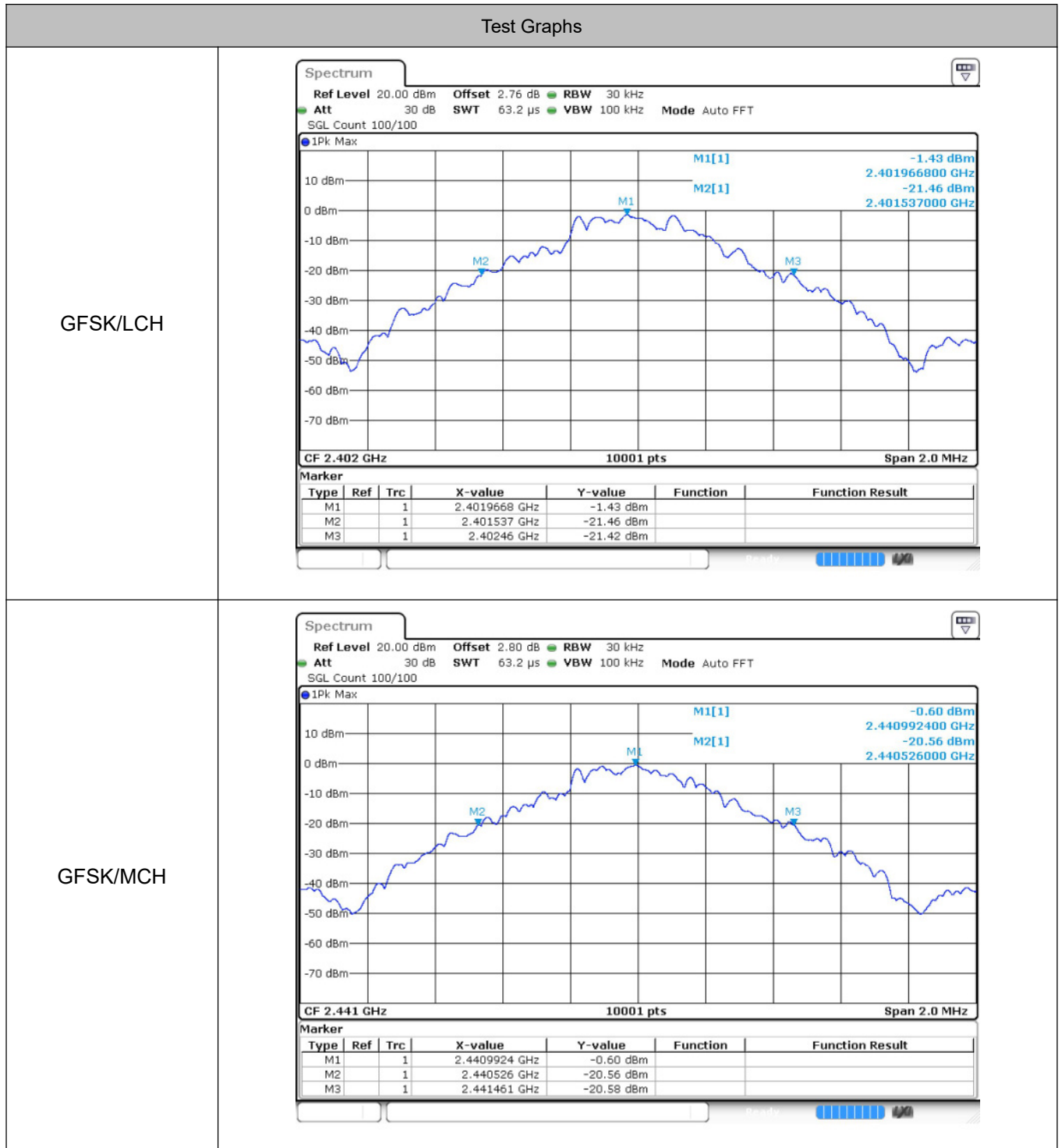


3 20dB Bandwidth

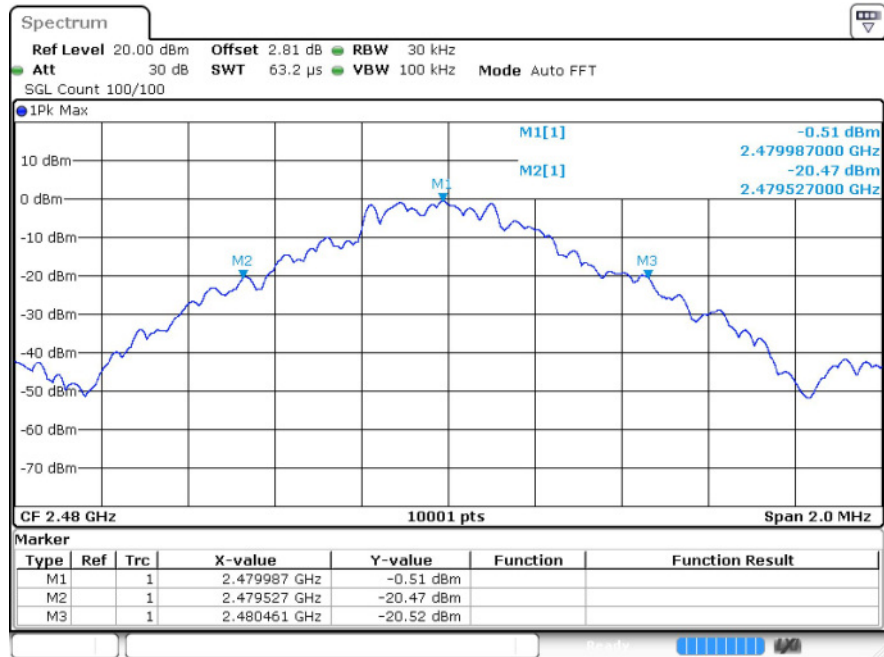
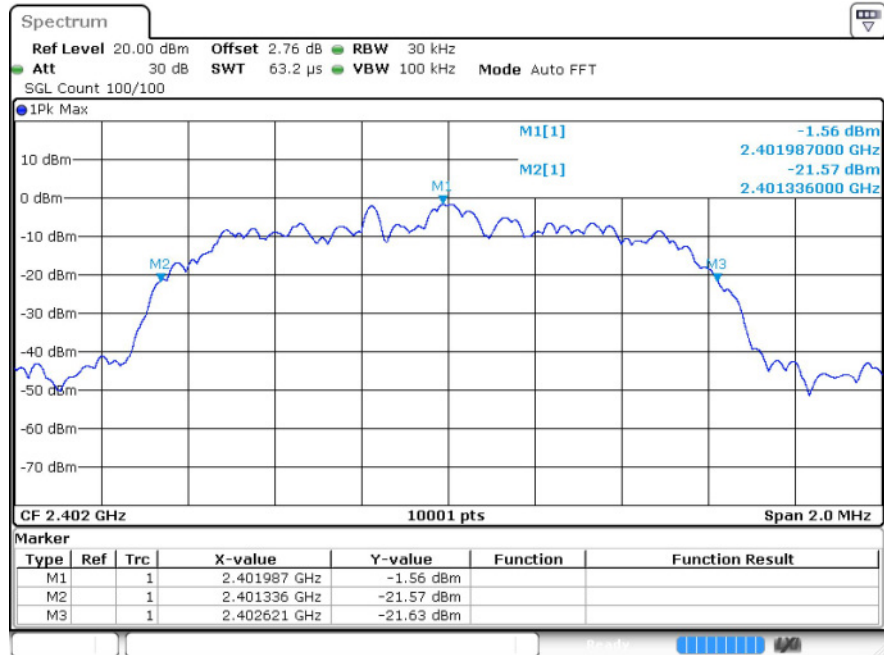
3.1 Test Result

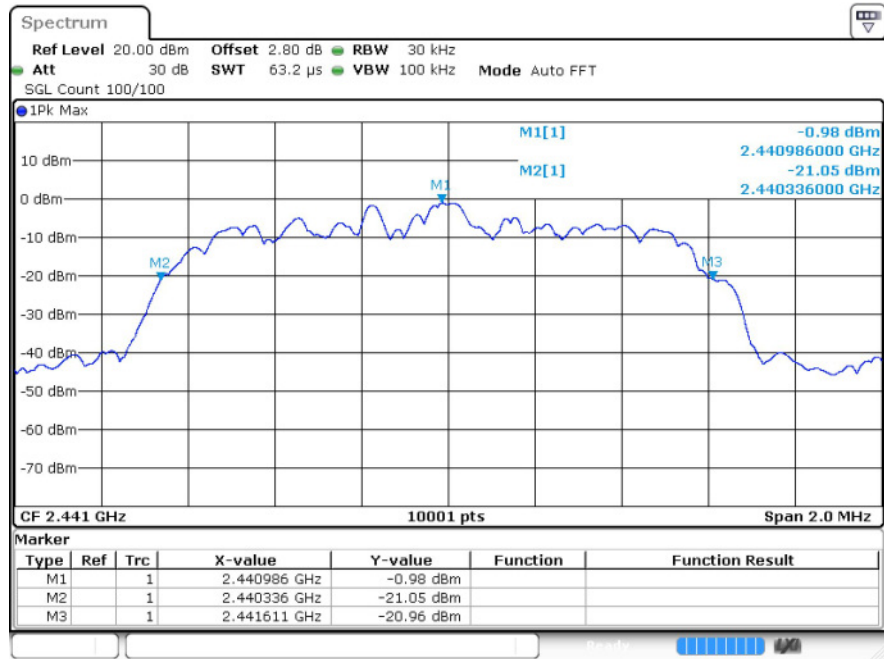
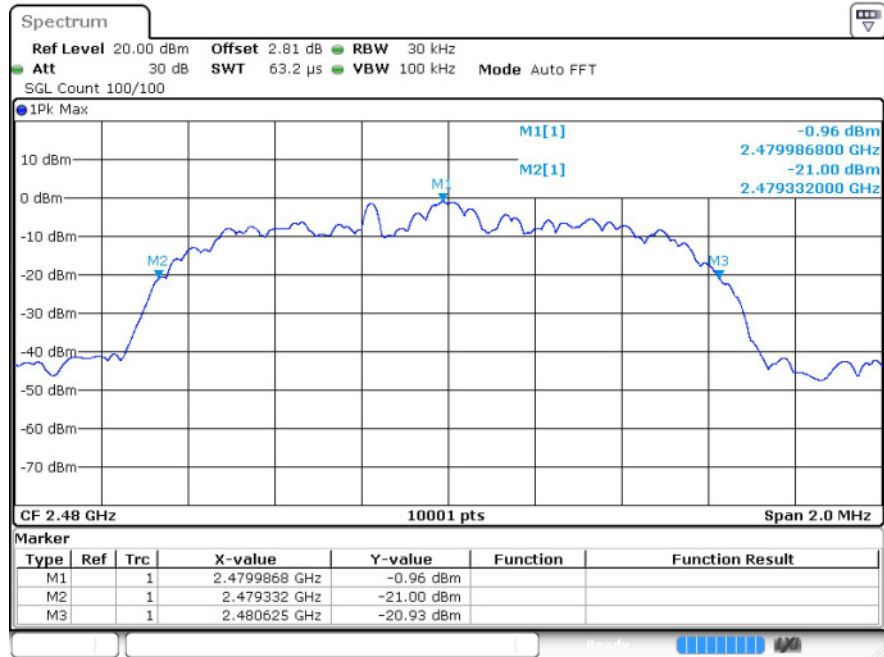
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.923	Not Specified	Pass
	MCH	0.936	Not Specified	Pass
	HCH	0.934	Not Specified	Pass
$\pi/4$ DQPSK	LCH	1.284	Not Specified	Pass
	MCH	1.275	Not Specified	Pass
	HCH	1.293	Not Specified	Pass
8DPSK	LCH	1.277	Not Specified	Pass
	MCH	1.264	Not Specified	Pass
	HCH	1.272	Not Specified	Pass

3.2 Test Graphs

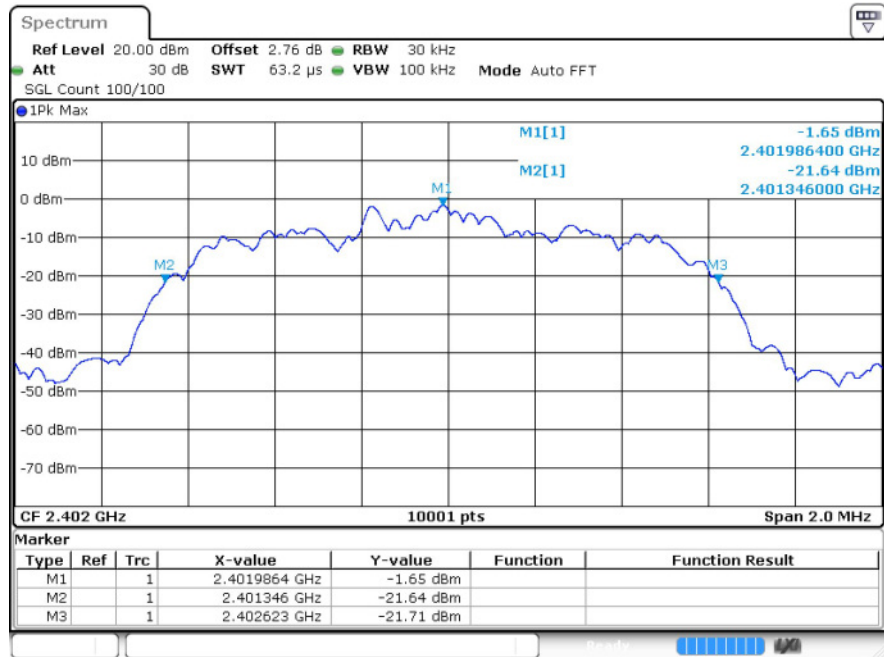


GFSK/HCH

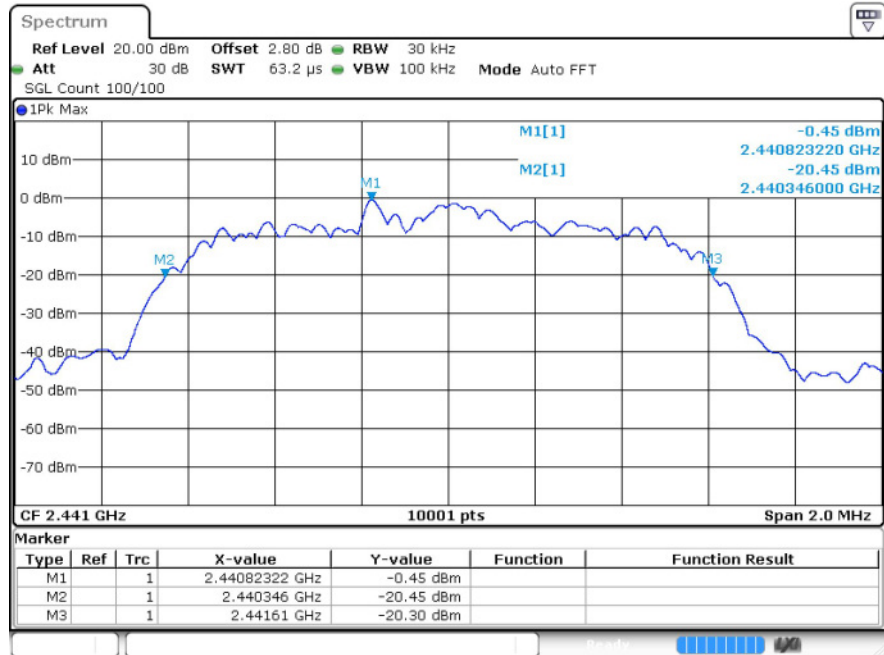

 $\pi/4$ DQPSK/LCH


$\pi/4$ DQPSK/MCH

 $\pi/4$ DQPSK/HCH


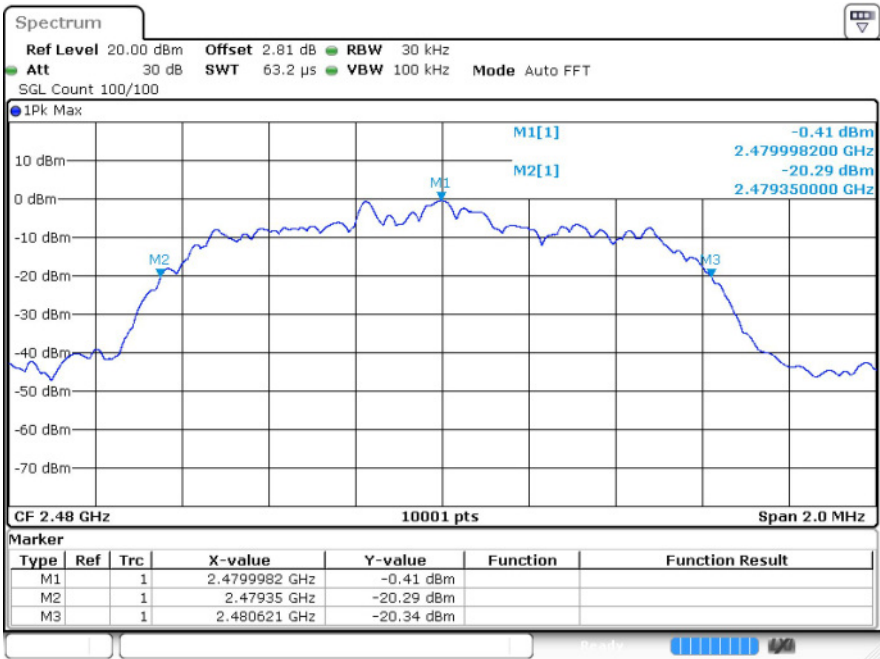
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

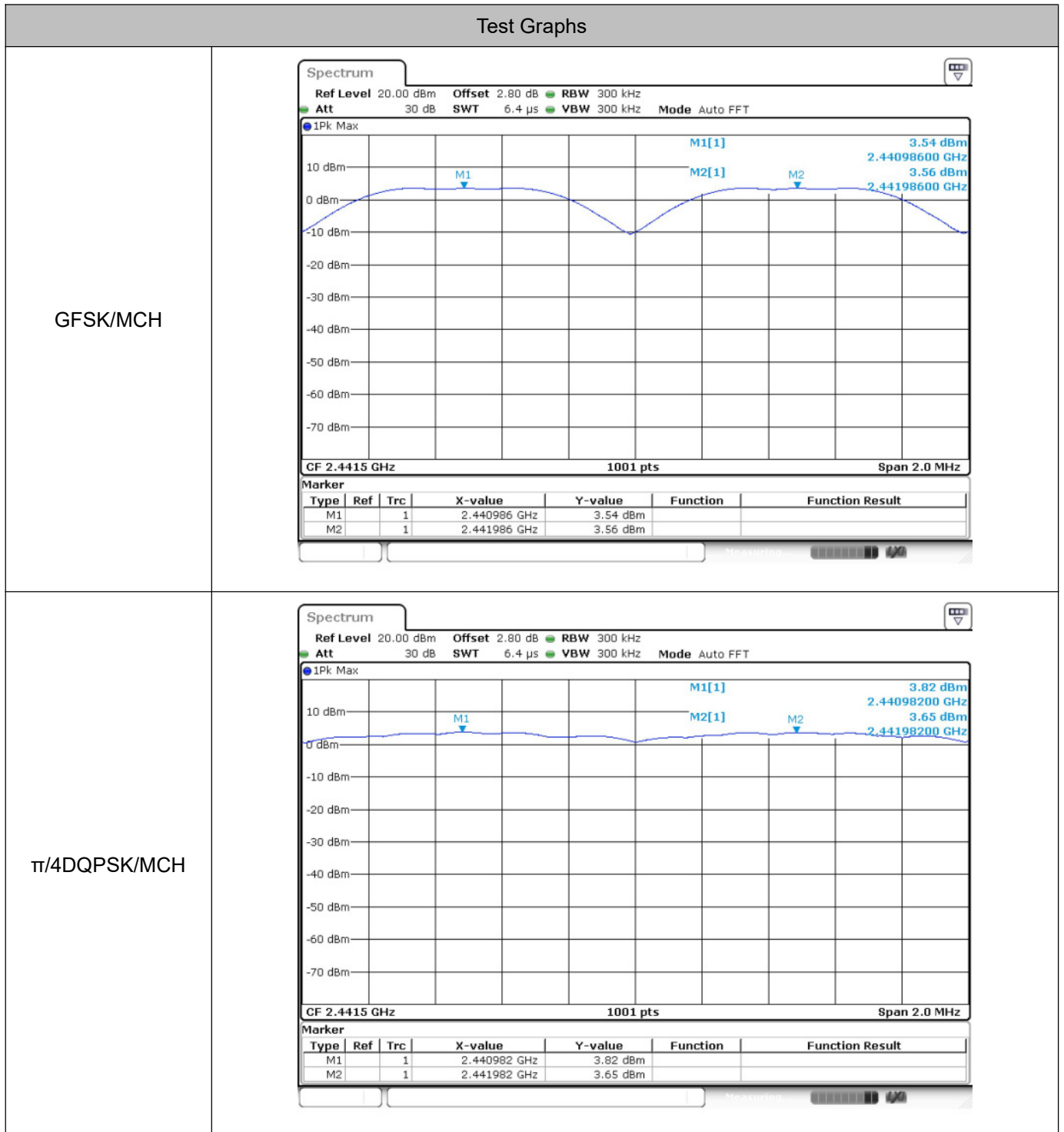


4 Carrier Frequency Separation

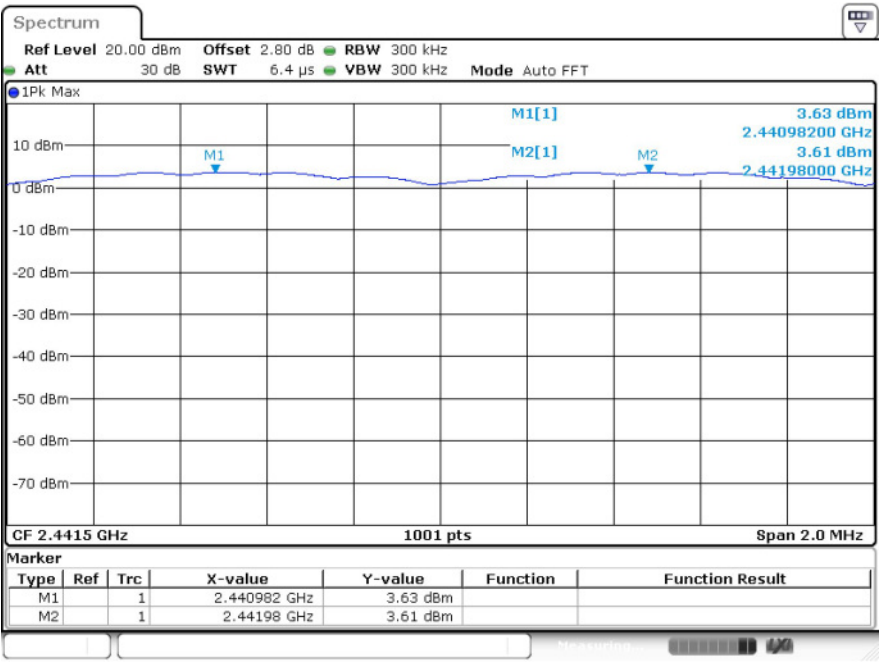
4.1 Test Result

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	MCH	1	0.624	Pass
$\pi/4$ DQPSK	MCH	1	0.85	Pass
8DPSK	MCH	0.998	0.843	Pass

4.2 Test Graphs



8DPSK/MCH

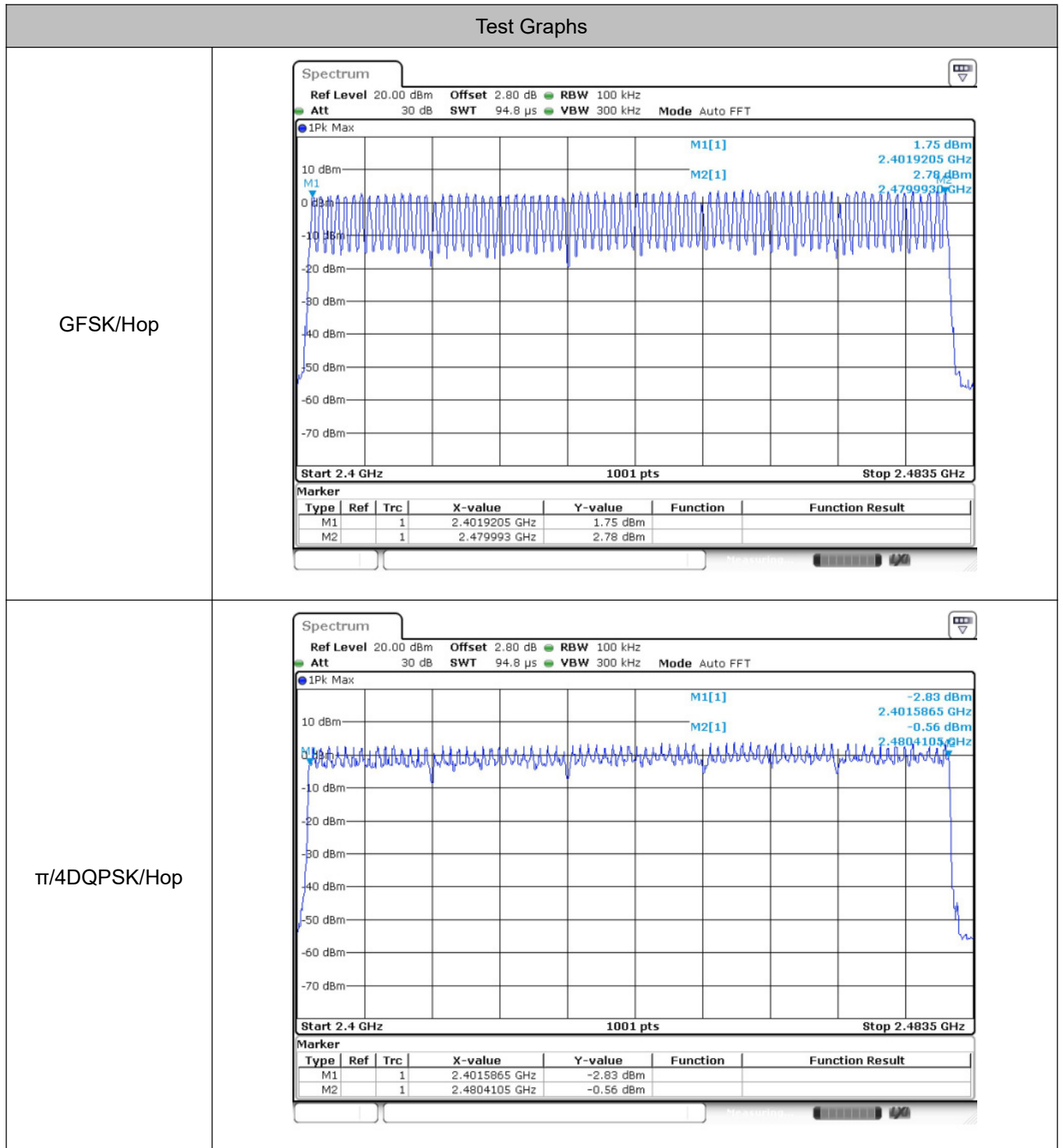


5 Hopping Channel Number

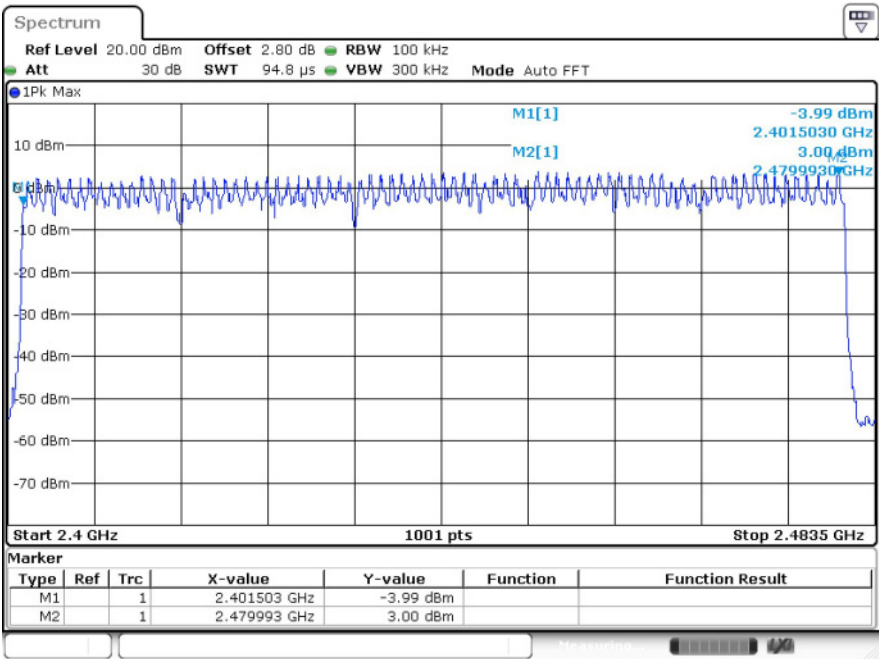
5.1 Test Result

Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

5.2 Test Graphs



8DPSK/Hop





6 Dwell Time

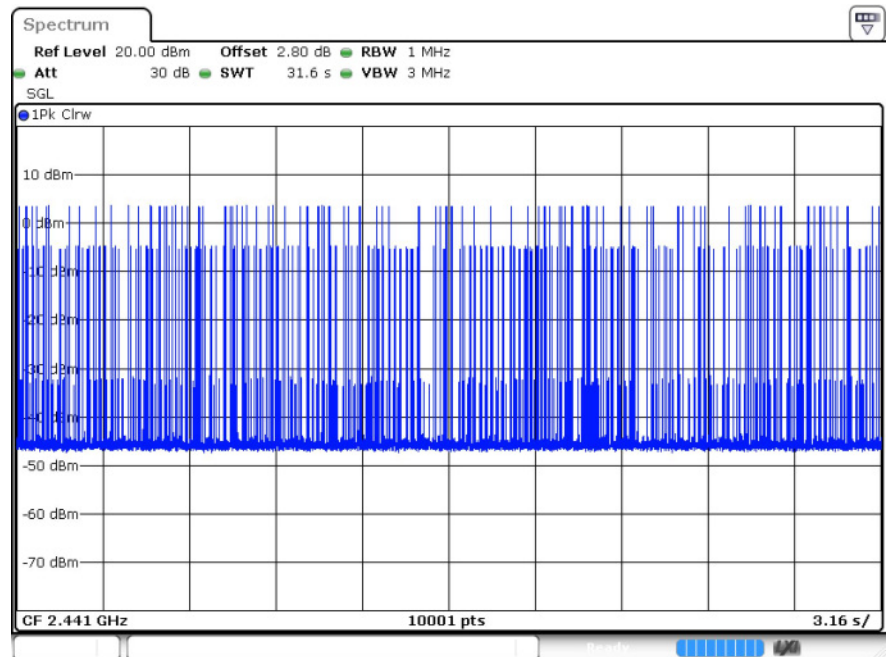
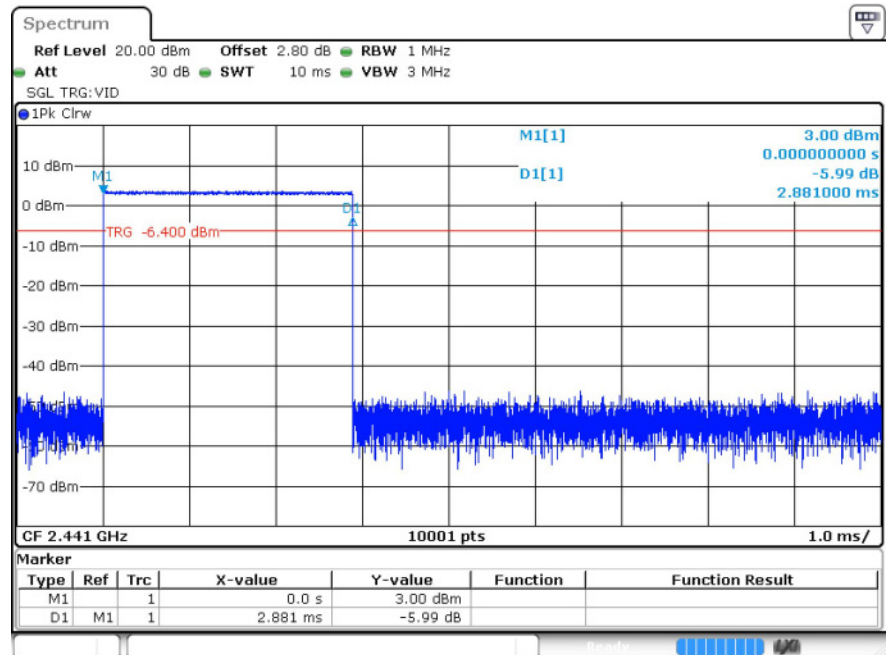
6.1 Test Result

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Limit [s]	Verdict
GFSK	DH5	MCH	2.881	103	296.743	0.4	Pass
$\pi/4$ DQPSK	2DH5	MCH	2.889	105	303.345	0.4	Pass
8DPSK	3DH5	MCH	2.89	97	280.33	0.4	Pass

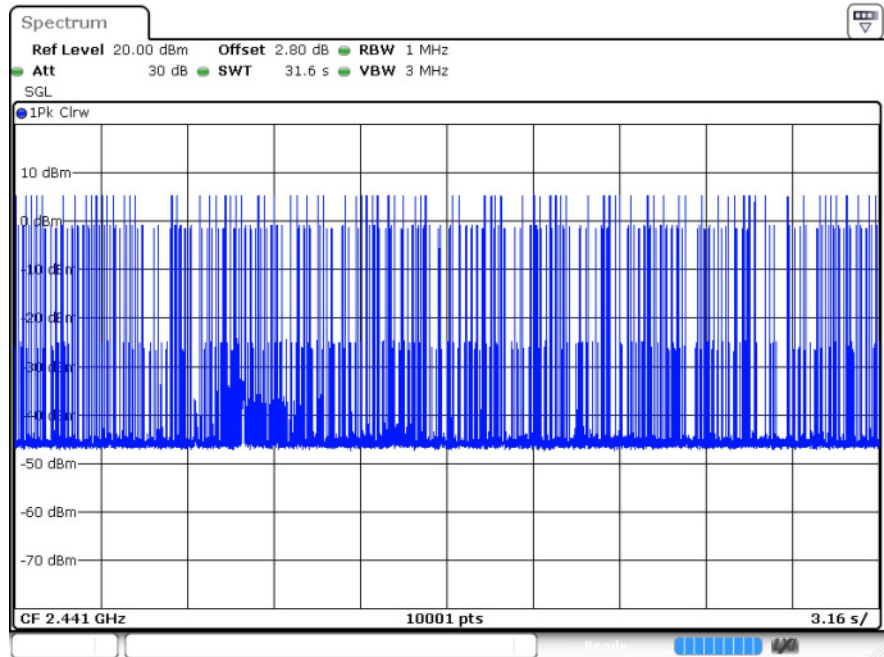
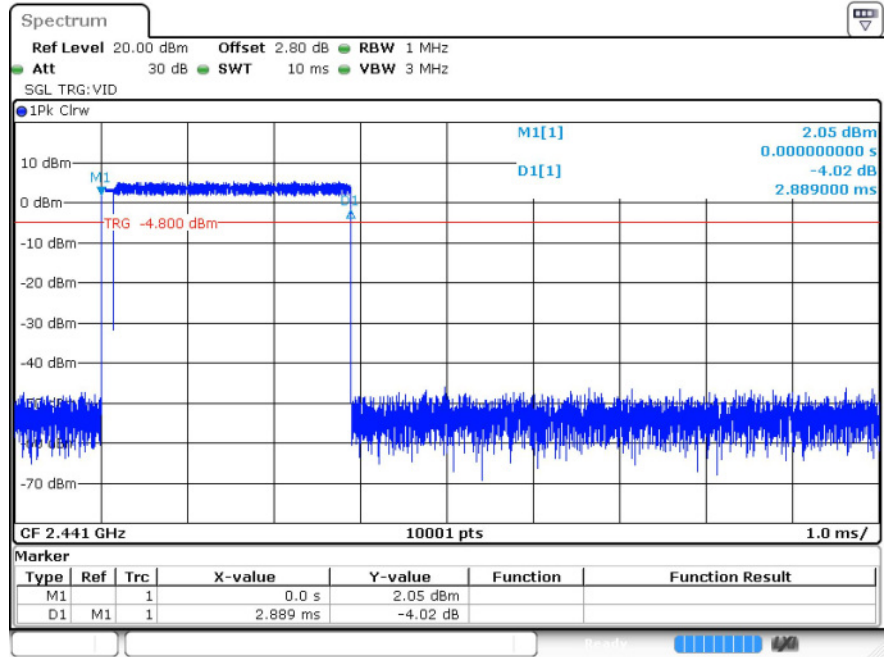
6.2 Test Graphs

Test Graphs

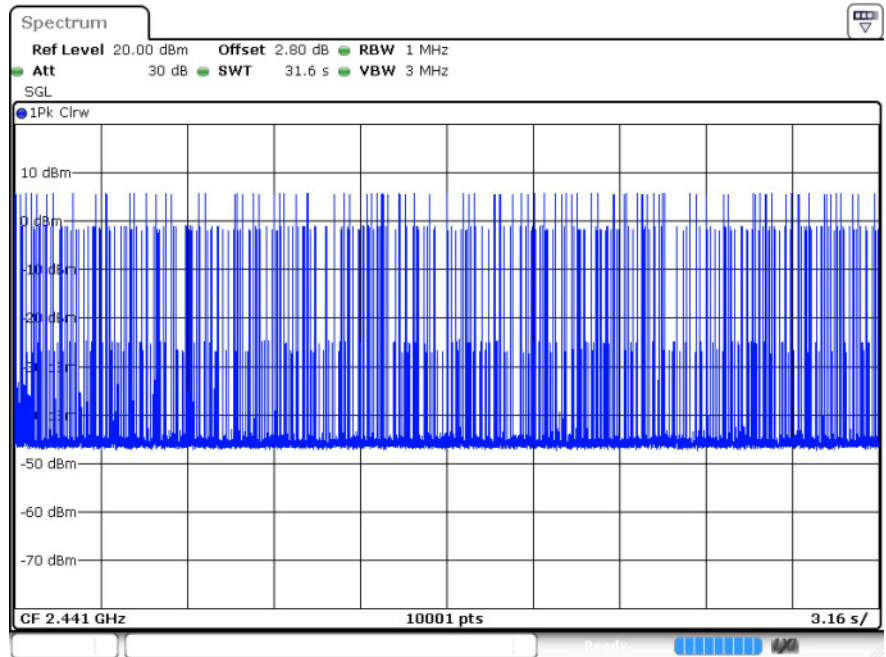
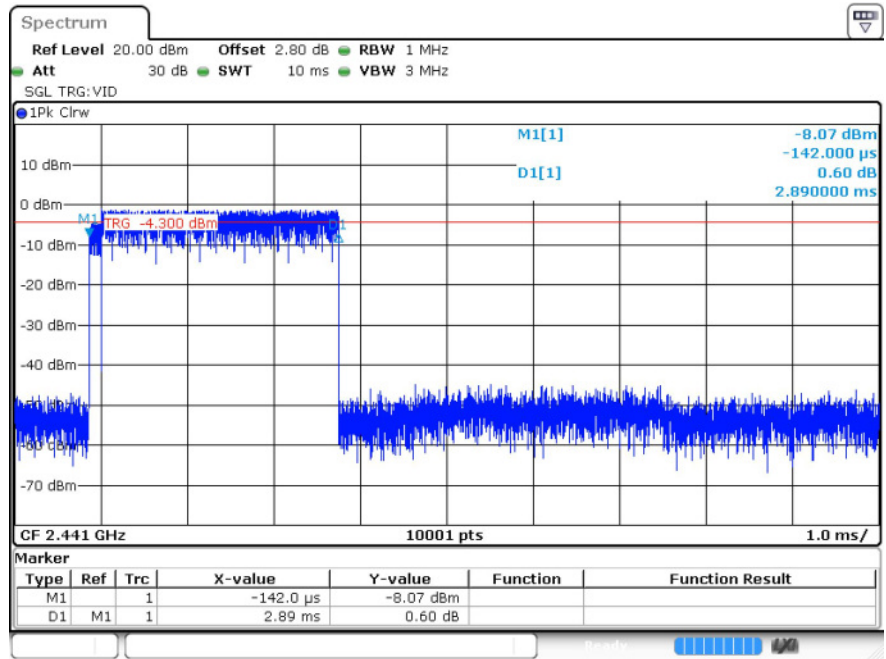
GFSK_DH5/MCH



$\pi/4$ DQPSK
_2DH5/MCH



8DPSK_3DH5/MCH

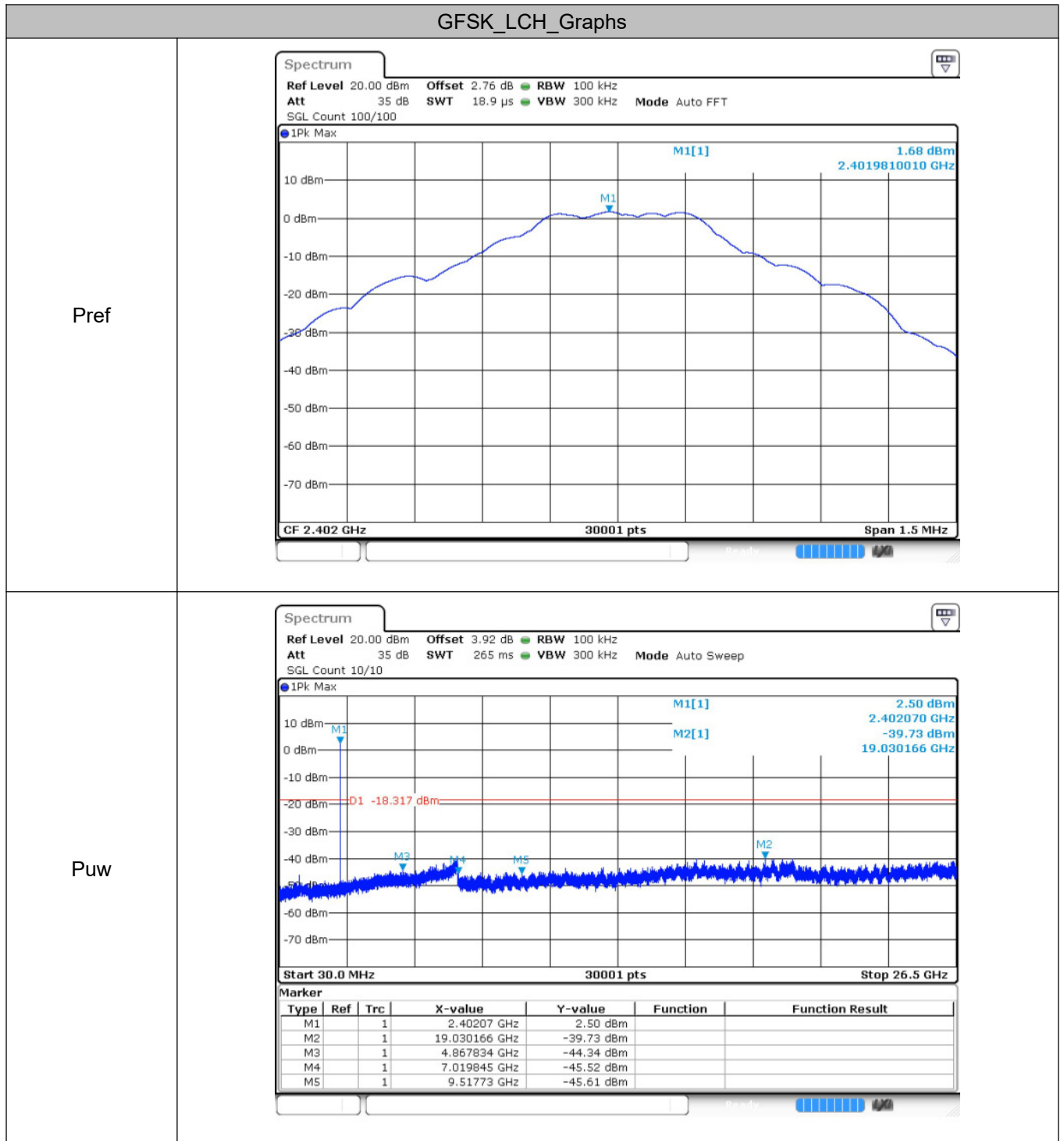


7 RF Conducted Spurious Emissions

7.1 Test Result

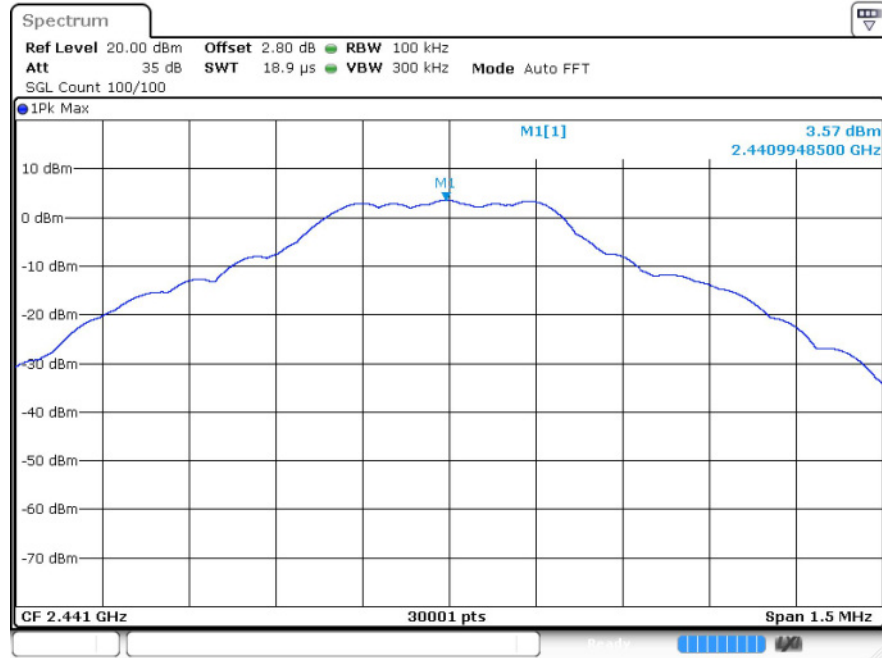
Mode	Channel	Max. Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	-41.41	-20	Pass
	MCH	-42.78	-20	Pass
	HCH	-42.8	-20	Pass
$\pi/4$ DQPSK	LCH	-41.64	-20	Pass
	MCH	-43.01	-20	Pass
	HCH	-41.09	-20	Pass
8DPSK	LCH	-40.97	-20	Pass
	MCH	-42.85	-20	Pass
	HCH	-42.37	-20	Pass

7.2 Test Graphs

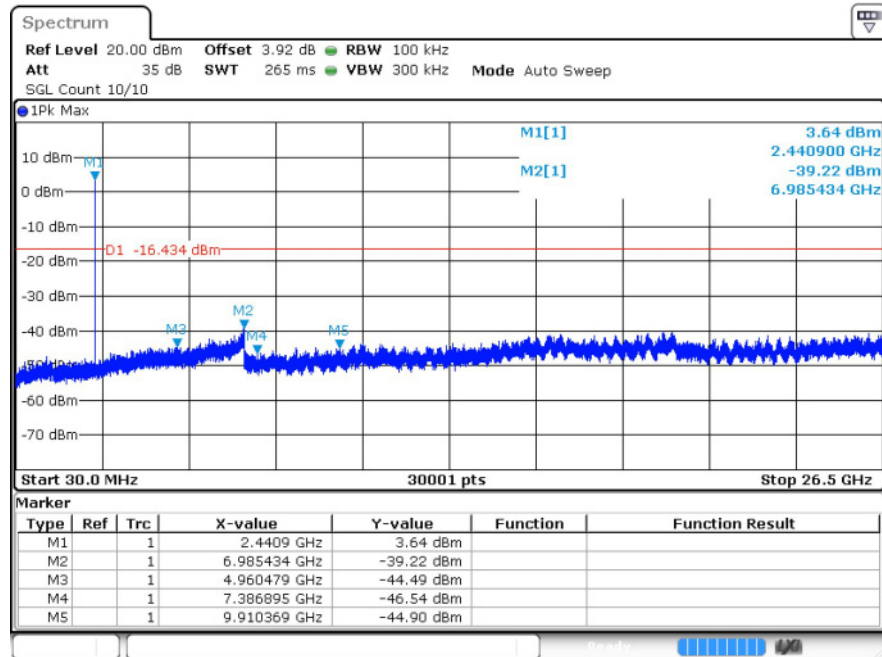


GFSK_MCH_Graphs

Pref

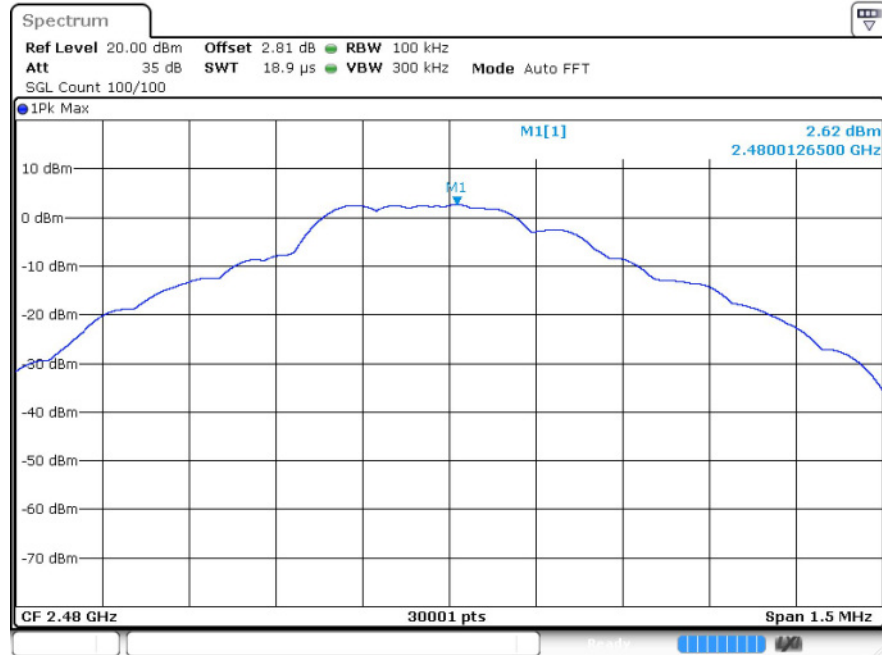


Puw

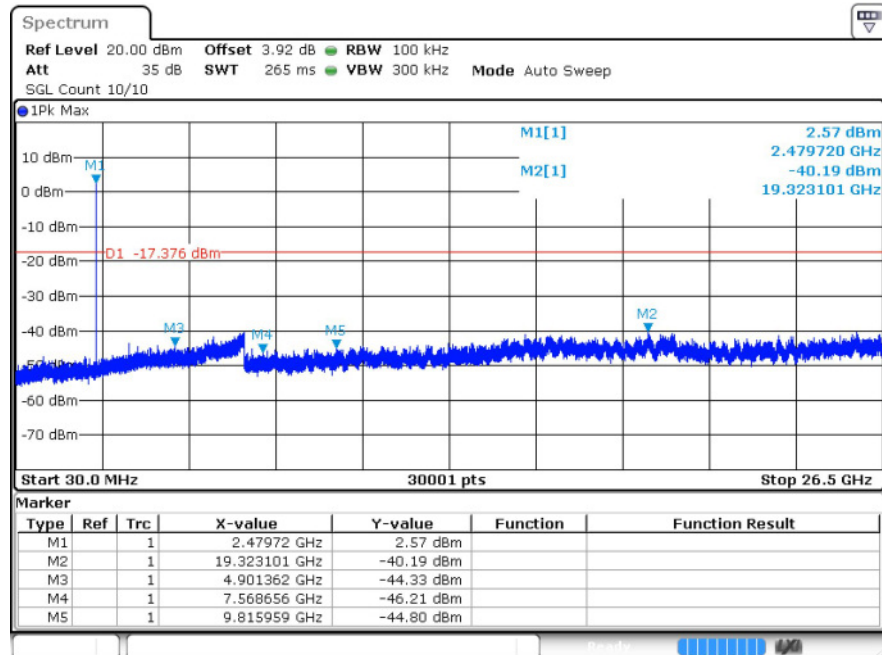


GFSK_HCH_Graphs

Pref

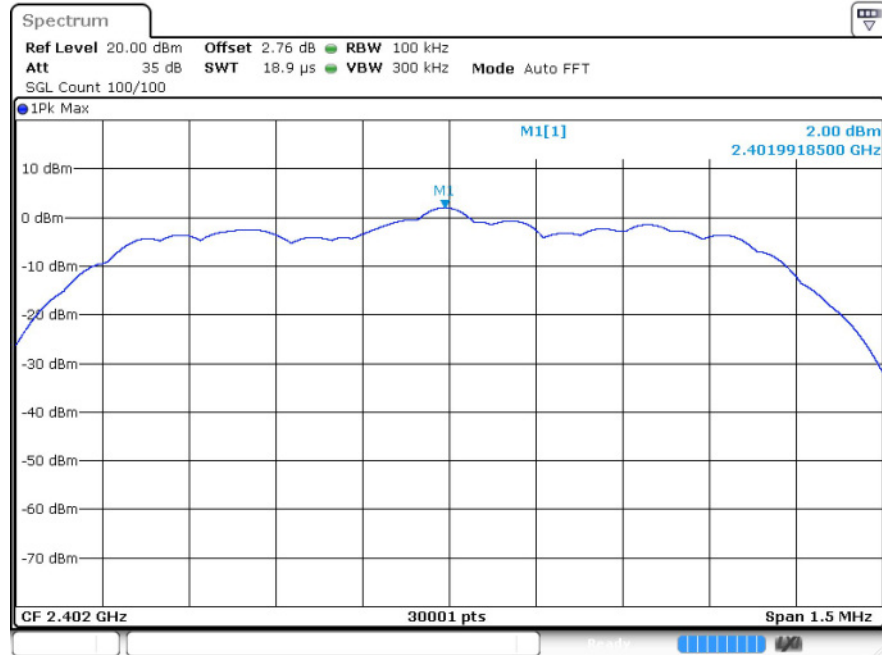


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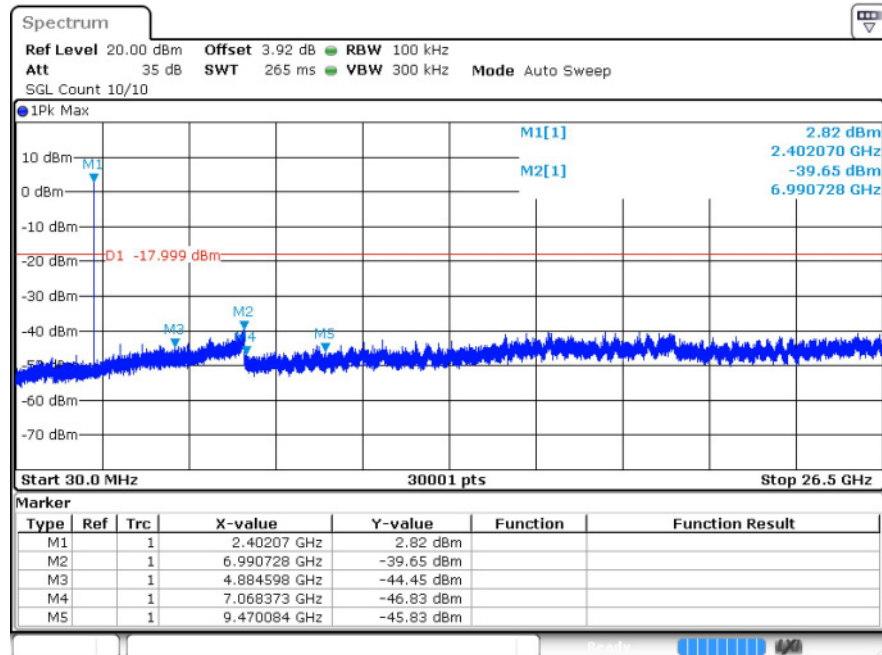


$\pi/4$ DQPSK_LCH_Graphs

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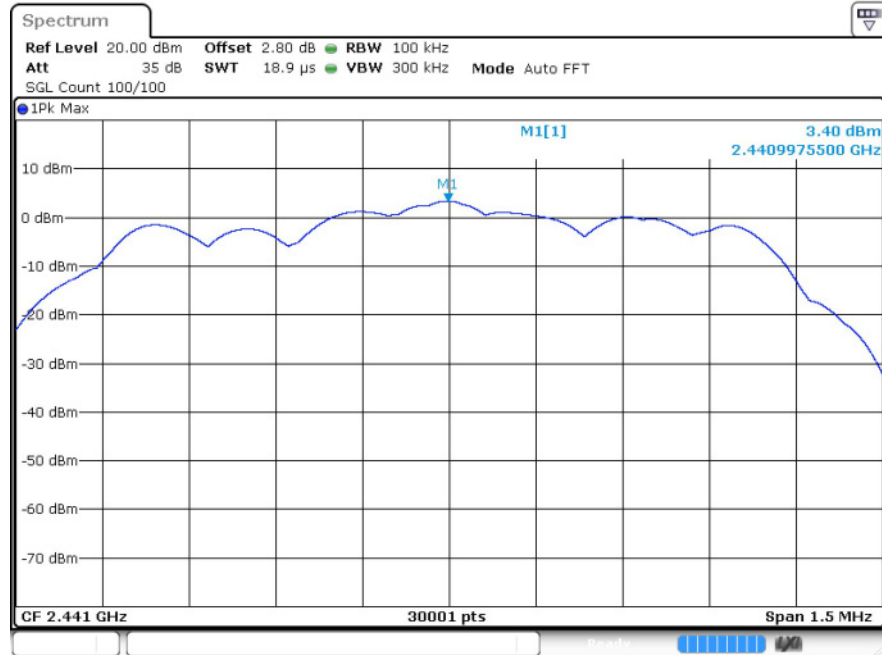


Puw

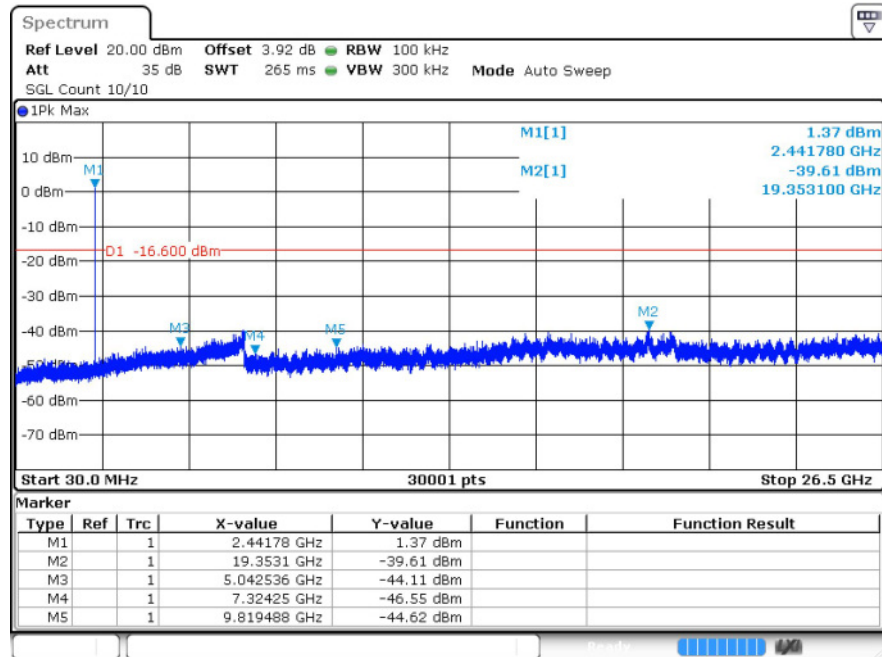


π /4DQPSK_MCH_Graphs

Pref

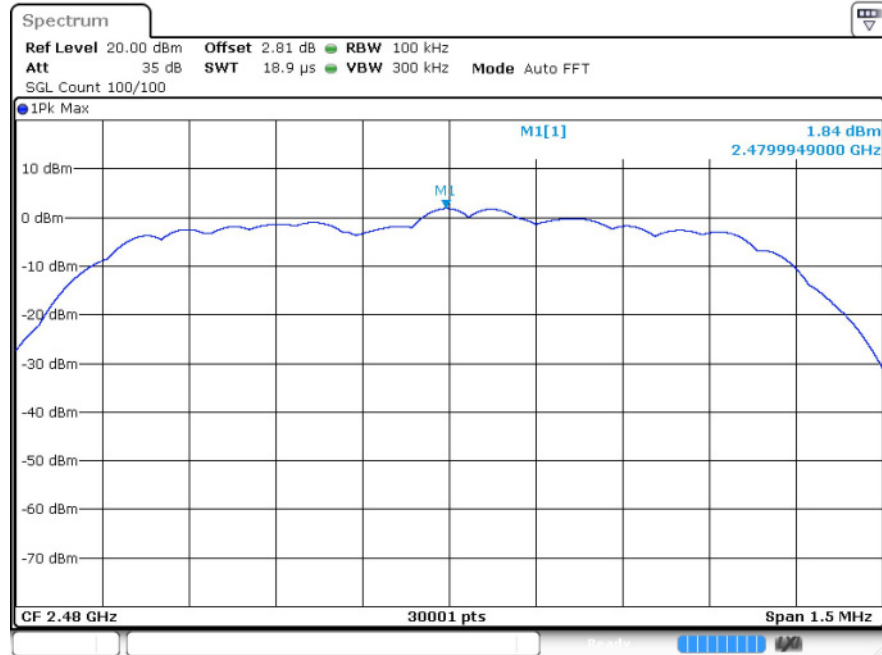


Puw



$\pi/4$ DQPSK_HCH_Graphs

Pref



Puw

