

Appendix A

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

Product Name: projector

Trade Mark: HAPPRUN

Test Model: JQ820

Environmental Conditions

Temperature:	25.4° C
Relative Humidity:	52.5%
ATM Pressure:	100.0 kPa
Test Engineer:	Emiya lin
Supervised by:	Simba Haung

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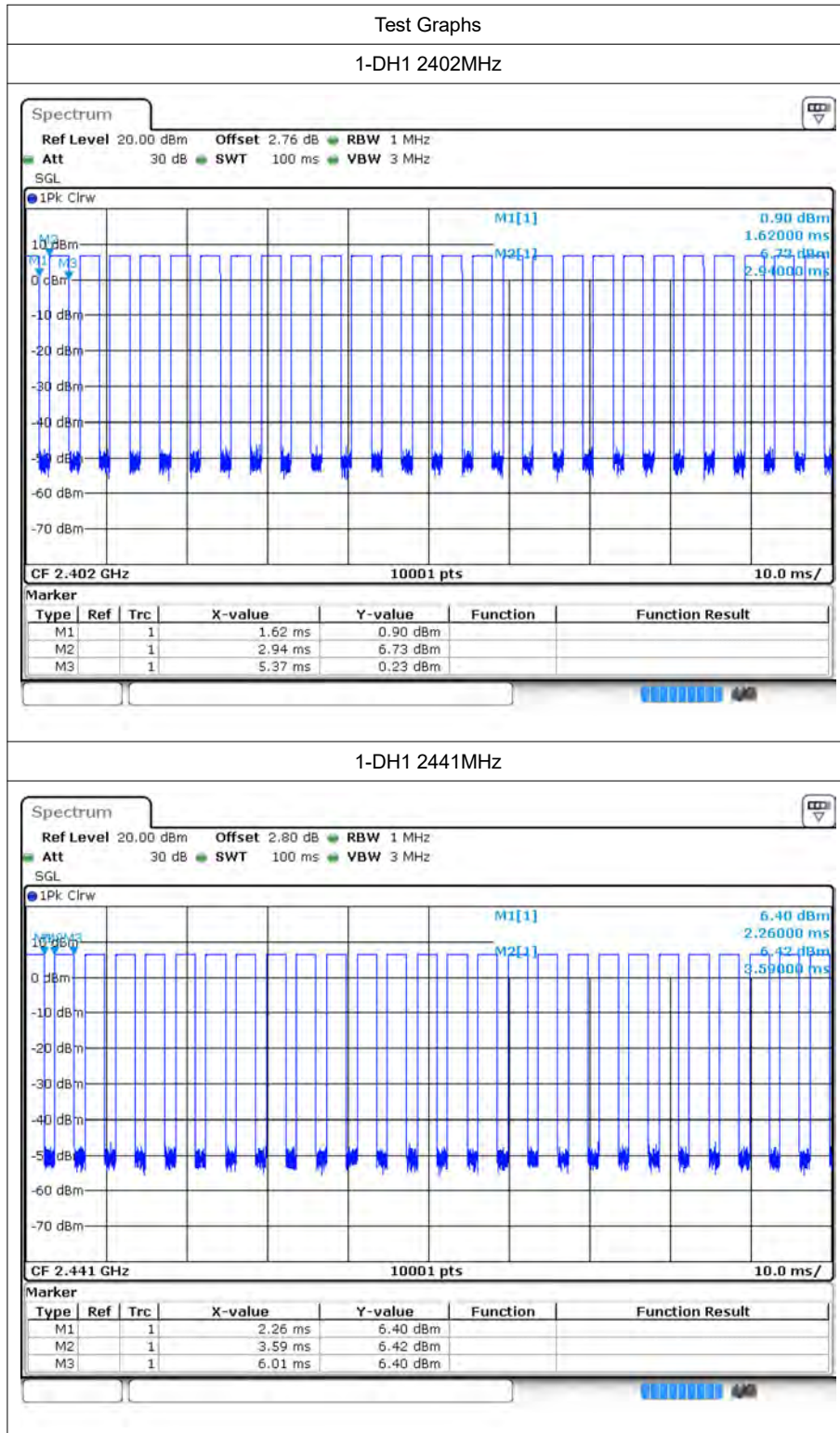
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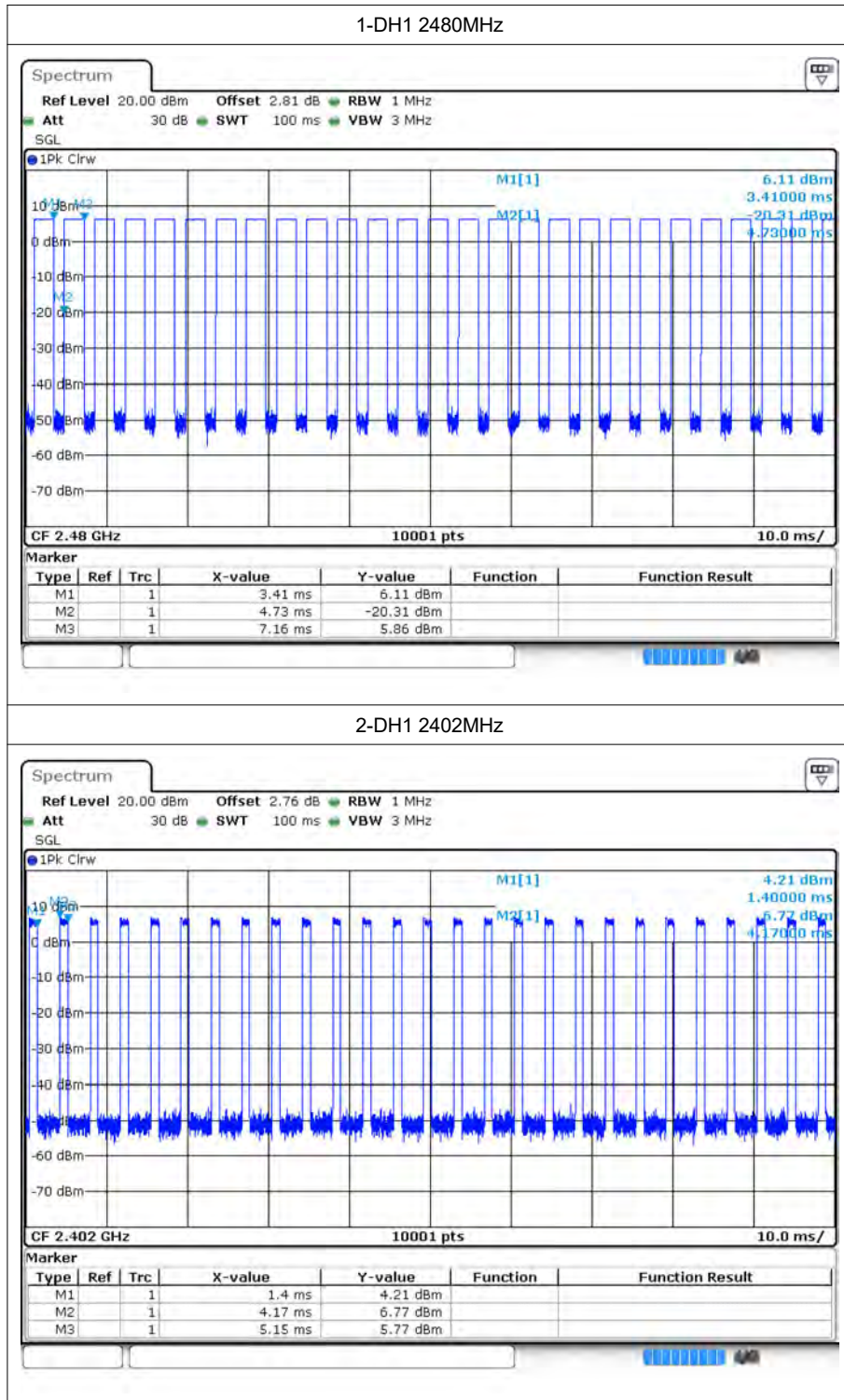
1 Duty Cycle

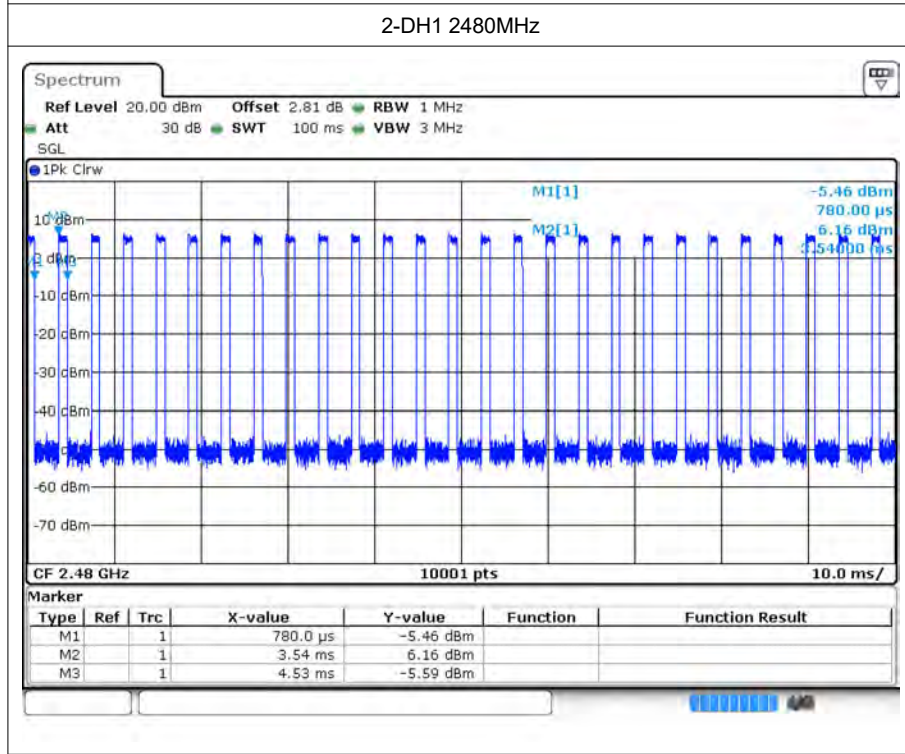
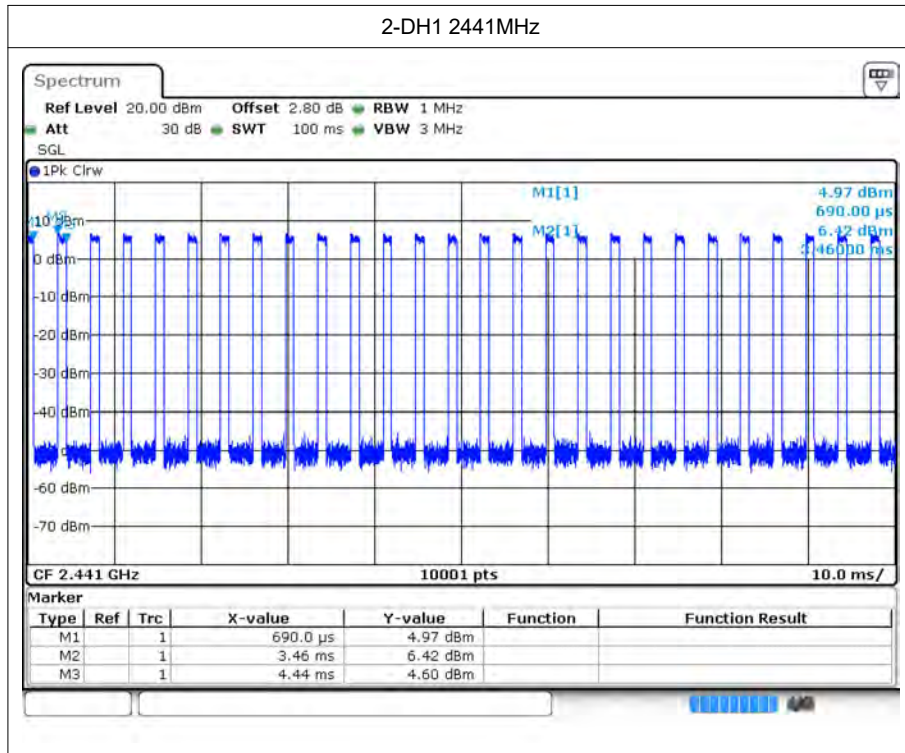
1.1 Test Result

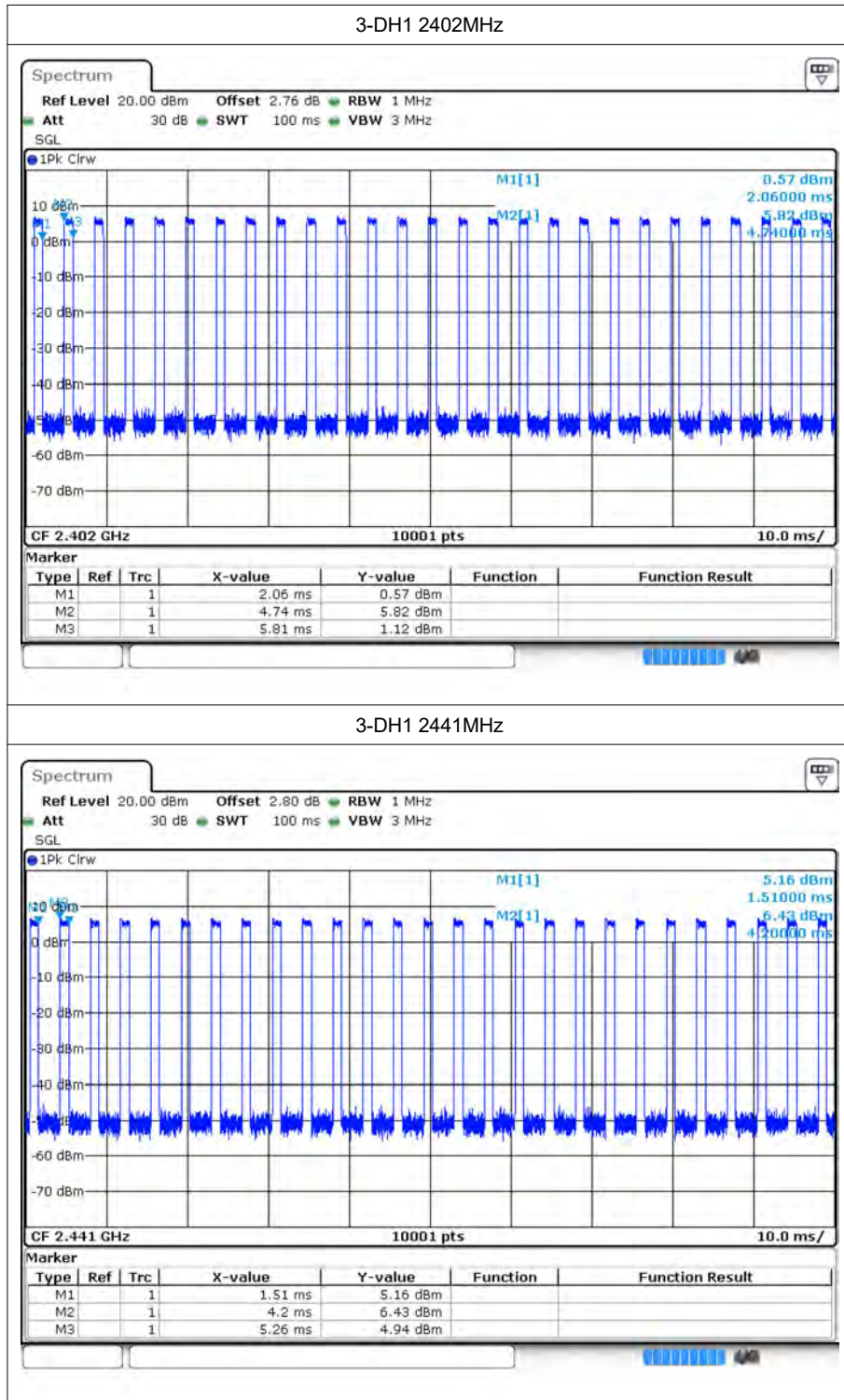
Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor	1/T (kHz)
1-DH1	2402	65.06	1.87	0.41
1-DH1	2441	65.44	1.84	0.41
1-DH1	2480	64.82	1.88	0.41
2-DH1	2402	26.73	5.73	1.02
2-DH1	2441	26.44	5.78	1.02
2-DH1	2480	26.79	5.72	1.01
3-DH1	2402	29.16	5.35	0.93
3-DH1	2441	28.89	5.39	0.94
3-DH1	2480	28.5	5.45	0.94

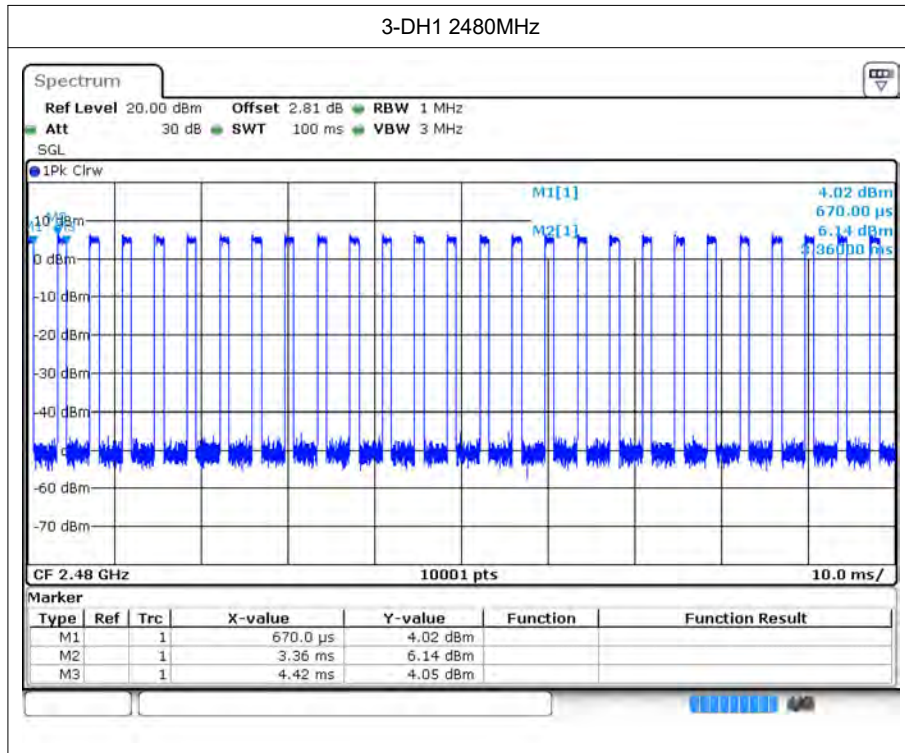
1.2 Test Graphs









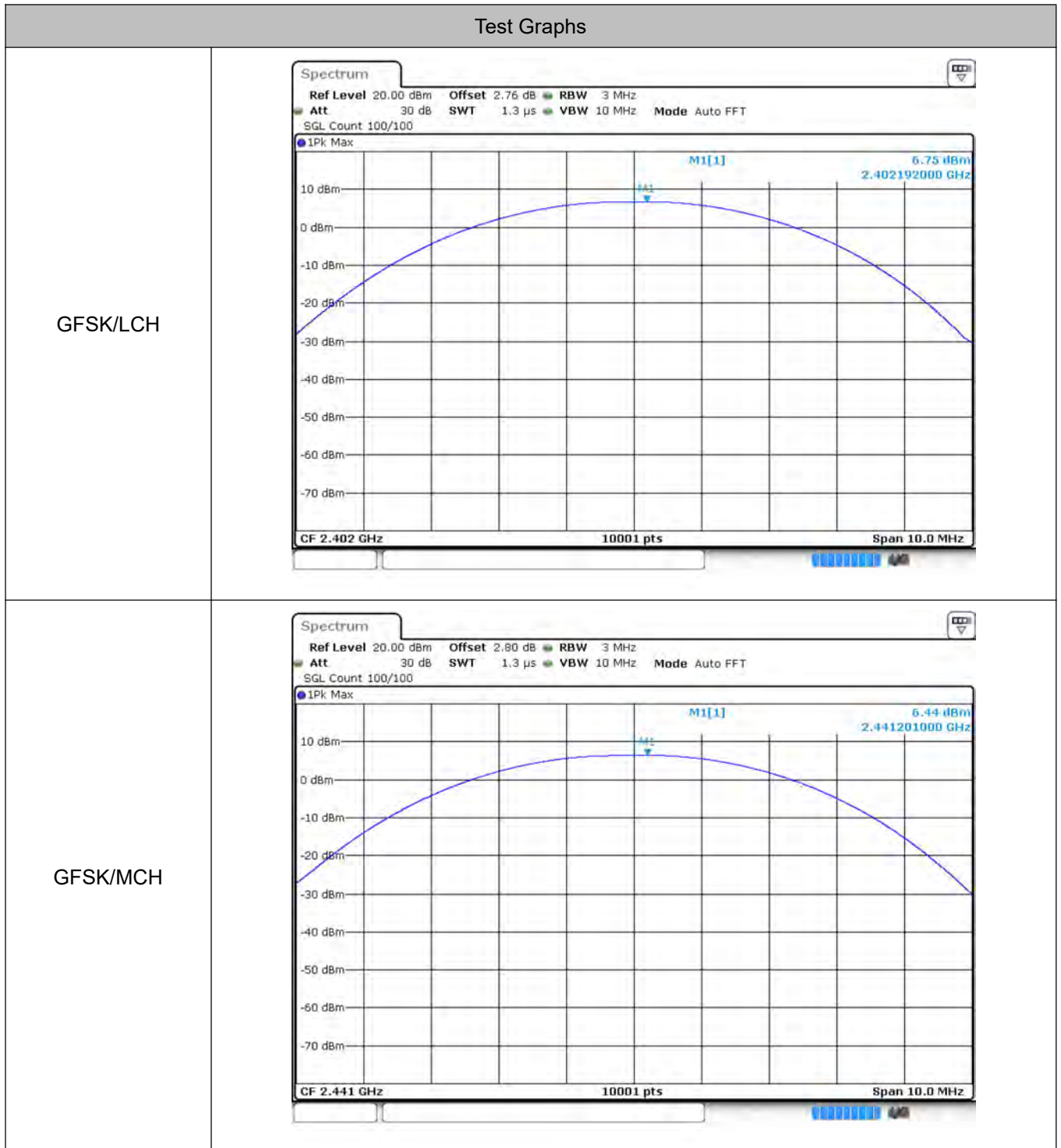


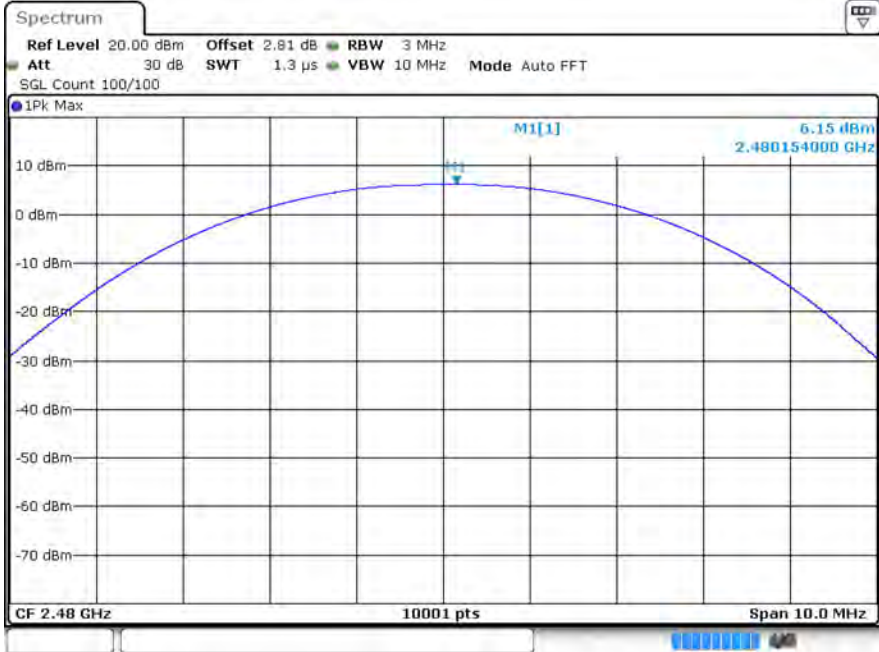
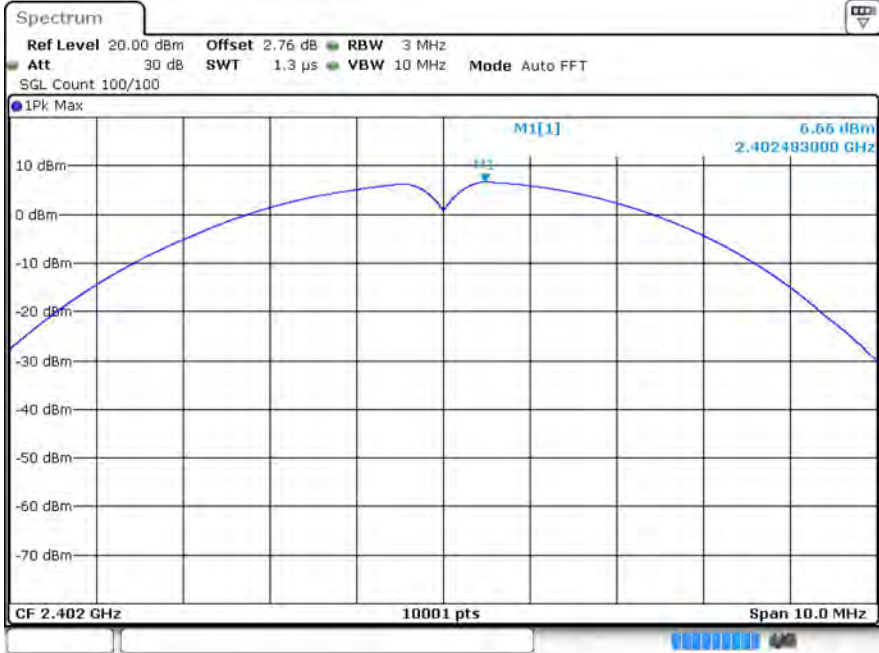
2 Maximum Conducted Peak Output Power

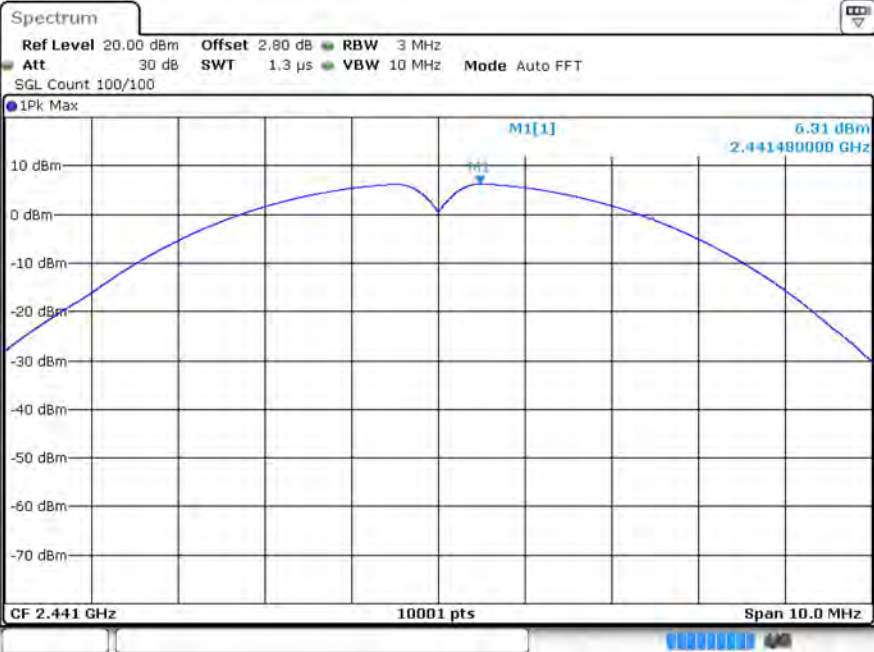
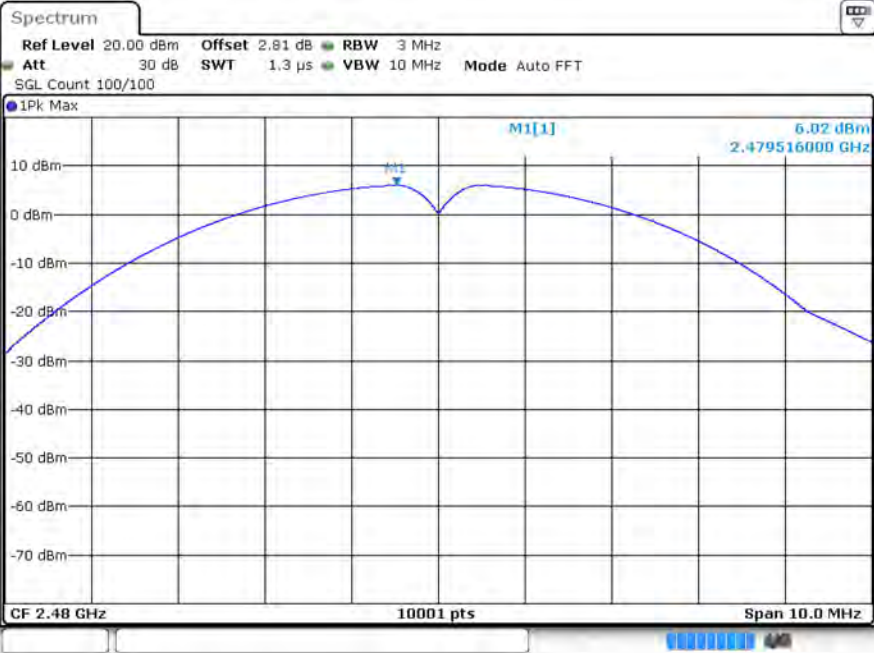
2.1 Test Result

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	6.75	21	Pass
	MCH	6.44	21	Pass
	HCH	6.15	21	Pass
$\pi/4$ DQPSK	LCH	6.66	21	Pass
	MCH	6.31	21	Pass
	HCH	6.02	21	Pass
8DPSK	LCH	6.68	21	Pass
	MCH	6.36	21	Pass
	HCH	6.01	21	Pass

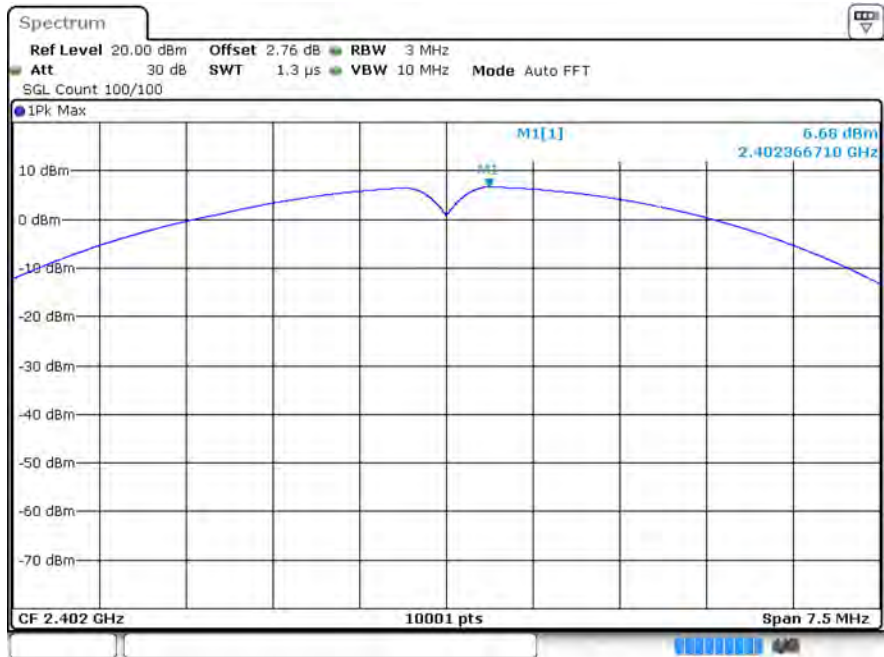
2.2 Test Graphs



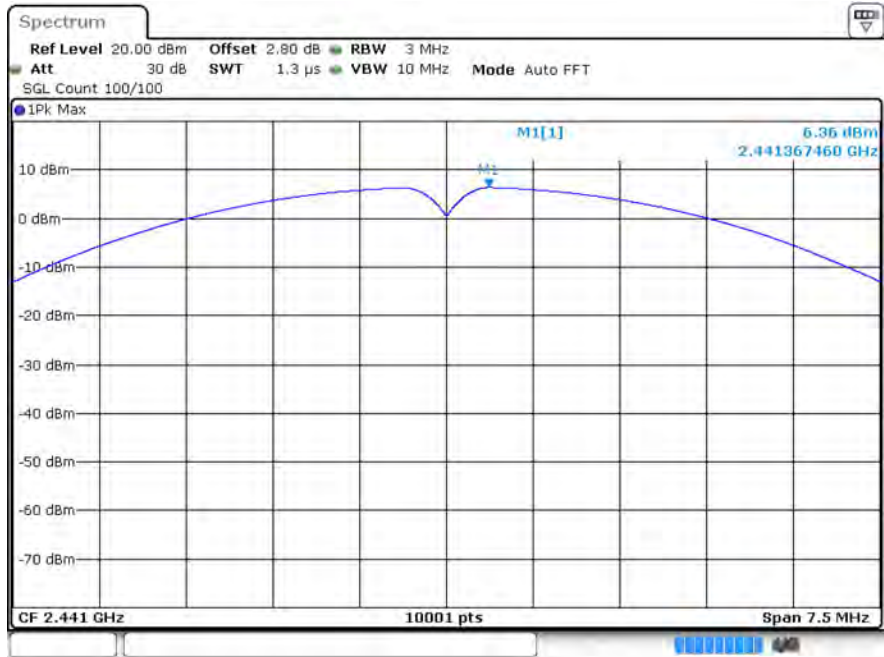
<p>GFSK/HCH</p>	 <p>Spectrum Ref Level 20.00 dBm Offset 2.81 dB RBW 3 MHz Att 30 dB SWT 1.3 μs VBW 10 MHz Mode Auto FFT SGL Count 100/100 1Pk Max M1[1] 6.15 dBm 2.480154000 GHz CF 2.48 GHz 10001 pts Span 10.0 MHz</p>
<p>π/4DQPSK/LCH</p>	 <p>Spectrum Ref Level 20.00 dBm Offset 2.76 dB RBW 3 MHz Att 30 dB SWT 1.3 μs VBW 10 MHz Mode Auto FFT SGL Count 100/100 1Pk Max M1[1] 6.66 dBm 2.402483000 GHz CF 2.402 GHz 10001 pts Span 10.0 MHz</p>

<p>$\pi/4$DQPSK/MCH</p>	 <p>Spectrum Ref Level 20.00 dBm Offset 2.80 dB RBW 3 MHz Att 30 dB SWT 1.3 μs VBW 10 MHz Mode Auto FFT SGL Count 100/100 1Pk Max 6.31 dBm 2.441480000 GHz CF 2.441 GHz 10001 pts Span 10.0 MHz</p>
<p>$\pi/4$DQPSK/HCH</p>	 <p>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 6.02 dBm 2.479516000 GHz CF 2.48 GHz 10001 pts Span 10.0 MHz</p>

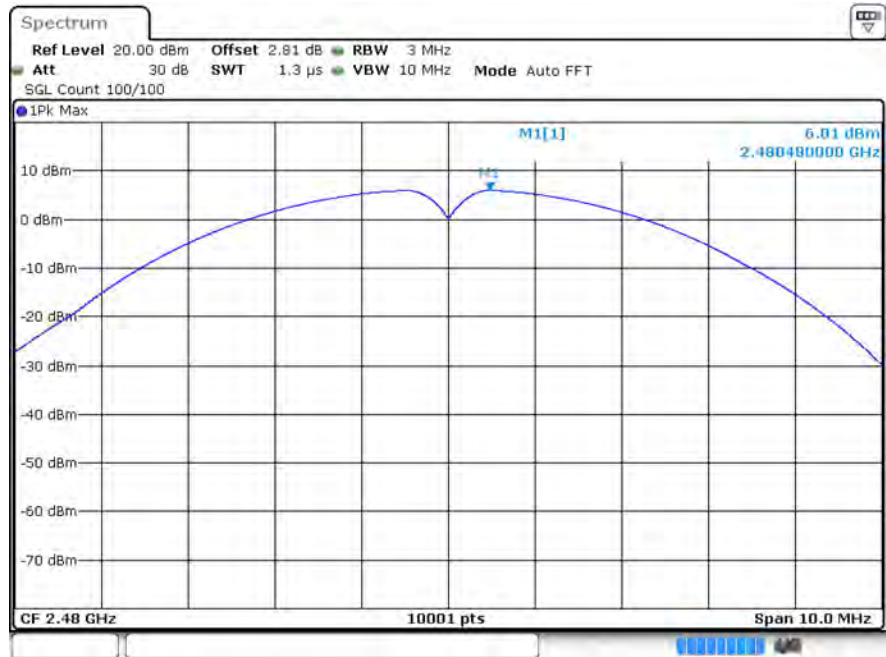
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

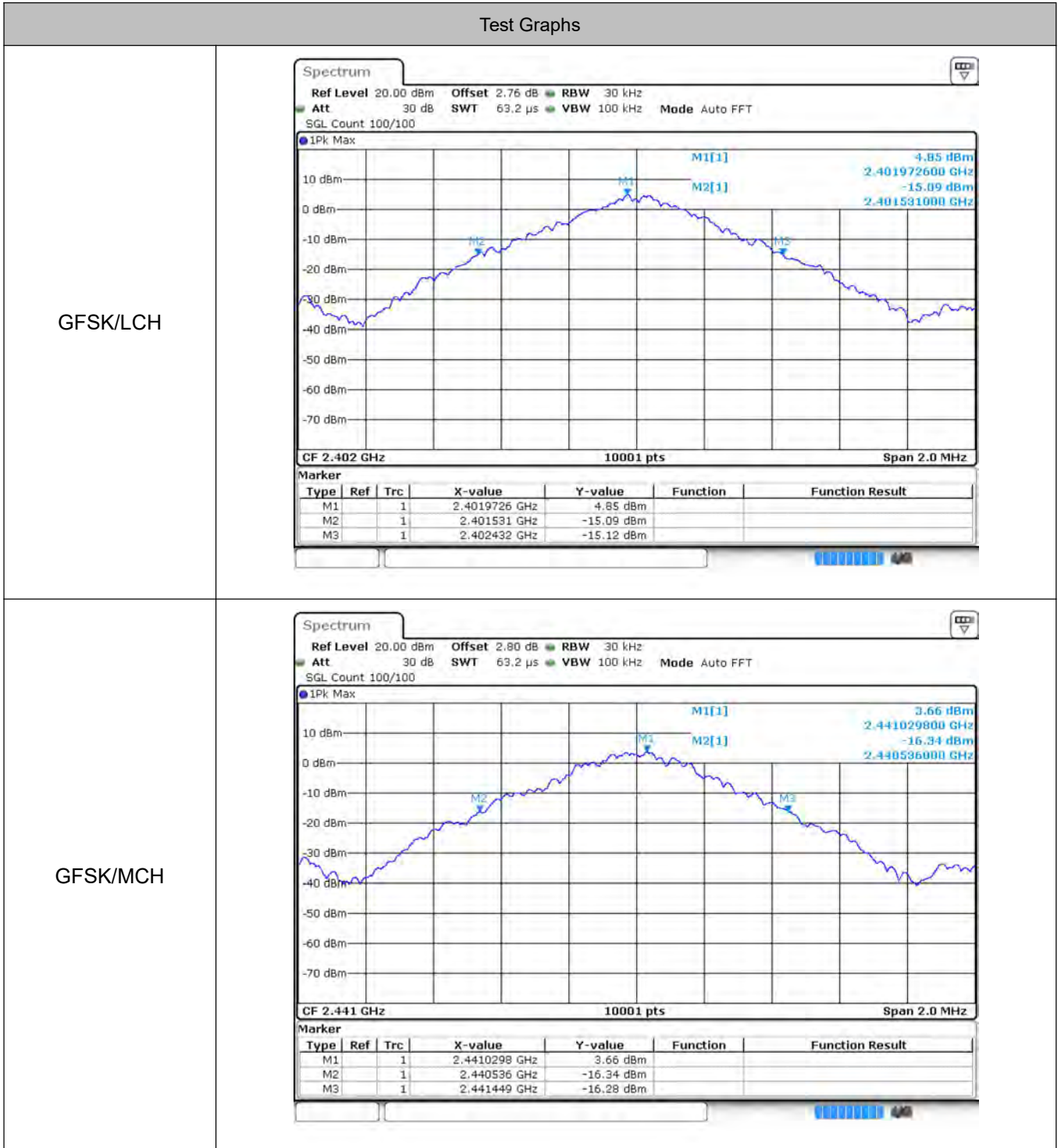


3 20dB Bandwidth

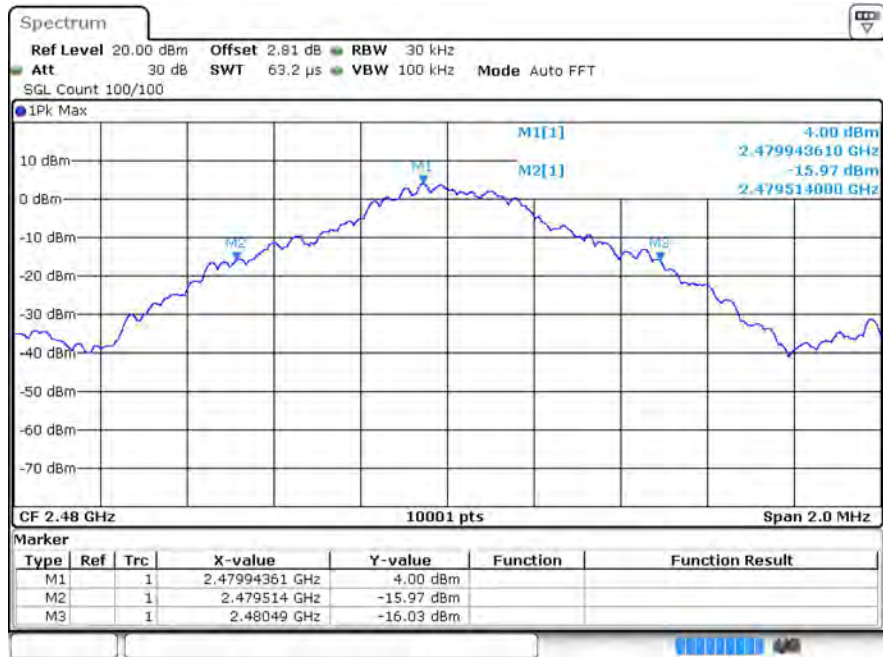
3.1 Test Result

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.901	Not Specified	Pass
	MCH	0.914	Not Specified	Pass
	HCH	0.976	Not Specified	Pass
$\pi/4$ DQPSK	LCH	1.278	Not Specified	Pass
	MCH	1.274	Not Specified	Pass
	HCH	1.268	Not Specified	Pass
8DPSK	LCH	1.322	Not Specified	Pass
	MCH	1.245	Not Specified	Pass
	HCH	1.296	Not Specified	Pass

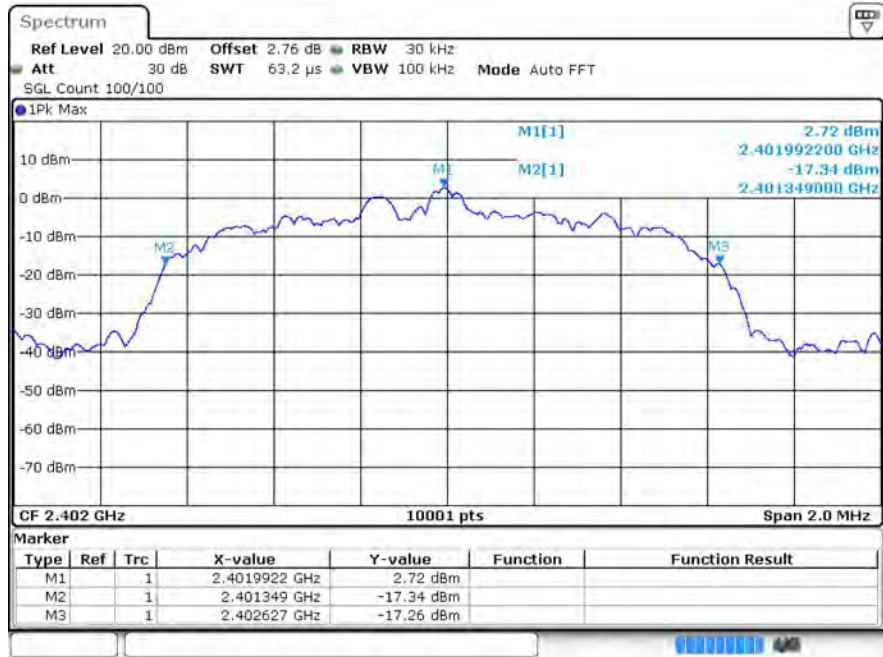
3.2 Test Graphs



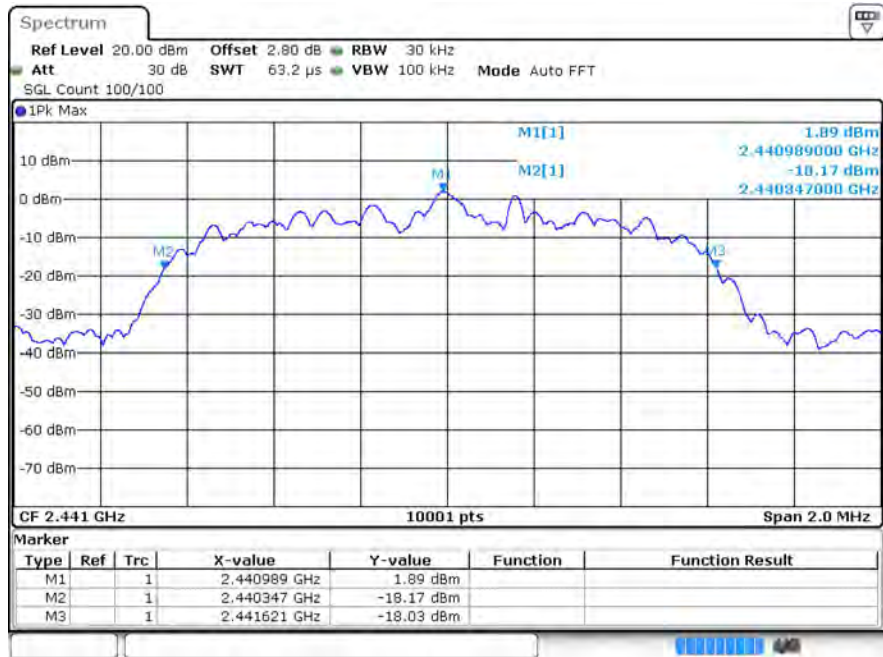
GFSK/HCH



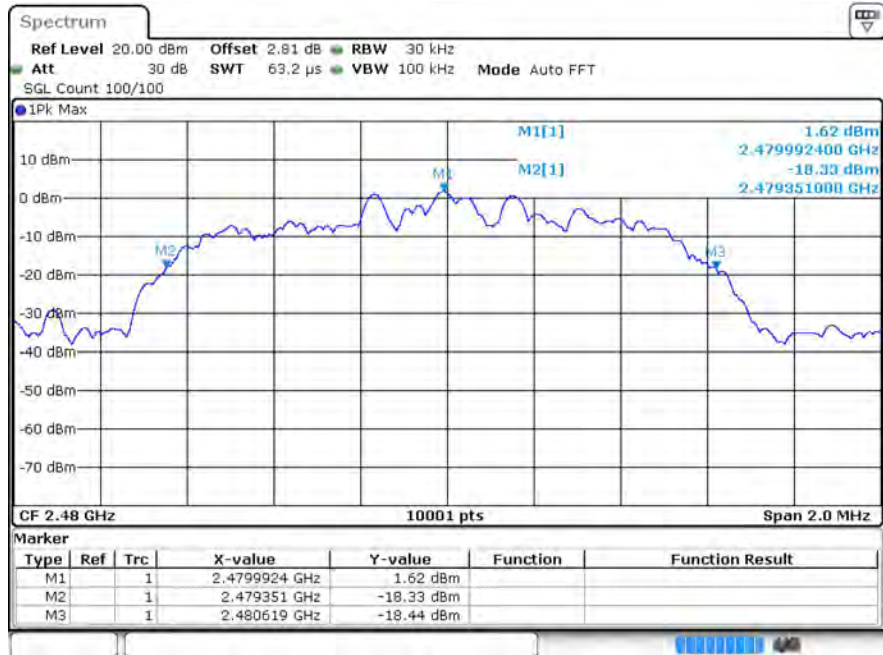
$\pi/4$ DQPSK/LCH



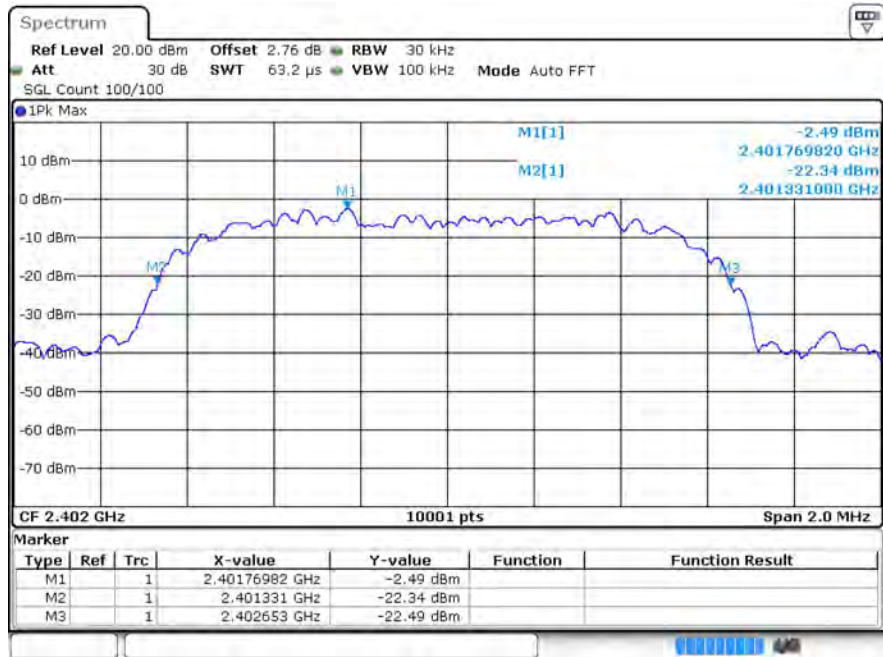
$\pi/4$ DQPSK/MCH



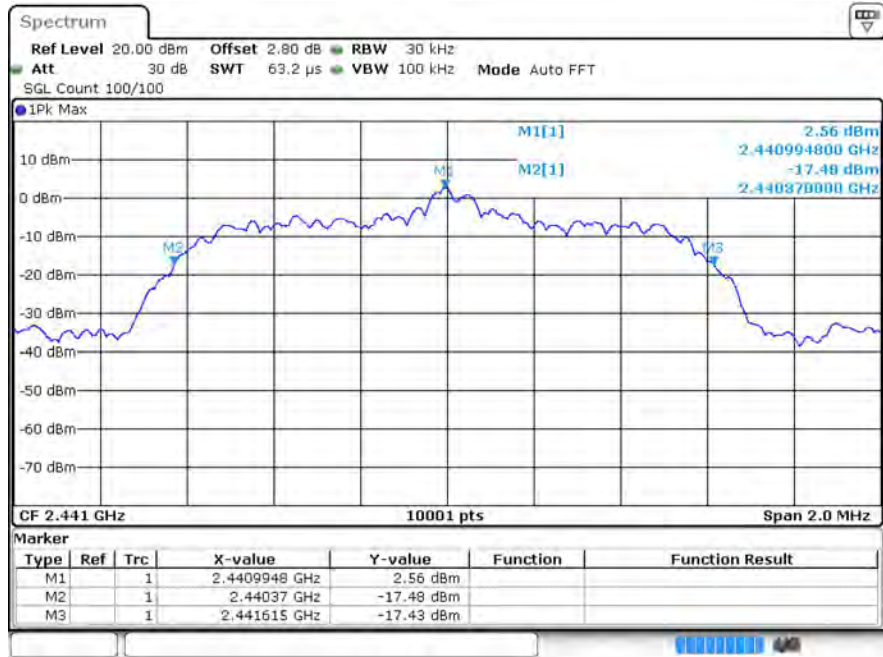
$\pi/4$ DQPSK/HCH



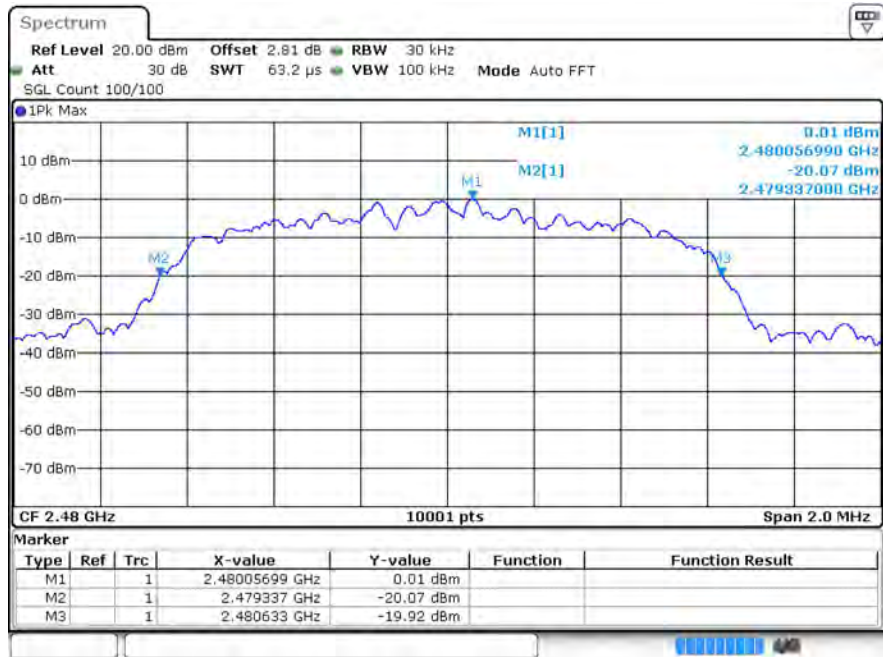
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH



4 Carrier Frequency Separation

4.1 Test Result

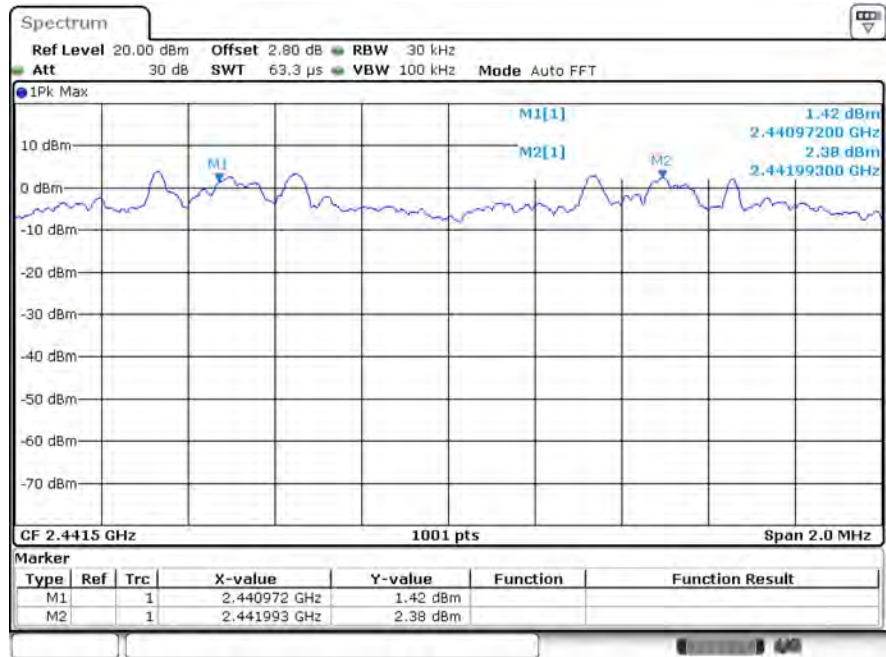
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	MCH	1	0.609	Pass
$\pi/4$ DQPSK	MCH	0.937	0.849	Pass
8DPSK	MCH	1.021	0.83	Pass

4.2 Test Graphs





8DPSK/MCH

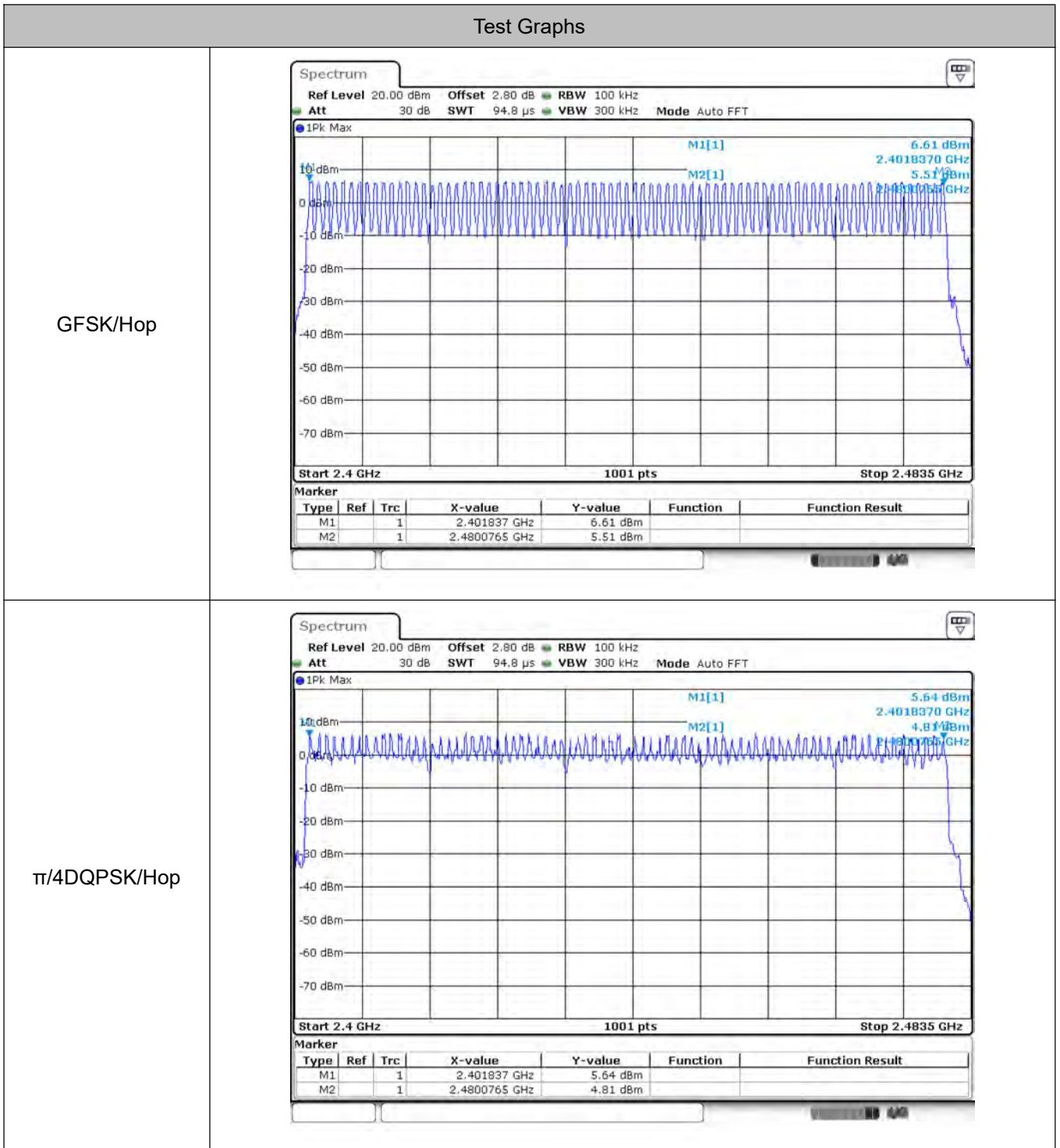


5 Hopping Channel Number

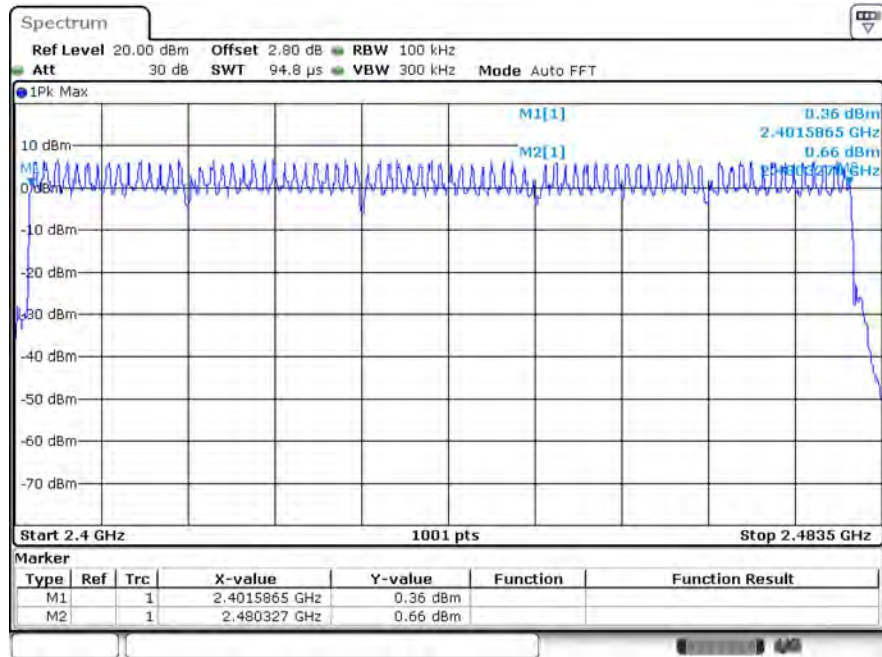
5.1 Test Result

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

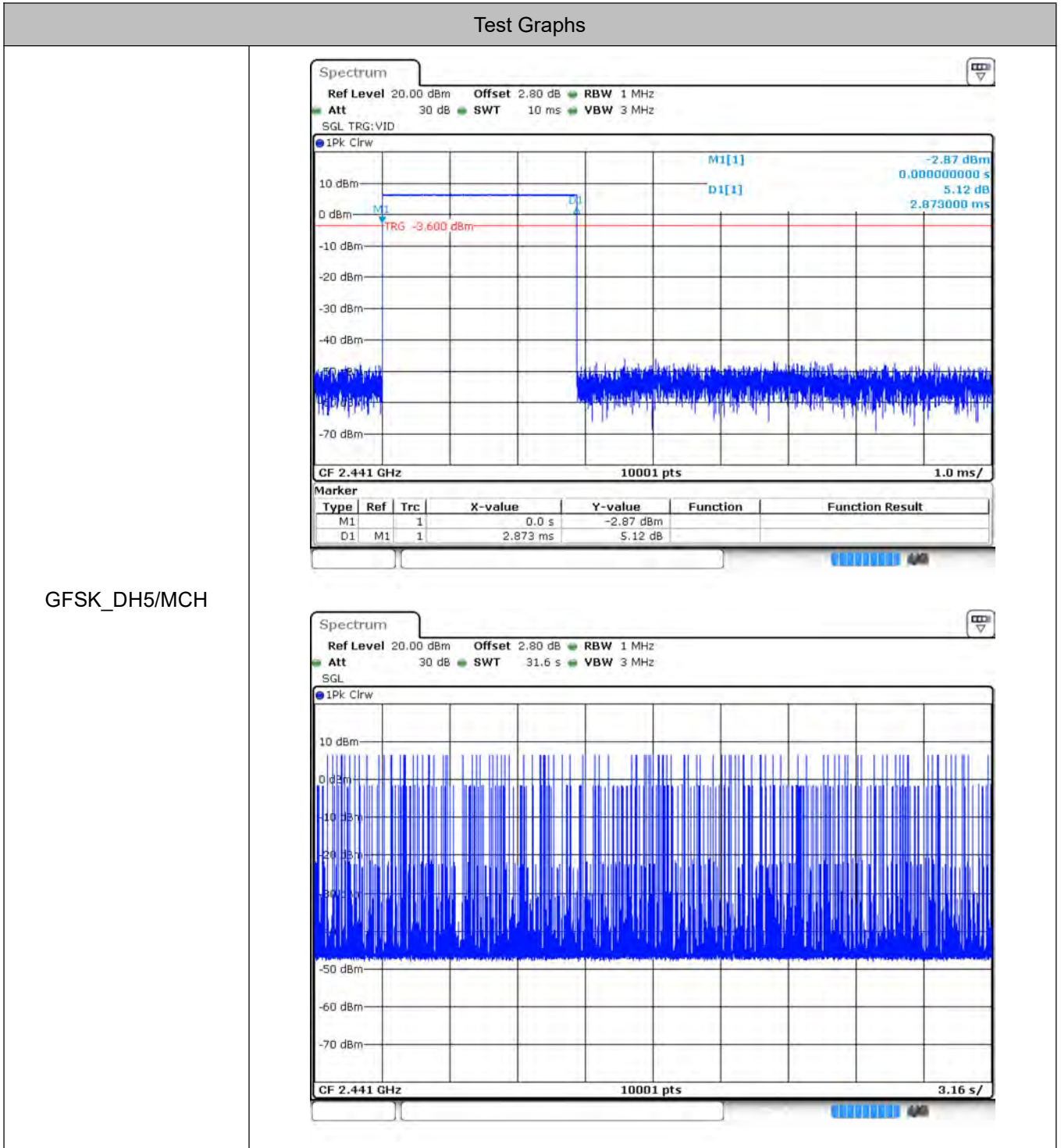


6 Dwell Time

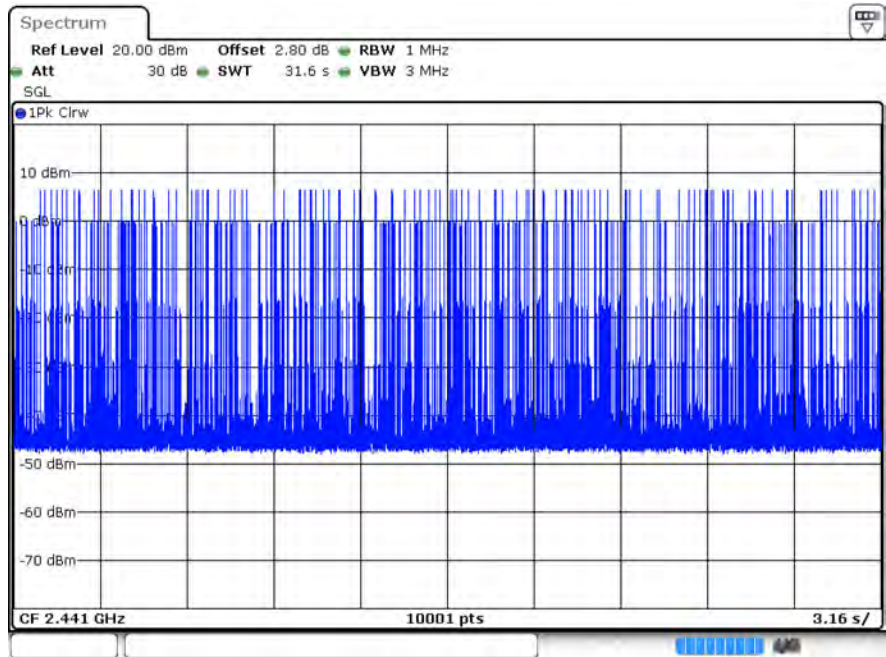
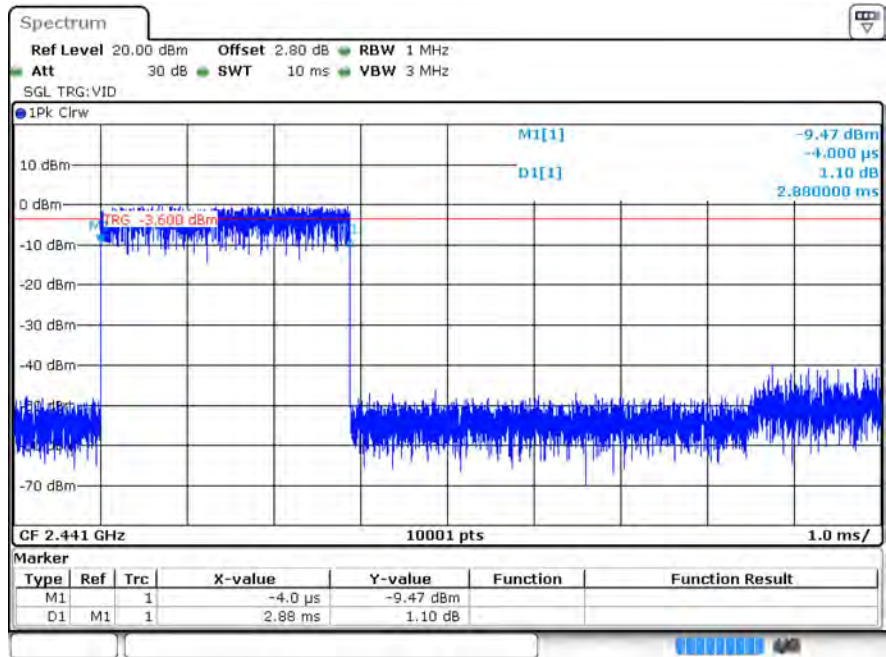
6.1 Test Result

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Limit [s]	Verdict
GFSK	DH5	MCH	2.873	112	321.776	0.4	Pass
$\pi/4$ DQPSK	2DH5	MCH	2.88	112	322.56	0.4	Pass
8DPSK	3DH5	MCH	2.88	113	325.44	0.4	Pass

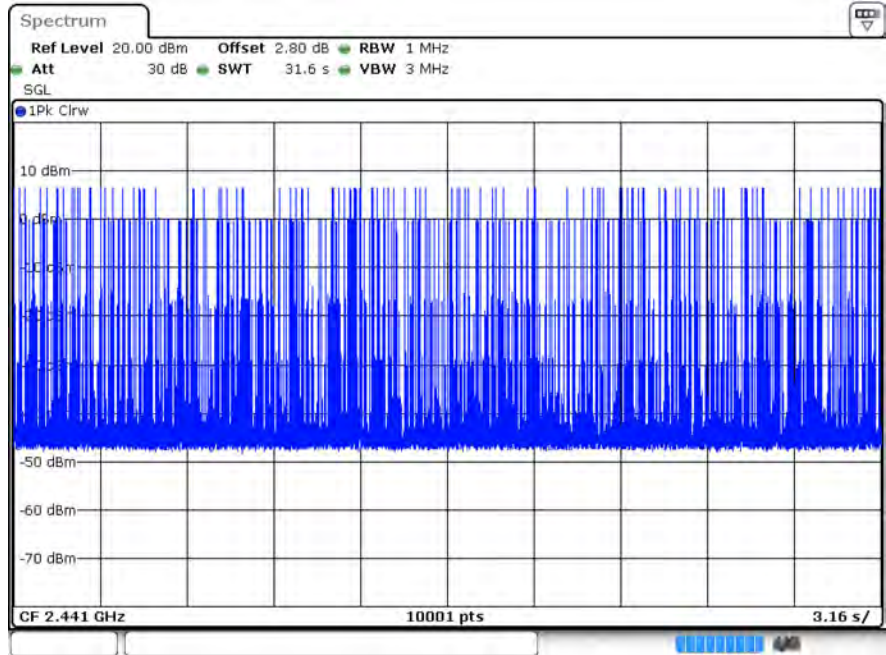
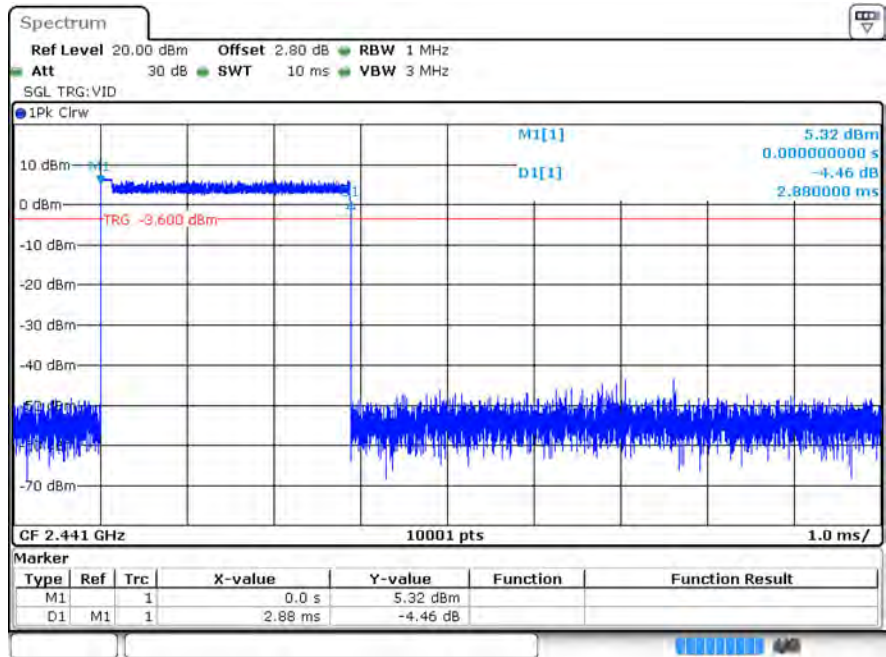
6.2 Test Graphs



$\pi/4$ DQPSK
_2DH5/MCH



8DPSK_3DH5/MCH

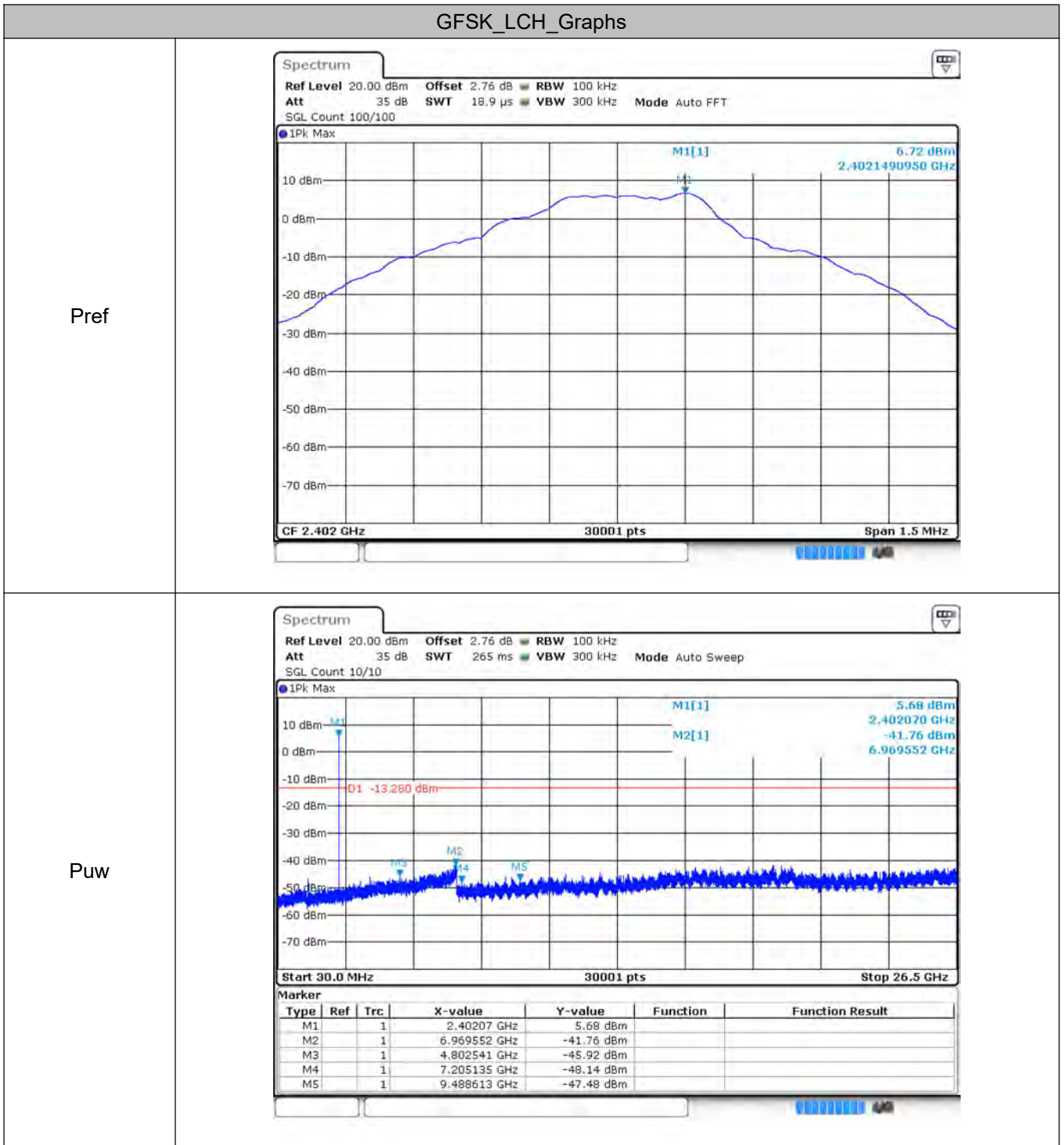


7 RF Conducted Spurious Emissions

7.1 Test Result

Mode	Channel	Max. Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	-48.48	-20	Pass
	MCH	-47.77	-20	Pass
	HCH	-46.42	-20	Pass
$\pi/4$ DQPSK	LCH	-46.21	-20	Pass
	MCH	-48.19	-20	Pass
	HCH	-45.33	-20	Pass
8DPSK	LCH	-48.11	-20	Pass
	MCH	-47.01	-20	Pass
	HCH	-46.68	-20	Pass

7.2 Test Graphs

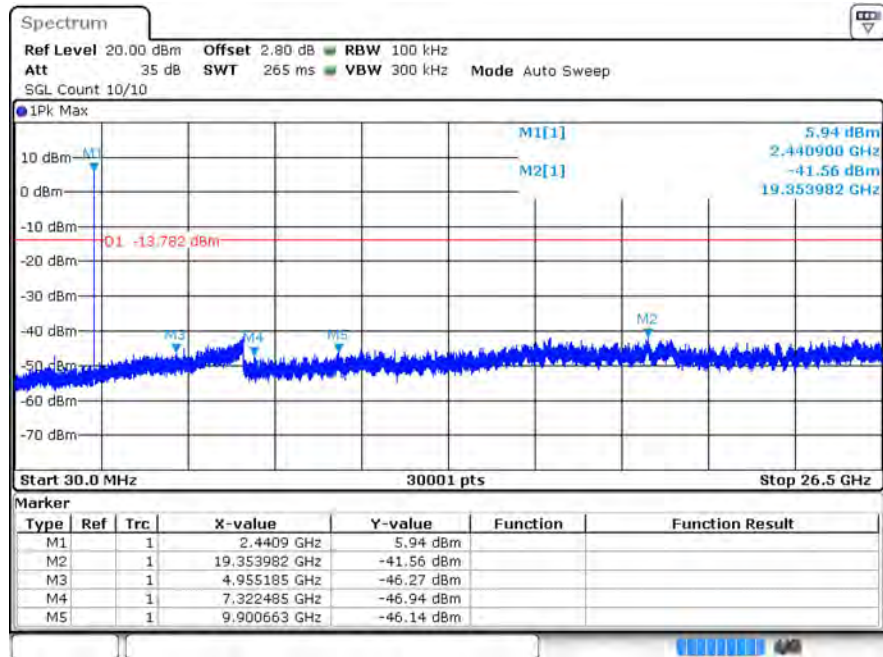


GFSK_MCH_Graphs

Pref



Puw

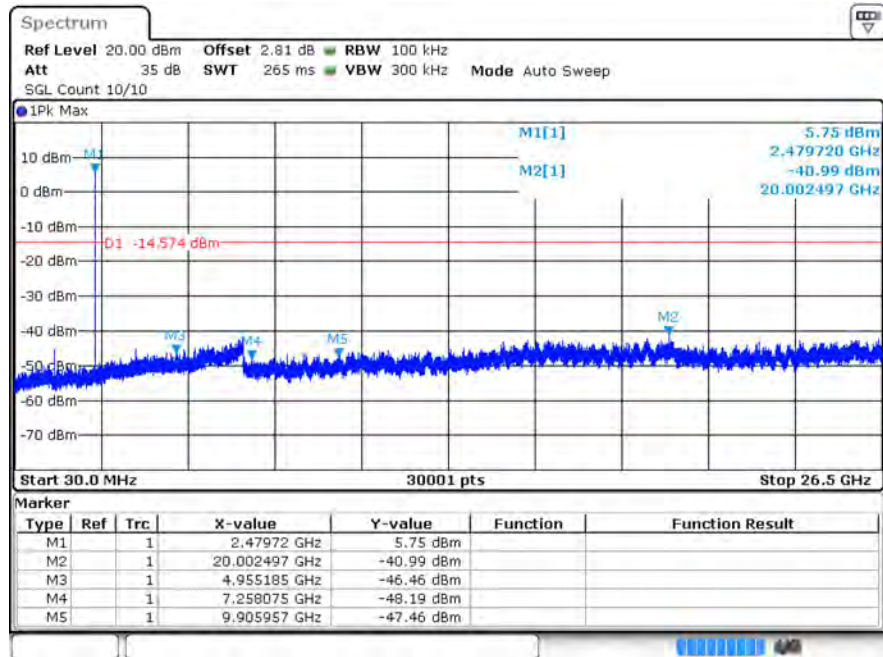


GFSK_HCH_Graphs

Pref

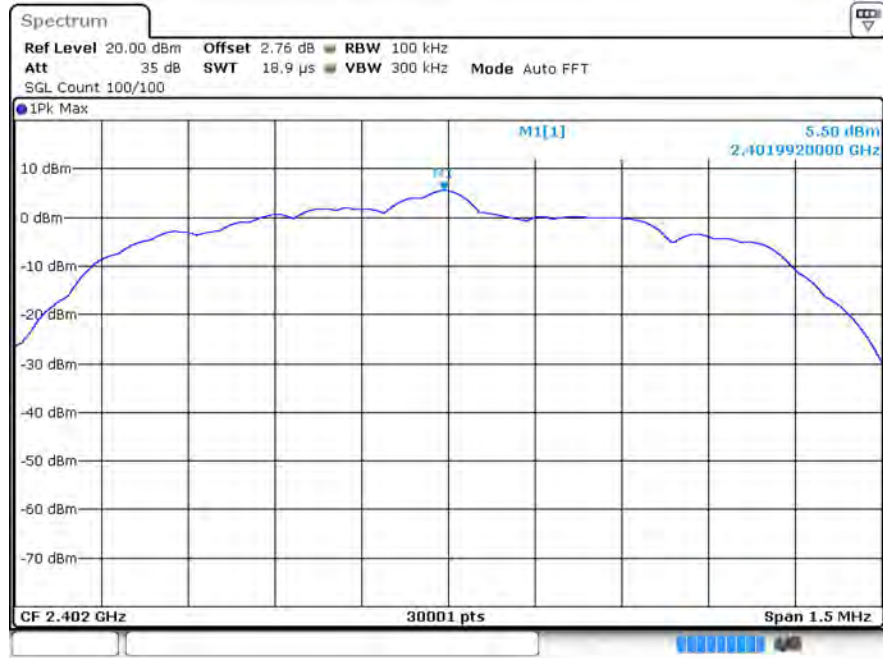


Puw

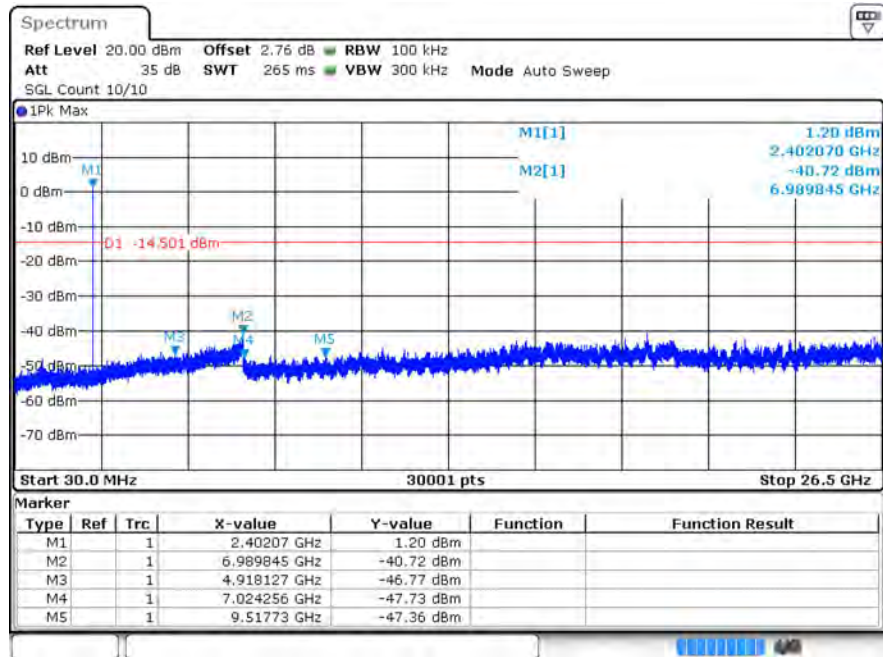


$\pi/4$ DQPSK_LCH_Graphs

Pref



Puw

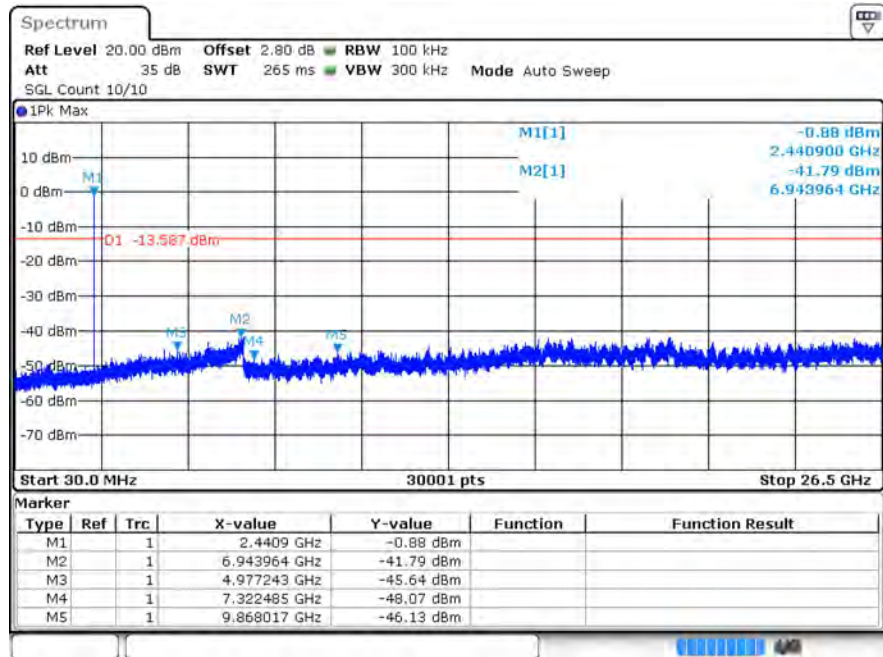


π /4DQPSK_MCH_Graphs

Pref

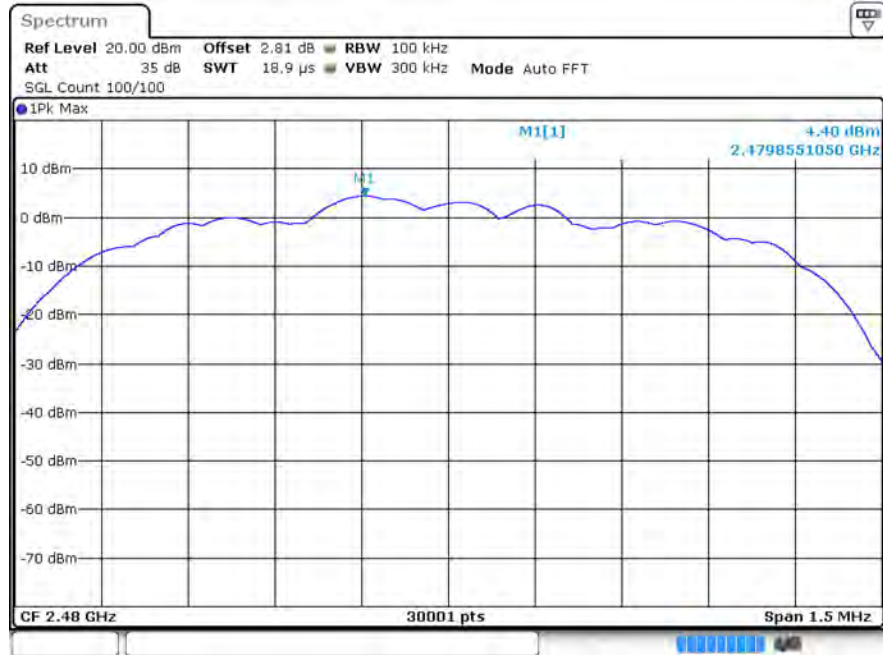


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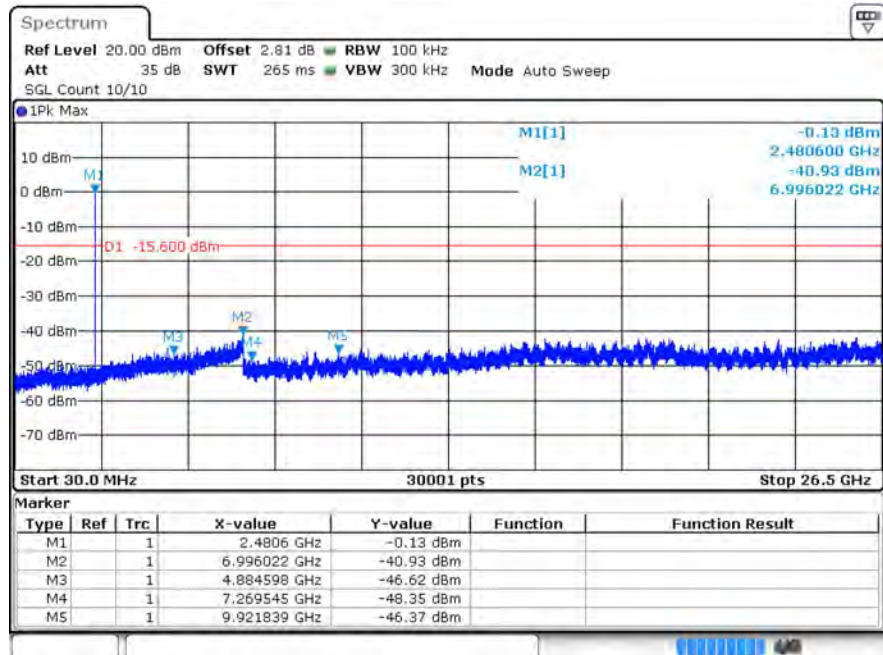


$\pi/4$ DQPSK_HCH_Graphs

Pref



Puw

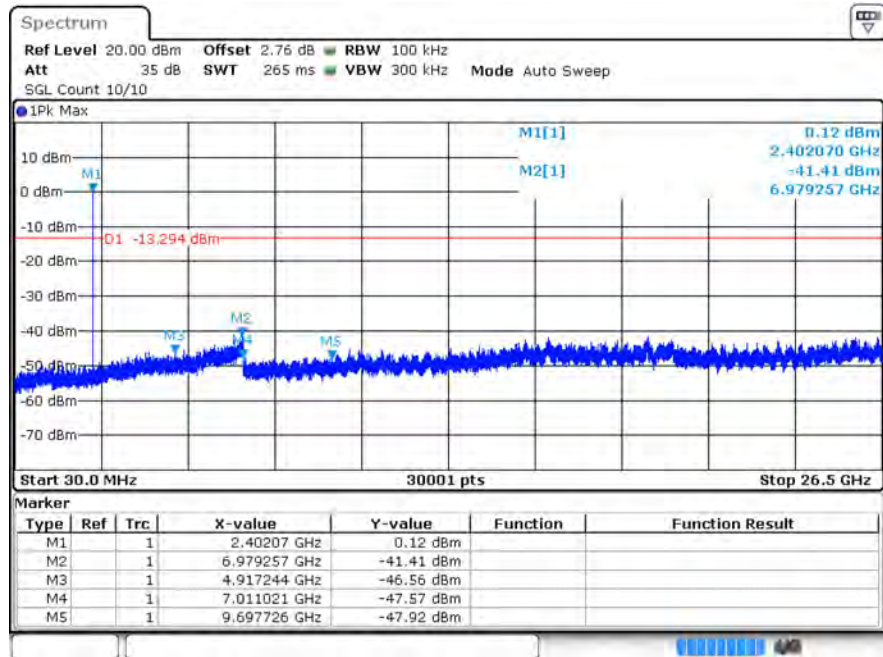


8DPSK_LCH_Graphs

Pref

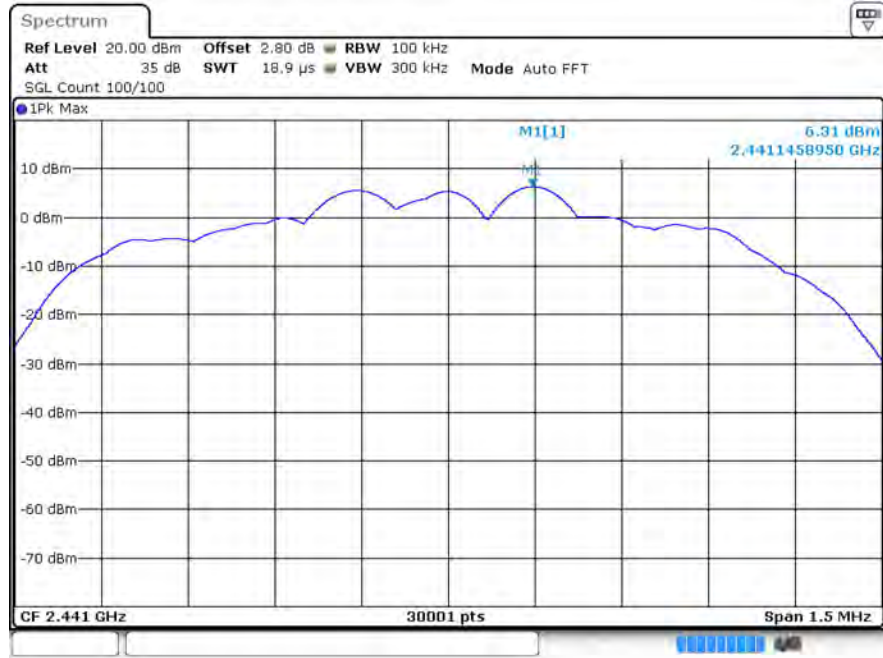


Puw

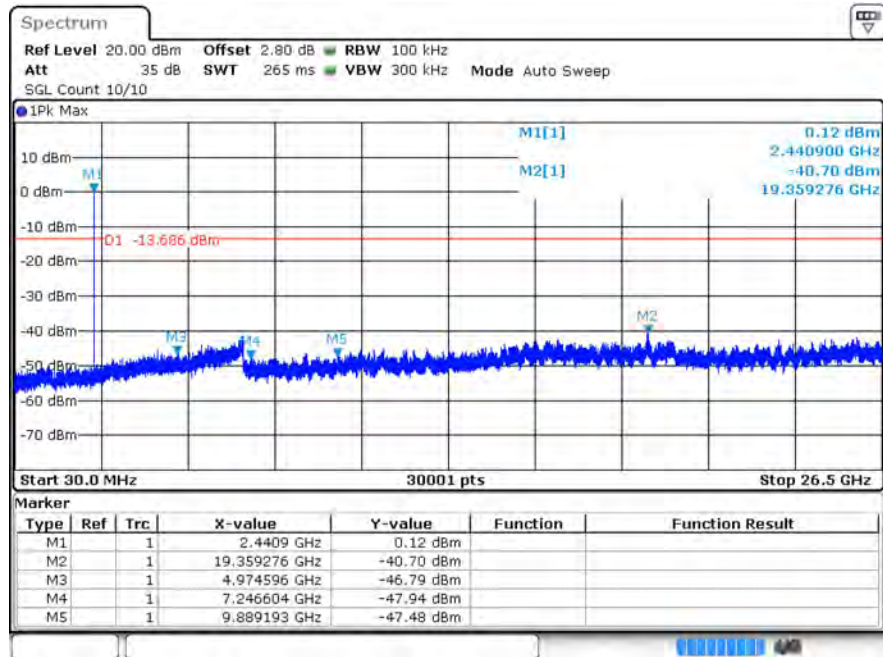


8DPSK_MCH_Graphs

Pref

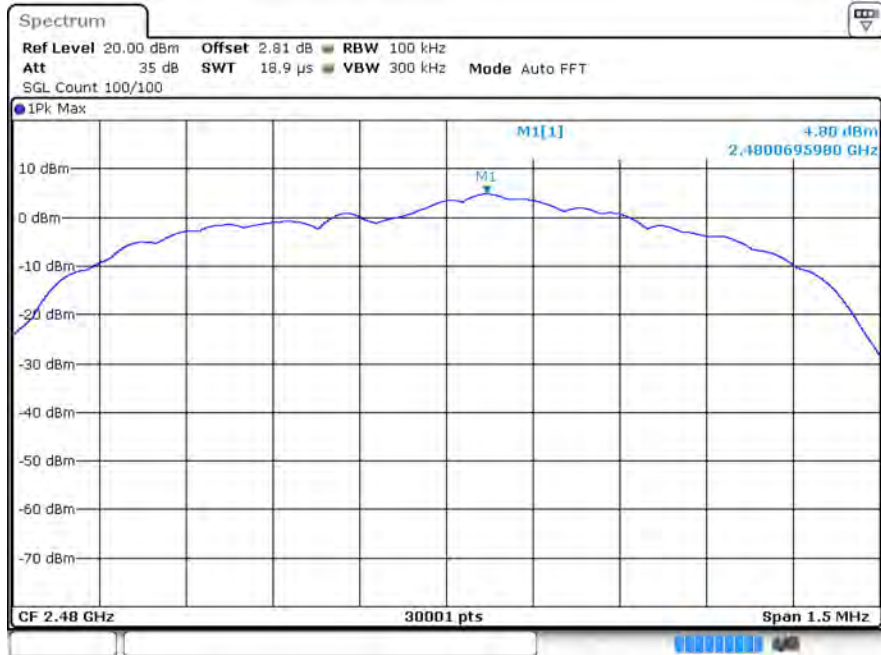


Puw

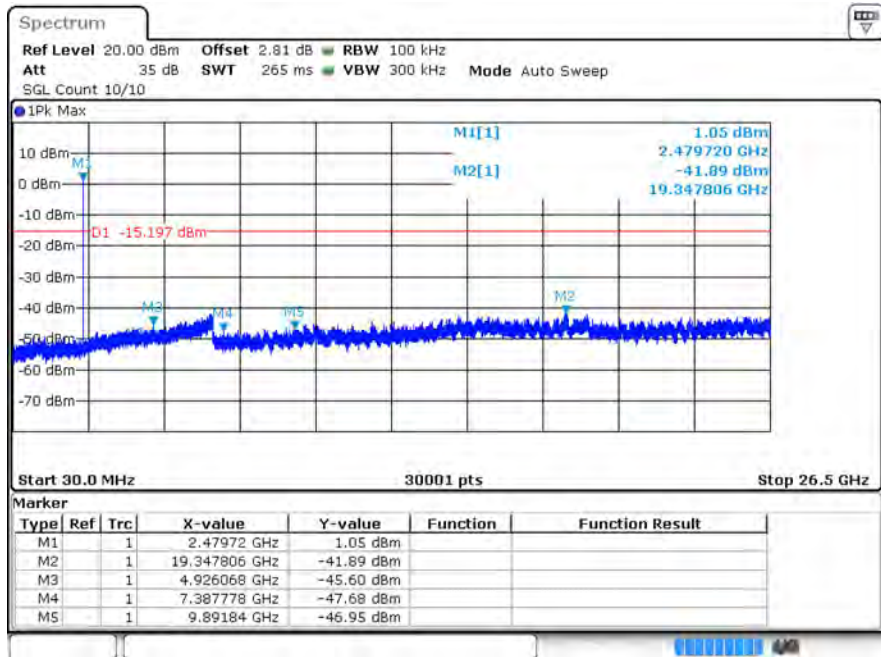


8DPSK_HCH_Graphs

Pref



Puw

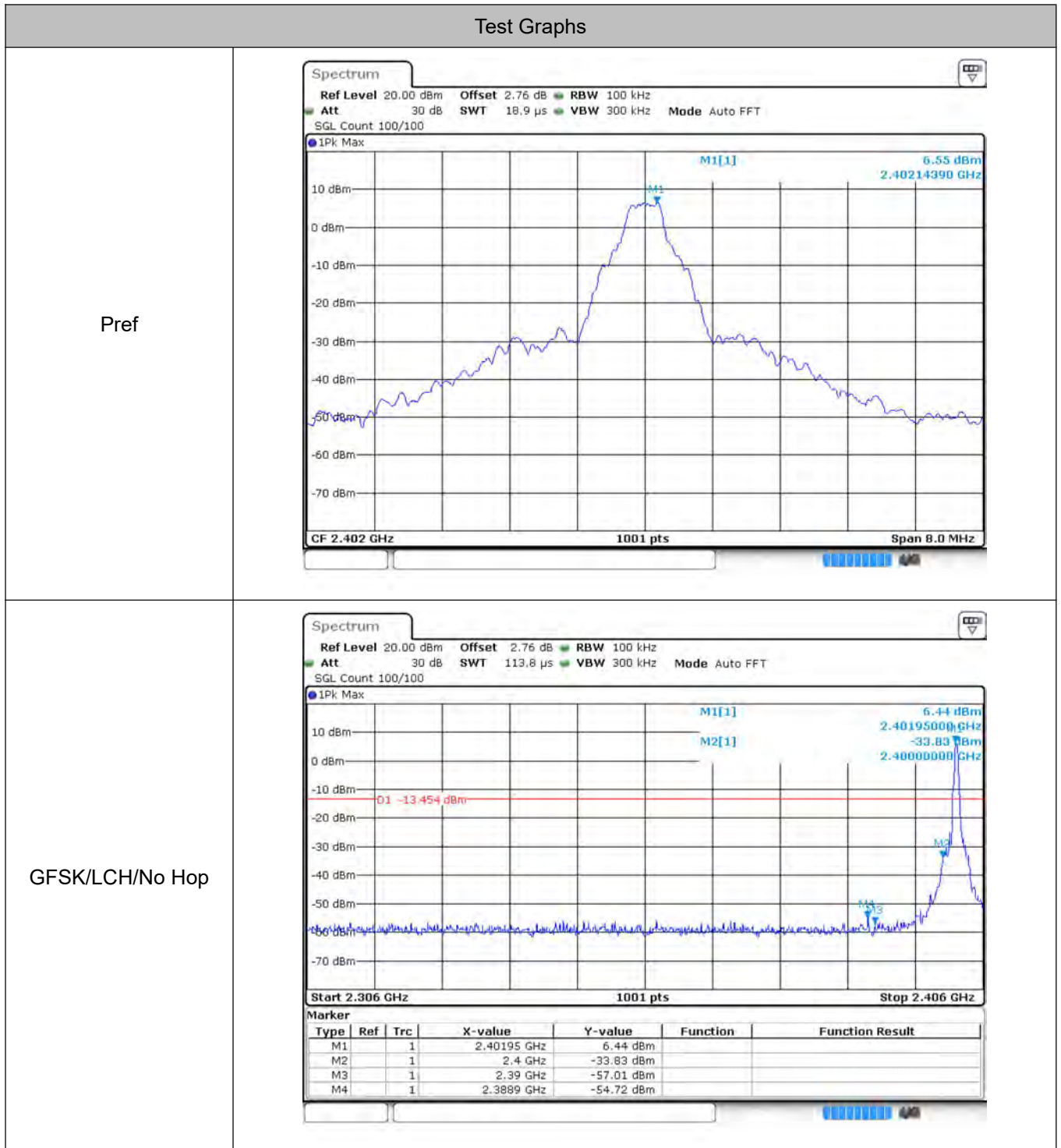


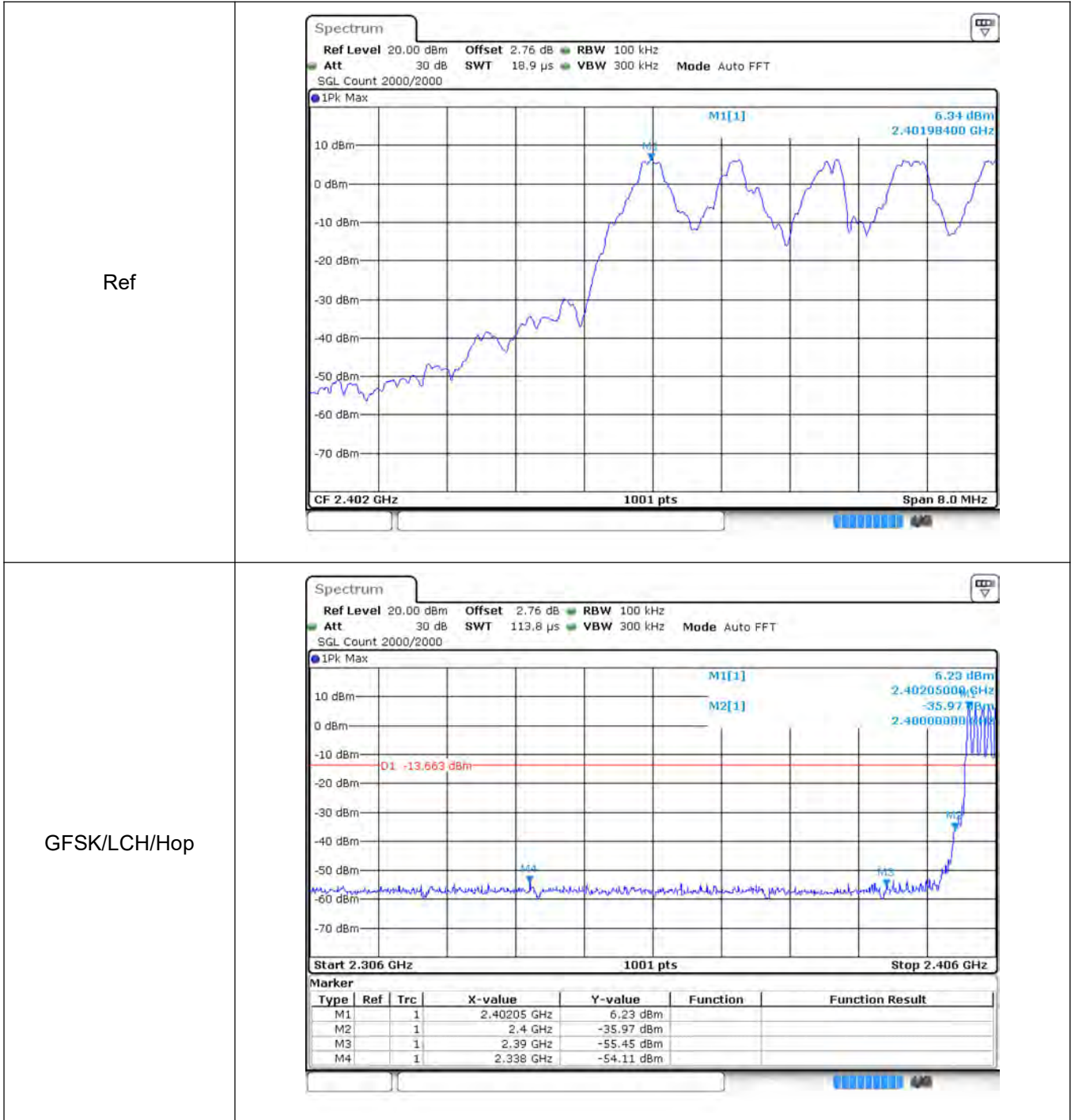
8 Band-edge for RF Conducted Emissions

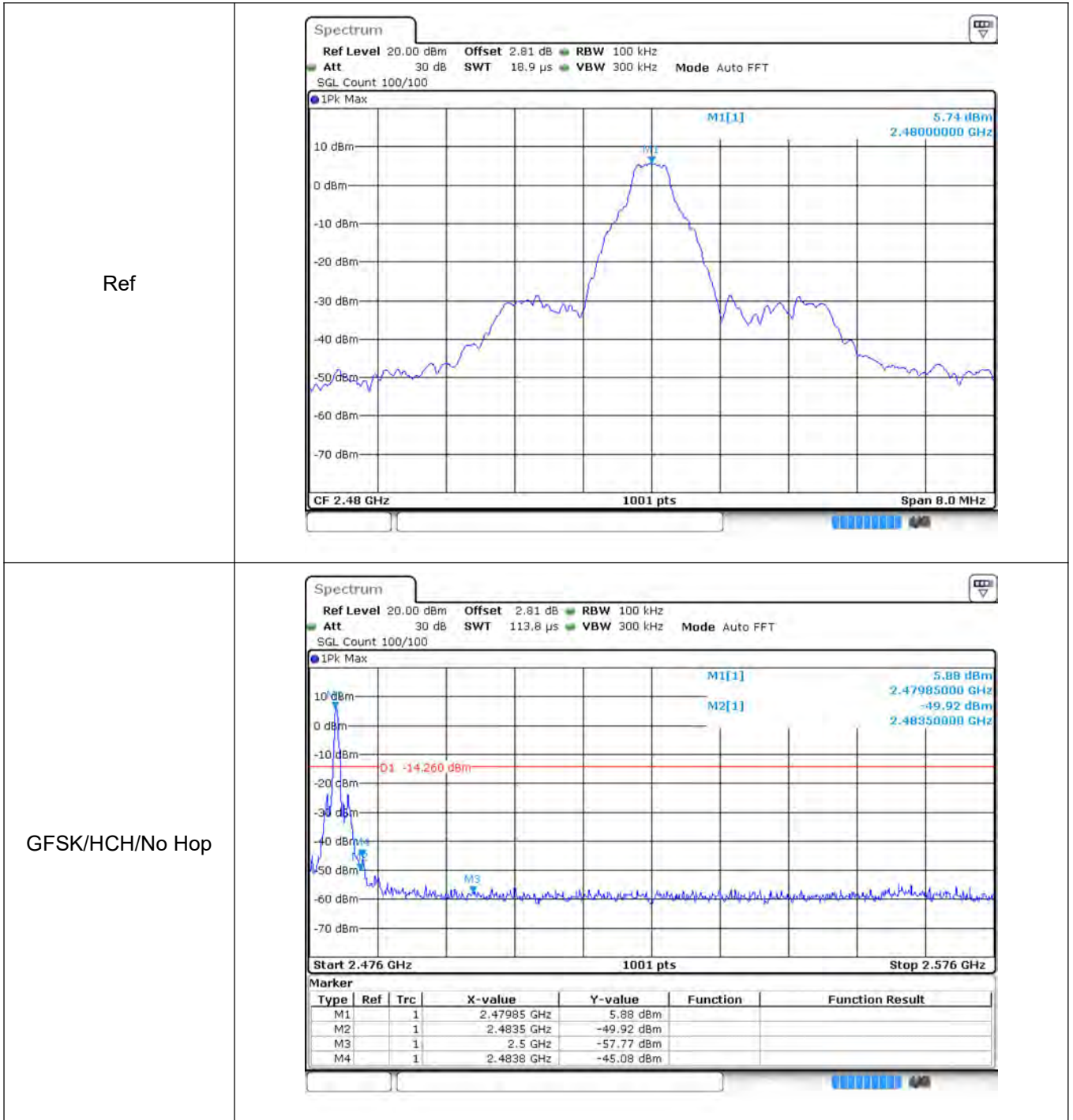
8.1 Test Result

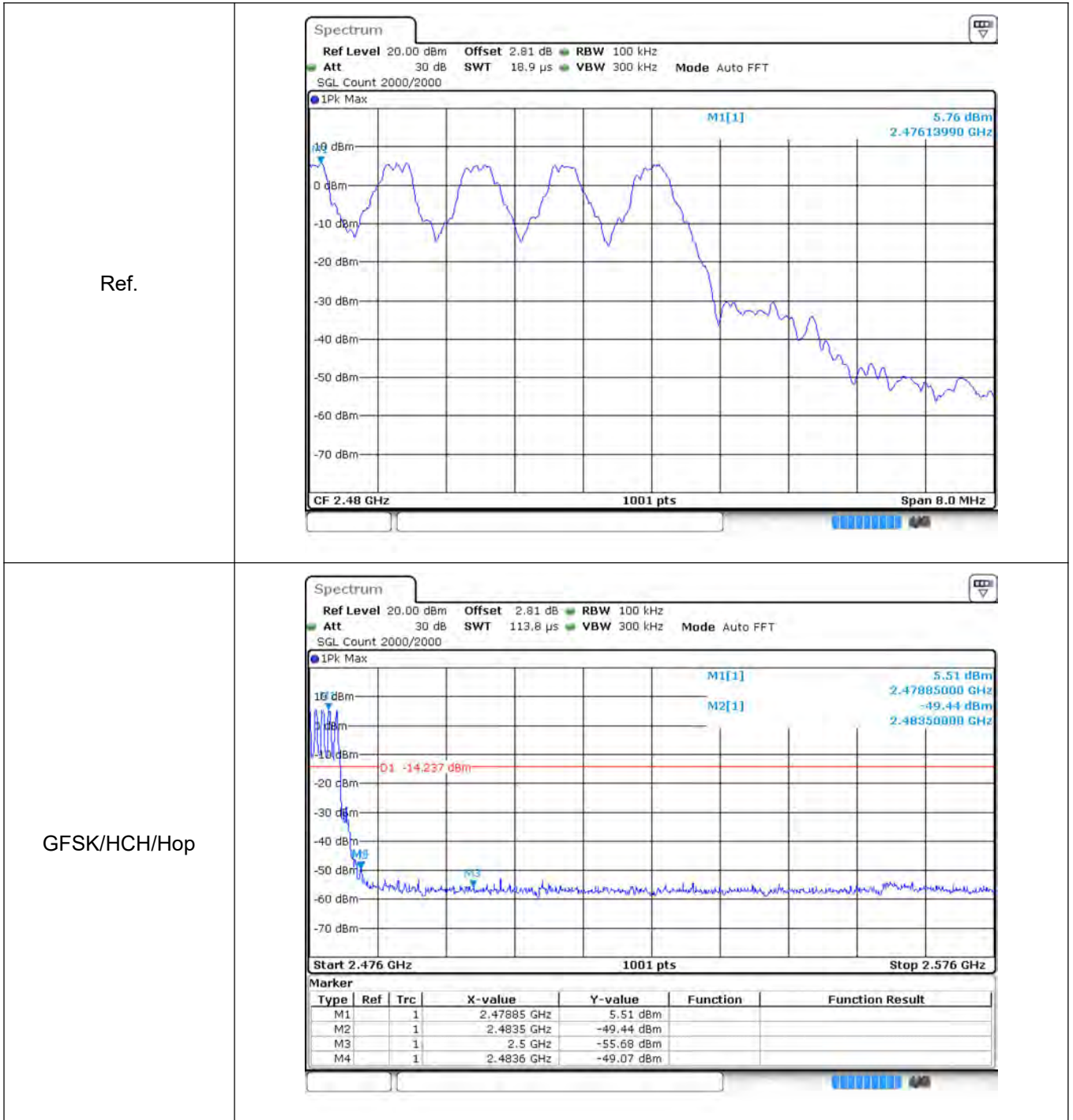
Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Max Spurious Level [dBc]	Limit [dBc]	Verdict
GFSK	LCH	2402	Off	-61.26	-20	Pass
			On	-60.45	-20	Pass
	HCH	2480	Off	-50.82	-20	Pass
			On	-54.82	-20	Pass
$\pi/4$ DQPSK	LCH	2402	Off	-61.8	-20	Pass
			On	-57.99	-20	Pass
	HCH	2480	Off	-54.93	-20	Pass
			On	-57.26	-20	Pass
8DPSK	LCH	2402	Off	-61.93	-20	Pass
			On	-61	-20	Pass
	HCH	2480	Off	-53.32	-20	Pass
			On	-55.19	-20	Pass

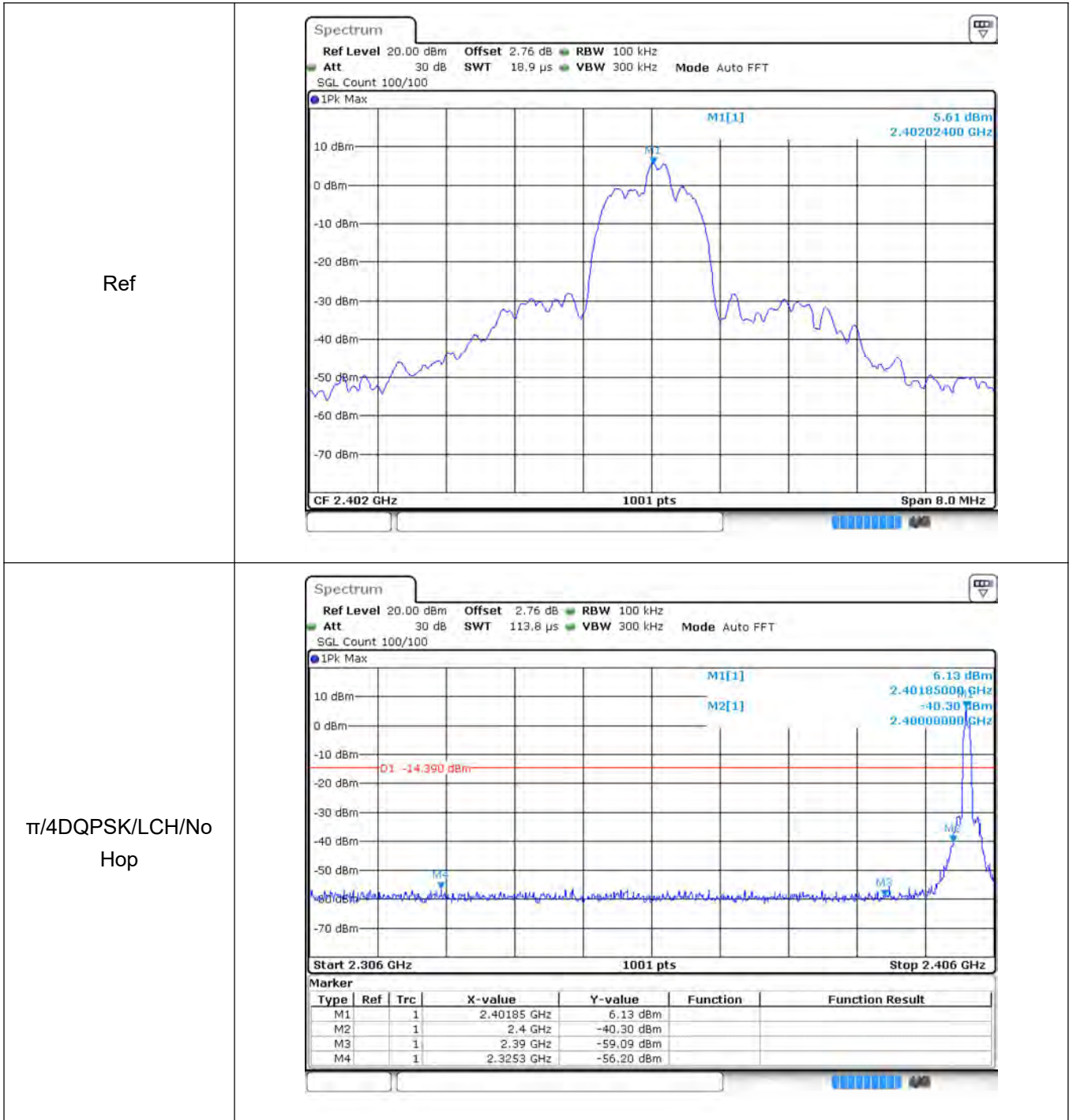
8.2 Test Graphs

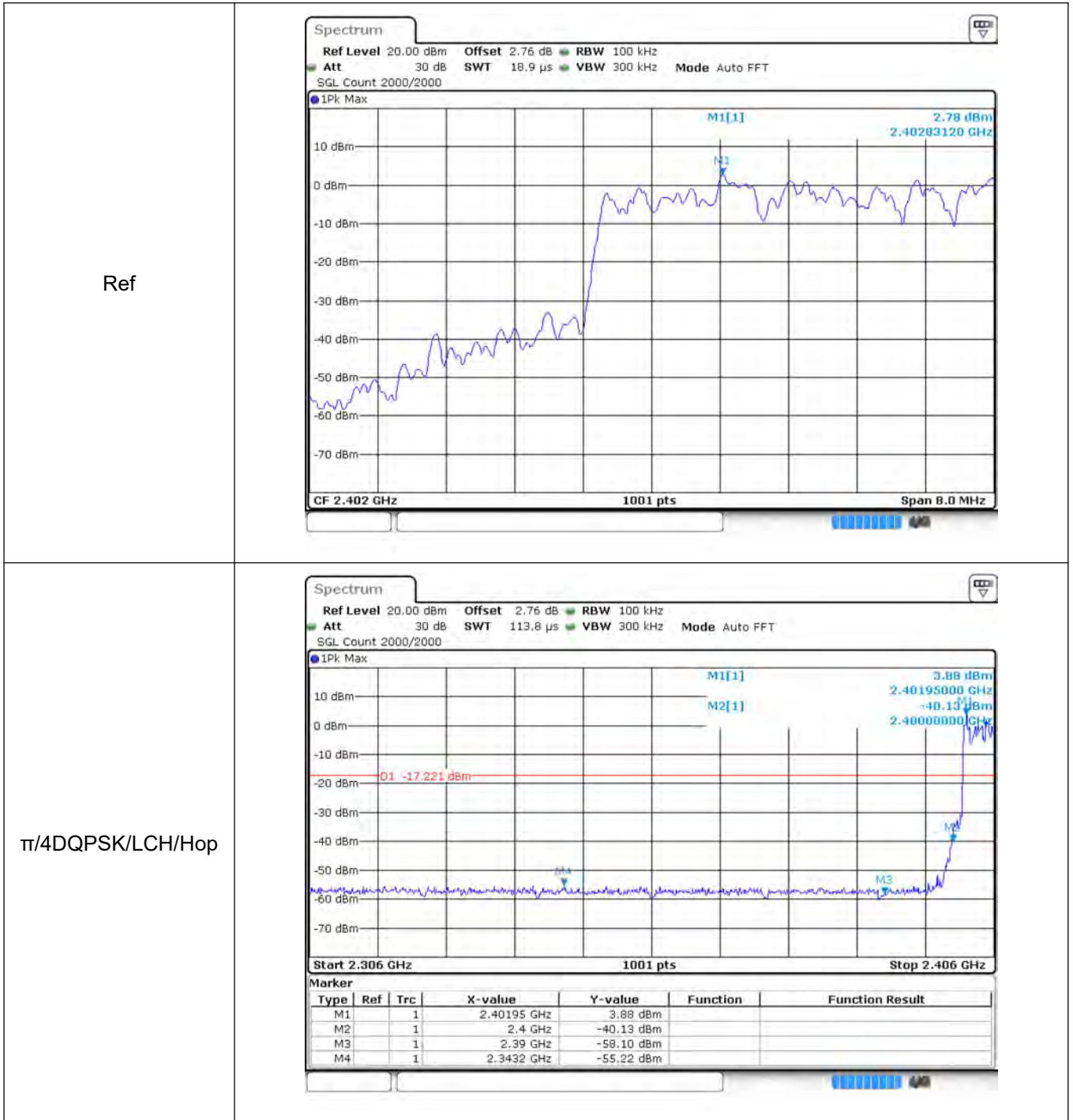


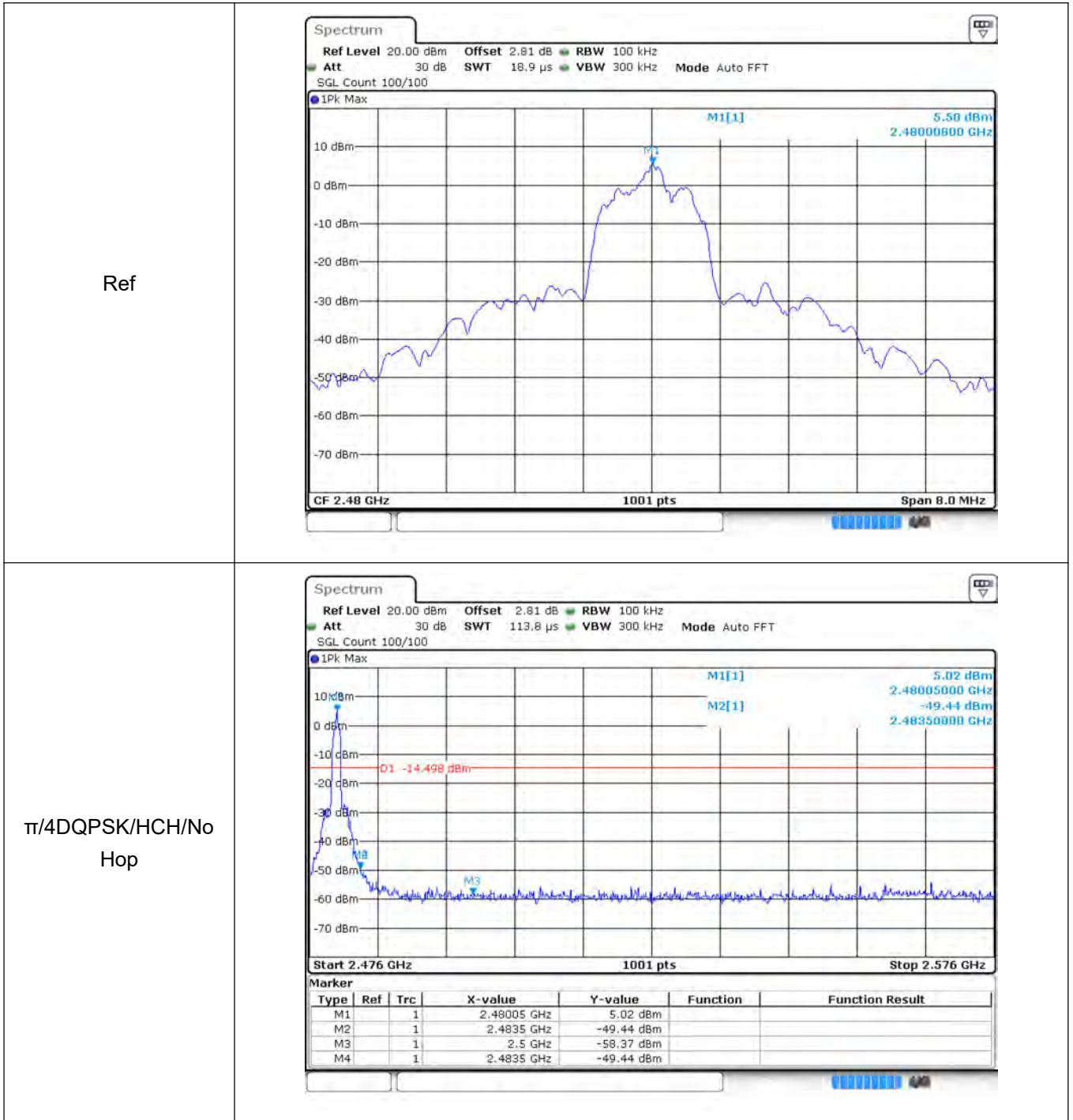


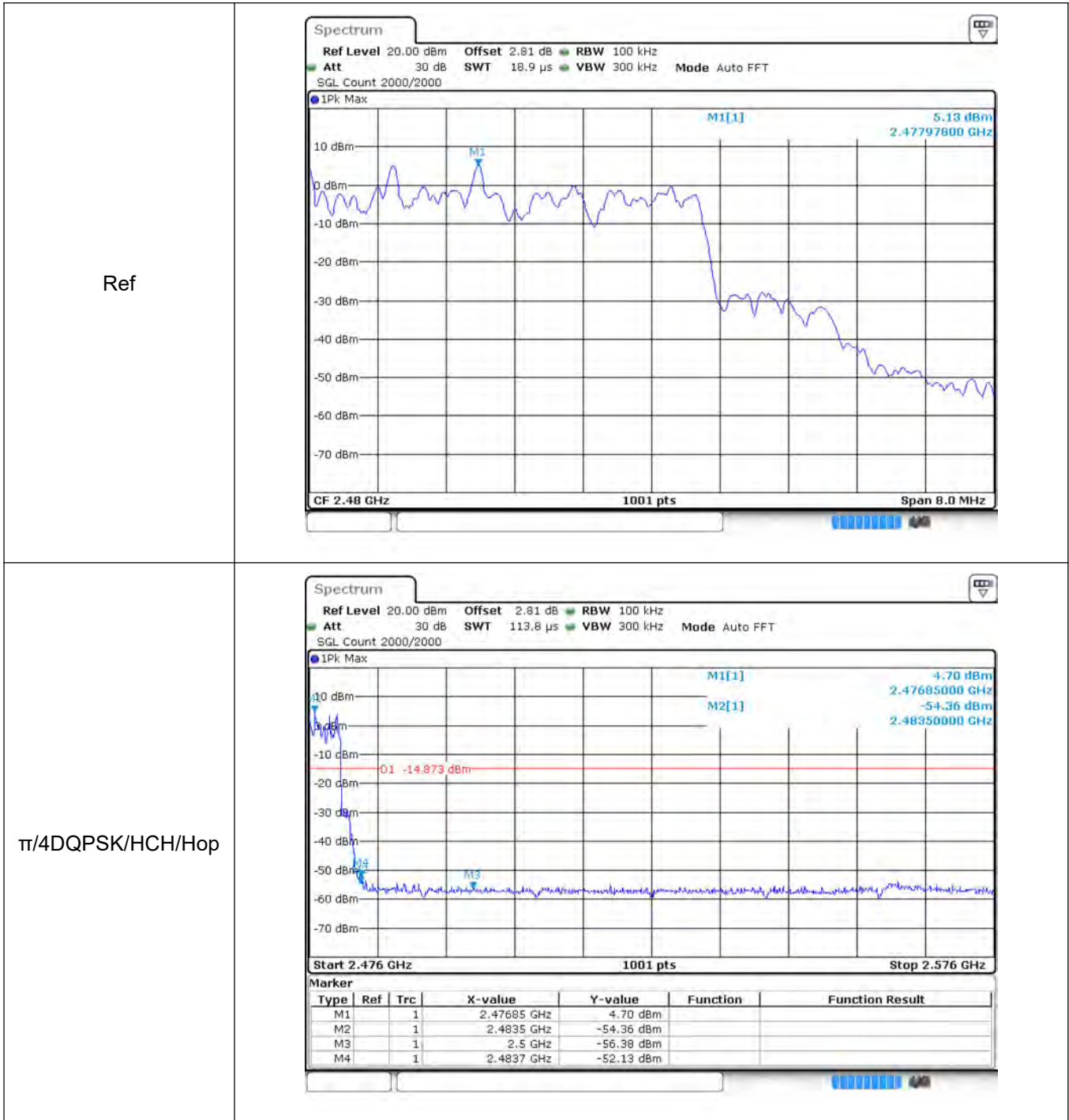


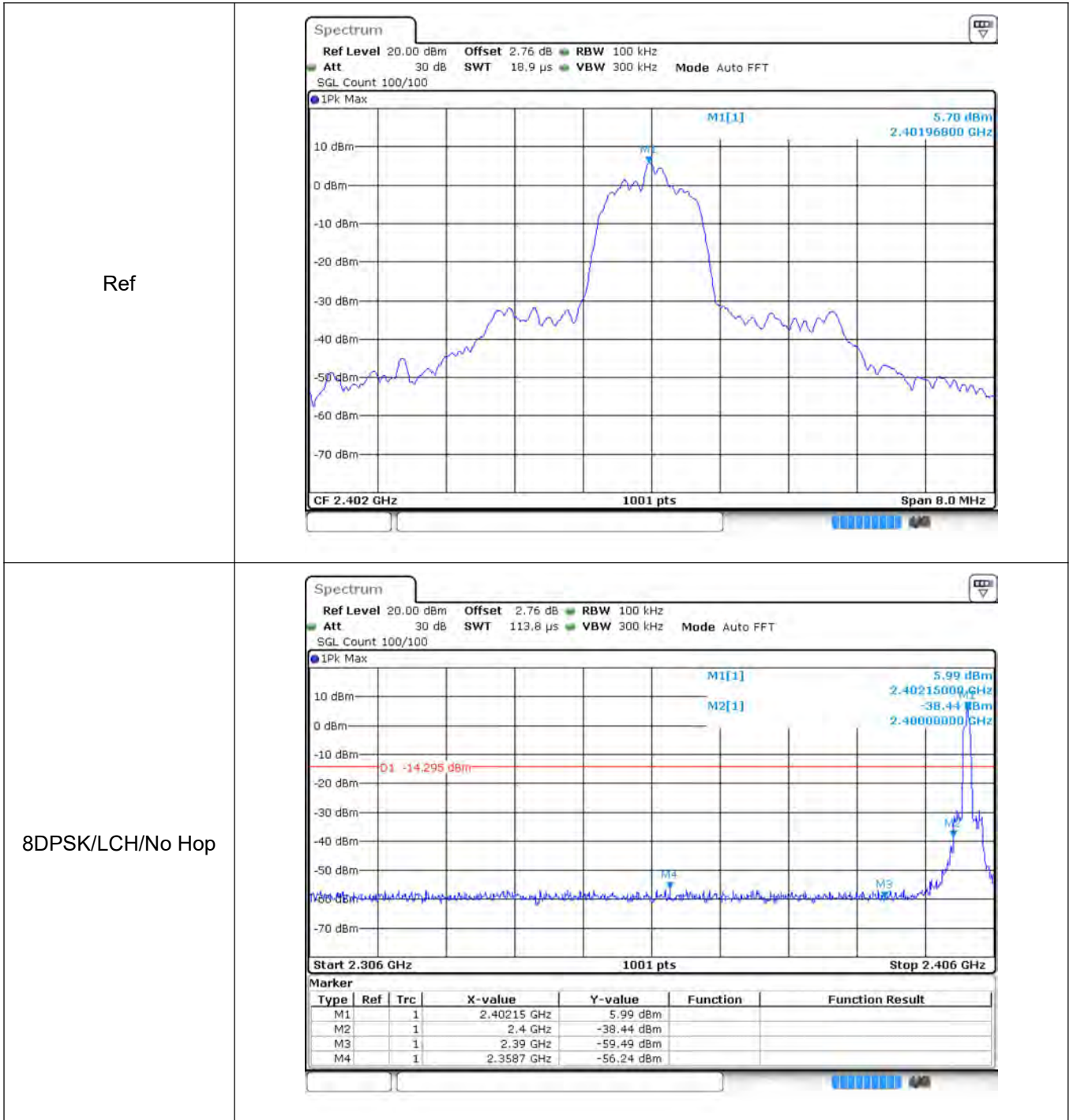


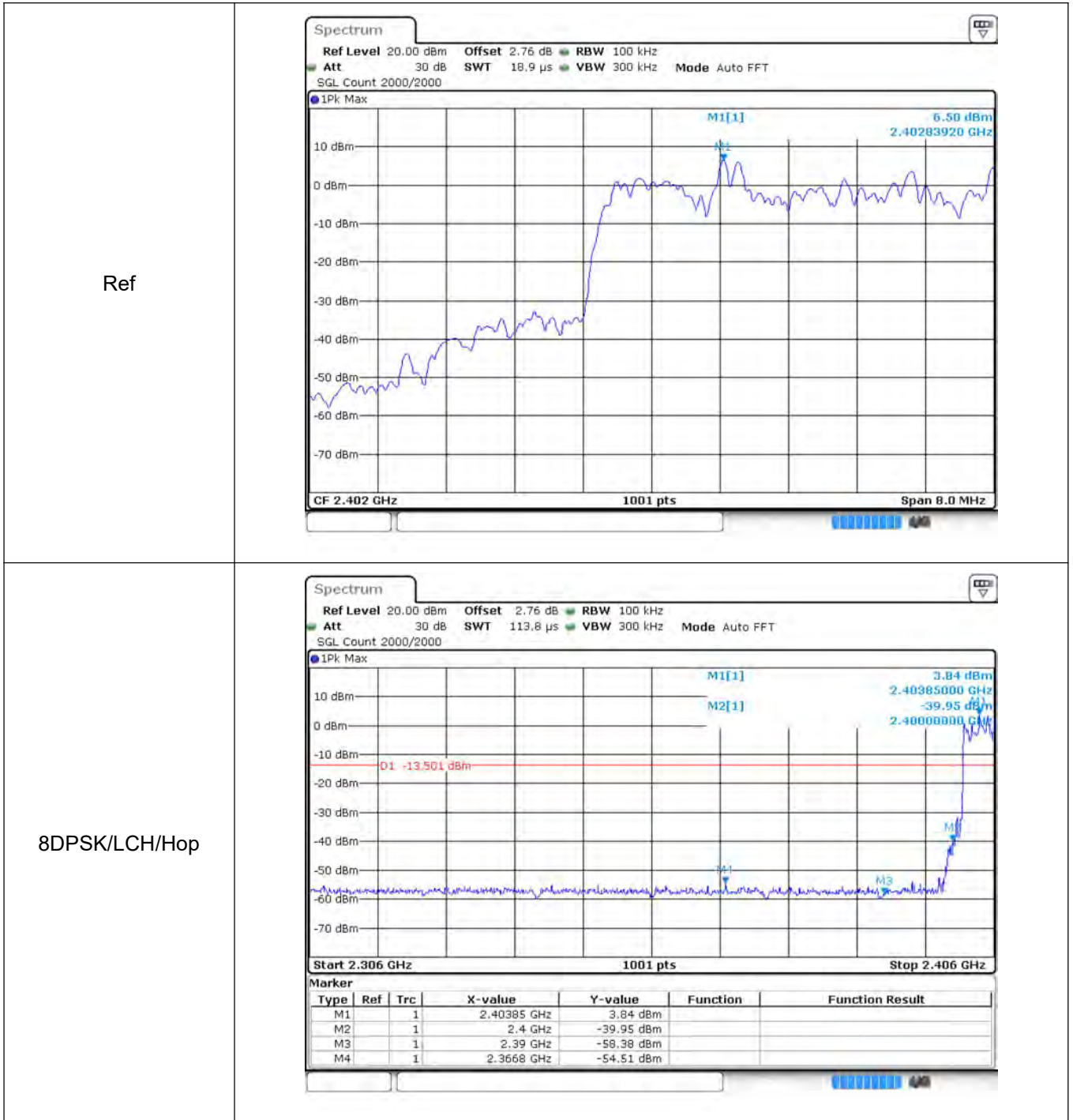


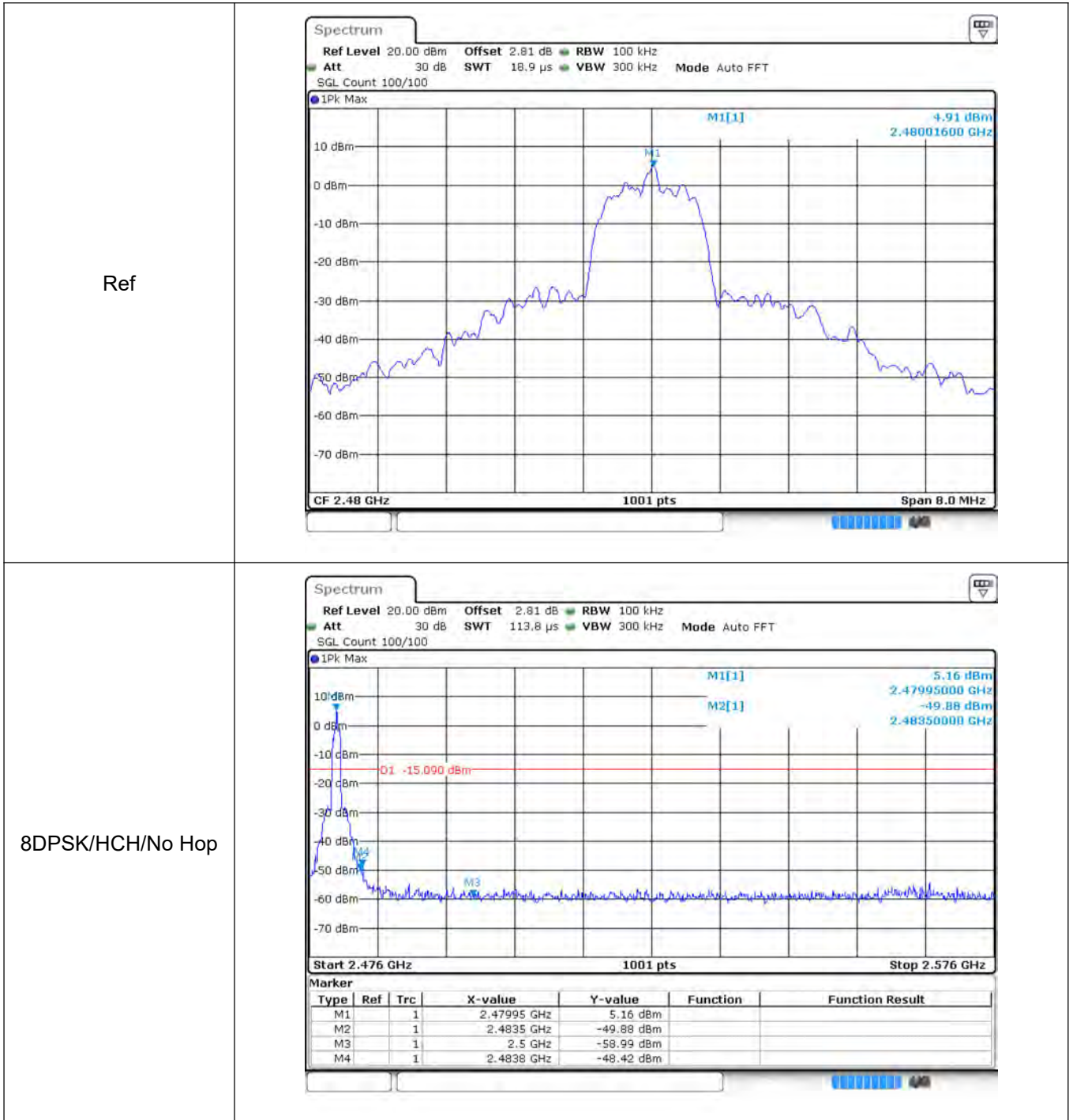


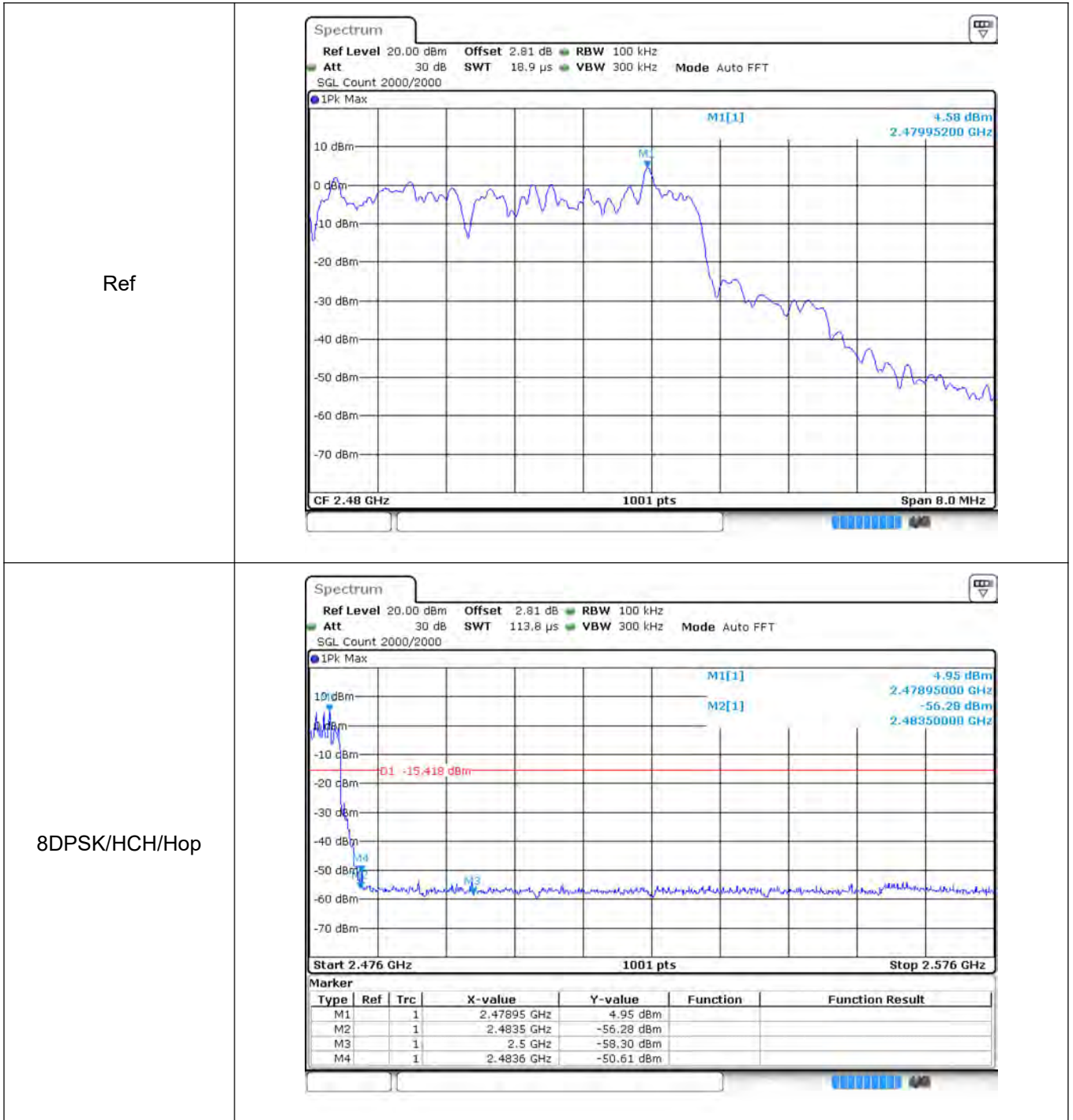












9 Restrict-band band-edge measurements

9.1 Test Result

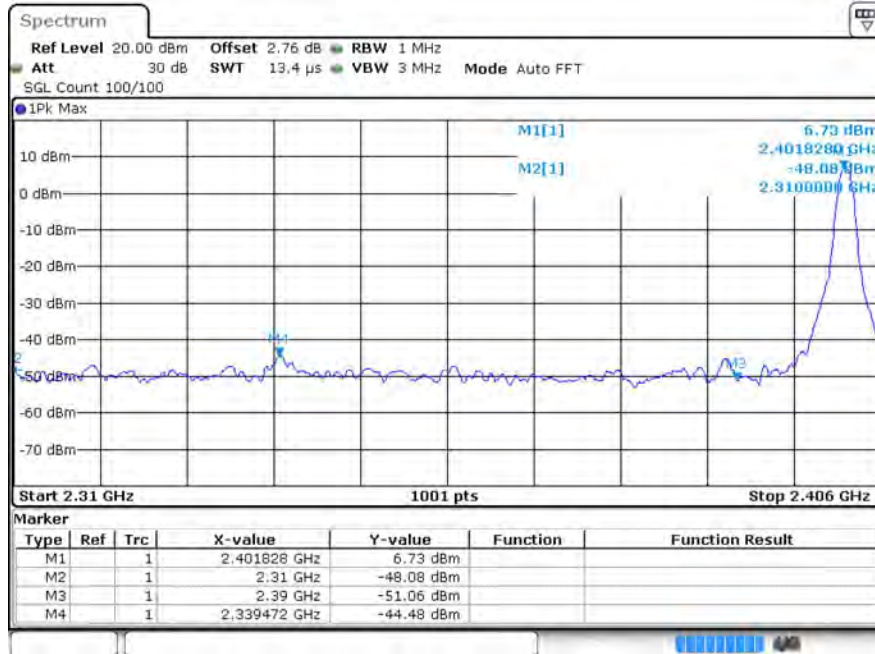
Test Mode	Hopping	Freq.	Power [dBm]	Gain	Duty Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-48.08	2.02	-	49.2	PEAK	74	Pass
	Off	2310.0	-56.76	2.02	1.87	42.39	AV	54	Pass
	Off	2339.472	-44.48	2.02	-	52.8	PEAK	74	Pass
	Off	2340.816	-54.32	2.02	1.87	44.83	AV	54	Pass
	Off	2390.0	-51.06	2.02	-	46.22	PEAK	74	Pass
	Off	2390.0	-56.64	2.02	1.87	42.51	AV	54	Pass
	Off	2483.5	-38.29	2.02	-	58.99	PEAK	74	Pass
	Off	2483.5	-47.68	2.02	1.88	51.48	AV	54	Pass
	Off	2483.512	-38.41	2.02	-	58.87	PEAK	74	Pass
	Off	2483.512	-47.72	2.02	1.88	51.44	AV	54	Pass
	Off	2500.0	-48.32	2.02	-	48.96	PEAK	74	Pass
	Off	2500.0	-56.22	2.02	1.88	42.94	AV	54	Pass
$\pi/4$ DQPSK	Off	2310.0	-48.86	2.02	-	48.42	PEAK	74	Pass
	Off	2310.0	-55.84	2.02	5.73	47.17	AV	54	Pass
	Off	2338.608	-44.94	2.02	-	52.34	PEAK	74	Pass
	Off	2339.088	-54.36	2.02	5.73	48.65	AV	54	Pass
	Off	2390.0	-49.5	2.02	-	47.78	PEAK	74	Pass
	Off	2390.0	-56.01	2.02	5.73	47	AV	54	Pass
	Off	2483.5	-41.34	2.02	-	55.94	PEAK	74	Pass
	Off	2483.5	-50.2	2.02	5.72	52.8	AV	54	Pass
	Off	2483.512	-41.55	2.02	-	55.73	PEAK	74	Pass
	Off	2483.512	-50.32	2.02	5.72	52.68	AV	54	Pass
	Off	2500.0	-50.13	2.02	-	47.15	PEAK	74	Pass
	Off	2500.0	-56.87	2.02	5.72	46.13	AV	54	Pass
8DPSK	Off	2310.0	-50.46	2.02	-	46.82	PEAK	74	Pass
	Off	2310.0	-56.22	2.02	5.35	46.41	AV	54	Pass
	Off	2340.336	-44.34	2.02	-	52.94	PEAK	74	Pass
	Off	2339.28	-53.67	2.02	5.35	48.96	AV	54	Pass



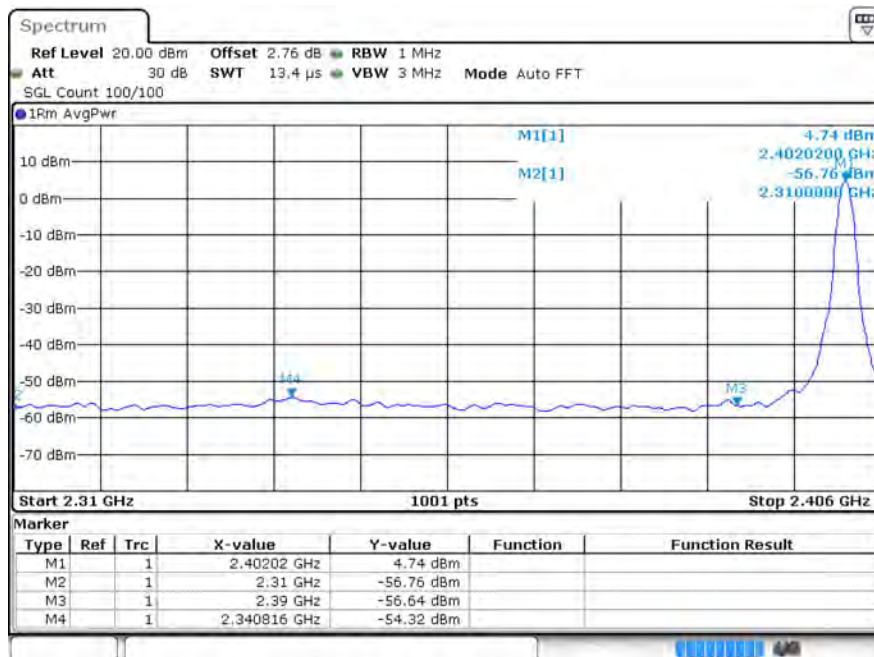
Off	2390.0	-49.92	2.02	-	47.36	PEAK	74	Pass
Off	2390.0	-56.51	2.02	5.35	46.12	AV	54	Pass
Off	2483.5	-34.99	2.02	-	62.29	PEAK	74	Pass
Off	2483.5	-51.67	2.02	5.45	51.06	AV	54	Pass
Off	2483.512	-35.14	2.02	-	62.14	PEAK	74	Pass
Off	2483.512	-51.75	2.02	5.45	50.98	AV	54	Pass
Off	2500.0	-49.7	2.02	-	47.58	PEAK	74	Pass
Off	2500.0	-56.49	2.02	5.45	46.24	AV	54	Pass

9.2 Test Graphs

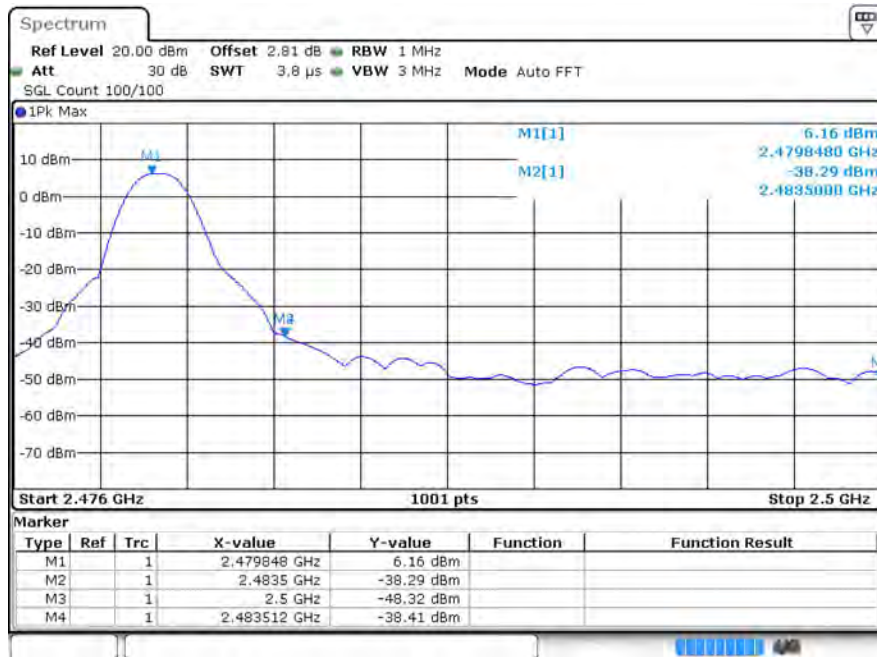
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



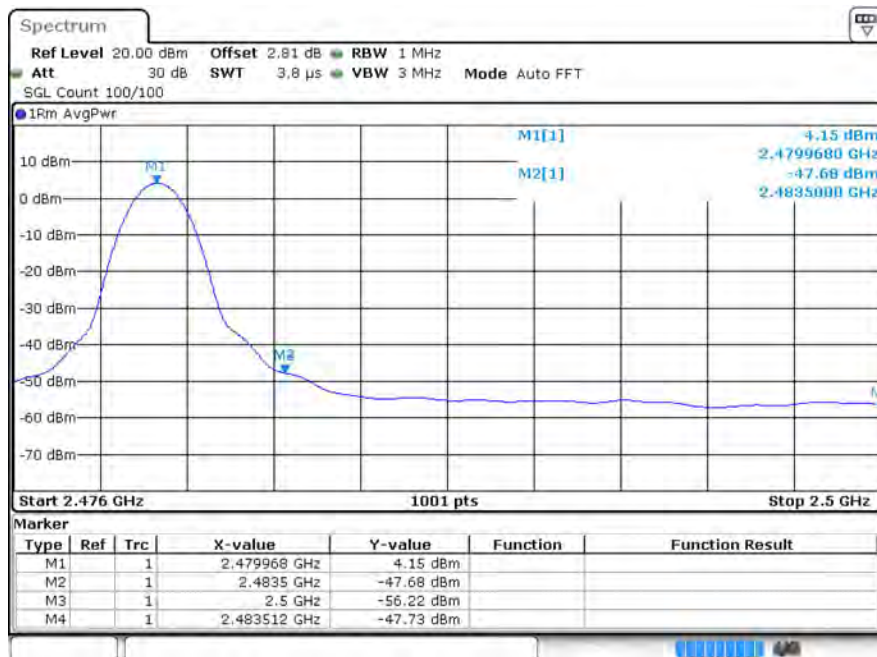
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



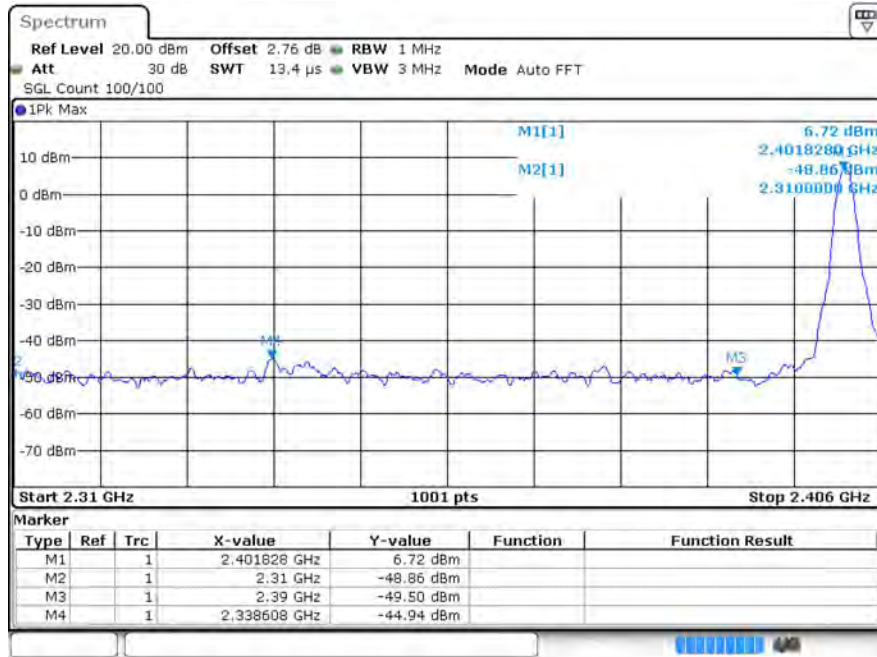
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



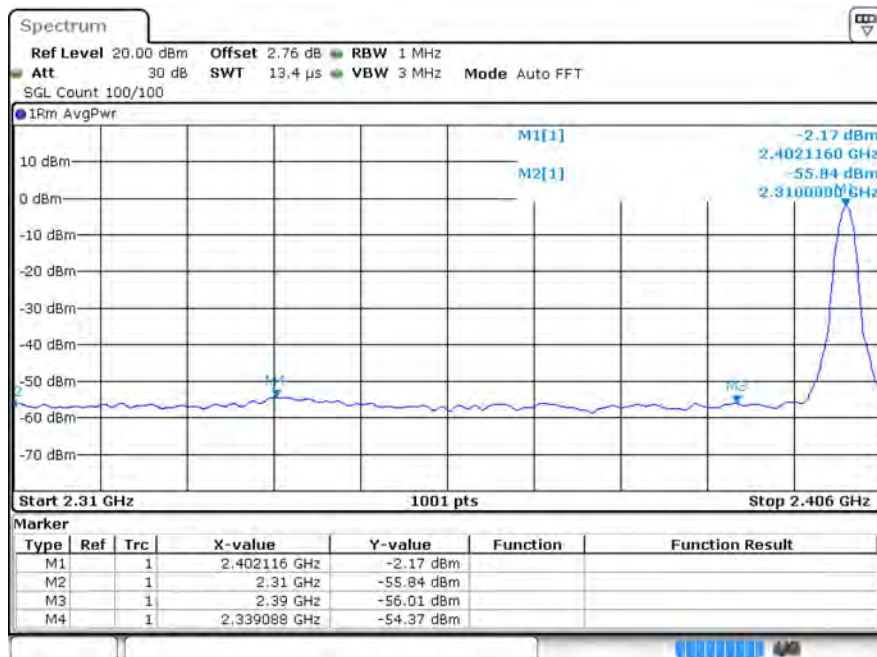
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



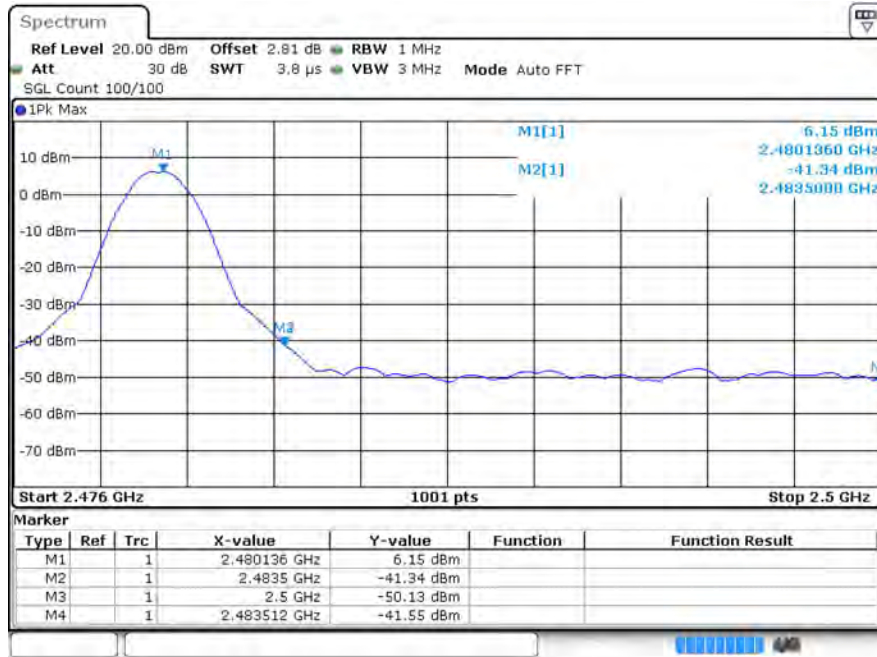
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



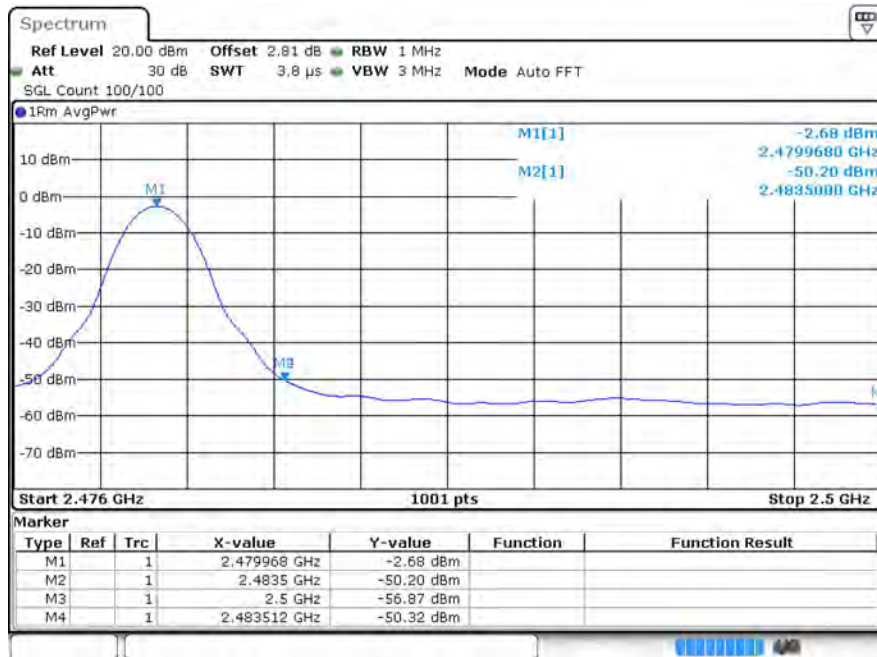
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



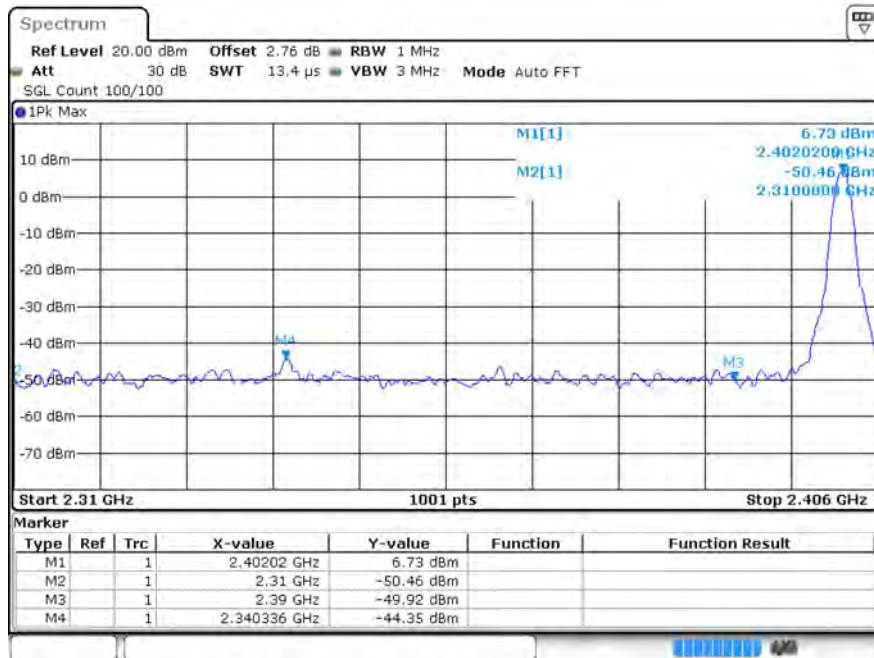
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



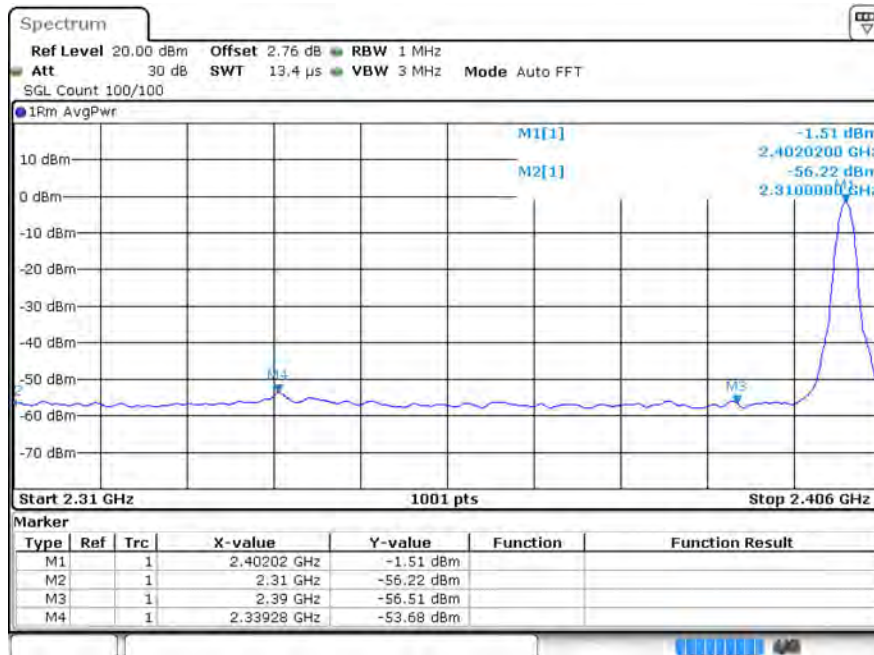
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



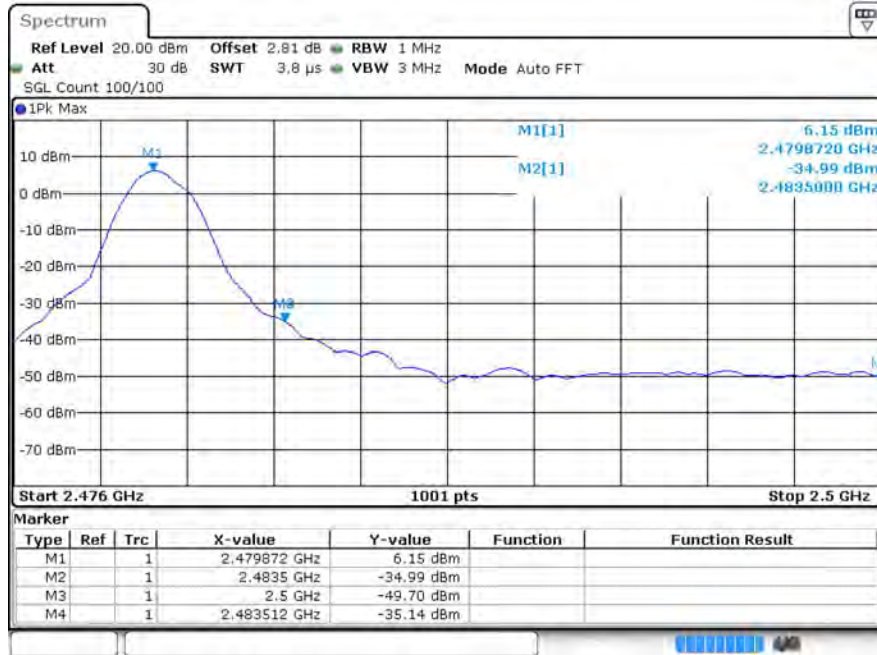
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



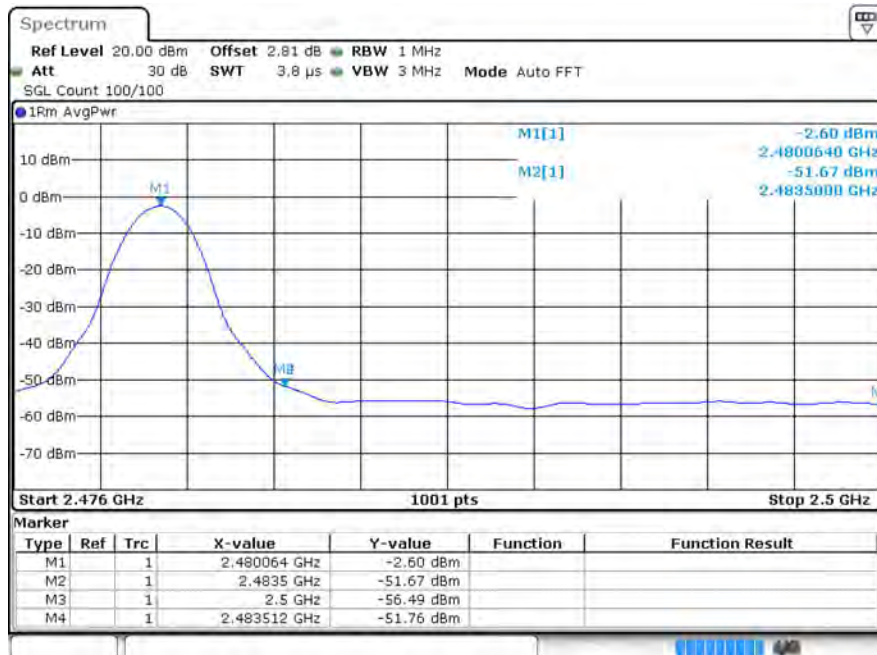
Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



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



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



---The End---