

Appendix A

RF Test Data for BT V4.0(BDR/EDR) (Conducted Measurement)

Product Name: HyFlip

Trade Mark: N/A

Test Model: HTLF11INC4Z1ES

Environmental Conditions

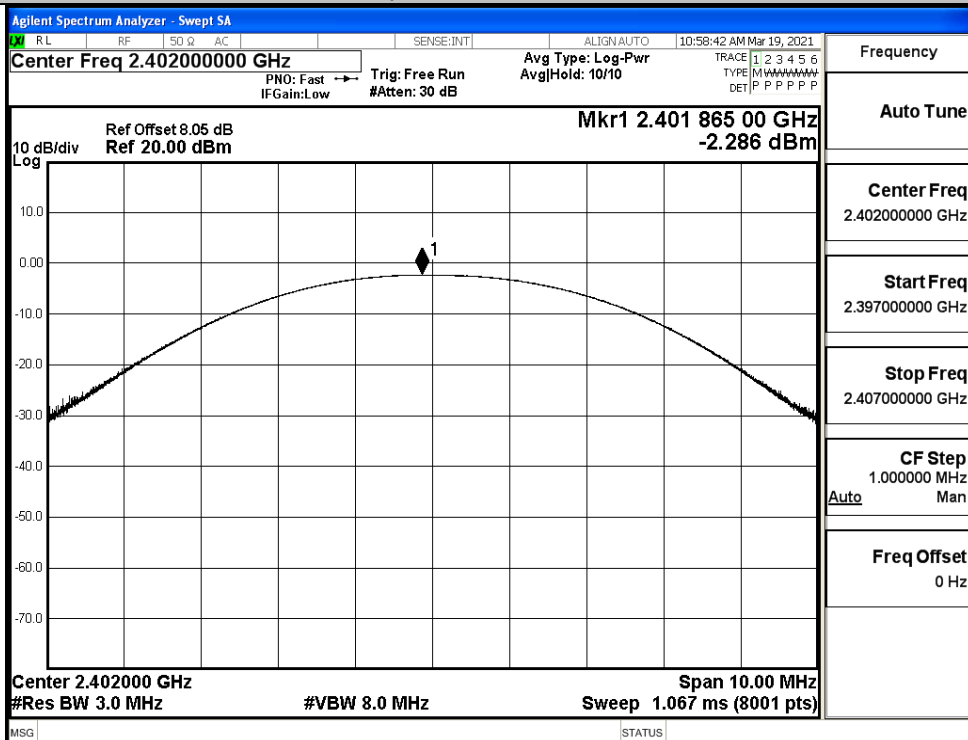
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

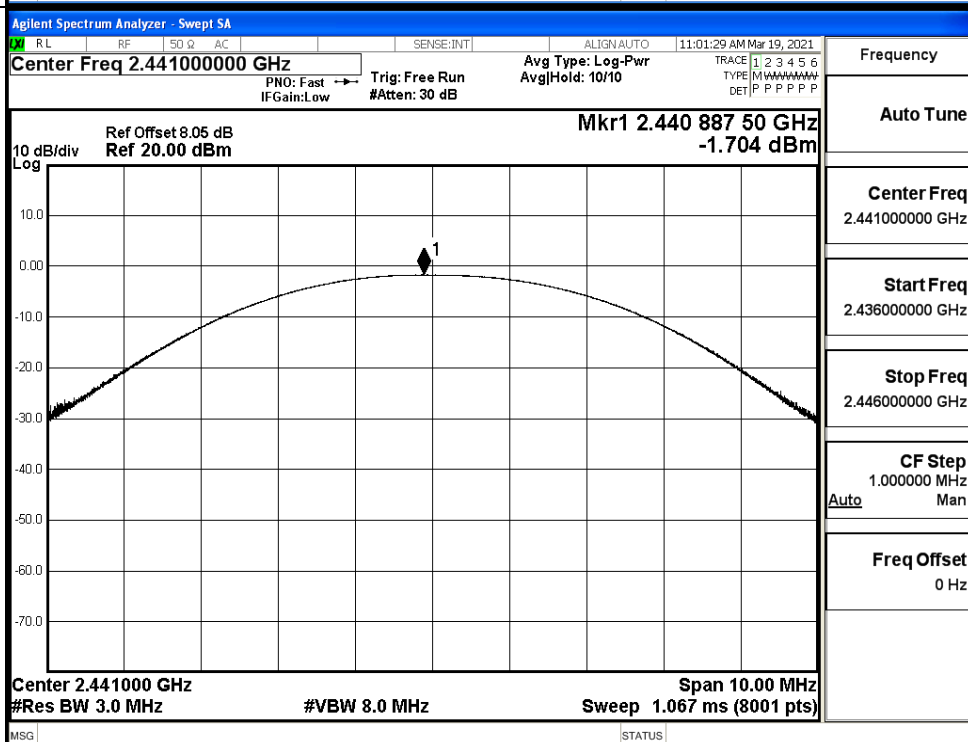
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.286	21	PASS
	MCH	-1.704	21	PASS
	HCH	-1.490	21	PASS
$\pi/4$ DQPSK	LCH	-1.413	21	PASS
	MCH	-0.742	21	PASS
	HCH	-0.636	21	PASS
8DPSK	LCH	-0.911	21	PASS
	MCH	-0.350	21	PASS
	HCH	-0.205	21	PASS

Test Graphs

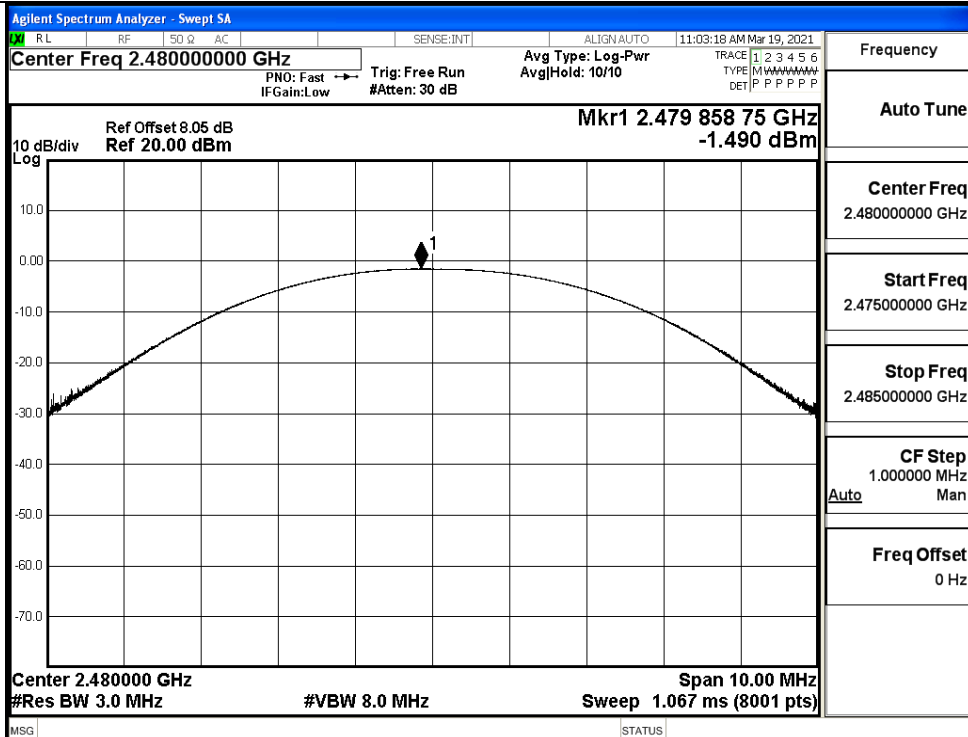
GFSK/LCH



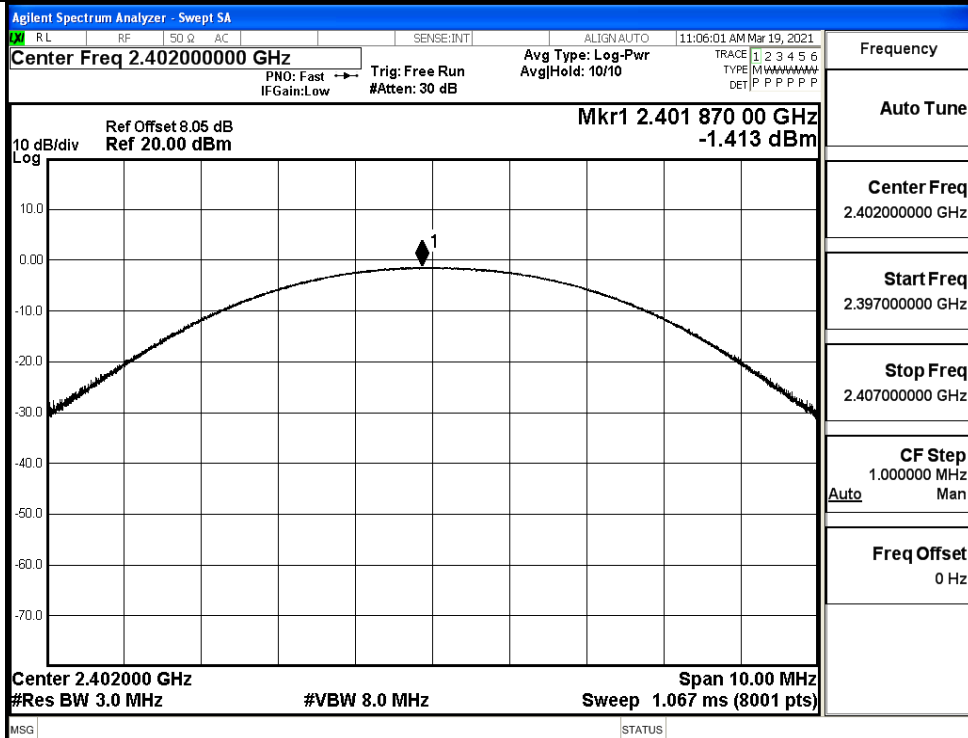
GFSK/MCH

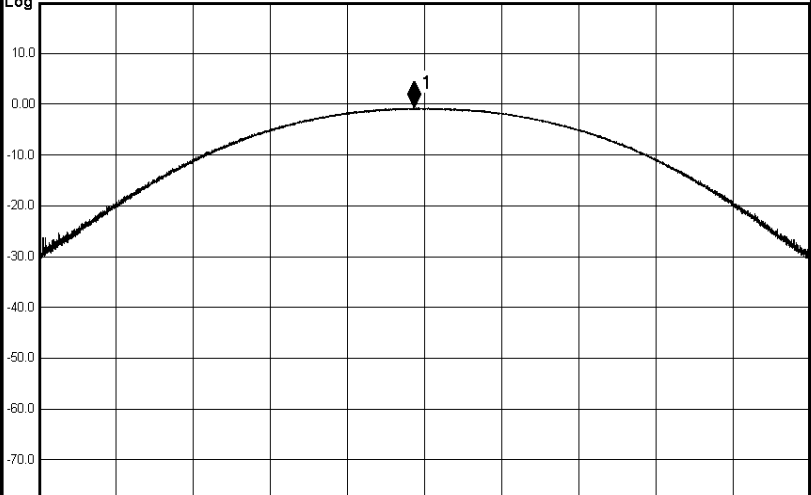
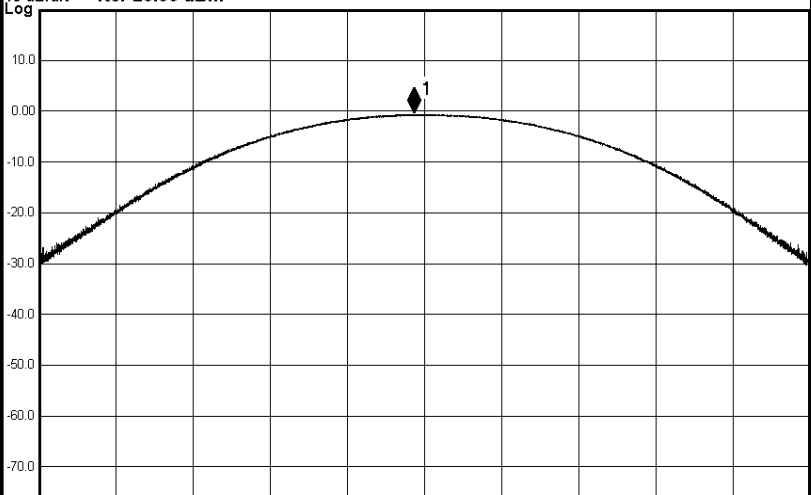


GFSK/HCH

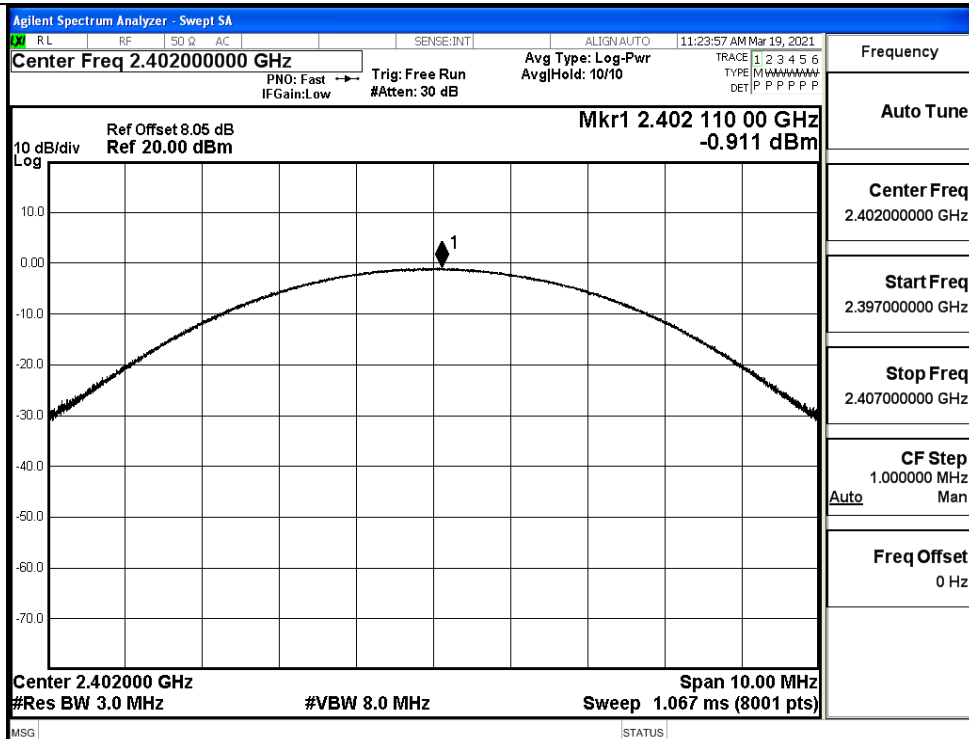


$\pi/4$ DQPSK/LCH

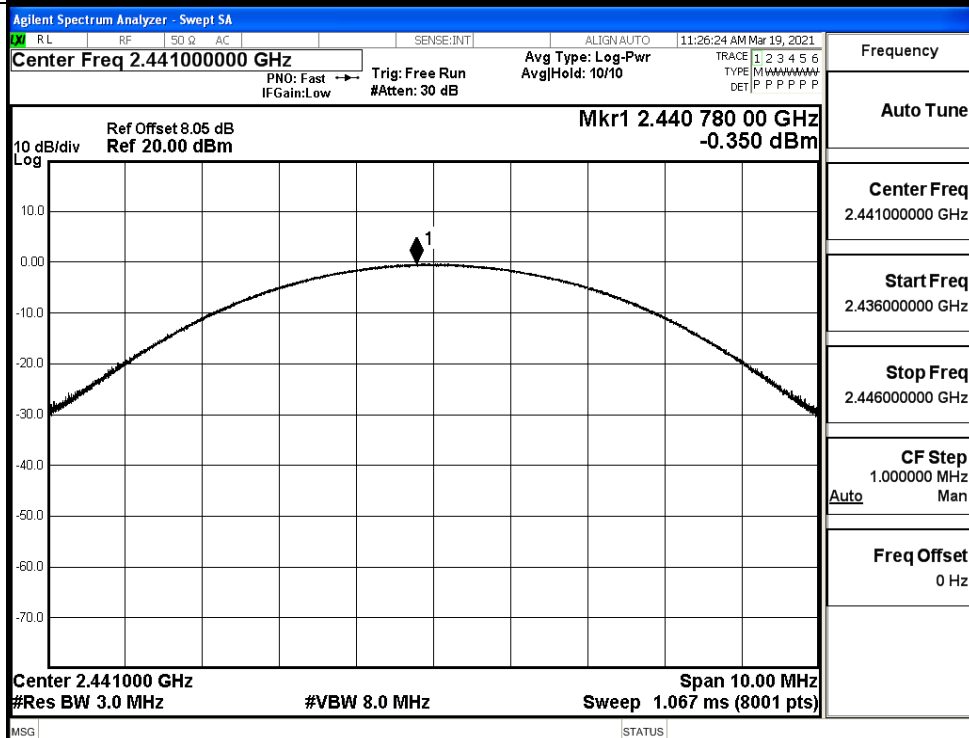


$\pi/4$DQPSK/MCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Q AC SENSE:INT ALIGN: AUTO 11:08:39 AM Mar 19, 2021 Center Freq 2.441000000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 10/10 Mkr1 2.440 860 00 GHz -0.742 dBm Ref Offset 8.05 dB Ref 20.00 dBm 10 dB/div Log Center 2.441000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 10.00 MHz Sweep 1.067 ms (8001 pts) MSG STATUS  Frequency Auto Tune Center Freq 2.441000000 GHz Start Freq 2.436000000 GHz Stop Freq 2.446000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz
$\pi/4$DQPSK/HCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Q AC SENSE:INT ALIGN: AUTO 11:11:36 AM Mar 19, 2021 Center Freq 2.480000000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 10/10 Mkr1 2.479 863 75 GHz -0.636 dBm Ref Offset 8.05 dB Ref 20.00 dBm 10 dB/div Log Center 2.480000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 10.00 MHz Sweep 1.067 ms (8001 pts) MSG STATUS  Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.475000000 GHz Stop Freq 2.485000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz

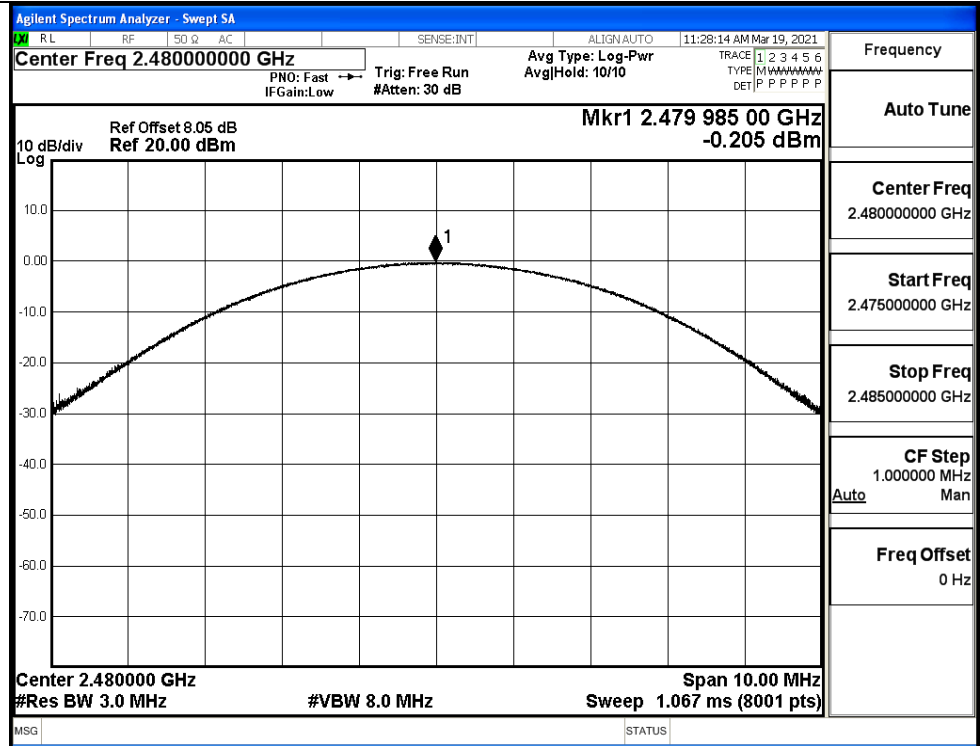
8DPSK/LCH



8DPSK/MCH



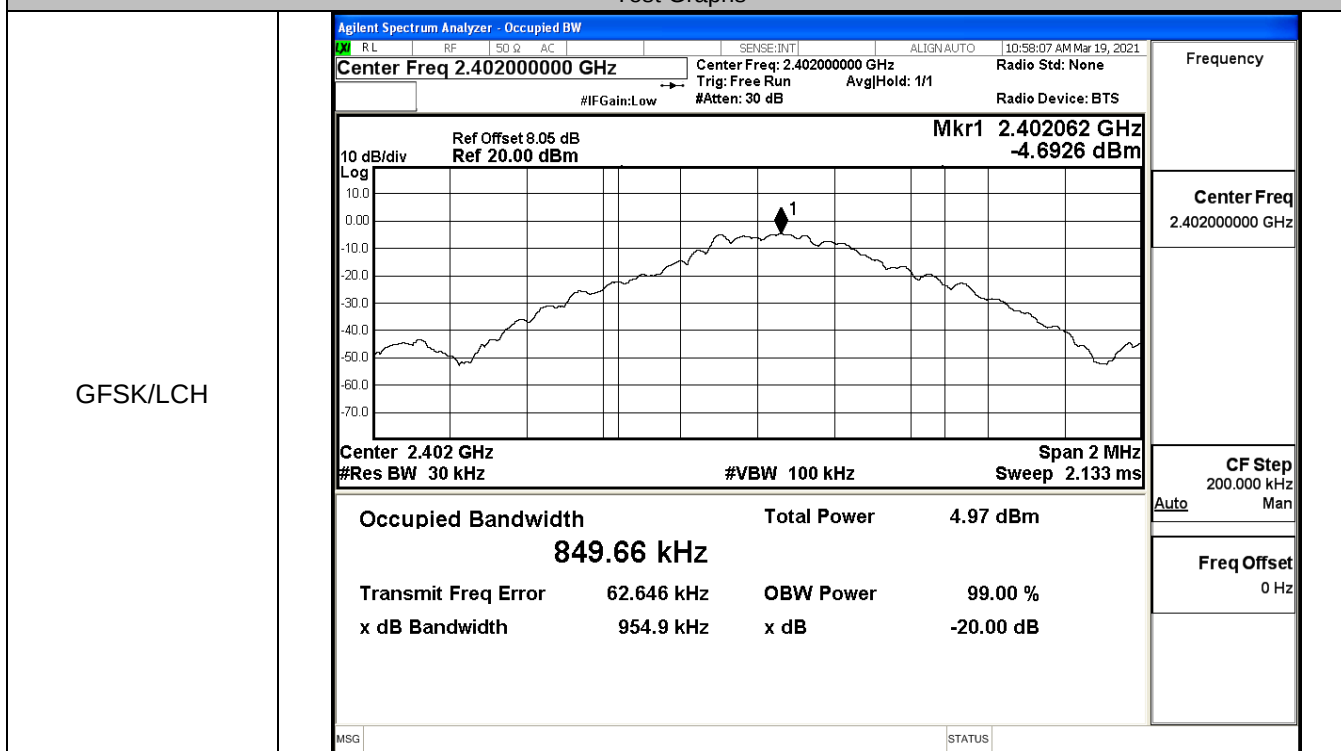
8DPSK/HCH



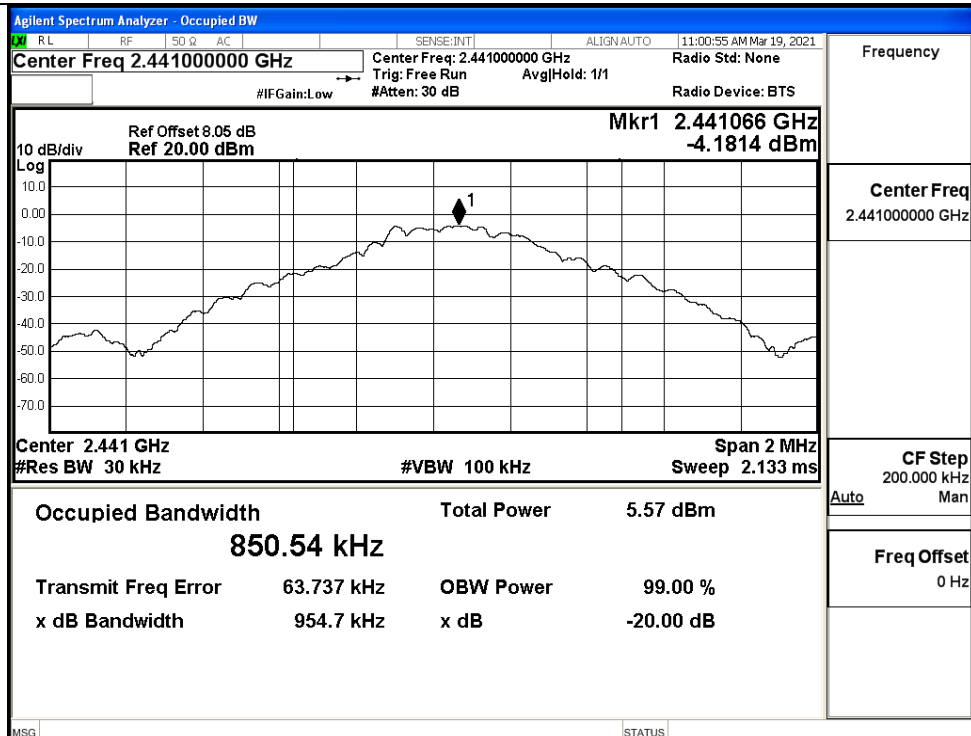
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9549	Not Specified	PASS
	MCH	0.9547	Not Specified	PASS
	HCH	0.9556	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.284	Not Specified	PASS
	MCH	1.284	Not Specified	PASS
	HCH	1.282	Not Specified	PASS
8DPSK	LCH	1.297	Not Specified	PASS
	MCH	1.295	Not Specified	PASS
	HCH	1.296	Not Specified	PASS

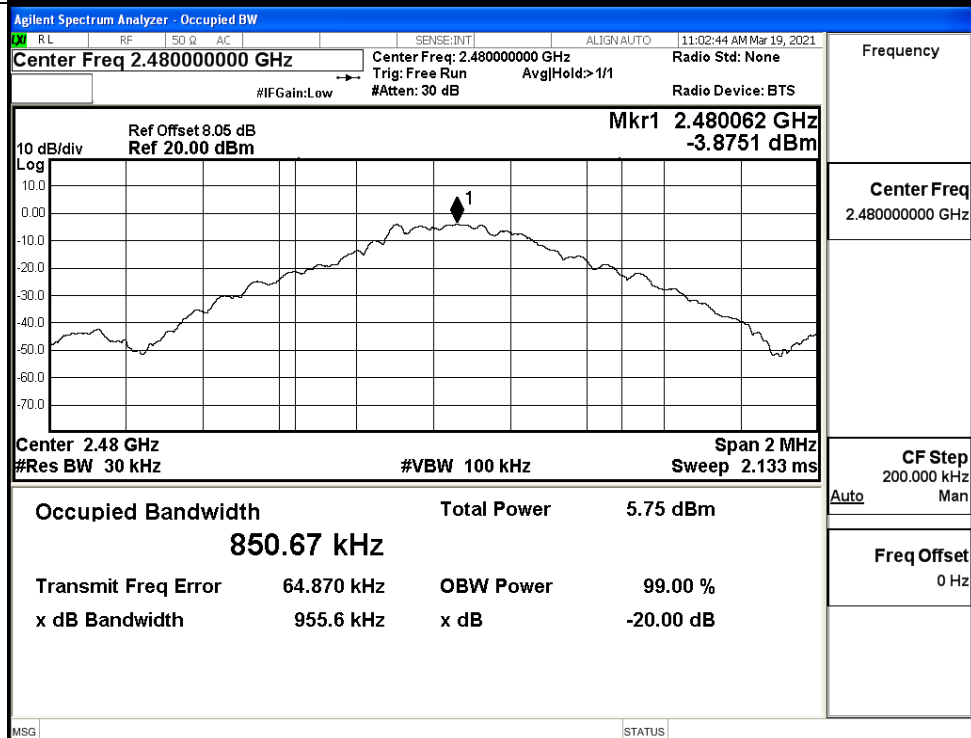
Test Graphs



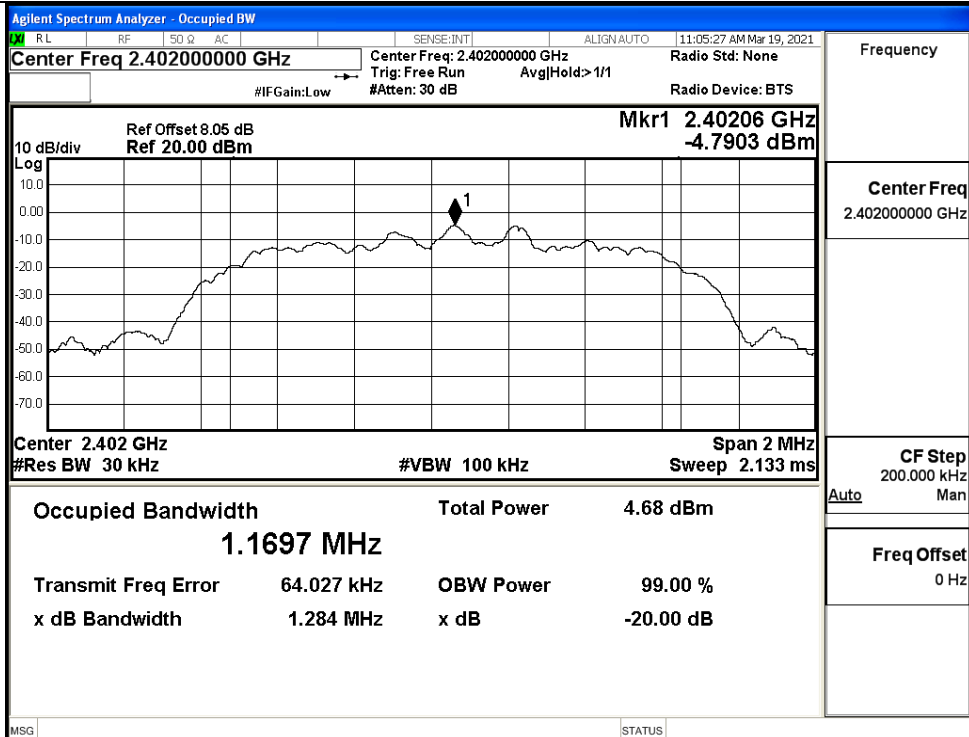
GFSK/MCH



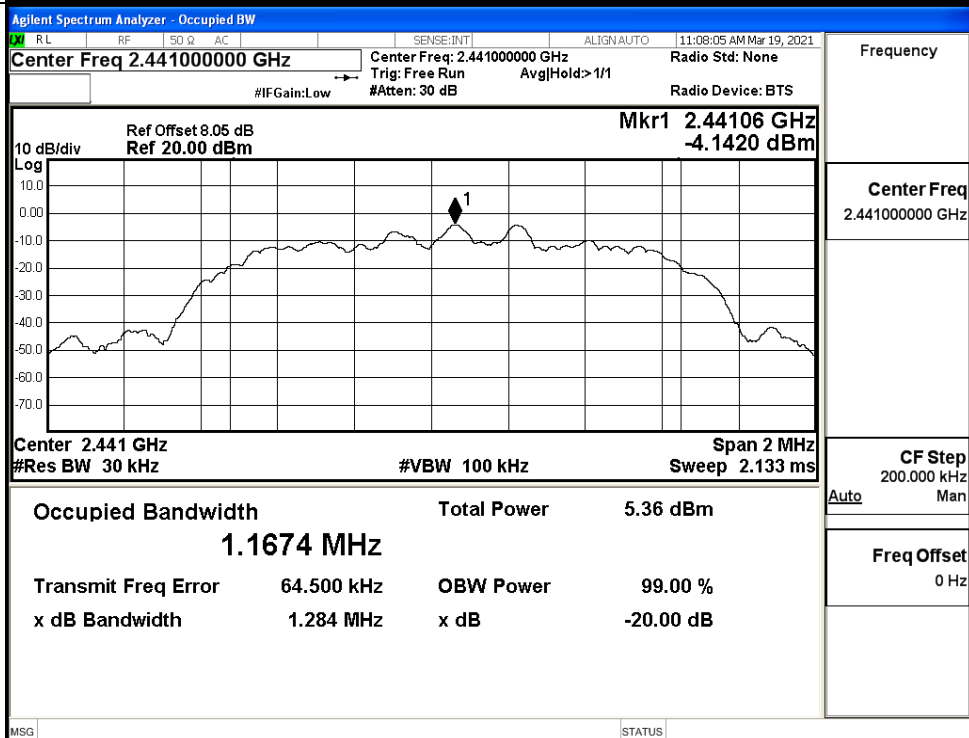
GFSK/HCH



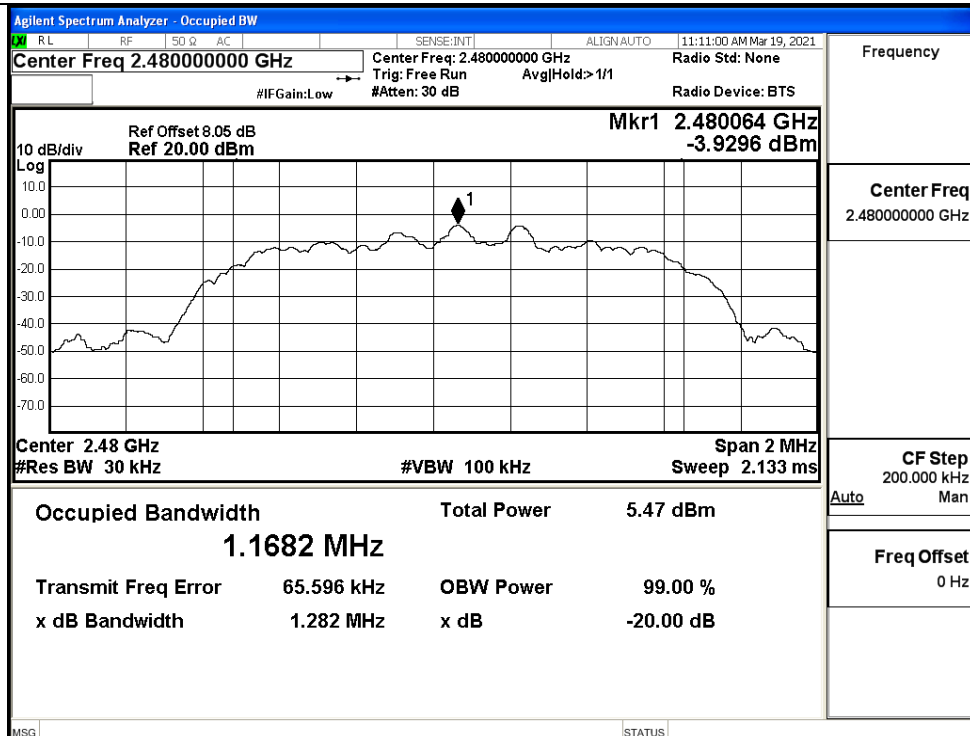
$\pi/4$ DQPSK/LCH



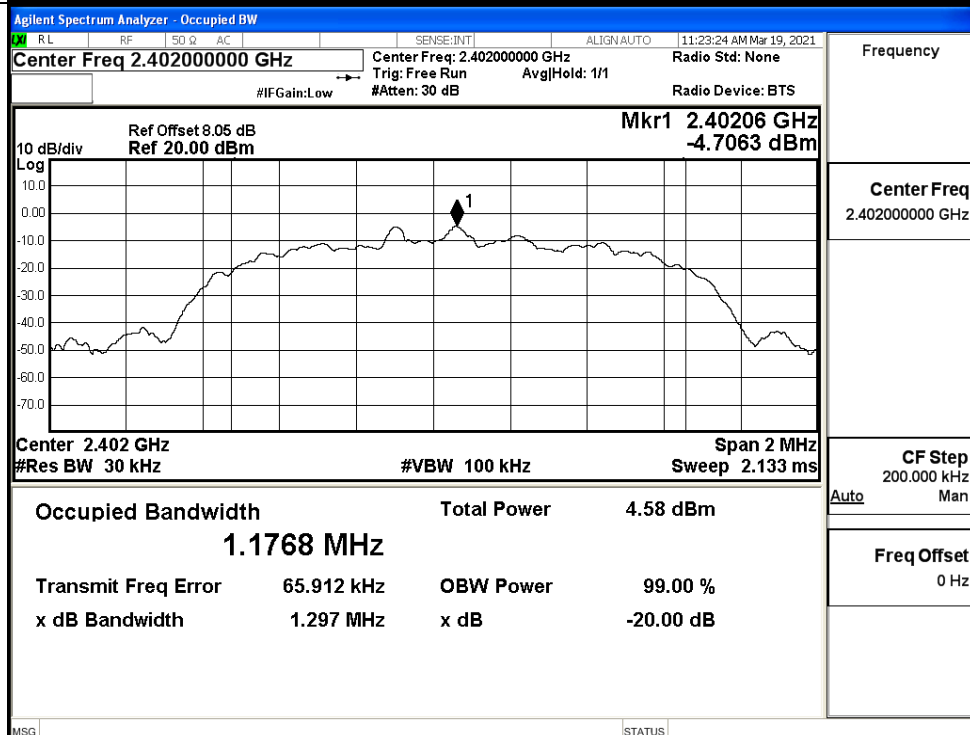
$\pi/4$ DQPSK/MCH



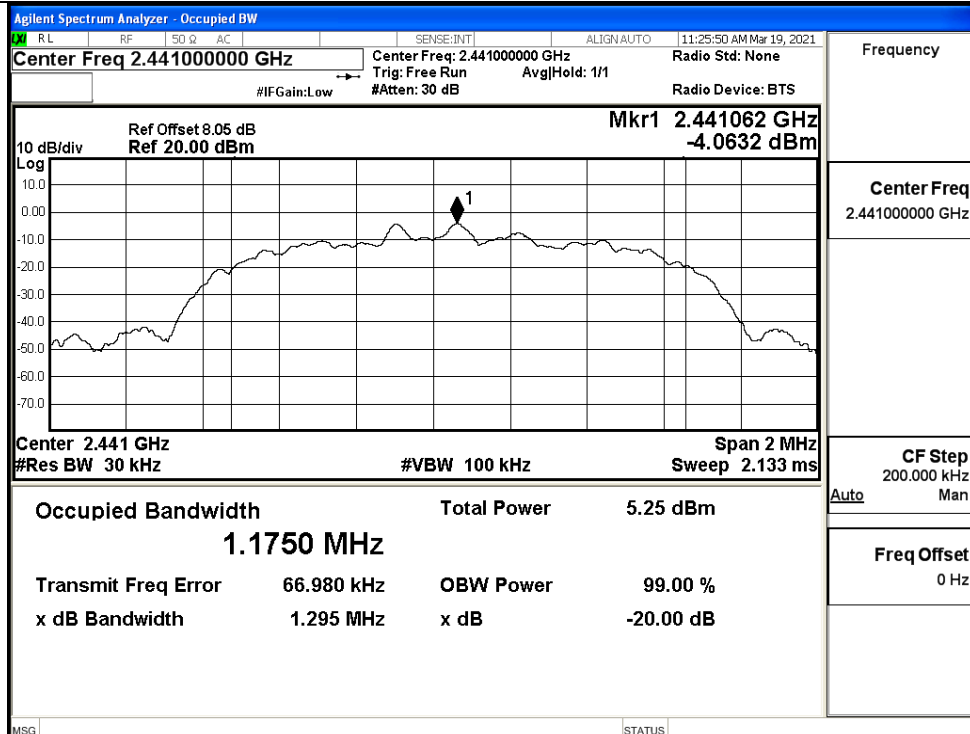
$\pi/4$ DQPSK/HCH



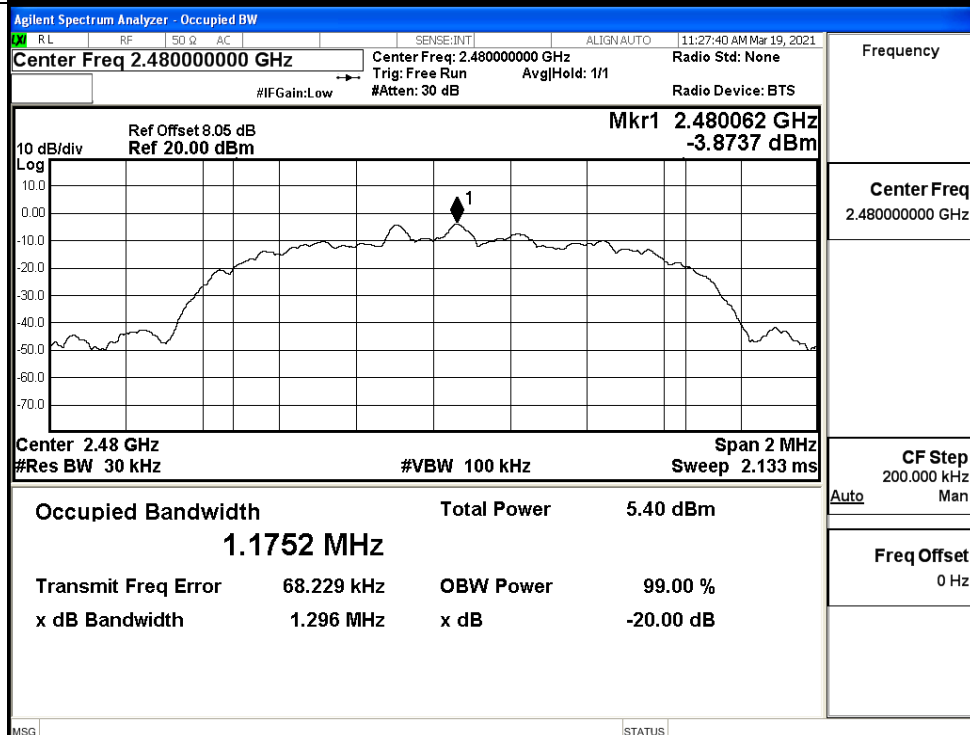
8DPSK/LCH



8DPSK/MCH



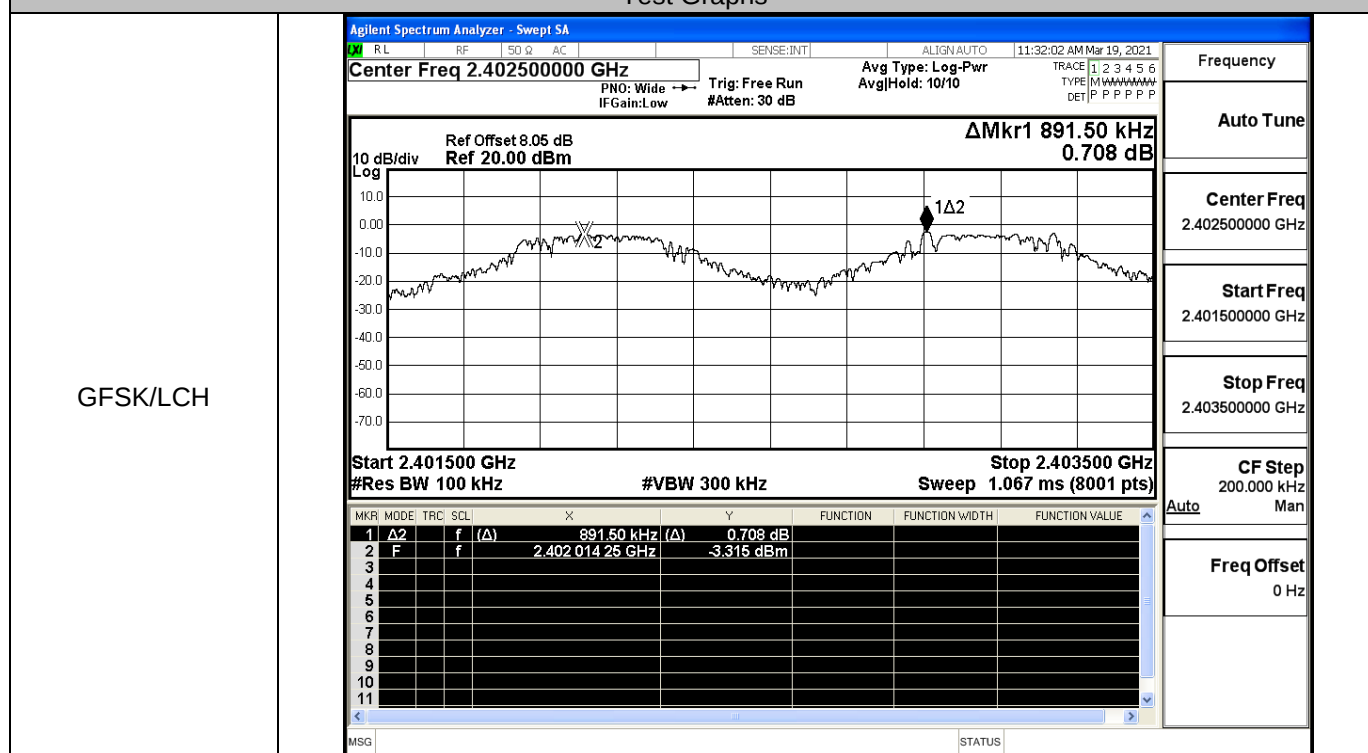
8DPSK/HCH



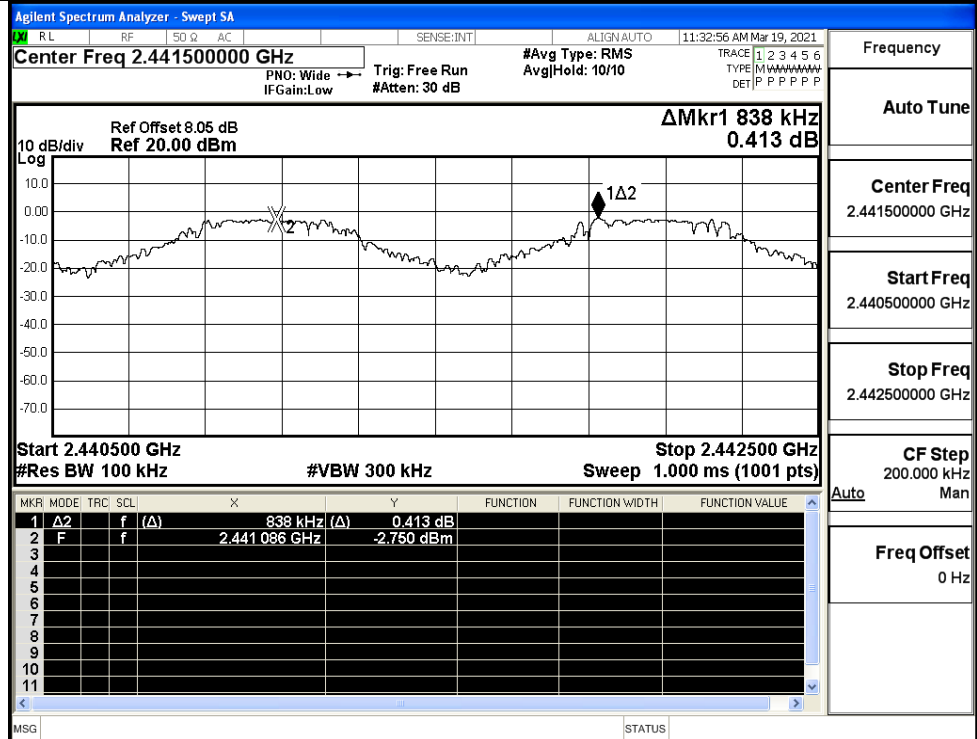
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.891	0.637	PASS
	MCH	0.838	0.637	PASS
	HCH	0.774	0.637	PASS
$\pi/4$ DQPSK	LCH	1.088	0.856	PASS
	MCH	1.164	0.856	PASS
	HCH	1.004	0.856	PASS
8DPSK	LCH	1.324	0.865	PASS
	MCH	1.148	0.865	PASS
	HCH	1.102	0.865	PASS

Test Graphs



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

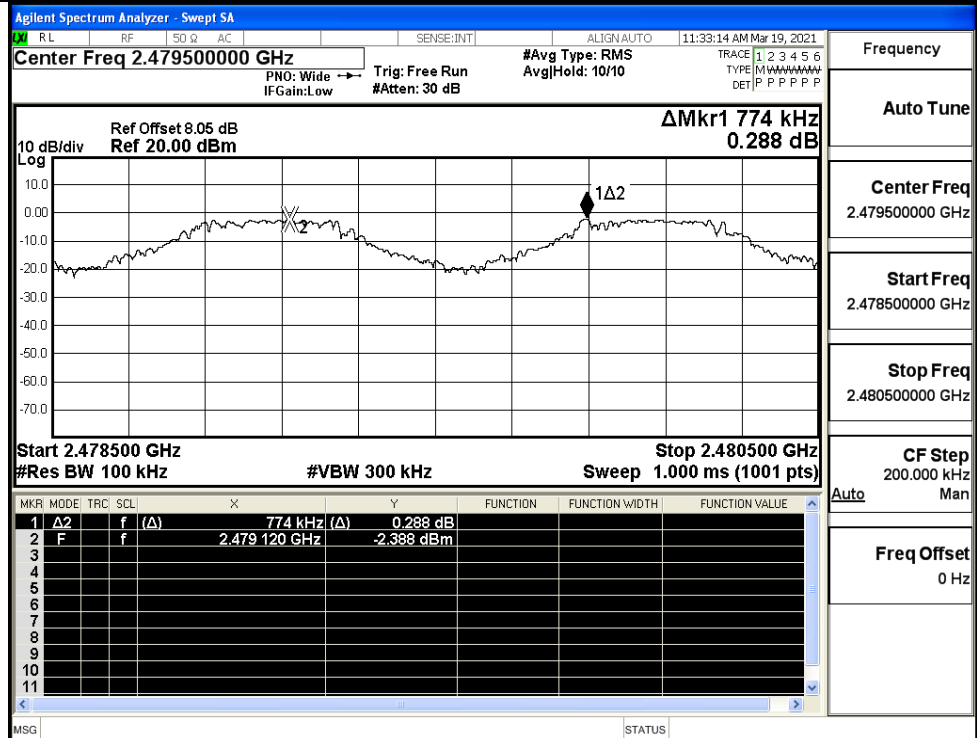
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

GFSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

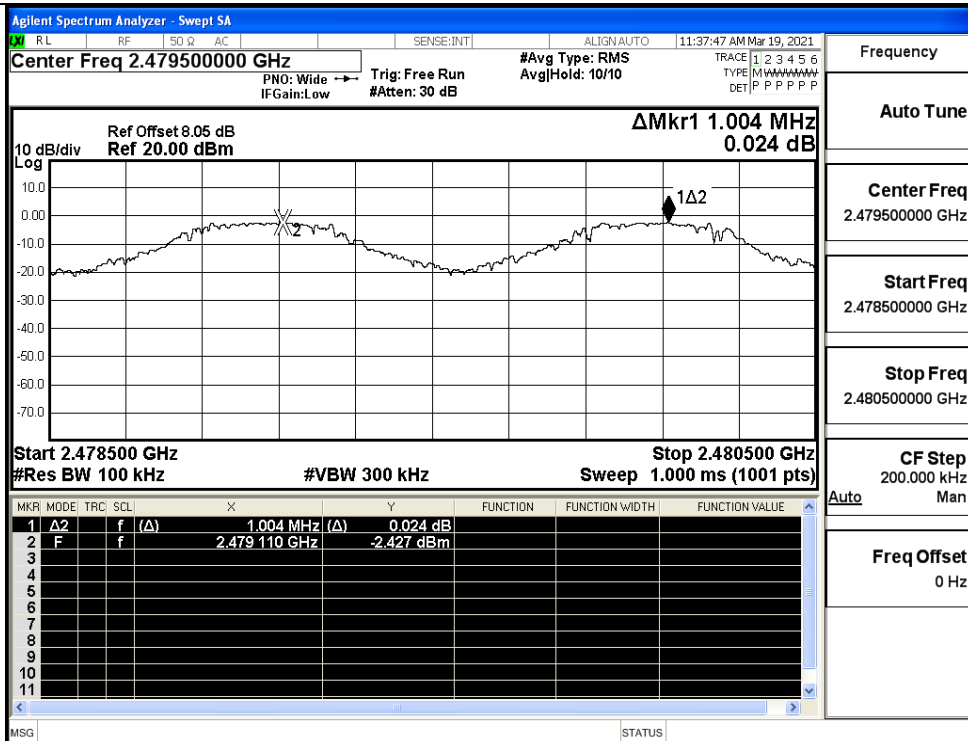
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

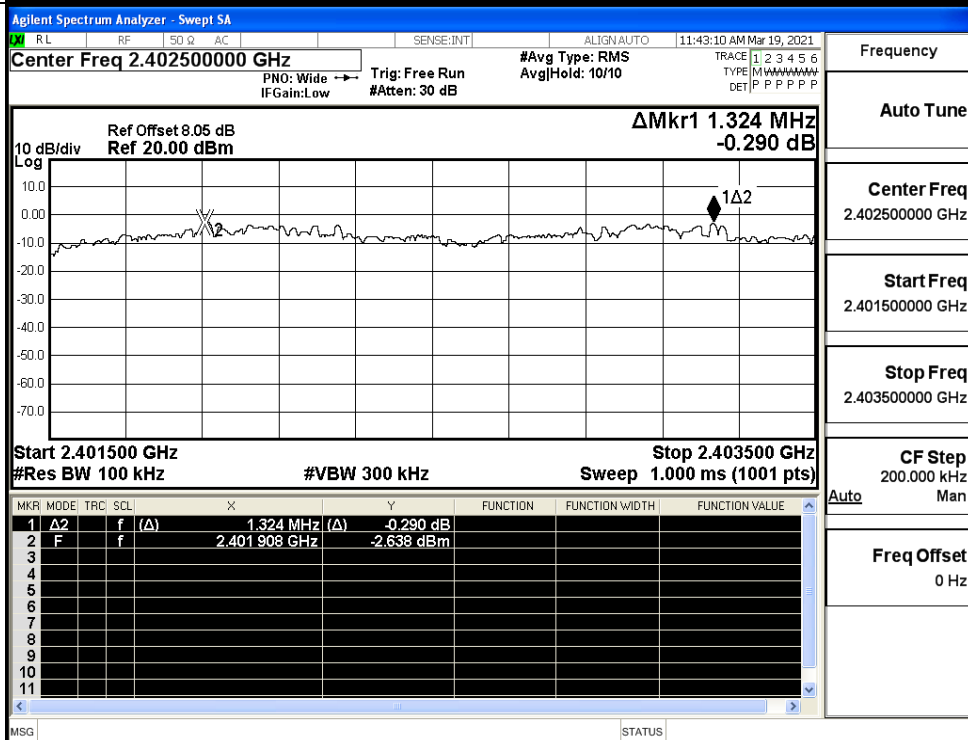
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

8DPSK/LCH



Frequency

Auto Tune

Center Freq
2.402500000 GHz

Start Freq
2.401500000 GHz

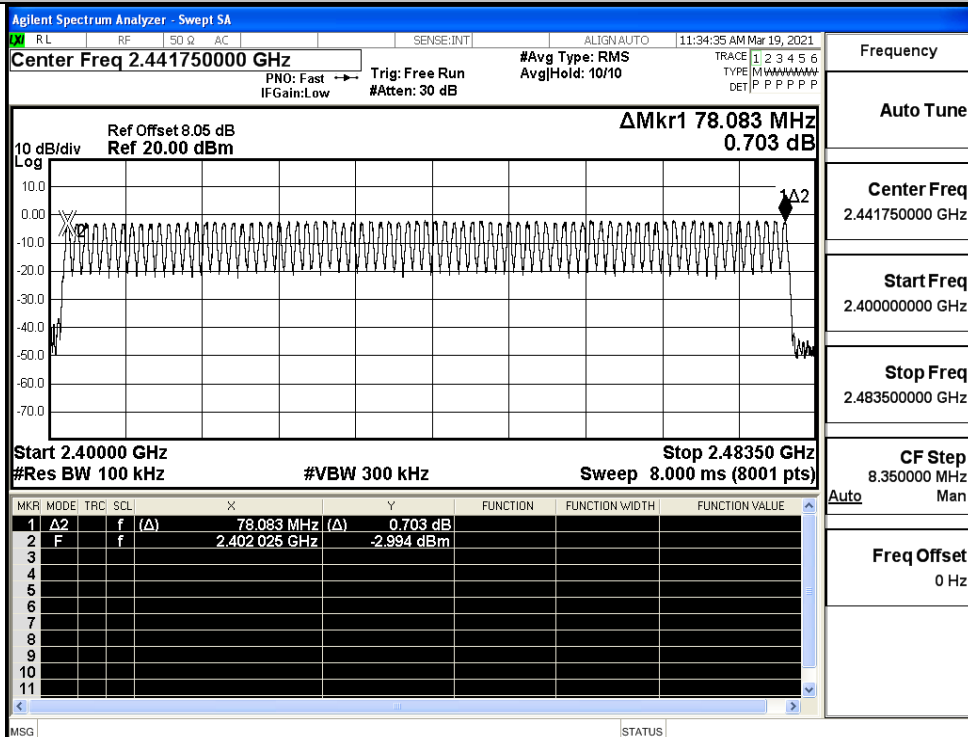
Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

Test Graphs

GFSK/Hop



Frequency

Auto Tune

Center Freq
2.441750000 GHz

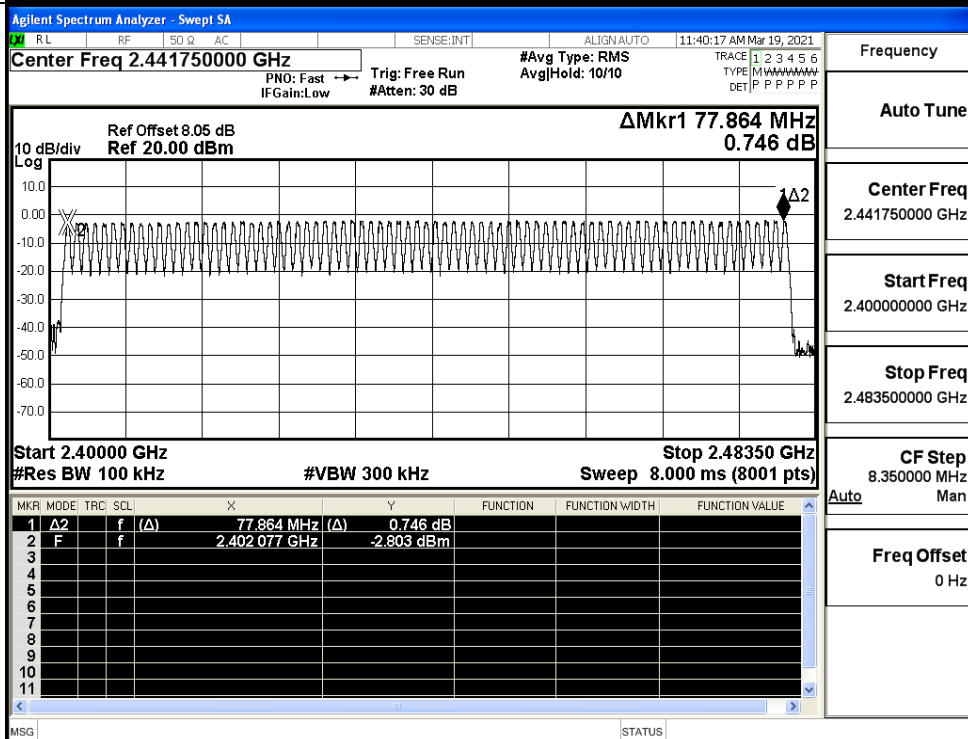
Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/Hop



Frequency

Auto Tune

Center Freq
2.441750000 GHz

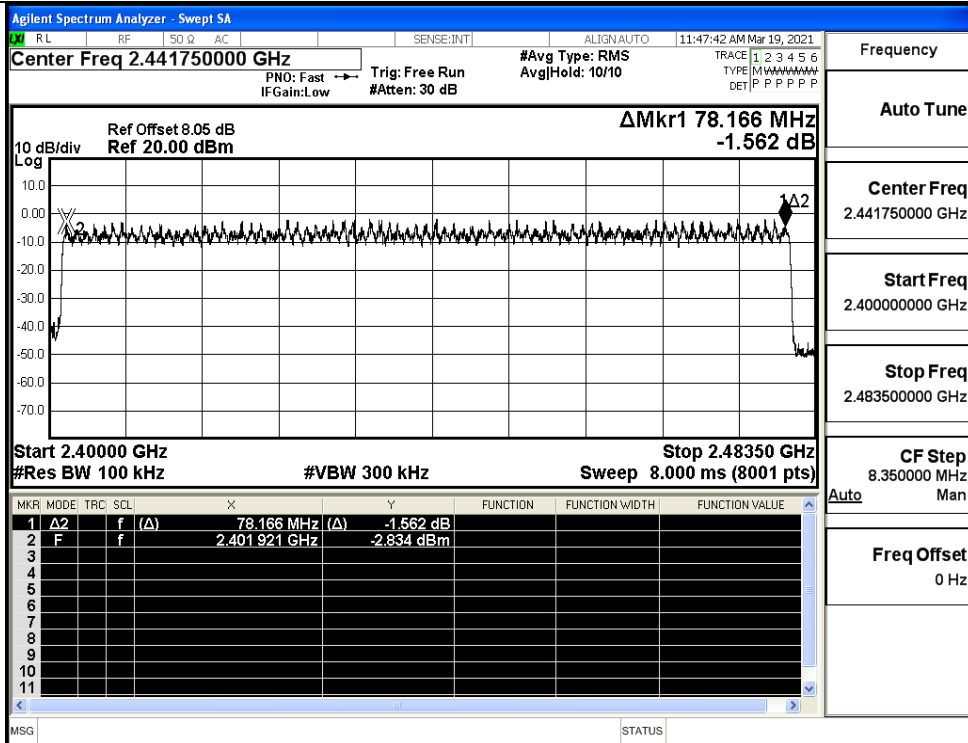
Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
Auto Man

Freq Offset
0 Hz

8DPSK/Hop

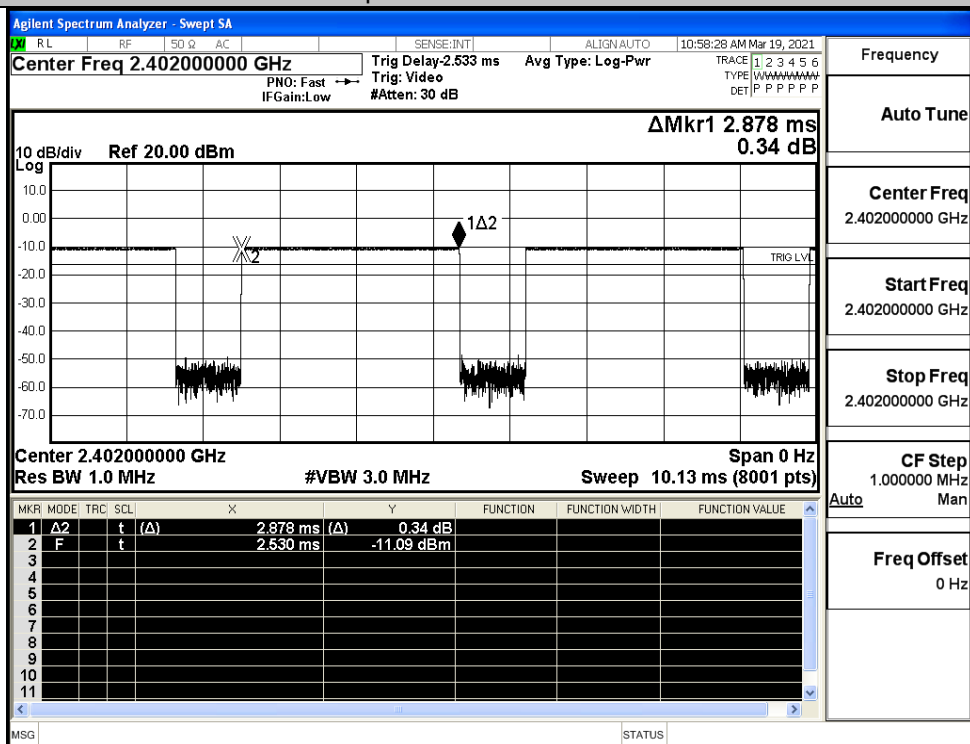


A.5 Dwell Time

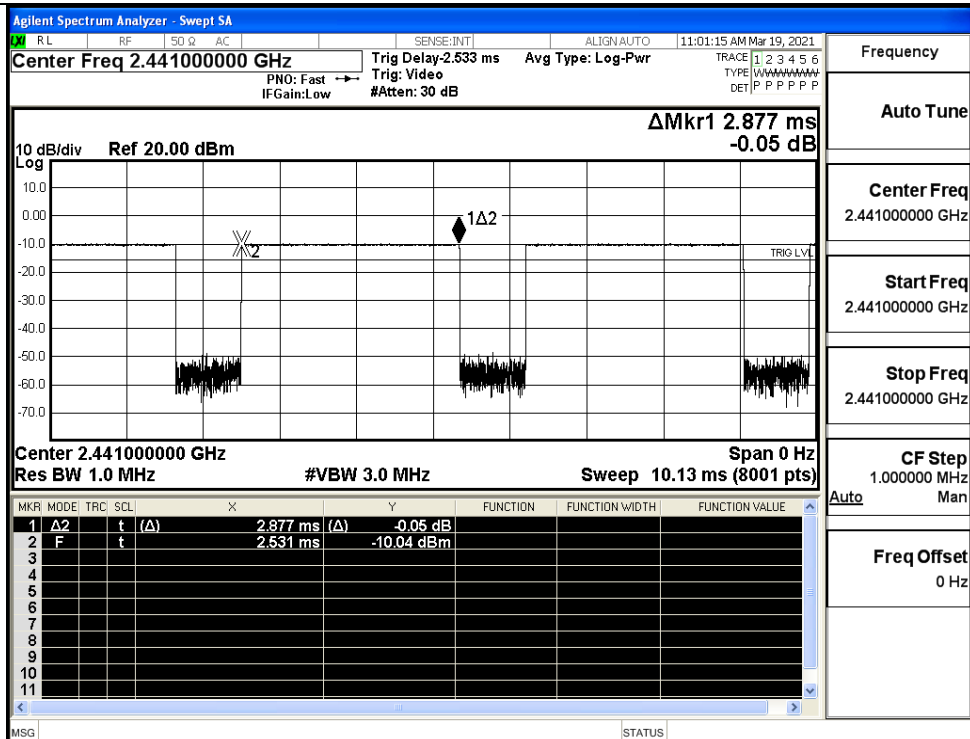
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.308	0.4	PASS
	3DH5	MCH	2.88	106.7	0.308	0.4	PASS
	3DH5	HCH	2.88	106.7	0.308	0.4	PASS

Test Graphs

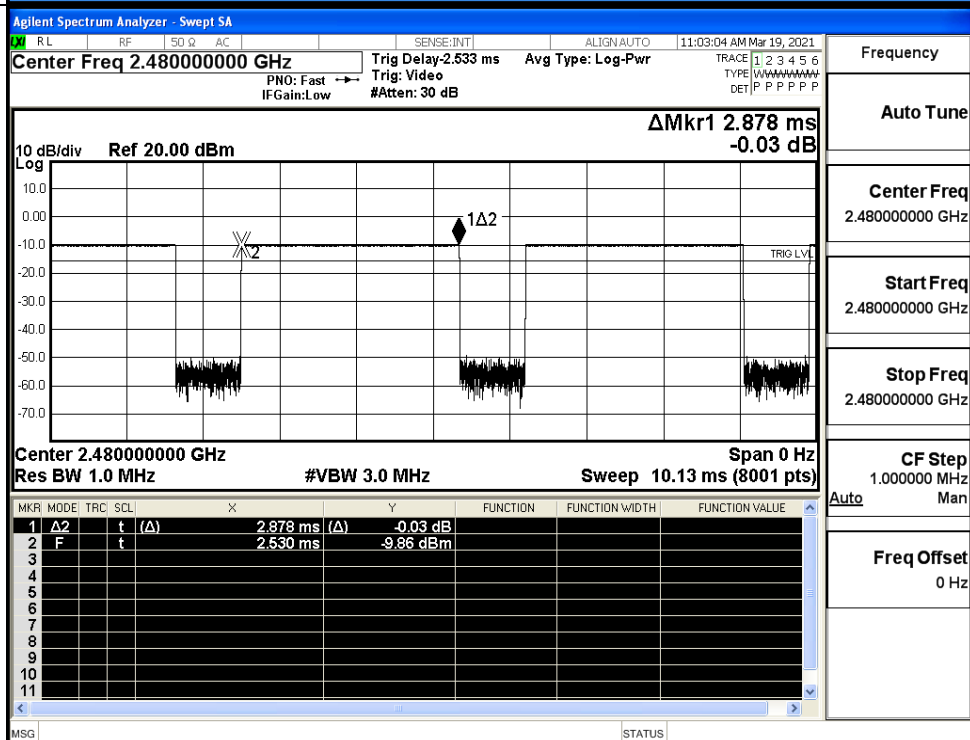
GFSK_DH5/LCH



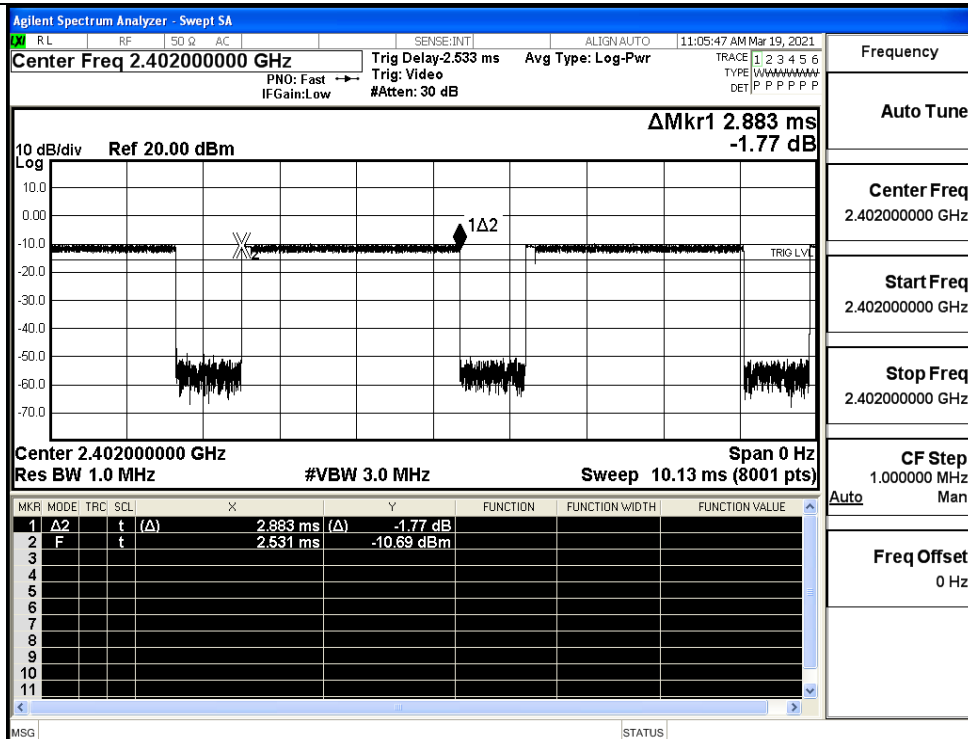
GFSK_DH5/MCH



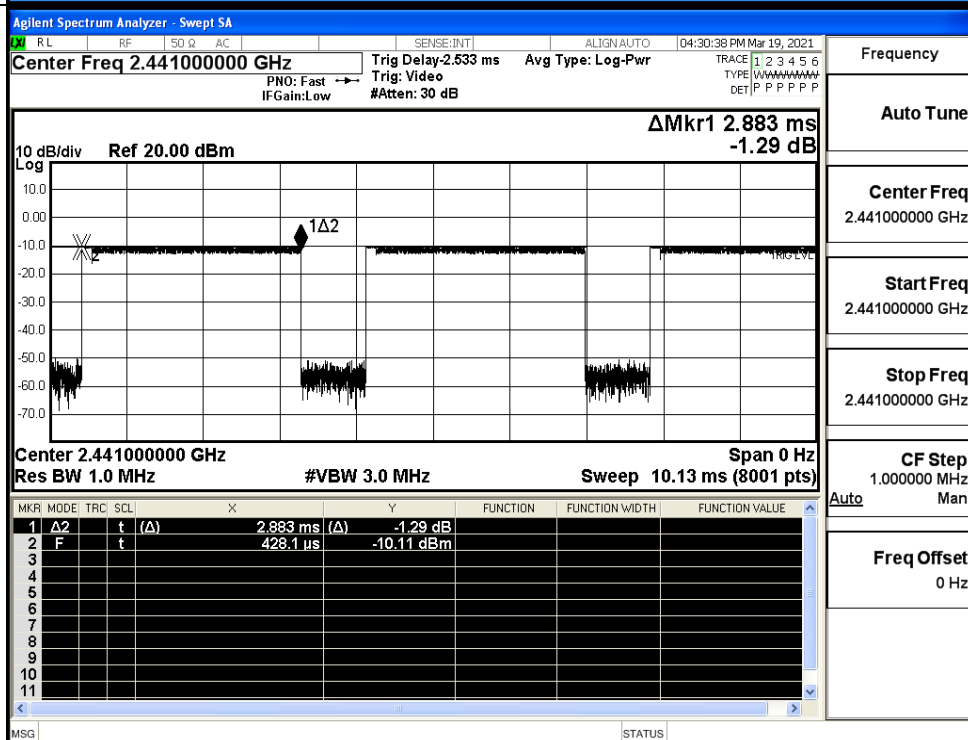
GFSK_DH5/HCH



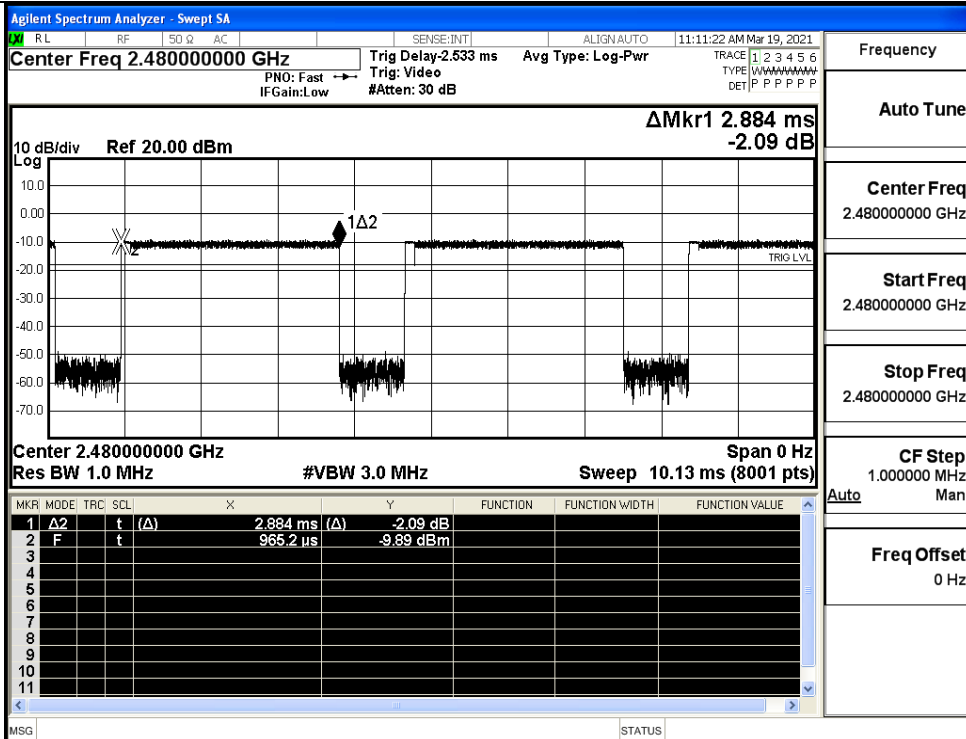
$\pi/4$ DQPSK
_2DH5/LCH



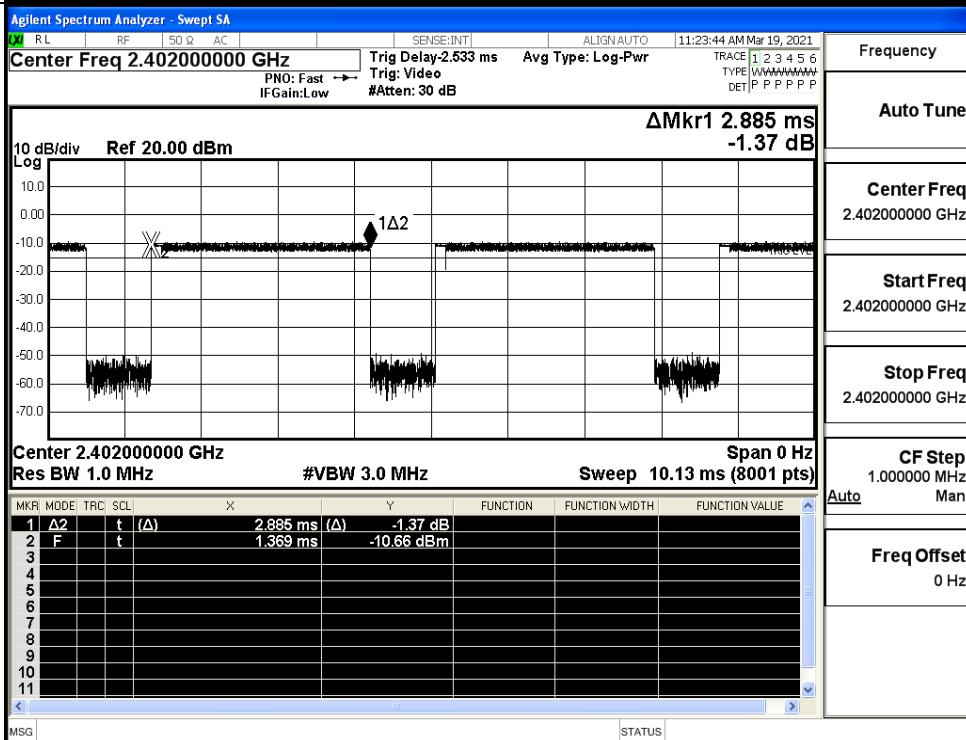
$\pi/4$ DQPSK
_2DH5/MCH



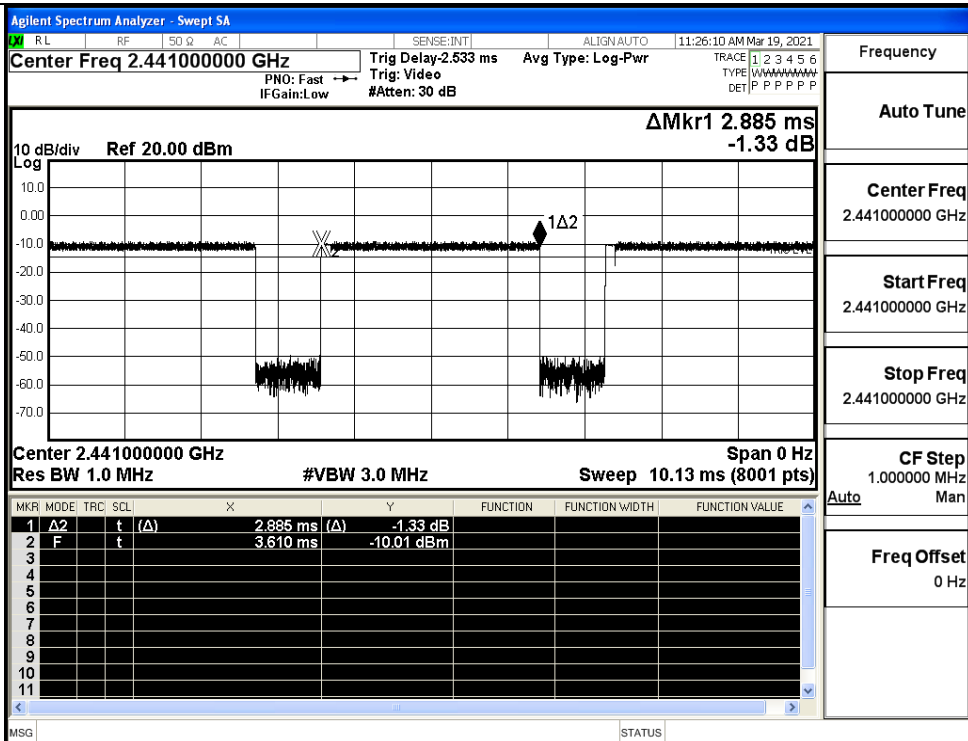
$\pi/4$ DQPSK
_2DH5/HCH



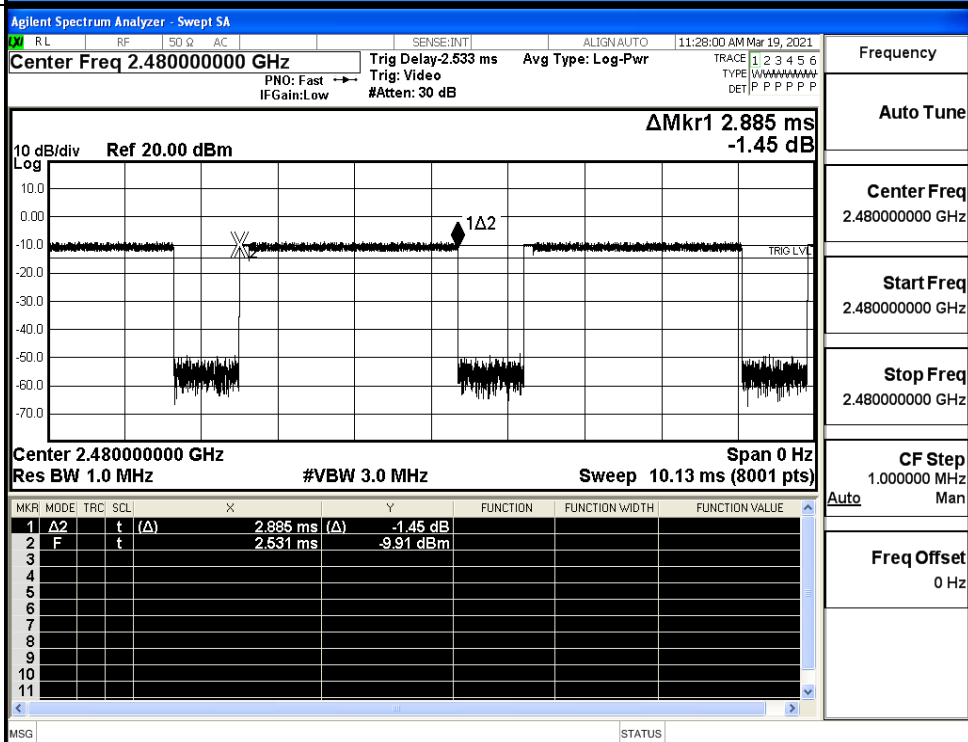
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH

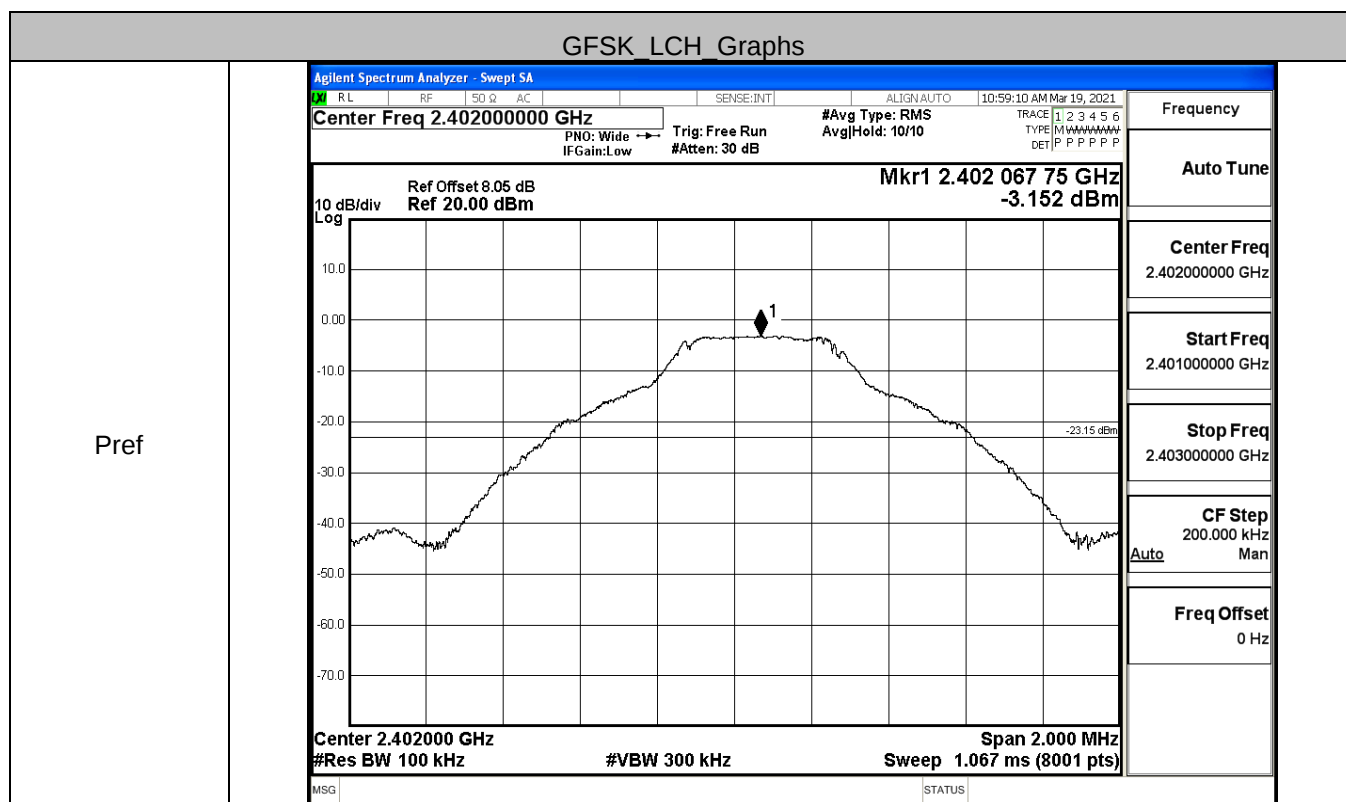


8DPSK_3DH5/HCH

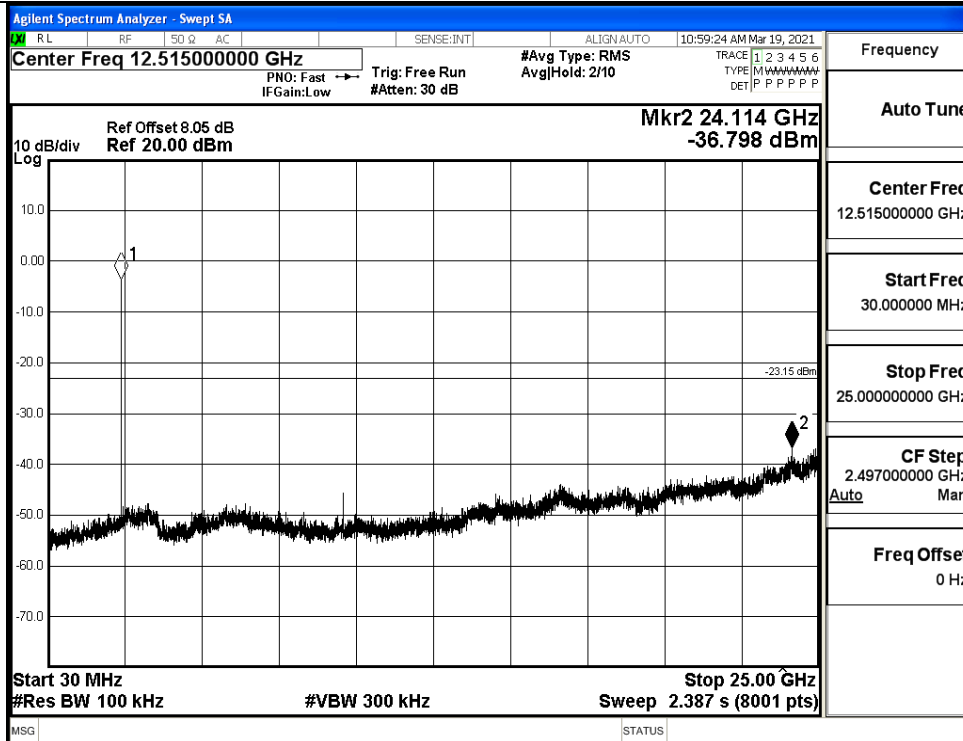


A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-3.152	-36.798	-23.152	PASS
	MCH	-1.97	-37.519	-21.970	PASS
	HCH	-1.753	-37.293	-21.753	PASS
$\pi/4$ DQPSK	LCH	-2.655	-37.278	-22.655	PASS
	MCH	-2.002	-37.496	-22.002	PASS
	HCH	-1.887	-36.185	-21.887	PASS
8DPSK	LCH	-2.602	-36.879	-22.602	PASS
	MCH	-2.304	-37.301	-22.304	PASS
	HCH	-1.843	-35.954	-21.843	PASS

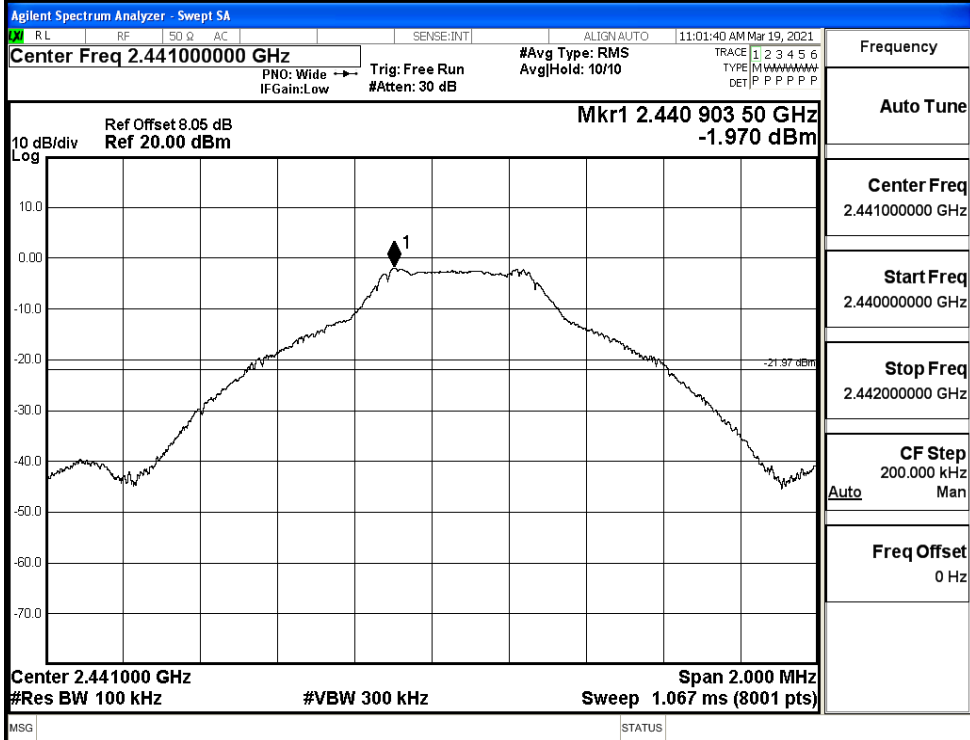


Puw

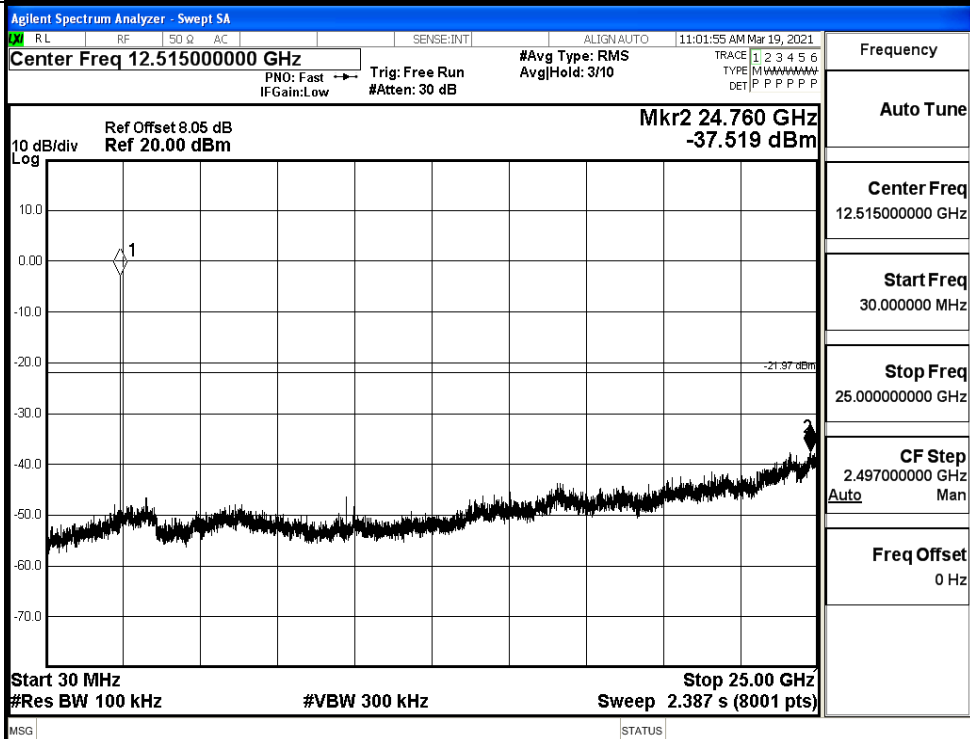


GFSK_MCH_Graphs

Pref

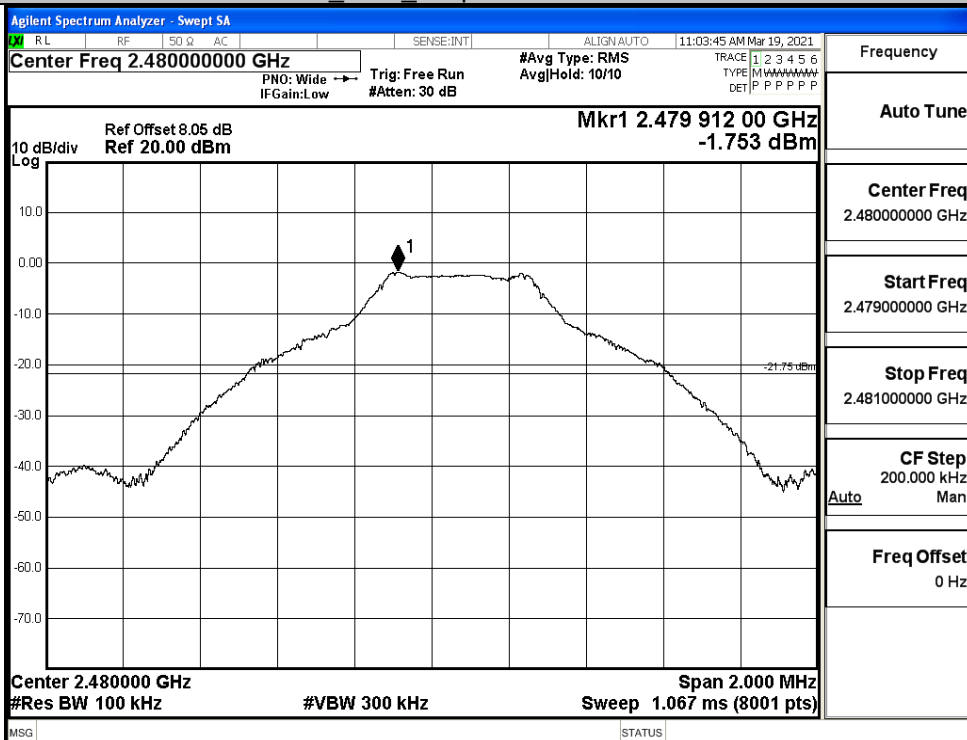


Puw

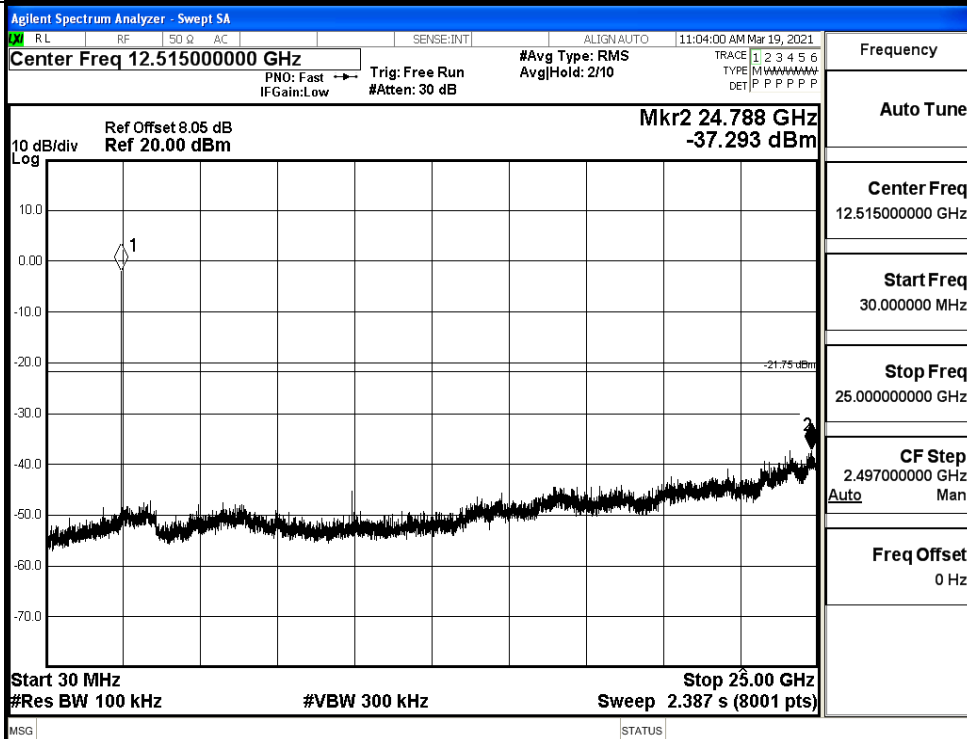


GFSK HCH_Graphs

Pref

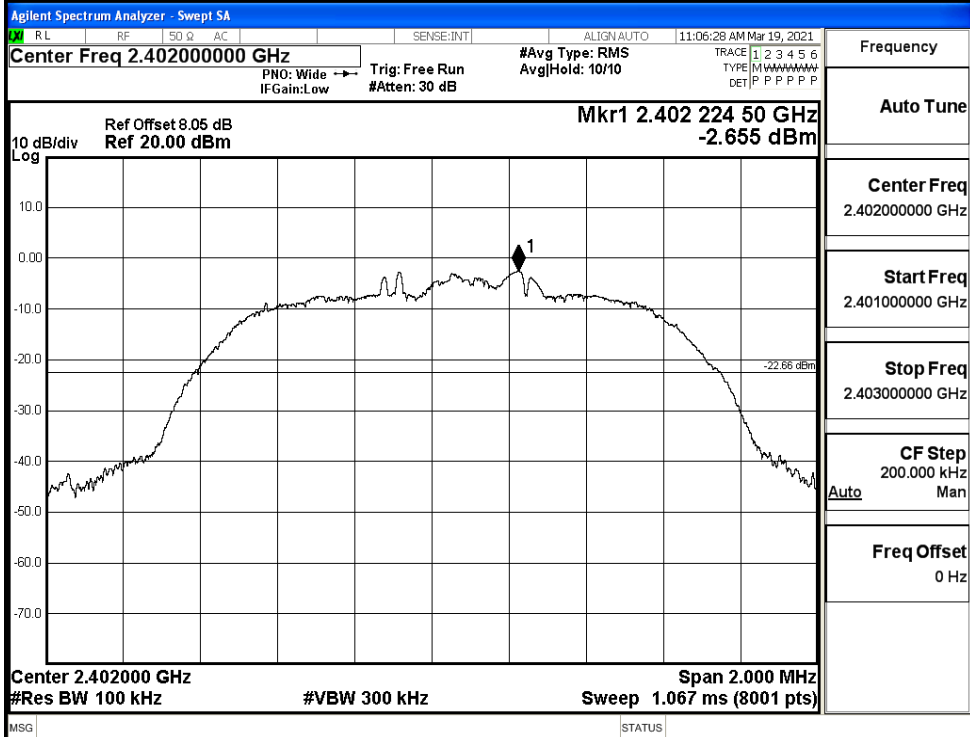


Puw

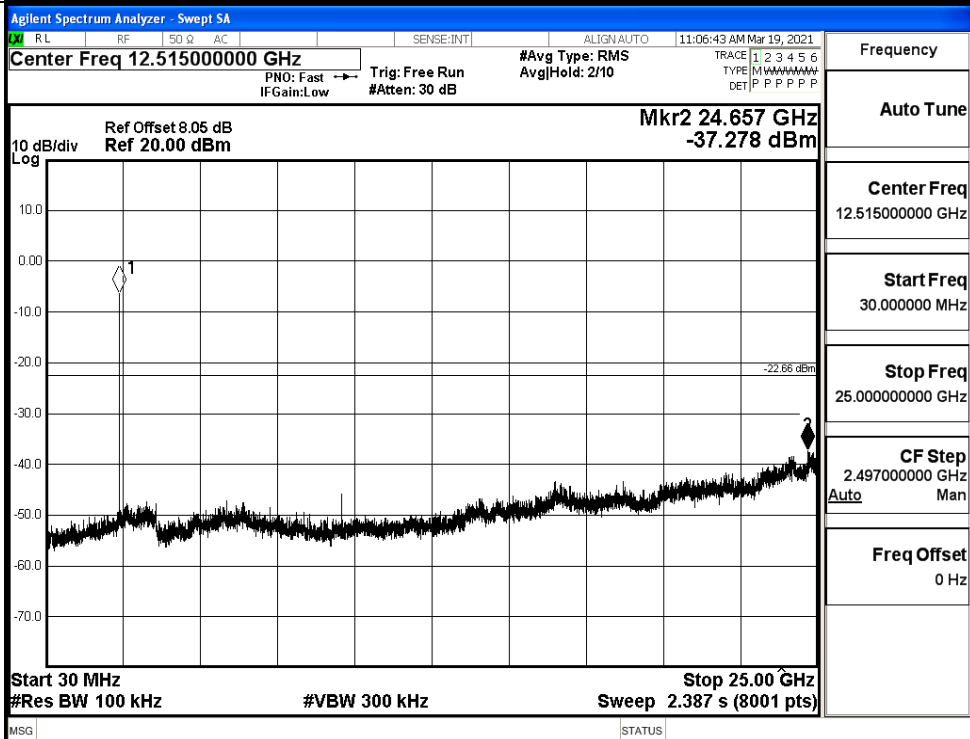


$\pi/4$ DQPSK_LCH_Graphs

Pref

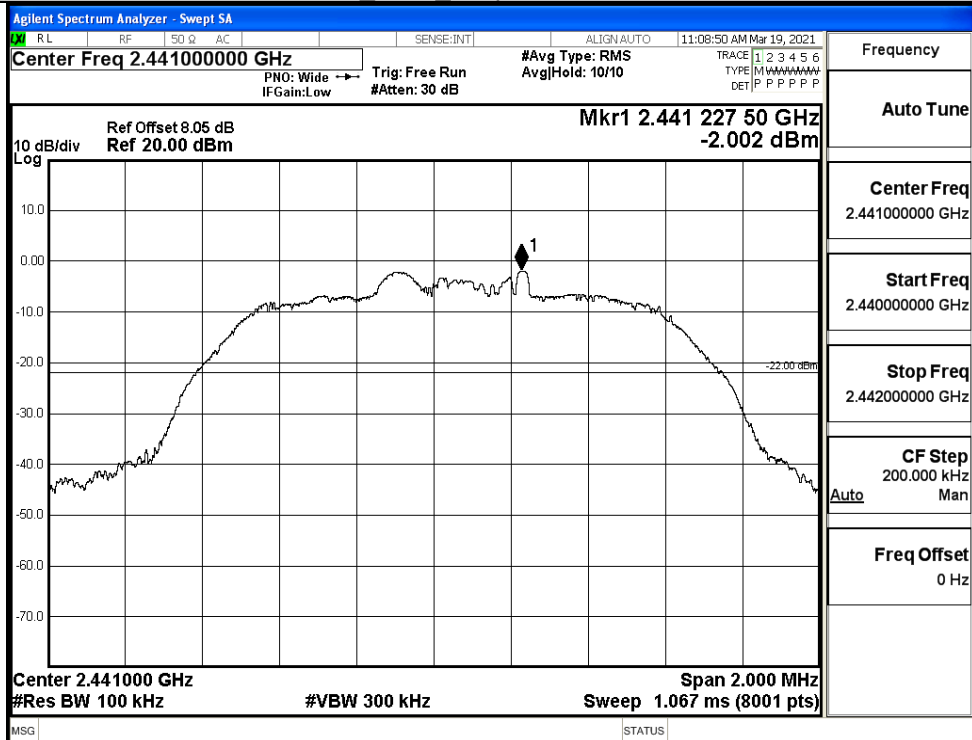


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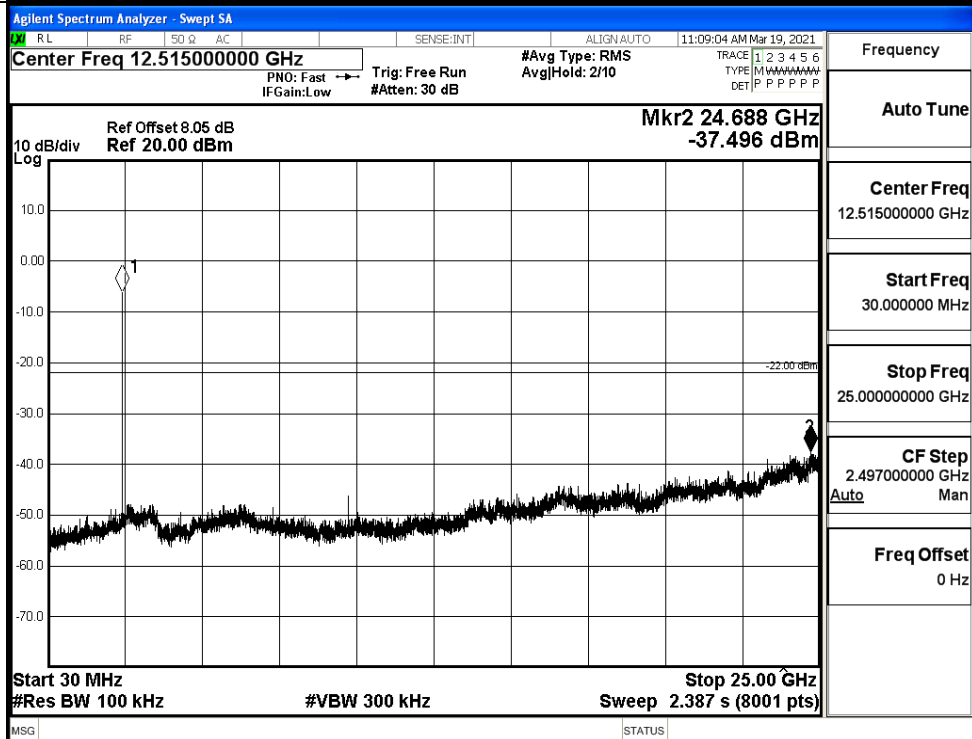


$\pi/4$ DQPSK_MCH_Graphs

Pref

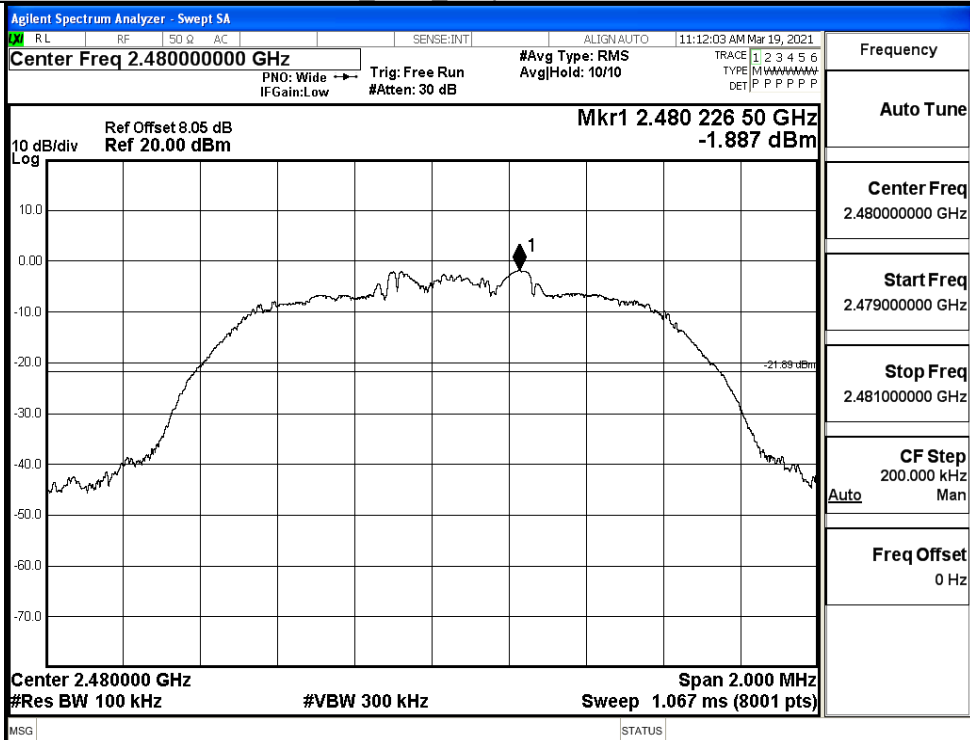


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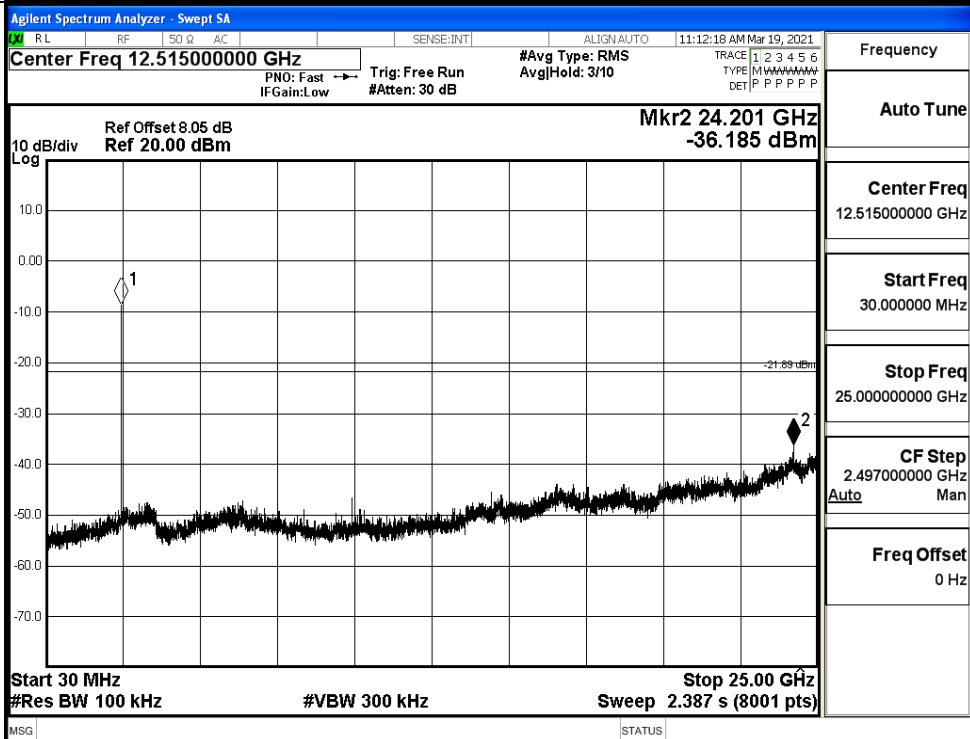


$\pi/4$ DQPSK_HCH_Graphs

Pref

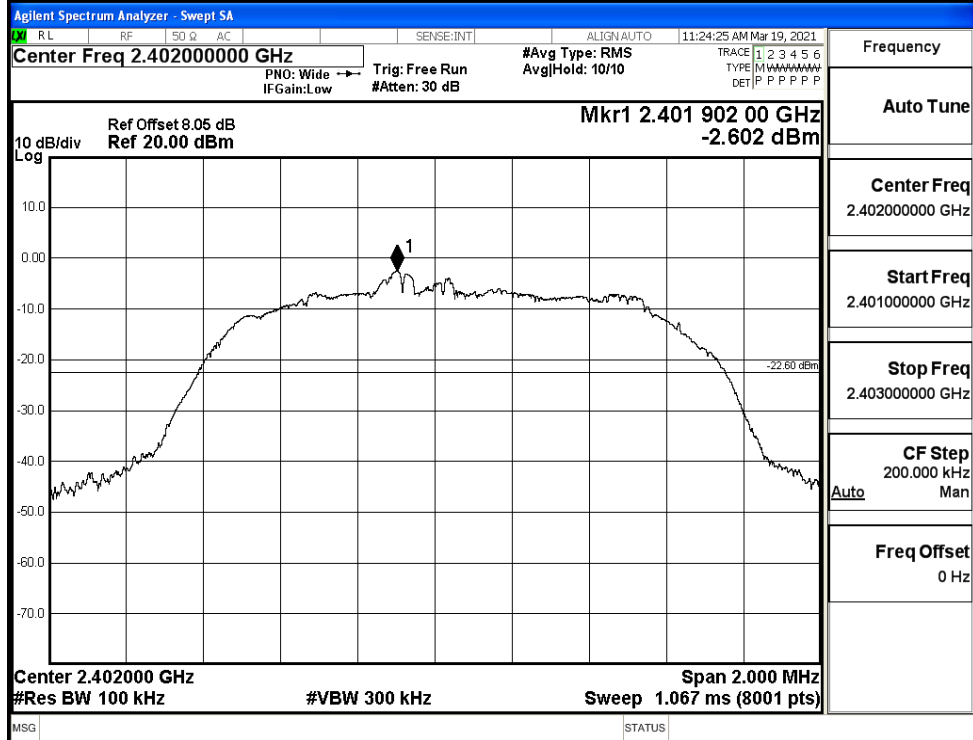


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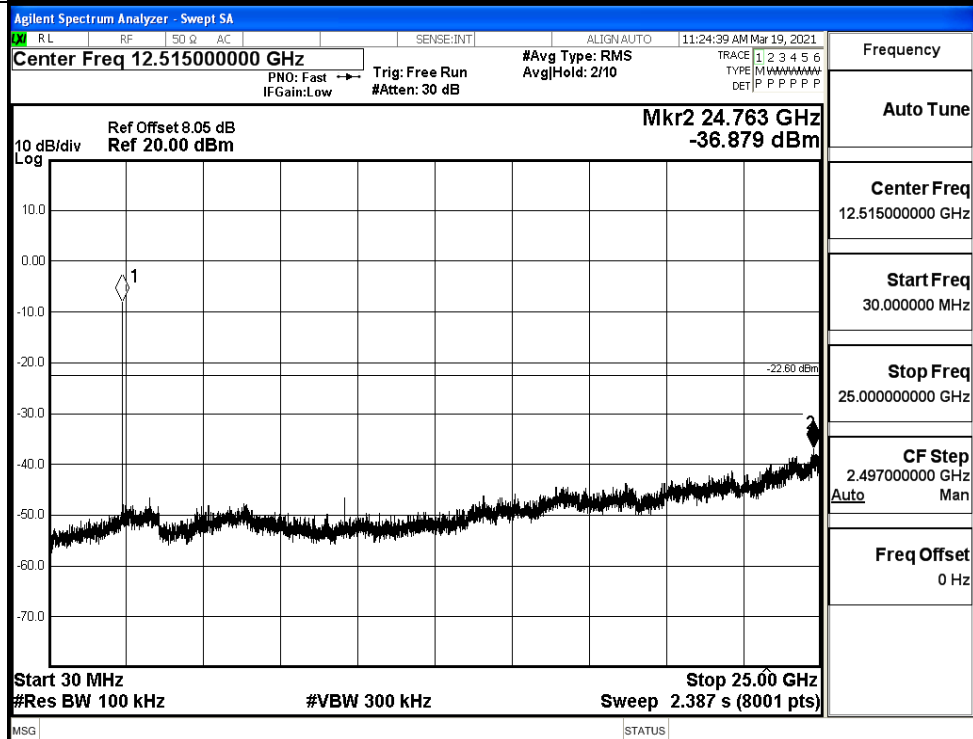


8DPSK_LCH_Graphs

Pref

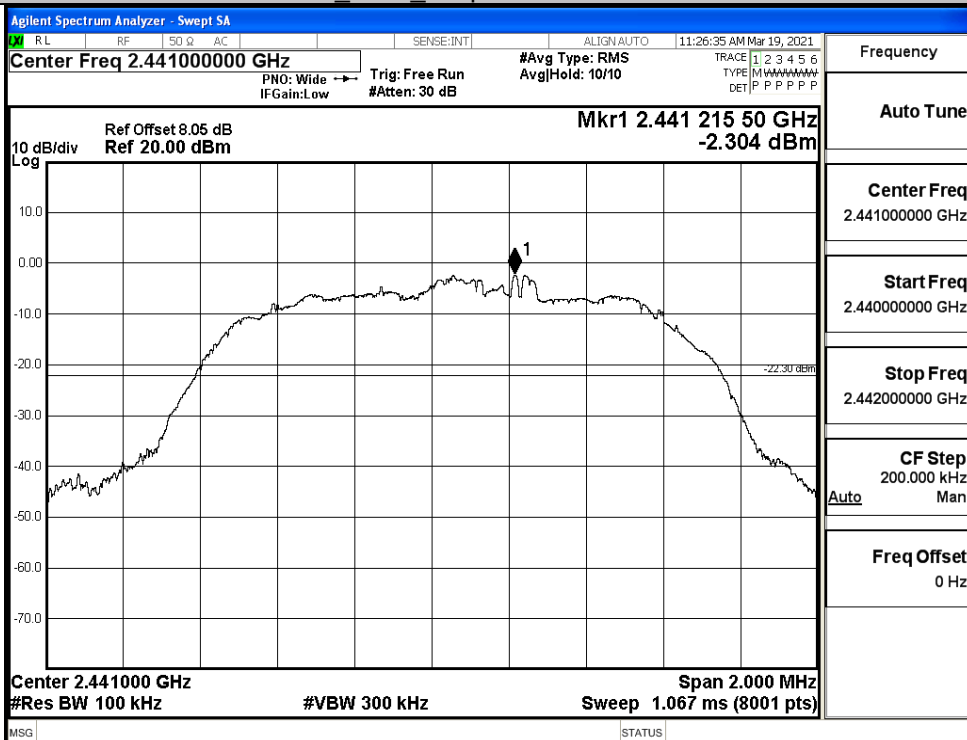


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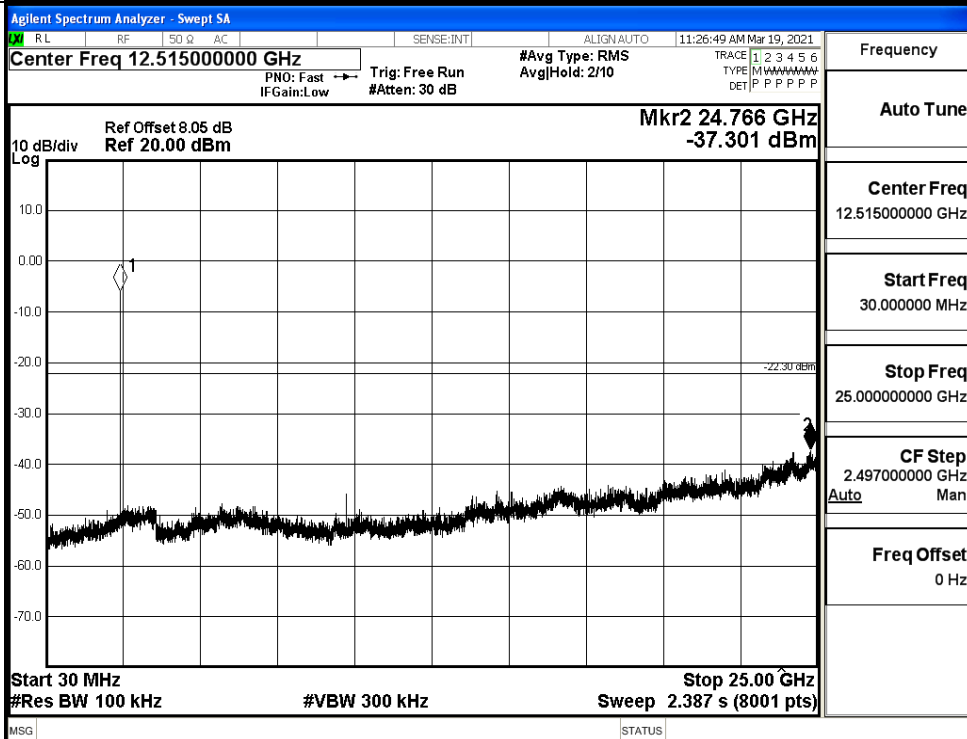


8DPSK_MCH_Graphs

Pref

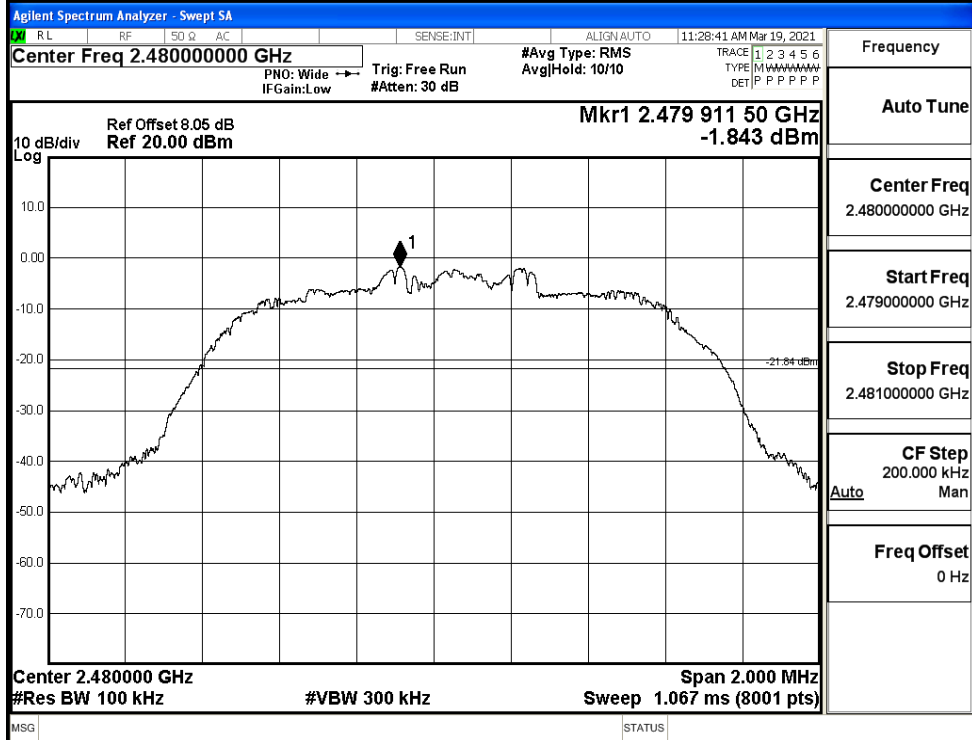


Puw

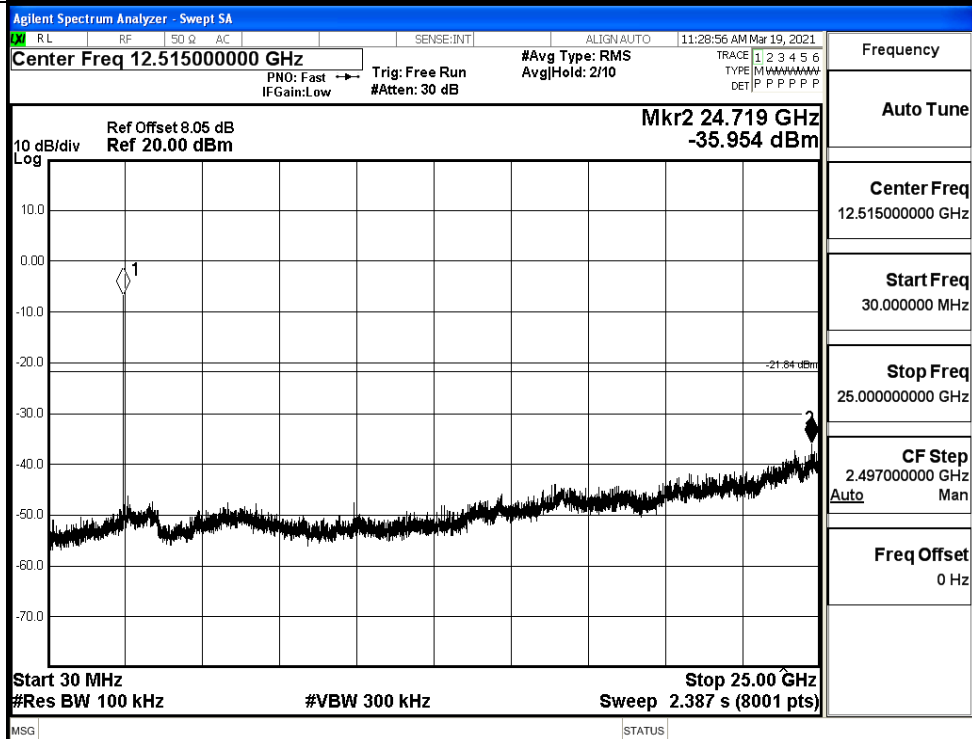


8DPSK_HCH_Graphs

Pref



Puw

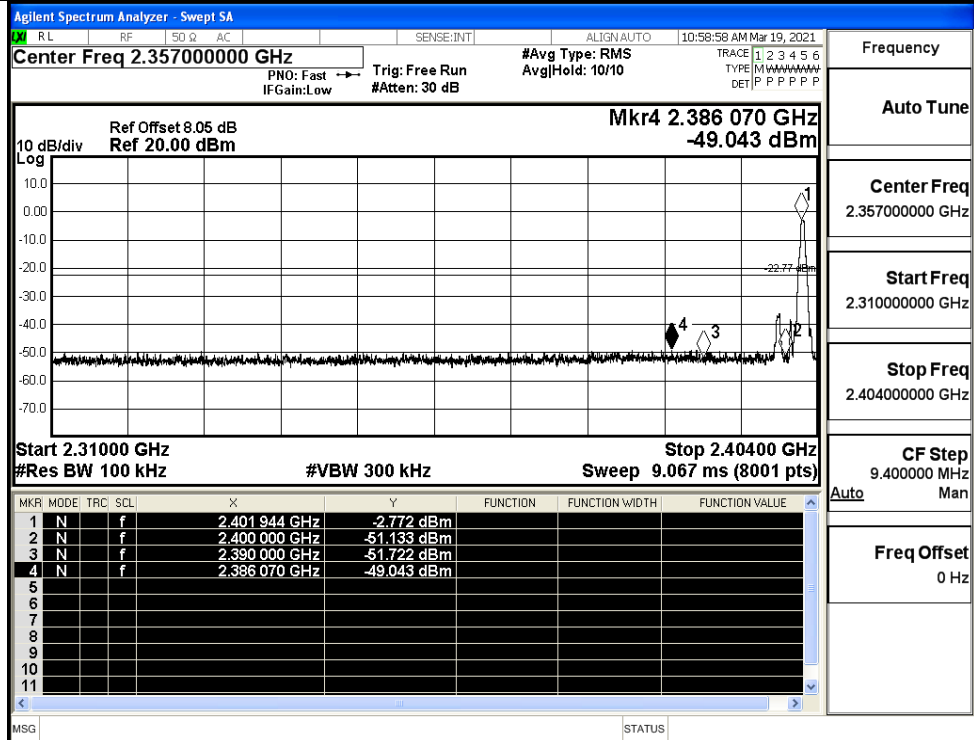


A.7 Band-edge for RF Conducted Emissions

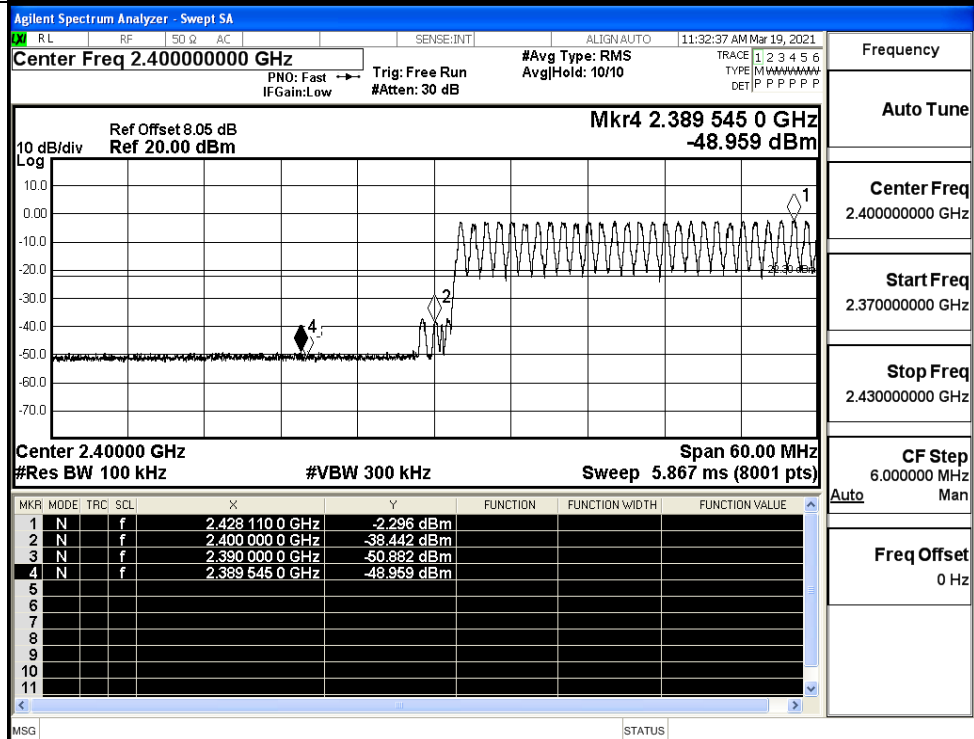
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-2.772	Off	-49.043	-22.77	PASS
			-2.296	On	-48.959	-22.3	PASS
	HCH	2480	-1.905	Off	-44.774	-21.91	PASS
			-1.792	On	-46.527	-21.79	PASS
$\pi/4$ DQPSK	LCH	2402	-2.618	Off	-48.679	-22.62	PASS
			-2.205	On	-48.497	-22.21	PASS
	HCH	2480	-1.824	Off	-43.790	-21.82	PASS
			-1.939	On	-46.566	-21.94	PASS
8DPSK	LCH	2402	-2.926	Off	-48.508	-22.93	PASS
			-2.071	On	-47.050	-22.07	PASS
	HCH	2480	-1.789	Off	-45.656	-21.79	PASS
			-2.015	On	-46.829	-22.02	PASS

Test Graphs

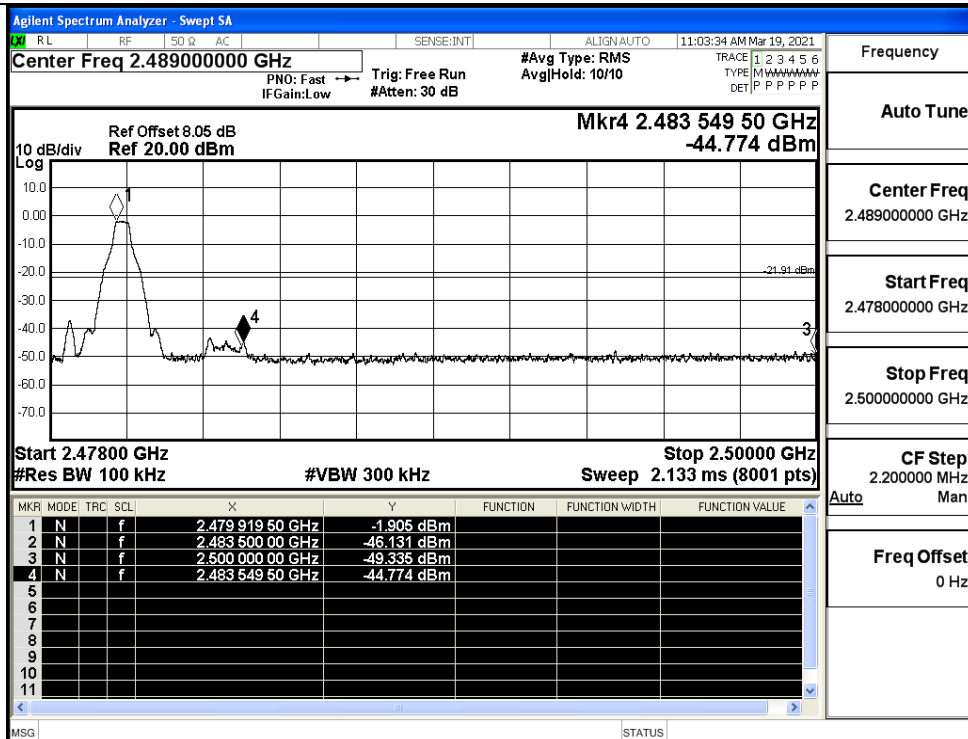
GFSK/LCH/No Hop



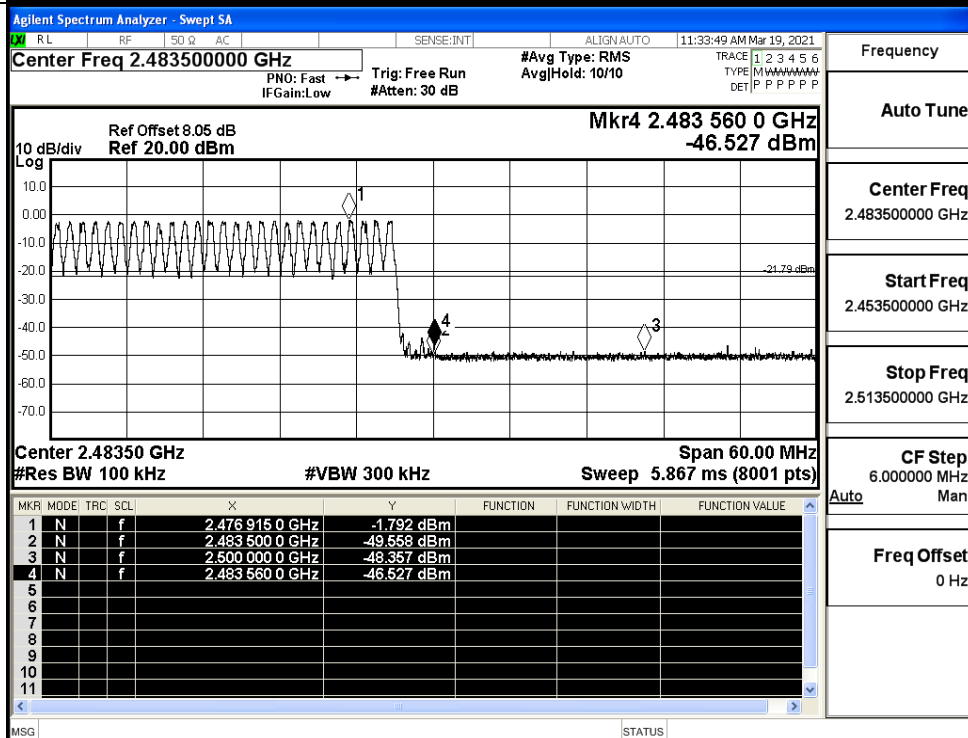
GFSK/LCH/Hop



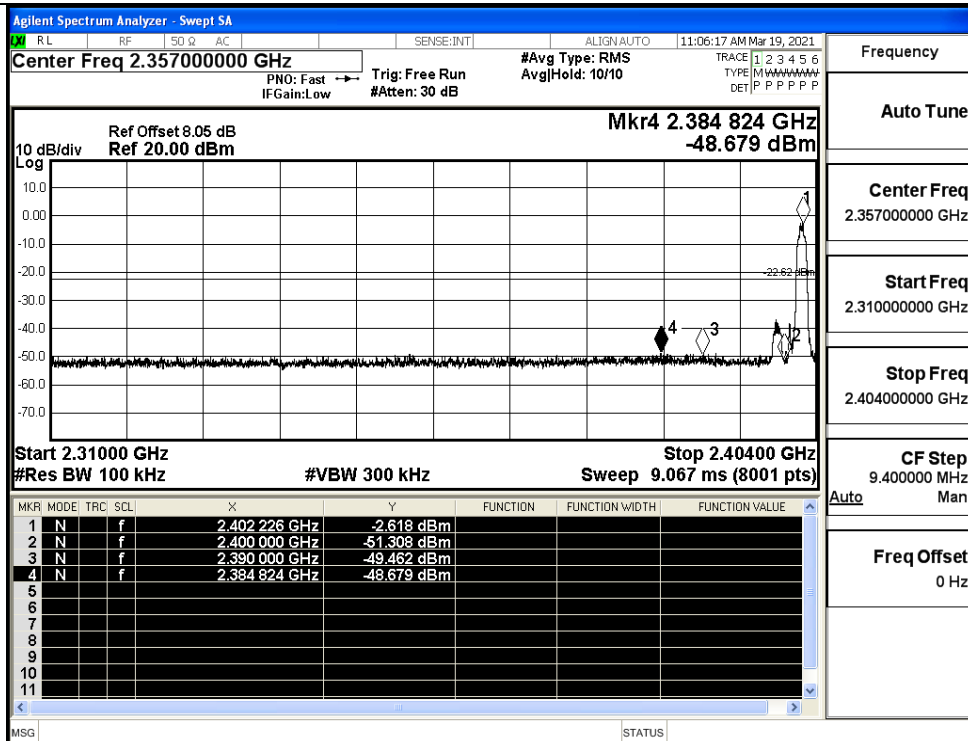
GFSK/HCH/No Hop



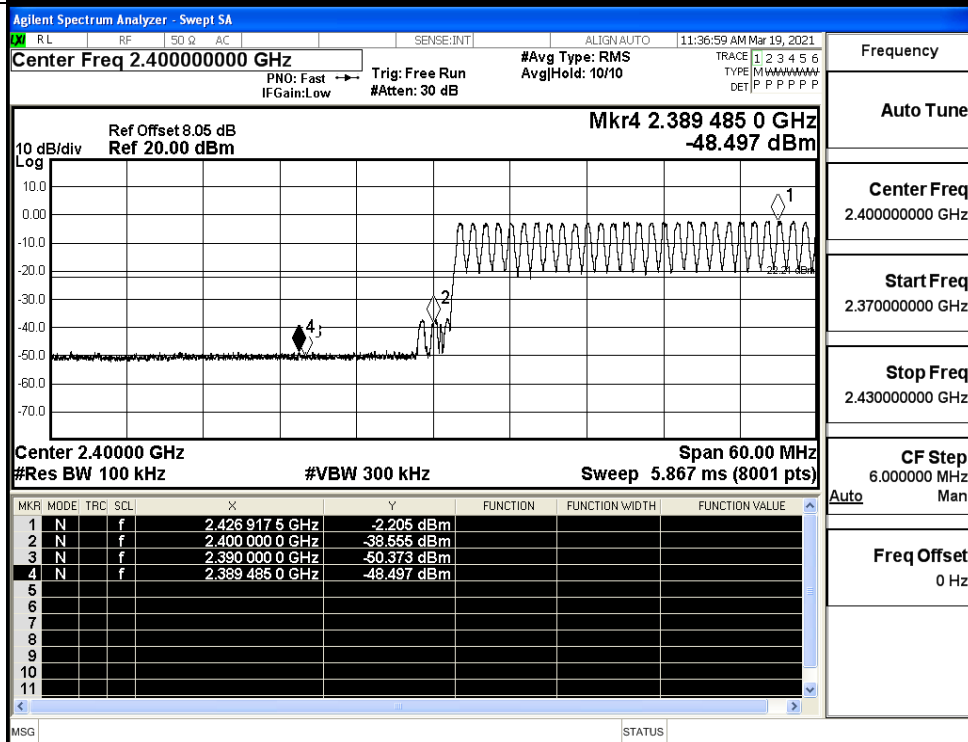
GFSK/HCH/Hop



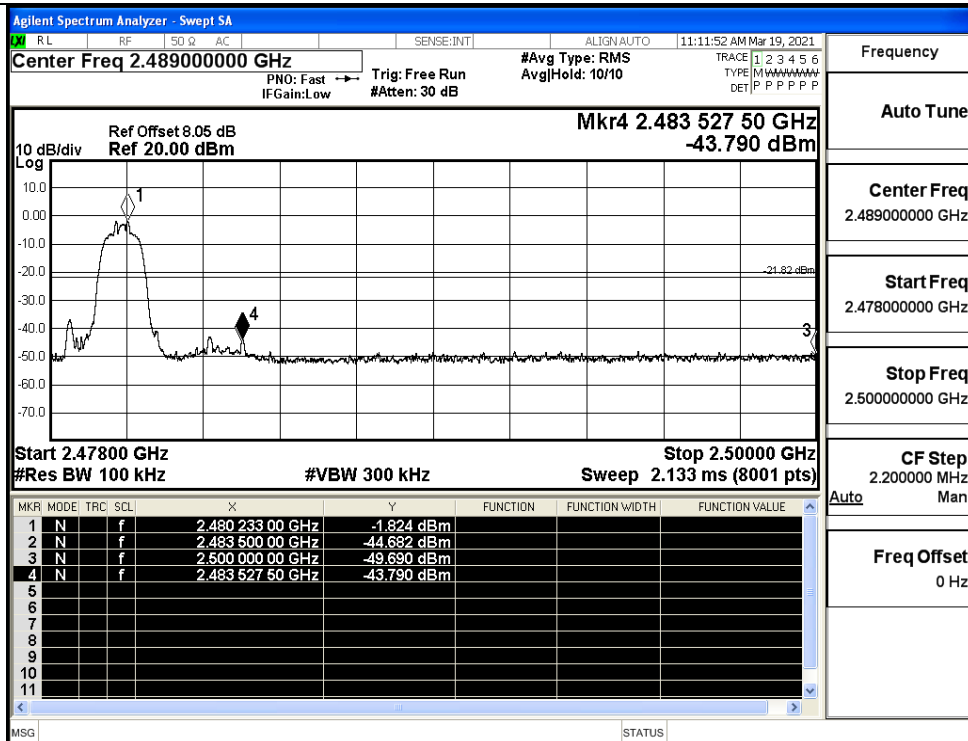
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



$\pi/4$ DQPSK/HCH/No
Hop



Frequency

Auto Tune

Center Freq
2.489000000 GHz

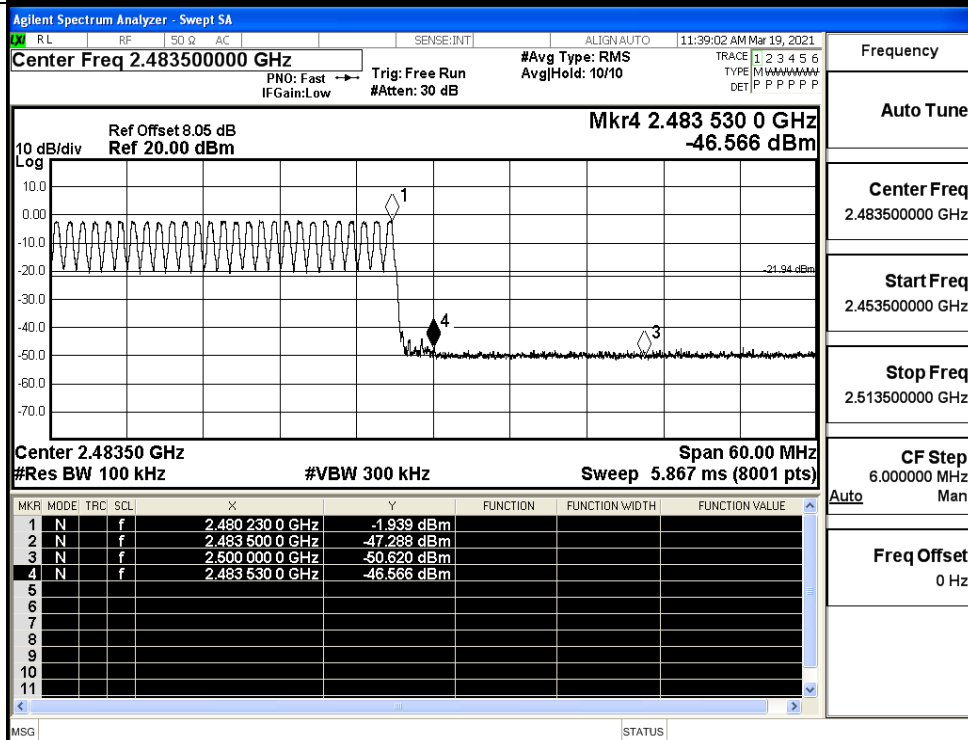
Start Freq
2.478000000 GHz

Stop Freq
2.500000000 GHz

CF Step
2.200000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop



Frequency

Auto Tune

Center Freq
2.483500000 GHz

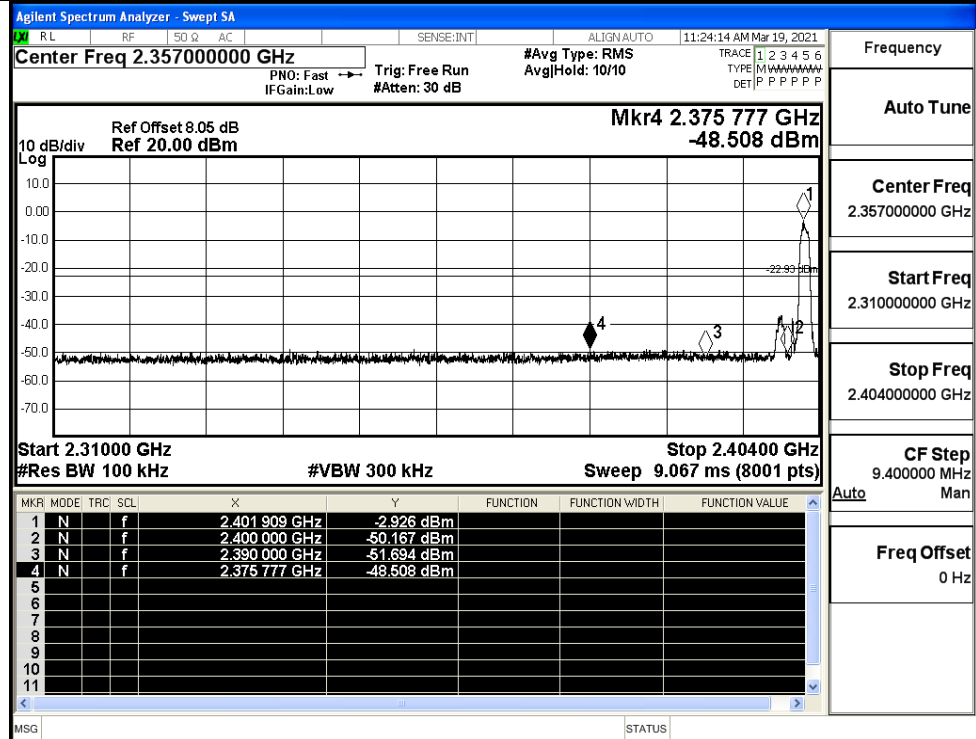
Start Freq
2.453500000 GHz

Stop Freq
2.513500000 GHz

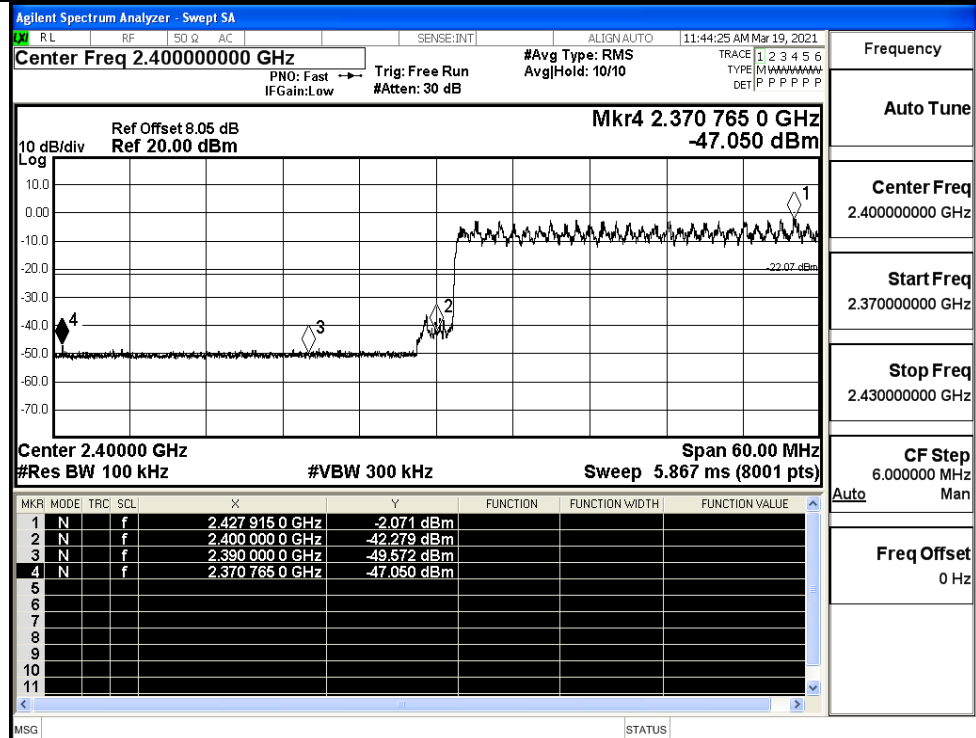
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

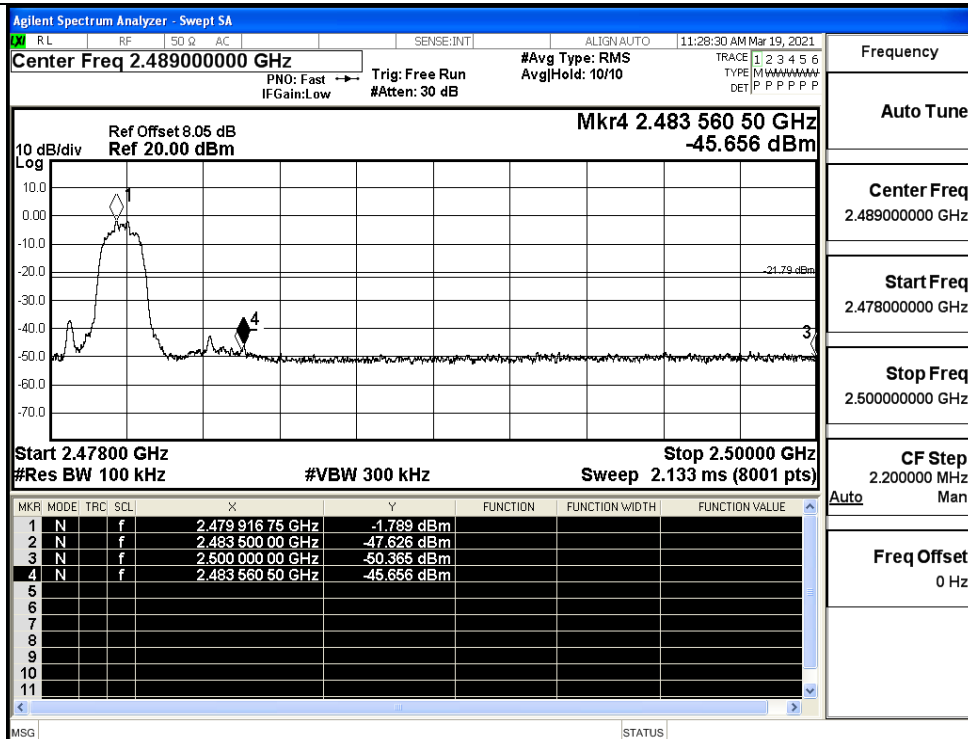
8DPSK/LCH/No Hop



8DPSK/LCH/Hop



8DPSK/HCH/No Hop

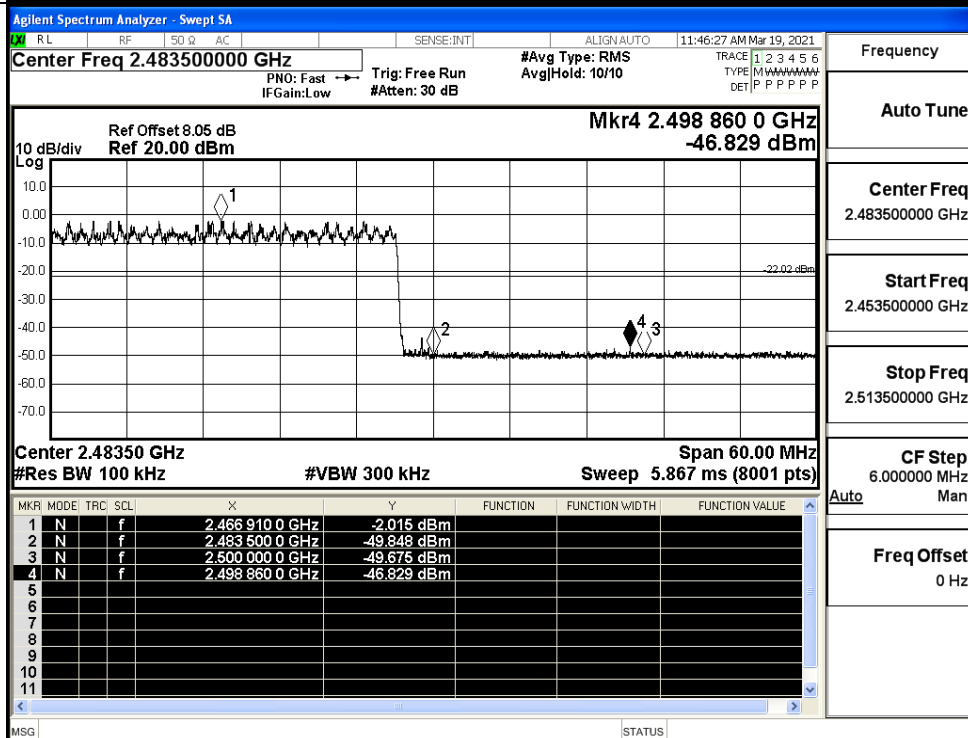


Frequency

Auto Tune

Center Freq
2.489000000 GHzStart Freq
2.478000000 GHzStop Freq
2.500000000 GHzCF Step
2.200000 MHz
Auto ManFreq Offset
0 Hz

8DPSK/HCH/Hop



Frequency

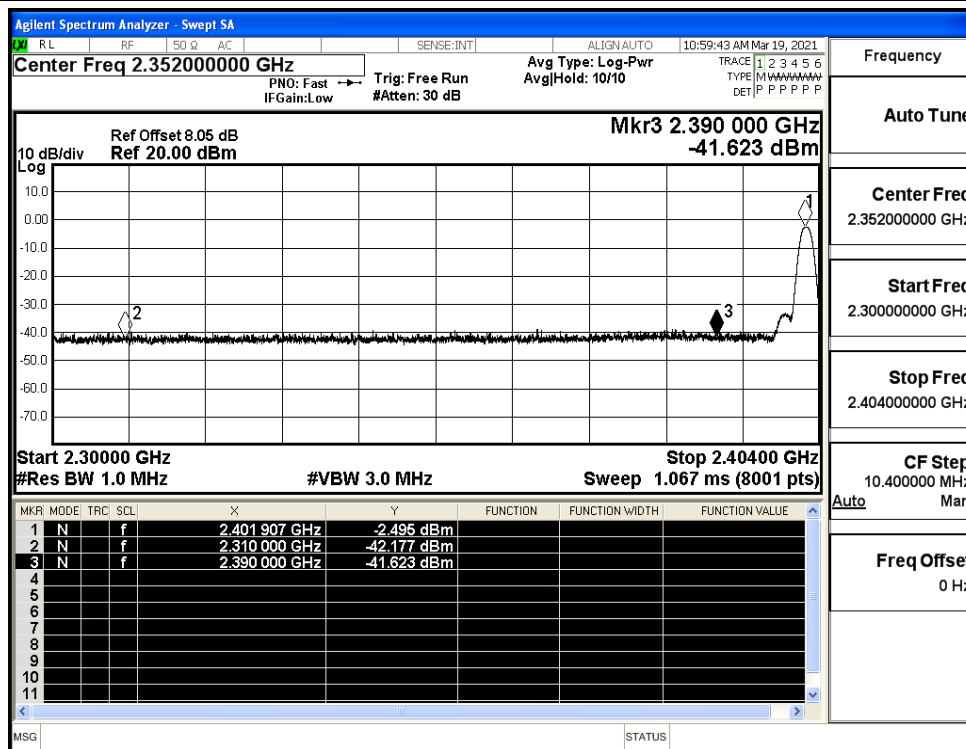
Auto Tune

Center Freq
2.483500000 GHzStart Freq
2.453500000 GHzStop Freq
2.513500000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

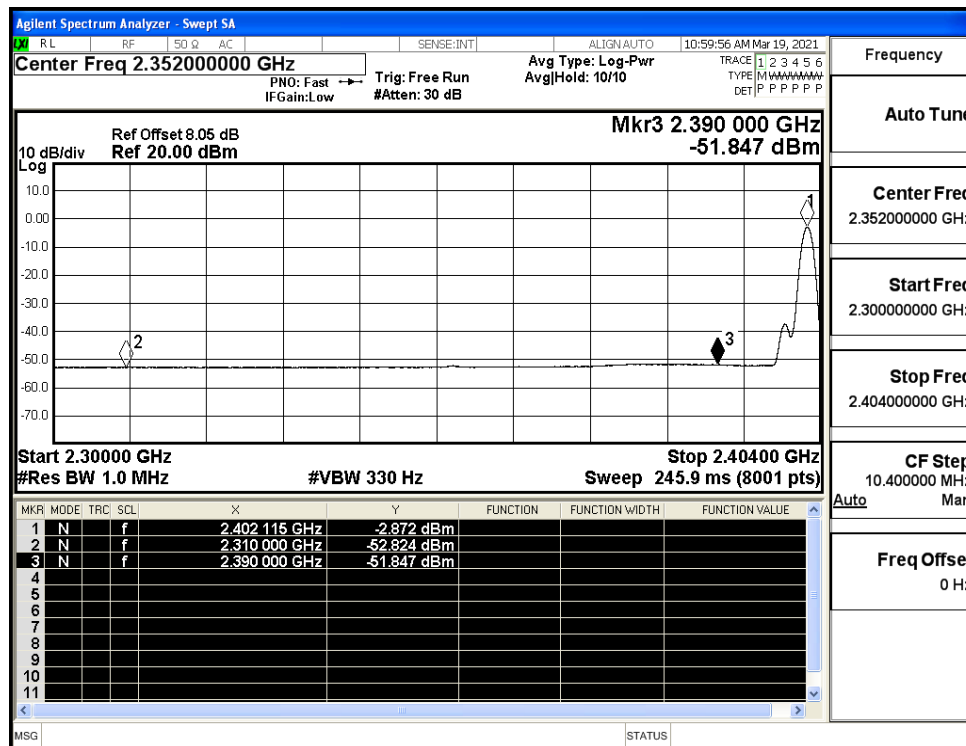
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.18	2.1	0	55.15	PEAK	74	PASS
	Off	2310.0	-52.82	2.1	0	44.51	AV	54	PASS
	Off	2390.0	-41.62	2.1	0	55.71	PEAK	74	PASS
	Off	2390.0	-51.85	2.1	0	45.48	AV	54	PASS
	Off	2483.5	-39.11	2.1	0	58.22	PEAK	74	PASS
	Off	2483.5	-47.06	2.1	0	50.27	AV	54	PASS
	Off	2500.0	-42.04	2.1	0	55.29	PEAK	74	PASS
	Off	2500.0	-50.90	2.1	0	46.43	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.33	2.1	0	55.00	PEAK	74	PASS
	Off	2310.0	-52.76	2.1	0	44.57	AV	54	PASS
	Off	2390.0	-41.74	2.1	0	55.59	PEAK	74	PASS
	Off	2390.0	-51.89	2.1	0	45.44	AV	54	PASS
	Off	2483.5	-39.22	2.1	0	58.11	PEAK	74	PASS
	Off	2483.5	-49.17	2.1	0	48.16	AV	54	PASS
	Off	2500.0	-39.70	2.1	0	57.63	PEAK	74	PASS
	Off	2500.0	-50.82	2.1	0	46.51	AV	54	PASS
8DPSK	Off	2310.0	-40.84	2.1	0	56.49	PEAK	74	PASS
	Off	2310.0	-52.69	2.1	0	44.64	AV	54	PASS
	Off	2390.0	-40.52	2.1	0	56.81	PEAK	74	PASS
	Off	2390.0	-51.90	2.1	0	45.43	AV	54	PASS
	Off	2483.5	-39.46	2.1	0	57.87	PEAK	74	PASS
	Off	2483.5	-49.24	2.1	0	48.09	AV	54	PASS
	Off	2500.0	-40.79	2.1	0	56.54	PEAK	74	PASS
	Off	2500.0	-50.83	2.1	0	46.50	AV	54	PASS

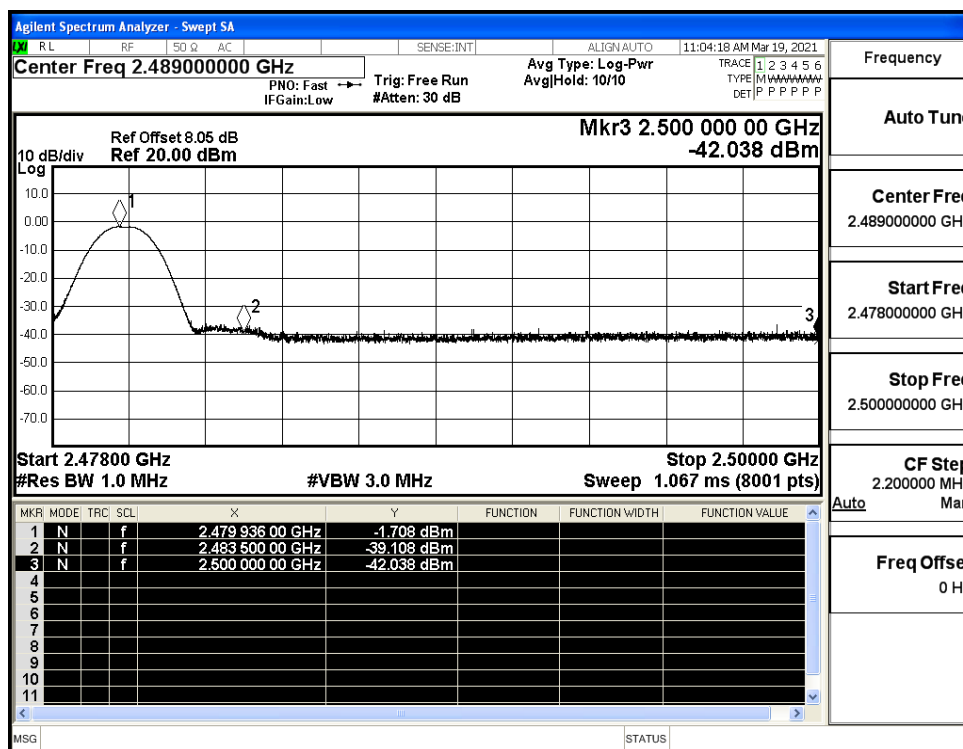
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



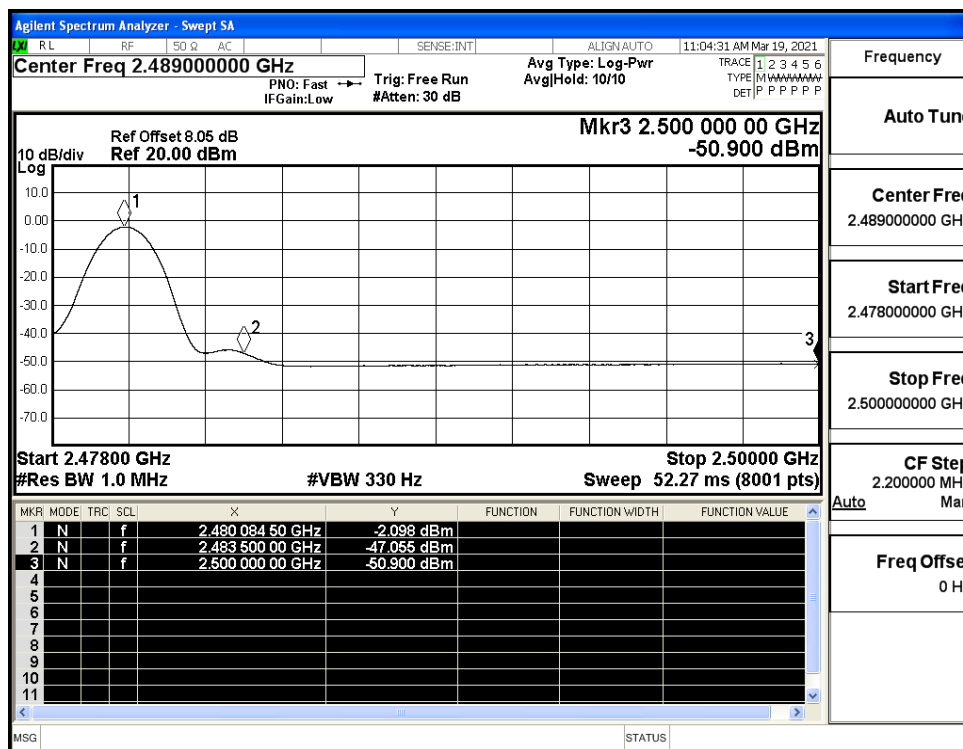
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



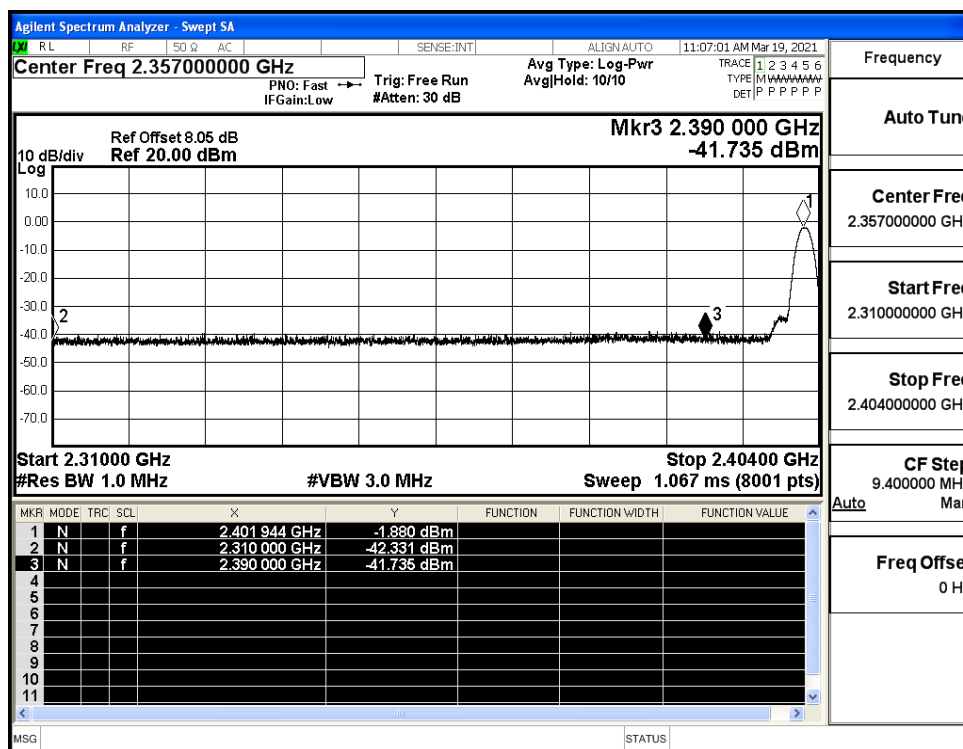
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



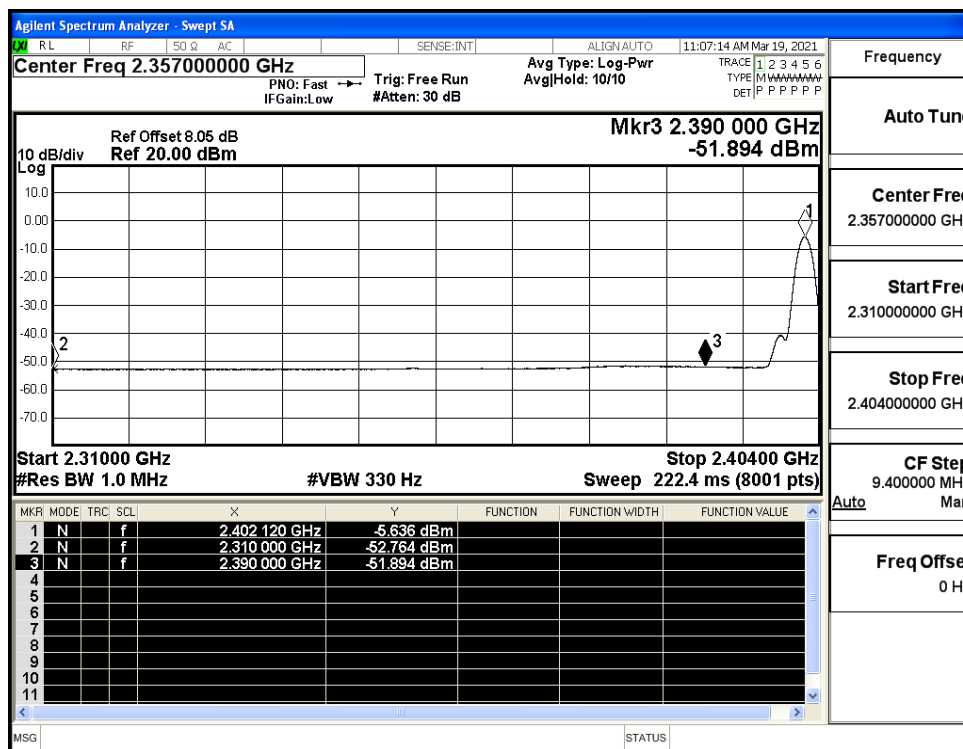
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

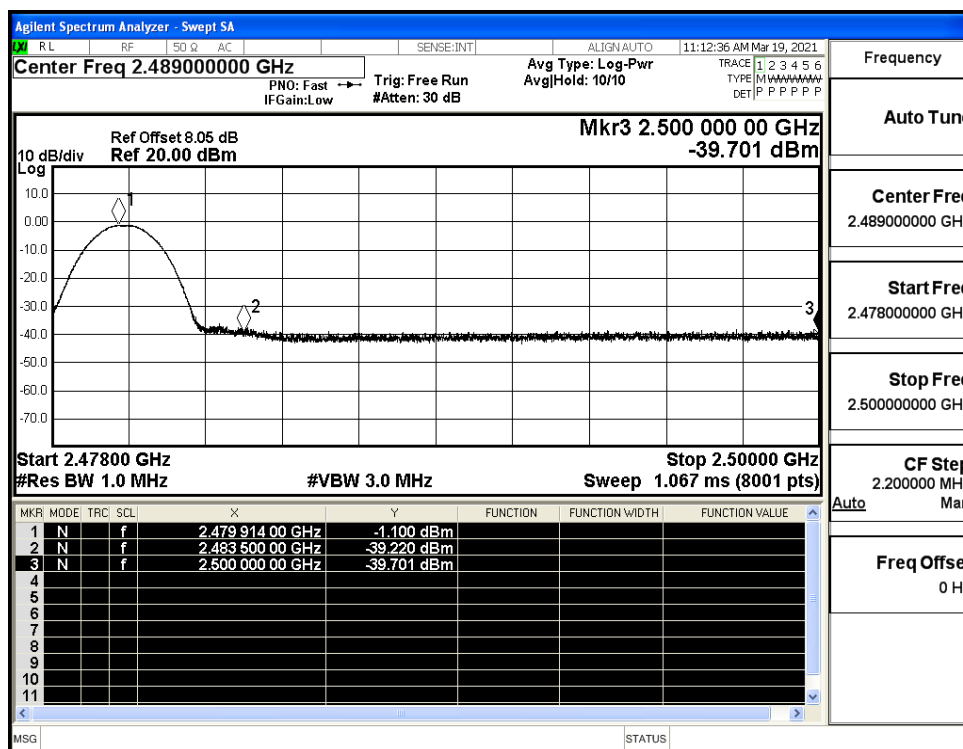
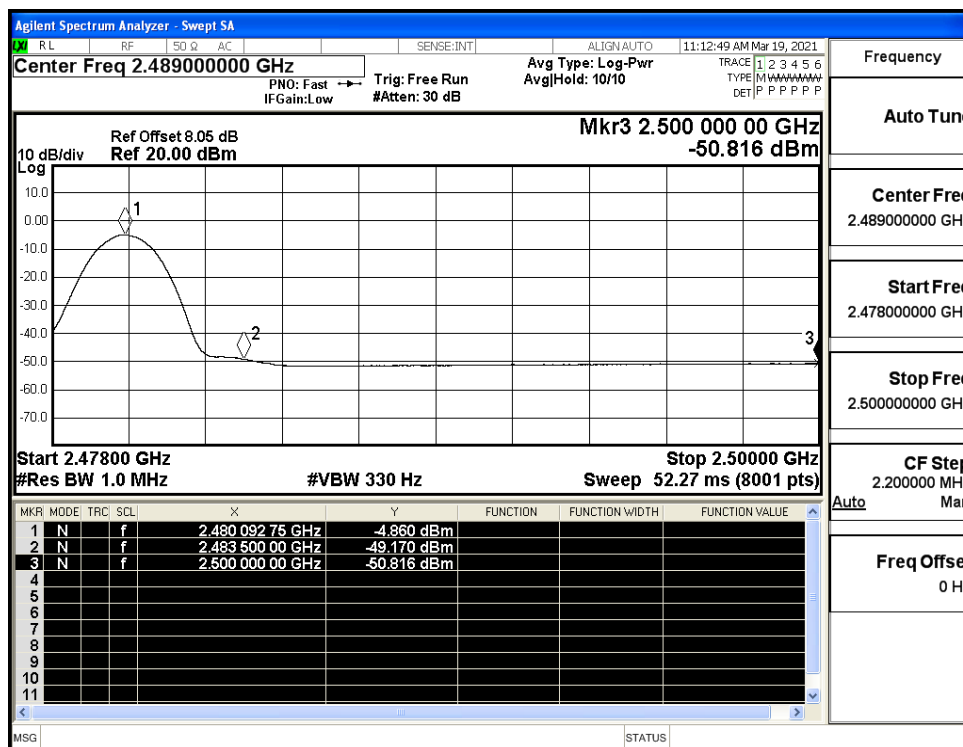


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)

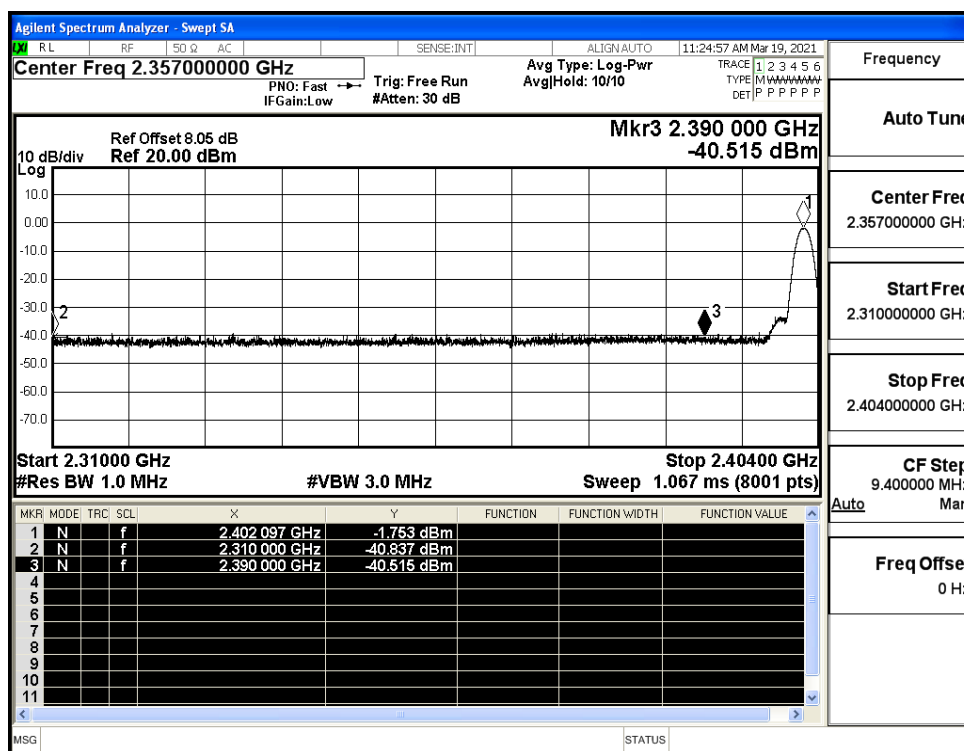


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

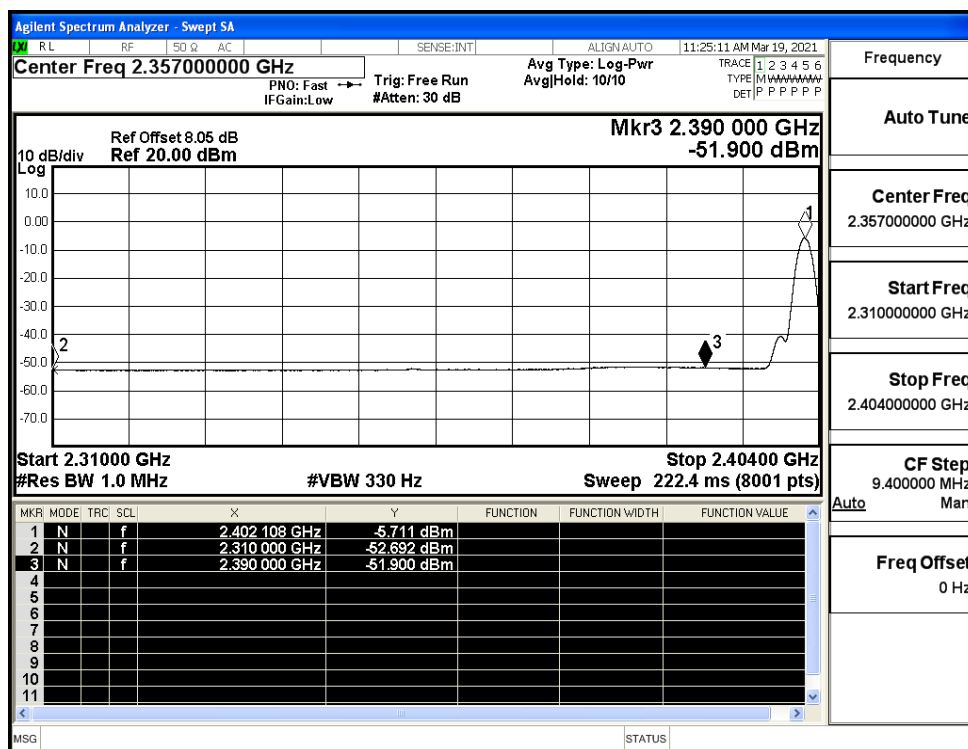


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (High Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (High Channel)

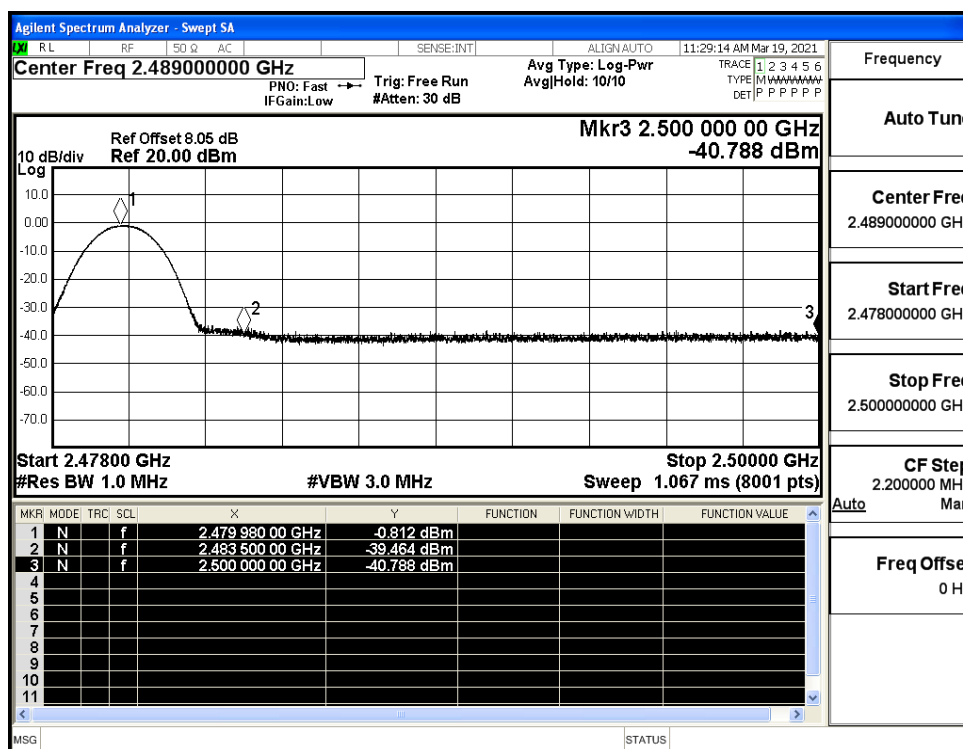
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

