

Appendix A

RF Test Data for BT V5.1(BDR/EDR) (Conducted Measurement)

Product Name: Wireless earbuds

Trade Mark: N/A

Test Model: XY-EB006

Environmental Conditions

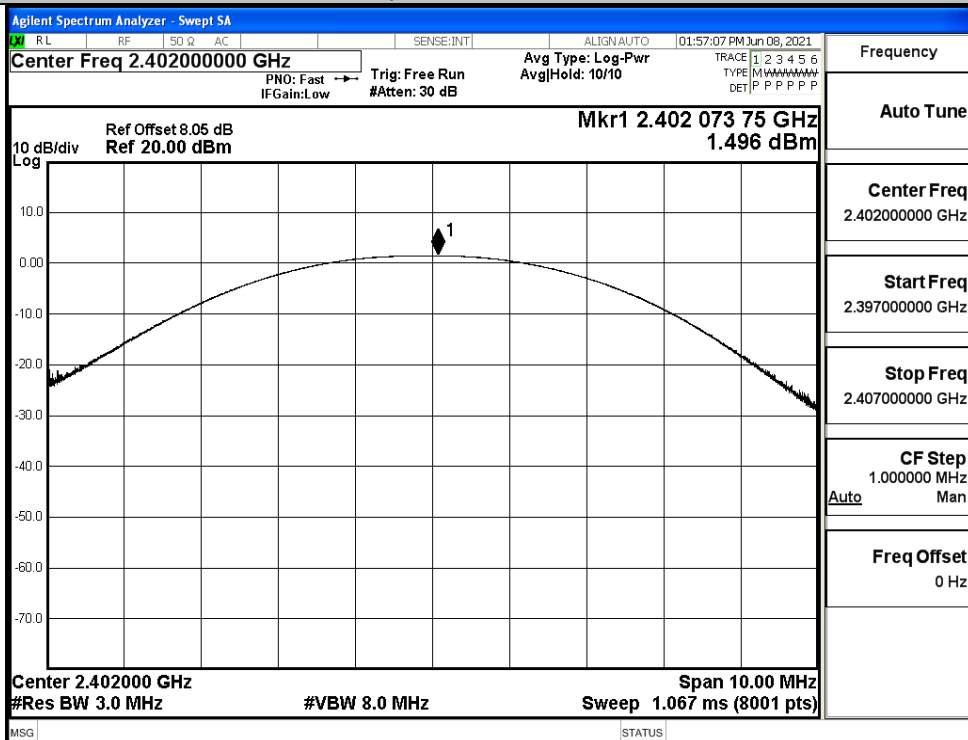
Temperature:	24.6 ° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Kay Hu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

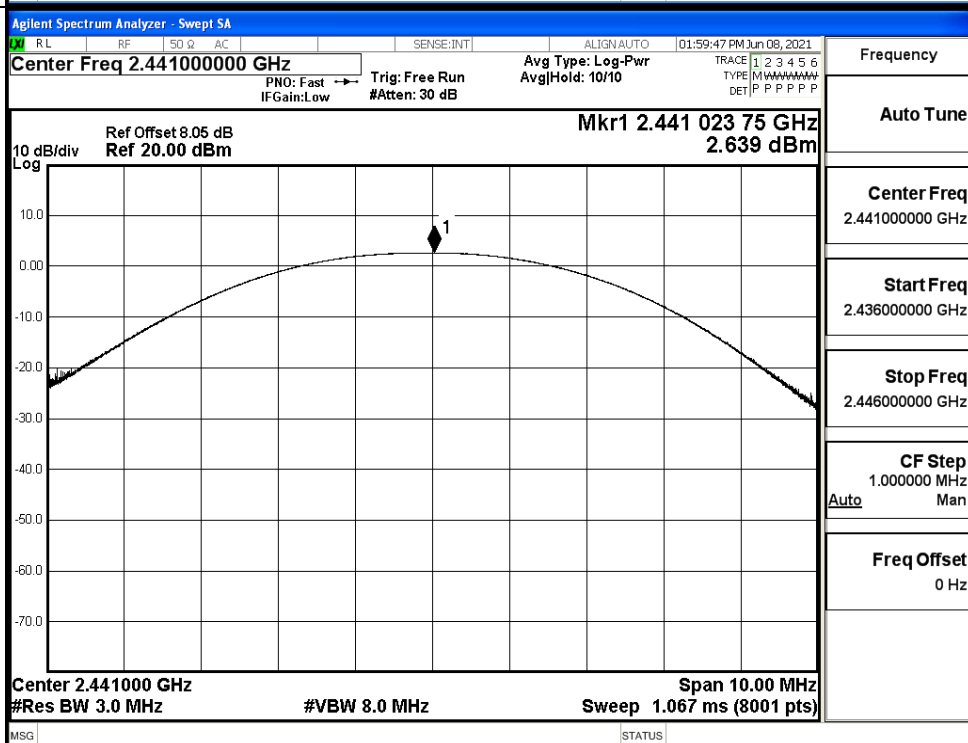
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.496	30	PASS
	MCH	2.639	30	PASS
	HCH	2.863	30	PASS
$\pi/4$ DQPSK	LCH	2.641	21	PASS
	MCH	3.763	21	PASS
	HCH	4.001	21	PASS

Test Graphs

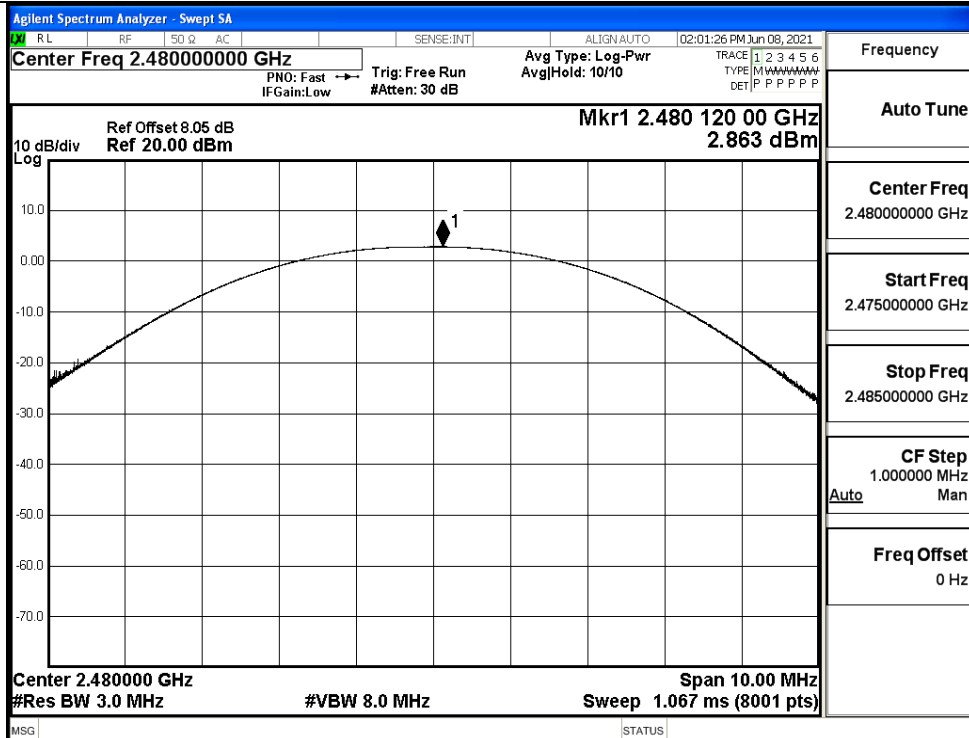
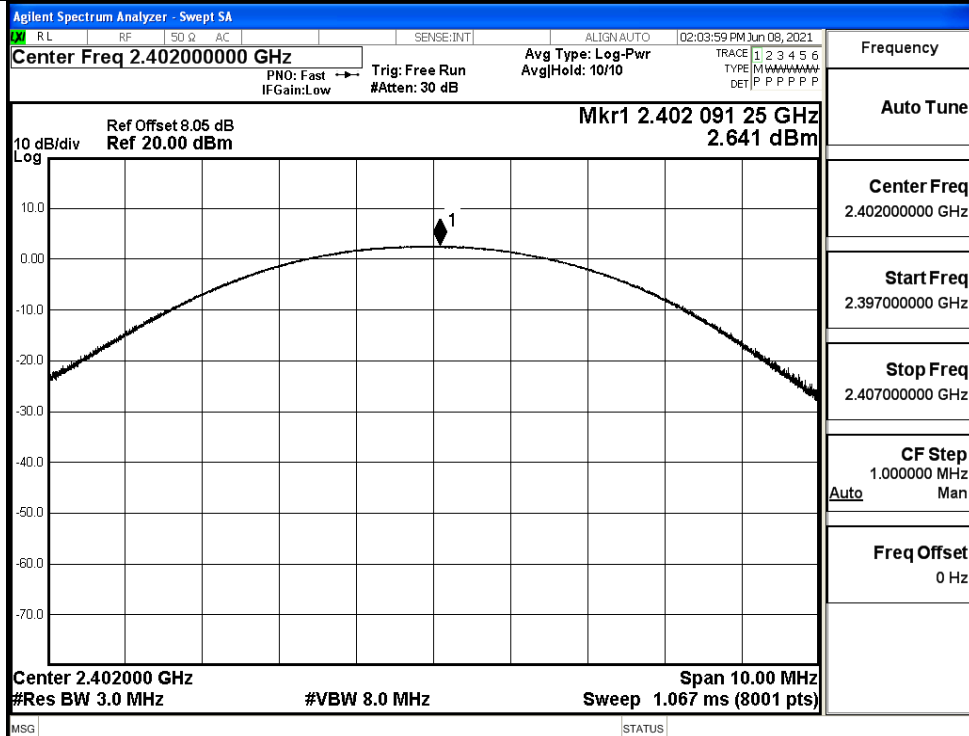
GFSK/LCH

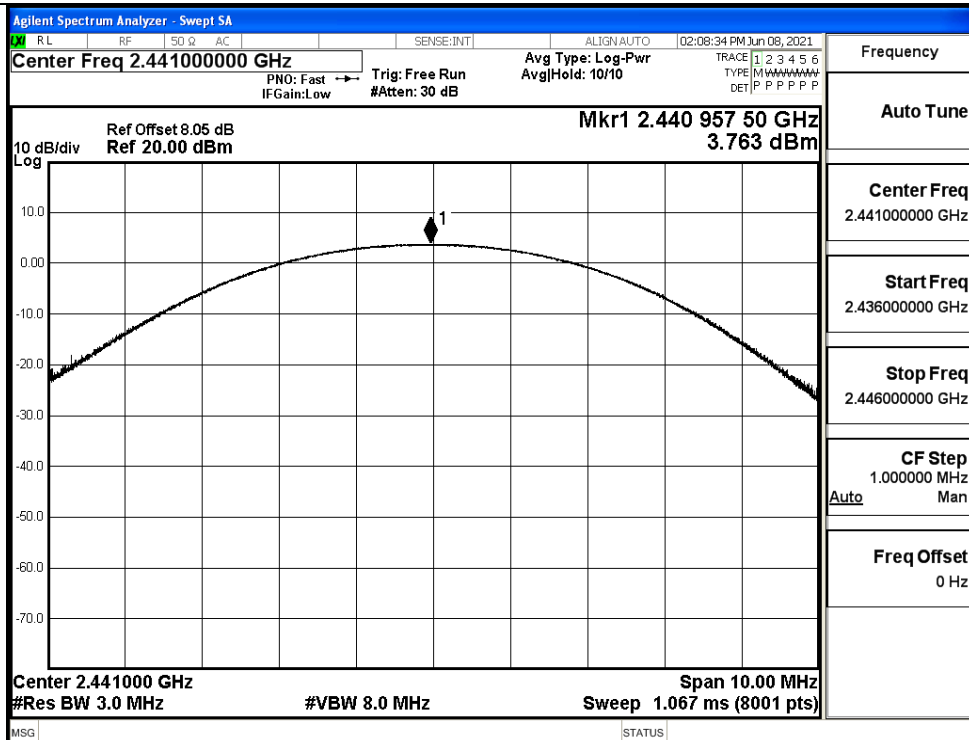
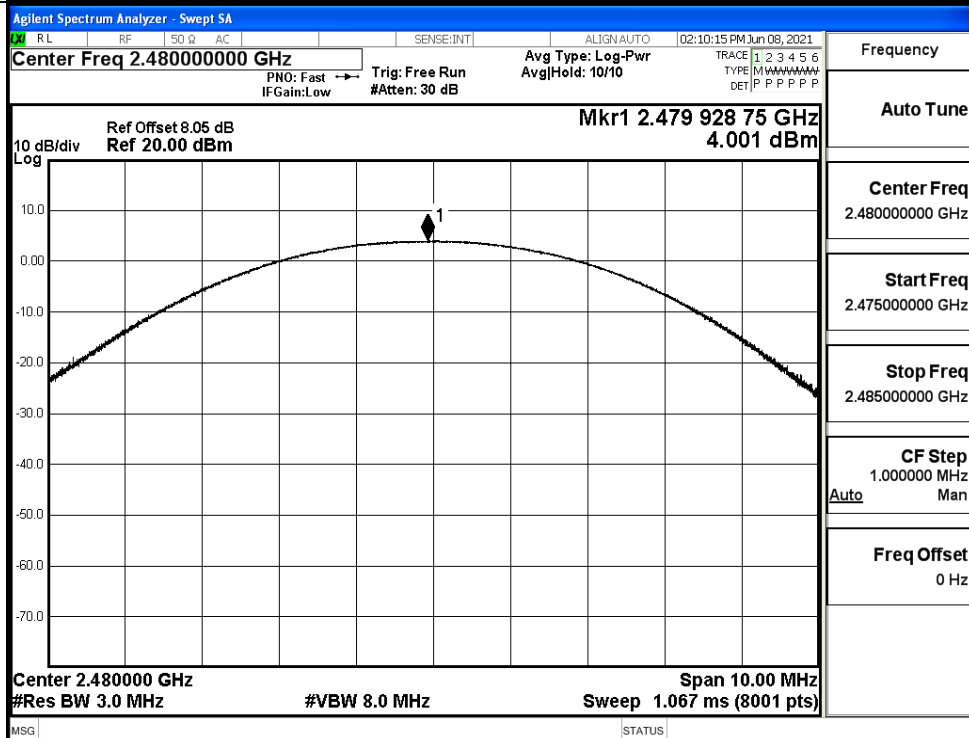


GFSK/MCH



GFSK/HCH

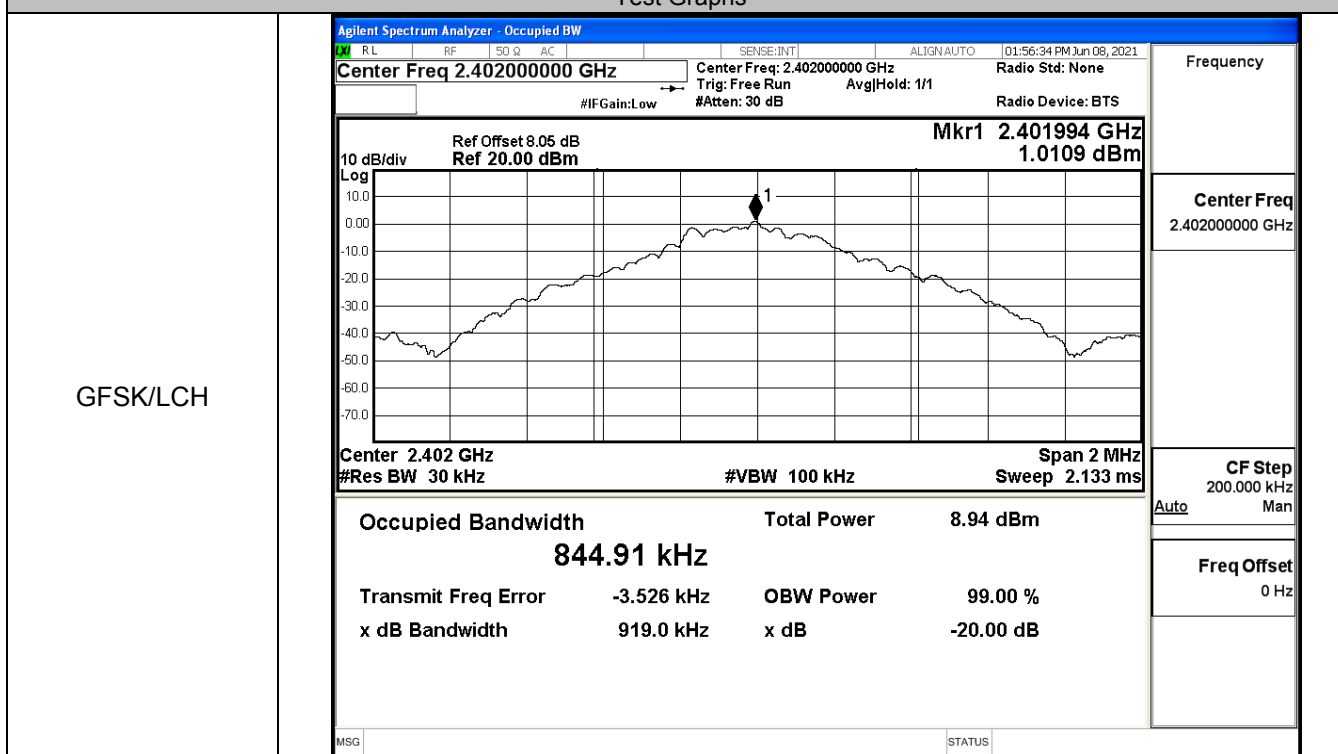
 π /4DQPSK/LCH

$\pi/4$ DQPSK/MCH $\pi/4$ DQPSK/HCH

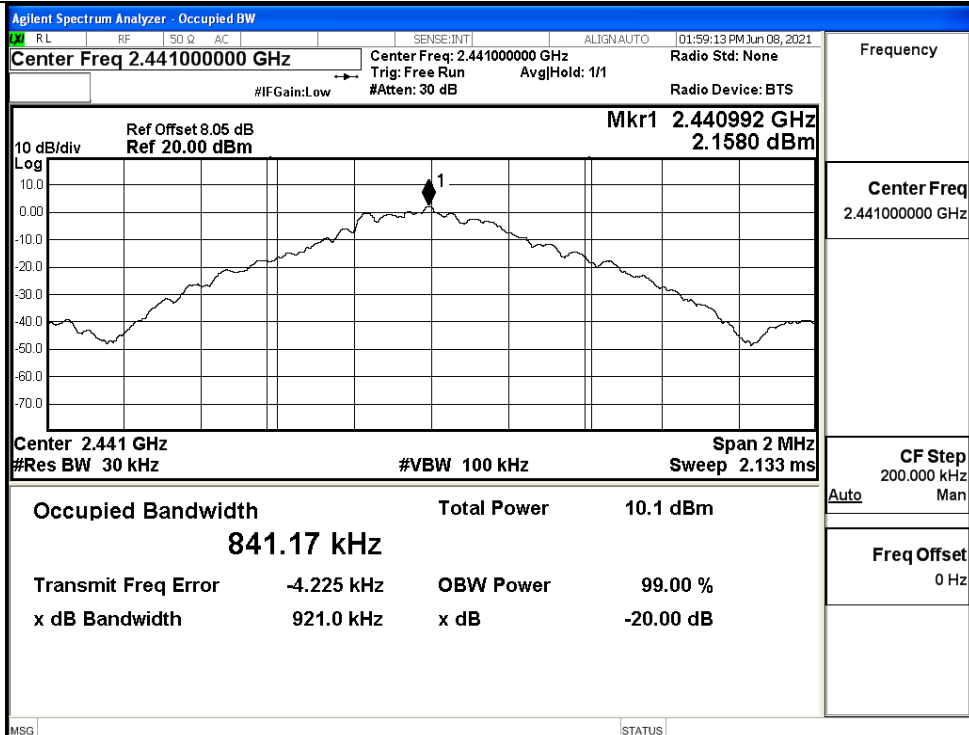
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9190	Not Specified	PASS
	MCH	0.9210	Not Specified	PASS
	HCH	0.9071	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.224	Not Specified	PASS
	MCH	1.253	Not Specified	PASS
	HCH	1.253	Not Specified	PASS

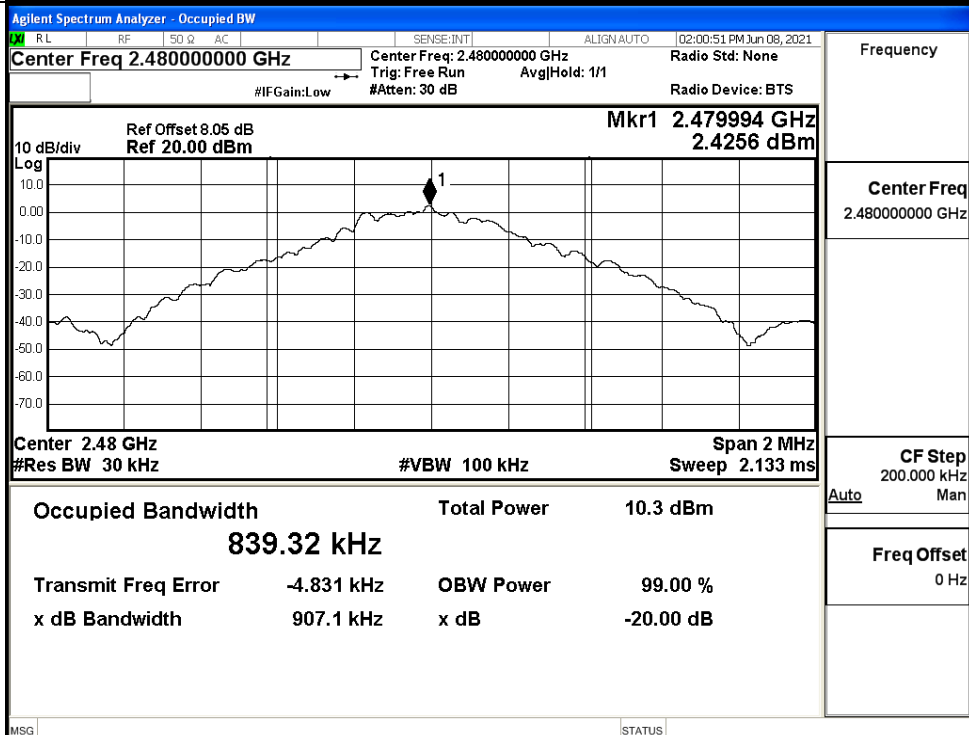
Test Graphs

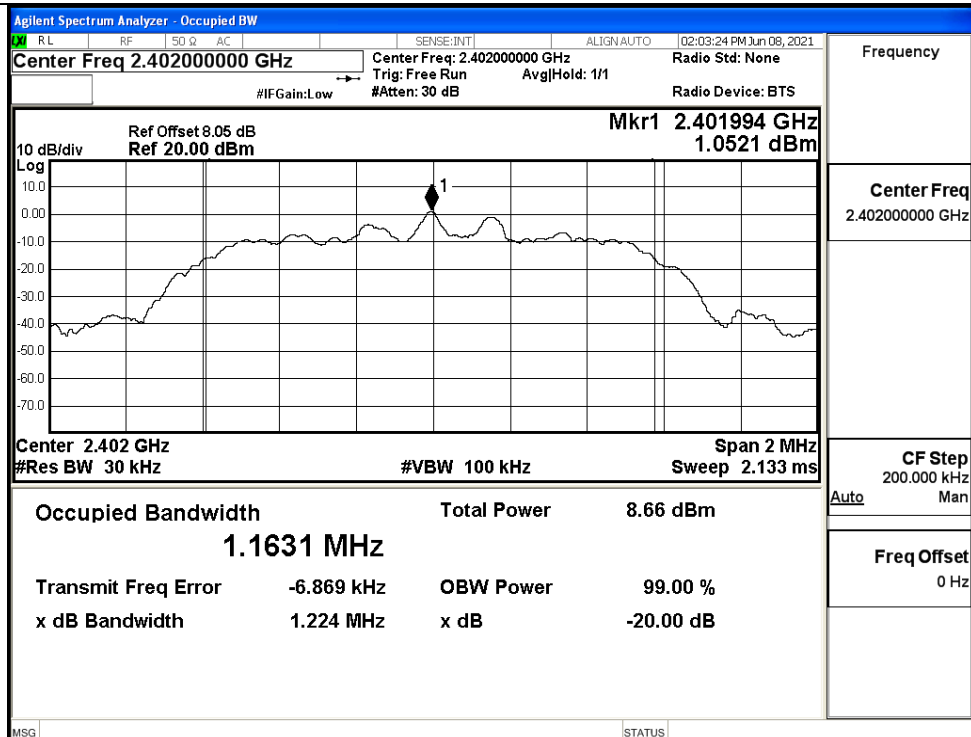
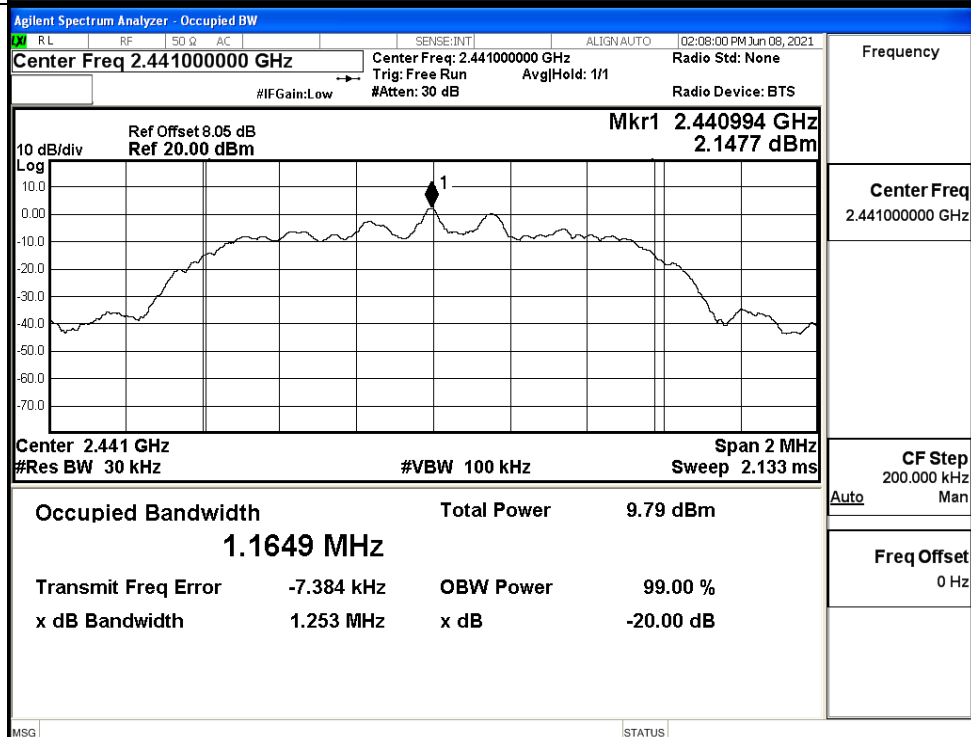


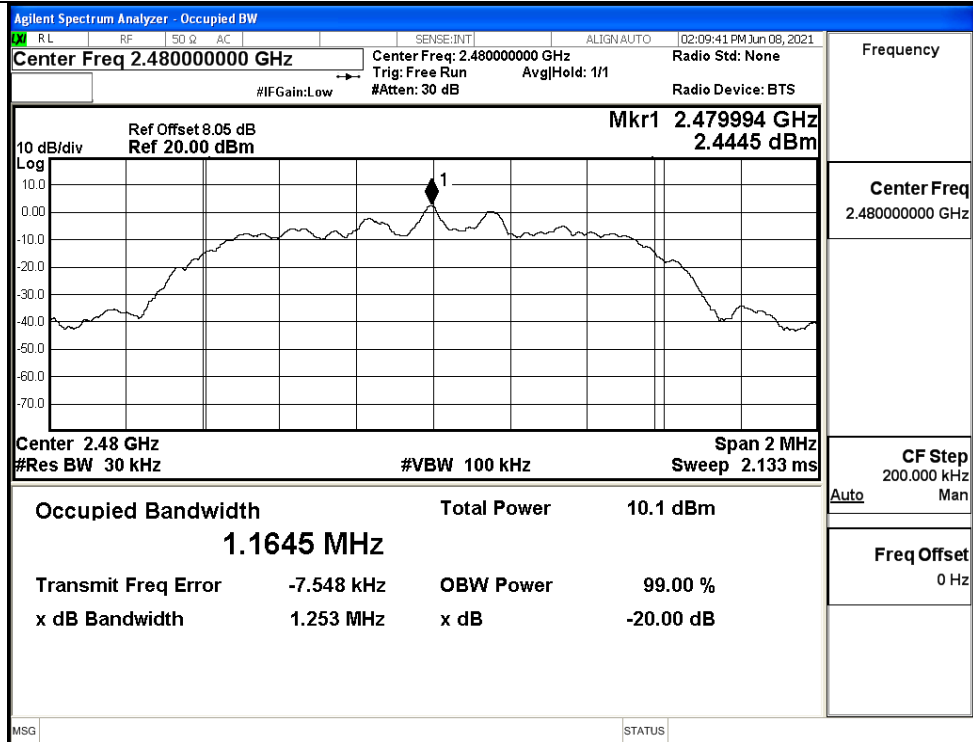
GFSK/MCH



GFSK/HCH



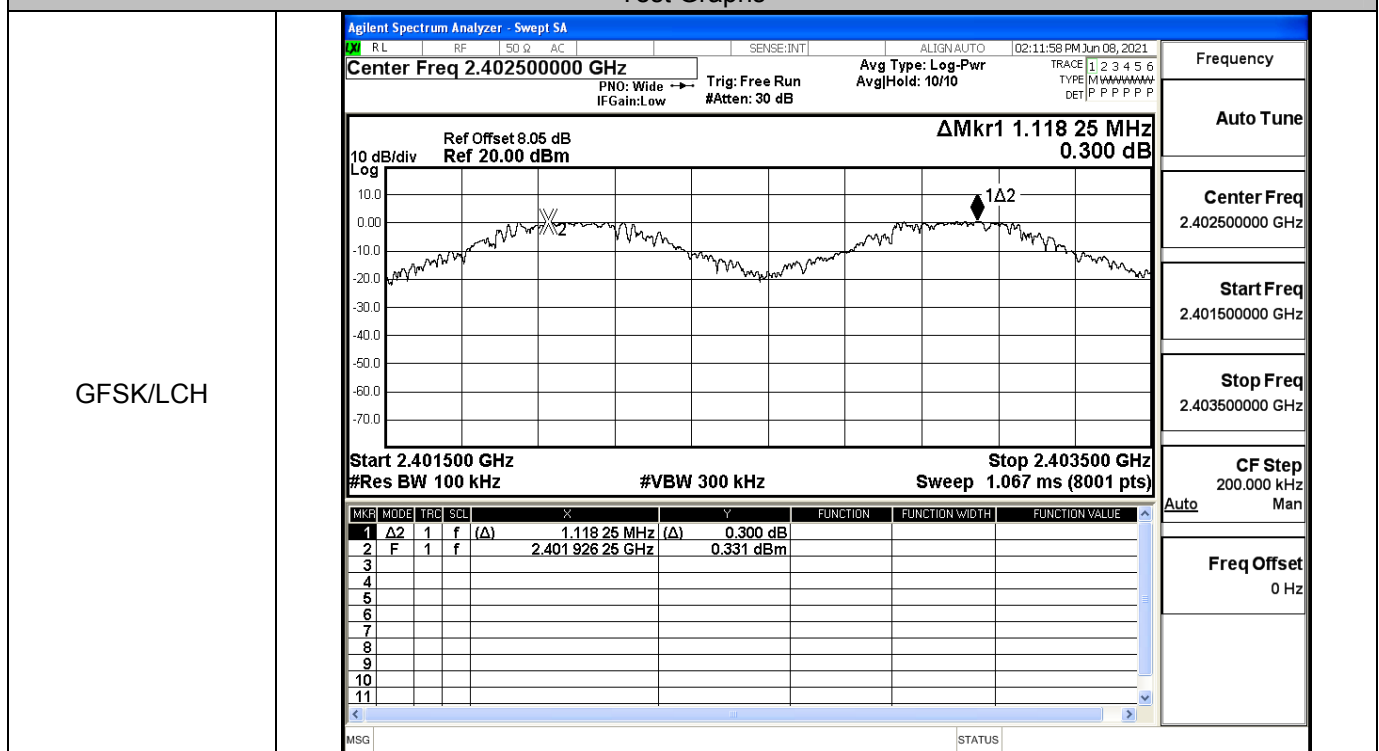
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

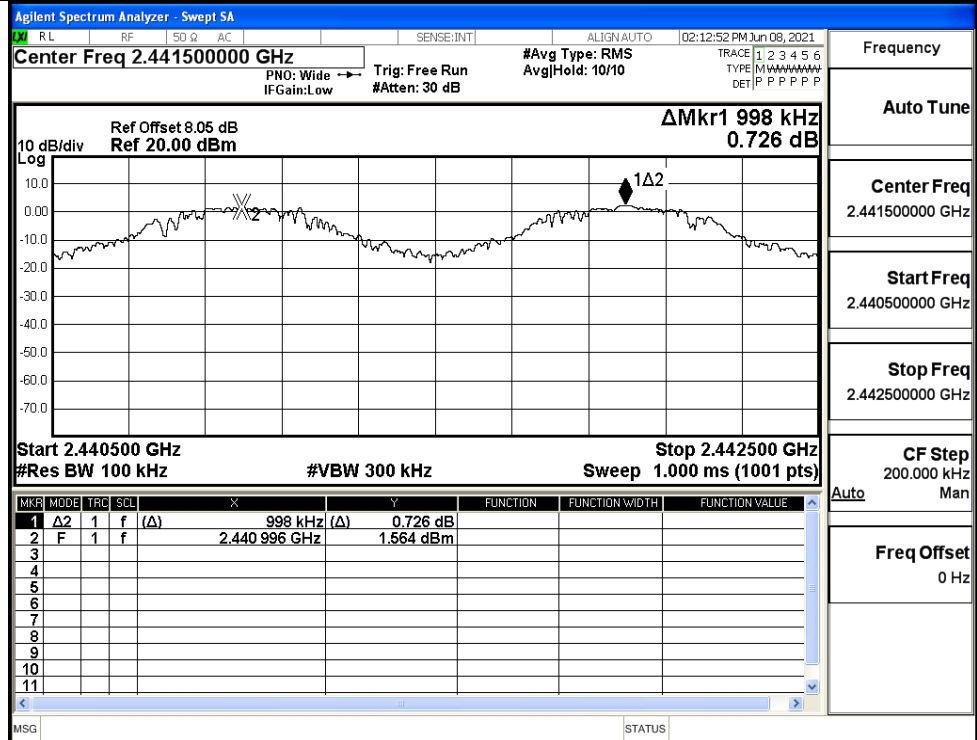
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.118	0.614	PASS
	MCH	0.998	0.614	PASS
	HCH	0.980	0.614	PASS
$\pi/4$ DQPSK	LCH	0.870	0.835	PASS
	MCH	0.972	0.835	PASS
	HCH	0.846	0.835	PASS

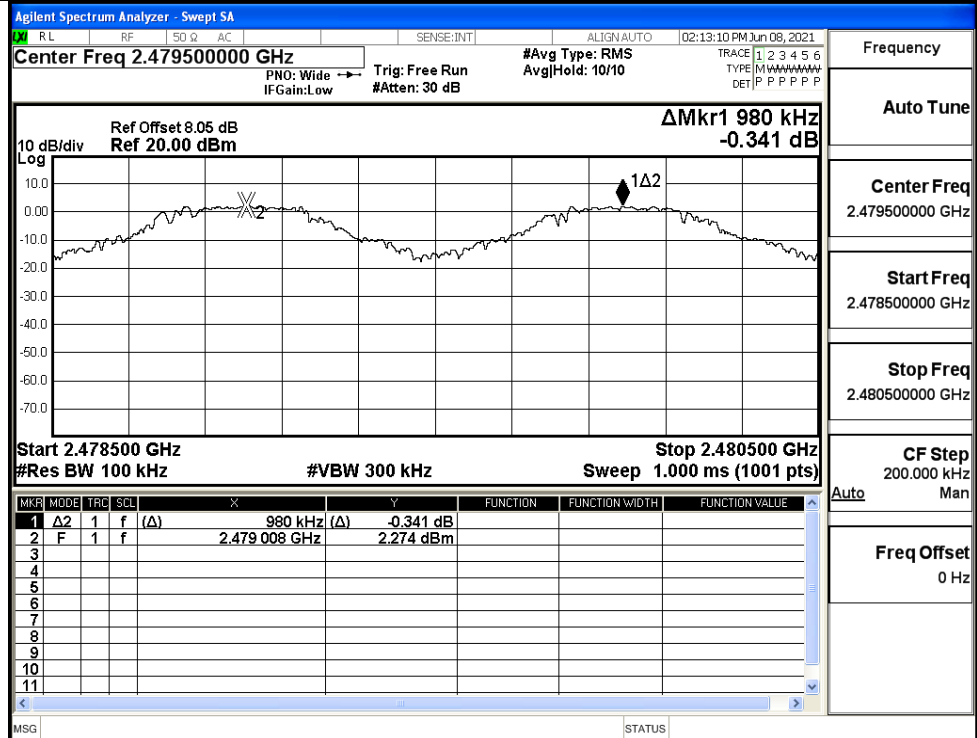
Test Graphs

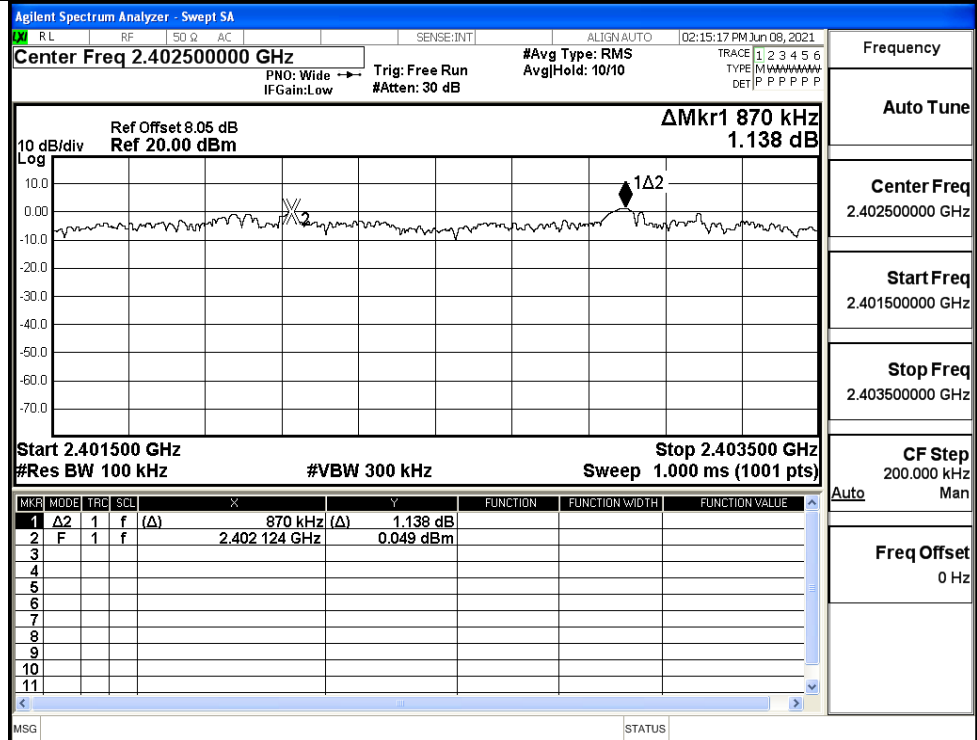
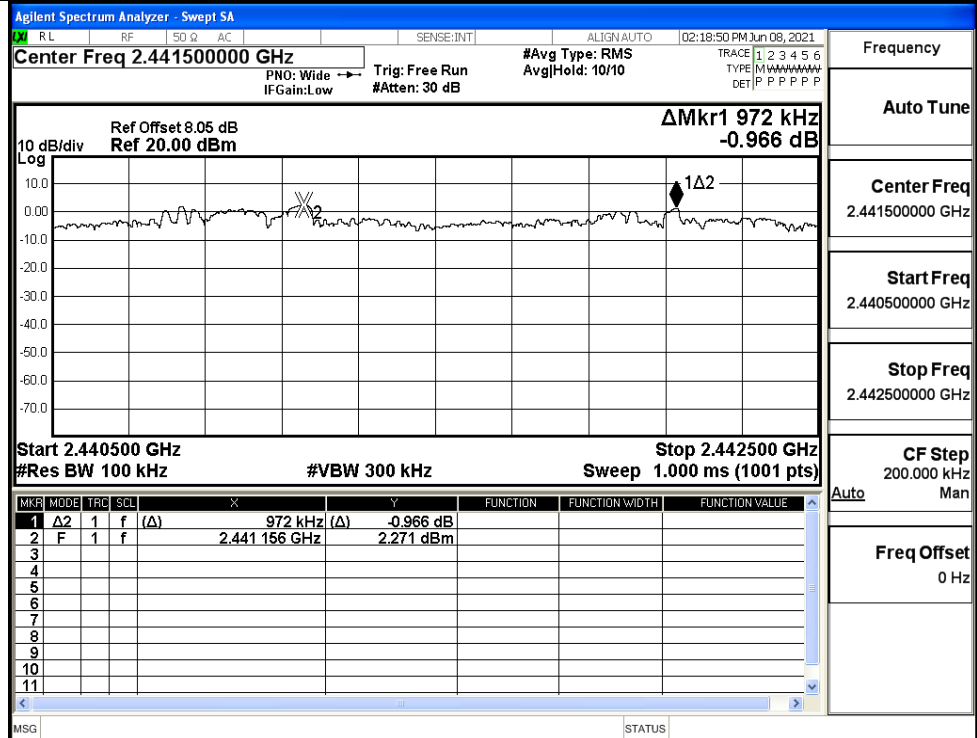


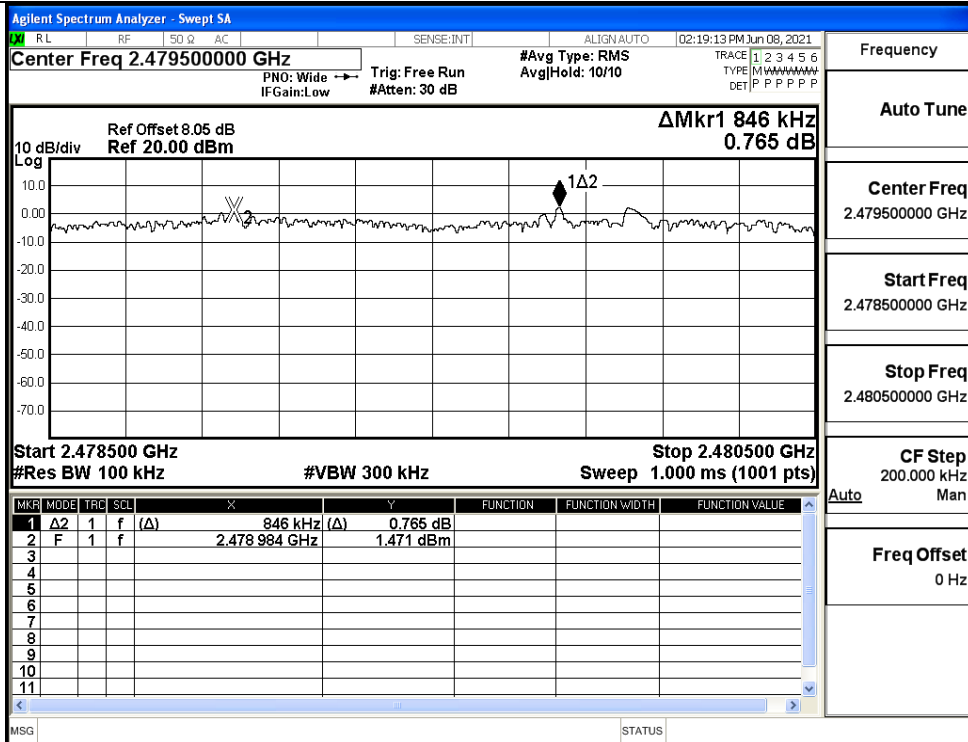
GFSK/MCH



GFSK/HCH



$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

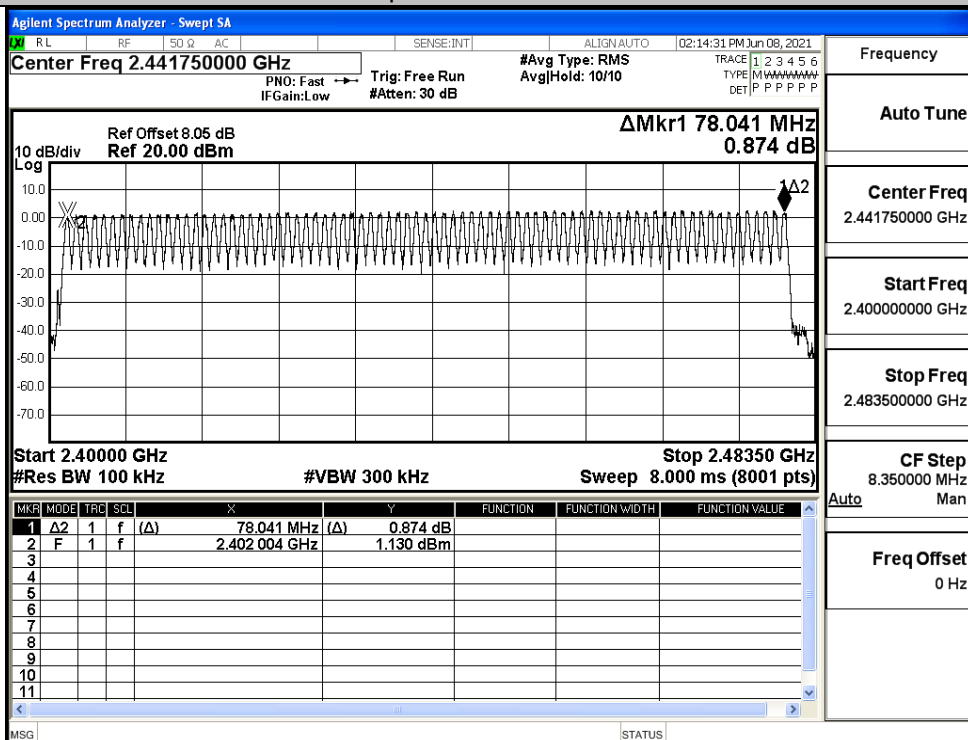
$\pi/4$ DQPSK/HCH

A.4 Hopping Channel Number

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

Test Graphs

GFSK/Hop



Frequency

Auto Tune

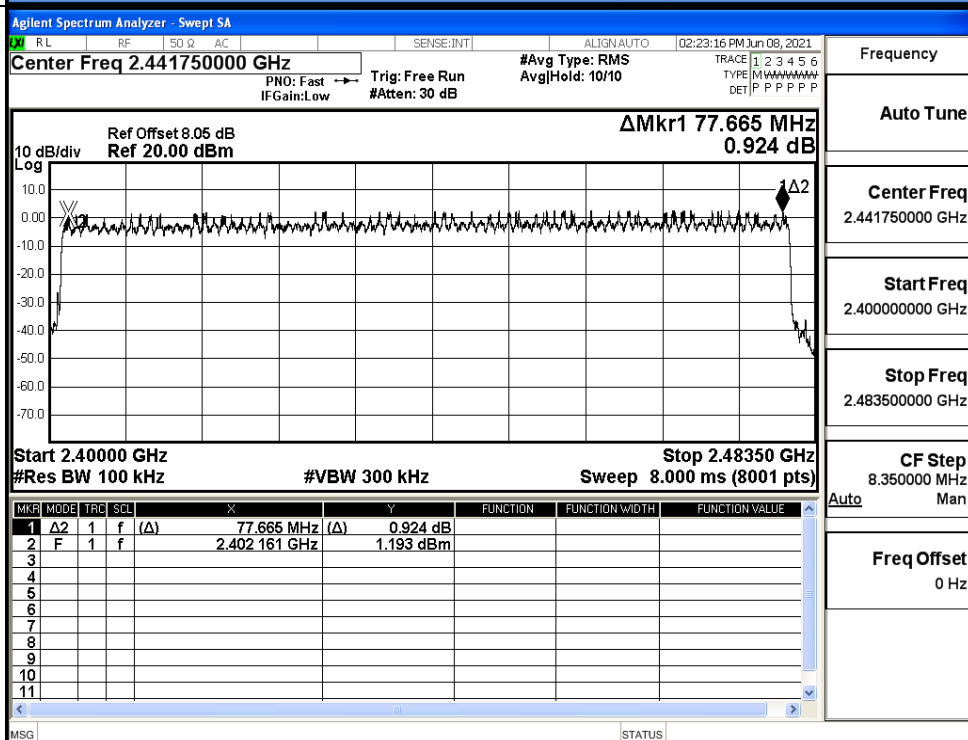
Center Freq
2.441750000 GHz

Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
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
Man

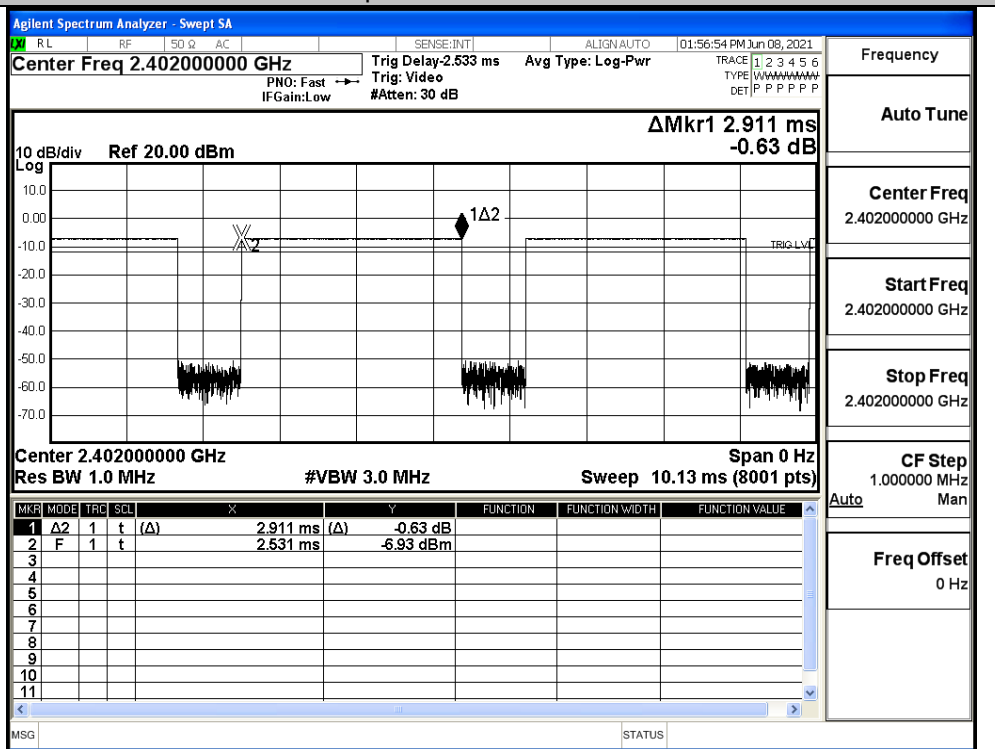
Freq Offset
0 Hz

A.5 Dwell Time

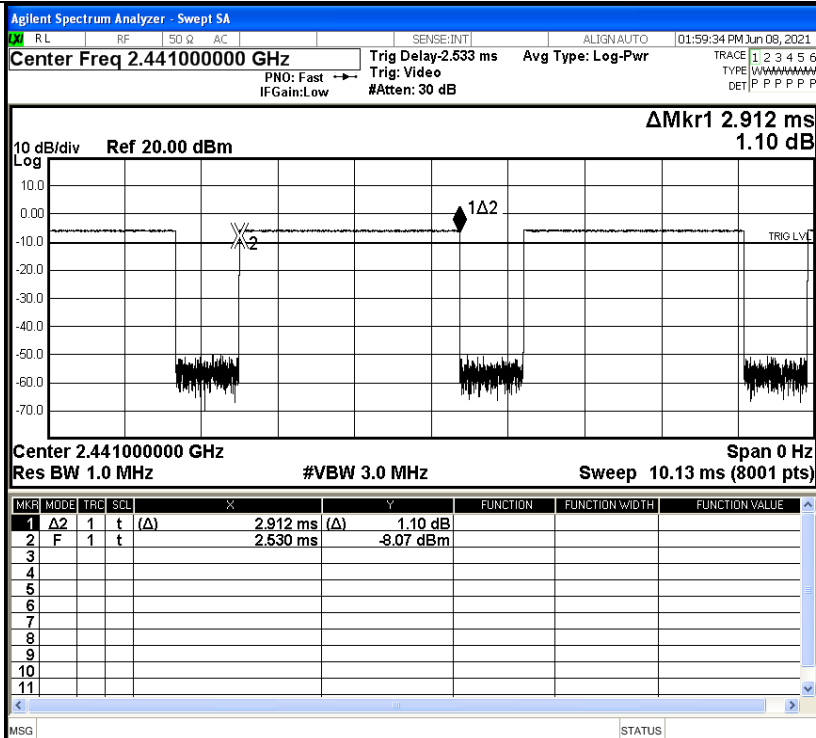
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.91	106.7	0.31	0.4	PASS
	DH5	MCH	2.91	106.7	0.31	0.4	PASS
	DH5	HCH	2.91	106.7	0.31	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.91	106.7	0.312	0.4	PASS
	2DH5	MCH	2.91	106.7	0.312	0.4	PASS
	2DH5	HCH	2.91	106.7	0.312	0.4	PASS

Test Graphs

GFSK_DH5/LCH



GFSK_DH5/MCH

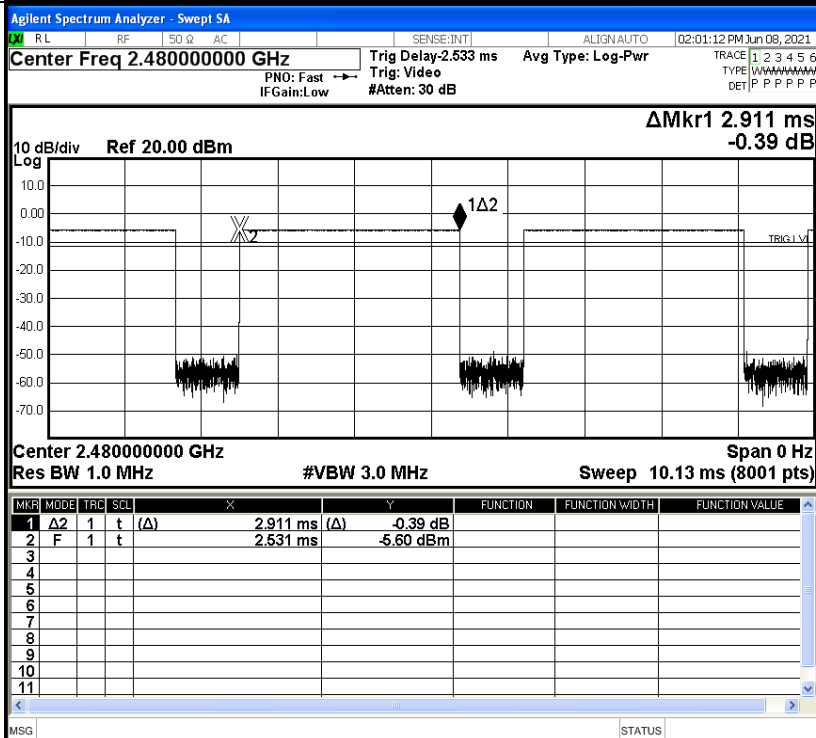


Frequency

Auto Tune

Center Freq
2.441000000 GHzStart Freq
2.441000000 GHzStop Freq
2.441000000 GHzCF Step
1.000000 MHz
Auto ManFreq Offset
0 Hz

GFSK_DH5/HCH



Frequency

Auto Tune

Center Freq
2.480000000 GHzStart Freq
2.480000000 GHzStop Freq
2.480000000 GHzCF Step
1.000000 MHz
Auto ManFreq Offset
0 Hz

Agilent Spectrum Analyzer - Swept SA

RL RF SO Q AC SENSE:INT ALIGN:AUTO 02:03:45 PM Jun 08, 2021
Center Freq 2.402000000 GHz Trig Delay-2.533 ms Avg Type: Log-Pwr PNO: Fast → IF Gain: Low Trg: Video #Atten: 30 dB TRACE 1 2 3 4 5 6 TYPE P P P P P DET P P P P P

The spectrum plot shows frequency from approximately 2.398 GHz to 2.406 GHz. The y-axis is power density in dB/div Log, ranging from -70.0 to 10. A reference level of Ref 20.00 dBm is indicated. A sharp peak is visible at 2.402 GHz, labeled "Δmkr1". Below the main trace, there are two distinct noise floor regions.

MkR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	A2	1	t	(Δ)	2.917 ms	(Δ)	-0.91 dB	
2	F	1	t		163.4 μs		-7.80 dBm	
3								
4								
5								
6								
7								
8								
9								
10								
11								

Frequency Auto Tune Center Freq 2.402000000 GHz Start Freq 2.402000000 GHz Stop Freq 2.402000000 GHz CF Step 1.000000 MHz Man Auto Freq Offset 0 Hz

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 02:08:20 PM Jun 08, 2021

Center Freq 2.441000000 GHz Trig Delay: 2.533 ms Avg Type: Log-Pwr PNO: Fast → IF Gain: Low Trig: Video #Atten: 30 dB TRACE 1 2 3 4 5 6 TYPE P P P P P P DET P P P P P P

ΔMkr1 2.917 ms -0.56 dB

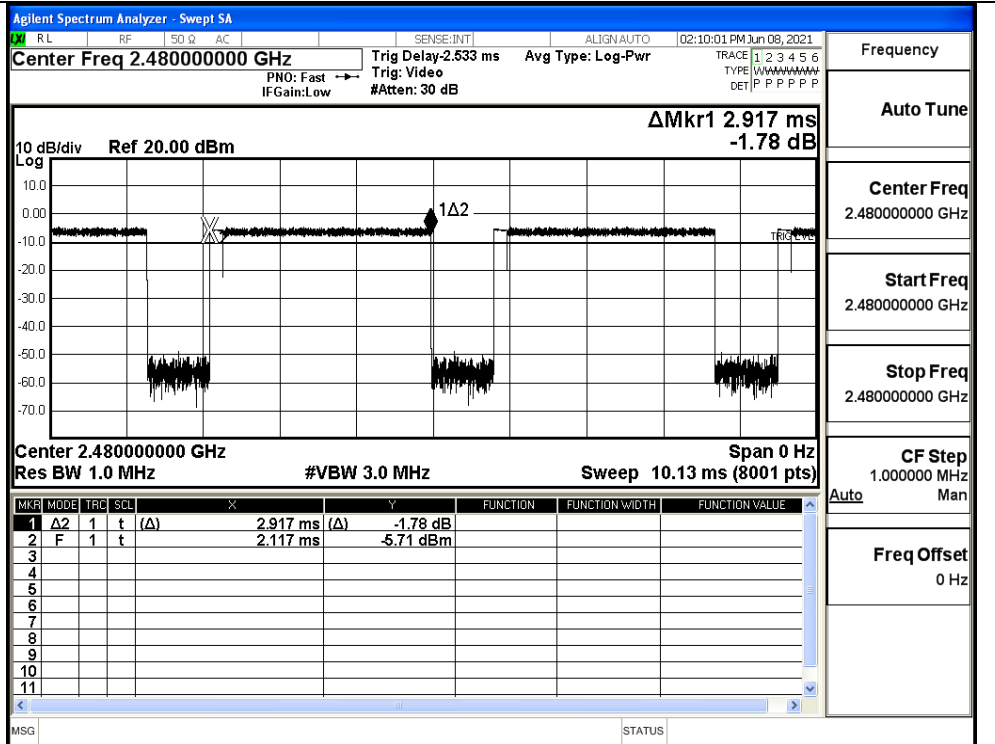
The main plot area shows a spectrum from 10 dB/div to -70.0 dBm. The center frequency is 2.441 GHz. A marker labeled ΔMkr1 is placed on the signal at 2.917 ms and -0.56 dB. The resolution bandwidth is 1.0 MHz, and the sweep time is 10.13 ms.

MkR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	1	t	(Δ)	2.917 ms	(Δ)	-0.56 dB	
2	F	1	t		3.500 ms		-6.97 dBm	
3								
4								
5								
6								
7								
8								
9								
10								
11								

Center 2.441000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8001 pts)
 Auto Man

Freq Offset
 0 Hz

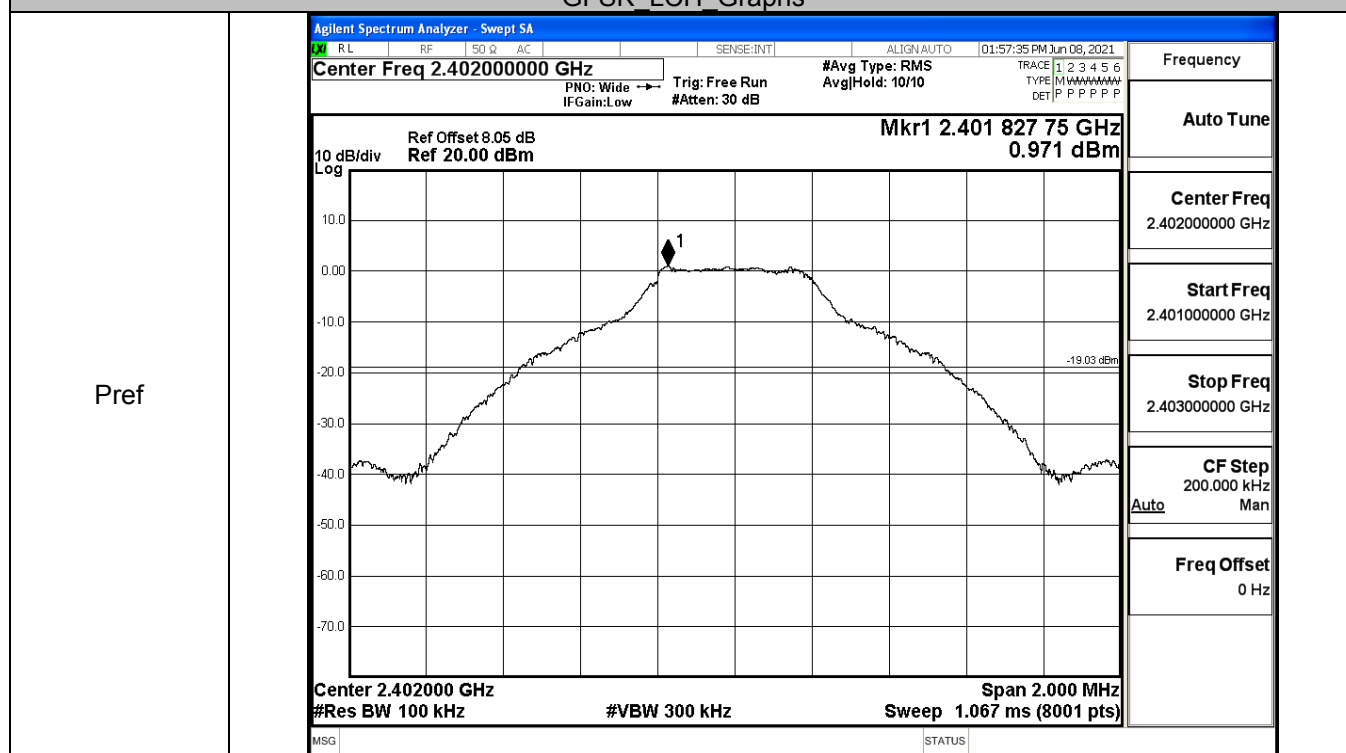
$\pi/4$ DQPSK
_2DH5/HCH



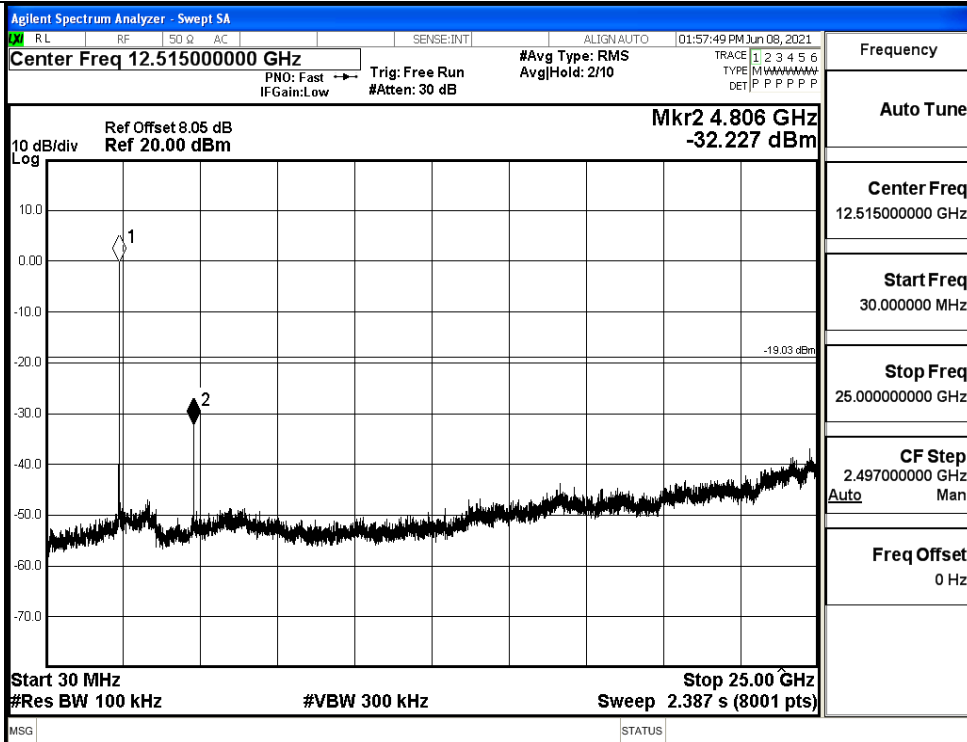
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.971	-32.227	-19.029	PASS
	MCH	2.258	-32.206	-17.742	PASS
	HCH	2.46	-28.218	-17.540	PASS
$\pi/4$ DQPSK	LCH	1.195	-35.946	-18.805	PASS
	MCH	2.318	-34.830	-17.682	PASS
	HCH	2.577	-34.649	-17.423	PASS

GFSK LCH Graphs

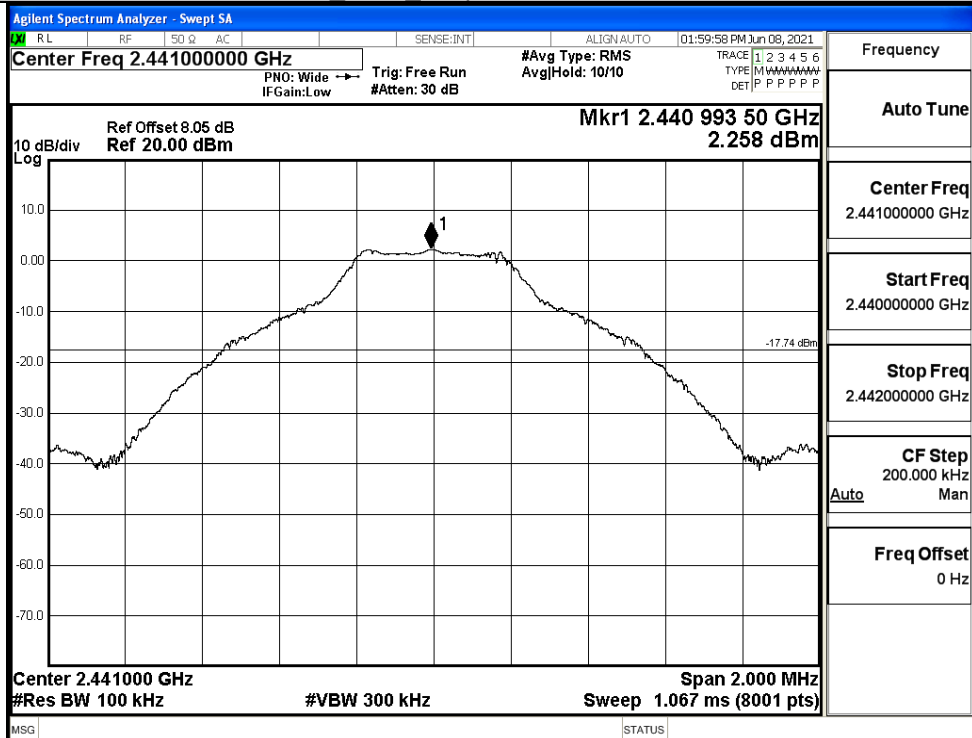


Puw

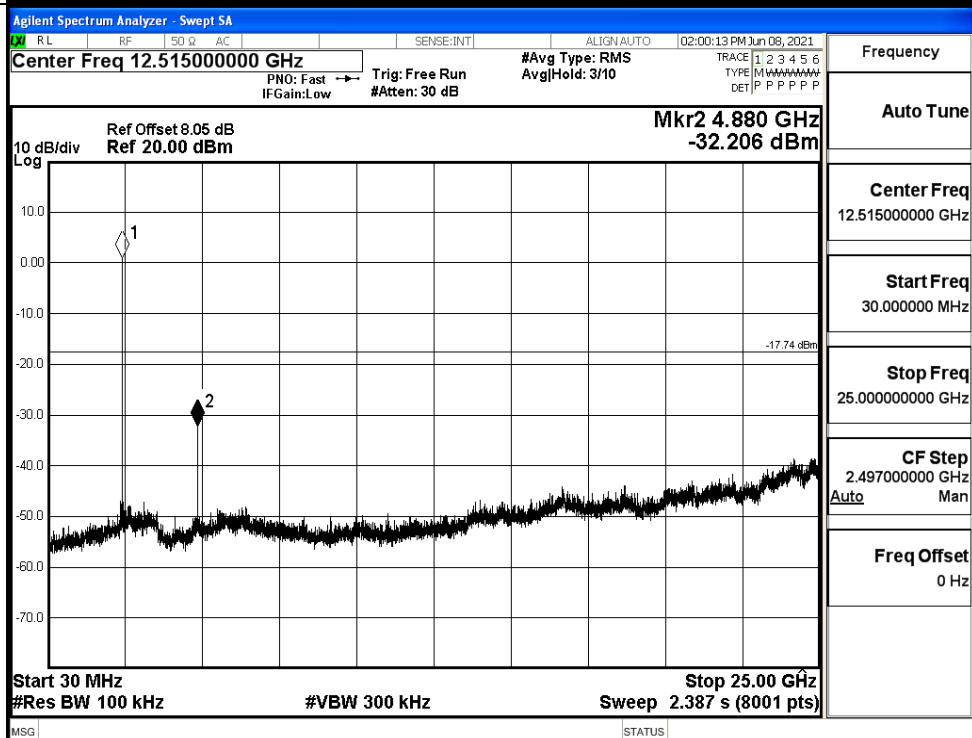


GFSK_MCH_Graphs

Pref

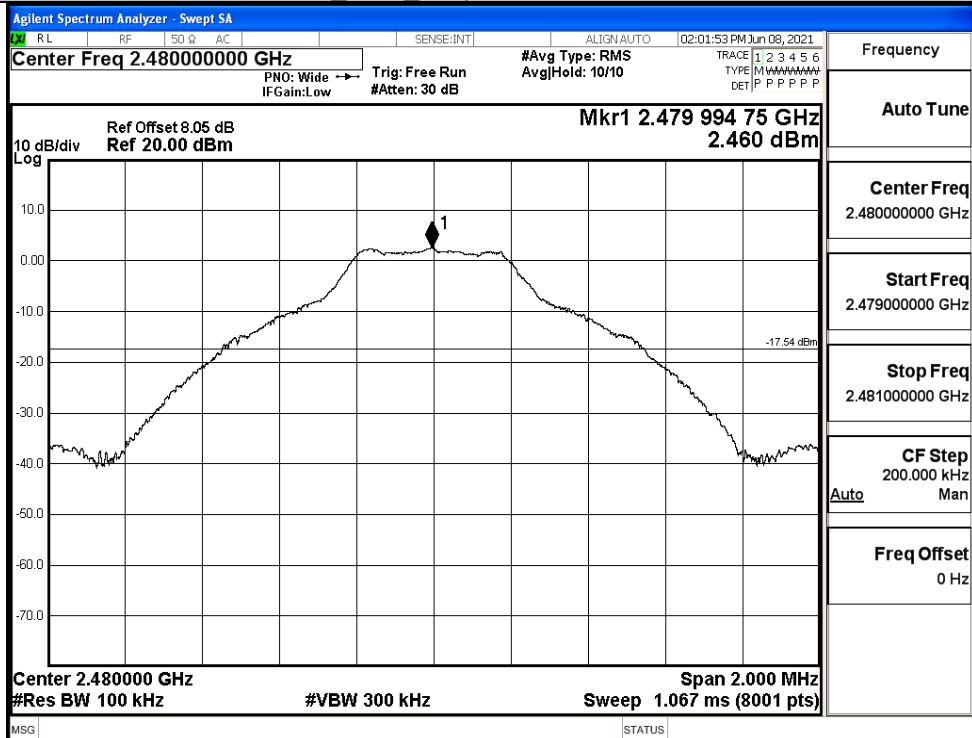


Puw

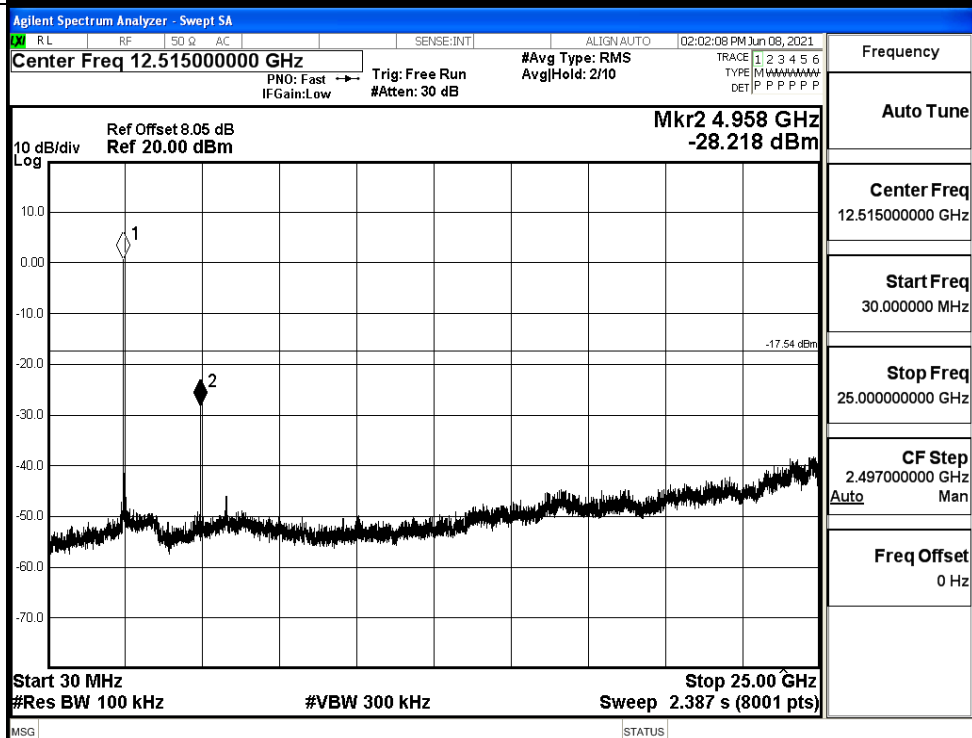


GFSK_HCH_Graphs

Pref

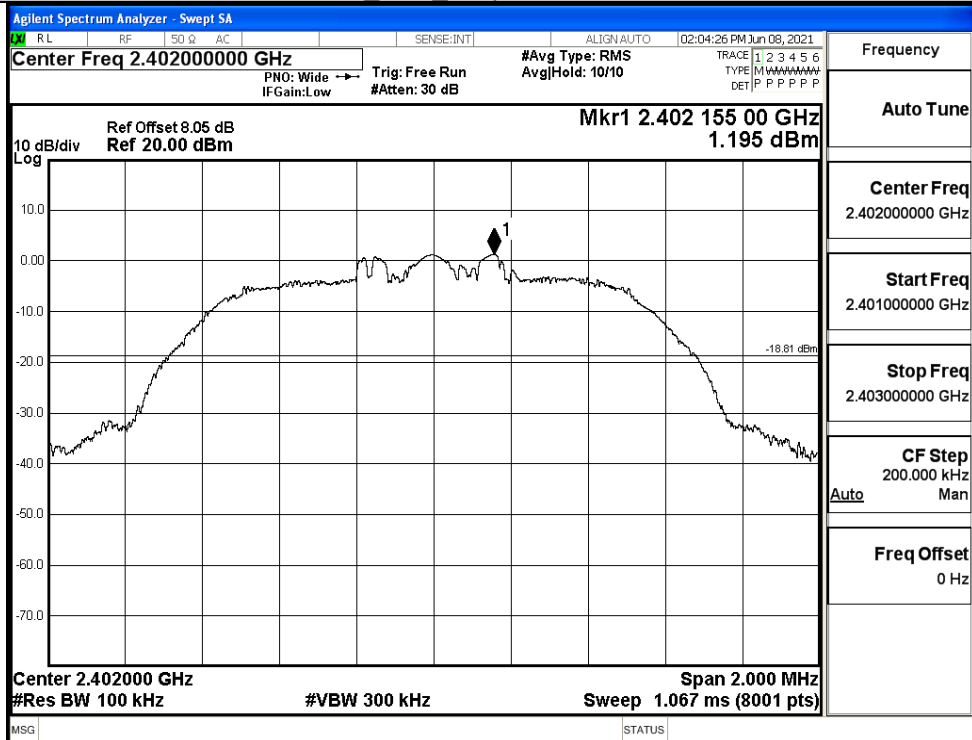


Puw

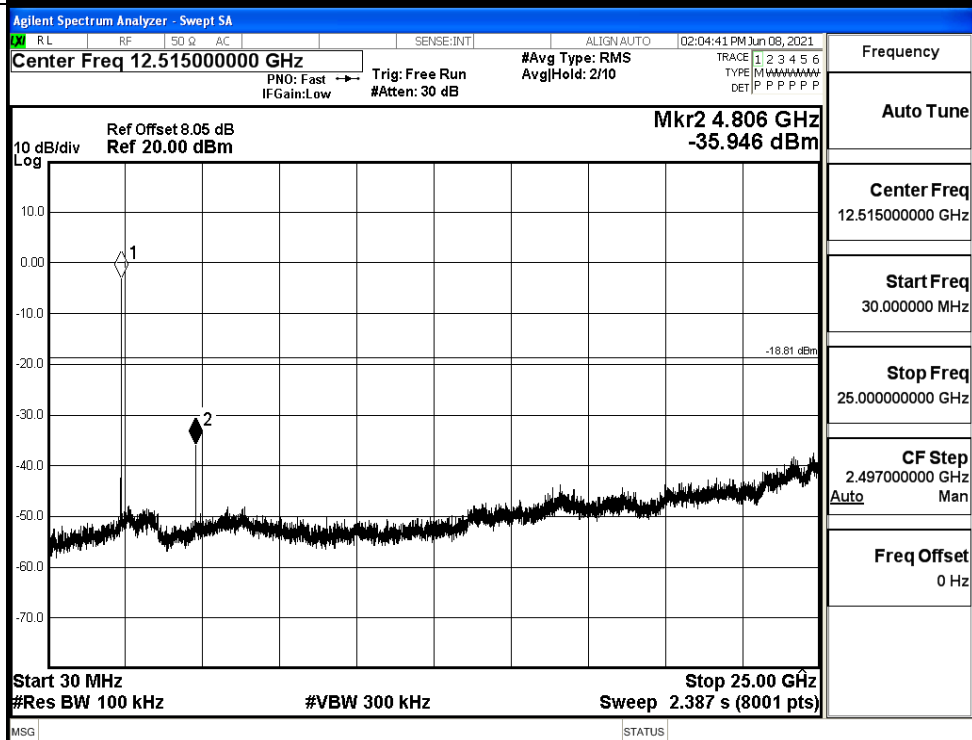


$\pi/4$ DQPSK_LCH_Graphs

Pref

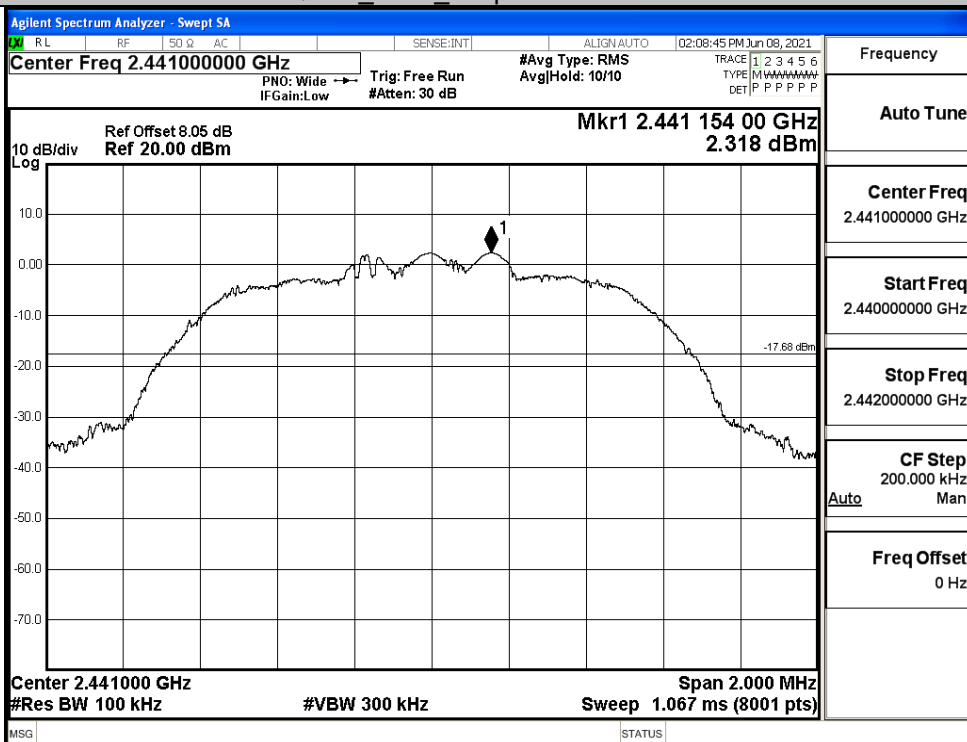


Puw

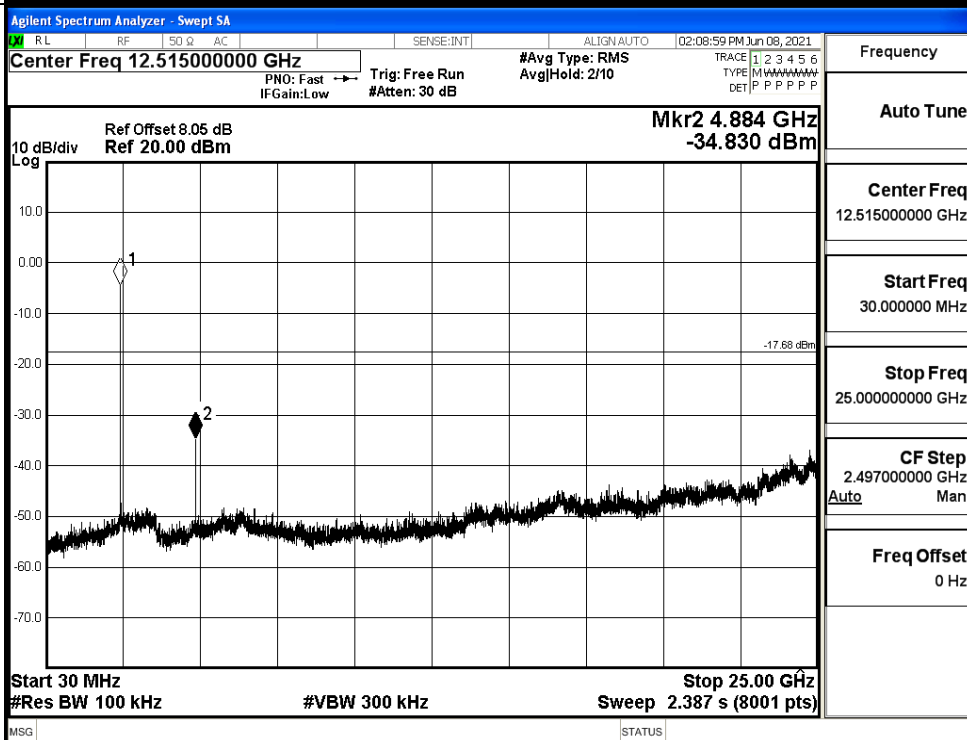


π /4DQPSK_MCH_Graphs

Pref

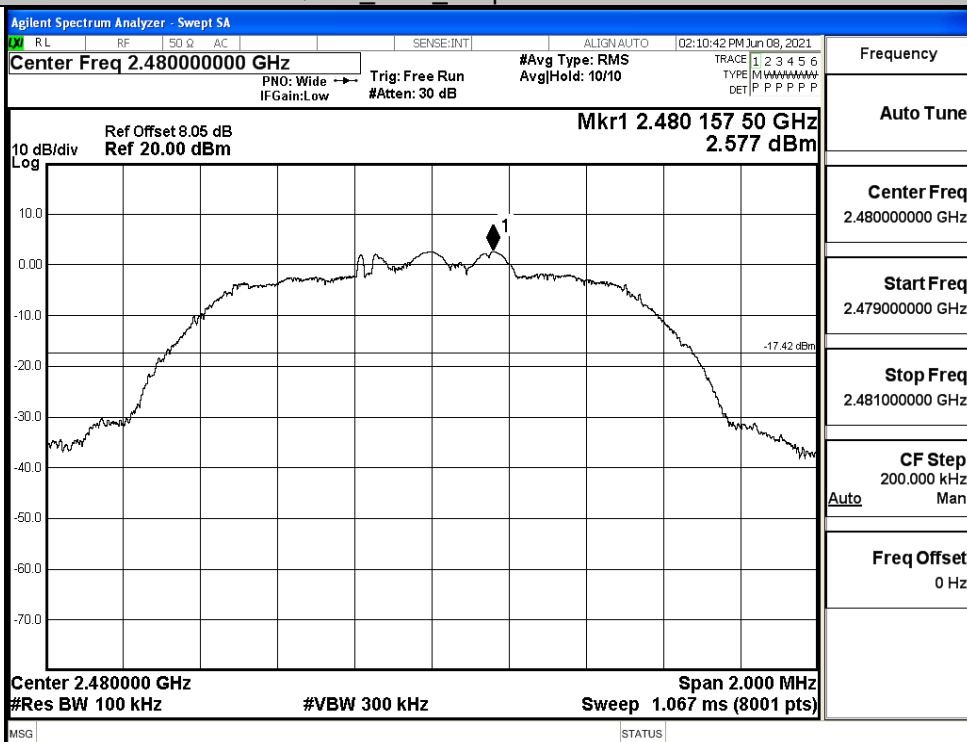


Puw

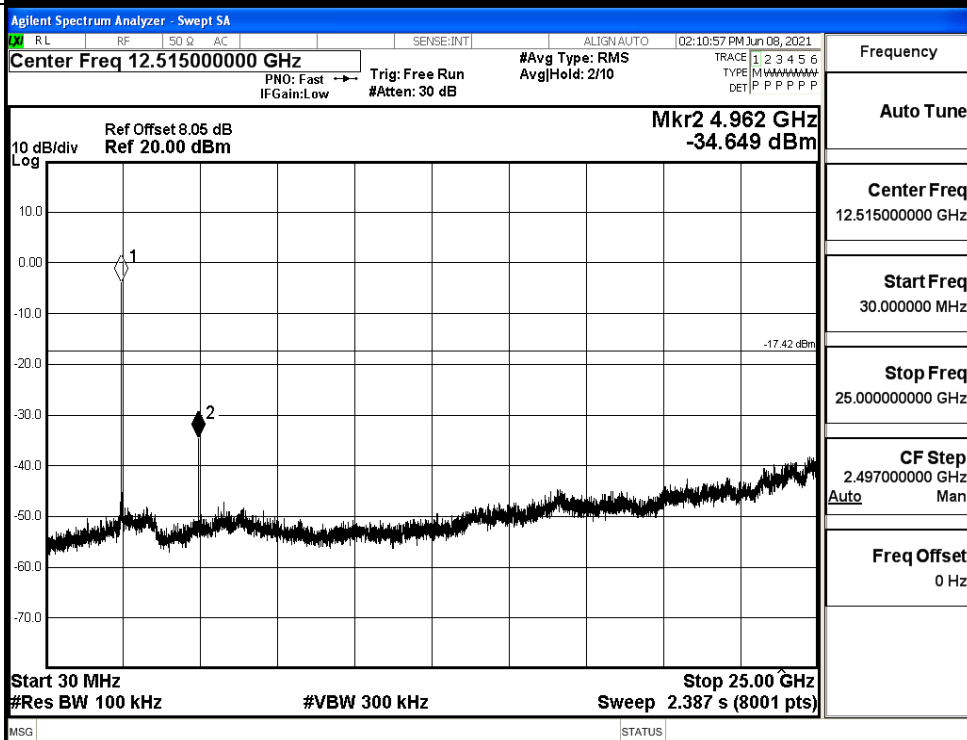


π /4DQPSK_HCH_Graphs

Pref



Puw

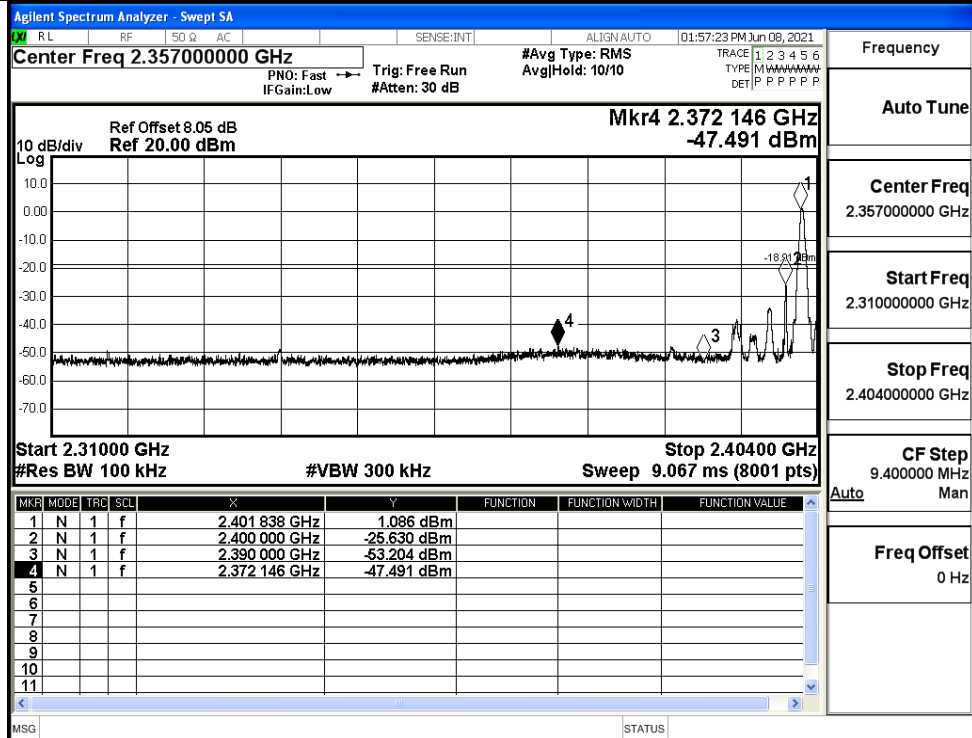


A.7 Band-edge for RF Conducted Emissions

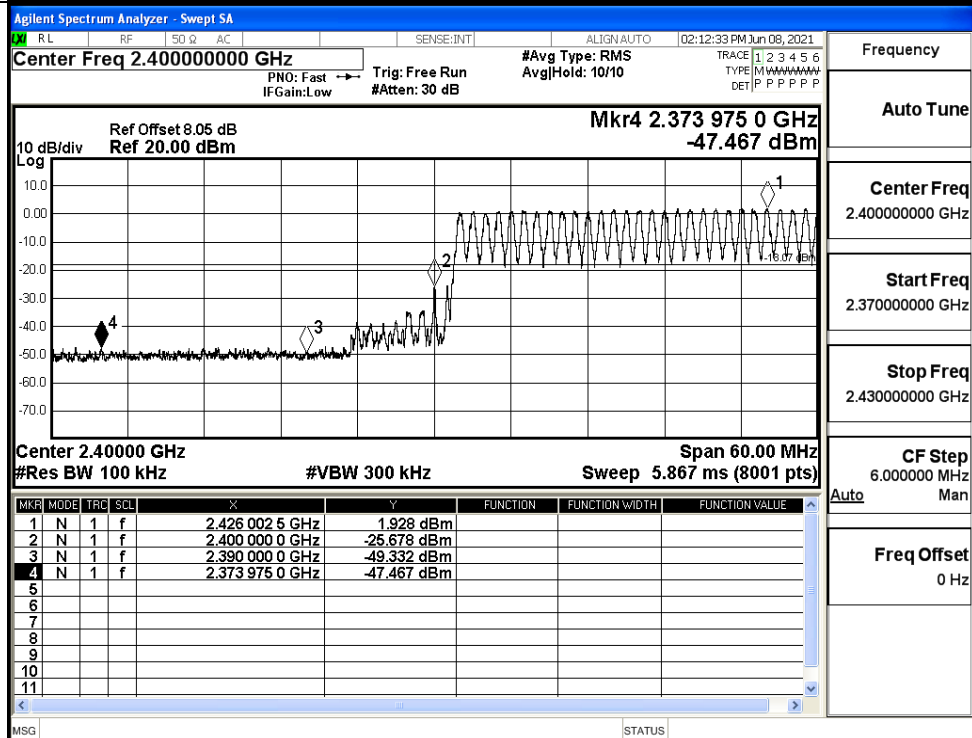
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.086	Off	-47.491	-18.91	PASS
			1.928	On	-47.467	-18.07	PASS
	HCH	2480	2.528	Off	-42.485	-17.47	PASS
			2.690	On	-44.035	-17.31	PASS
$\pi/4$ DQPSK	LCH	2402	1.259	Off	-48.335	-18.74	PASS
			2.169	On	-46.886	-17.83	PASS
	HCH	2480	2.597	Off	-42.560	-17.4	PASS
			2.641	On	-44.161	-17.36	PASS

Test Graphs

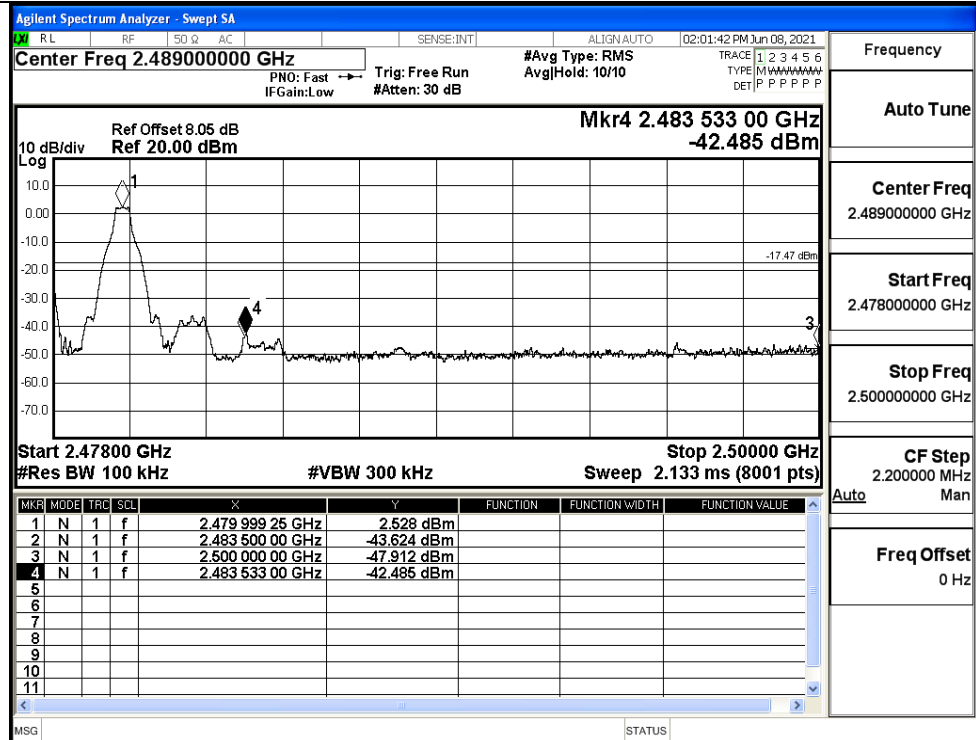
GFSK/LCH/No Hop



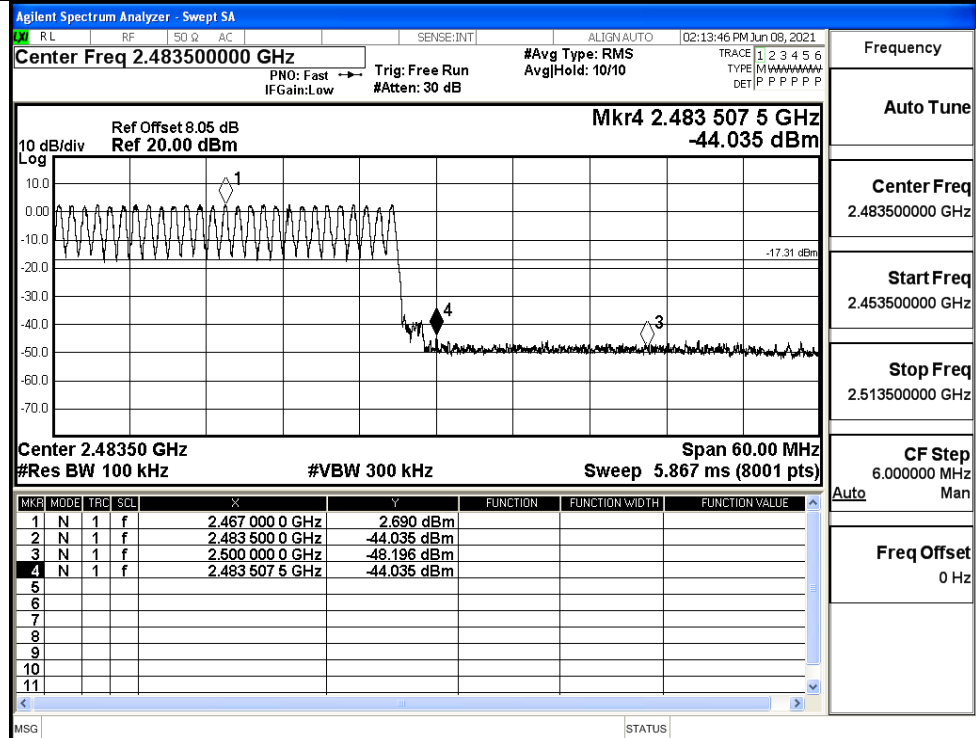
GFSK/LCH/Hop



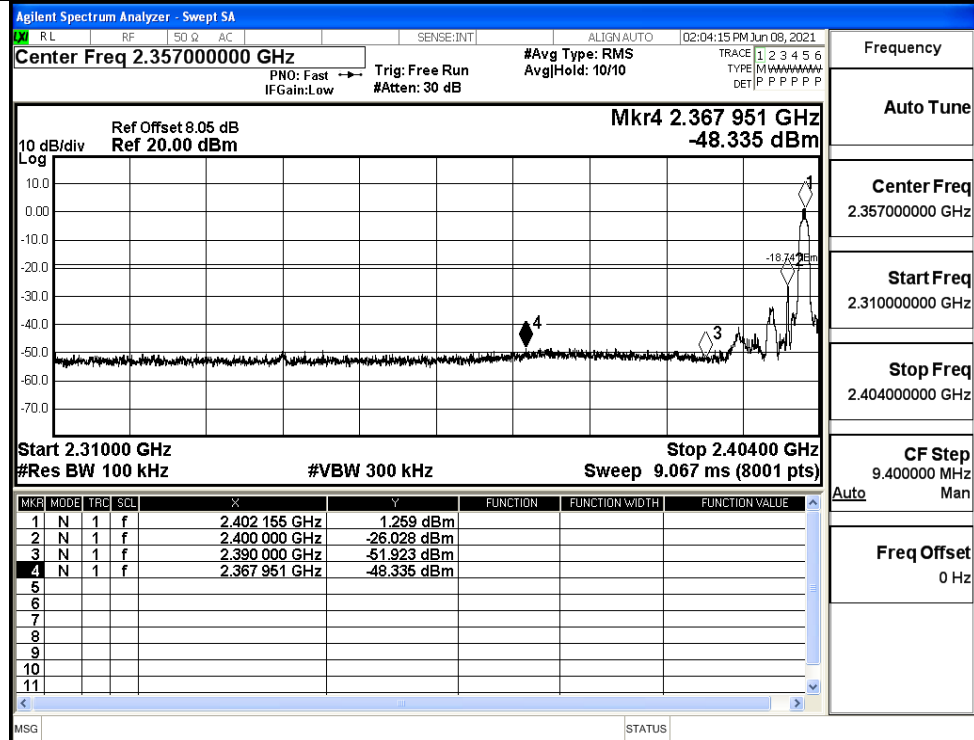
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

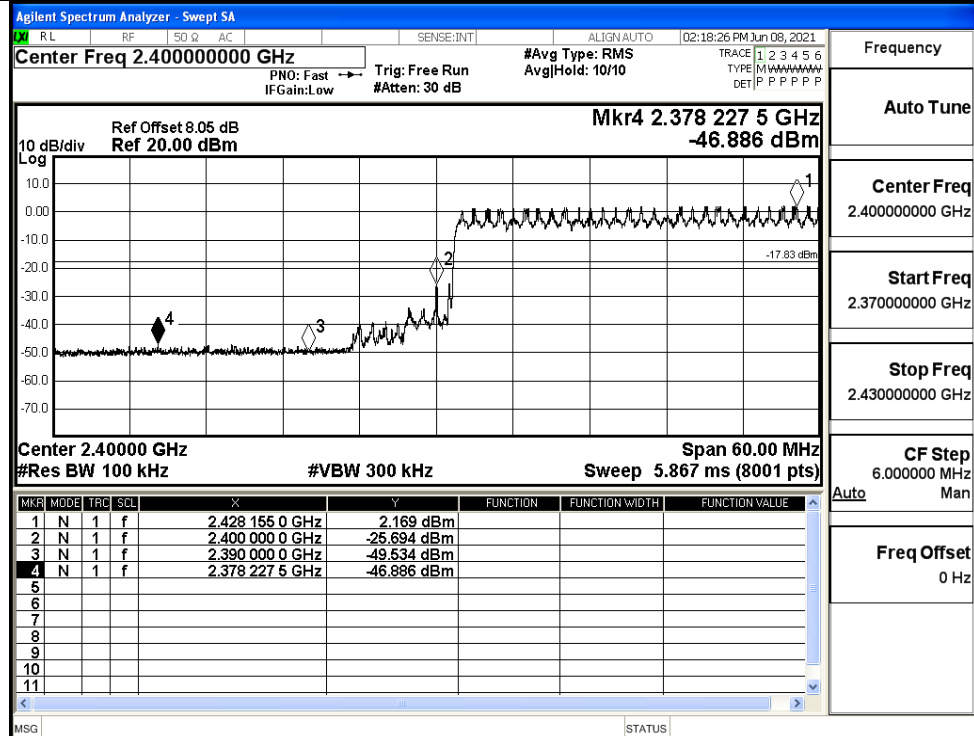
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

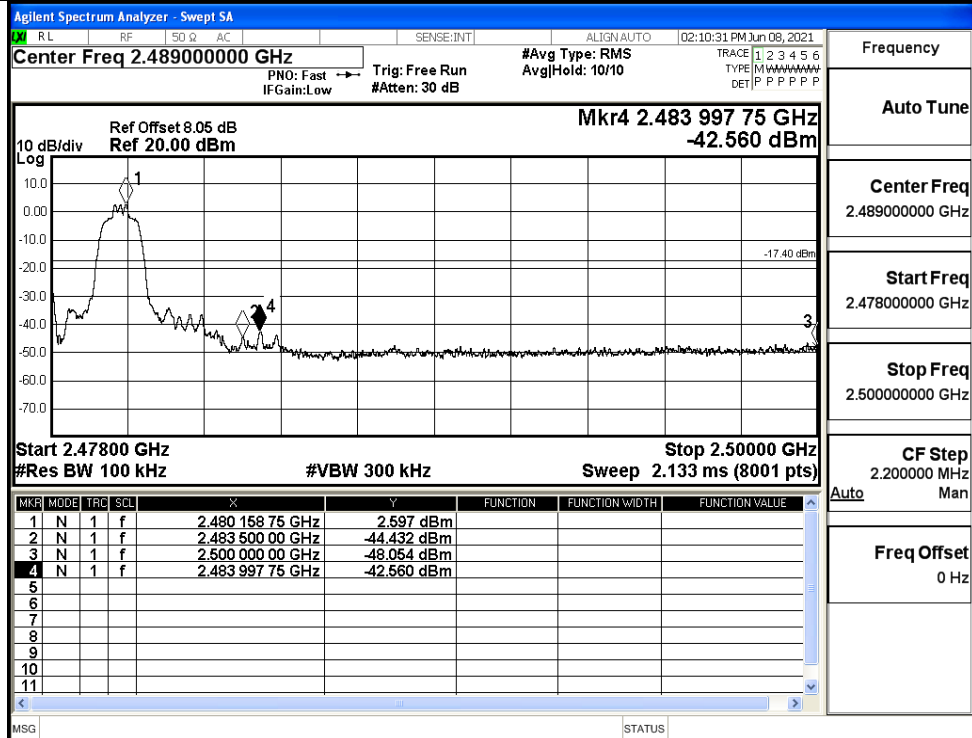
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

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

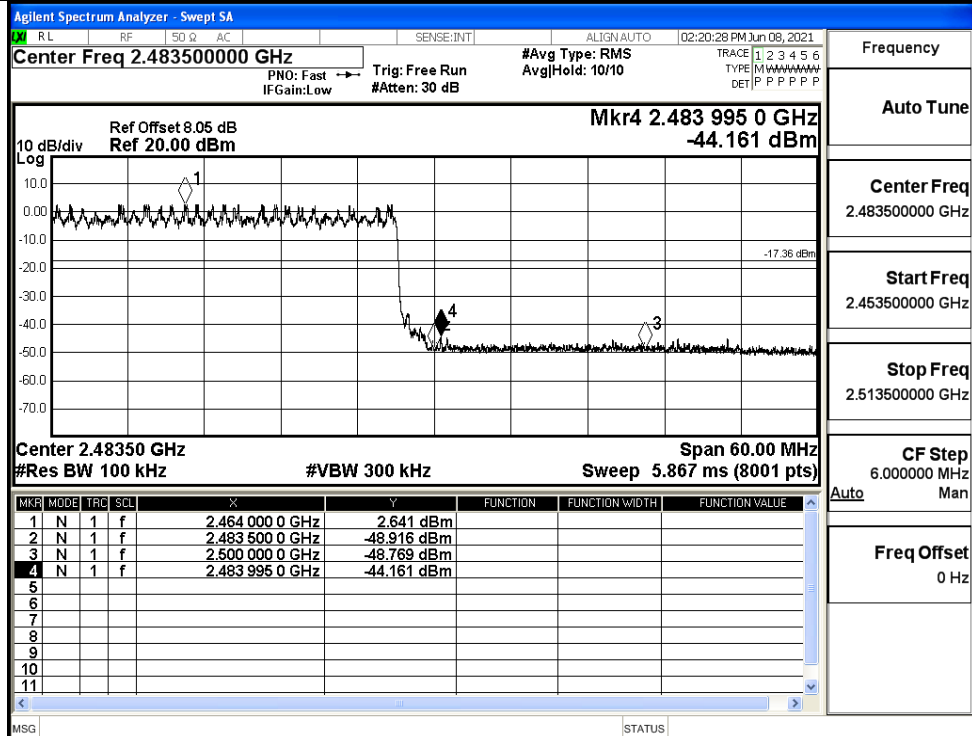


Frequency

Auto Tune

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

$\pi/4$ DQPSK/HCH/Hop



Frequency

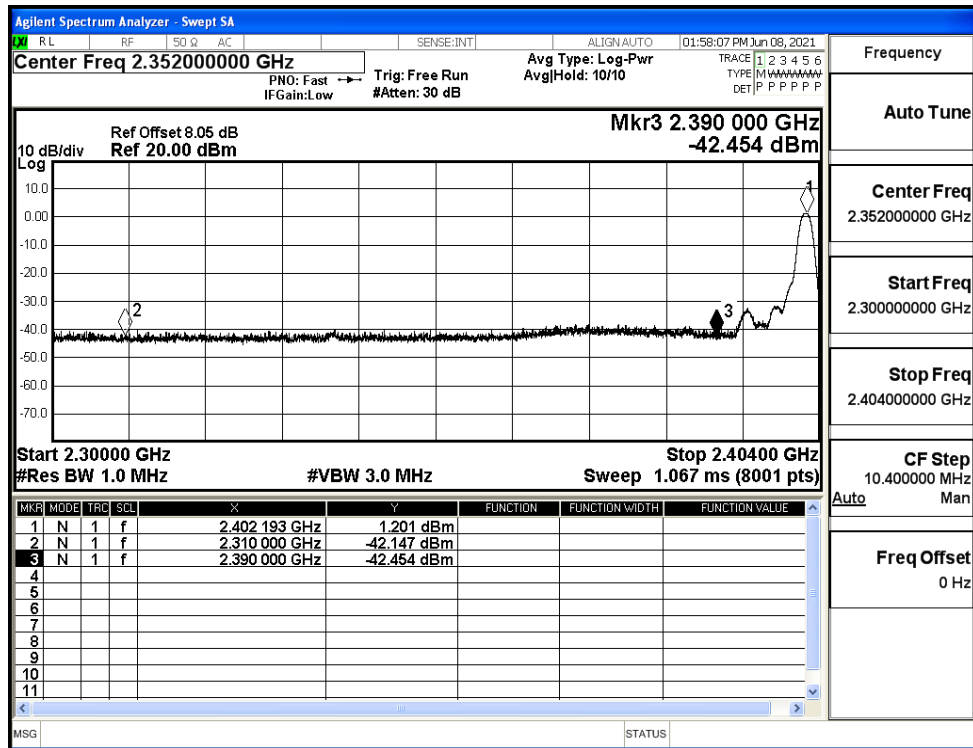
Auto Tune

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

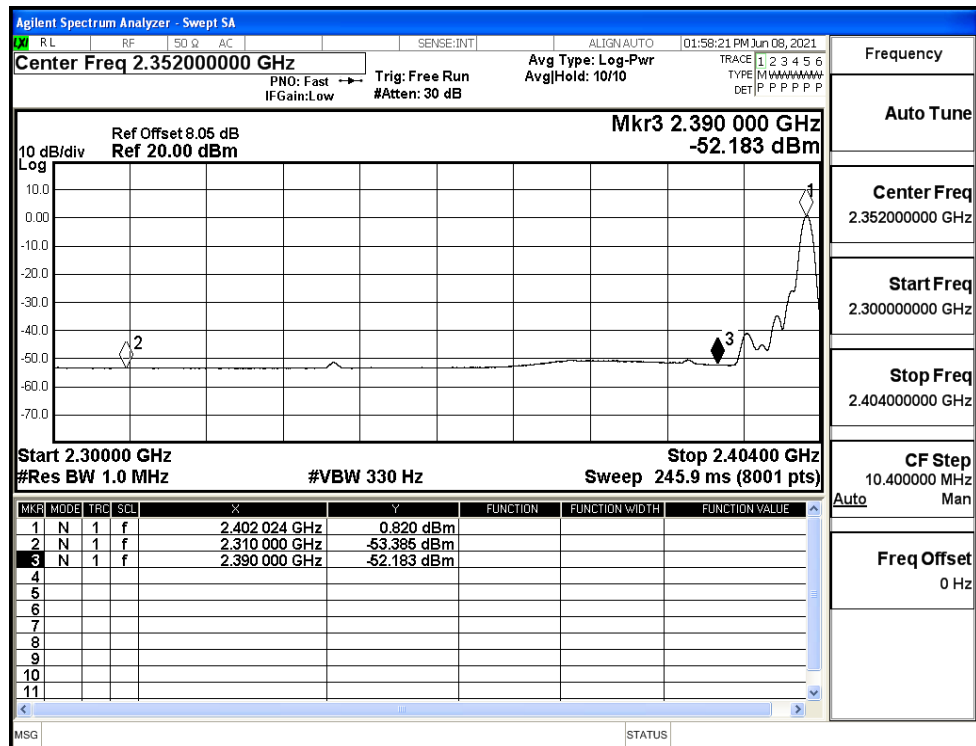
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.15	2.0	0	53.11	PEAK	74	PASS
	Off	2310.0	-53.39	2.0	0	41.87	AV	54	PASS
	Off	2390.0	-42.45	2.0	0	52.80	PEAK	74	PASS
	Off	2390.0	-52.18	2.0	0	43.07	AV	54	PASS
	Off	2483.5	-37.59	2.0	0	57.67	PEAK	74	PASS
	Off	2483.5	-46.32	2.0	0	48.94	AV	54	PASS
	Off	2500.0	-39.79	2.0	0	55.47	PEAK	74	PASS
	Off	2500.0	-49.25	2.0	0	46.00	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.17	2.0	0	52.09	PEAK	74	PASS
	Off	2310.0	-53.37	2.0	0	41.89	AV	54	PASS
	Off	2390.0	-41.24	2.0	0	54.02	PEAK	74	PASS
	Off	2390.0	-52.19	2.0	0	43.07	AV	54	PASS
	Off	2483.5	-39.00	2.0	0	56.26	PEAK	74	PASS
	Off	2483.5	-47.43	2.0	0	47.83	AV	54	PASS
	Off	2500.0	-39.13	2.0	0	56.13	PEAK	74	PASS
	Off	2500.0	-49.62	2.0	0	45.63	AV	54	PASS

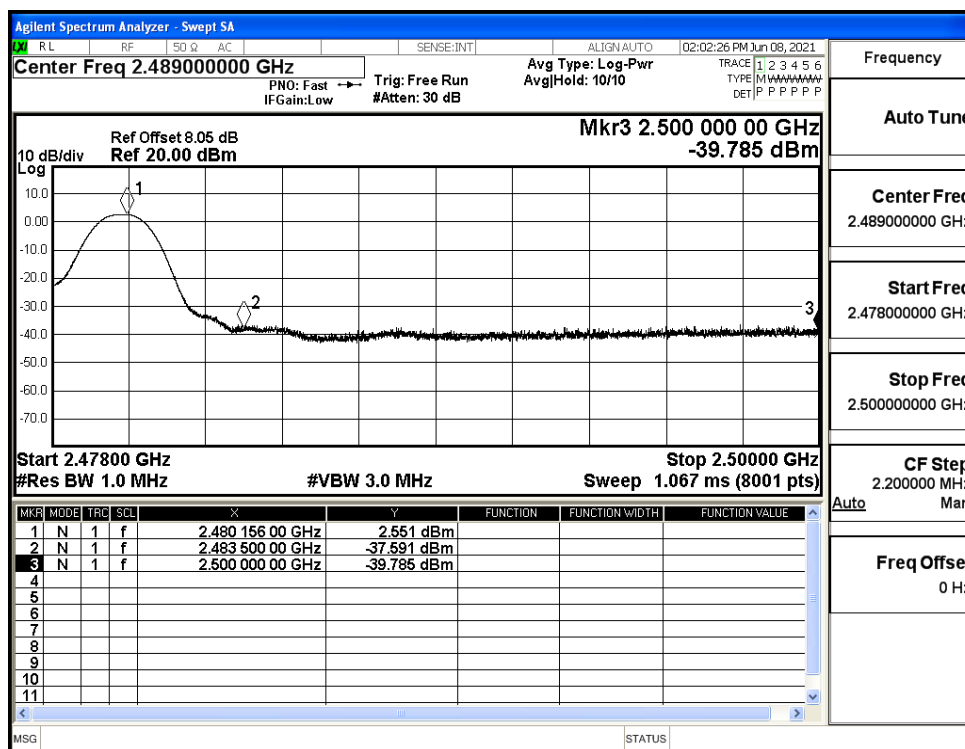
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



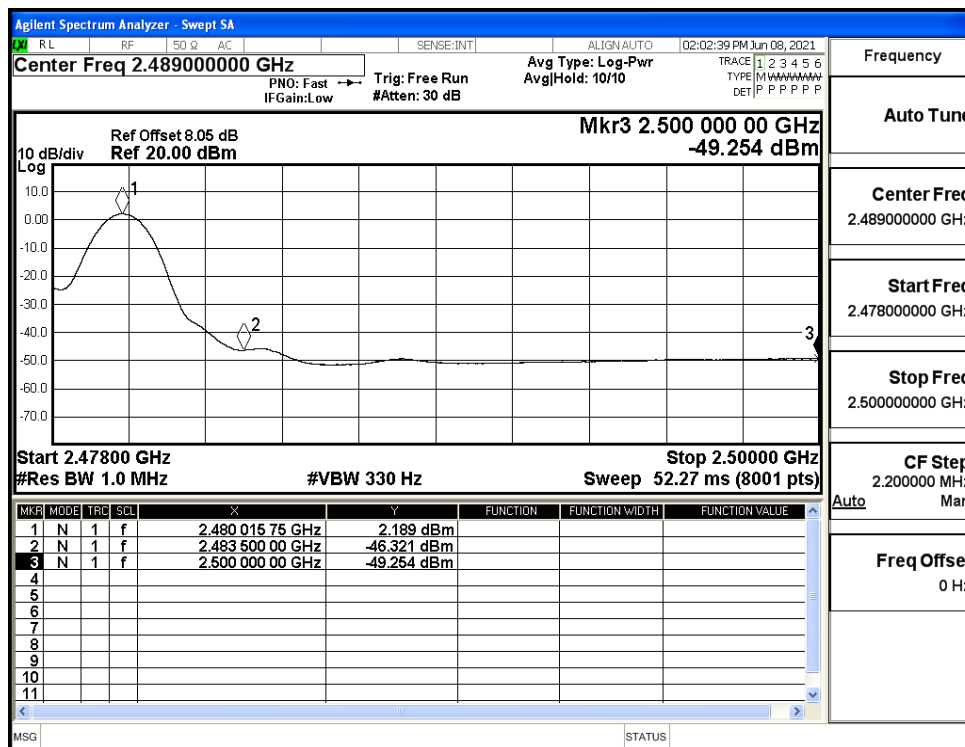
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

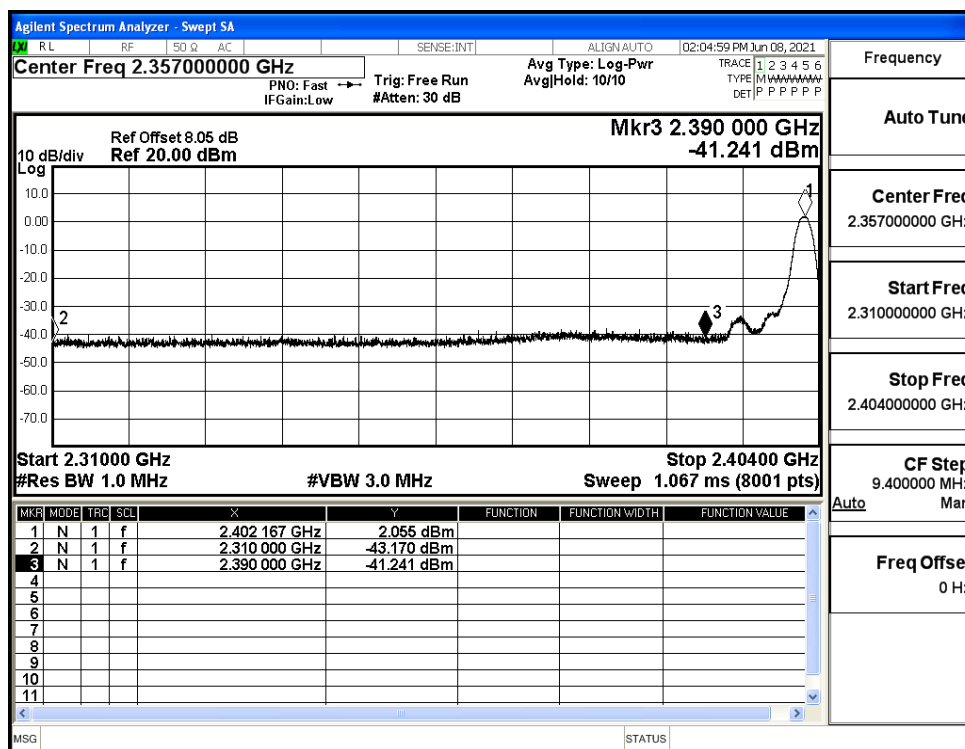
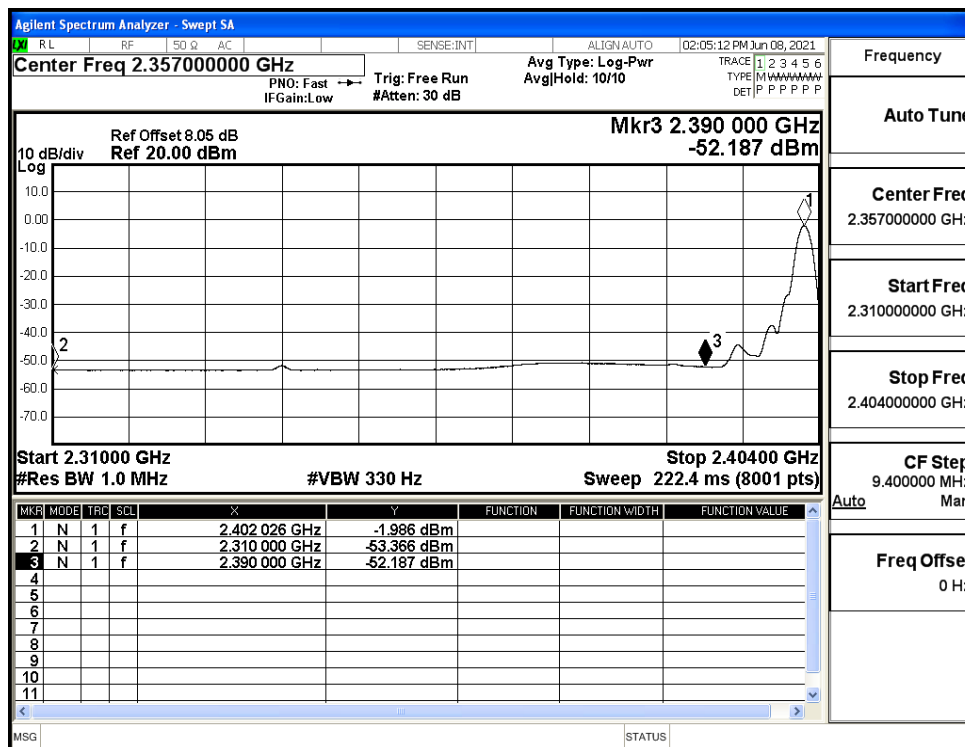


Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)

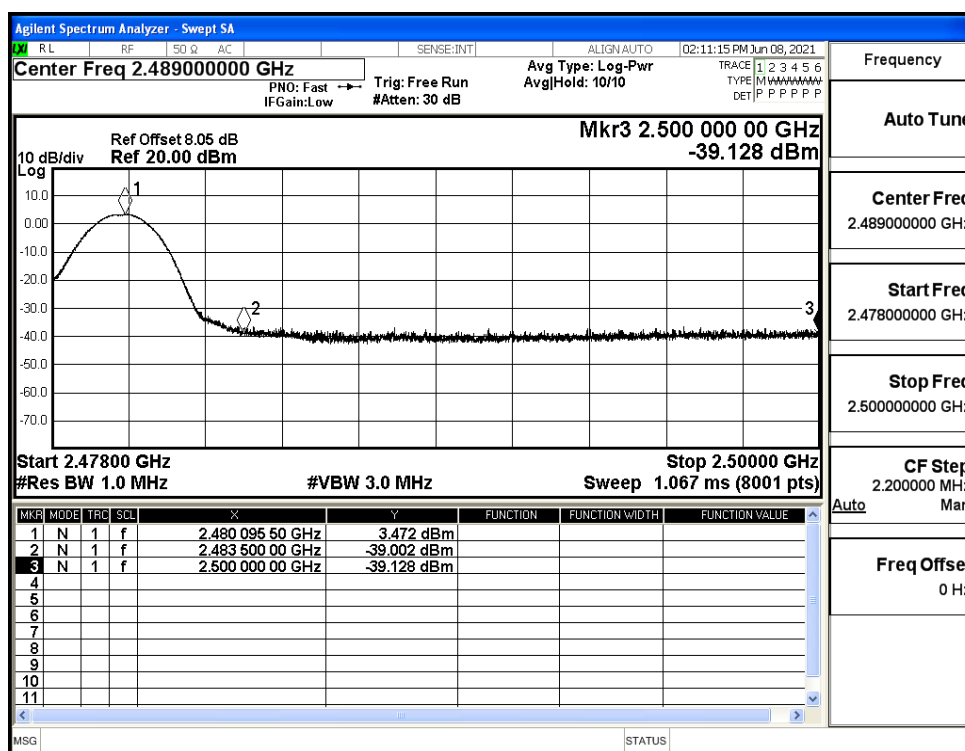


Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



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_π/4-DQPSK_PEAK (High Channel)



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

