



Appendix A

RF Test Data for BT V5.0(DSS) (Conducted Measurement)

Product Name: Ellis Bluetooth® Headphones

Trade Mark: Gemline

Test Model: 101127-001B

Environmental Conditions

Temperature:	21.6 ° C
Relative Humidity:	52.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Ken He
Supervised by:	Li Huan

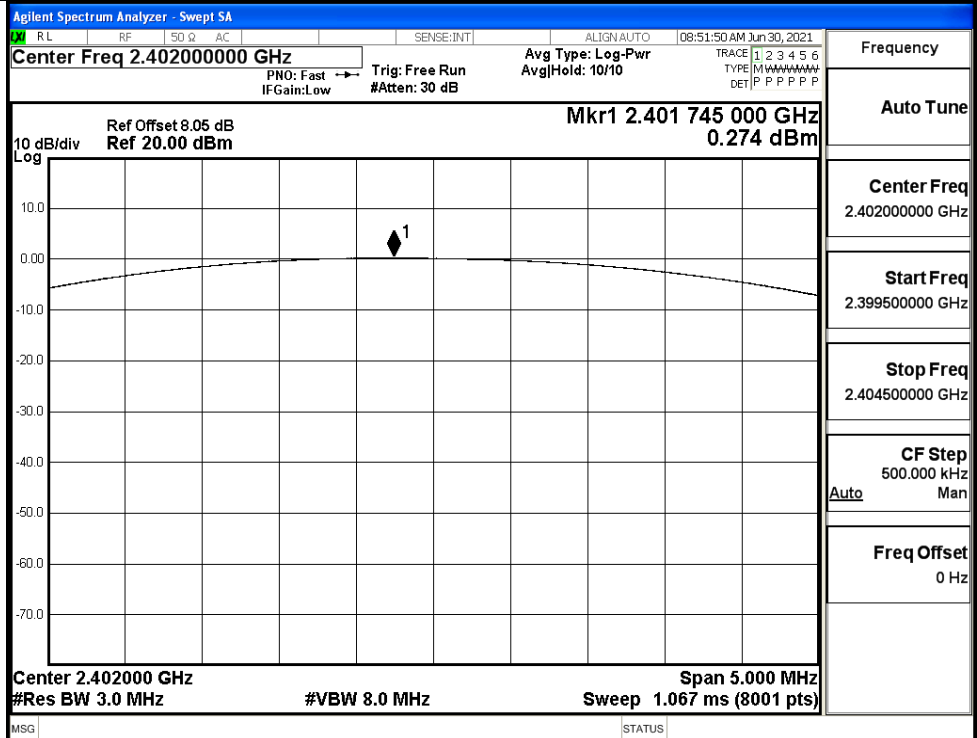
A.1 Maximum Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.274	21	PASS
	MCH	0.545	21	PASS
	HCH	0.278	21	PASS
$\pi/4$ DQPSK	LCH	0.937	21	PASS
	MCH	1.153	21	PASS
	HCH	0.927	21	PASS

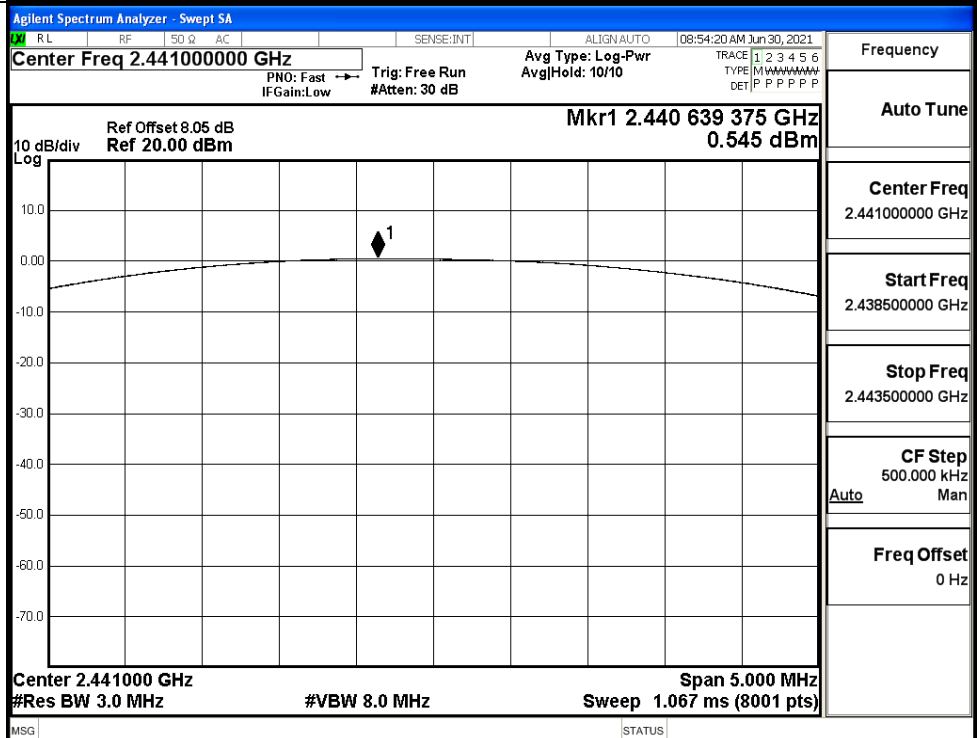


Test Graphs

GFSK/LCH

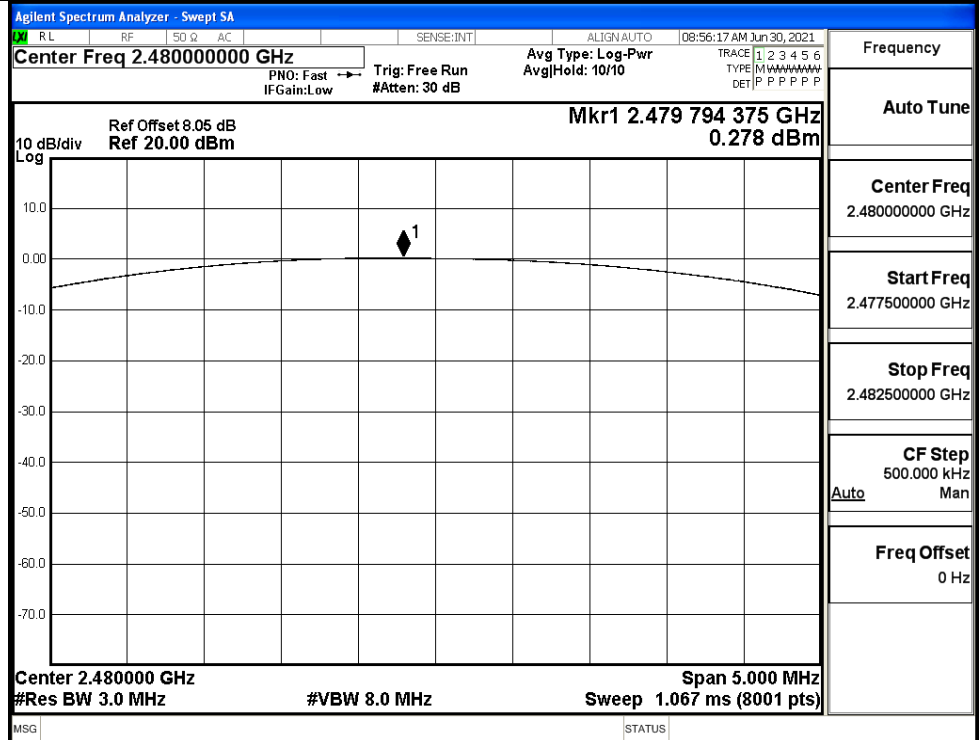
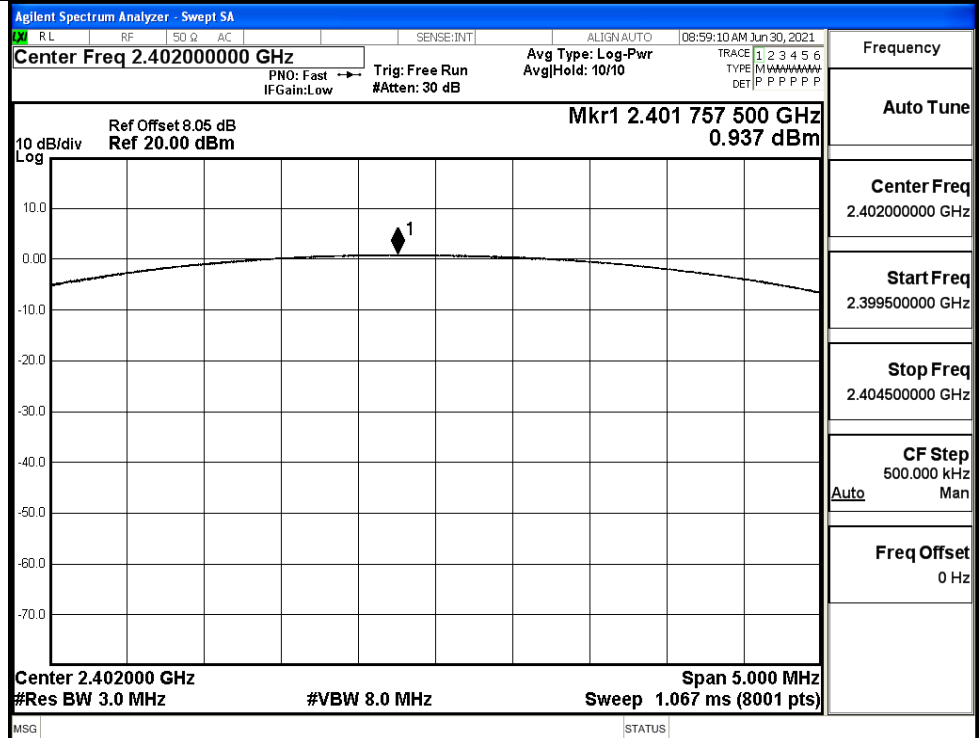


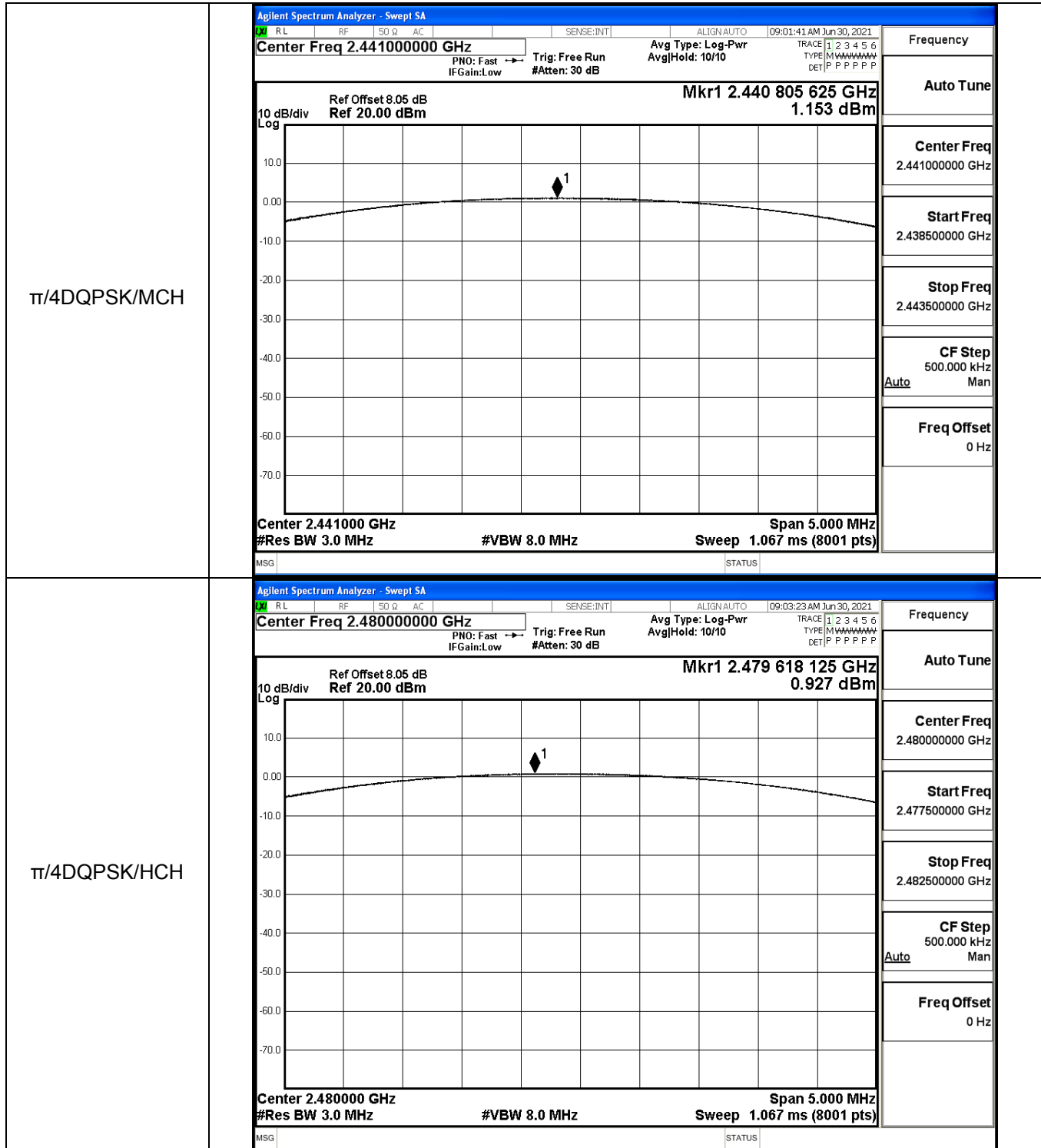
GFSK/MCH





GFSK/HCH

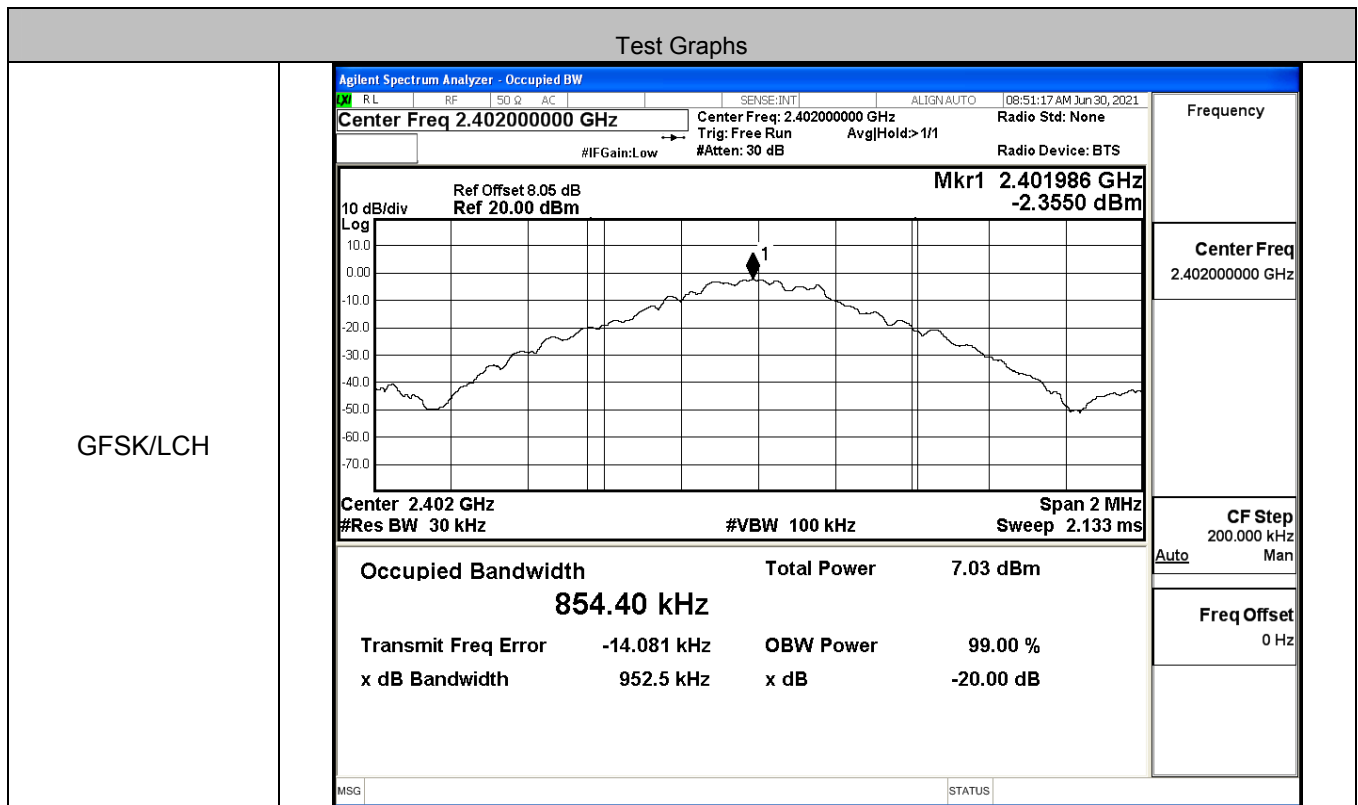
 $\pi/4$ DQPSK/LCH





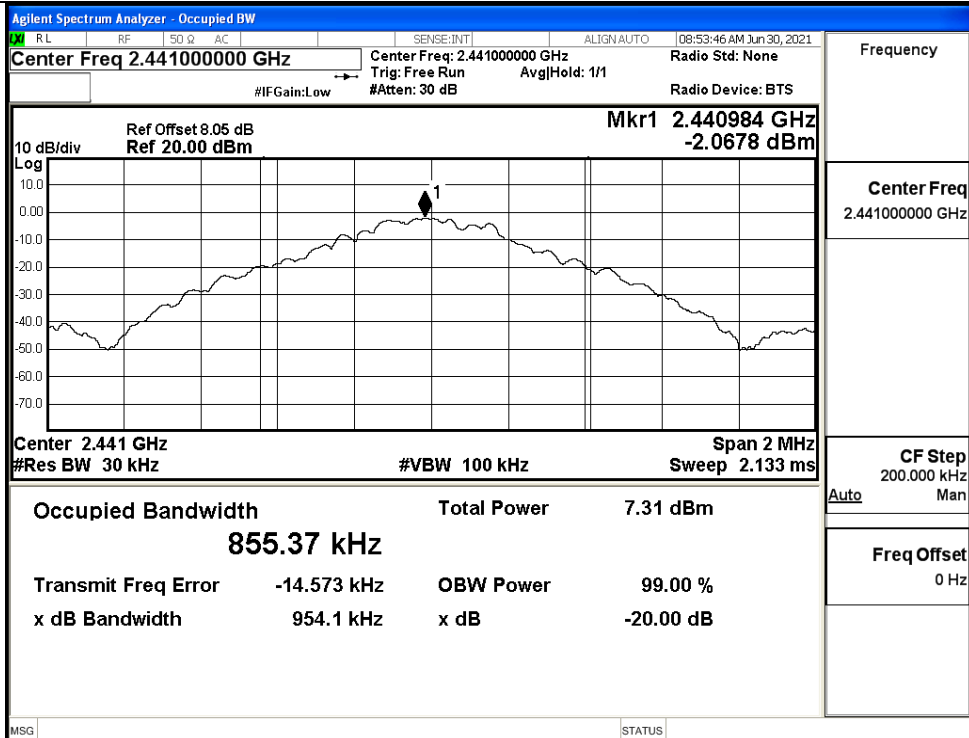
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9525	Not Specified	PASS
	MCH	0.9541	Not Specified	PASS
	HCH	0.9535	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.315	Not Specified	PASS
	MCH	1.316	Not Specified	PASS
	HCH	1.315	Not Specified	PASS

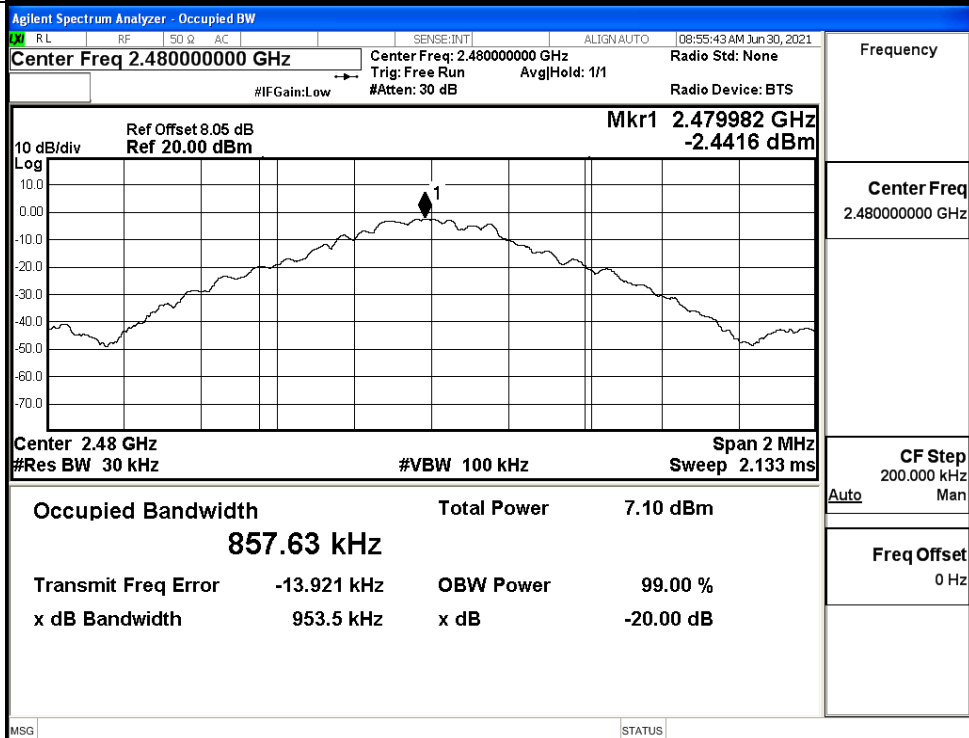


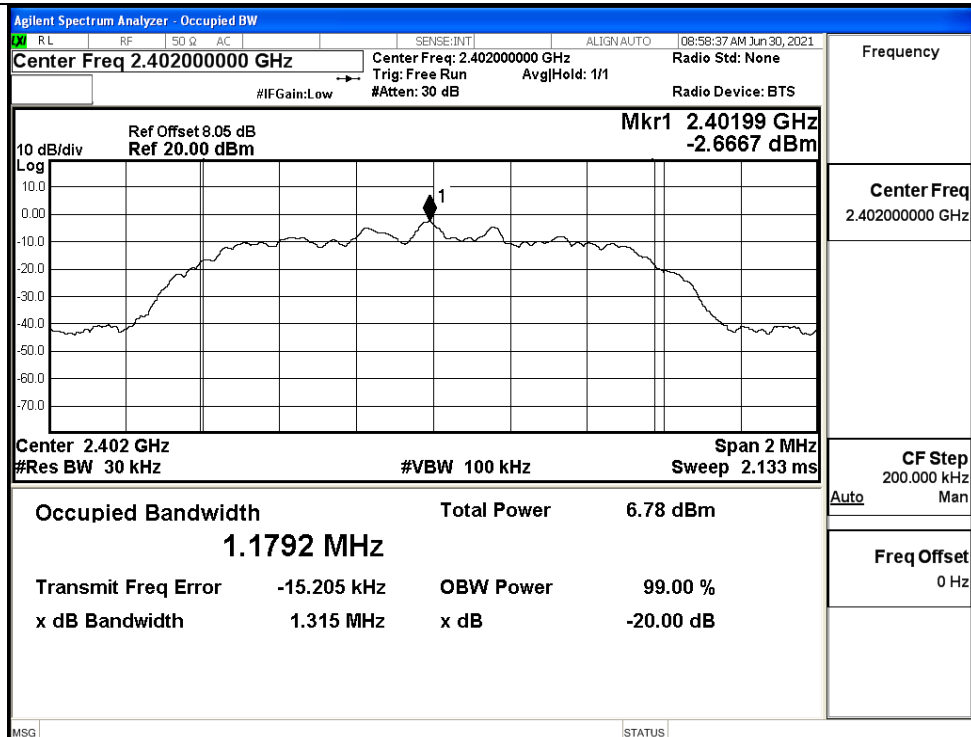
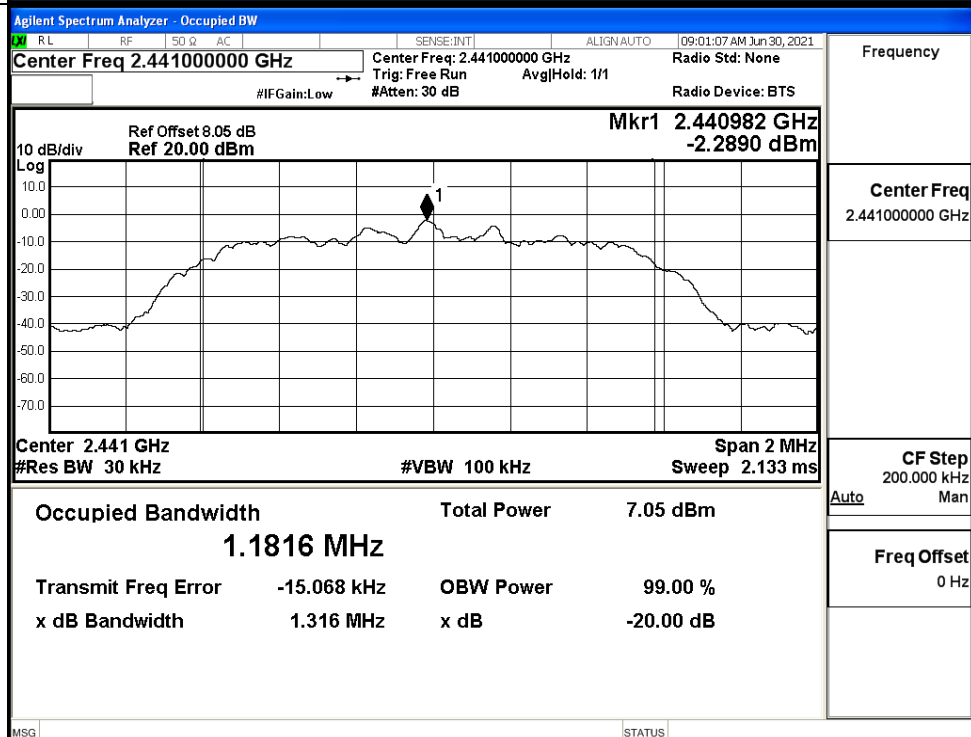


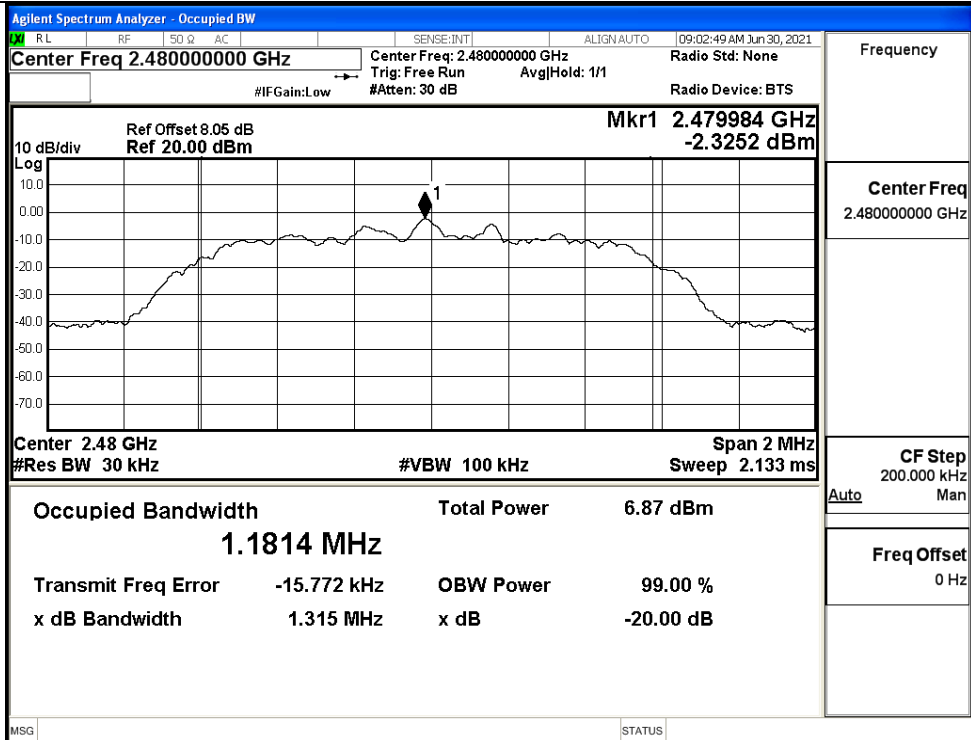
GFSK/MCH



GFSK/HCH



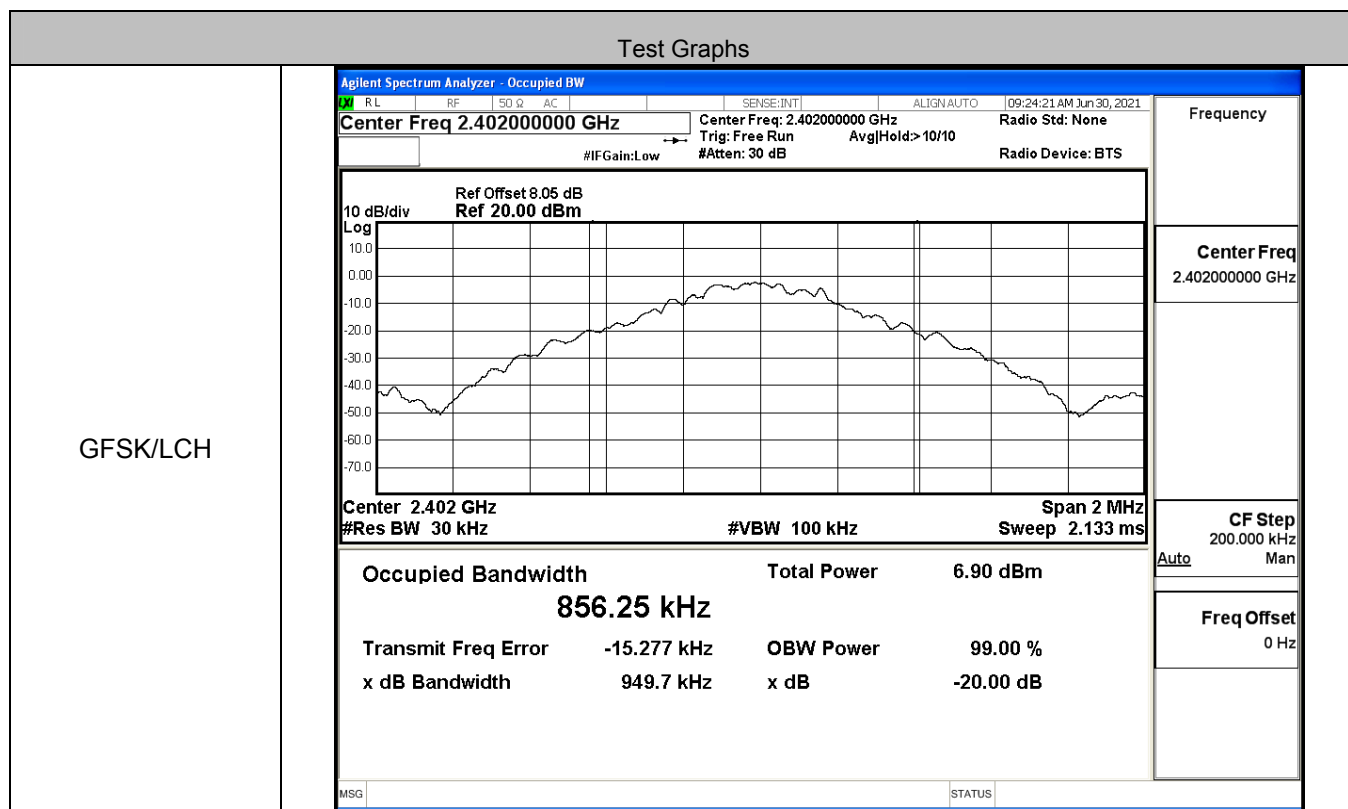
 $\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

 $\pi/4$ DQPSK/HCH



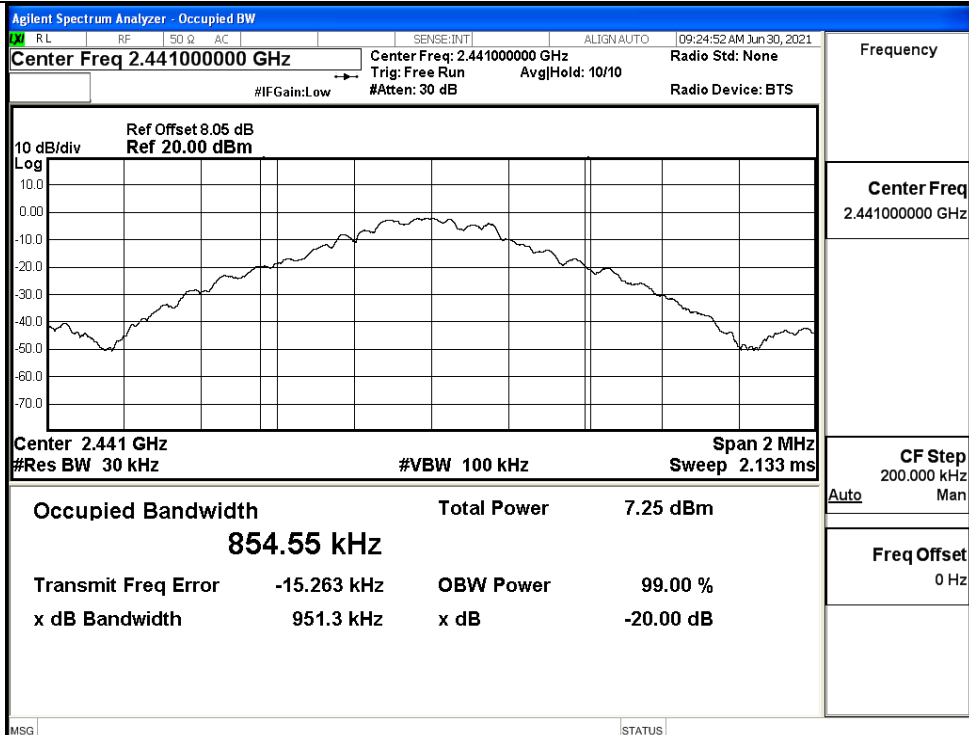
A.2 Occupied Bandwidth

Mode	Channel.	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.85625	Not Specified	PASS
	MCH	0.85455	Not Specified	PASS
	HCH	0.85541	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.1789	Not Specified	PASS
	MCH	1.1793	Not Specified	PASS
	HCH	1.1838	Not Specified	PASS

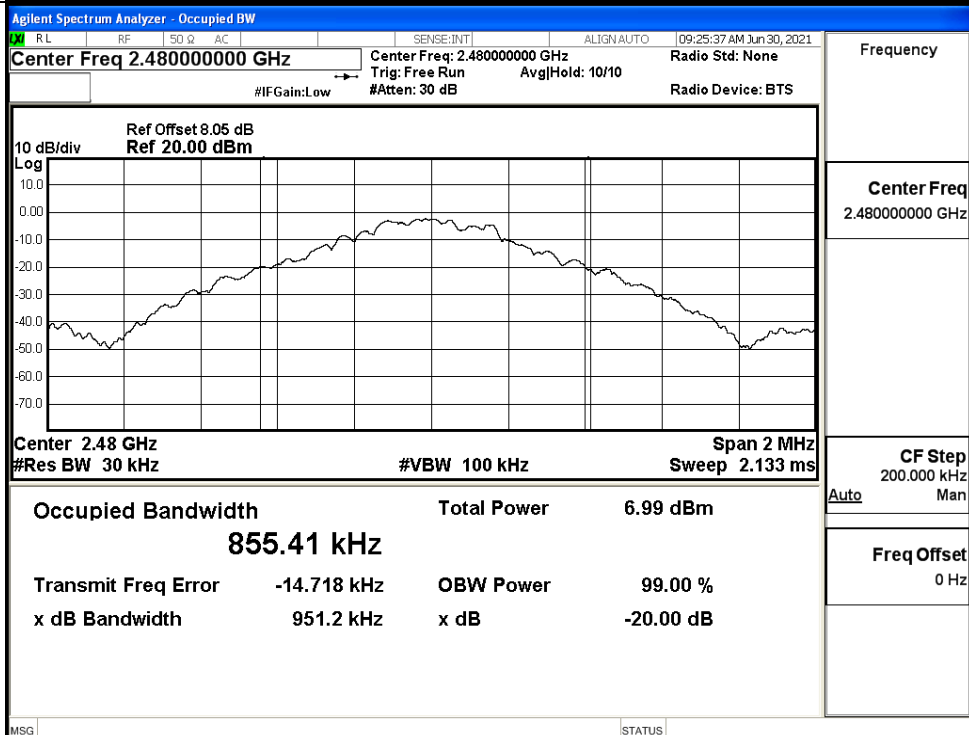


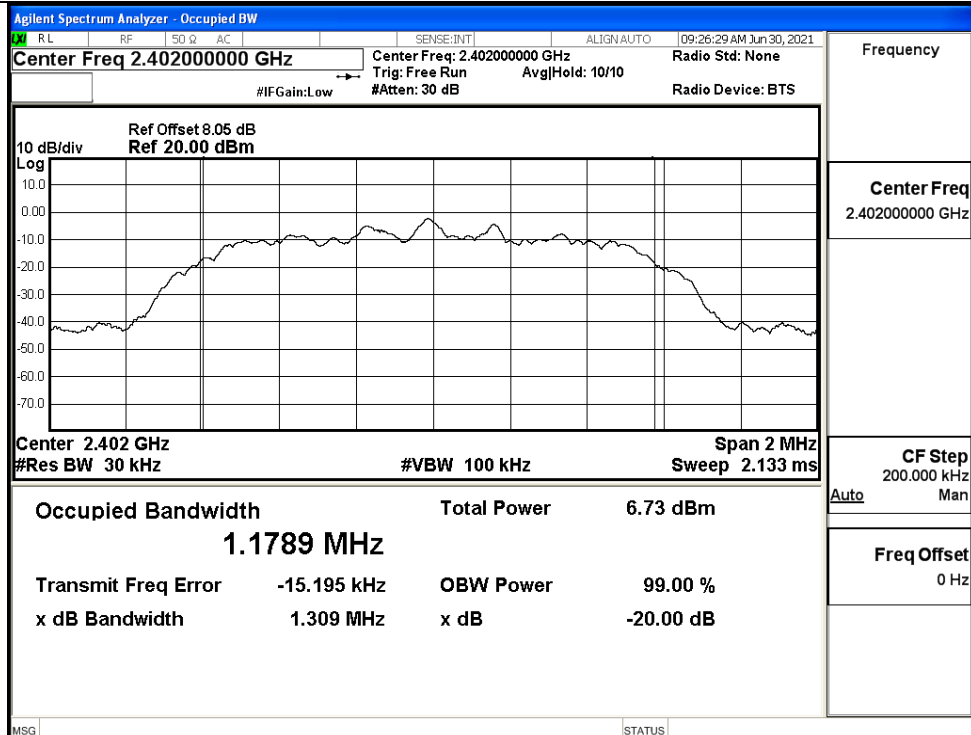
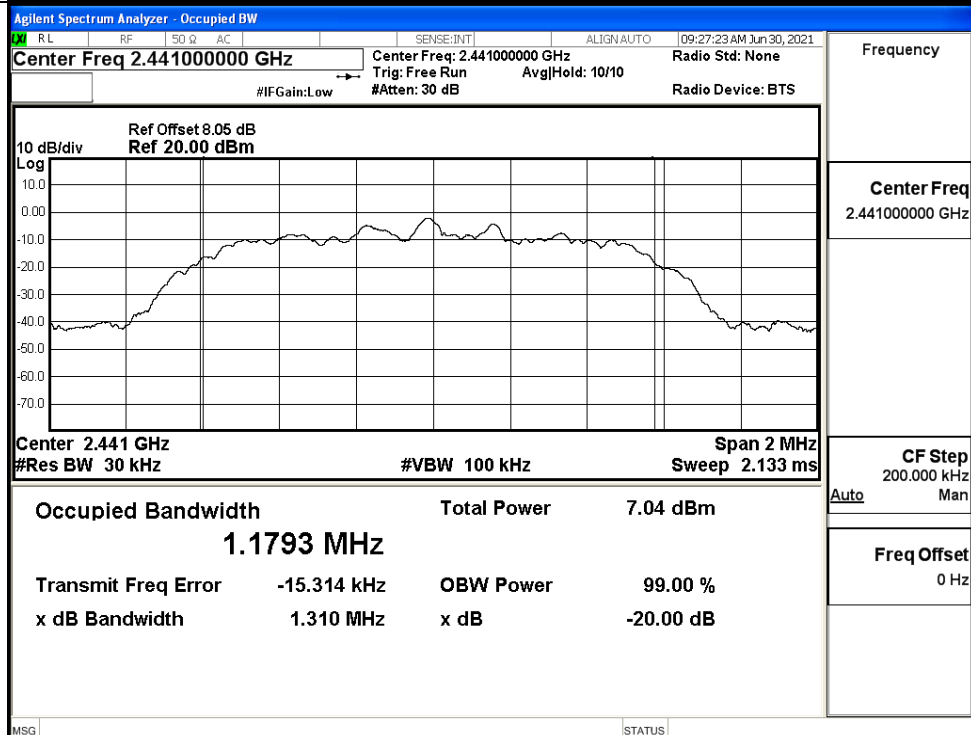


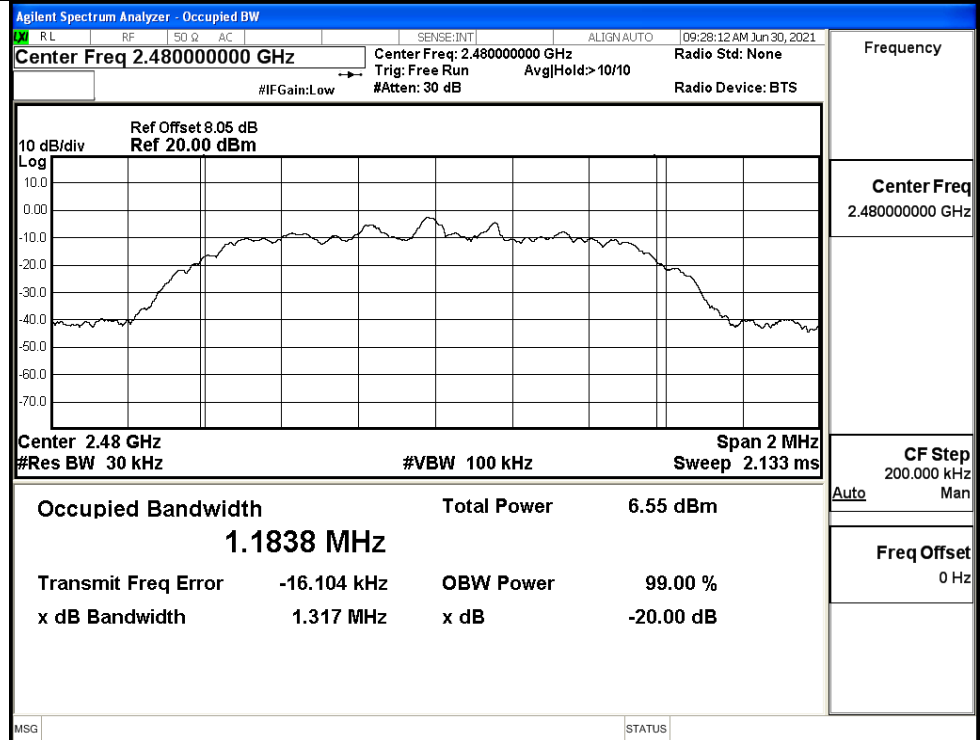
GFSK/MCH



GFSK/HCH



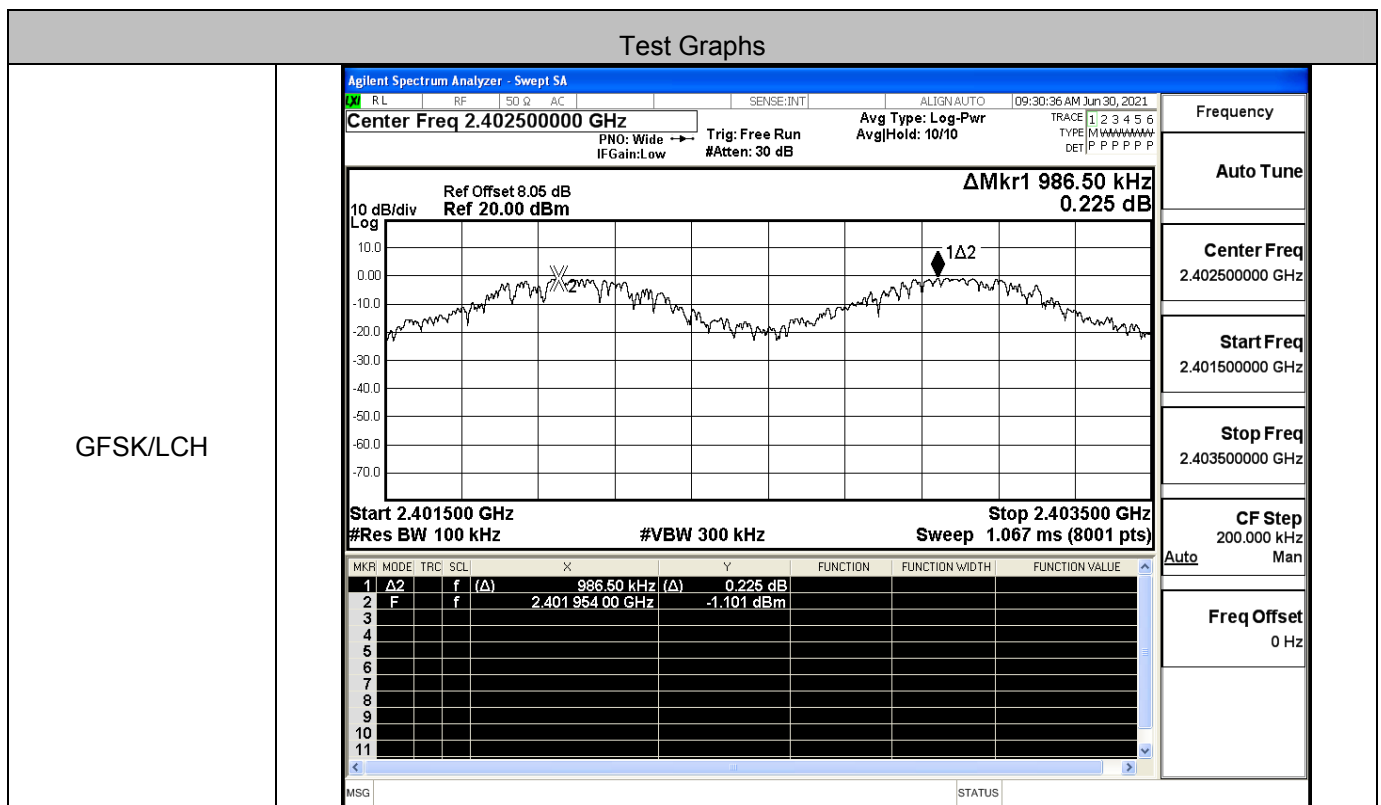
 $\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

 $\pi/4$ DQPSK/HCH



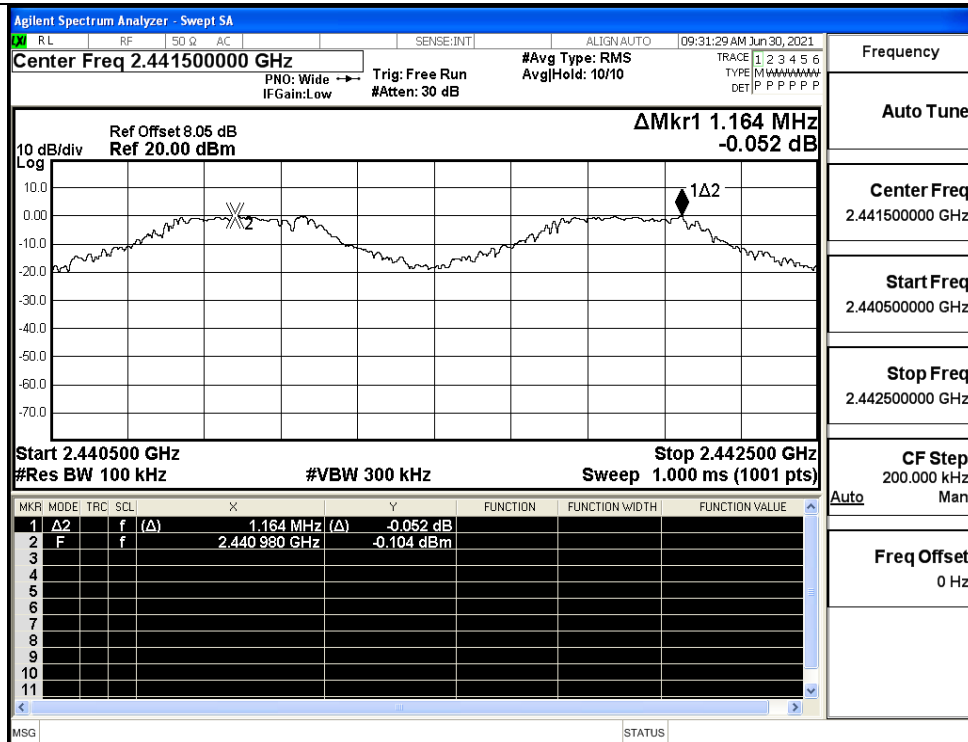
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.986	0.636	PASS
	MCH	1.164	0.636	PASS
	HCH	0.946	0.636	PASS
$\pi/4$ DQPSK	LCH	1.122	0.877	PASS
	MCH	0.966	0.877	PASS
	HCH	1.164	0.877	PASS

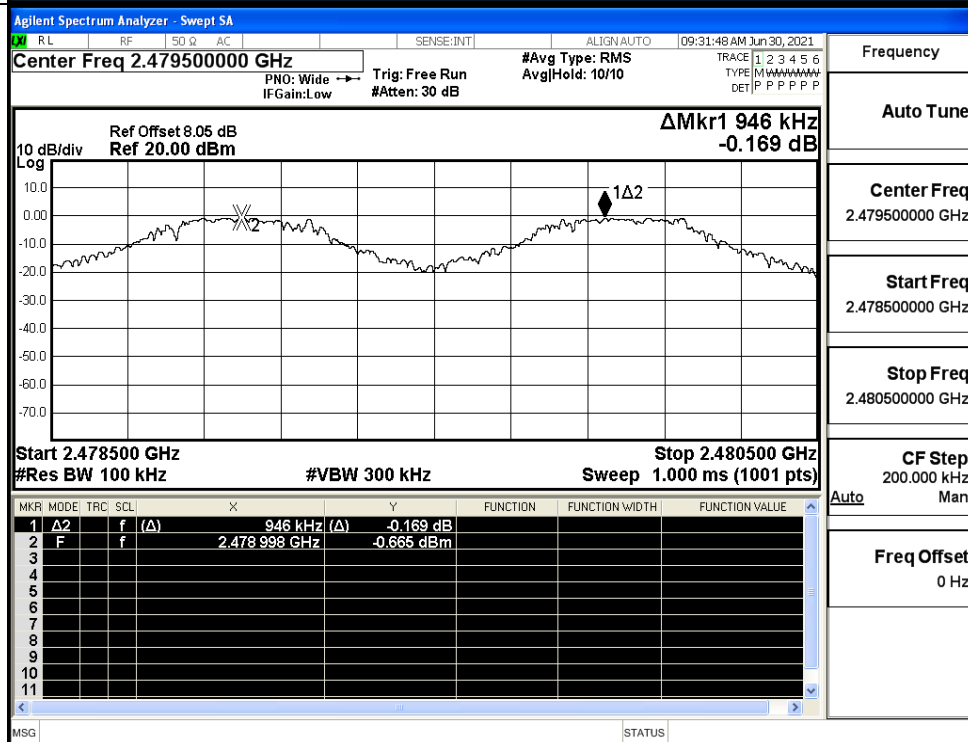


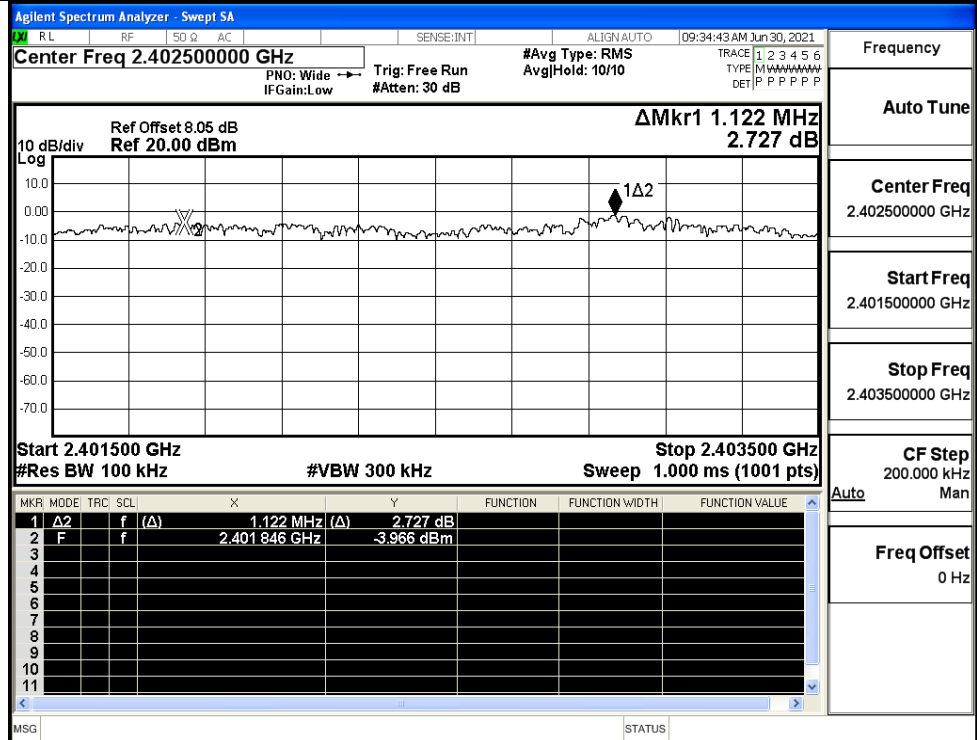
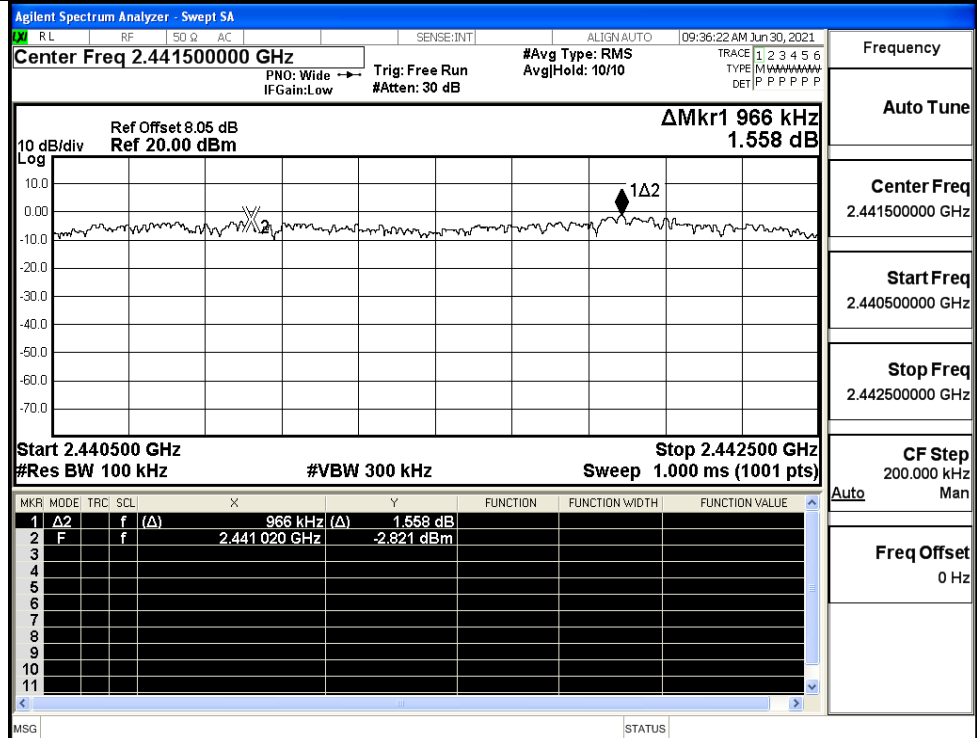


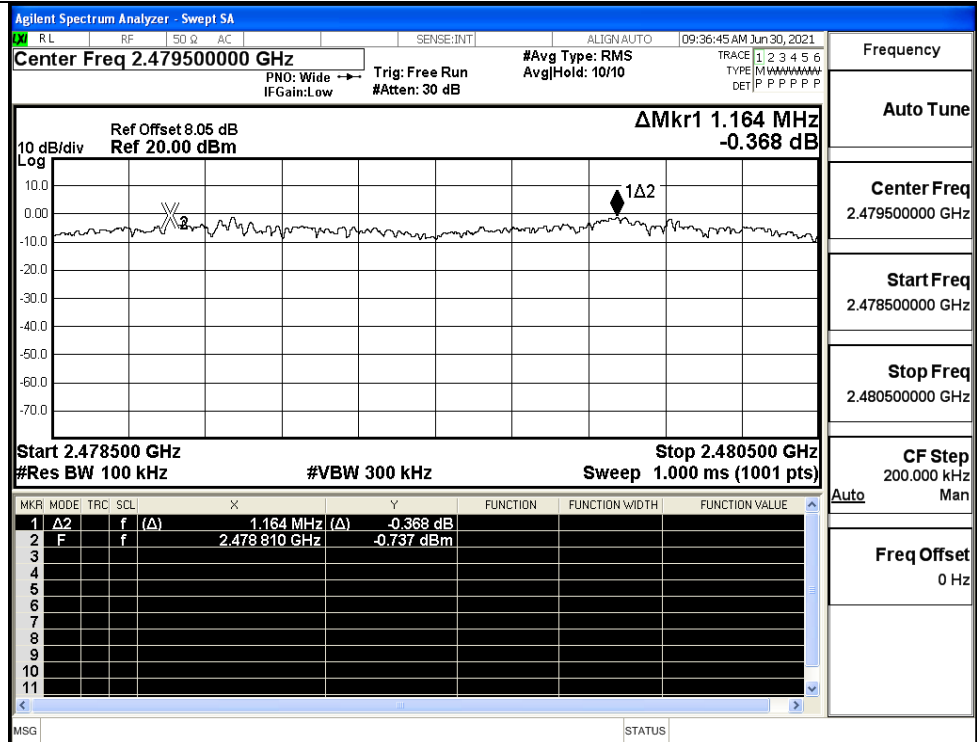
GFSK/MCH



GFSK/HCH



 π /4DQPSK/LCH π /4DQPSK/MCH

 $\pi/4$ DQPSK/HCH

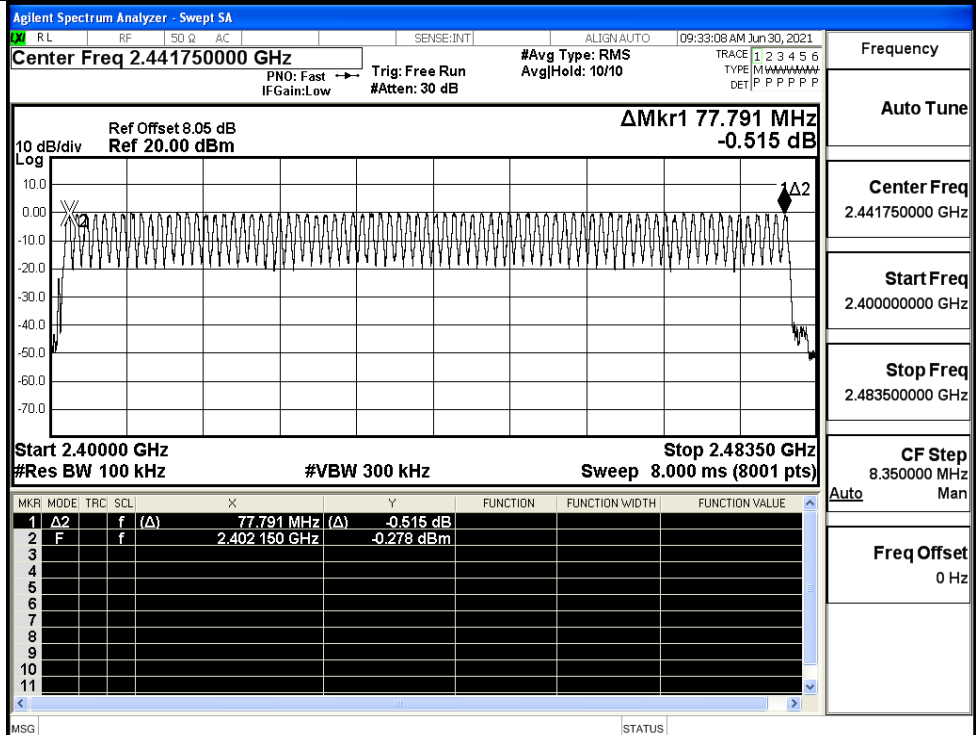
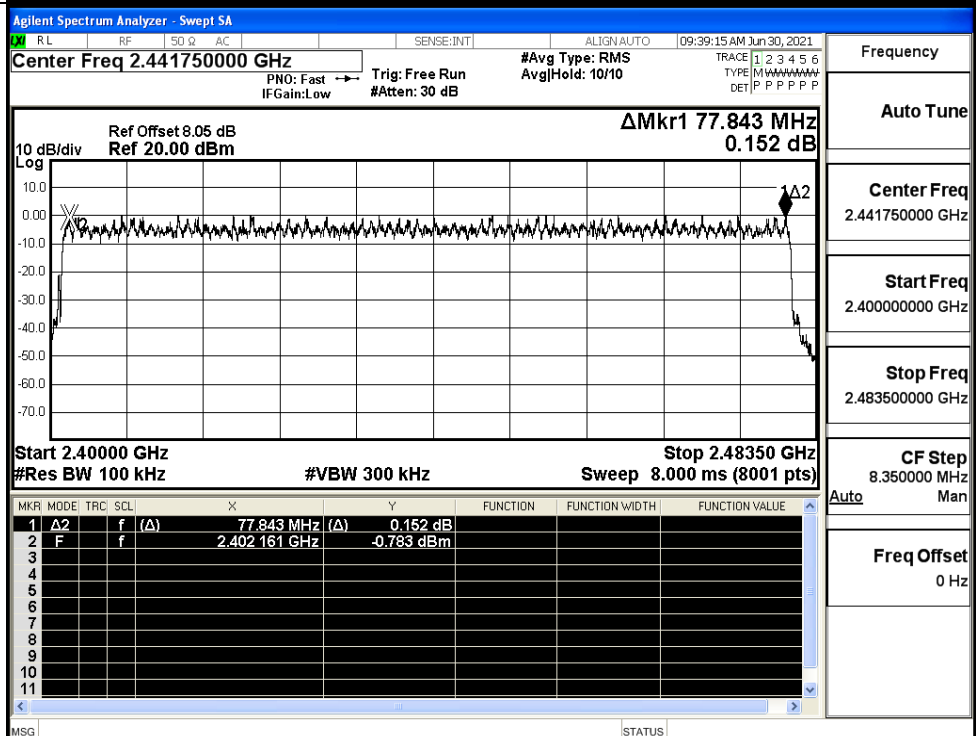


A.4 Hopping Channel Number

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

Test Graphs

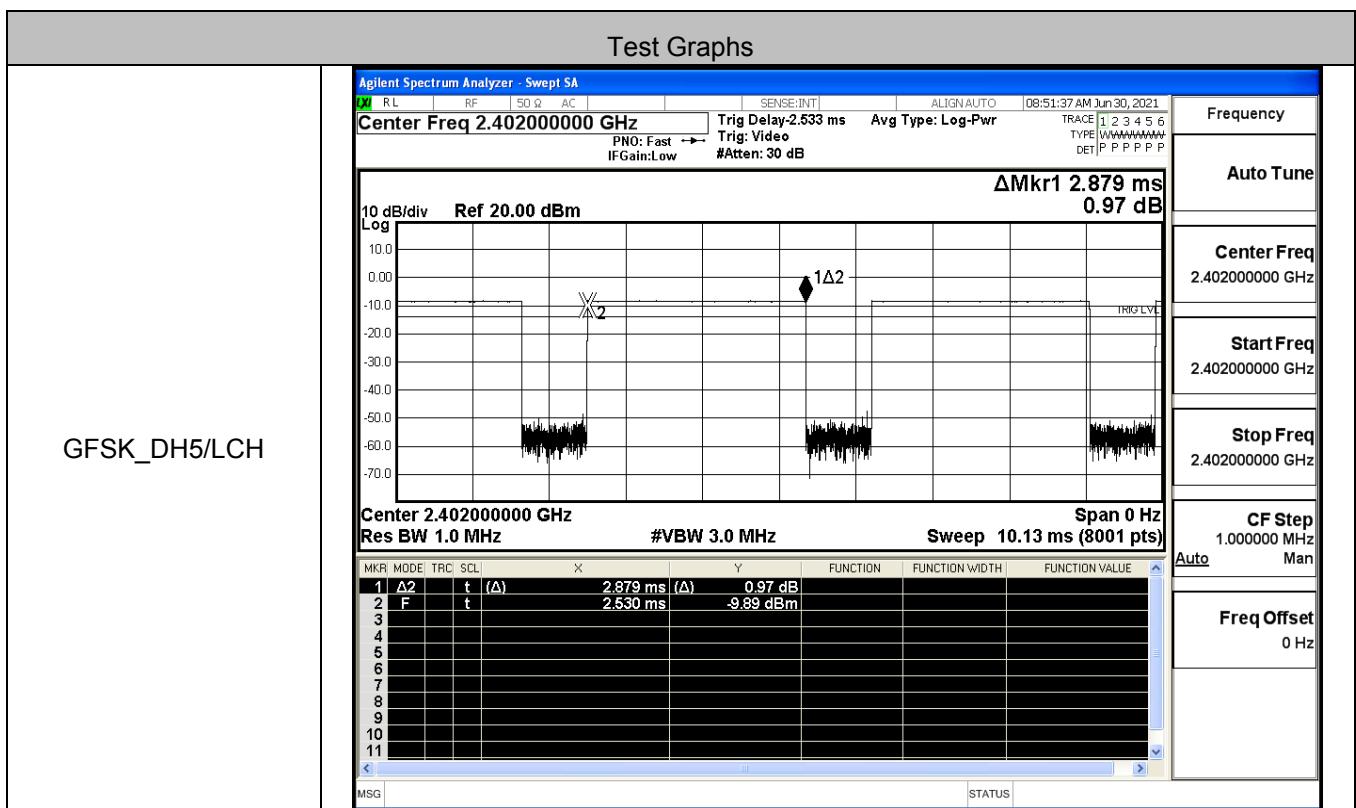
GFSK/Hop

 $\pi/4$ DQPSK/Hop



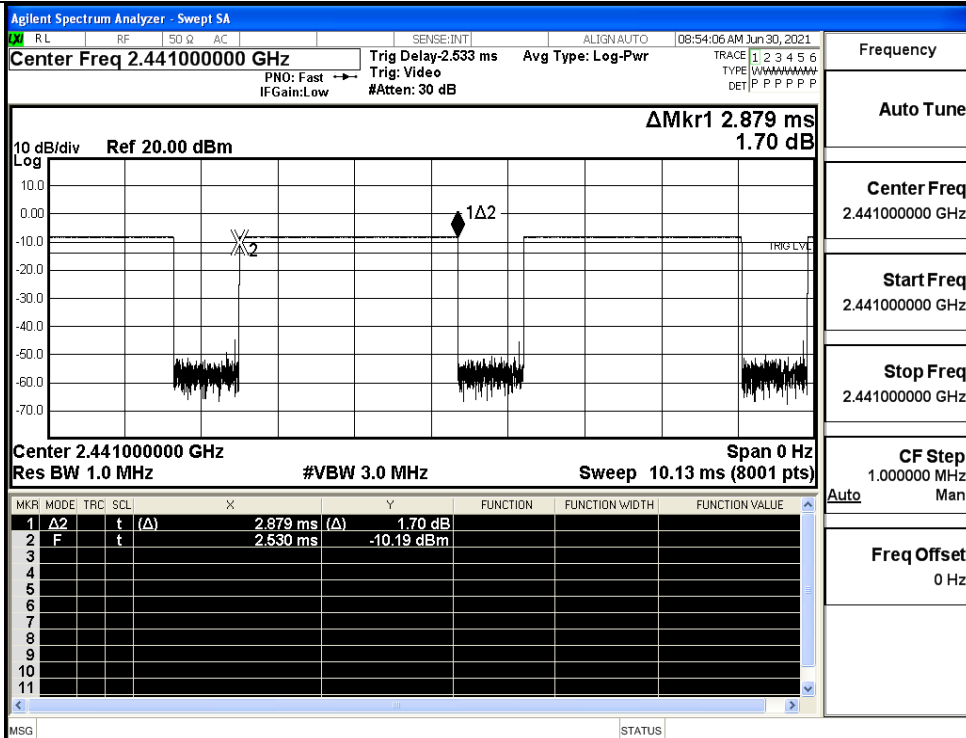
A.5 Dwell Time

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	0.308	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS

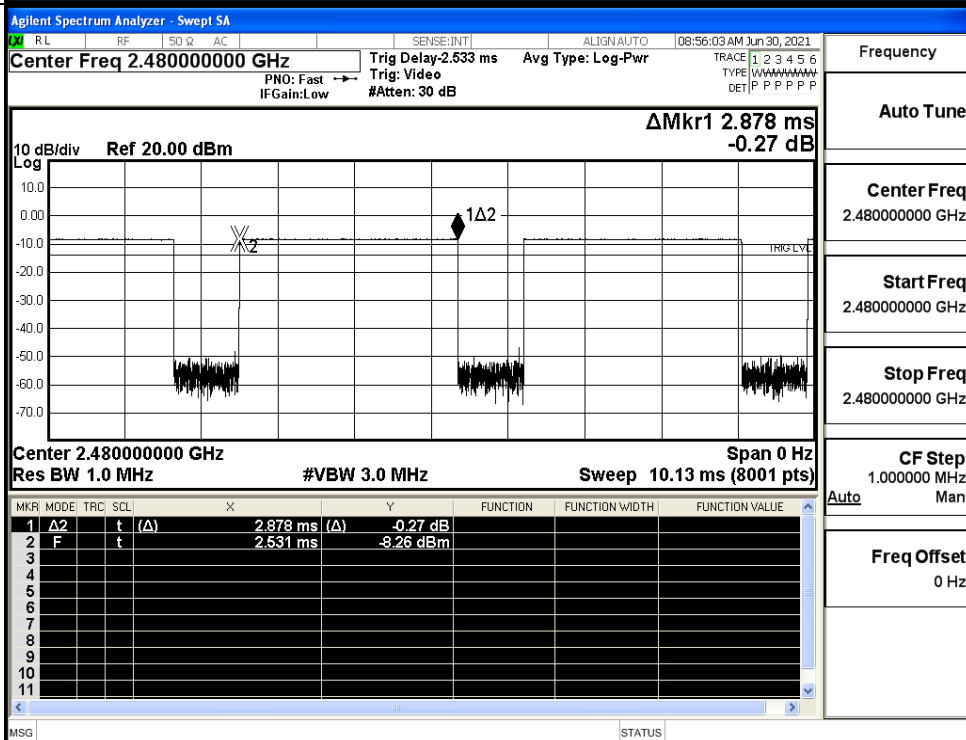




GFSK_DH5/MCH

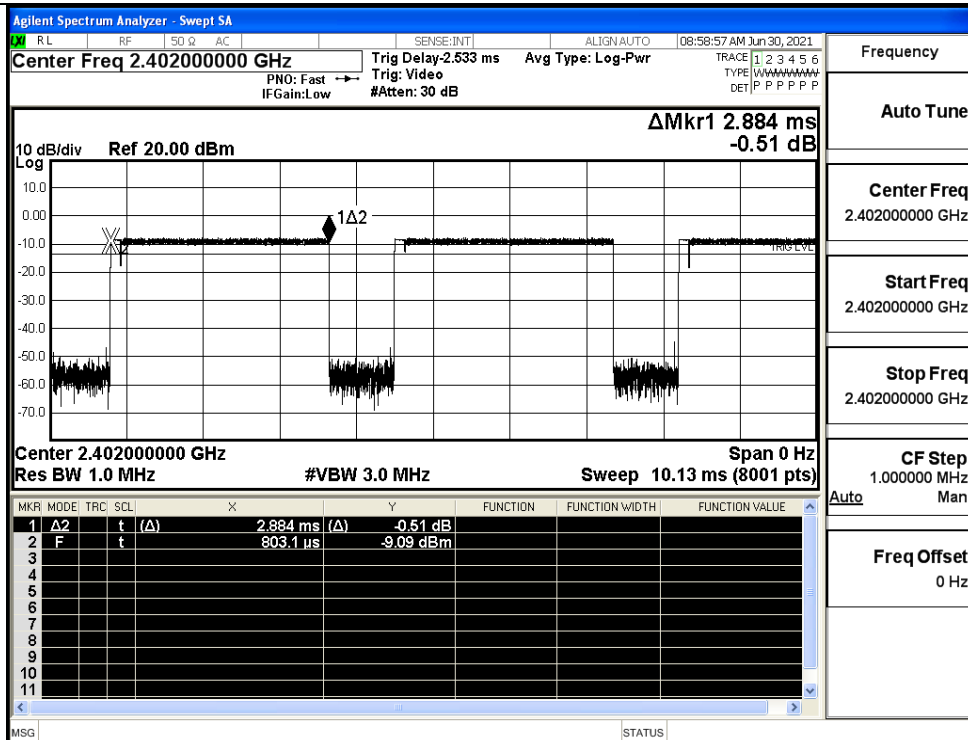


GFSK_DH5/HCH

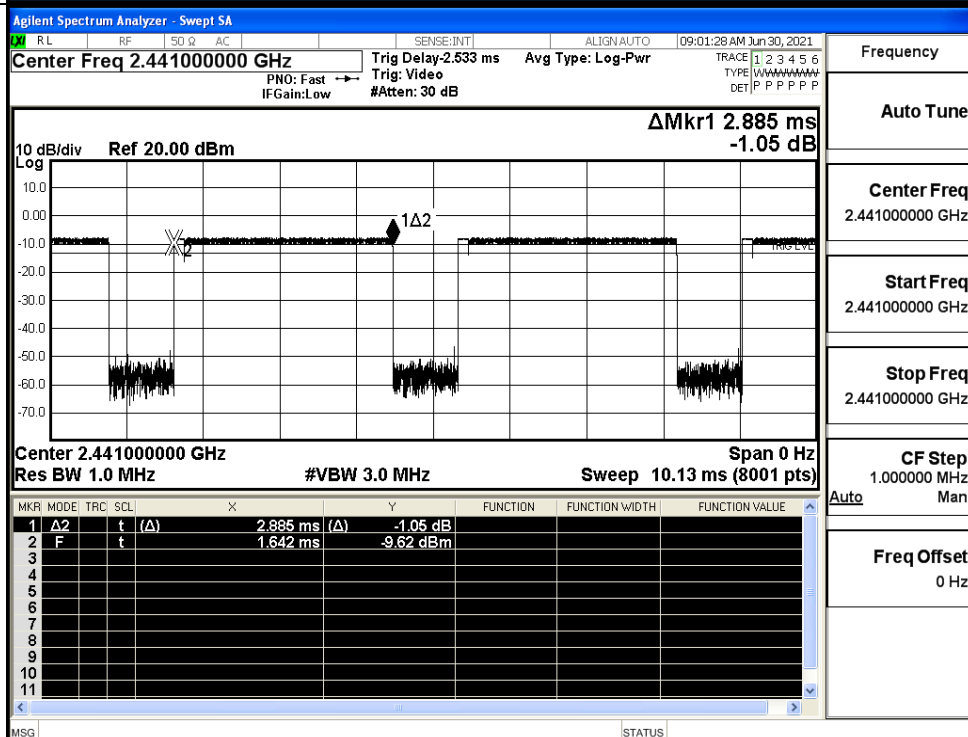


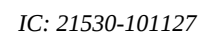


$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH





Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 09:03:10 AM Jun 30, 2021

Center Freq 2.480000000 GHz Trig Delay: 2.533 ms Avg Type: Log-Pwr
 PNO: Fast → Trg: Video IF Gain: Low #Atten: 30 dB TRACE 1 2 3 4 5 6 TYPE P P P P P P DET P P P P P P

The plot displays a spectrum from -70.0 dBm to 10.0 dBm. A signal is visible at approximately -1.36 dBm. The plot includes a grid and various measurement parameters.

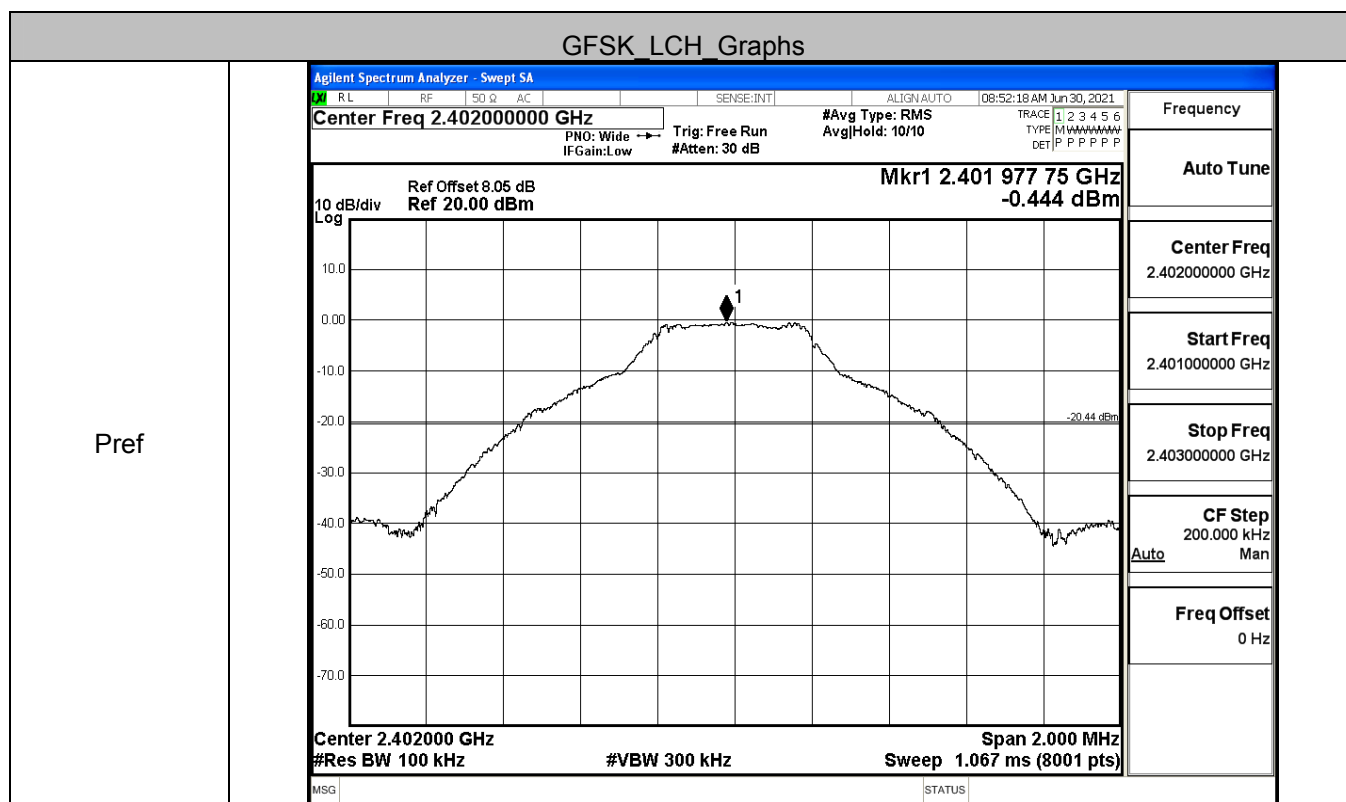
Mkr Mode	TRC	SCL	X	Y	Function	Function Width	Function Value
1	Δ2	t	(Δ)	2.884 ms	(Δ)	-1.36 dBm	
2	F	t		396.5 μs		-8.29 dBm	
3							
4							
5							
6							
7							
8							
9							
10							
11							

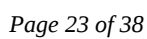
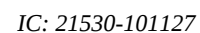
Center 2.480000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8001 pts)
 ΔMkr1 2.884 ms -1.36 dB



A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.444	-37.433	-20.444	PASS
	MCH	-0.375	-37.923	-20.375	PASS
	HCH	-0.6	-37.967	-20.600	PASS
$\pi/4$ DQPSK	LCH	-0.538	-38.379	-20.538	PASS
	MCH	0.026	-38.319	-19.974	PASS
	HCH	-0.514	-38.472	-20.514	PASS

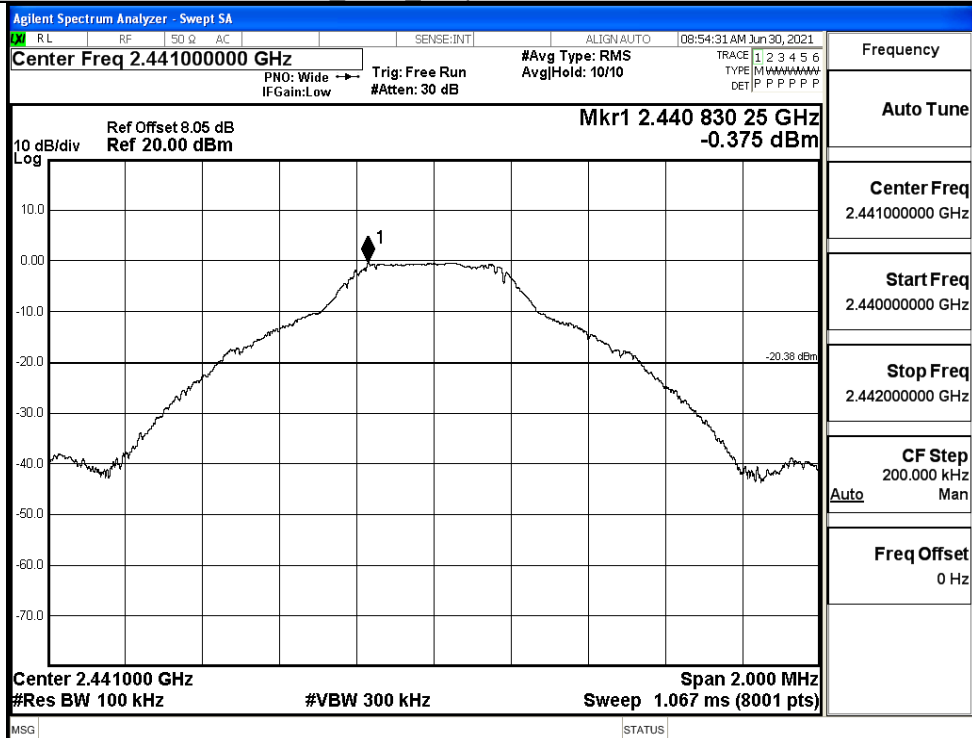




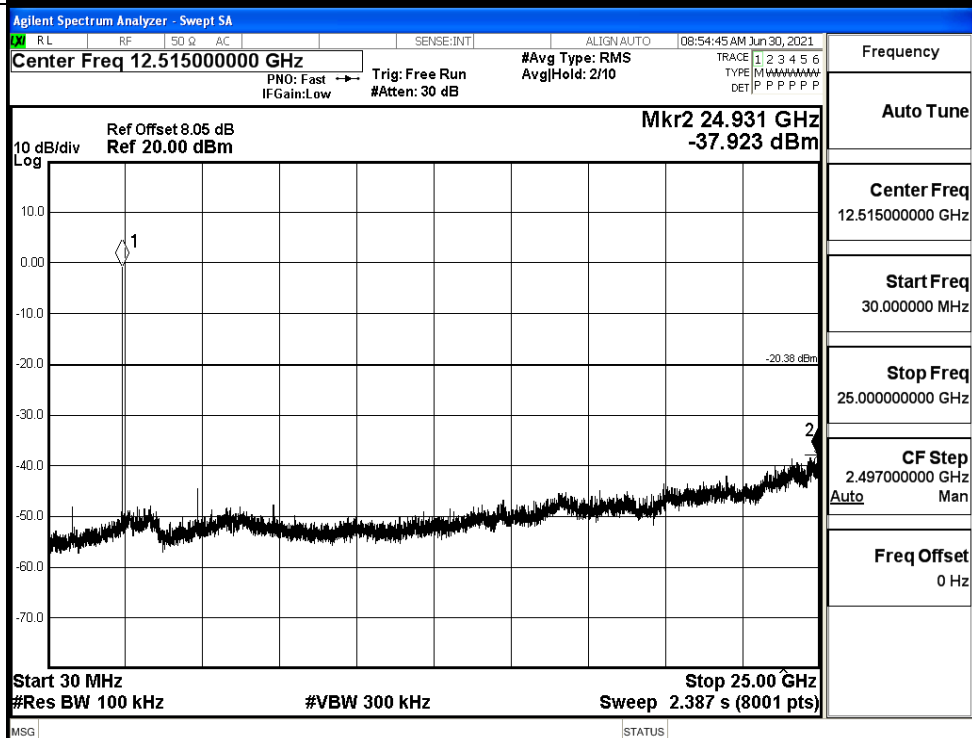


GFSK_MCH_Graphs

Pref



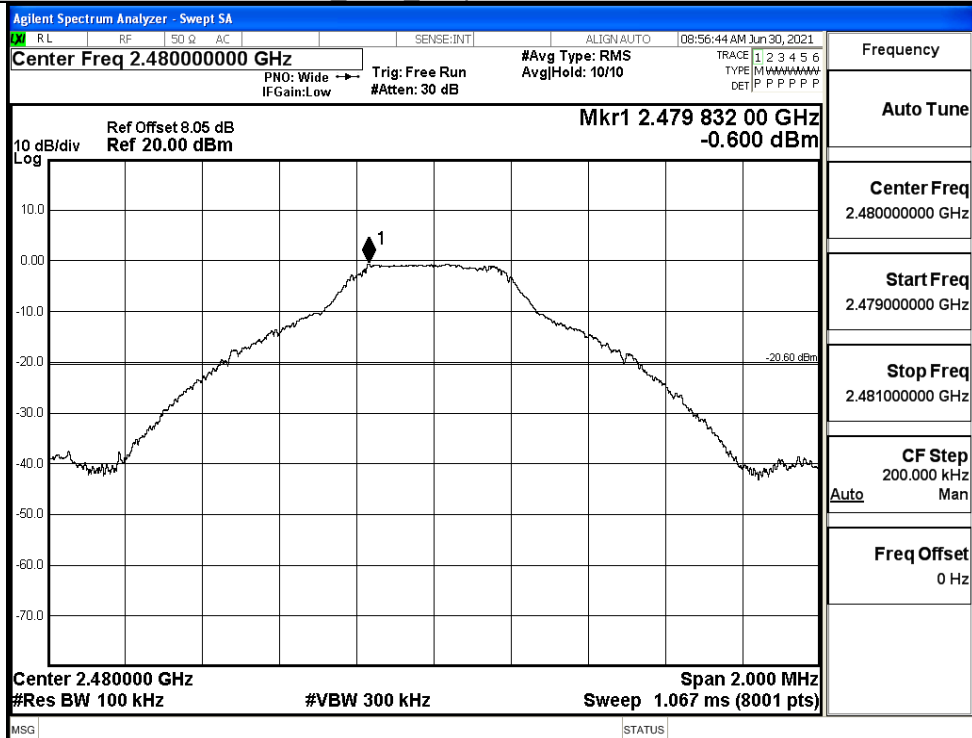
Puw



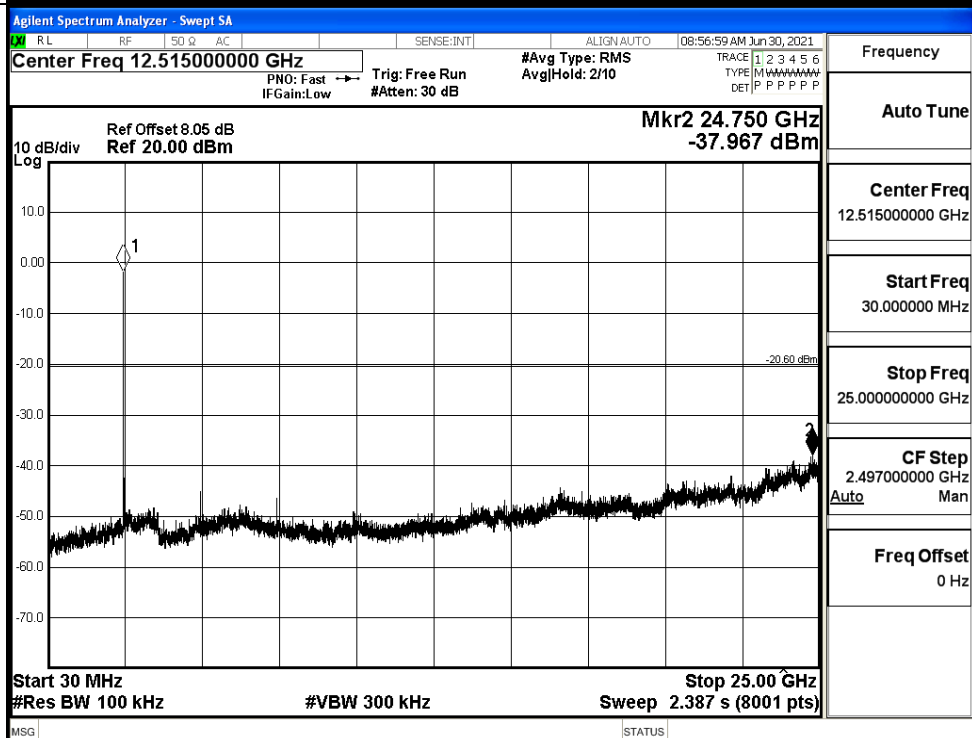


GFSK_HCH_Graphs

Pref

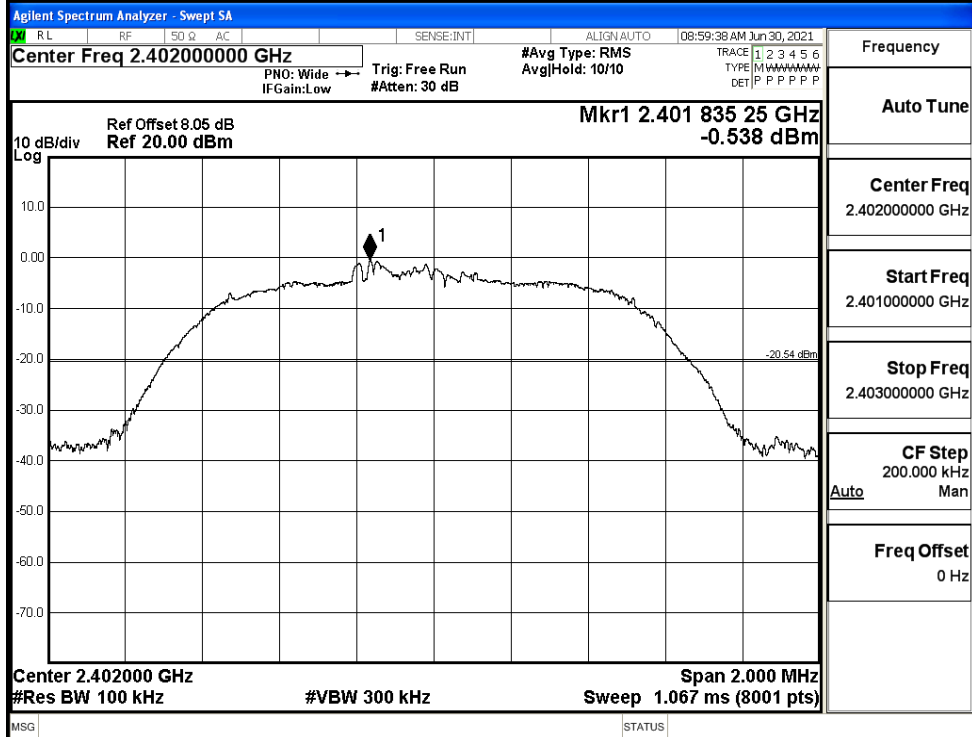


Puw

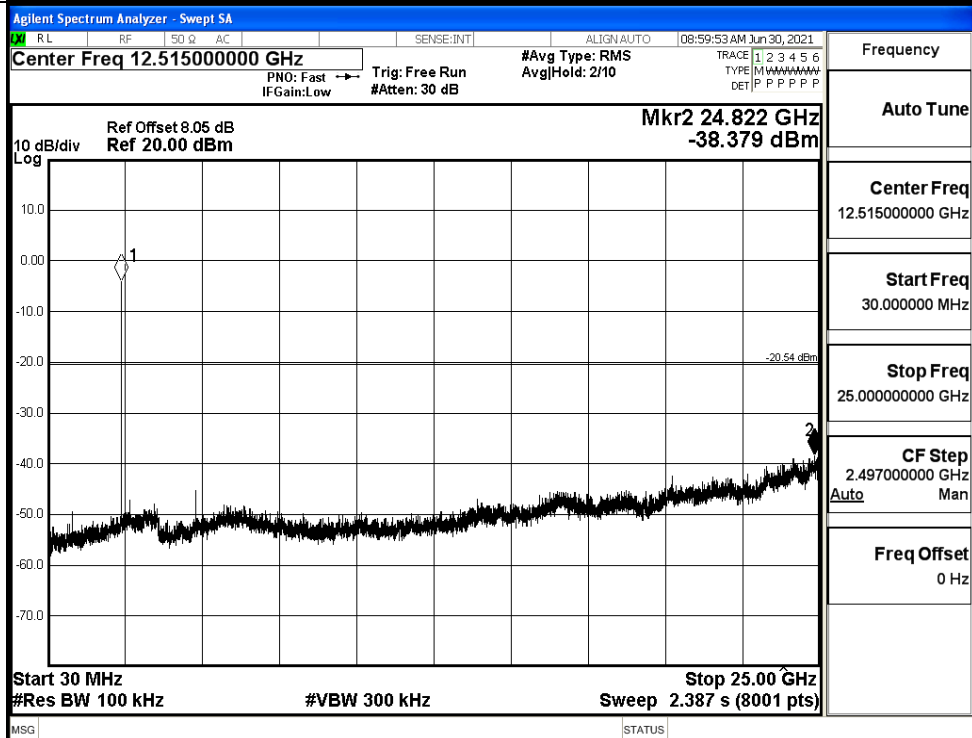


 $\pi/4$ DQPSK_LCH_Graphs

Pref

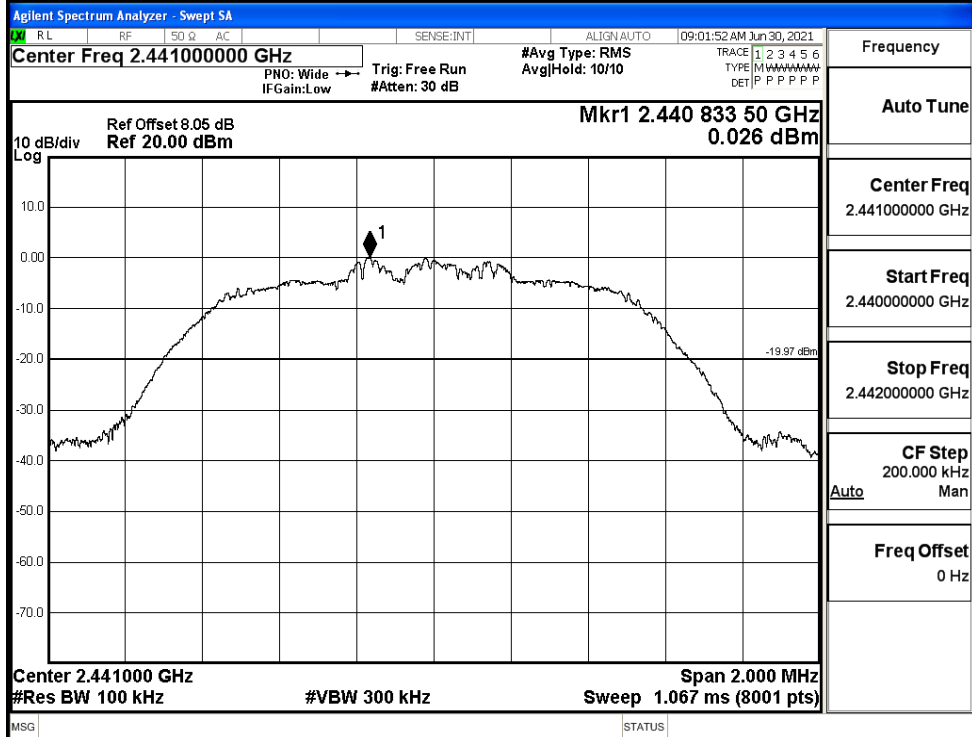


Puw

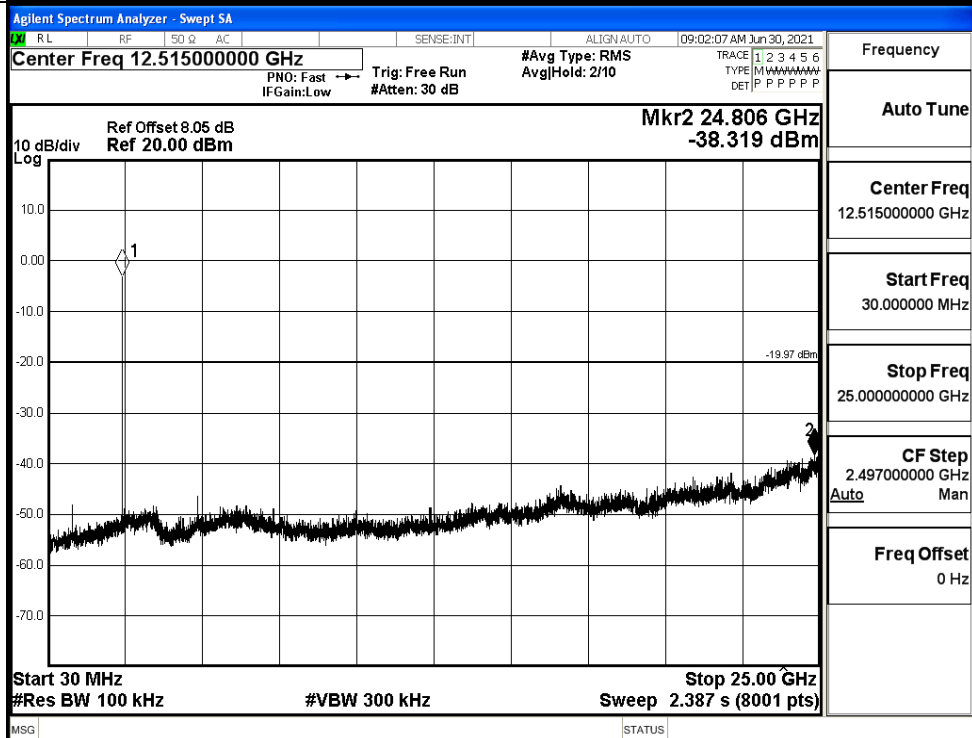


 π /4DQPSK_MCH_Graphs

Pref

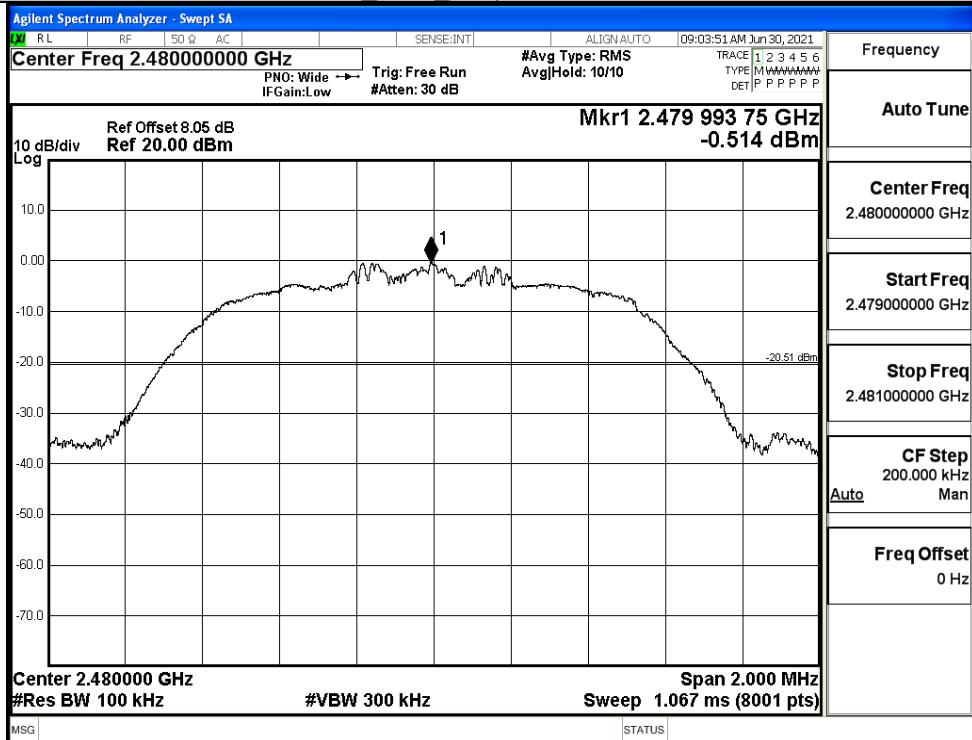


Puw

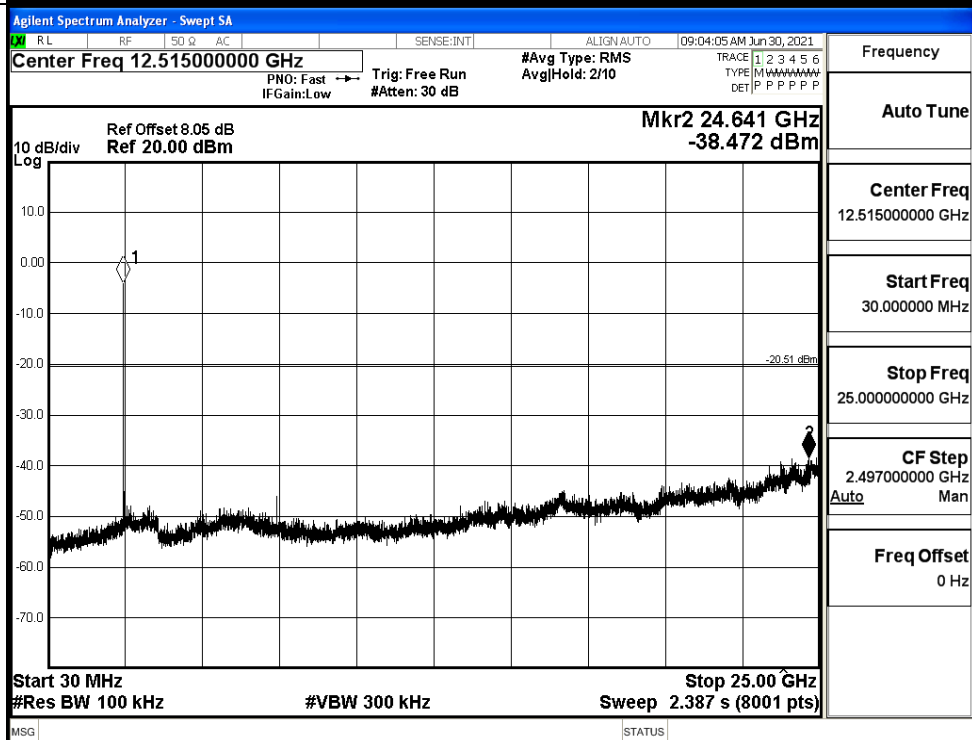


 π /4DQPSK_HCH_Graphs

Pref



Puw





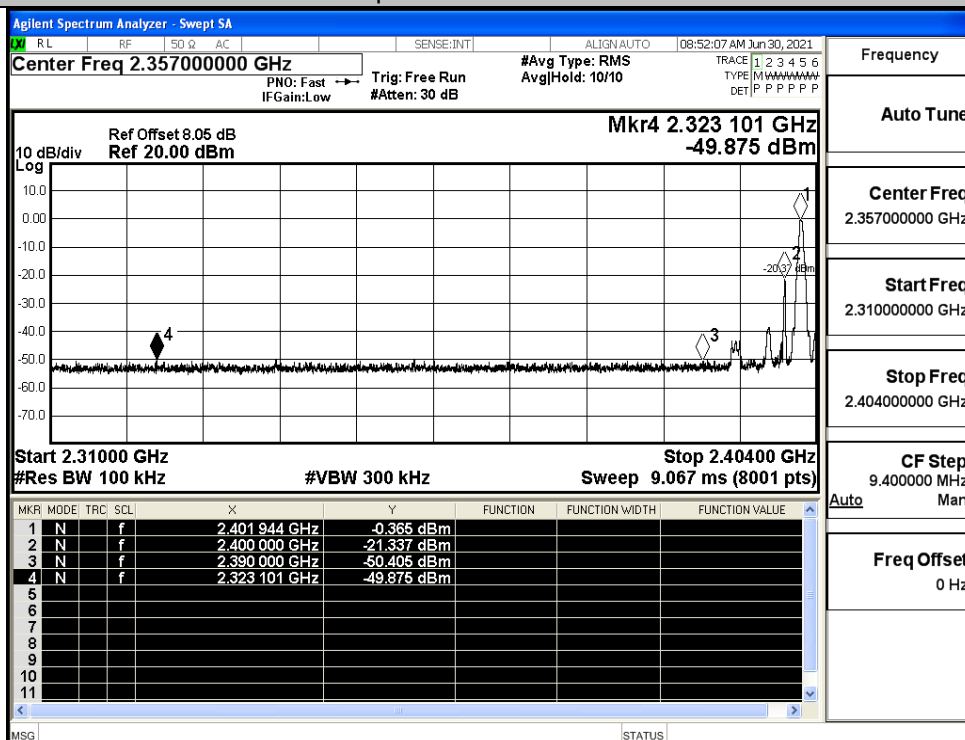
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.365	Off	-49.875	-20.37	PASS
			-0.180	On	-49.534	-20.18	PASS
	HCH	2480	-0.358	Off	-48.198	-20.36	PASS
			-0.064	On	-48.859	-20.06	PASS
$\pi/4$ DQPSK	LCH	2402	-0.755	Off	-50.074	-20.76	PASS
			-0.050	On	-48.904	-20.05	PASS
	HCH	2480	-0.343	Off	-48.069	-20.34	PASS
			0.226	On	-47.830	-19.77	PASS

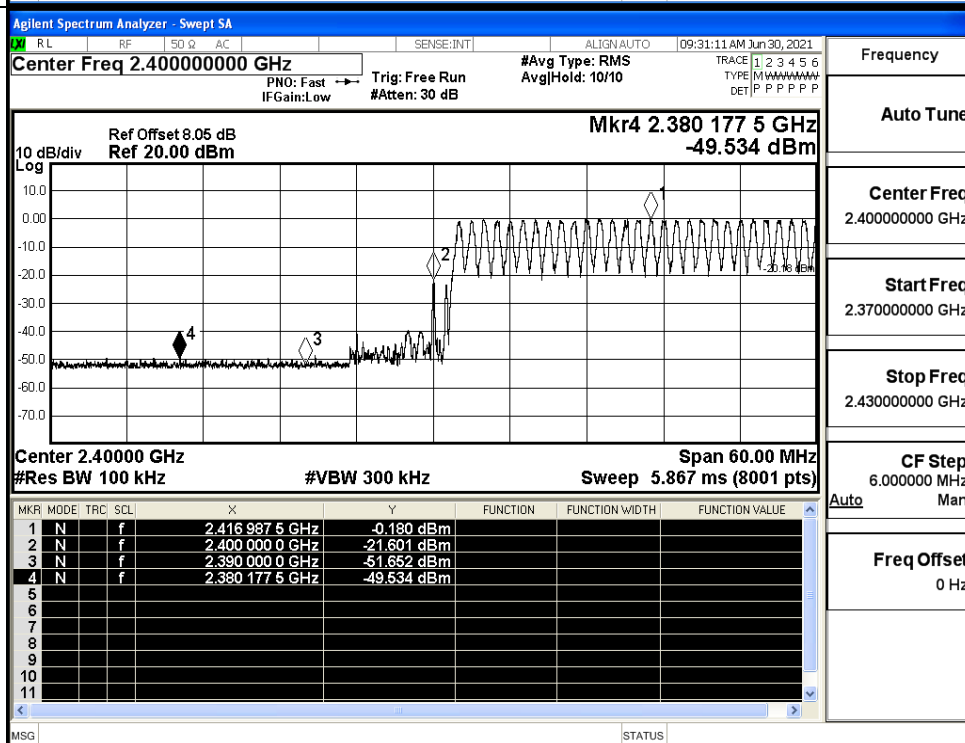


Test Graphs

GFSK/LCH/No Hop

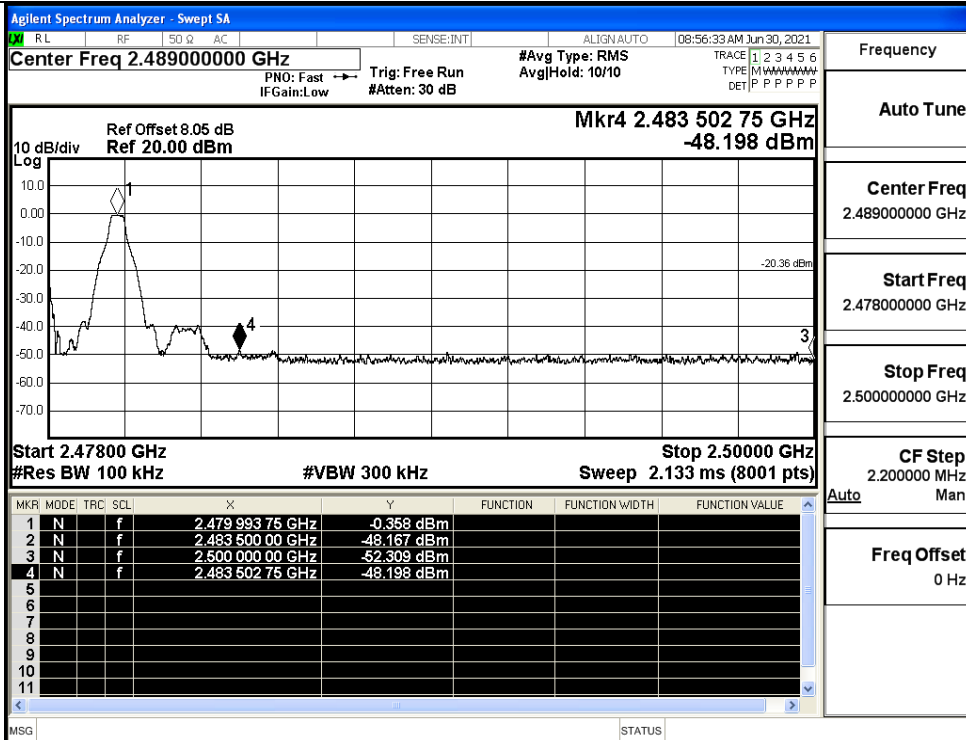


GFSK/LCH/Hop

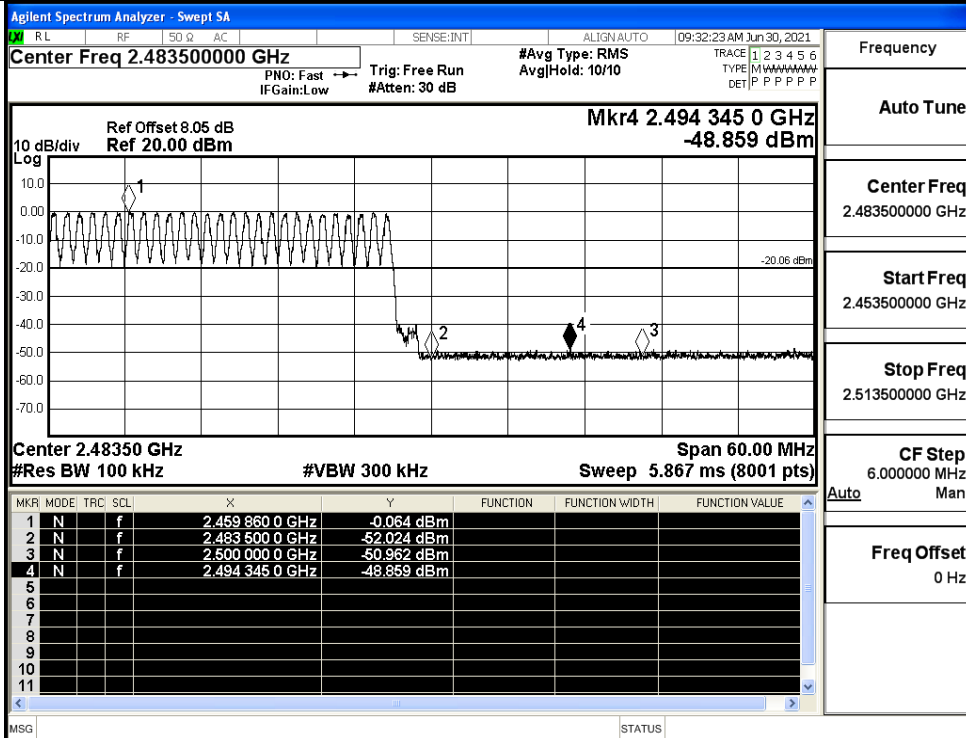




GFSK/HCH/No Hop

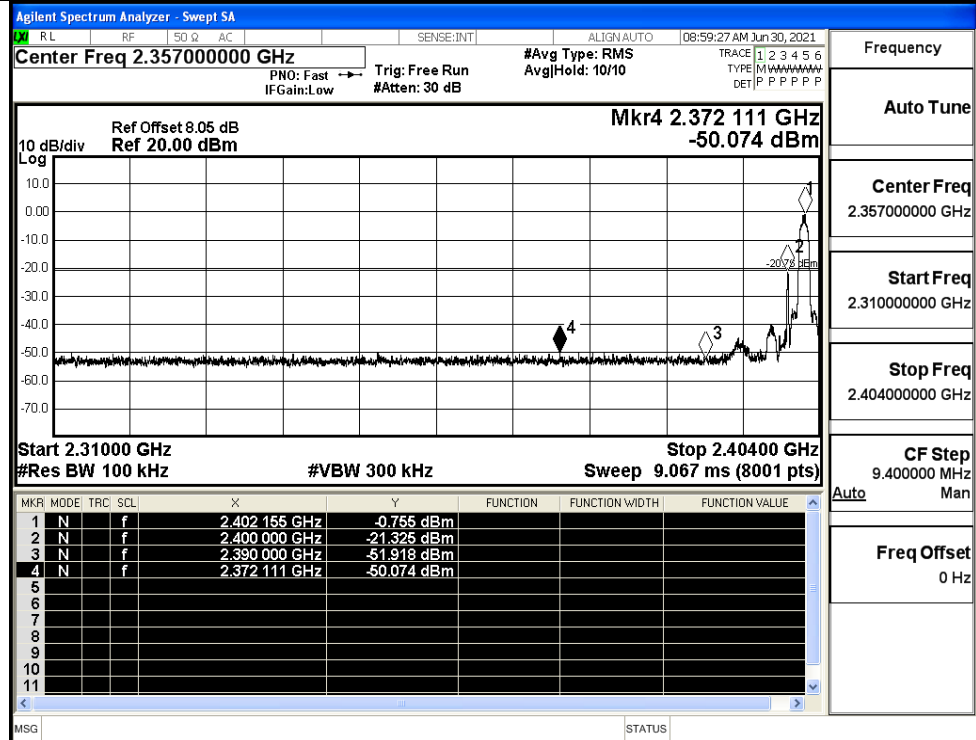


GFSK/HCH/Hop





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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

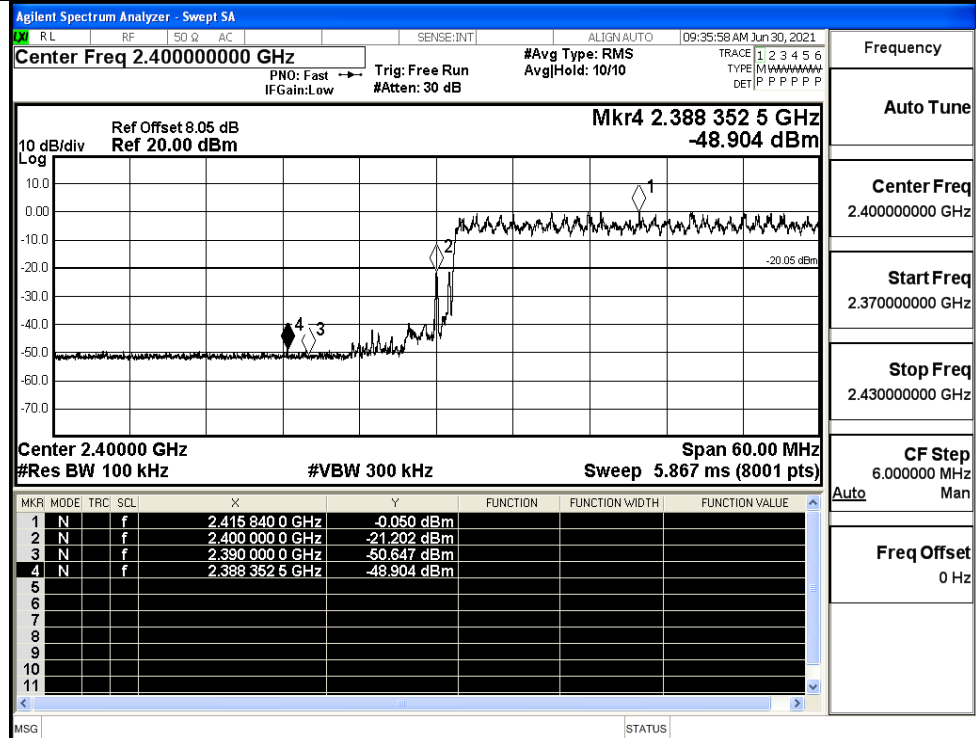
Start Freq
2.310000000 GHz

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

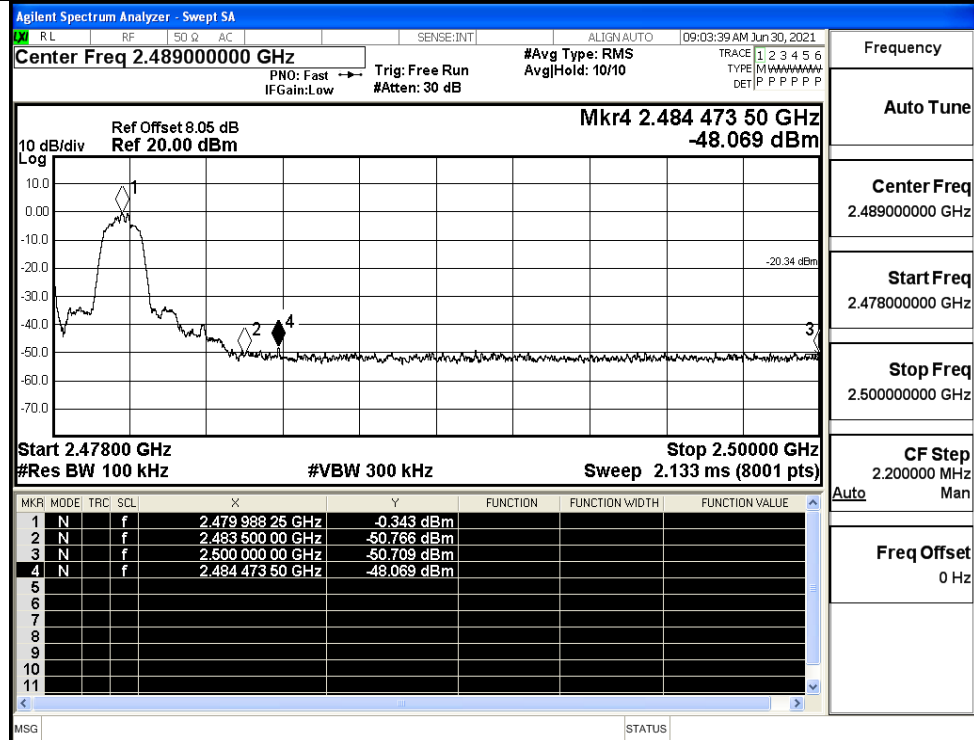
Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz



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



Frequency

Auto Tune

Center Freq
2.489000000 GHz

Start Freq
2.478000000 GHz

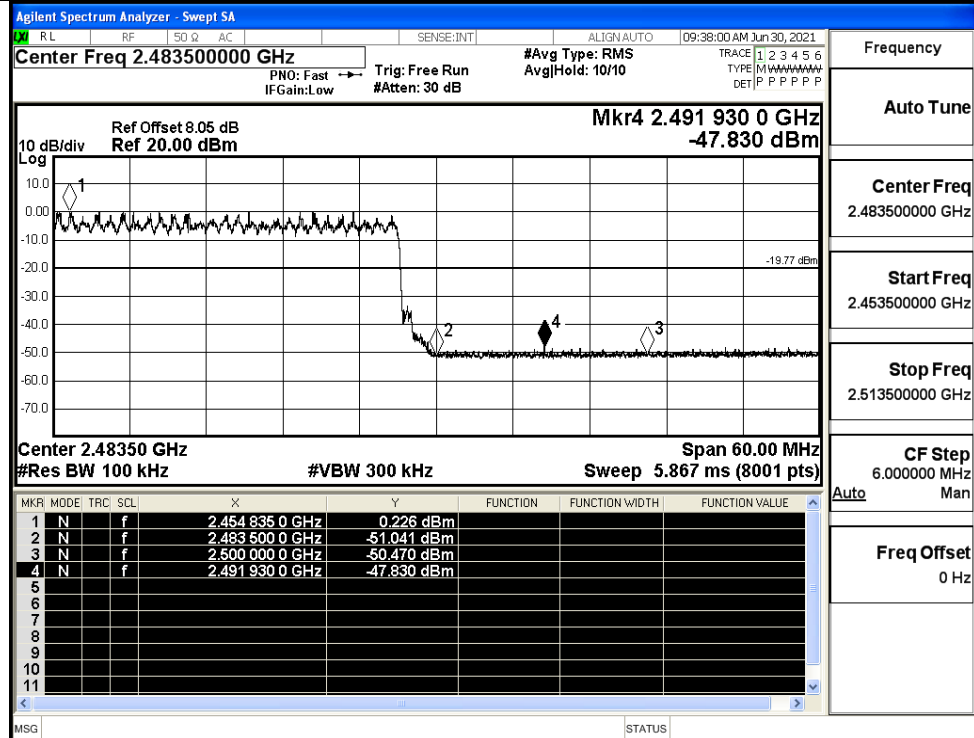
Stop Freq
2.500000000 GHz

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

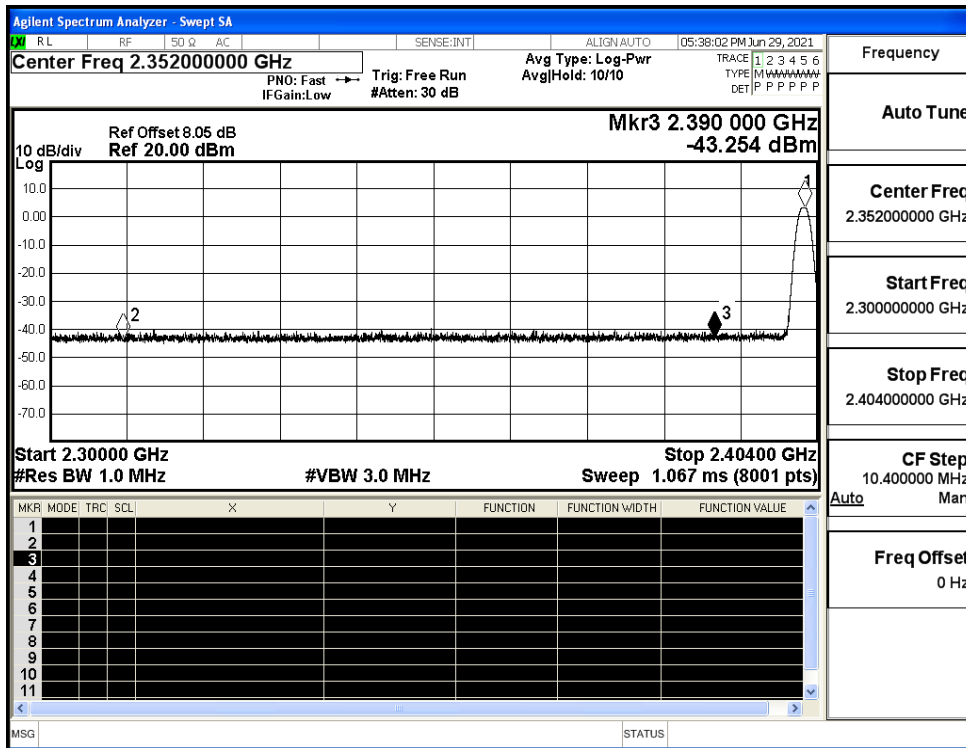


A.8 Restrict-band band-edge measurements

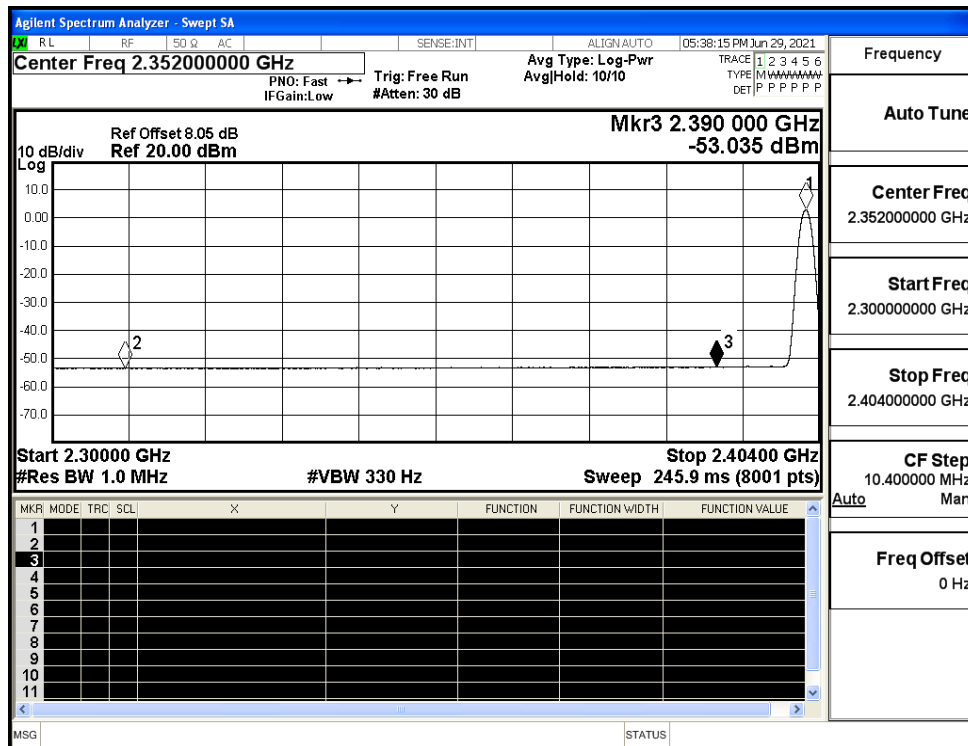
Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.72	2.0	0	53.51	PEAK	74	PASS
	Off	2310.0	-53.42	2.0	0	43.81	AV	54	PASS
	Off	2390.0	-43.25	2.0	0	53.98	PEAK	74	PASS
	Off	2390.0	-53.04	2.0	0	44.19	AV	54	PASS
	Off	2483.5	-42.35	2.0	0	54.88	PEAK	74	PASS
	Off	2483.5	-52.48	2.0	0	44.75	AV	54	PASS
	Off	2500.0	-41.41	2.0	0	55.82	PEAK	74	PASS
	Off	2500.0	-52.41	2.0	0	44.82	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.26	2.0	0	53.97	PEAK	74	PASS
	Off	2310.0	-53.46	2.0	0	43.77	AV	54	PASS
	Off	2390.0	-42.18	2.0	0	55.05	PEAK	74	PASS
	Off	2390.0	-53.06	2.0	0	44.17	AV	54	PASS
	Off	2483.5	-42.45	2.0	0	54.78	PEAK	74	PASS
	Off	2483.5	-52.35	2.0	0	44.88	AV	54	PASS
	Off	2500.0	-41.10	2.0	0	56.13	PEAK	74	PASS
	Off	2500.0	-52.36	2.0	0	44.87	AV	54	PASS



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

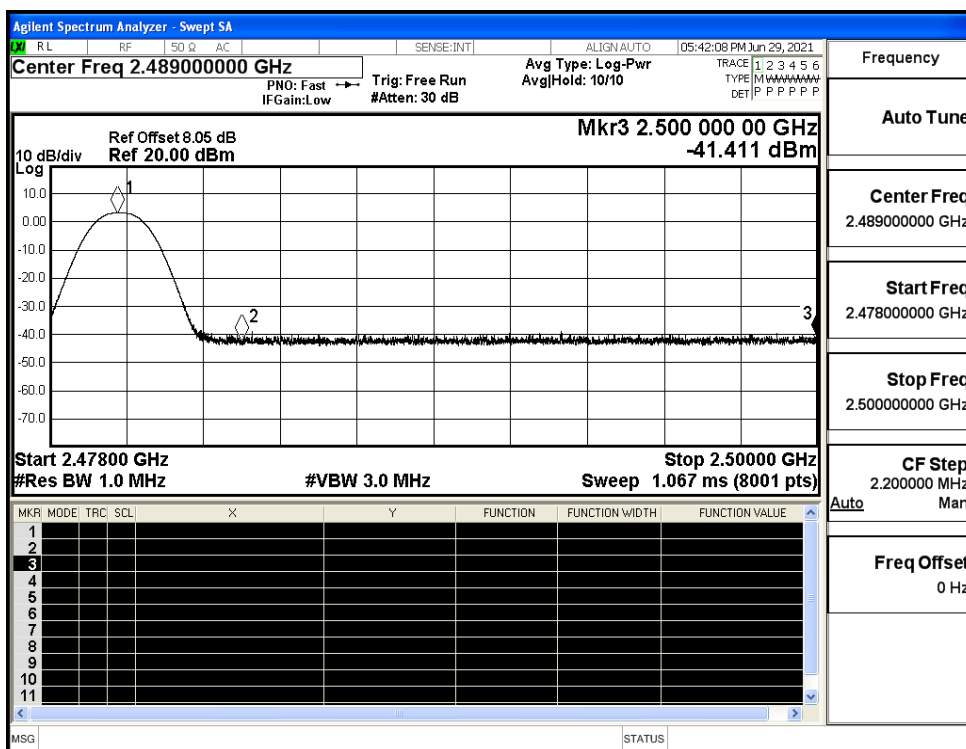


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

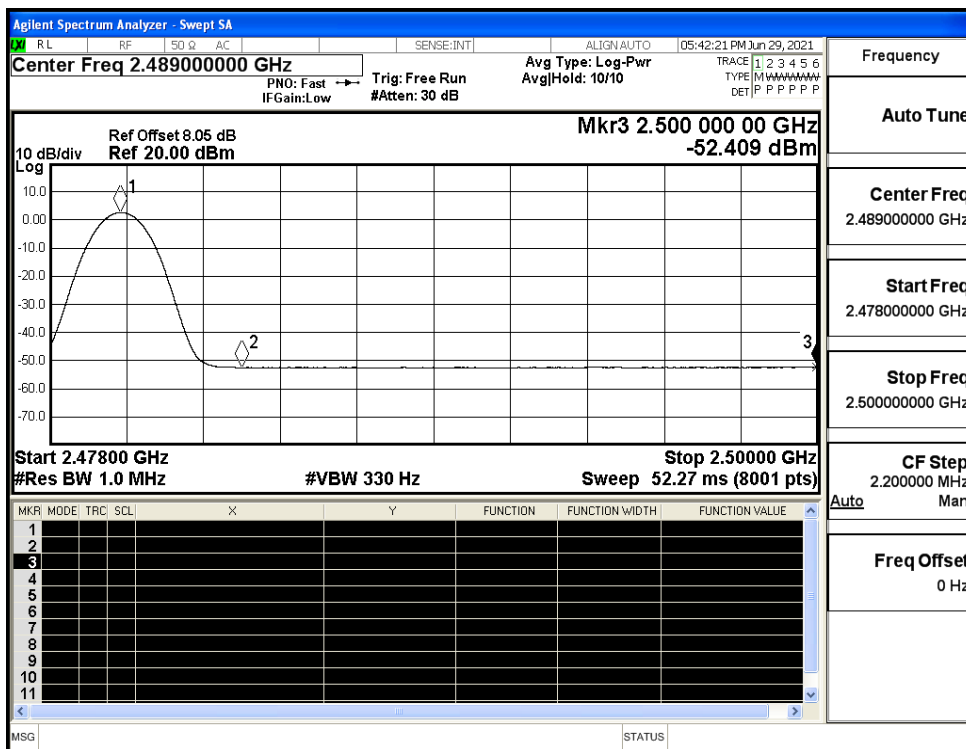


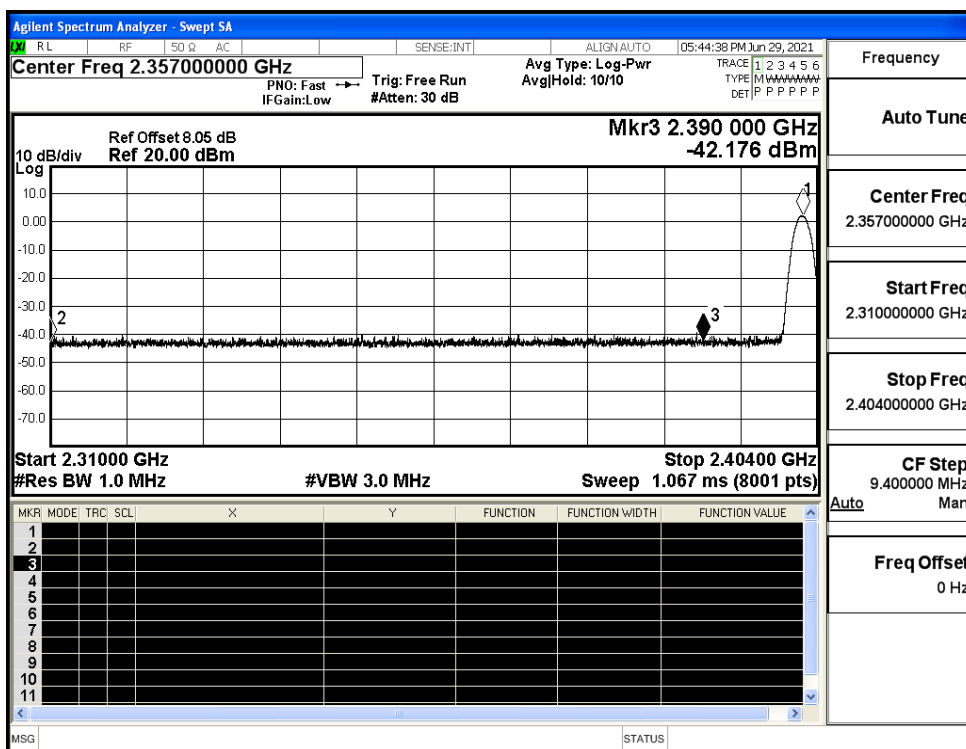
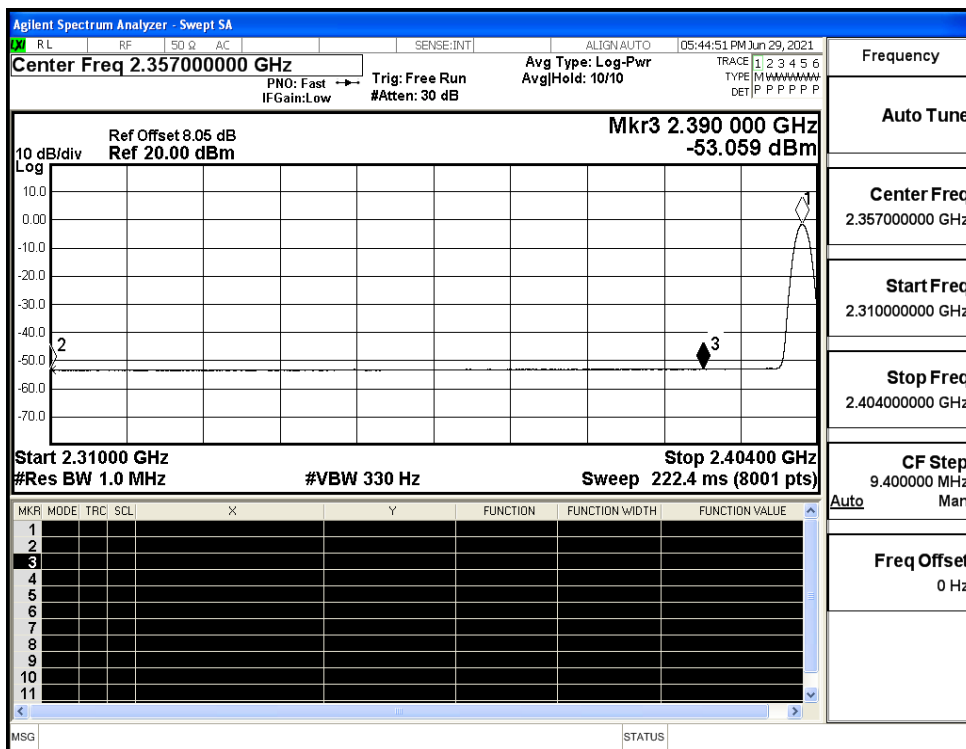


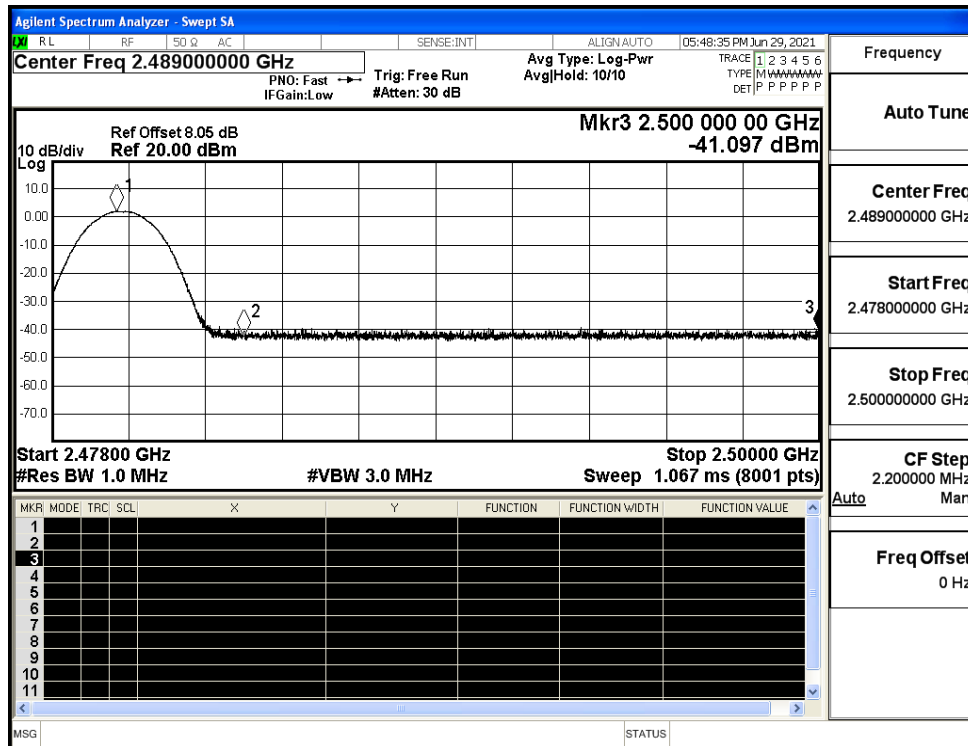
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



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)