

Appendix A

RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)

Product Name: Brooks Bluetooth® Earbuds

Trade Mark: Gemline

Test Model: 101140-001B

Environmental Conditions

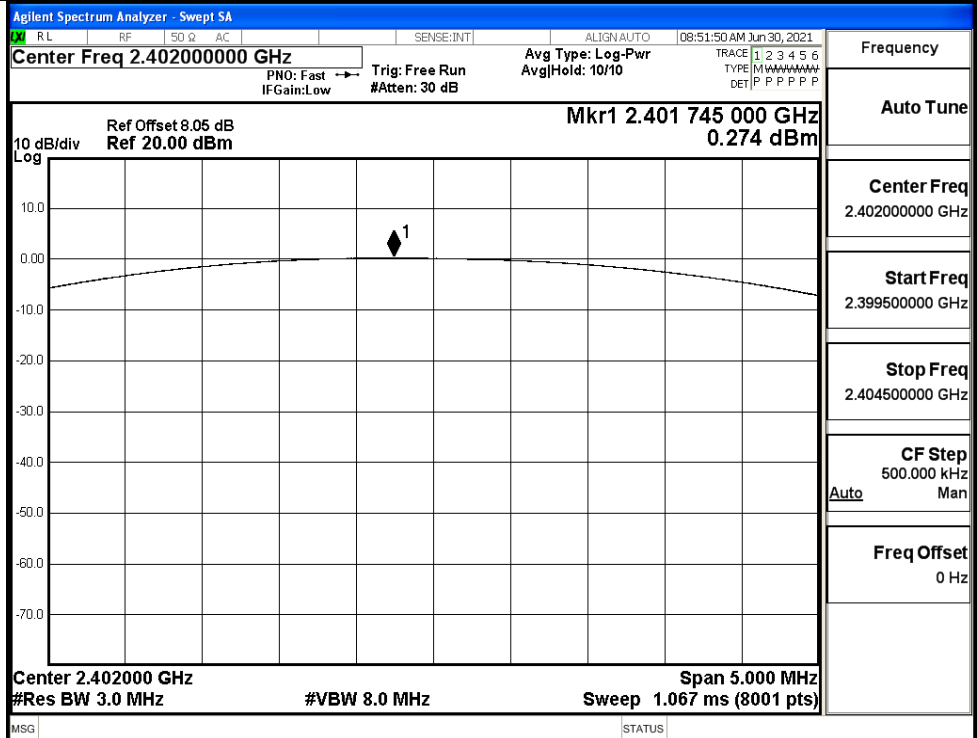
Temperature:	21.6° C
Relative Humidity:	52.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Ken He
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

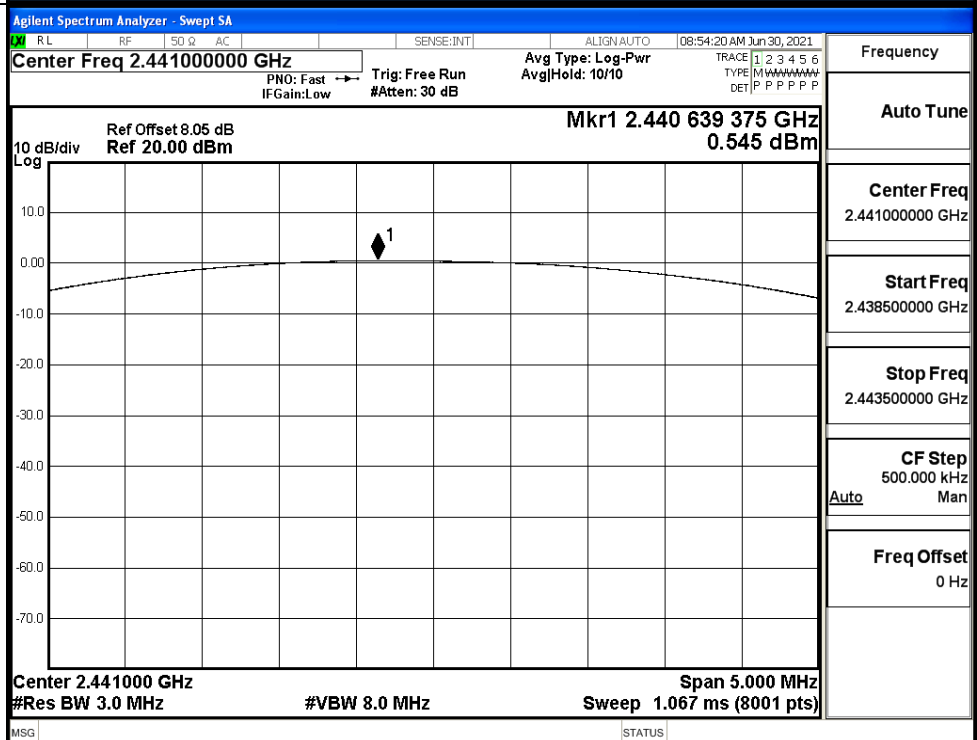
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.274	21	PASS
	MCH	0.545	21	PASS
	HCH	0.278	21	PASS
$\pi/4$ DQPSK	LCH	0.937	21	PASS
	MCH	1.153	21	PASS
	HCH	0.927	21	PASS
8DPSK	LCH	0.990	21	PASS
	MCH	1.270	21	PASS
	HCH	0.995	21	PASS

Test Graphs

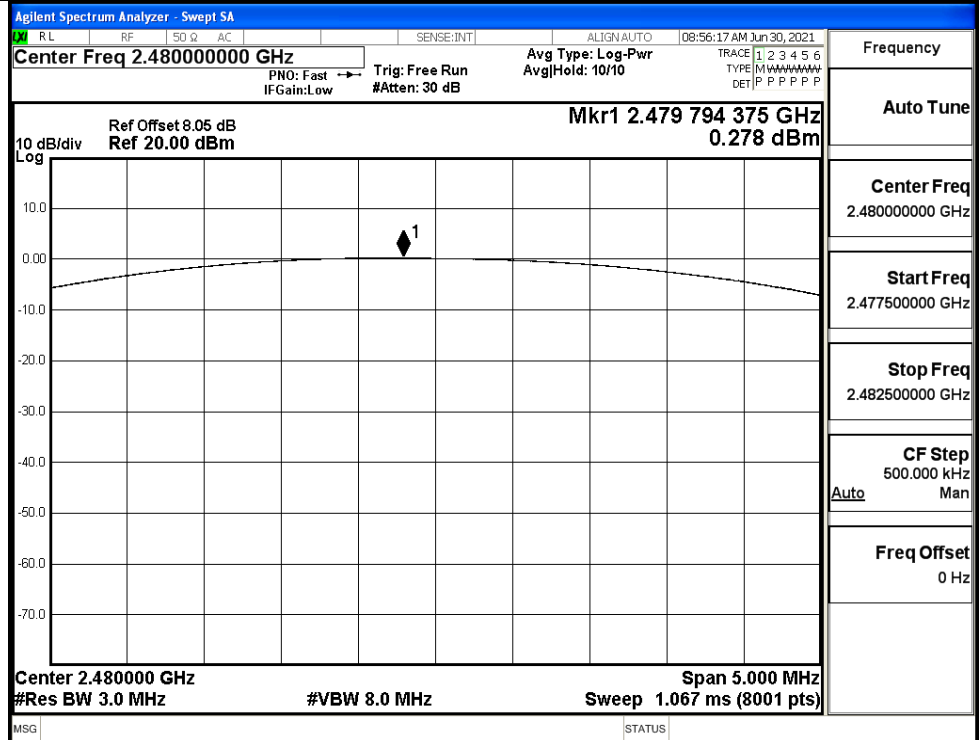
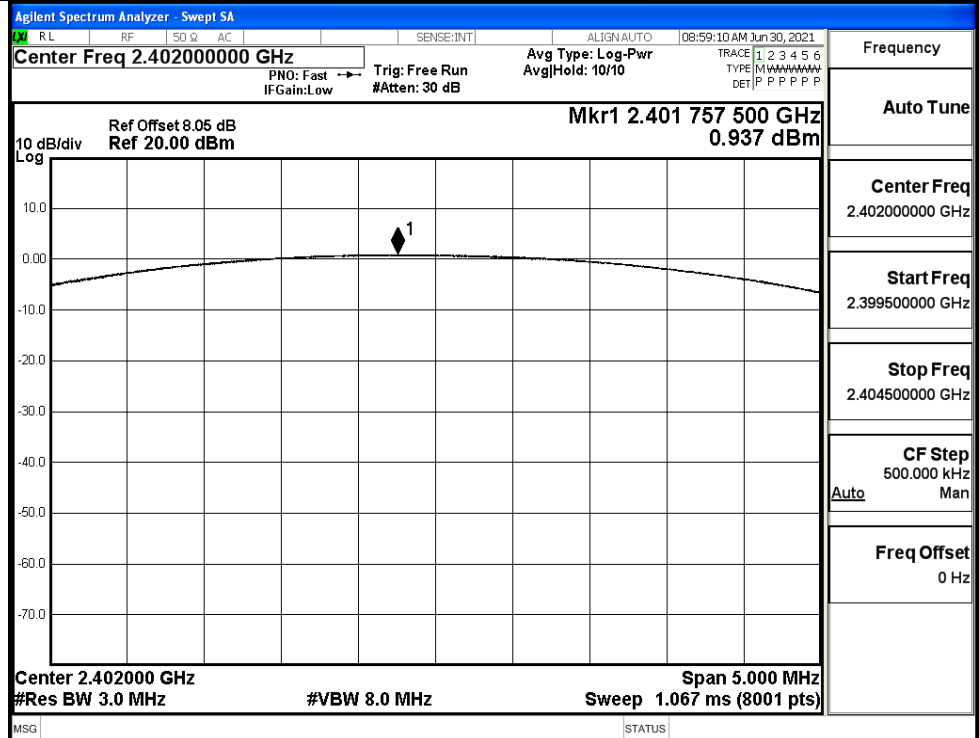
GFSK/LCH

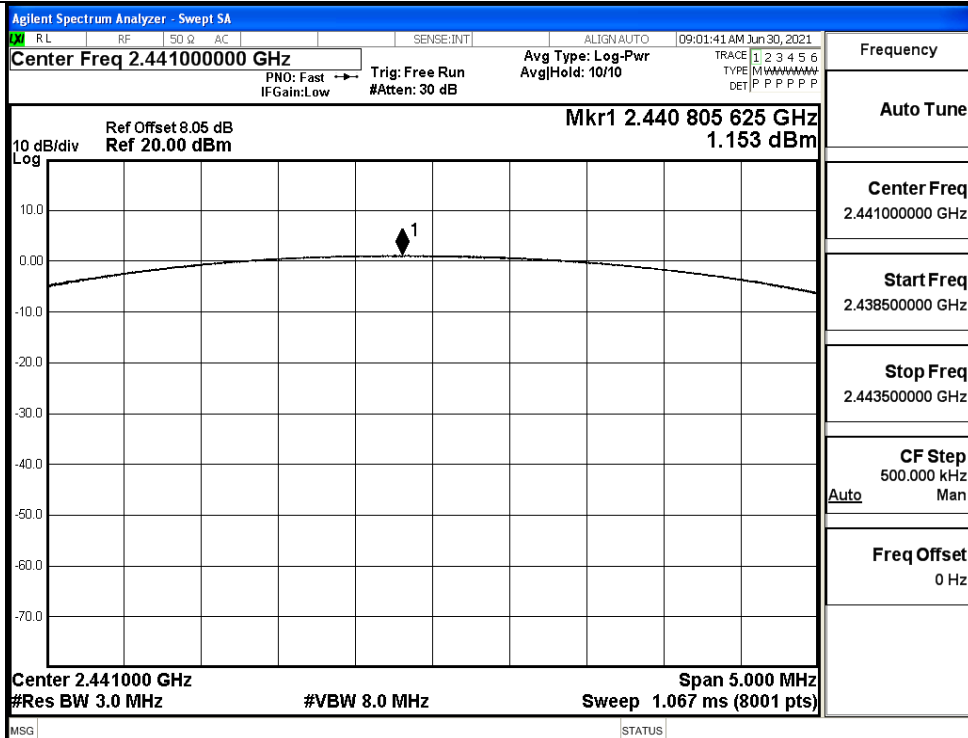
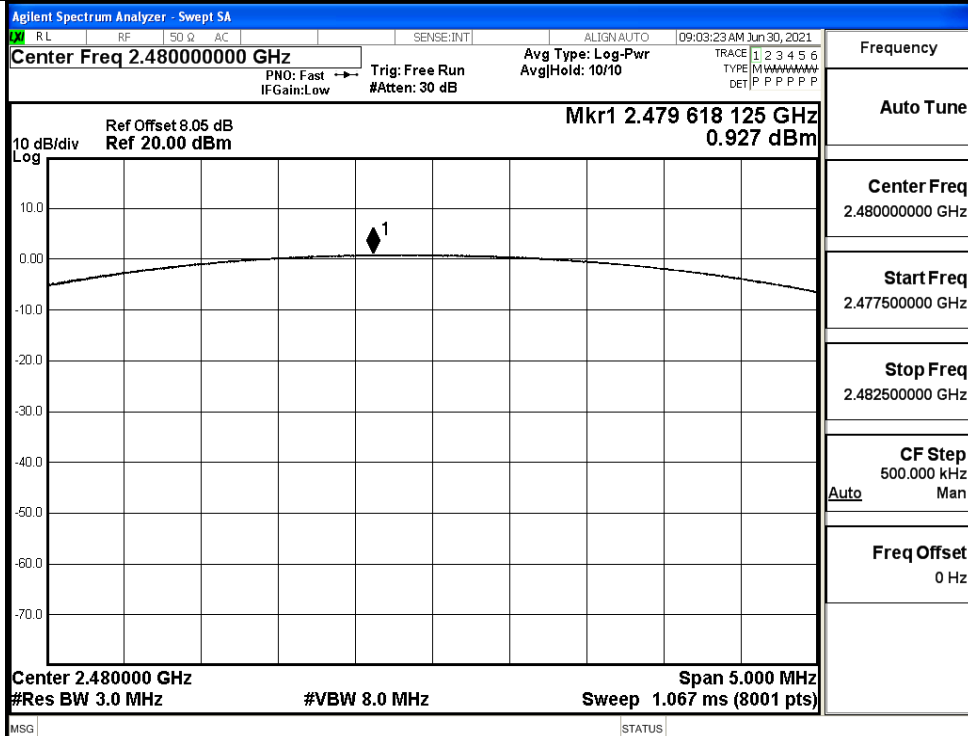


GFSK/MCH

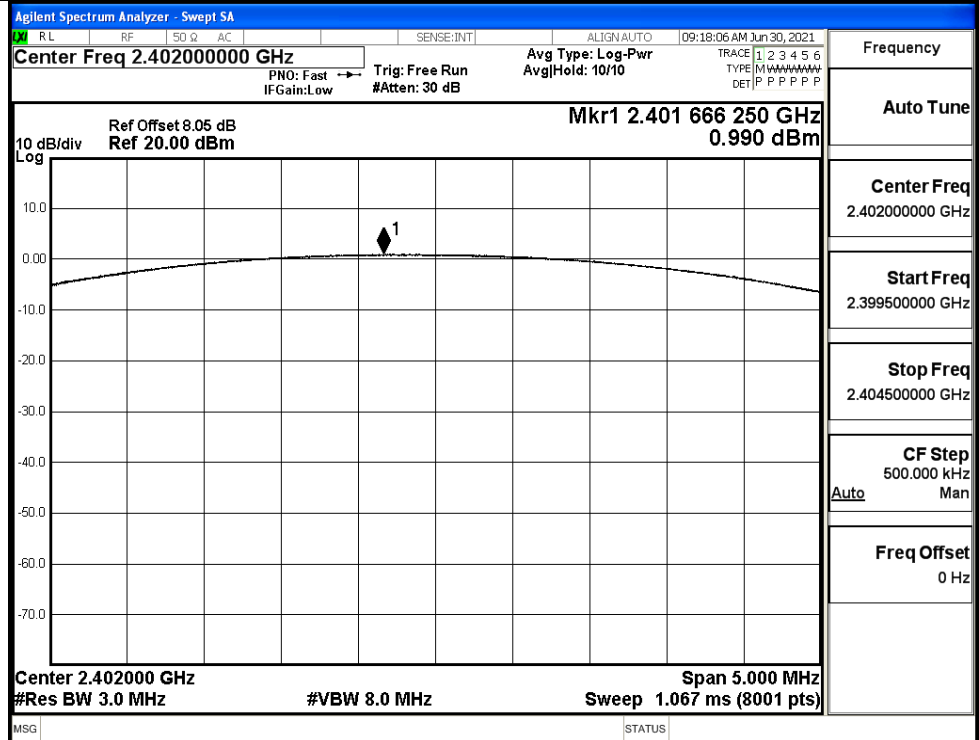


GFSK/HCH

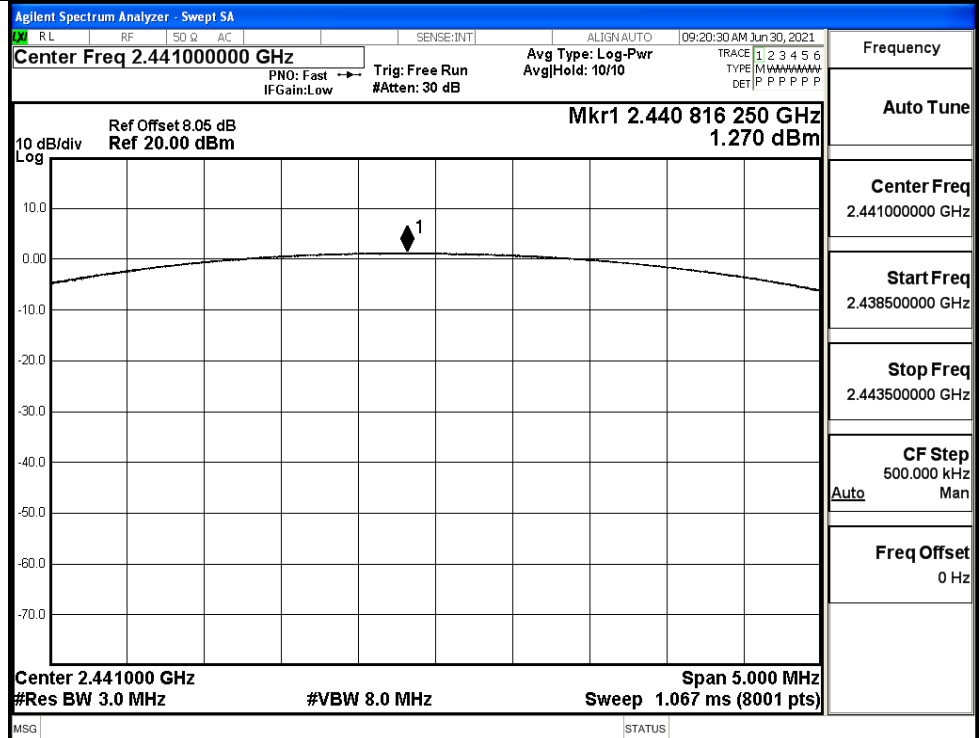
 π /4DQPSK/LCH

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

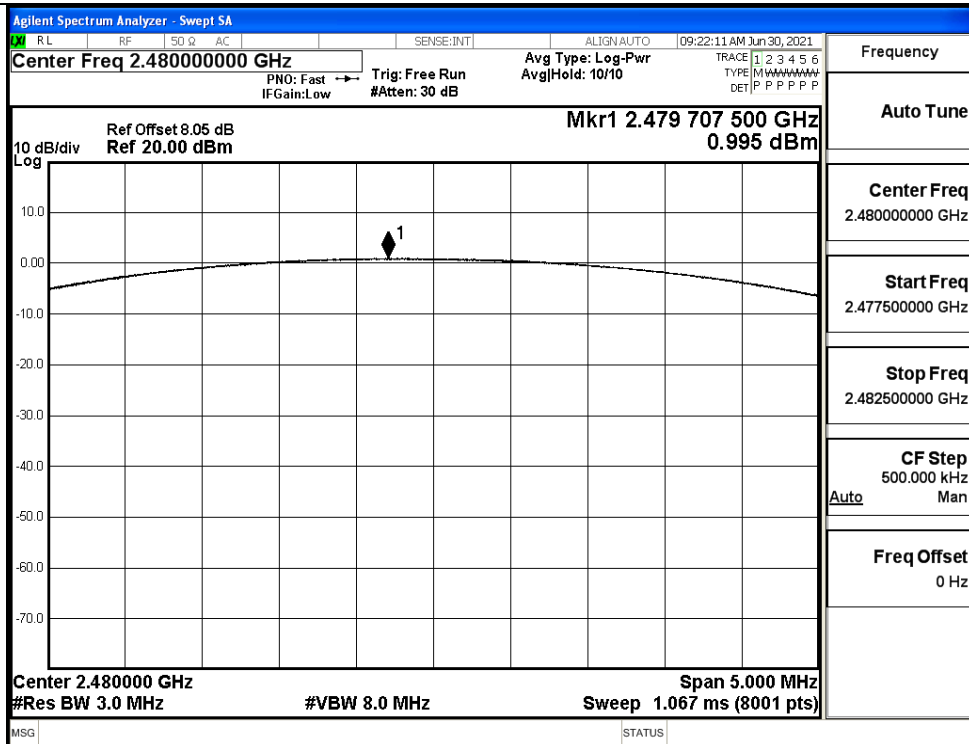
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

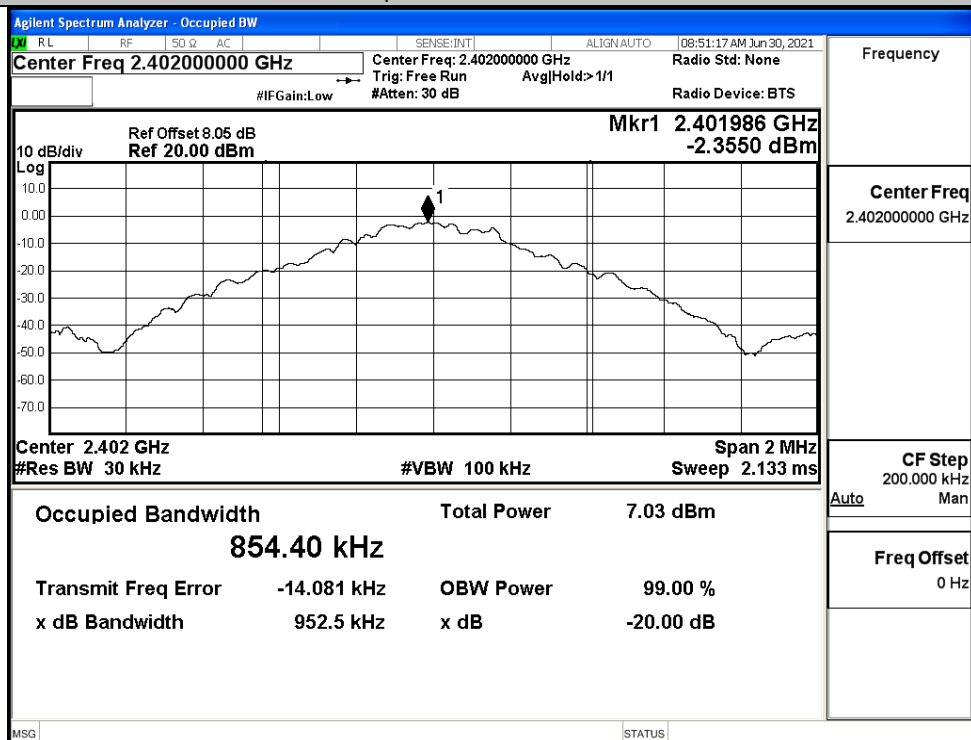


A.2 20dB Bandwidth

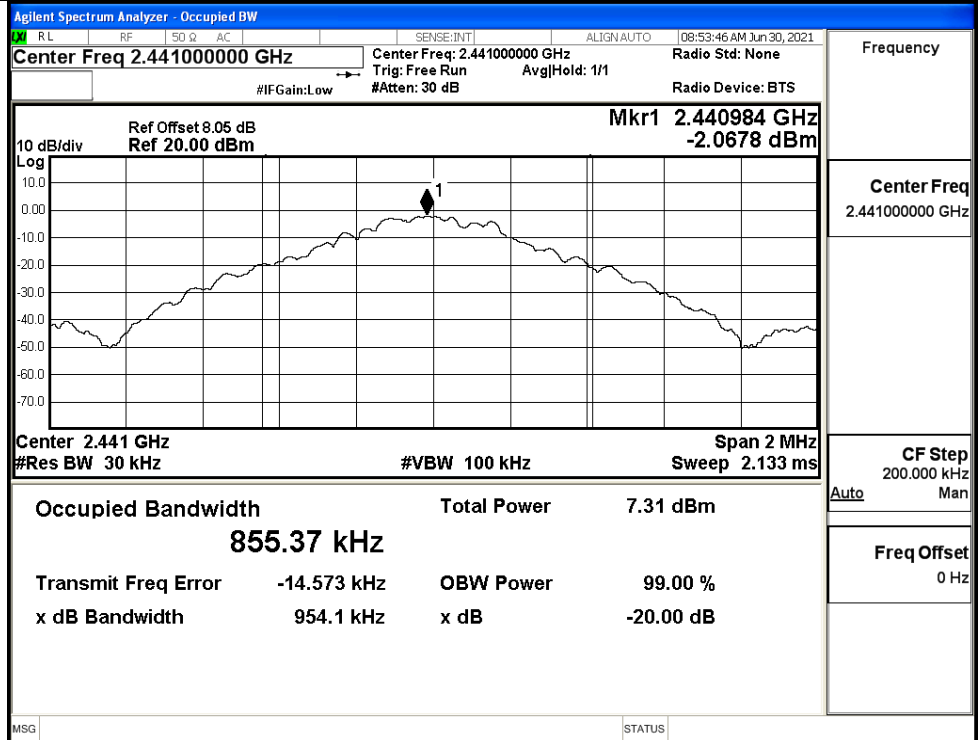
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9525	Not Specified	PASS
	MCH	0.9541	Not Specified	PASS
	HCH	0.9535	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.315	Not Specified	PASS
	MCH	1.316	Not Specified	PASS
	HCH	1.315	Not Specified	PASS
8DPSK	LCH	1.313	Not Specified	PASS
	MCH	1.313	Not Specified	PASS
	HCH	1.322	Not Specified	PASS

Test Graphs

GFSK/LCH



GFSK/MCH



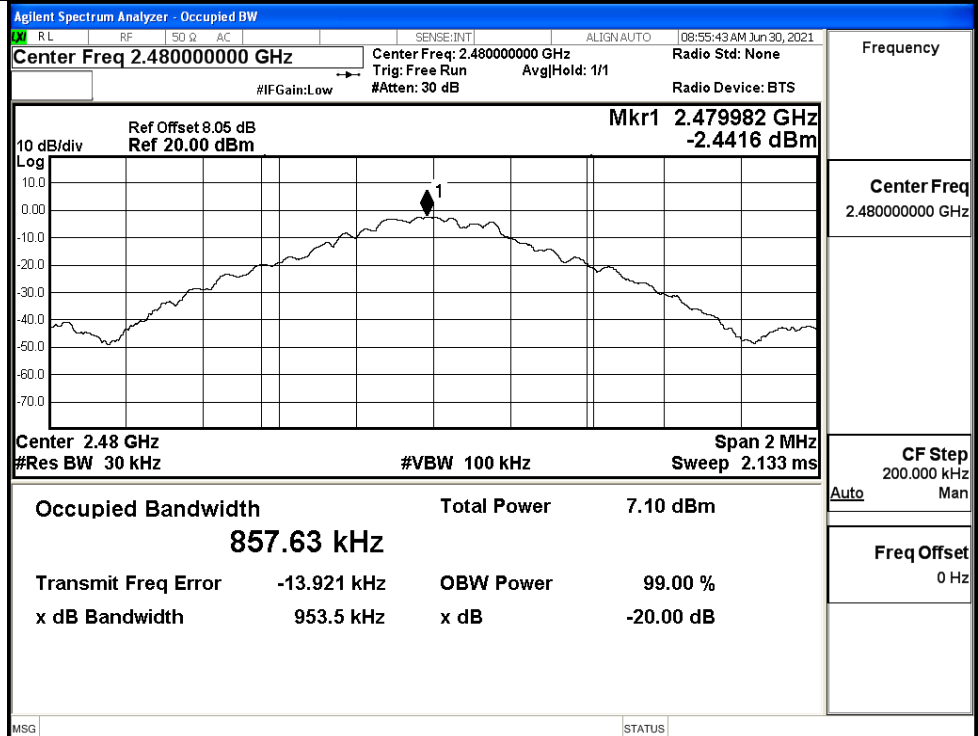
Frequency

Center Freq
2.441000000 GHzCF Step
200.000 kHz
Man

Auto

Freq Offset
0 Hz

GFSK/HCH

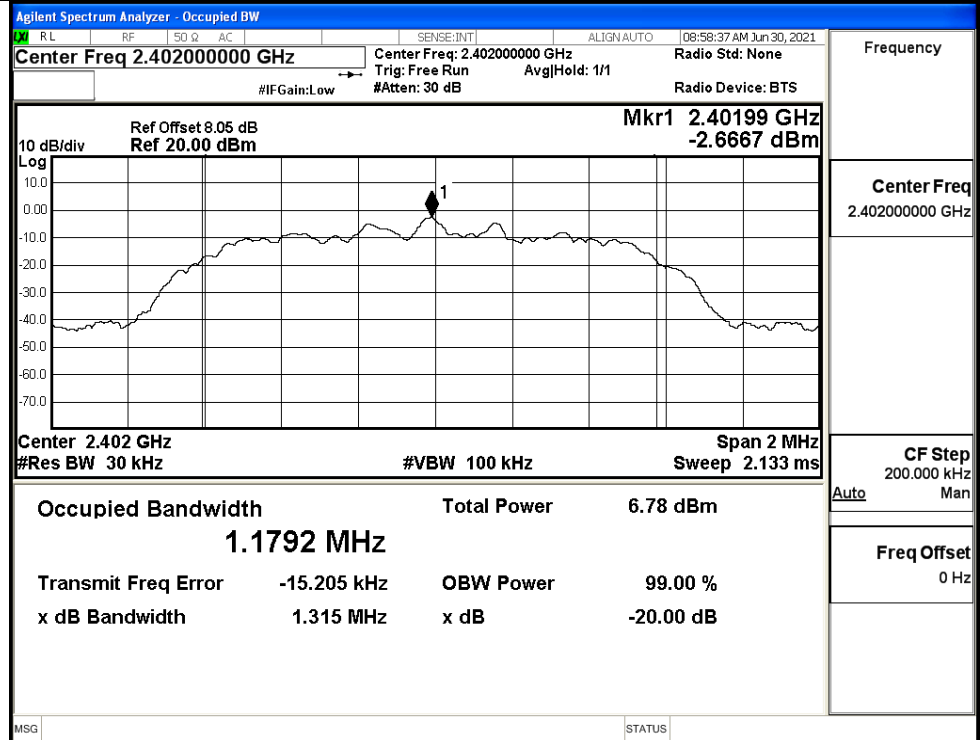


Frequency

Center Freq
2.480000000 GHzCF Step
200.000 kHz
Man

Auto

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH

Frequency

Center Freq

2.40200000 GHz

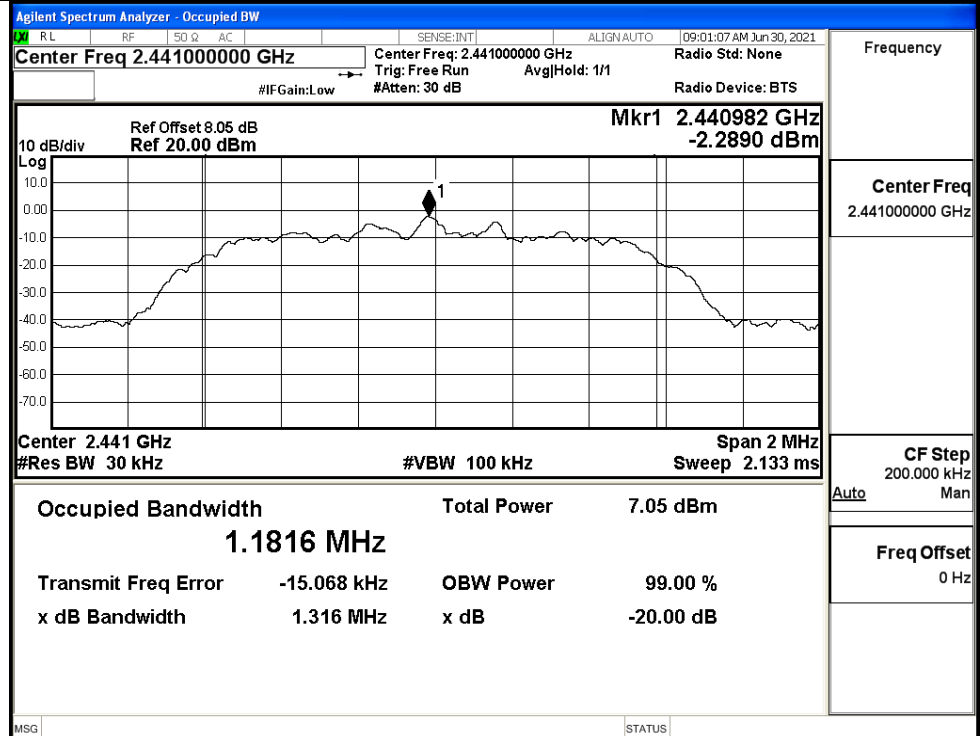
CF Step

200.000 kHz

Man

Freq Offset

0 Hz

 $\pi/4$ DQPSK/MCH

Frequency

Center Freq

2.44100000 GHz

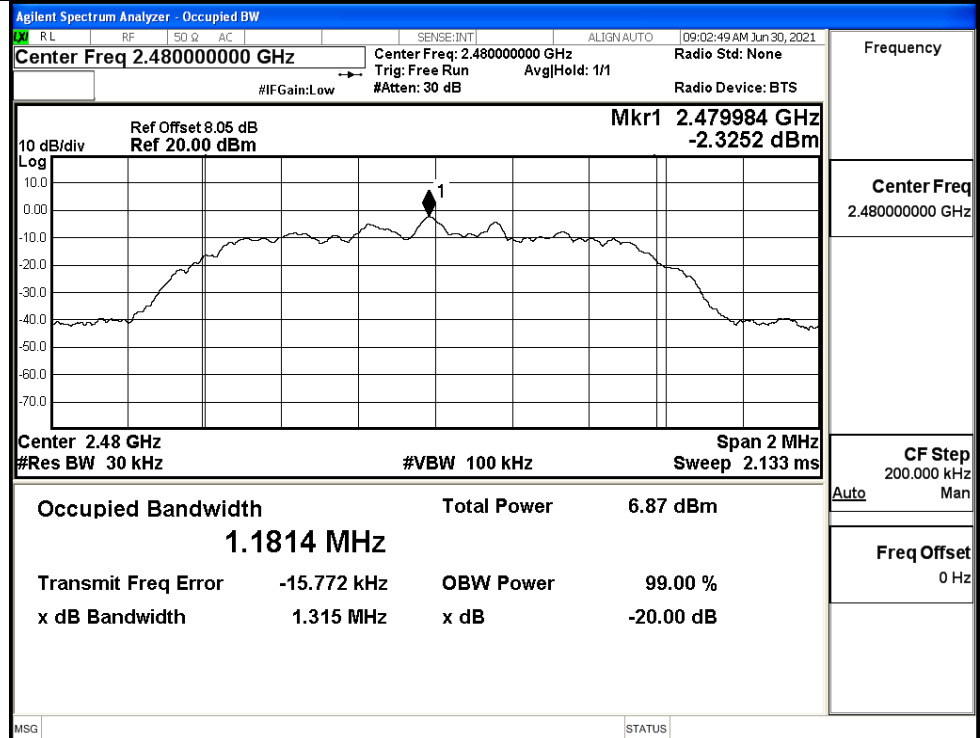
CF Step

200.000 kHz

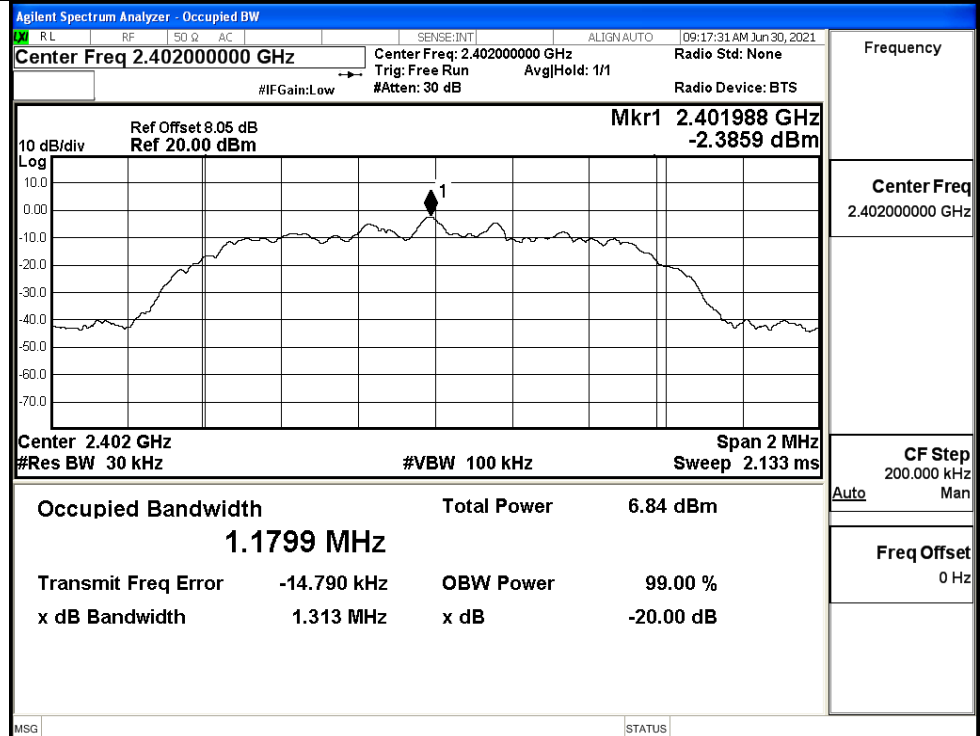
Man

Freq Offset

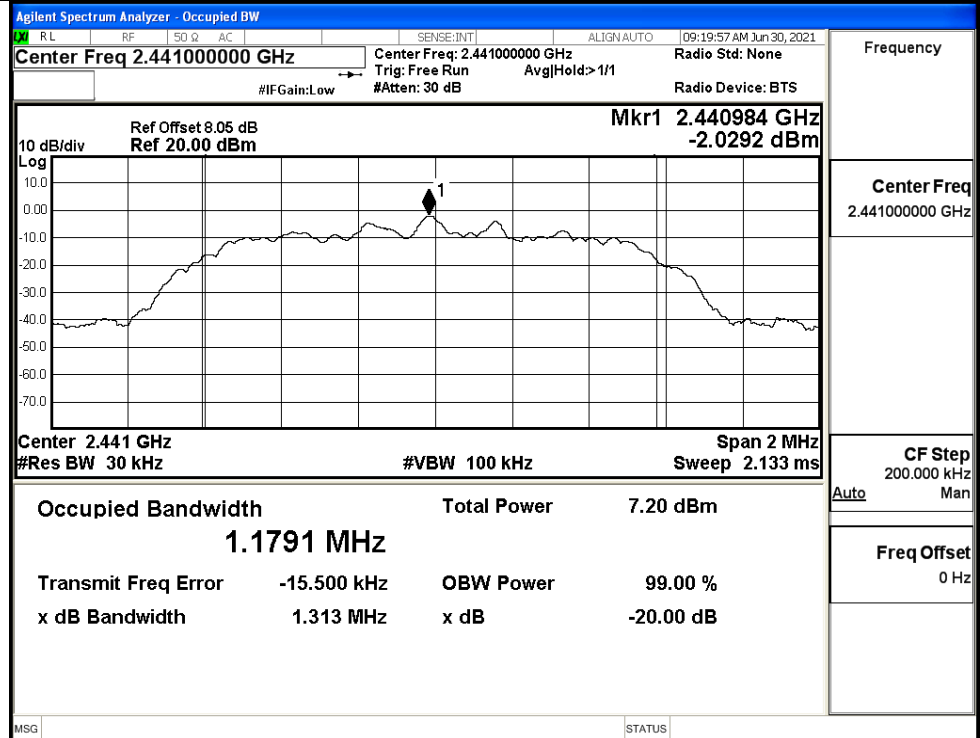
0 Hz

$\pi/4$ DQPSK/HCH

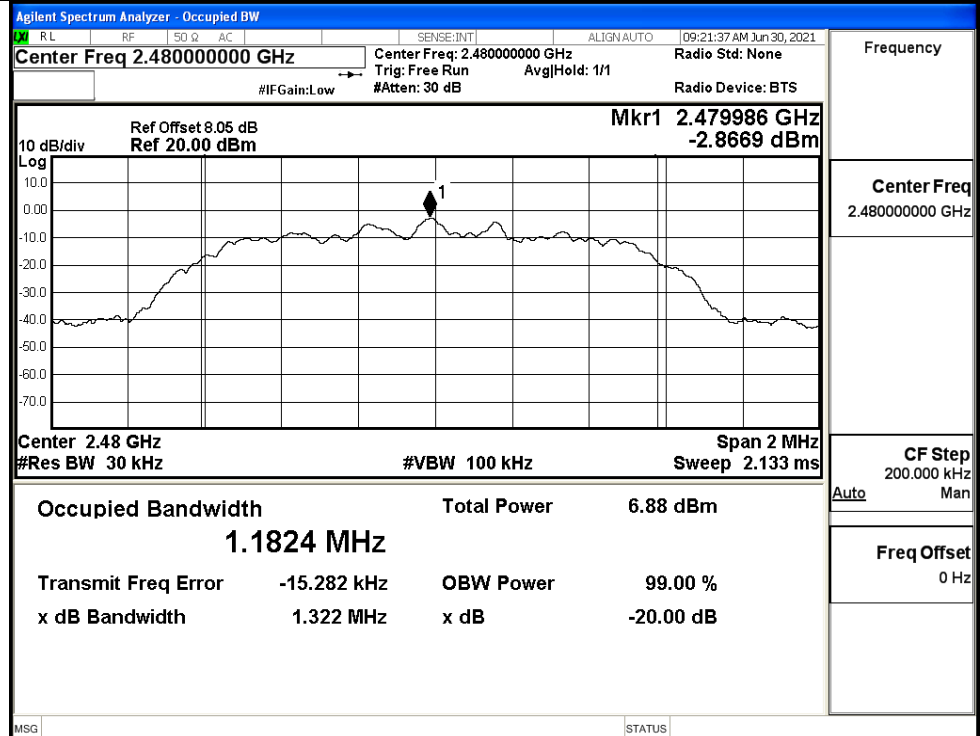
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

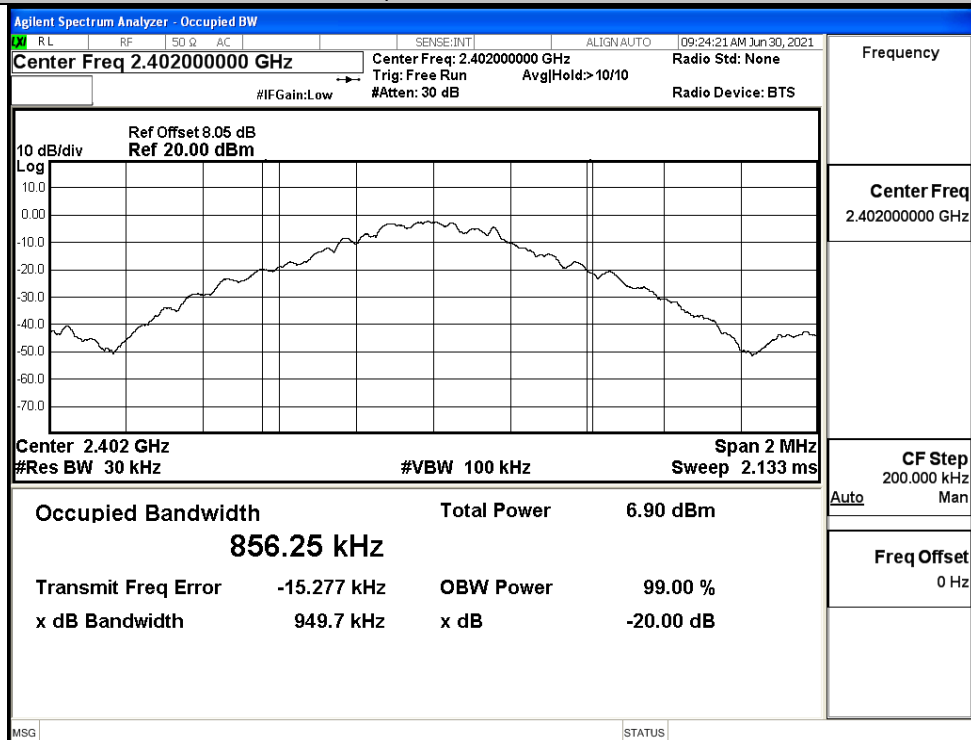


A.3 Occupied Bandwidth

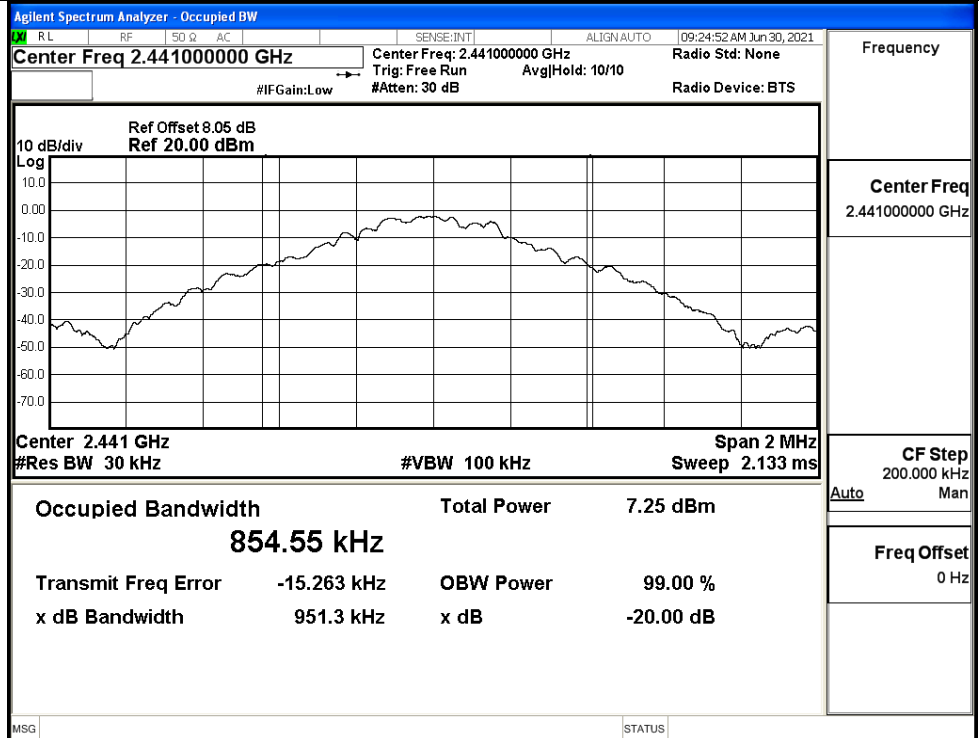
Mode	Channel.	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.85625	Not Specified	PASS
	MCH	0.85455	Not Specified	PASS
	HCH	0.85541	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.1789	Not Specified	PASS
	MCH	1.1793	Not Specified	PASS
	HCH	1.1838	Not Specified	PASS
8DPSK	LCH	1.1795	Not Specified	PASS
	MCH	1.1814	Not Specified	PASS
	HCH	1.1809	Not Specified	PASS

Test Graphs

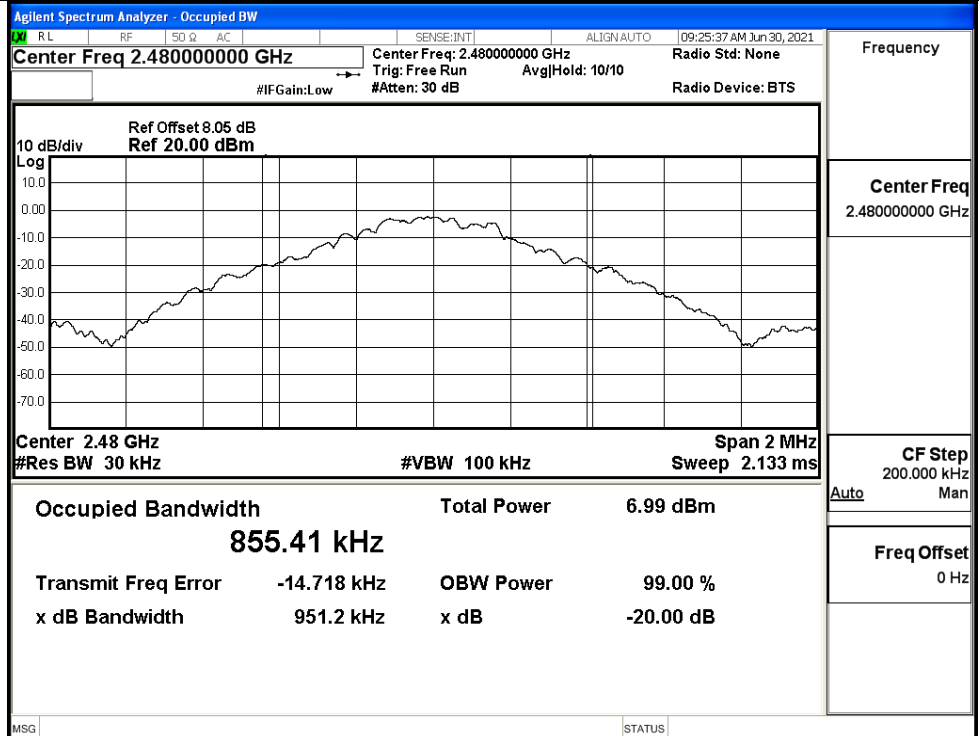
GFSK/LCH

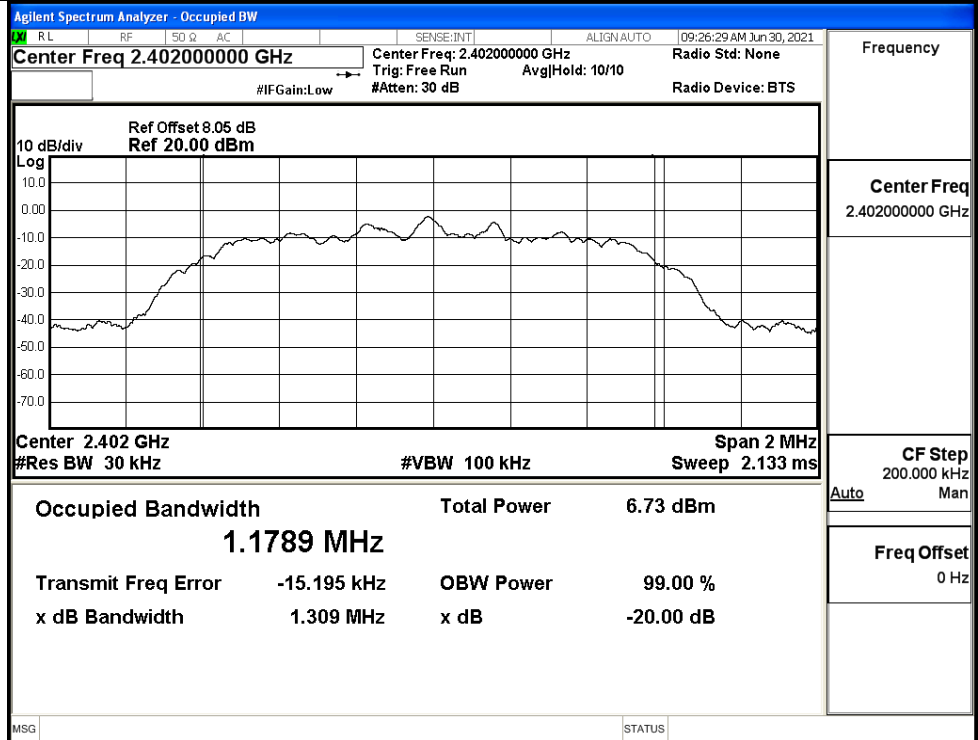
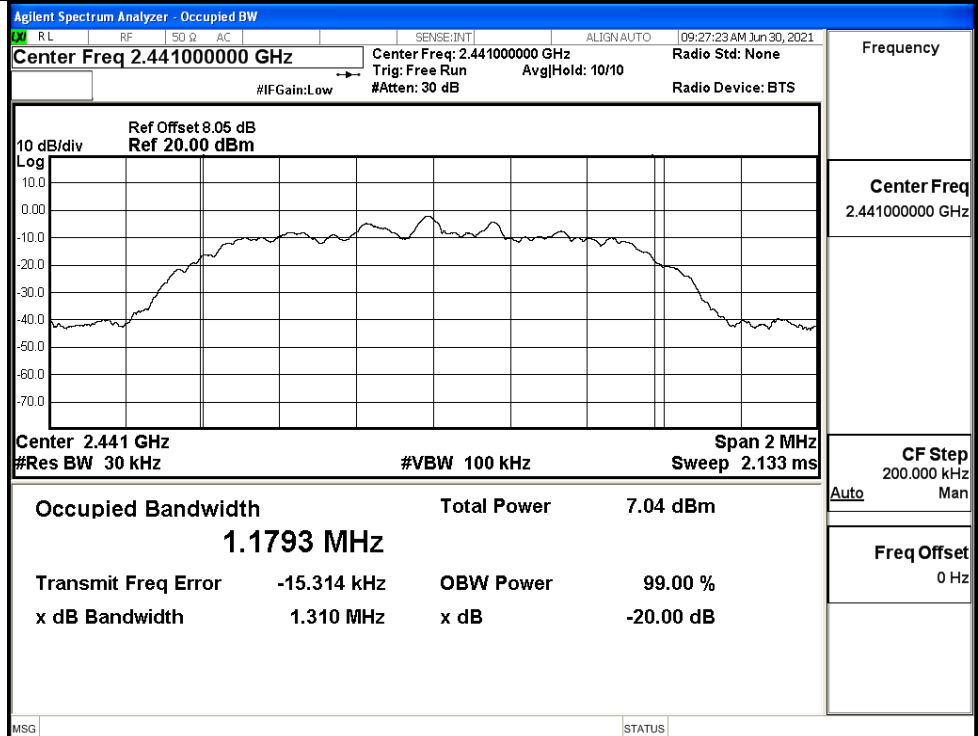


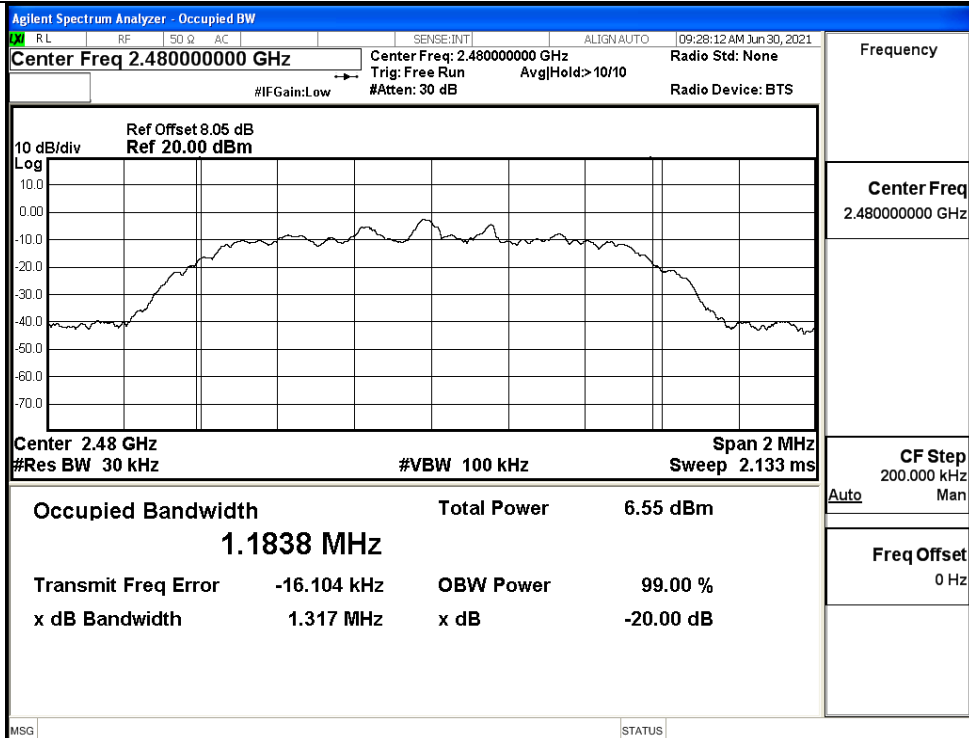
GFSK/MCH



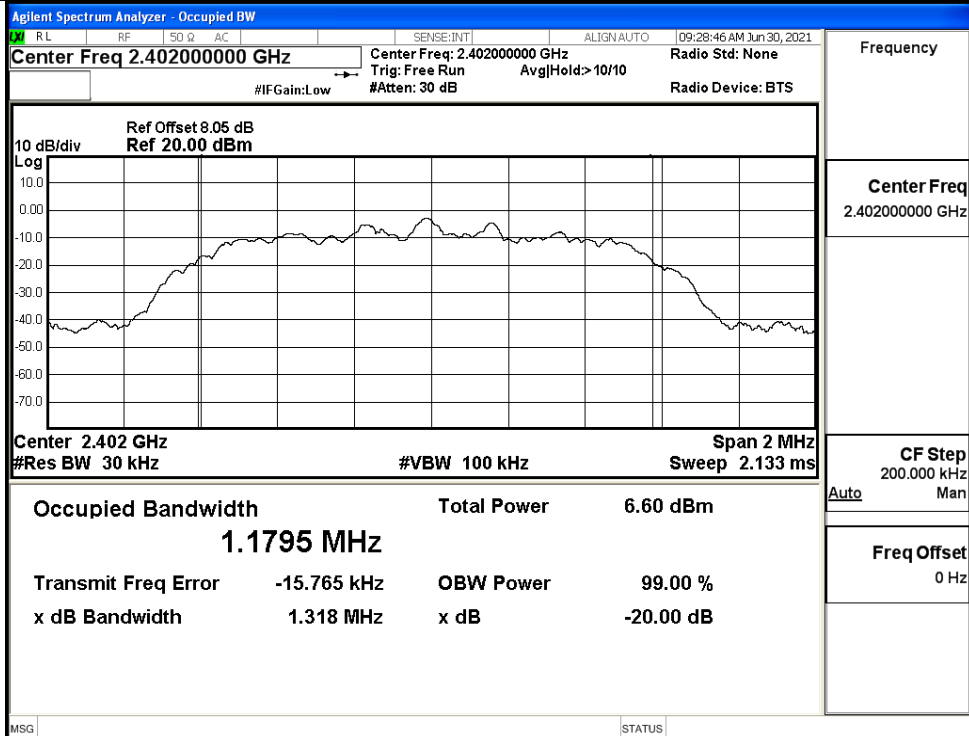
GFSK/HCH



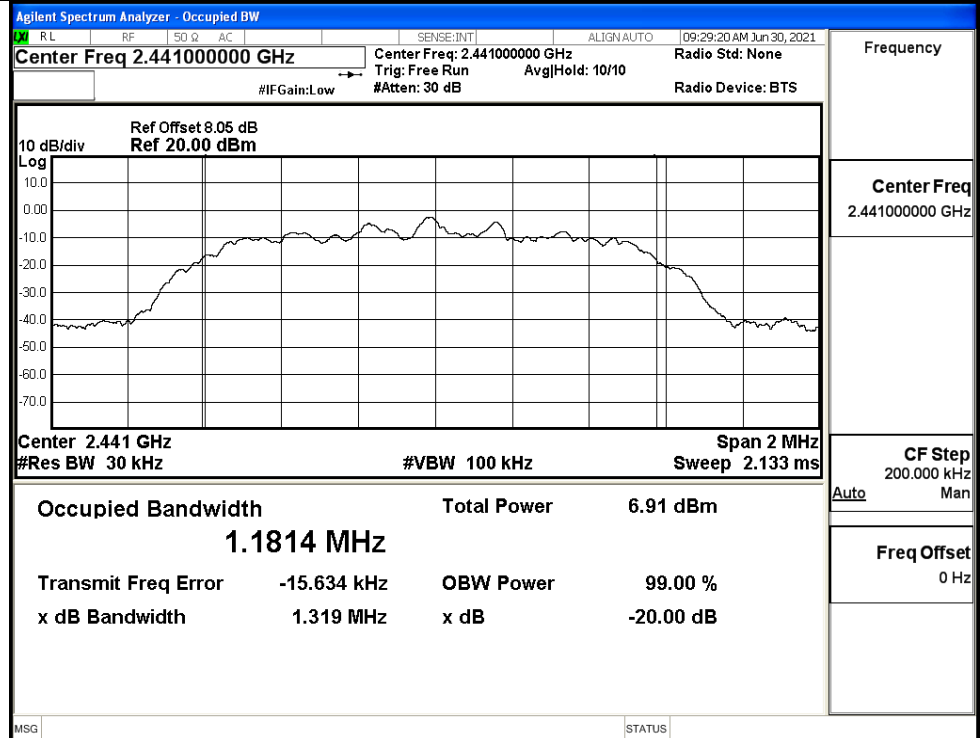
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

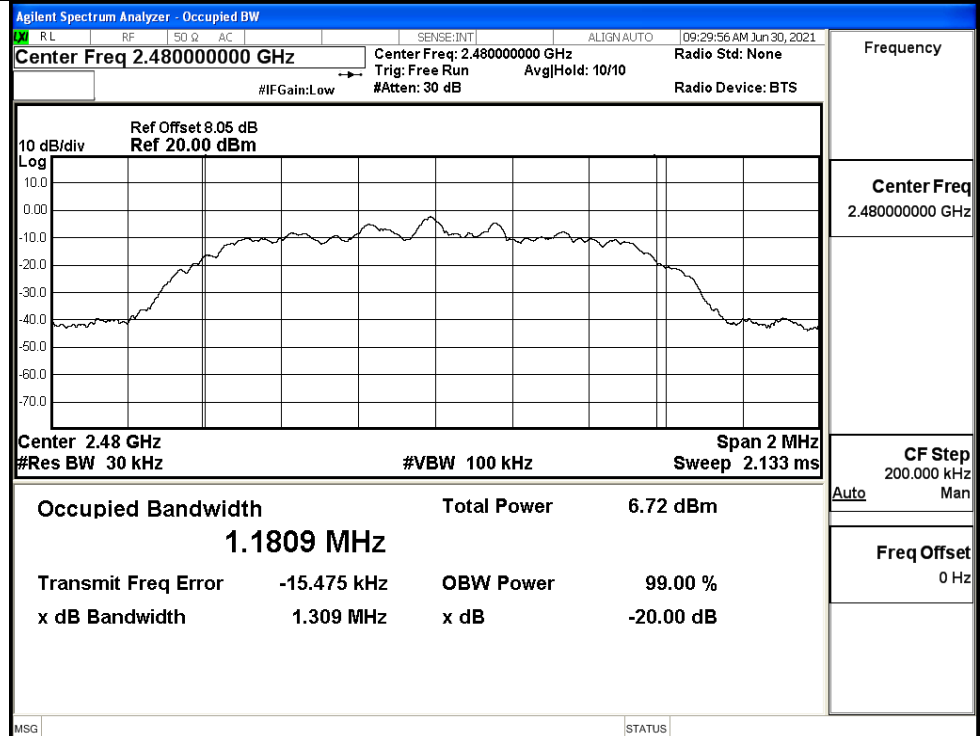
8DPSK/LCH



8DPSK/MCH



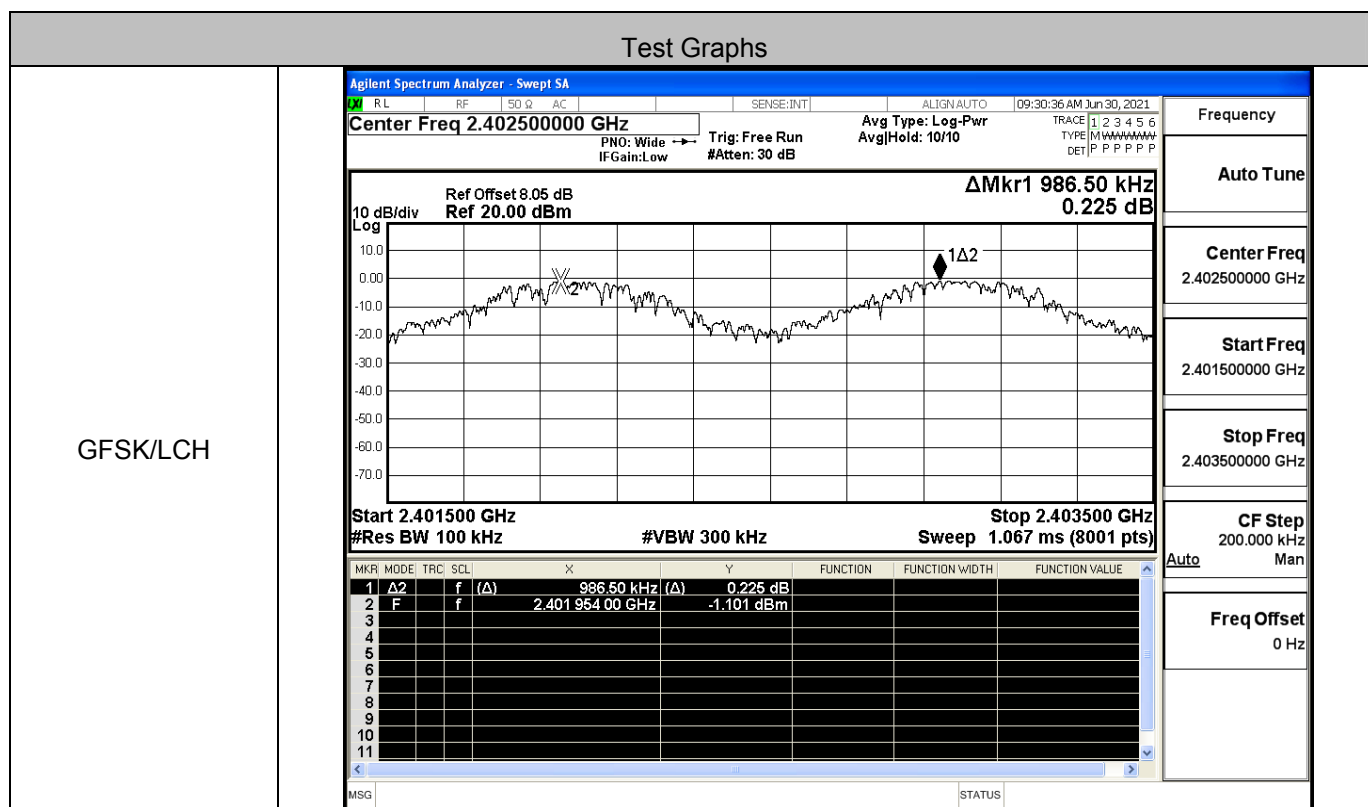
8DPSK/HCH



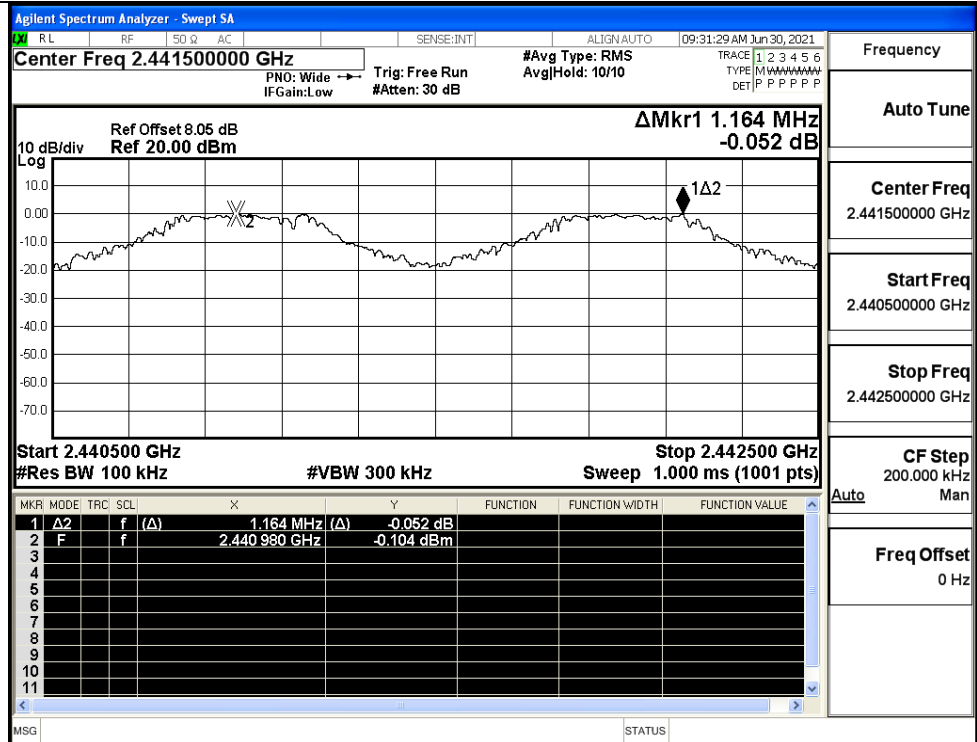
A.4 Carrier Frequency Separation

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
8DPSK	LCH	1.148	0.881	PASS
	MCH	0.972	0.881	PASS
	HCH	0.970	0.881	PASS

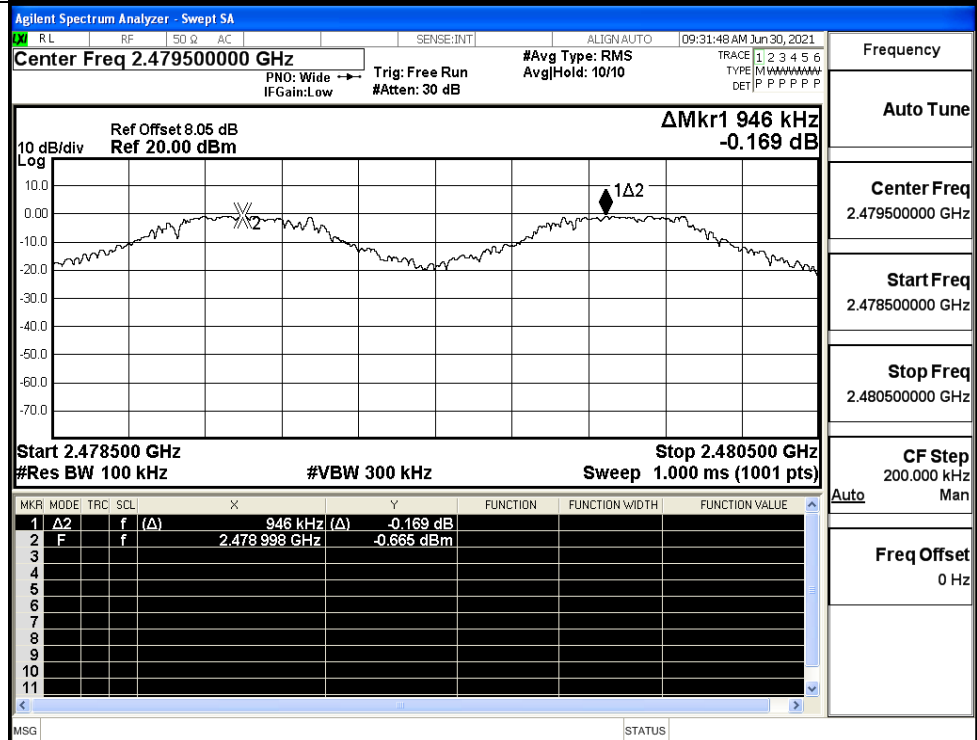
Test Graphs

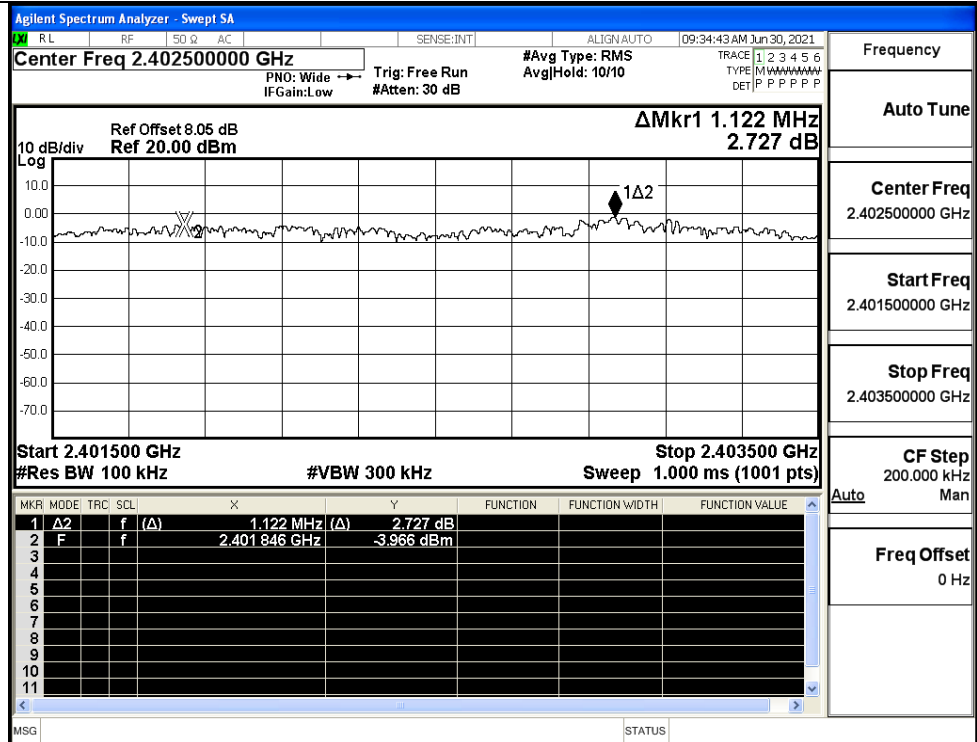
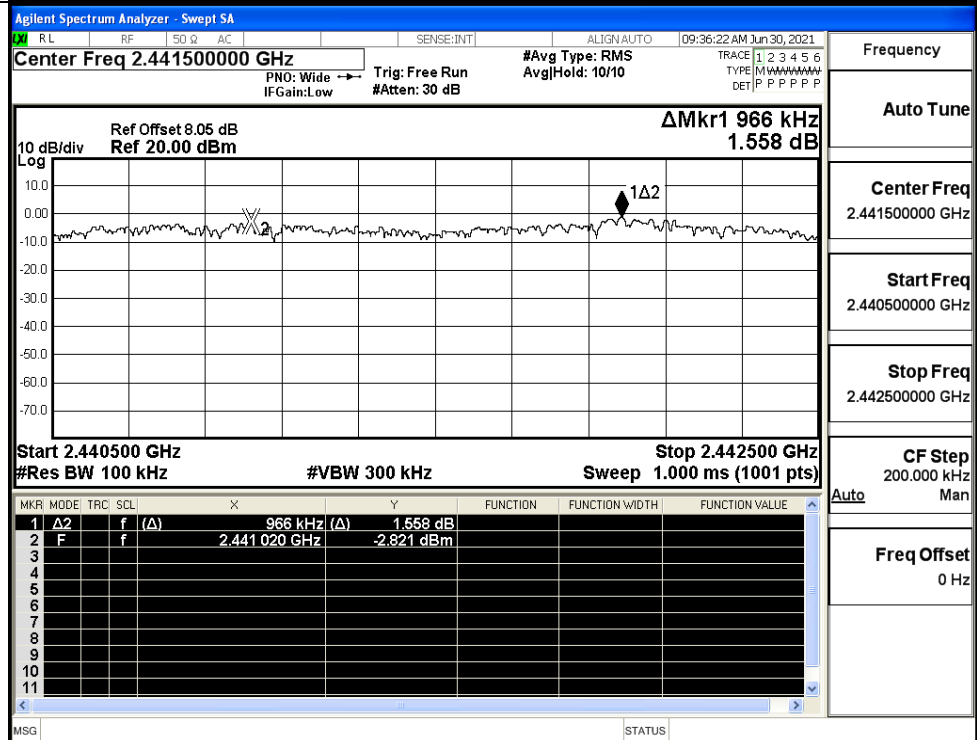


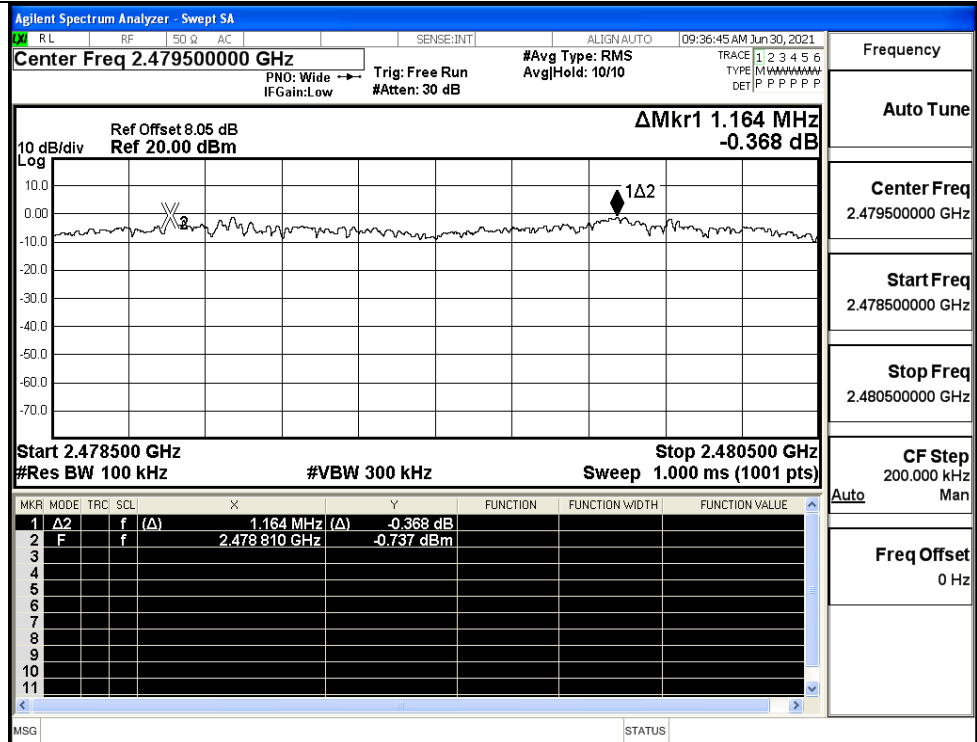
GFSK/MCH



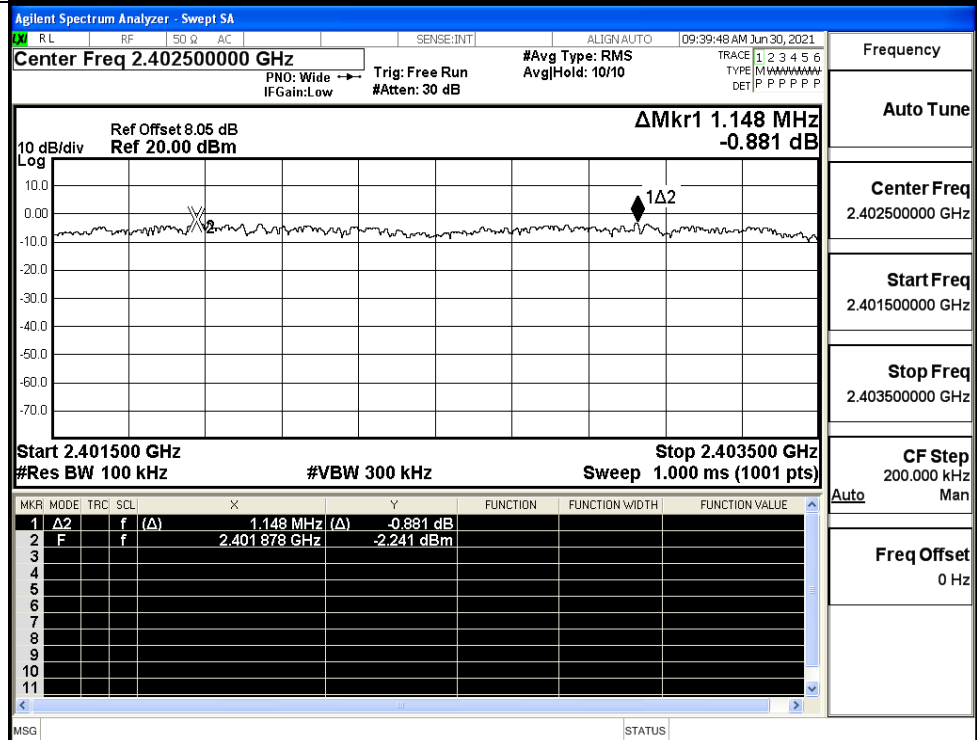
GFSK/HCH



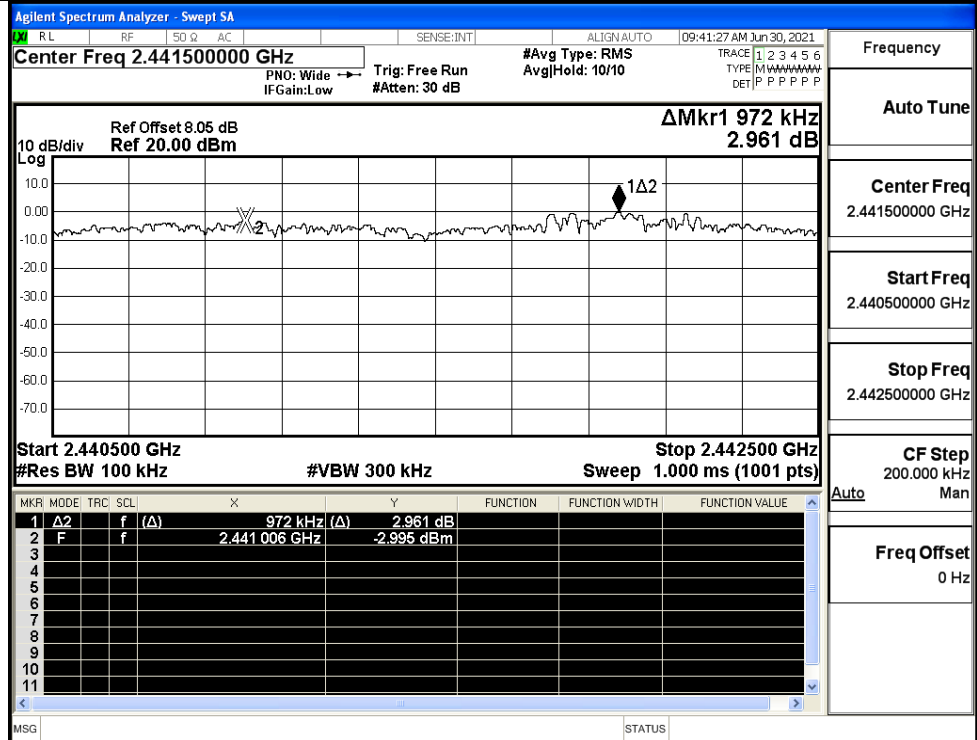
π /4DQPSK/LCH π /4DQPSK/MCH

π /4DQPSK/HCH

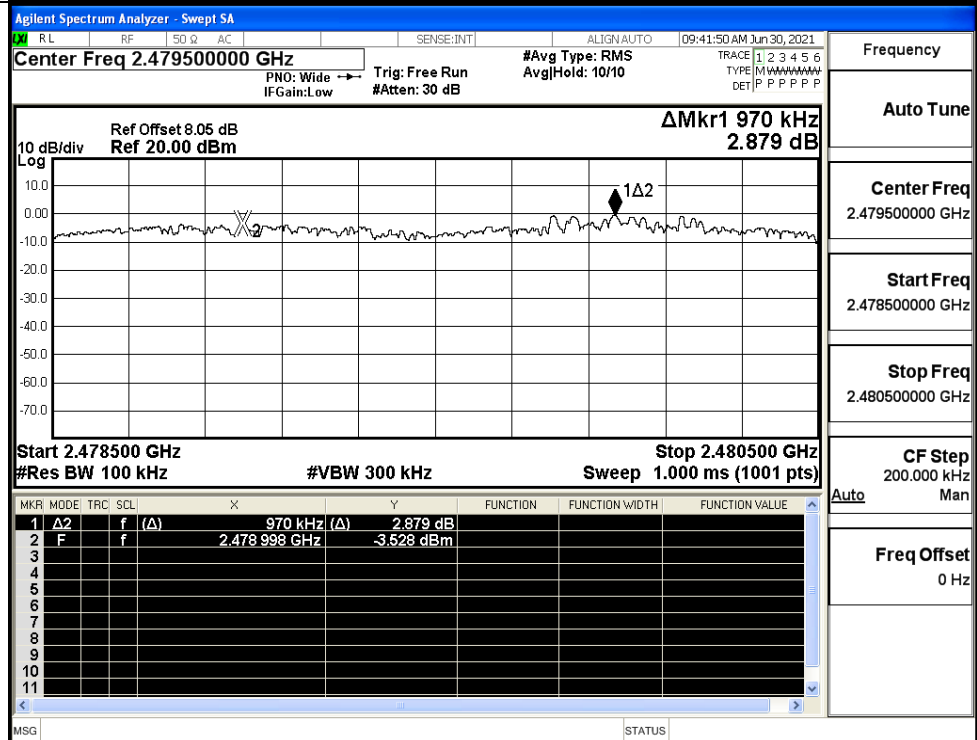
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

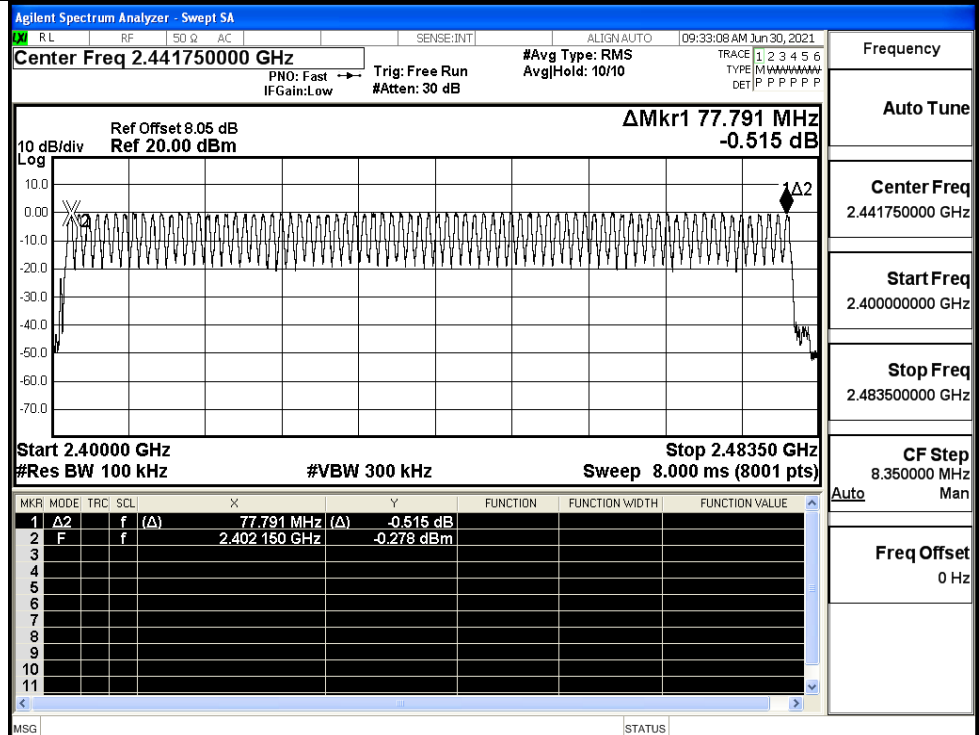
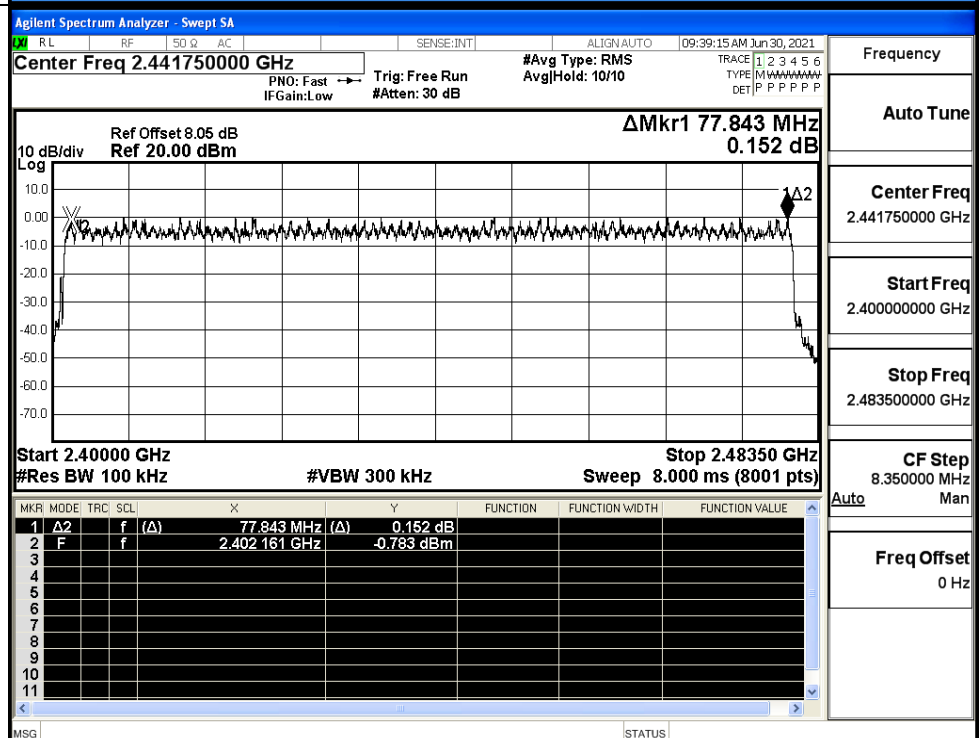


A.5 Hopping Channel Number

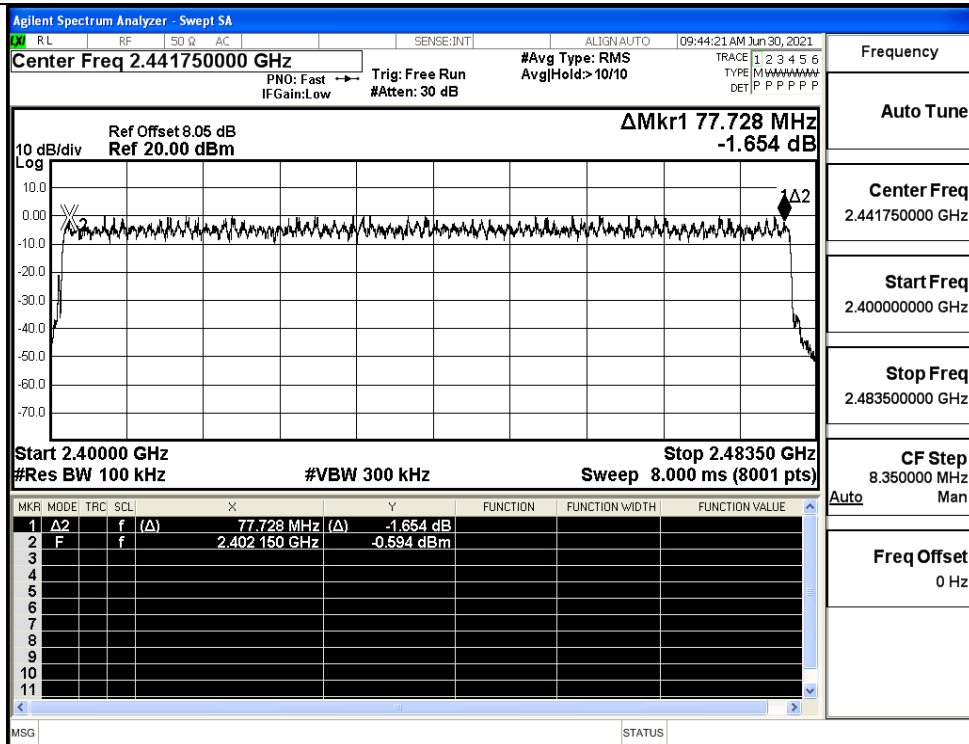
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

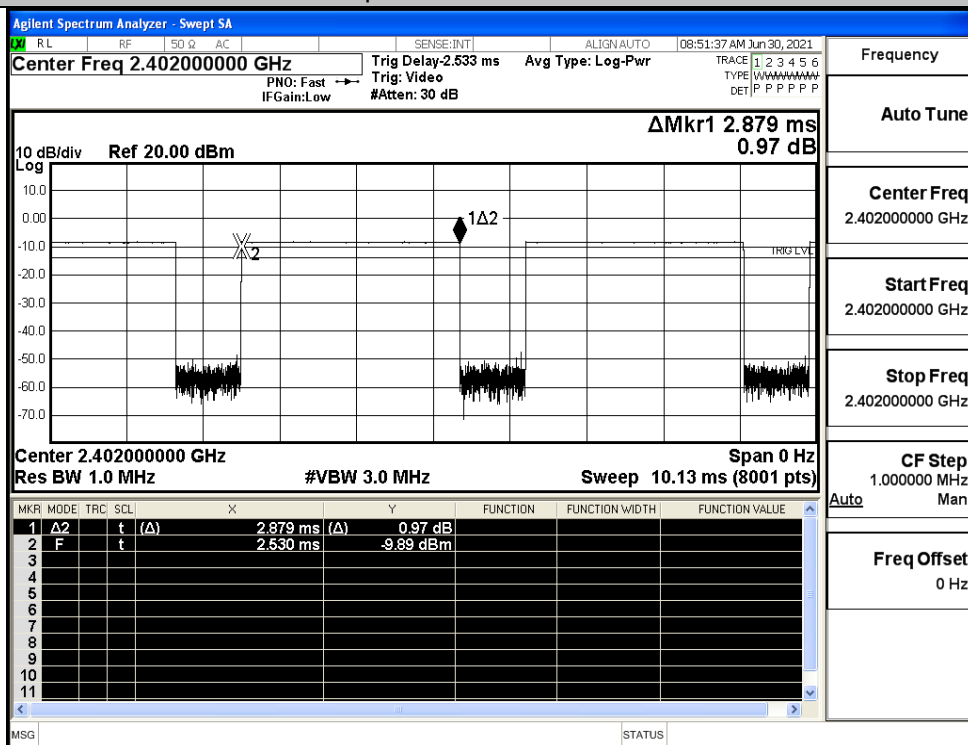


A.6 Dwell Time

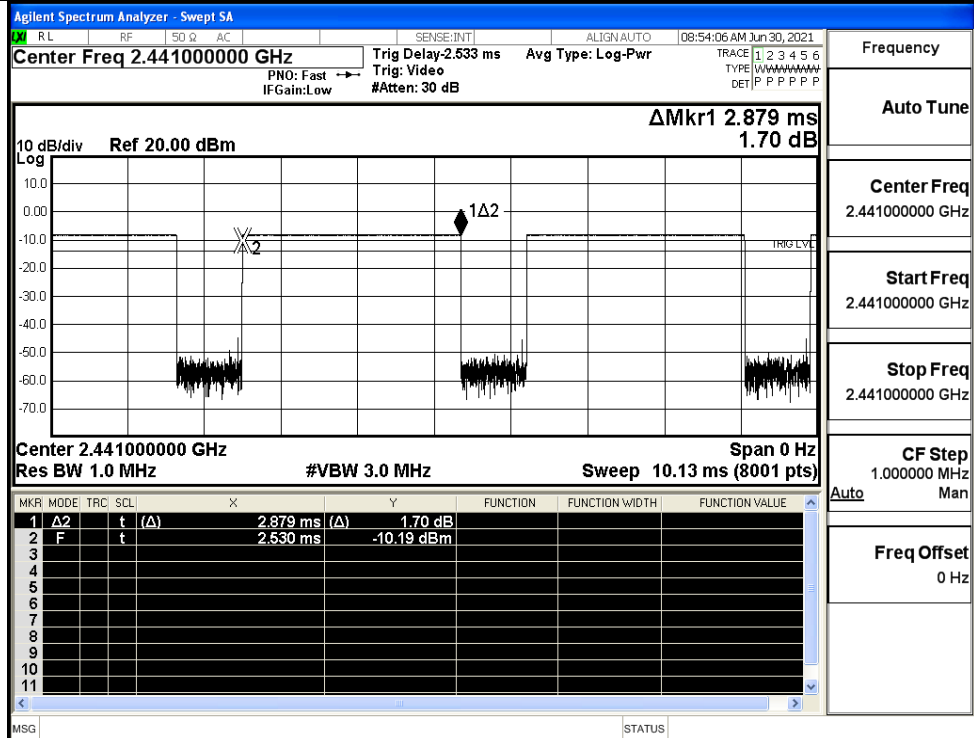
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.308	0.4	PASS
	2DH5	HCH	2.88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

Test Graphs

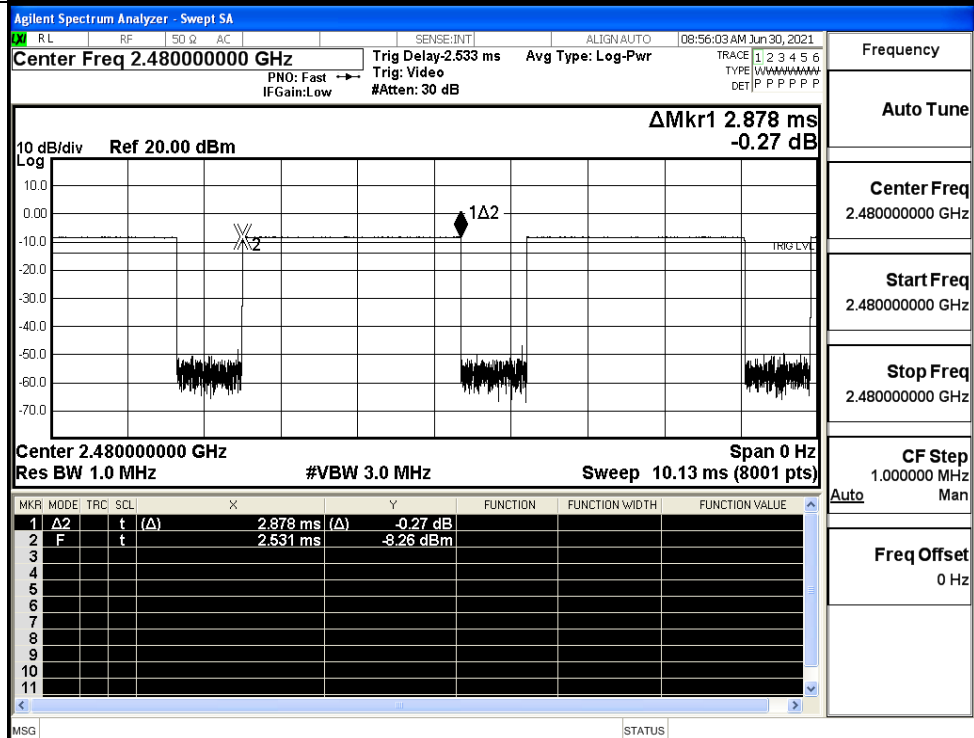
GFSK_DH5/LCH



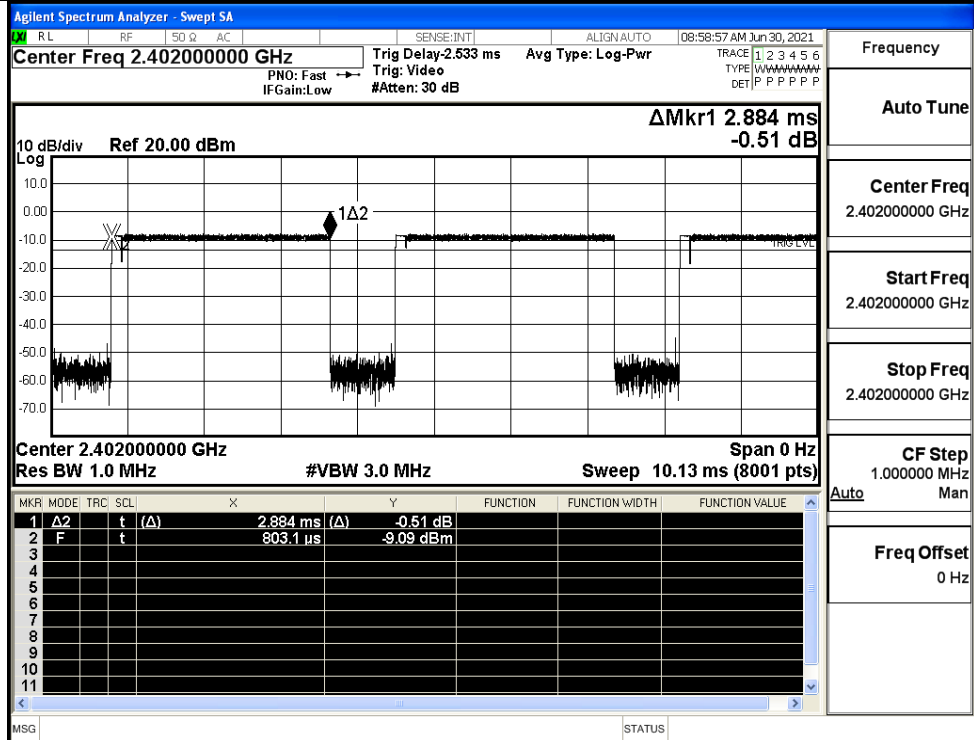
GFSK_DH5/MCH



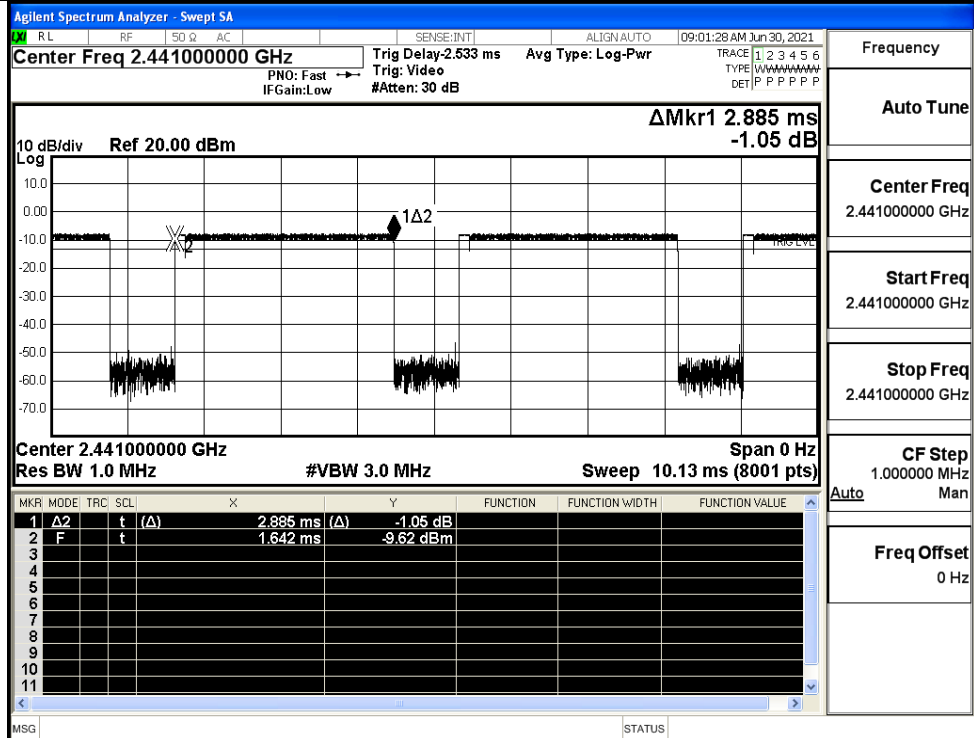
GFSK_DH5/HCH



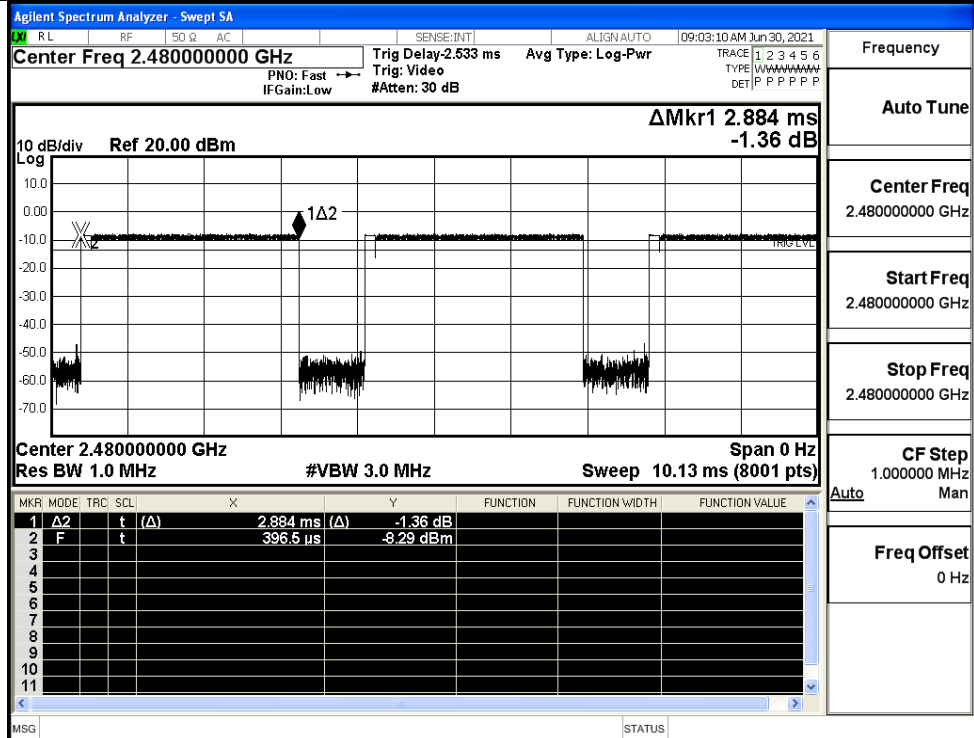
$\pi/4$ DQPSK
_2DH5/LCH



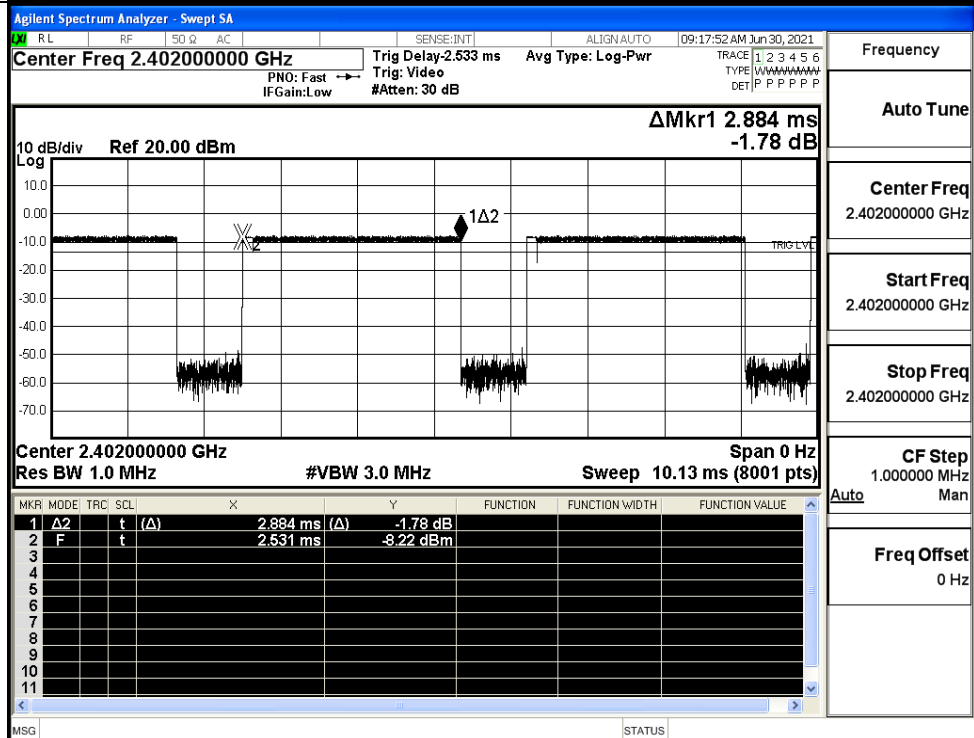
$\pi/4$ DQPSK
_2DH5/MCH



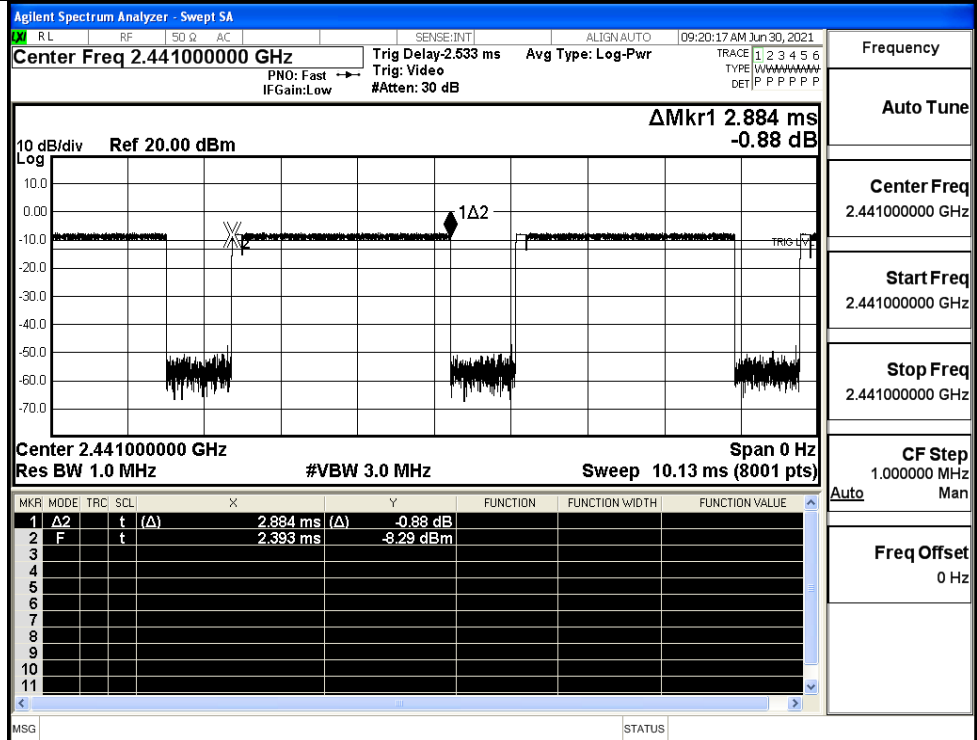
$\pi/4$ DQPSK
_2DH5/HCH



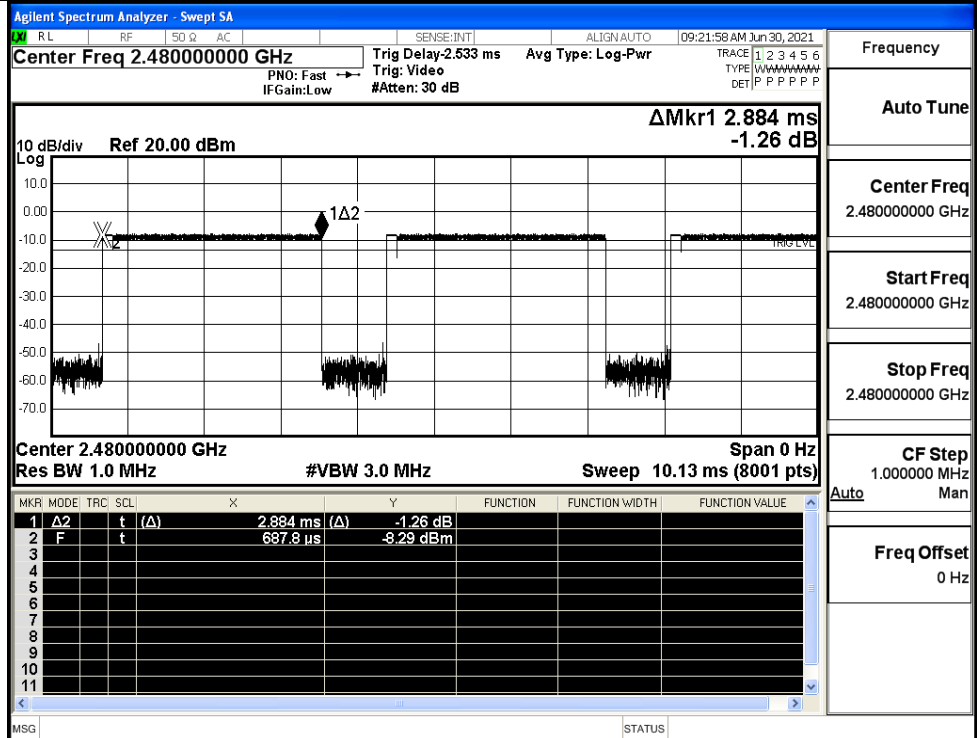
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



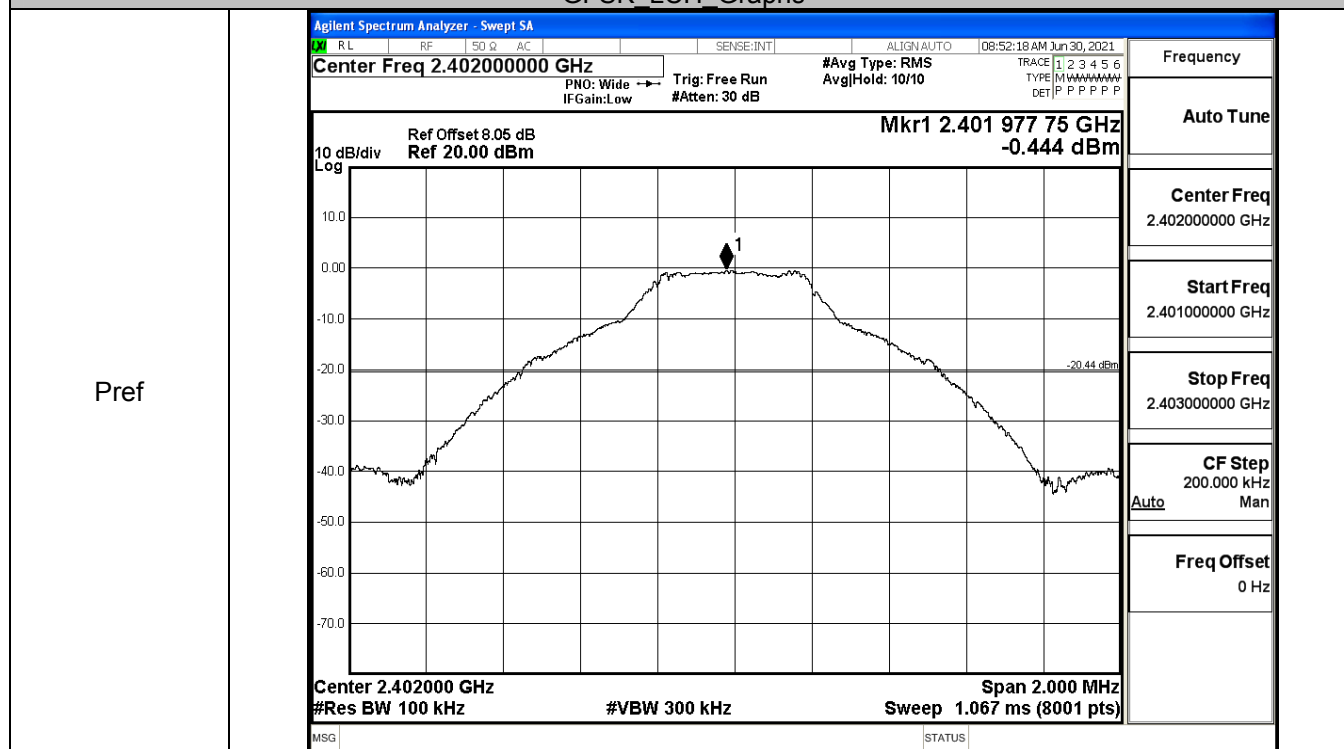
8DPSK_3DH5/HCH



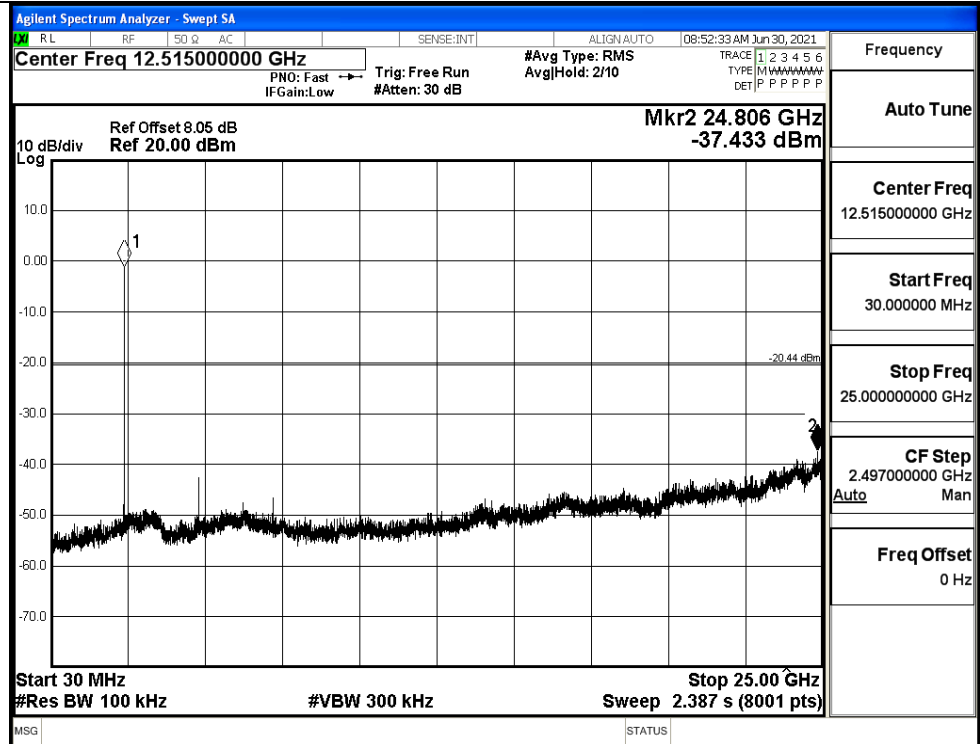
A.7 RF Conducted Spurious Emissions

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
8DPSK	LCH	-0.521	-37.234	-20.521	PASS
	MCH	-0.046	-37.843	-20.046	PASS
	HCH	-0.207	-37.204	-20.207	PASS

GFSK LCH Graphs

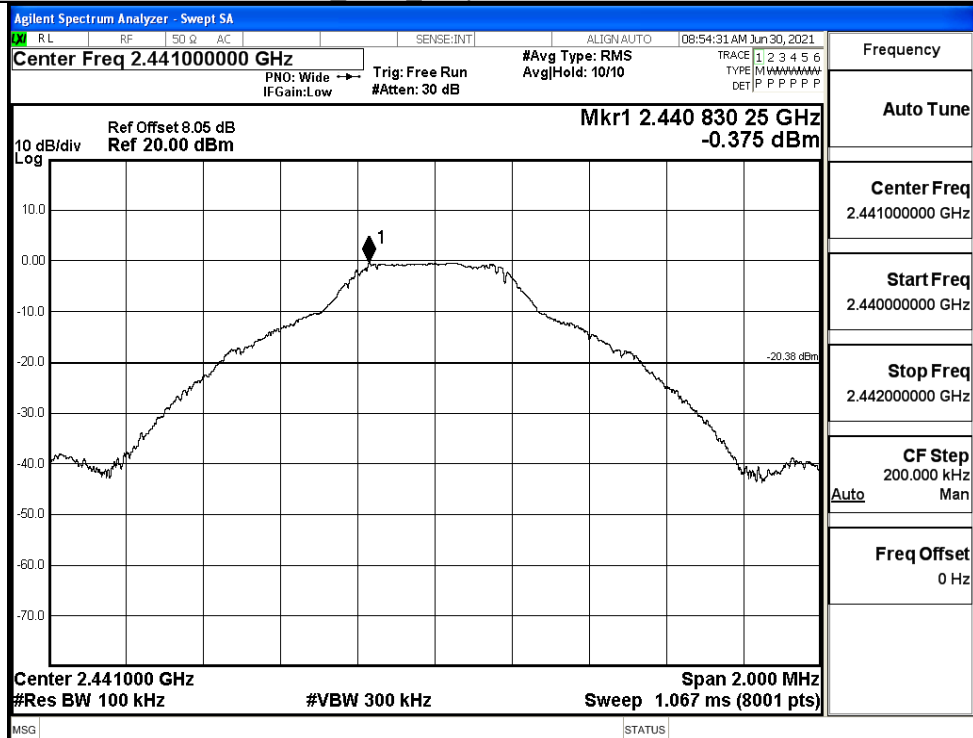


Puw

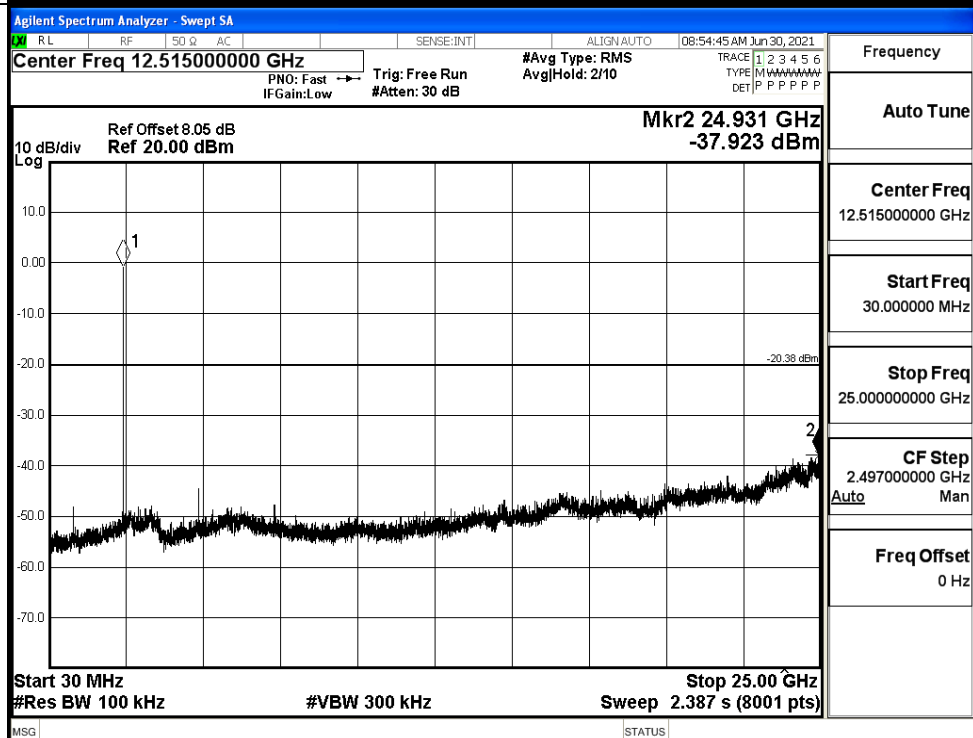


GFSK_MCH_Graphs

Pref

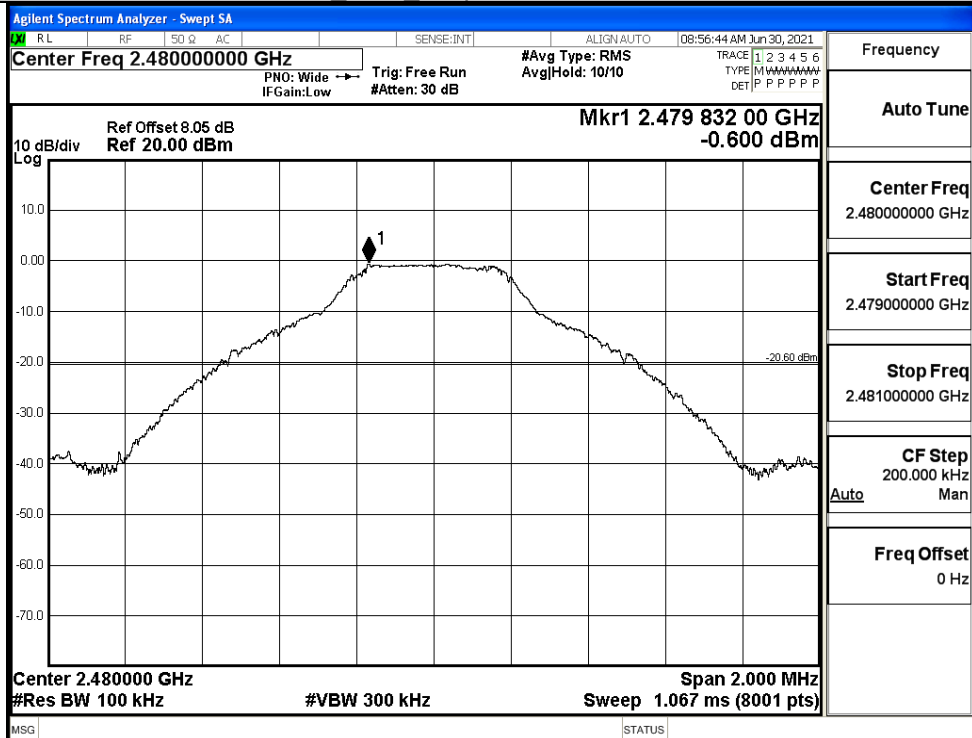


Puw

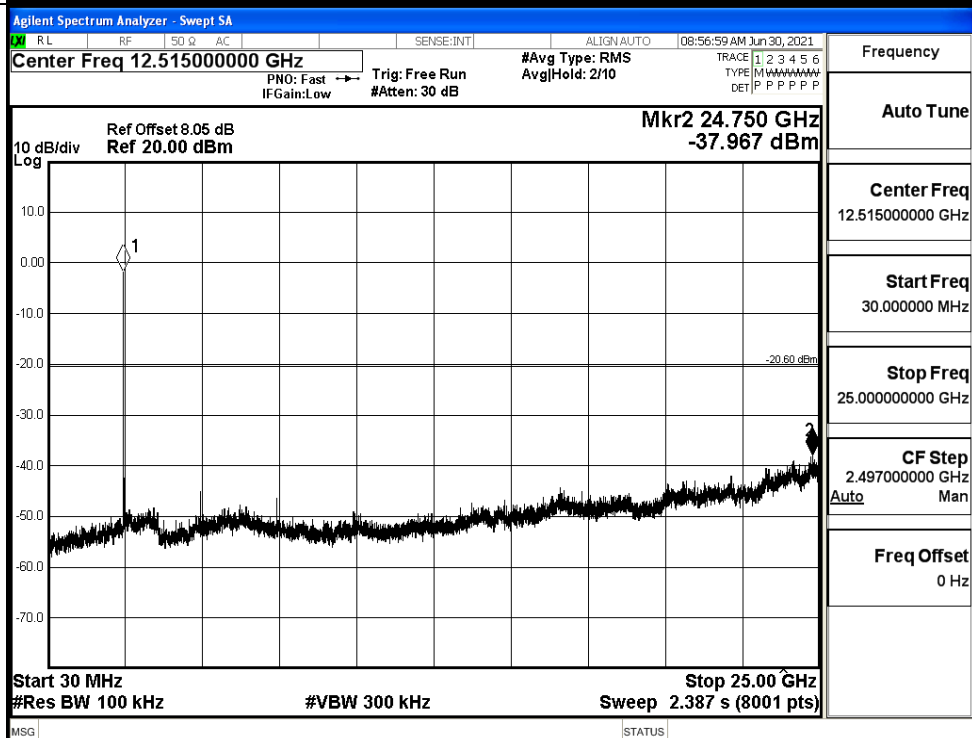


GFSK_HCH_Graphs

Pref

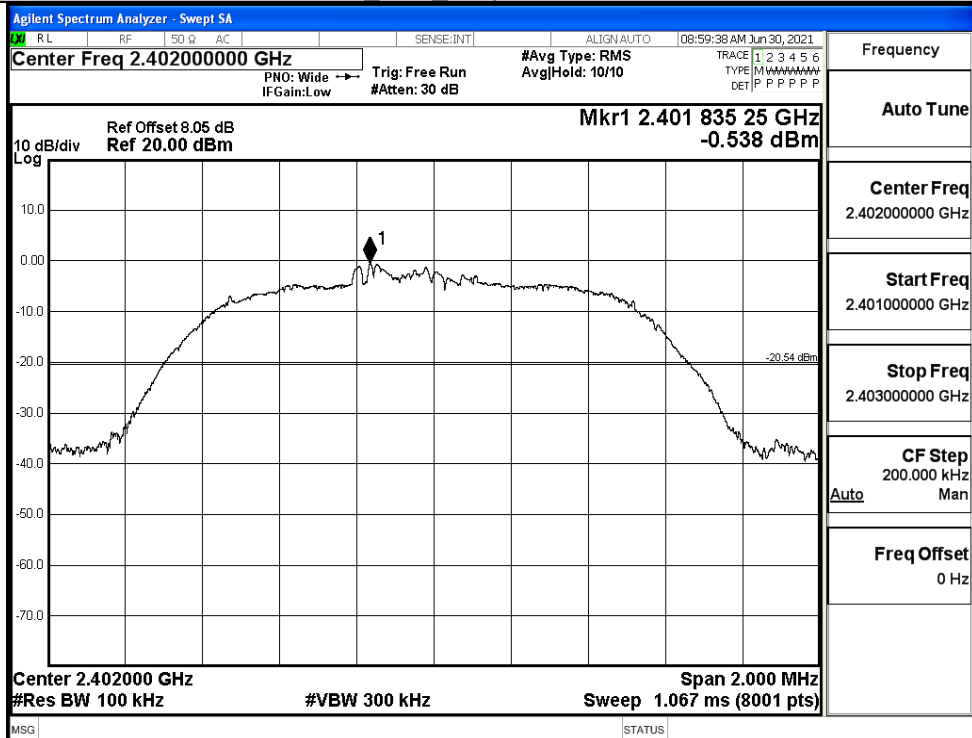


Puw

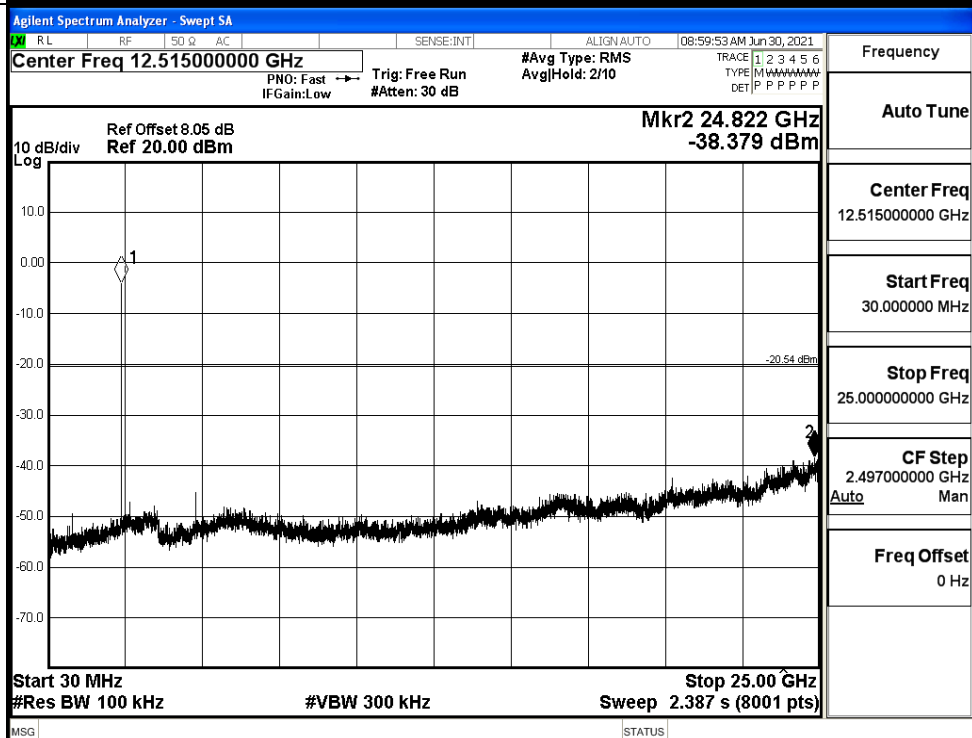


$\pi/4$ DQPSK_LCH_Graphs

Pref

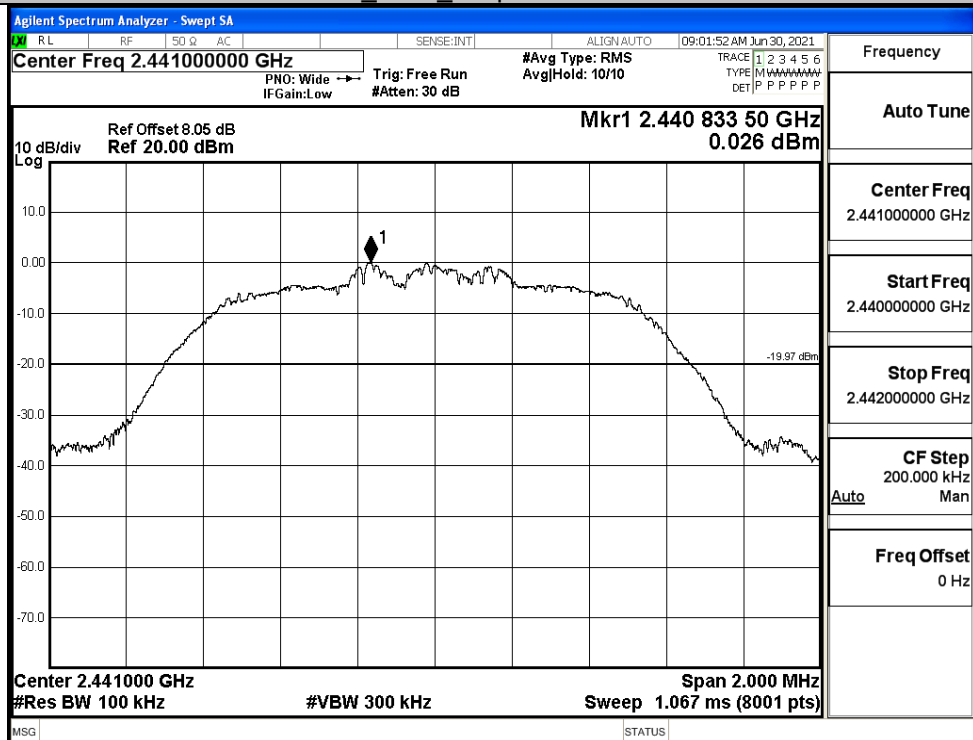


Puw

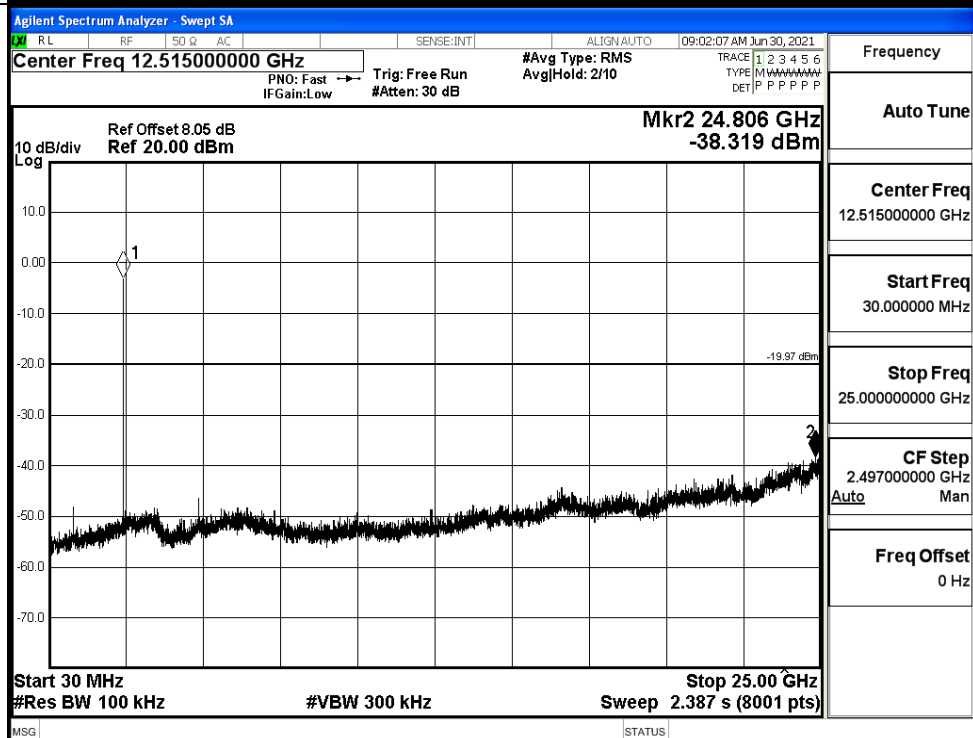


π /4DQPSK_MCH_Graphs

Pref

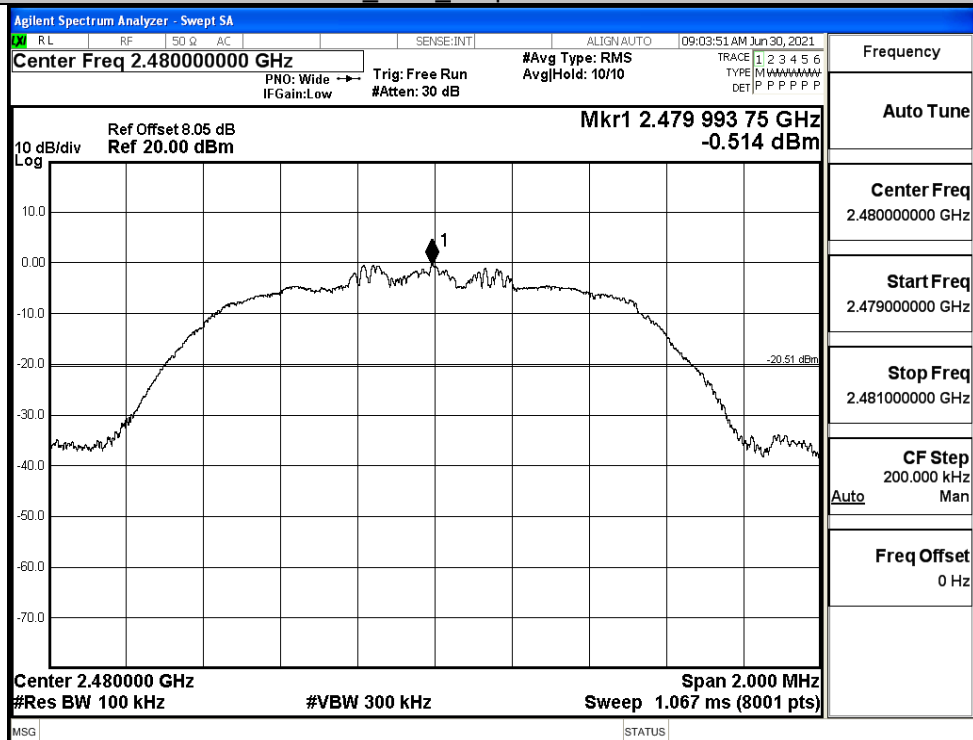


Puw

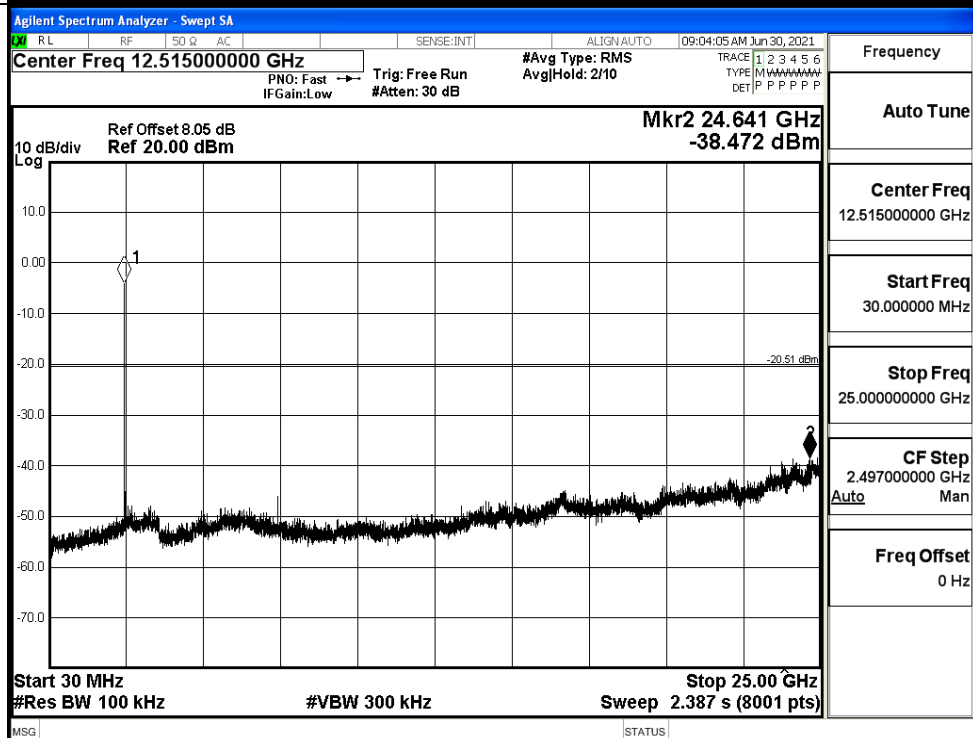


$\pi/4$ DQPSK_HCH_Graphs

Pref

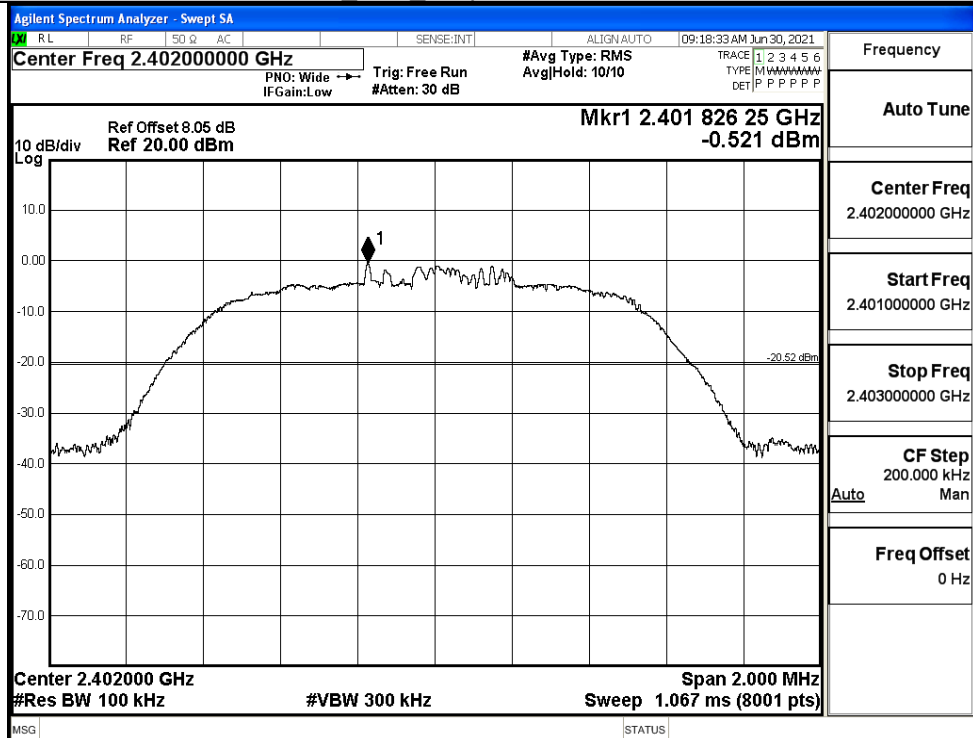


Puw

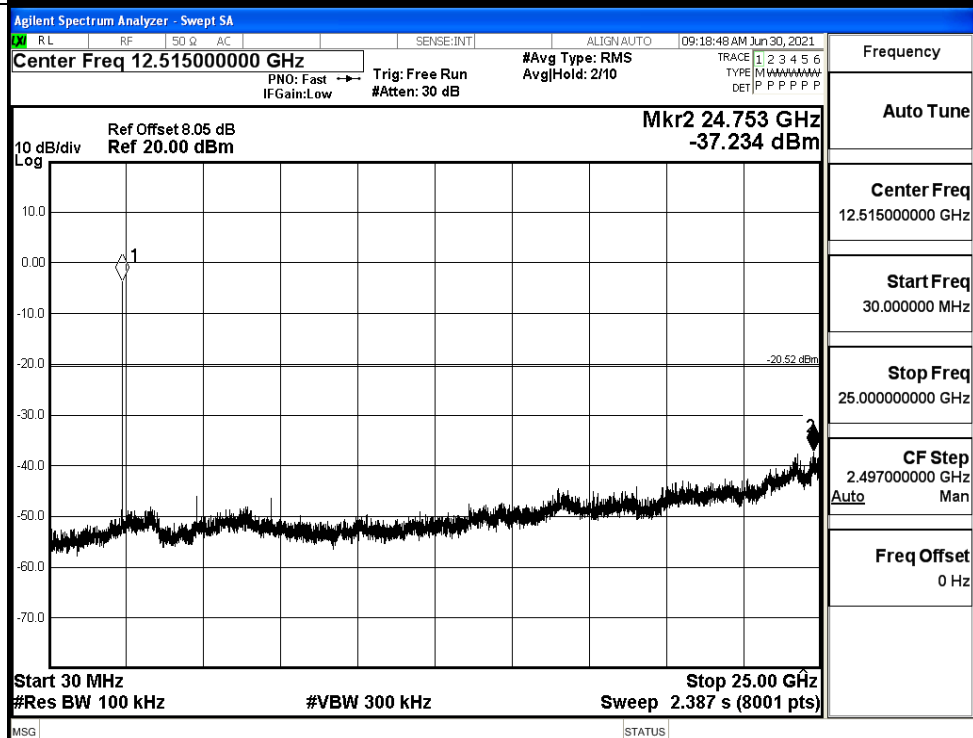


8DPSK_LCH_Graphs

Pref

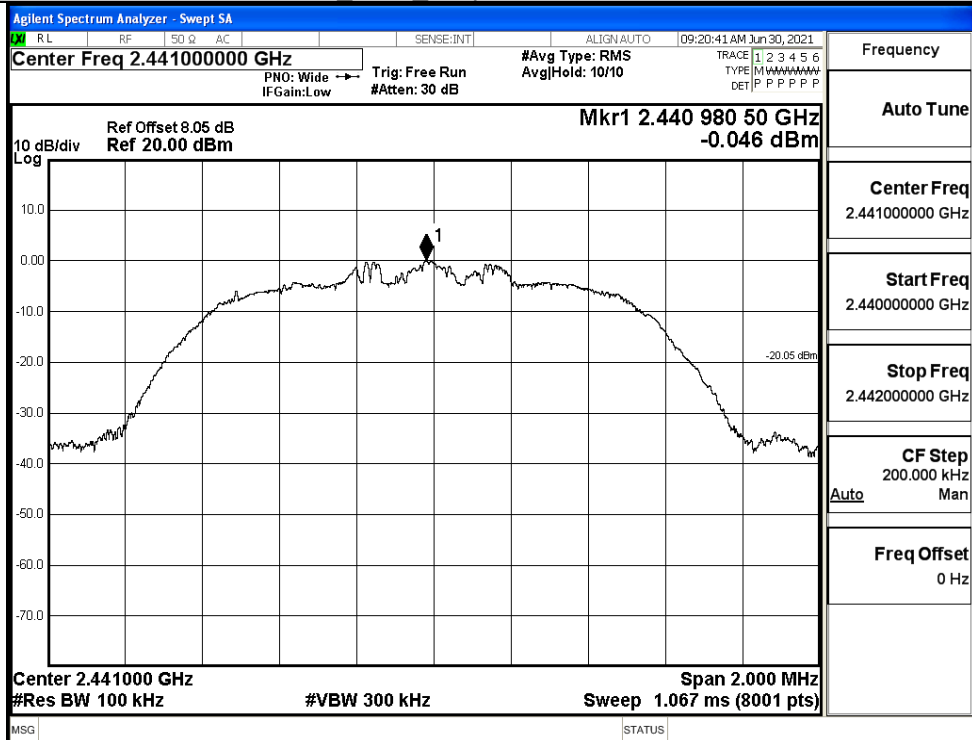


Puw

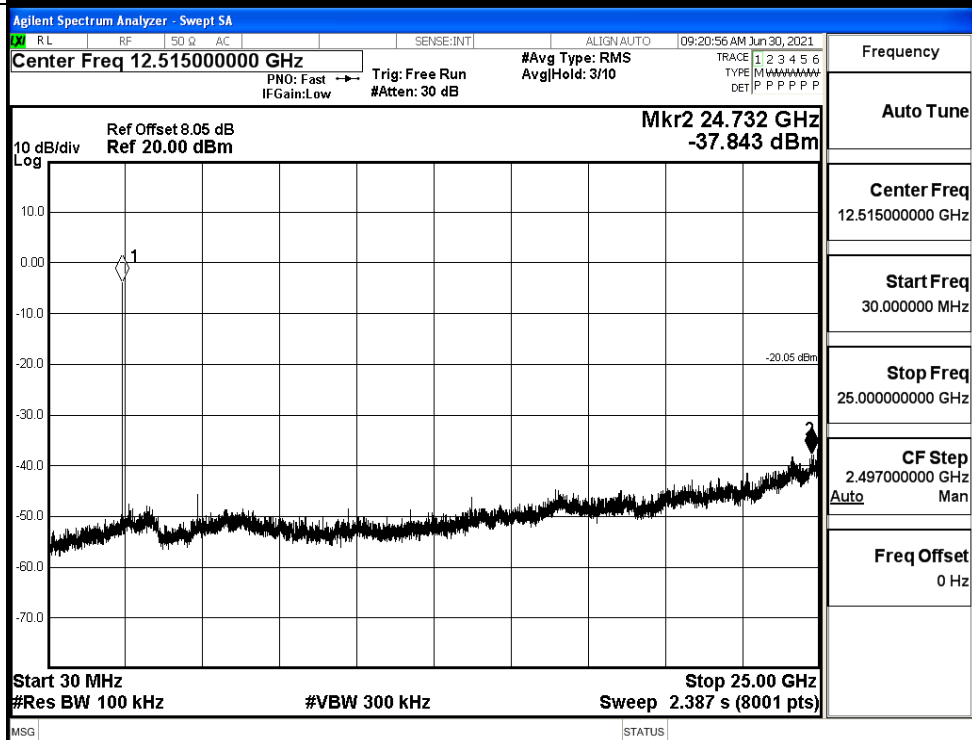


8DPSK_MCH_Graphs

Pref

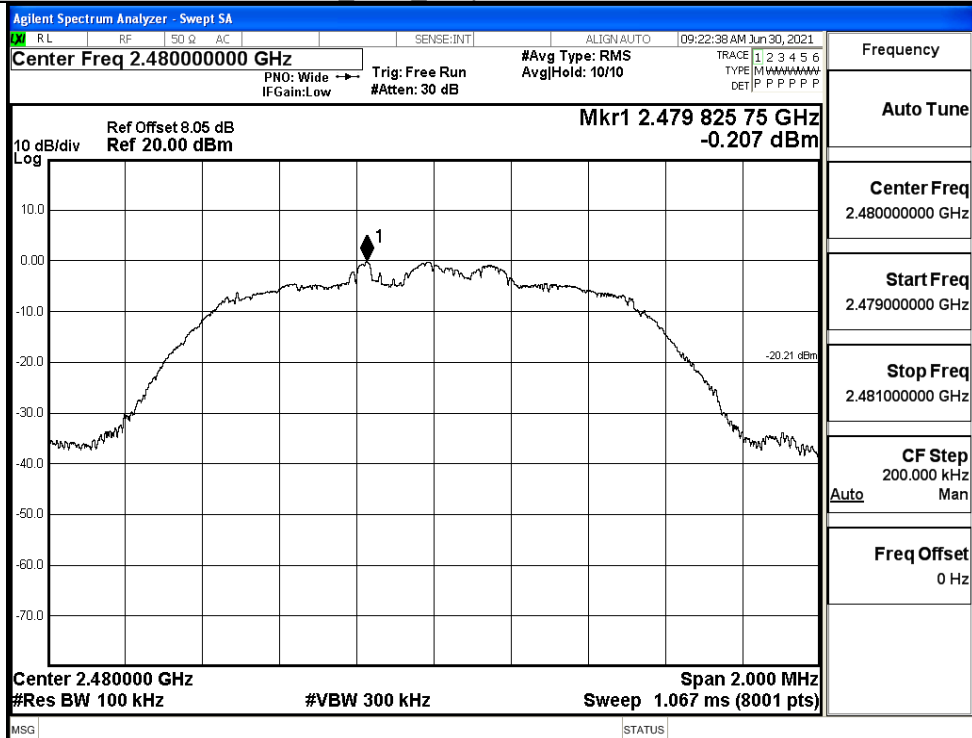


Puw

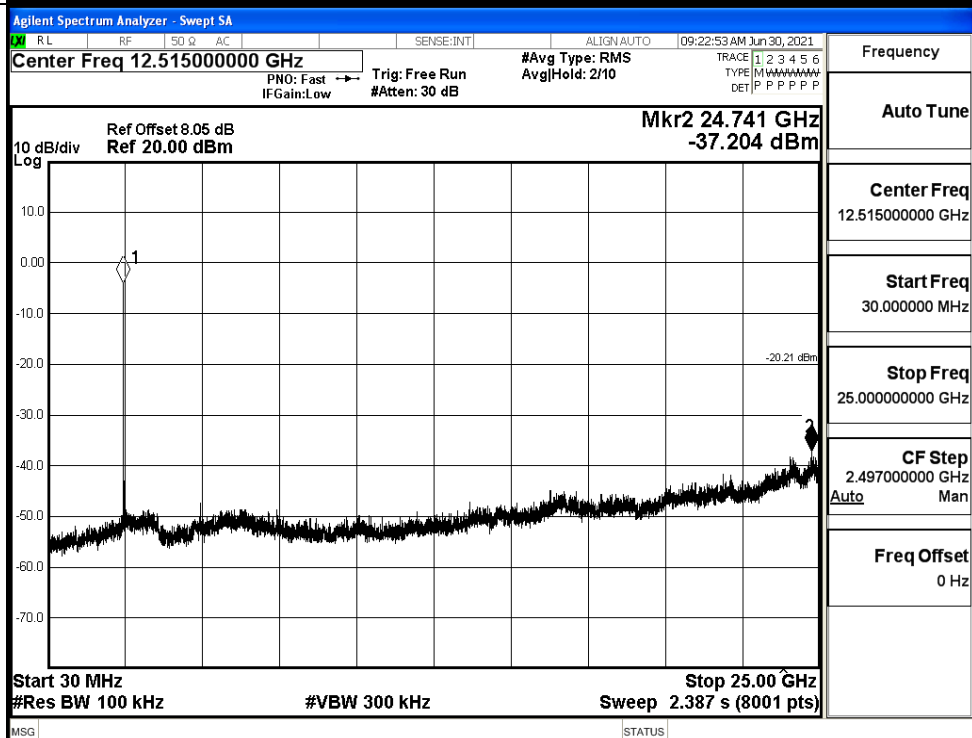


8DPSK_HCH_Graphs

Pref



Puw

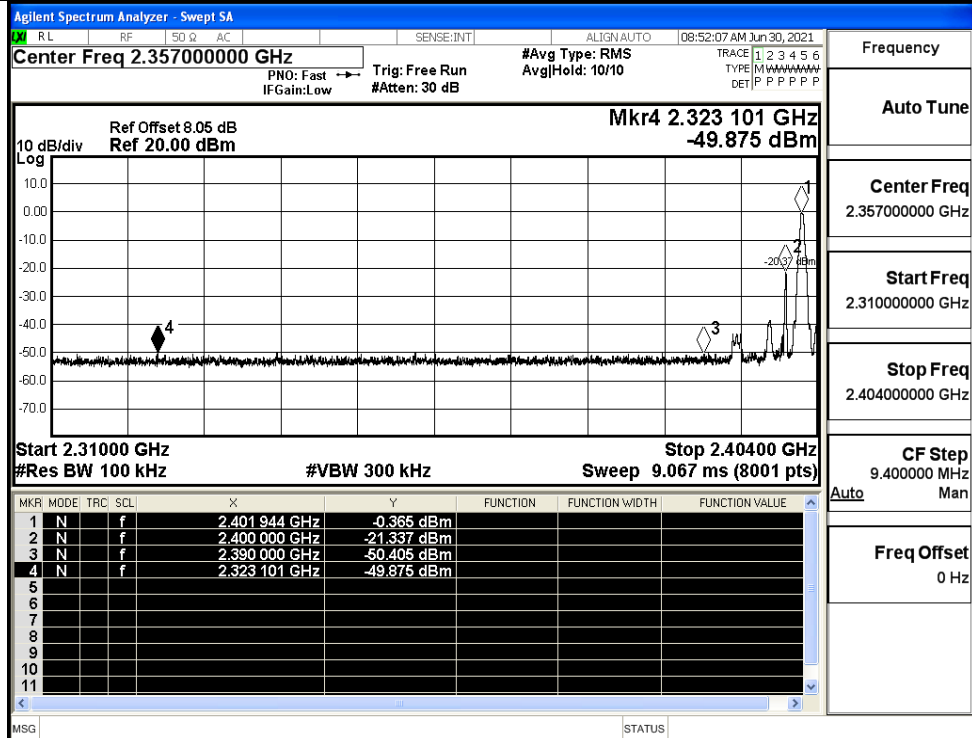


A.8 Band-edge for RF Conducted Emissions

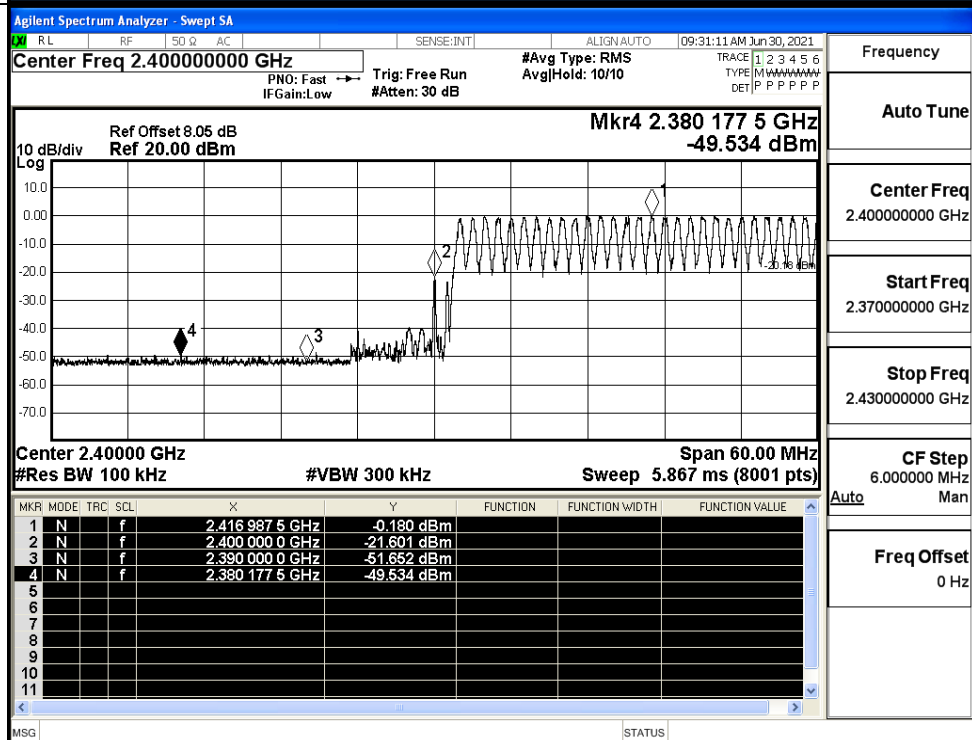
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.365	Off	-49.875	-20.37	PASS
			-0.180	On	-49.534	-20.18	PASS
	HCH	2480	-0.358	Off	-48.198	-20.36	PASS
			-0.064	On	-48.859	-20.06	PASS
$\pi/4$ DQPSK	LCH	2402	-0.755	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
8DPSK	LCH	2402	-0.307	Off	-49.120	-20.31	PASS
			-0.184	On	-48.942	-20.18	PASS
	HCH	2480	-0.085	Off	-49.060	-20.09	PASS
			-0.045	On	-48.799	-20.05	PASS

Test Graphs

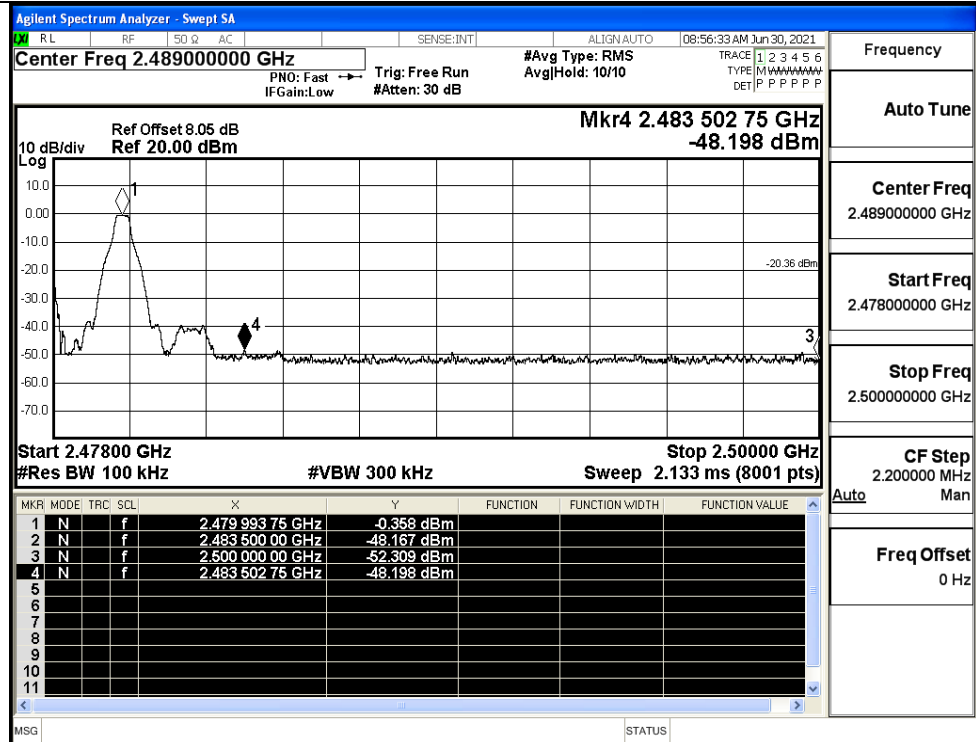
GFSK/LCH/No Hop



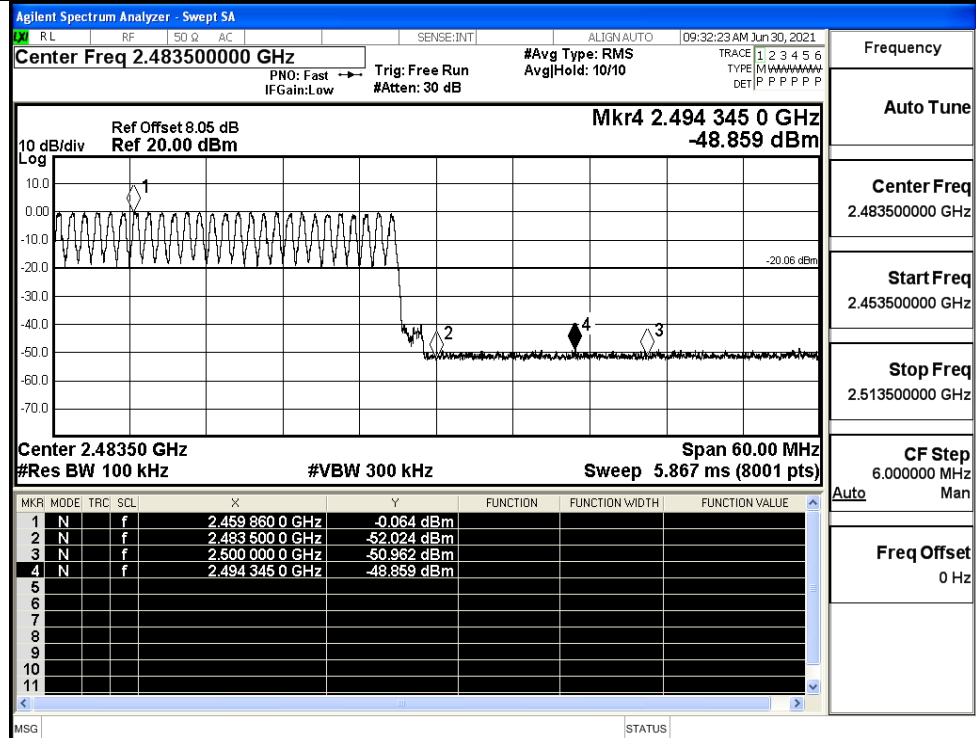
GFSK/LCH/Hop



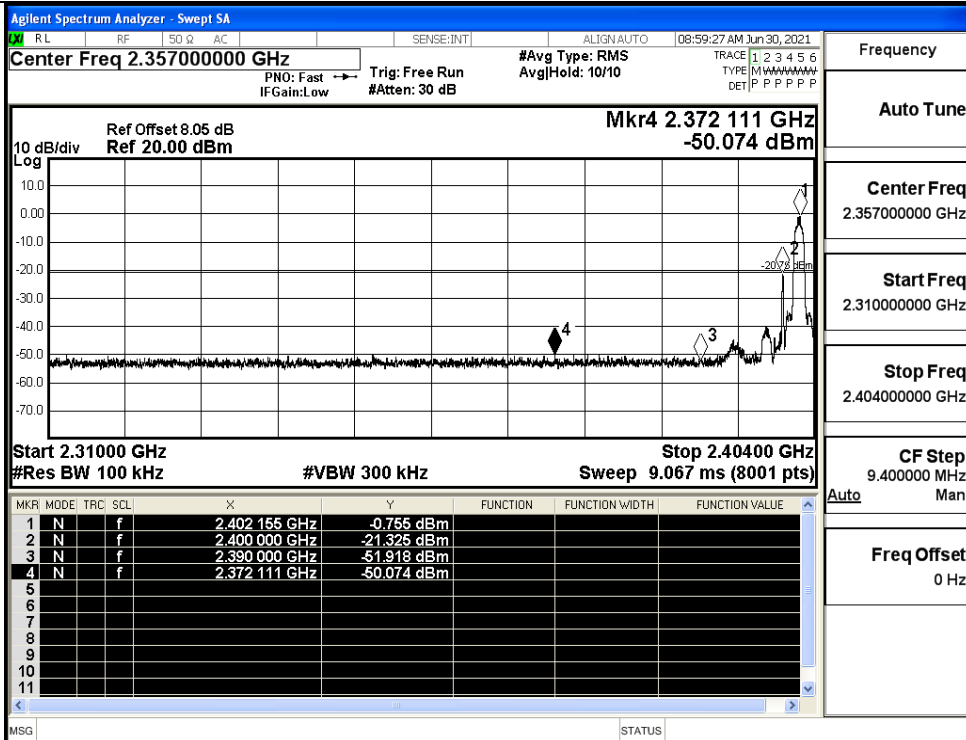
GFSK/HCH/No Hop



GFSK/HCH/Hop



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

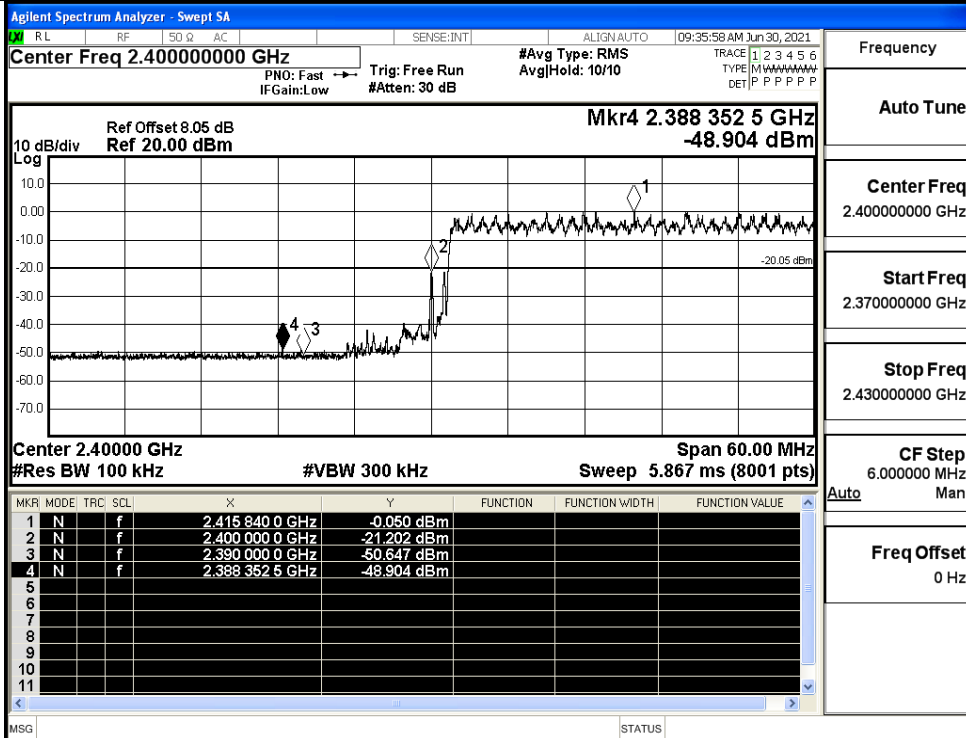


Frequency

Auto Tune

Center Freq
2.357000000 GHzStart Freq
2.310000000 GHzStop Freq
2.404000000 GHzCF Step
9.400000 MHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop

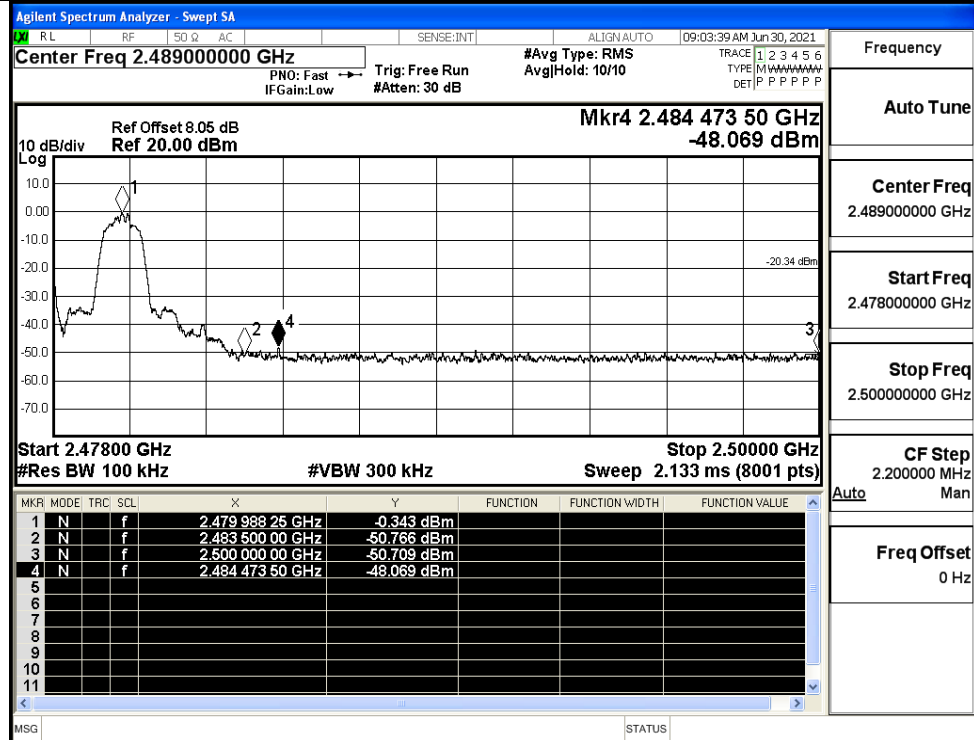


Frequency

Auto Tune

Center Freq
2.400000000 GHzStart Freq
2.370000000 GHzStop Freq
2.430000000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

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



Frequency

Auto Tune

Center Freq
2.489000000 GHz

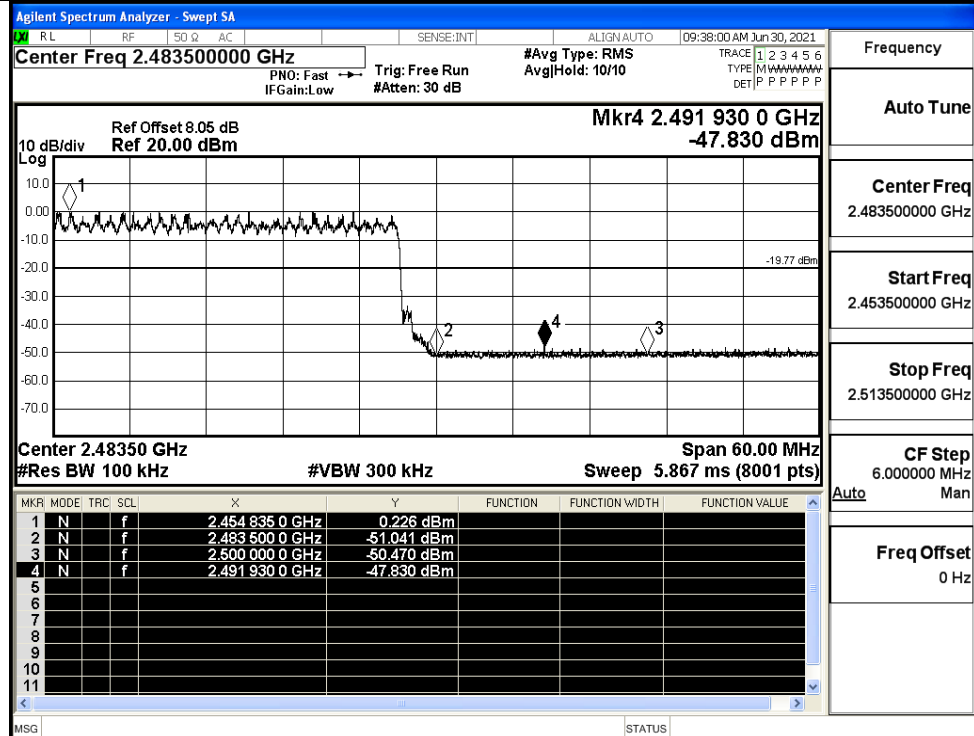
Start Freq
2.478000000 GHz

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

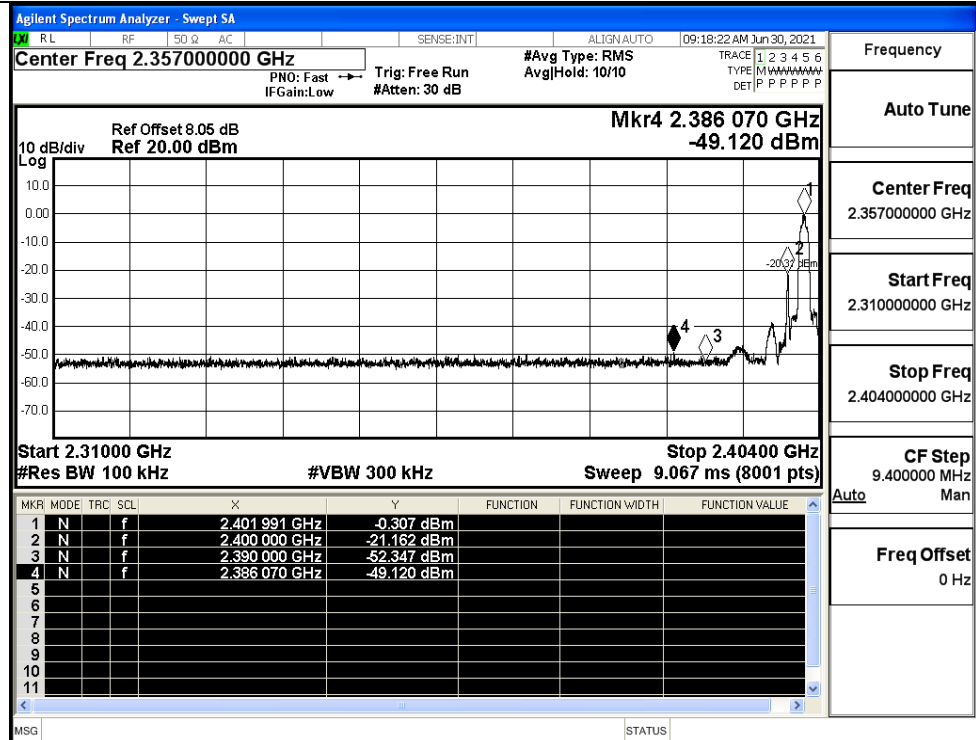
Start Freq
2.453500000 GHz

Stop Freq
2.513500000 GHz

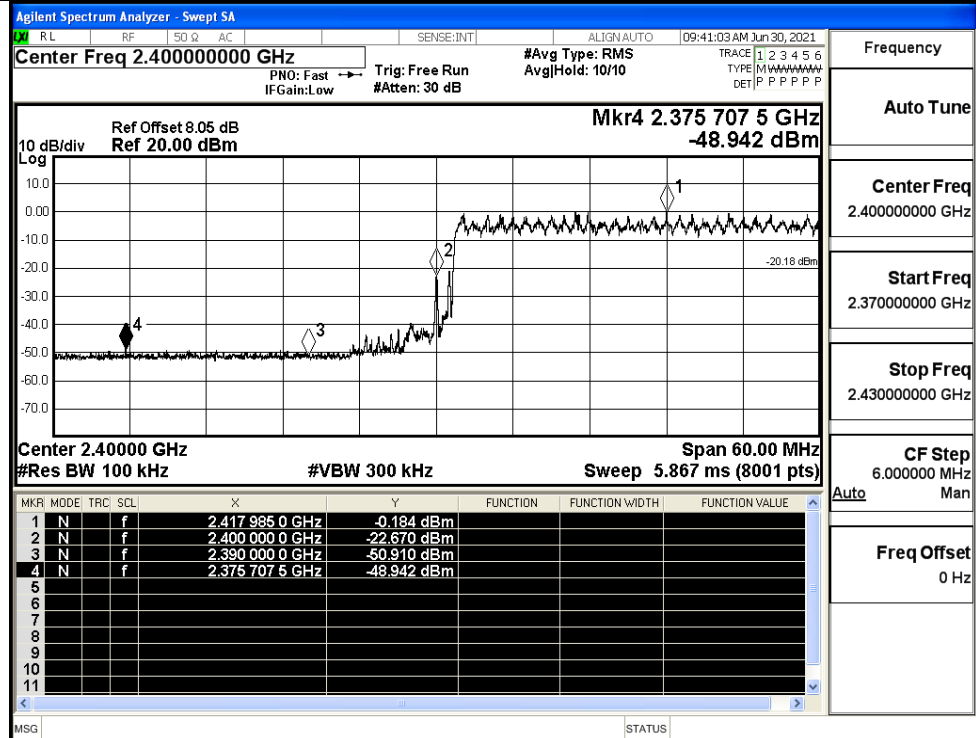
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

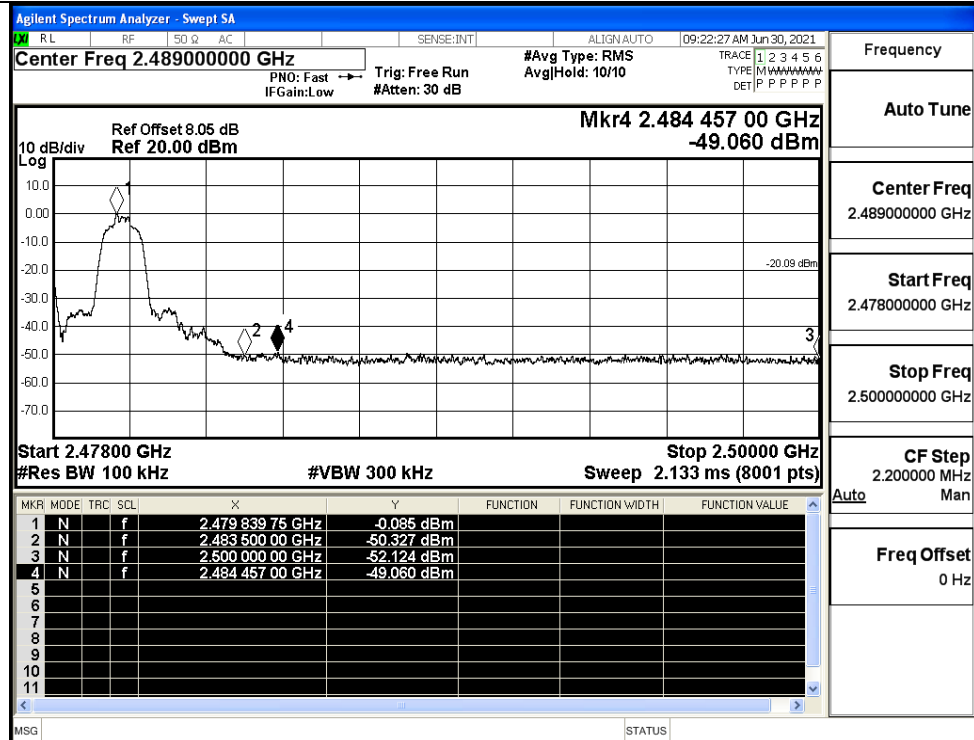
8DPSK/LCH/No Hop



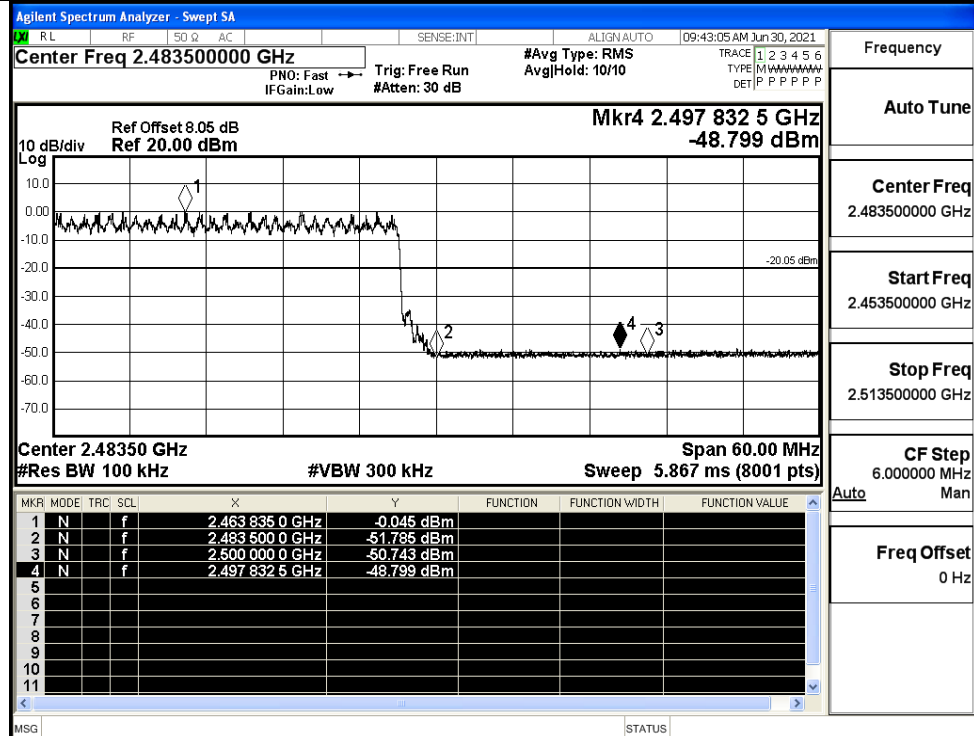
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



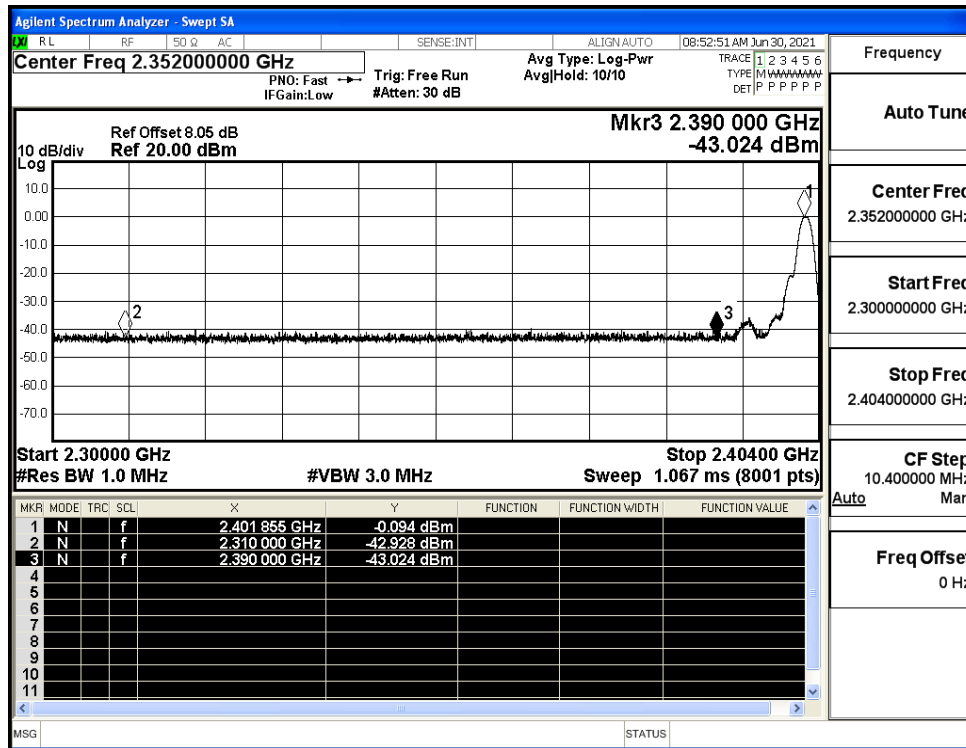
8DPSK/HCH/Hop



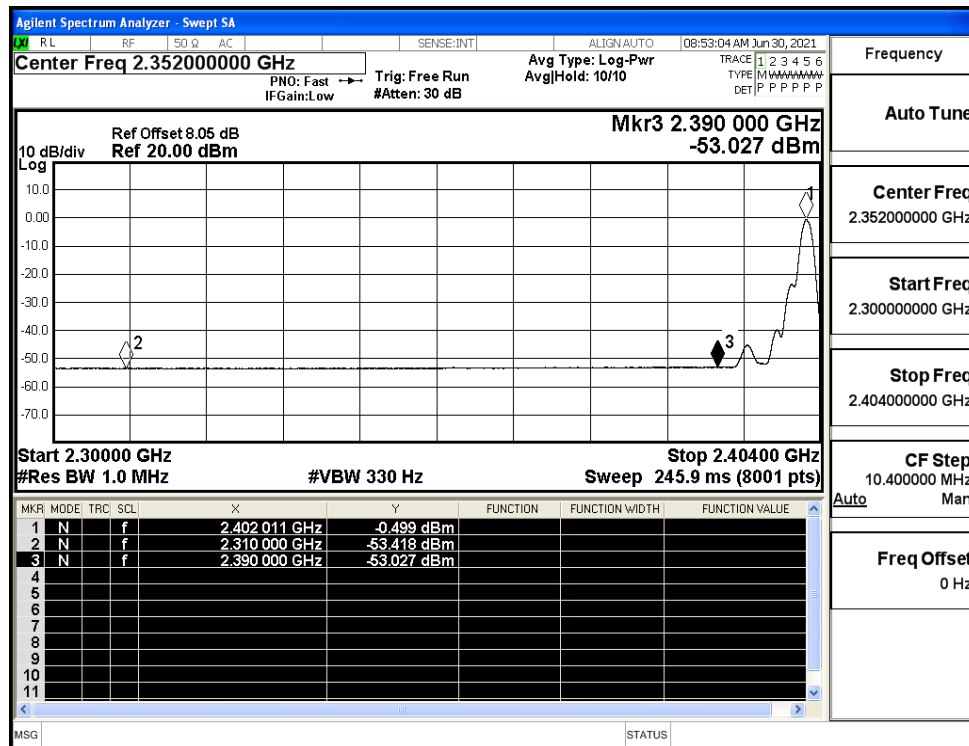
A.9 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.93	2.0	0	54.30	PEAK	74	PASS
	Off	2310.0	-53.42	2.0	0	43.81	AV	54	PASS
	Off	2390.0	-43.02	2.0	0	54.21	PEAK	74	PASS
	Off	2390.0	-53.03	2.0	0	44.20	AV	54	PASS
	Off	2483.5	-40.19	2.0	0	57.04	PEAK	74	PASS
	Off	2483.5	-50.34	2.0	0	46.89	AV	54	PASS
	Off	2500.0	-43.27	2.0	0	53.96	PEAK	74	PASS
	Off	2500.0	-52.44	2.0	0	44.79	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.67	2.0	0	54.56	PEAK	74	PASS
	Off	2310.0	-53.53	2.0	0	43.70	AV	54	PASS
	Off	2390.0	-44.33	2.0	0	52.90	PEAK	74	PASS
	Off	2390.0	-53.00	2.0	0	44.23	AV	54	PASS
	Off	2483.5	-39.98	2.0	0	57.25	PEAK	74	PASS
	Off	2483.5	-50.50	2.0	0	46.73	AV	54	PASS
	Off	2500.0	-43.14	2.0	0	54.09	PEAK	74	PASS
	Off	2500.0	-52.39	2.0	0	44.84	AV	54	PASS
8DPSK	Off	2310.0	-43.73	2.0	0	53.50	PEAK	74	PASS
	Off	2310.0	-53.49	2.0	0	43.74	AV	54	PASS
	Off	2390.0	-43.24	2.0	0	53.99	PEAK	74	PASS
	Off	2390.0	-53.04	2.0	0	44.19	AV	54	PASS
	Off	2483.5	-41.32	2.0	0	55.91	PEAK	74	PASS
	Off	2483.5	-50.39	2.0	0	46.84	AV	54	PASS
	Off	2500.0	-42.52	2.0	0	54.71	PEAK	74	PASS
	Off	2500.0	-52.42	2.0	0	44.81	AV	54	PASS

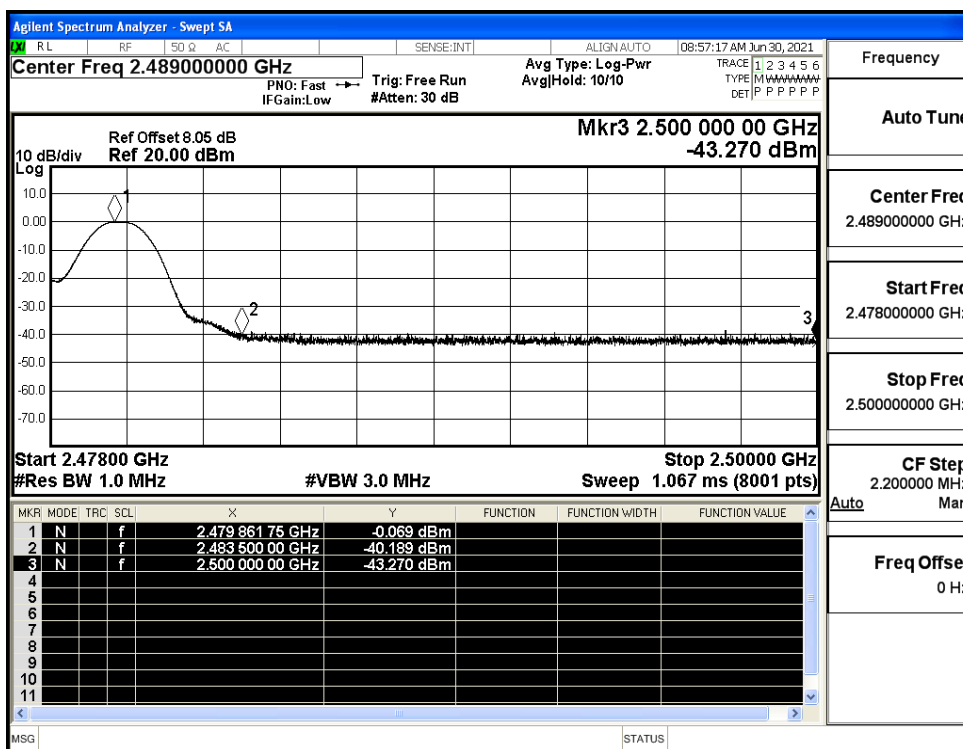
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



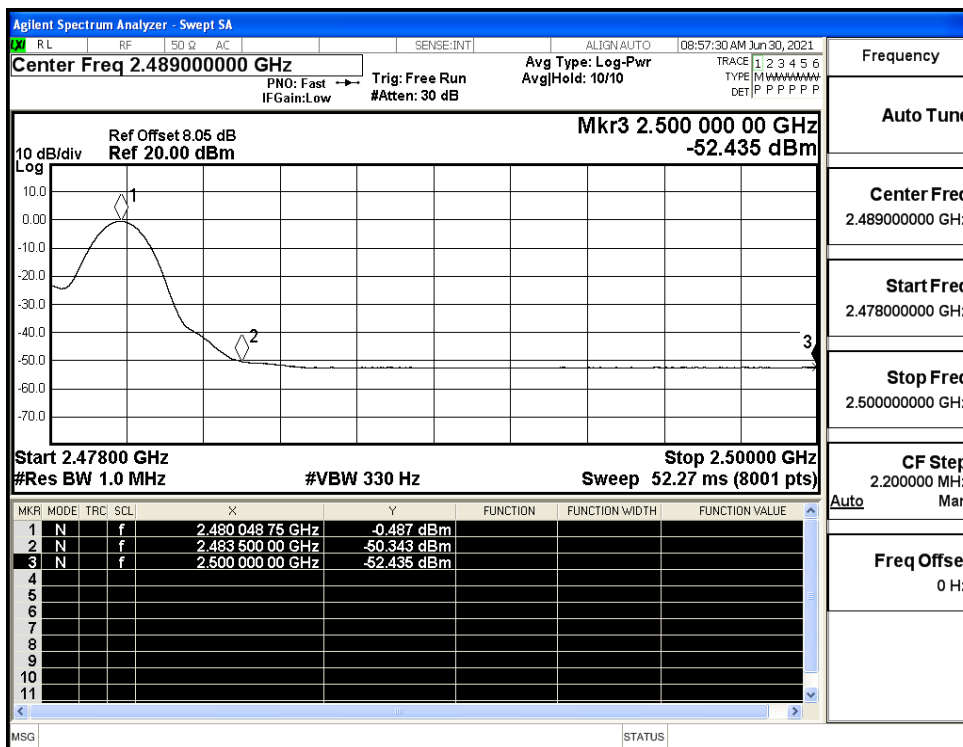
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

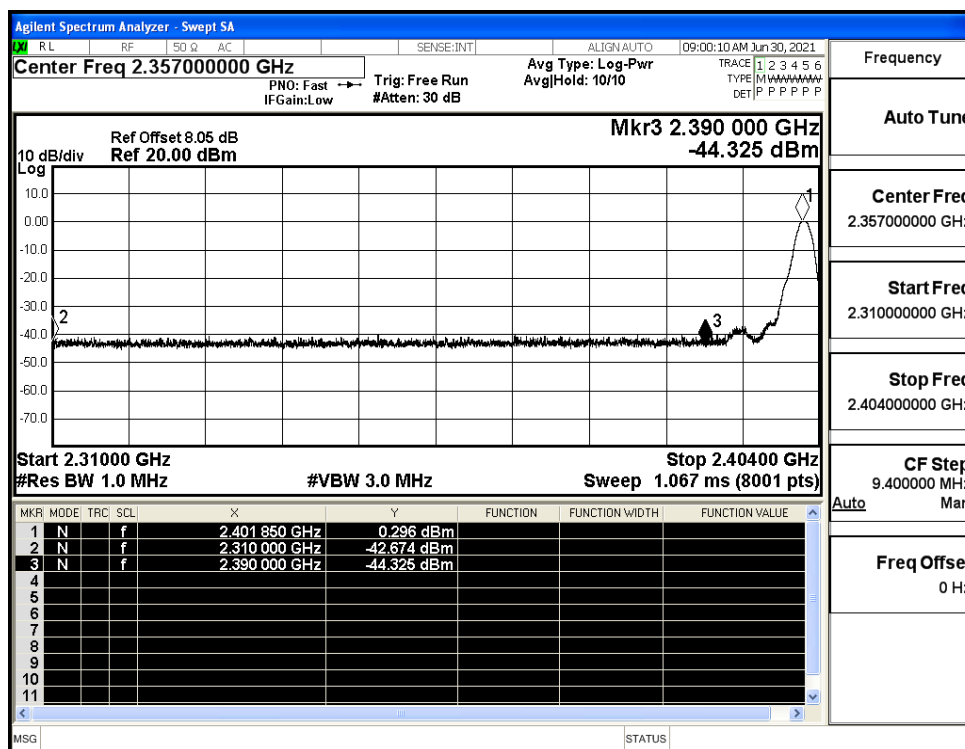
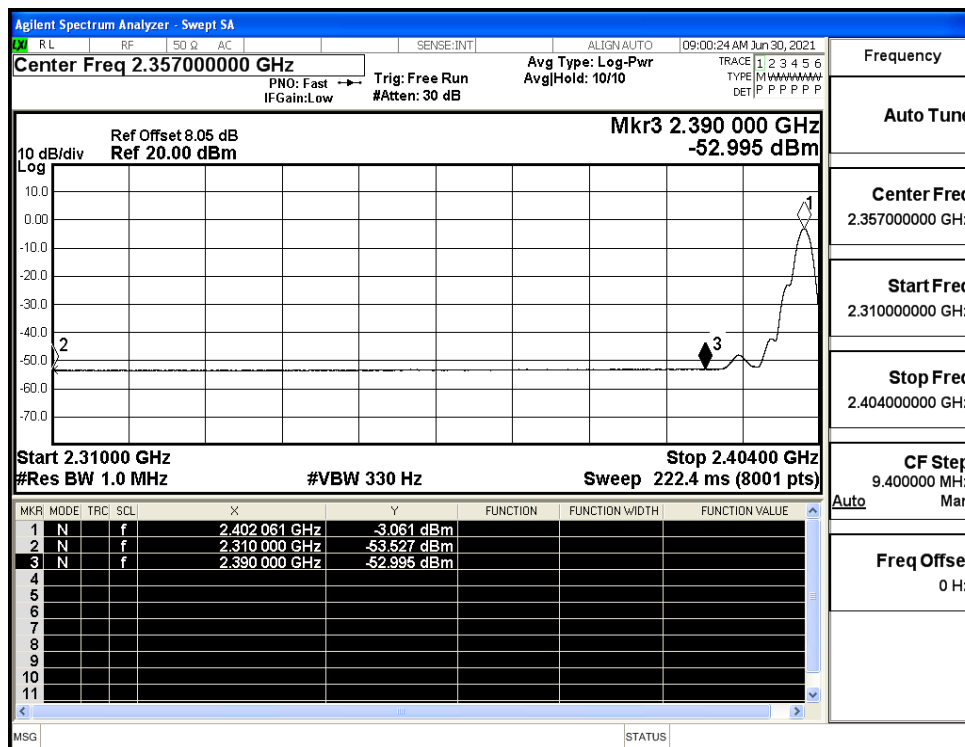


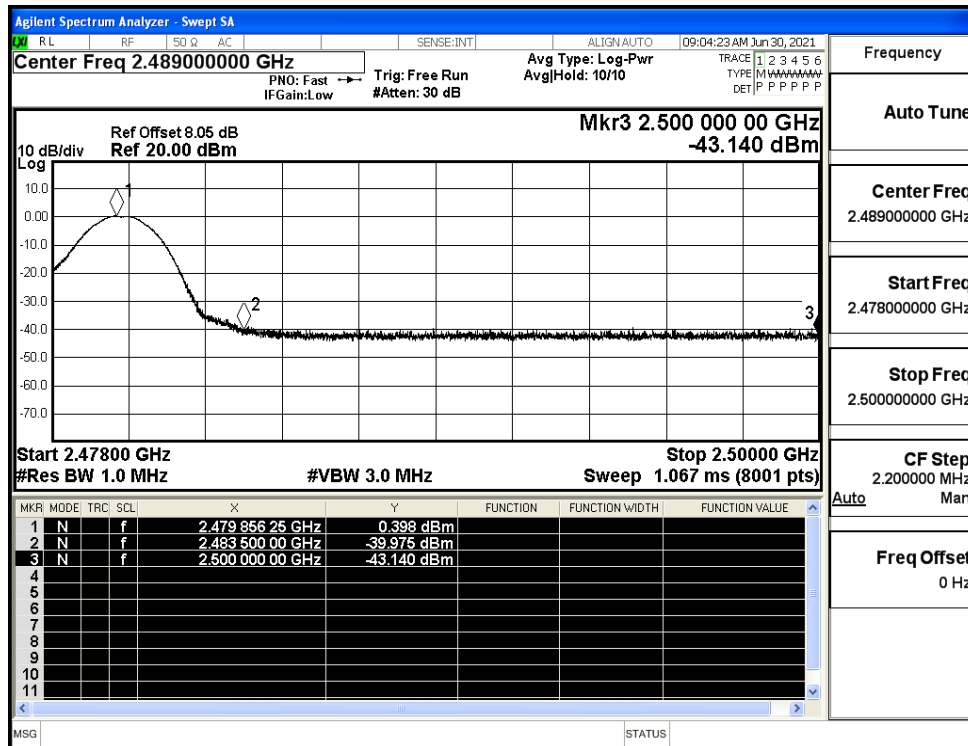
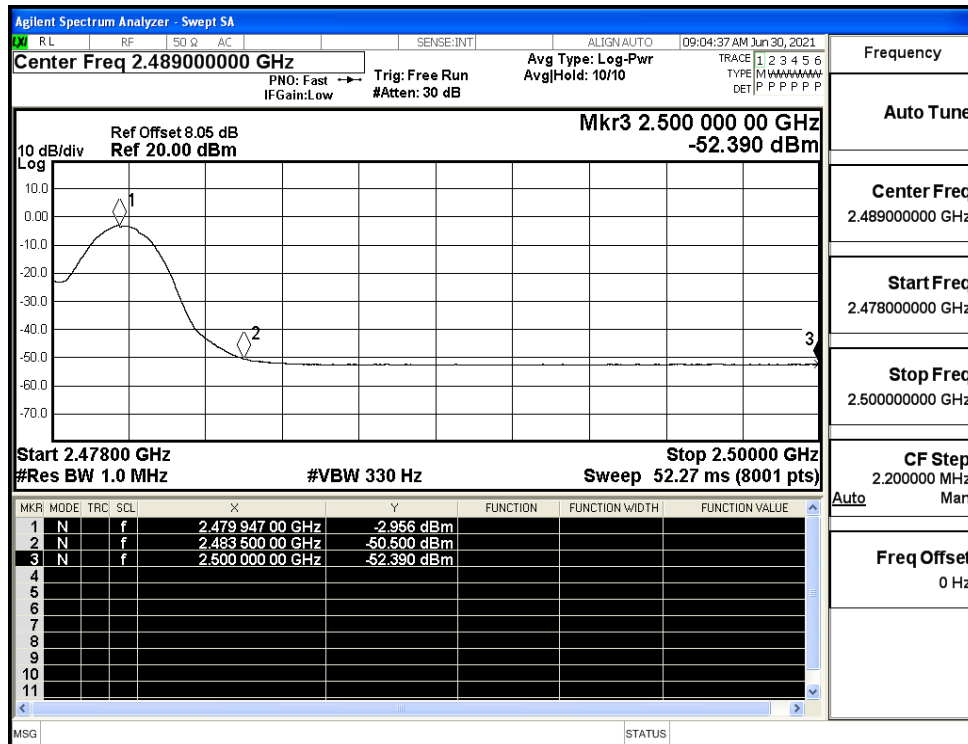
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



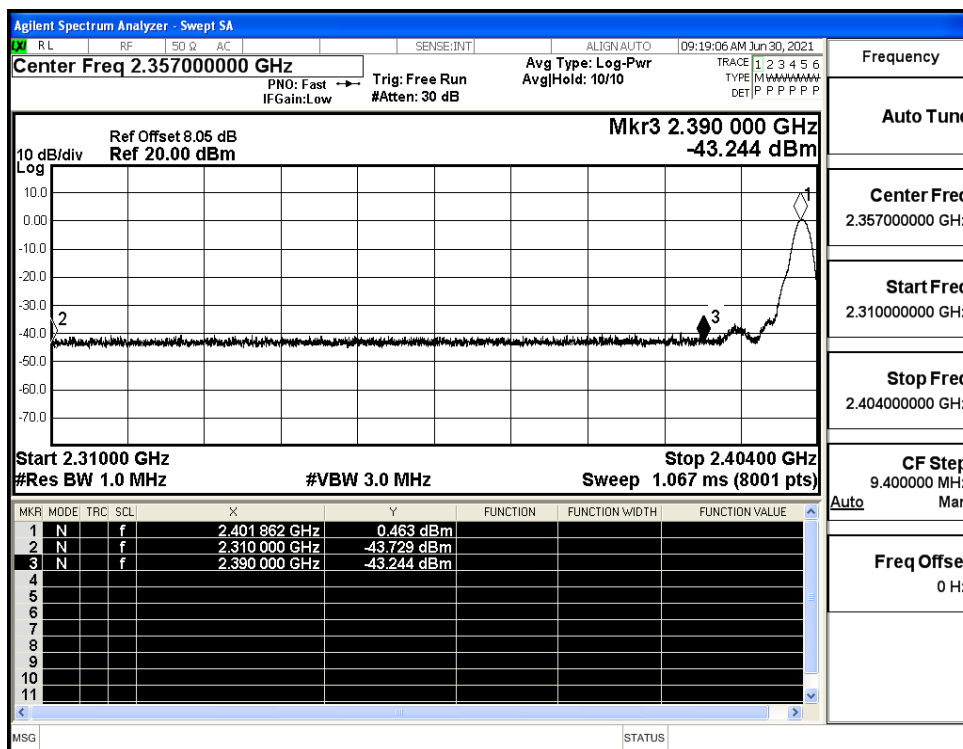
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



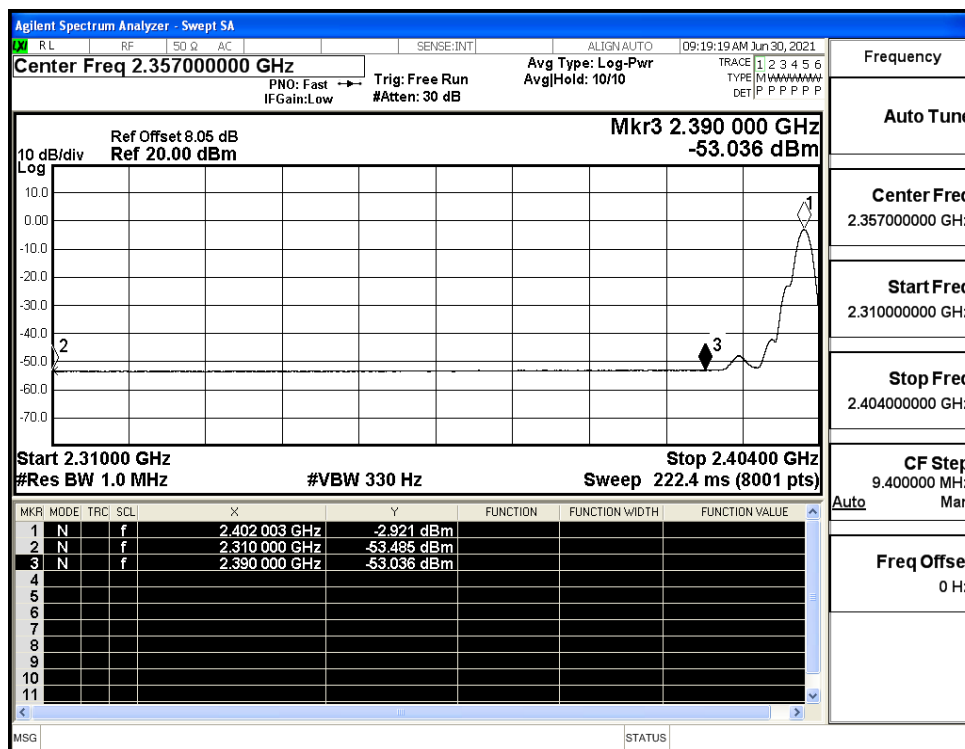
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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)

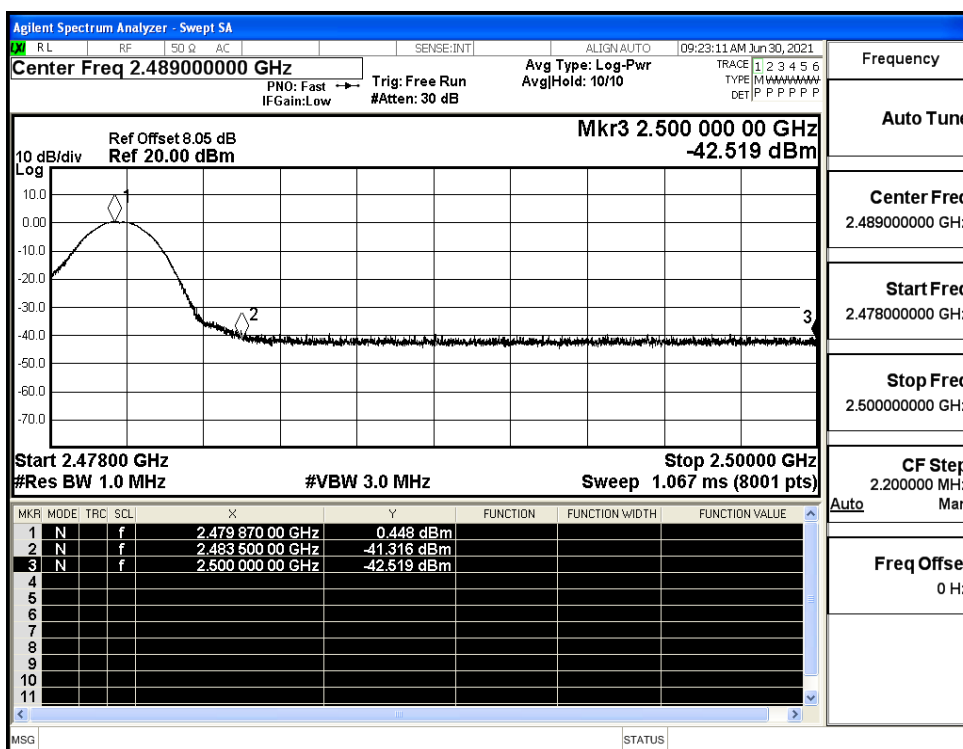
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

