

Appendix A

RF Test Data for Bluetooth V3.0 (Conducted Measurement)

Product Name: Portable speaker

Trade Mark: Pyle

Test Model: PWMA325BT

Environmental Conditions

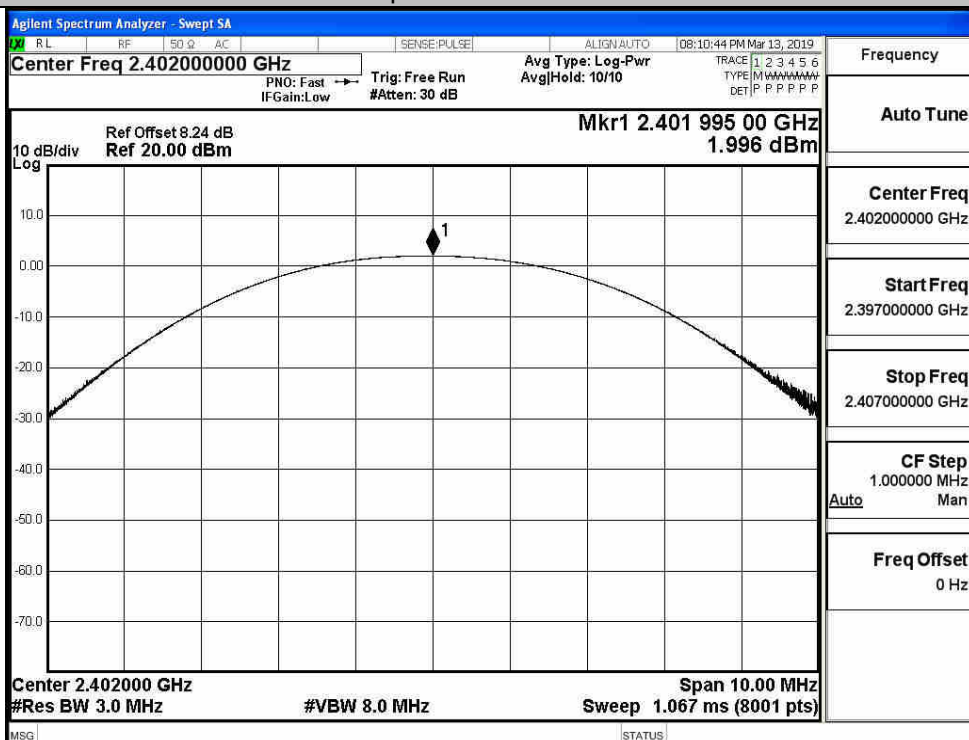
Temperature:	22.4 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Jerry.Zeng
Supervised by:	Tom.Liu

A.1 Maximum Conducted Peak Output Power

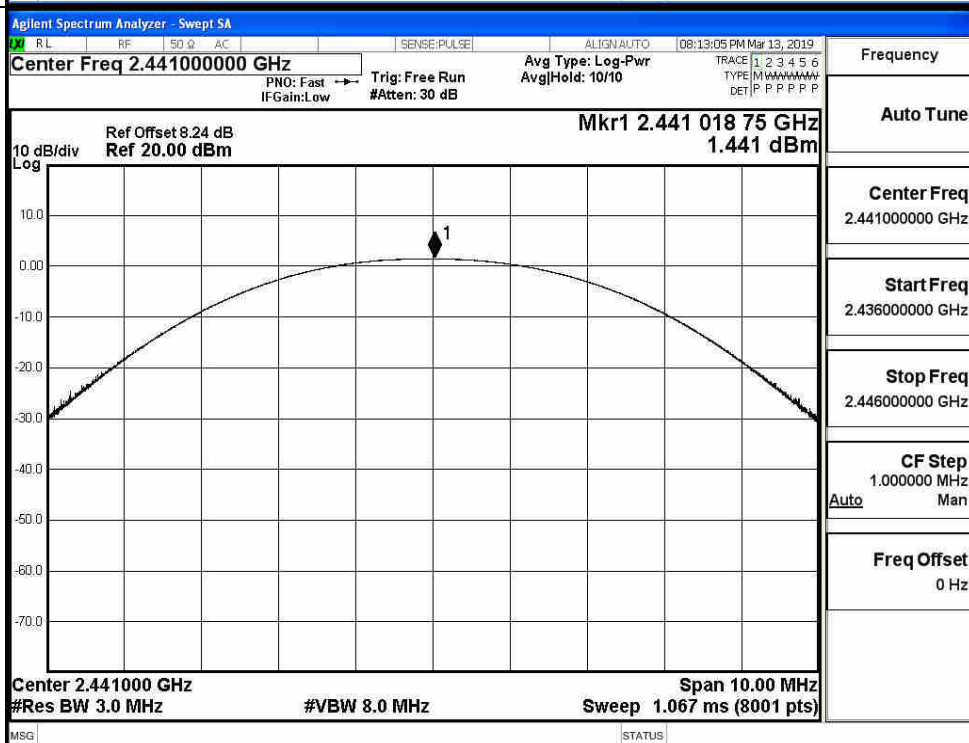
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.996	21	PASS
	MCH	1.441	21	PASS
	HCH	1.552	21	PASS
$\pi/4$ DQPSK	LCH	1.356	21	PASS
	MCH	0.808	21	PASS
	HCH	0.738	21	PASS

Test Graphs

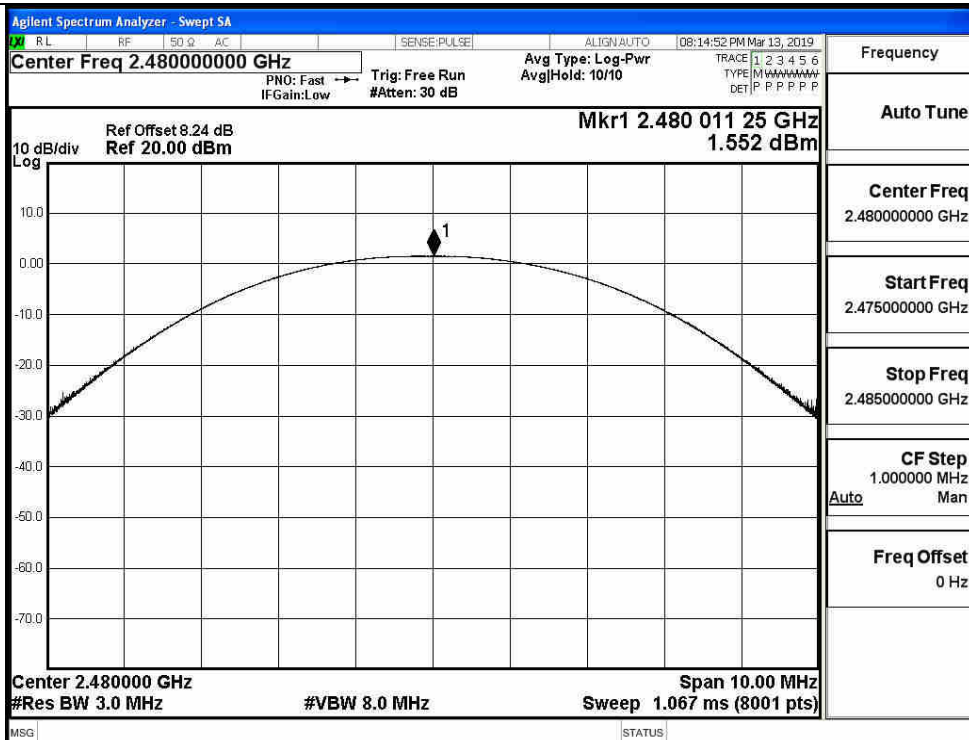
GFSK/LCH



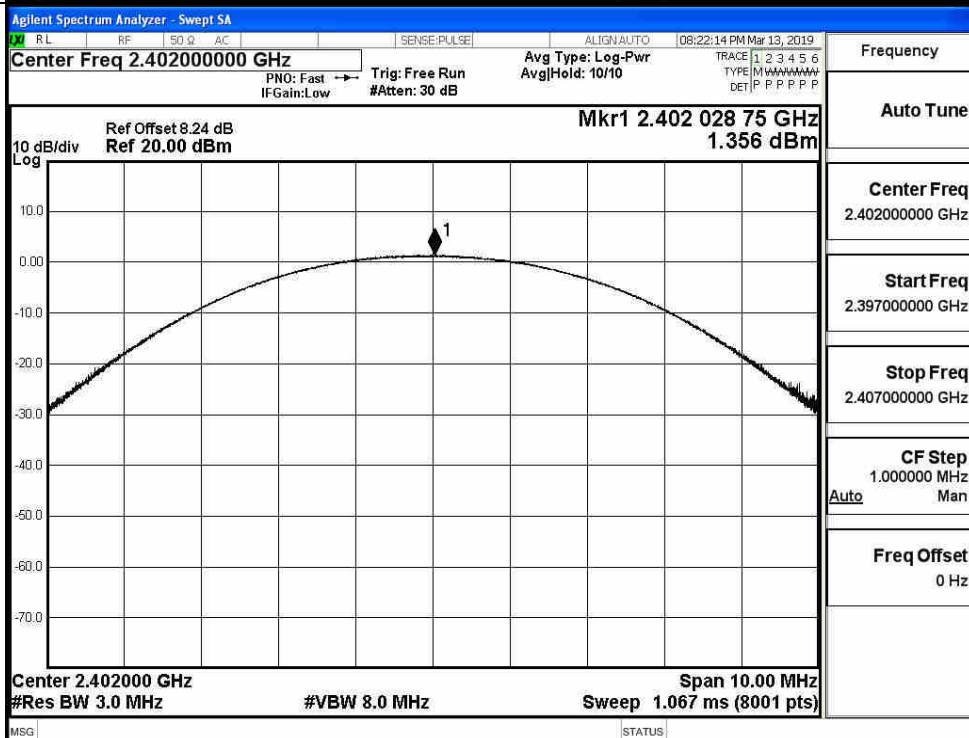
GFSK/MCH



GFSK/HCH



$\pi/4$ DQPSK/LCH



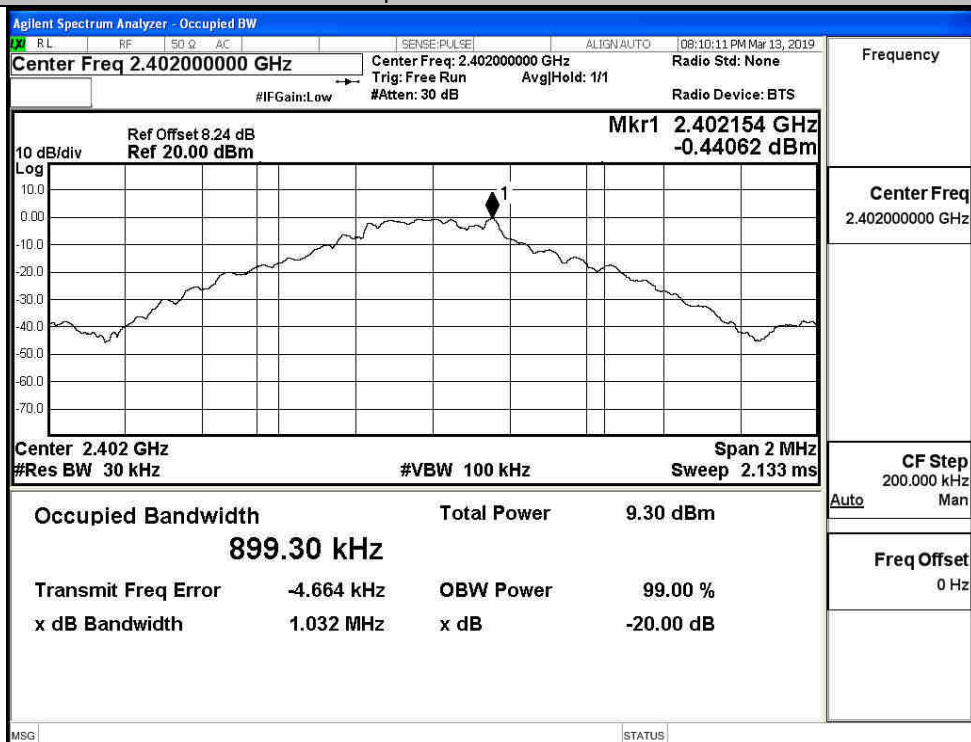
$\pi/4$DQPSK/MCH	Agilent Spectrum Analyzer - Swept SA R L RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 08:56:20 PM Mar 13, 2019 Center Freq 2.441000000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr AvgHold: 10/10 TRACE 1 2 3 4 5 6 TYPE: M W W W W W W W DET: P P P P P P P Ref Offset 8.24 dB Ref 20.00 dBm Mkr1 2.440 923 75 GHz 0.808 dBm 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 R L RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 08:26:49 PM Mar 13, 2019 Center Freq 2.480000000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr AvgHold: 10/10 TRACE 1 2 3 4 5 6 TYPE: M W W W W W W W DET: P P P P P P P Ref Offset 8.24 dB Ref 20.00 dBm Mkr1 2.480 073 75 GHz 0.738 dBm 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

A.2 20dB Bandwidth

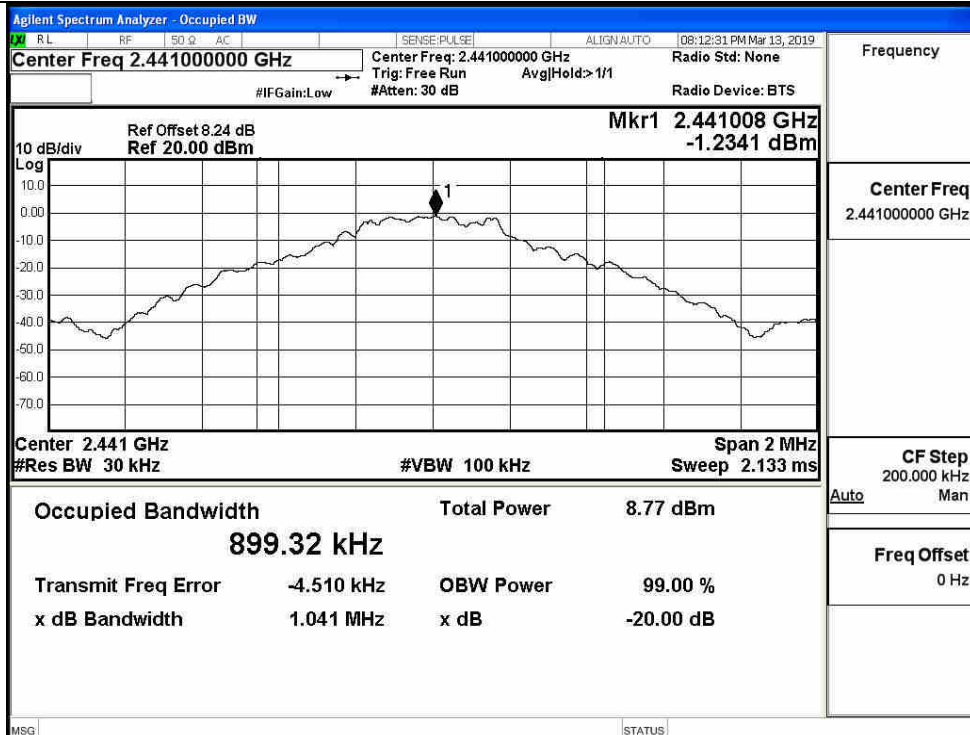
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.032	Not Specified	PASS
	MCH	1.041	Not Specified	PASS
	HCH	1.041	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.291	Not Specified	PASS
	MCH	1.289	Not Specified	PASS
	HCH	1.291	Not Specified	PASS

Test Graphs

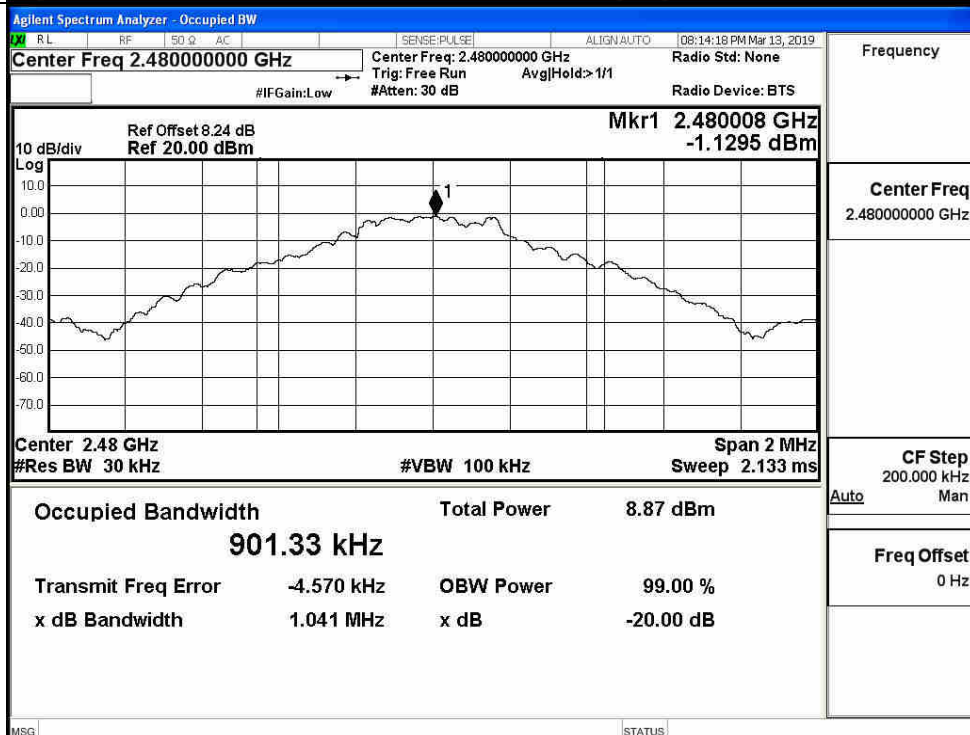
GFSK/LCH



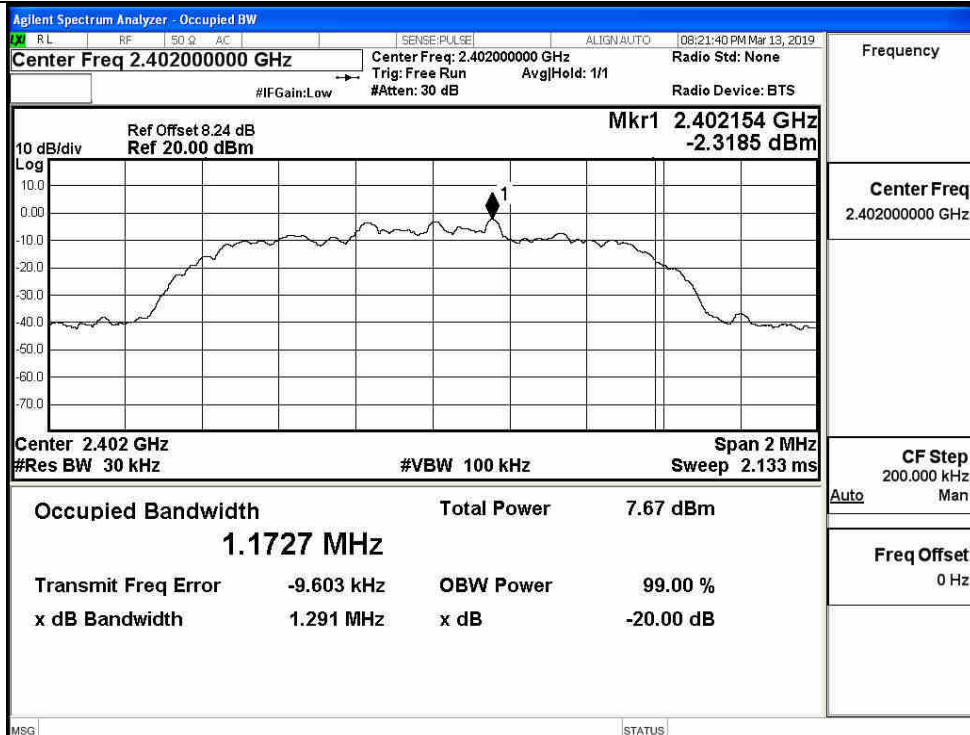
GFSK/MCH



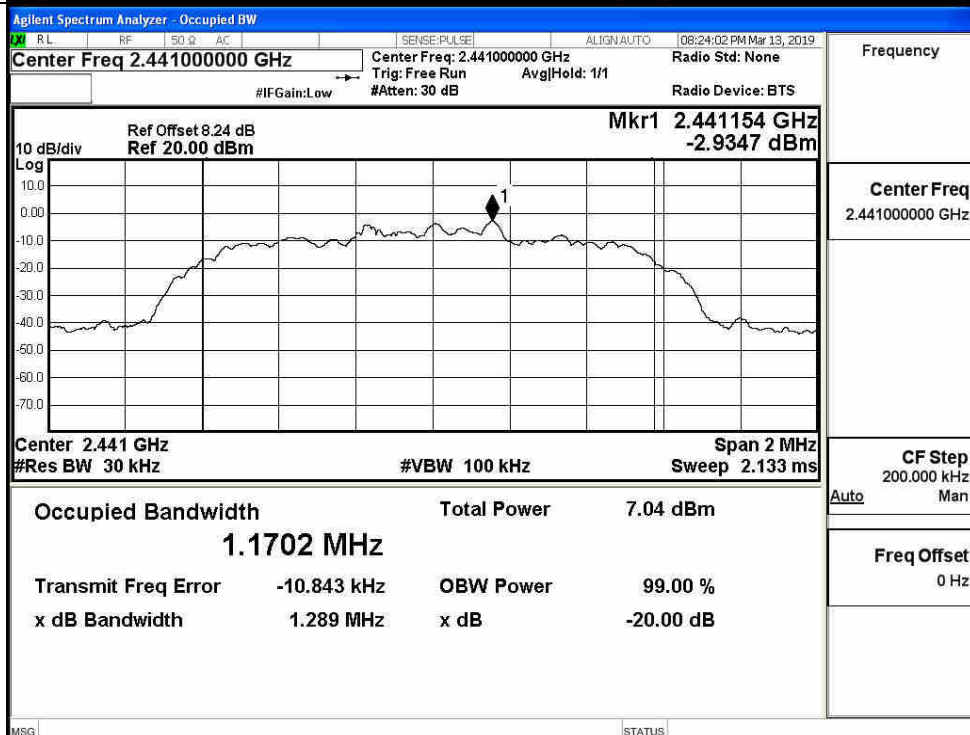
GFSK/HCH

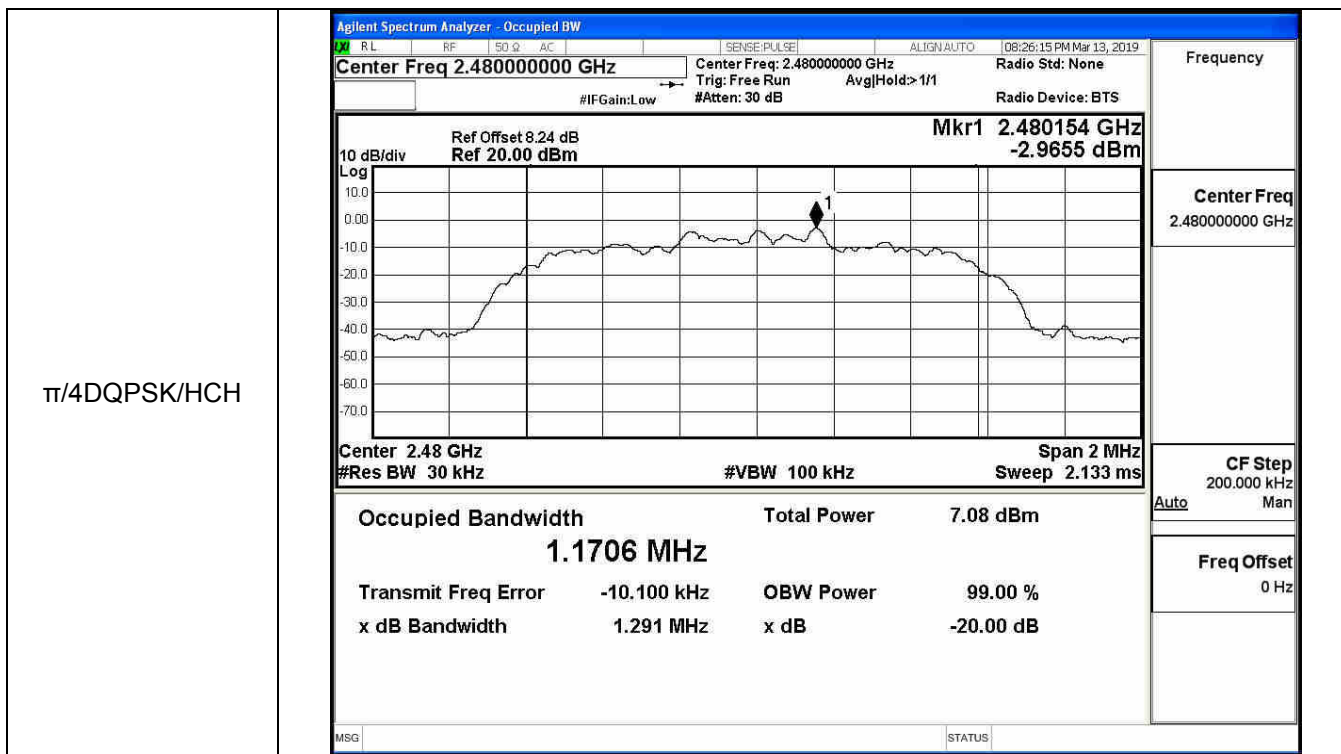


$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



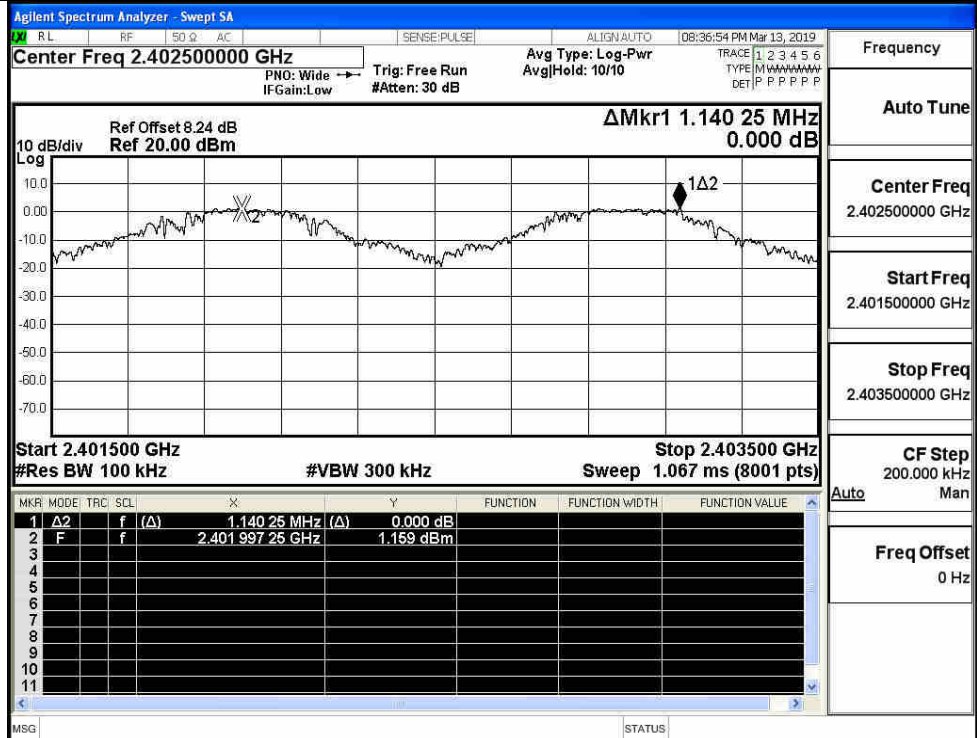


A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.140	0.694	PASS
	MCH	0.706	0.694	PASS
	HCH	0.982	0.694	PASS
$\pi/4$ DQPSK	LCH	0.892	0.861	PASS
	MCH	1.006	0.861	PASS
	HCH	0.960	0.861	PASS

Test Graphs

GFSK/LCH



Frequency

Auto Tune

Center Freq
2.402500000 GHz

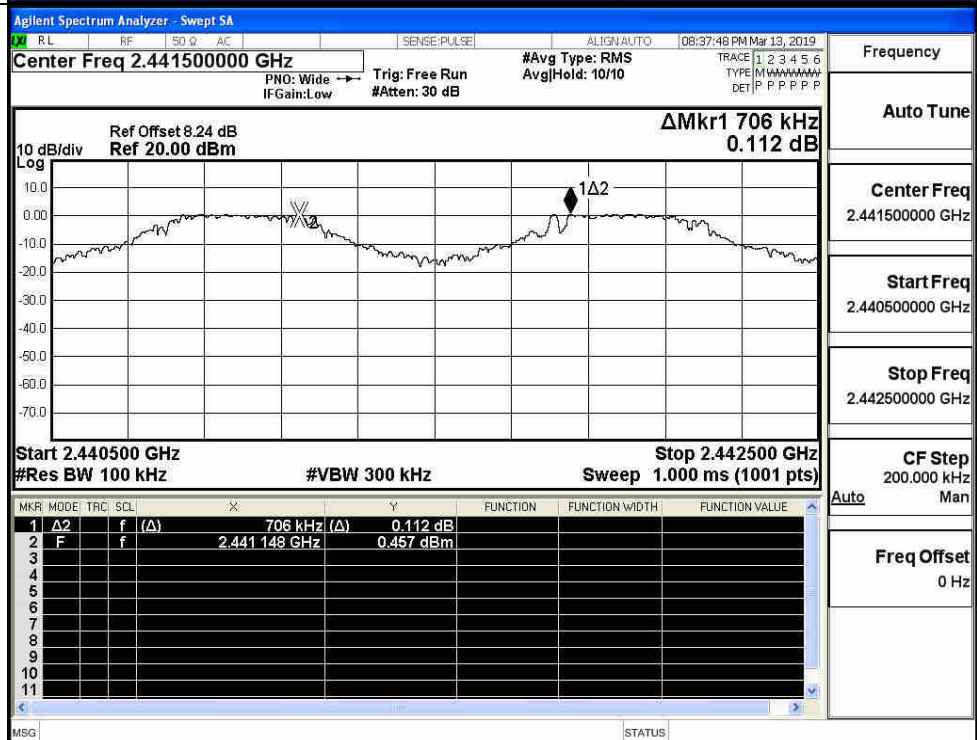
Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

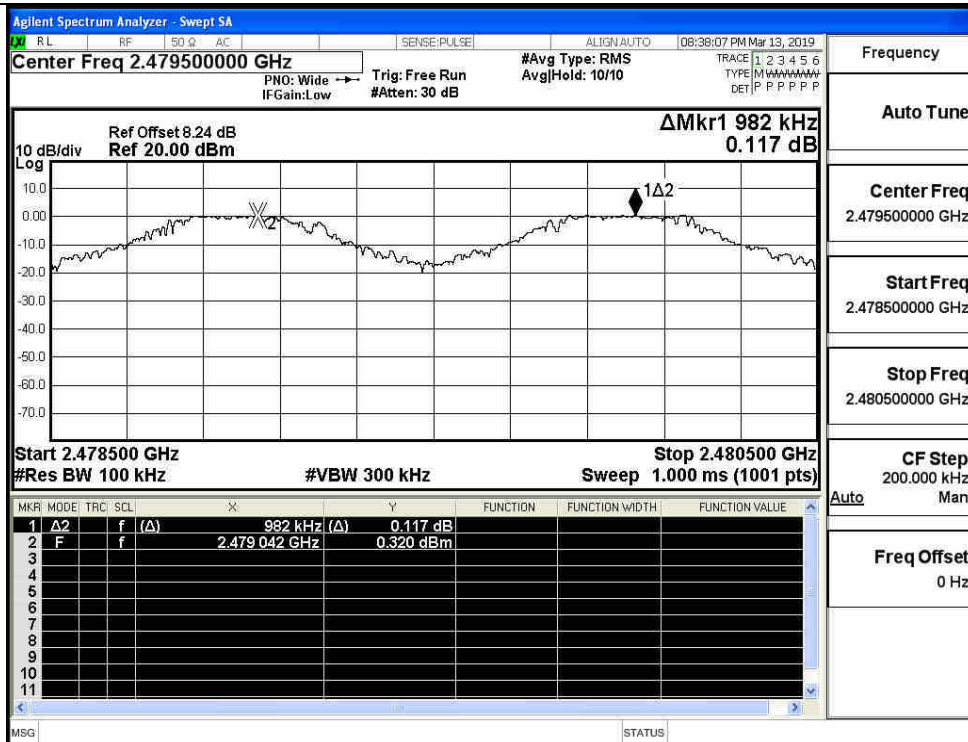
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

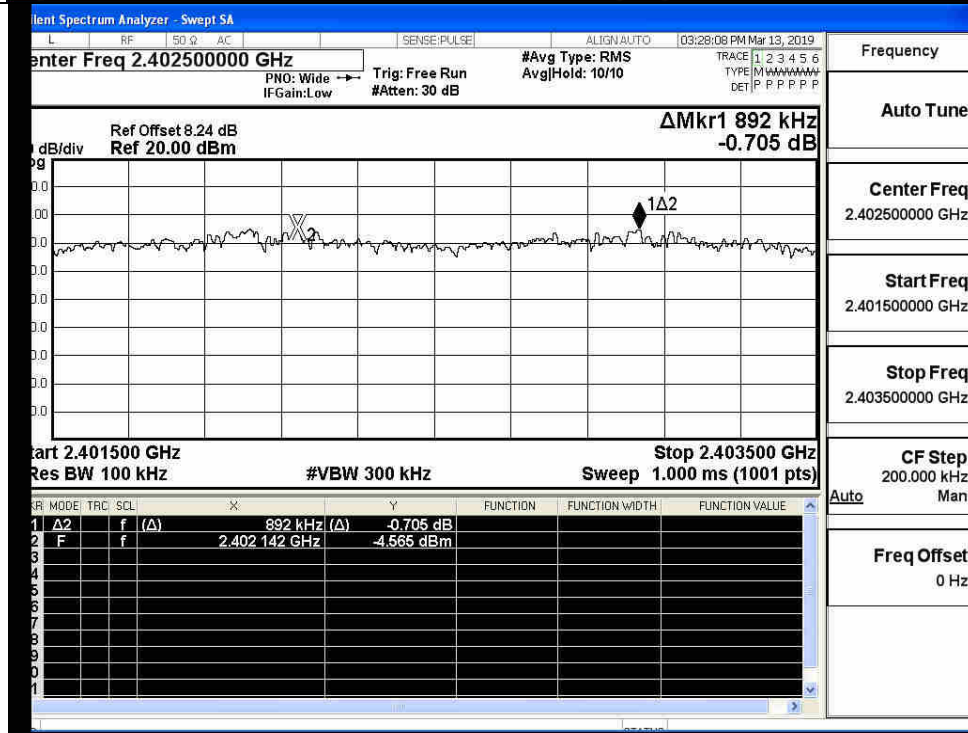
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

π/4DQPSK/LCH



Frequency

Auto Tune

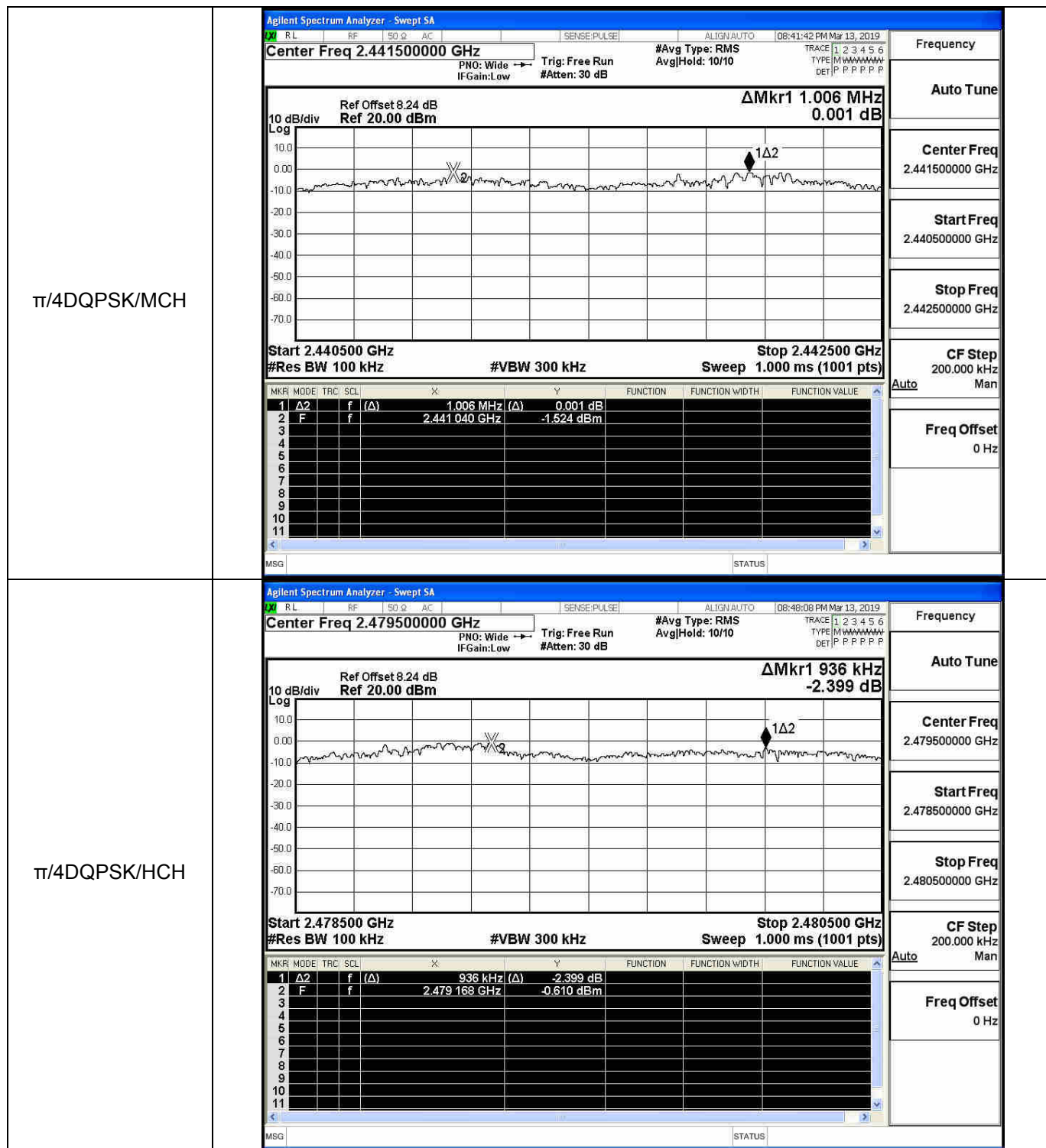
Center Freq
2.402500000 GHz

Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

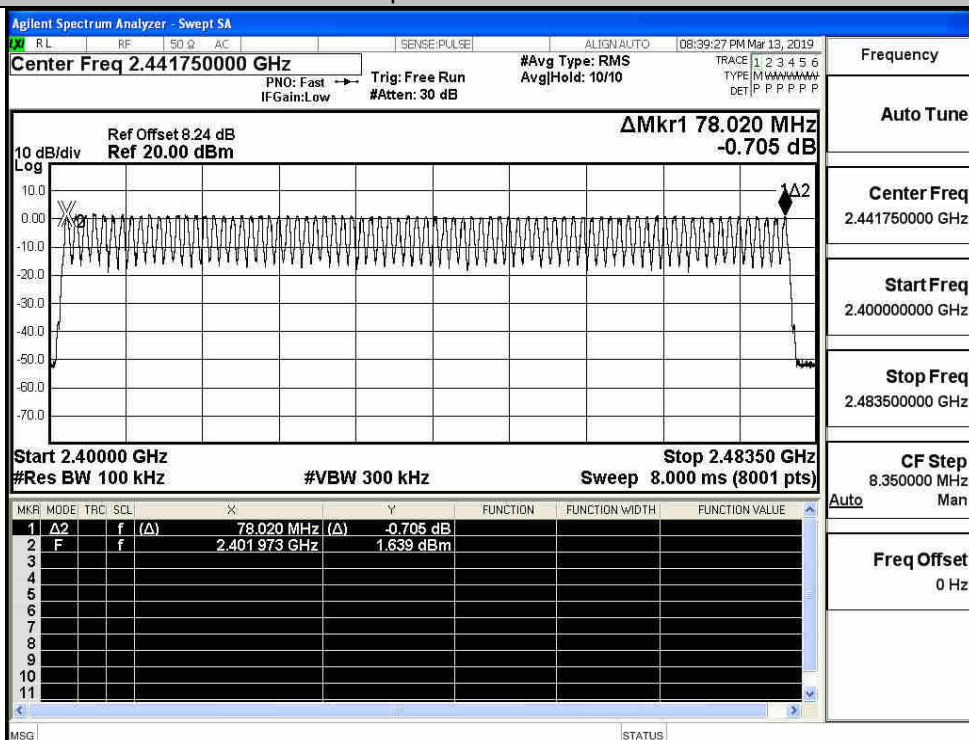


A.4 Hopping Channel Number

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

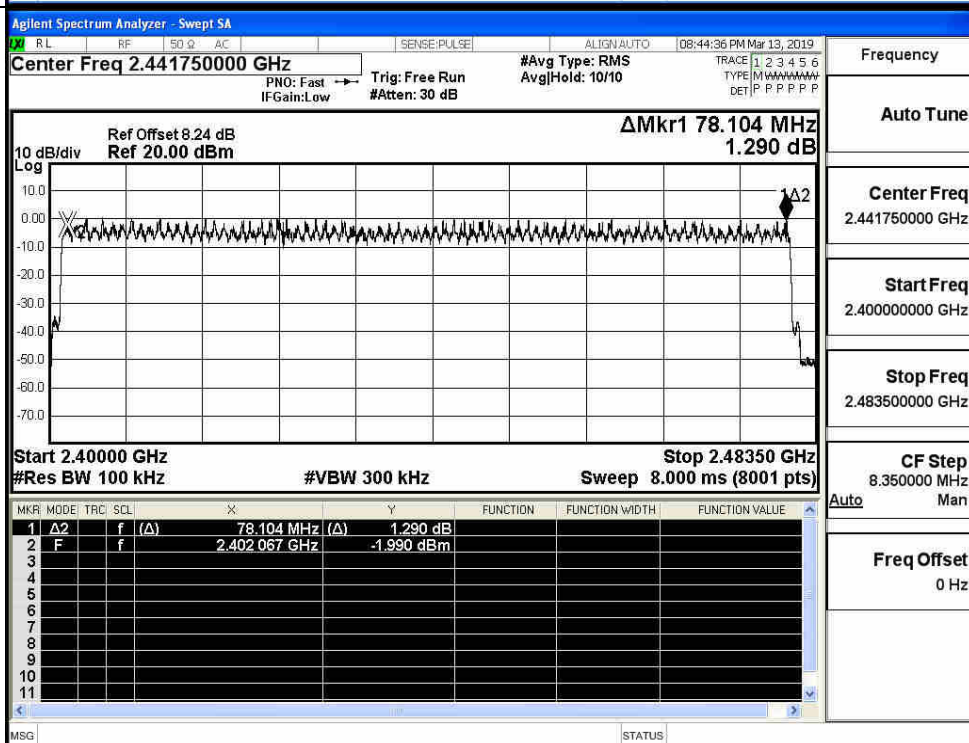
Test Graphs

GFSK/Hop



Frequency

Auto Tune

Center Freq
2.441750000 GHzStart Freq
2.400000000 GHzStop Freq
2.483500000 GHzCF Step
8.350000 MHz
Auto ManFreq Offset
0 Hz $\pi/4$ DQPSK/Hop

Frequency

Auto Tune

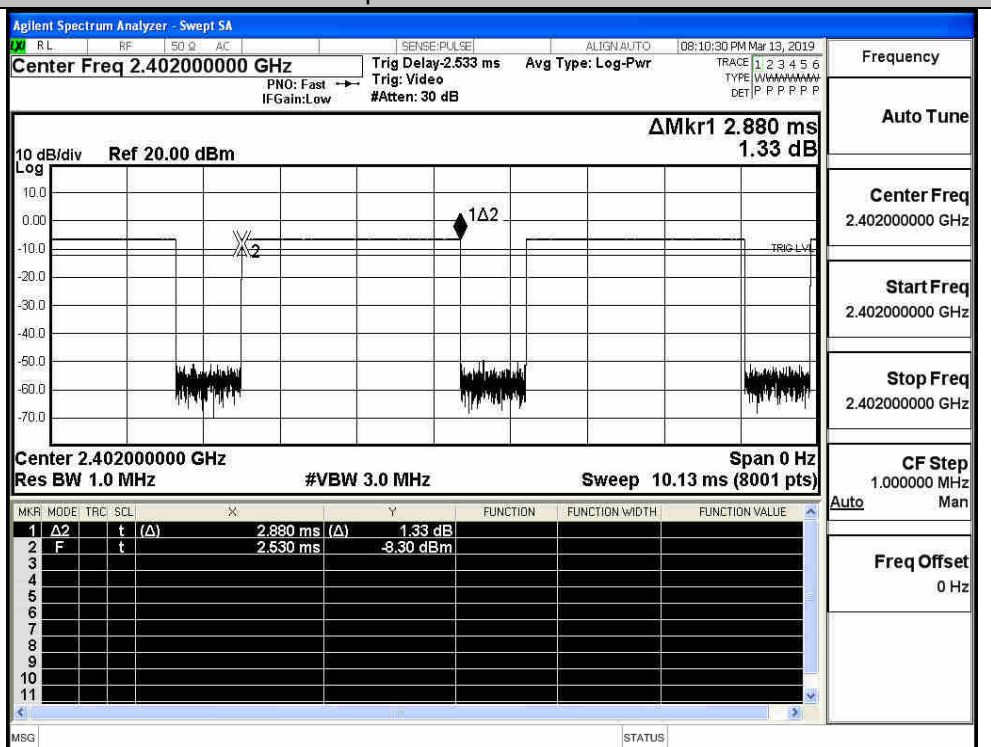
Center Freq
2.441750000 GHzStart Freq
2.400000000 GHzStop Freq
2.483500000 GHzCF Step
8.350000 MHz
Auto ManFreq Offset
0 Hz

A.5 Dwell Time

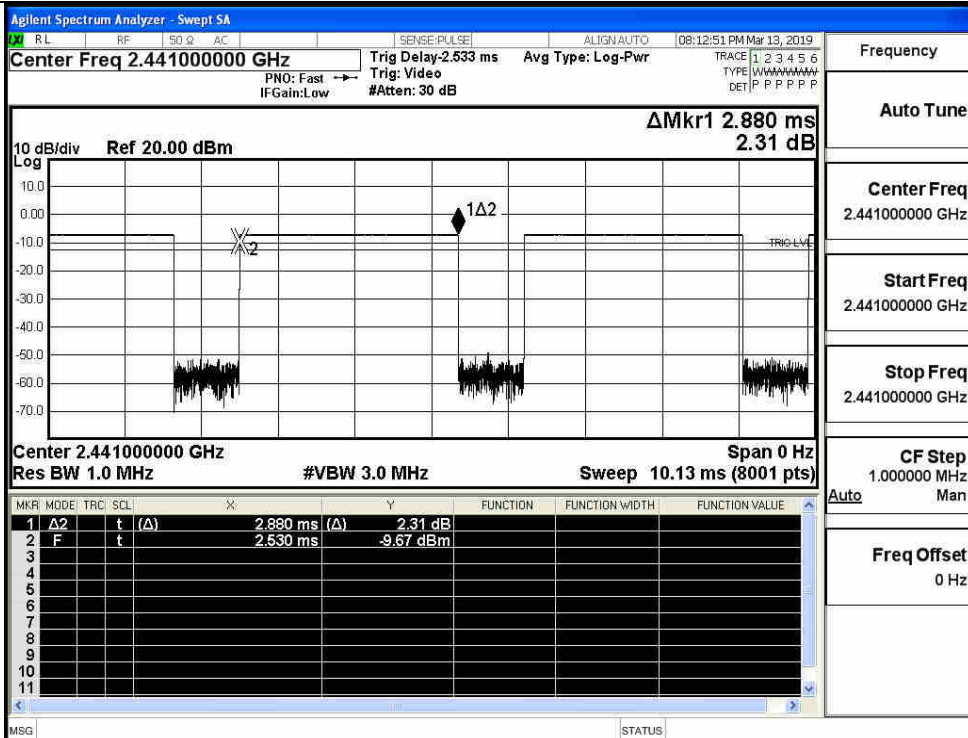
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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

Test Graphs

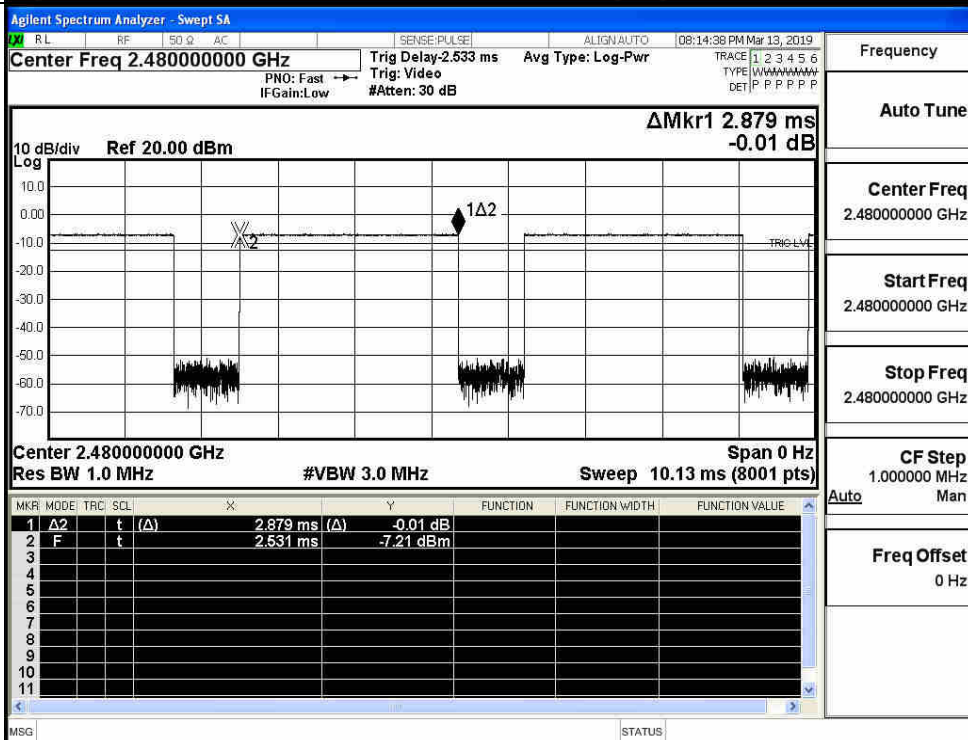
GFSK_DH5/LCH



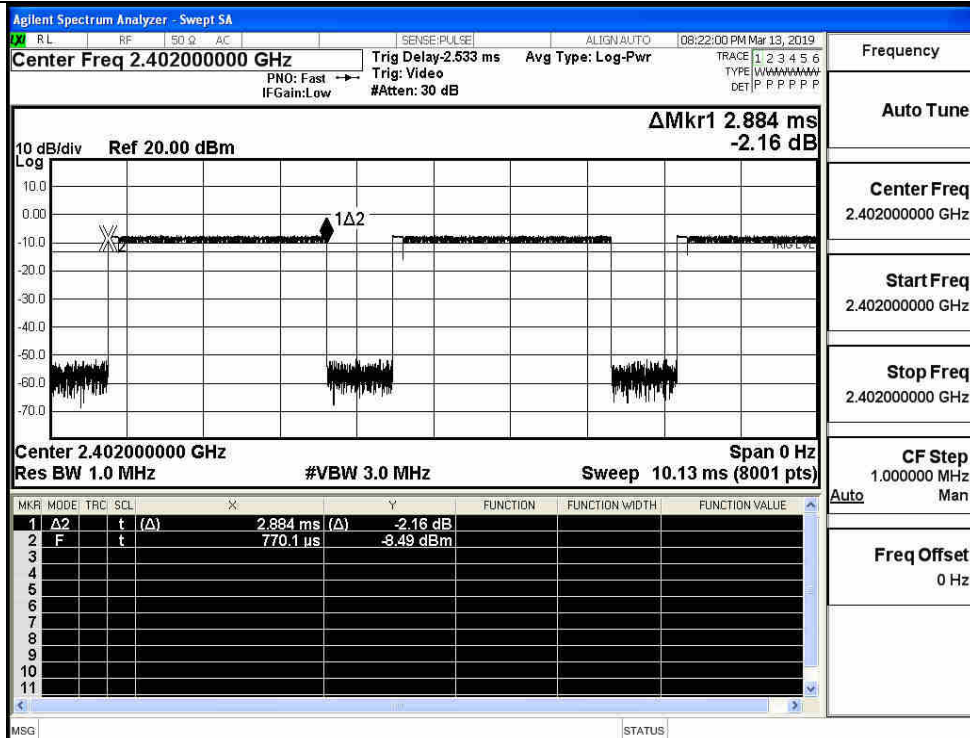
GFSK_DH5/MCH



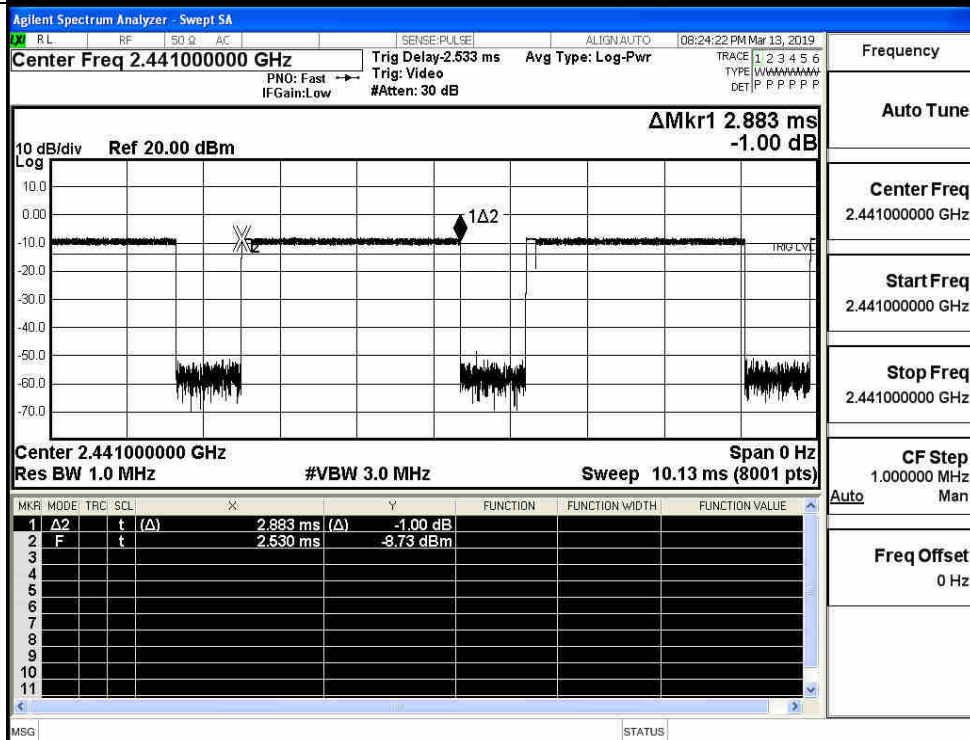
GFSK_DH5/HCH



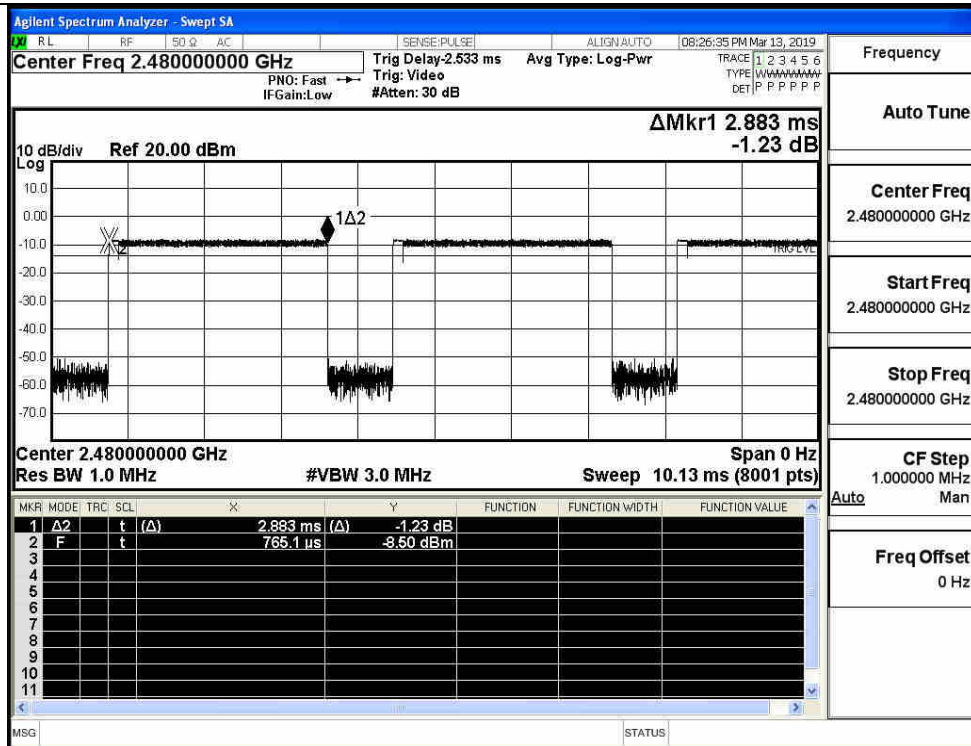
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



$\pi/4$ DQPSK
_2DH5/HCH

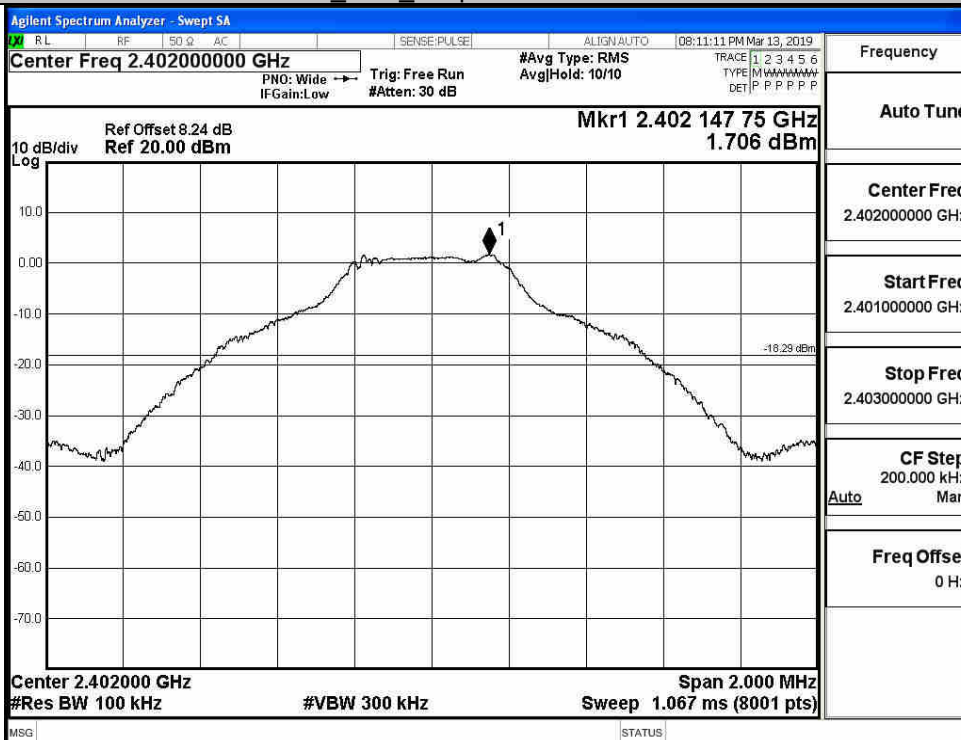


A.6 RF Conducted Spurious Emissions

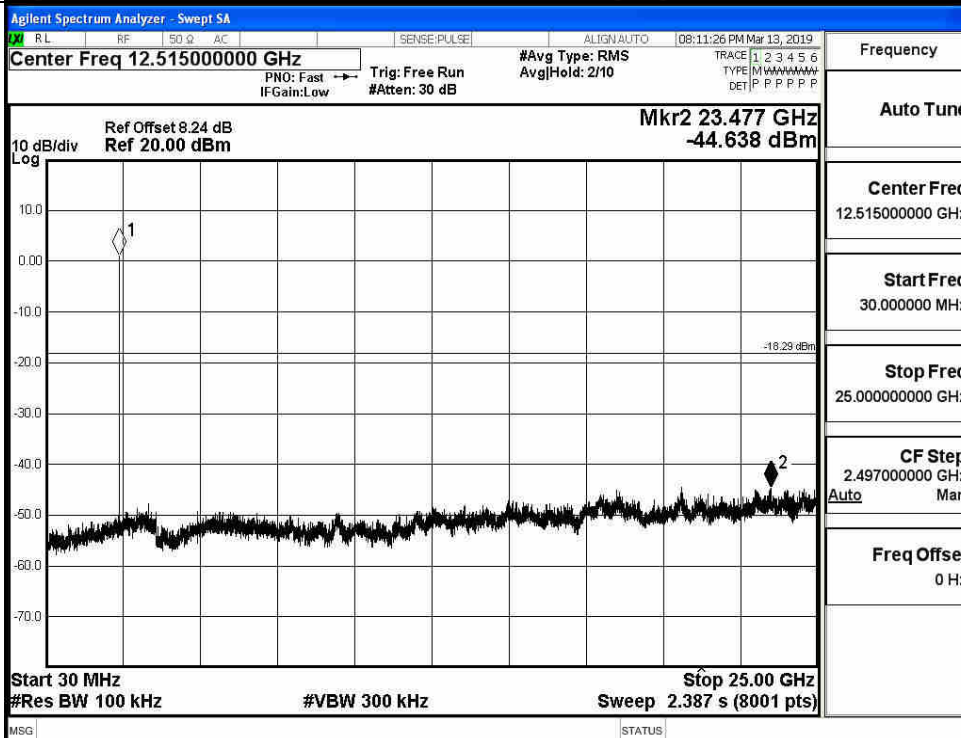
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.706	-44.638	-18.294	PASS
	MCH	1.125	-44.098	-18.875	PASS
	HCH	1.196	-43.656	-18.804	PASS
$\pi/4$ DQPSK	LCH	-0.091	-43.969	-20.091	PASS
	MCH	-0.117	-44.571	-20.117	PASS
	HCH	-0.345	-44.785	-20.345	PASS

GFSK_LCH_Graphs

Pref

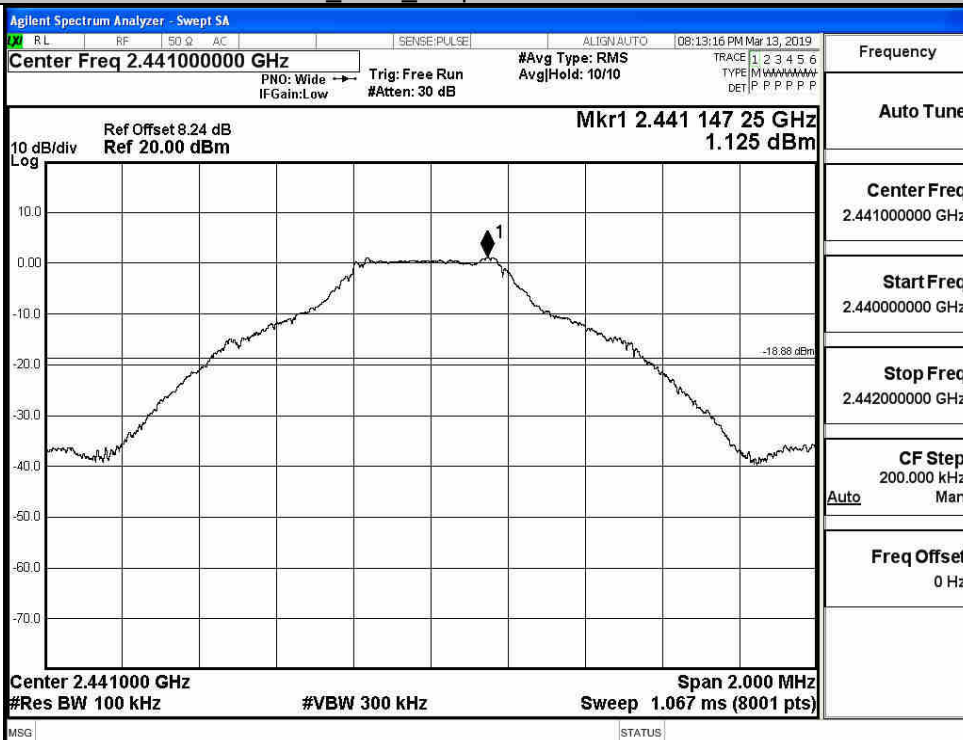


Puw

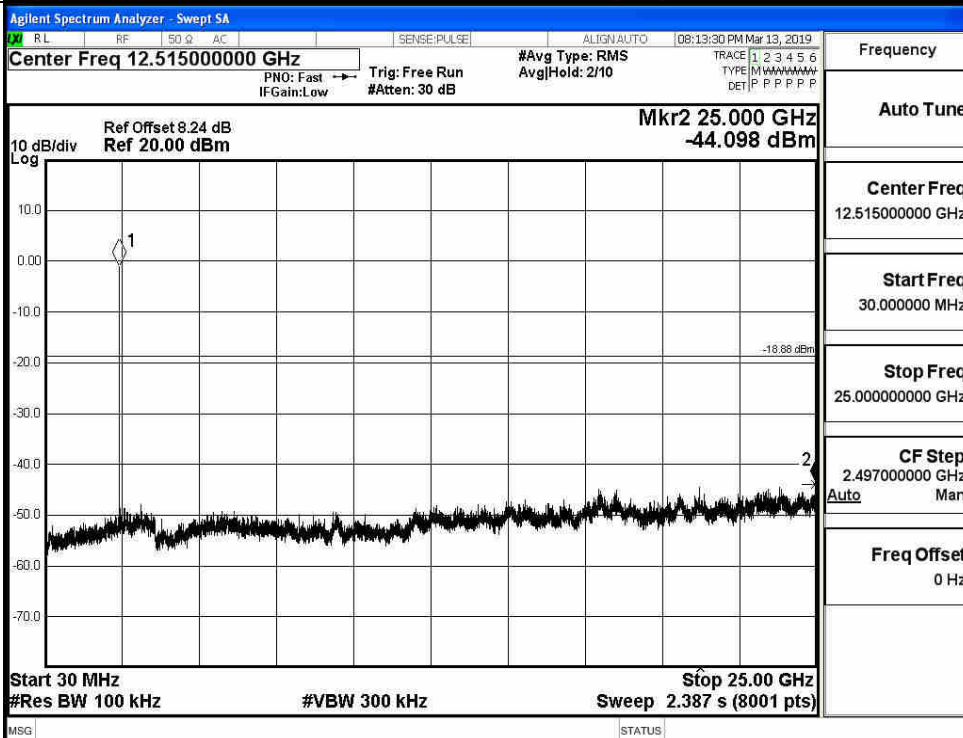


GFSK_MCH_Graphs

Pref

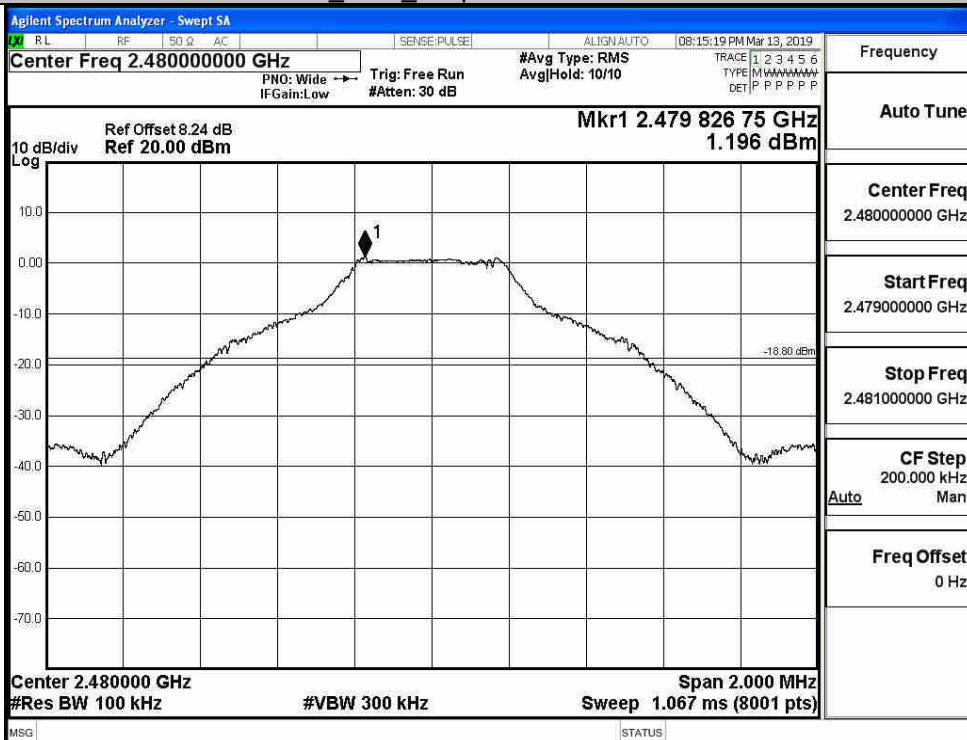


Puw

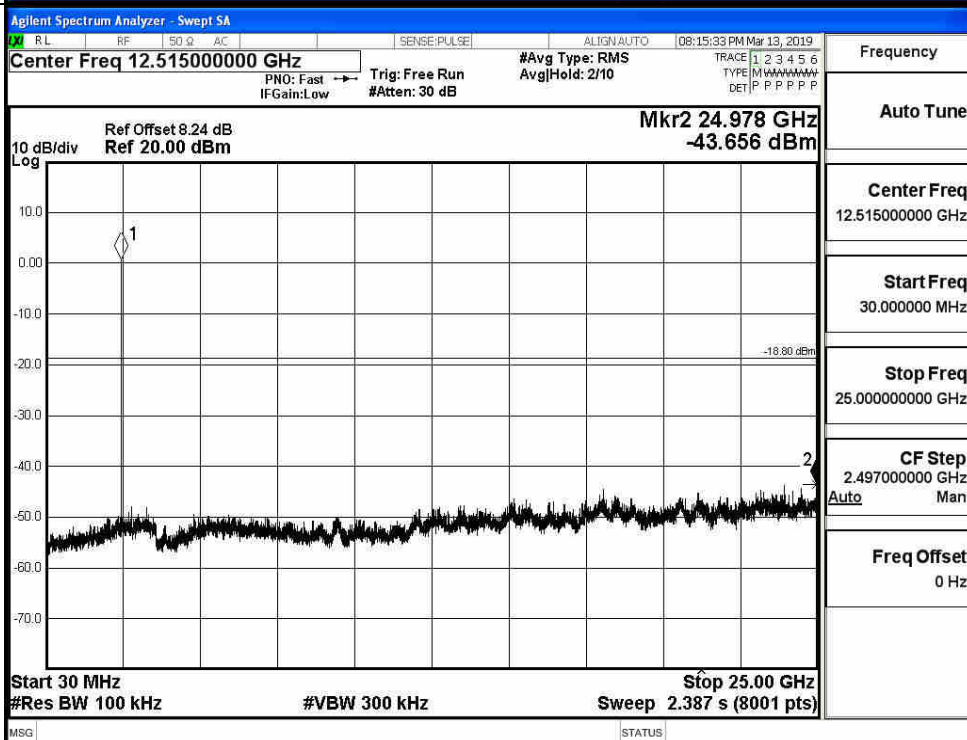


GFSK_HCH_Graphs

Pref

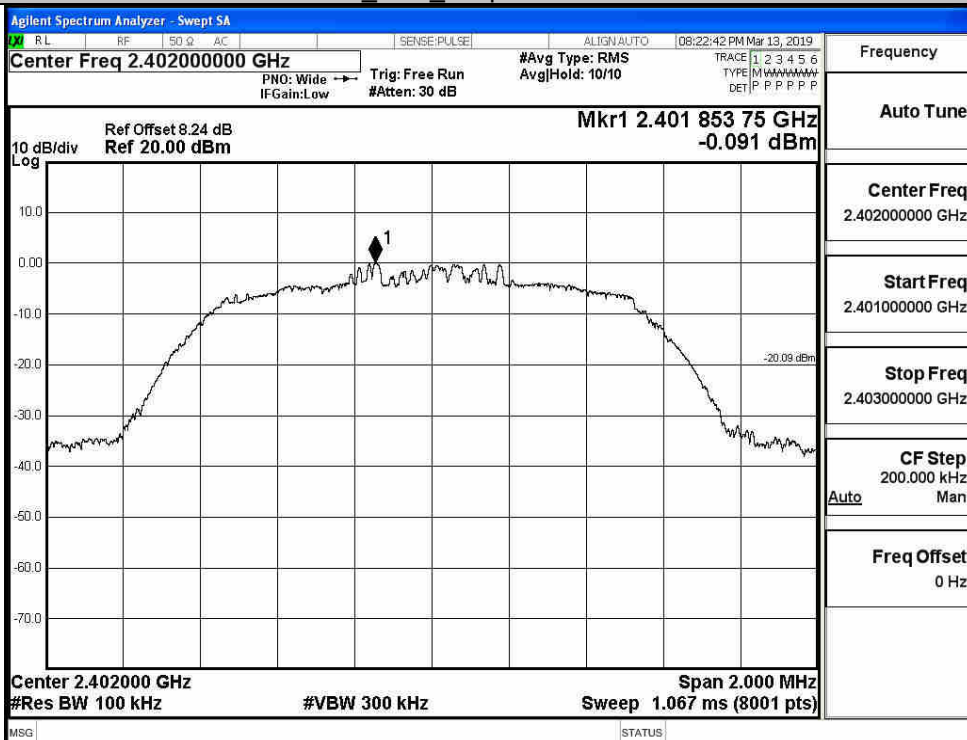


Puw

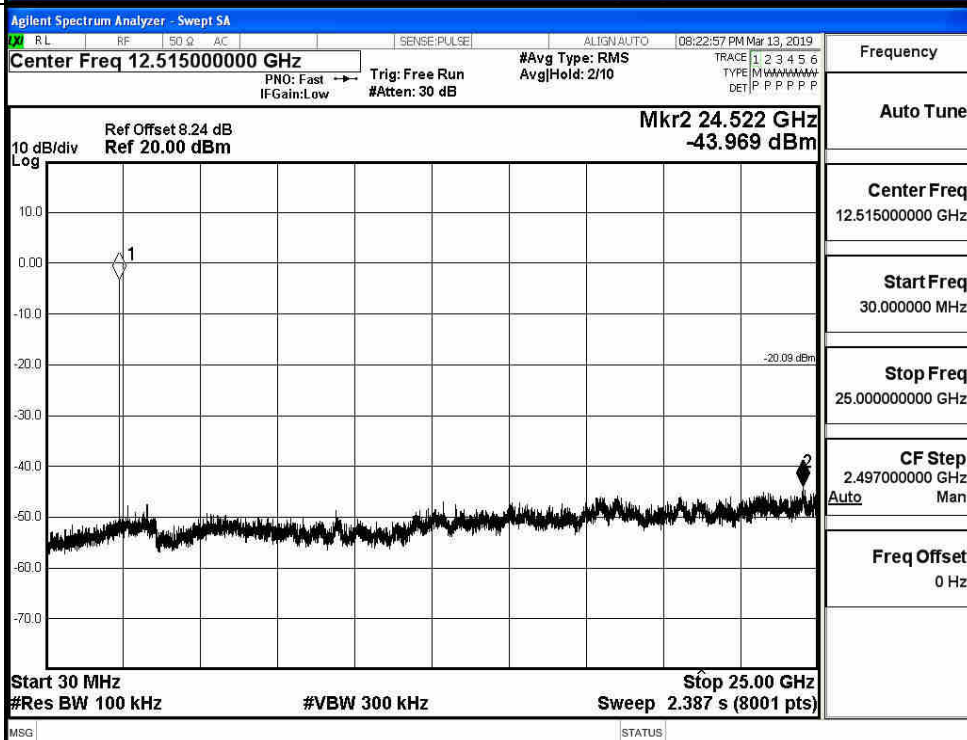


$\pi/4$ DQPSK_LCH_Graphs

Pref

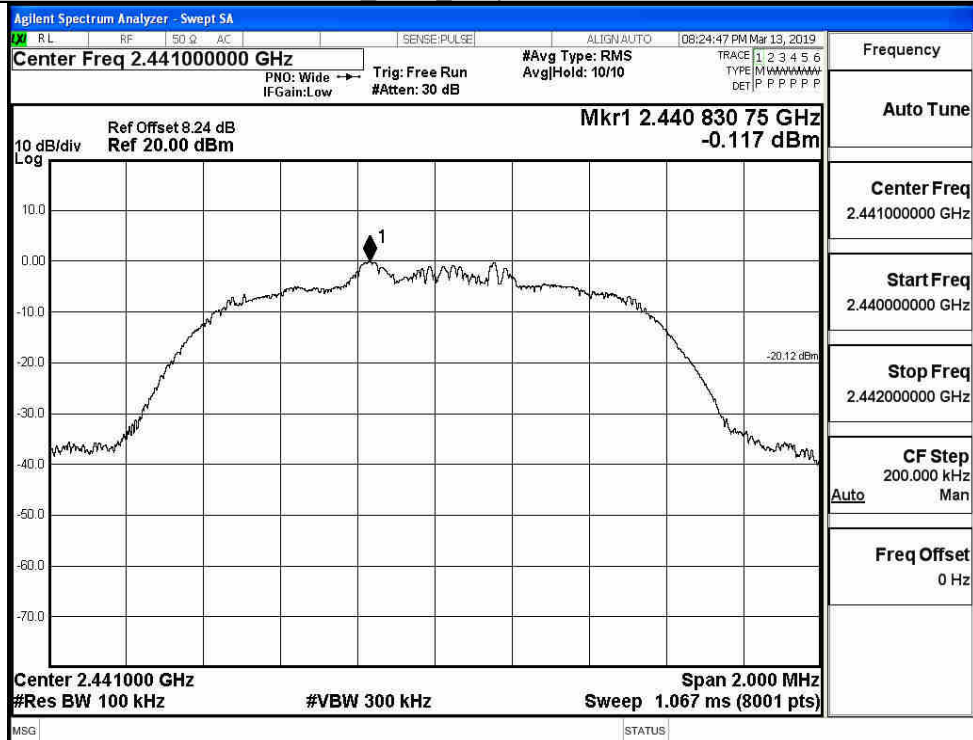


Puw

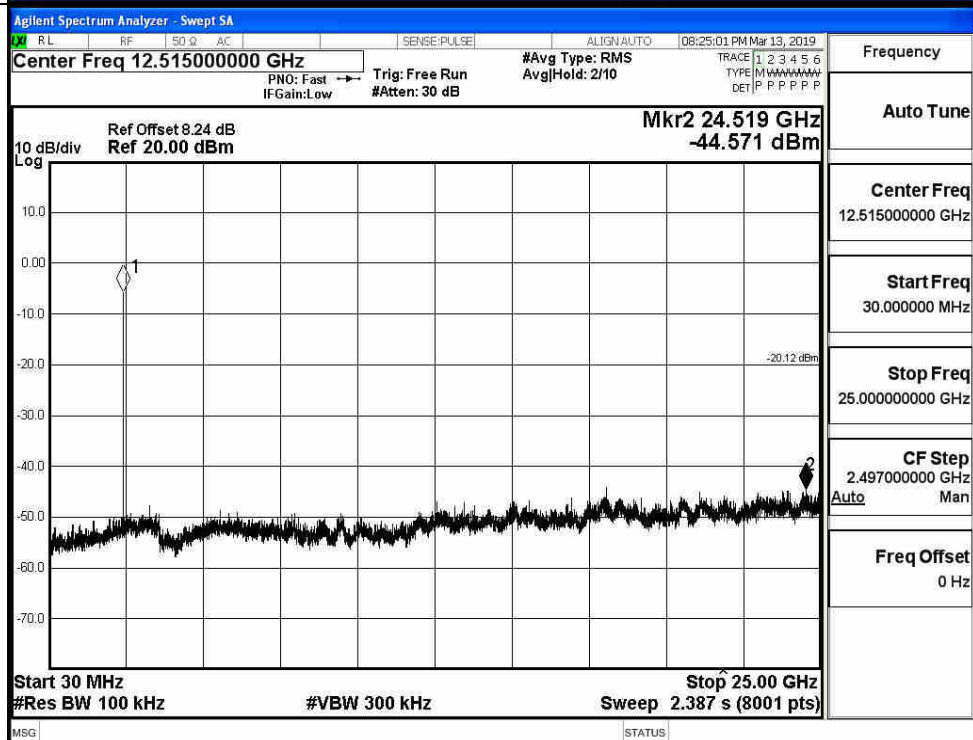


$\pi/4$ DQPSK_MCH_Graphs

Pref

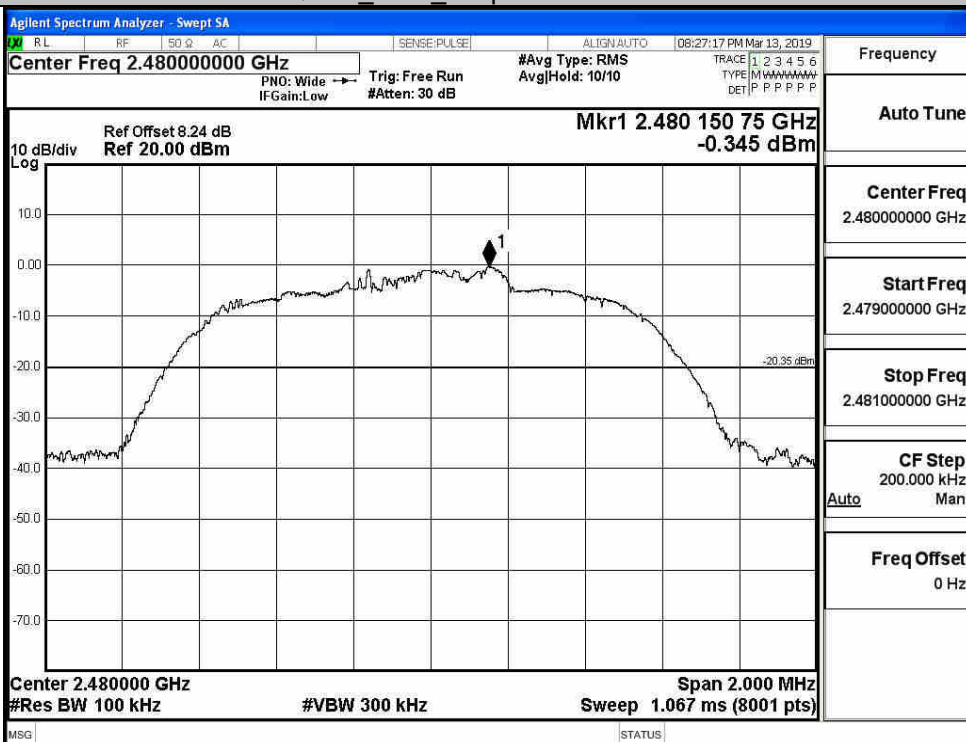


Puw

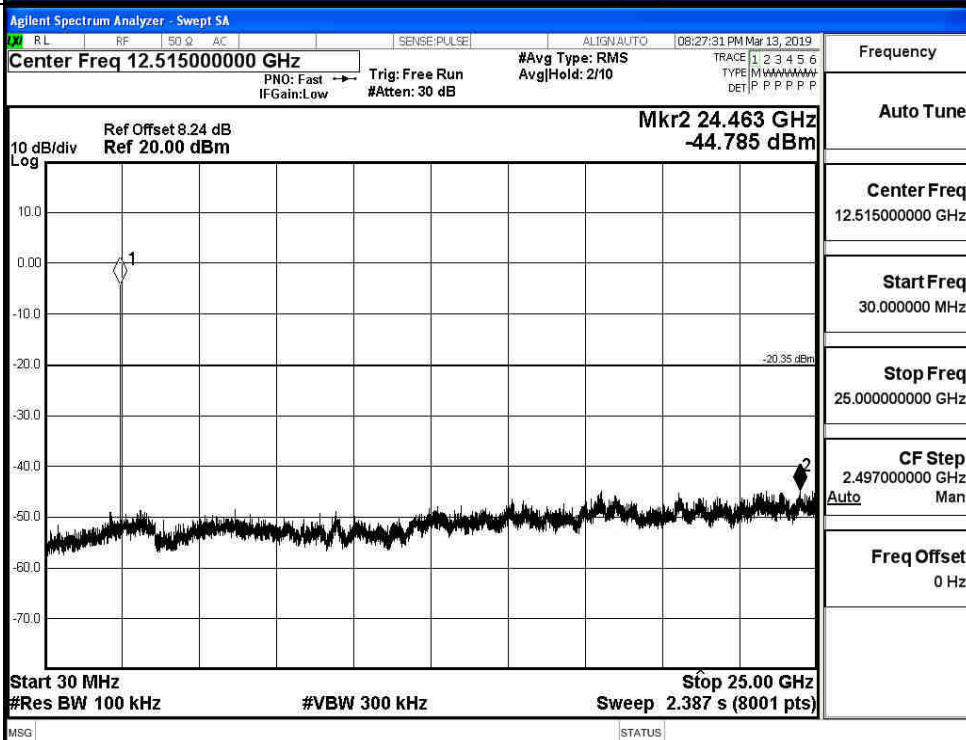


$\pi/4$ DQPSK_HCH_Graphs

Pref



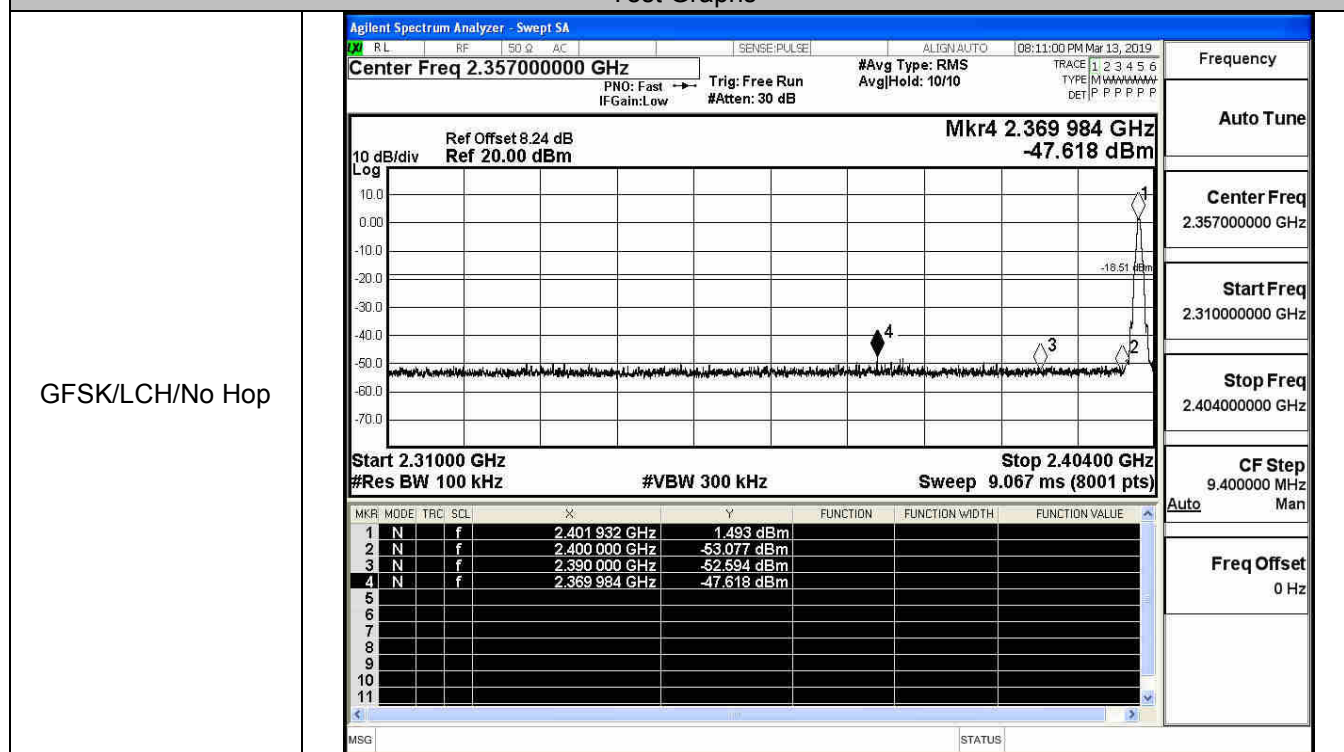
Puw



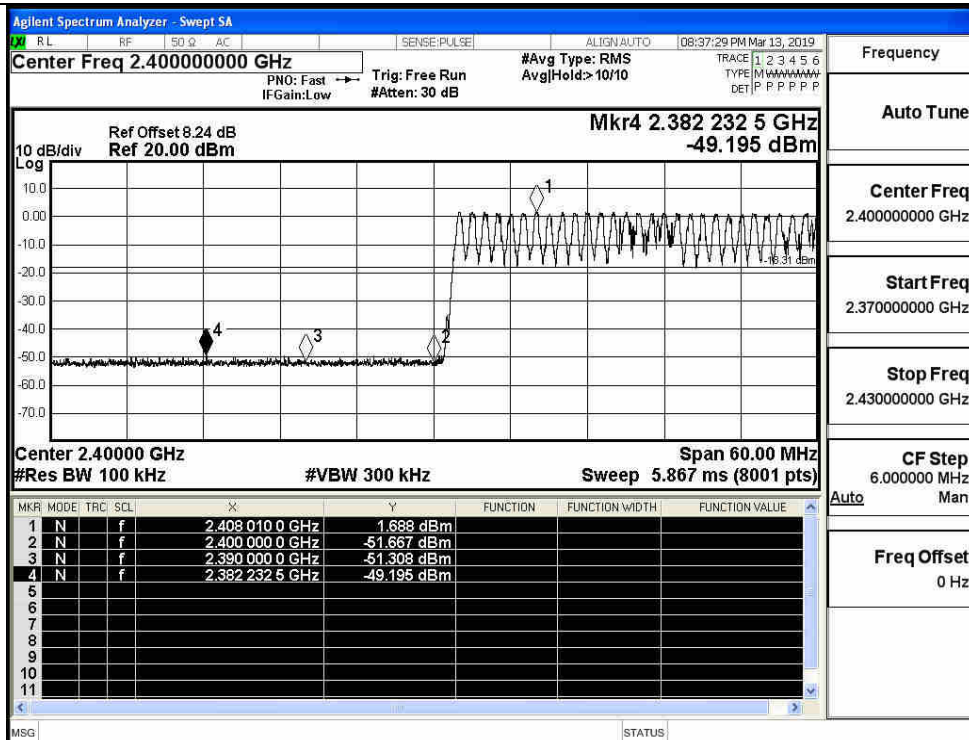
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.493	Off	-47.618	-18.51	PASS
			1.688	On	-49.195	-18.31	PASS
	HCH	2480	1.294	Off	-49.248	-18.71	PASS
			1.171	On	-48.158	-18.83	PASS
$\pi/4$ DQPSK	LCH	2402	0.437	Off	-49.895	-19.56	PASS
			0.350	On	-49.360	-19.65	PASS
	HCH	2480	-0.161	Off	-49.759	-20.16	PASS
			-0.191	On	-39.029	-20.19	PASS

Test Graphs



GFSK/LCH/Hop

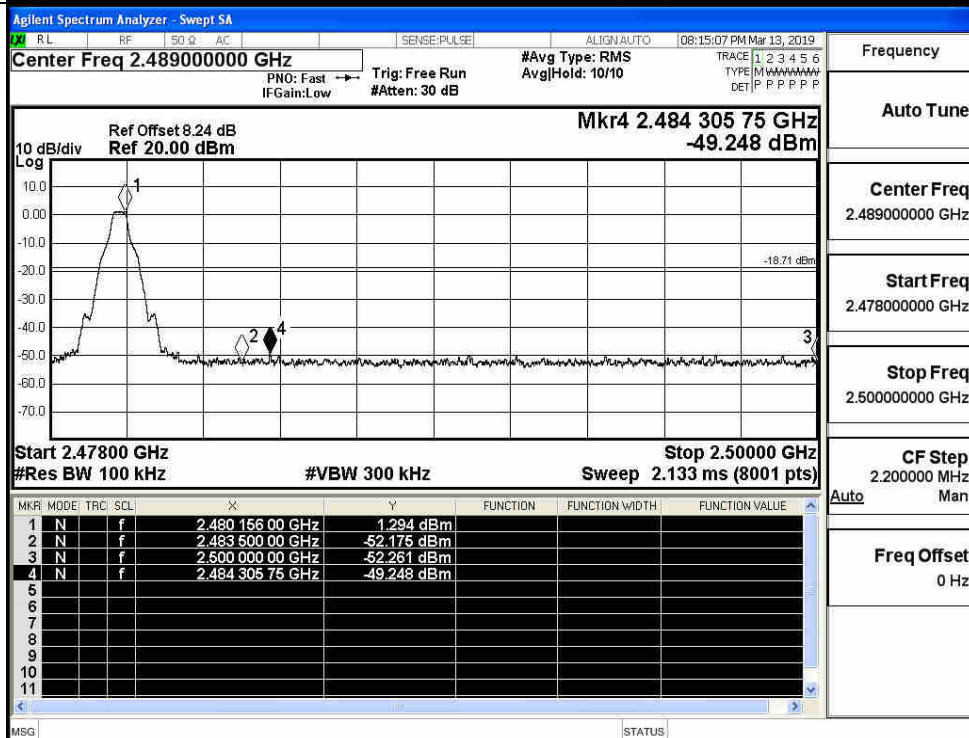


Frequency

Auto Tune

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

GFSK/HCH/No Hop

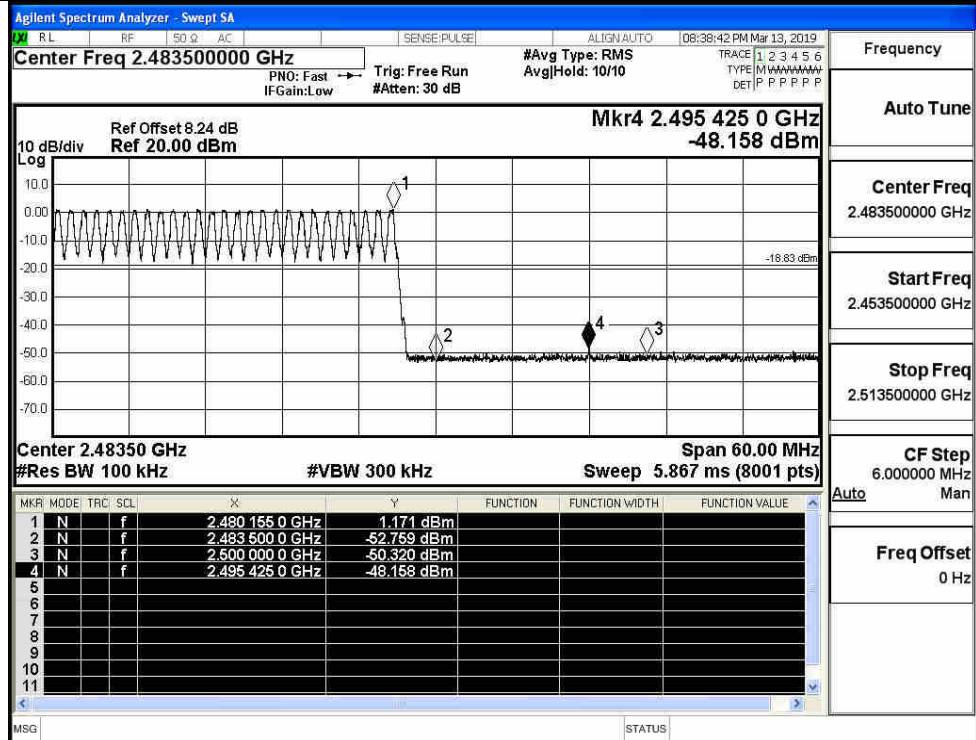


Frequency

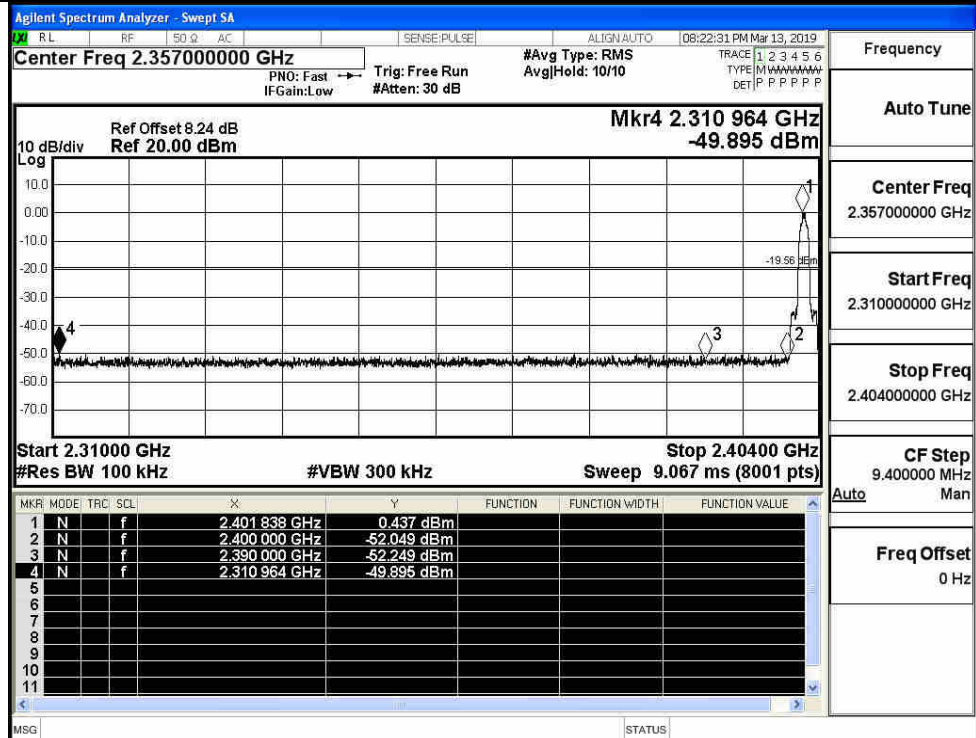
Auto Tune

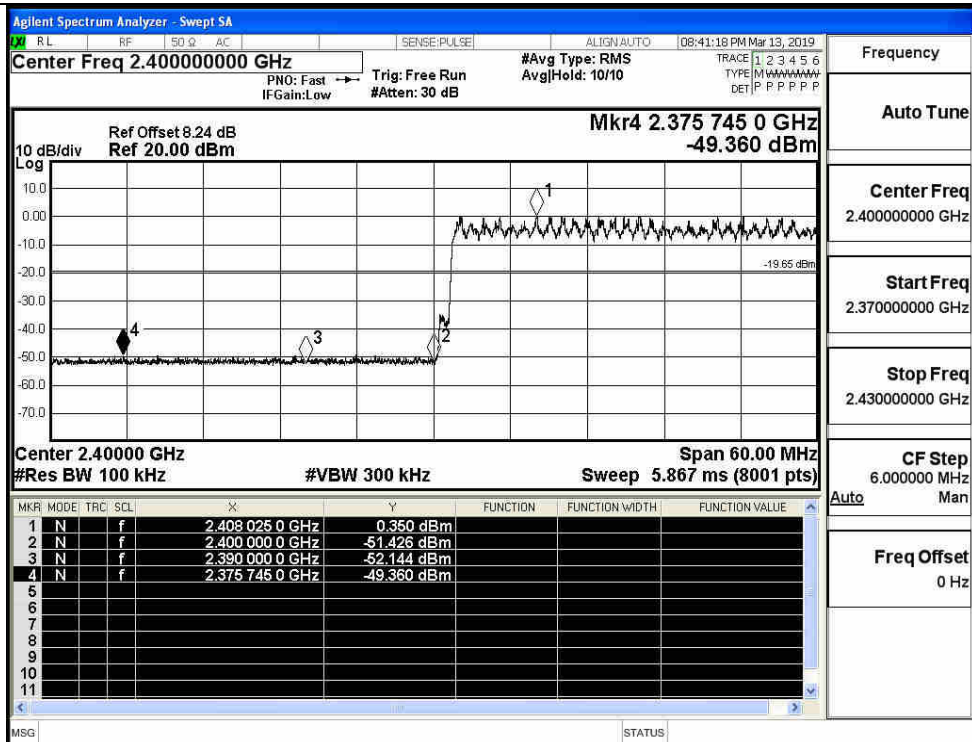
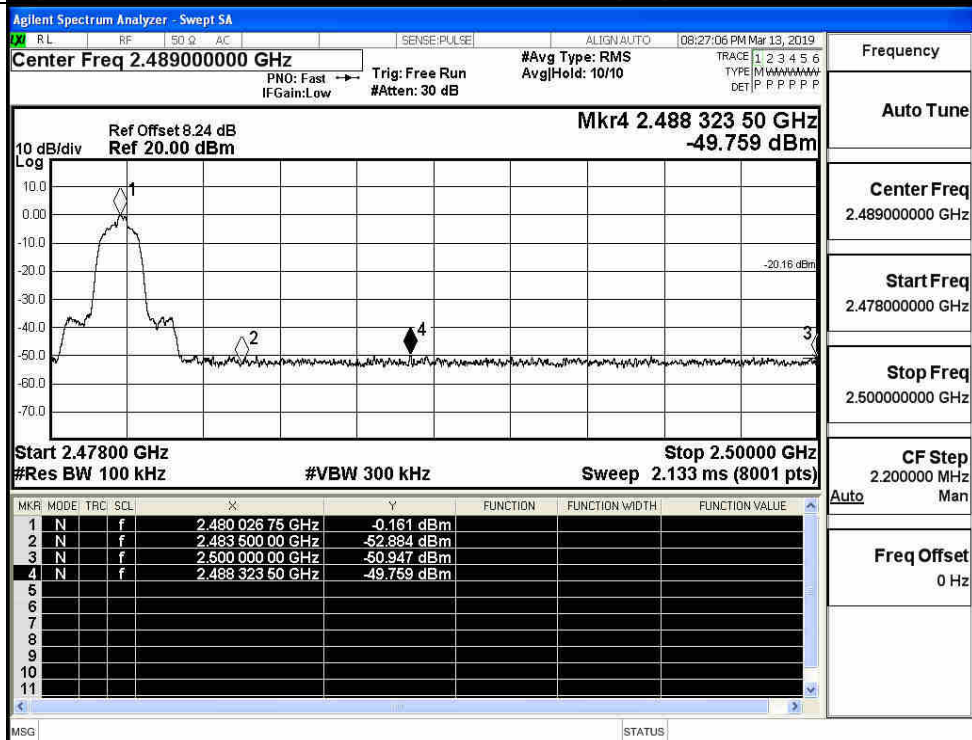
Center Freq
2.489000000 GHzStart Freq
2.478000000 GHzStop Freq
2.500000000 GHzCF Step
2.200000 MHz
Auto ManFreq Offset
0 Hz

GFSK/HCH/Hop

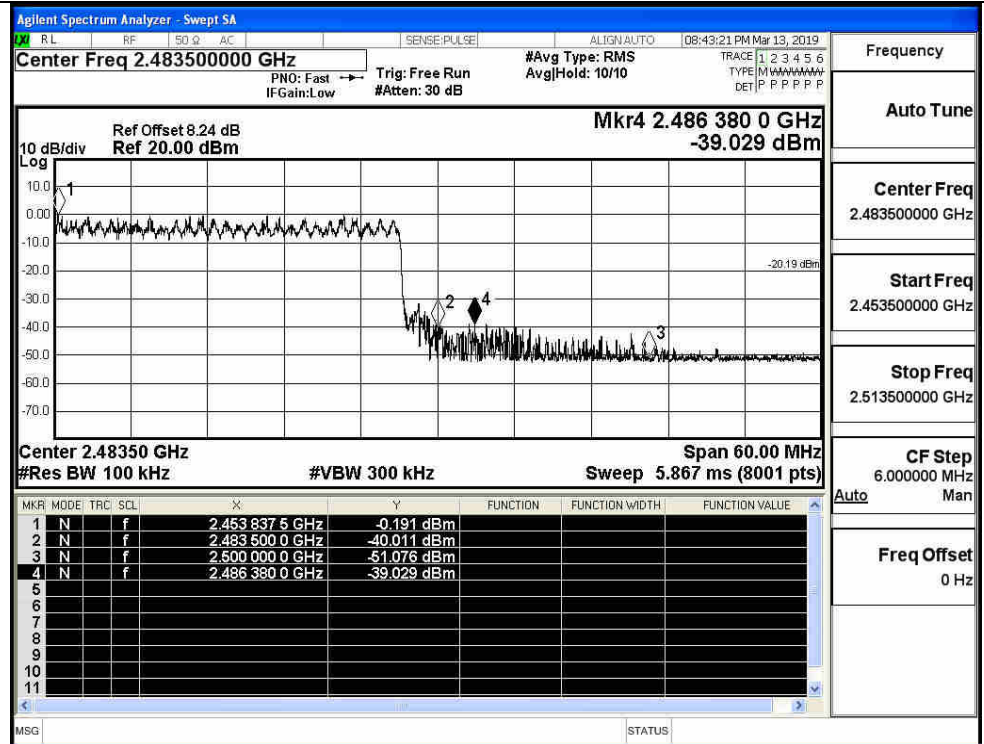


π /4DQPSK/LCH/No
Hop



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

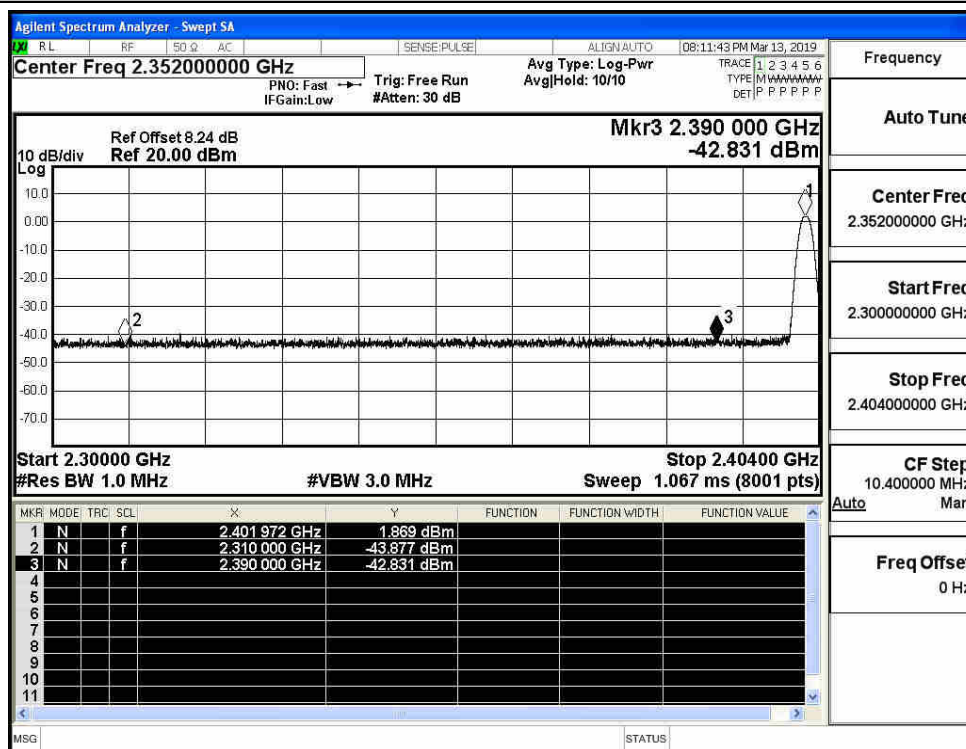
$\pi/4$ DQPSK/HCH/Hop



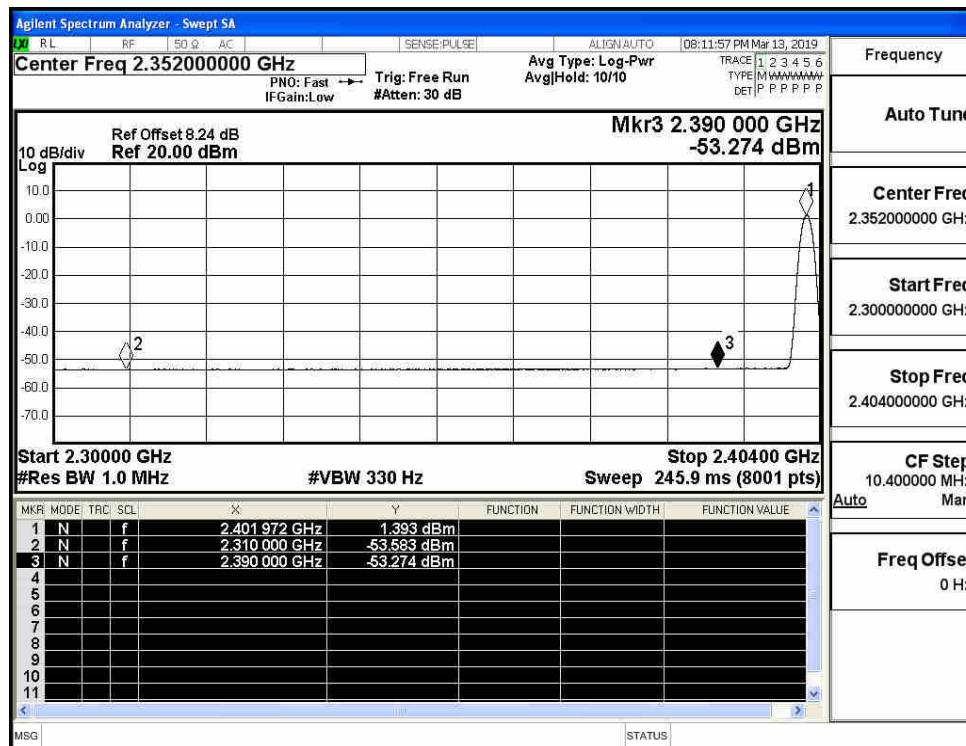
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.88	2.0	0	53.38	PEAK	74	PASS
	Off	2310.0	-53.58	2.0	0	43.67	AV	54	PASS
	Off	2390.0	-42.83	2.0	0	54.43	PEAK	74	PASS
	Off	2390.0	-53.27	2.0	0	43.98	AV	54	PASS
	Off	2483.5	-41.80	2.0	0	55.45	PEAK	74	PASS
	Off	2483.5	-52.86	2.0	0	44.40	AV	54	PASS
	Off	2500.0	-43.29	2.0	0	53.96	PEAK	74	PASS
	Off	2500.0	-52.92	2.0	0	44.33	AV	54	PASS
T/4DQPSK	Off	2310.0	-42.50	2.0	0	54.76	PEAK	74	PASS
	Off	2310.0	-53.56	2.0	0	43.70	AV	54	PASS
	Off	2390.0	-42.99	2.0	0	54.27	PEAK	74	PASS
	Off	2390.0	-53.33	2.0	0	43.93	AV	54	PASS
	Off	2483.5	-43.51	2.0	0	53.75	PEAK	74	PASS
	Off	2483.5	-52.87	2.0	0	44.38	AV	54	PASS
	Off	2500.0	-43.34	2.0	0	53.92	PEAK	74	PASS
	Off	2500.0	-52.95	2.0	0	44.31	AV	54	PASS

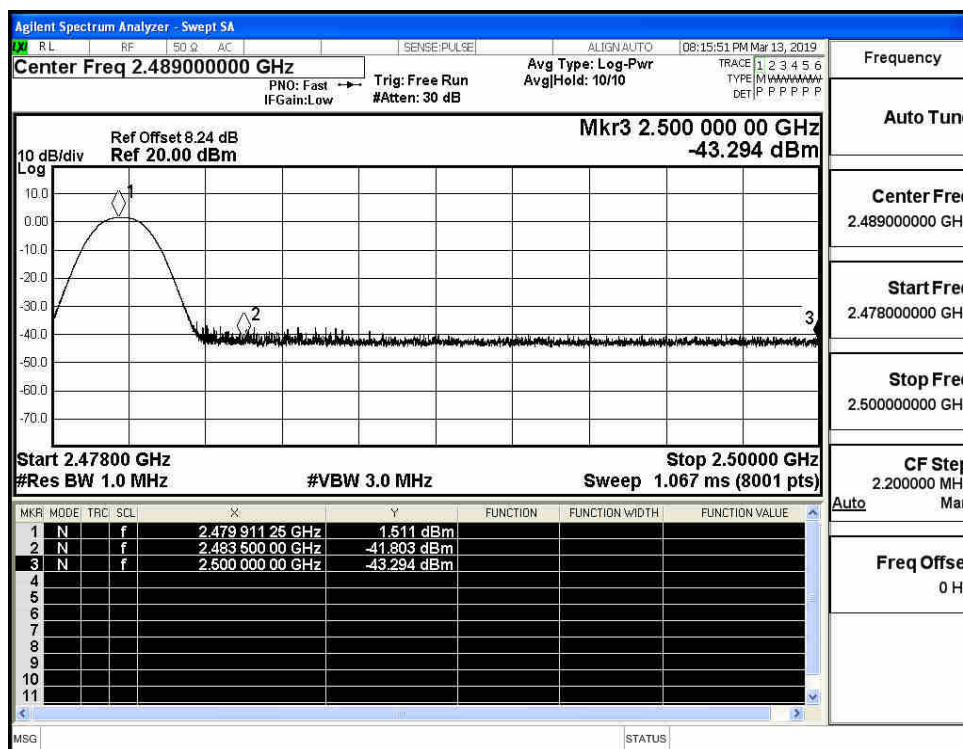
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



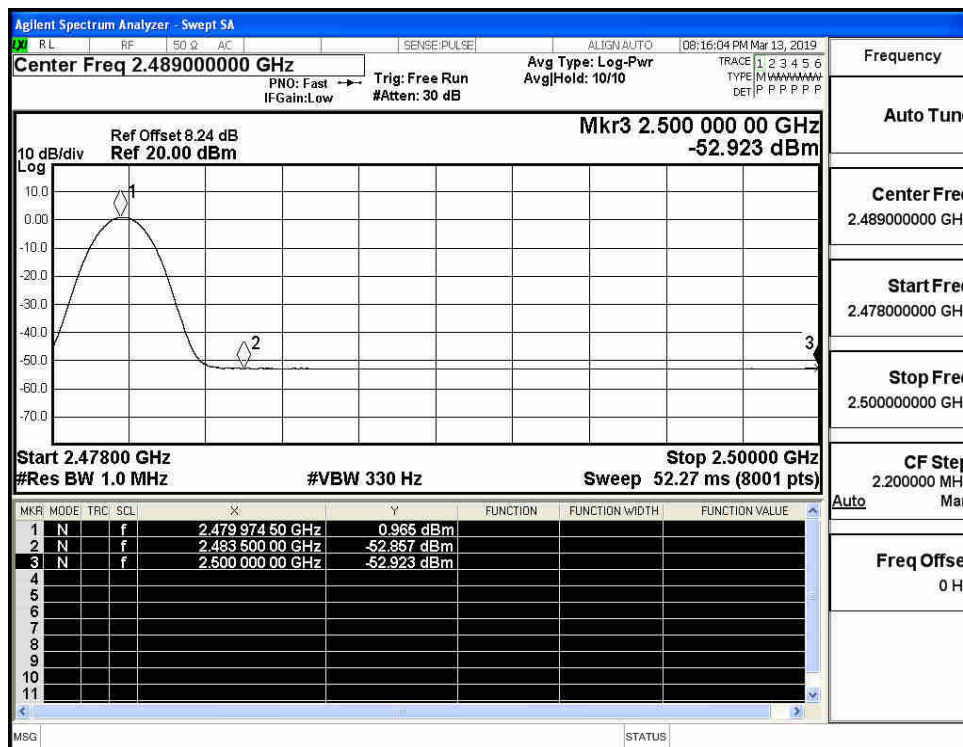
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



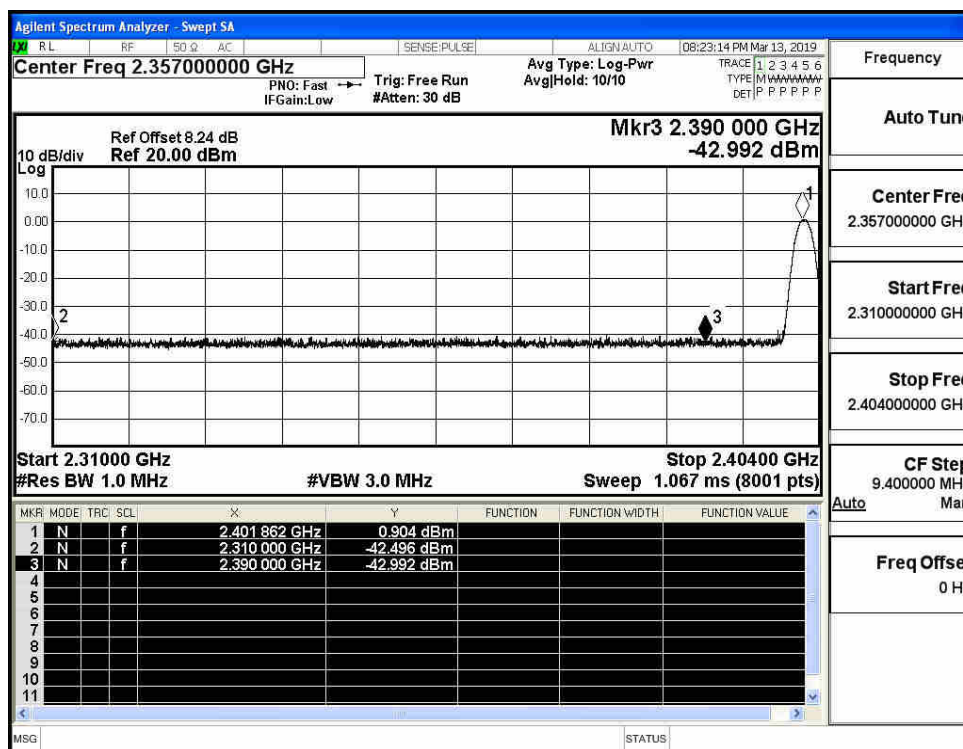
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



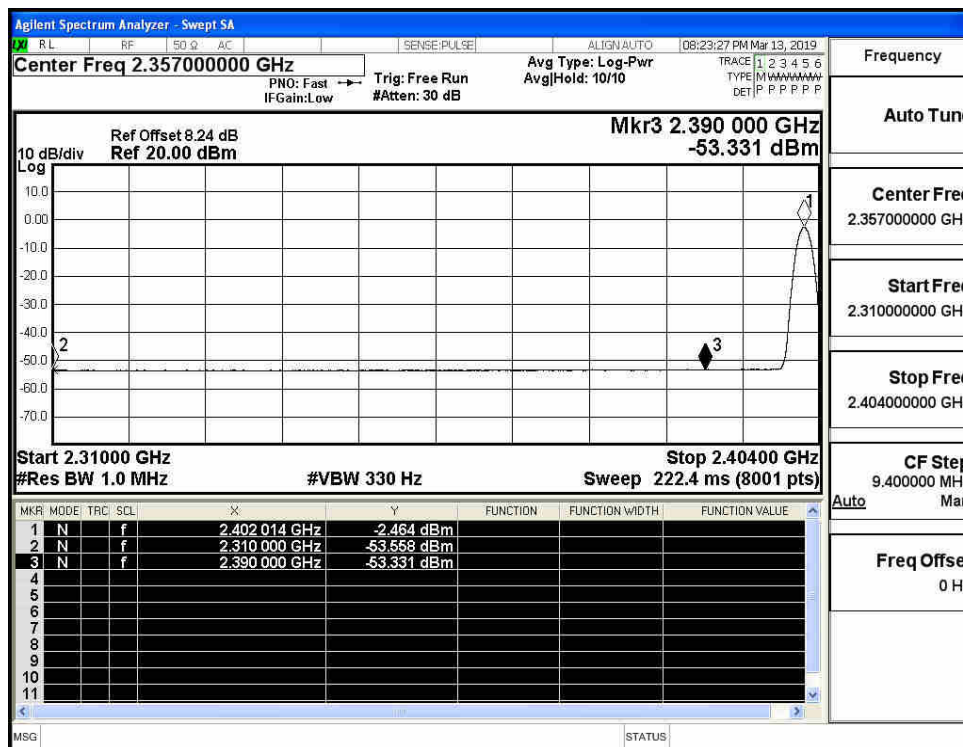
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

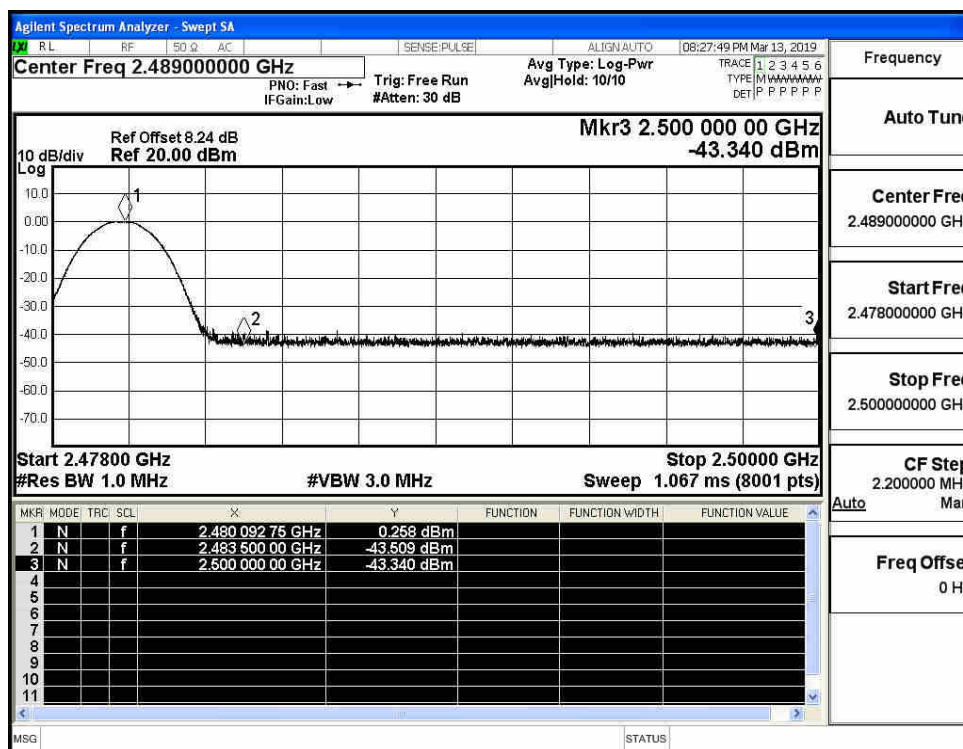


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



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)