

Appendix A

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

Product Name: TRUE WIRELESS EARBUDS WITH CHARGING CASE

Trade Mark: N/A

Test Model:RT18

FCC ID: QIF-RT18

Environmental Conditions

Temperature:	23.7 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

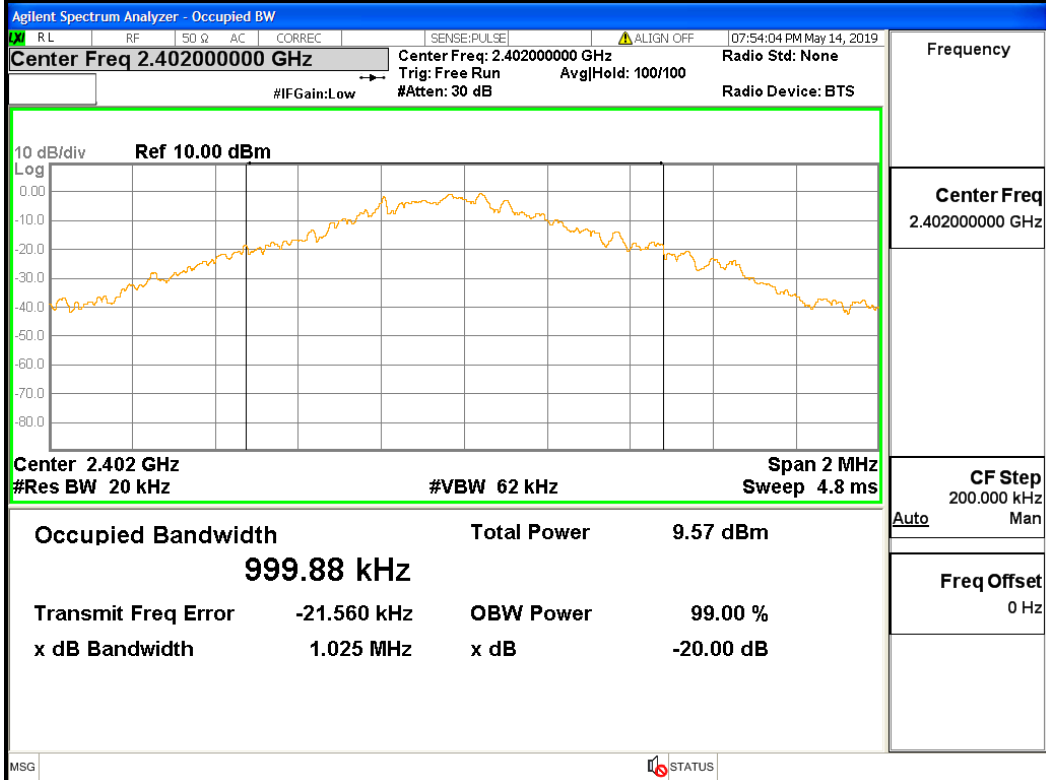
A.1 20 dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	1.025	Not Specified	PASS
GFSK	MCH	1.025	Not Specified	PASS
GFSK	HCH	0.955	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.359	Not Specified	PASS
$\pi/4$ DQPSK	MCH	1.310	Not Specified	PASS
$\pi/4$ DQPSK	HCH	1.309	Not Specified	PASS
8DPSK	LCH	1.298	Not Specified	PASS
8DPSK	MCH	1.275	Not Specified	PASS
8DPSK	HCH	1.272	Not Specified	PASS

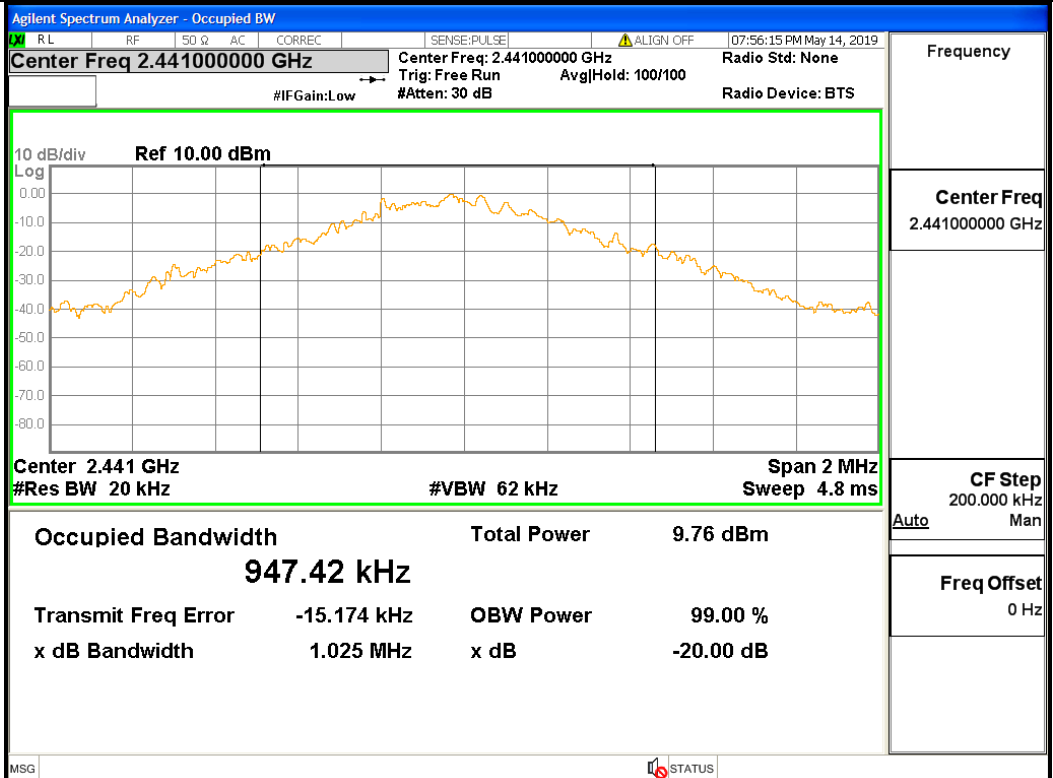
Test Graph

Graphs

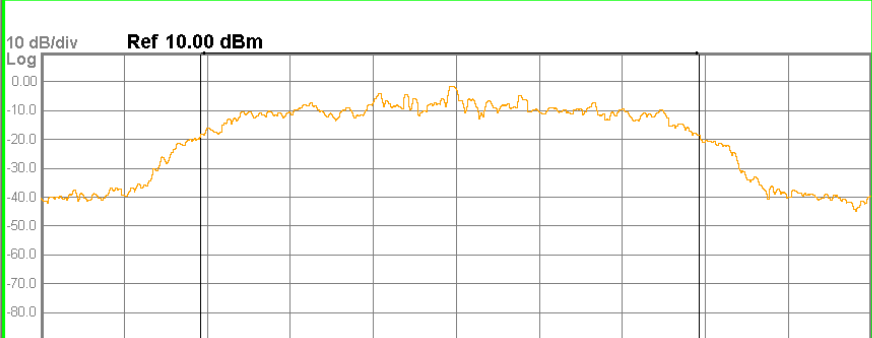
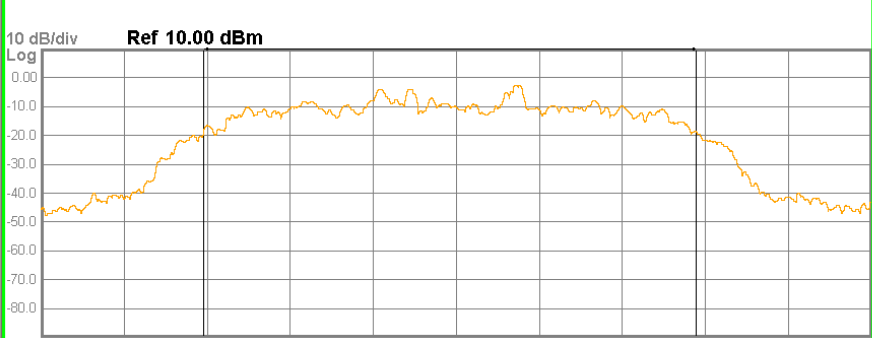
GFSK/LCH



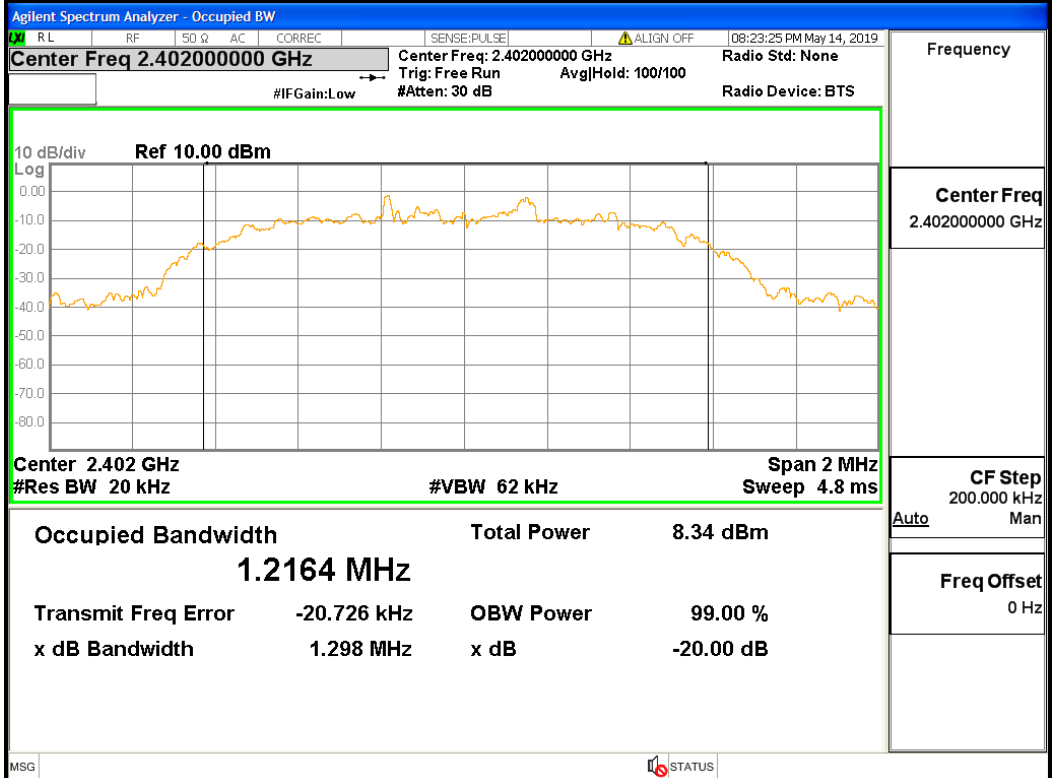
GFSK/MCH



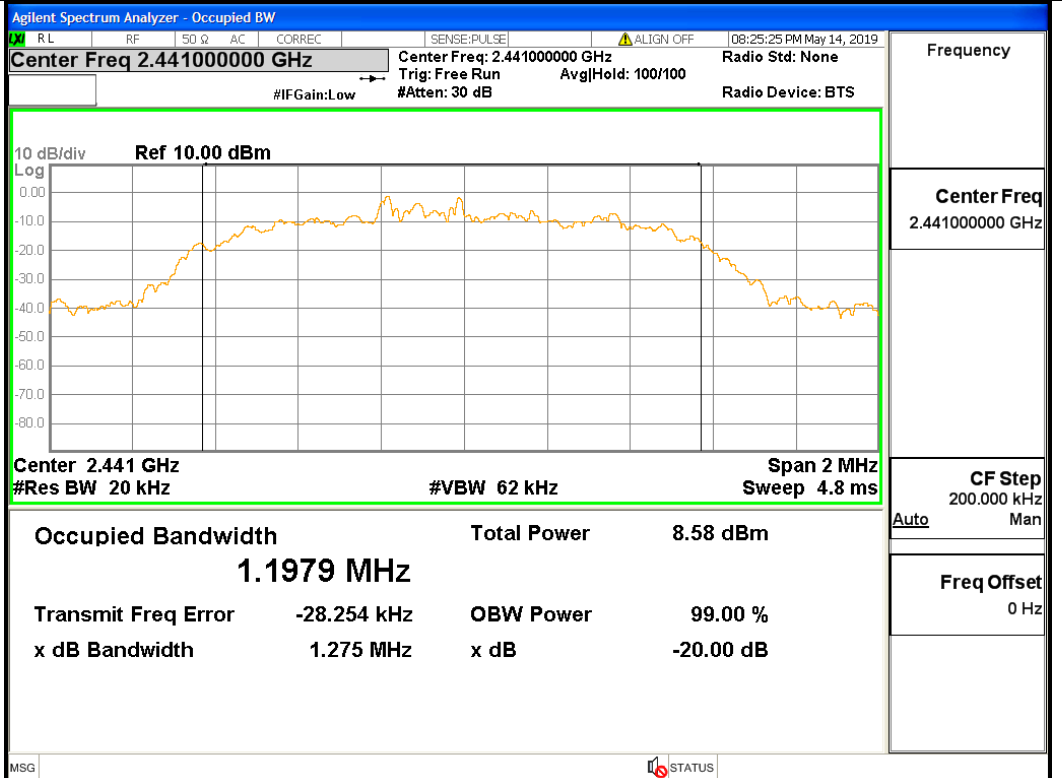
GFSK/HCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC CORREC SENSE:PULSE ALIGN OFF 07:59:01 PM May 14, 2019 Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Radio Std: None #IFGain:Low #Atten: 30 dB AvgHold: 100/100 Radio Device: BTS 10 dB/div Ref 10.00 dBm Center 2.48 GHz #Res BW 20 kHz #VBW 62 kHz Span 2 MHz Sweep 4.8 ms Occupied Bandwidth 903.00 kHz Total Power 9.52 dBm Transmit Freq Error -13.865 kHz OBW Power 99.00 % x dB Bandwidth 955.3 kHz x dB -20.00 dB MSG STATUS
π/4DQPSK/LCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC CORREC SENSE:PULSE ALIGN OFF 07:59:54 PM May 14, 2019 Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Radio Std: None #IFGain:Low #Atten: 30 dB AvgHold: 100/100 Radio Device: BTS 10 dB/div Ref 10.00 dBm Center 2.402 GHz #Res BW 20 kHz #VBW 62 kHz Span 2 MHz Sweep 4.8 ms Occupied Bandwidth 1.2223 MHz Total Power 7.73 dBm Transmit Freq Error -10.022 kHz OBW Power 99.00 % x dB Bandwidth 1.359 MHz x dB -20.00 dB MSG STATUS

π/4DQPSK/MCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC CORREC SENSE:PULSE ALIGN OFF 08:03:25 PM May 14, 2019 Center Freq 2.441000000 GHz Center Freq: 2.441000000 GHz Radio Std: None #IFGain:Low #Atten: 30 dB AvgHold: 100/100 Radio Device: BTS  10 dB/div Ref 10.00 dBm Center 2.441 GHz Span 2 MHz #Res BW 20 kHz #VBW 62 kHz Sweep 4.8 ms Occupied Bandwidth 1.1956 MHz Total Power 8.30 dBm Transmit Freq Error -14.347 kHz OBW Power 99.00 % x dB Bandwidth 1.310 MHz x dB -20.00 dB MSG STATUS	Frequency Center Freq 2.441000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz
π/4DQPSK/HCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC CORREC SENSE:PULSE ALIGN OFF 08:21:37 PM May 14, 2019 Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Radio Std: None #IFGain:Low #Atten: 30 dB AvgHold: 100/100 Radio Device: BTS  10 dB/div Ref 10.00 dBm Center 2.48 GHz Span 2 MHz #Res BW 20 kHz #VBW 62 kHz Sweep 4.8 ms Occupied Bandwidth 1.1855 MHz Total Power 7.61 dBm Transmit Freq Error -15.219 kHz OBW Power 99.00 % x dB Bandwidth 1.309 MHz x dB -20.00 dB MSG STATUS	Frequency Center Freq 2.480000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz

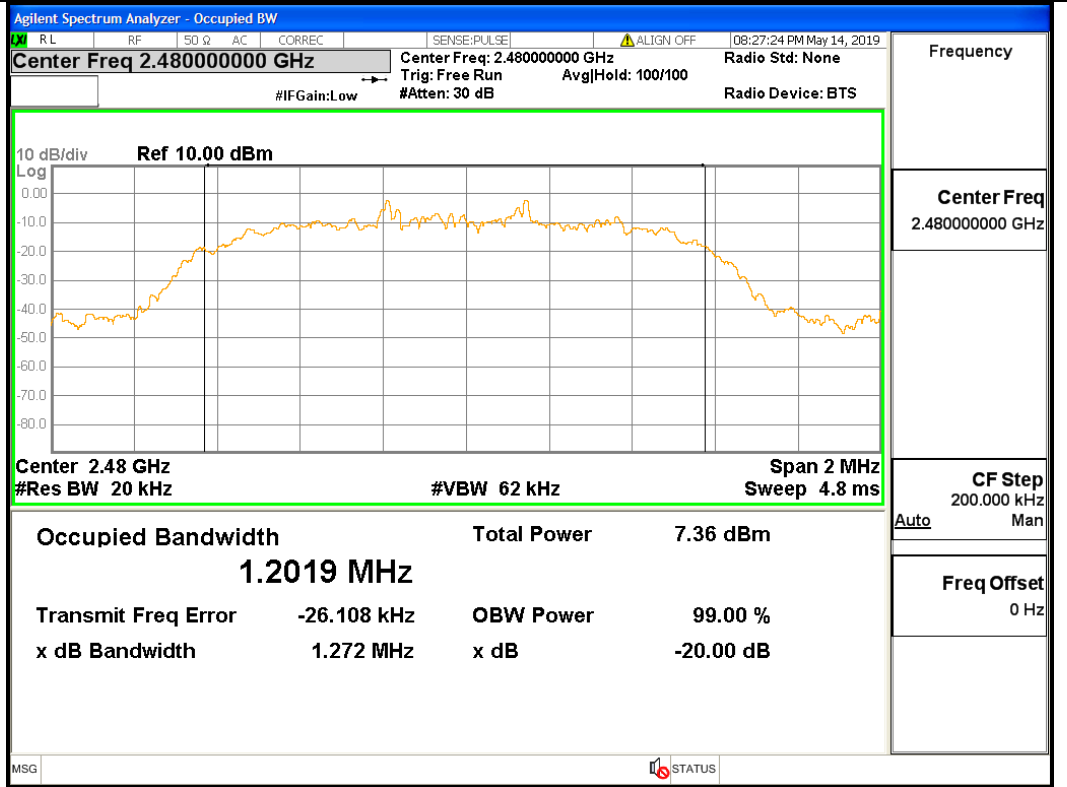
8DPSK/LCH



8DPSK/MCH



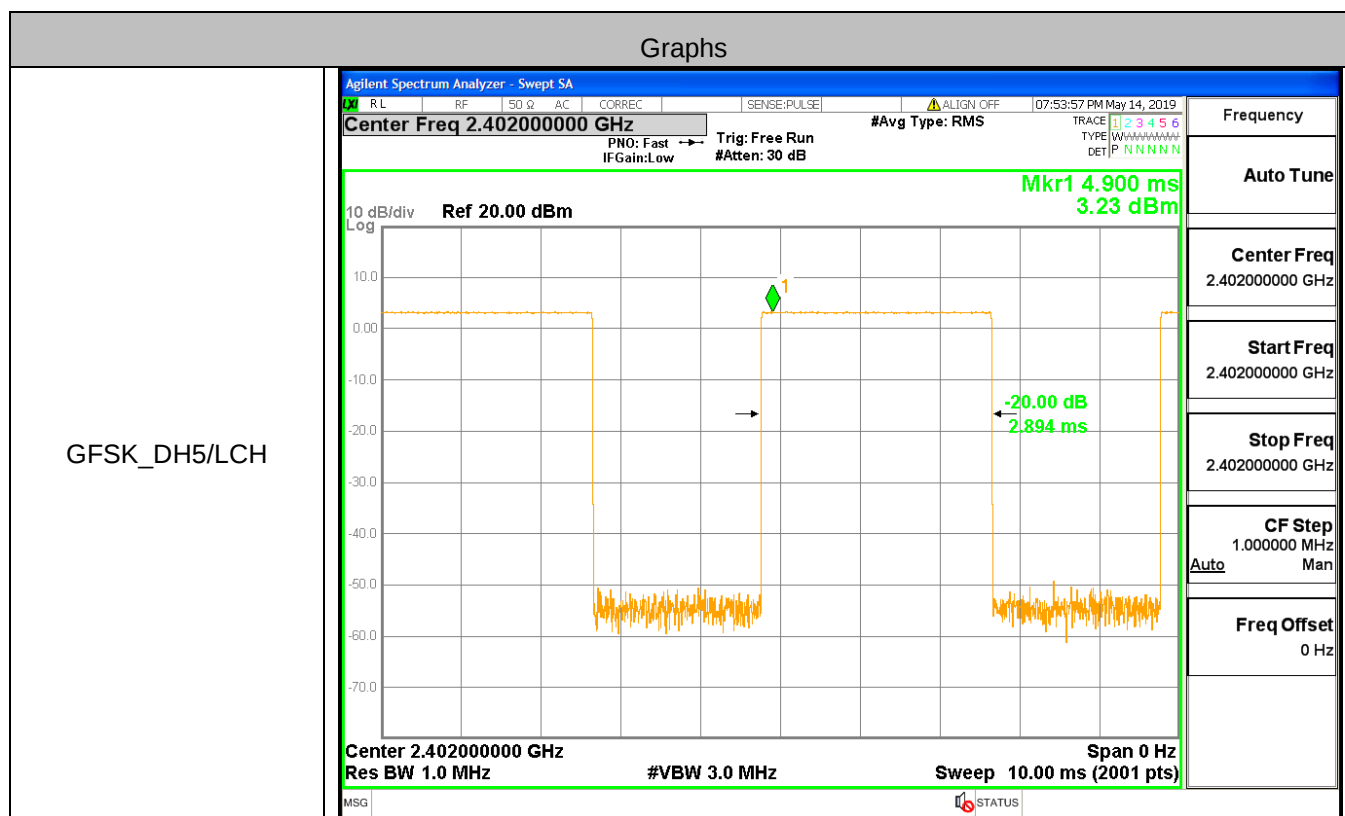
8DPSK/HCH



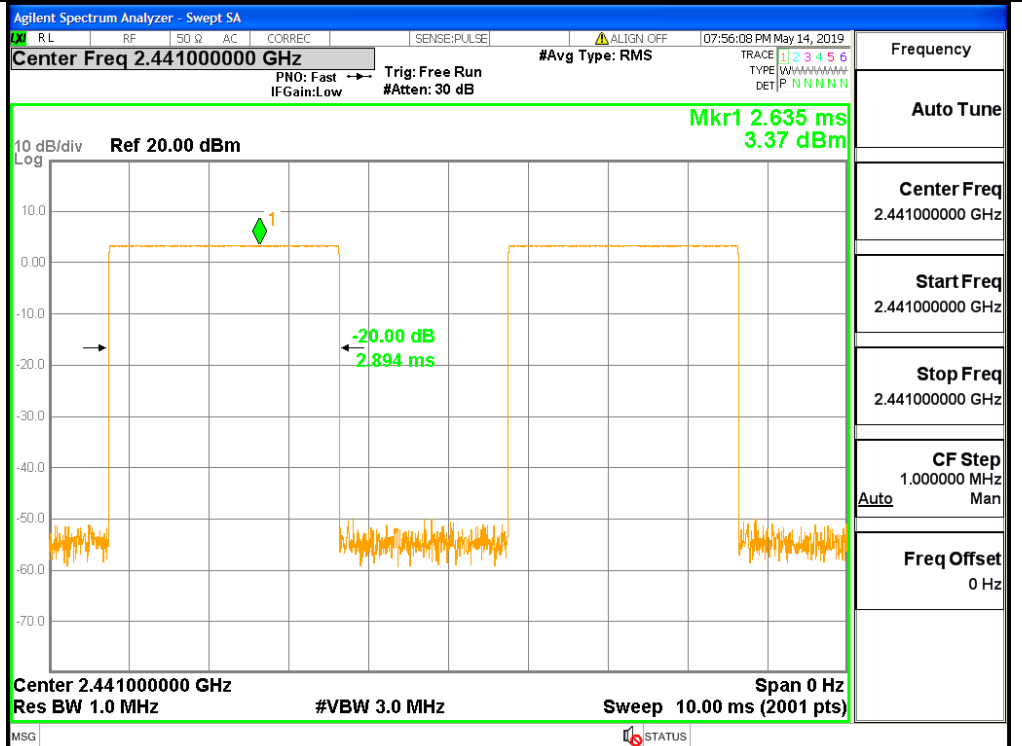
A.2 Dwell Time

Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.002894	106.7	0.308764	0.4	PASS
GFSK	DH5	MCH	0.002894	106.7	0.308760	0.4	PASS
GFSK	DH5	HCH	0.002896	106.7	0.309004	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	0.002899	106.7	0.309272	0.4	PASS
$\pi/4$ DQPSK	2DH5	MCH	0.002901	106.7	0.309584	0.4	PASS
$\pi/4$ DQPSK	2DH5	HCH	0.002899	106.7	0.309304	0.4	PASS
8DPSK	3DH5	LCH	0.002902	106.7	0.309621	0.4	PASS
8DPSK	3DH5	MCH	0.002900	106.7	0.309473	0.4	PASS
8DPSK	3DH5	HCH	0.002900	106.7	0.309436	0.4	PASS

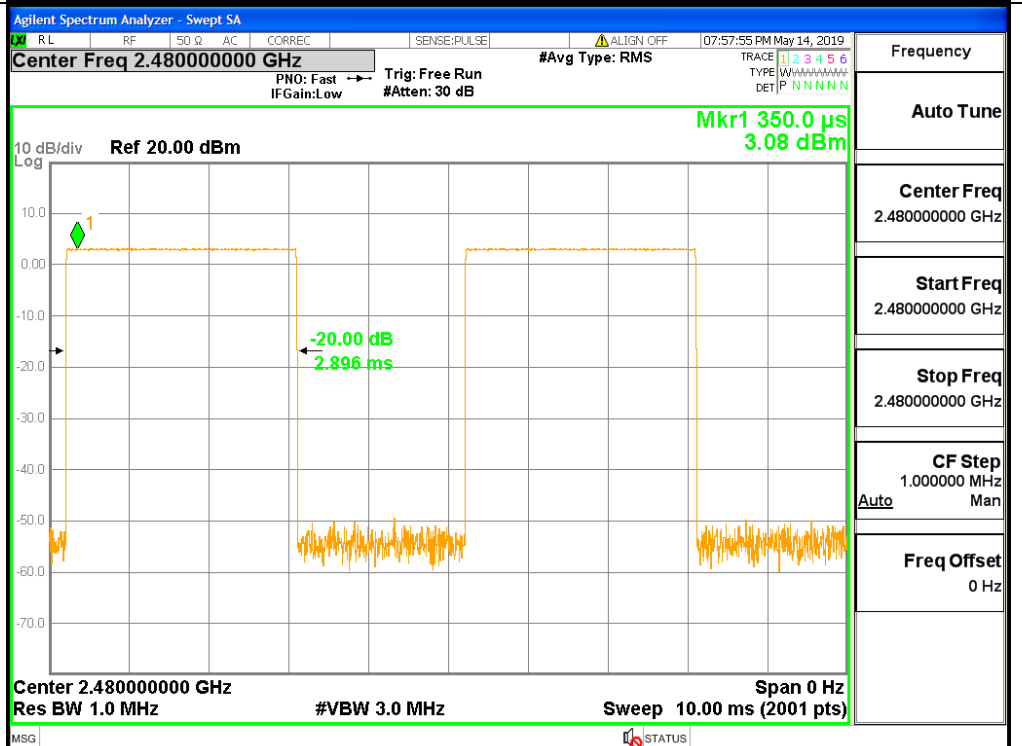
Test Graph



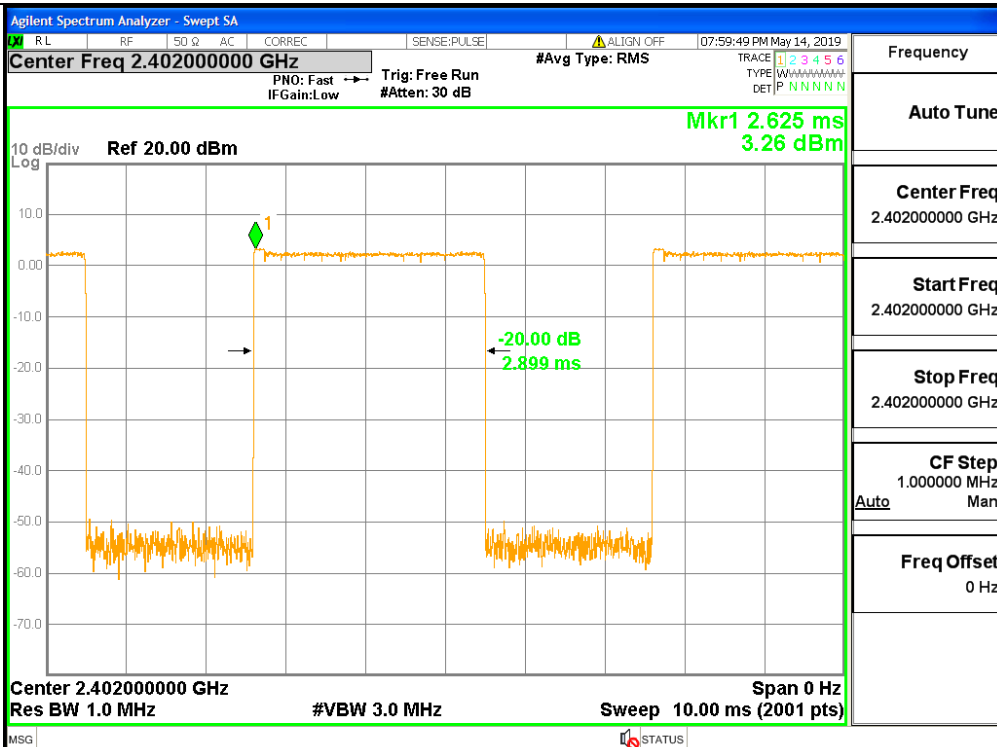
GFSK_DH5/MCH



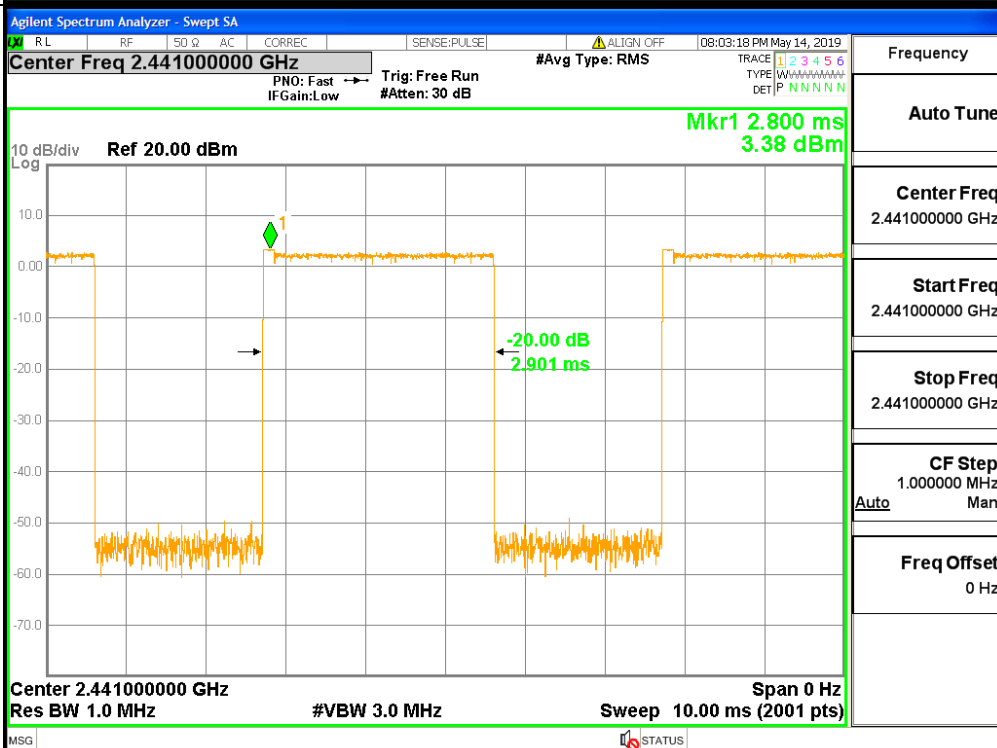
GFSK_DH5/HCH



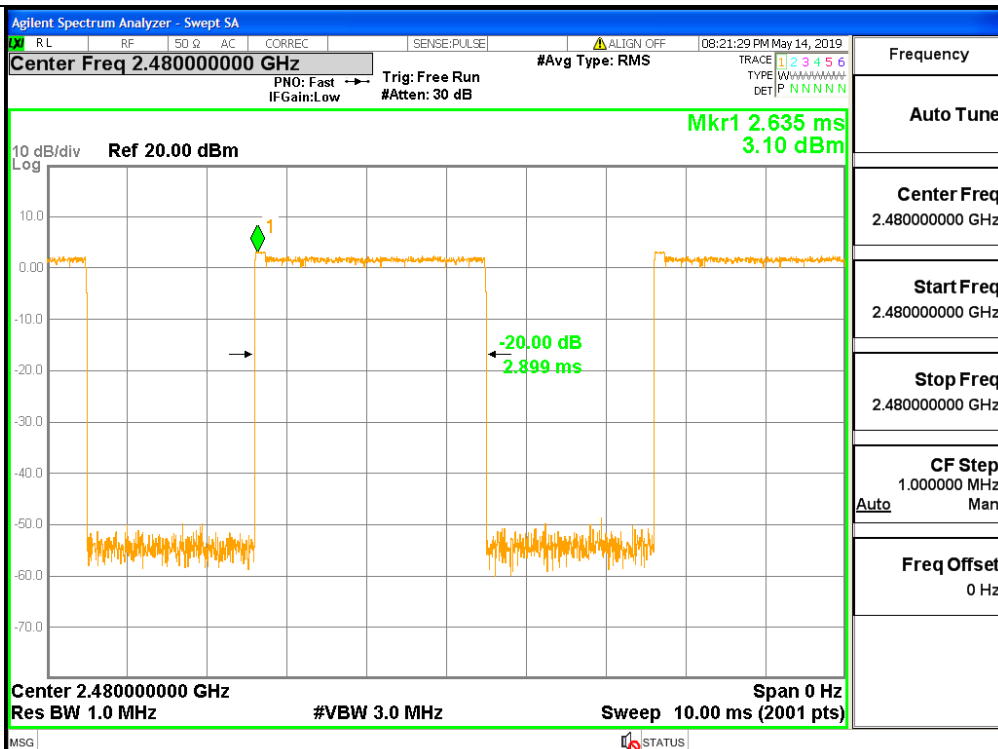
$\pi/4$ DQPSK
_2DH5/LCH



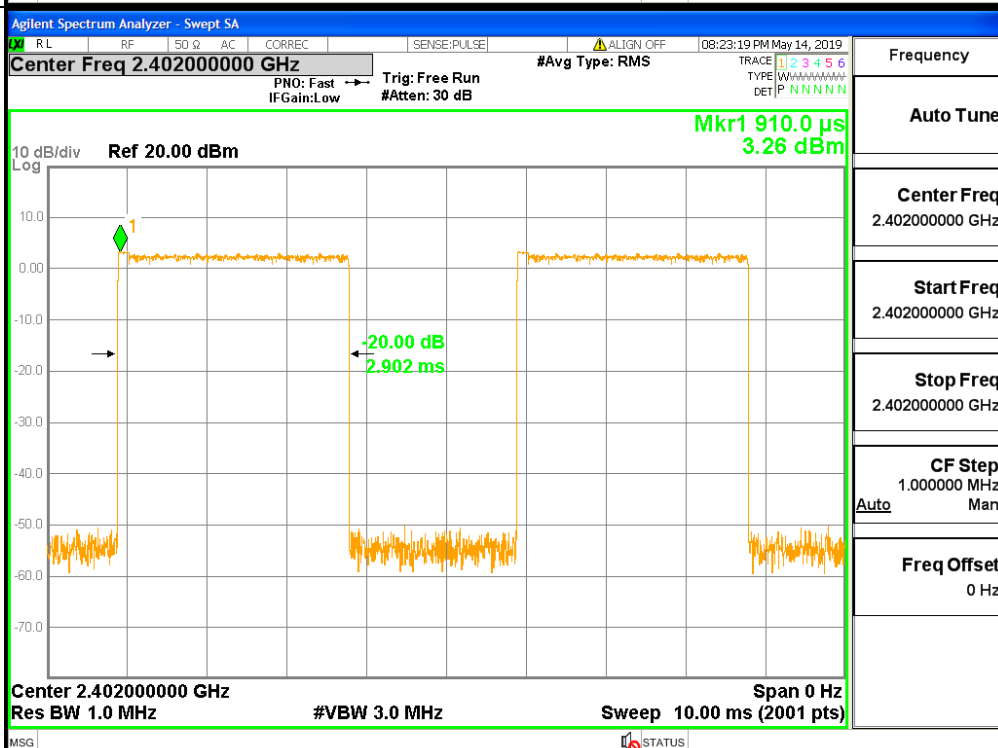
$\pi/4$ DQPSK
_2DH5/MCH

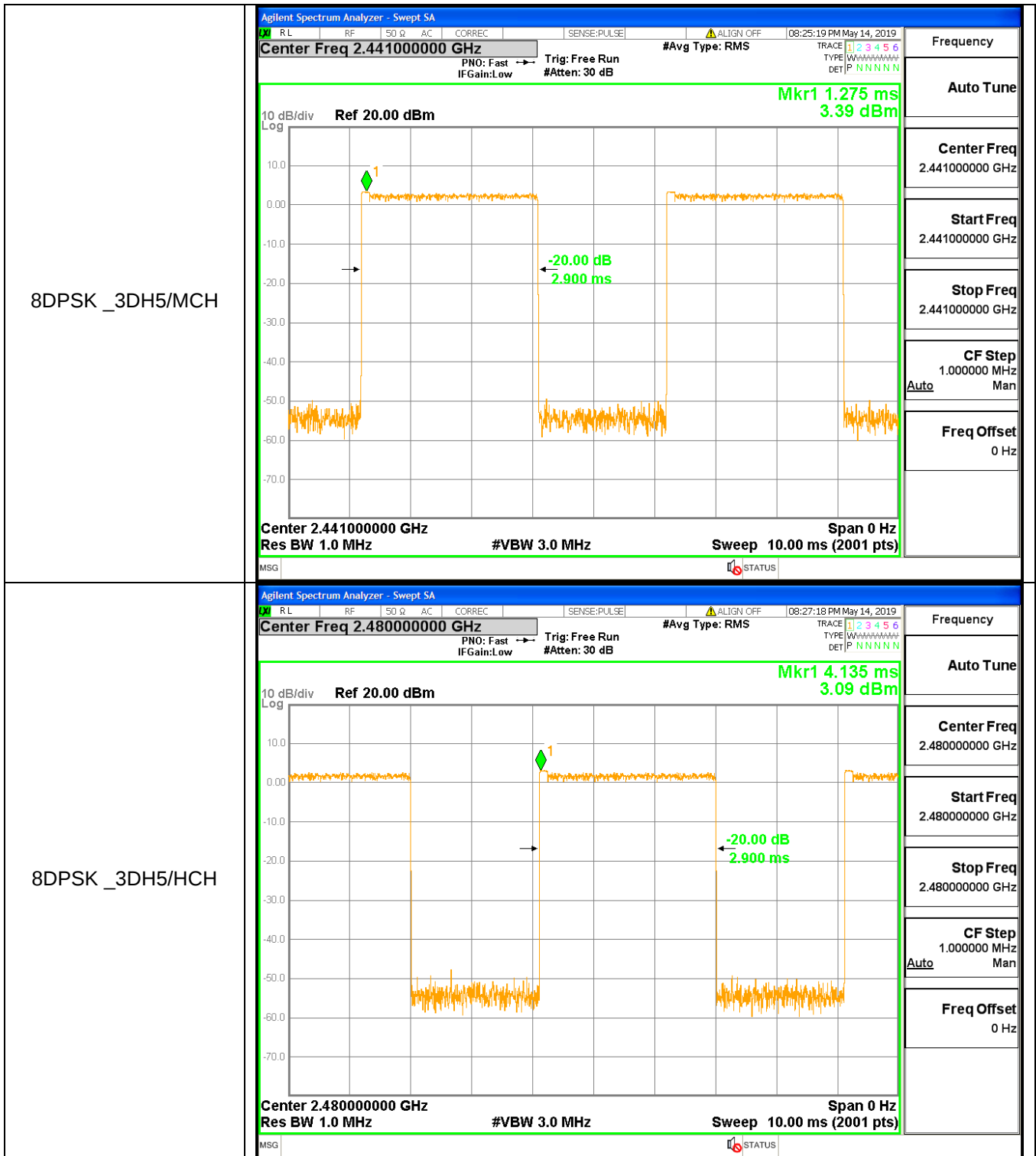


$\pi/4$ DQPSK
_2DH5/HCH



8DPSK_3DH5/LCH

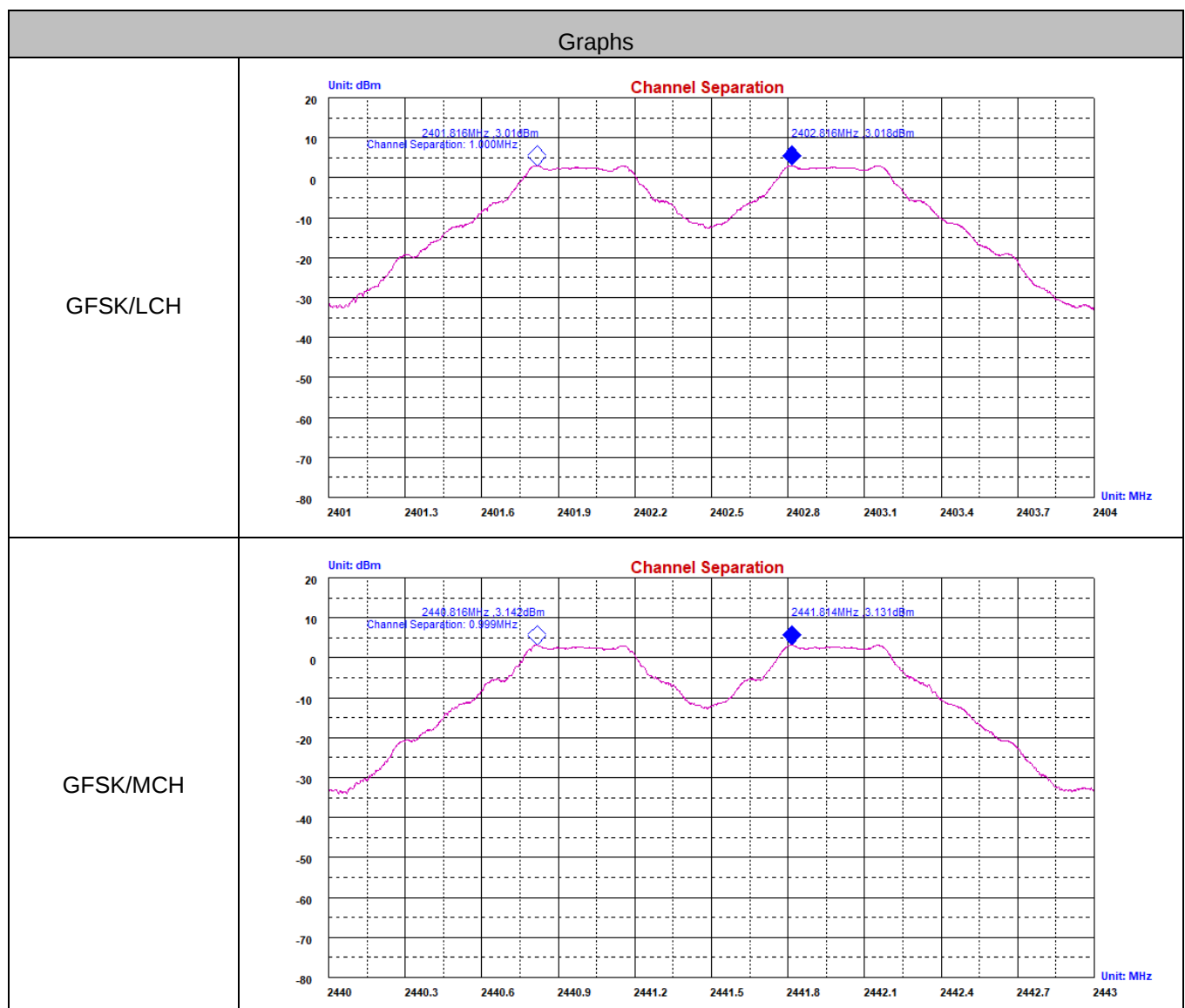




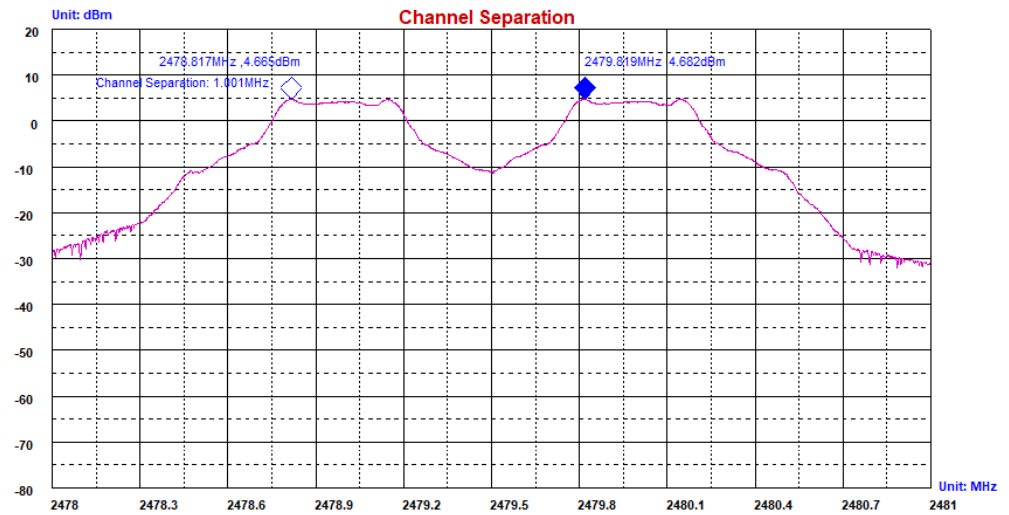
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.000	0.683	PASS
GFSK	MCH	0.999	0.683	PASS
GFSK	HCH	1.001	0.637	PASS
$\pi/4$ DQPSK	LCH	1.001	0.906	PASS
$\pi/4$ DQPSK	MCH	0.990	0.873	PASS
$\pi/4$ DQPSK	HCH	1.007	0.873	PASS
8DPSK	LCH	1.001	0.865	PASS
8DPSK	MCH	1.000	0.850	PASS
8DPSK	HCH	0.993	0.848	PASS

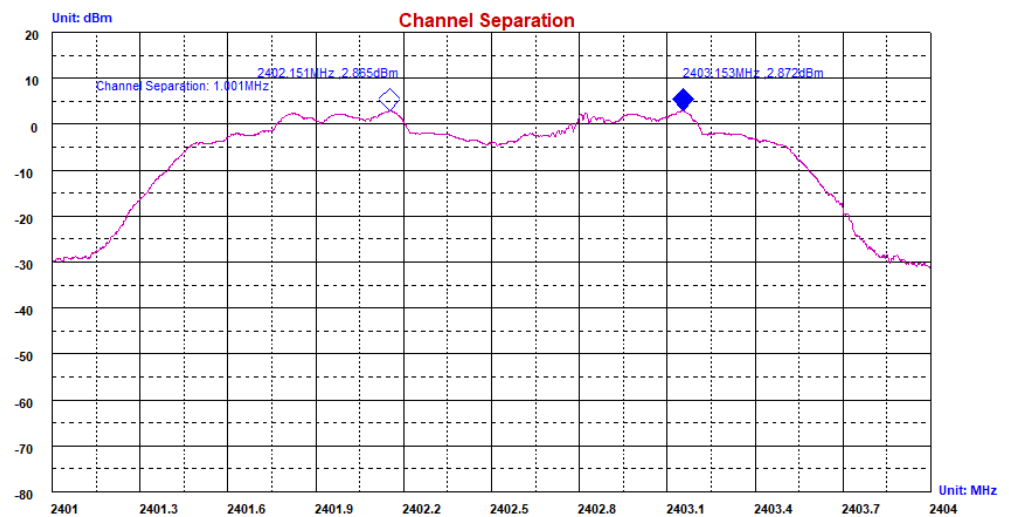
Test Graph



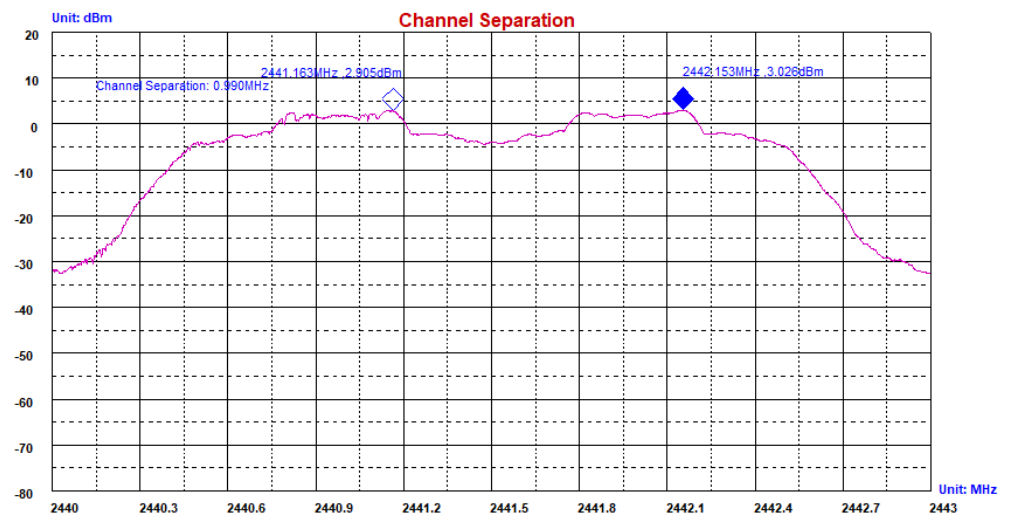
GFSK/HCH

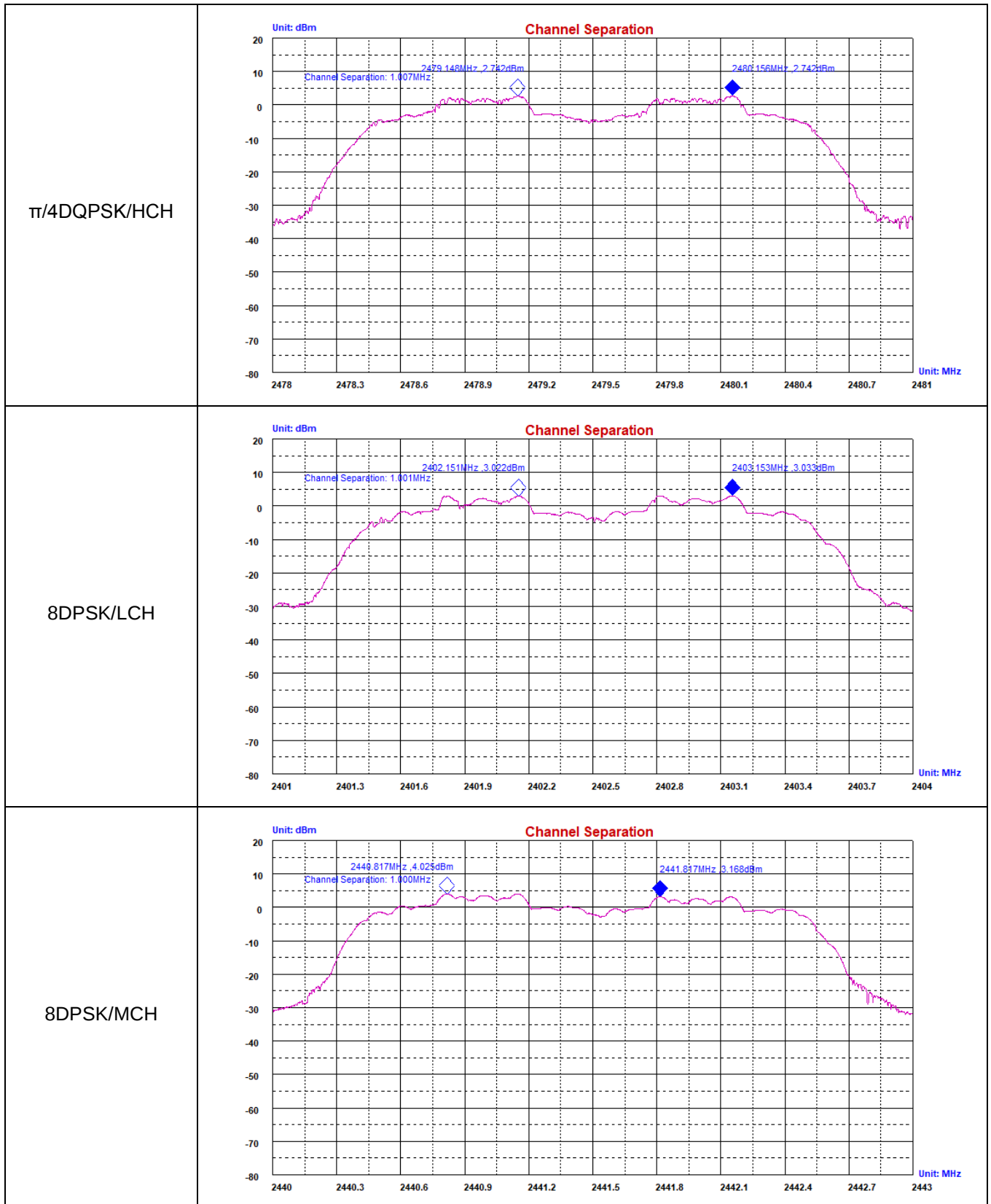


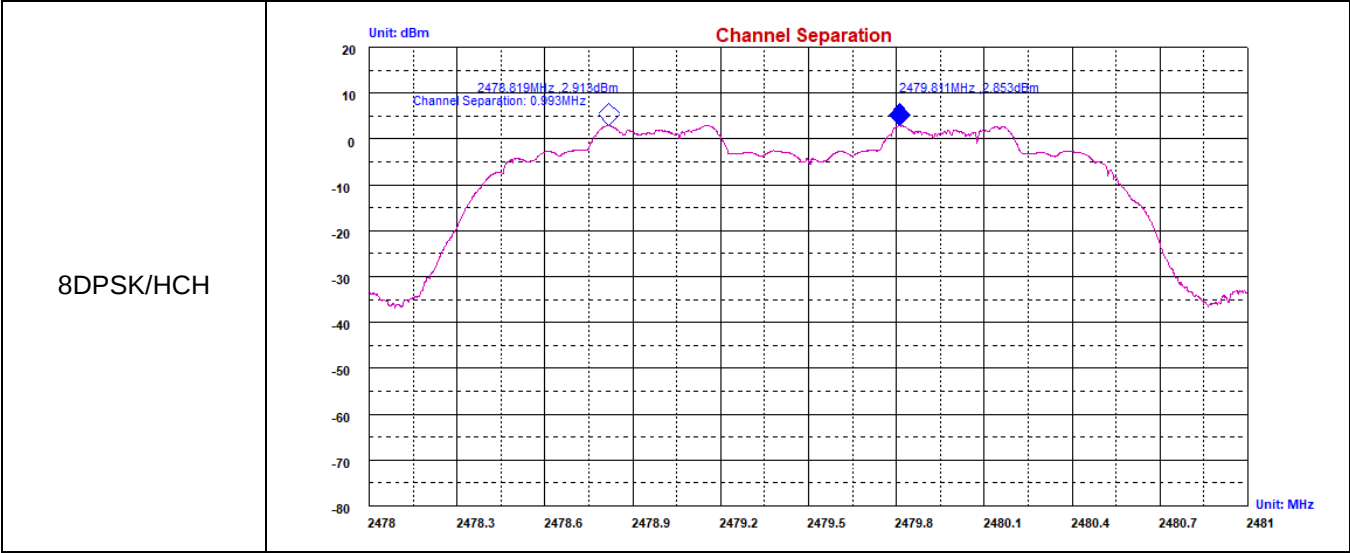
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



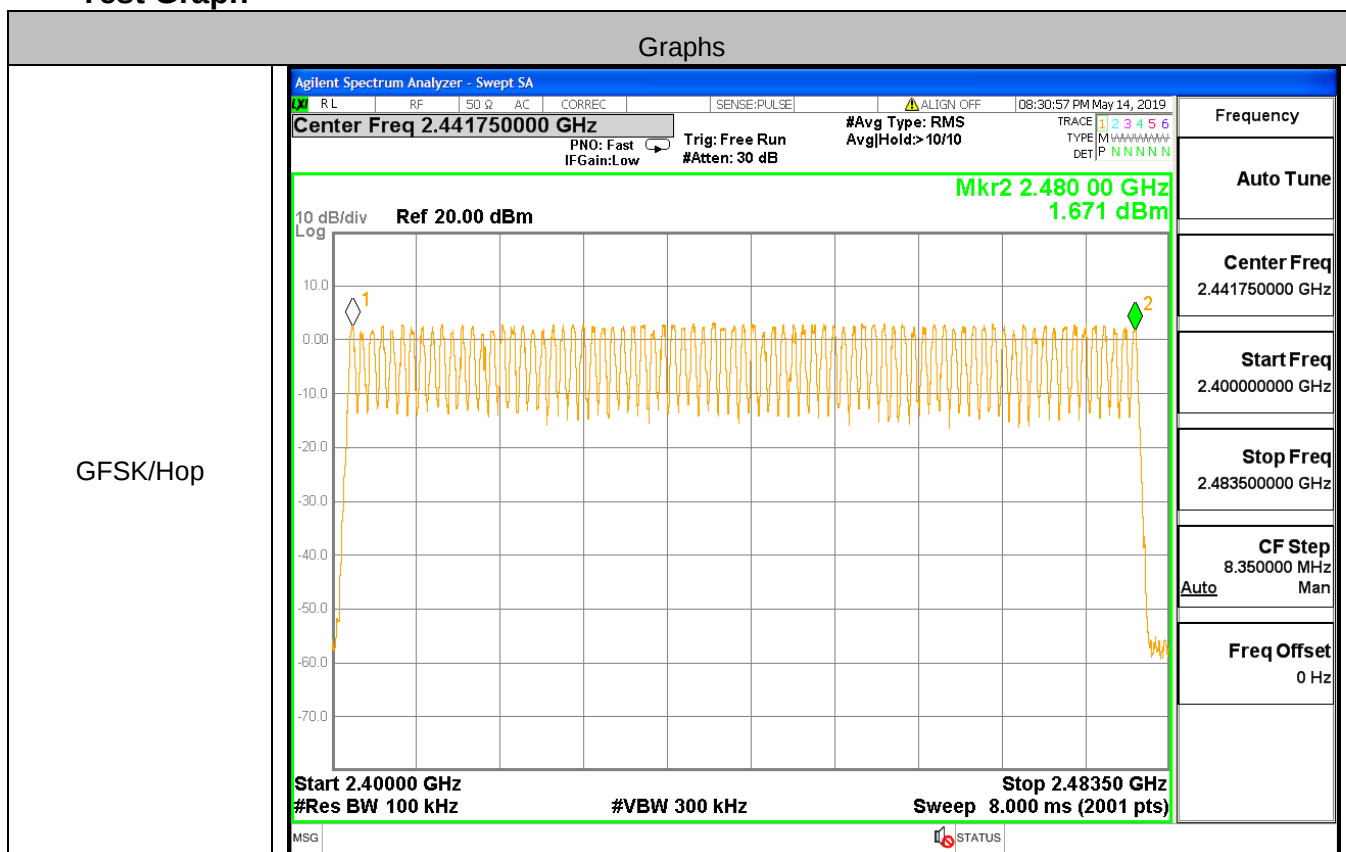


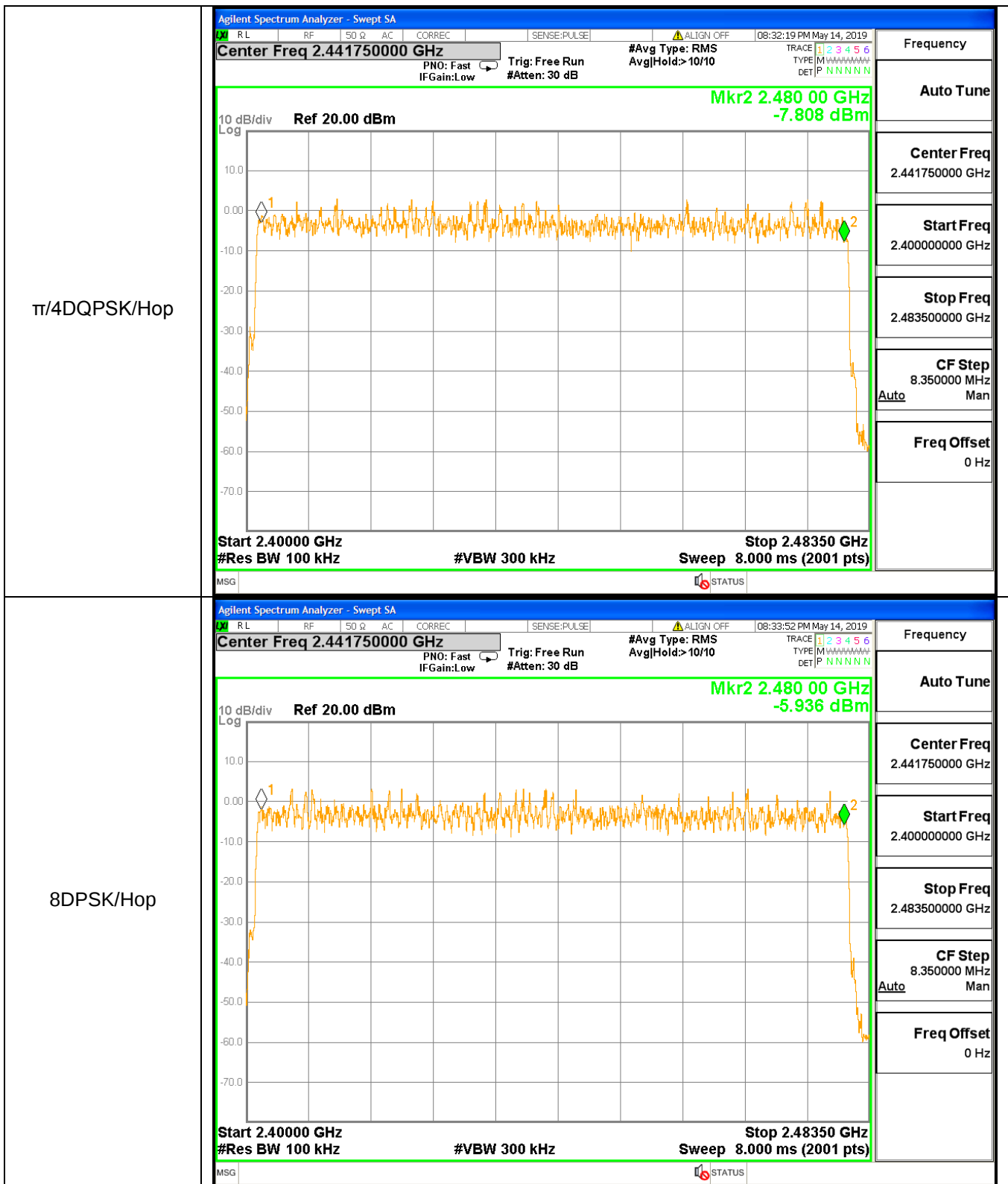


A.4 Hopping Channel Number

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 Graph

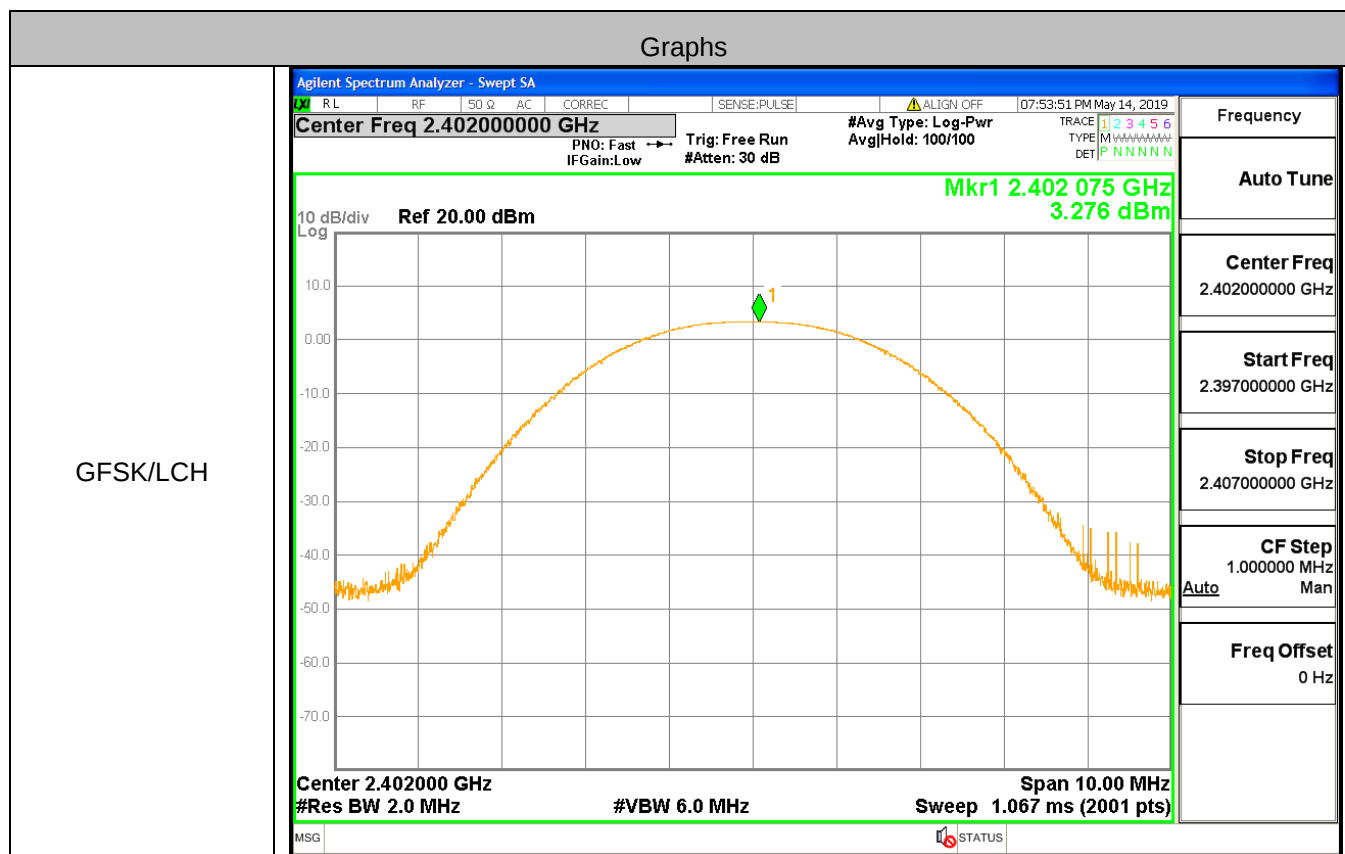




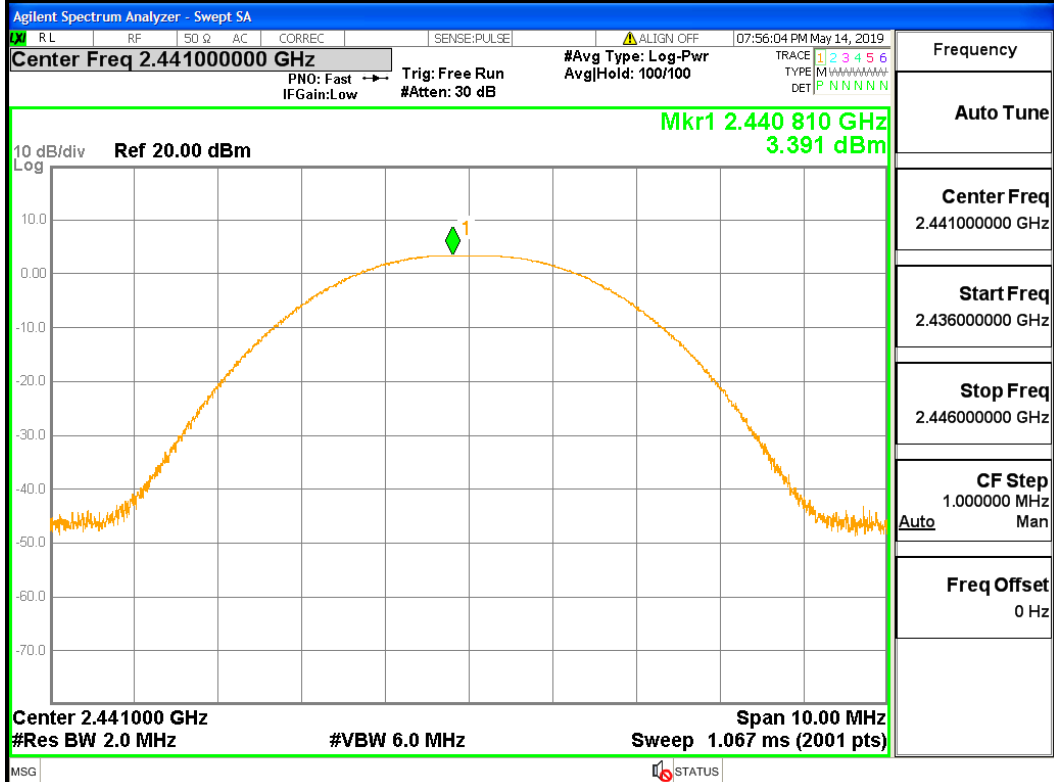
A.5 Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	3.276	21	PASS
GFSK	MCH	3.391	21	PASS
GFSK	HCH	3.111	21	PASS
$\pi/4$ DQPSK	LCH	3.272	21	PASS
$\pi/4$ DQPSK	MCH	3.408	21	PASS
$\pi/4$ DQPSK	HCH	3.141	21	PASS
8DPSK	LCH	3.280	21	PASS
8DPSK	MCH	3.400	21	PASS
8DPSK	HCH	3.136	21	PASS

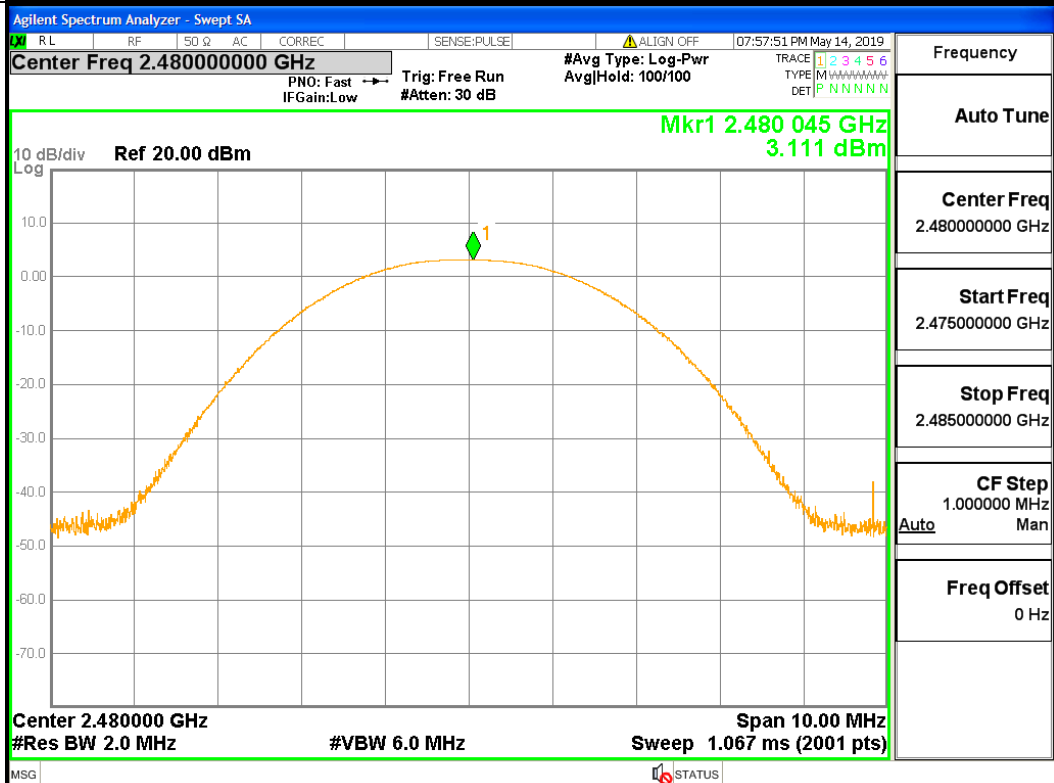
Test Graph

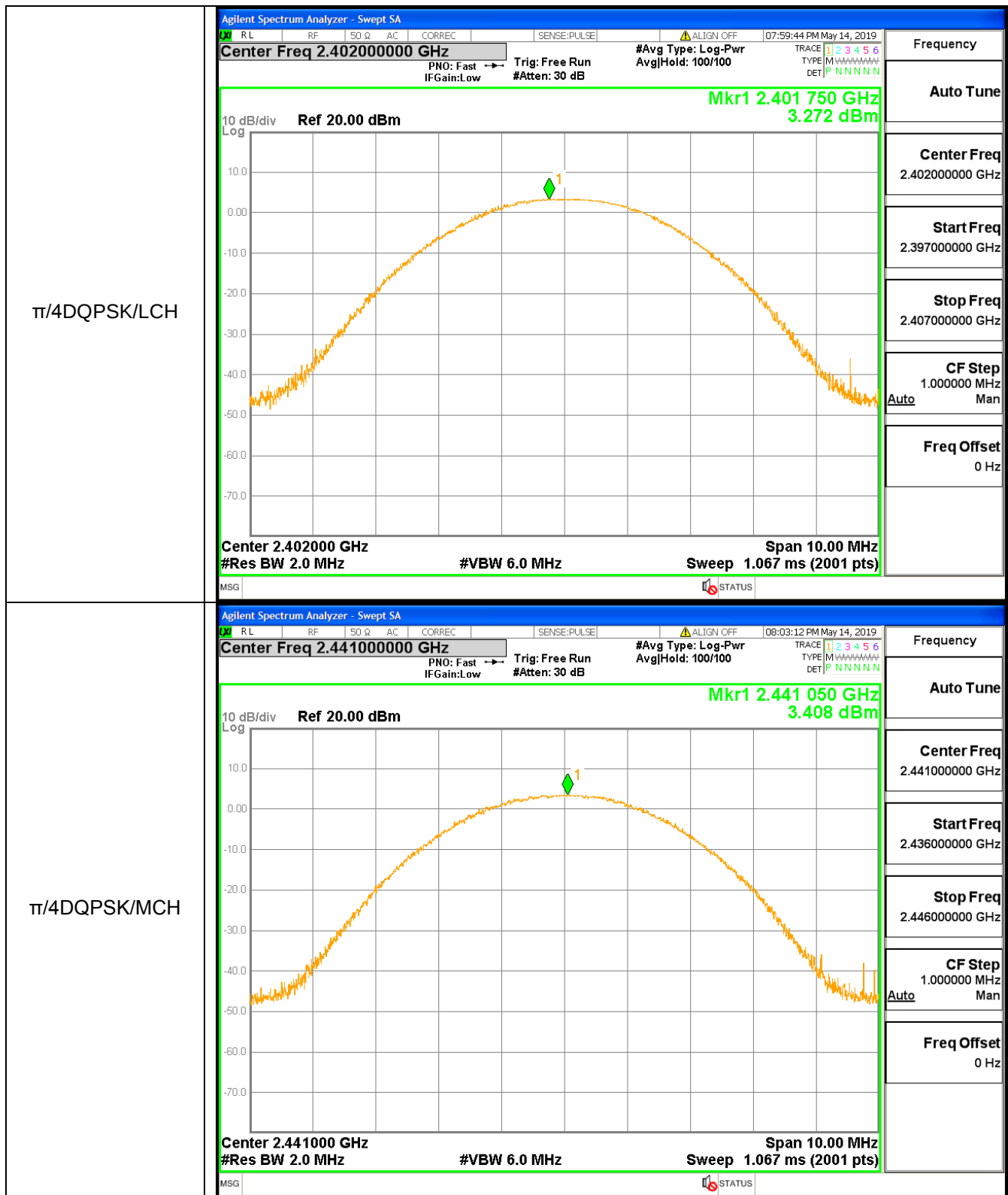


GFSK/MCH



GFSK/HCH





Frequency

Auto Tune

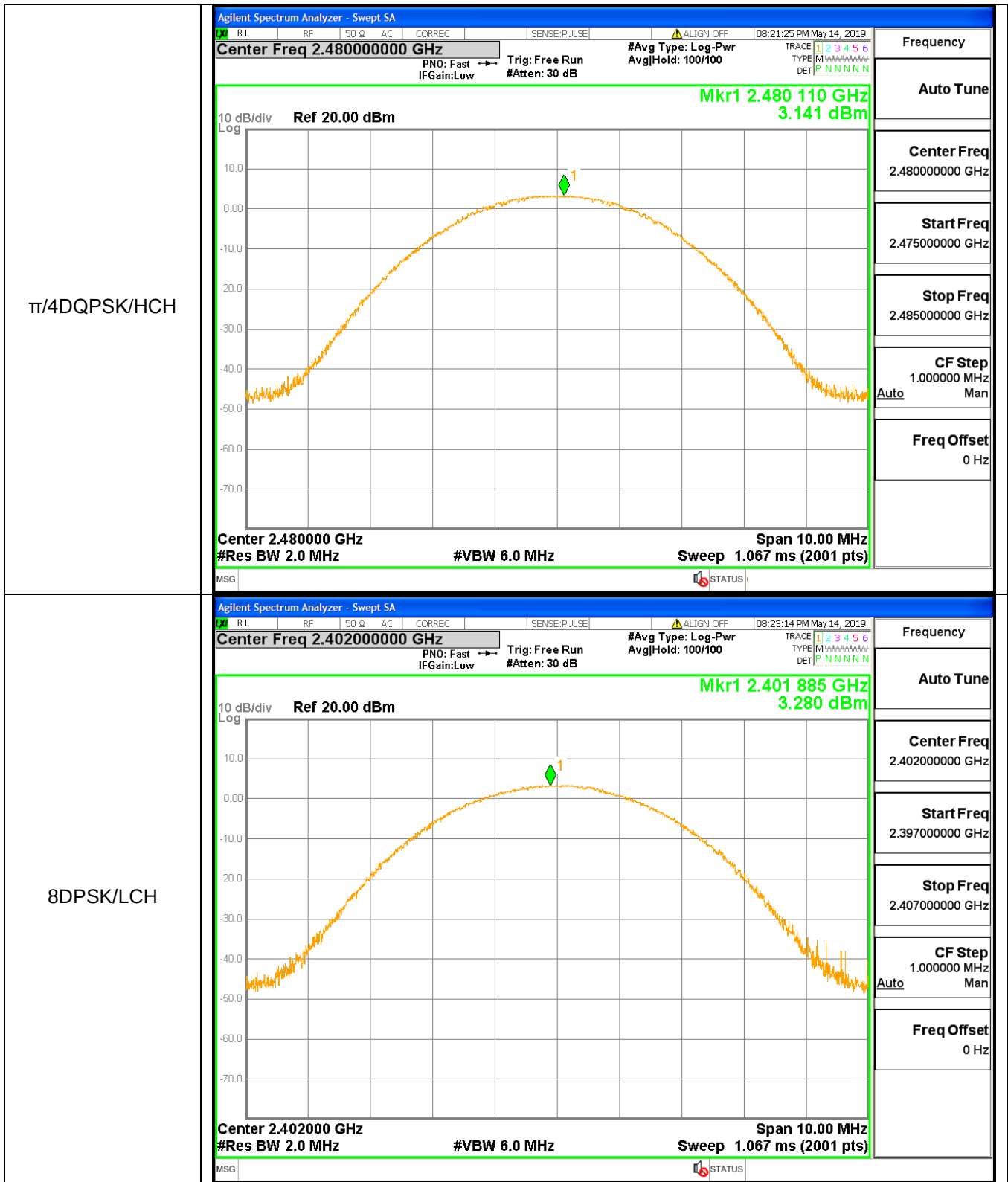
Center Freq
2.402000000 GHz

Start Freq
2.397000000 GHz

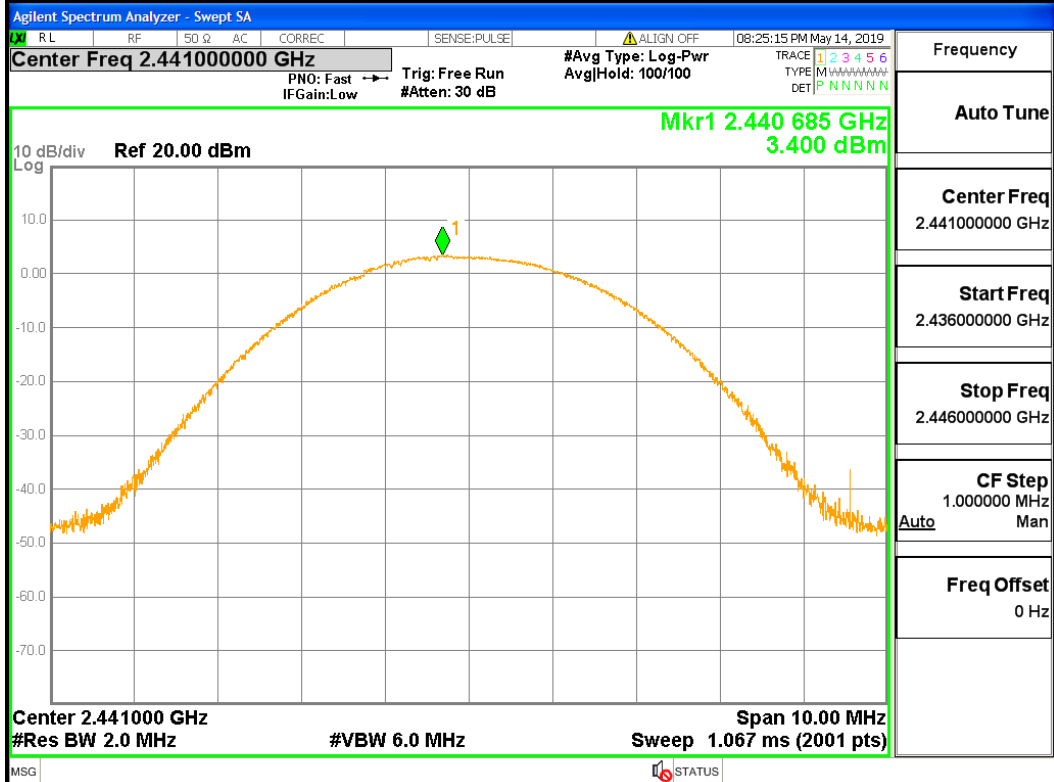
Stop Freq
2.407000000 GHz

CF Step
1.000000 MHz
Auto Man

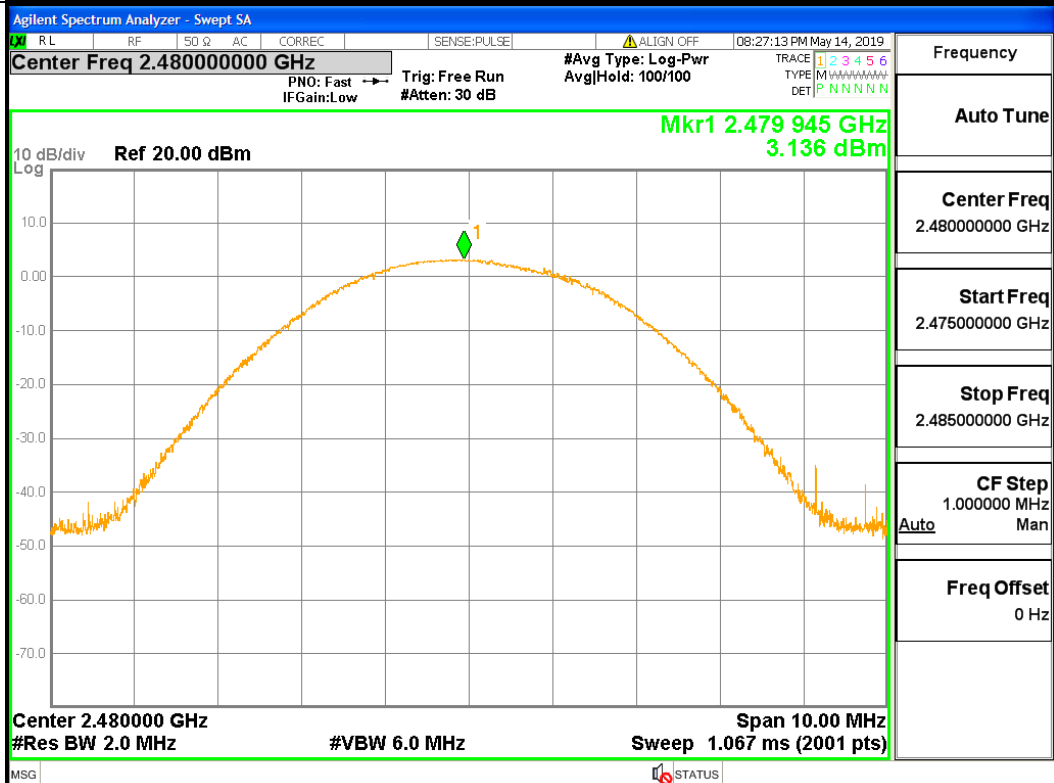
Freq Offset
0 Hz



8DPSK/MCH



8DPSK/HCH



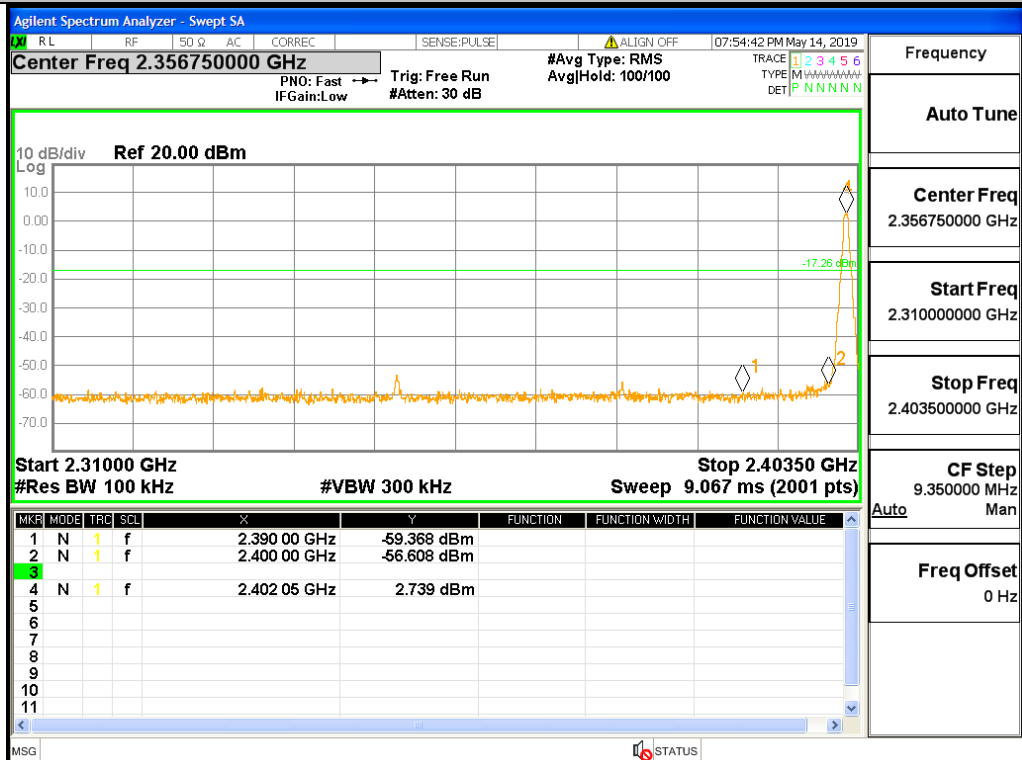
A.6 Band-edge for RF Conducted Emissions

Type	Carrier Frequency(MHz)	Frequency(MHz)	Carrier Frequency Power [dBm]	Bandedge Peak(dBm)	Upper limit(dBm)	Conclusion
1DH5	2402	2400	2.739	-56.61	-17.261	Pass
1DH5	2480	2483.5	2.534	-57.33	-17.466	Pass
2DH5	2402	2400	2.877	-49.64	-17.123	Pass
2DH5	2480	2500	2.598	-59.68	-17.402	Pass
3DH5	2402	2400	3.036	-48.20	-16.964	Pass
3DH5	2480	2483.5	2.706	-60.34	-17.294	Pass
1DH5-Hopping	2402	2393.88	2.877	-53.69	-17.123	Pass
1DH5-Hopping	2480	2496.01	3.008	-53.77	-16.992	Pass
2DH5-Hopping	2402	2400	2.817	-53.30	-17.183	Pass
2DH5-Hopping	2480	2500	2.111	-58.40	-17.889	Pass
3DH5-Hopping	2402	2399.58	2.764	-48.48	-17.236	Pass
3DH5-Hopping	2480	2484.88	1.966	-54.46	-18.034	Pass

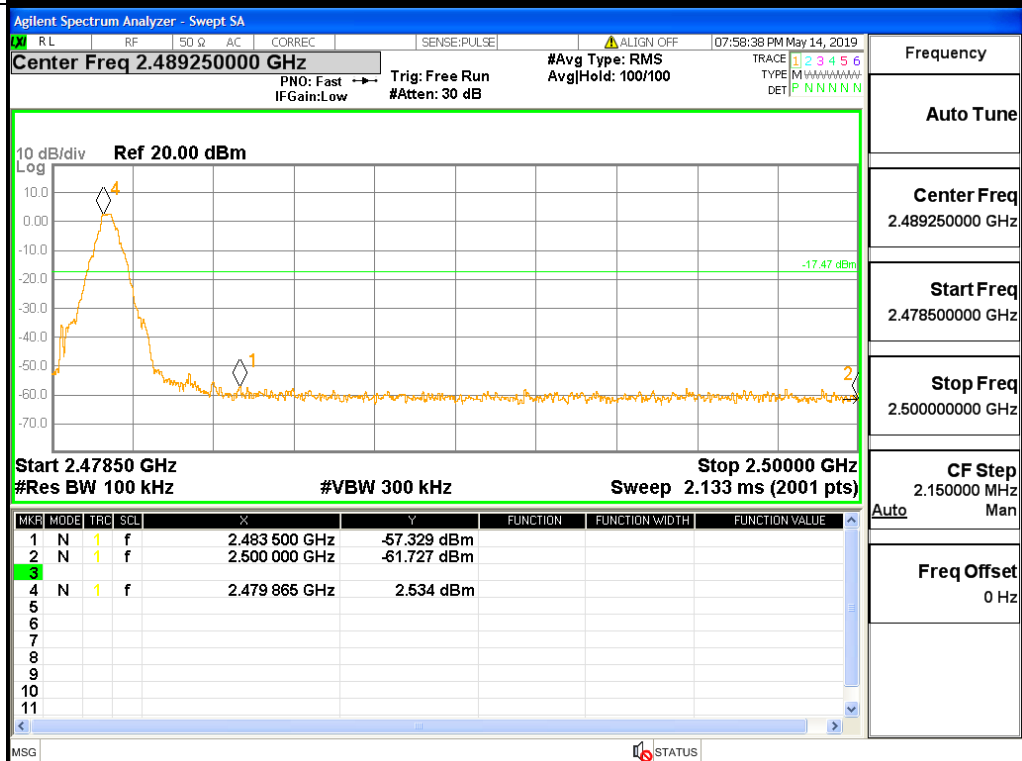
Test Graph

Graphs

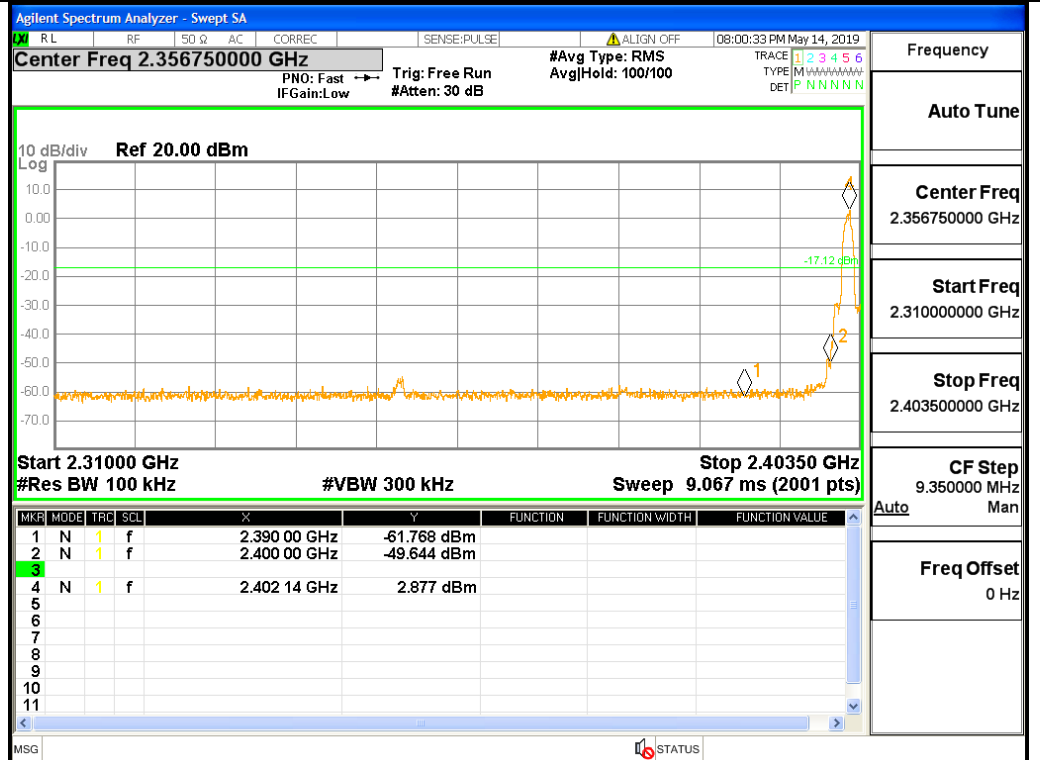
GFSK/LCH/No Hop



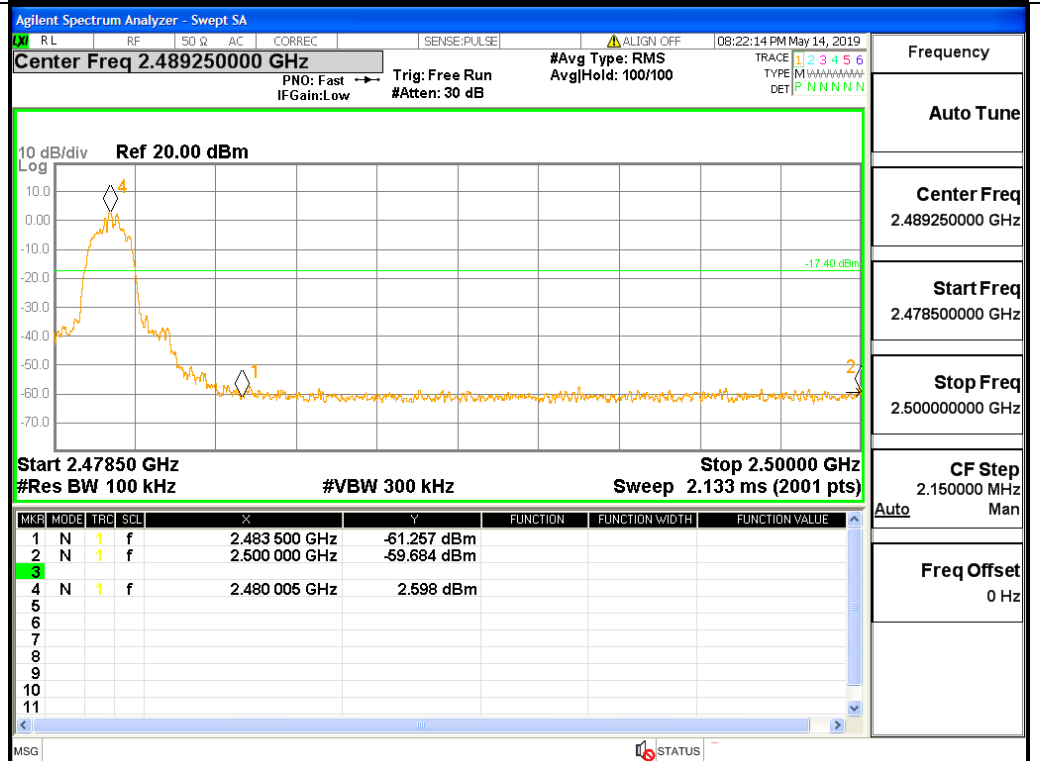
GFSK/HCH/No Hop



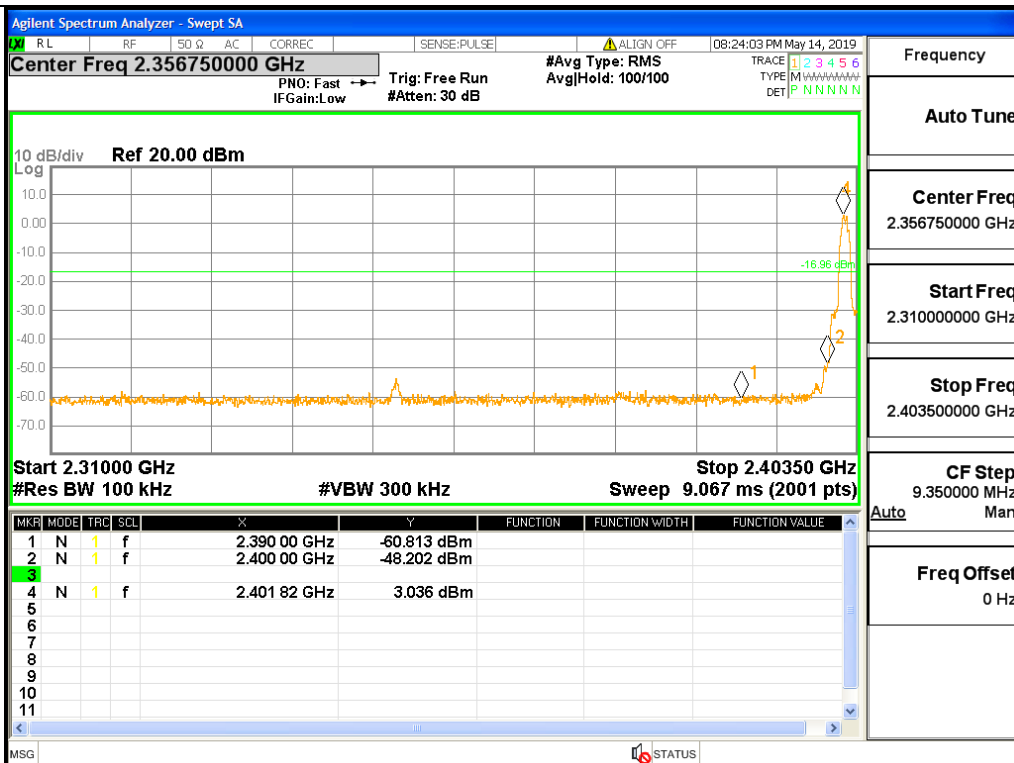
π /4DQPSK/LCH/No
Hop



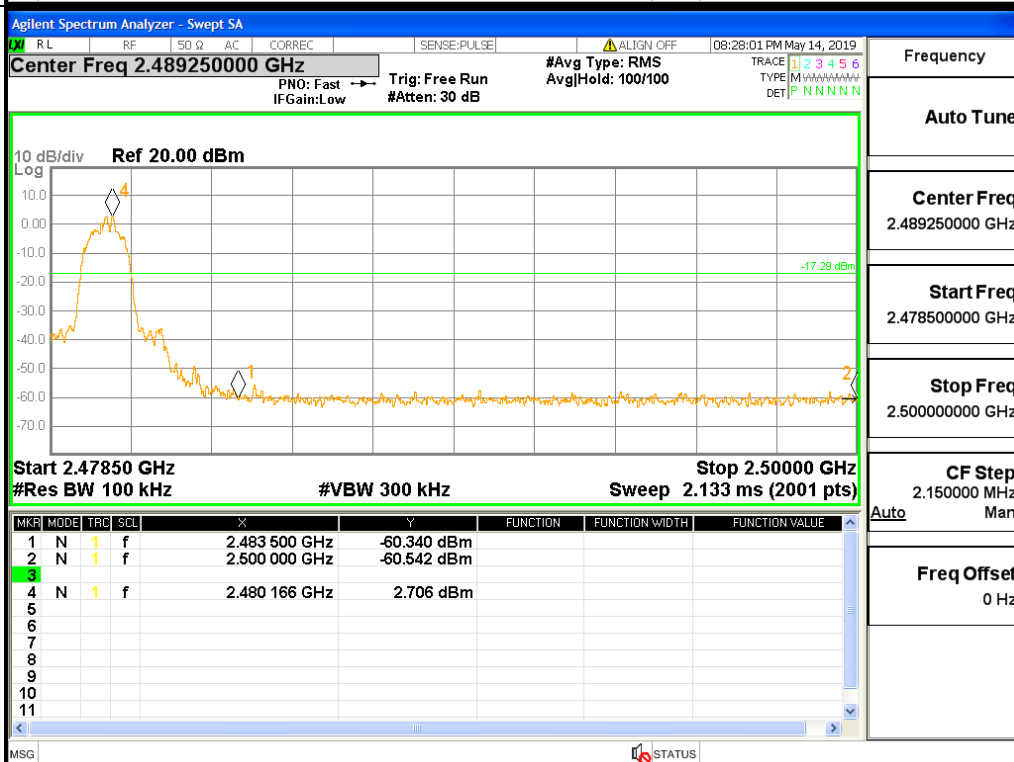
π /4DQPSK/HCH/No
Hop



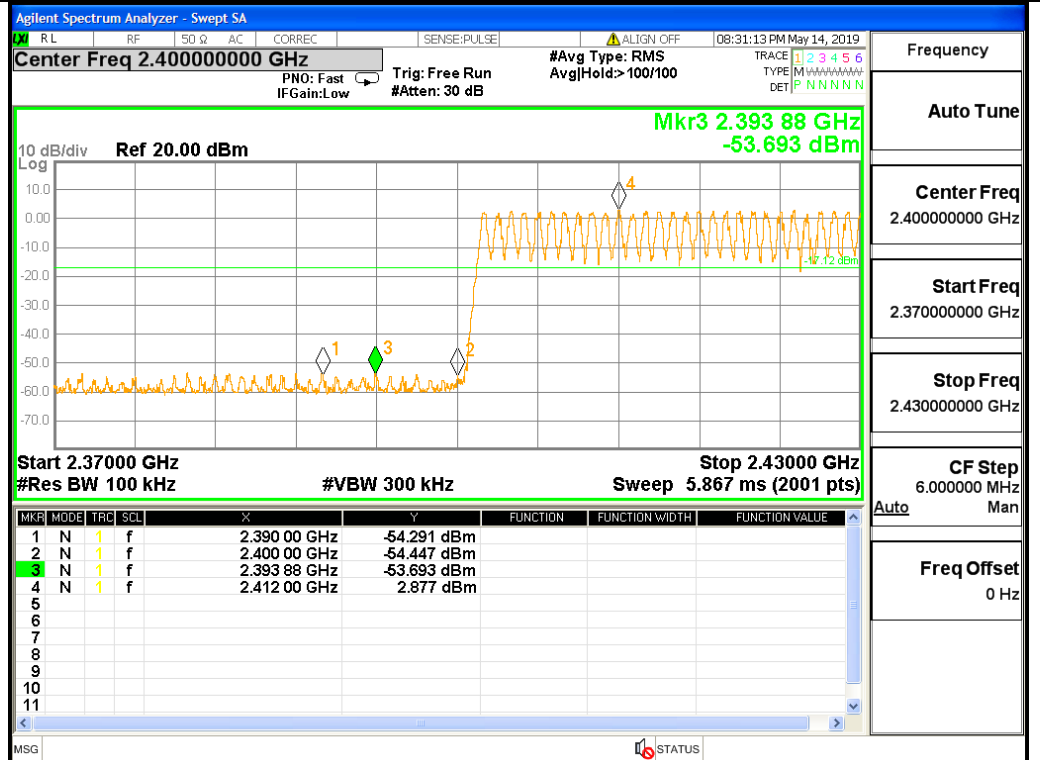
8DPSK/LCH/No Hop



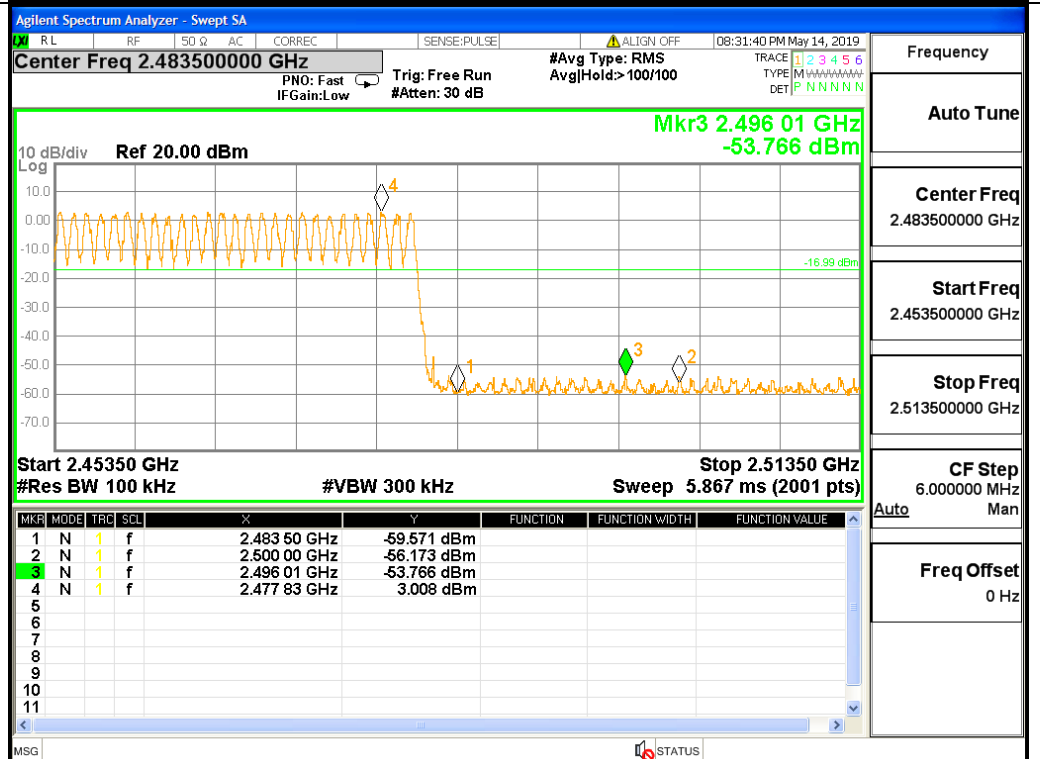
8DPSK/HCH/No Hop



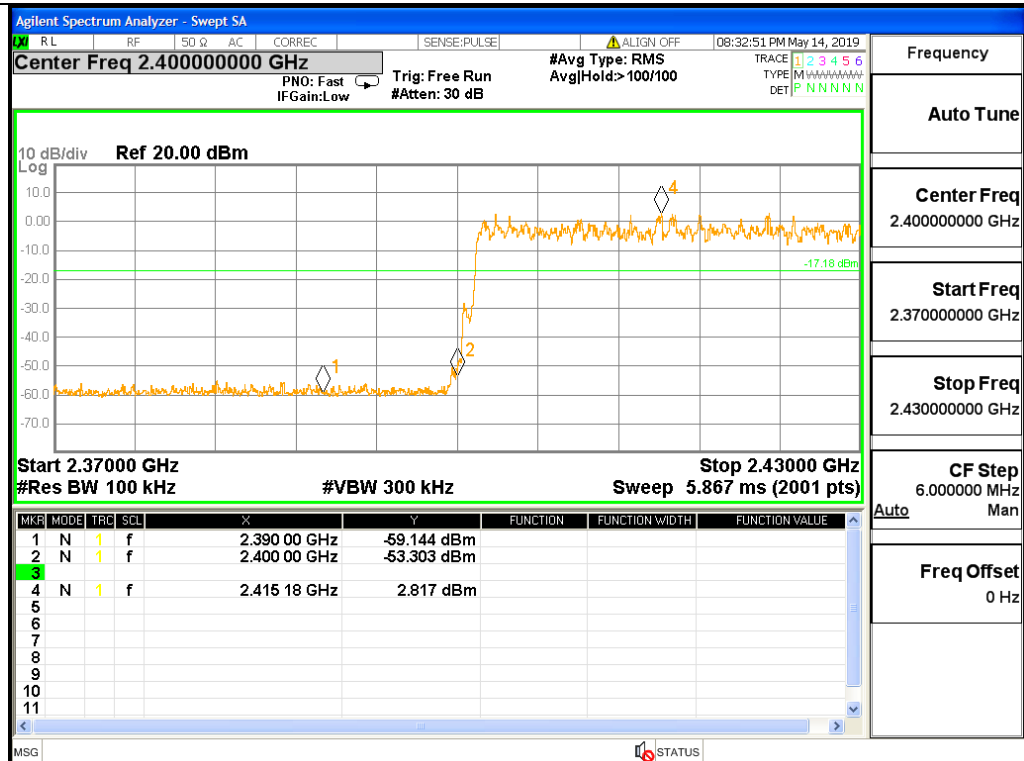
GFSK/LCH/Hop



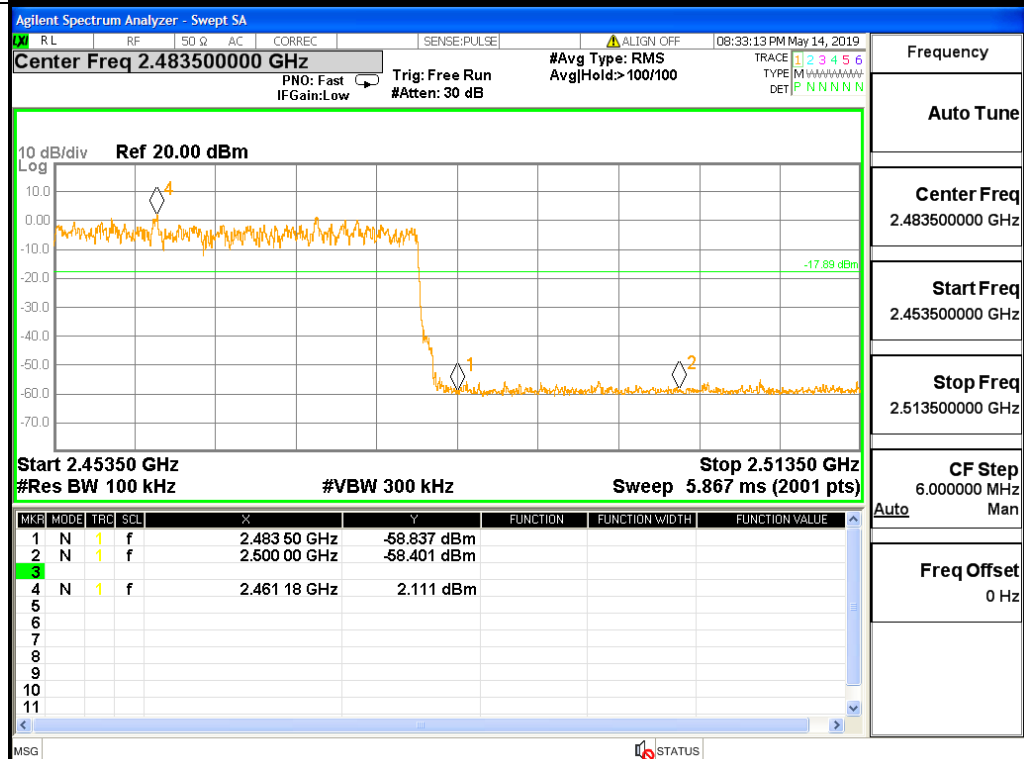
GFSK/HCH/Hop



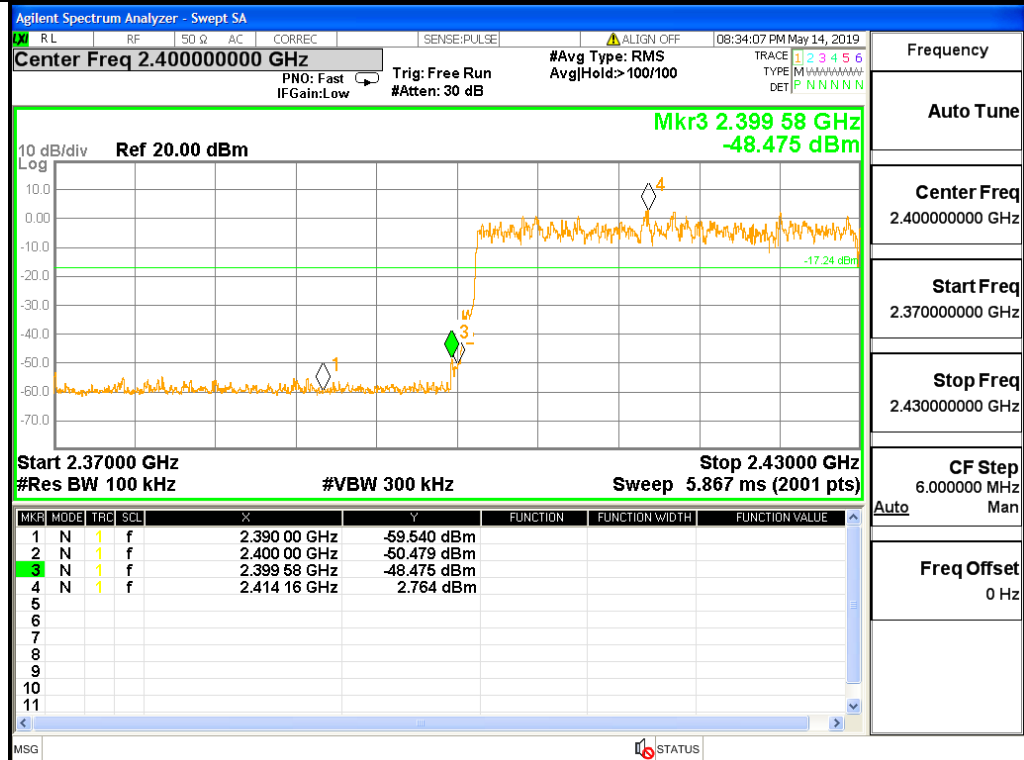
π /4DQPSK/LCH/Hop



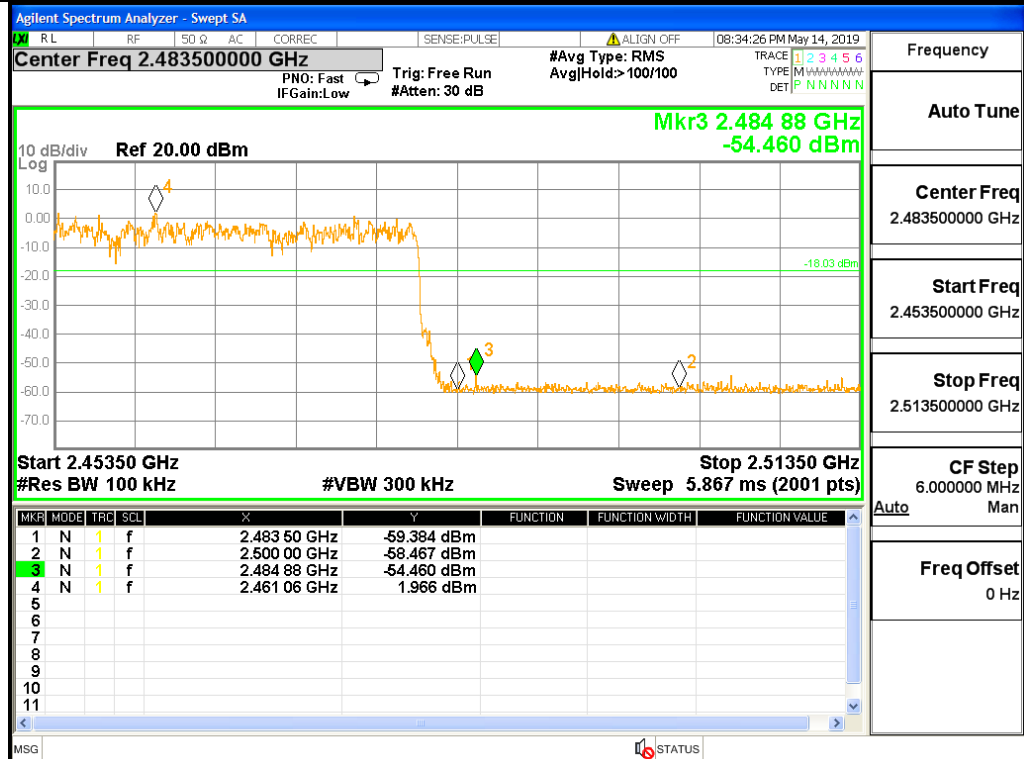
π /4DQPSK/HCH/Hop



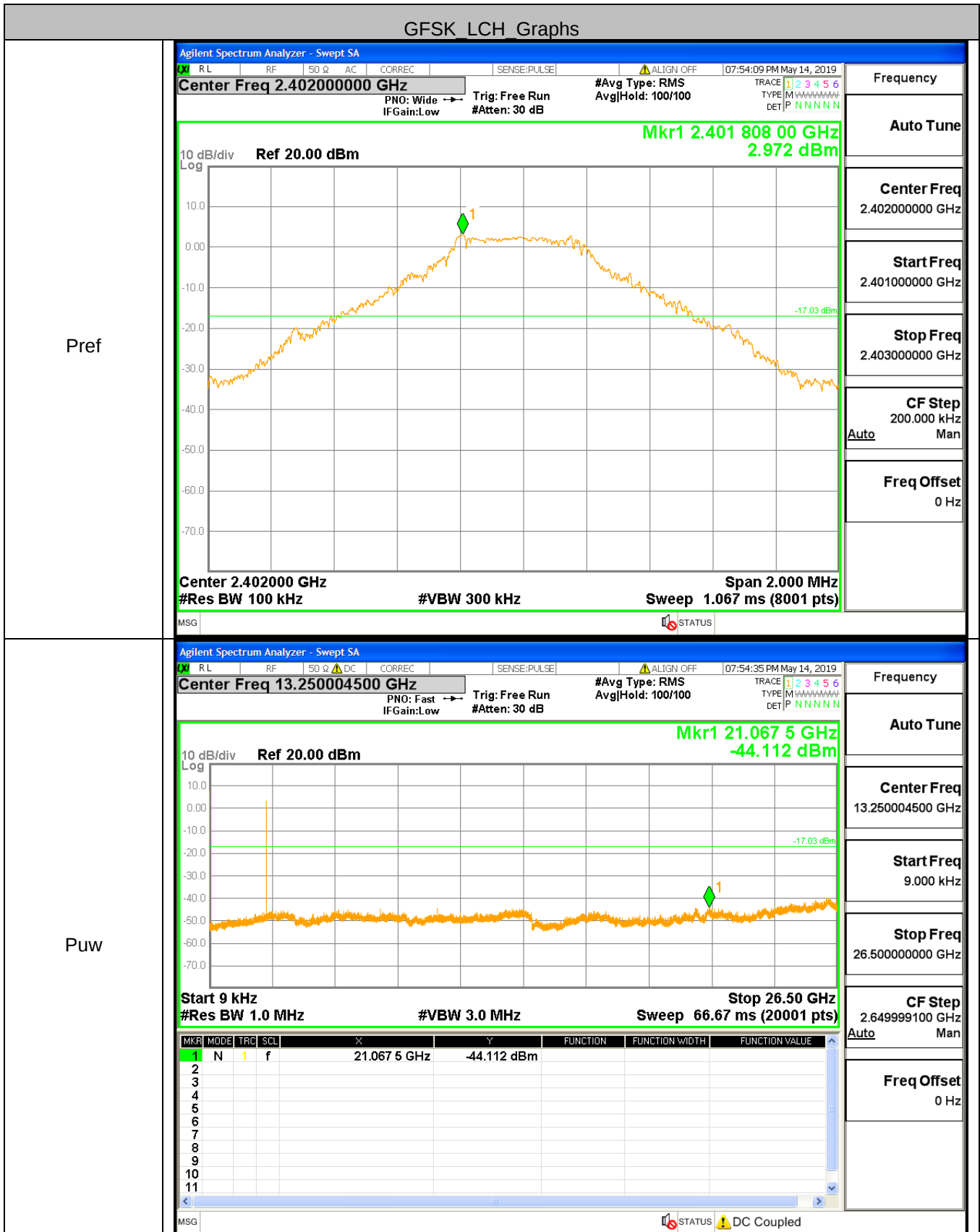
8DPSK/LCH/Hop



8DPSK/HCH/Hop

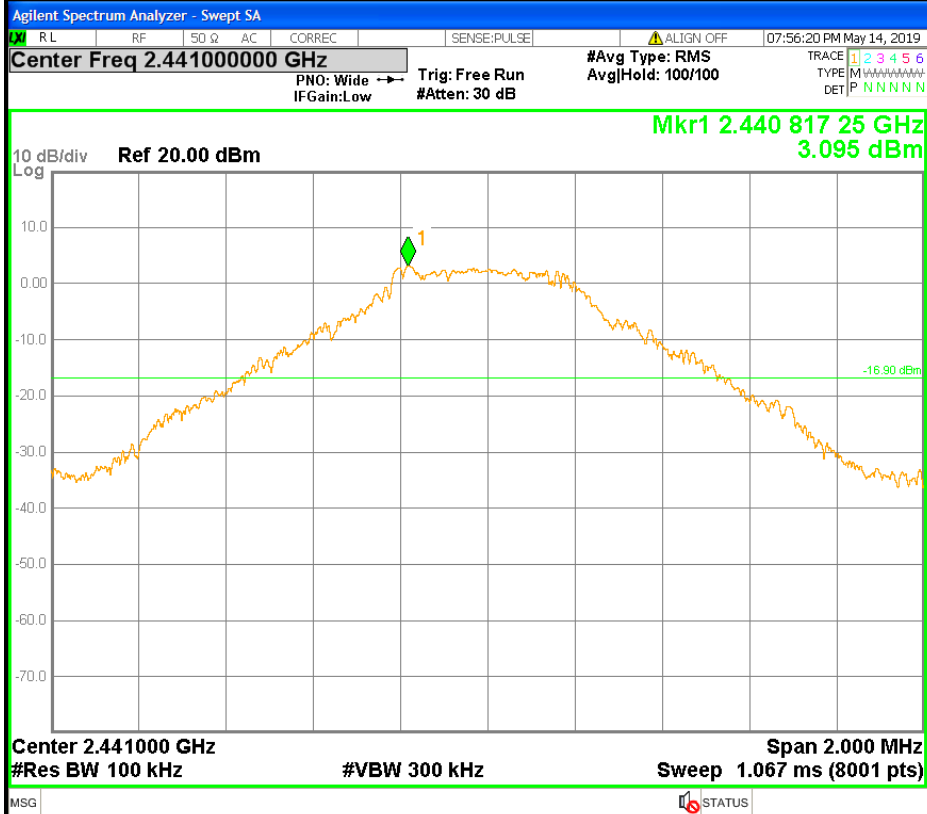


A.7 RF Conducted Spurious Emissions Test Graph



GFSK MCH Graphs

Pref



Frequency

Auto Tune

Center Freq
2.441000000 GHz

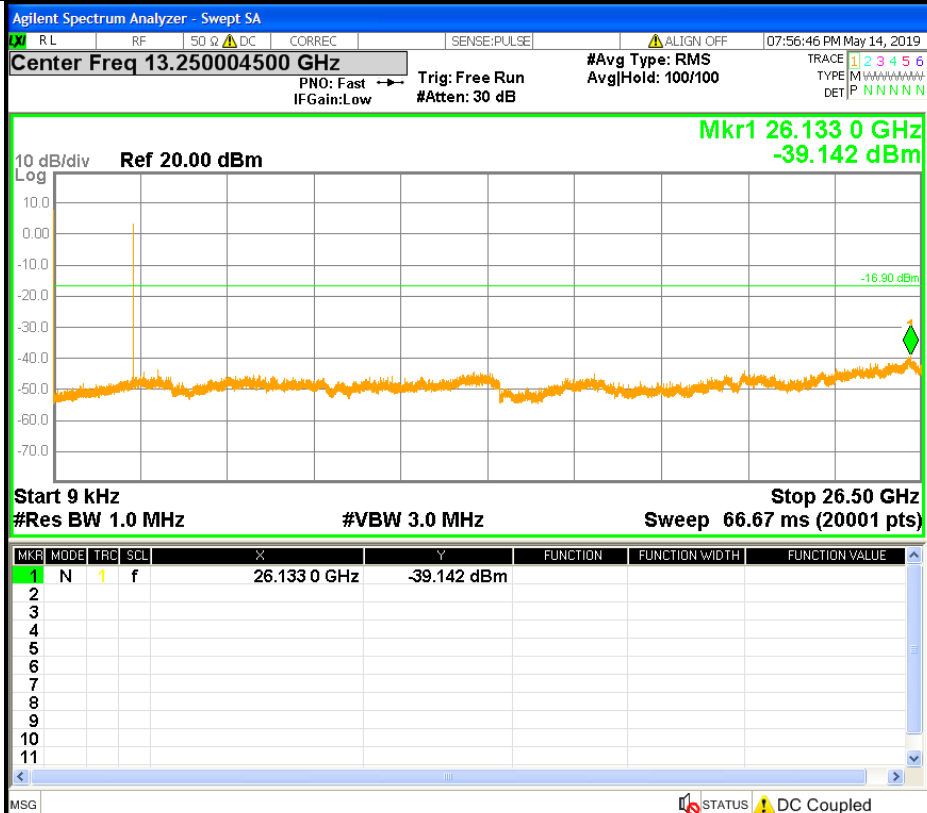
Start Freq
2.440000000 GHz

Stop Freq
2.442000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

Puw



Frequency

Auto Tune

Center Freq
13.250004500 GHz

Start Freq
9.000 kHz

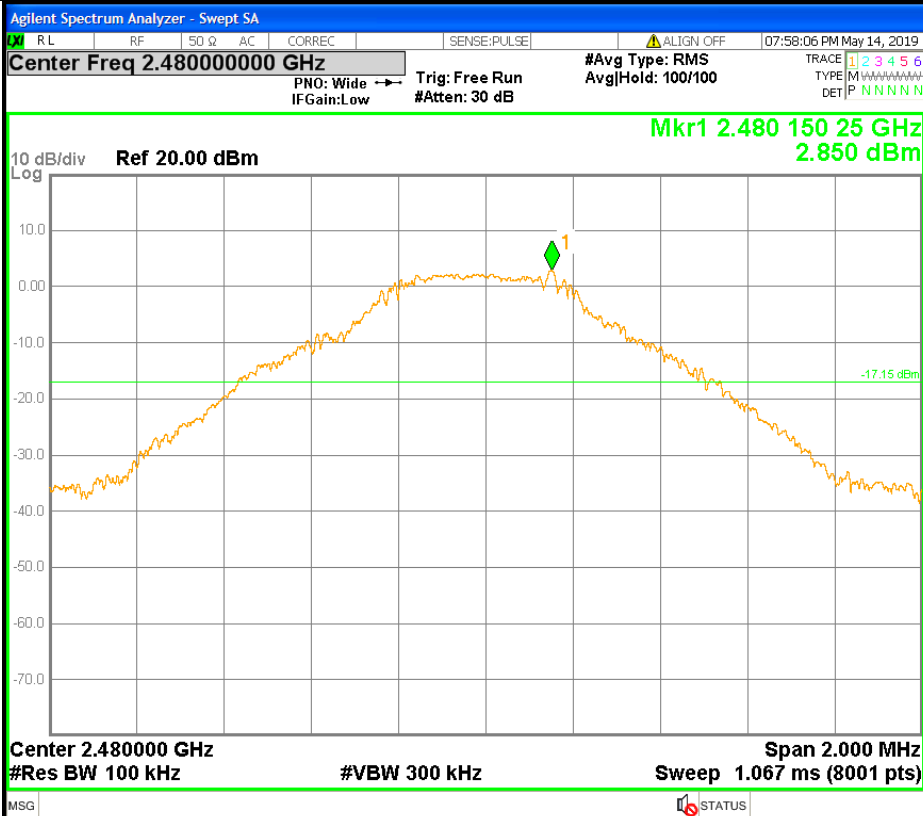
Stop Freq
26.500000000 GHz

CF Step
2.649999100 GHz
Auto Man

Freq Offset
0 Hz

GFSK HCH Graphs

Pref



Frequency

Auto Tune

Center Freq
2.480000000 GHz

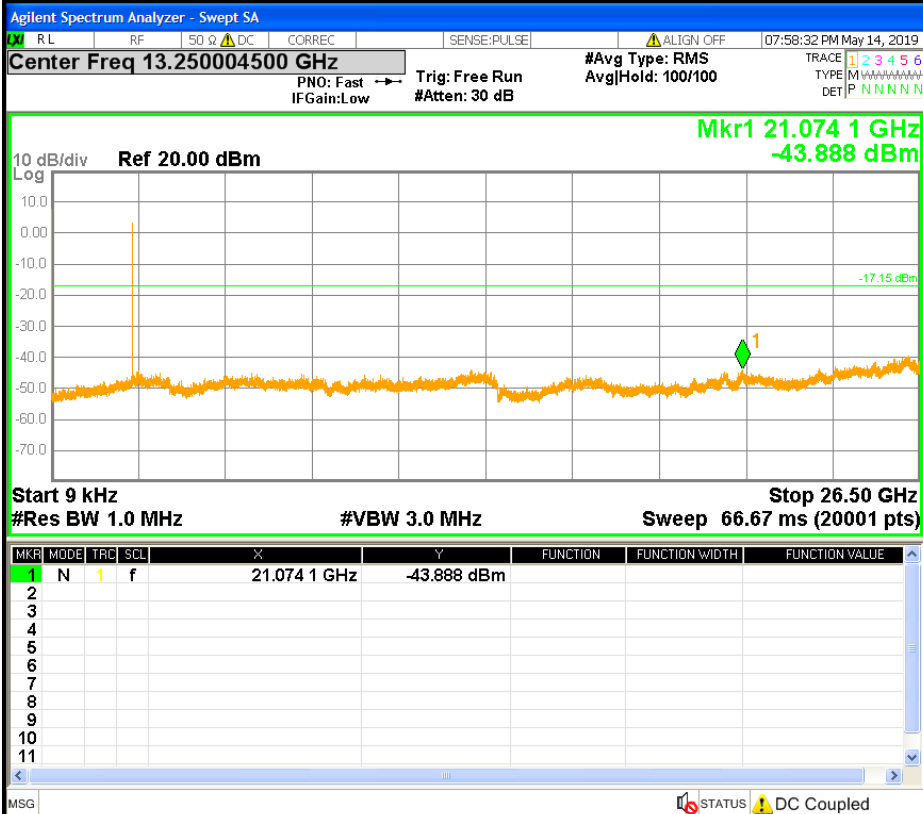
Start Freq
2.479000000 GHz

Stop Freq
2.481000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

Puw



Frequency

Auto Tune

Center Freq
13.250004500 GHz

Start Freq
9.000 kHz

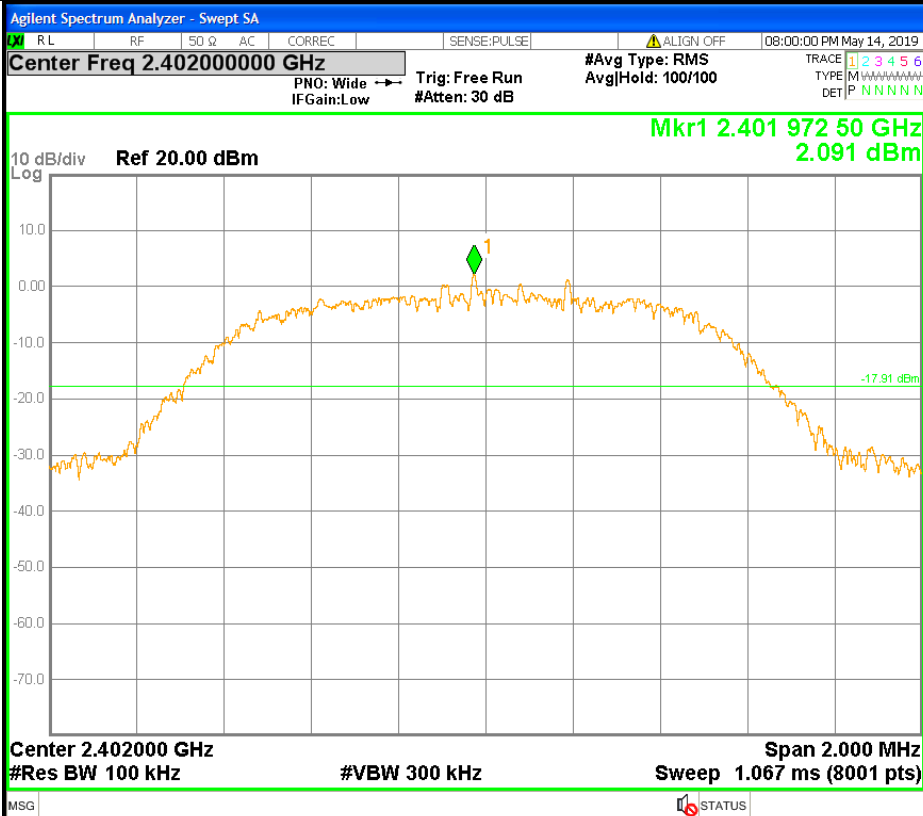
Stop Freq
26.500000000 GHz

CF Step
2.649999100 GHz
Auto Man

Freq Offset
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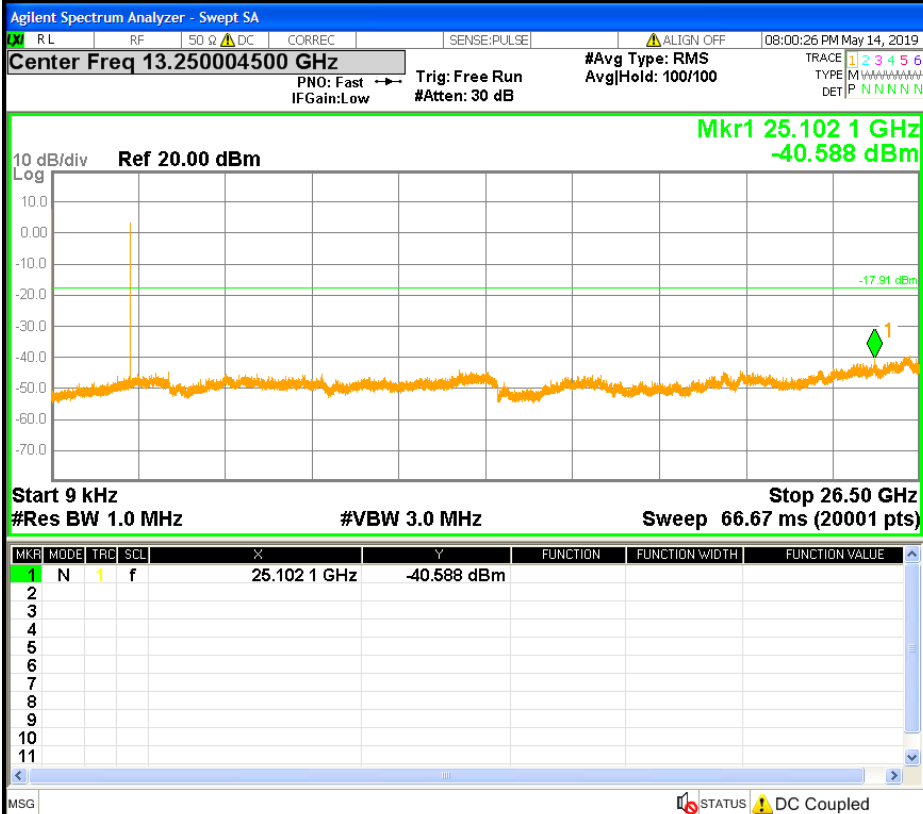
$\pi/4$ DQPSK LCH Graphs

Pref



Frequency
Auto Tune
Center Freq 2.402000000 GHz
Start Freq 2.401000000 GHz
Stop Freq 2.403000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

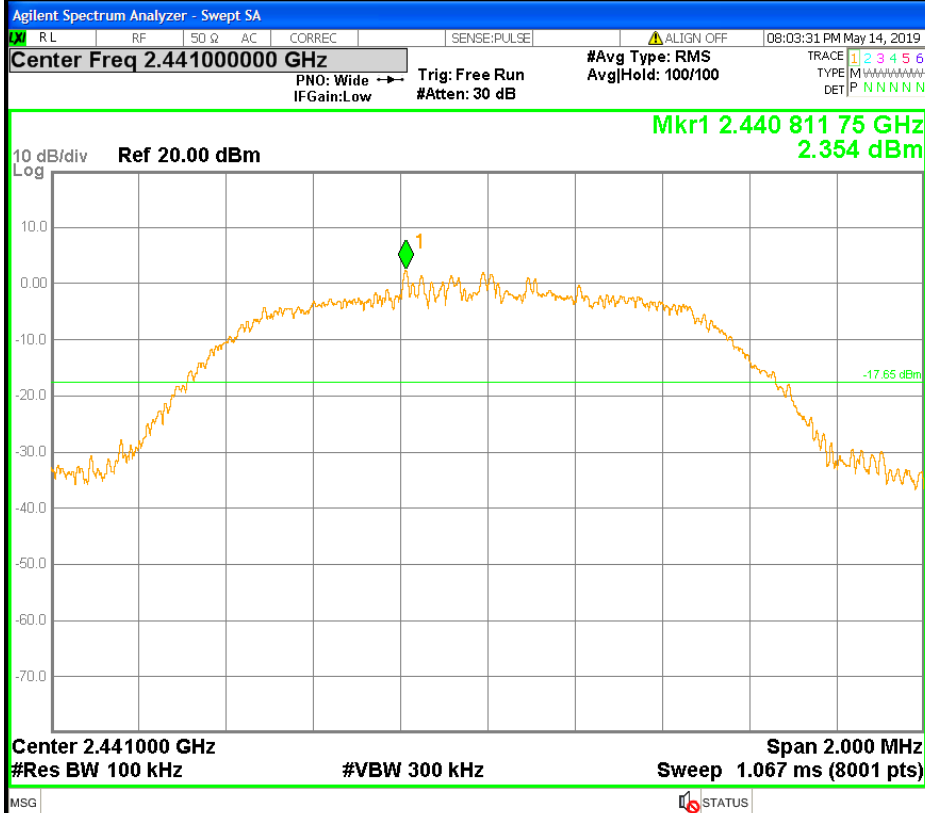
Puw



Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

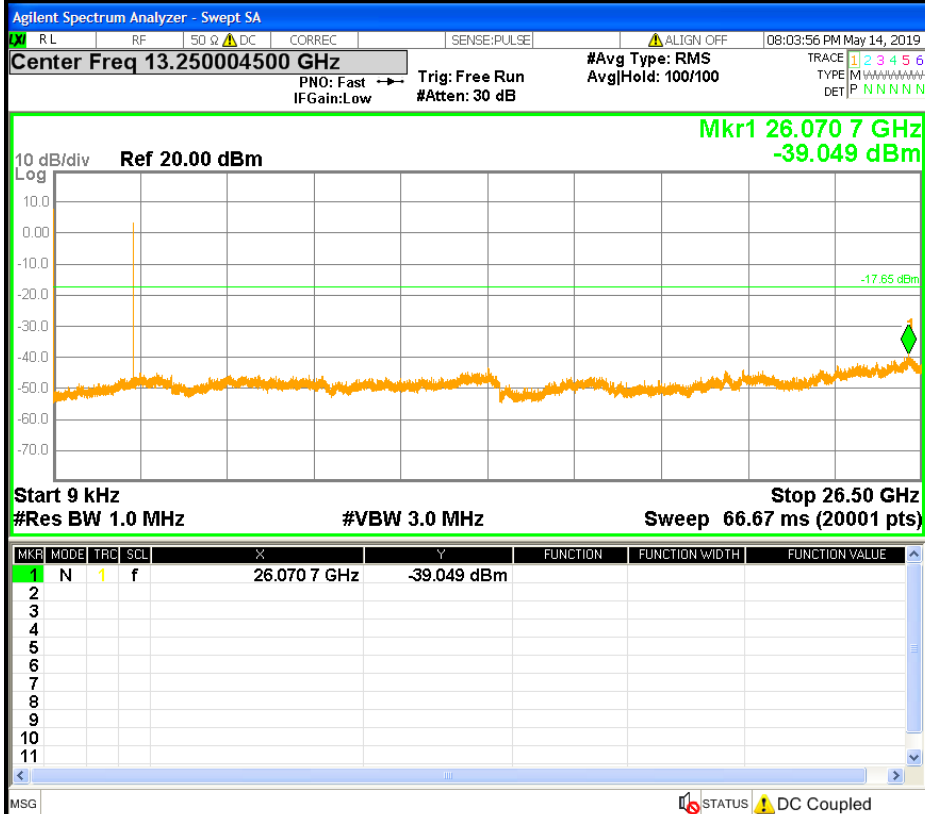
$\pi/4$ DQPSK MCH Graphs

Pref



Frequency
Auto Tune
Center Freq 2.441000000 GHz
Start Freq 2.440000000 GHz
Stop Freq 2.442000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

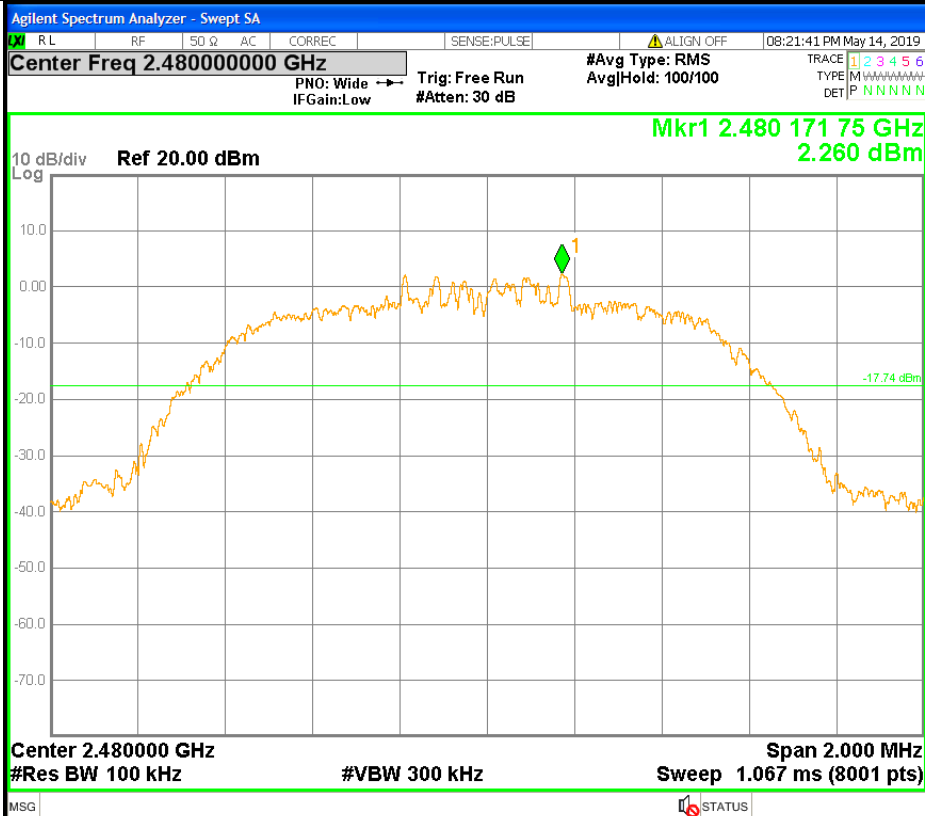
Puw



Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

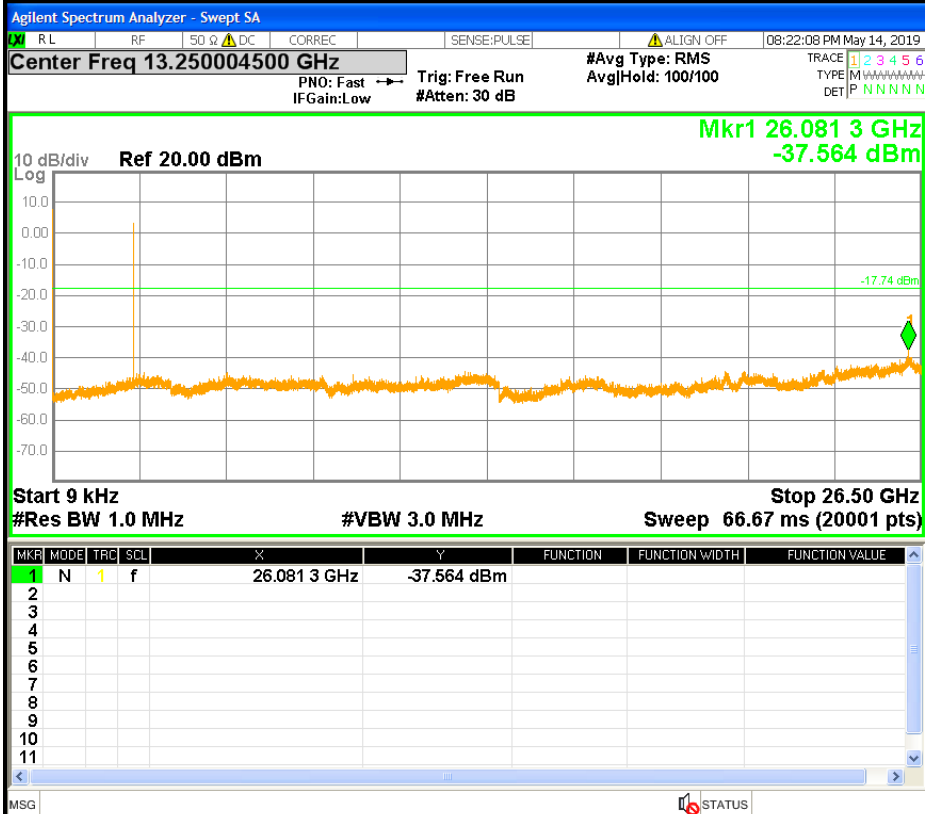
$\pi/4$ DQPSK HCH Graphs

Pref



Frequency
Auto Tune
Center Freq 2.480000000 GHz
Start Freq 2.479000000 GHz
Stop Freq 2.481000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

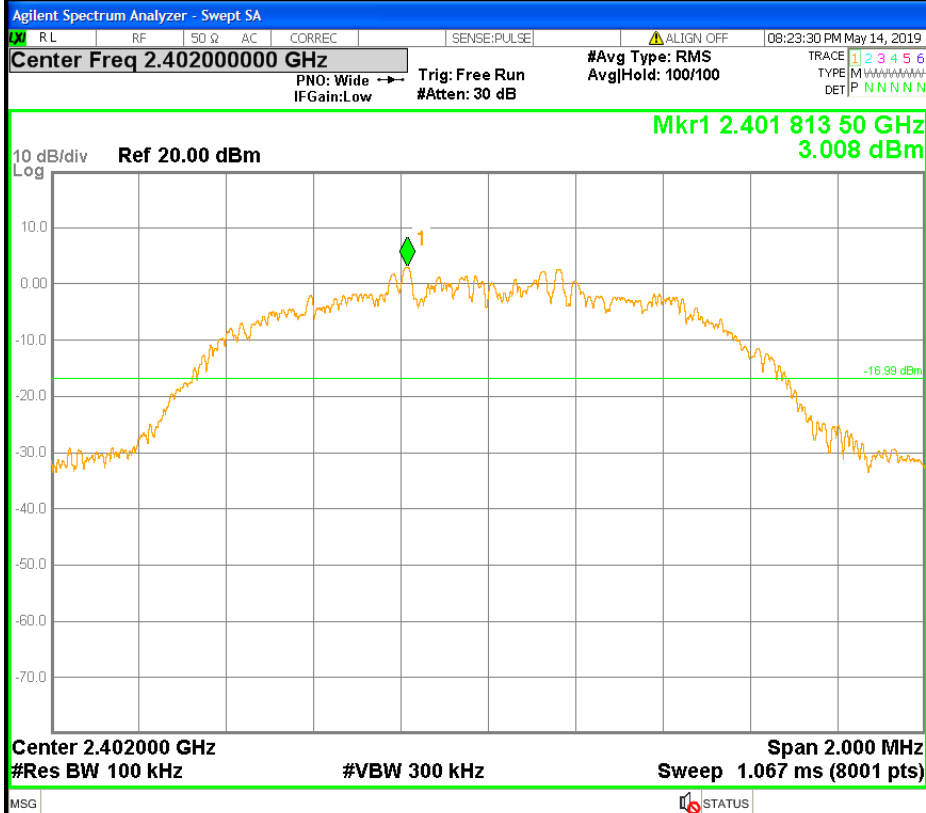
Puw



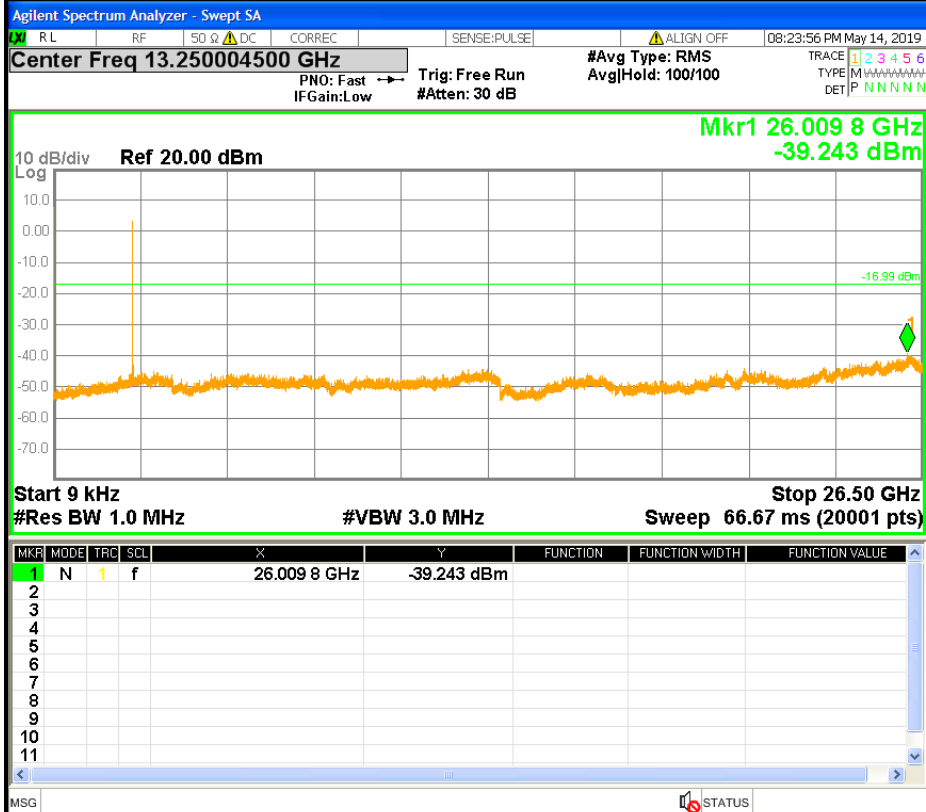
Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

8DPSK LCH Graphs

Pref

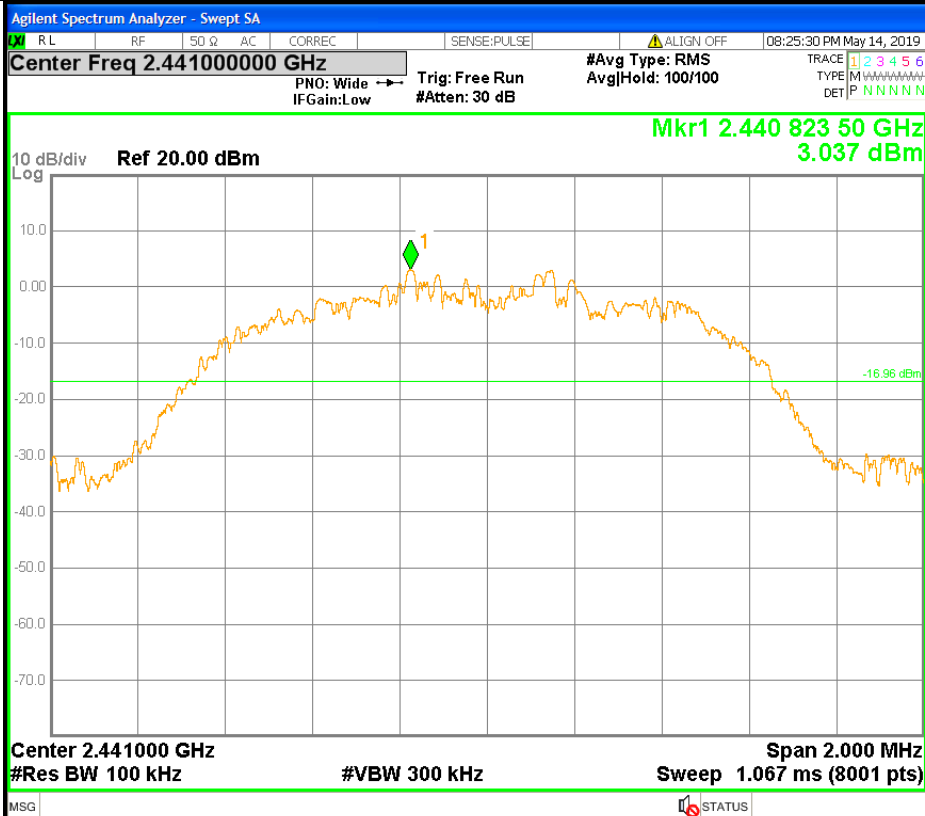


Puw

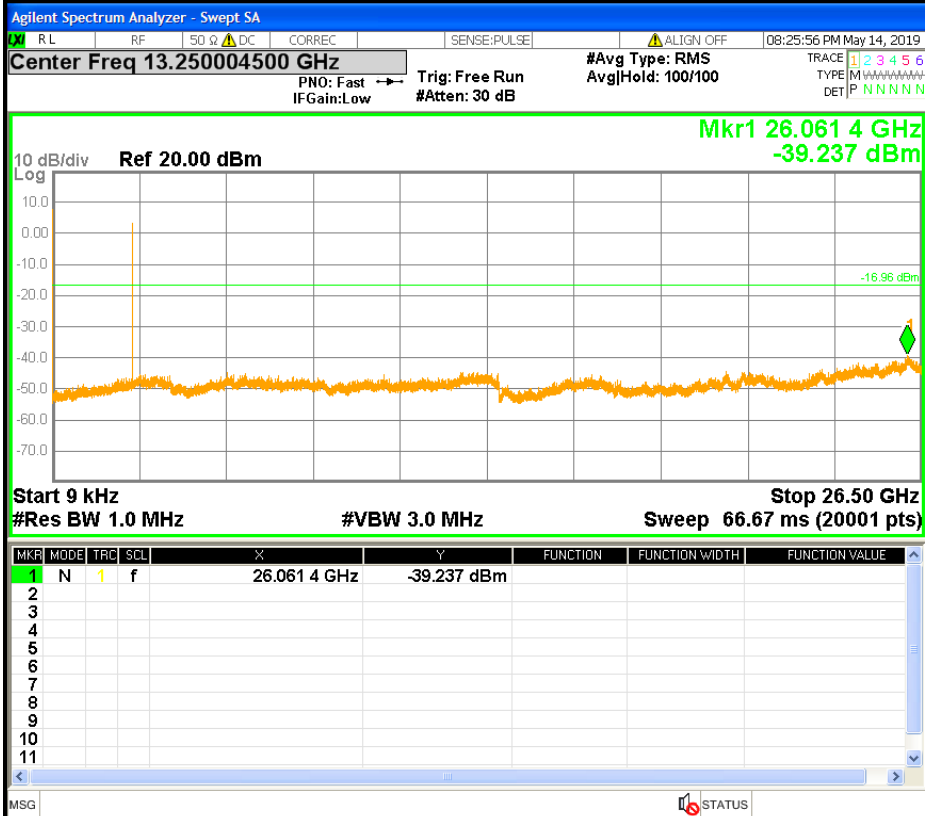


8DPSK MCH Graphs

Pref

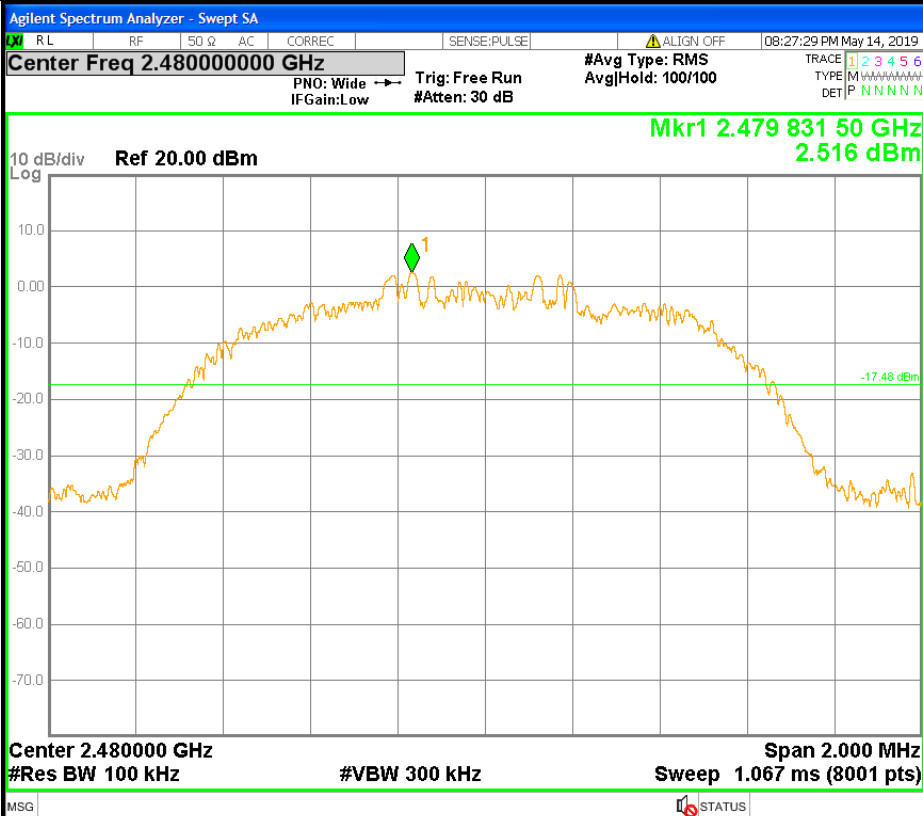


Puw



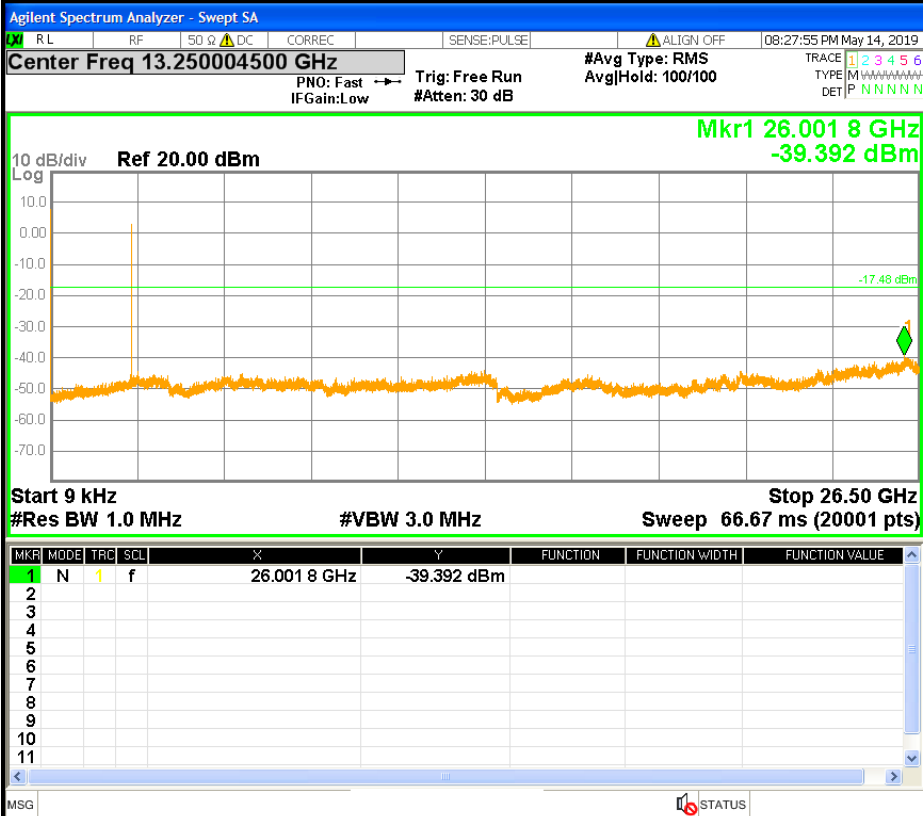
8DPSK HCH Graphs

Pref



Frequency
Auto Tune
Center Freq 2.480000000 GHz
Start Freq 2.479000000 GHz
Stop Freq 2.481000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

Puw



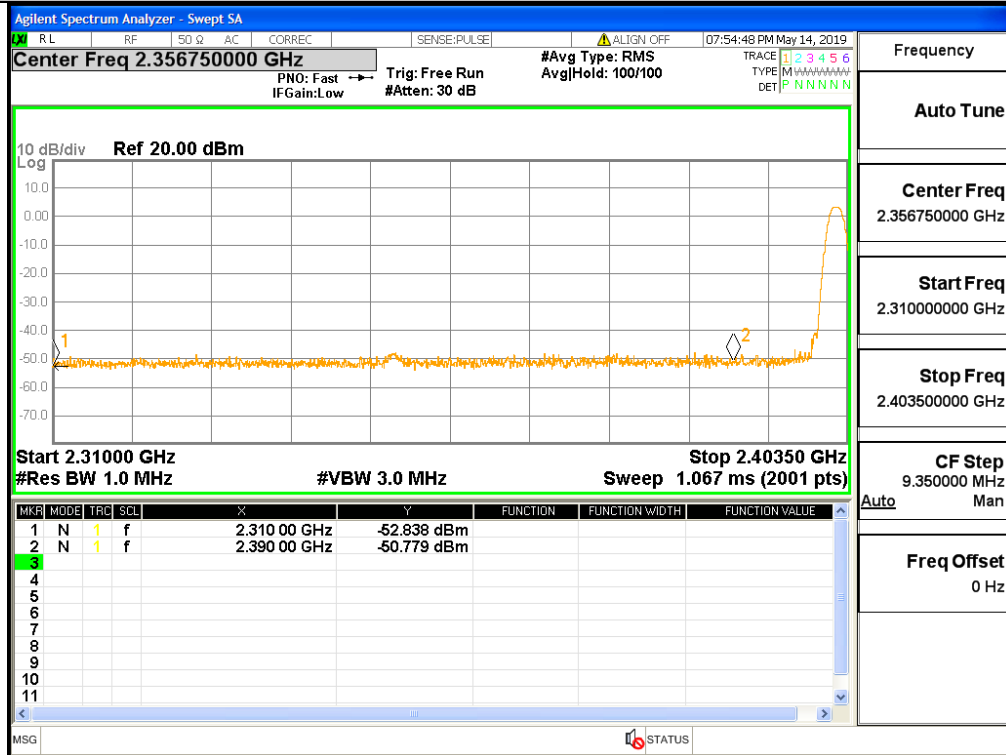
Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

A.8 Restrict-band band-edge measurements

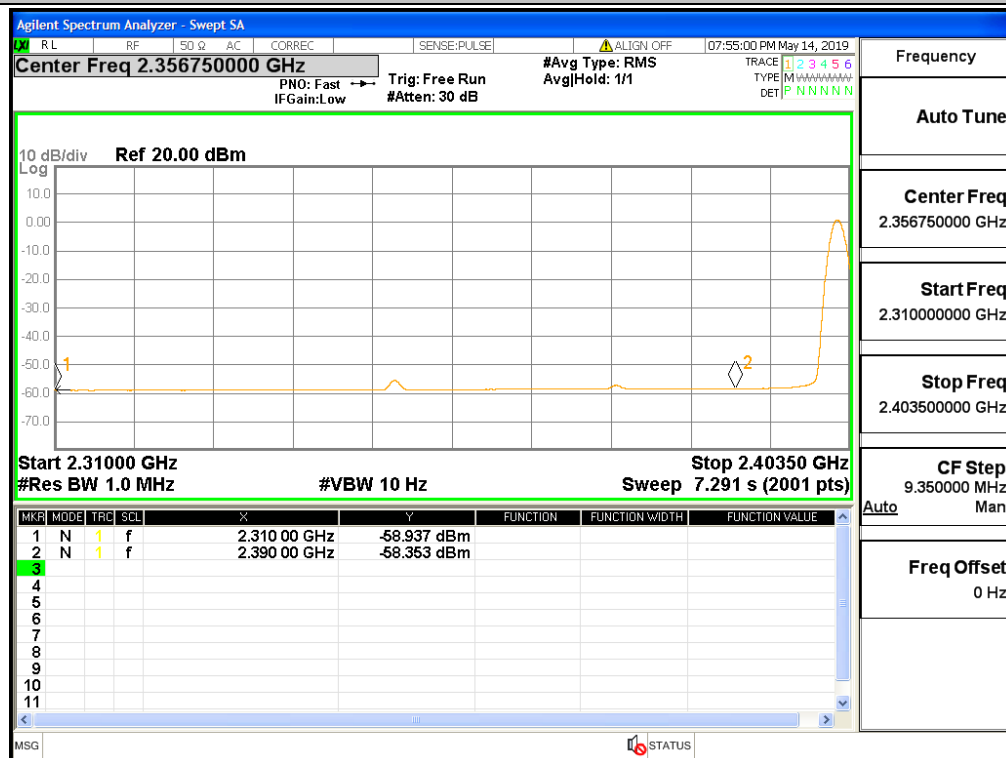
Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Peak Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2390.0	2.00	0.00	-50.78	46.42	74	Pass
1DH5	2480	2483.8	2.00	0.00	-39.60	57.60	74	Pass
2DH5	2402	2390.0	2.00	0.00	-51.58	45.62	74	Pass
2DH5	2480	2483.5	2.00	0.00	-47.72	49.48	74	Pass
3DH5	2402	2390.0	2.00	0.00	-52.18	45.02	74	Pass
3DH5	2480	2485.2	2.00	0.00	-44.32	52.88	74	Pass

Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Average Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2390.0	2.00	0.00	-58.35	38.85	54	Pass
1DH5	2480	2483.5	2.00	0.00	-55.46	41.74	54	Pass
2DH5	2402	2390.0	2.00	0.00	-58.49	38.71	54	Pass
2DH5	2480	2483.5	2.00	0.00	-55.40	41.80	54	Pass
3DH5	2402	2390.0	2.00	0.00	-58.45	38.75	54	Pass
3DH5	2480	2483.5	2.00	0.00	-55.39	41.81	54	Pass

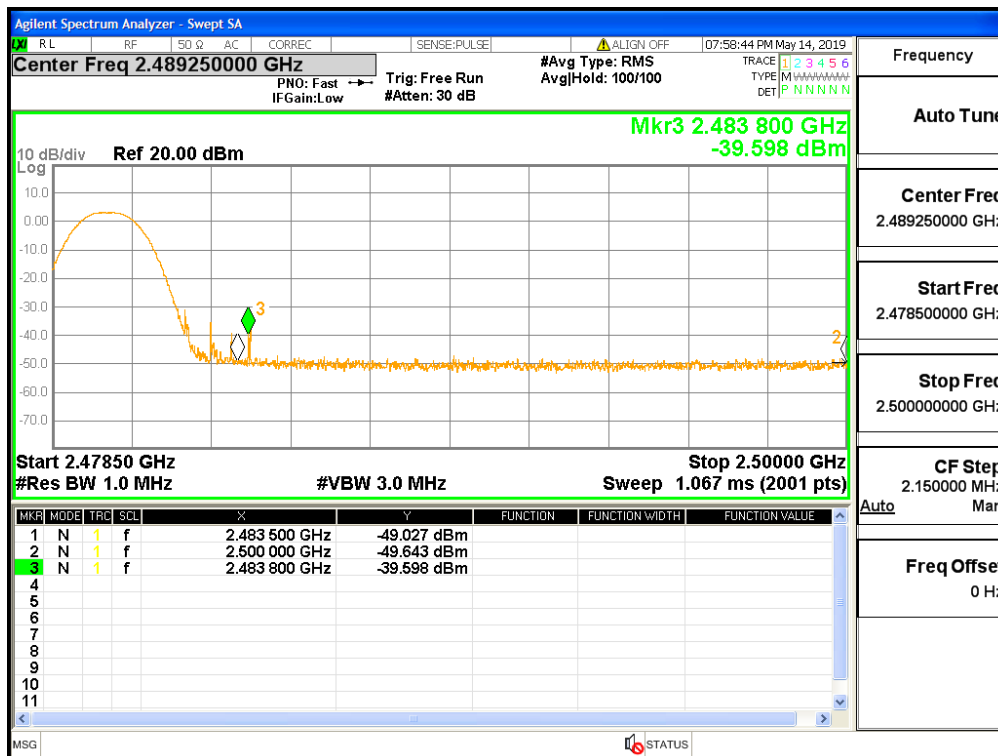
Restrict-band band-edge measurements_2402_PEAK_DH5



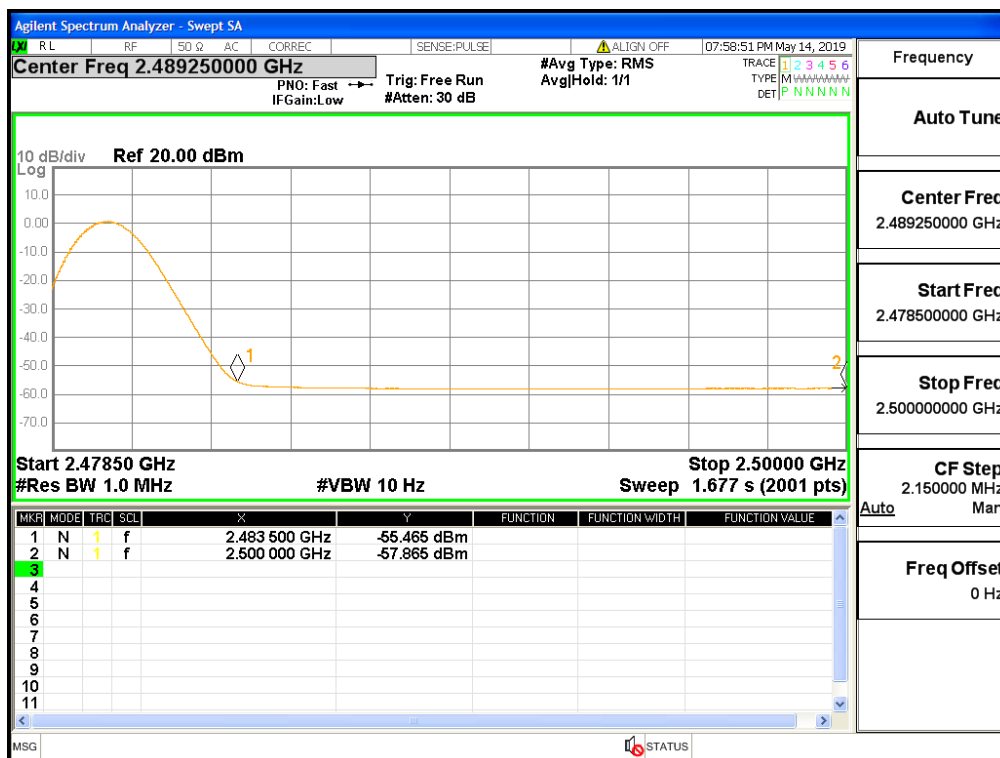
Restrict-band band-edge measurements_2402_AV_DH5



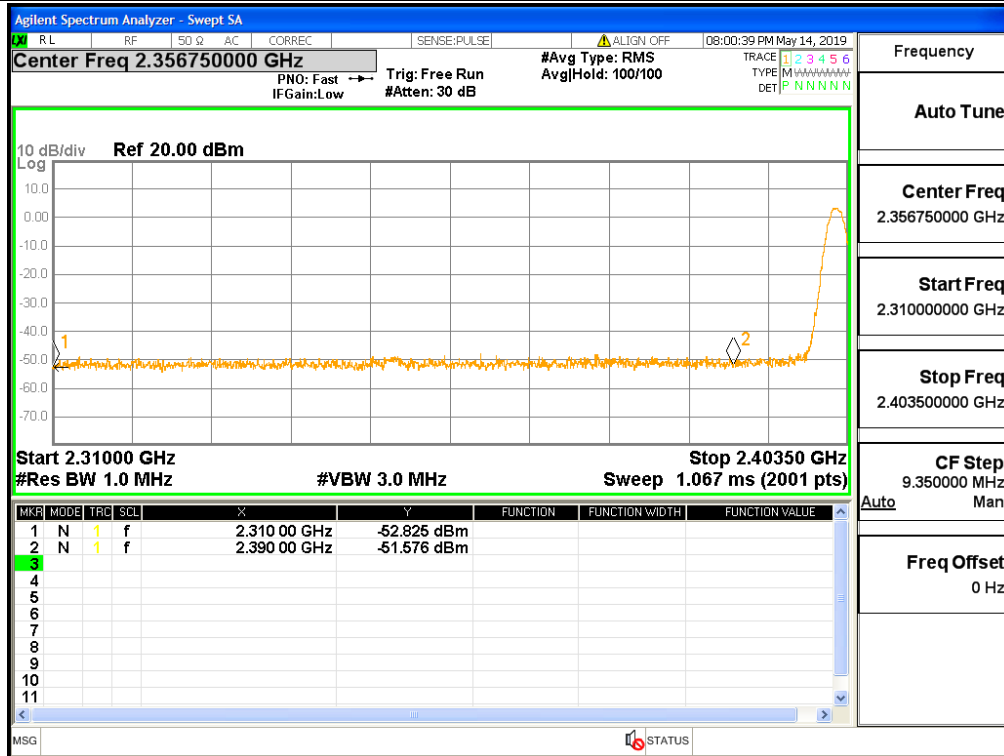
Restrict-band band-edge measurements_2480_PEAK_DH5



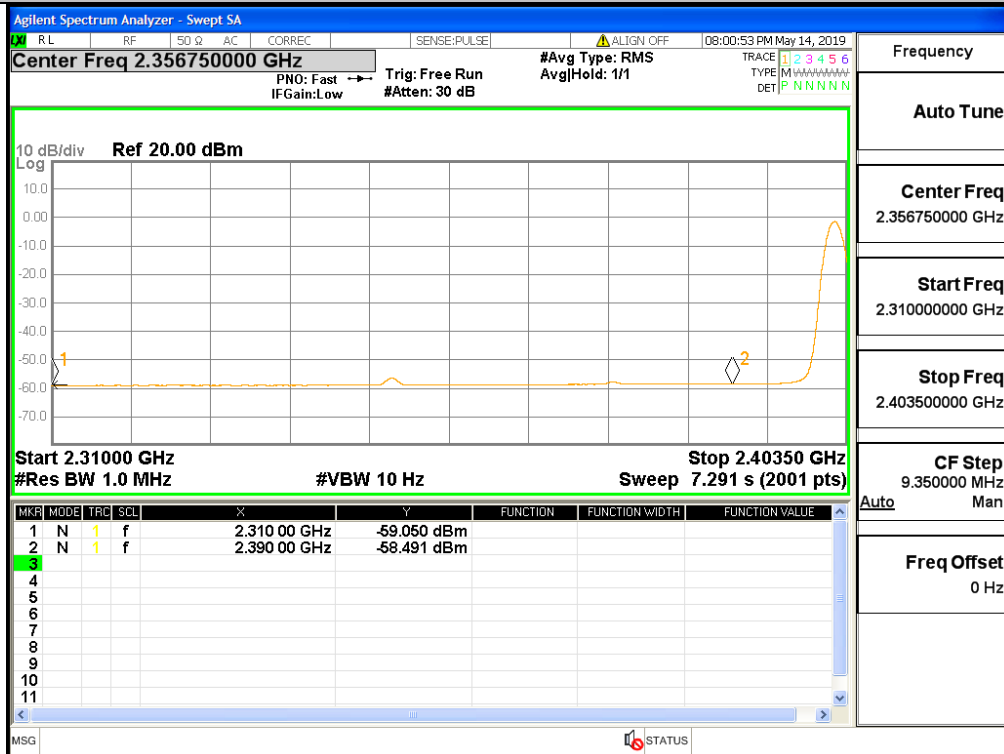
Restrict-band band-edge measurements_2480_AV_DH5



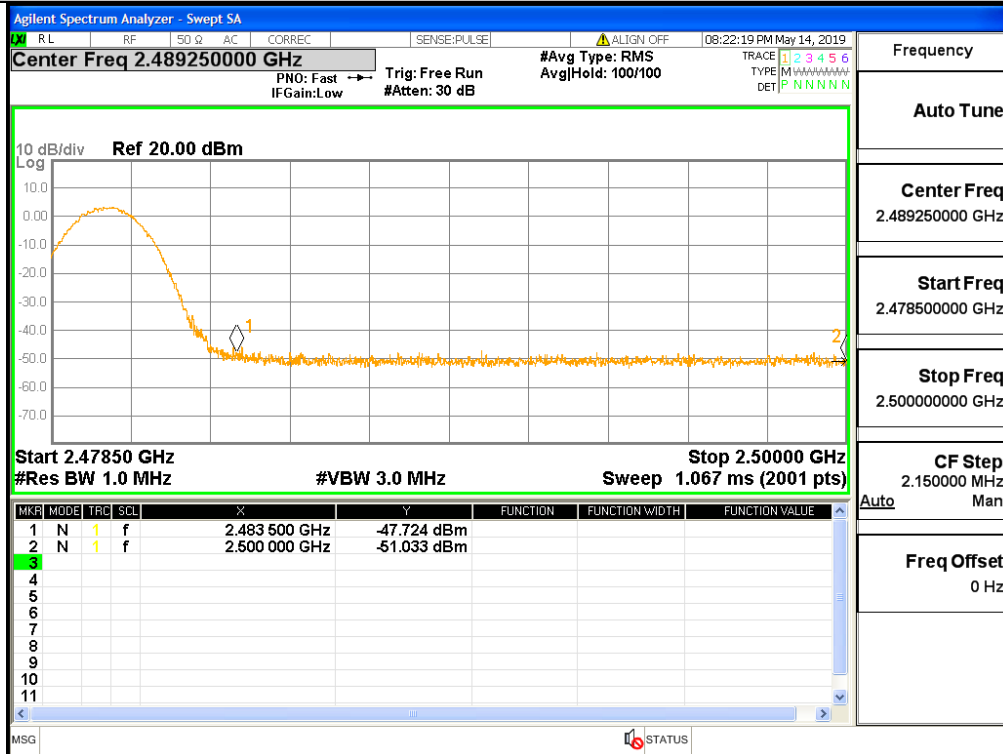
Restrict-band band-edge measurements_2402_PEAK_2DH5



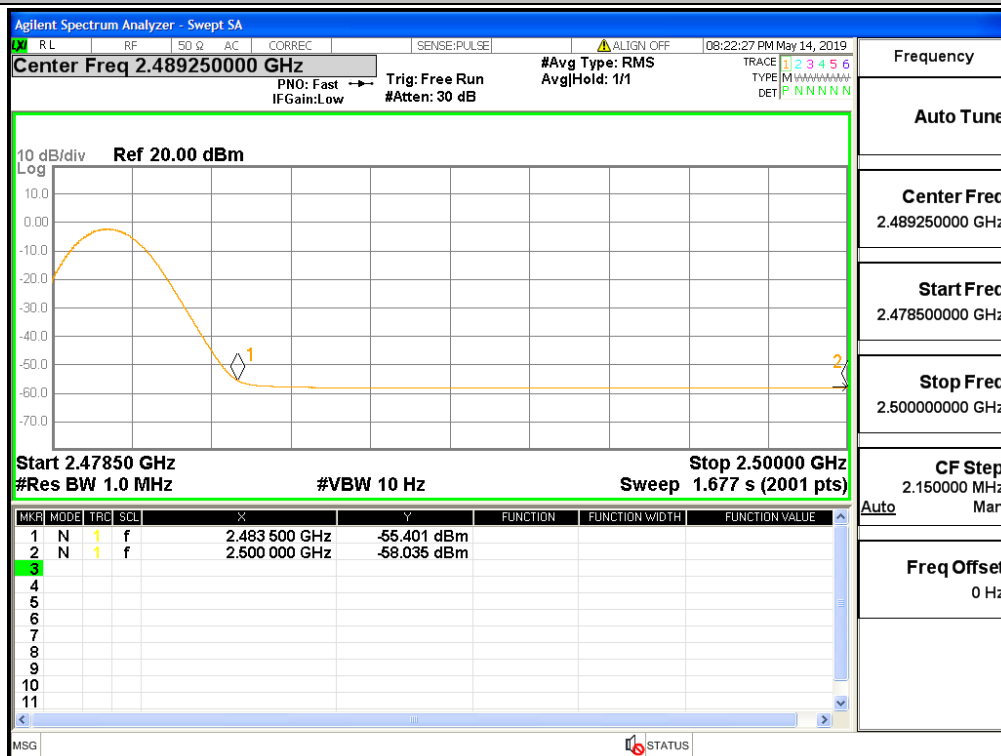
Restrict-band band-edge measurements_2402_AV_2DH5



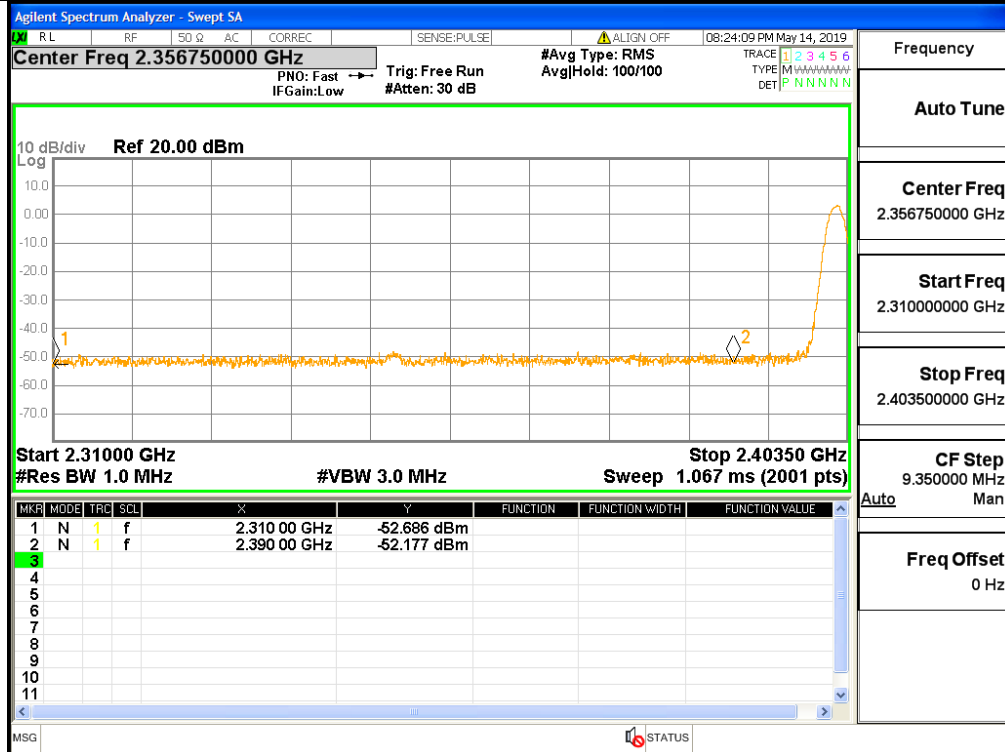
Restrict-band band-edge measurements_2480_PEAK_2DH5



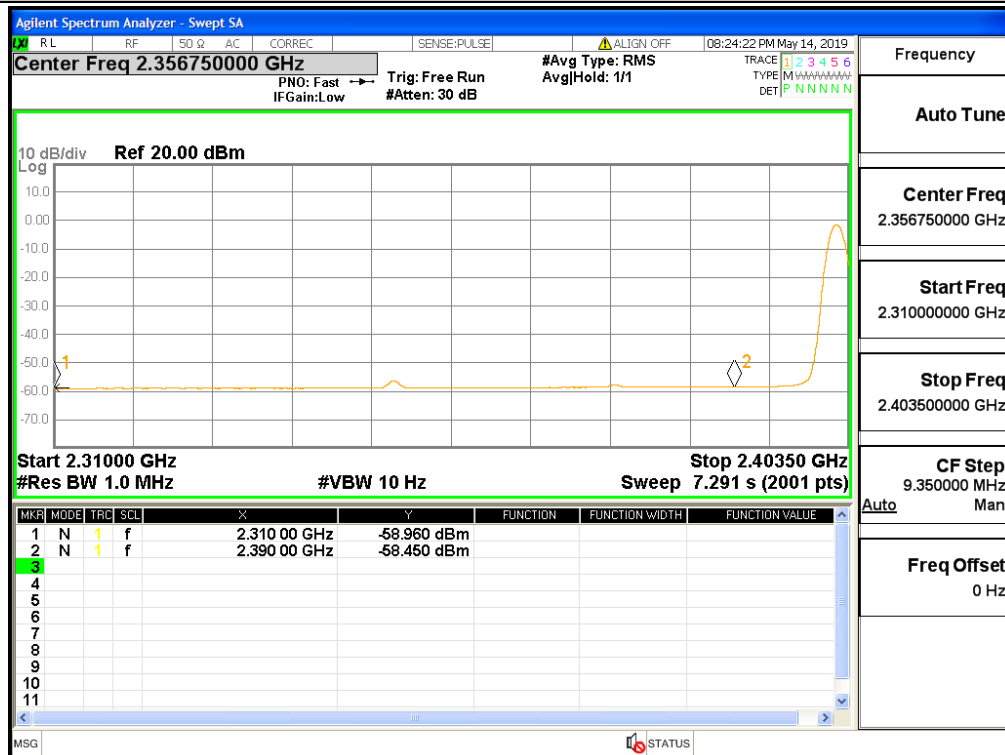
Restrict-band band-edge measurements_2480_AV_2DH5



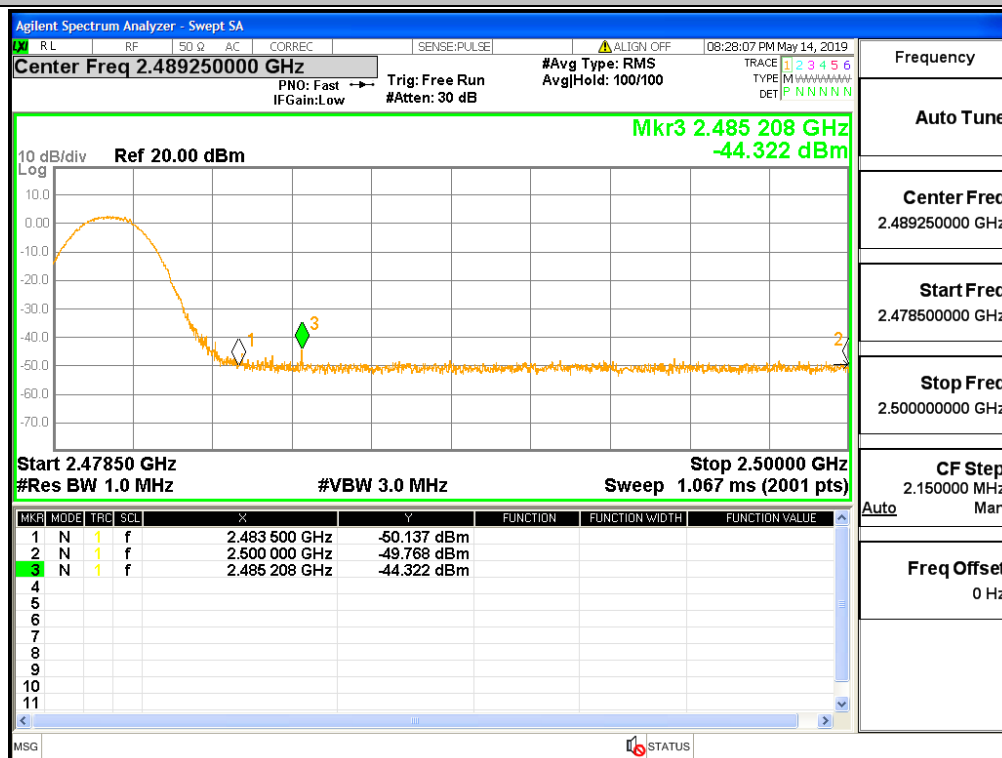
Restrict-band band-edge measurements_2402_PEAK_3DH5



Restrict-band band-edge measurements_2402_AV_3DH5



Restrict-band band-edge measurements_2480_PEAK_3DH5



Restrict-band band-edge measurements_2480_AV_3DH5

