

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: RT02B

FCC ID: QIF-RT02B

Environmental Conditions

Temperature:	23.1 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

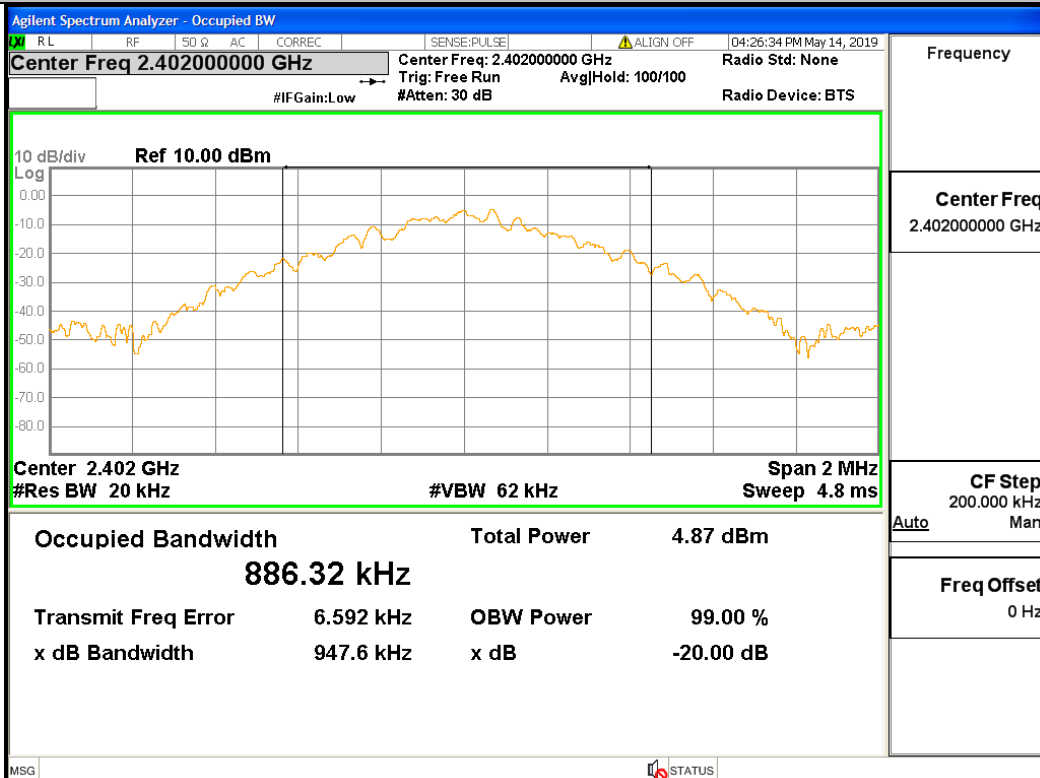
A.1 20 dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	0.948	Not Specified	PASS
GFSK	MCH	0.950	Not Specified	PASS
GFSK	HCH	0.942	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.346	Not Specified	PASS
$\pi/4$ DQPSK	MCH	1.350	Not Specified	PASS
$\pi/4$ DQPSK	HCH	1.348	Not Specified	PASS
8DPSK	LCH	1.341	Not Specified	PASS
8DPSK	MCH	1.340	Not Specified	PASS
8DPSK	HCH	1.341	Not Specified	PASS

Test Graph

Graphs

GFSK/LCH



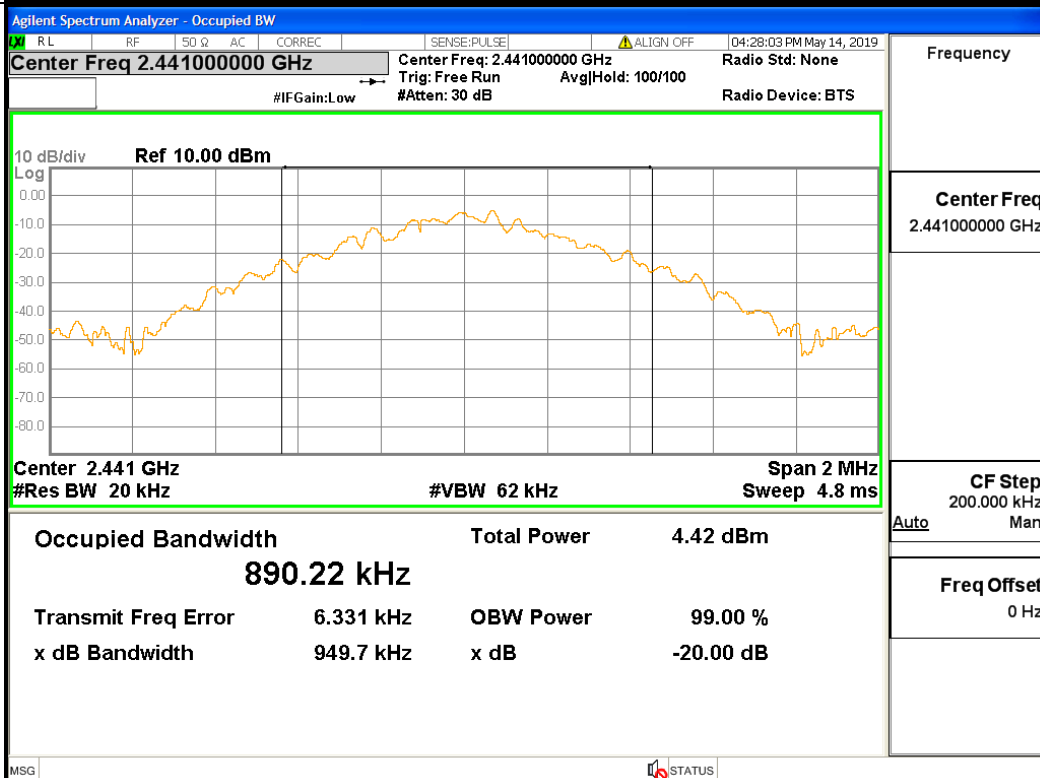
Frequency

Center Freq
2.40200000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/MCH

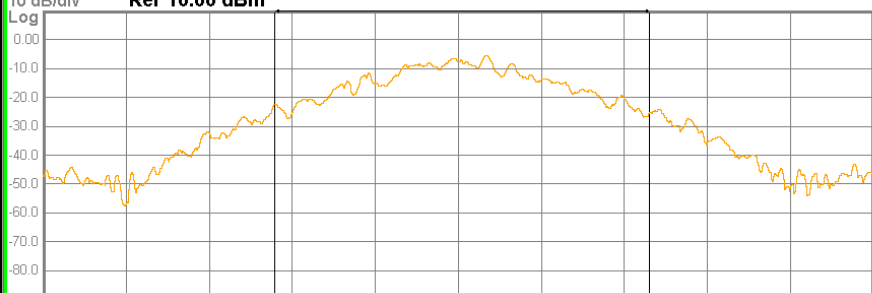


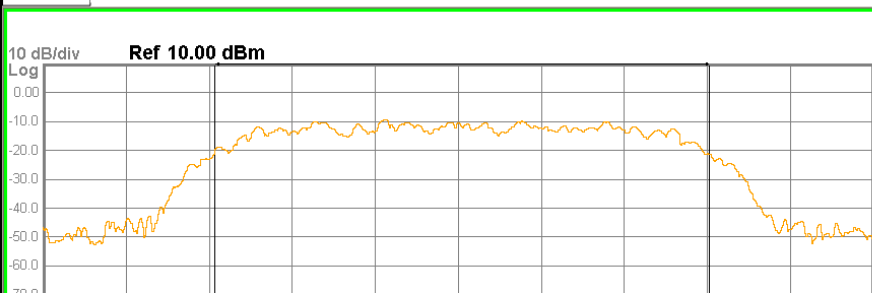
Frequency

Center Freq
2.44100000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/HCH	Agilent Spectrum Analyzer - Occupied BW				SENSE:PULSE		ALIGN OFF		04:29:05 PM May 14, 2019		Frequency																													
	Center Freq 2.480000000 GHz		Center Freq: 2.480000000 GHz		Trig: Free Run		Avg/Hold: 100/100		Radio Std: None		Center Freq 2.480000000 GHz																													
	#IFGain:Low		#Atten: 30 dB						Radio Device: BTS																															
																																								
	Center 2.48 GHz		#Res BW 20 kHz		#VBW 62 kHz		Span 2 MHz		Sweep 4.8 ms		CF Step 200.000 kHz Auto Man																													
<table><tr><td colspan="2">Occupied Bandwidth</td><td colspan="2">Total Power</td><td colspan="2">3.98 dBm</td></tr><tr><td colspan="2">896.05 kHz</td><td colspan="2"></td><td colspan="2"></td></tr><tr><td colspan="2">Transmit Freq Error</td><td colspan="2">10.512 kHz</td><td colspan="2">OBW Power</td><td colspan="2">99.00 %</td></tr><tr><td colspan="2">x dB Bandwidth</td><td colspan="2">942.4 kHz</td><td colspan="2">x dB</td><td colspan="2">-20.00 dB</td></tr></table>											Occupied Bandwidth		Total Power		3.98 dBm		896.05 kHz						Transmit Freq Error		10.512 kHz		OBW Power		99.00 %		x dB Bandwidth		942.4 kHz		x dB		-20.00 dB		Freq Offset 0 Hz	
Occupied Bandwidth		Total Power		3.98 dBm																																				
896.05 kHz																																								
Transmit Freq Error		10.512 kHz		OBW Power		99.00 %																																		
x dB Bandwidth		942.4 kHz		x dB		-20.00 dB																																		
MSG											STATUS																													

π/4DQPSK/LCH	Agilent Spectrum Analyzer - Occupied BW				SENSE:PULSE		ALIGN OFF		04:30:15 PM May 14, 2019		Frequency																													
	Center Freq 2.402000000 GHz		Center Freq: 2.402000000 GHz		Trig: Free Run		Avg/Hold: 100/100		Radio Std: None		Center Freq 2.402000000 GHz																													
	#IFGain:Low		#Atten: 30 dB						Radio Device: BTS																															
																																								
	Center 2.402 GHz		#Res BW 20 kHz		#VBW 62 kHz		Span 2 MHz		Sweep 4.8 ms		CF Step 200.000 kHz Auto Man																													
<table><tr><td colspan="2">Occupied Bandwidth</td><td colspan="2">Total Power</td><td colspan="2">4.85 dBm</td></tr><tr><td colspan="2">1.1907 MHz</td><td colspan="2"></td><td colspan="2"></td></tr><tr><td colspan="2">Transmit Freq Error</td><td colspan="2">9.433 kHz</td><td colspan="2">OBW Power</td><td colspan="2">99.00 %</td></tr><tr><td colspan="2">x dB Bandwidth</td><td colspan="2">1.346 MHz</td><td colspan="2">x dB</td><td colspan="2">-20.00 dB</td></tr></table>											Occupied Bandwidth		Total Power		4.85 dBm		1.1907 MHz						Transmit Freq Error		9.433 kHz		OBW Power		99.00 %		x dB Bandwidth		1.346 MHz		x dB		-20.00 dB		Freq Offset 0 Hz	
Occupied Bandwidth		Total Power		4.85 dBm																																				
1.1907 MHz																																								
Transmit Freq Error		9.433 kHz		OBW Power		99.00 %																																		
x dB Bandwidth		1.346 MHz		x dB		-20.00 dB																																		
MSG											STATUS																													

Center Freq 2.402000000 GHz

Center Freq: 2.402000000 GHz

Radio Std: None

#IFGain:Low

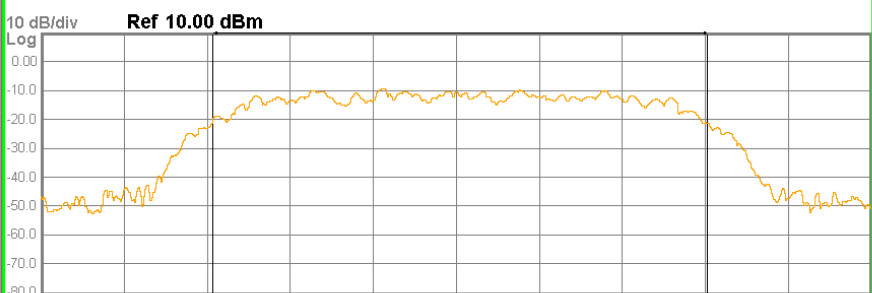
#Atten: 30 dB

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

1.1907 MHz

Total Power

4.85 dBm

Transmit Freq Error

9.433 kHz

OBW Power

99.00 %

x dB Bandwidth

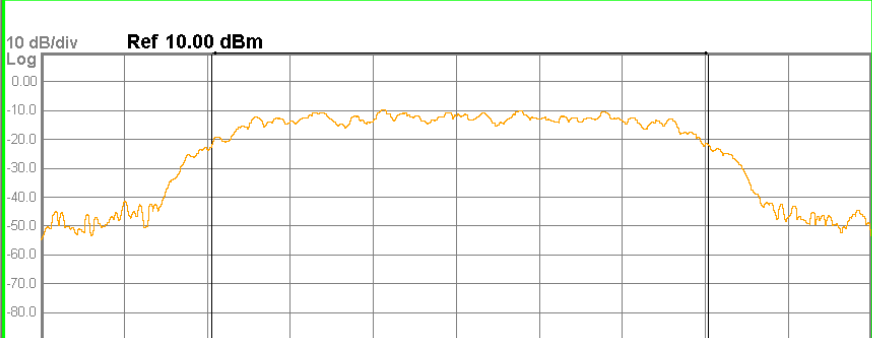
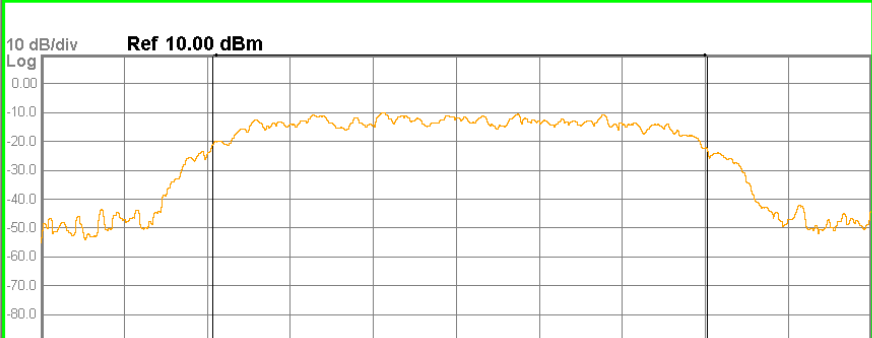
1.346 MHz

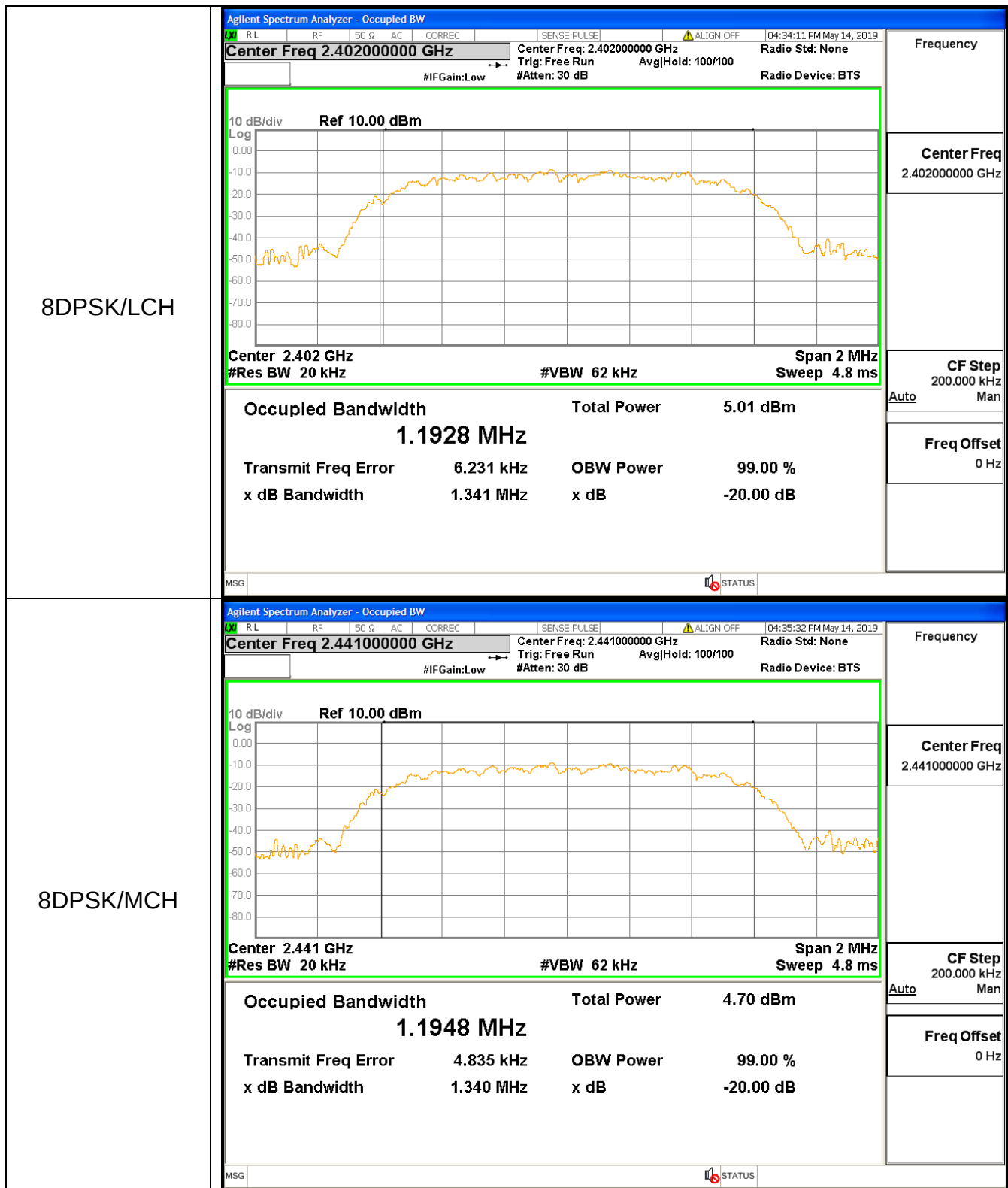
x dB

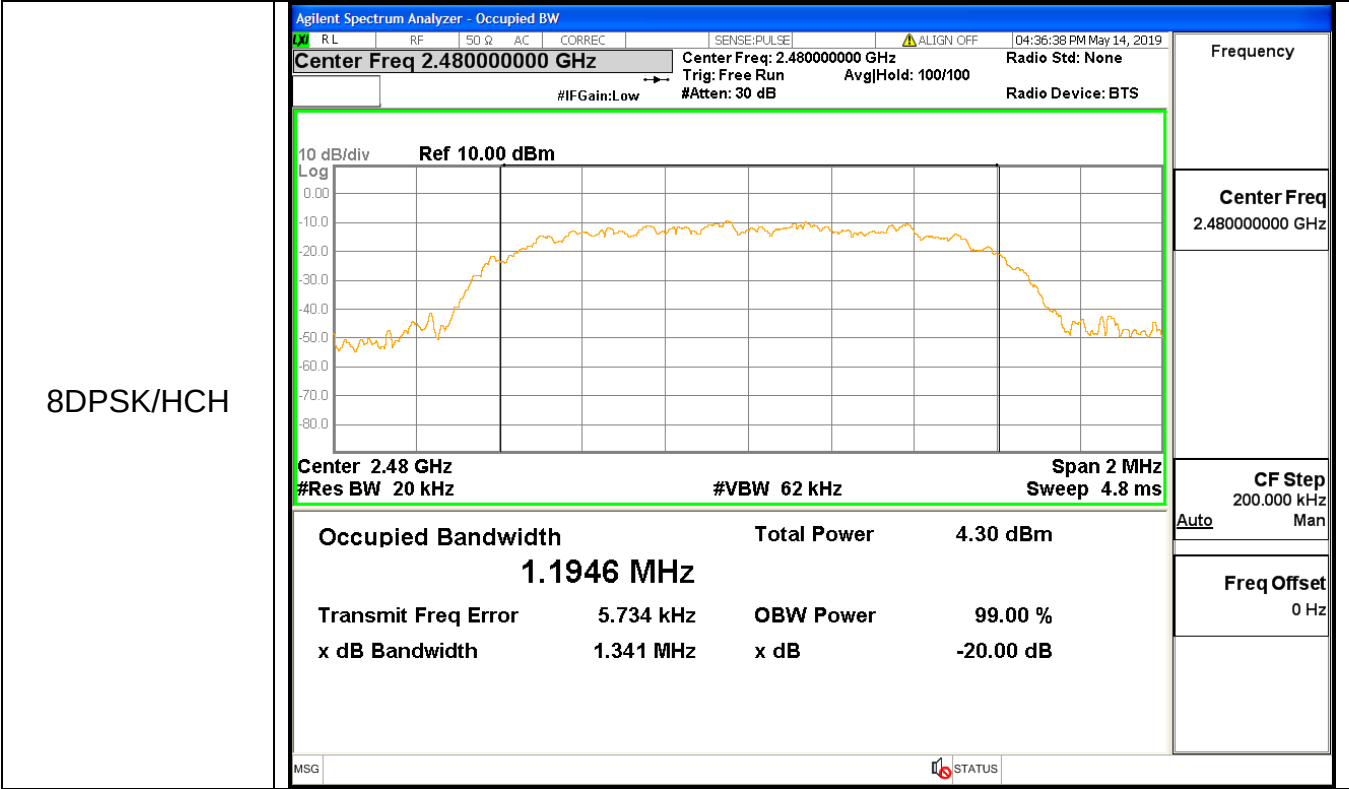
-20.00 dB

MSG

STATUS

π/4DQPSK/MCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC CORREC SENSE:PULSE ALIGN OFF 04:31:46 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 1.1921 MHz Total Power 4.45 dBm Transmit Freq Error 10.529 kHz OBW Power 99.00 % x dB Bandwidth 1.350 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
	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC CORREC SENSE:PULSE ALIGN OFF 04:32:55 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 1.1889 MHz Total Power 3.94 dBm Transmit Freq Error 8.618 kHz OBW Power 99.00 % x dB Bandwidth 1.348 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

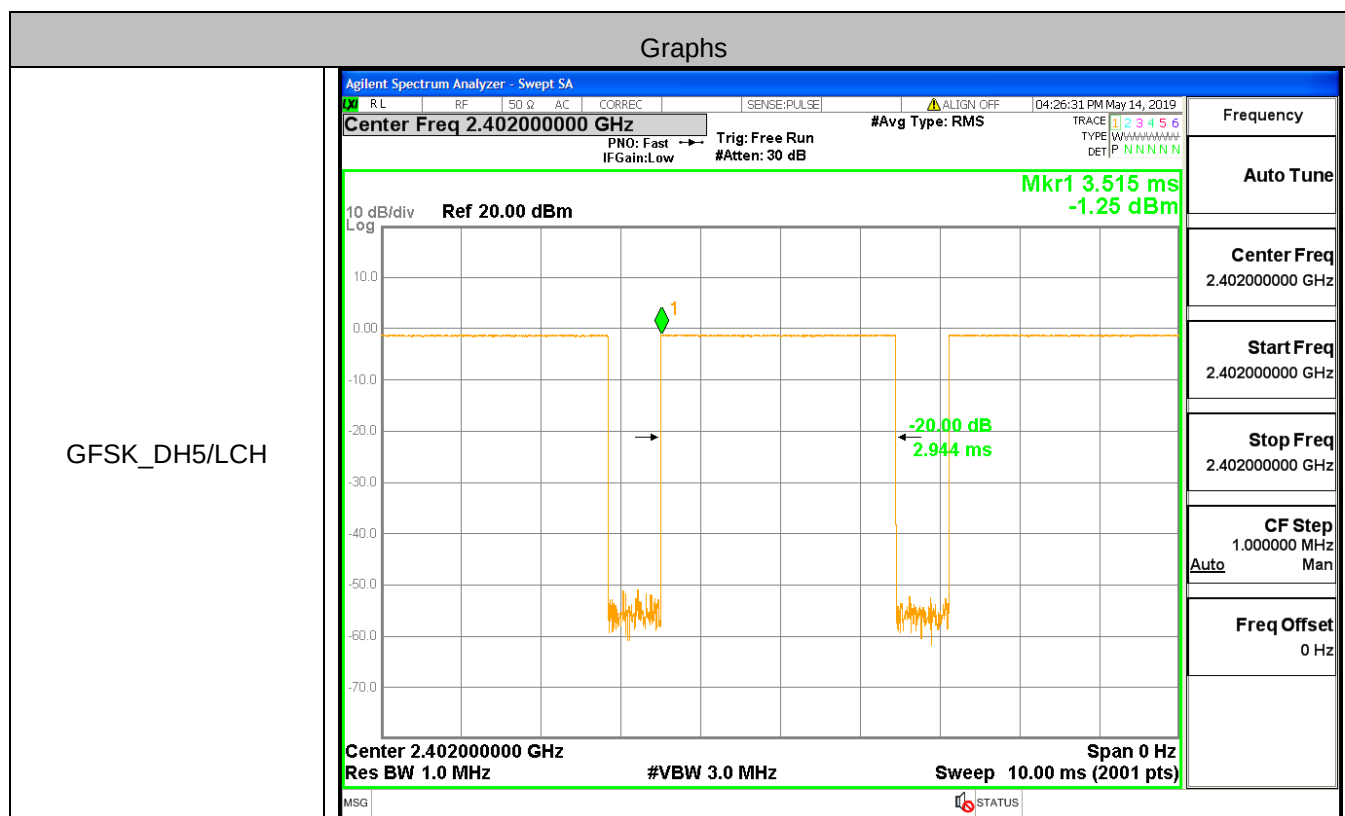


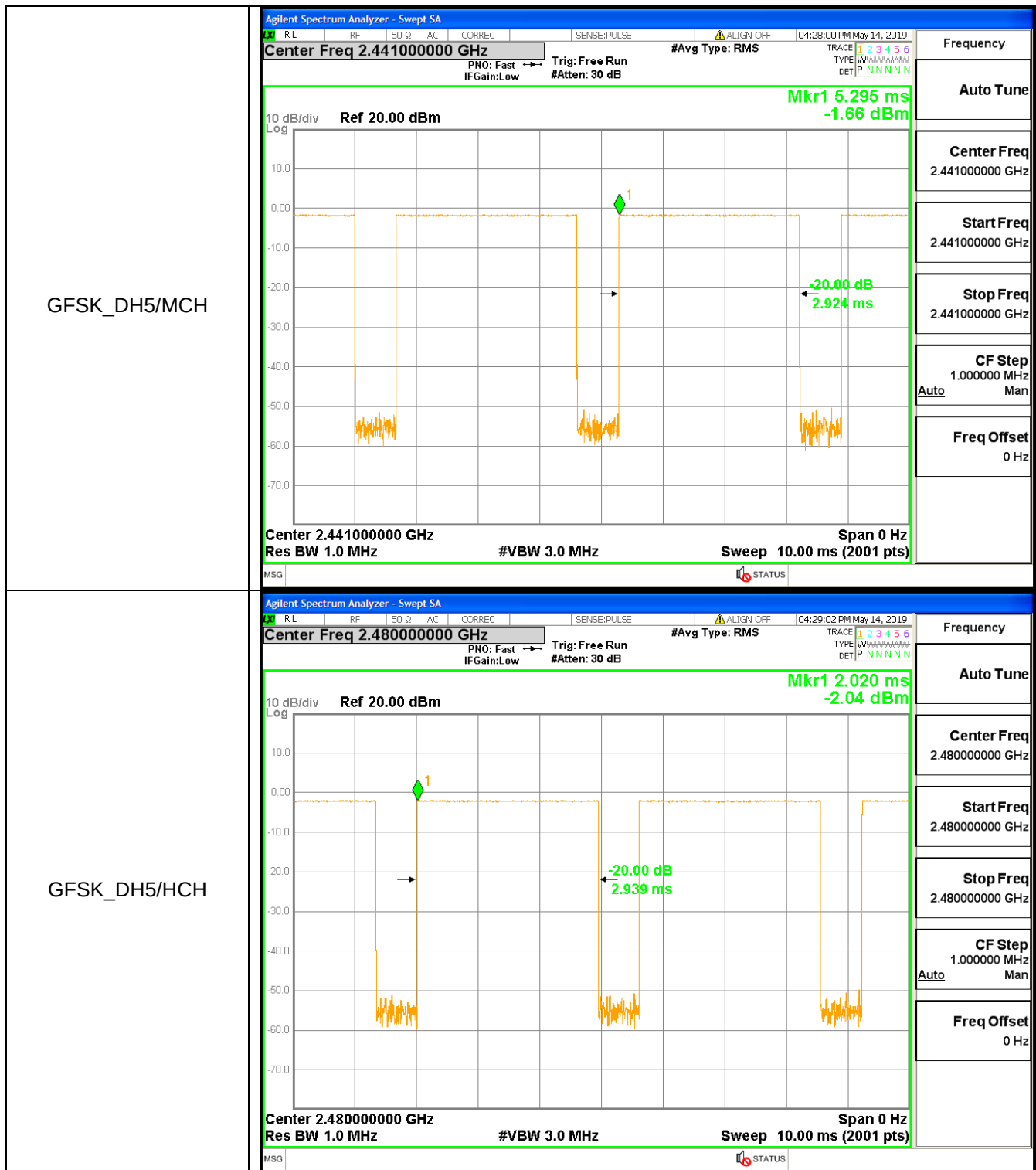


A.2 Dwell Time

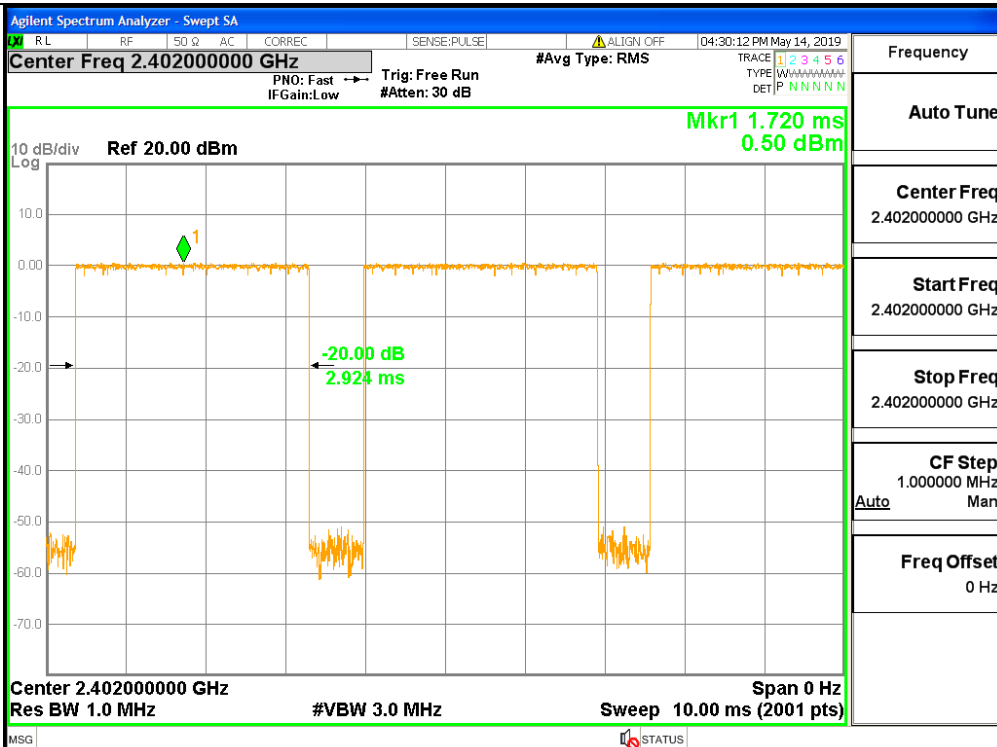
Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.002944	106.7	0.314076	0.4	PASS
GFSK	DH5	MCH	0.002924	106.7	0.312018	0.4	PASS
GFSK	DH5	HCH	0.002939	106.7	0.313633	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	0.002924	106.7	0.311962	0.4	PASS
$\pi/4$ DQPSK	2DH5	MCH	0.002939	106.7	0.313608	0.4	PASS
$\pi/4$ DQPSK	2DH5	HCH	0.002923	106.7	0.311907	0.4	PASS
8DPSK	3DH5	LCH	0.002943	106.7	0.314037	0.4	PASS
8DPSK	3DH5	MCH	0.002943	106.7	0.314039	0.4	PASS
8DPSK	3DH5	HCH	0.002939	106.7	0.313609	0.4	PASS

Test Graph

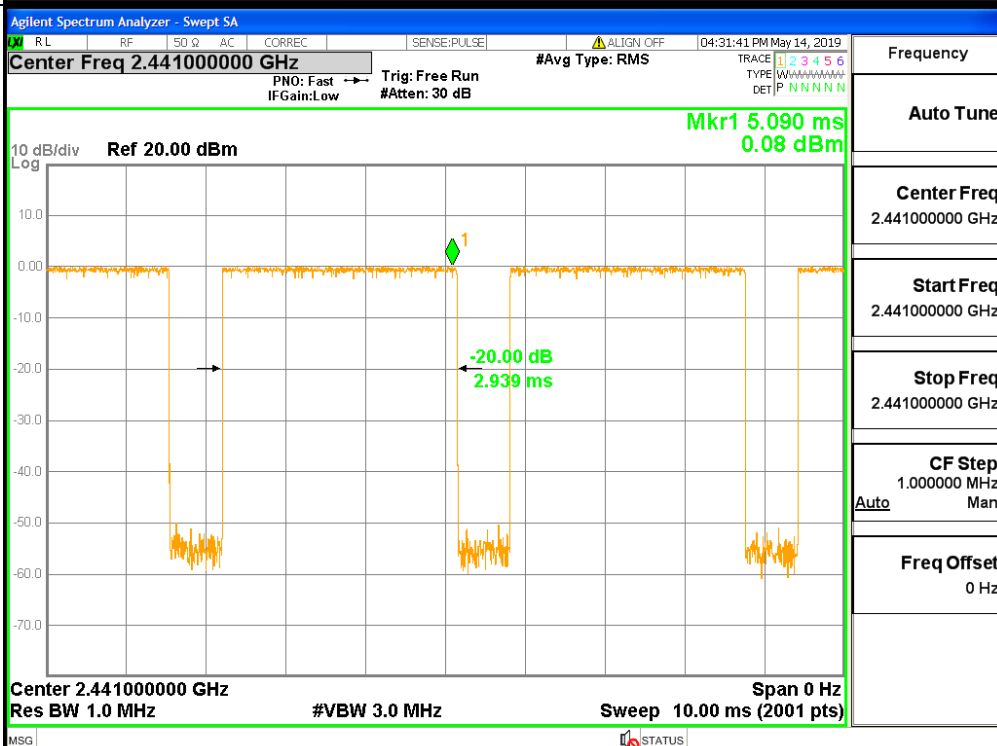




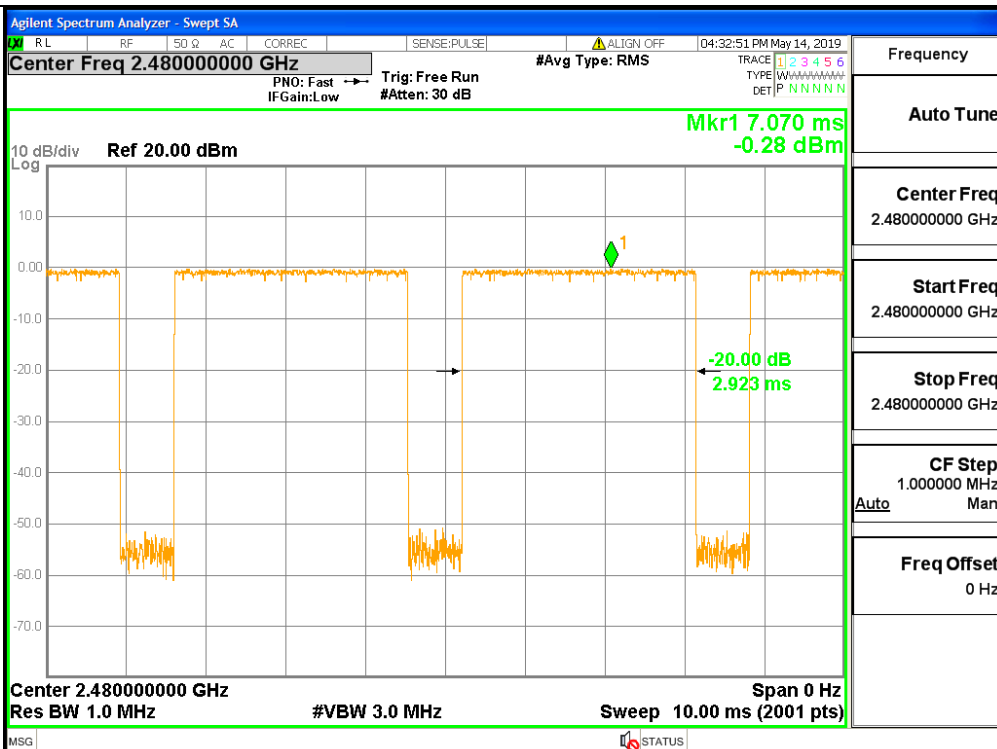
$\pi/4$ DQPSK
_2DH5/LCH



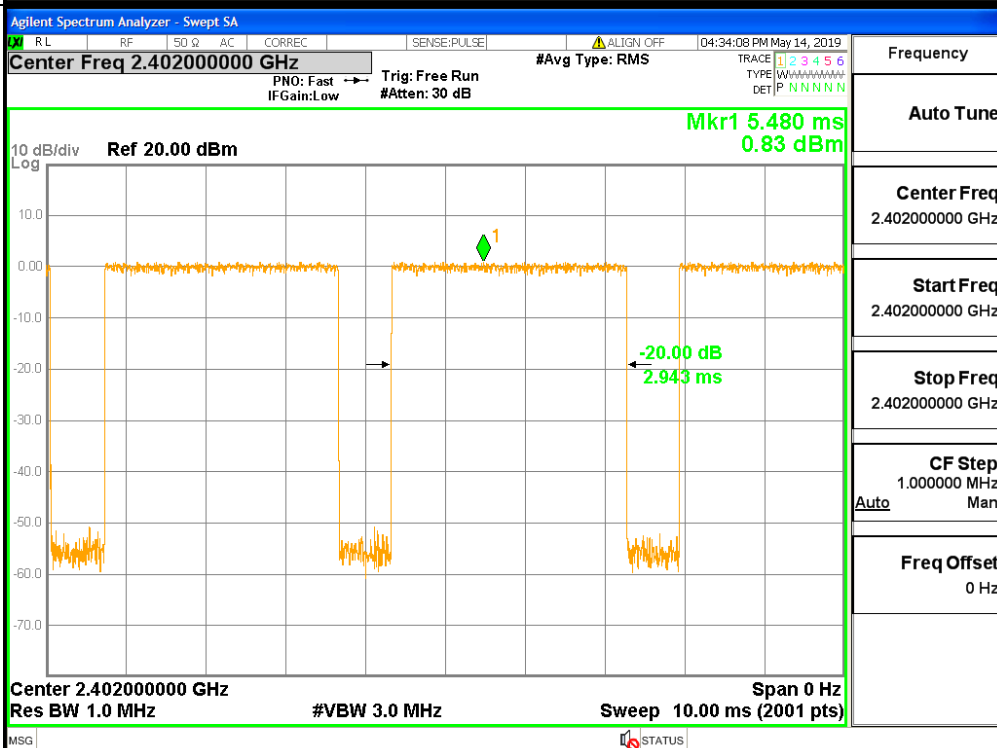
$\pi/4$ DQPSK
_2DH5/MCH

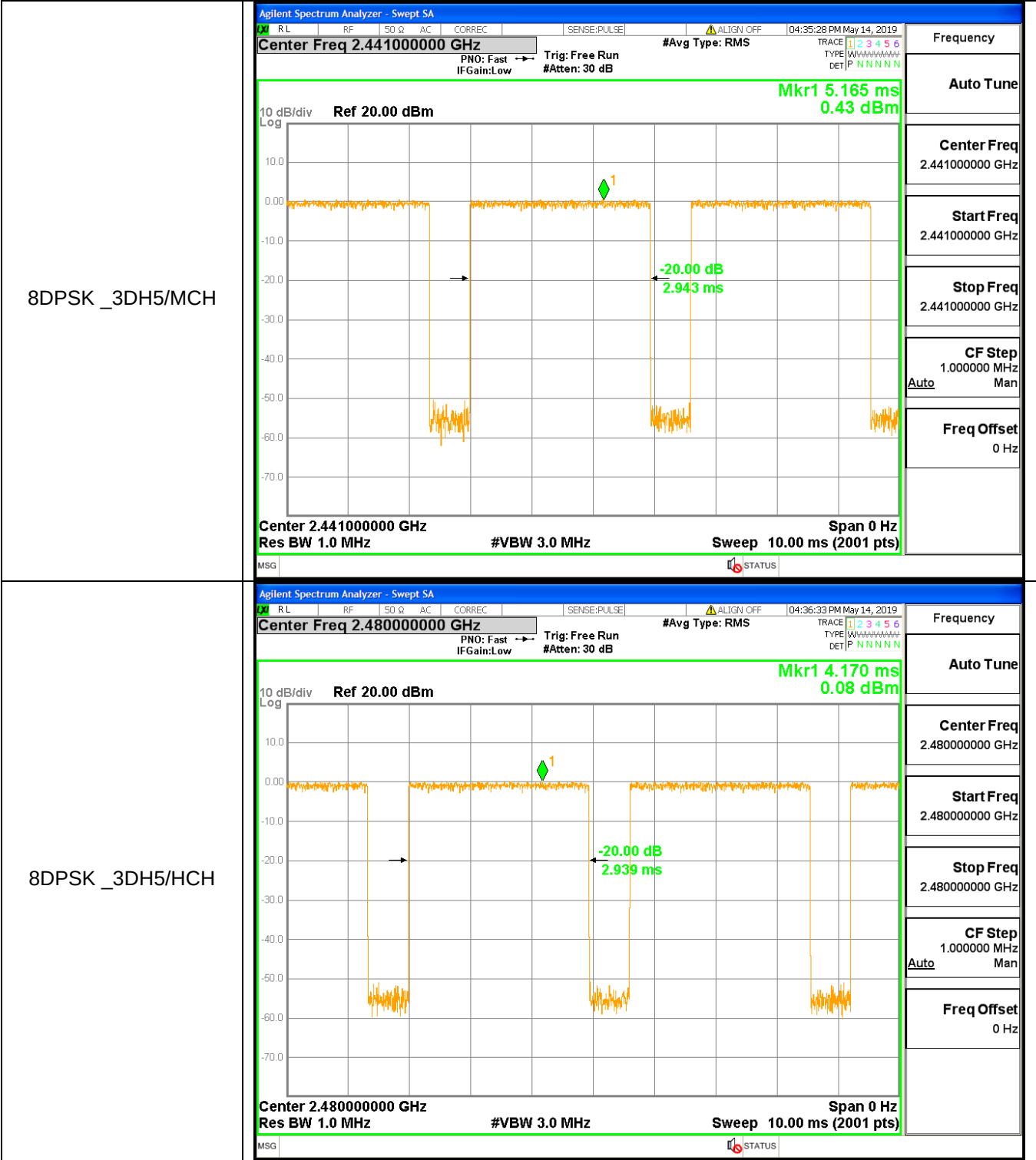


$\pi/4$ DQPSK
_2DH5/HCH



8DPSK_3DH5/LCH

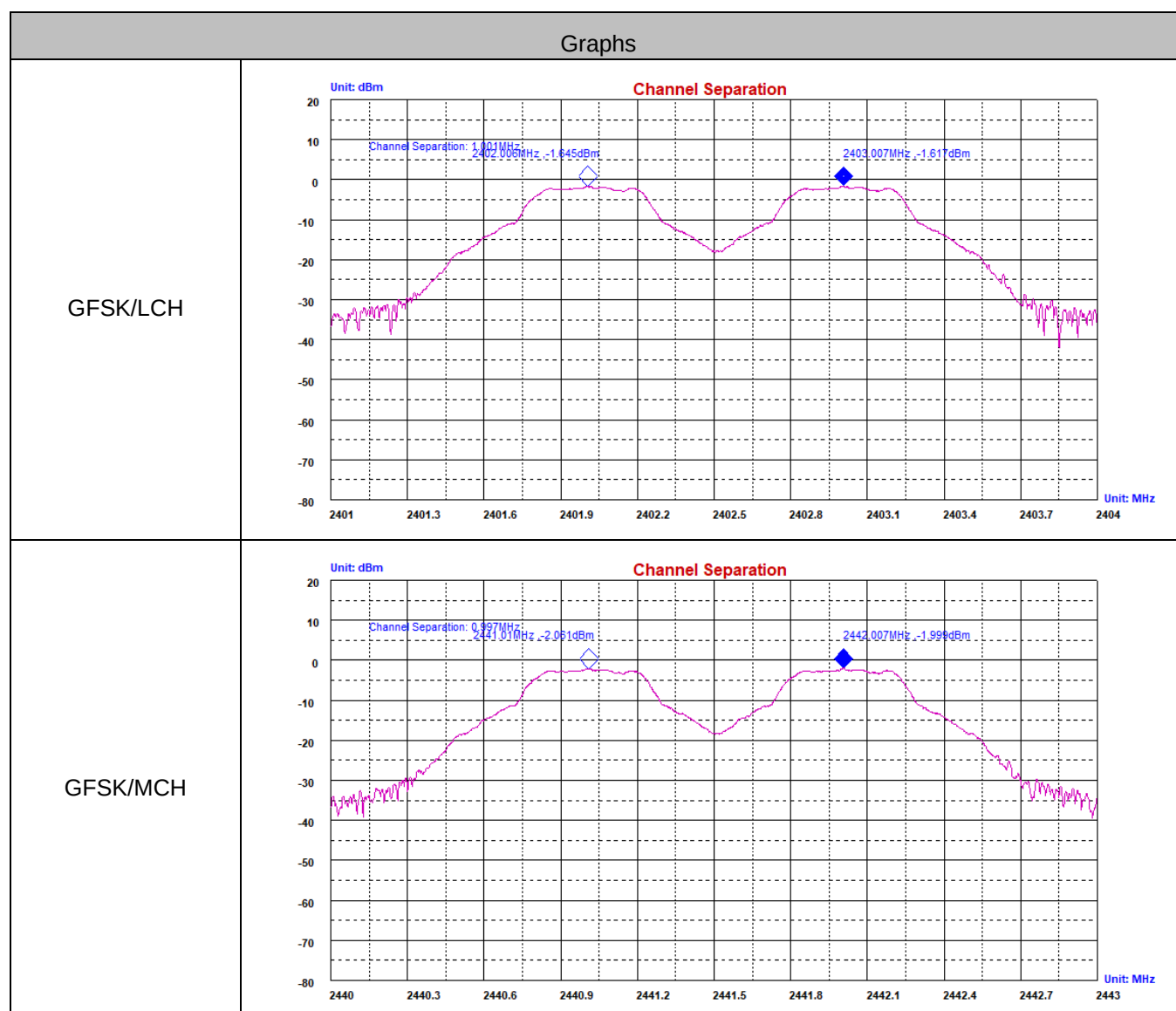


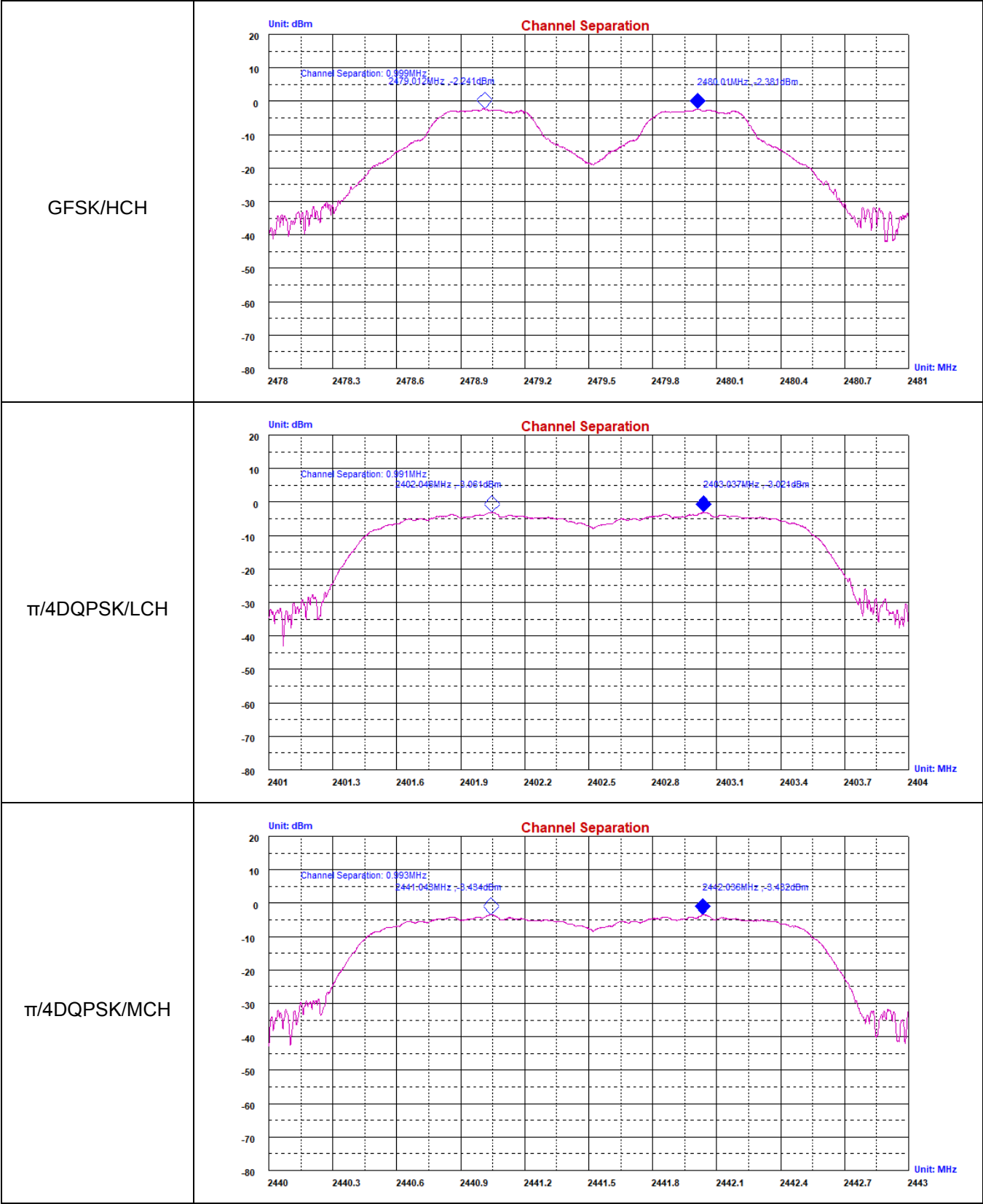


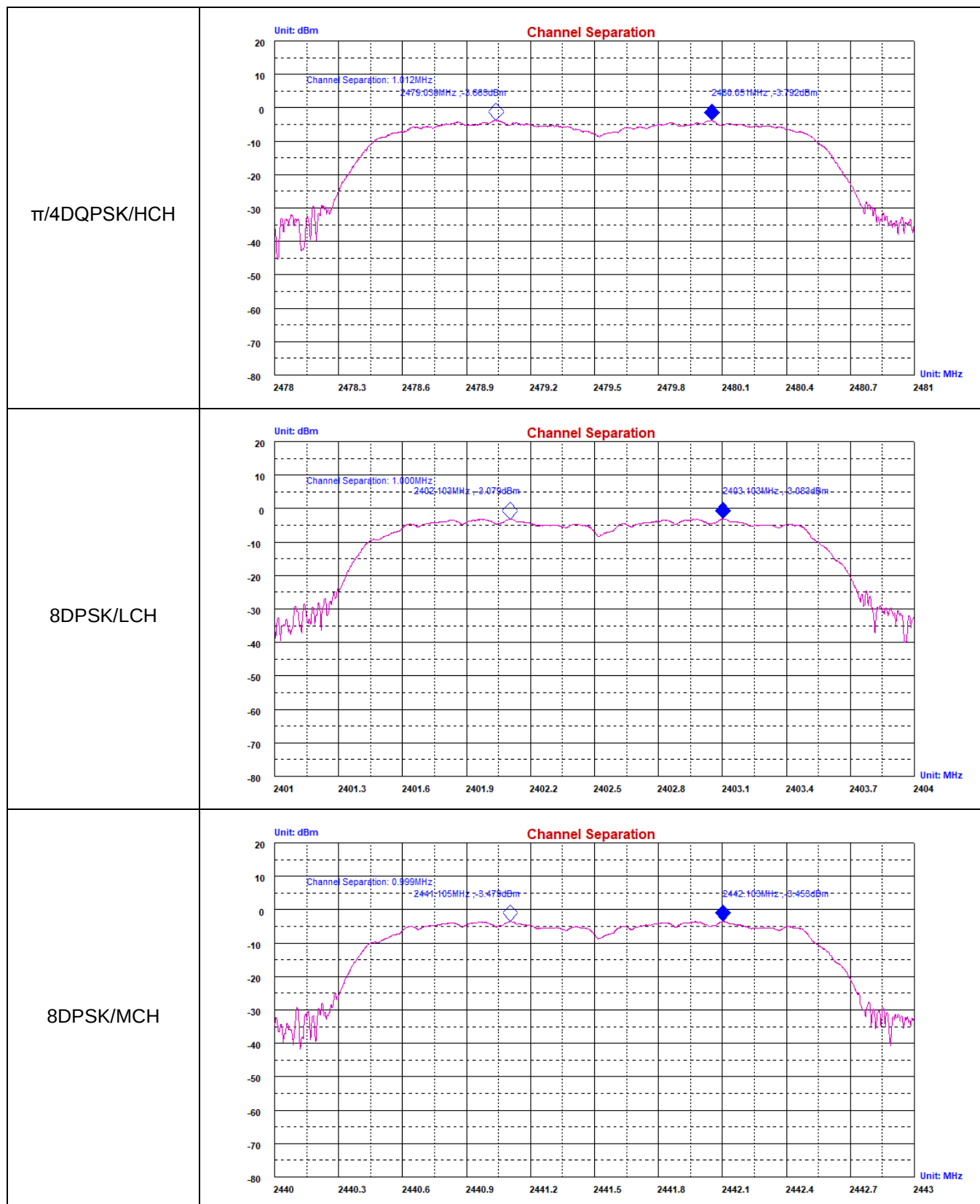
A.3 Carrier Frequency Separation

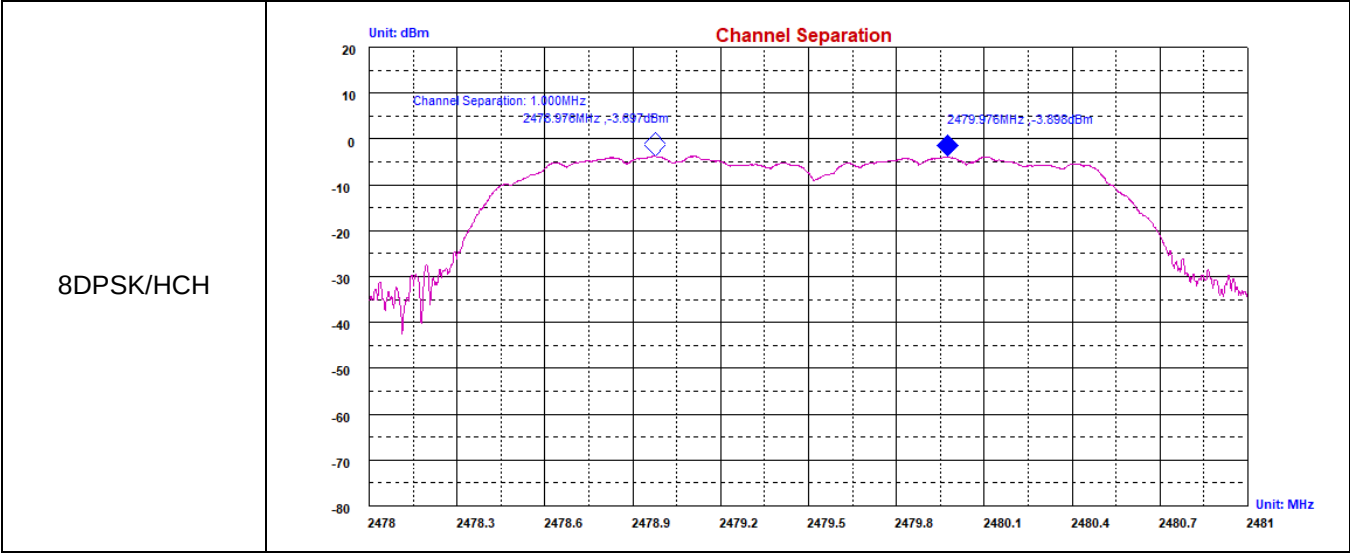
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.001	0.632	PASS
GFSK	MCH	0.997	0.633	PASS
GFSK	HCH	0.999	0.628	PASS
$\pi/4$ DQPSK	LCH	0.991	0.897	PASS
$\pi/4$ DQPSK	MCH	0.993	0.900	PASS
$\pi/4$ DQPSK	HCH	1.012	0.899	PASS
8DPSK	LCH	1.000	0.894	PASS
8DPSK	MCH	0.999	0.893	PASS
8DPSK	HCH	1.000	0.894	PASS

Test Graph





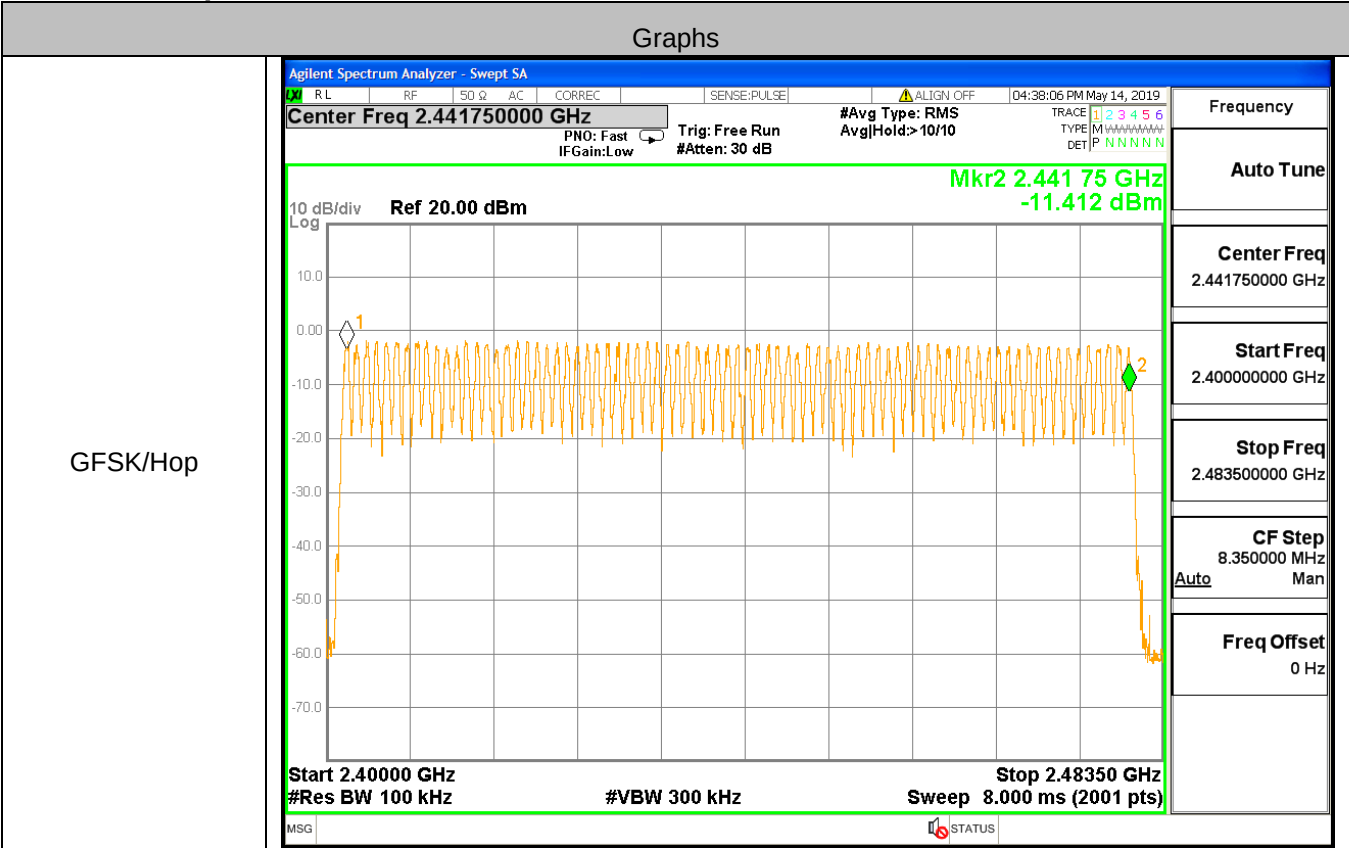


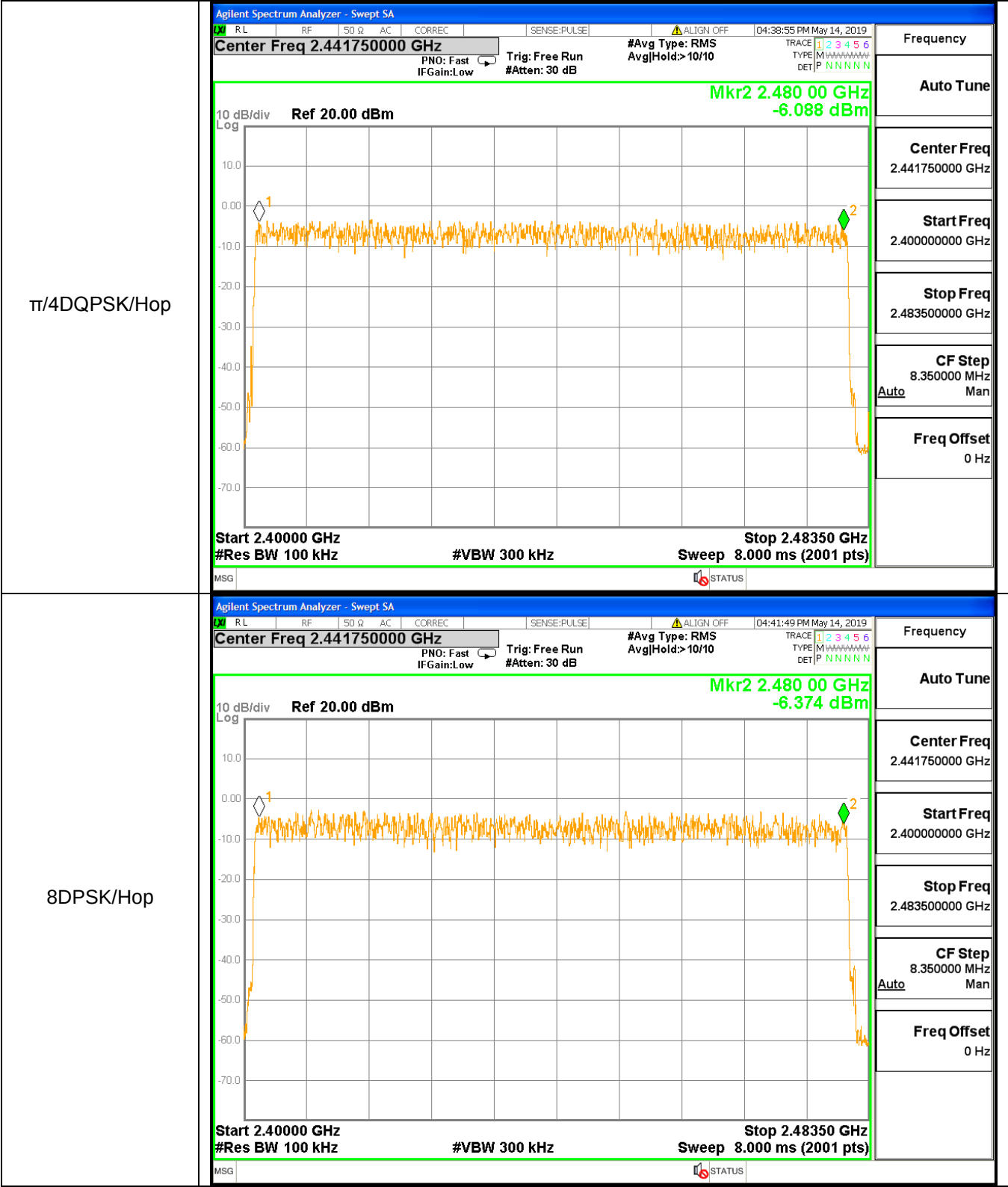


A.4 Hopping Channel Number

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

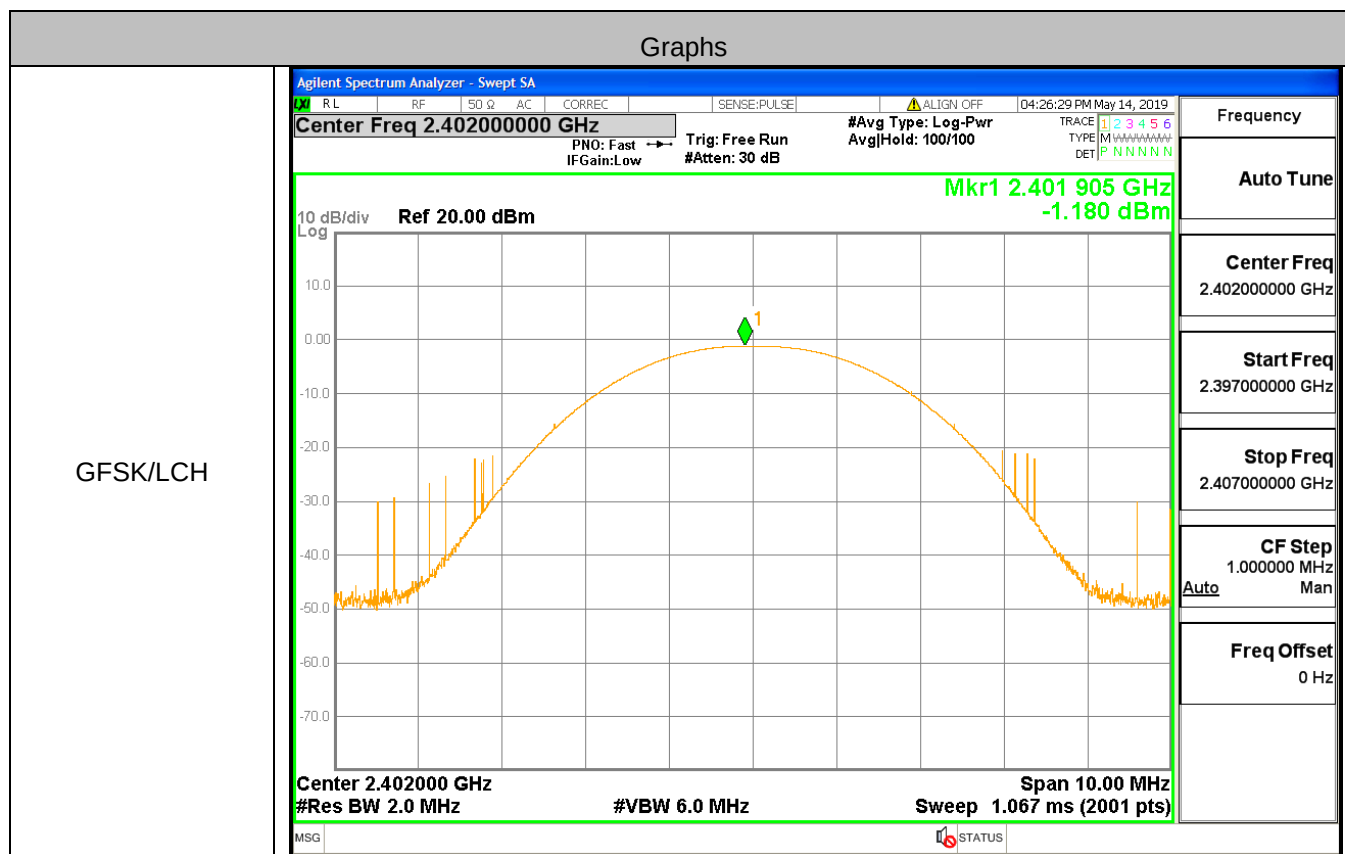


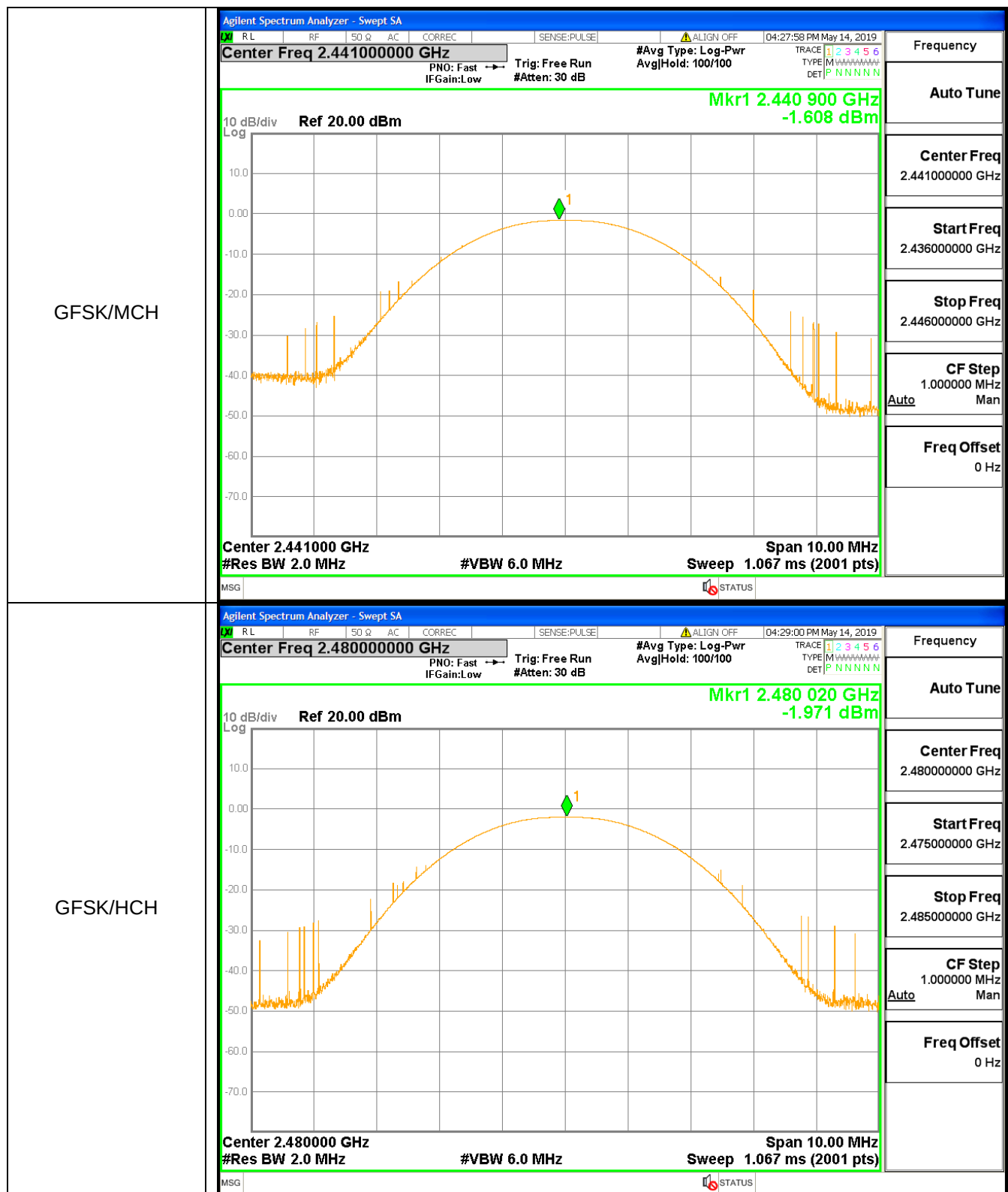


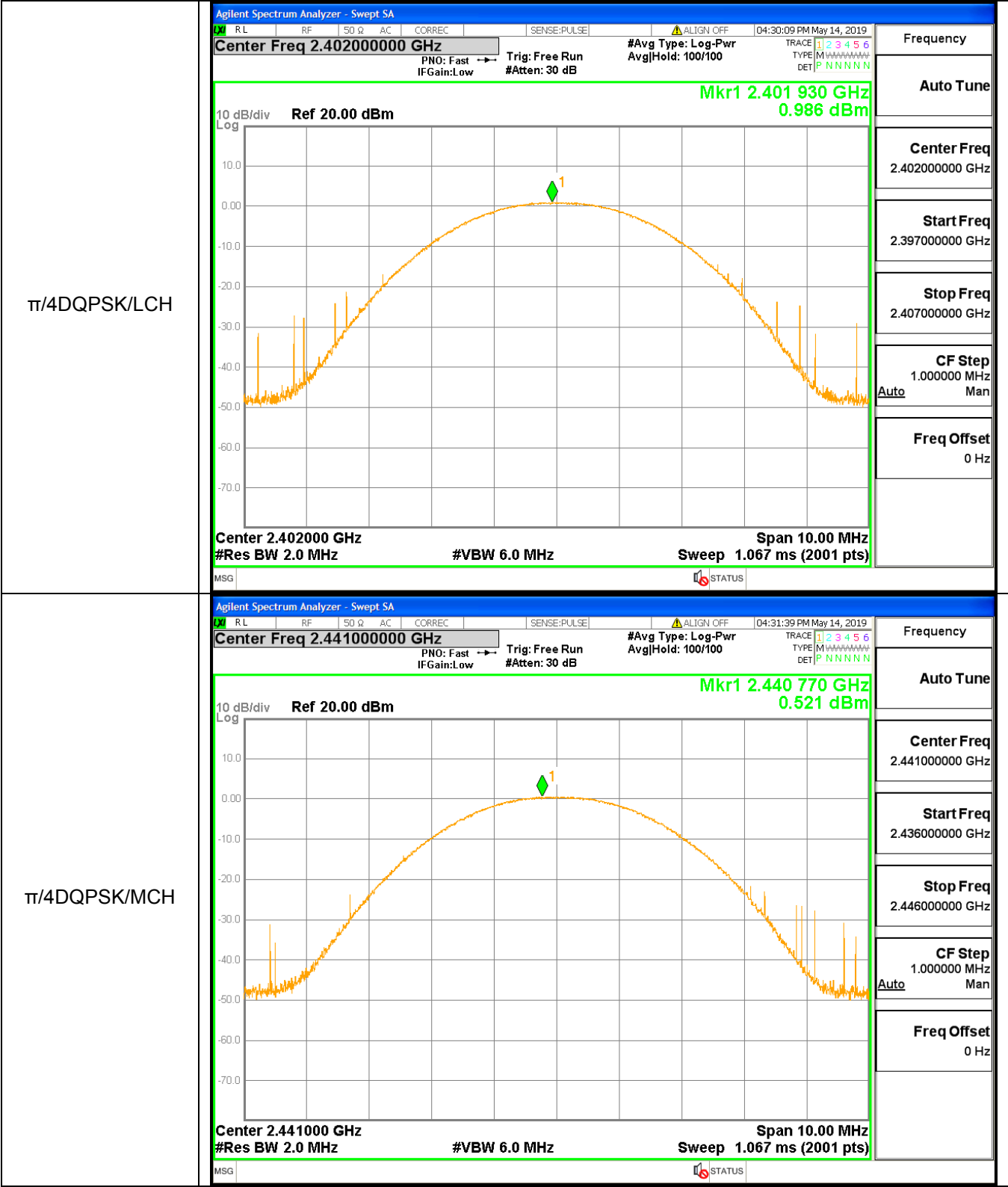
A.5 Conducted Peak Output Power

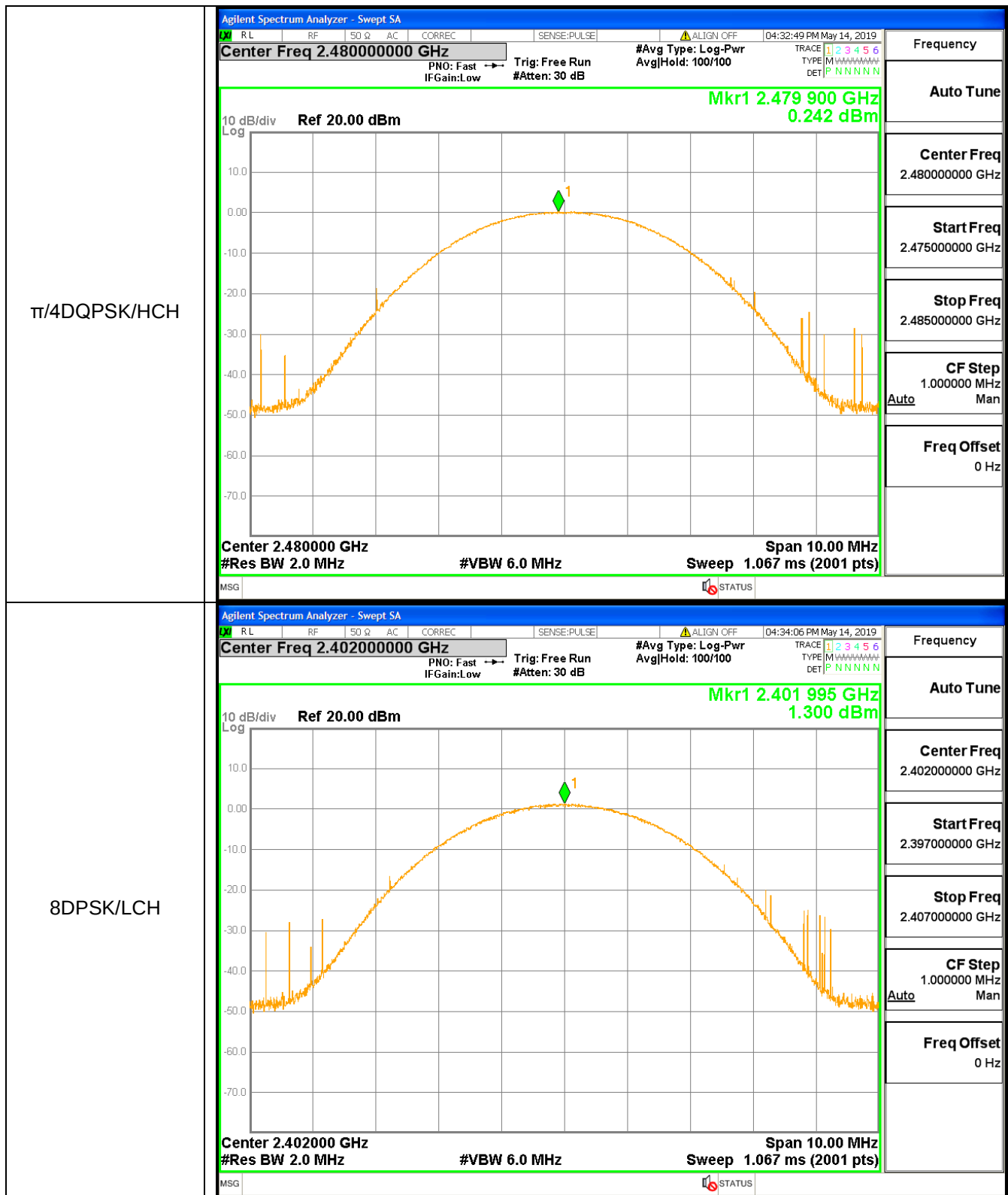
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.180	21	PASS
GFSK	MCH	-1.608	21	PASS
GFSK	HCH	-1.971	21	PASS
$\pi/4$ DQPSK	LCH	0.986	21	PASS
$\pi/4$ DQPSK	MCH	0.521	21	PASS
$\pi/4$ DQPSK	HCH	0.242	21	PASS
8DPSK	LCH	1.300	21	PASS
8DPSK	MCH	1.084	21	PASS
8DPSK	HCH	0.742	21	PASS

Test Graph









Frequency

Auto Tune

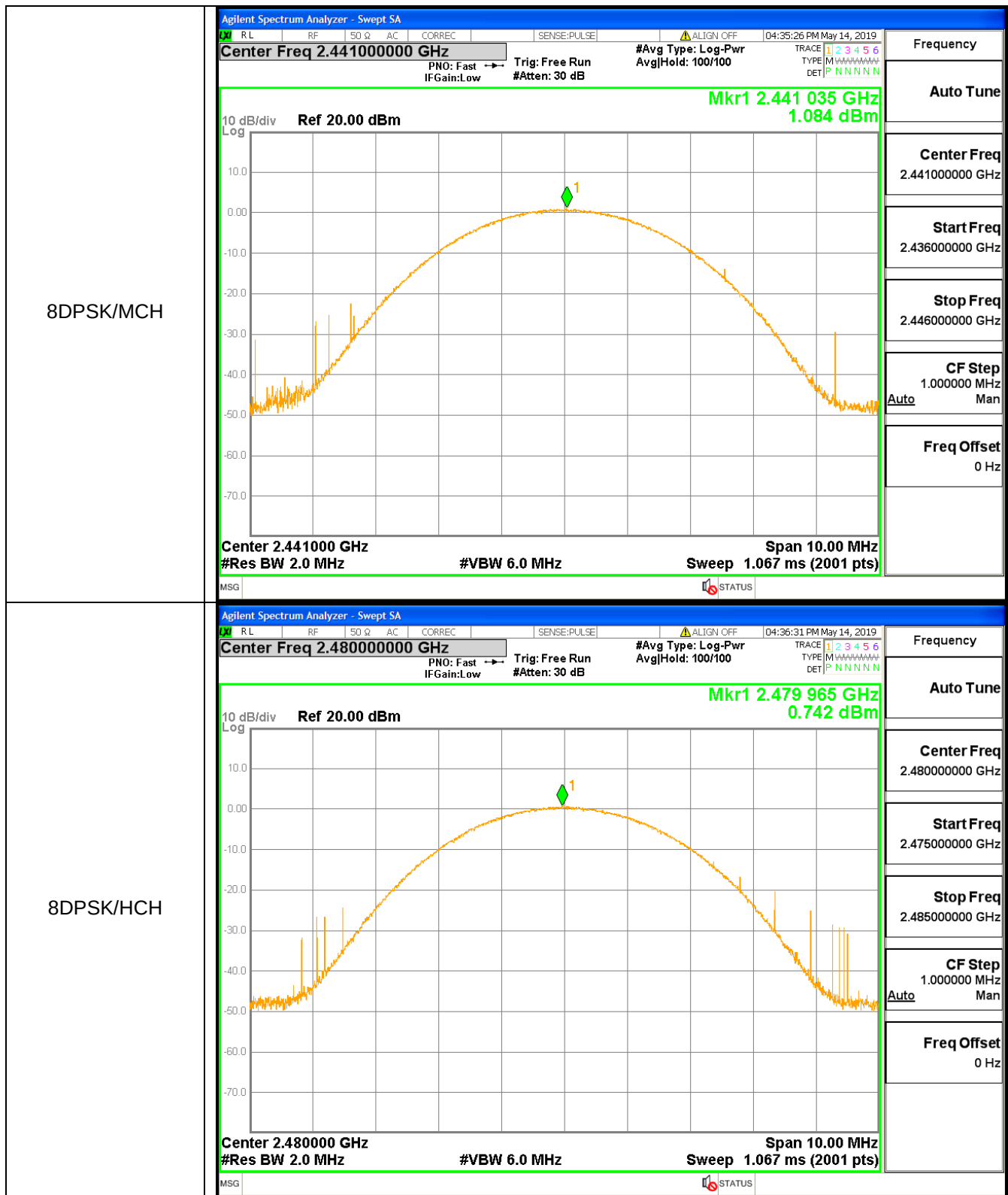
Center Freq
2.480000000 GHz

Start Freq
2.475000000 GHz

Stop Freq
2.485000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz



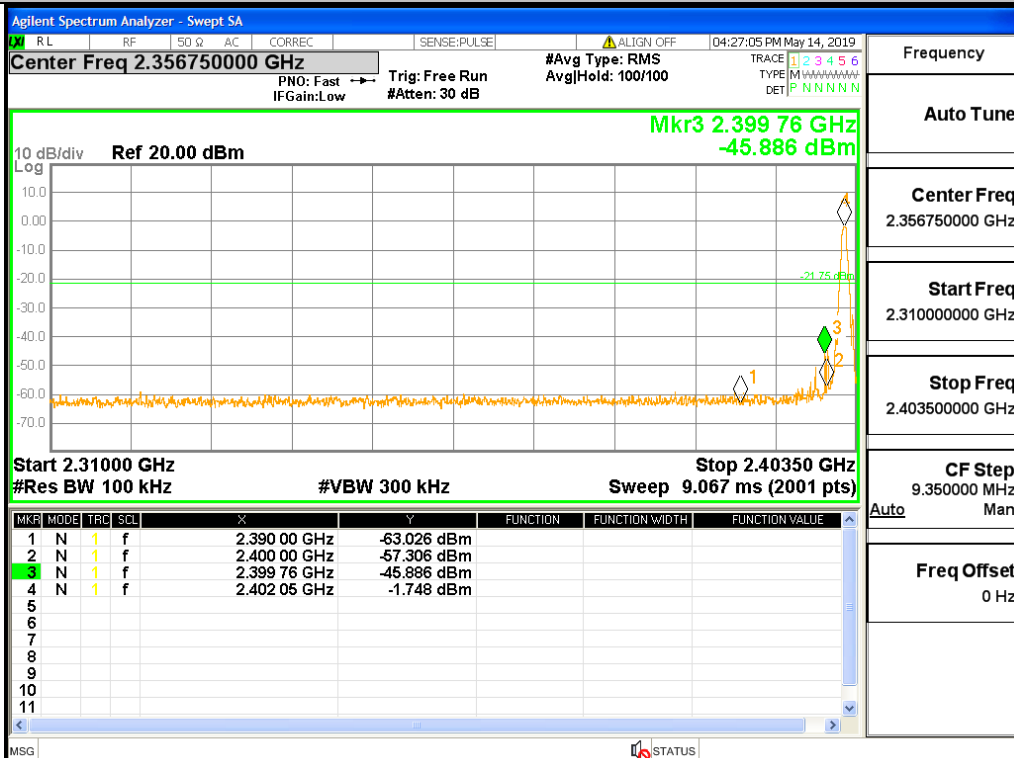
A.6 Band-edge for RF Conducted Emissions

Type	Carrier Frequency(MHz)	Frequency(MHz)	Carrier Frequency Power [dBm]	Bandedge Peak(dBm)	Upper limit(dBm)	Conclusion
1DH5	2402	2399.76	-1.748	-45.89	-21.748	Pass
1DH5	2480	2483.94	-2.603	-54.08	-22.603	Pass
2DH5	2402	2399.90	-3.582	-44.08	-23.582	Pass
2DH5	2480	2483.61	-3.884	-51.99	-23.884	Pass
3DH5	2402	2399.62	-2.986	-46.48	-22.986	Pass
3DH5	2480	2486.06	-3.882	-57.72	-23.882	Pass
1DH5-Hopping	2402	2399.82	-1.753	-45.32	-21.753	Pass
1DH5-Hopping	2480	2483.50	-2.146	-60.39	-22.146	Pass
2DH5-Hopping	2402	2390.00	-3.430	-60.28	-23.430	Pass
2DH5-Hopping	2480	2483.50	-3.471	-60.19	-23.471	Pass
3DH5-Hopping	2402	2400.00	-3.000	-59.58	-23.000	Pass
3DH5-Hopping	2480	2500.00	-3.747	-60.59	-23.747	Pass

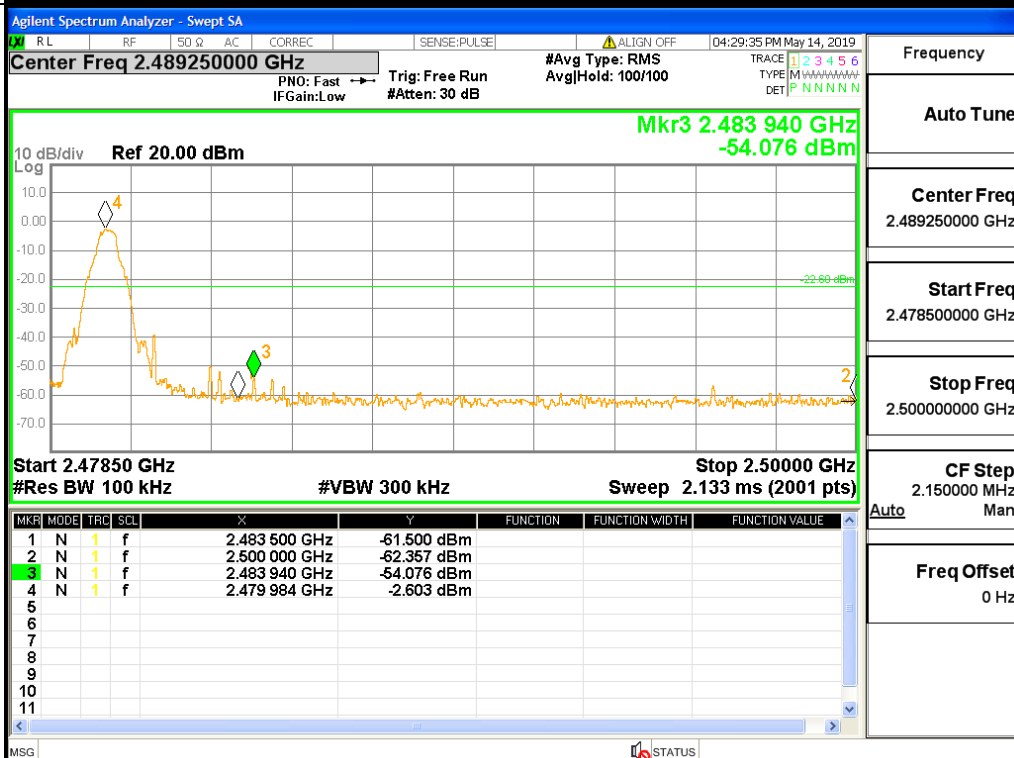
Test Graph

Graphs

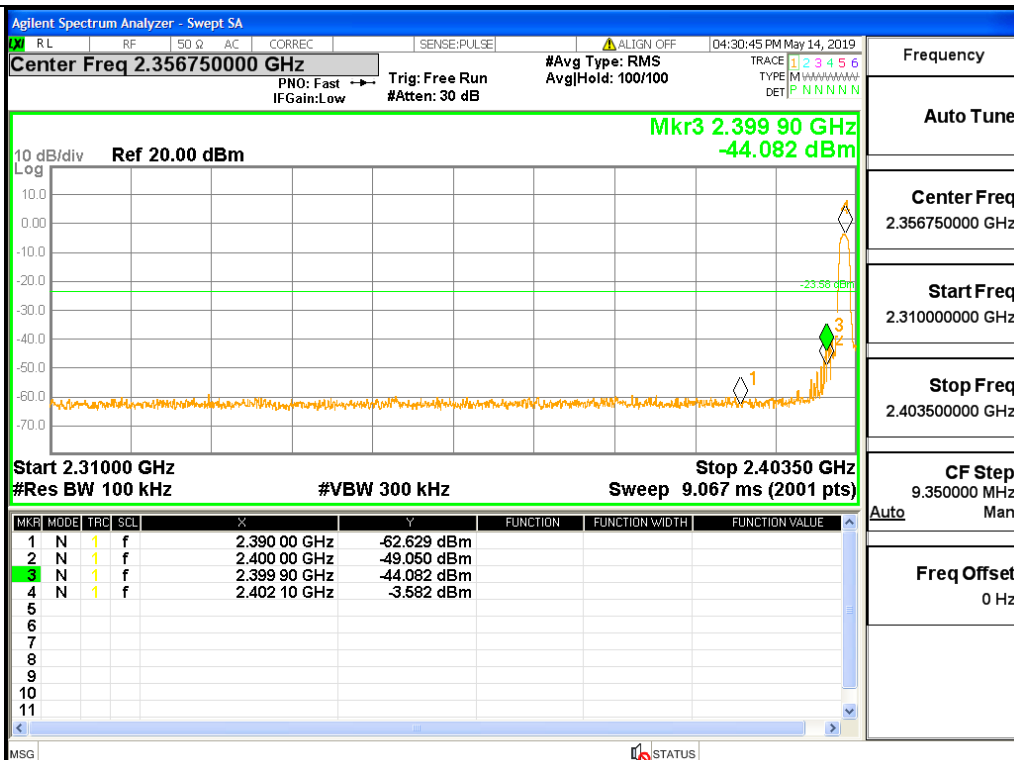
GFSK/LCH/No Hop



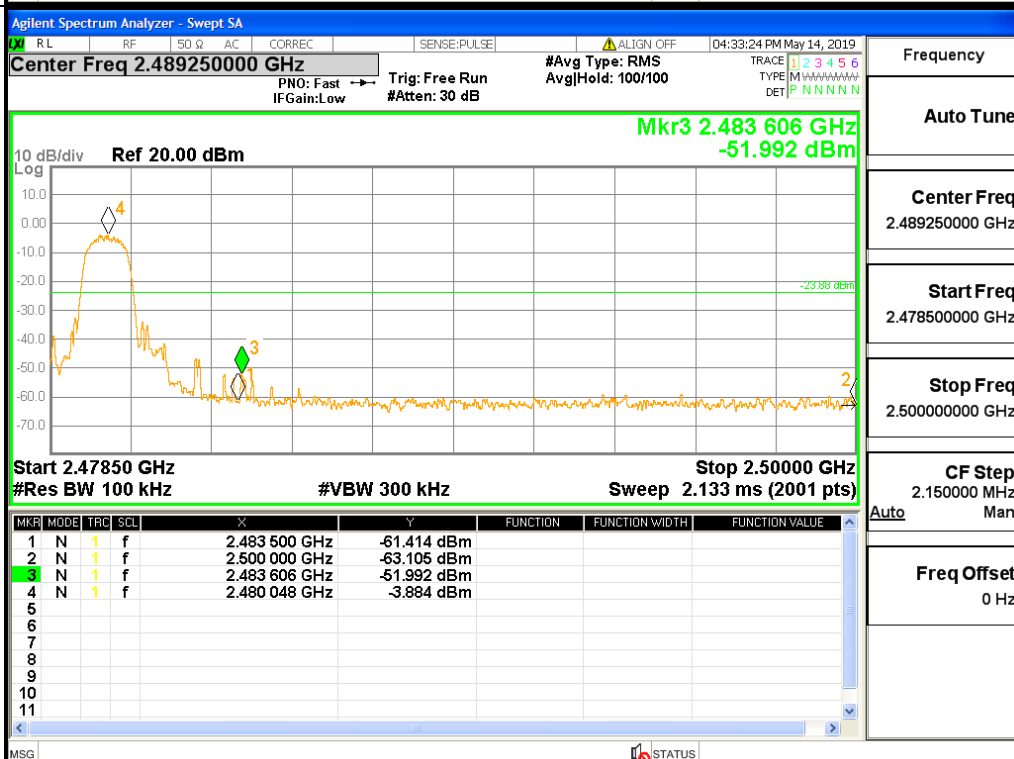
GFSK/HCH/No Hop



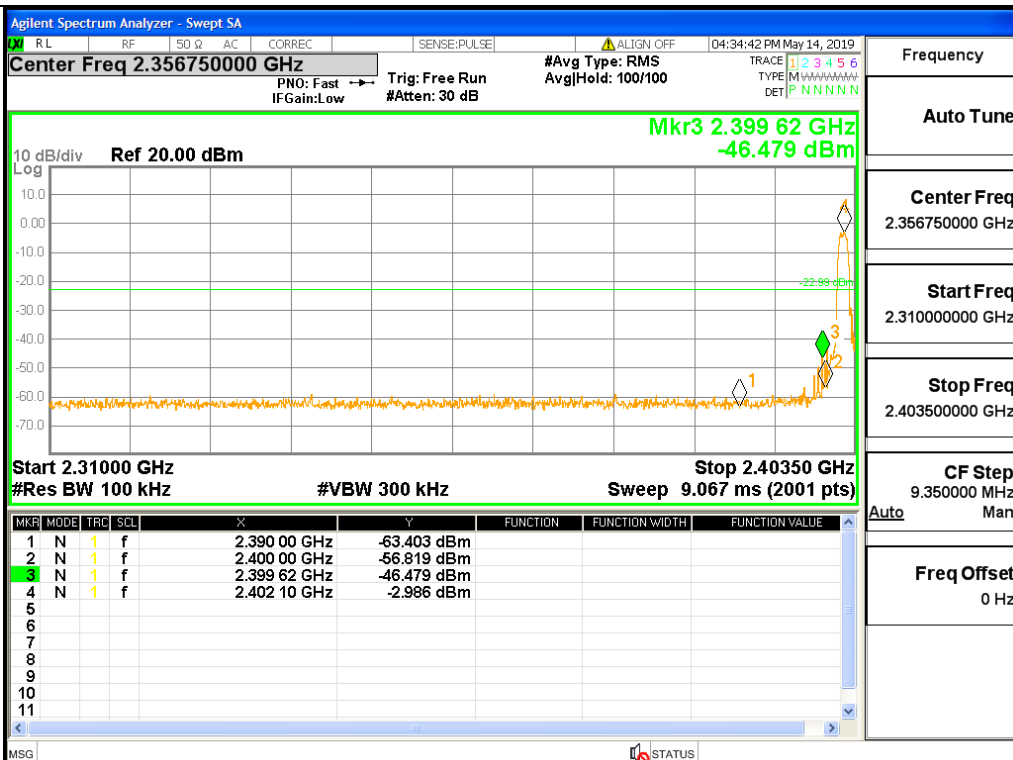
π /4DQPSK/LCH/No
Hop



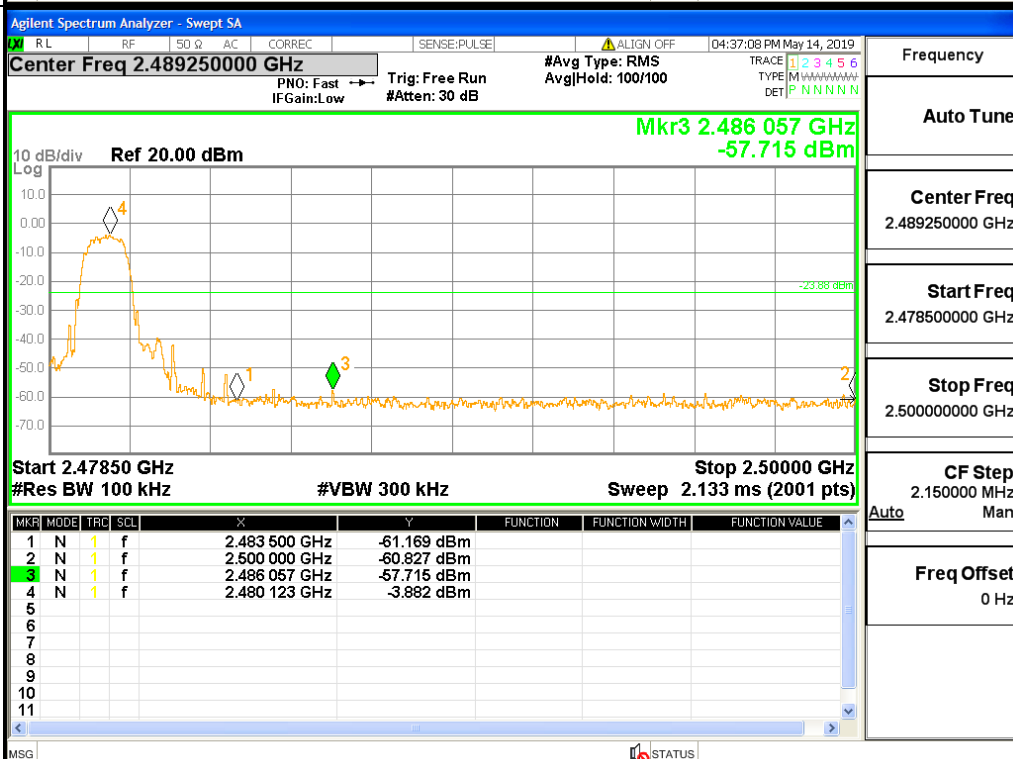
π /4DQPSK/HCH/No
Hop



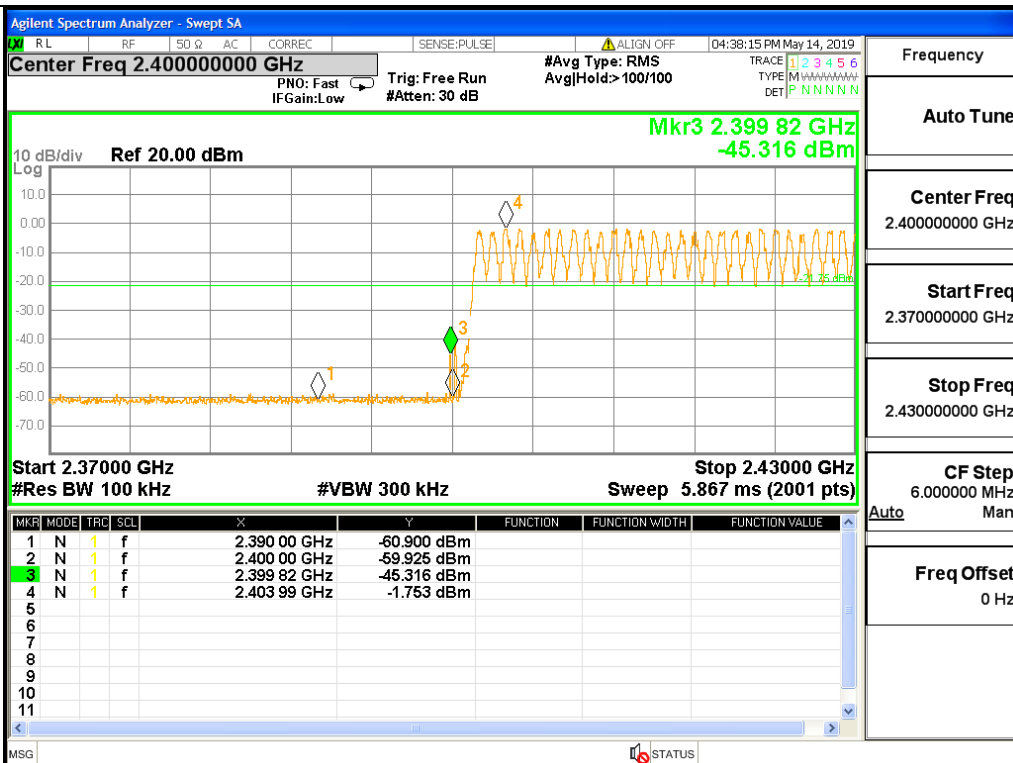
8DPSK/LCH/No Hop



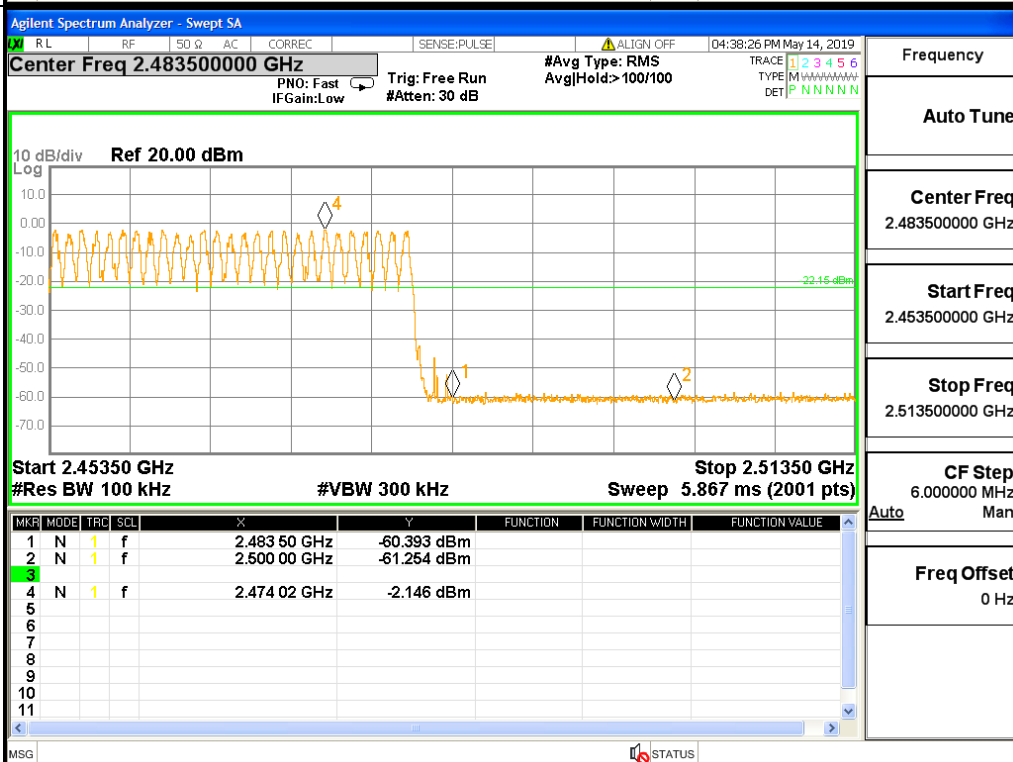
8DPSK/HCH/No Hop



GFSK/LCH/Hop

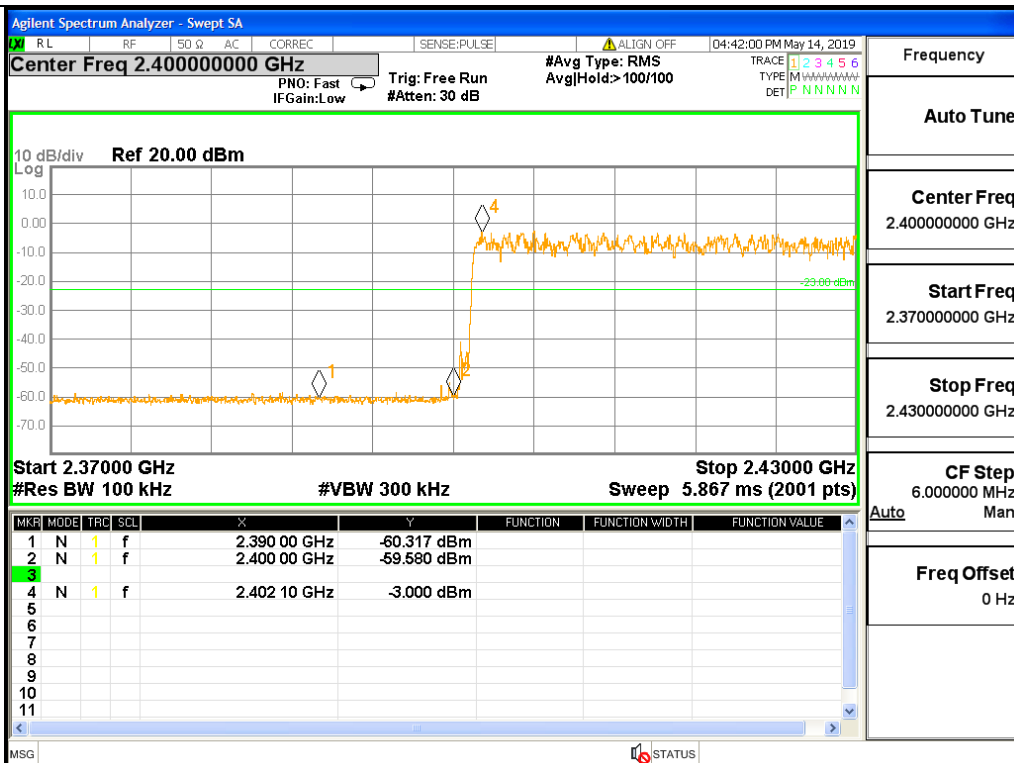


GFSK/HCH/Hop

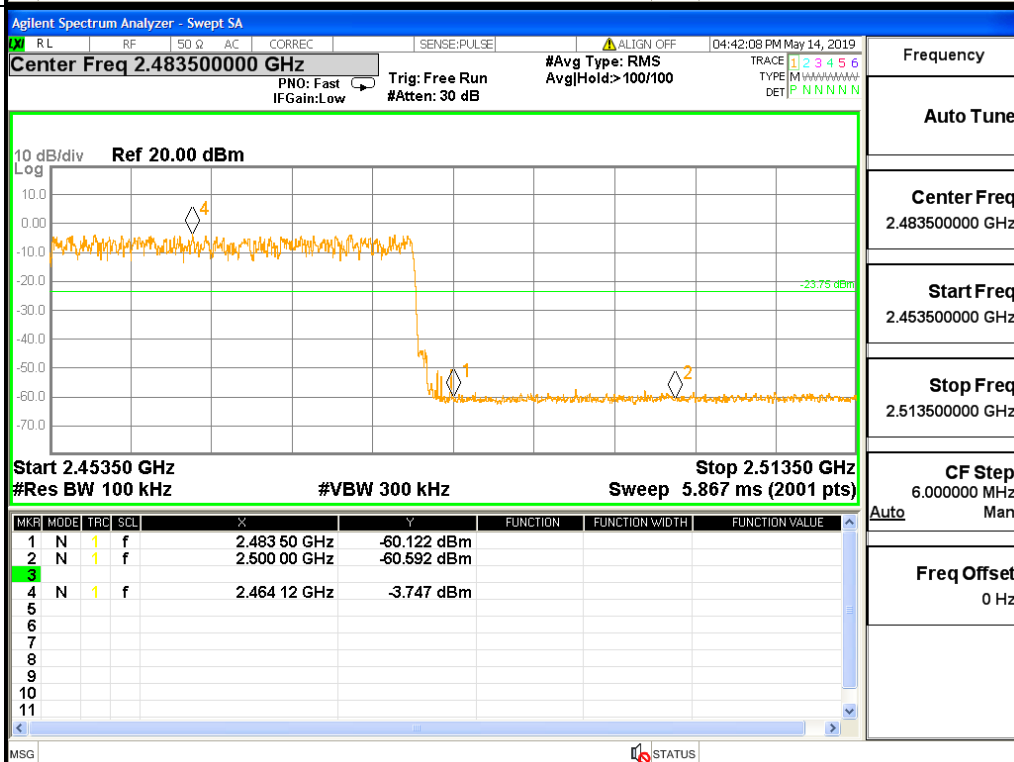




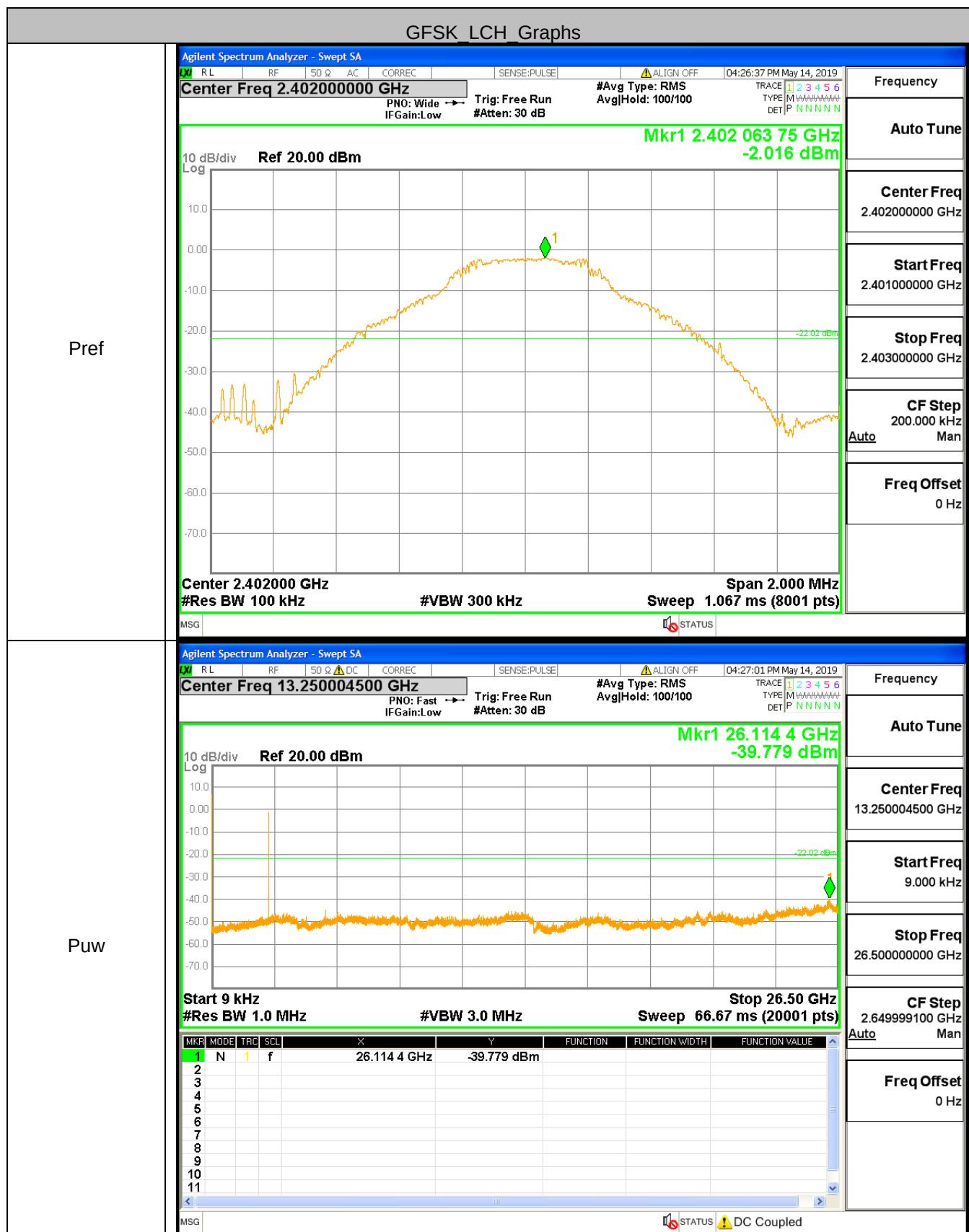
8DPSK/LCH/Hop



8DPSK/HCH/Hop

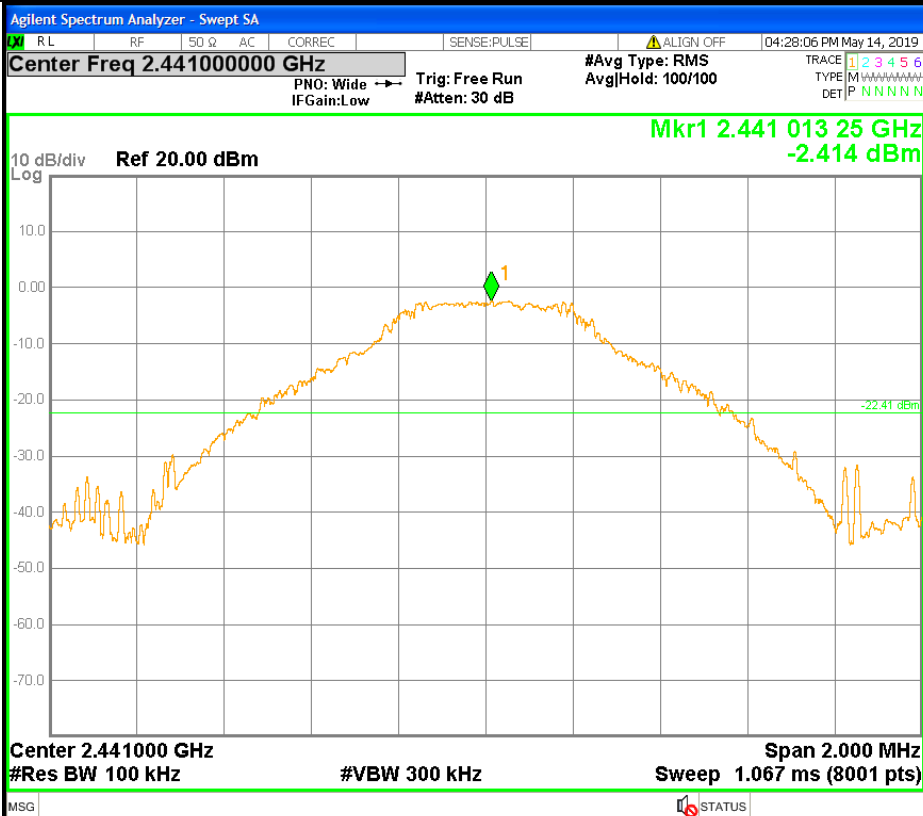


A.7 RF Conducted Spurious Emissions Test Graph

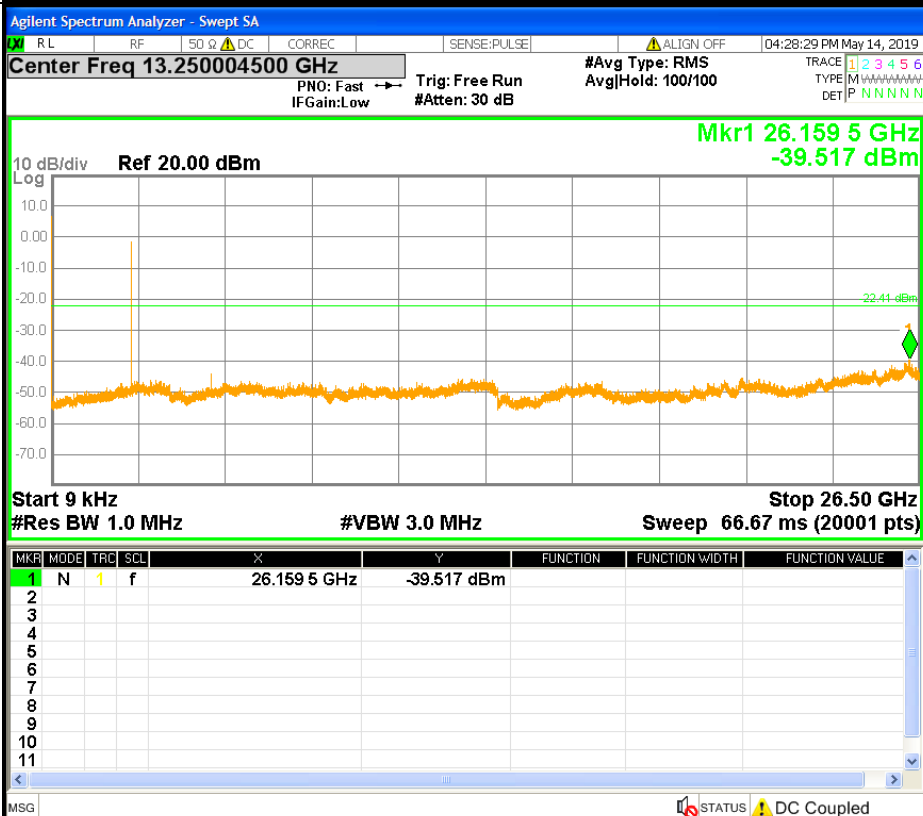


GFSK MCH Graphs

Pref

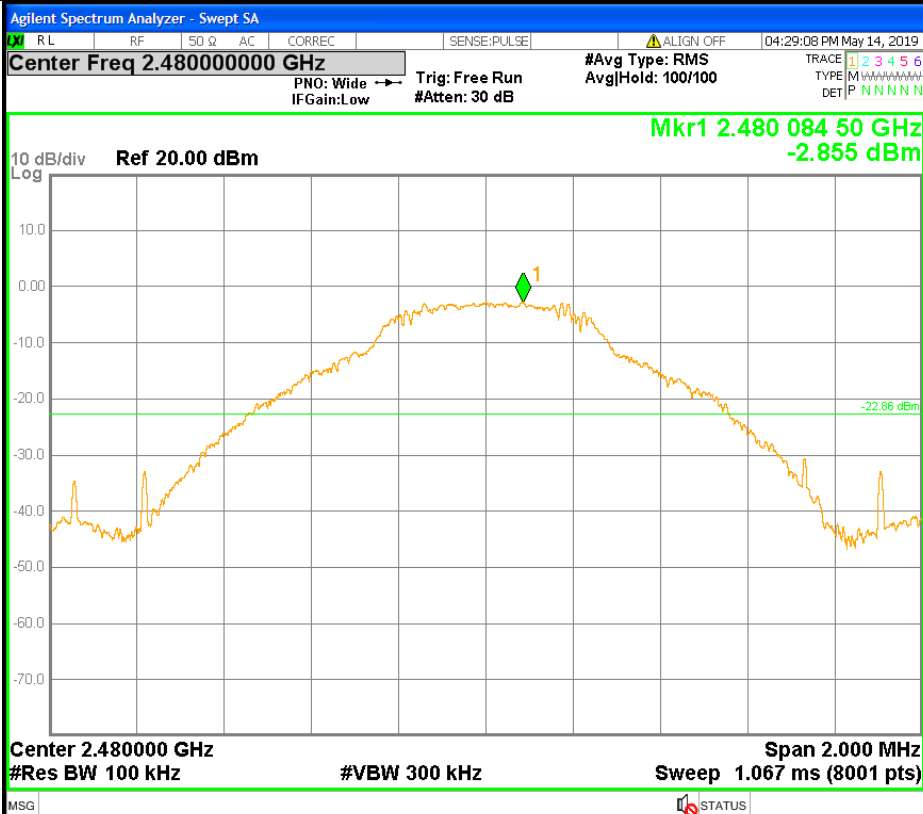


Puw



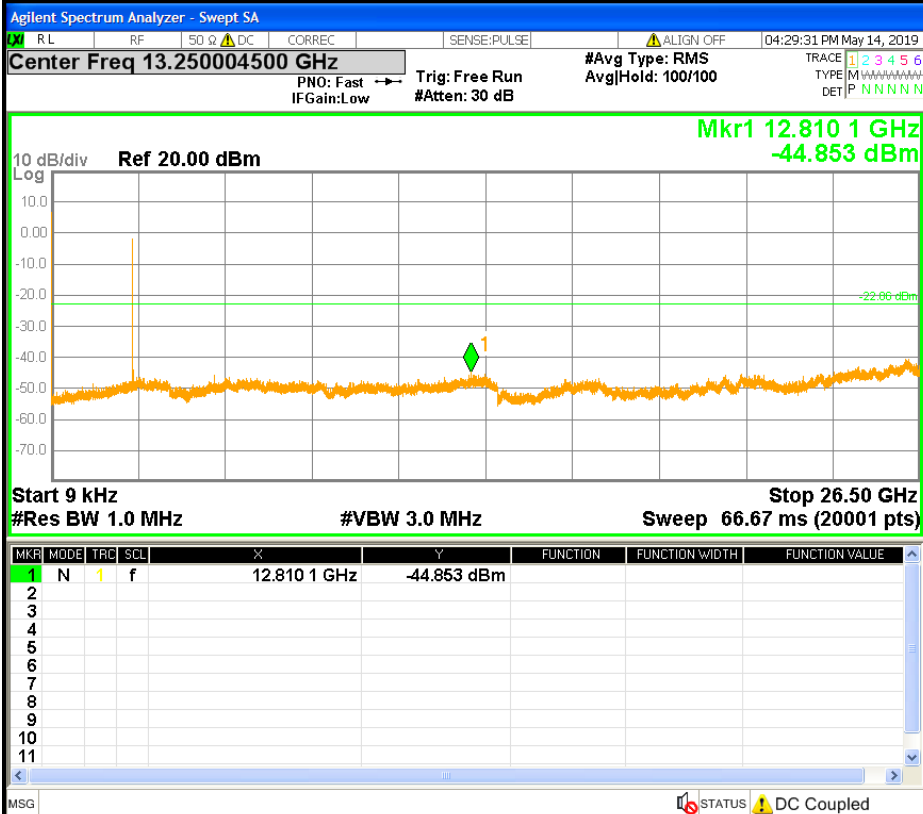
GFSK HCH Graphs

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
Freq Offset 0 Hz

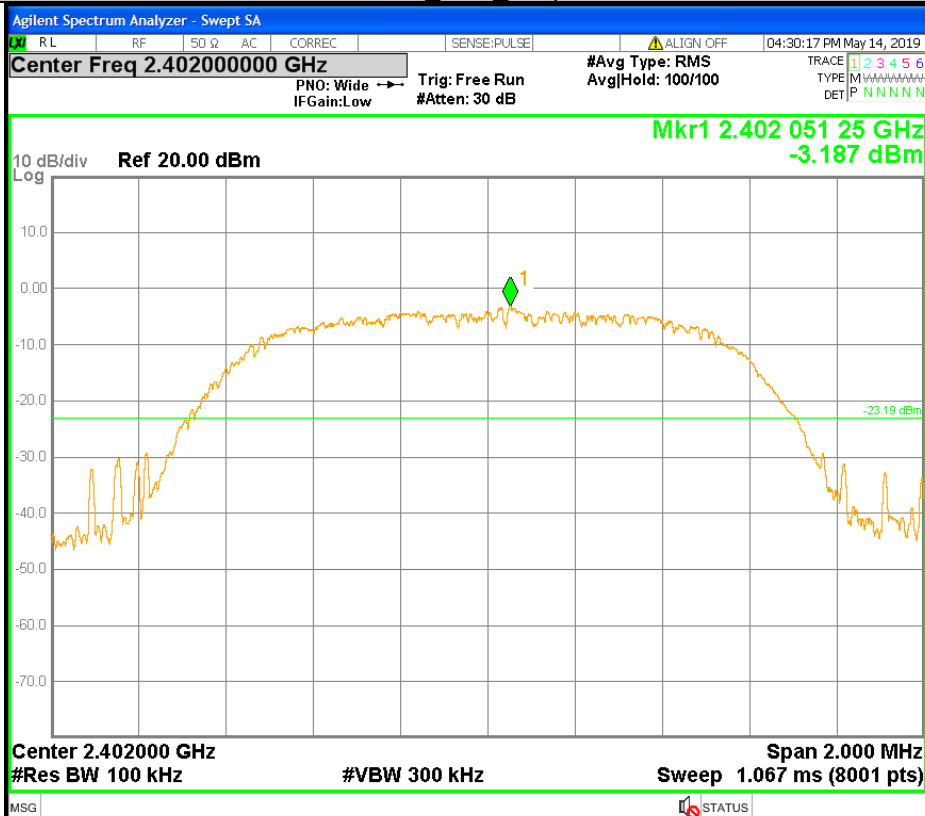
Puw



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

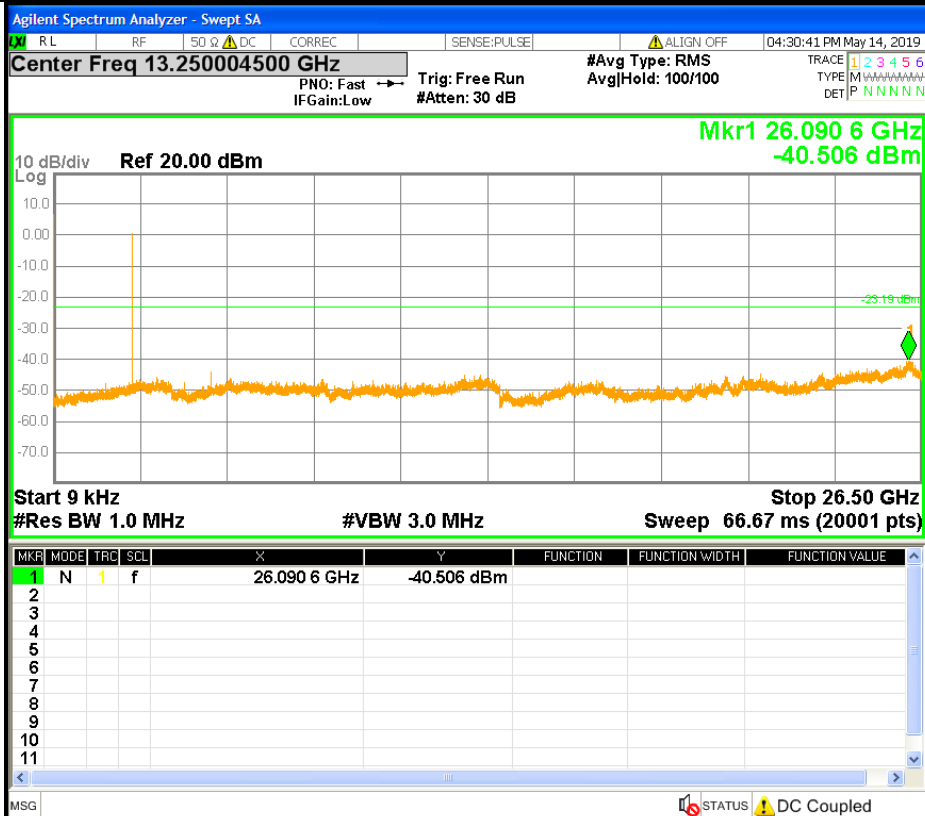
$\pi/4$ DQPSK LCH Graphs

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

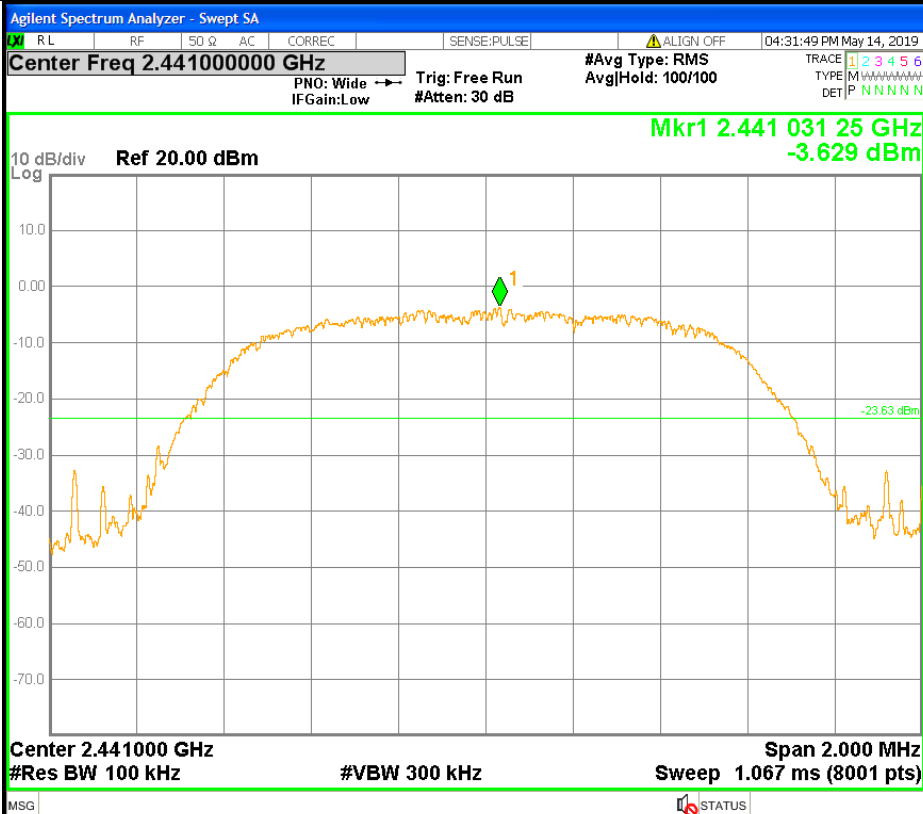
Puw



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

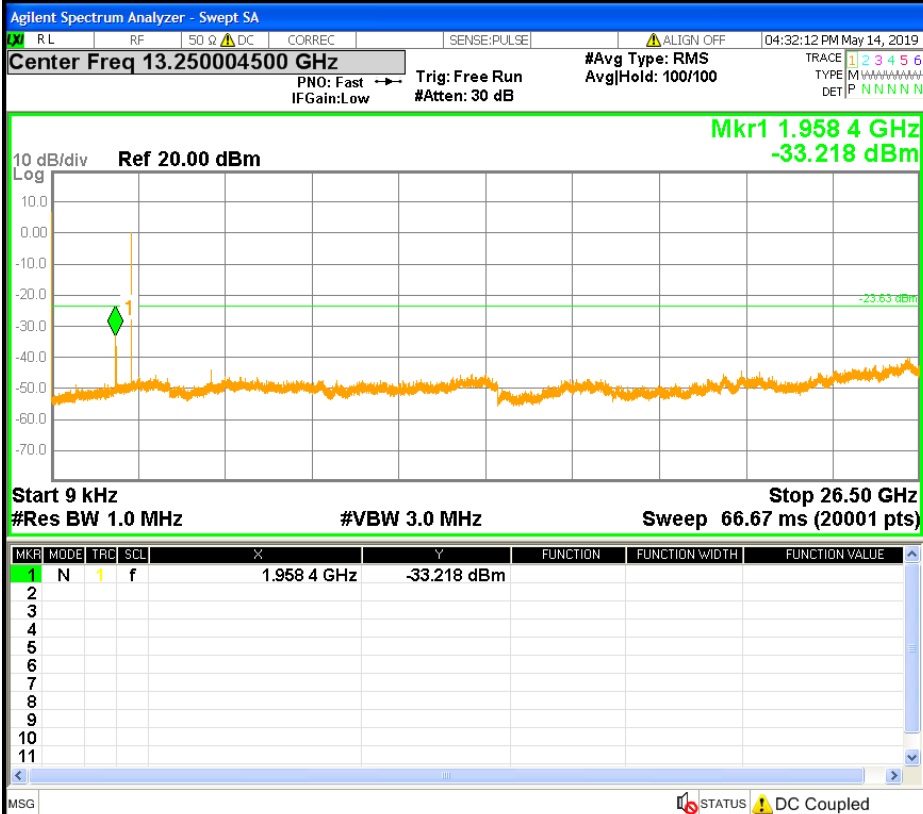
$\pi/4$ DQPSK MCH Graphs

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
Freq Offset 0 Hz

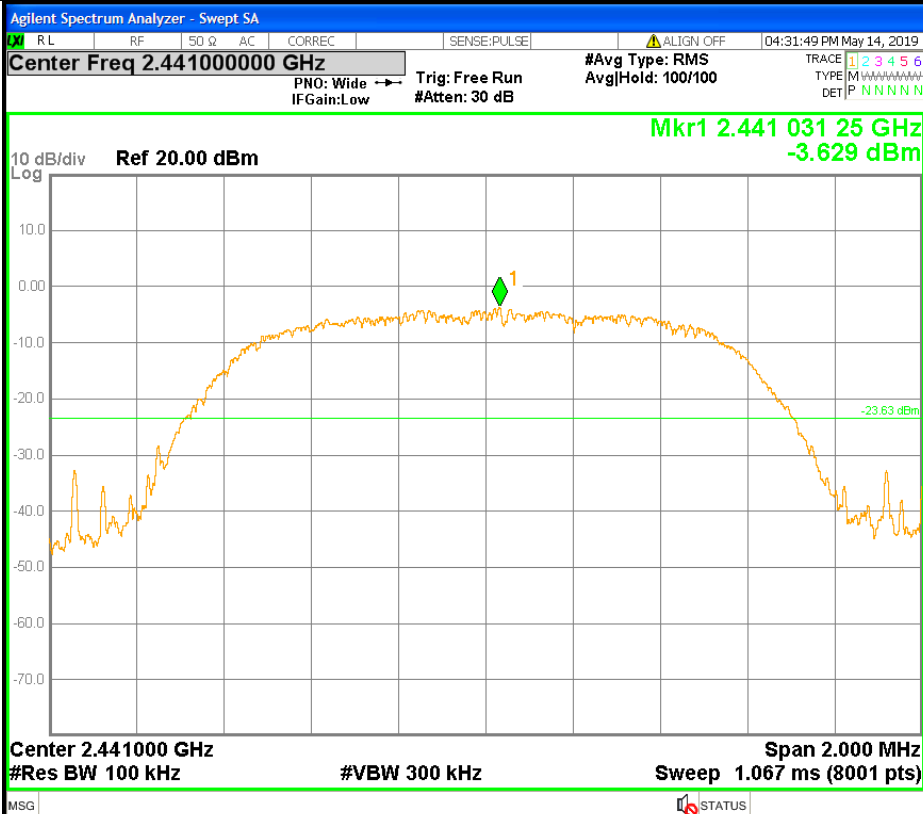
Puw



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

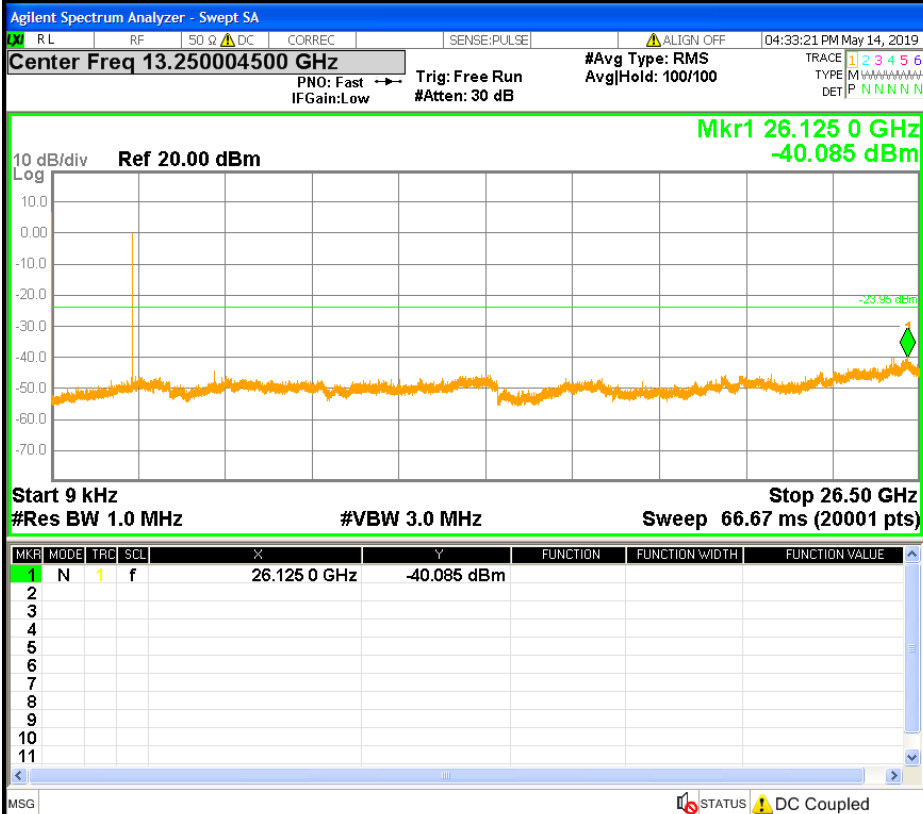
$\pi/4$ DQPSK HCH Graphs

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
Freq Offset 0 Hz

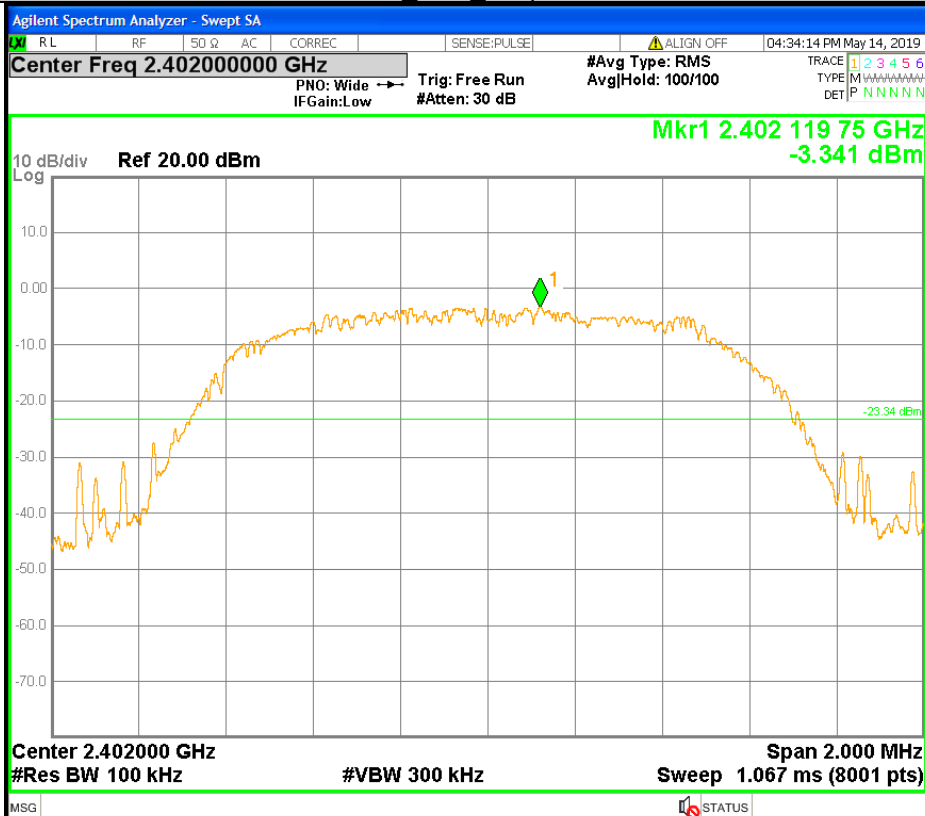
Puw



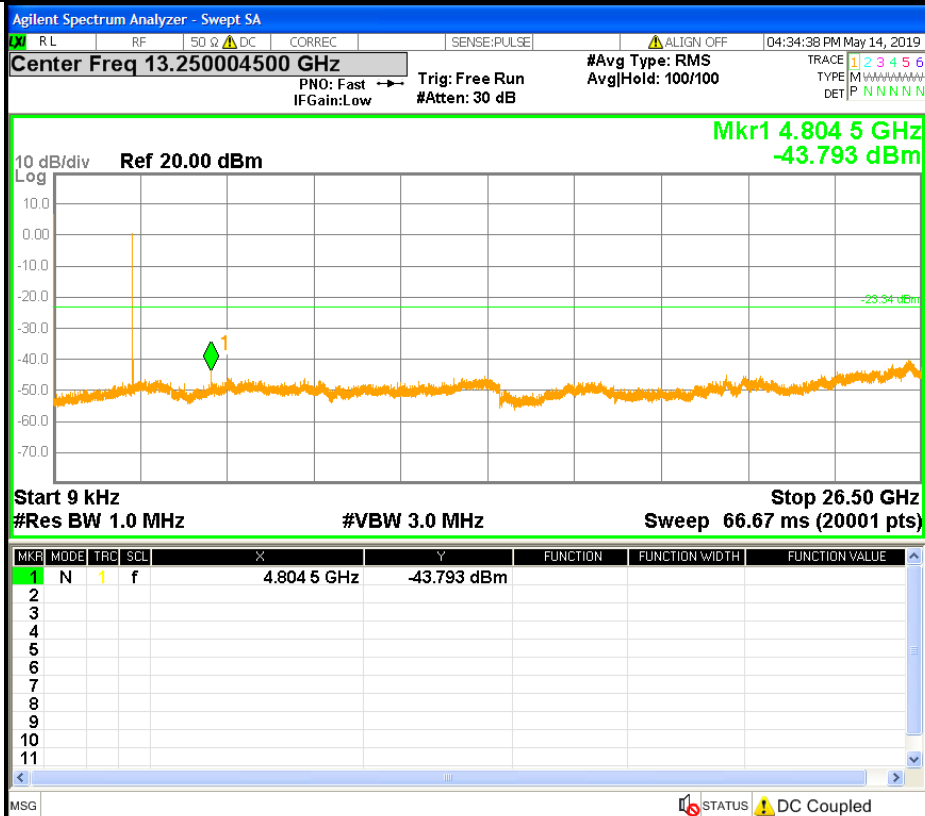
Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto
Freq Offset 0 Hz

8DPSK LCH Graphs

Pref

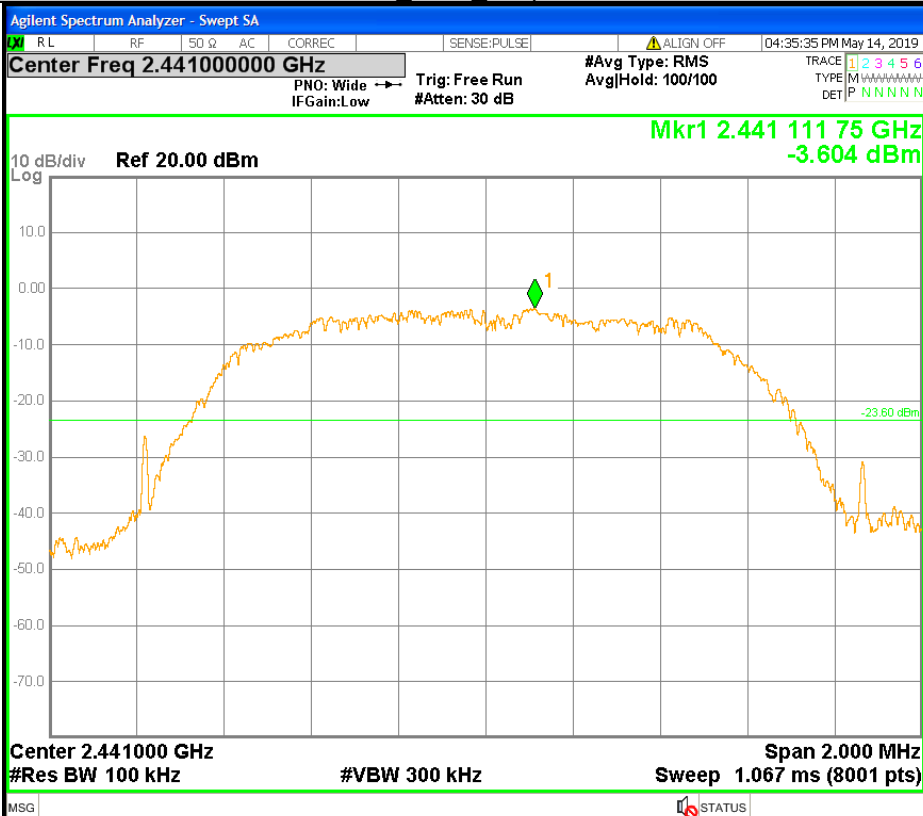


Puw

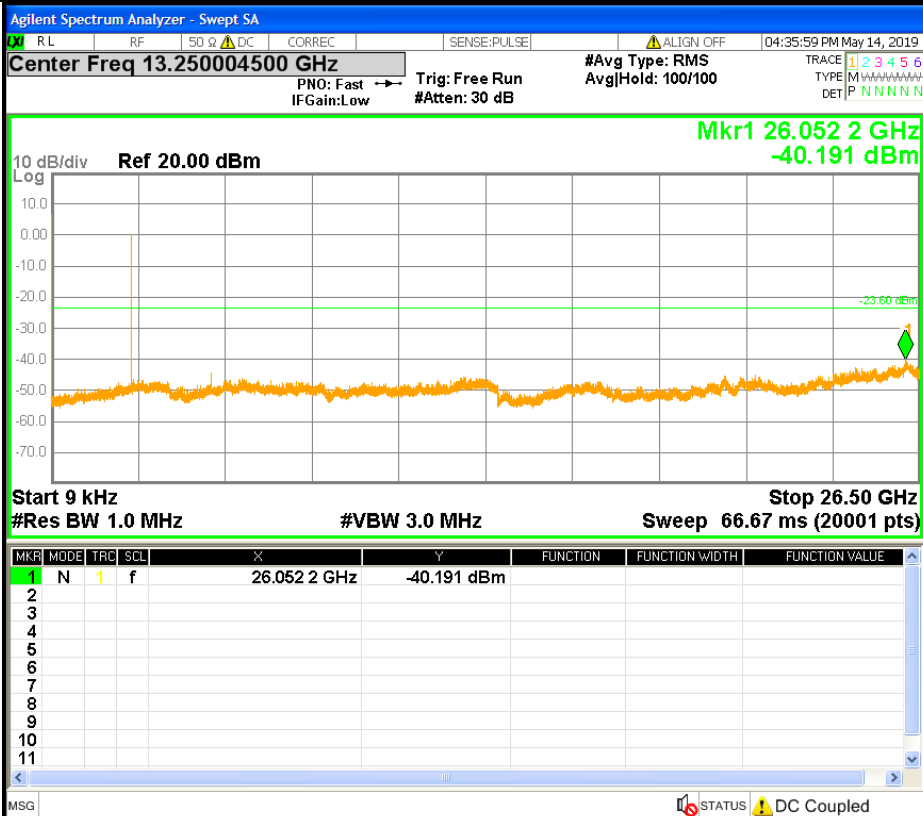


8DPSK MCH Graphs

Pref

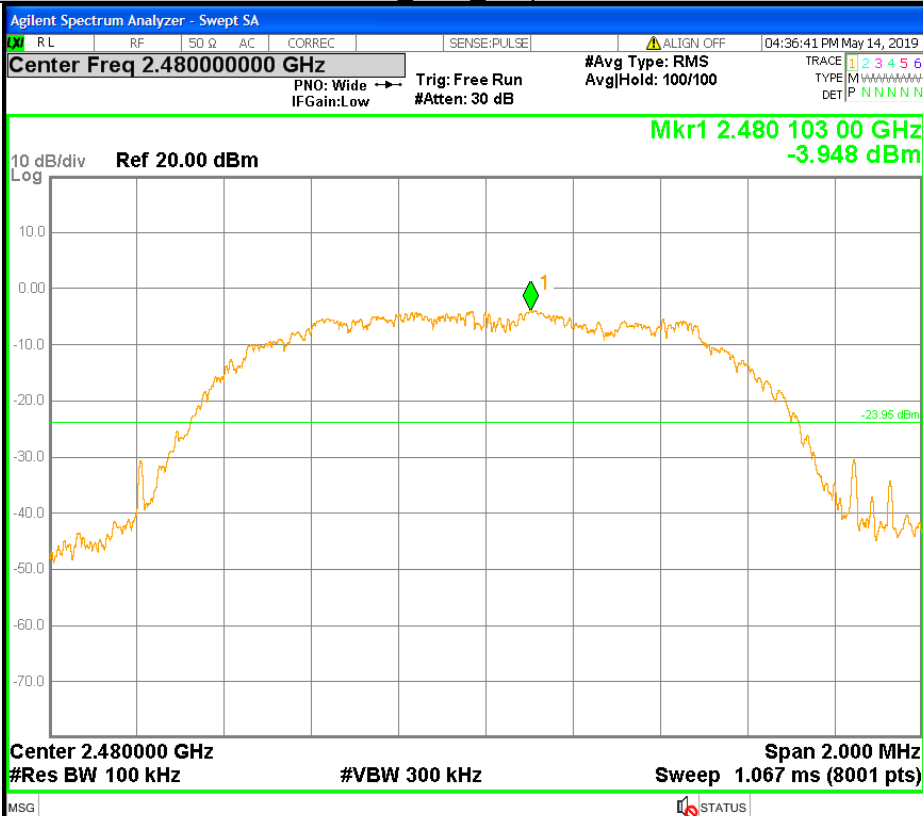


Puw

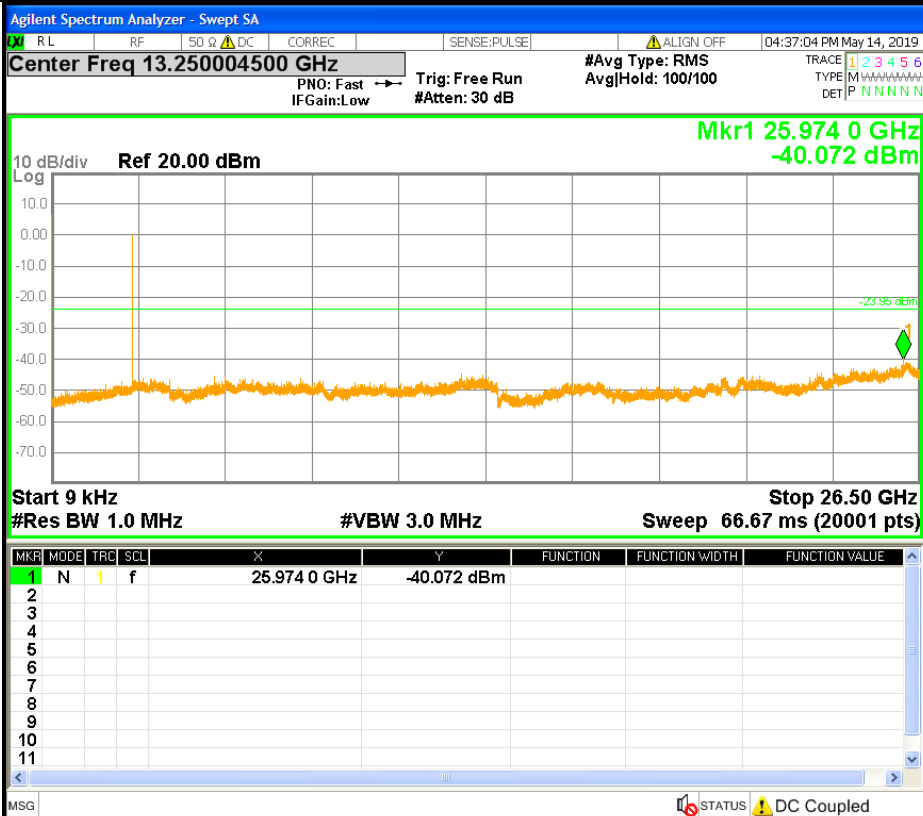


8DPSK HCH Graphs

Pref



Puw

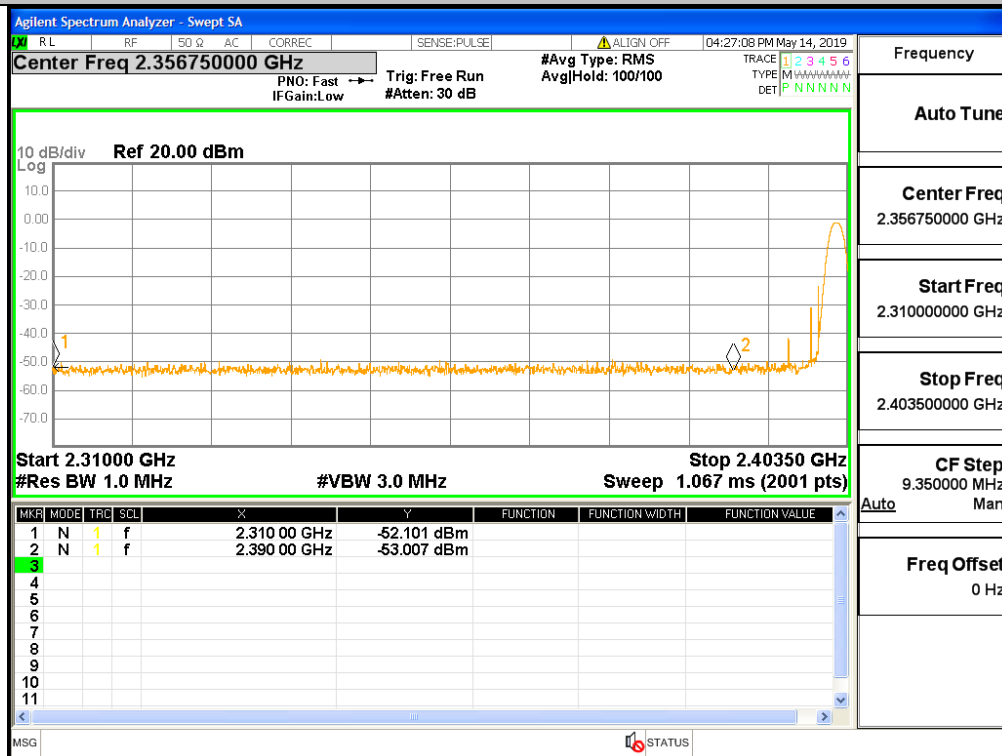


A.8 Restrict-band band-edge measurements

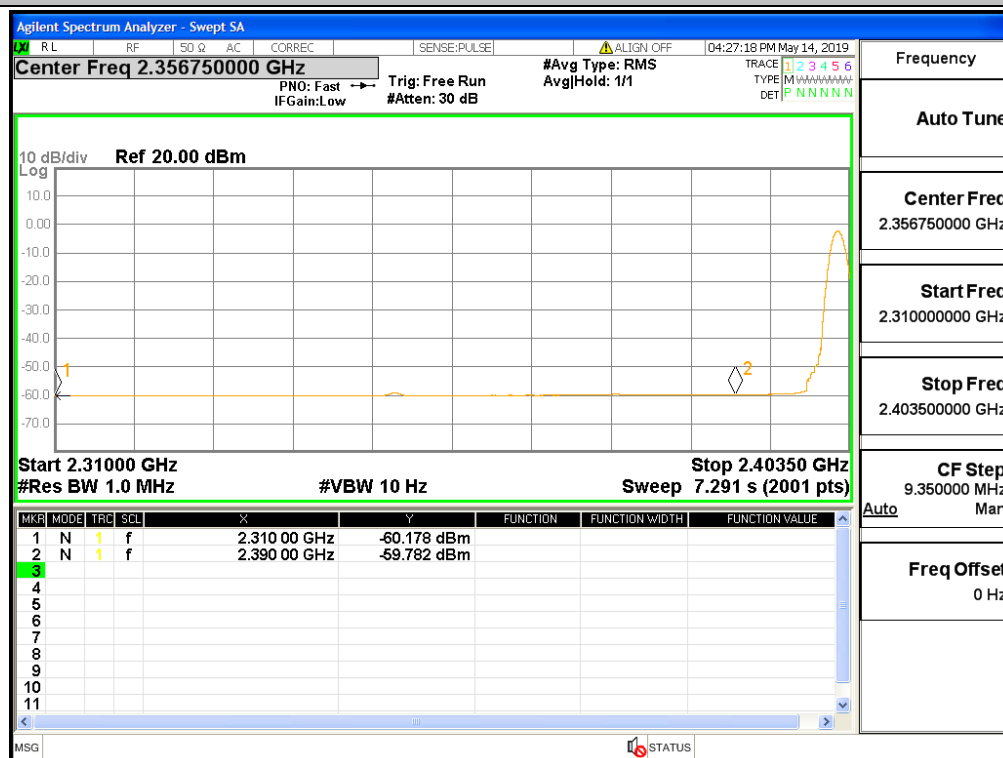
Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Peak Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2310.00	2.00	0.00	-52.10	45.10	74	Pass
1DH5	2480	2483.56	2.00	0.00	-34.33	62.87	74	Pass
2DH5	2402	2390.00	2.00	0.00	-52.46	44.74	74	Pass
2DH5	2480	2483.61	2.00	0.00	-34.13	63.07	74	Pass
3DH5	2402	2390.00	2.00	0.00	-52.29	44.91	74	Pass
3DH5	2480	2485.25	2.00	0.00	-39.70	57.50	74	Pass

Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Average Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2390.00	2.00	0.00	-59.78	37.42	54	Pass
1DH5	2480	2483.50	2.00	0.00	-57.15	40.05	54	Pass
2DH5	2402	2390.00	2.00	0.00	-59.78	37.42	54	Pass
2DH5	2480	2483.50	2.00	0.00	-56.34	40.86	54	Pass
3DH5	2402	2390.00	2.00	0.00	-59.76	37.44	54	Pass
3DH5	2480	2483.50	2.00	0.00	-56.35	40.85	54	Pass

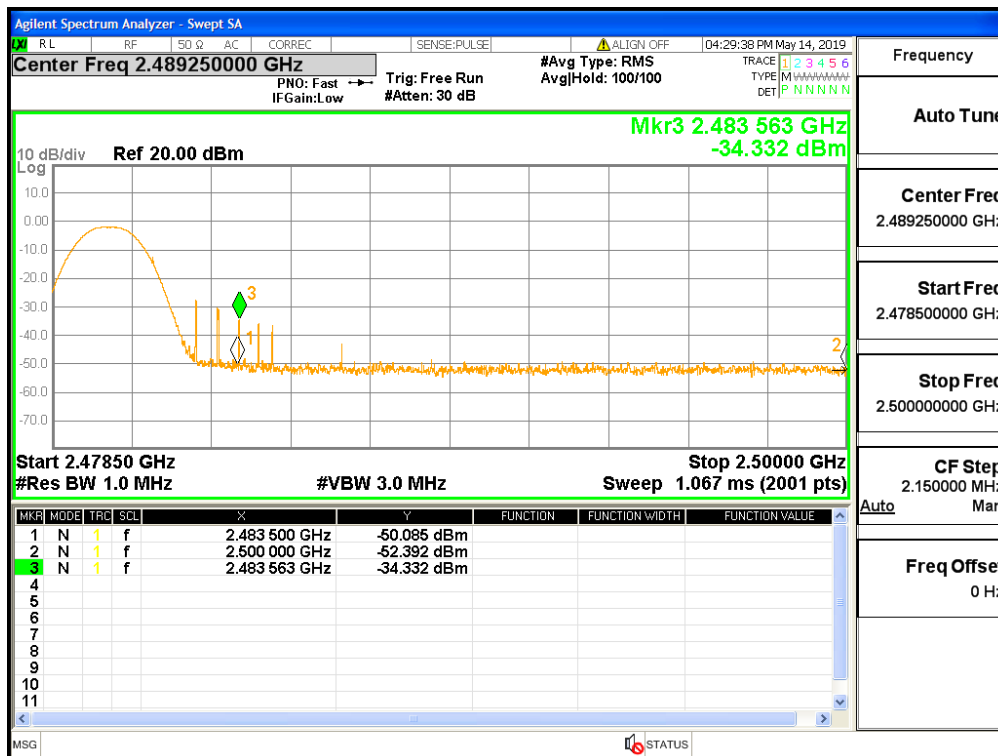
Restrict-band band-edge measurements_2402_PEAK_DH5



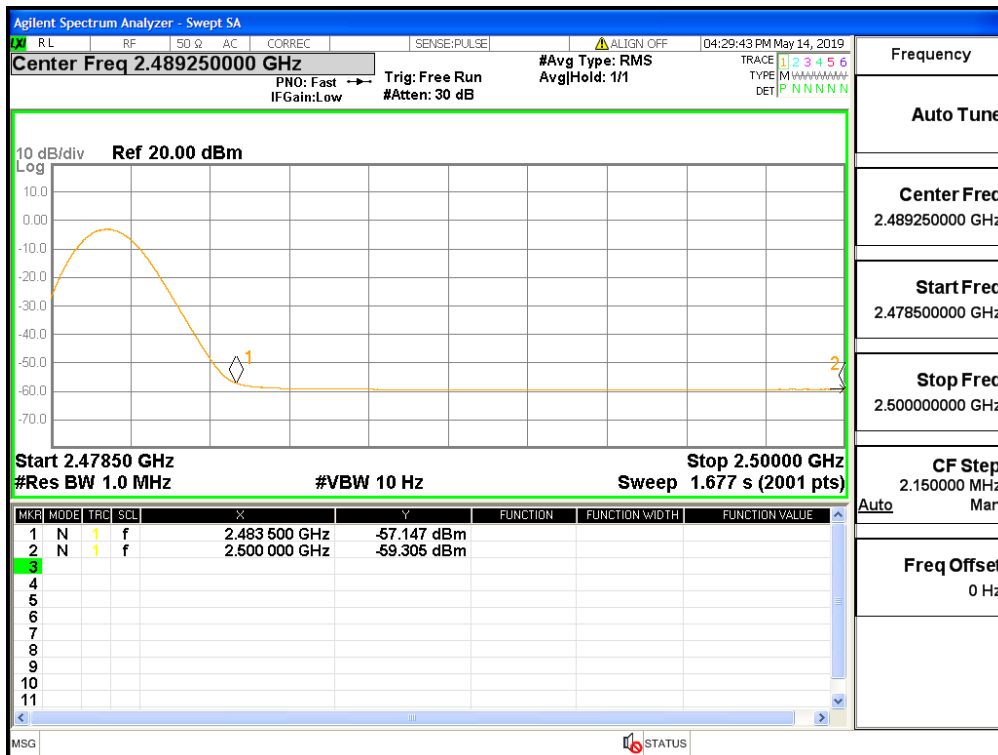
Restrict-band band-edge measurements_2402_AV_DH5



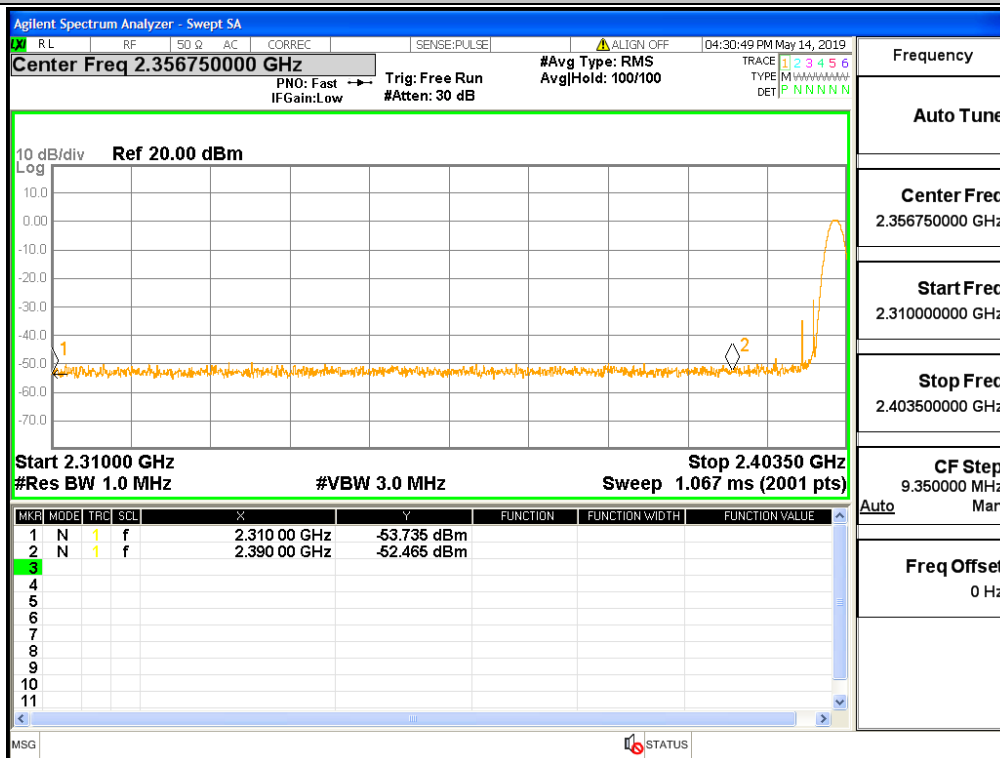
Restrict-band band-edge measurements_2480_PEAK_DH5



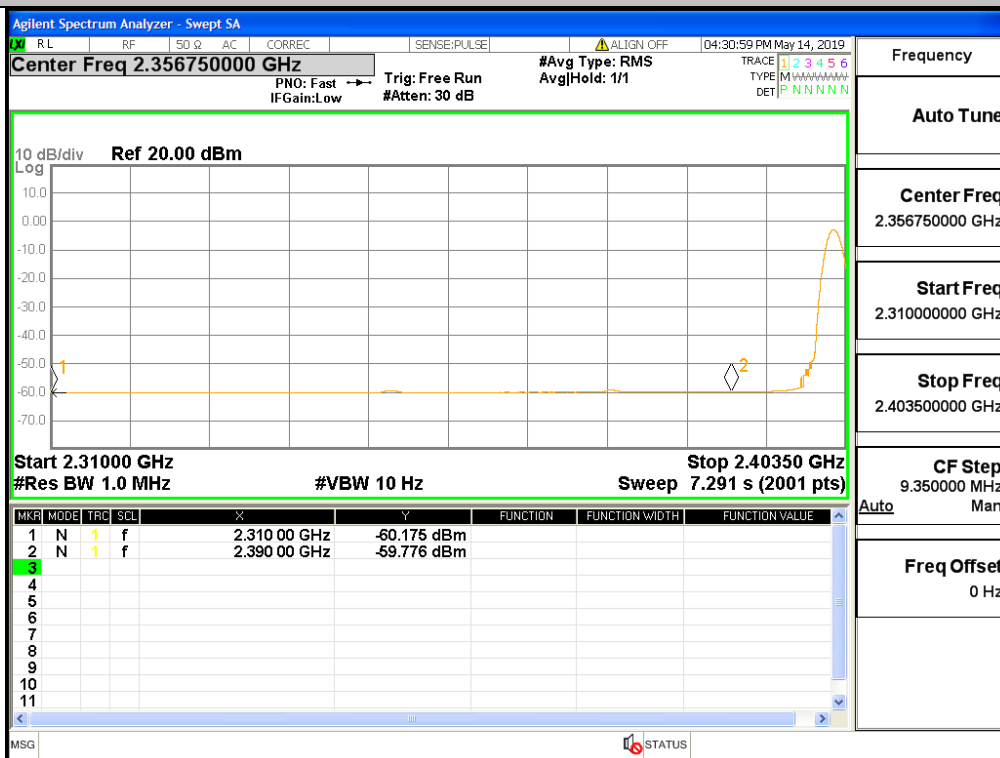
Restrict-band band-edge measurements_2480_AV_DH5



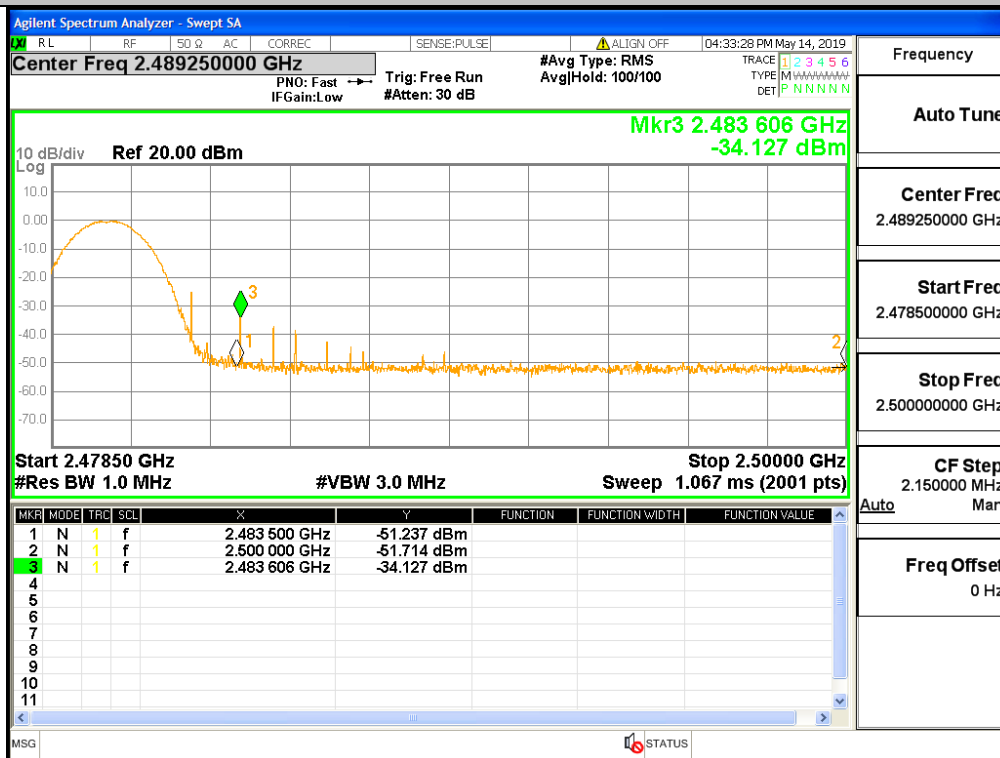
Restrict-band band-edge measurements_2402_PEAK_2DH5



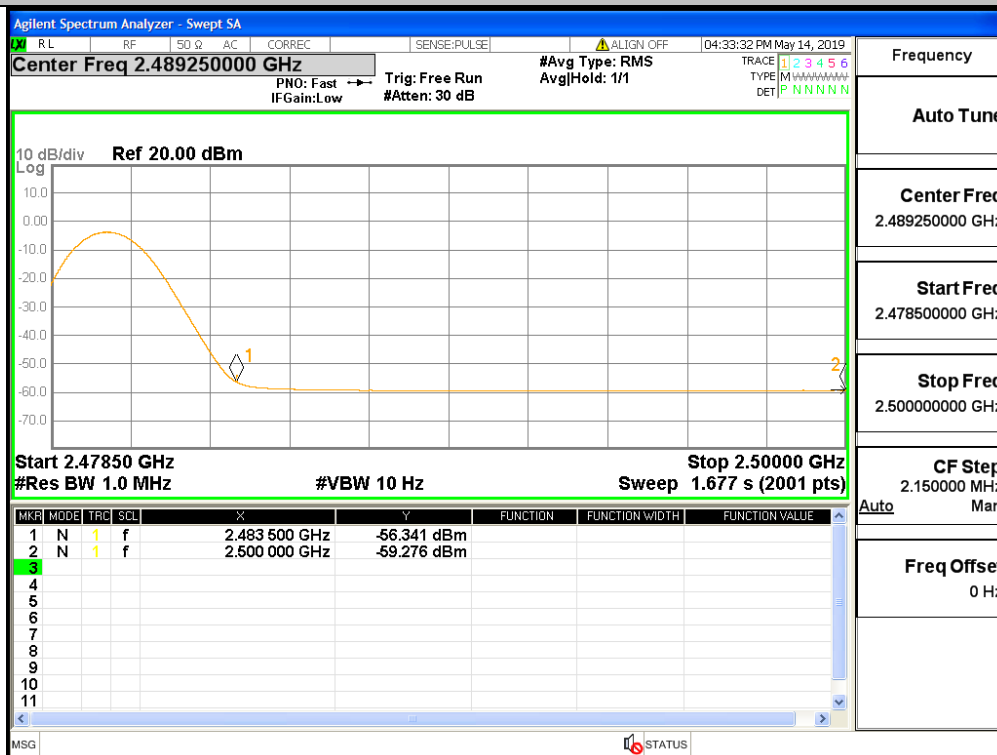
Restrict-band band-edge measurements_2402_AV_2DH5



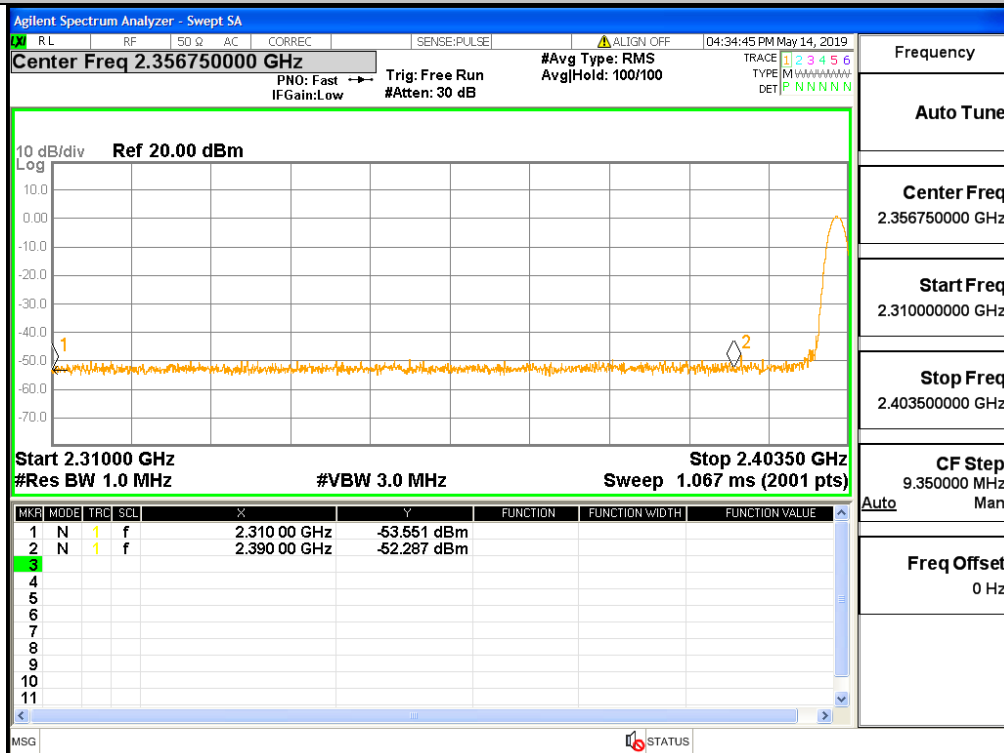
Restrict-band band-edge measurements_2480_PEAK_2DH5



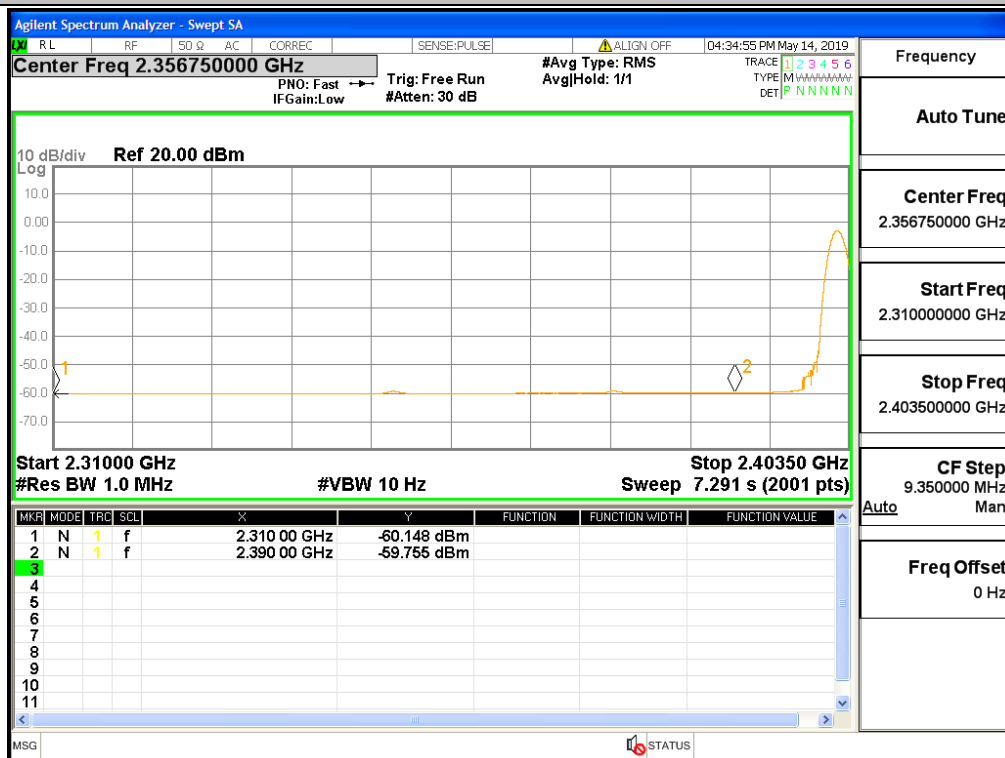
Restrict-band band-edge measurements_2480_AV_2DH5



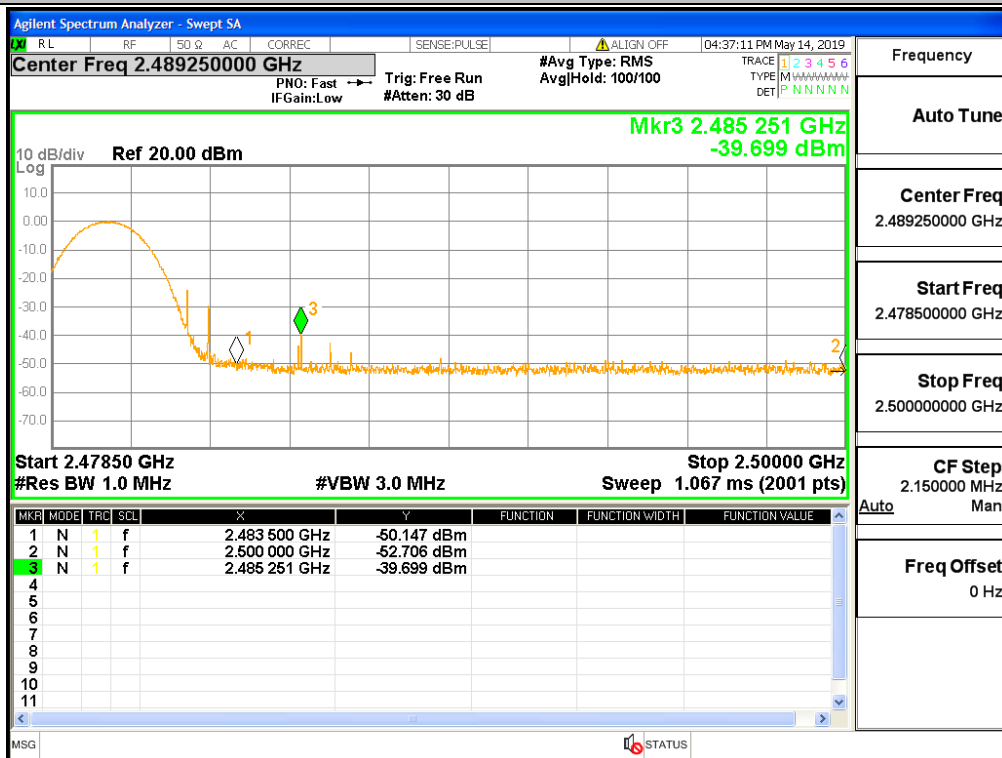
Restrict-band band-edge measurements_2402_PEAK_3DH5



Restrict-band band-edge measurements_2402_AV_3DH5



Restrict-band band-edge measurements_2480_PEAK_3DH5



Restrict-band band-edge measurements_2480_AV_3DH5

