

Appendix A RF Test Data for BT(BLE) (Conducted Measurement)

Product Name: Shenzhen SEI Robotics Co., Ltd.

Trade Mark: SEI

Test Model: SN8BABH

FCC ID: 2AOVU-SN8BABX

Environmental Conditions

Temperature:	23.7° C
Relative Humidity:	52%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

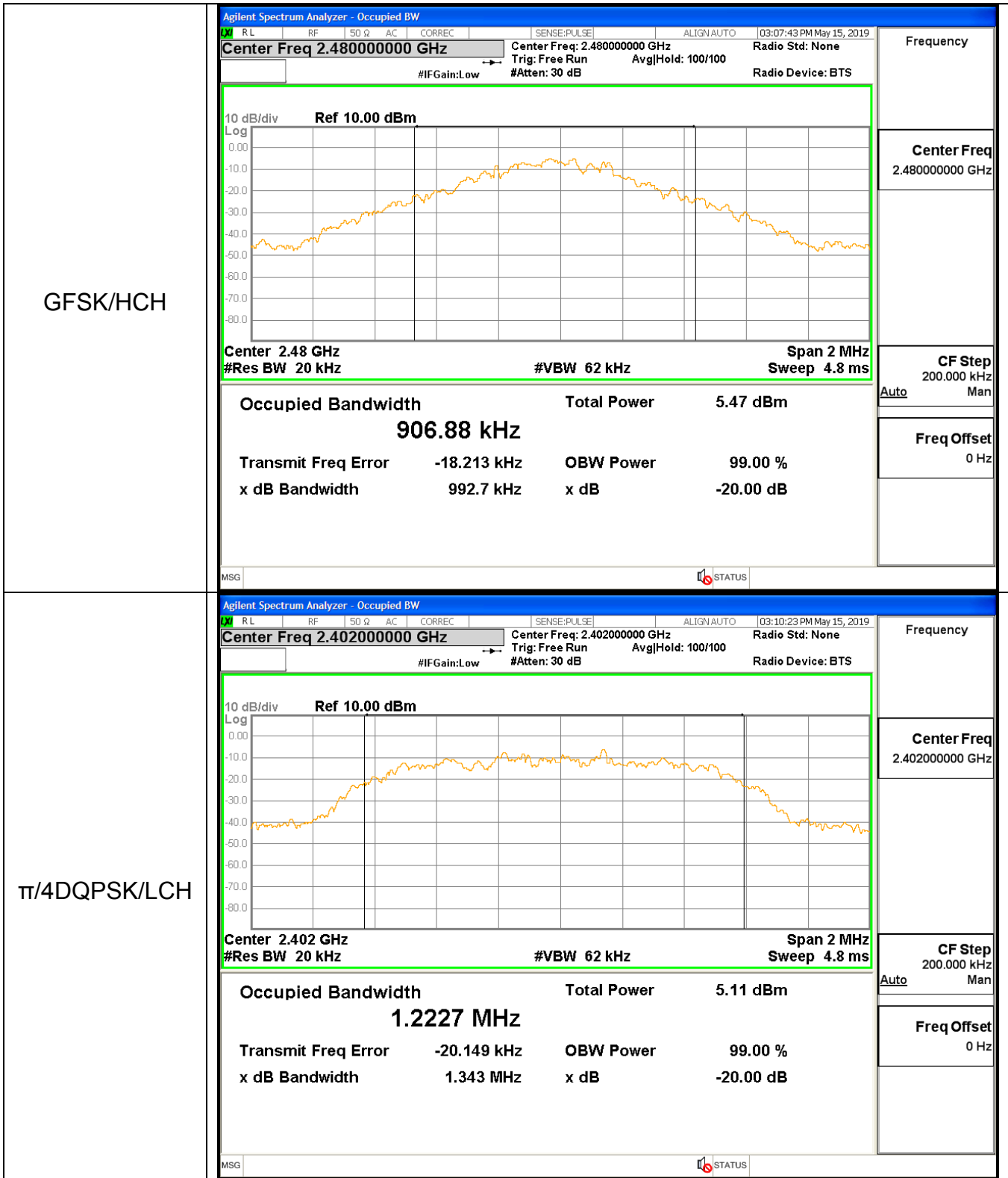
A.1 20 dB Bandwidth

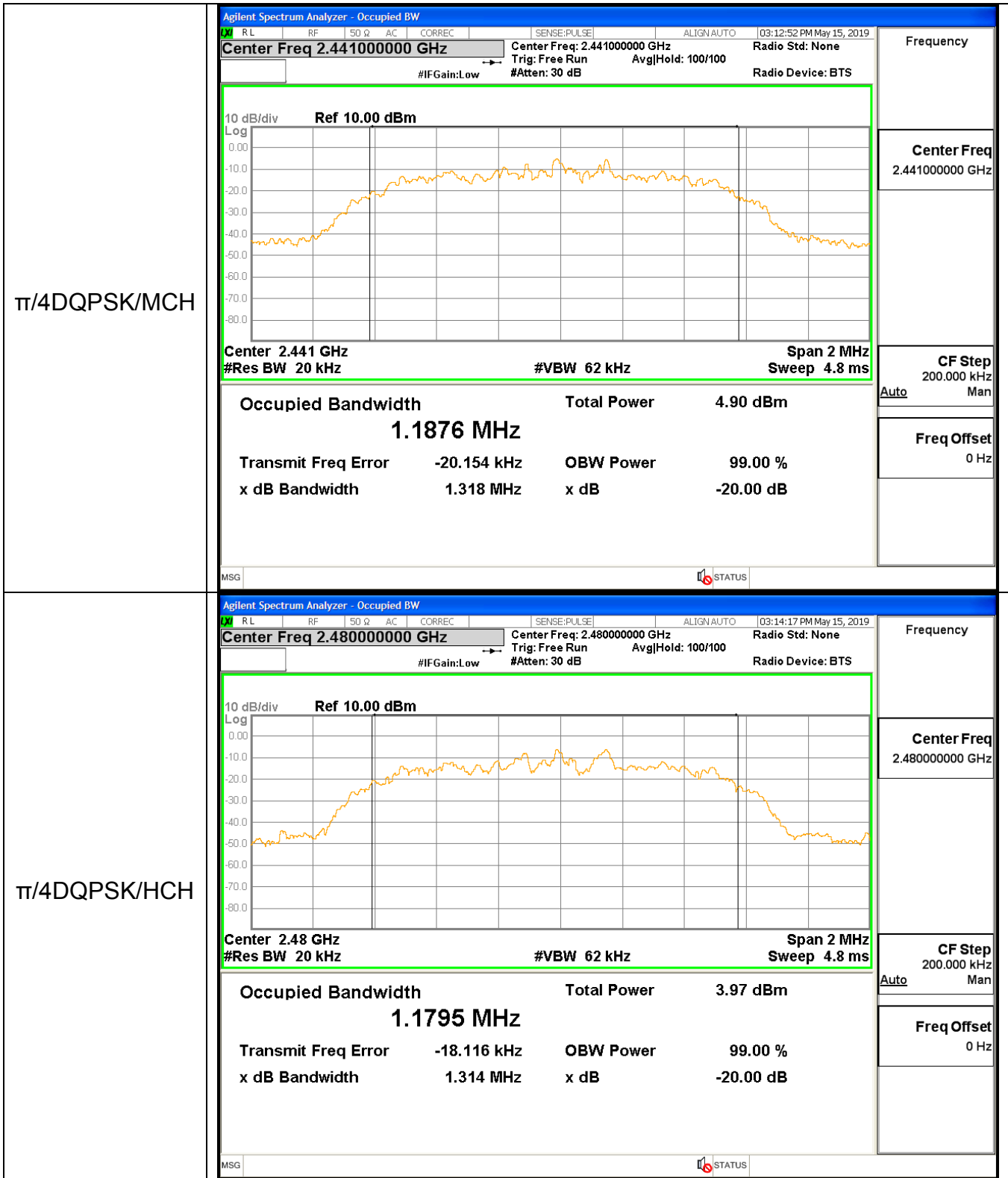
Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	1.026	Not Specified	PASS
GFSK	MCH	1.038	Not Specified	PASS
GFSK	HCH	0.993	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.343	Not Specified	PASS
$\pi/4$ DQPSK	MCH	1.318	Not Specified	PASS
$\pi/4$ DQPSK	HCH	1.314	Not Specified	PASS
8DPSK	LCH	1.263	Not Specified	PASS
8DPSK	MCH	1.275	Not Specified	PASS
8DPSK	HCH	1.271	Not Specified	PASS

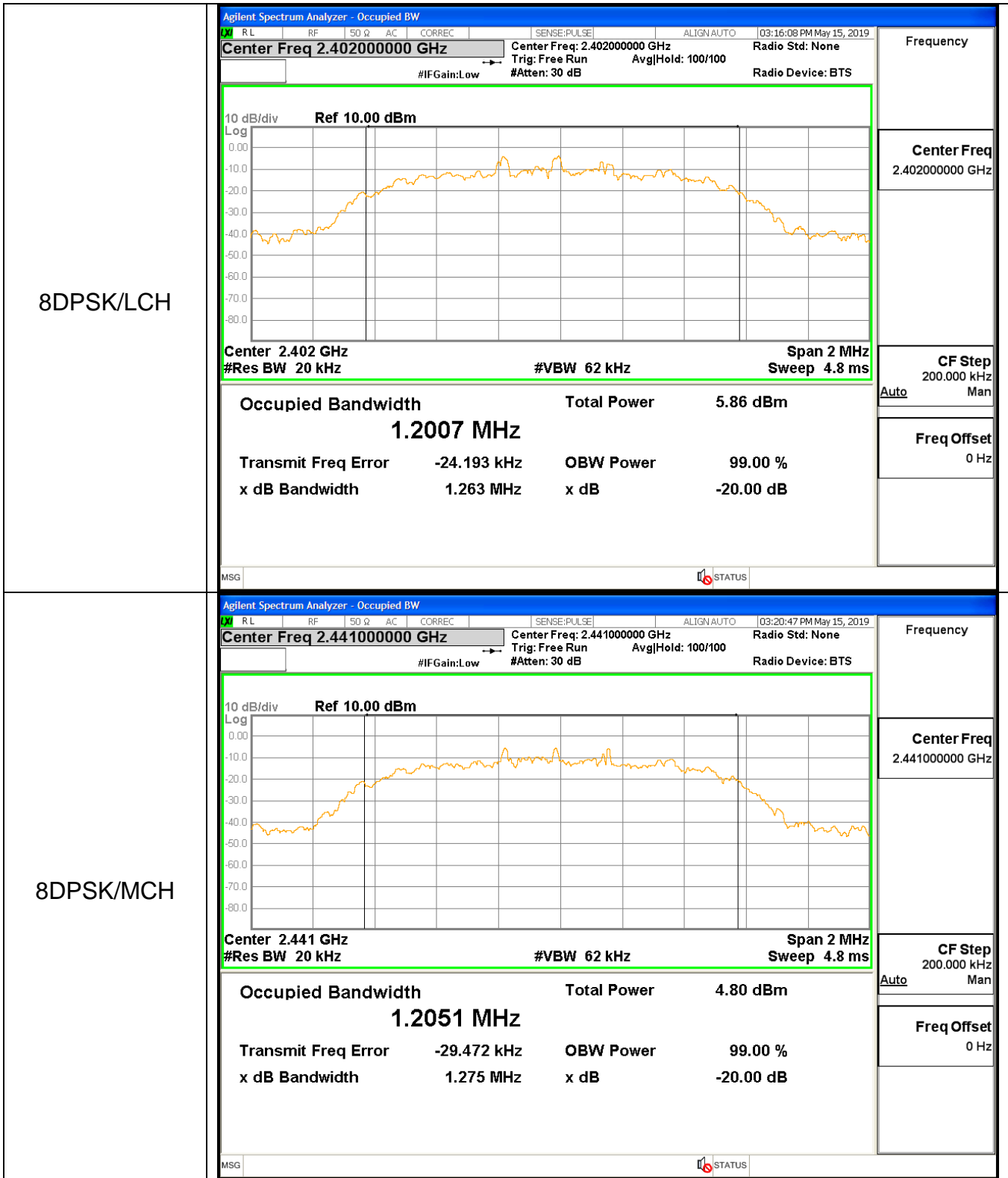
Test Graph

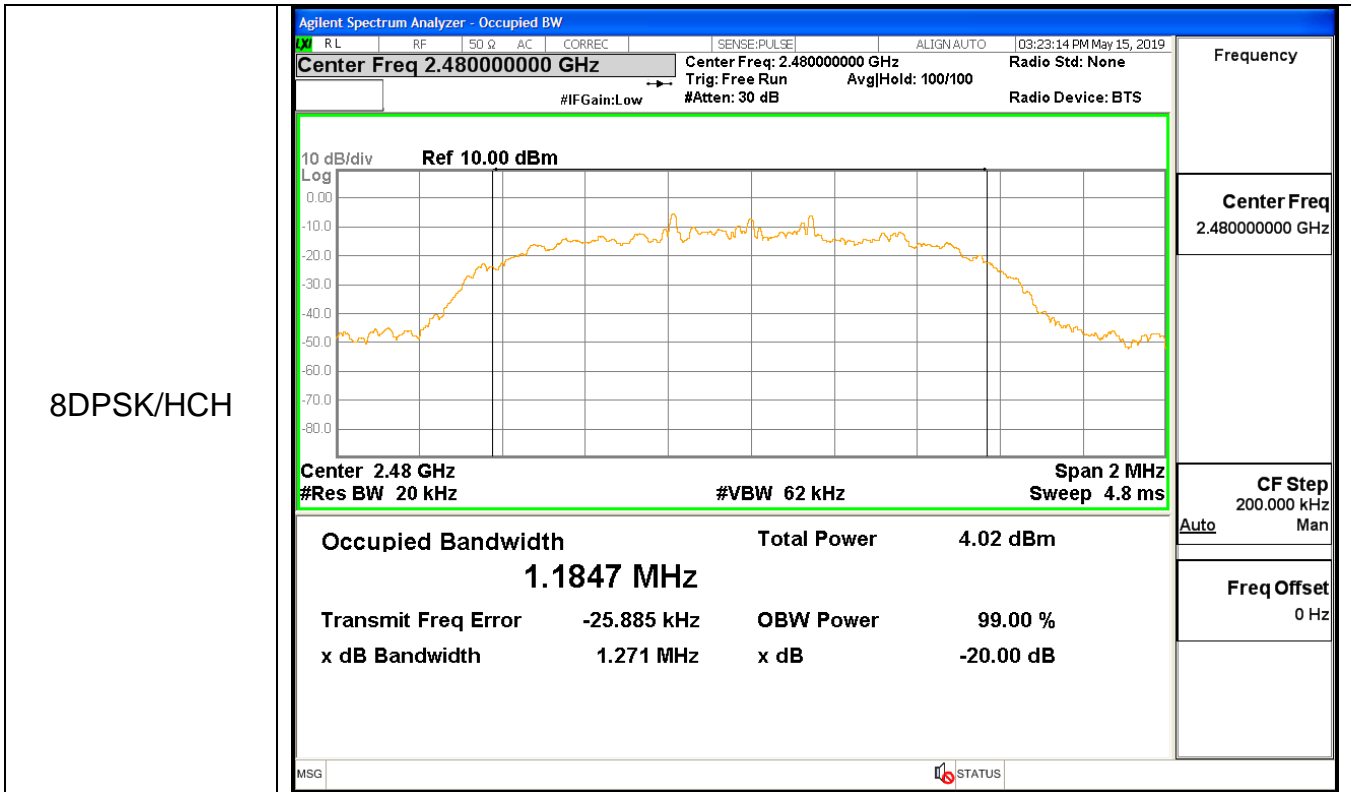
Graphs

GFSK/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.40200000 GHz Center Freq: 2.40200000 GHz Radio Std: None #IFGain:Low Trig: Free Run AvgHold: 100/100 Radio Device: BTS #Atten: 30 dB			Frequency											
				Center Freq 2.40200000 GHz											
Center 2.402 GHz Span 2 MHz #Res BW 20 kHz #VBW 62 kHz Sweep 4.8 ms			CF Step 200.000 kHz Man												
<table border="0" style="width: 100%;"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>6.56 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">992.10 kHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>-27.179 kHz</td> <td>OBW Power 99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.026 MHz</td> <td>x dB -20.00 dB</td> </tr> </table>			Occupied Bandwidth	Total Power	6.56 dBm	992.10 kHz			Transmit Freq Error	-27.179 kHz	OBW Power 99.00 %	x dB Bandwidth	1.026 MHz	x dB -20.00 dB	Freq Offset 0 Hz
Occupied Bandwidth	Total Power	6.56 dBm													
992.10 kHz															
Transmit Freq Error	-27.179 kHz	OBW Power 99.00 %													
x dB Bandwidth	1.026 MHz	x dB -20.00 dB													
MSG STATUS															
GFSK/MCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.44100000 GHz Center Freq: 2.44100000 GHz Radio Std: None #IFGain:Low Trig: Free Run AvgHold: 100/100 Radio Device: BTS #Atten: 30 dB			Frequency											
				Center Freq 2.44100000 GHz											
Center 2.441 GHz Span 2 MHz #Res BW 20 kHz #VBW 62 kHz Sweep 4.8 ms			CF Step 200.000 kHz Man												
<table border="0" style="width: 100%;"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>6.30 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">946.79 kHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>-18.266 kHz</td> <td>OBW Power 99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.038 MHz</td> <td>x dB -20.00 dB</td> </tr> </table>			Occupied Bandwidth	Total Power	6.30 dBm	946.79 kHz			Transmit Freq Error	-18.266 kHz	OBW Power 99.00 %	x dB Bandwidth	1.038 MHz	x dB -20.00 dB	Freq Offset 0 Hz
Occupied Bandwidth	Total Power	6.30 dBm													
946.79 kHz															
Transmit Freq Error	-18.266 kHz	OBW Power 99.00 %													
x dB Bandwidth	1.038 MHz	x dB -20.00 dB													
MSG STATUS															





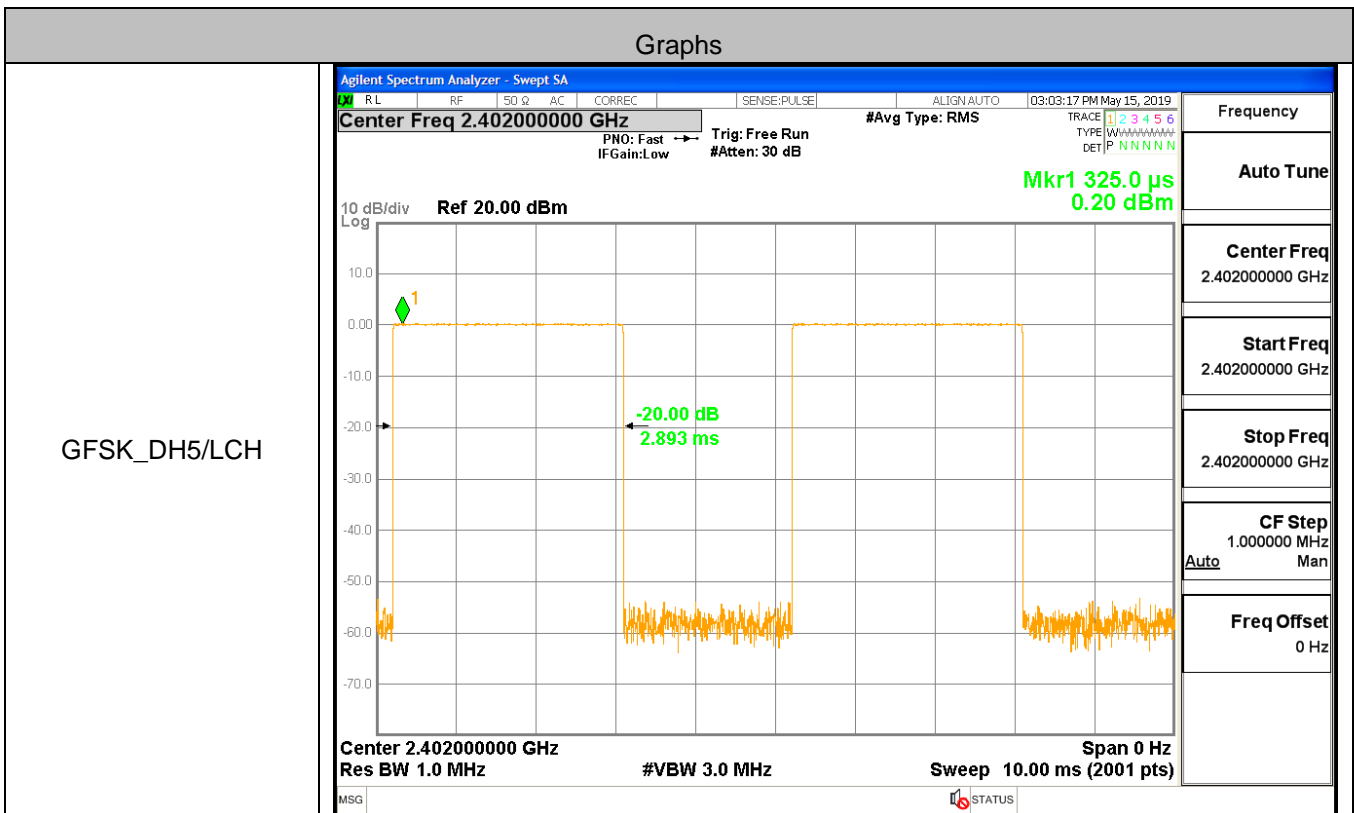


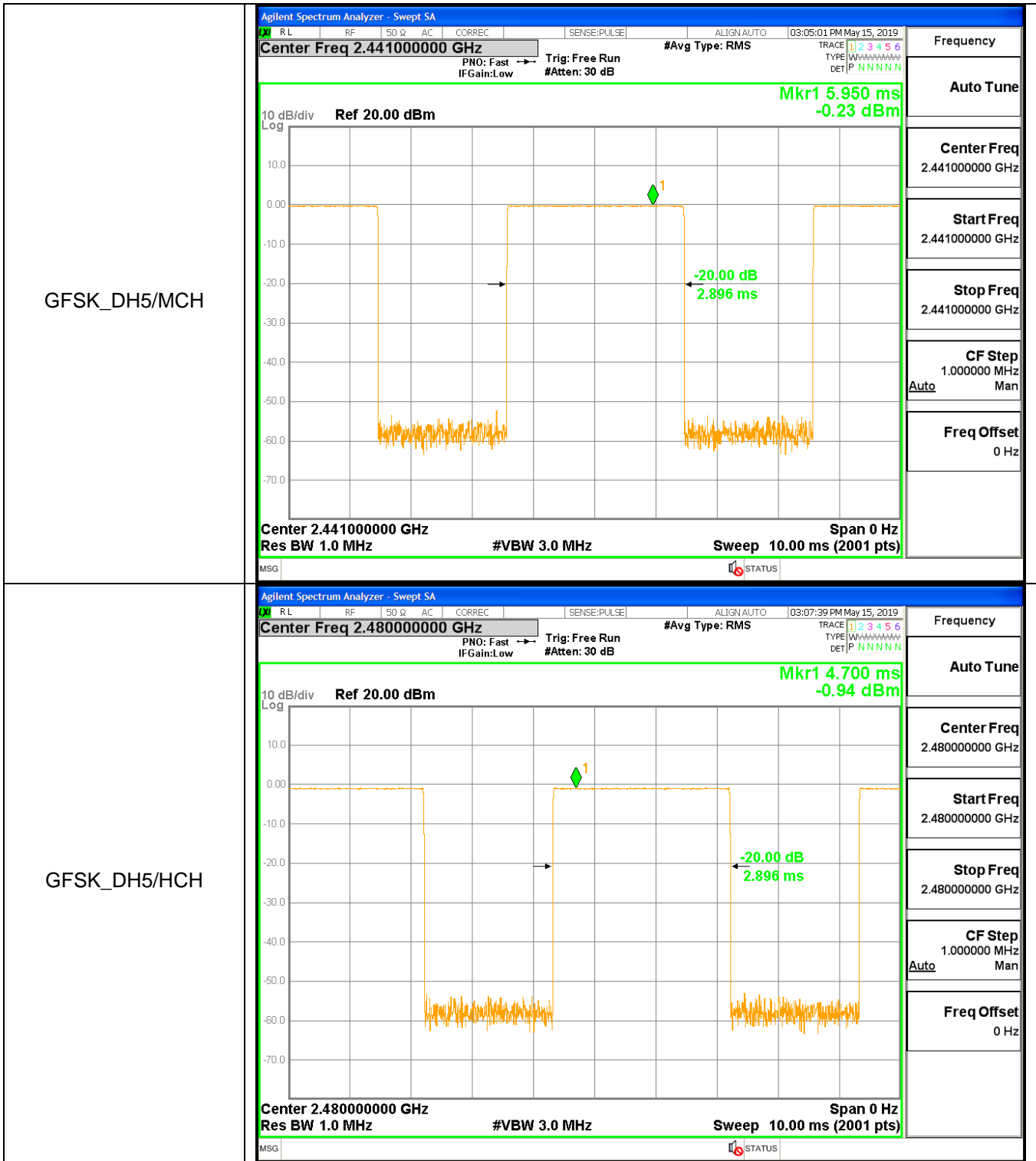


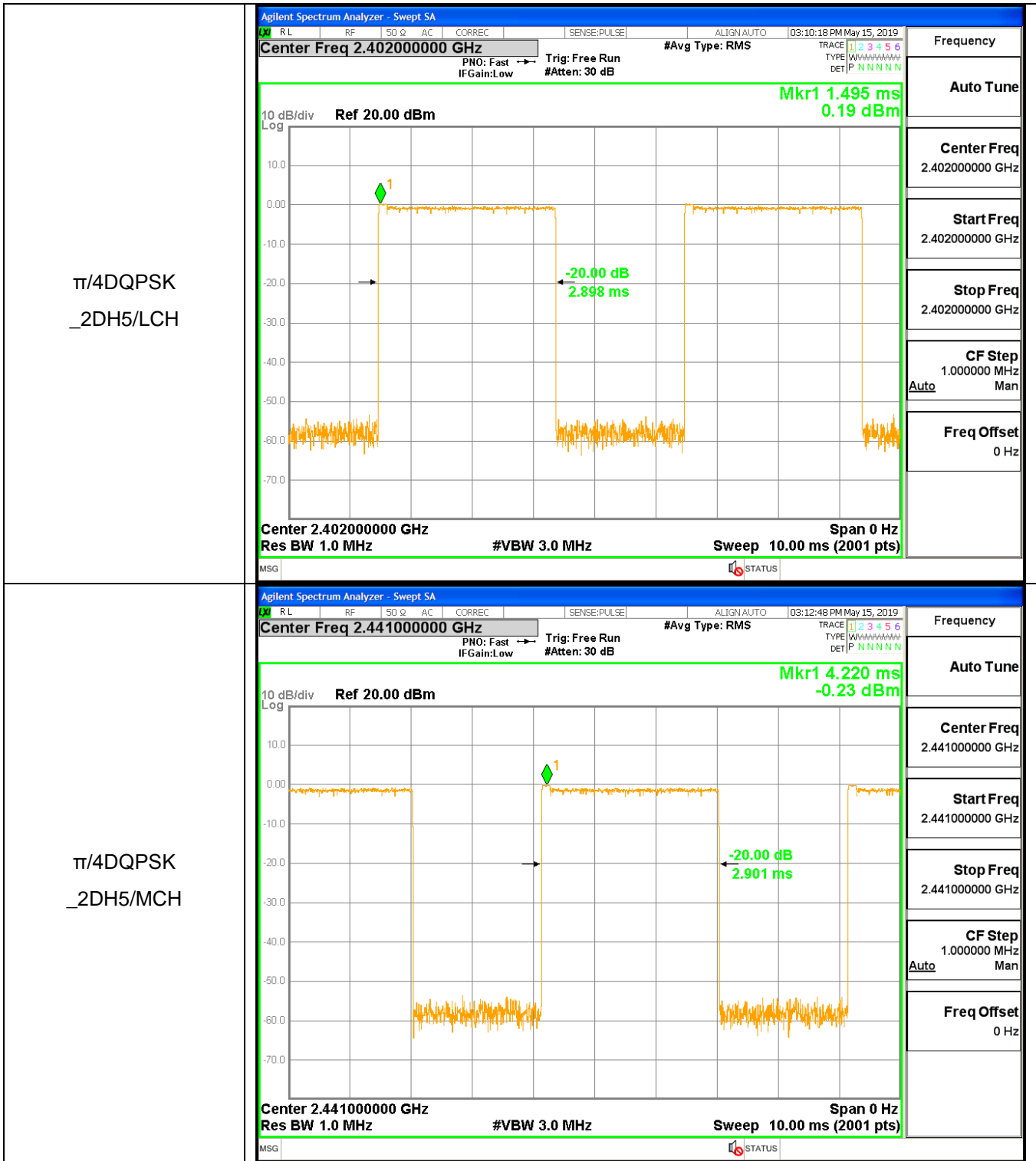
A.2 Dwell Time

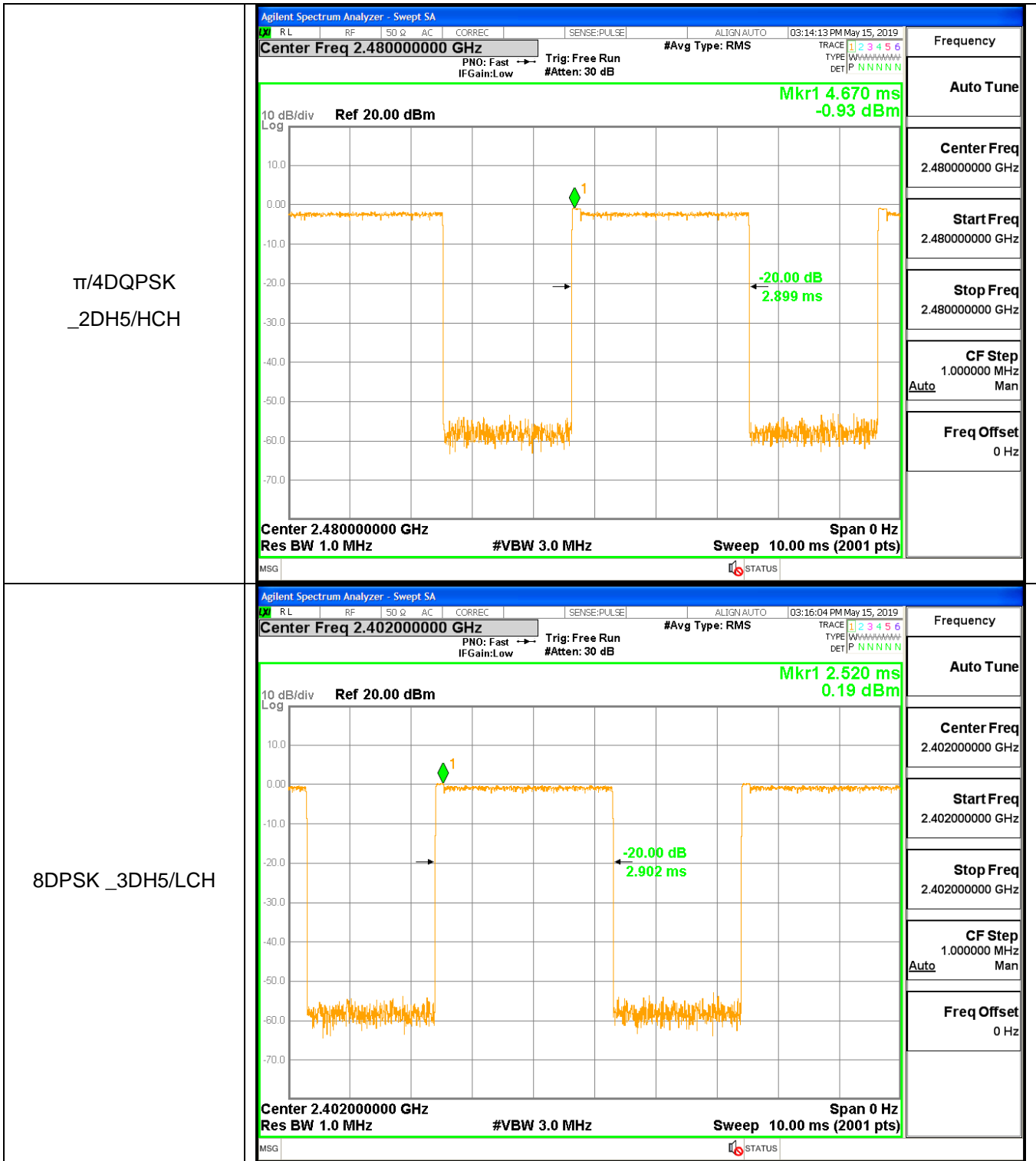
Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.002893	106.7	0.308658	0.4	PASS
GFSK	DH5	MCH	0.002896	106.7	0.309039	0.4	PASS
GFSK	DH5	HCH	0.002896	106.7	0.309019	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	0.002898	106.7	0.309248	0.4	PASS
$\pi/4$ DQPSK	2DH5	MCH	0.002901	106.7	0.309511	0.4	PASS
$\pi/4$ DQPSK	2DH5	HCH	0.002899	106.7	0.309375	0.4	PASS
8DPSK	3DH5	LCH	0.002902	106.7	0.309634	0.4	PASS
8DPSK	3DH5	MCH	0.002902	106.7	0.30965	0.4	PASS
8DPSK	3DH5	HCH	0.002902	106.7	0.309625	0.4	PASS

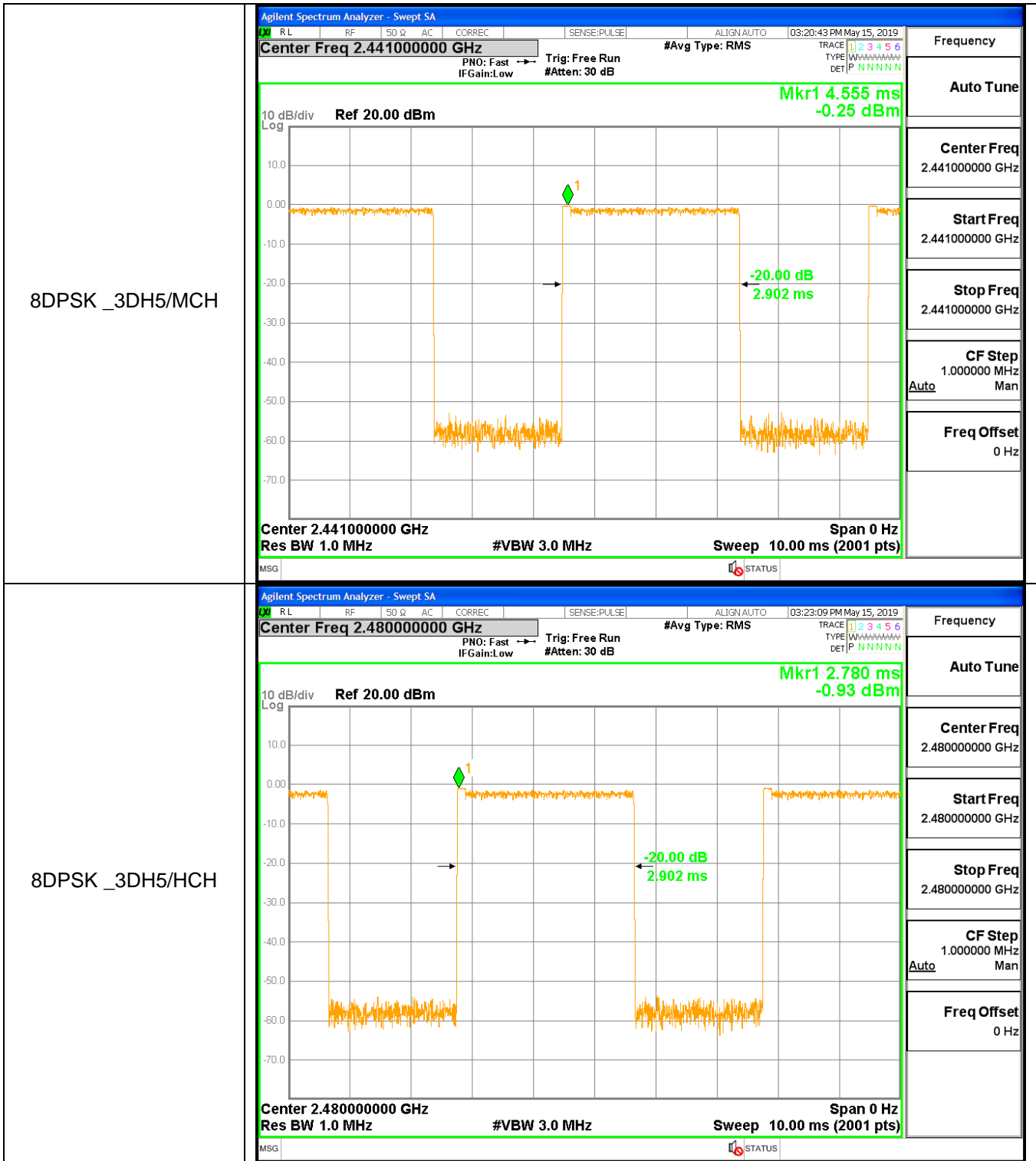
Test Graph







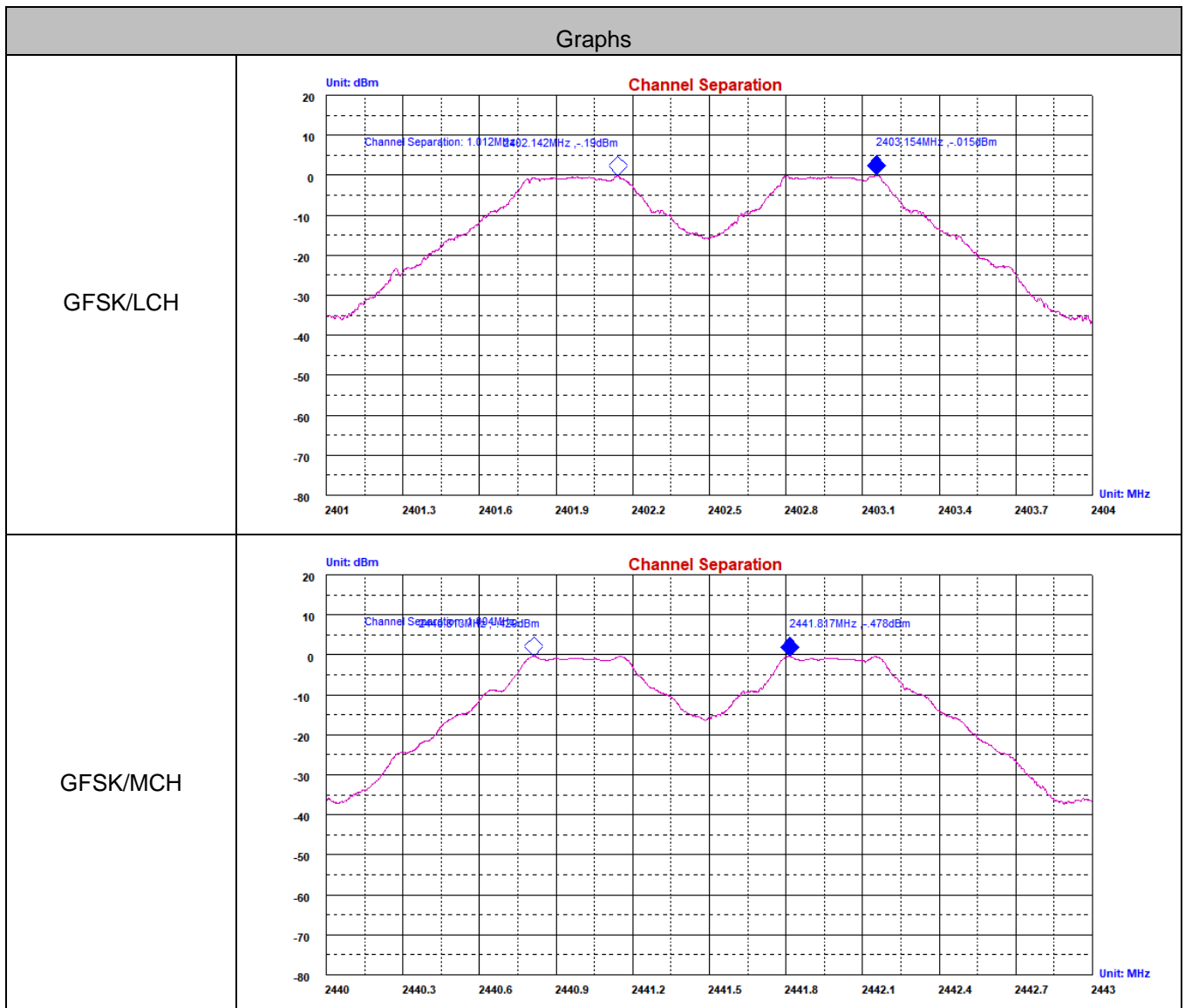


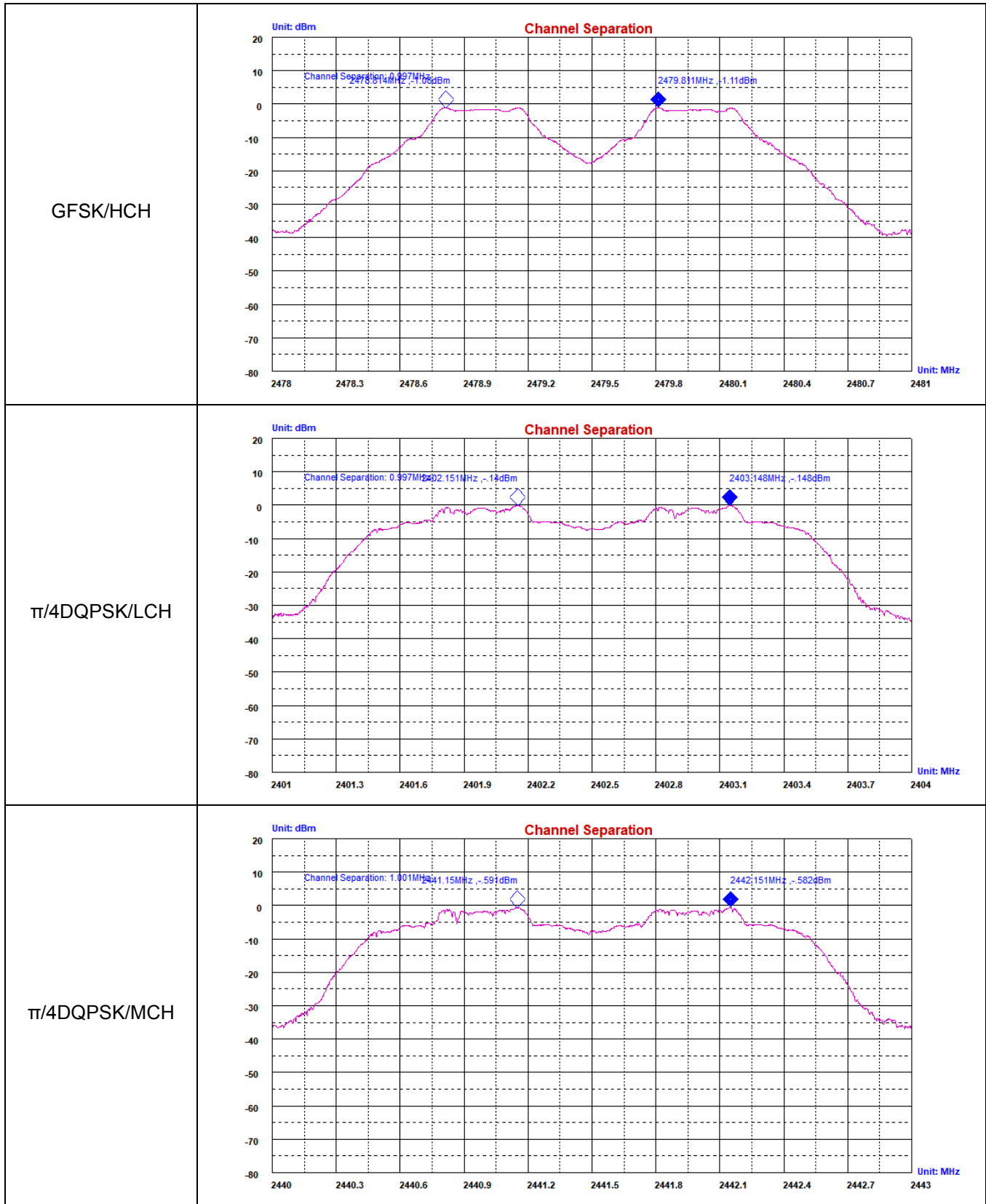


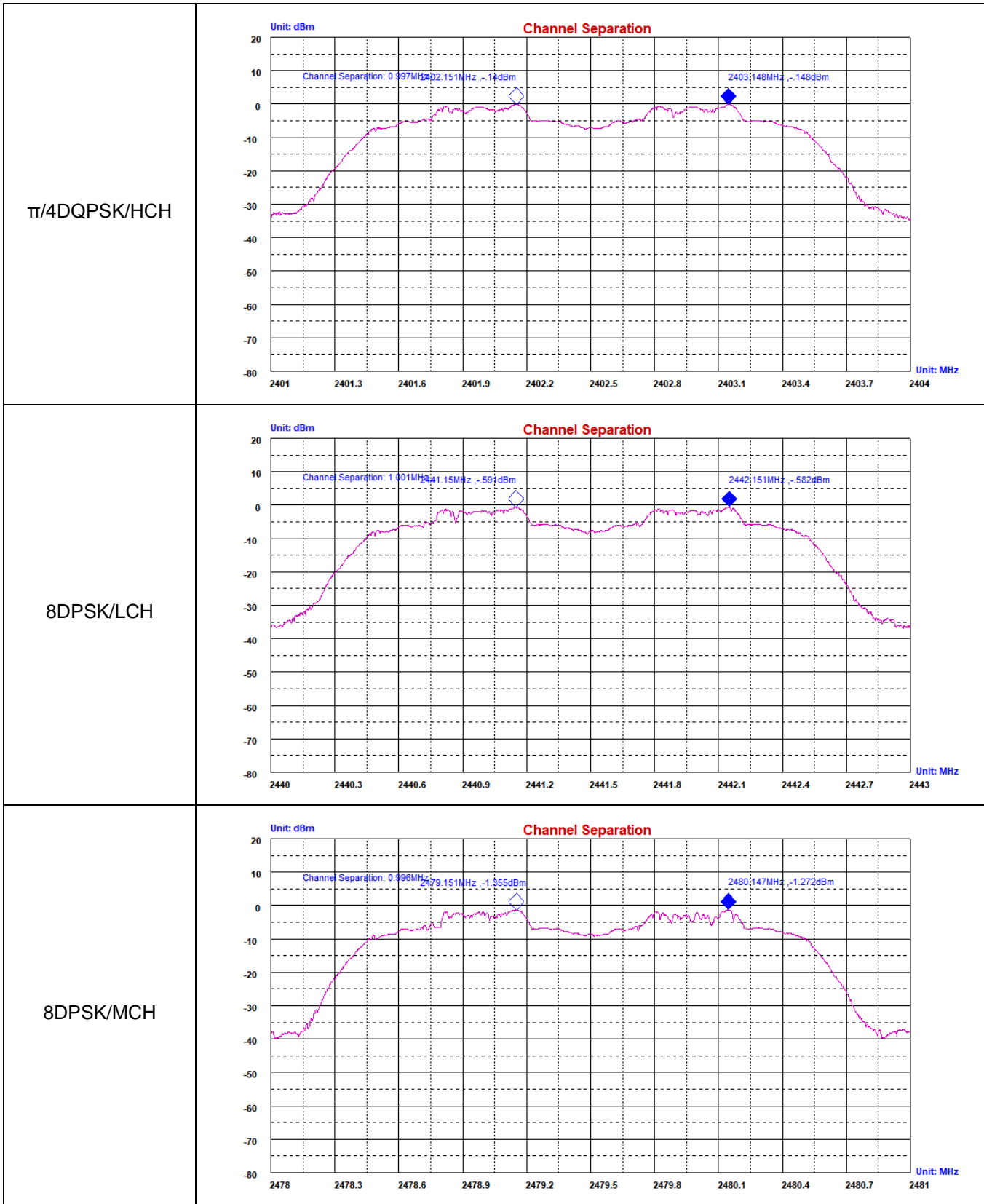
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.012	0.684	PASS
GFSK	MCH	1.004	0.692	PASS
GFSK	HCH	0.997	0.662	PASS
$\pi/4$ DQPSK	LCH	0.997	0.895	PASS
$\pi/4$ DQPSK	MCH	1.001	0.879	PASS
$\pi/4$ DQPSK	HCH	0.996	0.876	PASS
8DPSK	LCH	1.009	0.842	PASS
8DPSK	MCH	0.997	0.850	PASS
8DPSK	HCH	0.997	0.847	PASS

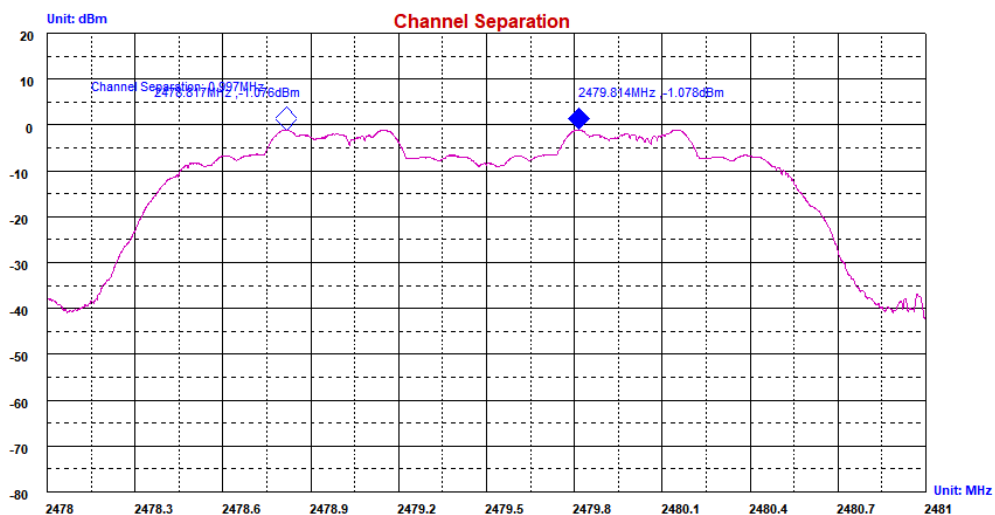
Test Graph







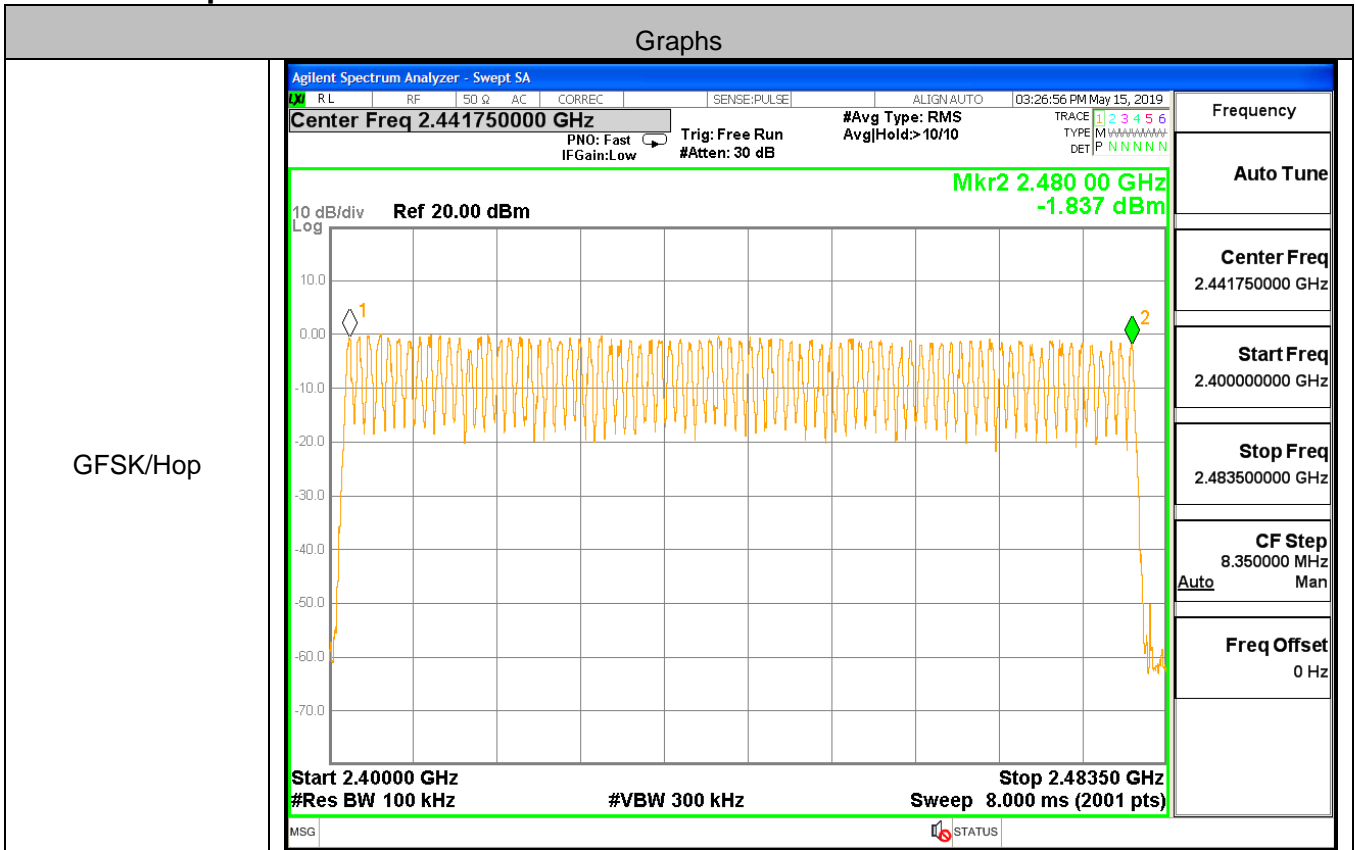
8DPSK/HCH



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 Graph

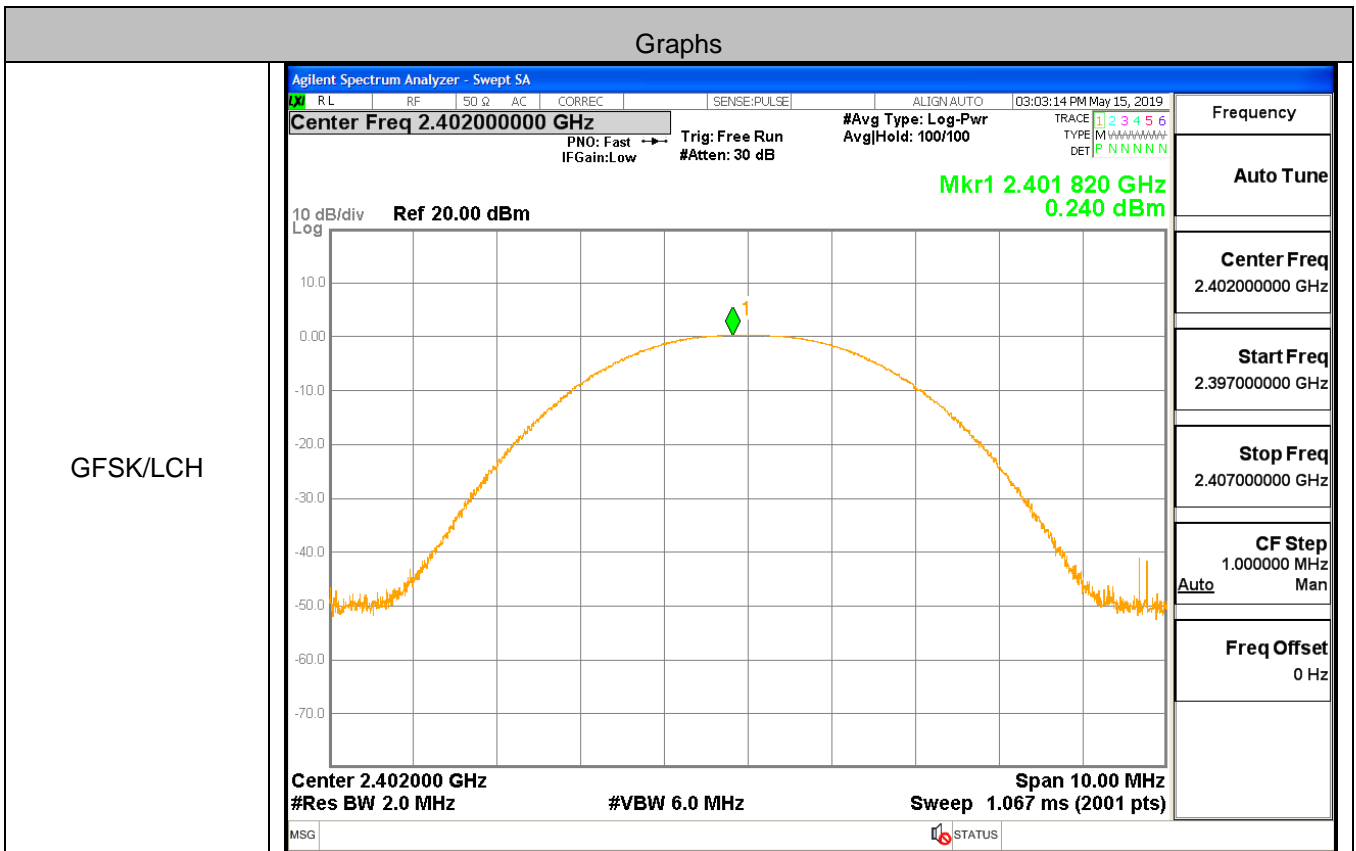


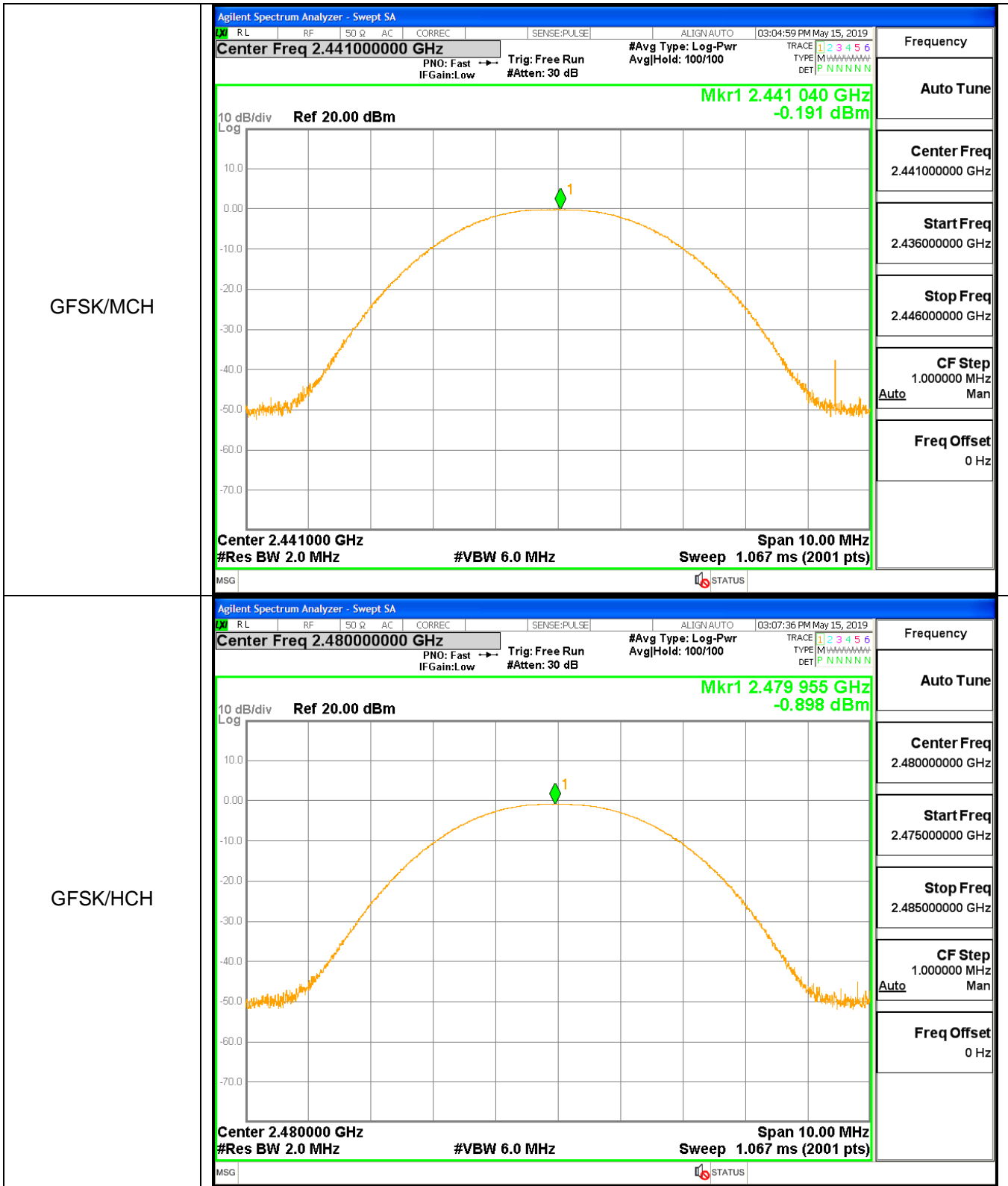


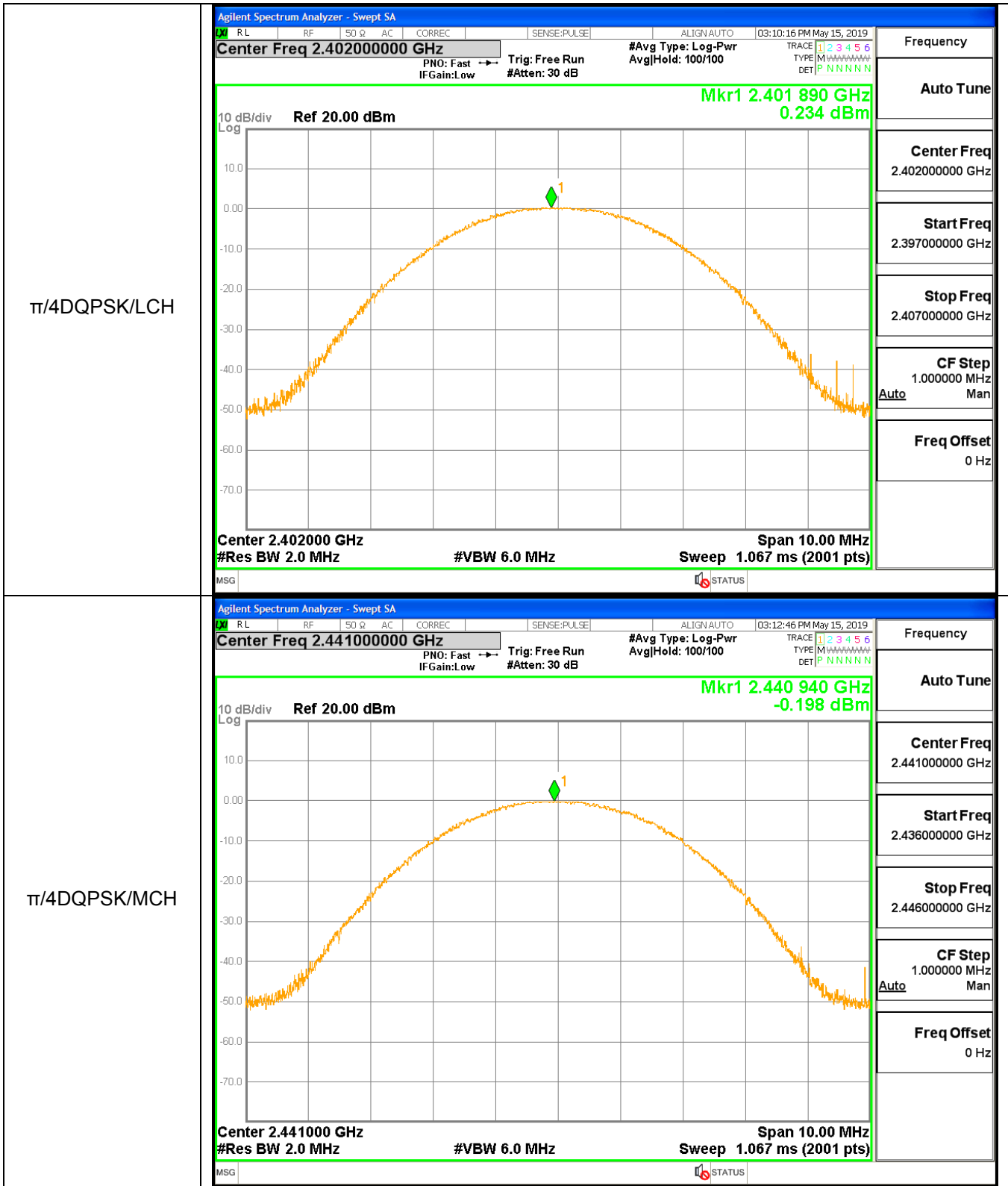
A.5 Conducted Peak Output Power

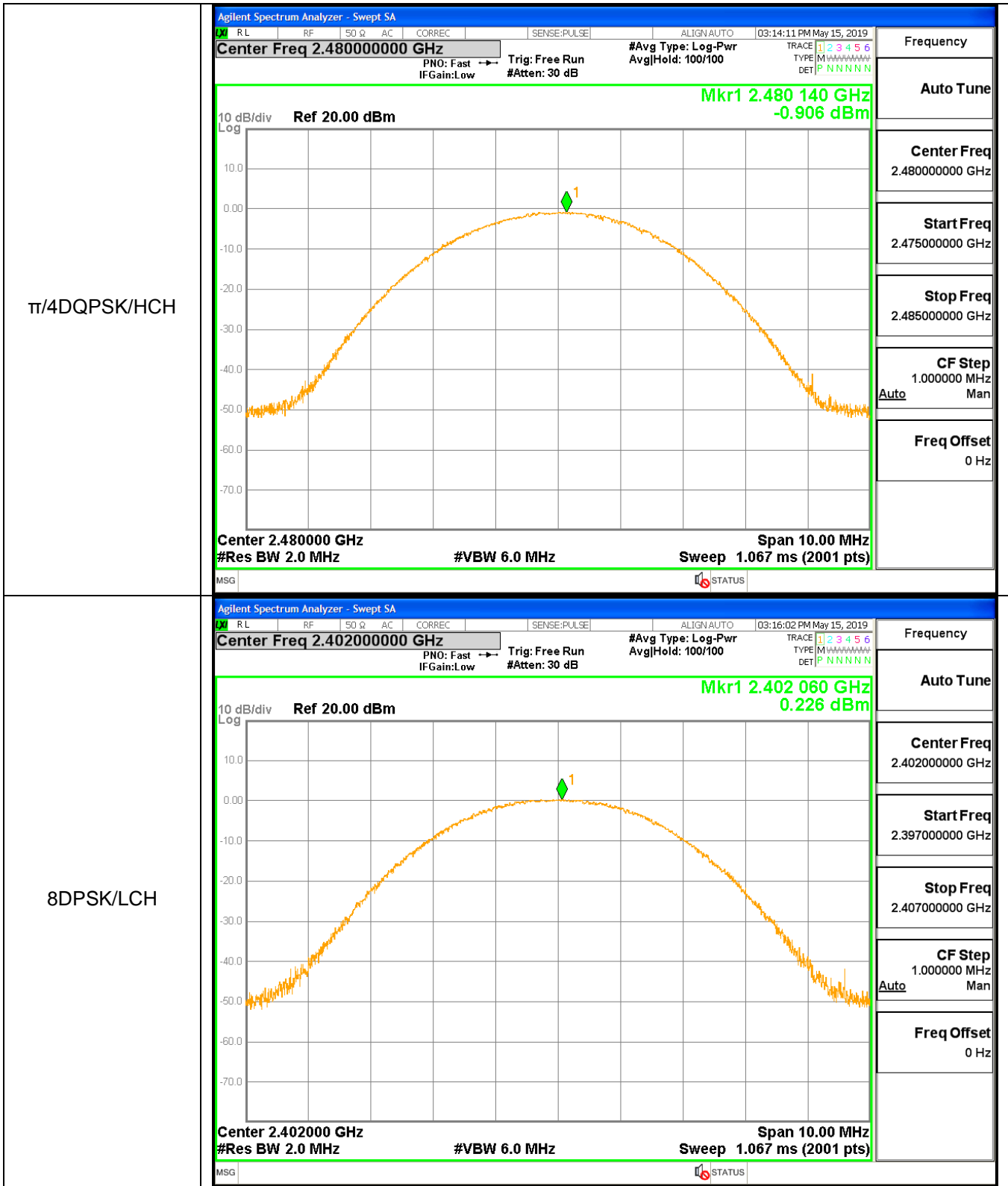
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.240	21	PASS
GFSK	MCH	-0.191	21	PASS
GFSK	HCH	-0.898	21	PASS
$\pi/4$ DQPSK	LCH	0.234	21	PASS
$\pi/4$ DQPSK	MCH	-0.198	21	PASS
$\pi/4$ DQPSK	HCH	-0.906	21	PASS
8DPSK	LCH	0.226	21	PASS
8DPSK	MCH	-0.195	21	PASS
8DPSK	HCH	-0.893	21	PASS

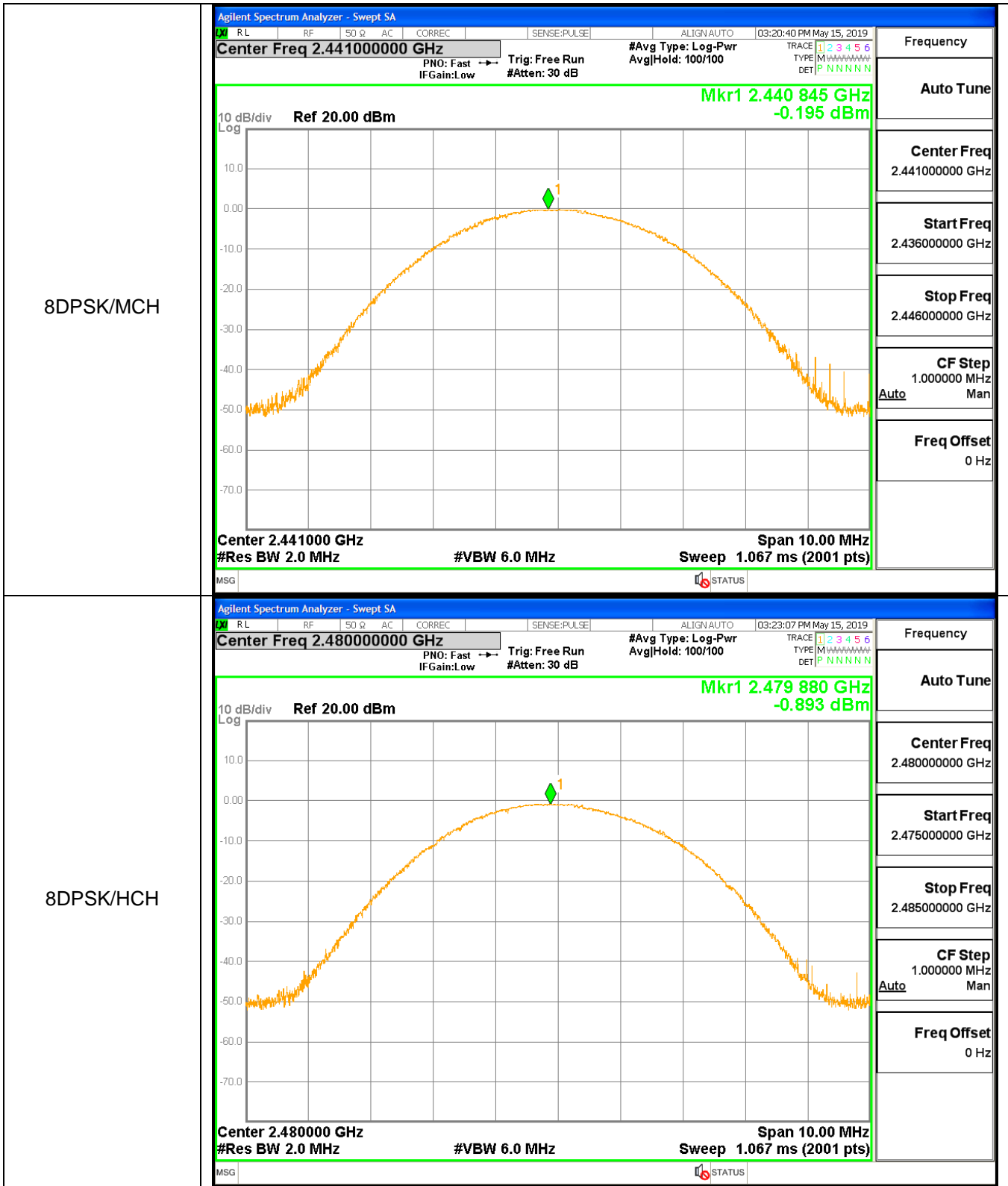
Test Graph











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	2399.81	-0.38	-48.02	-20.38	Pass
1DH5	2480	2500	-1.26	-63.48	-21.26	Pass
2DH5	2402	2400	-2.74	-51.59	-22.74	Pass
2DH5	2480	2486.40	-3.62	-60.68	-23.62	Pass
3DH5	2402	2400	-0.95	-52.63	-20.95	Pass
3DH5	2480	2487.96	-1.03	-60.61	-21.03	Pass
1DH5-Hopping	2402	2391.93	-0.08	-57.09	-20.08	Pass
1DH5-Hopping	2480	2488	-0.58	-57.21	-20.58	Pass
2DH5-Hopping	2402	2399.79	-0.46	-51.76	-20.46	Pass
2DH5-Hopping	2480	2500	-0.72	-62.74	-20.72	Pass
3DH5-Hopping	2402	2399.91	-0.24	-50.59	-20.24	Pass
3DH5-Hopping	2480	2483.5	-2.90	-62.24	-22.90	Pass

Test Graph

Graphs

GFSK/LCH/No Hop

Agilent Spectrum Analyzer - Swept SA
 Center Freq 2.356750000 GHz
 #Avg Type: RMS
 Avg|Hold: 100/100
 PNO: Fast Trig: Free Run
 IFGain:Low #Atten: 30 dB

10 dB/div Ref 20.00 dBm
 Mkr3 2.399 81 GHz
 -48.024 dBm

Start 2.31000 GHz Stop 2.40350 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 9.067 ms (2001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.390 00 GHz	-62.433 dBm			
2	N	1	f	2.400 00 GHz	-58.469 dBm			
3	N	1	f	2.399 81 GHz	-48.024 dBm			
4	N	1	f	2.402 00 GHz	-0.382 dBm			

Frequency

Auto Tune

Center Freq
2.356750000 GHz

Start Freq
2.310000000 GHz

Stop Freq
2.403500000 GHz

CF Step
9.350000 MHz

Freq Offset
0 Hz

GFSK/HCH/ No Hop

Agilent Spectrum Analyzer - Swept SA
 Center Freq 2.489250000 GHz
 #Avg Type: RMS
 Avg|Hold: 100/100
 PNO: Fast Trig: Free Run
 IFGain:Low #Atten: 30 dB

10 dB/div Ref 20.00 dBm
 -21.28 dBm

Start 2.47850 GHz Stop 2.50000 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.133 ms (2001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.483 500 GHz	-63.635 dBm			
2	N	1	f	2.500 000 GHz	-63.475 dBm			
3	N	1	f	2.480 037 GHz	-1.264 dBm			

Frequency

Auto Tune

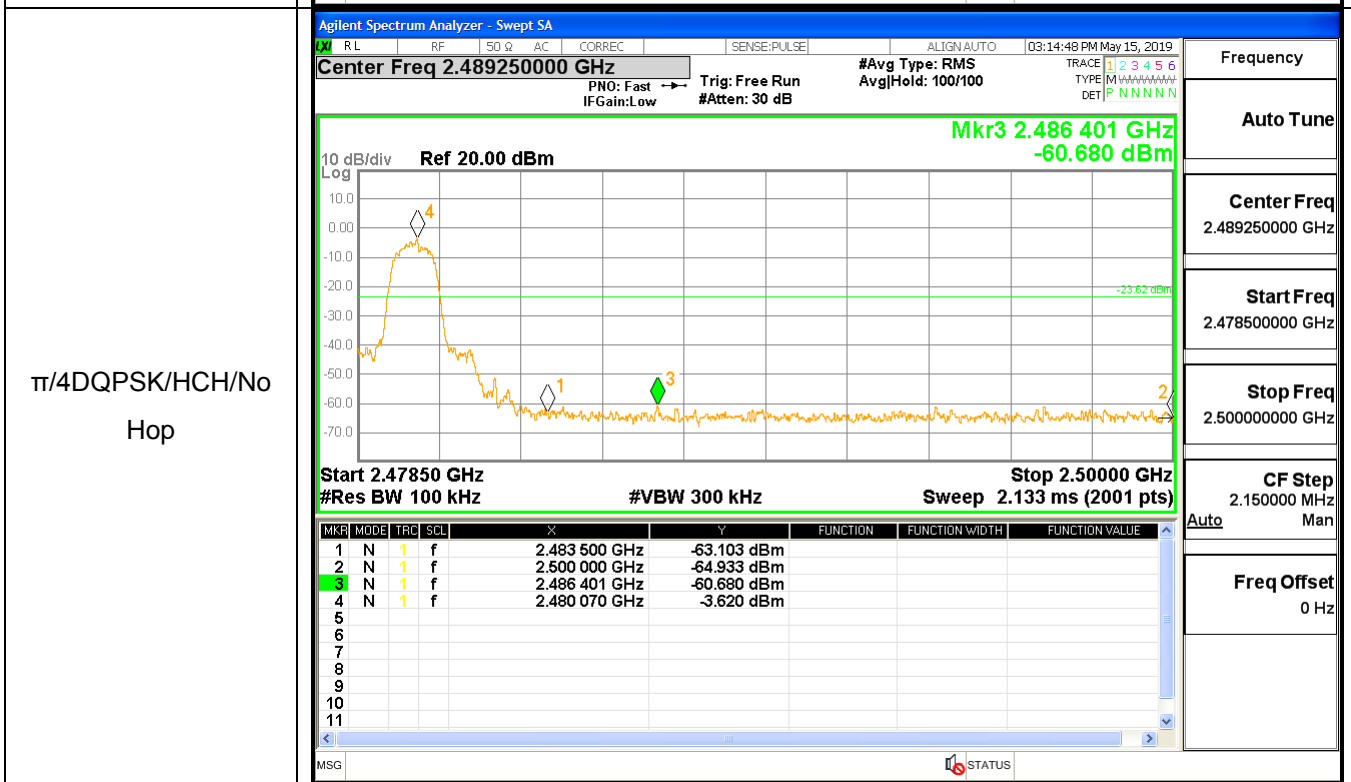
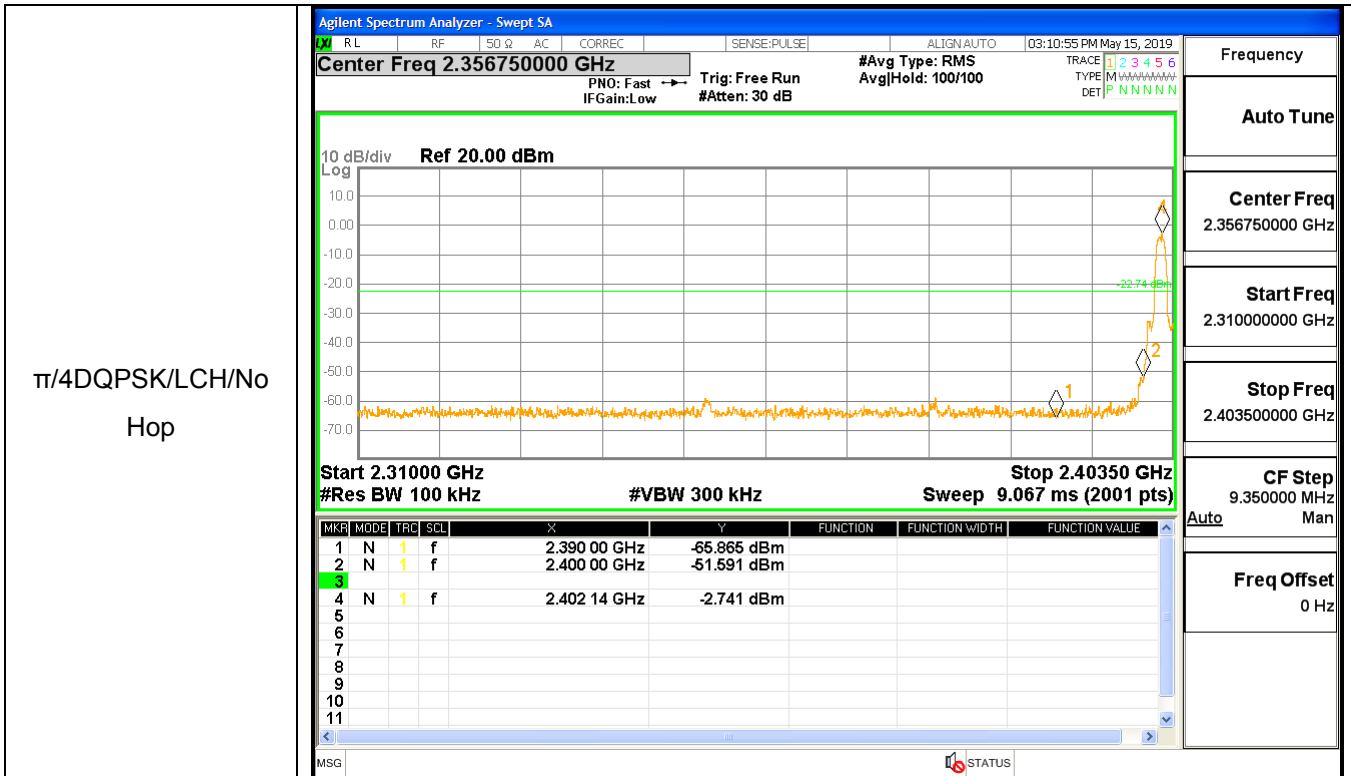
Center Freq
2.489250000 GHz

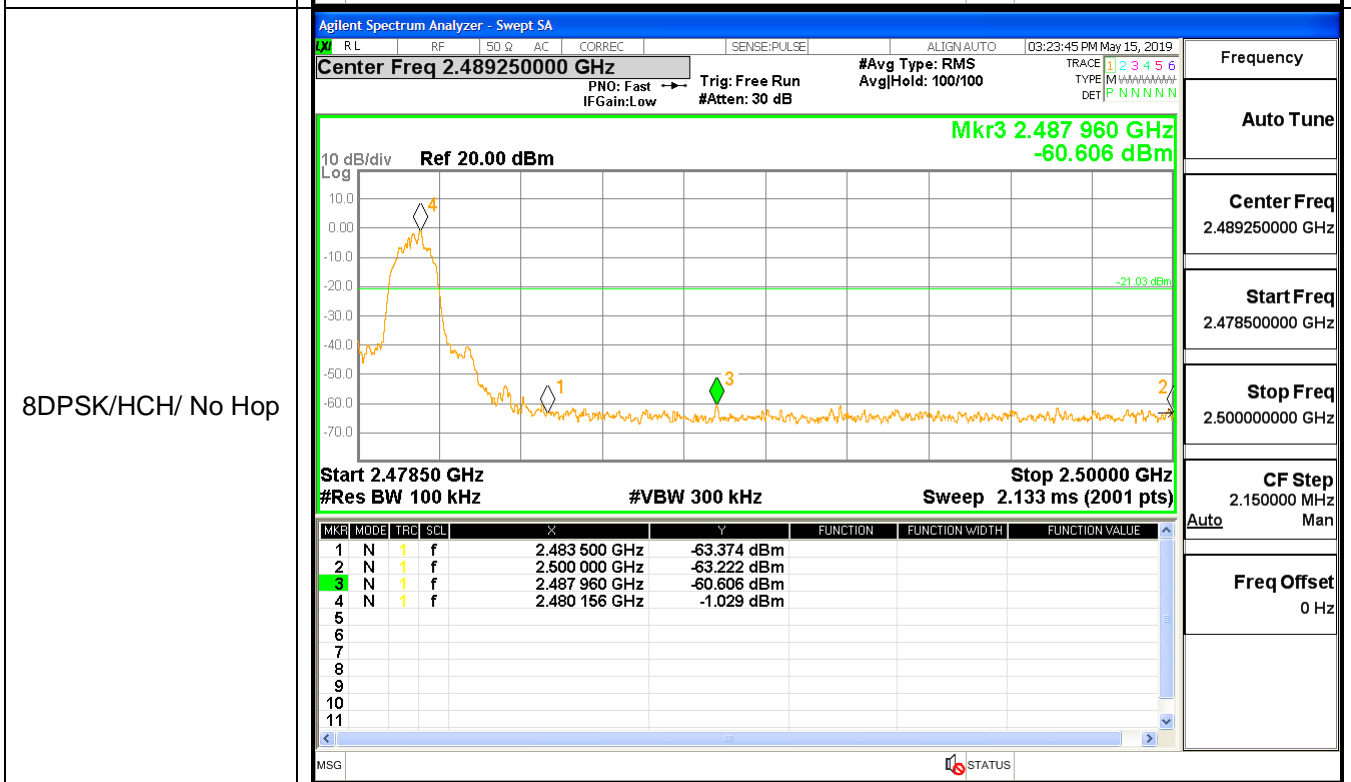
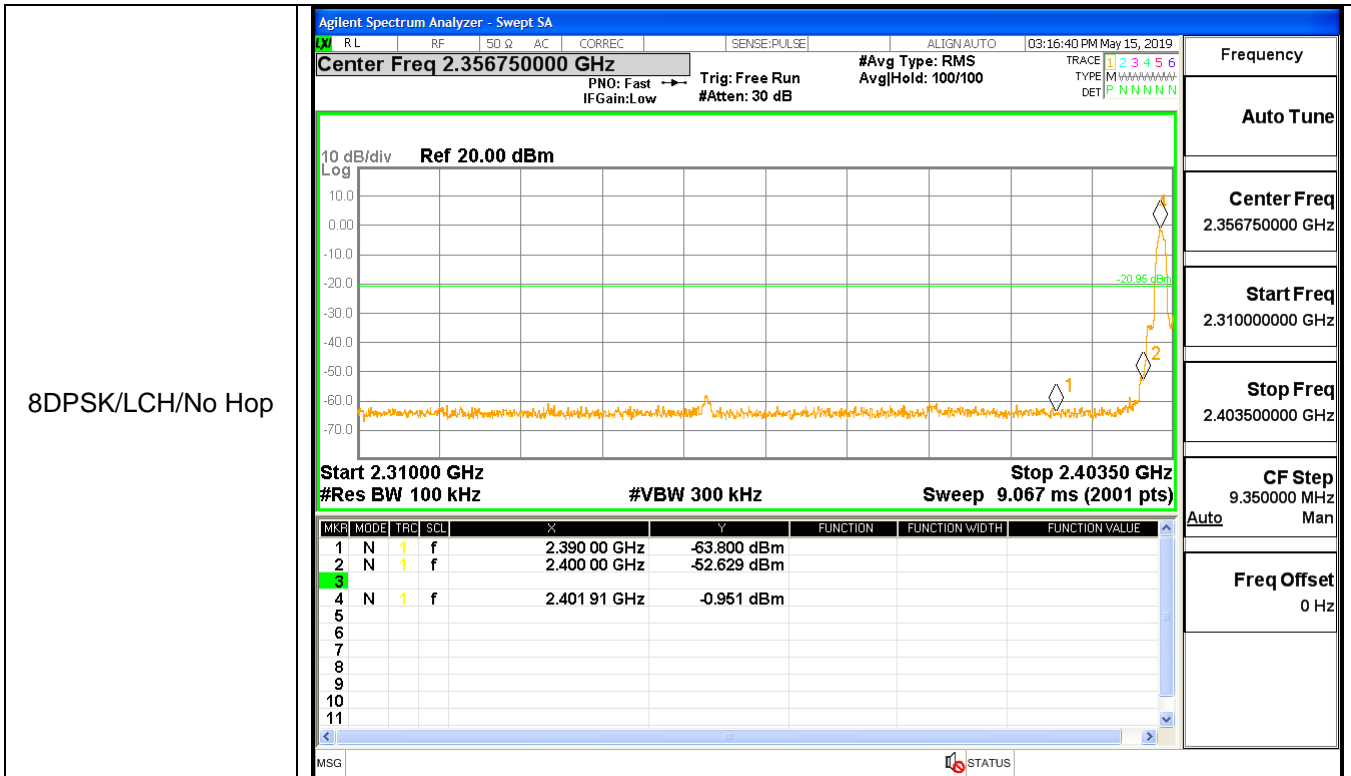
Start Freq
2.478500000 GHz

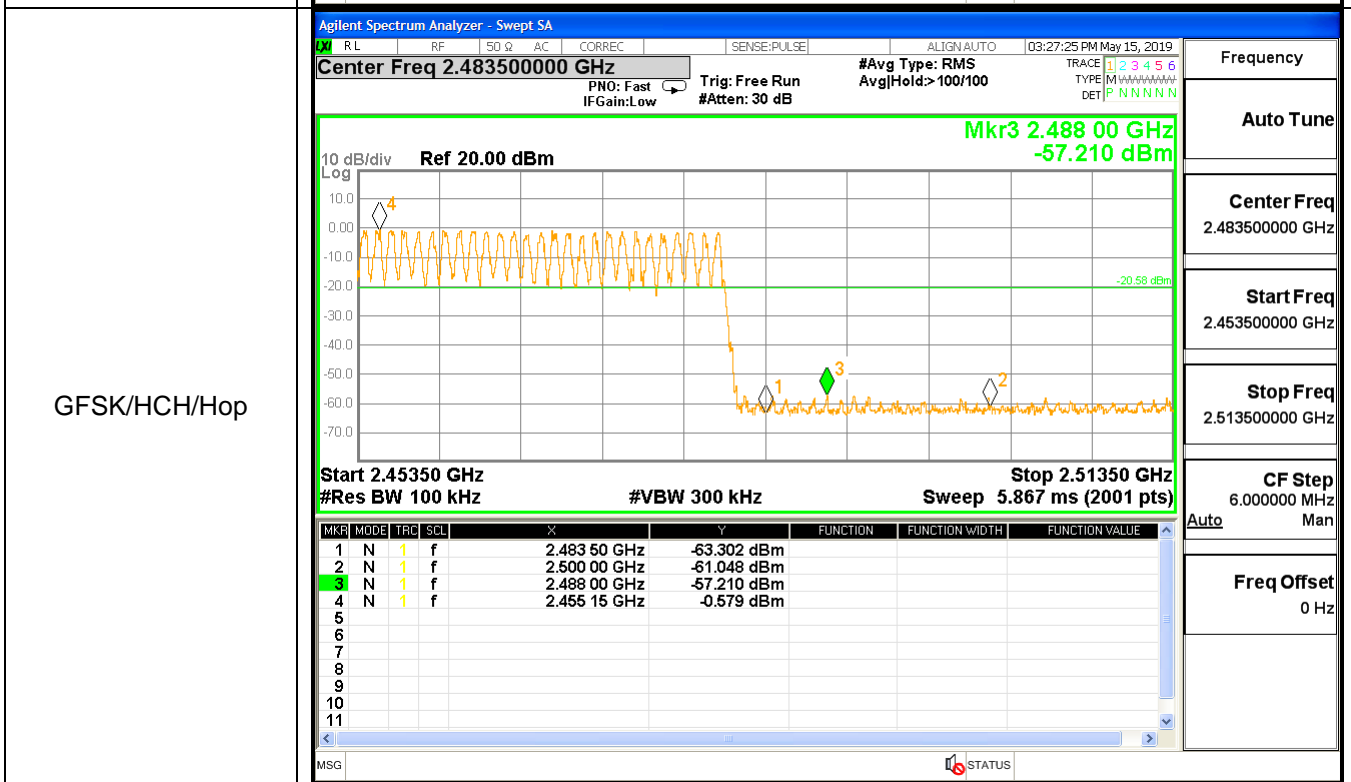
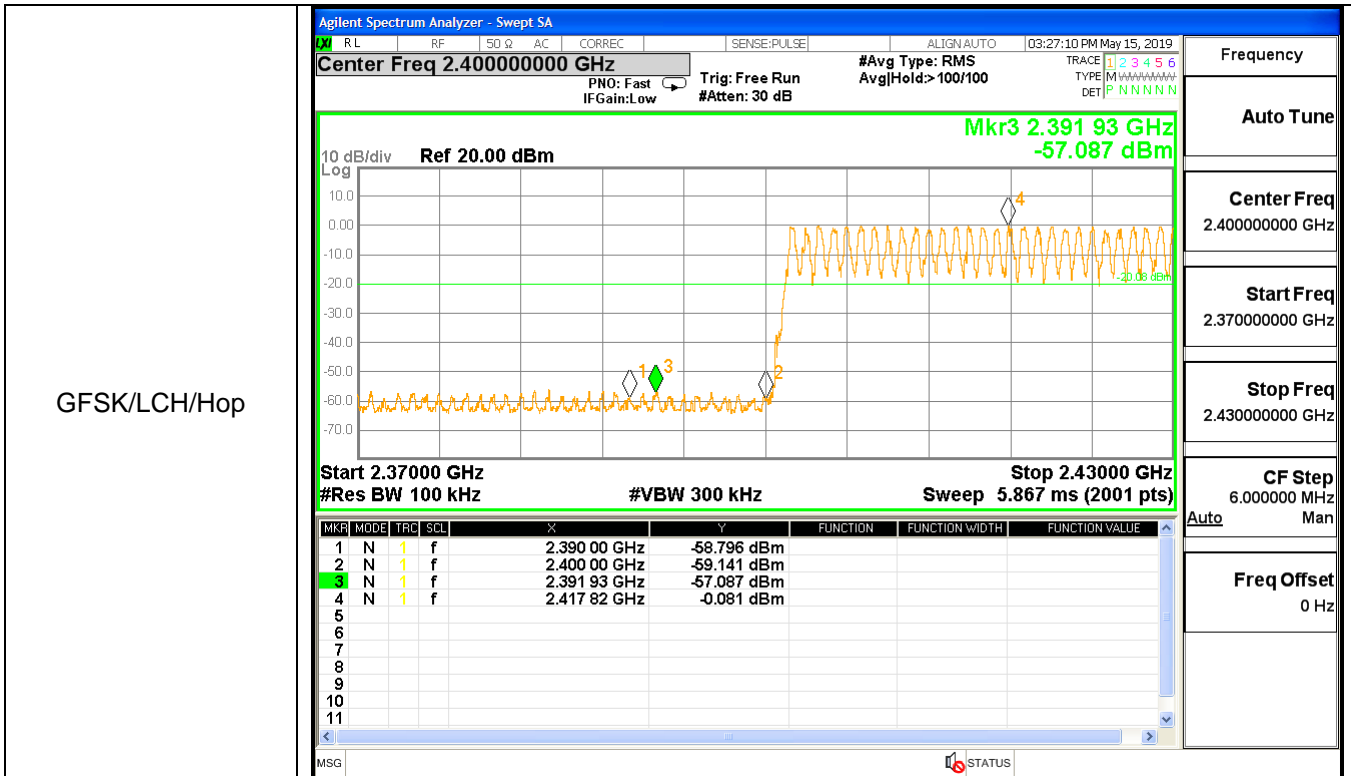
Stop Freq
2.500000000 GHz

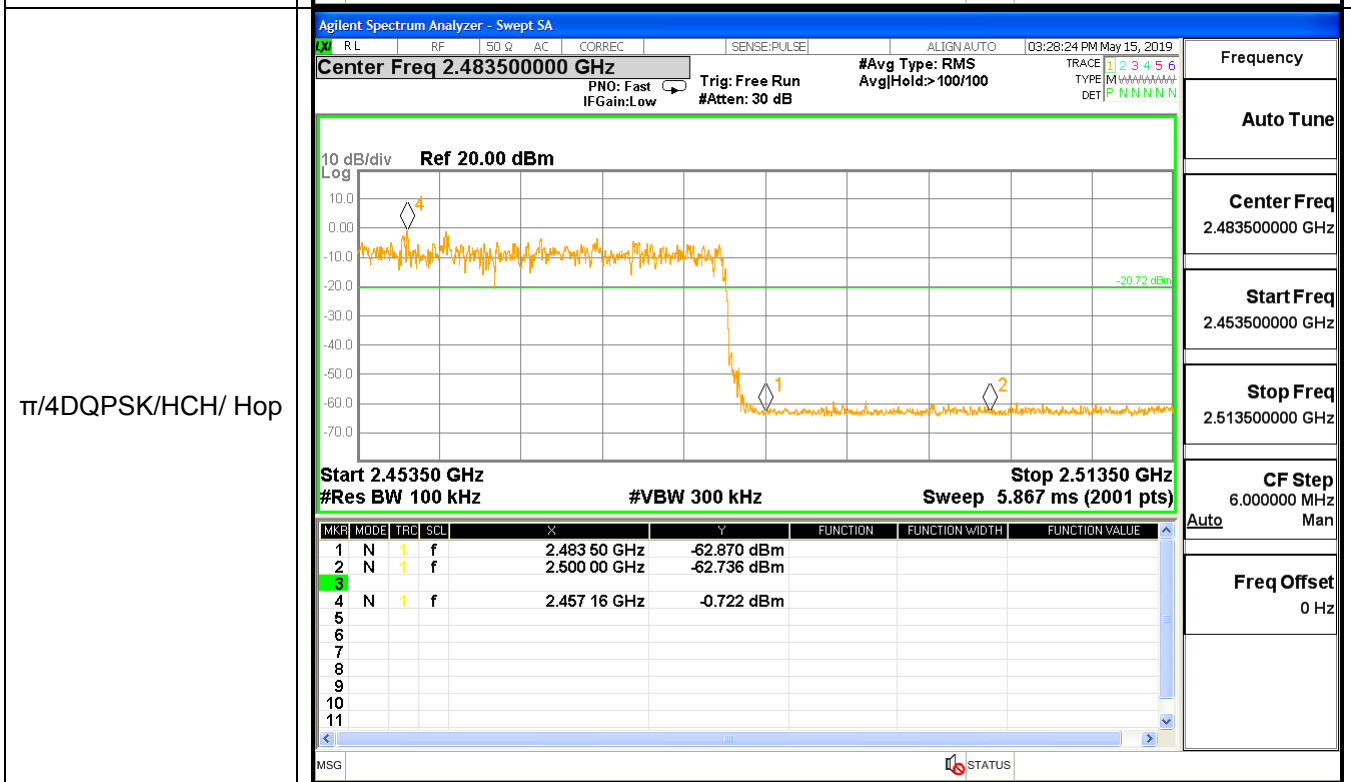
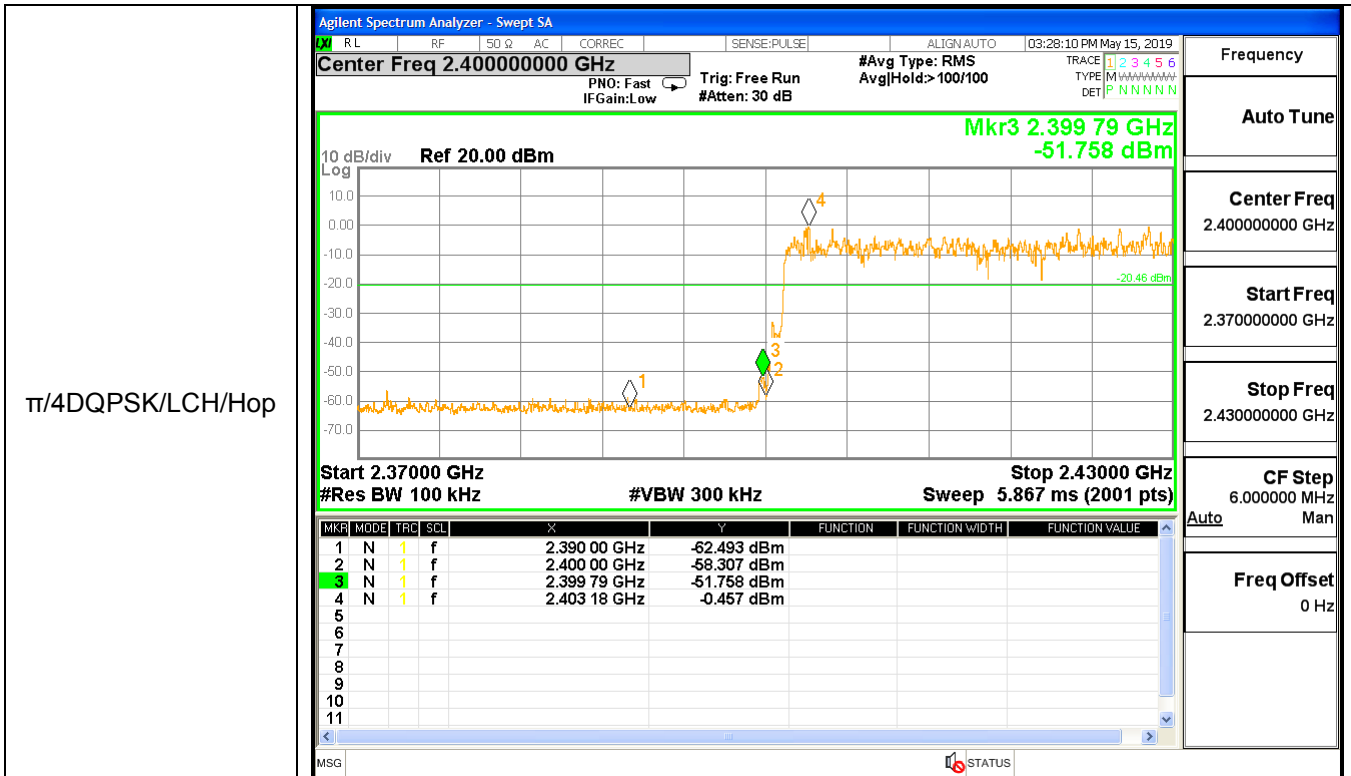
CF Step
2.150000 MHz

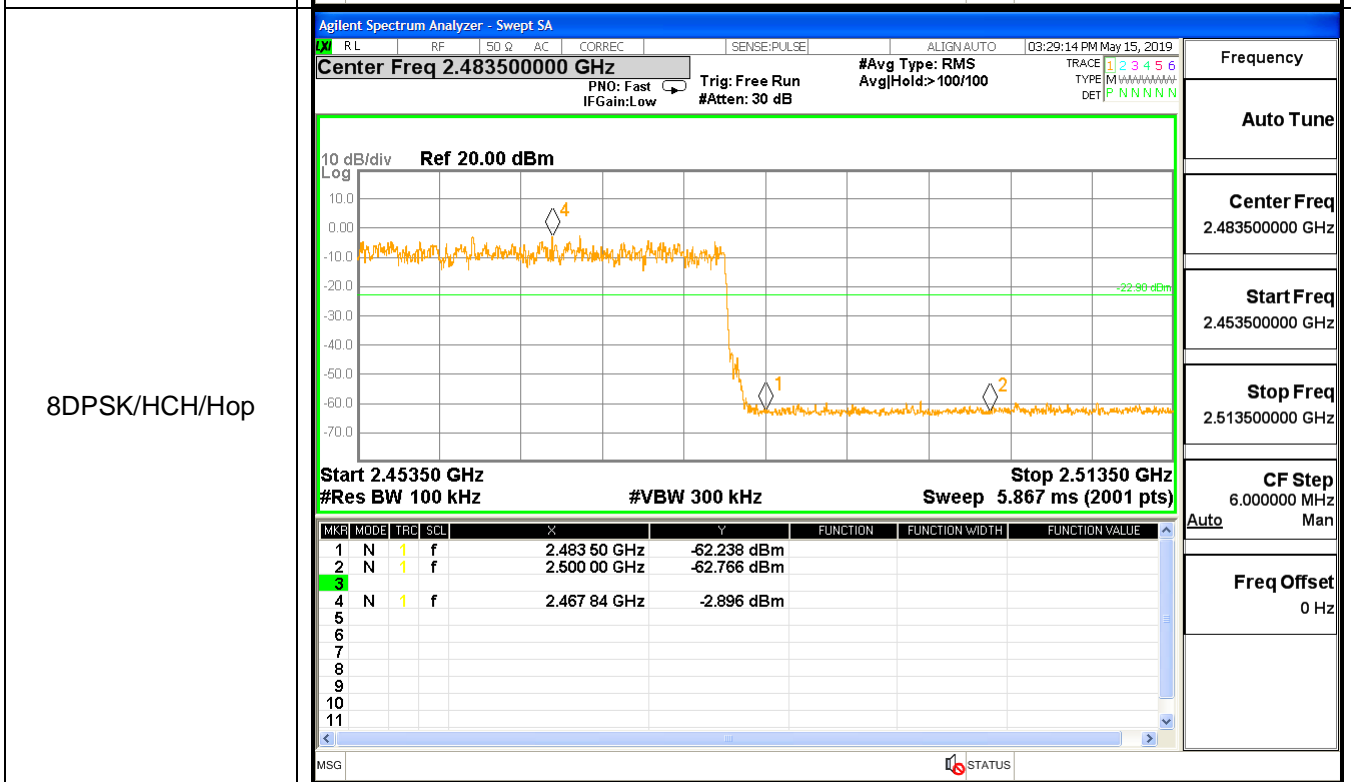
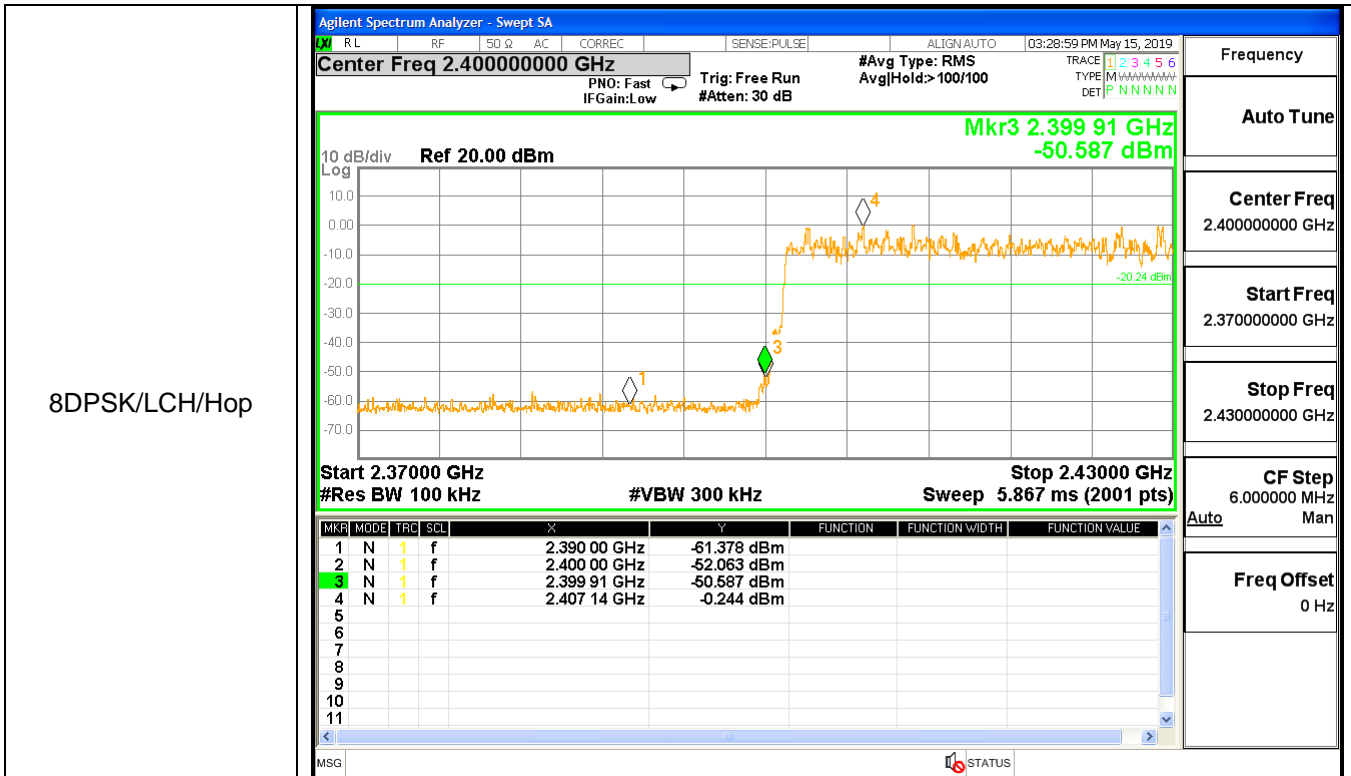
Freq Offset
0 Hz



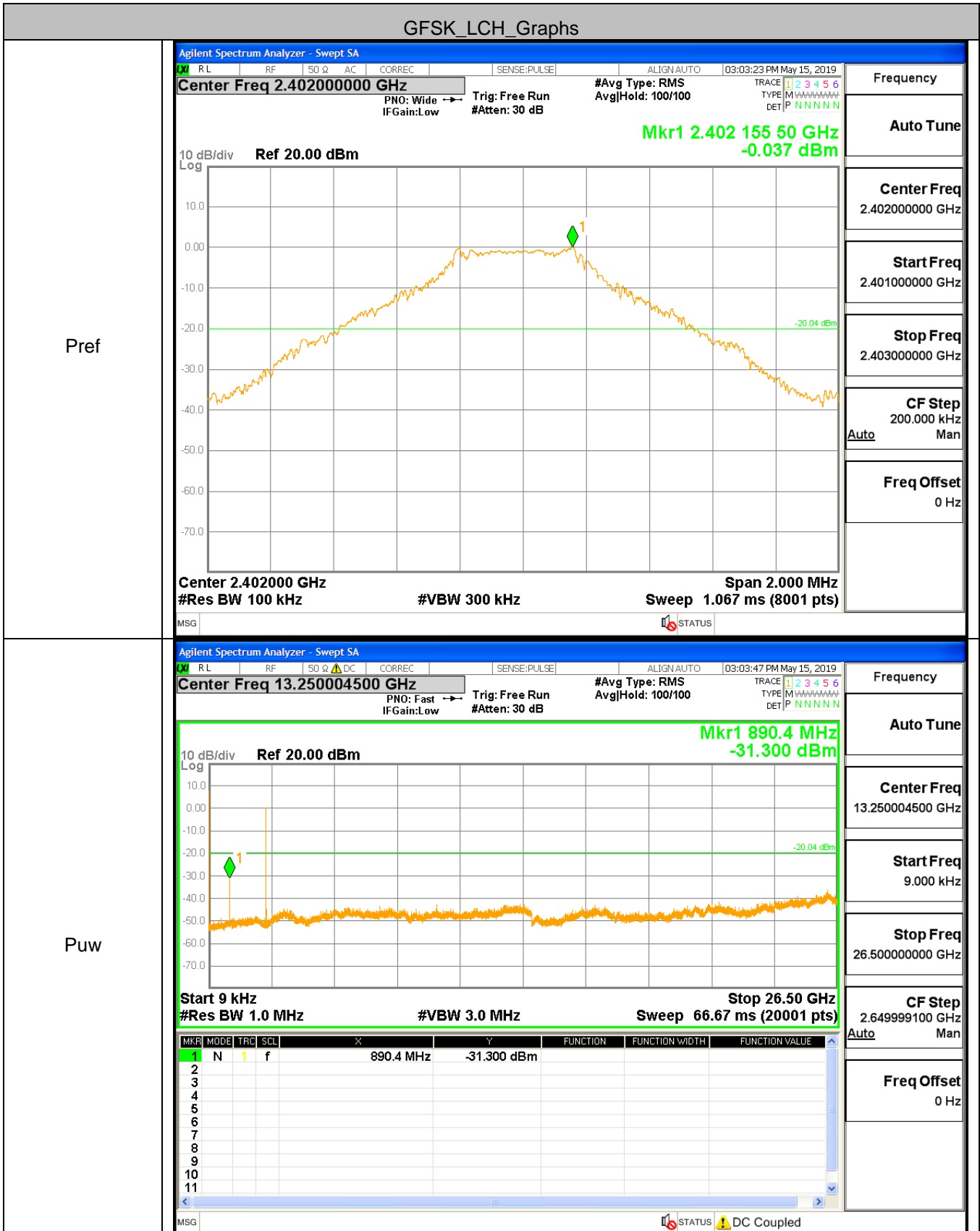


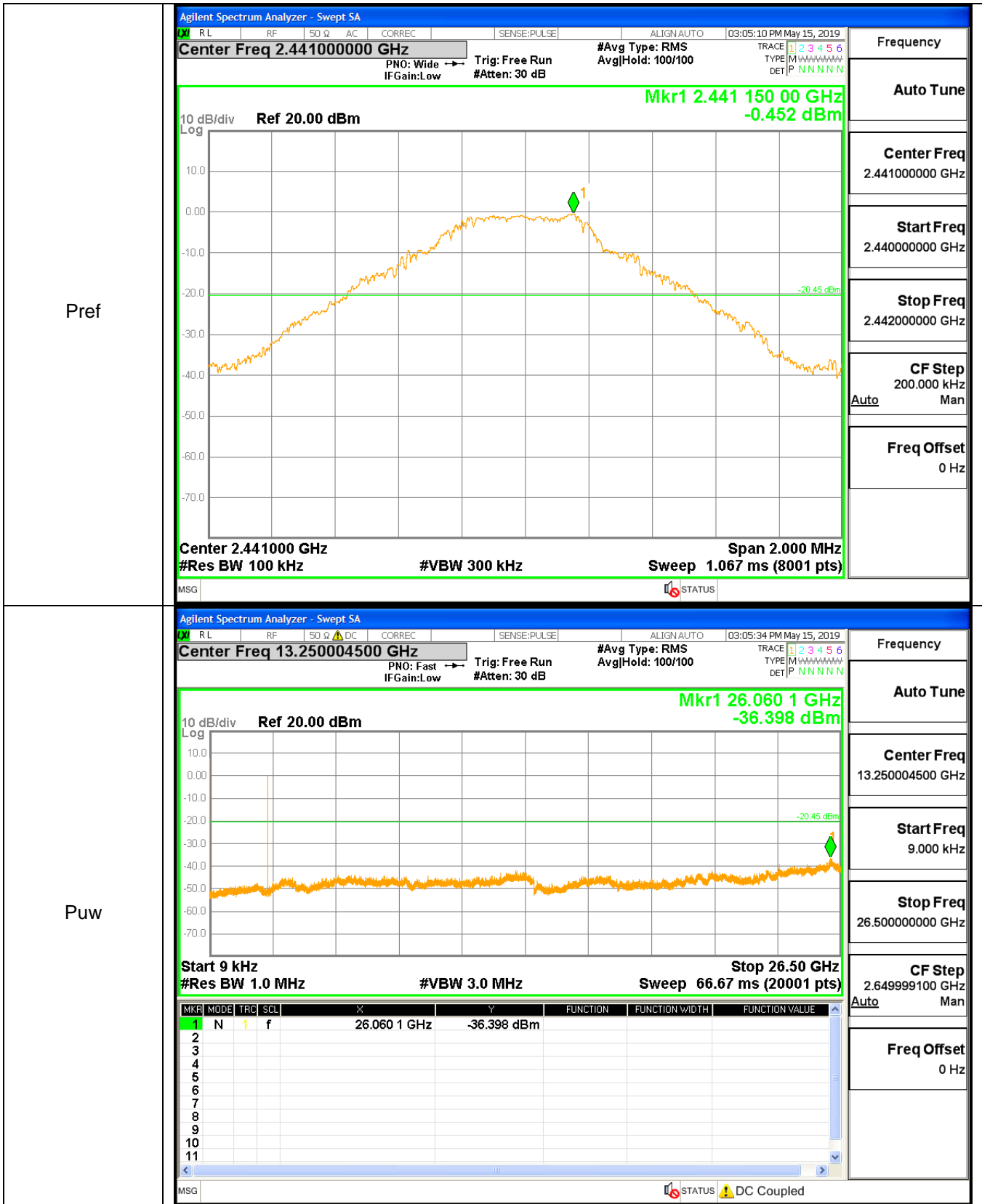




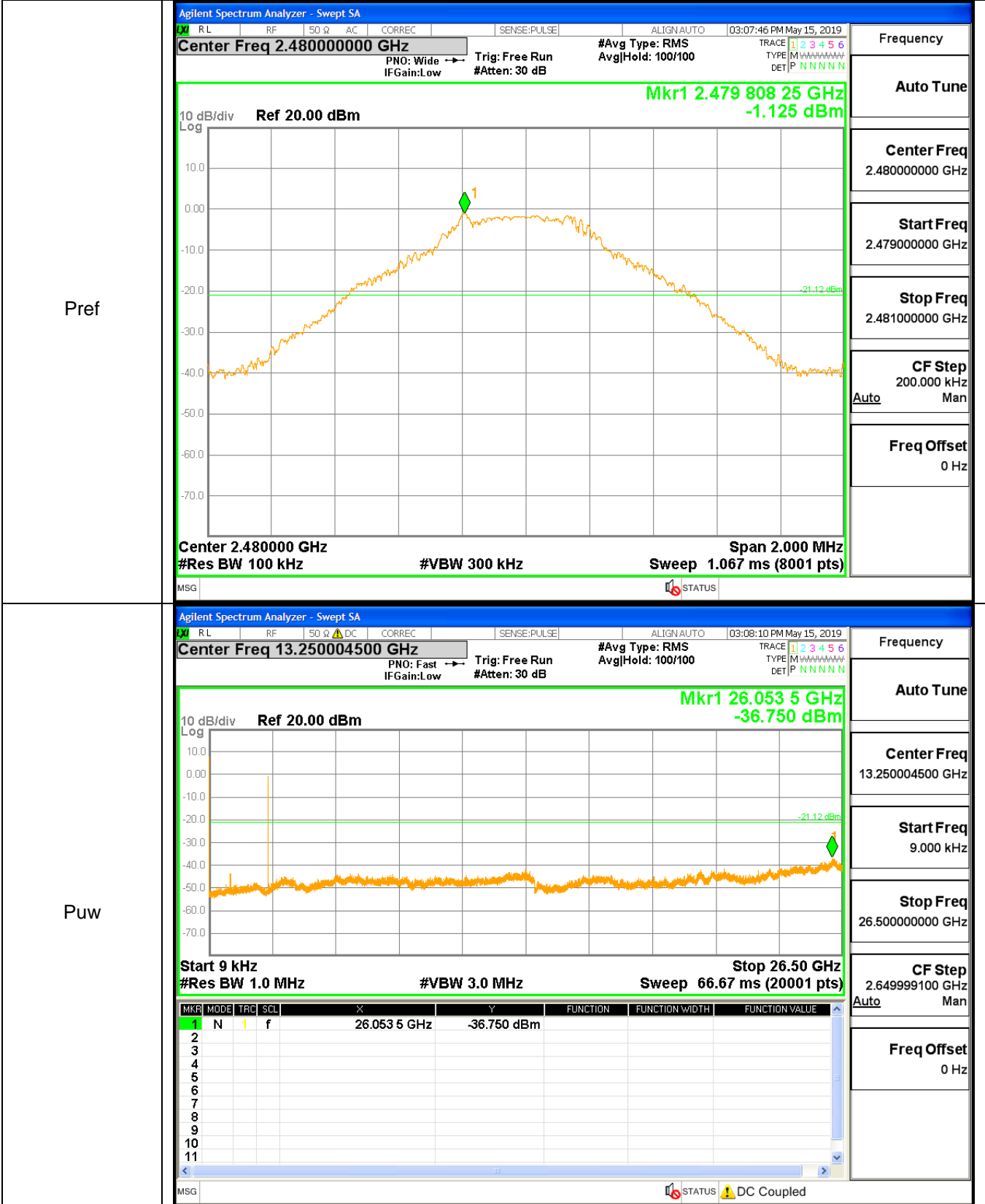


A.7 RF Conducted Spurious Emissions Test Graph

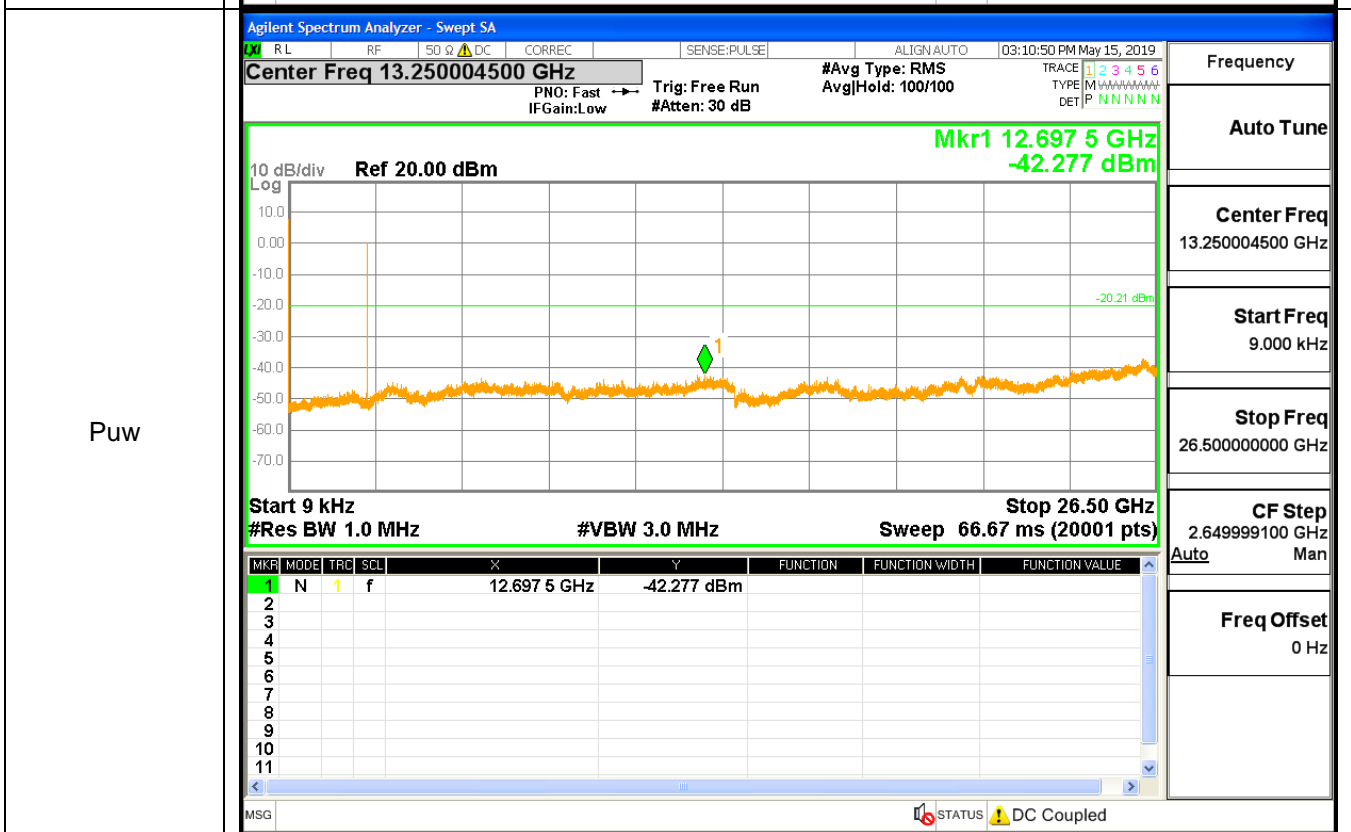
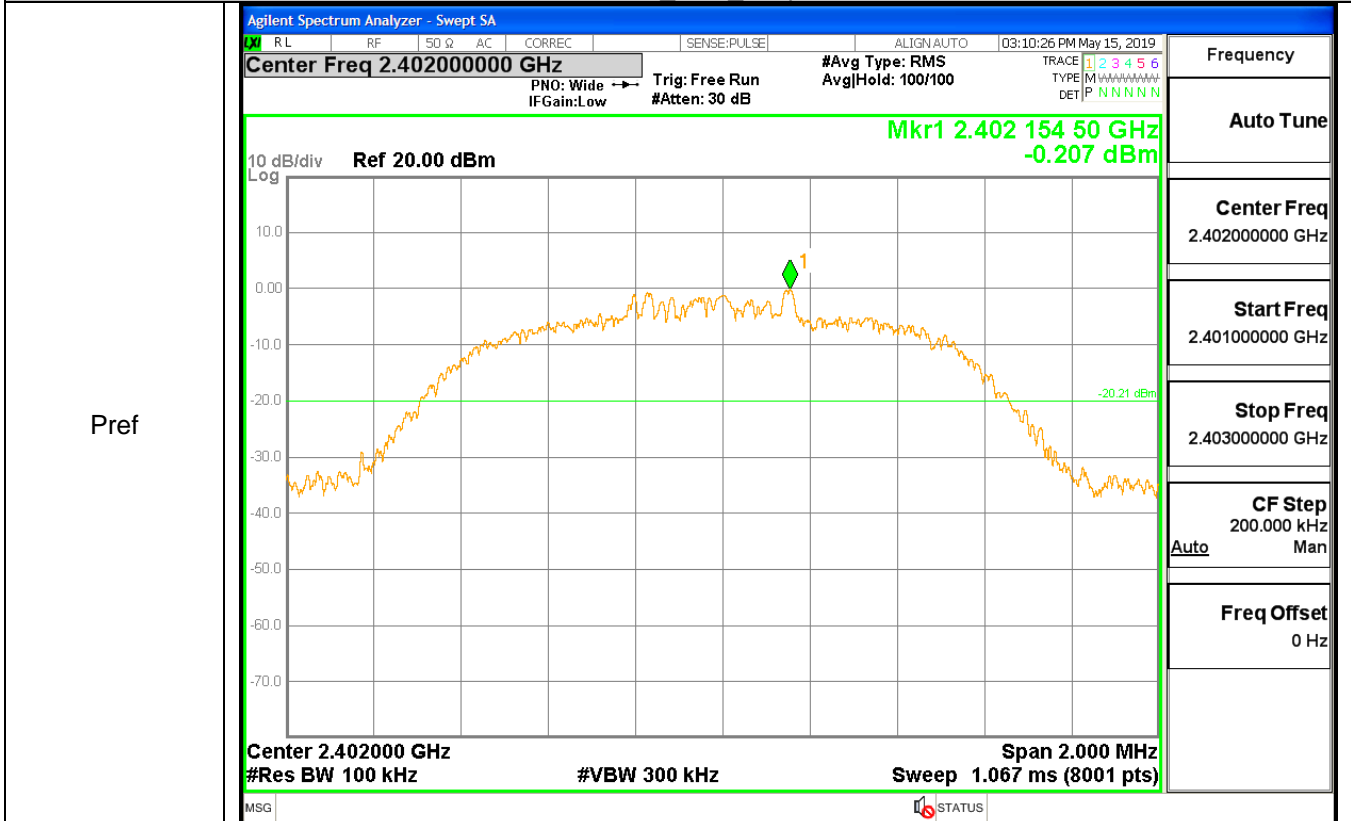




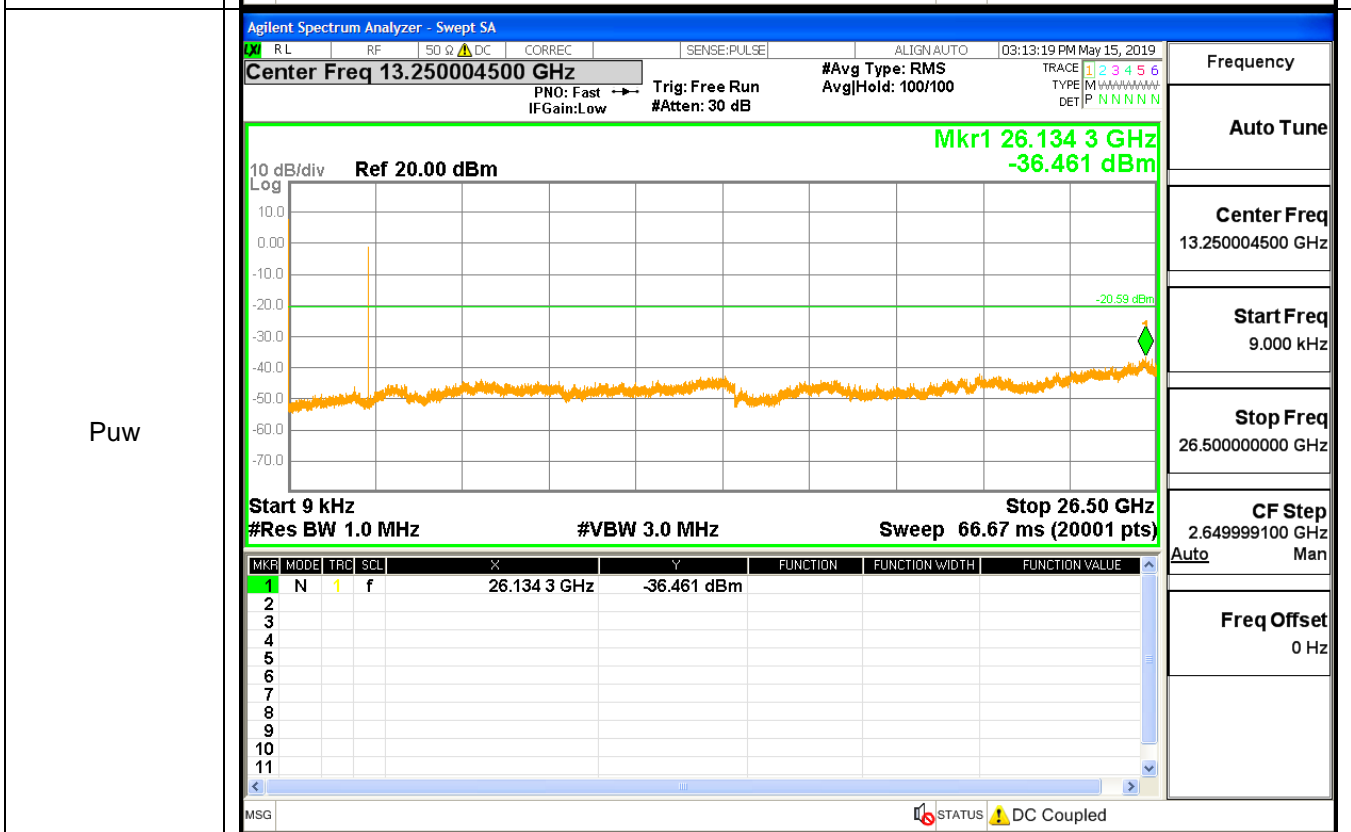
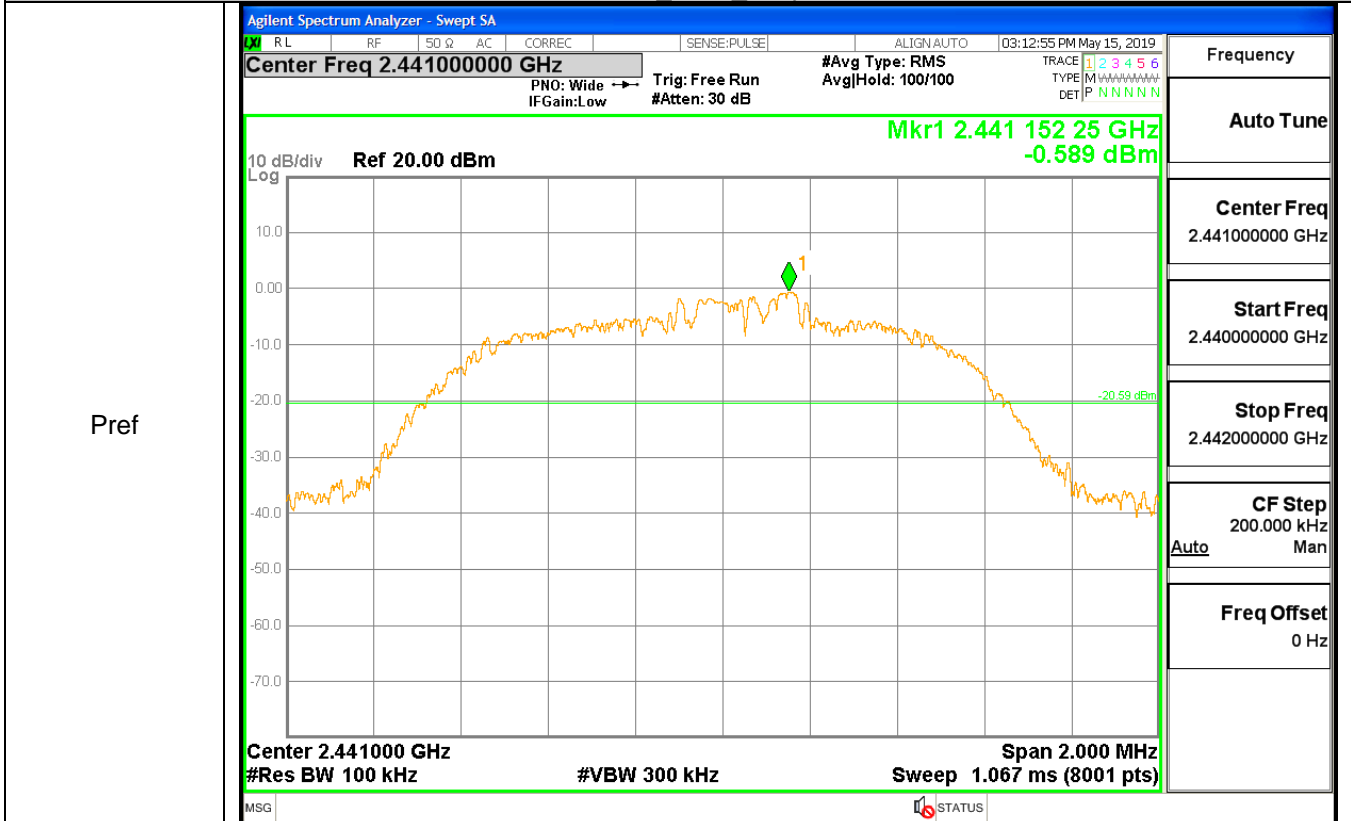
GFSK_HCH_Graphs



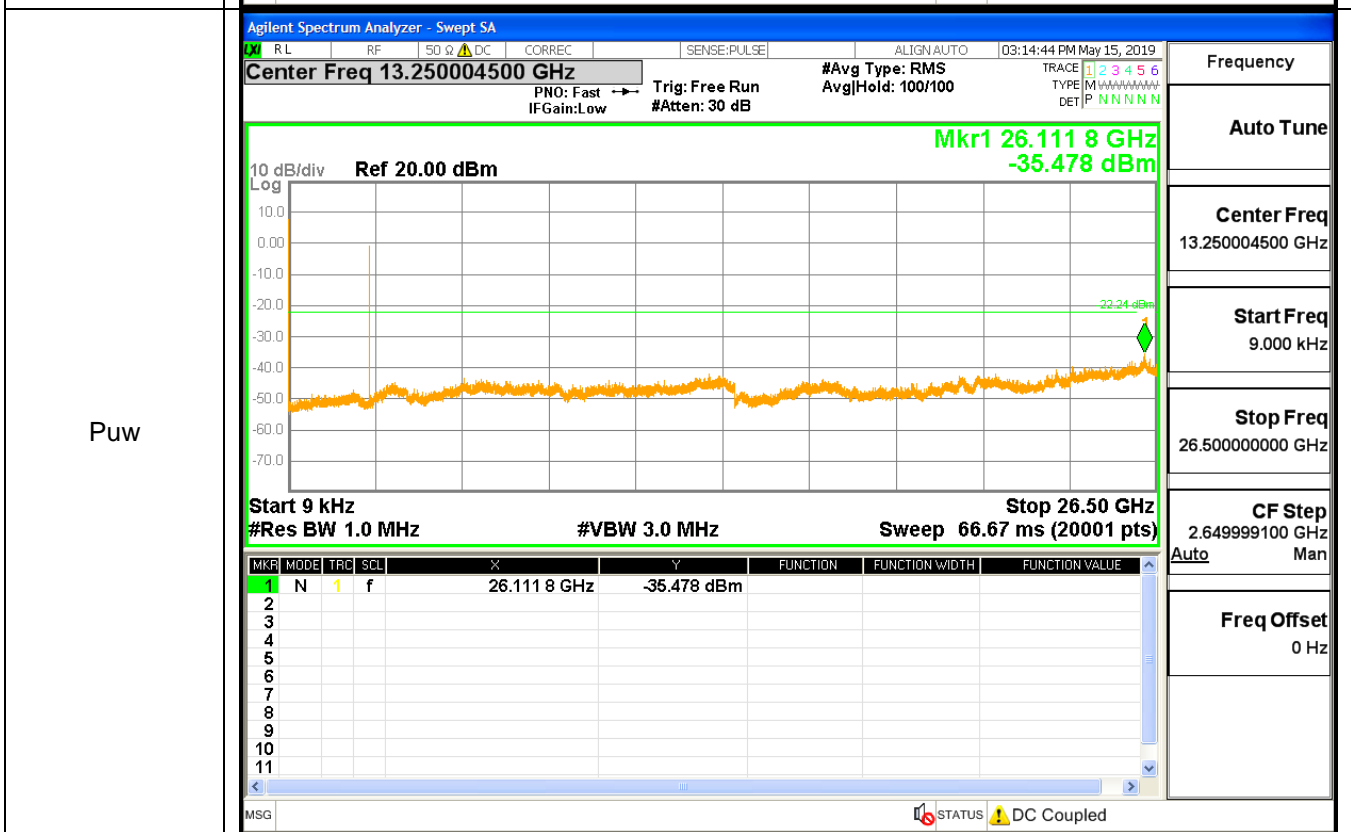
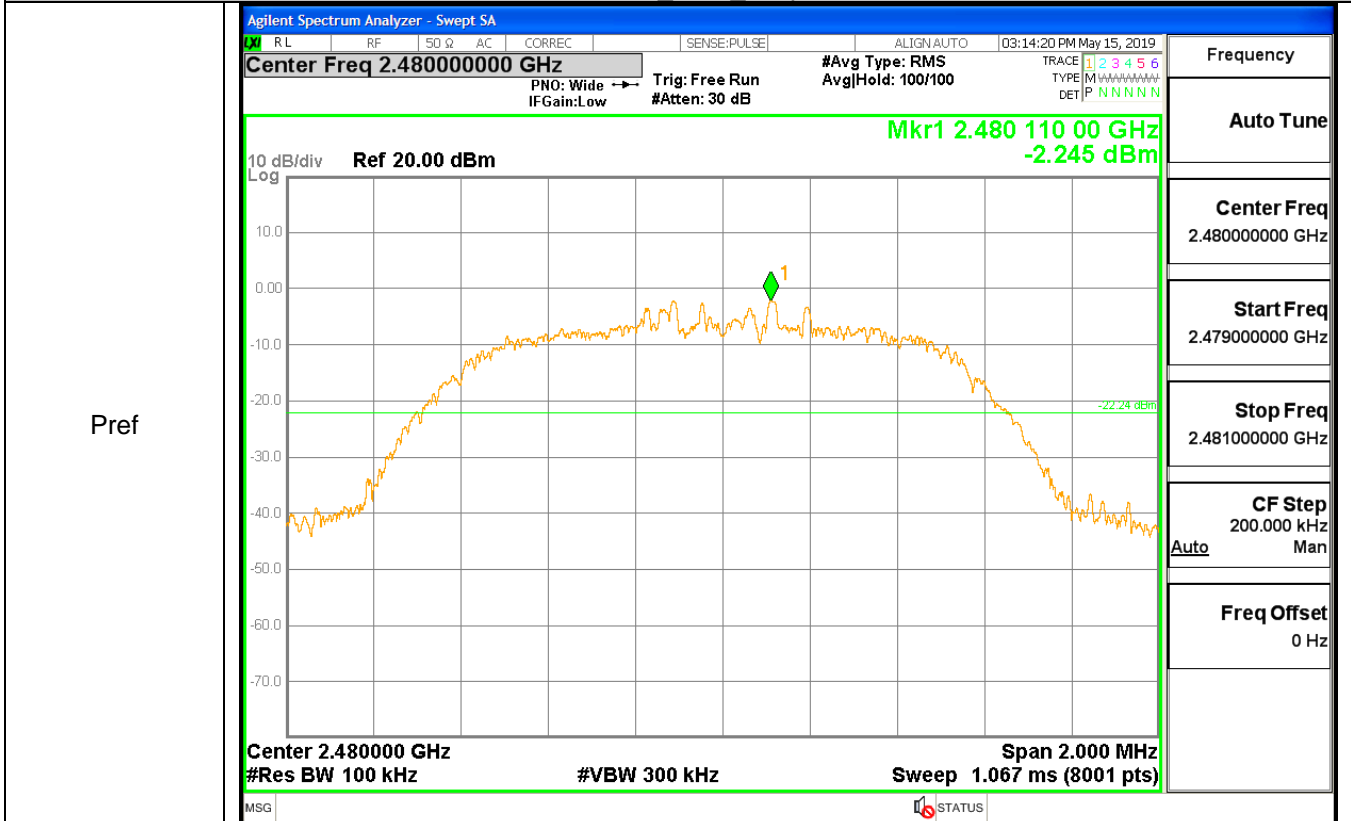
$\pi/4$ DQPSK_LCH_Graphs



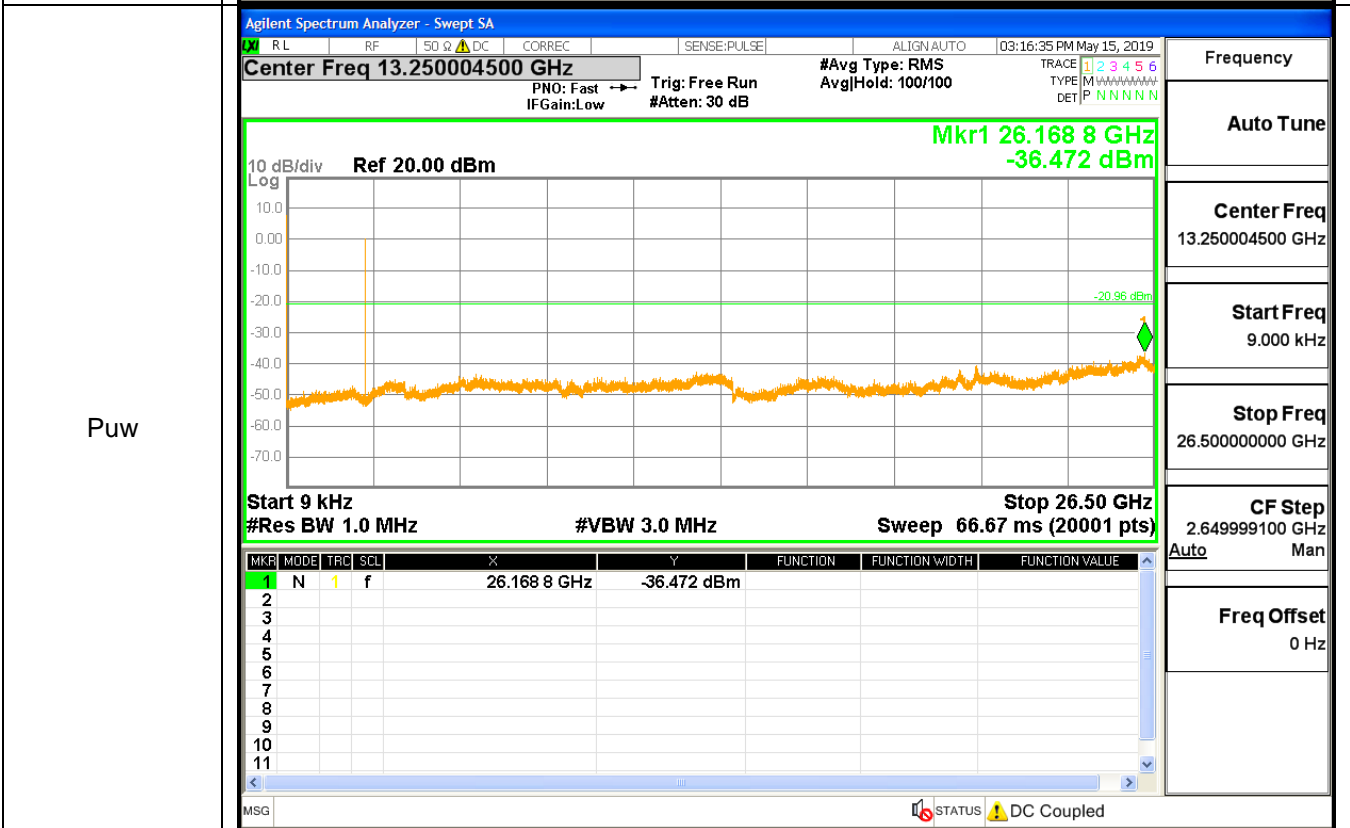
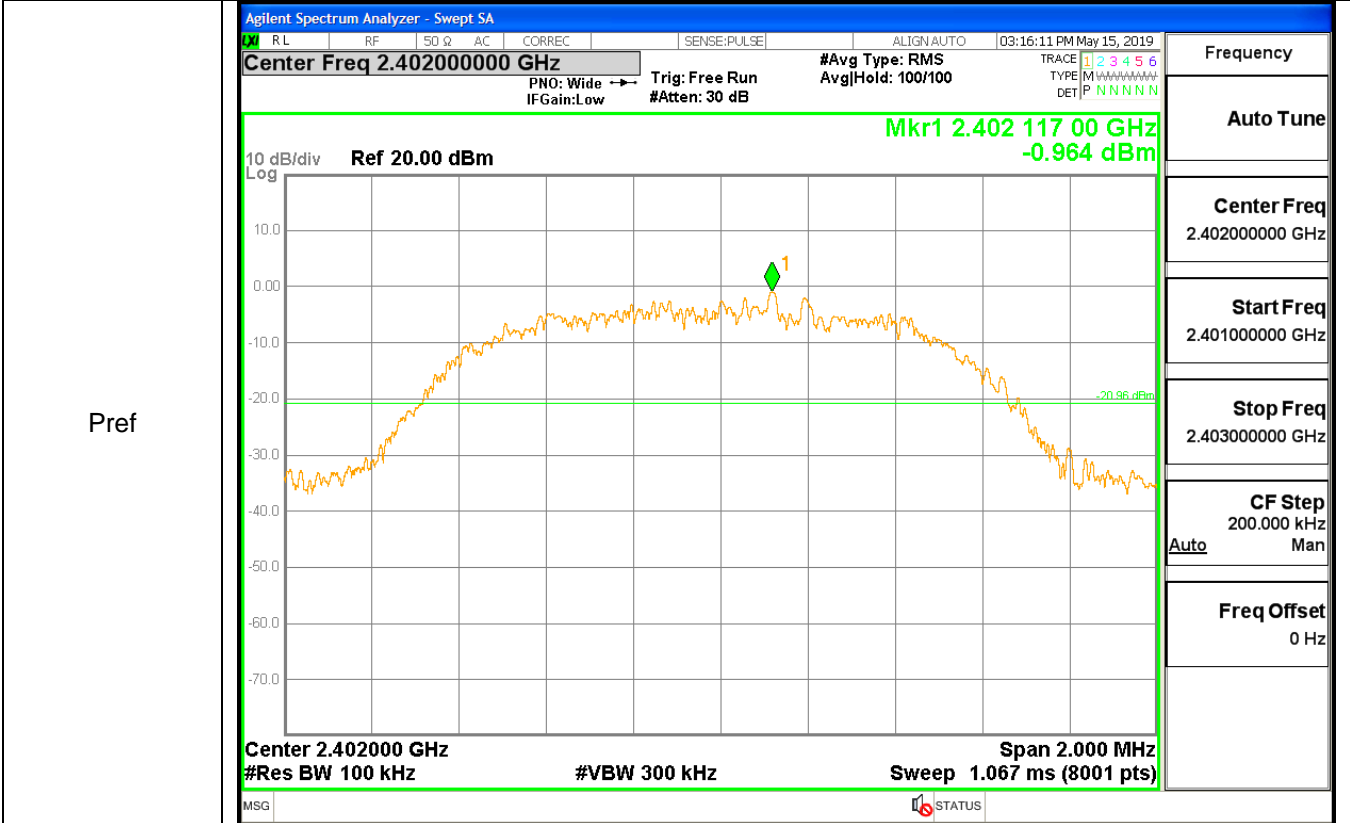
$\pi/4$ DQPSK_MCH_Graphs



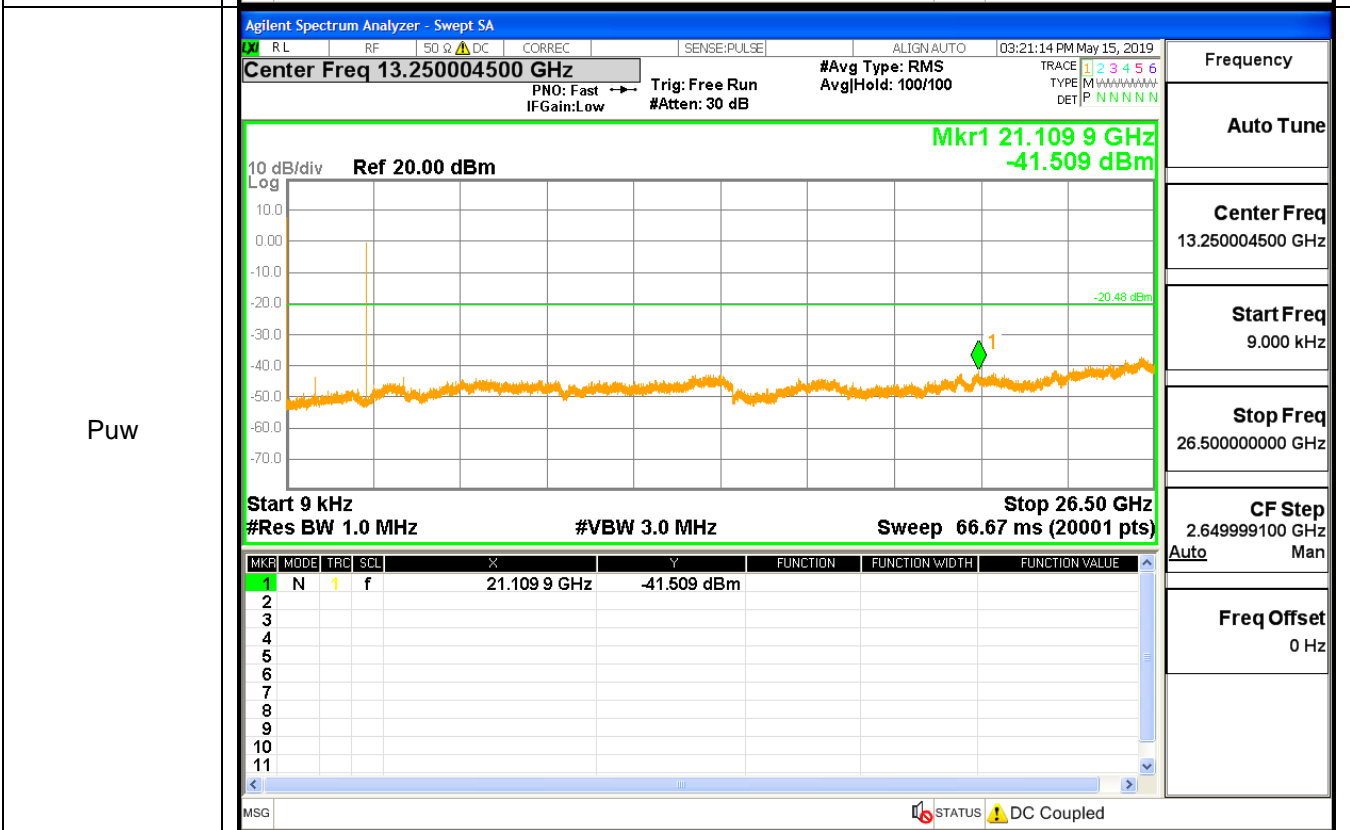
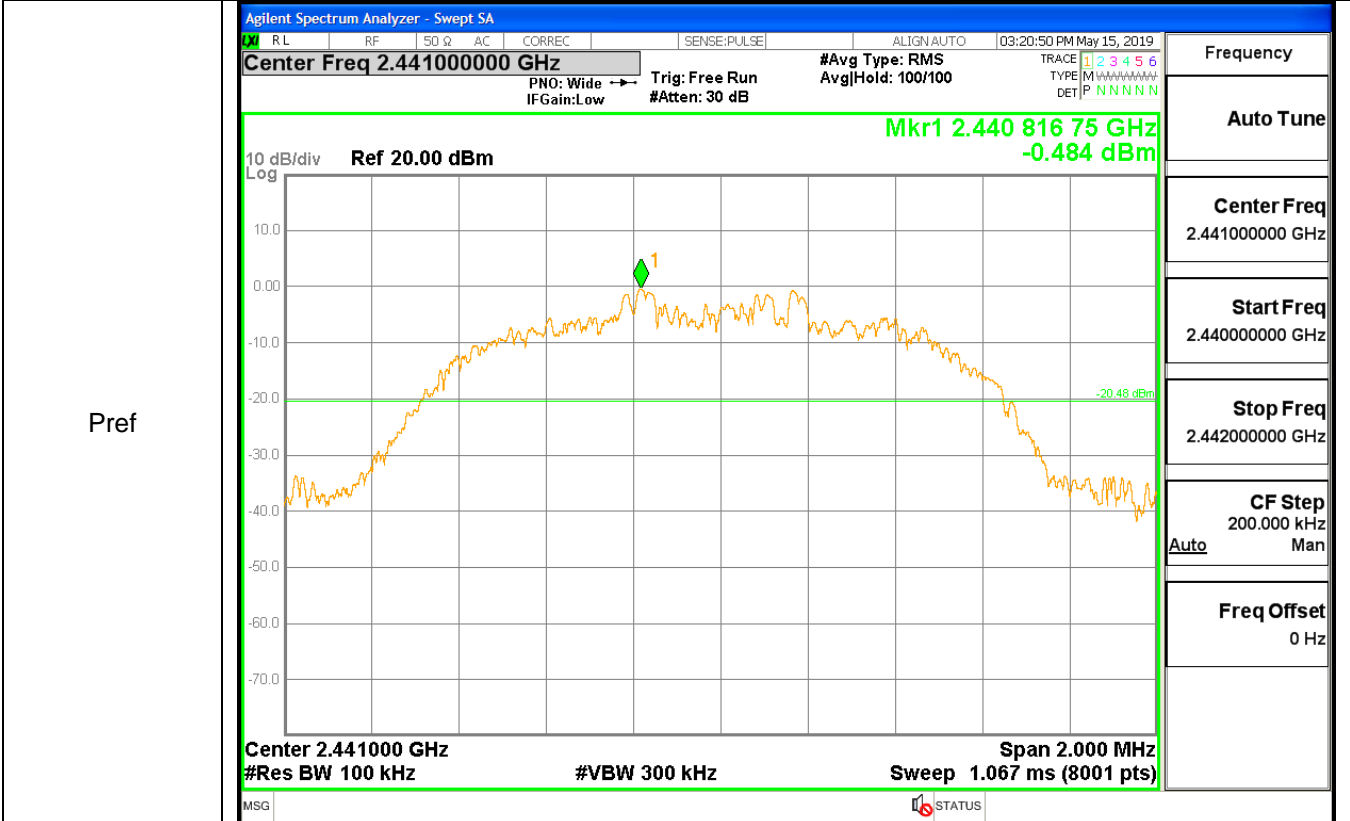
$\pi/4$ DQPSK_HCH_Graphs



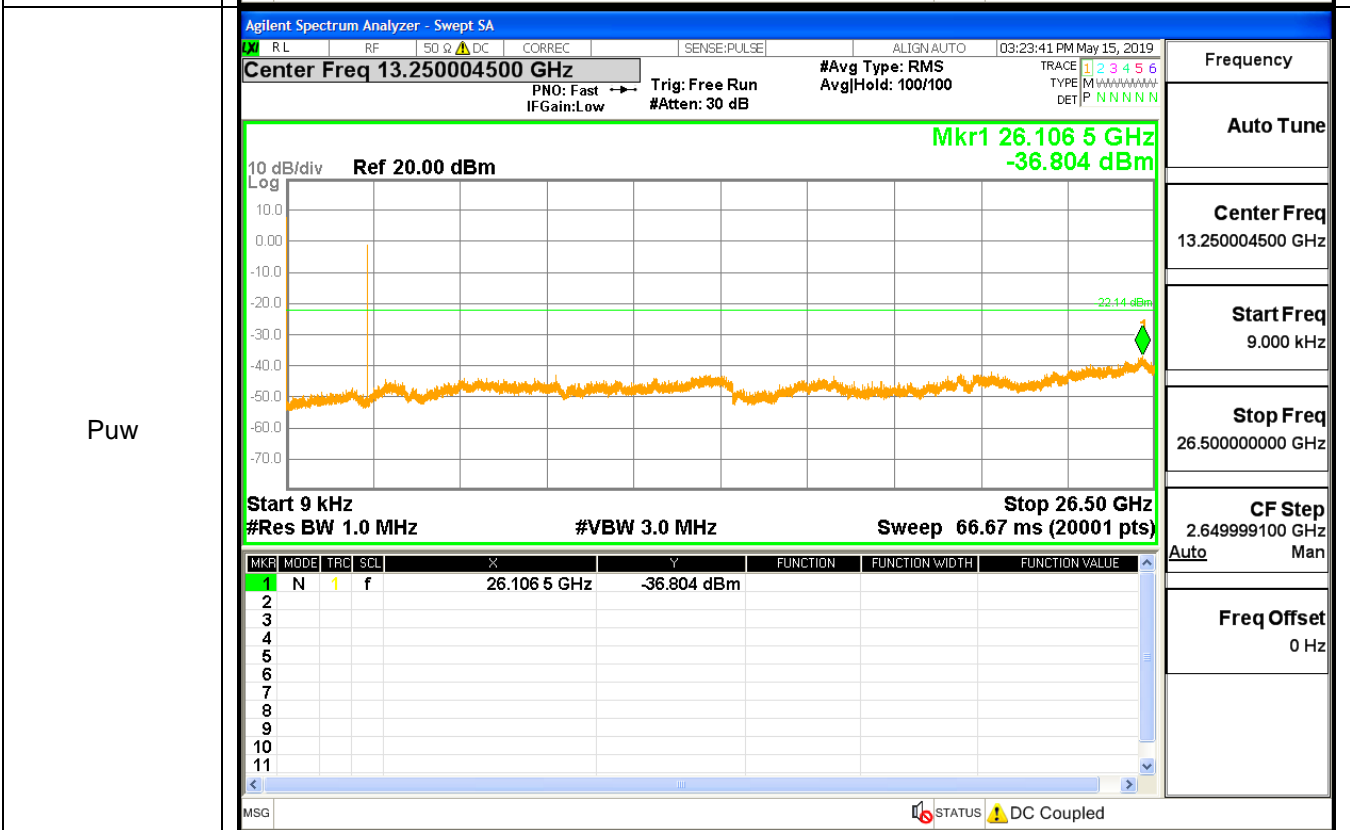
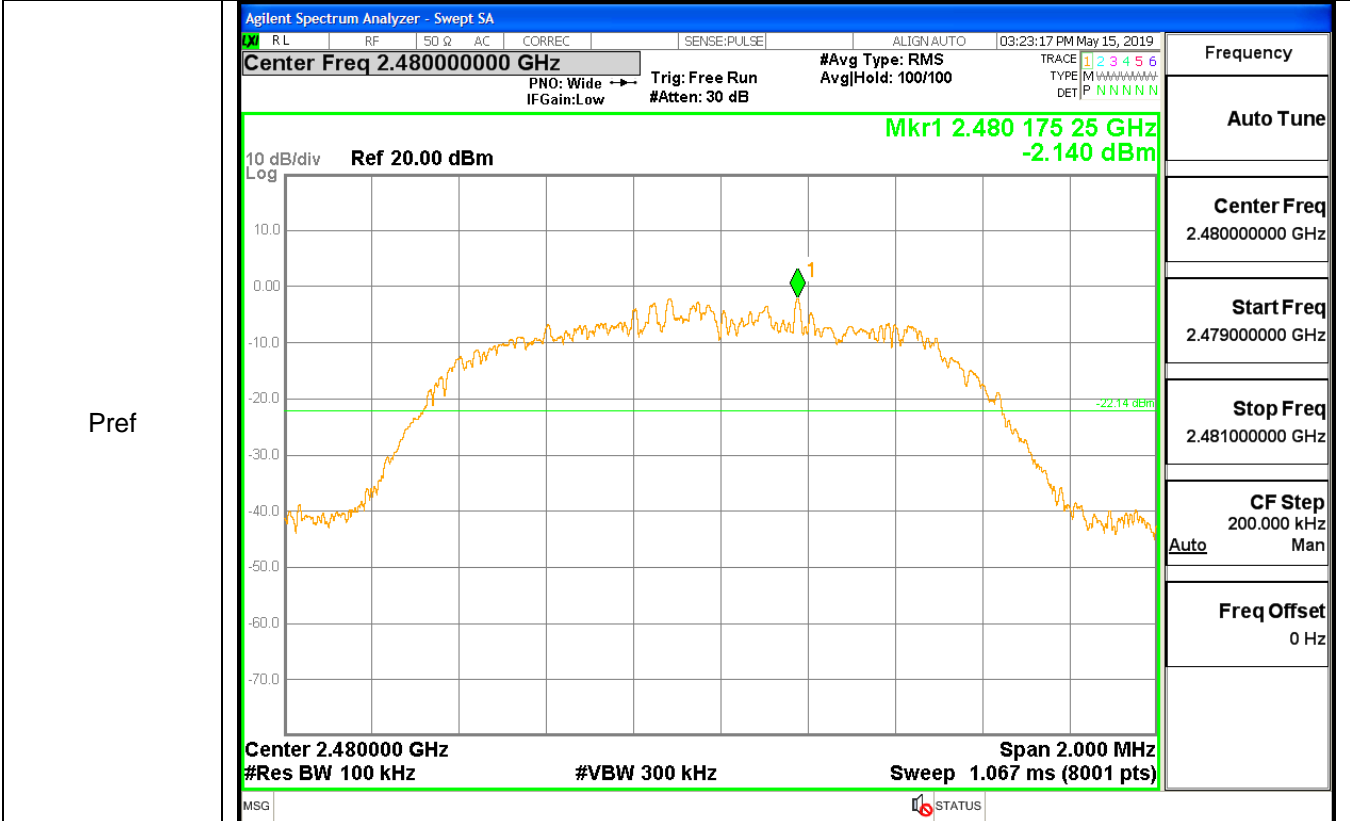
8DPSK_LCH_Graphs



8DPSK_MCH_Graphs



8DPSK_HCH_Graphs

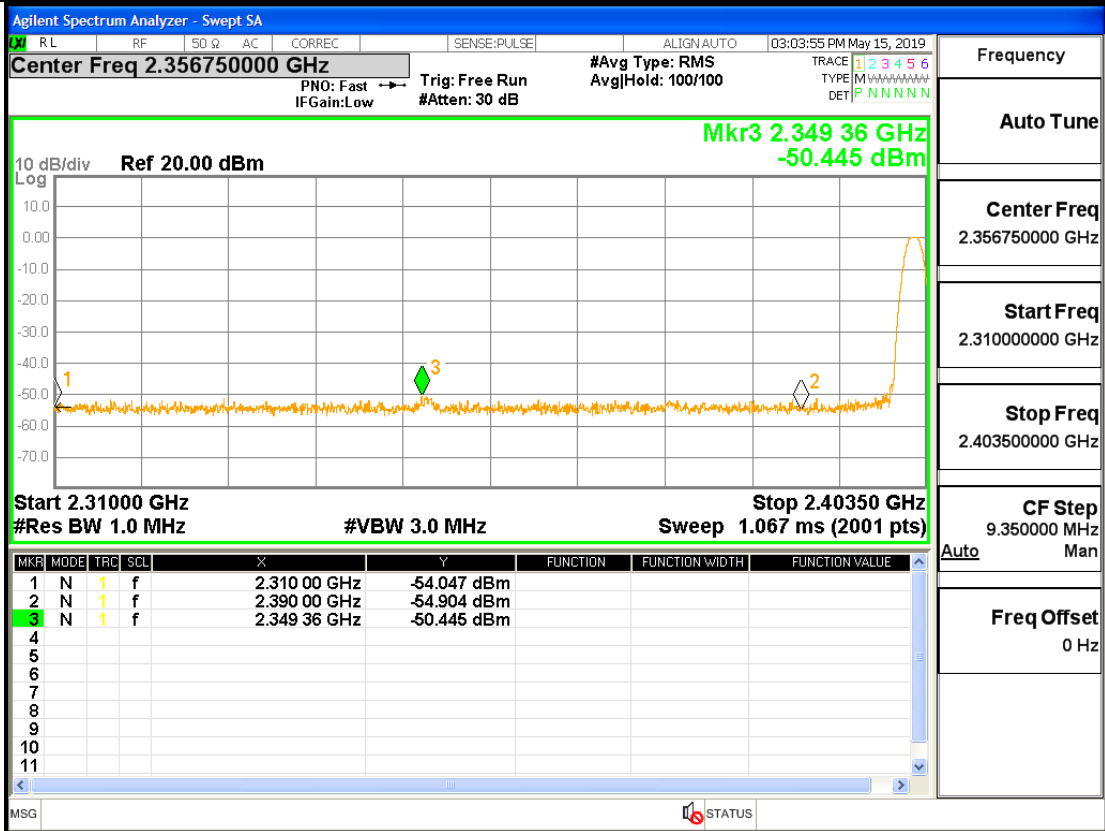


A.8 Restrict-band band-edge measurements

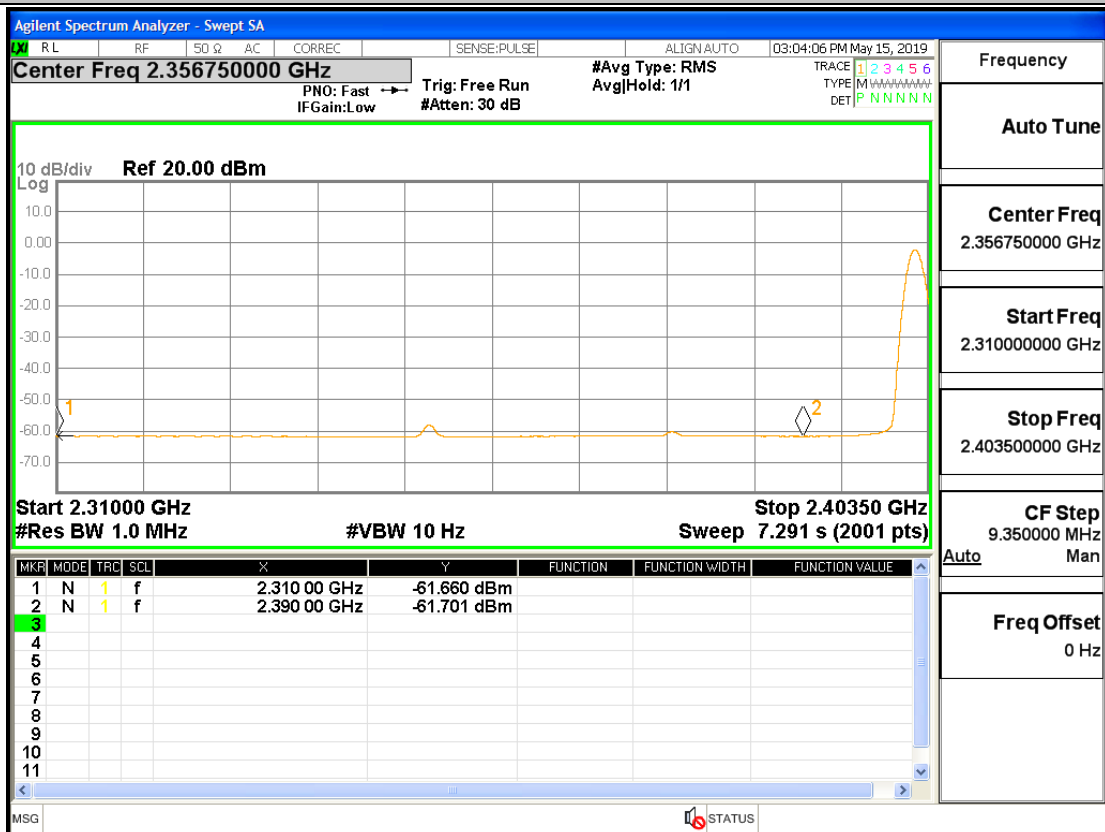
Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Peak Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2349.36	3.10	0.00	-50.45	47.86	74	Pass
1DH5	2480	2483.76	3.10	0.00	-47.47	50.83	74	Pass
2DH5	2402	2350.25	3.10	0.00	-50.63	47.67	74	Pass
2DH5	2480	2483.50	3.10	0.00	-53.04	45.26	74	Pass
3DH5	2402	2350.06	3.10	0.00	-50.52	47.79	74	Pass
3DH5	2480	2483.54	3.10	0.00	-46.08	52.22	74	Pass

Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Average Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2310.00	3.10	0.00	-61.66	36.64	54	Pass
1DH5	2480	2483.50	3.10	0.00	-59.34	38.96	54	Pass
2DH5	2402	2310.00	3.10	0.00	-61.76	36.54	54	Pass
2DH5	2480	2483.50	3.10	0.00	-59.24	39.06	54	Pass
3DH5	2402	2310.00	3.10	0.00	-61.77	36.53	54	Pass
3DH5	2480	2483.50	3.10	0.00	-59.20	39.10	54	Pass

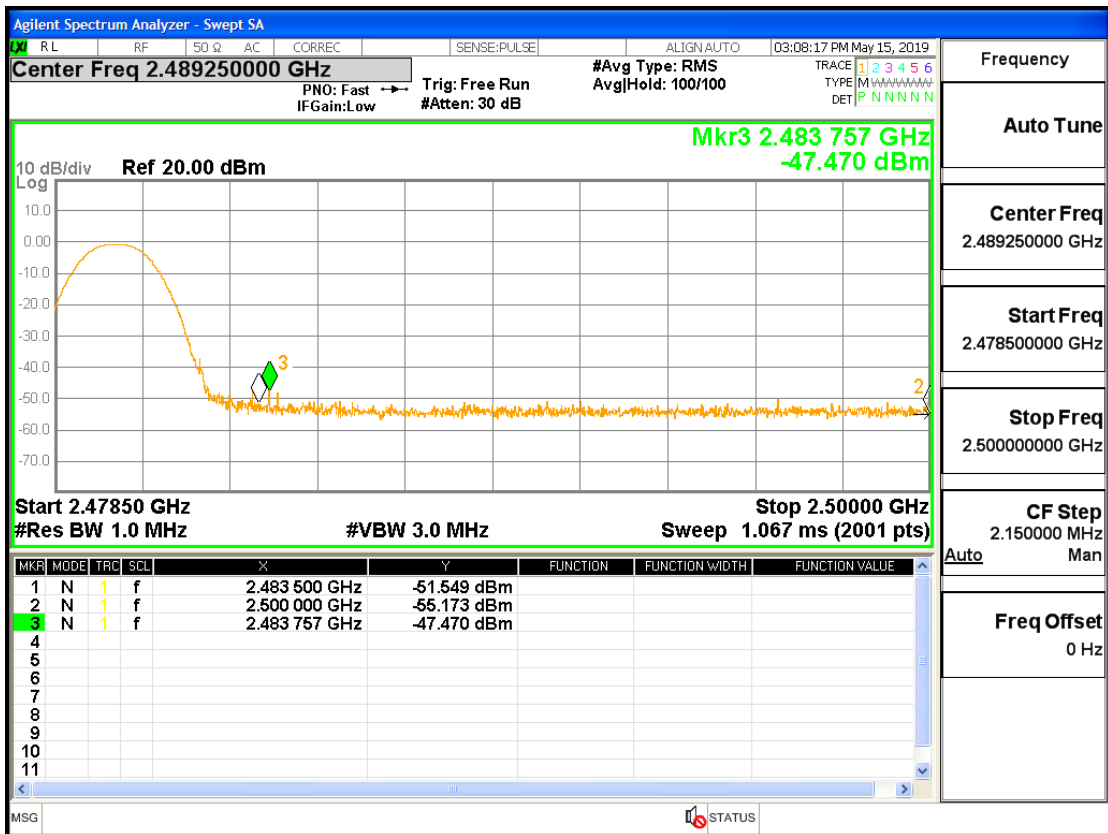
Restrict-band band-edge measurements_2402_PEAK_DH5



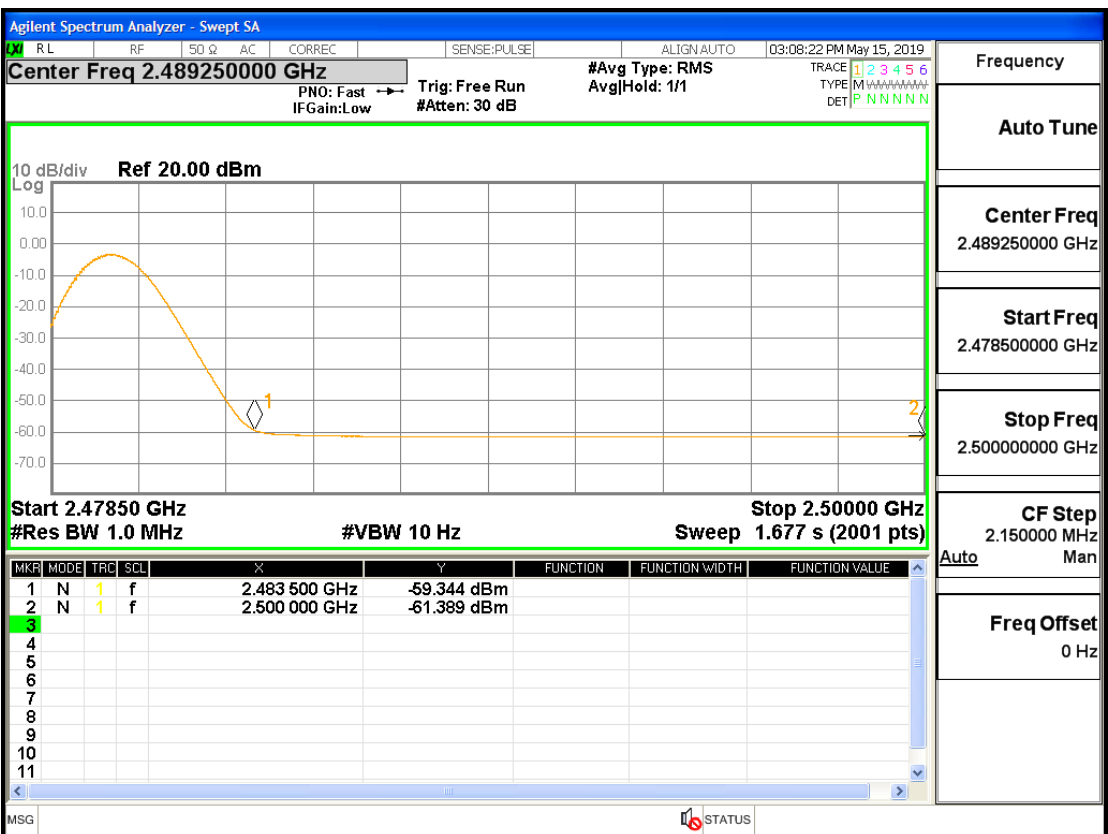
Restrict-band band-edge measurements_2402_AV_DH5



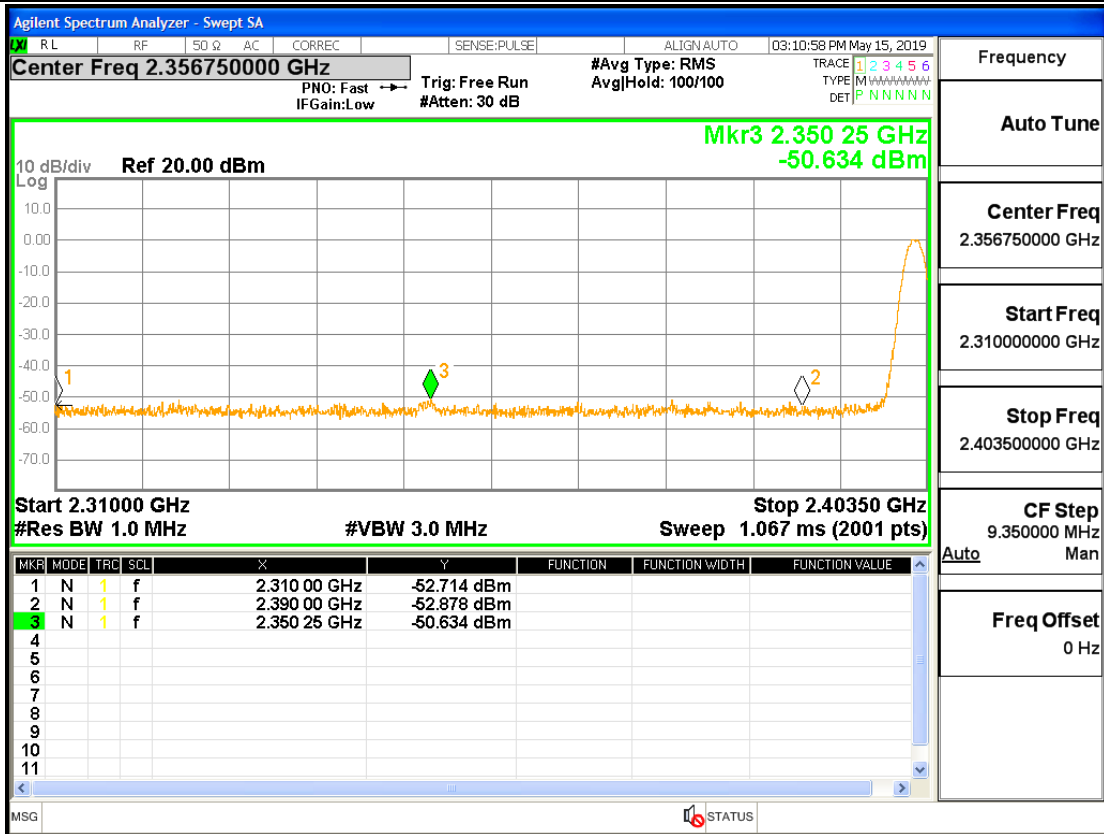
Restrict-band band-edge measurements_2480_PEAK_DH5



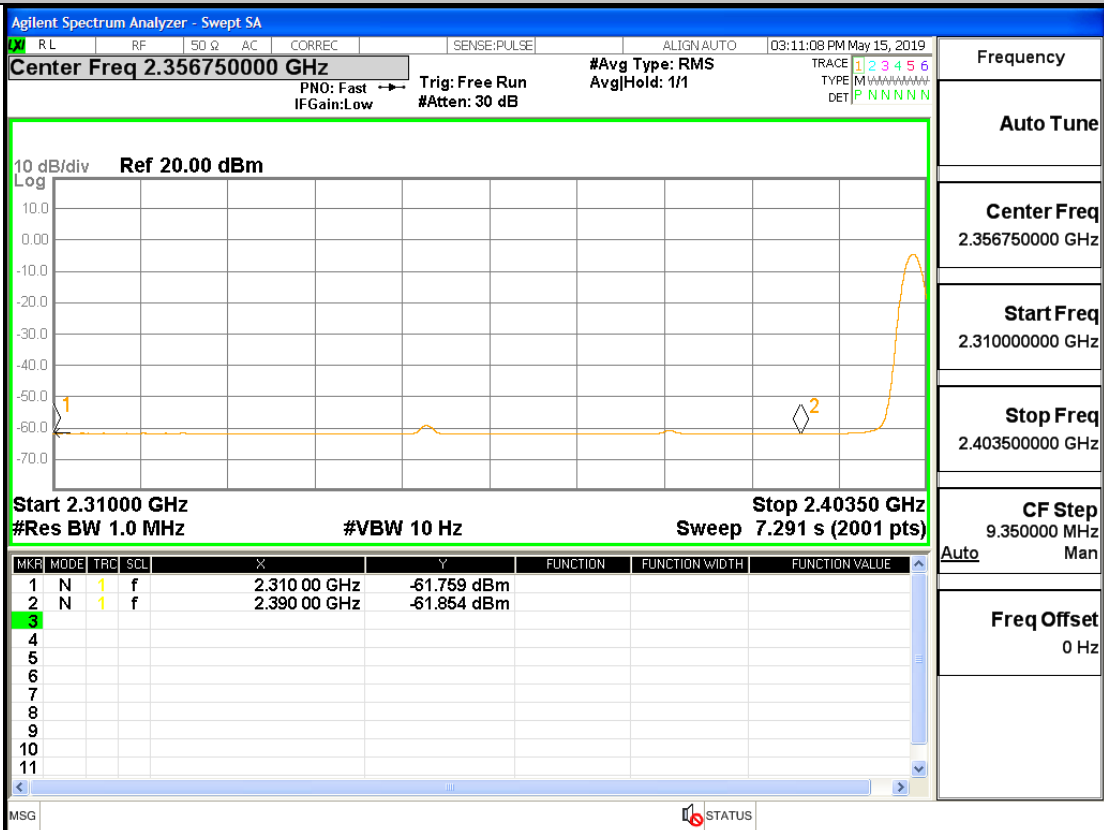
Restrict-band band-edge measurements_2480_AV_DH5



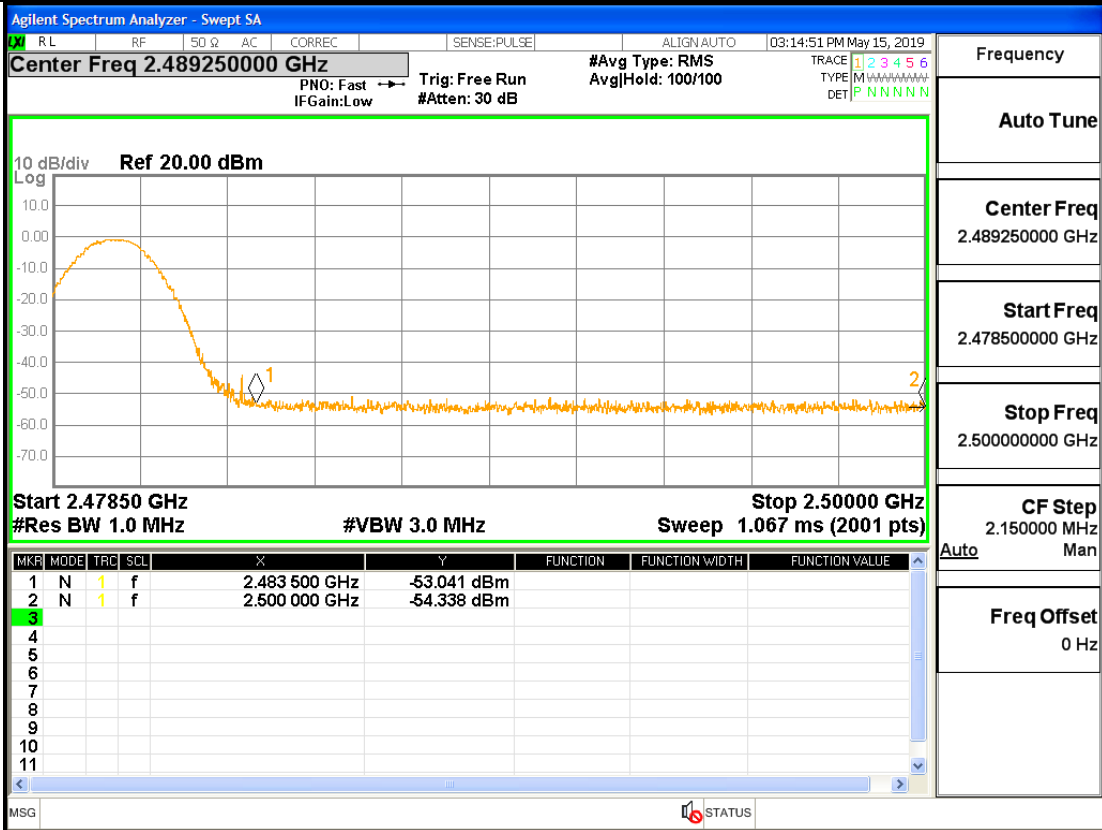
Restrict-band band-edge measurements_2402_PEAK_2DH5



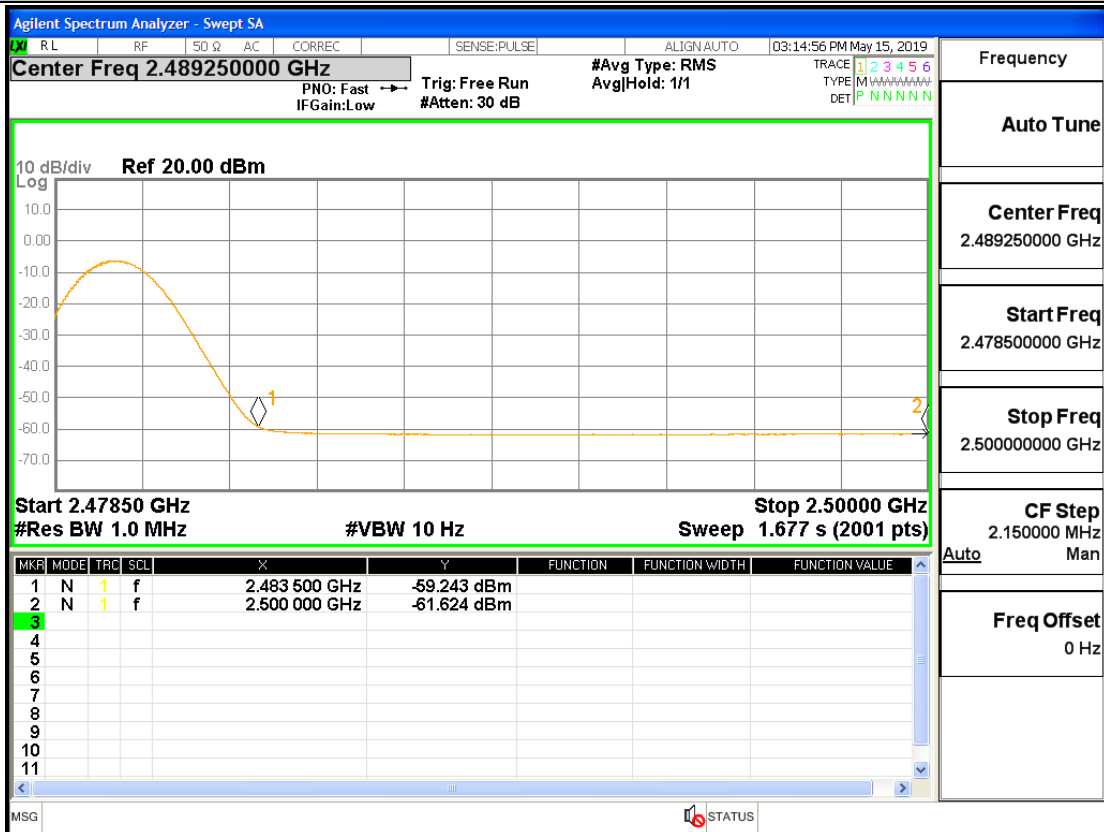
Restrict-band band-edge measurements_2402_AV_2DH5



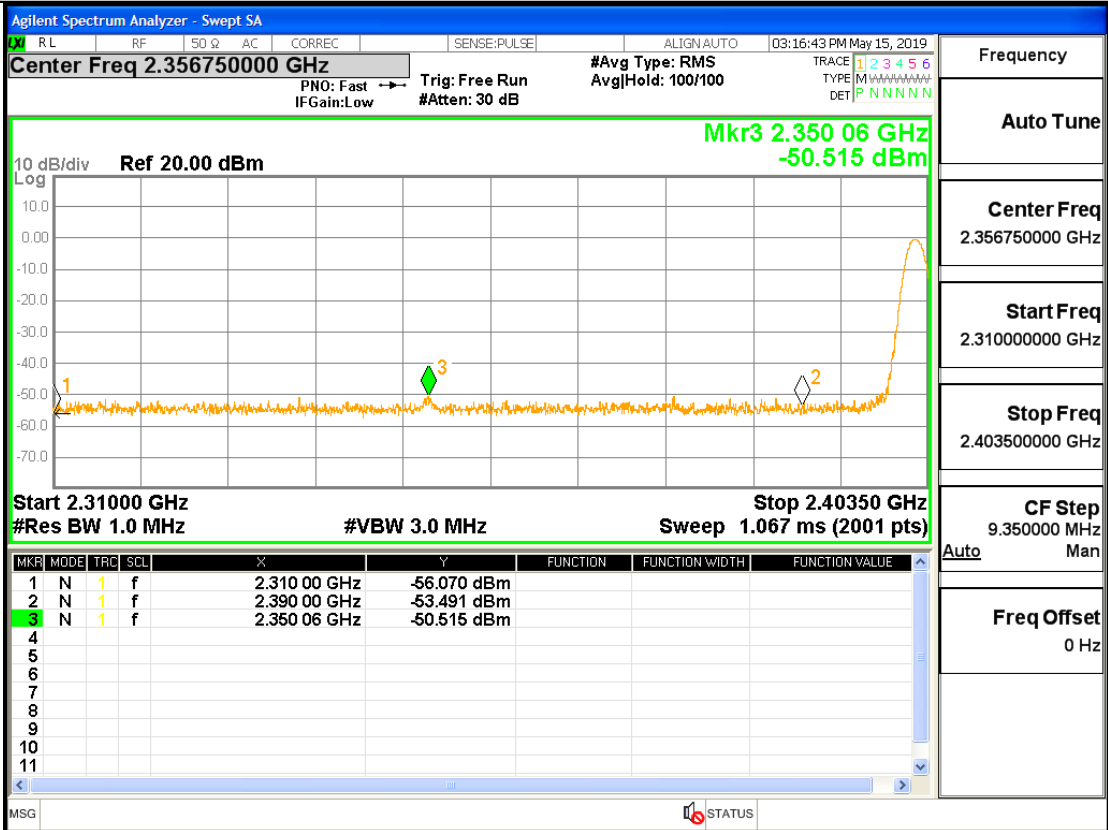
Restrict-band band-edge measurements_2480_PEAK_2DH5



Restrict-band band-edge measurements_2480_AV_2DH5

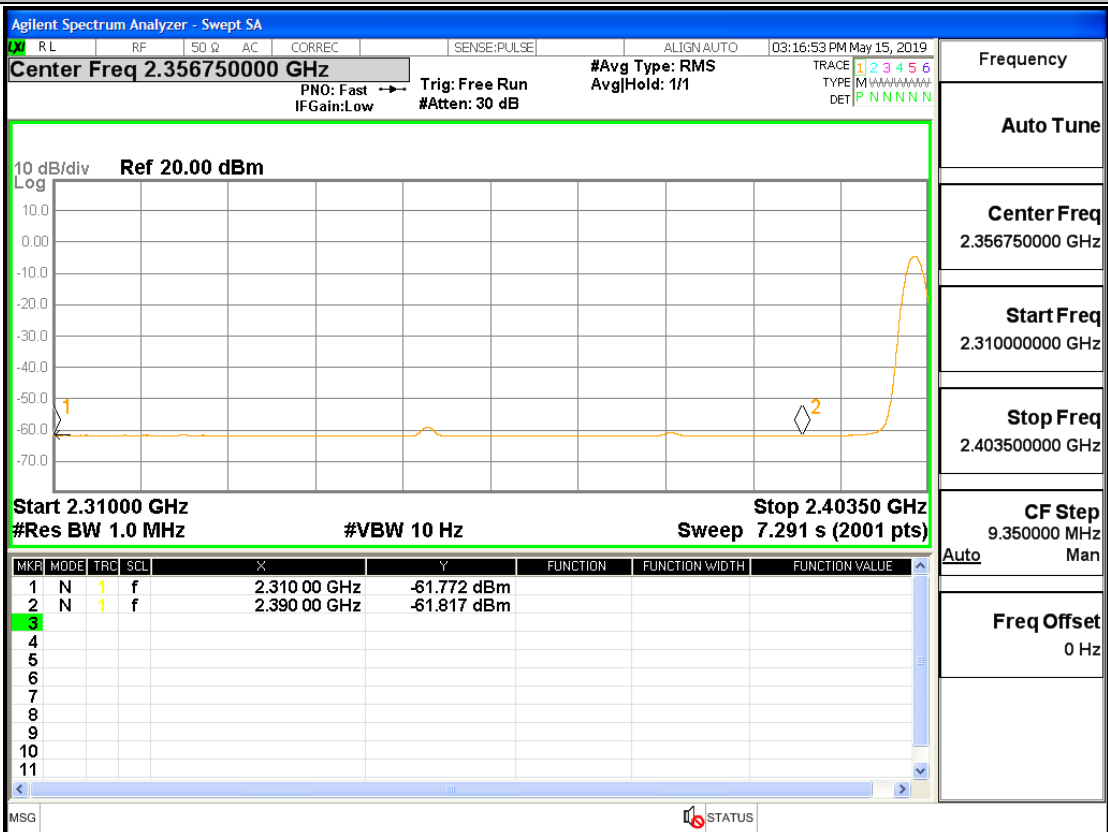


Restrict-band band-edge measurements_2402_PEAK_3DH5



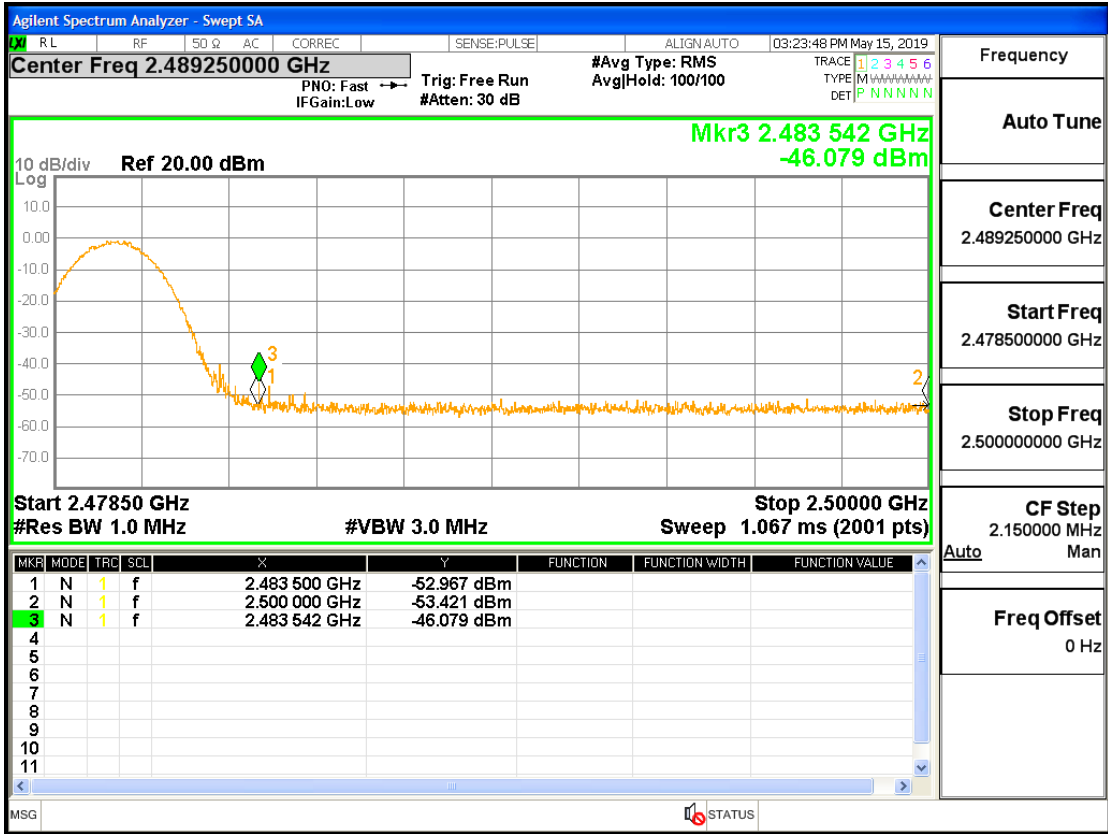
Frequency
Auto Tune
Center Freq 2.356750000 GHz
Start Freq 2.310000000 GHz
Stop Freq 2.403500000 GHz
CF Step 9.350000 MHz Auto Man
Freq Offset 0 Hz

Restrict-band band-edge measurements_2402_AV_3DH5



Frequency
Auto Tune
Center Freq 2.356750000 GHz
Start Freq 2.310000000 GHz
Stop Freq 2.403500000 GHz
CF Step 9.350000 MHz Auto Man
Freq Offset 0 Hz

Restrict-band band-edge measurements_2480_PEAK_3DH5



Restrict-band band-edge measurements_2480_AV_3DH5

