

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

Product Name: Bluetooth headset

Trade Mark: sentry

Test Model: BT989

FCC ID: 2ACP4-BT989

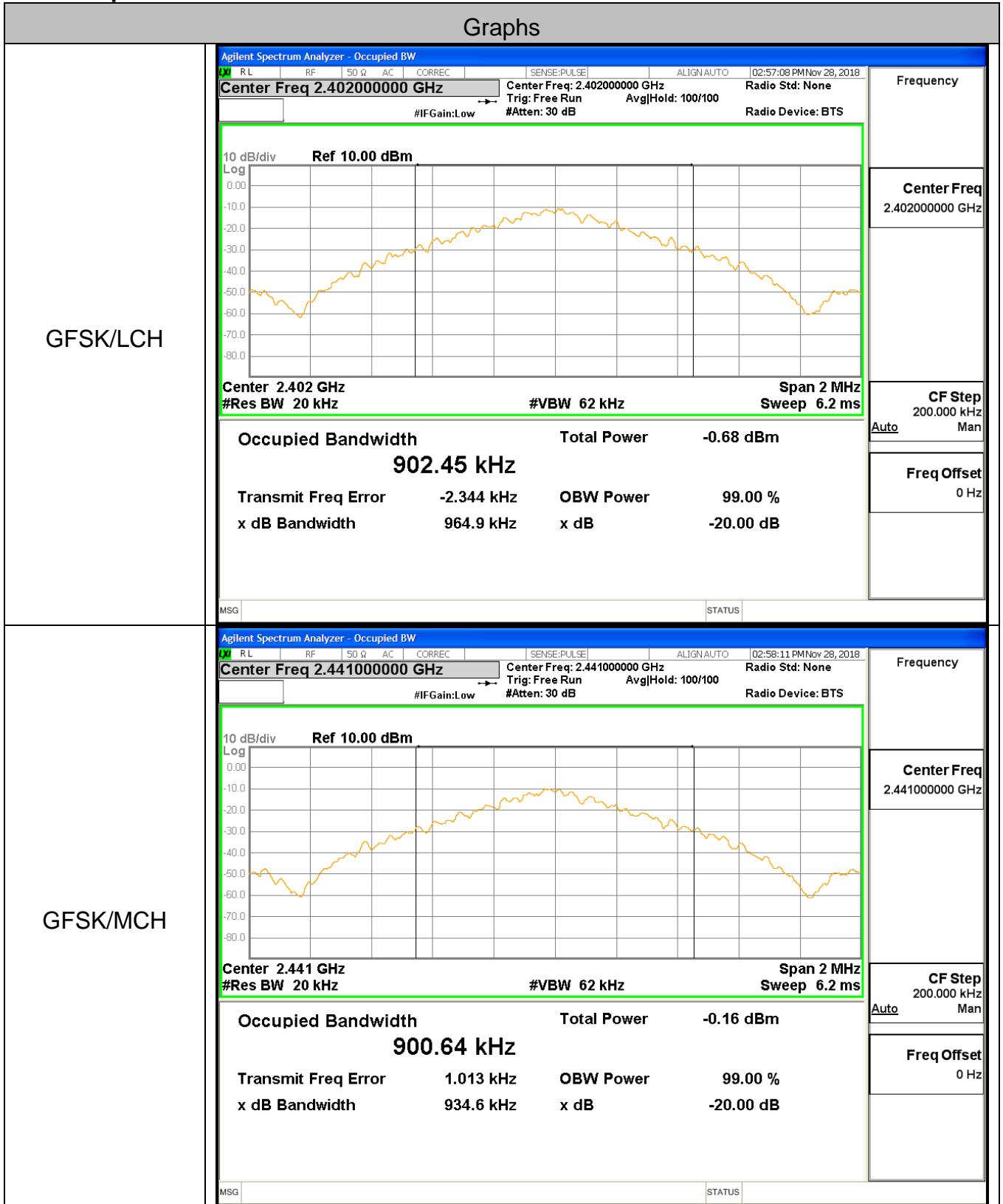
Environmental Conditions

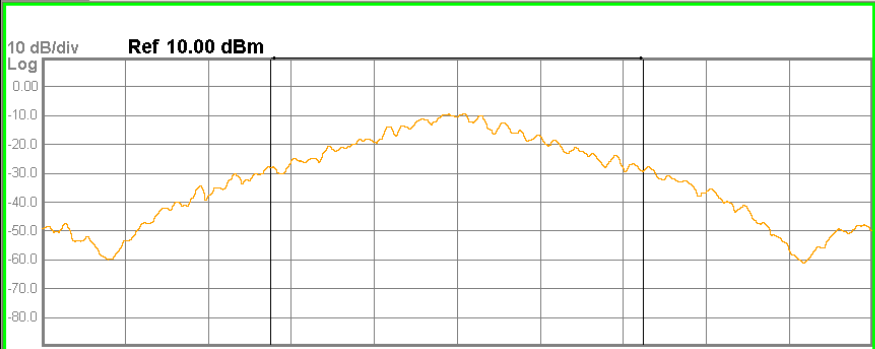
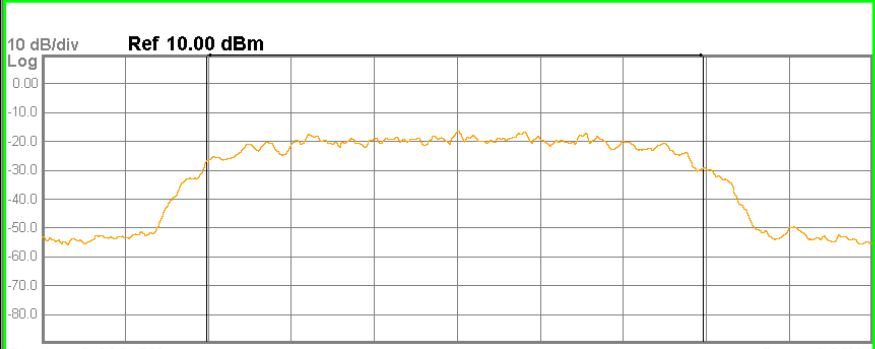
Temperature:	22.5 ° C
Relative Humidity:	55.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

A.1 20 dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	0.963	Not Specified	PASS
GFSK	MCH	0.935	Not Specified	PASS
GFSK	HCH	0.940	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.335	Not Specified	PASS
$\pi/4$ DQPSK	MCH	1.332	Not Specified	PASS
$\pi/4$ DQPSK	HCH	1.336	Not Specified	PASS

Test Graph



GFSK/HCH	<div>Agilent Spectrum Analyzer - Occupied BW</div> <div><div><div><div>Center Freq 2.480000000 GHz</div><div>Center Freq: 2.480000000 GHz</div><div>Trig: Free Run</div><div>#IFGain: Low</div><div>#Atten: 30 dB</div></div><div><div>Radio Std: None</div><div>Radio Device: BTS</div></div></div><div><div>03:00:23 PM Nov 28, 2018</div><div>ALIGN AUTO</div></div></div>				Frequency
					Center Freq 2.480000000 GHz
	<div>Center 2.48 GHz</div> <div>#Res BW 20 kHz</div> <div>#VBW 62 kHz</div> <div>Span 2 MHz</div> <div>Sweep 6.2 ms</div>				CF Step 200.000 kHz Man
	<div>Occupied Bandwidth</div> <div>897.06 kHz</div> <div>Total Power</div> <div>0.51 dBm</div> <div>Transmit Freq Error</div> <div>-814 Hz</div> <div>OBW Power</div> <div>99.00 %</div> <div>x dB Bandwidth</div> <div>939.5 kHz</div> <div>x dB</div> <div>-20.00 dB</div>				Freq Offset 0 Hz
π /4DQPSK/LCH	<div>Agilent Spectrum Analyzer - Occupied BW</div> <div><div><div>Center Freq 2.402000000 GHz</div><div>Center Freq: 2.402000000 GHz</div><div>Trig: Free Run</div><div>#IFGain: Low</div><div>#Atten: 30 dB</div></div><div><div>Radio Std: None</div><div>Radio Device: BTS</div></div></div> <div><div>03:01:29 PM Nov 28, 2018</div><div>ALIGN AUTO</div></div>				Frequency
					Center Freq 2.402000000 GHz
	<div>Center 2.402 GHz</div> <div>#Res BW 20 kHz</div> <div>#VBW 62 kHz</div> <div>Span 2 MHz</div> <div>Sweep 6.2 ms</div>				CF Step 200.000 kHz Man
	<div>Occupied Bandwidth</div> <div>1.1915 MHz</div> <div>Total Power</div> <div>-2.81 dBm</div> <div>Transmit Freq Error</div> <div>-4.014 kHz</div> <div>OBW Power</div> <div>99.00 %</div> <div>x dB Bandwidth</div> <div>1.335 MHz</div> <div>x dB</div> <div>-20.00 dB</div>				Freq Offset 0 Hz

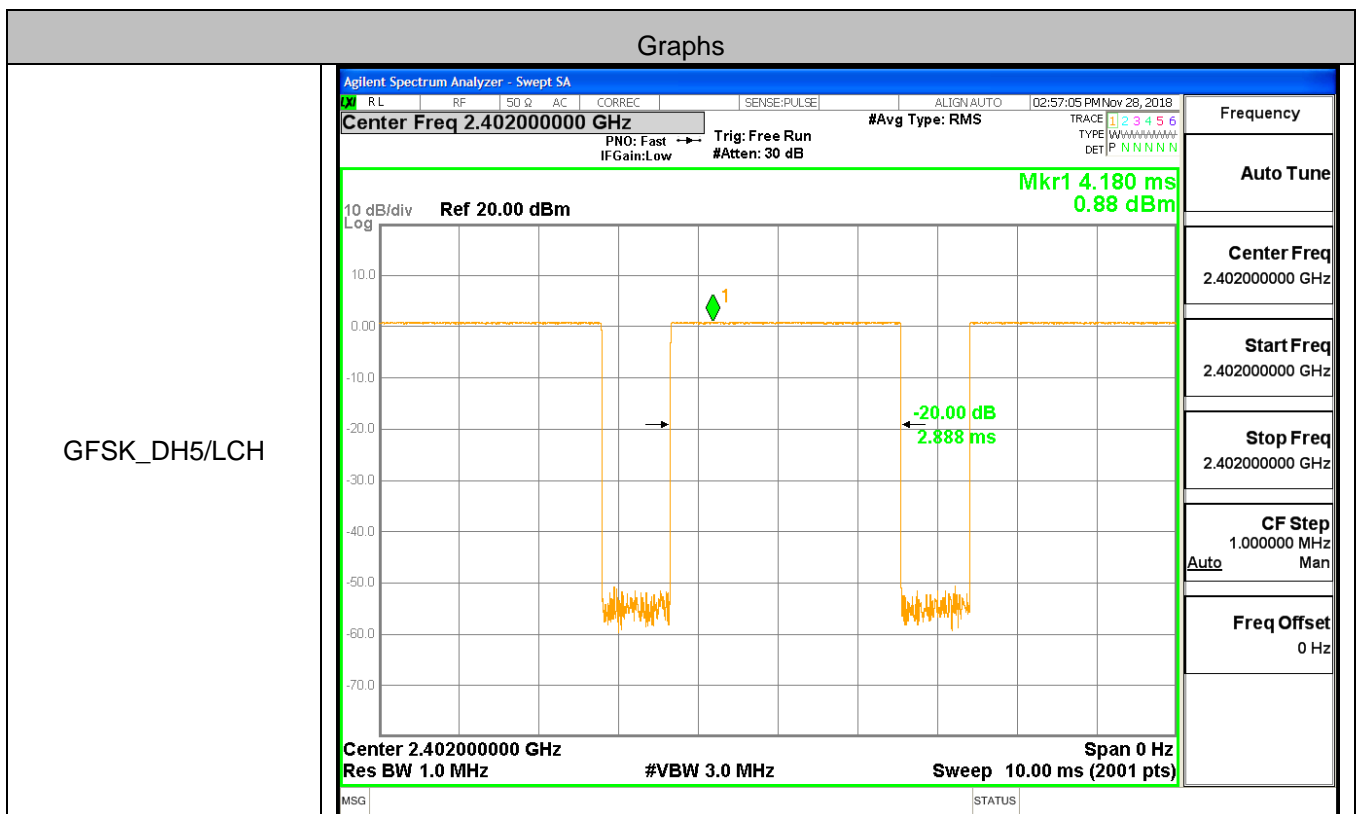
$\pi/4$ DQPSK/MCH	<div>Agilent Spectrum Analyzer - Occupied BW</div> <div><div><div>RL</div><div>RF</div><div>50 Ω</div><div>AC</div><div>CORREC</div><div>SENSE:PULSE</div><div>ALIGN:AUTO</div><div>03:02:55 PM Nov 28, 2018</div></div><div><div>Center Freq 2.441000000 GHz</div><div>Center Freq: 2.441000000 GHz</div><div>Radio Std: None</div><div>Trig: Free Run</div><div>Avg/Hold: 100/100</div><div>#IFGain:Low</div><div>#Atten: 30 dB</div><div>Radio Device: BTS</div></div></div>										Frequency
	<div><div>10 dB/div</div><div>Ref 10.00 dBm</div><div></div></div>										Center Freq 2.441000000 GHz
	<div>Center 2.441 GHz</div> <div>#Res BW 20 kHz</div> <div>#VBW 62 kHz</div> <div>Span 2 MHz</div> <div>Sweep 6.2 ms</div>										CF Step 200.000 kHz Auto Man
	<div>Occupied Bandwidth</div> <div>1.1906 MHz</div> <div>Total Power</div> <div>-2.43 dBm</div> <div>Transmit Freq Error</div> <div>-5.479 kHz</div> <div>OBW Power</div> <div>99.00 %</div> <div>x dB Bandwidth</div> <div>1.331 MHz</div> <div>x dB</div> <div>-20.00 dB</div>										Freq Offset 0 Hz
	<div>MSG</div> <div>STATUS</div>										

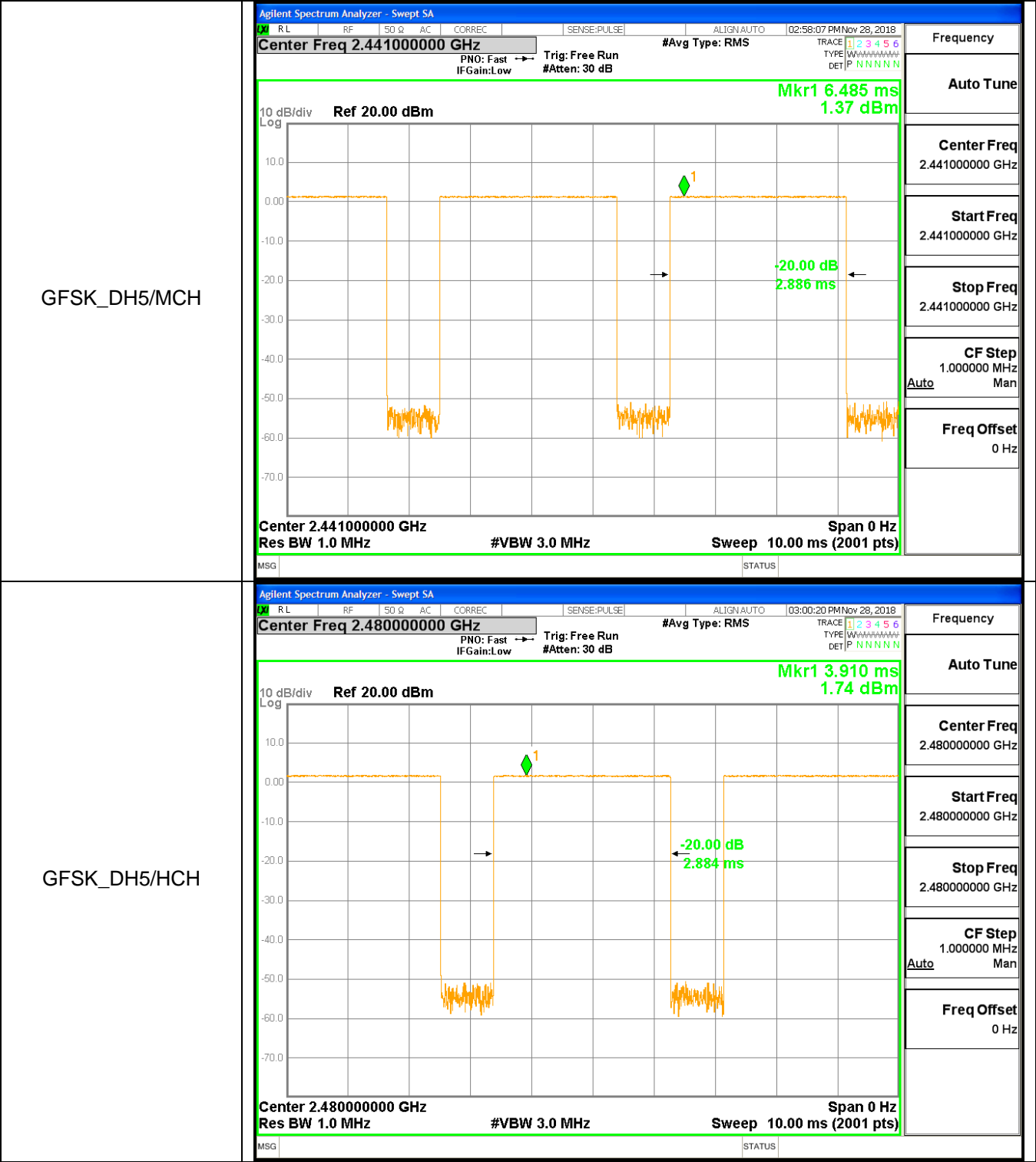
$\pi/4$ DQPSK/HCH	<div>Agilent Spectrum Analyzer - Occupied BW</div> <div><div><div>RL</div><div>RF</div><div>50 Ω</div><div>AC</div><div>CORREC</div><div>SENSE:PULSE</div><div>ALIGN:AUTO</div><div>03:04:03 PM Nov 28, 2018</div></div><div><div>Center Freq 2.480000000 GHz</div><div>Center Freq: 2.480000000 GHz</div><div>Radio Std: None</div><div>Trig: Free Run</div><div>Avg/Hold: 100/100</div><div>#IFGain:Low</div><div>#Atten: 30 dB</div><div>Radio Device: BTS</div></div></div>										Frequency
	<div><div>10 dB/div</div><div>Ref 10.00 dBm</div><div></div></div>										Center Freq 2.480000000 GHz
	<div>Center 2.48 GHz</div> <div>#Res BW 20 kHz</div> <div>#VBW 62 kHz</div> <div>Span 2 MHz</div> <div>Sweep 6.2 ms</div>										CF Step 200.000 kHz Auto Man
	<div>Occupied Bandwidth</div> <div>1.1912 MHz</div> <div>Total Power</div> <div>-2.11 dBm</div> <div>Transmit Freq Error</div> <div>-3.455 kHz</div> <div>OBW Power</div> <div>99.00 %</div> <div>x dB Bandwidth</div> <div>1.335 MHz</div> <div>x dB</div> <div>-20.00 dB</div>										Freq Offset 0 Hz
	<div>MSG</div> <div>STATUS</div>										

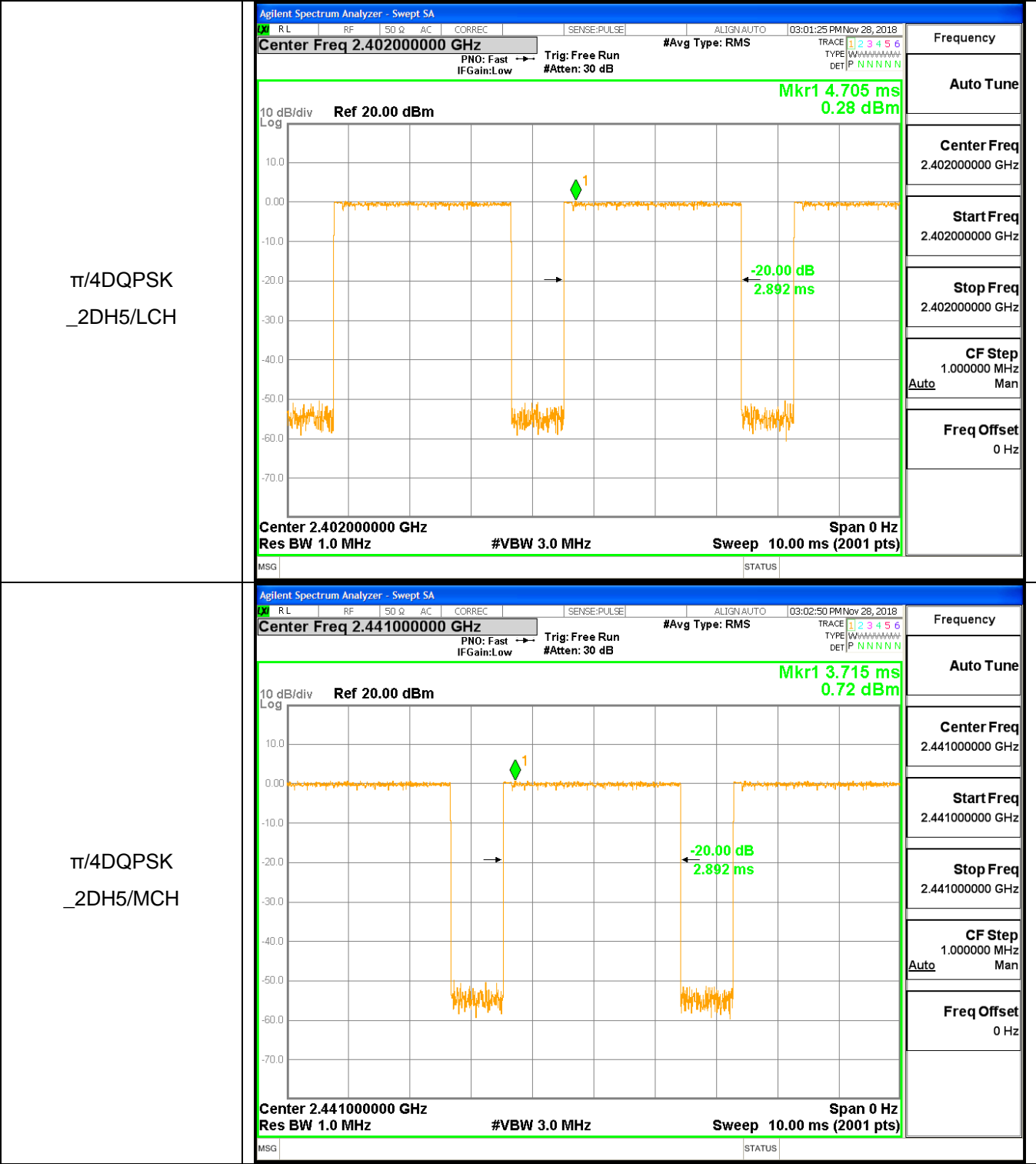
A.2 Dwell Time

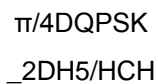
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.00321295	106.7	0.34282177	0.4	PASS
GFSK	DH5	MCH	0.003098497	106.7	0.330609681	0.4	PASS
GFSK	DH5	HCH	0.002888395	106.7	0.308191787	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	0.002886448	106.7	0.307984036	0.4	PASS
$\pi/4$ DQPSK	2DH5	MCH	0.0028837	106.7	0.307690737	0.4	PASS
$\pi/4$ DQPSK	2DH5	HCH	0.002892336	106.7	0.308612239	0.4	PASS

Test Graph





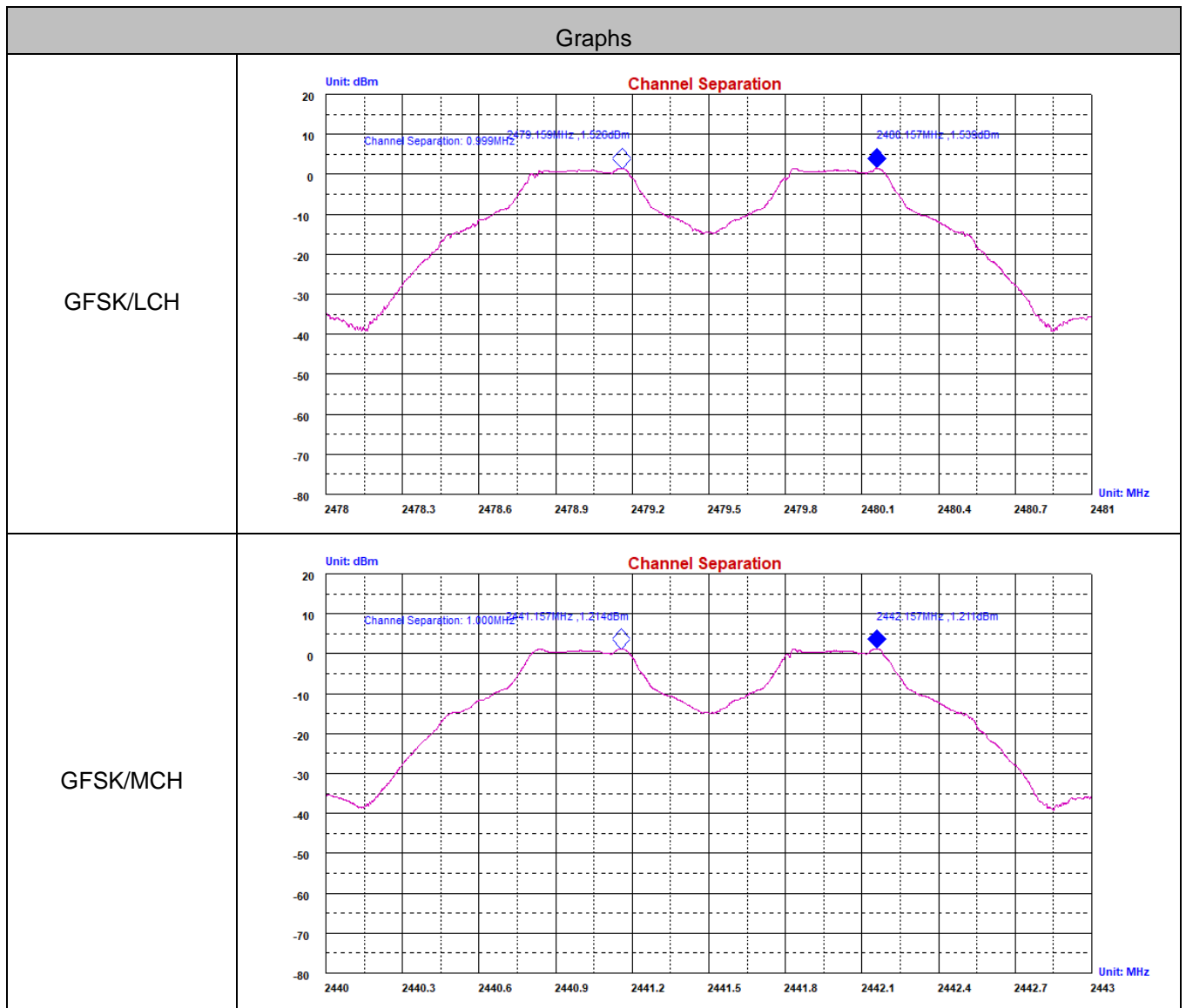




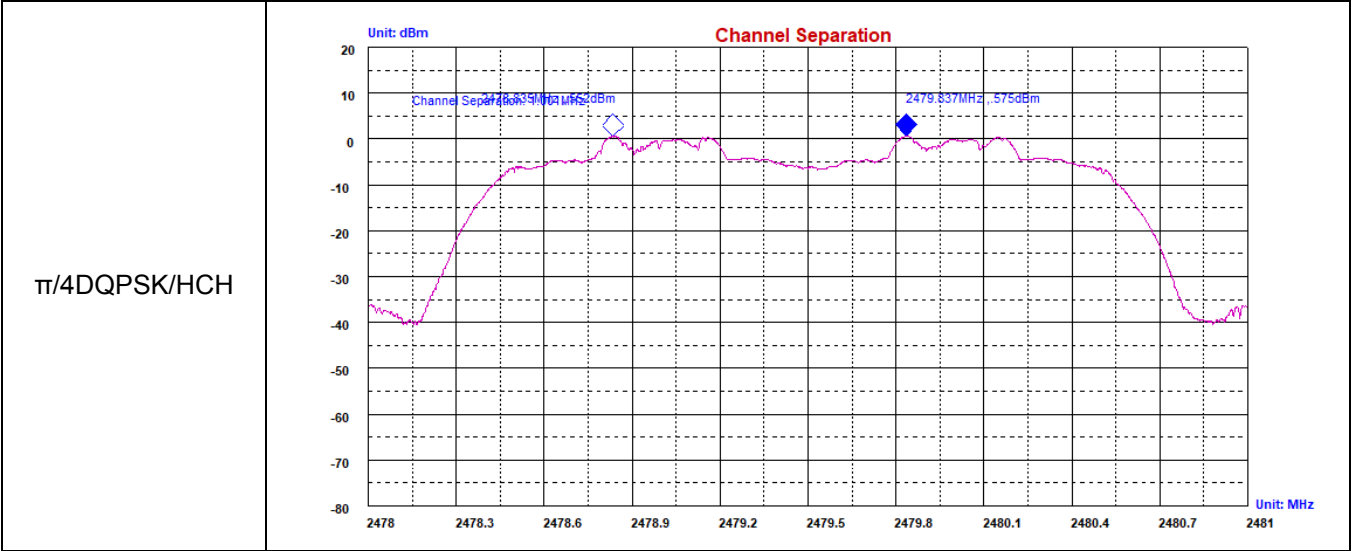
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.999	0.642	PASS
GFSK	MCH	1.000	0.623	PASS
GFSK	HCH	0.996	0.627	PASS
$\pi/4$ DQPSK	LCH	1.001	0.890	PASS
$\pi/4$ DQPSK	MCH	1.003	0.888	PASS
$\pi/4$ DQPSK	HCH	1.001	0.891	PASS

Test Graph



<p>GFSK/HCH</p>	<p>Unit: dBm</p> <p>Channel Separation</p> <p>Bandwidth: 0.996MHz</p> <p>2478.99MHz, -4.487dBm</p> <p>2479.985MHz, -4.513dBm</p> <p>Unit: MHz</p>
<p>$\pi/4$DQPSK/LCH</p>	<p>Unit: dBm</p> <p>Channel Separation</p> <p>Bandwidth: 1.001MHz</p> <p>2402.147MHz, -5.563dBm</p> <p>2403.148MHz, -5.576dBm</p> <p>Unit: MHz</p>
<p>$\pi/4$DQPSK/MCH</p>	<p>Unit: dBm</p> <p>Channel Separation</p> <p>Bandwidth: 1.014MHz</p> <p>2440.821MHz, -4.005dBm</p> <p>2441.835MHz, -2.03dBm</p> <p>Unit: MHz</p>

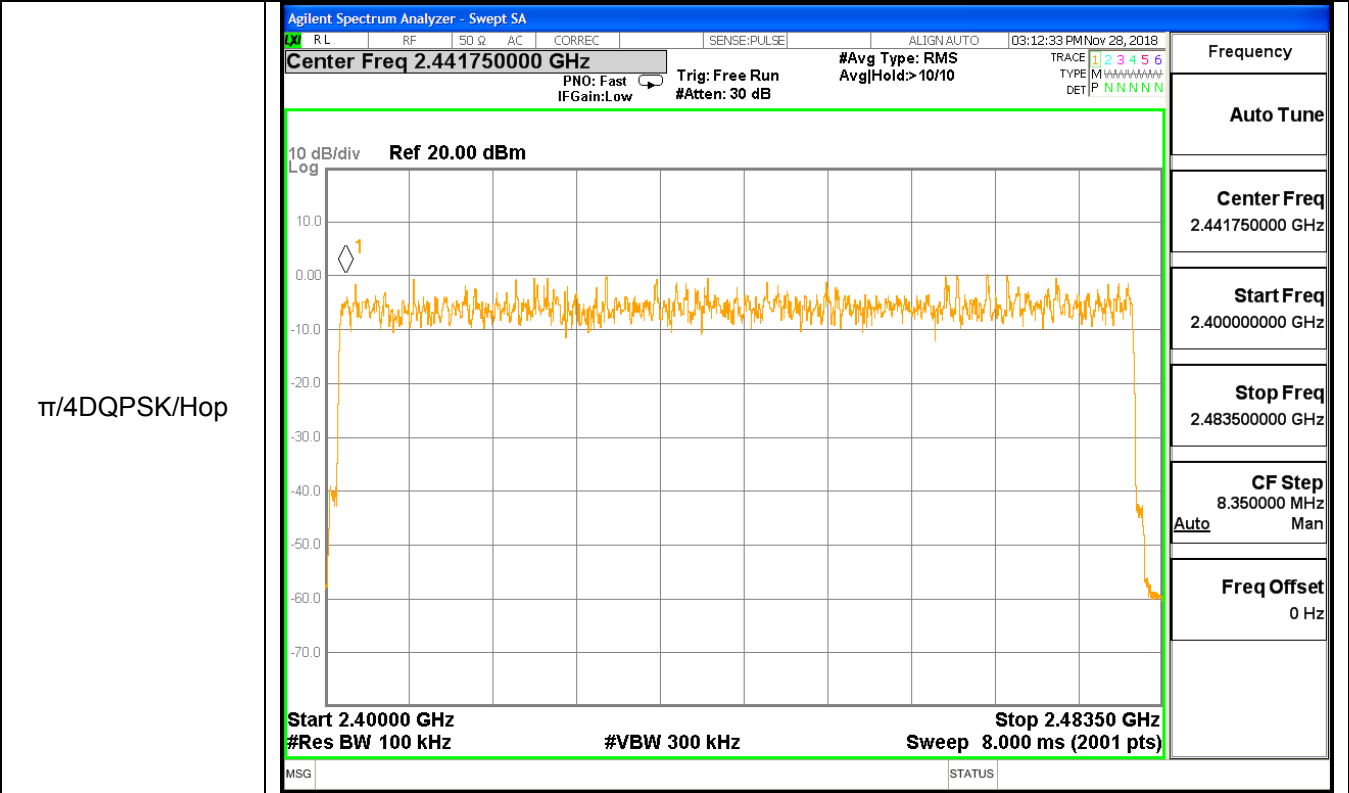


A.4 Hopping Channel Number

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

Test Graph

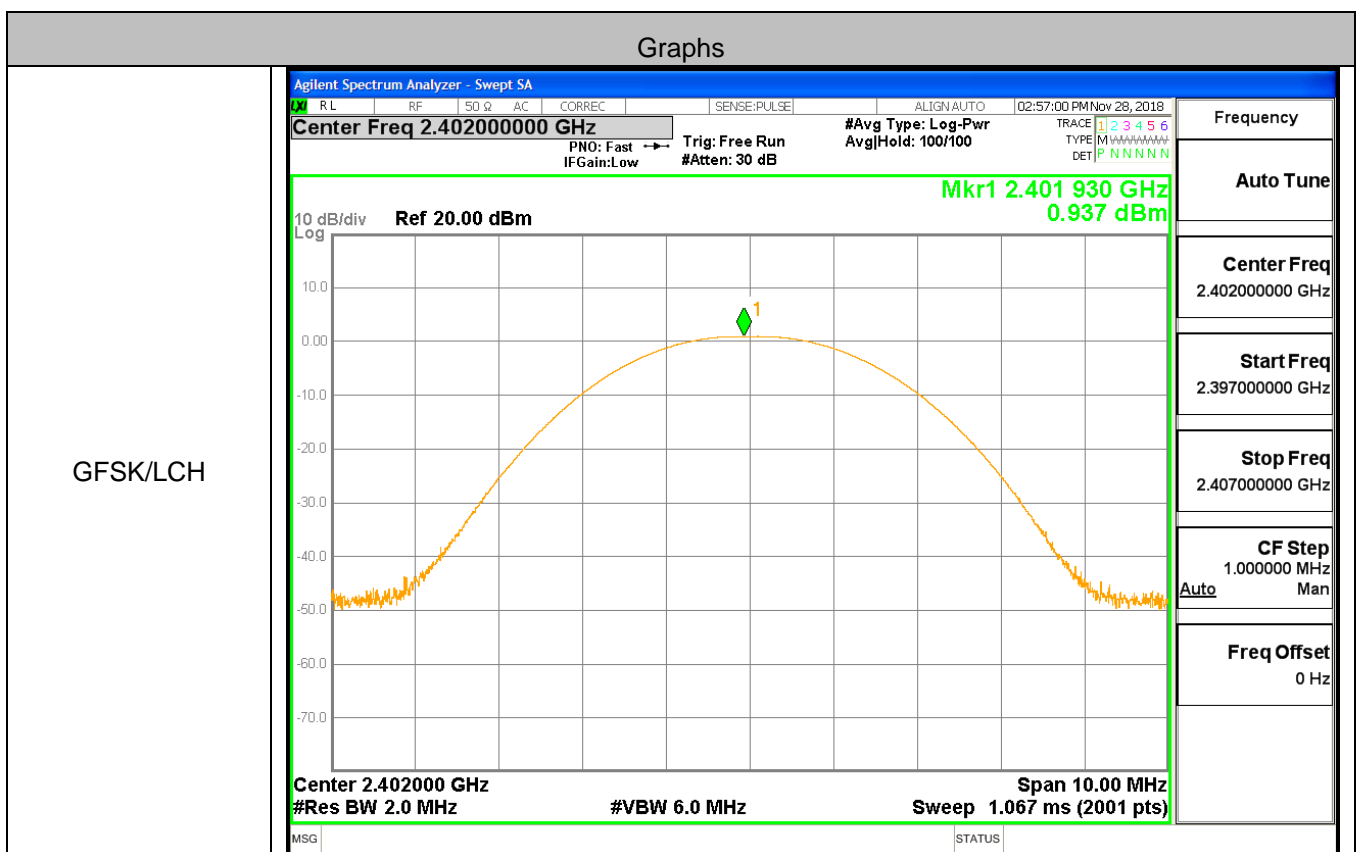


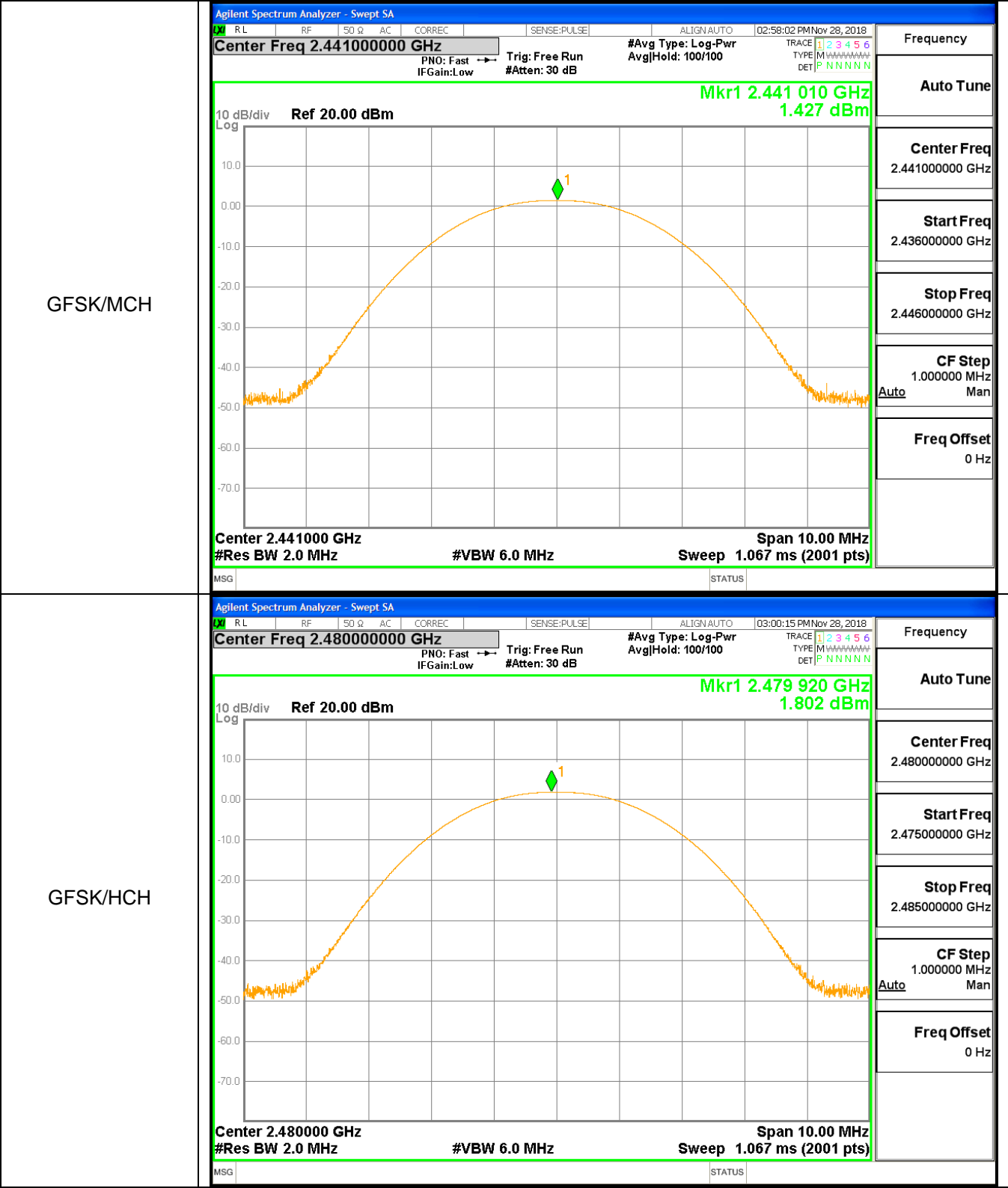


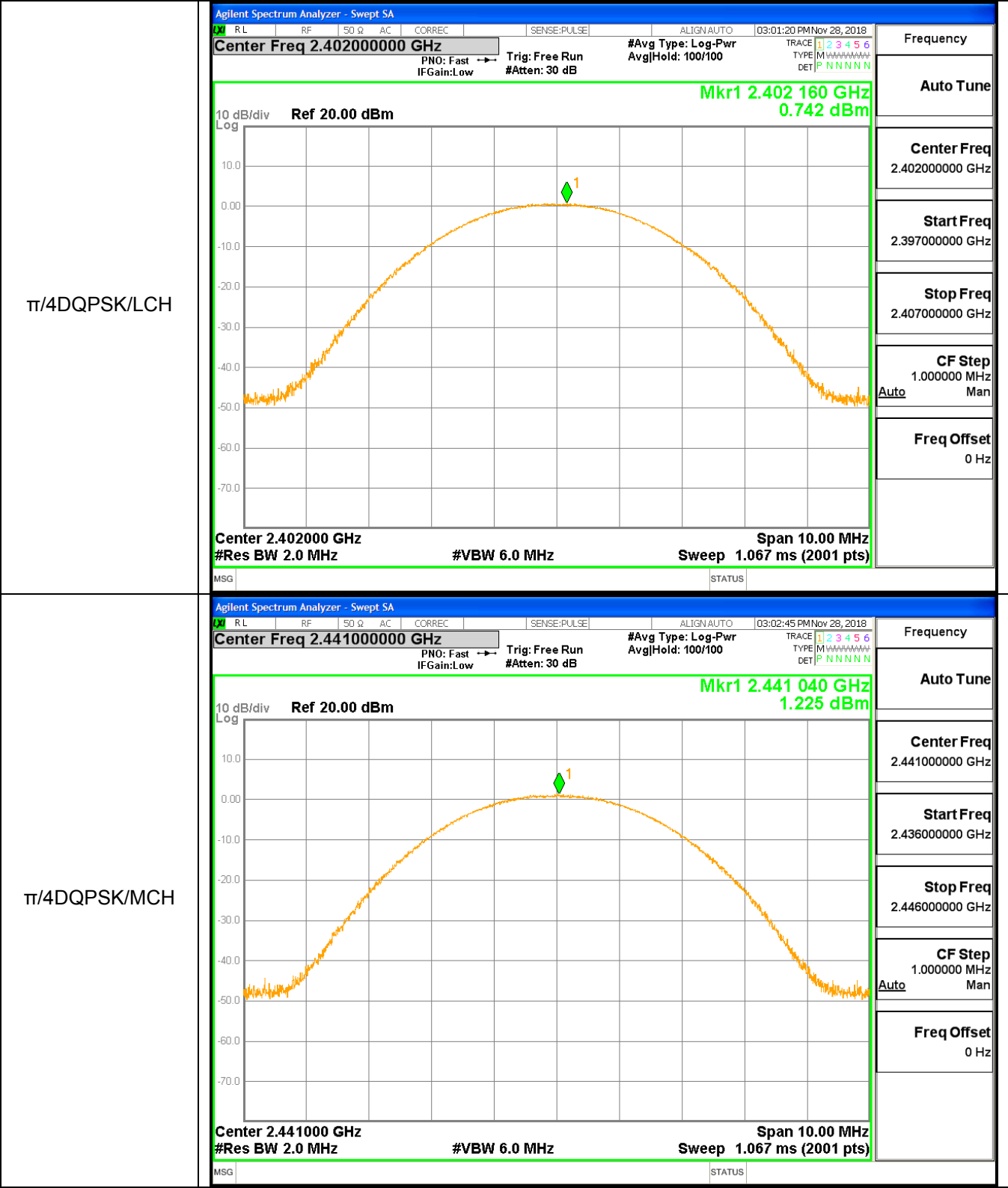
A.5 Conducted Peak Output Power

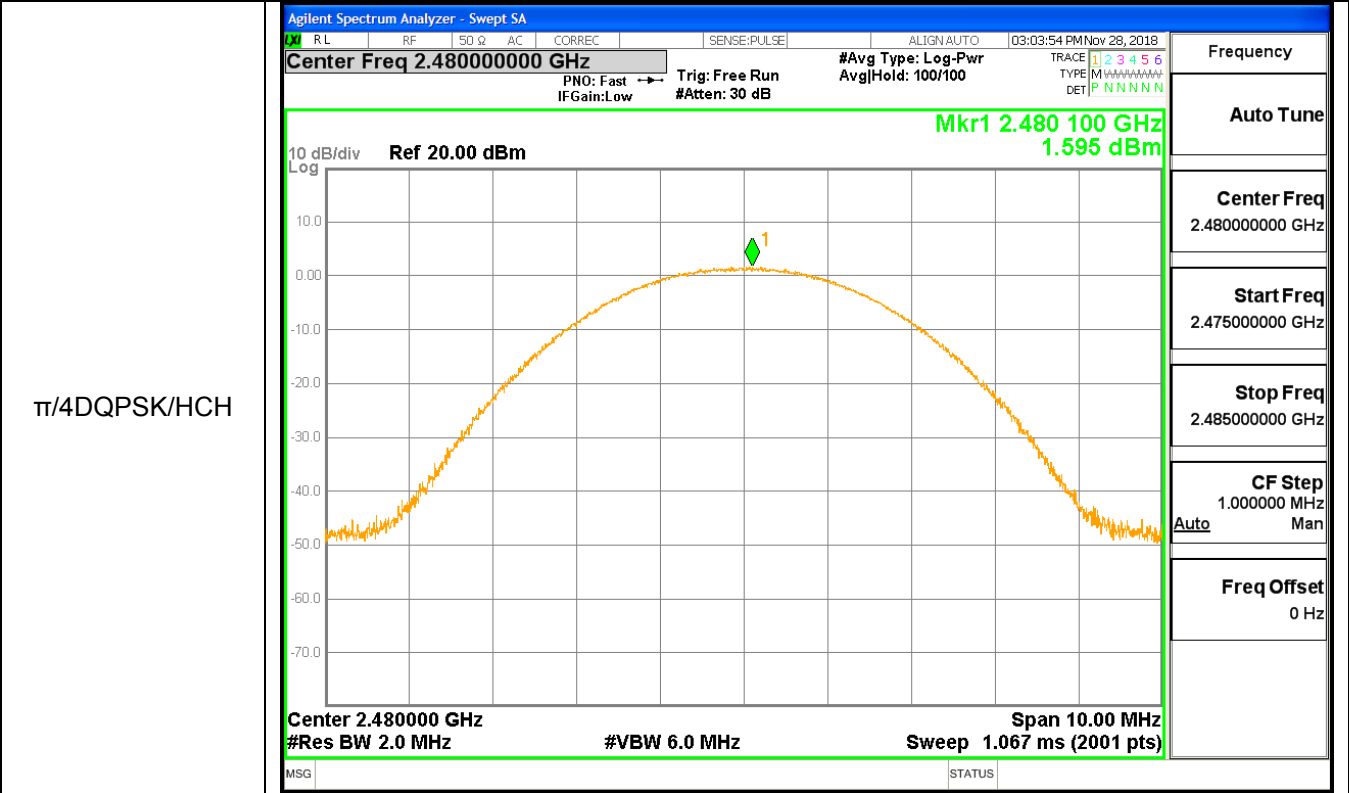
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.937	21	PASS
GFSK	MCH	1.427	21	PASS
GFSK	HCH	1.802	21	PASS
$\pi/4$ DQPSK	LCH	0.742	21	PASS
$\pi/4$ DQPSK	MCH	1.225	21	PASS
$\pi/4$ DQPSK	HCH	1.595	21	PASS

Test Graph





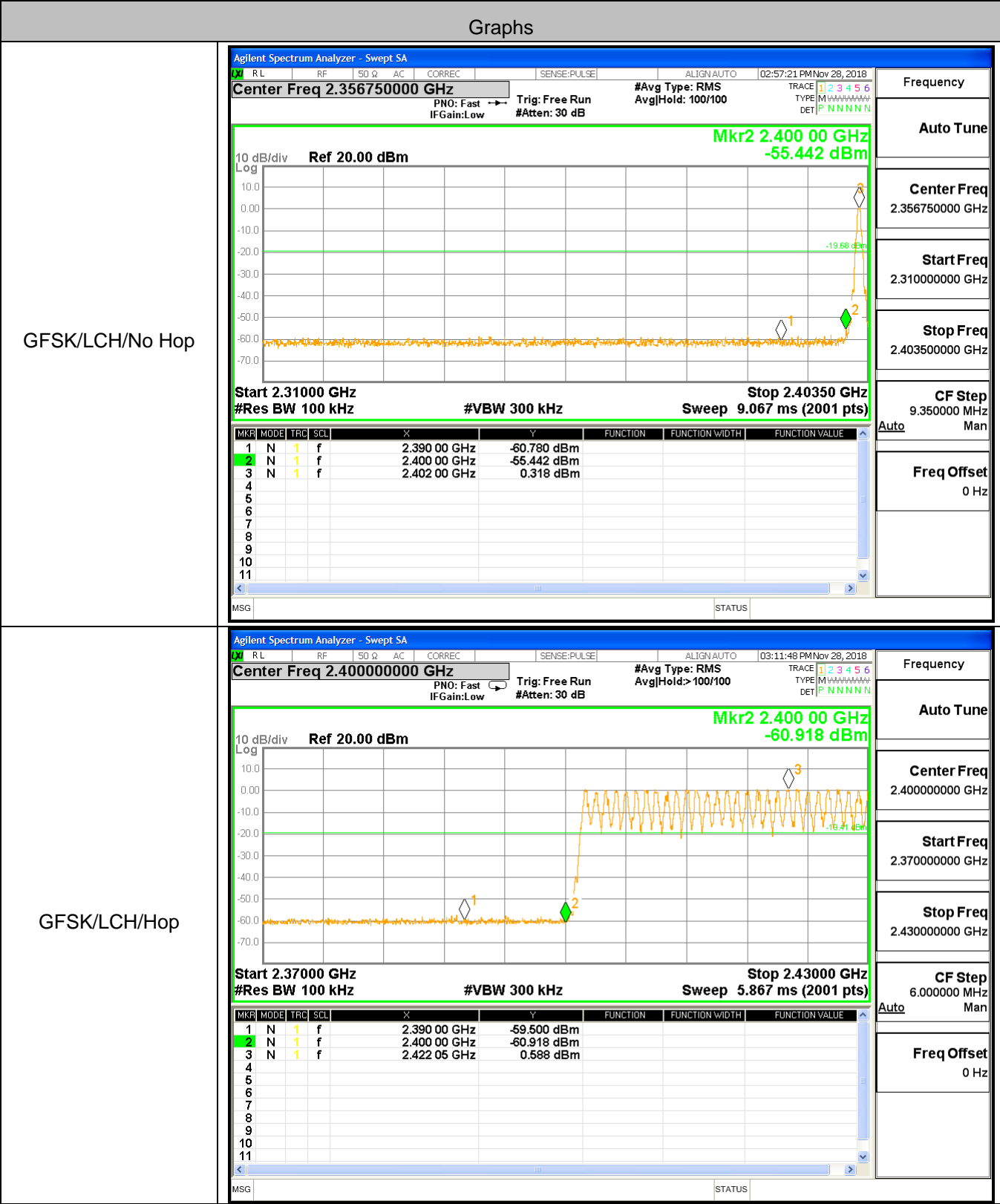


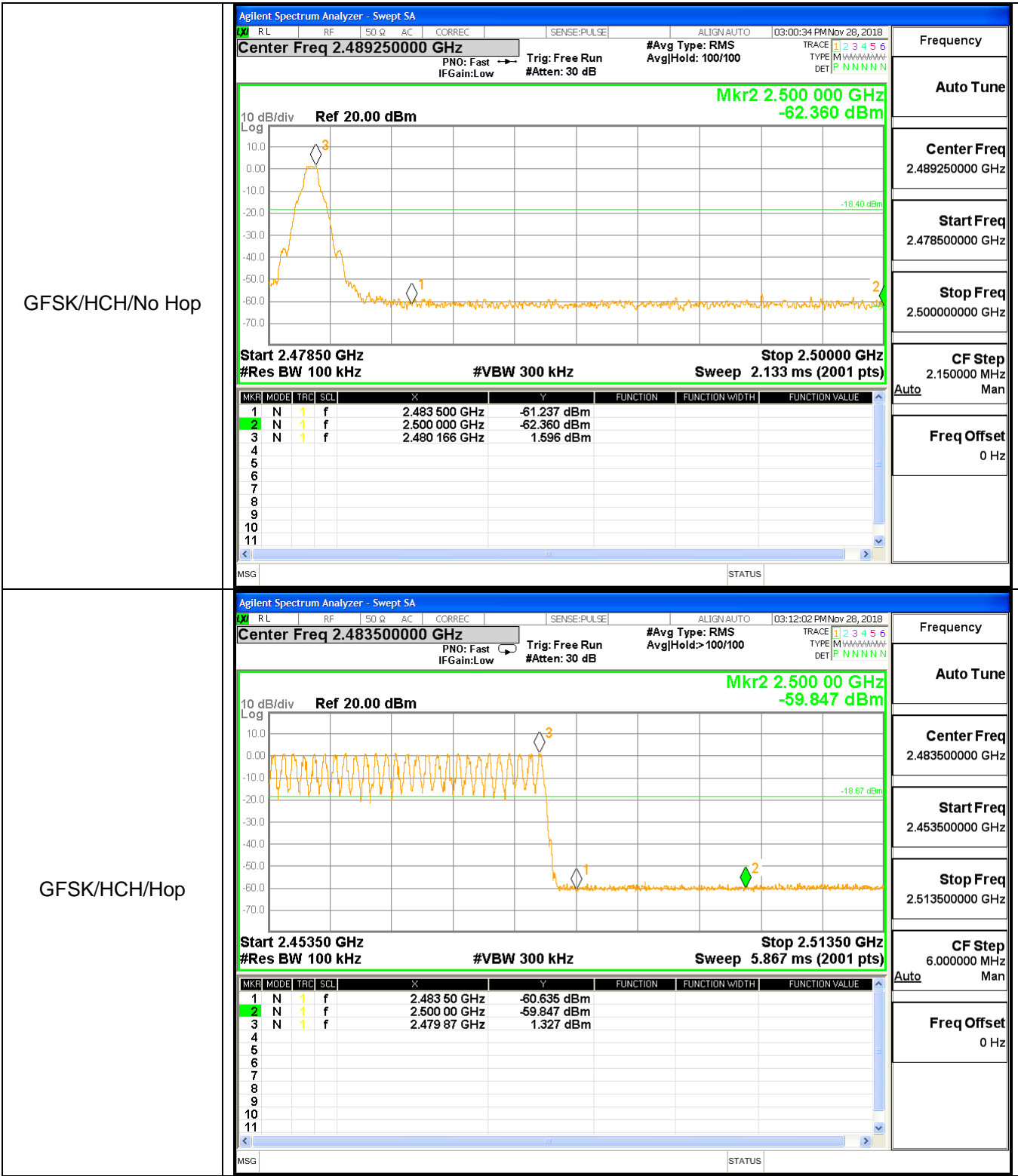


A.6 Band-edge for RF Conducted Emissions

Type	Carrier Frequency(MHz)	Frequency(MHz)	Carrier Frequency Power [dBm]	Bandedge Peak(dBm)	Upper limit(dBm)	Conclusion
1DH5	2402	2390	0.318	-60.78	-19.682	Pass
1DH5	2402	2400	0.318	-55.44	-19.682	Pass
1DH5-Hopping	2402	2390	0.588	-59.5	-19.412	Pass
1DH5-Hopping	2402	2400	0.588	-60.92	-19.412	Pass
1DH5	2480	2483.5	1.596	-61.24	-18.404	Pass
1DH5	2480	2500	1.596	-62.36	-18.404	Pass
1DH5-Hopping	2480	2483.5	1.327	-60.64	-18.673	Pass
1DH5-Hopping	2480	2500	1.327	-59.85	-18.673	Pass
2DH5	2402	2390	-3.638	-60.92	-23.638	Pass
2DH5	2402	2400	-3.638	-55.14	-23.638	Pass
2DH5-Hopping	2480	2483.5	-0.047	-60.16	-20.047	Pass
2DH5-Hopping	2480	2500	-0.047	-59.71	-20.047	Pass
2DH5	2480	2483.5	-0.803	-62.32	-20.803	Pass
2DH5	2480	2500	-0.803	-61.38	-20.803	Pass
2DH5-Hopping	2402	2390	-2.746	-0.236	-60.52	Pass
2DH5-Hopping	2402	2400	-2.746	-0.236	-58.11	Pass

Test Graph





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

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.390 00 GHz	-60.920 dBm			
2	N	1	f	2.400 00 GHz	-55.142 dBm			
3	N	1	f	2.401 82 GHz	-3.638 dBm			

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

$\pi/4$ DQPSK/LCH/Hop

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.390 00 GHz	-60.521 dBm			
2	N	1	f	2.400 00 GHz	-58.114 dBm			
3	N	1	f	2.424 06 GHz	-0.236 dBm			

Frequency
Auto Tune
Center Freq
2.400000000 GHz
Start Freq
2.370000000 GHz
Stop Freq
2.430000000 GHz
CF Step
6.000000 MHz
Auto Man
Freq Offset
0 Hz

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

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.489250000 GHz

Mkr2 2.500 000 GHz -61.378 dBm

Start 2.47850 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.50000 GHz 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	-62.323 dBm			
2	N	1	f	2.500 000 GHz	-61.378 dBm			
3	N	1	f	2.479 984 GHz	-0.803 dBm			

$\pi/4$ DQPSK/HCH/Hop

Agilent Spectrum Analyzer - Swept SA

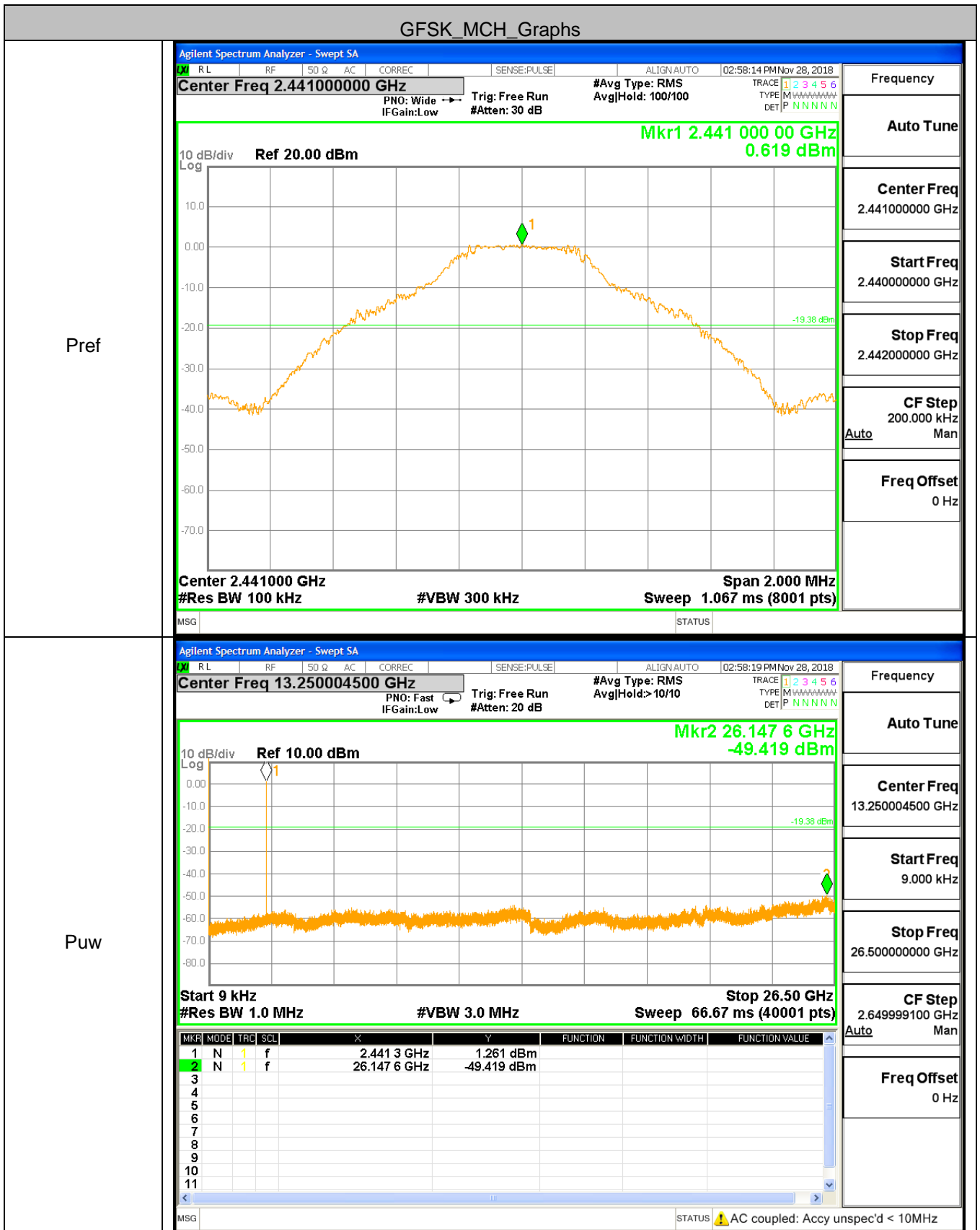
Center Freq 2.483500000 GHz

Mkr2 2.500 00 GHz -59.709 dBm

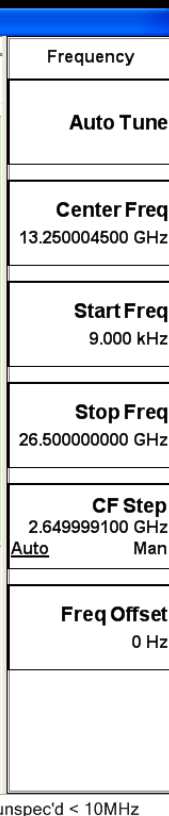
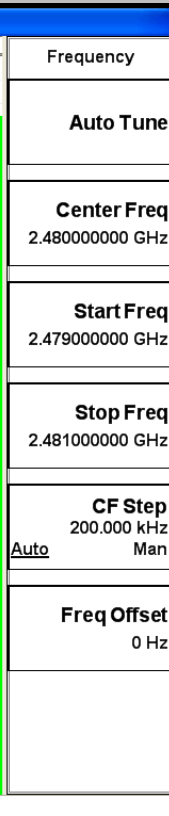
Start 2.45350 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.51350 GHz Sweep 5.867 ms (2001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.483 50 GHz	-60.165 dBm			
2	N	1	f	2.500 00 GHz	-59.709 dBm			
3	N	1	f	2.465 98 GHz	-0.047 dBm			

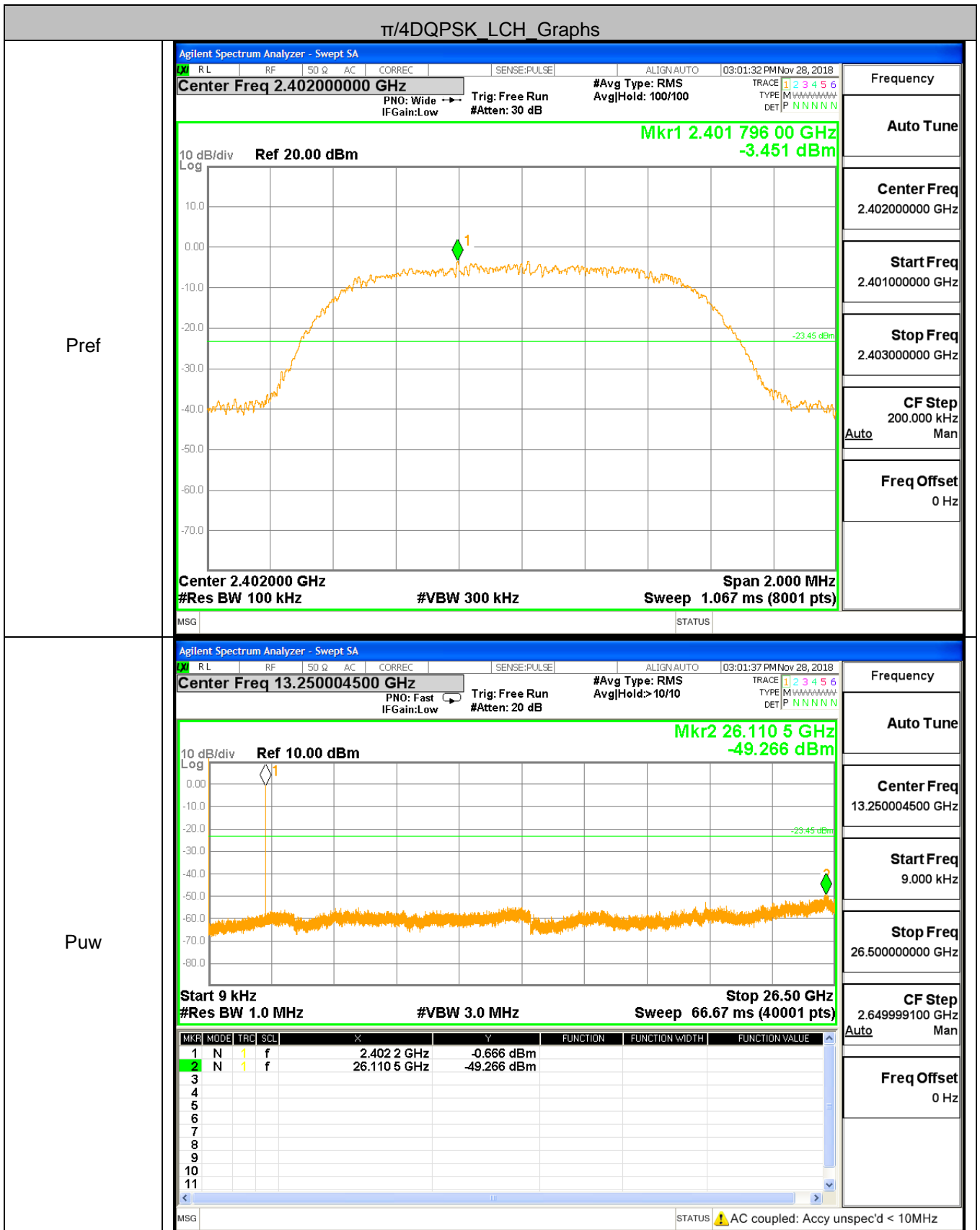
GFSK_MCH_Graphs

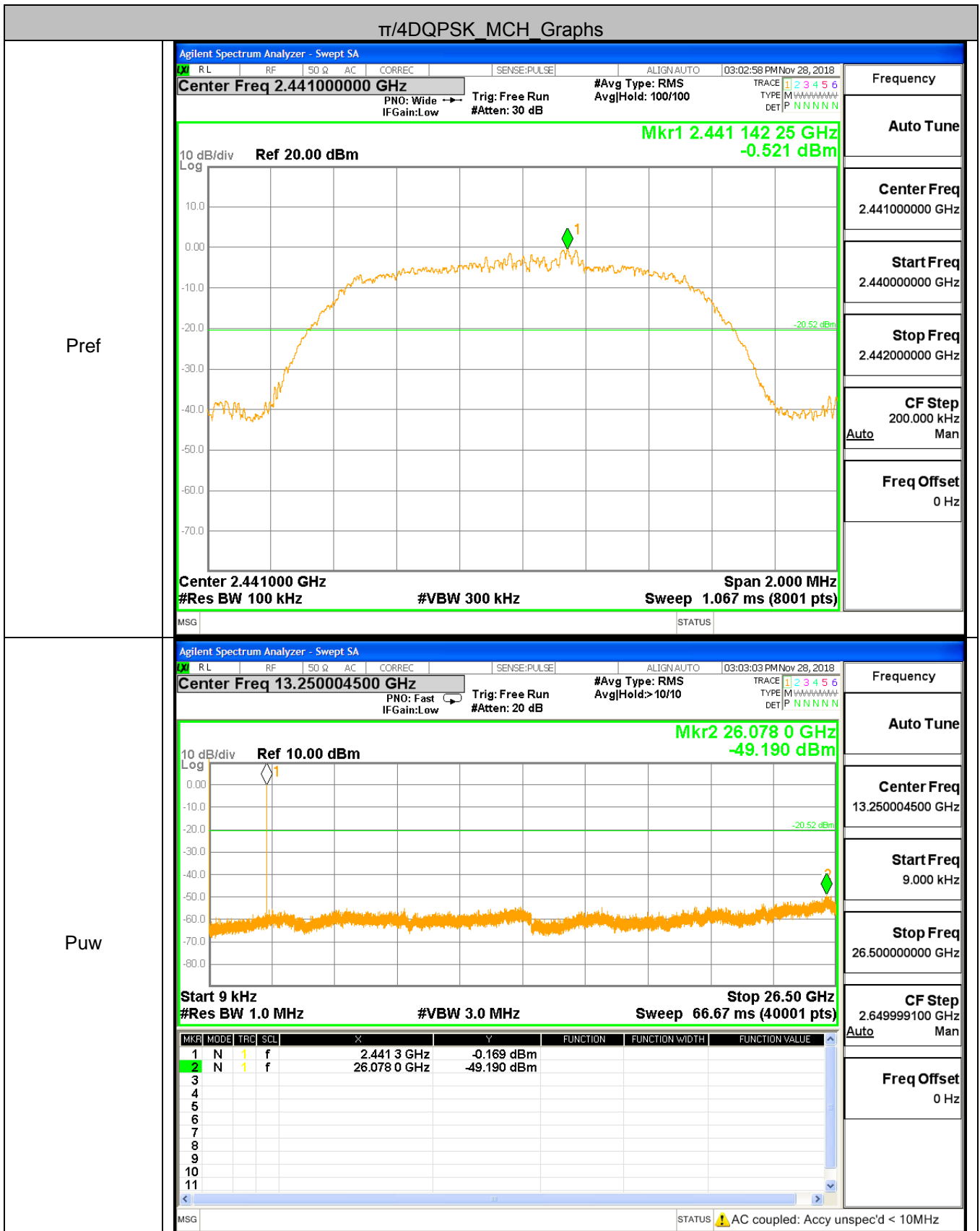


GFSK_HCH_Graphs

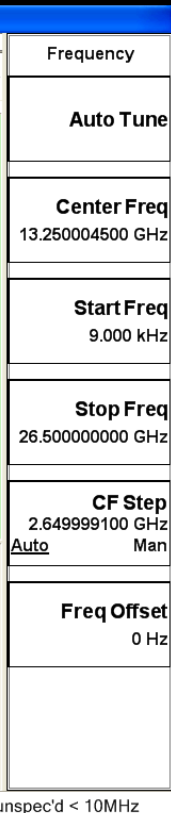
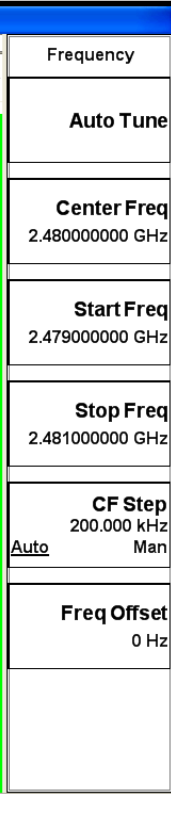


STATUS	⚠ AC coupled: Accy unspec'd < 10MHz
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π /4DQPSK LCH Graphs

$\pi/4$ DQPSK MCH Graphs

$\pi/4$ DQPSK HCH Graphs



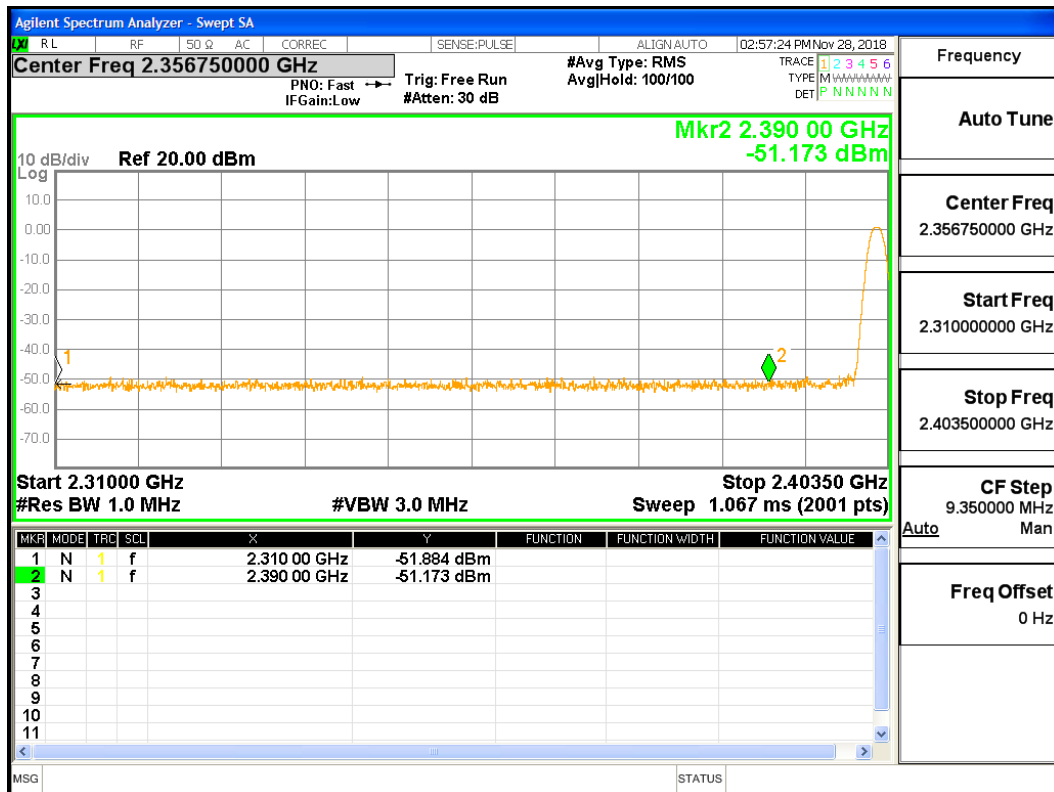
STATUS	⚠ AC coupled: Accy unspec'd < 10MHz
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A.8 Restrict-band band-edge measurements

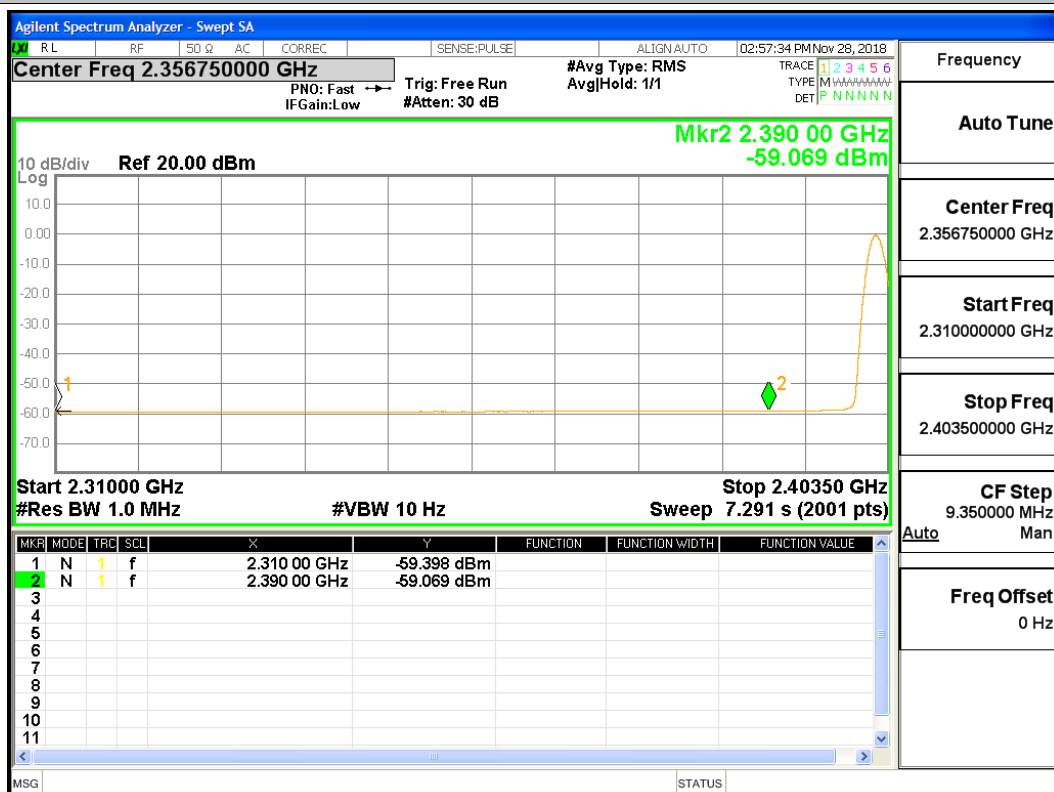
Type	Carrier Frequency (MHz)	Frequency (MHz)	Gain	Ground Factor	Peak Value (dBm)	E [dBuV/m]	Limit [dBuV/m]	Average Value (dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2310	-0.58	0.00	-51.88	42.74	74	-59.4	35.22	54	Pass
1DH5	2402	2390	-0.58	0.00	-51.17	43.45	74	-59.07	35.55	54	Pass
1DH5	2480	2483.5	-0.58	0.00	-50.62	44	74	-56.44	38.18	54	Pass
1DH5	2480	2500	-0.58	0.00	-50.49	44.13	74	-58.51	36.11	54	Pass
2DH5	2402	2310	-0.58	0.00	-52.3	42.32	74	-59.38	35.24	54	Pass
2DH5	2402	2390	-0.58	0.00	-52.92	41.7	74	-59.03	35.59	54	Pass
2DH5	2480	2483.5	-0.58	0.00	-49.04	45.58	74	-56.28	38.34	54	Pass
2DH5	2480	2500	-0.58	0.00	-51.39	43.23	74	-58.5	36.12	54	Pass

Test Graph

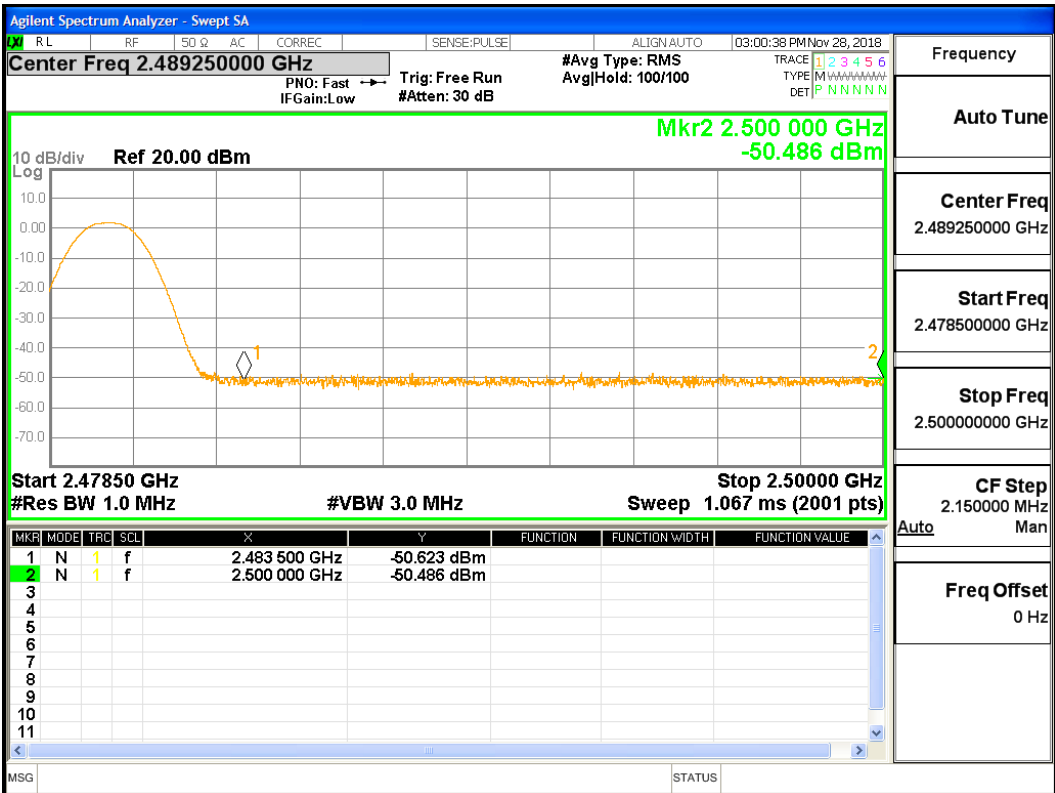
Restrict-band band-edge measurements_2402_PEAK_DH5



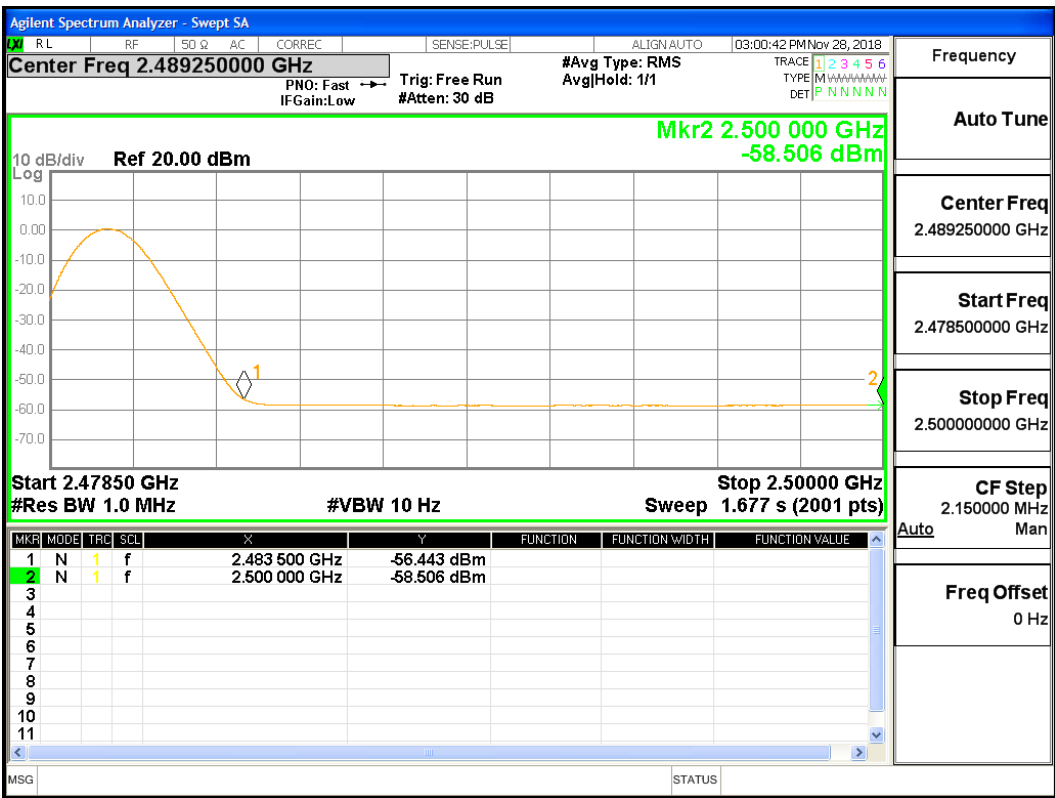
Restrict-band band-edge measurements_2402_AV_DH5



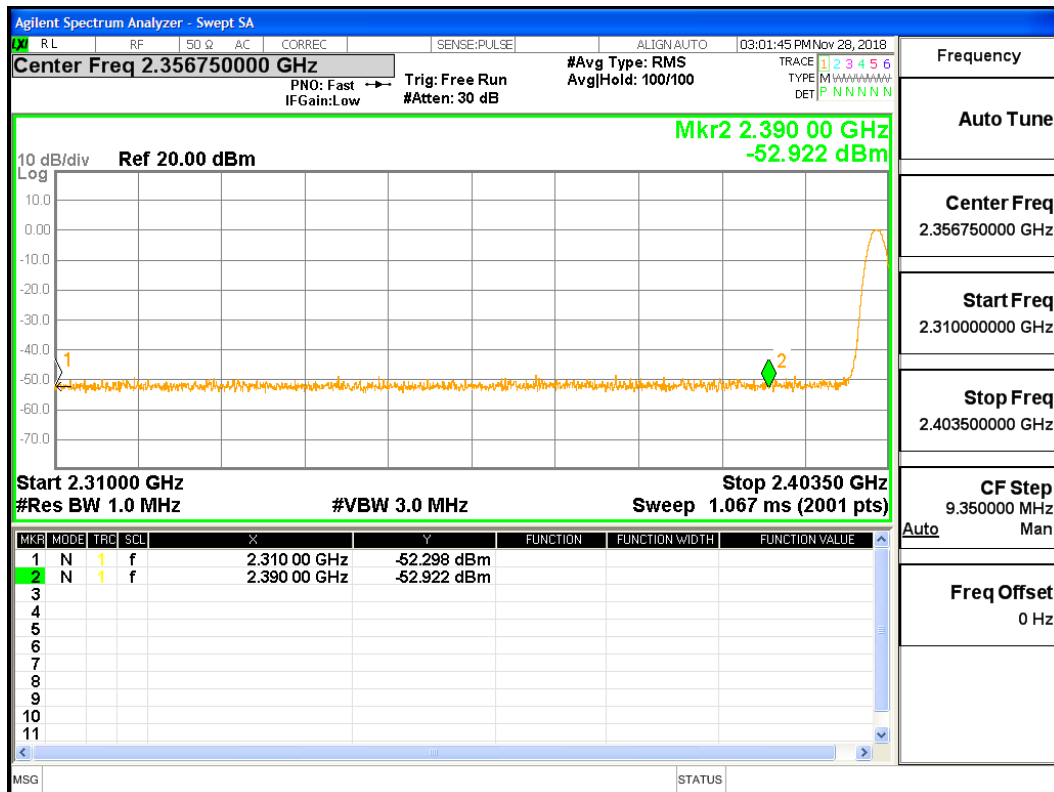
Restrict-band band-edge measurements_2480_PEAK_DH5



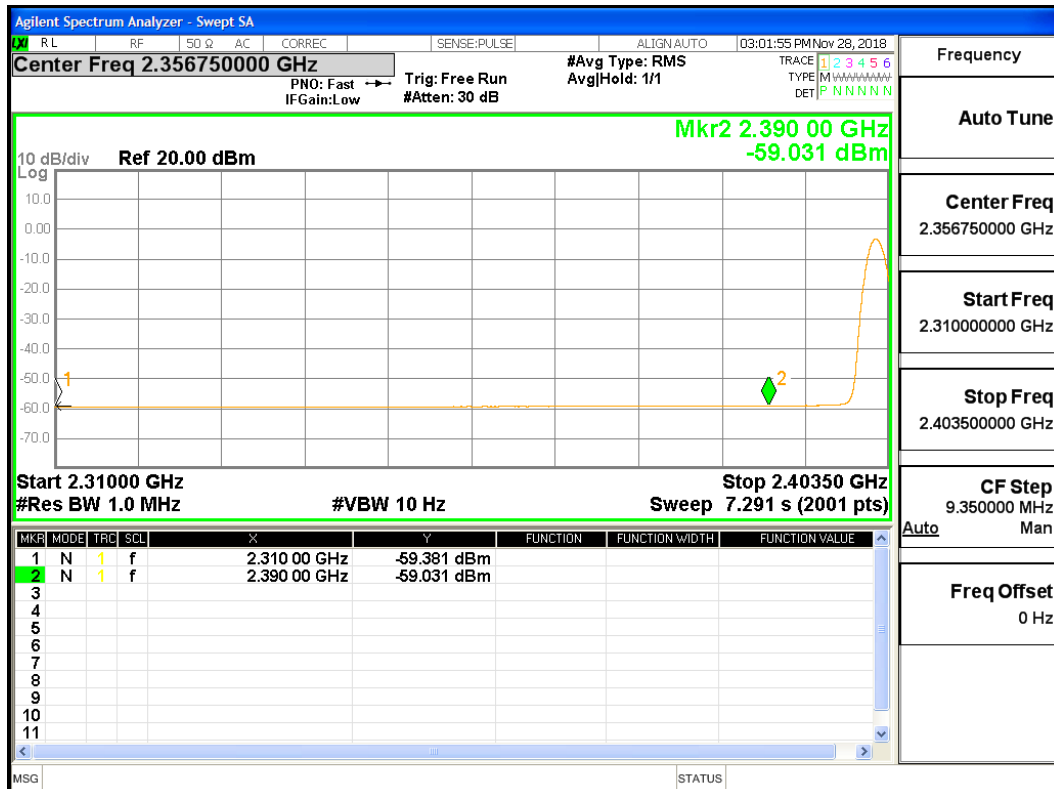
Restrict-band band-edge measurements 2480 AV DH5



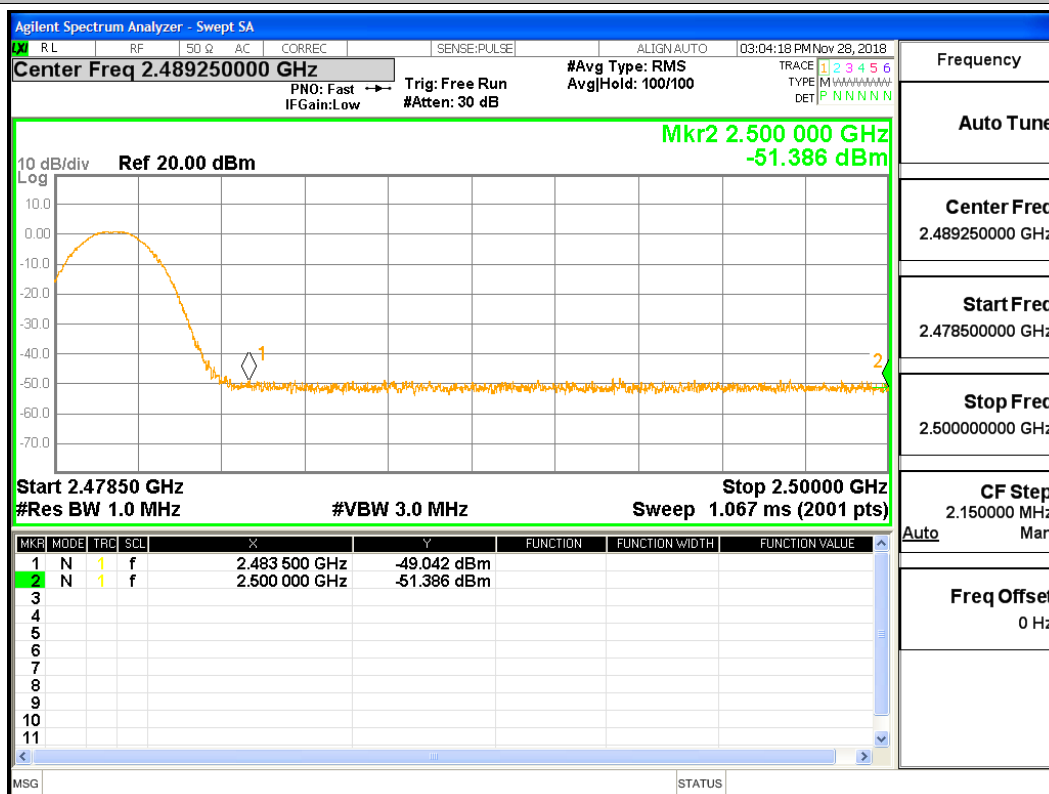
Restrict-band band-edge measurements_2402_PEAK_2DH5



Restrict-band band-edge measurements_2402_AV_2DH5



Restrict-band band-edge measurements_2480_PEAK_2DH5



Restrict-band band-edge measurements_2480_AV_2DH5

