

Appendix A

RF Test Data for BT V4 .2 (BDR/EDR) (Conducted Measurement)

Product Name: Lapbook

Trade Mark: Fusion5

Test Model: C60B

Environmental Conditions

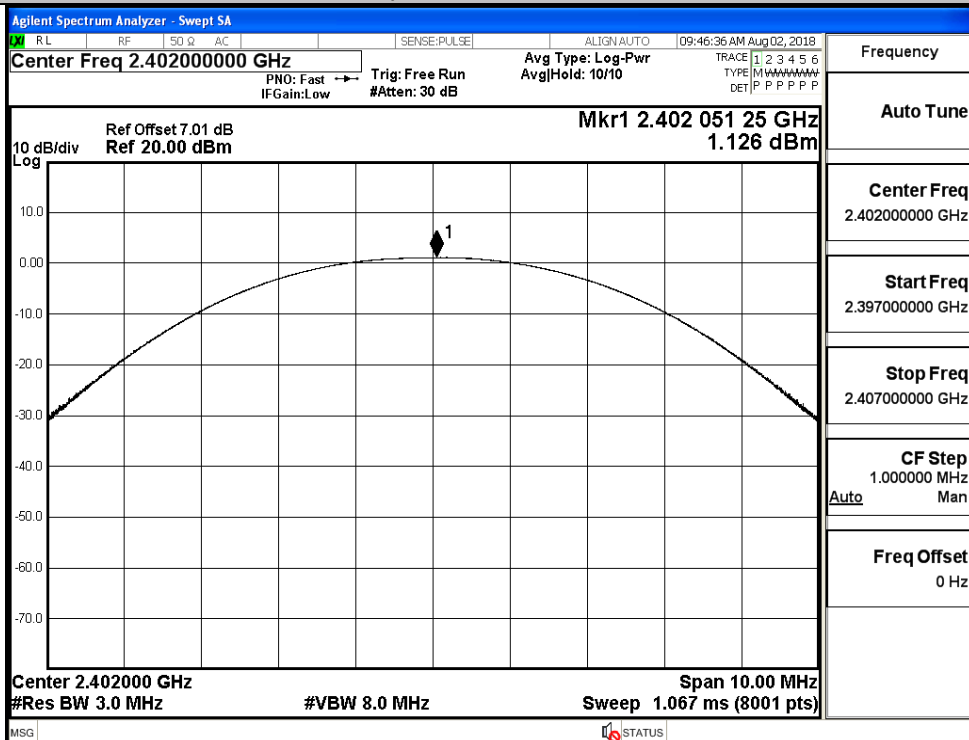
Temperature:	24.6 ° C
Relative Humidity:	52.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Tom.Liu
Supervised by:	Jayden.Zhuo

A.1 Maximum Conducted Output Power

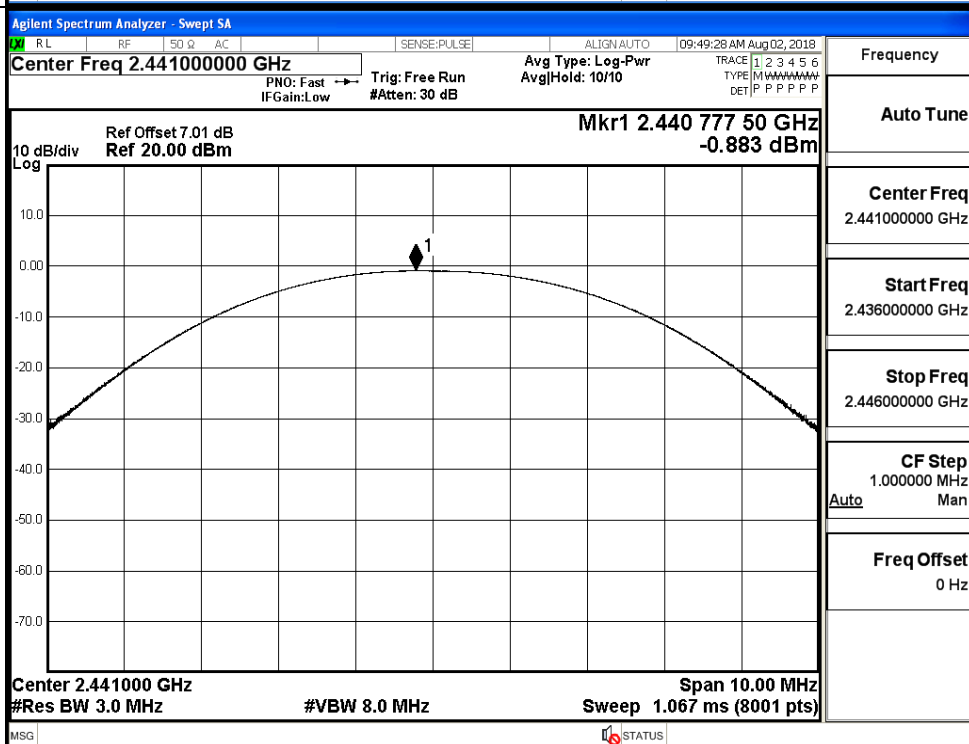
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.126	21	PASS
	MCH	-0.883	21	PASS
	HCH	-0.264	21	PASS
$\pi/4$ DQPSK	LCH	0.406	21	PASS
	MCH	-1.550	21	PASS
	HCH	-1.148	21	PASS
8DPSK	LCH	0.502	21	PASS
	MCH	-1.453	21	PASS
	HCH	-1.120	21	PASS

Test Graphs

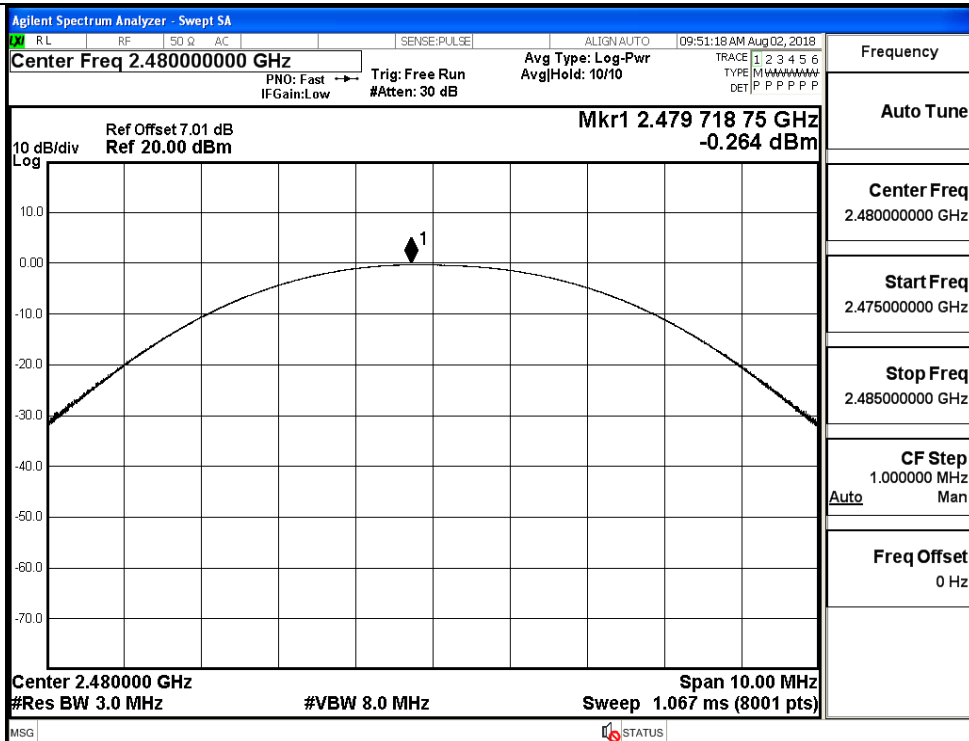
GFSK/LCH



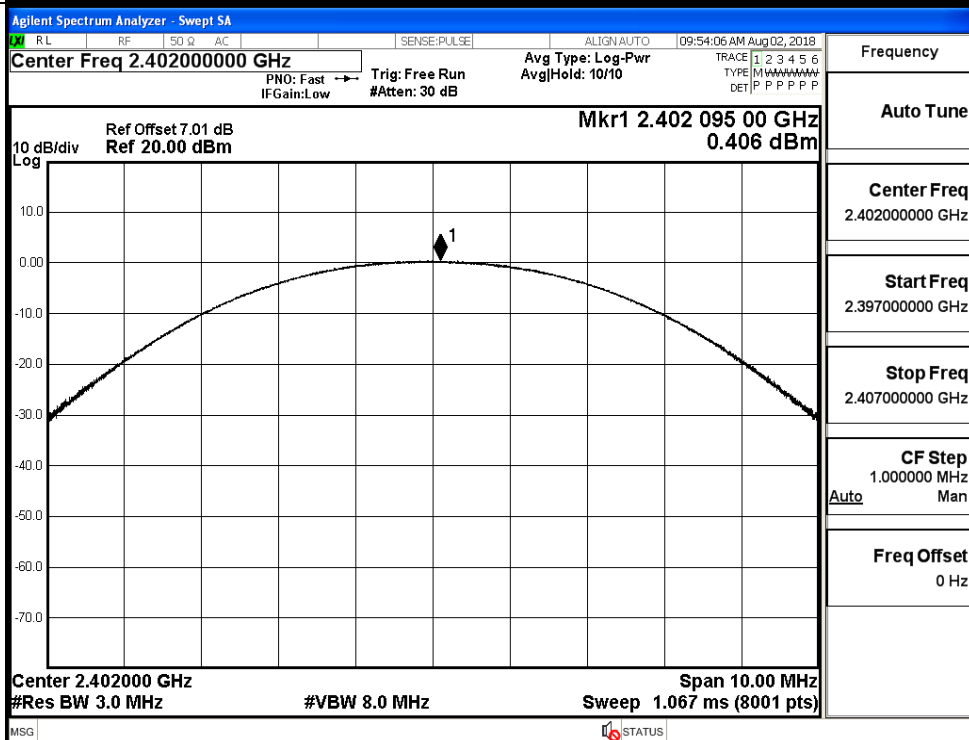
GFSK/MCH



GFSK/HCH

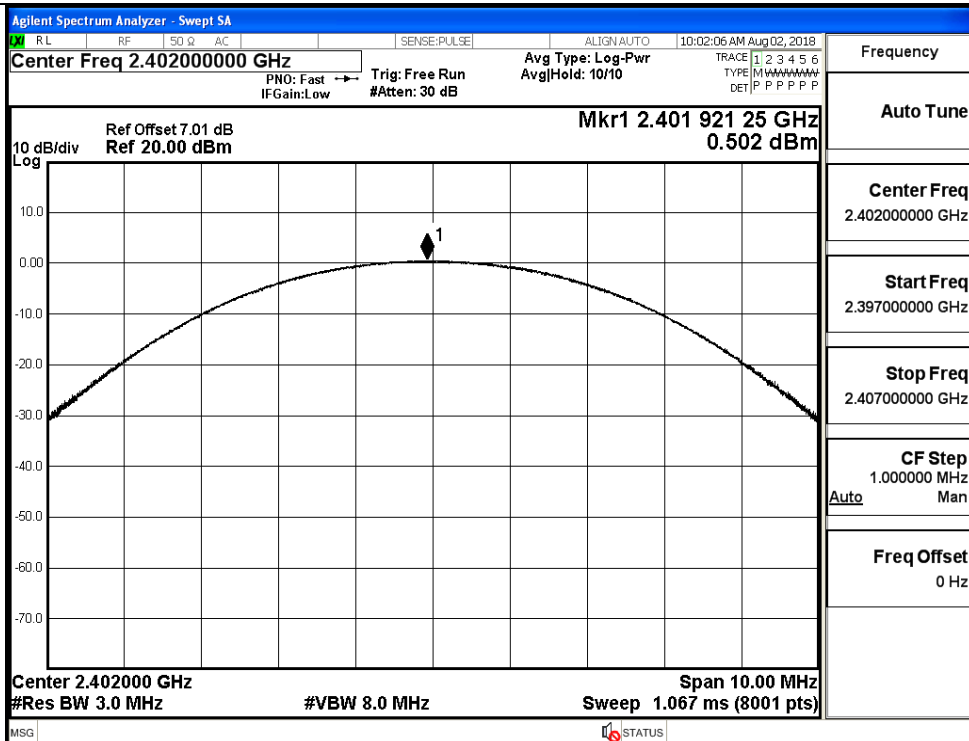


$\pi/4$ DQPSK/LCH

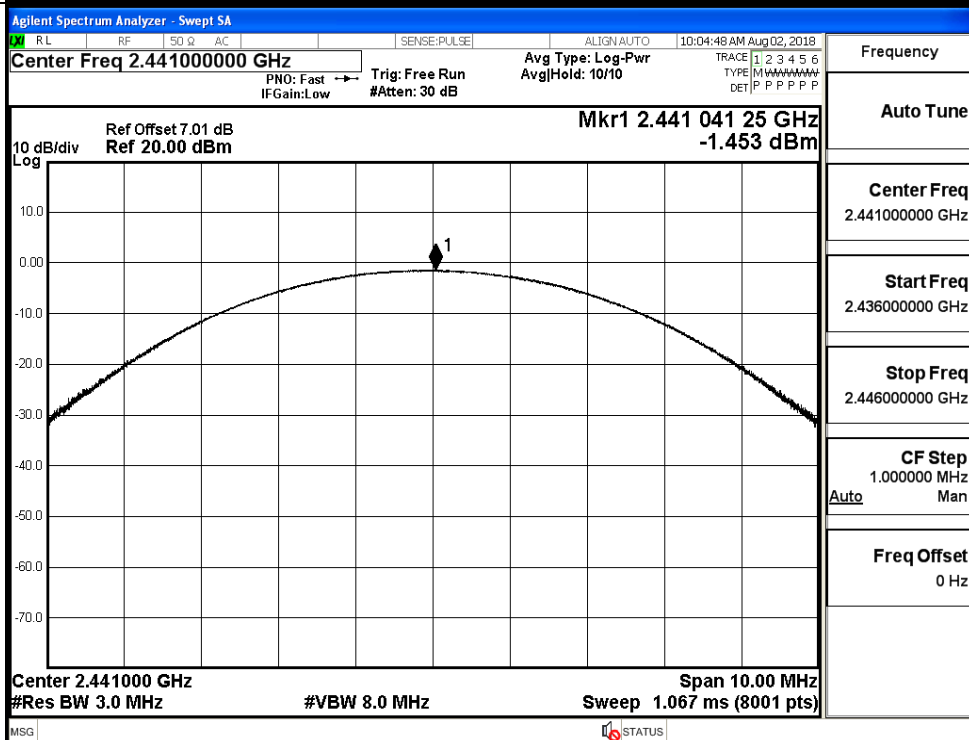


$\pi/4$DQPSK/MCH	Agilent Spectrum Analyzer - Swept SA ☒ R L ☐ RF ☐ 50 Ω ☐ AC ☐ SENSE:PULSE ☐ ALIGN:AUTO 09:56:50 AM Aug 02, 2018 Center Freq 2.441000000 GHz PNO: Fast $\rightarrow$ Trig: Free Run Avg Type: Log-Pwr IF Gain: Low #Atten: 30 dB AvgHld: 10/10 TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P P P P P P Ref Offset 7.01 dB Ref 20.00 dBm Mkr1 2.440 835 00 GHz -1.550 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 09:59:18 AM Aug 02, 2018 Center Freq 2.480000000 GHz PNO: Fast $\rightarrow$ Trig: Free Run Avg Type: Log-Pwr IF Gain: Low #Atten: 30 dB AvgHld: 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 Ref Offset 7.01 dB Ref 20.00 dBm Mkr1 2.479 962 50 GHz -1.148 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

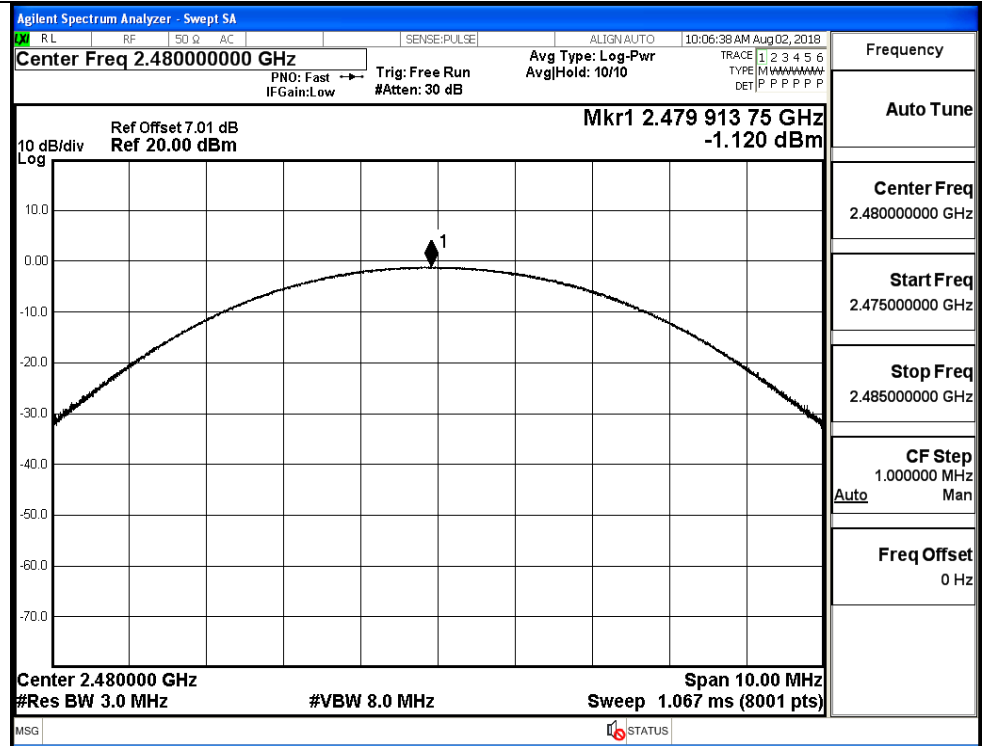
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

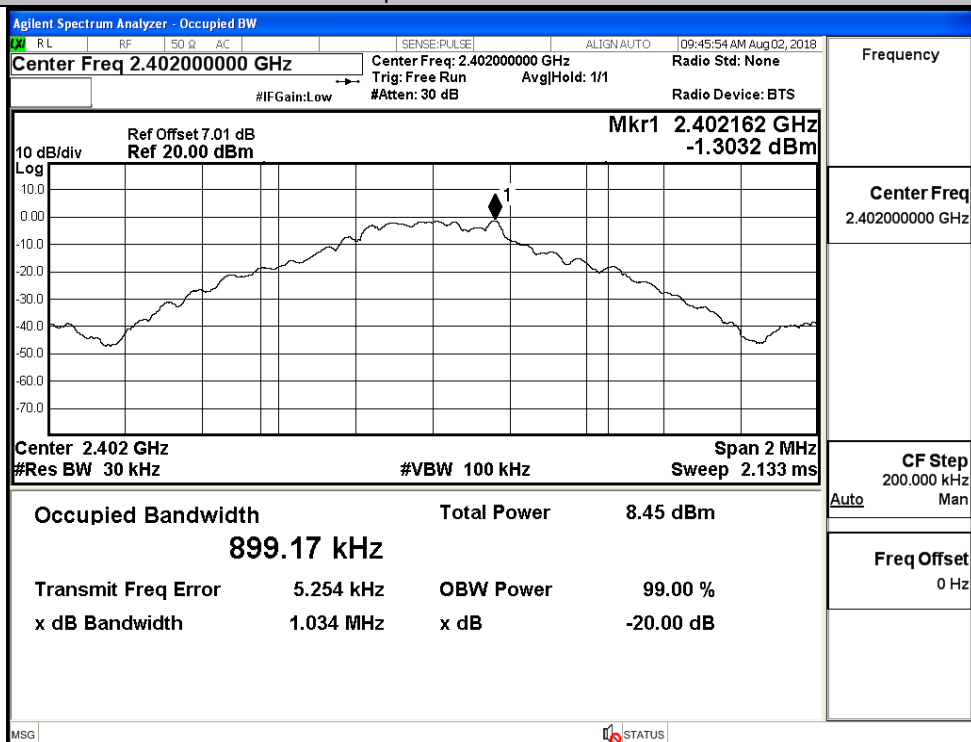


A.2 99% and 20dB Bandwidth

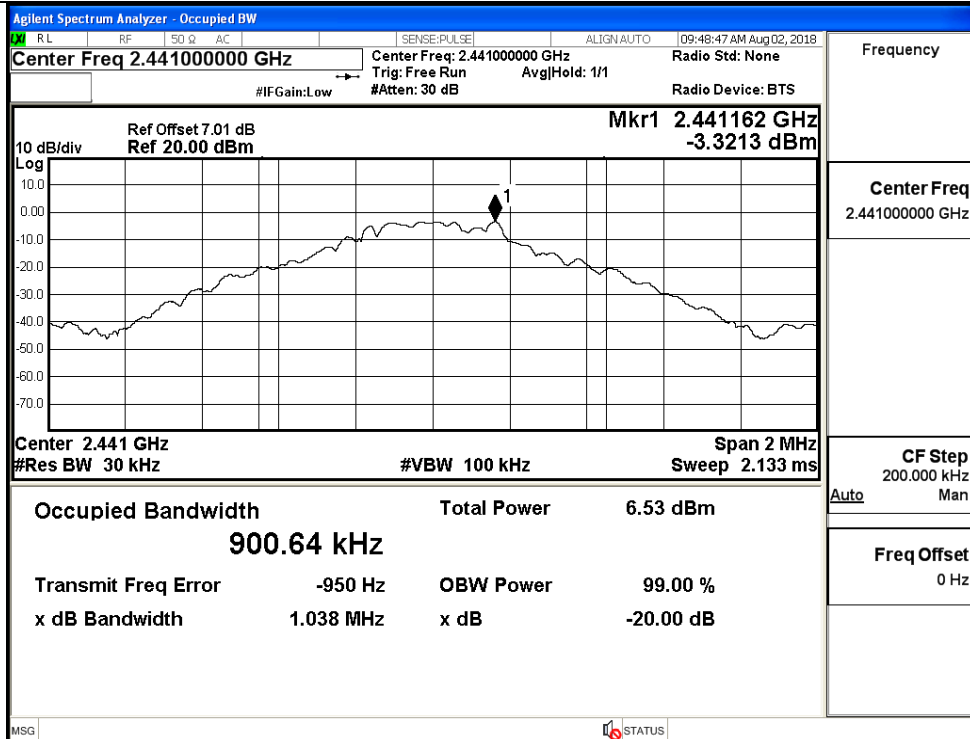
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.89917	1.034	Not Specified	PASS
	MCH	0.90064	1.038	Not Specified	PASS
	HCH	0.89754	1.042	Not Specified	PASS
π /4DQPSK	LCH	1.1714	1.290	Not Specified	PASS
	MCH	1.1814	1.316	Not Specified	PASS
	HCH	1.1702	1.289	Not Specified	PASS
8DPSK	LCH	1.1767	1.293	Not Specified	PASS
	MCH	1.1947	1.298	Not Specified	PASS
	HCH	1.1779	1.291	Not Specified	PASS

Test Graphs

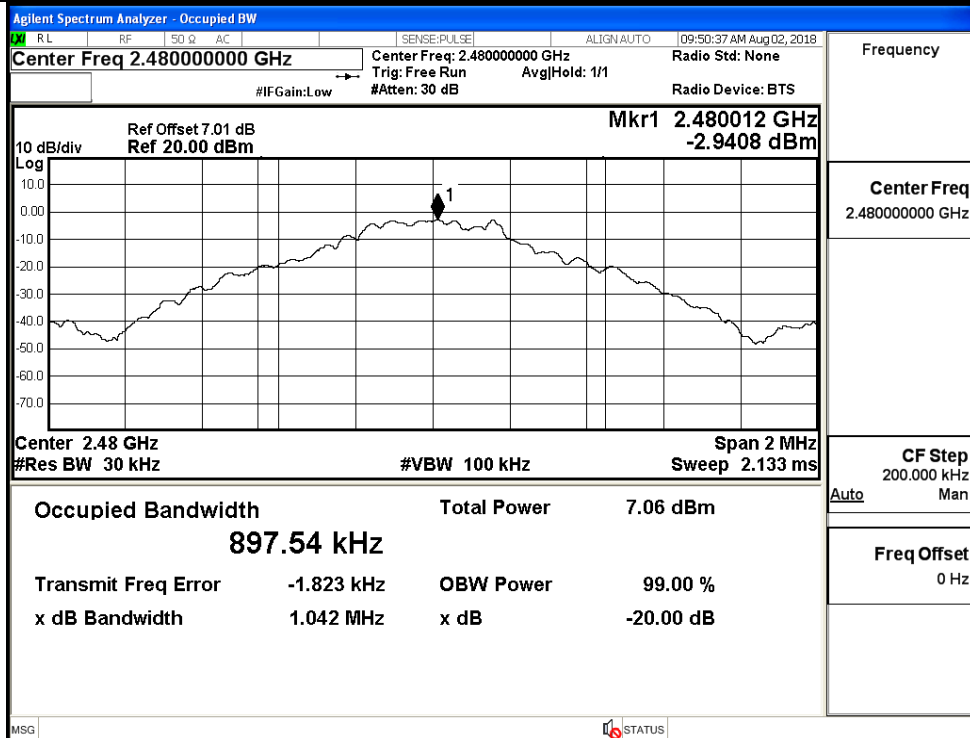
GFSK/LCH



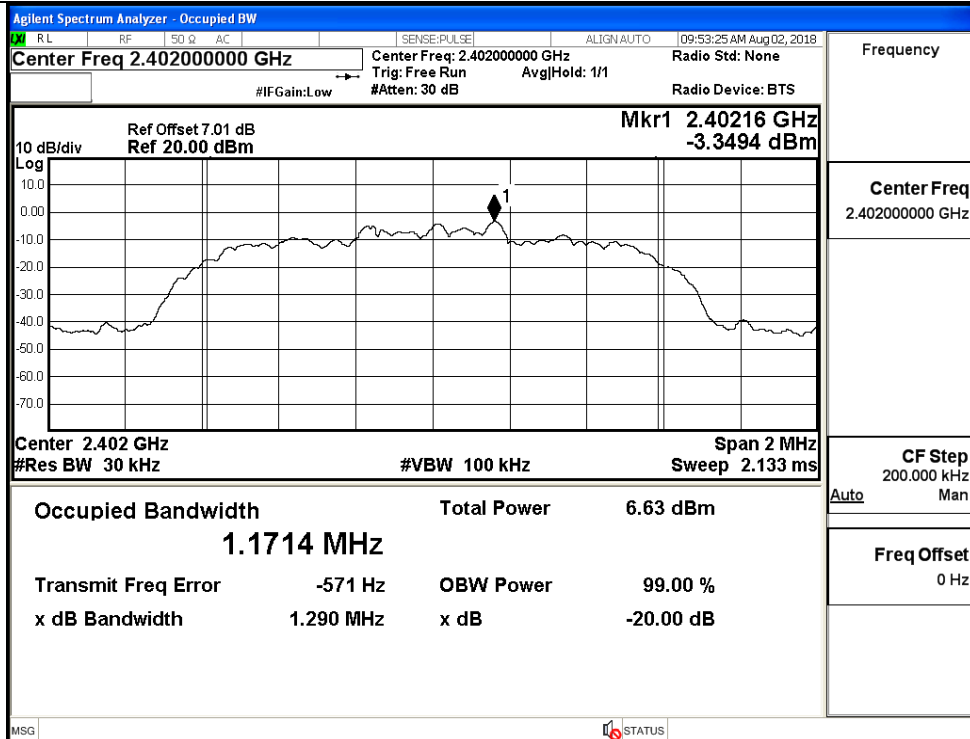
GFSK/MCH



GFSK/HCH



$\pi/4$ DQPSK/LCH



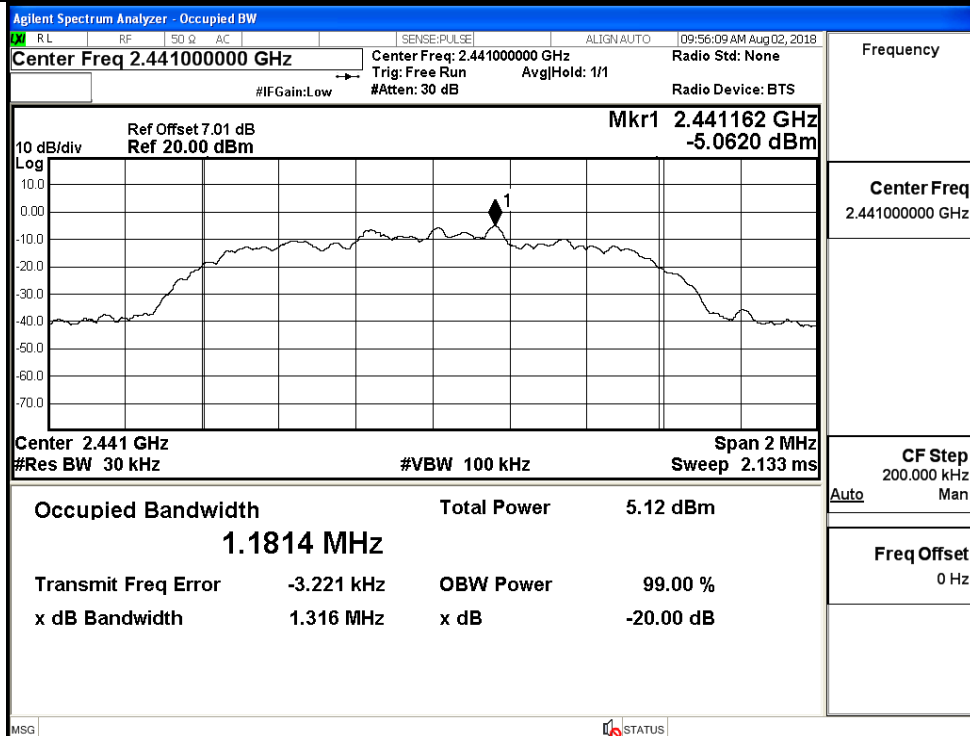
Frequency

Center Freq
2.40200000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/MCH



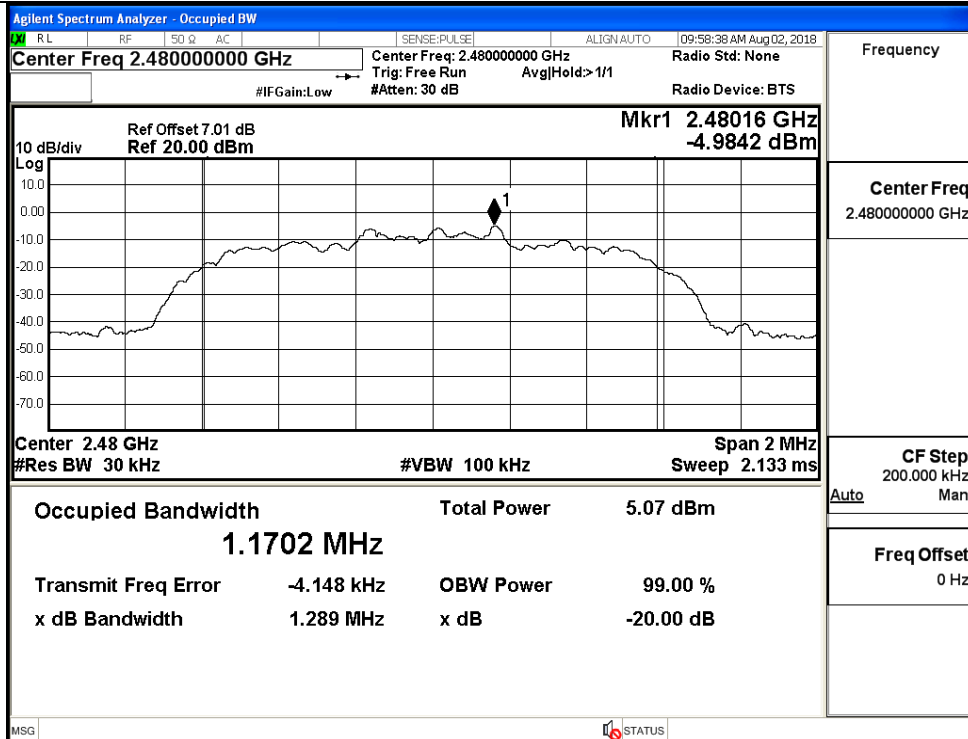
Frequency

Center Freq
2.44100000 GHz

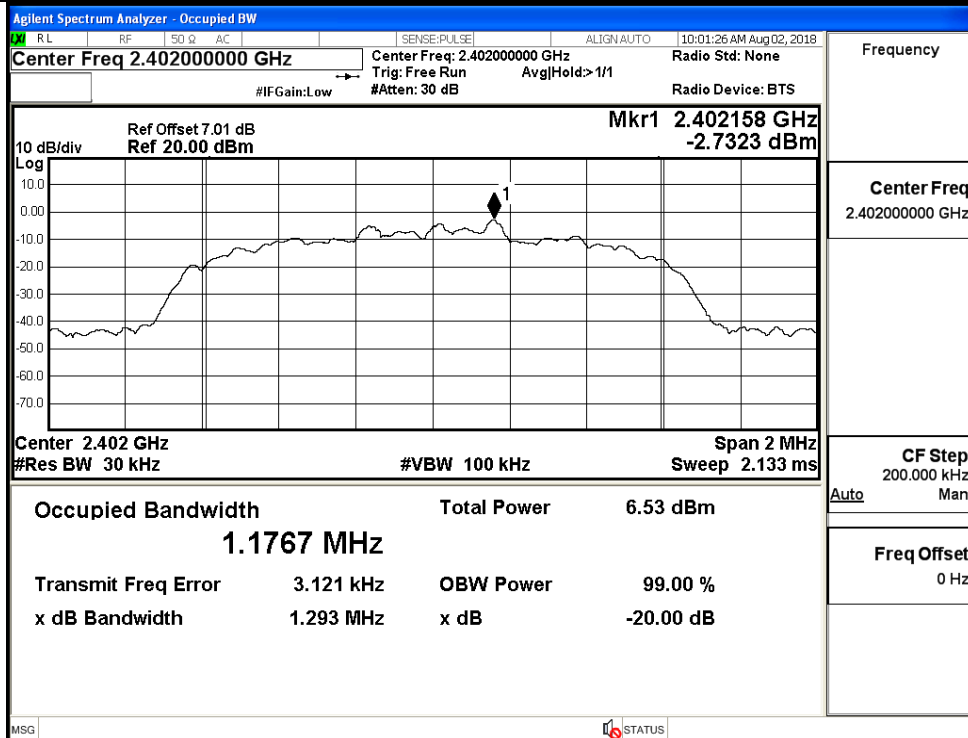
CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

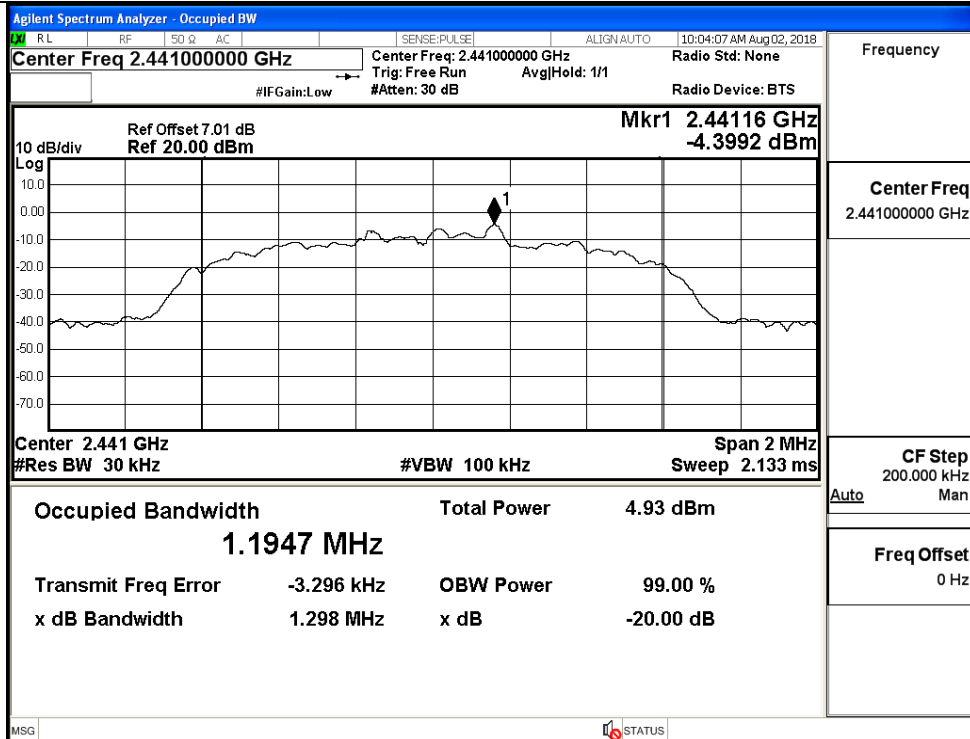
$\pi/4$ DQPSK/HCH



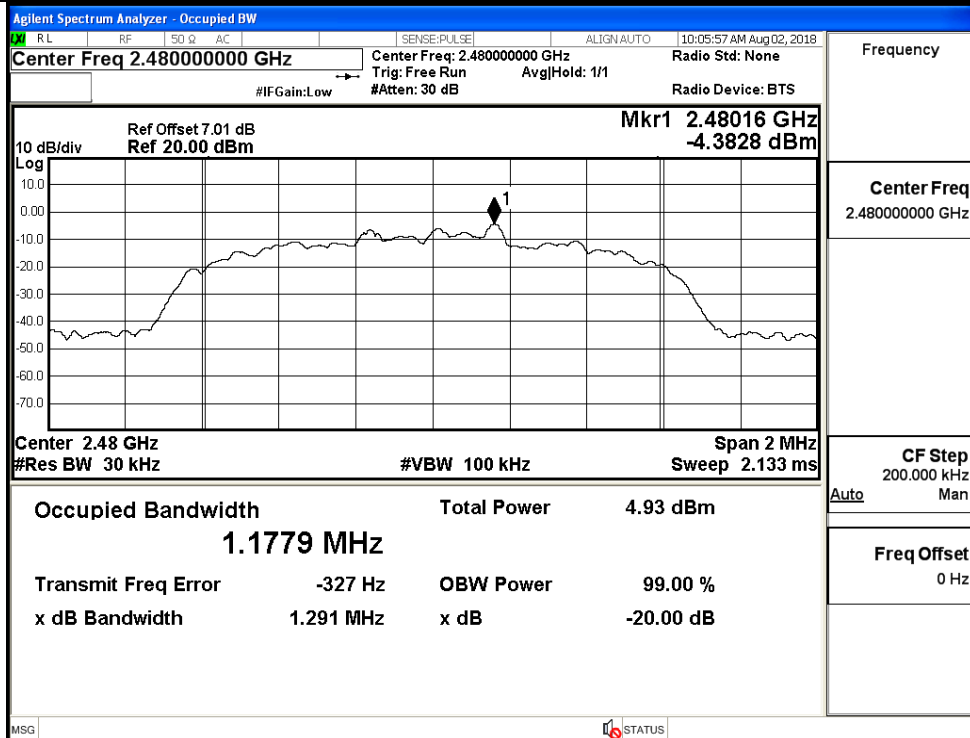
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

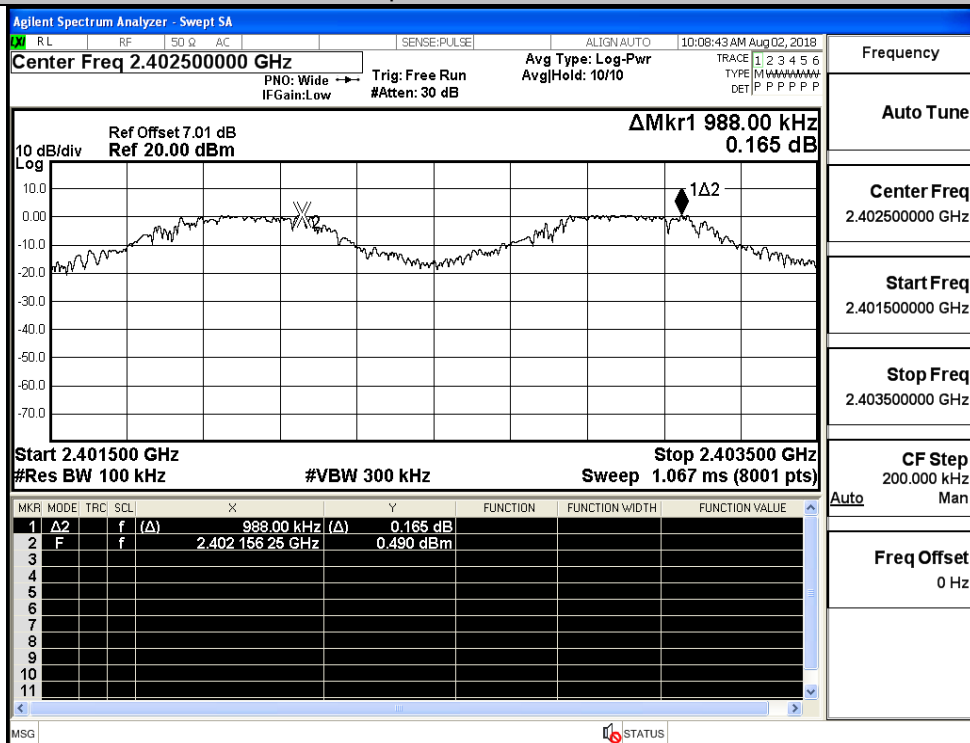


A.3 Carrier Frequency Separation

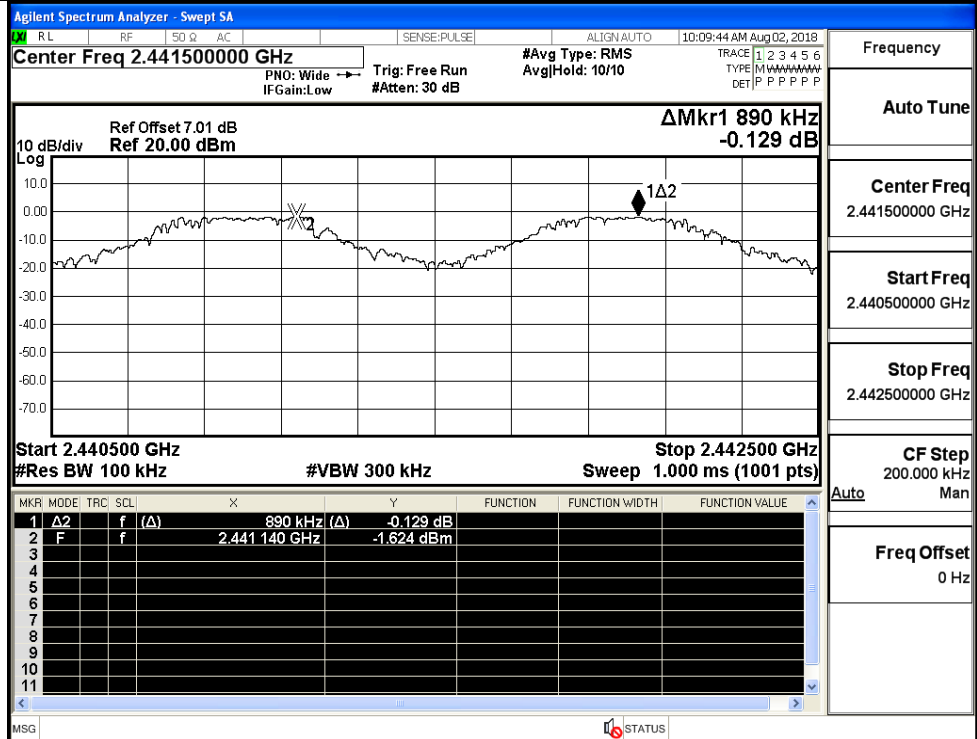
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.988	0.695	PASS
	MCH	0.890	0.695	PASS
	HCH	1.084	0.695	PASS
$\pi/4$ DQPSK	LCH	0.890	0.877	PASS
	MCH	1.150	0.877	PASS
	HCH	0.978	0.877	PASS
8DPSK	LCH	0.870	0.865	PASS
	MCH	1.080	0.865	PASS
	HCH	1.192	0.865	PASS

Test Graphs

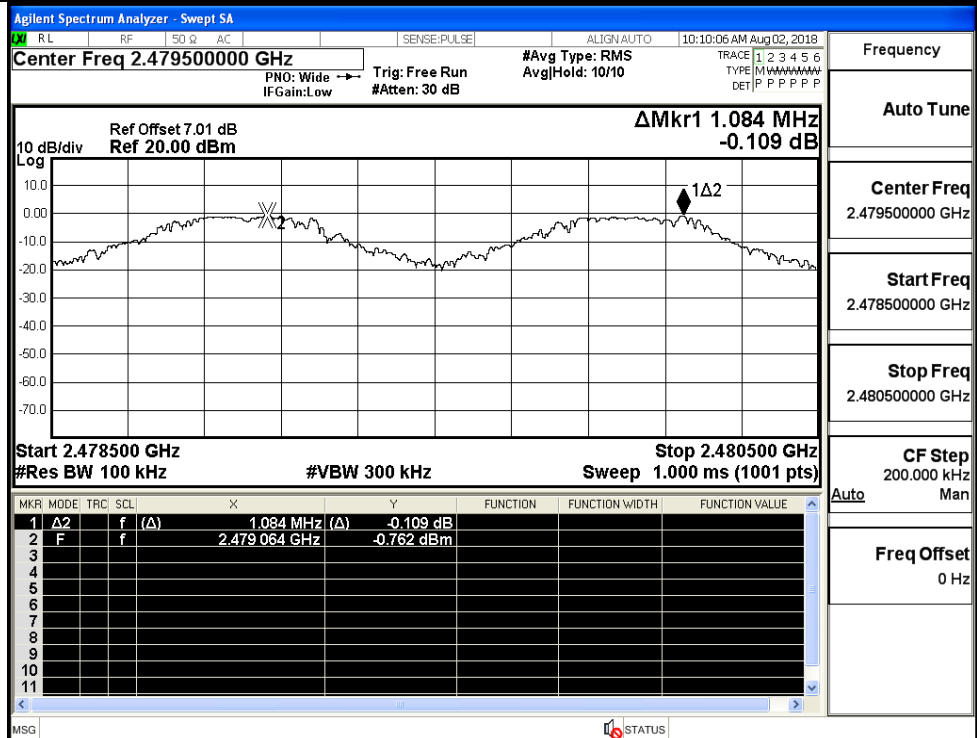
GFSK/LCH



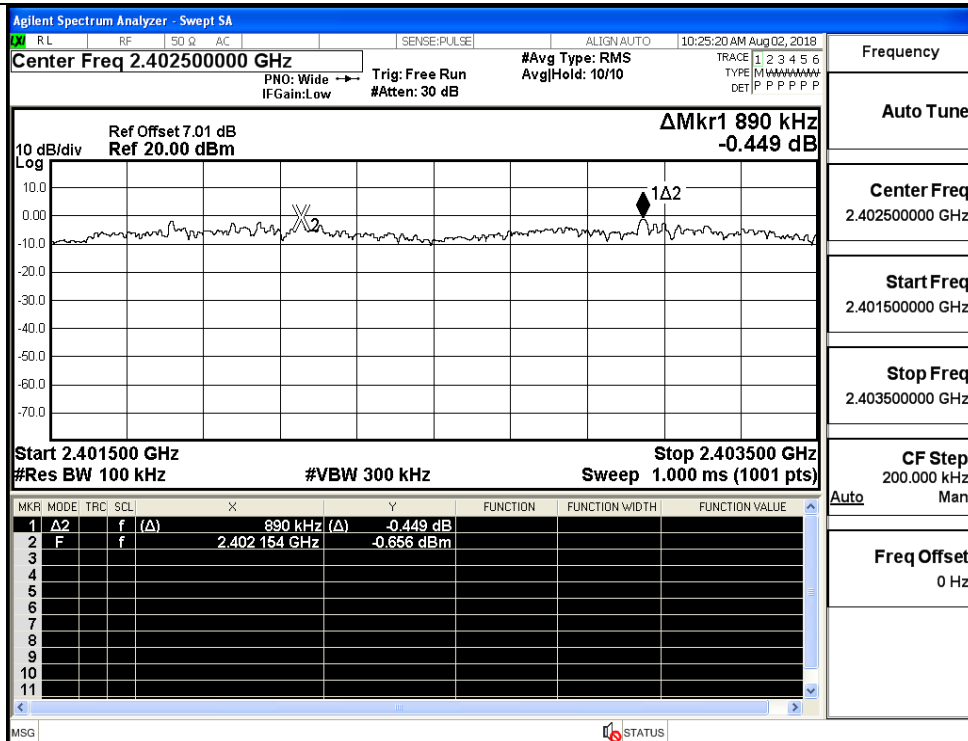
GFSK/MCH



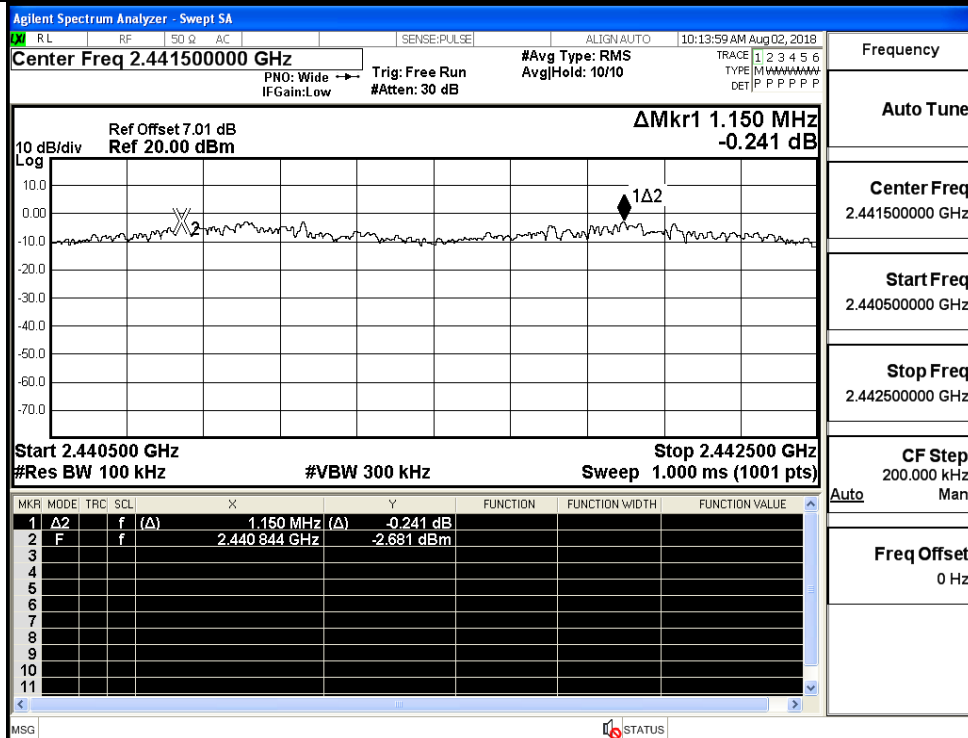
GFSK/HCH



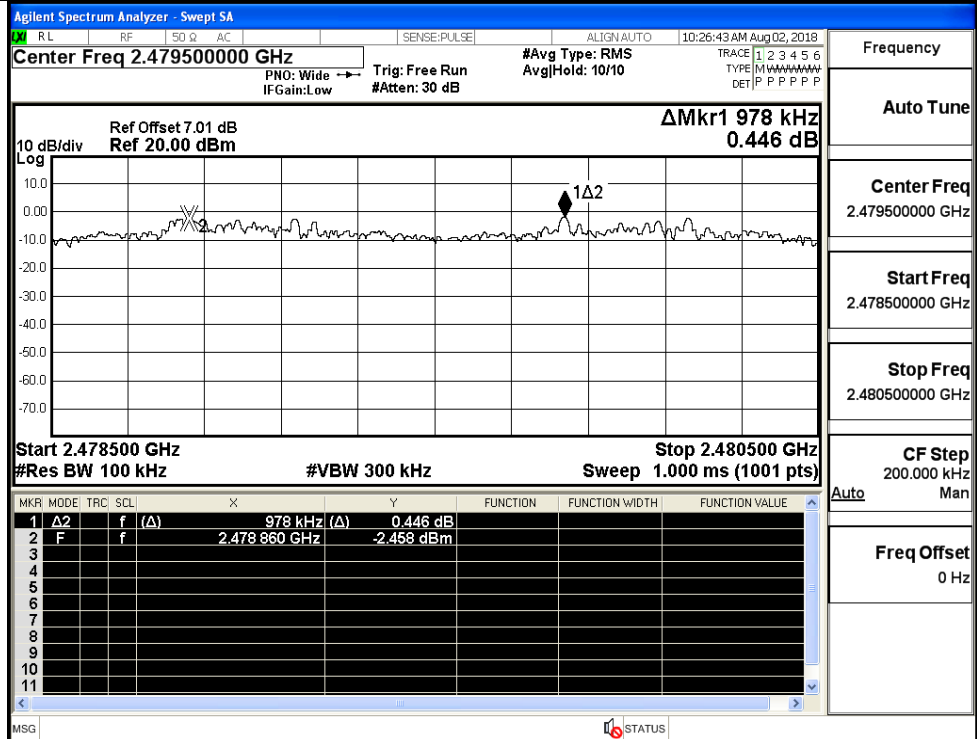
$\pi/4$ DQPSK/LCH



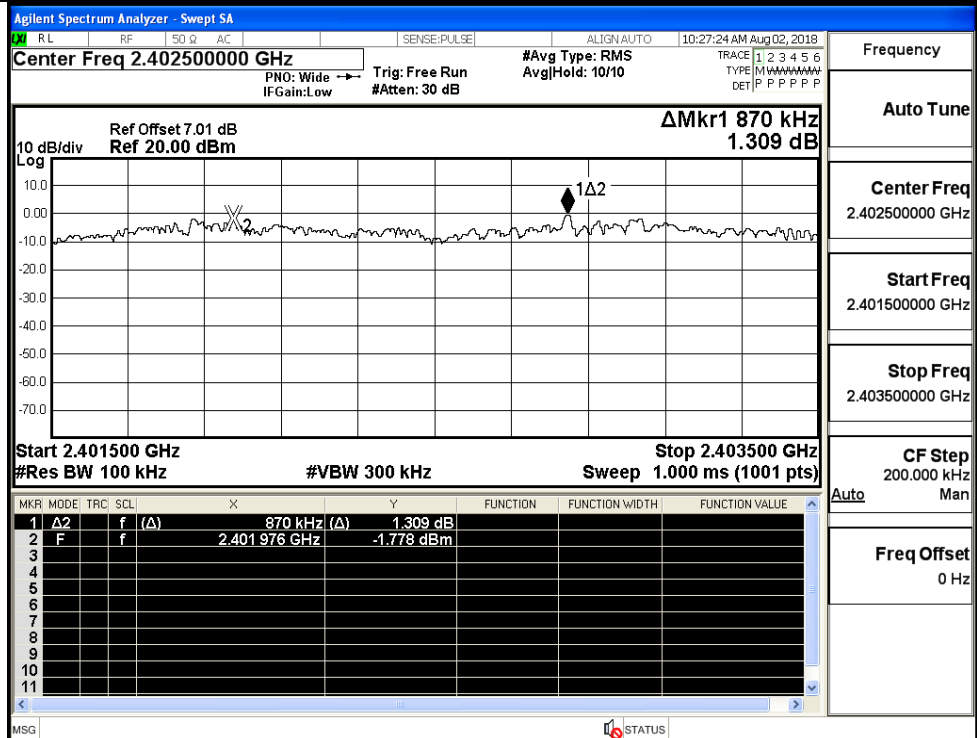
$\pi/4$ DQPSK/MCH



$\pi/4$ DQPSK/HCH



8DPSK/LCH



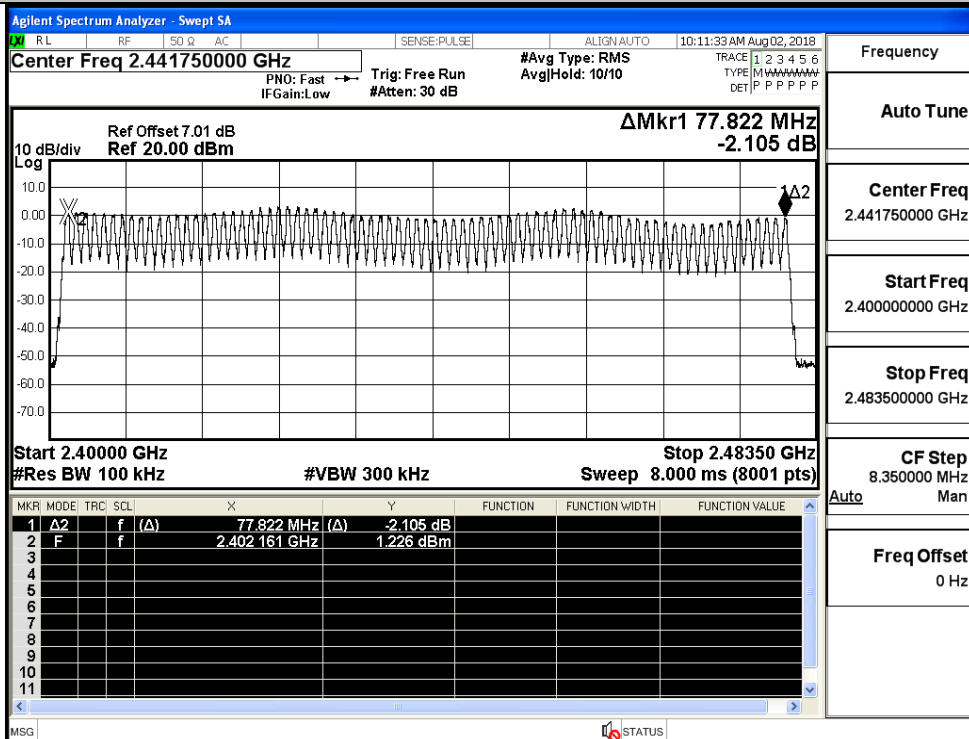
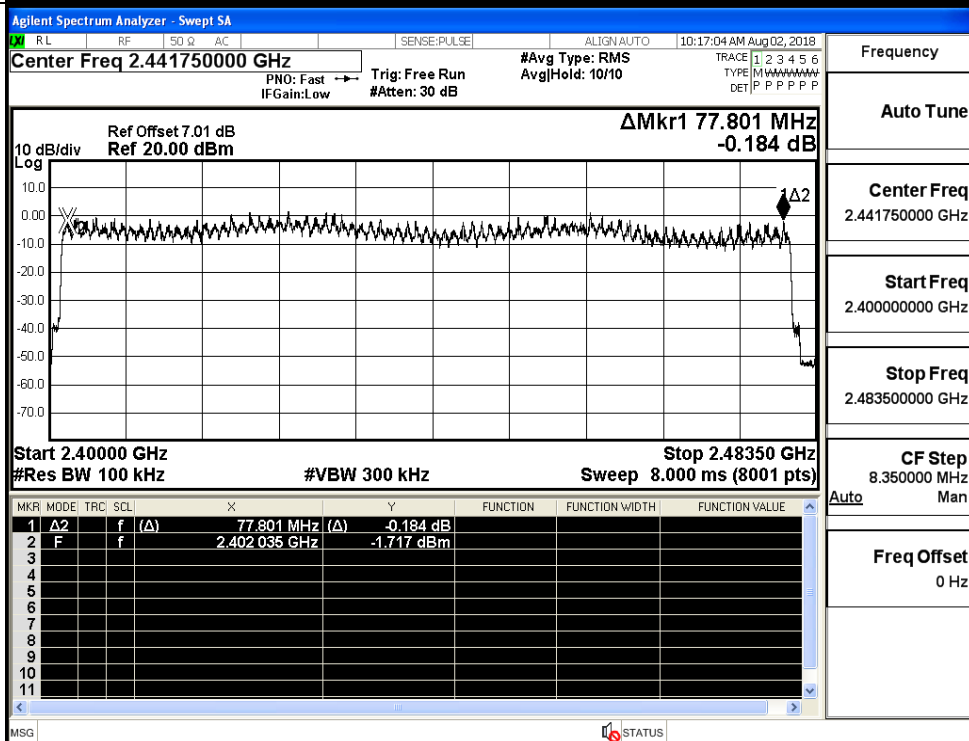
8DPSK/MCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:PULSE ALIGN: AUTO 10:19:28 AM Aug 02, 2018 Center Freq 2.441500000 GHz PN0: Wide → IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS AvglHold: 10/10 TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P P P P P P P Ref Offset 7.01 dB Ref 20.00 dBm ΔMkr1 1.080 MHz 0.490 dB 10 dB/div Log Start 2.440500 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.442500 GHz Sweep 1.000 ms (1001 pts) <table><tr><th>MKR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>Δ2</td><td>f</td><td>(Δ)</td><td>1.080 MHz (Δ)</td><td>0.490 dB</td><td></td><td></td><td></td></tr><tr><td>2</td><td>F</td><td>f</td><td></td><td>2.441 088 GHz</td><td>-3.752 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS Frequency Auto Tune Center Freq 2.441500000 GHz Start Freq 2.440500000 GHz Stop Freq 2.442500000 GHz CF Step 200.000 kHz Man Freq Offset 0 Hz	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	1.080 MHz (Δ)	0.490 dB				2	F	f		2.441 088 GHz	-3.752 dBm				3									4									5									6									7									8									9									10									11								
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8DPSK/HCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:PULSE ALIGN: AUTO 10:19:55 AM Aug 02, 2018 Center Freq 2.479500000 GHz PN0: Wide → IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS AvglHold: 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 7.01 dB Ref 20.00 dBm ΔMkr1 1.192 MHz -1.278 dB 10 dB/div Log Start 2.478500 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.480500 GHz Sweep 1.000 ms (1001 pts) <table><tr><th>MKR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>Δ2</td><td>f</td><td>(Δ)</td><td>1.192 MHz (Δ)</td><td>-1.278 dB</td><td></td><td></td><td></td></tr><tr><td>2</td><td>F</td><td>f</td><td></td><td>2.478 796 GHz</td><td>-4.498 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS 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	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	1.192 MHz (Δ)	-1.278 dB				2	F	f		2.478 796 GHz	-4.498 dBm				3									4									5									6									7									8									9									10									11								
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A.4 Hopping Channel Number

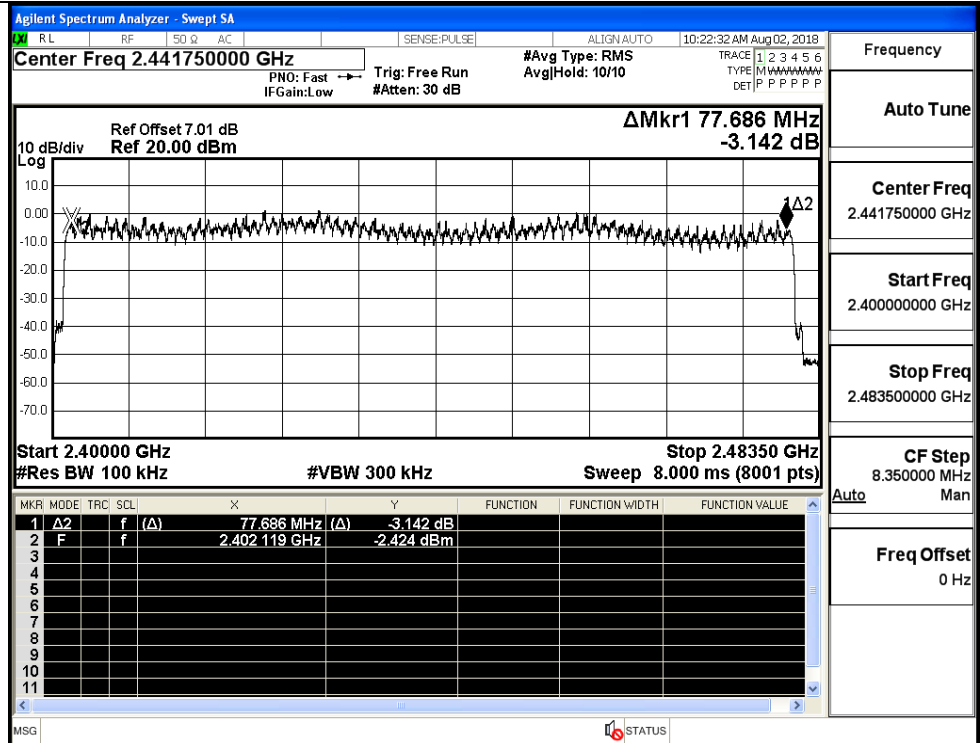
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

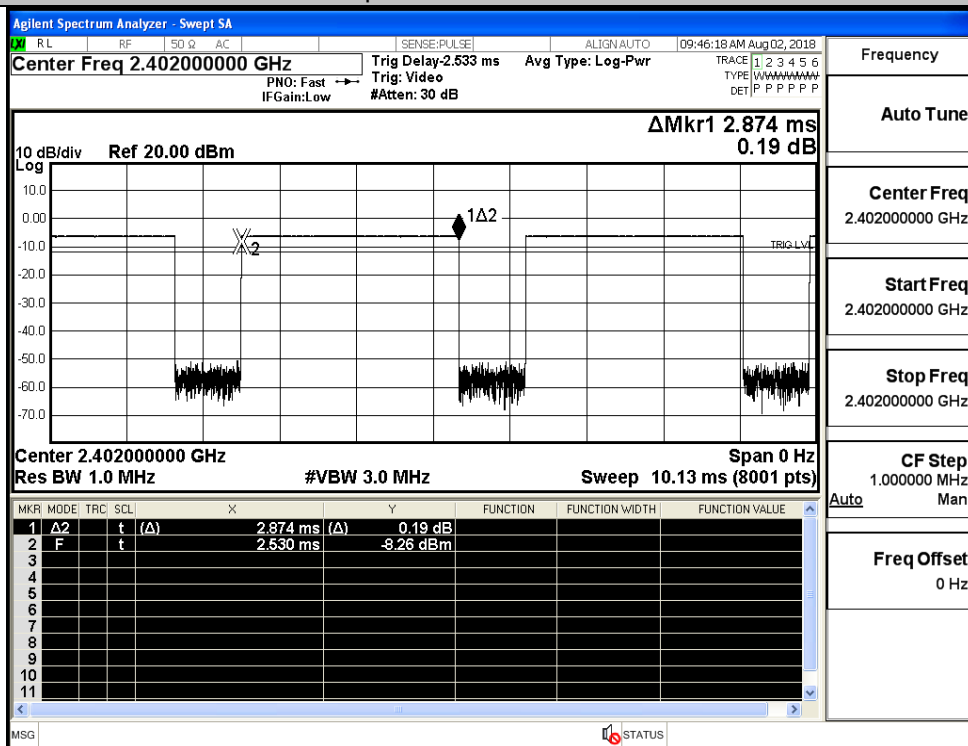


A.5 Dwell Time

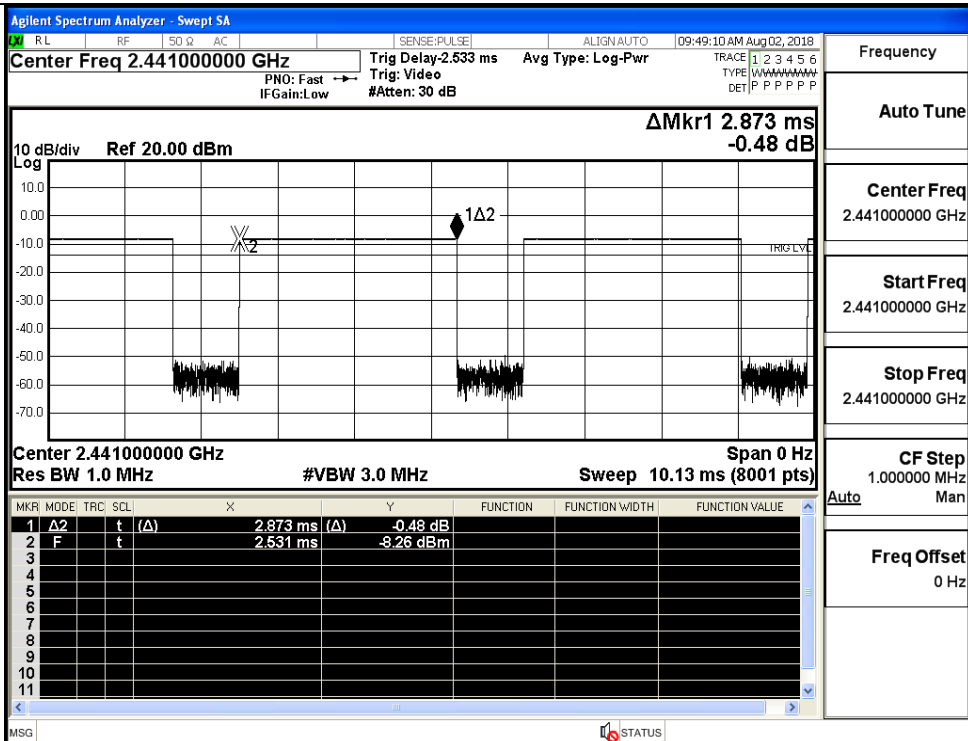
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.87	106.7	0.307	0.4	PASS
	2DH5	MCH	2.87	106.7	0.307	0.4	PASS
	2DH5	HCH	2.87	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.87	106.7	0.307	0.4	PASS
	3DH5	MCH	2.87	106.7	0.307	0.4	PASS
	3DH5	HCH	2.87	106.7	0.307	0.4	PASS

Test Graphs

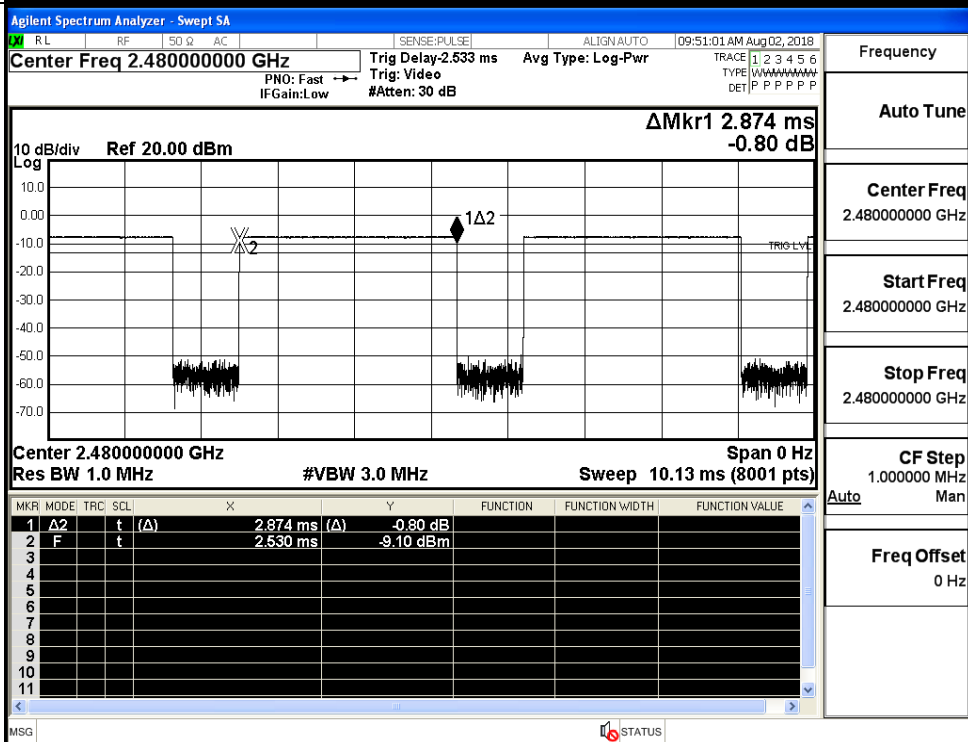
GFSK_DH5/LCH



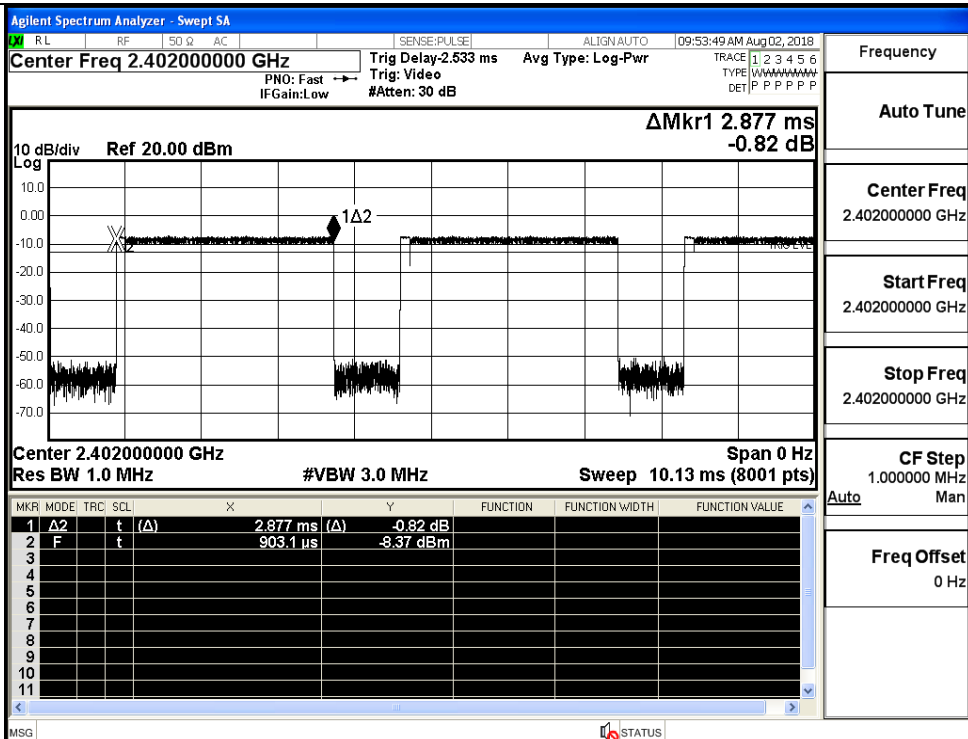
GFSK_DH5/MCH



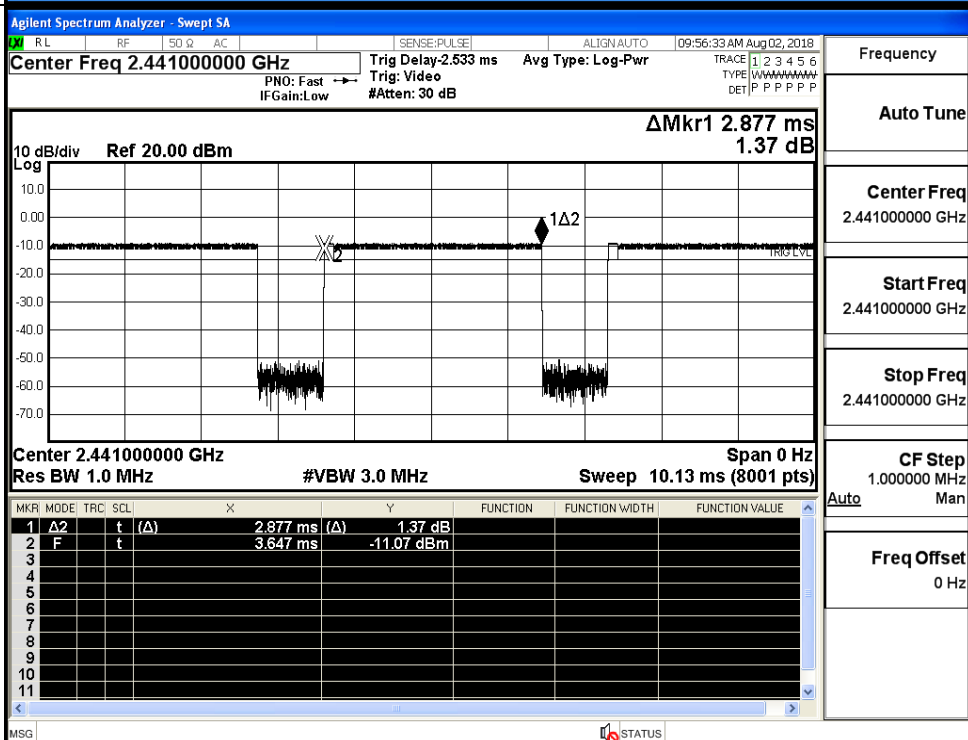
GFSK_DH5/HCH



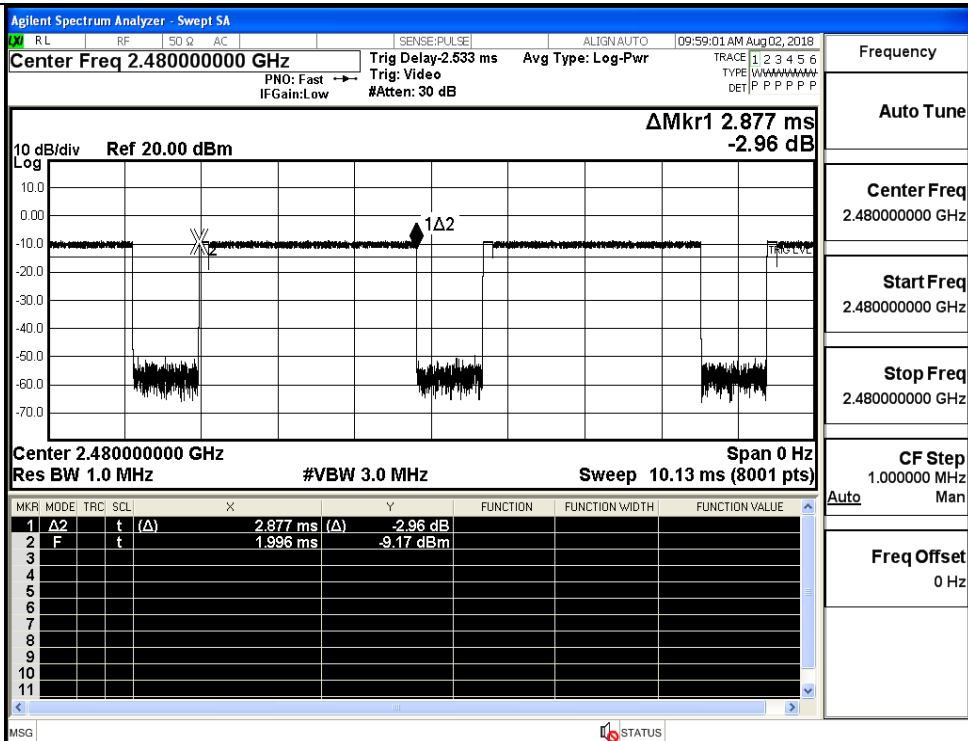
$\pi/4$ DQPSK
_2DH5/LCH



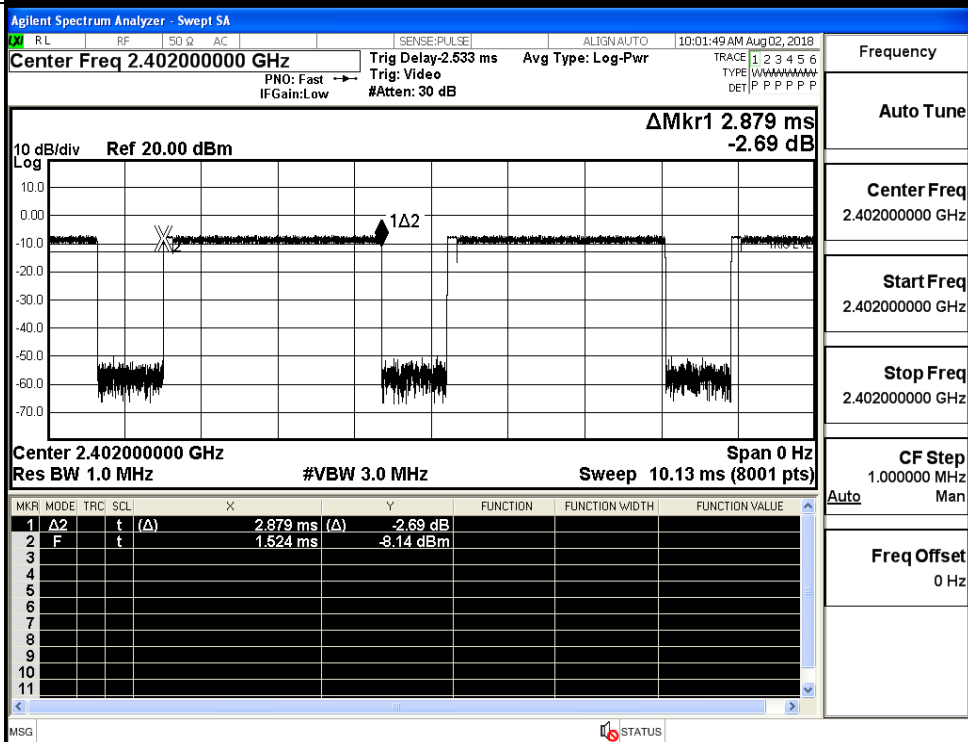
$\pi/4$ DQPSK
_2DH5/MCH



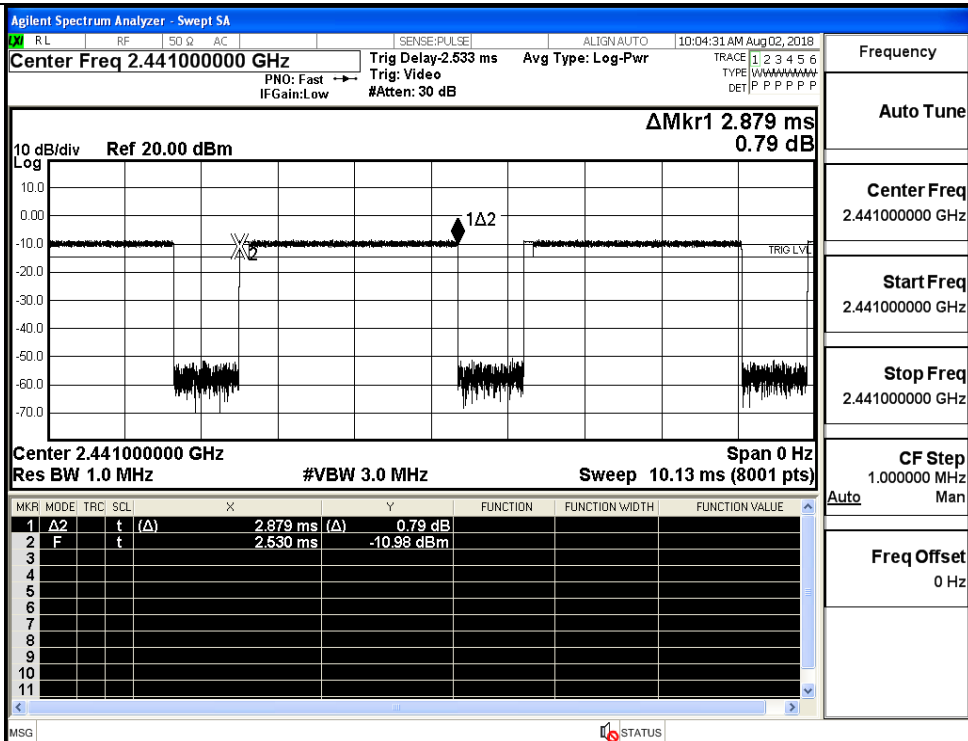
$\pi/4$ DQPSK
_2DH5/HCH



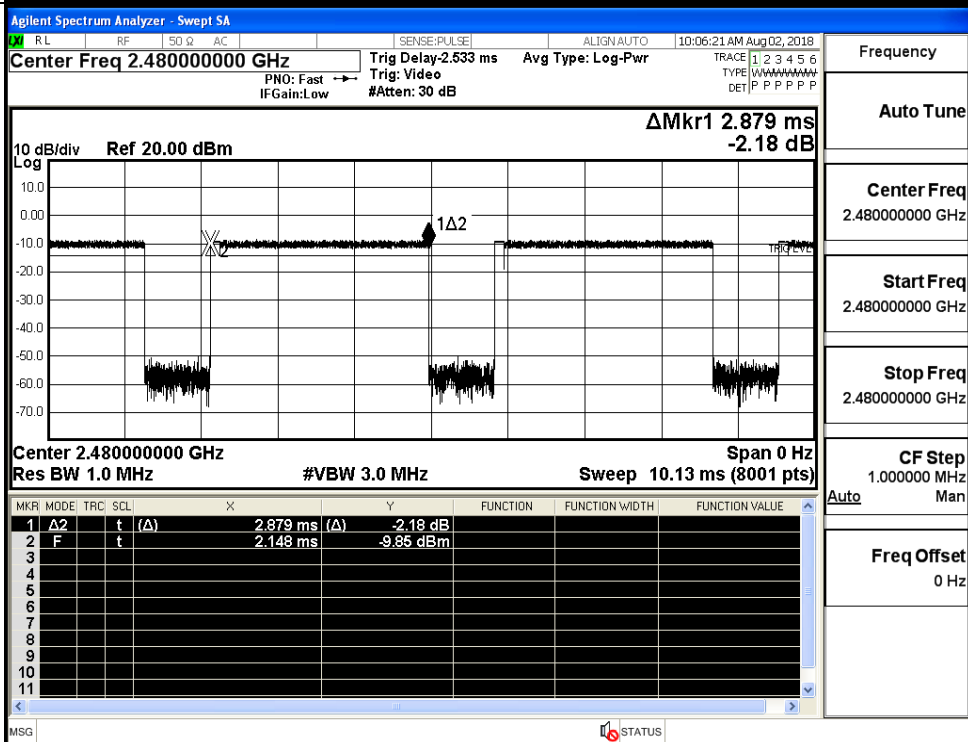
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



8DPSK_3DH5/HCH

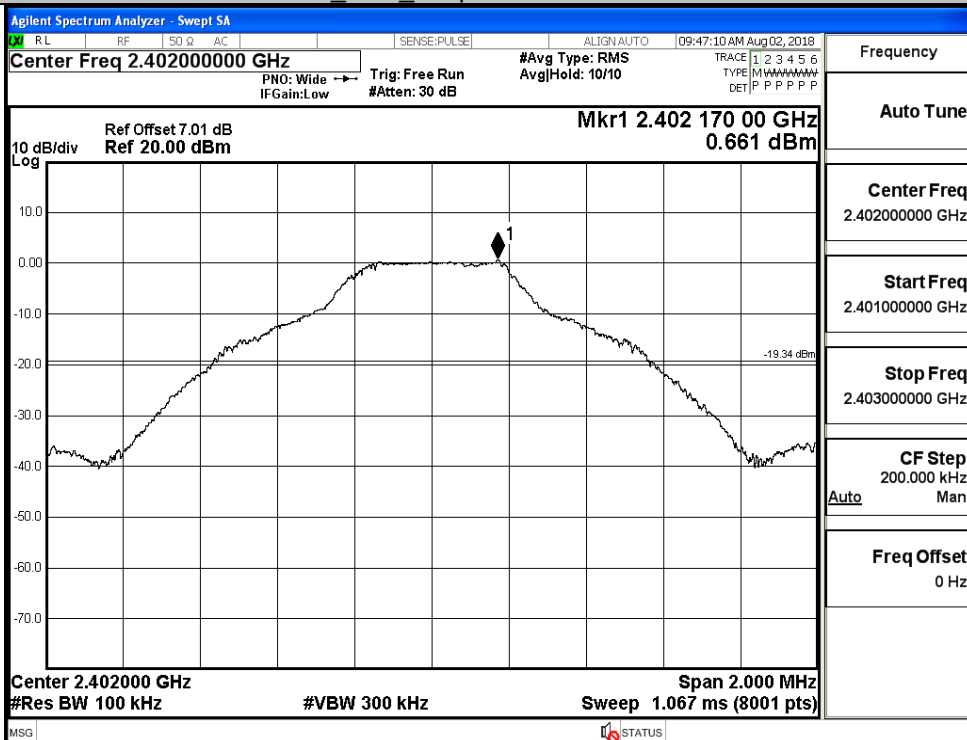


A.6 RF Conducted Spurious Emissions

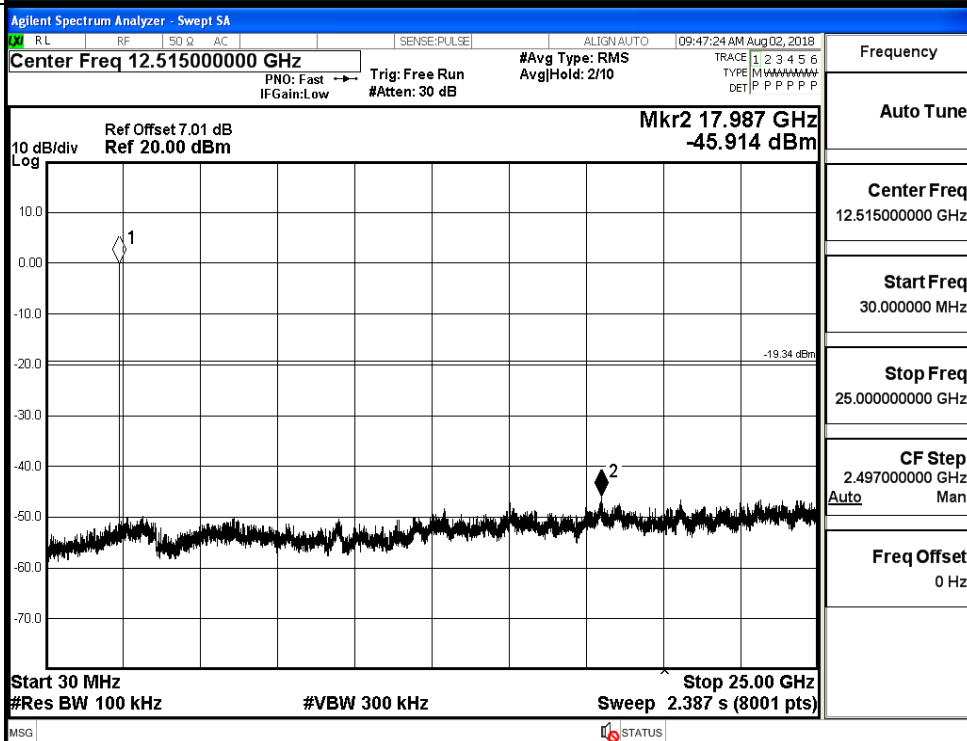
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.661	-45.914	-19.339	PASS
	MCH	-1.182	-45.812	-21.182	PASS
	HCH	-0.786	-45.796	-20.786	PASS
$\pi/4$ DQPSK	LCH	-1.081	-44.293	-21.081	PASS
	MCH	-2.188	-46.183	-22.188	PASS
	HCH	-2.063	-46.175	-22.063	PASS
8DPSK	LCH	-0.935	-45.684	-20.935	PASS
	MCH	-2.349	-46.115	-22.349	PASS
	HCH	-2.364	-44.831	-22.364	PASS

GFSK LCH Graphs

Pref

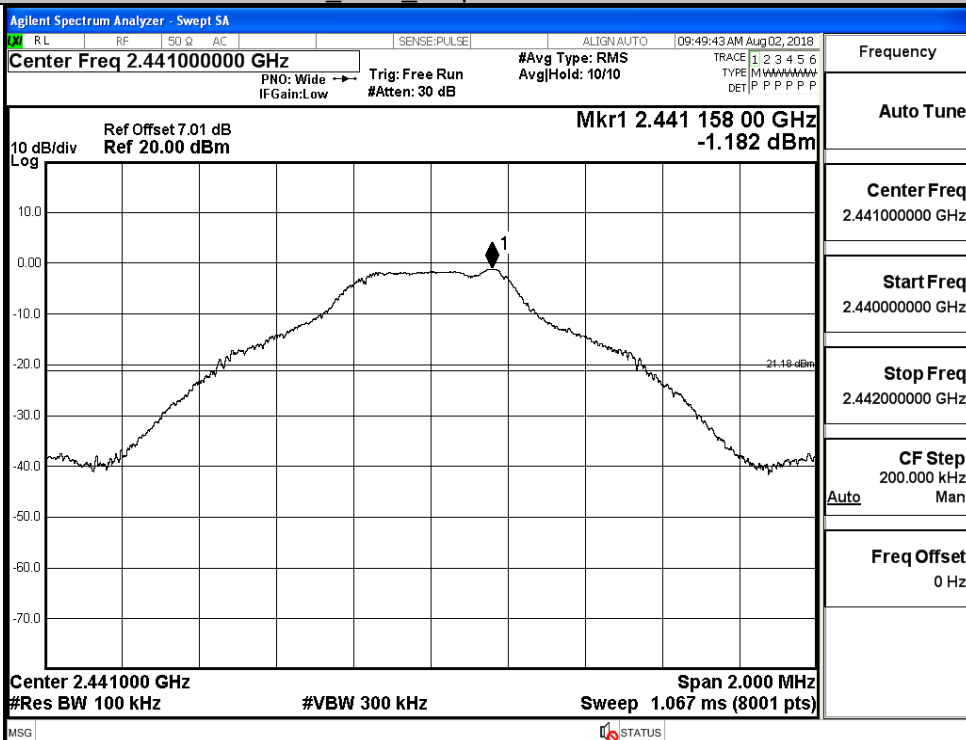


Puw

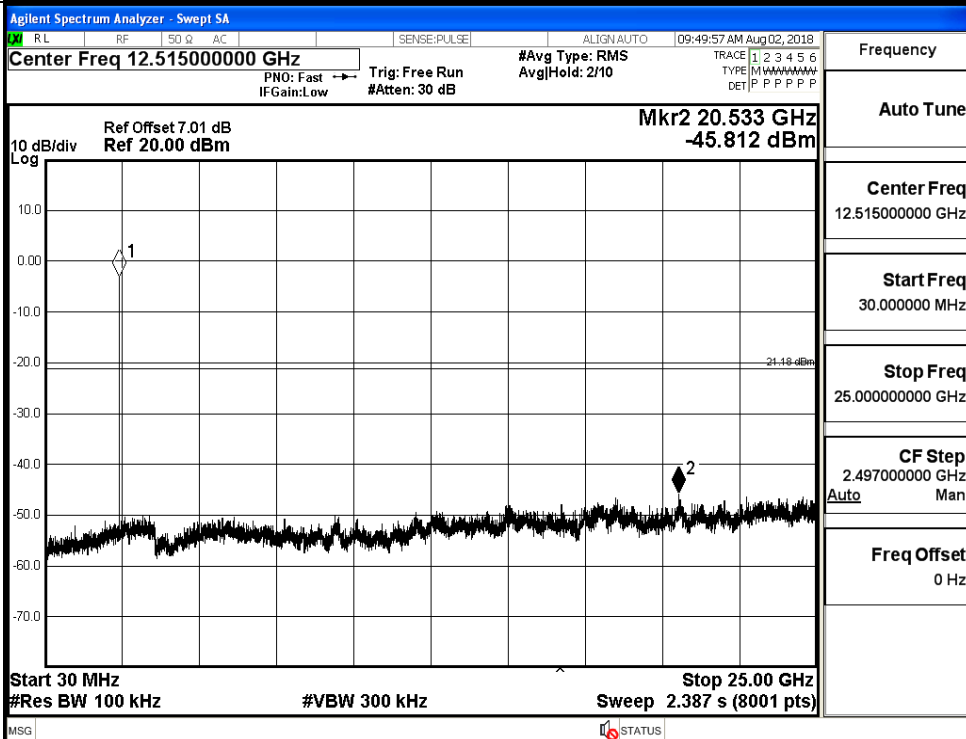


GFSK_MCH_Graphs

Pref

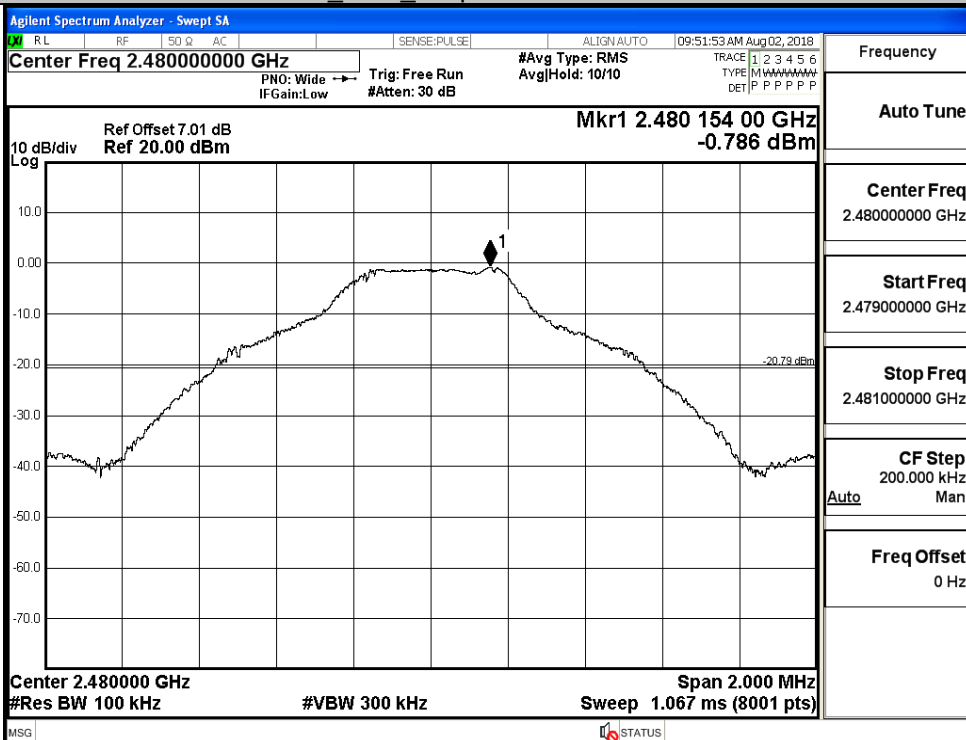


Puw

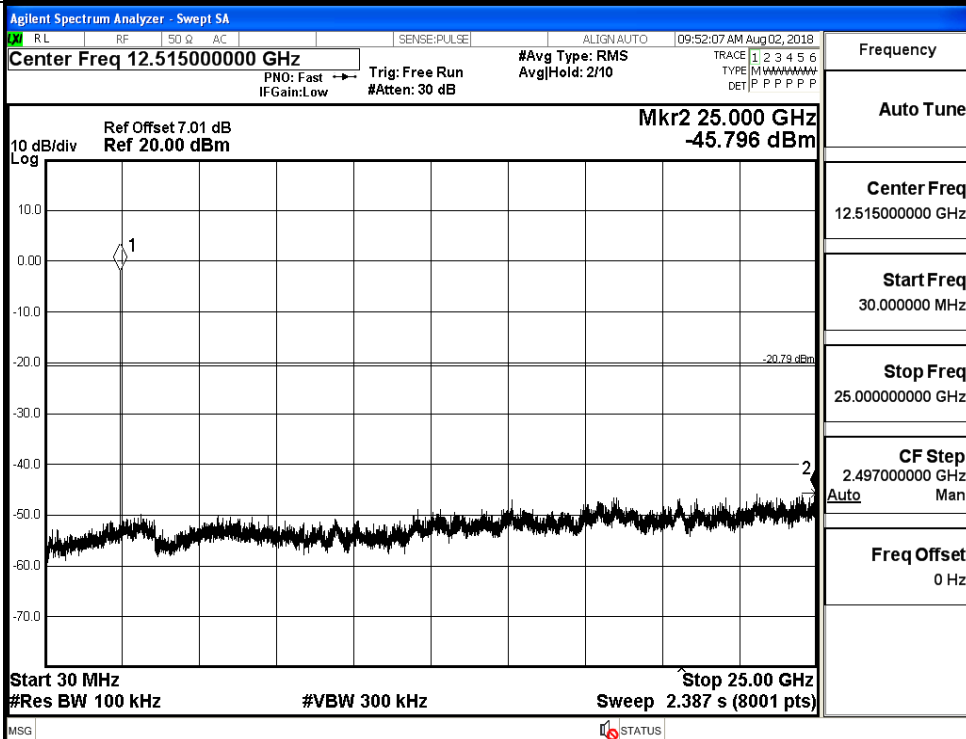


GFSK_HCH_Graphs

Pref

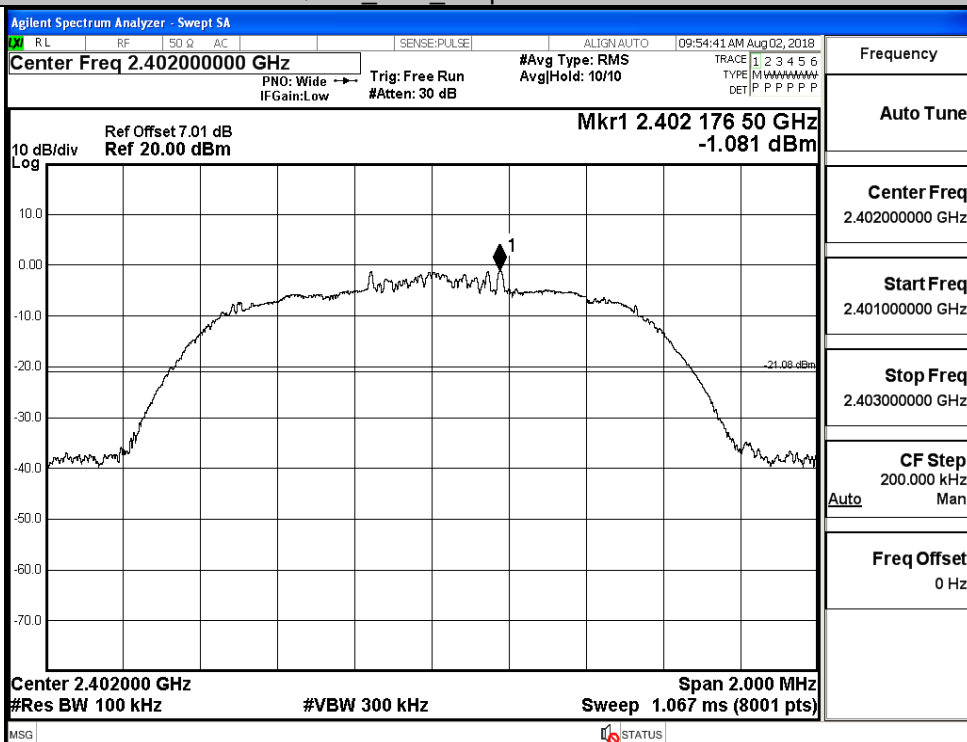


Puw

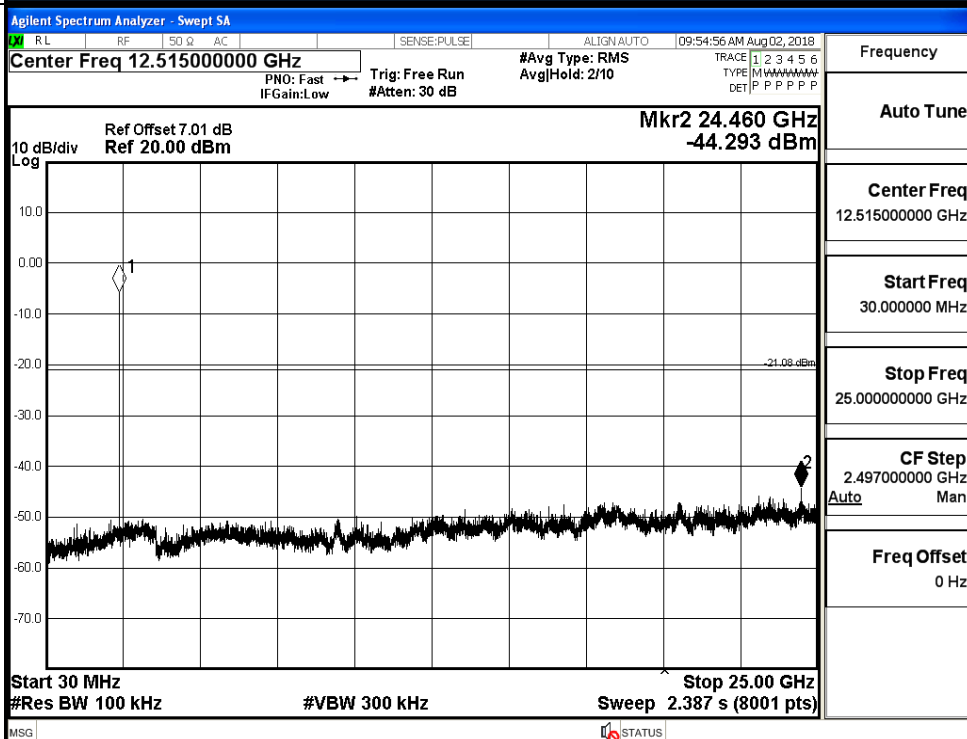


$\pi/4$ DQPSK LCH_Graphs

Pref

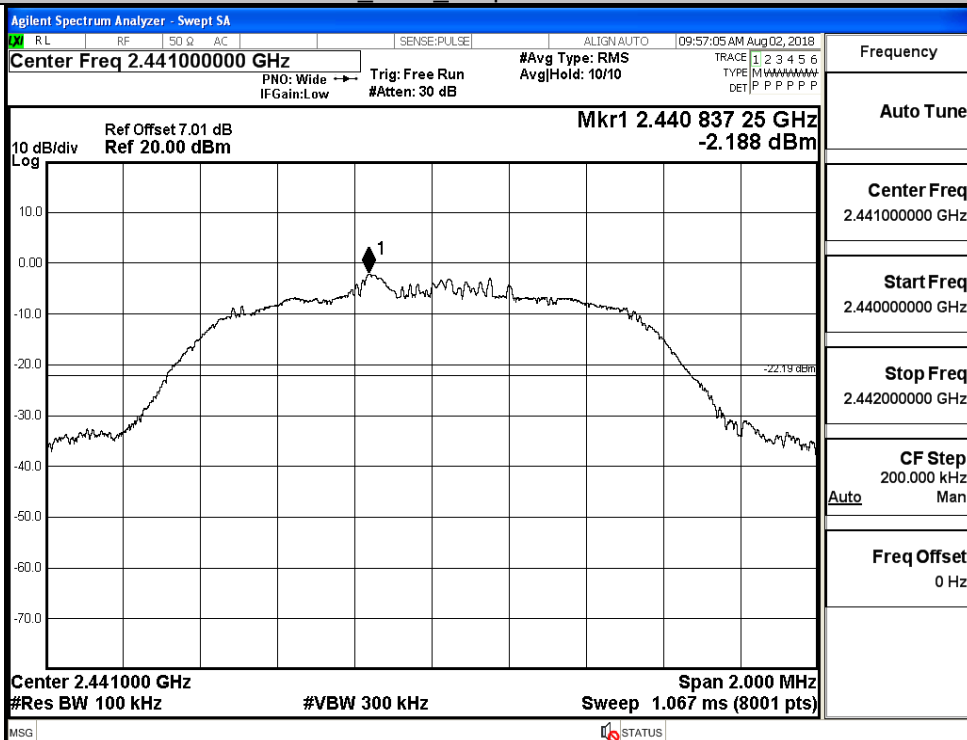


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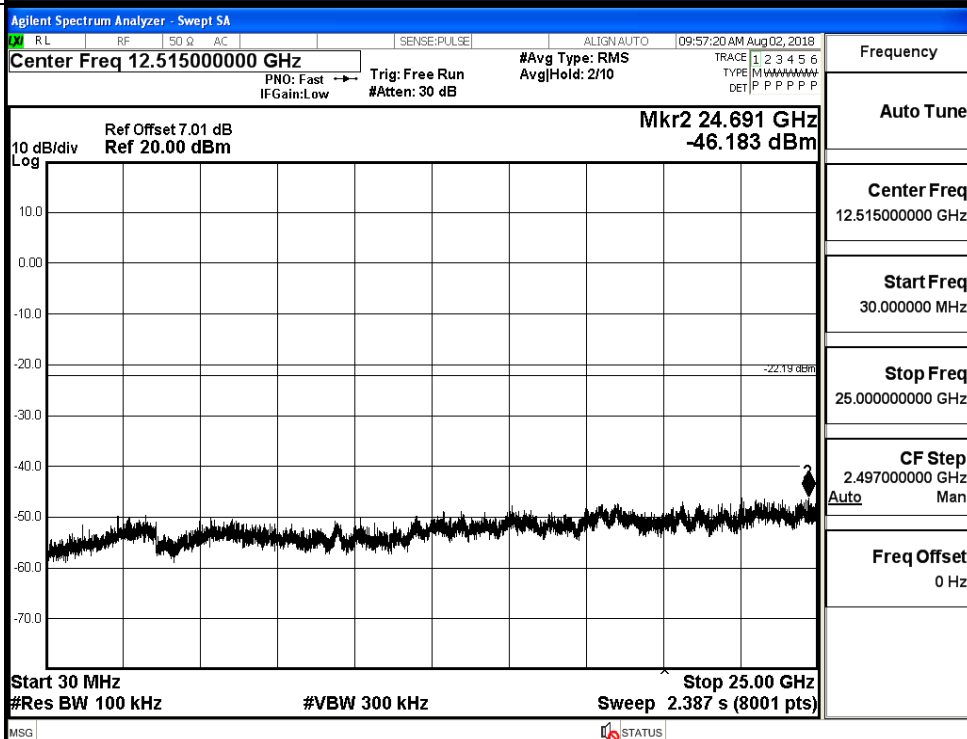


$\pi/4$ DQPSK_MCH_Graphs

Pref

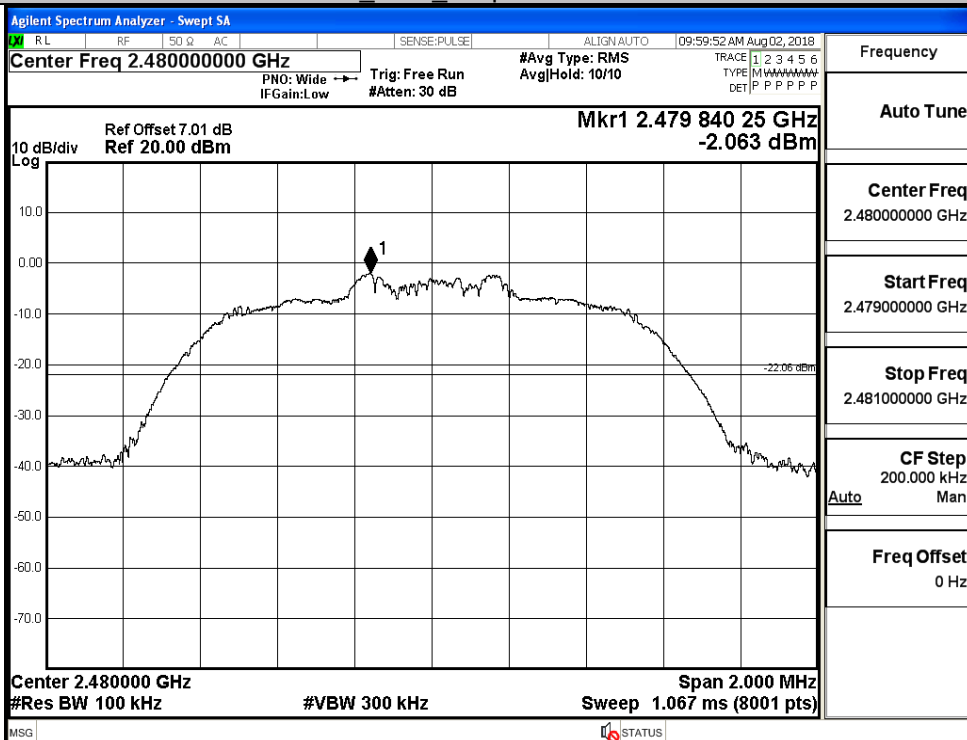


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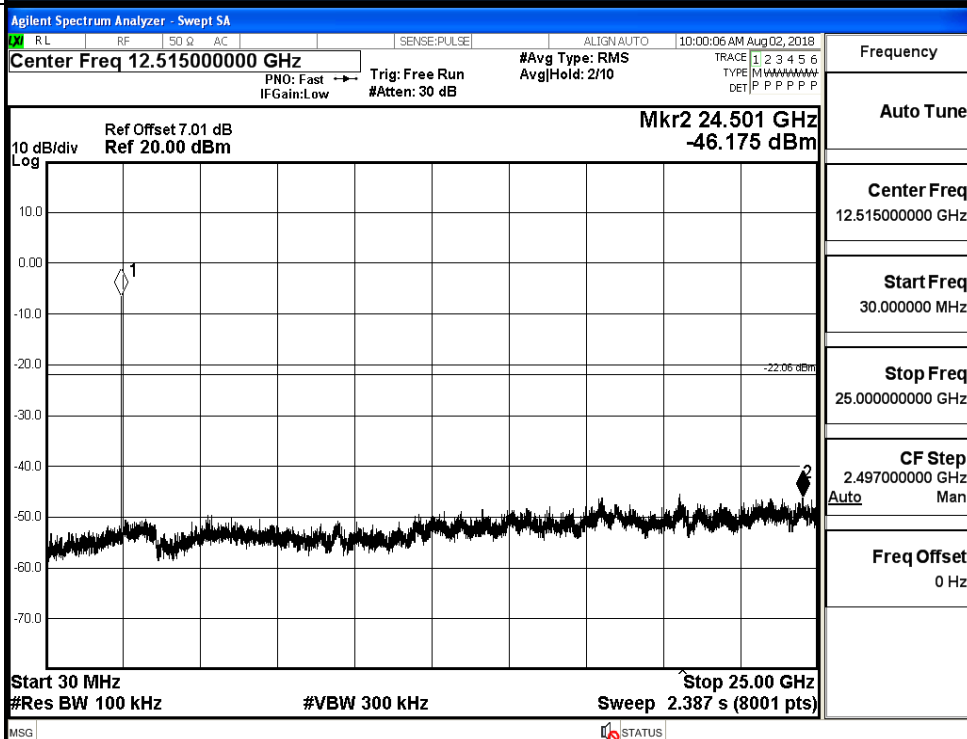


$\pi/4$ DQPSK_HCH_Graphs

Pref

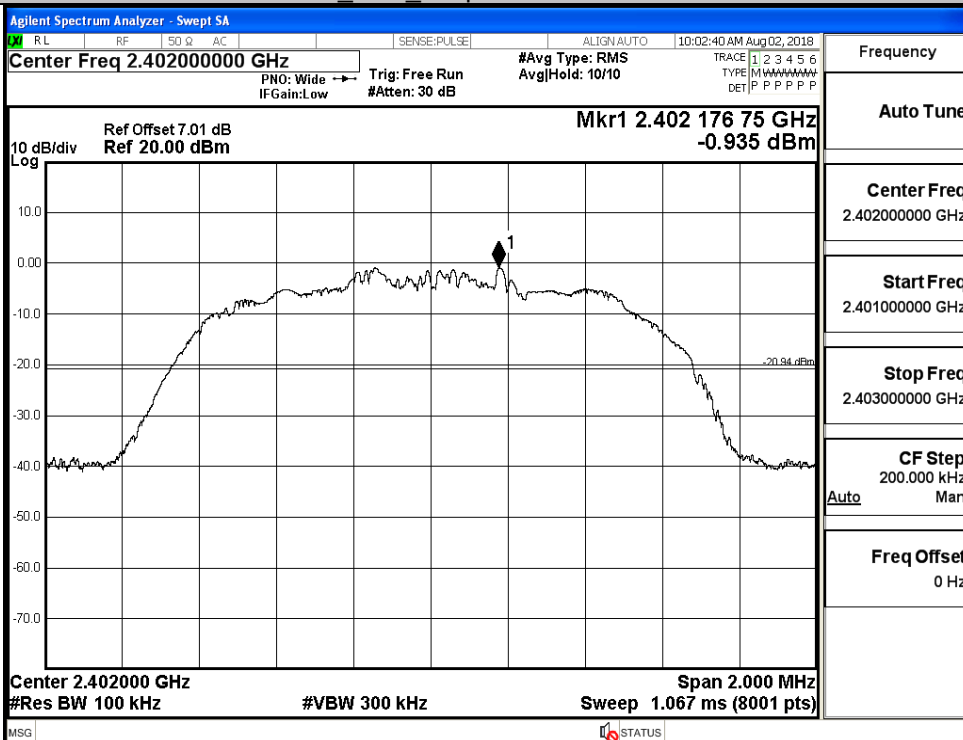


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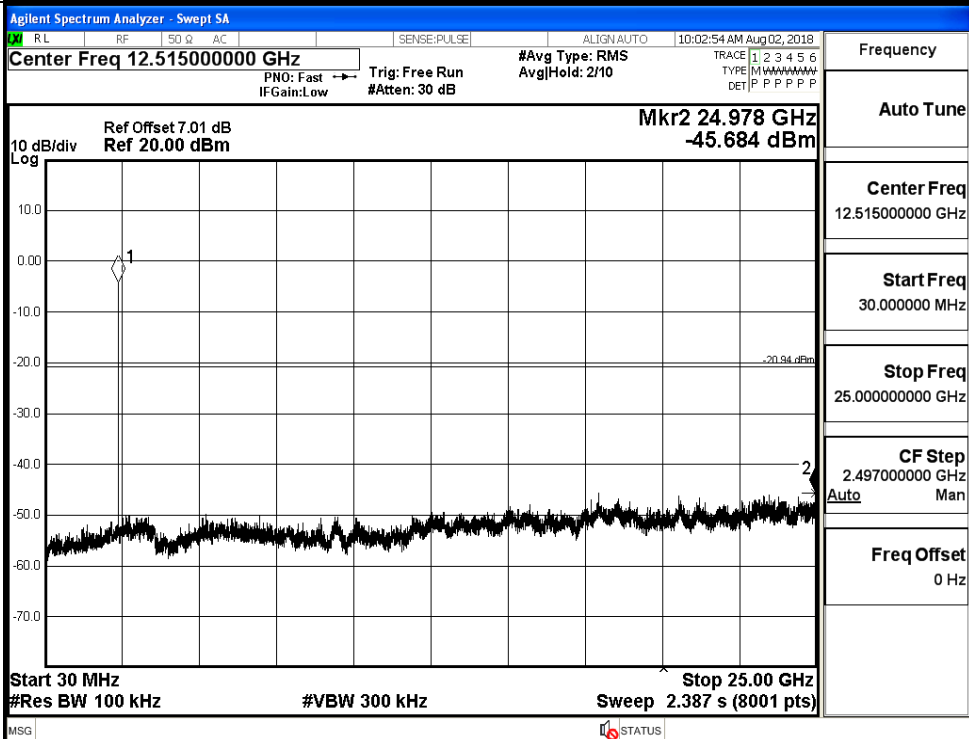


8DPSK_LCH_Graphs

Pref

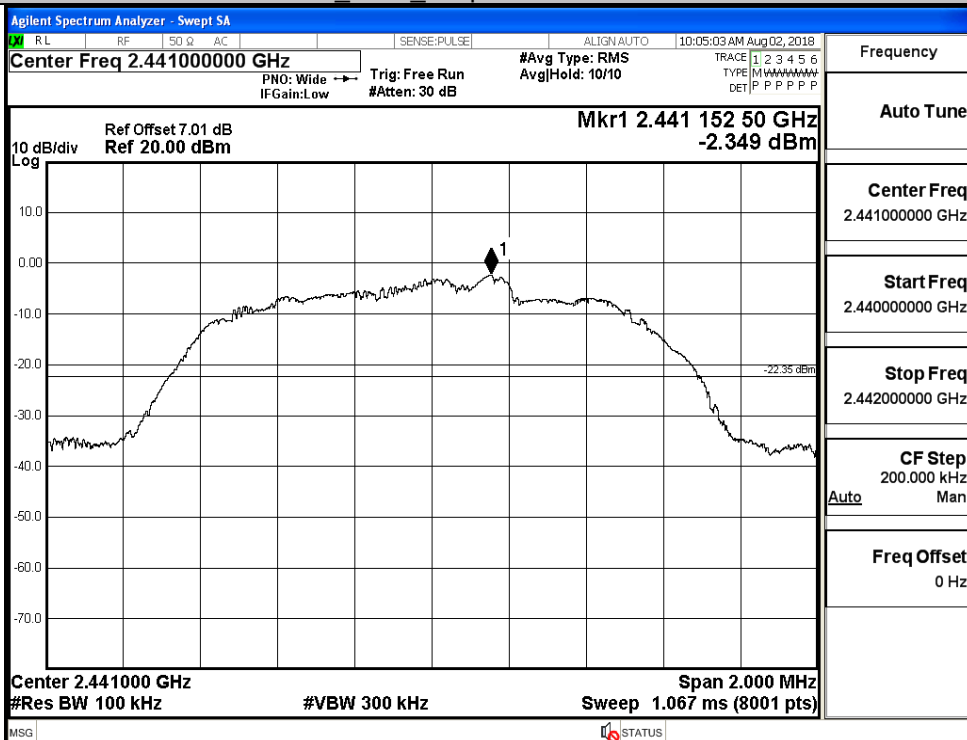


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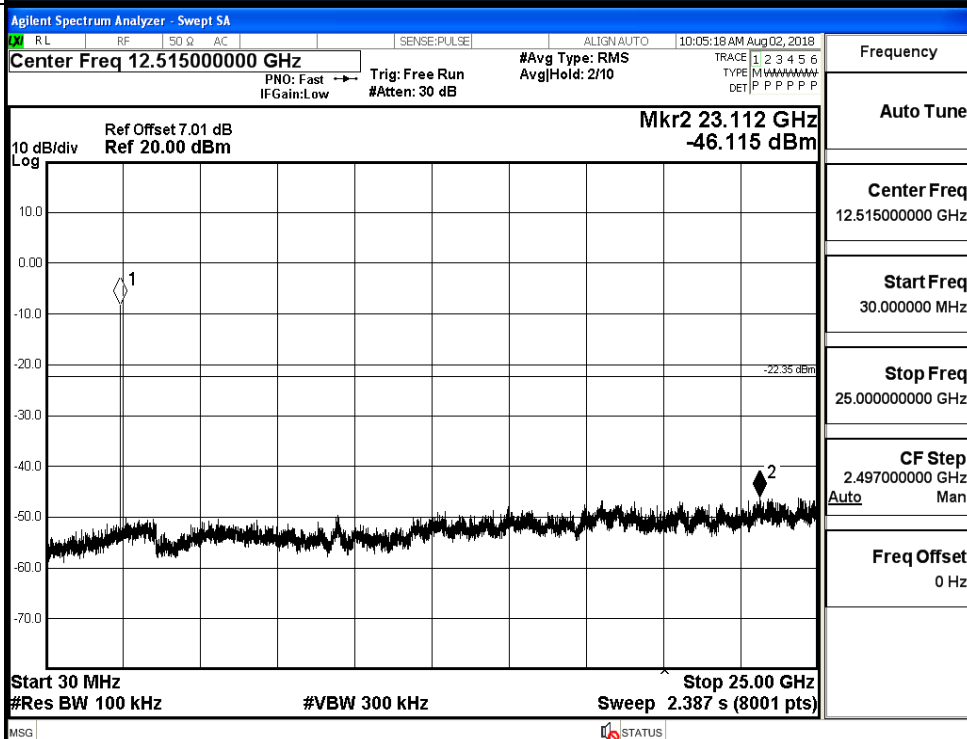


8DPSK_MCH_Graphs

Pref

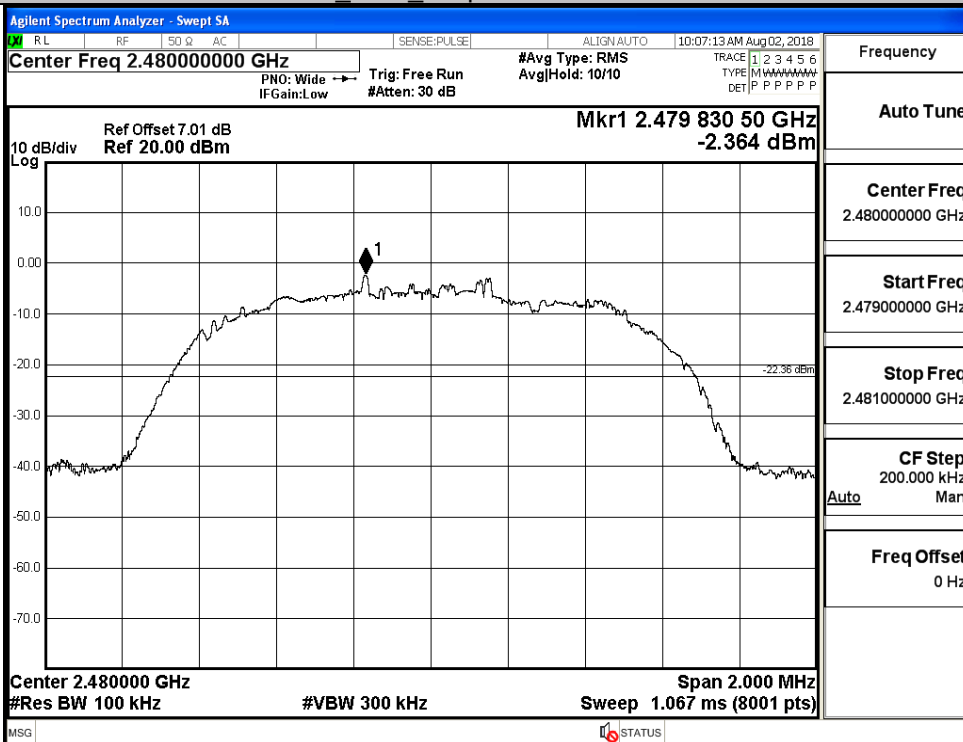


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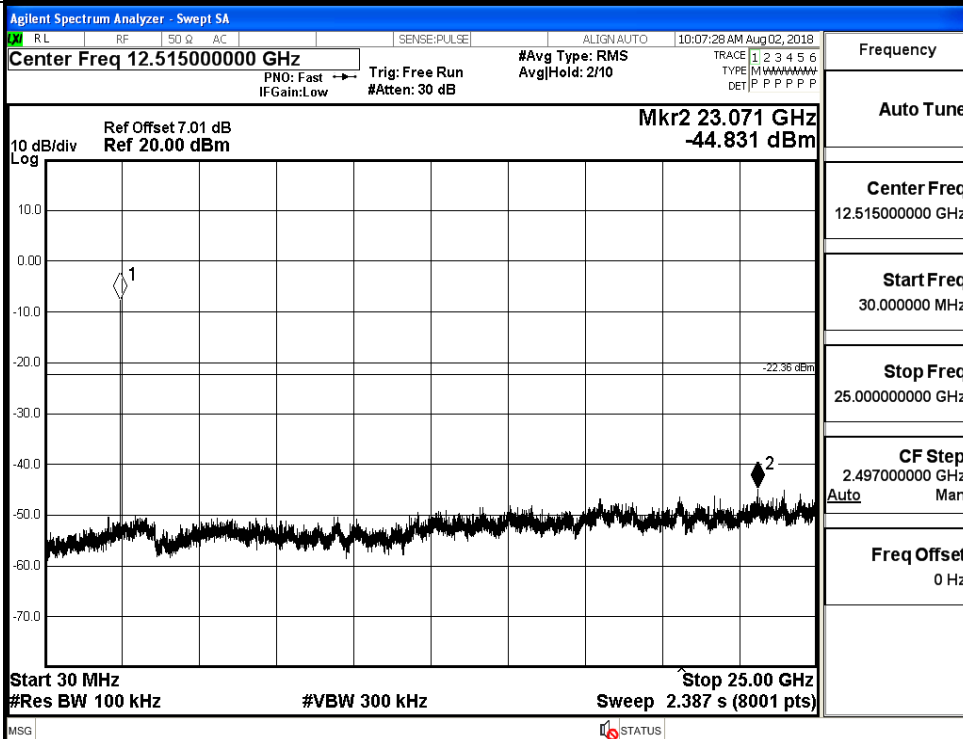


8DPSK_HCH_Graphs

Pref



Puw

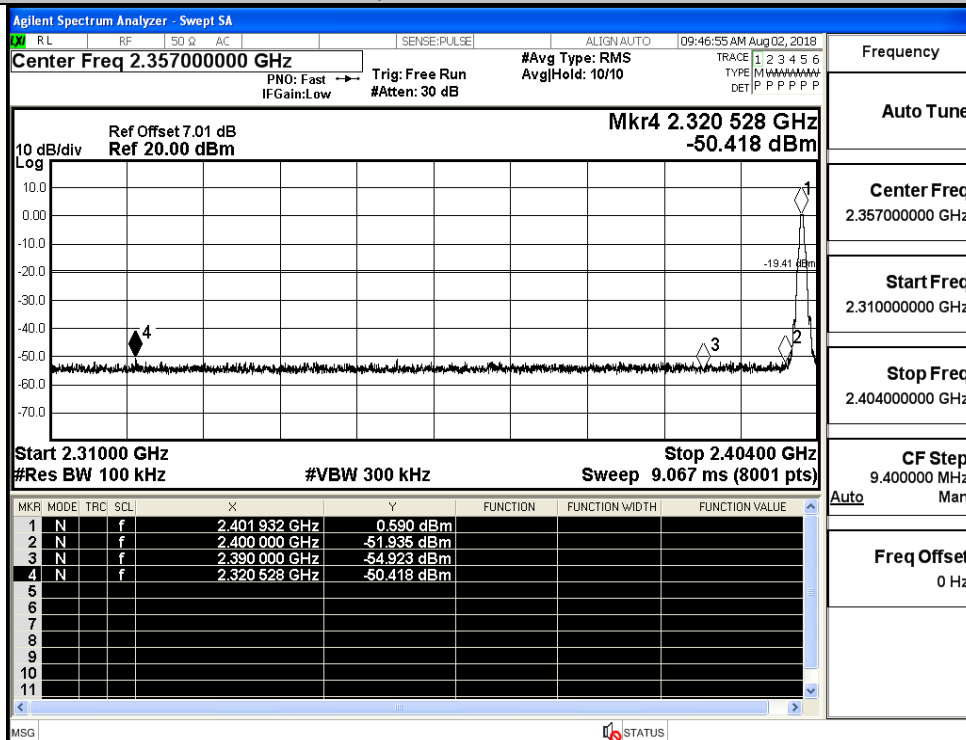


A.7 Band-edge for RF Conducted Emissions

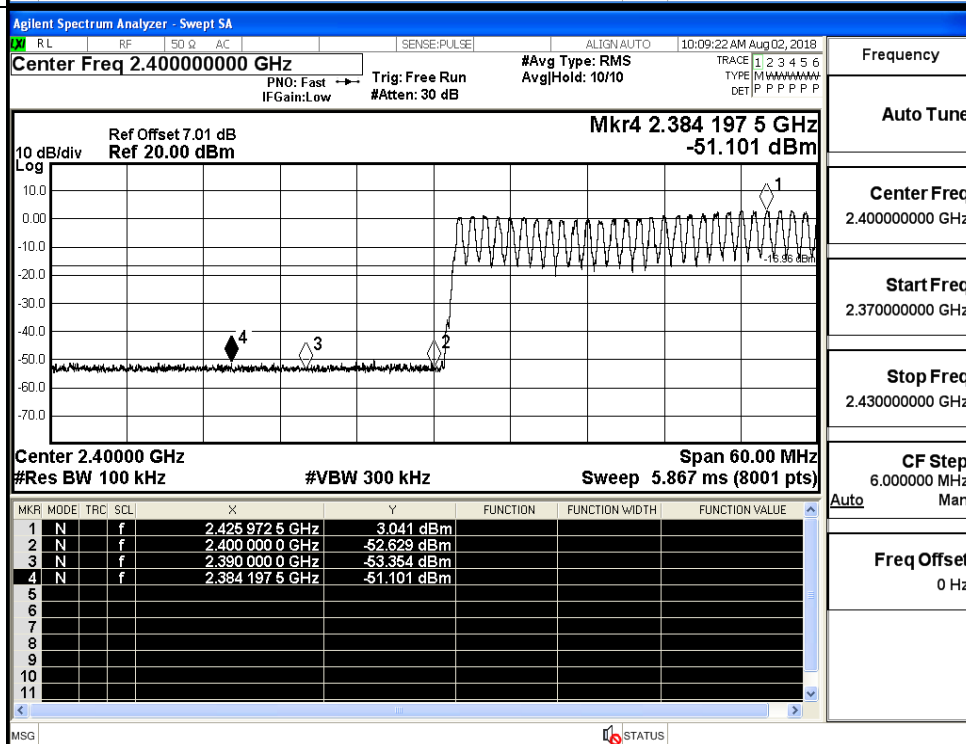
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.590	Off	-50.418	-19.41	PASS
			3.041	On	-51.101	-16.96	PASS
	HCH	2480	-0.780	Off	-50.420	-20.78	PASS
			2.195	On	-50.807	-17.81	PASS
$\pi/4$ DQPSK	LCH	2402	-0.549	Off	-51.178	-20.55	PASS
			2.051	On	-50.476	-17.95	PASS
	HCH	2480	-2.242	Off	-50.731	-22.24	PASS
			1.127	On	-49.587	-18.87	PASS
8DPSK	LCH	2402	-0.494	Off	-50.621	-20.49	PASS
			1.652	On	-50.540	-18.35	PASS
	HCH	2480	-1.973	Off	-51.087	-21.97	PASS
			0.790	On	-49.674	-19.21	PASS

Test Graphs

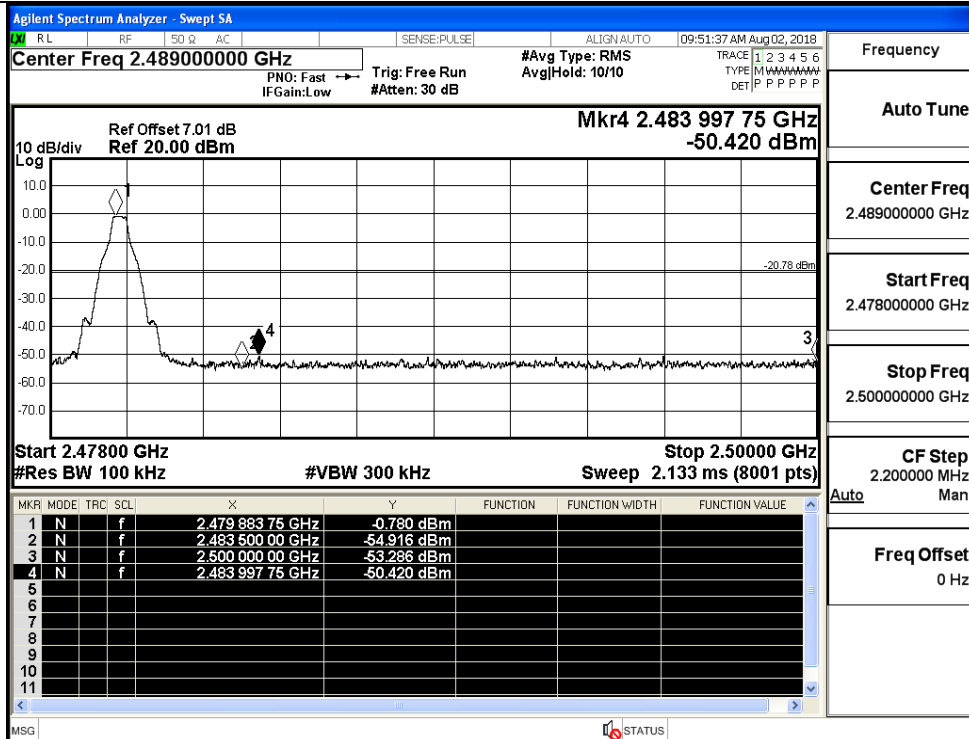
GFSK/LCH/No Hop



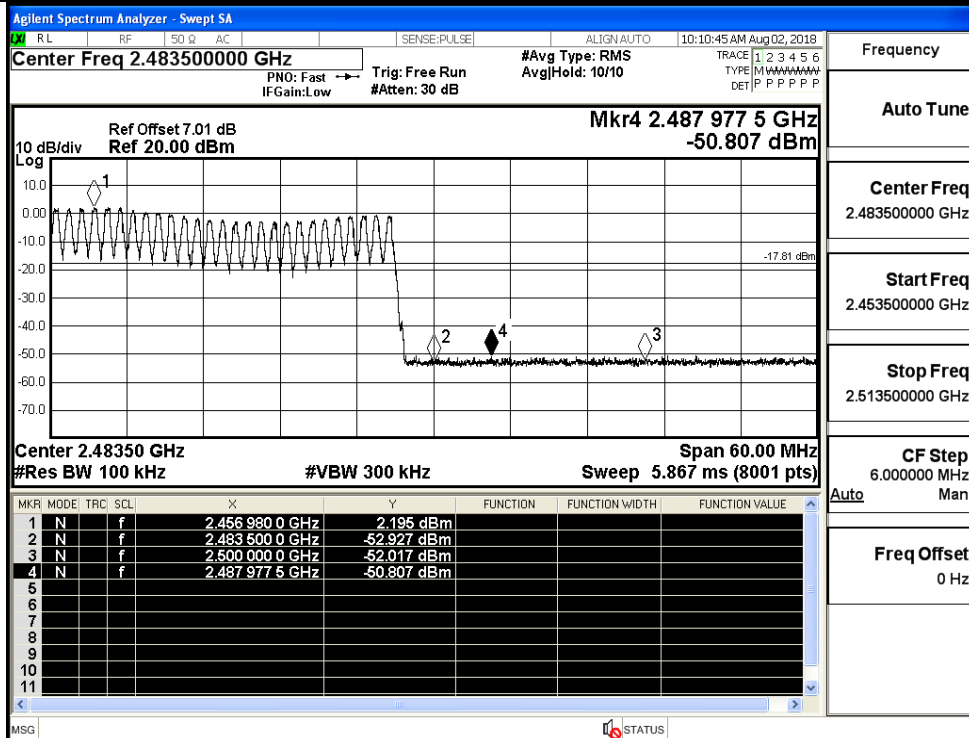
GFSK/LCH/Hop



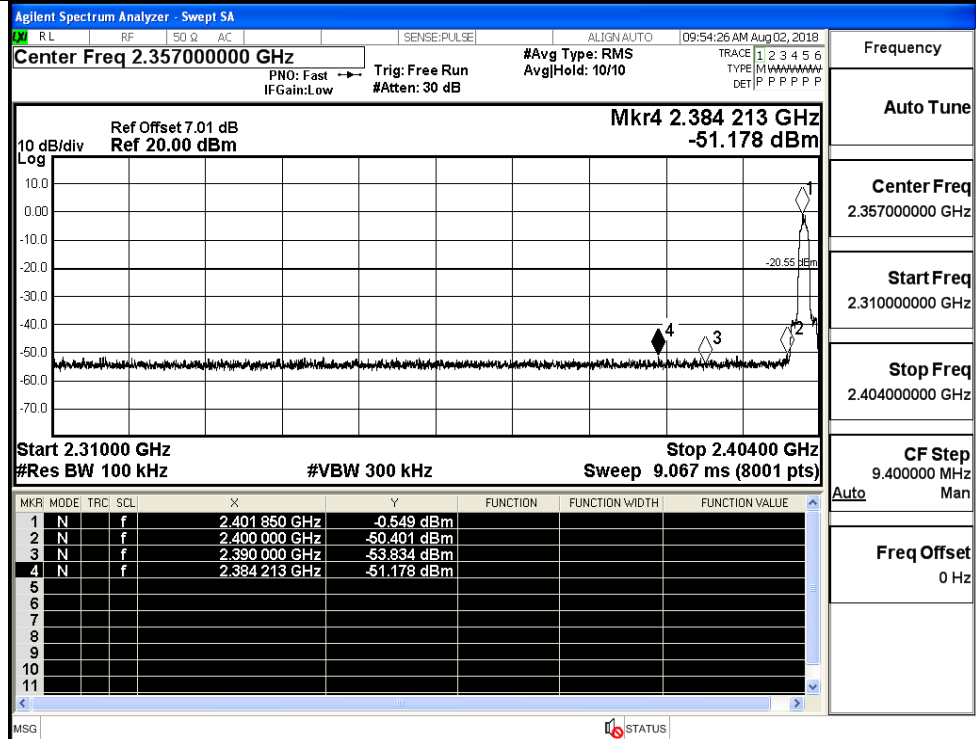
GFSK/HCH/No Hop



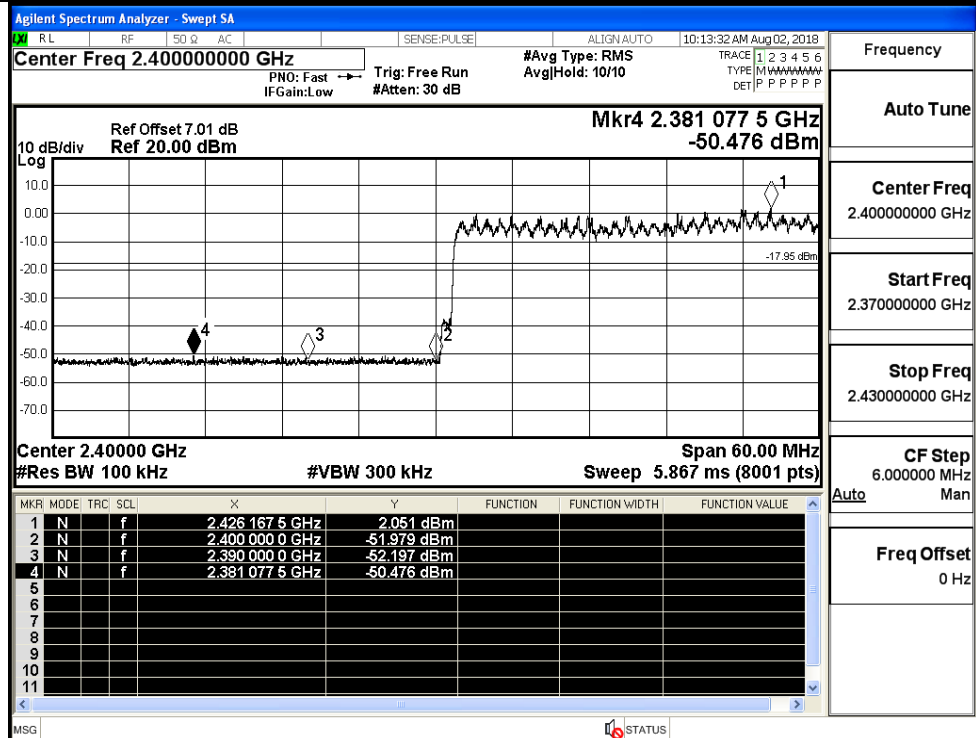
GFSK/HCH/Hop



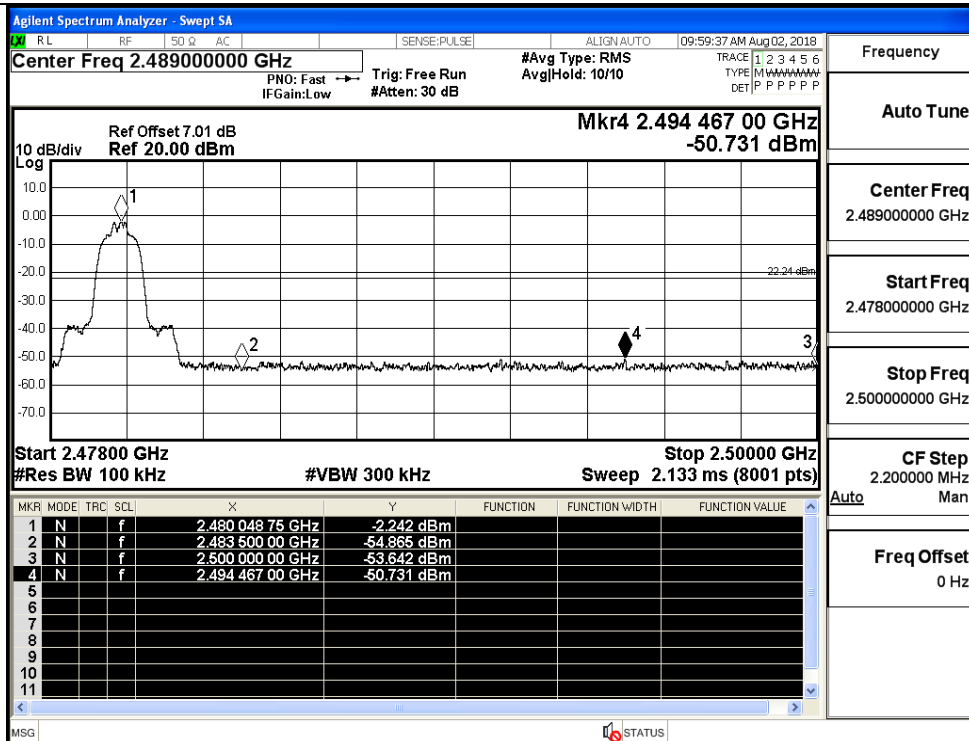
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



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

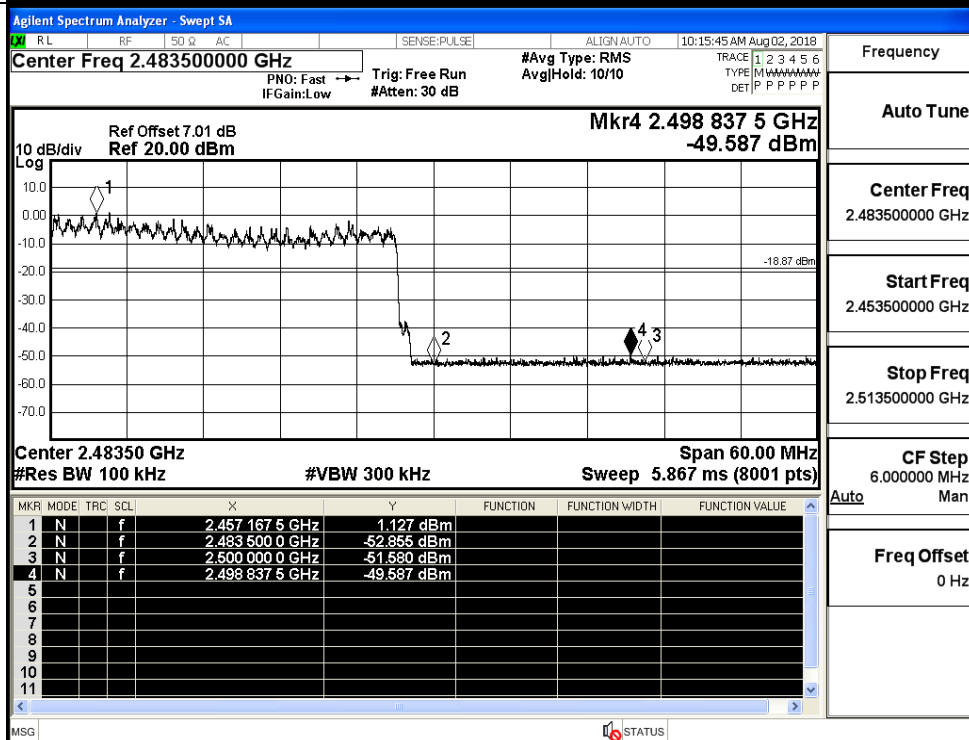


Frequency

Auto Tune

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

$\pi/4$ DQPSK/HCH/Hop

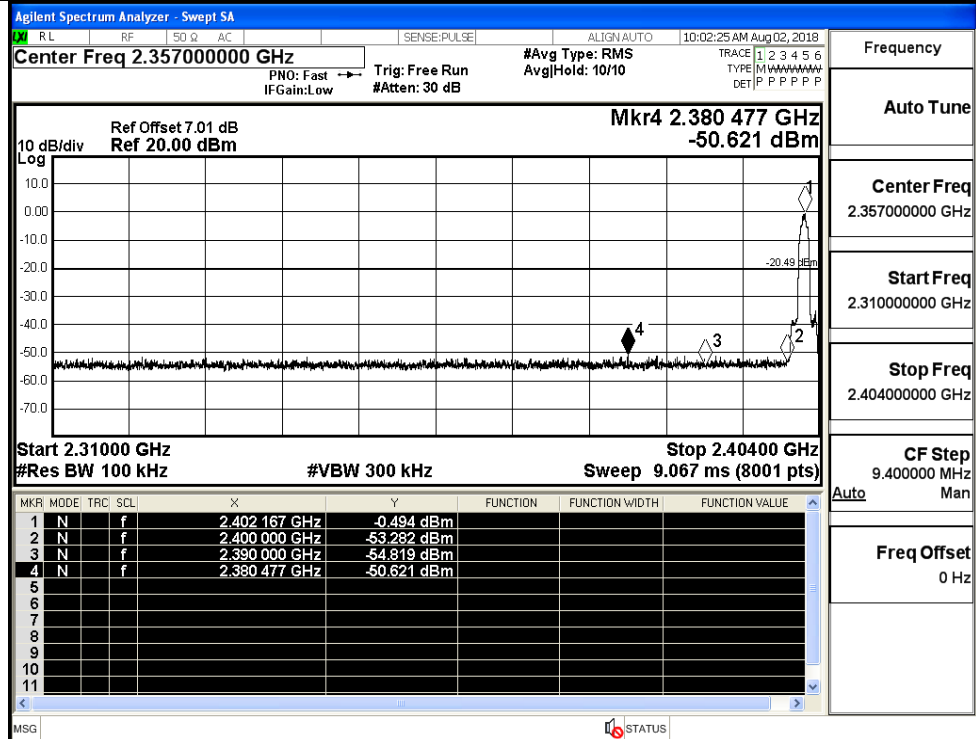


Frequency

Auto Tune

Center Freq
2.483500000 GHzStart Freq
2.453500000 GHzStop Freq
2.513500000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

8DPSK/LCH/No Hop



Frequency

Auto Tune

Center Freq
2.357000000 GHz

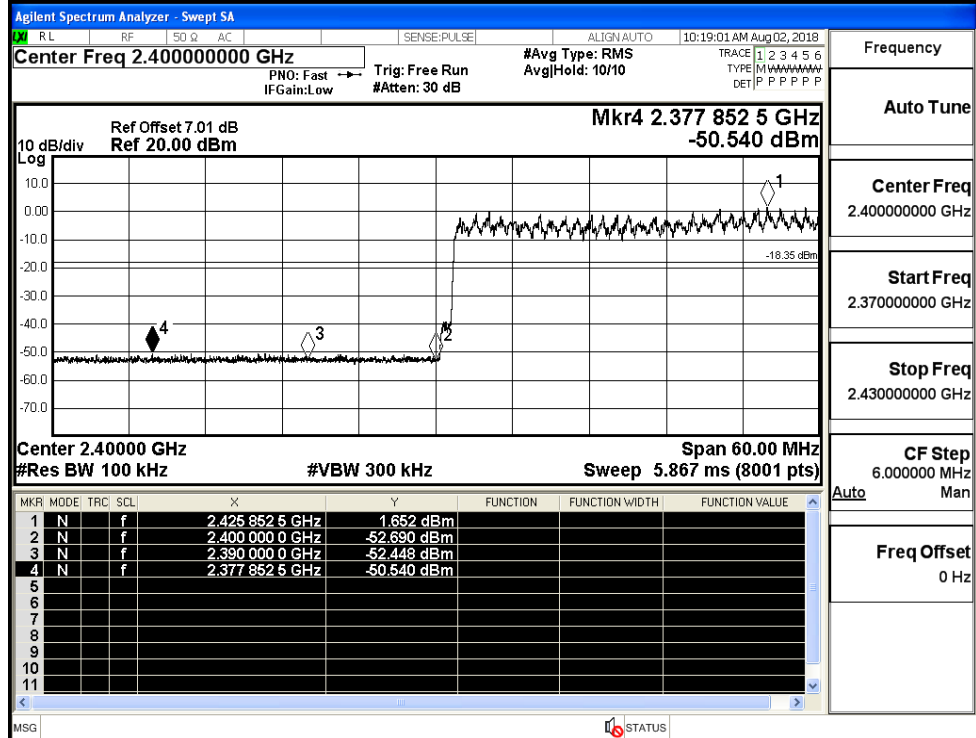
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Auto Man

Freq Offset
0 Hz

8DPSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

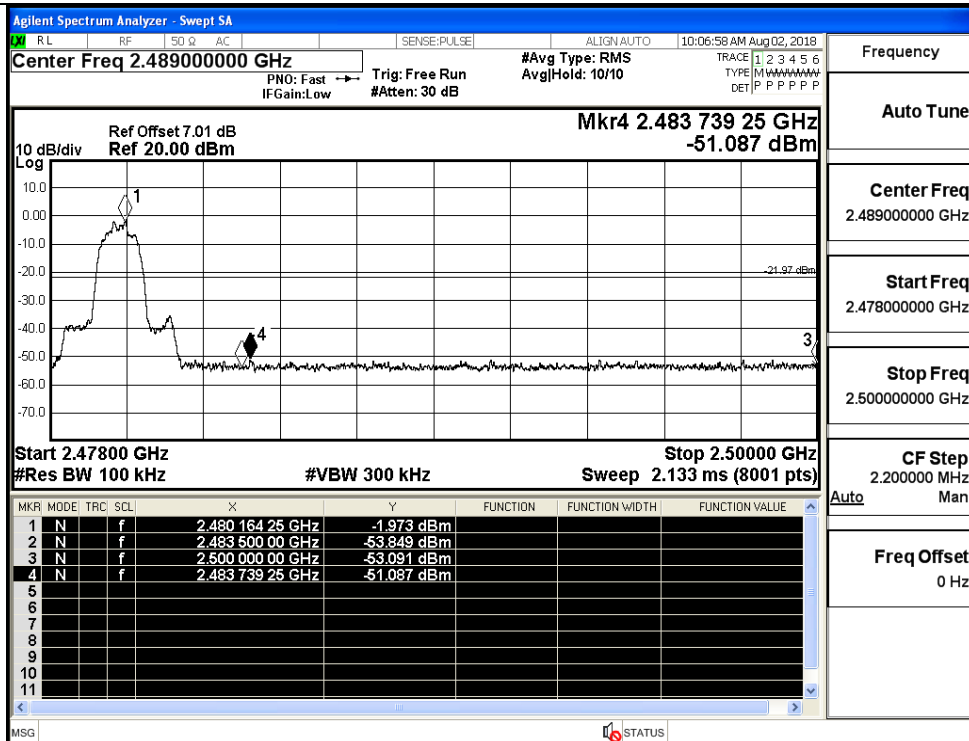
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

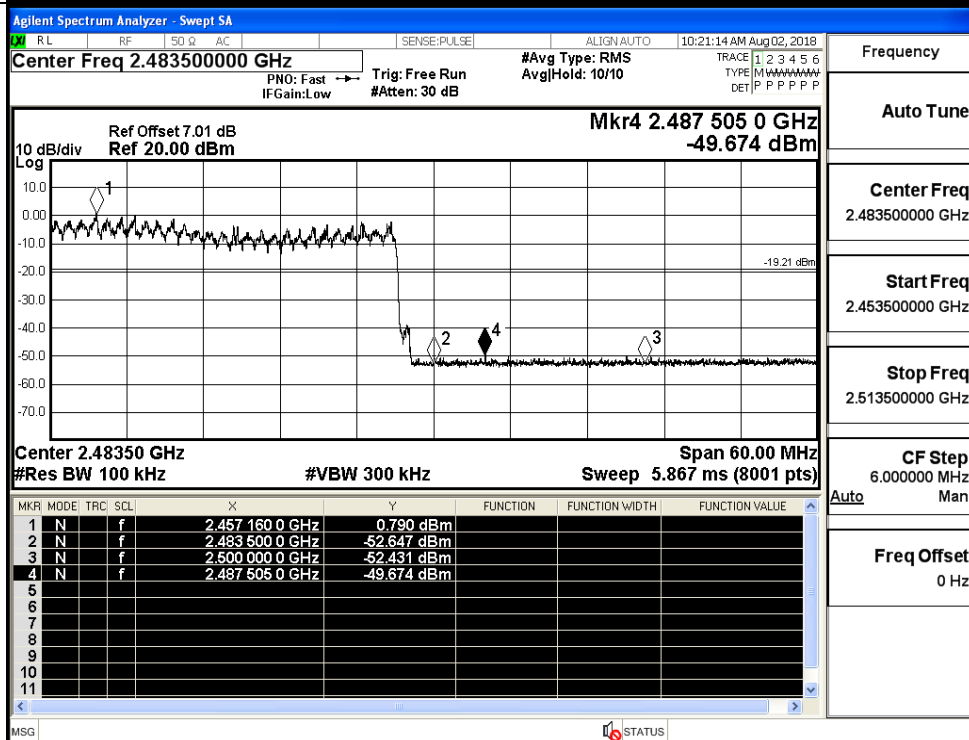
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

8DPSK/HCH/No Hop



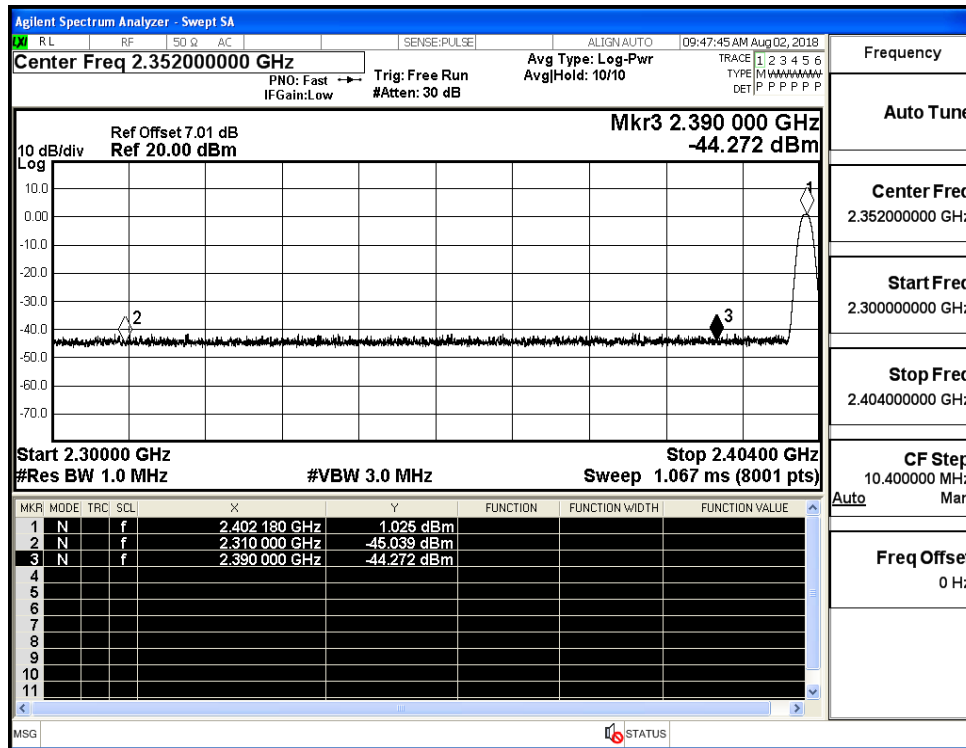
8DPSK/HCH/Hop



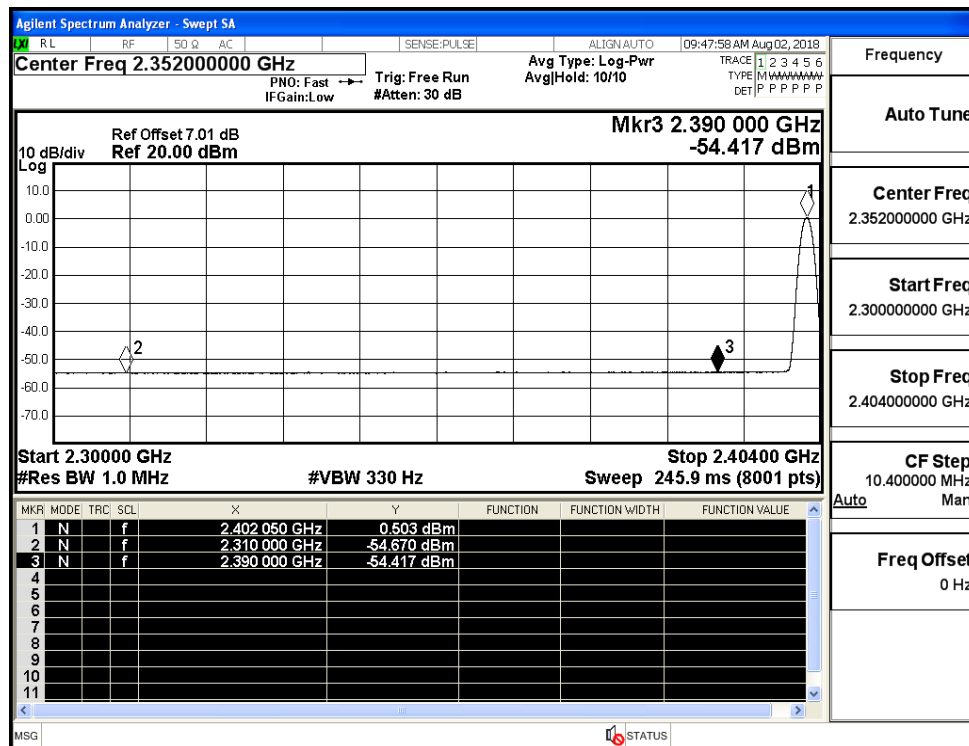
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-45.04	2.0	0	52.22	PEAK	74	PASS
	Off	2310.0	-54.67	2.0	0	42.59	AV	54	PASS
	Off	2390.0	-44.27	2.0	0	52.99	PEAK	74	PASS
	Off	2390.0	-54.42	2.0	0	42.84	AV	54	PASS
	Off	2483.5	-43.31	2.0	0	53.95	PEAK	74	PASS
	Off	2483.5	-54.25	2.0	0	43.00	AV	54	PASS
	Off	2500.0	-43.65	2.0	0	53.61	PEAK	74	PASS
	Off	2500.0	-54.16	2.0	0	43.10	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-44.92	2.0	0	52.34	PEAK	74	PASS
	Off	2310.0	-54.76	2.0	0	42.50	AV	54	PASS
	Off	2390.0	-43.84	2.0	0	53.42	PEAK	74	PASS
	Off	2390.0	-54.52	2.0	0	42.74	AV	54	PASS
	Off	2483.5	-43.92	2.0	0	53.34	PEAK	74	PASS
	Off	2483.5	-54.19	2.0	0	43.07	AV	54	PASS
	Off	2500.0	-44.61	2.0	0	52.65	PEAK	74	PASS
	Off	2500.0	-54.10	2.0	0	43.16	AV	54	PASS
8DPSK	Off	2310.0	-44.62	2.0	0	52.64	PEAK	74	PASS
	Off	2310.0	-54.67	2.0	0	42.59	AV	54	PASS
	Off	2390.0	-43.39	2.0	0	53.87	PEAK	74	PASS
	Off	2390.0	-54.49	2.0	0	42.77	AV	54	PASS
	Off	2483.5	-43.47	2.0	0	53.79	PEAK	74	PASS
	Off	2483.5	-54.20	2.0	0	43.06	AV	54	PASS
	Off	2500.0	-43.98	2.0	0	53.28	PEAK	74	PASS
	Off	2500.0	-54.05	2.0	0	43.21	AV	54	PASS

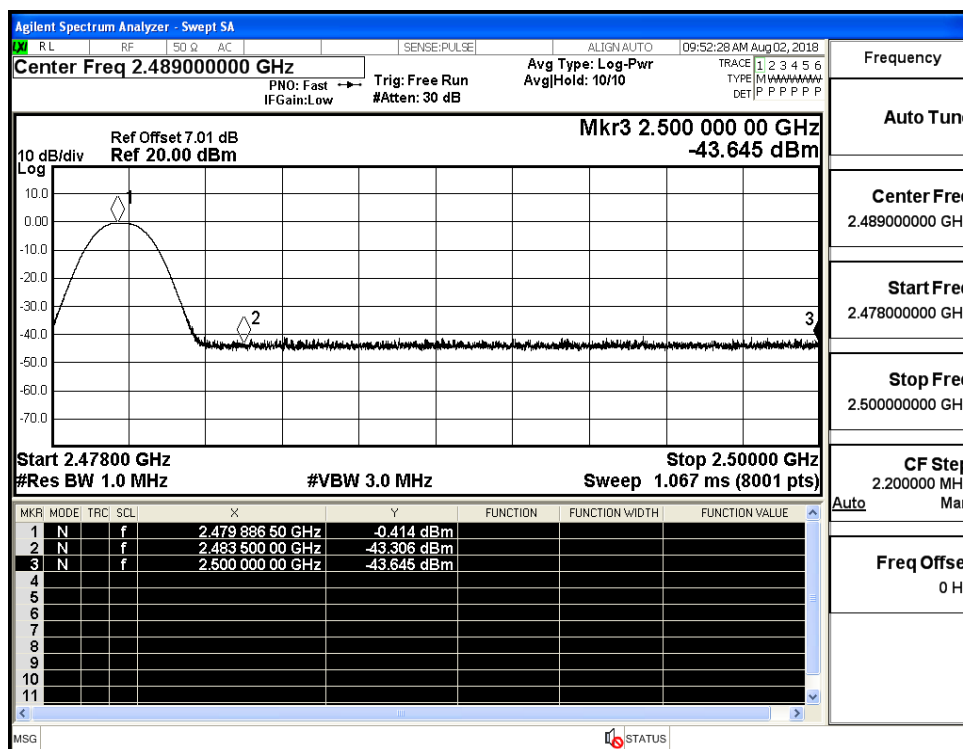
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



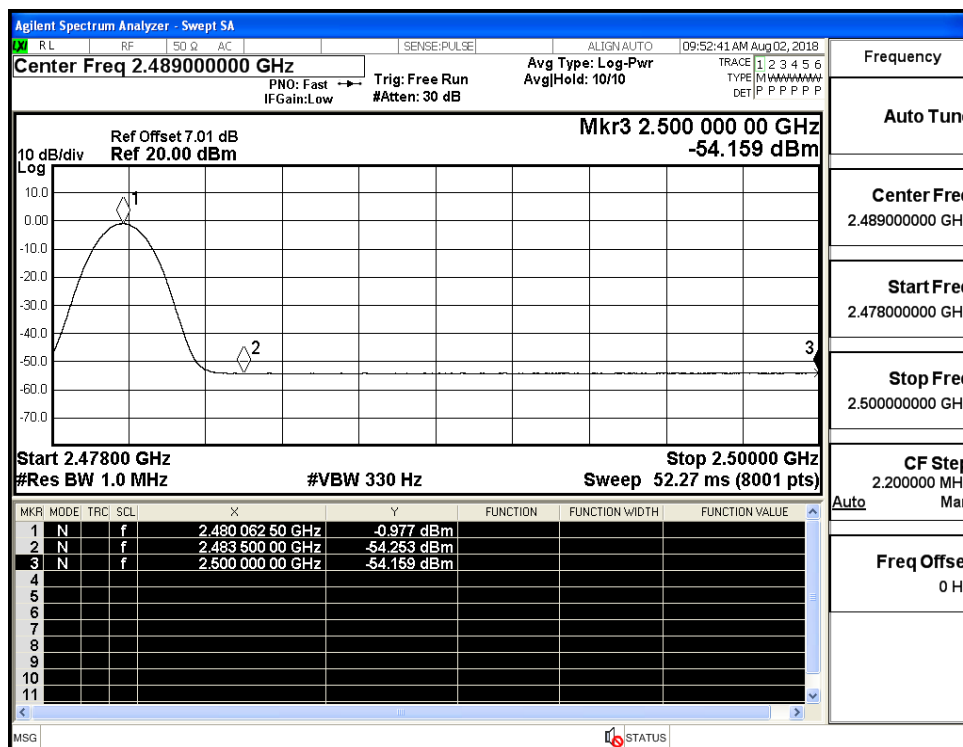
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



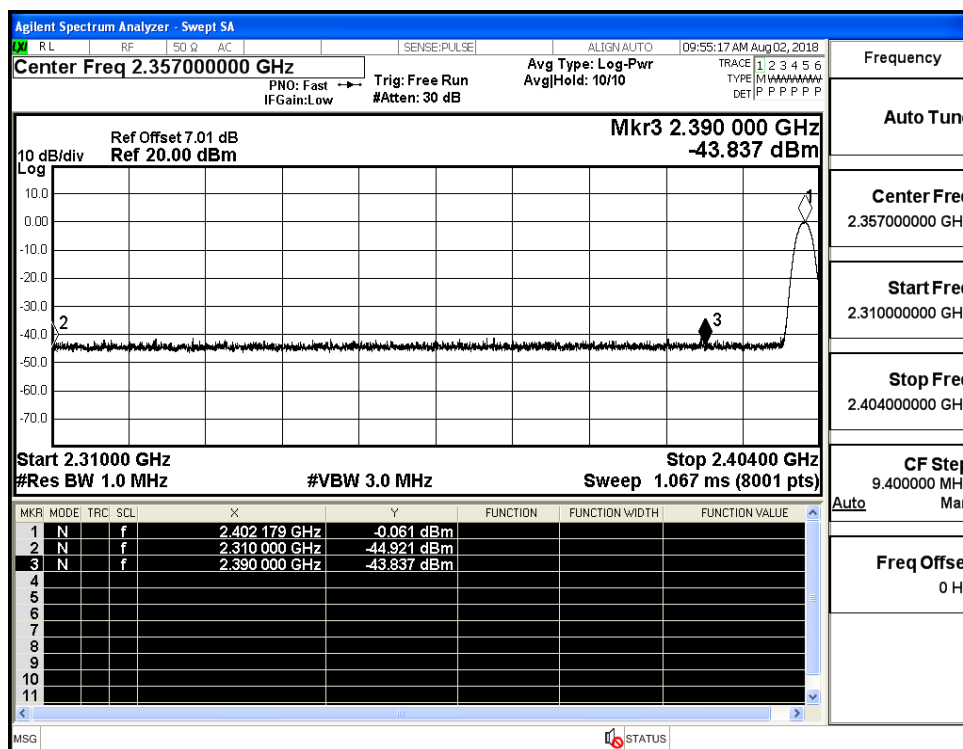
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



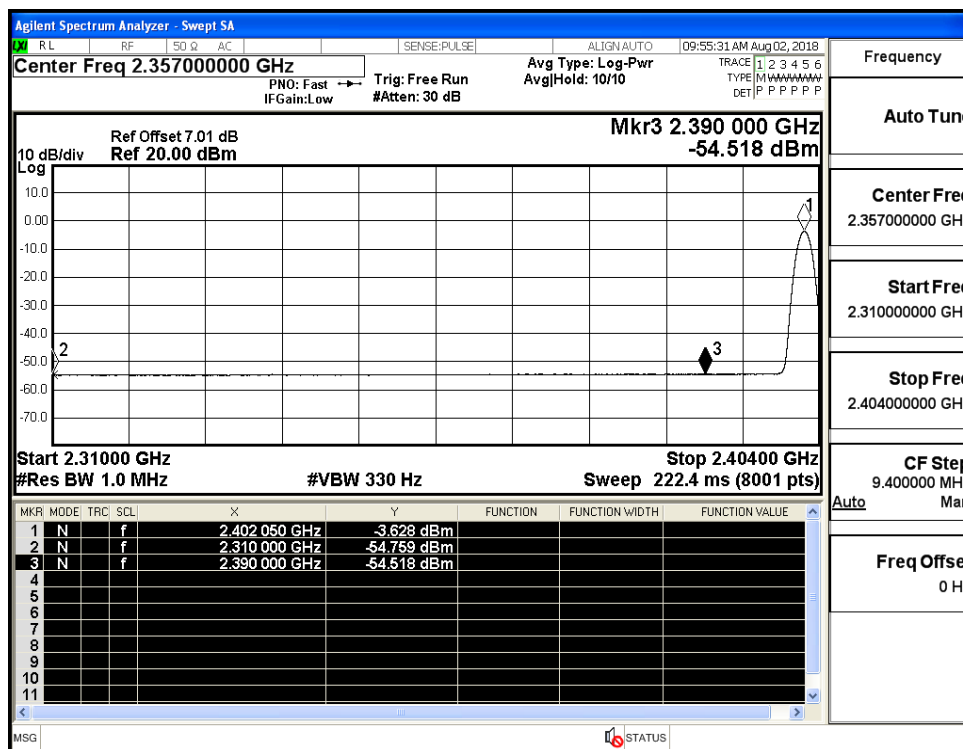
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

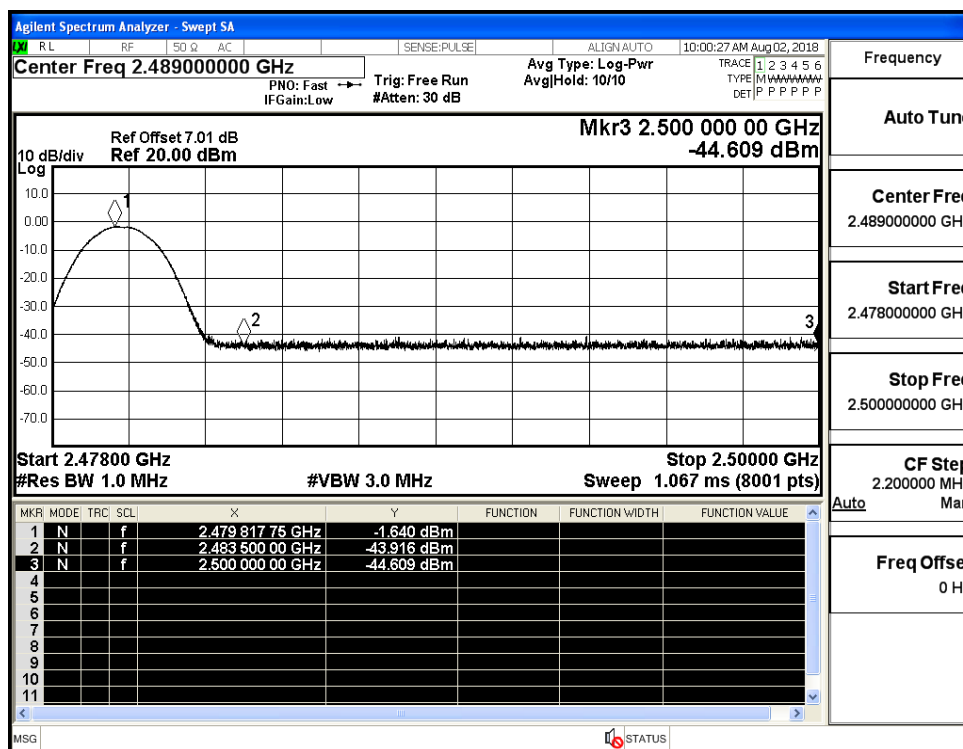
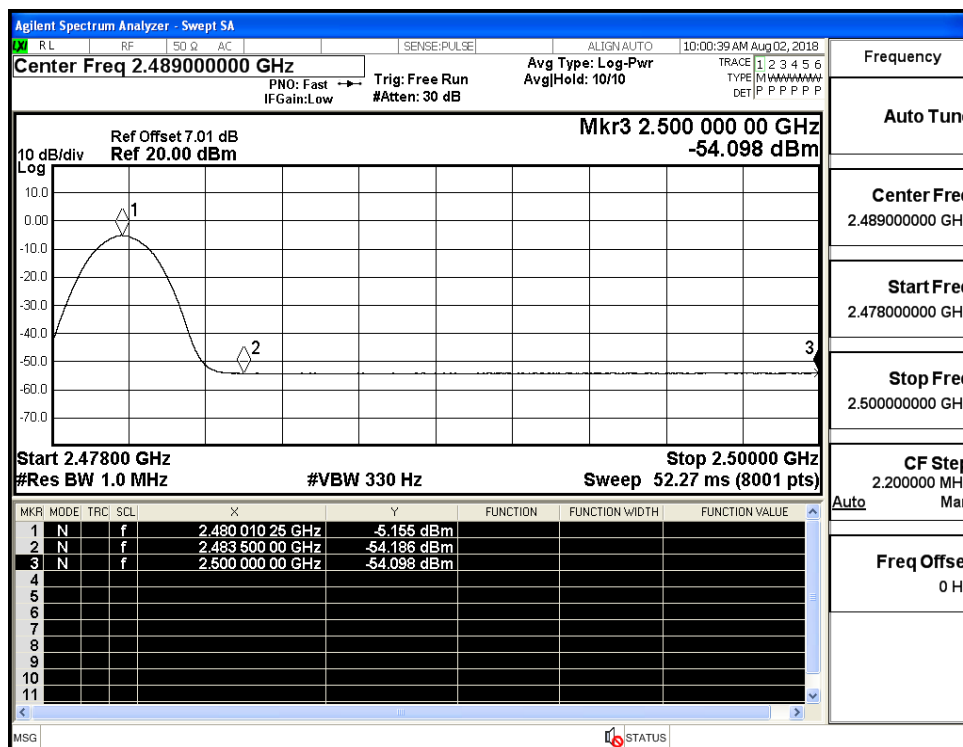


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)

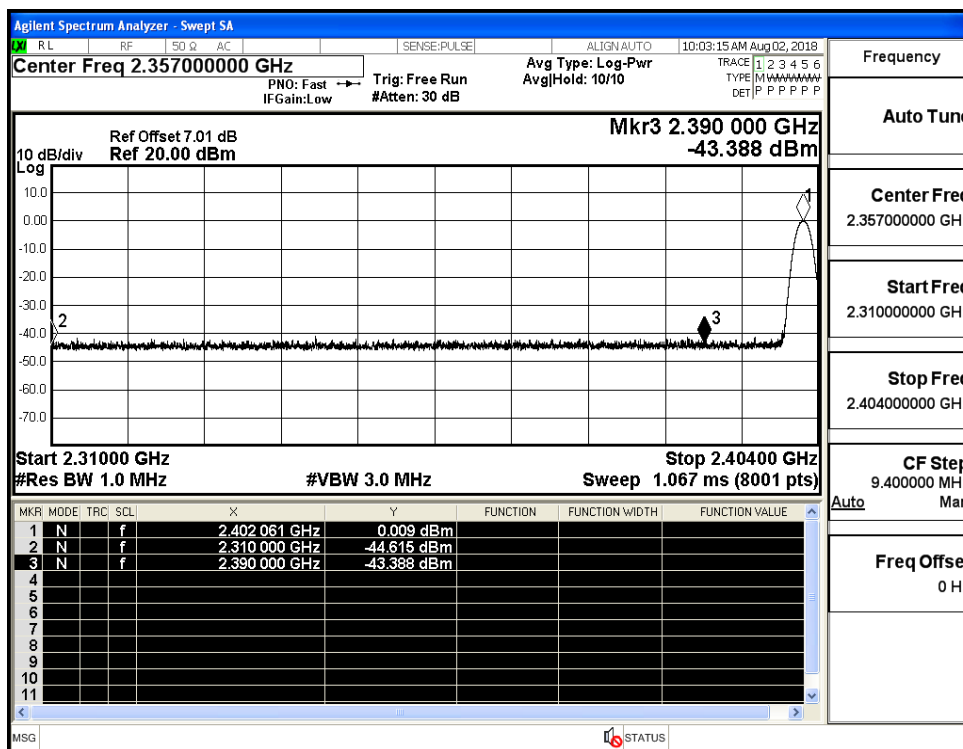


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

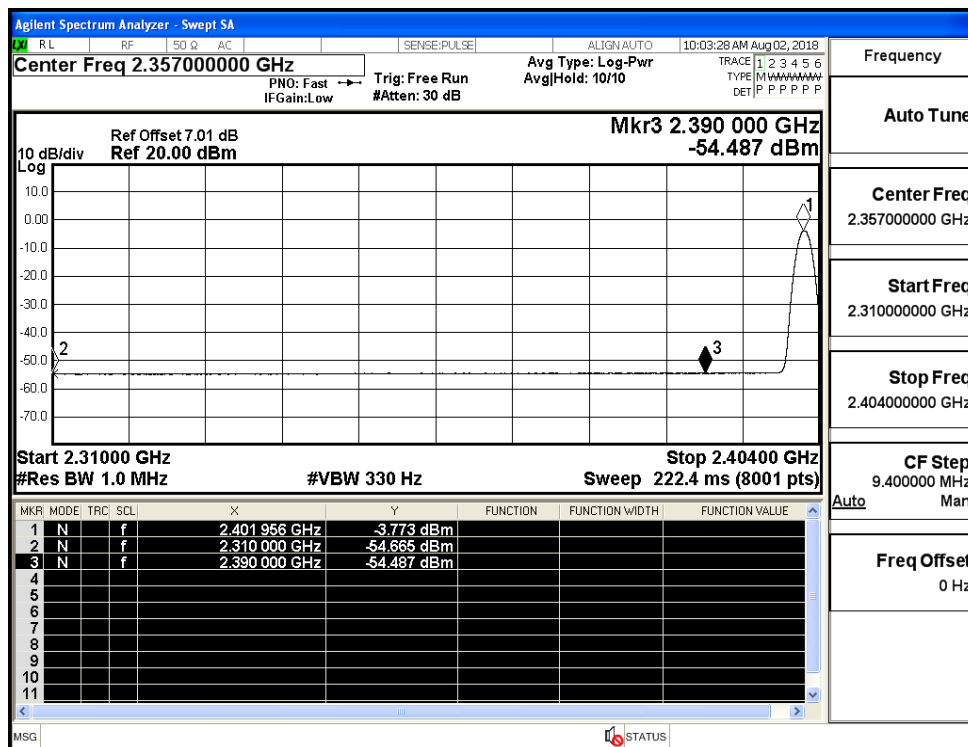


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (High Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (High Channel)

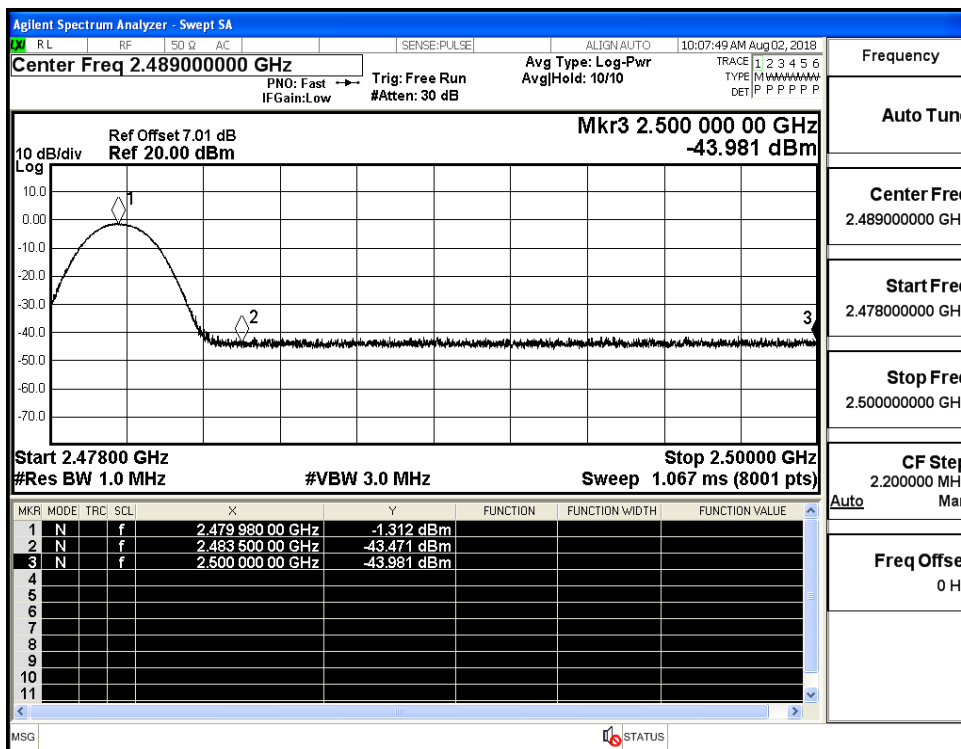
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (High Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)

