

Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Wi-Fi Module

Trade Mark: N/A

Test Model: EWN-1638ACX2AA

Environmental Conditions

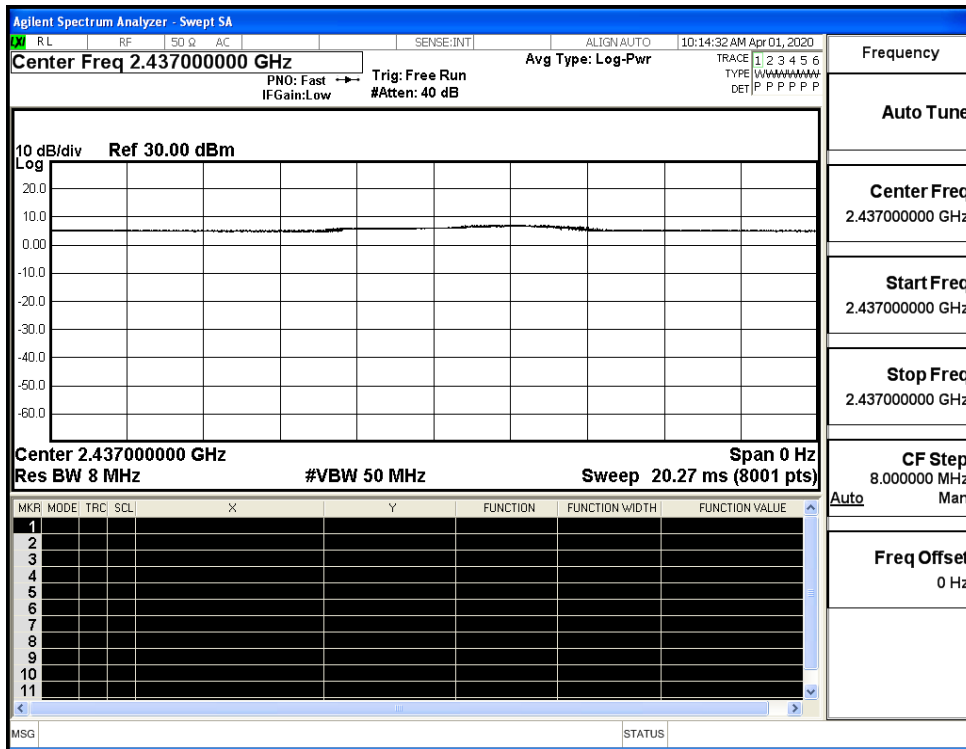
Temperature:	21.4°C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Jack Liu
Supervised by:	Li Huan

C.1 Duty Cycle

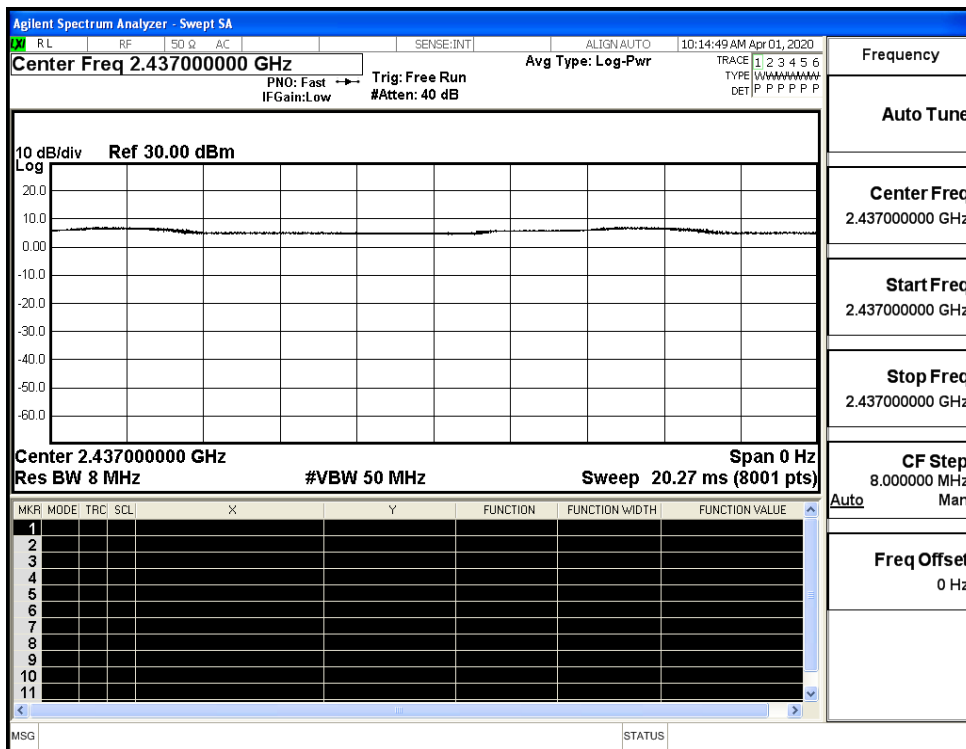
Test Mode	Test Channel	Ant	Duty Cycle[%]	Verdict
11B	2437	Ant_0	100	PASS
11G	2437	Ant_0	100	PASS
11N20	2437	Ant_0	100	PASS
11N40	2437	Ant_0	100	PASS

Test Mode	Test Channel	Ant	Duty Cycle[%]	Verdict
11B	2437	Ant_1	100	PASS
11G	2437	Ant_1	100	PASS
11N20	2437	Ant_1	100	PASS
11N40	2437	Ant_1	100	PASS

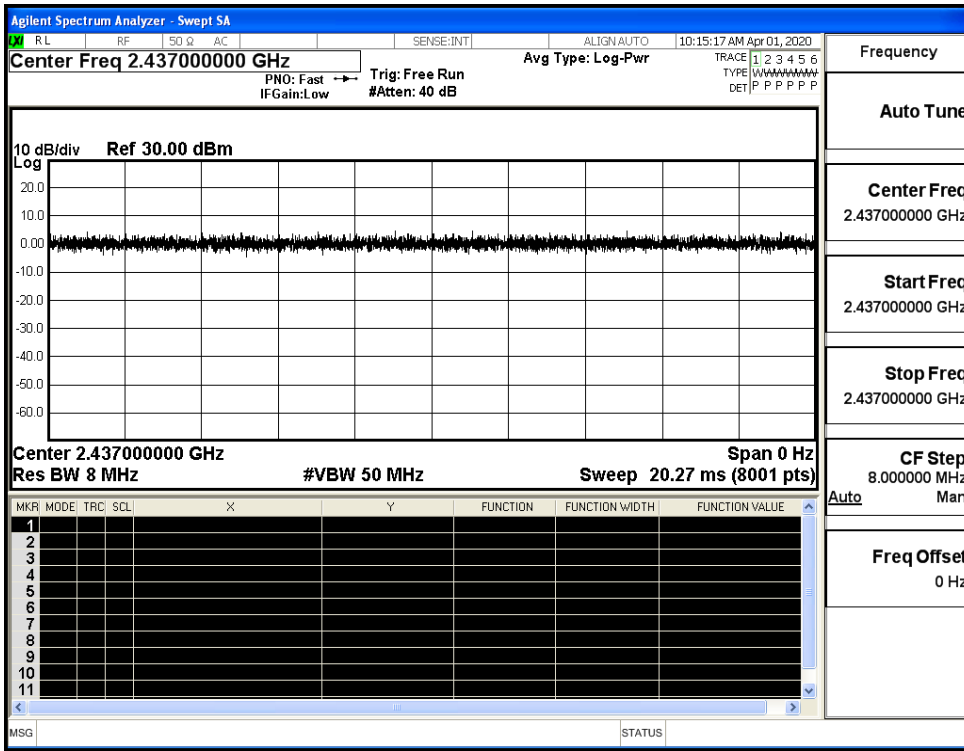
Duty Cycle_11B_2437_Ant_0



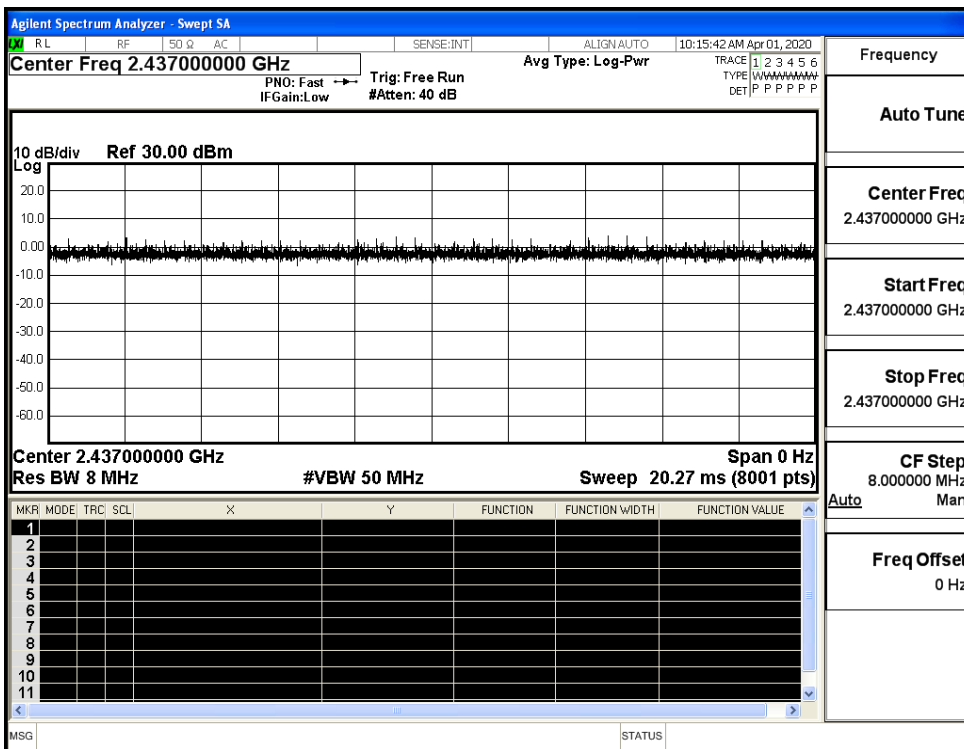
Duty Cycle_11G_2437_Ant_0



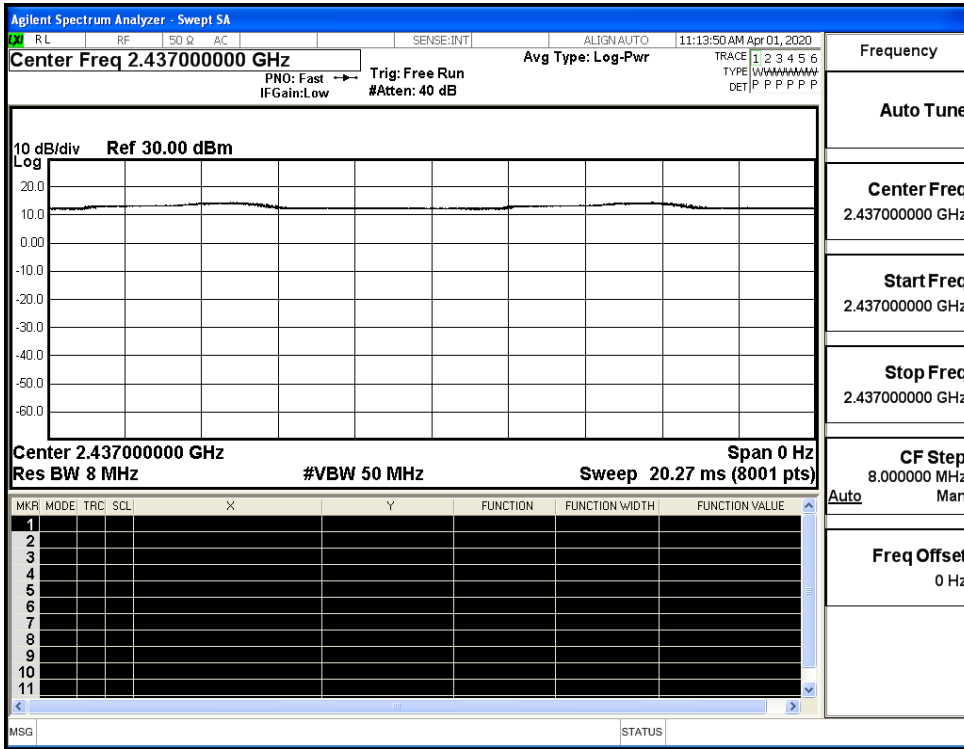
Duty Cycle_11N20_2437_Ant_0



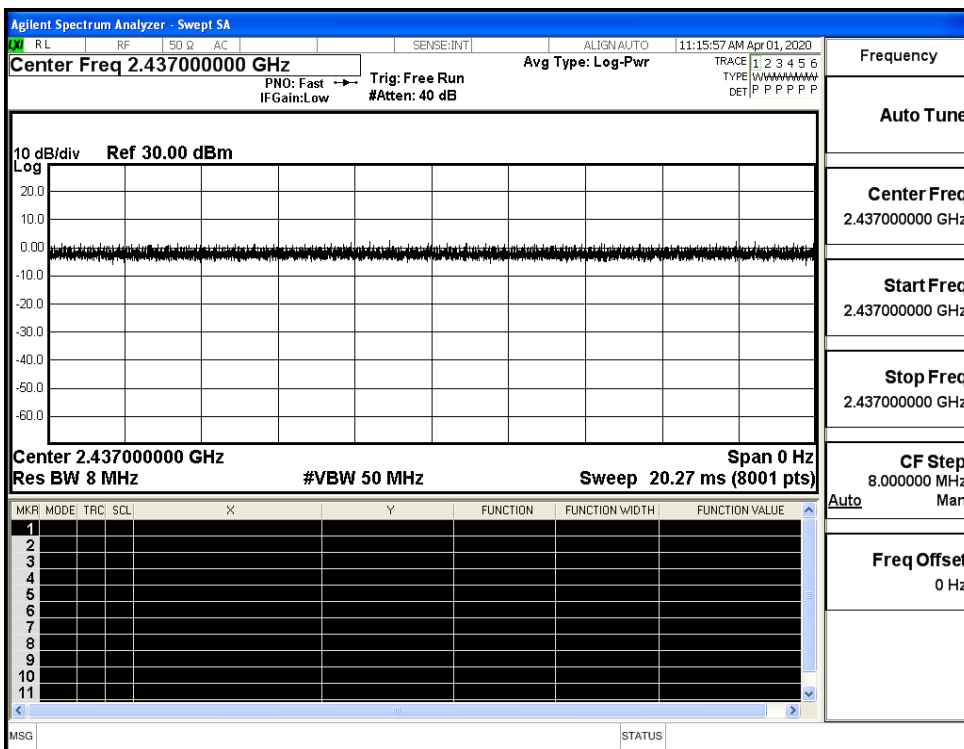
Duty Cycle_11N40_2437_Ant_0



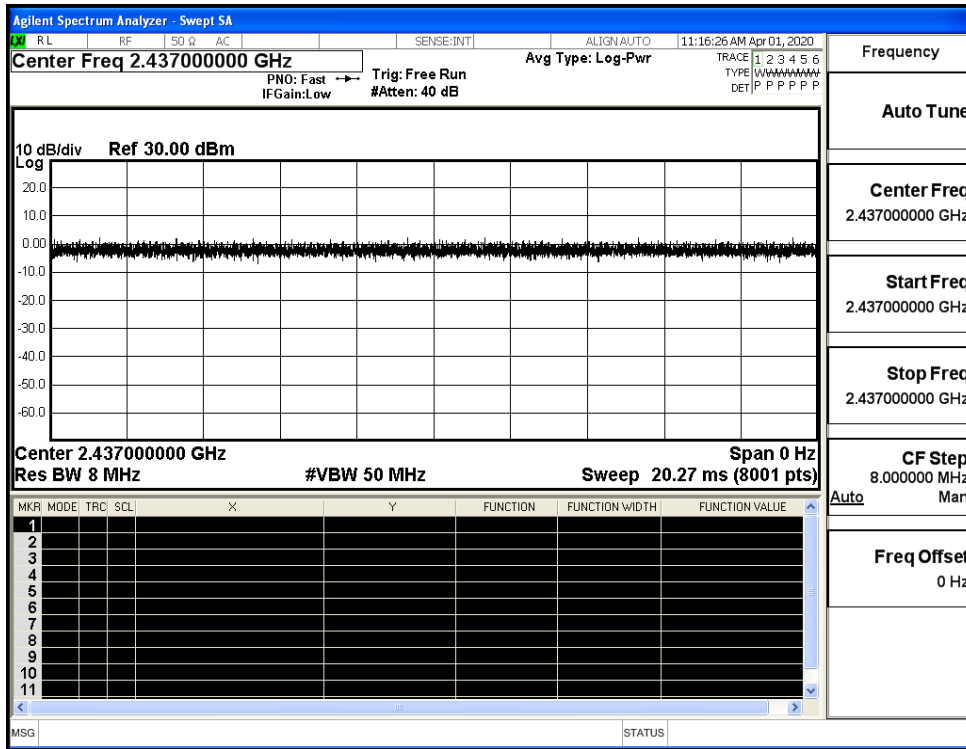
Duty Cycle_11B_2437_Ant_1



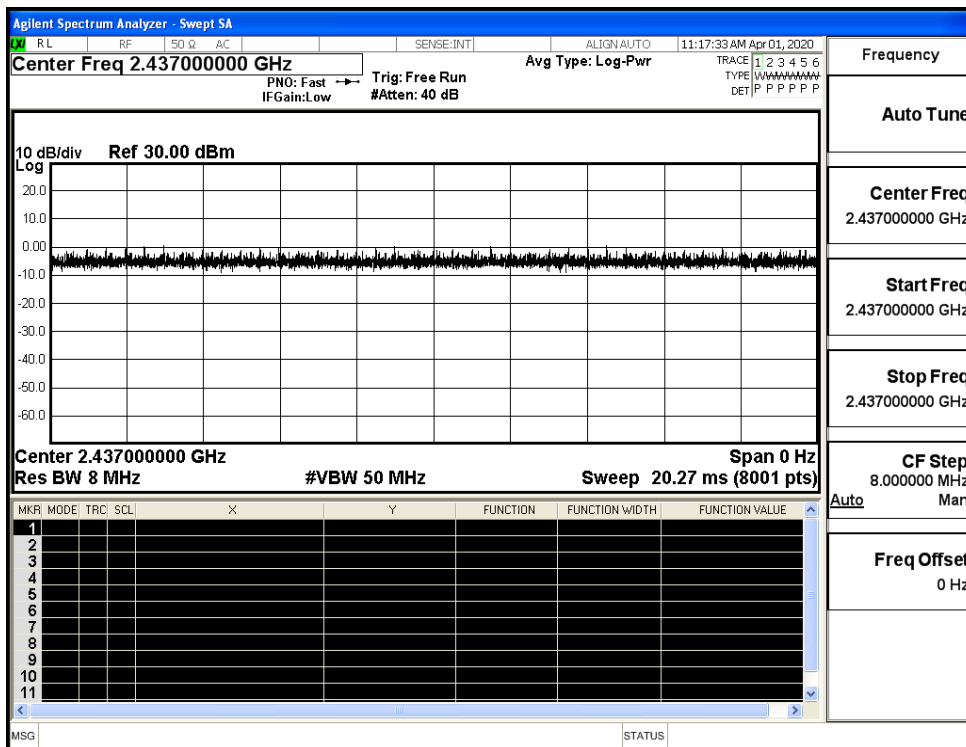
Duty Cycle_11G_2437_Ant_1



Duty Cycle_11N20_2437_Ant_1



Duty Cycle_11N40_2437_Ant_1



C.2 Maximum Conducted Output Power

Mode	Channel	Meas.Level [dBm]			Limit [dBm]	Verdict
		Ant_0	Ant_1	Sum		
11B	LCH	10.55	7.93	/	30	PASS
	MCH	10.46	8.53	/	30	PASS
	HCH	10.82	8.02	/	30	PASS
11G	LCH	13.25	10.82	/	30	PASS
	MCH	13.09	11.37	/	30	PASS
	HCH	13.38	10.28	/	30	PASS
11N20	LCH	13.69	11.55	15.76	30	PASS
	MCH	13.48	11.46	15.60	30	PASS
	HCH	13.81	10.9	15.60	30	PASS
11N40	LCH	15.02	11.84	16.73	30	PASS
	MCH	14.89	11.65	16.58	30	PASS
	HCH	14.95	11.49	16.57	30	PASS

C.3 Maximum Power Spectral Density

Ant_0

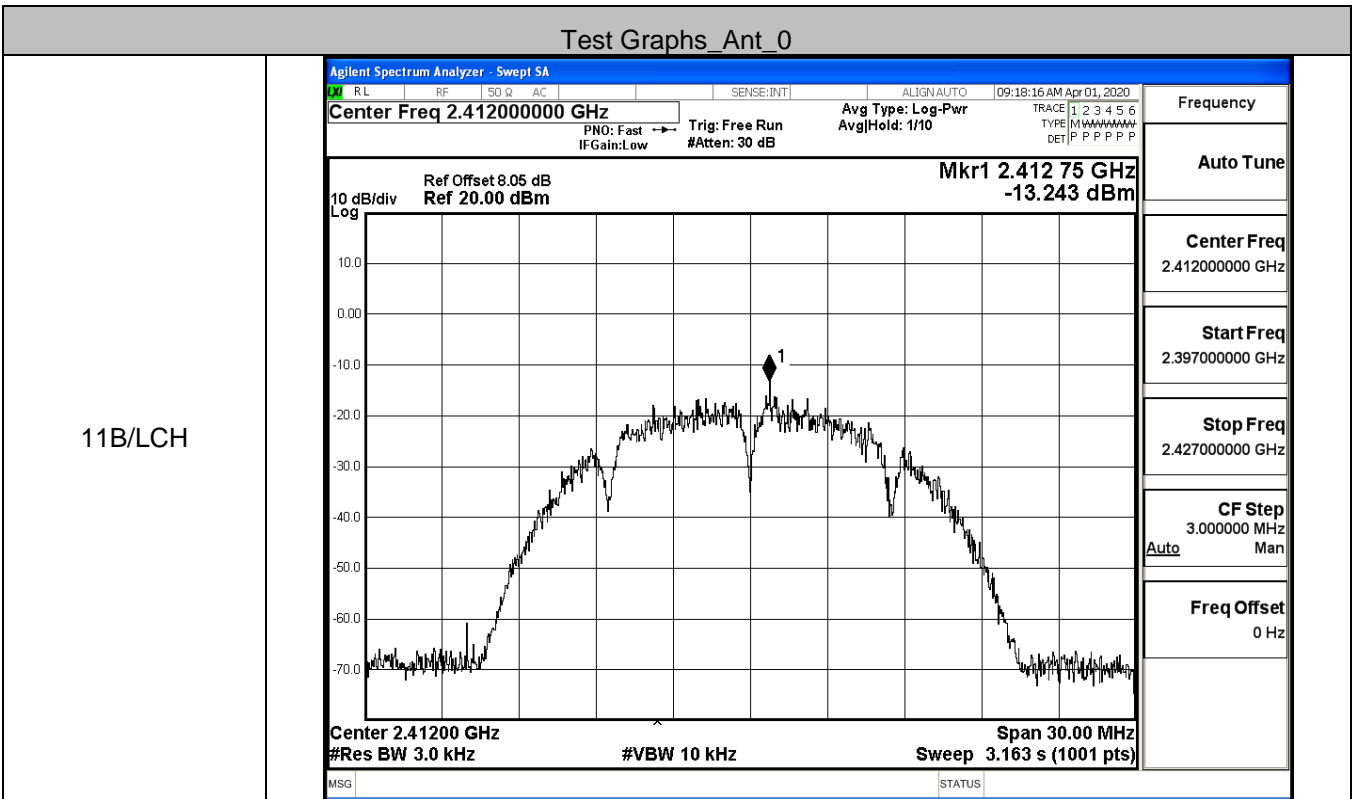
Mode	Channel	Result [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-13.243	8	PASS
	MCH	-16.381	8	PASS
	HCH	-15.545	8	PASS
11G	LCH	-21.164	8	PASS
	MCH	-21.316	8	PASS
	HCH	-20.042	8	PASS
11N20	LCH	-19.681	8	PASS
	MCH	-19.297	8	PASS
	HCH	-20.921	8	PASS
11N40	LCH	-22.656	8	PASS
	MCH	-22.785	8	PASS
	HCH	-22.200	8	PASS

Ant_1

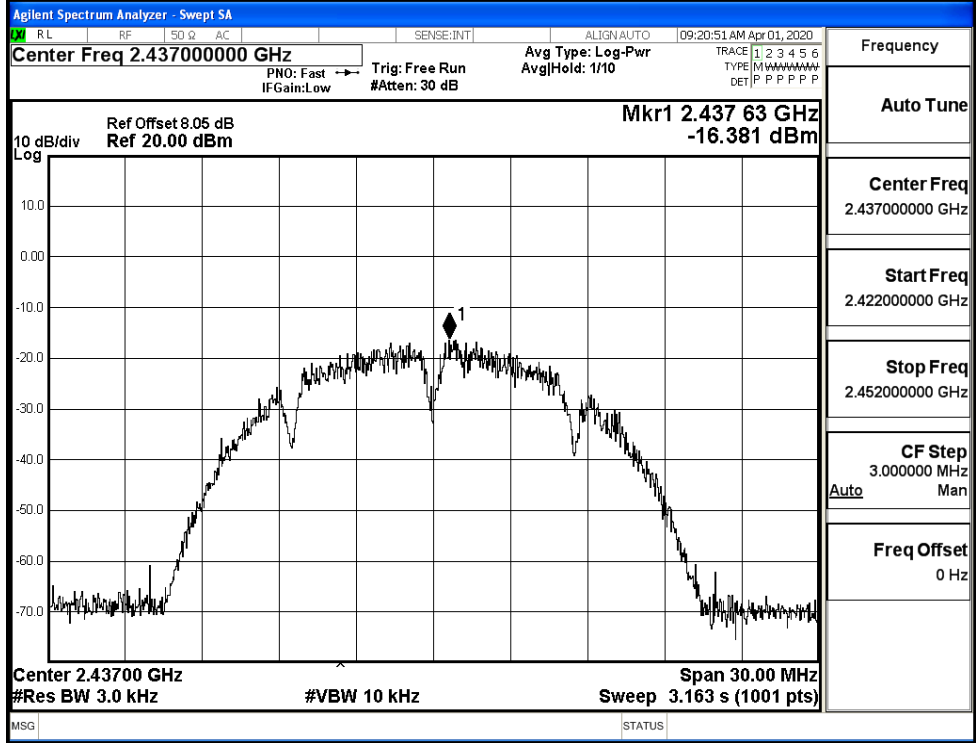
Mode	Channel	Result [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-24.344	8	PASS
	MCH	-23.848	8	PASS
	HCH	-24.349	8	PASS
11G	LCH	-25.510	8	PASS
	MCH	-25.071	8	PASS
	HCH	-25.755	8	PASS
11N20	LCH	-24.867	8	PASS
	MCH	-25.141	8	PASS
	HCH	-25.326	8	PASS
11N40	LCH	-24.520	8	PASS
	MCH	-26.292	8	PASS
	HCH	-26.589	8	PASS

Combined Ant_0 and Ant_1

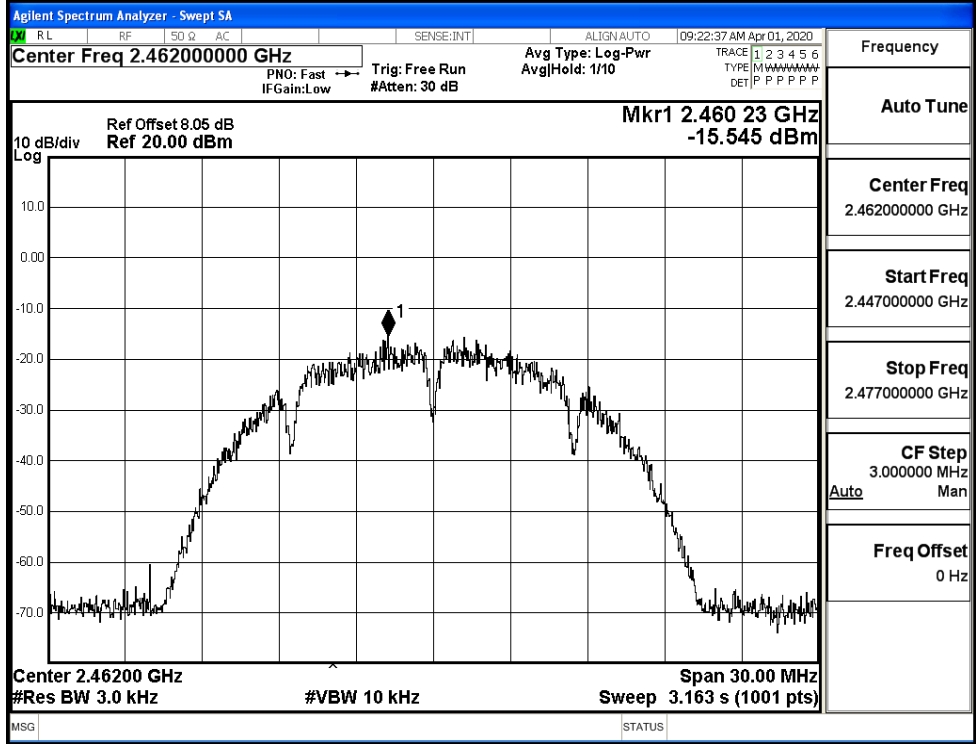
Mode	Channel	Result [dBm/3KHz]			Limit [dBm/3KHz]	Verdict
		Ant_0	Ant_1	Sum		
11N20	LCH	-19.681	-24.867	-18.532	8	PASS
	MCH	-19.297	-25.141	-18.292	8	PASS
	HCH	-20.921	-25.326	-19.577	8	PASS
11N40	LCH	-22.656	-24.520	-20.478	8	PASS
	MCH	-22.785	-26.292	-21.183	8	PASS
	HCH	-22.200	-26.589	-20.852	8	PASS



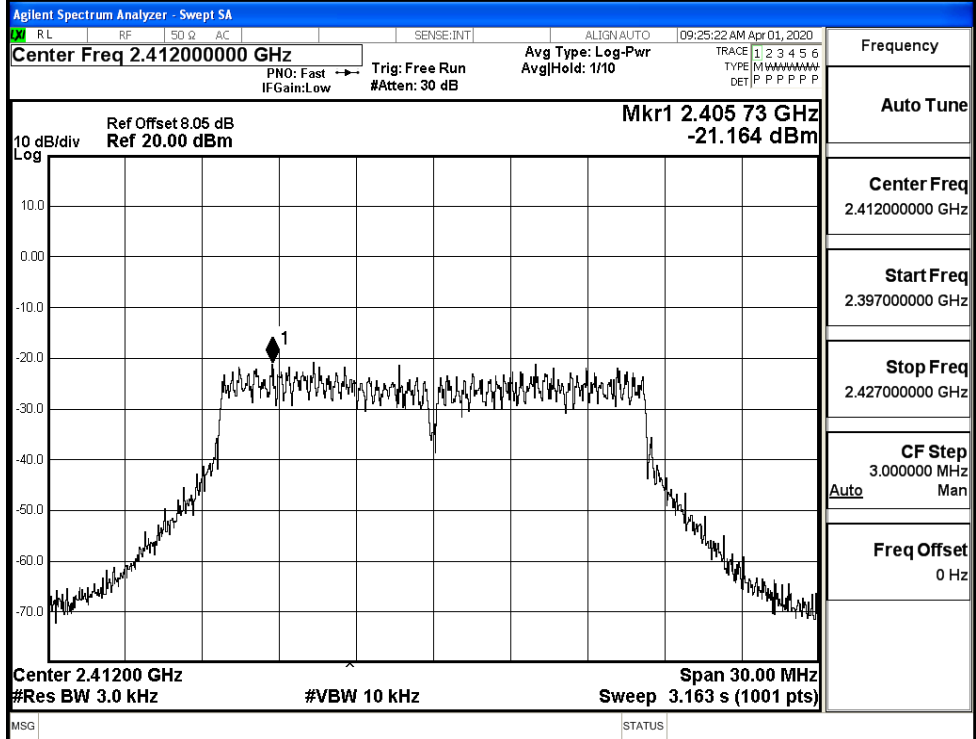
11B/MCH



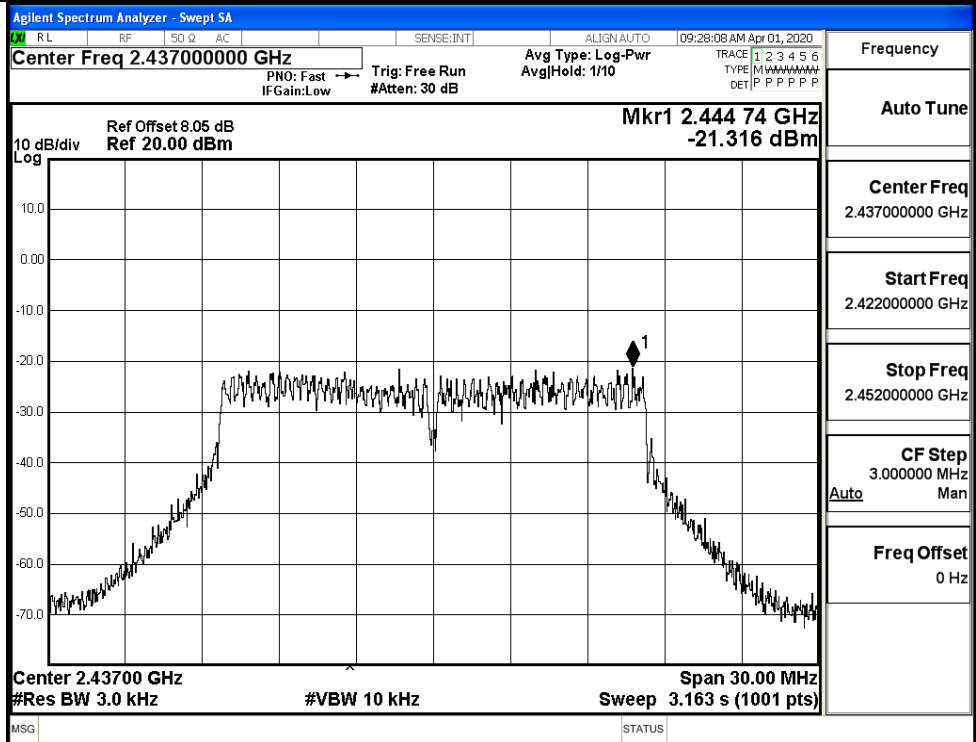
11B/HCH



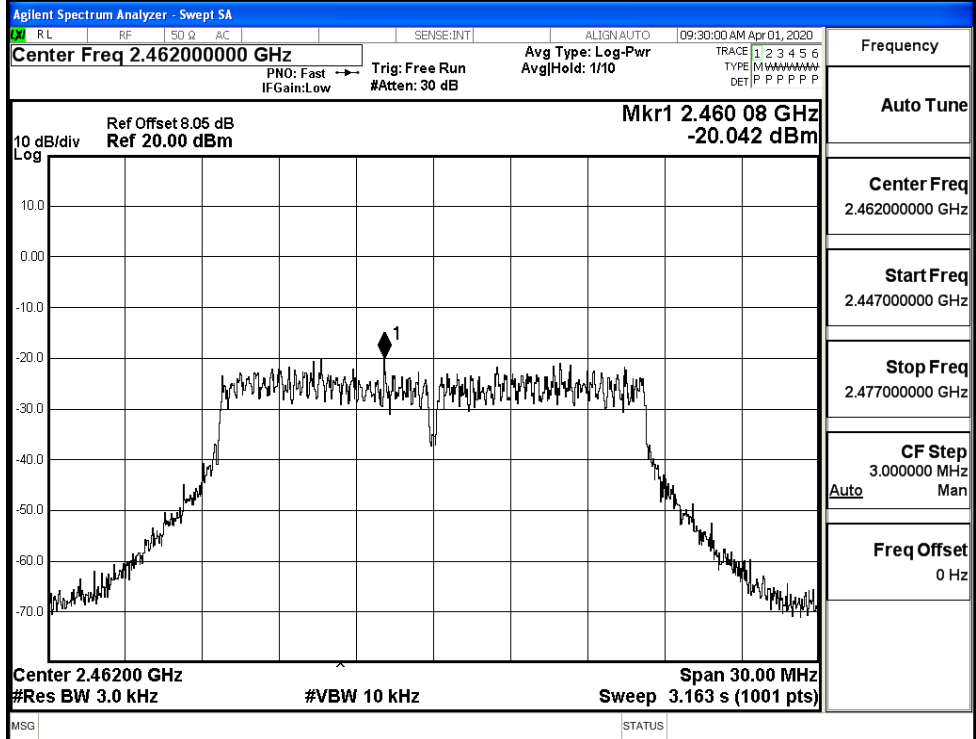
11G/LCH



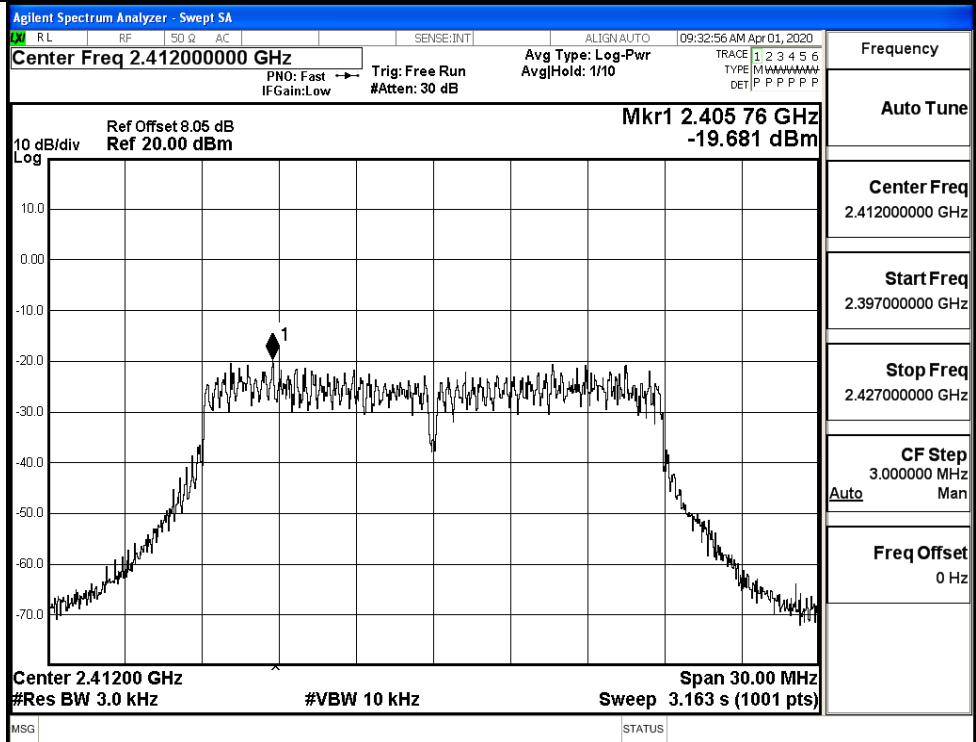
11G/MCH



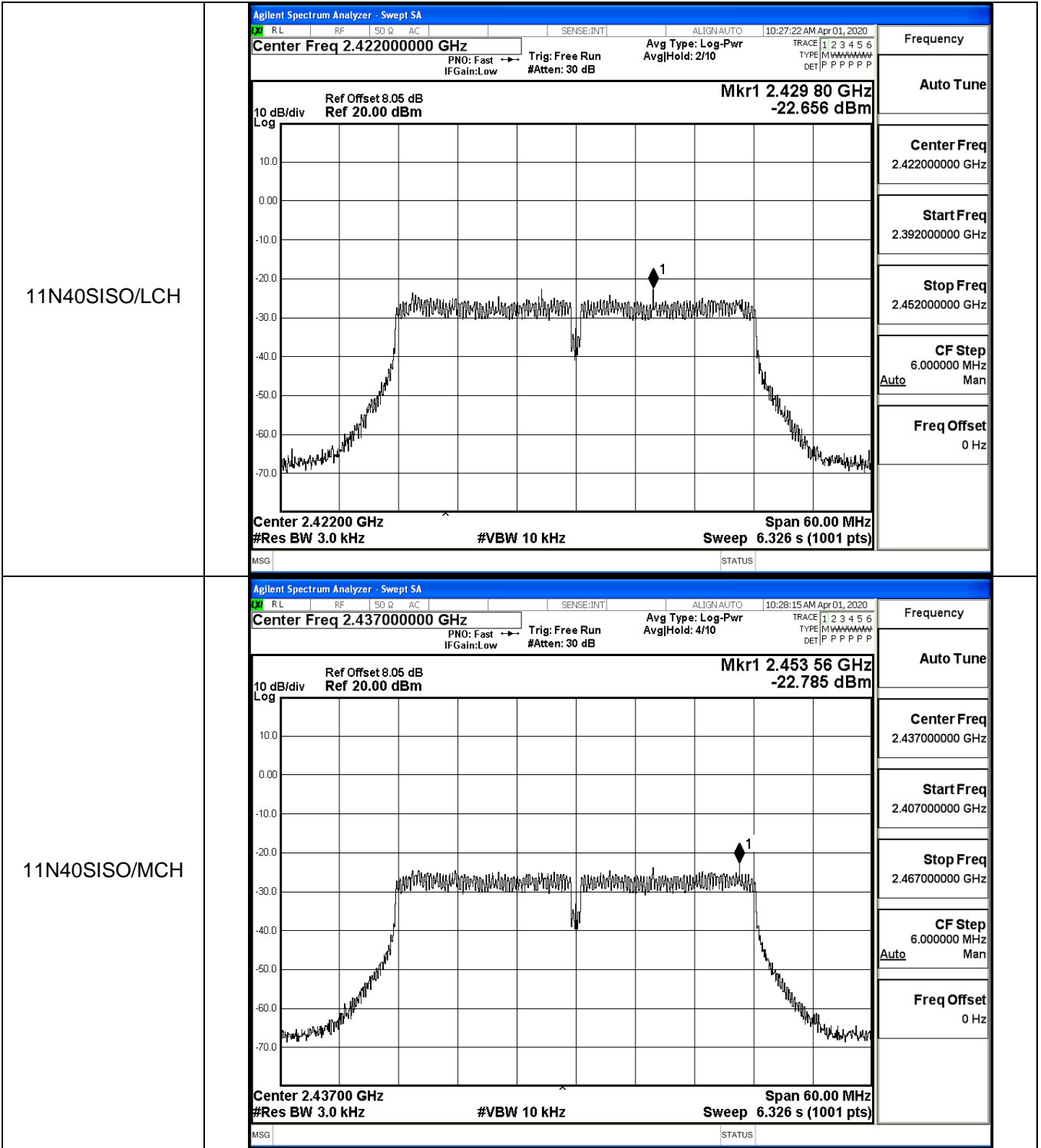
11G/HCH



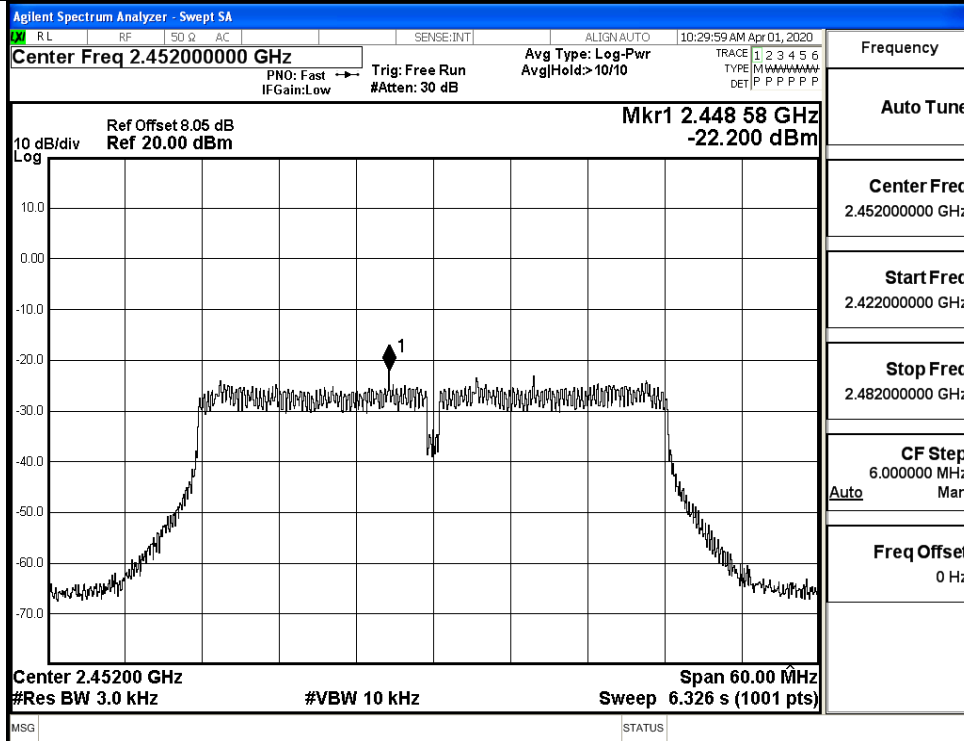
11N20SISO/LCH



<p>11N20SISO/MCH</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.43700000 GHz</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm</p> <p>Mkr1 2.43073 GHz -19.297 dBm</p> <p>Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 3.163 s (1001 pts)</p>	<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
<p>11N20SISO/HCH</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.46200000 GHz</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm</p> <p>Mkr1 2.46758 GHz -20.921 dBm</p> <p>Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 3.163 s (1001 pts)</p>	<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.44700000 GHz</p> <p>Stop Freq 2.47700000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

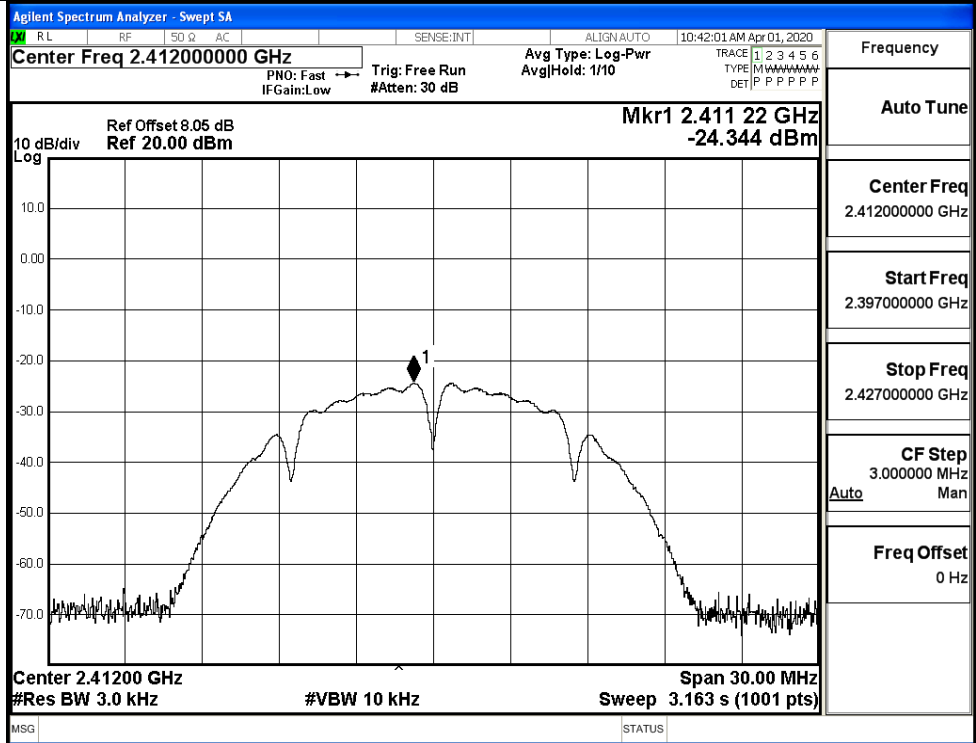


11N40SISO/HCH

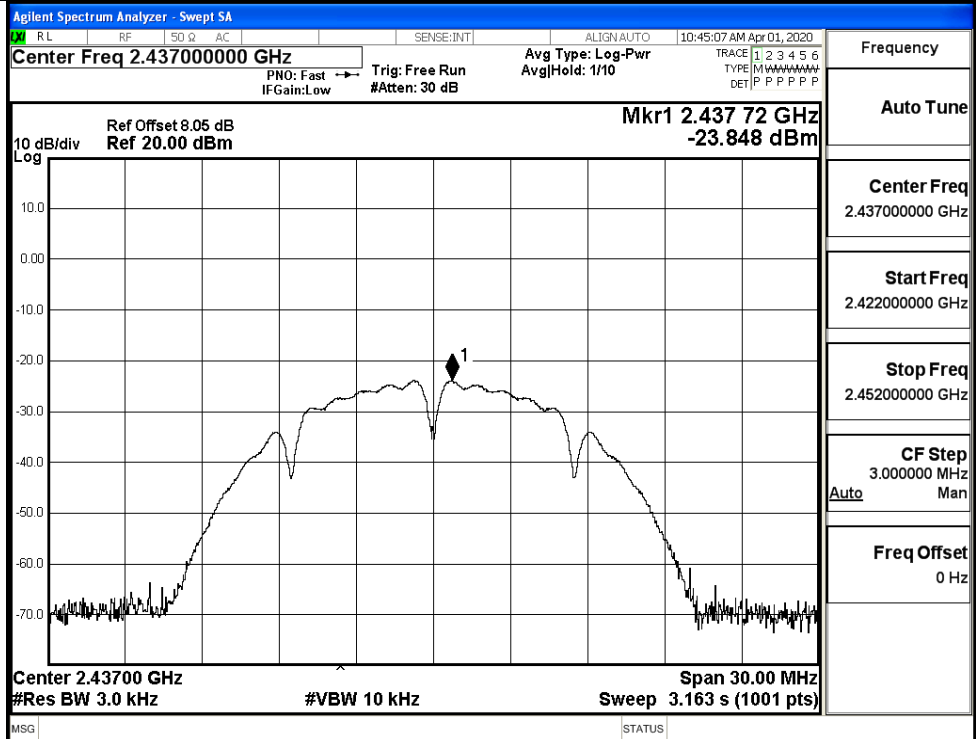


Test Graphs_Ant_1

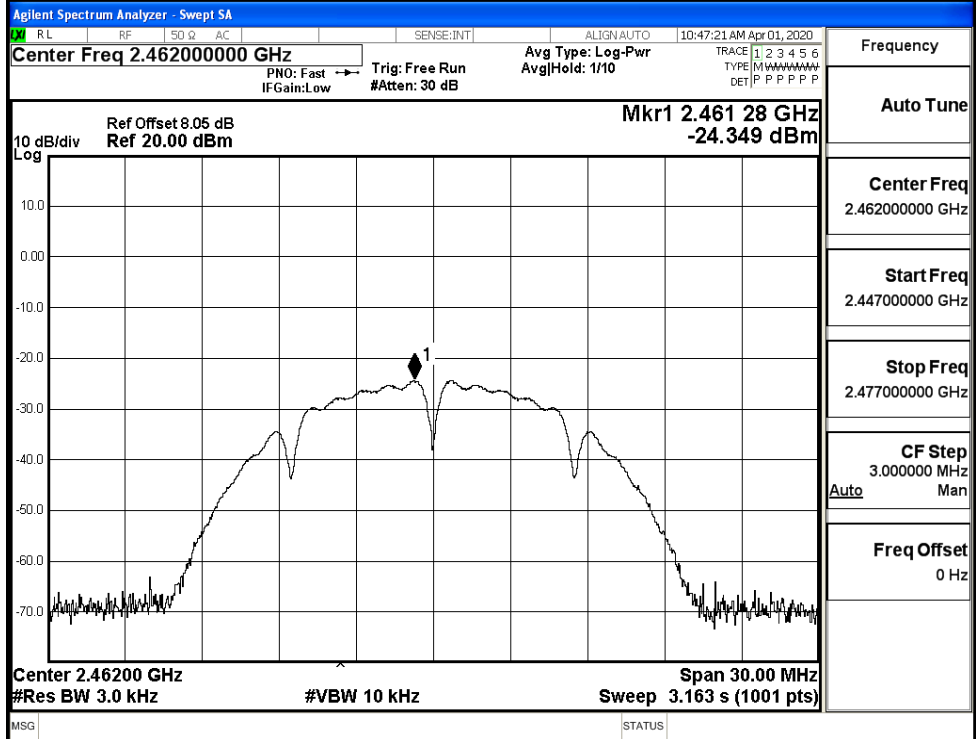
11B/LCH



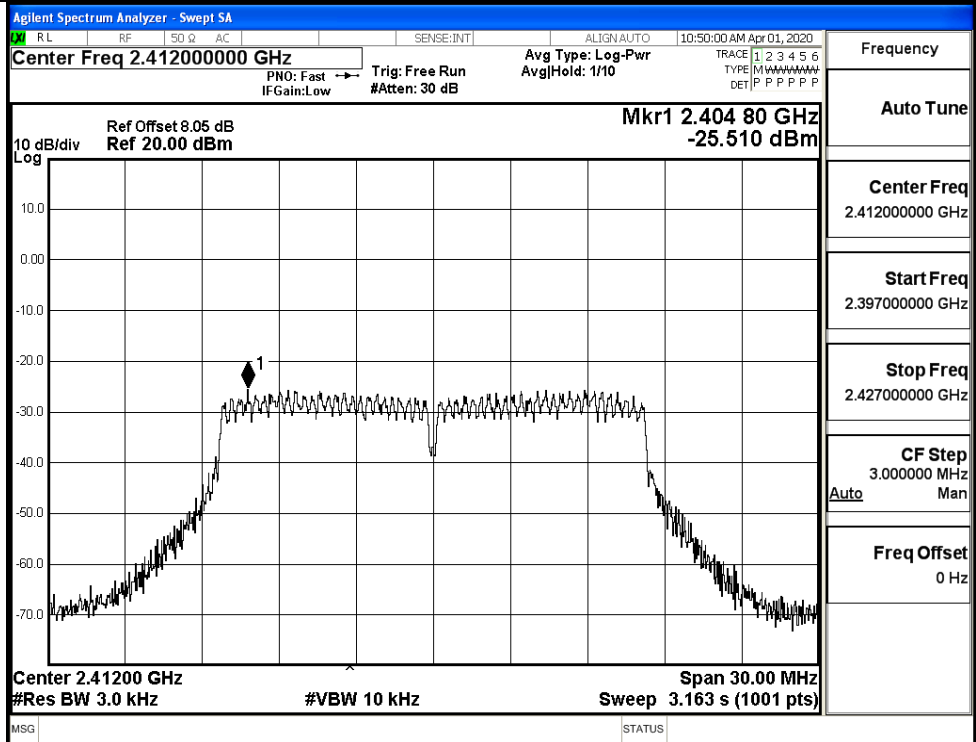
11B/MCH



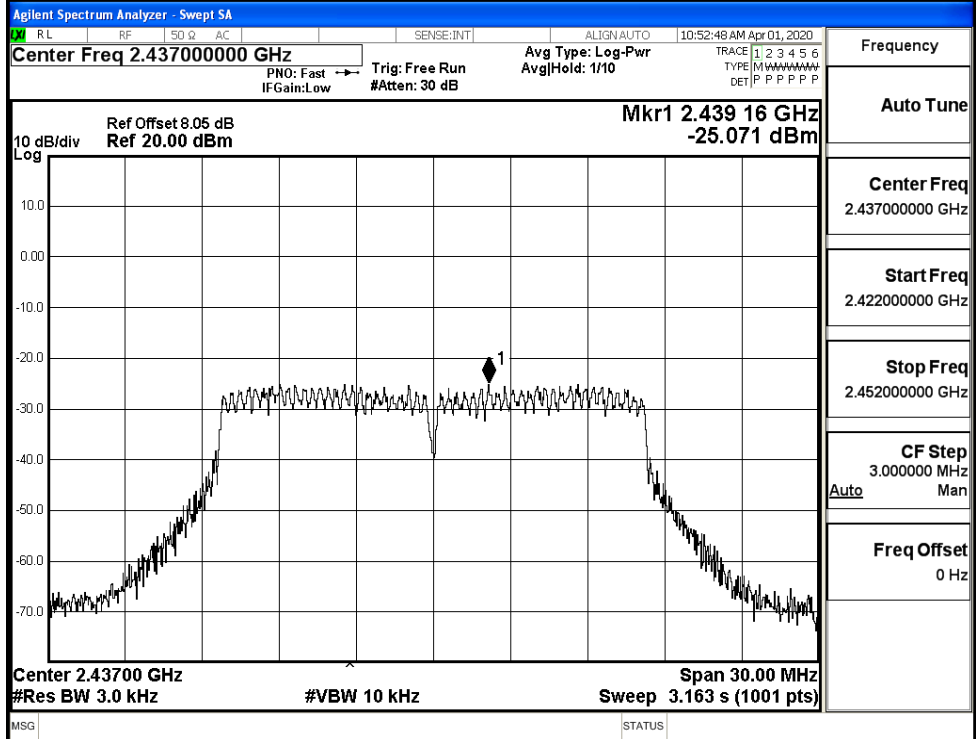
11B/HCH



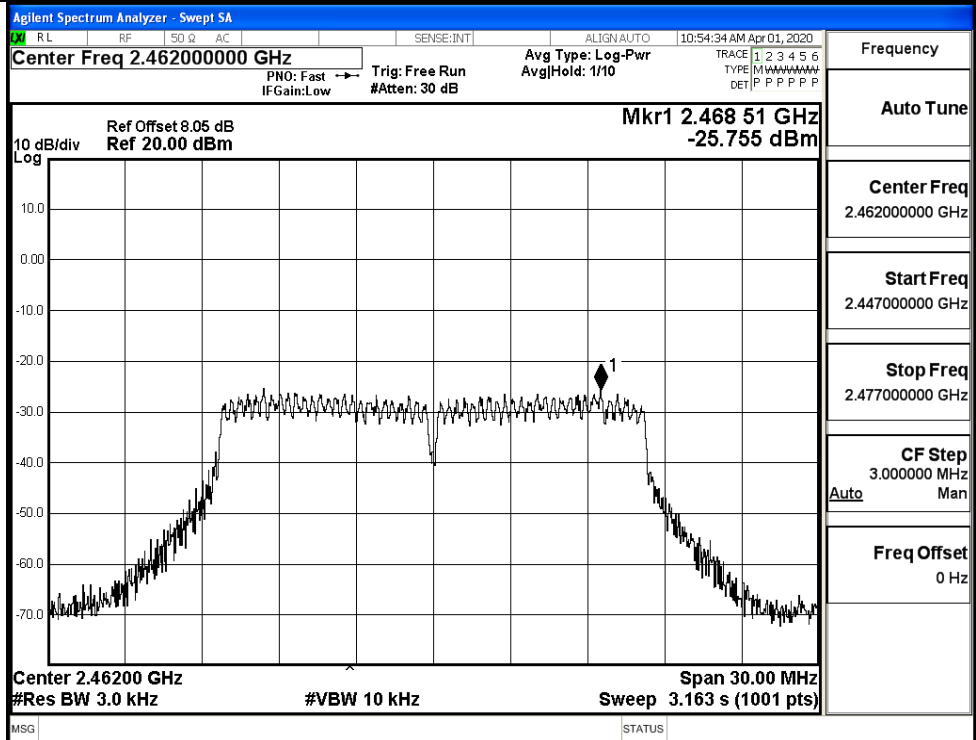
11G/LCH

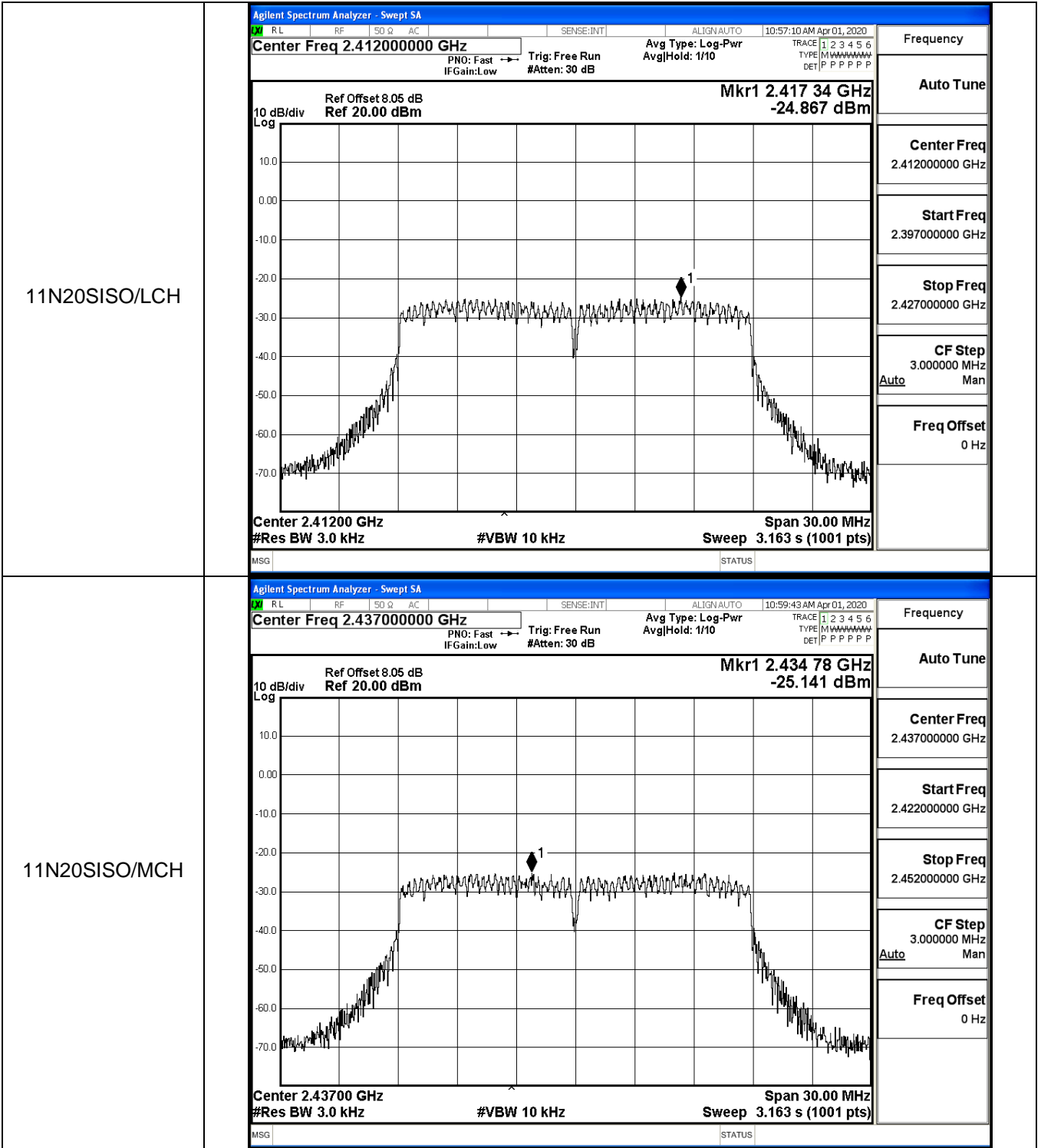


11G/MCH

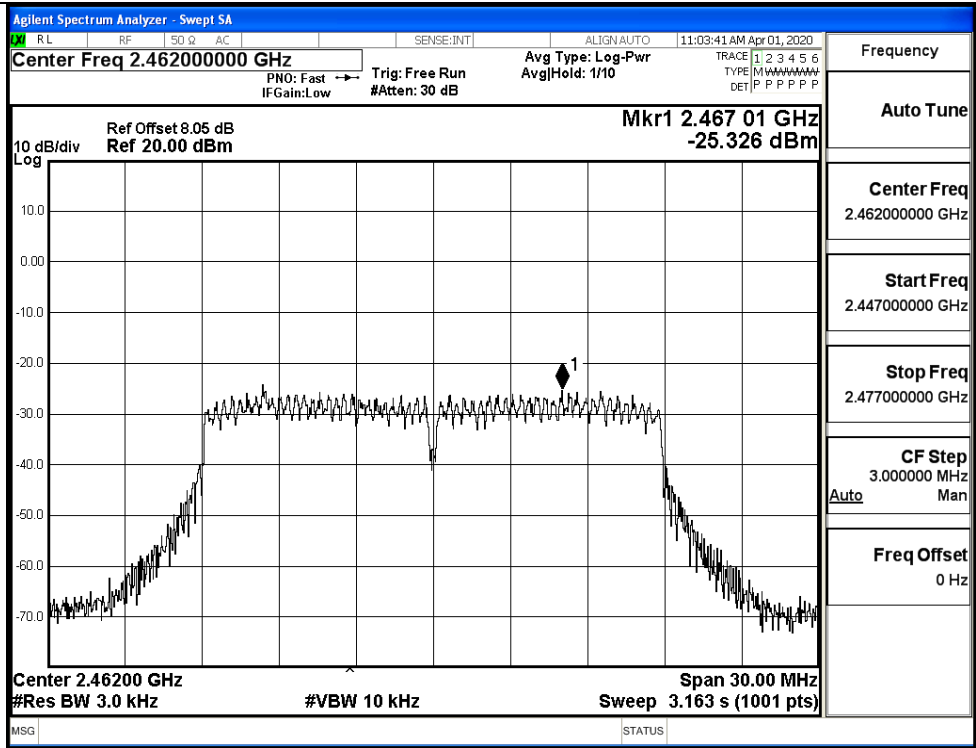


11G/HCH

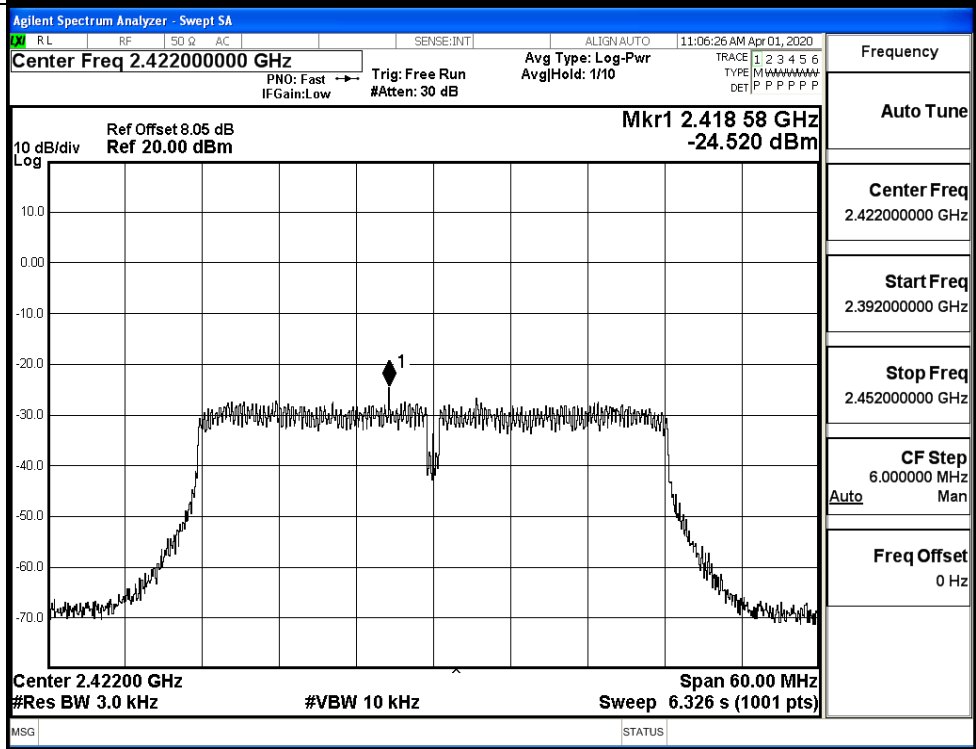


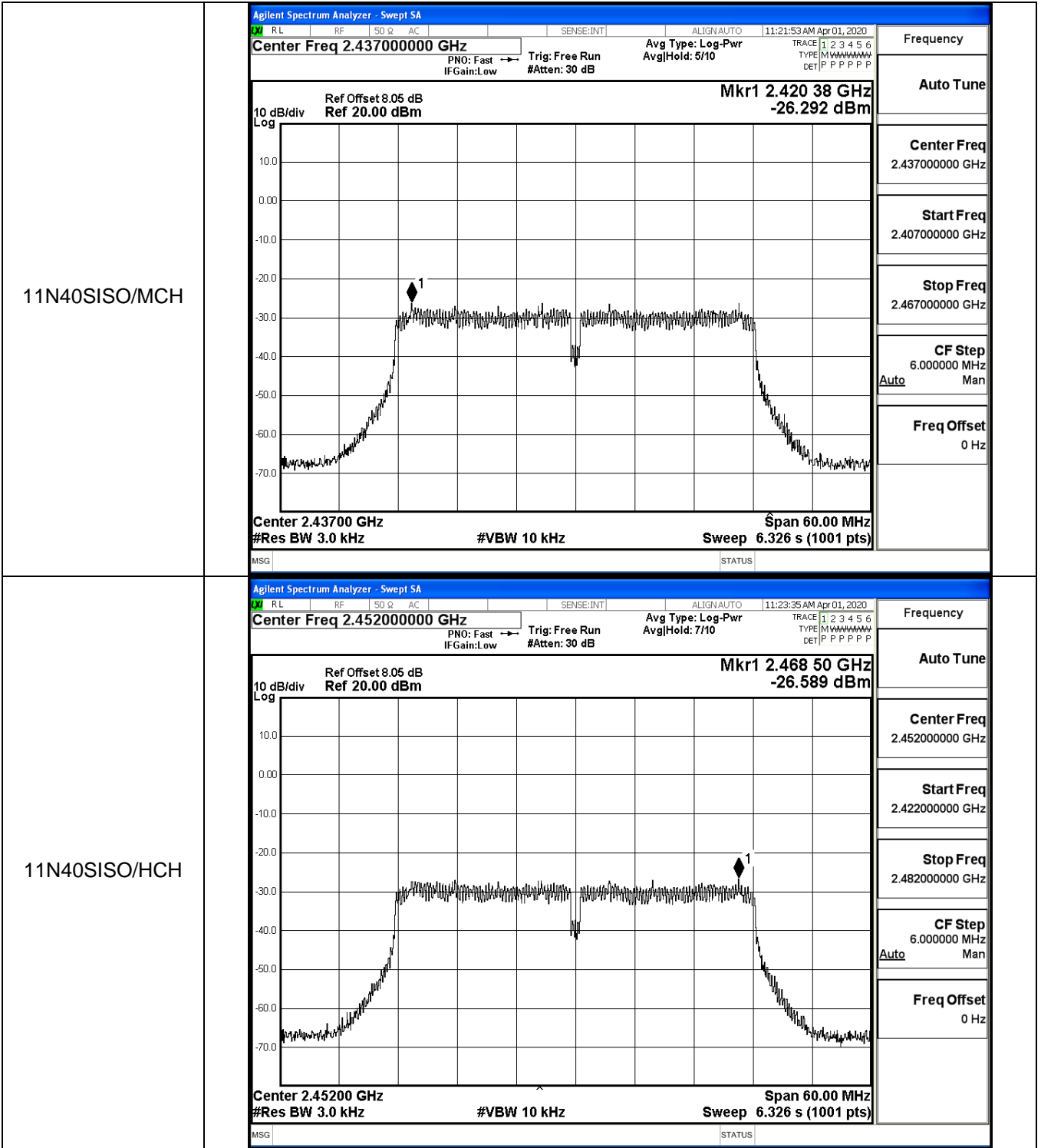


11N20SISO/HCH



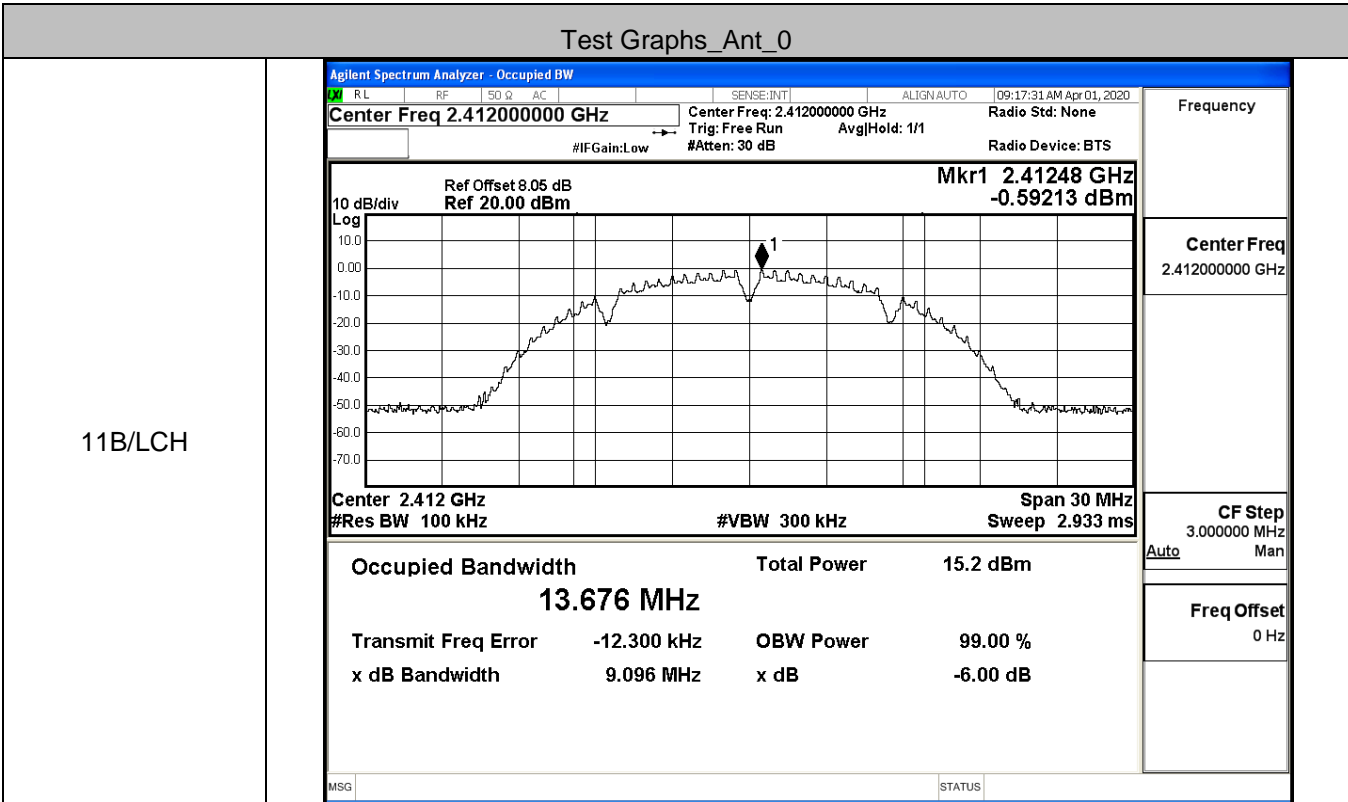
11N40SISO/LCH



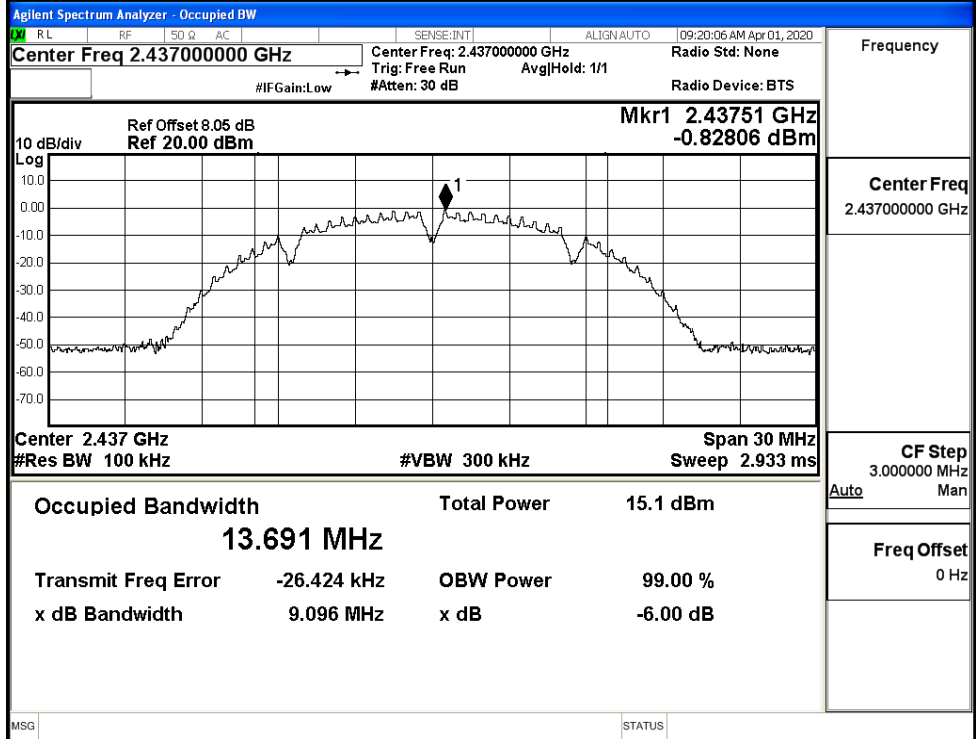


C.4 6dB Bandwidth

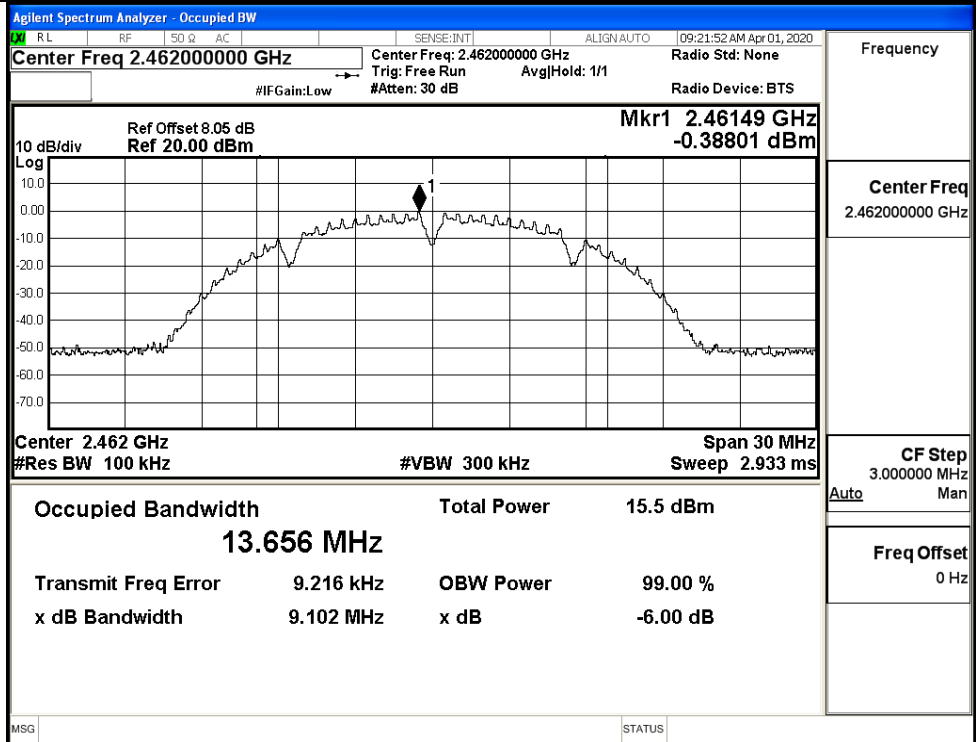
Mode	Channel	6dB Bandwidth [MHz]		Limit [MHz]	Verdict
		Ant_0	Ant_1		
11B	LCH	9.096	9.135	≥ 0.5	PASS
	MCH	9.096	9.138	≥ 0.5	PASS
	HCH	9.102	9.139	≥ 0.5	PASS
11G	LCH	16.35	16.53	≥ 0.5	PASS
	MCH	16.34	16.54	≥ 0.5	PASS
	HCH	16.35	16.55	≥ 0.5	PASS
11N20	LCH	17.07	17.64	≥ 0.5	PASS
	MCH	17.15	17.64	≥ 0.5	PASS
	HCH	17.07	17.66	≥ 0.5	PASS
11N40	LCH	36.10	36.52	≥ 0.5	PASS
	MCH	36.09	36.54	≥ 0.5	PASS
	HCH	36.07	36.54	≥ 0.5	PASS



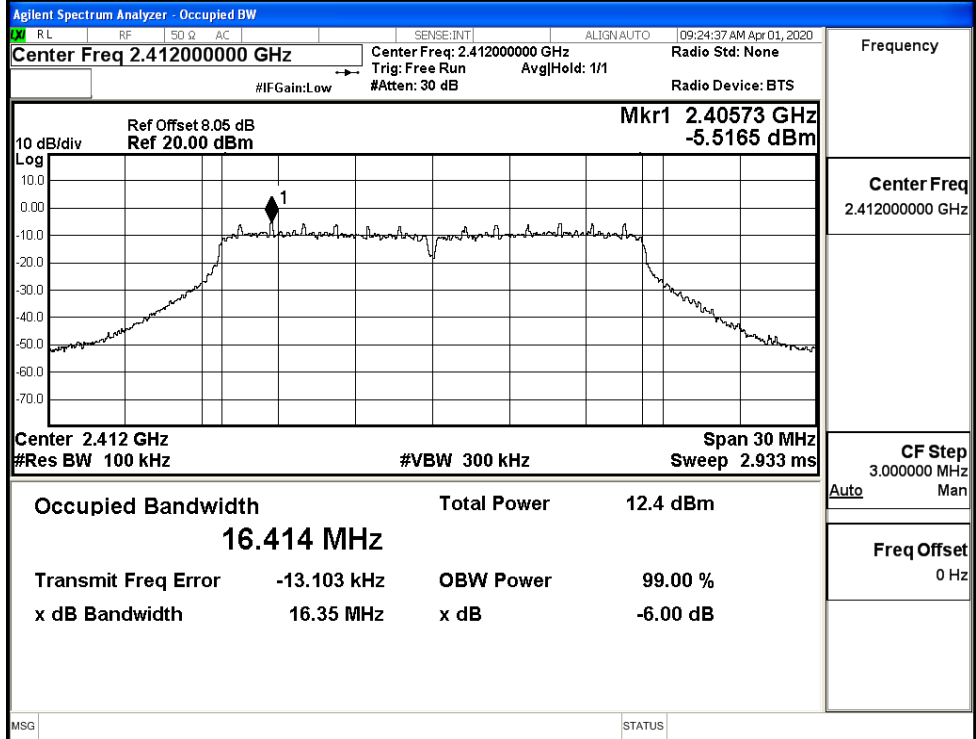
11B/MCH



11B/HCH

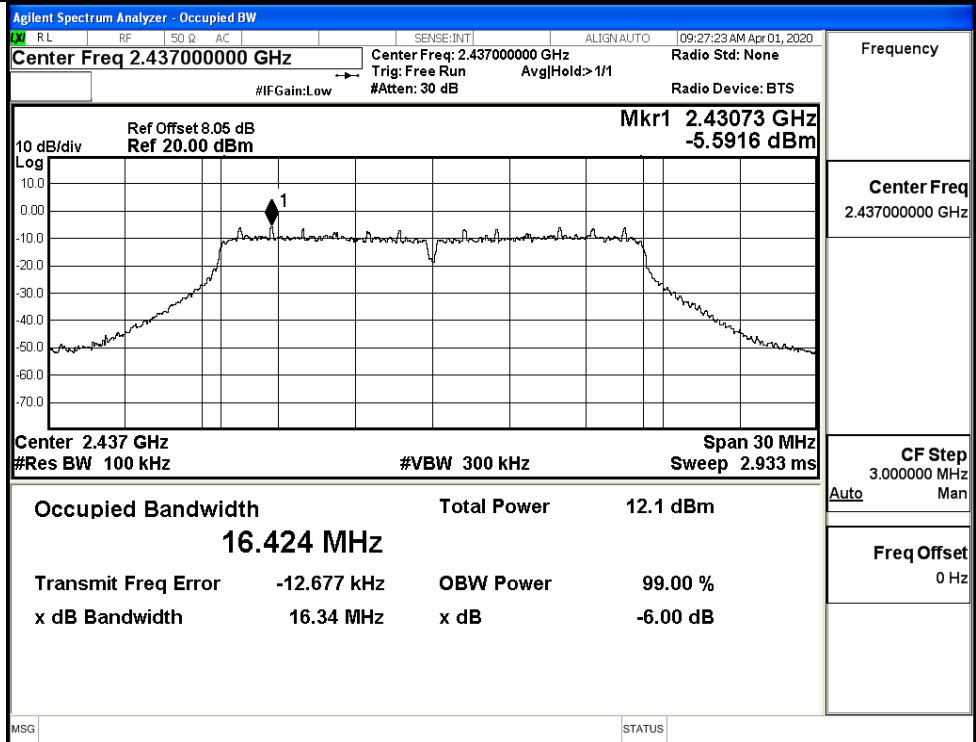


11G/LCH



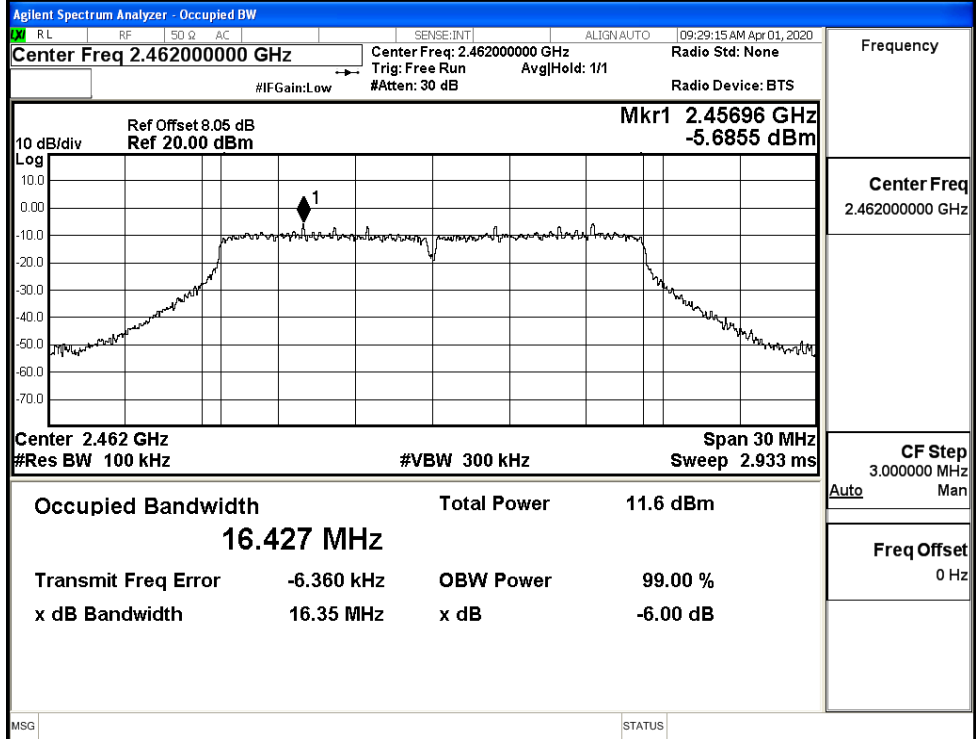
Frequency	2.41200000 GHz
Center Freq	2.41200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/MCH

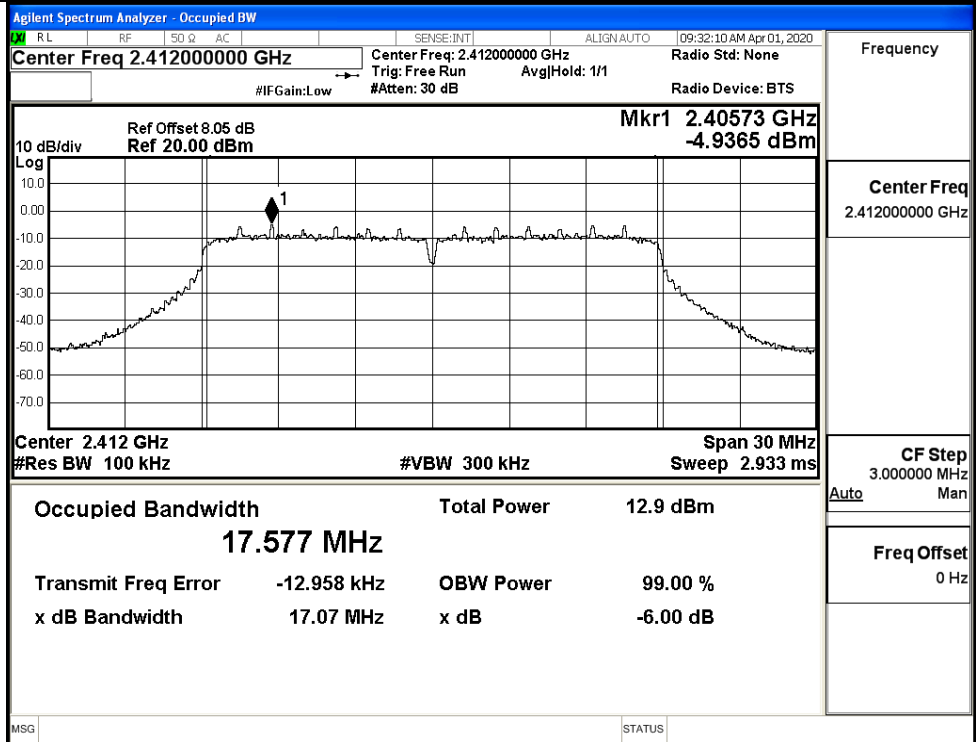


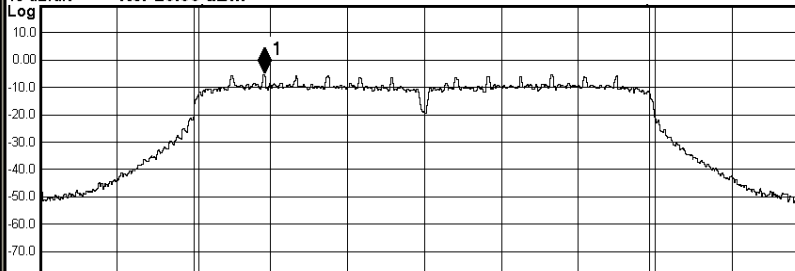
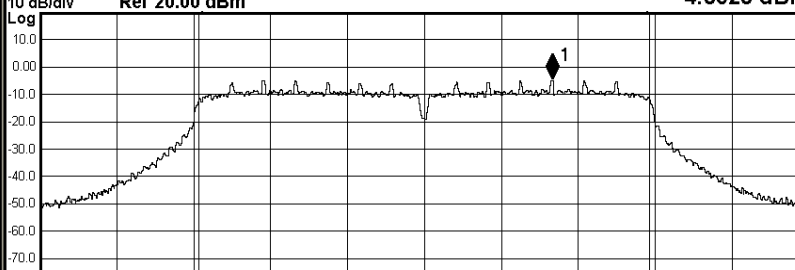
Frequency	2.43700000 GHz
Center Freq	2.43700000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/HCH

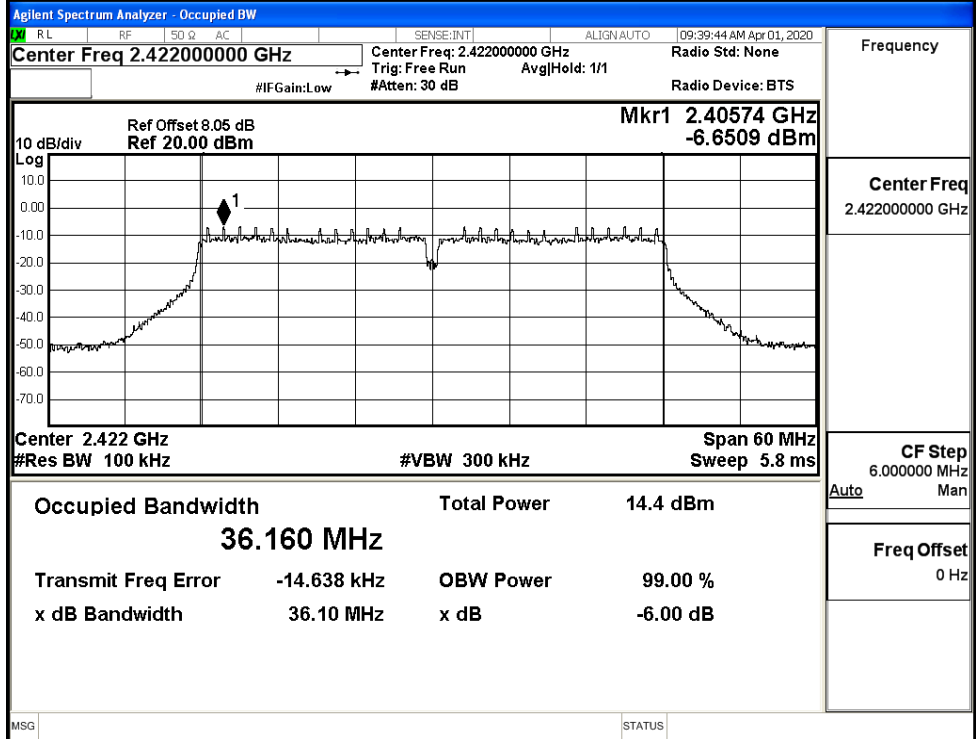


11N20SISO/LCH

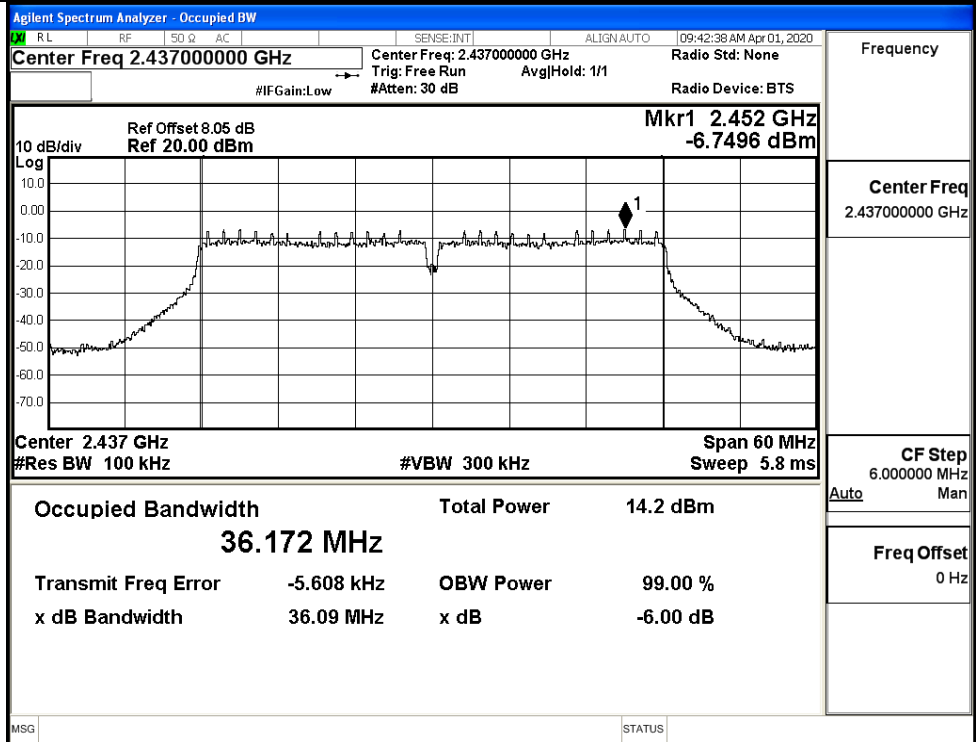


<p>11N20SISO/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF SQ Ω AC SENSE:INT ALIGN AUTO 09:34:42 AM Apr 01, 2020</p> <p>Center Freq 2.43700000 GHz Center Freq: 2.43700000 GHz Radio Std: None Trig: Free Run Avg Hold: >1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <p>10 dB/div Ref Offset 8.05 dB Mkr1 2.43076 GHz Ref 20.00 dBm -5.2910 dBm</p>  <p>Center 2.437 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.578 MHz Total Power 12.7 dBm</p> <p>Transmit Freq Error -13.313 kHz OBW Power 99.00 % x dB Bandwidth 17.15 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.43700000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
<p>11N20SISO/HCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF SQ Ω AC SENSE:INT ALIGN AUTO 09:37:10 AM Apr 01, 2020</p> <p>Center Freq 2.46200000 GHz Center Freq: 2.46200000 GHz Radio Std: None Trig: Free Run Avg Hold: 1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <p>10 dB/div Ref Offset 8.05 dB Mkr1 2.46698 GHz Ref 20.00 dBm -4.8528 dBm</p>  <p>Center 2.462 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.569 MHz Total Power 13.0 dBm</p> <p>Transmit Freq Error -2.813 kHz OBW Power 99.00 % x dB Bandwidth 17.07 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.46200000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

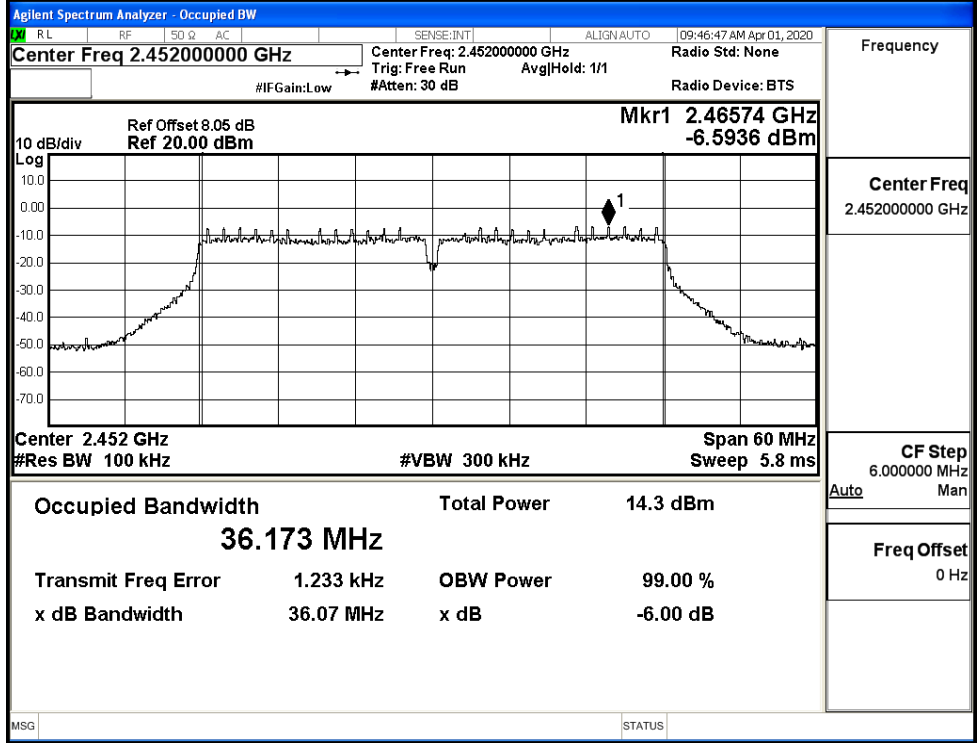
11N40SISO/LCH



11N40SISO/MCH

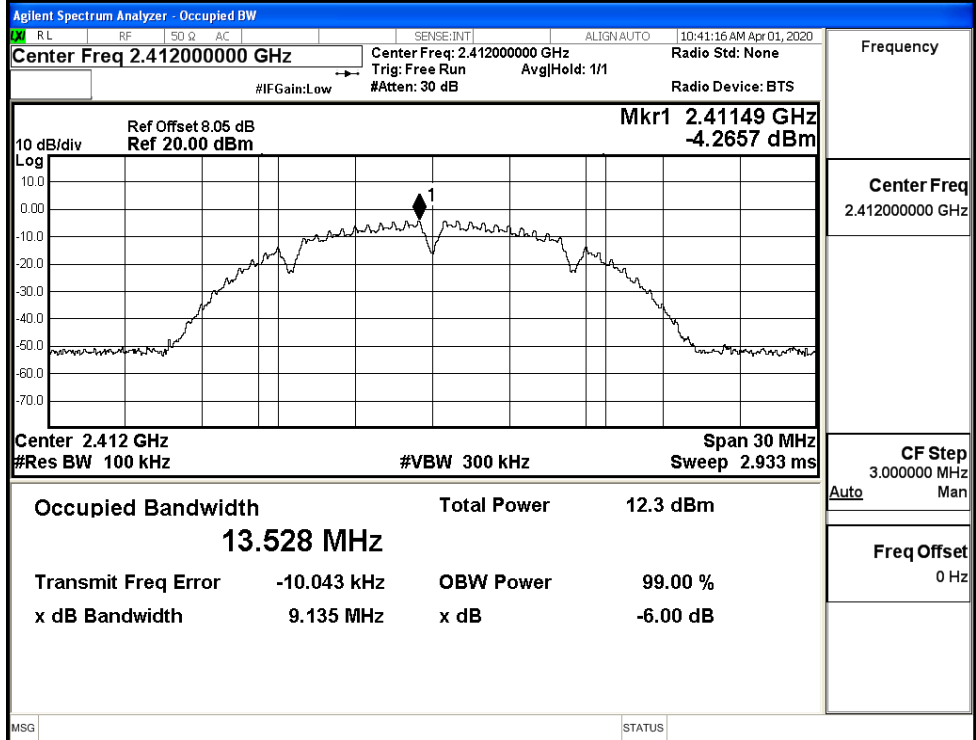


11N40SISO/HCH



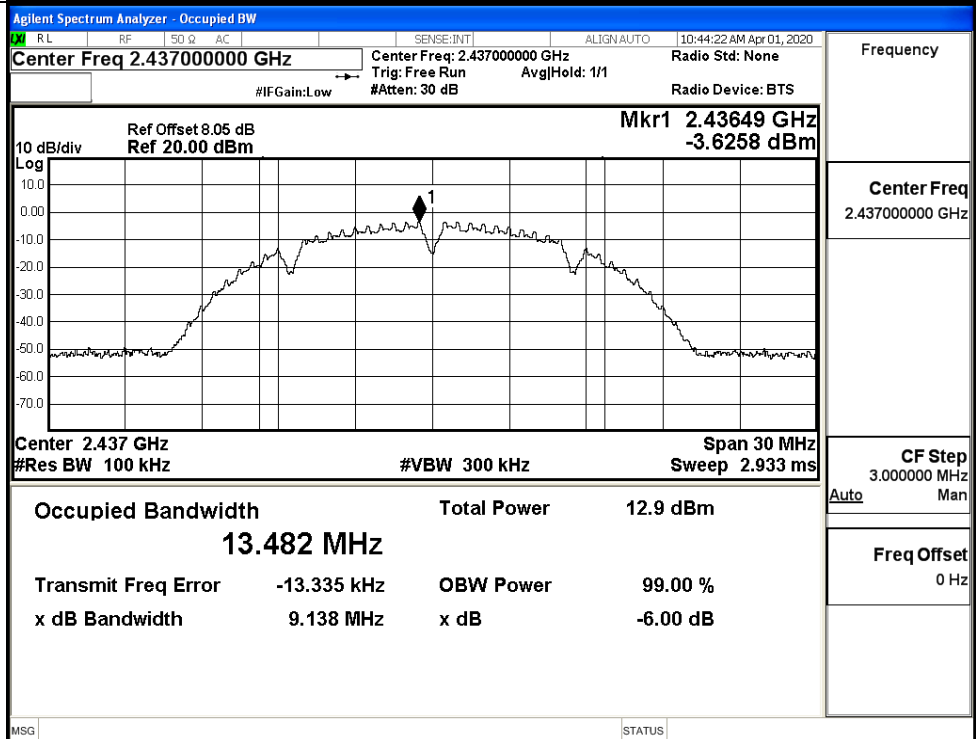
Test Graphs_Ant_1

11B/LCH



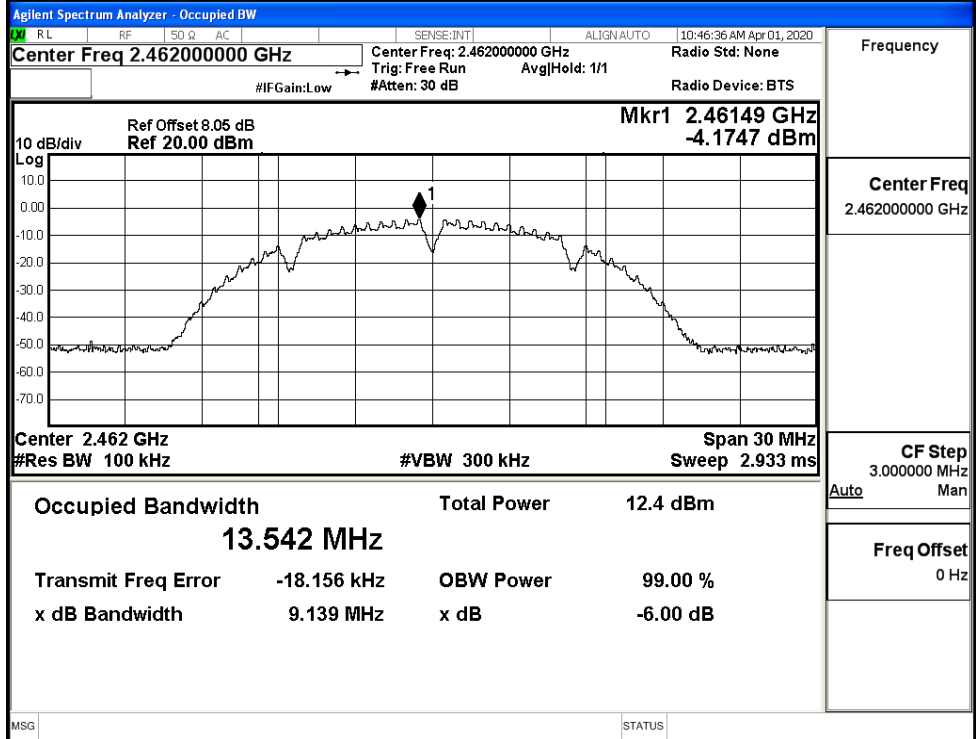
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Center Freq	2.41200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11B/MCH



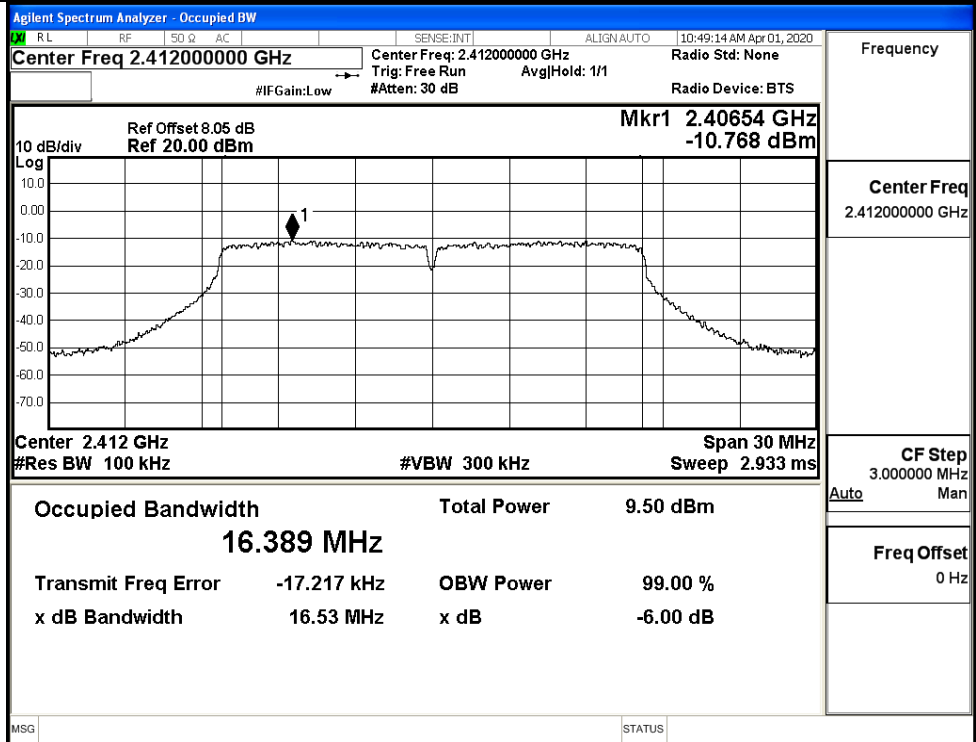
Frequency	2.43700000 GHz
Center Freq	2.43700000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11B/HCH



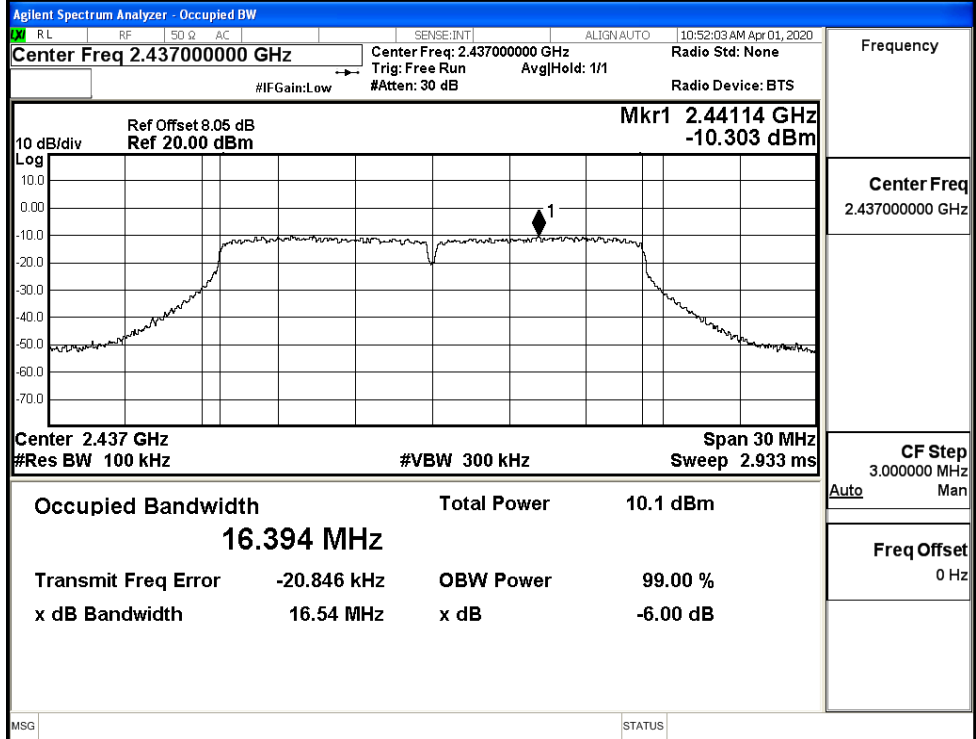
Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/LCH

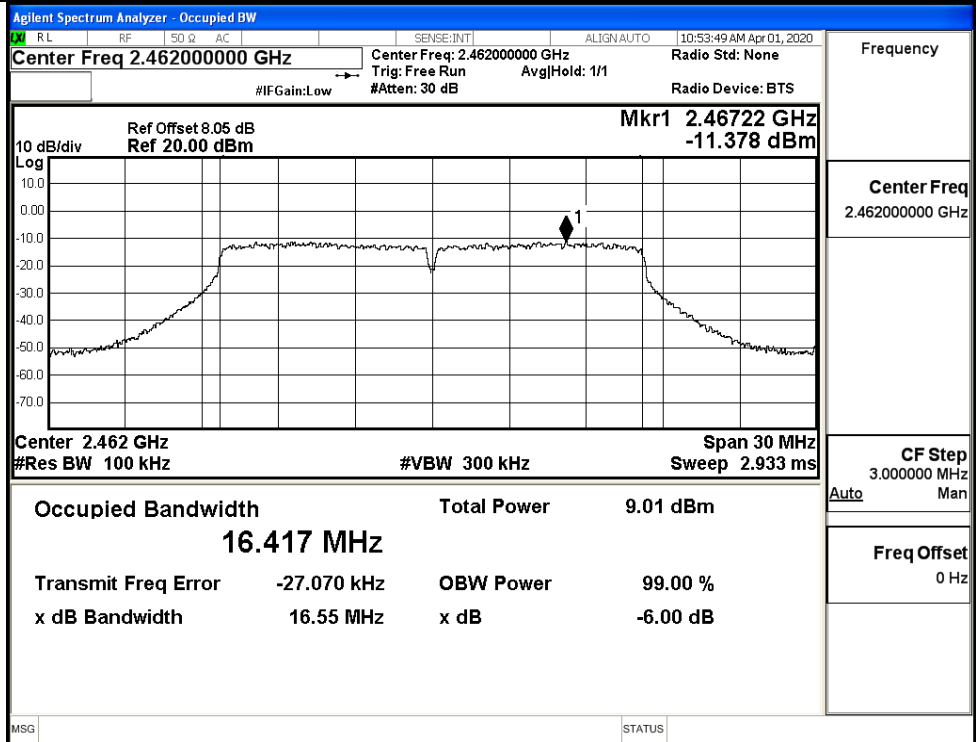


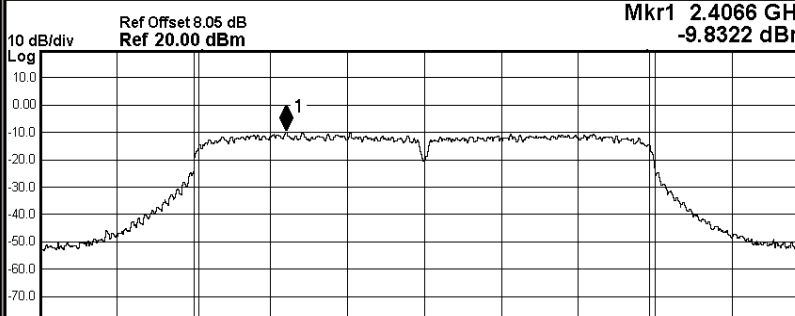
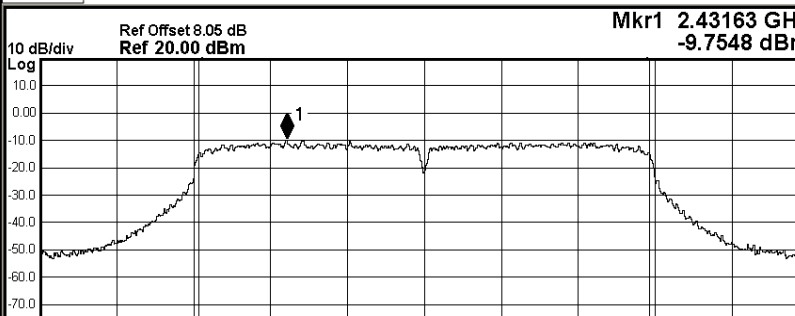
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Center Freq	2.41200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/MCH

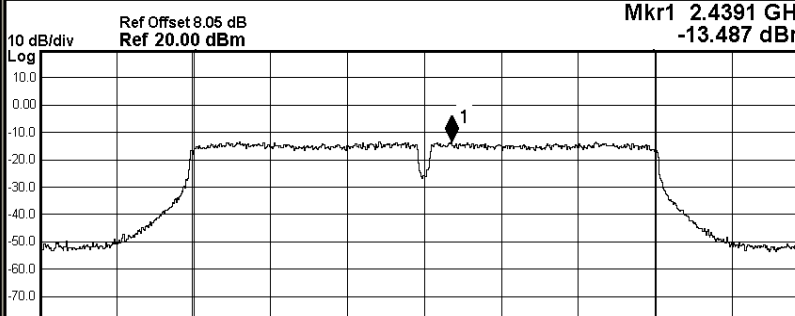
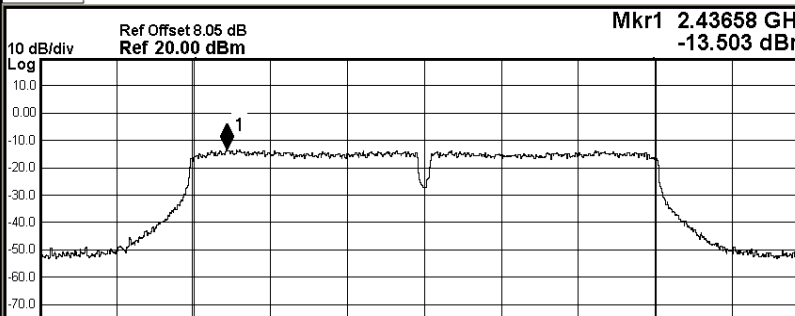


11G/HCH



<p>11N20SISO/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF 50 Ω AC SENSE:INT ALIGN AUTO 10:56:25 AM Apr 01, 2020</p> <p>Center Freq 2.41200000 GHz Center Freq: 2.41200000 GHz Radio Std: None Trig: Free Run AvgHold: 1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS</p>  <p>10 dB/div Ref Offset 8.05 dB Mkr1 2.4066 GHz Ref 20.00 dBm -9.8322 dBm</p> <p>Center 2.412 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.933 ms</p> <p>Occupied Bandwidth Total Power 10.0 dBm 17.559 MHz</p> <p>Transmit Freq Error -6.643 kHz OBW Power 99.00 % x dB Bandwidth 17.64 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.41200000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
<p>11N20SISO/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF 50 Ω AC SENSE:INT ALIGN AUTO 10:58:57 AM Apr 01, 2020</p> <p>Center Freq 2.43700000 GHz Center Freq: 2.43700000 GHz Radio Std: None Trig: Free Run AvgHold: 1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS</p>  <p>10 dB/div Ref Offset 8.05 dB Mkr1 2.43163 GHz Ref 20.00 dBm -9.7548 dBm</p> <p>Center 2.437 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.933 ms</p> <p>Occupied Bandwidth Total Power 9.93 dBm 17.555 MHz</p> <p>Transmit Freq Error -8.087 kHz OBW Power 99.00 % x dB Bandwidth 17.64 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.43700000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

<p>11N20SISO/HCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF 50 Ω AC SENSE:INT ALIGN AUTO 11:02:55 AM Apr 01, 2020</p> <p>Center Freq 2.46200000 GHz Center Freq: 2.462000000 GHz Radio Std: None Trig: Free Run AvgHold: 1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <p>10 dB/div Ref Offset 8.05 dB Mkr1 2.4566 GHz Ref 20.00 dBm -10.560 dBm</p> <p>Center 2.462 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.933 ms</p> <p>Occupied Bandwidth Total Power 9.37 dBm 17.565 MHz</p> <p>Transmit Freq Error -14.874 kHz OBW Power 99.00 % x dB Bandwidth 17.66 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.46200000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>
<p>11N40SISO/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF 50 Ω AC SENSE:INT ALIGN AUTO 11:05:35 AM Apr 01, 2020</p> <p>Center Freq 2.42200000 GHz Center Freq: 2.422000000 GHz Radio Std: None Trig: Free Run AvgHold: 1/1 #IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <p>10 dB/div Ref Offset 8.05 dB Mkr1 2.43538 GHz Ref 20.00 dBm -13.122 dBm</p> <p>Center 2.422 GHz Span 60 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 5.8 ms</p> <p>Occupied Bandwidth Total Power 10.5 dBm 36.147 MHz</p> <p>Transmit Freq Error -6.711 kHz OBW Power 99.00 % x dB Bandwidth 36.52 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.42200000 GHz</p> <p>CF Step 6.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

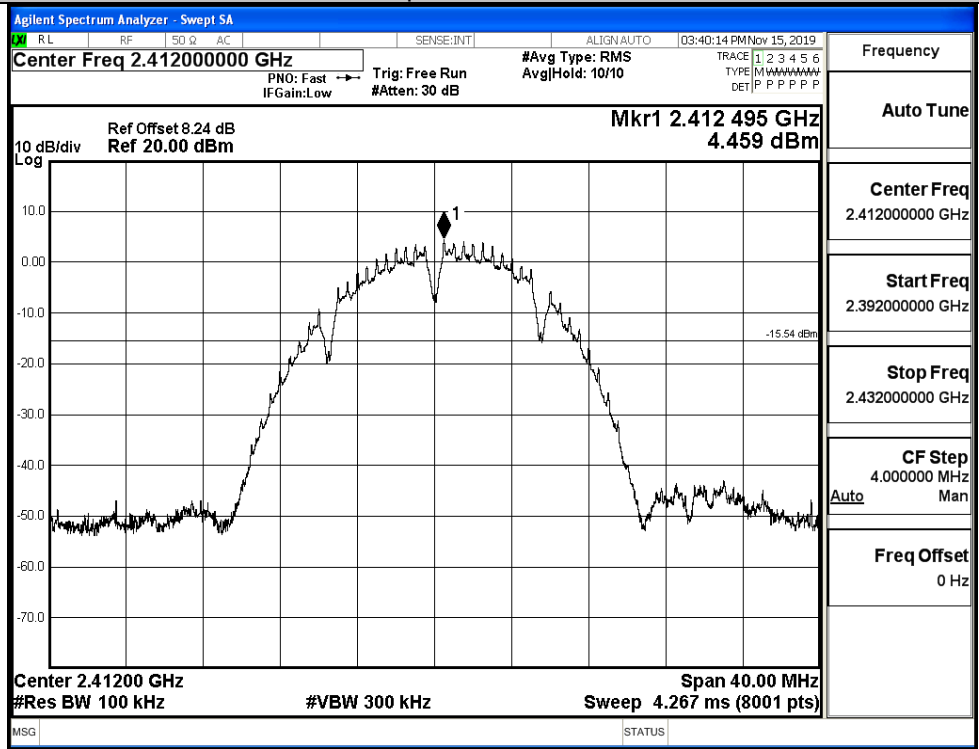
<p>11N40SISO/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.43700000 GHz</p> <p>Mkr1 2.4391 GHz -13.487 dBm</p>  <p>Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 60 MHz Sweep 5.8 ms</p> <p>Occupied Bandwidth 36.135 MHz Total Power 10.3 dBm</p> <p>Transmit Freq Error -15.900 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 36.54 MHz x dB -6.00 dB</p>	<p>Frequency</p> <p>Center Freq 2.43700000 GHz</p> <p>CF Step 6.000000 MHz</p> <p>Freq Offset 0 Hz</p>
<p>11N40SISO/HCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.45200000 GHz</p> <p>Mkr1 2.43658 GHz -13.503 dBm</p>  <p>Center 2.452 GHz #Res BW 100 kHz #VBW 300 kHz Span 60 MHz Sweep 5.8 ms</p> <p>Occupied Bandwidth 36.157 MHz Total Power 10.1 dBm</p> <p>Transmit Freq Error -22.731 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 36.54 MHz x dB -6.00 dB</p>	<p>Frequency</p> <p>Center Freq 2.45200000 GHz</p> <p>CF Step 6.000000 MHz</p> <p>Freq Offset 0 Hz</p>

C.5 RF Conducted Spurious Emissions**Ant_0**

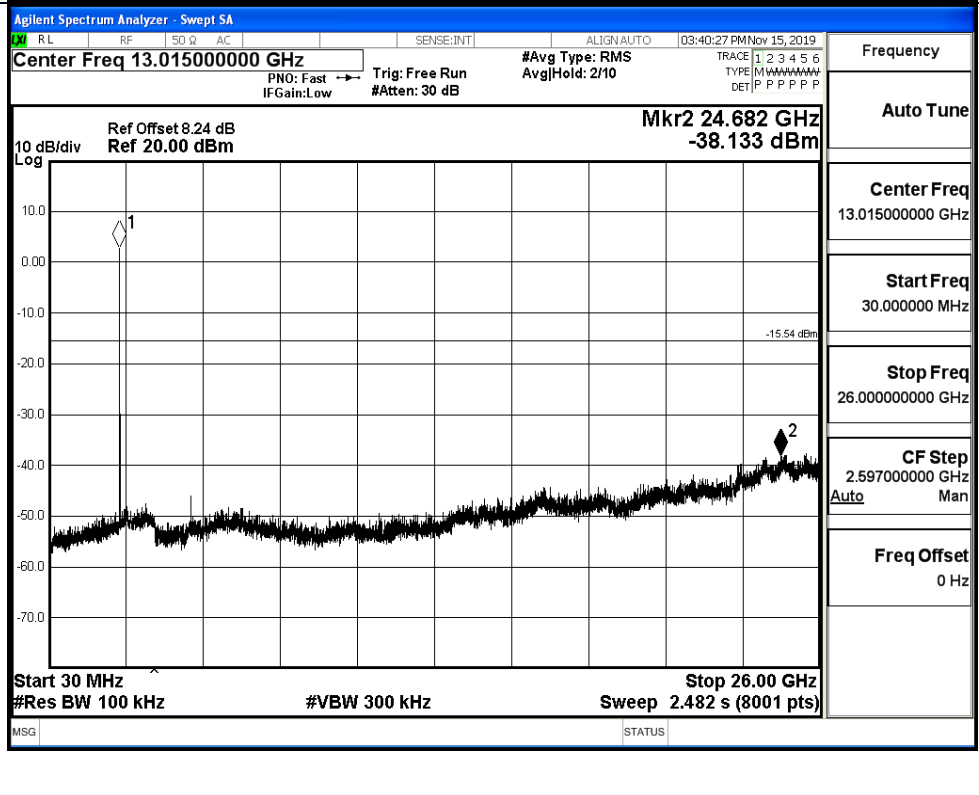
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	-0.599	-37.769	-20.599	PASS
	MCH	-0.713	-36.369	-20.713	PASS
	HCH	-0.792	-37.933	-20.792	PASS
11G	LCH	-5.802	-38.036	-25.802	PASS
	MCH	-5.76	-37.855	-25.760	PASS
	HCH	-5.614	-37.563	-25.614	PASS
11N20	LCH	-5.127	-38.232	-25.127	PASS
	MCH	-5.395	-37.957	-25.395	PASS
	HCH	-5.123	-37.371	-25.123	PASS
11N40	LCH	-6.942	-37.491	-26.942	PASS
	MCH	-6.999	-36.962	-26.999	PASS
	HCH	-6.637	-37.421	-26.637	PASS

11B_LCH_Graphs_Ant_0

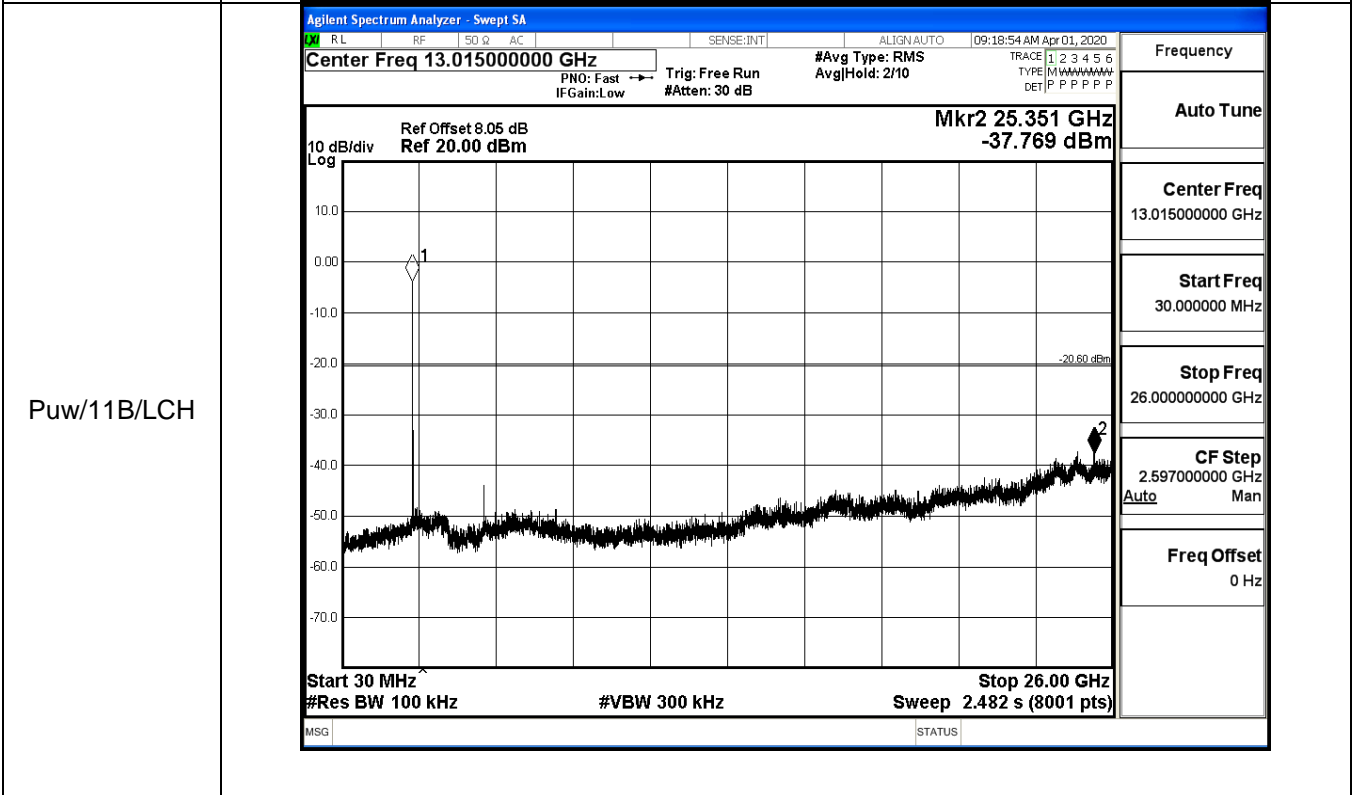
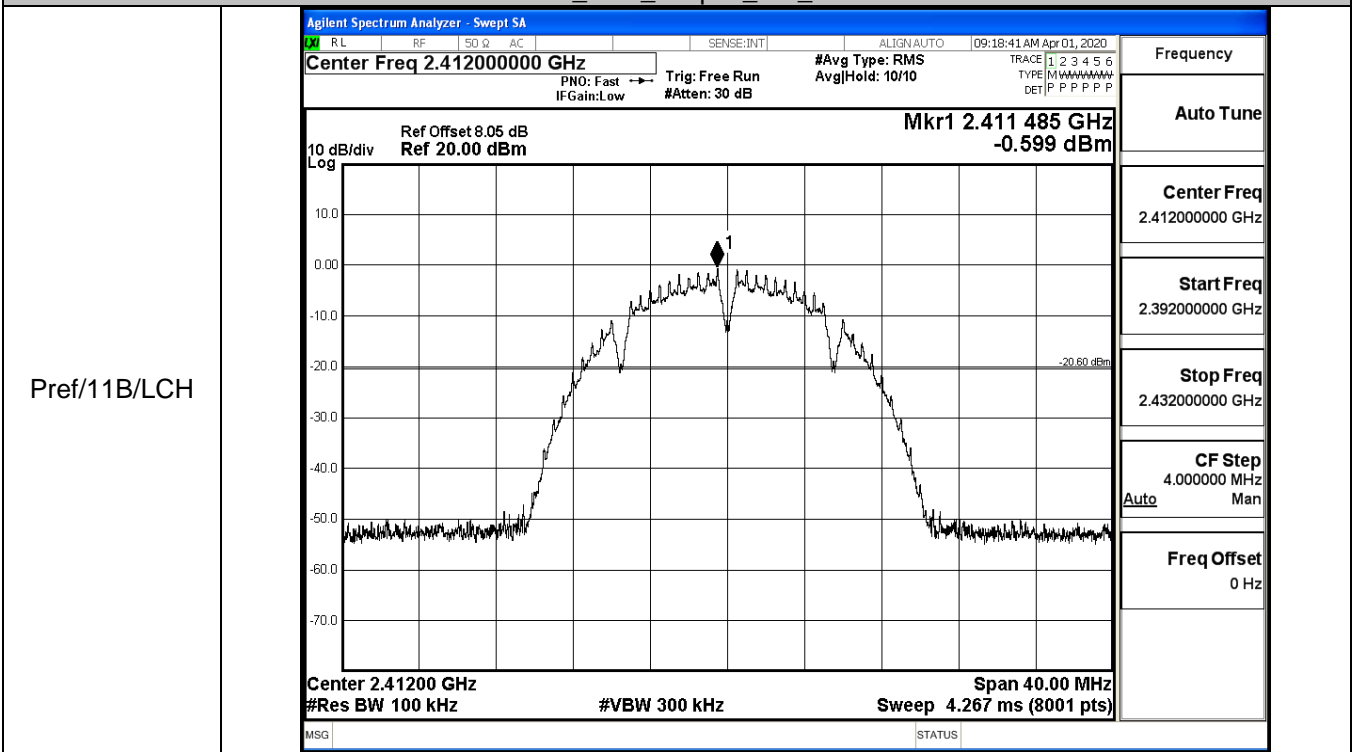
Pref/11B/LCH



Puw/11B/LCH

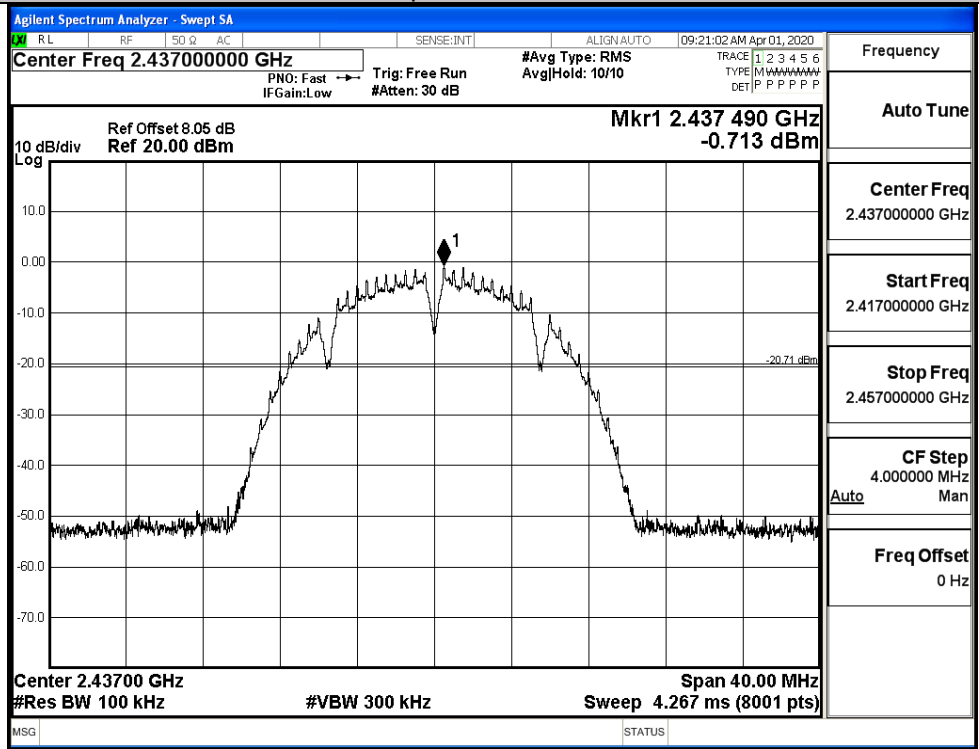


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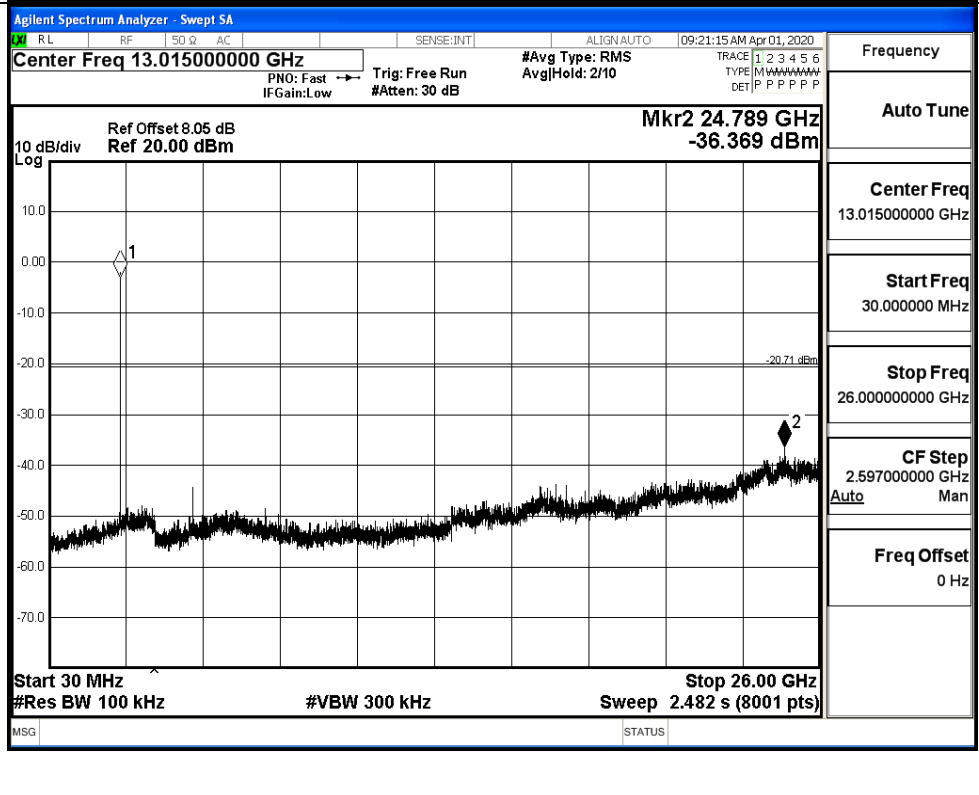


11B_MCH_Graphs_Ant_0

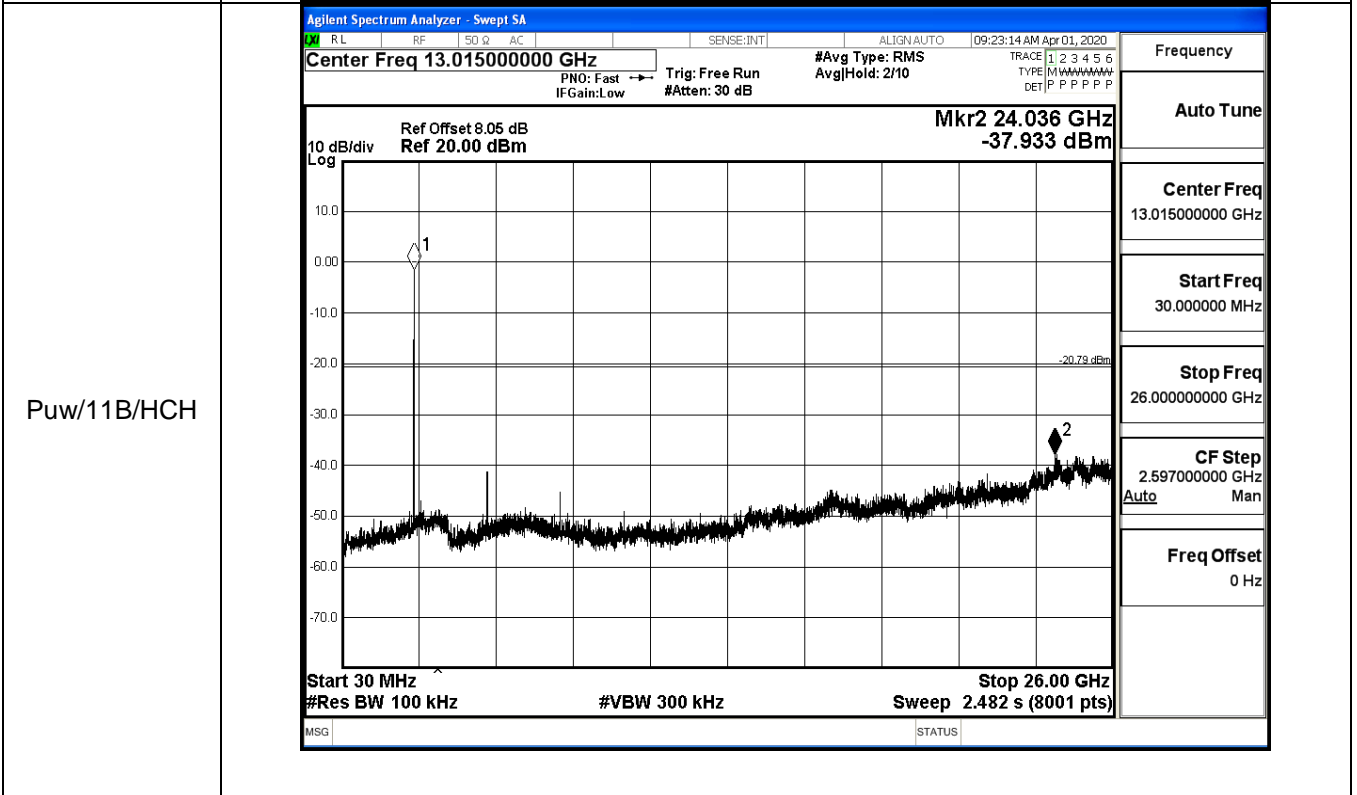
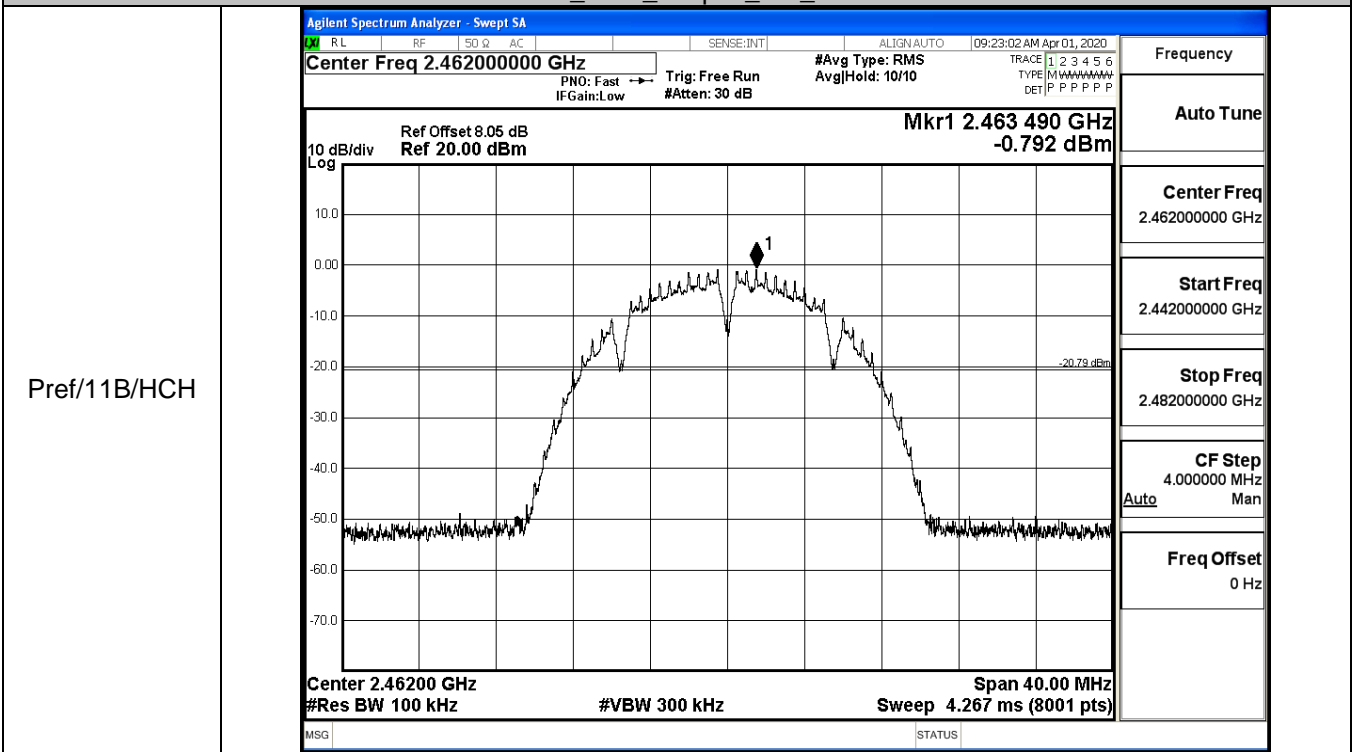
Pref/11B/MCH



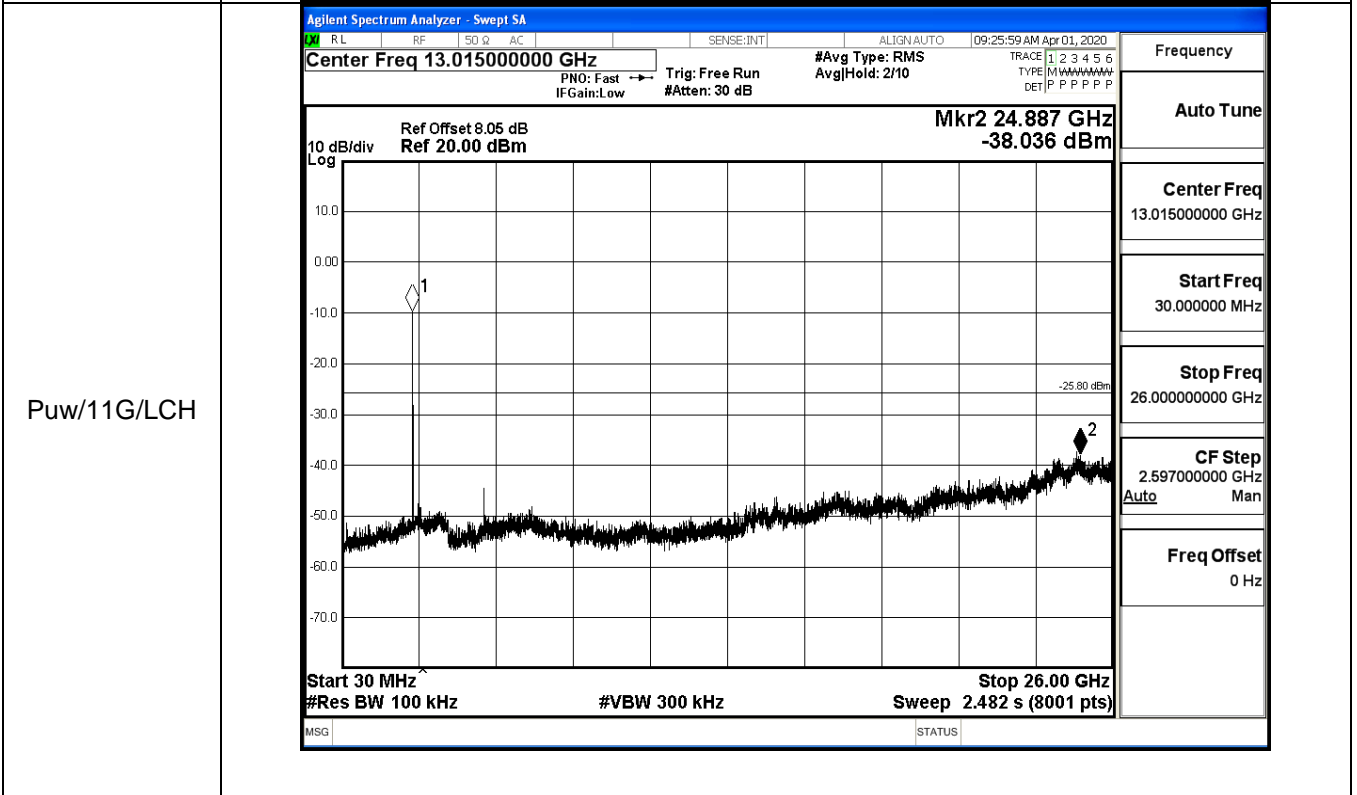
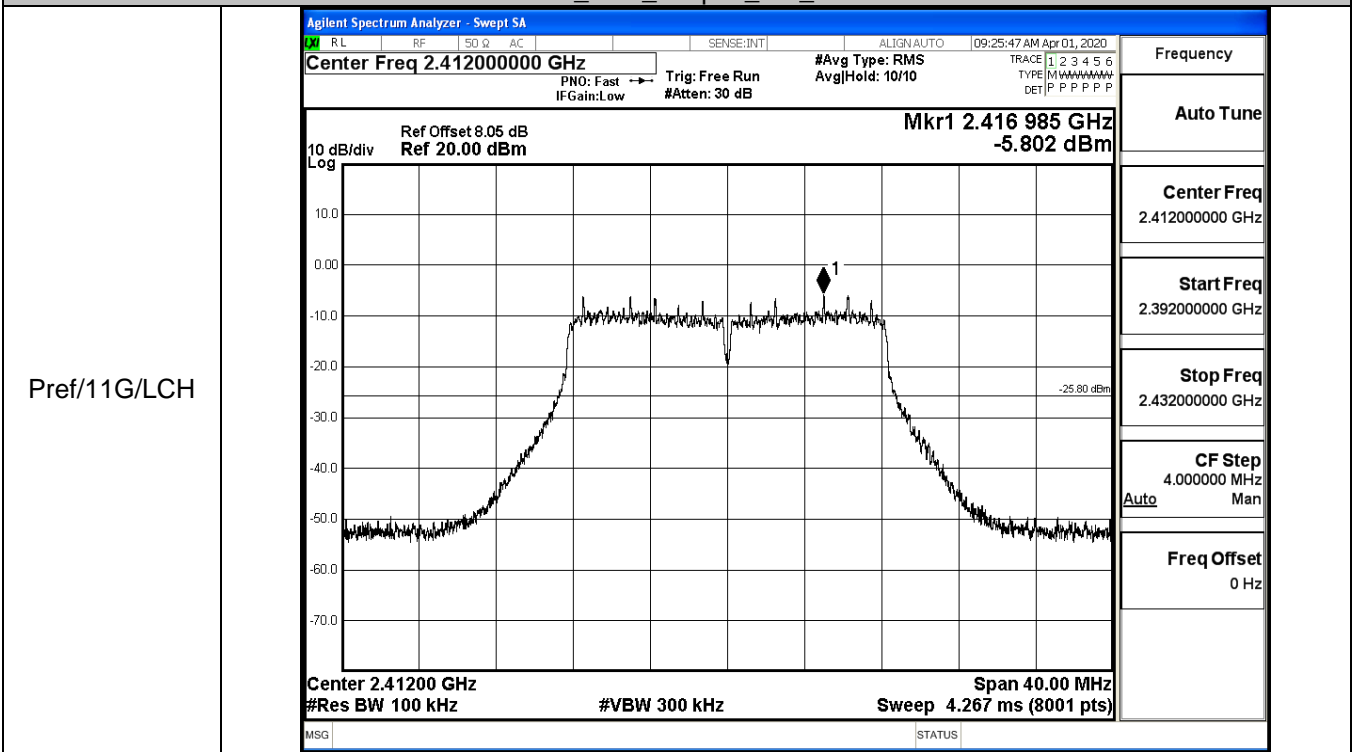
Puw/11B/MCH



11B_HCH_Graphs_Ant_0

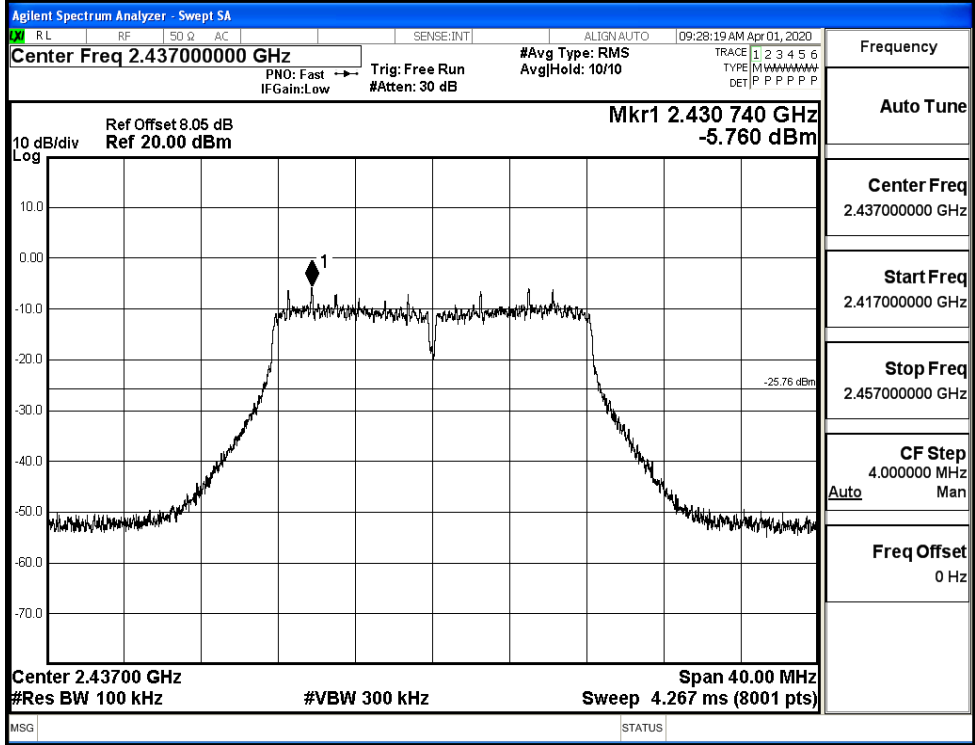


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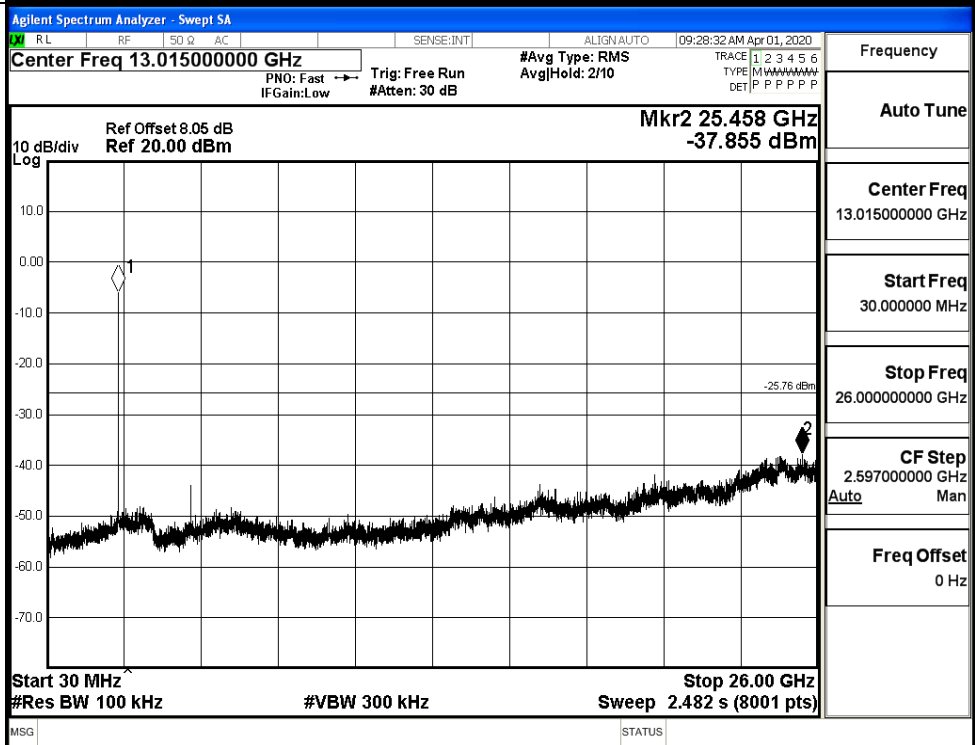


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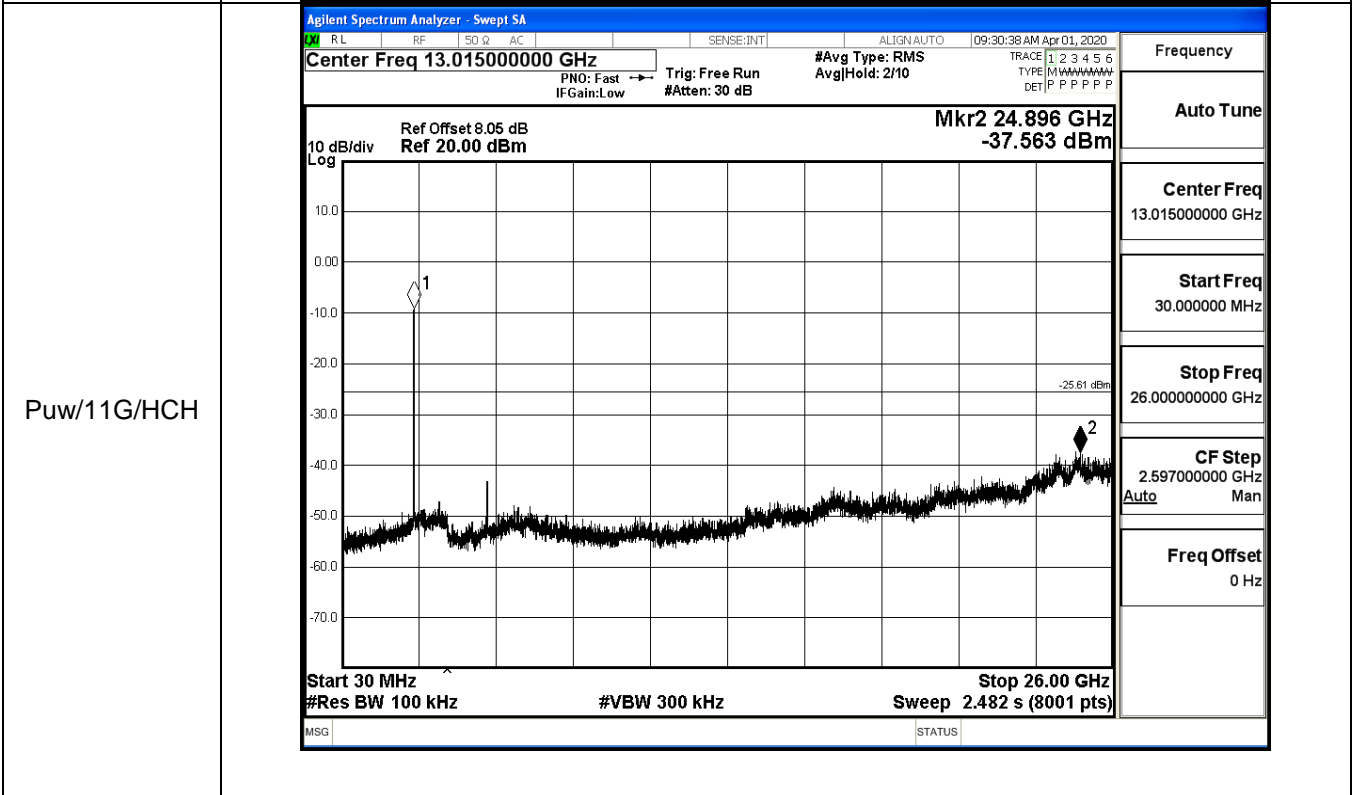
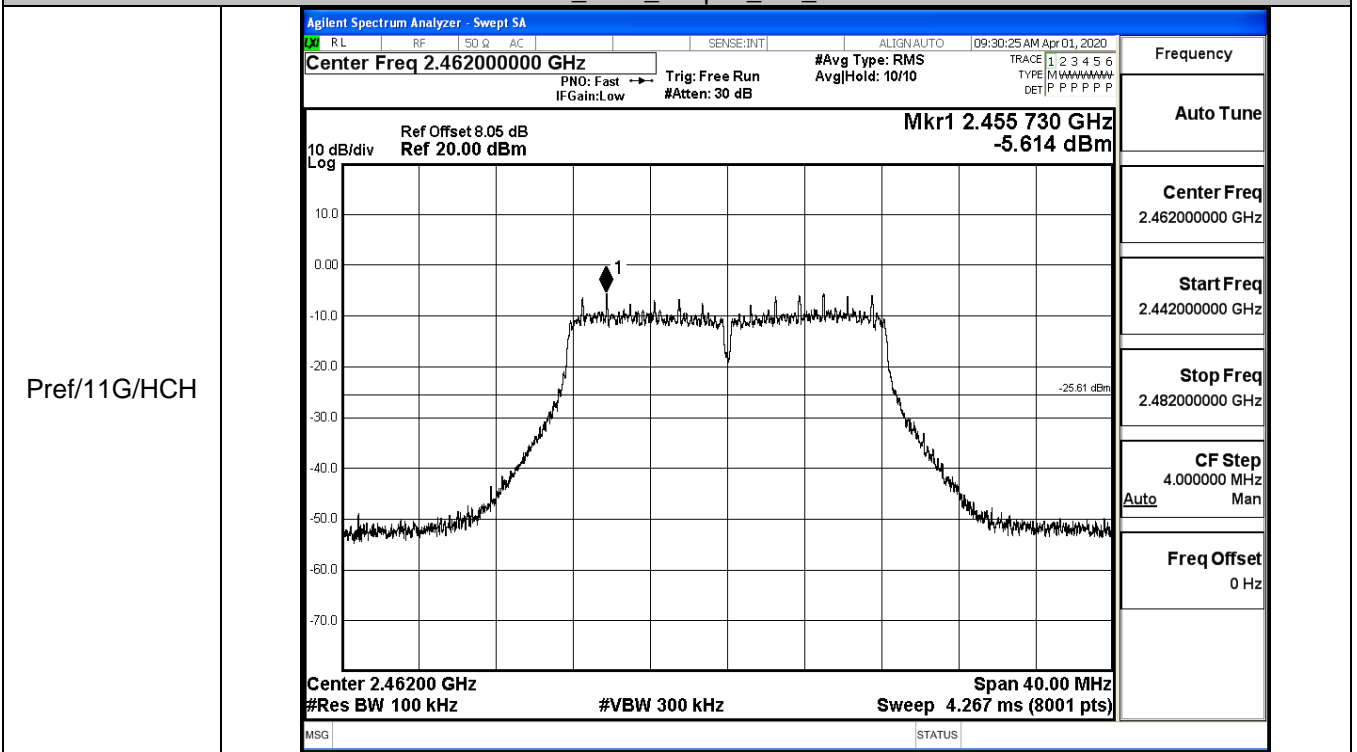
Pref/11G/MCH



Puw/11G/MCH

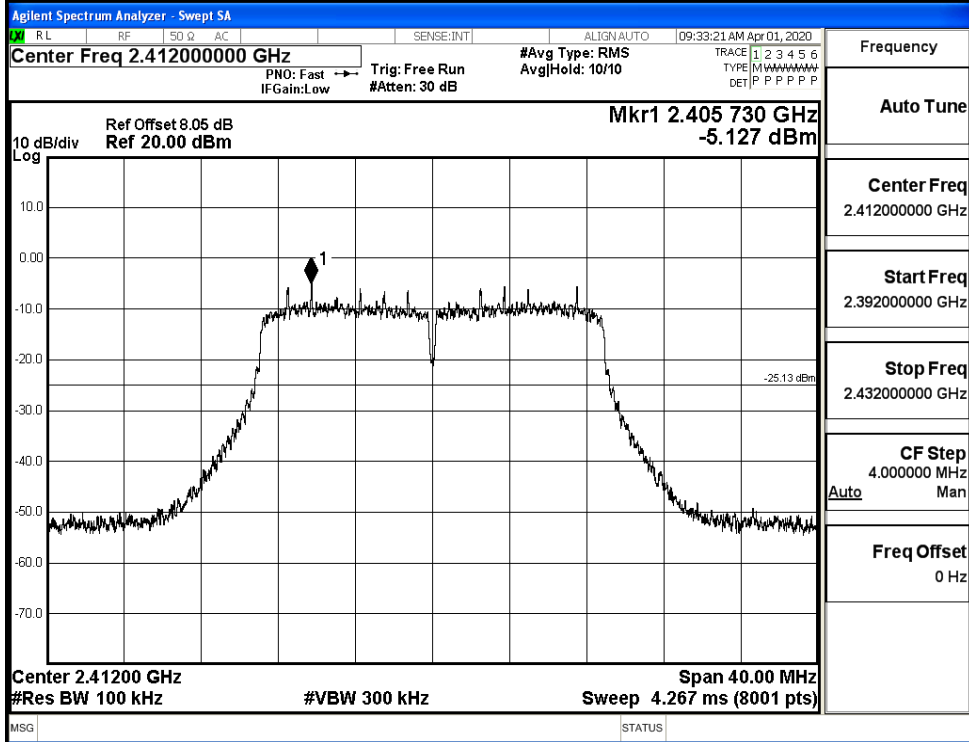


11G_HCH_Graphs_Ant_0



11N20SISO_LCH_Graphs_Ant_0

Pref/11N20SIS
O/LCH



Puw/11N20
SISO/LCH

