

Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: IPTV Receiver

Trade Mark: FORMULER

Test Model: Z ALPHA

Environmental Conditions

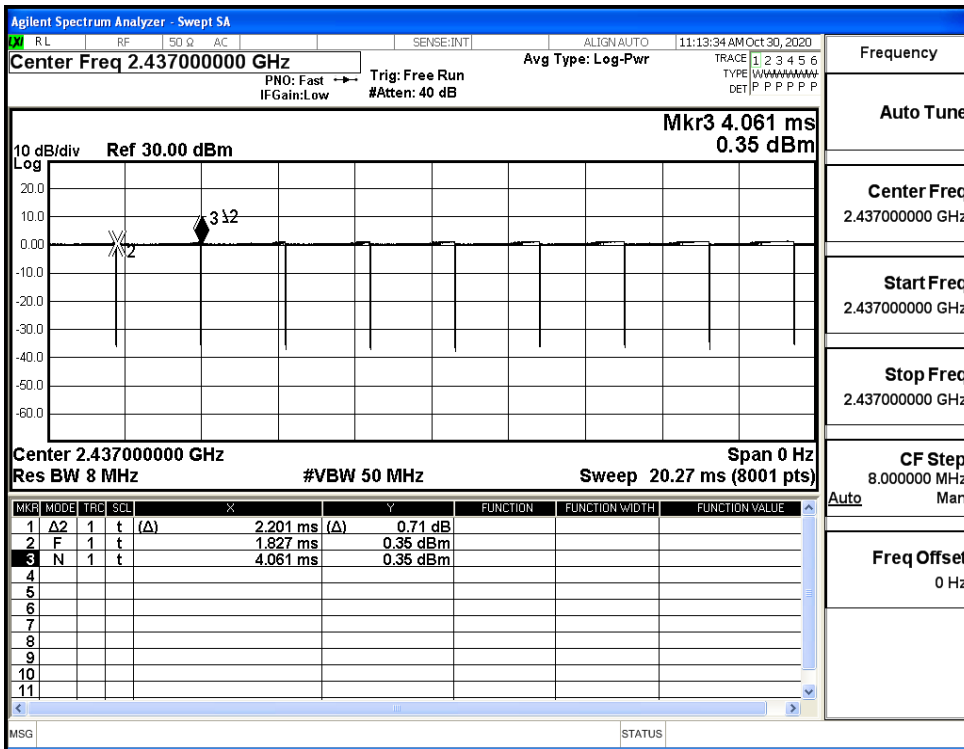
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Ken He
Supervised by:	Li Huan

C.1 Duty Cycle

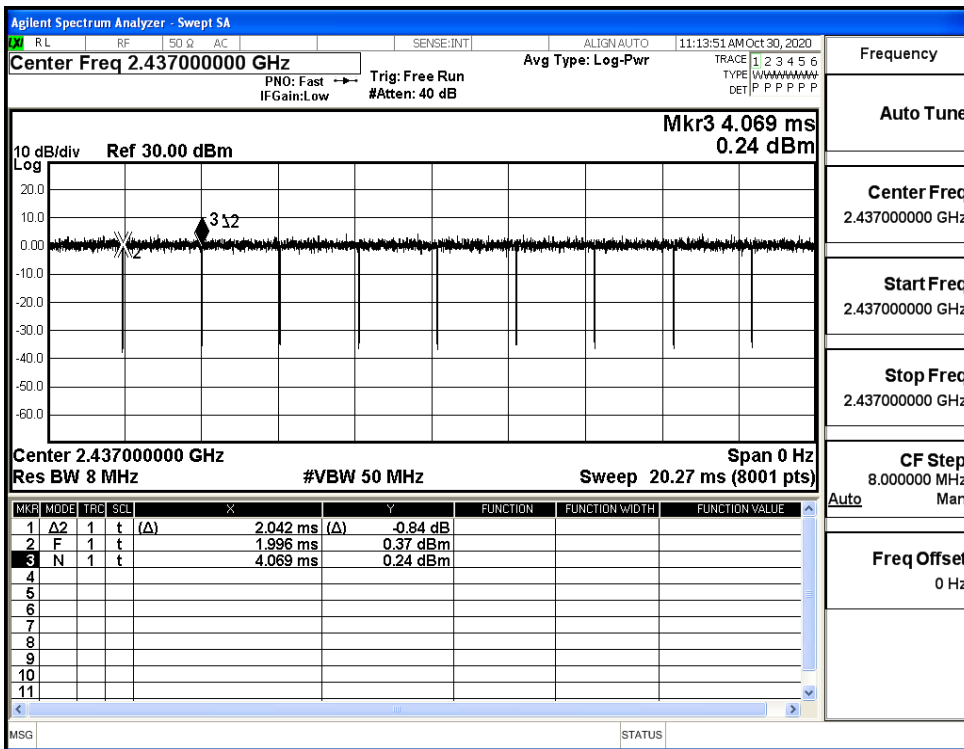
ANT 0

Test Mode	Test Channel	Ant	Duty Cycle[%]	10log(1/x) Factor (dB)	1/B Minimum VBW(KHz)
11B	2437	Ant0	98.53	0.06	0.01
11G	2437	Ant0	98.53	0.06	0.01
11N20SISO	2437	Ant0	98.43	0.07	0.01
11N40SISO	2437	Ant0	96.58	0.15	0.01

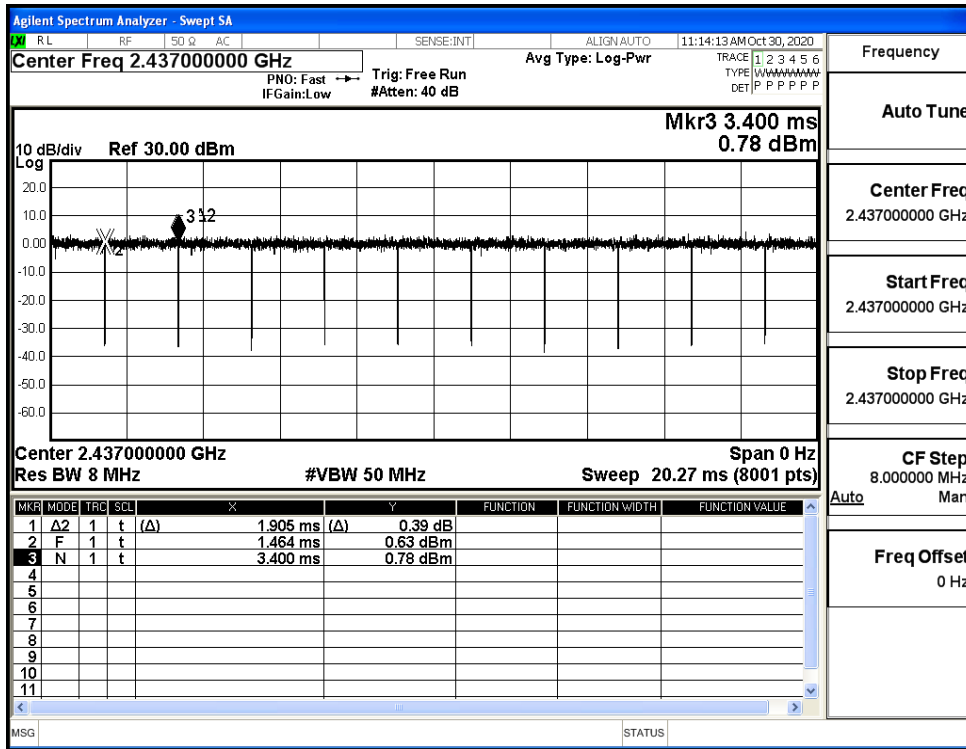
Duty Cycle_11B_2437_Ant0



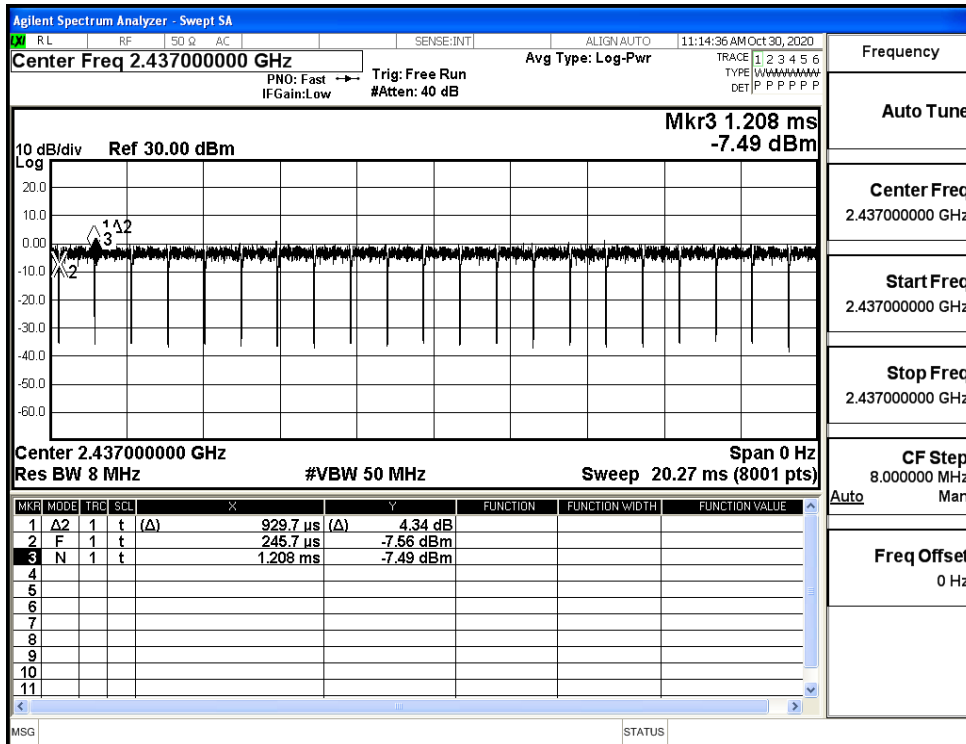
Duty Cycle_11G_2437_Ant0



Duty Cycle_11N20SISO_2437_Ant0



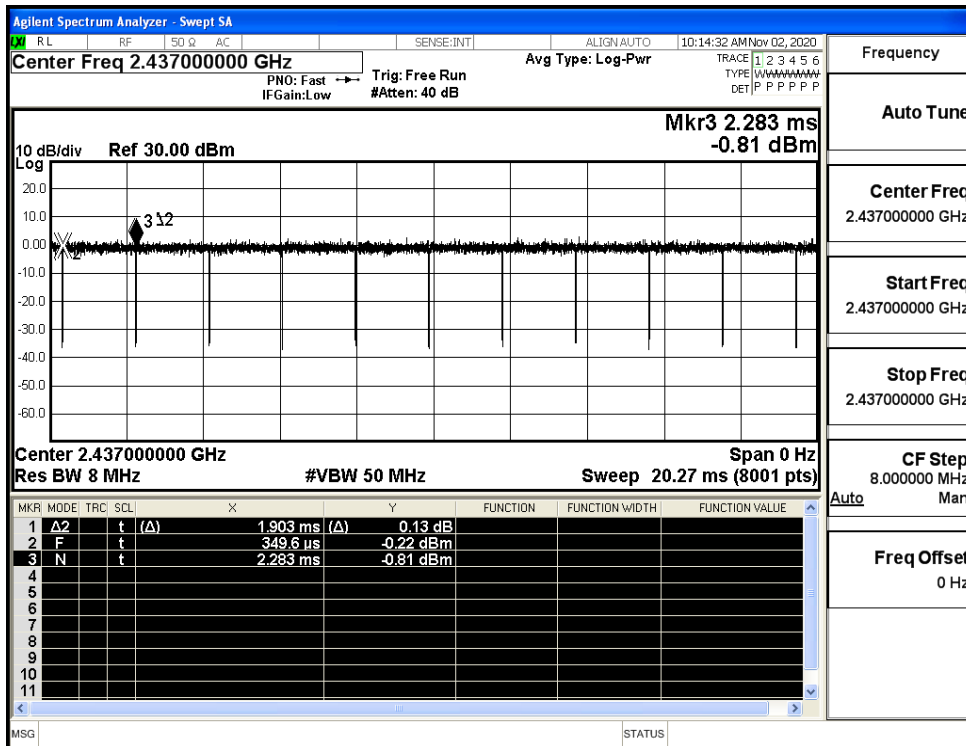
Duty Cycle_11N40SISO_2437_Ant0



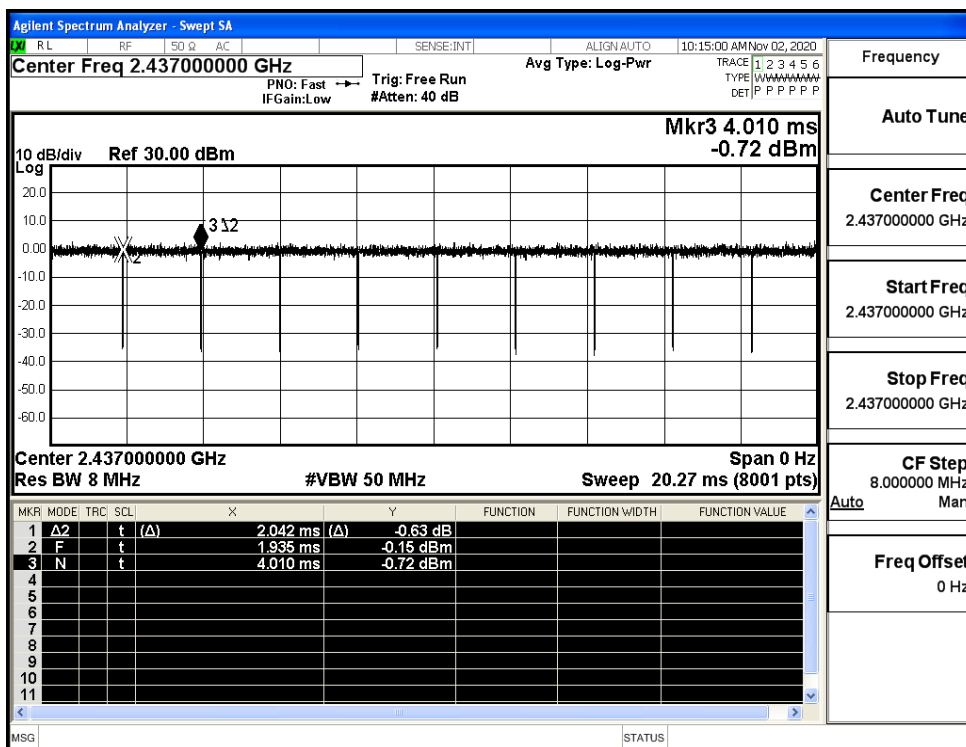
ANT 1

Test Mode	Test Channel	Ant	Duty Cycle[%]	10log(1/x) Factor (dB)	1/B Minimum VBW(KHz)
11B	2437	Ant0	98.43	0.07	0.01
11G	2437	Ant0	98.41	0.07	0.01
11N20SISO	2437	Ant0	98.3	0.07	0.01
11N40SISO	2437	Ant0	96.84	0.14	0.01

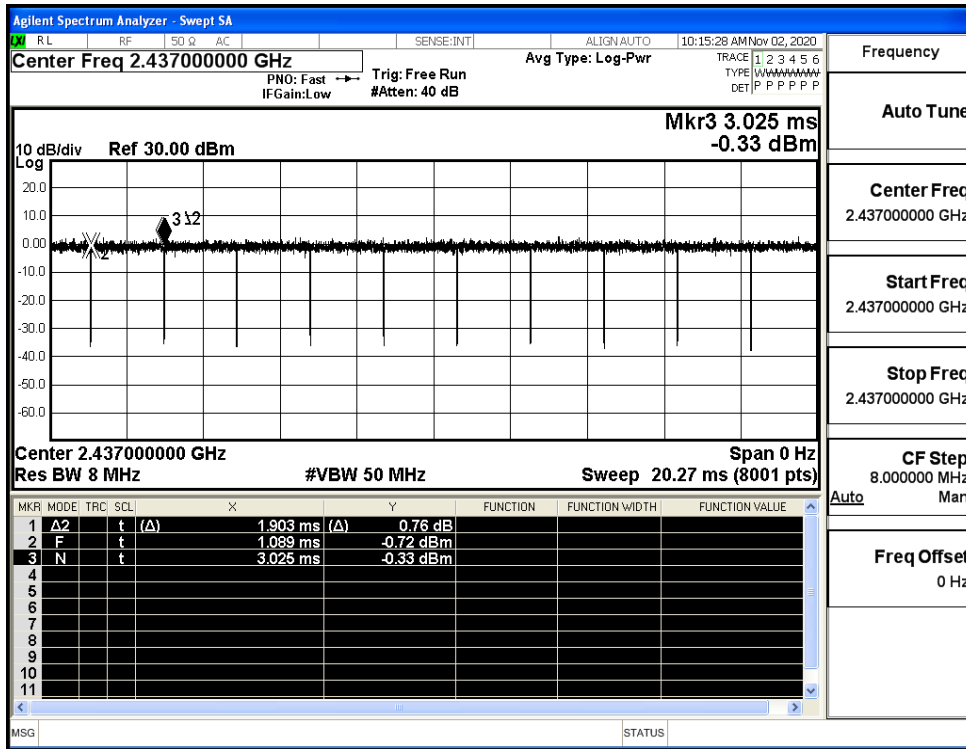
Duty Cycle_11B_2437_Ant1



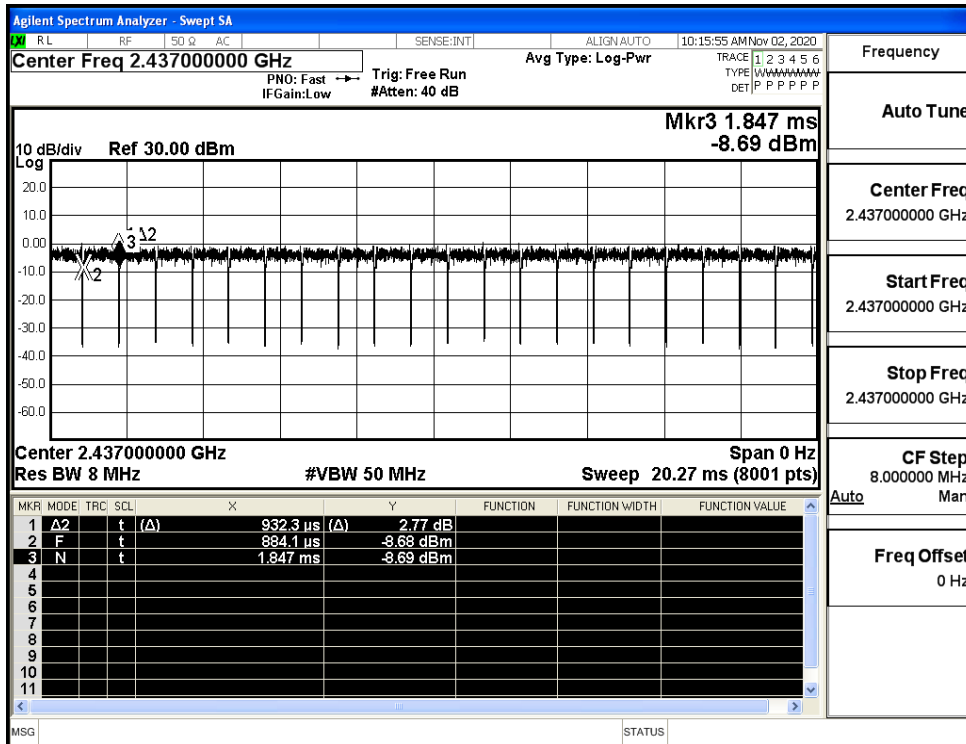
Duty Cycle_11G_2437_Ant1



Duty Cycle_11N20SISO_2437_Ant1



Duty Cycle_11N40SISO_2437_Ant1



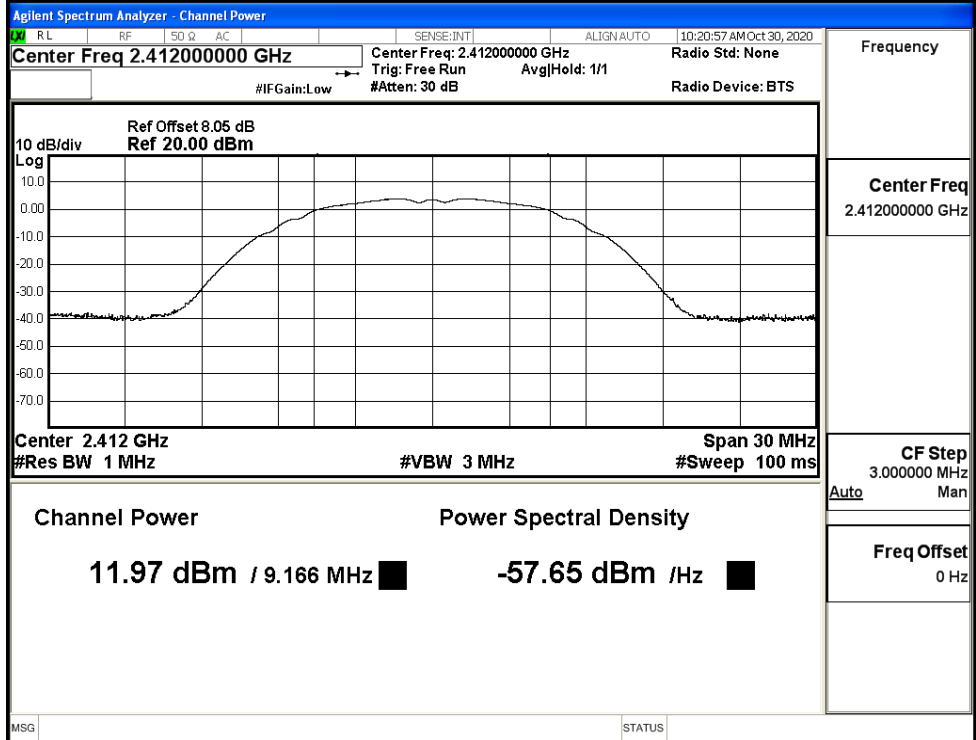
C.2 Maximum Conducted Output Power

ANT 0

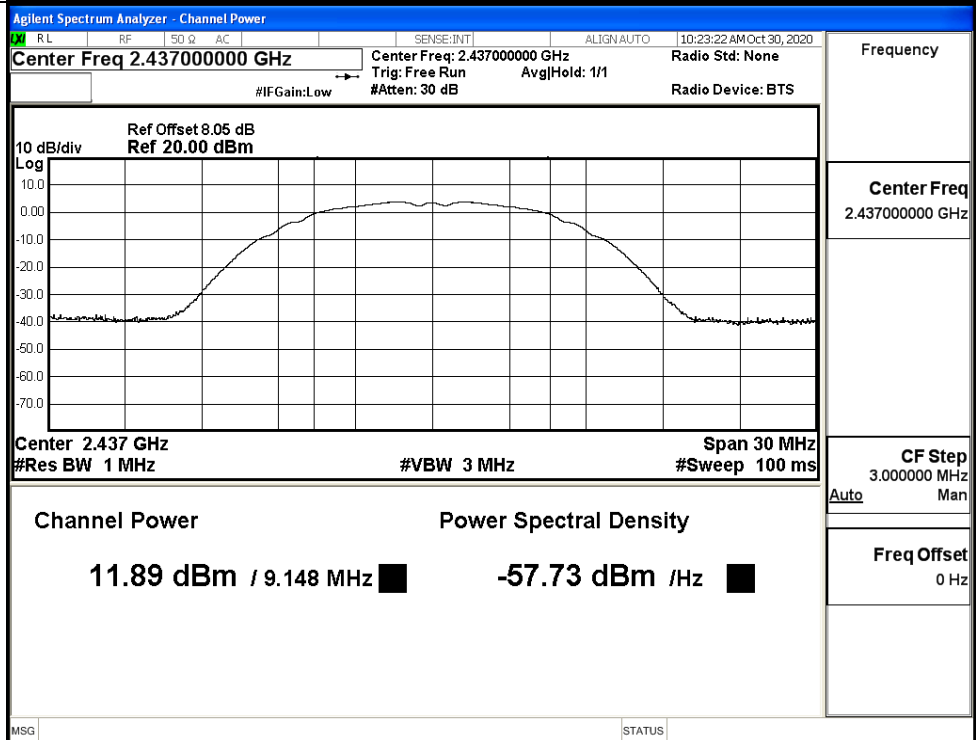
Mode	Channel	AVG Conducted Power (dBm)	Duty Cycle Factor(dB)	Report Conducted Power(dBm)	Limit [dBm]	Verdict
11B	LCH	11.97	0	11.97	30	PASS
	MCH	11.89	0	11.89	30	PASS
	HCH	12.06	0	12.06	30	PASS
11G	LCH	13.13	0	13.13	30	PASS
	MCH	13.08	0	13.08	30	PASS
	HCH	13.23	0	13.23	30	PASS
11N20SISO	LCH	12.75	0	12.75	30	PASS
	MCH	12.7	0	12.7	30	PASS
	HCH	13.25	0	13.25	30	PASS
11N40SISO	LCH	13.48	0.15	13.63	30	PASS
	MCH	13.75	0.15	13.90	30	PASS
	HCH	13.55	0.15	13.70	30	PASS

Test Graphs

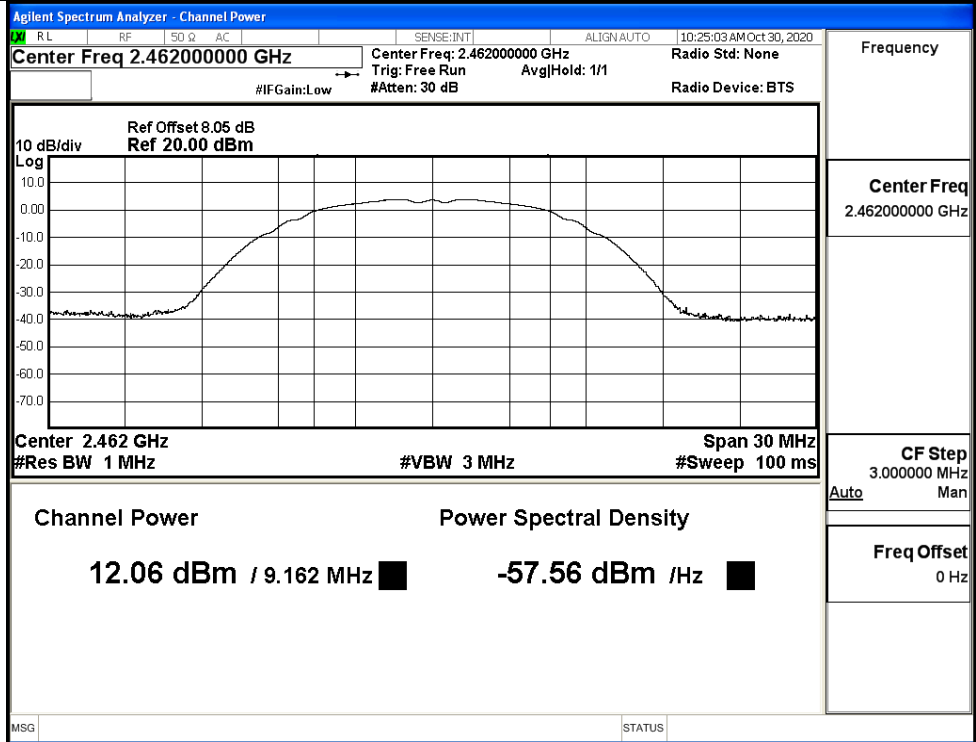
11B/LCH



11B/MCH

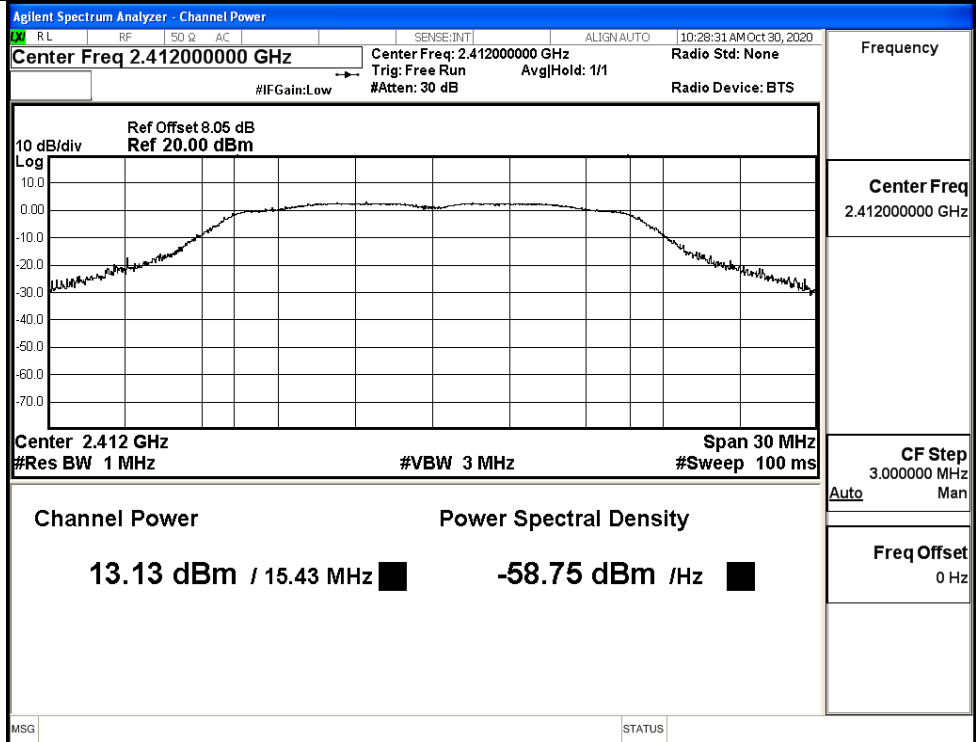


11B/HCH



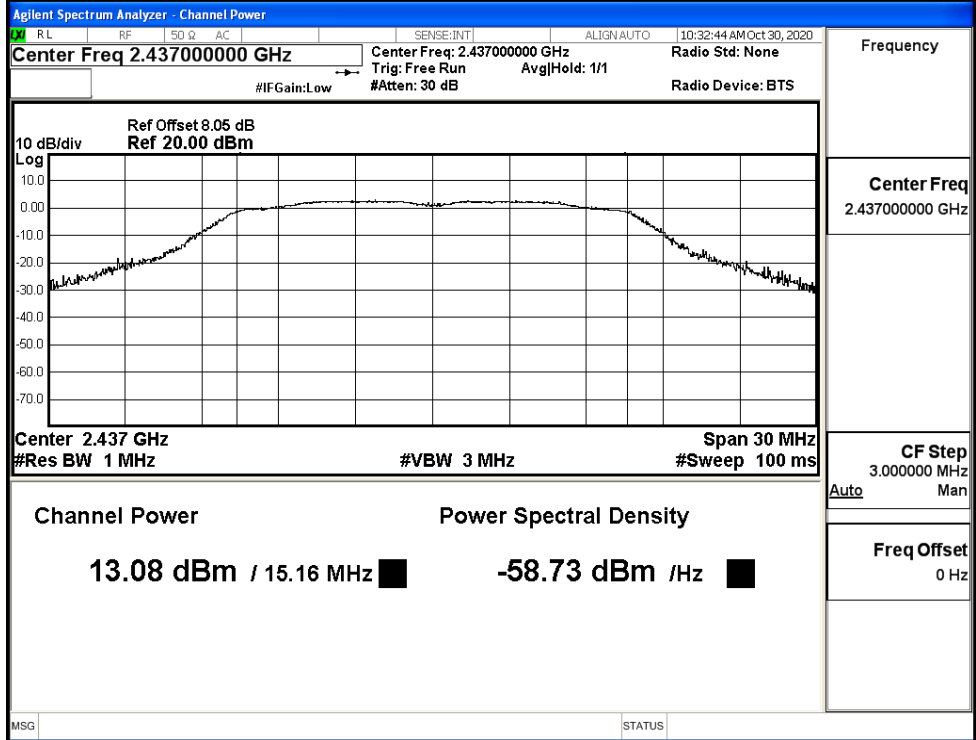
Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/LCH



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

11G/MCH

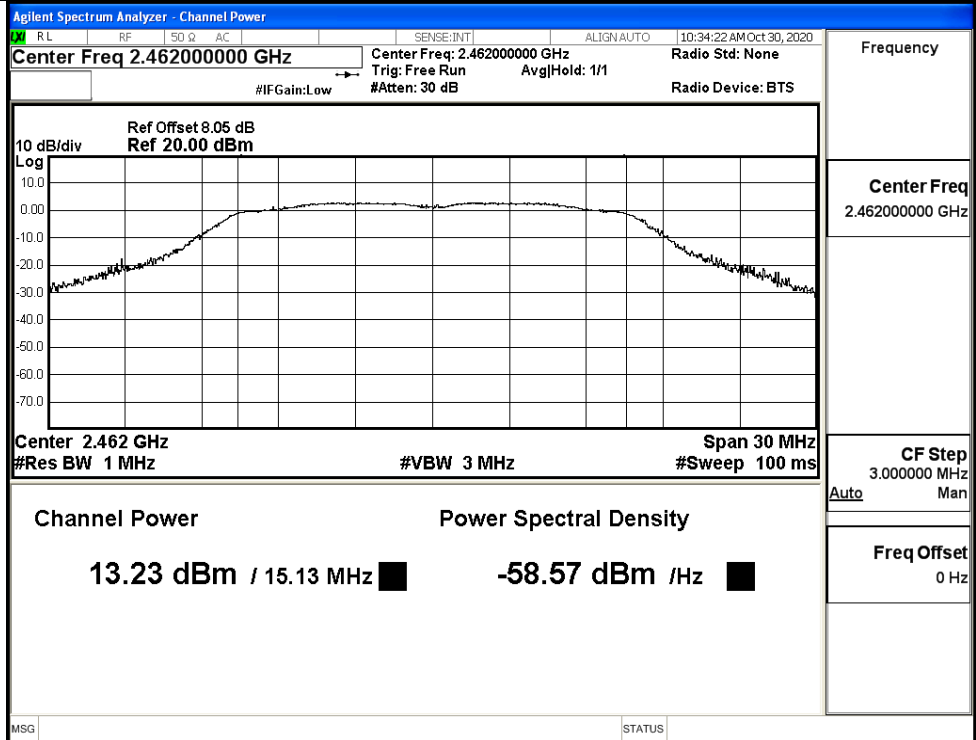


Frequency
Center Freq
2.437000000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11G/HCH

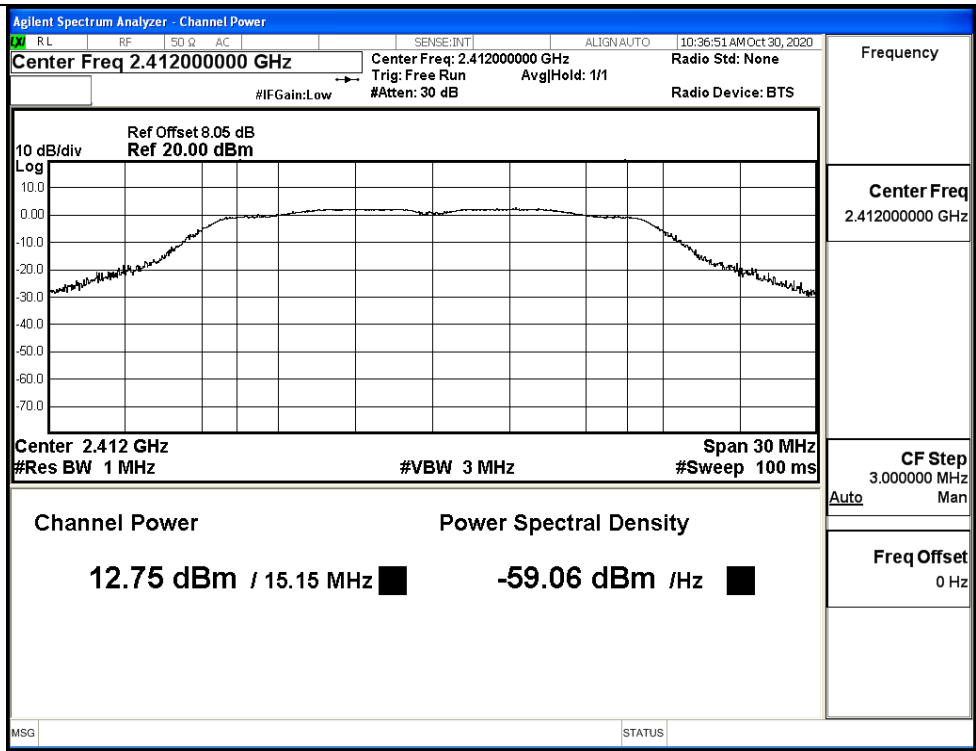


Frequency
Center Freq
2.462000000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/LCH

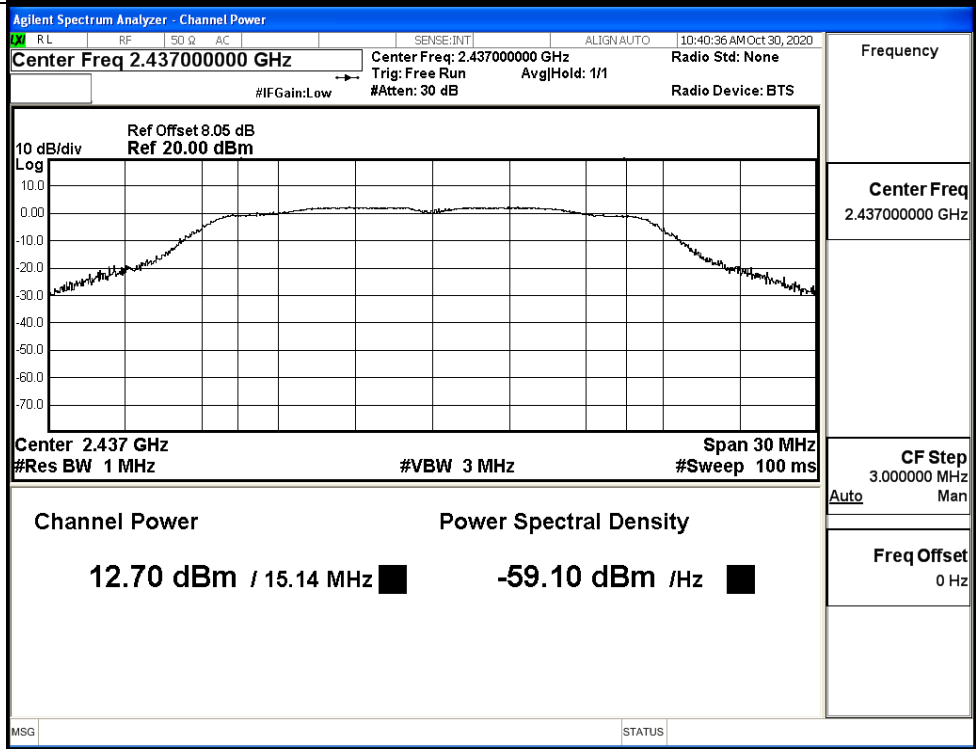


Frequency
Center Freq
2.41200000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/MCH

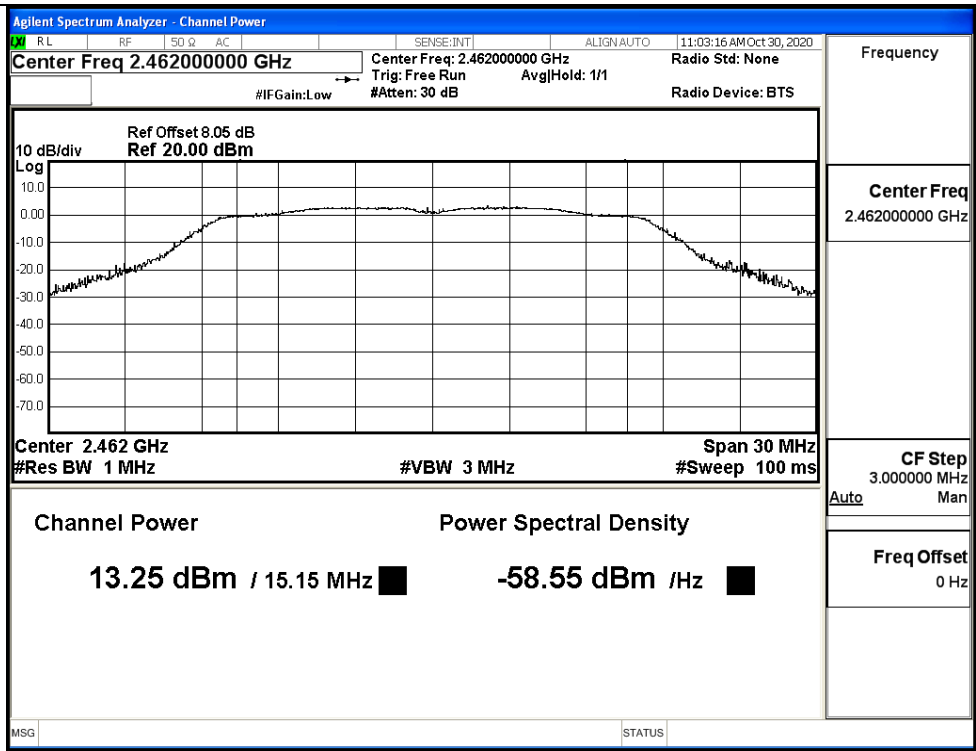


Frequency
Center Freq
2.43700000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/HCH

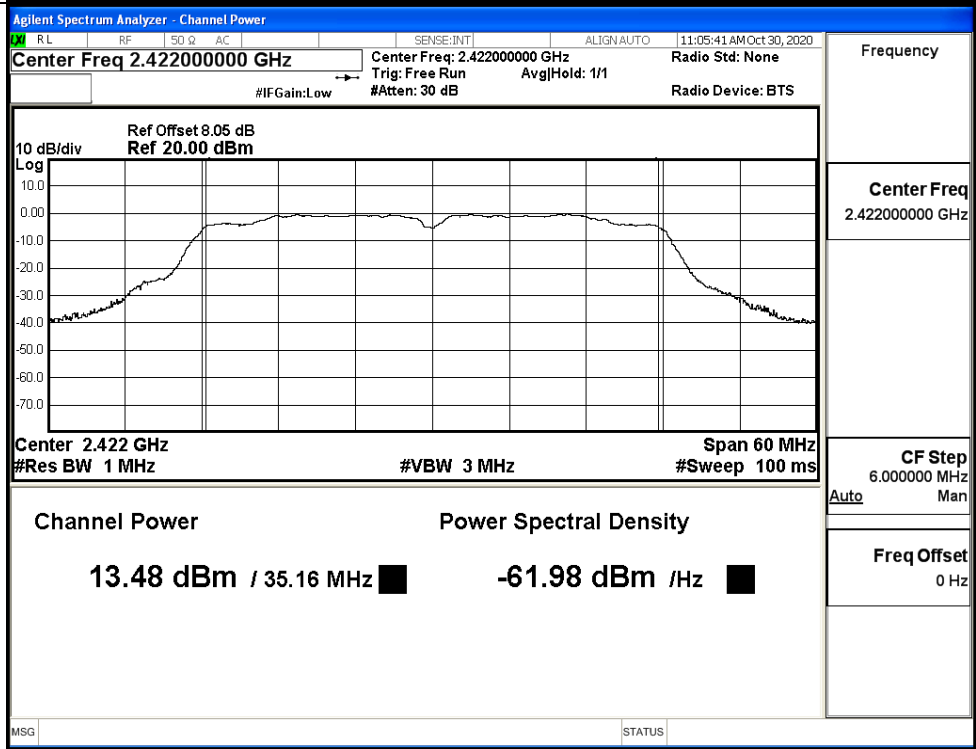


Frequency
Center Freq
2.462000000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N40SISO/LCH

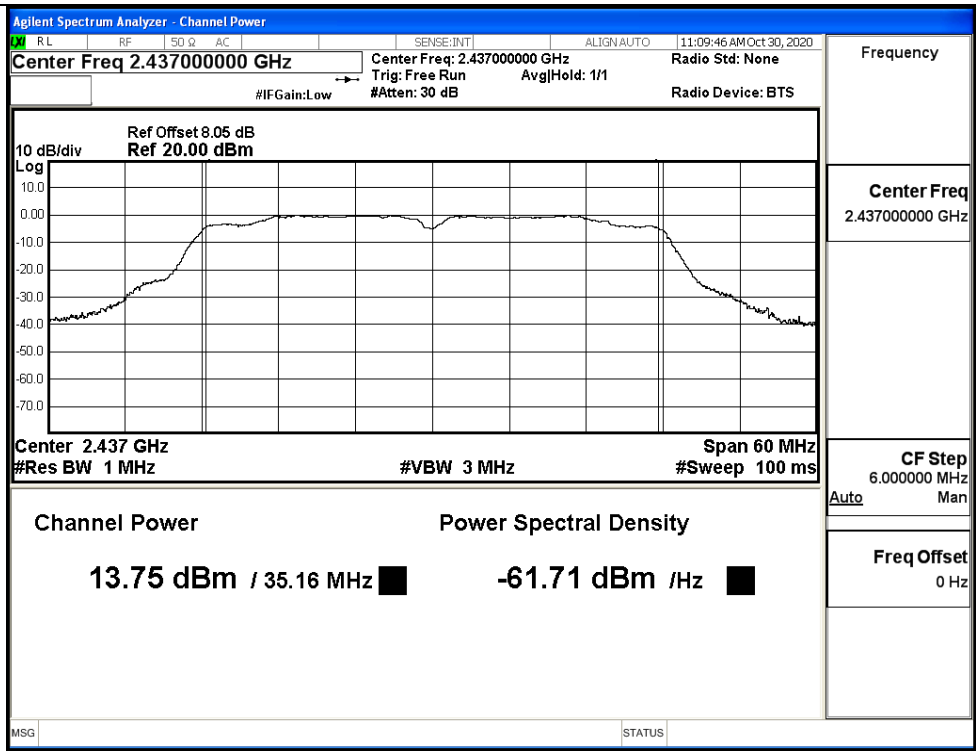


Frequency
Center Freq
2.422000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

11N40SISO/MCH

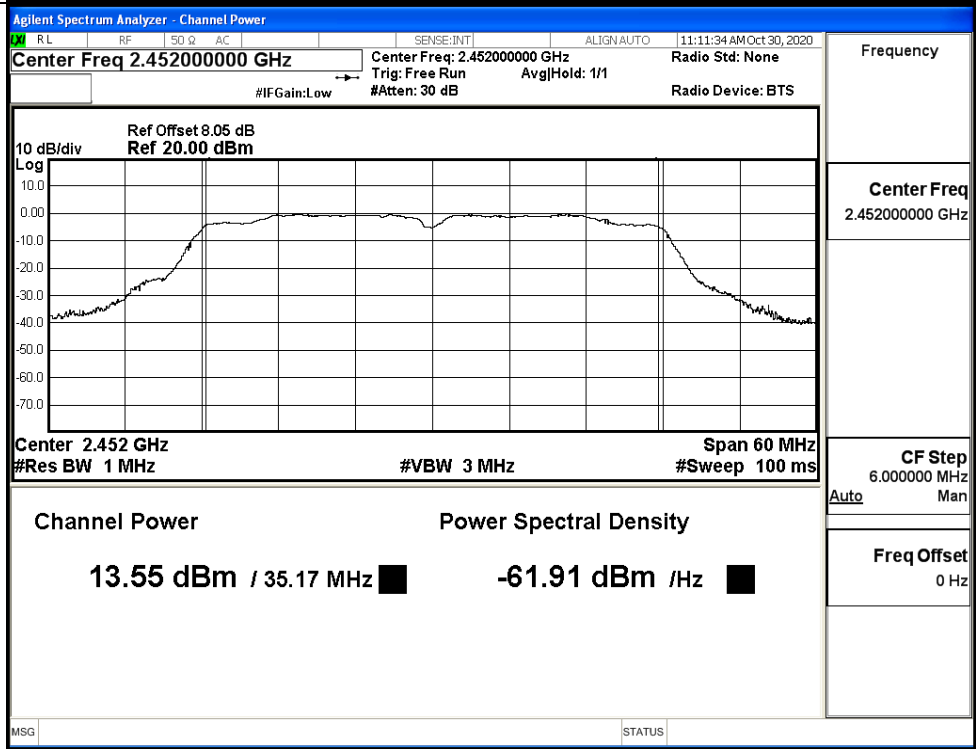


Frequency
Center Freq
2.437000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

11N40SISO/HCH



Frequency
Center Freq
2.452000000 GHz

CF Step
6.000000 MHz
Auto Man

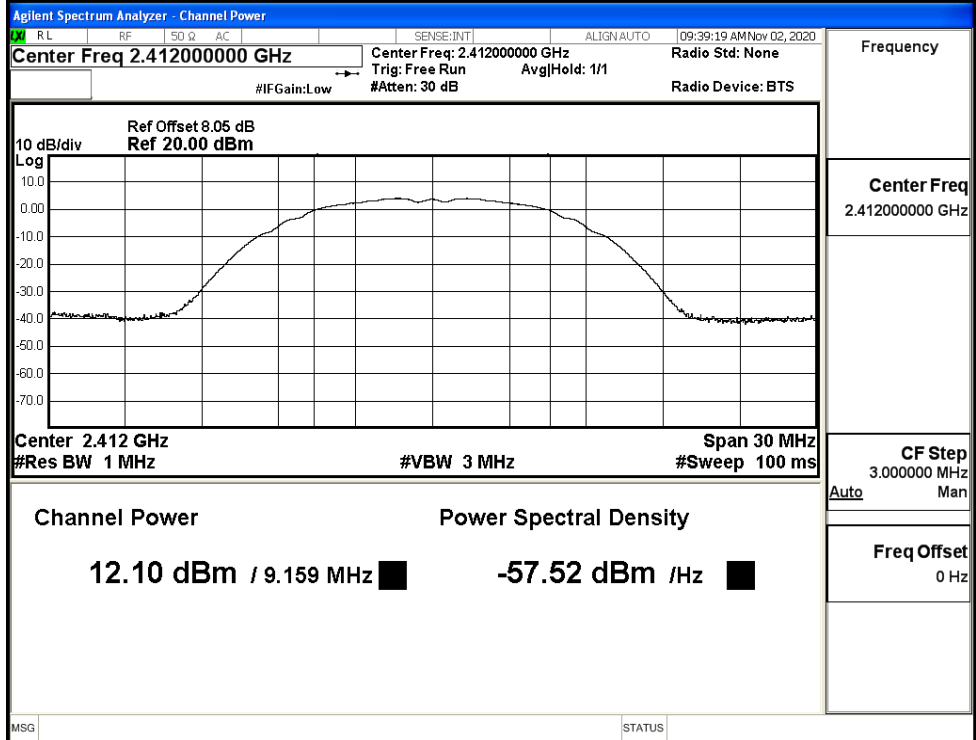
Freq Offset
0 Hz

ANT 1

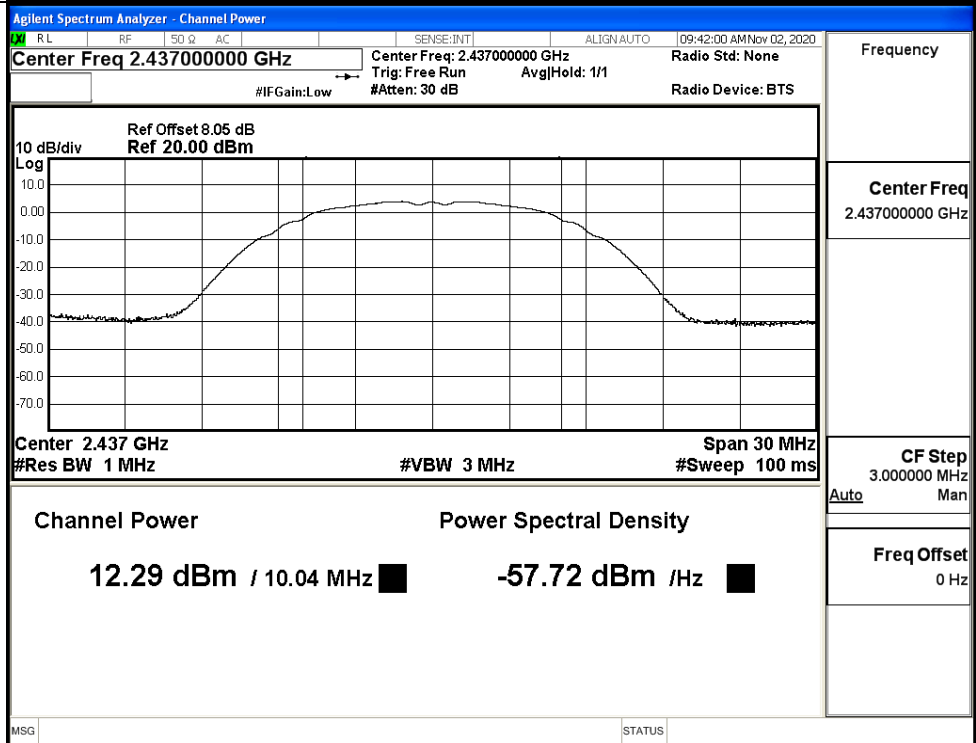
Mode	Channel	AVG Conducted Power (dBm)	Duty Cycle Factor(dB)	Report Conducted Power(dBm)	Limit [dBm]	Verdict
11B	LCH	12.1	0	12.1	30	PASS
	MCH	12.29	0	12.29	30	PASS
	HCH	12.83	0	12.83	30	PASS
11G	LCH	12.23	0	12.23	30	PASS
	MCH	12.66	0	12.66	30	PASS
	HCH	13.24	0	13.24	30	PASS
11N20SISO	LCH	12.4	0	12.4	30	PASS
	MCH	12.33	0	12.33	30	PASS
	HCH	12.7	0	12.7	30	PASS
11N40SISO	LCH	12.62	0.14	12.76	30	PASS
	MCH	12.64	0.14	12.78	30	PASS
	HCH	12.5	0.14	12.64	30	PASS

Test Graphs

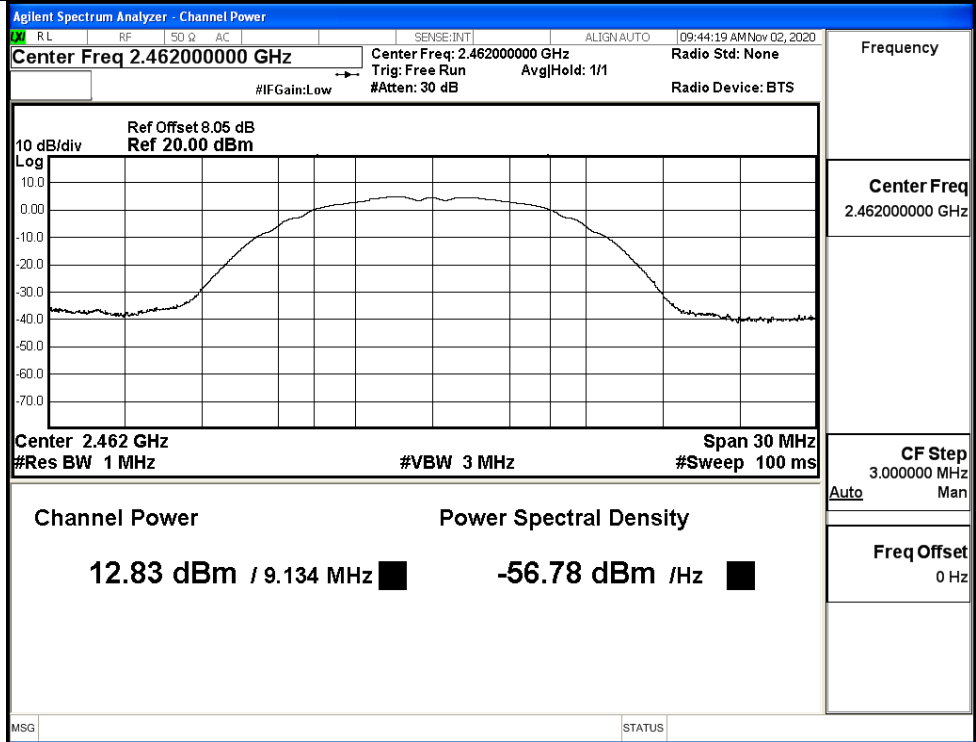
11B/LCH



11B/MCH

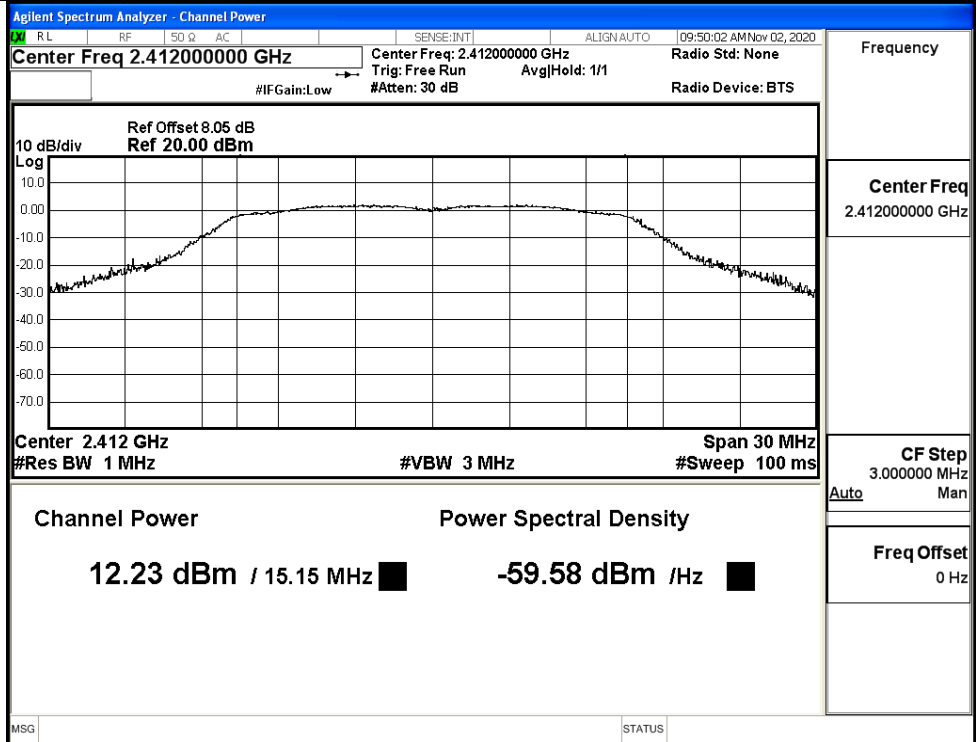


11B/HCH



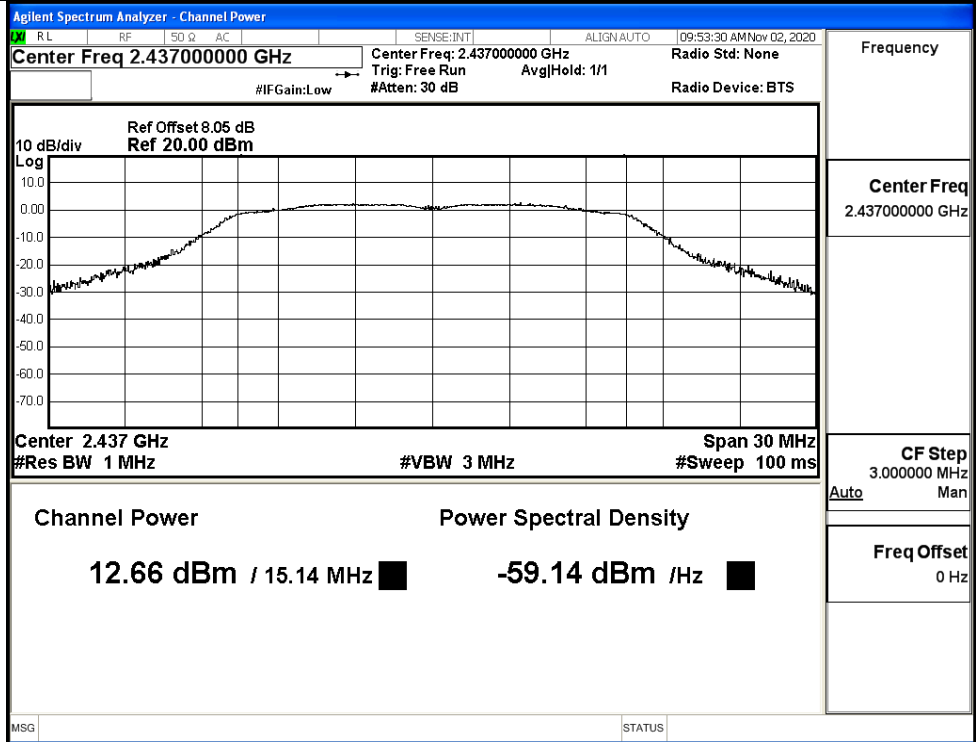
Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/LCH



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

11G/MCH



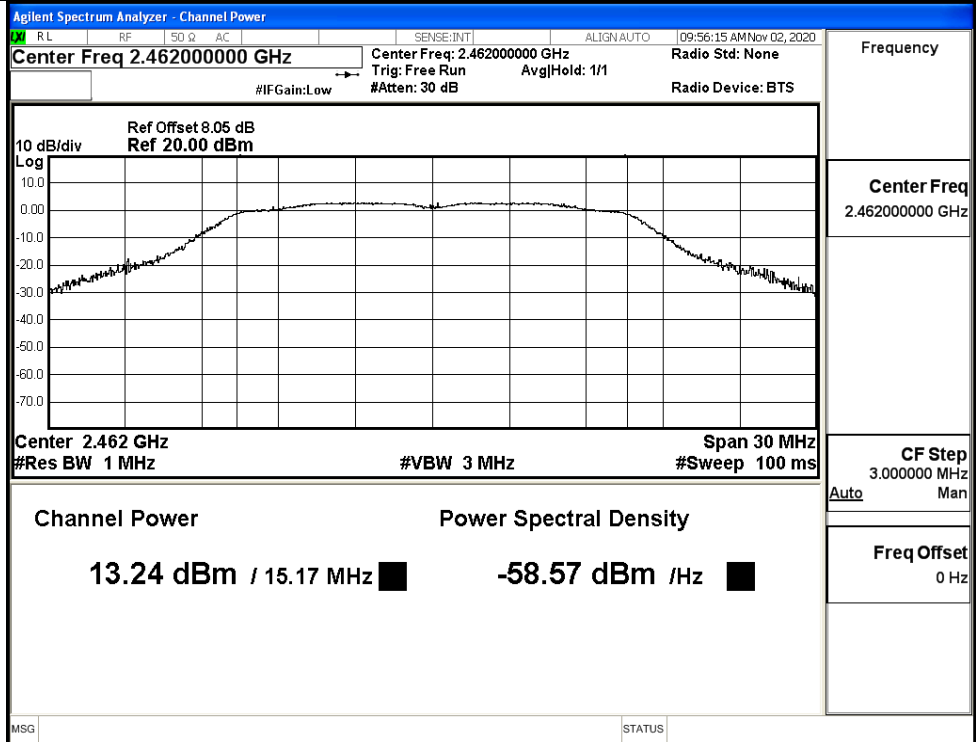
Frequency

Center Freq
2.43700000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11G/HCH



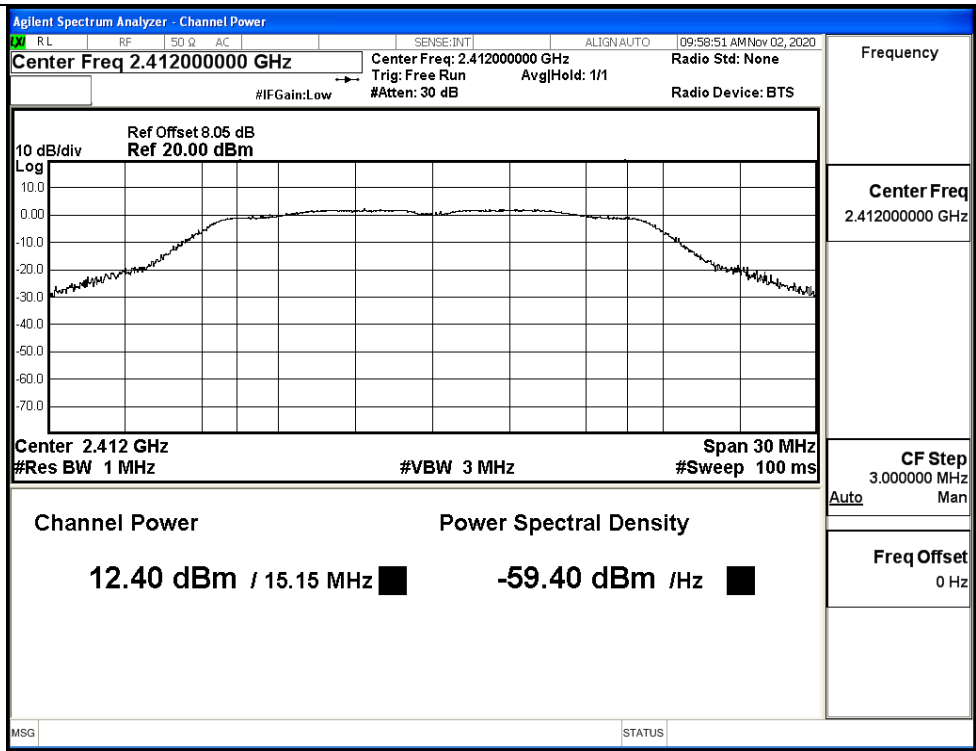
Frequency

Center Freq
2.46200000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/LCH

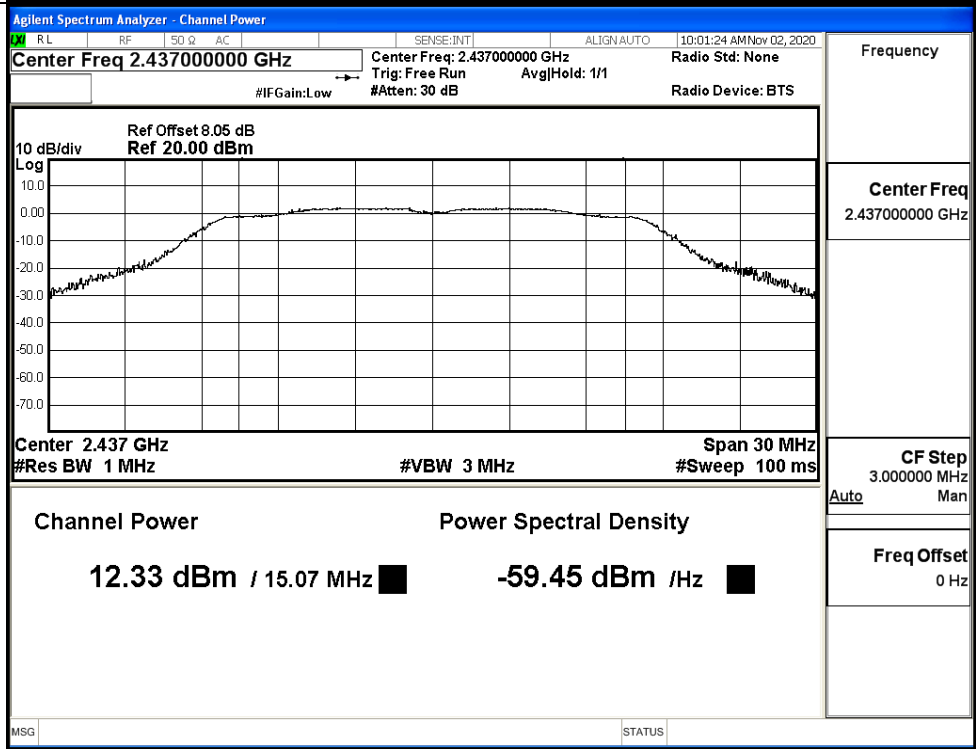


Frequency
Center Freq
2.41200000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/MCH

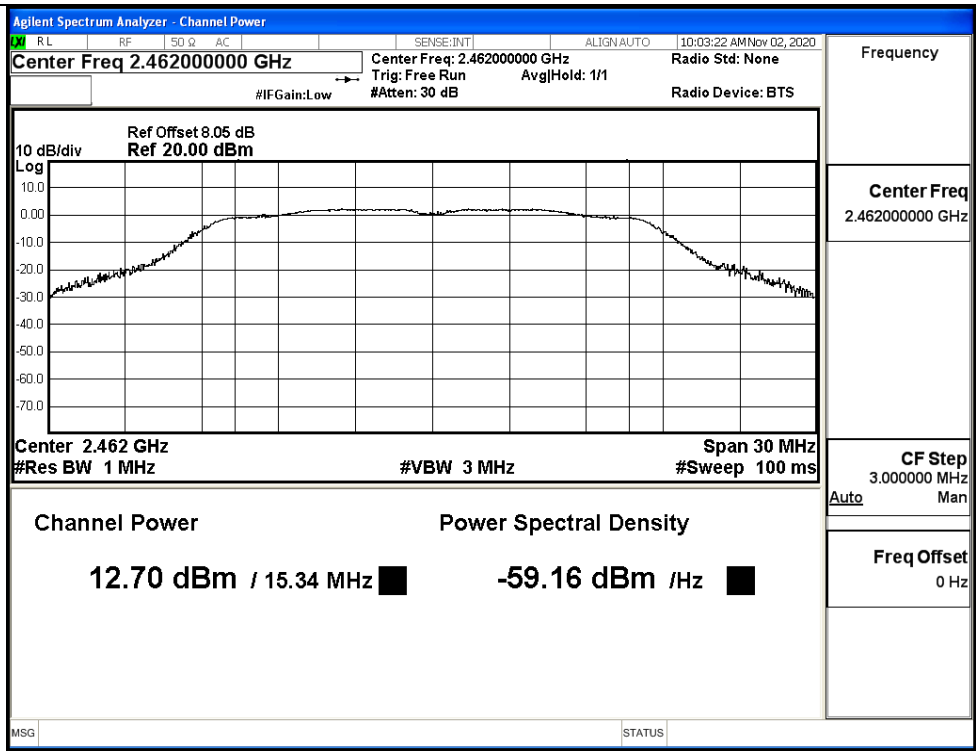


Frequency
Center Freq
2.43700000 GHz

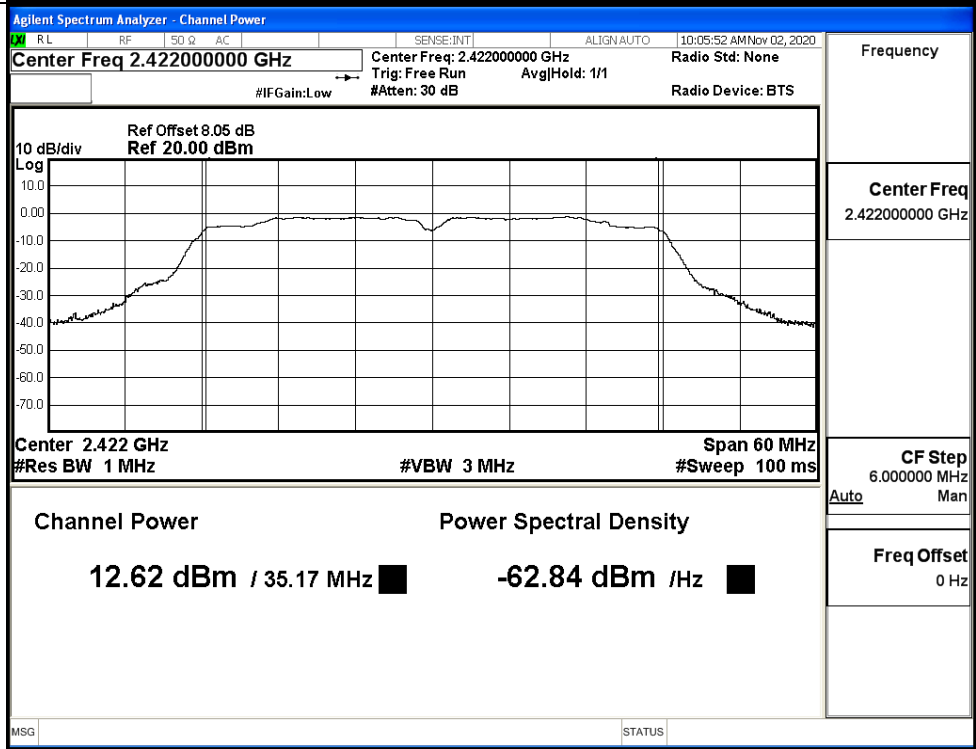
CF Step
3.000000 MHz
Auto Man

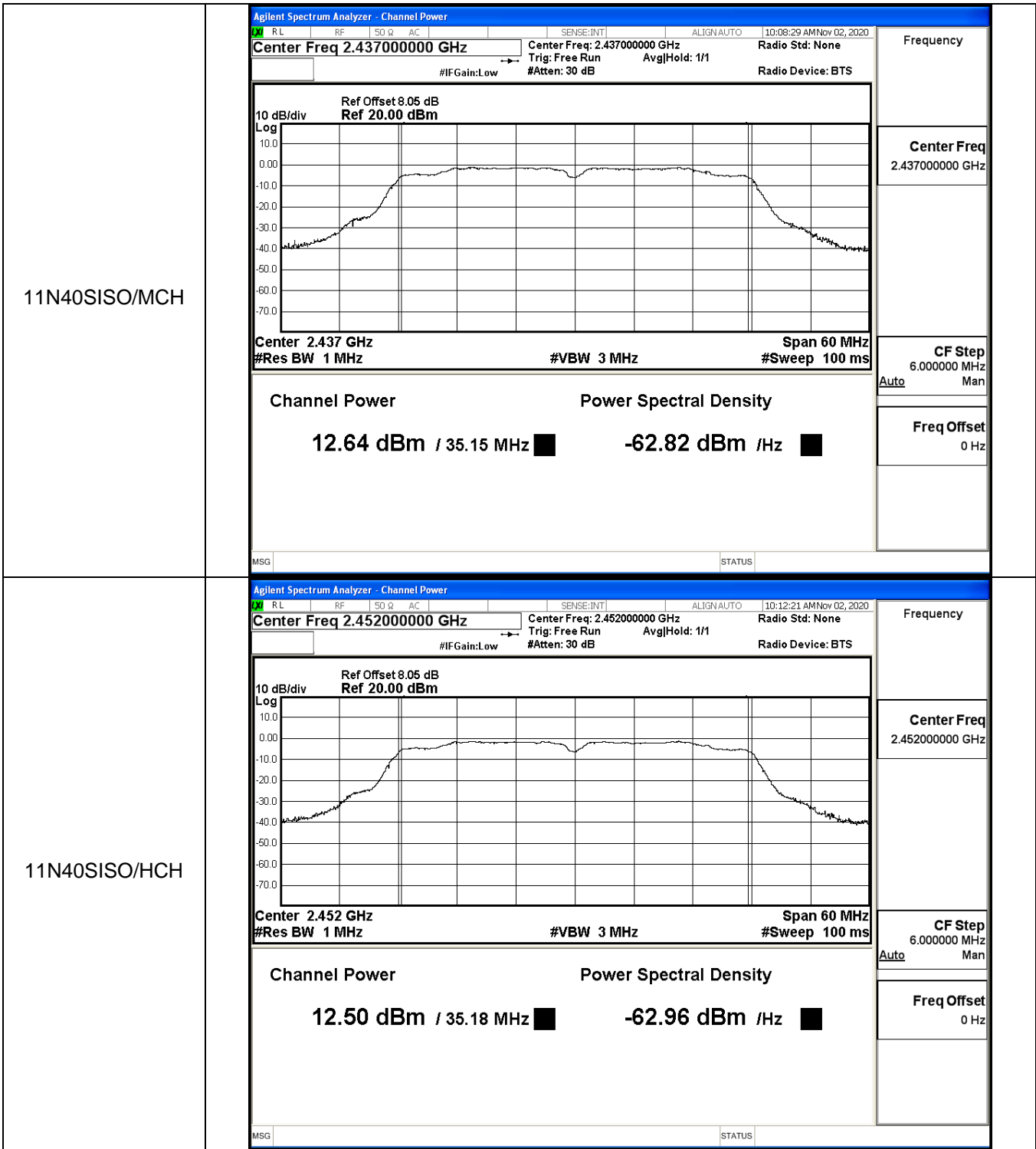
Freq Offset
0 Hz

11N20SISO/HCH



11N40SISO/LCH





MIMO

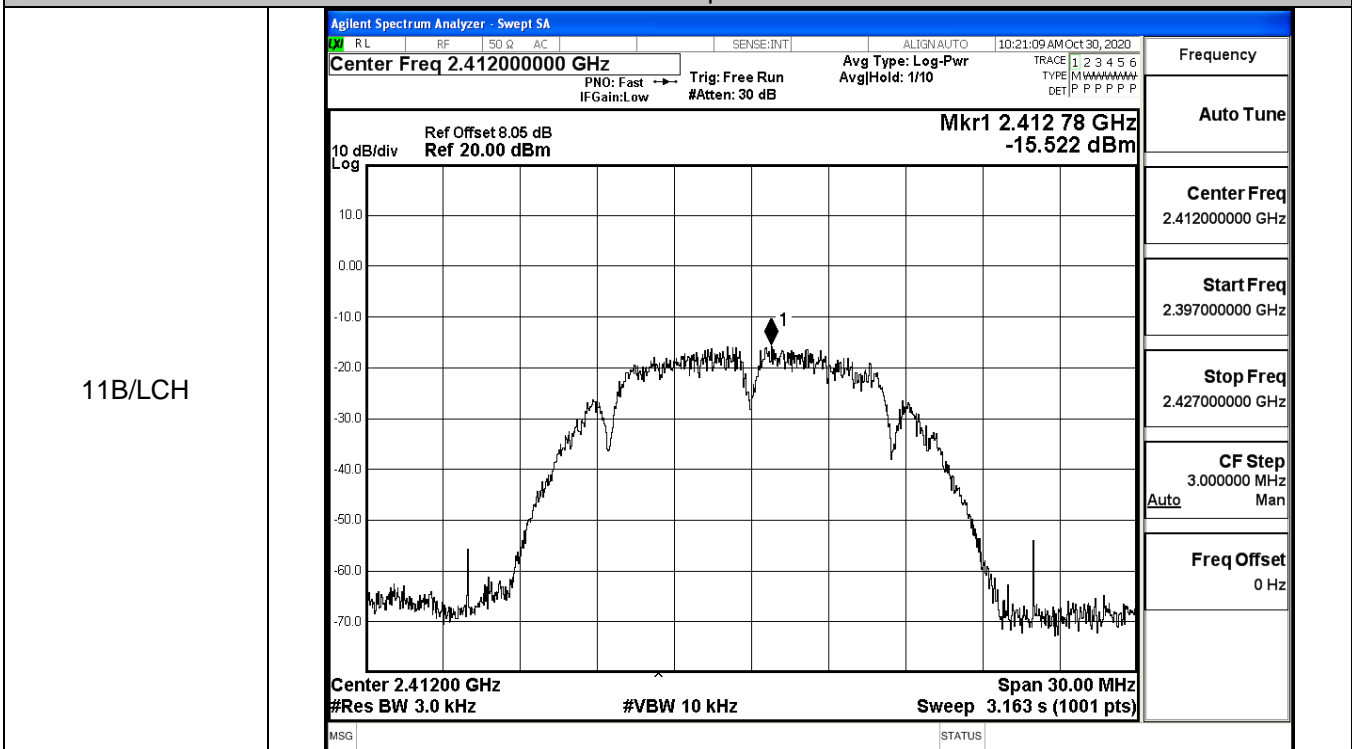
Mode	Channel	ANT 0 [dBm]	ANT 1 [dBm]	MIMO [dBm]	Limit [dBm]	Verdict
11N20	LCH	12.75	12.4	15.59	30	PASS
	MCH	12.7	12.33	15.53	30	PASS
	HCH	13.25	12.7	15.99	30	PASS
11N40	LCH	12.41	10.99	14.77	30	PASS
	MCH	12.57	9.87	14.44	30	PASS
	HCH	12.35	10.90	14.70	30	PASS

C.3 Maximum Power Spectral Density

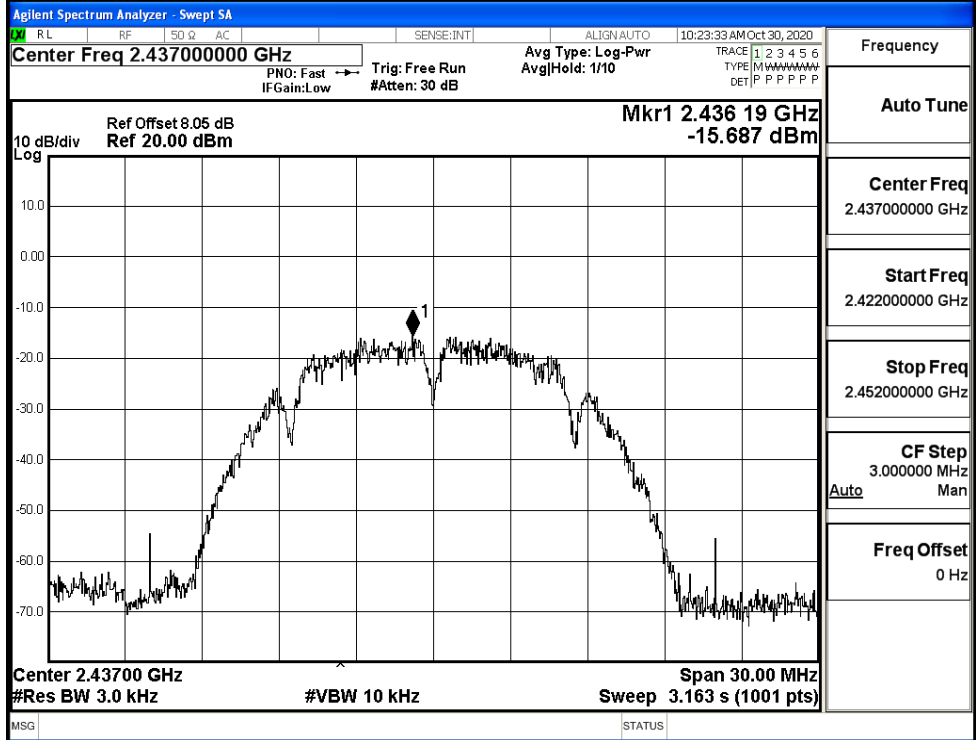
ANT 0

Mode	Channel	Power Density [dBm/3KHz]	Duty Cycle Factor (dB)	RBW Factor (dB)	Report Power Density [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-15.522	0	0	-15.52	8	PASS
	MCH	-15.687	0	0	-15.69	8	PASS
	HCH	-15.090	0	0	-15.09	8	PASS
11G	LCH	-20.452	0	0	-20.45	8	PASS
	MCH	-20.780	0	0	-20.78	8	PASS
	HCH	-19.812	0	0	-19.81	8	PASS
11N20 SISO	LCH	-20.959	0	0	-20.96	8	PASS
	MCH	-21.678	0	0	-21.68	8	PASS
	HCH	-20.261	0	0	-20.26	8	PASS
11N40 SISO	LCH	-23.287	0.15	0	-23.14	8	PASS
	MCH	-23.130	0.15	0	-22.98	8	PASS
	HCH	-23.005	0.15	0	-22.86	8	PASS

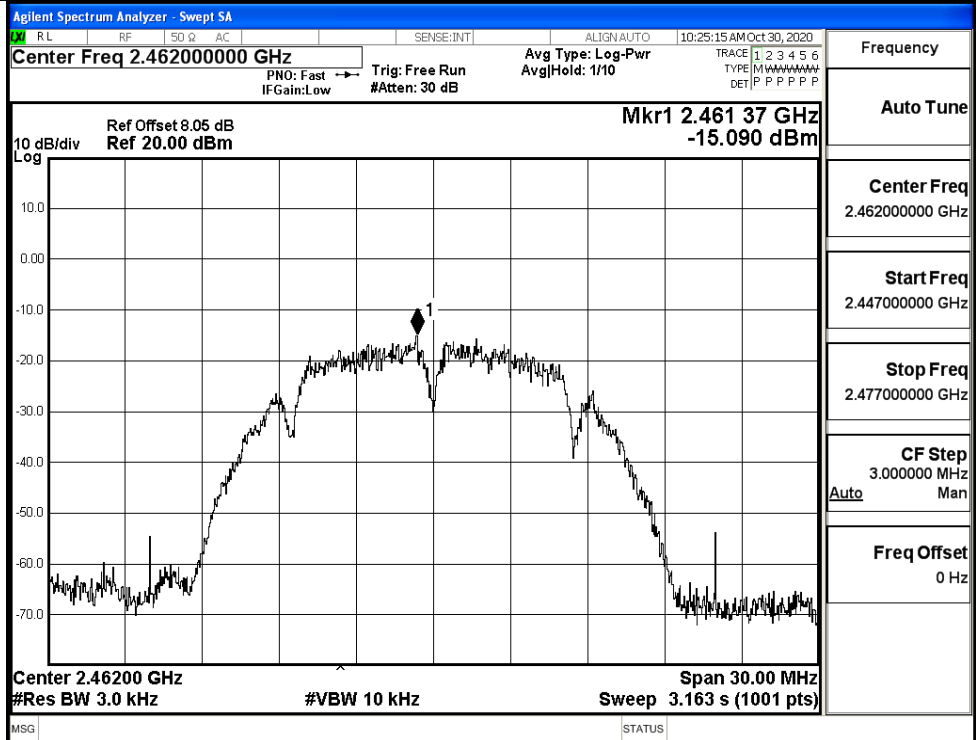
Test Graphs



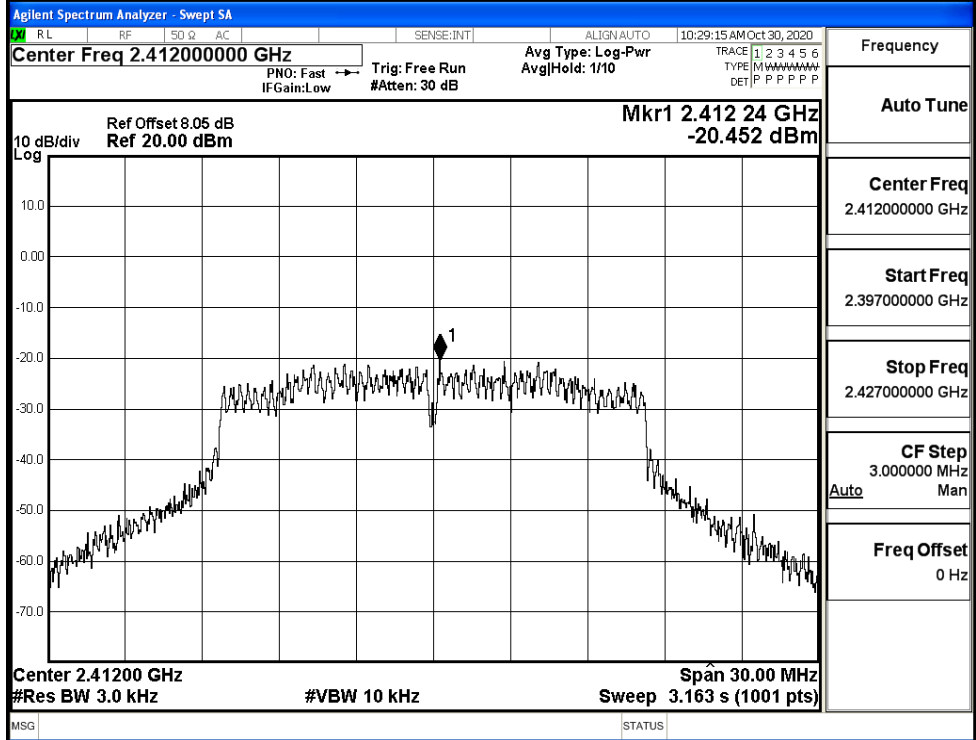
11B/MCH



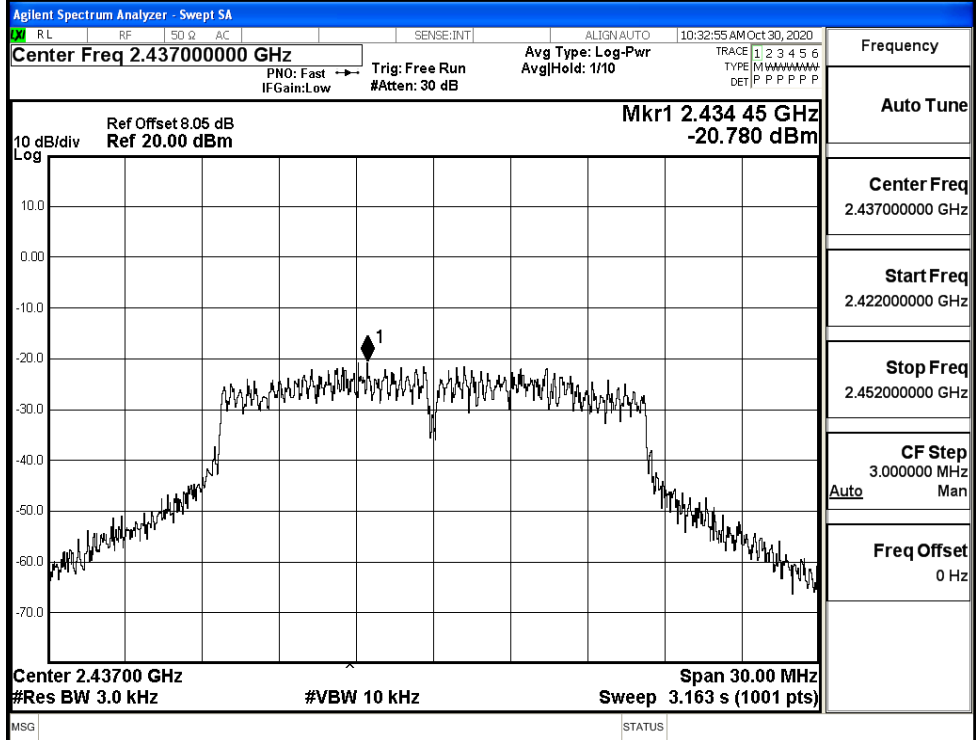
11B/HCH



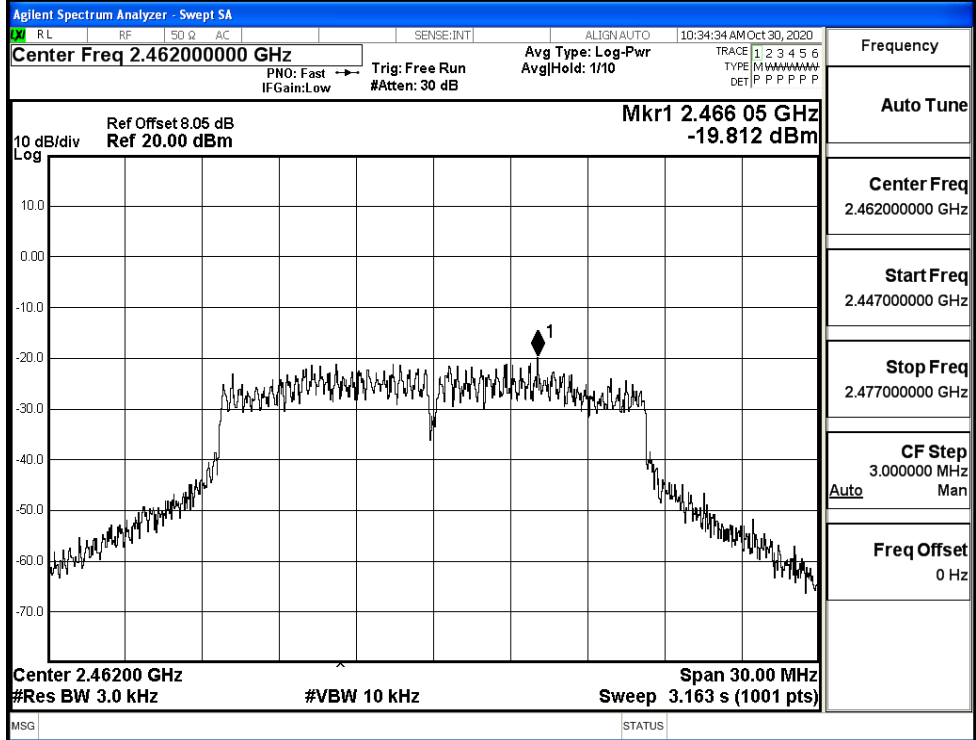
11G/LCH



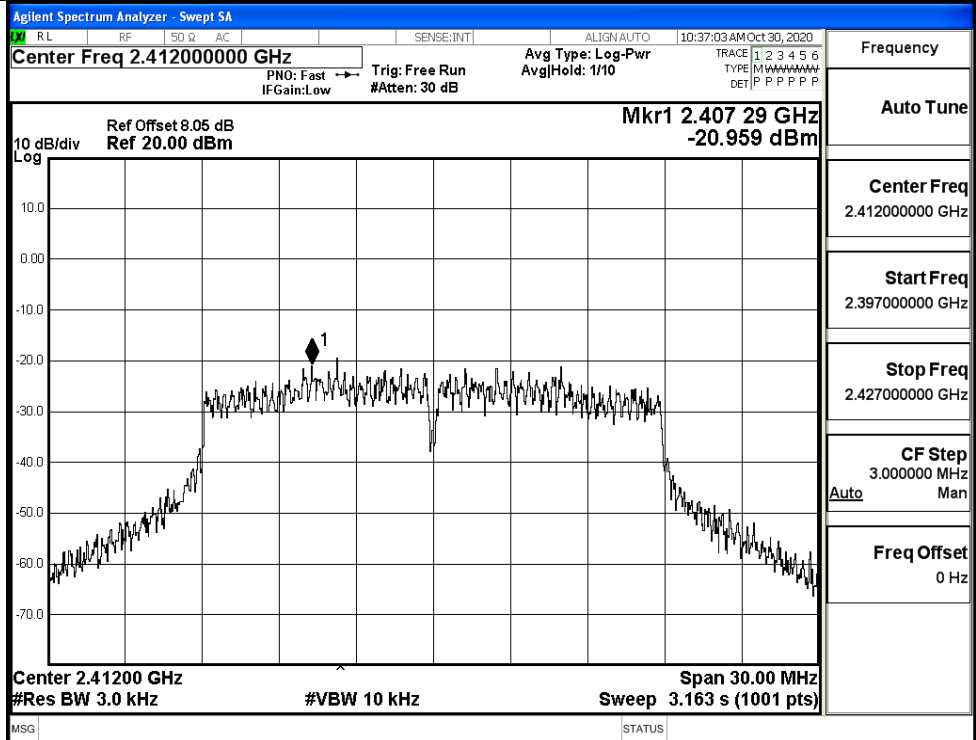
11G/MCH



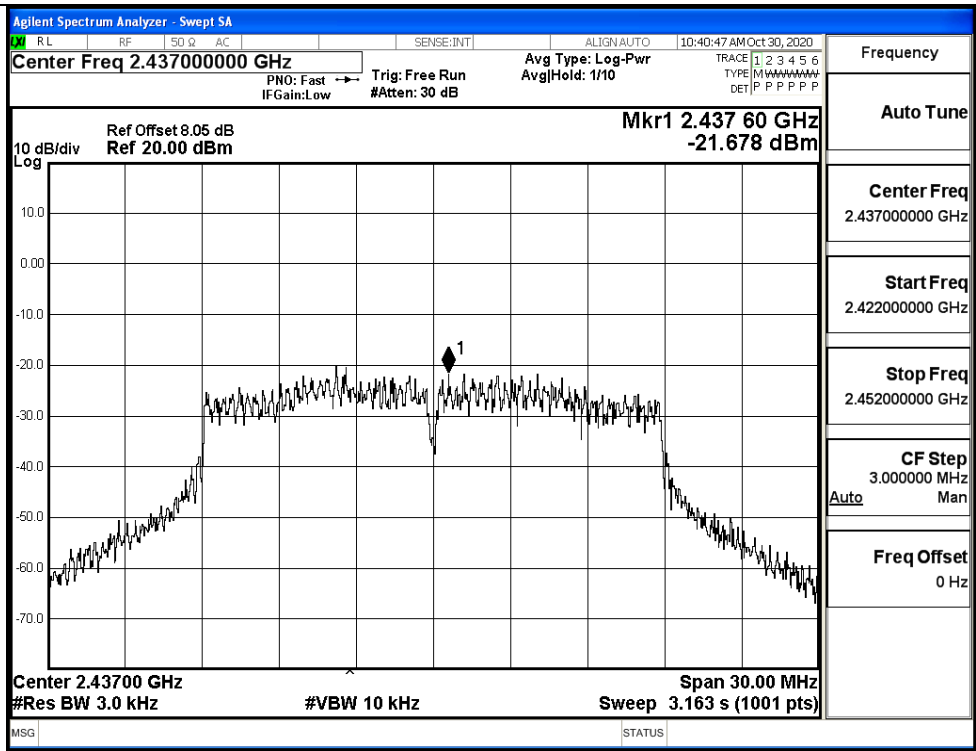
11G/HCH



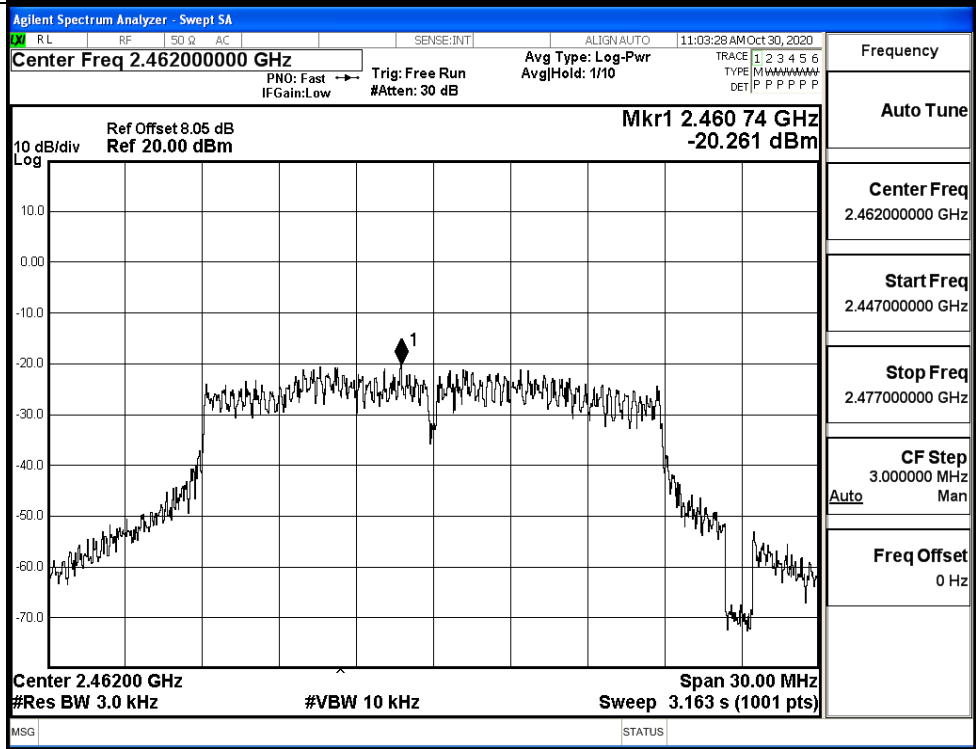
11N20SISO/LCH



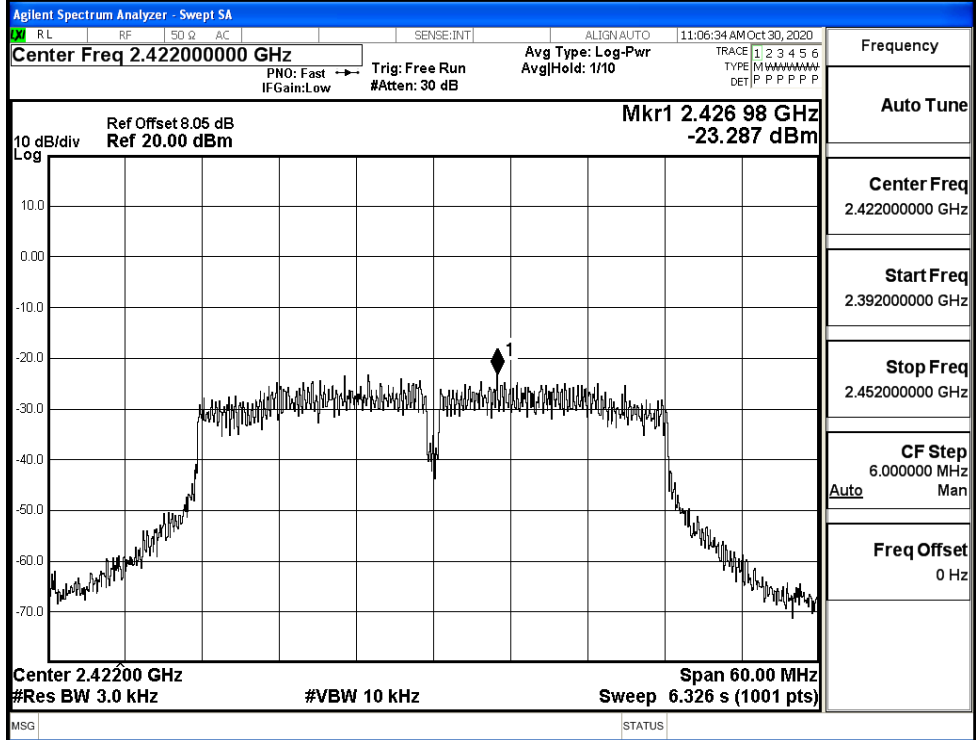
11N20SISO/MCH



11N20SISO/HCH

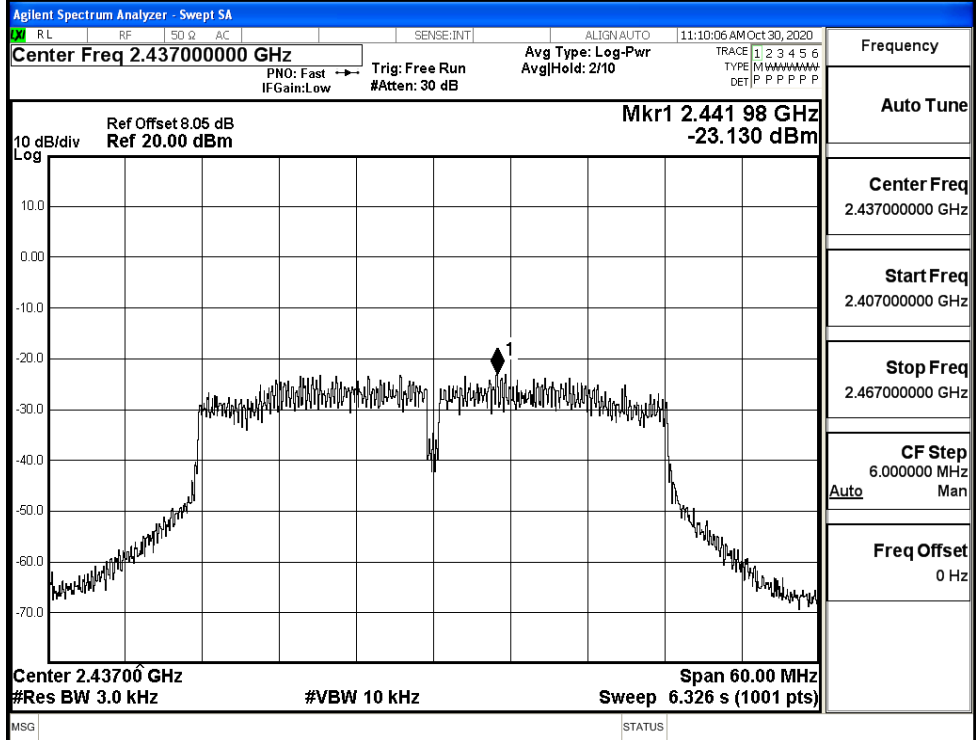


11N40SISO/LCH

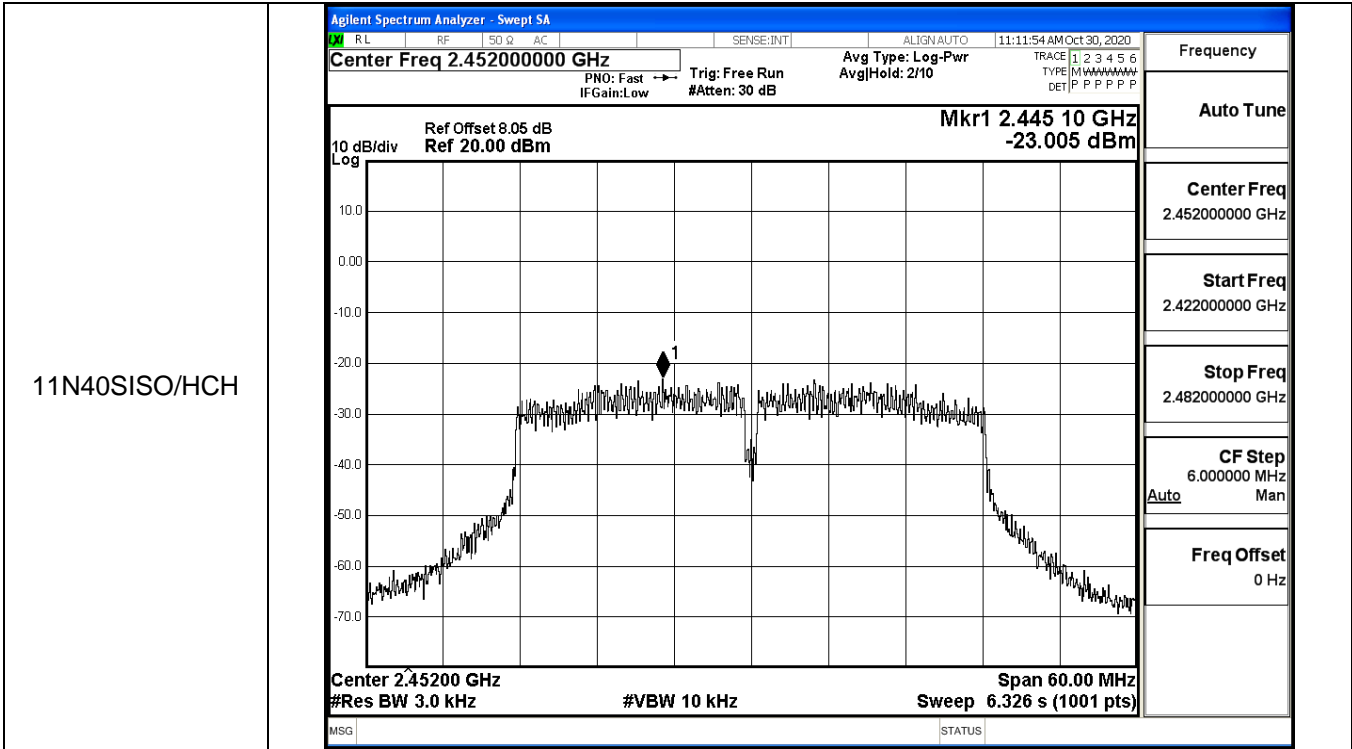


Frequency
Auto Tune
Center Freq 2.42200000 GHz
Start Freq 2.39200000 GHz
Stop Freq 2.45200000 GHz
CF Step 6.00000 MHz Auto Man
Freq Offset 0 Hz

11N40SISO/MCH

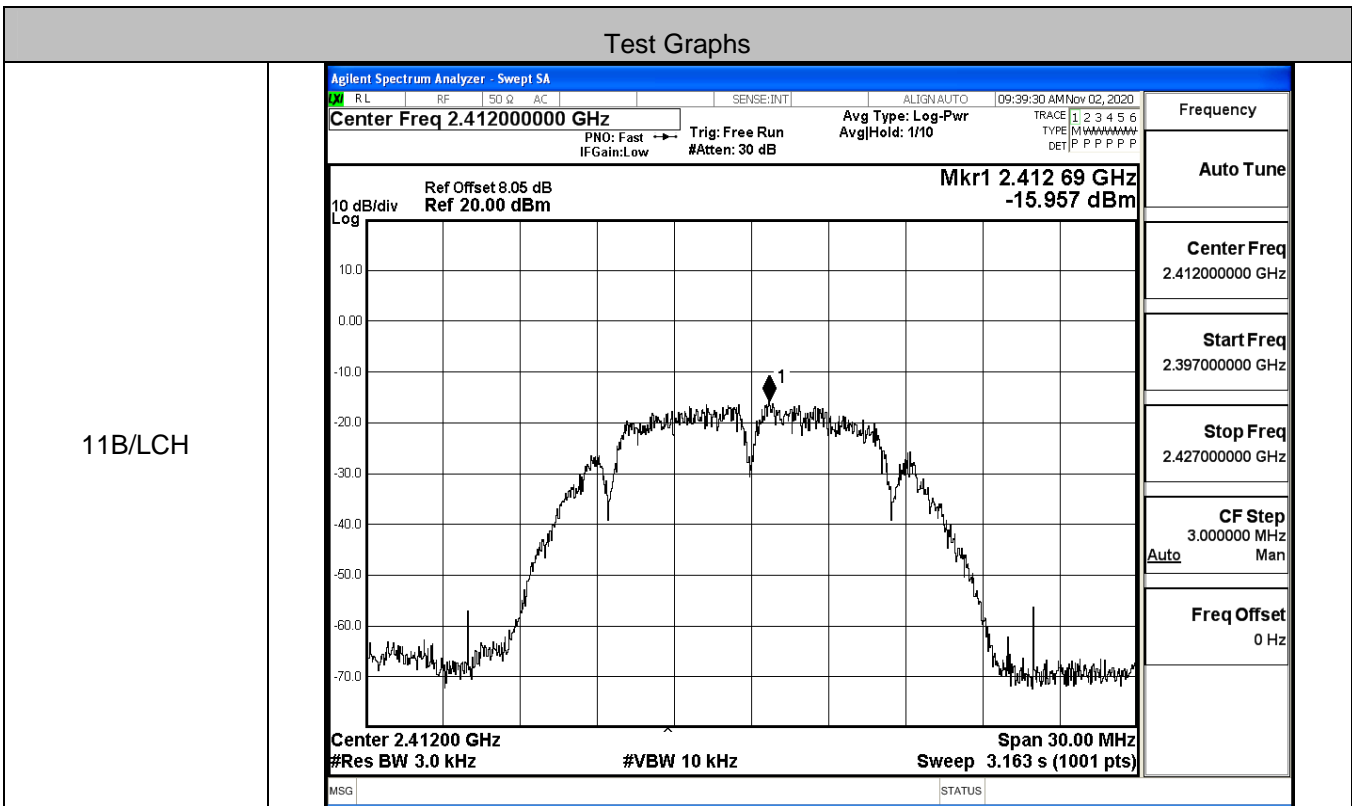


Frequency
Auto Tune
Center Freq 2.43700000 GHz
Start Freq 2.40700000 GHz
Stop Freq 2.46700000 GHz
CF Step 6.00000 MHz Auto Man
Freq Offset 0 Hz

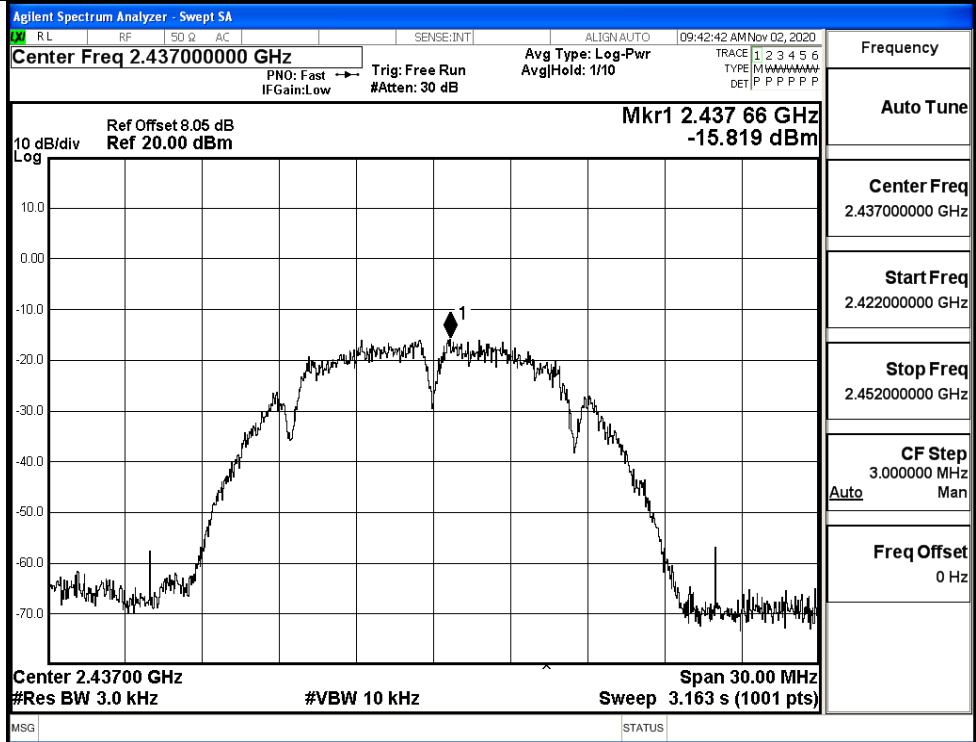


ANT 1

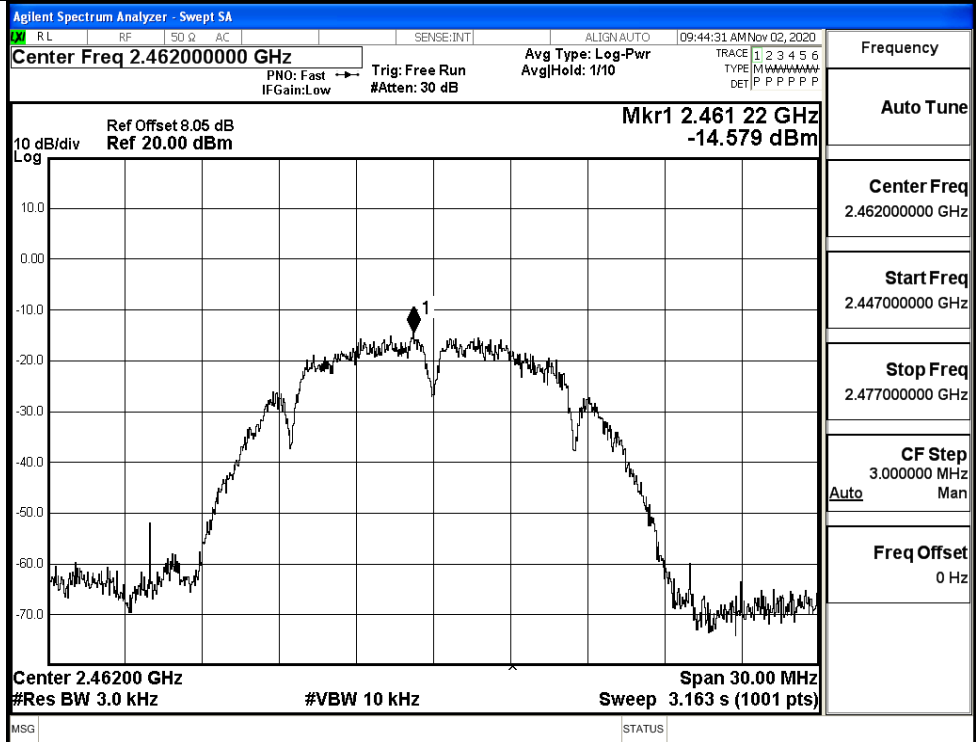
Mode	Channel	Power Density [dBm/3KHz]	Duty Cycle Factor (dB)	RBW Factor (dB)	Report Power Density [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-15.957	0	0	-15.96	8	PASS
	MCH	-15.819	0	0	-15.82	8	PASS
	HCH	-14.579	0	0	-14.58	8	PASS
11G	LCH	-20.058	0	0	-20.06	8	PASS
	MCH	-20.671	0	0	-20.67	8	PASS
	HCH	-20.348	0	0	-20.35	8	PASS
11N20 SISO	LCH	-19.881	0	0	-19.88	8	PASS
	MCH	-22.039	0	0	-22.04	8	PASS
	HCH	-20.502	0	0	-20.50	8	PASS
11N40 SISO	LCH	-23.929	0.14	0	-23.79	8	PASS
	MCH	-23.772	0.14	0	-23.63	8	PASS
	HCH	-24.096	0.14	0	-23.96	8	PASS



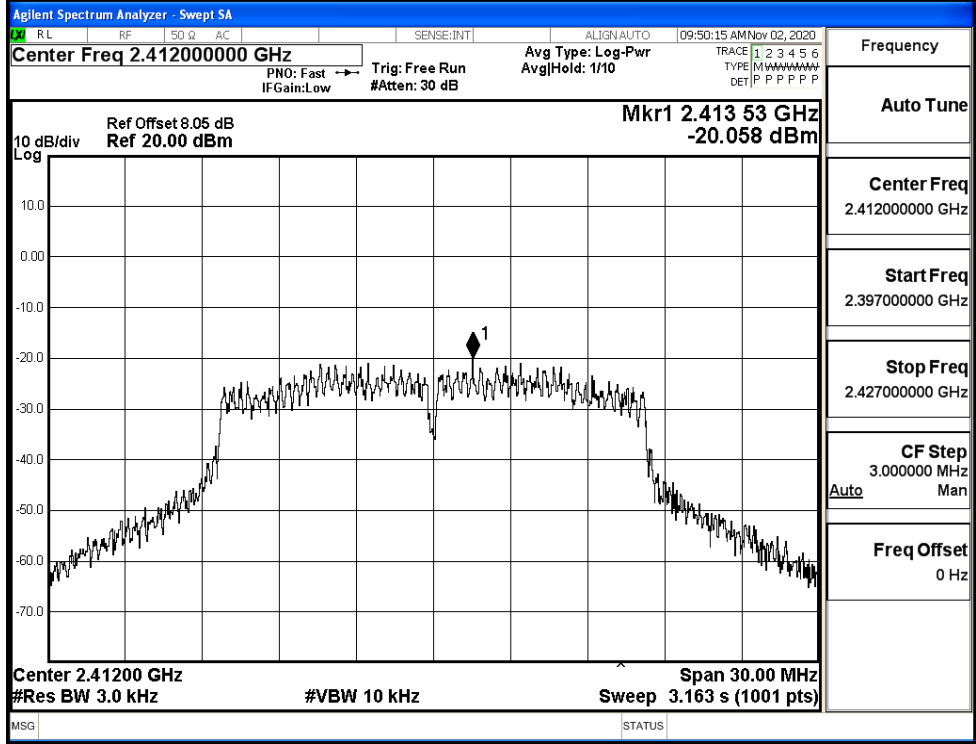
11B/MCH



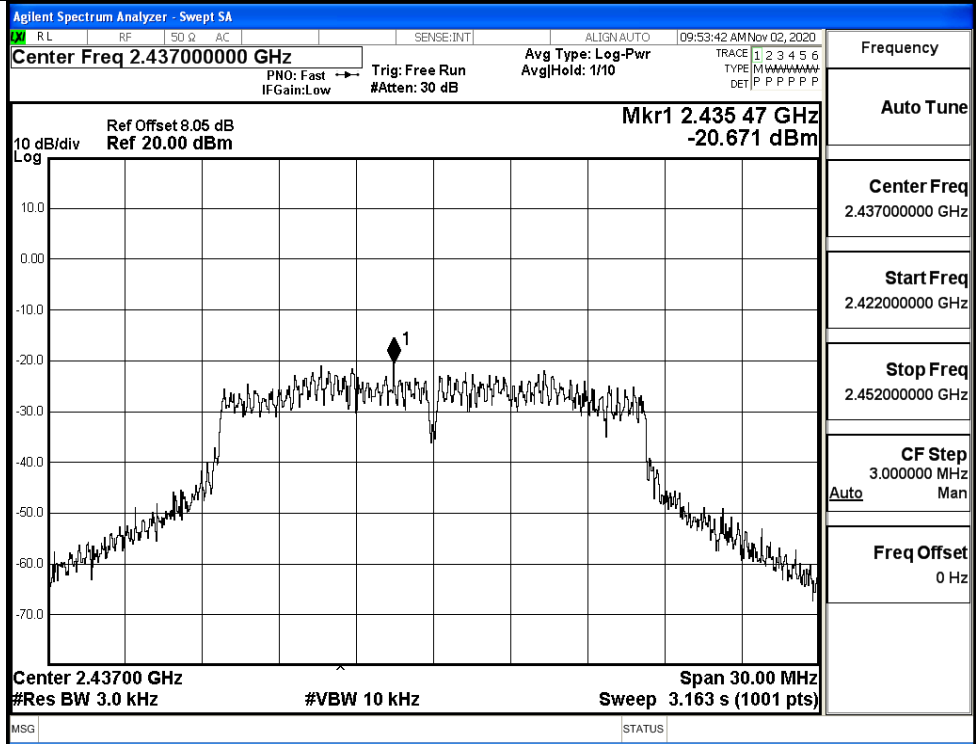
11B/HCH



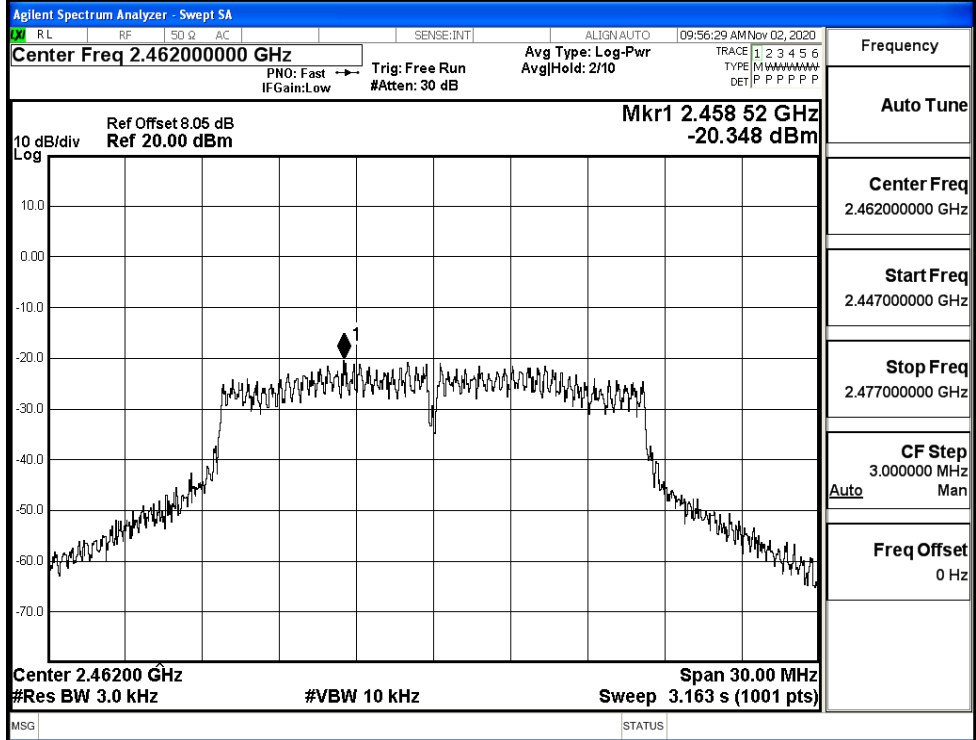
11G/LCH



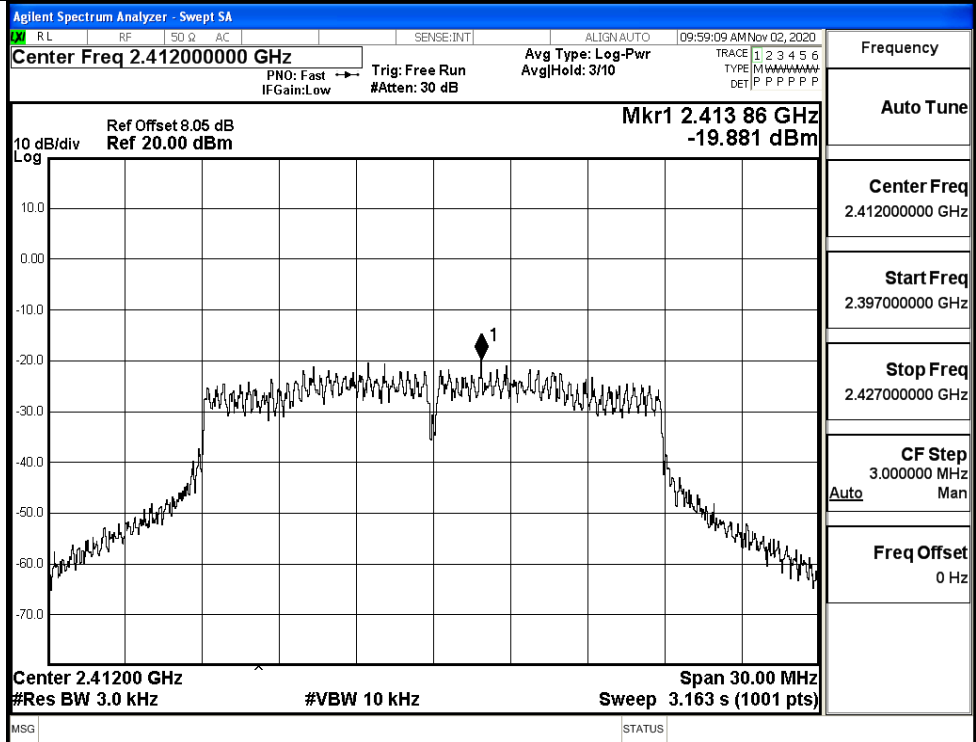
11G/MCH



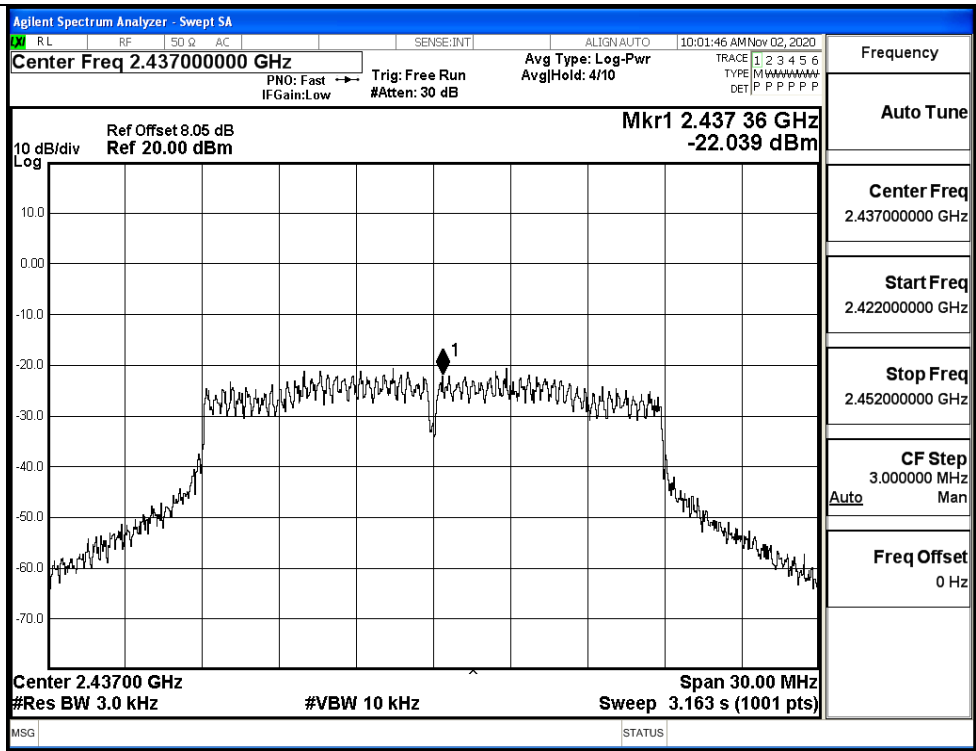
11G/HCH



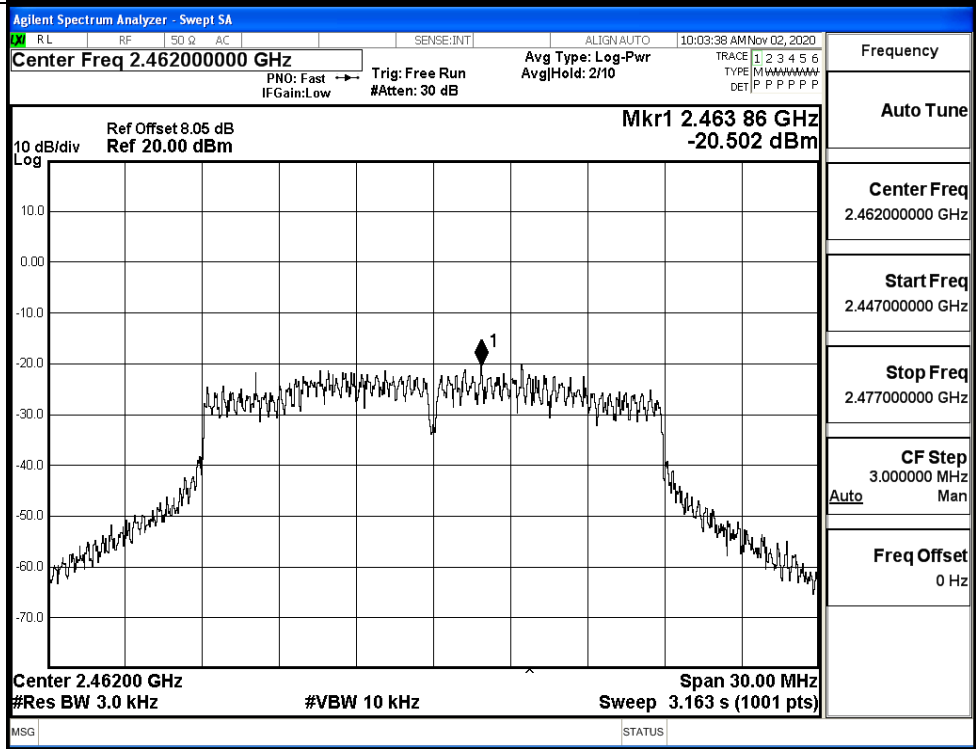
11N20SISO/LCH



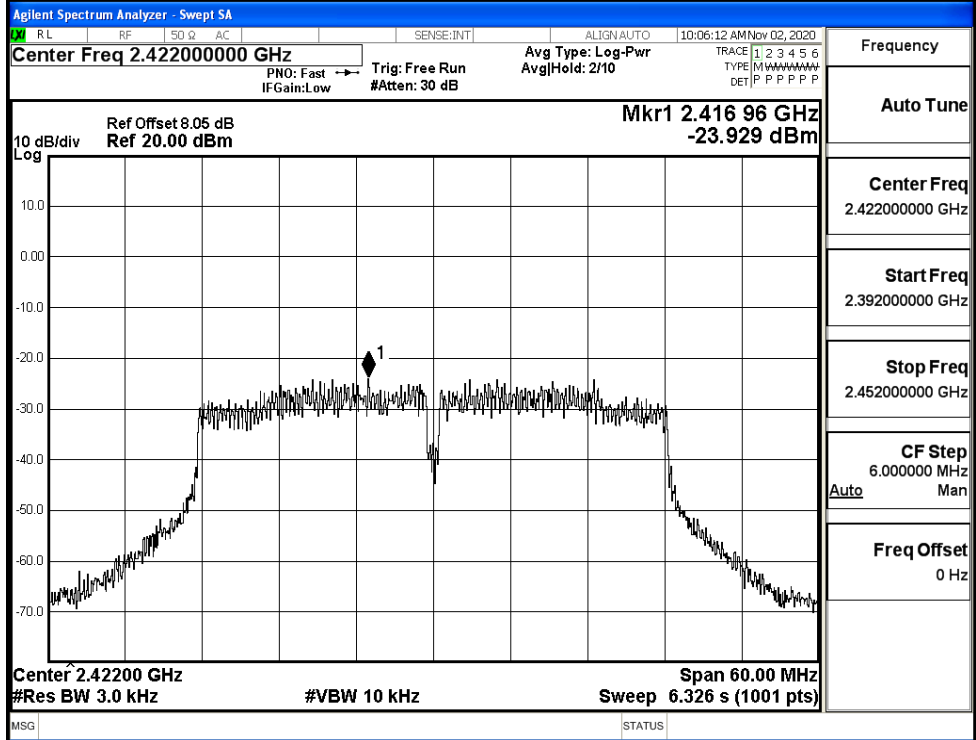
11N20SISO/MCH



11N20SISO/HCH

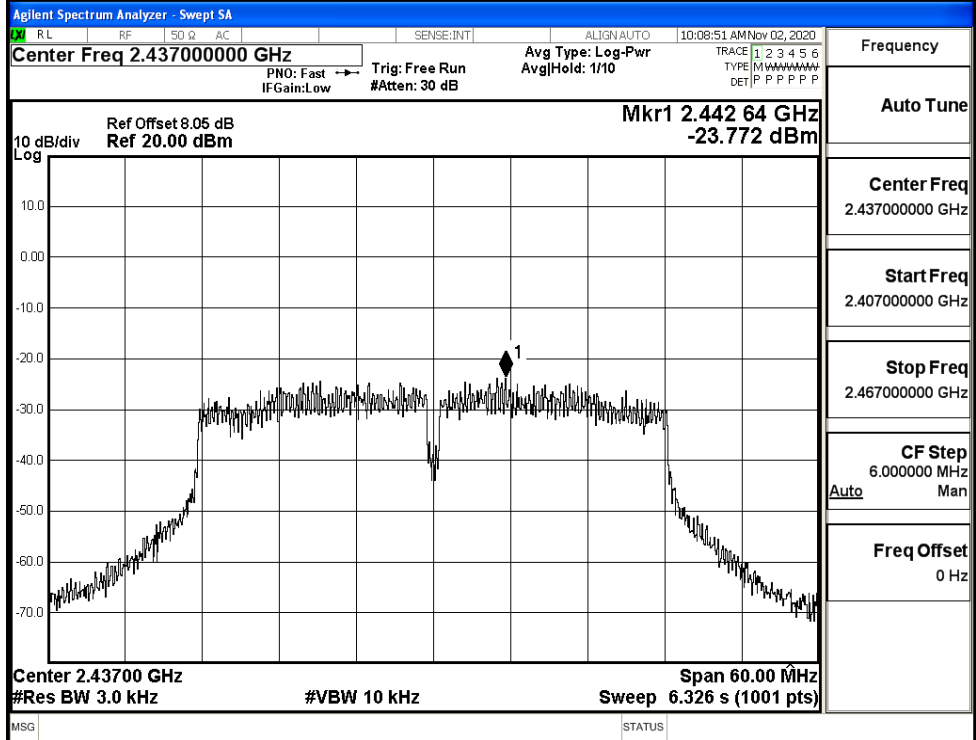


11N40SISO/LCH

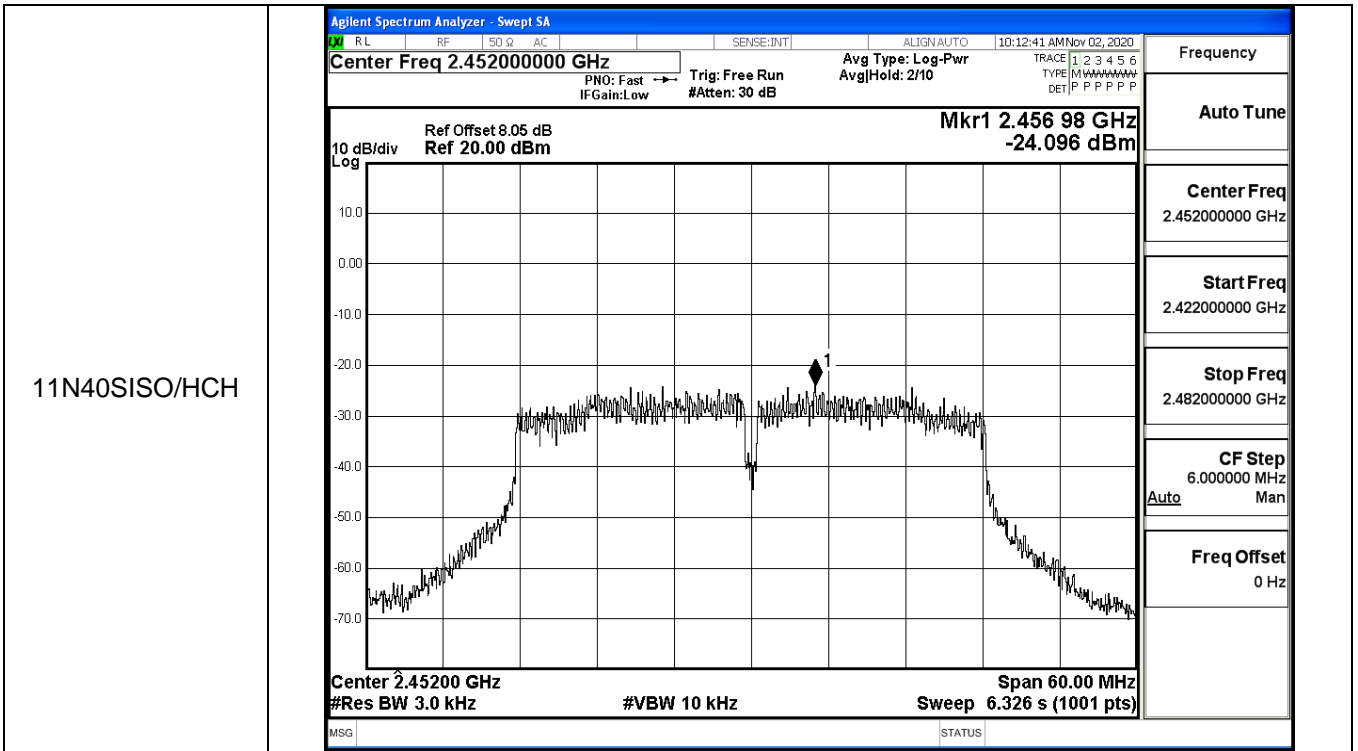


Frequency
Auto Tune
Center Freq 2.42200000 GHz
Start Freq 2.392000000 GHz
Stop Freq 2.452000000 GHz
CF Step 6.000000 MHz Auto Man
Freq Offset 0 Hz

11N40SISO/MCH



Frequency
Auto Tune
Center Freq 2.437000000 GHz
Start Freq 2.407000000 GHz
Stop Freq 2.467000000 GHz
CF Step 6.000000 MHz Auto Man
Freq Offset 0 Hz



MIMO

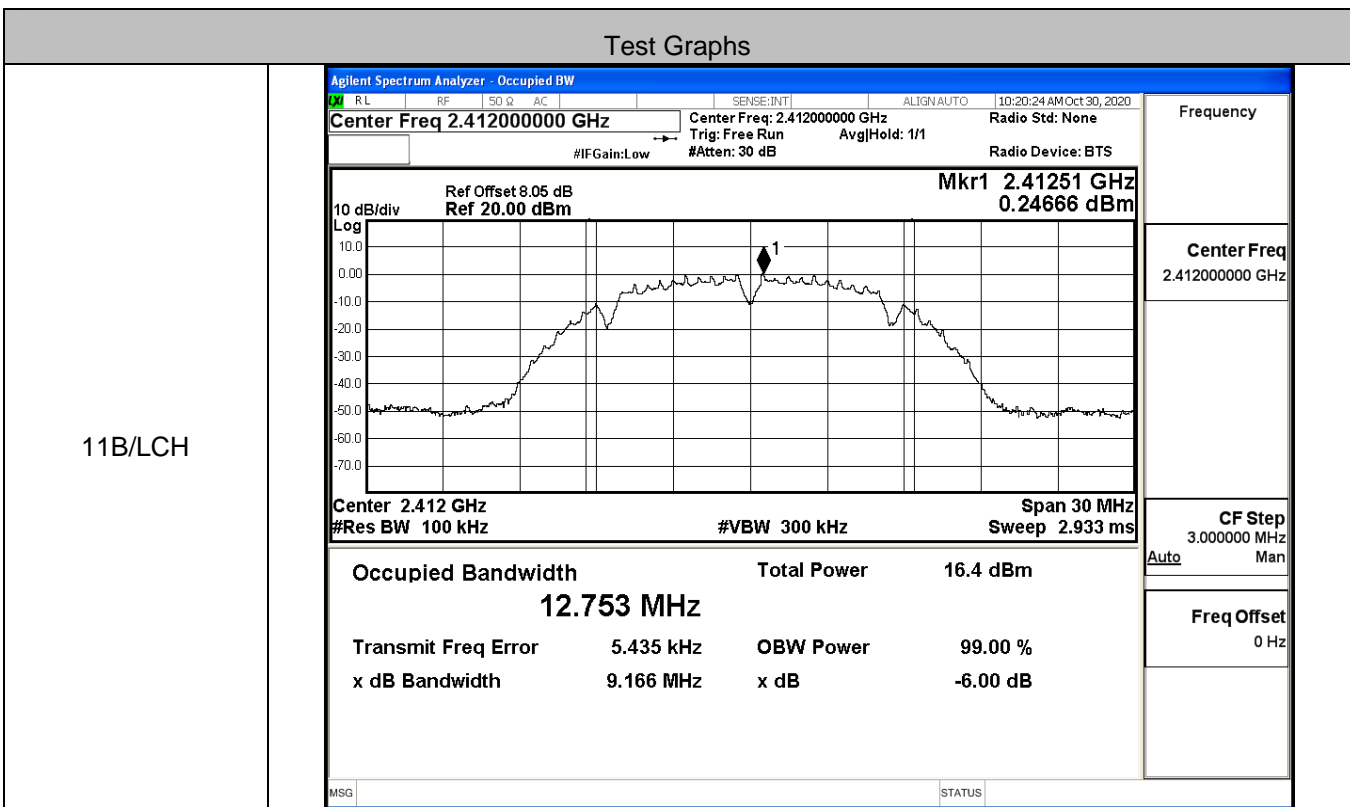
Mode	Channel	ANT 0 [dBm/3KHz]	ANT 1 [dBm/3KHz]	MIMO [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11N20	LCH	-20.96	-19.88	-17.38	8	PASS
	MCH	-21.68	-22.04	-18.85	8	PASS
	HCH	-20.26	-20.50	-17.37	8	PASS
11N40	LCH	-23.14	-23.79	-20.44	8	PASS
	MCH	-22.98	-23.63	-20.28	8	PASS
	HCH	-22.86	-23.96	-20.36	8	PASS

C.4 6dB Bandwidth

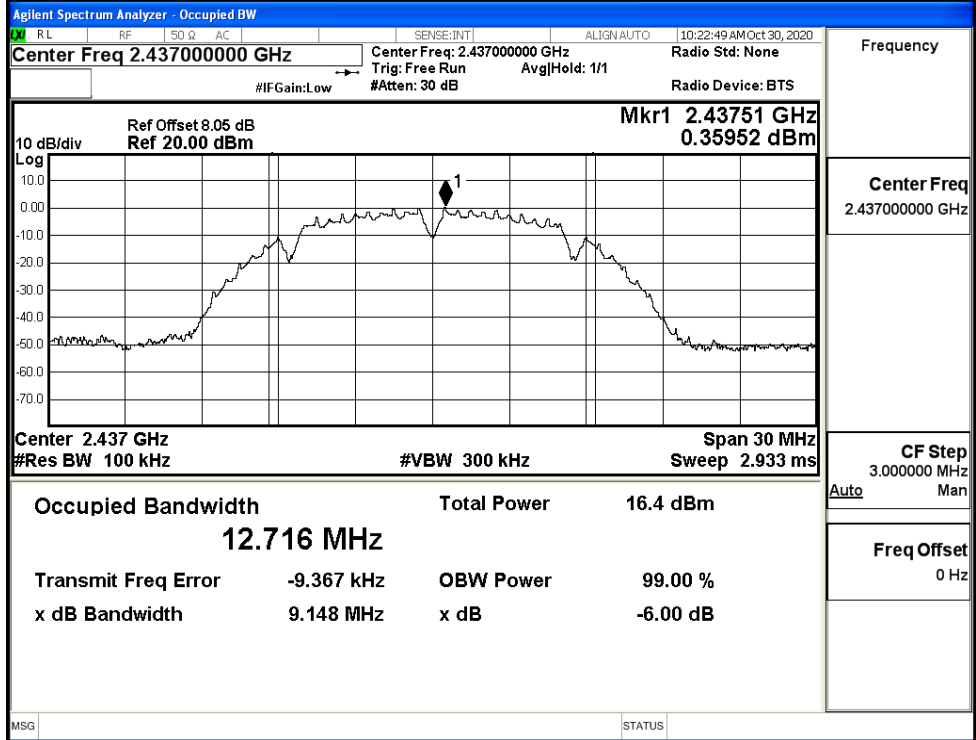
ANT 0

Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.166	≥0.5	PASS
	MCH	9.148	≥0.5	PASS
	HCH	9.162	≥0.5	PASS
11G	LCH	15.43	≥0.5	PASS
	MCH	15.16	≥0.5	PASS
	HCH	15.13	≥0.5	PASS
11N20SISO	LCH	15.15	≥0.5	PASS
	MCH	15.14	≥0.5	PASS
	HCH	15.15	≥0.5	PASS
11N40SISO	LCH	35.16	≥0.5	PASS
	MCH	35.16	≥0.5	PASS
	HCH	35.17	≥0.5	PASS

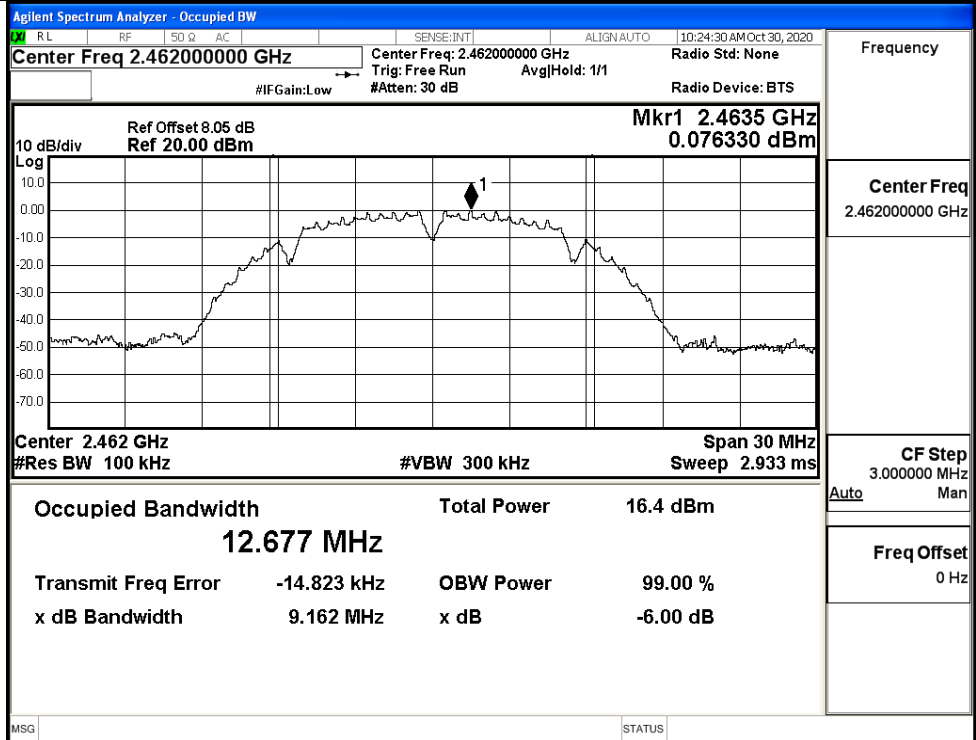
Test Graphs



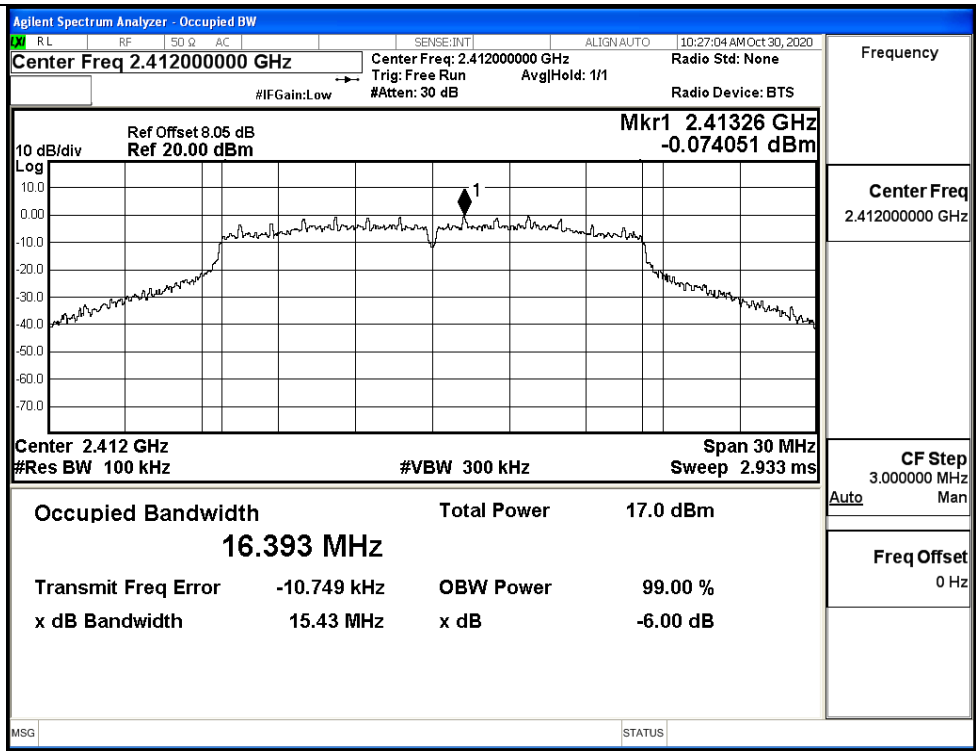
11B/MCH



11B/HCH



11G/LCH



Frequency

Center Freq

2.41200000 GHz

CF Step

3.000000 MHz

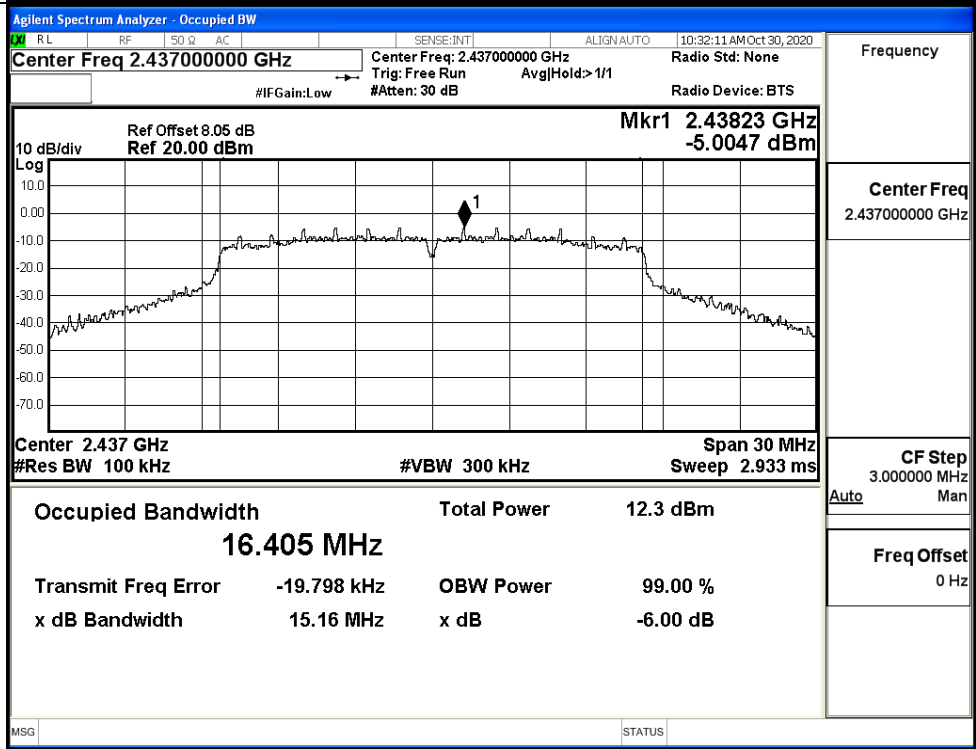
Auto

Man

Freq Offset

0 Hz

11G/MCH



Frequency

Center Freq

2.43700000 GHz

CF Step

3.000000 MHz

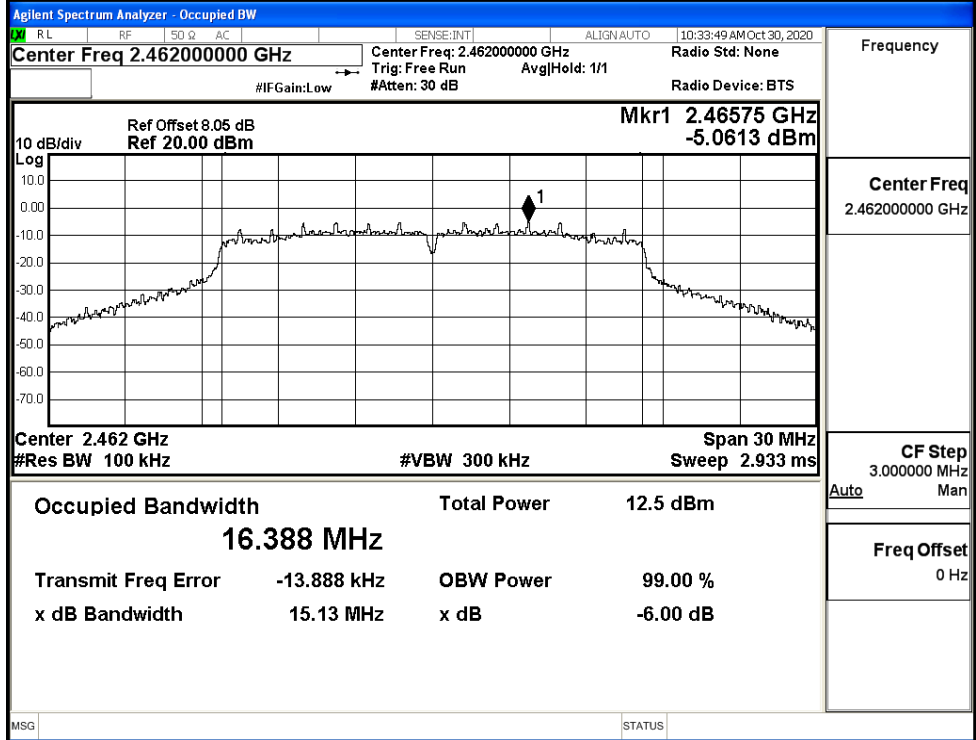
Auto

Man

Freq Offset

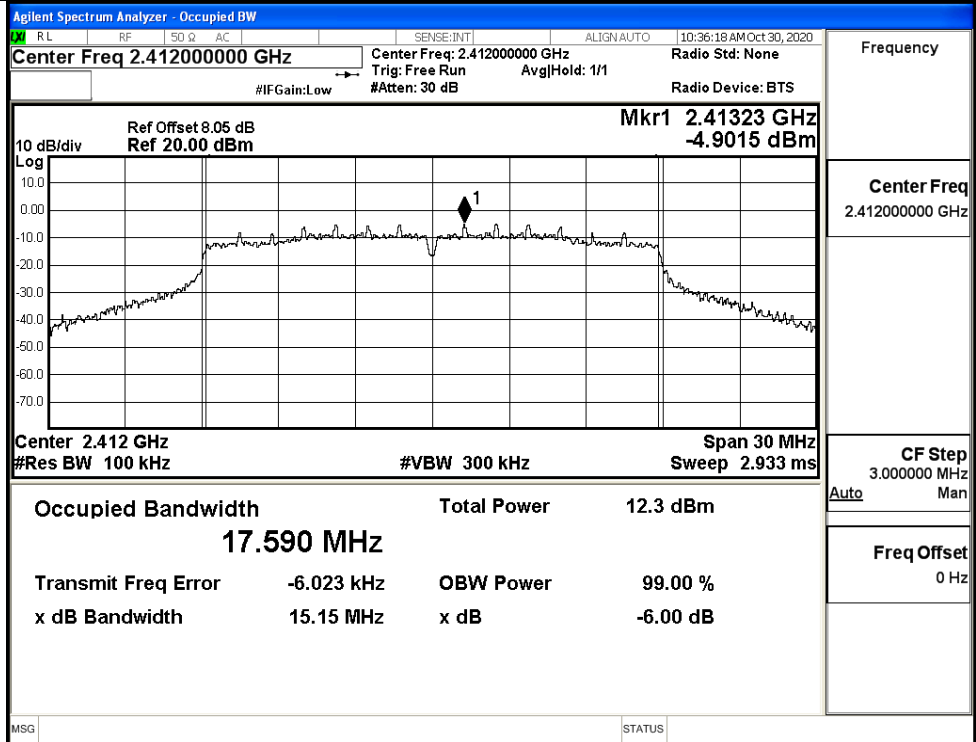
0 Hz

11G/HCH

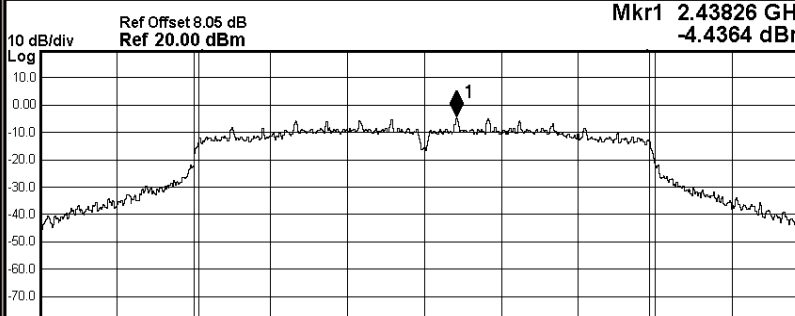
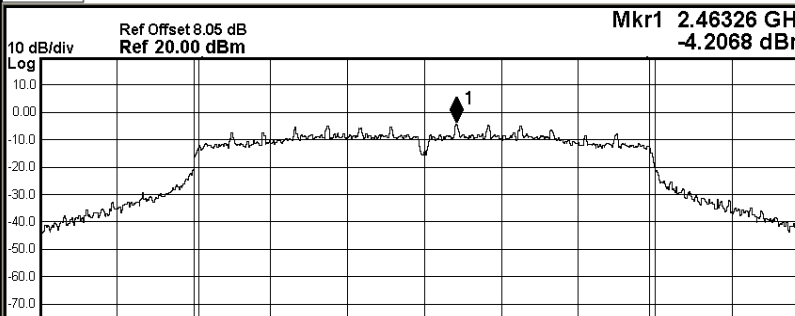


Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

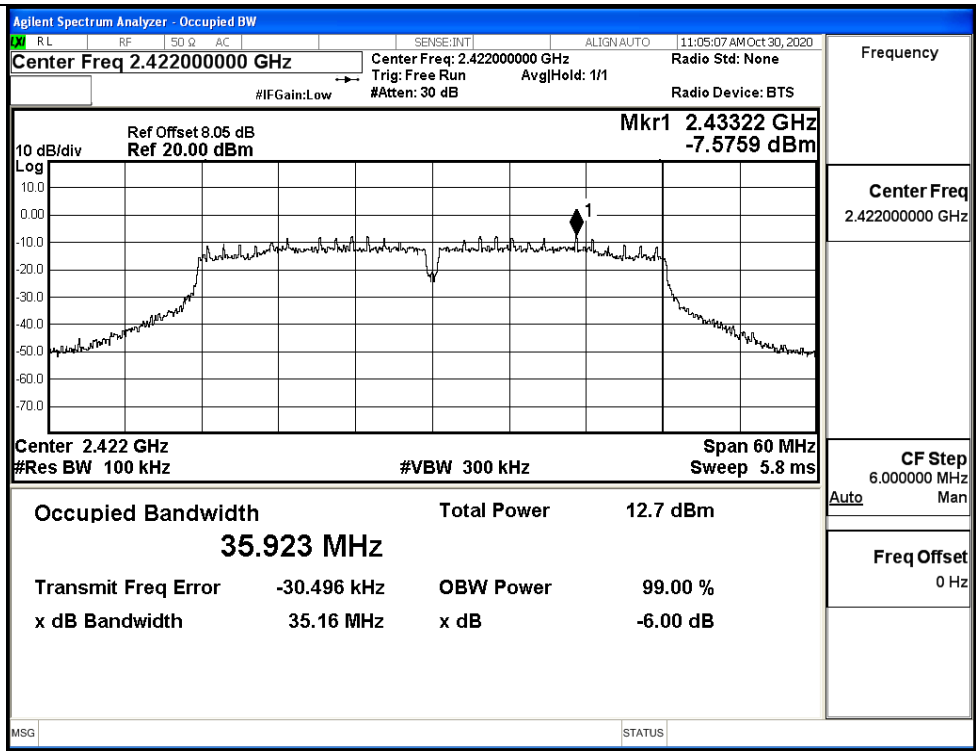
11N20SISO/LCH



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

<p>11N20SISO/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>RL RF SQ Ω AC SENSE:INT ALIGN AUTO 10:40:03 AM Oct 30, 2020</p> <p>Center Freq 2.437000000 GHz Center Freq: 2.437000000 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 2.43826 GHz Ref 20.00 dBm -4.4364 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 17.579 MHz Total Power 12.2 dBm</p> <p>Transmit Freq Error -12.945 kHz OBW Power 99.00 % x dB Bandwidth 15.14 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.437000000 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 11:02:43 AM Oct 30, 2020</p> <p>Center Freq 2.462000000 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 2.46326 GHz Ref 20.00 dBm -4.2068 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 17.589 MHz Total Power 12.8 dBm</p> <p>Transmit Freq Error -12.133 kHz OBW Power 99.00 % x dB Bandwidth 15.15 MHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.462000000 GHz</p> <p>CF Step 3.000000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p>

11N40SISO/LCH



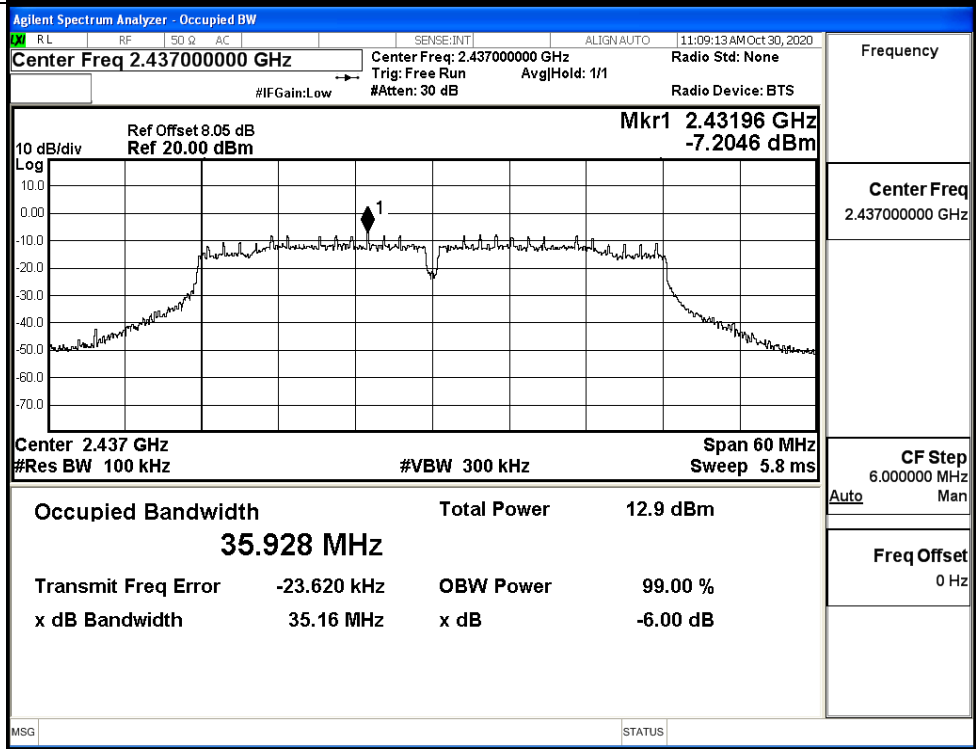
Frequency

Center Freq
2.42200000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

11N40SISO/MCH

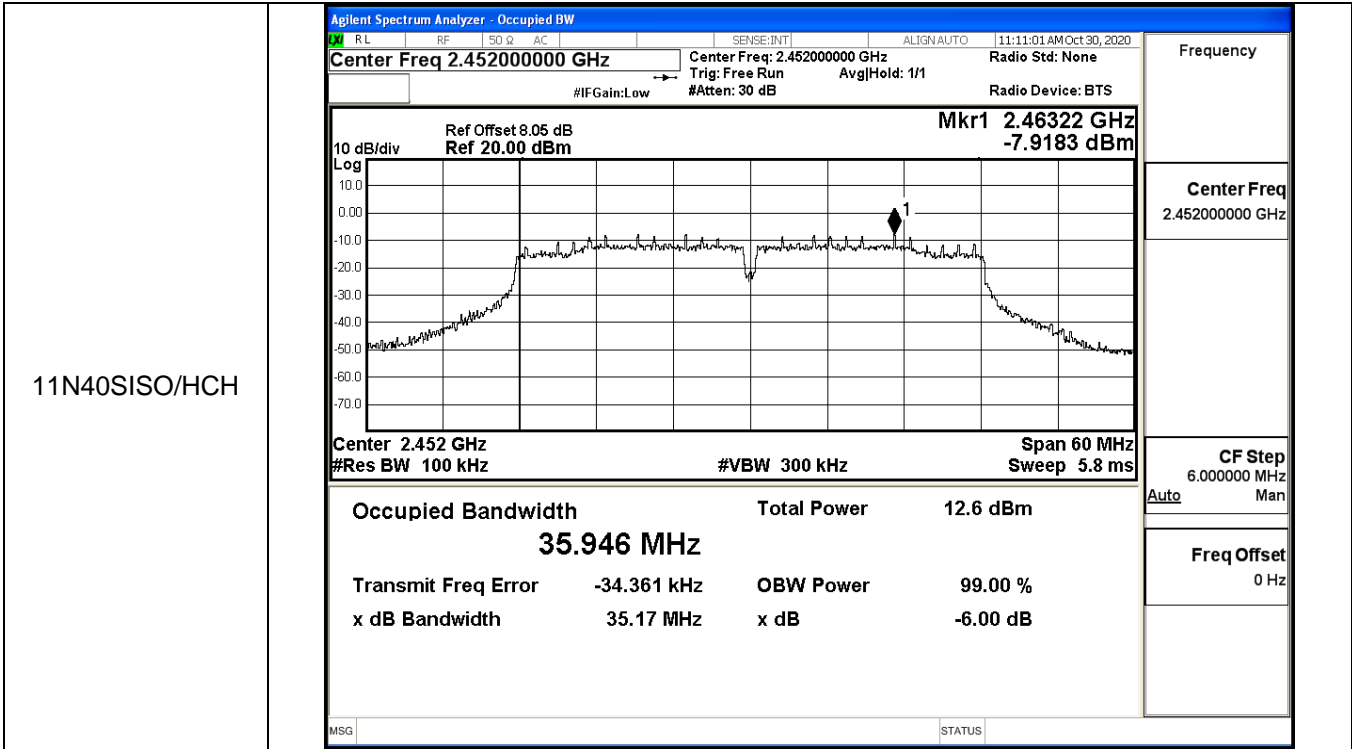


Frequency

Center Freq
2.43700000 GHz

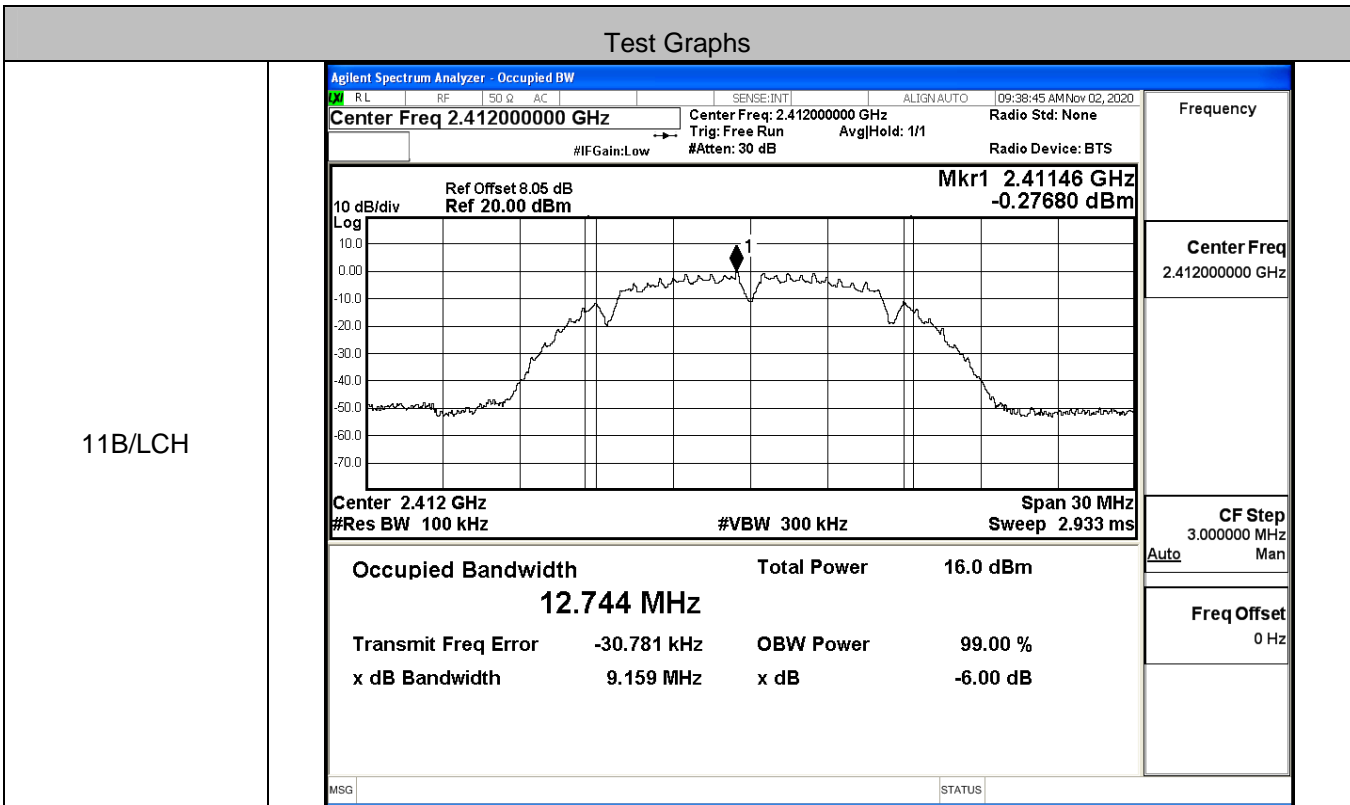
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

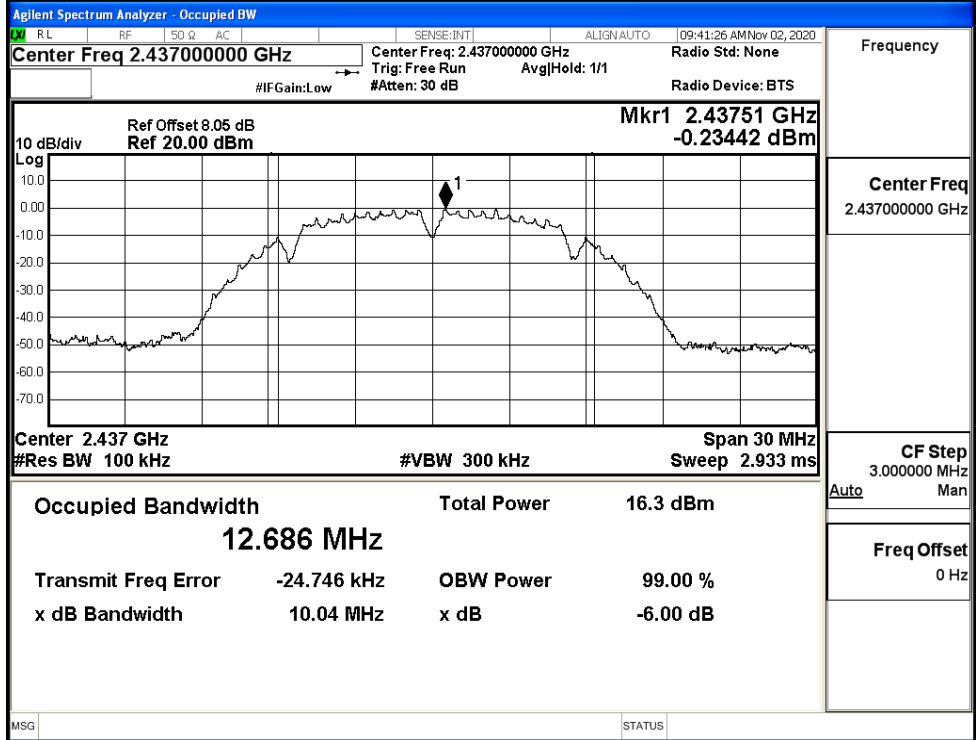


ANT 1

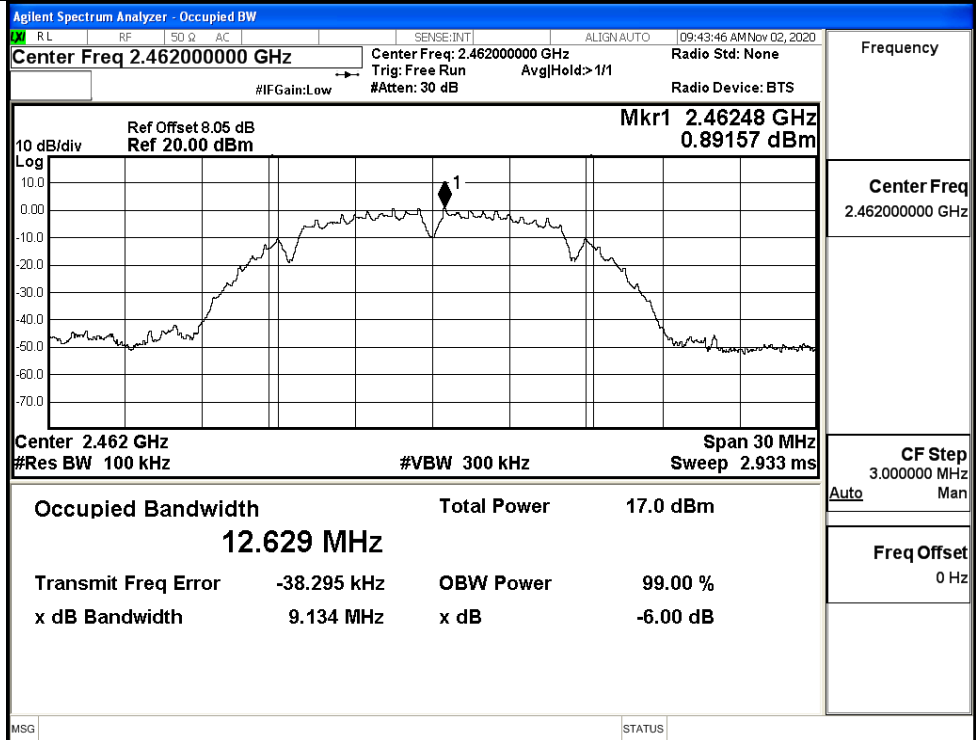
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.159	≥0.5	PASS
	MCH	10.04	≥0.5	PASS
	HCH	9.134	≥0.5	PASS
11G	LCH	15.15	≥0.5	PASS
	MCH	15.14	≥0.5	PASS
	HCH	15.17	≥0.5	PASS
11N20SISO	LCH	15.15	≥0.5	PASS
	MCH	15.07	≥0.5	PASS
	HCH	15.34	≥0.5	PASS
11N40SISO	LCH	35.17	≥0.5	PASS
	MCH	35.15	≥0.5	PASS
	HCH	35.18	≥0.5	PASS



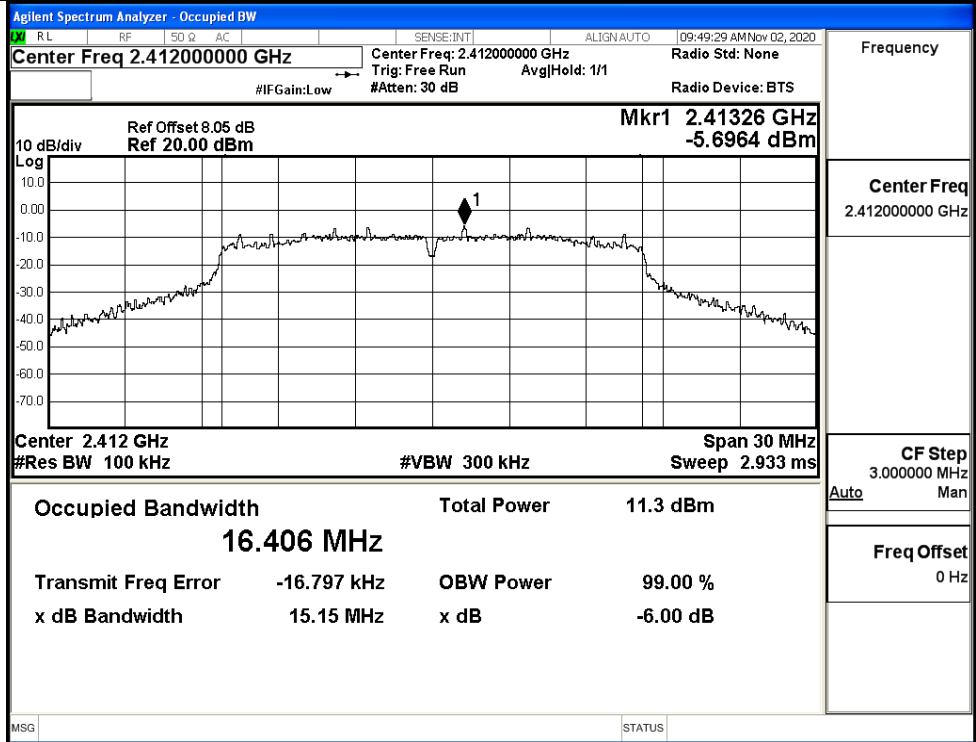
11B/MCH



11B/HCH



11G/LCH



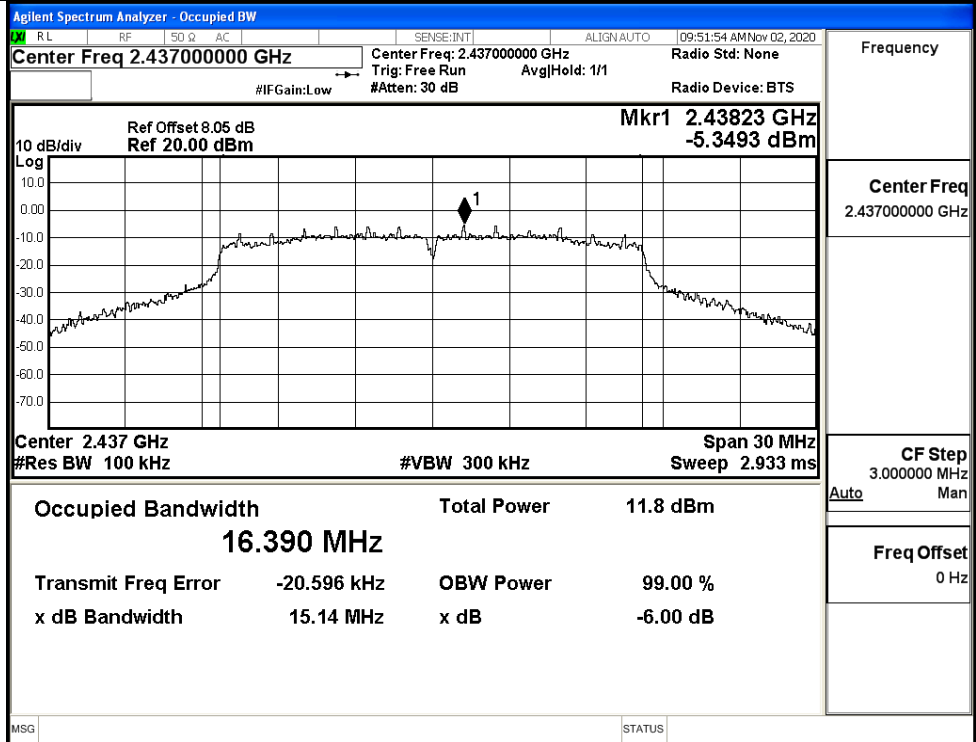
Frequency

Center Freq
2.41200000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11G/MCH



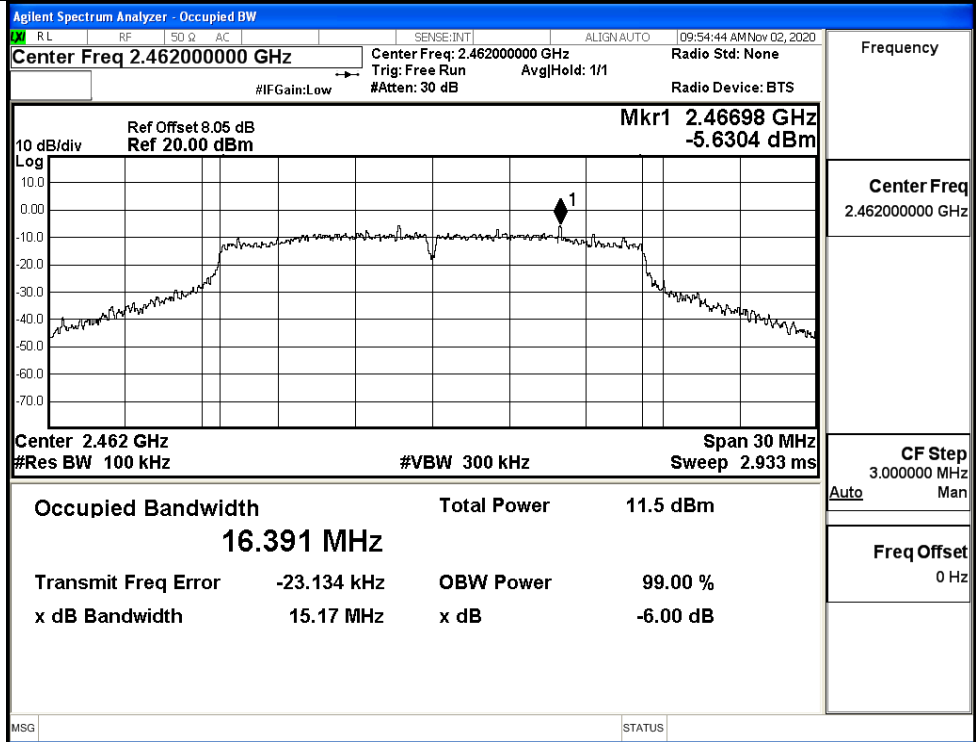
Frequency

Center Freq
2.43700000 GHz

CF Step
3.000000 MHz
Auto Man

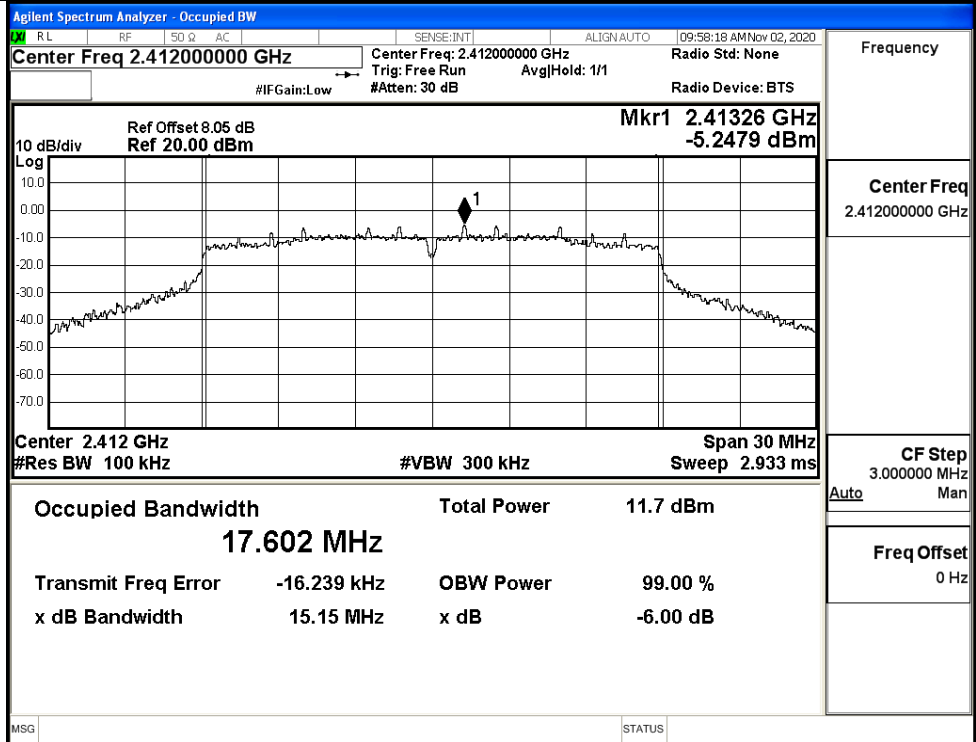
Freq Offset
0 Hz

11G/HCH



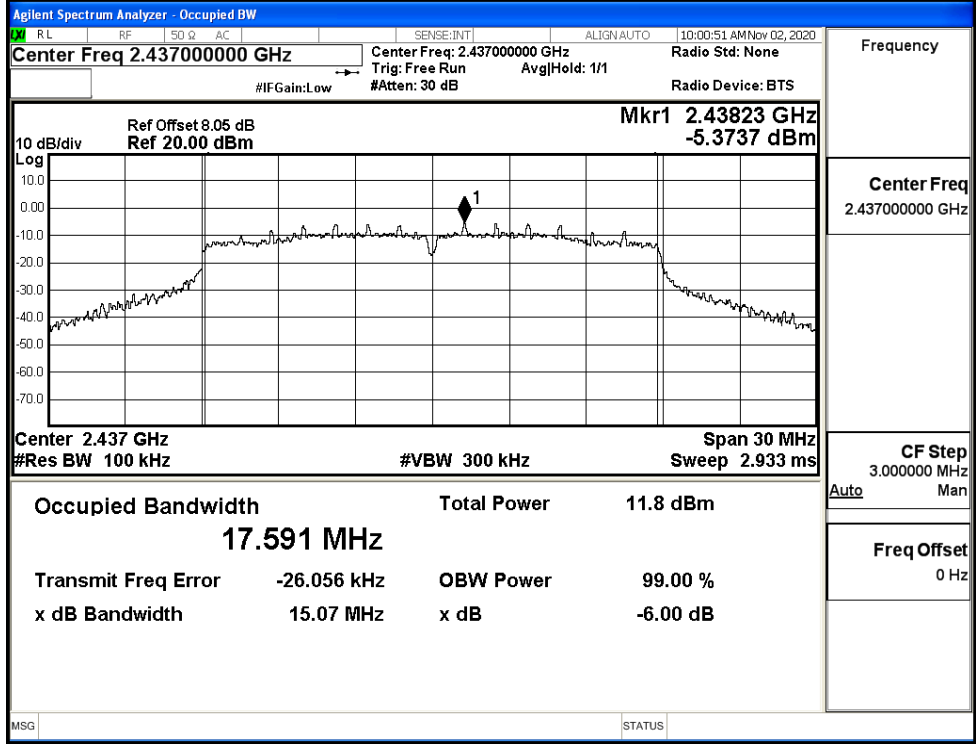
Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11N20SISO/LCH



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

11N20SISO/MCH

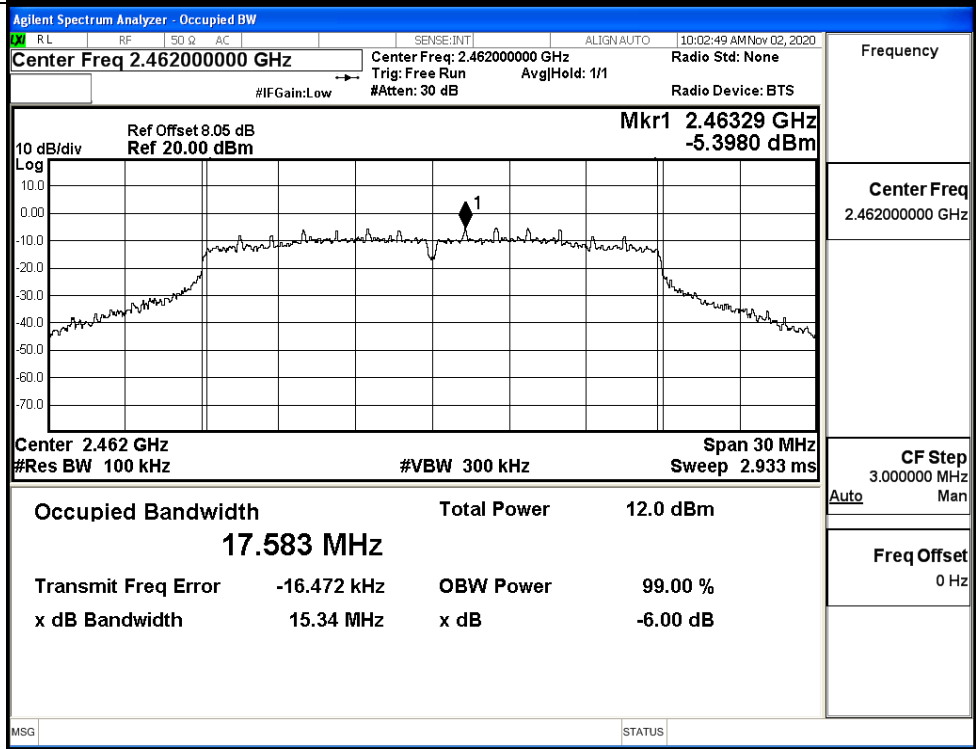


Frequency
2.43700000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/HCH

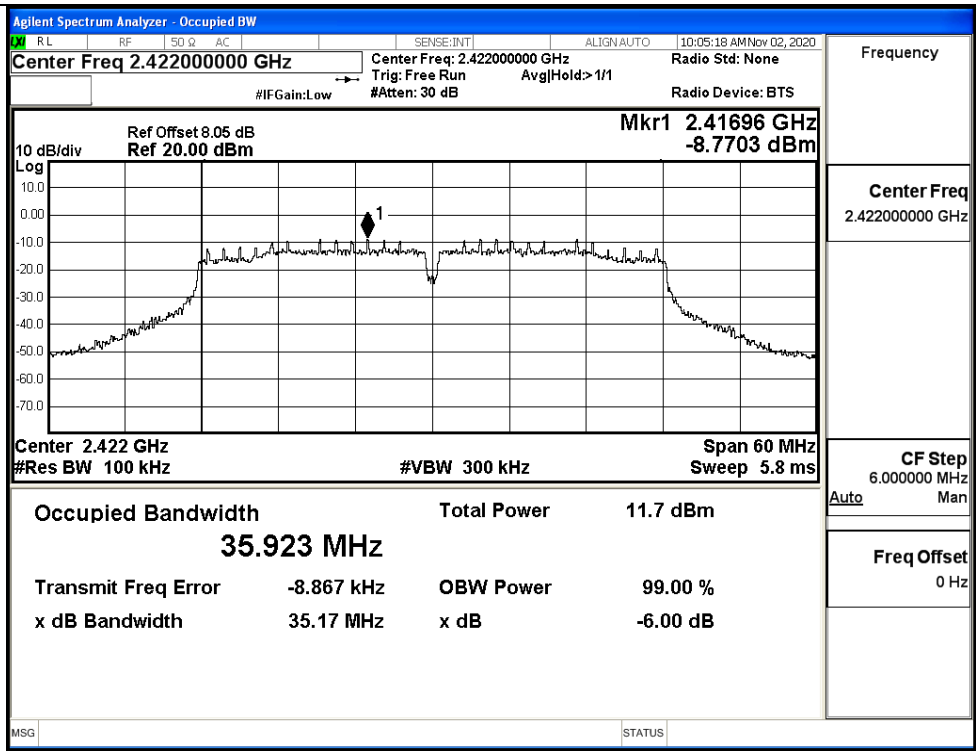


Frequency
2.46200000 GHz

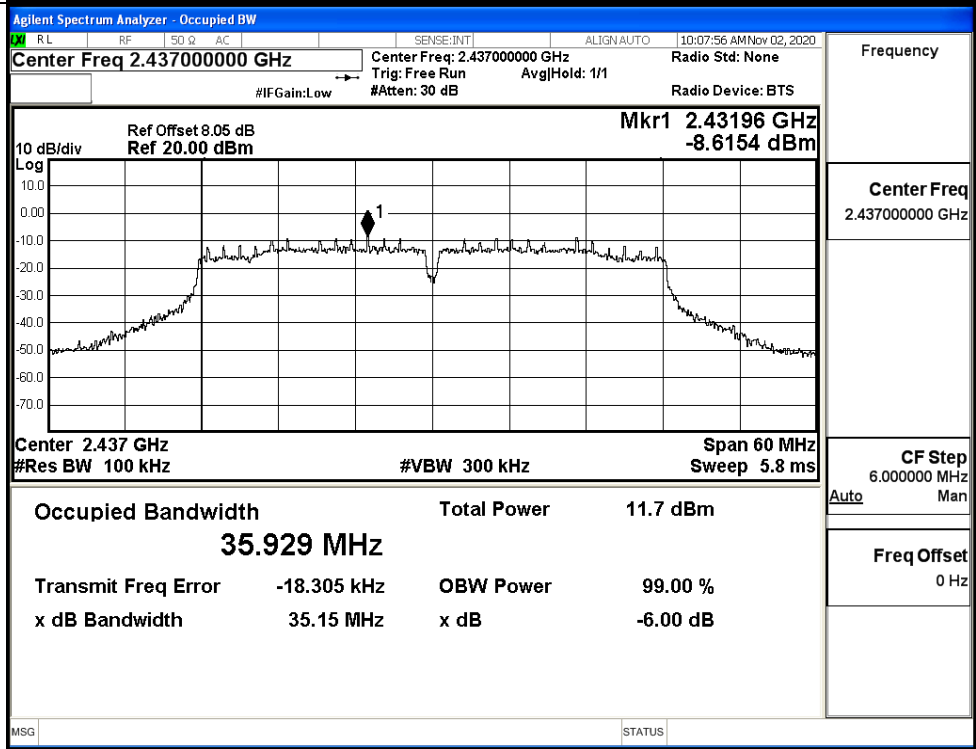
CF Step
3.000000 MHz
Auto Man

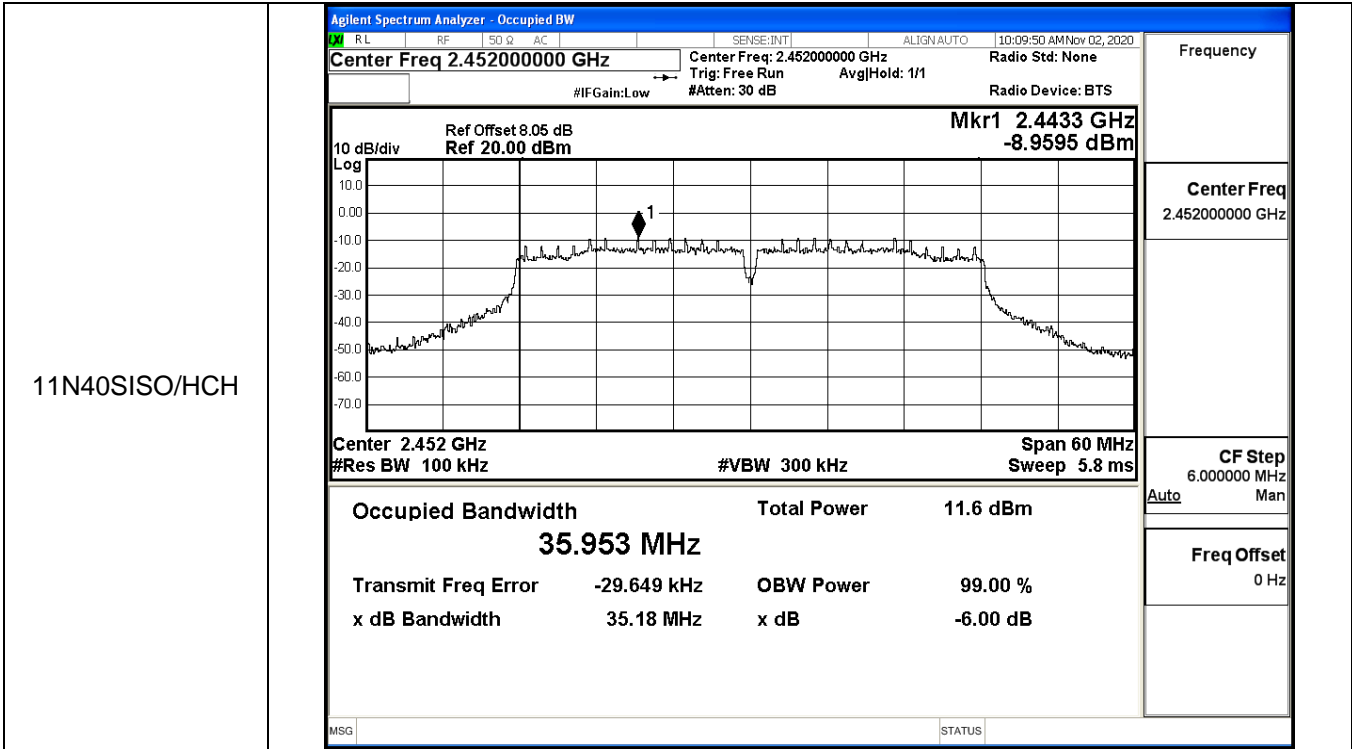
Freq Offset
0 Hz

11N40SISO/LCH



11N40SISO/MCH



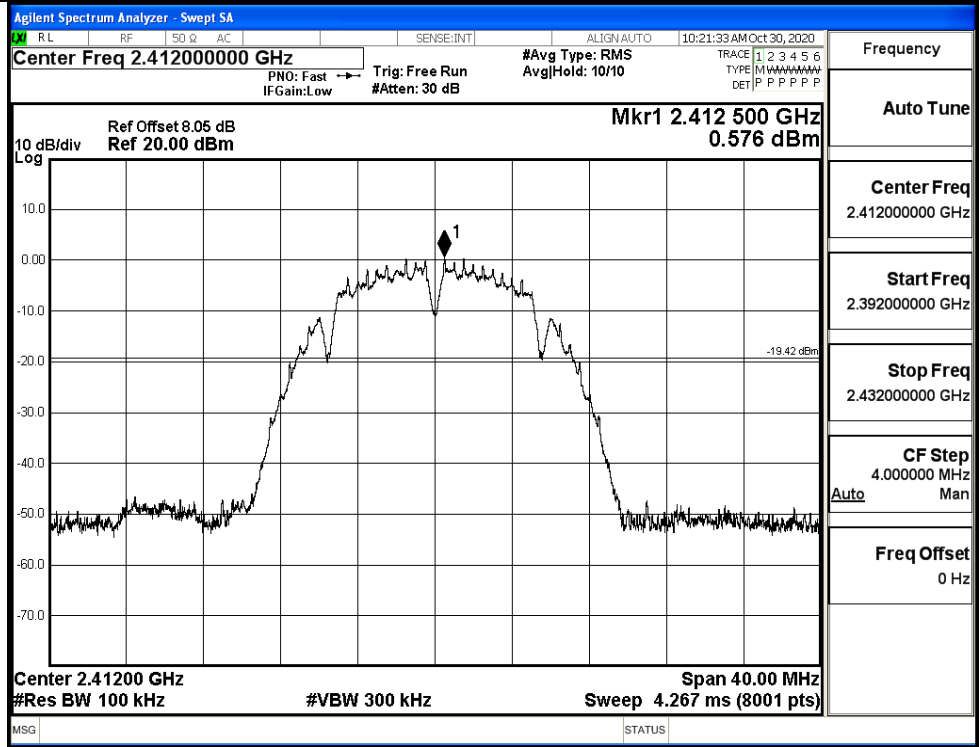


C.5 RF Conducted Spurious Emissions**ANT 0**

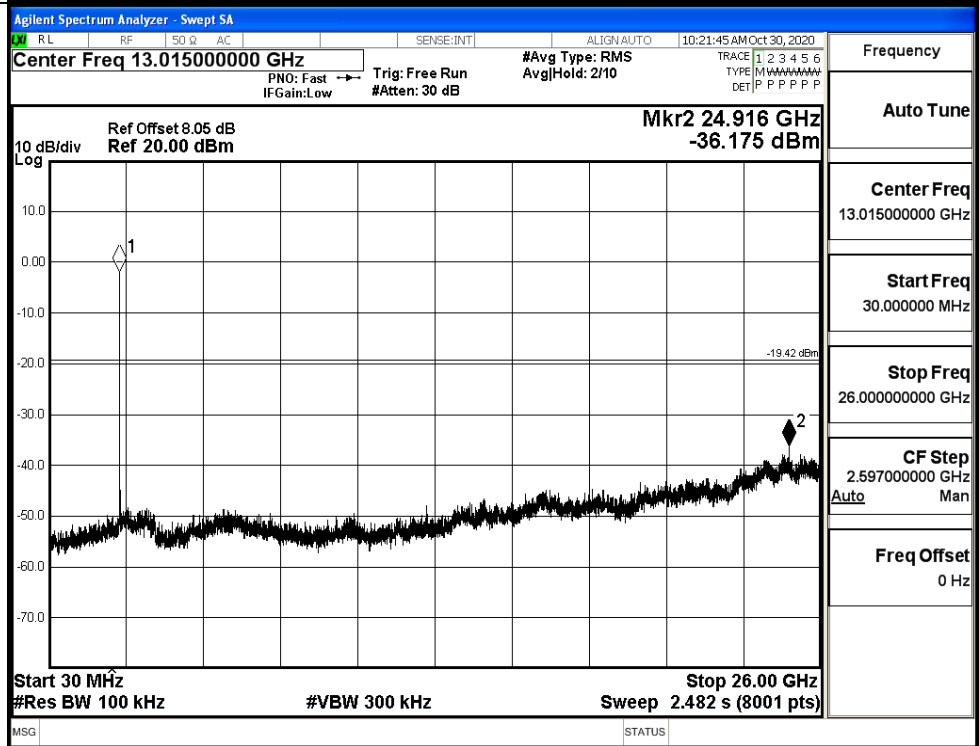
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	0.576	-36.175	-19.424	PASS
	MCH	0.328	-37.994	-19.672	PASS
	HCH	-0.449	-37.739	-20.449	PASS
11G	LCH	-5.292	-37.112	-25.292	PASS
	MCH	-4.938	-37.989	-24.938	PASS
	HCH	-4.758	-37.549	-24.758	PASS
11N20 SISO	LCH	-5.267	-37.522	-25.267	PASS
	MCH	-5.512	-37.539	-25.512	PASS
	HCH	-4.269	-36.577	-24.269	PASS
11N40 SISO	LCH	-8.003	-37.832	-28.003	PASS
	MCH	-7.794	-37.786	-27.794	PASS
	HCH	-7.762	-37.654	-27.762	PASS

11B_LCH_Graphs

Pref/11B/LCH

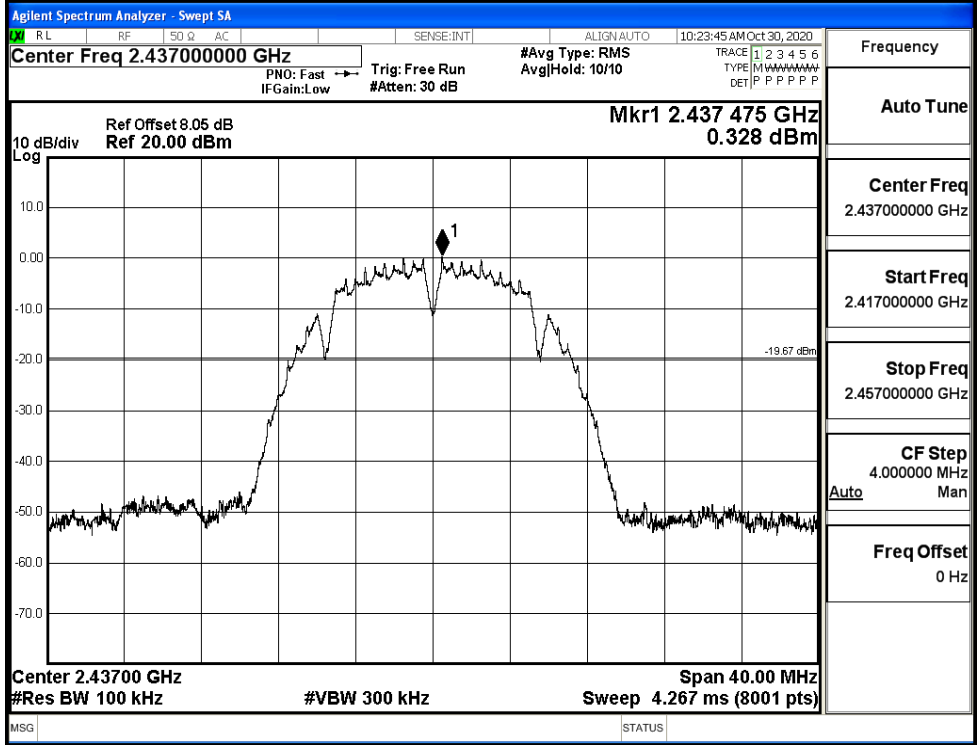


Puw/11B/LCH

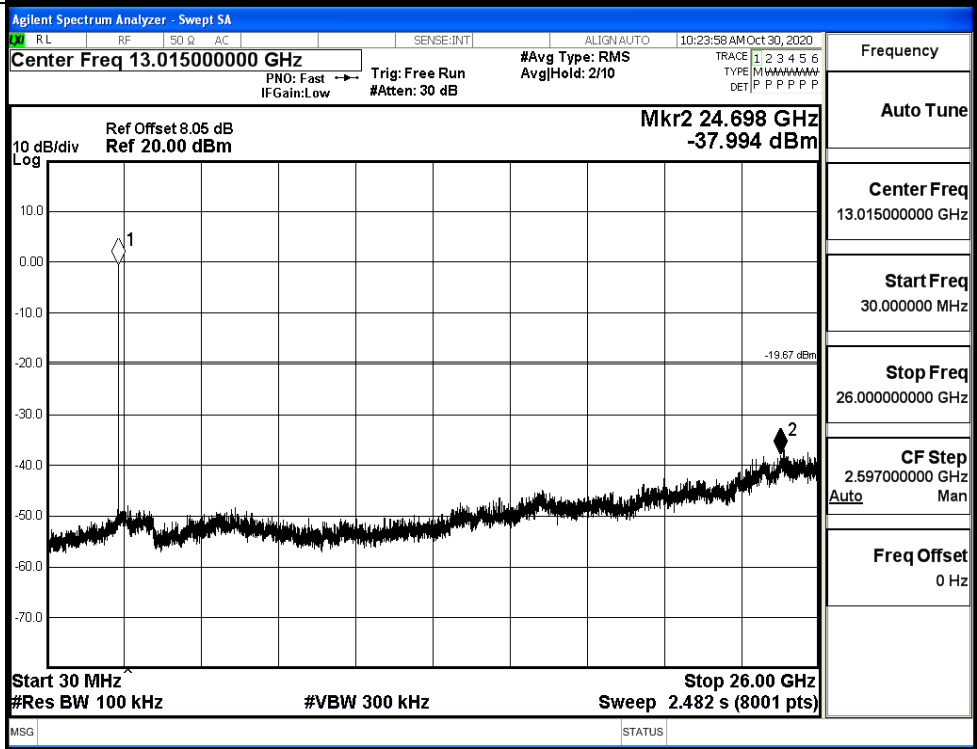


11B_MCH_Graphs

Pref/11B/MCH

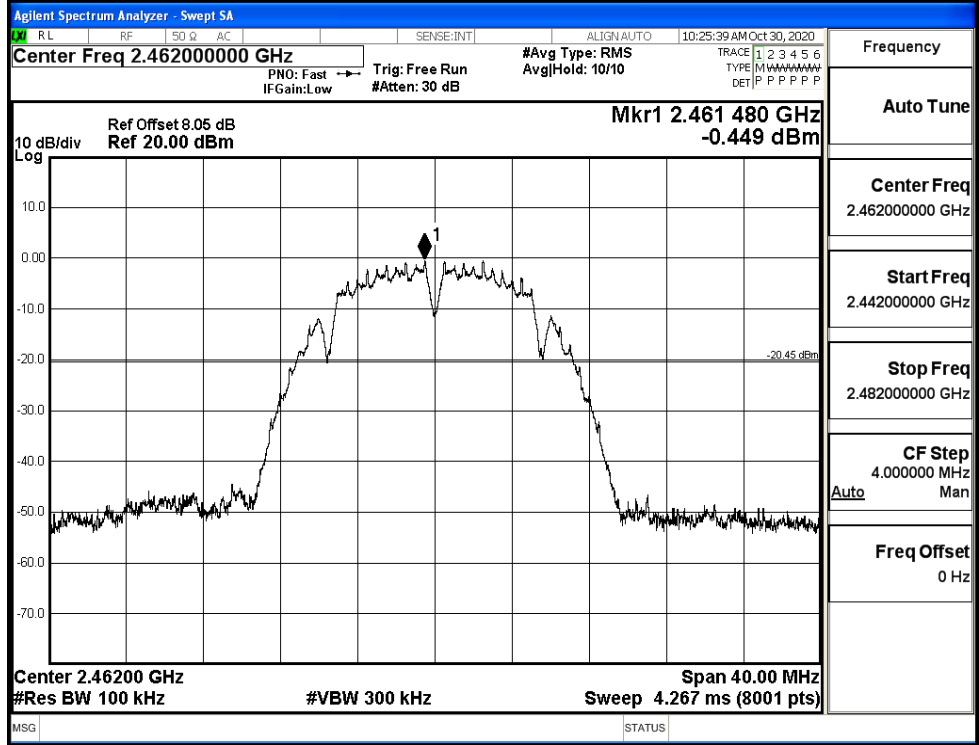


Puw/11B/MCH

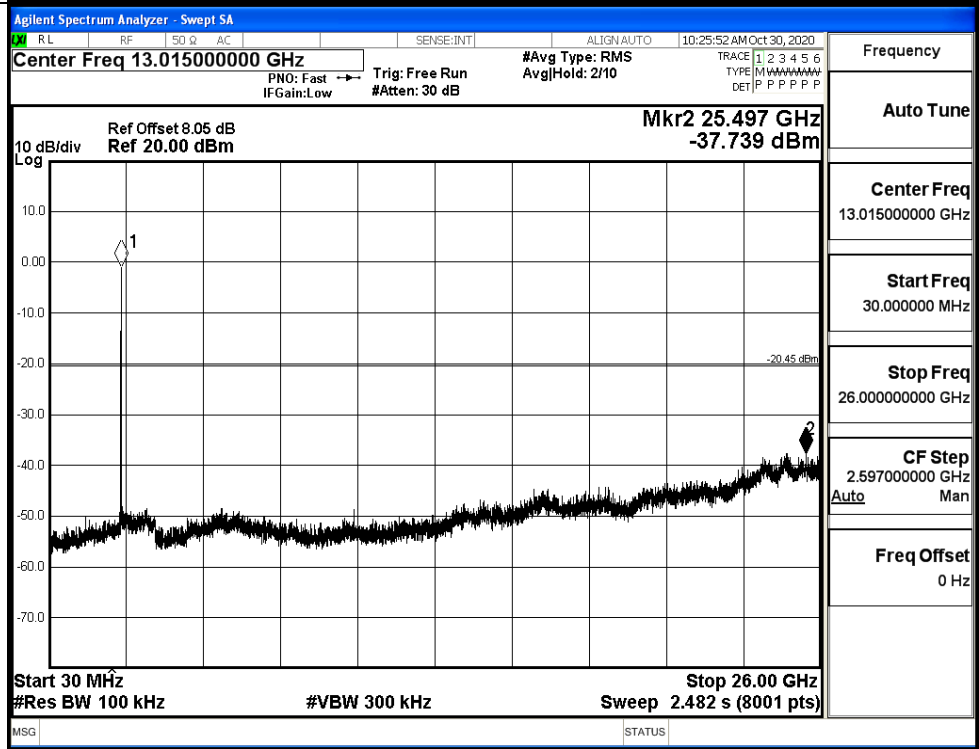


11B_HCH_Graphs

Pref/11B/HCH

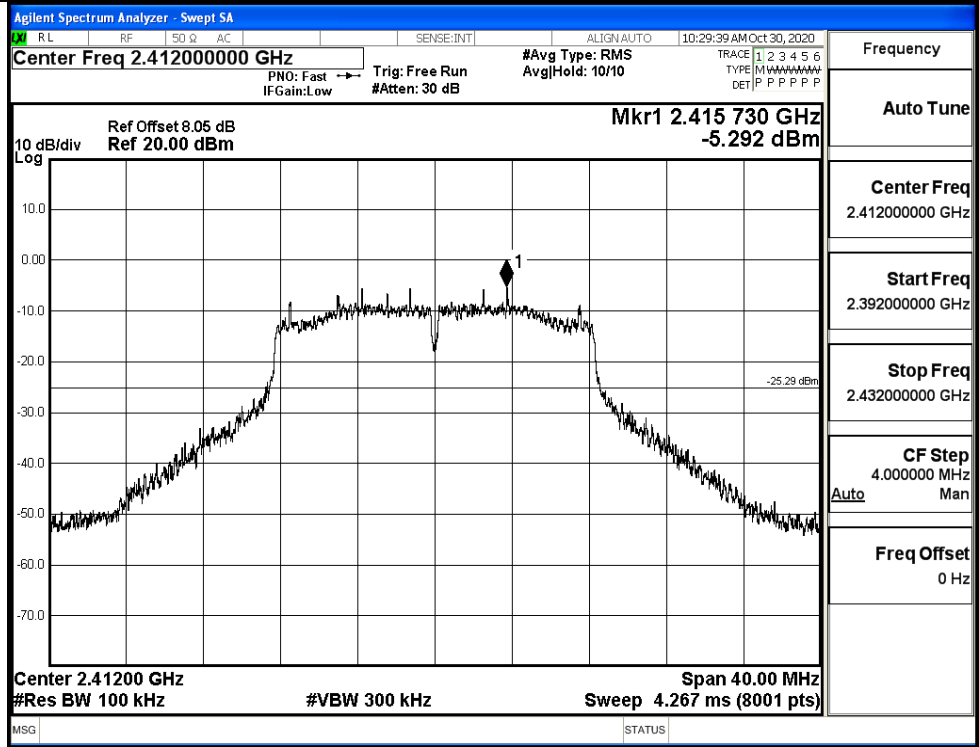


Puw/11B/HCH

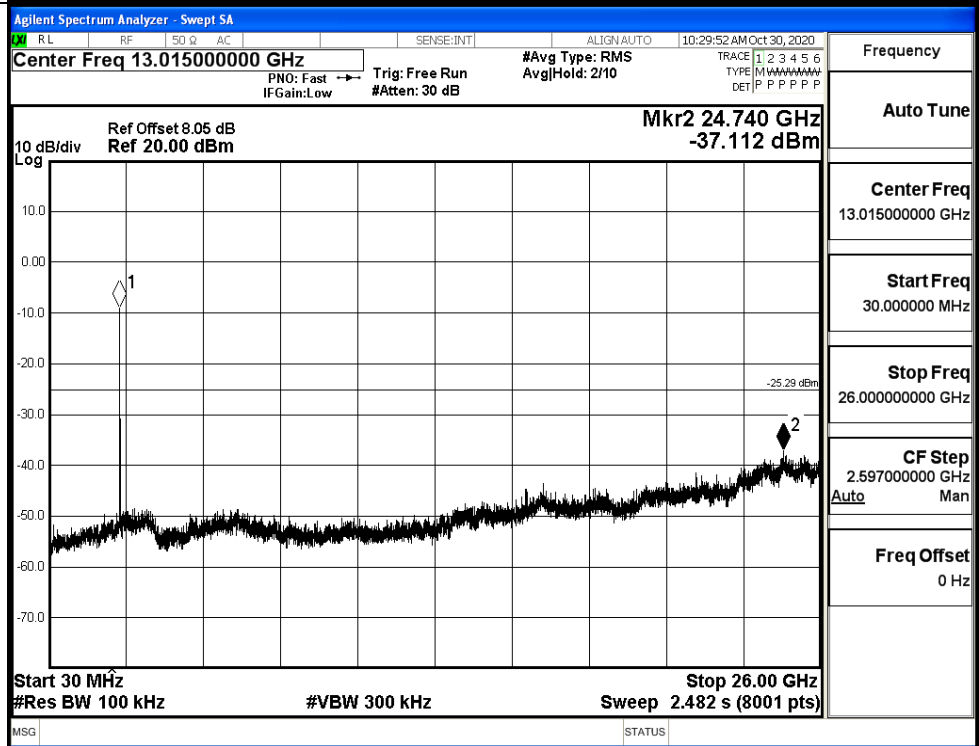


11G_LCH_Graphs

Pref/11G/LCH

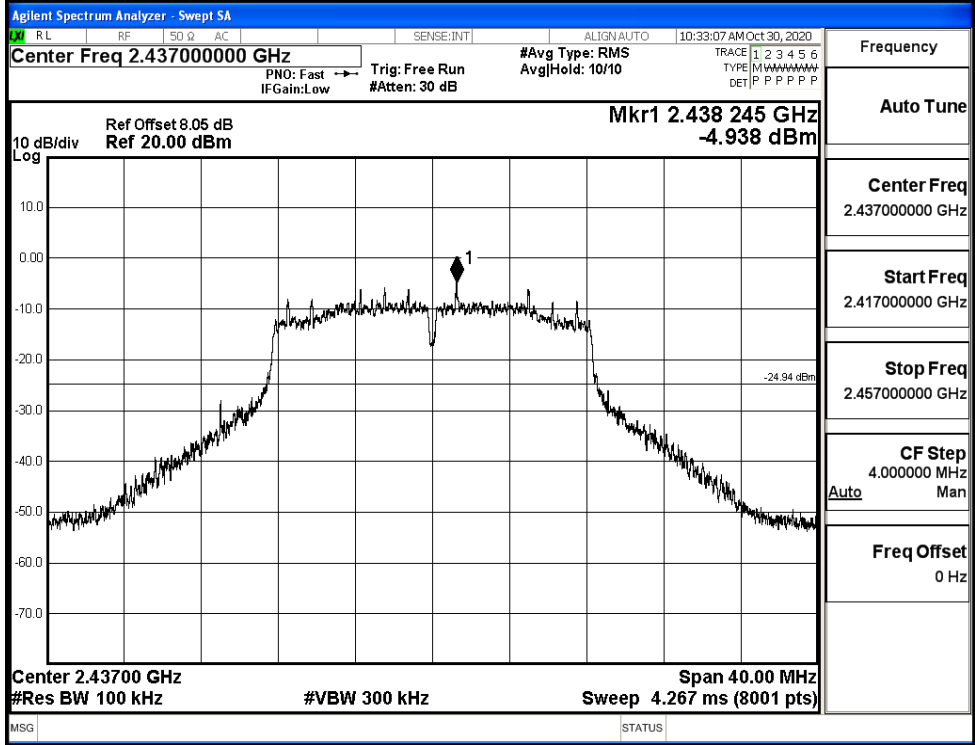


Puw/11G/LCH

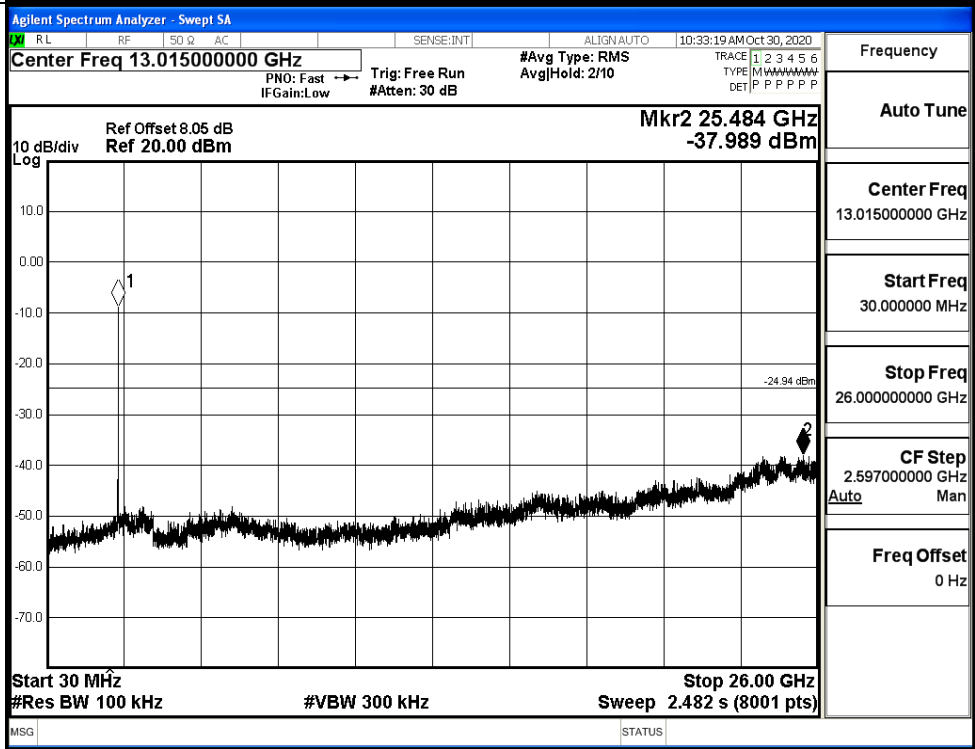


11G_MCH_Graphs

Pref/11G/MCH

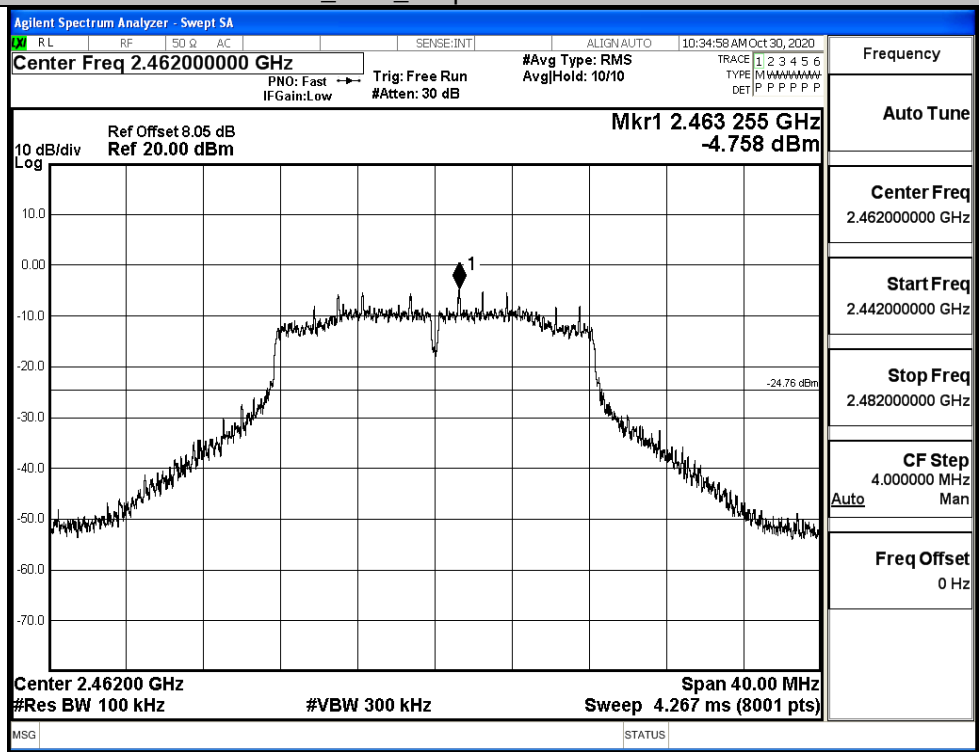


Puw/11G/MCH

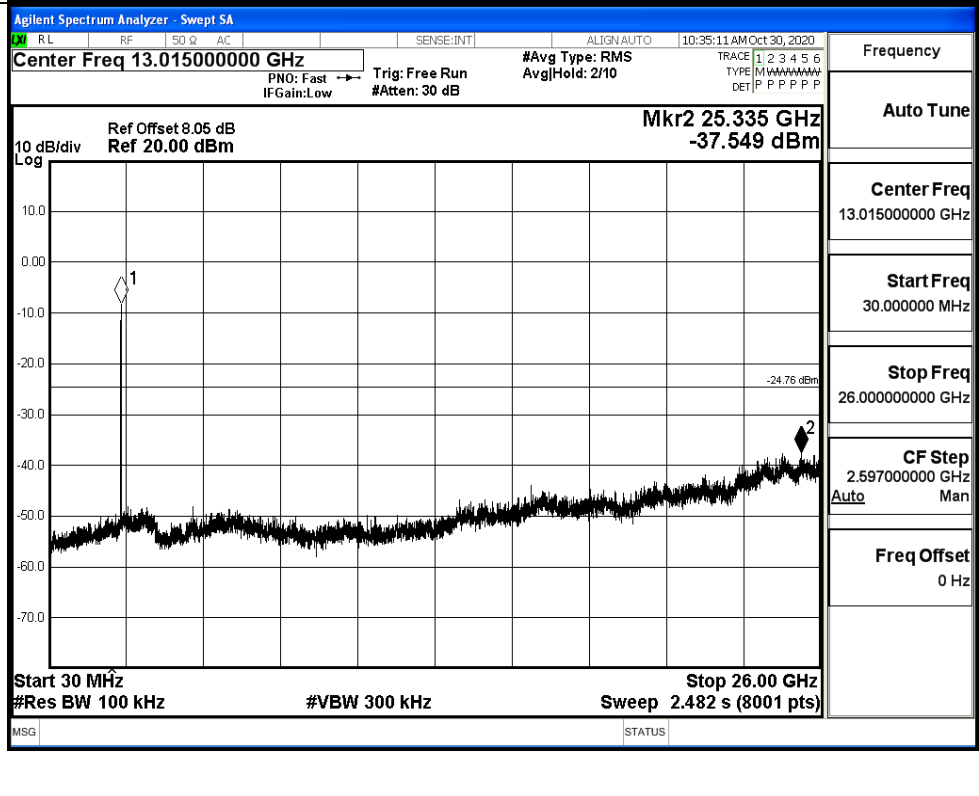


11G_HCH_Graphs

Pref/11G/HCH

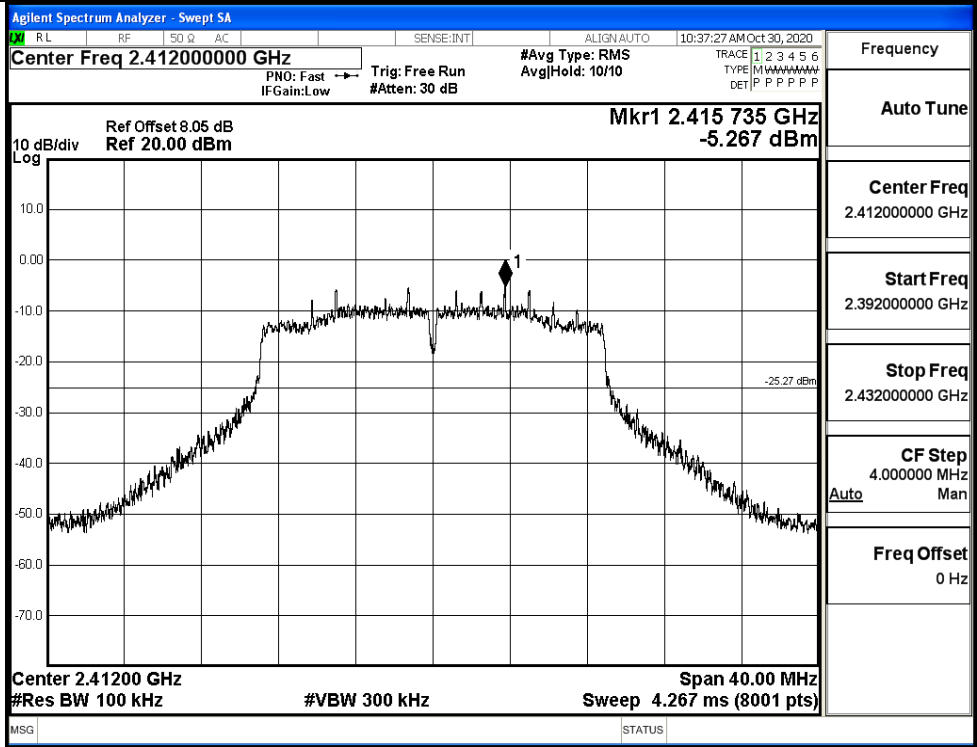


Puw/11G/HCH

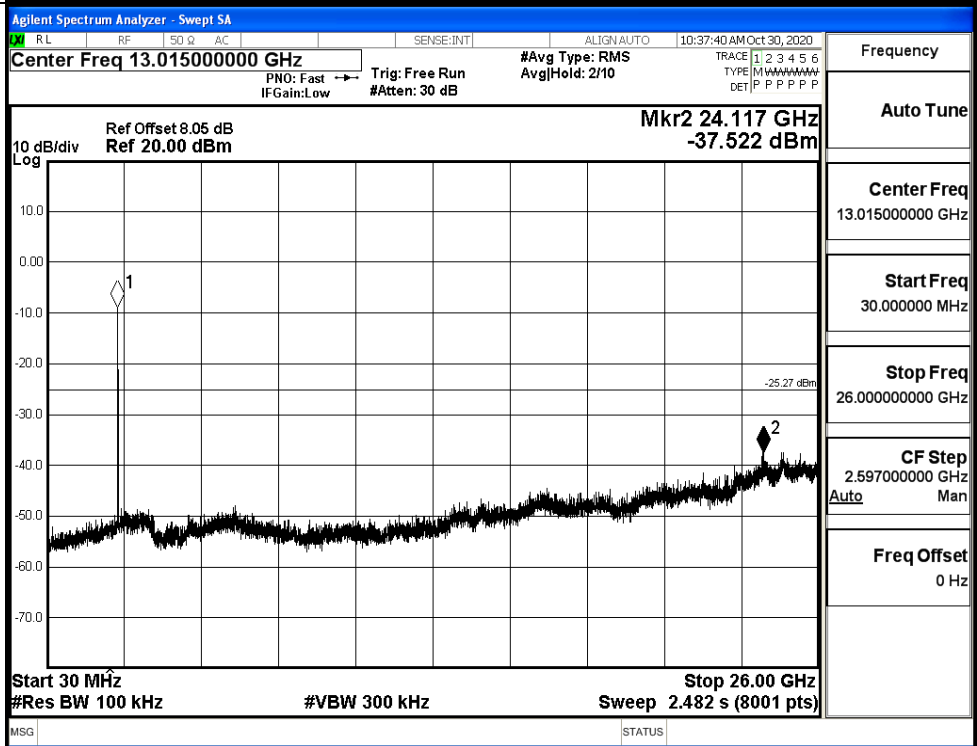


11N20SISO_LCH_Graphs

Pref/11N20SIS
O/LCH

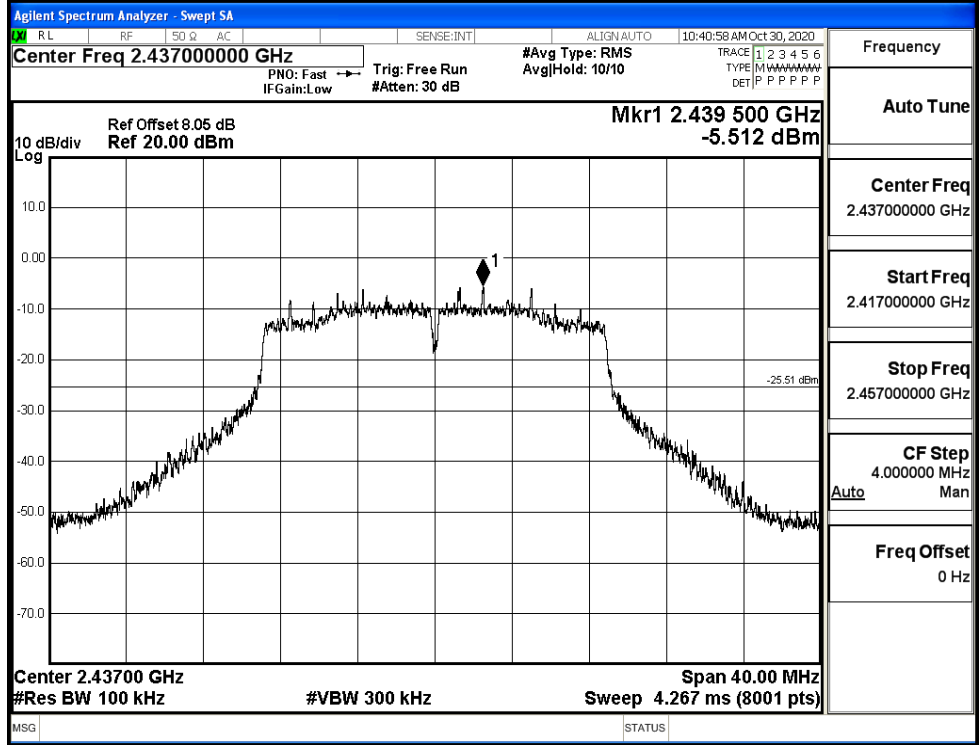


Puw/11N20
SISO/LCH

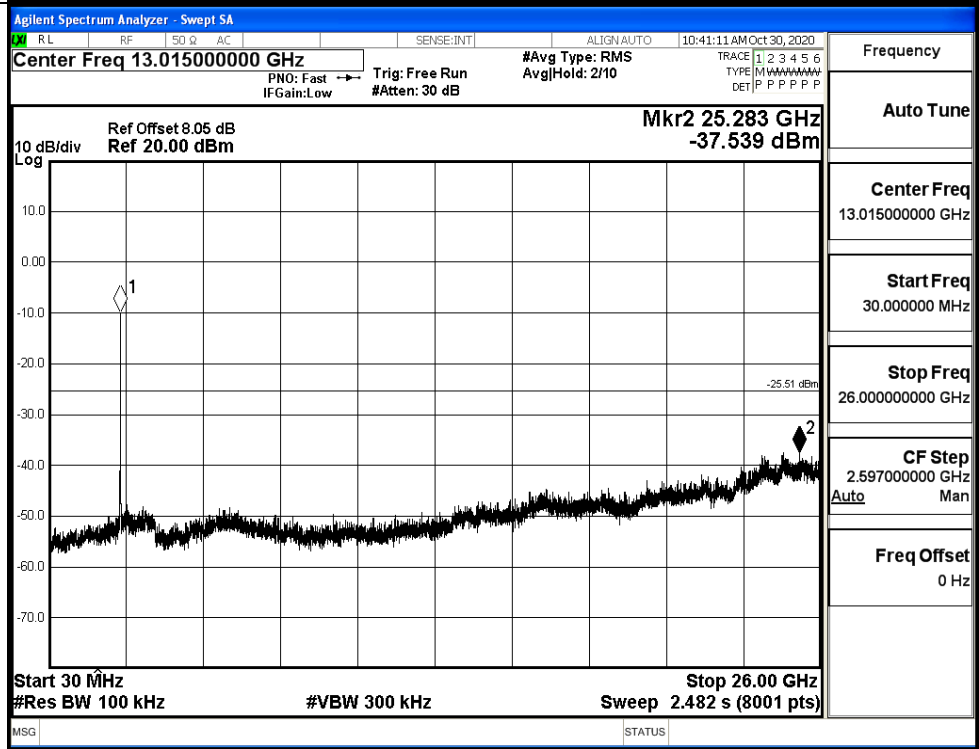


11N20SISO_MCH_Graphs

Pref/11N20
SISO/MCH

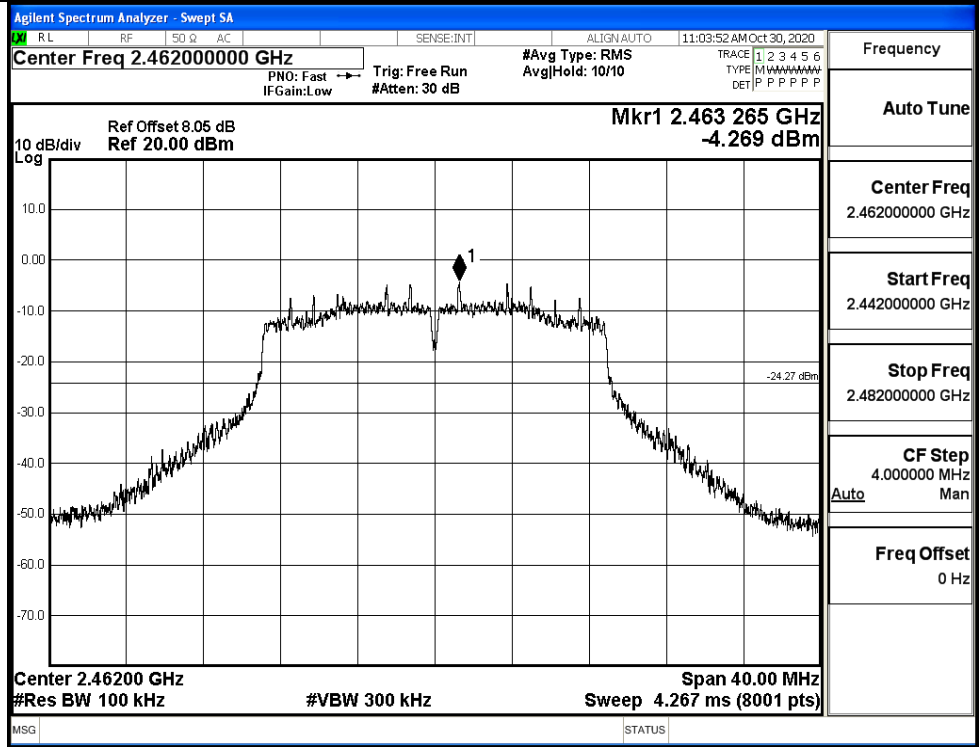


Puw/11N20
SISO/MCH

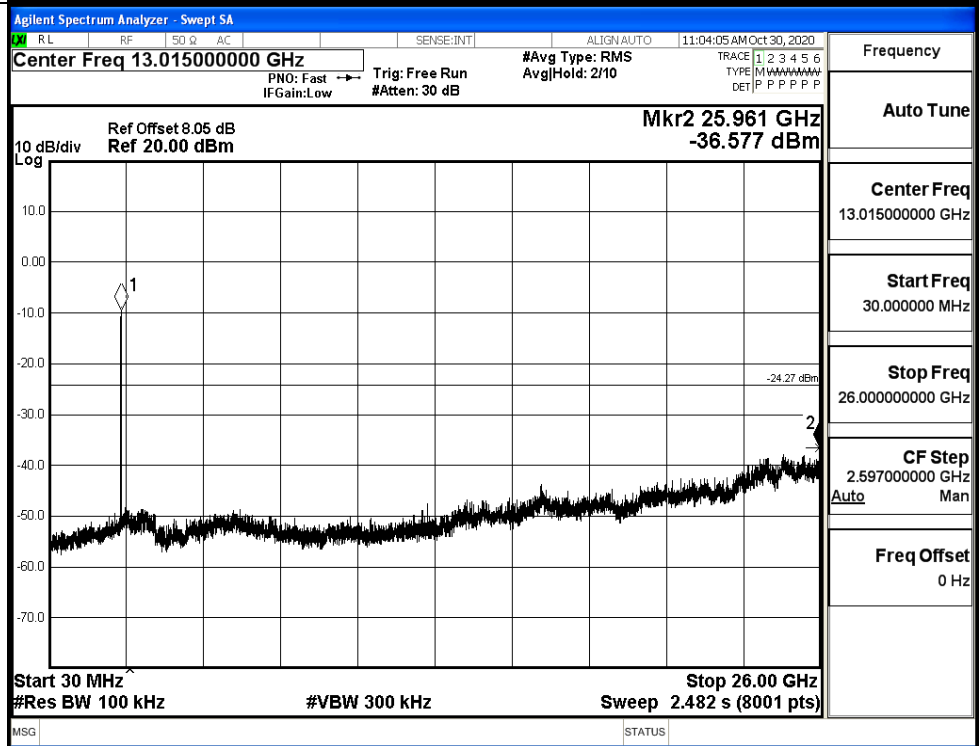


11N20SISO_HCH_Graphs

Pref/11N20
SISO/HCH

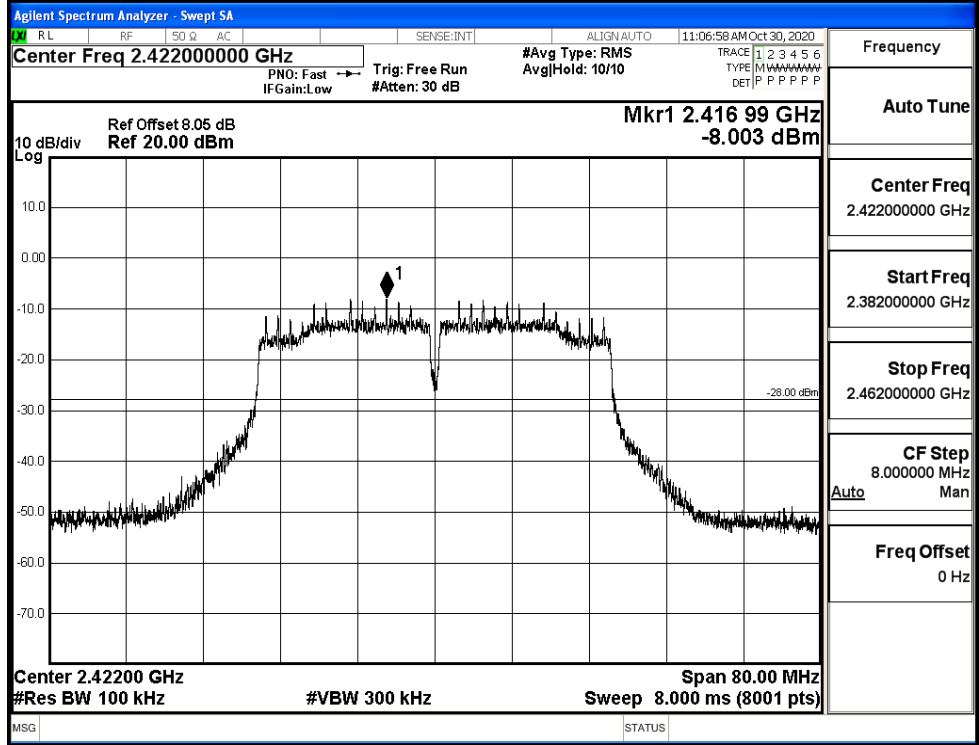


Puw/11N20
SISO/HCH

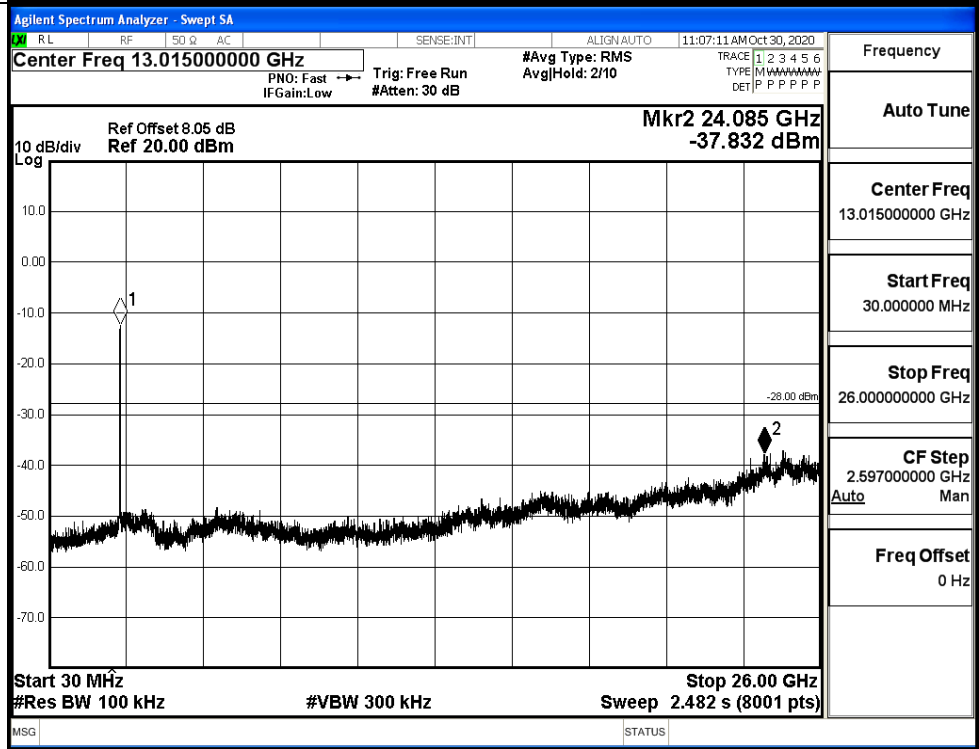


11N40SISO_LCH_Graphs

Pref/11N40
SISO/LCH

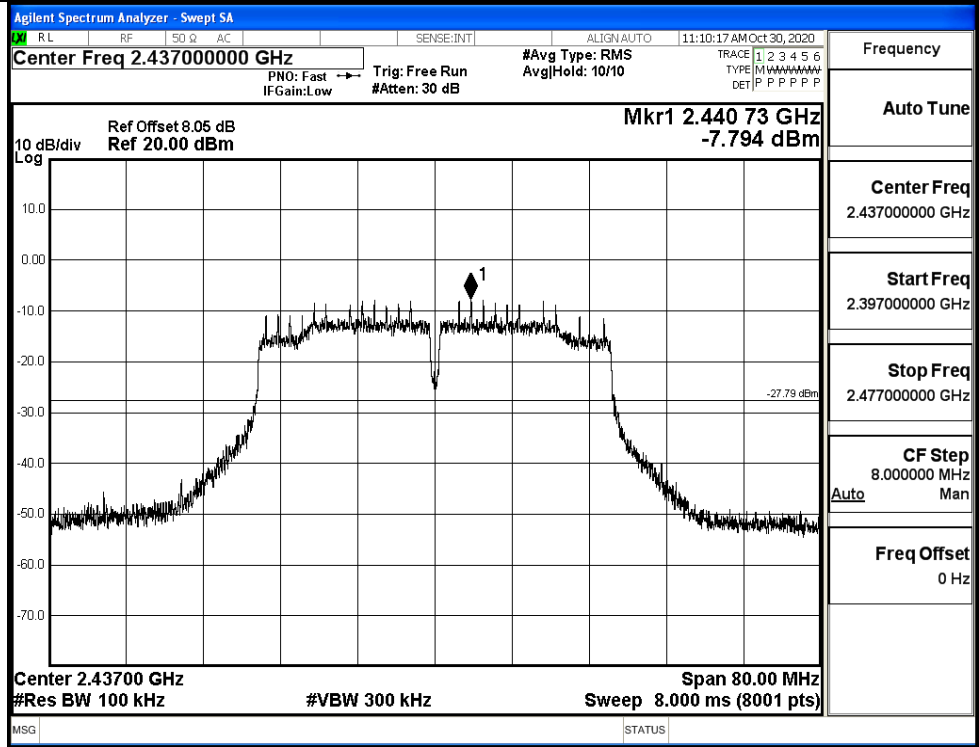


Puw/11N40
SISO/LCH



11N40SISO_MCH_Graphs

Pref/11N40
SISO/MCH



Puw/11N40
SISO/MCH

