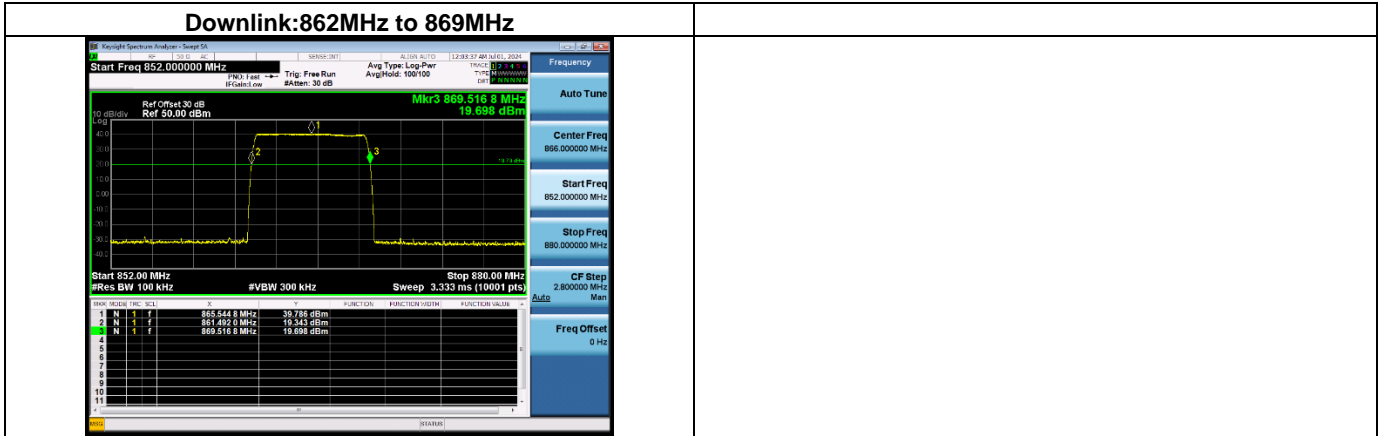


Appendix B for KSCR240500097002

1. Out of band rejection



2. Input/output power and amplifier/booster gain

Mode	Operation Band	Frequency F0 (MHz)	Signal Type	Signal Level (dBm)	Input Power (dBm)	Output Power (dBm)	ERP (dBm)	Gain (dB)
Down link	862~869MHz	865.5	LTE	Pre-AGC	-9.32	39.89	37.74	49.21
				3dB Above AGC	-6.85	39.89	37.74	/
Down link	862~869MHz	865.5	GMSK	Pre-AGC	-9.28	39.85	37.70	49.13
				3dB Above AGC	-6.74	39.85	37.70	/

Remark:

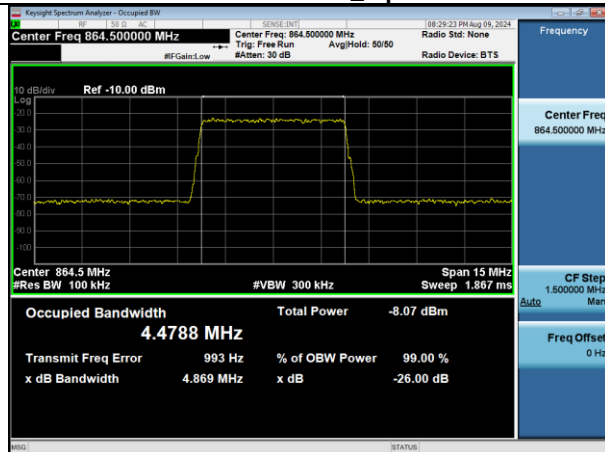
- 1) The normal power is 40dBm and the measured output power which show in above table is within±2.0dB tolerance.
- 2) ERP(dBm)=Total Output Power(dBm)+Antenna Gain(dBi)-2.15dB.Antenna Gain is 0.0dBi.

3 Input-versus-output signal comparison

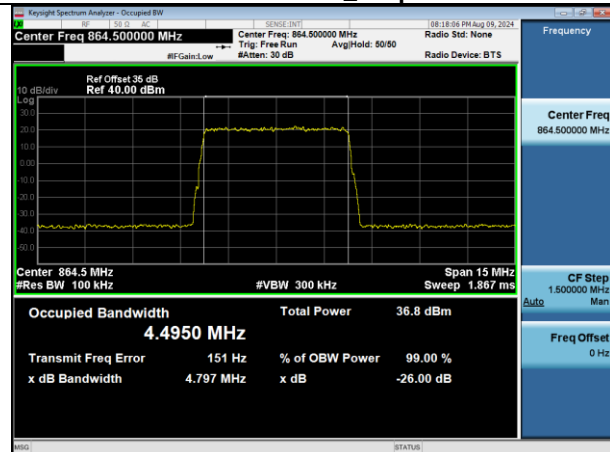
Occupied Bandwidth				
Channel Spacing (MHz)	Test Frequency (MHz)	Signal Level	Signal Type	99%Occupied Channel Bandwidth (MHz)
LTE 5M	864.5	Pre-AGC	Input	4.4788
	864.5		Output	4.4950
	864.5	3dB Above AGC	Input	4.4971
	864.5		Output	4.4883
	865.5	Pre-AGC	Input	4.4827
	865.5		Output	4.4918
	865.5	3dB Above AGC	Input	4.4788
	865.5		Output	4.4858
	866.5	Pre-AGC	Input	4.4961
	866.5		Output	4.4841
	866.5	3dB Above AGC	Input	4.4854
	866.5		Output	4.921

LTE 5M Low

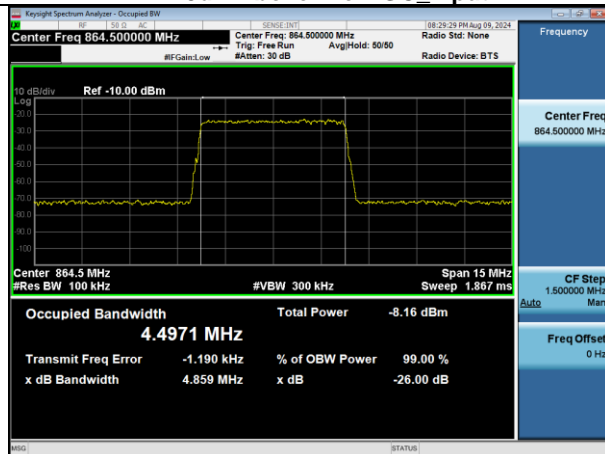
Pre-AGC_Input



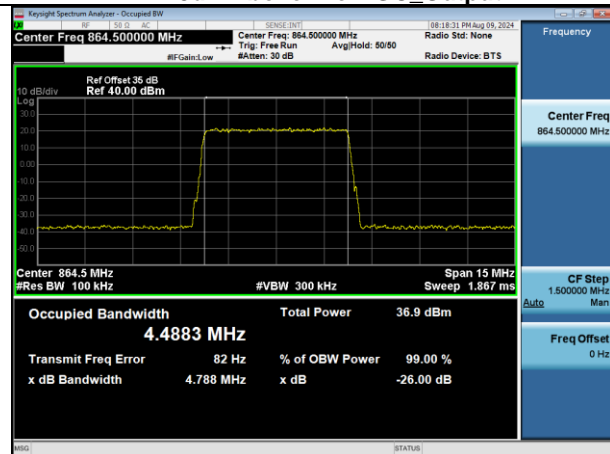
Pre-AGC_Output



3dB Above Pre-AGC Input

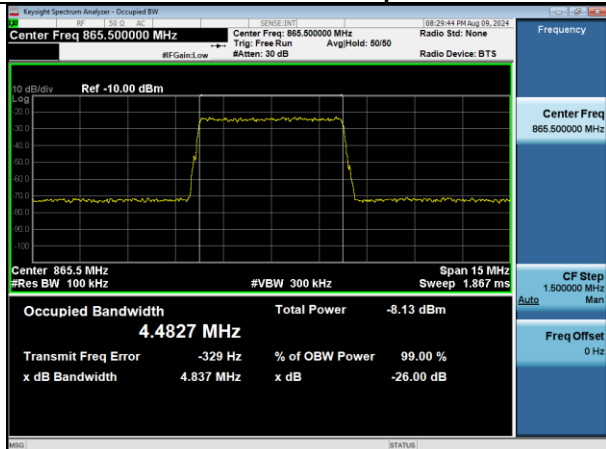


3dB Above Pre-AGC Output

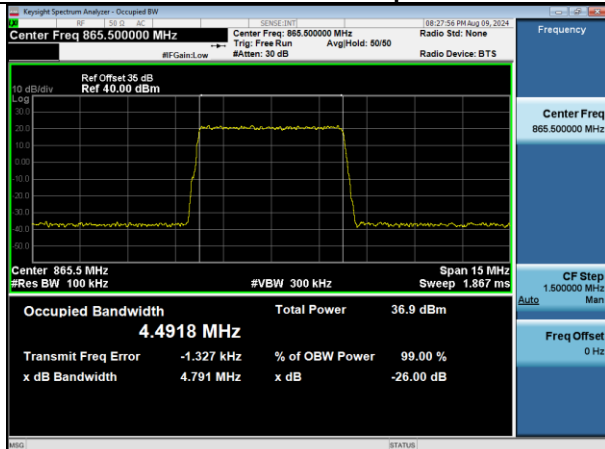


LTE 5M Middle

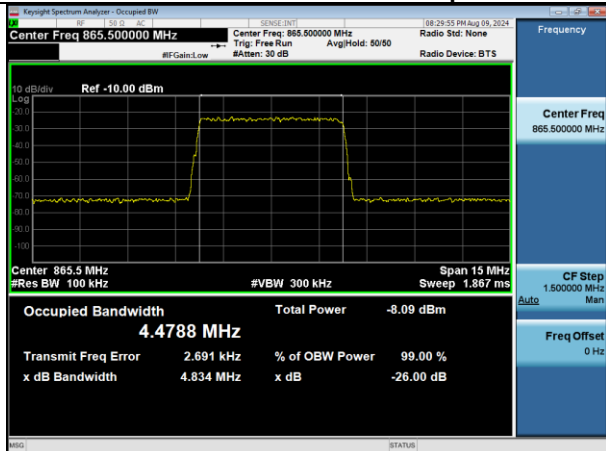
Pre-AGC_Input



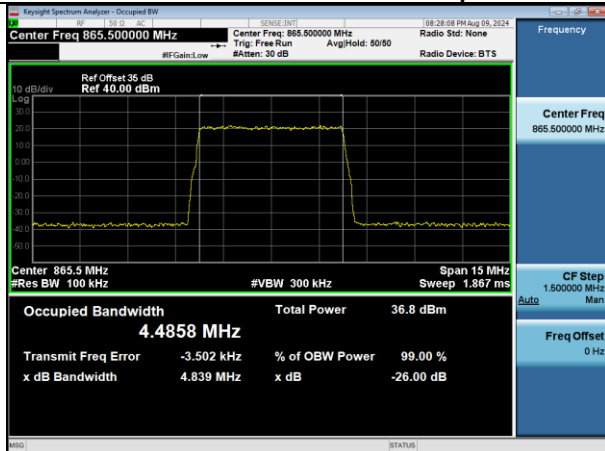
Pre-AGC_Output



3dB Above Pre-AGC_Input

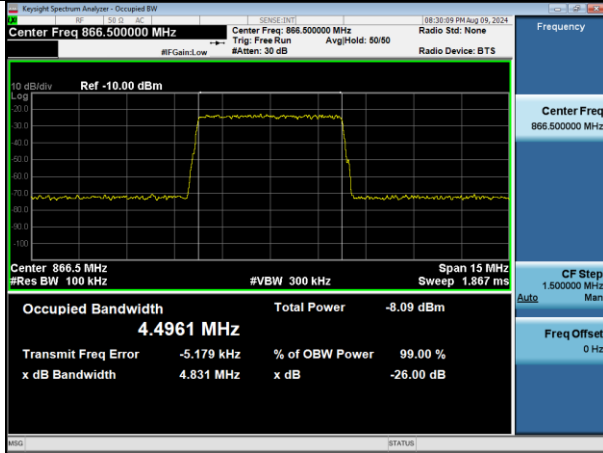


3dB Above Pre-AGC_Output

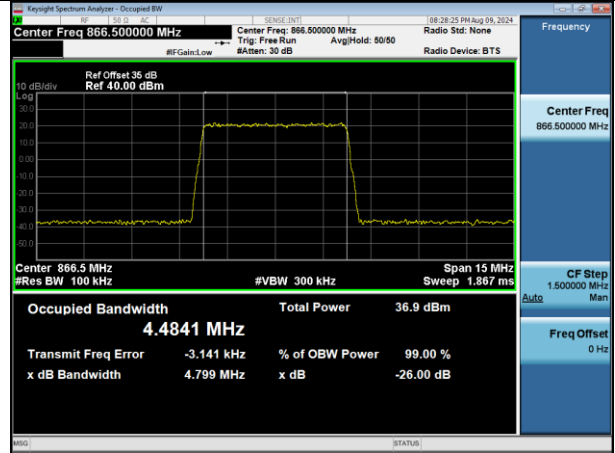


LTE 5M High

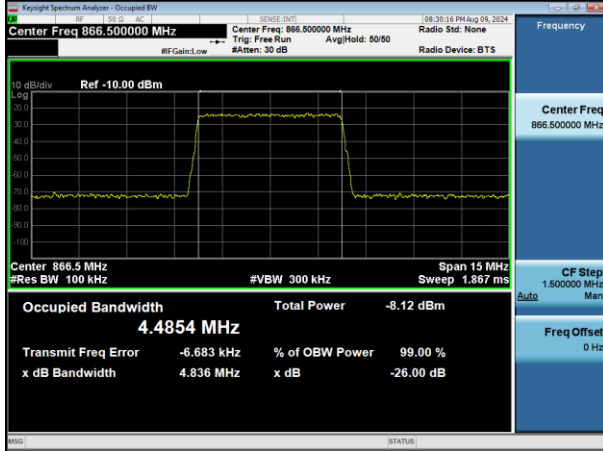
Pre-AGC Input



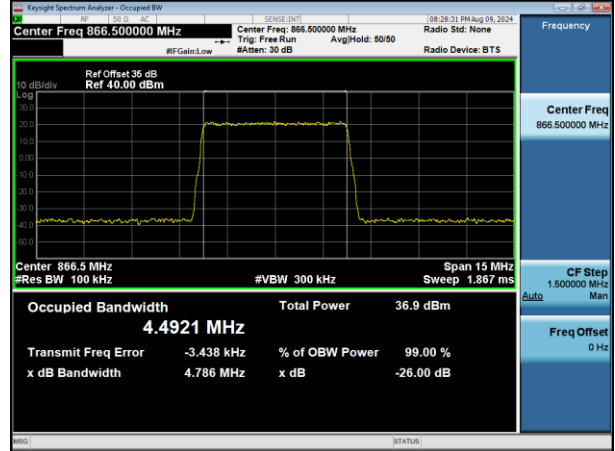
Pre-AGC Output



3dB Above Pre-AGC Input



3dB Above Pre-AGC Output



Occupied Bandwidth				
Channel Spacing (MHz)	Test Frequency (MHz)	Signal Level	Signal Type	99% Occupied Channel Bandwidth (KHz)
GMSK 0.2M	862.1	Pre-AGC	Input	246.60
	862.1		Output	245.68
	862.1	3dB Above AGC	Input	246.52
	862.1		Output	246.66
	865.5	Pre-AGC	Input	246.53
	865.5		Output	246.16
	865.5	3dB Above AGC	Input	246.49
	865.5		Output	246.59
	868.9	Pre-AGC	Input	246.66
	868.9		Output	246.13
	868.9	3dB Above AGC	Input	246.20
	868.9		Output	246.78

GMSK 0.2M Low

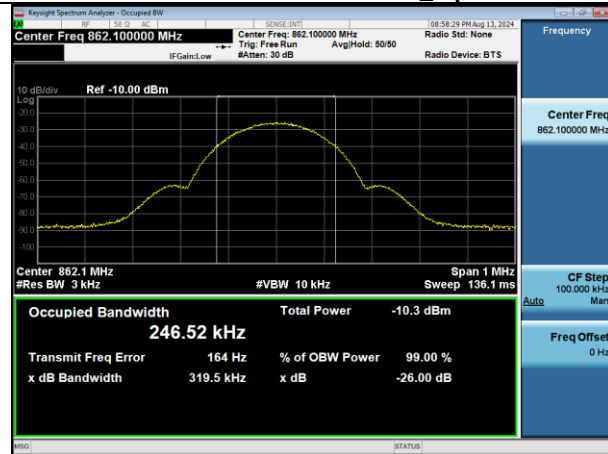
Pre-AGC_Input



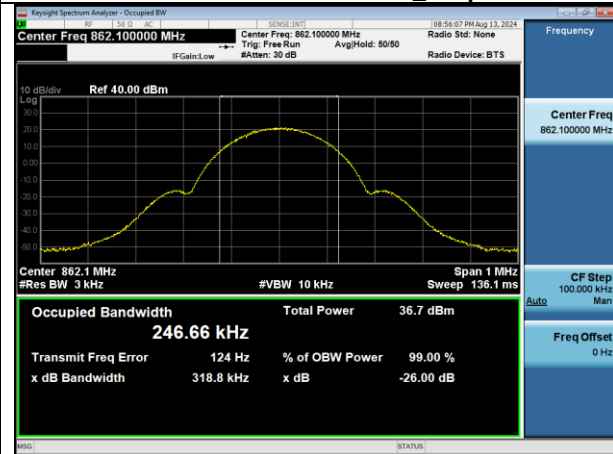
Pre-AGC_Output



3dB Above Pre-AGC Input

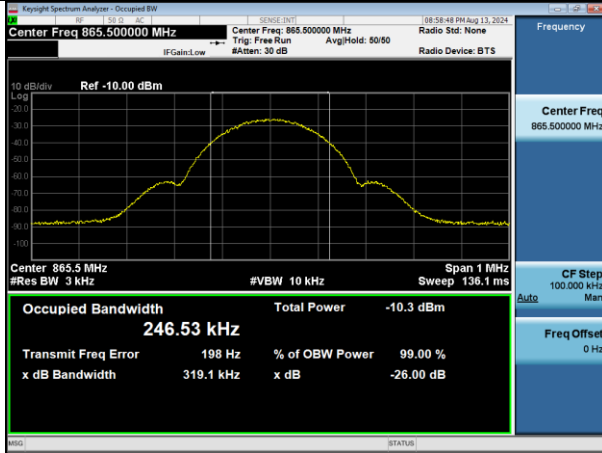


3dB Above Pre-AGC Output

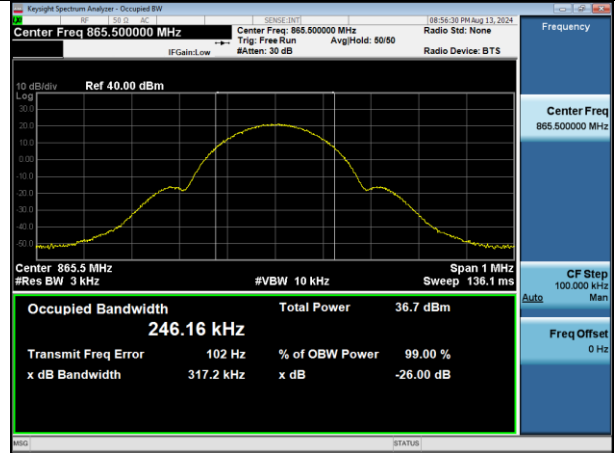


GMSK 0.2M Middle

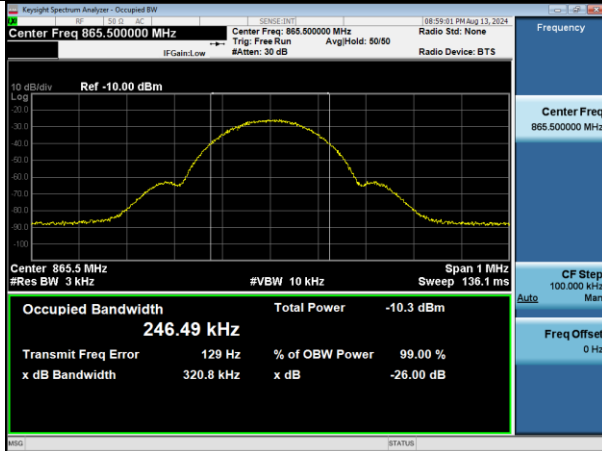
Pre-AGC Input



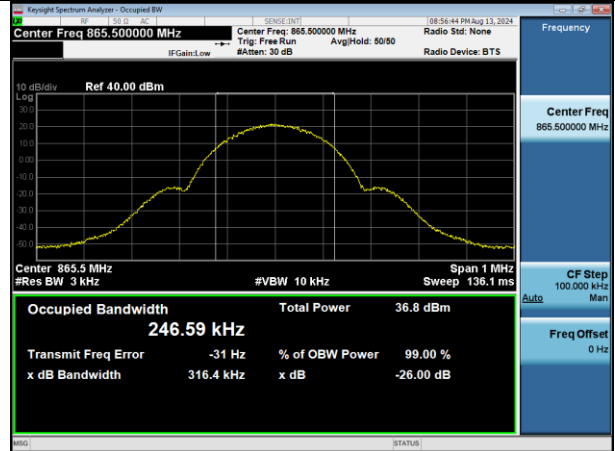
Pre-AGC Output



3dB Above Pre-AGC Input

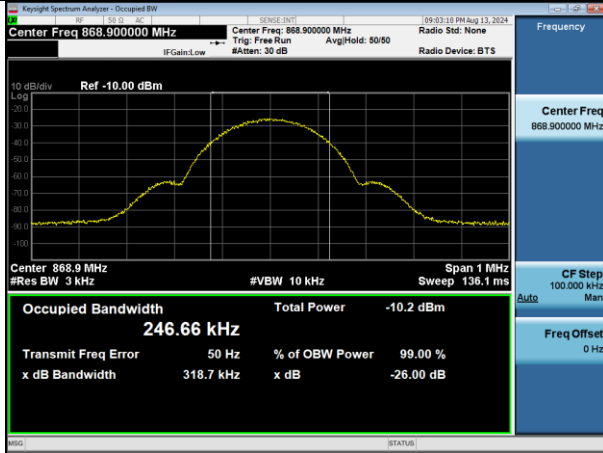


3dB Above Pre-AGC Output

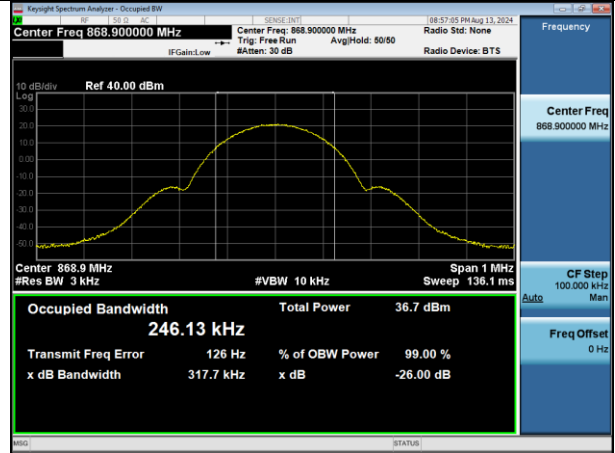


GMSK 0.2M High

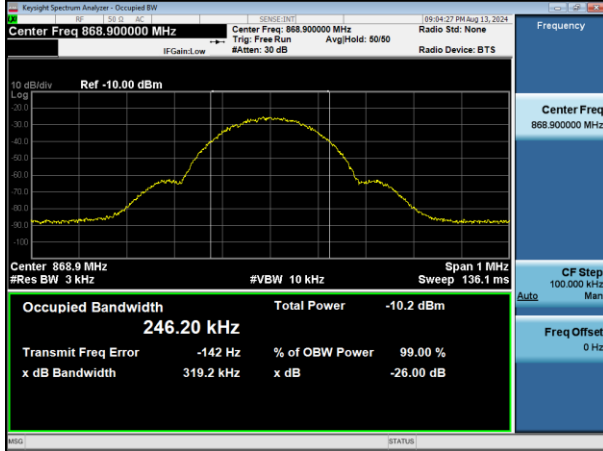
Pre-AGC Input



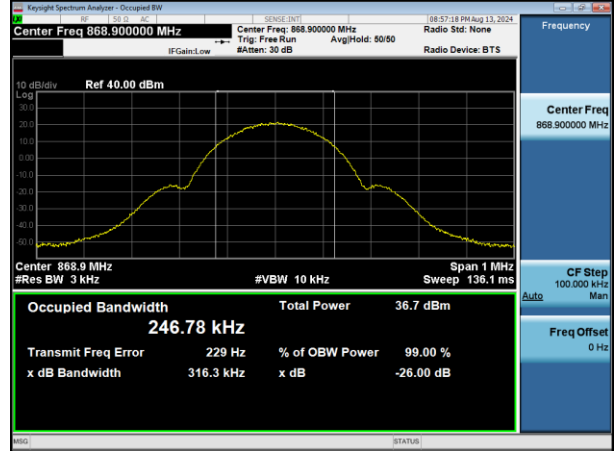
Pre-AGC Output



3dB Above Pre-AGC Input

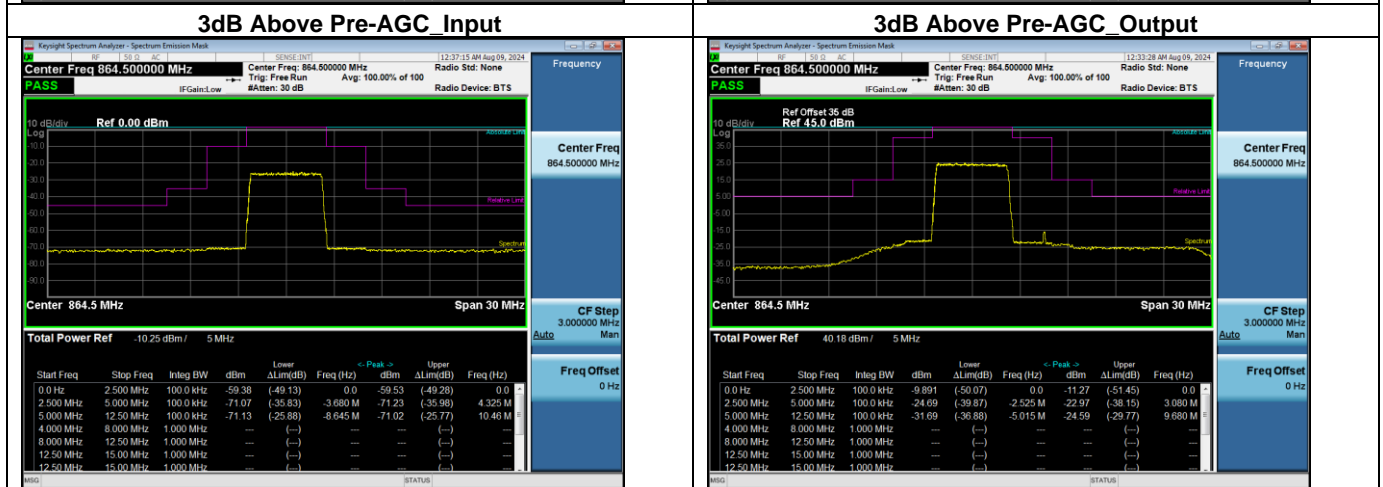


3dB Above Pre-AGC Output



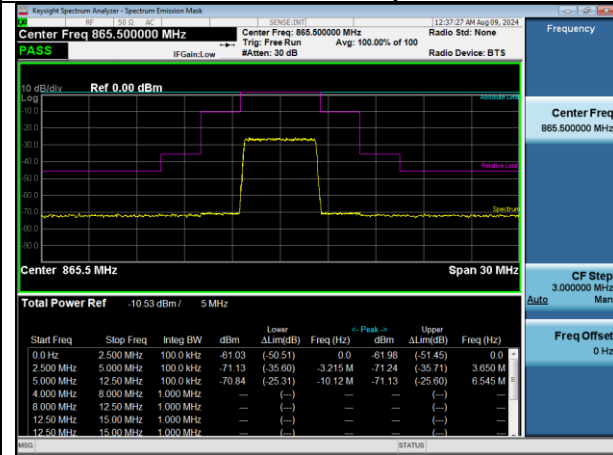
Emission masks				
Channel Spacing (MHz)	Channel	Signal Level	Signal Type	Result
LTE 5M	Low	Pre-AGC	Input	Pass
			Output	Pass
		3dB Above AGC	Input	Pass
			Output	Pass
	Middle	Pre-AGC	Input	Pass
			Output	Pass
		3dB Above AGC	Input	Pass
			Output	Pass
	High	Pre-AGC	Input	Pass
			Output	Pass
		3dB Above AGC	Input	Pass
			Output	Pass

LTE 5M-Low

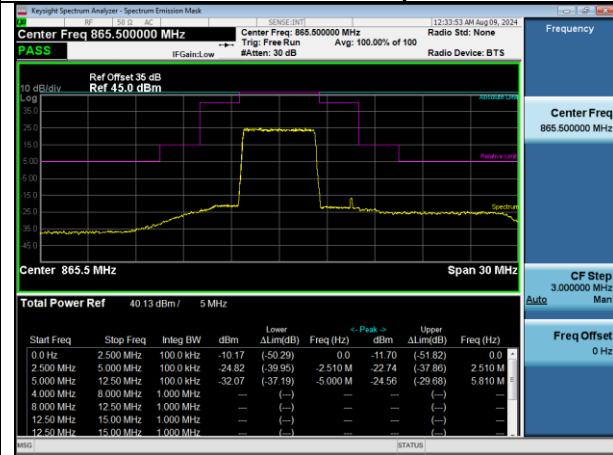


LTE 5M-Middle

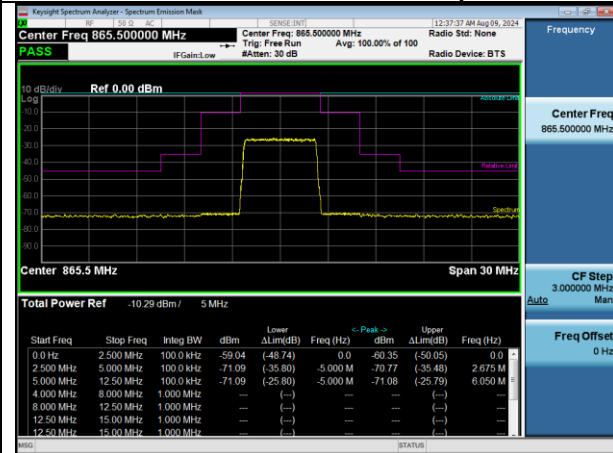
Pre-AGC Input



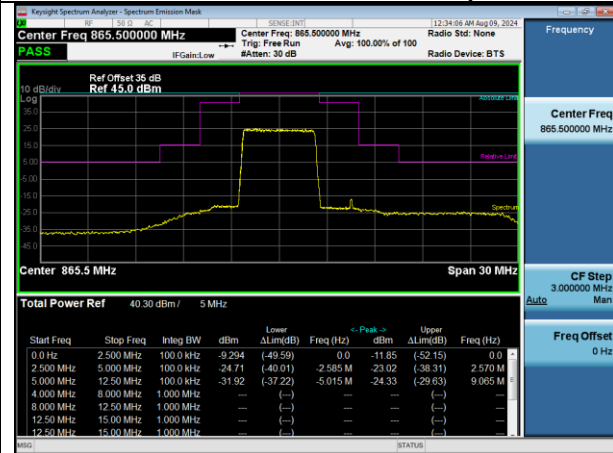
Pre-AGC Output



3dB Above Pre-AGC Input

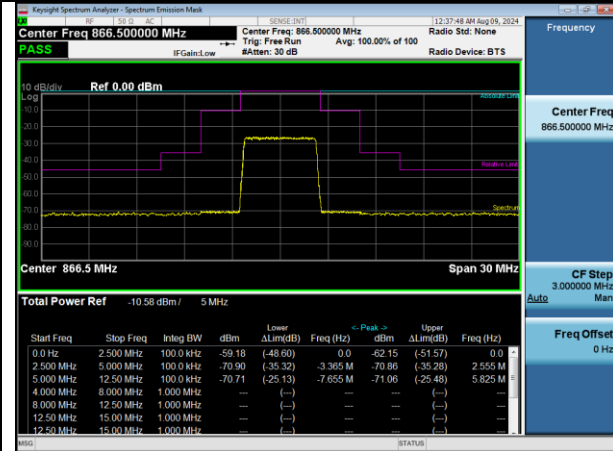


3dB Above Pre-AGC Output

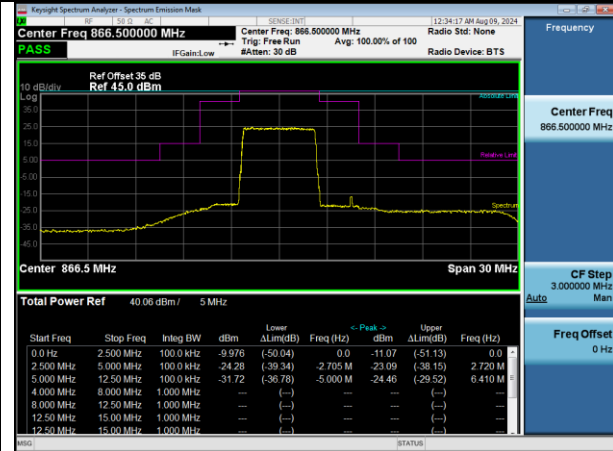


LTE 5M-High

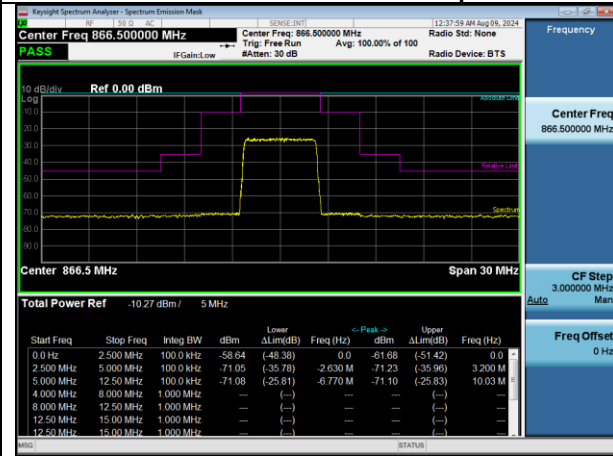
Pre-AGC_Input



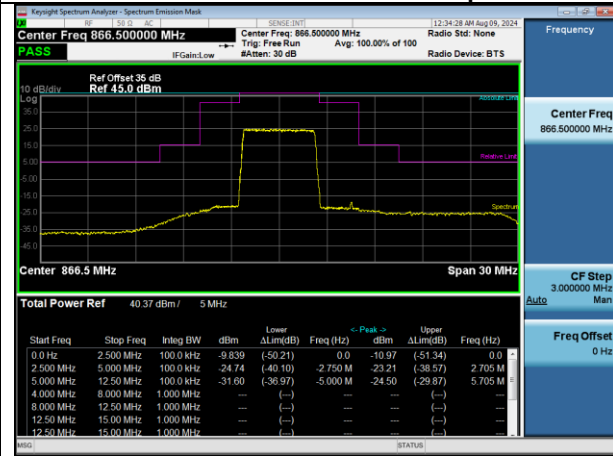
Pre-AGC_Output



3dB Above Pre-AGC_Input

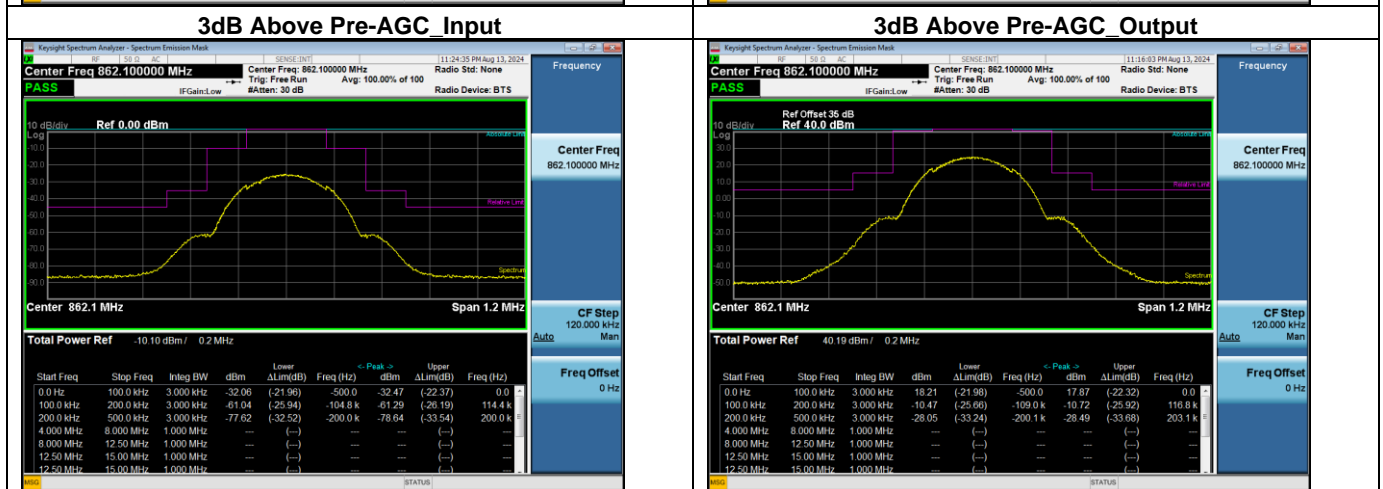
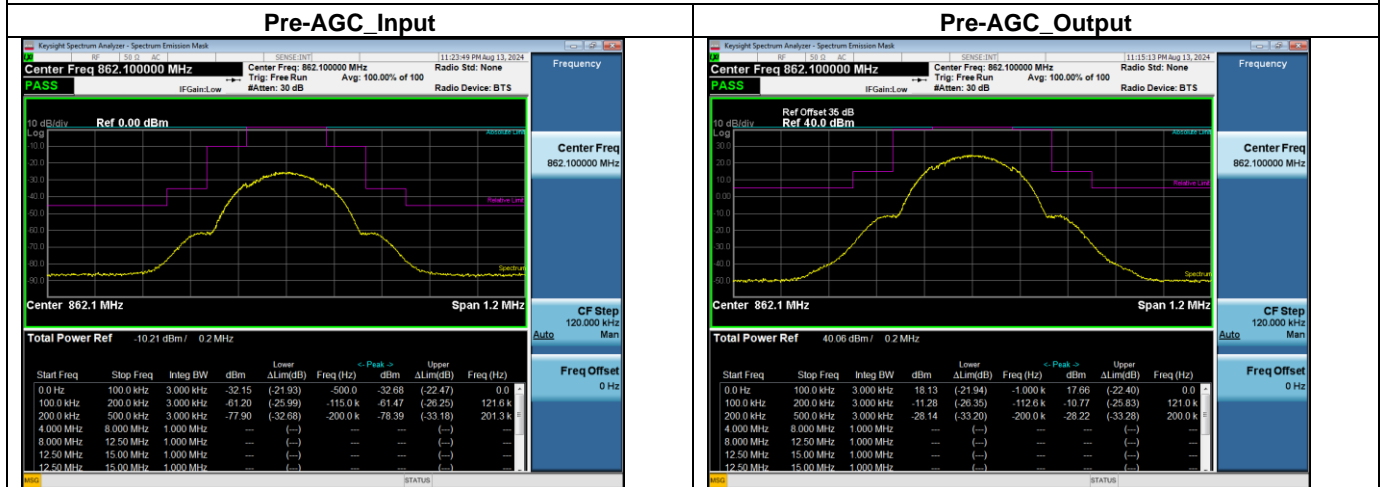


3dB Above Pre-AGC_Output



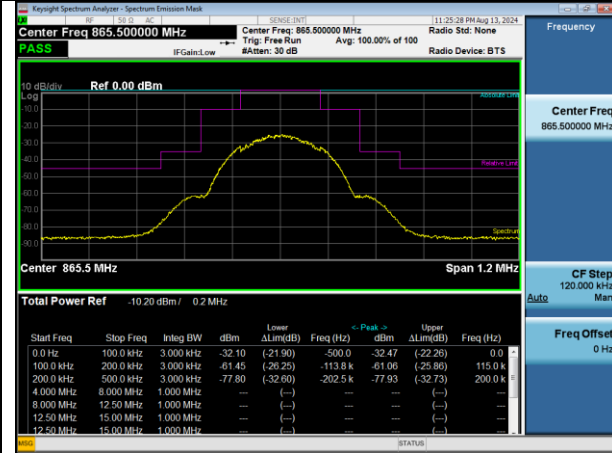
Emission masks				
Channel Spacing (MHz)	Channel	Signal Level	Signal Type	Result
GMSK 0.2M	Low	Pre-AGC	Input	Pass
			Output	Pass
		3dB Above AGC	Input	Pass
			Output	Pass
	Middle	Pre-AGC	Input	Pass
			Output	Pass
		3dB Above AGC	Input	Pass
			Output	Pass
	High	Pre-AGC	Input	Pass
			Output	Pass
		3dB Above AGC	Input	Pass
			Output	Pass

GMSK 0.2M-Low

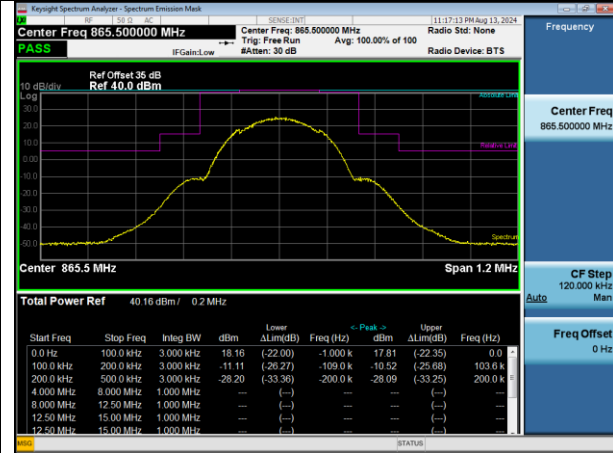


GMSK 0.2M -Middle

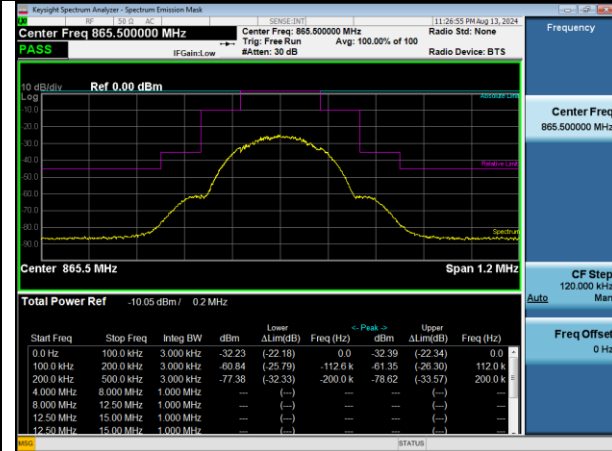
Pre-AGC Input



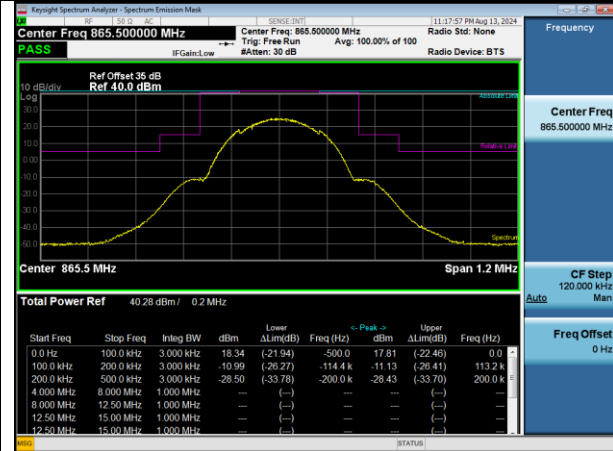
Pre-AGC Output



3dB Above Pre-AGC Input

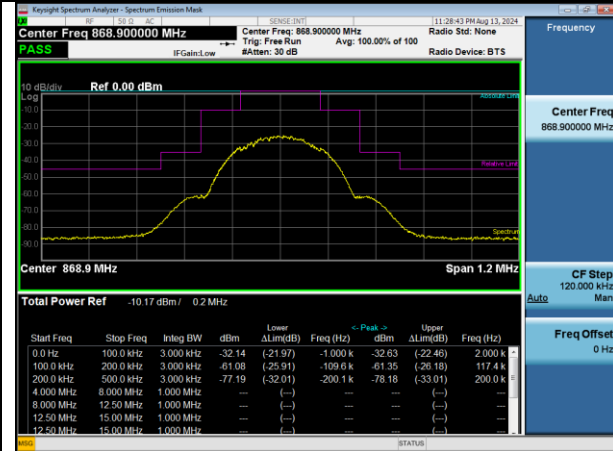


3dB Above Pre-AGC Output



GMSK 0.2M -High

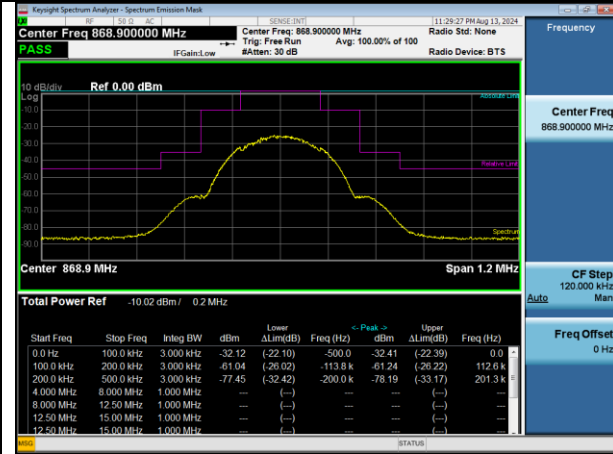
Pre-AGC_Input



Pre-AGC_Output



3dB Above Pre-AGC_Input



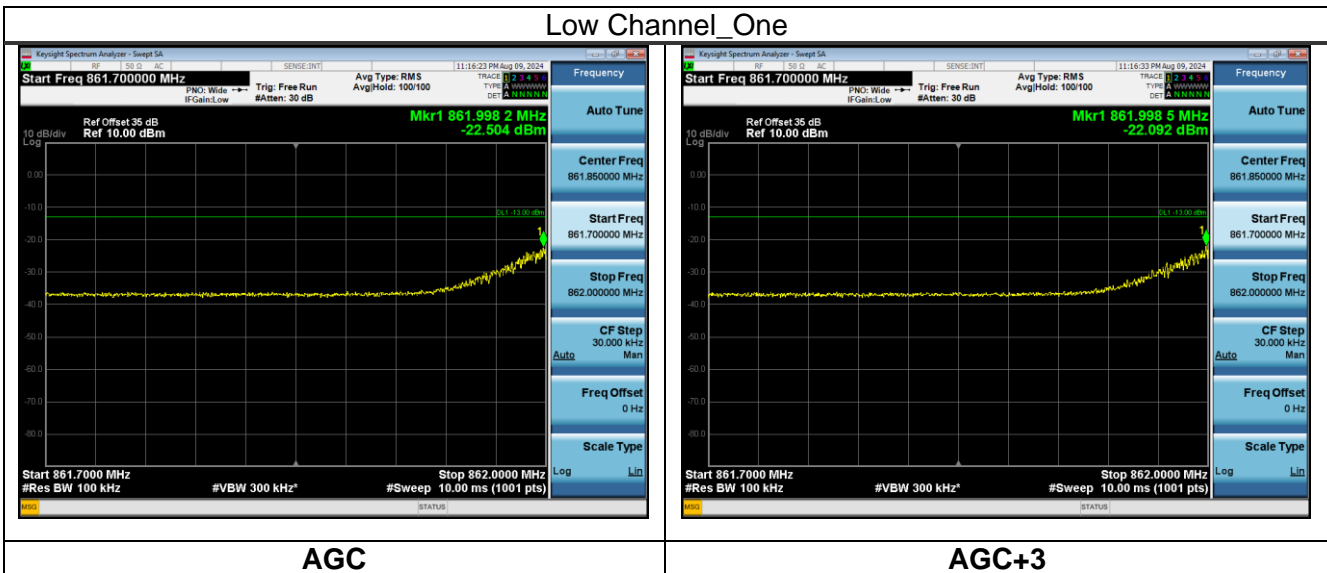
3dB Above Pre-AGC_Output



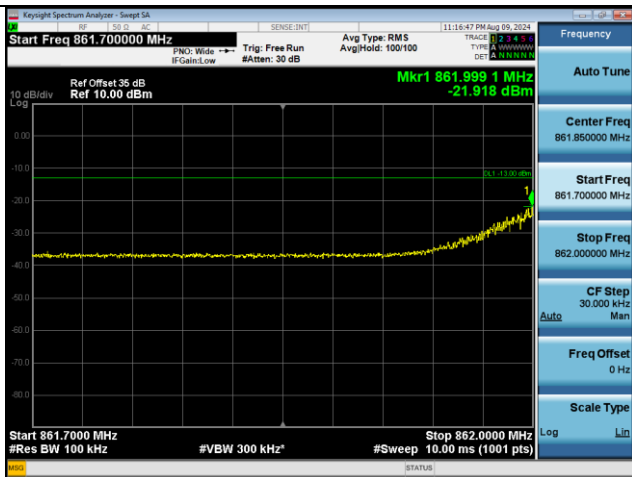
4. out of Band/out of block (including intermodulation)

Signal				Channel	TX Type	ANT	OOB (dBm)		Verdict
Input	Type	Level (dBm)	Frequency (MHz)				Result	Limit	
One	LTE 5MHz	AGC	864.5	LCH	SISO	1	-22.50	Refer To Test Graph	Pass
		AGC+3	864.5	LCH	SISO	1	-22.09	Refer To Test Graph	Pass
Two	LTE 5MHz	AGC	864.5	LCH	SISO	1	-21.92	Refer To Test Graph	Pass
		AGC+3	864.5	LCH	SISO	1	-21.89	Refer To Test Graph	Pass
One	LTE 5MHz	AGC	866.5	HCH	SISO	1	-23.78	Refer To Test Graph	Pass
		AGC+3	866.5	HCH	SISO	1	-23.16	Refer To Test Graph	Pass
Two	LTE 5MHz	AGC	866.5	HCH	SISO	1	-22.72	Refer To Test Graph	Pass
		AGC+3	866.5	HCH	SISO	1	-23.10	Refer To Test Graph	Pass

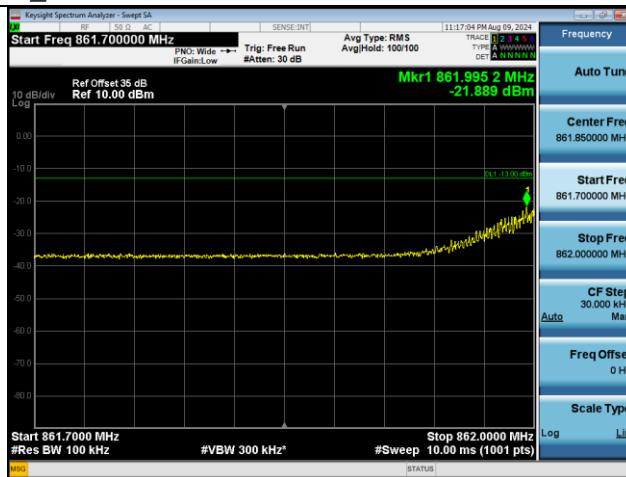
Low Channel_One



Low Channel_Two

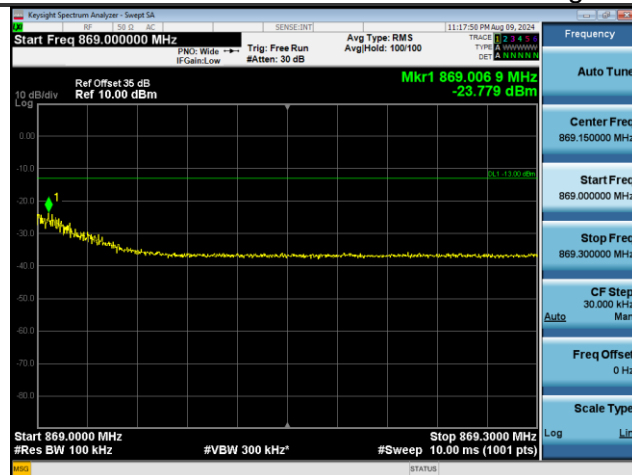


AGC

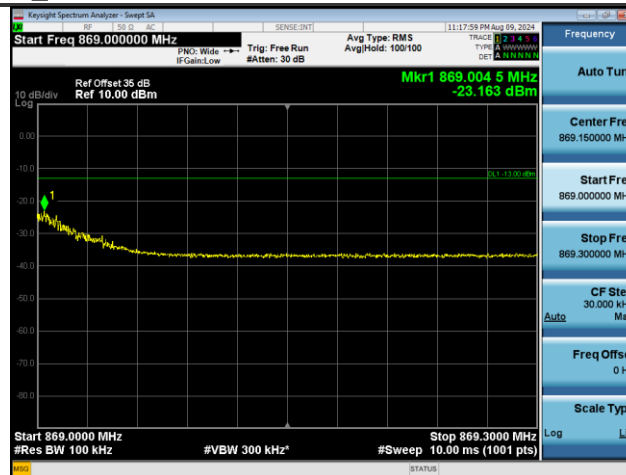


AGC+3

High Channel_One

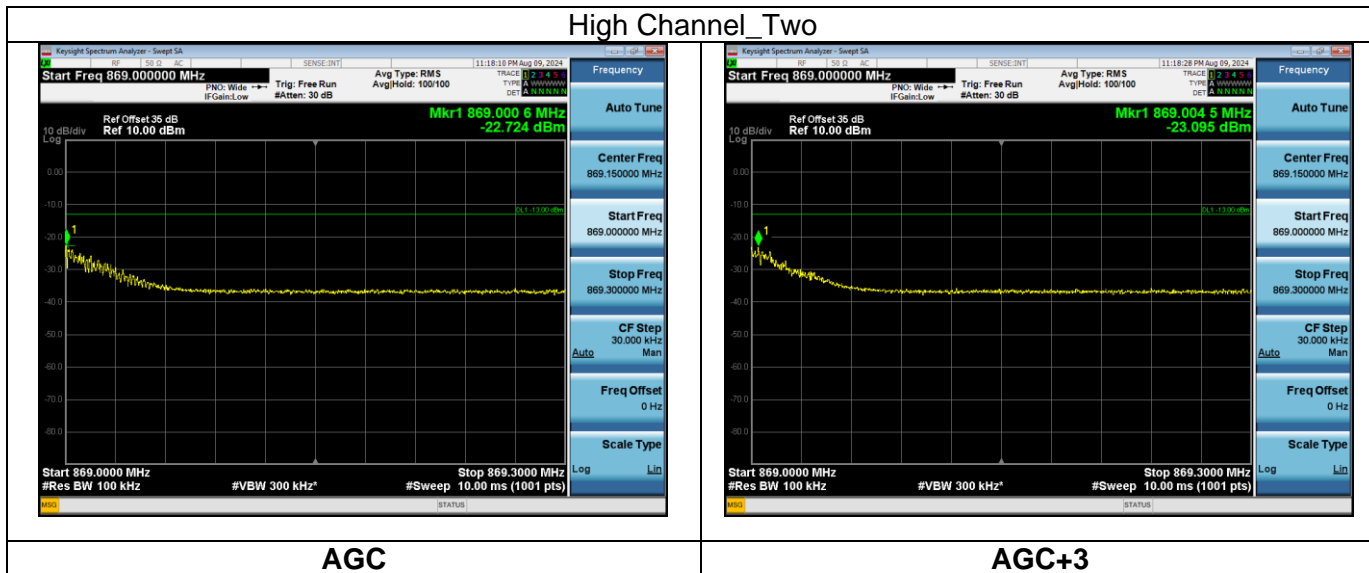


AGC



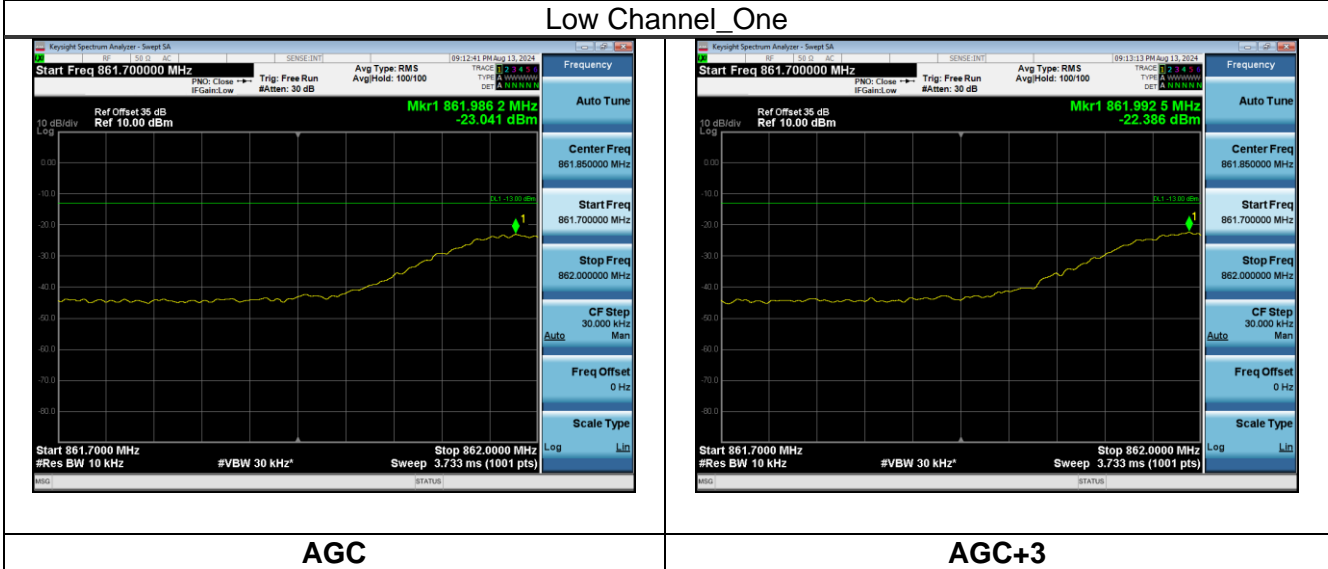
AGC+3

High Channel_Two



Signal				Channel	TX Type	ANT	OOB (dBm)		Verdict
Input	Type	Level (dBm)	Frequency (MHz)				Result	Limit	
One	GMSK 0.2MHz	AGC	862.1	LCH	SISO	1	-23.04	Refer To Test Graph	Pass
		AGC+3	862.1	LCH	SISO	1	-22.39	Refer To Test Graph	Pass
Two	GMSK 0.2MHz	AGC	862.1	LCH	SISO	1	-22.82	Refer To Test Graph	Pass
		AGC+3	862.1	LCH	SISO	1	-22.71	Refer To Test Graph	Pass
One	GMSK 0.2MHz	AGC	868.9	HCH	SISO	1	-22.71	Refer To Test Graph	Pass
		AGC+3	868.9	HCH	SISO	1	-22.53	Refer To Test Graph	Pass
Two	GMSK 0.2MHz	AGC	868.9	HCH	SISO	1	-22.79	Refer To Test Graph	Pass
		AGC+3	868.9	HCH	SISO	1	-23.12	Refer To Test Graph	Pass

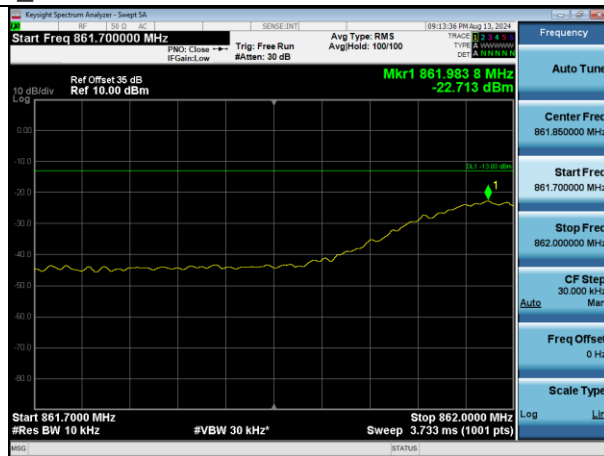
Low Channel_One



Low Channel_Two



AGC

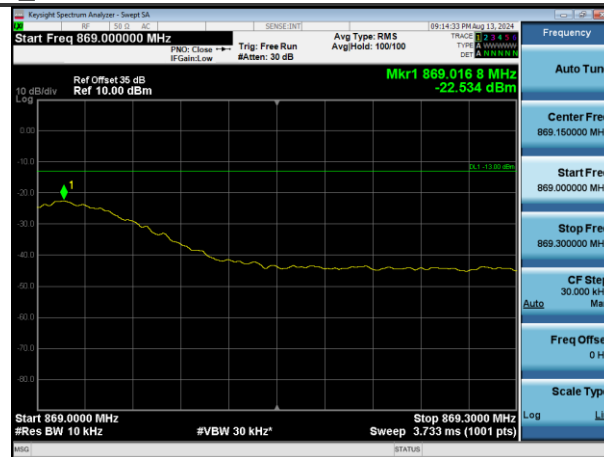


AGC+3

High Channel_One

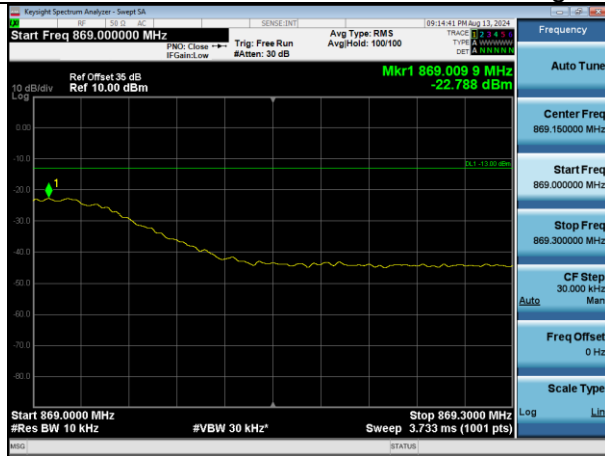


AGC



AGC+3

High Channel_Two



AGC

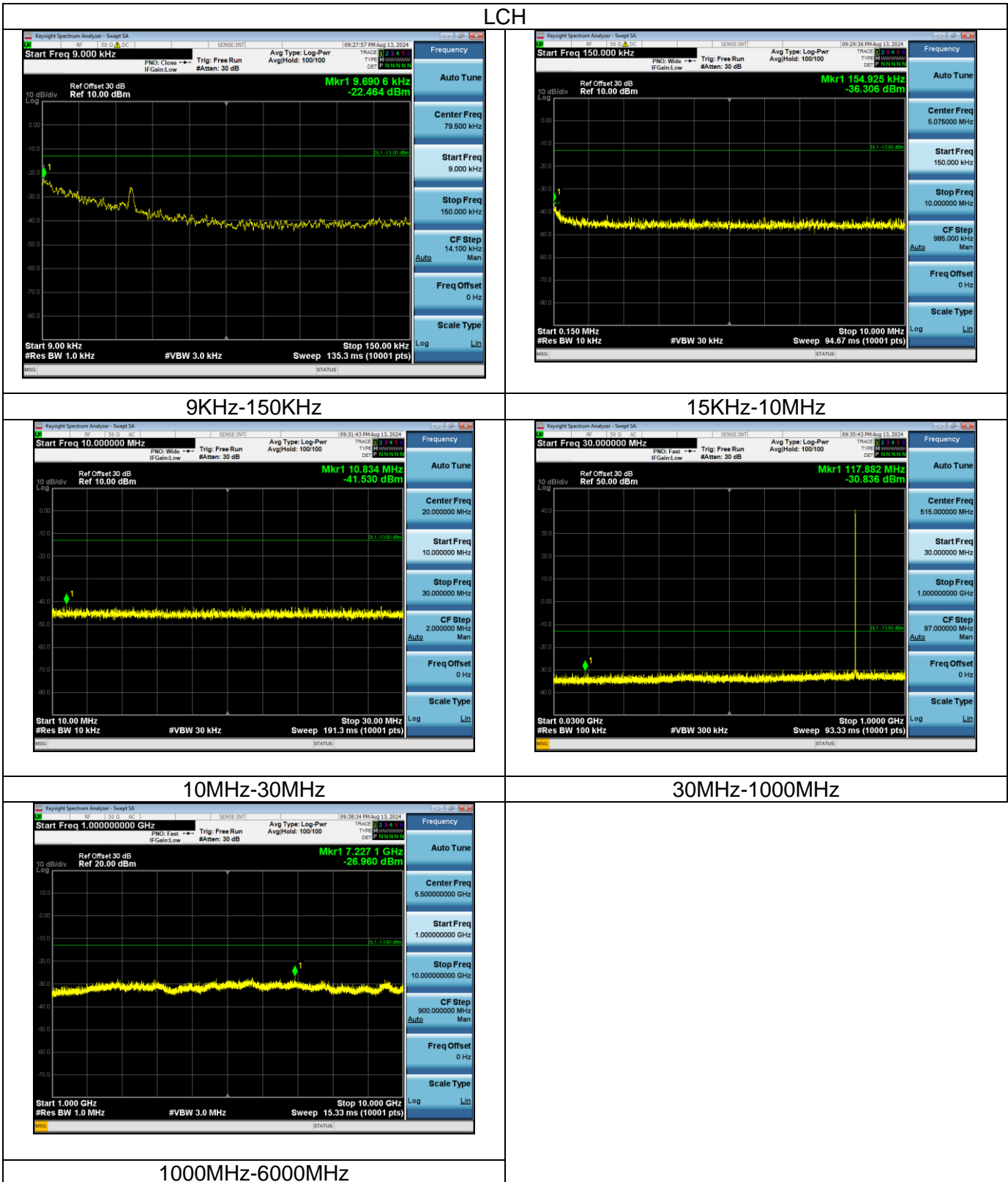


AGC+3

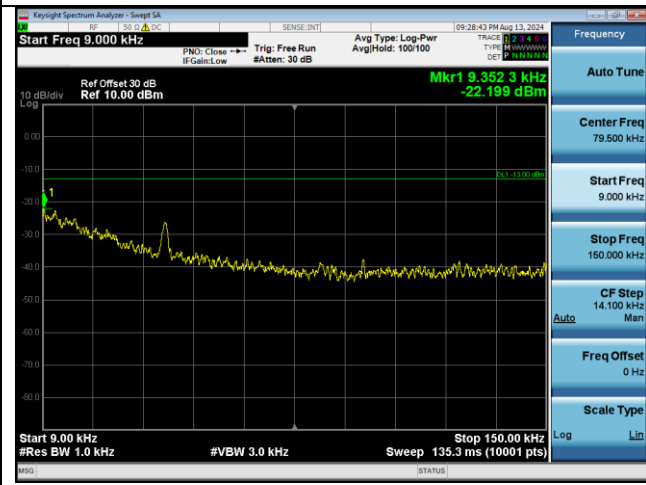
5. Conducted Spurious Emissions

Signal	Channel	Frequency Range (MHz)	Worst Test Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
LTE 5M	LCH	0.009~0.15	-22.46	-13.00	-9.46	Pass
		0.15~10	-35.48	-13.00	-22.48	Pass
		10~30	-41.64	-13.00	-28.64	Pass
		30~1000	-30.38	-13.00	-17.38	Pass
		1000~10000	-22.85	-13.00	-9.85	Pass
	MCH	0.009~0.15	-22.20	-13.00	-9.2	Pass
		0.15~10	-34.42	-13.00	-21.42	Pass
		10~30	-41.47	-13.00	-28.47	Pass
		30~1000	-30.61	-13.00	-17.61	Pass
		1000~10000	-23.03	-13.00	-10.03	Pass
	HCH	0.009~0.15	-21.95	-13.00	-8.95	Pass
		0.15~10	-34.60	-13.00	-21.6	Pass
		10 - 30	-41.15	-13.00	-28.15	Pass
		30 - 1000	-30.32	-13.00	-17.32	Pass
		1000 - 10000	-23.44	-13.00	-10.44	Pass
GMSK 0.2M	LCH	0.009~0.15	-22.46	-13.00	-9.46	Pass
		0.15~10	-36.31	-13.00	-23.31	Pass
		10~30	-41.53	-13.00	-28.53	Pass
		30~1000	-30.84	-13.00	-17.84	Pass
		1000~10000	-26.96	-13.00	-13.96	Pass
	MCH	0.009~0.15	-22.20	-13.00	-9.20	Pass
		0.15~10	-35.83	-13.00	-22.83	Pass
		10~30	-41.71	-13.00	-28.71	Pass
		30~1000	-28.19	-13.00	-15.19	Pass
		1000~10000	-27.09	-13.00	-14.09	Pass
	HCH	0.009~0.15	-22.46	-13.00	-9.46	Pass
		0.15~10	-36.17	-13.00	-23.17	Pass
		10 - 30	-41.12	-13.00	-28.12	Pass
		30 - 1000	-30.17	-13.00	-17.17	Pass
		1000 - 10000	-25.15	-13.00	-12.15	Pass

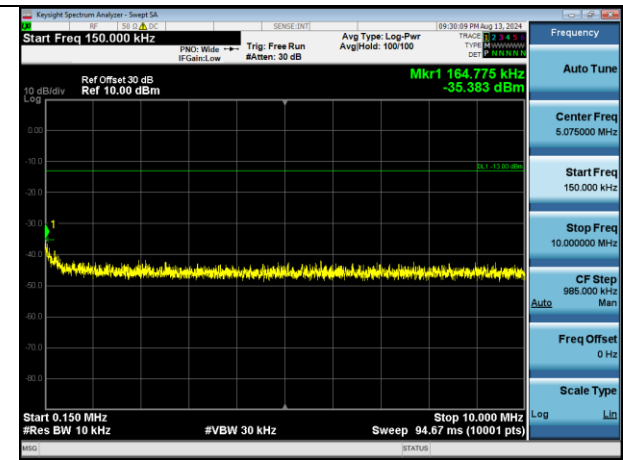
LCH



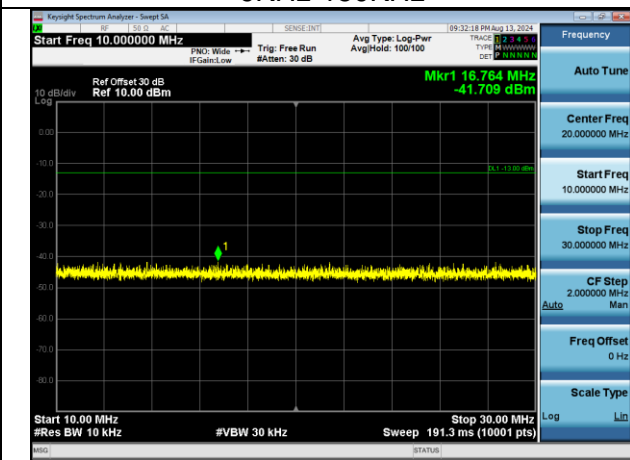
MCH



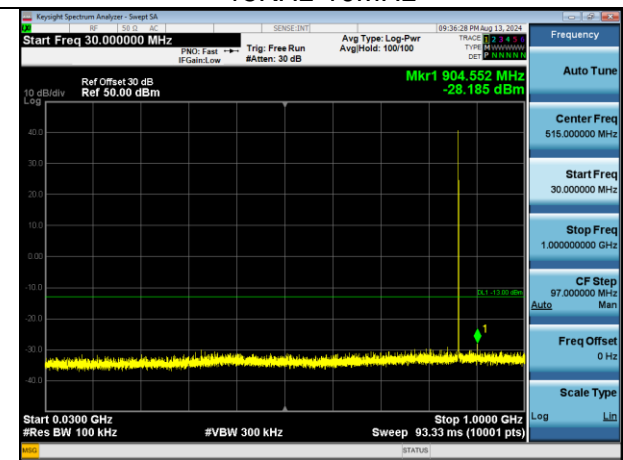
9KHz-150KHz



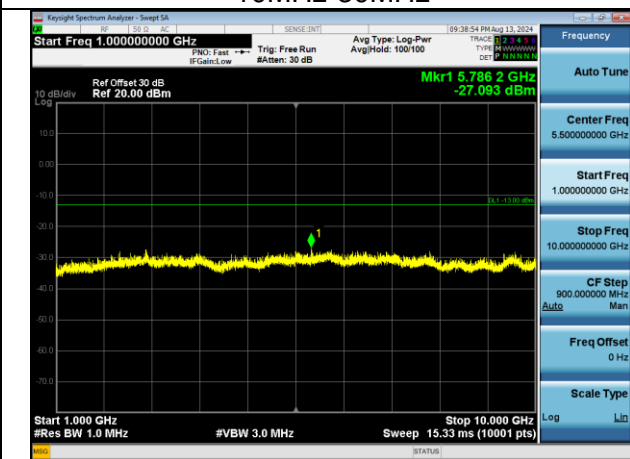
15KHz-10MHz



10MHz-30MHz

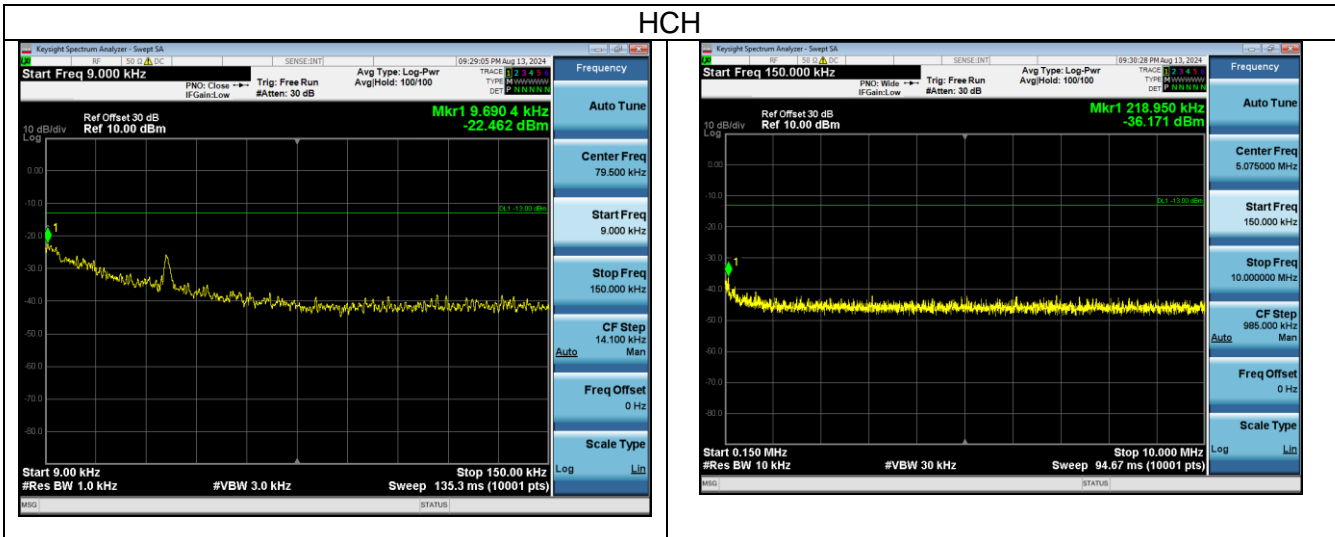


30MHz-1000MHz



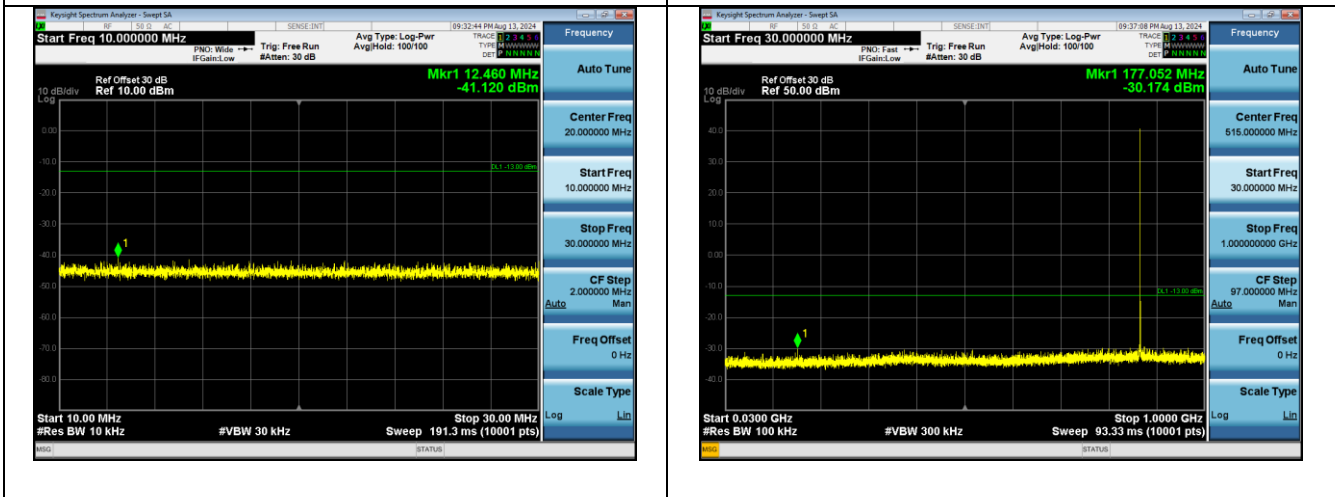
1000MHz-6000MHz

HCH



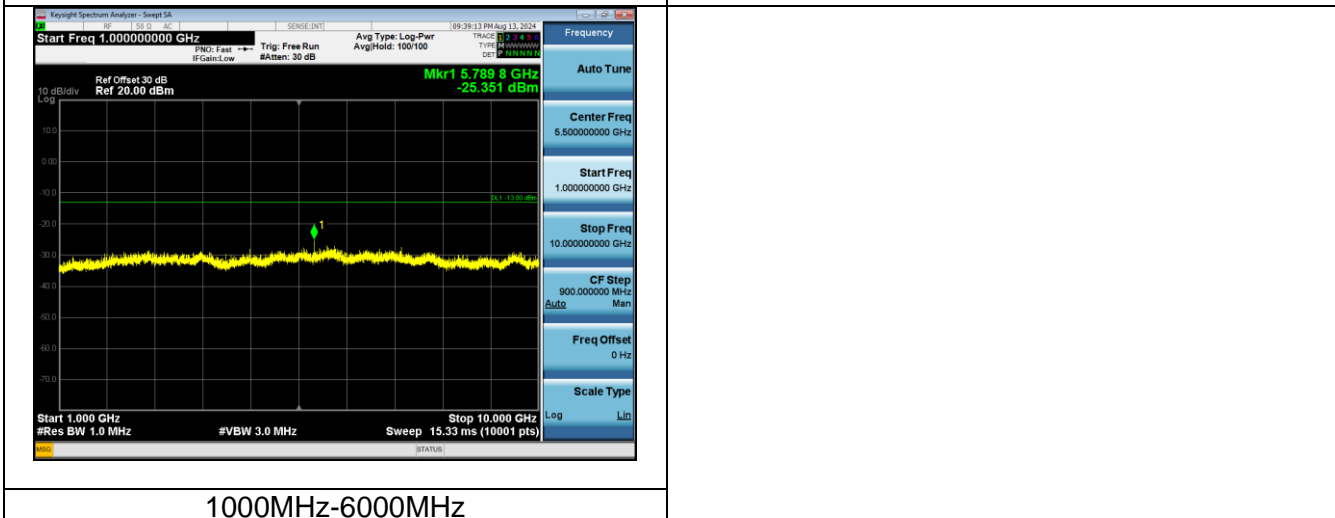
9KHz-150KHz

150KHz-10MHz



10MHz-30MHz

30MHz-1000MHz



1000MHz-6000MHz

6. Radiated Spurious Emissions

LTE 5M-862MHz-869MHz-Low Channel					
Frequency	Spurious Emission Polarization and Level		Limit	Over Limit	Verdict
	MHz	Polarization			
140.93	Horizontal	-50.63	-13	-37.63	Pass
322.10	Horizontal	-61.63	-13	-48.63	Pass
625.34	Horizontal	-54.50	-13	-41.50	Pass
2864.57	Horizontal	-44.65	-13	-31.65	Pass
3953.21	Horizontal	-42.91	-13	-29.91	Pass
8387.60	Horizontal	-43.85	-13	-30.85	Pass
137.72	Vertical	-55.01	-13	-42.01	Pass
185.07	Vertical	-52.06	-13	-39.06	Pass
976.05	Vertical	-55.08	-13	-42.08	Pass
3165.60	Vertical	-41.33	-13	-28.33	Pass
4482.07	Vertical	-36.47	-13	-23.47	Pass
8779.52	Vertical	-48.62	-13	-35.62	Pass

LTE 5M-862MHz-869MHz-Middle Channel					
Frequency	Spurious Emission Polarization and Level		Limit	Over Limit	Verdict
	MHz	Polarization			
103.27	Horizontal	-56.84	-13	-43.84	Pass
470.17	Horizontal	-61.79	-13	-48.79	Pass
823.54	Horizontal	-56.61	-13	-43.61	Pass
1590.06	Horizontal	-40.29	-13	-27.29	Pass
3960.70	Horizontal	-48.68	-13	-35.68	Pass
6558.67	Horizontal	-41.12	-13	-28.12	Pass
65.25	Vertical	-59.01	-13	-46.01	Pass
485.27	Vertical	-50.17	-13	-37.17	Pass
563.07	Vertical	-62.94	-13	-49.94	Pass
2787.75	Vertical	-39.57	-13	-26.57	Pass
3671.29	Vertical	-38.36	-13	-25.36	Pass
8742.09	Vertical	-46.85	-13	-33.85	Pass

LTE 5M-862MHz-869MHz-High Channel					
Frequency	Spurious Emission Polarization and Level		Limit	Over Limit	Verdict
	MHz	Polarization	dBm	dB	
119.15	Horizontal	-56.96	-13	-43.96	Pass
532.23	Horizontal	-52.72	-13	-39.72	Pass
864.89	Horizontal	-62.98	-13	-49.98	Pass
2806.26	Horizontal	-37.13	-13	-24.13	Pass
4204.05	Horizontal	-41.86	-13	-28.86	Pass
8539.48	Horizontal	-36.75	-13	-23.75	Pass
132.24	Vertical	-62.23	-13	-49.23	Pass
227.76	Vertical	-57.99	-13	-44.99	Pass
867.16	Vertical	-60.70	-13	-47.70	Pass
1648.50	Vertical	-41.50	-13	-28.50	Pass
5221.75	Vertical	-42.46	-13	-29.46	Pass
6480.88	Vertical	-43.24	-13	-30.24	Pass

GMSK 0.2M-862MHz-869MHz-Low Channel					
Frequency	Spurious Emission Polarization and Level		Limit	Over Limit	Verdict
	MHz	Polarization	dBm	dB	
171.50	Horizontal	-51.18	-13	-38.18	Pass
365.93	Horizontal	-62.22	-13	-49.22	Pass
690.73	Horizontal	-54.70	-13	-41.70	Pass
2950.81	Horizontal	-45.17	-13	-32.17	Pass
4025.83	Horizontal	-43.87	-13	-30.87	Pass
8467.52	Horizontal	-44.52	-13	-31.52	Pass
179.57	Vertical	-55.90	-13	-42.90	Pass
248.22	Vertical	-52.16	-13	-39.16	Pass
1054.03	Vertical	-55.30	-13	-42.30	Pass
3184.15	Vertical	-41.45	-13	-28.45	Pass
4532.81	Vertical	-36.65	-13	-23.65	Pass
8833.26	Vertical	-48.67	-13	-35.67	Pass

GMSK 0.2M-862MHz-869MHz-Middle Channel					
Frequency	Spurious Emission Polarization and Level		Limit	Over Limit	Verdict
MHz	Polarization	dBm	dBm	dB	
118.88	Horizontal	-57.74	-13	-44.74	Pass
499.85	Horizontal	-62.65	-13	-49.65	Pass
827.93	Horizontal	-56.93	-13	-43.93	Pass
1611.52	Horizontal	-40.51	-13	-27.51	Pass
4005.19	Horizontal	-49.53	-13	-36.53	Pass
6619.84	Horizontal	-41.20	-13	-28.20	Pass
75.45	Vertical	-59.84	-13	-46.84	Pass
578.74	Vertical	-51.14	-13	-38.14	Pass
612.72	Vertical	-63.57	-13	-50.57	Pass
2867.08	Vertical	-39.78	-13	-26.78	Pass
3697.97	Vertical	-38.45	-13	-25.45	Pass
8757.67	Vertical	-47.40	-13	-34.40	Pass

GMSK 0.2M-862MHz-869MHz-High Channel					
Frequency	Spurious Emission Polarization and Level		Limit	Over Limit	Verdict
MHz	Polarization	dBm	dBm	dB	
165.11	Horizontal	-57.36	-13	-44.36	Pass
569.75	Horizontal	-53.38	-13	-40.38	Pass
947.85	Horizontal	-63.18	-13	-50.18	Pass
2893.25	Horizontal	-37.78	-13	-24.78	Pass
4222.60	Horizontal	-42.45	-13	-29.45	Pass
8622.23	Horizontal	-37.48	-13	-24.48	Pass
185.97	Vertical	-62.67	-13	-49.67	Pass
236.60	Vertical	-58.57	-13	-45.57	Pass
961.29	Vertical	-60.80	-13	-47.80	Pass
1718.54	Vertical	-41.83	-13	-28.83	Pass
5290.06	Vertical	-43.36	-13	-30.36	Pass
6534.56	Vertical	-44.10	-13	-31.10	Pass

7. Frequency Stability

Frequency Stability vs temperature:

Channel Bandwidth(MHz)	Temperature (°C)	Voltage (V ac)	Frequency Error(Hz)	Tolerance (ppm)	Limit(ppm)
LTE 5M	50	120	14.10	0.016	0.1
	40	120	22.95	0.027	0.1
	30	120	14.74	0.017	0.1
	20	120	4.36	0.005	0.1
	10	120	12.23	0.014	0.1
	0	120	34.03	0.039	0.1
	-10	120	37.52	0.043	0.1
	-20	120	33.40	0.039	0.1
	-30	120	35.56	0.041	0.1
	-40	120	16.05	0.019	0.1
GMSK 0.2M	50	120	20.77	0.024	0.1
	40	120	32.89	0.038	0.1
	30	120	23.79	0.027	0.1
	20	120	8.89	0.010	0.1
	10	120	16.10	0.019	0.1
	0	120	36.78	0.042	0.1
	-10	120	41.35	0.048	0.1
	-20	120	37.91	0.044	0.1
	-30	120	39.79	0.046	0.1
	-40	120	16.59	0.019	0.1

Frequency Stability vs voltage:

Channel Bandwidth(MHz)	Voltage (V ac)	Temperature (°C)	Frequency Error(Hz)	Tolerance (ppm)	Limit(ppm)
LTE 5M	102	20	1.51	0.002	0.1
	120	20	21.74	0.025	0.1
	138	20	36.73	0.042	0.1
GMSK 0.2M	102	20	7.93	0.009	0.1
	120	20	30.06	0.035	0.1
	138	20	45.54	0.053	0.1

8. Noise figure

