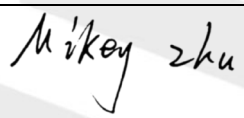
ANNEX D TEST DATA

For

Project No.:	8232EU120604W
Client:	REDBEAN Corporation
Product Description:	Redbean Pencil H1
Model No.:	H1
FCC ID:	2BKJU-H1
Technology:	Bluetooth BLE
Test Engineer:	
Test Date:	2024-08-15

Test Summary

Item	Result
Duty Cycle	Pass
Bandwidth	Pass
Maximum Conducted Output Power	Pass
Maximum Power Spectral Density	Pass
Unwanted Emissions In Non-restricted Frequency Bands	Pass
Unwanted Emissions In Restricted Frequency Bands	Pass

1. Duty Cycle

1.1 Test Result

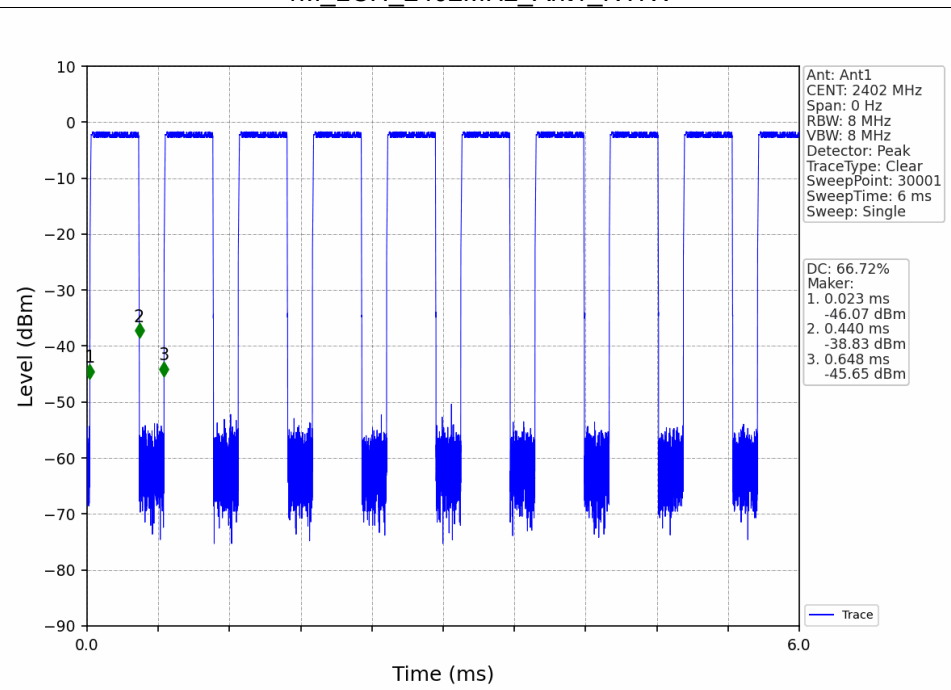
1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.417	0.625	66.72	1.76	0.00
		2440	0.417	0.625	66.72	1.76	0.00
		2480	0.417	0.625	66.72	1.76	0.00
2M	SISO	2402	0.232	0.625	37.12	4.30	0.00
		2440	0.232	0.625	37.12	4.30	0.03
		2480	0.225	0.625	36.00	4.44	0.03

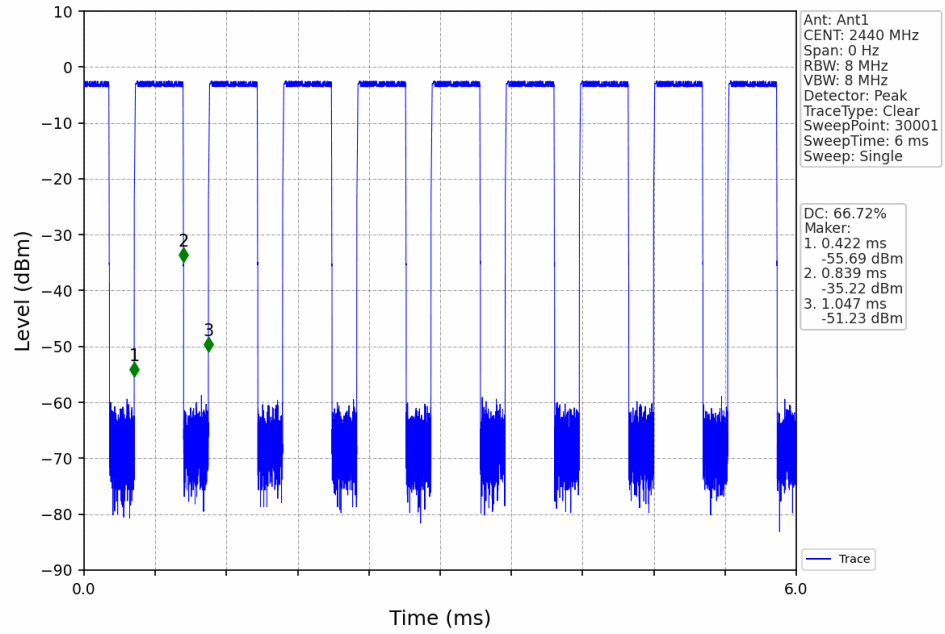
1.2 Test Graph

1.2.1 Ant1

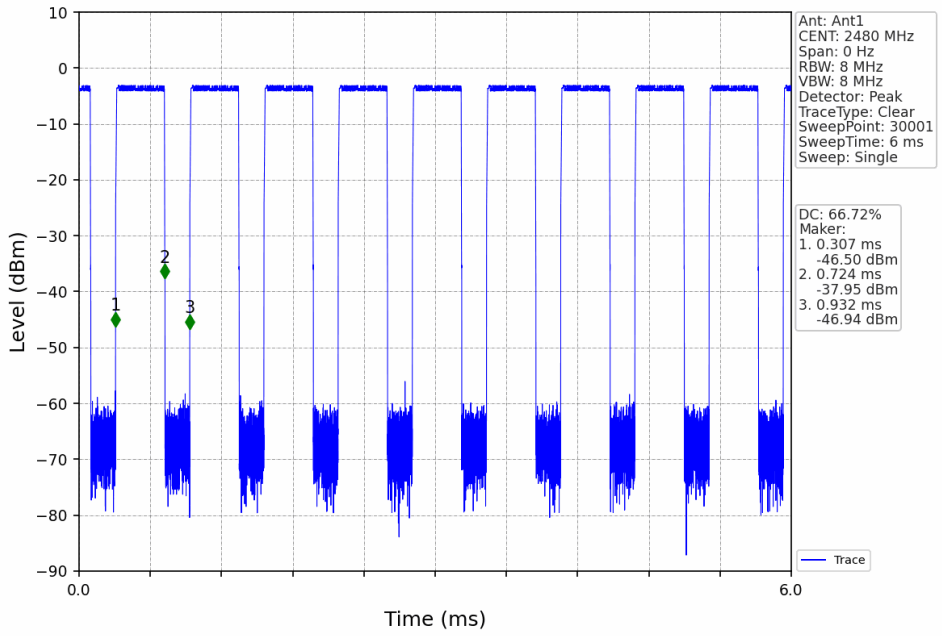
1M_LCH_2402MHz_Ant1_NTNV



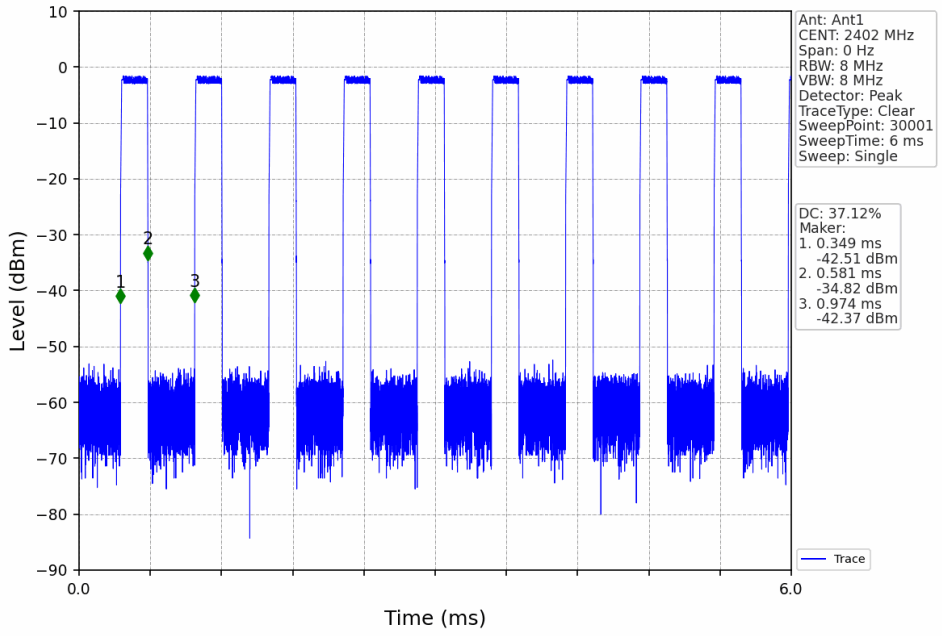
1M_MCH_2440MHz_Ant1_NTNV



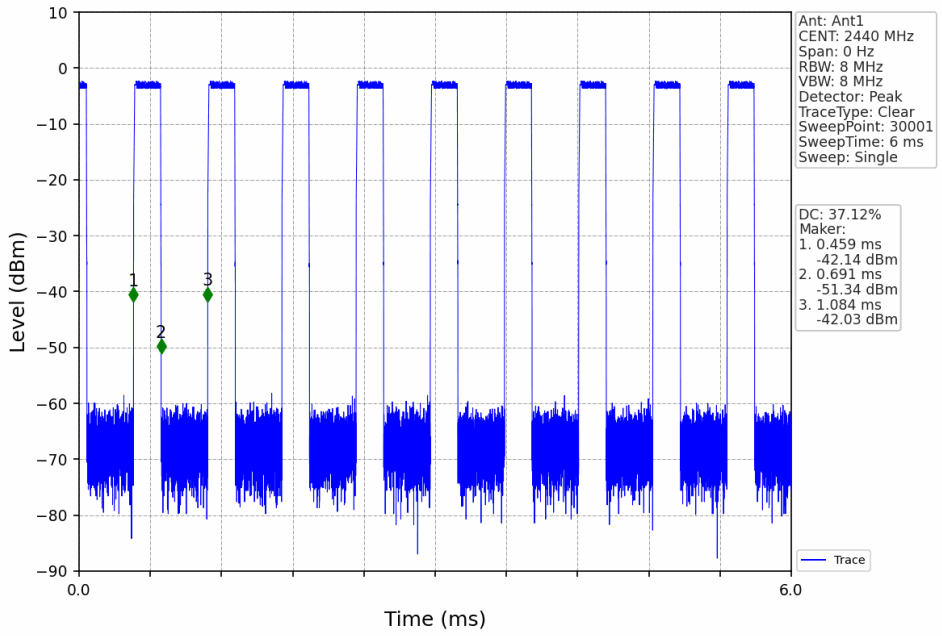
1M_HCH_2480MHz_Ant1_NTNV



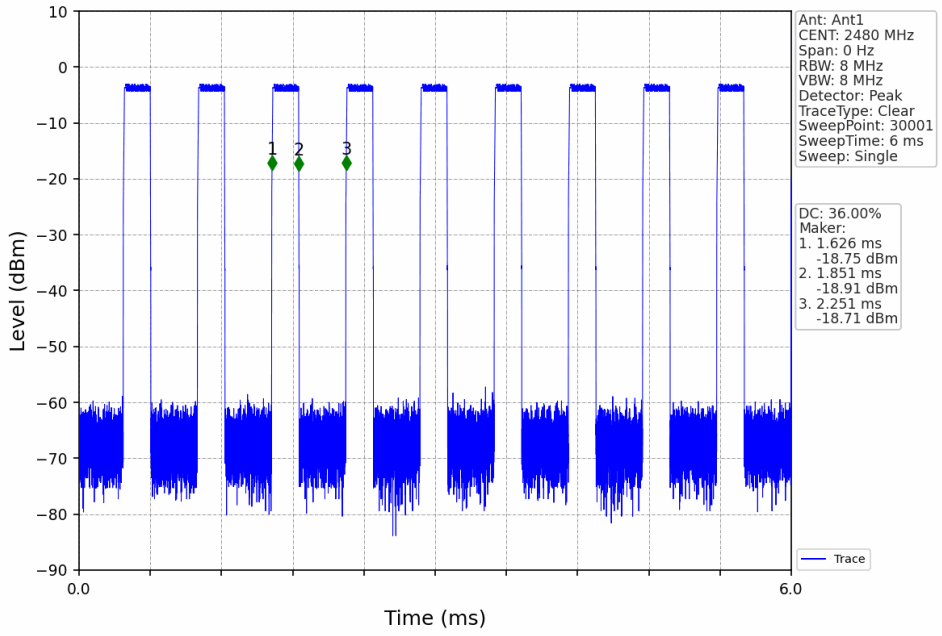
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



2. Bandwidth

2.1 Test Result

2.1.1 OBW

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	1.016	/	Pass
		2440	1	1.017	/	Pass
		2480	1	1.016	/	Pass
2M	SISO	2402	1	2.013	/	Pass
		2440	1	2.011	/	Pass
		2480	1	2.011	/	Pass

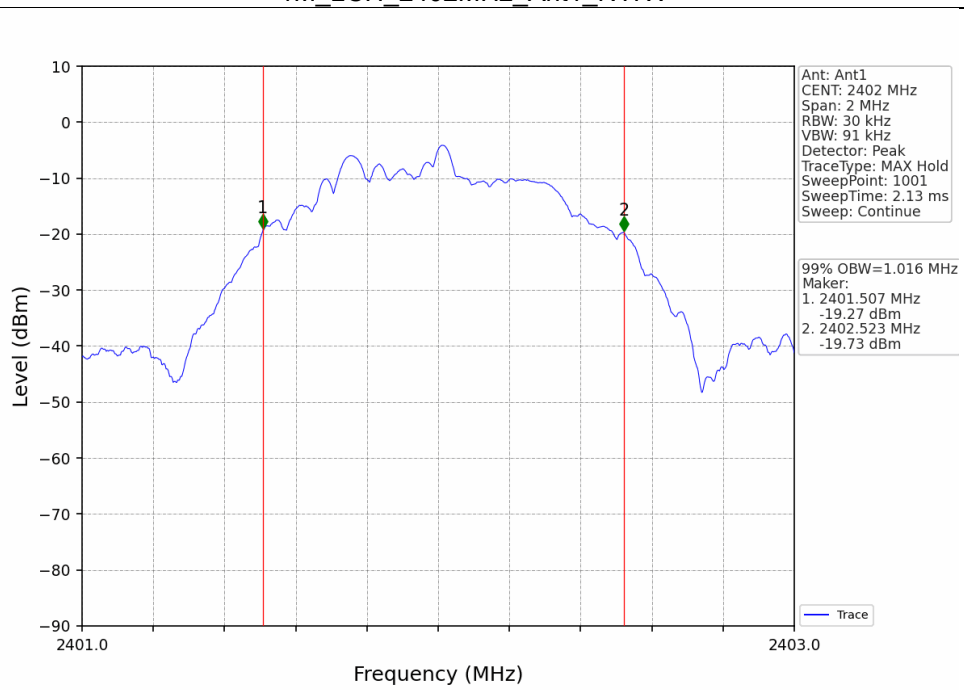
2.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.663	>=0.5	Pass
		2440	1	0.660	>=0.5	Pass
		2480	1	0.658	>=0.5	Pass
2M	SISO	2402	1	1.145	>=0.5	Pass
		2440	1	1.144	>=0.5	Pass
		2480	1	1.137	>=0.5	Pass

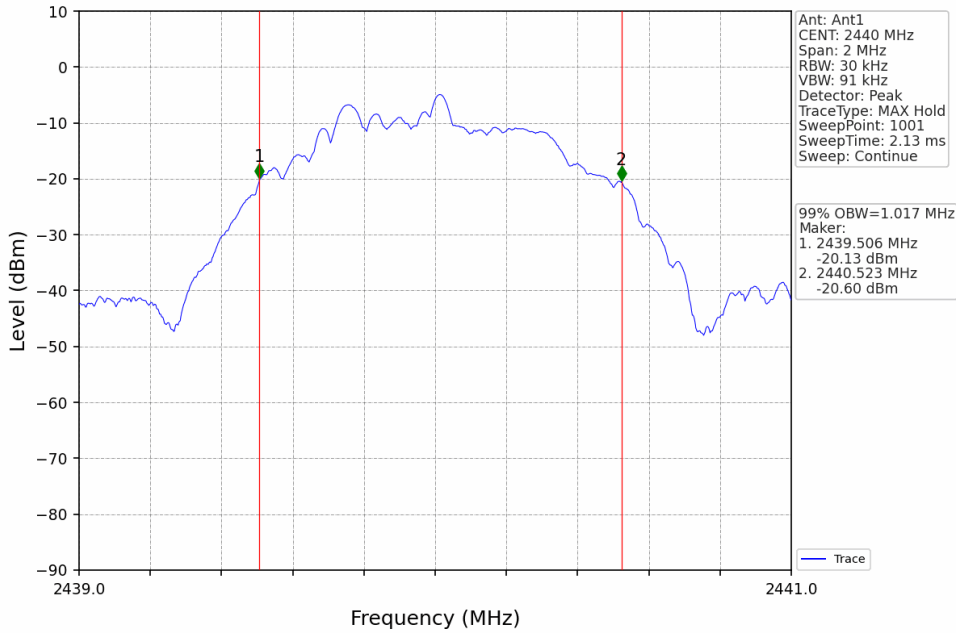
2.2 Test Graph

2.2.1 OBW

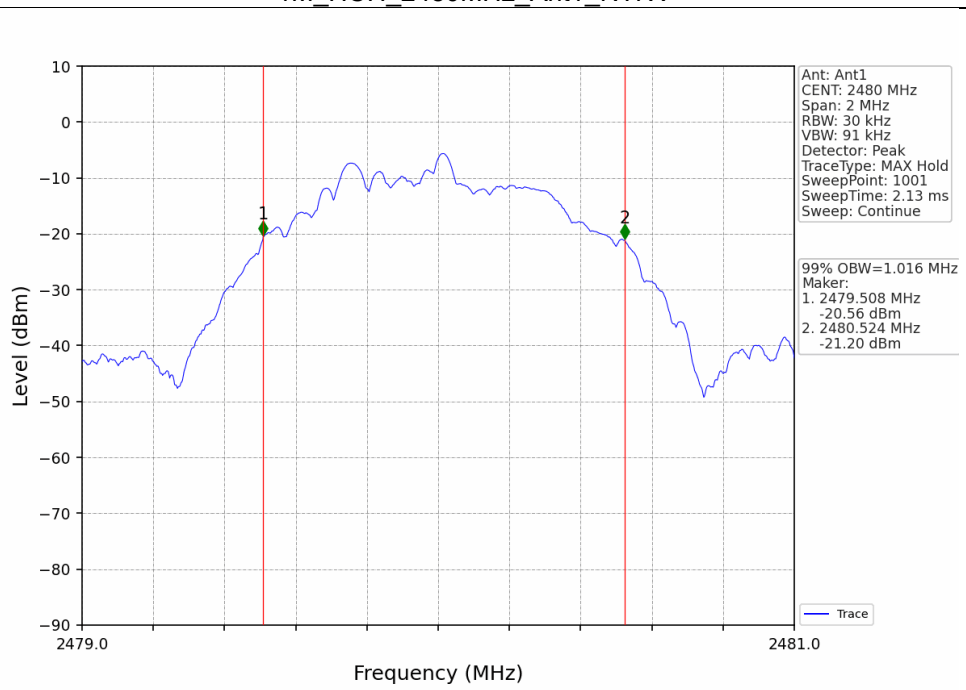
1M_LCH_2402MHz_Ant1_NTNV



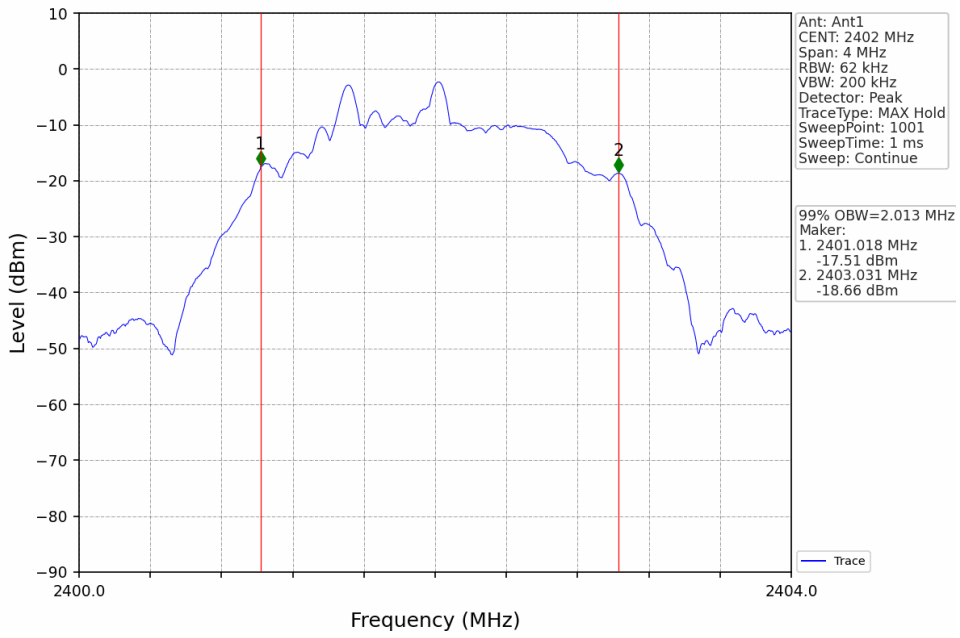
1M_MCH_2440MHz_Ant1_NTNV



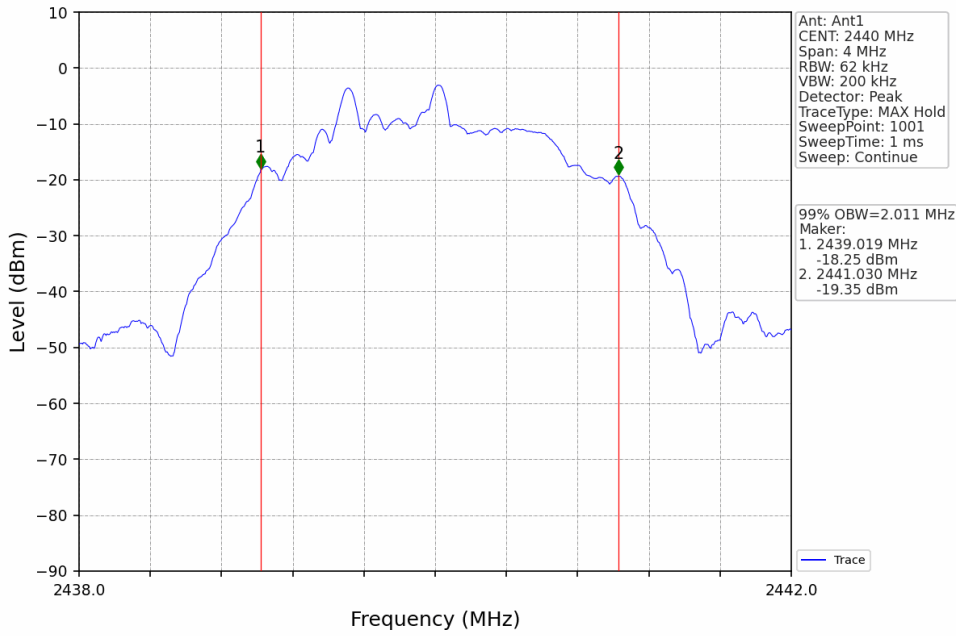
1M_HCH_2480MHz_Ant1_NTNV



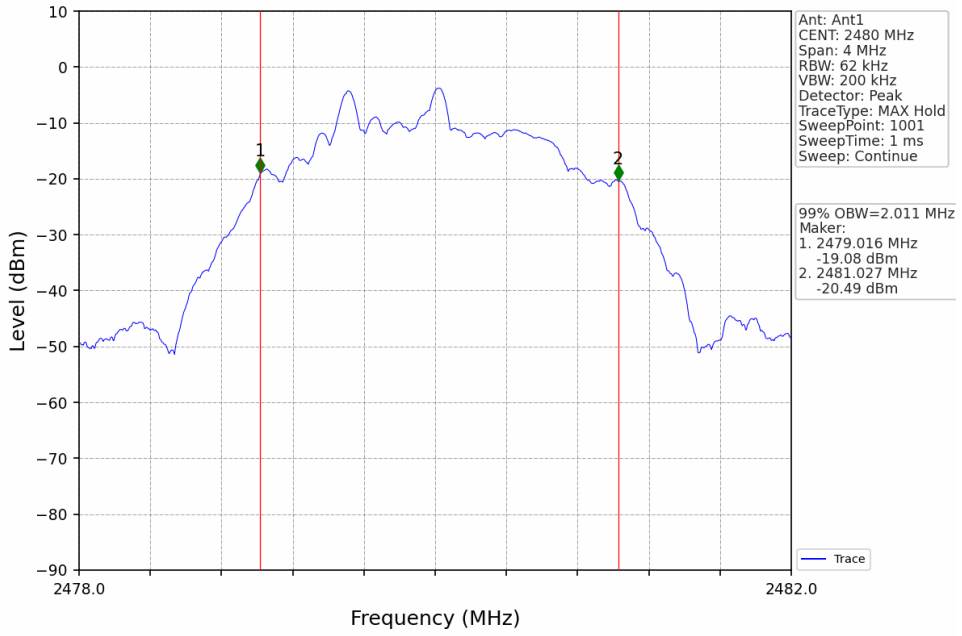
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV

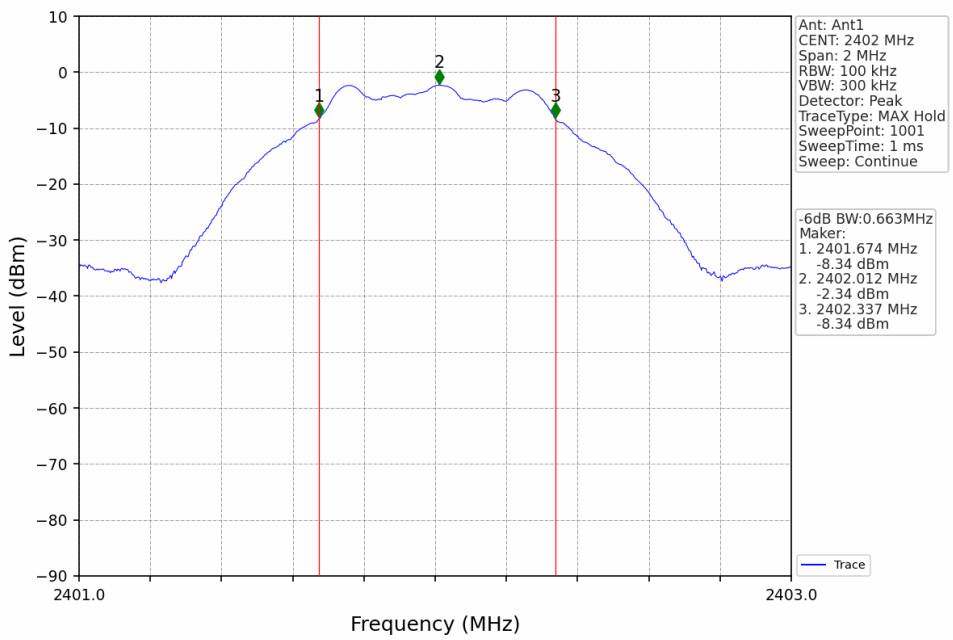


2M_HCH_2480MHz_Ant1_NTNV

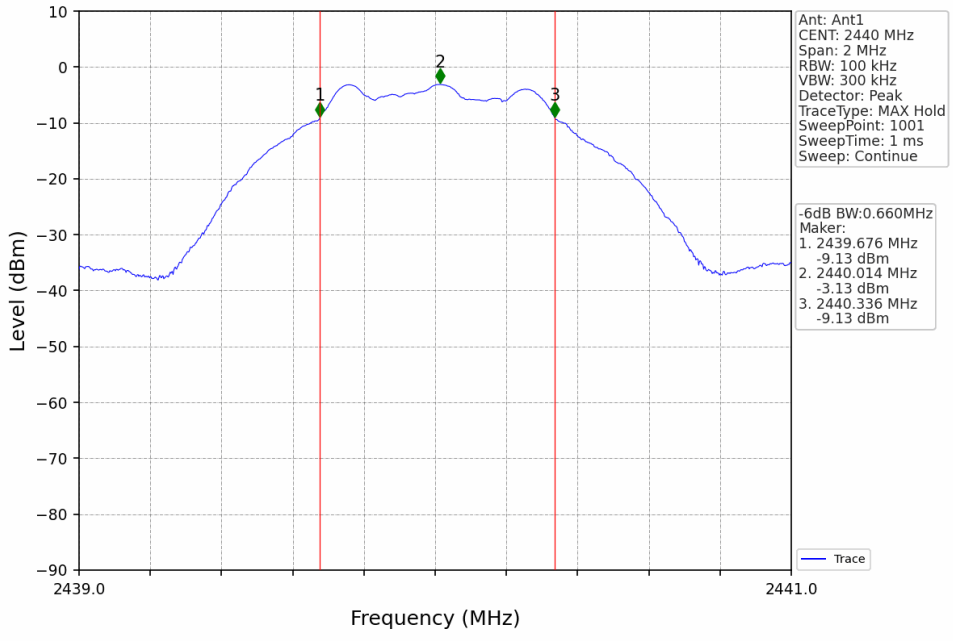


2.2.2 6dB BW

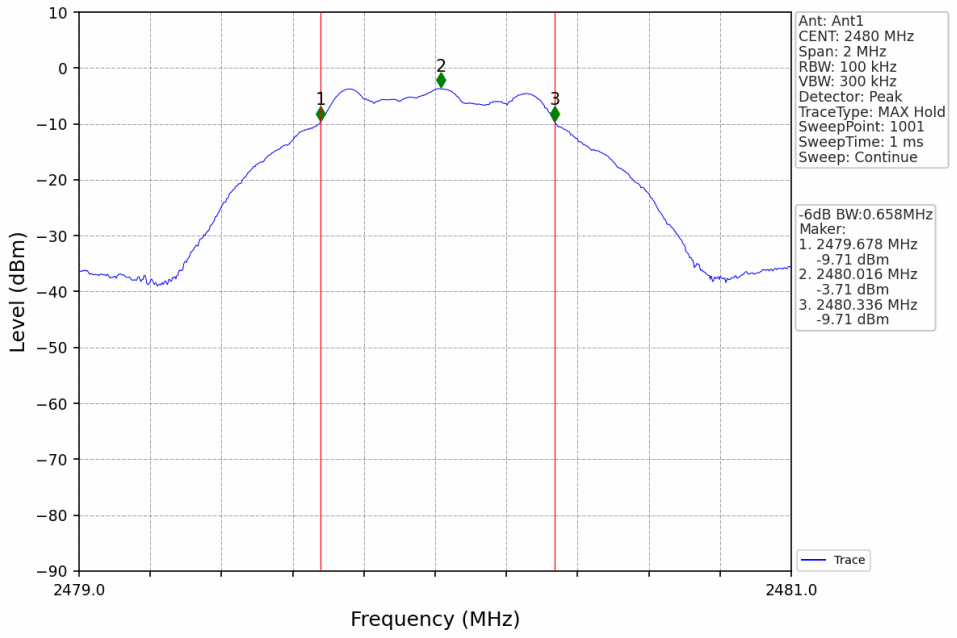
1M_LCH_2402MHz_Ant1_NTNV



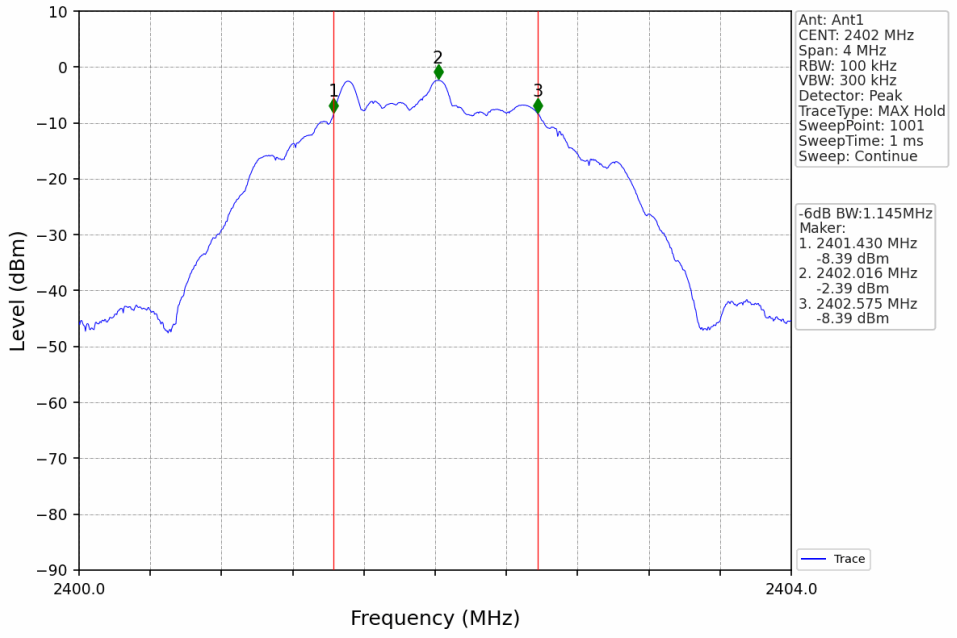
1M_MCH_2440MHz_Ant1_NTNV



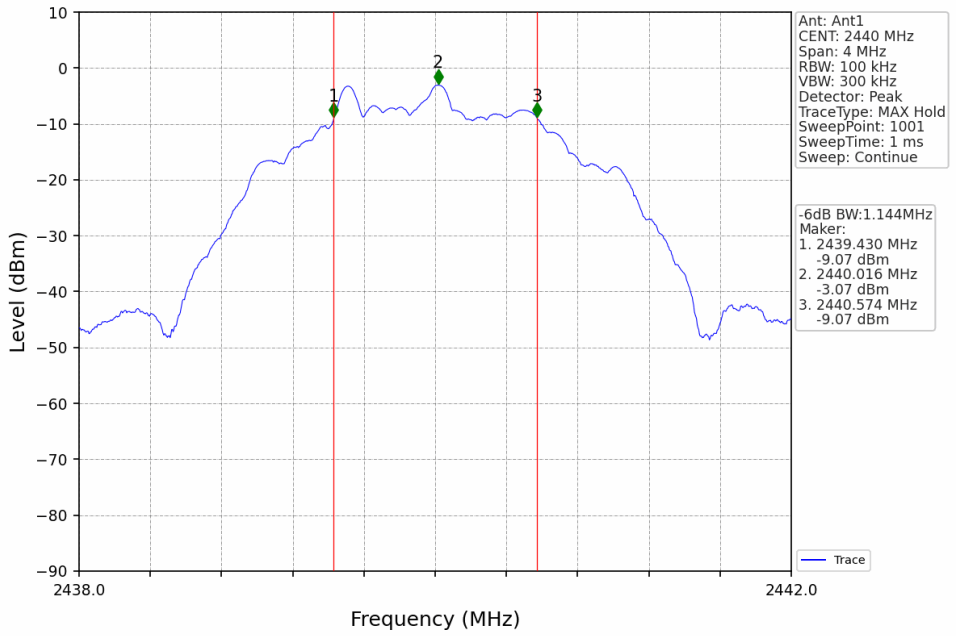
1M_HCH_2480MHz_Ant1_NTNV



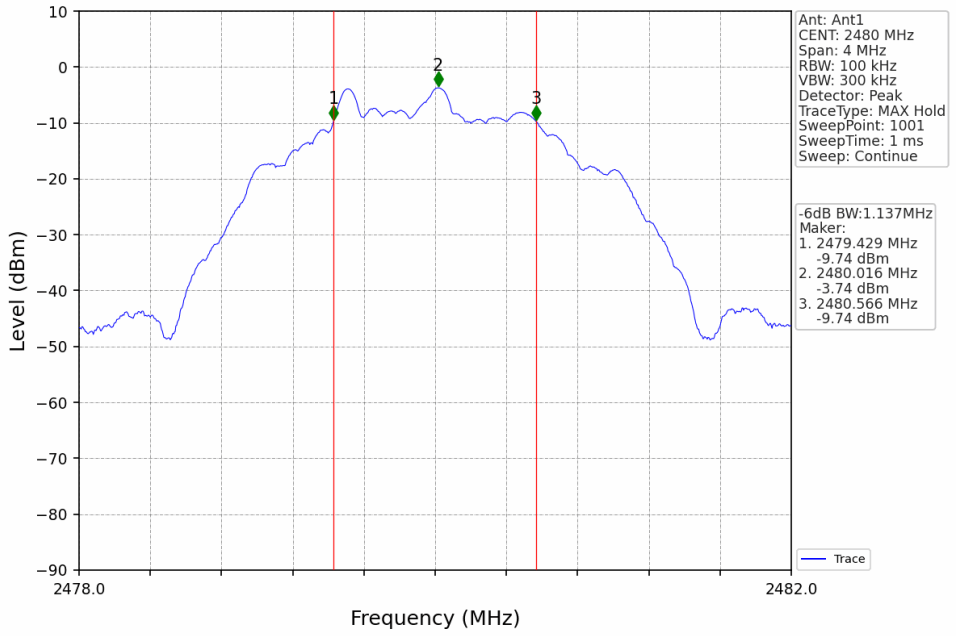
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



3. Maximum Conducted Output Power

3.1 Test Result

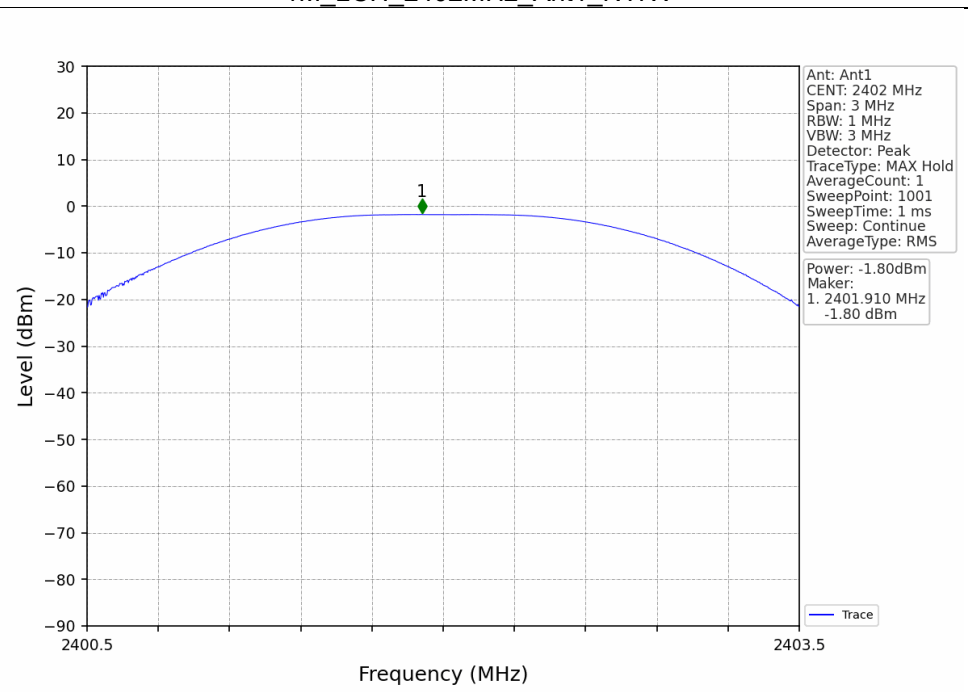
3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	-1.80	<=30	Pass
		2440	-2.62	<=30	Pass
		2480	-3.19	<=30	Pass
2M	SISO	2402	-1.84	<=30	Pass
		2440	-2.57	<=30	Pass
		2480	-3.22	<=30	Pass

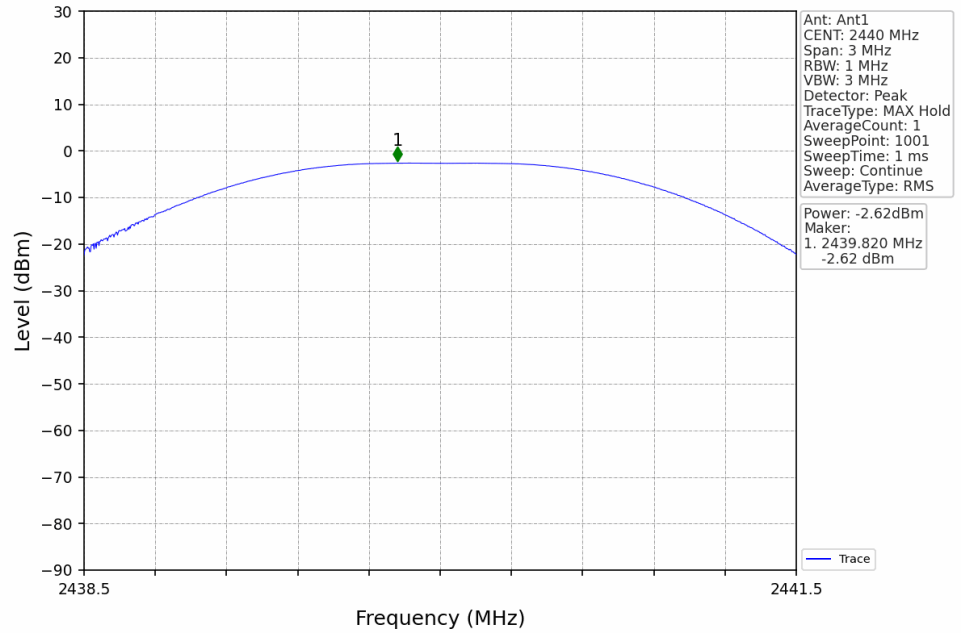
3.2 Test Graph

3.2.1 Power

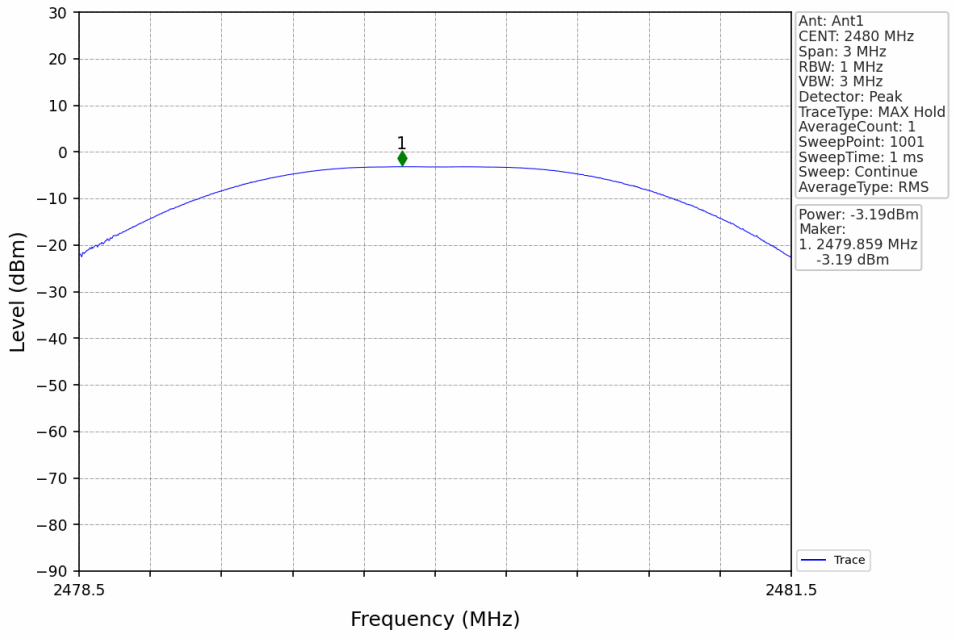
1M_LCH_2402MHz_Ant1_NTNV



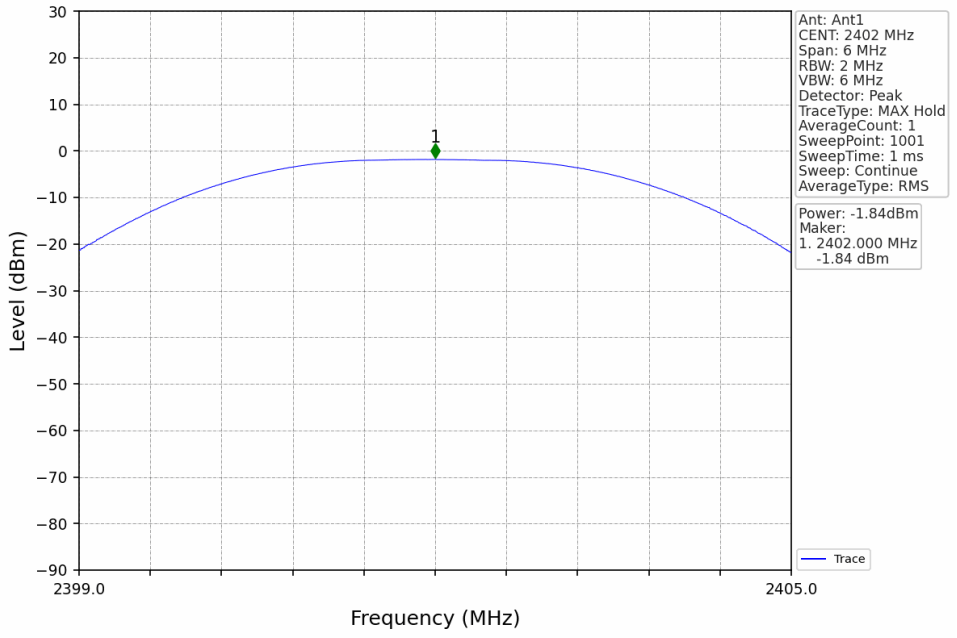
1M_MCH_2440MHz_Ant1_NTNV



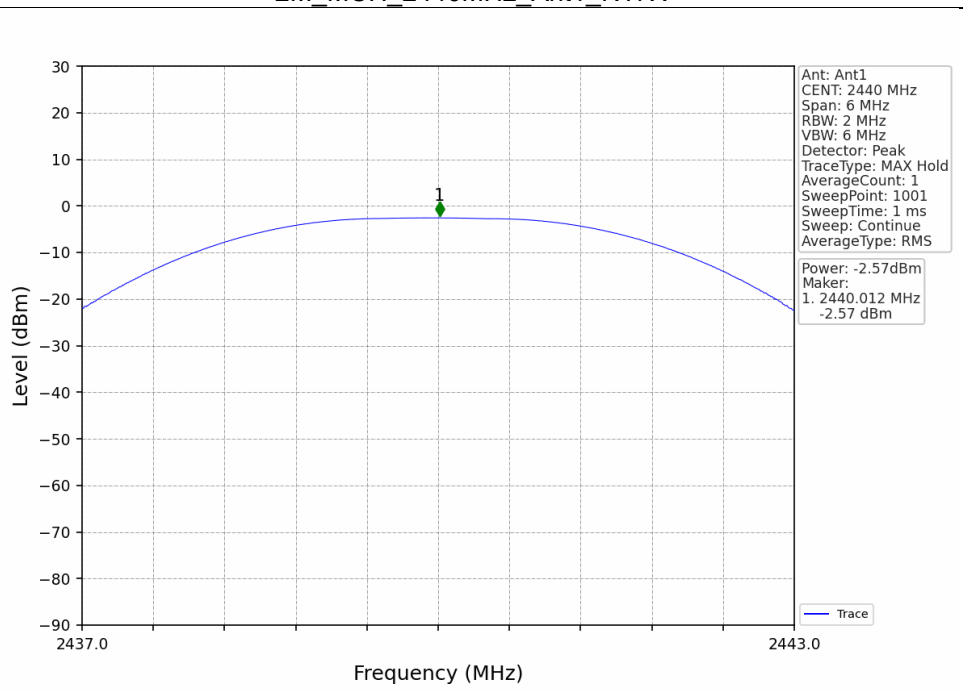
1M_HCH_2480MHz_Ant1_NTNV



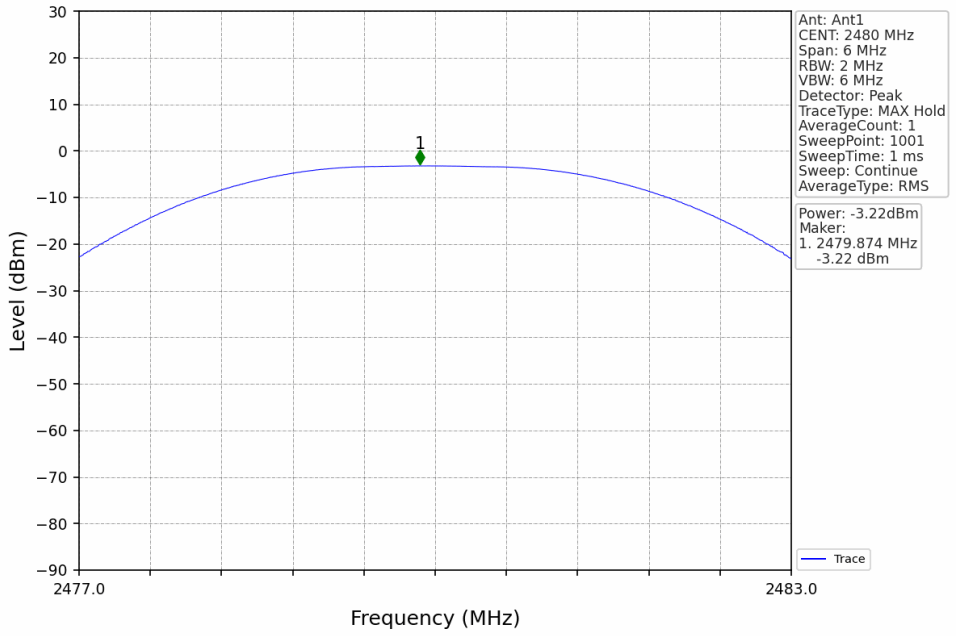
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



4. Maximum Power Spectral Density

4.1 Test Result

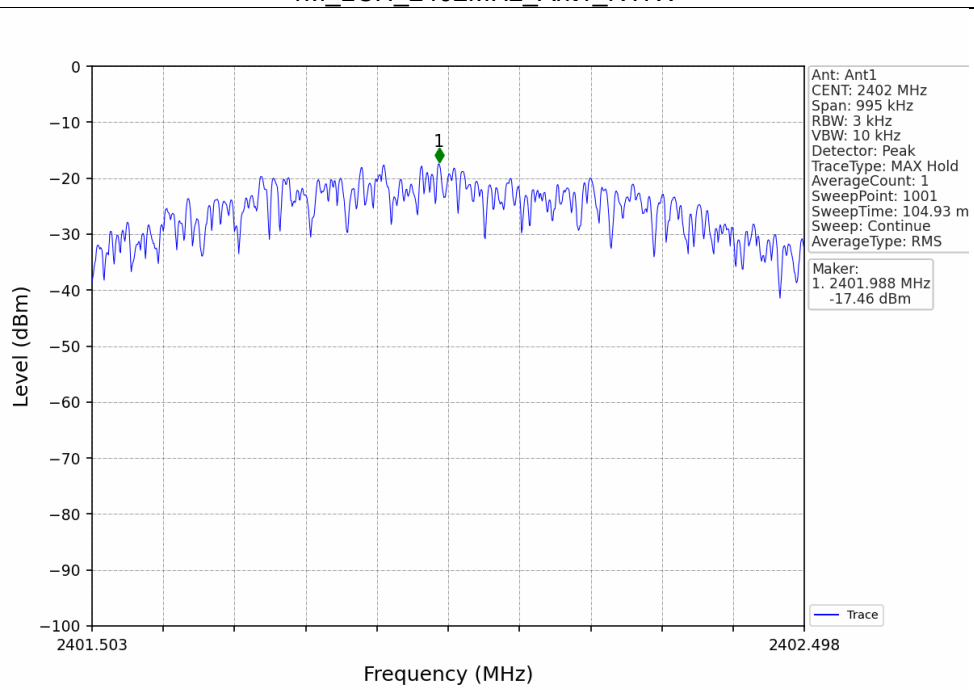
4.1.1 PSD

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-17.46	<=8	Pass
		2440	-18.31	<=8	Pass
		2480	-19.04	<=8	Pass
2M	SISO	2402	-19.39	<=8	Pass
		2440	-20.28	<=8	Pass
		2480	-20.98	<=8	Pass

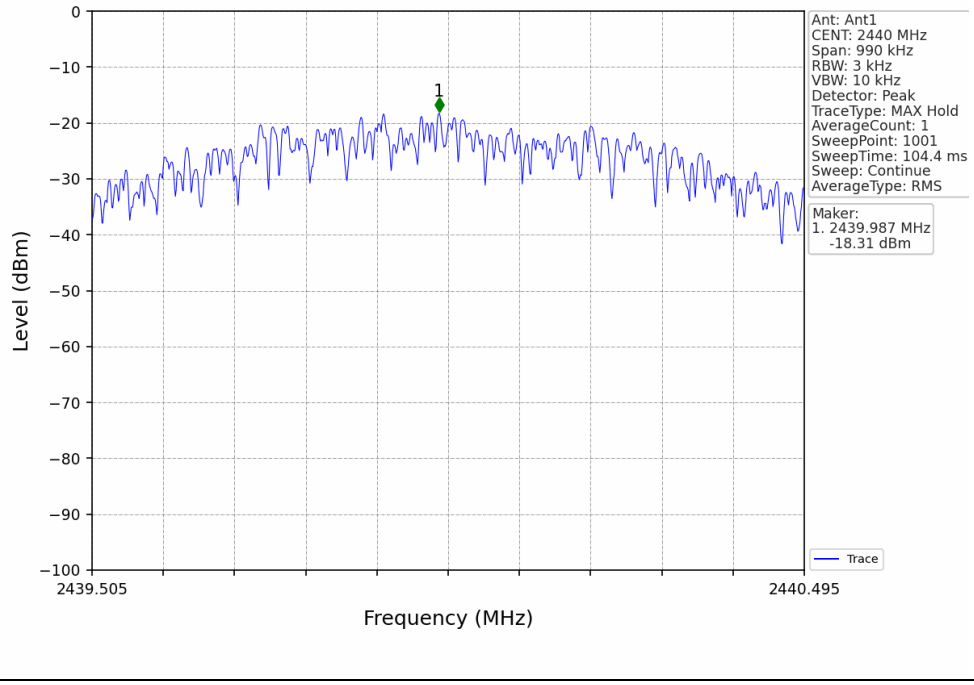
4.2 Test Graph

4.2.1 PSD

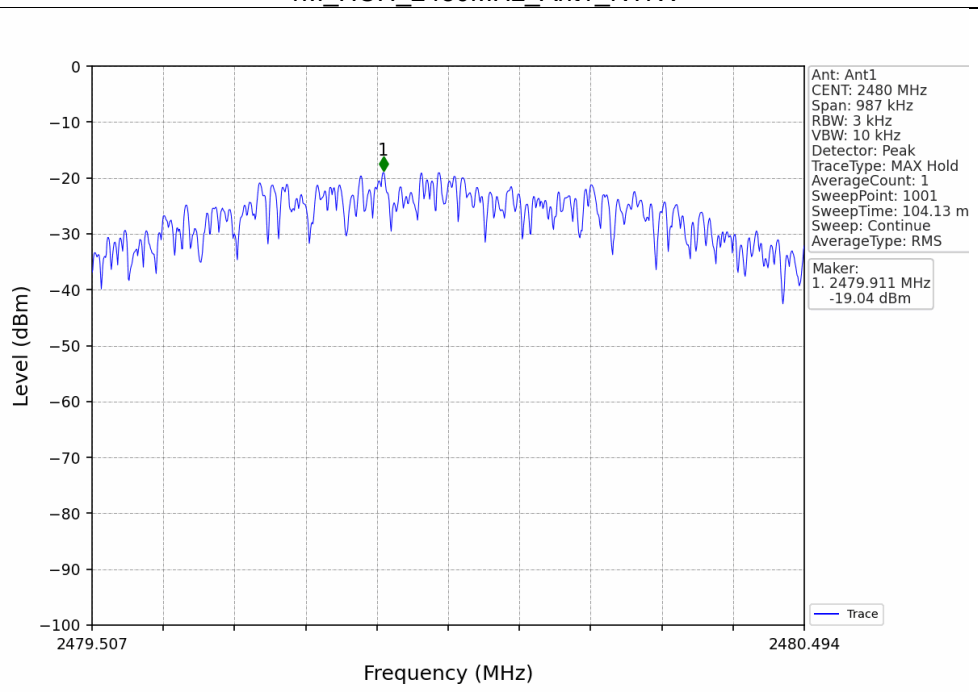
1M_LCH_2402MHz_Ant1_NTNV



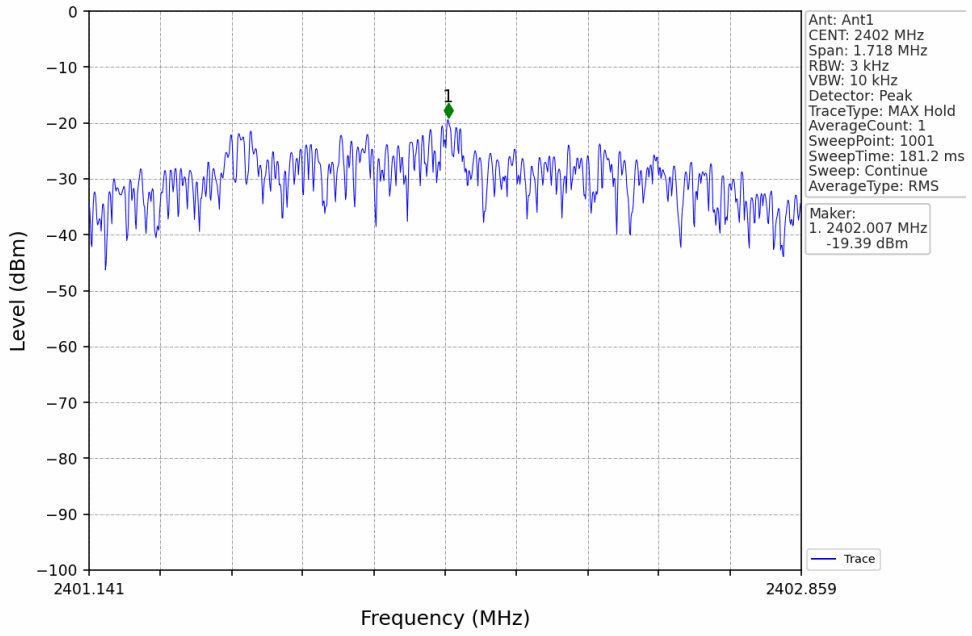
1M_MCH_2440MHz_Ant1_NTNV



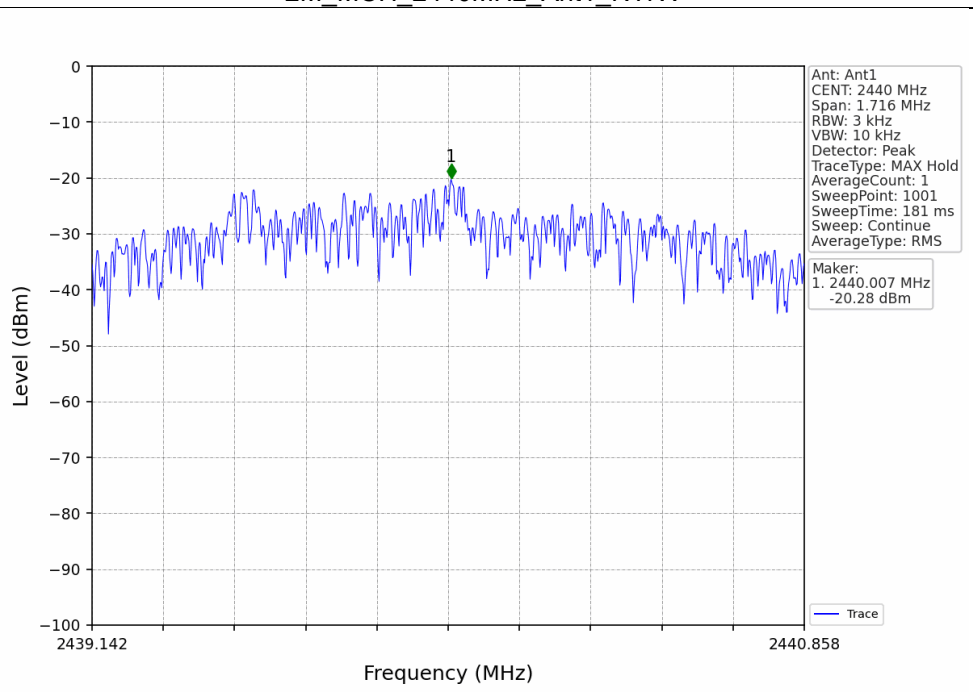
1M_HCH_2480MHz_Ant1_NTNV



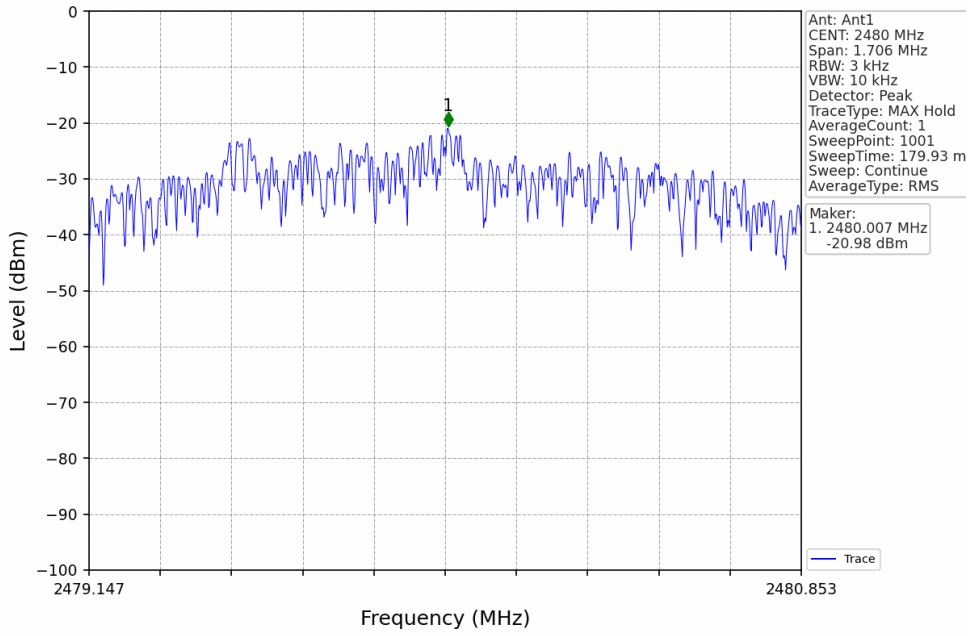
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	-2.35
		2440	1	-3.14
		2480	1	-3.72
2M	SISO	2402	1	-2.42
		2440	1	-3.12
		2480	1	-3.78
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.				

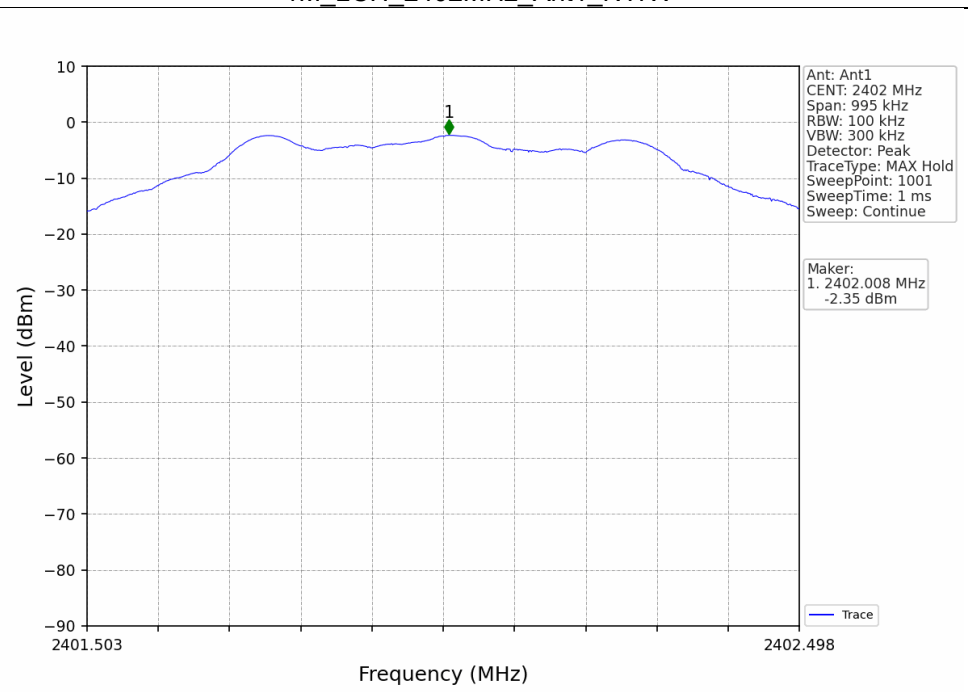
5.1.2 CSE

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	-2.35	-22.35	Pass
		2440	1	-3.14	-23.14	Pass
		2480	1	-3.72	-23.72	Pass
2M	SISO	2402	1	-2.42	-22.42	Pass
		2440	1	-3.12	-23.12	Pass
		2480	1	-3.78	-23.78	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.						

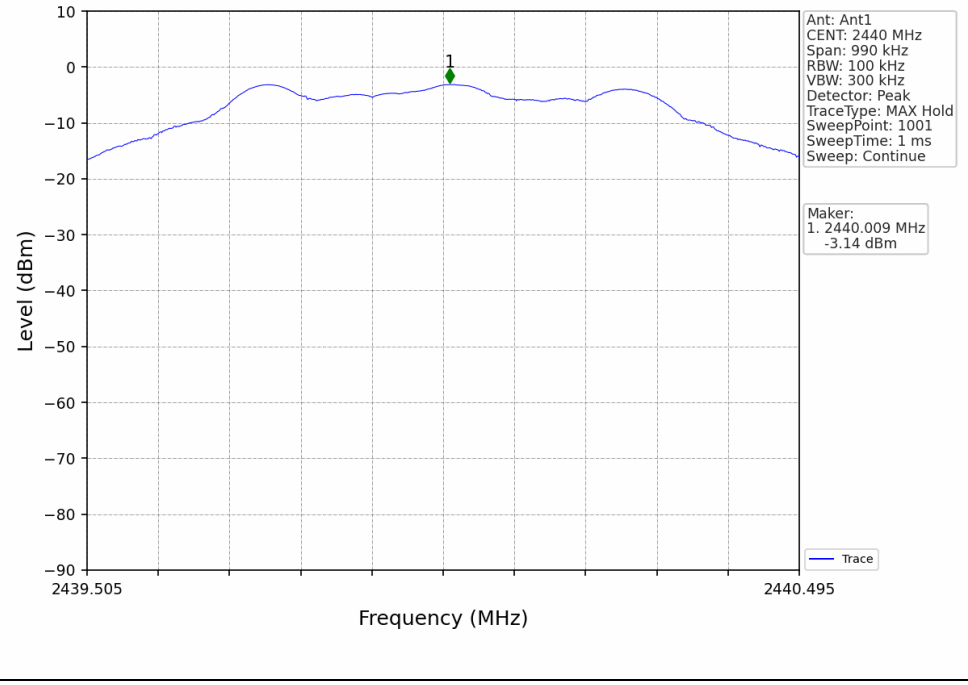
5.2 Test Graph

5.2.1 Ref

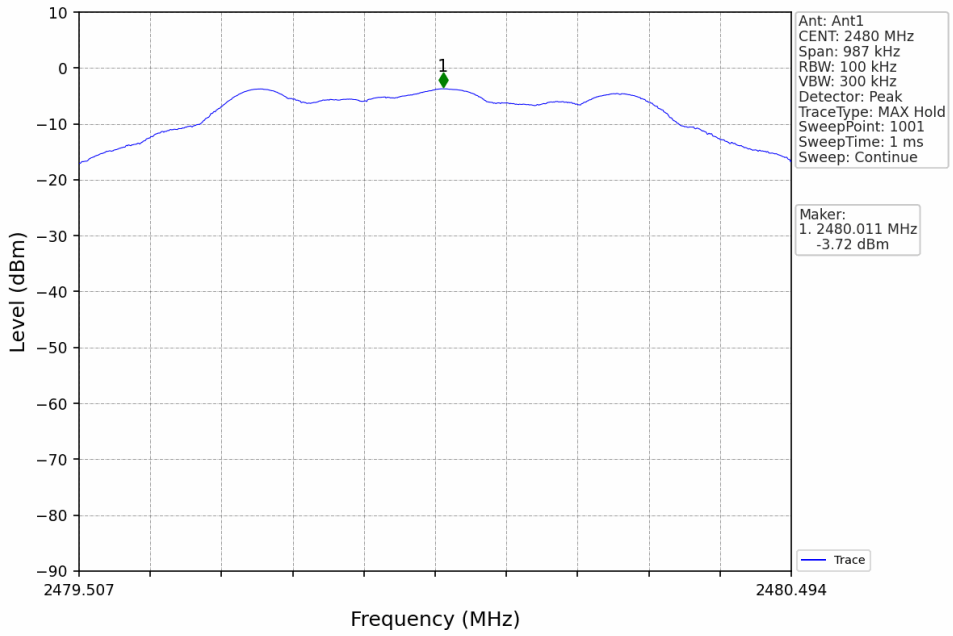
1M_LCH_2402MHz_Ant1_NTNV



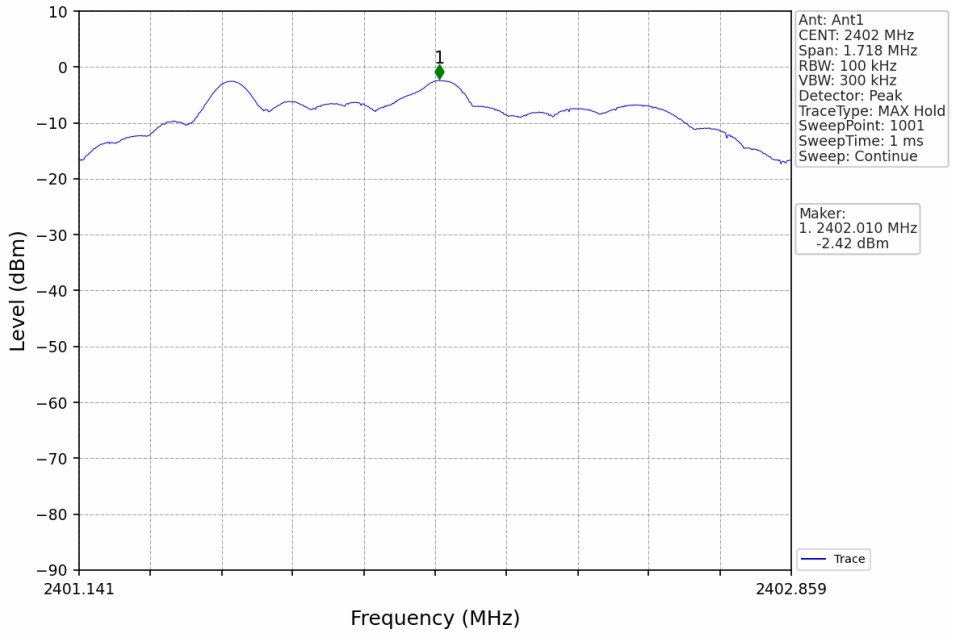
1M_MCH_2440MHz_Ant1_NTNV



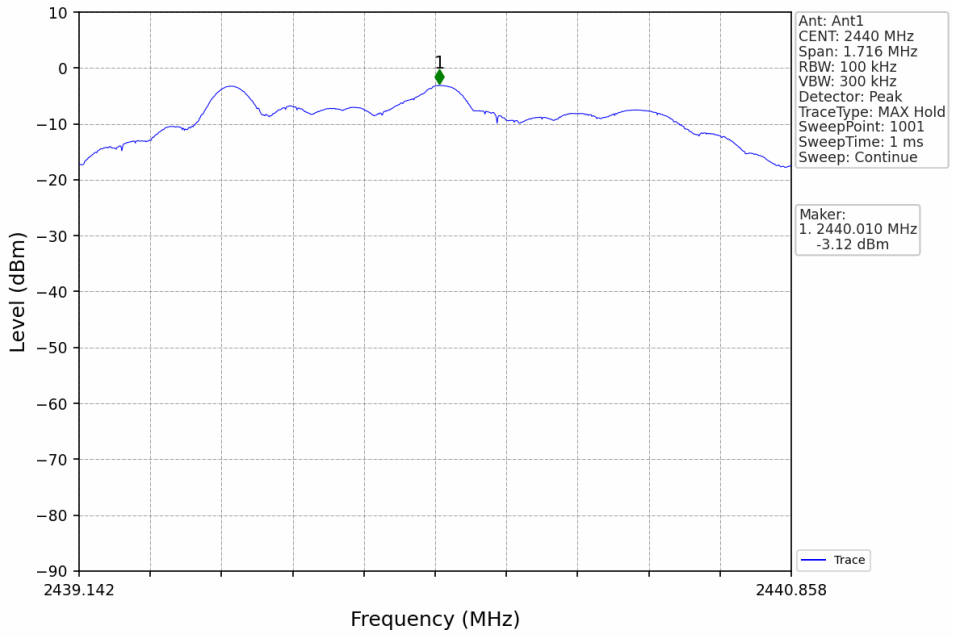
1M_HCH_2480MHz_Ant1_NTNV



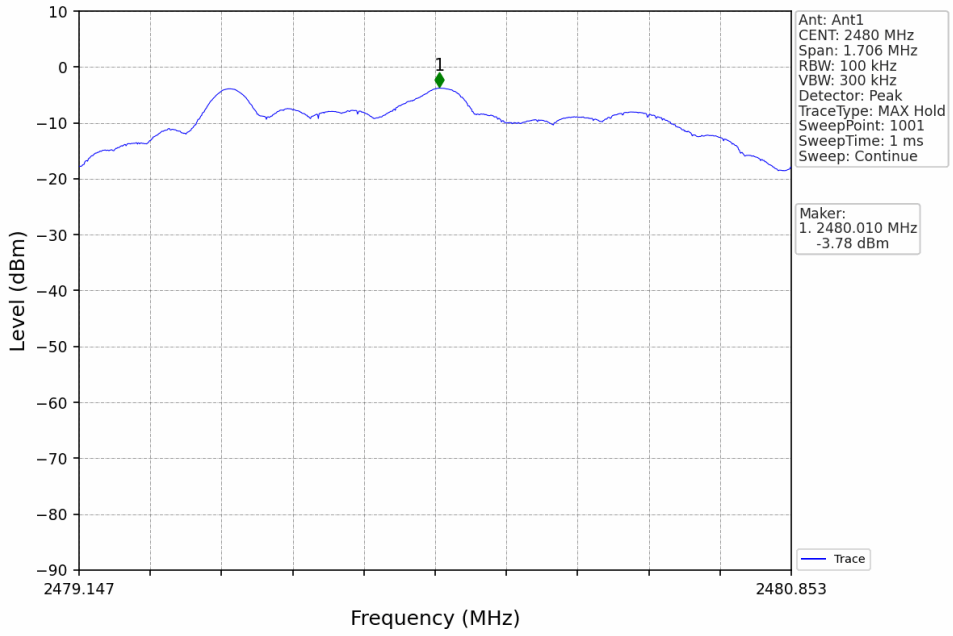
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV

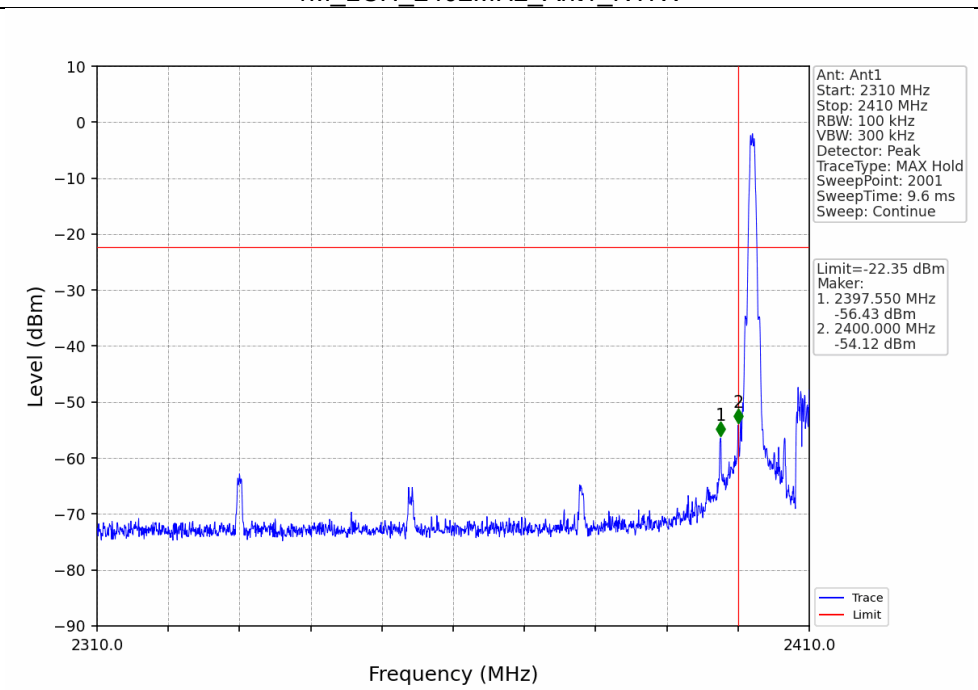


2M_HCH_2480MHz_Ant1_NTNV

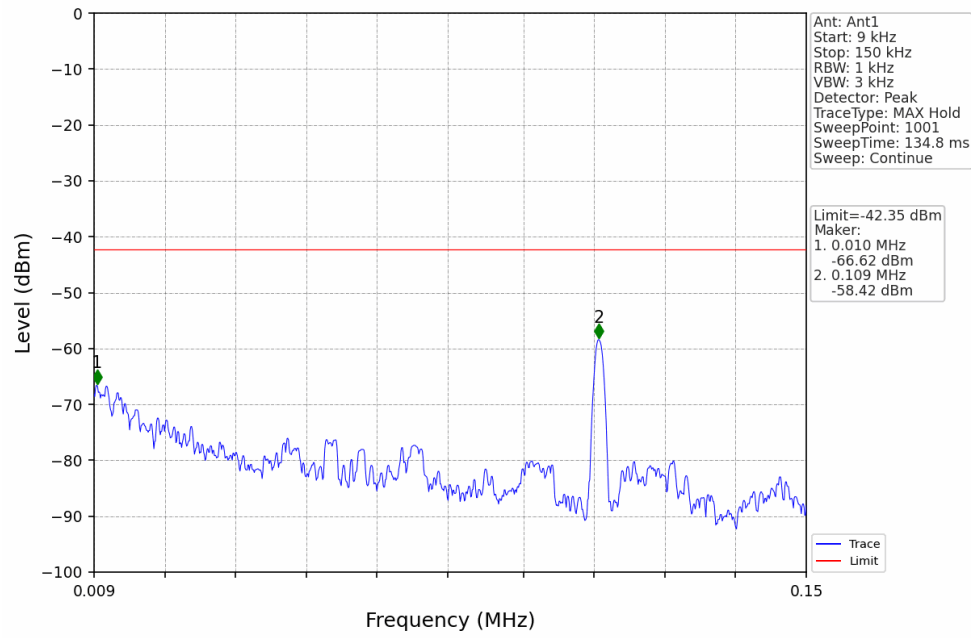


5.2.2 CSE

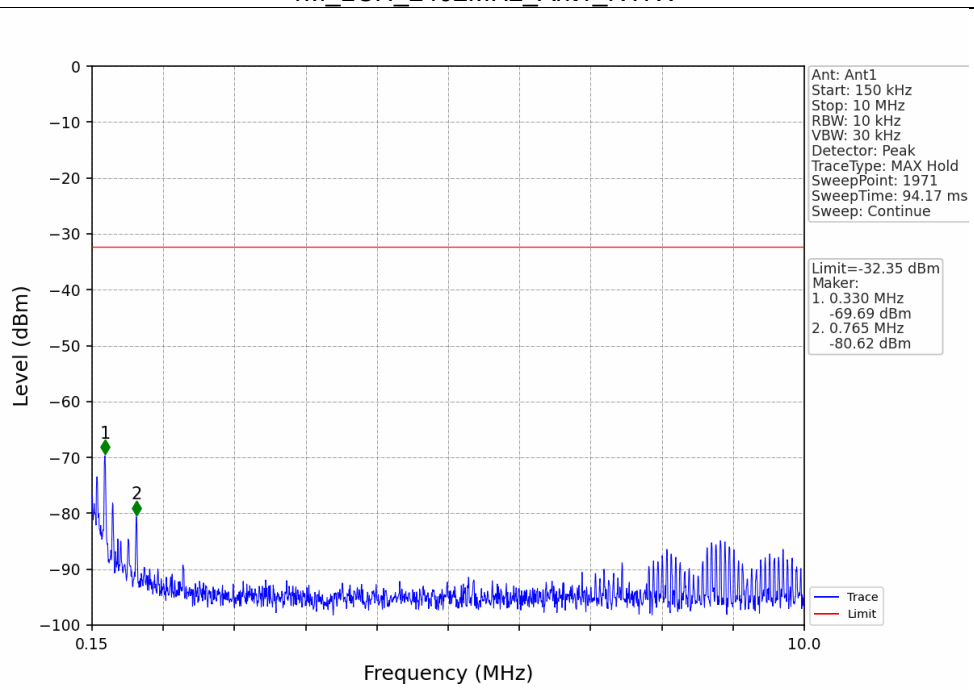
1M_LCH_2402MHz_Ant1_NTNV



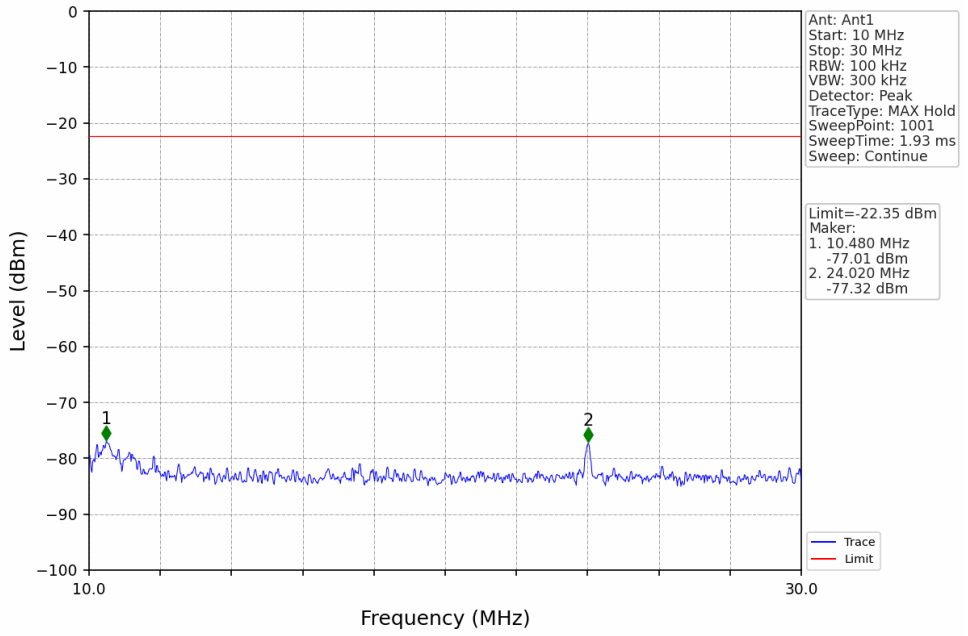
1M_LCH_2402MHz_Ant1_NTNV



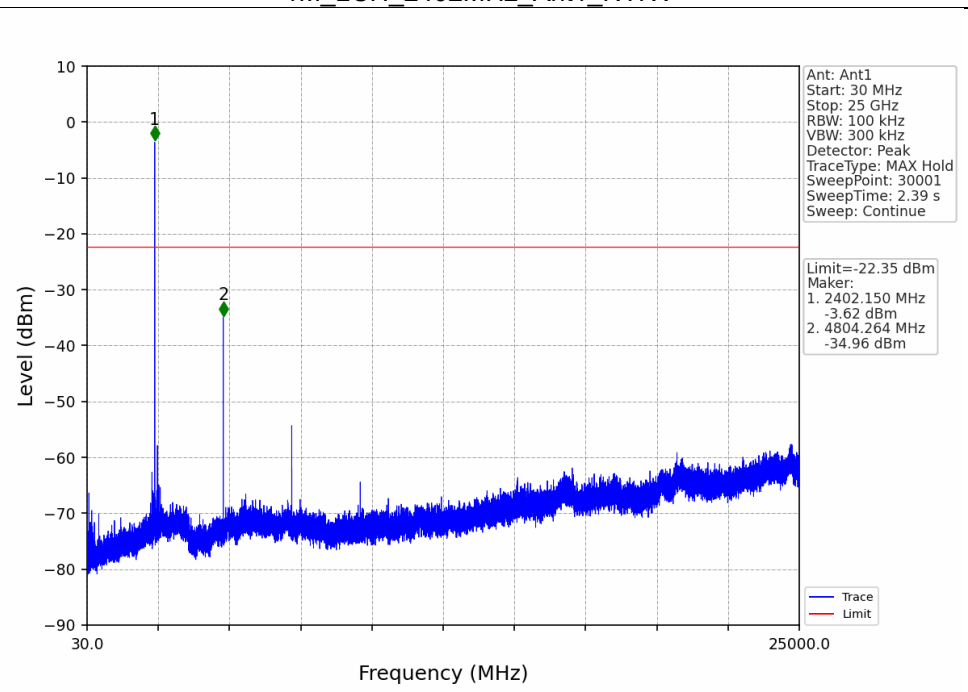
1M_LCH_2402MHz_Ant1_NTNV



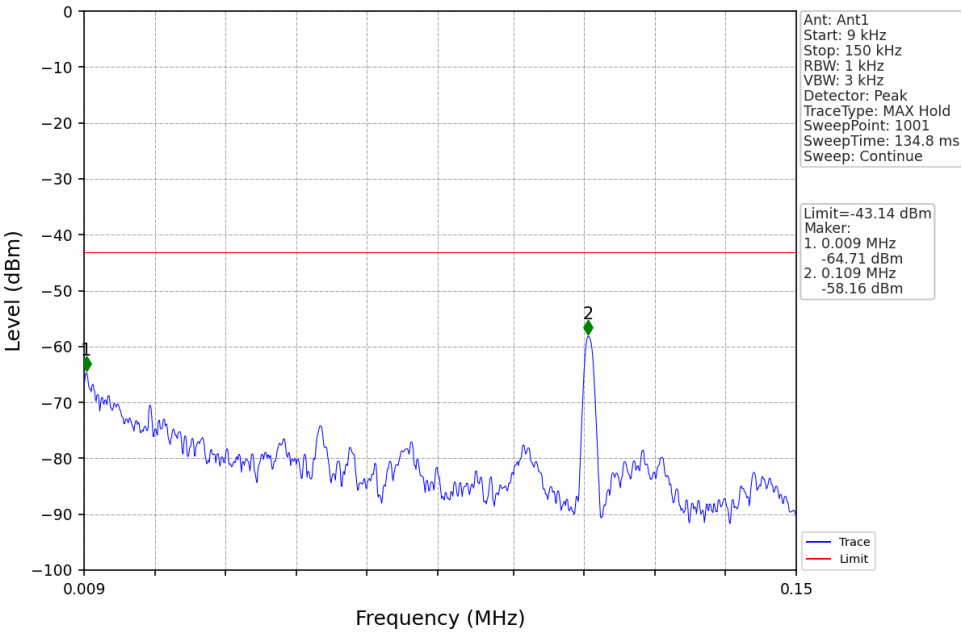
1M_LCH_2402MHz_Ant1_NTNV



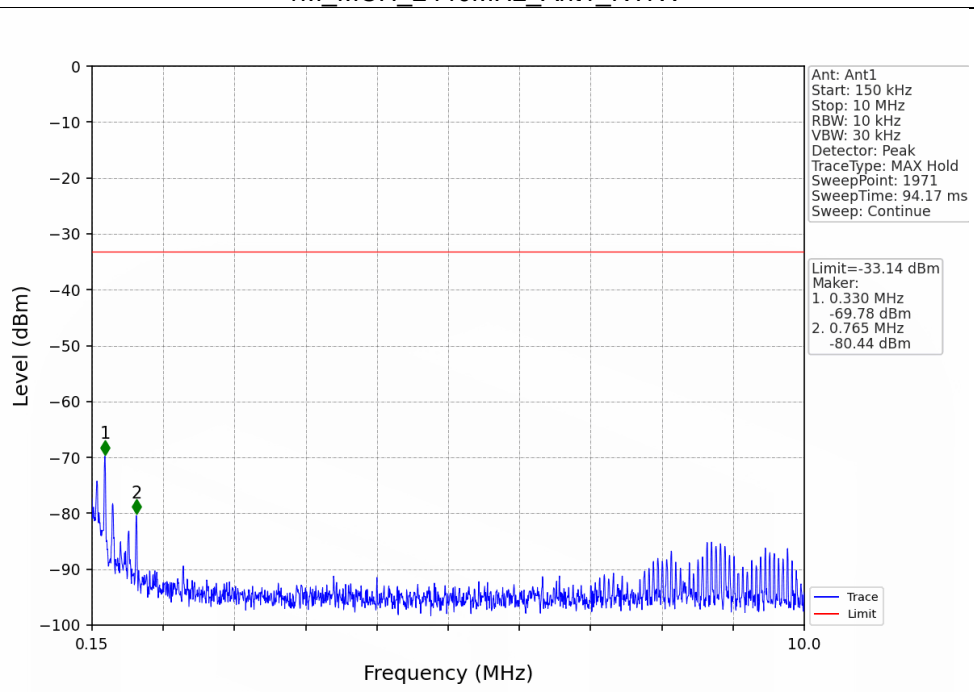
1M_LCH_2402MHz_Ant1_NTNV



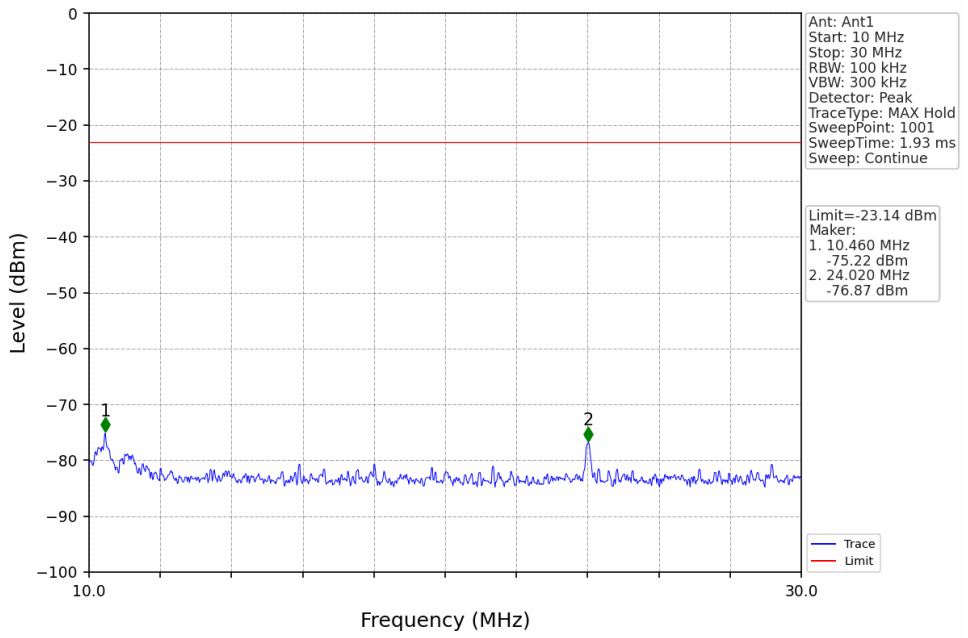
1M_MCH_2440MHz_Ant1_NTNV



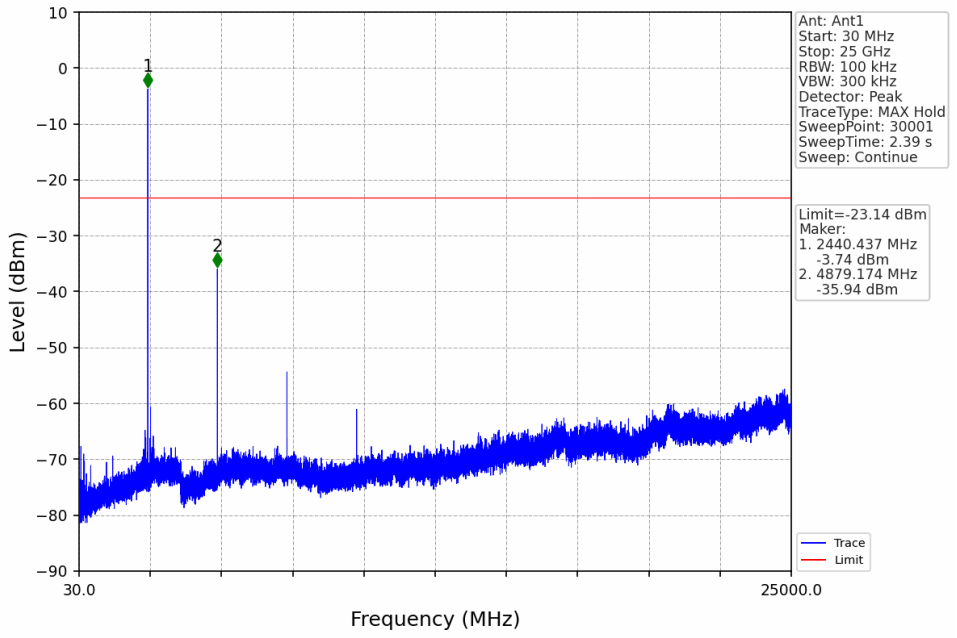
1M_MCH_2440MHz_Ant1_NTNV



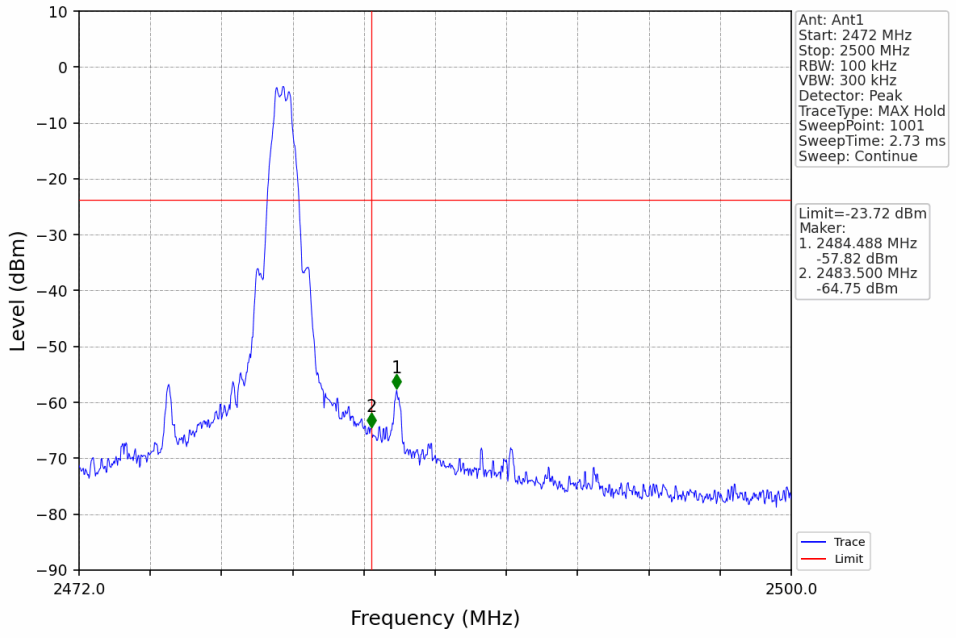
1M_MCH_2440MHz_Ant1_NTNV



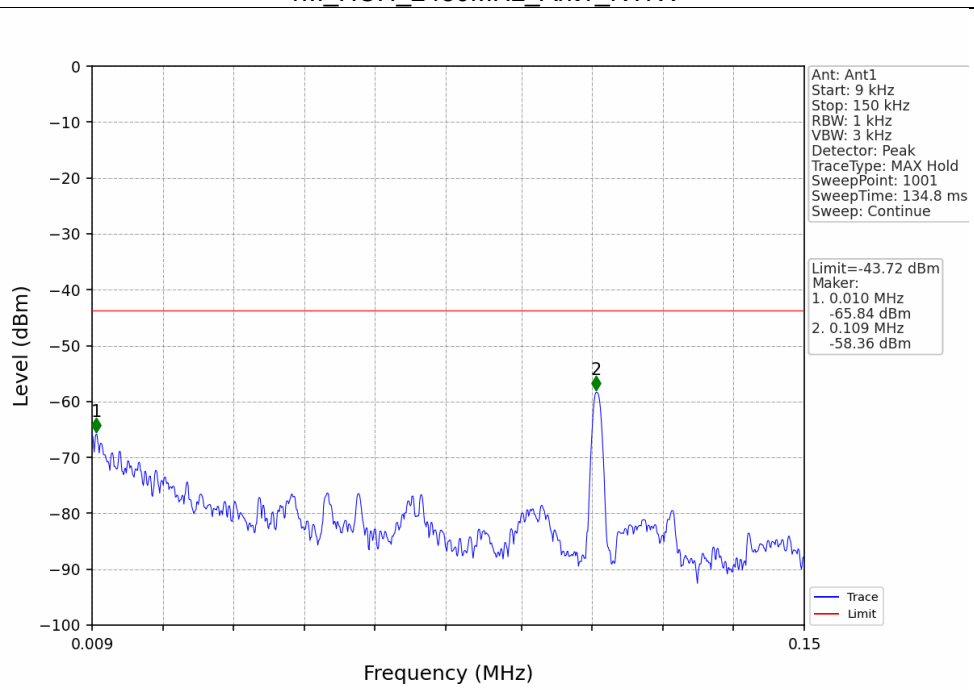
1M_MCH_2440MHz_Ant1_NTNV



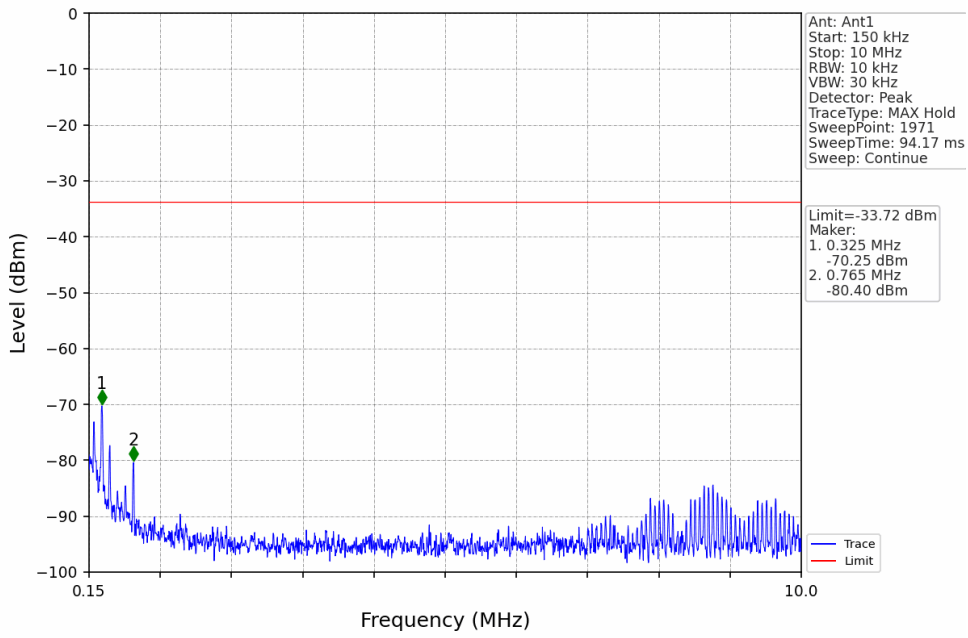
1M_HCH_2480MHz_Ant1_NTNV



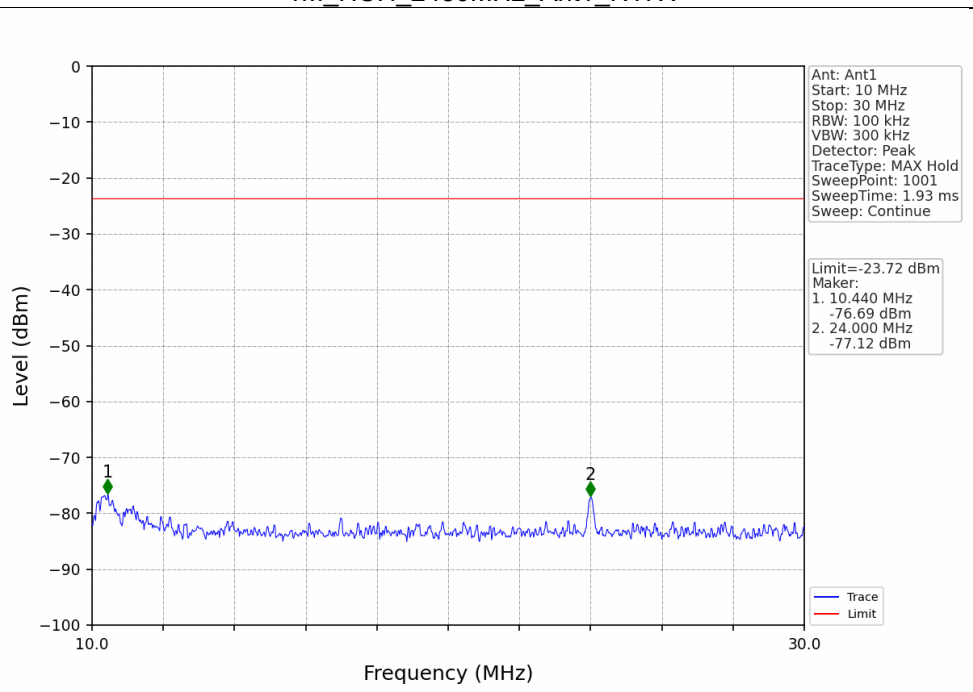
1M_HCH_2480MHz_Ant1_NTNV



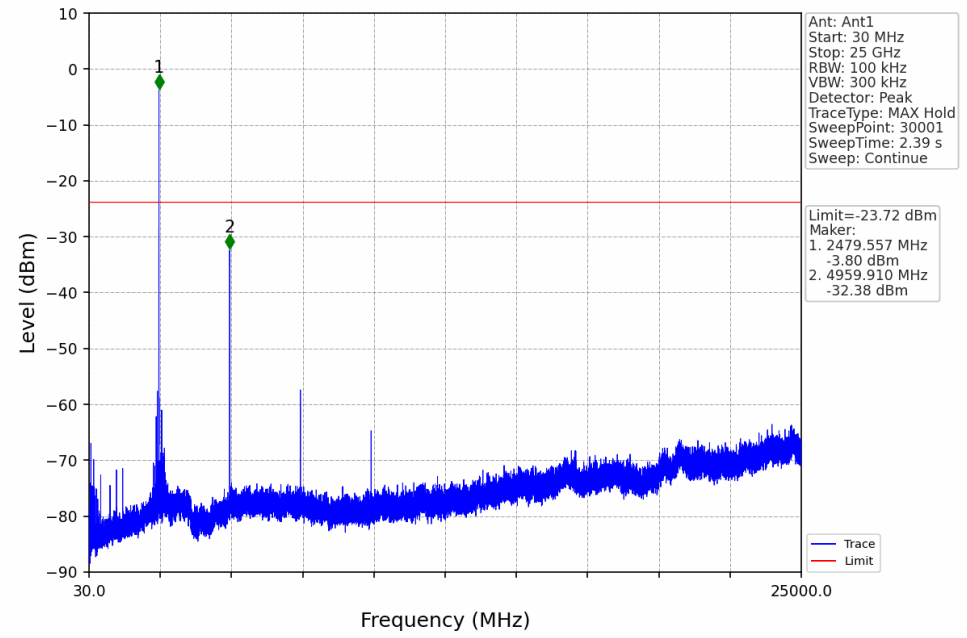
1M_HCH_2480MHz_Ant1_NTNV



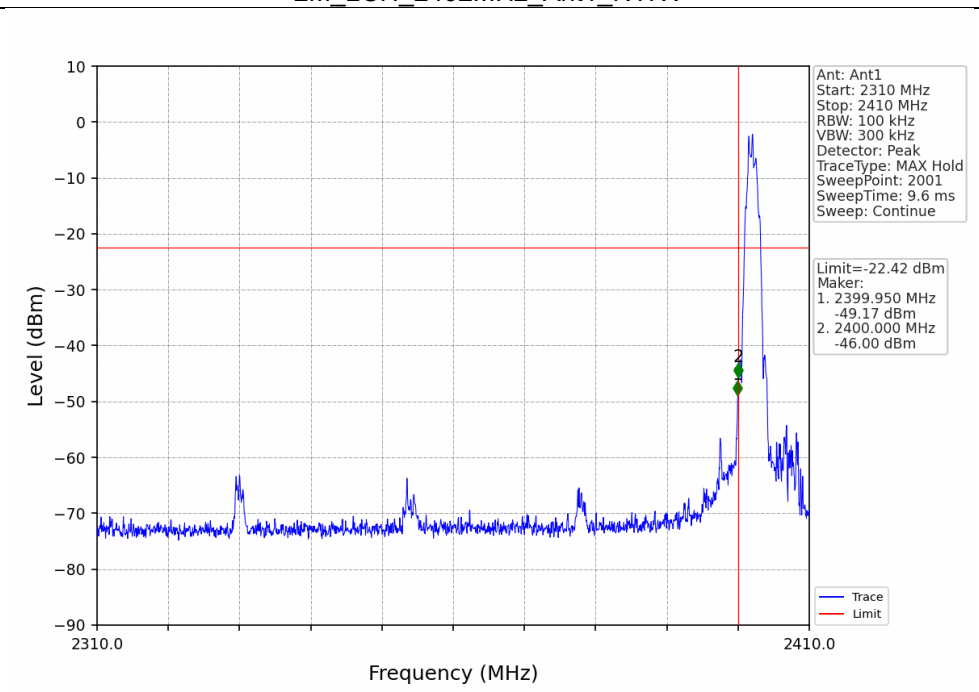
1M_HCH_2480MHz_Ant1_NTNV



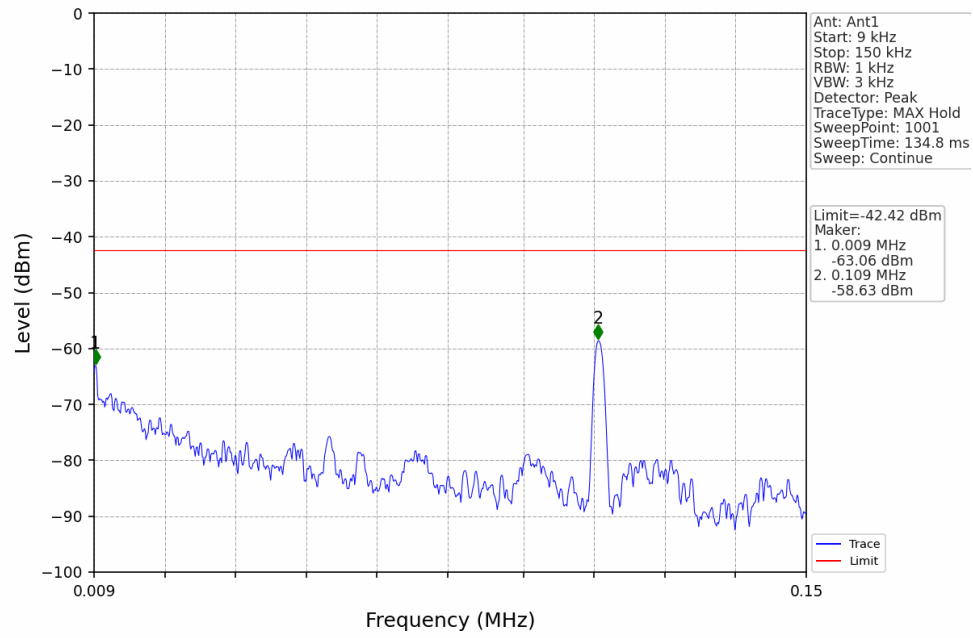
1M_HCH_2480MHz_Ant1_NTNV



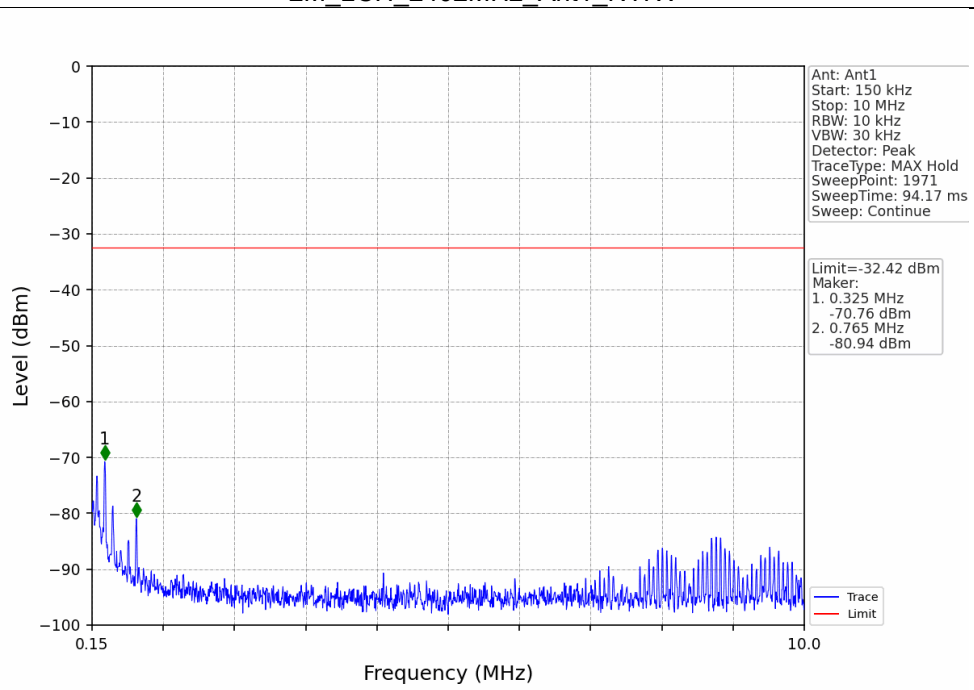
2M_LCH_2402MHz_Ant1_NTNV



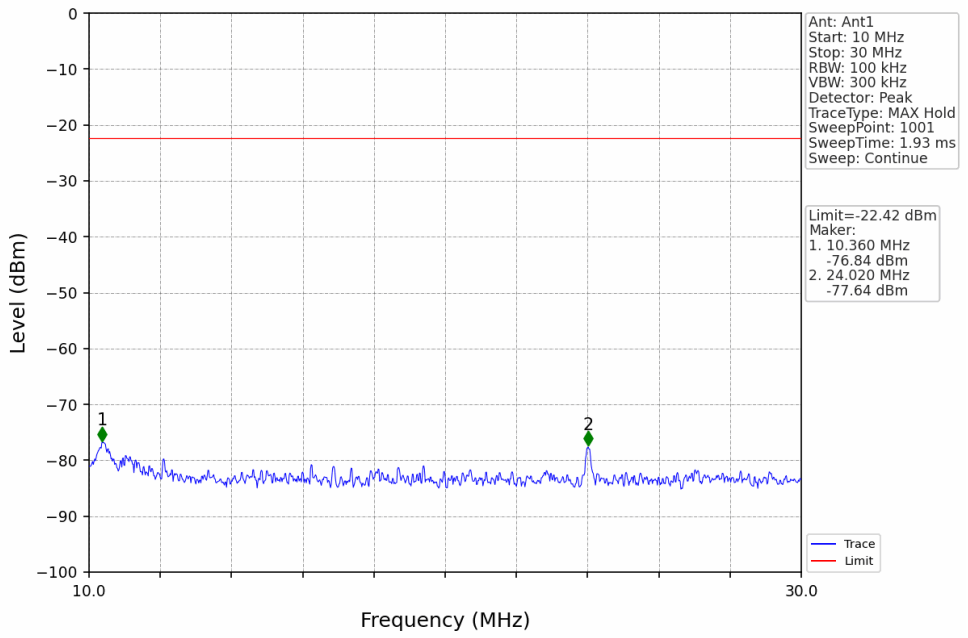
2M_LCH_2402MHz_Ant1_NTNV



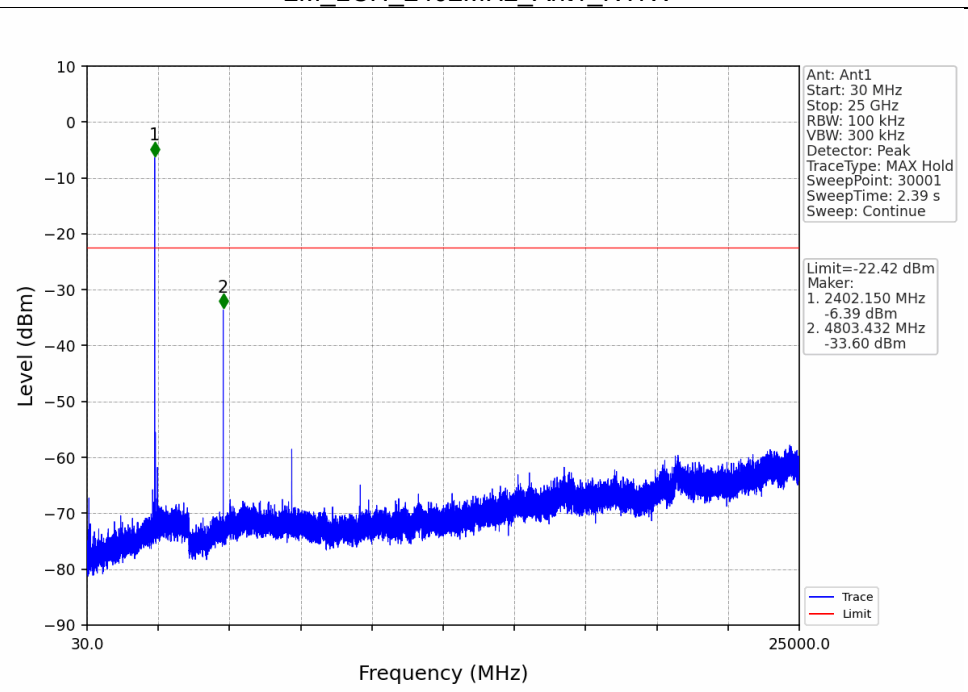
2M_LCH_2402MHz_Ant1_NTNV



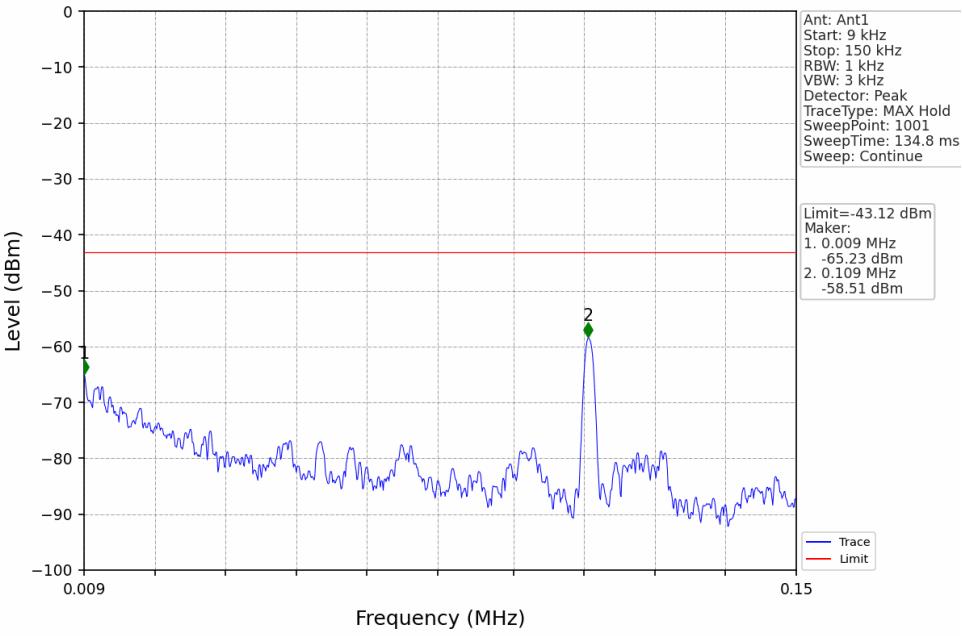
2M_LCH_2402MHz_Ant1_NTNV



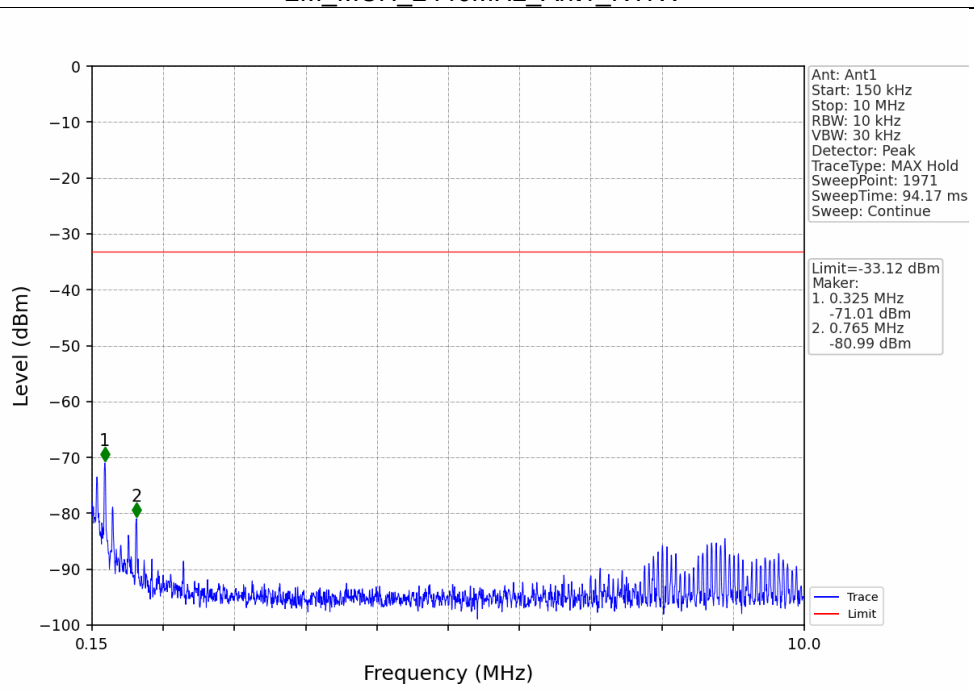
2M_LCH_2402MHz_Ant1_NTNV



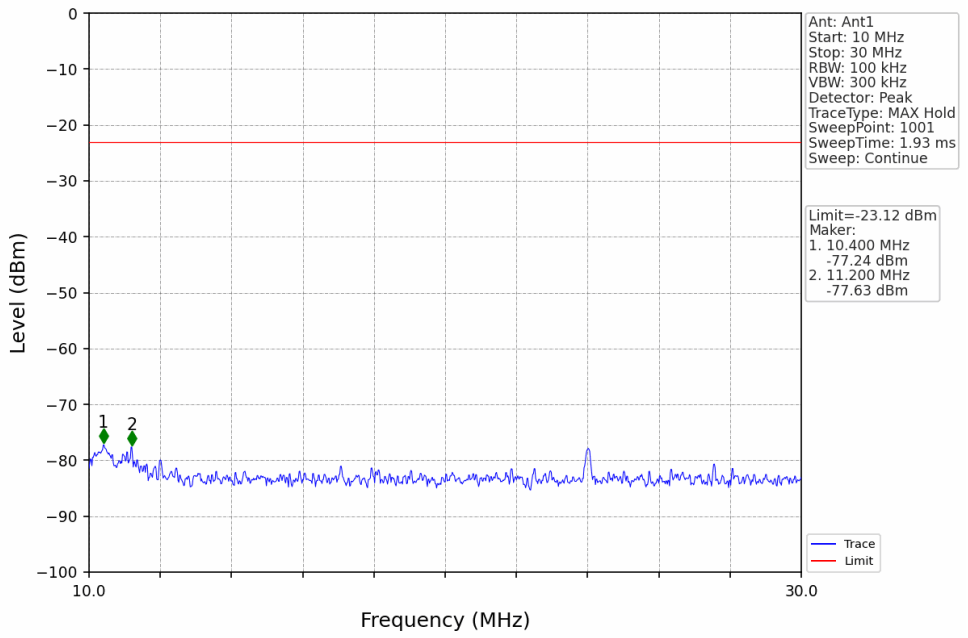
2M_MCH_2440MHz_Ant1_NTNV



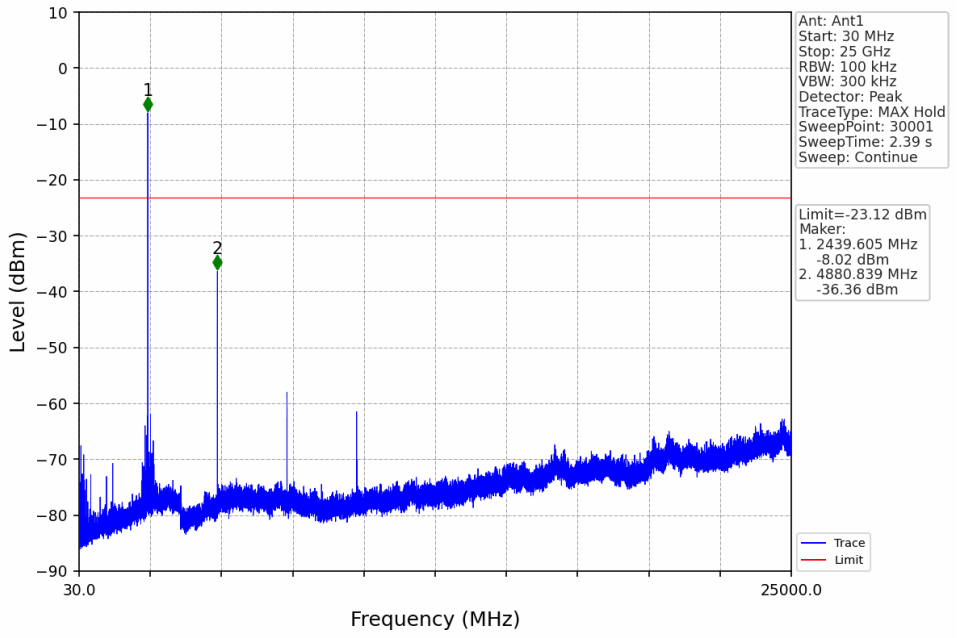
2M_MCH_2440MHz_Ant1_NTNV



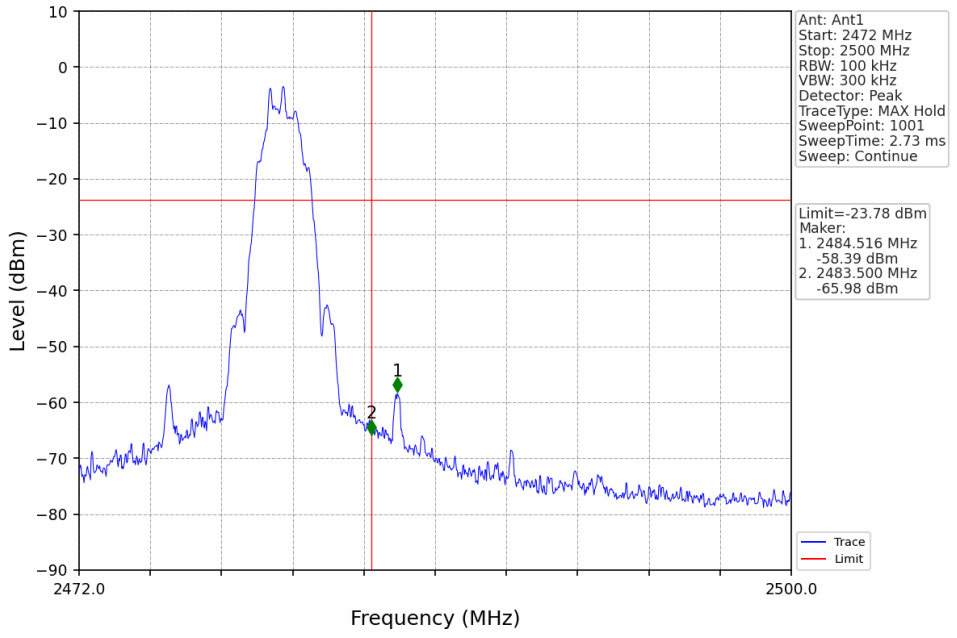
2M_MCH_2440MHz_Ant1_NTNV



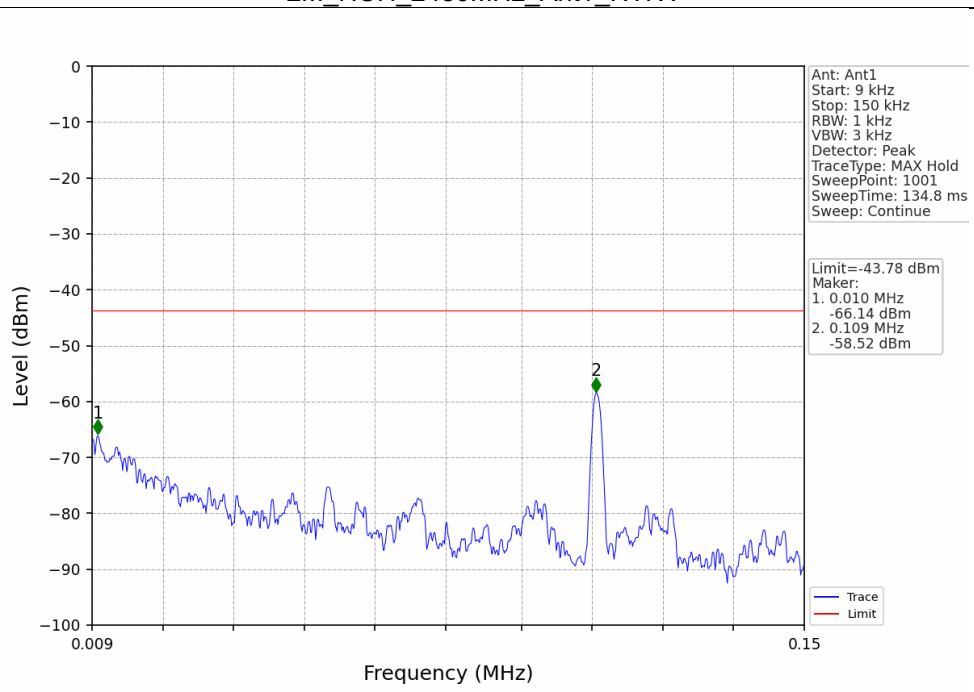
2M_MCH_2440MHz_Ant1_NTNV



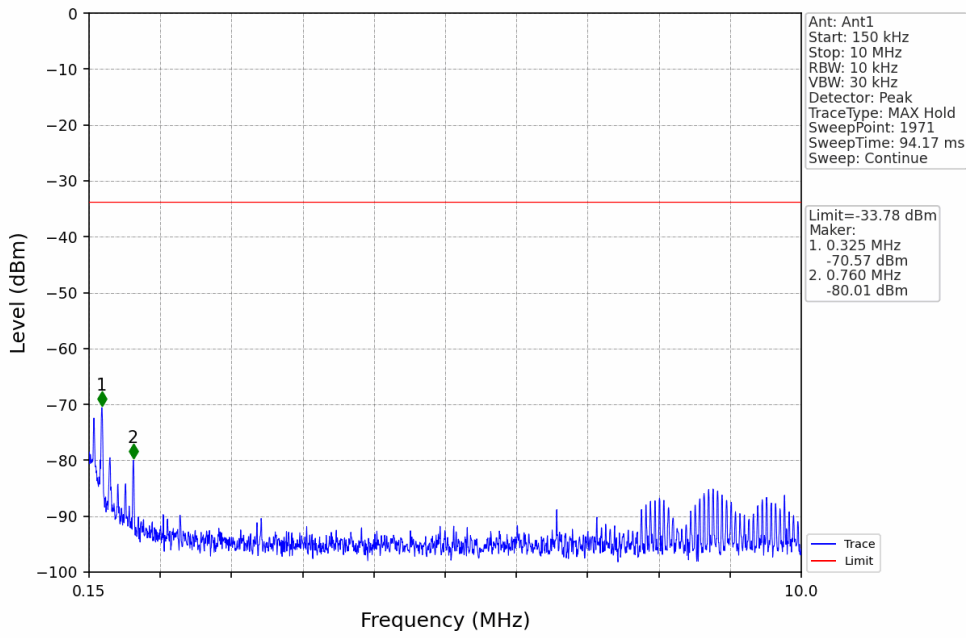
2M_HCH_2480MHz_Ant1_NTNV



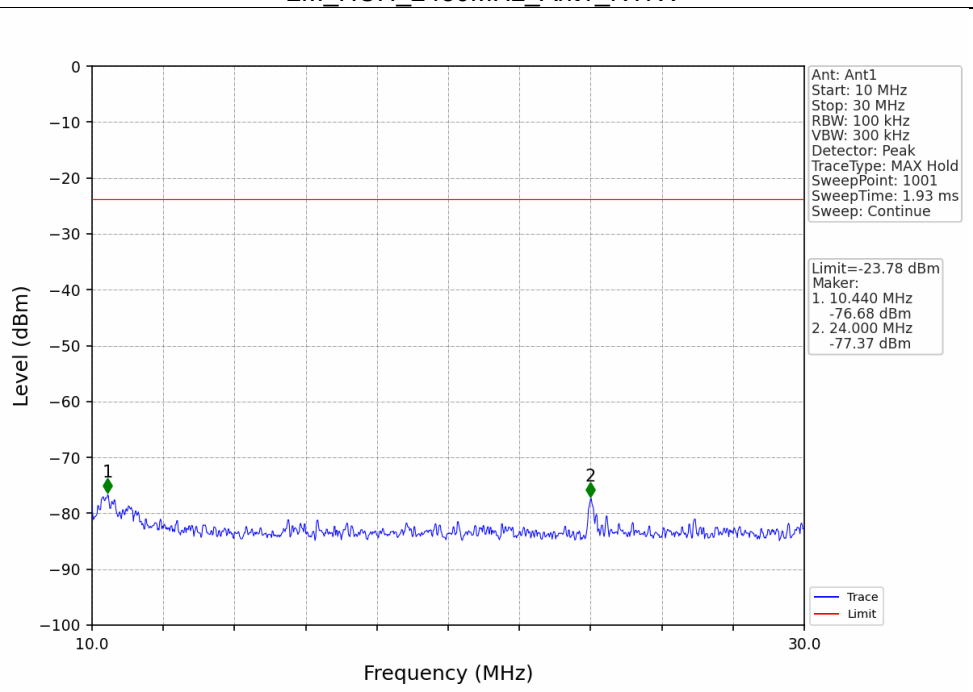
2M_HCH_2480MHz_Ant1_NTNV



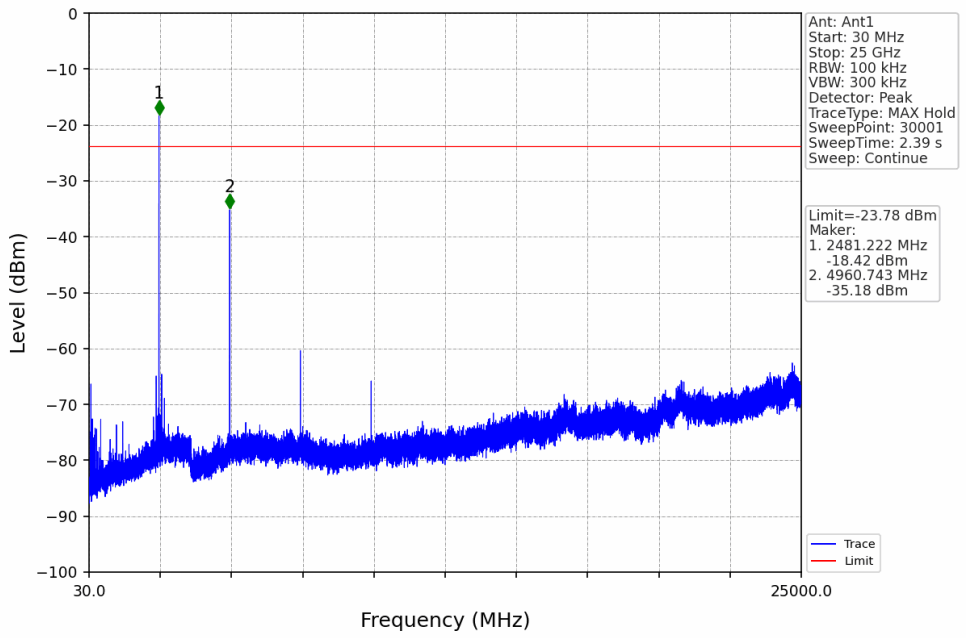
2M_HCH_2480MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



6. Unwanted Emissions In Restricted Frequency Bands

6.1 Test Result

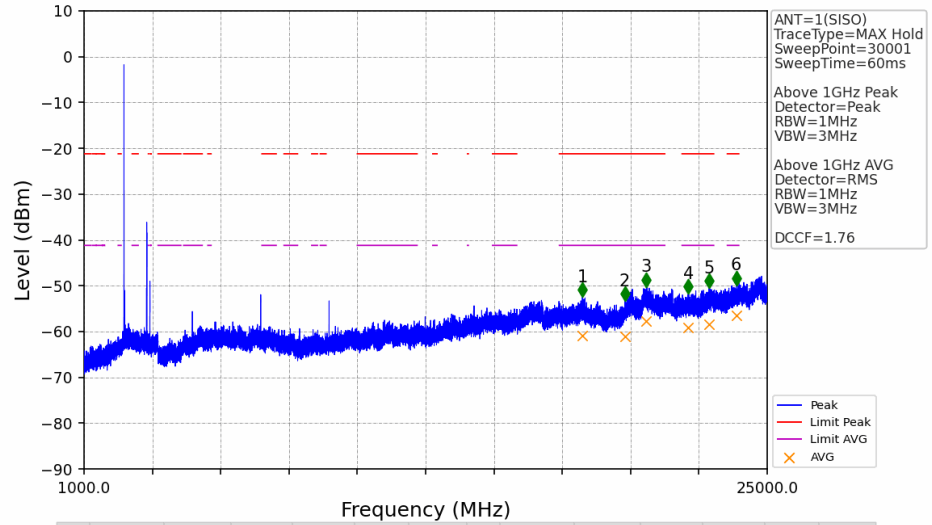
6.1.1 RSE

Mode	TX Type	Frequency (MHz)	ANT	Level of Unwanted Emissions (dBm)		Verdict
				Result	Limit	
1M	SISO	2402	1	Refer To Test Graph		Pass
		2440	1	Refer To Test Graph		Pass
		2480	1	Refer To Test Graph		Pass
2M	SISO	2402	1	Refer To Test Graph		Pass
		2440	1	Refer To Test Graph		Pass
		2480	1	Refer To Test Graph		Pass

6.2 Test Graph

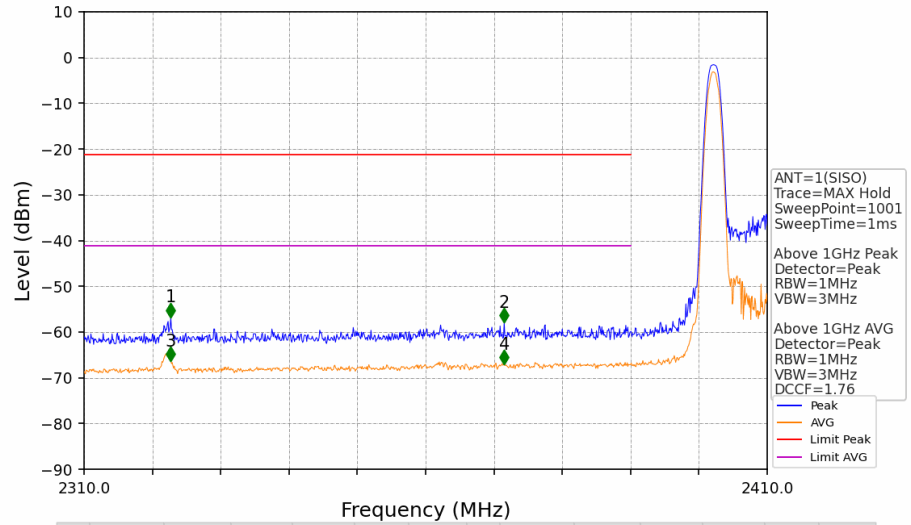
6.2.1 RSE

1M_LCH_2402MHz_Ant1_NTNV



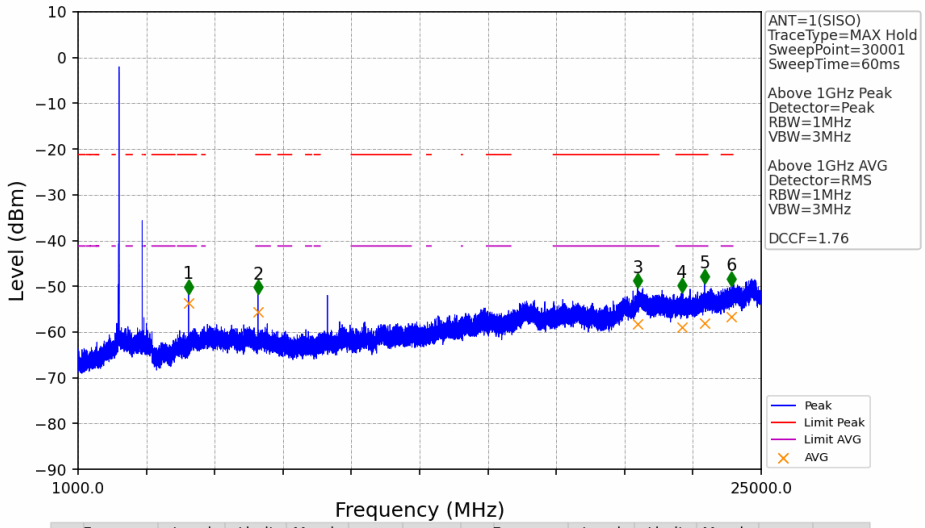
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	18506.4	-52.45	-21.20	31.25	Pass	Peak	7	18506.4	-60.97	-41.20	19.77	Pass	AVG
2	19995.2	-53.35	-21.20	32.15	Pass	Peak	8	19995.2	-61.03	-41.20	19.83	Pass	AVG
3	20758.4	-50.22	-21.20	29.02	Pass	Peak	9	20758.4	-57.70	-41.20	16.50	Pass	AVG
4	22230.4	-51.70	-21.20	30.50	Pass	Peak	10	22230.4	-59.13	-41.20	17.93	Pass	AVG
5	22956.8	-50.55	-21.20	29.35	Pass	Peak	11	22956.8	-58.46	-41.20	17.26	Pass	AVG
6	23912.8	-49.91	-21.20	28.71	Pass	Peak	12	23912.8	-56.51	-41.20	15.31	Pass	AVG

1M_LCH_2402MHz_Ant1_NTNV



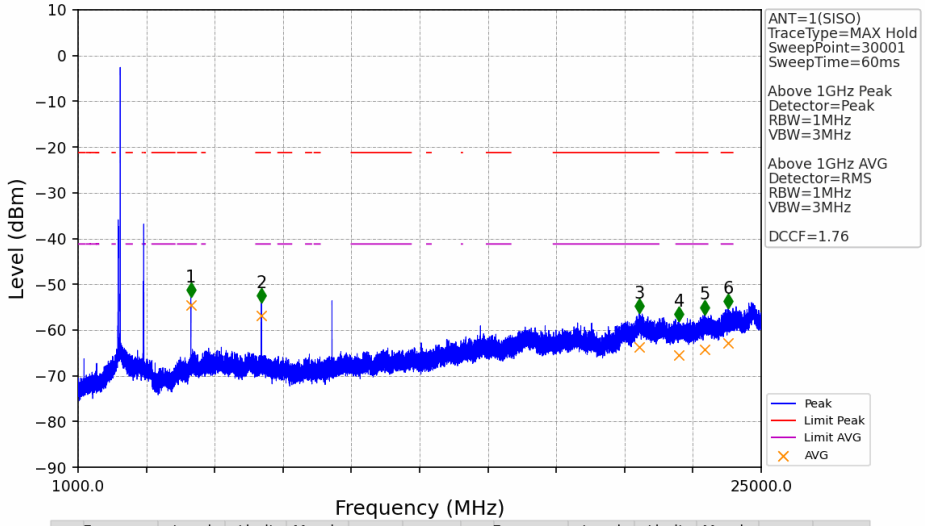
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2322.700	-56.77	-21.20	35.57	Pass	Peak	3	2322.700	/	-21.20	/	/	AVG
2	2371.500	-57.95	-21.20	36.76	Pass	Peak	4	2371.500	/	-21.20	/	/	AVG

1M_MCH_2440MHz_Ant1_NTNV



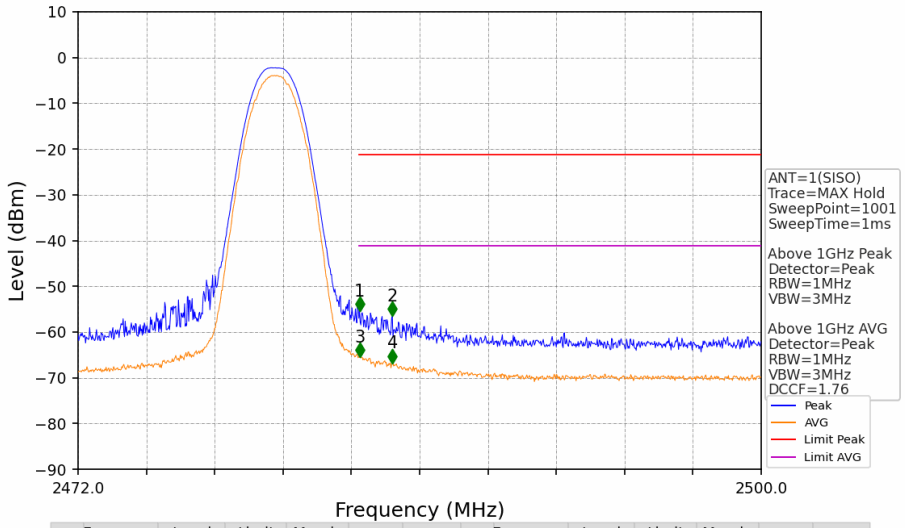
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	4880	-51.64	-21.20	30.44	Pass	Peak	7	4880	-53.74	-41.20	12.54	Pass	AVG
2	7320	-51.71	-21.20	30.51	Pass	Peak	8	7320	-55.53	-41.20	14.33	Pass	AVG
3	20656.8	-50.33	-21.20	29.12	Pass	Peak	9	20656.8	-58.28	-41.20	17.08	Pass	AVG
4	22210.4	-51.34	-21.20	30.14	Pass	Peak	10	22210.4	-59.03	-41.20	17.83	Pass	AVG
5	23009.6	-49.35	-21.20	28.15	Pass	Peak	11	23009.6	-58.01	-41.20	16.80	Pass	AVG
6	23961.6	-49.91	-21.20	28.71	Pass	Peak	12	23961.6	-56.67	-41.20	15.47	Pass	AVG

1M_HCH_2480MHz_Ant1_NTNV



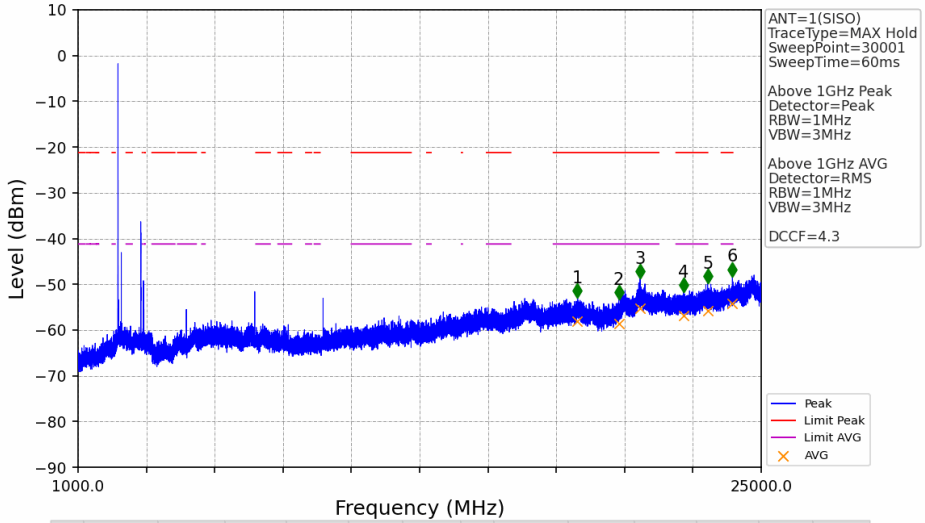
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	4960.8	-52.80	-21.20	31.60	Pass	Peak	7	4960.8	-54.50	-41.20	13.30	Pass	AVG
2	7441.6	-54.00	-21.20	32.80	Pass	Peak	8	7441.6	-56.83	-41.20	15.63	Pass	AVG
3	20709.6	-56.34	-21.20	35.14	Pass	Peak	9	20709.6	-63.75	-41.20	22.55	Pass	AVG
4	22116.8	-58.06	-21.20	36.86	Pass	Peak	10	22116.8	-65.48	-41.20	24.28	Pass	AVG
5	23009.6	-56.58	-21.20	35.38	Pass	Peak	11	23009.6	-64.18	-41.20	22.98	Pass	AVG
6	23848.8	-55.21	-21.20	34.01	Pass	Peak	12	23848.8	-62.82	-41.20	21.62	Pass	AVG

1M_HCH_2480MHz_Ant1_NTNV



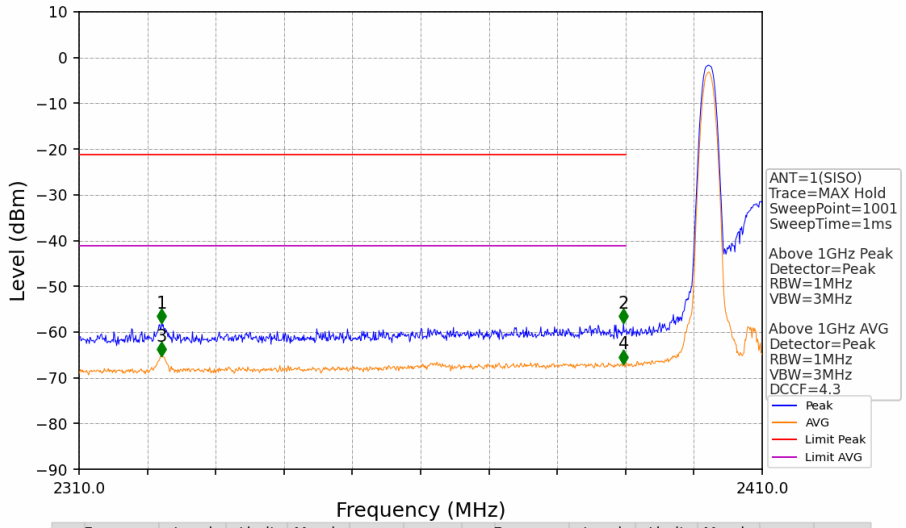
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2483.536	-55.38	-21.20	34.18	Pass	Peak	3	2483.536	/	-21.20	/	/	AVG
2	2484.880	-56.57	-21.20	35.37	Pass	Peak	4	2484.880	/	-21.20	/	/	AVG

2M_LCH_2402MHz_Ant1_NTNV



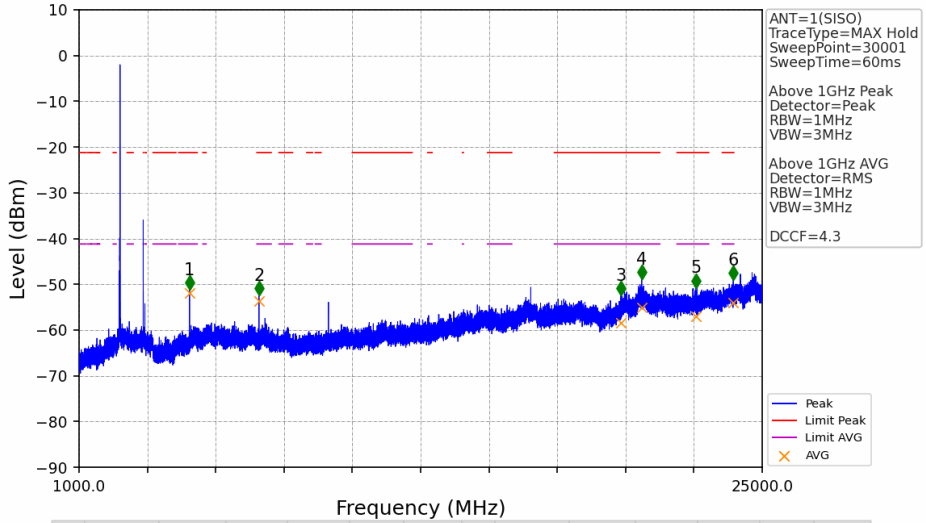
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	18545.6	-52.93	-21.20	31.73	Pass	Peak	7	18545.6	-58.06	-41.20	16.86	Pass	AVG
2	19994.4	-53.36	-21.20	32.16	Pass	Peak	8	19994.4	-58.66	-41.20	17.46	Pass	AVG
3	20744.8	-48.73	-21.20	27.53	Pass	Peak	9	20744.8	-55.19	-41.20	13.99	Pass	AVG
4	22267.2	-51.73	-21.20	30.53	Pass	Peak	10	22267.2	-56.77	-41.20	15.57	Pass	AVG
5	23117.6	-49.77	-21.20	28.57	Pass	Peak	11	23117.6	-55.75	-41.20	14.55	Pass	AVG
6	23988.8	-48.29	-21.20	27.09	Pass	Peak	12	23988.8	-54.19	-41.20	12.99	Pass	AVG

2M_LCH_2402MHz_Ant1_NTNV



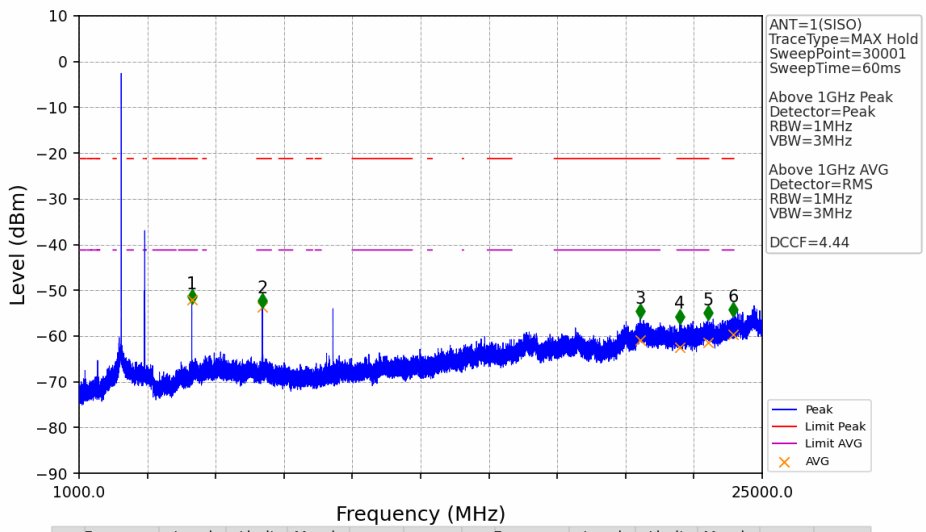
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2322.100	-58.13	-21.20	36.93	Pass	Peak	3	2322.100	/	-21.20	/	/	AVG
2	2389.700	-58.09	-21.20	36.89	Pass	Peak	4	2389.700	/	-21.20	/	/	AVG

2M_MCH_2440MHz_Ant1_NTNV



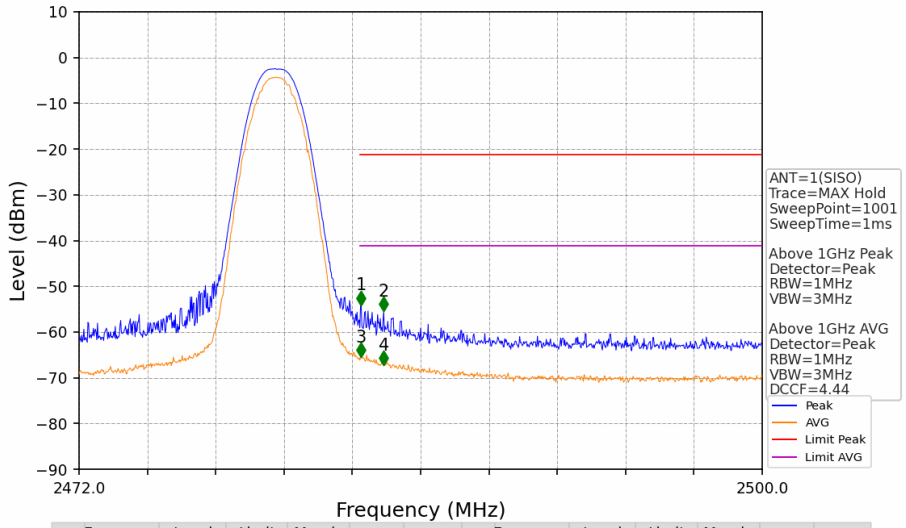
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	4880	-51.23	-21.20	30.04	Pass	Peak	7	4880	-51.96	-41.20	10.76	Pass	AVG
2	7320	-52.48	-21.20	31.28	Pass	Peak	8	7320	-53.60	-41.20	12.40	Pass	AVG
3	20033.6	-52.42	-21.20	31.22	Pass	Peak	9	20033.6	-58.35	-41.20	17.16	Pass	AVG
4	20766.4	-48.92	-21.20	27.73	Pass	Peak	10	20766.4	-55.06	-41.20	13.86	Pass	AVG
5	22660	-50.77	-21.20	29.57	Pass	Peak	11	22660	-57.06	-41.20	15.86	Pass	AVG
6	23982.4	-49.10	-21.20	27.90	Pass	Peak	12	23982.4	-54.01	-41.20	12.80	Pass	AVG

2M_HCH_2480MHz_Ant1_NTNV



No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	4960	-52.93	-21.20	31.73	Pass	Peak	7	4960	-52.00	-41.20	10.80	Pass	AVG
2	7440	-53.86	-21.20	32.66	Pass	Peak	8	7440	-53.64	-41.20	12.44	Pass	AVG
3	20713.6	-56.11	-21.20	34.91	Pass	Peak	9	20713.6	-60.84	-41.20	19.64	Pass	AVG
4	22108	-57.29	-21.20	36.09	Pass	Peak	10	22108	-62.48	-41.20	21.27	Pass	AVG
5	23089.6	-56.45	-21.20	35.25	Pass	Peak	11	23089.6	-61.43	-41.20	20.23	Pass	AVG
6	23970.4	-55.85	-21.20	34.65	Pass	Peak	12	23970.4	-59.70	-41.20	18.50	Pass	AVG

2M_HCH_2480MHz_Ant1_NTNV



No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2483.564	-54.13	-21.20	32.93	Pass	Peak	3	2483.564	/	-21.20	/	/	AVG
2	2484.488	-55.49	-21.20	34.29	Pass	Peak	4	2484.488	/	-21.20	/	/	AVG

--------- End of Report -------