ANNEX D TEST DATA

For

Project No.:	8328EU012611W
Client:	Shenzhen Rango Innovation Technology co., Ltd.
Product Name:	Storm A2 Dongle
Model No.:	StormA2P
FCC ID:	2AYJI-STORMA2P
Technology:	Bluetooth BDR&EDR
Test Engineer:	Mikey zhu
Test Date:	2025-04-21

Test Summary

Item	Result
Duty Cycle	Pass
Bandwidth	Pass
Maximum Conducted Output Power	Pass
Carrier Frequency Separation	Pass
Number of Hopping Frequencies	Pass
Time of Occupancy (Dwell Time)	Pass
Unwanted Emissions In Non-restricted Frequency Bands	Pass

1. Duty Cycle

1.1 Test Result

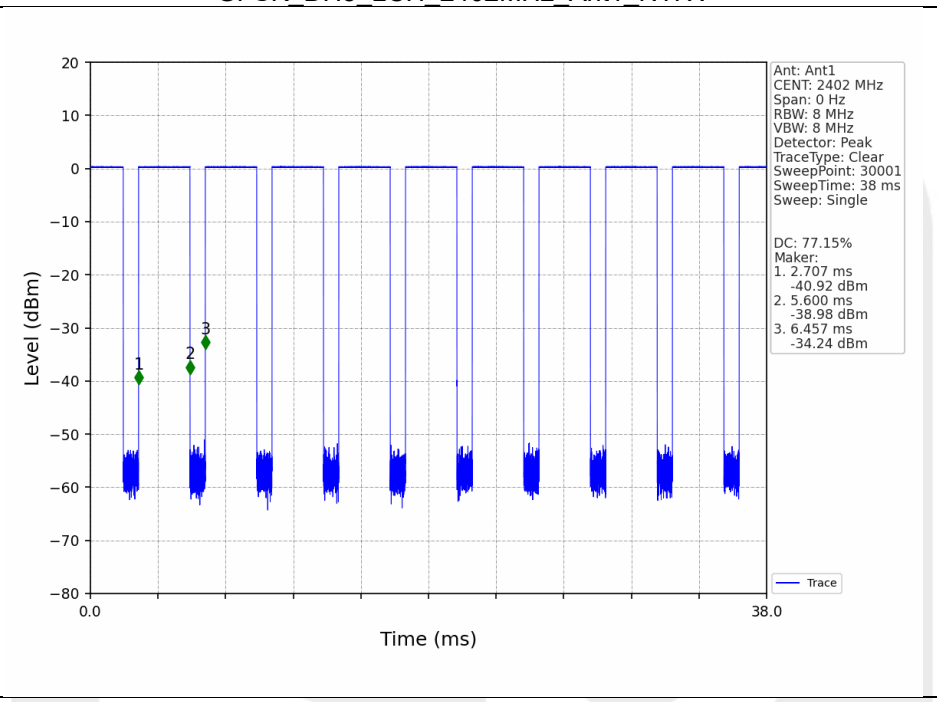
1.1.1 Ant1

Ant1								
Mode	TX Type	Frequency (MHz)	Packet Type	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
GFSK	SISO	2402	DH5	2.893	3.750	77.15	1.13	0.03
		2441	DH5	2.892	3.750	77.12	1.13	0.04
		2480	DH5	2.893	3.751	77.13	1.13	0.04
fπ/4-DQPSK	SISO	2402	2DH5	2.897	3.749	77.27	1.12	0.07
		2441	2DH5	2.899	3.751	77.29	1.12	0.06
		2480	2DH5	2.899	3.751	77.29	1.12	0.04
8DPSK	SISO	2402	3DH5	2.900	3.750	77.33	1.12	0.03
		2441	3DH5	2.900	3.750	77.33	1.12	0.03
		2480	3DH5	2.899	3.749	77.33	1.12	0.03

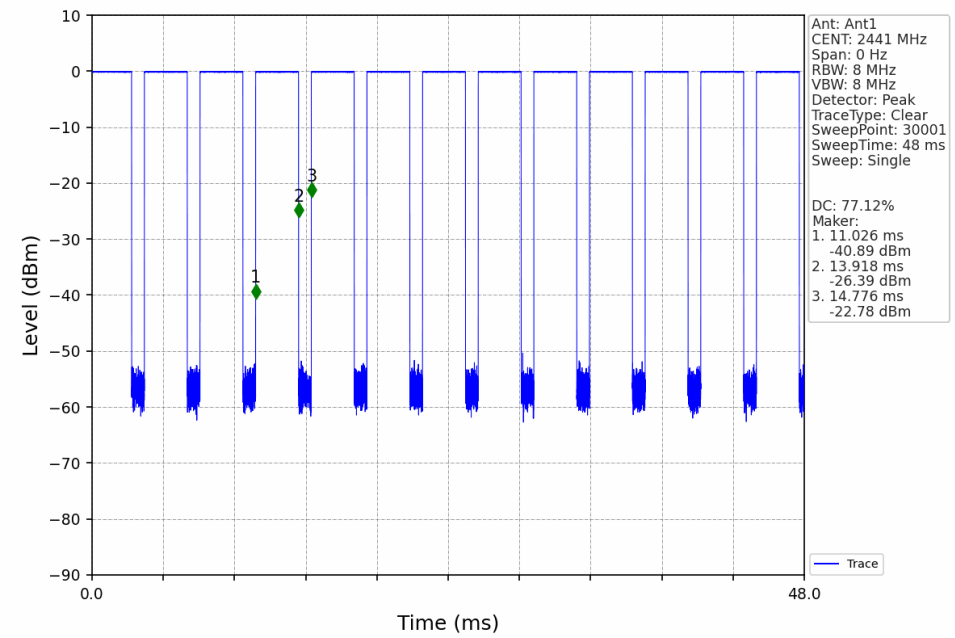
1.2 Test Graph

1.2.1 Ant1

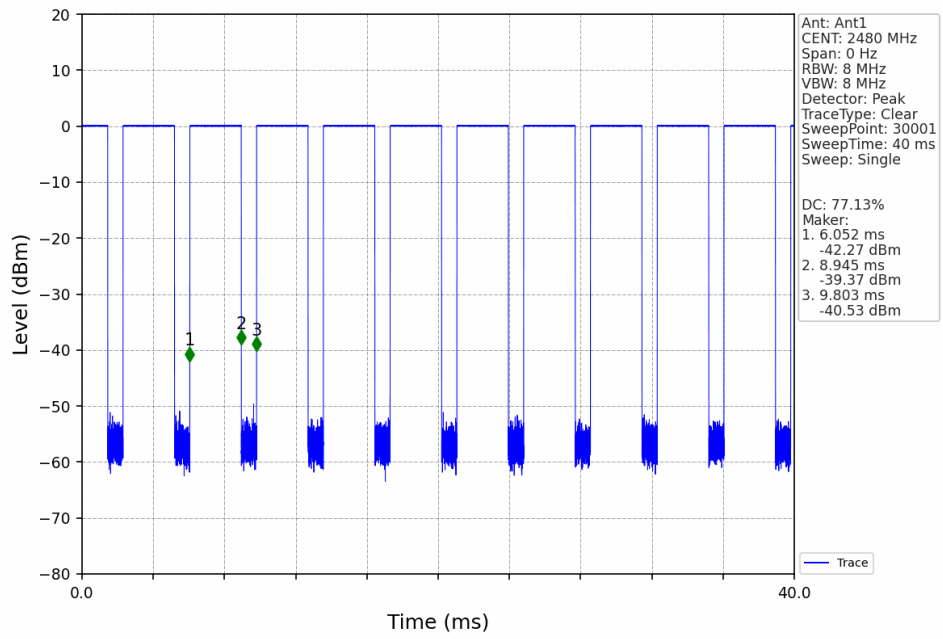
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



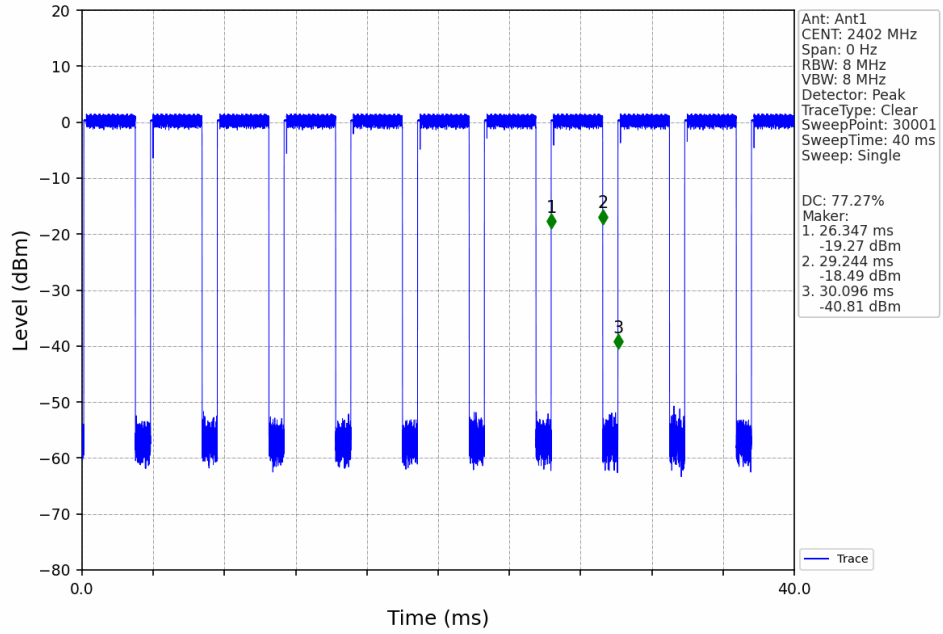
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



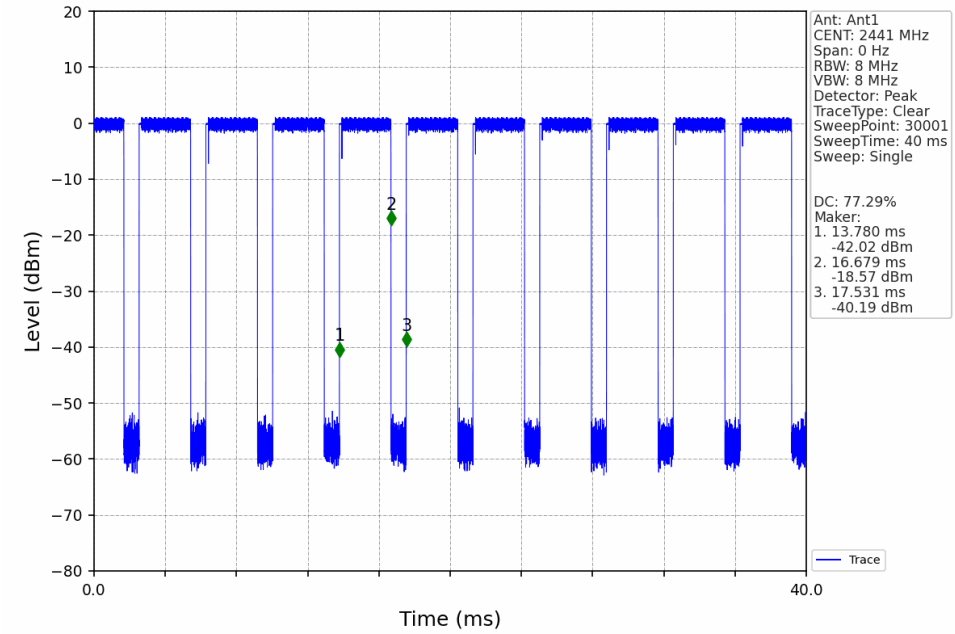
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



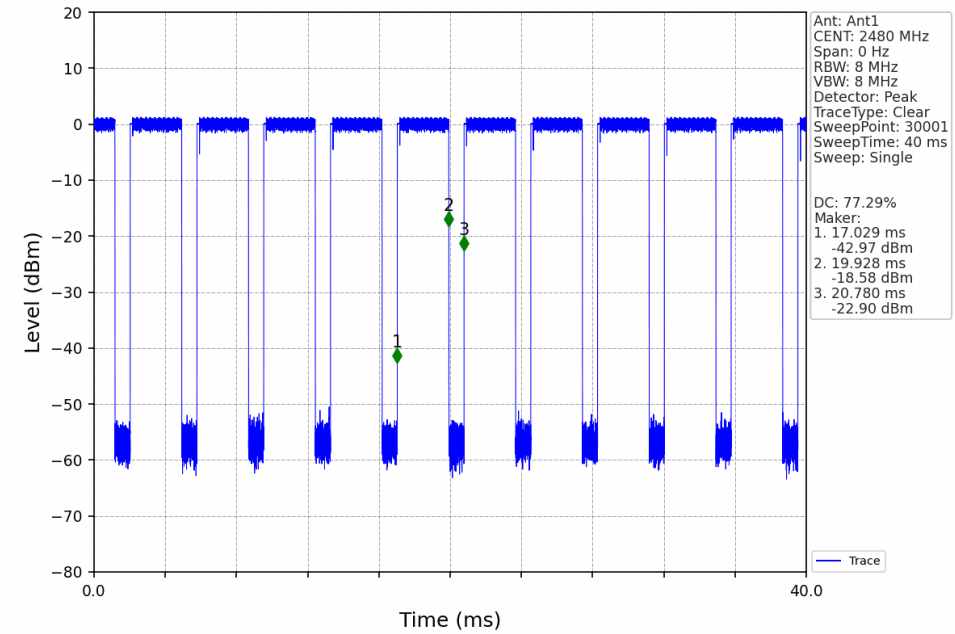
π /4-DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



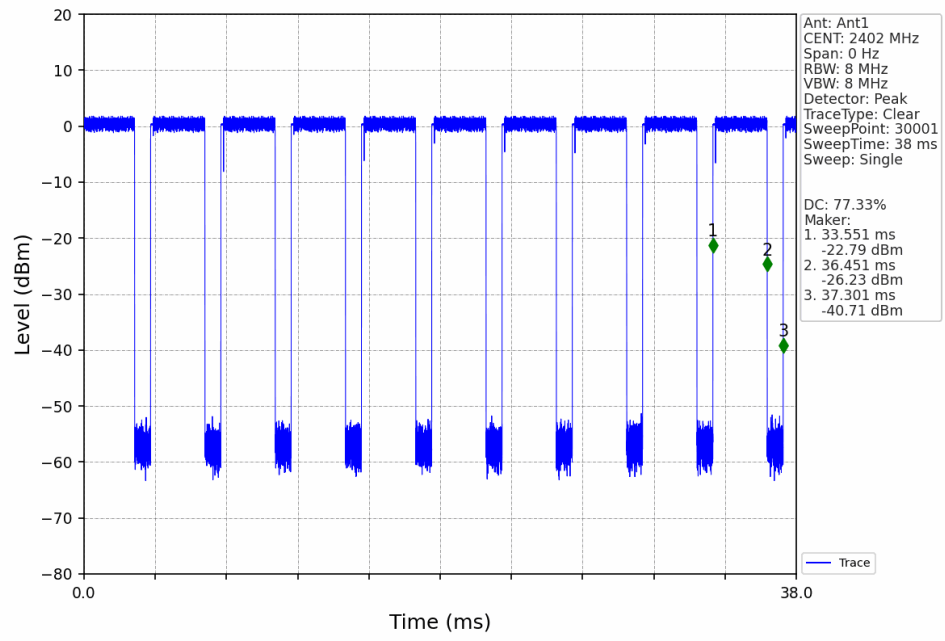
π /4-DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



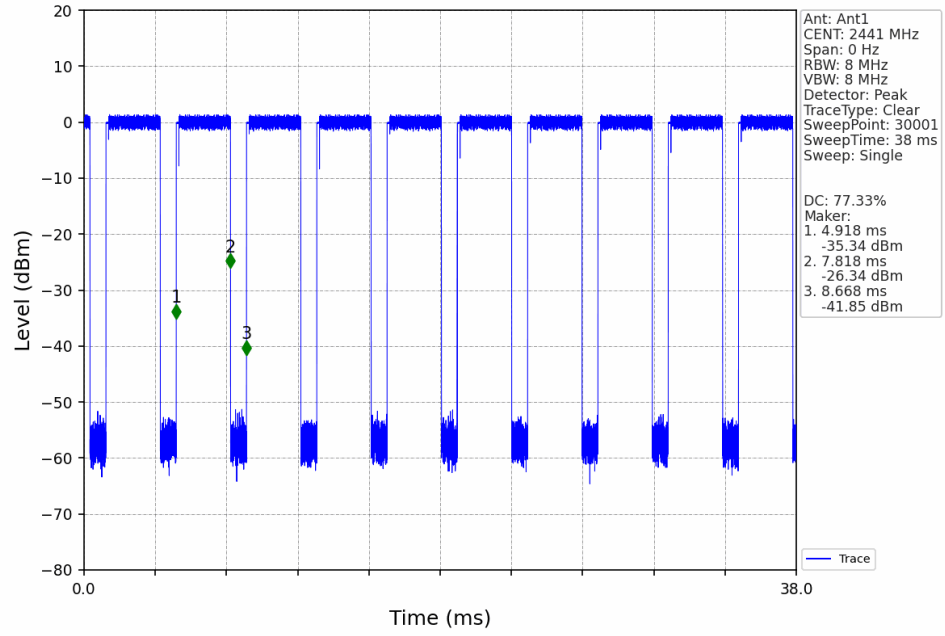
π /4-DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



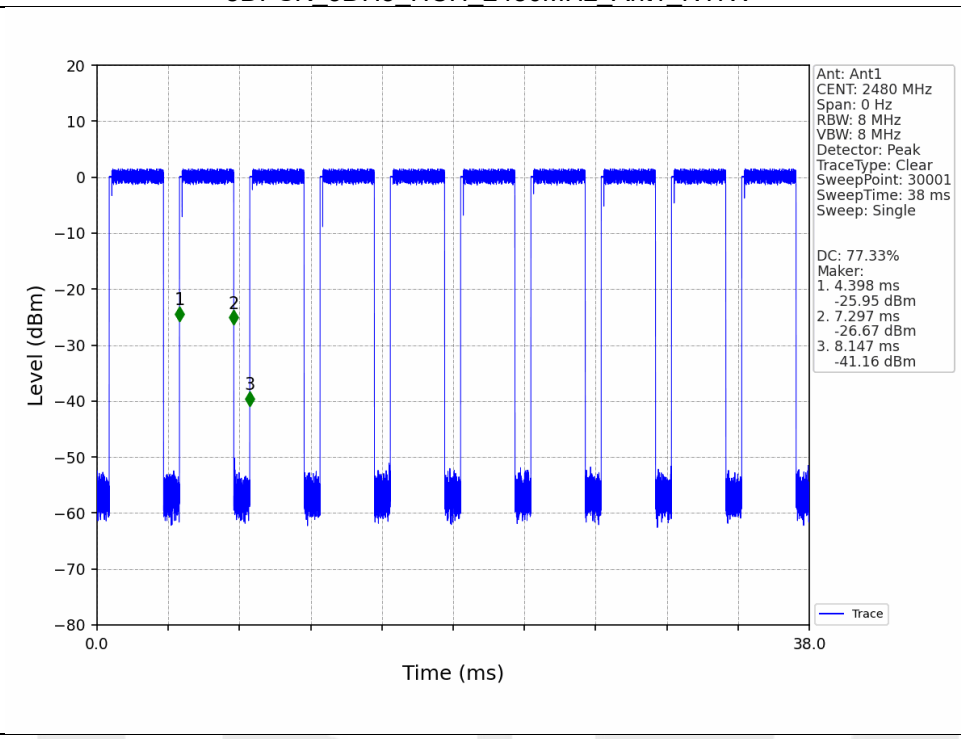
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



2. Bandwidth

2.1 Test Result

2.1.1 OBW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.876	/	Pass
		2441	DH5	1	0.884	/	Pass
		2480	DH5	1	0.876	/	Pass
π /4-DQPSK	SISO	2402	2DH5	1	1.168	/	Pass
		2441	2DH5	1	1.172	/	Pass
		2480	2DH5	1	1.169	/	Pass
8DPSK	SISO	2402	3DH5	1	1.174	/	Pass
		2441	3DH5	1	1.177	/	Pass
		2480	3DH5	1	1.178	/	Pass

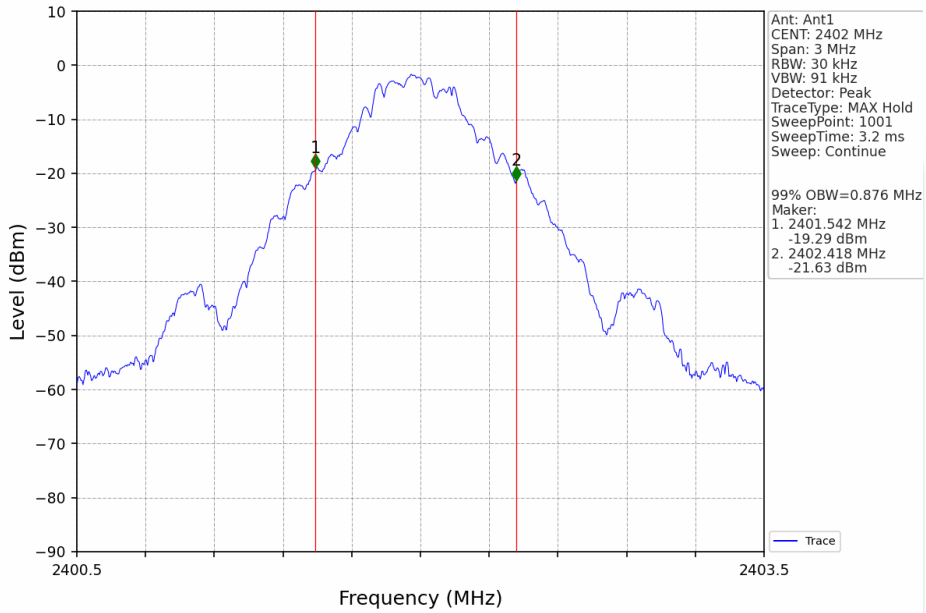
2.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.959	/	Pass
		2441	DH5	1	0.959	/	Pass
		2480	DH5	1	0.957	/	Pass
π /4-DQPSK	SISO	2402	2DH5	1	1.285	/	Pass
		2441	2DH5	1	1.286	/	Pass
		2480	2DH5	1	1.283	/	Pass
8DPSK	SISO	2402	3DH5	1	1.301	/	Pass
		2441	3DH5	1	1.302	/	Pass
		2480	3DH5	1	1.299	/	Pass

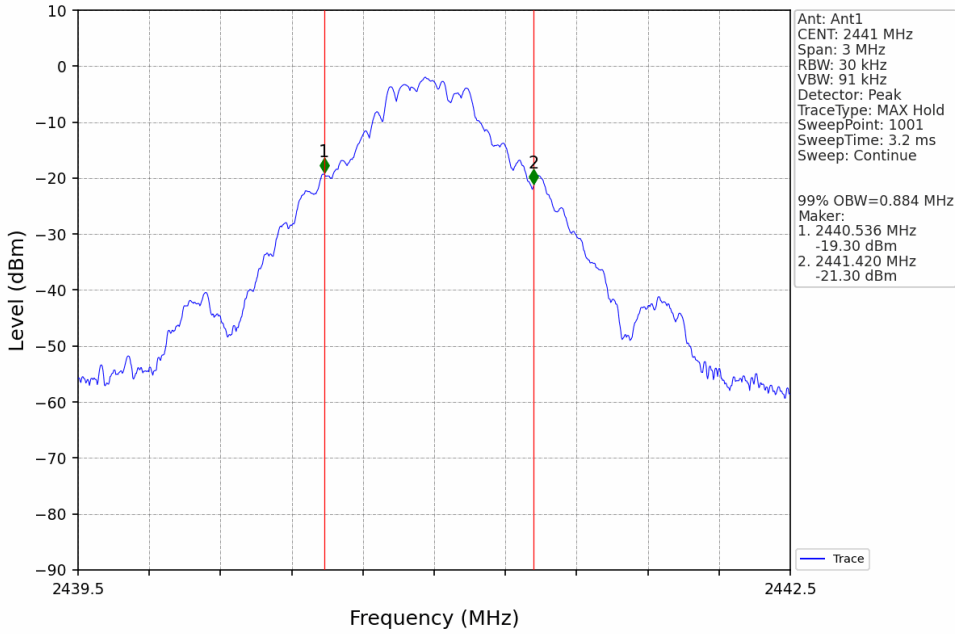
2.2 Test Graph

2.2.1 OBW

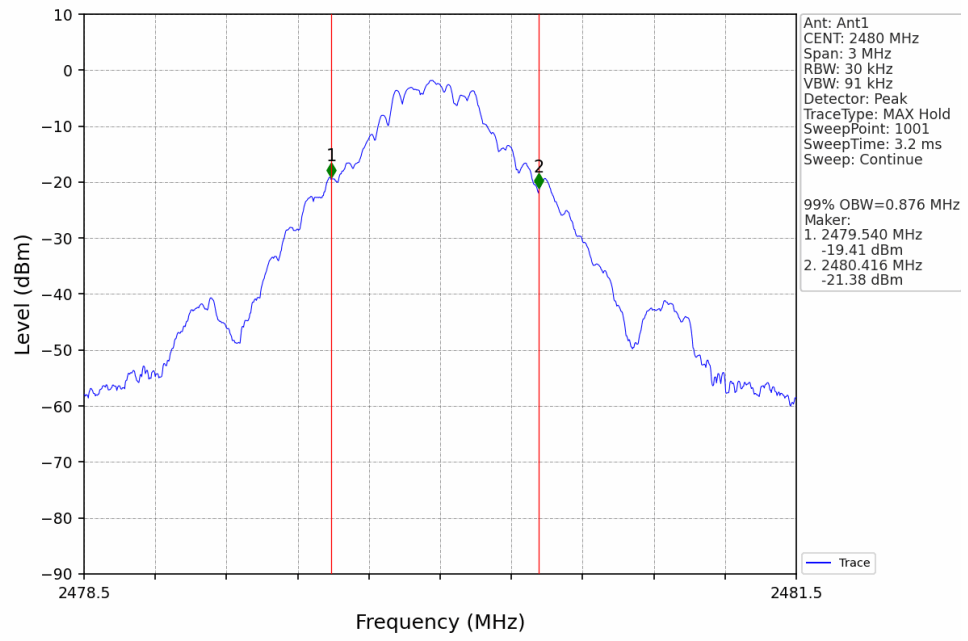
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



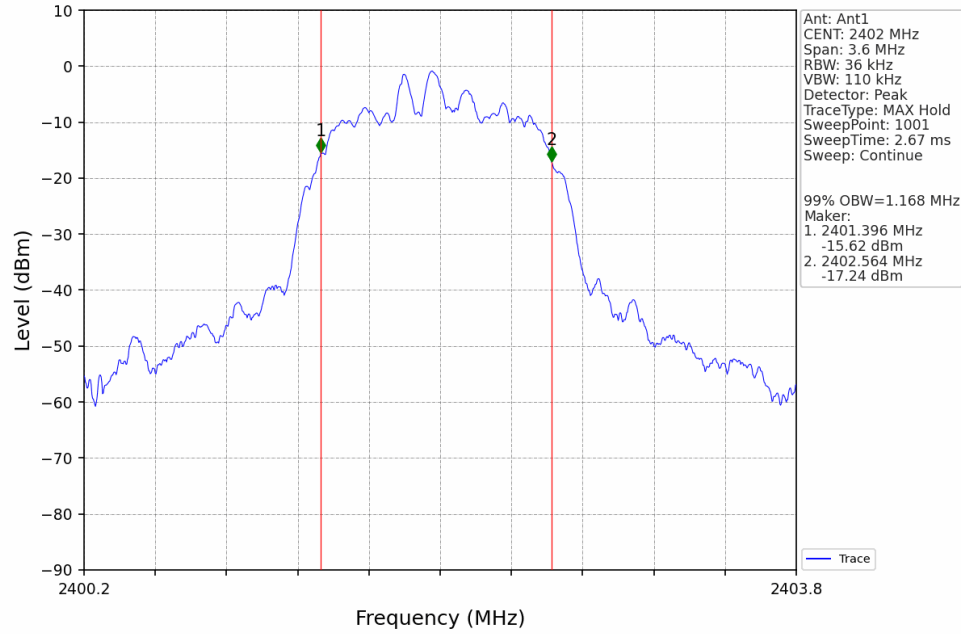
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



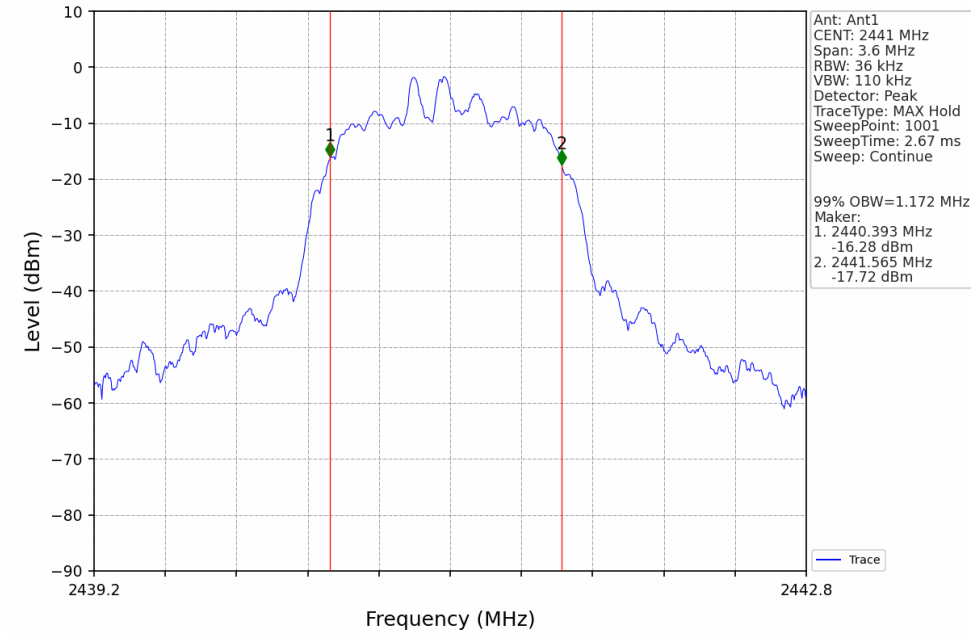
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



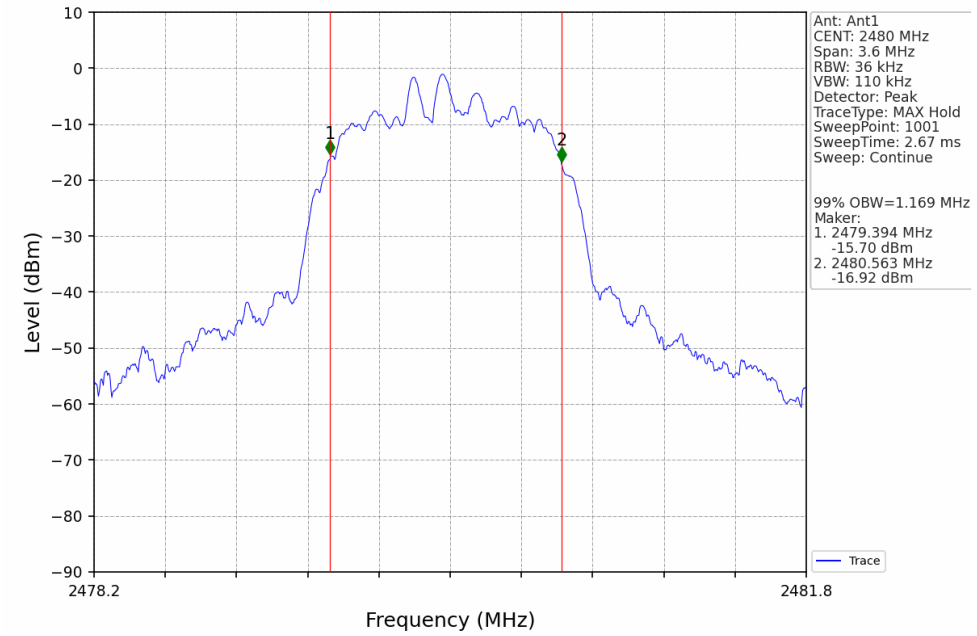
π /4-DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



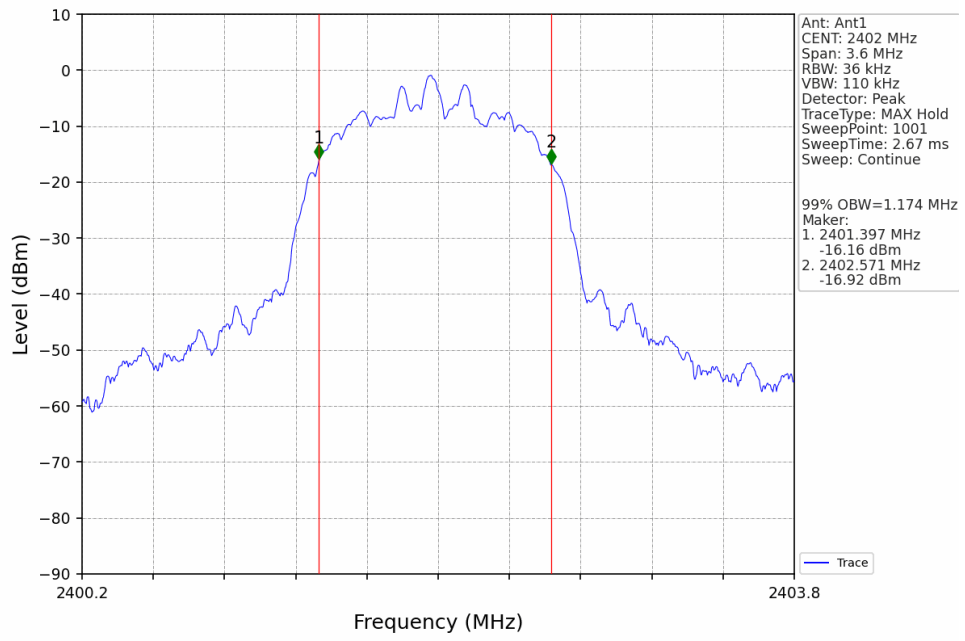
π /4-DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



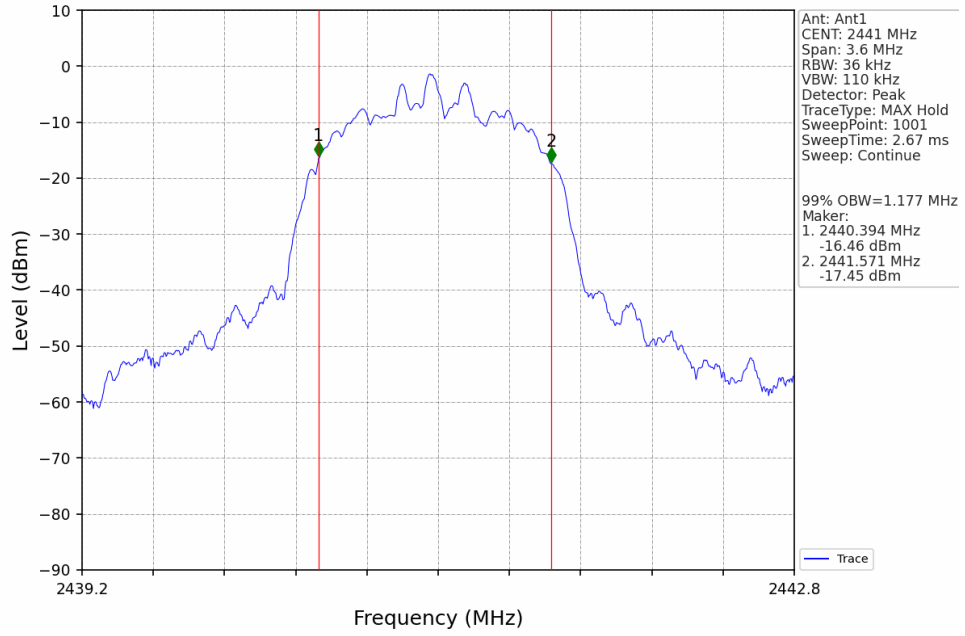
π /4-DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



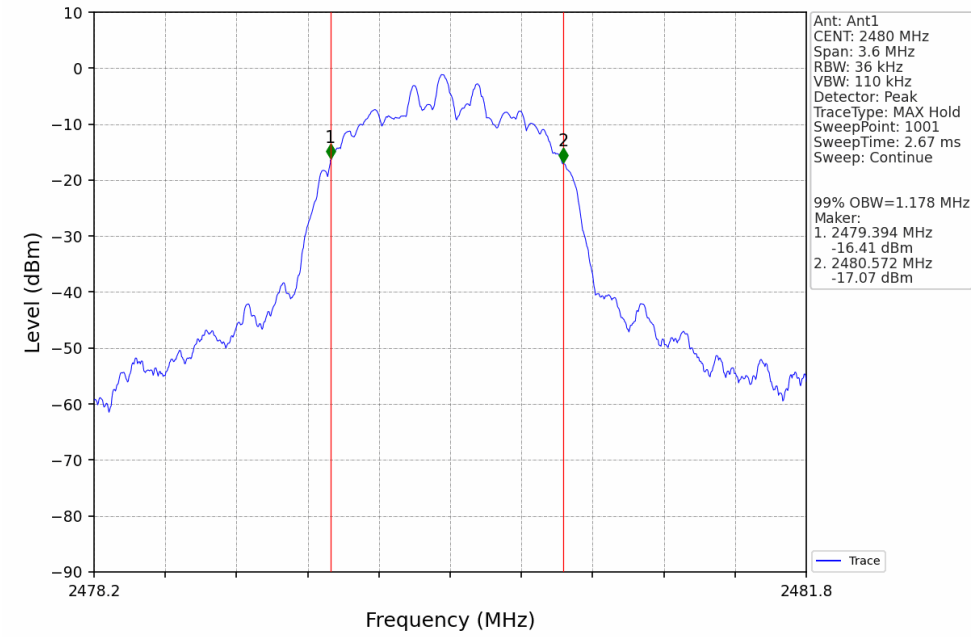
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

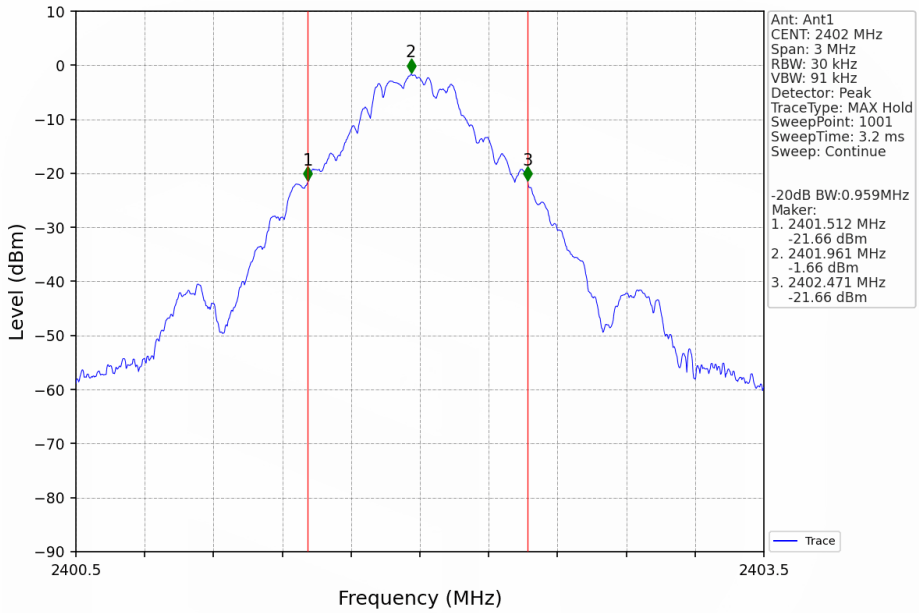


8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

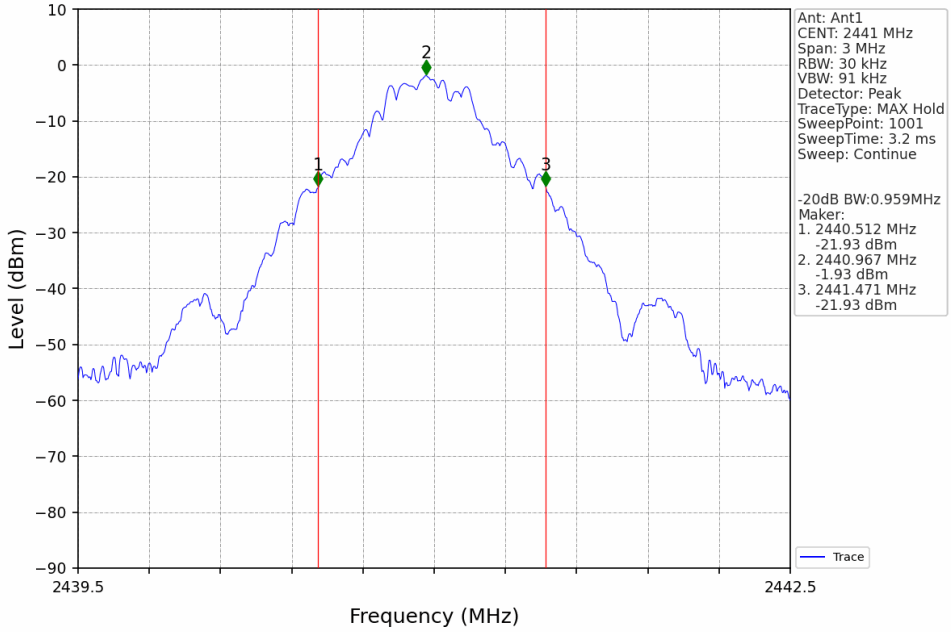


2.2.2 20dB BW

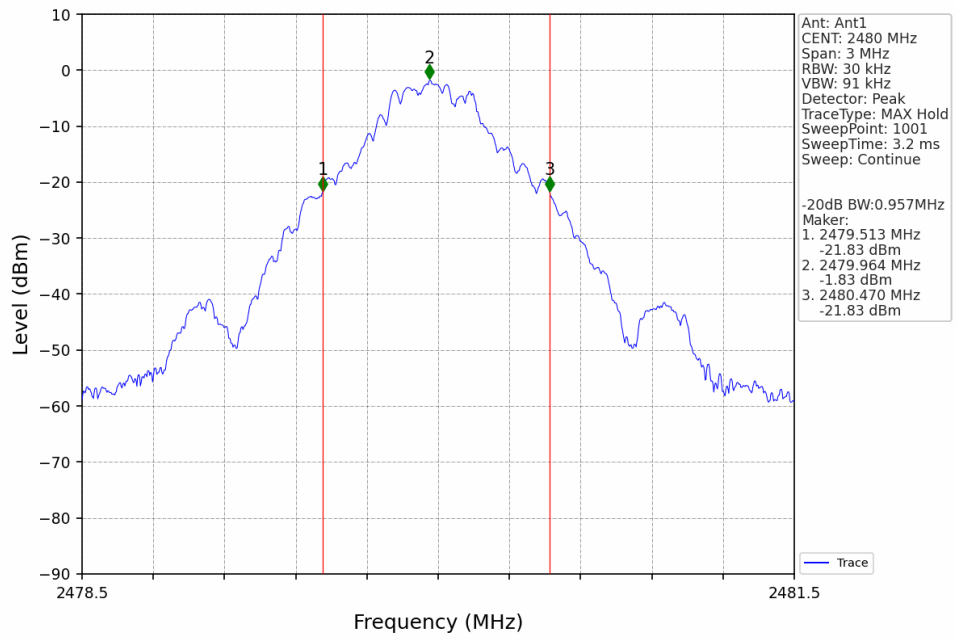
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



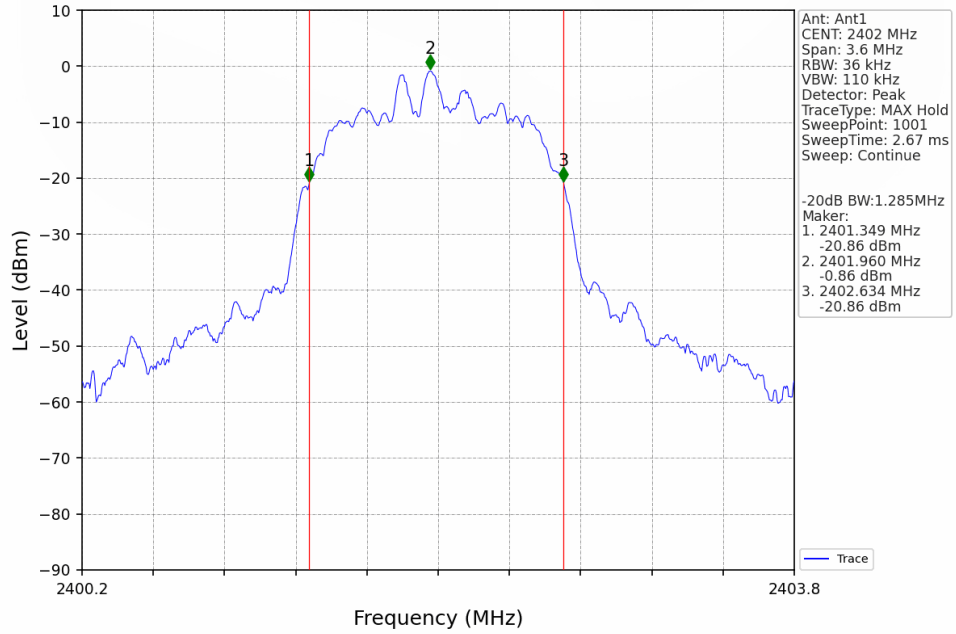
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



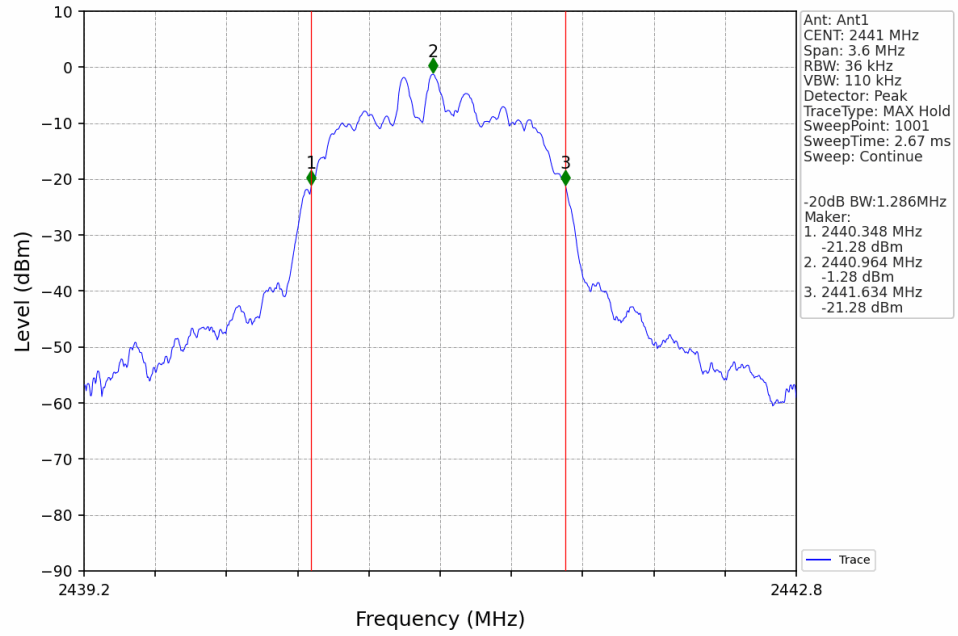
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



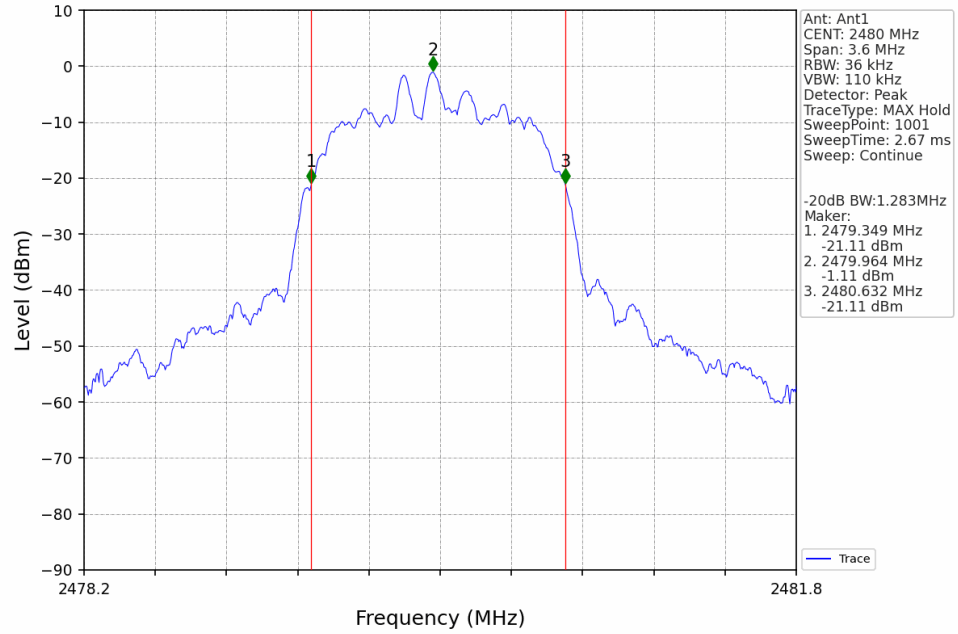
π /4-DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



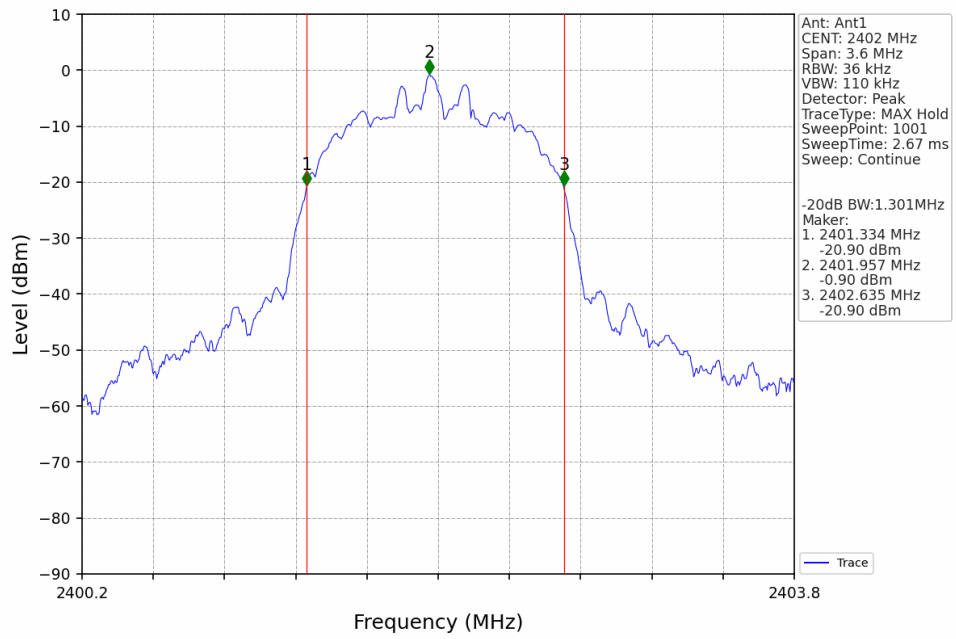
π /4-DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



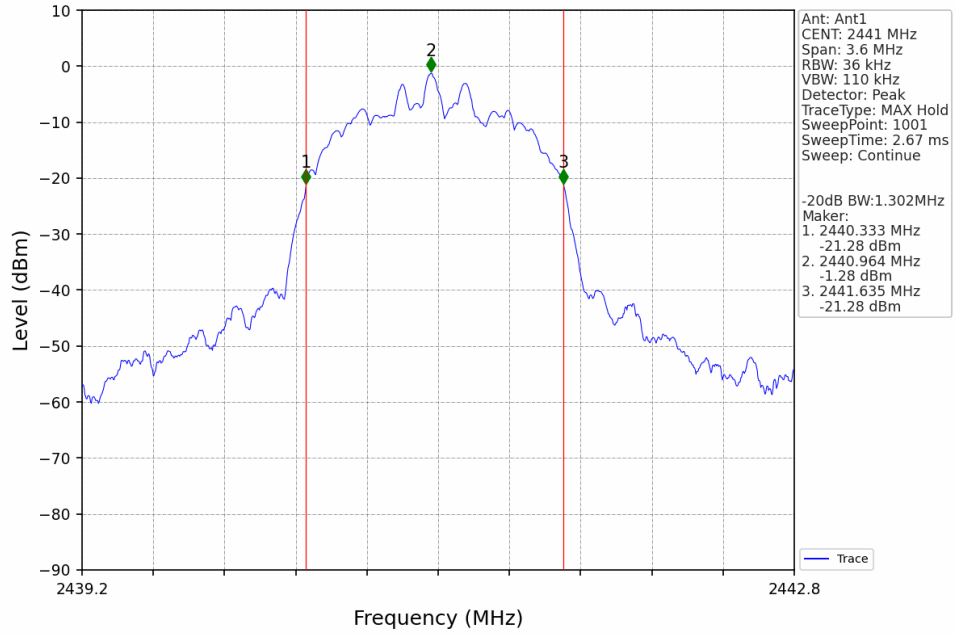
π /4-DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



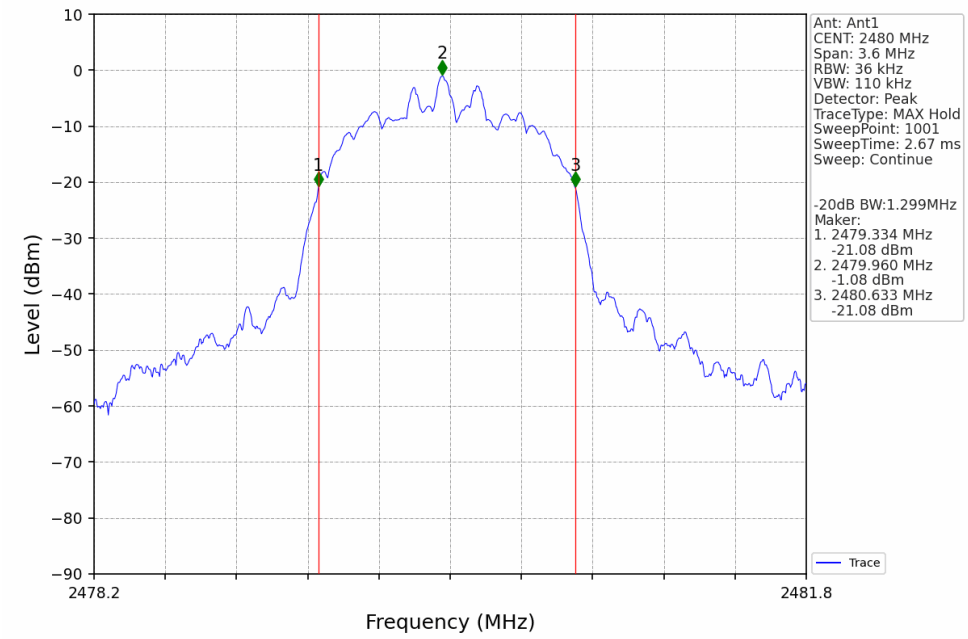
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



3. Maximum Conducted Output Power

3.1 Test Result

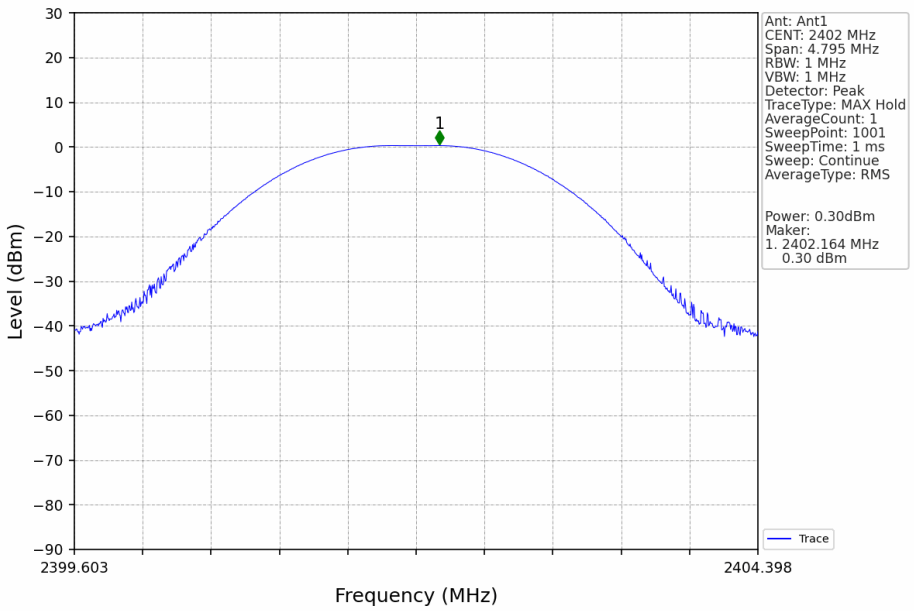
3.1.1 Power

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	0.30	<=30	Pass
		2441	DH5	-0.11	<=30	Pass
		2480	DH5	0.09	<=30	Pass
π/4-DQPSK	SISO	2402	2DH5	1.25	<=20.97	Pass
		2441	2DH5	0.82	<=20.97	Pass
		2480	2DH5	1.02	<=20.97	Pass
8DPSK	SISO	2402	3DH5	1.66	<=20.97	Pass
		2441	3DH5	1.22	<=20.97	Pass
		2480	3DH5	1.36	<=20.97	Pass
Note1: Antenna Gain: Ant1: -3.31dBi;						

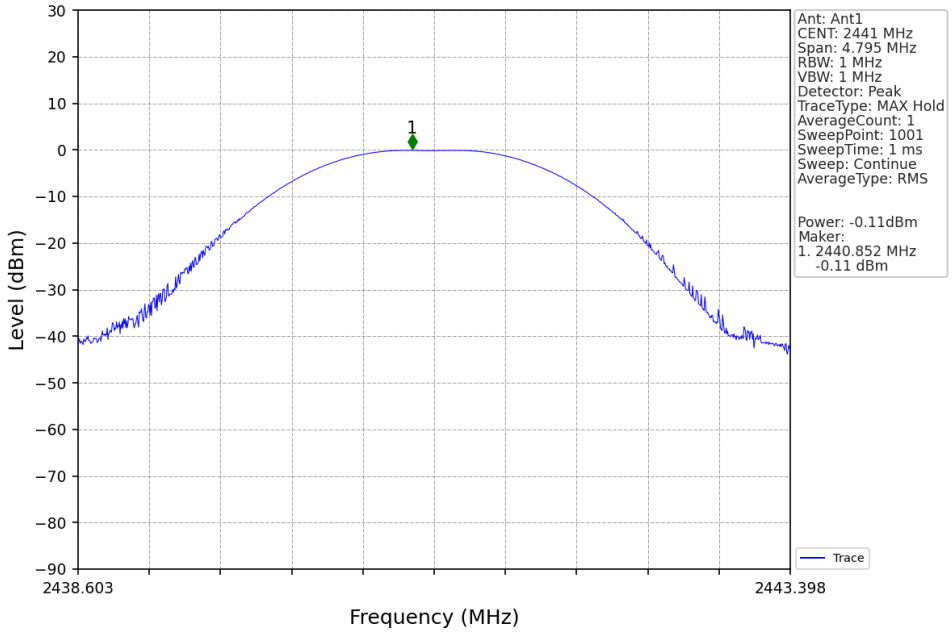
3.2 Test Graph

3.2.1 Power

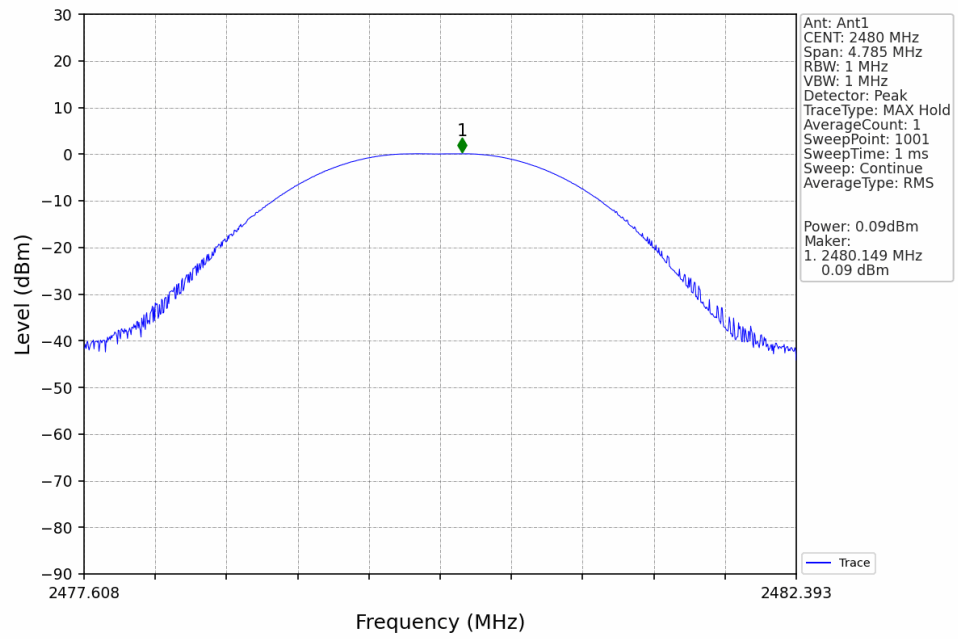
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



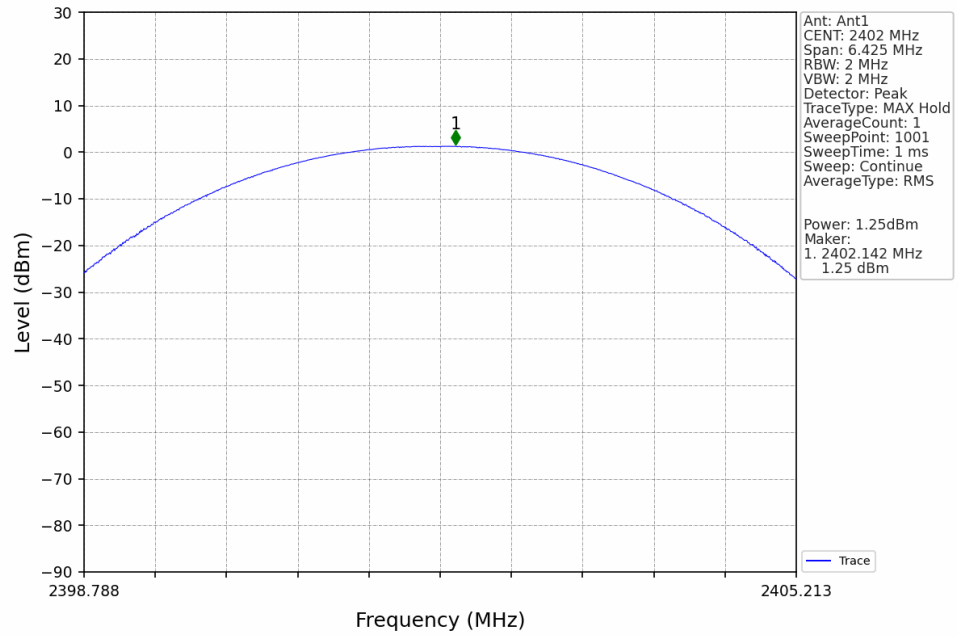
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



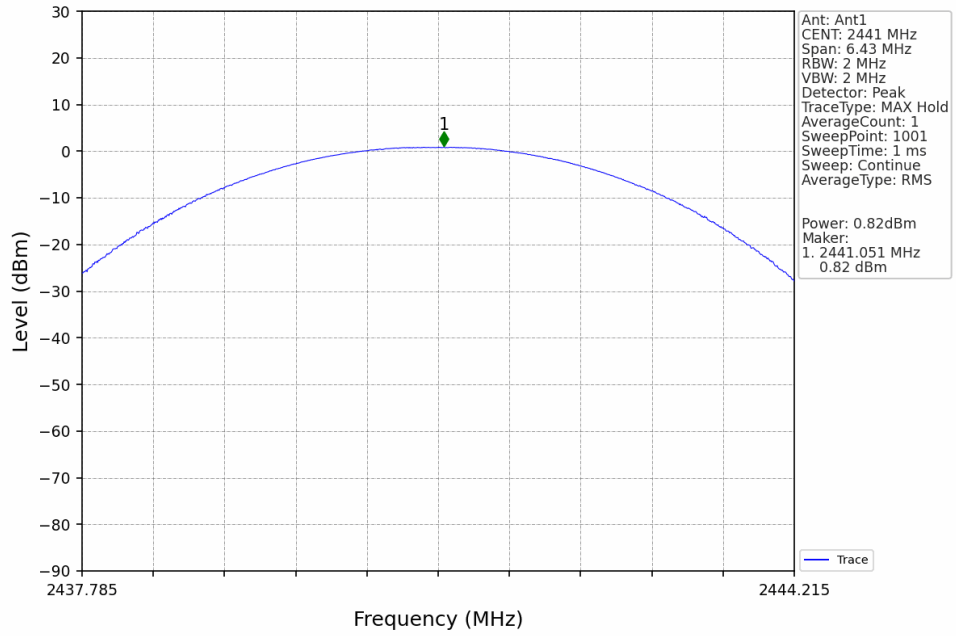
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



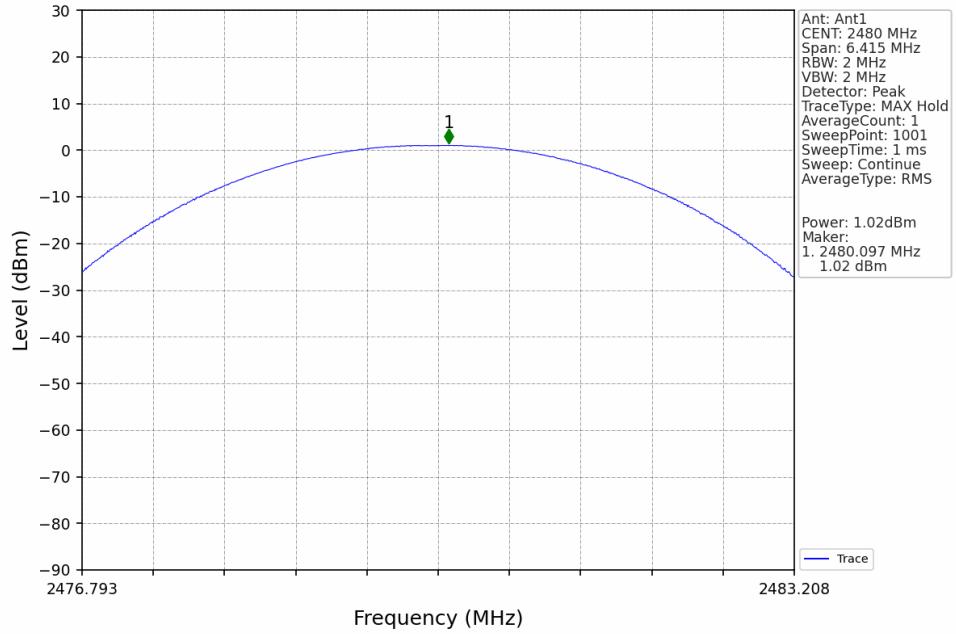
π /4-DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



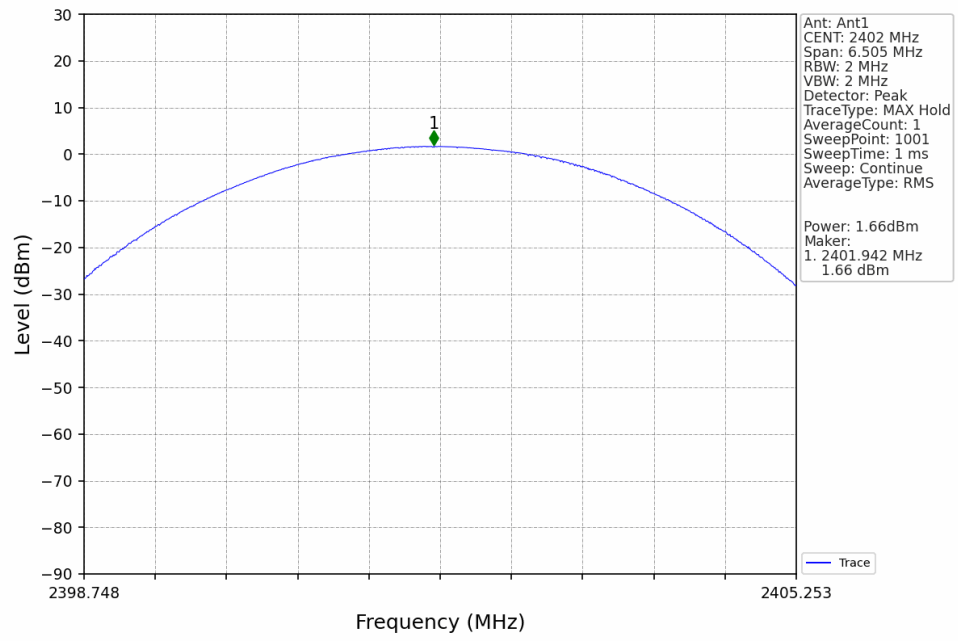
π /4-DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



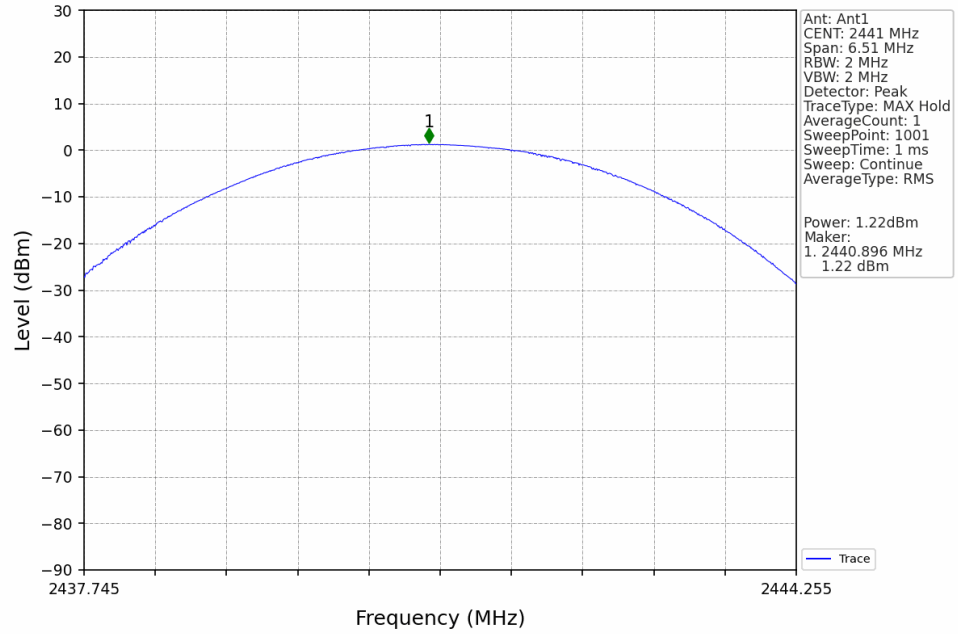
π /4-DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



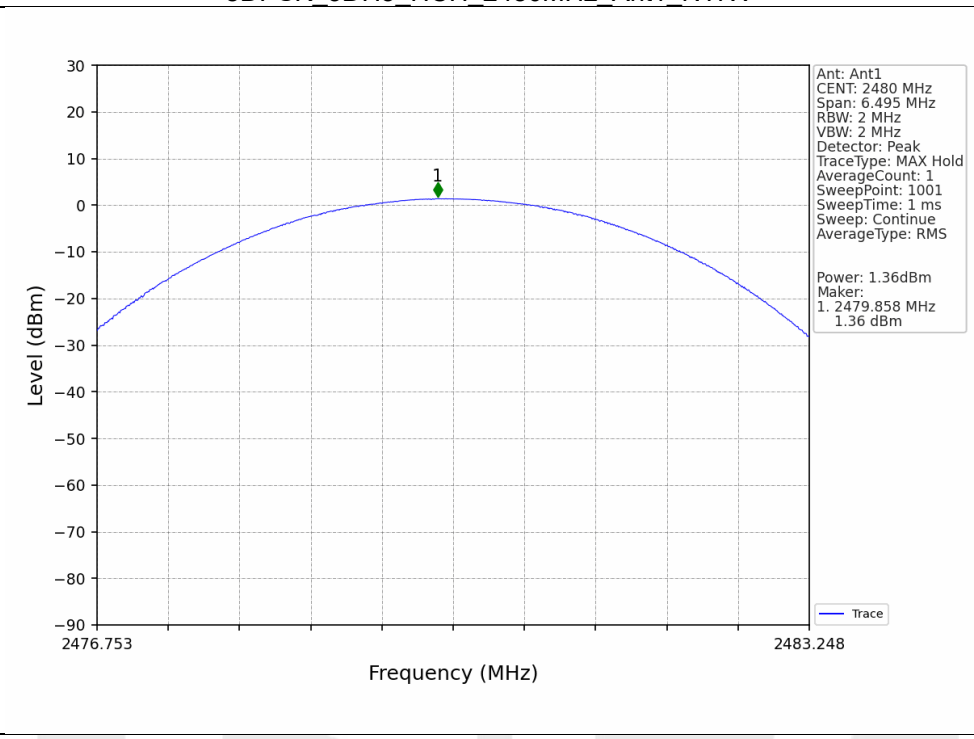
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



4. Carrier Frequency Separation

4.1 Test Result

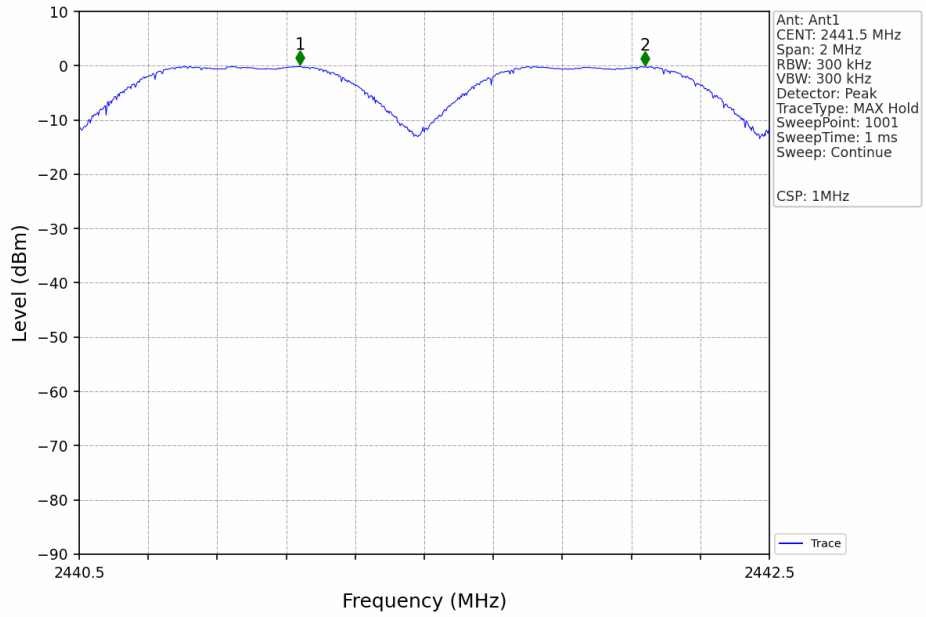
4.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.000	0.959	>=0.959	Pass
π /4-DQPSK	SISO	HOPP	2DH5	0.994	1.286	>=0.857	Pass
8DPSK	SISO	HOPP	3DH5	0.967	1.302	>=0.868	Pass

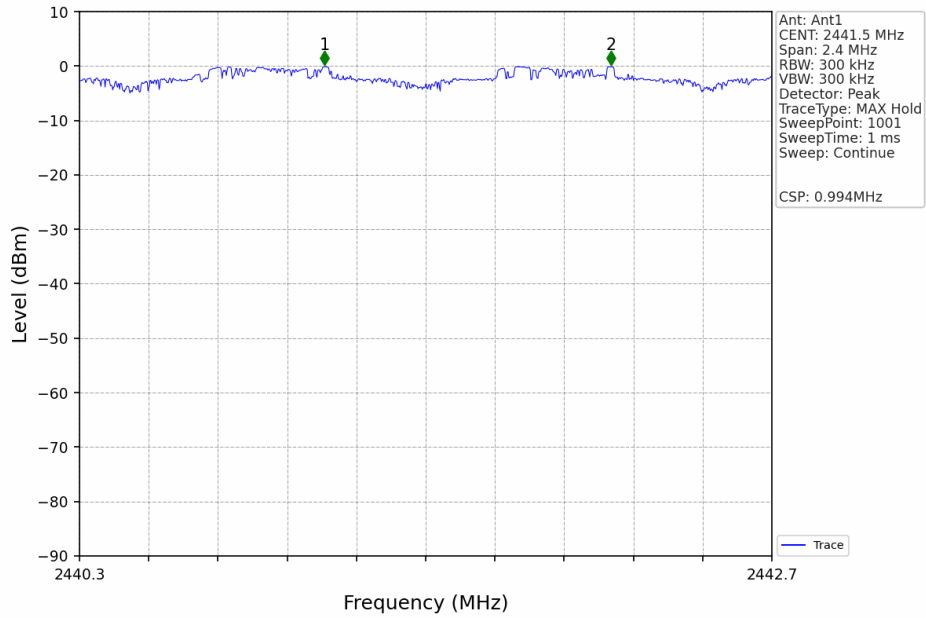
4.2 Test Graph

4.2.1 Ant1

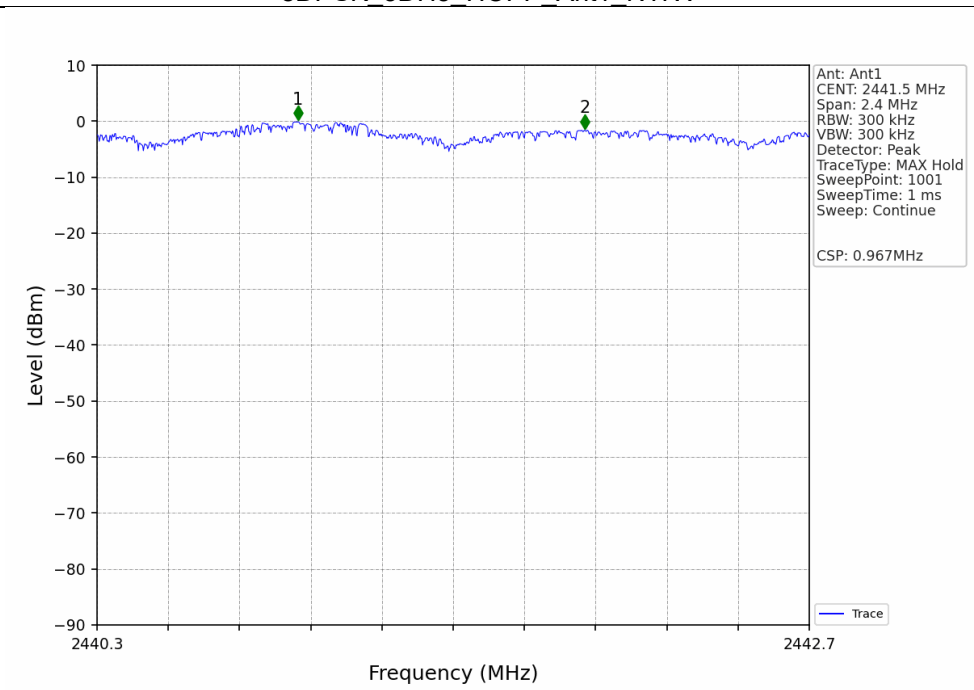
GFSK_DH5_HOPP_Ant1_NTNV



π /4-DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



5. Number of Hopping Frequencies

5.1 Test Result

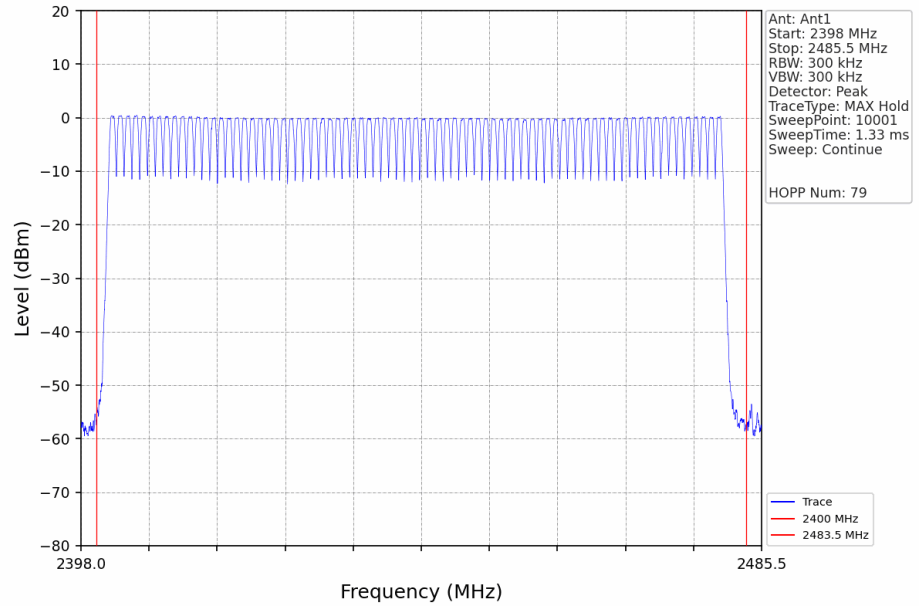
5.1.1 HoppNum

Mode	TX Type	Frequency (MHz)	Packet Type	Num of Hopping Frequencies		Verdict
				ANT1	Limit	
GFSK	SISO	HOPP	DH5	79	>=15	Pass
π/4-DQPSK	SISO	HOPP	2DH5	79	>=15	Pass
8DPSK	SISO	HOPP	3DH5	79	>=15	Pass

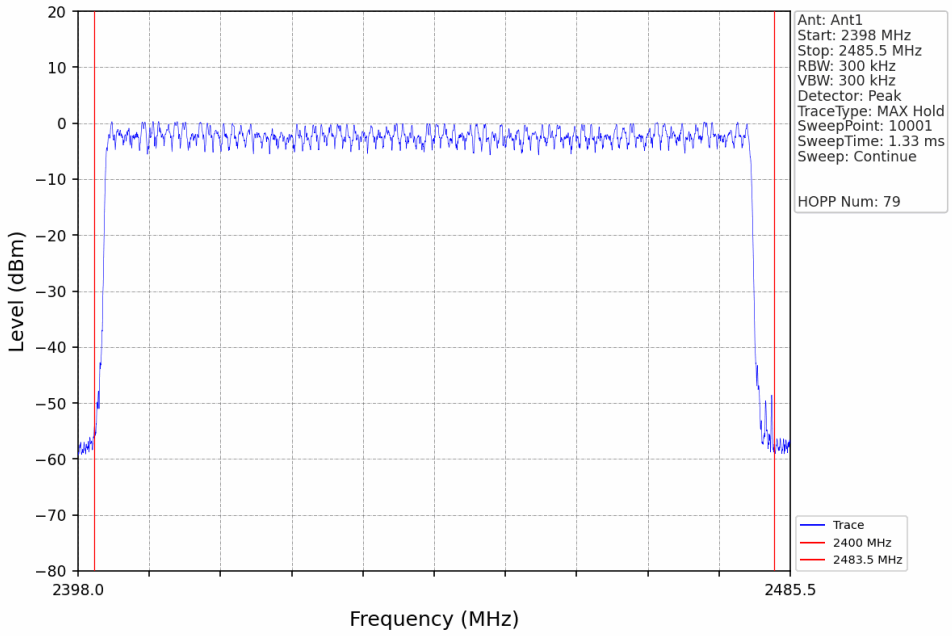
5.2 Test Graph

5.2.1 HoppNum

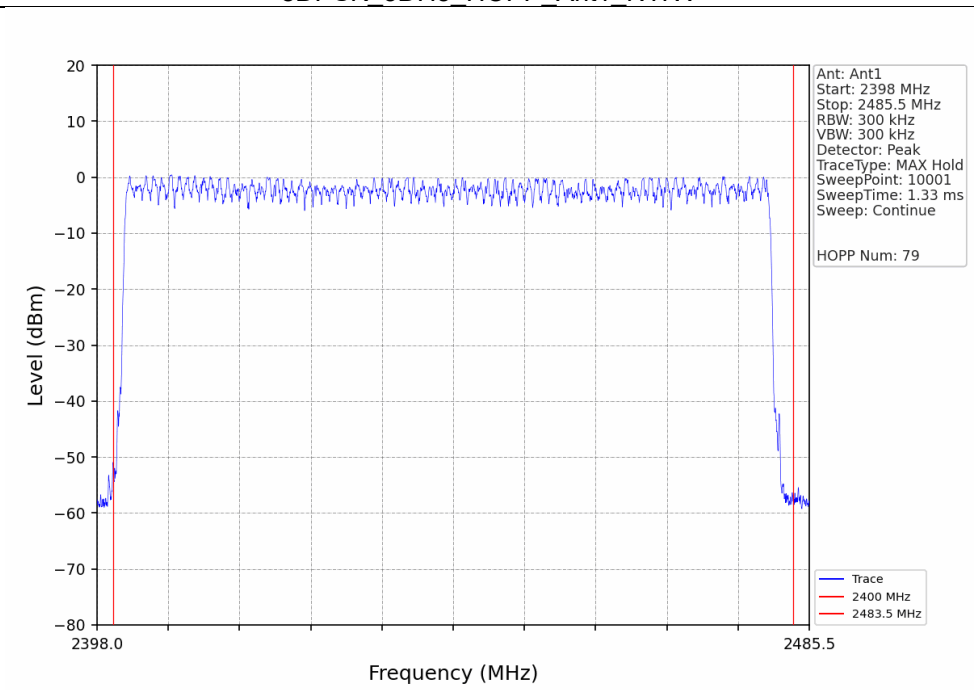
GFSK_DH5_HOPP_Ant1_NTNV



π /4-DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



6. Time of Occupancy (Dwell Time)

6.1 Test Result

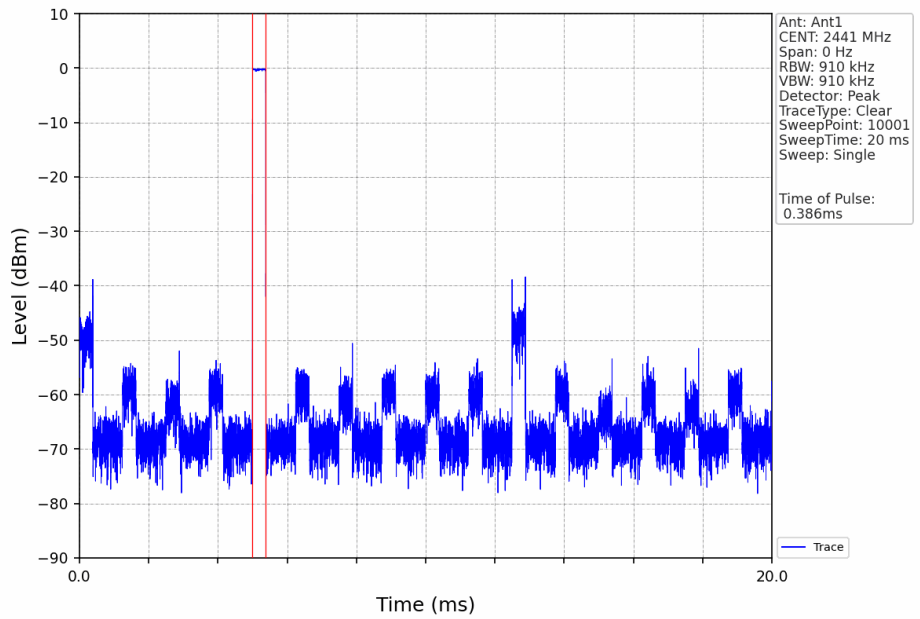
6.1.1 Ant1

Ant1									
Mode	TX Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	SISO	HOPP	DH1	0.386	31.600	321	123.906	<=400	Pass
			DH3	1.646	31.600	167	274.882	<=400	Pass
			DH5	2.896	31.600	103	298.288	<=400	Pass
π /4-DQPSK	SISO	HOPP	2DH1	0.396	31.600	319	126.324	<=400	Pass
			2DH3	1.648	31.600	163	268.624	<=400	Pass
			2DH5	2.894	31.600	104	300.976	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.396	31.600	319	126.324	<=400	Pass
			3DH3	1.652	31.600	153	252.756	<=400	Pass
			3DH5	2.902	31.600	88	255.376	<=400	Pass

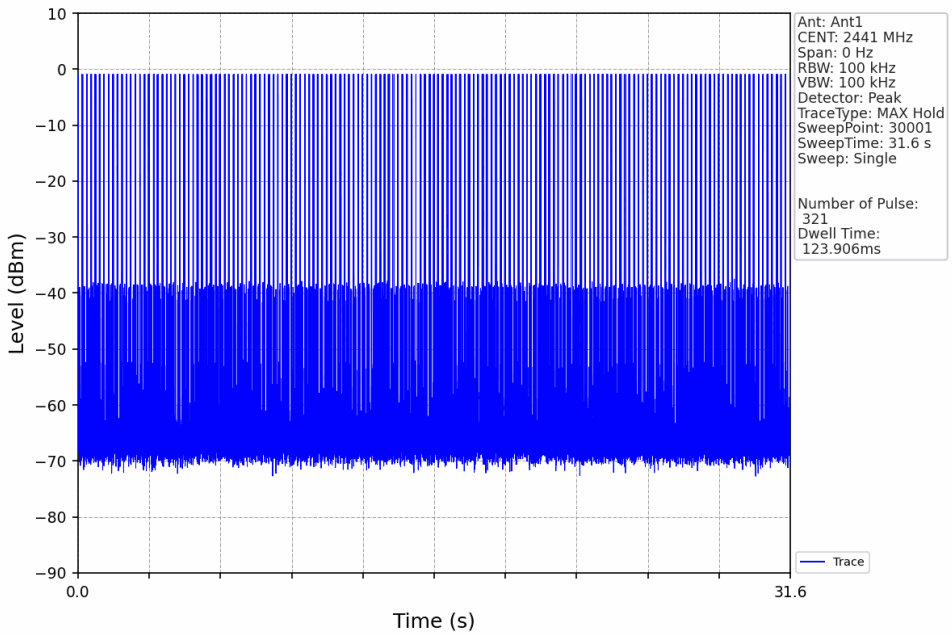
6.2 Test Graph

6.2.1 Ant1

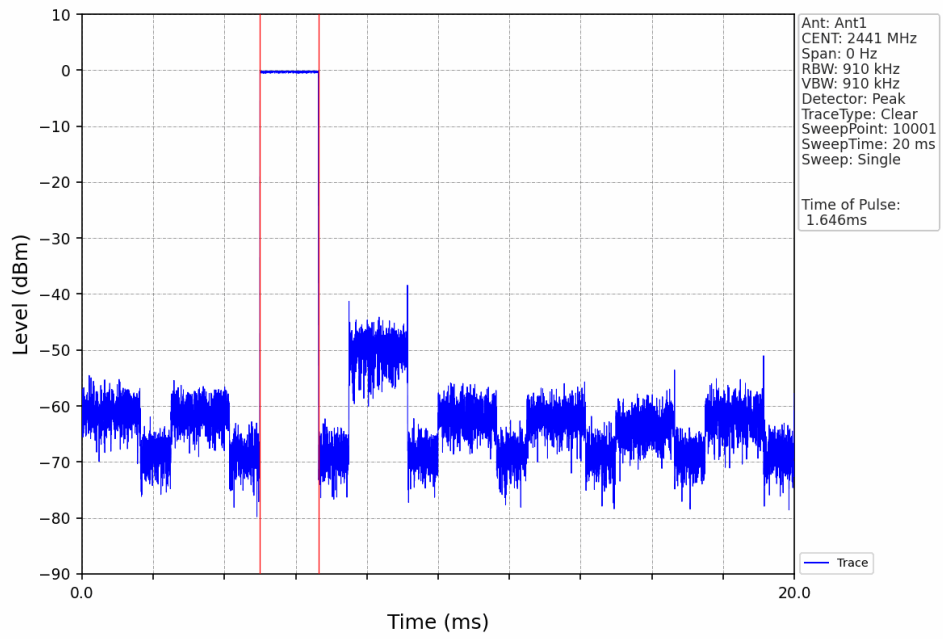
GFSK_DH1_HOPP_Ant1_NTNV



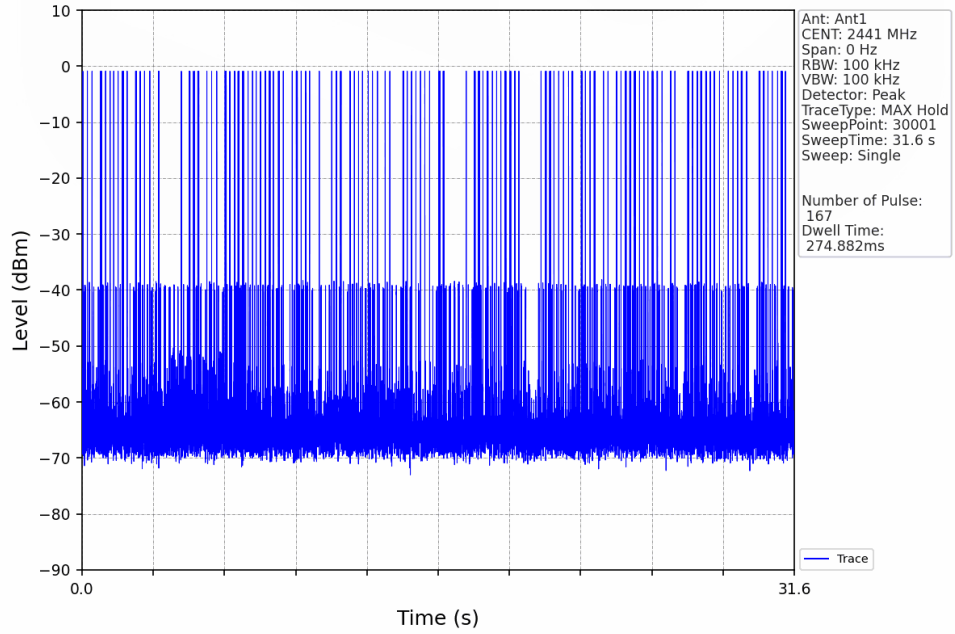
GFSK_DH1_HOPP_Ant1_NTNV



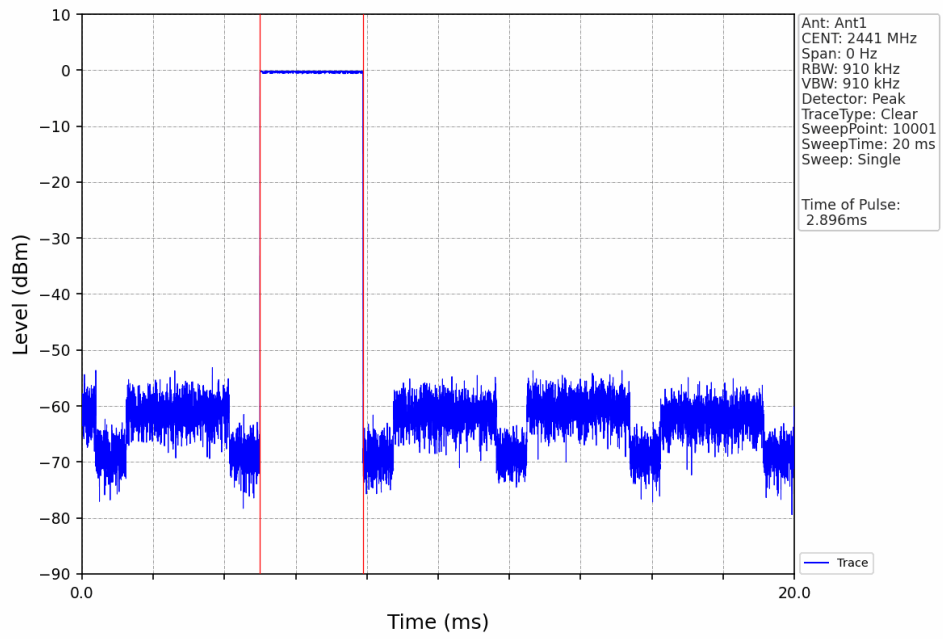
GFSK_DH3_HOPP_Ant1_NTNV



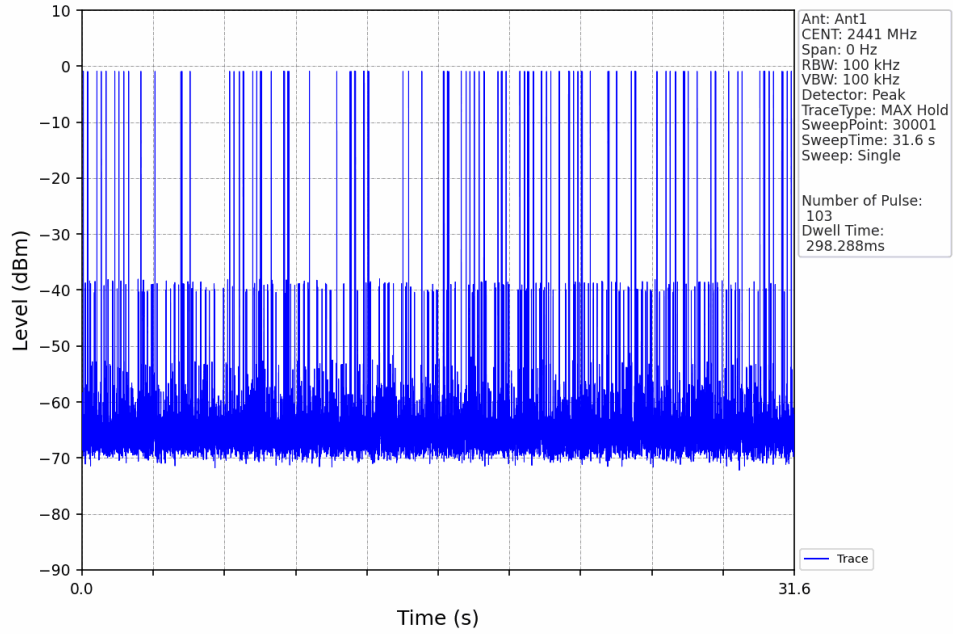
GFSK_DH3_HOPP_Ant1_NTNV



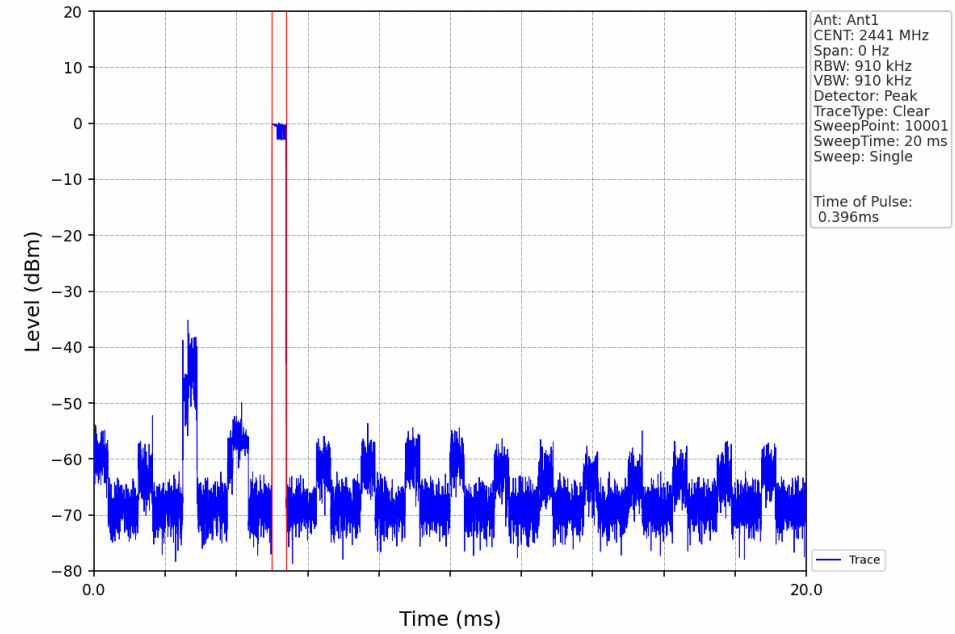
GFSK_DH5_HOPP_Ant1_NTNV



GFSK_DH5_HOPP_Ant1_NTNV



π /4-DQPSK_2DH1_HOPP_Ant1_NTNV



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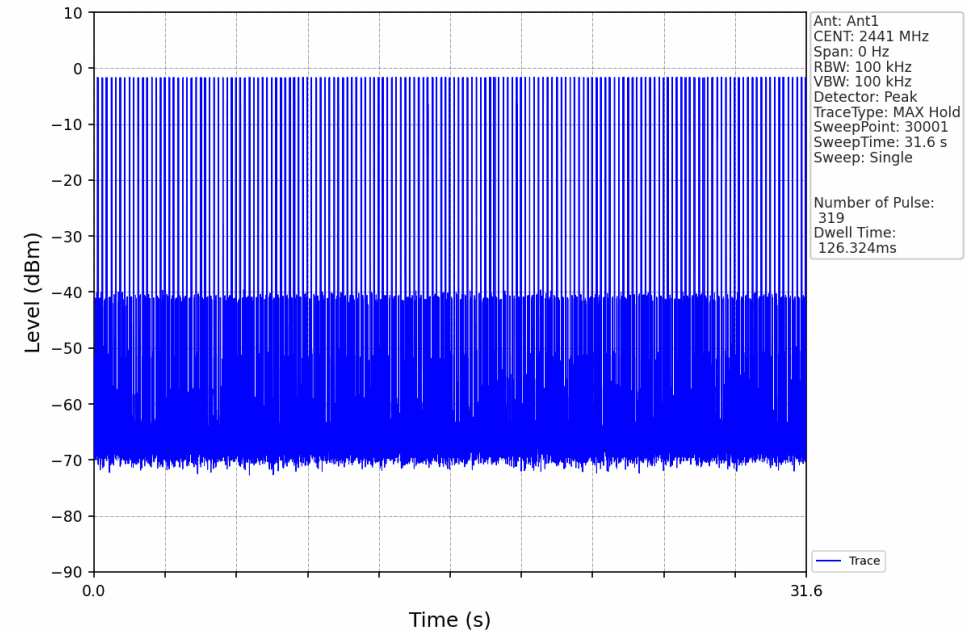

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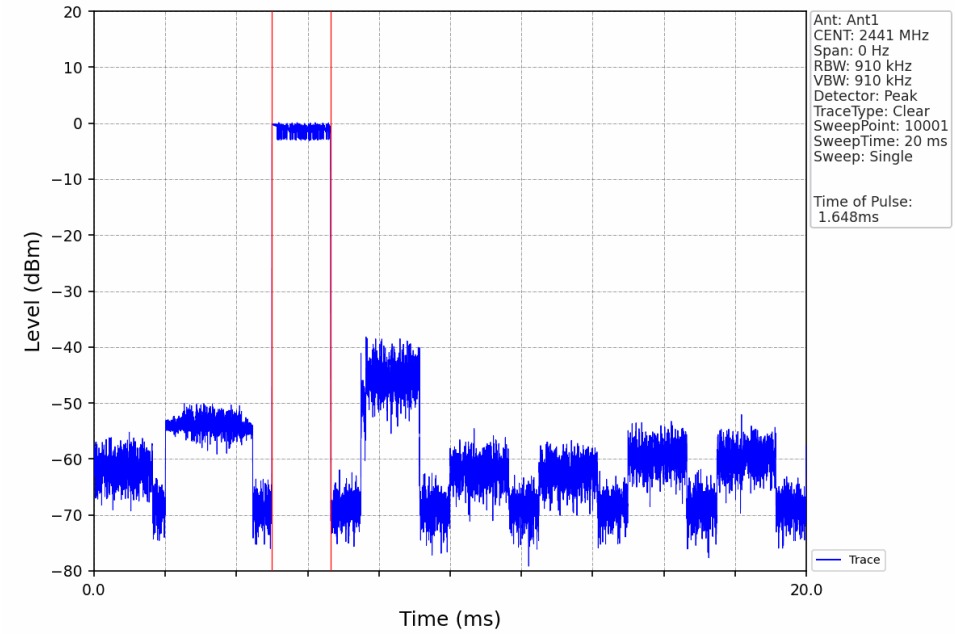

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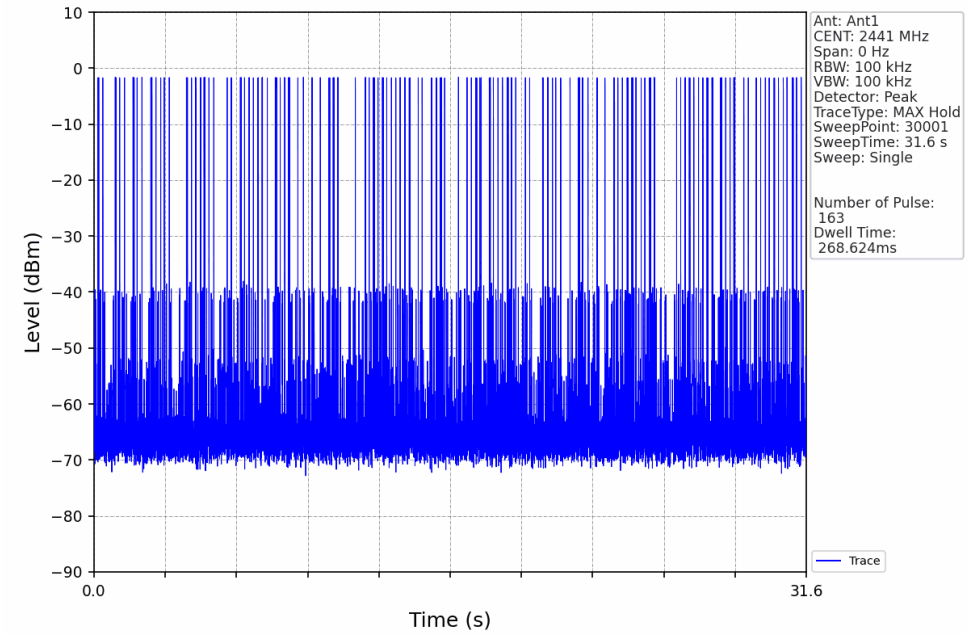

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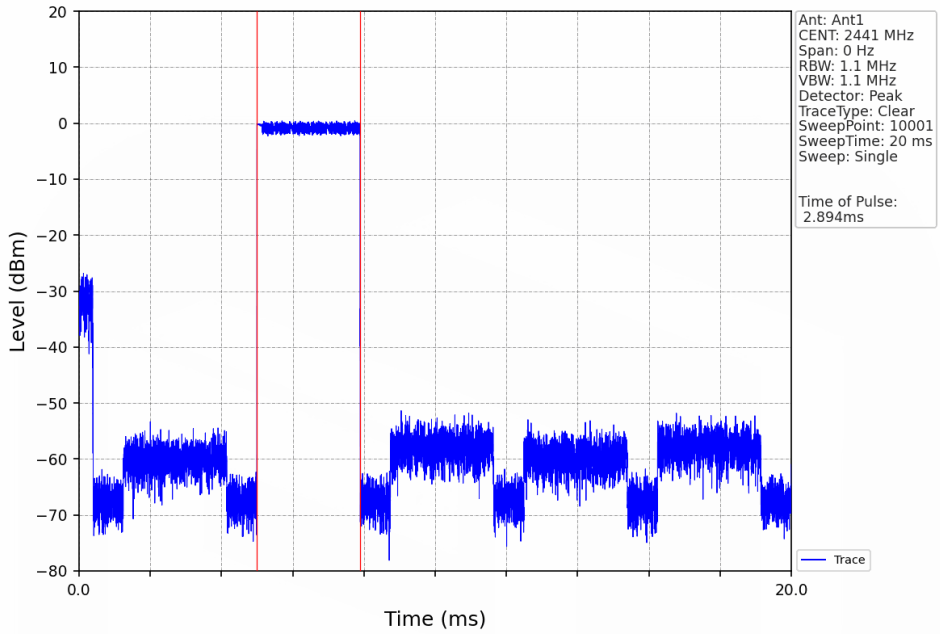

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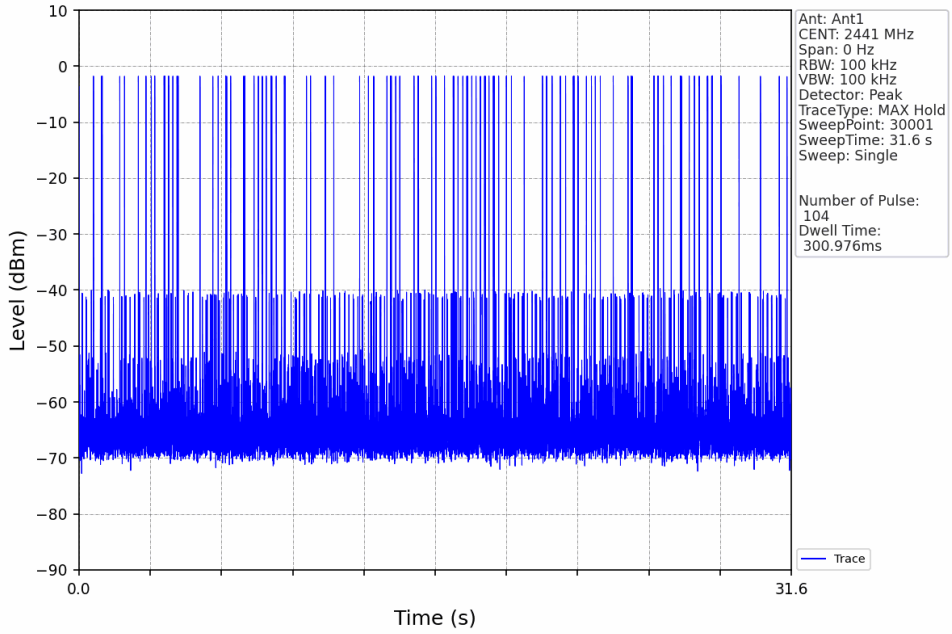
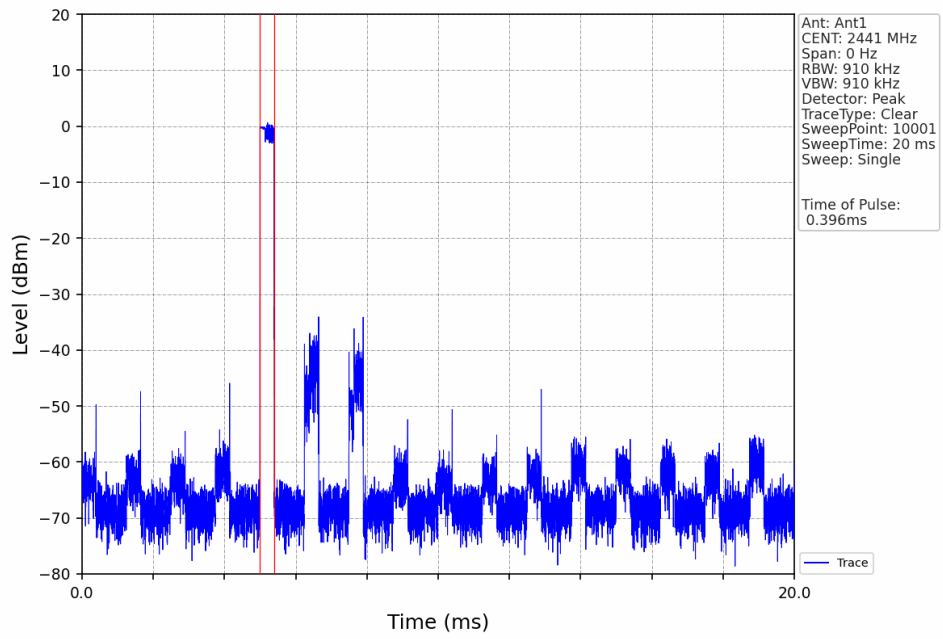


8DPSK_3DH1_HOPP_Ant1_NTNV



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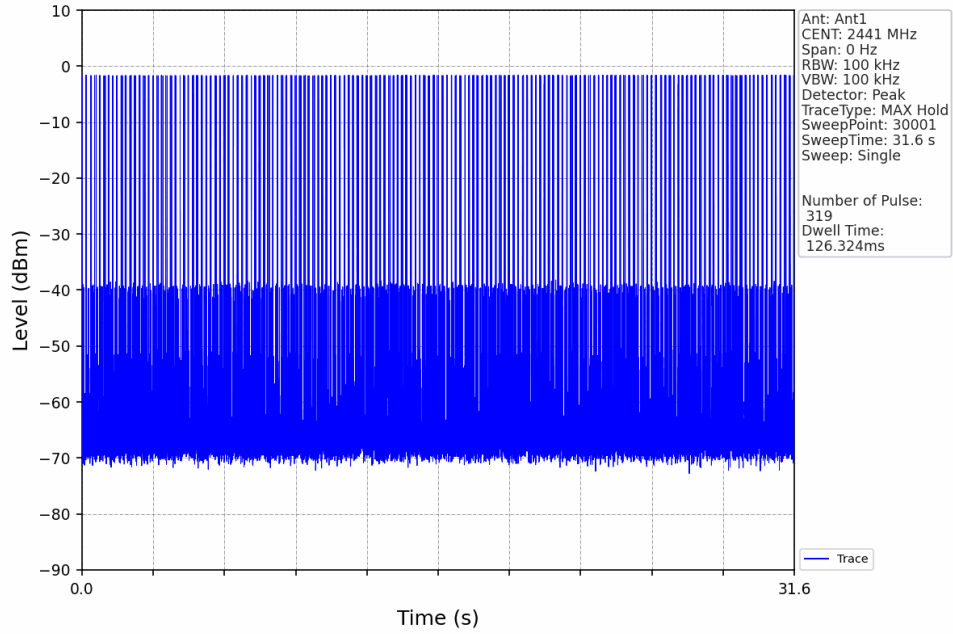

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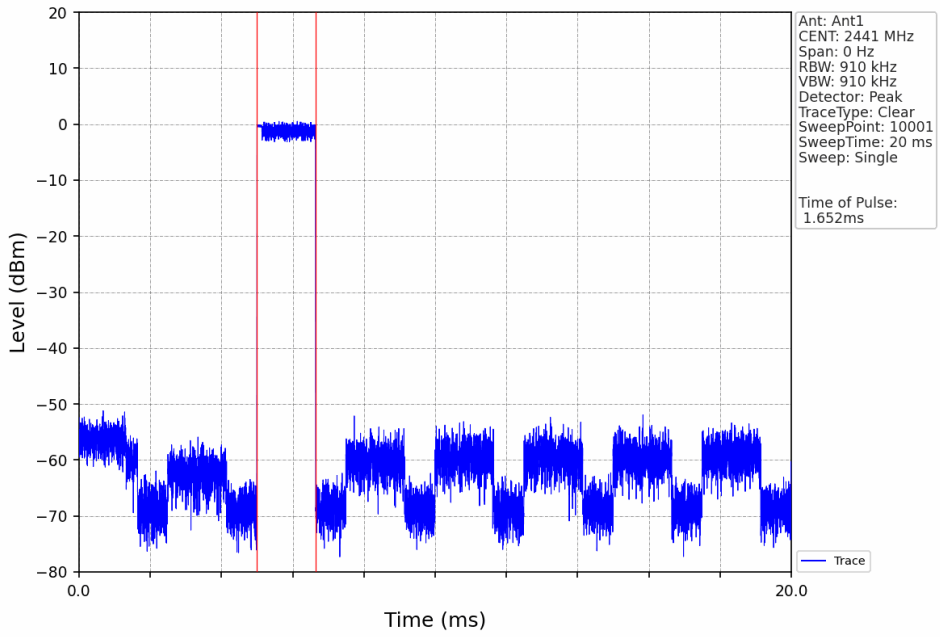

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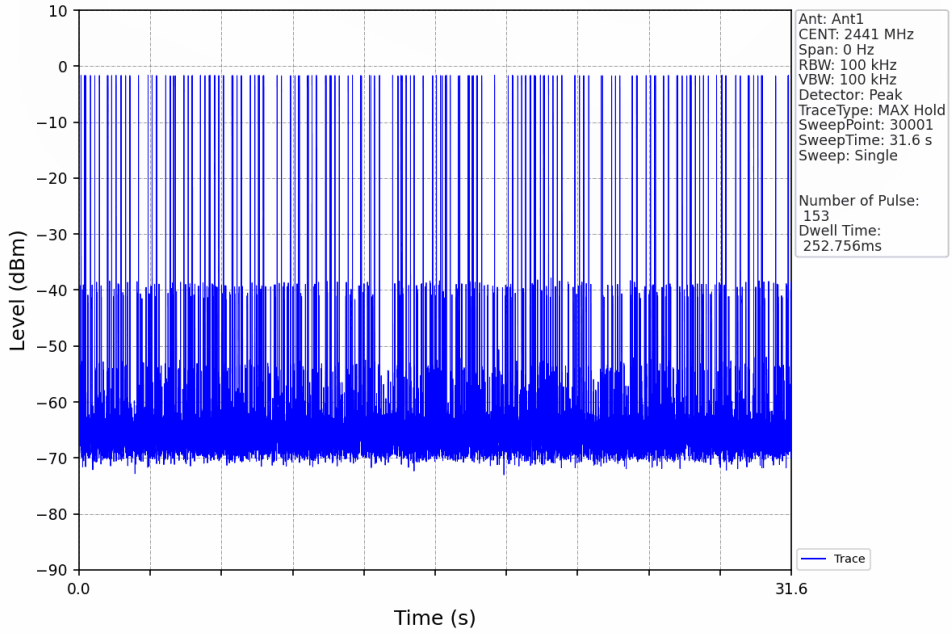
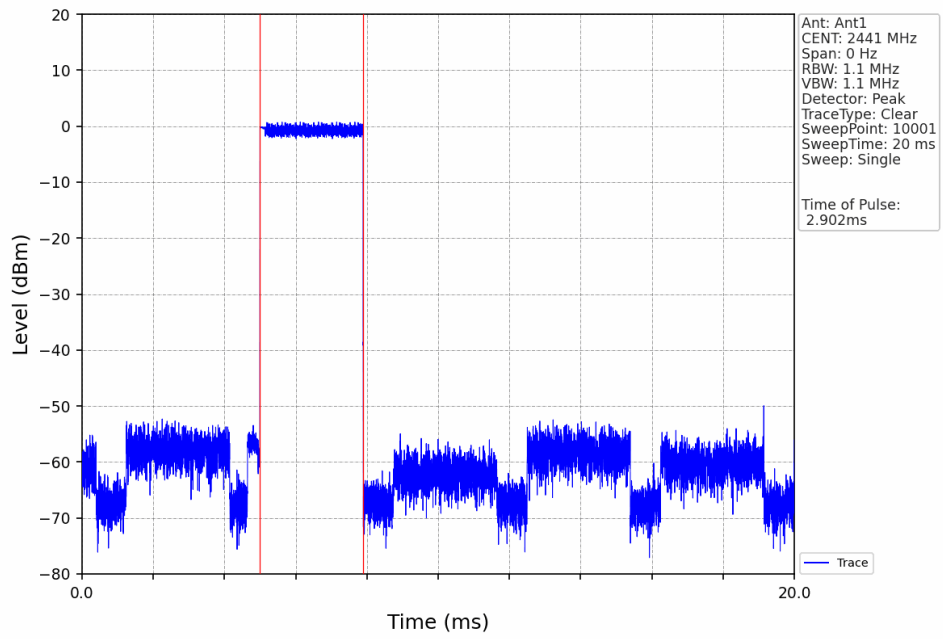
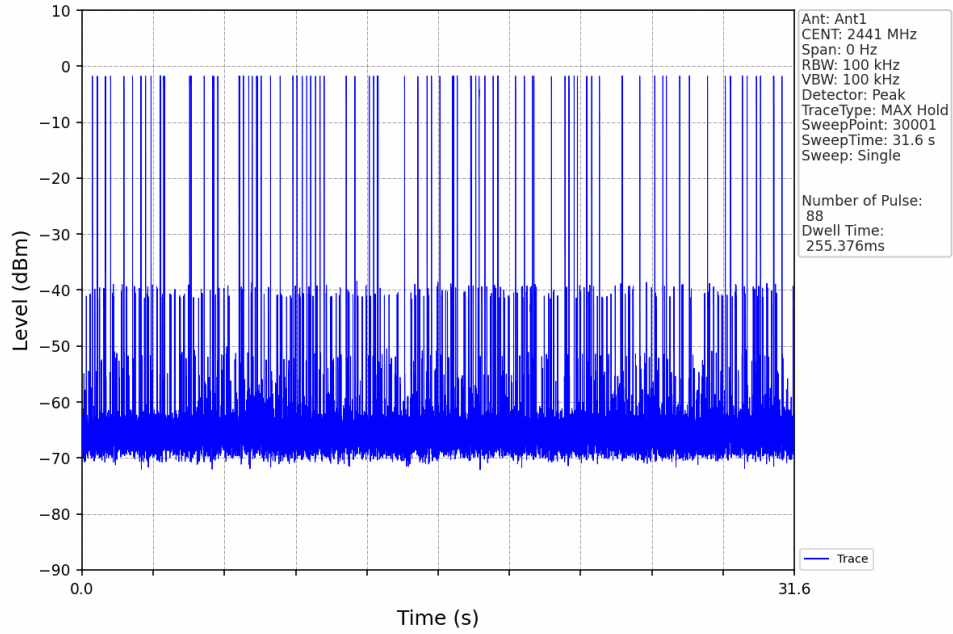


8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



7. Unwanted Emissions In Non-restricted Frequency Bands

7.1 Test Result

7.1.1 Ref

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	0.16
		2441	DH5	1	-0.20
		2480	DH5	1	-0.04
		HOPP	DH5	1	0.28
					0.28
π /4-DQPSK	SISO	2402	2DH5	1	0.24
		2441	2DH5	1	-0.19
		2480	2DH5	1	-0.03
		HOPP	2DH5	1	0.06
					0.06
8DPSK	SISO	2402	3DH5	1	0.24
		2441	3DH5	1	-0.31
		2480	3DH5	1	-0.01
		HOPP	3DH5	1	-0.23
					-0.23
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.					

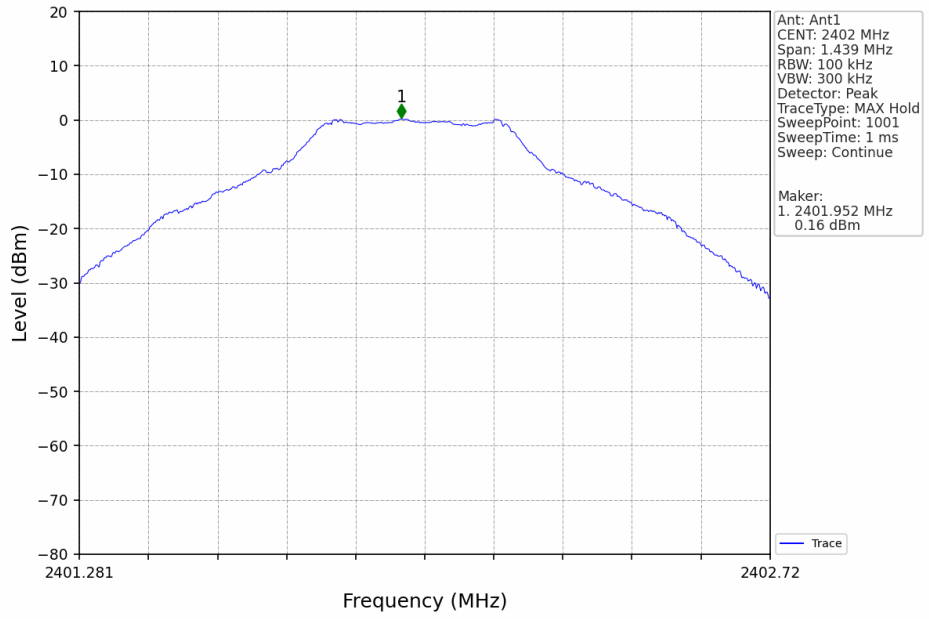
7.1.2 CSE

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	0.16	-19.84	Pass
		2441	DH5	1	-0.20	-20.20	Pass
		2480	DH5	1	-0.04	-20.04	Pass
		HOPP	DH5	1	0.28	-19.72	Pass
					0.28	-19.72	Pass
π /4-DQPSK	SISO	2402	2DH5	1	0.24	-19.76	Pass
		2441	2DH5	1	-0.19	-20.19	Pass
		2480	2DH5	1	-0.03	-20.03	Pass
		HOPP	2DH5	1	0.06	-19.94	Pass
					0.06	-19.94	Pass
8DPSK	SISO	2402	3DH5	1	0.24	-19.76	Pass
		2441	3DH5	1	-0.31	-20.31	Pass
		2480	3DH5	1	-0.01	-20.01	Pass
		HOPP	3DH5	1	-0.23	-20.23	Pass
					-0.23	-20.23	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.							

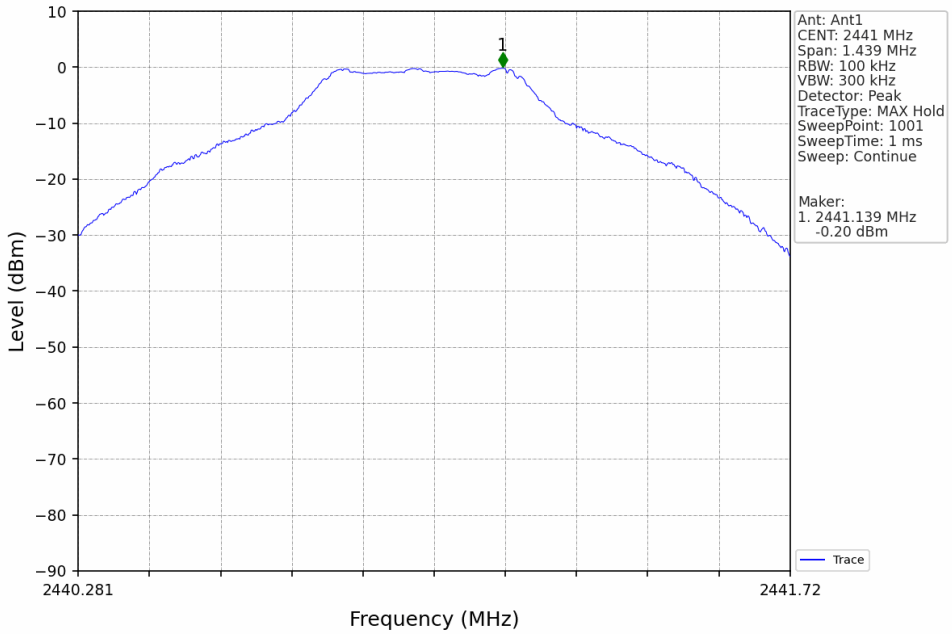
7.2 Test Graph

7.2.1 Ref

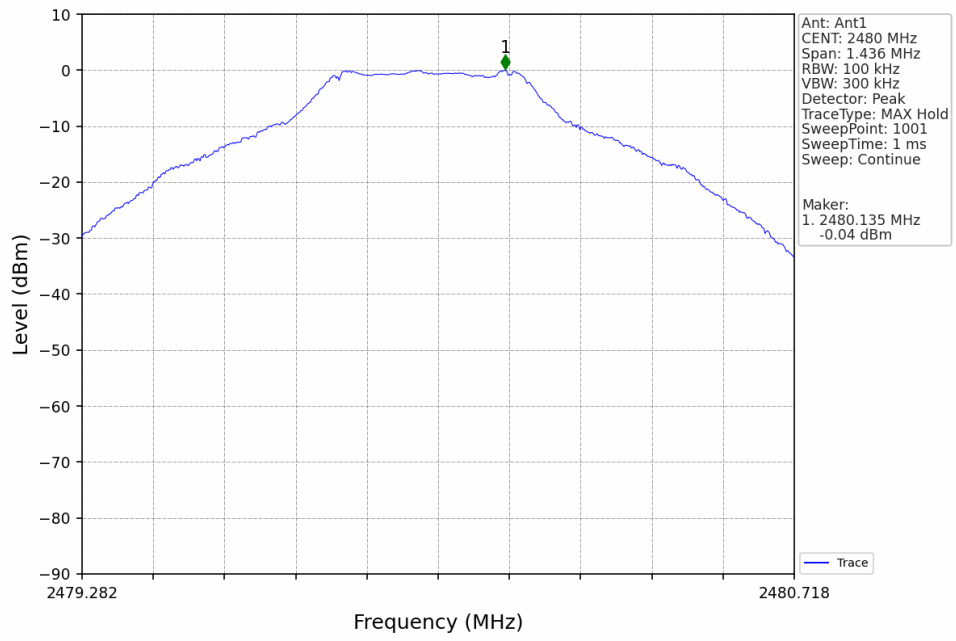
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



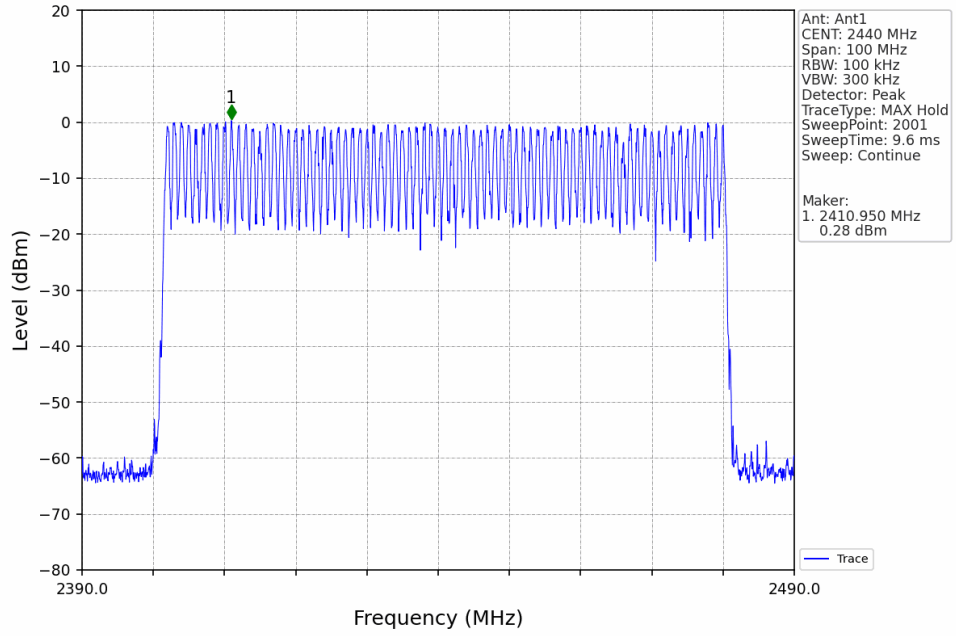
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



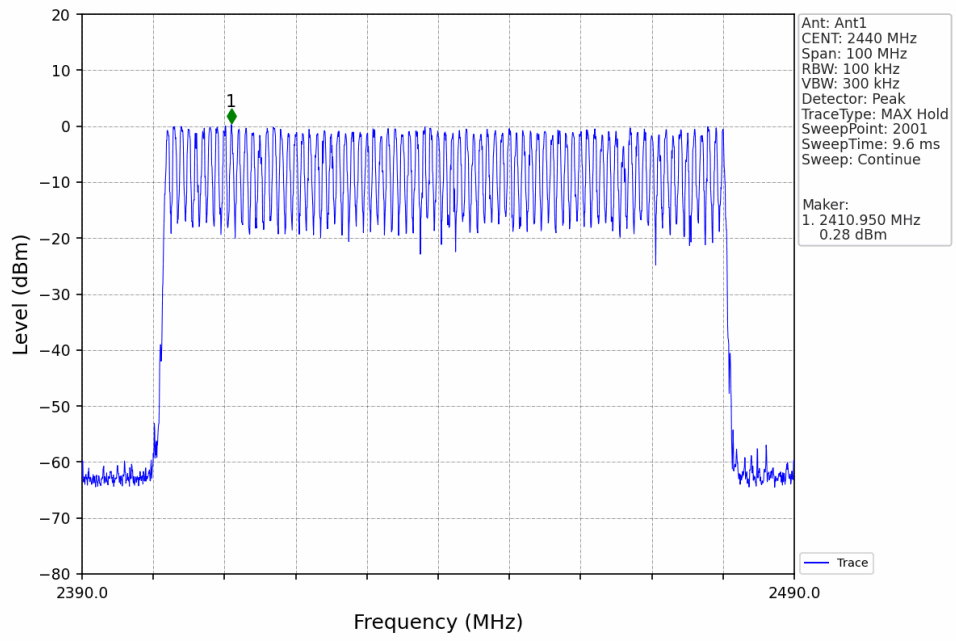
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



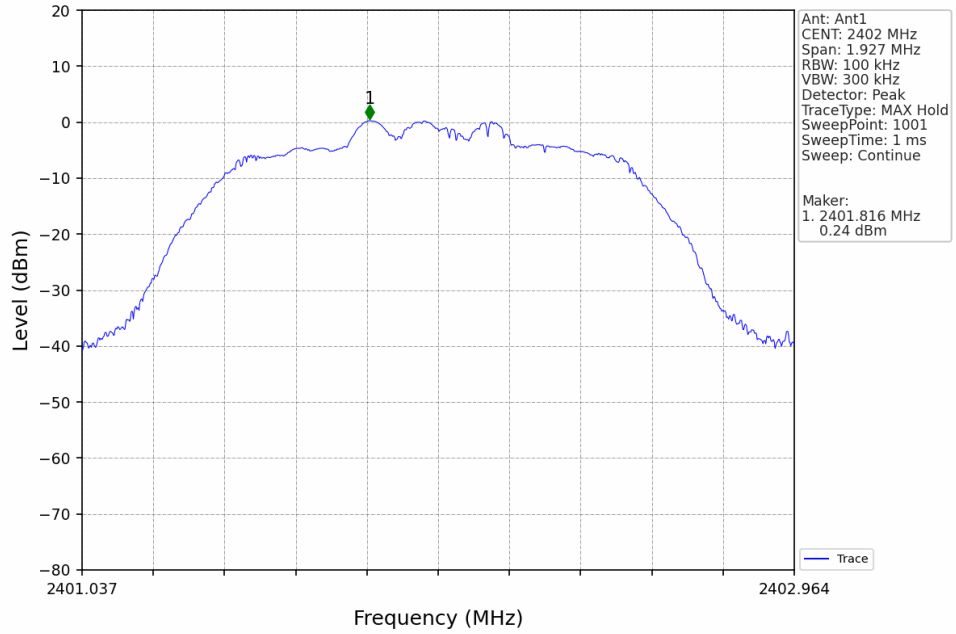
GFSK_DH5_HOPP_Ant1_NTNV



GFSK_DH5_HOPP_Ant1_NTNV



π /4-DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



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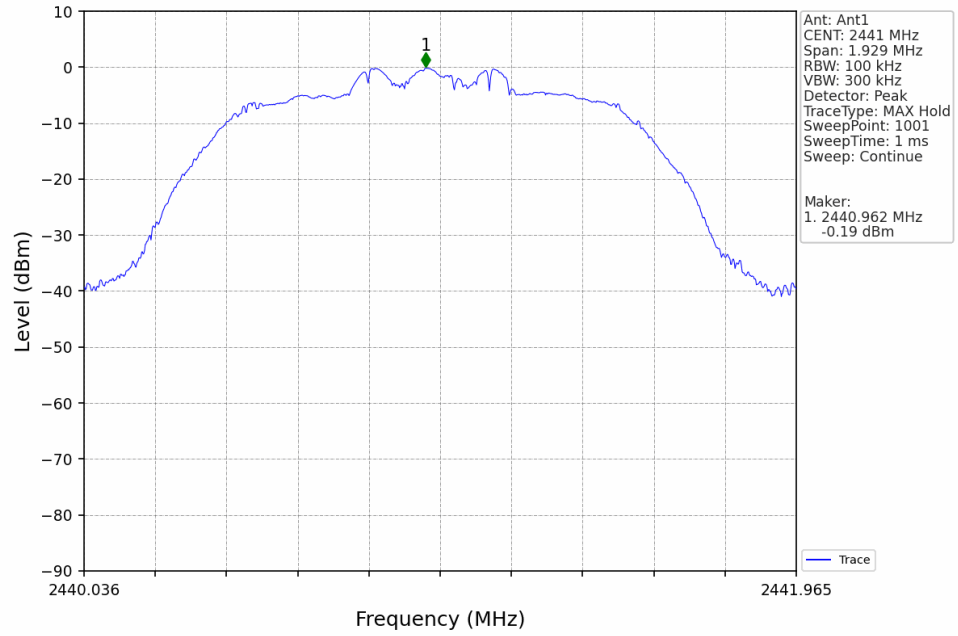

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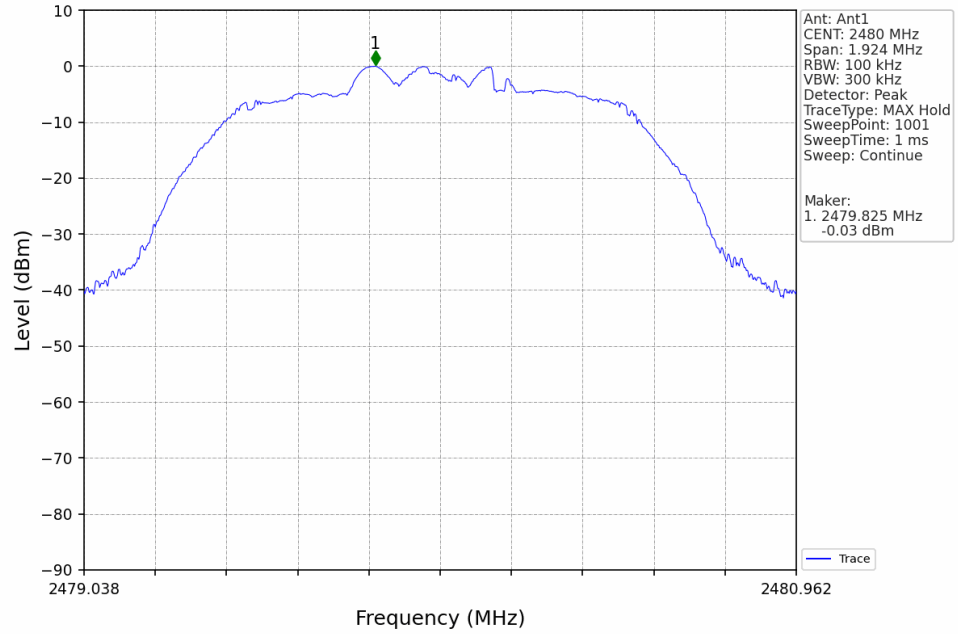

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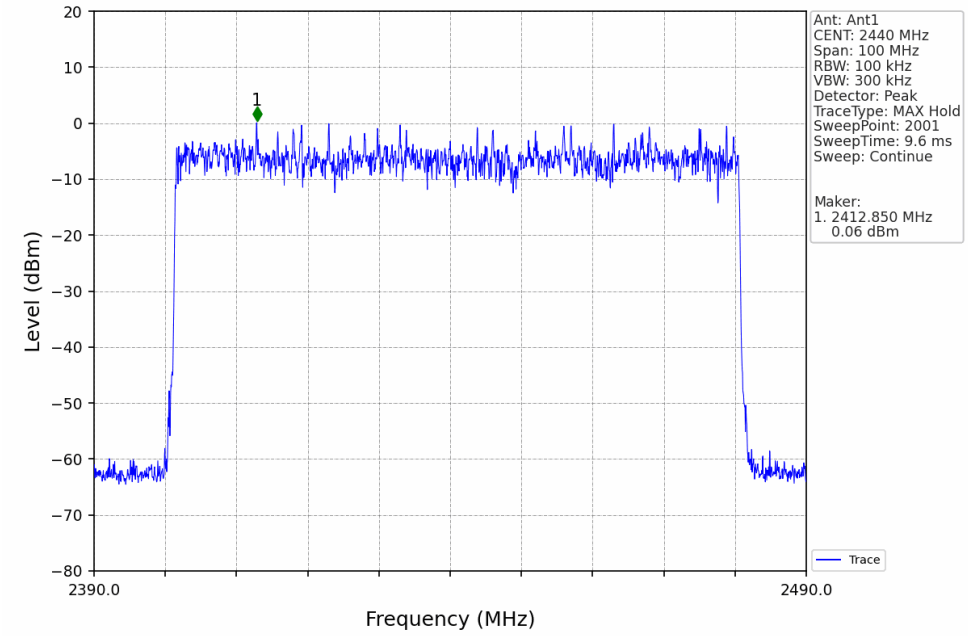

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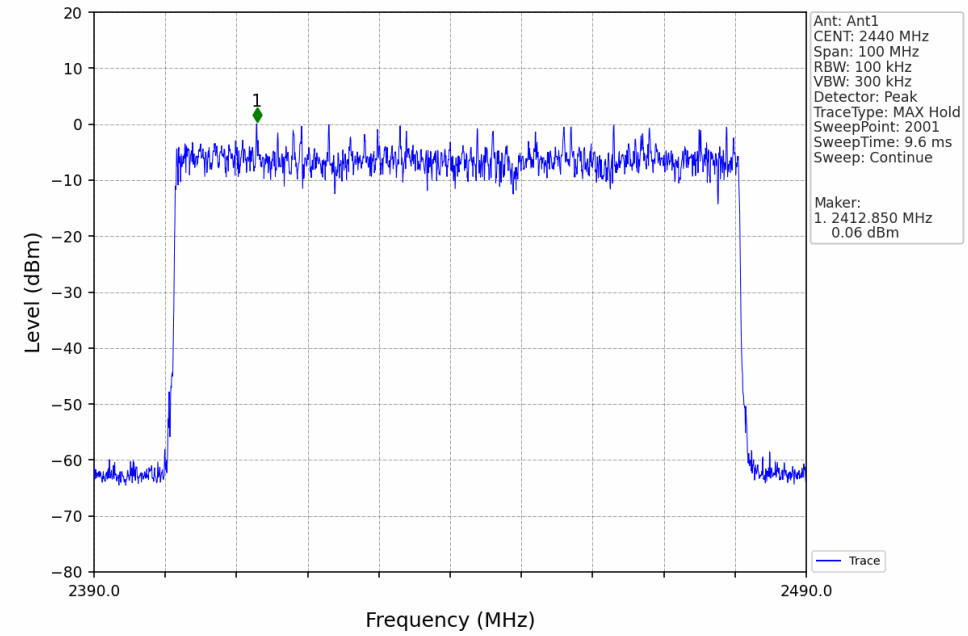
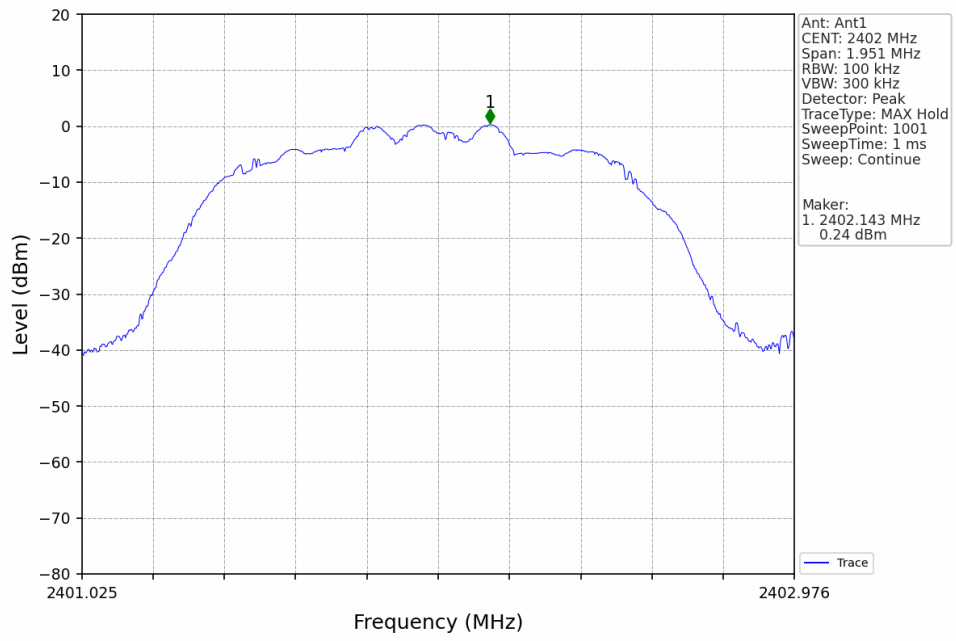
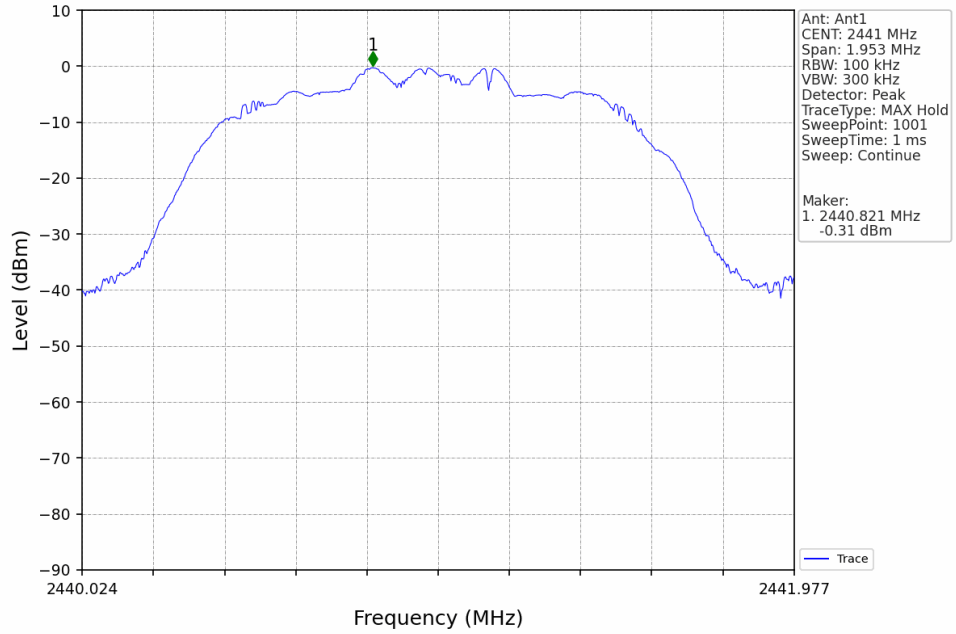


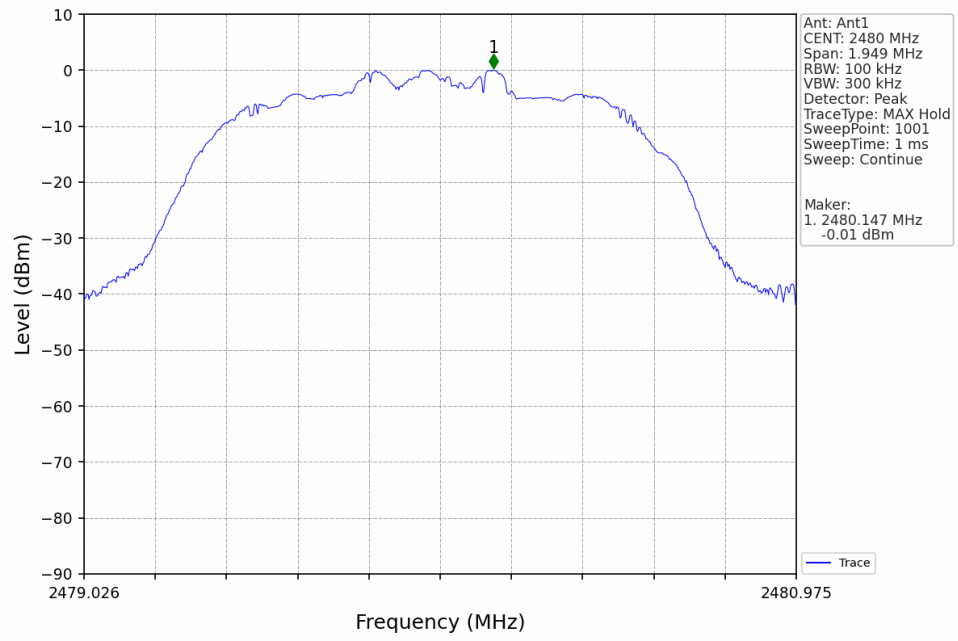
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



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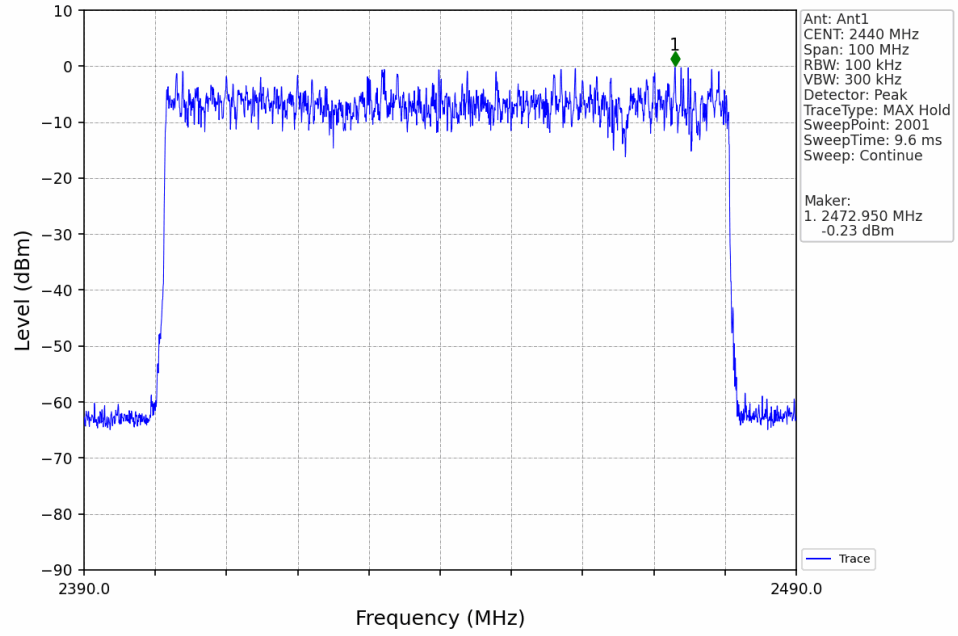

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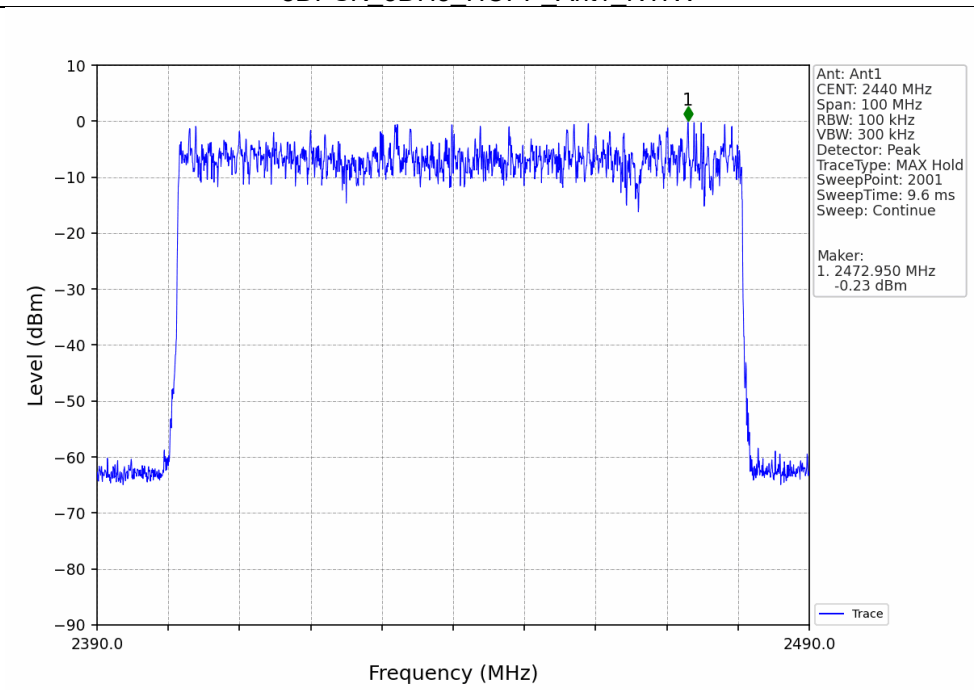
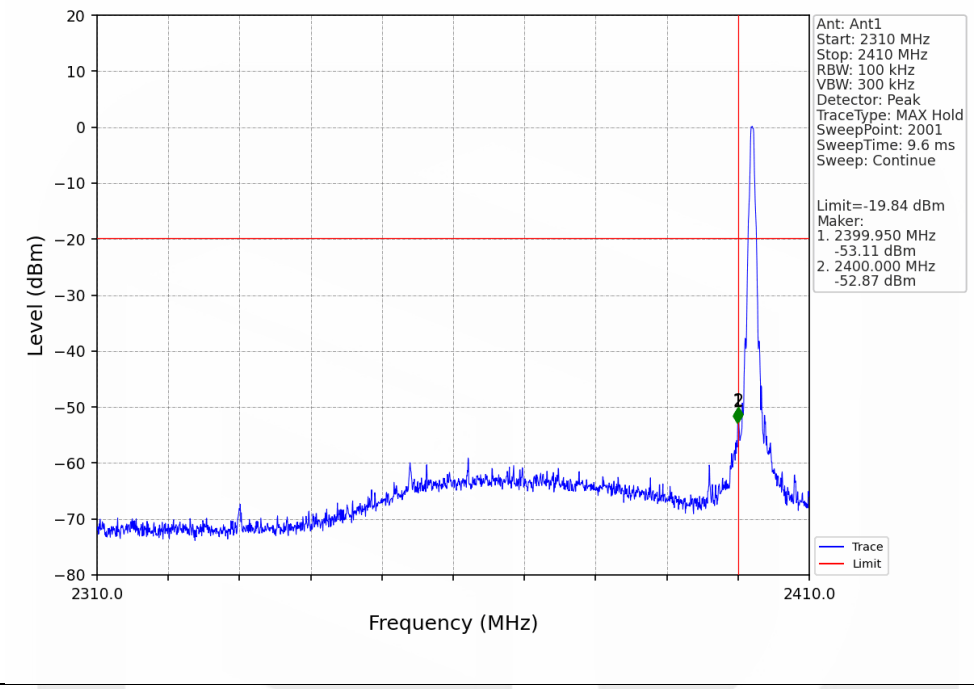
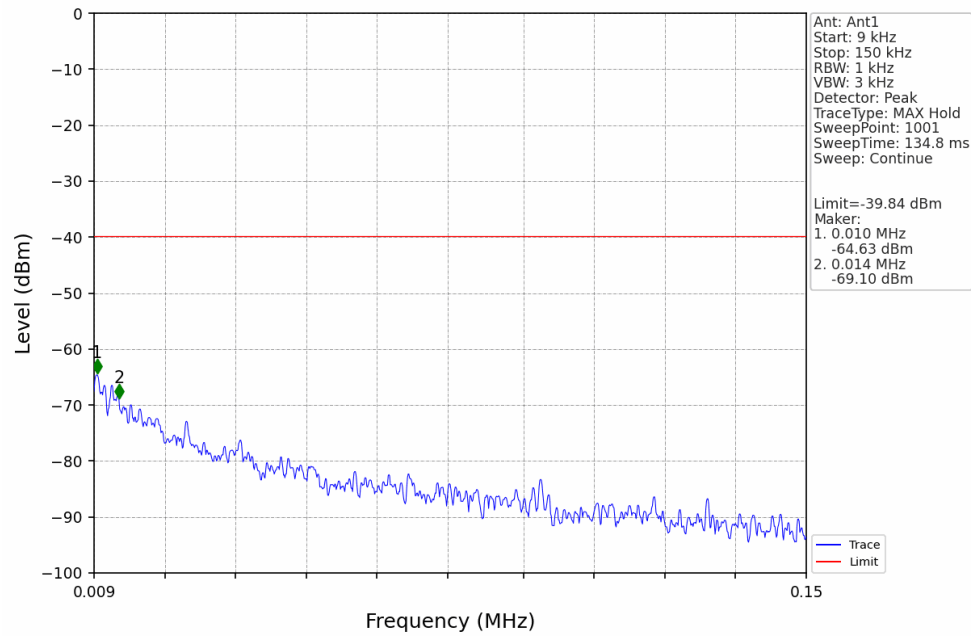


7.2.2 CSE

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_LCH_2402MHz_Ant1_NTNV



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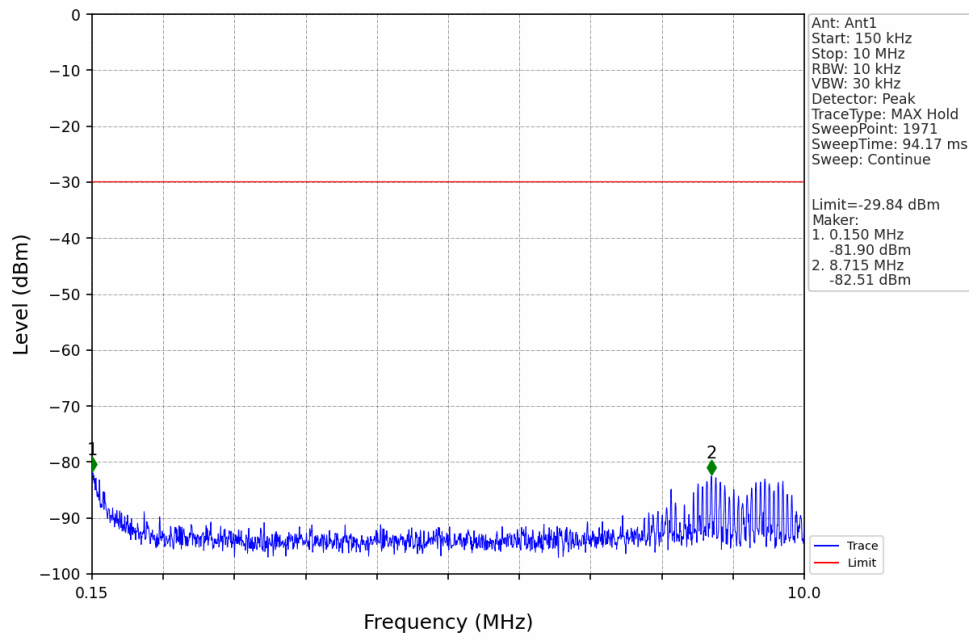
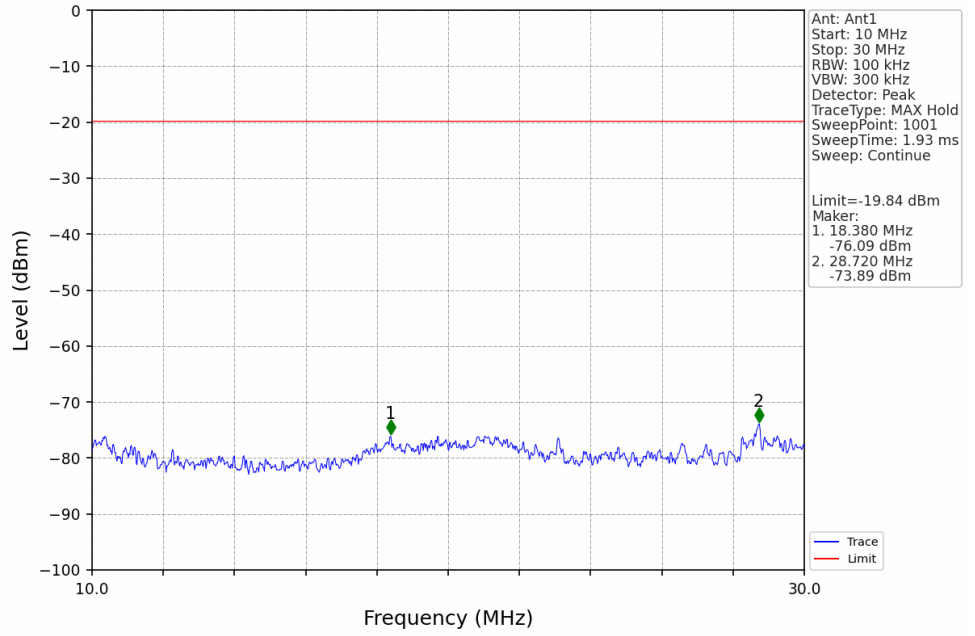
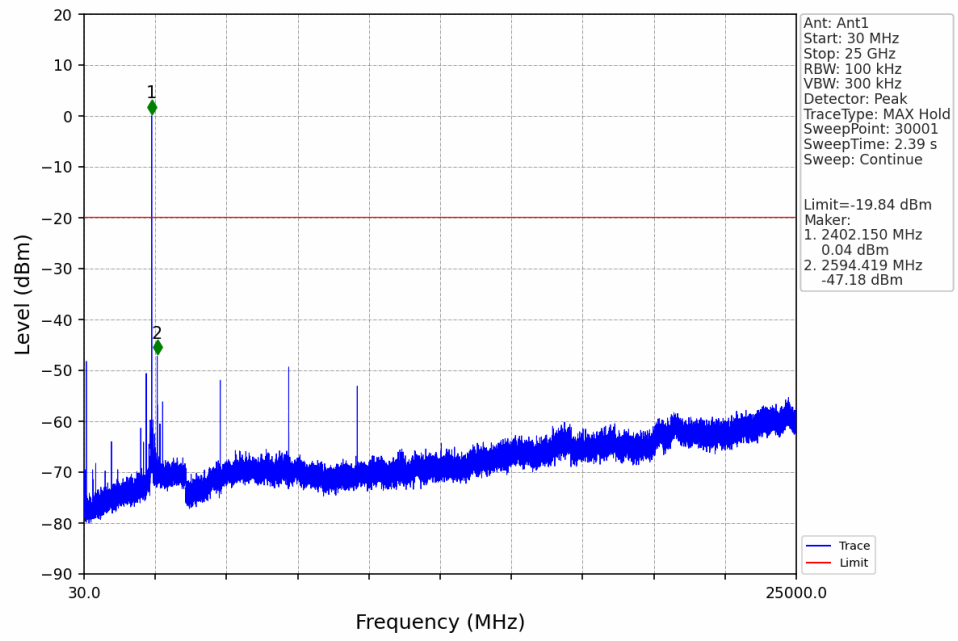


GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_LCH_2402MHz_Ant1_NTNV



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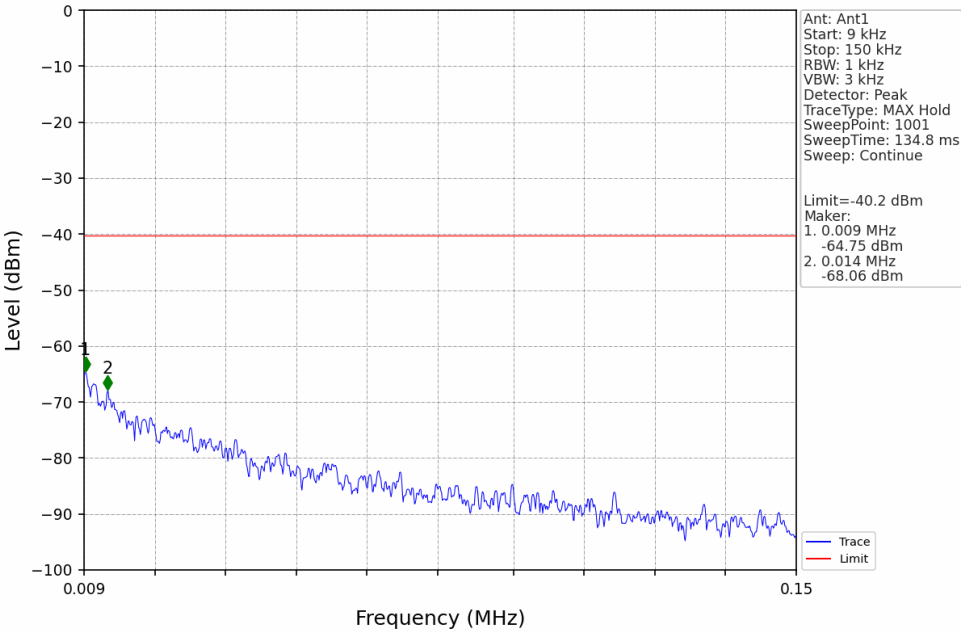

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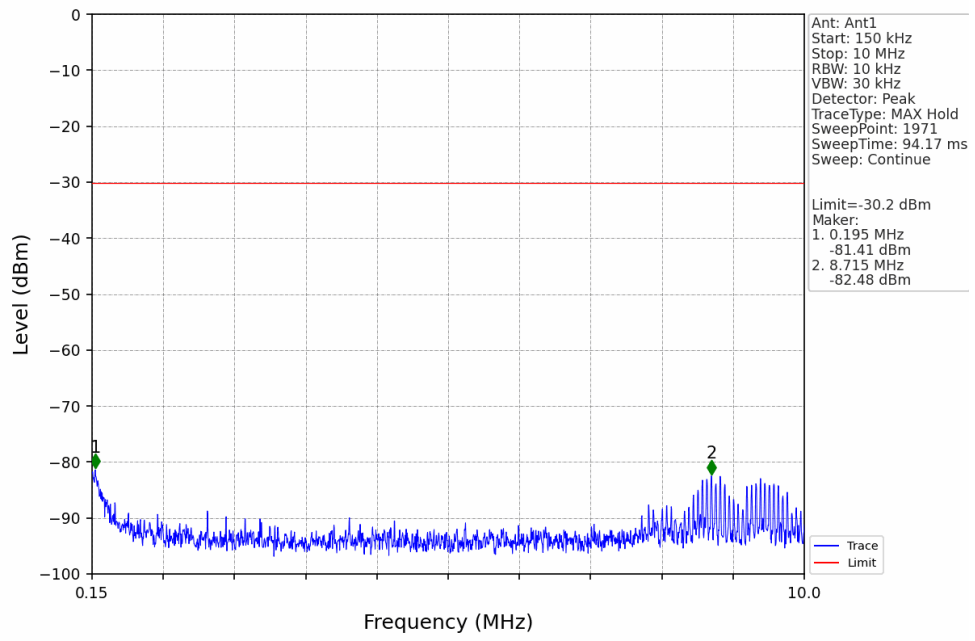
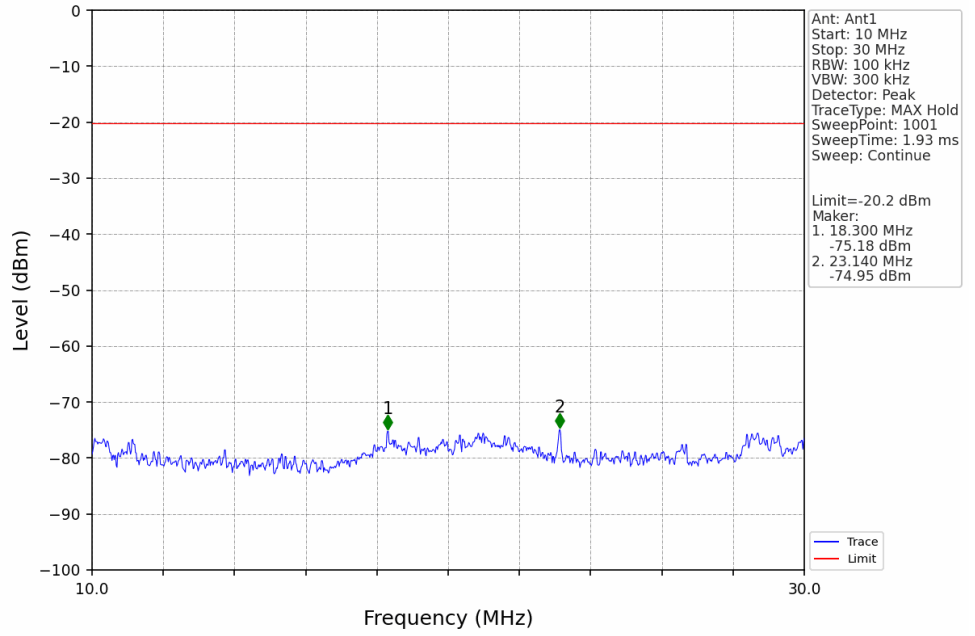


GFSK_DH5_MCH_2441MHz_Ant1_NTNV



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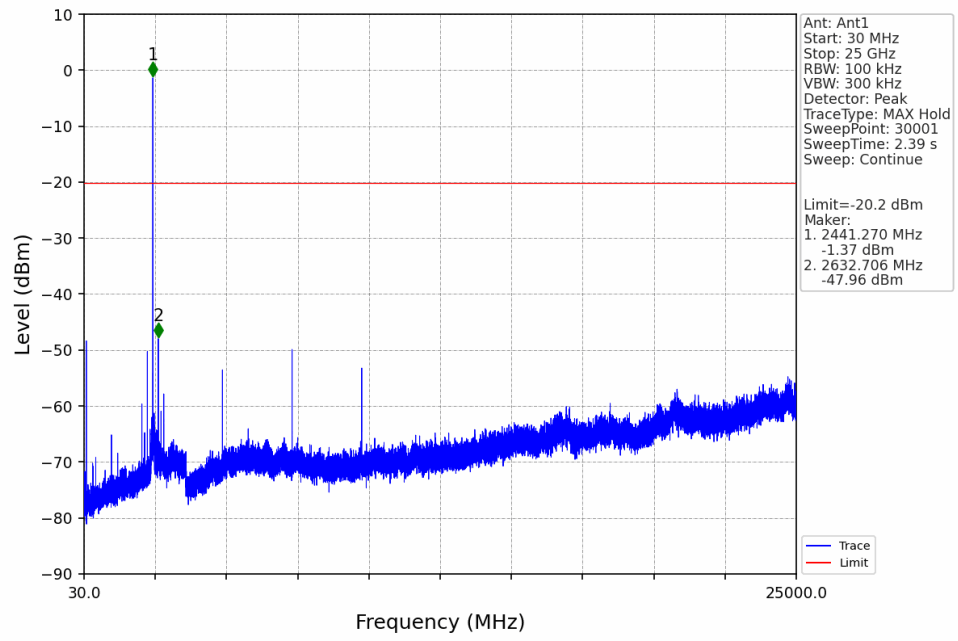

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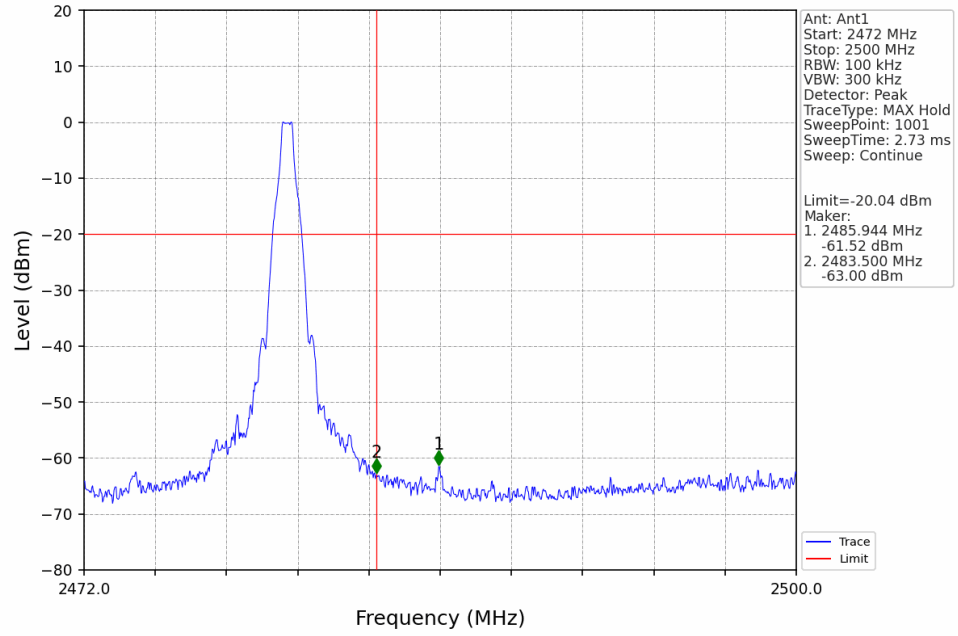

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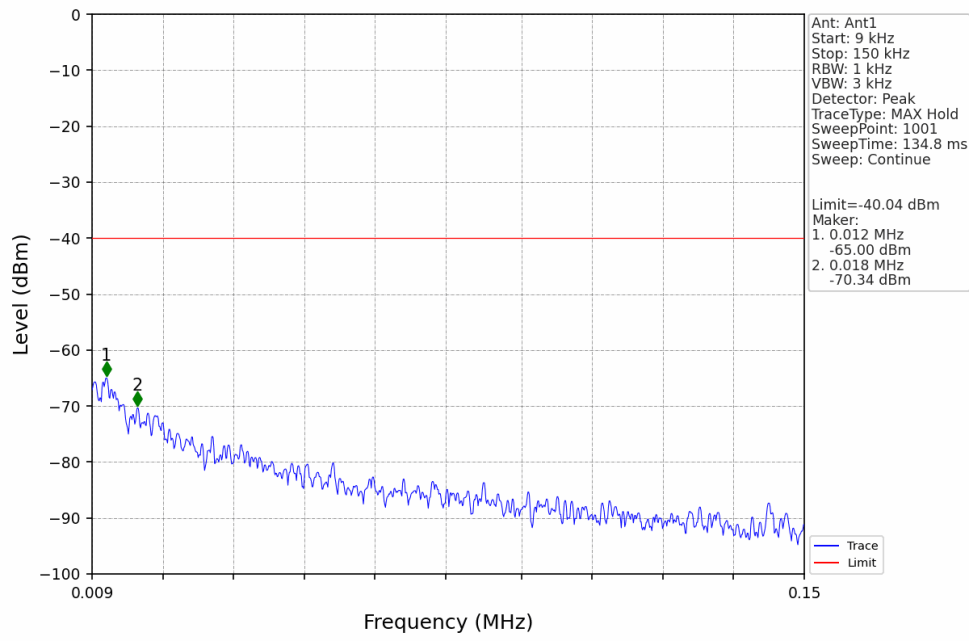

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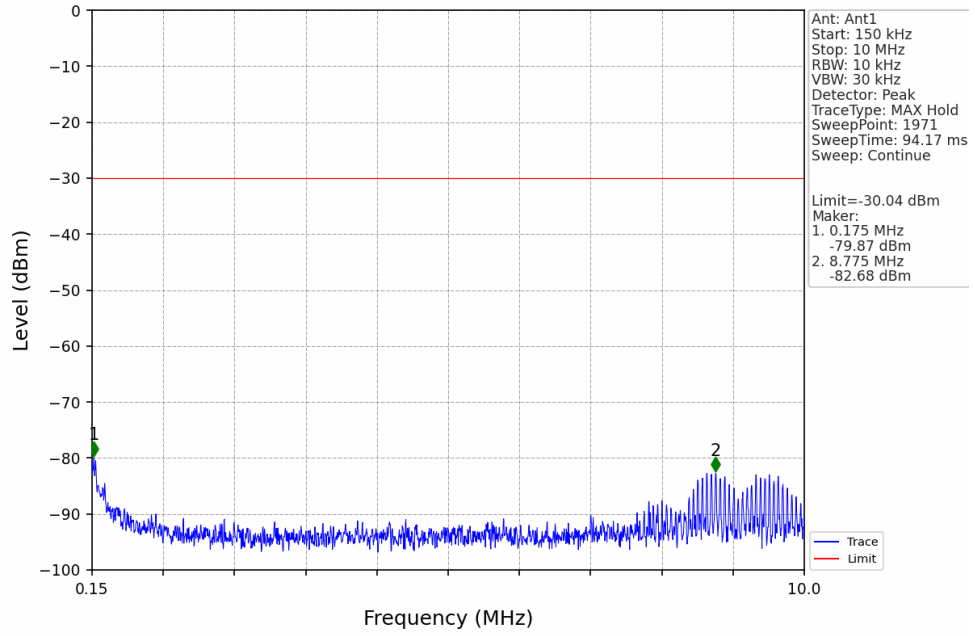

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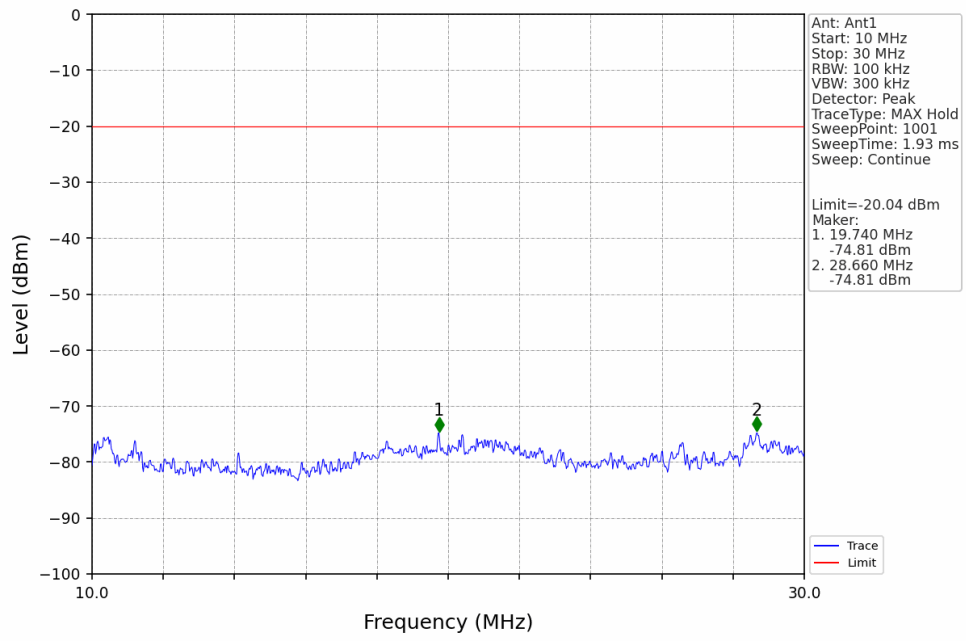

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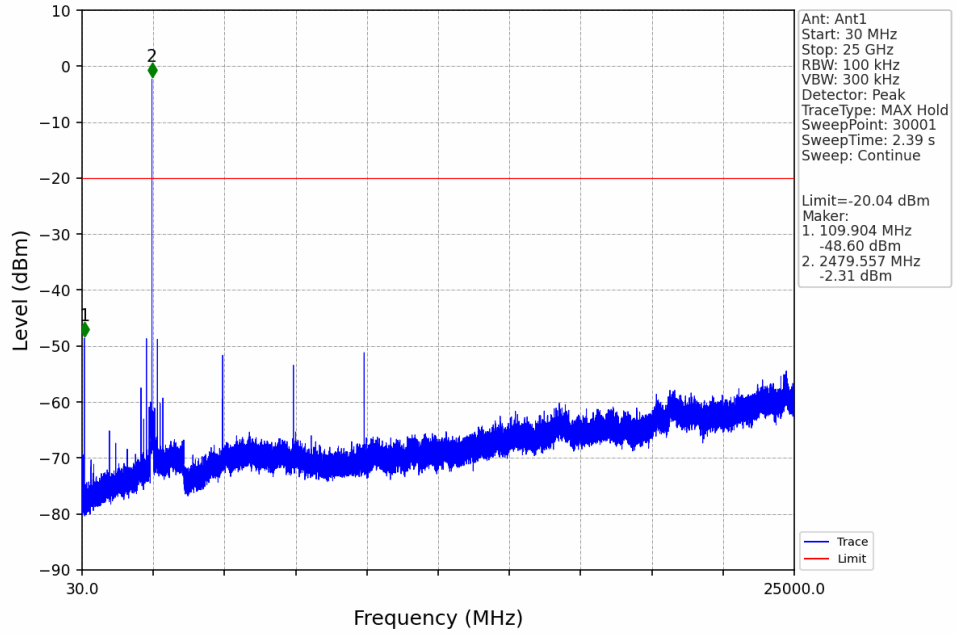

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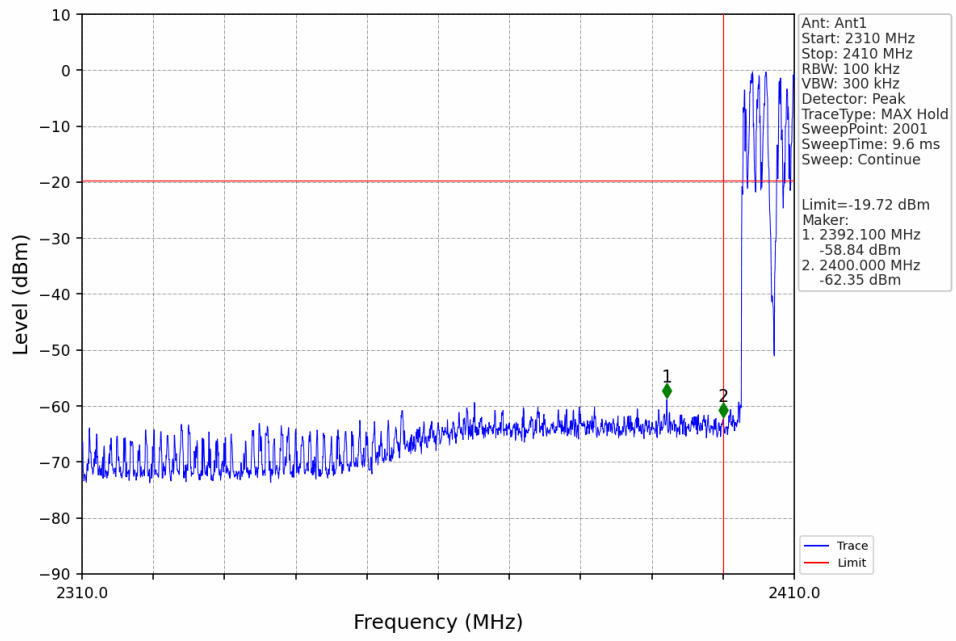

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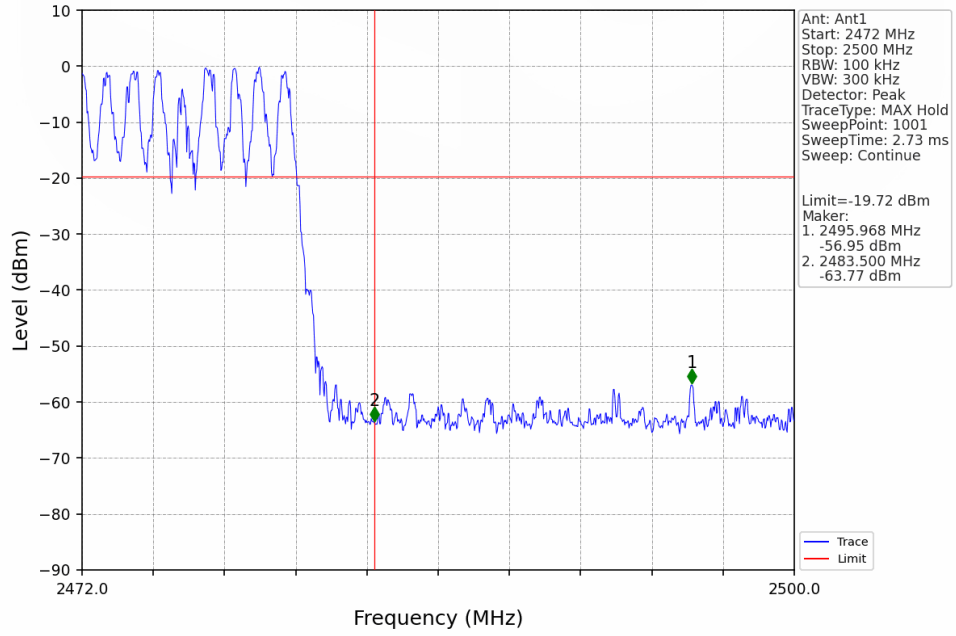

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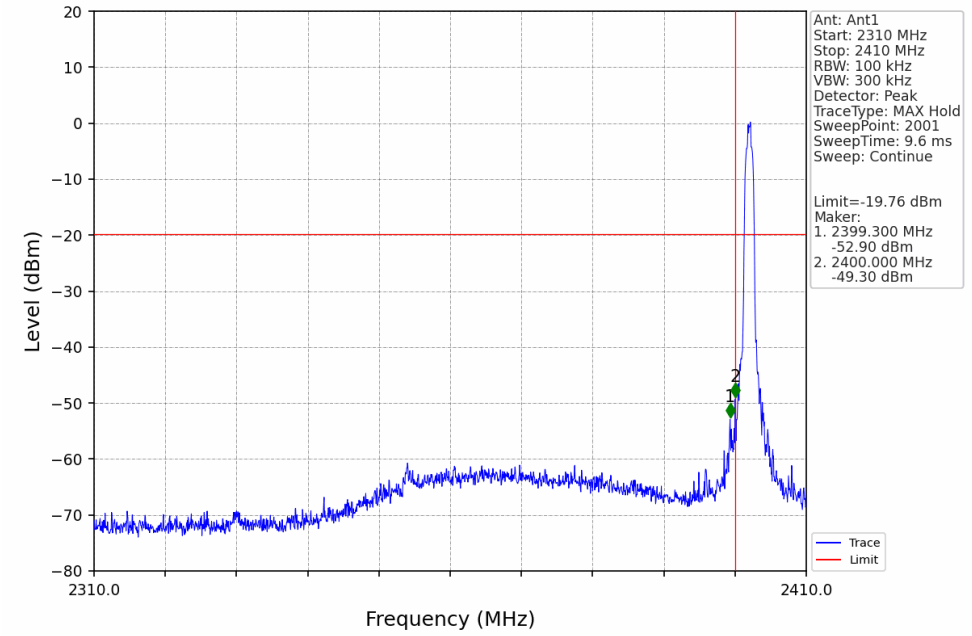

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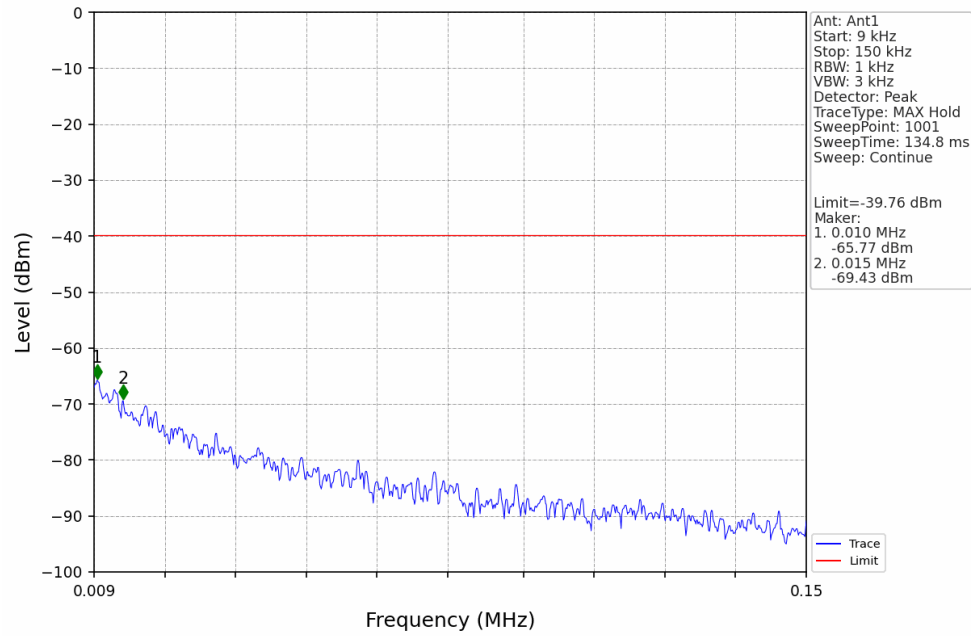

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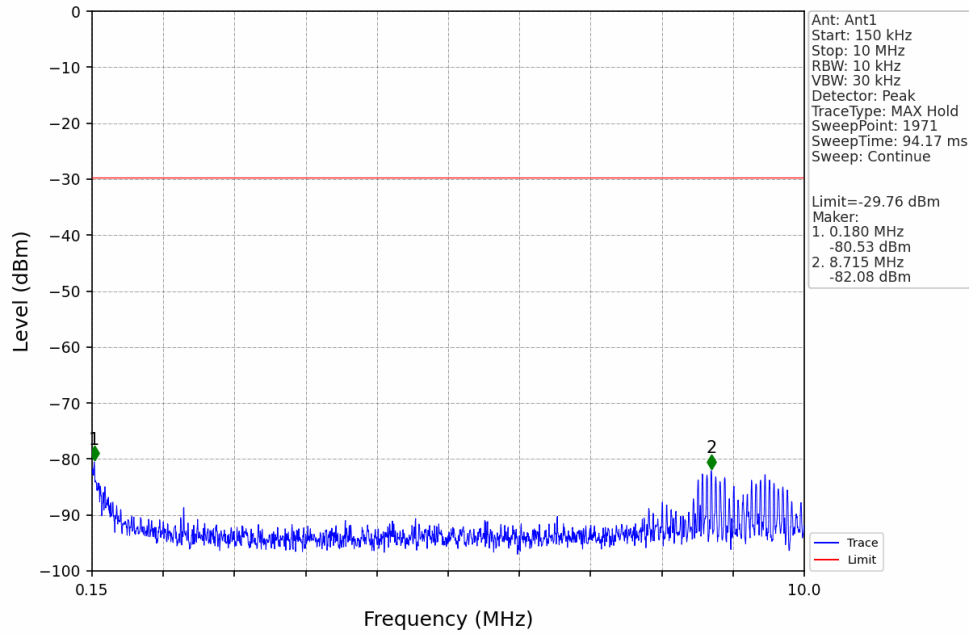

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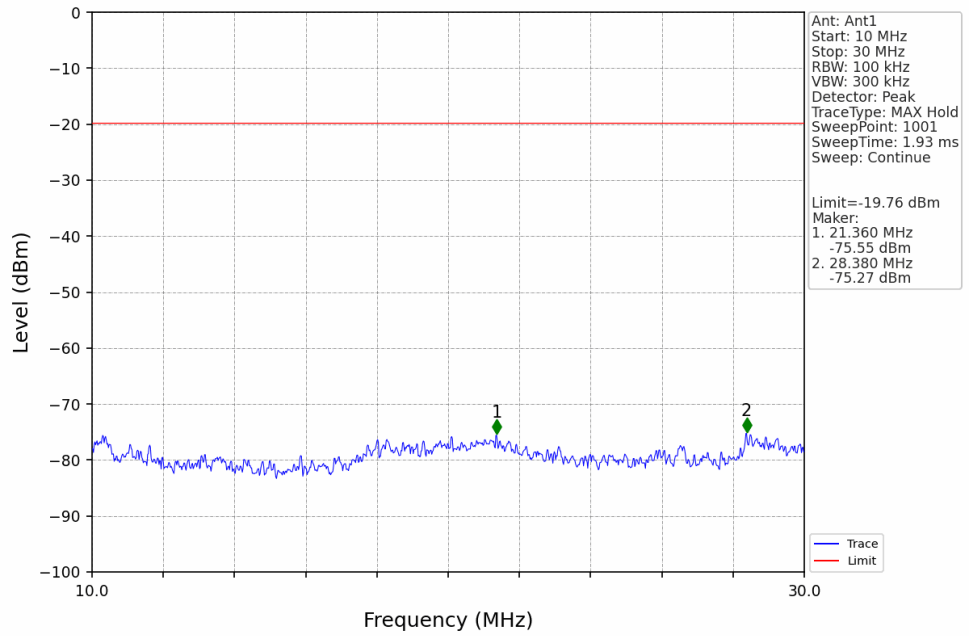

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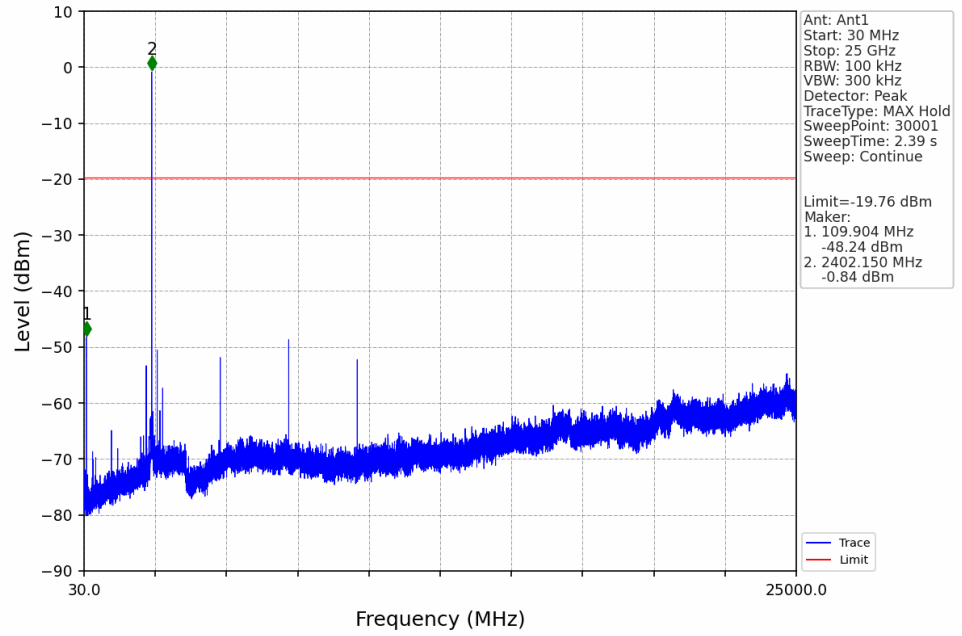

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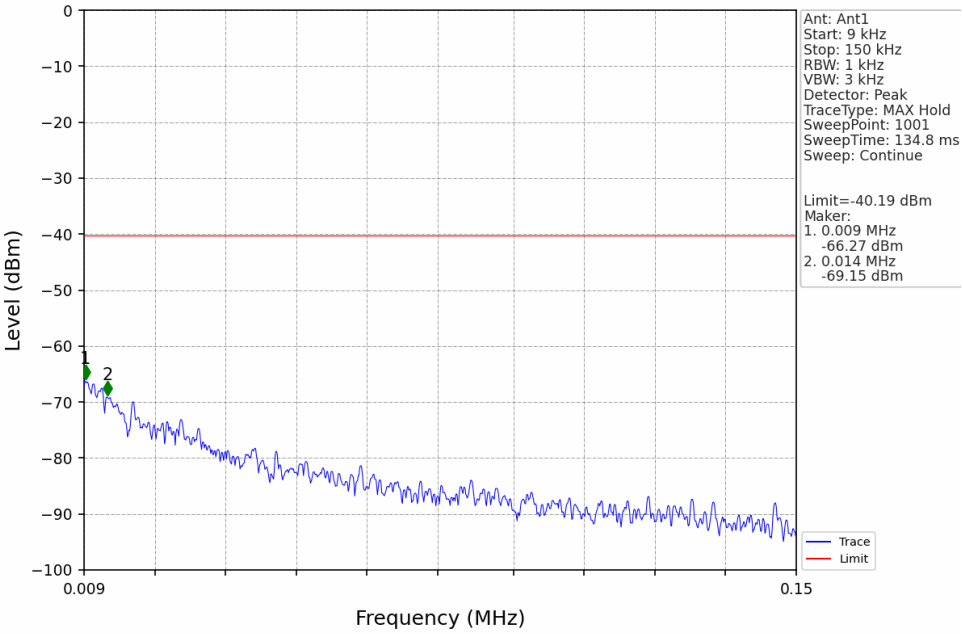

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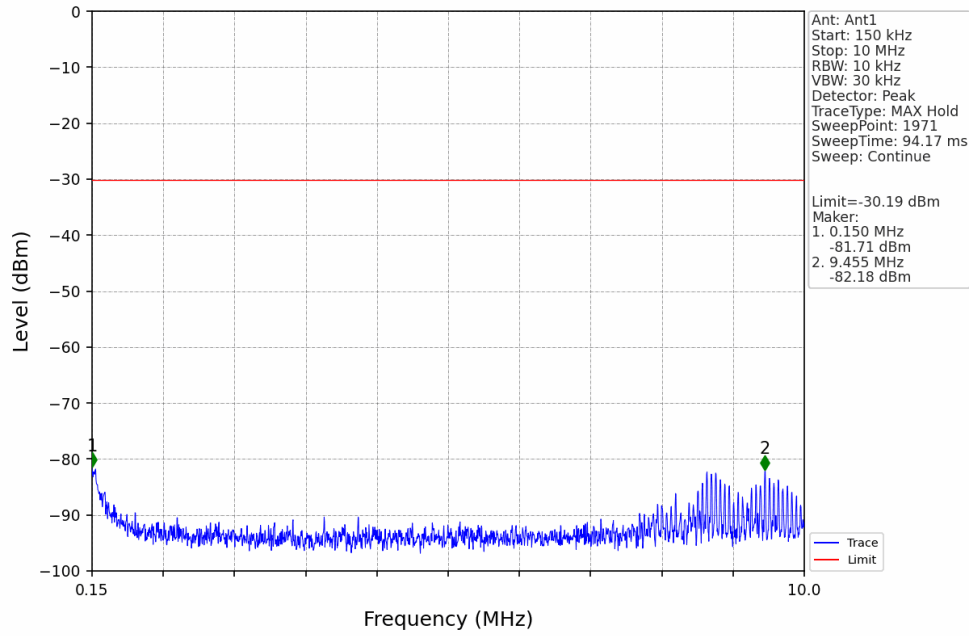

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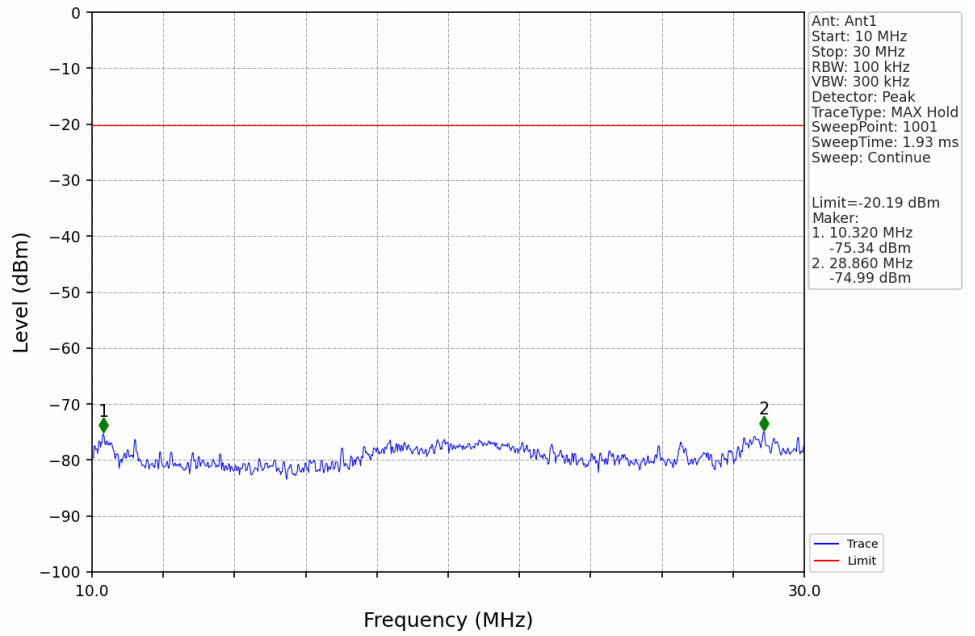

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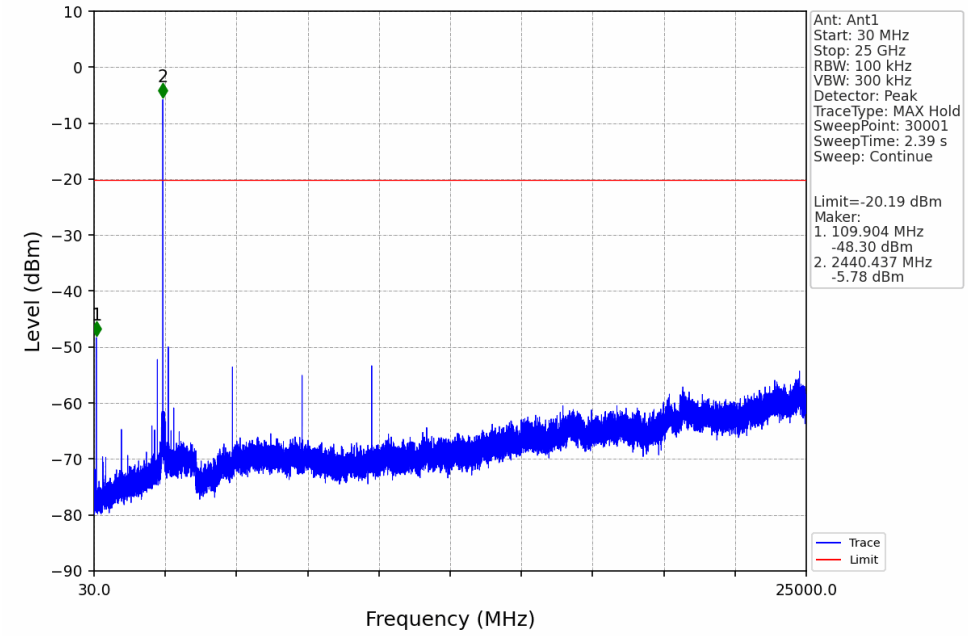

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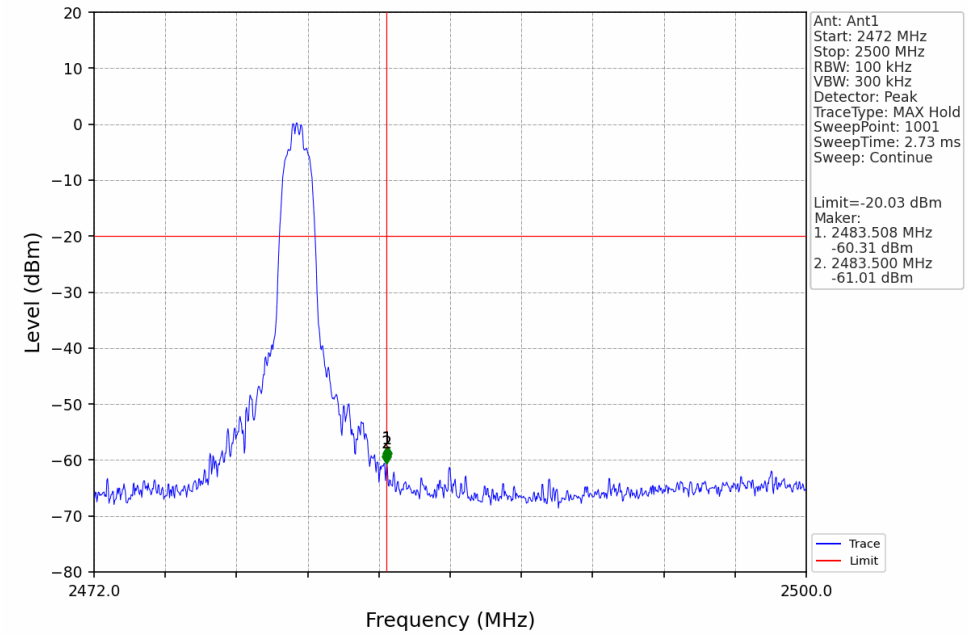

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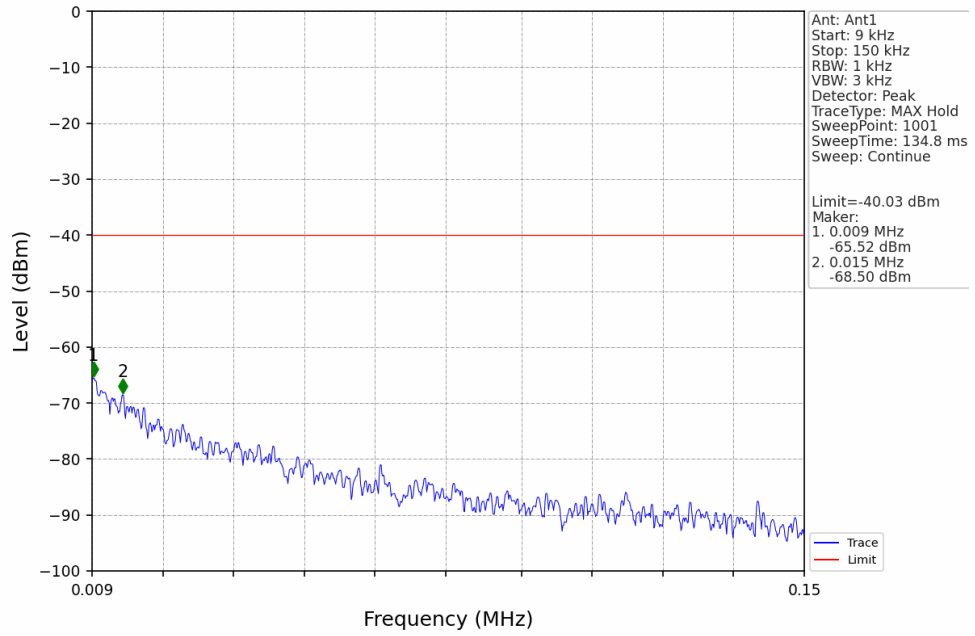

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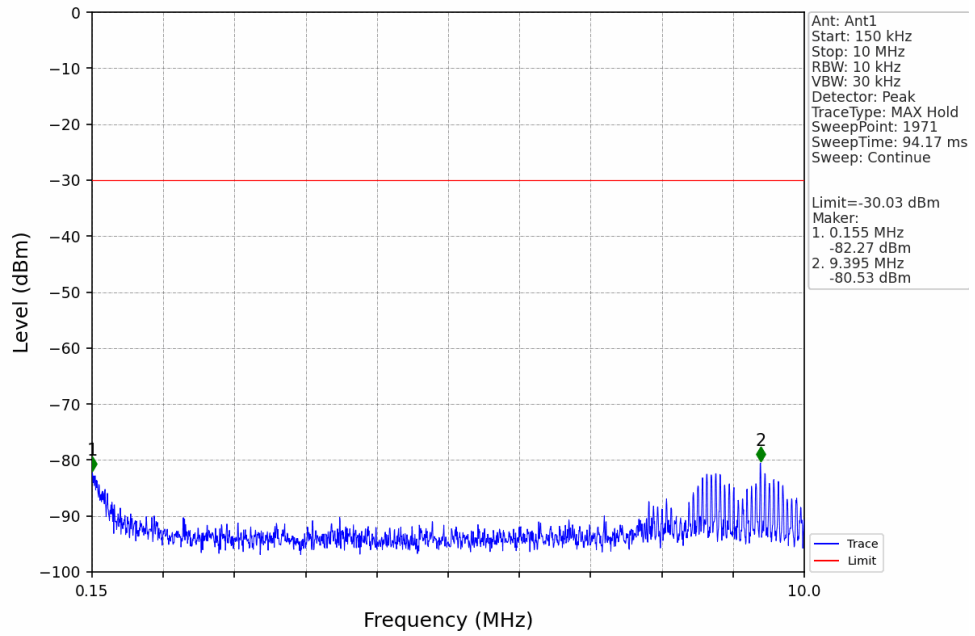

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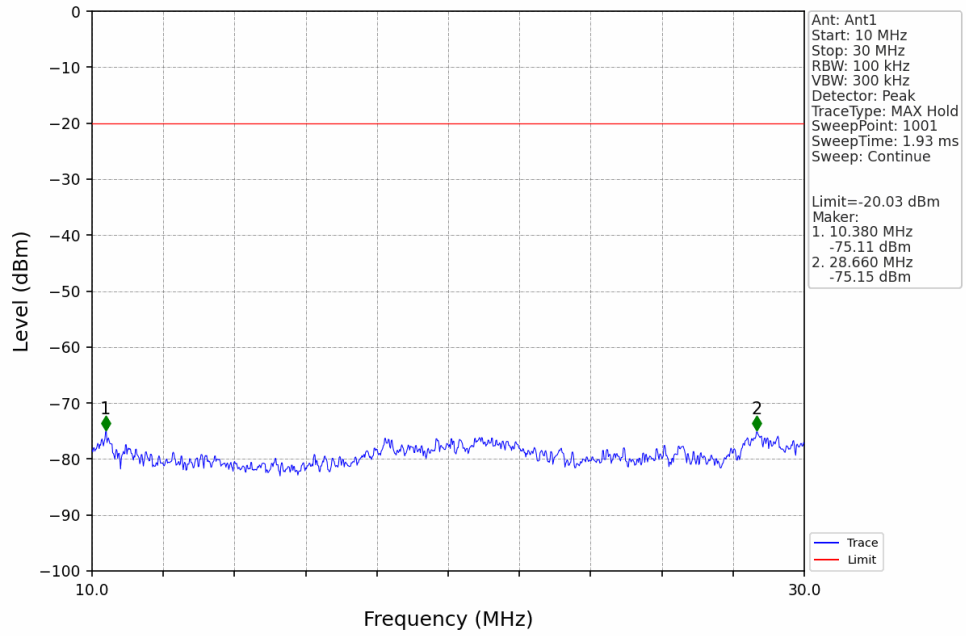

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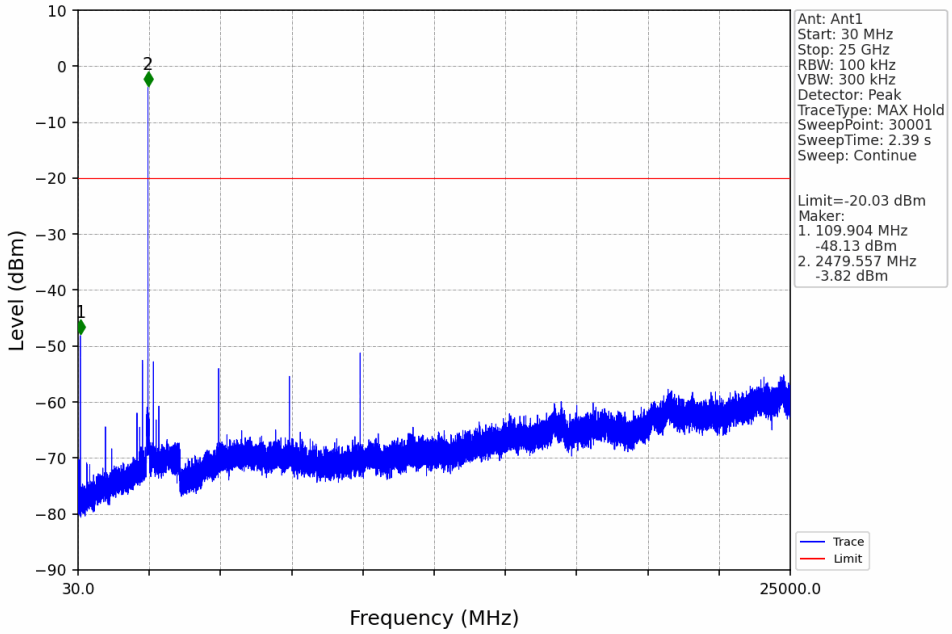

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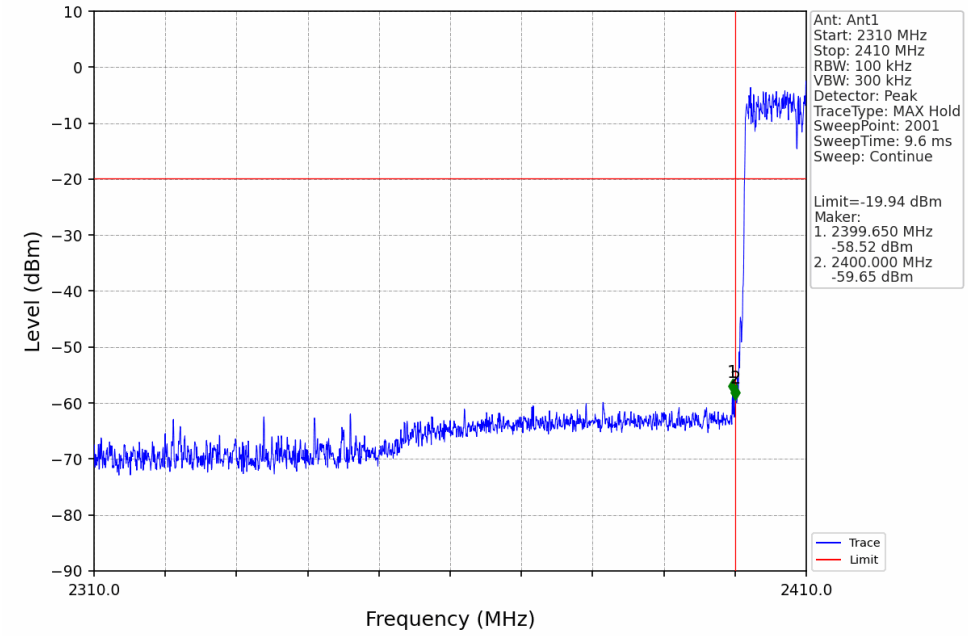

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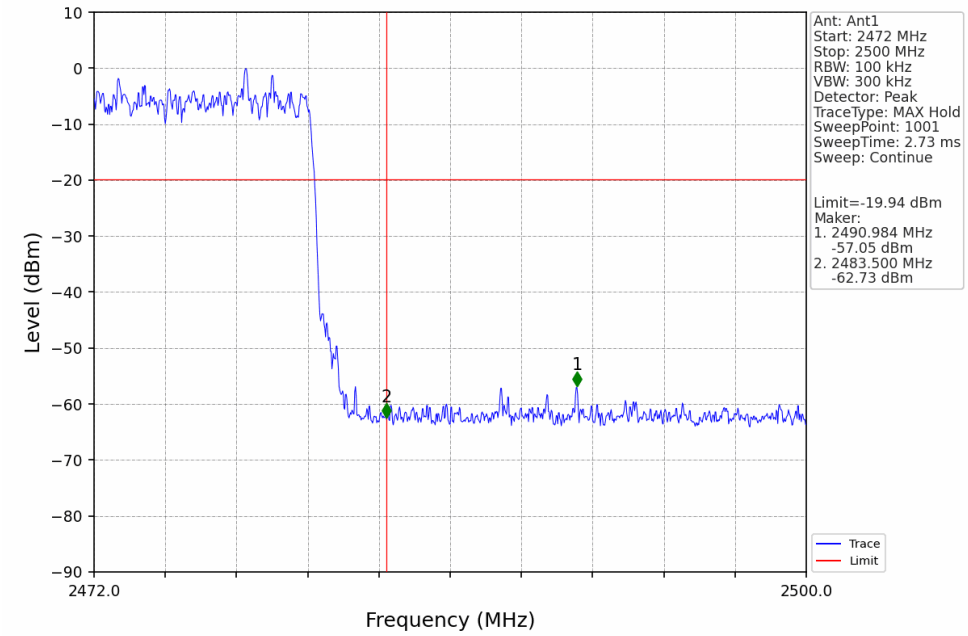
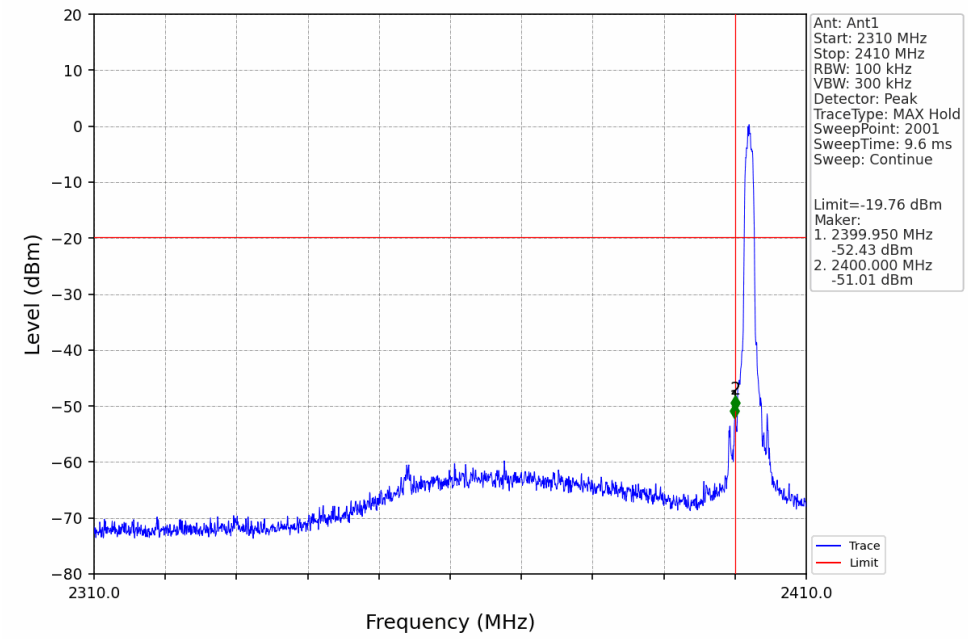


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



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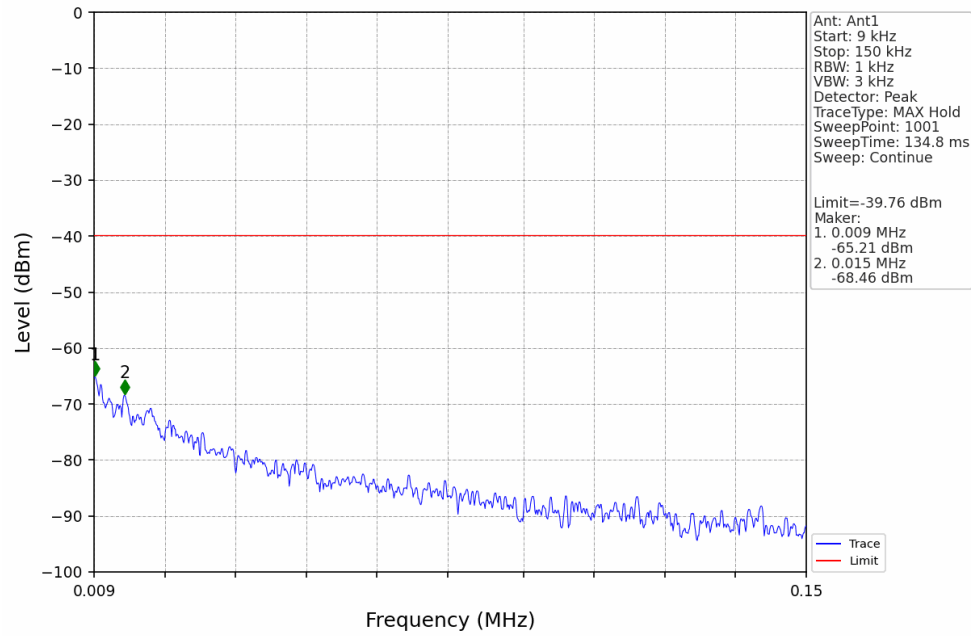

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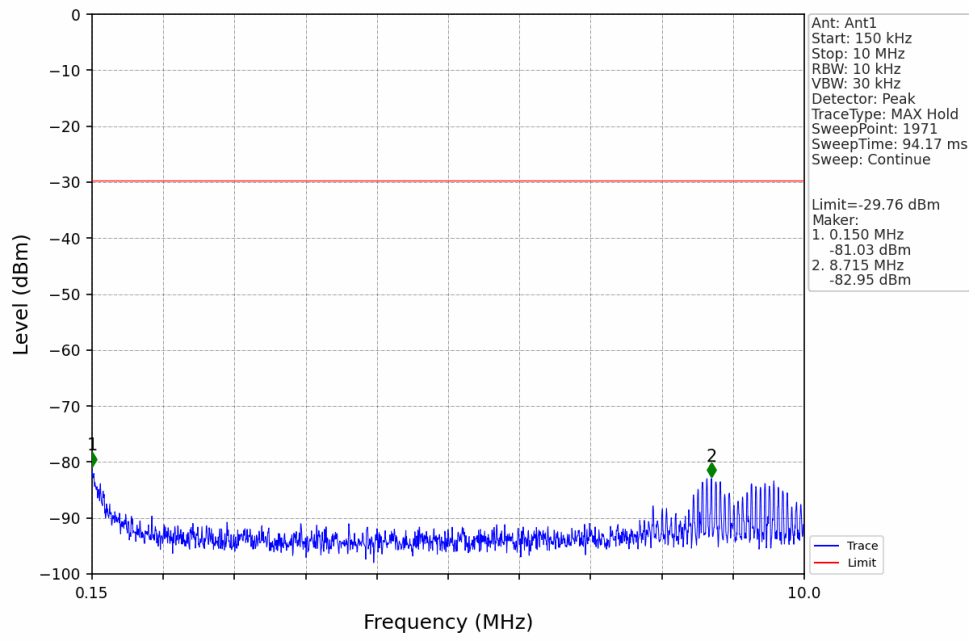

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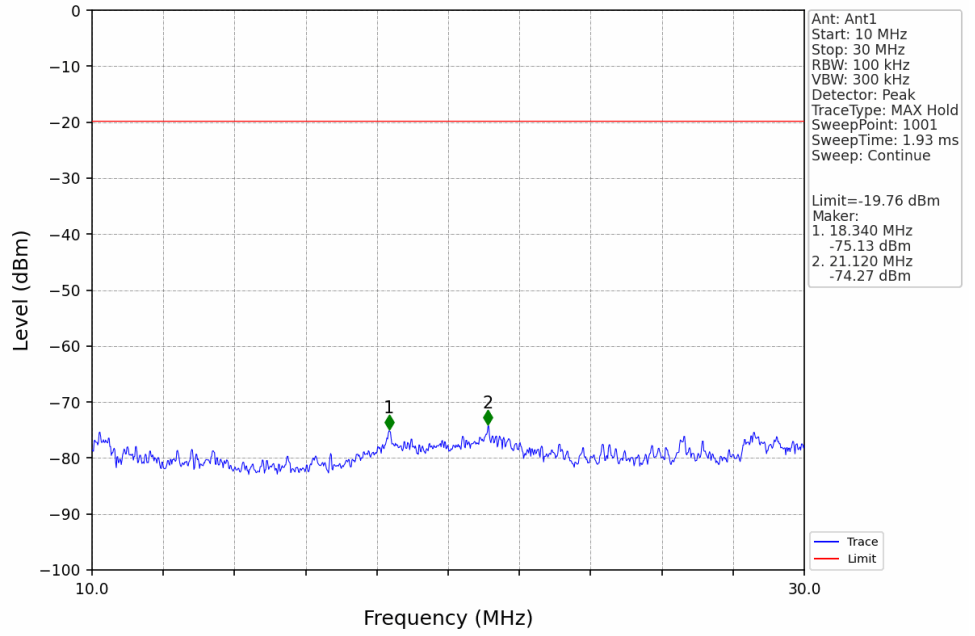

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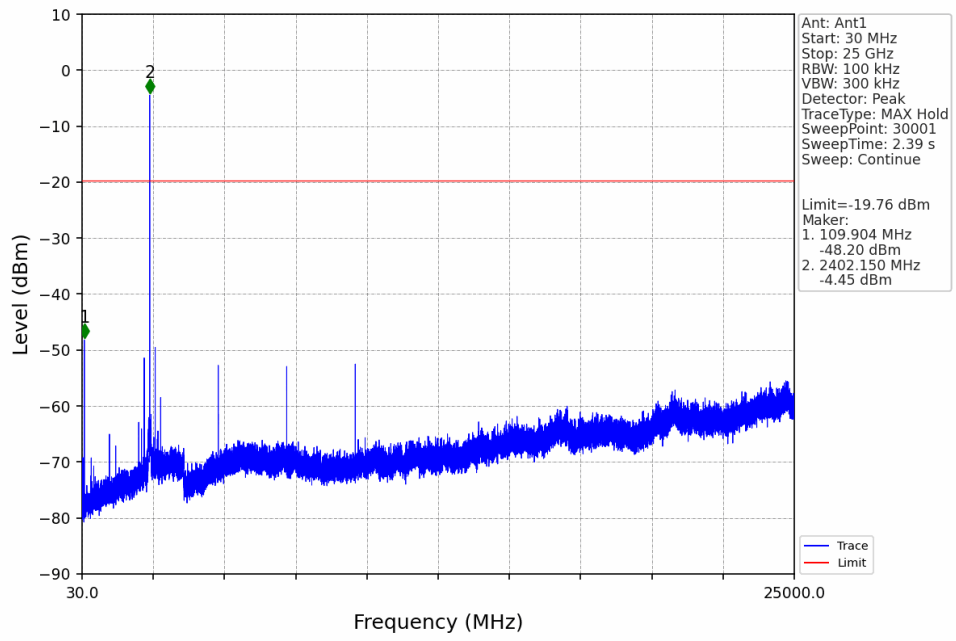

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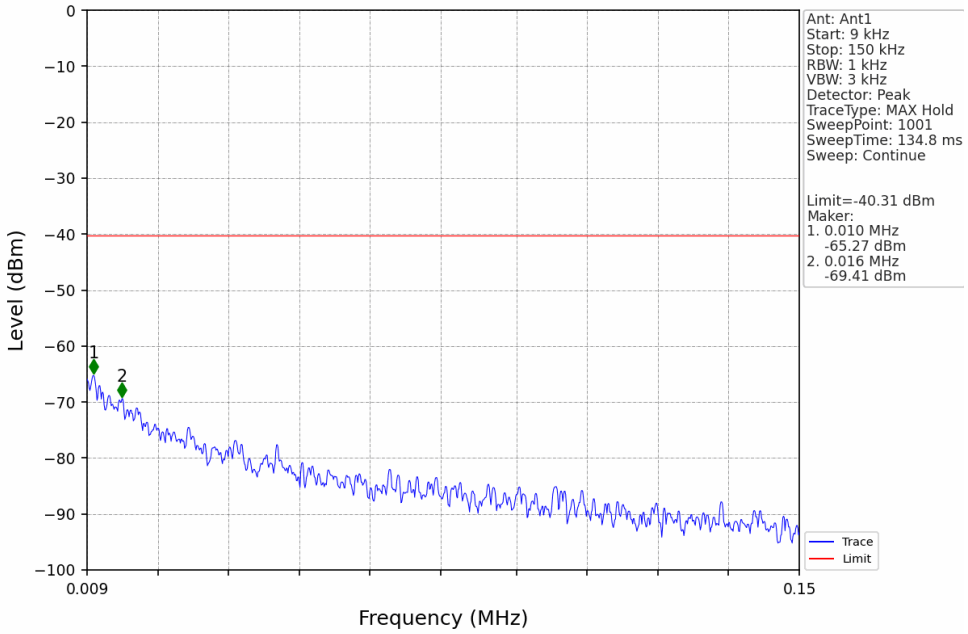

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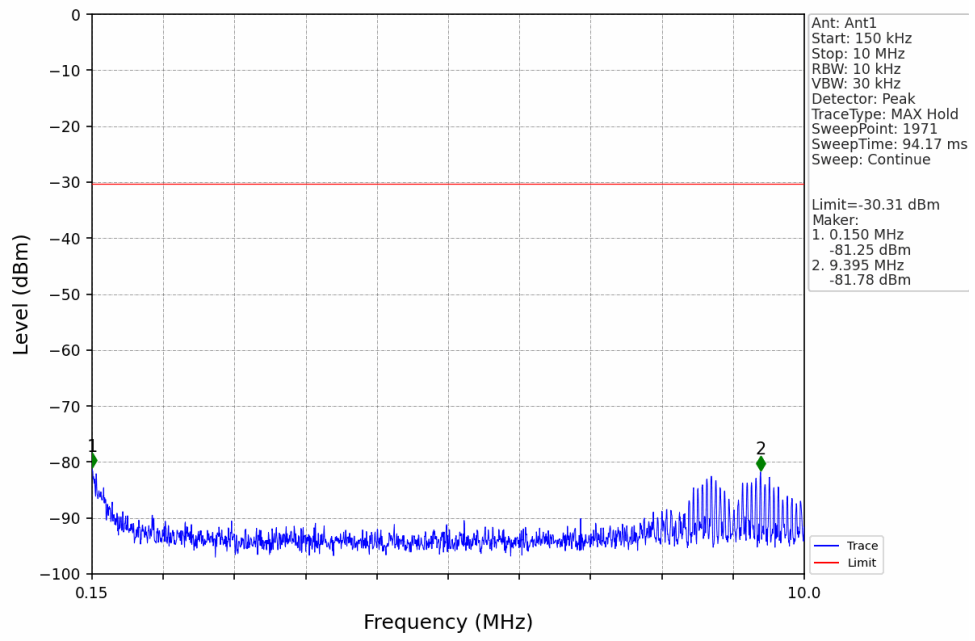

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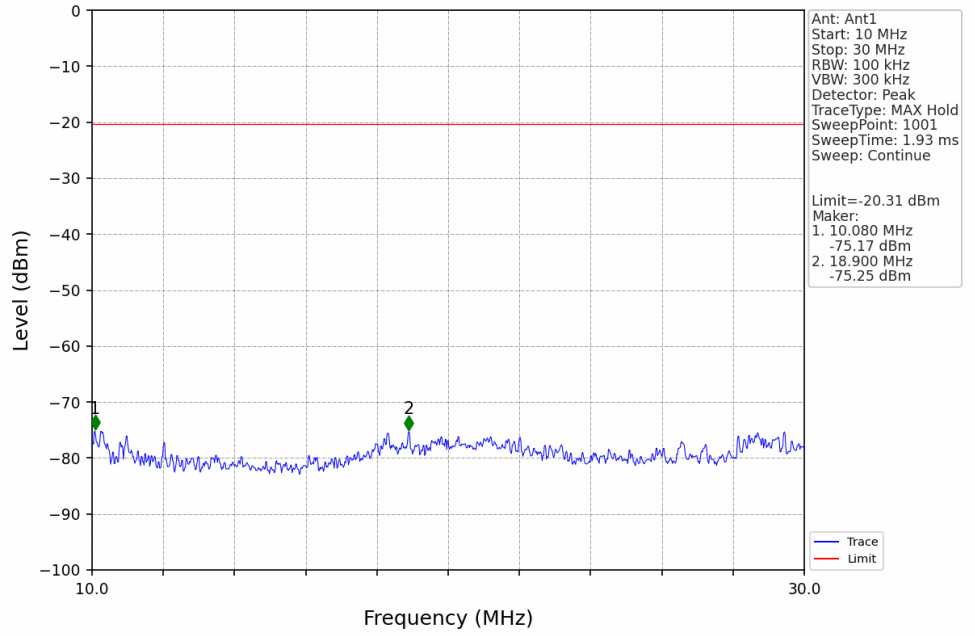

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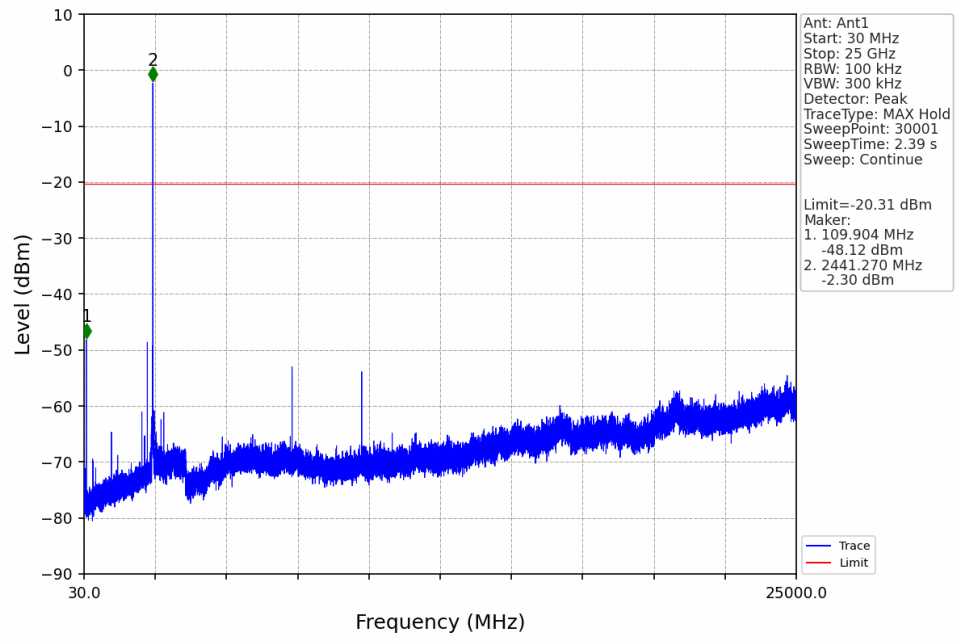

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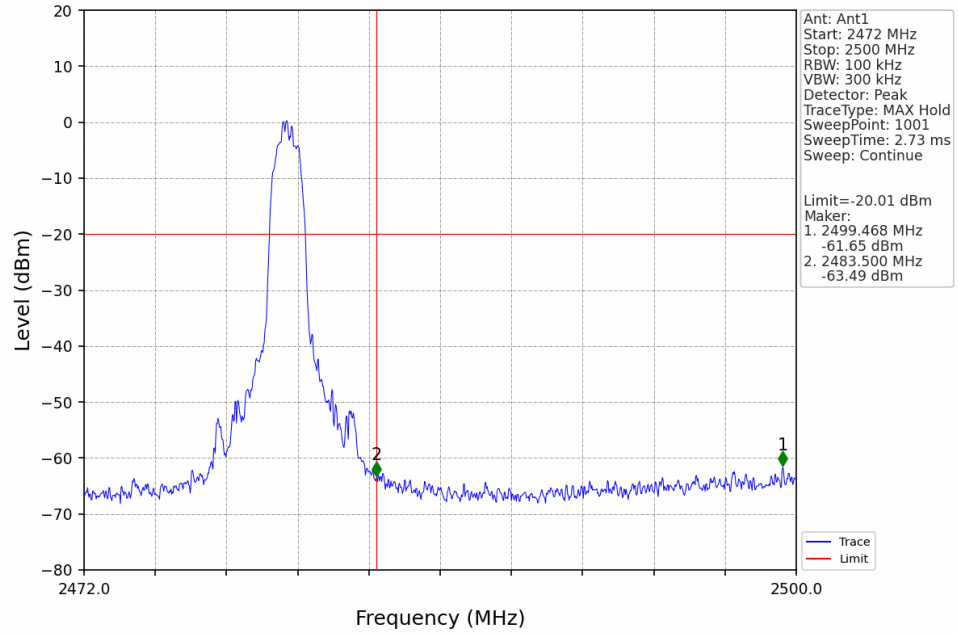

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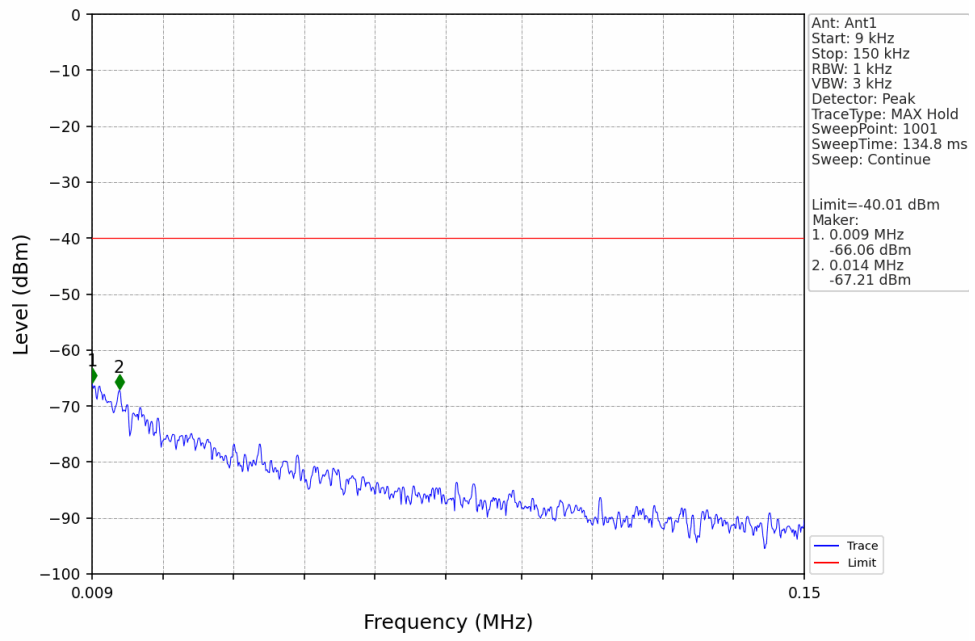

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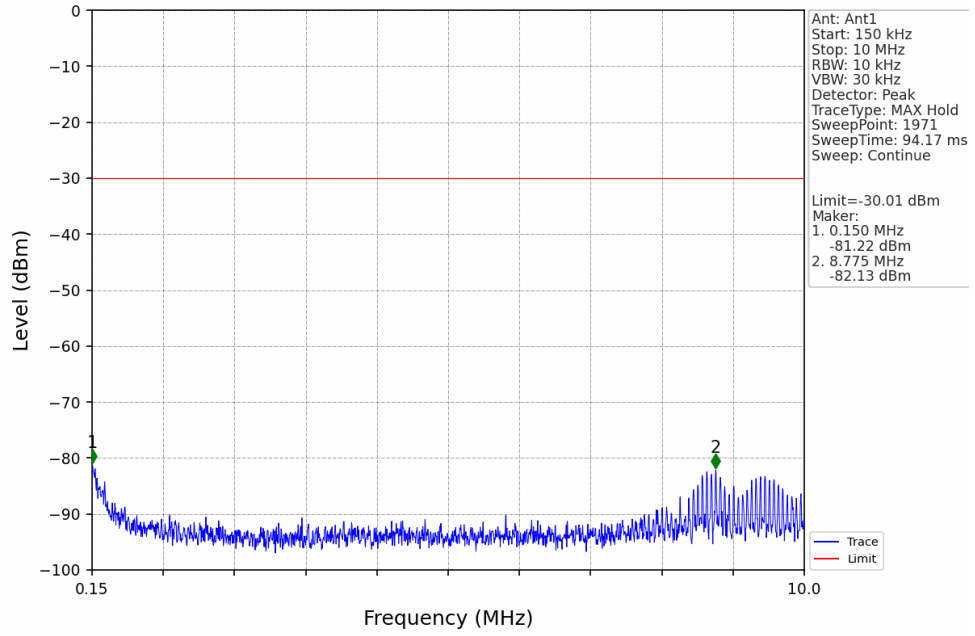

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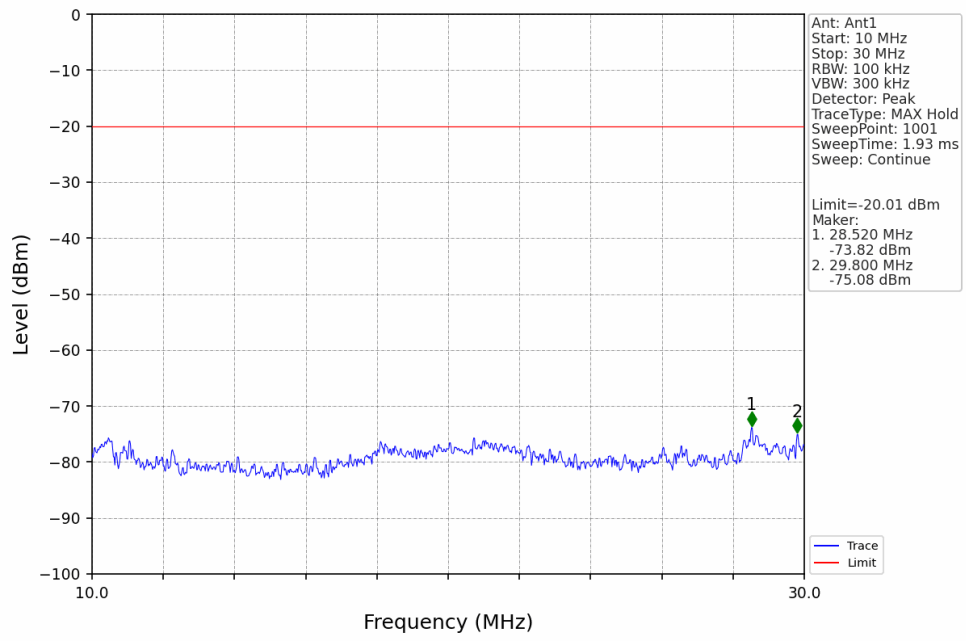

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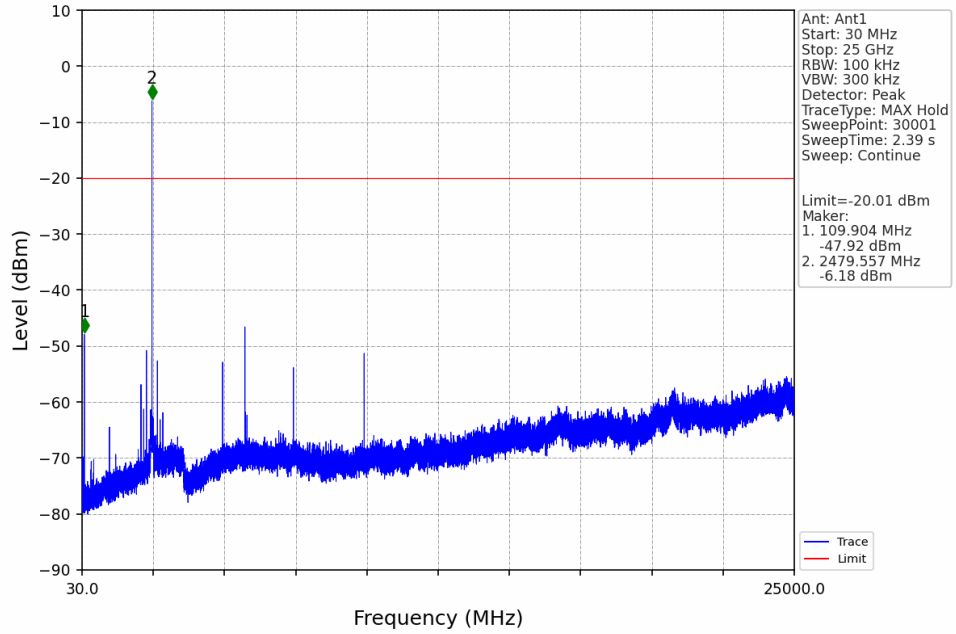

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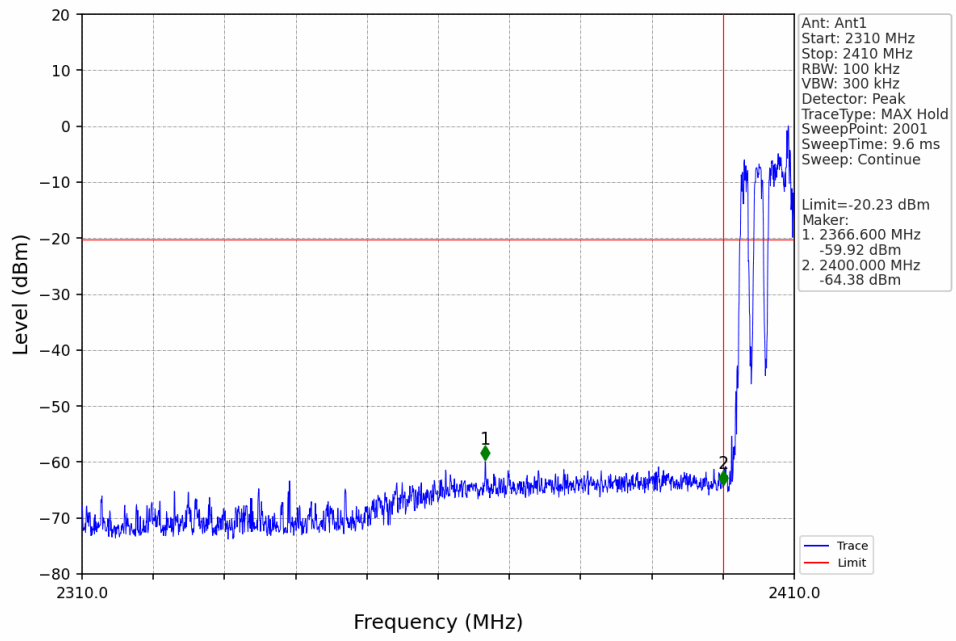

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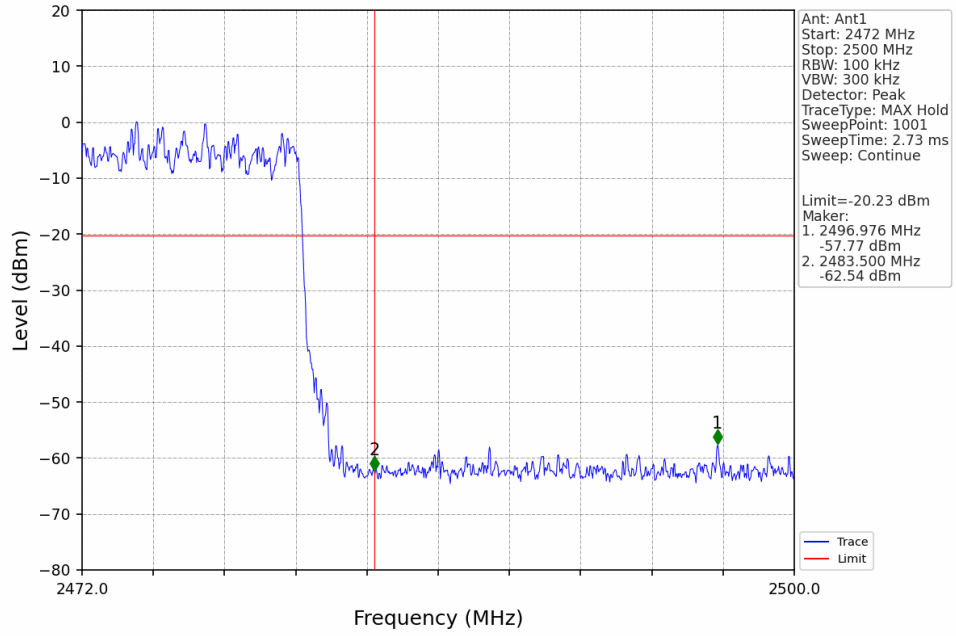

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